PERSONAL HANDY PHONE SYSTEM

ARIB STANDARD

VERSION 5.3

(2/2)

RCR STD-28

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Version 2.2	June	25th	1996
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Version 3.3	March	2nd	2000
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Association of Radio Industries and Businesses (ARIB)

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6. The note about IPR (Industrial Property Rights) in the INTRODUCTION of Fascicle 1 of the Standard applies to the use of Essential IPR for the ARIB Standard in Japan. If the ARIB Standard is adopted outside Japan, Essential IPR will be treated in accordance with policies stated by each IPR owner. The IPR owners are, however, expected to apply the rules of the preface of the "Guidelines for Treatment of Industrial Property Rights in connection with the ARIB Standard" (September 5, 1995, approved by the 1st Standard Assembly Meeting). In the preface of the Guidelines, it is stated that it is "desirable that the Essential IPR which relates to any or all parts of the contents of the ARIB Standard should be used free of charge by anyone and that it would not block the use of such Essential IPR in any other country where such an ARIB Standard is adopted".

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Appendices

Appendices

Appendix A. Broadcasting signal transmission method on logical control channel and PS reception operation

(Private standard/Public standard)

1. Type of broadcasting signal transmitted on BCCH (A)

(1) Broadcasting signal that must be transmitted

Broadcasting signal that reports global definition information:	Radio channel information broadcasting 2nd system information broadcasting

(2) Omittable broadcasting signal

Broadcasting signal that informs only local definition information:	System information broadcasting, 3rd system information broadcasting (exclusively for public systems)

(3) Optional broadcasting signal

Broadcasting signal that informs only optional information:	Option information broadcasting (exclusively for private systems)

2. Broadcasting signal transmission regulations

Broadcasting information required for the system to run must be transmitted at least once in 4 LCCH superframes using BCCH (A).

3. Method of use of broadcasting reception indication region

The "broadcasting reception indication" is present in local information broadcasting messages and incoming call messages, and its purpose is to report whether or not reception of each broadcasting signal is required in PS.

(1) In case where broadcasting reception indication displays global definition information pattern

It shows the pattern number of global definition information presently used by the system, and this indication value agrees with the value of the global definition information pattern contained in the radio channel information broadcasting and the 2nd system information broadcasting informed by BCCH (A). The purpose of this indication is to quickly perform steady reception of the logical control channel in cases where PS shifts zones and so forth, and to report the fact that a change occurred in the contents of the global definition information during operation for PS.

The global definition information pattern is guaranteed to have one meaning only within one paging area. Therefore, if the paging area is different even if within the same system, the value of the global definition information pattern is independent, and the same value may be used to correspond to different global definition information.

Also, the global definition information pattern is the same within the paging area.

If handover is executed between paging areas is executed, the paging area length (n_p) and uplink LCCH timing are the same even in areas where the paging area number is different.

(2) In case where broadcasting reception indication displays local definition information reception indication

One type of broadcasting message reception indication can be performed by one broadcasting reception indication. The status numbers of various notification information contents are contained in the broadcasting reception indication, and the index of the contents of the indicated broadcasting message is informed to PS. As long as there are no changes in the broadcasting informations, as compared to the broadcasting information that the PS has already acquired in response to reception indication, the broadcasting message, which is displayed in the relevant reception indication on the logical control channel from the same CS, does not have to be received, even if the reception indication of the relevant broadcasting information continues to be transmitted.

(3) Procedure in case where broadcasting reception indications of differing contents are transmitted simultaneously

This is explained using an example where the reception indications of the system information broadcasting and 2nd system information broadcasting are required.

In this case, as shown in Figure 1, the reception indication of the system information broadcasting is displayed on the incoming call message, and the reception indication of the 2nd system information can be performed on the system information broadcasting message. At this time, in addition to the system information broadcasting reception indication, the 2nd system information broadcasting reception indication or global definition information pattern indication can be performed on the incoming call message as required. In so doing, it can be informed to the PS which has received only the incoming call message at the PCH position on the logical control channel that the status number in the system information broadcasting reception indication has not changed, but that the status number in the 2nd system information broadcasting reception indication has changed or that the global definition information pattern has changed. In addition, even if there are no changes in actual contents of the system information, by updating the status number in the system information broadcasting reception indication, similar control can be realized by inducing broadcasting reception in the order shown in Figure 1.

Furthermore, the global definition information pattern and status number (mi: i = 1 to 3) are used cyclically.

4. CS information and PS operating conditions

4.1 Relationship between CS information and restriction control (private)

(1) Default values of CS information to be indicated by System information broadcasting

The default values are General CS, Non-originating-exclusive CS , Non-specified-user-service CS, Non-SD-write CS, and Relevant CS available. A CS having service attribute other than these values must indicate the values by System information broadcasting.

(2) CS information and restriction valid ranges

In the descriptions below, "General PS restriction control" refers to the control operation based on general PS restriction information of bits 5 and 6 of octet 6 of System information broadcasting.

If the CS service attribute is Priority CS or Specified-user-service CS, the General PS restriction control is valid for all PSs except PSs with attributes that agree with the relevant CS service attribute. However, in the case of a CS by which both Priority CS and Specified-user-service CS are indicated, judgment is done by Priority CS only.

The corresponding relationship is shown in Table 1, and valid/invalid judgment flow of PS is shown in Figure 2.

(3) Operating example of CS information and restriction control

General CS:

[1] This service attribute is the default, and the transmission of System information broadcasting for attribute notification can be omitted.
[2] When restriction is performed, System information broadeasting is transmitted. The Broadcasting reception indication shall be System information broadcasting reception indication.
[3] When System information broadcasting is not required, a Global definition information pattern shall be set in Broadcasting reception indication area.

Priority CS:

[1] System information broadcasting is transmitted in order to notify this service attribute. Broadcasting reception indication is coded as System information broadcasting reception indication.
[2] When restriction is performed, System information broadcasting is transmitted. Broadcasting reception indication shall be System information broadcasting reception indication.
[3] When System information broadcasting is not required, a Global definition information pattern shall be set in Broadcasting reception indication area.

Specified-user-service station:

[1] System information broadcasting is transmitted in order to notify this service attribute. Broadcasting reception indication is coded as System information broadcasting reception indication.
[2] When restriction is performed, System information broadcasting is transmitted. Broadcasting reception indication shall be System information broadcasting reception indication.

[3] When System information broadcasting is not required, a Global definition information pattern shall be set in Broadcasting reception indication area.

4.2 PS operation (private and public)

(1) Zone selection

If CS is "own zone selection impossible", the PS which is in the process of standby zone searching does not select the relevant CS in the standby zone regardless of reception level.

(2) Call origination

If the CS is any of the following, the PS does not transmit the call origination request to the relevant CS.

[1] If CS is "own zone selection impossible"

[2] If CS is under call origination restriction to relevant PS

(3) Incoming call

If CS is "own zone selection impossible", the PS does not transmit the incoming call response to the relevant CS.

(4) Location registration

If the CS is any of the following, the PS does not transmit the location registration request to the relevant CS.

[1] If CS is "own zone selection impossible"

[2] If CS is in location registration restriction to relevant PS

(5) Recalling-type handover

PS can transmit recalling-type handover request to the relevant CS regardless of CS information and information of the 2nd system information broadcasting message.

(6) TCH switching

PS can transmit TCH switching request to the relevant CS regardless of CS information.

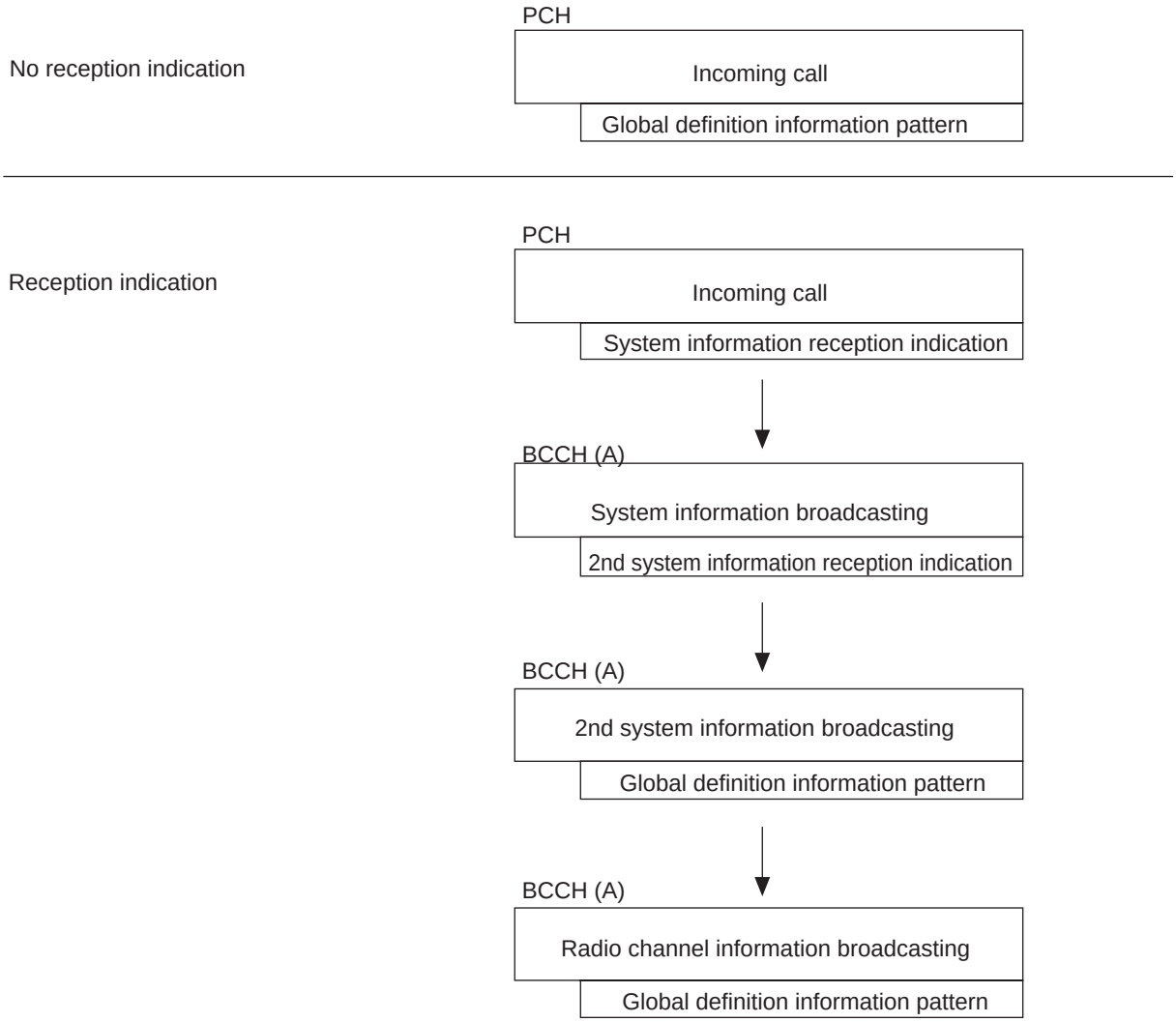


Figure 1 Example of transmission procedure of broadcasting reception indication

Table 1 Corresponding relationships

CS attribute \ PS attribute		General station		Priority station	
		Non-specified-user-service station	Specified-user-service station	Non-specified-user-service station	Specified-user-service station
General station	Non-specified-user-service station	Restriction value valid	Restriction value valid	Restriction value valid	Restriction value valid
	Specified-user-service station	Restriction value valid	Restriction value invalid	Restriction value valid	Restriction value invalid
Priority station	Non-specified-user-service station	Restriction value valid	Restriction value valid	Restriction value invalid	Restriction value invalid
	Specified-user-service station	Restriction value valid	Restriction value invalid	Restriction value invalid	Restriction value invalid

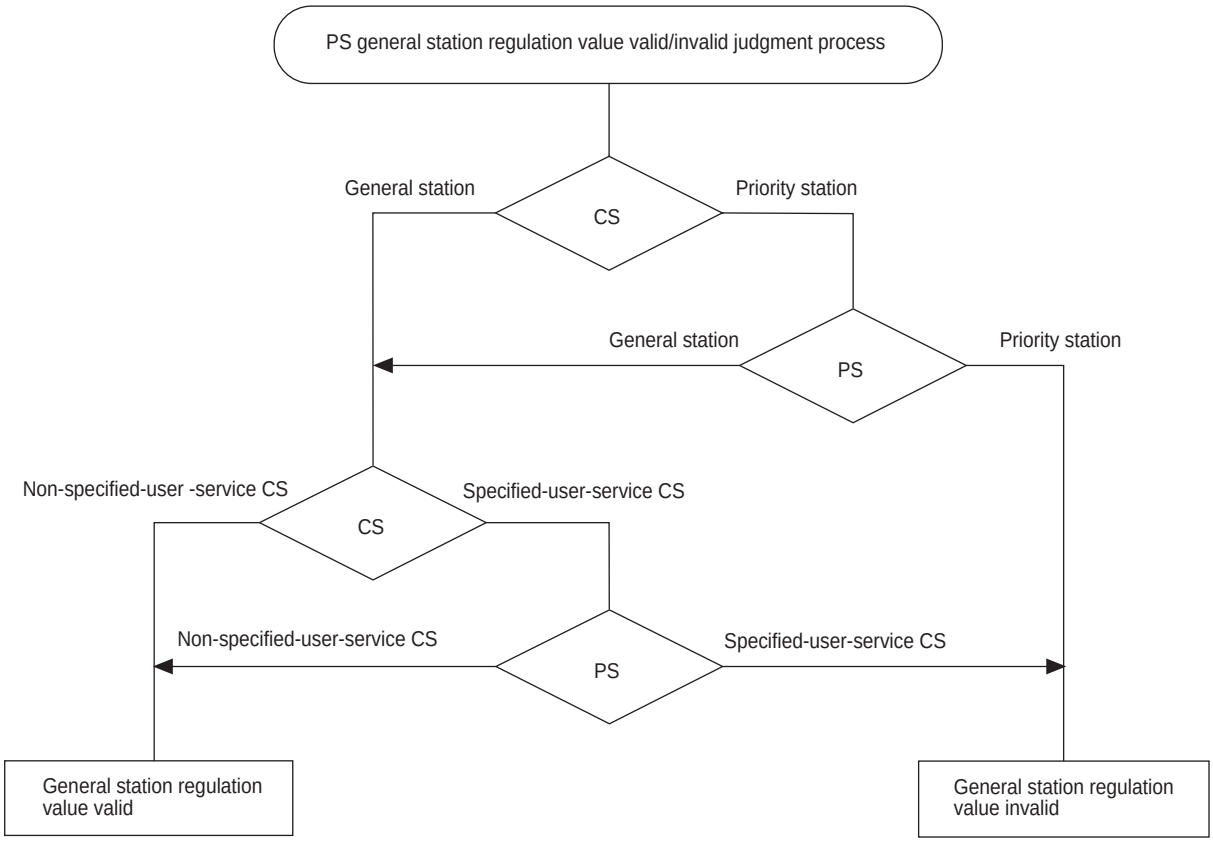
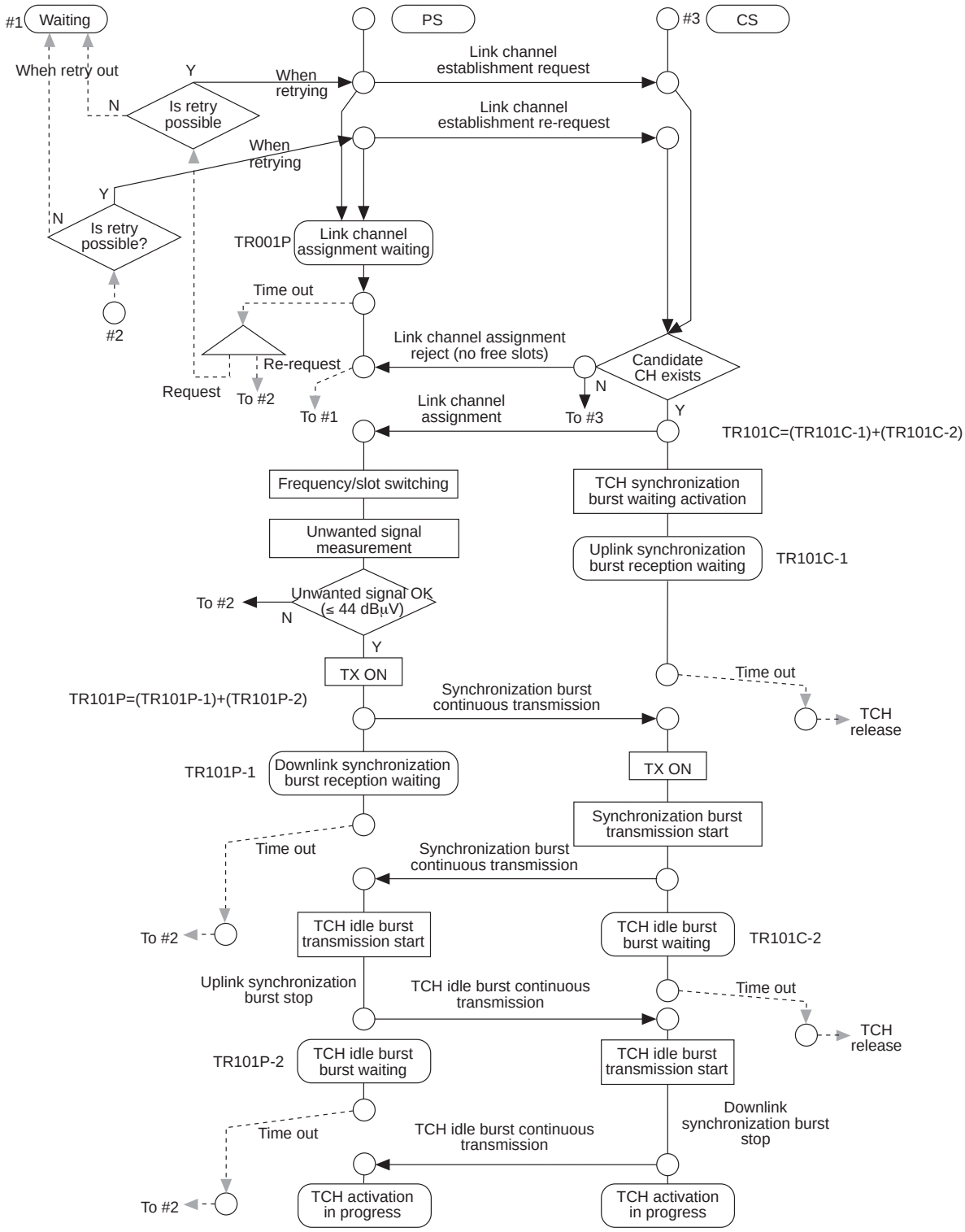


Figure 2　PS valid/invalid judgment flow

Appendix B Link channel establishment sequence (Private standard/Public standard)



(Note) Refer to Appendix H and K for the relevant timers.

Appendix C. Restriction control (Private standard/Public standard)

This appendix describes the contents of restriction control provided by the standard and PS operation according to the restriction information contained in the system information broadcasting message.

1 Access group restriction

(1) Restriction process overview

In the case of public systems, general PSs are divided into 8 restriction groups, and by prohibiting call origination/location registration operations for the general PSs of each group, the traffic that accesses the network is restricted. By adjusting the number of groups that are simultaneously restricted, 8 stages of restriction levels (0–100%: 12.5% spacing) are realized.

In the case of private systems, general PSs are divided into a number of restriction groups (8 for $0 < n_p \leq 8$, $16 - n_p$ for $8 < n_p$), and by prohibiting call origination/location registration operations for the general PSs of each group, the traffic that accesses the network is restricted. By adjusting the number of groups that are simultaneously restricted, the restriction levels (if number of restriction groups = 4, 0–100%: 25% spacing) are realized according to the number of restriction groups.

Note that the group under restriction is changed regularly so that restriction implementation is not biased toward a certain group during restriction.

In private system however, this restriction process applies only if octet 4, 5 usage designation indicated in octet 7 of System information broadcasting message is (00) or (01).

(2) Restriction contents

Control is performed in response to the overload state of the network. By using restriction information of the system information broadcasting message, the network broadcast general PS location registration/calling restriction present/absent (radio channel usage restriction information element), and the group under restriction (restriction group designation information element). When the general PS recognizes that there is location registration or call origination restriction, it judges whether its own station is included in the group under restriction, and if it is included (note 1), the operation of the restriction contents call origination/location registration) of the system information broadcasting message is prohibited.

During access group restriction implementation, the group under restriction is regularly changed so that the restriction implementation is not biased toward the general PSs of a certain group. An example of group under restriction changes is shown in Figure. 1.

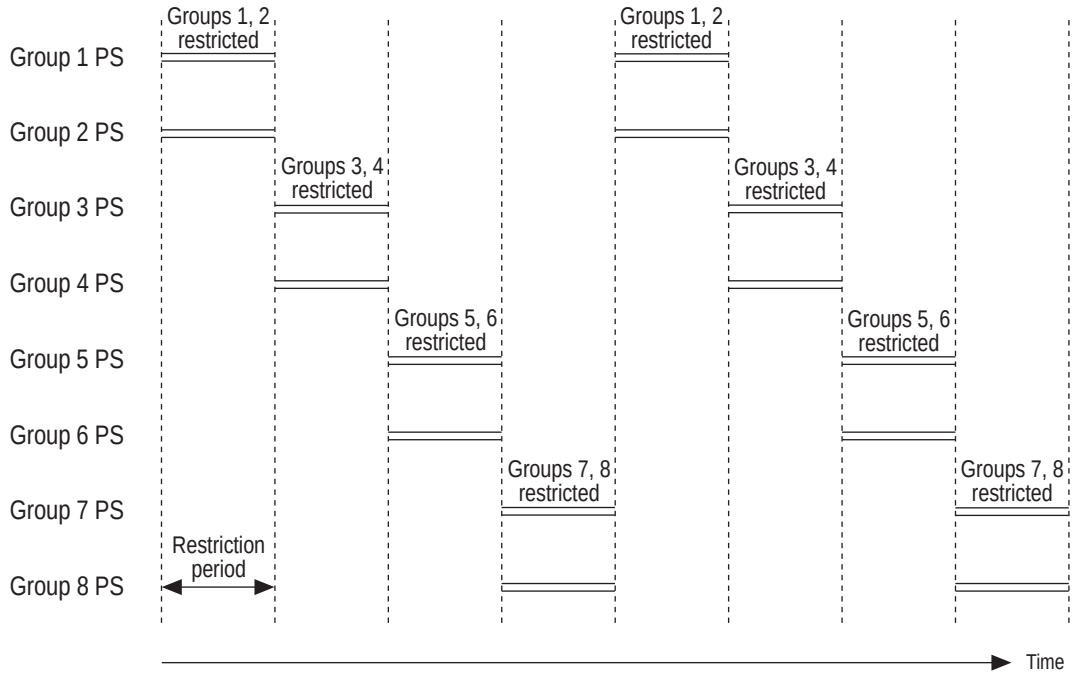


Figure 1 Example of group under restriction changes

When a general PS, that has access group restriction implement, ignores the restriction by sending call origination or location registration the relevant process is cut off.

(Note 1) When (PS number [note 2]) MOD (number of restriction groups) + 1 agrees with group under restriction.

(Note 2) The PS number for determining the PS restriction group is calculated as follows.

[1] In the case of the PS number type is BCD.

The lower 4 digits before the filler are treated as decimal "1000" "100" "10" "1". If there are less than 4 digits before the filler, it is treated as "0" in order from the position of "1000".

[2] In the case of the PS number type is hexadecimal.

The lower 16 bits are treated as a numeric value.

2 Access cycle restriction

(1) Restriction process overview

When restriction is canceled, there is the possibility of SCCH overload occurring due to the general PSs for which restriction was canceled accessing the network all at once to request call origination/location registration. To prevent this, access cycle restriction is performed to distribute call origination/location registration of the general PSs when restriction is canceled. Figures 2–3 show examples of distributing traffic by access cycle restriction when restriction is canceled.

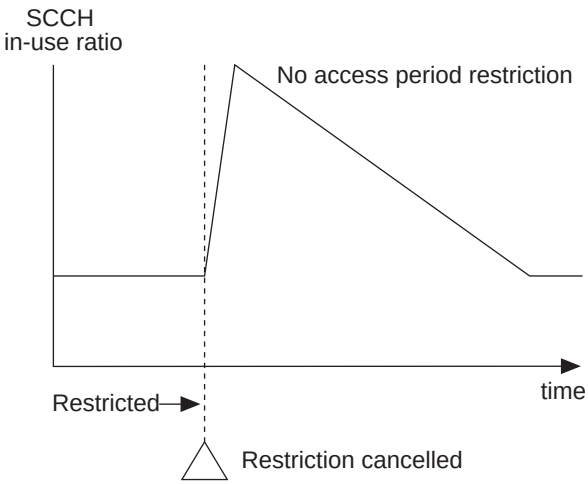


Figure 2 SCCH in-use ratio when restriction is cancelled with no access period restriction

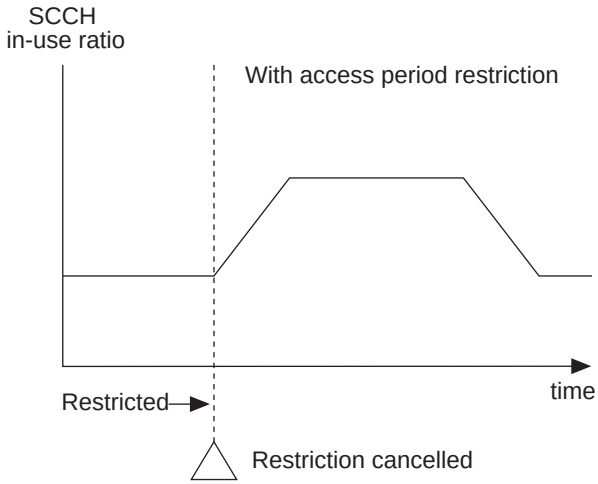


Figure 3 SCCH in-use ratio when restriction is cancelled with access period restriction

(2) Restriction contents

By the restriction information of the system information broadcasting message, the network broadcasts access cycle interval . General PSs judge whether the access cycle interval is "0" or not "0", and if it is not 0, it performs control of the specified cycle interval from when call origination/location registration is requested, and the network cannot be accessed. As a result of this control, the SCCH access timing becomes lagged for each general PS, and SCCH overload can be prevented.

An example of general PS operation is shown in Figure 4. When the network implements call origination/location registration restriction on general PSs of groups 1 and 2, it also implements access cycle restriction. The general PSs group 1 and 2 recognize the access group restriction and access cycle restriction through the broadcasting information. If a call origination/location registration request is generated by a general PS of group 1 or 2, call origination/location registration is prohibited by access group restriction, and the access cycle interval from when the request is generated prohibits access to the network regardless of the presence or absence of access group restriction. Thus, when access group restriction is canceled, the restricted general PSs do not access the network all at once, and the SCCH in-use ratio does not increase rapidly.

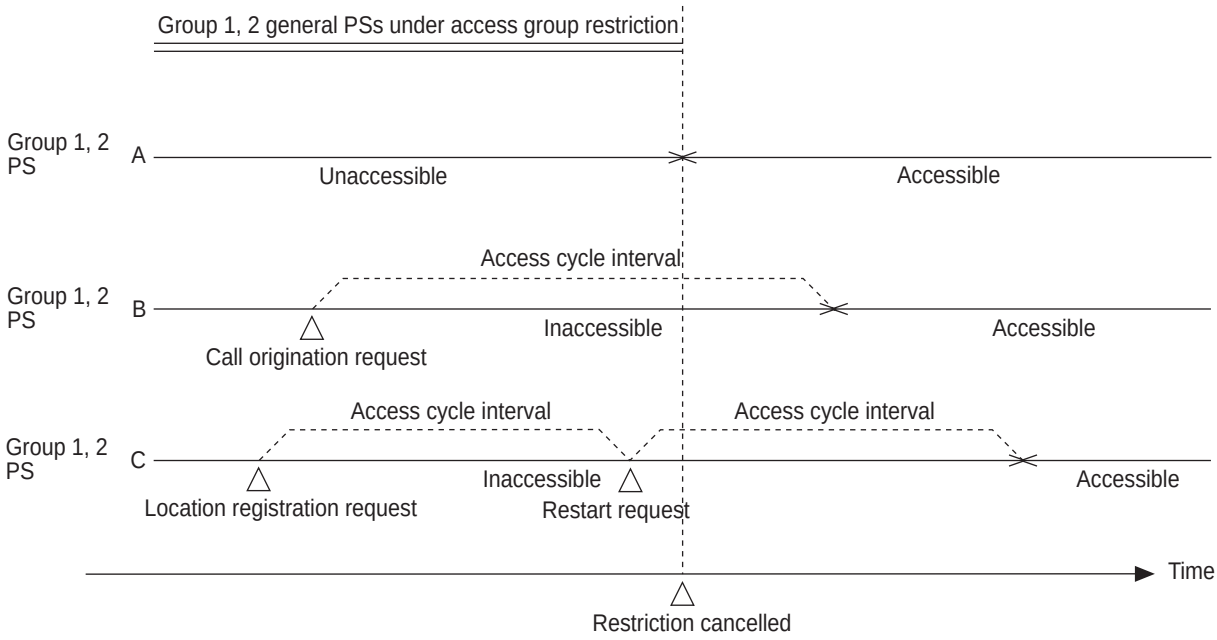


Figure 4 General PS operation during access cycle restriction

3 Priority PSs access restriction

(1) Restriction content overview

After access group restriction is 100% implemented for the general PSs, if restriction is further increased, restriction is placed on the priority PSs.

(2) Restriction contents

Restriction control is performed separately for call origination and location registration for priority PSs. By the restriction information of the system information broadcasting message, the network broadcasts the priority PS location registration/call origination possible/impossible (restriction information). When the priority PS recognizes location registration impossible or call origination impossible, the operation of the restriction contents (call origination/ location registration) of the priority PS is prohibited.

Priority PSs are not subject to the access cycle restriction described above.

Appendix D PS switchback operation during channel switching during communication

(Private standard/Public standard)

Regulations on the PS switchback operation during channel switching during communication are shown below.

Furthermore, the meaning of the terms used in this document are as follows.

[1] TCH switching (re-)request

(Re-)request from PS for communication physical slot switching to other CS. (including own CS)

[2] TCH switching prohibited

Prohibits TCH switching request message transmission from PS.

[3] TCH switching indication

Switching indication of communication physical slot to PS from CS.

[4] Handover

Switching of communication physical slot by re-calling type switching to other CS. (including own CS)

[5] TCH switching

General name for communication physical slot switching excluding cases due to handover.

1 Timing after which switchback is impossible

After PS receives a new channel downlink idle burst (new channel synchronization establishment), it may not switch back to the old channel.

And switchback is possible if the new channel synchronization is established after receiving downlink burst of 2nd TCH during the handover of 2 slots fixed type 64 kbit/s communication and if receiving downlink idle burst on only TCH is completed and receive 2nd TCH downlink synchronization burst is disabled. However, if receiving downlink idle burst on only TCH is completed during the handover of Slot changeable type 64k bit/s Unrestricted Digital Information, it may not switch back to the old channel.

2 PS operation during switchback

The switchback operation sequence is shown in Figures 1 and 2, and the PS flow during TCH switching is shown in Figure 3.

And the handover switchback operation sequence in case of 2 slots fixed type 64 kbit/s communication is shown in Figures 4 and 5.

Switchback operation regulations are as follows.

[1] The total number of TCH switching request retries, TCH switching re-requests and TCH switching re-request retries in the same TCH switching operation or handover operation is a maximum of 3. (Grand total 4 times)

[2] After TCH switching activation or handover activation, PS switches back when the old channel downlink idle burst is received (old channel synchronization establishment).

[3] After PS receives a TCH switching indication, if it switches back after a TCH switching trial without an undesired signal, TR304P (refer to Appendix H) is activated. While this timer is active, TCH switching request message transmission may not be performed. (Case Ⓐ in Figure 1)

[4] After the TCH switching trial, if PS switches back due to an unwanted signal,

- The TCH switching re-request message can be transmitted within the range of number of retires described in item [1] (Case Ⓑ in Figure 1).
- Otherwise, TR304P (refer to Appendix H) is activated, and while this timer is active, the TCH switching request message cannot be transmitted (Case Ⓒ in Figure 1).

[5] If PS switches back after handover trial

- In the case of switchback of PS re-calling type handover and re-calling type handover with CS indication, use TR305P
- In the case of switchback of re-calling type handover with PS request, TR304P is activated, and while this timer is active, the relevant process cannot be performed again.

[6] After the handover trial, TR105P (refer to Appendix H) is activated as a PS timer to switchback if the handover trial is unsuccessful.

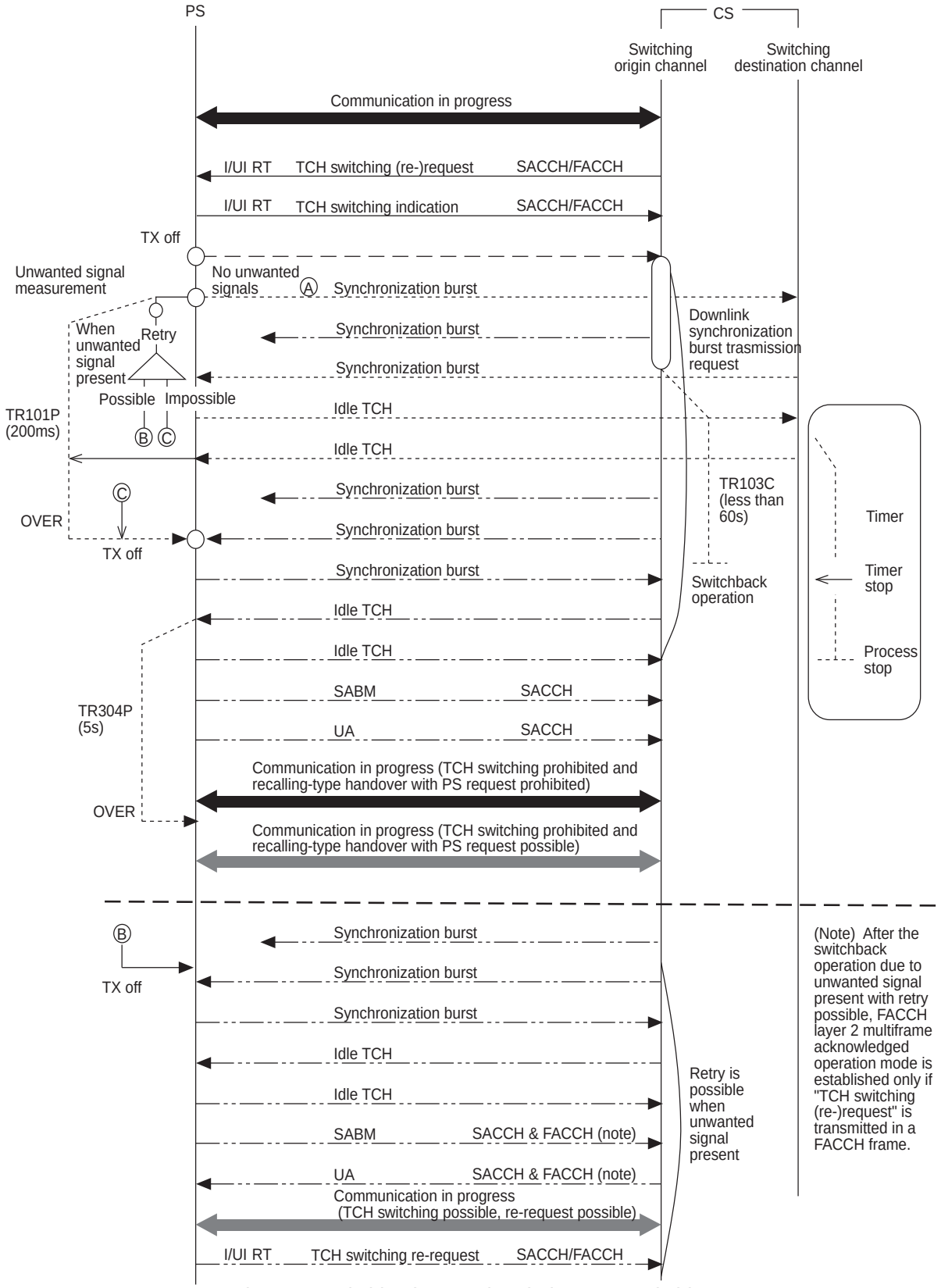


Figure 1 Switchback operation during TCH switching

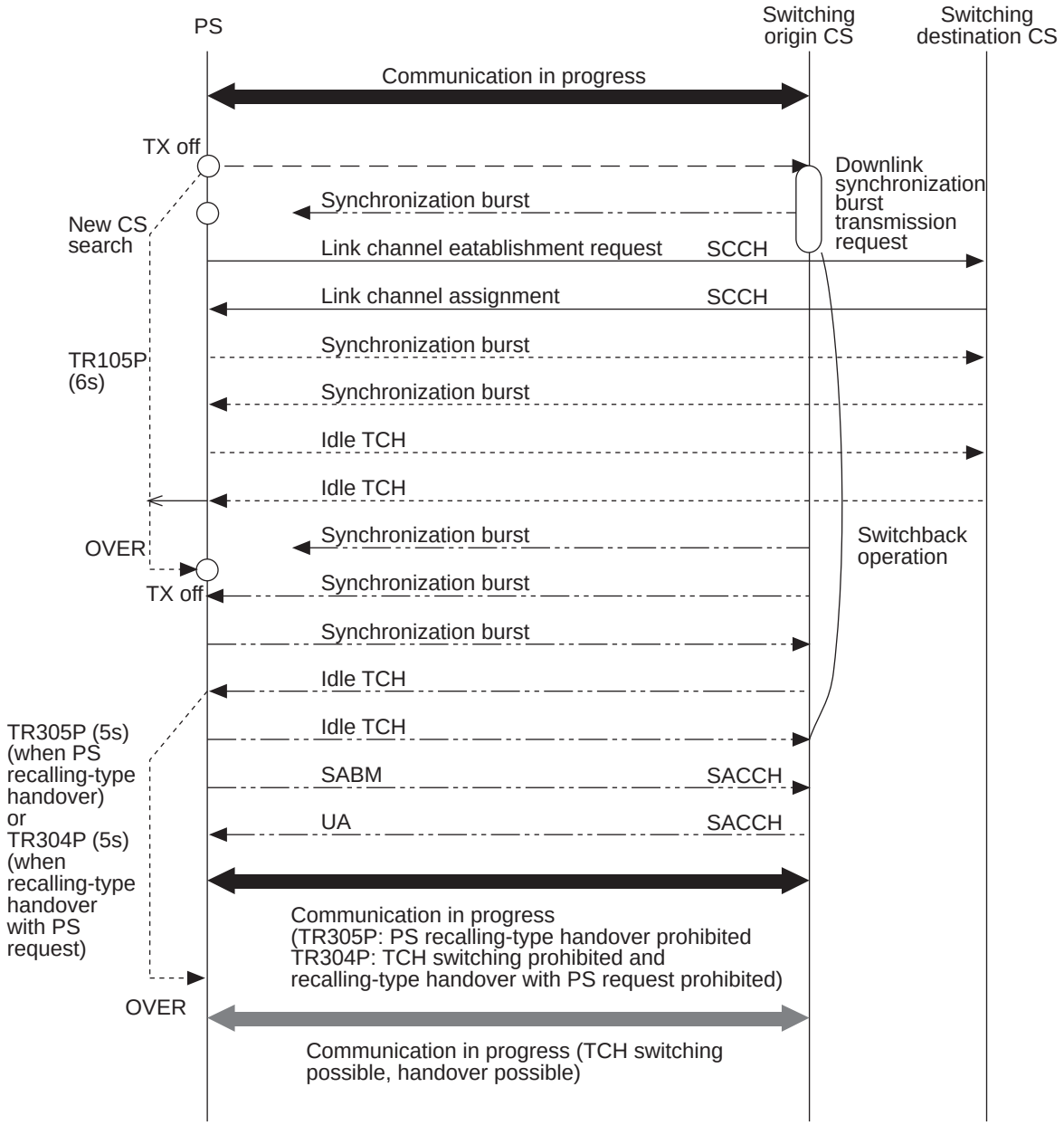


Figure 2 Switchback operation during handover

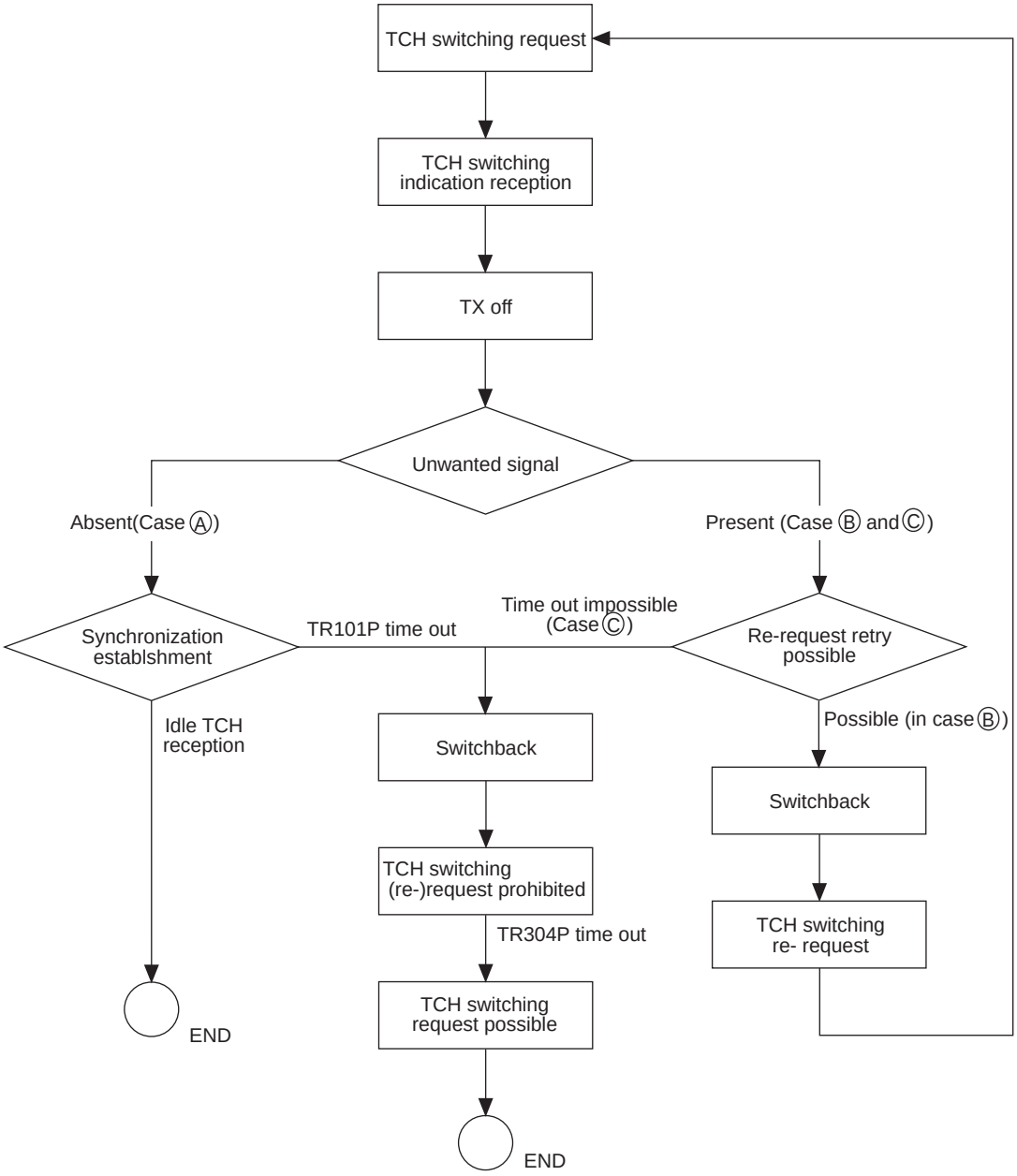


Figure 3 PS switchback operation during TCH switching

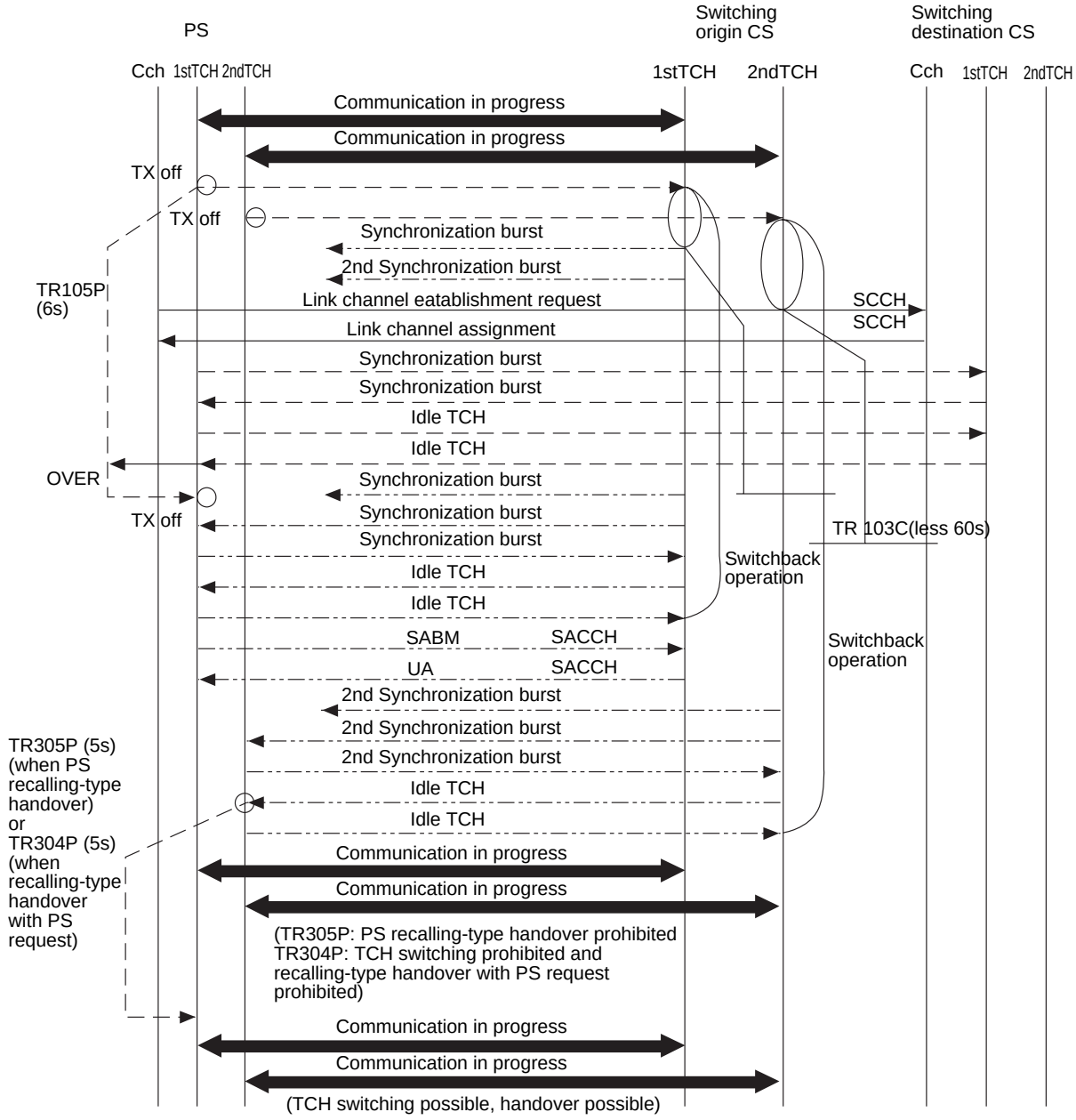


Figure4 64kbit/s UDI Switchback operation during handover (this switchback operation is owing to the factor of 1st TCH side)

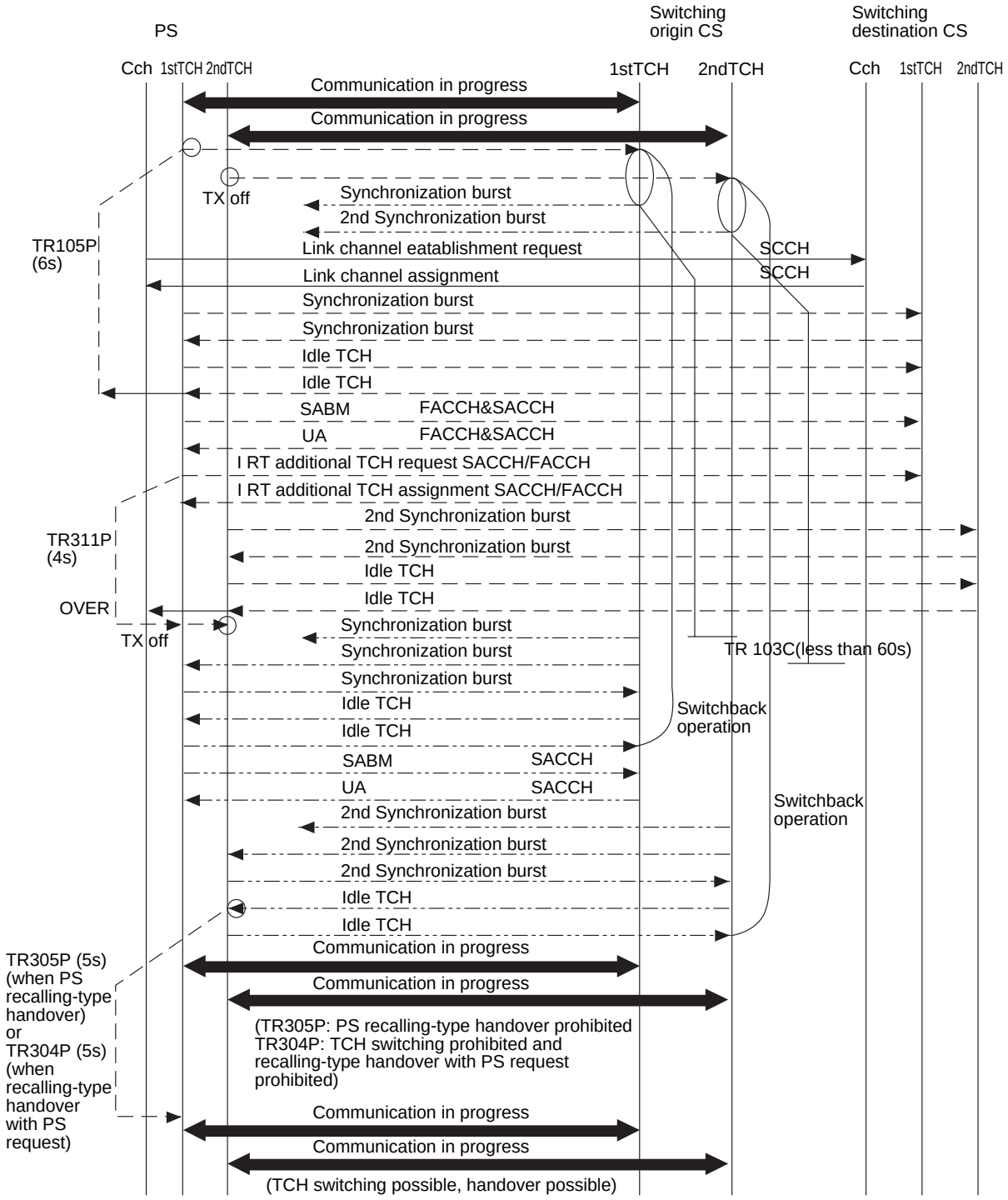


Figure5 64kbit/s UDI Switchback operation during handover (this switchback operation is owing to the factor of 2nd TCH side)

The following symbols and abbreviations are used in these descriptions. The symbols, their meanings and complete descriptions of their application methods are in ITU-T Z Series recommendations.

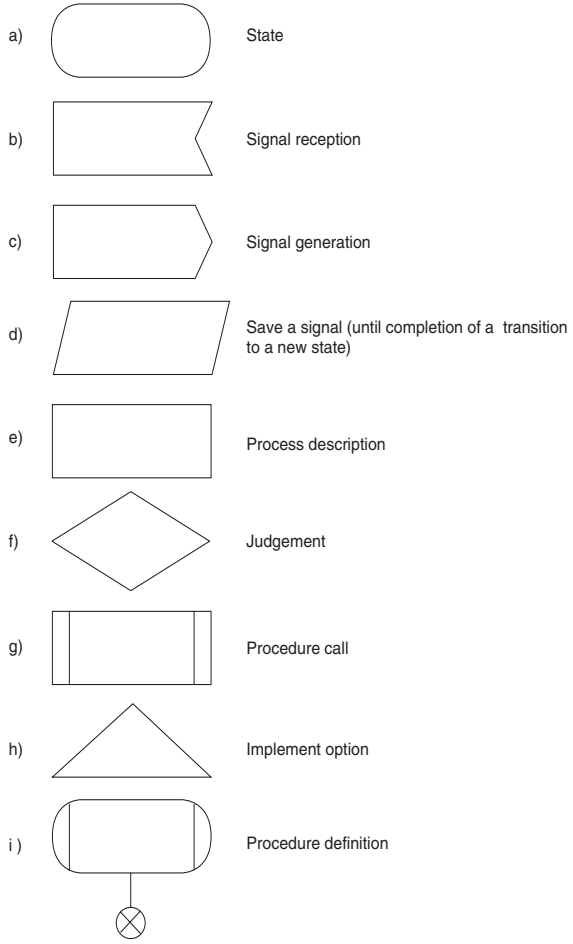
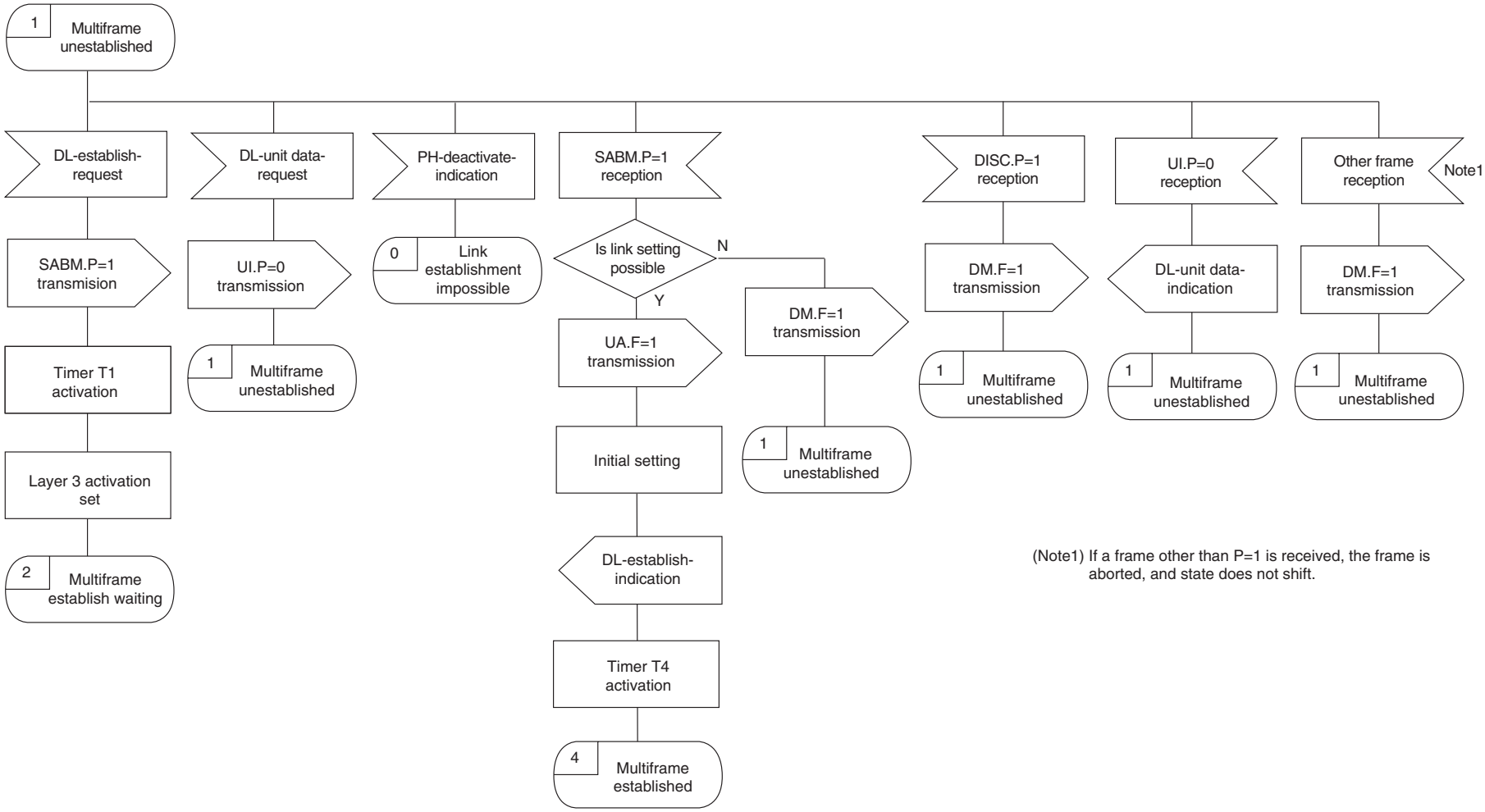


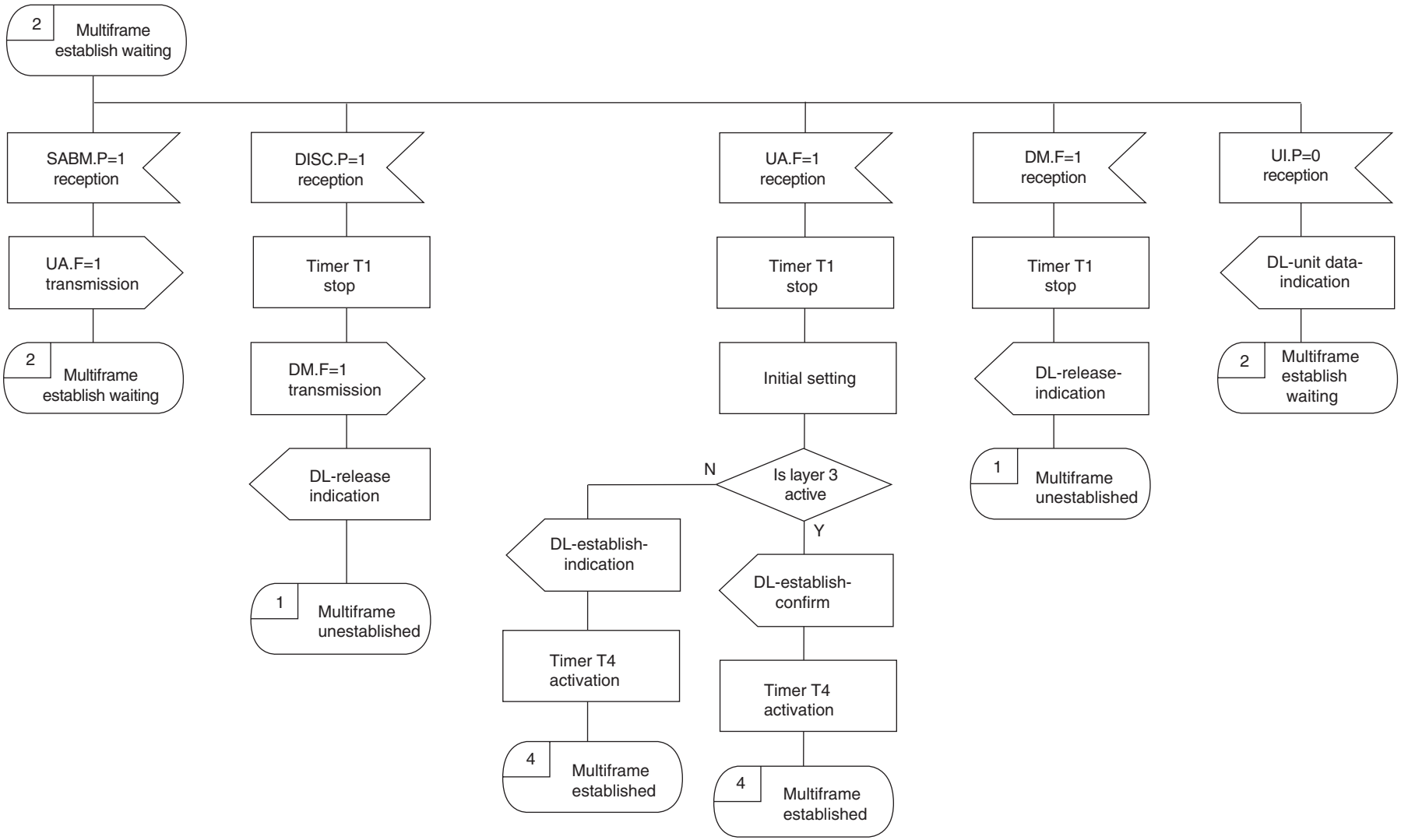
Figure 1 Layer 2 SDL diagram rules

Appendix E Layer 2 SDL diagram (1/15)
[State 0 Link establishment impossible (1/1)]

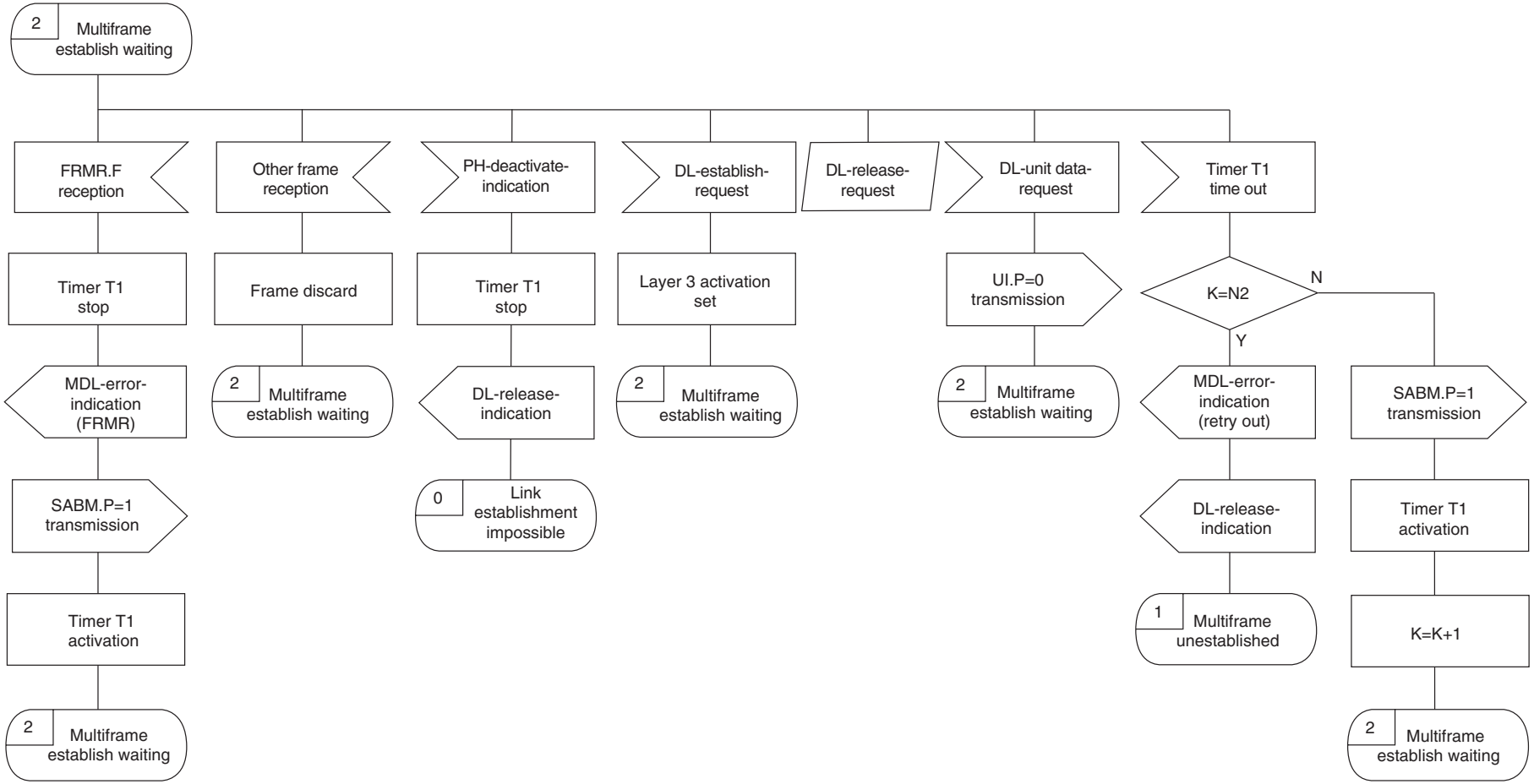


(Note1) If a frame other than P=1 is received, the frame is aborted, and state does not shift.

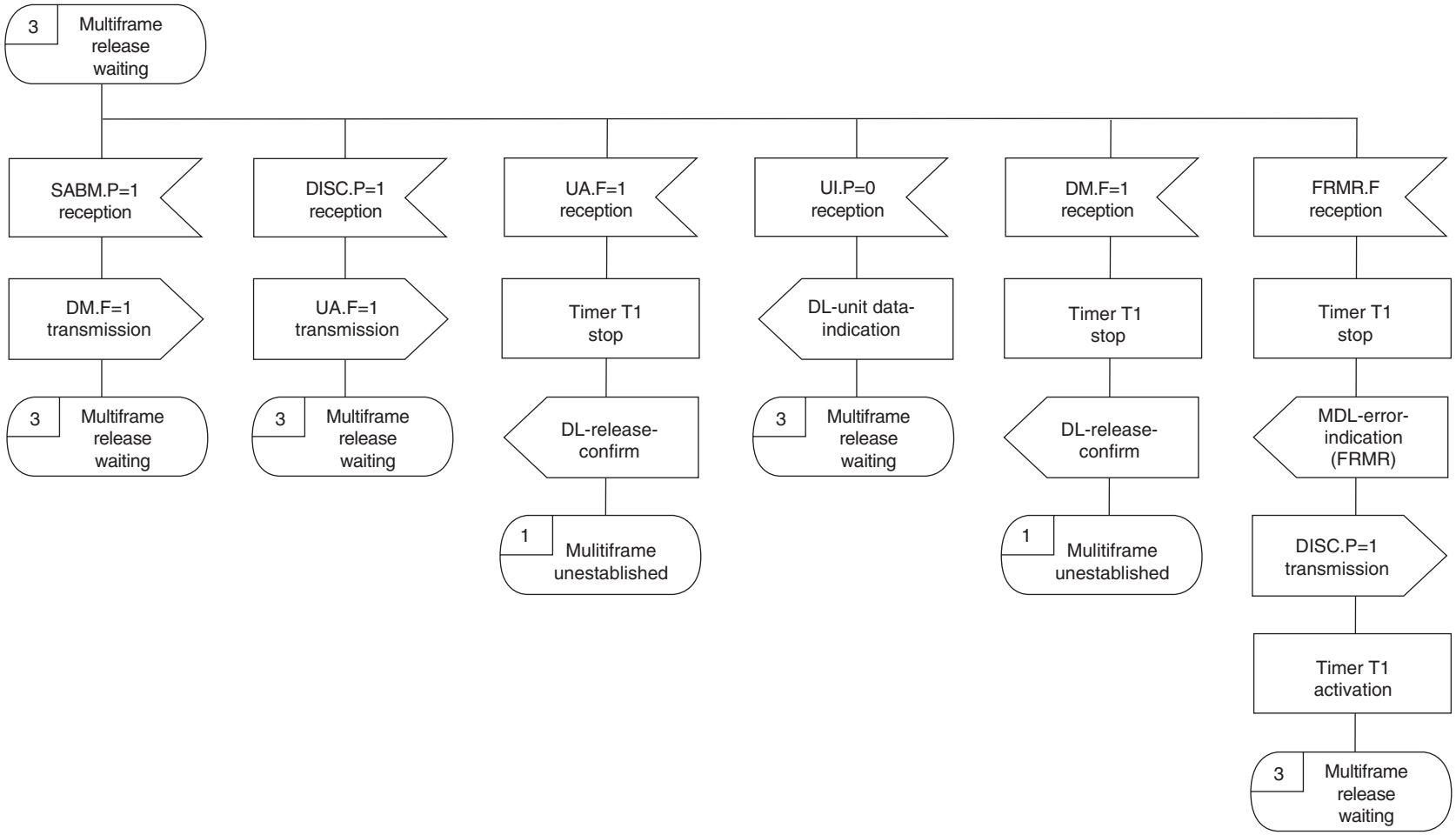
Appendix E Layer 2 SDL diagram (2/15)
[State 1 Multiframe unestablish state (1/1)]



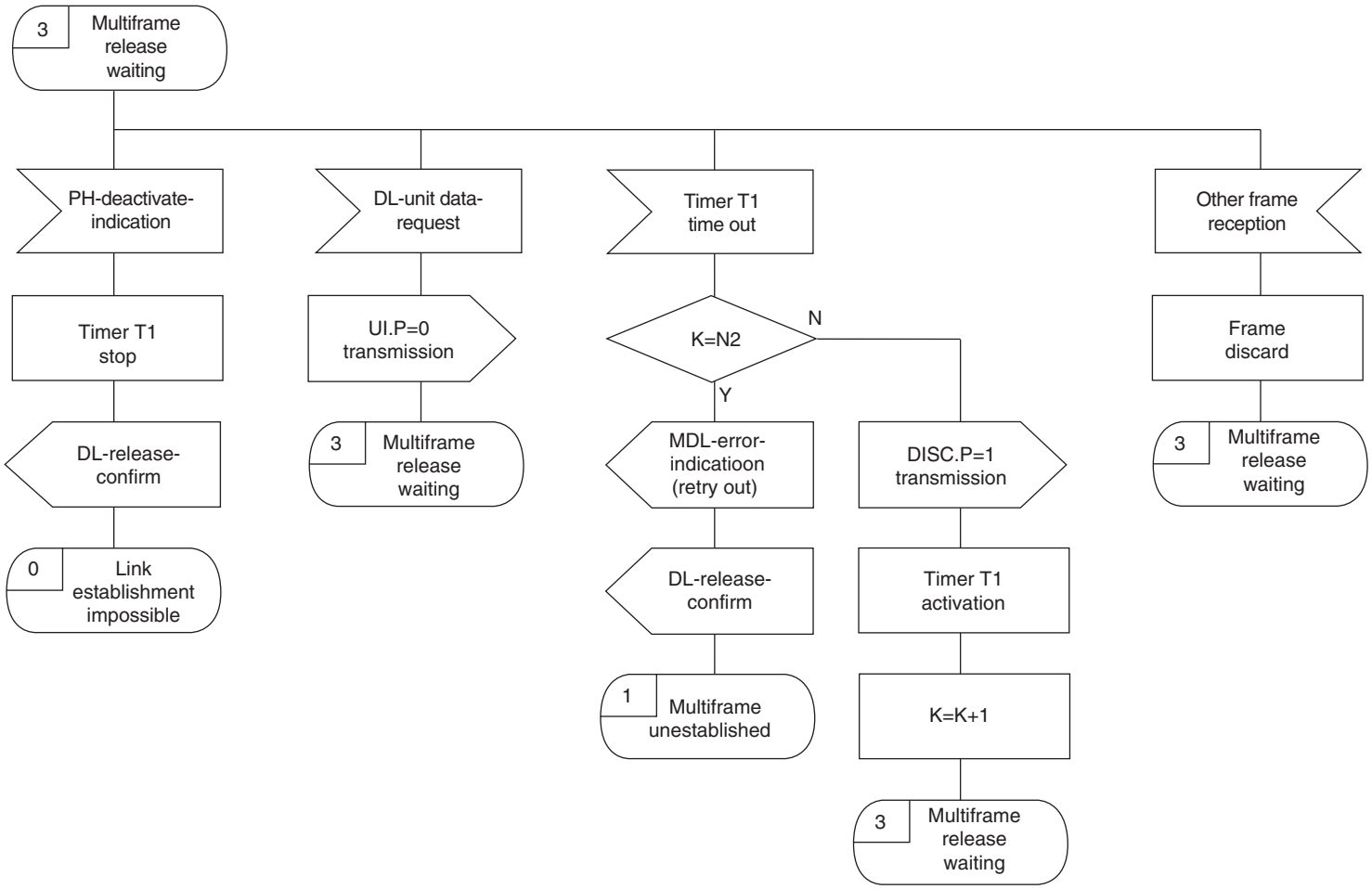
Appendix E Layer 2 SDL diagram (3/15)
[State 2 Multiframe establish waiting (1/2)]



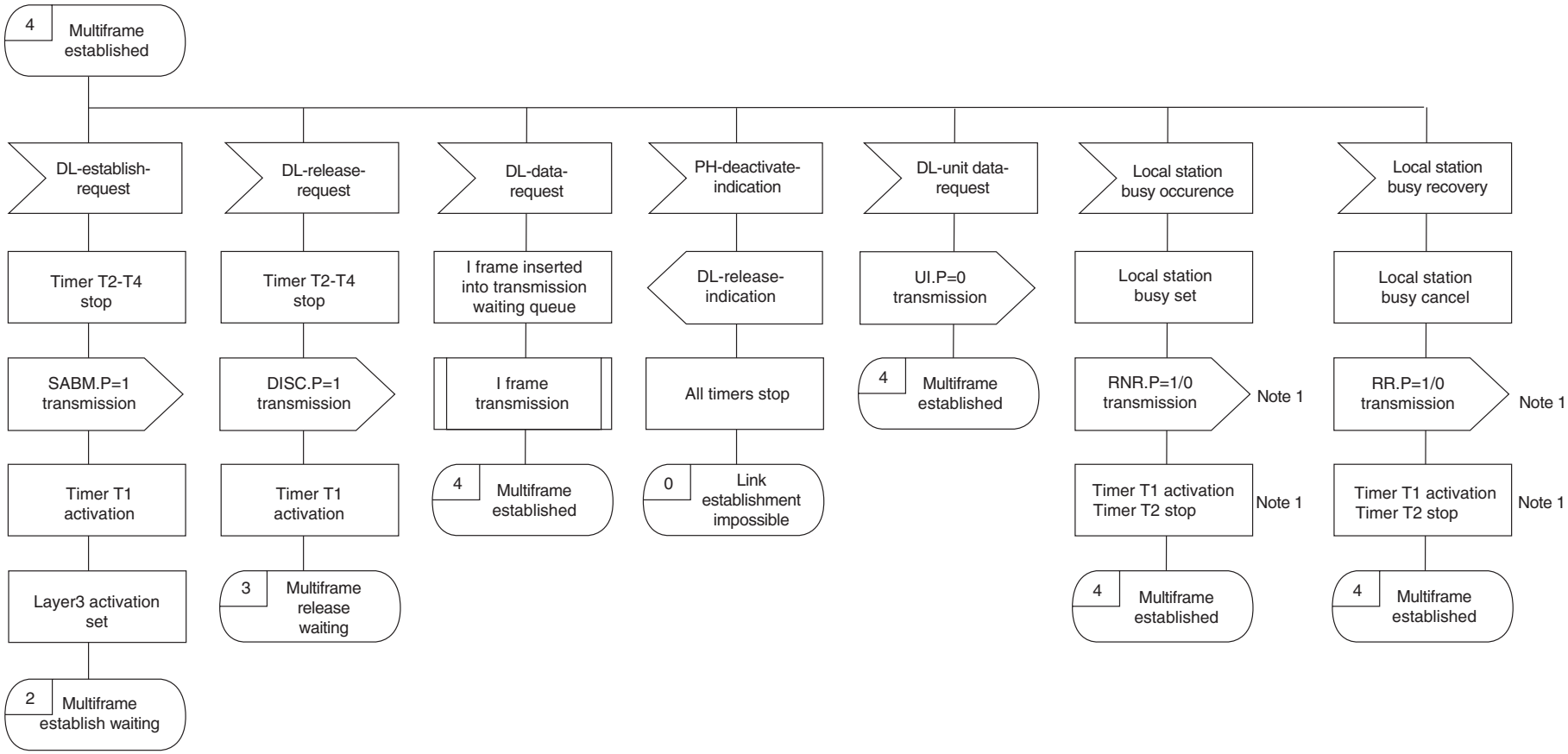
Appendix E Layer 2 SDL diagram (4/15)
[State 2 Multiframe establish waiting (2/2)]



Appendix E Layer 2 SDL diagram (5/15)
[State3 Multiframe release waiting (1/2)]

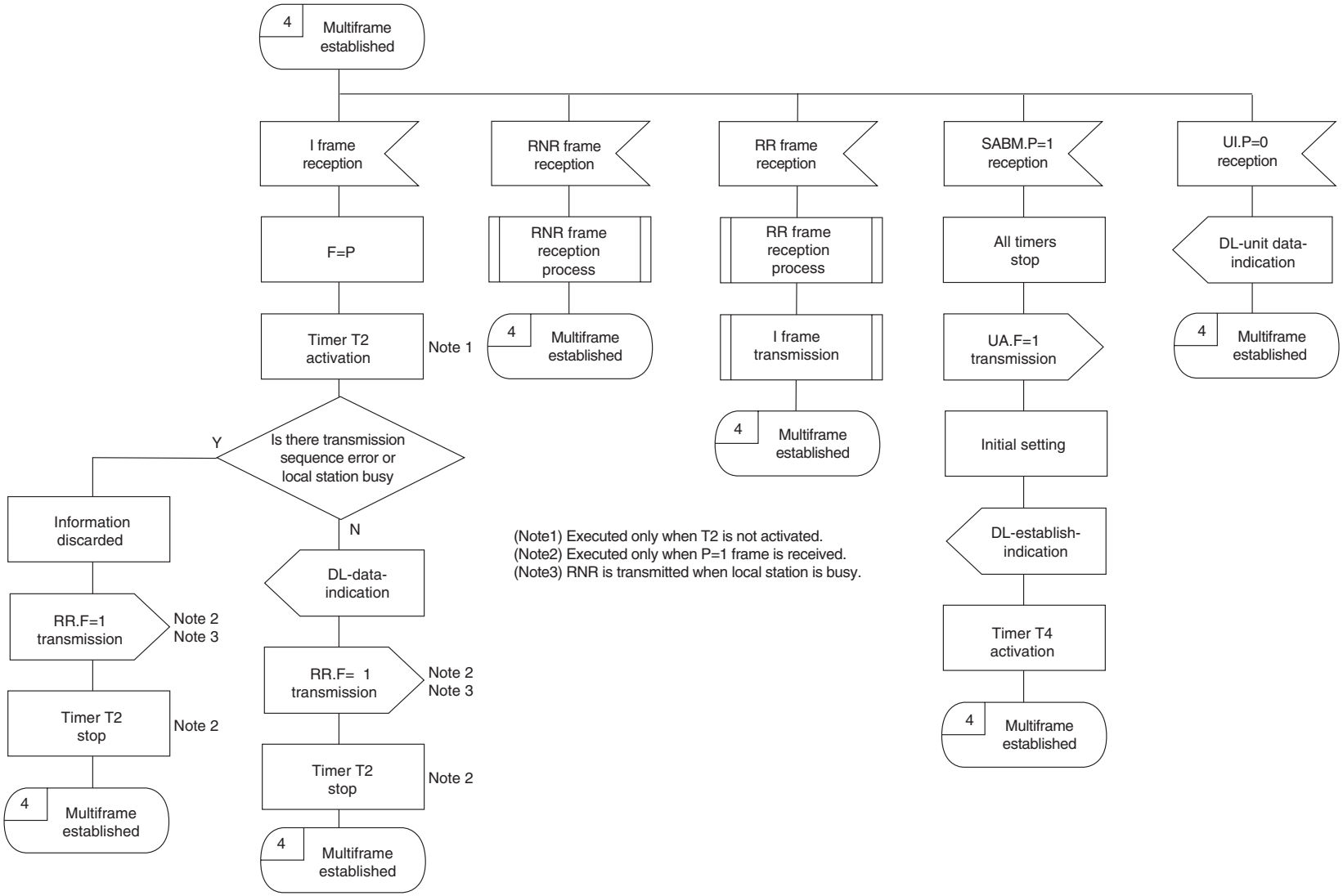


Appendix E Layer 2 SDL diagram (6/15)
[State3 Multiframe release waiting (2/2)]

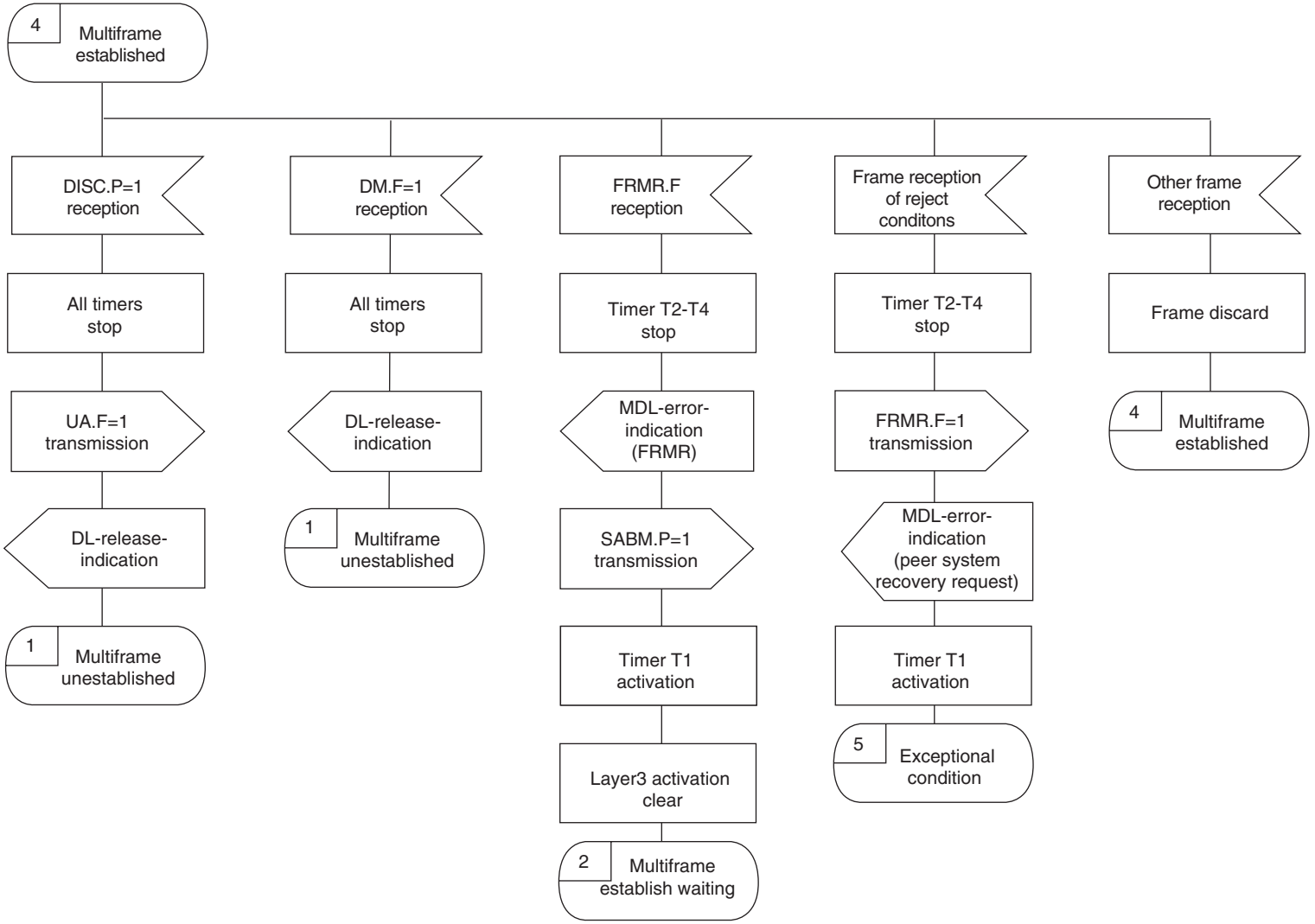


(Note 1) Performed in cases where there is no transmitted S response.

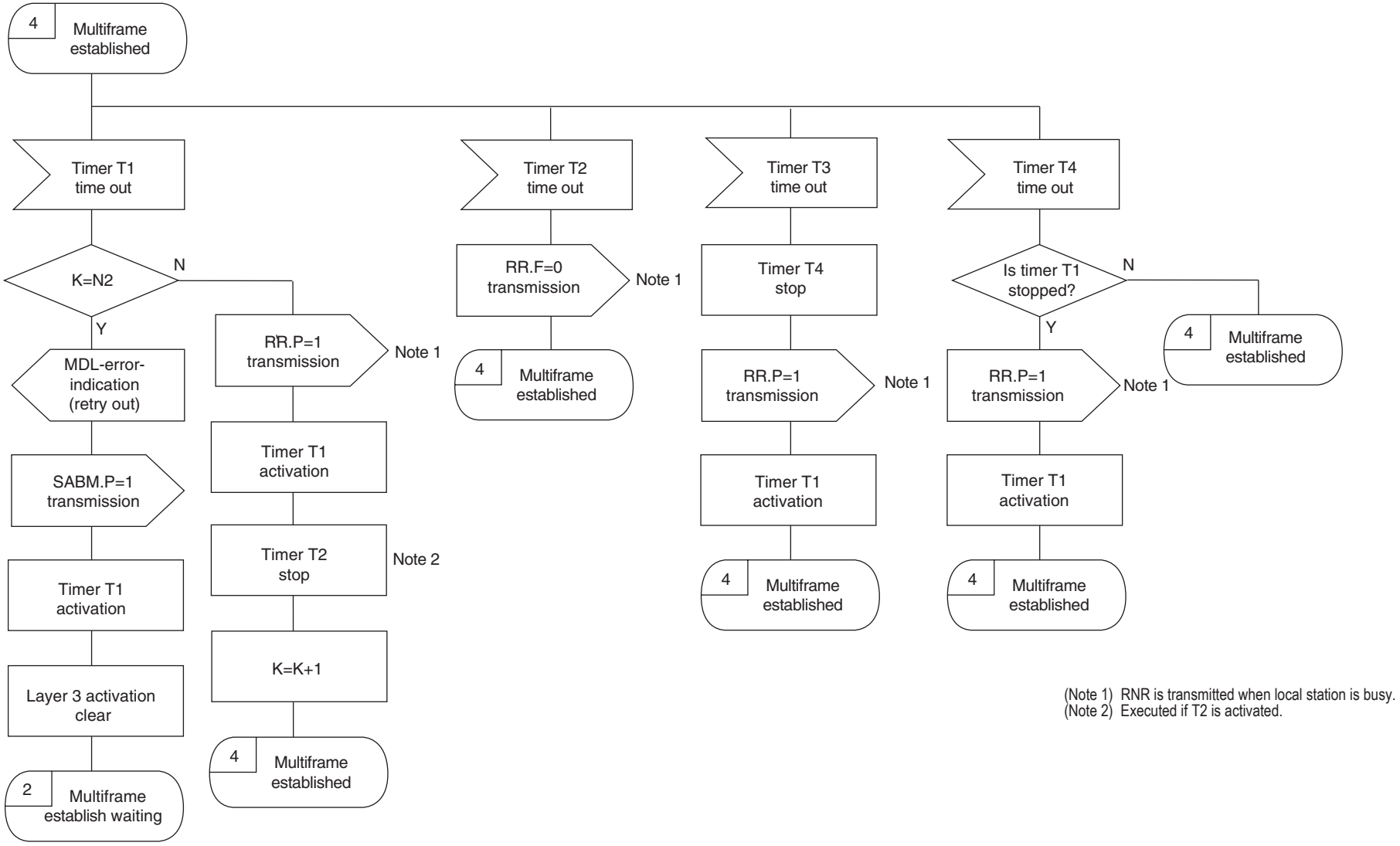
Appendix E Layer 2 SDL diagram (7/15)
[State 4 Multiframe established (1/7)]



Appendix E Layer 2 SDL diagram (8/15)
[State 4 Multiframe established (2/7)]

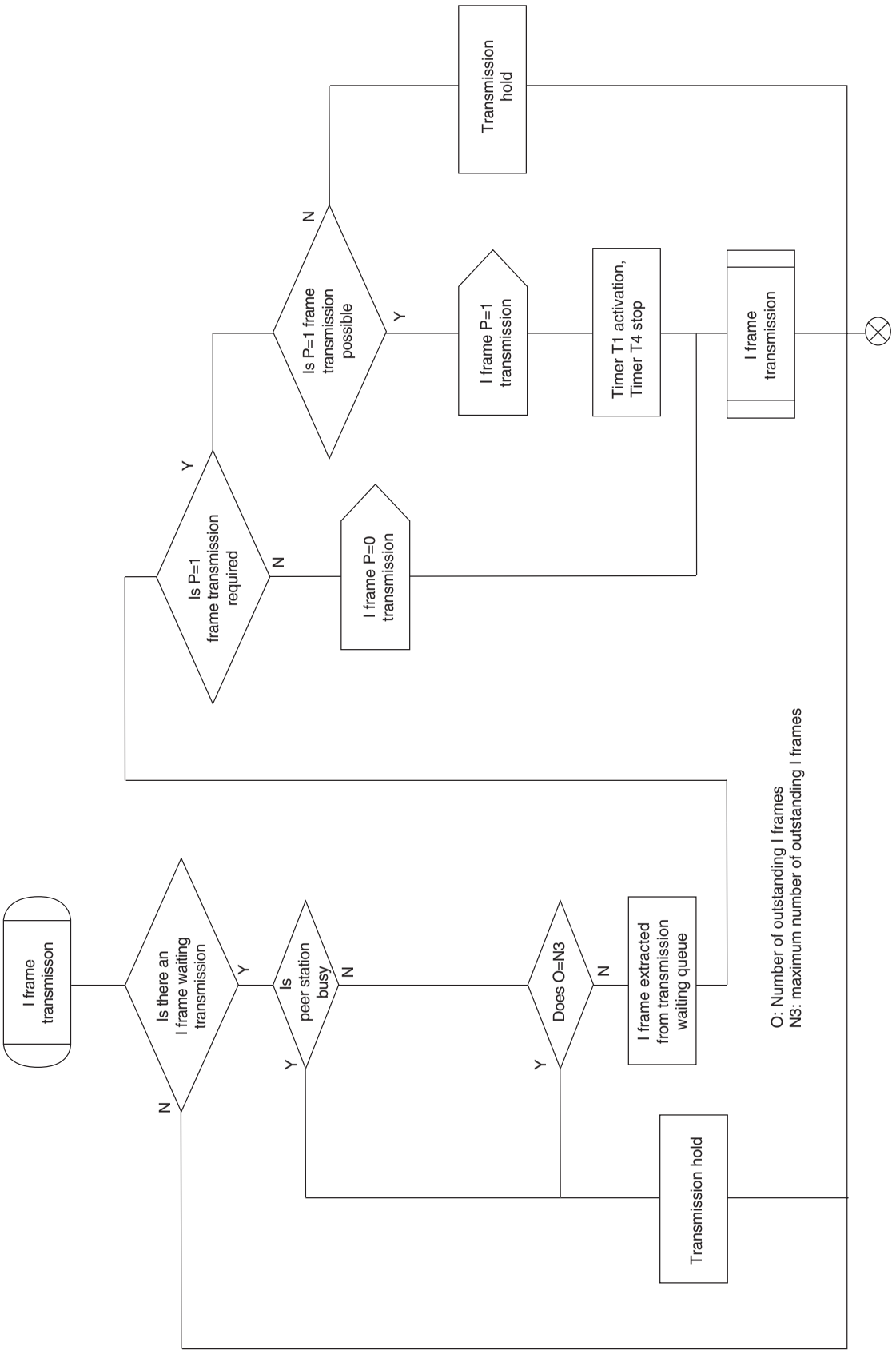


Appendix E Layer 2 SDL diagram (9/15)
[State 4 Multiframe established (3/7)]

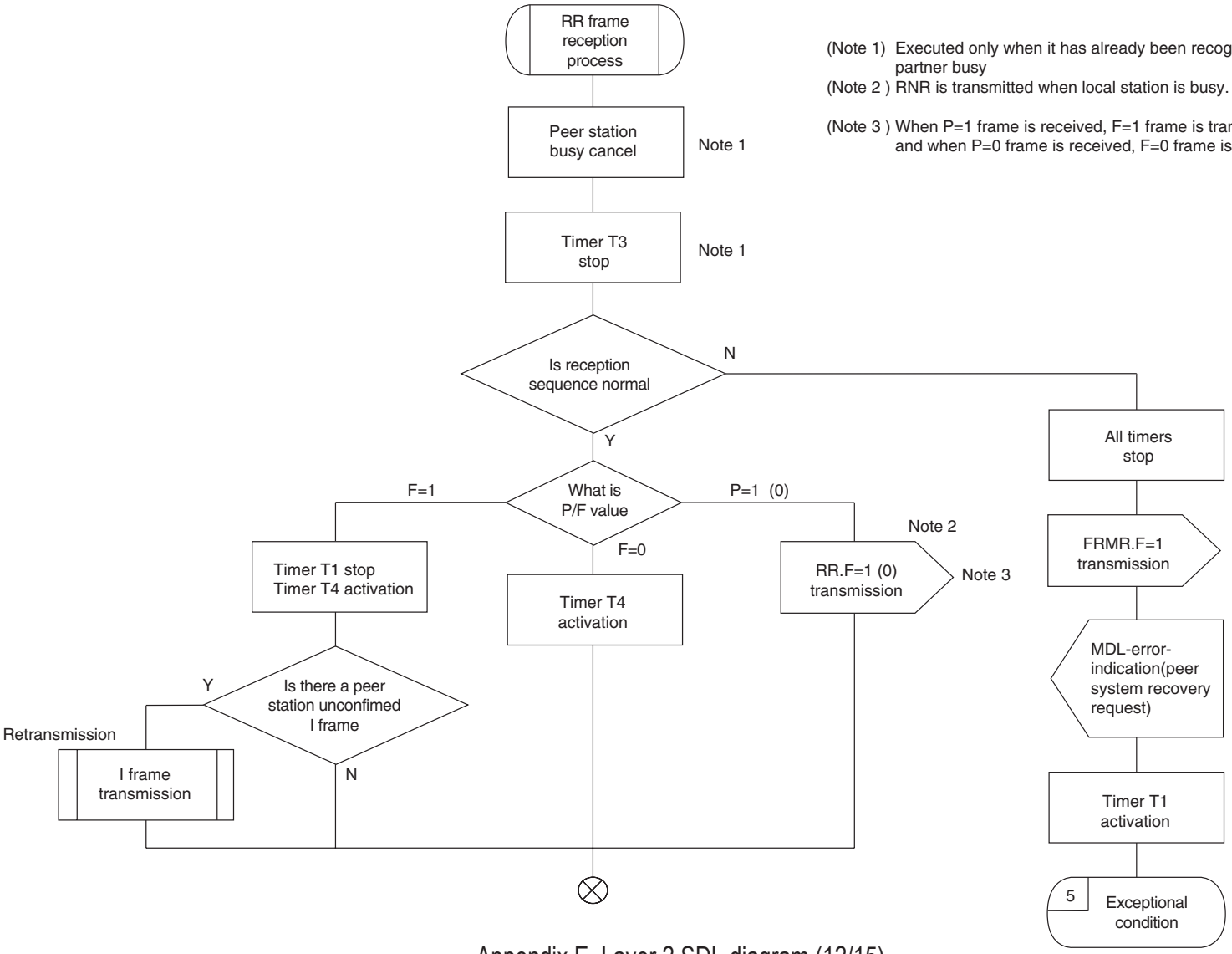


(Note 1) RNR is transmitted when local station is busy.
(Note 2) Executed if T2 is activated.

Appendix E Layer 2 SDL diagram (10/15)
[State 4 Multiframe established (4/7)]



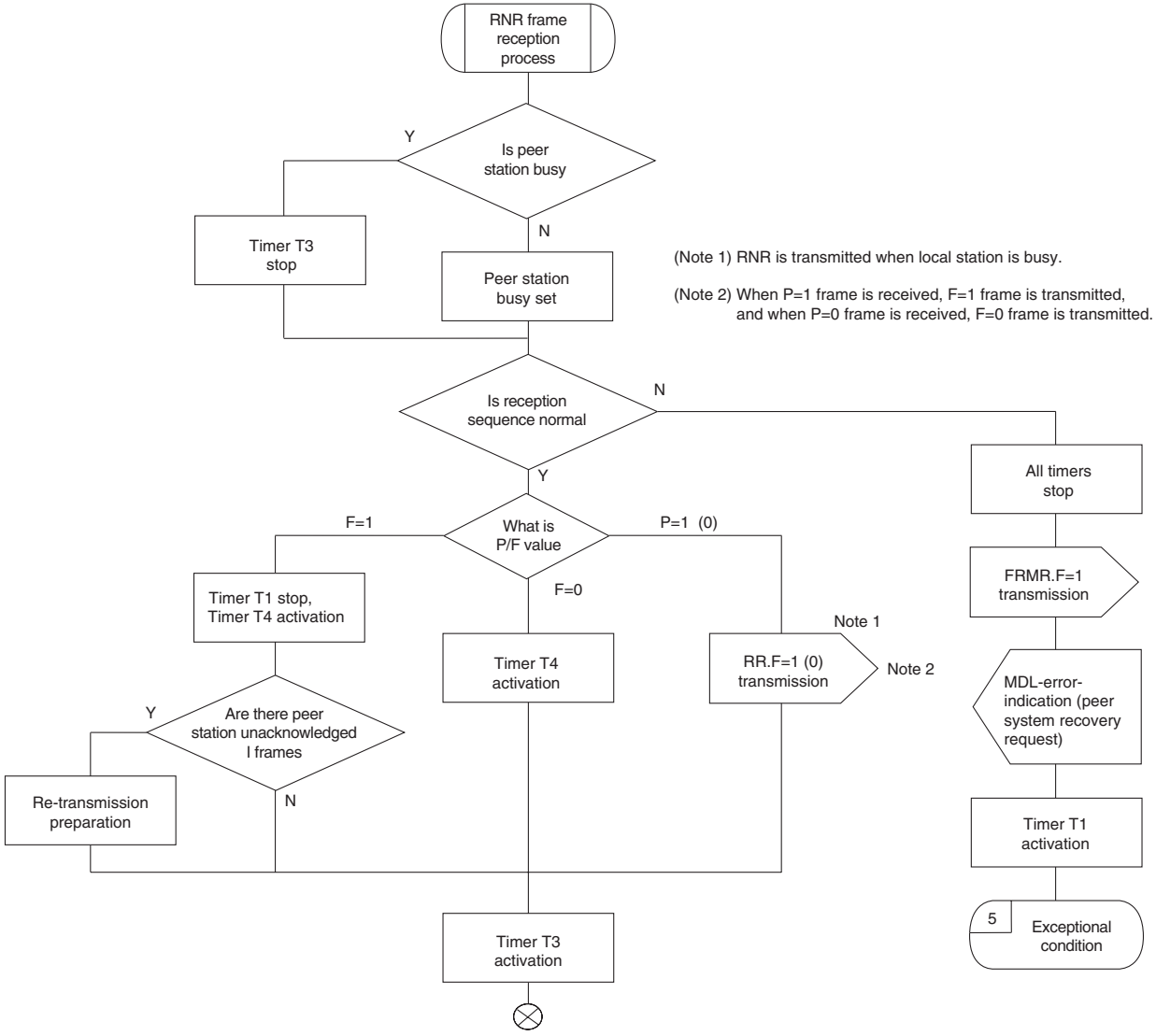
Appendix E Layer 2 SDL diagram (11/15)
[State 4 Multiframe established (5/7)]



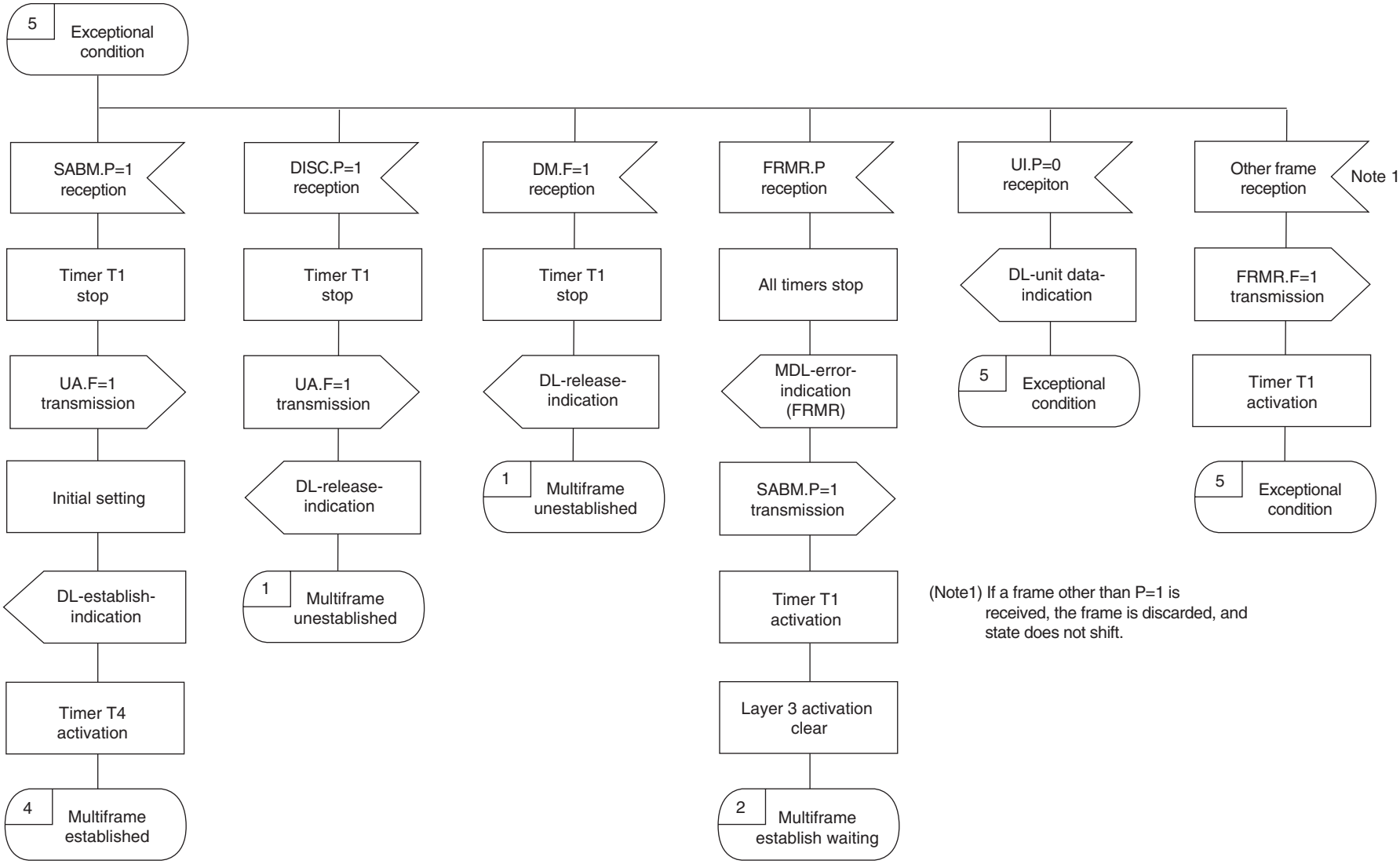
(Note 1) Executed only when it has already been recognized as partner busy
(Note 2) RNR is transmitted when local station is busy.

(Note 3) When P=1 frame is received, F=1 frame is transmitted, and when P=0 frame is received, F=0 frame is transmitted.

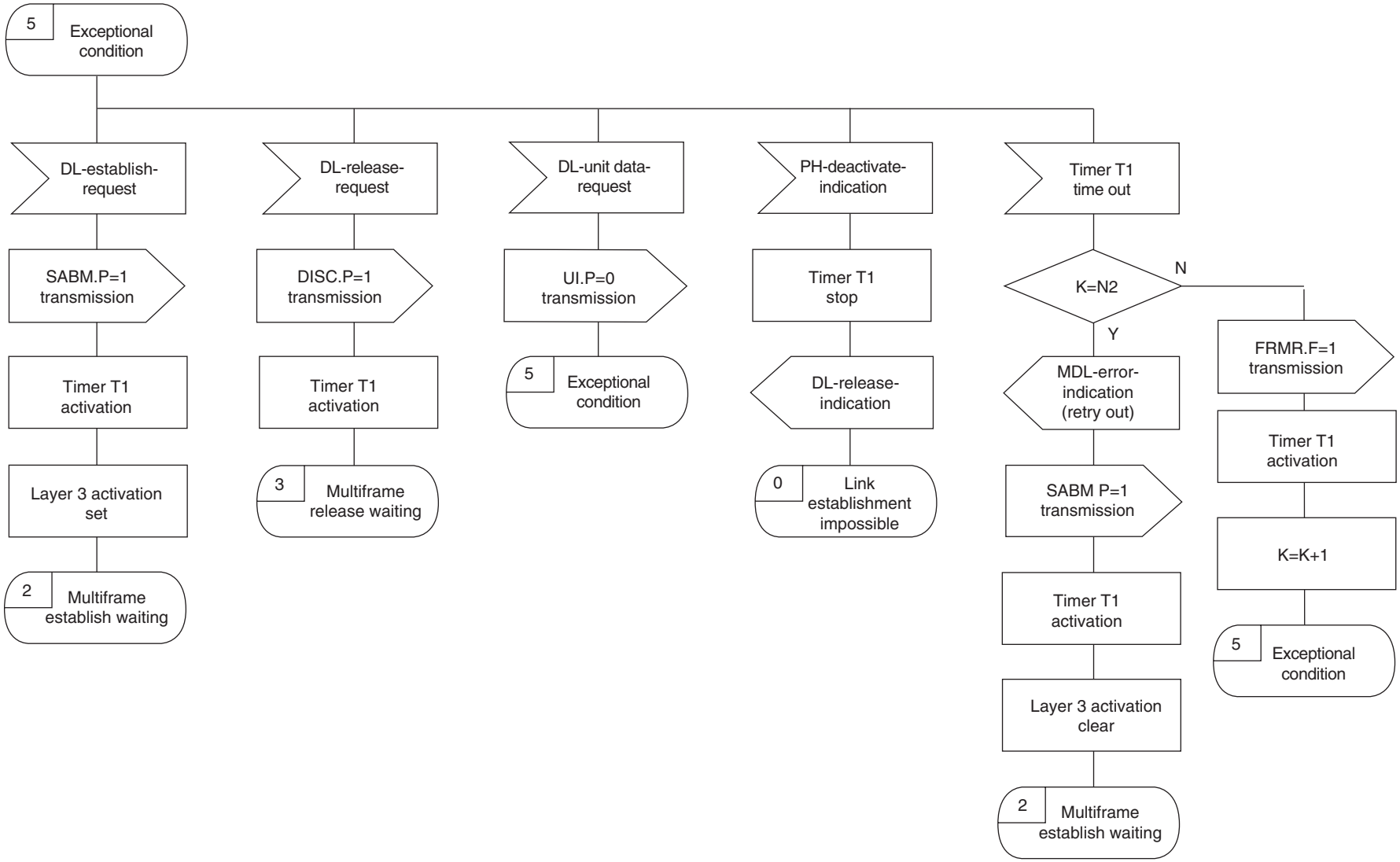
Appendix E Layer 2 SDL diagram (12/15)
[State 4 Multiframe established (6/7)]



Appendix E Layer 2 SDL diagram (13/15)
[State 4 Multiframe established (7/7)]

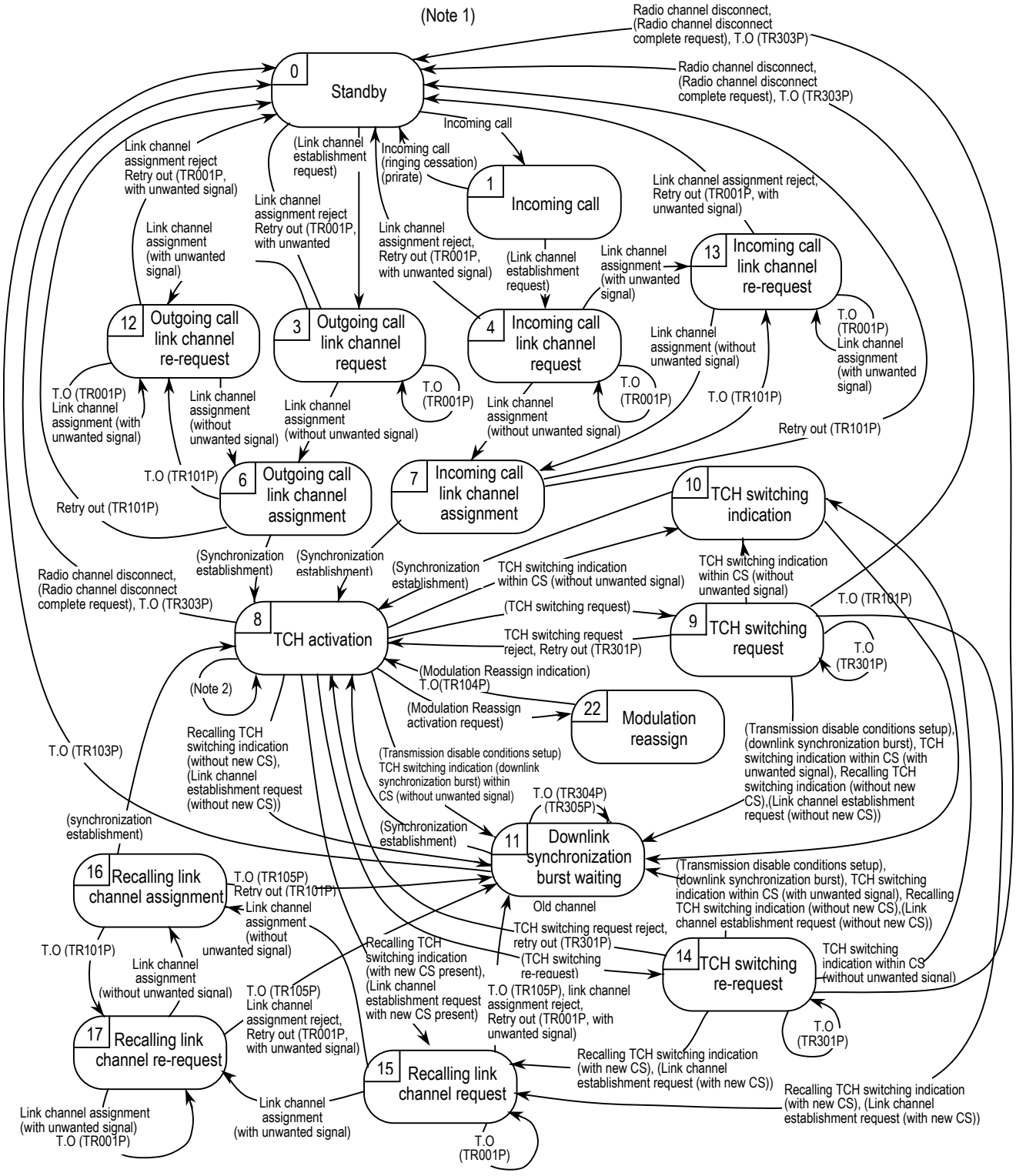


Appendix E Layer 2 SDL diagram (14/15)
[State 5 Exceptional condition (1/2)]



Appendix E Layer 2 SDL diagram (15/15)
[State 5 Exceptional condition (2/2)]

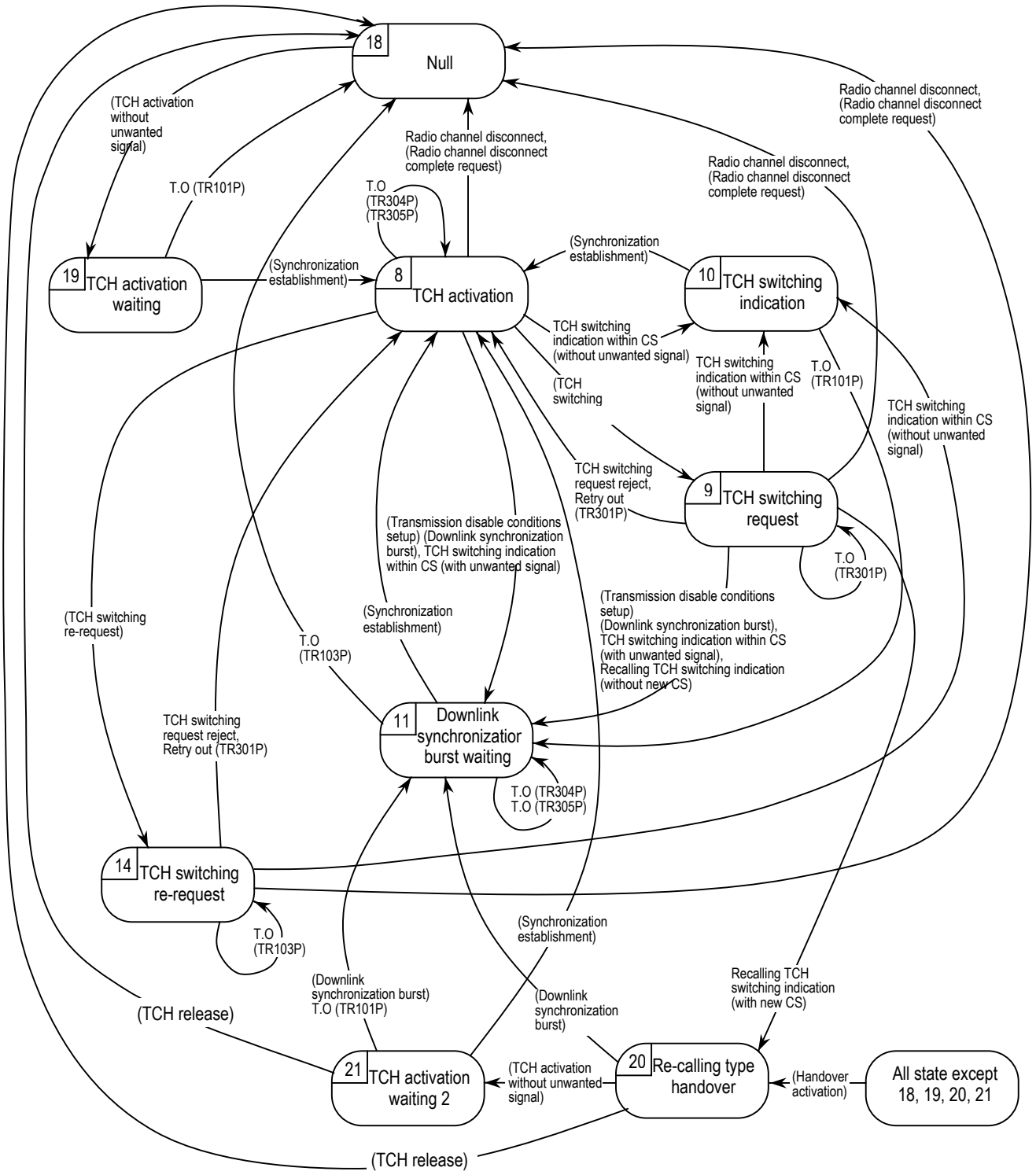
Appendix F RT state transition diagram (PS side) (Private standard/Public standard)



(Note 1) Refer to Appendix G: RT SDL diagrams (PS side).

(Note 2) (Incoming call response request), (RT function request), RT function request response, Retry out (TCH switching (re-)request), (Definition information request), Definition information response, (Encryption key set request), T.O (TR302-1/2P), (TR304P), (TR305P), (TR311P), (additional TCH request), additional TCH assignment, additional TCH reject, (additional TCH re-request), additional TCH request indication, (additional TCH request indication reject) (Modulation reassign request), Modulation reassign indication, Modulation reassign reject

RT state transition diagram (PS side TCH)



RT state transition diagram (PS side 2nd TCH)

Appendix G RT SDL diagrams (PS Side)

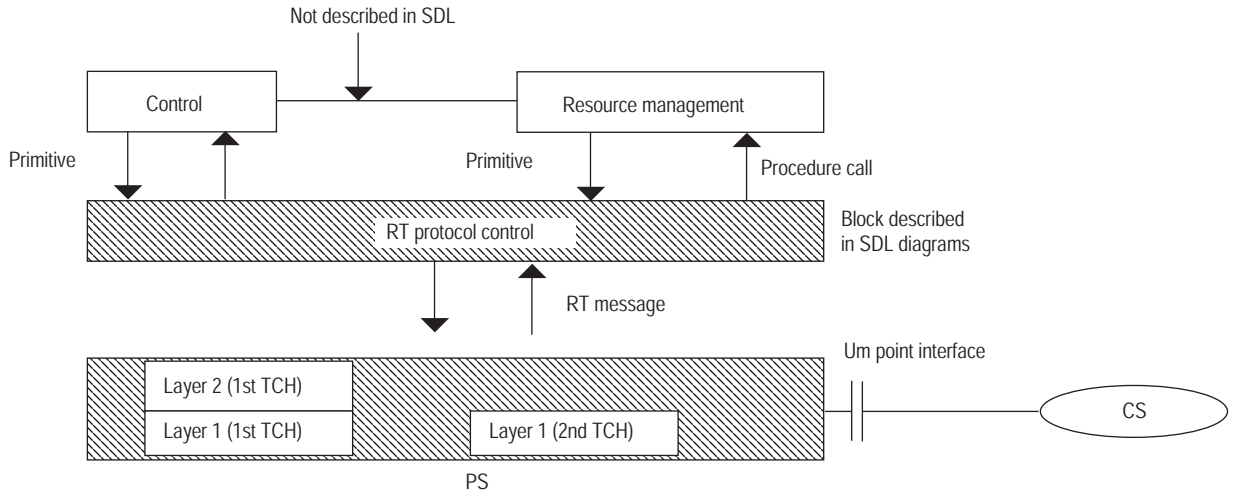


Figure 1 RT SDL diagram description method (PS side)

(Private standard/Public standard)

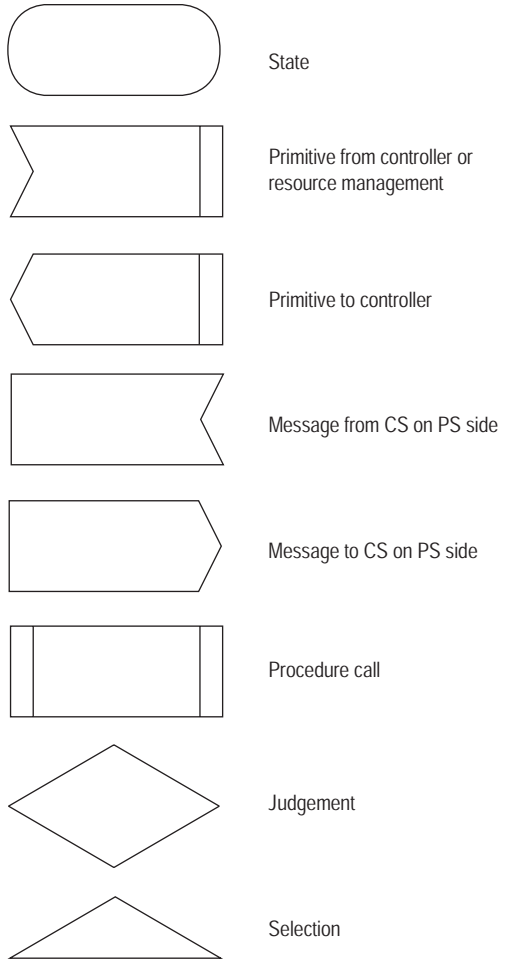
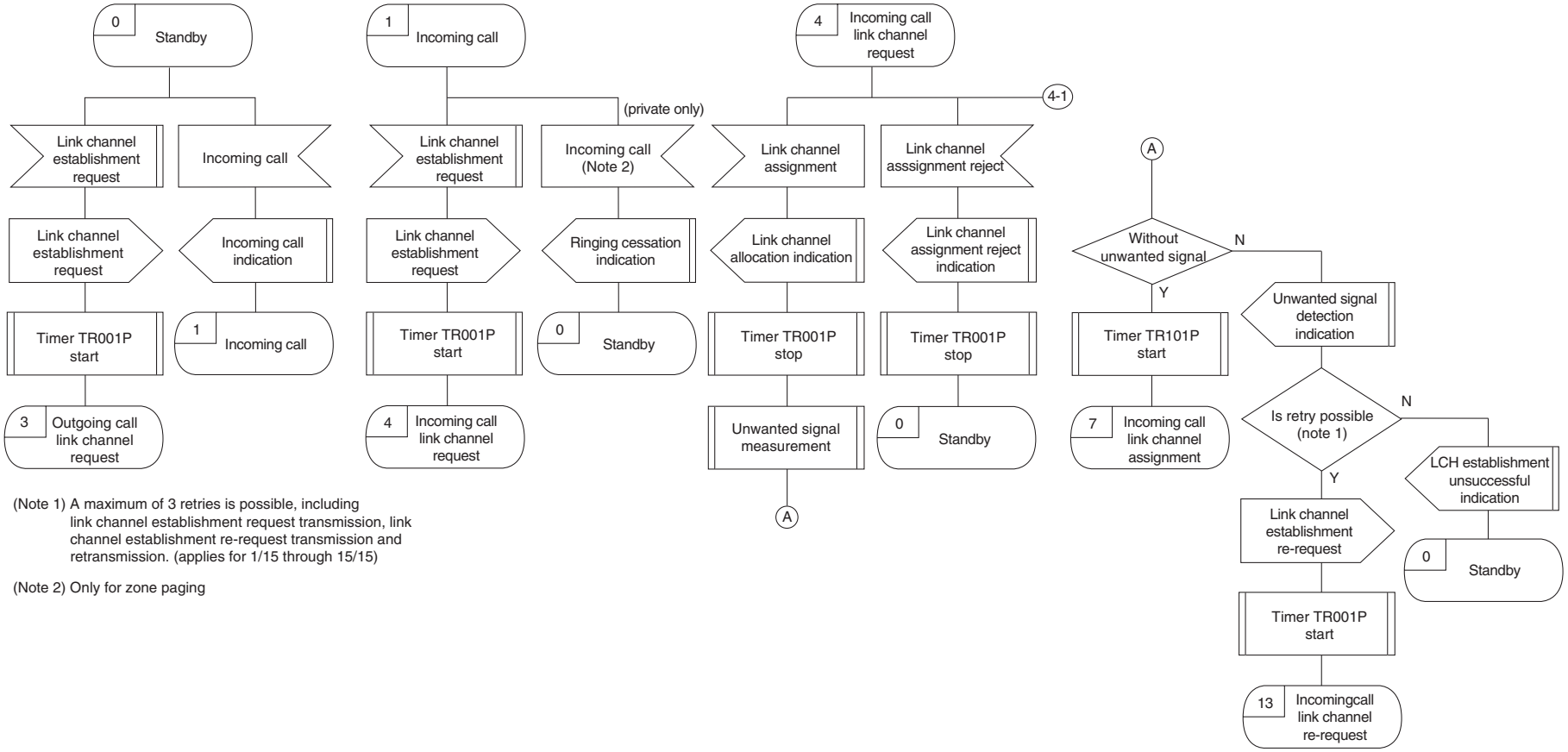


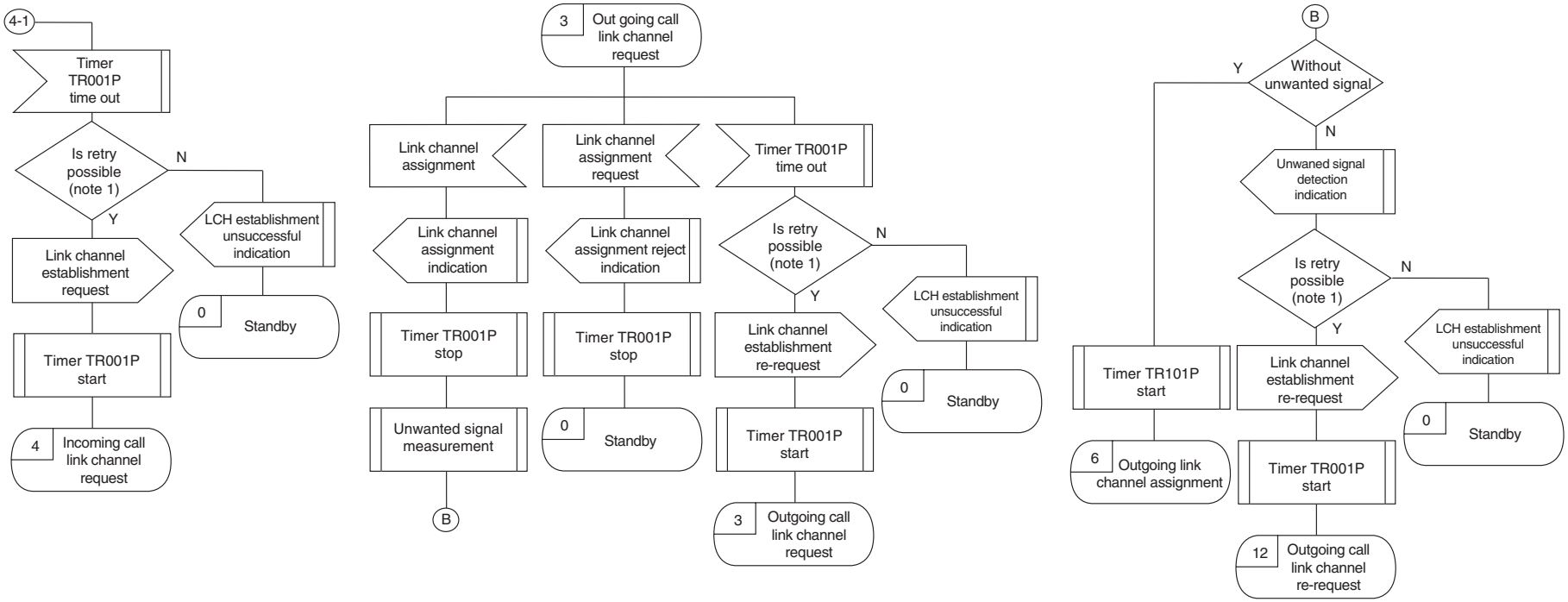
Figure 2 RT SDL diagram rules (PS side)



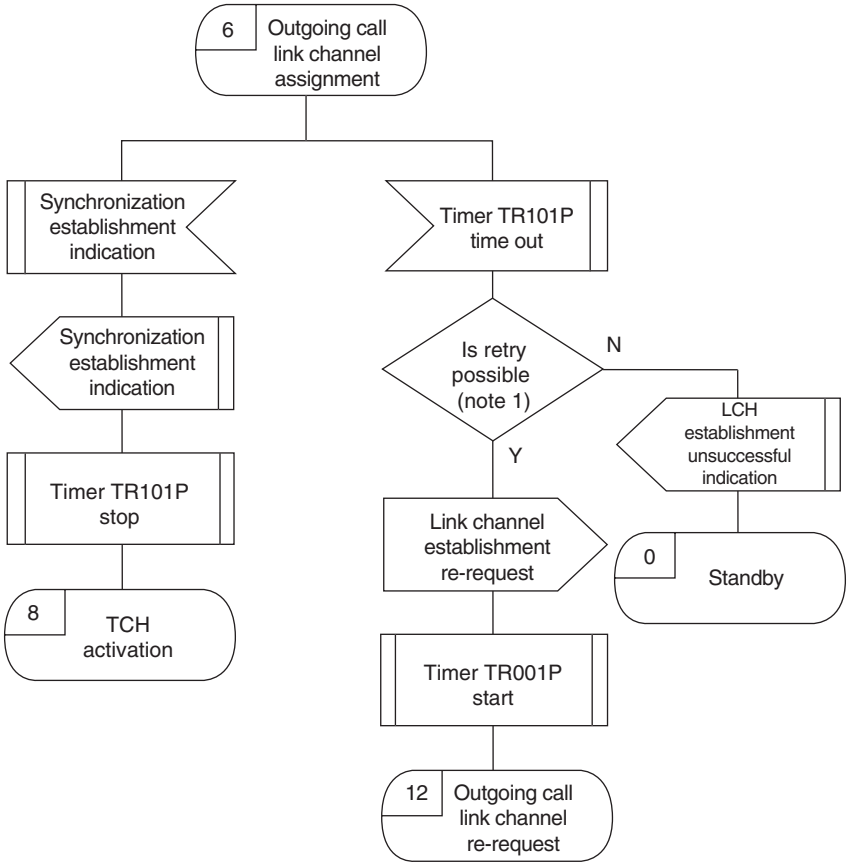
(Note 1) A maximum of 3 retries is possible, including link channel establishment request transmission, link channel establishment re-request transmission and retransmission. (applies for 1/15 through 15/15)

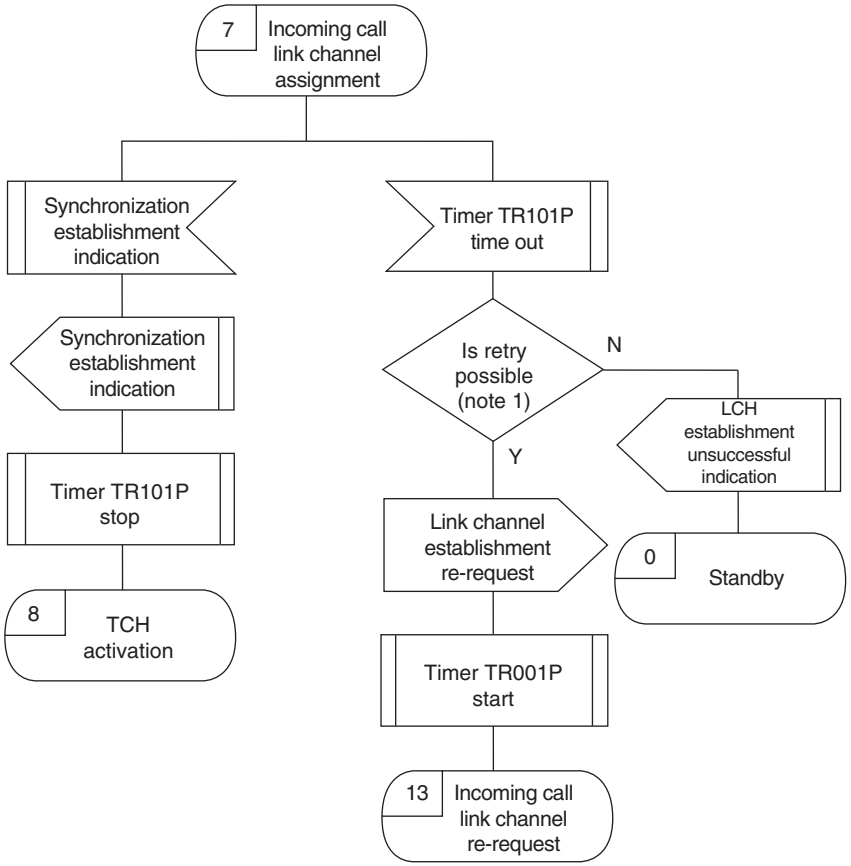
(Note 2) Only for zone paging

Appendix G RT SDL diagram (PS side TCH) 1/19

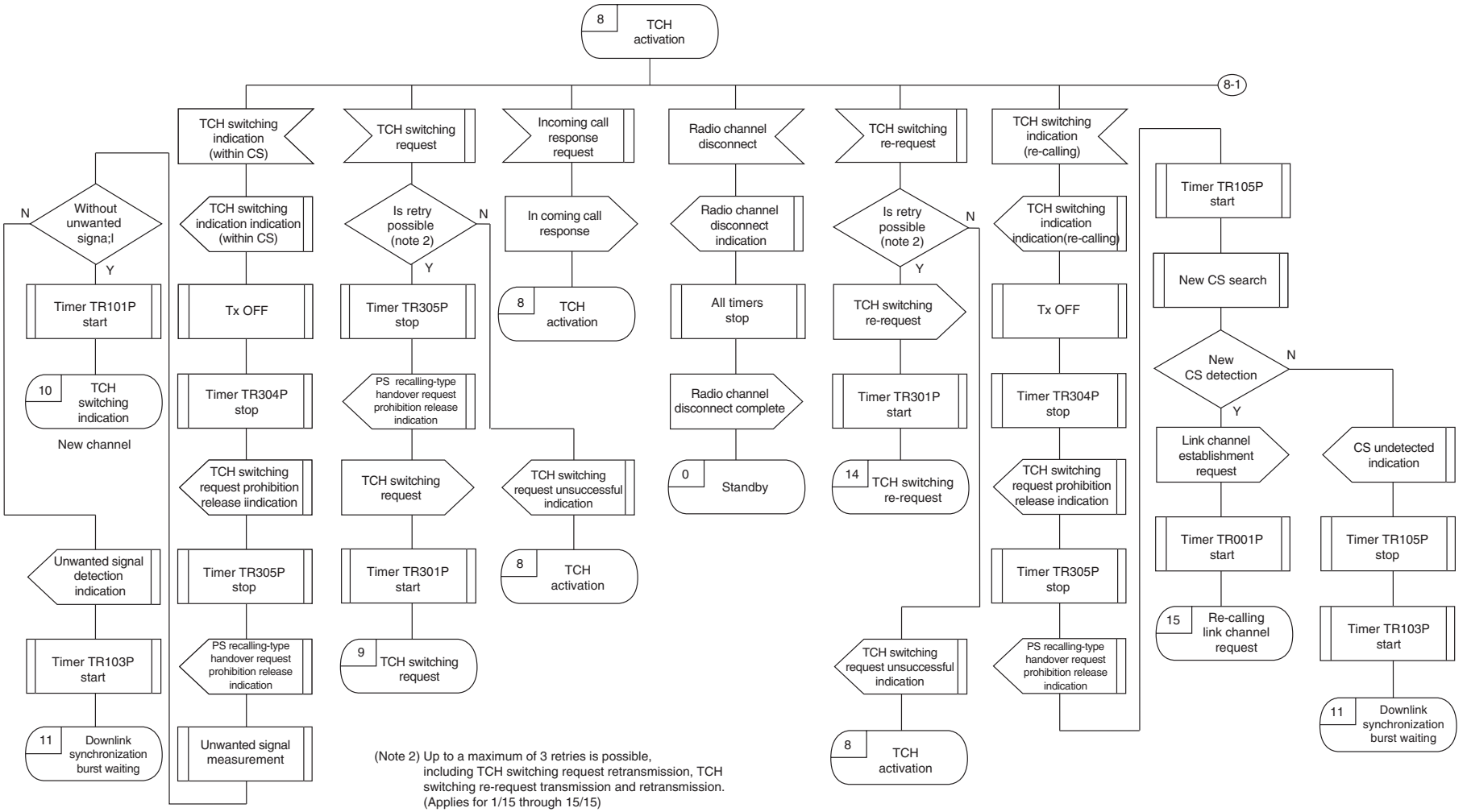


Appendix G RT SDL diagram (PS side TCH) 2/19



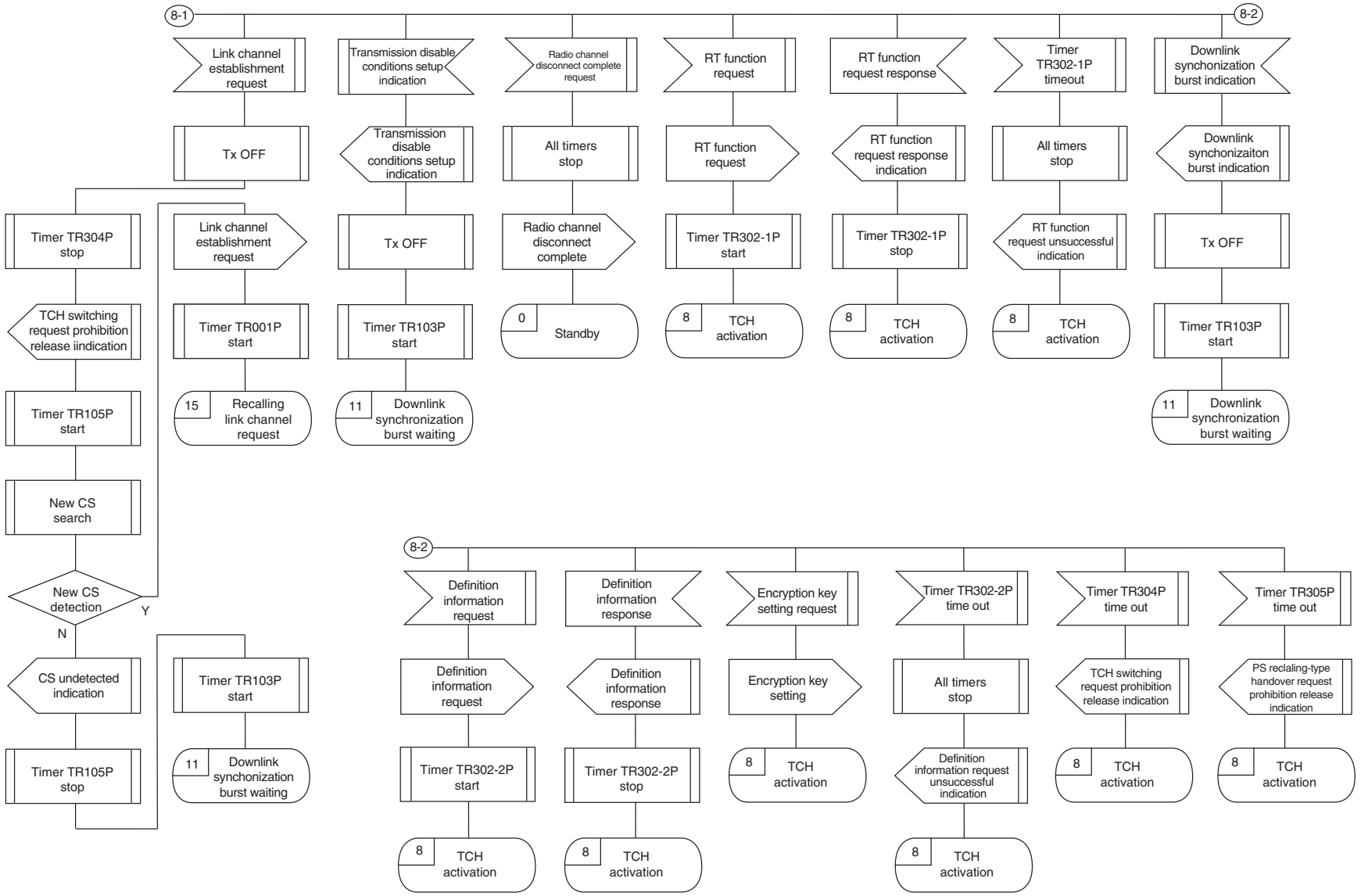


Appendix G RT SDL diagram (PS side TCH) 3/19

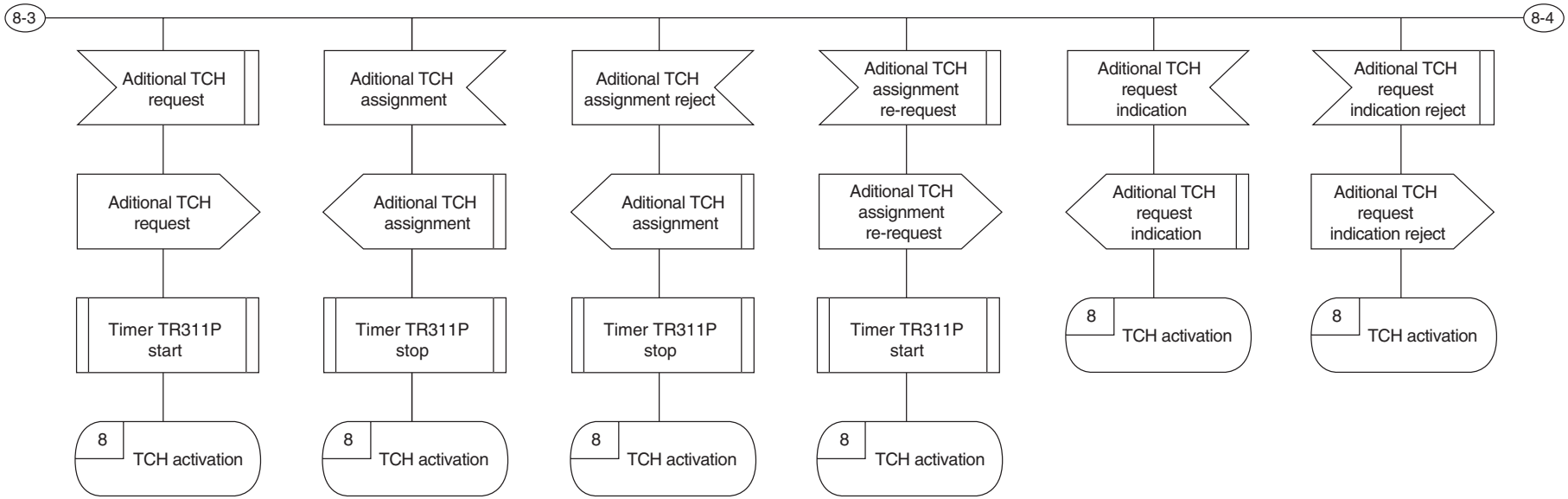


(Note 2) Up to a maximum of 3 retries is possible, including TCH switching request retransmission, TCH switching re-request transmission and retransmission. (Applies for 1/15 through 15/15)

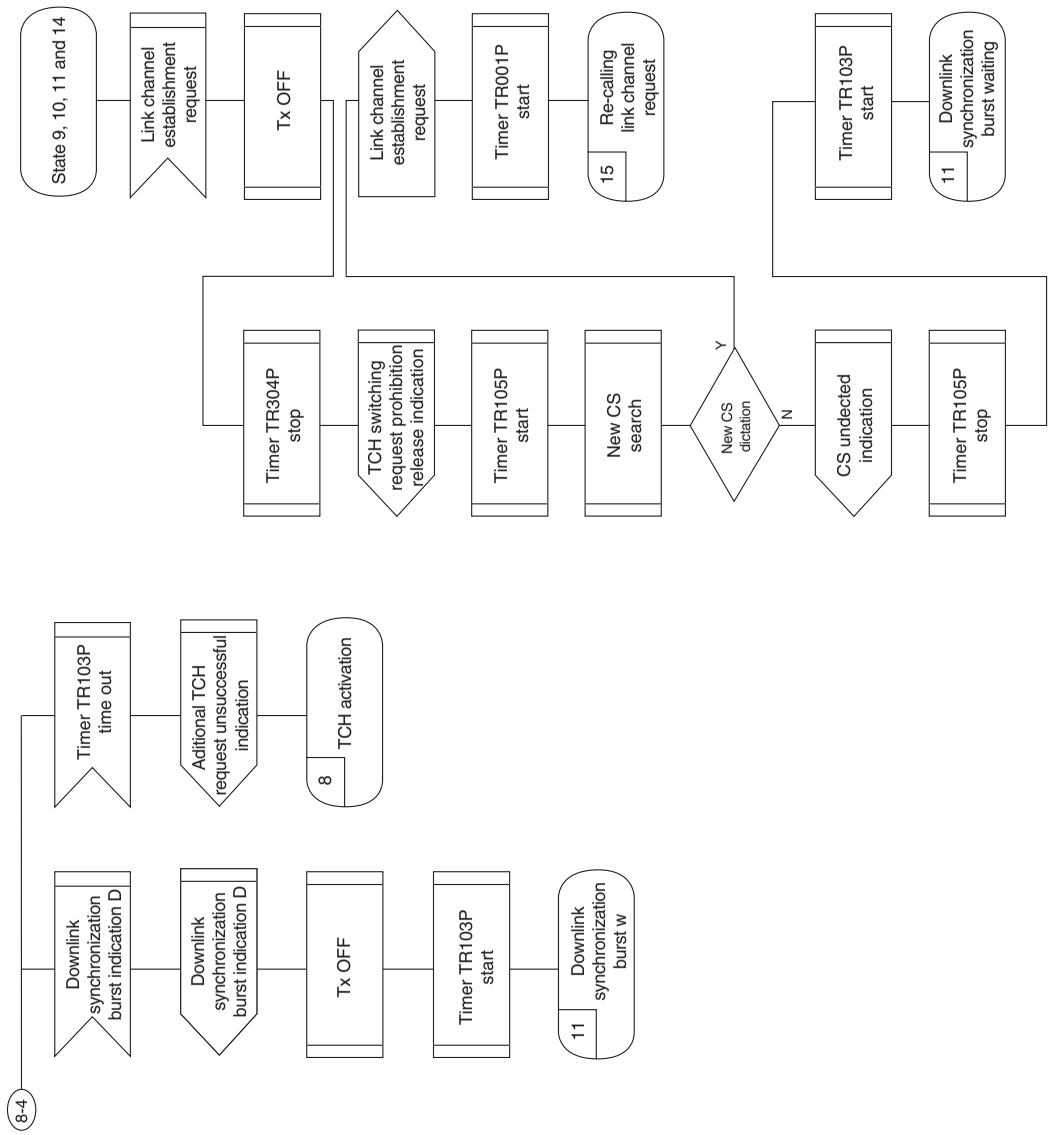
Appendix G RT SDL diagram (PS side TCH) 4/19



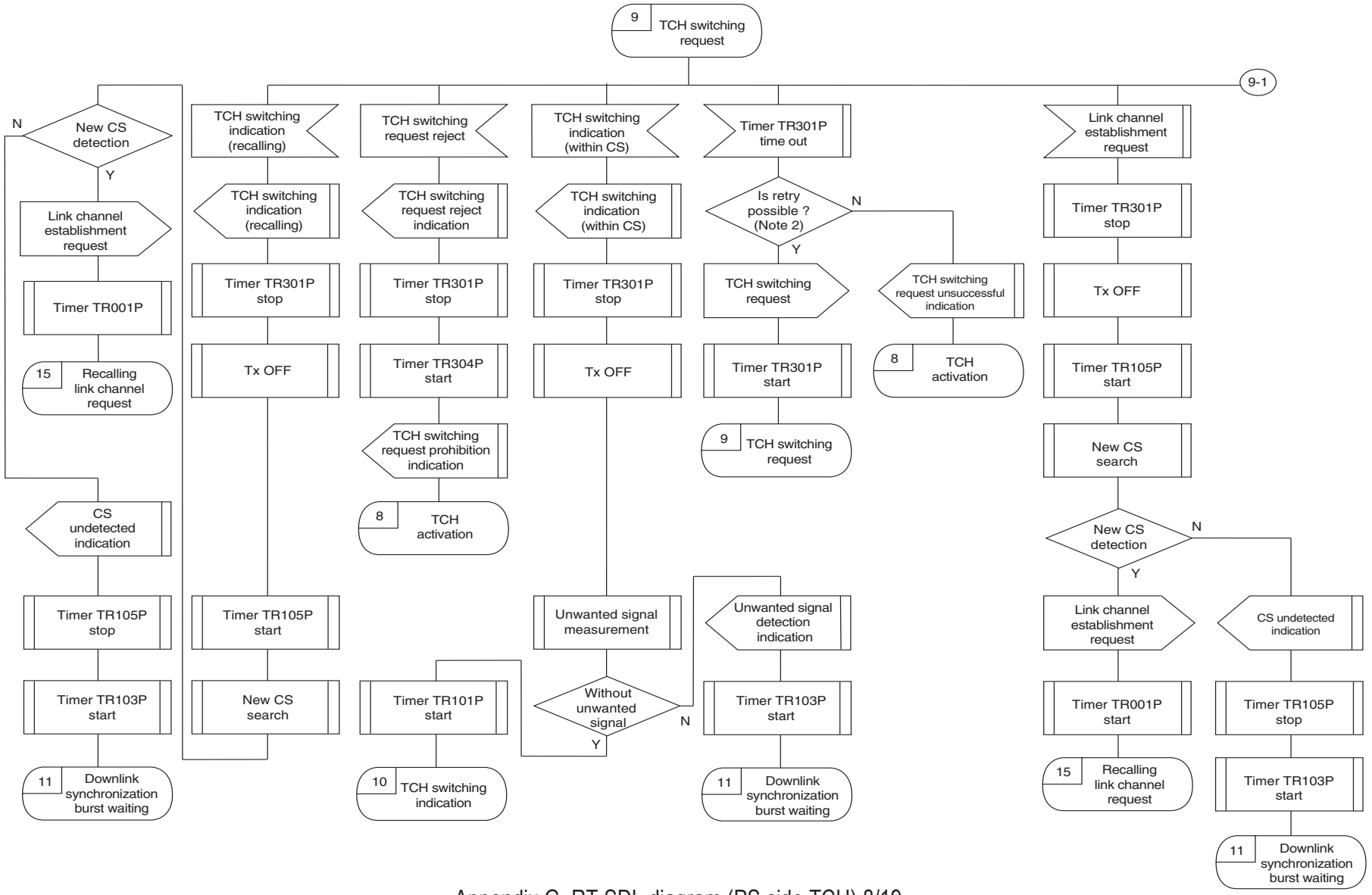
Appendix G RT SDL diagram (PS side TCH) 5/19



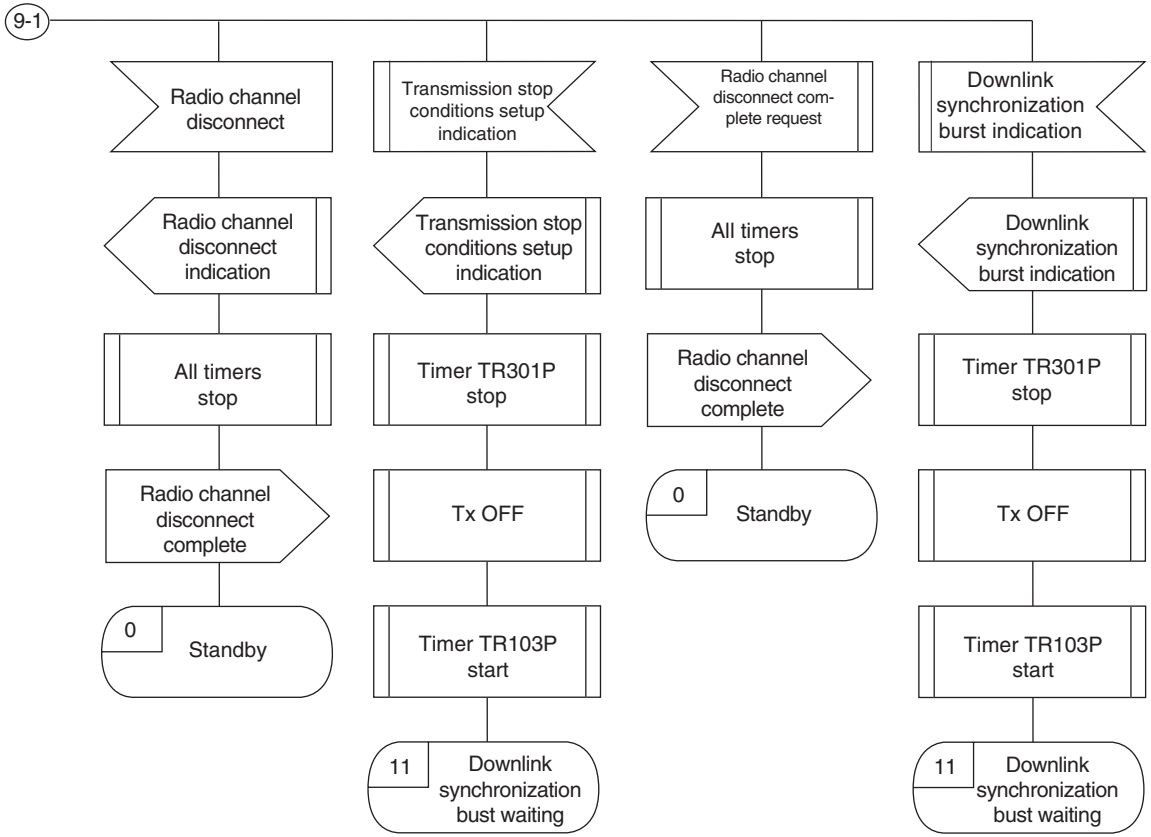
Appendix G RT SDL diagram (PS side TCH) 6/19

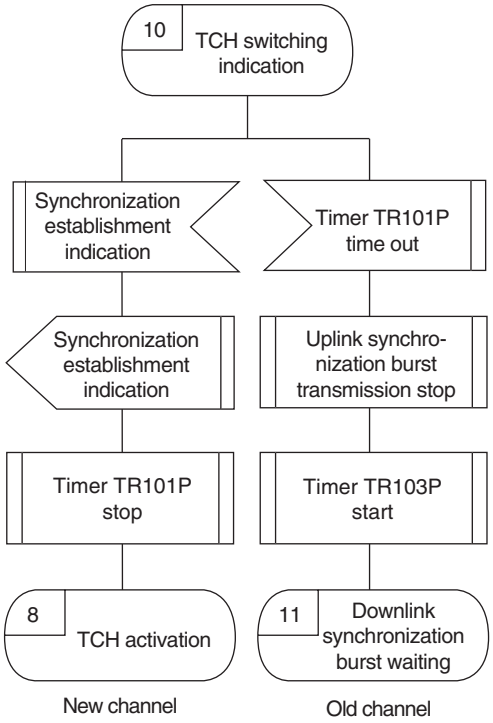


Appendix G RT SDL diagram (PS side TCH) 7/19

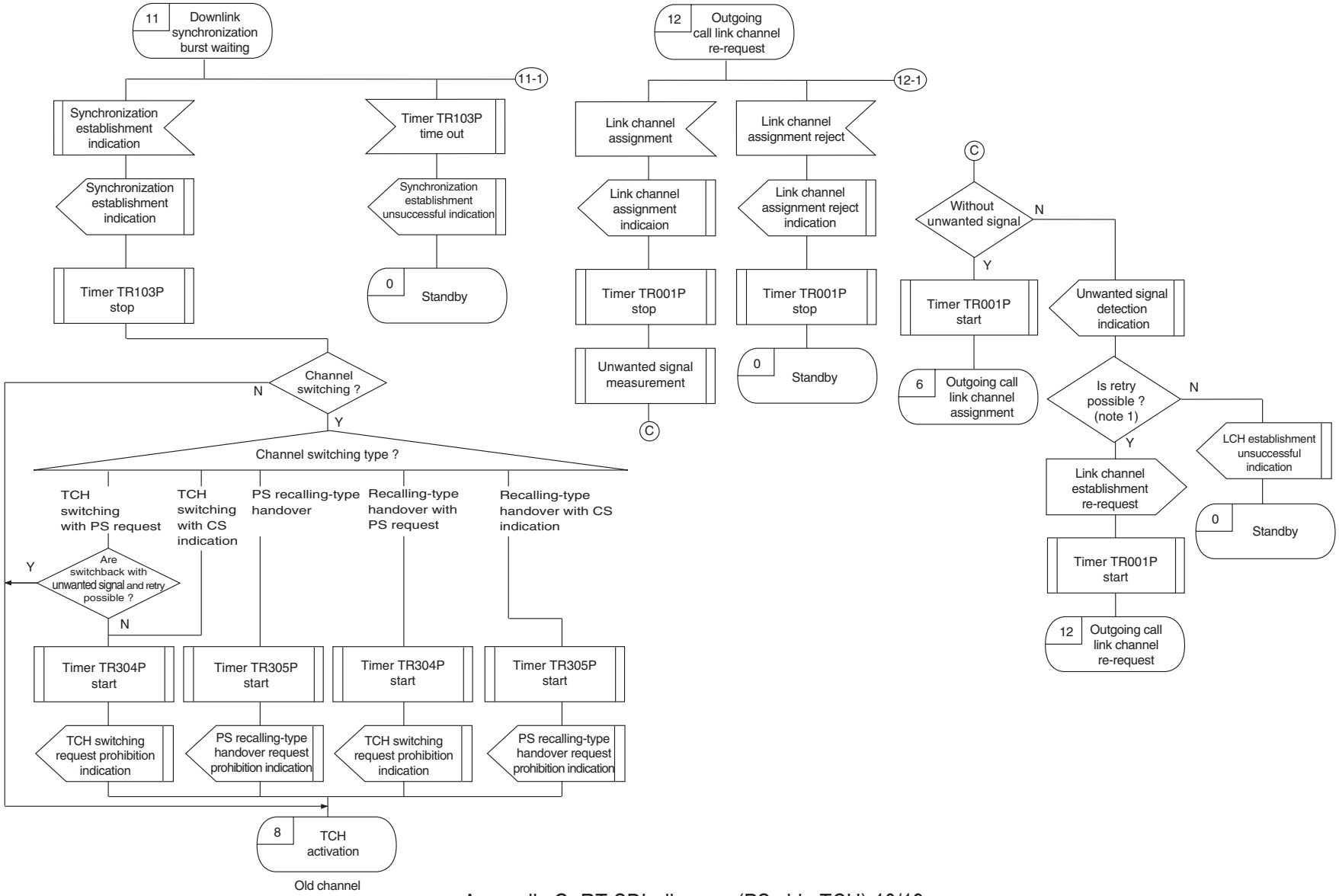


Appendix G RT SDL diagram (PS side TCH) 8/19

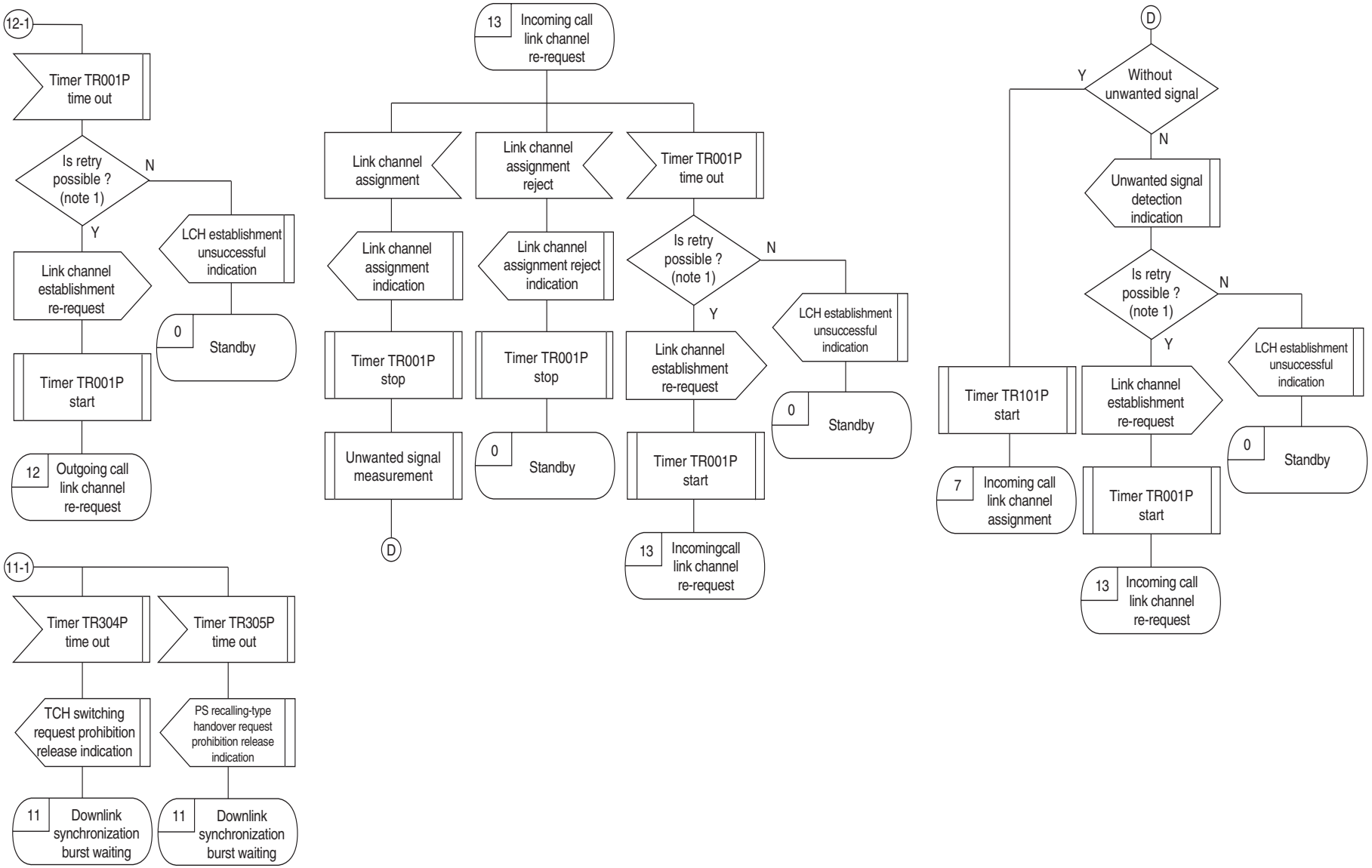




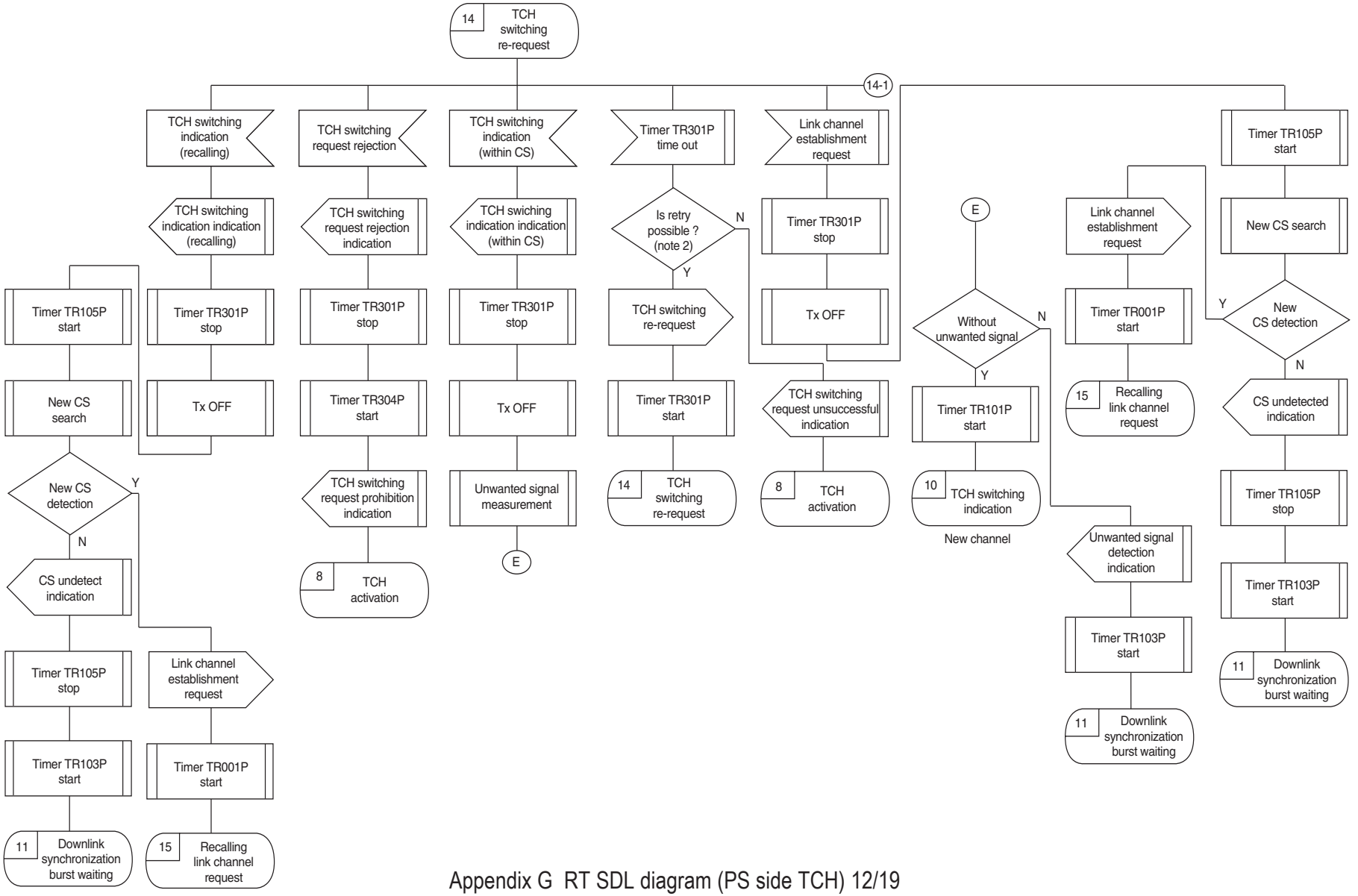
Appendix G RT SDL diagram (PS side TCH) 9/19



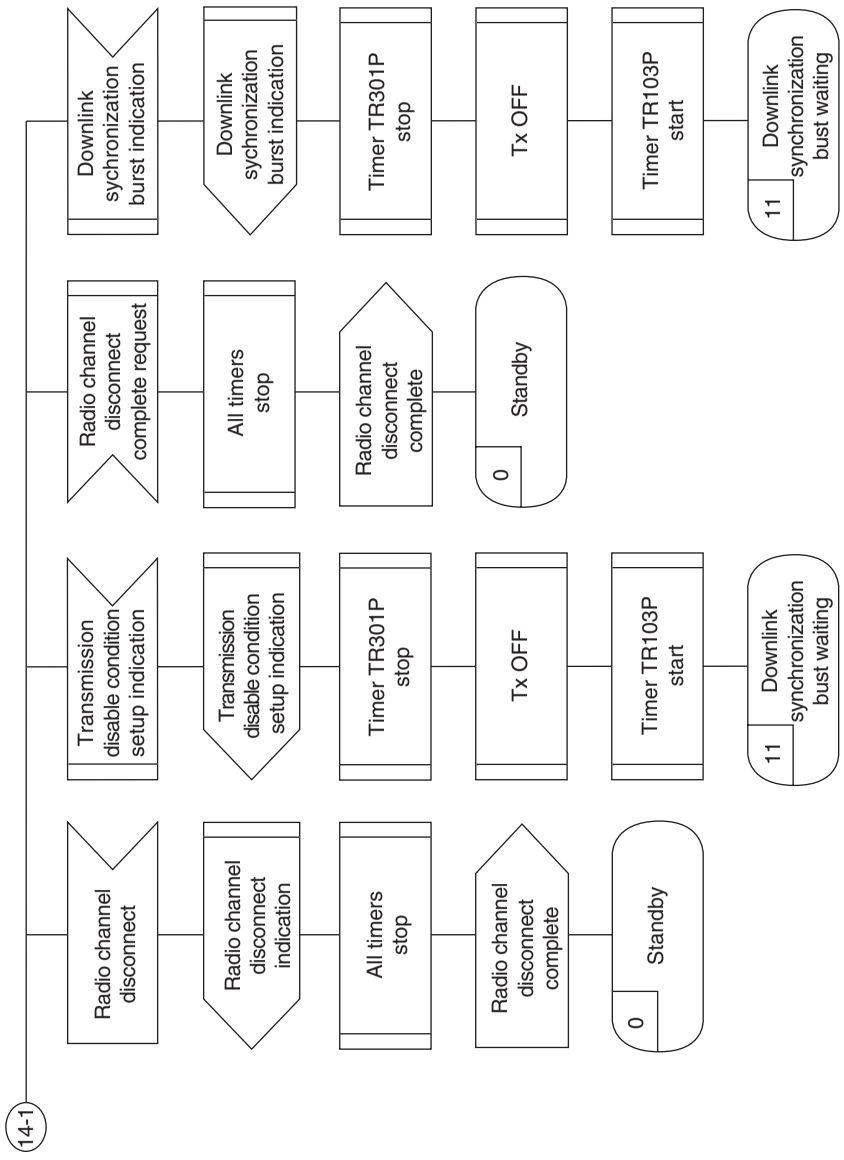
Appendix G RT SDL diagram (PS side TCH) 10/19



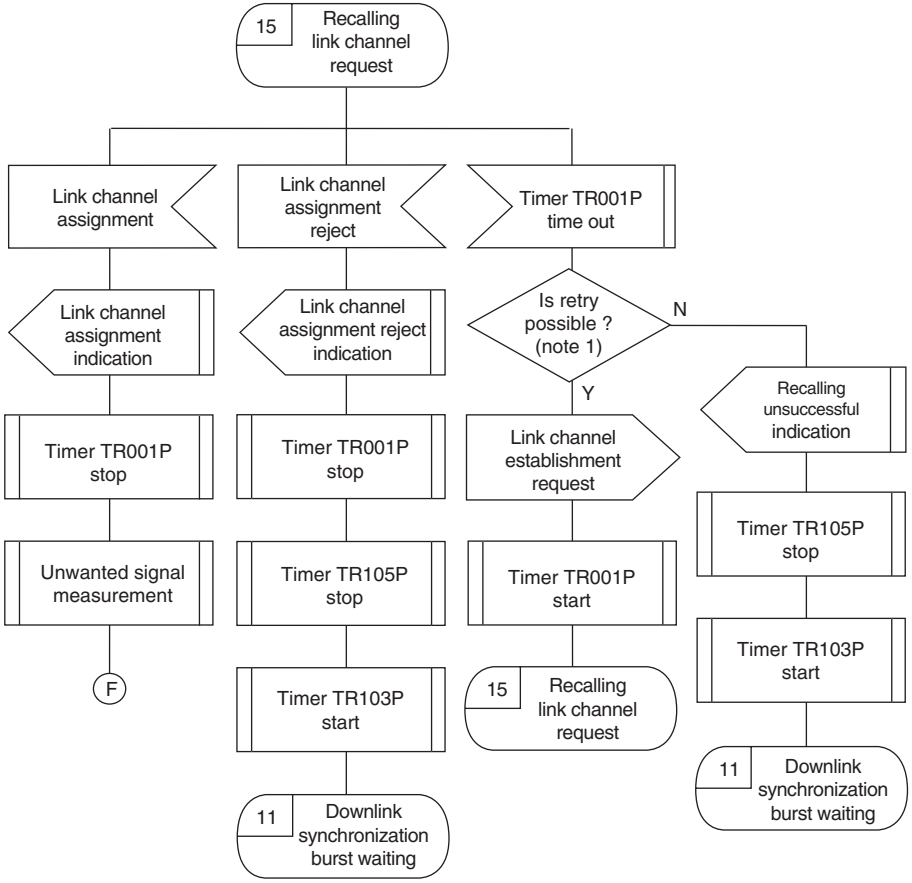
Appendix G RT SDL diagram (PS side TCH) 11/19

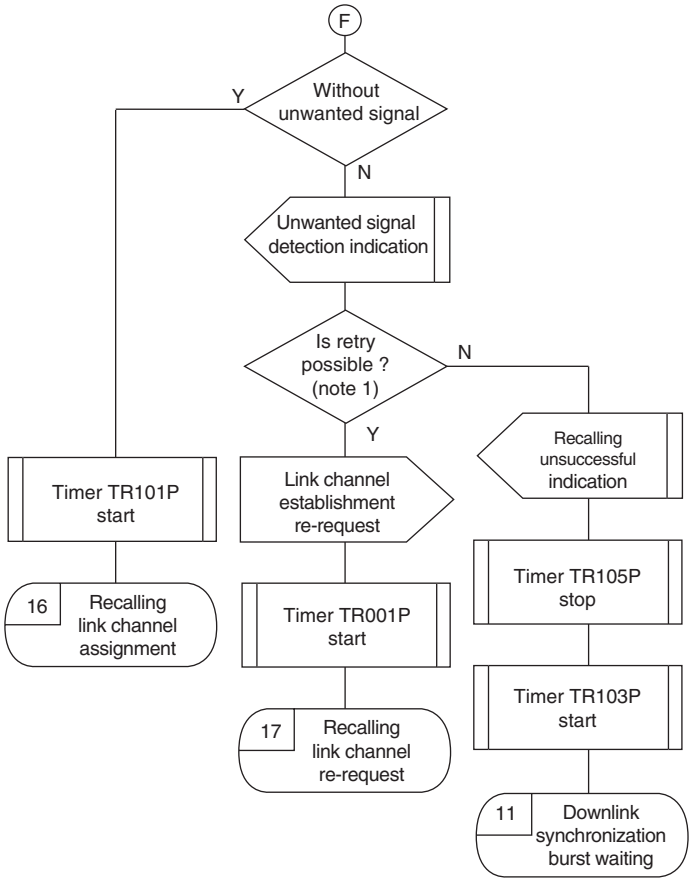


Appendix G RT SDL diagram (PS side TCH) 12/19

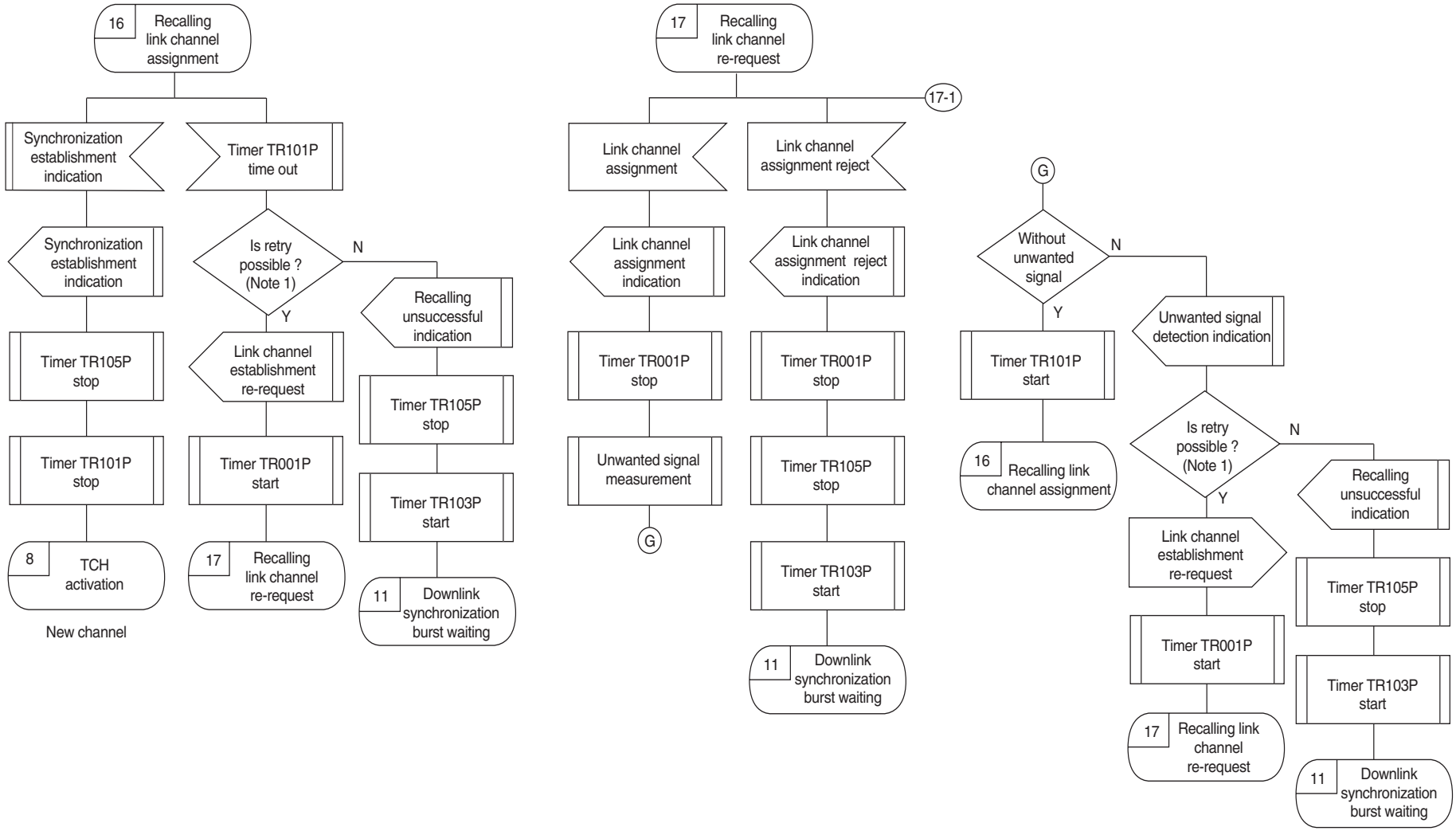


Appendix G RT SDL diagram (PS side TCH) 13/19



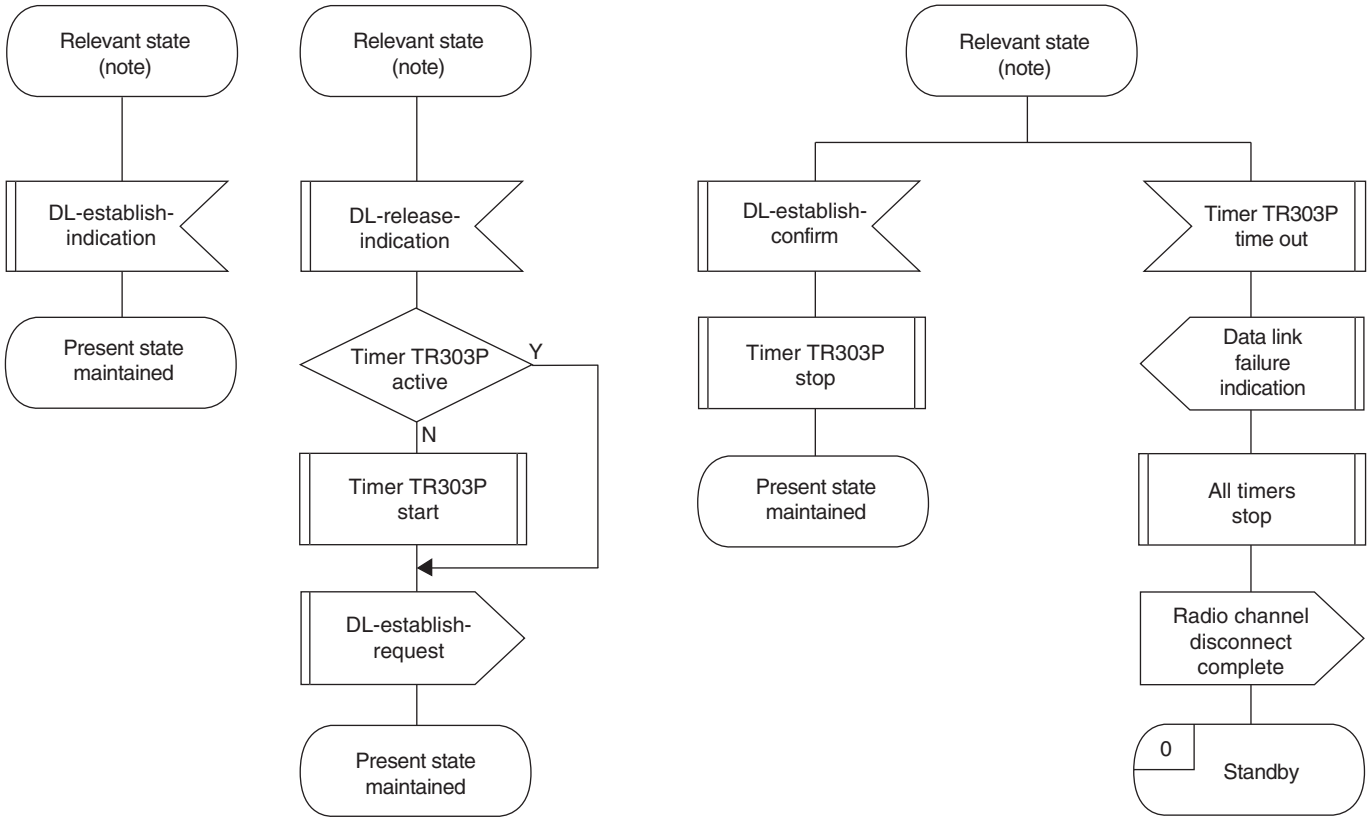


Appendix G RT SDL diagram (PS side TCH) 14/19



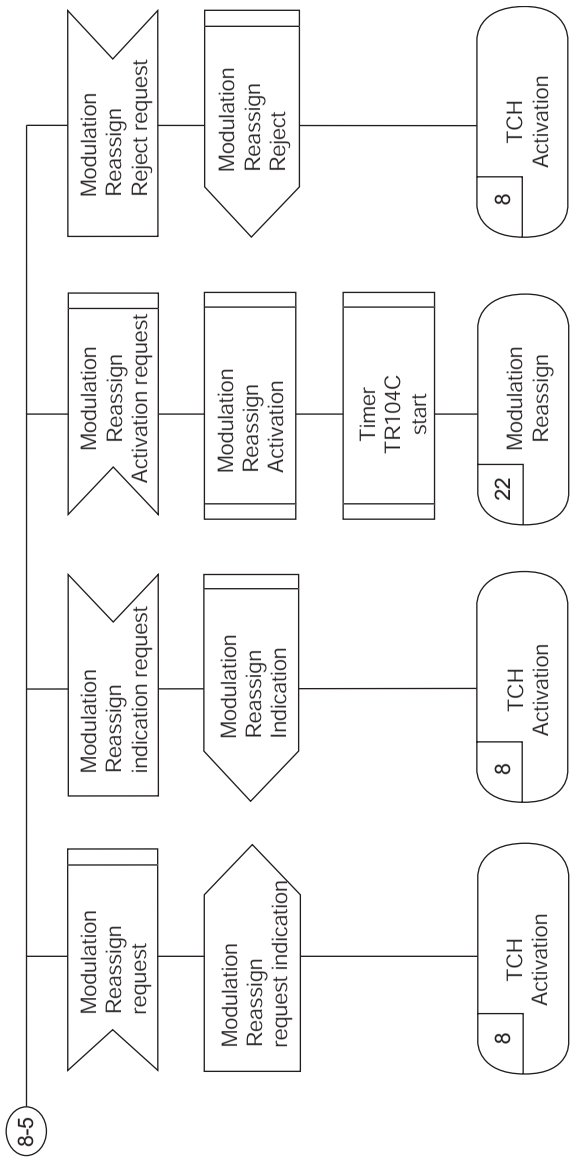
Appendix G RT SDL diagram (PS side TCH) 15/19

Appendix G RT SDL diagram (PS side TCH) 16/19

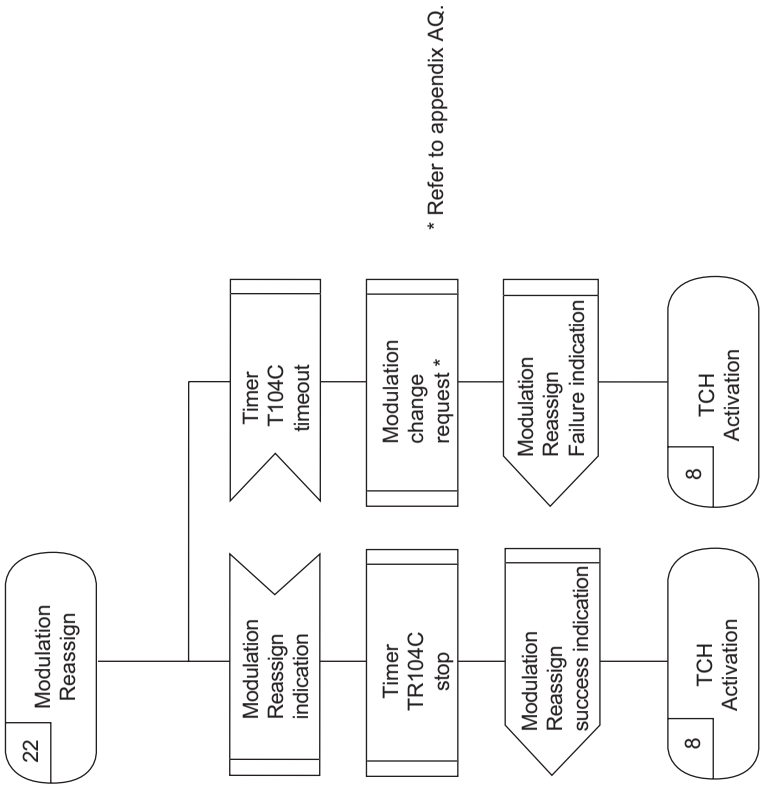


(Note) Relevant state is as follows: 8, 9, 14.

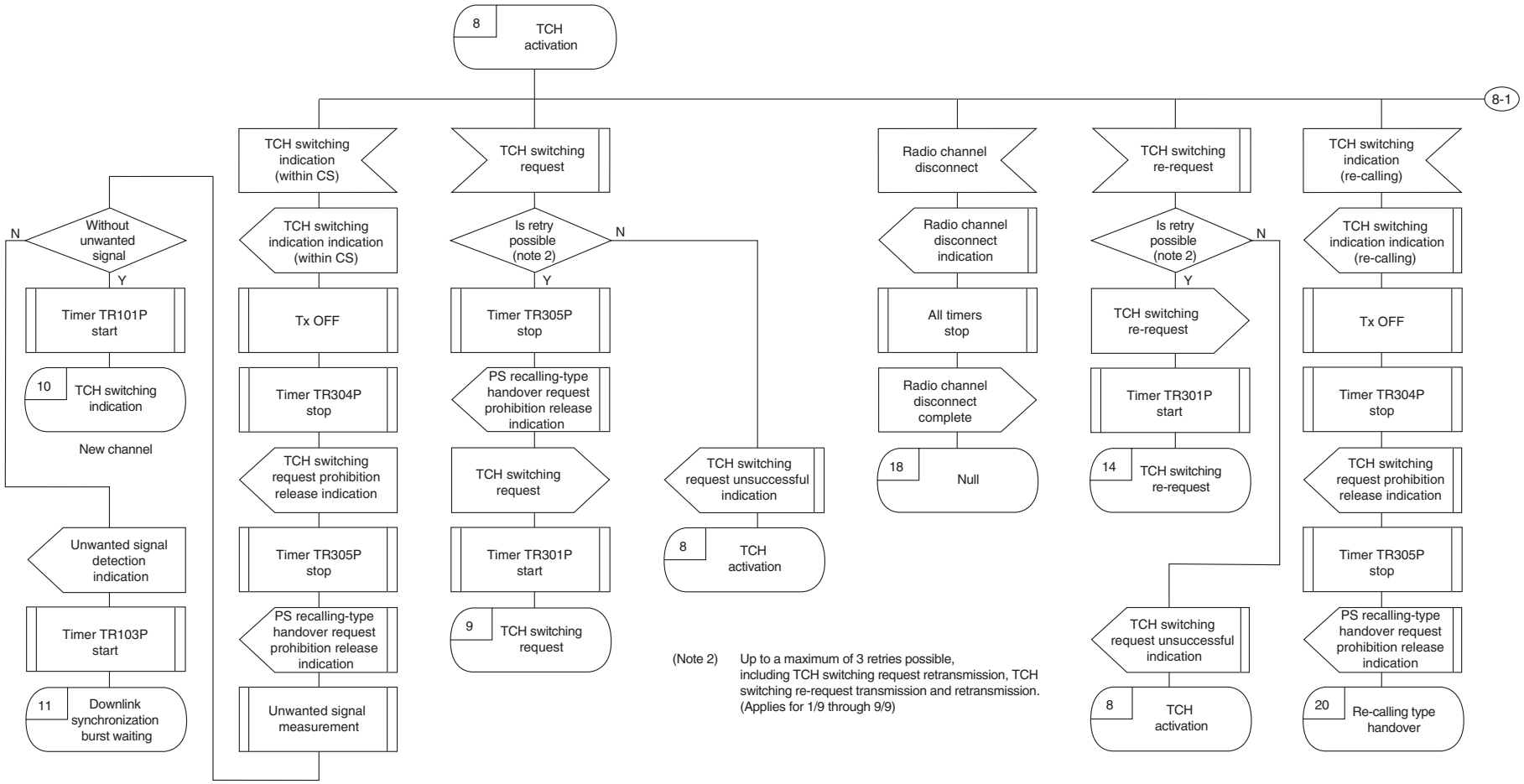
Appendix G RT SDL diagram (PS side TCH) 17/19



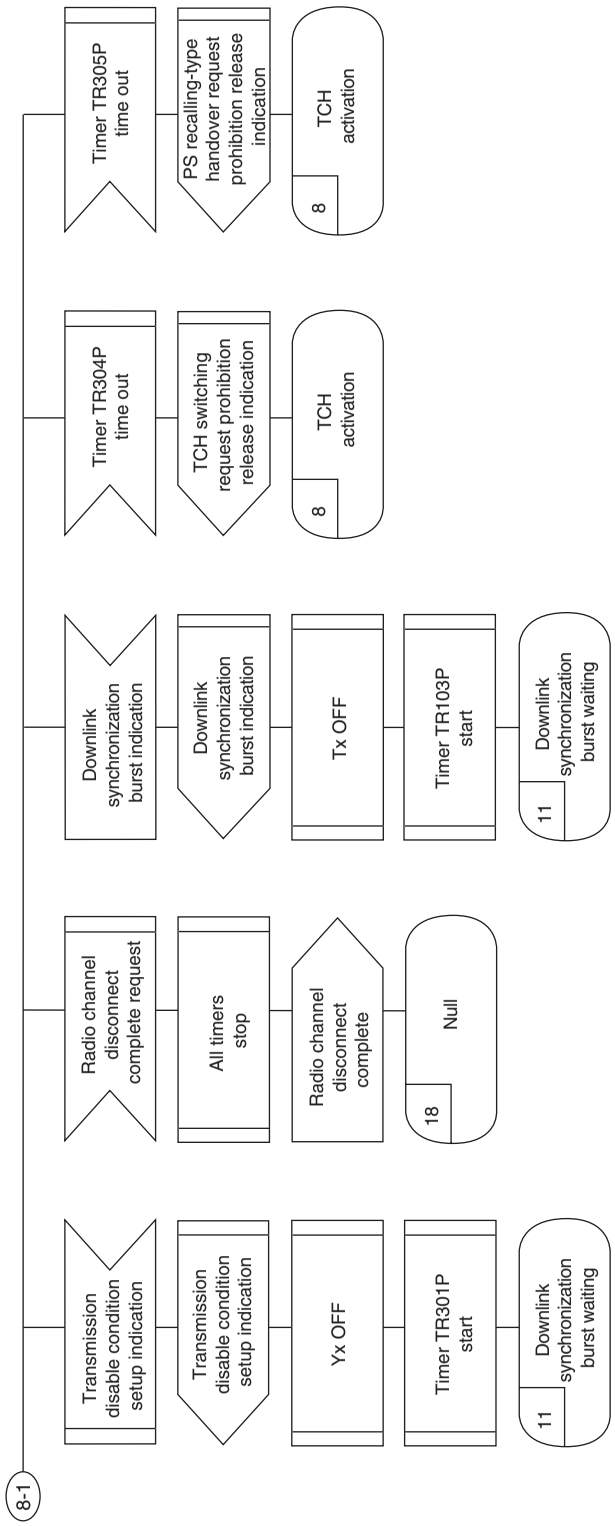
Appendix G RT SDL diagram (PS side TCH) 18/19



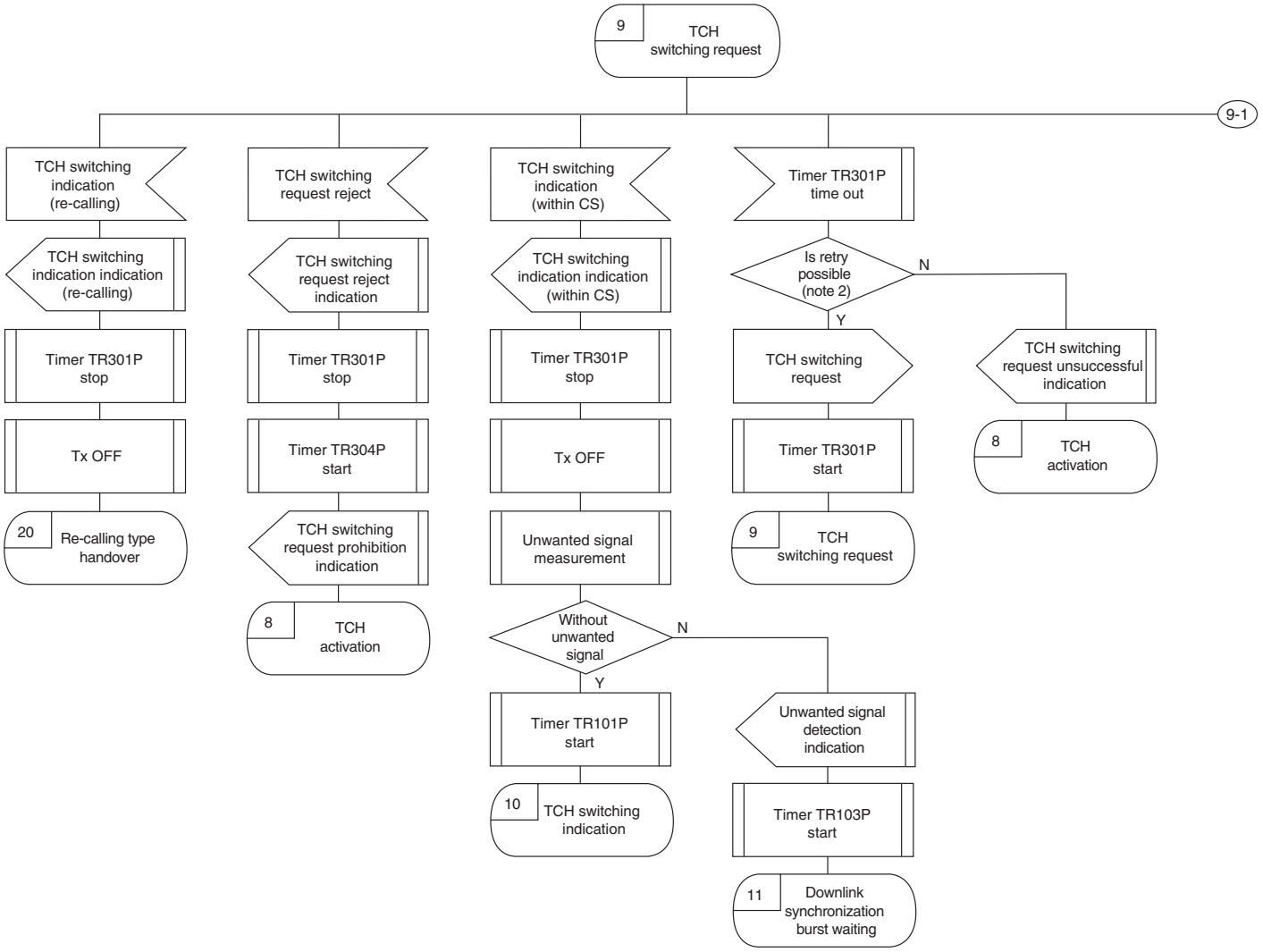
Appendix G RT SDL diagram (PS side TCH) 19/19



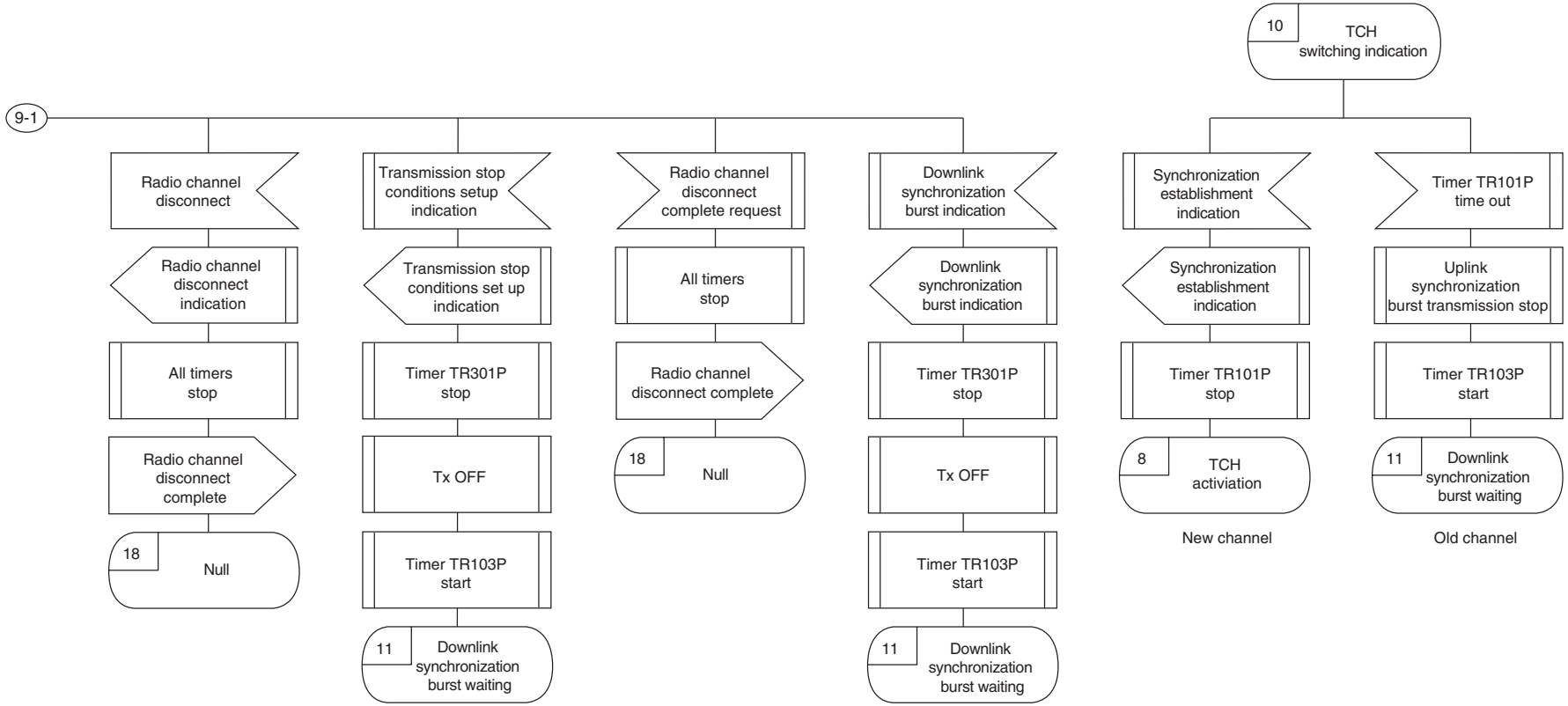
Appendix G RT SDL diagram (PS side : 2nd TCH) 1/9



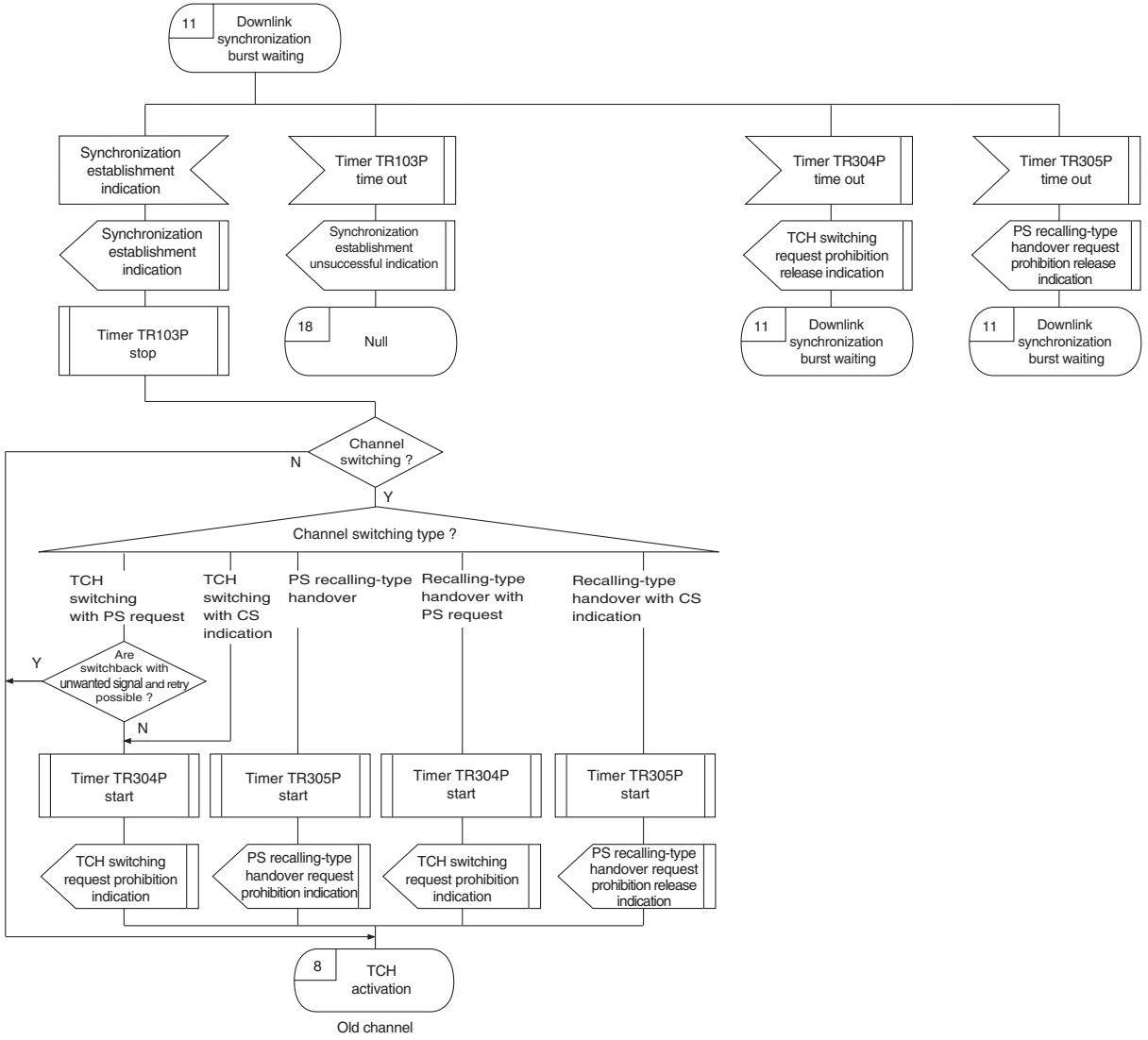
Appendix G RT SDL diagram (PS side : 2nd TCH) 2/9



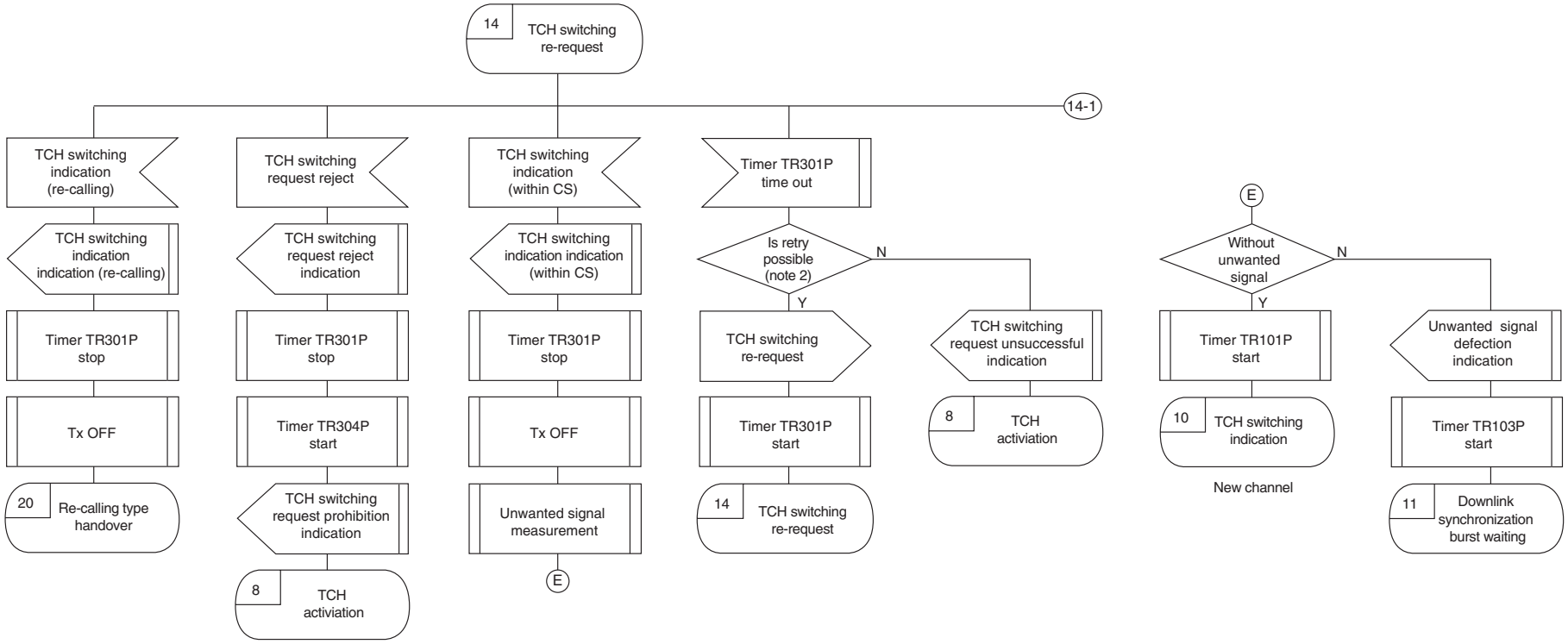
Appendix G RT SDL diagram (PS side : 2nd TCH) 3/9



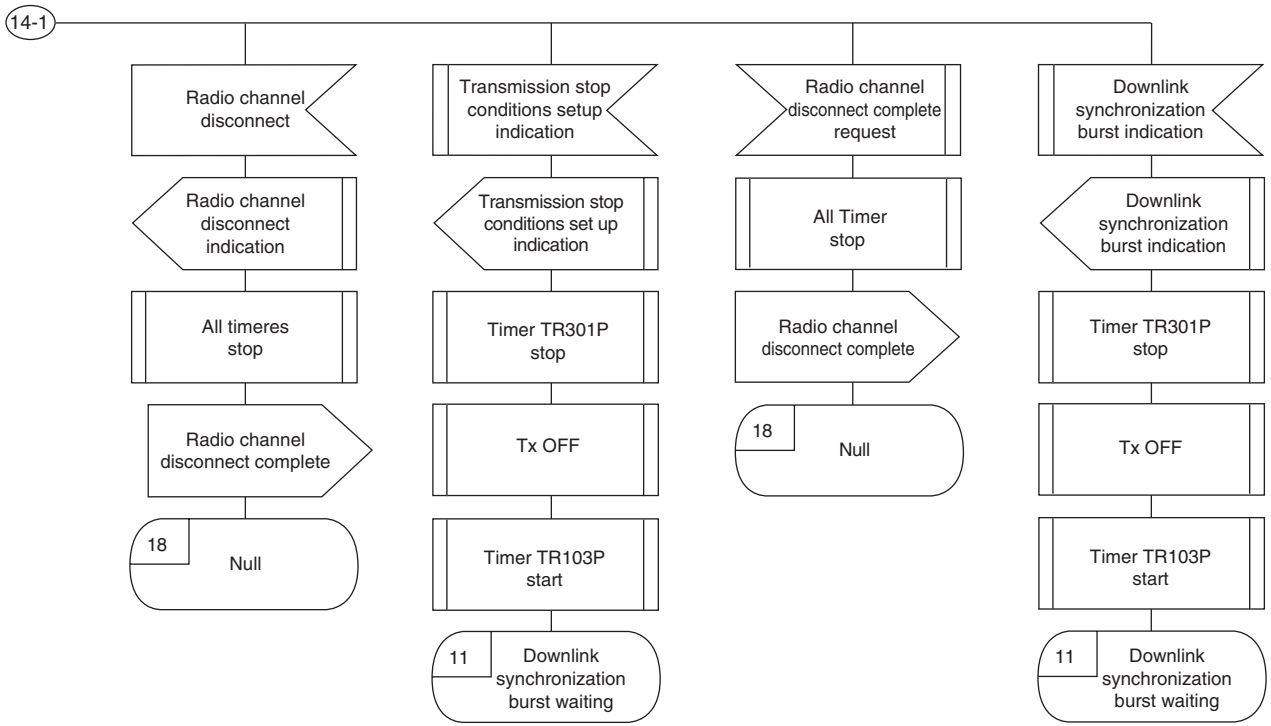
Appendix G RT SDL diagram (PS side : 2nd TCH) 4/9



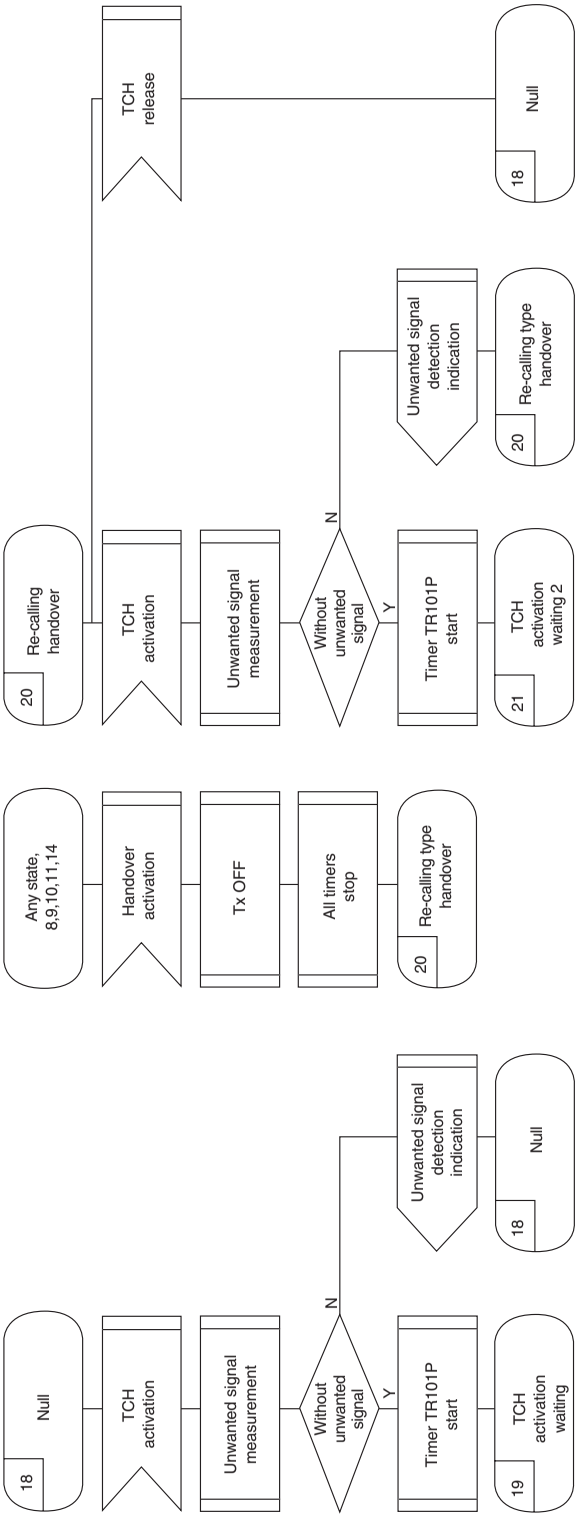
Appendix G RT SDL diagram (PS side : 2nd TCH) 5/9



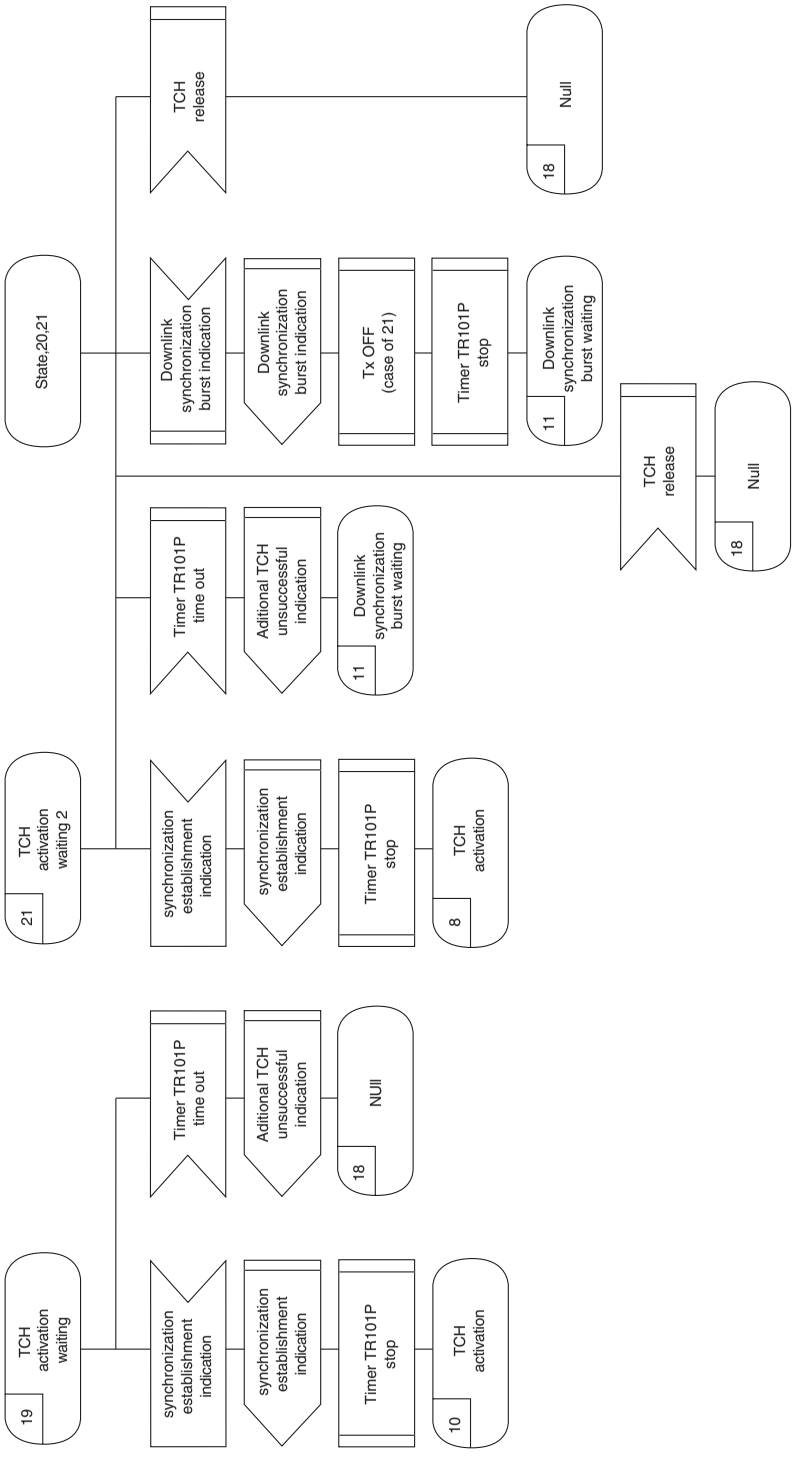
Appendix G RT SDL diagram (PS side : 2nd TCH) 6/9



Appendix G RT SDL diagram (PS side : 2nd TCH) 7/9



Appendix G RT SDL diagram (PS side : 2nd TCH) 8/9



Appendix G RT SDL diagram (PS side : 2nd TCH) 9/9

Appendix H RT PS side timers (Private standard/Public standard)

RT PS side timers 1/2

Timer No.	Timer Value	Status	Start conditions	Stop conditions	Expiration (Retry)	Expiration (Retry out)	Timer	Timer value
TR001P	(1200 ms)	Outgoing call link channel request Incoming call link channel request	"Link channel establishment request" transmission	"Link channel confirm" reception "Link channel assignment reject" reception	"Link channel establishment request" transmission	Standby	Mandatory	Mandatory (note 1)
		Recalling link channel request				Downlink synchronization burst waiting (old TCH)		
		Outgoing call link channel re-request Incoming call link channel re-request	"Link channel establishment re-request" transmission		"Link channel establishment re-request" transmission	Standby		
		Recalling link channel re-request				Downlink synchronization burst waiting (old TCH)		
TR101P	(200 ms)	Outgoing call link channel assignment Incoming call link channel assignment	Without U wave	"Synchronization establishment" reception	"Link channel establishment re-request" transmission	Standby	Mandatory (note 2)	Mandatory
		Recalling link channel assignment				Downlink synchronization burst waiting (old TCH)		
		TCH switching indication				Downlink synchronization burst waiting	Mandatory	Mandatory
		TCH activation (1st TCH) TCH activation waiting (2nd TCH)				TCH activation (1st TCH) Null (2nd TCH)		
		TCH activation (1st TCH) TCH activation waiting 2 (2nd TCH)				Downlink synchronization burst waiting (old TCH) (Note 8)		
TR103P	(10 s)	Downlink synchronization burst waiting	When entering downlink synchronization burstwaiting status	"Synchronization establishment" reception		Standby	Mandatory	Mandatory
TR104P	(200 ms)	Modulation Reassign	"Modulation Reassign activation request" primitive reception	"Modulation Reassign indication" primitive reception		TCH activation	Mandatory	Mandatory
TR105P	(6 s)	TCH switching running	When moving to new CS search	When "synchronization establishment" reception or entering downlink synchronization burst waiting status		Downlink synchronization burst waiting (old TCH)	Mandatory	Mandatory

RT PS side timers 2/2

TR301P (1 s)	TCH switching request	"TCH switching request" transmission,	"TCH switching indication" reception "TCH switching request reject" reception	"TCH switching request" transmission	TCH activation	Man-datory	Man-datory
	TCH switching re-request	"TCH switching re-request" transmission		"TCH switching re-request" transmission			
TR302-1P (1 S)	TCH activation	"RT function request" transmission	"RT function request" response" reception		TCH activation	Man-datory	Man-datory
TR302-2P (1 S)	TCH activation	"Definition information request" transmission	"Definition information response" reception		TCH activation	Man-datory	Man-datory
TR303P (90 s)	TCH activation , TCH switching request TCH switching re-request	"DL-release-indiication" primitive reception	"DL-establish-confirm" primitive reception		Standby	Optional (note 4)	Man-datory
TR304P (5 s) (note 3)	TCH activation, Downlink synchronization burst waiting	"Synchronization establishment" (old TCH) reception (TCH switching, recalling-type handover with PS request) or TCH switching request rejection reception	(Note 5)		TCH activation , Downlink synchronization burst waiting	Man-datory	Man-datory
TR305P (5 s) (note 3)	TCH activation , Downlink synchronization burst waiting	"Synchronization establishment" (old TCH) reception (PS recalling-type handover, recalling-type handover with CS indication)	(Note 6)		TCH activation, Downlink synchronization burst waiting	Man-datory	Man-datory
TR311P (4 s)	TCH activation (1st TCH) Null (2nd TCH)	"Additional TCH request" transmission	"Additional TCH assignment" reception		TCH activation (1st TCH) Null (2nd TCH)	Man-datory	Man-datory
		"Additional TCH re-request" transmission	"Additional TCH reject" reception				

(Note 1) The timer value of timer TR001P is any value of at least 1200 ms.

(Note 2) TR101P = (TR101P-1) + (TR101P-2)
TR101P-1 100 ms
TR101P-2 100 ms

(Note 3) While this timer is running:
TR304P: TCH switching prohibited and recalling-type handover with PS request prohibited
TR305P: PS recalling-type handover prohibited

(Note 4) Mandatory when data link re-establish is performed.

(Note 5) When the TCH switching indication is received from CS (TCH switching within CS or recalling-type handover) or when link channel establishment request is transmitted (Recalling-type handover), this timer is stopped.

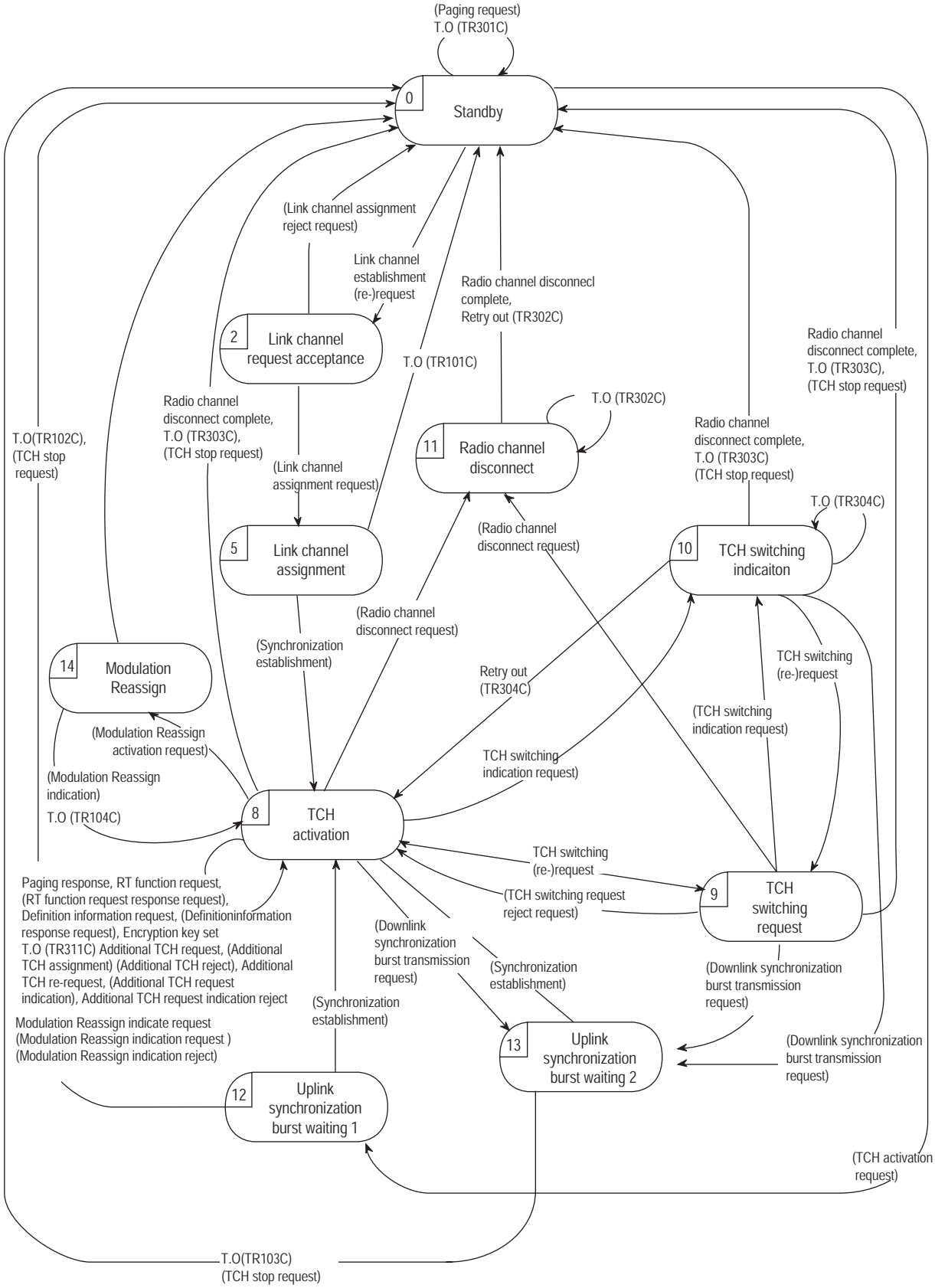
(Note 6) When the TCH switching indication is received from CS (TCH switching within CS or recalling -type handover) or when TCH switching request is transmitted, this timer is stopped.

(Note 7) All timers stopped "radio channel disconnect" reception, "radio channel disconnect complete transmission request" primitive reception.

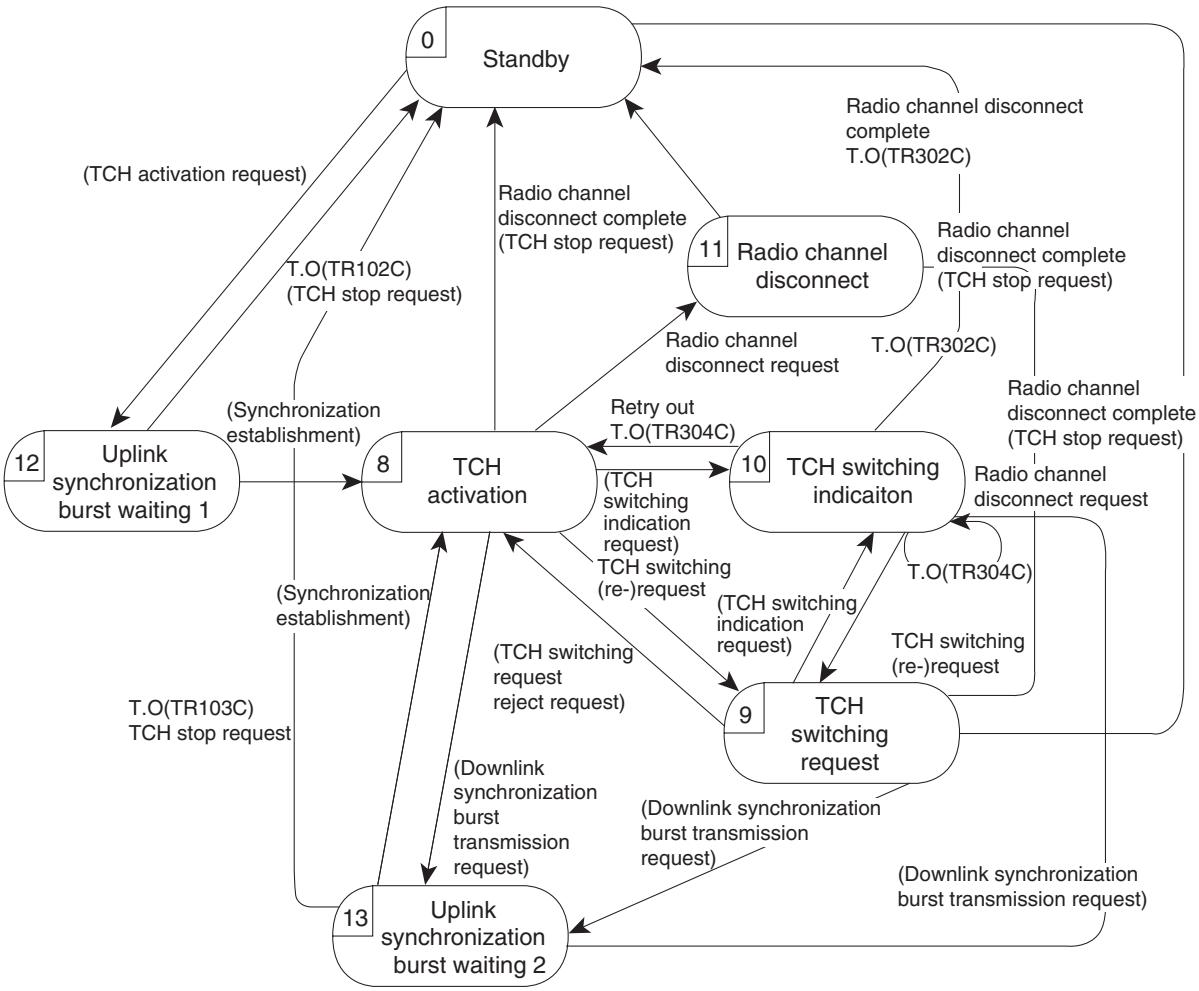
Mandatory: Specified in the standard, and must be realized. Further, a mandatory timer value is valid when the timer is realized.
Optional: Specified in the standard, and is realized depending on need. Further, an opthional timer value is a reference value when the timer is realized.

(Note 8) Connection of only 1st TCH is allowed in slot changeable type 64kbit/s Unrestricted Digital Information connection, so state of TCH activation (1st TCH) and Null (2nd TCH) can enter.

Appendix I RT state transition diagram (CS side) (Private standard/Public standard)



RT state transition diagram (CS side TCH)



RT state transition diagram (CS side:2nd TCH)

Appendix J RT SDL diagrams(CS side)

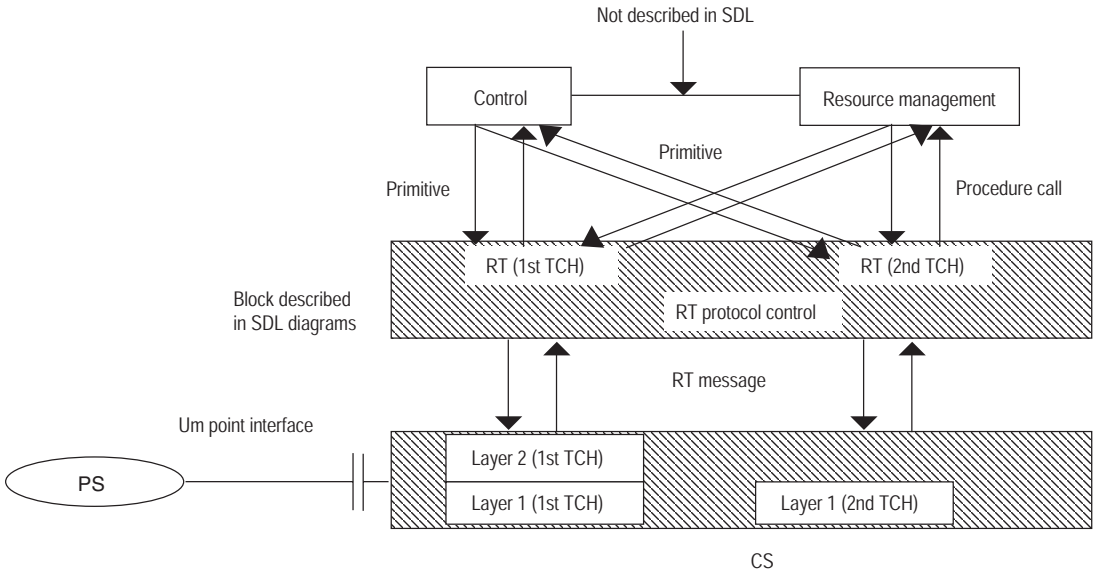


Figure 1 RT SDL diagram description method (CS side)

(Private standard/Public standard)

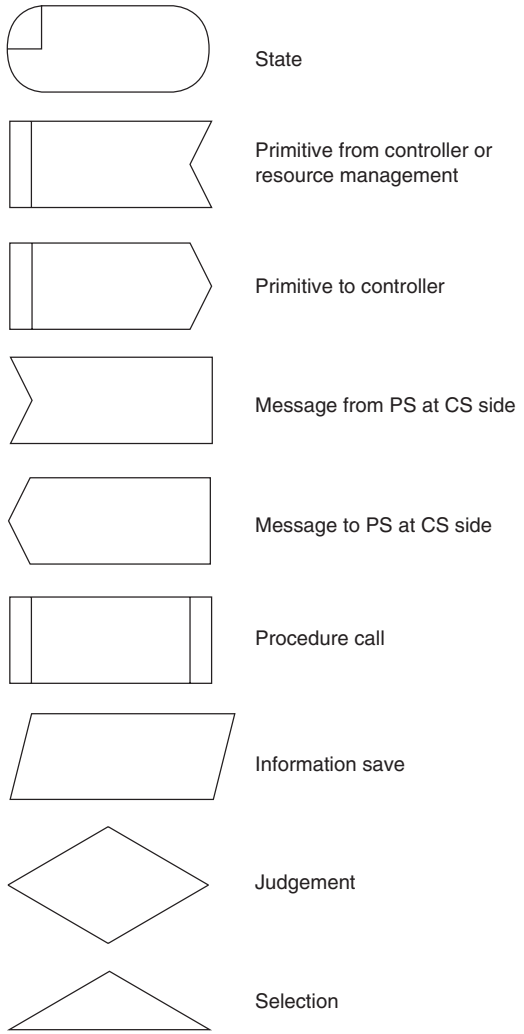
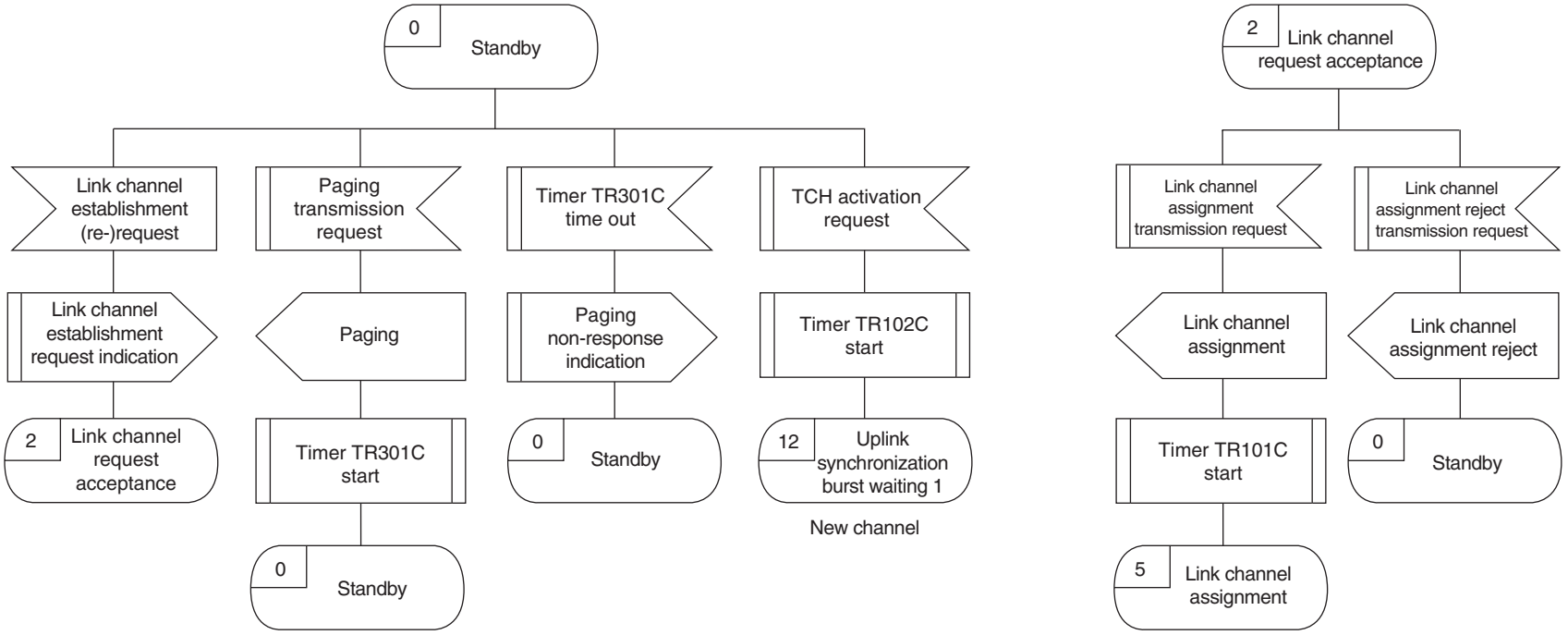
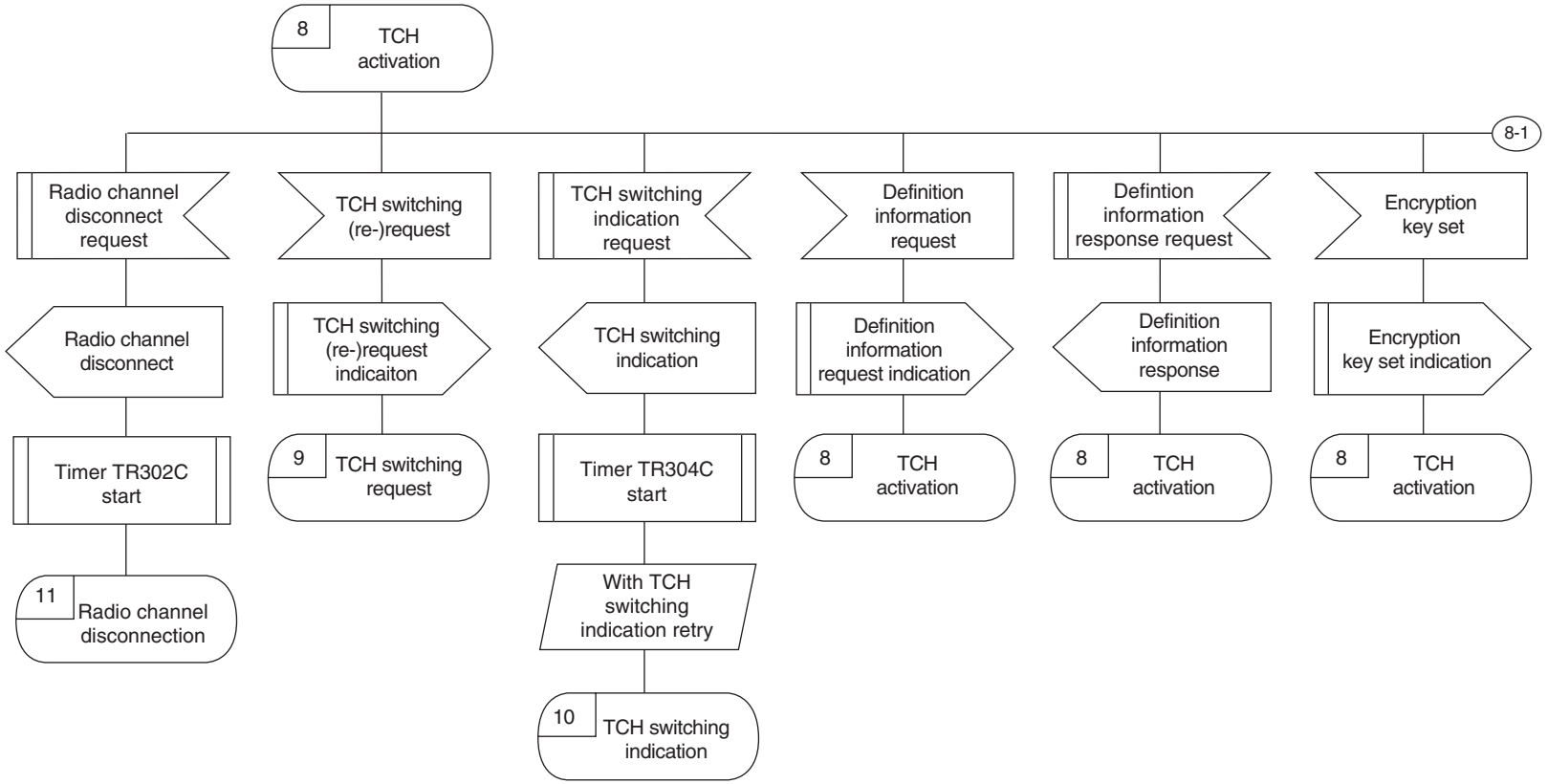


Figure 2 RT SDL diagram rules (CS side)

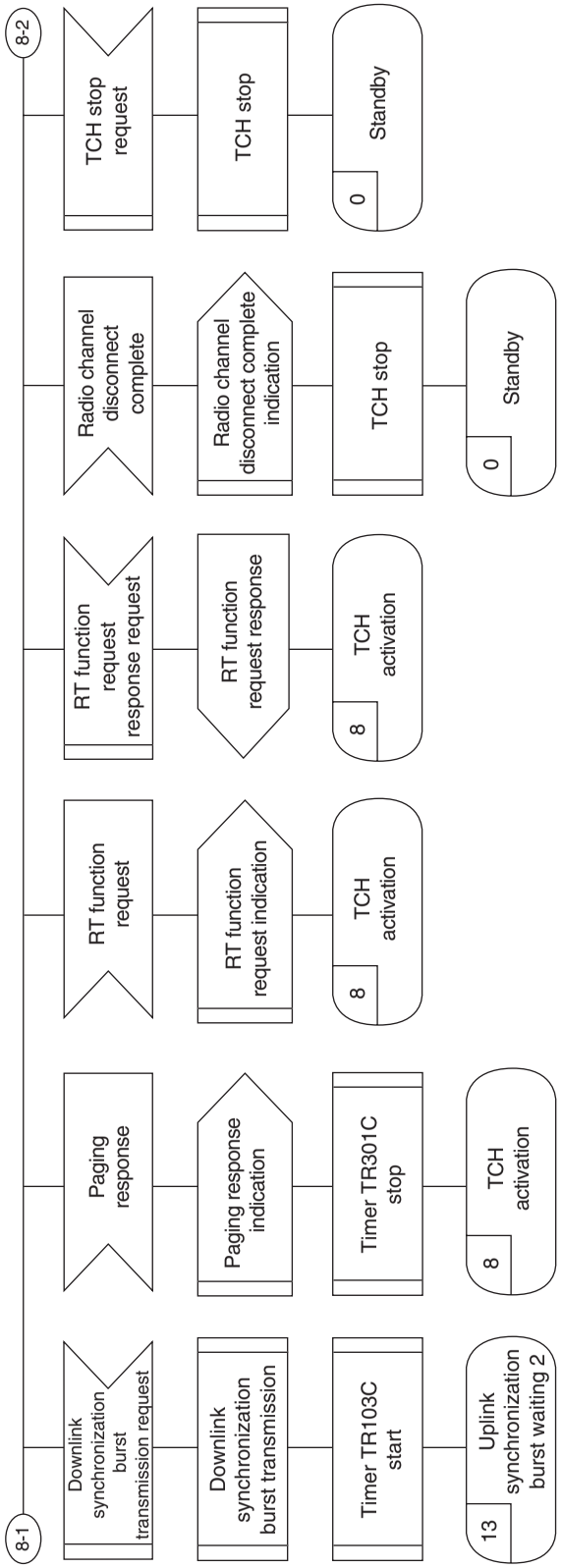


Appendix J RT SDL diagram (CS side TCH) 1/12

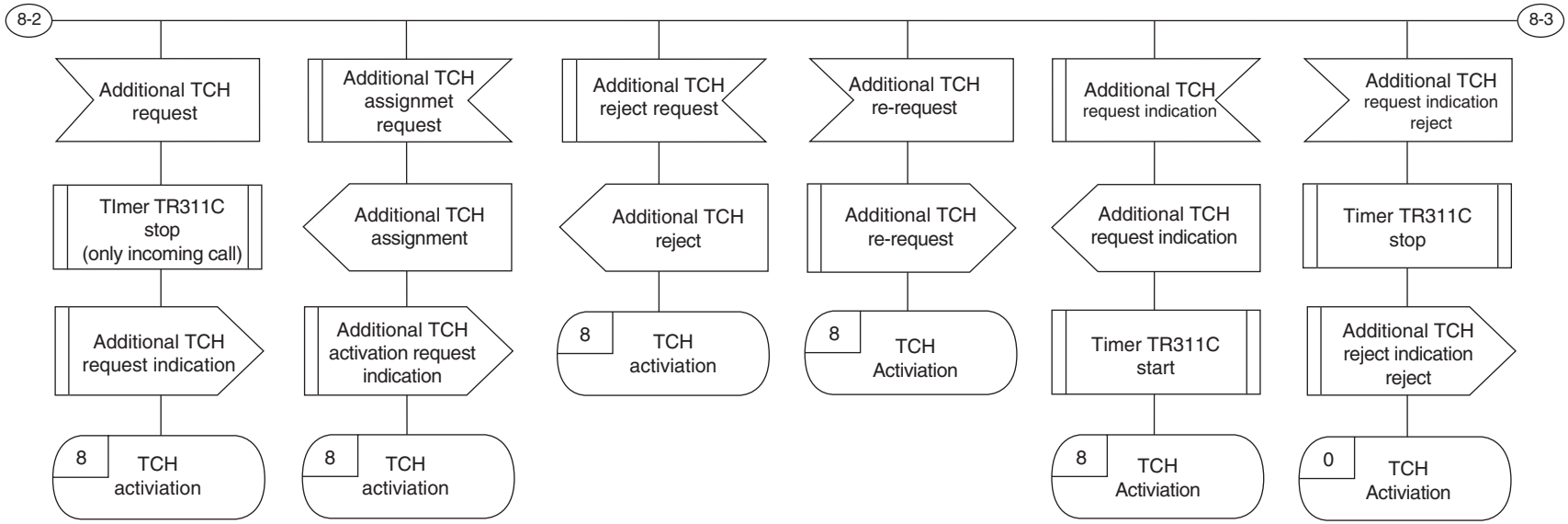
Appendix J RT SDL diagram (CS side TCH) 2/12



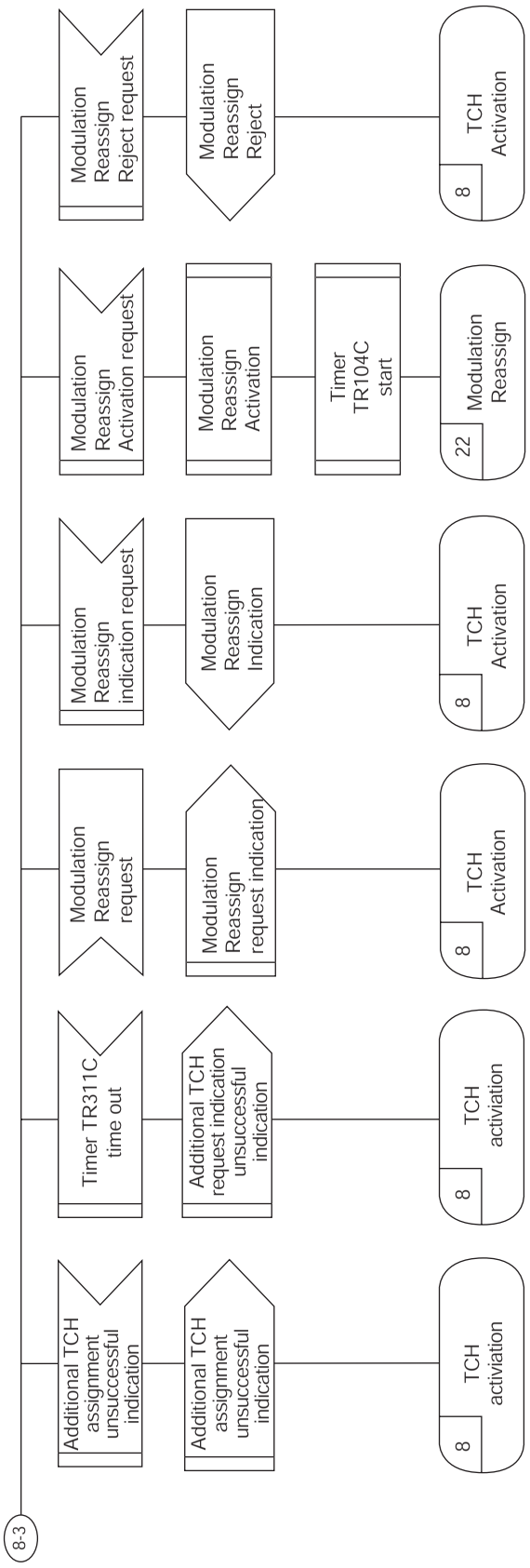
Appendix J RT SDL diagram (CS side TCH) 3/12



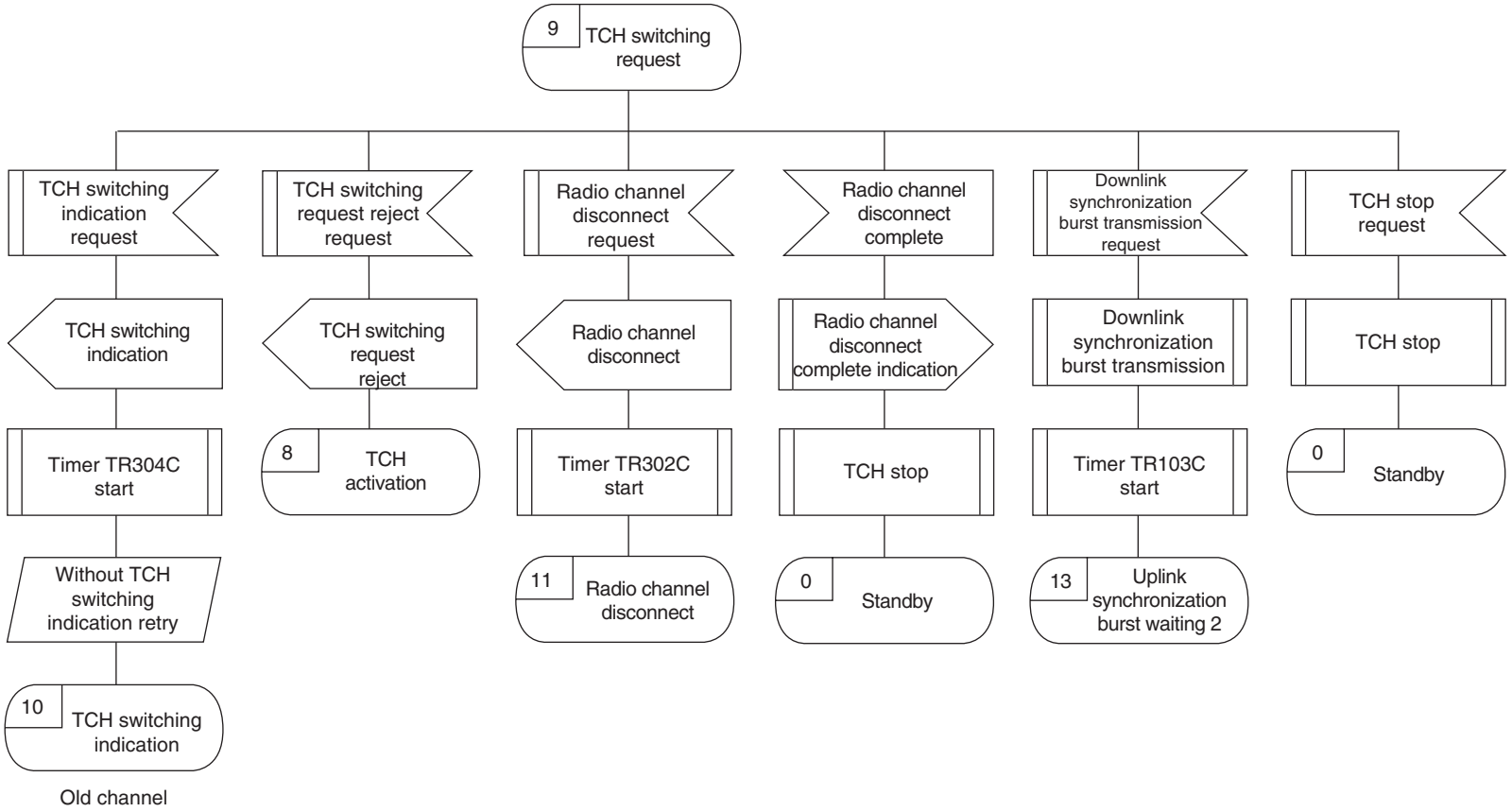
Appendix J RT SDL diagram (CS side TCH) 4/12



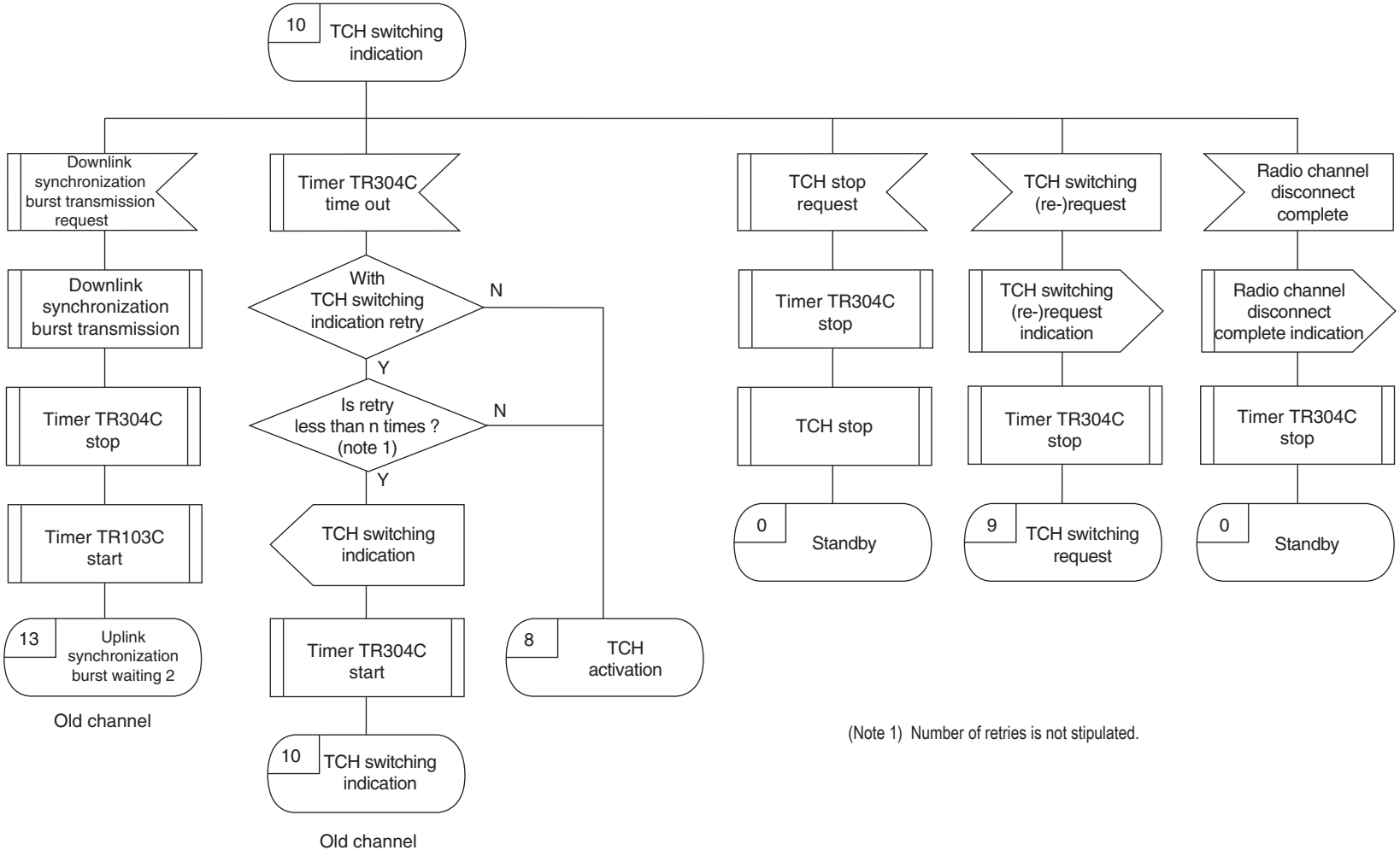
Appendix J RT SDL diagram (PS side : 2nd TCH) 5/12



Appendix J RT SDL diagram (CS side TCH) 6/12

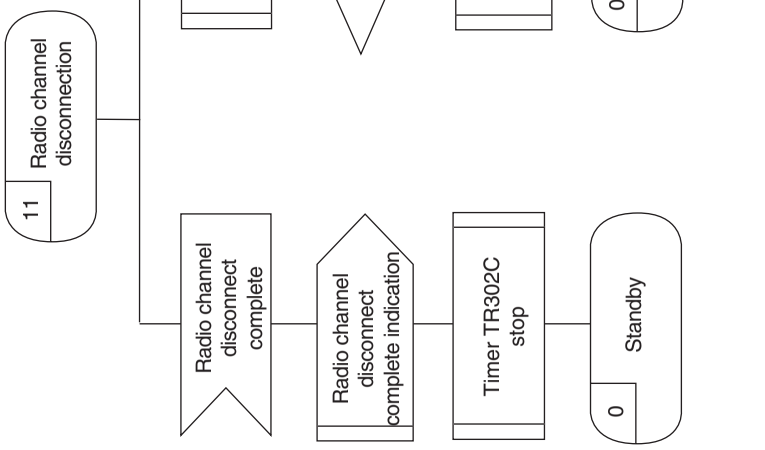


Appendix J RT SDL diagram (CS side TCH) 7/12

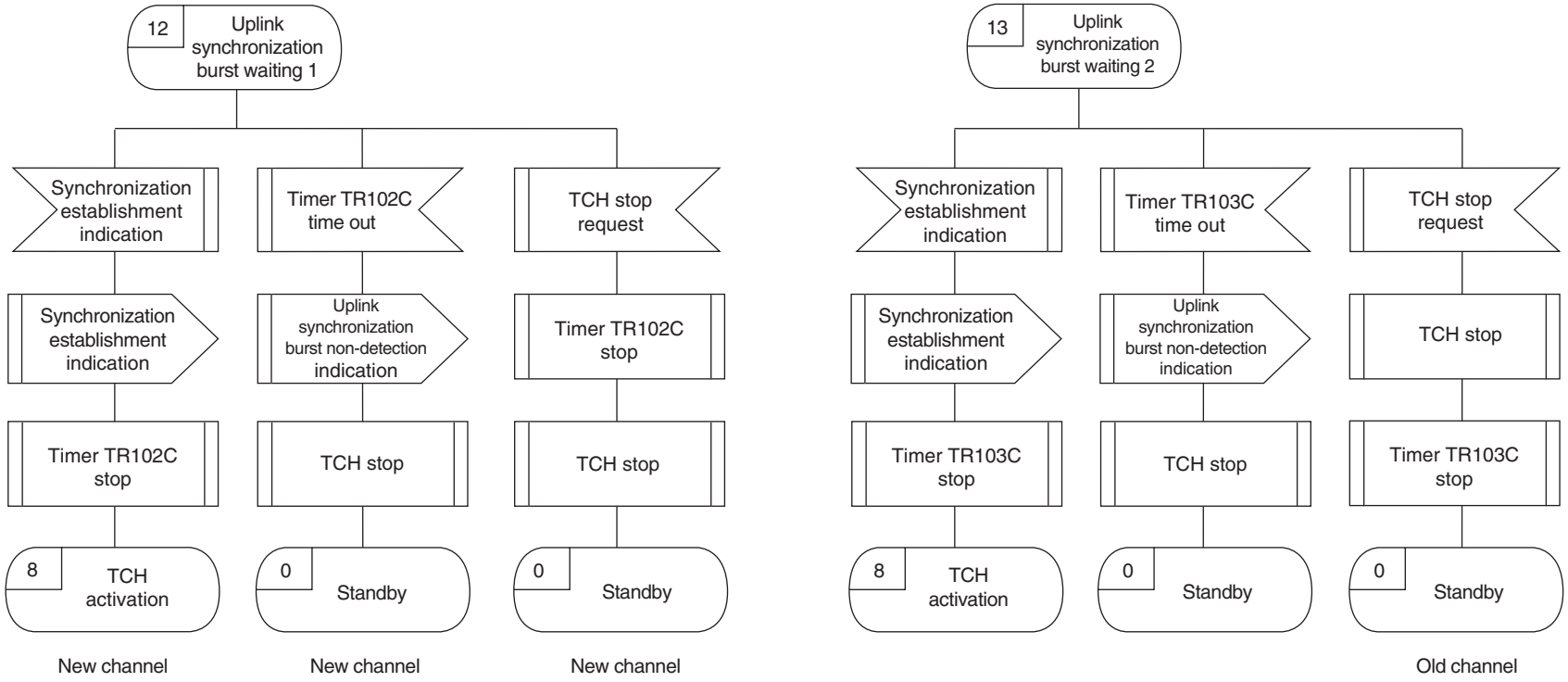


(Note 1) Number of retries is not stipulated.

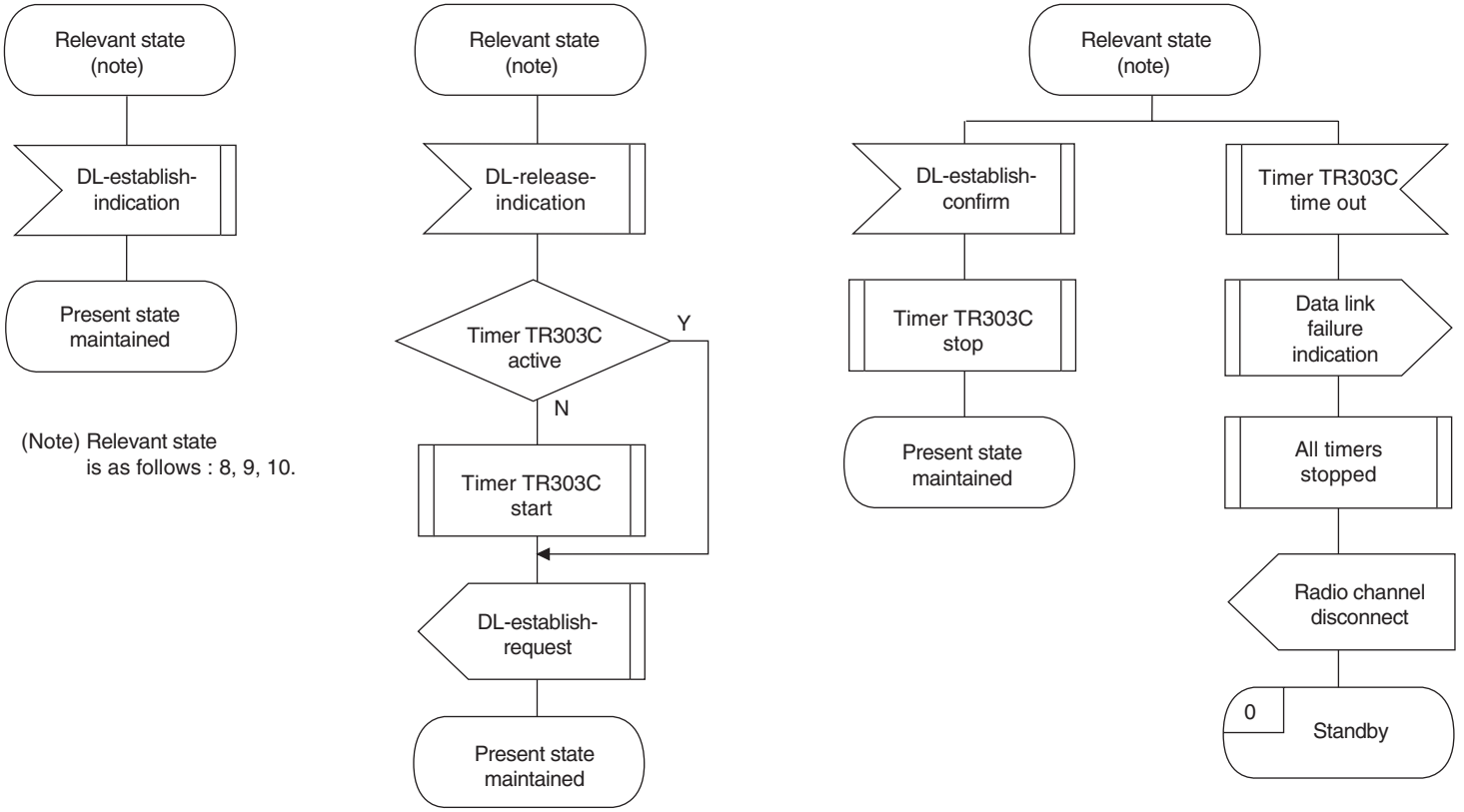
Appendix J RT SDL diagram (CS side TCH) 8/12



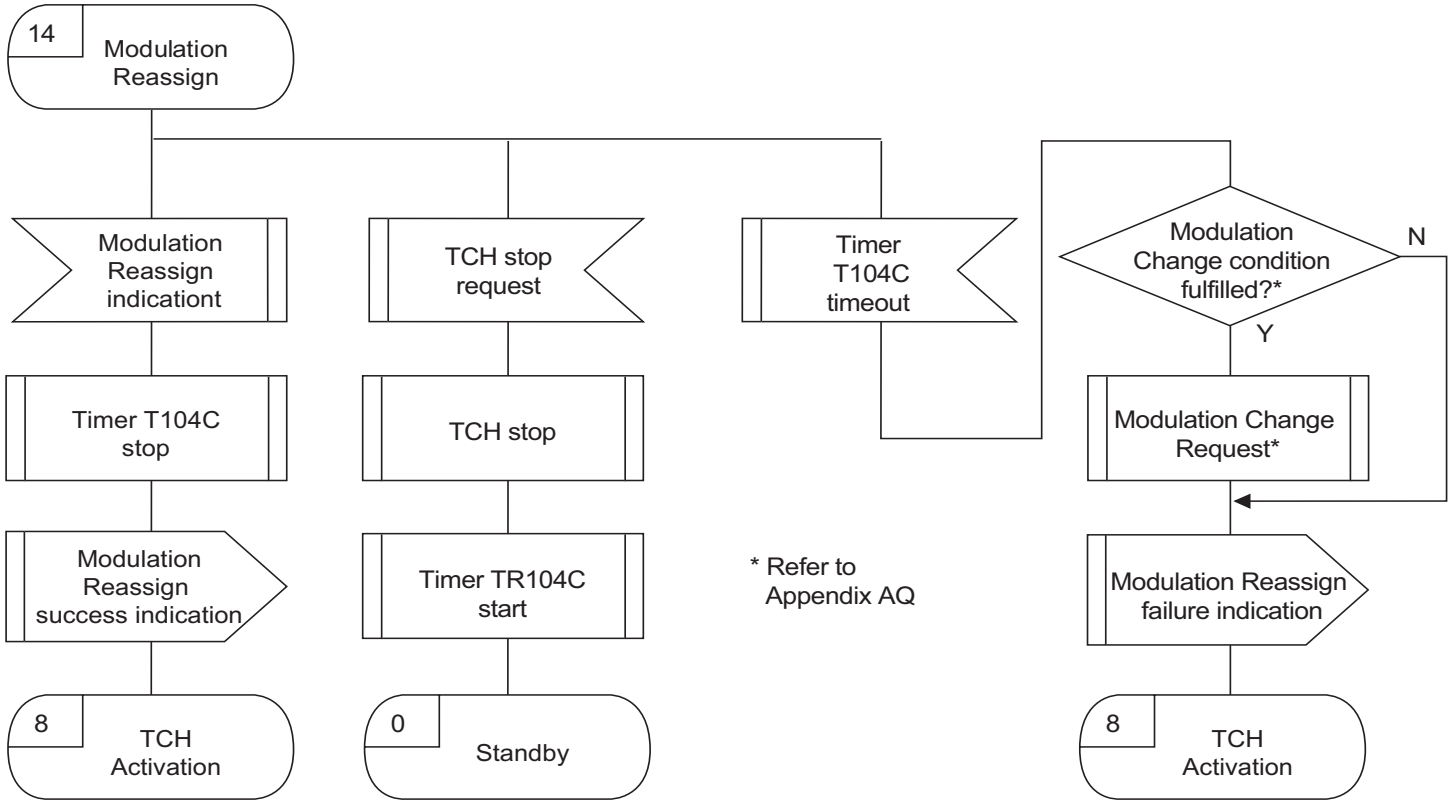
Appendix J RT SDL diagram (CS side TCH) 9/12



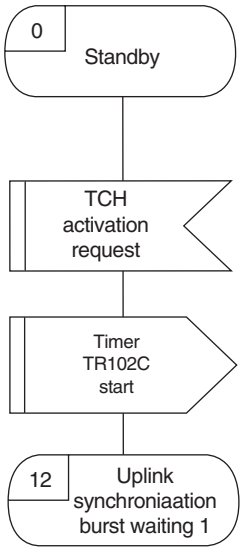
Appendix J RT SDL diagram (CS side TCH) 10/12

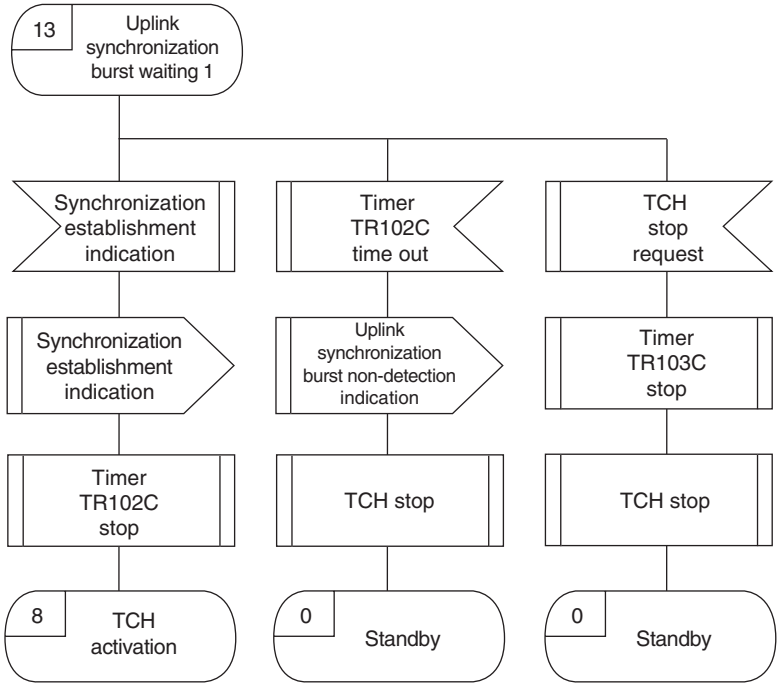


Appendix J RT SDL diagram (CS side TCH) 11/12

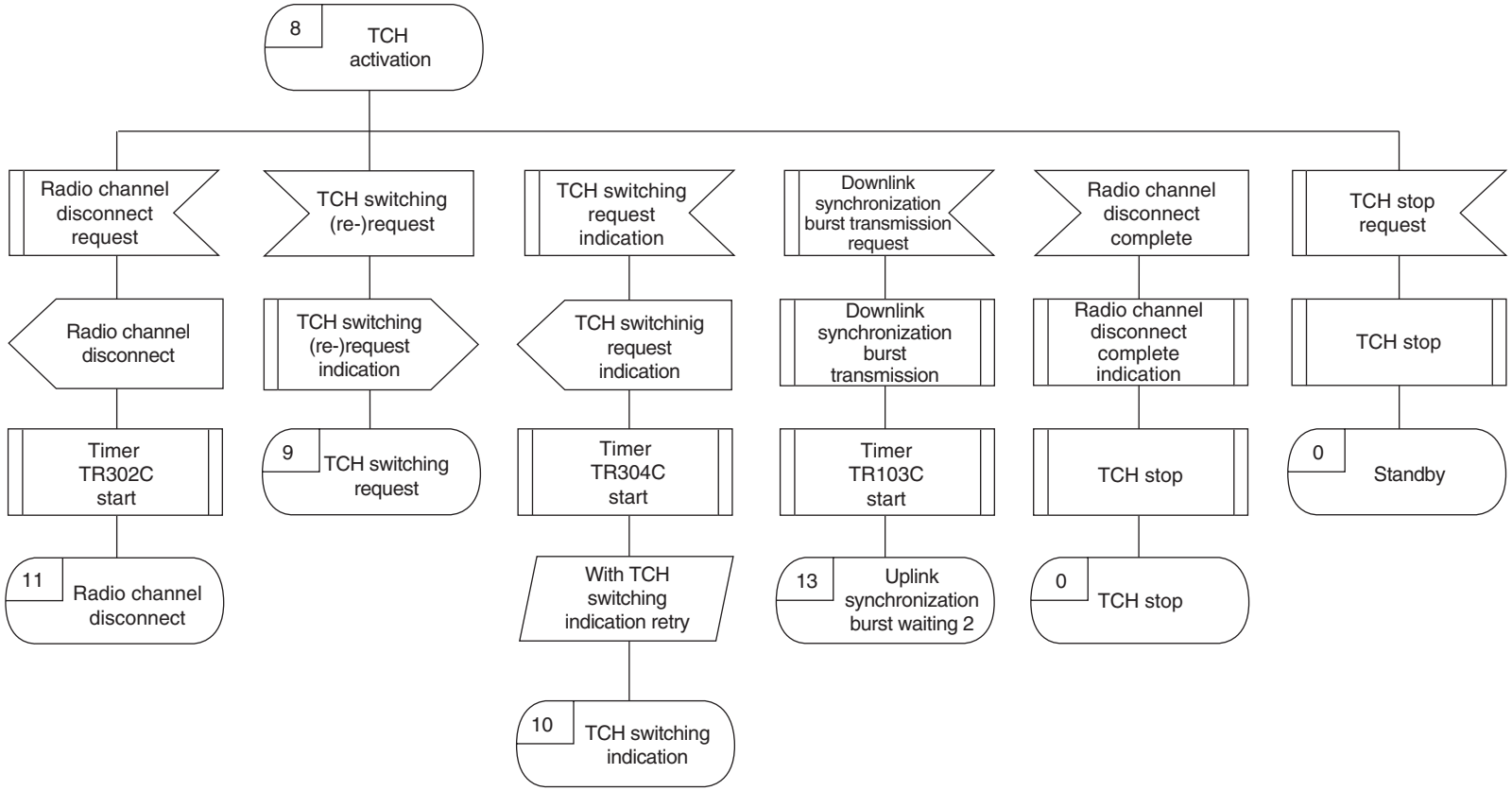


Appendix J RT SDL diagram (CS side TCH) 12/12

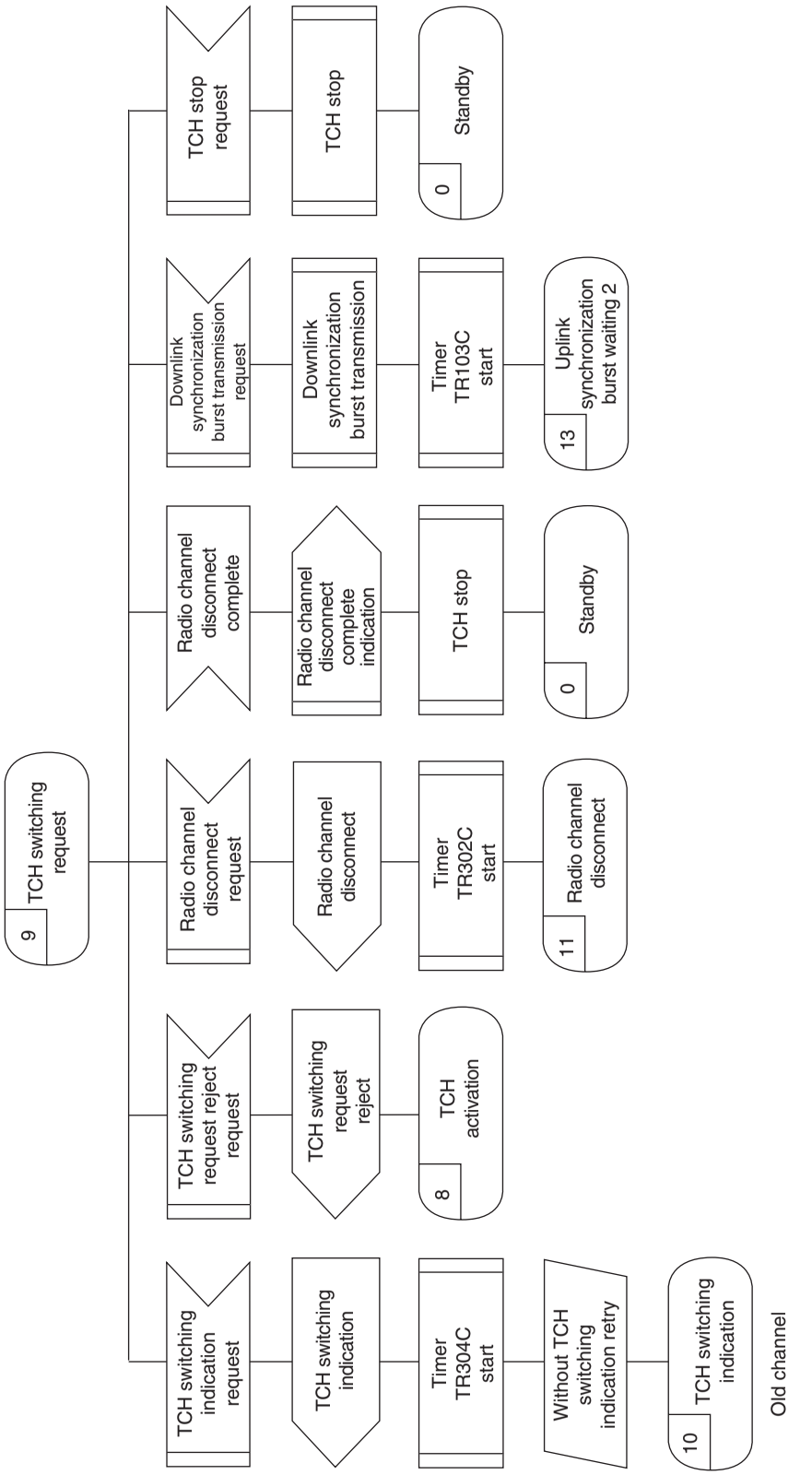




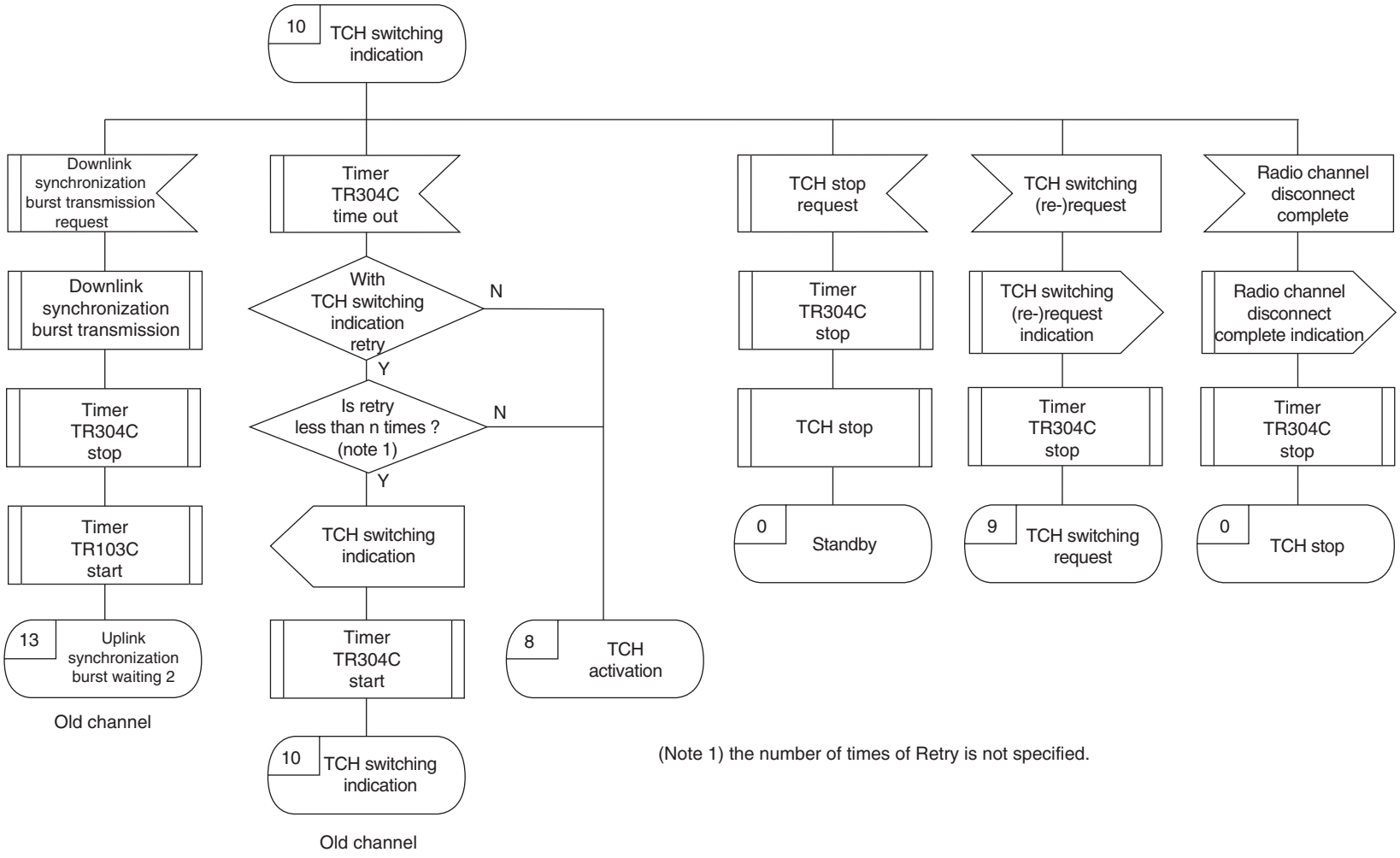
Appendix J RT SDL diagram (CS side 2nd TCH) 1/6



Appendix J RT SDL diagram (CS side 2nd TCH) 2/6

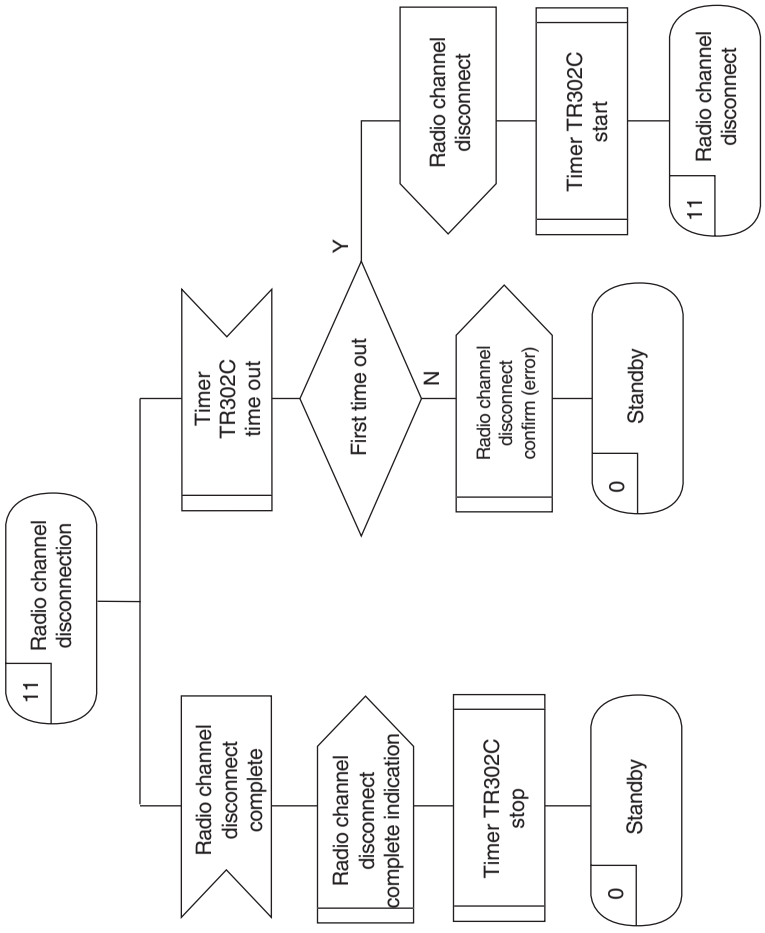


Appendix J RT SDL diagram (CS side 2nd TCH) 3/6

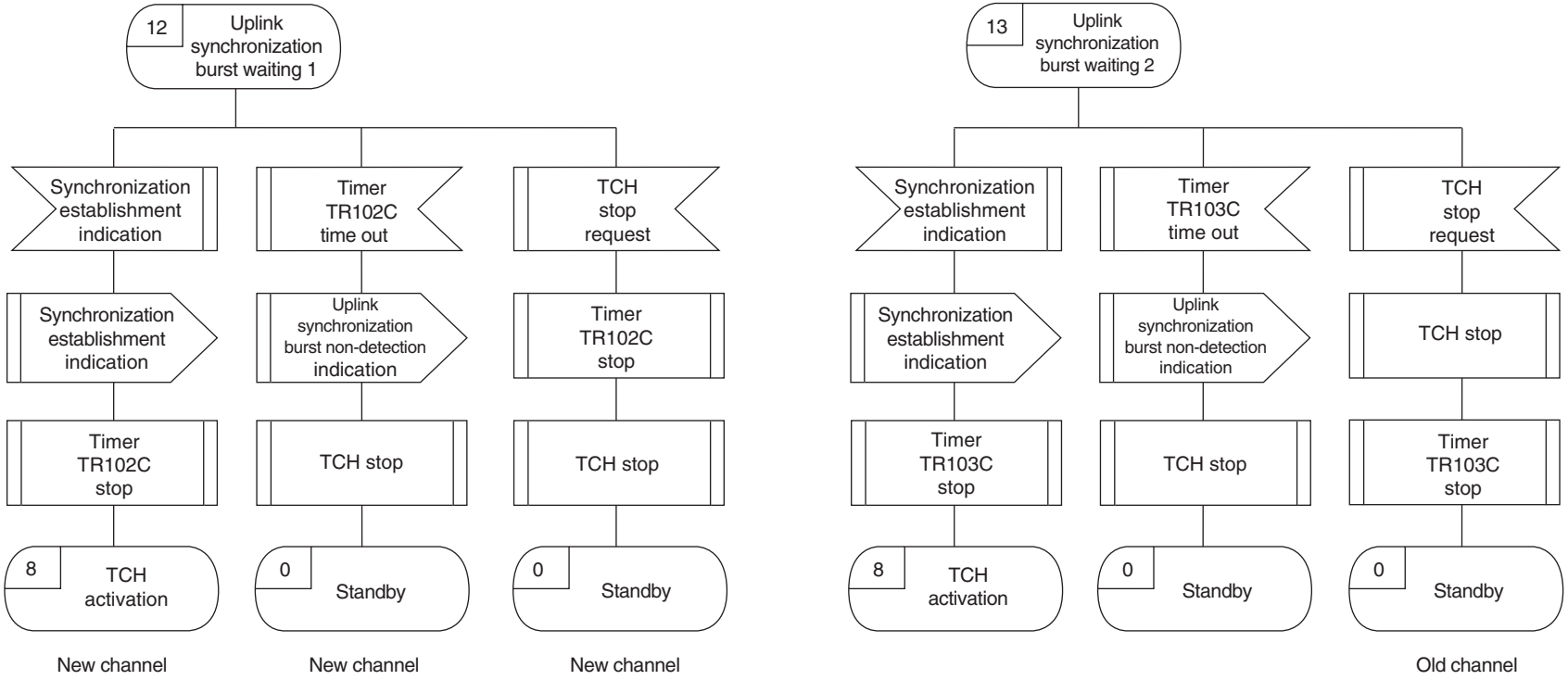


(Note 1) the number of times of Retry is not specified.

Appendix J RT SDL diagram (CS side 2nd TCH) 4/6



Appendix J RT SDL diagram (CS side 2nd TCH) 5/6



Appendix J RT SDL diagram (CS side 2nd TCH) 6/6

RT CS side timers

Timer No.	Timer Value	State	Start conditions	Stop conditions	Time out (Retry)	Time out (Retry out)	Mandatory/Optional Timer	Mandatory/Optional Timer value
TR101C	(200 ms) (Note 1)	Link channel allocation	"Link channel allocation" transmission	"Synchronization establishment" primitive reception	–	Standby	Mandatory	Mandatory
TR102C	(200 ms) (Note 2)	Uplink synchronization burst waiting 1	"TCH activation request" primitive reception	"Synchronization establishment" primitive reception	–	Standby	Mandatory	Mandatory
TR103C	(60 s or less)	Uplink synchronization burst waiting 2	"Downlink synchronization burst" transmission	"Synchronization establishment" primitive reception	–	Standby	Mandatory	Mandatory
TR104C	(200 ms)	Modulation Reassign	"Modulation Reassign activation request" primitive reception	"Modulation Reassign indication" primitive reception	–	TCH activation	Mandatory	Mandatory
TR301C	(4 s) (Note 5)	Waiting	"Paging" transmission	"Paging response" reception	–	Standby	Mandatory	Mandatory
TR302C	(1 s)	Radio channel disconnect	"Radio channel disconnect" transmission	"Radio channel disconnect complete" reception	"Radio channel disconnect" transmission	Standby	Mandatory	Mandatory
TR303C	(90 s)	TCH activation, TCH switching request, TCH switching indication	"DL-release-indication" primitive reception	"DL-establish-confirm" primitive reception	–	Standby	Optional (Note 3)	Mandatory
TR304C	(1 s)	TCH switching indication	"TCH switching indication" transmission	"Downlink synchronization burst" transmission	"TCH switching indication" transmission	TCH activation	Mandatory	Mandatory
TR311C	(4 s)	TCH activation (1st TCH) waiting (2nd TCH)	"Additional TCH request indication" transmission	"Additional TCH request" reception	–	TCH activation (1st TCH) waiting (2nd TCH)	Mandatory	Mandatory
				"Additional TCH request indication reject" reception				

(Note 1) TR101C = (TR101C-1) + (TR101C-2)
TR101C-1 (synchronization burst waiting timer) 100 ms
TR101C-2 (idle TCH waiting timer) 100 ms

(Note 2) TR102C = (TR102C-1) + (TR102C-2)
TR102C-1 (synchronization burst waiting timer) 100 ms
TR102C-2 (idle TCH waiting timer) 100 ms

(Note 3) Mandatory when data link re-establish is performed.

(Note 4) All timers stopped "radio channel disconnect complete" reception, "radio channel disconnect transmission request" primitive reception, "TCH stop request" primitive reception.

(Note 5) Do not use when all paging is performed in private system.

Mandatory: Specified in the standard and must be realized.
Further, a mandatory timer value is valid when the timer is realized.

Optional: Specified in the standard and is realized depending on need.
Further, an optional timer value is a reference value when the timer is realized.

Appendix L Error state processes in RT (Private standard/Public standard)

The error procedures in all procedures which transfer signal information using the protocol identifier of the radio frequency transmission manegement message are shown below. Detailed error processing procedures depend on inplementation of the network or user and may vary in each system.

1. Protocol identifier

If a message in which the protocol identifier is different from "RCR STD-28 radio interface radio frequency transmission management message" is received, that massage is ignored.
"Ignored" means that the message is considered not to have been received, and nothing is done.

2. Missing message

If a message is received which does not contain a compiete message type because the message length is short, that message is ignored.

3. Message type or message sequence errors

If an unexpected message or unrecognized message is received, that message is ignored, and status shift is not performed.

4. General information element errors

4.1 Information element sequence errors

An information element of multiple octet having a code value smaller than the previous multiple octet information element identifier code value is considered an information element sequence error.
If a message that contains this information element sequence error is received, this information element should be ignored. At this time, if this information element is a mandatory information element, it follows the error procedure for an unsatisfactory information element. Also, If it is not a mandatory information element, that information element is ignored, and message processing is performed.

4.2 Multiplexed information elements

If information elements are repeated within a message when repetition of information elements within a message is not permitted, only the contents of the information element seen first should be processed, and all further repetition of information elements should be ignored. If repetition of information elements is permitted, only the permitted information element contents are processed. If it exceeds the limit of information element repetition, the information element contents up to the limit are processed, and information element repetition exceeding the limit is ignored.

5. Mandatory information element errors

5.1 Unsatisfactory mandatory information element

If a message is received in which at least one or more mandatory information elements is unsatisfactory, operations are not performed for this message, and state shift is not performed.
In reception of a "radio channel disconnect" message, if a "cause" information element is not contained, it is considered that a "radio channel disconnect" message accompanied by cause (other normal event) was received.

5.2 Mandatory information element content errors

If a message is received that has one or more mandatory information element with invalid contents, operations are not performed for this message, and state shift is not performed.
If a "radio channel disconnect" message is received accompanied by cause of invalid contents, the same operations are performed as when a "radio channel disconnect" message accompanied by "cause (other normal events)" is received.
In general, an information element of a length that exceeds the maximum length is treated as content error information.
As for the maximum length of each information element , all information element of the supported protocol version must be recognized.

6. Non-mandatory information element errors

Operations for information element that are not recognized as mandatory are shown below.

6.1 Unrecognized information elemment

Due to conpatibility of protocol versions in the link channel establishment phase, there generally cannot be any unrecognized information elements, but if one is received, the operation for that message is not performed, and state shift is not performed.

6.2 Information element which are recognized but unexpected

If a message which has undefined information elements although one or more can be recognized is received, that information element is ignored, and it is treated as an iformation element which has valid contents.

6.3 Non-mandatory information element content errors

If a message is received that has one or more non-mandatory information element that have invalid contents, operations are performed for the message and for information element that have valid contents that can be recognized.
Information elements that have lengths that exceed the maximum length are treated as information elements having content erros.
As for the maximum length of each information element, all information elements of the supported protocol version must be recognized.

7. Data link failure

If layer 3 is notified of data link failure by the data link layer via DL-release-indication, the following procedures are applied.

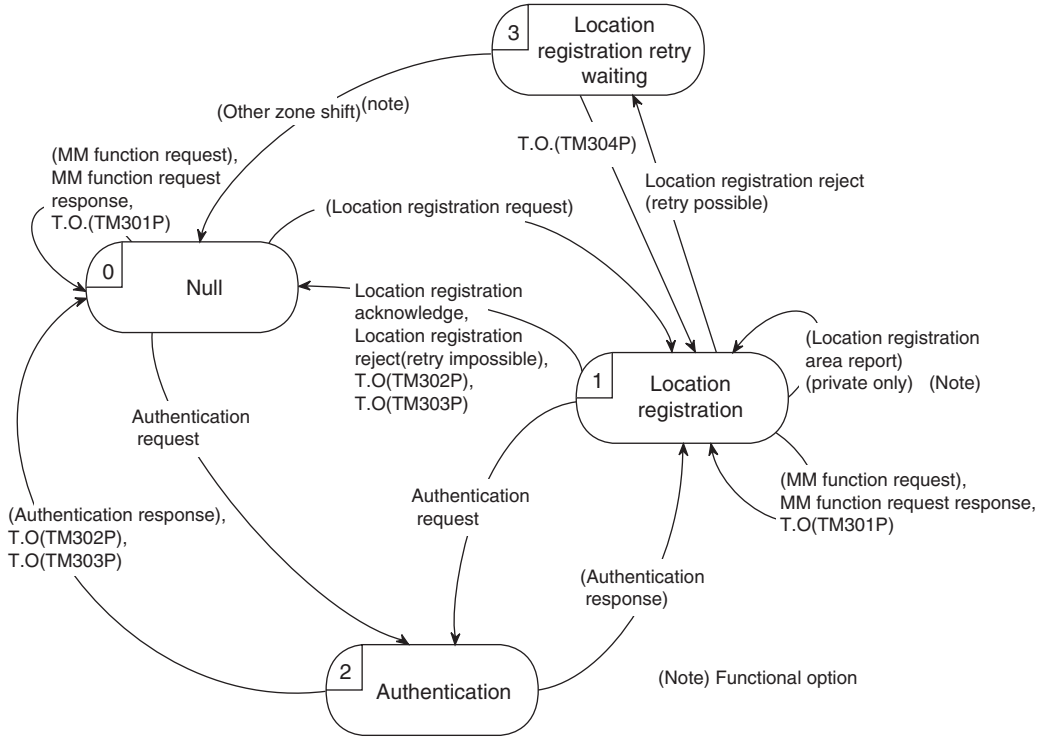
a) In any call where a timer is not operating, fimer TR303P or TR303C is started However, if timer TR303P or
TR303C is already operating, it is not restarted.

b) If layer 3 is not in "standby" state, a data link re-establish is requested by DL-establish-request.

If data link re-establish is by DL-establish-confirm, timer TR303P or TR303C is stopped.
If timer TR303P or TR303C expires prior to data link re-establish, the following procedures are followed.

a) In CS, if data link failure is detected, a "radio channel disconnect" message accompanied by "cause (device abnormal)" is transmitted, and it enters to "standby "state.

b) In PS, if data link failure is detected, a "radio channel disconnect complete" message is transmitted, and it enters to "standby" state.



MM state transition diagram (PS side)

Appendix N MM SDL diagrams (PS side)

(Private standard/Public standard)

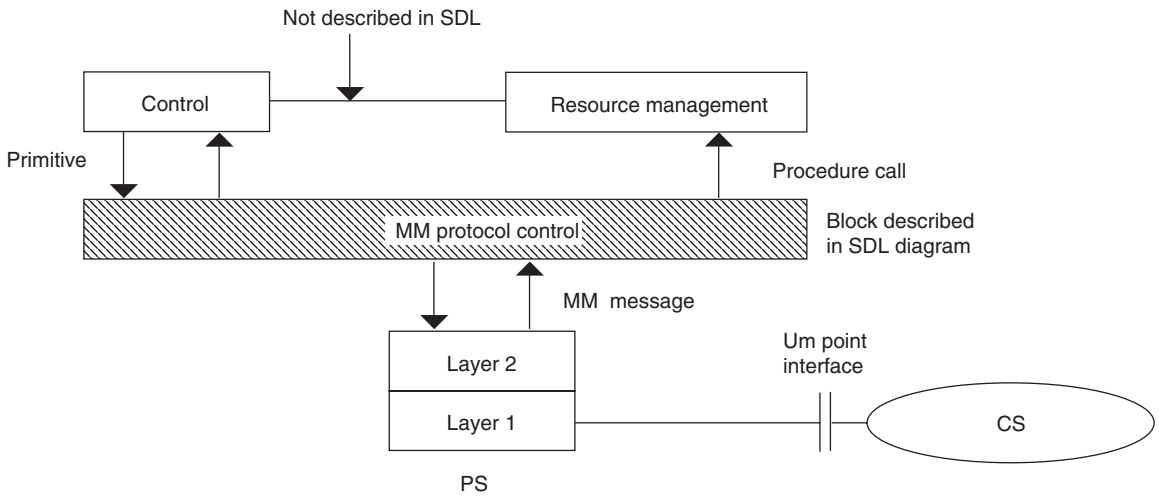


Figure 1 MM SDL diagrams description method (PS side)

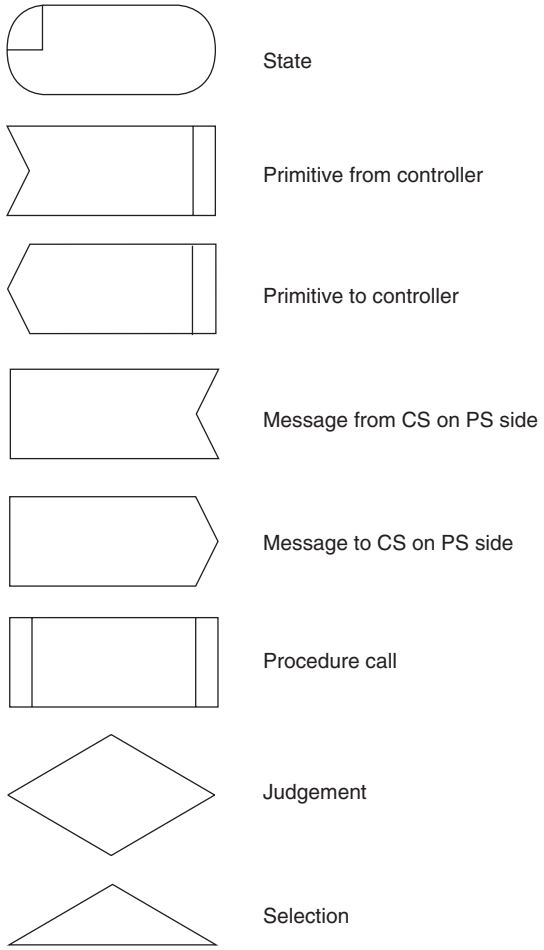
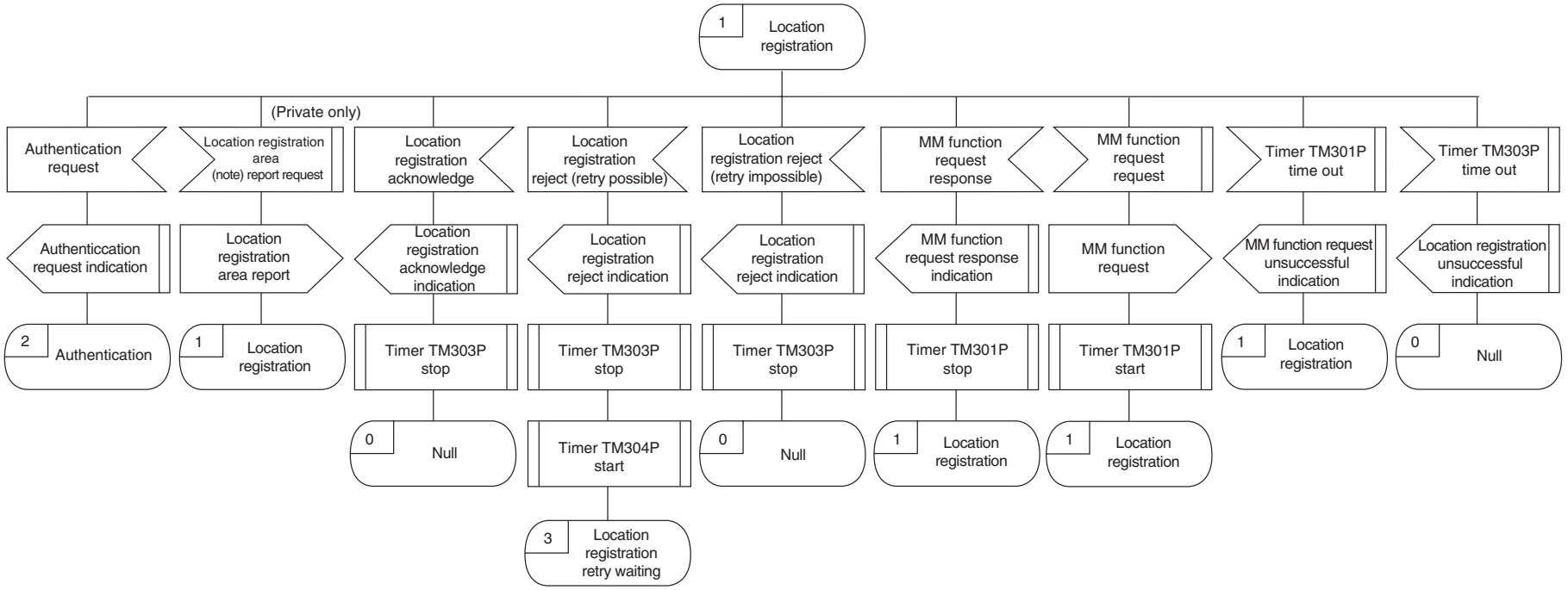


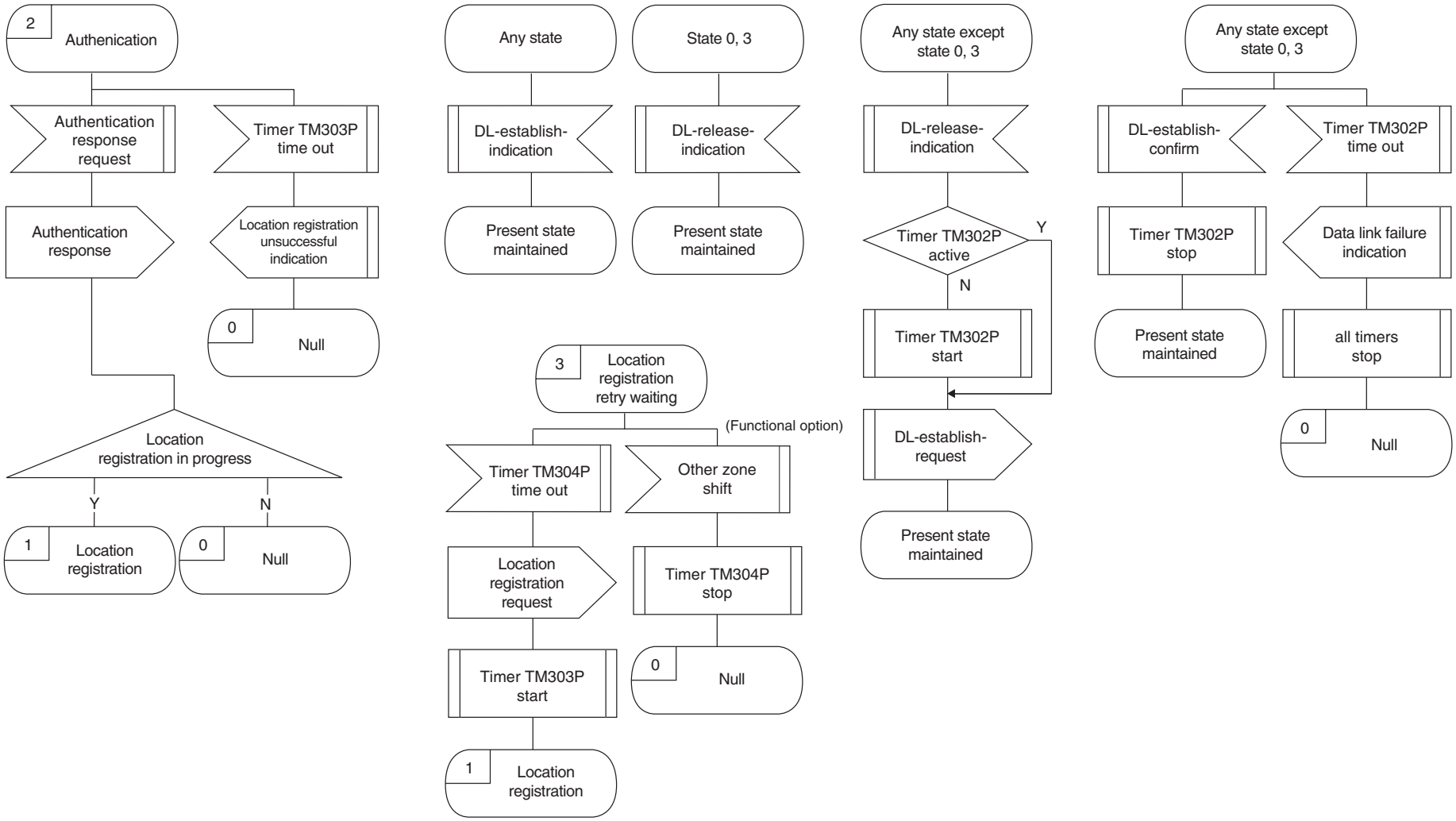
Figure 2 MM SDL diagrams rules (PS side)

Appendix N MM SDL diagram (PS side) 1/3



(Note) This primitive is generated, when PS receives "MM function request response" and it is determined to use a method of PS specified paging area.

Appendix N MM SDL diagram (PS side) 2/3



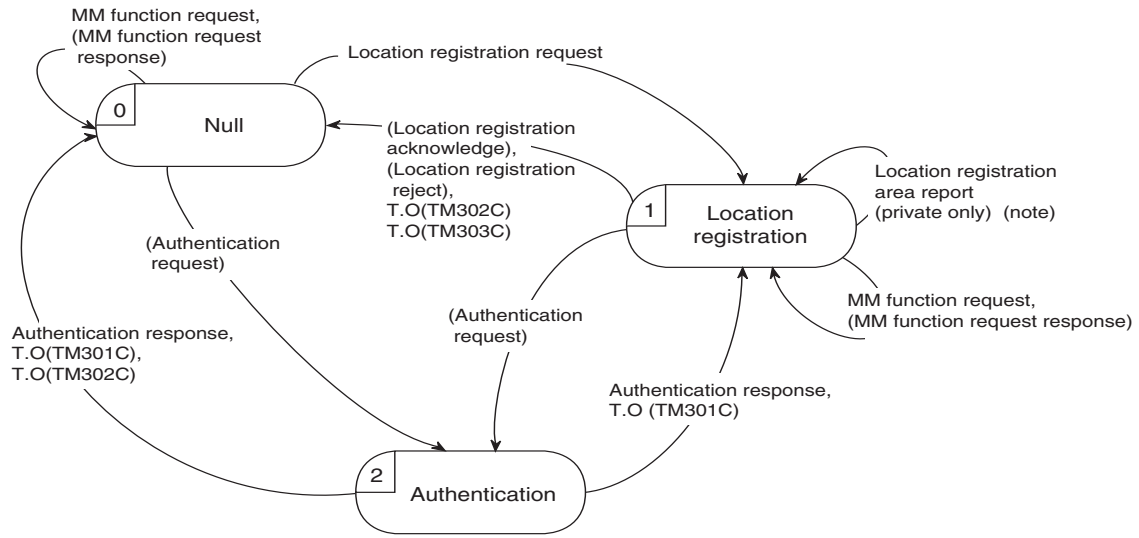
Appendix N MM SDL diagram (PS side) 3/3

MM PS side timers

Timer No. (Value)	State	Start conditions	Stop conditions	1st time out	Mandatory/ Optional	
					Timer	Timer value
TM301P (1 s)	Null	"MM function request" transmission	"MM function request response" reception	Null	Man-datory	Man-datory
	Location registration			Location registration		
TM302P (90 s)	Any state except null state and location registration retry waiting state	"DL-release-indication" primitive reception	"DL-establish-confirm" primitive reception	Null	Optional (note)	Man-datory
TM303P (60 s)	Location registration	"Location registration request" transmission	"Location registration acknowledge" or "Location registration reject" primitive reception	Null	Man-datory	Man-datory
	Authentication					
TM304P (100 s)	Location registration retry waiting	"Location registration reject" (retry possible) reception	"Other zone shift" primitive reception	Location registration after "location registration request" transmission	Man-datory	Man-datory

(Note) Mandatory when data link re-establish performed.

Mandatory: Specified in the standard, and must be realized. Further, a mandatory timer value is valid when the timer is realized.
Optional: Specified in the standard, and is realized depending on need. Further, an optional timer value is a reference value when the timer is realized.



MM state transition diagram (CS side)

Appendix Q MM SDL diagrams (CS side)

(Private standard/Public stanedard)

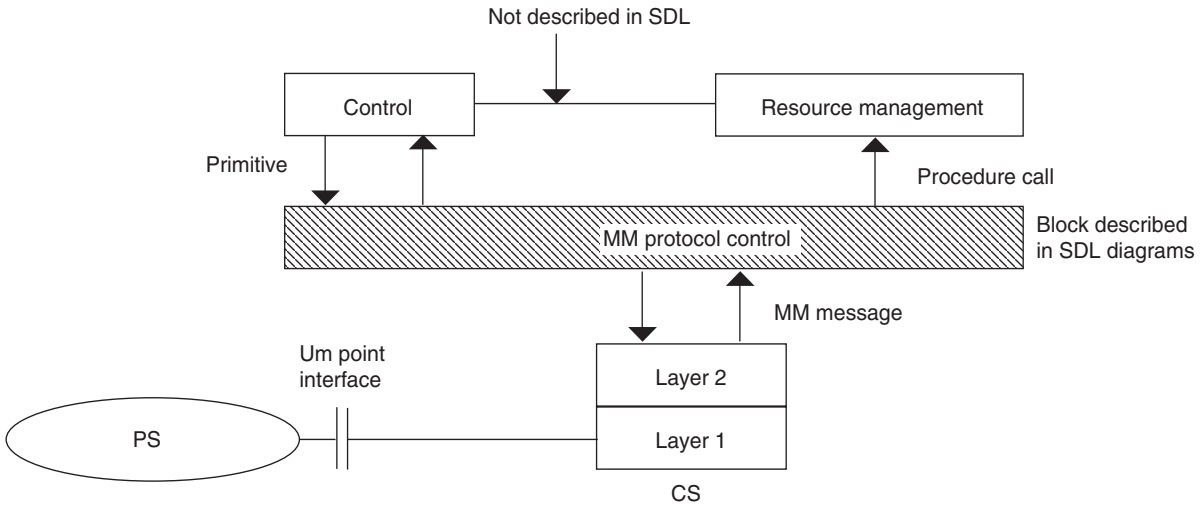


Figure 1 MM SDL diagrams description method (CS side)

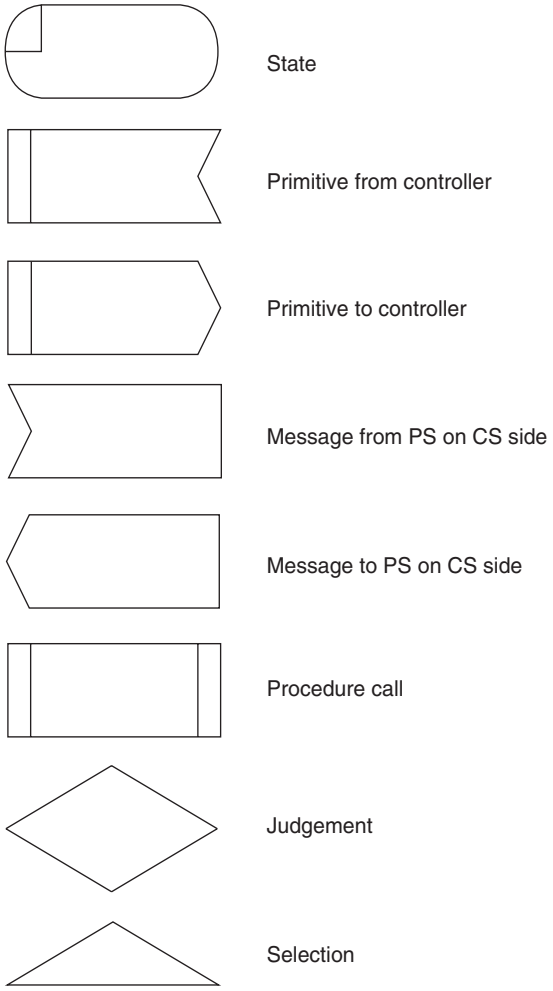
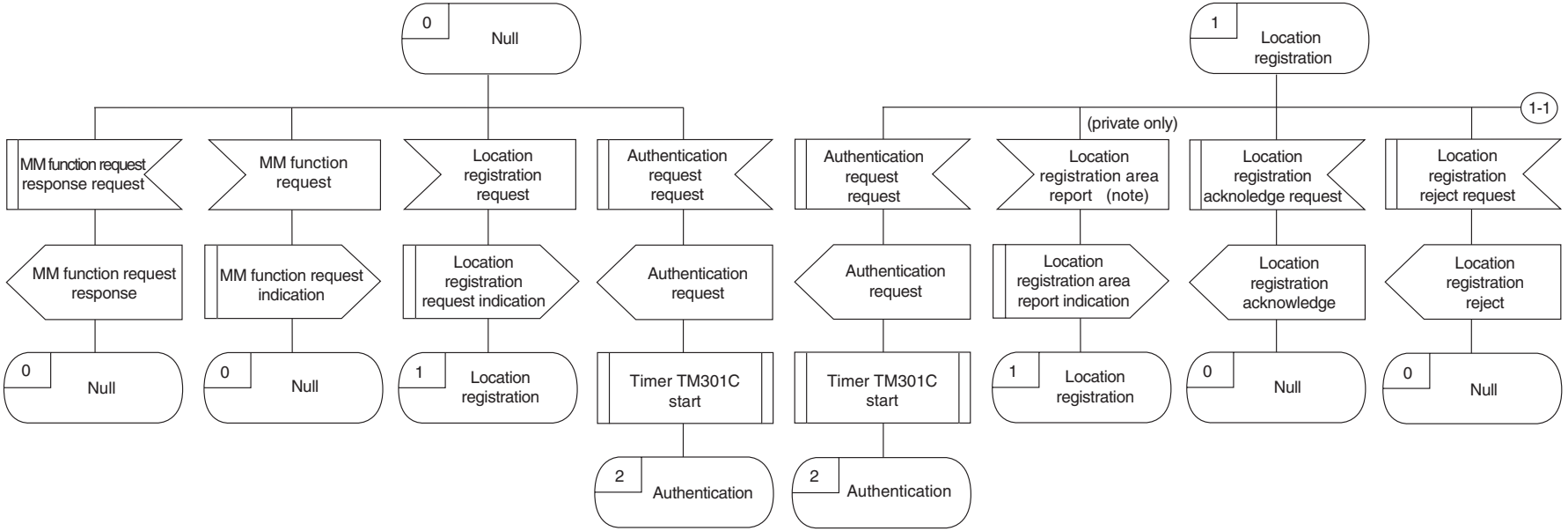
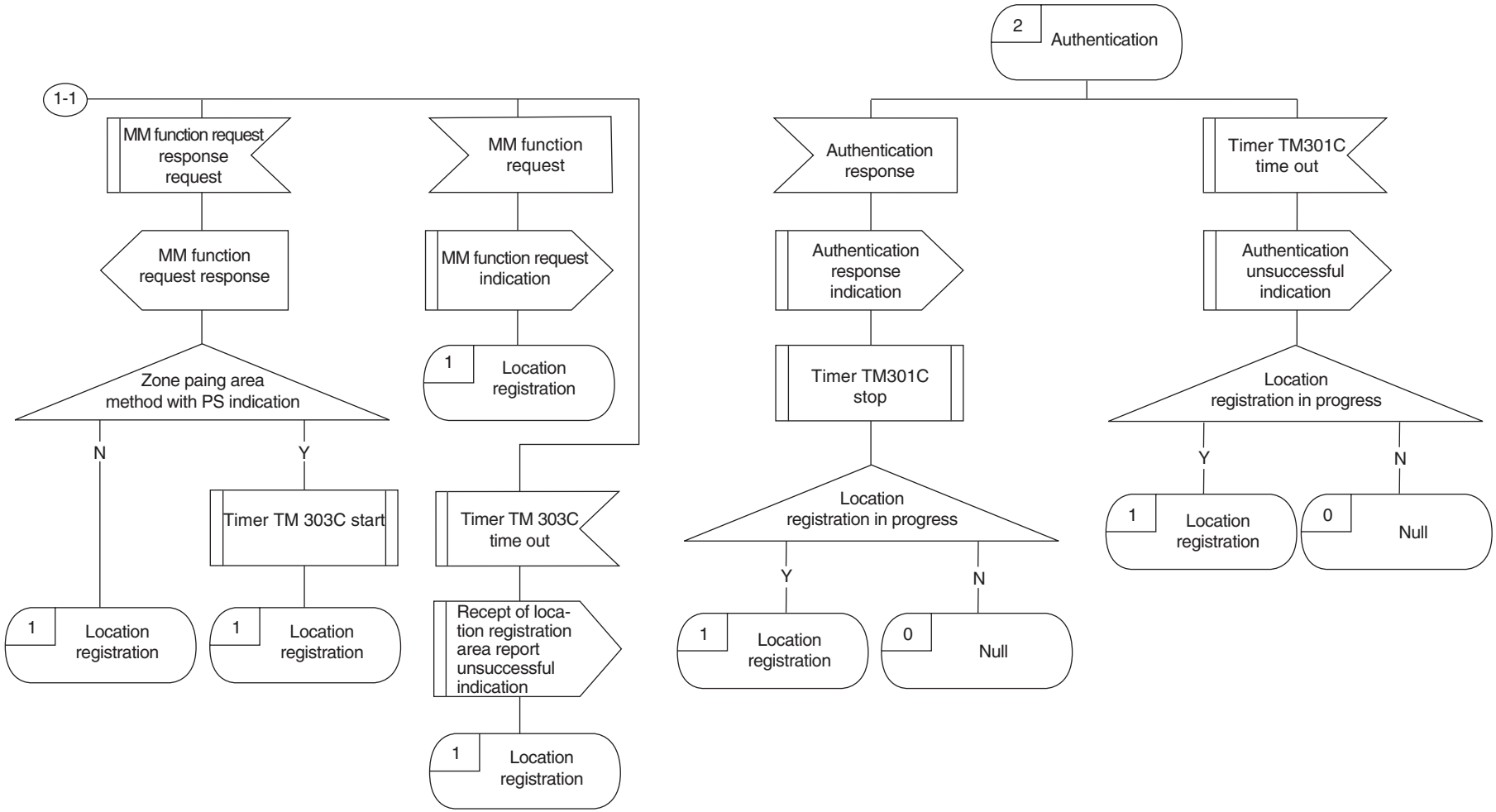


Figure 2 MM SDL diagrams rules (CS side)

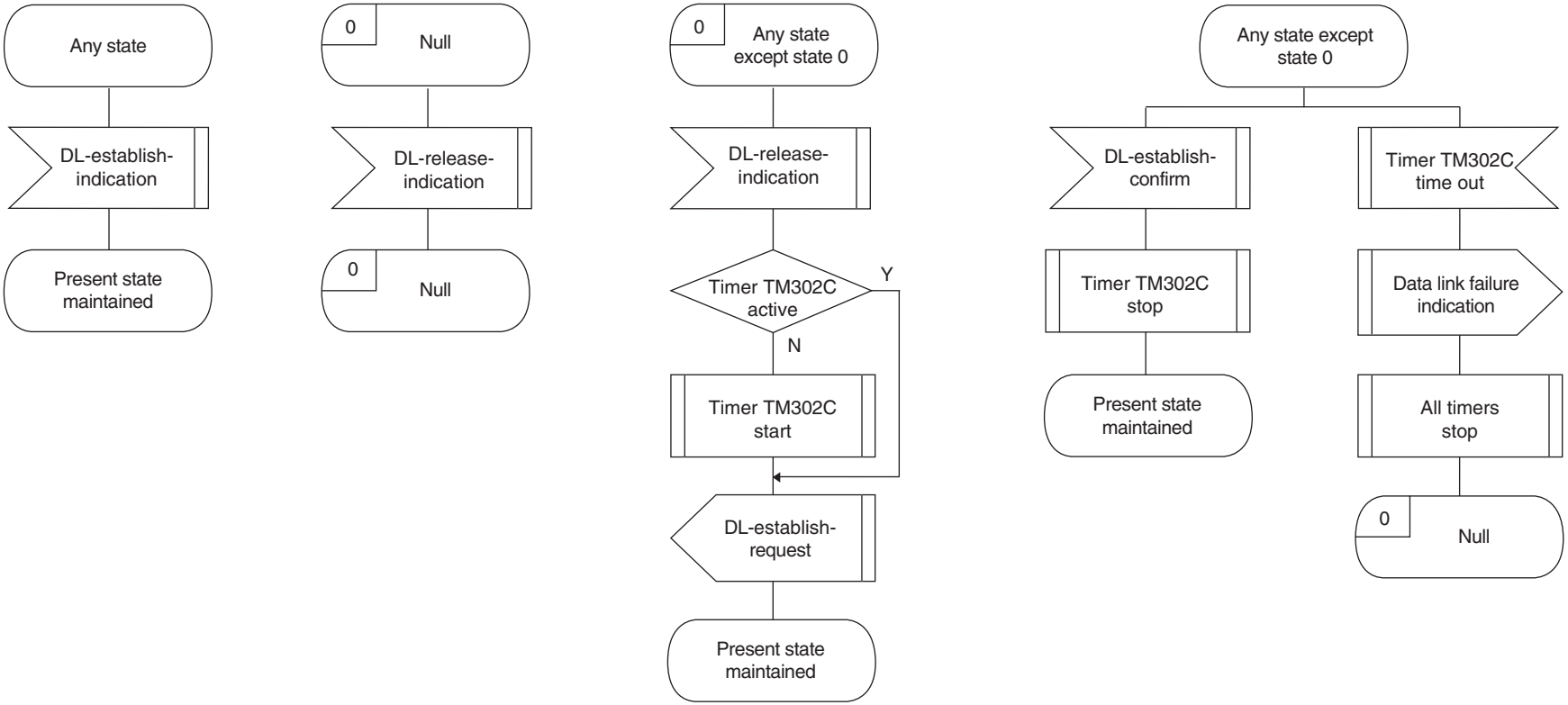


(Note) This message is used only when zone paging area method with PS indication is selcted.

Appendix Q MM SDL diagram (CS side) 1/3



Appendix Q MM SDL diagram (CS side) 2/3



Appendix Q MM SDL diagram (CS side) 3/3

MM CS side timers

Timer No. (Value)	State	Start conditions	Stop conditions	Time out	Mandatory/ Optional	
					Timer	Timer value
TM301C (4 s)	Null	"Authentication request" transmission	"Authentication response" reception	Null	Man-datory	Man-datory
	Location registration			Location registration		
TM302C (90 s)	Any state except null state	"DL-release-indication" primitive reception	"DL-establish-confirm" primitive reception	Null	Optional (Note 1)	Man-datory
TM303C (4 s)	Location registration	"MM function request response" transmission	"Location registration area report" reception	Location registration	Optional (Note 2)	Optional

(Note 1) Mandatory when data link re-establish performed

(Note 2) Mandatory in case of paging area method with PS indication

Mandatory: Specified in the standard, and must be realized. Further, a mandatory timer value is valid when the timer is realized.
Optional: Specified in the standard, and is realized depending on need. Further, an optional timer value is a reference value when the timer is realized.

Appendix S Error state processes in MM (Private standard/Public standard)

The error procedures in all procedures which transfer signal information using the protocol identifier of the mobility management message are shown below. Detailed error processing procedures depend on implementation of the network or user, and may vary in each system.

1. Protocol identifier

If a message in which the protocol identifier is different from "RCR-STD-28 radio interface mobility management message" is received, that message is ignored.
"Ignored" means that the message is considered to have not been received, and nothing is performed.

2. Missing message

If a message is received which does not contain a complete message type because the message length is short, that message is ignored.

3. Message type or message sequence errors

If an unexpected message or unrecognized message is received, that message is ignored, and state transition is not performed.

4. General information element errors

4.1 Information element sequence errors

An information element of multiple octet having a code value smaller than the previous multiple octet information element identifier code value is considered an information element sequence error.
If a message that contains this information element sequence error is received, this information element should be ignored. At this time, if this information element is mandatory, it follows the error procedure for an unsatisfactory mandatory information element. Also, if it is not mandatory, that information element is ignored, and message processing is performed.

4.2 Multiplexed information elements

If information elements are repeated within a message when repetition of information elements within a message is not permitted, only the contents of the information element seen first should be processed, and all further repetition of information elements should be ignored. If repetition of information elements is permitted, only the permitted information element contents are processed. If it exceeds the limit of information element repetition, the information element contents up to the limit are processed, and information element repetition exceeding the limit is ignored.

5. Mandatory information element errors

5.1 Unsatisfactory mandatory information element

If a message is received in which one or more mandatory information elements is unsatisfactory, operations are not performed for this message, and state transition is not performed.

5.2 Mandatory information element content errors

If a message is received that has one or more mandatory information elements with invalid contents, operations are not performed for this message, and state transition is not performed.
In general, an information element of a length that exceeds the maximum is treat_ed as content error information elements.
As for the maximum length of each information element, all information elements of the supported protocol version must be recognized.

6. Non-mandatory information element errors

Operations for information elements that are not recognized as mandatory are shown below.

6.1 Unrecognized information elements

Due to compatibility of protocol versions in the link channel establishment phase, there generally cannot be any unrecognized information elements, but if one is received, the operation for that message is not performed, and state transition is not per_formed.

6.2 Information elements which are recognized but not expected

If a message which has undefined information elements although one or more can be recognized is received, that information element is ignored, and it is treated as the only information element which has valid contents.

6.3 Non-mandatory information element content errors

If a message is received that has one or more non-mandatory information elements that have invalid contents, operations are performed for the message and for information elements that have valid contents that can be recognized.

Information elements that have lengths that exceed the maximum are treated as information elements having content errors.

As for the maximum length of each information element, all information elements of the supported protocol version must be recognized.

7. Data link failure

If layer 3 is notified of data link failure by the data link layer via DL-release-indication, the following procedures are applied.

a) In any call where a timer is not operating, timer TM302P or TM302C is started. However, if timer TR302P or TM 302C is already operating, it is not restarted.

b) If layer 3 is not in "standby" state or in "location registration retry waiting" state, a data link re-establish is requested via DL-establish-request.

If data link re-establish is reported via DL-establish-confirm, timer TM302P or TM302C is stopped. If timer TM302P or TM302C expires prior to data link re-establish, it shifts to "null" state.

In the case of a CC message with a facility information element, the primitive is present between the CC message and facility. However, the primitives are not stated in SDL (CC).

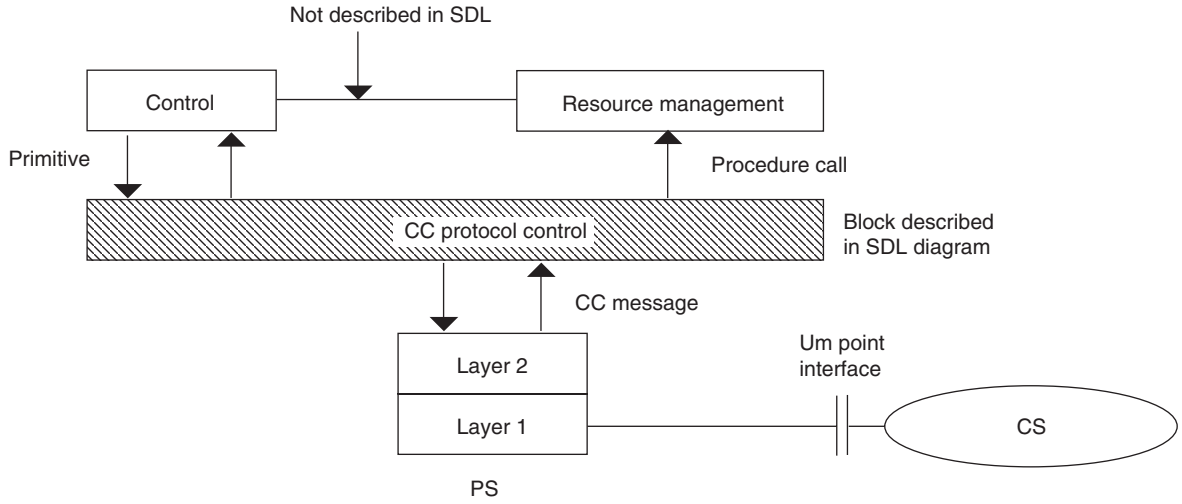


Figure 1 CC SDL diagram description method (PS side)

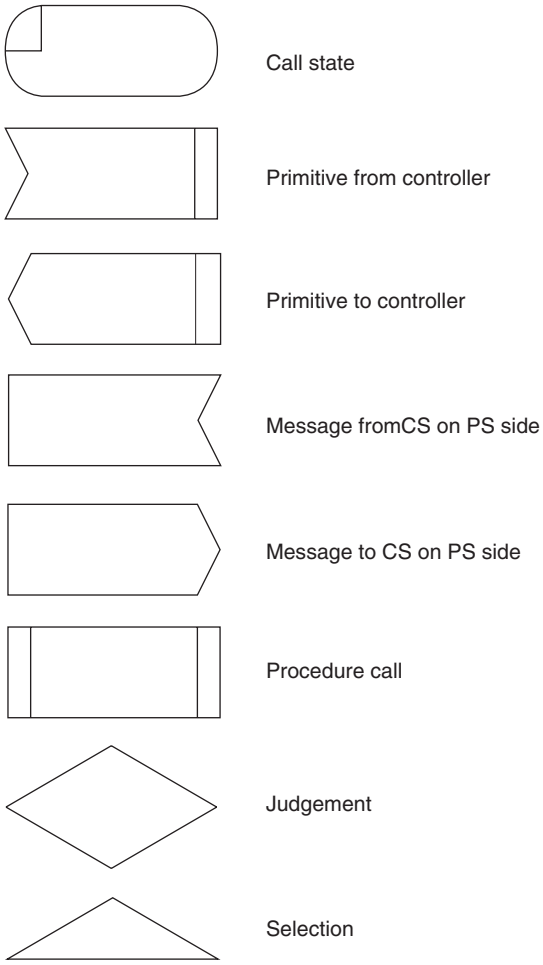
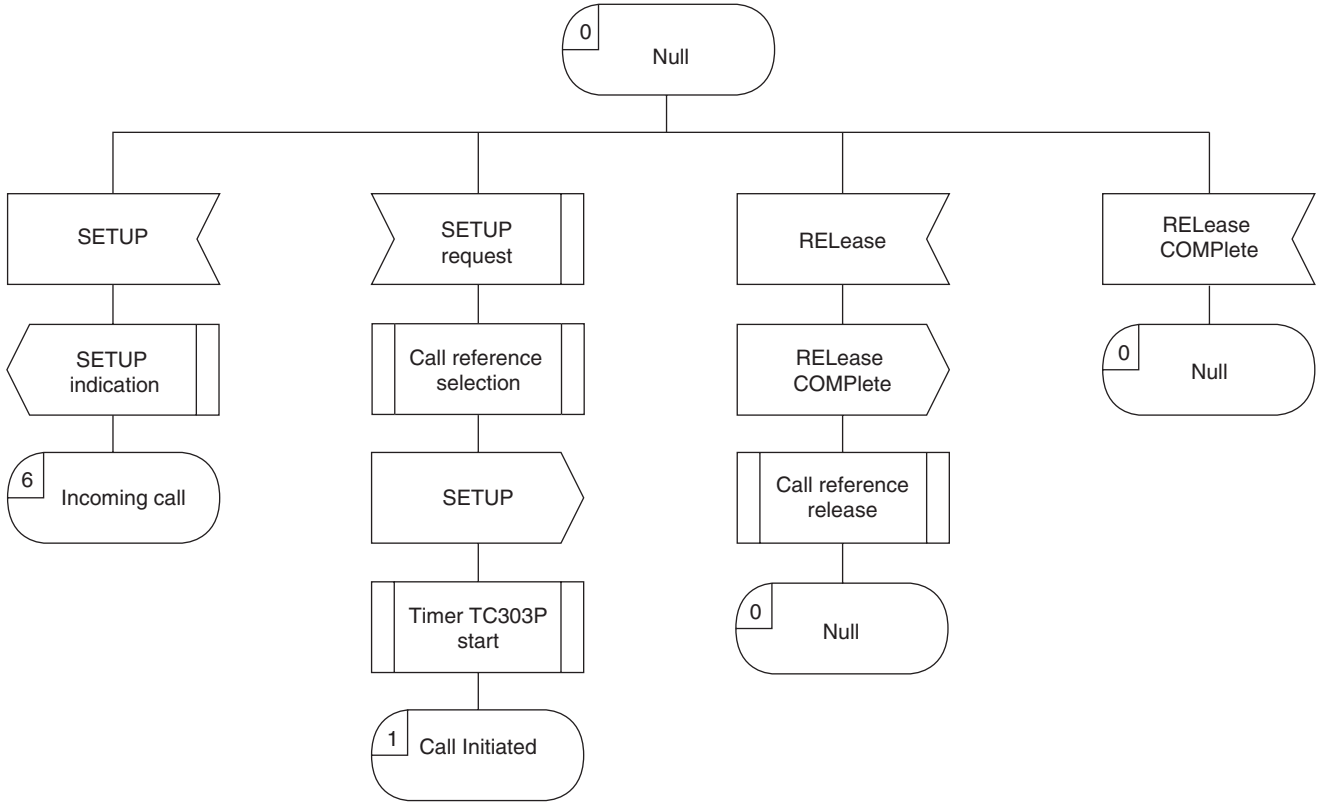
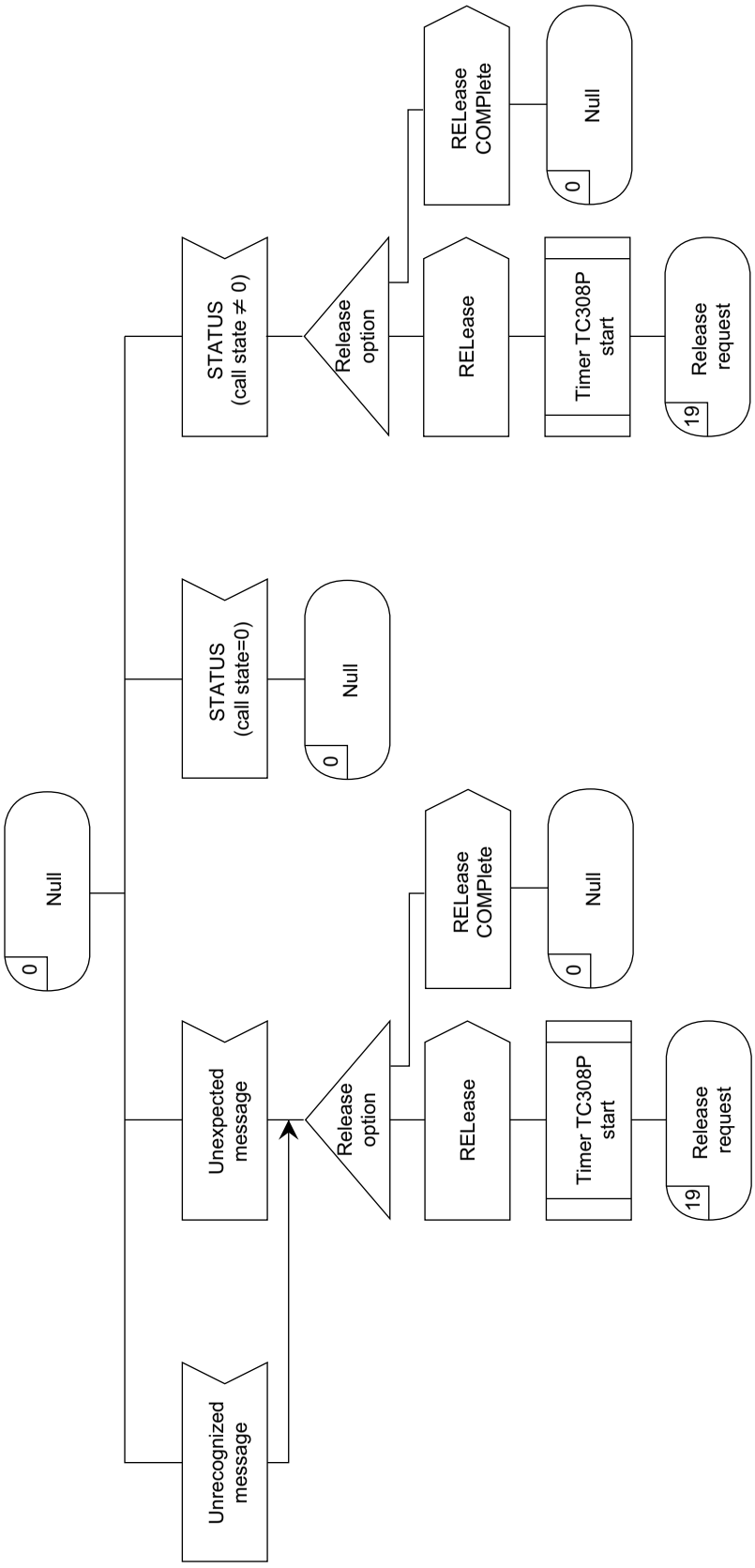


Figure 2 CC SDL diagram rules (PS side)

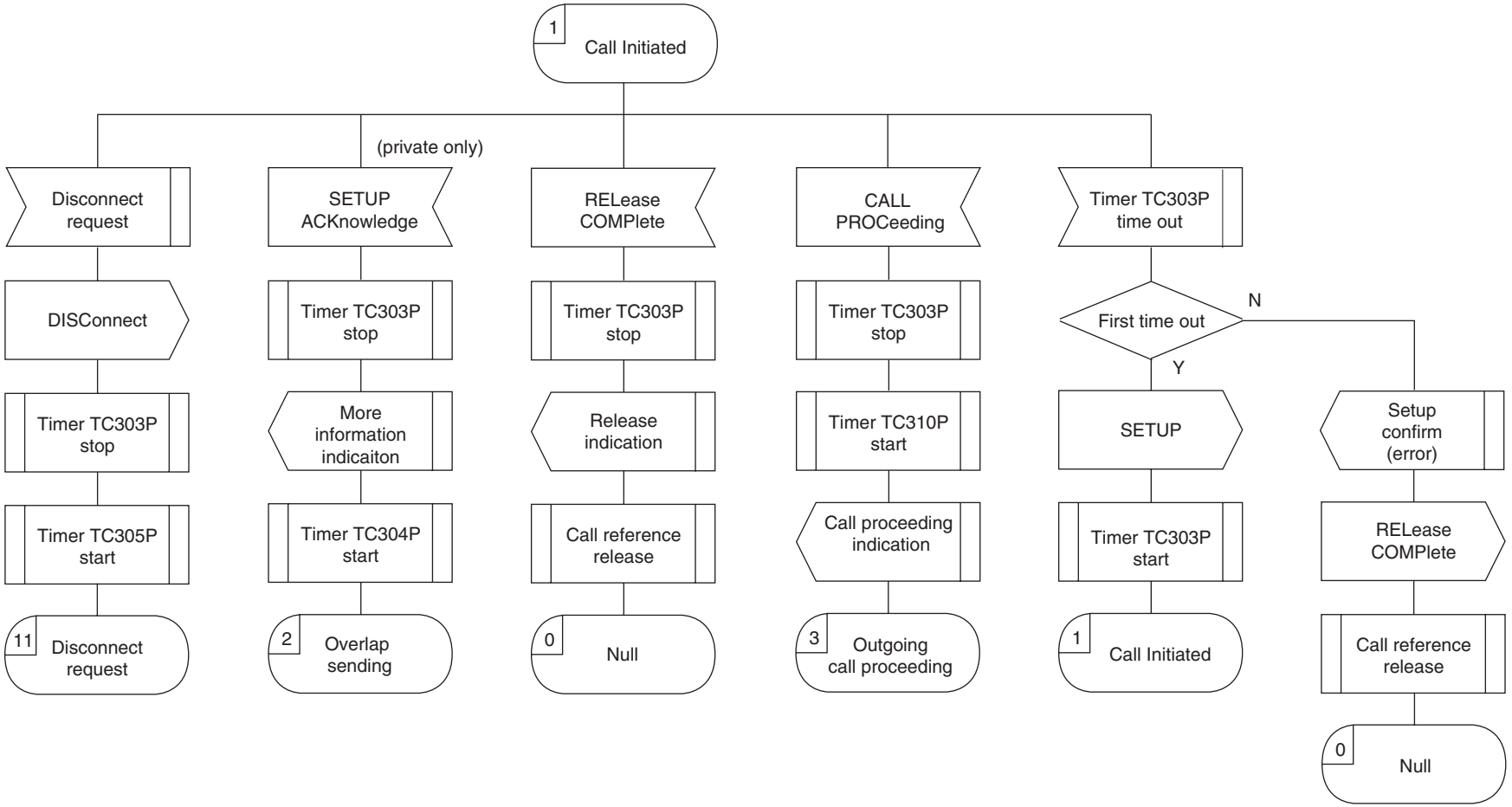


(Note1) Timer TC303P is optional.

Appendix T CC SDL diagram (PS side) 1/17

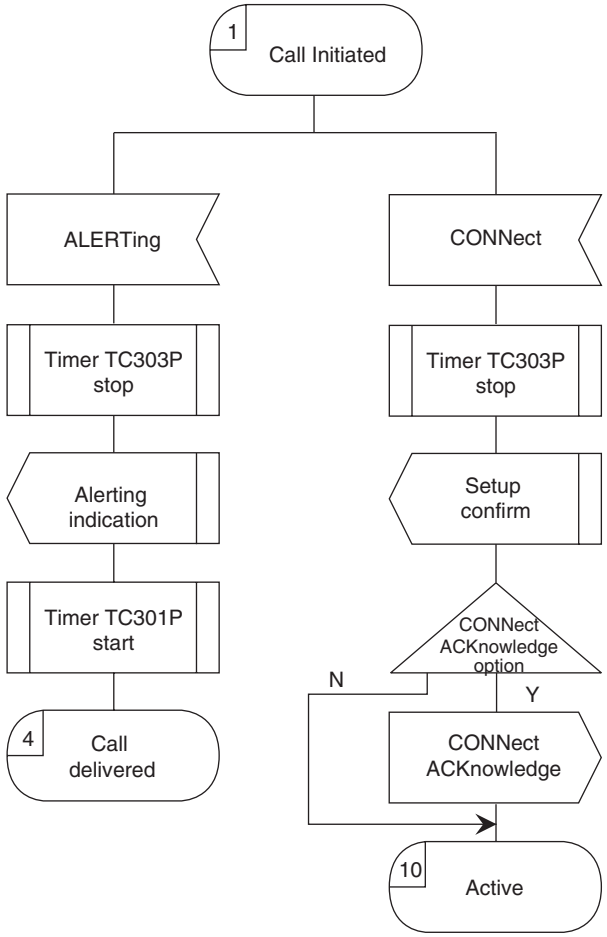


Appendix T CC SDL diagram (PS side) 2/17



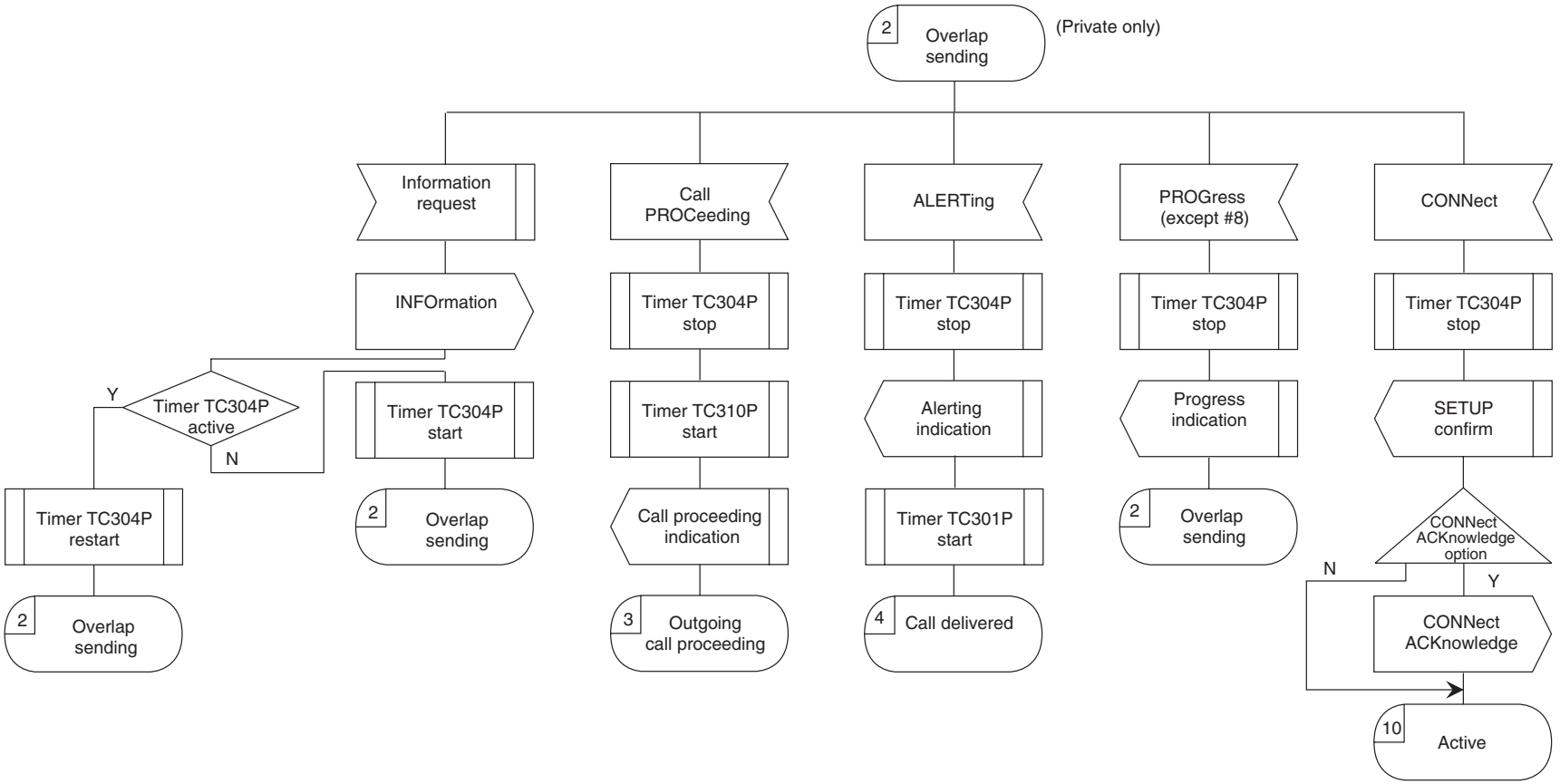
(Note 1) Timer TC303P, TC304P, TC310P are optional.

Appendix T CC SDL diagram (PS side) 3/17



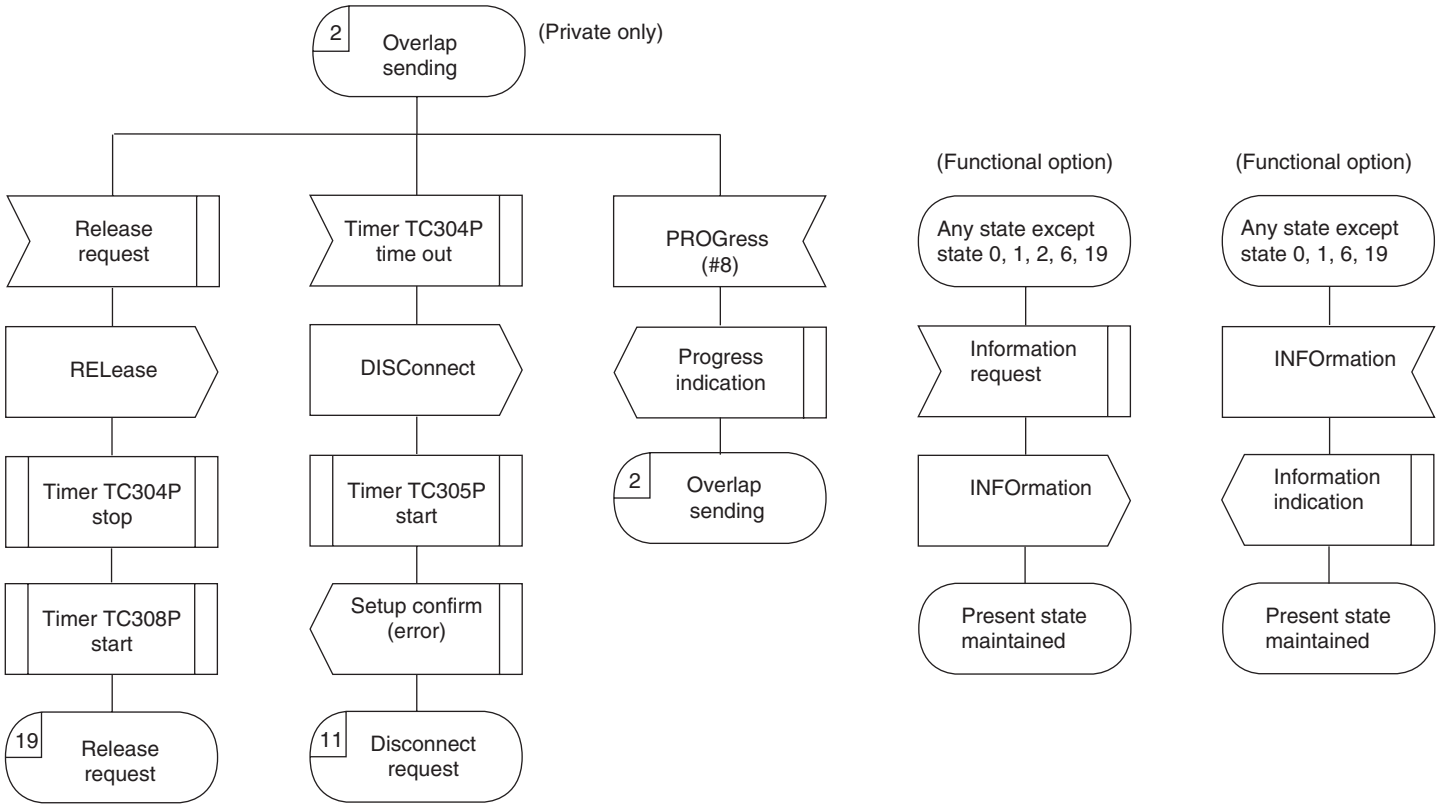
(Note 1) Timer TC303P, TC301P are optional.

Appendix T CC SDL diagram (PS side) 4/17



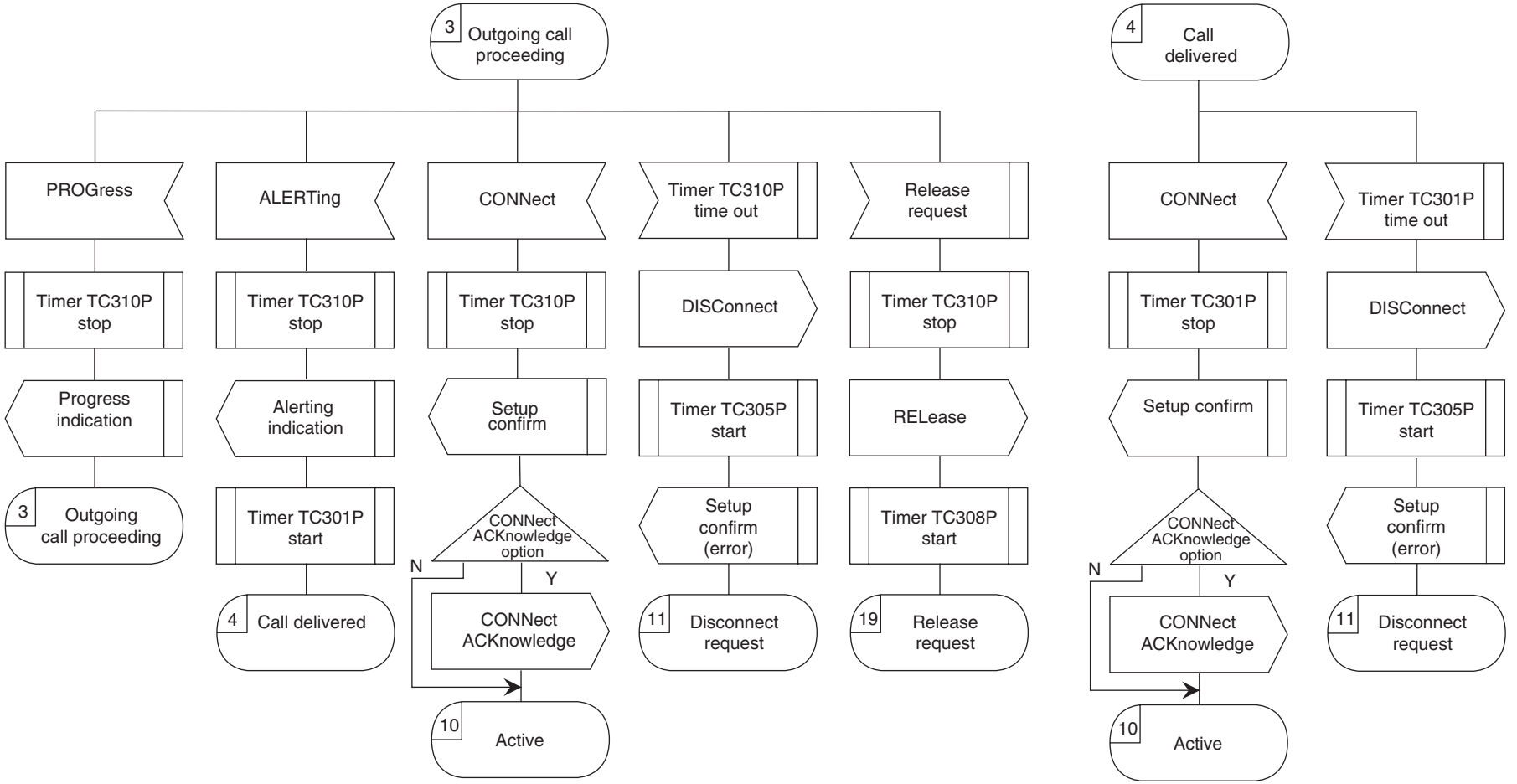
(Note 1) Timer TC301P, TC304P, TC310P are optional.

Appendix T CC SDL diagram (PS side) 5/17



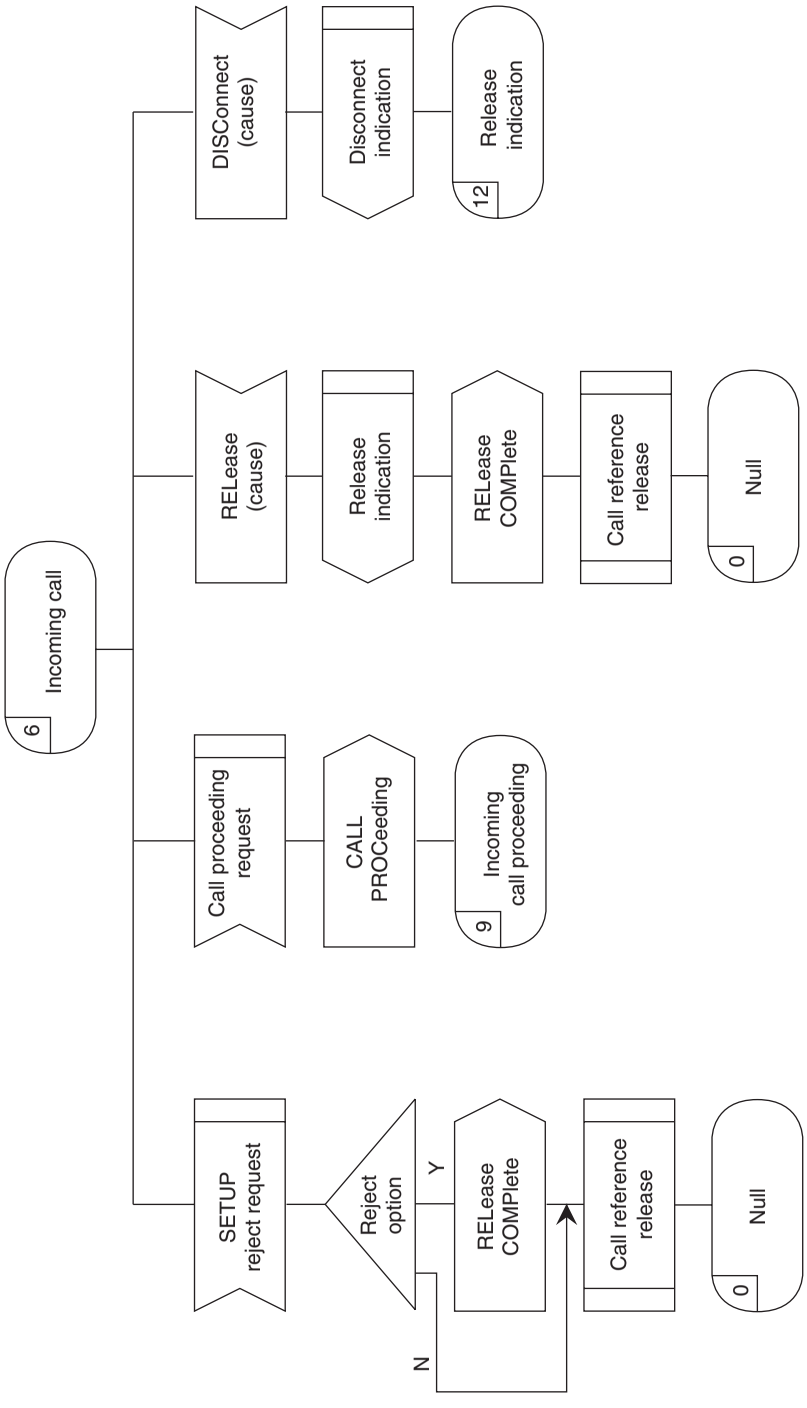
(Note 1) Timer TC304P is optional.

Appendix T CC SDL diagram (PS side) 6/17

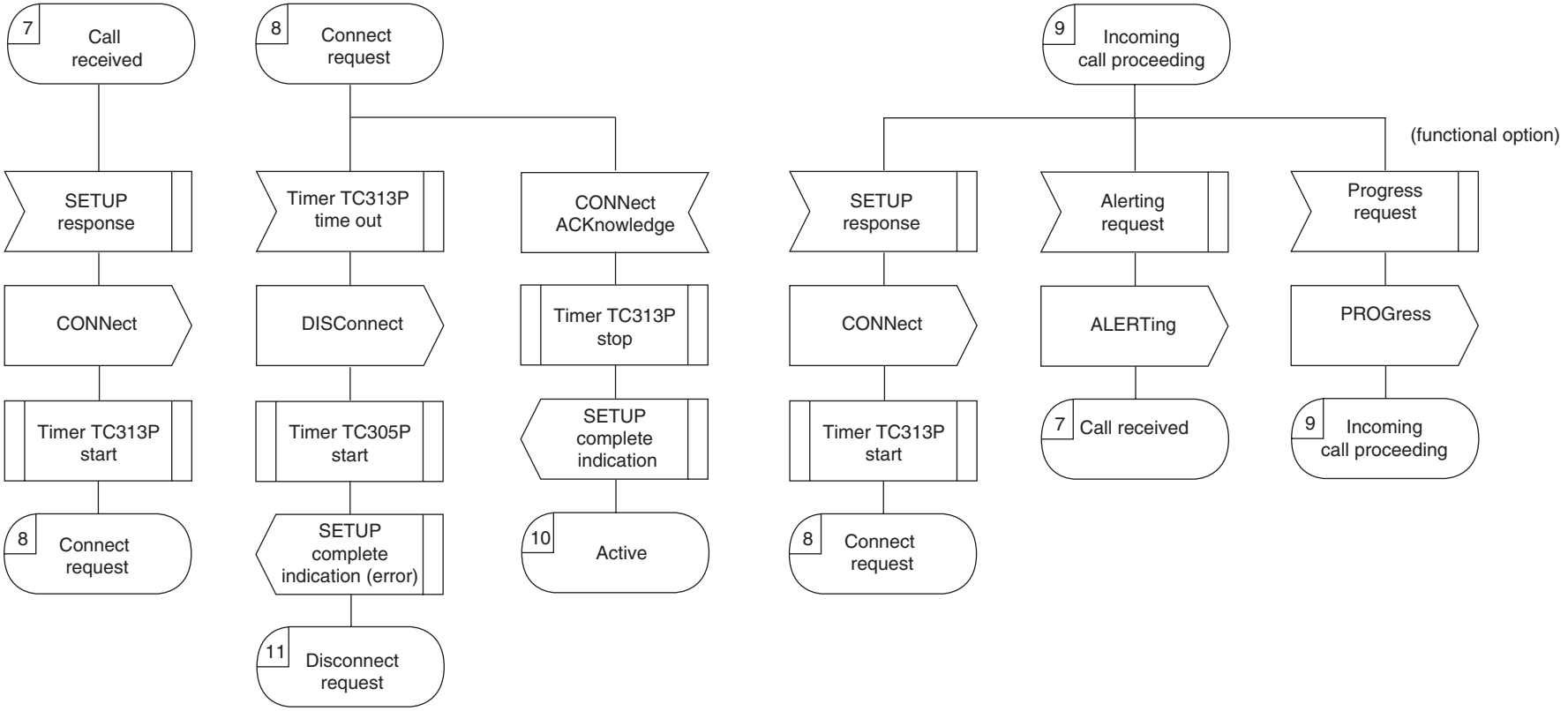


(Note 1) Timer TC301P, TC310P are optional.

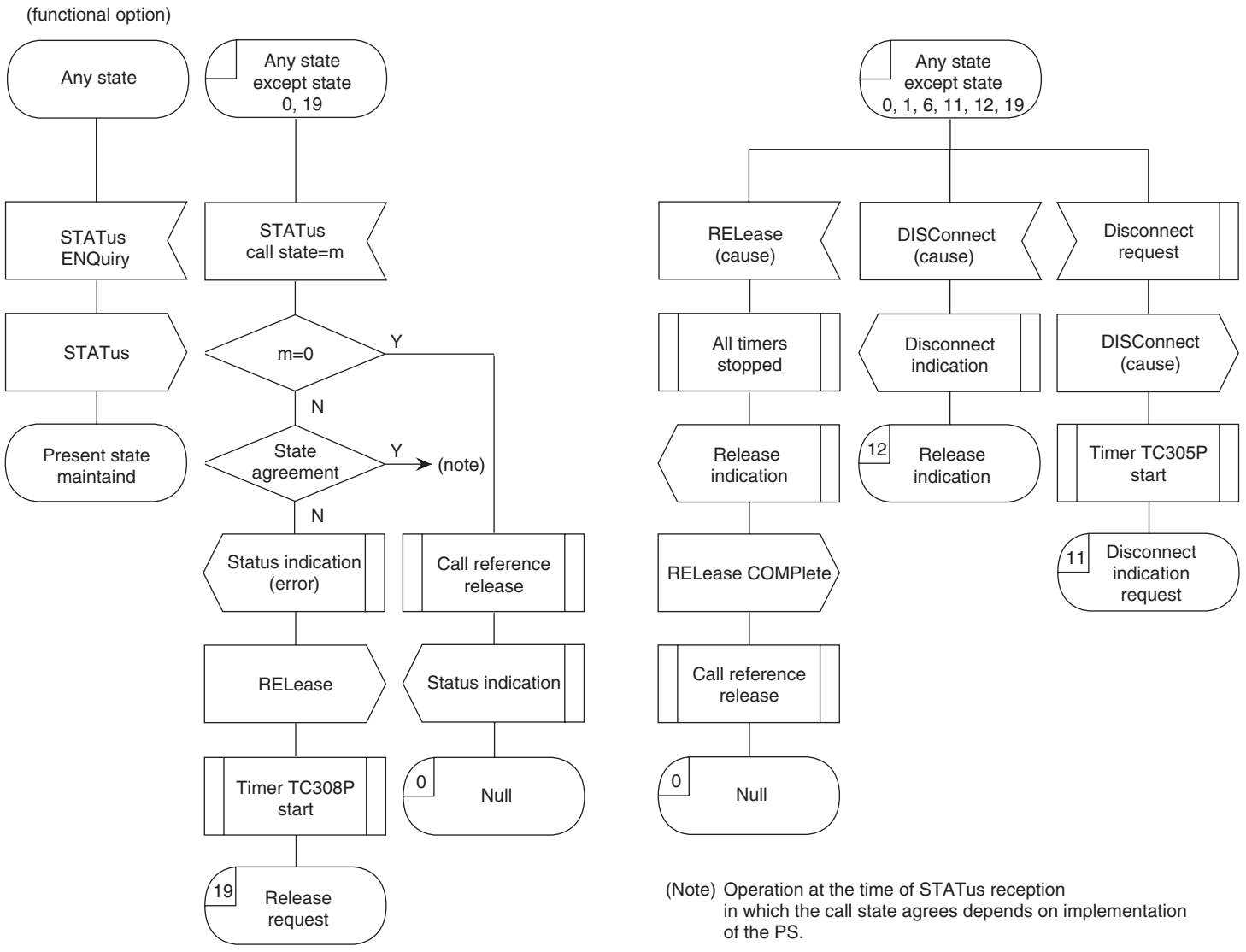
Appendix T CC SDL diagram (PS side) 7/17



Appendix T CC SDL diagram (PS side) 8/17

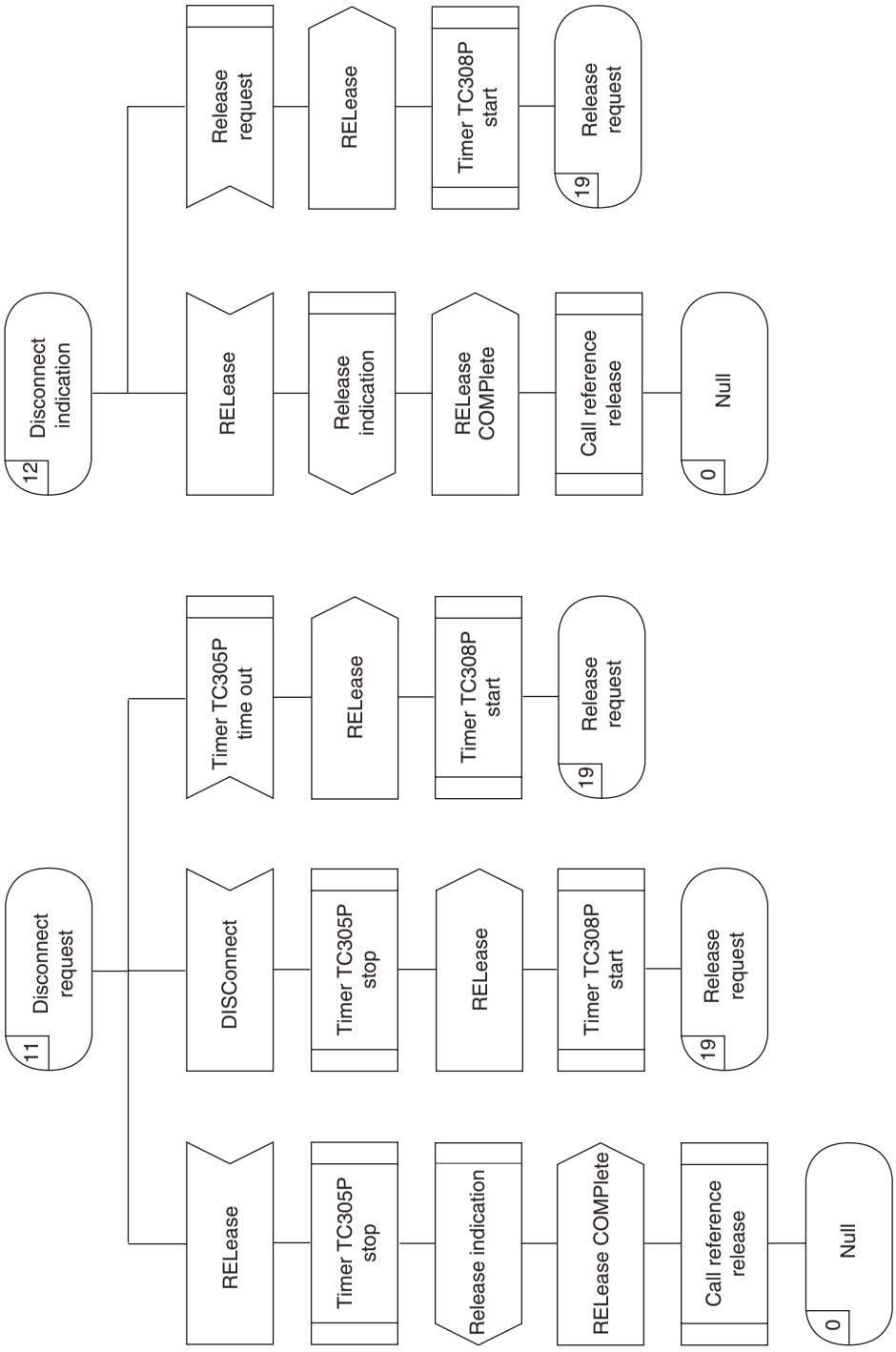


Appendix T CC SDL diagram (PS side) 9/17

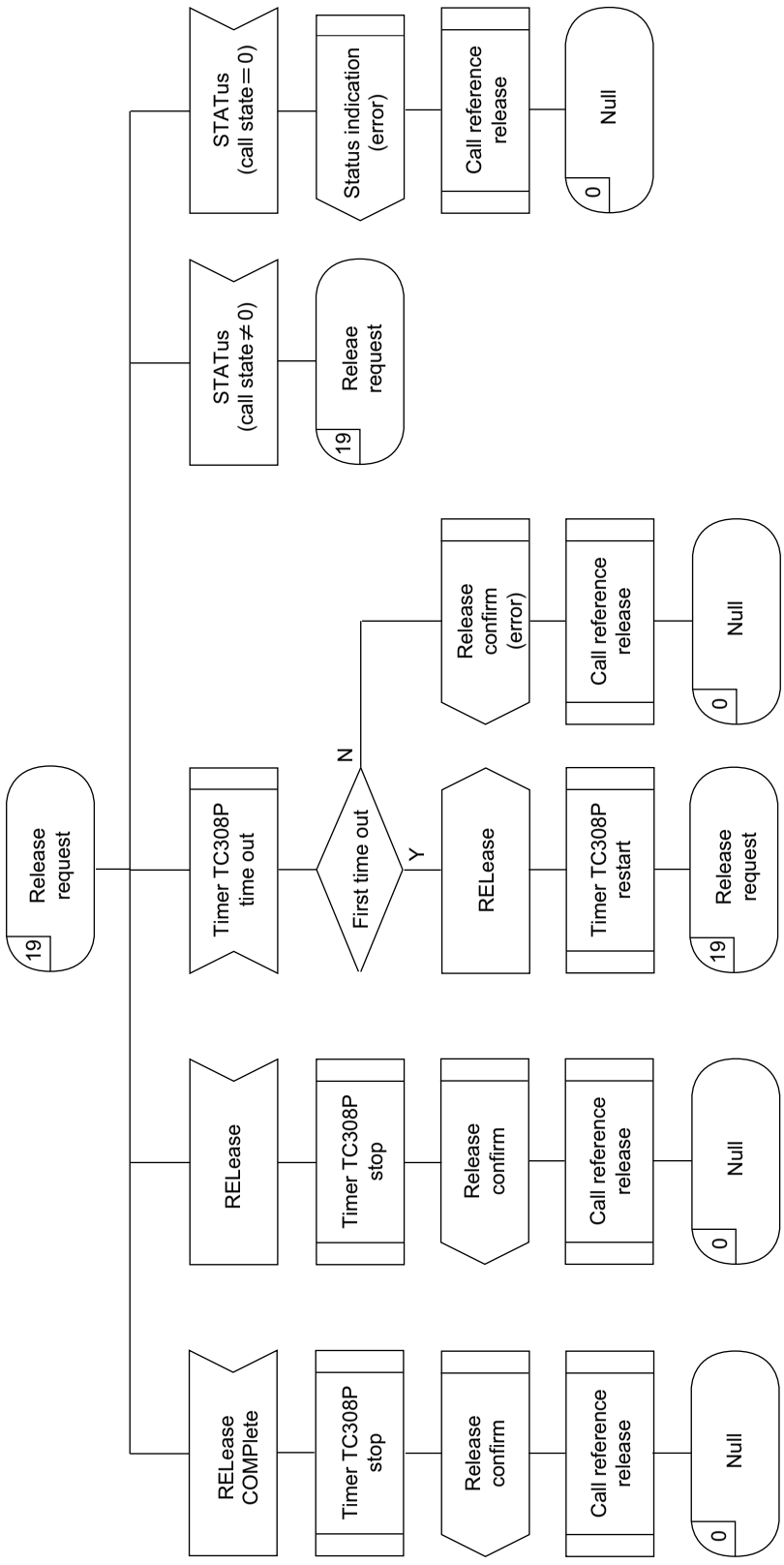


(Note) Operation at the time of STATus reception in which the call state agrees depends on implementation of the PS.

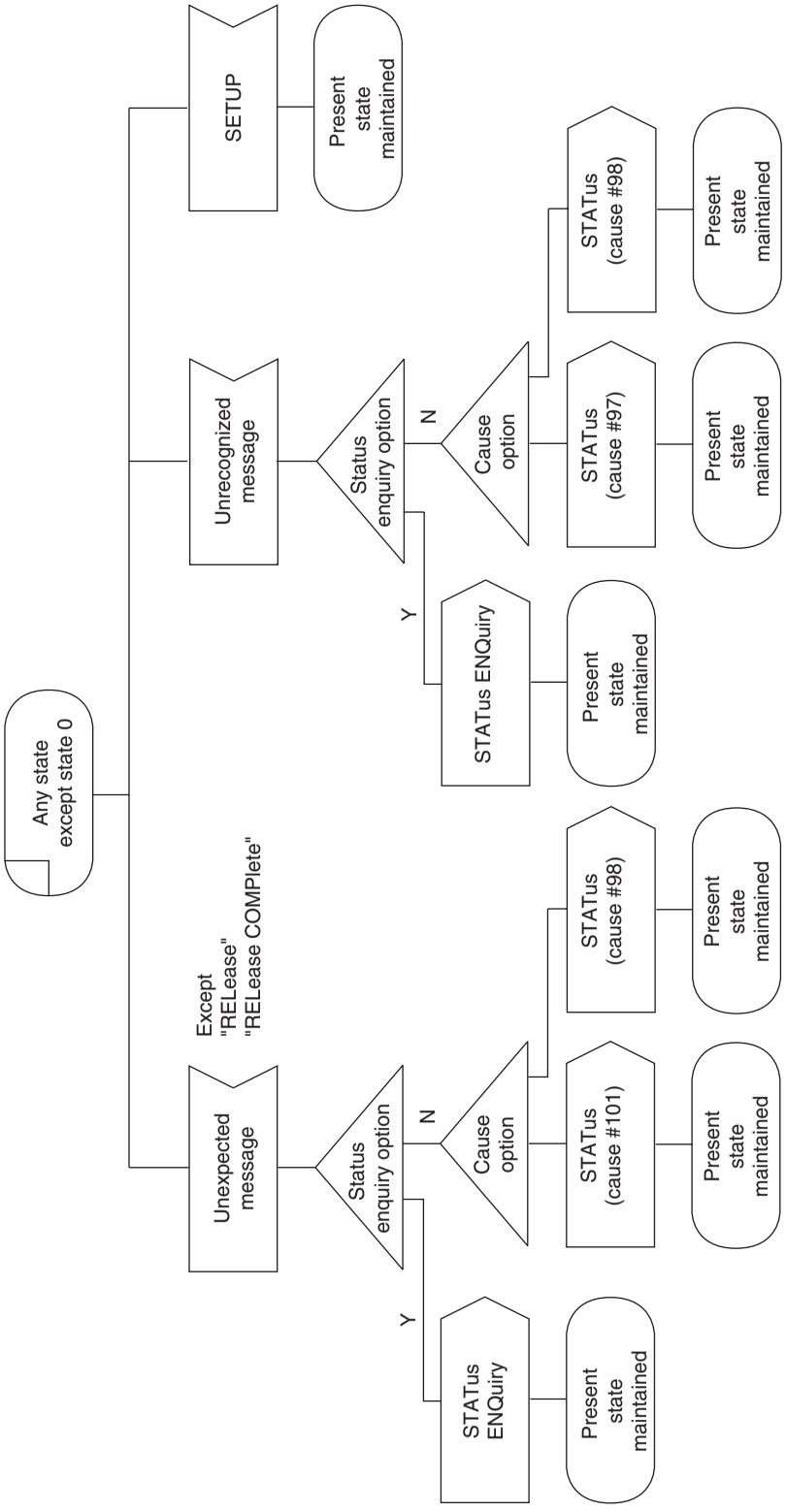
Appendix T CC SDL diagram (PS side) 10/17



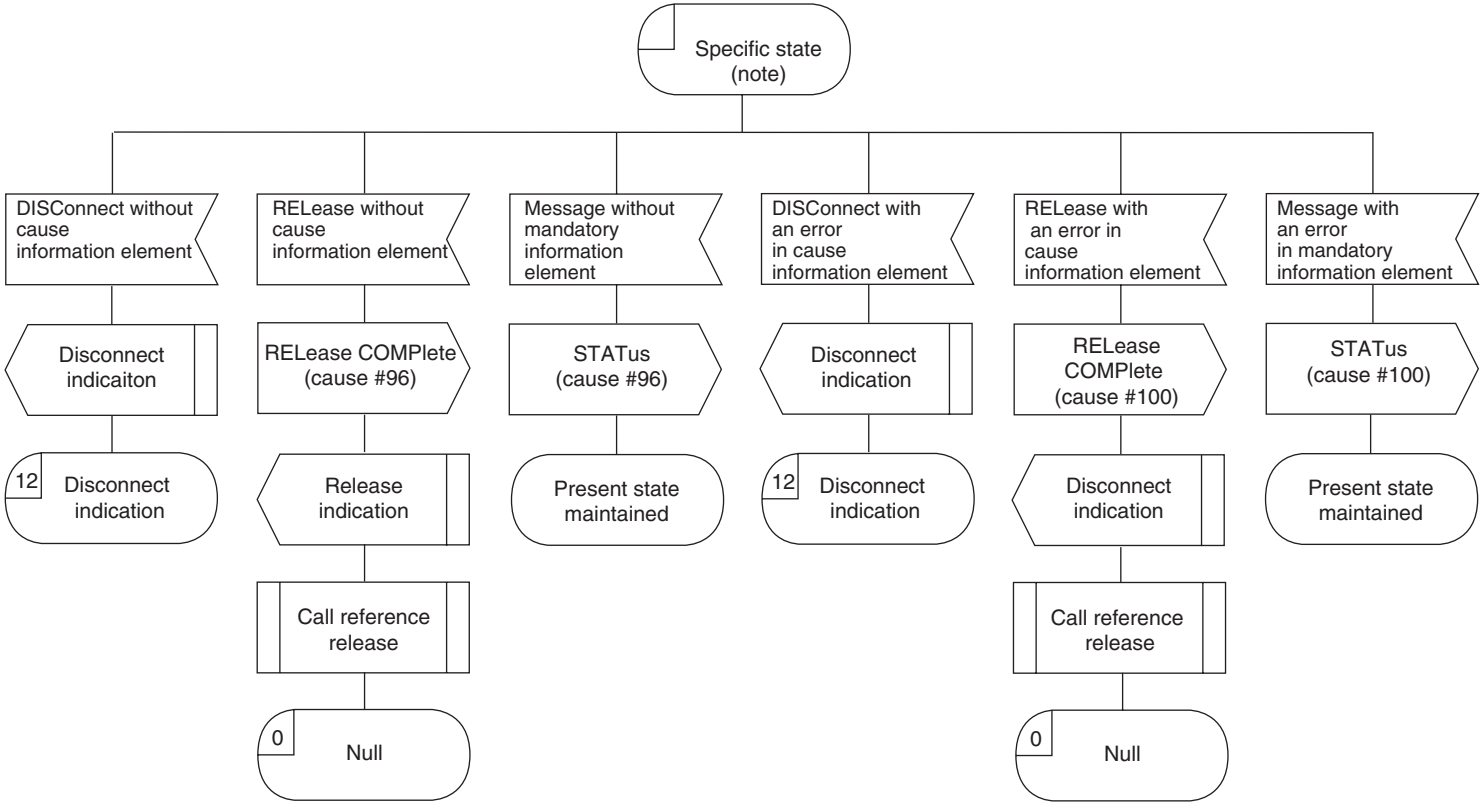
Appendix T CC SDL diagram (PS side) 11/17



Appendix T CC SDL diagram (PS side) 12/17

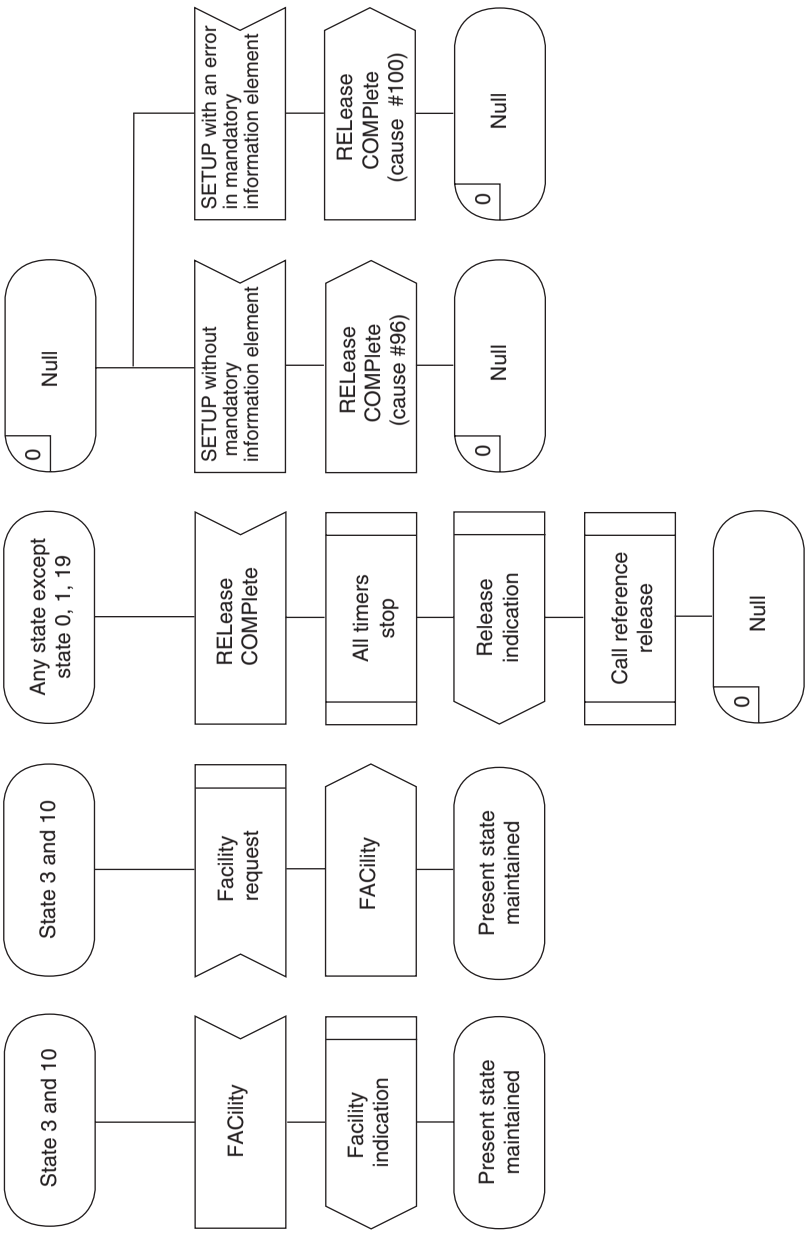


Appendix T CC SDL diagram (PS side) 13/17

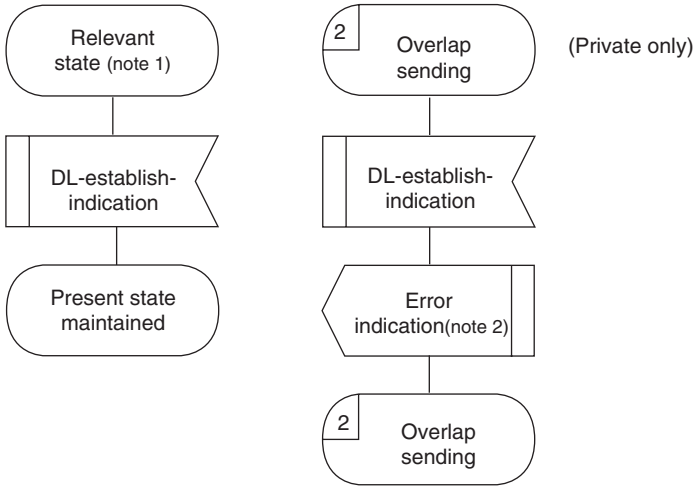


(Note) This is a state where the message received in this SDL diagram is an expected message.

Appendix T CC SDL diagram (PS side) 14/17

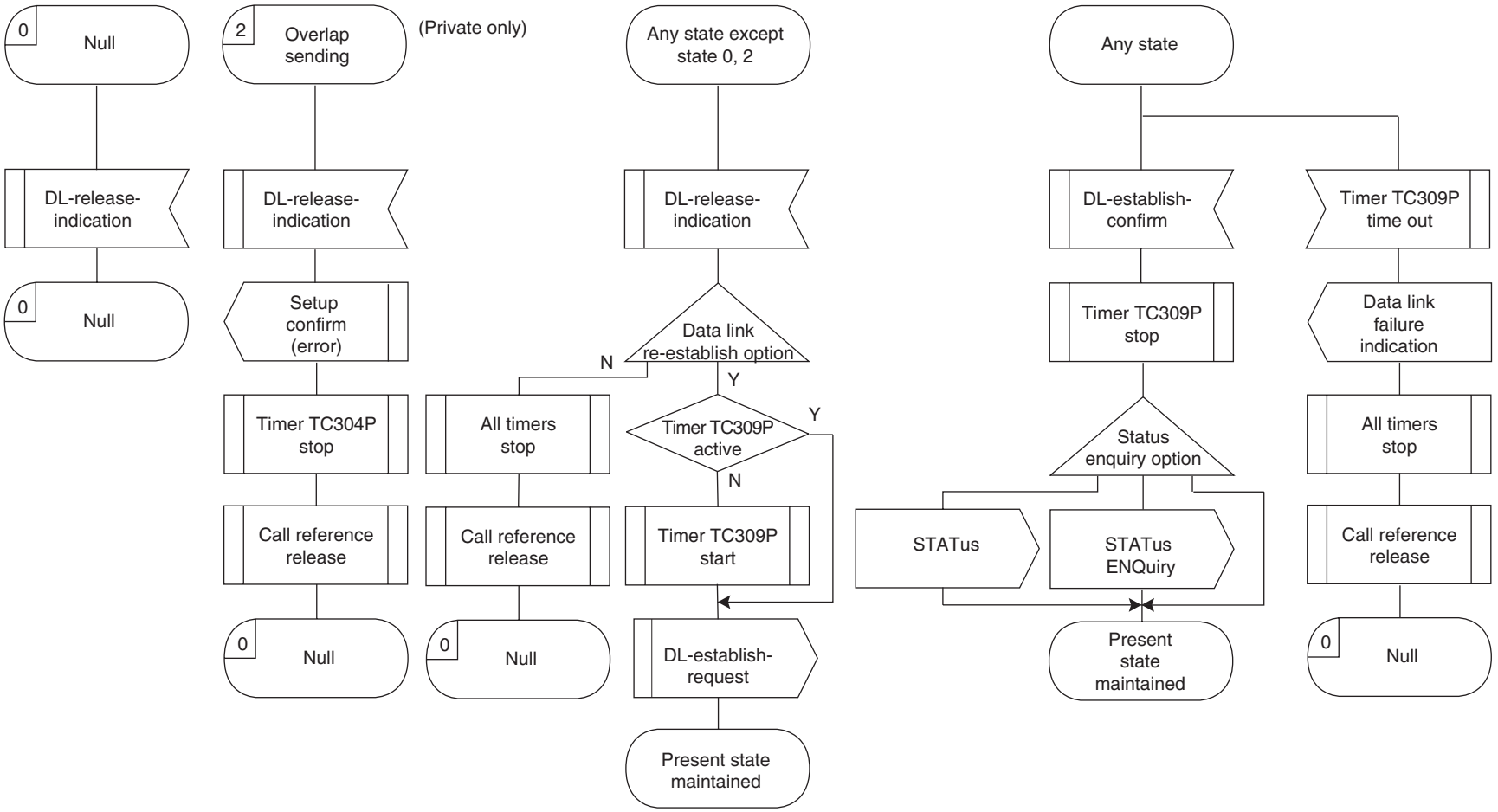


Appendix T CC SDL diagram (PS side) 15/17



(Note 1) Relevant state is as follows: P1, P3, P4, P6 ~ P12, P19.
(Note 2) When this primitive is received, call control should disconnect the call by transmitting a disconnect request primitive.

Appendix T CC SDL diagram (PS side) 16/17



(Note 1) Timer TC304P is optional.

Appendix T CC SDL diagram (PS side) 17/17

Appendix U CC PS side timers (Private standard/ Public standard)

CC PS side timers 1/2

Timer		State of call	Start conditions	Nomal stop conditions	Time out (Retry)	Time out (Retry out)	Mandatory/Optional	
No.	Value						Timer	Timer value
TC301P	(3 minutes or more)	Call delivered	"ALERTing" reception	"CONNect" reception		Call is disconnect-recovered	Optional	Man-datory
TC303P	(4 sec)	Call initiated	"SETUP" transmission	"ALERTing", "CONNect", "SETUP ACKnowledge", "CALL PROCeeding" or "RELease COMPlete" received	"SETUP" is retransmitted, and TC303P is restarted. If "RELease COMPlete" was already received, call was disconnect-recovered.	"RELease COMPlete" is transmitted, enters null state	Optional	Man-datory
TC304P	(15 sec)	Overlap sending	When "INFOrmation" is transmitted When "INFOrmation" is transmitted, TC304P is restarted	When "CALL PROCeeding", "ALERTing", "CONNect" or "DISConnect" is received		"DISConnect" is transmitted.	Optional (note 2)	Man-datory
TC305P	(30 sec)	Disconnect request	When "DISConnect" is transmitted	When "RELease" or "DISConnect" is received		"RELease" is transmitted	Man-datory	Man-datory
TC308P	(4 sec)	Release request	When "RELease" is transmitted	When "RELease COMPlete" or "RELease" is received	"RELease" is retransmitted, TC308P is restarted	Call reference is released	Man-datory	Man-datory
TC309P	(90 sec)	Any stable state	When data link is disconnected and call of stable state is not lost	When data link is reconnected		Internal connection is disconnect-recovered, and call reference is released	Optional (note1)	Man-datory
TC310P	(30 - 120 sec)	Outgoing call proceeding	When "CALL PROCeeding" is received	When "ALERTing", "CONNect", "DISConnect" or "PROGress" is received		"DISConnect" transmitted	Optional	Man-datory
TC313P	(4 sec)	Connect request	When "CONNect" is transmitted	When "CONNect ACKnowledge" is received		"DISConnect" transmitted	Man-datory	Man-datory

CC PS side timers 2/2

TC322P	(4 sec)	All call state	When "STATus ENQuiry" is transmitted	When "STATus", "DISConnect", "RELease" or "RELease COMPlete" is received	"STATus ENQuiry" can be retransmitted several times	"STATus ENQuiry" can be retransmitted several times	Mandatory when Appendix X 5.10 is imple-mented	Man-datory

(Note 1) Mandatory when data link re-eatablish performed.

(Note 2) Private only

Mandatory: Specified in the standard, and must be realized. Further, a mandatory timer value is valid when the timer is realized.

Optional: Specified in the standard, and is realized depending on need. Further, an optional timer value is a reference value when the timer is realized.

In the case of a CC message with a facility information element attached, the primitive is present between the CC message and facility. However, the description of the primitive on the SDL (CC) is omitted.

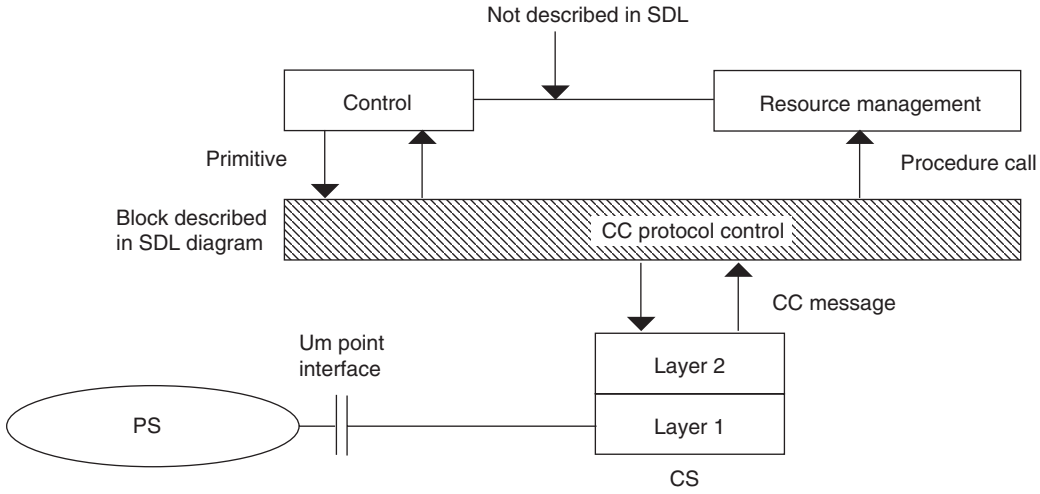


Figure 1 CC SDL diagram description method (CS side)

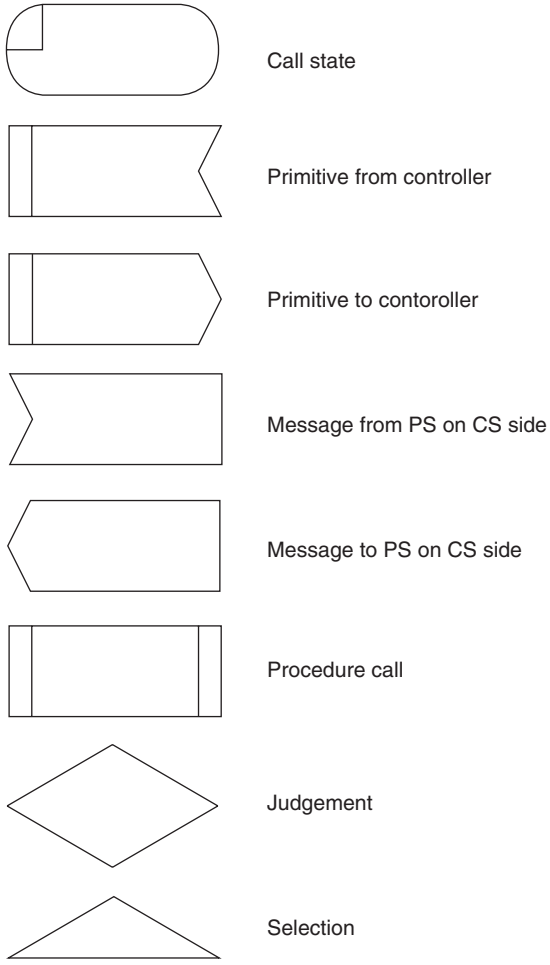
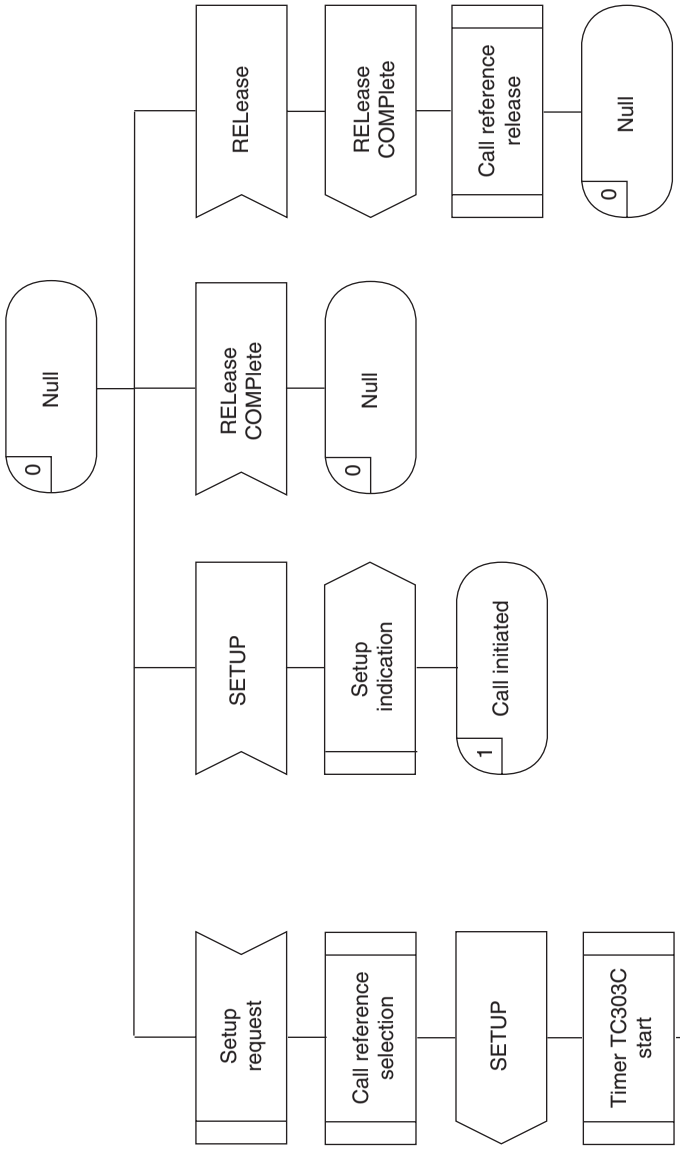
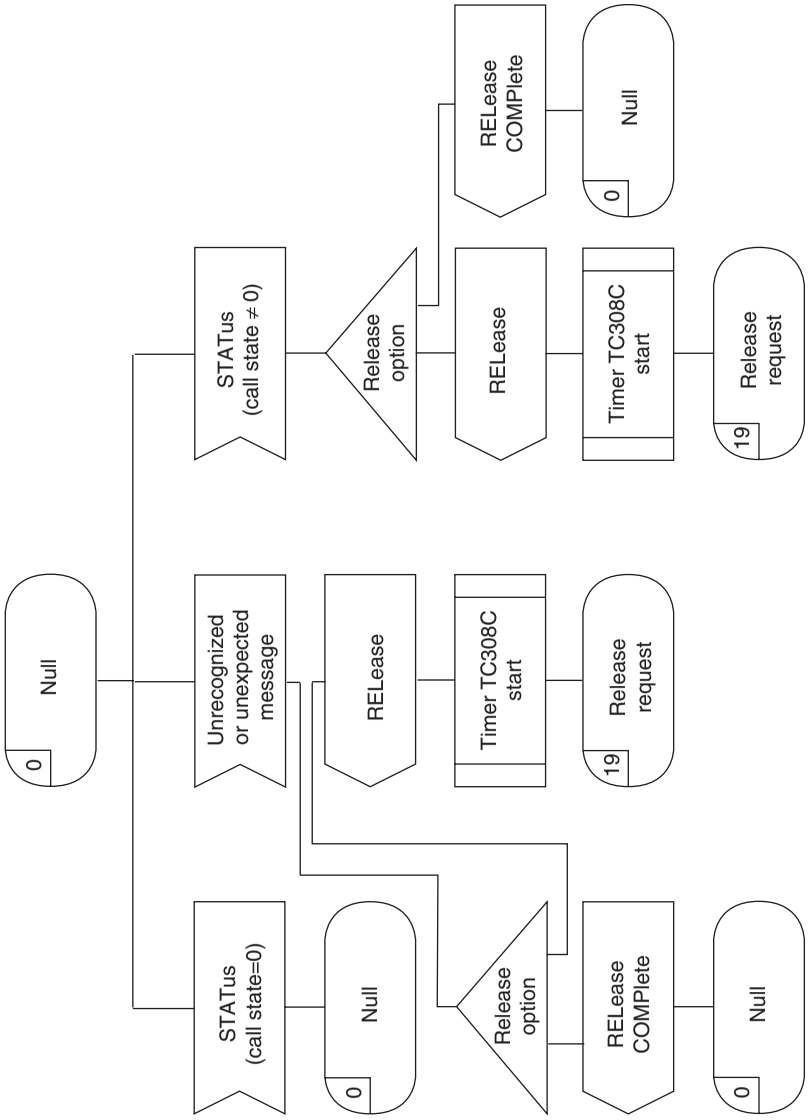


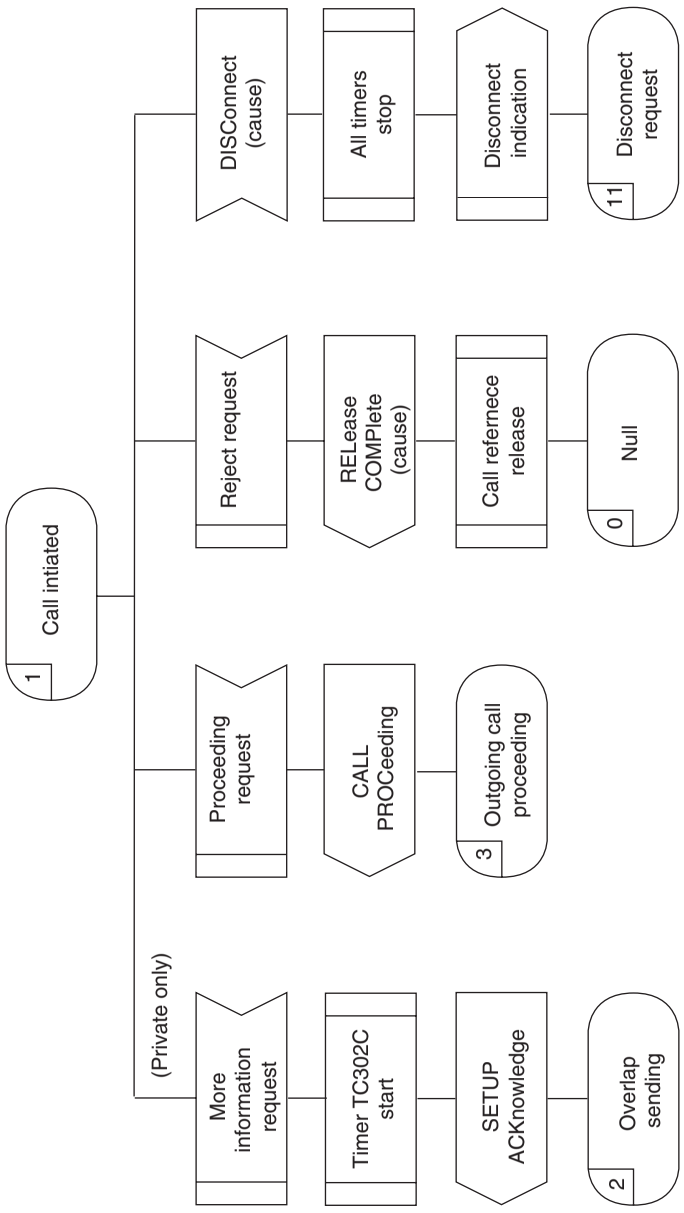
Figure 2 CC SDL diagram rules (CS side)



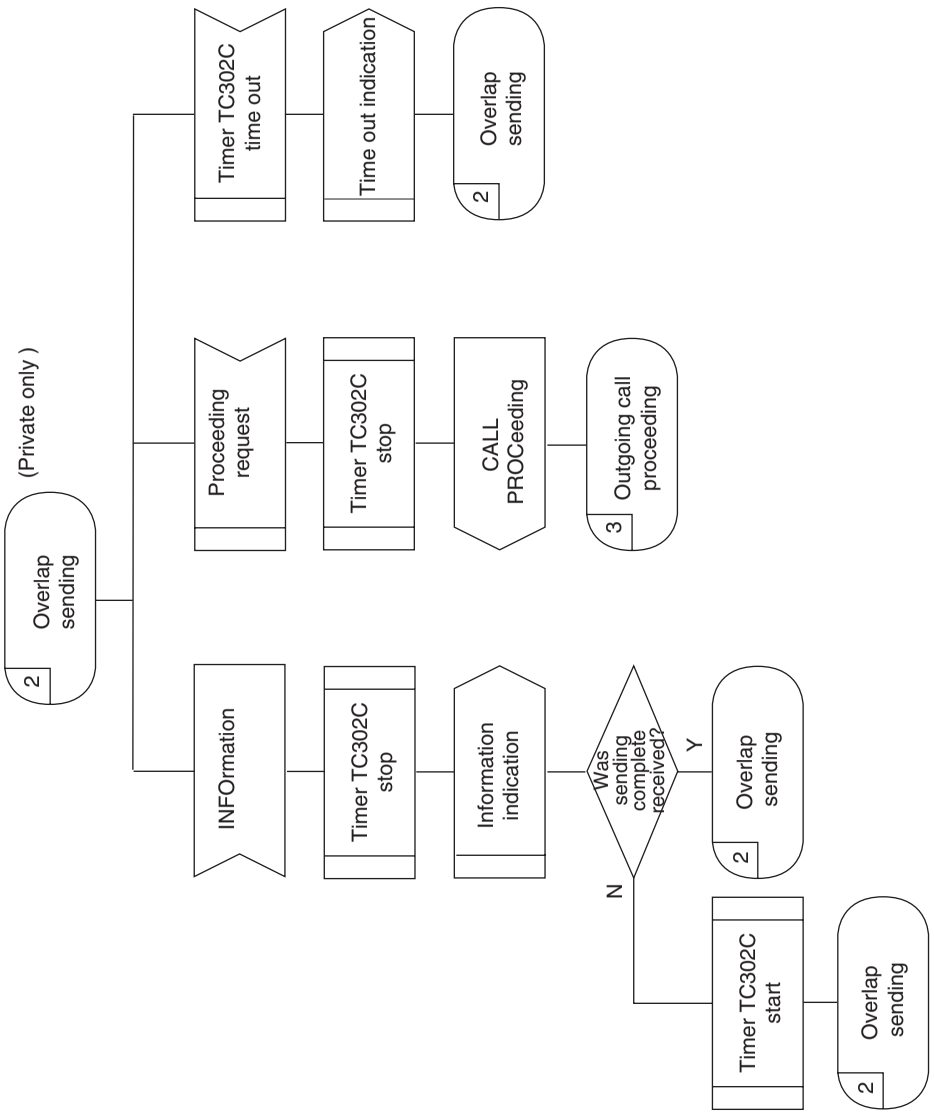
Appendix V CC SDL diagram (CS side) 1/19



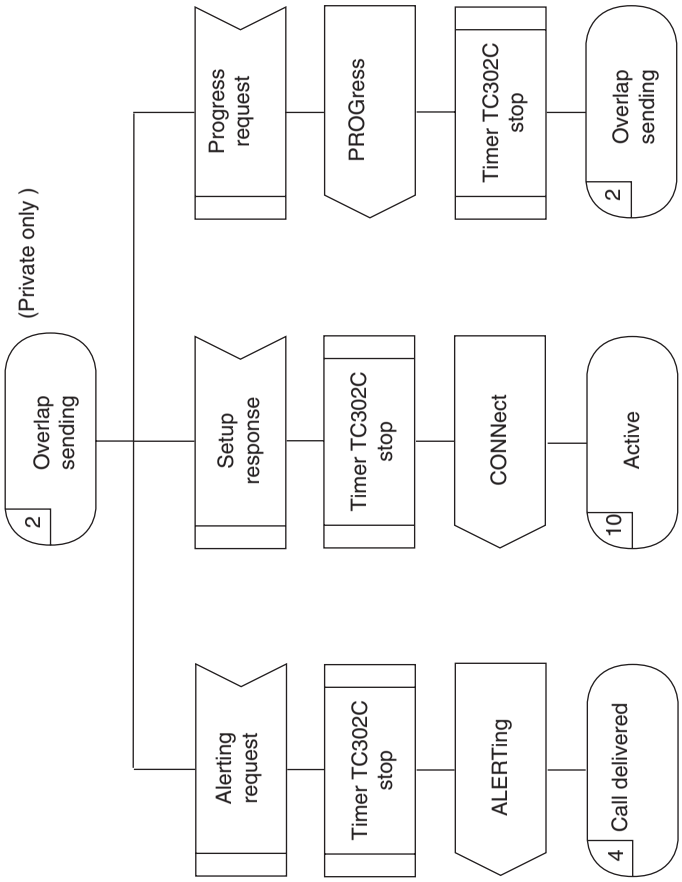
Appendix V CC SDL diagram (CS side) 2/19



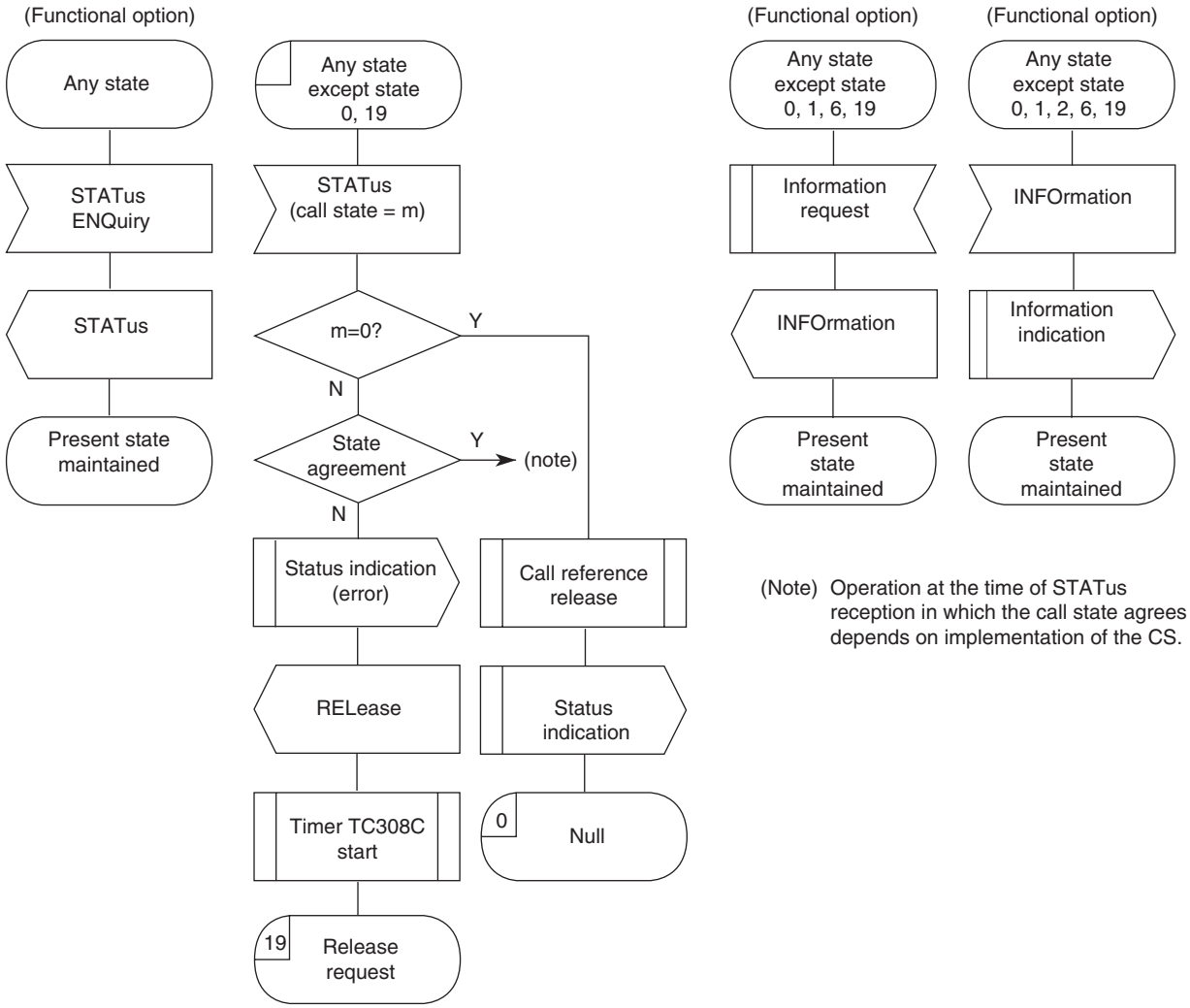
Appendix V CC SDL diagram (CS side) 3/19



Appendix V CC SDL diagram (CS side) 4/19

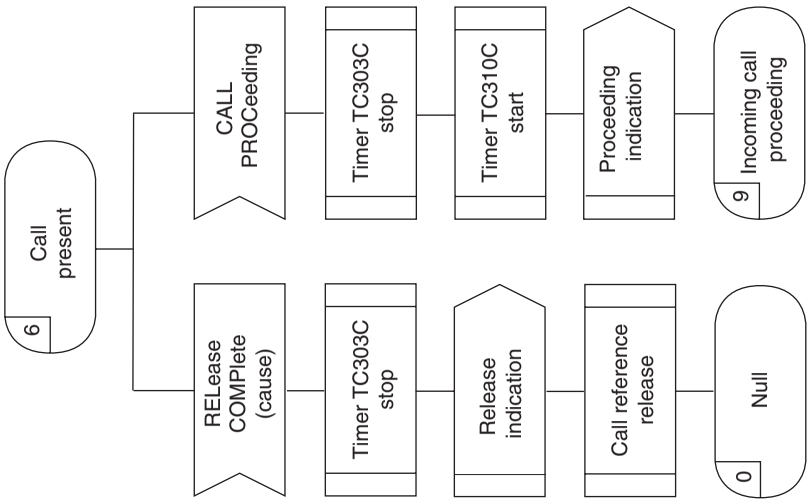


Appendix V CC SDL diagram (CS side) 5/19

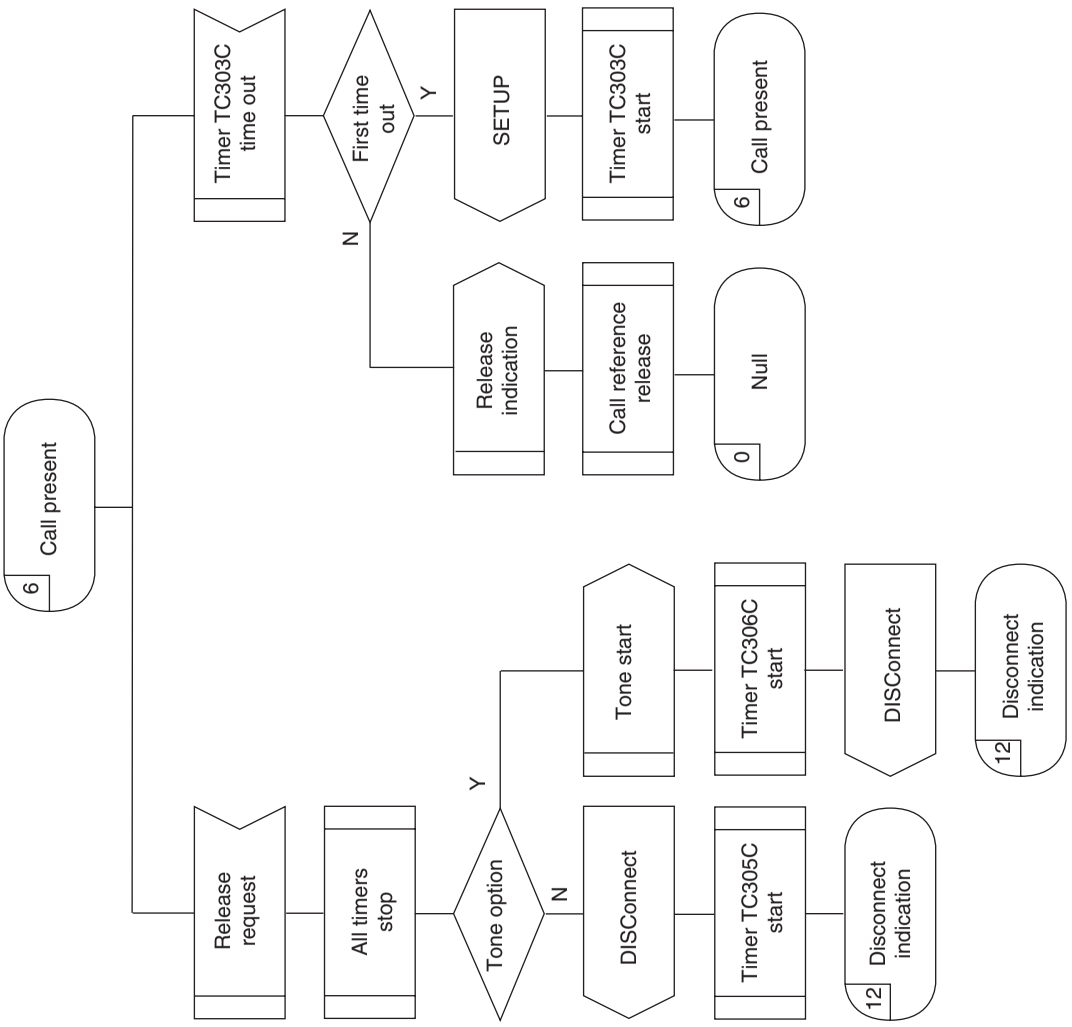


Appendix V CC SDL diagram (CS side) 6/19

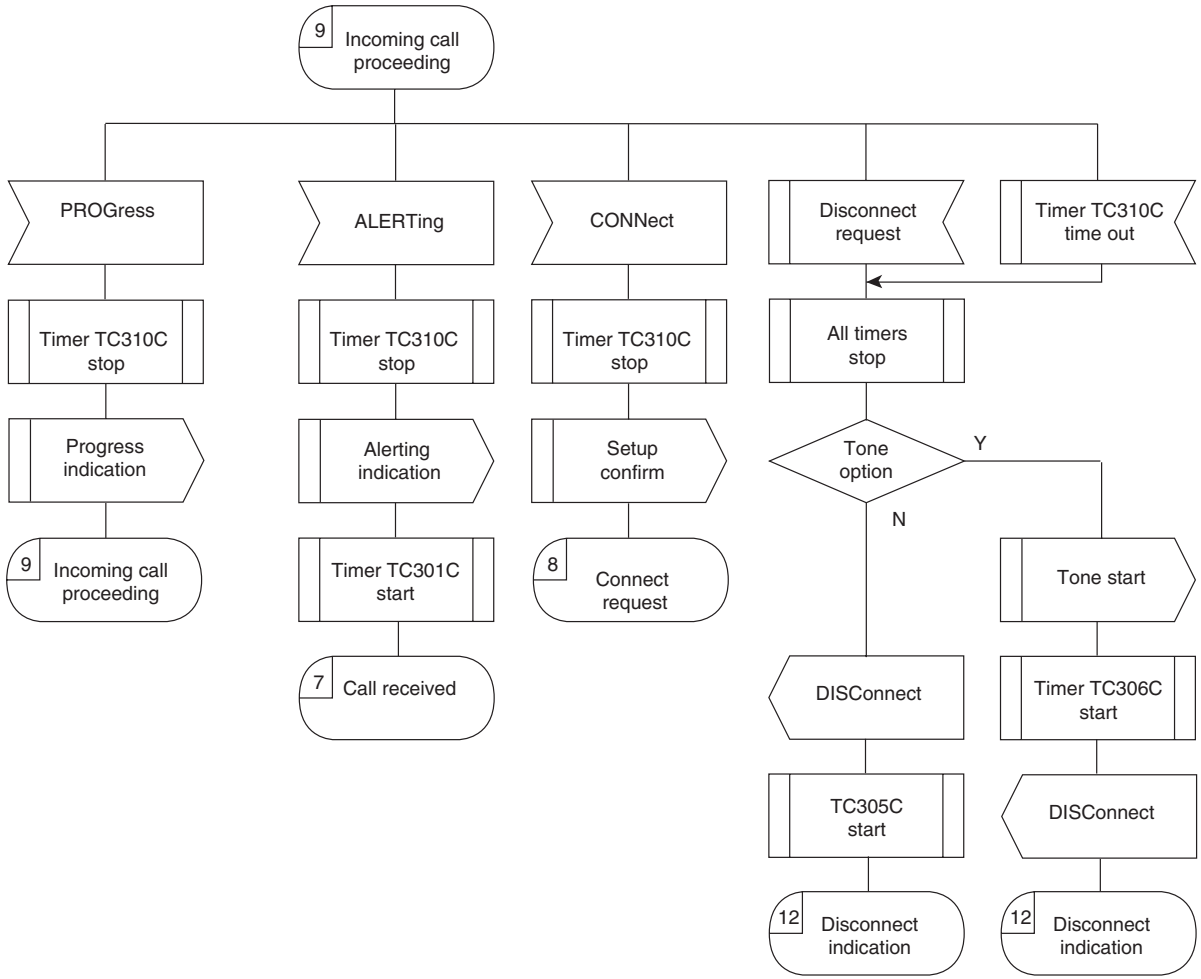
Appendix V CC SDL diagram (CS side) 7/19



Appendix V CC SDL diagram (CS side) 8/19

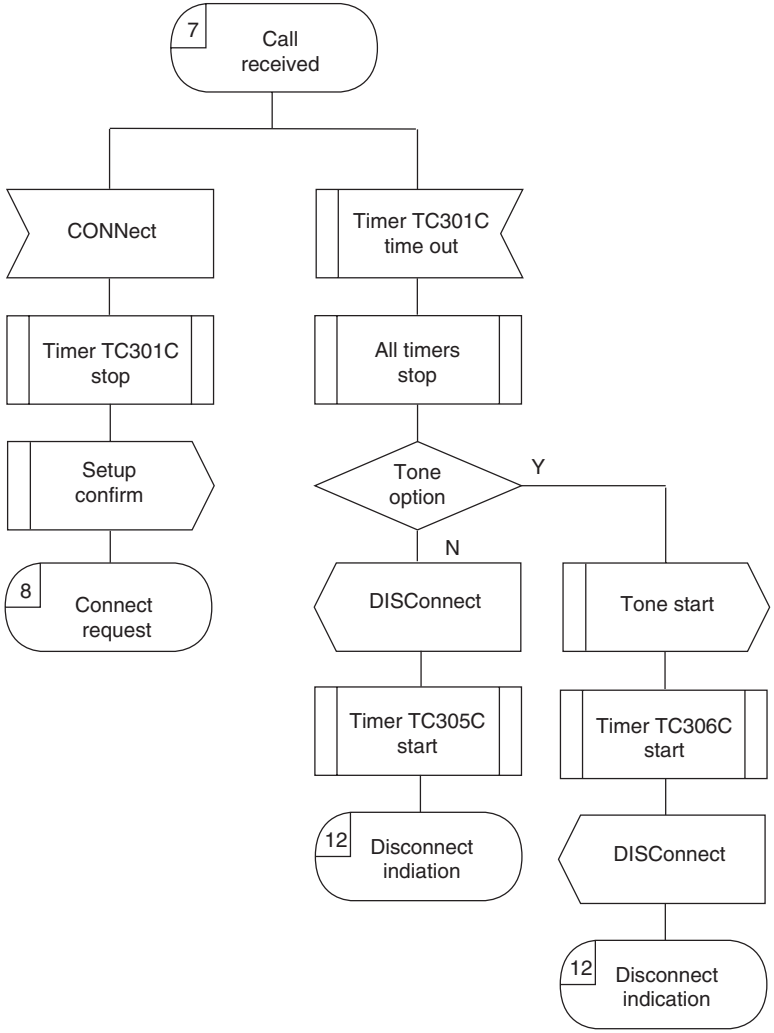


Appendix V CC SDL diagram (CS side) 9/19



(Note) Timer TC301C is optional.

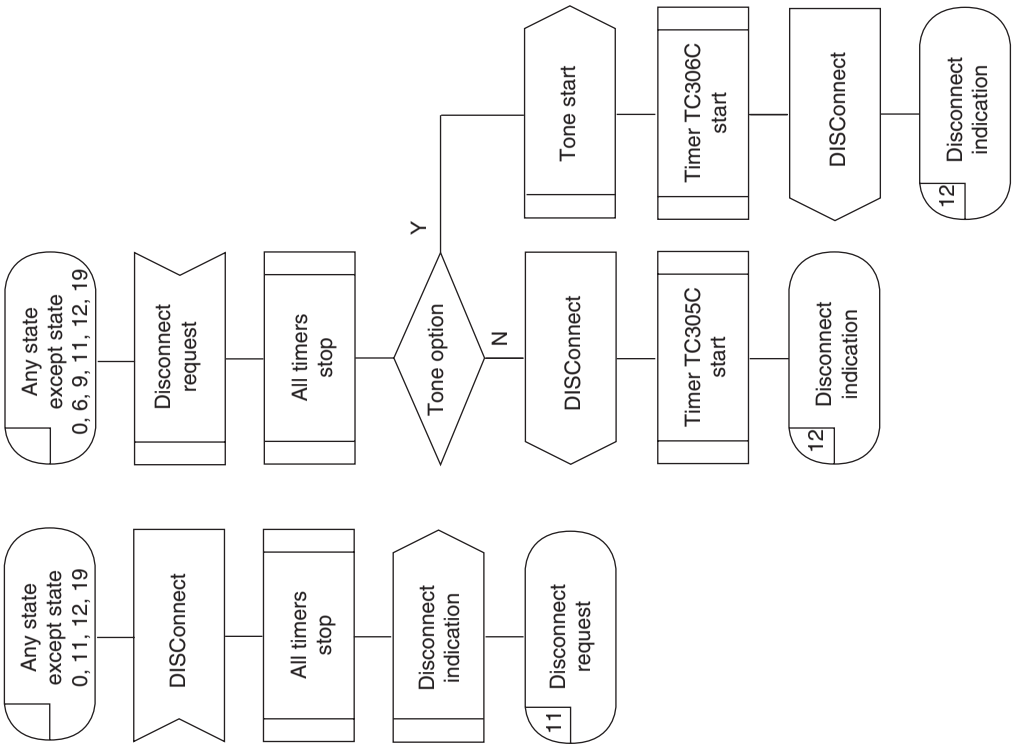
Appendix V CC SDL diagram (CS side) 10/19



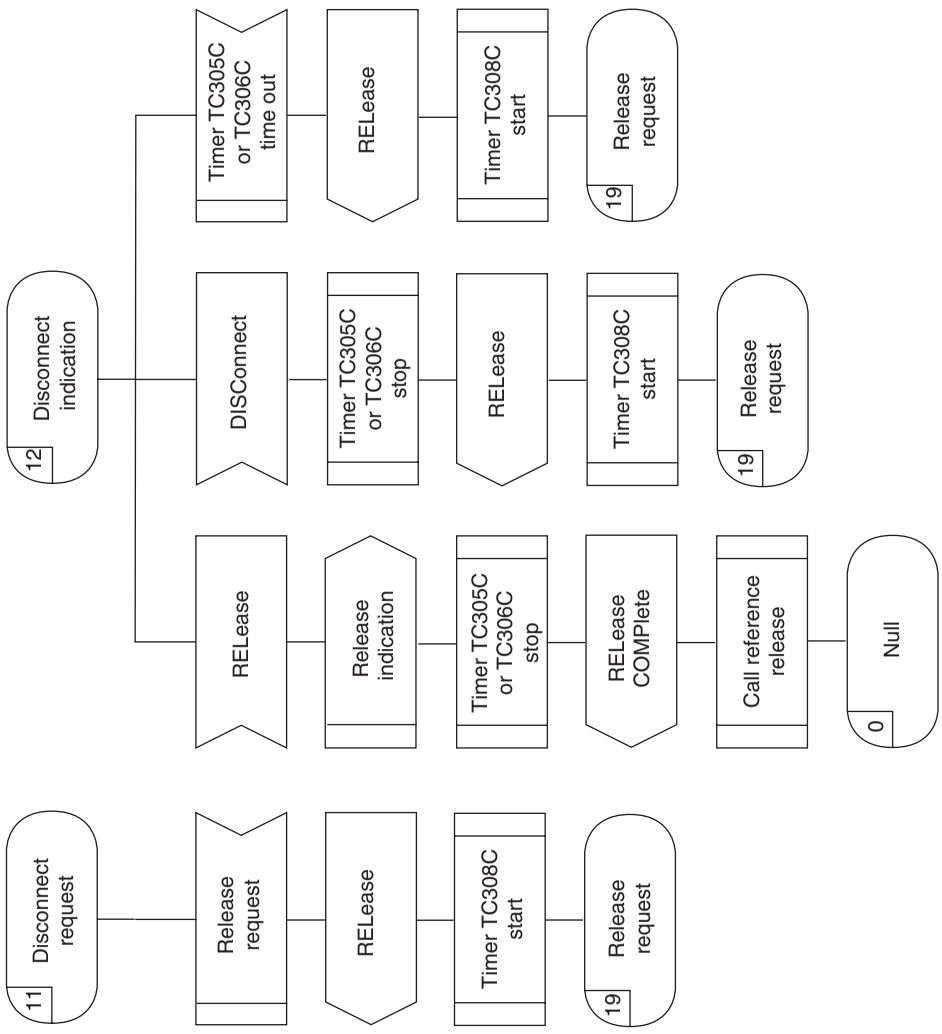
(Note 1) Timer TC301C is optional.

Appendix V CC SDL diagram (CS side) 11/19

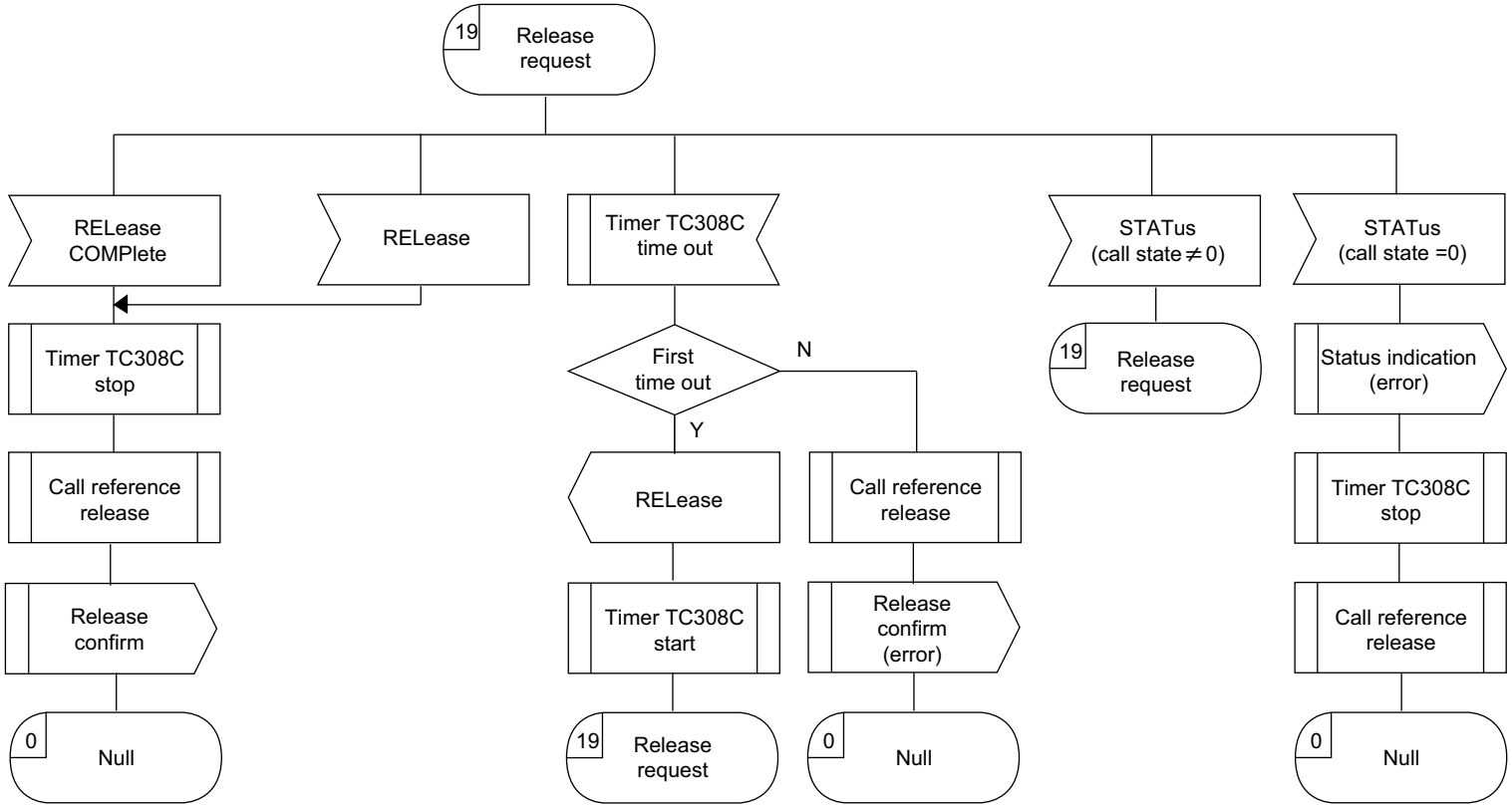
Appendix V CC SDL diagram (CS side) 12/19



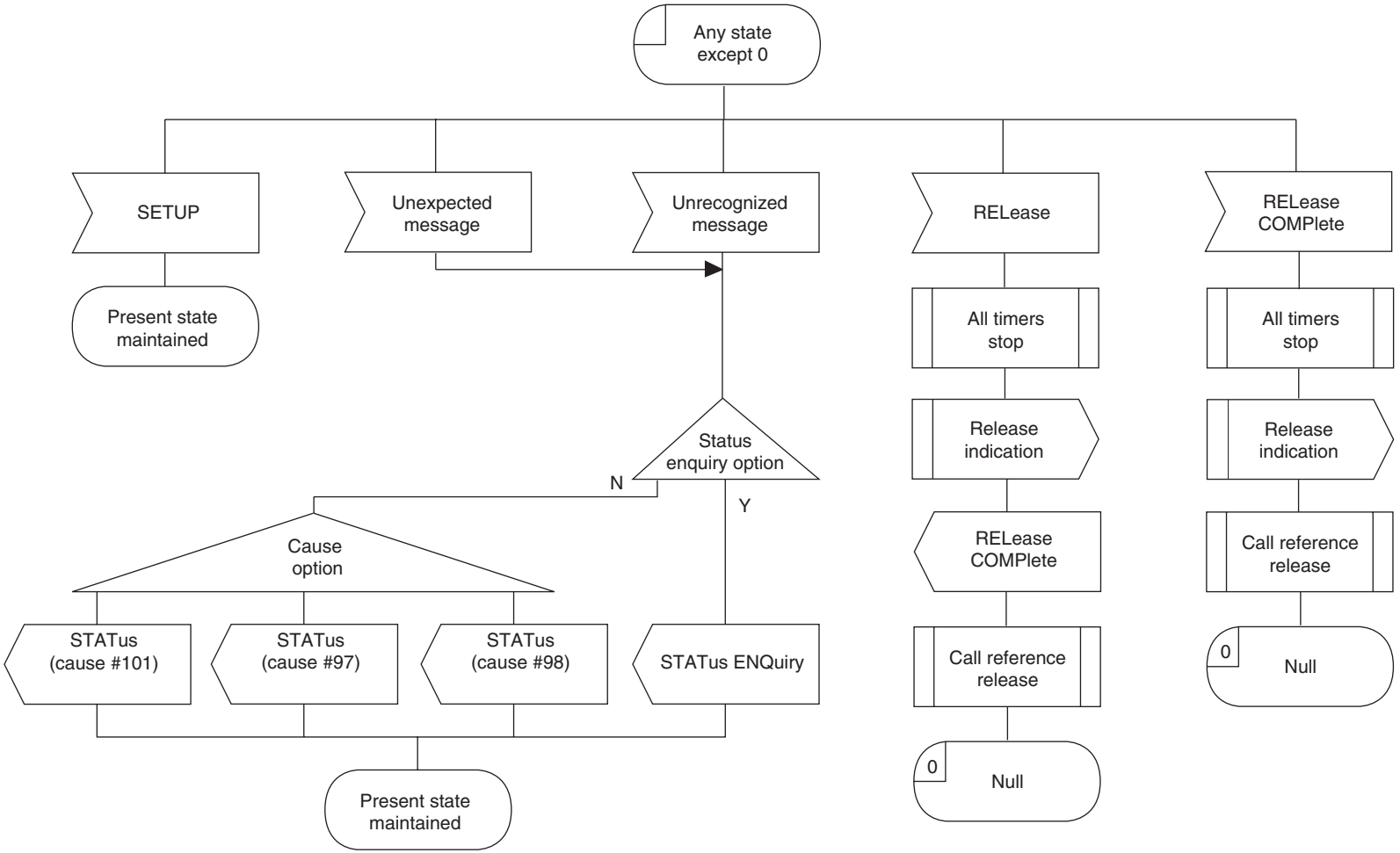
Appendix V CC SDL diagram (CS side) 13/19



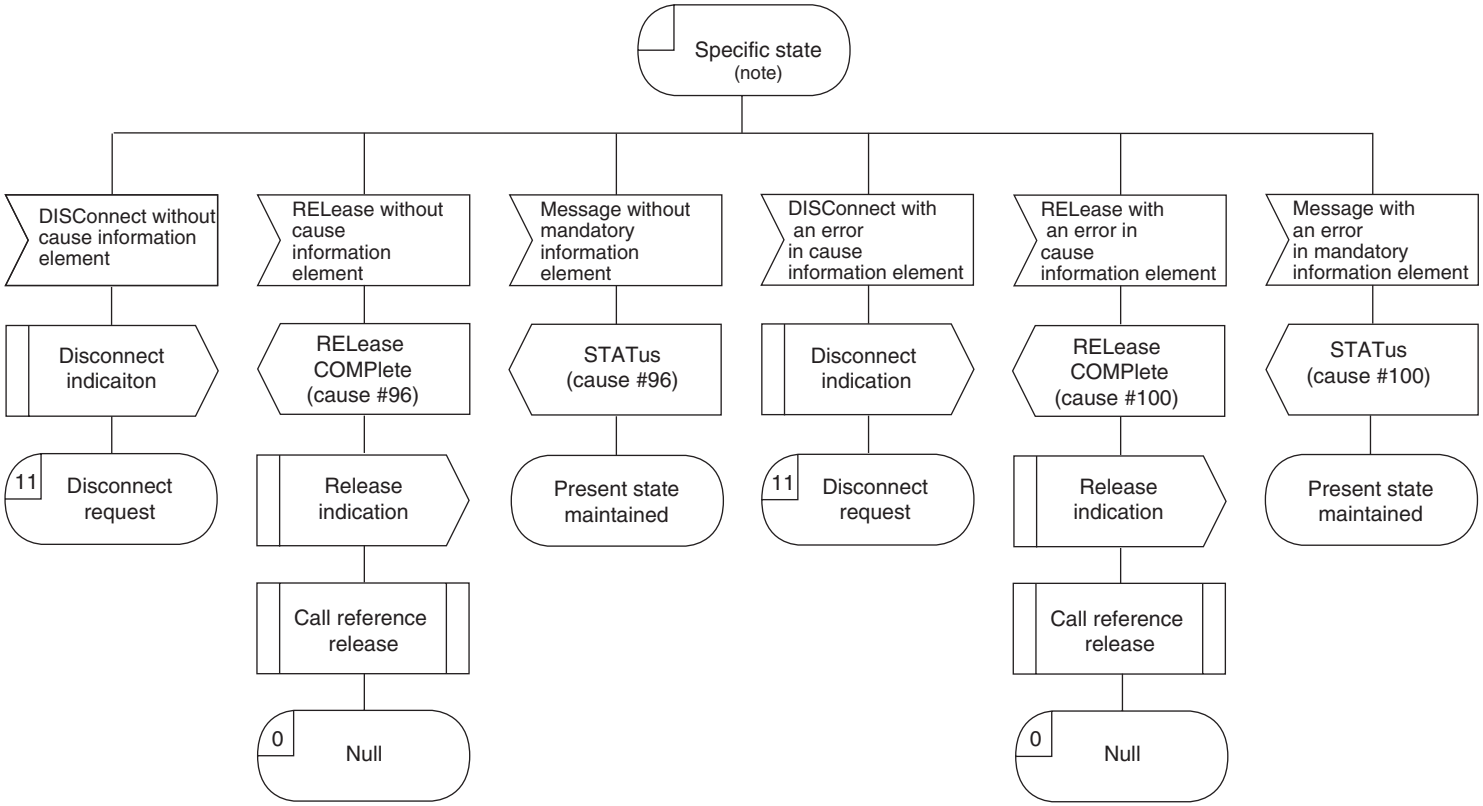
Appendix V CC SDL diagram (CS side) 14/19



Appendix V CC SDL diagram (CS side) 15/19

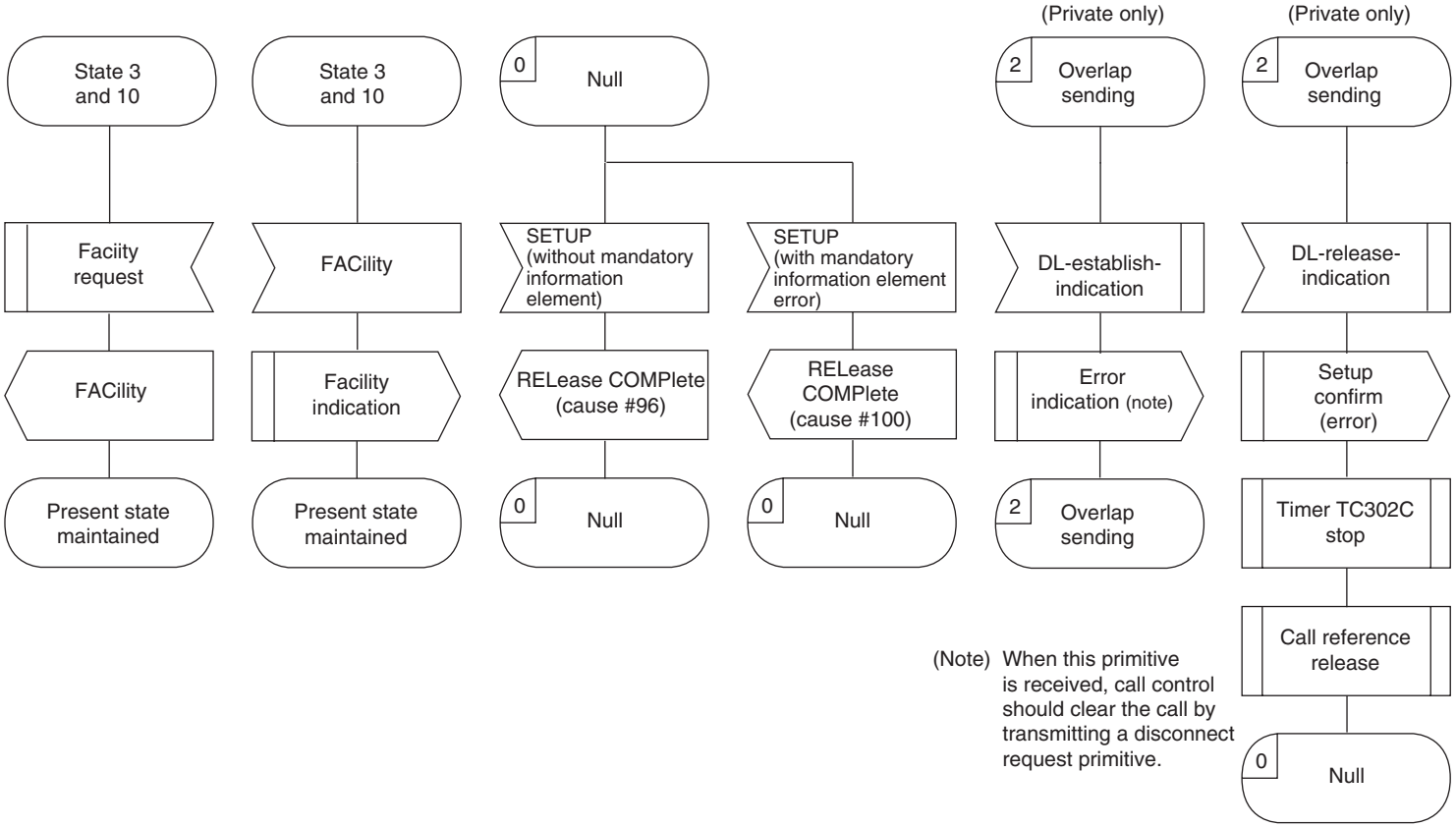


Appendix V CC SDL diagram (CS side) 16/19

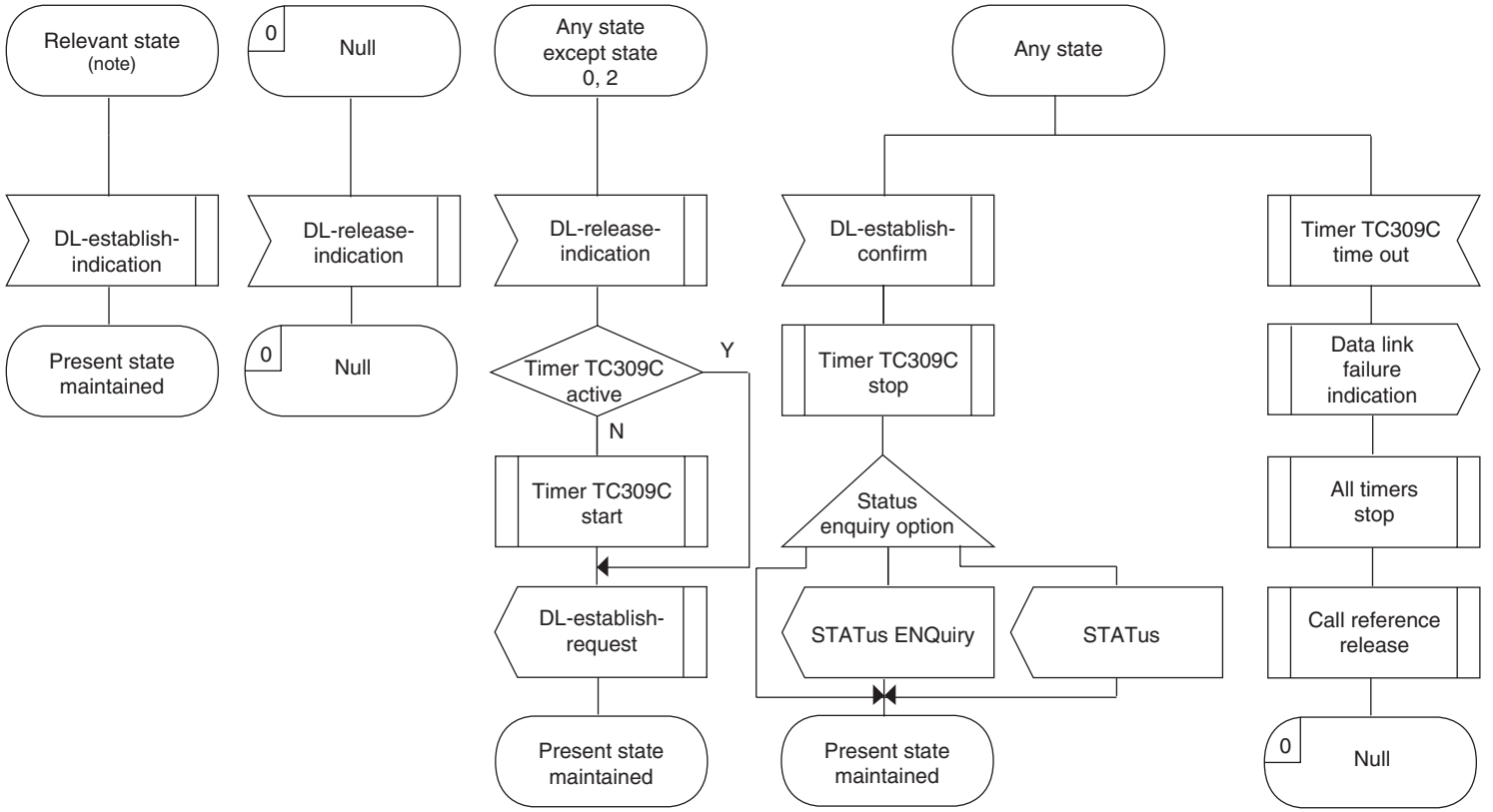


(Note) This state is where the message received in this SDL diagram is an expected message.

Appendix V CC SDL diagram (CS side) 17/19



Appendix V CC SDL diagram (CS side) 18/19



(Note) Relevant state is as follows:C1, C3, C4, C6-C12, C19

Appendix V CC SDL diagram (CS side) 19/19

Appendix W CC CS side timers (Private standard/Public standard)

CC CS side timers

Timer No.	Timer value	State of call	Start conditions	Normal stop conditions	Time out (retry)	Time out (retry out)	Mandatory/Optional	
							Timer	Timer value
TC301C	3 min or more	Call received	"ALERting" received	"CONNect" received		Clear call	(note 2)	Mandatory
TC302C	10Ð15 sec	Overlap sending	"SETUP ACKnowledge" sent. Receipt of "INFOmation", restarts TC302C	"Sending complete" received (note 1)		Clear if call information determined to be definitely incomplete. Otherwise send "CALL PROCeeding"	Mandatory if overlap sending is implemented (note 3)	Mandatory
TC303C	4 sec	Call present	"SETUP" sent	"CALL PROCeeding" or " RELease COMPlete" received.	Retransmit "SETUP"; restart TC303C. If "RELease COMPlete" has been received, clear the call.	Clear connectoin within CS and of communication network, and enter null state.	Mandatory	Mandatory
TC305C	30 sec	Disconnect indication	"DISConnect" without progress indicator #8 sent.	"RELease" or "DISConnect" received.		Send "RELease"	Mandatory	Mandatory
TC306C	30 sec (note 4)	Disconnect indication	"DISConnect" with progress indicator #8 sent.	"RELease" or "DISConnect" received.		Stop the tone/announcement and send "RELease".	Mandatory if inband tones/ announcements are provided	Mandatory
TC308C	4 sec	Release request	"RELease" sent	"RELease COMPlete" or "RELease" received	Retransmit "RELease" and restart TC308C	Release call reference	Mandatory	Mandatory
TC309C	90 sec	Any stable state	Data link disconnection. Call in stable states are not lost.	Data link reconnected		Clear connection within CS and of communication network, and enter null state.	Mandatory	Mandatory
TC310C	10 sec	Incoming call proceeding	"CALL PROCeeding" received	"ALERTing", "CONNect" or "DISConnect" received. If "DISConnect", retain cause and continue timing.		Clear call	Mandatory	Mandatory
TC322C	4 sec	All call state	"STATus ENQuiry" sent	"STATus", "DISConnect", "RELease" or "RELease COMPlete" received.	"STATus ENQuiry" may be retransmitted several times	"STATus ENQuiry" may be retransmitted several times	Mandatory if Appendix X 5.10 is implemented.	Mandatory

Note 1: When network can determine other information reception completion, this timer can be stopped.

Note 2: When network may already have applied an internal alerting supervision timing function, timer TC301C is not used.

Note 3: Private only

Note 4: The value of timer TC306C may depend on the length of the announcement.

Mandatory: Specified in the standard, and must be realized. Further, a mandatory timer value is valid when the timer is realized.

Optional: Specified in the standard, and is realized depending on need. Further, an optional timer value is reference value when the timer is realized.

Appendix X CC circuit-switched call control procedures (Private standard/Public standard)

1 Circuit-switched call control procedures

In this document the terms "user" and "network" are used.

User: The user expressed in the text pertaining to PS0, PS1, PS2, PS3, TA, TE1 and TE2 shown in section 2.2 of the main text pertains to the equipment or depends on the implementation of the equipment.

Network: The network expressed in the text pertaining to the cell station (CS) and communication network connected to the cell station pertains to the equipment or depends on the implementation of the cell station and the service offered by the communication network.

The call state referred to in this document is comprised of the network side state, the user side state and the common state between network and user. Unless otherwise noted, all states described below are understood to be common.

Also, if there are differences between the SDL diagrams of the appendices and the this document, this document takes priority.

In addition to the messages shown in this document, "information" messages or "facility" messages for call control can be transmitted by the user or network directly after the first response to a "setup" message is transmitted or received, until call reference release begins. "information" messages or "facility" messages received during "release request" state are ignored. Also, the overlap sending procedure is a procedure for private systems. It is undetermined for public systems.

2 Call establishment at origination-side interface

Before these procedures are activated, a data link connection (data link service described in 4.4.2 Layer 2 standards of the main text) must be set up between the user and network. All CC messages are sent to the data link layer using the DL-data-request primitive.

2.1 Call request

By transferring a "setup" message via the Um point interface, the user starts call establishment. After "setup" message transfer, the user is seen as being in "call initiated" state. The message always contains the call reference selected according to the procedure of section 4.4.3.7.3.3 of the main text. The bearer capability information element is mandatory in the "setup" message even in the case of an overlap sending.

The call information required in call establishment must all be contained in the "setup" message in the case of en-bloc sending, and part of it must be contained in the case of overlap sending.

When en-bloc sending is used, the "setup" message contains all information requested by the network for call processing. In particular, if called party number information exists, it is contained in the following information elements.

a) Called party number information element (there are also cases where a called party subaddress information element is added)
b) The keypad facility information element can be used to transfer other call information. (Private only)

(Note) Support of a) is mandatory for all networks. Support of b) is optional.

For overlap sending, refer to section 2.2 of this document.

2.2 Overlap sending

When overlap sending is used, the "setup" message pertains to any of the following.

a) There is no called party number information element

b) Incomplete called party number information

c) Called party number information which network cannot determine to be complete

By receiving such a "setup" message, the network starts timer TC302C (the value of timer TC302C is specified in Appendix W), transmits a "setup acknowledge" message to the user, and enters "overlap sending" state. In the case of a), if the network returns a dial tone as an option, a progress indicator #8 "In-band information or appropriate pattern is available." and a signal are contained in "setup acknowledge" message.

When the user receives the "setup acknowledge" message, it enters "overlap sending" state. Also, as an option, starts timer TC304P. (The value of timer TC304P is specified in Appendix U.)

After "setup acknowledge" message reception, the user transmits the remaining call information (if any) by one or more "information" messages.

The user can add called party number information to any of the following information elements.

a) Called party number information element

b) Keypad facility information element

One of the two is used (a and b cannot be mixed in one overlap sending procedure).

(Note 1) Support of a) is mandatory for all networks. Support of b) is optional.

(Note 2) The "information" message is conveyed by method a) or b). It can contain other additional call information besides called party number. Explanation of the contents of the keypad facility information element is up to individual networks. It should be noted that before the network determines that called party number information is complete and concludes the overlap sending procedure, the user transfers all additional call information (included in the keypad facility information element).

If the user uses timer TC304P, the user restarts timer TC304P each time an "information" message is sent.

The call information of the message that concludes information transmission can contain a transmission complete indication suitable for the numbering plan used (for example, # or a sending complete information element as a network option). The timer TC302C is restarted each time the network receives an "information" message that does not contain the sending complete indication.

2.3 Invalid call information

In the network, after "setup" message reception or during overlap sending, if it is acknowledged that the call information received from the user is invalid (ex.: Invalid number), one of the following causes together with call release defined in section 4 of this document is started.

a) #1 Unallocated number
b) #3 No route to destination
c) #22 Destination terminal number change
d) #28 Invalid number format (incomplete number)

2.4 Outgoing call proceeding

2.4.1 Outgoing call proceeding (en-bloc sending)

If en-bloc sending is used (that is, if the network determines that all information required for call establishment is included in the "setup" message from the user), the network acknowledges the "setup" message, and it transfers a "call proceeding" message to the user to indicate that the call is being processed, and it enters "outgoing call proceeding" state.

When the user receives the "call proceeding" message, the user enters "outgoing call proceeding" state. Also, as an option, timer TC310P can be started.

If it is decided that the requested service is not recognized or that use is impossible, the network adds one of the following causes, and it starts the call clearing according to the procedure shown in section 4 of this document.

a) #57 Bearer capability not permitted
b) #58 Current use not possible bearer capability
c) #63 Other service or option use impossible class
d) #65 Not-yet-provided bearer capability designation

(Note) If the supplementary service is unrecognized or is not available, the used procedure is determined by the supplementary service control procedure.

2.4.2 Outgoing call proceeding (overlap sending)

Overlap sending is due to any of the following conditions.

a) When network receives sending complete indication that can be understood by network

b) When network receives all call information required in call establishment

If the network determines that the requested service is recognized and available, it stops timer TC302C, and sends a "call proceeding" message to the user, and enters "outgoing call proceeding" state. Similarly, if it does not recognize the requested service or determines that it cannot be used, the network adds one of the following causes, and initiates call clearing according to section4 of this document.

a) #57 Bearer capability not permitted
b) #58 Current use not possible bearer capability
c) #63 Other service or option use impossible class
d) #65 Not-yet-provided bearer capability designation

(Note 1) The "call proceeding" message is sent in order to indicate the fact that the requested call establishment was begun, and further call information will not be accepted.
(Note 2) If the supplementary service is unrecognized or is not available, the used procedure is determined by the supplementary service control procedure.

When the user receives the "call proceeding" message, the user stops timer TC304P is activated and enters "outgoing call proceeding" state. It can also start timer TC310P as an option.

By expiration of timer TC304P, the user performs cause #102 "Recovery by timer expiration" together with call clearing according to the procedure shown in section 4 of this document.

The network acts as follows when timer TC302C is complete.

a) If the network decides that the call information is clearly incomplete, it starts call clearing according to section 4 of this document together with cause #28 "Invalid number format (incomplete number)".

b) Other than a), it transmits a "call proceeding" message, and enters "outgoing call proceeding" state.

2.5 Notification of interworking at origination-side interface

During call establishment, if the CS calls a network other than an ISDN network, or if it receives a message that contains a progress indicator information element from an ISDN network, the progress indicator information element is returned to the origination user by any of the following messages.

a) If a state change is requested, a suitable call control message ("setup acknowledge", "call proceeding", "alerting","connect" message)

b) If the state change is inappropriate, a "progress" message

Among the following progress content values, one is contained in the progress indicator information element in the message sent to the user.

a) #1 Call is not ISDN end-to-end. Further progress information will become in-band.
b) #2 Destination-side address is non-ISDN.
c) #4 Call has returned to ISDN (at this time the call is end-to-end ISDN).

If the progress indicator information element is contained in a call control message, the procedure described in section 2.1 of this document and below is applied. If the progress indicator information element is contained in a "progress" message, state change does not occur but the monitor timer except TC302C is stopped.

If a call is shifted to the ISDN environment from non-ISDN at the interface where the message is generated, at least one of the following progress indicator information elements is contained in the "setup" message sent to the network.

a) #1 Call is not ISDN end-to-end. Further progress information will become in-band.
b) #3 Origination-side address is non-ISDN.

2.6 Call delivered

If the network receives (or detects) an indication that alerting of the destination-side was started, the network sends a "alerting" message to the origination-side user via the Um point interface, and enters "call delivered" state.

When the user receives the "alerting" message, the user can start an internally generated calling display. Then, it stops timer TC310P (if active) and enters "call delivered" state. Also, as an option, it can start TC301P.

2.7 Call connected

If the network receives (or detects) an indication that the call was accepted, it sends a "connect" message to the origination-side user via the Um point interface and enters "active" state.

This message informs to the origination-side user that the network path is set via the network and that the local indication that shows alerting is stopped.

In receiving the "connect" message, the origination-side user stops the user-generated alerting indication and stops timer TC310P or TC301P (if activated), and as an option, it can transmit a "connect acknowledge" message. Then, it enters "active" state. When the network recognizes that the call entered "active" state, it does not do anything when it receives the "connect acknowledge" message.

2.8 Call rejection

When an indication that the call could not be accepted is received from the network or destination-side, if the network is given a cause by the destination-side, it starts call clearing on the origination-side Um point interface according to the regulations of section 4 of this document using this cause.

3 Call establishment at destination-side interface

Before these procedures are activated, a data link connection (data link service described in section 4.4.2 Layer 2 standards of the main text) must be set up between the user and network. All CC messages are delivered to layer 2 using the DL-data-request primitive. All call references included in messages exchanged via the Um point interface contain the call reference values specified in the "setup" message sent from the network.

3.1 Incoming calls

By transferring a "setup" message via the interface, the network indicates that the call was received on the Um point interface.

In addition to mandatory information elements, the "setup" message can also contain information elements specified in section 4.4.3.7.2.1.11 of the main text.

After the "setup" message is sent, the network starts timer TC303C, and enters "call present" state.

The "setup" message must contain all information required for the destination-side to process the call. In the case of an incoming call, the sending complete information element (private only) does not have to be included in "setup" message.

Upon receiving the "setup" message, the user enters "call present" state.

If the network does not receive a response to the "setup" message prior to the first time out of timer TC303C, it retransmits the "setup" message, and restarts timer TC303C.

3.2 Communication possibility acknowledgment

A user who has received a "setup" message executes communication possibility acknowledgment before responding to the "setup" message. The expression "user" in section 3.3 of this document implies a user that is able to communicate.

A user who is incompatible with the user who received the "setup" message transmits a "release complete" message accompanied by cause #88 "Terminal attribute disagreement", and enters "null" state. The network treats the "release complete" message according to section 3.3.4 of this document.

3.3 Call confirmation

3.3.1 Response to "setup" message

A user who has received sufficient call establishment information and has been judged as satisfying compatibility requirements responds by a "call proceeding" message. Then, it enters "incoming call proceeding" state.

(Note) The progress indicator information element can be contained in the "call proceeding" message if necessary.

If the user wishes to deny the call, he transfers a "release complete" message together with cause #21 "Communication reject," and enters "null" state. The network treats this "release complete" message according to section 3.3.4 of this document.

3.3.2 Reception of "call proceeding" and "alerting" messages

With reception of the "call proceeding" message from the user, the network stops timer TC303C, starts timer TC310C, and enters "incoming call proceeding" state. With reception of the "alerting" message from the user, the network stops timer TC310C, starts timer TC301C (if other alerting monitor timer functions do not exist), and enters "call received" state.

3.3.3 Call establishment incomplete

If the network does not receive any response before the timer TC303C expires after it retransmits the "setup" message, the network starts the clearing procedure accompanied by the appropriate cause to the origination user. Also, it adds cause #102 "Recovery due to timer expiration", and starts the clearing procedure for the destination user according to section 4.4 of this document.

If the network does not receive a "alerting", "connect" or "disconnect" message before timer TC301C expires and after the "call proceeding" message is received, the network starts the clearing procedure accompanied by cause #18 "Destination user no response" to the origination user Also, it adds cause #102 "Recovery due to timer expiration" and starts the clearing procedure of the destination user according to section 4.4 of this document.

If the network does not receive a "connect" or "disconnect" message before the timer TC301C (or the timer according to the calling monitor function in the network) expires after the "alerting" message is

received, the network starts the clearing procedure including cause #19 "Destination user calling in progress, no response" to the origination user. Also, it adds cause #102 "Recovery due to timer expiration", and starts the clearing procedure of the destination user according to section 4.4 of this document.

3.3.4 Destination user clearing when call establishment on destination-side

If a "release complete" or "disconnect" message is received before a "connect" message is received and after the "setup" message was transmitted by downlink signal, the network (if operating) stops timer TC303C, TC310C or TC301C, and continues the user clearing procedure according to section 4.3 of this document. Then, it follows the cause contained in the "release complete" or "disconnect" message, and performs the call clearing procedure of the origination user.

3.3.5 Notification or interworking at destination-side interface

CS can be connected with an existing analog telephone network or ISDN as the communication network. If CS is connected to an analog network and if interworking occurs in call establishment in the ISDN to which the CS is connected, the "setup" message sent to the destination user can contain a progress indicator information element that contains the following progress contents.

a) #1 Call is not ISDN end-to-end. Further progress information will become in-band signal.
b) #3 Origination-side address is non-ISDN.

In addition, if the call separates ISDN from the destination-side Um point interface (type PS3 shown in section 2.2 of the main text) or if the in-band information/pattern is available, that user can notify the origination user. In this case, the progress contents can be included in the following messages and can be sent from the user to the network.

a) Suitable call control message when state change is desired (examples: "call proceeding", "alerting", "connect" message) or
b) "progress" message when state change is unsuitable

One of the following progress contents described below is contained in the progress indicator of the message sent to the network.

a) #1 Call is not ISDN end-to-end. Further progress information will become in-band signal.
b) #2 Destination-side address is non-ISDN.
c) #4 Call has returned to ISDN.

If a progress indicator is contained in the call control message, the procedure specified in section 2.5 of this document is applied.

If the progress indicator information element is contained in the "progress" message, the state does not change, but the monitor timer is stopped.

3.3.6 Connect

The user reports acceptance of the incoming call by transmitting a "connect" message to the network. When the "connect" message is transmitted, the user starts timer TC313P. If the "alerting" message is sent to the network beforehand, there are cases where the "connect" message may contain only a call reference.

3.3.7 Communication possible

In receiving the "connect" message, the network (if operating) stops timers TC310C and TC301C, sets the circuit switched path, transmits a "connect acknowledge" message, and starts the procedure of transmitting the "connect" message to the origination user.

The "connect acknowledge" message indicates completion of circuit switched connection. End-to-end connection is not assured until the origination user receives the "connect" message.

When the user receives the "connect acknowledge" message, it stops timer TC313P, then enters "active" state.

If timer TC313P expires before reception of the "connect acknowledge" message, the user starts the release complete procedure according to the procedure of section 4 of this document.

4 Call clearing

4.1 Terminology

The terms described below are used in the clearing procedure of the standard.

- Channel is "connected"

When the channel has performed circuit switched connection established according to the standard.

- Channel is "disconnected"

When the channel has not performed circuit switched connection but still cannot be used in a new connection.

- Channel is "released"

When the channel has not performed circuit switched connection and can be used in a new connection. Similarly, a "released" call reference can be reused.

4.2 Exceptional state

In normal state, call clearing is generally performed in the case where the user or network transmits a "disconnect" message, and the procedure specified in sections 4.3 and 4.4 of this document is followed. Exceptions are only in the cases shown below.

a) As a response to the "setup" message, if another response (for example, a "setup acknowledge" message in the case of overlap sending) is not sent beforehand, the user or network can deny the call by responding with "release complete" message, releasing the call reference, and entering "null" state.

4.3 Clearing initiated by user

Separate from the exceptions described in section 4.2 and section 5 of this document, the user starts clearing by transmitting a "disconnect" message, starting timer TC305P, and entering "disconnect request" state.

(Note) When the user starts clearing by sending a "release" message, the procedure described in section 4.4 of this document is continued.

By receiving a "disconnect" message, the network enters "disconnect request" state, and starts the clearing procedure of the communication destination. Then, it sends a "release" message to the user, starts timer TC308C, and enters "release request" state.

(Note) A "release" message has meaning locally and does not mean acknowledgment of clearing from the communication destination.

By receiving a "release" message, the user stops timer TC305P, transmits a "release complete" message, releases the call reference, and enters "null" state. By receiving the "release complete" message from the user, the network stops timer TC308C, releases the call reference, and enters "null" state.

If a "release" message is not received as a response to the "disconnect" message before timer TC305P expires, the user sends to the network a "release" message that contains the cause number contained in the "disconnect" message, starts timer TC308P, and enters "release request" state.

In addition, the user may report the second cause information element shown by cause #102 "Recovery due to timer expiration".

If timer TC308C expires the first time, the network sends a "release" message and restarts timer TC308C. In addition, the network may report the second cause information element shown by cause #102 "Recovery due to timer expiration". If no "release complete" message was received from the user before the timer TC308C expired the second time, the call reference is released, and it enters "null" state.

4.4 Clearing initiated by network

Separate from the exceptions shown in sections 4.2 and 5 of this document, the network starts release by transmitting a "disconnect" message and entering "disconnect indication" state. Since the "disconnect" message is generated locally for release, it does not indicate that the channel is disconnected at the Um point interface.

(Note) When the network starts call clearing by transmitting a "release" message, the procedure described in section 4.3 of this document is followed.

4.4.1 Clearing when tone/announcement is offered

If in-band tone/announcement is offered, the "disconnect" message includes progress Indicator #8 "In-band information or appropriate pattern is available.".

The network starts timer TC306C and then enters "disconnect indication" state.

When a "disconnect" message that includes progress indicator #8 is received, the user can activate the function for receiving in-band tone/announcement (if not yet activated). Then, it enters "disconnect indication" state. Meanwhile, if the clearing operation continues without in-band tone/announcement being performed, the user can transmit a "release" message, start timer TC308P, and enter "release request" state.

If the user uses the offered in-band tone/announcement, afterward, (before the "release" message is received from the network) it performs clearing by sending a "release" message, starting timer TC308P, and then entering "release request" state.

By receiving the "release" message, the network stops timer TC306C, sends a "release complete" message, releases the call reference, and then enters "null" state.

If timer TC306C expires, the network sends a "release" message to which the cause number contained in the "disconnect" message is added, starts timer TC308C, and the network continues the clearing operation by entering "release request" state.

In addition to the cause number contained in the "disconnect" message, the "release" message can contain a second cause information element which indicates cause #102 "Recovery due to timer expiration". By receiving this "release" message, the user operates according to section 4.3 of this document.

4.4.2 Clearing when tone/announcement are not offered

If in-band tone/announcement is not offered, the "disconnect" message does not contain progress indicator #8 "In-band information or appropriate pattern is available.". The network sends a "release" message, starts timer TC305C and starts clearing by entering "disconnect indication" state.

When a "disconnect" message that does not contain progress content #8 is received, the user sends a "release" message, starts timer TC308P, then enters "release request" state.

By receiving the "release" message, the network stops timer TC305C, sends a "release complete" message, releases the call reference, and enters "null" state.

If timer TC305C expires, the network sends to the user a "release" message to which the cause number contained in the "disconnect" message is added, starts timer TC308C, and enters "release request" state. In addition to the previous clearing cause, the "release" message may contain cause #102 "Recovery due to timer expiration" as a second cause information element.

4.4.3 Conclusion of clearing

As a result of a "release complete" message being received from the network, the user stops timer TC308P, releases the call reference, and then enters "null" state.

If the user does not receive a "release complete" message before timer TC308P expires for the first time, a "release" message is retransmitted, and timer TC308P is restarted. If a "release complete" message is not received from the network before timer TC308P expires for the second time, the user releases the call reference, and enters "null" state.

4.5 Collision of clearing procedures

When "disconnect" messages are transmitted for the same call at the same time from both the user and network, collision of clearing procedures occurs.

If the network receives a "disconnect" message during "disconnect indication" state, the network stops timer TC305C or TC306C, transmits the "release" message, starts timer TC308C, and then enters "release request" state. Similarly, if the user receives a "disconnect" message during "release request" state, the user stops timer TC305P, transmits a "release" message, starts timer TC308P, and enters "release request" state.

Collision of clearing procedures also occurs when "release" messages are transmitted for the same call at the same time. If such a "release" message is received during "release request" state, timer TC308C or TC308P is stopped, the call reference is released, and it enters "null" state (without sending a "release complete" message).

4.6 In-band tone/announcement

Regardless of changes in call state, for in-band tone/announcement generated by the network before reaching active state, the "progress" message is returned at the same time as application of in-band tone/announcement. The "progress" message contains progress indicator #8 "In-band information or appropriate pattern is available.".

If the in-band tone/announcement must be provided together with a call state change, it has progress content #8 "In-band information or appropriate pattern is available." that indicates that in-band information or an appropriate pattern can be used at present, and the appropriate message (for example, "alerting", "disconnect" message etc.) is transmitted at the same time as in-band tone/announcement application.

(Note 1) If a "progress" message is used, the user may start call clearing as a result of the in-band tone/announcement used according to the procedure of section 4.3 of this document.

(Note 2) The protocol described in section 4.6 of this document is used at the origination side Um point interface.

5 Error state processing

All procedures for transferring signal information using a call control message protocol discriminator are applied only to messages that have been through the checks described in sections 5.1 - 5.7 of this document.

The detailed error processing procedure depends on implementation of the user and network and can vary for each network. The functions for simplifying normal processing for error state are specified in this chapter and should be realized in each implementation.

In sections 5.1 to 5.7 of this document, they are described in order of priority.

5.1 Protocol discriminator errors

If a message is received in which the protocol discriminator code differs from "RCR STD-28 radio interface call control message", the message is ignored.

"Ignored" means that it does nothing, the same as when no message is received.

5.2 Missing message

If a complete message type information element is not contained because the message length is short, that message is ignored.

5.3 Call reference errors

5.3.1 Invalid call reference format

If bit 1 through bit 4 of the first octet of the call reference information element indicates a length longer than the maximum length handled by the destination-side equipment, that message is ignored.

5.3.2 Call reference procedure errors

a) If any message, except for "setup", "release", "release complete", "status" or "status enquiry" messages, is received that has a call reference unrecognized as being related to active or call establishment in progress, call clearing of the call reference of the received message is initiated by transmitting a "release" message accompanied by cause #81 "Invalid call reference used" according to section 4 of this document.

   Or, the destination-side entity can transmit a "release complete" message accompanied by cause #81 "Invalid call reference used", and can maintain "null" state.

b) If a "release" message is received that has a call reference unrecognized as being related to active or call establishment in progress, a "release complete" message accompanied by cause #81 "Invalid call reference used" is returned to the call reference of the received message.

c) If a "release complete" message is received that has a call reference unrecognized as being related to active or call establishment in progress, nothing is done.

d) If a "setup" message is received that has a call reference unrecognized as being related to active or call establishment in progress, and whose call reference flag is set to "1", this message is ignored.

e) If a "setup" message is received that has a call reference unrecognized as being related to active or call establishment in progress, this "setup" message is ignored.

f) If a "status" message is received that has a call reference unrecognized as being related to active or call establishment in progress, the procedure of section 5.11 of this document is applied.

g) If a "status enquiry" message is received that has a call reference unrecognized as being related to active or call establishment in progress, the procedure of section 5.10 of this document is applied.

5.4 Message type or message sequence errors

In a state other than "null" state, if an unexpected message or unrecognized message except for the "release" message or "release complete" message is received, a "status" message with cause #98 "Call state and message disagreement or message type undefined" is returned.

When the network or user can distinguish between the unimplemented (or absent) message type and the implemented but incompatible with call state message type, a "status" message accompanied by the following reasons is transmitted.

a) Cause #97 Message type undefined or not implemented, or
b) Cause #101 Call state and message disagreement

Or, a "status enquiry" message of the call state of the requested entity of the same rank is transmitted.

At this time, the state does not change in any case.

However, there are two exceptions to this procedure. The first exception is when the network or user receives an unexpected "release" message (for example, when the "disconnect" message was undelivered due to an undetected transmission error). In this case, transmission of the "status" message or "status enquiry" message is not performed.

If the network receives an unexpected "release" message, the network stops all timers, and performs clearing of the call with the communication destination by the cause contained in the "release" message sent from the user, or if none was contained, by cause #31 "Other normal class", and a "release complete" message is returned to the user, the call reference is released, and it enters "null" state. If the user receives an unexpected "release" message, the user stops all timers, performs clearing of the connection, returns a "release complete" message to the network, releases the call reference, and enters "null" state.

The second exception is when the network or user receives an unexpected "release complete" message.

When the network receives an unexpected "release complete" message, the network stops all timers, and performs clearing of the call with the communication destination by the cause displayed by the user, or if none is displayed, by cause #111 "Other procedure error class", it releases the call reference, and enters "null" state. If the user receives an unexpected "release complete" message, the user stops all timers, releases the call reference, and enters "null" state.

5.5 General information element errors

The general information element error procedure can also be applied to information elements other than those with codeset 0.

5.5.1 Wrong sequence information elements

An information element of multiple octet having a code value smaller than the previous multiple octet information element code value should be considered to be a wrong sequence information element.

If the network or user receives a message containing a wrong sequence information element, this information element is ignored. If this information is mandatory, it follows the error processing procedure for missing mandatory information elements described in section 5.6.1 of this document. If an aborted information element is not mandatory, the destination-side continues message processing.

(Note) Processing of all information elements regardless of positioning sequence in the received message can be selected by implementation.

5.5.2 Multiplexed information elements

If information elements are repeated within a message when repetition of information elements within a message is not permitted, only the contents of the information element seen first should be processed, and all further repetition of information elements should be ignored. If repetition of information elements is permitted, only the permitted information element contents are processed. If it exceeds the limit of information element repetition, the information element contents up to the limit are processed, and information element repetition exceeding the limit is ignored.

5.6 Mandatory information element errors

5.6.1 Mandatory information element missing

If a message is received in which one or more mandatory information elements is missing, except for "setup", "disconnect", "release" or "release complete" message, nothing is done by this message, and the state does not change. A "status" message with cause #96 "Mandatory information element missing" is returned.

If a "setup" message or "release" message in which one or more mandatory information elements is missing is received, a "release complete" message with cause #96 "Mandatory information element missing" is returned.

If a "disconnect" message that does not contain a cause information element is received, the same operation as when a "disconnect" message with cause #31 "Other normal class" is received is performed, except when the release message sent to the Um point interface contains cause #96 "Mandatory information element missing".

If a "release complete" message that does not contain a cause information element is received, a "release complete" message with cause #31 "Other normal class" is assumed.

5.6.2 Mandatory information element content errors

If a message is received that has one or more mandatory information elements of invalid content, except for "setup" messages, "disconnect" messages, "release" messages and "release complete" messages, nothing is done by this message, and state does not change. A "status" message with cause #100 "Invalid information element contents" is returned.

If a "setup" message or "release" message that has one or more mandatory information elements of invalid content is received, a "release complete" message with cause #100 "Invalid information element contents " is returned.

If a "disconnect" message with an information element reason of invalid content is received, the same operation as when a "disconnect" message with cause #31 "Other normal class" is transmitted is performed, except when a "release" message with cause #100 "Invalid information element contents" is transmitted to the Um point interface.

If a "release complete" message with a cause information element of invalid content is received, it is assumed that a "release complete" message with cause #31 "Other normal class" is transmitted.

In general, information elements longer than the maximum length are treated as information elements with content errors.

5.7 Non-mandatory information element errors

The sections below pertain to operations for information elements that are not recognized as mandatory.

5.7.1 Unrecognized information elements

If a message is received that has one or more unrecognized information elements, the receiving entity checks whether or not the information element is coded to indicate that "understanding is required" (refer to Table 4.4.3.7.17 of the main text for reserved information element identifiers indicated as "understanding is required"). If the unrecognized information element is coded to indicate that "understanding is required", it undergoes the same procedure as when section 5.6.1 of this document: Mandatory information element missing error state is generated. If it is unrecognized, the receiving entity performs the following process.

A process is performed for the received message and an information element that has recognized invalid contents contained in the received message. A "status" message containing one cause information element other than the "disconnect" message, "release" message and "release complete" message is returned. The "status" message indicates the call state of the destination-side after received message processing. The cause information element includes cause #99 "Information element undefined". The origination-side of the unrecognized information element determines further operations.

In the case of a clearing message that contains at least one unrecognized information element, the error is informed to the Um point interface by the following methods.

a) If a "disconnect" message that contains at least one unrecognized information element is received, a "release" message with cause #99 "Information element undefined" is returned.

b) If a "release" message that contains at least one unrecognized information element is received, a "release complete" message with cause #99 "Information element undefined" is returned.

c) If a "release complete" message that contains at least one unrecognized information element is received, no error is reported by the unrecognized information.

5.7.2 Non-mandatory information element content errors

If a message is received that has at least one non-mandatory information element having invalid contents, operation is according to the information elements that have valid contents and are recognized messages. A "status" message containing one cause information element is returned. The "status" message indicates the call state of the destination-side that detected the error. The cause information element contains cause #100 "Invalid information element contents".

An information element that has a length exceeding the maximum length is treated as illegal contents. However, for access information elements (for example, called party subaddress), cause #43 "Access information destroyed" is used instead of cause #100 "Invalid information element contents". However, in certain networks, access information elements are shortened to within the maximum length range.

5.8 Data link re-set

When the entity is informed of a spontaneous data link layer re-set by DL-establish-indication , the following procedures are applied.

a) Calls in "overlap sending" state undergo clearing due to the fact that the entity transmits a "disconnect" message with cause #41 "Temporary failure", and it follows the procedure of section 4 of this document.

b) For calls in release state (status numbers C11, C12, C19, P11, P12 and P19), nothing is done.

c) For calls in establish state (status numbers C1, C3, C4, C6, C7, C8, C9, P1, P3, P4, P6, P7, P8 and P9) and calls in "active" state, the recovery operation is not performed by DL-establish-indication, and they are continued according to the actual procedures.

5.9 Data link failure

When it is reported from the data link layer entity by DL-release-indication that the entity is in data link failure, the following procedures are applied.

a) Calls is "overlap sending" state undergo internal clearing. For calls for which timer TC309C or TC309P is not running, timer T309C or TC309P is started. If timer TC309C or TC309P is already running, it is not restarted.

b) When the call is not in "null" state, the entity requests re-establishing of layer 2 by transmitting DL-establish-request. Or, the entity disconnect-recovers internally.

If there was notification of layer 2 re-establish by DL-establish-confirm, the following procedures are applied.

a) Timer TC309C or TC309P is stopped.

b) A "status" message can be transmitted to an entity of the same rank for reporting the present call state. Or, a "status enquiry" message can be transmitted to confirm the call state of the entity of the same rank.

If timer TC309C or TC309P expires within the data link re-establish period, the network reports to the communication destination with cause #27 "Destination terminal damage", and releases the call reference and enters "null" state.

(Note) Implementation of timer TC309P is optional on the user side. If timer TC309P expires before data link re-establish, the user acts as if it received cause #27 "Destination terminal damage", releases the call reference, and enters "null" state.

5.10 Status enquiry procedure

When the entity wants to investigate the correctness of the call state of an entity of the same rank, it may send a "status enquiry" message to request call state. Particularly in this case, the error state procedure shown in sections 5.8 and 5.9 of this document may be applied.

When it transmits a "status enquiry" message, it expects to receive a "status" message, and starts timer TC322C or TC322P. While timer TC322C or TC322P is running, this request exists for a single piece of unresolved call state information. If timer TC322C or TC322P is already operating, it does not restart it. If a clearing message is received before timer TC322C or TC322P expires, it stops timer TC322C or TC322P and continues call clearing.

The destination-side that received the "status enquiry" message sends a "status" message accompanied by a report of the present call state and cause #30 "Response to status enquiry" or cause #97 "Message type undefined or not implemented". The state does not change due to reception of a "status enquiry" message.

Transmission or reception of the "status" message under the above conditions does not directly affect the call state of either the transmitting side or destination-side. The destination-side of the "status" message studies the cause information element. If the "status" message contains cause #97 "Message type undefined or not implemented", timer TC322C or TC322P continues until there is a clear response of a "status enquiry" message. If "status" message with cause #30 "Response to status enquiry" is received, it stops timer TC322C or TC322P, and based on this "status" message information, it undertakes suitable operations in relation to the present state of the destination-side. If timer TC322C or TC322P expires after the "status" message accompanied by cause #97 "Message type undefined or not implemented" is received, suitable operations are undertaken in relation to the present call state of the destination-side based on this "status" message information. Any further suitable operations depend on installation. However, the operations are specified within the scope used in section 5.11 of this document.

If timer TC322C or TC322P expires without a "status" message being received, the "status enquiry" message can be retransmitted one or more times until a response is received. If "status enquiry" message retransmission reaches the maximum number of times (depends on implementation), the call undergoes clearing at the Um point interface accompanied by cause #41 "Temporary failure". Also, if necessary, the network also starts clearing of the communication destination using cause #41 "Temporary failure".

5.11 "Status" message reception

If a "status" message of state disagreement notification is received, the destination-side entity:

a) Performs clearing of the call by transmitting a suitable clearing message accompanied by cause #101 "Call state and message disagreement".

Or,

b) Undertakes an operation to attempt recovery from other (call state) disagreement. (This operation is an implementation option.)

In cases other than those specified below, decision of whether or not the call state disagrees is determined by the implementation.

a) In "null" state, if a "status" message which informs any call state other than "null" state is received, the destination-side entity undertakes any of the following.

   [1] Follows procedures of section 4 of this document by transmitting a "release" message accompanied by cause #101 "Call state and message disagreement".

   [2] Send a "release complete" message with cause #101 "Call state and message disagreement" and remain in the "null" state.

b) In "release request" state, if a "status" message which informs any call state other than "null" state is received, it does nothing.

c) In any states other than "null" state, if a "status" message that reports "null" state is received, the destination-side releases all resources and enters "null" state.

d) In "null" state, if a "status" message that informs "null" state is received, that message is aborted, and no other operation is performed except remaining at "null" state.

Coexisting call state may be indicated, and a "status" message that contains one of the following causes may be received.

a) #96 Mandatory information element missing
b) #97 Message type undefined or not implemented
c) #99 Information element undefined or
d) #100 Invalid information element contents

The operations undertaken in this case are options in implementation. If other procedures are undetermined, the destination-side performs clearing by the procedure described in section 4 of this document using the cause of the "status" message.

6 Signalling procedures for bearer capability selection

These procedures shall apply only in the case where the call, or call request, as currently routed, is entirely within the PHS network or the ISDN. It will not apply to situations involving interworking with non-ISDNs.

This procedures on PHS service shall apply only to select Information transfer rate for unrestricted digital communication, and shall apply for communication with JT-V110 terminals in the case that repeated Low layer compatibility information elements within the SETUP message indicate both the 64 kbit/s JT-V110 unrestricted digital communication and the 32 kbit/s JT-V110 unrestricted digital communication shown in Appendix AH. Therefore, repeating of the Bearer capability information elements not occur at the interworking to the network conformed to ISDN.

To select the 64 kbit/s unrestricted or the 32 kbit/s unrestricted by repeating the Bearer capability information elements within the SETUP message for communication with the exception of JT-V110 terminals is further study.

6.1 Procedures for the originating user to indicate bearer capability selection is allowed

6.1.1 Normal operation

For some bearer services, the originating user can indicate that
- fallback to an alternative bearer capability is allowed; or
- fallback to an alternative bearer capability is not allowed.

If the calling user allows fallback to occur to an alternative bearer capability, then the user shall indicate this to the network by means of repeated Bearer capability information elements within the SETUP message sent to indicate the presence of a call request. This procedure allows a maximum of two Bearer capability information elements in the SETUP message.

The order of the information elements shall indicate the priority of the bearer capabilities. Bearer capability information elements shall be in ascending order of priority, i.e. a subsequent Bearer capability information element shall indicate a bearer capability with higher priority.

If fallback allowed is indicated in the SETUP message as described above, and fallback occurs at the destination user, or fallback does not occur, the originating network shall include in the CONNECT message sent to the calling user the Bearer capability information element of the resultant bearer service.

If fallback allowed is indicated in the SETUP message as described above, and fallback occurs within the PHS network or the ISDN (e.g. bearer capability selection is not supported or the selected route does not suport the preferred bearer capability), the originating network shall include in a PROGRESS message or other appropriate call control message sent to the calling user a Progress indicator information element with the progress description No.5, interworking has occurred and has resulted in a telecommunication service change. The originating network shall include the Bearer capability information element of the resultant bearer service.

6.1.2 Exceptional procedures

The procedures of section 5 of this Appendix shall apply, with the addition that

a) If the calling user receives no Bearer capability information element in the CONNECT message, or prior to the CONNECT message in some other call control message, the user shall assume that the bearer service corresponds to the first Bearer capability information element that the user included in the SETUP message.

b) If the calling user receives a Progress indicator information element with a progress description No.1, call is not end-to-end ISDN, further call progress information may be available in-band or progress description No.2,destination address is non-ISDN subsequent to a Progress indicator information element with a progress description No.5, interworking has occurred and has resulted in a telecommunication service change, then the last received Progress indicator information element shall be taken account of. Where the progress description is No.1, call is not end-to-end ISDN, further call progress information may be available in-band or progress description is No.2, destination address is non-ISDN the user shall assume a bearer service category of circuit-mode 32 kbit/s 8 kHz structured usable for 3.1 kHz audio information transfer.

6.2 Procedures for bearer capability selection at the destination side

6.2.1 Normal operation

If the calling user and the network operator allow fallback to occur to an alternative bearer capability, then the destination network shall indicate this to the destination user by means of repeated bearer capability information elements within the SETUP message sent to indicate the presence of a call request.

The order of the information elements shall indicate the priority of the bearer capabilities. Bearer capability information elements shall be in ascending order of priority, i.e. a subsequent Bearer capability information element shall indicate a bearer capability with higher priority.

If fallback allowed is indicated in the SETUP message as described above, and the user wishes to accept the call without having fallback occur, the user shall include in the CONNECT message sent to the network the Bearer capability information element of the requested bearer service.

If fallback allowed is indicated in the SETUP message as described above, and the user wishes to accept the call with having fallback occur to the lowest priority alternative bearer capability, the user may, but need not, include in the CONNECT message sent to the network the Bearer capability information element of the alternative bearer service.

If no Bearer capability information element is indicated by the called user, the network shall assume that the lowest priority bearer capability is selected.

If fallback allowed is indicated in the call request, and no interworking has been encountered (i.e. a progress descripton No.1, call is not end-to-end ISDN,further call progress information may be available in-band or progress description No.2, destination address is non-ISDN has not been sent), the destination network shall indicate the resultant bearer capability and connection type to the originating network at the time the bearer is established, even if no Bearer capability information element is received from the destination user.

6.2.2 Exceptional procedures

The procedures of section 5 of this Appendix shall apply.

7 User notification procedure

This procedure allows the network to notify a user of any appropriate call-related event during the active state of a call. It also allows a user to notify the remote user of any appropriate call-related event during the active state of a call by sending a NOTIFY message containing a notify indicator to the network; upon receipt of the message, the network must send a NOTIFY message containing the same notify indicator to the other user involved in the call. No state change occurs at any of the interface sides following the sending or the receipt of this message.

NOTE - It is not standard to send the NOTIFY message to the network from the user.

Appendix Y User Scrambling control methods (Private standard/Public standard)

1. Encryption key set

1.1 Setting method

Encryption key set is performed from PS to CS. The setting methods offered in the standard are shown below.

(1) Prior setting method

Encryption key set is performed when the PS is purchased or when the PS owner thinks it is necessary.

Encryption key creation within the PS or any key input method can be used.

If encryption key set is requested from the PS owner, the PS performs encryption key set with the CS in the SCH establishment phase, when location registration, outgoing call (including recalling-type handover), or incoming call operation is performed immediately afterward.

In communication thereafter, encryption can be performed using that encryption key as long as there is no new encryption key set.

(2) Setting for each call

Encryption key set is performed in the SCH establishment phase for each call when outgoing call (including recalling-type handover) or incoming call is performed.

1.2 Setting of presence or absence of user scramble

PS applies encryption across all communication after the encryption key is set. Temporary encryption is not possible. (However, with certain encryption keys, encryption can be turned off so as not to change data before and after .)

1.3 Phase in which encryption key is set

Encryption key set is performed in the SCH establishment phase.

1.4 Encryption process activation timing

The encryption process is initiated by the first TCH data of the communications phase.

For the definition of the communications phase, refer to section 2.5 of the maintext.

2. User scrambling control methods

2.1 Determination of user scrambling control type

PS determines the user scrambling control type using the RT function request at the time of calling (including recalling-type handover), incoming call receiving or location registration.

Table 1 Attributes determined by RT function request

Item no.	Attribute	Type
1	Encryption type	No encryption/ Standard encryption/Other encryption (option/reserved)
2	Encryption key used	Key set for each call / Prior encryption / Prior encryption key (updated)
3	Passcoding of encryption key	No passcode / Other passcode (option / reserved)

(Note 1) Underline indicates example of default value.

(Note 2) Standard encryption is the user scrambling mechanism method.

2.2 Control sequence

2.2.1 Prior set key is used

The control sequence when the prior setting method is used is shown in Figure 1.1 and Figure 1.2.

(1) Use of prior setting key

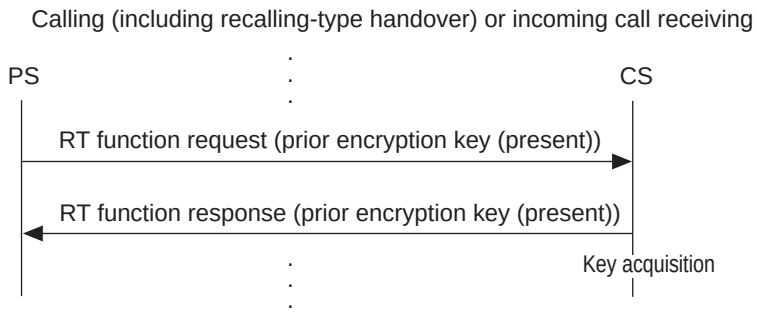


Figure 1.1 Control sequence (prior set key used)

(2) Prior set key is updated (while talking)

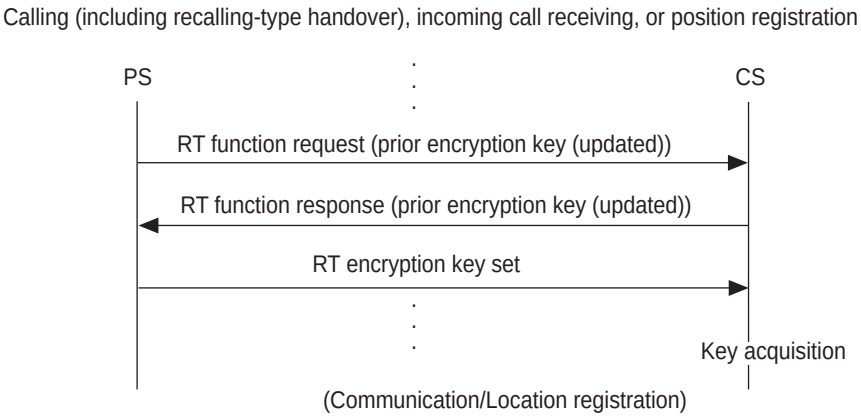


Figure 1.2 Control sequence (prior set key updated)

2.2.2 Set for each call

The control sequence when it is set for each call is shown in Figure 2.

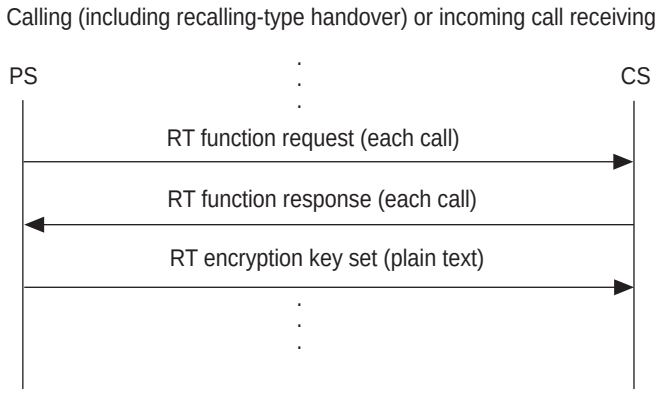


Figure 2 Control sequence (set for each call)

(User scrambling key example)

Bit	8 7 6 5	4 3 2 1
Octet 3	1000th digit MSB LSB	100th digit MSB LSB
Octet 4	10th digit MSB LSB	1st digit MSB LSB

Appendix Z Operation of PS that has automatic location registration function

(Private standard/Public standard)

1. Standby mobile operation

This shows the operation from when the power is turned on until it enters standby state. (Refer to Figure 1)

(1) Control channel selection

When the power is turned on, after any control channel synchronization establishment, if standby shift conditions (standby zone selection level, global definition information and local definition information) are satisfied, channel selection by the relevant control channel is OK, and it enters standby.

However, if standby shift conditions are not satisfied, channel selection is NG, and control channel selection is performed again.

(2) Standby

In standby, the following operations are performed.

[1] The level difference between the standby zone hold level (control channel) and reception level is determined, and the presence/absence of zone shift is judged.

[2] BCCH is received, and if global definition information and local definition information are changed, operations are performed in response to the change contents. (Example: If the paging area number changed, the location registration operation is performed.)

[3] If an incoming call is received on PCH or/and there is a PS call, the call connection operation is performed.

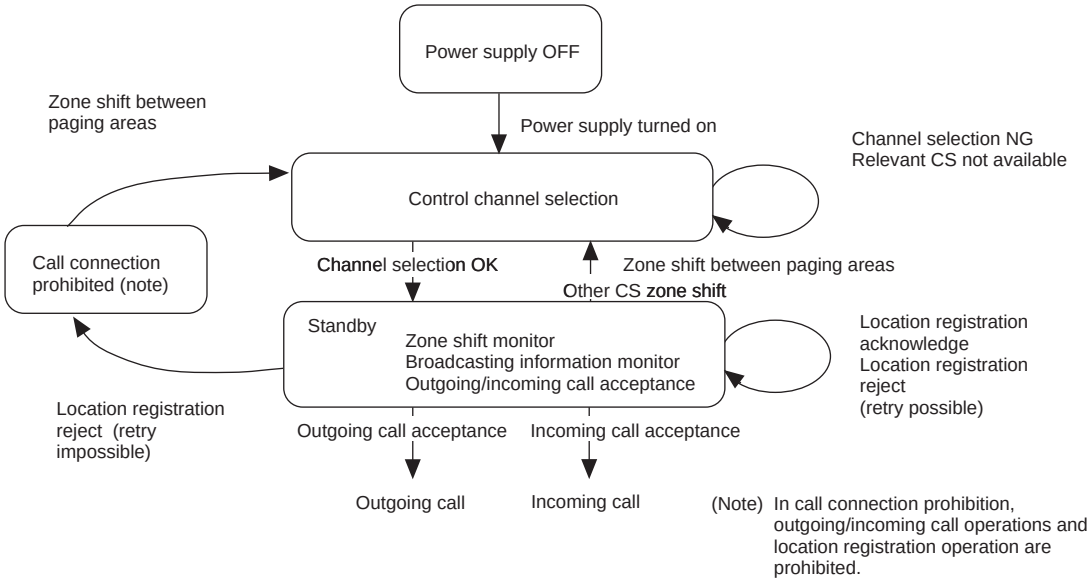


Figure 1 PS operation when standby shift is performed

2. Location registration operation

As a rule, PSs that have an automatic location registration function must initiate a location registration sequence when changing to a new wait status and when establishing synchronization with the LCCH superframe. If valid location registration data (Note 1) is stored by the PS, the location registration sequence does not need to be initiated because the location registration data is already known on the CS side.

The conditions for valid location registration data of PS are as follows:

[1] When location registration last successfuly, the completed registration data becomes valid from the instant that the location registration data is stored.

[2] The location registration reception data stored by the PS is only valid so long as the PS remains within the same paging area. The data remains valid even if the predefined global difinition information pattern changes.

[3] When the PS power is turned on and when communication is ended, if the relevant location registration data transmitted by the CS is the same as that stored by PS, then the location registration data is valid.

When it enters a new standby state and synchronization to the LCCH superframe is established, the PS that has an automatic location registration function activates location registration only if either of the following 2 events occurs.

[1] The location registration data of the CS which last successfully completed location registration is not stored. However, a location registration reject (retry impossible) message is not received within the relevant paging area.

[2] The location registration data of the CS which last successfully completed location registration differ from the location registration data of the CS which is presently synchronized. However, a location registration reject (retry impossible) message is not received within the relevant paging area.

(Note 1) Location registration data

- In public, location registration data is country code, operator identification code or paging area number

- In private, when it is "fixed paging area method by system information broad casting" or "paging area method by additional ID", location registration data is country code, system identification", or paging area number when it is "paging area method with PS indication.", location registration data is country code or CS-ID.

3. Operation of PS when location registration is restricted

If the CS has performed location registration restriction, the PS that has the automatic location registration function must operate according to the algorithm stated in Appendix C.

4. Operation of PS when number of retransmissions of link channel establishment (re-)request message has reached specified value

When the PS performs retransmission for any reason such as Timer TR001P time out or unwanted signals, if the number of retransmissions is less than the specified value, the link channel establishment

(re-)request message can be retransmitted. On the other hand, if the number of retransmissions exceeds the specified value, the PS that has the automatic location registration function must have a function that causes the delay of the reactivation timer value (100 sec) until the next location registration is activated (reactivated).

However, if it enters standby state of another CS before the reactivation timer time out, the PS that has the automatic location registration function stops the reactivation timer, and can again perform the activation process of "2: Location registration operation".
If location registration is restricted while the reactivation timer is running, it must operate according to the algorithm stated in Appendix C. That is, after the reactivation timer time out, it must operate according to the restriction before the link channel establishment request message is transmitted.

5. Reception of link channel assignment reject message

After the link channel establishment request is transmitted, if the link channel assignment reject is received, the PS that has the automatic location registration function must perform the following operations according to the reject reason of the relevant message.

- Relevant CS not available: Location registration operation to the same CS stopped. (PS not waiting for relevant CS)
- Traffic restriction: Performs same restriction control as "3. PS operation when location registration is restricted".
- Other: Performs same reactivation process as "4. Operation of PS when number of retransmissions of link channel establishment (re-)request message has reached specified value", or stops location registration operation to same CS.

6. Reception of location registration reject message

When location registration is executed, if the location registration reject message is received, the PS that has an automatic location registration function must perform the following according to the cause of that message.

- Location registration retry impossible: In the same paging area, it stops the location registration operation, and moves to call connection prohibit state (prohibits calling/receiving operation and location registration operation). Also, for a location registration prohibited area, the location registration data of the relevant CS must be stored.
- Location registration retry possible: Performs same reactivation process as "4. Operation of PS when number of retransmissions of link channel establishment (re-)request message has reached specified value".

7. Other

When location registration is executed, when a PS that has an automatic location registration function again activates the location registration operation while in the abnormal completion state without receiving a location registration acknowledge message or location registration reject message, it

performs according to "4. Operation of PS when number of retransmissions of link channel establishment (re-)request message has reached specified value".

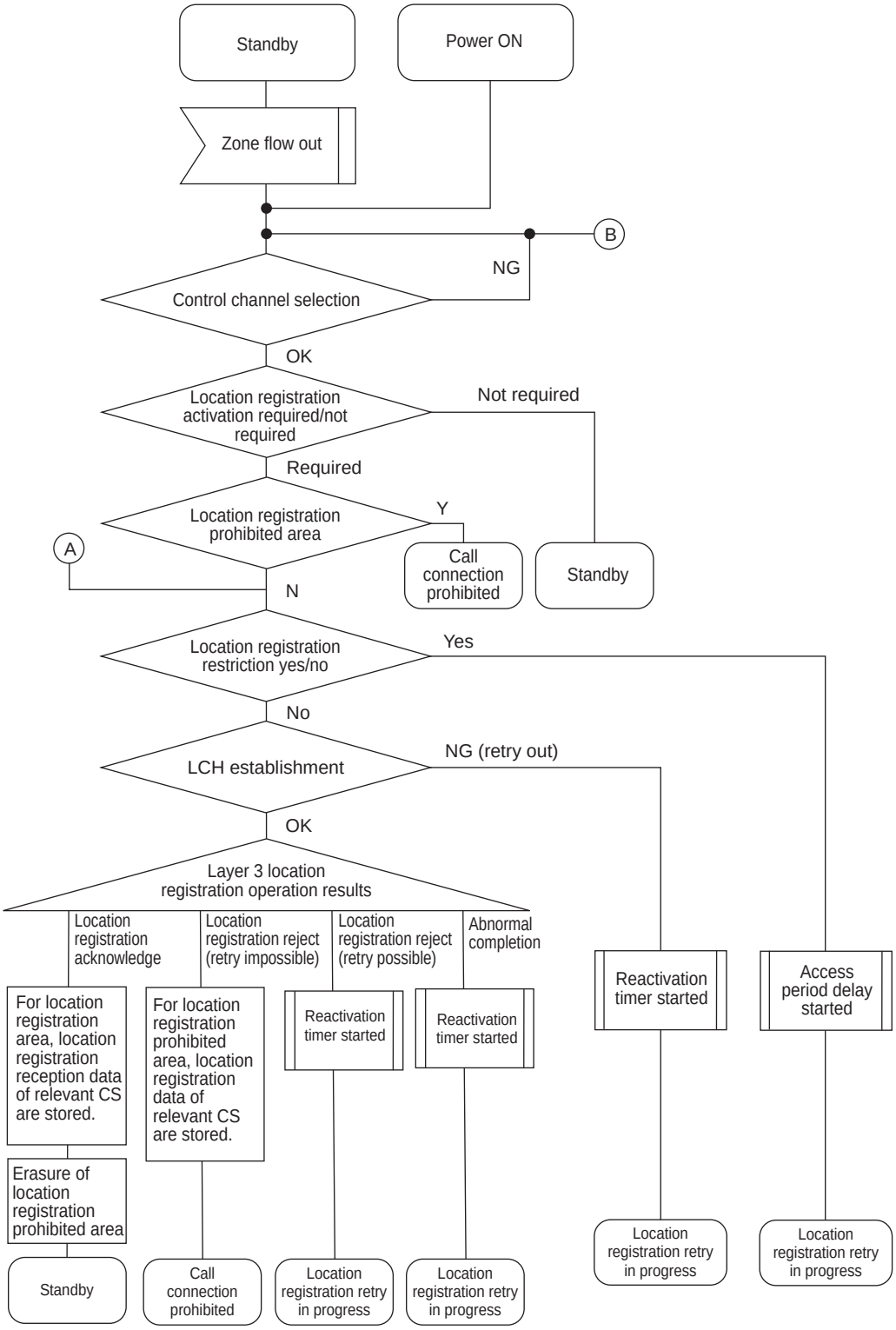


Figure 2 PS operation in location registration (1/2)

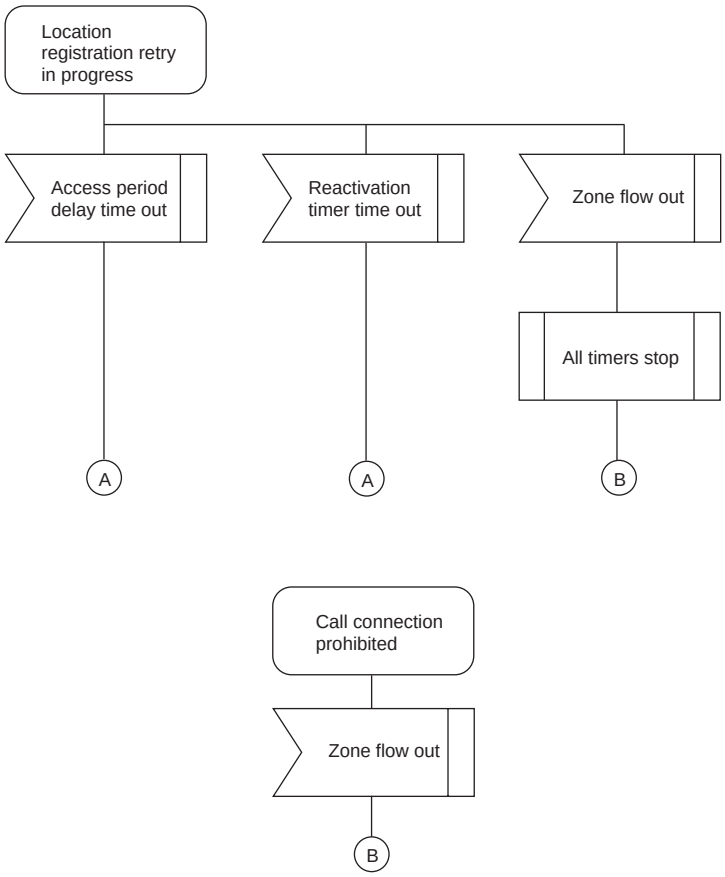


Figure 2 PS operation in location registration (2/2)

Appendix AA Definition of functional operation

(private standard/Public standard)

1. Management of object identifiers for RCR organization

The object identifier for RCR organization is managed by the following configuration.

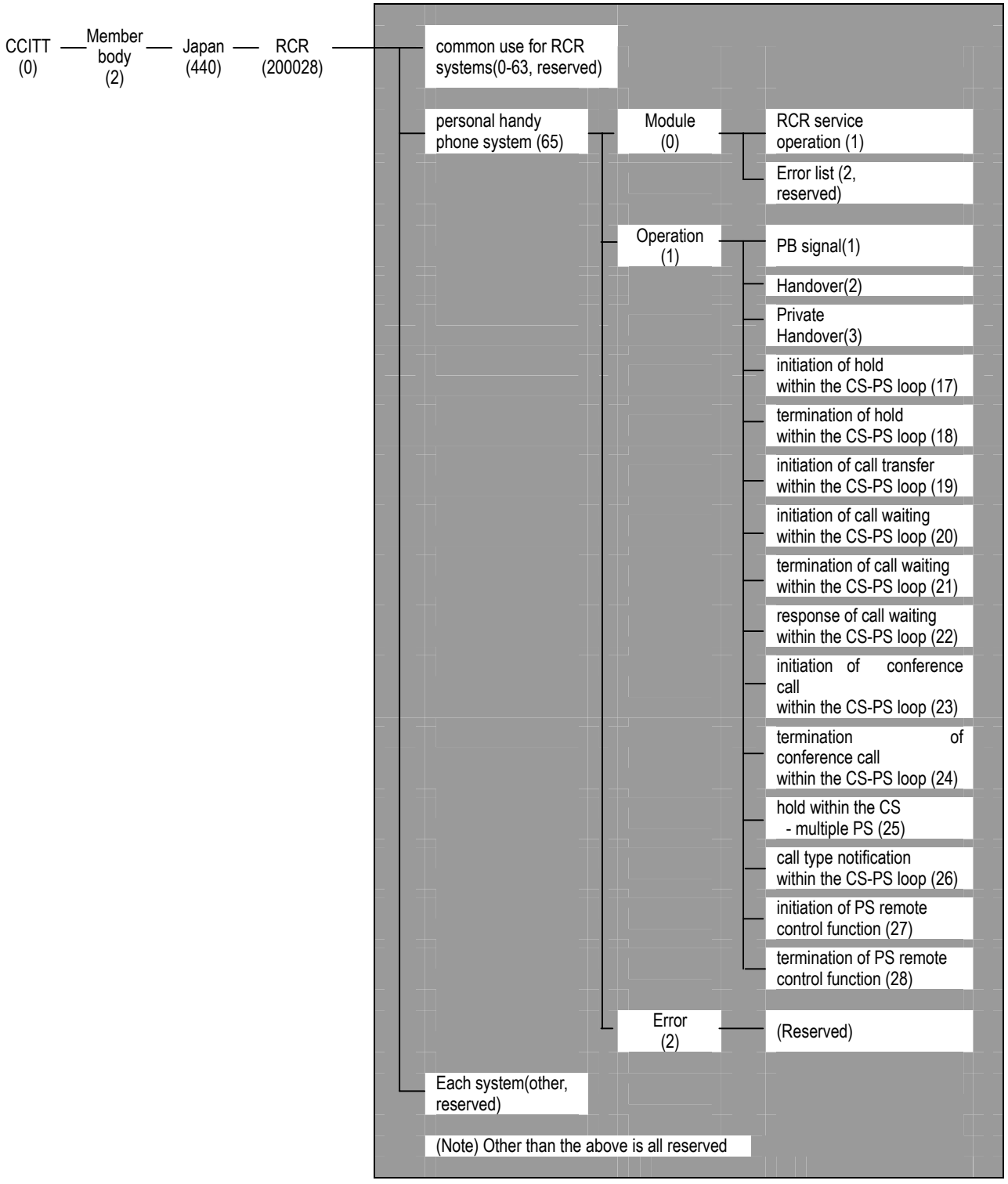


Figure 1. Management of object identifiers for RCR organization

When the object identifier is used for the RCR organization, the RCR definition must be followed. Also, among object identifiers for the RCR organization, those not defined by RCR(reserved) may not be used.

Furthermore, in the following items among the standard, any suitable object identifiers including those defined by standards other than the standard or other organizations can be cited and used.

(1) Reference items
(2) Option items
(3) When the used object identifier is not specified in the standardized object items

2. Definition of operations

The definition of each operation by abstract syntax notation one (ASN.1) is shown below.

If by the standard, the coding in the case where operations are used is according to Figure 4.4.3.7.14 of section 4.4.3 of the main text. Therefore, items defined as options (note) in this item, if contained in Figure. 4.4.3.7.14, are coded mandatory.

(Note) Options in this item are defined in the case where other organizations cite (import) each operation. Handling is different from the options specified in "1.3 Standardization rules" of the main text.

DTMF tone transmission operation, handover operation, and supplementary service operations for private system

The definitions of the DTMF tone transmission operation, handover operation, and supplementary service operations for private system are shown in Figure2.

```
RCR-Service-Operations{ccitt (0) member-body (2) japan (440) rcr (200028)
        personal-handy-phone-system (65) module (0) rcr-service-operations (1)}
DEFINITION::=
BEGIN
EXPORTS     pBSendingService,handover,privatehandover, cshldstart, cshldend, begincsct,
            begincscw, endcscw, anscscw, begincstpy, endcstpy, cssyshldreq, cscalltyp,
            begincsrmt, endcsrmt
IMPORTS     OPERATION,ERROR
            FROM
            Remote-Operation-Notation{joint-iso-ccitt remote-operations (4) notation (0)}
            UsernotSubscribed, notAvailable,insufficientInformation,invalidCallState,
            basicServiceNotProvided,proceduralError ,resourceUnavailable,
            supplementaryServiceInteractionNotAllowed
            FROM
            General-Error-List{ccitt recommendation q 950 general-error-list (1)}
            Q931InformationElement
            FROM
            Embedded-Q931-Types {ccitt recommendation q 932 embedded-q931-types (5)}
            ;
PBSendingServiceType::=
            OPERATION
            ARGUMENT SET OF { pBSignal          [1] IMPLICIT PBSignal }
```

```
pBSendingService PBSendingServiceType : : =
                {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-system
                (65) operation (1) PB-sending-service (1) }

HandoverType::=
                OPERATION
                ARGUMENT SET  { handoverCategory      [2] IMPLICIT HandoverCategory,
                                CallingPartyNumber          Q931InformationElement,
                                resultOfCalculation   [3] IMPLICIT OCTET STRING OPTIONAL}
                                --The calling number information element is the telephone number
                                   of the activator of this operation
                                --"resultOfCalculatio" shows the ciphering pattern for
                                   authentication, and its length is variable
                RESULT
                ERRORS {notAvailable, insufficientInformation, invalidCallState,
                        basicServiceNotProvided, proceduralError}
handover HandoverType::=
                {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
                system (65) operation (1) handover (2) }

privateHandoverType::=
                OPERATION
                ARGUMENT SET { handoverCategory       [2] IMPLICIT HandoverCategory,
                               callingPartyNumber          Q931InformationElement OPTIONAL,
                               resultOfCalculation    [3] IMPLICIT OCTET STRING OPTIONAL,
                               pSIdentity             [4] IMPLICIT OCTET STRING OPTIONAL}
                               --The calling number information element is the PS number and the
                                  calling number of the activator of this operation
                               --"resultOfCalculation"shows the ciphering pattern for authentication,
                                  and its length is variable
                RESULT
                ERRORS{notAvailable, insufficientInformation, invalidCallState,
                        basicServiceNotProvided, proceduralError}

privatehandover privateHandoverType::=
        {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
                system (65) operation (1) privatehandover (3)}

CsHldStartType::=
                OPERATION
                RESULT
                ERRORS{userNotSubscribed, notAvailable, insufficientInformation, invalidCallState,
                        supplementaryServiceInteractionNotAllowed, proceduralError}

cshldstart CsHldStartType::=
        {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
    system (65) operation (1) cshldstart (17)}
                -- initiation of hold within the CS-PS loop

CsHldEndType::=
                OPERATION
                RESULT
```

```
                ERRORS{invalidCallState, basicServiceNotProvided}

cshldend CsHldEndType::=
        {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
    system (65) operation (1) cshldend (18)}
                -- termination of hold within the CS-PS loop

BeginCsCtType::=
                OPERATION
                RESULT
                ERRORS{userNotSubscribed, invalidCallState,
supplementaryServiceInteractionNotAllowed}

begincsct BeginCsCtType::=
        {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
    system (65) operation (1) begincsct (19)}
                -- initiation of call transfer within the CS-PS loop

BeginCsCwType::=
                OPERATION
                ARGUMENT SET {callType                  [5] IMPLICIT CallType,
                              callingPartyNumber            Q931InformationElement OPTIONAL}

begincscw BeginCsCwType::=
        {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
    system (65) operation (1) begincscw (20)}
                -- initiation of call waiting within the CS-PS loop

EndCsCwType::=
                OPERATION

endcscw EndCsCwType::=
        {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
    system (65) operation (1) endcscw (21)}
                -- termination of call waiting within the CS-PS loop

AnserCsCwType::=
                OPERATION

ansercscw AnserCsCwType::=
        {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
    system (65) operation (1) ansercscw (22)}
                -- response of call waiting within the CS-PS loop

BeginCsTpyType::=
                OPERATION
                RESULT
                ERRORS{userNotSubscribed, notAvailable, invalidCallState, resourceUnavailable,
                        supplementaryServiceInteractionNotAllowed}
```

```
begincstpy BeginCsTpyType::=
        {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
    system (65) operation (1) begincstpy (23)}
                -- initiation of conference call within the CS-PS loop

EndCsTpyType::=OPERATION
                RESULT
                ERRORS{InvalidCallState}

endcstpy EndCsTpyType::=
        {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
  system (65) operation (1) endcstpy (24)}
                -- termination of conference call within the CS-PS loop

CsSysHldReqType::=
                OPERATION
                RESULT
                ERRORS{userNotSubscribed, notAvailable, insufficientInformation, invalidCallState,
                        basicServiceNotProvided, proceduralError}

cssyshldreq CsHldReqType::=
        {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
    system (65) operation (1) cssyshldreq (25)}
                -- hold within the CS-multiple PS

CsCallTypType::=
                OPERATION
                ARGUMENT SET OF{callType                [5]IMPLICIT CallType }

cscalltyp CsCallTypType::=
        {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
    system (65) operation (1) cscalltyp (26)}
                -- call type notification within the CS-PS loop

BeginCsRmtType::=
                OPERATION
                RESULT
                ERRORS{userNotSubscribed, notAvailable, insufficientInformation, invalidCallState}

begincsrmt BeginCsRmtType::=
        {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
    system (65) operation (1) begincsrmt (27)}
                -- initiation of PS remote control function

EndCsRmtType::=
                OPERATION
                RESULT
                ERRORS{userNotSubscribed, notAvailable, insufficientInformation, invalidCallState}

endcsrmt EndCsRmtType::=
        {ccitt (0) member-body (2) japan (440) rcr (200028) personal-handy-phone-
    system (65) operation (1) endcsrmt (28)}
```

```
                -- termination of PS remote control function

PBSignal::=IA5String(FROM ("0"|"1"|"2"|"3"|"4"|"5"|"6"|"7"|"8"|"9"|"*"|"#"))

HandoverCategory::=ENUMERATED{newLink(1)}
                                        -- " newLink "  shows recalling-type hanover

CallType::= ENUMERATED    {
                unknown(0)
                -- indefinite
                outgoing1(1),
                outgoint2(2),
                -- outside line call
                doorphone1(3),
                doorphone2(4),
                -- door phone call
                extention1(5),
                extention2(6),
                -- extension call
                option(7) }
                -- optional

END --of RCR-Service-Operations
```

Figure 2. Definition of DTMF tone transmission operation, handover operation, and supplementary service operations for private system

Appendix AB PHS-FWA standard

INTRODUCTION

This appendix is being developed for "The radio interface of the system for PHS-FWA(hereinafter referred to the FWA system) " and especially for the regulations necessary to apply "Personal Handy Phone System" to "The system for FWA".

About description methods in this appendix

1. This appendix (the PHS-FWA standard) is fundamentally based on the public standard of the main text (The main text is defined in the chapter 1.) and has the same structure as the one of the main text. The appendix, however, describes only the parts changed from the main text and refers to the main text when the contents of this appendix have the same as the main text.
2. The chapter 1 in the appendix is newly described and refers to the main text in case of need. The chapters 2, 3, 4, 5, and the appendices print the same tables of contents as the main text for contrast which show whether the text is changed or not. This appendix only describes the items changed form the main text.
3. The chapters 7, and 8 refer to the public standard of the main text because they have the same contents as the main text. The chapter 6 in the main text and attachment is not applied to this appendix.
4. This appendix is applied to the systems both in Japan and overseas. The classification of standard for overseas systems is (Overseas standard), if there are no descriptions or markings in particular.

APPENDIX AB CONTENTS

Chapter 1 General

1.1 Overview (Domestic standard)

The appendix is provided to specify the radio interface of the PHS-FWA system (hereinafter referred to the FWA system) by using the "Personal Handy Phone System".

1.2 Application scope (Domestic standard)

The FWA system are constructed from the personal stations, the cell stations and relay station (radio stations which relay communication between cell station and personal stations) shown in Figure 1.1. (Refer to Attached document 1.)
The appendix specifies the radio interface as shown in Figure 1.1 for this FWA system.

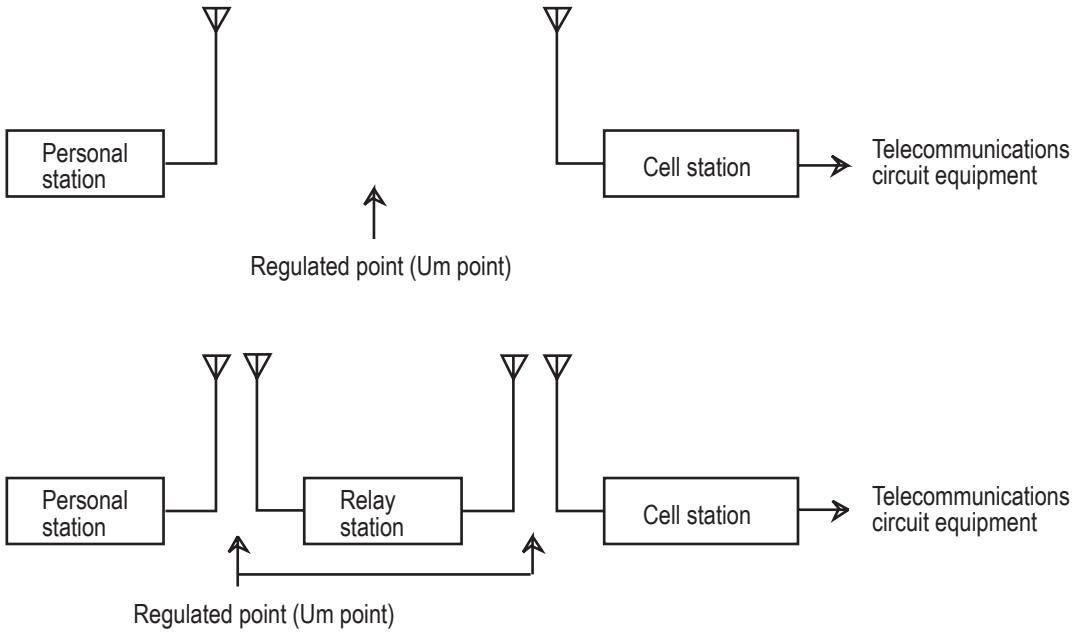


Figure 1.1 The regulated point of the radio interface of the FWA system

1.3 Basic rules of standardization (Domestic standard)

This section is based on the section 1.3 of the main text of public standard.

1.4 Document conformity (Domestic standard)

The "main text" used in this appendix refers the chapters from 1 to 8 and the appendices except appendix AB of the Personal Handy Phone System ARIB Standard (RCR STD-28).
"Test items and conditions for public personal station compatibility confirmation" (RCR TR-23) for "Personal Handy Phone System" is also the related document.
In the standard, "execute" refers to radio law execution rules, "equipment" refers to radio equipment rules, "notification" refers to Ministry of Posts and Telecommunications notifications, "formal authorization" refers to radio equipment formal authorization rules, "technological conformity" refers to technological standards conformity for certain radio equipment.
Also, the relationship between radio equipment established by legal ordinance and the radio interface provisions specified by this standard is shown in Table 1.1.

Table 1.1 Distinction between cell station and personal station, and applicable Um point interface provisions

Cell station / Personal station	PHS-FWA Cell station	PHS -FWA Relay station
PHS -FWA Fixed terminal	PHS-FWA system standard	PHS -FWA system standard
PHS -FWA Relay station	PHS -FWA system standard	

Chapter 2 System Overview

Except for the specified items changed, this chapter conforms to the public standard in the chapter 2 of the main text. The items including the changed contents are shown in the reference table of the next page which is made from the contents table of the chapter 2 of the main text. This chapter only describes the changed items and contents.

[Reference table to the main text]

(Note) The items denoted by * have the changed contents.

Chapter 2 System Overview

2.1 System structure (Domestic standard)

The FWA system is made up of personal stations, cell stations and radio stations which relay communications between cell stations and personal stations (hereinafter, referred as relay stations). (Refer to Attached document 1.)

2.1.1 Personal station (PS) (Domestic standard)

The personal station, as a subscriber communication terminal, is used to make radio communications to cell stations.

A personal station consists of radio equipment made up of antenna, transmitter, and receiver; voice encoding equipment; control equipment; and a sending/receiving handset. In case of need the additional equipment for the subscriber is to be able to be connected to the personal station. (Refer to Attached document 1.)
Hereinafter unless otherwise noted, "Personal Station" or "PS" described in this appendix denotes "The personal station of the FWA system or PS of the FWA system" but does not denote the general personal station or general PS of the Personal Handy Phone System.(“Personal Station” in this appendix is “Fixed Station” in Japanese law.)

2.1.2 Cell station (CS) (Domestic standard)

The cell station carries out radio communication with personal stations.

A cell station consists of radio equipment made up of antenna, transmitter, and receiver; voice coding equipment; and control equipment. (Refer to Attached document 1.)

Hereinafter unless otherwise noted, "Cell Station" or "CS" described in this appendix denotes "The cell station of the FWA system or CS of the FWA system" but does not denote the general cell station or CS of the Personal Handy Phone System.

2.1.3 Relay station (RS) (Domestic standard)

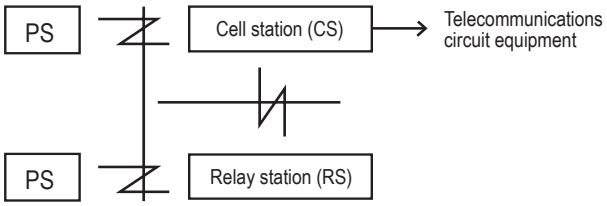
The relay station relays radio communication between cell station and personal stations.

Each of cell station and personal station opposing part of relay station works as personal station and cell station, and the relay station consisys of radio equipment made up of antenna, transmitter, and receiver; voice coding equipment; and control equipment and so on.

Hereinafter unless otherwise noted, "Relay station" or "RS" described in this appendix denotes "The relay station of the FWA system" but does not denote the general relay station or RS of the Personal Handy Phone System.

2.2 Interface definition (Domestic standard)

There is one interface point for the FWA system (Um point), as shown in Figure 2.1.



Um point : Interface point between personal station and cell station
..... Refer to the main text and to this appendix.

Figure 2.1 Interface point

2.3 System basic functions (Domestic standard)

Except for the following items changed, this section conforms to the public standard in the section 2.3 of the main text.

(2) Interconnectability

Basic connection of the personal station with cell stations at the specified locations is possible.
Mutual connection of the private system with the public system and both uses of the private personal station as the public personal station and of the public personal station as the private personal station are also possible.
(4) The section 2.3. (4) of the main text is not applied to this appendix.

2.3.1 System conditions (Domestic standard)

2.3.1.1 Basic functions (Domestic standard)

Except for the following items changed, this section conforms to the public standard in the section 2.3.1.1 of the main text.

(1) The system can be connected to the public telephone networks provided by the telecommunications operators.

2.3.1.a Classification of systems (Domestic standard)
Threr are two types in PHS-FWA system. The definitions are as follows.
In Type 1 system, public PHS interface is fully applied.
In Type 2 system, the communication channels are set up by using Personal Handy Phone System, and those channels are used to construct the whole network.

2.3.2 Services that can be used by this system (Domestic standard)

2.3.2.2 Service types (Domestic standard)

Service types of Type 1 system are as shown below.

(1) Bearer service

The bearer service used via communications channels are presently as shown in Table 2.2.

(2) Teleservice

Teleservice used via communication channels is not specified at present.

(3) Supplementary services (circuit-mode services)

Supplementary services used as circuit mode services are presently as shown in Table 2.2.

In Type 2 system, services which are offered by network can be used.

Table 2.2 Service types

Type	Item	Overview
Bearer services	32 kbit/s voice	Provides transmission function suited for voice communication with terminal; 32 kbit/s ADPCM CODEC is inserted.
	32 kbit/s 3.1 kHz audio	Provides transmission function suited for 3.1 kHz bandwidths communication with terminal; 32 kbit/s ADPCM CODEC is inserted.
	32 kbit/s unrestricted digital	Provides transmission function suited for digital data communication with terminal; information is transmitted transparently.
	64 kbit/s unrestricted digital (note 2)	Using max 2 channels on Um point, provides transmission function suited for digital data communication with terminal; information is transmitted transparently.
	64 kbit/s voice(note 2)	Using max 2 channels on Um point, provides transmission function suited for voice communication with terminal; 64 kbit/s PCM CODEC is inserted.
	64 kbit/s 3.1 kHz audio(note 2)	Using max 2 channels on Um point, provides transmission function suited for 3.1 kHz bandwidths communication with terminal; 64 kbit/s PCM CODEC is inserted.
Supplementary services	DTMF signal transmission	Service which generates DTMF signals on CS side according to the message from PS.
	Hooking signal transmission (note 1)	Service which generates hooking signal on CS side according to the message from PS.
	PHS User-to-User Signaling (PHS-UUS) Supplementary service (note 2)	Service which allows PS to send/receive a limited amount of information to/from another PS over the communication channel in association with a call to the other PS.
	Subscriber line test signal transmission	Service which reports the test starting and the test result in case of the subscriber line test (transmission media test and so on).
	Meter pulsing signal transmission	Service which indicates PS side to start the collection of coins according to the message from CS side.
	Coin collection signal transmission	Service which reports the result of coin collection to CS side according to the message from PS side.
	Ground start signal transmission	Service which indicates CS side to execute the free-of-charge communication in case of emergency according to the message from PS side.

(Note 1) This item, however which is defined only for the private system in the main text, is standard in the FWA system.

(Note 2) This service can be used on RT-MM protocol version after version 3 of RCR STD-28.

2.4 Access method (Domestic standard)

2.4.4 Carrier structure (Domestic mandatory)

Except for the following items changed, this section conforms to the public standard in the section 2.4.4 of the main text.

The structure of the radio carrier in the FWA system is fundamentally based on the legal ordinance of the relevant country. It, however, is to be desired that the structure should be based on "The carrier structure" for public system shown in the Table 2.4 of the main text. The control carrier, however, is given one carrier for each FWA system.

The structure of the radio carrier in the domestic FWA system should be based on “The carrier structure” for public system in the Table 2.4 of the main text.

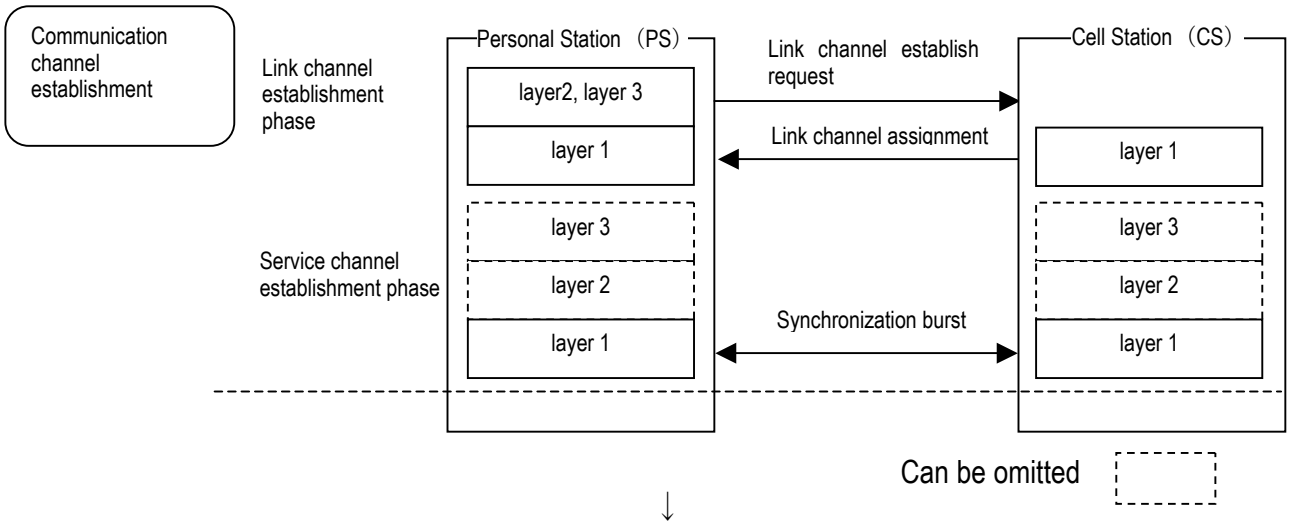
2.5 Protocol basic rules (Domestic standard)

Type 1 Protocol basic rules conform to the Protocol basic rules described in the section 2.5 of the maintext.

Type 2 Protocol basic rules are as follows.

Basic structure of signals and application example of ISDN service are shown in Figure 2.5.a.

The explanation of the words in this figure are same as which are shown in section 2.5.

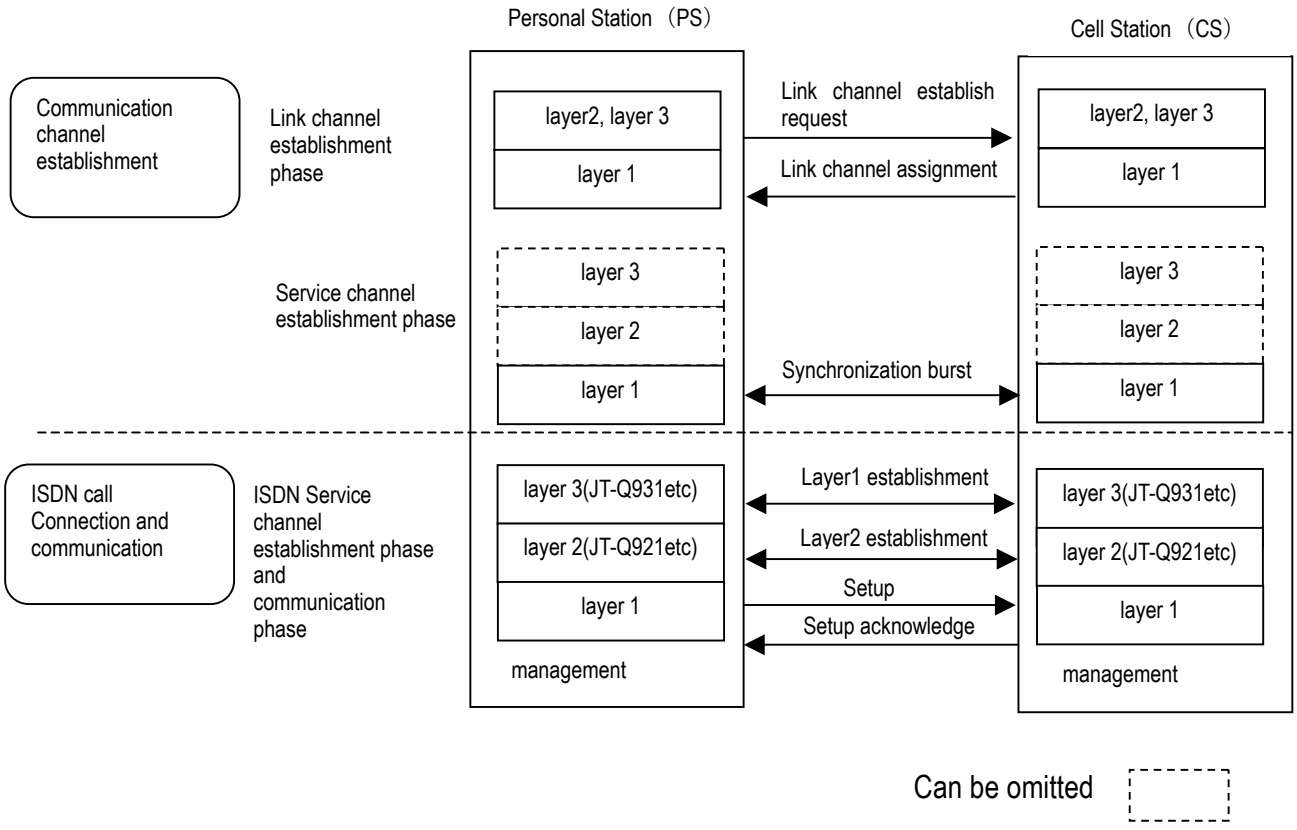


↓

After the communication channels are set up, by using those channels, whole network services are started.

(a) Basic structure of signals

_ Application example of ISDN service



(b)Application example of ISDN service

Figure.2.5.a Basic structure of signals

2.7 Encryption method (Domestic standard)

Type 1 user scrambling control mechanism conform to user scrambling control mechanism described in the section 2.7 of the maintext. Encryption method for Type 2 is not specified.

2.9 PS Number (Domestic standard)

(1) Subscriber numbers : Numbers for identifying personal stations in connections with telecommunication network.
(2) It conforms to the section 2.9(2) of the maintext. (Domestic standard)

Chapter 3 Technical Requirements for Radio Facilities

Except for the specified items changed, this chapter conforms to the public standard in the chapter 3 of the main text. The items including the changed contents are shown in the reference table made from the table of contents of the chapter 3 of the main text and shown in the following pages. This chapter only describes the changed items and contents.
When the conditions relating to the emission of the radio wave do not conform to the legal ordinances of the relevant country, they are to conform to the legal ordinances of the relevant country.

[Reference table to the main text]

(Note) The items denoted by * have the changed contents.

3.2 General conditions (Domestic mandatory)

3.2.1 Radio frequency band (Equipment-article 7) (Domestic mandatory)

It is to be desired that the radio frequency used in the FWA system should be as follows;

(1) Domestic :1,893.65MHz ~ 1,919.45MHz.
(This is to be defined both ends of the carrier frequencies.)

(2) Overseas :1,893.5 MHz ~ 1,919.6 MHz.
(This is to be defined both edges of the frequency band.)

3.2.2 Carrier frequency spacing (Domestic standard)

The carrier frequency spacing is 300 kHz.

It is to be desired that the carrier frequency should be 1,893.65 MHz and 1,893.65 MHz plus some integer multiple of 300 kHz.

3.2.4 Communications system (Equipment-item 2.12 of article 58) (Domestic mandatory)

It is a duplex system that uses the multi-carrier TDMA-TDD method.

3.2.5 Number of multiplexed circuits (Notification/ '98 year, number 463) (Domestic mandatory)

The number of multiplexed circuits for TDMA is 4 (when using full rate codec).

3.2.6 Modulation method (Equipment-item 2.12 of article 58) (Domestic mandatory)

The modulation method is $\pi/4$ shift QPSK modulation (quaternary phase modulation which has been shifted by $\pi/4$ each symbol period).
Transmission side filtering is Square Root of Raised Cosine with Roll-off rate (α) of 0.5.

3.2.7 Transmission rate (Equipment-item 2.12 of article 58) (Domestic mandatory)

The signal transmission rate is 384 kbit/s.

3.2.8 Voice coding rate (Notification/ '98 year, number 463) (Domestic mandatory)

(1) The voice coding rate

The voice coding rate is 32 kbit/s or 64 kbit/s. (Domestic mandatory)

(2) The voice coding rate of Type 1

The voice coding rate is 32 kbit/s-ADPCM (when applying full rate CODEC) or 64 kbit/s-PCM. (Domestic standard)

3.2.9 Frame length (Notification/ '98 year, number 463) (Domestic mandatory)

The frame length is 5 msec (structure of 4 transmission slots + 4 reception slots).

3.2.12 Radio station identification number (Domestic standard)

3.2.12.1 Selective calling systems (Domestic standard)

The calling identification memory device and the calling identification discrimination device for personal station shall be of a type conforming the established technical requirements for the public standard.

3.2.12.2 Calling identification memory device requirements (Domestic standard)

a) It should be possible to store calling identification code

b) The stored calling identification code must not be easily erasable.

c) Transmission must not be possible if the calling identification code has not been stored.

d) The calling identification memory device must not be easily retrievable.

3.2.12.3 Calling identification discrimination system requirements (Domestic standard)

The calling identification code must be detectable from the radio waves received.

3.2.16 Interference avoidance and transmission disable (Domestic standard)

3.2.16.1 Interference avoidance (Domestic standard)

The cell station and personal station perform continuous line monitoring after service channel establishment. The number of slots which have slot errors (unique word non-detection or CRC error) among valid slots (slots for which transmission is scheduled by peer station in response to transmission of own station) are monitored (called FER measurement) for 1.2 seconds (when full rate: 240 slots equivalent), and if that number is above the channel switching FER threshold value reported from the cell station, interference avoidance is performed by any of items [1]-[4] of 3.2.16 interference avoidance and transmission disable.

3.2.16.2 Transmission disable (Domestic standard)

(2) The carrier frequencies for the direct communication between personal stations are not applied to this appendix.

3.2.18 Transmission timing and transmission jitter (Domestic standard)

(2) PS transmission timing
The contents below are added.
In case that the antenna is able to be removed from the cabinet, and is fixed on the specific place to use, it is allowed that the standard transmission timing is advanced maximum 6 symbols in 0.5 symbol (1 bit) to come into the receipt window of CS.

3.3 Conditions for modulation method

3.3.1 Modulation method (Domestic standard)

3.3.1.1 Modulation method (Equipment-item 2.12 of article 58) (Domestic mandatory)

π /4 shift QPSK is used.

3.3.1.3 Spectrum shaping of baseband signal (Domestic standard)

(2) Roll-off rate (Equipment-item 2.12 of article 58) (Domestic mandatory)

Roll-off rate (α) = 0.5.

3.3.2 Transmission rate (Equipment-item 2.12 of article 58) (Domestic mandatory)

It is 384 kbit/s.

3.4 Conditions relating to transmitter and receiver (Domestic standard)

3.4.1 Frequency bands and carrier (Domestic standard)

It is to be desired that the frequency bands and the carrier numbers of the FWA system for overseas area should be based on the frequency bands and the carrier numbers for public system shown in Table 3.5 specified in Appendix AC of the main text. In case the system is not able to operate in the frequency bands for public system shown in Table 3.5 specified in Appendix AC of the main text, it is to be desired that the carrier number should be named in order from the lowest frequency as No.1 of the frequency number. In this case, however the carrier frequency spacing is to be 300 kHz and each frequency is to be some integral multiple of the carrier frequency spacing or of its divisor.
The control carrier for each FWA system is to be selected one carrier from the communication carriers for the public system.

3.4.2 Transmission characteristics (Domestic standard)

3.4.2.1 Transmission power (Equipment-item 2.12 of article 58) (Domestic mandatory)

(1) Definition

a. If there is an antenna measurement terminal: It is antenna supplied power.

b. If there isn't an antenna measurement terminal: It is antenna emission power measured at the test site or at the RFCD (Radio-Frequency Coupling Device) calibrated at the test site.

(2) Standards

Maximum transmission power:
For FWA cell stations, it is 500 mW or less. For other cell stations, personal stations and relay stations, it is 10 mW or less.
However, in case of domestic area, for FWA cell stations, it is 20 mW or less, and for personal stations and relay stations, it is 10 mW or less.

Output accuracy: Within + 20%, -50%

3.4.2.2 Transmission of calling identification code (Domestic standard)

When the calling identification code is transmitted, the signal transmitted from the transmitter must be as follows:

(1) For personal stations, the signal is consist of 28 bits. (Refer to section 4.2.10.)

(2) The signal has the established slot configuration, and transmits using channel coding and scrambling methods. (Refer to sections 4.2.9, 4.2.10 and 4.2.11.)

3.4.2.3 Adjacent channel power (Equipment-item 2.12 of article 58) (Domestic mandatory)

(1) Definition

Adjacent channel power is average power in a burst radiated within a band of $\pm$ 96 kHz centering on a frequency separated by Δ f kHz from the carrier wave frequency, in cases where it is modulated by a standard encoding test signal of the same coding speed as the modulated signal.

(2) Standards

a. 600 kHz deviated: 800 nW or less

b. 900 kHz deviated: 250 nW or less

3.4.2.5 Carrier off time leakage power (Equipment-item 2.12 of article 58) (Domestic mandatory)

(1) Definition

Carrier off time leakage power is power radiated in the relevant transmission frequency band within the no-signal time.

(2) Standards

It is 80 nW or less.

(3) The measurement is performed during communication, and the measurement period is the non-transmission slot.

3.4.2.6 Transmission spurious (Equipment-article 7) (Domestic standard)

(1) Definition

Transmission Spurious is the average power of spurious emission (note) for each frequency supplied to the power line.

(Note) It is radiation of radio waves at 1 or more frequencies outside the required frequency band, and at a level which can be reduced without affecting information transmission. It includes harmonic emissions, sub-harmonic emissions, parasitic emissions and inter-modulation products, but does not include those generated in the course of modulation for information transmission by power emission at frequencies near the required frequency band.

(2) Standards

a. Within band (1,893.5 MHz ~ 1,919.6 MHz) : 250 nW or less.

b. Outside of band (except above) : 2.5 μ W or less.

(3) Measurement is performed during communication, and the measurement period is transmission slots and non-transmission slots (except within the band).

3.4.4 Antennas (Equipment- item 2.12 of article 58) (Domestic mandatory)

(1) Cell station

Antenna has a gain of 22 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 22 dBi, the portion by which it is lower may be compensated by the gain of the antenna.

(2) Personal station

a) Cabinet-built-in-type antenna has a gain of 22 dBi or less.
However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 22 dBi, the portion by which it is lower may be compensated by the gain of the antenna.

b) In case that the antenna is able to be removed from the cabinet, and PS cabinet is fixed on the specific place to use, the antenna gain is not specified.

(3) Relay station

Antenna gain is 22 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 22 dBi, the portion by which it is lower may be compensated by the antenna gain.

Chapter 4 Communication Control Methods

Except for the changed items mentioned this chapter conforms to the public standard in the chapter 4 of the main text. The items having the changed contents are shown in the reference table given in the following pages which is made †from the contents table of the chapter 4 of the main text. This chapter only describes the changed items and contents.

[Reference table to the main text]

(Note) The items denoted by * have the changed contents.

4.4.3.7.2.1.3 CONNect

4.4.3.7.2.1.4 CONNect ACKnowledge

4.4.3.7.2.1.5 DISConnect

4.4.3.7.2.1.6 FACility

4.4.3.7.2.1.7 INFOrmation ..... *

4.4.3.7.2.1.8 PROGress

4.4.3.7.2.1.9 RELease

4.4.3.7.2.1.10 RELease COMPlete

4.4.3.7.2.1.11 SETUP

4.4.3.7.2.1.12 SETUP ACKnowledge ..... *

4.4.3.7.2.1.13 STATus

4.4.3.7.2.1.14 STATus ENQuiry

4.4.3.7.2.1.15 NOTIFY ..... *

4.4.3.7.2.1.16 USER INFOrmation

4.4.3.7.3 Message format and information element coding

4.4.3.7.3.1 Overview

4.4.3.7.3.2 Protocol discriminator

4.4.3.7.3.3 Call reference

4.4.3.7.3.4 Message type

4.4.3.7.3.5 Other information elements ..... *

4.4.3.7.3.5.1 Coding regulations ..... *

4.4.3.7.3.5.2 Information element identifier codeset extension and locking shift procedure

4.4.3.7.3.5.3 Locking shift

4.4.3.7.3.5.4 Bearer capability

4.4.3.7.3.5.5 Call state

4.4.3.7.3.5.6 Called party number

4.4.3.7.3.5.7 Called party subaddress

4.4.3.7.3.5.8 Calling party number

4.4.3.7.3.5.9 Calling party subaddress

4.4.3.7.3.5.10 Cause

4.4.3.7.3.5.11 Facility

4.4.3.7.3.5.12 Keypad facility

4.4.3.7.3.5.13 Progress indicator

4.4.3.7.3.5.14 Sending complete

4.4.3.7.3.5.15 Signal ..... *

4.4.3.7.3.5.16 Advice of change

4.4.3.7.3.5.17 Notification indicator

4.4.3.7.3.5.18 PS identity

4.4.3.7.3.5.19 High layer compatibility

4.4.3.7.3.5.20 Low layer compatibility

4.4.3.7.3.5.21 Repeat indicator

4.4.3.7.3.5.22 Manual call origination indicator

4.4.3.7.3.5.23 Communication type

4.4.3.7.3.5.24 Display

4.4.3.7.3.5.25 More data ..... *

4.4.3.7.3.5.26 User - user..... *

4.4.3.7.4 Supplementary services

4.4.3.7.4.1 Supplementary service types..... *

4.4.3.7.4.1.1 DTMF signal transmission

4.4.3.7.4.1.2 Hooking signal transmission

4.4.3.7.4.1.3 Supplementary service within the CS-PS loop

4.4.3.7.4.1.4 Pause signal transmission

4.2 Layer 1 standards (Domestic standard)

4.2.5 Physical slot usage method (Domestic standard)

4.2.5.1 Mapping of physical slots on frequency axis (Domestic standard)

Except for the following items changed, this section conforms to the public standard in the section 4.2.5.1 of the main text.
It is to be desired that the correspondence relationship of each physical slot with the control carrier exclusively used for control and communications carriers other than control carrier for the FWA system for overseas conforms to Figure 4.2.3 specified in Appendix AC of the main text.

4.2.7 Structure of logical control channel (Domestic standard)

4.2.7.6 PS logical control channel usage (Domestic standard)

Except for the following items changed, this section conforms to the public standard in the section 4.2.7.6 of the main text.

(5) LCCH reception start operation

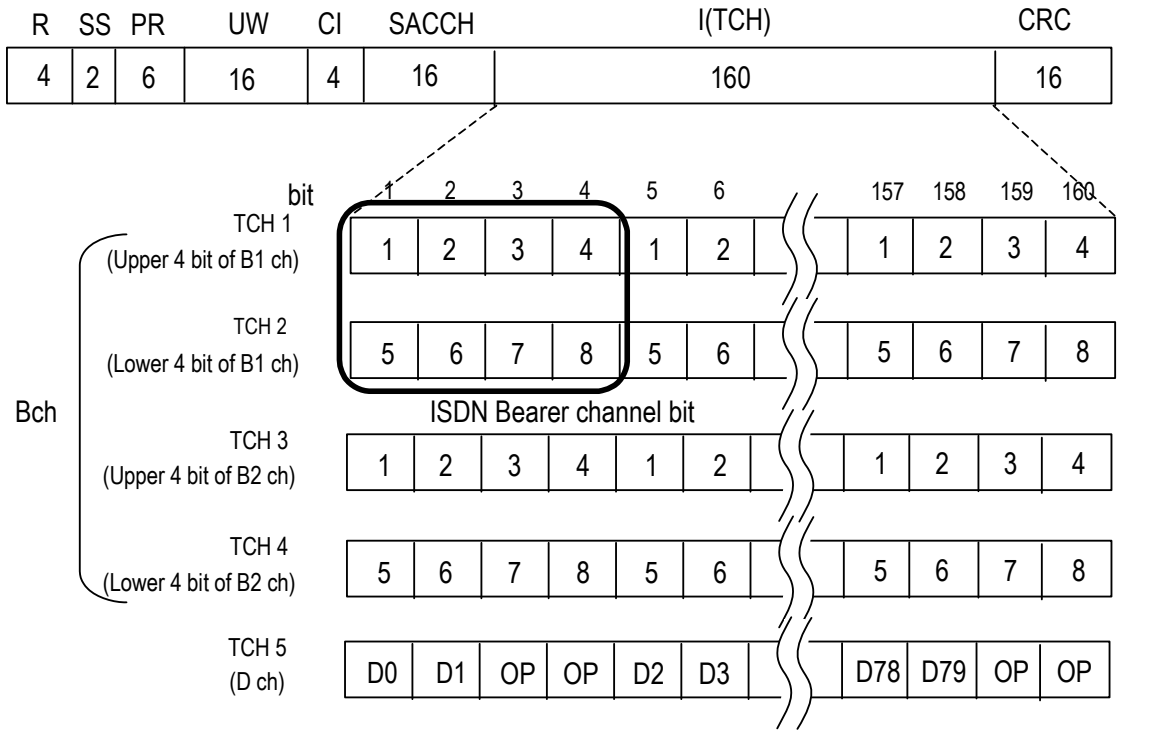
The contents below added.
A CS may be operated in 2LCCH usage mode in the FWA system, and it is possible that each LCCH is independent. So, in this case, either LCCH must be received.

(6) PS operation during handover

If PS activates recalling-type handover, it does not need to follow the local information broadcasting reception indication. Therefore, if the LCCH profile data of the handover destination CS and the uplink LCCH access timing are known, LCCH reception is performed without receiving broadcasting contents from the handover destination CS, and Link channel establishment request message can be transmitted.
(Note) In the FWA system, recalling-type handover is a functional option.

4.2.9 Slot structure (Domestic standard)

Except for the following items added, slot structure follow to the public standard in the section 4.2.9 of the main text.
An example of the use of communication physical slot in Type 2 system is shown in Figure 4.2.17.a.



OP: Option
TCH: communication physial slots
B1 and B2 are first B channel and second B channel of ISDN.
Communication physical channel 1 ~ 5 can be located in different slots.

Figure 4.2.17.a An example of the use of communication physical slot in Type 2 system

4.3 Link channel establishment phase (Domestic standard)

4.3.4 Message format (Domestic standard)

Except for the following items changed, this section conforms to the public standard in the section 4.3.4 of the main text.

System type 3, which is in link channel establishment request message, link channel establishment re-request message and 2nd system information broadcasting message, indicates the FWA system.

4.3.4.1.2 Link channel establishment request (Domestic standard)

Except for the following items changed, this section conforms to the public standard in the section 4.3.4.1.2 of the main text.
When CC protocol type (octet 3) bit 8 is set to “1”, it indicates overlap sending procedure.

4.3.4.1.3 Link channel assignment (Domestic standard)

Except for the following items changed, this section conforms to the public standard in the section 4.3.4.1.3 of the main text.
When CC protocol type (octet 3) bit 8 is set to “1”, it indicates overlap sending procedure.

4.3.4.1.5 Link channel establishment re-request (Domestic standard)

Except for the following items changed, this section conforms to the public standard in the section 4.3.4.1.5 of the main text.
When CC protocol type (octet 3) bit 8 is set to “1”, it indicates overlap sending procedure.

4.3.4.2 Broadcasting messages (Domestic standard)

Except for the following items changed, this section conforms to the public standard in the section 4.3.4.2 of the main text.

In the FWA system, the control carrier structure (0 1) is standard, and in this time, n_{offset} is valid in the FWA system as standard.

Obtainable values of downlink LCCH profile data in the FWA system are as follows.

[LCCH structure parameters in the FWA system]

(1) The LCCH interval value (n) is $20 \leq n \leq 60$.

(2) The frame basic unit length (n_{sub}) is $n_{sub} \leq 6$.

(3) The number of same paging groups (n_{sg}) is $n_{sg} = 1$.

(4) The battery saving cycle maximum value (n_{bs}) is $n_{bs} \leq 4$.

(5) The maximum battery saving cycle is
$5ms \times n \times n_{sub} \times n_{group} \times n_{bs} \leq 2{,}500ms$.

(6) The group division number (n_{group} x n_{pch}) is n_{group} x $n_{pch} \leq 10$.
However, when 2LCCH are used and PCH paging groups are mutually related, the group division number is n_{group} x n_{pch} x $2 \leqq 10$.

(7) The paging grouping factor (n_{group}) is $n_{group} \leq 6$.

(8) The number of PCHs (n_{pch}) is natural number such that $n_{sub} > n_{pch}$.

4.3.4.2.2 System information broadcasting message (Domestic standard)

Except for the following items changed, this section conforms to the public standard in the section 4.3.4.2.2 of the main text.
When CC protocol type (octet 3) bit 8 is set to “1”, it indicates overlap sending procedure.

4.4 Service channel establishment phase and communications phase (Domestic standard)

4.4.3 Layer 3 standards (Domestic standard)

4.4.3.1 Type 1 Overview (Domestic standard)

4.4.3.1.1 Range of standard (Domestic standard)

The procedures specified by this standard are for control of the circuit switched connections.
Options and defaults are determined as follows by the standard.
Recalling-type connection function is specified as a functional option in both PS and CS. This definition is available through this appendix. However, in this appendix, the changes of recalling-type connection function are described only in this section.

(1) Handling of RT function requests

Except for the following items changed, this section conforms to the public standard in the section 4.4.3.1.1 (1) of the main text.

Table 4.4.3.1.2 RT function request contents default values (the FWA system) (note)

Function	Default	Remarks
Encryption	No active encryption control; User scrambling; Key set for each call; No passcode	
TCH switching	Switching function within carrier within CS, among carriers present No TCH switching function to other CS No CS-ID designation switching function to other CS Recalling-type connection function to other CS within paging areas absent Recalling-type connection function to other CS between paging areas absent	
Zone information indication function	Zone information indication function absent	

(Note) "Condition report function", "PS-ID Notification control information", "Transmission Power Control", and "VOX Function Information" are not specified. Therefore, they are treated as no function.

(2) This section conforms to the public standard in the section 4.4.3.1.1 (2) of the main text.

4.4.3.7 Call control (CC) (Domestic standard)

4.4.3.7.1 Call control (CC) state definitions (Domestic standard)

4.4.3.7.1.1 CC state at PS

Except for the following items changed, this section conforms to the public standard in the section 4.4.3.7.1.1 of the main text.
In call state at PS, ③Overlap sending(P2) state is also specified.

4.4.3.7.1.2 CC state at CS

Except for the following items changed, this section conforms to the public standard in the section 4.4.3.7.1.2 of the main text.
In call state at CS, ③Overlap sending(P2) state is also specified.

4.4.3.7.2 Message function definitions and contents (Domestic standard)

4.4.3.7.2.1 CC message overview (Domestic standard)

Except for the following items changed, this section conforms to the public standard in section 4.4.3.7.2.1 of the main text.
Signal information element is referred to section 4.4.3.7.3.5.15.
SETUP ACKnowledge message and USER INFOrmation message in Table 4.4.3.7.1 are also specified.
Also, SETUP ACKnowledge message is standard, and USER INFOrmation message is a functional option.

4.4.3.7.2.1.7 INFOrmation (Domestic standard)

This message is transferred when it is desired to transmit information from PS or CS. (Refer to Table 4.4.3.7.8)

4.4.3.7.2.1.12 SETUP ACKnowledge

Except for the following items changed, this section conforms to the public standard in section 4.4.3.7.2.1.12 of the main text.
This message is (Domestic standard / Overseas standard).

4.4.3.7.2.1.16 USER INFOrmation

Except for the following items changed, this section conforms to the public standard in section 4.4.3.7.2.1.16 of the main text.
This message is (Domestic standard / Overseas standard).

Table 4.4.3.7.8 Information message contents

Message type : Information
Significance : Local
Direction : Both directions
Function channel : SACCH/FACCH

Information element	Reference	Direction	Type	Information length	Remarks
Protocol discriminator	4.4.3.7.3.2 (Main text)	both	M	1	
Call reference	4.4.3.7.3.3 (Main text)	both	M	2 ~ 3	
Message type	4.4.3.7.3.4 (Main text)	both	M	1	
Sending complete	4.4.3.7.3.5.14 (Main text)	uplink	O	1	(note 1)
Display	4.4.3.7.3.5.24 (Main text)	downlink	O	2 ~ 82	(note 6)
Keypad facility	4.4.3.7.3.5.12 (Main text)	uplink	O	2 ~ 34	(note 2)
Signal	4.4.3.7.3.5.15	downlink	O	2 ~ 3	(note 3)
Called party number	4.4.3.7.3.5.6 (Main text)	uplink	O	2 ~ *	(note 4)
Test starting	4.4.3.7.3.5.a	downlink	O	3	(note 7)
Test result	4.4.3.7.3.5.b	uplink	O	2 ~ *	(note 8)
Meter pulsing signal	4.4.3.7.3.5.c	downlink	O	3	(note 9)
Coin collection signal	4.4.3.7.3.5.d	uplink	O	3	(note 10)
Ground start signal	4.4.3.7.3.5.e	uplink	O	1	(note 11)
Extended supplementary service	4.4.3.7.3.5.f	both	O	1 ~ *	(note 12)
Locking shift	4.4.3.7.3.5.3 (Main text)	uplink	O	1	Codeset 5 (note 5)
Communication type	4.4.3.7.3.5.23 (Main text)	uplink	O	2 ~ 3	(note 6)

(Note 1) Private only.
(Note 2) Included when PS sends hooking signal during PS in active (P10) state in the FWA system.
(Note 3) Included when information is provided that shows tone.
(Note 4) Included when sending called party number information from PS to CS.
Information length depends on the network.
(Note 5) Mandatory if codeset is shifted.
(Note 6) Private only
(Note 7) Included when test starting is indicated, during supplementary service of test signal transmission.
(Note 8) Included when transfer test result during supplementary service of test signal transmission.
(Note 9) Included when supplementary service of meter pulsing signal transmission is provided.
(Note 10) Included when supplementary service of coin collection signal transmission is provided.
(Note 11) Included when supplementary service of ground start signal transmission is provided.
(Note 12) Included when supplementary service that is not specified in the FWA system is executed.
Multiple extended supplementary service information elements indicated in section 4.4.3.7.3.5.f can be included.

4.4.3.7.3 Message format and information element coding (Domestic standard)

4.4.3.7.3.5 Other information elements (Domestic standard)

The information elements below are added in section 4.4.3.7.3.5 of the main text.
• Test starting (section 4.4.3.7.3.5.a)
• Test result (section 4.4.3.7.3.5.b)
• Meter pulsing signal (section 4.4.3.7.3.5.c)
• Coin collection signal (section 4.4.3.7.3.5.d)
• Ground start signal (section 4.4.3.7.3.5.e)
• Extended supplementary service (section 4.4.3.7.3.5.f)

4.4.3.7.3.5.1 Coding regulations (Domestic standard)

Except for the following items changed, this section conforms to the public standard in the section 4.4.3.7.3.5.1 of the main text.

(2) The coding for information element identification bits for the elements shown in this section is shown in Table 4.4.3.7.17.

Table 4.4.3.7.17 Information element coding

[Codeset 0] (note 1)

Bit 8	7	6	5	4	3	2	1		
1	-	-	-	-	-	-	-	Single octet information element	
	0	0	1	-	-	-	-	Shift	
	0	1	0	0	0	0	0	More data (note 4)	
	0	1	0	0	0	0	1	Sending complete (note 4)	
	0	1	0	0	1	0	1	Ground start signal	
	0	1	0	0	1	1	0	Extended supplementary service (option)	(note 5)
	0	1	0	0	1	1	1	Extended supplementary service (option)	(note 5)
	1	0	1	-	-	-	-	Repeat indicator	

8	7	6	5	4	3	2	1	
0	-	-	-	-	-	-	-	Multiple octet information element
	0	0	0	0	1	0	0	Bearer capability
	0	0	0	1	0	0	0	Cause
	0	0	1	0	1	0	0	Call state
	0	0	1	1	1	0	0	Facility
	0	0	1	1	1	1	0	Progress indicator
	0	1	0	0	1	1	1	Notification indicator
	0	1	0	1	0	0	0	Display (note 4)
	0	1	0	1	0	1	0	Extended supplementary service (option) (note 5)
	0	1	0	1	0	1	1	Extended supplementary service (option) (note 5)
	0	1	0	1	1	0	0	Keypad facility (note 6)
	0	1	0	1	1	1	0	Extended supplementary service (option) (note 5)
	0	1	0	1	1	1	1	Extended supplementary service (option) (note 5)
	0	1	1	0	1	0	0	Signal (note 3)
	0	1	1	1	1	0	0	Test starting
	0	1	1	1	1	0	1	Test result
	0	1	1	1	1	1	0	Meter pulsing signal
	0	1	1	1	1	1	1	Coin collection signal
	1	1	0	1	1	0	0	Calling party number
	1	1	0	1	1	0	1	Calling party subaddress (note 3)
	1	1	1	0	0	0	0	Called party number
	1	1	1	0	0	0	1	Called party subaddress (note 3)
	1	1	1	1	1	0	0	Low layer compatibility
	1	1	1	1	1	0	1	High layer compatibility
	1	1	1	1	1	1	0	User-user (note 3)
			Other					Reserved (note 2)

[Codeset 5]

Bit

8	7	6	5	4	3	2	1	
0	0	0	0	0	0	0	1	Advice of charge (note 3)
0	1	0	0	0	0	0	1	PS identity (note 4)
0	1	0	0	0	0	1	0	Manual call origination indicator (note 4)
0	1	0	0	0	0	1	1	Communication type (note 4)
			Other					Reserved (note 2)

(Note 1) Refer to section 4.4.3.7.3.5.2 of the main text for codeset.
(Note 2) If bits 5~8 are "0000" among reserved values, they are information elements that must be understood on the destination-side.
They are reserved for a standard information element.
(Refer to Appendix X of the main text.)
(Note 3) This is a functional option in public, private and the FWA system.
(Note 4) Private and the FWA system only. This is a functional option in Private and the FWA system.
(Note 5) This is used in the FWA system when operators subjoin supplementary service individually.
(Note 6) Private and the FWA system only.

4.4.3.7.3.5.4 Bearer capability (Domestic standard)

Except for the following items changed, this section conforms to the public standard in the section 4.4.3.7.3.5.4 of the main text.

User information layer 1 protocol (octet 5)

Bit 5	4	3	2	1	
0	0	0	1	0	TTC standard JT-G711 μ-law
0	0	0	1	1	ITU-T Recommendation G.711 A-law

4.4.3.7.3.5.15 Signal (Domestic standard)

Signal is used for transmitting information which generate signals such as tones or alerting patterns from CS to PS. Signal information element is coded as shown in Figure 4.4.3.7.18.

(Note) The calling on pattern is for indicating the calling pattern, and its method of use is undetermined.

Octet	Bit 8	7	6	5	4	3	2	1
1	0	Signal 0	0	1	1	0	1	0	0
		Information element identifier						
2	Signal content length							
3	Signal content value							

Signal content value (octet 3)

Bit 8	7	6	5	4	3	2	1	
0	0	0	0	0	0	0	0	Dial tone on
0	0	0	0	0	0	0	1	Ring back tone on
0	0	0	0	0	0	1	0	Interrupt tone on
0	0	0	0	0	0	1	1	Network congestion tone on
0	0	0	0	0	1	0	0	Busy tone on
0	0	0	0	0	1	0	1	Confirm tone on
0	0	0	0	0	1	1	0	Answer tone on
0	0	0	0	0	1	1	1	Call waiting tone on
0	0	0	0	1	0	0	0	Off hook warning tone on
0	0	1	1	1	1	1	1	Tone off
0	1	0	0	0	0	0	0	Alerting on pattern 0
0	1	0	0	0	0	0	1	Alerting on pattern 1
0	1	0	0	0	0	1	0	Alerting on pattern 2
0	1	0	0	0	0	1	1	Alerting on pattern 3
0	1	0	0	0	1	0	0	Alerting on pattern 4
0	1	0	0	0	1	0	1	Alerting on pattern 5
0	1	0	0	0	1	1	0	Alerting on pattern 6
0	1	0	0	0	1	1	1	Alerting on pattern 7
0	1	0	0	1	1	1	0	Alerting off (auto offhook) (note)
0	1	0	0	1	1	1	1	Alerting off
		Other						Reserved

(Note) Used only the cause to request auto offhook to PS in order to subscriber line test signal transmission which is supplementary service of the FWA system.

Figure 4.4.3.7.18 Signal

4.4.3.7.3.5.25 More data

Except for the following items changed, this section conforms to the public standard in the section 4.4.3.7.3.5.25 of the main text.
This message is (Domestic standard / Overseas standard).

4.4.3.7.3.5.26 User-user

Except for the following items changed, this section conforms to the public standard in the section 4.4.3.7.3.5.26 of the main text.
This message is (Domestic standard / Overseas standard).

4.4.3.7.3.5.a Test starting (Domestic standard)

The test starting is used to designate the test starting from CS side to PS side (Additional equipment for subscriber and so on).
This information element is coded as shown in Figure 4.4.3.7.3.5.a.

Octet	Bit 8	7	6	5	4	3	2	1
1	Test starting: 0	0	1	1	1	1	0	0 (Information element identifier)
2	Test starting content length							
3	Test item							

Test item (Octet 3)

Bit 8	7	6	5	4	3	2	1	
X	X	X	X	X	X	X	1/0	Loop resistance test present/absent
X	X	X	X	X	X	1/0	X	Insulation resistance test present/absent
X	X	X	X	X	1/0	X	X	Capacitance test present/absent
X	X	X	X	1/0	X	X	X	Incoming voltage test present/absent
			Other				Option	

X:Don't care

Figure 4.4.3.7.3.5.a Test starting

4.4.3.7.3.5.b Test result (Domestic standard)

The test result is used to report the test result from PS side (Additional equipment for subscriber and so on) to CS side.
This information element is coded as shown in Figure 4.4.3.7.3.5.b.

Octet	Bit 8	7	6	5	4	3	2	1
1	0	Test result: 0	1	1	1	1	0	1 (Information element identifier)
2	Test result content length							
3	Test item							
4	Test measurement result content length							
5~a	Test measurement result							
a+1	Test item							
a+2	Test measurement result content length							
a+3~b	Test measurement result							
	:							
y+1	Test item							
y+2	Test measurement result content length							
y+3~z	Test measurement result							

(Note) a~z are discretionary values (octet value).

Test item

Bit 8	7	6	5	4	3	2	1	
X	X	X	X	X	X	X	1/0	Loop Resistance test present/absent
X	X	X	X	X	X	1/0	X	Insulation resistance test present/absent
X	X	X	X	X	1/0	X	X	Capacitance test present/absent
X	X	X	X	1/0	X	X	X	Incoming voltage test present/absent
			Other				Option	

X:Don't care

Figure 4.4.3.7.3.5.b Test result

4.4.3.7.3.5.c Meter pulsing signal (Domestic standard)

Meter pulsing signal is used to indicate starting coin collection and so on from CS to PS (Additional equipment for subscriber and so on), and it is coded as shown in Figure 4.4.3.7.3.5.c.

Octet	Bit 8	7	6	5	4	3	2	1
1	0	Meter pulsing signal Information element identifier						
2	Meter pulsing signal content length							
3	Sequence number			Collection type		Meter pulsing signal item		

Sequence number (Octet3)
Shows transmission order of the meter pulsing signal. When the transmission times are 5 or more, the sequence number 1~4 are used recurrently.

Bit 8	7	
0	0	Shows sequence number 1
0	1	Shows sequence number 2
1	0	Shows sequence number 3
1	1	Shows sequence number 4

Collection type (Octet3)
Shows the discrimination of collected coin or card, and the coin type. This element can be used arbitrarily.

Bit 6	5	4
0	0	0
	:	
1	1	1

Meter pulsing signal item (Octet3)

Bit 3	2	1	
x	x	1/0	Reverse/Normal
x	1/0	x	Network power feeding present/absent
Other			Option
			x: Don't care

Figure 4.4.3.7.3.5.c Meter pulsing signal

4.4.3.7.3.5.d Coin collection signal (Domestic standard)

Coin collection signal is used to notify the result of coin collection and so on from PS (Additional equipment for subscriber and so on) to CS, and it is coded as shown in Figure 4.4.3.7.3.5.d.

Octet	Bit 8	7	6	5	4	3	2	1
1	0	Coin collection signal 0	1	1	1	1	1	1 Information element identifier
2	Coin collection signal content length							
3	Sequence number			Collection type			Coin collection signal item	

Sequence number (Octet3)
Shows transmission order of the coin collection signal. When the transmission times are 5 or more, the sequence number 1~4 are used recurrently.

Bit 8	7	
0	0	Shows sequence number 1
0	1	Shows sequence number 2
1	0	Shows sequence number 3
1	1	Shows sequence number 4

Collection type (Octet3)
Shows the discrimination of collected coin or card, and the coin type. This element can be used arbitrarily.

Bit 6	5	4
0	0	0
	:	
1	1	1

Coin collection signal item (Octet3)

Bit 3	2	1	
x	x	1/0	Coin present/absent
Other			Option
			x: Don't care

Figure 4.4.3.7.3.5.d Coin collection signal

4.4.3.7.3.5.e Ground start signal (Domestic standard)

Ground start signal is used to indicate starting free-of-charge communication from CS to PS (Additional equipment for subscriber and so on), and it is coded as shown in Figure 4.4.3.7.3.5.e.

Octet	Bit 8	7	6	5	4	3	2	1
	Ground start signal							
1	1	0	1	0	0	1	0	1
	Information element identifier							

Figure 4.4.3.7.3.5.e Ground start signal

4.4.3.7.3.5.f Extended supplementary service (Domestic standard)

The extended supplementary service is used for the supplementary services that aren't specified beforehand by standards for the FWA system. This information element is coded as shown in Figure 4.4.3.7.3.5.f.1 ~ Figure 4.4.3.7.3.5.f.2 (single octet) and Figure 4.4.3.7.3.5.f.3 ~ Figure 4.4.3.7.3.5.f.6 (multiple octets).

Octet	Bit 8	7	6	5	4	3	2	1
1	1	Extended supplementary service Information element identifier						

Figure 4.4.3.7.3.5.f.1 Extended supplementary service (single octet)

Octet	Bit 8	7	6	5	4	3	2	1
1	1	Extended supplementary service Information element identifier						

Figure 4.4.3.7.3.5.f.2 Extended supplementary service (single octet)

Octet	Bit 8	7	6	5	4	3	2	1
1	0	Extended supplementary service Information element identifier						
2	Extended supplementary service content length							
3~*	Option							

Figure 4.4.3.7.3.5.f.3 Extended supplementary service (multiple octets)

Octet	Bit 8	7	6	5	4	3	2	1
1	0	Extended supplementary service Information element identifier						
2	Extended supplementary service content length							
3~*	Option							

Figure 4.4.3.7.3.5.f.4 Extended supplementary service (multiple octets)

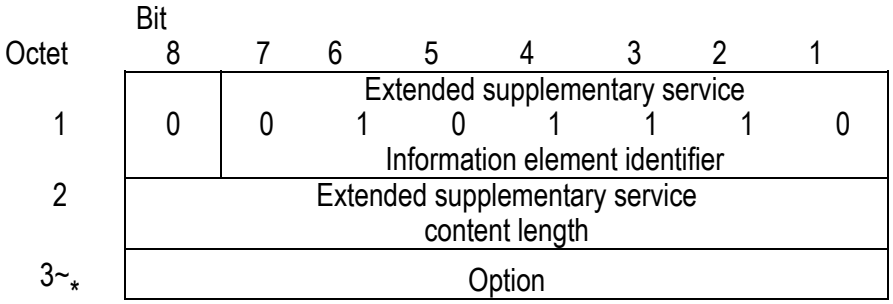


Figure 4.4.3.7.3.5.f.5 Extended supplementary service (multiple octets)

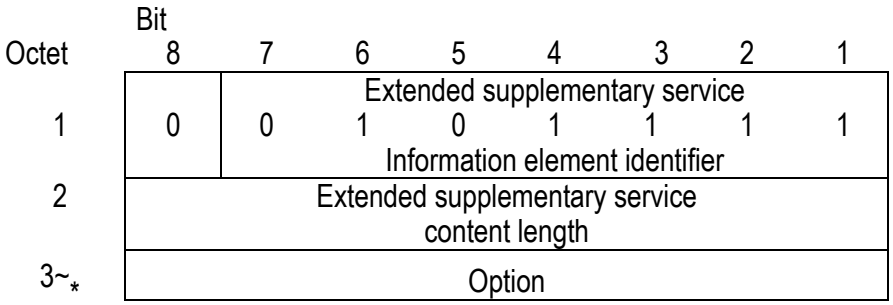


Figure 4.4.3.7.3.5.f.6 Extended supplementary service (multiple octets)

4.4.3.7.4 Supplementary services (Domestic standard)

4.4.3.7.4.1 Supplementary service types (Domestic standard)

The following supplementary services are added in the section 4.4.3.7.4.1 of the main text. As well, the sequence of recalling-type handover of these added supplementary services is not specified.

· Subscriber line test signal transmission (section 4.4.3.7.4.1.a)
· Meter pulsing signal transmission (section 4.4.3.7.4.1.b)
· Coin collection signal transmission (section 4.4.3.7.4.1.c)
· Ground start signal transmission (section 4.4.3.7.4.1.d)

The supplementary services provided by the functional operation (facility message) or the stimulus procedure (information message) in the personal handy phone system are shown in Table 4.4.3.7.18.

Table 4.4.3.7.18 Supplementary service types

Supplementary service	Reference
DTMF transmission	4.4.3.7.4.1.1 (Main text)
Hooking signal Transmission (note)	4.4.3.7.4.1.2 (Main text)
PHS User-to-User Signaling (PHS-UUS) supplementary service	4.4.3.7.4.1.5 (Main text)
Subscriber line test signal transmission	4.4.3.7.4.1.a
Meter pulsing signal transmission	4.4.3.7.4.1.b
Coin collection signal transmission	4.4.3.7.4.1.c
Ground start signal transmission	4.4.3.7.4.1.d

(Note) This supplementary service, which is defined only for the private system in the main text, is standard in the FWA system.

4.4.3.7.4.1.a Subscriber line test signal transmission (Domestic standard)

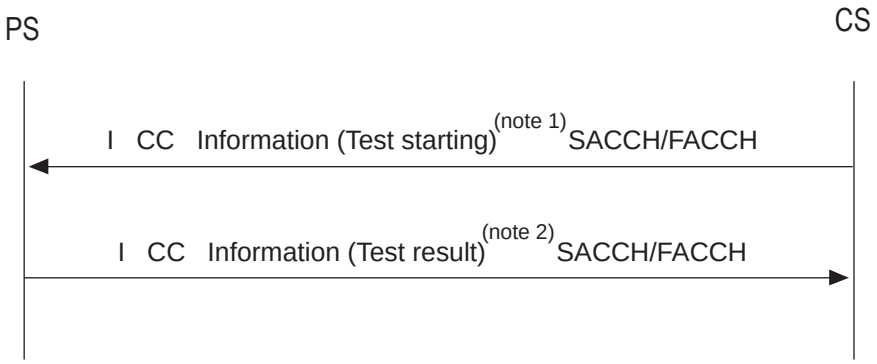
(1) Definition

Subscriber line test signal transmission is a function by which test signal is transmitted to start subscriber line test from CS to PS, and to report result of the test from PS (Additional equipment for subscriber and so on) to CS .

Subscriber line test starting signal is transmitted to the PS side as a call control (CC) message, and PS tests subscriber line on the PS side, then PS reports the test result to CS.

(2) Sequence

Subscriber line test signal transmission sequence is shown in Figure 4.4.3.7.4.1.a.



(Note 1) Test starting information element is mandatory.
(Note 2) Test result information element is mandatory.

Figure 4.4.3.7.4.1.a Subscriber line test signal transmission sequence

4.4.3.7.4.1.b Meter pulsing signal transmission (Domestic standard)

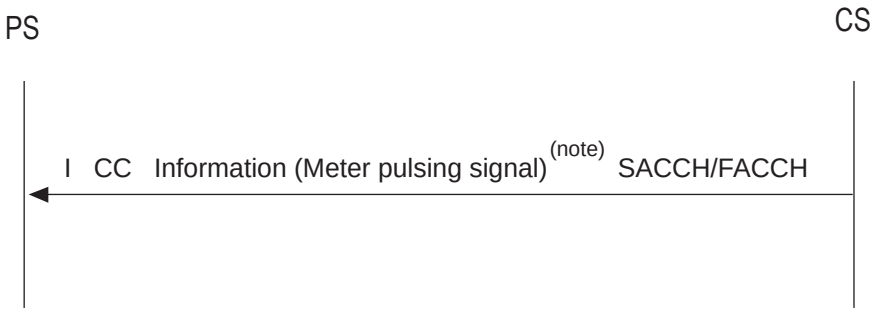
(1) Definition

Meter pulsing signal transmission is a function by which meter pulsing signal is transmitted to indicate that coin collection and so on are started from CS to PS (Additional equipment for subscriber and so on).

Meter pulsing signal is transmitted to the PS side as a call control (CC) message, and coin is collected and so forth on the PS side.

(2) Sequence

Meter pulsing signal transmission sequence is shown in Figure 4.4.3.7.4.1.b.



(Note) Meter pulsing signal information element is mandatory.

Figure 4.4.3.7.4.1.b Meter pulsing signal transmission sequence

4.4.3.7.4.1.c Coin collection signal transmission (Domestic standard)

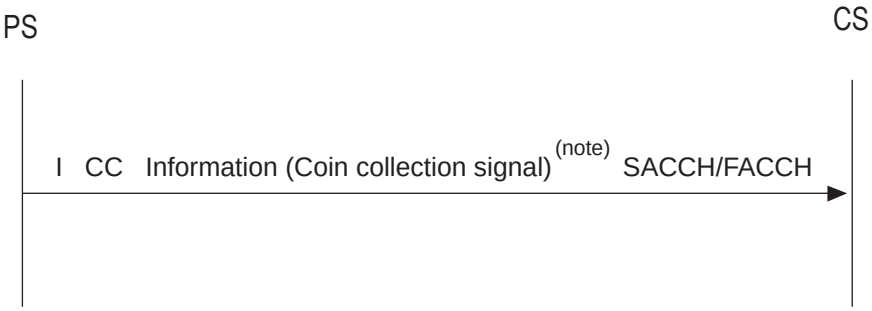
(1) Definition

Coin collection signal transmission is a function by which coin collection signal is transmitted to notify the result of coin collection and so on from PS (Additional equipment for subscriber and so on) to CS.

Coin collection signal is transmitted to the CS side as a call control (CC) message to inform the result of coin collection and so on the PS side.

(2) Sequence

Coin collection signal transmission sequence is shown in Figure 4.4.3.7.4.1.c



(Note) Coin collection signal information element is mandatory.

Figure 4.4.3.7.4.1.c Coin collection signal transmission sequence

4.4.3.7.4.1.d Ground start signal transmission (Domestic standard)

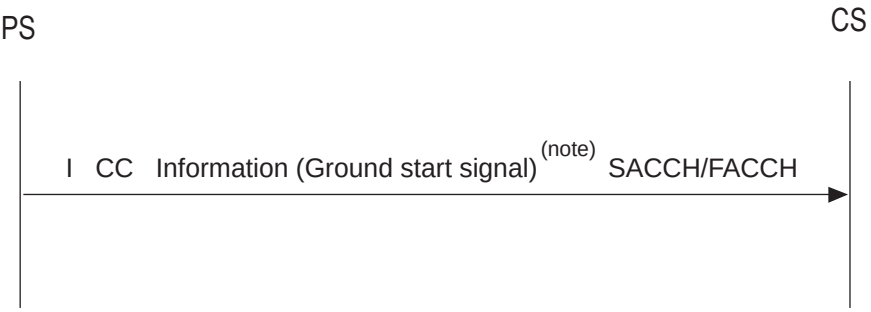
(1) Definition

Ground start signal transmission is a function by which ground start signal is transmitted to indicate starting free-of-charge communication from PS (Additional equipment for subscriber and so on) to CS.

Ground start signal is transmitted to the CS side as a call control (CC) message, and free-of-charge process is performed on the CS side.

(2)Sequence

Ground start signal transmission sequence is shown in Figure 4.4.3.7.4.1.d



(Note) Ground start signal information element is mandatory.

Figure 4.4.3.7.4.1.d Ground start signal transmission sequence

4.4.3.8 Control sequence (Domestic standard)

4.4.3.8.1 Outgoing call (Domestic standard)

4.4.3.8.1.2 Overlap sending (Domestic standard)

This section , which is defined only for the private system in the main text, is standard in the FWA system.

4.4.3.8.a Type 2 radio channel establishment sequence (Domestic standard)

The combination of proper sequences described in section 4.4.3.8.1 ~ 4.4.3.8.8 of the main text are applied to Type 2 radio channel establishment sequences.
However, it can be omitted Layer 2 or Layer 3 signal of the service channel establishment phase.

Chapter 5 Voice Coding Method

Except for the changed items mentioned this chapter conforms to the public standard in the chapter 5 of the main text. The items having the changed contents are shown in the reference table given in the following page which is made from the contents table of the chapter 5 of the main text. This chapter only describes the changed items and contents.

[Reference table to the main text]
(Note) The items denoted by * have the changed contents.

Chapter 5 Voice Coding Method

5.2 Voice coding method (Domestic standard)

The voice coding method for Type 1 in the FWA system should be compliant with 32 kbit/s ADPCM as per ITU-T Recommendation G.726 or 64 kbit/s PCM (μ-law or A-law) as per ITU-T Recommendation G.711. The voice coding rate for Type 2 in the FWA system should be 32 kbit/s or 64 kbit/s.

Appended Documents to Appendix AB

Except for changed items mentioned, these appended documents conform to the public standard of the appendices in the main text. And the item which has changed contents is shown on the next page in reference table to the appendices in the main text and the title of changed appendix is shown and the changed contents are described here.

[Reference table to the main text]

(Note) The items denoted by * have the changed contents.

Appendices in the main text

Appendix T CC SDL diagrams (PS side)

(Domestic standard)

Except for following items changed, this appendix conforms to the public standard in the appendix T of the main text.

The CC SDL diagrams specified for the private standard, i.e. (5/17), (6/17), (16/17) and (17/17), should be also used for the FWA system.

Appendix V CC SDL diagrams (CS side)

(Domestic standard)

Except for following items changed, this appendix conforms to the public standard in the appendix V of the main text.

The CC SDL diagrams specified for the private standard, i.e. (4/19), (5/19) and (18/19), should be also used for the FWA system.

Appendix X CC circuit-switched call control procedures

(Domestic standard)

Except for following items changed, this appendix conforms to the public standard in the appendix X of the main text.

The procedures specified for the private standard, section 1: Circuit-switched call control procedures, section 2.1: Call request and section 2.2: Overlap sending, should be also used for the FWA system.

Appendix Z Operation of PS that has automatic location registration function

(Domestic standard)

Except for following items changed, this appendix conforms to the public standard in the appendix Z of the main text.

1. Standby mobile operation

(1) Control channel selection

When the power is turned on, after synchronization has been established on any control channel, if standby shift conditions (standby zone selection level and global definition information) are satisfied, channel selection by the relevant control channel is allowed, and it enters standby. In that case, it is desirable for the PS to store paging area number of concerned paging area lastingly.

However, if standby shift conditions are not satisfied, channel selection is assumed as not allowed, and control channel selection is performed again.

Attached Documents

Attached document 1	FWA system overview
Attached document 2	Mobility restriction method
Attached document 3	Avoidance countermeasure of LCCH asynchronous interference
Attached document 4	Supplementary services overview

Attached document 1 FWA system overview

1. Definition of FWA system

(1) The concepts of FWA (Fixed Wireless Access) system are to provide the subscribers with the subscriber telephone services by changing the whole or a part of the subscriber line into the radio link in order to reduce the costs of the installation and of the maintenance of the subscriber line and to make the subscriber telephone services start rapidly.

(2) Basically FWA system provides with the subscriber telephone services and does not guarantee the functions of the roaming and the wide-area handover provided with by the cellular systems, PHS and so on.

(3) The subscriber radio systems, the cellular systems, PHS and so on are applicable to FWA system as the techniques of the radio systems. FWA system specified in this standard, however, is the one using PHS based on RCR STD-28. The specifications and descriptions of FWA system written in this standard are described about FWA system using PHS.

2. Structure of FWA system

The structure of the standard FWA system is shown in Figure 1.

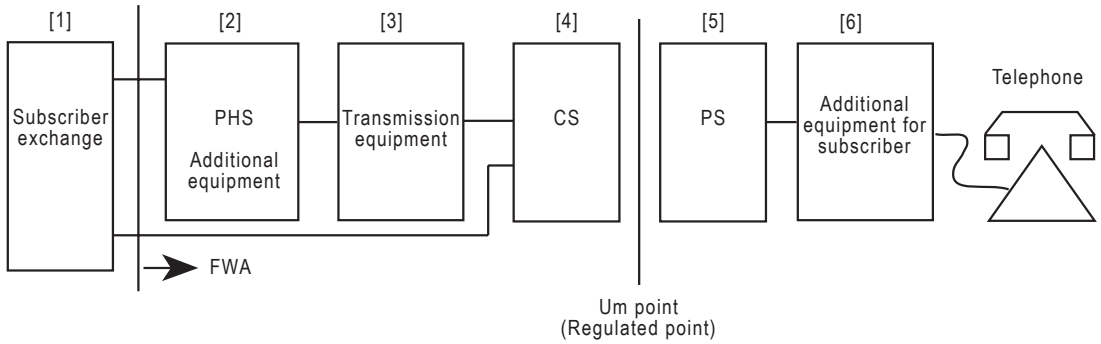


Figure 1 The structure of the standard FWA system

[1] Subscriber exchange : The exchange which the subscriber telephones are connected to. Strictly speaking the exchange is already installed and therefore is not a constituent element of FWA system.

[2] PHS additional equipment : The equipment containing the function of the exchange (the function of processing the calls) or the function of collecting the lines. In case of need, it processes the authentication. In some case, however, it may be a constituent element, but in the other case it may be not a constituent element.

[3] Transmission equipment : The facilities of the transmission lines connected between PHS additional equipment and CS. Any of optical fiber, microwave and metallic wire is available and extends the service area of FWA system. In some case it may be a constituent element but in the other case it may be not a constituent element.

[4] CS : The cell station of the FWA system. Different from the CS for public system, there are some cases where CS has the function of the authentication according to the structure of [2] PHS additional equipment.

[5] PS : The personal station of the FWA system. Different from the PS for public system, in some cases, PS and [6] the additional equipment for subscriber are constructed in one body.

[6] The additional equipment for subscriber : The additional equipment connecting the telephone and PS by 2W interface and so on. In order that it looks as if the additional equipment were the subscriber line to the telephone, it has the functions of the 4W/2W conversion, DP/PB transmission/reception, the generation of the howler/ringer and so on. When [5] PS is used as a telephone, the additional equipment for subscriber is not necessary to be used.

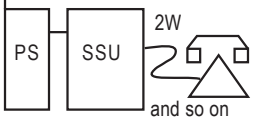
(Note) The structure above described is shown as an example of the constituent element in order to make clear the functions of FWA system but does not show the equipment structure of the actual system.

3. Examples of PS side

[1]

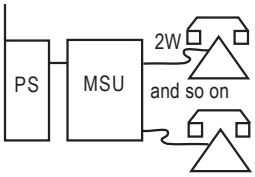
The case where PS is used as a telephone (except for a public telephone).

[2]



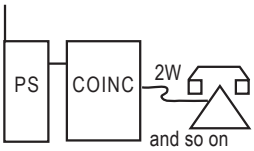
The case where a telephone (except for a public telephon is connected to a PS by 2W and so on.

[3]



The case where telephones (except for public telephones are connected to a PS by 2W and so on.

[4]



The case where the public telephone is connected to a PS by 2W and so on.

(Note)

SSU (Single Subscriber Unit)	:	This is one of the additional equipment for subscriber, and has the function connecting a telephone (except for a public telephone) to a PS by 2W and so on.
MSU (Multiple Subscriber Unit)	:	This is one of the additional equipment for subscriber, and has the function connecting telephones to a PS by 2W and so on.
COINC (COIN Controller)	:	This is one of the additional equipment for subscriber and has the function connecting a public telephone to a PS by 2W and so on. The concrete function is the almost same as the function of SSU. However, it has the additional function of the coin collection and so on.

Attached document 2 Mobility restriction method

1. Introduction

It is supposed that the mobility is restricted in an application of the FWA system compared with the one of public standard system. By restricting mobility under which PS can be connected only specific (single or multiple) CS, it becomes possible to remove a part of call control function such as pursuit routing, paging and handover or a part of mobility management function such as location information management, and there is a possibility that operating costs are reduced compared with common public services.

Two examples of mobility restriction method are as follows.

2. Example 1 of mobility restriction method

On the assumption that the system allows mobility of PS, as an example of mobility restriction method, method that uses paging area number and location registration operation is as follows.

PS stores paging area number in location registration. When there are plural CS's that allow relevant PS to connect in the system, common paging area number for these CS's is set up. Also, when there is a CS that allows relevant PS to connect, different paging area number for each CS's is set up. When each CS assures authentication operation in location registration, the PS that the CS wants to connect can store paging area number. The PS always acts as to capture downlink LCCH of CS whose paging area number is stored in the PS, and when the PS cannot capture the downlink LCCH of CS, the PS starts to capture downlink LCCH of other CS and to execute location registration process at the time. In order to restrict unnecessary location registration operation in the CS, except that the CS renews admitting PS, location registration restriction may be broadcasted usually. In case that paging area number stored in PS is lost, be careful because relevant PS can not originate and receive a call, until location registration restriction is canceled and location registration operation is achieved again.

Further, PS can try location registration only when the CS has the same operator identification code, country code and system type.

Operation regulations of CS and PS are as follows.

[1] Store of paging area number (PS)

When location registration is achieved in, the PS stores a paging area number. It is desirable for PS to store the paging area number lastingly. If PS can capture plural downlink LCCH, PS has to capture selectively a downlink LCCH from a CS whose paging area number is the same as that PS stores. That is to say, during a retry to registrate location, PS has to keep watching downlink LCCH from other CS at regular interval and capture a downlink LCCH from a CS that has the same paging area number that PS stores.

[2] Unnecessary location registration restriction (CS)

The CS generally restricts location registration by using system information broadcasting message to avoid unnecessary location registration traffic.

[3] Renewal of stored paging area number (CS/PS)

When the CS (or system) has to change admitting PS, the CS cancels location registration restriction

(temporary) and accepts location registration.

If the PS cannot find a CS whose paging area number is not the same as that the PS stores around the PS, the PS tries to do location registration to CS whose location registration restriction is canceled, and if location registration is achieved, the PS renews stored paging area number.

3. Example 2 of mobility restriction method

When all PS's are always used as fixed station, location registration restriction is unnecessary and the PS does not have to keep stored paging area number lastingly, In case that the PS can capture plural downlink LCCH, the PS shall have function that capture downlink LCCH one by one until achieved.

Attached document 3 Avoidance countermeasure of LCCH asynchronous interference

LCCH is constructed from 2LCCH/1 frequency structure, and LCCH profile data is more flexible than public standard. The reason why as follows: ISDN is dominant in Japan but the FWA system is assumed to apply to analog network in the countries outside of Japan, so this system needs to avoid asynchronous interference.

And in the 2LCCH/1frequency construction, it is also considered to avoid LCCH collision of neighboring CS's in asynchronous operation mode, by adding random offset time to the timing between 2 LCCH's.

Attached document 4 Supplementary services overview

1. Purpose of supplementary services in the FWA system

The purpose is to realize the same services in the FWA system which are provided on a wired telephone connected to subscribers exchange. Furthermore, the services (howler transmission etc.) which can be provided by additional equipment for subscriber these are some of existing services on subscriber exchange, are out of scope of this standard, and services which are impossible to realize or not provided by using existing CC message in RCR STD-28, are specified as supplementary services in the FWA system. As well, because these newly specified supplementary services for the FWA system are assumed to apply only to fixed PS, the sequence of recalling-type handover is not specified.

2. Supplementary service overview

Supplementary service overview in FWA system is as follows.

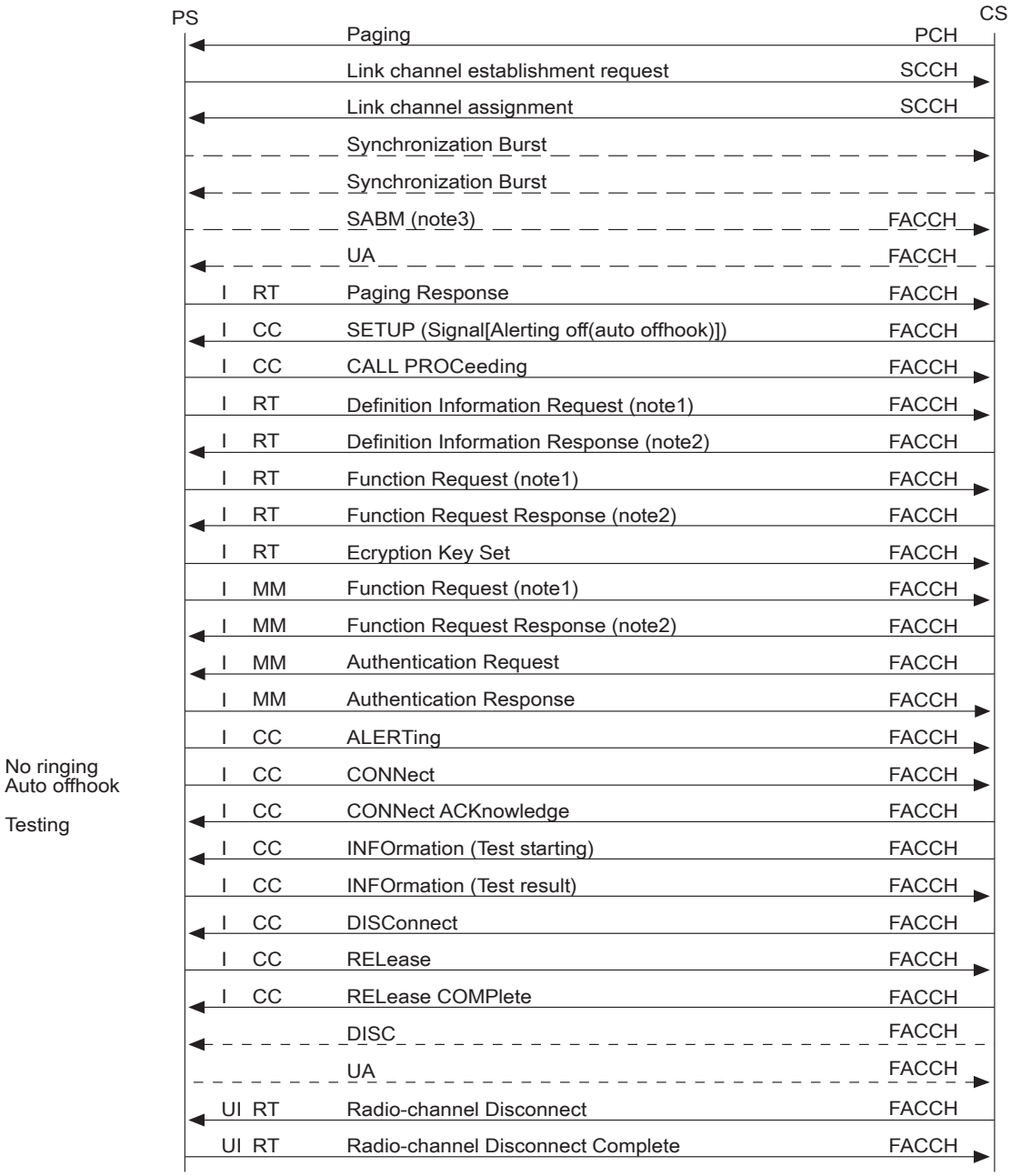
Items	Direction	Overview
DTMF transmission	uplink	Service which generates DTMF signal on CS side according to the message from PS.
Hooking signal transmission	uplink	Service which generates hooking signal (register recall signal) on CS side according to the message from PS.
PHS User-to-User Signaling (PHS-UUS) supplementary service	both directions	Service which allows PS to send/receive a limited amount of information to/from another PS over the communication channel in association with a call to the other PS.
Subscriber line test signal transmission	both directions	As items of subscriber line test (hereinafter referred to as test), medium tests are thought as follows. 1) Loop resistance test 2) Insulation resistance test 3) Capacitance test 4) Incoming voltage test 4 items above are specified as "test items" (4.4.3.7.3.5.a, 4.4.3.7.3.5.b). Operator can add test items using option area (Maximum 4 items). The test result reportings are categorized into two cases; case of the measured value of above test (case A), and case of the result that is judged from measured value as good or no good on the PS side (case B). In case of A, measured value is coded in "test result" area in test result element (free form). In case of B, in the same area, for example, when measured value is good, "0" is coded and when no good, "1" is coded. It is not specified which case is chosen.
Meter pulsing signal transmission	downlink	It is used for coin collection etc. to the telephone that has coin collecting function. "Sequence number" is specified to recognize lack of meter pulsing signal from the CS side in the PS side. In "collection type", indication information that operators need as collecting coin type etc. that using 12kHz or 16kHz etc. out-band signal from the CS side, can be coded (free form). In "meter pulsing signal item", information that operators need as meter pulsing from the CS side is specified. If operators need other information, operators uniquely can add in option areas (Maximum 1 item). There are cases where coin collection signal or ground start signal is transmitted from the PS side for meter pulsing signal.

Items	Direction	Overview
Coin collection signal transmission	uplink	It is used to inform result of coin collection etc. from the PS side for meter pulsing signal. "Sequence number" is specified to recognize lack of coin collection signal from the PS side in the CS side. In "collection type", result information that operators need as collected coin type etc. that using 16kHz etc. out-band signal from the PS side, can be coded (free form). In "coin collection signal item", information as collected coin etc. is present or absent operators need is specified. If operators need other information, operators uniquely can add in option areas (Maximum 2 items).
Ground start signal transmission	uplink	It is used to transmit ground state etc. on one side of 2W attached to the telephone that has coin collection function as free-of-charge communication starting indication. Ground start signal element doesn't have particular information and only free-of-charge communication indication is transmitted.

3. Example of sequence

(1) Subscriber line test

An example of subscriber line testing sequence is shown in Figure 1.

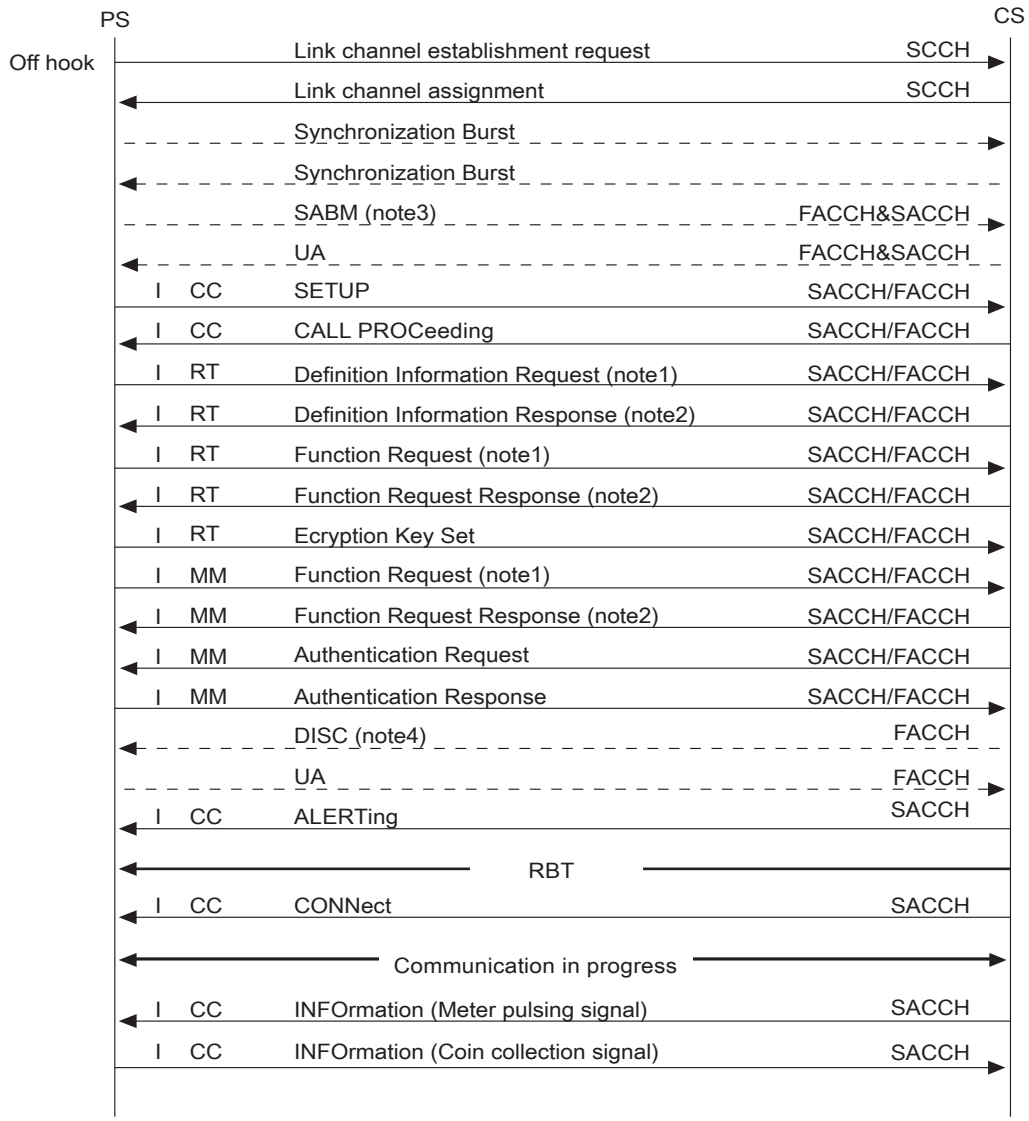


(Note 1) This control signal can be omitted as necessary.
(Note 2) This control signal is for the previous control signal with the (note 1) attached. It is transmitted only when the relevant control signal is received.
(Note 3) The layer 3 sequence of the service channel establishment phase is activated after the FACCH layer 2 multiframe acknowledged operation mode is established.

Figure 1 Example of subscriber line testing sequence

(2) Case of coin collection during communication

An example of coin collection etc. sequence is shown in Figure 2.

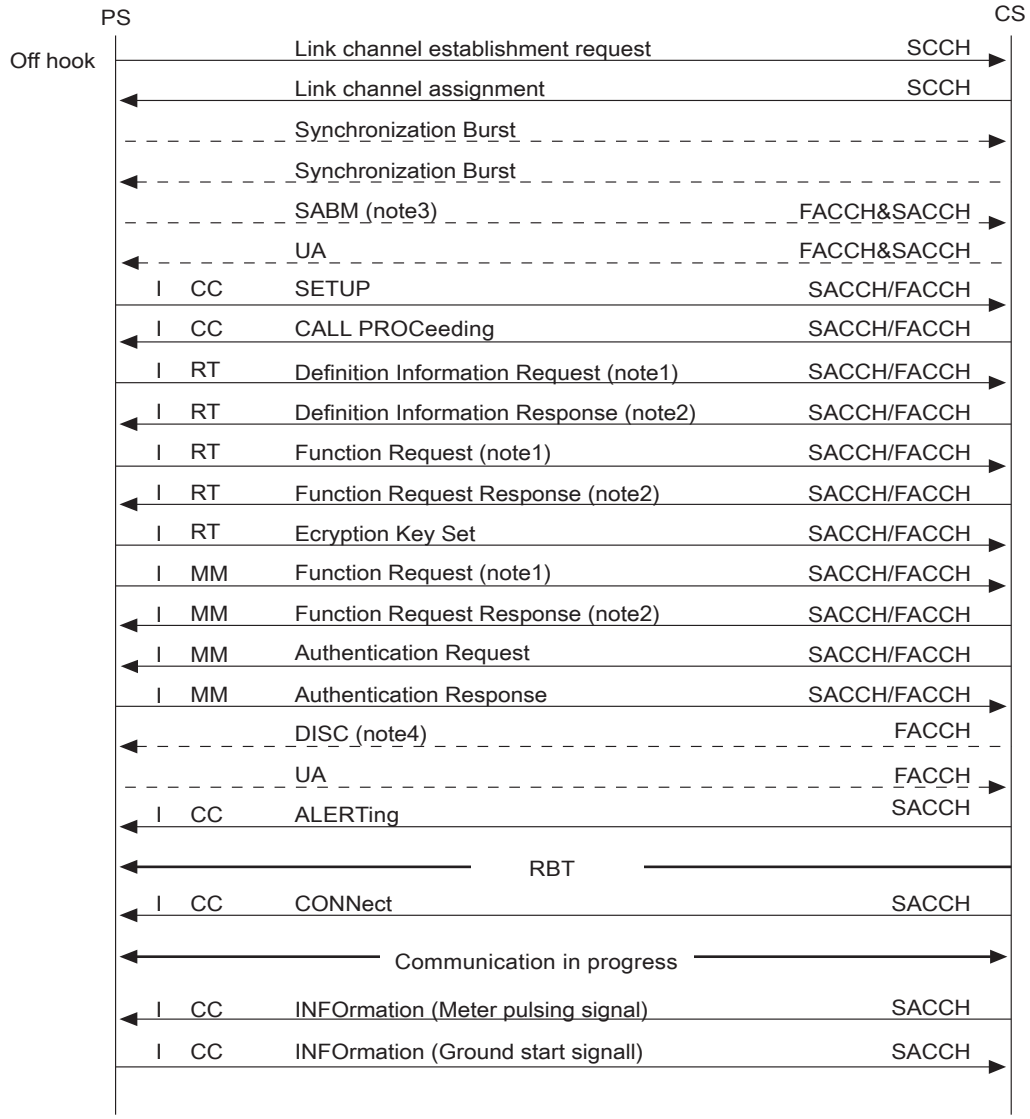


(Note 1) This control signal can be omitted as necessary.
(Note 2) This control signal is for the previous control signal with the (note 1) attached. It is transmitted only when the relevant control signal is received.
(Note 3) The layer 3 sequence of the service channel establishment phase is activated after the FACCH or SACCH layer 2 multiframe acknowledged operation mode is established.
(Note 4) Before layer 2 DISC transmission on FACCH, the layer 2 multiframe acknowledged operation mode should be established on SACCH.

Figure 2 Example of coin collection sequence

(3) Case of coin collection suspending for communication (free-of-charge)

An example of coin collection etc. suspending sequence is shown in Figure 3.



(Note 1) This control signal can be omitted as necessary.
(Note 2) This control signal is for the previous control signal with the (note 1) attached. It is transmitted only when the relevant control signal is received.
(Note 3) The layer 3 sequence of the service channel establishment phase is activated after the FACCH or SACCH layer 2 multiframe acknowledged operation mode is established.
(Note 4) Before layer 2 DISC transmission on FACCH, the layer 2 multiframe acknowledged operation mode should be established on SACCH.

Figure 3 Example of coin collection suspending sequence

Appendix AC Control/communication carriers of private system used in the countries outside of Japan (Standard)

This appendix specifies the usage of control/communication carrier of private system used in the countries except Japan.

1. Carrier structure

The structure of the radio carrier used in the countries outside of Japan is fundamentally based on the legal ordinance of the relevant country. It is however desirable to change the assignment of control/communication carrier for private system from that of Japan in order to minimize the interference with other radio system.

As an example for the countries outside of Japan, control carriers in private system are recommended to be thirtieth carrier (1903.85MHz) and thirty-sixth carrier (1905.65MHz), and twelfth carrier (1898.45MHz) and eighteenth carrier (1900.25MHz) used as control carriers in private system in Japan are recommended to use as common usage for communication carrier in private and public systems.

In Private system for the countries outside of Japan, three parts of "Table 2.4 Carrier structure" in the section 2.4.4 "Carrier structure" in the main text, "Table 3.5 Relationship between frequency bands and carrier numbers" in the section 3.4.1 "Frequency bands and carrier" in the main text, and "Figure 4.2.3 Mapping of physical slots on frequency axis" in the section 4.2.5.1 "Mapping of physical slots on frequency axis" in the main text, are replaced with the following figure and tables.

Note that this appendix is not applied to the systems in Japan.

Table 2.4 Carrier structure

Control carriers	(a) Private	2 frequencies 1,903.85MHz 1,905.65MHz	
	(b) Public	More than 1 frequencies	Is made use of communications carriers for public system.
Communications carriers	(a) Common usage for Private, Direct communication between PSs, and Public	10 frequencies	Decreases the number of control carriers for public. (note) In direct communication between personal stations in a specific group, is made use of 3 carriers from 10 carriers for direct communication between personal stations.
	(b) Common usage for Private and Public	30 frequencies	Decreases the number of control carriers for public system. (note)
	(c) Public	45 frequencies	Decreases the number of control carriers for public system. (note)

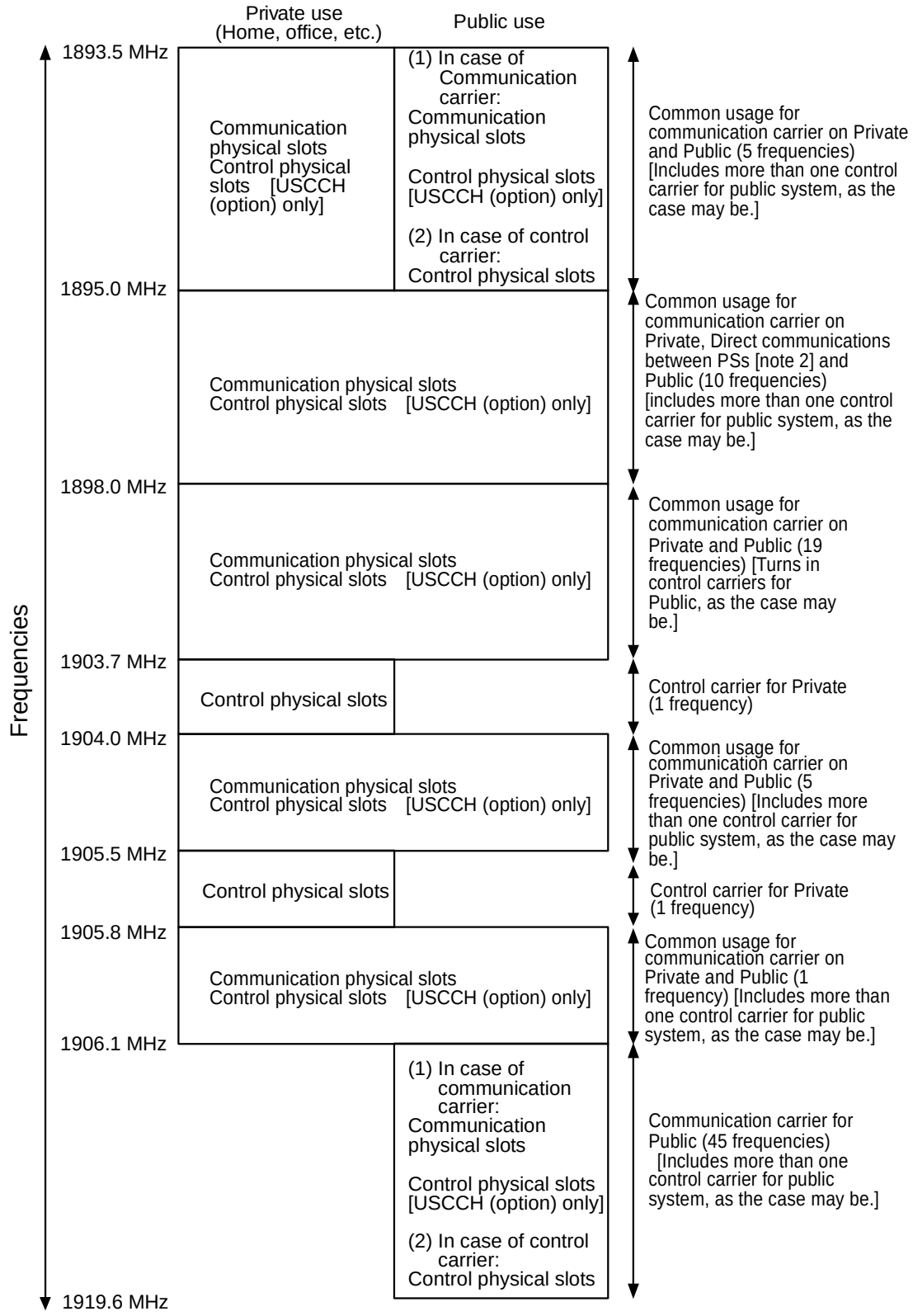
(Note) From among the communications carriers for public system, the control carriers for public system is designated, so the number of communication carriers for public system will decrease by exactly the number of designated carriers (refer to Figure 4.2.3).

Table 3.5 Relationship between frequency bands and carrier number

Carrier number	Frequency bands (MHz)	Usefulness	Carrier number	Frequency bands (MHz)	Usefulness
251	1,893.650	Common usage for communication carrier on Private, and Public (note 1)	38	1,906.250	Communication carrier for Public (note 1)
252	950		39	550	
253	1,894.250		40	850	
254	550		41	1,907.150	
255	850		42	450	
1	1,895.150	Common usage for communication carrier on Private, Direct communications between PSs (note 2) and Public (note 1)	43	750	
2	450		44	1,908.050	
3	750		45	350	
4	1,896.050		46	650	
5	350		47	950	
6	650		48	1,909.250	
7	950		49	550	
8	1,897.250		50	850	
9	550		51	1,910.150	
10	850		52	450	
11	1,898.150	Common usage for communication carrier on Private and Public (note 1)	53	750	
12	450		54	1,911.050	
13	750		55	350	
14	1,899.050		56	650	
15	350		57	950	
16	650		58	1,912.250	
17	950		59	550	
18	1,900.250		60	850	
19	550		61	1,913.150	
20	850		62	450	
21	1,901.150		63	750	
22	450		64	1,914.050	
23	750		65	350	
24	1,902.050		66	650	
25	350		67	950	
26	650		68	1,915.250	
27	950		69	550	
28	1,903.250		70	850	
29	550		71	1,916.150	
30	850	Control carrier on Private	72	450	
31	1,904.150	Common usage for communication carrier on Private, and Public (note 1)	73	750	
32	450		74	1,917.050	
33	750		75	350	
34	1,905.050		76	650	
35	350		77	950	
36	650	Control carrier on Private	78	1,918.250	
37	950	Common usage for communication carrier on Private and Public (note 1)	79	550	
			80	850	
			81	1,919.150	
			82	450	

(Note 1) Includes more than one control carrier for public system, as the case may be.

(Note 2) Includes 3 carriers (4, 7, 9) for direct communication between personal stations in a specific group.



[Note 1] It is desirable not to use carriers adjacent to control carriers for private system and public system.

[Note 2] Includes 3 carriers (4, 7, 9) for direct communication between personal stations in a specific group.

Figure 4.2.3 Mapping of physical slots on frequency axis

Appendix AD Compatibility checking (Private standard/Public standard)

In this appendix, the word "check" means that the user examines the contents of the specified information element.

1. CS-to-PS compatibility checking

When CS is providing a bearer service at the called side, PS shall check that the bearer service offered by CS in the Bearer capability information element matches the bearer services that the PS is able to support. If a mismatch is detected, then the PS shall either ignore or reject the offered call using cause No. 88, "incompatible destination".

2. User-to-user compatibility checking

The called side terminal equipment shall check that the contents of the Low layer compatibility information element is compatible with the functions it supports.

The Low layer compatibility information element shall be used to check compatibility of low layers.

If the Low layer compatibility information element is not included in an incoming SETUP message, the Bearer capability information element shall be used to check the compatibility of low layers.

(Note) The Bearer capability information element is also checked. Therefore, if any conflict from duplication of information in Bearer capability and the Low layer compatibility information elements is detected, this conflict shall be resolved according to Appendix AE.

The called terminal equipment may check the High layer compatibility information element (if present) as part of user-to-user compatibility checking procedures, even if the network only supports bearer services.

If a mismatch is detected in checking any of the information element above, then the terminal equipment shall either ignore or reject the offered call using cause No. 88, "incompatible destination".

The case that the compatibility assured with the available description of the call is when all terminal equipment implement (i.e. understand the contents of) the High layer compatibility and Low layer compatibility information elements. Thus, based on the High layer compatibility and Low layer compatibility information encoding, they are capable of accepting a call for which they have the requested functionality.

(Note) In the case of Private system which is based on RCR STD-28 (Ver.3 or newer one), some terminal equipment, upon bilateral agreement with other users or in accordance with other standards (e.g. Recommendation X.213) may employ the User-user information element for additional compatibility check. Such terminal equipment shall check the User-user information element in a manner identical to that described here for the High layer compatibility information element "compatibility assured" case after the User-user information defined.

However, the User – user information has not standardized in the public system nor the private system which is based on RCR STD-28 (Ver.2 or Ver.1).

Appendix AE Low layer information coding principles (Private standard/Public standard)

This appendix uses the words "network" and "user" described in appendix X.
This appendix describes principles that shall be used when the calling users specifies information during call set-up regarding low layer capabilities required in the network and by the destination terminal.

1. Principles

1.1 Definitions of types of information

There are three different types of information that the calling user may specify call set-up to identify low layer capabilities needed in the network and destination terminal:

(a) Type 1 information is information about the calling terminal which is only used at the destination end to allow a decision regarding terminal capability. An example would be modem type. This information is encoded in octets 5 to 7 of the Low layer compatibility information element or encoded in octets 6 to 7 of the Low layer compatibility information element if the rate adaption is executed by interworking unit between the networks whose information transfer rate is different from other's ;

(b) Type 2 information is the selection of bearer service from the choices of bearer services offered by the network to which the calling user is connected. This type of information is present even if interworking occurs. An example is unrestricted digital information (UDI). This information is coded in octet 3 and 4 of the Bearer capability information element when the transfer mode required by the calling user is circuit mode;

(c) Type 3 information is information about the terminal or intended call which is used to decide destination terminal compatibility and possibly to facilitate interworking with other networks such as ISDNs or dedicated networks. An example is ADPCM encoding. This information is encoded in octet 5 of the Bearer capability information element or encoded in octet 5 of the Low layer compatibility information element if the rate adaption is executed by interworking unit between the networks whose information transfer rate is different from other's ;

2. Examination by network

Type 1 information is user-to-user (i.e. not examined by network) while both type 2 and type 3 information shall be available for examination by the destination user and network. The Law layer compatibility information element is an information element which is not examined by the network unless the rate adaption is not executed by interworking unit between the networks whose information transfer rate is different from other's while the Bearer capability information element is an information element which is examined by the user and the network.

3. Location of type 1 information

Type 1 information (i.e. terminal information only significant to the called user) shall , when used, be included in the Low layer compatibility information element.

4. Location of type 2 and type 3 information

Type 2 (i.e. bearer selection) shall be included in the Bearer capability information element. Type 3 information, when used, is included in the Bearer capability information element or in the Low layer compatibility information element if the rate adaption is executed by interworking unit between the

networks whose information transfer rate is different from other's. The network may use and modify the information (e.g. to provide interworking).

Normally with UDI, the rate adaption technique chosen is related to the terminal. However, a particular rate adaption technique may be chosen by the interworking unit between PHS and ISDN. In that case, the user information layer 1 protocol and the user rate in the Bearer capability information element or those in the Low layer compatibility information element is used for rate adaption.

Hence, there is some terminal related information which may be considered interworking related. The consequence for the calling user of not including such terminal related information neither in the Bearer capability information nor the Low layer compatibility is that the call may not be completed if an interworking situation encountered.

5. Relationship between Bearer capability and Low layer compatibility information elements

There shall be no contradiction of information between the Low layer compatibility and the Bearer capability at the originating side. However, the word "contradiction" means that contradiction of bearer services such as the user rate specified in the Low layer compatibility information element required for a service is beyond the end-to-end information transfer rate which is negotiated by interworking unit for rate adaption. However, as some Bearer capability and some Low layer compatibility code points may be modified during the transport of the call, this principle implies that there shall be minimal duplication of information between Bearer capability information element and Low layer compatibility information element.

(Note) If as result of duplication, a contradiction occurs between the Bearer capability information element and the Low layer compatibility information element at the terminating side, the receiving entity shall ignore the conflicting information in the Low layer compatibility information element.

Appendix AF Low layer compatibility negotiation (Private standard/Public standard)

This appendix uses the words "network" and "user" described in appendix X.

This appendix describes an additional low layer compatibility checking procedure that may be applied by the user.

However, support of this procedure is optional.

1 General

The purpose of the Low layer compatibility information element is to provide a means which shall be used for compatibility checking by an addressed entity (e.g. a remote user or an interworking unit or high layer function network node addressed by the calling user). The Low layer compatibility information element is transferred transparently between the call originating entity (e.g. the calling user) and the addressed entity unless the rate adaption is not executed by interworking unit between the networks whose information transfer rate is different from other's.

The user information protocol fields of the Low layer compatibility information element indicate the low layer attributes at the call originating entity and the addressed entity. The call originating entity and the addressed entity may modify the low layer attributes by the negotiation described below if that can supported by the bearer capability actually provided by the network.

2 Low layer compatibility notification to the called user

When the calling user wishes to notify the called user of its information transfer attributes (type 2 information - octets 3 and 4) or any low layer protocol (type 1 information) to be used during the call and not already identified in the Bearer capability information element, then the calling user shall include a Low layer compatibility information element in the SETUP message; this element is conveyed by the network and delivered to the called user. However, if the network unable to convey this information element, it shall act as the case of receiving "unrecognized information element".

3 Low layer compatibility negotiation between users

If the negotiation indicator of the Low layer compatibility information element included in the SETUP message is set to "Out-band negotiation is possible (octet 3a, bit 7)", then one or more of the low layer protocol attribute(s) may be negotiated. In this case, the called user responding positively to the call may include a Low layer compatibility information element in the CONNECT message. This element will be conveyed transparently by the network unless the rate adaption is not executed by interworking unit between the networks whose information transfer rate is different from other's. It will be delivered to the calling user in the CONNECT message.

(Note) Only the low layer protocol attributes may be negotiated and therefore the information transfer attributes (octet 3 to 4), if returned by the called user in the CONNECT message, will be identical to the ones received in the Low layer compatibility information element contained in the SETUP message.

If, for any reason, the network is unable to convey this information element, it shall act as the case of receiving "unrecognized information element". Users are advised not to include in the Low layer compatibility information element sent from the called user to the calling user, attributes which would have the same value as the ones contained in the Low layer compatibility information element received from the calling party.

4 Low layer compatibility negotiation options

The Low layer compatibility information element contains a negotiation indicator which may have one of the following values:

a) Out-band negotiation not possible (default): Then the called user shall not invoke negotiation.

b) Out-band negotiation possible: The called user may then invoke low layer compatibility negotiation, as needed, according to section 3.

c) In-band negotiation possible: The called user may then invoke low layer compatibility negotiation using the supported in-band negotiation, according to service or application requirements.

d) Either in-band or out-band negotiation allowed: The called user may invoke one or the other low layer compatibility negotiation procedures according to its requirements. If the out-band low layer compatibility negotiation supported by both parties, then this method of negotiation is preferred.

5 Alternate requested values

If the user wishes to indicate alternative values of low layer compatibility parameters (e.g. alternative protocol suites or protocol parameters), the Low layer compatibility information element is repeated in the SETUP message. Up to four Low layer compatibility information elements may be included in a SETUP message. The first Low layer compatibility information element in the message is preceded by the Repeat indicator information element specifying "priority list for selection". The order of appearance of the Low layer compatibility information elements indicates the order preference of end-to-end low layer parameters.

Alternatively, the network may discard the lower priority Low layer compatibility information element(s) depending on the signaling capability of the network.

If the network or called user does not support repeating of the Low layer compatibility information element, and therefore discards the Repeat indicator information element and the subsequent Low layer compatibility information elements, only the first Low layer compatibility information element is used in the negotiation.

The called user indicates a single choice from among the options offered in the SETUP message by including the Low layer compatibility information element in the CONNECT message. Absence of a Low layer compatibility information element in the CONNECT message indicates acceptance of the first Low layer compatibility information element in the SETUP message.

Appendix AG Interface between PS and external terminal (Private standard/Public standard)

This appendix specifies interface between PS and external terminal, in case of PS has interface with external terminals. "Input level", "Shape of connecter", and "Pin assignment" for "2 wire interface", "3 wire interface", and "specfic interface" are described as follows.

1. 2 Wire interface

1.1 Shape

Connector of communications (Notification/'85 year, number 399)

1.2 Input level at PS side

Table 1.1 shows input level at PS side for 2 wire interface.

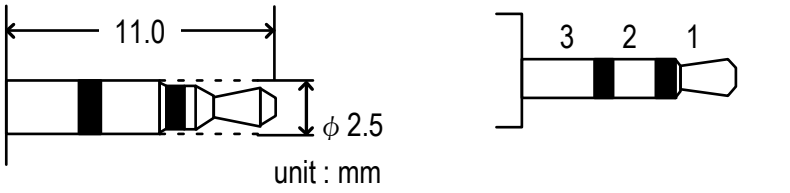
Table 1.1 Input level at PS side for 2 wire interface.

Maximum input level	0 dBs
Average input level	-8.0 dBs

2. 3 Wire interface

2.1 Shape

Connector for 3 wire interface consists of jack adjusted to 2.5Ø plug in JIS C 6560. Fig 2.1 shows shape of connector for 3 wire interface.



Shape Connection terminal number

Figure 2.1 Shape of connector for 3 wire interface

2.2 Connection terminal assignment

Table 2.1 shows connection terminal assignment of connector for 3 wire interface.

Table 2.1 Connection terminal assignment of connector for 3 wire interface

Number	Name	Direction	Contents
1	Signal transmission	External terminal → PS	Signal transmission for external terminals to PS
2	Signal reception	PS → External terminal	Signal reception for external terminals from PS
3	Ground	——	

2.3 Input level at PS side

Table 2.2 shows input level at PS side for 3 wire interface.

Table 2.2 Input level at PS side for 3 wire interface

Maximum input level	-35.5 dBs
Average input level	-43.5 dBs

3. Specific interface (Reference)

3.1 Specific interface (12 pins)

3.1.1 Shape

Fig 3.1 shows receptacle (PS side). Fig 3.2 shows plug (external terminal side).

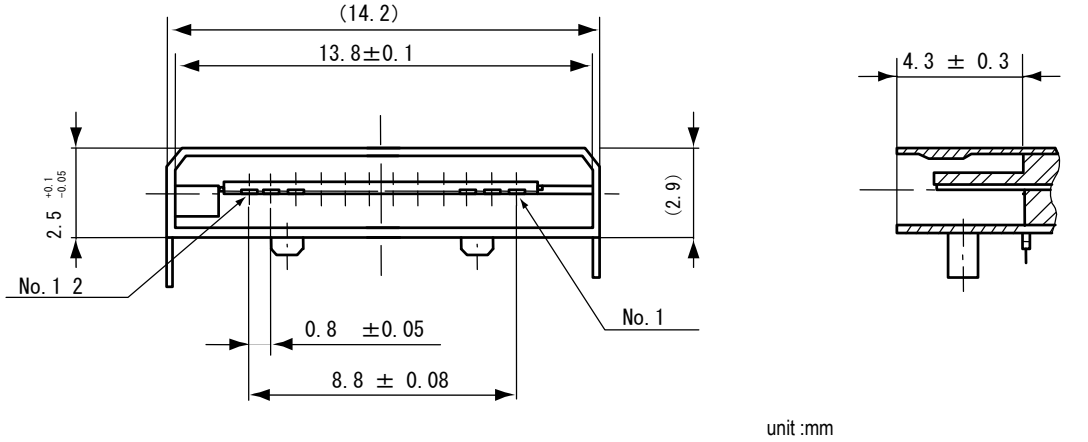


Figure 3.1 Shape of receptacle for specific interface (12 pins)

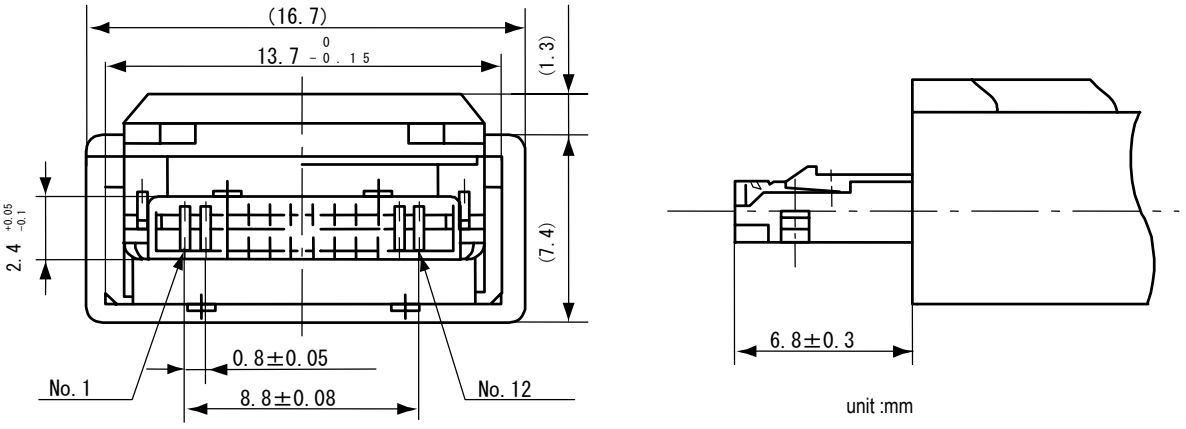


Figure 3.2 Shape of plug for specific interface(12 pins)

3.1.2 Pin assignment

Table 3.1 shows pin assignment of connector for specific interface (12 pins).

Table 3.1 Pin assignment of connector for specific interface (12 pins)

Number	Name	Direction	Contents
1	Reserved	——	(note)
2	Ground	——	
3	Signal reception	PS → External terminal	Signal reception for external terminals from PS
4	Reserved	——	(note)
5	Signal transmission	External → PS terminal	Signal transmission for external terminals to PS
6	Reserved	——	(note)
7	Reserved	——	(note)
8	Reserved	——	(note)
9	Reserved	——	(note)
10	Reserved	——	(note)
11	Reserved	——	(note)
12	Reserved	——	(note)

(note) Reserved for data communications.

3.1.3 Input level at PS side

Table 3.2 shows Input level at PS side for specific interface (12 pins).

Table 3.2 Input level at PS side for specific interface (12 pins)

Maximum input level	-10.5 dBs
Average input level	-18.5 dBs

3.2 Specific interface (16 pins)

3.2.1 Shape

Fig 3.3 shows receptacle (PS side). Fig 3.4 shows plug (external terminal side).

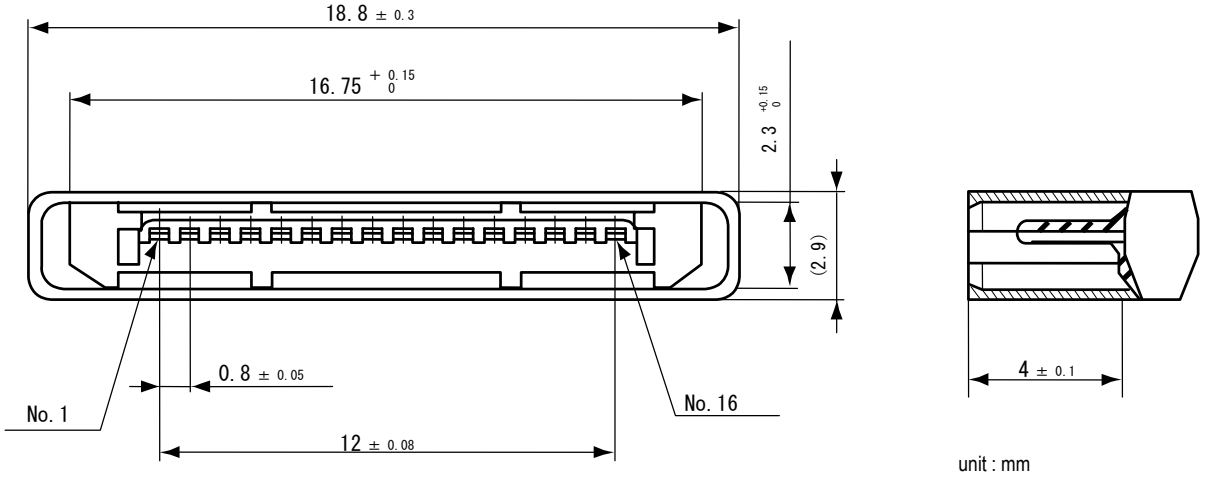


Figure 3.3 Shape of receptacle for specific interface (16 pins)

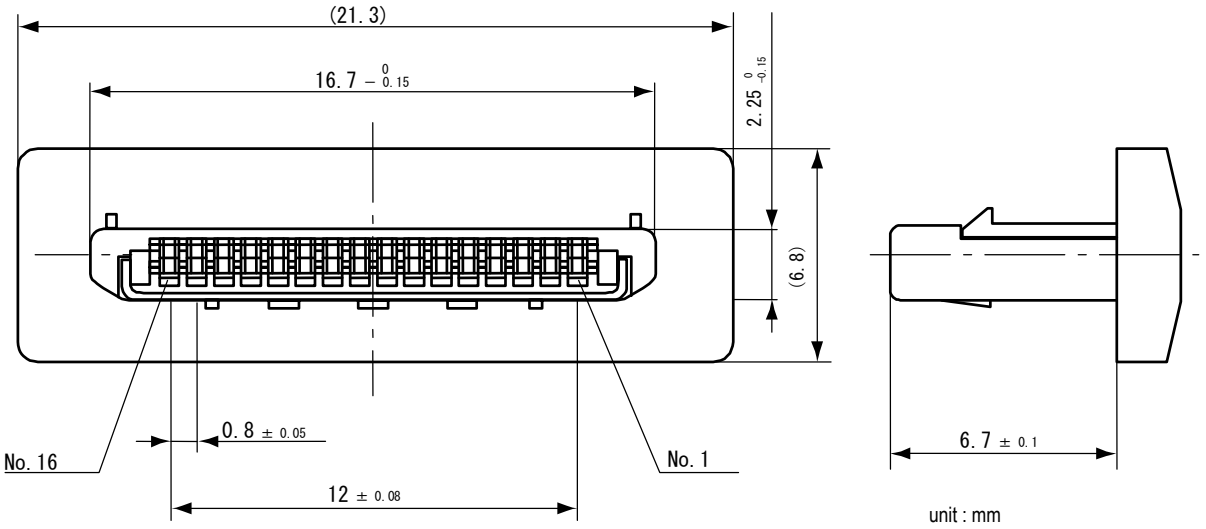


Figure 3.4 Shape of plug for specific interface (16 pins)

3.2.2 Pin assignment

Table 3.3 shows pin assignment of connector for specific interface (16 pins).

Table 3.3 Pin assignment of connector for specific interface (16 pins)

Number	Name	Direction	Contents
1	Signal transmission	External —> PS terminal	Signal transmission for external terminals to PS
2	Reserved	——	(note)
3	Reserved	——	(note)
4	Reserved	——	(note)
5	Reserved	——	(note)
6	Reserved	——	(note)
7	Reserved	——	(note)
8	Reserved	——	(note)
9	Ground	——	(note)
10	Signal reception	PS —>_External terminal	Signal reception for external terminals from PS
11	Reserved	——	(note)
12	Reserved	——	(note)
13	Reserved	——	(note)
14	Reserved	——	(note)
15	Reserved	——	(note)
16	Reserved	——	(note)

(note) Reserved for data communications.

3.2.3 Input level at PS side

Table 3.4 shows input level at PS side for specific interface (16 pins)

Table 3.4 Input level at PS side for specific interface(16 pins)

Maximum input level	-10.5 dBs
Average input level	-18.5 dBs

Appendix AH Rate adaption procedure on CS for interworking with ISDN-based network providing unrestricted digital information services

(Private standard/Public standard)

This appendix describes the rate adaption procedures on CS for the Personal Handy phone System (PHS) interworking with ISDN-based network through I (TCH) at Um point.

1. General

When the PHS, which is based on 32k bit/s information transfer rate, communicates with the network such as ISDN based on 64k bit/s information transfer rate, it is necessary to execute the rate adaption interworking at the interface point. This appendix describes the procedures and information elements which are used for the rate adaption interworking.

2. Handling of interworking on rate adaption in CS

2.1 Communication with data terminals not conforming to V.110

(a) Outgoing call

(i) 32k bit/s Unrestricted Digital Information (UDI)

When CS interworks with ISDN-based network, if the information transfer rate of the Bearer capability information element is set to “32k bit/s”, CS shall execute the rate adaption interworking for 32k bit/s UDI.
In above case, if the Low layer compatibility information element is omitted in a SETUP message or if the user information layer 1 protocol (octet 5) in the Low layer compatibility information element is set to other than standardized rate adaption V.110/X.30, CS shall indicate to ISDN-based network the user information layer 1 protocol (octet 5) in the Bearer capability information element in the SETUP message as "Standardized rate adaption V.110/X.30" and the user rate (octet 5a) in the Bearer capability information as "32k bit/s". In addition, CS shall change the information transfer rate (octet 4) in the Bearer capability information element and the information transfer rate (octet 4) in the Low layer compatibility information from 32k bit/s to 64k bit/s. The interworking procedure is as shown in figure 2.1.1.

(Note) The user information layer 1 protocol of "Standardized rate adaption V.110/X.30" is used even in the case that the terminal is not standardized V.110.

Um point (RCR STD-28)			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	32k bit/s	
	User information layer 1 protocol	-	
	User rate	-	
Low layer compatibility	Information transfer rate	32k bit/s	

Change in CS →

ISDN-based network interface			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	64k bit/s	(note 1)
	User information layer 1 protocol	V.110 /X.30	(note 1)
	User rate	32k bit/s	(note 1)
Low layer compatibility	Information transfer rate	64k bit/s	(note 2)

(Note 1) At ISDN-based network interface, the information transfer rate in the Bearer capability information (octet 4) shall be set to "64k bit/s", the user information layer 1 protocol (octet 5) shall be set to "Standardized rate adaption V.110/X.30" and the user rate (octet 5a) shall be set to the same value as the information transfer rate in the Bearer capability information at Um point.

(Note 2) The information transfer rate (octet 4) in the Low layer compatibility information at ISDN-based network interface shall be the same value as the information transfer rate (octet 4) in the Bearer capability information element. This also applies to the case that multiple Low layer compatibility information elements are included in a SETUP message when the low layer compatibility negotiation is provided.

(Note 3) Low layer compatibility information element is optional and may be omitted.

(Note 4) If the low layer compatibility negotiation is provided and if the Low layer compatibility information element is included in the CONNect message, CS shall change the information transfer rate (octet 4) in the Low layer compatibility information element at Um point from 64k bit/s to 32k bit/s.

Figure 2.1.1 Interworking procedure in CS (1)

(ii) 64k bit/s Unrestricted Digital Information (UDI)

When CS interworks with ISDN-based network, if the information transfer rate of the Bearer capability information element is set to “64k bit/s”, CS shall execute the rate adaption interworking for 64k bit/s UDI.
In above case, if the Low layer compatibility information element is omitted in a SETUP message or if the user information layer 1 protocol (octet 5) in the Low layer compatibility information is set to other than standardized rate adaption V.110/X.30, CS shall transfer both Bearer capability information and Low layer compatibility information transparently. The interworking procedure is as shown in figure 2.1.2.

Um point (RCR STD-28)			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	64k bit/s	
	User information layer 1 protocol	-	
	User rate	-	
Low layer compatibility	every contents		

No change in CS →

ISDN-based network interface			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	64k bit/s	
	User information layer 1 protocol	-	
	User rate	-	
Low layer compatibility	every contents		

(Note 1) Low layer compatibility information is an optional information element, and may be omitted.

Figure 2.1.2 Interworking procedure in CS (2)

(b) Incoming call

(i) 32k bit/s Unrestricted Digital Information (UDI)

When CS interworks with ISDN-based network, if the information transfer rate of the Bearer capability information element is set to “32k bit/s”, CS shall execute the rate adaption interworking for 32k bit/s UDI.
In above case, CS shall execute the compatibility information check. In this check, it shall be verified that the user information layer 1 protocol (octet 5) in the Bearer capability information is set to "Standardized rate adaption V.110/X.30".

In the case of the verification is failure, CS shall recognize the SETUP message as imperfect and the incoming call shall be rejected or ignored.

In the case of the verification is successful, CS shall change the information transfer rate (octet 4) both in the Bearer capability information and the Low layer compatibility information on Um point from 64k bit/s to 32k bit/s. CS shall also delete the contents of the user information layer 1 protocol and the user rate in the Bearer capability information on Um point and continue interworking. The interworking procedure is as shown in figure 2.1.3.

Um point (RCR STD-28)			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	32k bit/s	
	User information layer 1 protocol	-	
	User rate	-	
Low layer compatibility	Information transfer rate	32k bit/s	(note 1)

Change in CS ←

ISDN-based network interface			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	64k bit/s	
	User information layer 1 protocol	V.110 /X.30	
	User rate	32k bit/s	
Low layer compatibility	Information transfer rate	64k bit/s	

(Note 1) Information transfer rate (octet 4) in the Low layer compatibility information element at Um point shall be set to the same value as the information transfer rate (octet 4) in the Bearer capability information element. This also applies to the case that multiple Low layer compatibility information elements are included in a SETUP message when low layer compatibility negotiation procedure is provided.
(Note 2) Low layer compatibility information element is optional and may be omitted.
(Note 3) If the low layer compatibility negotiation is provided and if the Low layer compatibility information element is included in the CONNect message, CS shall change the information transfer rate(octet 4) in the Low layer compatibility information element at ISDN-based network interface from 32k bit/s to 64k bit/s.

Figure 2.1.3 Interworking procedure in CS (3)

(ii) 64k bit/s Unrestricted Digital Information (UDI)

When CS interworks with ISDN-based network, if the information transfer rate of the Bearer capability information element is set to “64k bit/s”, CS shall execute the rate adaption interworking for 64k bit/s UDI.
In above case, CS shall execute the compatibility information check. In this check, it shall be verified that both of the user information layer 1 protocol (octet 5) and user rate (octet 5a) in the Bearer capability information element is omitted and the user information layer 1 protocol (octet 5) in the Low layer compatibility information is set to other than standardized rate adaption V.110/X.30.
In the case of the verification is successful, CS shall transfer both Bearer capability information and Low layer compatibility information transparently. The interworking procedure is as shown in figure 2.1.4.

Um point (RCR STD-28)			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	64k bit/s	
	User information layer 1 protocol	-	
	User rate	-	
Low layer compatibility	every contents		

No change in CS

ISDN-based network interface			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	64k bit/s	
	User information layer 1 protocol	-	
	User rate	-	
Low layer compatibility	every contents		

(Note 1) Low layer compatibility information is an optional information element, and may be omitted.

Figure 2.1.4 Interworking procedure in CS (4)

2.2 Communication with V.110 terminals

(a) Outgoing call

(i) Communication with V.110 terminals on 32k bit/s UDI

When CS interworks with ISDN-based network, if the information transfer rate of the Bearer capability information element is set to “32k bit/s” and if the user information layer 1 protocol (octet 5) in the Low layer compatibility information is set to standardized rate adaption V. 110/X. 30, CS shall execute the rate adaption interworking for communication with V.110 terminals on 32k bit/s UDI.
In above case, CS shall change the information transfer rate (octet 4) in the Bearer capability information on ISDN-based network interface from 32k bit/s to 64k bit/s and omit the contents in the octet 5 and after in the Bearer capability information. CS shall also change the information transfer rate (octet 4) in the Low layer compatibility information on ISDN-based network interface from 32k bit/s to 64k bit/s. The interworking procedure is as shown in figure 2.2.1.

Um point (RCR STD-28)			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	32k bit/s	
	User information layer 1 protocol	-	
	User rate	-	
Low layer compatibility	Information transfer rate	32k bit/s	
	User information layer 1 protocol	V.110 /X.30	

Change in CS

→

ISDN-based network interface			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	64k bit/s	(note 1)
	User information layer 1 protocol	-	(note 1)
	User rate	-	(note 1)
Low layer compatibility	Information transfer rate	64k bit/s	(note 2)
	User information layer 1 protocol	V.110 /X.30	

(Note 1) The information transfer rate (octet 4) in the Bearer capability information element at ISDN-based network interface shall be set to "64k bit/s", and after and including octet 5 shall be omitted.

(Note 2) The information transfer rate (octet 4) in the Low layer compatibility information element at ISDN-based network interface shall be the same value as the information transfer rate (octet 4) in the Bearer capability information element. This also appliest the case that multiple Low

layer compatibility informations are included in a SETUP message when the low layer compatibility negotiation is provided.

(Note 3) Sending of Low layer compatibility information element is mandatory.

(Note 4) If the low layer compatibility negotiation is provided and if the Low layer compatibility information element is included in the CONNECT message, CS shall change the information transfer rate (octet 4) in the Low layer compatibility information element at Um point from 64k bit/s to 32k bit/s.

Figure 2.2.1 Interworking procedure in CS (5)

(ii) Communication with V.110 terminals on 64k bit/s UDI

When CS interworks with ISDN-based network, if the information transfer rate of the Bearer capability information element is set to “64k bit/s” and if the user information layer 1 protocol (octet 5) in the Low layer compatibility information element is set to standardized rate adaption V. 110/X. 30, CS shall execute the rate adaption interworking for communication with V.110 terminals on 64k bit/s UDI.
In above case, CS shall transfer both Bearer capability information and Low layer compatibility information transparently. The interworking procedure is as shown in figure 2.2.2.

Um point (RCR STD-28)			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	64k bit/s	
	User information layer 1 protocol	-	
	User rate	-	
Low layer compatibility	Information transfer rate	64k bit/s	
	User information layer 1 protocol	V.110 /X.30	

No Change in CS

ISDN-based network interface			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	64k bit/s	
	User information layer 1 protocol	-	
	User rate	-	
Low layer compatibility	Information transfer rate	64k bit/s	
	User information layer 1 protocol	V.110 /X.30	

(Note 1) Sending of Low layer compatibility information is mandatory.

Figure 2.2.2 Interworking procedure in CS (6)

(b) Incoming call

(i) Communication with V.110 terminals on 32k bit/s UDI

When CS interworks with ISDN-based network, CS shall execute the compatibility information check. In this check, it shall be verified that both the user information layer 1 protocol (octet 5) in the Low layer compatibility information is set to "Standardized rate adaption V.110/X.30" and the required user rate (i.e. the intermediate rate which is uniquely calculated from the user rate (octet 5a) indicated in the Low layer compatibility information by using recommendation V.110 rate adaption method) is less or equal to 32k bit/s.If the intermediate rate (octet 5b) is indicated clearly, CS can use this information as the required user rate.

In the case of the verification is successful, CS shall change the information transfer rate (octet 4) both in the Bearer capability information and the Low layer compatibility information on ISDN-based network interface from 64k bit/s to 32k bit/s and continue interworking for communication with V.110 terminals on 32k bit/s UDI. The interworking procedure is as shown in figure 2.2.3.
In the case of the verification is failure, CS shall execute the interworking for communication with V.110 terminals on 64k bit/s UDI.

Um point (RCR STD-28)			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	32k bit/s	
	User information layer 1 protocol	-	
	User rate	-	
Low layer compatibility	Information transfer rate	32k bit/s	(note 1)
	User information layer 1 protocol	V.110 /X.30	

Change in CS ←

ISDN-based network interface			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	64k bit/s	
	User information layer 1 protocol	-	
	User rate	-	
Low layer compatibility	Information transfer rate	64k bit/s	(note 2)
	User information layer 1 protocol	V.110 /X.30	

(Note 1) The information transfer rate (octet 4) of Low layer compatibility information element at Um point shall be set to the same value as the information transfer rate (octet 4) of the Bearer capability information element. This also applies to the case that multiple Low layer compatibility informations are included in a SETUP message when low layer compatibility negotiation procedure is provided.
(Note 2) Sending of Low layer compatibility information is mandatory.
(Note 3) If the low layer compatibility negotiation is provided and if the Low layer compatibility information element is included in the CONNECT message, CS shall change the information transfer rate (octet 4) in the Low layer compatibility information element at ISDN-based network interface from 32k bit/s to 64k bit/s.

Figure 2.2.3 Interworking procedure in CS (7)

(ii) Communication with V.110 terminals on 64k bit/s UDI

When CS interworks with ISDN-based network, CS shall execute the compatibility information check. In this check, it shall be verified that both the user information layer 1 protocol (octet 5) in the Low layer compatibility information is set to "Standardized rate adaption V.110/X.30" and the required user rate (i.e. the intermediate rate which is uniquely calculated from the user rate (octet 5a) indicated in the Low layer compatibility information by using recommendation V.110 rate adaption method) is greater than 32k bit/s.
In the case of the verification is failure, CS shall recognize the SETUP message as imperfect and the incoming call shall be rejected or be ignored.
In the case of the verification is successful, CS shall transfer both Bearer capability information and Low layer compatibility information transparently and continue interworking. The interworking procedure is as shown in figure 2.2.4.

Um point (RCR STD-28)			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	64k bit/s	
	User information layer 1 protocol	-	
	User rate	-	
Low layer compatibility	Information transfer rate	64k bit/s	
	User information layer 1 protocol	V.110 /X.30	

No Change in CS

ISDN-based network interface			
Information elements		Contents	Remarks
Bearer capability	Information transfer rate	64k bit/s	
	User information layer 1 protocol	-	
	User rate	-	
Low layer compatibility	Information transfer rate	64k bit/s	
	User information layer 1 protocol	V.110 /X.30	

(Note 1) Sending of Low layer compatibility information is mandatory.

Figure 2.2.4 Interworking procedure in CS (8)

3. Rate adaption method in CS from the information transfer rate (32k bit/s) at Um point up to the information transfer rate (64k bit/s) of ISDN-based network

The rate adaption method used for interworking with ISDN-based network is recommendation I.460.

Figure 3.1 shows the rate adaption rule when the information rate is 32k bit/s.
Figure 3.2 shows the data multiplex rule for the two 32k bit/s data.

Intermediate rate	Bit position							
	1	2	3	4	5	6	7	8
32k bit/s	b1	b2	b3	b4	1	1	1	1

(Note 1) bn is the content of information and unuse bit position filled with data "1".
(Note 2) Information is transmitted to Um point in the order from b1 to bn.

Figure 3.1 The rate adaption rule when the information rate is 32k bit/s.

Intermediate rate	Bit position							
	1	2	3	4	5	6	7	8
32k bit/s x 2	b11	b12	b13	b14	b21	b22	b23	b24

(Note 1) bnm is the content of information. b11 to b14 are datum of the first 32k bit/s data and also b21 to b24 are datum of the second 32k bit/s data.
(Note 2) Information is transmitted to Um point in the order from b11 to b1n on 1st TCH and also b21 to b2n on 2nd TCH.

Figure 3.2 The data multiplex rule for the two 32k bit/s data.

4. The cause at call release in Unrestricted Digital information

This document describes the cause which CS or PS returns to ISDN based network in releasing Unrestricted digital information call. Call release will occur when requested service cannot be used or resource unavailable especially in incoming call.

Table 1 shows the cause at call release in 32k bit/s Unrestricted digital information and table 2 shows the cause at call release in 64k bit/s Unrestricted digital information.

Table 1 The cause at call release in 32k bit/s Unrestricted digital information (unpermitted bearer capability)

CS version		Ver 1	Ver 2 & Ver 3			
PS version		-	Ver 1		Ver 2 & Ver 3	
Bearer permission at CS		Unpermitted	Permitted	Unpermitted	Permitted	Unpermitted
PS presence	present	No reply	Call release cause #88	Call release cause #65	Normal procedure	Call release cause #65
	cause location	CS	PS*		-	CS
	Absent	No reply				

*IF CS can recognize that PS dose not have appropriate protocol version, CS can return this cause instead of PS. Even in this case, cause location shall be indicated as PS.

Table 2 The cause at call release in 64k bit/s Unrestricted digital information (unpermitted bearer capability)

CS version		Ver 2	Ver 3		
Free radio channel		-	-	Present	Absent
PS presence	present	Call release cause #65	Call release cause #88	Normal procedure	Call release cause #34
	cause location	CS	PS*	-	CS
	Absent	No reply			

*IF CS can recognize that PS dose not have appropriate protocol version, CS can return this cause instead of PS. Even in this case, cause location shall be indicated as PS.

Appendix AI Rate adaption rule at Um point in when communicating with the standardized V.110 terminals (Private standard/Public standard)

This appendix describes the rate adaption rule into I (TCH) at Um point when Personal Handy phone System provides the unrestricted digital information transfer capability.

The rate adaption specified in this appendix is the operation converting the rate of standardized V.110 (after RA1 function) into the information transfer rate at Um point.

The rule is shown in Figure 1.

Rate of Rec. V.110	Bit position							
	1	2	3	4	5	6	7	8
8 kbit/s	b1	1	1	1	-	-	-	-
16 kbit/s	b1	b2	1	1	-	-	-	-
32k bit/s	b1	b2	b3	b4	-	-	-	-
48kbit/s	b1	b2	b3	b4	b5	b6	-	-
64kbit/s	b1	b2	b3	b4	b5	b6	b7	b8

(Note 1) When information transfer rate at Um point is 32k bit/s, rate adaption shall be processed by 4 bit unit.
(Note 2) bn is the content of information and the unused bits are filled with "1".
(Note 3) The order of transmission is from left to right.
(Note 4) When information transfer rate at Um point is 48kbit/s, The rate adaption shall be processed by 4 bit unit.
(Note 5) When information transfer rate at Um point is 64kbit/s, The rate adaption shall be processed by 8 bit unit.

Figure 1 The rate adaption rule on Um point

Mapping of 2TCH

The direct mapping rate adaption rule without intermediate rate of standardized V.110 (RA1 operation data), is shown in Figure 2.

	Bit position							
	1	2	3	4	5	6	7	8
JT-V110 64k bit/s	b1	b2	b3	b4	b5	b6	b7	b8
Data on Um point	b11	b12	b13	b14	b21	b22	b23	b24
	1st TCH				2nd TCH			

(Note 1) Data is divided into 2 groups of 4 bits unit on Um point.
(Note 2) bnm is the content of information. b11 to b14 are datum of the first 32k bit/s data and also b21 to b24 are datum of the second 32k bit/s data.
(Note 3) Information is transmitted to Um point in the order from b11 to b1n on 1st TCH and also b21 to b2n on 2nd TCH.

Figure 2 The rate adaption rule on Um point (Not using intermediate rate)

Appendix AJ Optional procedures for bearer service change (Private standard/Public standard)

The procedure for bearer service change may not be provided on all networks. On those networks that support it, a user may use this procedure after making a suitable subscription-time arrangement.

However, because that the repeat of the bearer capability information element is not appeared on interworking point between PHS and ISDN based network at present, the bearer service change including interworking point between PHS and ISDN based network is further study subject.

When a bearer service requested in an originator*s SETUP message cannot be provided by the network, the network would reject the call or, under some circumstances, the network may change the bearer service and provide bearer service change notification. These procedures are currently applicable only to a change from 64 kbit/s unrestricted to 64 k bit/s restricted, and from 64 kbit/s restricted to 64 kbit/s restricted with rate adaption.

Up to two Bearer capability information elements may be present in the SETUP message from the originating user, corresponding to the allowed bearer service modifications given above. The bearer capability information element shall be immediately preceded by the Repeat indicator information element with the meaning field specifying Prioritized list for selecting one possibility. Hence, the order of Bearer capability information elements would indicate order of bearer service preference.

If the SETUP message contains Bearer capability information elements not agreeing with any of the permissible ordered combinations listed above, the network will reject the call attempt.

After sending a CALL PROCEEDING massage, when the originating network or terminating premises equipment determines that the preferred bearer service cannot be provided, it sends a NOTIFY message toward the call originator. The NOTIFY message contains Notification indicator information element with coding which indicates to the originating party the change in bearer service and also contains a Bearer capability information element specifying the attributes of the new bearer service.

Receipt of the NOTIFY message is not acknowledged. The call originator may allow the call to continue or may initiate call clearing in accordance with Appendix X.

(Note) The bearer service change notification using the NOTIFY message is not standardized in RCR STD-28.

Appendix AK Generic procedures for the control of PHS supplementary services

(Private standard/Public standard)

Contents

In this appendix the terms “user” and “network” are used each as same meaning words in appendix X. The Call Reference Value in this appendix may be changed with Recalling-type Handover.

1 General (Private standard/Public standard)

This appendix defines the generic procedures applicable for the control of supplementary services at the user-network interface of Personal Handy Phone System. These procedures may be used for the invocation and operation of supplementary services in association with existing calls or outside any existing calls.

The detailed procedures applicable to individual supplementary services obey each supplementary services regulation.

2 Overview of the generic protocols and of their scope (Private standard/Public standard)

Three generic protocols are defined for the control of supplementary services at user-network interfaces. These protocols operate at layer 3 (CC) of the control plane at the Um reference points, and assume that the use of layers 1 and 2 conforms to RCR STD-28(main text 4.2.2). In addition, the three generic protocols assume the existence of an established data link (data link service explained layer 2 regulation in main text 4.2.2) and use the acknowledged information transfer service available at the layer 2 to layer 3 interface.

2.1 Three generic protocols (Private standard/Public standard)

Three generic protocols are defined for the control of supplementary services, two of which are stimulus, the third being functional; these protocols are:

- the Keypad protocol;
- the Feature key management protocol;
- the Functional protocol.

(Note) The Keypad protocol and the Feature key management protocol is not standard in public network.

2.1.1 Stimulus protocols (Private standard)

2.1.1.1 Keypad protocol

The Keypad protocol is based on the use of the Keypad facility and Display information elements. The Keypad facility information element may be included in the SETUP and INFORMATION messages. The Display information element may be included in any CC message sent by the network to the user according to RCR STD-28.

This protocol applies to supplementary service invocation in the user-to-network direction, and the keypad facility codes used for the invocation of individual supplementary services are network dependent except a case it is regulated.

The protocol is stimulus in the sense that it does not require any knowledge about the invoked supplementary service by the user equipment. It may be used in any state of a call and in association with a call for supplementary service invocation.

2.1.1.2 Feature key management protocol

The Feature key management protocol is based on the use of two information elements that are specified in clause 8: the Feature activation and Feature indication information elements. The Feature activation information element may be included in the SETUP and in the INFORMATION messages in the user-to-network direction. The Feature indication information element may be included in CC messages in the network-to-user direction.

This protocol applies to supplementary service operation during calls. The user may send a Feature activation request at any time when call is active, and the network may send a Feature indication information element at any time when call is active. The supplementary service associated with the Feature identifier is service provider dependent and must be coordinated between the user and the service provider in advance.

This protocol is stimulus in the sense that it does not require knowledge of the invoked supplementary service by the user's terminal equipment. Knowledge of the service profile contained in the network and of the association of Feature keys to specific supplementary service invocations is required to unambiguously define the requested supplementary service. A detailed description of this protocol is contained in clause 5.

2.1.1.3 Information Request procedures

For networks which support access to services using the Keypad protocol and/or the Feature key management protocol, the Information Request (IRQ) procedures may be utilized to prompt for additional information when the network determines that additional information is required.

The support of the procedures in this subclause and the recognition of the Information Request information element is a network and a user option, and is supported on the basis of a bilateral agreement between the user and the network.

The information request message sequence is initiated when the network sends the user and INFORMATION message (in any call state using an active Call Reference Value) or a SETUP ACKNOWLEDGE message (as first response to a SETUP message in case of overlap sending) that contains the Information Request information element. The information request may be included in the SETUP ACKNOWLEDGE message when the network is responding to a feature request contained in a SETUP message that contains no called party address information. The Information Request information element shall be coded with the information request indicator set to "prompt for additional information" and type of information set to the appropriate value. After sending the information request prompt, the network will start timer TC302C on receipt of every INFORMATION message if the request information is not complete.

No RCR STD-28 CC call state changes should occur when the INFORMATION message is sent or received.

The user may always send the requested information in Keypad facility information elements contained in one or more INFORMATION messages. In addition, if the information requested was a called party number, then the user may also send the requested information in the Called party number information element in the INFORMATION messages.

When the network has determined that sufficient information has been received to proceed, it may send an INFORMATION message to the user, containing the “information request completed” to signal the end of information sending.

If the additional information was requested during overlap sending, and if the network has determined that sufficient information has been received for the call to proceed, then the network shall send a CALL PROCEEDING message to the user with the Information Request information element coded to indicate that the request for information has been completed unless this complete indication has been returned in an INFORMATION message earlier. If no call is to be established based on the information received by the network in the overlap sending state but a non-dummy call reference has been used for the information exchange, the network should initiate clearing of the call reference by sending a DISCONNECT message. The DISCONNECT message in this case may contain the Information Request information element, coded to indicate that the request for information has been completed and the Cause information element coded to cause value #16 “normal clearing”.

If the user initiates call clearing with a clearing message that allows a response from the network (DISCONNECT or RELEASE), the network should follow normal call clearing procedures and may include the Information Request information element in the appropriate call clearing message (RELEASE or RELEASE COMPLETE), coded to indicate that the request for information is complete.

2.1.2 Functional protocol (Private standard/Public standard)

The Functional protocol is based on the use of the Facility information element and the FACILITY message, as well as of other specific functional messages specified in clause 7. This protocol is symmetrical .

This protocol is functional in the sense that it requires the knowledge of the related supplementary service by the user equipment supporting it. This facilitates user equipment operation without human intervention by defining semantics for the protocol elements which user equipment can process on its own.

Functional procedures may follow a Keypad or a Feature key management supplementary service invocation. A exclusive message for a particular function may be used to invoke a supplementary service which requires synchronization of resources at both end of interface. To invoke a supplementary service which does not require such resources synchronization, usual message for general purpose (i.e. FACILITY message) is used.

3 Co-existence of protocols supported by a network (Private standard/Public standard)

Networks may support more than one of these generic protocols for the control of supplementary services. The support of multiple generic protocols is a network option. In advance users shall be informed the supplementary services available, and of the generic protocols supported on their access by the service provider.

As a general rule, the Functional protocol shall be used unless the network specifies the use of a stimulus protocol for the invocation of certain supplementary services, or the users have subscribed to a feature key management facility and service profile.

For a given call instance, the protocol applied at a local interface may be different from the one applied at a remote user's interface.

Some networks may support only one of the generic protocols per user access for the invocation of supplementary services. This has to be arranged in advance.

Network supporting multiple generic protocols per access in the user to network direction (i.e. for the supplementary service invocation) will implicitly recognize the protocol option chosen by the user on the basis of the received message type or information element type.

Networks supporting more than one generic protocol per access in the network to user direction (i.e. at the remote user interface) may choose to apply a particular protocol depending on the supplementary service characteristics involved.

4 Keypad protocol (Private standard)

The Keypad protocol is based on the use of the Keypad facility and Display information elements. While the generic procedures associated with Keypad invocation are specified in this clause, the allocation of the access codes used to request/indicate a supplementary service are network dependent except case it is regulated.

4.1 General

<The description about sending Keypad facility information element in the network-to-user direction in this clause is not standardized.>

This generic procedure is based on the use of:

- the Keypad facility information element by the user to invoke a supplementary service from the network by providing access codes using either en-bloc or overlap sending; and
- the Display information element by the network to give an indication to the user regarding a supplementary service being invoked. This procedure may be complemented in the case of calls where the Bearer capability information element in the SETUP message is coded indicating "speech" or "3.1 kHz audio" by the provision of in-band tones/announcements to the user.

NOTE- As a network option, the Keypad facility information element may be used by the network to give an indication to the user when the network expects an automatic reaction to the received information to acknowledge an invoked supplementary service. As the semantics of the Keypad facility information element are not standardized, the use of the Keypad facility information element in the network-to-user direction may inhibit terminal portability since for a terminal to operate successfully on more than one network it must be capable of interpreting various different semantics as assigned by the network to the Keypad facility information. In any case, user equipment not supporting this option shall follow the error recovery procedures defined in 5/RCR STD-28 appendix X of receipt of the Keypad facility information element.

The Keypad protocol may be used in conjunction with the Feature key management (see clause 5) or Functional protocol (see clause 6) during the invocation of a supplementary service.

The Keypad protocol is based on the use of the Keypad facility information element within the INFORMATION or SETUP messages during the establishment, active and clearing phases of a call.

4.2 Messages used in the Keypad protocol

As specified in RCR STD-28, the Keypad facility information element may be included in both the SETUP and INFORMATION messages and may be sent in the user-to-network direction.

4.3 Coding of the Keypad facility information element

The contents of the Keypad facility information element are a string of IA5 characters. The syntax of the IA5 character string and the allocation of values for given supplementary services are network dependent except case it is regulated.

4.4 Elements of procedure

4.4.1 General

The Keypad protocol includes the following aspects:

(1) the Keypad protocol may be used during the call establishment, active, and clearing phases of a call to invoke supplementary services. Supplementary service information is conveyed in Keypad facility information elements sent in either SETUP or INFORMATION messages;

(2) supplementary service information can be sent from the user to the network either en-bloc or using overlap sending;

(3) the network may prompt the user to send the required information using the Display information element and/or in-band tones or announcements. Whether this action shall occur or not is supplementary service and network specific. In any case, in-band tones or announcements shall only be used when the Bearer capability information element indicates “speech” or “3.1 kHz audio”;

(4) there may be different combinations of user provided information followed by network prompts. Examples of such possible combinations are shown in Table 4-1, where the term “stage” is used to refer to information sent by the user between network prompts (if any).

TABLE 4-1
Example of stages for sending of information

Number of stages	Sending information
1	All information sent en-bloc
1	All information sent overlap
2	Overlap..... Prompt..... Overlap
2	En bloc..... Prompt..... En bloc
2	Overlap..... Prompt..... En bloc
2	En bloc..... Prompt..... Overlap
3	Overlap..... Prompt..... Overlap…… Prompt..... Overlap, etc.

NOTE-The number of possible stages is network dependent and may also be dependent on the specific supplementary service being invoked.

4.5 Procedures at the invocation interface

4.5.1 User procedures

The procedures below define how information (using either en-bloc or overlap sending) may be sent in a single stage from the user to the network. The procedures are applicable for each stage of user-to-network information sending.

4.5.1.1 En-bloc sending of access codes

En-bloc sending of supplementary service information is accomplished by sending the “complete” supplementary service information in the following CC message:

- the SETUP message, if the supplementary service is being invoked during the call establishment; or
- the INFORMATION message, if the supplementary service is being invoked from the active phase of the call or during the clearing phase of a call.

The term “complete” supplementary service information means that sufficient supplementary service information is sent to the network to specify a service without any additional network prompting being required. The network determines that the supplementary service information is “complete” by either:

- analysis of the information contents of the Keypad facility information element; or
- the presence of a “sending complete” indication (see2.2/RCR STD-28 appendix X).

If the network determines that the information contents of the Keypad facility information element are invalid, the network shall use the error procedures specified in 4.5.2.3.

If the network determines that the information contents are valid and that the user is allowed to invoke the requested service, the network shall respond using the procedures as specified in 4.5.2.1.

4.5.1.2 Overlap sending of access codes

Overlap sending of supplementary service information is the sending of the “complete” supplementary service information (see 4.5.1.1 for the definition of complete) segmented such that a number of RCR STD-28 CC messages are used to convey the “complete” supplementary service information. The possible combination of CC messages:

(1) for supplementary services invoked during call establishment, consists of using the SETUP message plus one or more INFORMATION messages which will be sent in the overlap sending state; or

(2) for supplementary services invoked in the active or clearing phases of the call, consists of using two or more INFORMATION messages.

For case (1), normal overlap sending procedures, as specified in 2.2/RCR STD-28 appendix X, shall be used.

For case (2), the transmission or receipt of INFORMATION messages shall not cause any change to the RCR STD-28 CC call state.

The network shall respond to valid supplementary service information with one of the network responses as described in 4.5.2.1. If the supplementary service information is invalid, then the error procedures as described in 4.5.2.3 shall apply.

4.5.2 Network procedures

4.5.2.1 Network responses to user requests

After receiving information from the user, the network may take one of the following actions. Items (1) to (4) are applicable in the cases of both en-bloc and overlap sending; item (5) is applicable only in the case of information sent using overlap sending.

(1) Clear the call reference via the normal call clearing procedures (see 4/RCR STD-28 appendix X) including the appropriate Cause and optional Display information element(s).

(2) Send a CALL PROCEEDING message to the user.
NOTE - This network response is only applicable in a case where the supplementary service is being invoked during call establishment and not in the cases of the supplementary service being invoked from the active or clearing phases of the call.

(3) Send an INFORMATION or clearing message to the user that includes a Display information element containing an appropriate response to the request for a supplementary service. The receipt of an INFORMATION message by the user shall not cause any change to the RCR STD-28 CC call state.

(4) Prompt the user for more information using the procedures as specified in 4.5.2.2. This further information could be additional, or new information input by the user or another attempt by the user to re-input the original information correctly. Such procedures are network dependent and may be supplementary service specific.

(5) Wait for more overlap information. The allowed waiting period is governed by timer TC302C in the case of information sent in the overlap sending state and call control timers for overlap information sent during other CC phases of the call.

The precise action to be taken is dependent on the specific supplementary service being invoked.

4.5.2.2 Network prompting and in-band tone/announcement control

The network may prompt the user for more information or may provide in-band tones or announcements regardless of whether or not the Keypad facility information element was included in the initial SETUP message. The network shall determine whether prompting and/or in-band tone or announcement control should occur. Possible factors governing the provision of prompting and in-band information are:

- the nature of the supplementary service;
- the value of the inter-digit timer;
- the type of interface; and
- the current status or progress of the supplementary service request.

Simultaneously with the application of in-band tones or announcements, the network may send a PROGRESS message containing a Progress indicator information element with the progress descriptor No. 8, In-band information or appropriate pattern now available.

The network may, in addition to an audible prompt (i.e. tone or announcement), request information from the user by sending an INFORMATION message which contains the Display and/or Signal information elements (but shall not contain the Called party number information element).

The sending of the INFORMATION message by the network does not result in a change to the RCR STD-28 CC call state. However, when this message is sent in the network overlap sending state, timer TC302C shall be re-initialized.

The network may prompt the user more than once (i.e. multiple stages may occur), but the network should not prompt the user again prior to the user's response or, when in the overlap sending state, prior to the expiry of timer TC302C. This is to avoid situations where a user's response could be related to two unacknowledged network prompts.

NOTE - As a network option, the Information Request procedures described in 2.1.1.3 may be used to prompt the user for additional information related to a given service request.

4.5.2.3 Error conditions and treatment

An error condition exists in the following circumstances:

(1) timer TC302C expires and complete information has not been received;

(2) information containing a "sending complete" indication indicating en-bloc sending, but the user information sent is not complete;

(3) information received by the network (complete or incomplete) is invalid. Invalid information is information sent with incorrect format or containing invalid facility identifier or parameter codes;

(4) the user attempts to invoke a supplementary service to which the user has not provide or to which the user is not allowed access.

The action to be taken by the network in these situations is as follows:

NOTE - The text below identifies possible actions that may be taken in an error situation. The specific action to be taken is network and supplementary service dependent.

4.5.2.3.1 Supplementary service being invoked during call establishment

The network shall take one of the following actions:

(1) In-band tones or announcements are applied. If a SETUP ACKNOWLEDGE message has not already been sent, the network shall send a CALL PROCEEDING message to the user, indicating the B-channel to be used and including the Progress indicator information element with progress descriptor No. 8, In-band information or appropriate pattern is now available.

If a SETUP ACKNOWLEDGE message has already been sent, the network shall send a PROGRESS message to the user, including the Progress indicator information element with the progress descriptor No. 8, In-band information or appropriate pattern is now available.

The network may prompt the user using the procedures as specified in 4.5.2.2 to re-input the required information. Otherwise, after the in-band tone or announcement has been applied, the call reference shall be cleared by either the user initiating call clearing or the network initiating call clearing at the expiry of a tone or announcement timer. Both the network and the user shall use the clearing procedures as specified in 4/RCR STD-28 appendix X.

(2) No in-band tones or announcements are to be applied. The call reference shall be cleared by the network initiating call clearing procedures as specified in 4/RCR STD-28 appendix X.

4.5.2.3.2 Supplementary service being invoked from the active state or during the call clearing phase

The network shall take one of the following actions:

(1) In-band tones or announcements are applied. The network may prompt the user using the procedures as specified in 4.5.2.2 to re-input the request. Otherwise, depending on the specific supplementary service being invoked, the call shall either be cleared or remain in the same CC call state. In the case where the call is cleared, clearing shall occur after the in-band tone or announcement has been applied. Clearing shall occur either by the user initiating call clearing or by the network initiating call clearing at the expiry of a tone or announcement timer. Both the network and the user shall use the clearing procedures as specified in 4/RCR STD-28 appendix X.

(2) No in-band tones or announcements are to be applied. Depending on the specific supplementary service being invoked, the call shall either be cleared or remain in the same call state. In the case where the call is to be cleared, the call reference shall be cleared by the network initiating call clearing using the procedures as specified in 4/RCR STD-28 appendix X. If the call remains in the same CC call state, the user may be informed that the supplementary service request was unsuccessful by the network sending an INFORMATION message in accordance with 4.5.2.1, item (3).

4.6 Procedures at the remote interface

The Display and/or Signal information elements can be used for the purpose of providing notification to the remote user from the network. In this case, however, this information is used simply for the purpose of informing the human user, and no automatic reaction to the received information is to be performed by the user's equipment itself.

5 Feature key management protocol (Private standard)

The Feature key management protocol is a mechanism allowing users to invoke network supplementary services. As these are stimulus procedures, the protocol elements do not, by themselves, identify the service invoked. To determine the service invoked requires knowledge of the user's service profile maintained in the network. No CC call state changes directly occur by these procedures.

The Feature key management protocol is based on two information elements: Feature activation and Feature indication. The Feature activation information element is the means by which a user requests a supplementary service. The Feature activation information element contains a feature identifier number which the network then maps to the corresponding service as indicated by that user's service profile. The user's equipment need not have any knowledge of what service is being indicated by the feature identifier number and the user may send a feature request at any time.

Feature indication is the means by which a response to a Feature activation is indicated by the network. The feature identifier number correlates the network's response with a user's request and/or an indicator associated with a user's equipment. The Feature indication information element also contains a status indicator. The status indicator indicates the status of the requested service and may be used by the user's equipment as appropriate with its man-machine interface.

5.1 Messages

The Feature activation and Feature indication information elements may be present in several of the CC messages defined in RCR STD-28. The Feature activation information element may appear in the following CC messages in the user-to-network direction:

(1) SETUP
(2) INFORMATION

The Feature indication information element may be sent in the network-to-user direction in the following CC messages:

(1) SETUP
(2) SETUP ACKNOWLEDGE
(3) CONNECT

(4) CALL PROCEEDING
(5) ALERTING
(6) INFORMATION
(7) DISCONNECT
(8) RELEASE
(9) RELEASE COMPLETE

5.2 Procedures

5.2.1 Assumptions and restrictions

(1) These procedures assume that only on Feature activation request will appear in CC message.

(2) The phrase “call associated services” used herein is defined as services which act upon or relate to an existing call (as defined by the existence of a call reference).

(3) These procedures are used for the invocation of supplementary services which relate to predefined specific bearer capabilities and/or are context dependent. Hence the capability to include protocol elements to indicate the bearer capability that the supplementary service is to act upon is not provided.

5.2.2 Invocation of supplementary services

The user may request a feature by including a Feature activation information element in the messages defined in 5.1. If the INFORMATION messages is used, it may be sent while a call is established at any time. The user will indicate the desired feature by specifying the appropriate value in a feature identifier number.

5.2.2.1 Determination of call reference in the INFORMATION message

When the Feature activation information element is sent in the INFORMATION message, then the following rules apply:

An active call reference may be used regardless of whether the service type is call associated or non-call associated;

5.2.3 Network responses

The network may respond to a Feature activation request in several ways. This action will be supplementary service and network specific.

5.2.3.1 Normal responses

5.2.3.1.1 Return of a Feature indication

The network may return a Feature indication information element in an INFORMATION message or any other appropriate CC message as defined in 5.1. The feature indication may or may not have the same feature identifier number as was present in the original feature activation request. The status indicator will be provided as appropriate to the specific supplementary service requested.

5.2.3.1.2 Prompting for further information

The network may prompt the user for more information. When in the overlap sending state, it may do so using the Information Request procedures (described in 2.1.1.3).

The user's response shall follow normal overlap sending procedures as defined in RCR STD-28. As a network option, the Information Request procedures described in 2.1.1.3 may be used to prompt the user for additional information related to a given service request.

5.2.3.1.3 Implicit response

The network, under certain situations, may not return any explicit indication to the user after a feature activation request. In this case the response is implicit, such as the acknowledgement inherent in providing the service.

5.2.3.1.4 Return of Signal, Cause, or Display information elements

The network may return any combination of Signal, Cause, or Display information elements in conjunction with the responses as described in 5.2.3.1. The sue of these information elements is supplementary service and network specific. Coding and the appropriate CC messages that may contain these information elements are as defined in RCR STD-28.

5.2.3.2 Responses during error conditions

When an error condition exists (as defined in 5.2.5), the network may:

(1) Respond with one or more of the following options:

(a) return a Feature indication information element;
(b) prompt for further information (see 2.1.1.3);
(c) provide an implicit response; or
(d) return Signal, Cause, or Display information elements.

(2) Ignore the Feature activation request and not respond at all.

(3) Clear appropriate existing calls in conjunction with the above actions.

5.2.4 General aspects

5.2.4.1 Use of Feature indication information elements independent of a feature request

The network may choose to send Feature indication information while a call is established at any time. Multiple Feature indication information elements may be returned in a INFORMATION message or in an appropriate CC message if more than one indicator is to be updated.

5.2.4.2 Deactivation procedures

When explicitly deactivating a supplementary service, two methods may be used:

(1) sending of a feature activation request with the same feature identifier may deactivate the supplementary service. Some supplementary services may be “toggled” on and off;

(2) sending of a feature activation request with a different feature identifier which is explicitly defined (between the user and network) as the deactivator for that particular supplementary service.

5.2.4.3 Clearing of a call

If a Feature activation information element is sent using the call reference of an active call, and that call is cleared for some reason, then there does not exist a call reference with which to correlate the feature indication. If a Feature indication information element is to be returned, then the following option may be used:

- the network may send a Feature indication information element in one of the call clearing messages (i.e. DISCONNECT, RELEASE, or RELEASE COMPLETE);

5.2.5 Error conditions

5.2.5.1 Invalid feature activation request

If a user requests a feature using an invalid feature identifier number, the network may take actions specified in 5.2.3.2 as appropriate. An invalid feature identifier number is one in which the user has not subscribed to a corresponding service, or the value is not understood by the service provider (e.g. out of range).

5.2.5.2 Invalid call reference

If a user violates the use of the call reference as stated in 5.2.2.1, the network should not provide the service and should respond as indicated in 5.2.3.2.

5.2.5.3 Sending of multiple feature activation requests

If a sequence of feature activation requests is received in separate CC messages so rapidly that the network cannot respond to the first feature activation request prior to receiving a subsequent feature activation request, the network may take one of the following actions:

(1) act upon all feature activation requests by returning multiple Feature indication information elements (or other responses as detailed in 5.2.3.1). These may be sent in a single CC message or in multiple CC messages;

(2) act upon the first feature activation request by returning a single response. This response should correspond to the first feature activation request. Feature activation requests after the first request are discarded and ignored by the network.

The determination of which action to take is network and supplementary service specific.

6 Functional protocol

6.1 General

6.1.1 Introduction (Private standard/ Public standard)

This subclause specifies the functional signalling procedures for the control of supplementary services at the user-network interface. This generic protocol utilizes functions and services provided by RCR STD-28 Appendix X [CC circuit-switched call control procedures] and the functions of the data link layer as defined in section 4.4.2 of the main text [Layer 2 standards].

The support of supplementary services procedures otherwise is a network and user option based on a bilateral agreement.

6.1.2 Scope of the procedures (Private standard/ Public standard)

The procedures defined in clause 6 specify the basic methodology for the control (e.g. invocation, etc.) of supplementary services.

6.1.3 Categories of procedures

Two categories of procedures are defined for the functional signalling for supplementary services. The first category, called the separate message approach, utilizes separate message types to indicate a desired function. (Private standard)

The second category, called the common information element procedure, utilizes the Facility information element. (Private standard/ Public standard)

6.1.4 Supplementary service functions (Private standard/ Public standard)

The control of supplementary services by either the network or the user includes the following cases:

(1) the invocation of supplementary services during the establishment of a call;
(Private standard/ Public standard)

(2) the invocation of supplementary services during the clearing of a call;
(Private standard)

(3) the invocation of call related supplementary services during the active state of a call;
(Private standard/ Public standard)

(4) the activation, deactivation, interrogation or registration of supplementary services independent from an active call; (Private standard)

(5) the invocation of multiple, different supplementary services within a single message;
(Private standard)

(6) the in vocation of supplementary services related to different calls;
(Private standard)

(7) cancellation of invoked supplementary services and notification to the initiator of the supplementary service.
(Private standard)

The correlation of a call related supplementary service and the call which it modifies is provided by use of the call reference [cases a),b),c),e),f) and g) listed above].

The correlation of call independent supplementary service invocations and their responses is provided by the combination of the call reference of the message containing the Facility information element and the invoke identifier present within the Facility information element itself [refer to cases d),e) and g)].

The identification of different supplementary service invocations within one single message is provided by the invoke identifier of the corresponding Facility information element [refer to cases e) and g)]. The identification of supplementary service invocations related to different calls is provided by different messages with the corresponding call reference of the appropriate call [refer to case f)], i.e. different call reference values are used to identify each call individually.

6.2 Separate messages category (non standard)

6.3 Common information element category (Private standard/ Public standard)

A REGISTER, a FACILITY or an existing CC message is used to carry the Facility information element which requests the desired supplementary service.
This functional procedure provides a flexible and open ended approach to the provision of supplementary service protocols.

In addition, the use of the FACILITY message allows the actions and events related to supplementary services to be clearly separated from those associated with basic call control, hence providing improved stability to the call control procedures.

6.3.1 Call related supplementary service procedures (Private standard/Public standard)

For call related supplementary service procedures initiated at call establishment or call clearing, the procedures for call control as specified in RCR STD-28 Appendix X are utilized. This enables, for example, the originating user to send a supplementary service invocation within a SETUP message and to receive from the remote user a return result, return error, or reject component type in the Facility information element within an ALERTING message, CONNECT message, or any other appropriate message form the service provider.

For call related supplementary service invocations during the Active state of a call, the FACILITY message is used for the exchange of the Facility information elements over the existing signalling connection. This signalling connection is identified by the call reference of the corresponding active call.

The call reference provides the means to correlate FACILITY messages belonging to the same signalling transaction. In the case of call related invocations, the call reference correlates the call with the appropriate supplementary service transaction. When a supplementary service affects more than one call, different call references are used to identify each call individually.

If a call related FACILITY message is sent using the call reference of a call in progress or of an active call, and this cal is cleared due to call related causes, then the treatment of any out standing supplementary service requests is dependent on the requirements of each individual service. Additionally, the following guidelines apply:

(1) A supplementary service functional protocol (using the Facility information element) may use an existing bearer associated call reference if it is to be coupled to the bearer, or it may use a call reference not associated with a bearer.

(2) The implicit association provided by a call reference shall always be cleared when a bearer connection is released.

(3) If a bearer connection and a bearer unrelated call reference need to be associated at the receiving end, then the bearer unrelated protocol should include a request for the terminating end to associate the two call references.

6.3.2 Bearer connection independent supplementary service procedures (Private standard)

This subclause defines the transport functions employed for operations independent of a bearer connection. These transport functions are provided at the user-network interface by means of CC message exchange and utilize the data link services as described in section 4.2.2 of the main text. The messages used for transport (i.e. REGISTER, FACILITY, RELEASE COMPLETE) carry the application oriented Facility information elements containing the operation components. The correlation among the various transport messages is provided by means of the call reference value of each message.

For general rules, format and coding of call reference values see section 4.4.3.7.3.3 of the main text.

6.3.2.1 Point-to-point transport (Private standard)

Before these procedures are invoked, a reliable data link connection must be established between the user and the network. All messages shall be sent to the data link layer using a DL-DATA request primitive.

6.3.2.1.1 Connection oriented transport-Connection establishment (Private standard)

The initiator shall begin the establishment of the signalling connection by sending a REGISTER message to the responder and enter the Call Independent Service call state (P/C31). The responder upon receiving the REGISTER message, shall also enter the Call Independent Service call state (P/C31). Note that either the user or the network may assume the role of the initiator.

The signalling connection is identified by the call reference included in the REGISTER message. The call reference value shall be chosen in compliance to the procedures of section 4.4.3.7.3.3 of the main text.

6.3.2.1.2 Data transfer phase (Private standard)

After it's established, the signalling connection can be used to exchange the data between the user and the network involved in the connection. The user and the network are completely free to send data, i.e. there exists no predetermined sending scheme.

Data is transferred by sending a FACILITY message to the peer entity. Sending a FACILITY message shall not affect the call state.

The call reference identifying this connection shall be included in this FACILITY message.
The data, e.g. the component structures, shall be included in the Facility information element.

6.3.2.1.3 Connection release (Private standard)

The signalling connection may be released by the initiator or the responder of the REGISTER message establishing the connection. Releasing the connection shall be accomplished by sending a RELEASE COMPLETE message. The Cause information element shall indicate cause #16 "normal call clearing".

The call reference identifying this connection shall be included in the RELEASE COMPLETE message. After sending the RELEASE COMPLETE message, the sender shall release the used call reference and enter the Idle call state (P/C0).

After receipt of the RELEASE COMPLETE message, the receiver shall release the used call reference and inter the Idle call state (P/C0).

6.3.3 Responses to multiple supplementary service invocations (Private standard)

The correlation of responses to multiple supplementary service invocations is based on call references and invoke identifiers.

6.3.4 Coding of the call reference (Private standard/ Public standard)

For general rules, format and coding of call reference values, 4.4.3.7.3.3 / RCR STD-28 is applicable.

6.3.5 Formal definition of data types (Private standard/ Public standard)

Formal definition of data types to be used within the operations to be coded in the Facility information element are provided in Recommendation X.229[10](Remote Operations, Protocol Specification).

6.3.6 Error procedures (Private standard/ Public standard)

In general, the error handling procedures specified in section 5/ RCR STD-28 Appendix X apply with the modification that in items a) and d) of 5.3.2/RCR STD-28 Appendix X, ”SETUP “shall be replaced with “SETUP, REGISTER”.

Additional error handling required specifically for the common information element procedures are specified in the following subclauses.

6.3.6.1 Component related errors (Private standard/ Public standard)

If a facility information element with an invalid service protocol profile in any message other than REGISTER is received, the procedures specified in 5.6and 5.7/RCR STD-28 Appendix X will apply as appropriate.

If a network or user which implements procedures given in 6.3 receives a Facility information element containing an invoke component indicating an operation that is not recognized, i.e. a particular supplementary service or function has not been implemented, then a Facility information element containing a reject component reporting the general problem “unrecognized operation_ shall be returned to the sending entity. This rejection will not affect the handling of the message in which the Facility information element was included or of other information elements included in that message. If the operation value in the Facility information element in the message in which it was received is understood but in case of it is not defined to be sent, then a return error component with the value “procedure error” will be returned.

Other errors specific to individual supplementary services are treated according to procedures provided in each supplementary service.

6.3.6.2 Transport related errors (Private standard/ Public standard)

If a FACILITY message is received and it does not contain the Facility or Extended facility information element, the procedures specified in 5.6/RCR STD-28 Appendix X will apply.

6.3.6.3 Call related errors (Private standard/ Public standard)

If the network or user recognizes a supplementary service in a SETUP message but is not able to process the requested operation, then the following operations apply:

(1) the network or user may clear the call request ,It reject the supplementary service invocation by means of a RELEASE COMPLETE message which contains the Cause information element and the return error or reject component type with the appropriate parameters in the Facility information element;

(2) the network or user may continue to process the call request according to normal call controll procedures, and It can be rejected the supplementary service invocation by including a return error or reject component type with an appropriate data element in the Facility information element by means of a FACILITY message or in any appropriate CC message;

(3) the network or user may continue to process the call request according to the call control procedures, and it may ignore the supplementary service invocation.

The option to be used depends on the individual supplementary service procedures, which are the subject of the each individual service.

The Cause information element in CC messages will be used to report CC errors outside the component portion of the Facility information element (octets 1-3). When no CC protocol error is found, the Cause information element will convey cause #31 - normal, unspecified. Protocol errors in the component portion of the Facility information element (octets 4-later) will be reported in a Reject component carried in a Facility element.

If the call related FACILITY message is sent using the call reference of a call in progress or of an active call, and this call is to be cleared due to call related causes, then depending upon the supplementary service invoked, one of the following will occur:

- the network or user may retain both the connection and the call reference association ,and may send a response within a Facility information element in a FACILITY massage prior to the initiation of the normal call clearing procedures; or
- the network or user may send a response within a Facility information element in the first clearing message (i.e. DISCONNECT, RELEASE, or RELEASE COMPLETE message); or
- the network or user may continue with the clearing procedures.

In the third option, if the signalling connection is cleared while a supplementary service related request is pending, handling of the outstanding request will be according to the each individual supplementary service.
If a data link reset or data link failure occurs and a supplementary service request is outstanding, the procedures specified in 5.8,5.9/RCR STD-28 Appendix X will apply, respectively. The procedures associated with the treatment of the outstanding supplementary service requests in this case are for further study.

6.3.6.4 Call independent errors (Private standard)

If a REGISTER message indicating a call reference value that is currently in use is received, it shall be ignored , The STATUS message with a Cause information element indicating Cause value #101 “message not compatible with call state” and a Call state information element indication the appropriate CC call state shall be returned.

Only the FACILITY message, RELEASE COMPLETE message, STATUS message, and the STATUS ENQUIRY message shall be sent using the call reference that was assigned by a REGISTER message. If any other message is received, it should be ignored and a STATUS message with CCITT cause value #101 “message not compatible with call state”, and a Call state information element indicating call state 31 “call independent service” state shall be returned.

If a Facility information element is received with an invalid protocol profile in a REGISTER message, the contents of the REGISTER message shall be discarded and a RELEASE COMPLETE message containing cause #100 “invalid information element contents” shall be returned.

If either protocol entity receives an indication that the data link has been released via the DL-RELEASE -indication primitive, it shall release the call reference, enter the idle call state (P/C0) and regard the signalling connection as released.

If either protocol entity receives an indication that the data link has been spontaneously reset via the DL-ESTABLISH-indication primitive, it shall send a RELEASE COMPLETE message with the appropriate call reference with the Cause information element indicating cause value #41 “temporary failure”, release the call reference, enter the Idle call state (P/C0) and regard the signalling connection as released.

If a protocol error occurs, either the network or the user may release the signalling connection by sending a RELEASE COMPLETE message. The call reference identifying this connection shall be included in the RELEASE COMPLETE message. The cause value as indicated by the Cause information element will be dependent on the error case. After sending the RELEASE COMPLETE message, the sender shall release the used call reference and enter the Null call state (P/C0). On receipt of the RELEASE COMPLETE message, the receiver shall release the used call reference and enter the Null call state (P/C0).

7 Message functional definition and content (Private standard/ Public standard)

Definitions of the CC message provided in section 4.4.3.7.2, RCR STD-28 will apply with the following additions:

- Facility information element may be included, as an option, in the Call establishment or Call clearing messages. It may also be included in the FACILITY message to both direction defined in this Appendix.
- Feature activation information element may be included, as an option, in the SETUP and INFORMATION messages from the user to the network.
- Feature indication information element may be included, as an option, in the Call establishment or Call clearing messages. It may also be included in the INFORMATION message from the network to the user.
- Information request information element may be included, as an option, in the SETUP ACKNOWLEDGE or INFORMATION messages from the network to the user.
- Notification indicator information element may be included, as an option, in the Call establishment or Call clearing messages.

7.1 Messages for supplementary service control

Table 7-1 shows the messages specific to supplementary service control procedures.

Table 7-1: Messages specific to supplementary service control

Message type	Reference
FACILITY	7.1.1
REGISTER	7.1.2 (Note)

Note: Private standard

7.1.1 FACILITY (Private standard/ Public standard)

This message may be sent to request or acknowledge a supplementary service. Invoked supplementary services and its associated parameters are specified in the FACILITY information element (see Table 7-2).

For the use of this message, see section 6.

Table 7-2: Content of FACILITY message

Type of message : FACILITY
Significance : Local (Note 1)
Direction : both
Function channel : SACCH/FACCH

Information element	Reference	Direction	Type	Information length
Protocol discriminator	4.4.3.7.3.2/STD-28	both	M	1
Call reference	4.4.3.7.3.3/STD-28	both	M	2-3
Message type	4.4.3.7.3.4/STD-28	both	M	1
Facility	4.4.3.7.3.5.11/STD-28	both	M (Note 4)	8-*
Display	4.4.3.7.3.5.24/STD-28	downlink	O (Note 2)	(Note 3)

M Mandatory
O Optional

Note 1: While this message has local significance, it may transfer information of global significance.
Note 2: Included when the network provides information that can be presented to the user.
Note 3: The minimum length of the display information element is 2 octets. The maximum length, either 34 or 82 octets, depends on the network.
Note 4: Instead of this element, the Extended facility information element may be used.

7.1.2 REGISTER (Private standard)

This message is sent by the user or the network to assign a new call reference for non-call associated transactions (see Table 7-3).

For the use of this message ,see section 6.

Table 7-3: Content of REGISTER message

Type of message : REGISTER
Significance : Local (Note 1)
Direction : both
Function channel : SACCH/FACCH

Information element	Reference	Direction	Type	Information length
Protocol discriminator	4.4.3.7.3.2/STD-28	both	M	1
Call reference	4.4.3.7.3.3/STD-28	both	M	2-3
Message type	4.4.3.7.3.4/STD-28	both	M	1
Facility	4.4.3.7.3.5.11/STD-28	both	M (Note 4)	8-*
Display	4.4.3.7.3.5.24/STD-28	downlink	O (Note 2)	(Note 3)

Note 1: While this message has local significance, it may transfer the information of global significance.
Note 2: Included when the network provides information that can be presented to the user.
Note 3: The minimum length of the display information element is 2 octets. The maximum length, either 34 or 82 octets, depends on the network.
Note 4: Instead of this element, the Extended facility information element may be used.

8 General message format and information element coding (Private standard/ Public standard)

This clause should be read in conjunction with section 4.4.3.7.3, RCR STD-28 and contains the coding of the information elements specifically used by the procedures described in this Appendix.

8.1 Message type

The additional codings are defined in Table 8-1 for Message type.

Table 8-1: Message type

Bit 8 7 6 5 4 3 2 1	
0 1 1 - - - - -	Other messages
0 0 0 1 0	FACILITY
0 0 1 0 0	REGISTER (Note)

Note: Private standard

8.2 Other information elements

These information elements are coded in accordance with the general coding rules as specified in section 4.4.3.7.3.5.1, RCR STD-28.

Note: The value of Protocol discriminator shall be the same as that for messages used in RCR STD-28. Table 8-2 shows codepoints assigned to information elements specified in this Appendix.

Table 8-2: Information elements specific to supplementary service control

Bit 8 7 6 5 4 3 2 1		Reference	Max. length (Octets) (Note 1)
0 - - - - - - -	Variable length information element		
0 0 1 1 1 0 1	Extended facility	8.2.3 (Note 5)	(Note 4)
0 0 1 1 1 0 0	Facility	8.2.2	(Note 3)
0 0 1 0 1 0 0	Call state	8.2.1 (Note 5)	3
0 1 1 0 0 1 0	Information request	8.2.6 (Note 5)	3
0 1 0 0 1 1 1	Notification indicator	8.2.7 (Note 5)	(Note 4)
0 1 1 1 0 0 0	Feature activation	8.2.4 (Note 5)	4
0 1 1 1 0 0 1	Feature indication	8.2.5 (Note 5)	5
All other values than above are reserved (Note 2)			

Note 1: The following limits on the variable length information elements will not restrict the future extension of this Appendix.
Note 2: The reserved values with bits 5 to 8 coded “0000” are intended for future information elements for which interpretation at the receiving side is required (Refer to section 5.7.1, Appendix X of RCR STD-28).
Note 3: The maximum length of the Facility information element depends on the application other than on the maximum length of the message.
Note 4: The maximum length of this information element depends on the network.
Note 5: Private standard.

8.2.1 Call state (Private standard)

The Call state information element is coded as shown in Figure 4.4.3.7.8, STD-28. Table 8-3 contains additional values only required for the user in supplementary service control.

Table 8-3: Call state information element

Call state value (Octet 3)

Bit 6 5 4 3 2 1	
0 1 1 1 1 1	Call independent service

8.2.2 Facility (Private standard/ Public standard)

This section defines only the structure and the coding of the Facility information element. Specific procedures describing individual supplementary service are provided in each supplementary service Specification.

The purpose of the Facility information element is to indicate the invocation and operation of supplementary service, identified by the corresponding operation value within the Facility information element.

The Facility information element may be repeated in a given message.

The maximum length of the Facility information element depends on the application other than on the maximum length of the message.

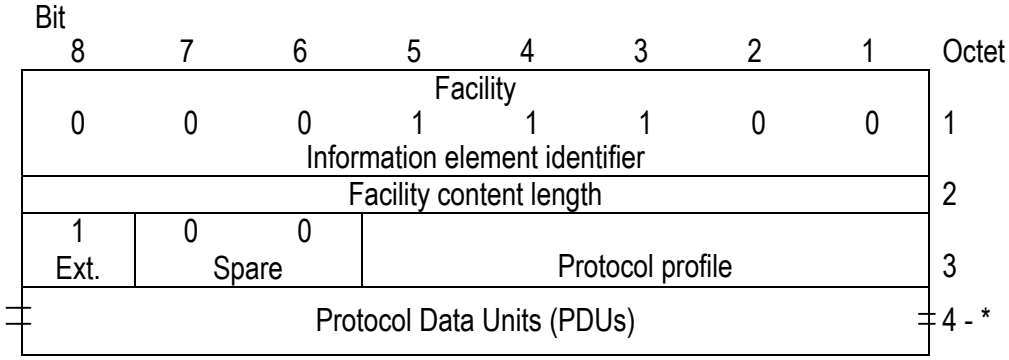


Figure 8-1: Facility information element

Table 8-4: Facility information element

Protocol Profile (Octet 3)

Bit 5	4	3	2	1	
1	0	0	0	1	Remote operation protocol
1	0	0	1	0	Reserved (CMIP protocol)
1	0	0	1	1	Reserved (ACSE protocol)

All other values are reserved and the usage is the subject of other Standard.

8.2.2.1 Remote Operations Protocol

This section defines the PDUs contents for the protocol profile of Remote Operations Protocol. Refer to JT-Q932, TTC Standard for the definition of component.

8.2.3 Extended facility (Private standard)

The Extended facility information element is used when protocol data units (PDUs) to be included in the Facility information element have lengths that make the total length of the Facility information element exceed 255 octets.

As shown in Figure 8-2, only the coding of the length of the Extended facility information element is different from the facility information element. Any other manners of use are the same as the facility information element as described in section 8.2.2.

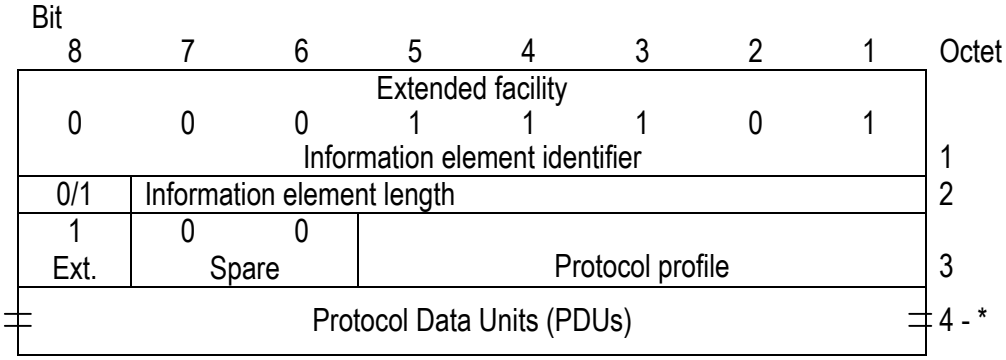


Figure 8-2: Extended facility information element

The length of the Extended facility information element is encoded in the following manner:

1) The information element length octet consists of one octet or more and indicates the number of octets of the information element.

2) For the information element length of 127 octets or less, the length consists of a single octet, where bit 8 is zero and bits 7 to 1 indicate the number of octets of the information element length, with bit 7 as the most significant bit.

3) For the information element length greater than 127 octets, the octet that indicates the information element length consists of an initial octet and one or more subsequent octets. The initial octet is encoded in the following manner:

   a) Bit 8 is 1.
   b) Bits 7 to 1 indicate the number of subsequent octets in the information element length octet, where bit 7 is the most significant bit.
   c) Value $1\ 1\ 1\ 1\ 1\ 1\ 1_2$ cannot be used. This restriction is intended for possible future extensions.

1) Subsequent octets within the information element length octets encode the information element length in the following manner:

   Bits 8 to 1 of the first subsequent octet, followed by bits 8 to 1 of the second subsequent octets followed further by bits 8 to 1 of each subsequent octet, up to and including the last subsequent octet indicate an unsigned binary integer equivalent to the information element length, with bit 8 of the first subsequent octet as the most significant bit.

   Example: The extended facility information element length of 201 octet can be encoded in the following manner:

   1 0 0 0 0 0 0 1
   1 1 0 0 1 0 0 1

8.2.4 Feature activation (Private standard)

The purpose of the Feature activation information element is to invoke a supplementary service identified by the number of feature identifier. The service for the feature identifier number depends on the service profile of the user.

The maximum length of this information element is 4 octets.

The Feature activation information element is encoded as shown in Figure 8-4 and Table 8-5.

Bit 8	7	6	5	4	3	2	1	Octet
Feature activation								
0	0	1	1	1	0	0	0	1
Information element identifier								
Feature activation content length								2
0/1 Ext.	Feature identifier number							3
1 Ext.	Feature identifier number (continuation)							3a

Figure 8-4: Feature activation information element

Table 8-5: Feature activation information element

Feature identifier number (Octets 3 and 3a)

The feature identifier number, encoded as a part of both the feature activation information element and feature indication information element, is a unique number assigned to a feature in a customer account. With this number, the feature being requested or updated is identified. Combination of the number and feature may be different for each user.

Bit 8 in octet 3 is used to extend the feature identifier field. Zero in bit 8 indicates there is a subsequent octet and 1 in it means octet 3 is the last one. The identifier numbers for a one octet field range from 1 to 127. For a multiple number of octet fields, the bit value decreases progressively as the octet number increases.

8.2.5 Feature indication

The purpose of the Feature indication information element is to have the network inform the relevant user about the status of a supplementary service.

The maximum length of this information element is 5 octets.

The Feature indication information element is encoded as shown in Figure 8-5 and Table 8-6.

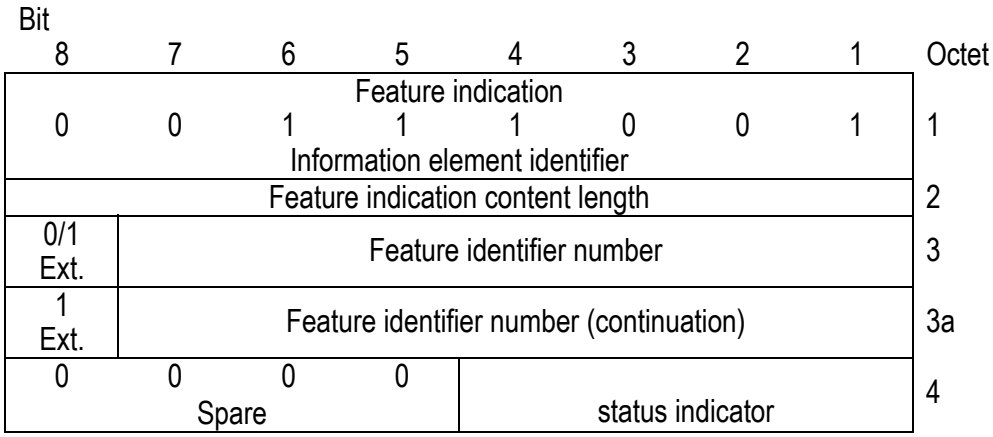


Figure 8-5: Feature indication information element

Table 8-6: Feature indication information element

Feature identifier number (Octets 3 and 3a)

These fields are encoded according to the descriptions in Table 8-5.

Status indicator (Octet 4)

The status of a supplementary service is identified by the status indicator field.

Bit 4 3 2 1	Status	Meaning	Examples of possible user equipment implementation
0 0 0 0	Deactivated	Feature is in the deactivated state	Lamp off
0 0 0 1	Activated	Feature is in the active state	Lamp steady on
0 0 1 0	Prompt	Feature is in the prompt state (waiting for user input)	Lamp steady flash
0 0 1 1	Pending	Feature is pending	Lamp steady wink

All other values than above are reserved.

8.2.6 Information request

The purpose of the Information request information element is to provide the functions of requesting additional information and of notifying completion of the information request (section 2.1.1.3).

The information request information element is encoded as shown in Figure 8-6 and Table 8-7.

The default maximum length of this information element is 3 octets.

Bit 8	7	6	5	4	3	2	1	Octet
0	Information request 0	1	1	0	0	1	0 Information element identifier	1
Length of information request contents								2
1 Ext.	Information request indication		Type of information					3

Figure 8-6: Information request information element

Table 8-7: Information request information element

Information request indicator (Octet 3)

Bit 7	
0	Information request completed
1	Prompt for additional information

Type of information (Octet 3)

Bit 6 5 4 3 2 1	
0 0 0 0 0 0	Undefined
0 0 0 0 0 1	Authorization code
0 0 0 0 1 0	Address digit
0 0 0 0 1 1	Terminal identification

All other values than above are reserved

8.2.7 Notification indicator

The following definition of the Notification indicator information element is to supplement that provided in RCR STD-28 CC.

The Notification indicator information element is used to notify the call-related information. For example, a supplementary service that influences some other users who are related to the call.

The Notification indicator information element is encoded in the manner as shown in Figure 8-7 and Table 8-8.

The maximum length of the information element depends on the application other than on the maximum length of the message.

The Notification indicator information element may be repeated in a message.

Bit 8	7	6	5	4	3	2	1	Octet
0	Notification indicator 0	1	0	0	1	1	1 Information element identifier	1
Length of Notification indicator contents								2
0/1 Ext.	Notification description							3
1 Ext.	Notification description							3a
Data structure encoded in ASN. 1								4 - *

Figure 8-7: Notification indicator information element

Table 8-8: Notification indicator information element

Bit 8 in octet 3 is used to extend the notification description field. Zero in bit 8 indicates there is a subsequent octet and 1 in it means octet 3 is the last one. The indicator numbers for a one octet field range from 1 to 127. For a multiple number of octet fields, the bit value decreases progressively as the octet number increases.

Notification description (Octet 3)

Extension [bit 8 of octet 3] is set to 1

Bit 7 6 5 4 3 2 1	
0 0 0 0 0 0 0	User suspended
0 0 0 0 0 0 1	User resume
0 0 0 0 0 1 1	Discriminator for extension to ASN.1 encoded component (Note)

All other values than above are reserved.

Note: Octet 4 is included only when this value is used.

See JT-Q932 for details.

9 Generic Notification Procedure

9.1 General

9.1.1 Introduction

This section specifies the functional signal procedures that provide notification delivery at the user-network interface. The following properties characterize notifications.

- No change of state is caused on either side of the user-network interface.
- One way flow of information that requires no response.
- Provision of additional information that can be discarded without requiring significant error recovery if notifications are unrecognized by a user.

A generic set of procedures optimized to provide notification delivery at the user-network interface is given thanks to the above listed properties.

This section is organized to comply with the basic call control procedures and especially with the following:

- Section 7: User notification procedures, Appendix X, RCR STD-28

9.1.2 Scope of the procedures

The procedures described in section 9 define the basic methodology for notification delivery at the user-network interface. The application of the entire range of these procedures in the user to network direction requires further study.

9.1.3 Categories of procedures

The type of information contained in the notification classifies the generic procedures for notification delivery.

(1) The delivery of simple notification “indicators” by the notification indicator information element. It also includes the additional codepoints in the Notification indicator information element defined for each supplementary service.
(2) The delivery of the notification “parameters” defined as information element according to the coding scheme defined in section 4.4.3.7.3.5.1 (Note). It also includes the information element defined for each supplementary service.
(3) The delivery of the notification “component” using the extension codepoint in octet 3 of the Notification indicator information element and ASN.1 encoded information in subsequent octets when no response is required (e.g. REJECT).

Option 1 (Delivery of notification “indicator”) will be used when no “parameters” exist. When “parameters” do exist, individual supplementary service will decide the applicable option.

Note: In connection with the delivery of information “parameters,” whether to use the notification indicator information element with the CC information element or not in messages other than the “NOTIFY” message requires further study.

9.2 Call related notifications

9.2.1 Introduction

The generic procedures of call related notifications are extensions that comply with the user notification procedures specified in clause 7, Appendix X, RCR STD-28. According to the procedures specified in section 9.2.2, the network can notify a user of supplementary service related event on an appropriate active call reference. In this context, the call reference is regarded to be active from the initiation of call establishment (including the “SETUP” message) to the completion of call clearing (including the “RELEASE COMPLETE” message). The delivery of notifications using the active call reference of the call the notification is related to is included in these procedures. In addition to those procedures already defined in RCR STD-28, application of these procedures in the user to network direction requires further study.

9.2.2 Procedures

9.2.2.1 Delivery of call related notifications

For the Delivery of call related notifications, use an active call reference and the underlying data link layer connection.

If the delivery of the notification coincide with call establishment or clearing procedures, the notification information can be carried by the related call control messages. Otherwise, the notification information is delivered by the “NOTIFY” message. The three types of notification information defined in section 9.1.3 are provided by those messages.

9.2.2.2 Error processing

If a terminal cannot recognize a “NOTIFY” message information element, a new codepoint or extension contents of the notification indicator information element, it shall handle it in accordance with the procedures in clause 5, Appendix X, RCR STD-28.

9.3 Extension of the notification indicator information element

See 8.2.7.

Appendix AL Standard relating to supplementary service functions within the CS-PS loop (Private standard)

Introduction

This appendix is provided for the radio interface for carrying out supplementary services within the CS-PS loop. In particular, it summarizes the regulations needed when applying private use supplementary services within the CS-PS loop to the "Personal Handy Phone System." Though the regulations are also described later on as all supplementary services have been appended to within the CS-PS loop, they are treated singularly for supplementary services within the CS-PS loop.
“Digital Cordless Telephone Interconnection <SD>” has been established as a technical document that specified a communication protocol, display and operation of digital cordless telephone by Communications and Information network Association of Japan (CIAJ) in connection with supplementary services described in this appendix.

Appendix AL Contents

Chapter 1 General

1.1 Overview

This document establishes definitions of services in the supplementary services that use functional signal procedures for controlling supplementary services at the Um point.

1.2 Application scope

The procedures defined in this chapter are limited to supplementary services closed in the radio interface of the "Personal Handy Phone System."

1.3 System structure

1.3.1 Personal station (PS)

The personal station, as a subscriber communication terminal, is used to make radio communication to cell stations.

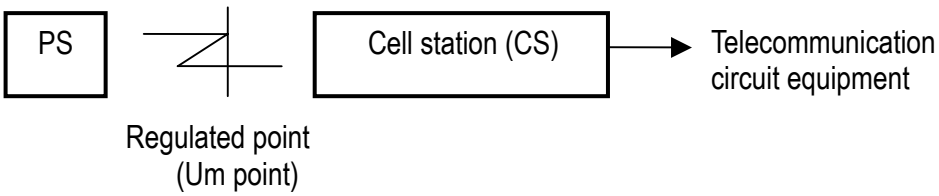
A personal station consists of radio equipment made up of an antenna, transmitter, and receiver; voice coding equipment; and a sending/receiving handset; and control equipment.
Hereinafter unless otherwise noted, in this appendix and in the definitions of the various supplementary services within the CS-PS loop, this shall be expressed as "user", "PS" or "Personal Station."

1.3.2 Cell station (CS)

The cell station carries out radio communication with personal stations.
A cell station consists of radio equipment made up of an antenna, transmitter, and receiver; voice coding equipment; sending/receiving handset; and control equipment.
Hereinafter unless otherwise noted, in this appendix and in the definitions of the various supplementary services within the CS-PS loop, this shall be expressed as "CS" or "Cell Station."

1.3.3 Interface definition

The PS and CS shall be a personal station and cell station that is compliant with these standards, and the regulated point (Um point) of the interface relating to the system shall be the Um point, as shown in Figure 1.3.3-1.



Um point : Interface point between personal station and cell station
Refer to the main text or to this appendix.

Figure 1.3.3-1 Interface point

1.3.4 Basic system functions

This section conforms to the basic function of private system in section 2.3 of the main text.

1.3.5 Services that can be used by this system

Services are limited to supplementary service within the CS-PS loop.
The number of calls held on the PS side in this service is a maximum of two. Also, when an outgoing call is made while communication is in progress, outgoing call processing shall be carried out via hold within the CS-PS loop.

As example of signal flows, an example of sequence of en-bloc sending outgoing call on communication in progress (Figure 1.9.1-1) and an example of sequence of overlap sending (outgoing) call on communication in progress (Figure 1.9.2-1) are shown in section 1.9.

"Supplementary service within the CS-PS loop" indicated in this appendix is supplementary service that is carried out by the PS registered to the CS for the private system and by the CS, and is positioned as a service that is carried out without any contribution to the public network.
All supplementary service included in this standard is service closed within PS and CS.

1.4 Actualization of procedures

Control methods that are required to actualize the supplementary service within the CS-PS loop functions are specified. The first control method is called the common information element procedure, and uses the facility information element.

The second control method carries out notification of the content of the supplementary service within the CS-PS loop on LCCH.

1.5 Control of supplementary service within the CS-PS loop

The following instances sometimes occur for control of supplementary service within the CS-PS loop:

(1) Supplementary service invocation during call setting
(2) Supplementary service invocation during call disconnection
(3) Supplementary service invocation relating to calls while communication is in progress
(4) Supplementary service invocation not relating to established calls
(5) Cancellation of invoked supplementary services and notification to supplementary service startup side
(6) Notification of supplementary services by LCCH

Correspondence between supplementary service relating to calls and calls that are the subject of control are provided using the call reference of the call that is to be controlled.

Correspondence between invocations of supplementary service that is not related to calls and responses to these invocations is linked by a combination of the call reference of the message accompanying the facility information element and the invoke identifier in the facility information element.

1.6 Auxiliary status for supplementary service

Auxiliary status is introduced to assure the synchronicity of status between the user and the service provider. Also, two statuses for each of the calls exist to handle all of the concepts in supplementary services in an integrated manner. If these states are conceptualized, a 2-dimensional space is established.

This status space can be expressed by two coordinates. In other words, one is the coordinates of call states of standard STD-28, and the other is the coordinates of auxiliary states relating to hold within the CS-PS loop or other supplementary service.

When a call state of standard STD-28 occurs, the former coordinates are updated. When the call migrates to a hold within the CS-PS loop state or other supplementary service, the latter coordinates are updated. When the hold within the CS-PS loop or the call of the supplementary service is reconnected, the format coordinates are updated again. Accordingly, the call state of standard STD-28 maintains the status while communication is in progress, and the auxiliary status of each supplementary service is generated and changes under these states.

1.7 Definition of operation classes

In accordance with the remote control model defined by recommendation X.219, operation classes are classified according to whether or not it is preferable to control (invoke) these supplementary services and give a response (report the results).

- In the case of success and failure (A result response is returned if the invocation is successful, and an error response is returned if the invocation fails.)
- In the case of failure only (A response is not returned if the invocation is successful, and an error response is returned if invocation fails.)
- In the case of success only (A result response is returned if invocation is successful, and an error response is not returned if invocation fails.)
- In the case of neither (Results or error responses are not returned whether the invocation is successful or not.)

The following Operation Classes are specified:

Operation Class 1 Report of synchronization, success and failure (results and errors)
Operation Class 2 Report of asynchronization, success and failure (results and errors)
Operation Class 3 Report of only asynchronization and failure (error) if any
Operation Class 4 Report of only asynchronization and success (result)
Operation Class 5 Asynchronization and results are not reported.

The Operation Classes in each of the operations in these supplementary services are described separately in each of the supplementary service within the CS-PS loop definitions.

1.8 Timer regulations used in supplementary services within the CS-PS loop

The timer values specified by supplementary services within the CS-PS loop are specified. For timers other than these timer values, the timer values in the main text are applied. Further, these timers are used independently for each supplementary service.

CC PS side timer

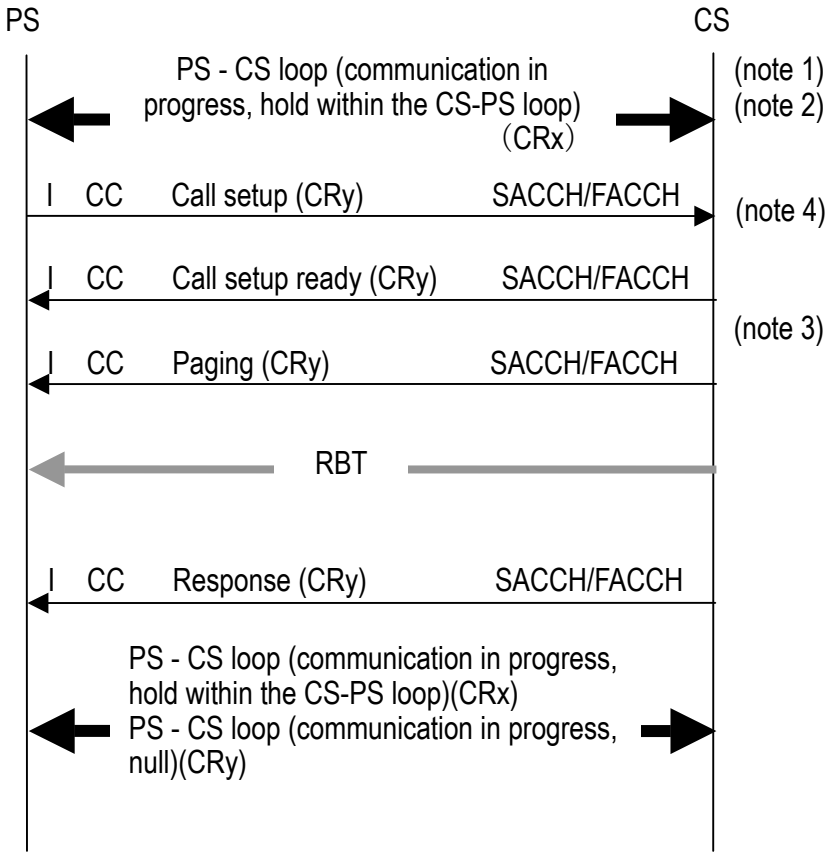
Table 1.8-1 CC PS side timer values

Timer Number	Timer Value	Call State	Start Conditions	Normal Stop Conditions	Time Out (at retry)	Time Out (at retry out)	Mandatory/Option	
							Timer	Timer Value
TC331P	4 sec.	Communication in progress	When facility (start/end of supplementary service) is sent	When return result of facility (start/end of supplementary service), error and reject are received	Facility (start/end of supplementary service) may be sent several times	Facility (start/end of supplementary service) may be sent several times	Mandatory	Mandatory

1.9 Reference

1.9.1 Example of sequence of en-bloc sending outgoing call on communication in progress

The following shows the sequence of en-bloc sending outgoing call on communication in progress.

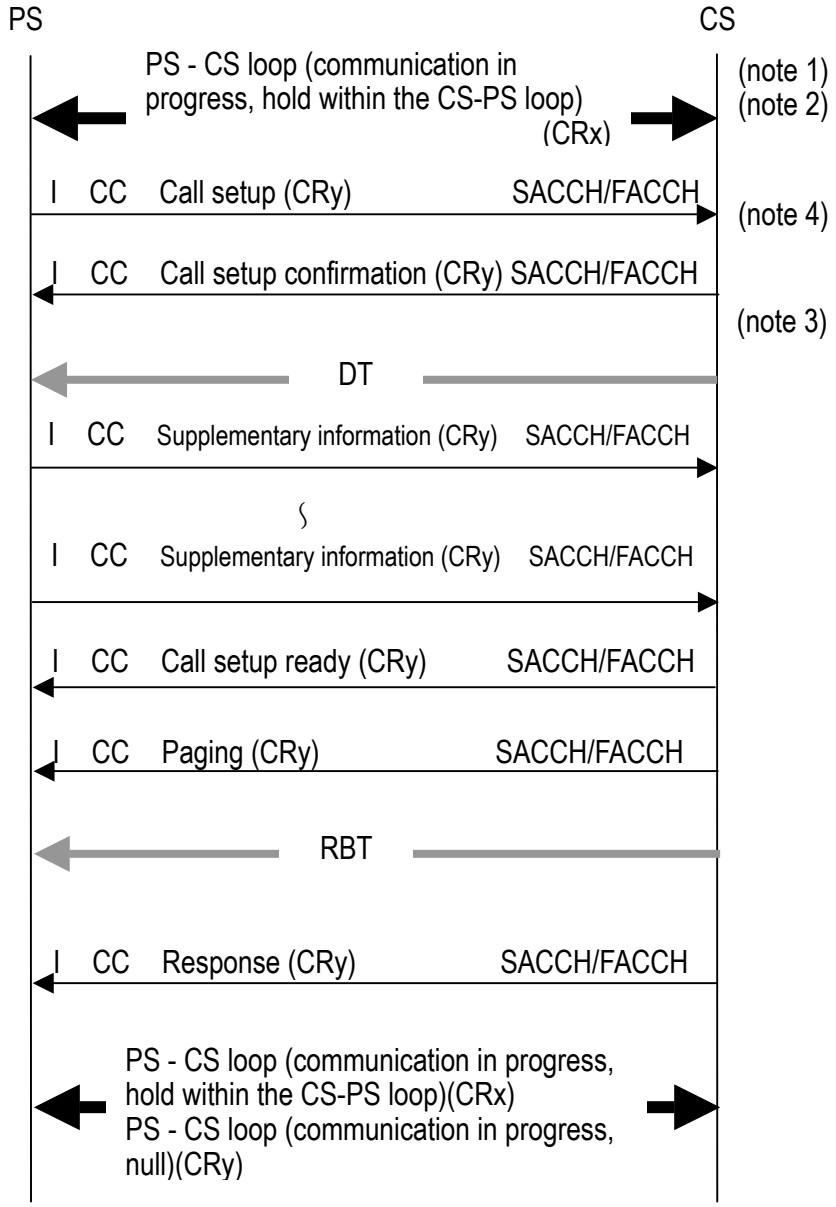


(Note 1) Here, the call reference of calls of communication in progress shall be "x(CRx)" and the call reference of new calls that occur while communication is in progress shall be "y(Cry)".
(Note 2) When an outgoing call is made while communication is in progress, the call must via the hold within the CS-PS loop.
(Note 3) When an outgoing call is made while communication is in progress, the RT message and the MM message are omitted.
(Note 4) FACCH can be used only when the setup of the layer 2 multi-frame acknowledged operation mode of FACCH is completed before this message is sent.

Figure 1.9.1-1 Example of sequence of en-bloc sending outgoing call on communication in progress

1.9.2 Example of sequence of overlap sending (outgoing) call on communication in progress

The following shows the sequence of overlap sending (outgoing) call on communication in progress.



(Note 1) Here, the call reference of calls of communication in progress shall be "x (CRx)" and the call reference of new calls that occur while communication is in progress shall be "y (CRy)".
(Note 2) When an outgoing call is made while communication is in progress, the call must via the hold within the CS-PS loop.
(Note 3) When an outgoing call is made while communication is in progress, the RT message and the MM message are omitted.
(Note 4) FACCH can be used only when the setup of the layer 2 multi-frame acknowledged operation mode of FACCH is completed before this message is sent.

Figure 1.9.2-1 Example of sequence of overlap sending (outgoing) call on communication in progress

Chapter 2 Supplementary service definition

2.1 Hold within the CS-PS loop supplementary service (Private standard)

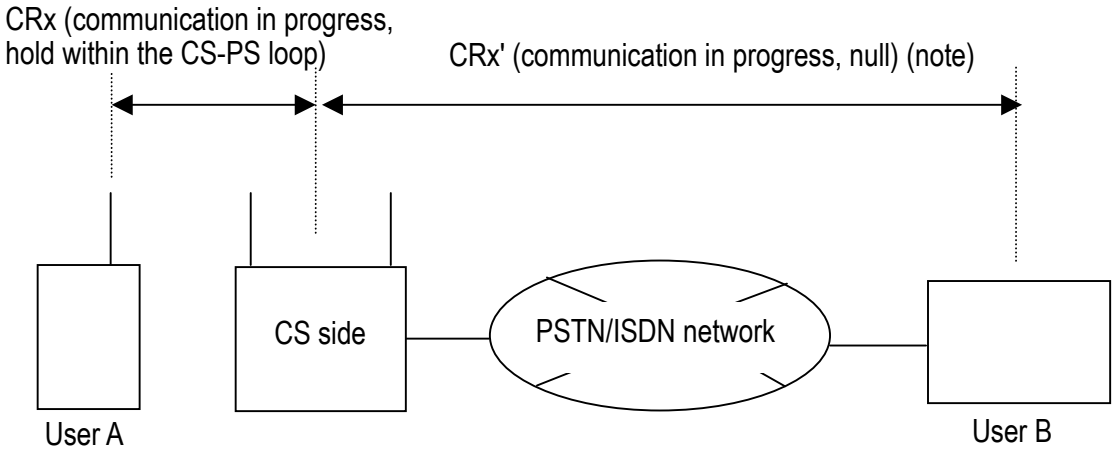
2.1.1 Definition

Hold within the CS-PS loop is a service that enables the communication of calls set by the user between a terminal and CS that does not include a public network to be temporarily interrupted or resumed. As other calls within the CS-PS loop can be originated, and outgoing calls and incoming calls that would not close in the CS can be made, the radio channel that was used for the interrupted call is provided as it is to the user who requested hold after communication is interrupted. Hold within the CS-PS loop includes a termination function of hold within the CS-PS loop that re-establishes communication on the radio channel between the user receiving the service and the user that is on hold.
This service corresponds to remote operation class 2 that is started up from the user at all times.

(Note) ・ Services that simultaneously set two or more calls to hold within the CS-PS loop for users registered to the same CS are outside the scope of this standard.
・ This service specifies the provision of hold within the CS-PS loop in the CS. The provision of services in a public network is outside the scope of this standard.

2.1.2 Service model

Services are shown in the following Figure 2.1.2-1.



(Note) Sometimes the call reference is not available.

Figure 2.1.2-1 Service model

2.1.3 Detailed description of supplementary service

2.1.3.1 Overview

When hold within the CS-PS loop is started up, communication on the radio channel is interrupted, and that radio channel is released from use by the call that is already set.
The radio channel is provided to the user in that state as it is so that the terminal on which hold within the CS-PS loop was started up can be used.

When the user (identified by the terminal) has put the call on hold within the CS-PS loop, the radio channel must be in a state that enables use by the user at all times so that that call can be canceled from hold within the CS-PS loop, or another call can be set, canceled or connected as long as the user or the communication party does not disconnect that call.

When the user that has specified hold within the CS-PS loop desires resetting of communication, termination of hold within the CS-PS loop is requested.

2.1.3.2 Special terms

- Service provider

  "Service provider" referred to here is either someone who manages the system on the CS side, or is sometimes the CS side itself.

- User provided with service

  The user that has the initiative for starting up hold within the CS-PS loop, or the user that started up the service. This user shall be user A.

- Remote user

  The side receiving hold within the CS-PS loop. This user shall be user B.

2.1.3.3 Restrictions in application to telecommunication service

This supplementary service is applied to telephone service and voice/3.1 kHz audio bearer service.
This supplementary service cannot be applied to non-voice services.

2.1.3.4 Procedure

2.1.3.4.1 Provision/cancellation of service

Hold within the CS-PS loop can be provided or used at all times after a prior arrangement with the service provider.

Hold within the CS-PS loop can be used independently. Also, hold within the CS-PS loop can sometimes be used together with another supplementary service.

Cancellation of hold within the CS-PS loop is carried out when there is a user request or due to a reason from the service provider.

2.1.3.4.2 Sequence startup and operation

It is based on the following premise here.

Conversation between user A and the CS side (call of connected user B) uses call reference "x" in "(communication in progress, hold within the CS-PS loop)." (CRx)

2.1.3.4.2.1 Start and end of hold within the CS-PS loop

2.1.3.4.2.1.1 Regular operation

After the call has received the response on the outgoing call user side, the hold within the CS-PS loop state is established by sending the "facility" message containing the hold within the CS-PS loop initiation invoke component at any time before that call is interrupted.

After the call has responded on the incoming call user side, the hold within the CS-PS loop state is established by sending the "facility" message containing the hold within the CS-PS loop initiation invoke component by the incoming call user at any time up to start of the call disconnection operation.

The CS side receives this request and starts up hold within the CS-PS loop, and returns the "facility" message containing the initiation of hold within the CS-PS loop return result component within the facility information element. Next, communication on the radio interface is interrupted. The service provider acknowledges this operation, and the same user can use the radio channel in question for another application. As an option, CS can notify user A and the side that is put on hold (user B) that the hold within the CS-PS loop state is established by starting the in-band tone.

2.1.3.4.2.1.2 Exceptional procedure

2.1.3.4.2.1.2.1 PS side

When user A has received the "facility" message containing the return error component or reject component after the "facility" message containing the hold within the CS-PS loop initiation invoke component has been sent, hold within the CS-PS loop is not initiated, and communication in progress is maintained.

2.1.3.4.2.1.2.2 Private PHS (NW)

When the CS already has two or more holds within the CS-PS loop, and has received the "facility" message containing the hold within the CS-PS loop initiation invoke component, the CS should reject the hold within the CS-PS loop, and return the "facility" message containing the reason indication "service provision impossible state" error component to user A.

When the CS receives the "facility" message containing the hold within the CS-PS loop initiation invoke component while communication is in progress and that cannot be accepted, the CS should return a "facility" message containing an error component that includes one of the following reason indications to user A:

- User non-contracted
- Provision impossible
- Information contents insufficient
- Service provision impossible state
- Supplementary service interaction not allowed
- Procedure error

When the CS has received the "facility" message containing the hold within the CS-PS loop initiation invoke component from the same user A with hold within the CS-PS loop still being carried out on the same call, CS should return a "facility" message containing the "service provision impossible by basic service" as the error indication to user A.

2.1.3.4.3 Management of hold within the CS-PS loop

User provided with service: The following operations are possible for user provided with services during hold within the CS-PS loop:

1) Termination of hold within the CS-PS loop
2) Disconnection

2.1.3.4.3.1 Regular processing

2.1.3.4.3.1.1 Termination of hold within the CS-PS loop

When the user that started up hold within the CS-PS loop has sent the "facility" message containing the hold within the CS-PS loop termination invoke component of that call, the service provider resets communication, and as an option the CS can notify the user and the side that is put on hold that the hold within the CS-PS loop termination state is established by stopping the in-band tone.

2.1.3.4.3.1.2 Disconnection of hold within the CS-PS loop

User A sends the "disconnection" message containing the appropriate call reference to the CS side so that the user that started up hold within the CS-PS loop disconnects that call.

・ When the disconnection message containing the call of the hold within the CS-PS loop is received, CS returns the release message to user A, and the resource of the call of the hold within the CS-PS loop is released.

2.1.3.4.4 Exceptional procedure

2.1.3.4.4.1 PS side

When user A has received a "facility" message containing the return error component or reject component after sending a "facility" message containing the hold within the CS-PS loop termination initiation invoke component during a hold within the CS-PS loop, the hold within the CS-PS loop state is maintained.

2.1.3.4.4.2 Private PHS (NW)

When the CS has received a "facility" message containing the hold within the CS-PS loop termination initiation invoke component of a call reference that is not in the hold within the CS-PS state, the CS should return a "facility" message containing the "service provision impossible by basic service" as the error indication to the user.

2.1.3.4.5 Request from remote user side during hold within the CS-PS loop

Release of hold within the CS-PS loop:
When the call is being held within the CS-PS loop, that call can be disconnected from either side.

2.1.3.5 Substitution procedure

None identified.

2.1.3.6 Functions for charge

This standard does not cover charging principles.

2.1.3.7 Mutual effect with other supplementary service

2.1.3.7.1 Call transfer within the CS - PS loop

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

2.1.3.7.2 Call waiting within the CS-PS loop

This is compatible with any supplementary service and does not adversely influence other supplementary services. No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

2.1.3.7.3 Conference call within the CS-PS loop

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

2.1.3.7.4 Hold within the CS-multiple PS

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

2.1.3.7.5 Hold within the CS-PS loop

When the hold within the CS-PS loop is provided to both users (users registered to a single CS) participating in a single call, each of the users can put on hold or cancel that call regardless of operation by the other user. Also, when a service outside of the permitted scope is requested, or the user already included in the hold within the CS-PS loop has made the same request, the CS applies the procedures described in 2.1.3.4.2.1.2.2, and sends the error indication "supplementary service whose mutual effect is not permitted" to the "facility" message containing the error component.

2.1.3.7.6 Call type notification within the CS-PS loop

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

2.1.3.7.7 PS remote control function within the CS-PS loop

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

2.1.3.8 Mutual effect with handover

None identified.

2.1.3.9 Request condition by mutual connection

2.1.3.9.1 Mutual connection with public network

The operation of this feature is not affected by the nature (i.e. integrated services digital network (ISDN) or non-ISDN) of the far end of the connection.

2.1.3.10 Notification identifier information element

None identified.

2.1.3.11 Dynamic description

The following shows the SDL diagram.

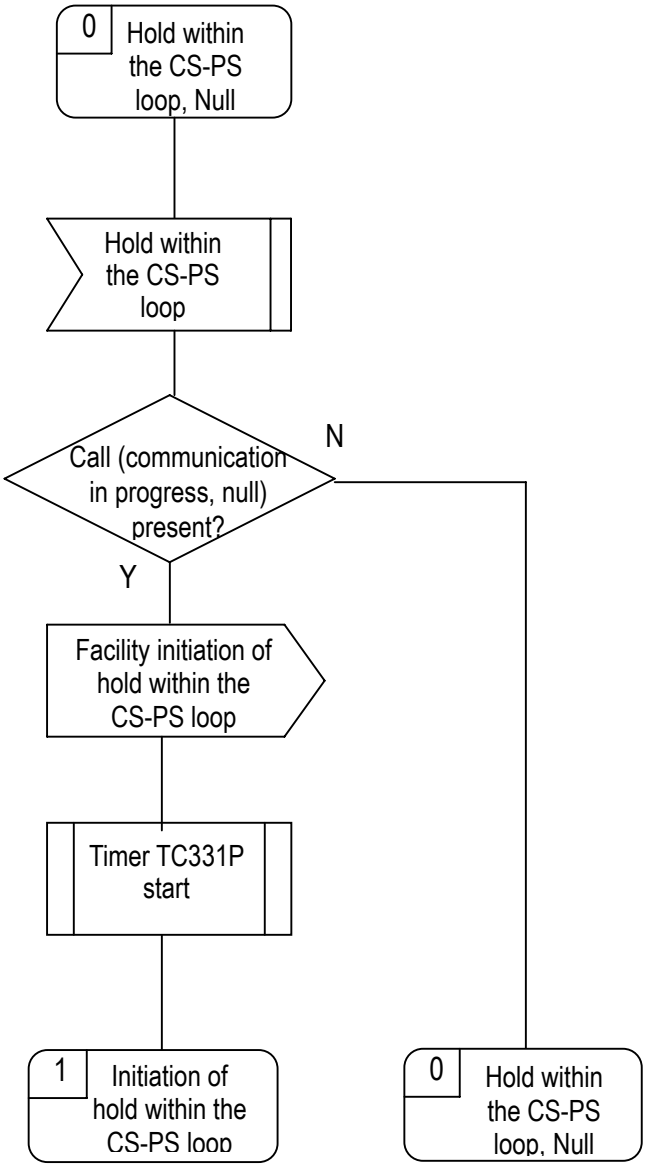


Figure 2.1.3.11-1 SDL diagram (PS side) (1/4)

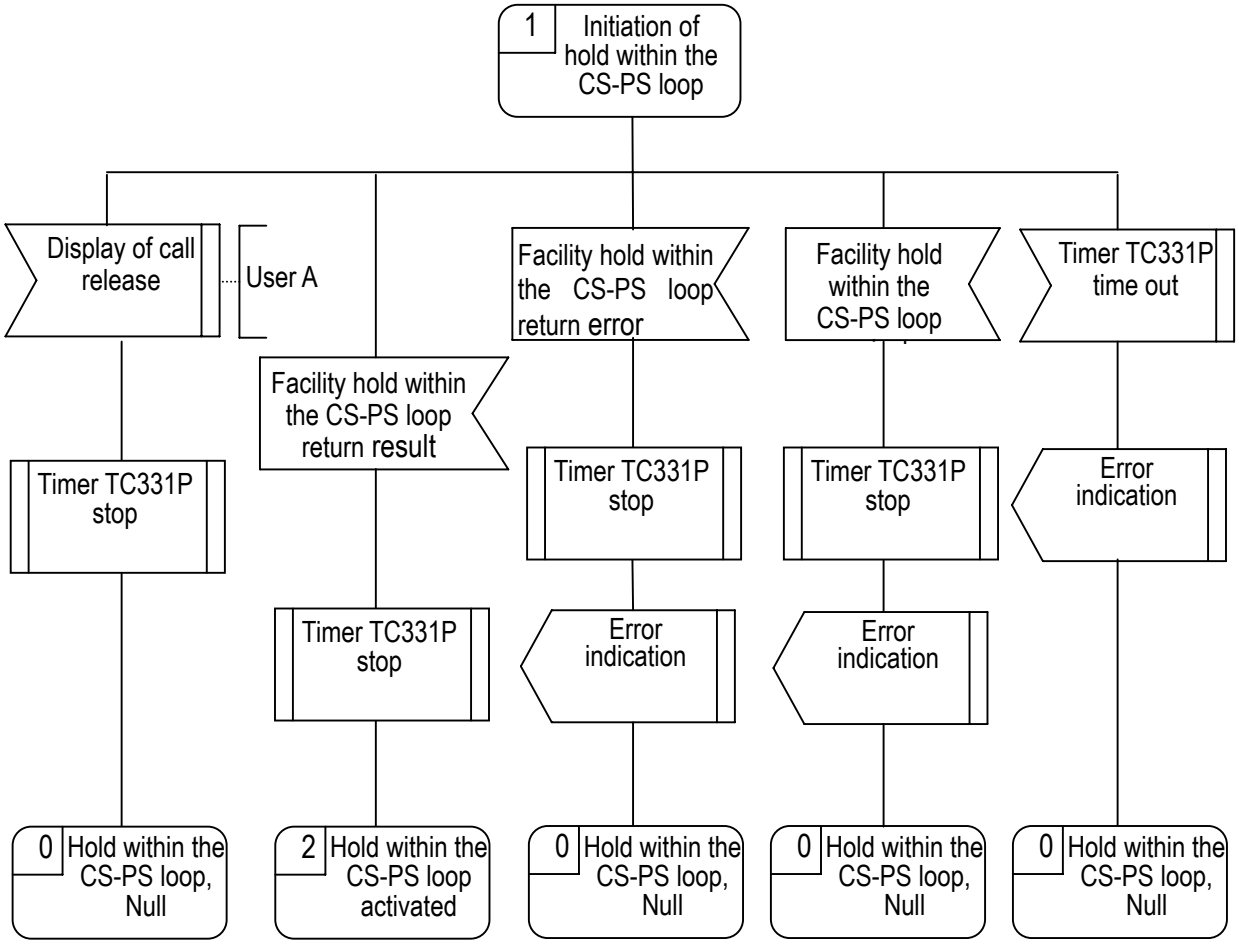


Figure 2.1.3.11-2 SDL diagram (PS side) (2/4)

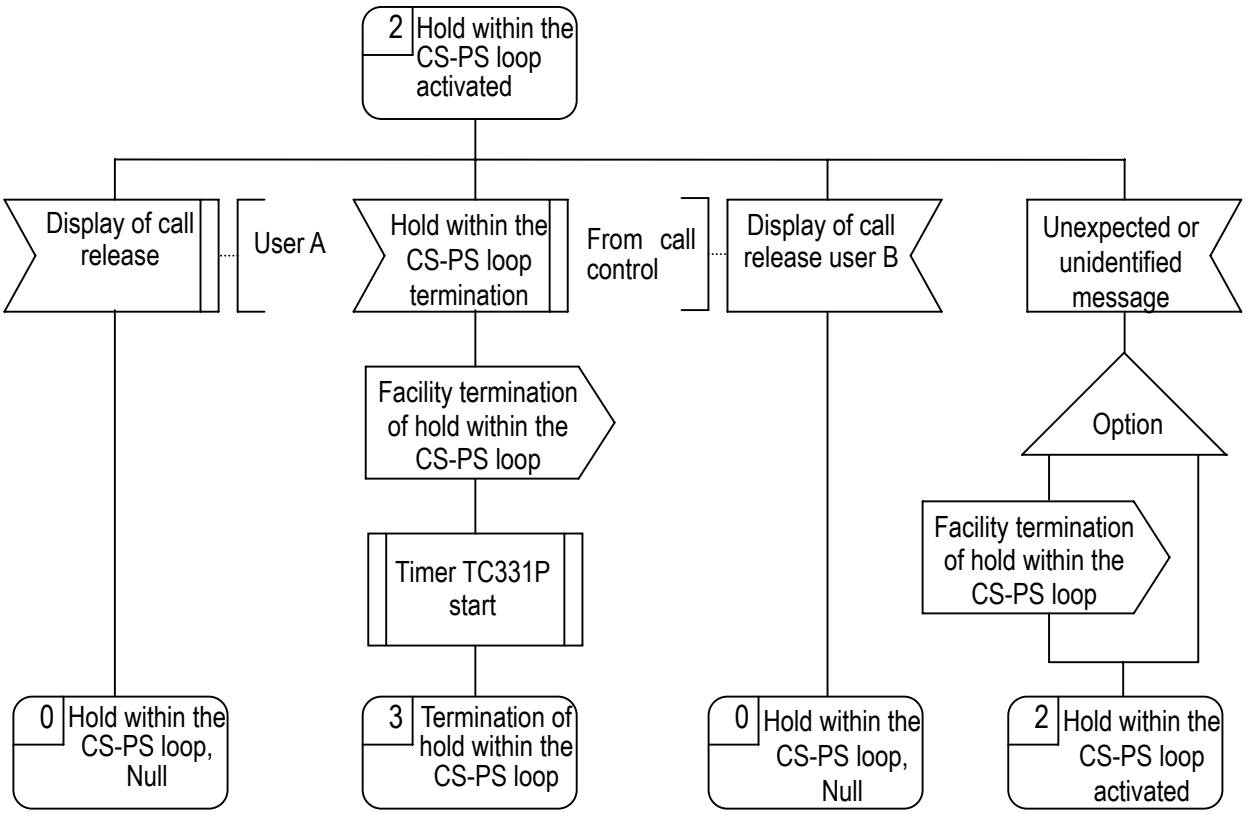


Figure 2.1.3.11-3 SDL diagram (PS side) (3/4)

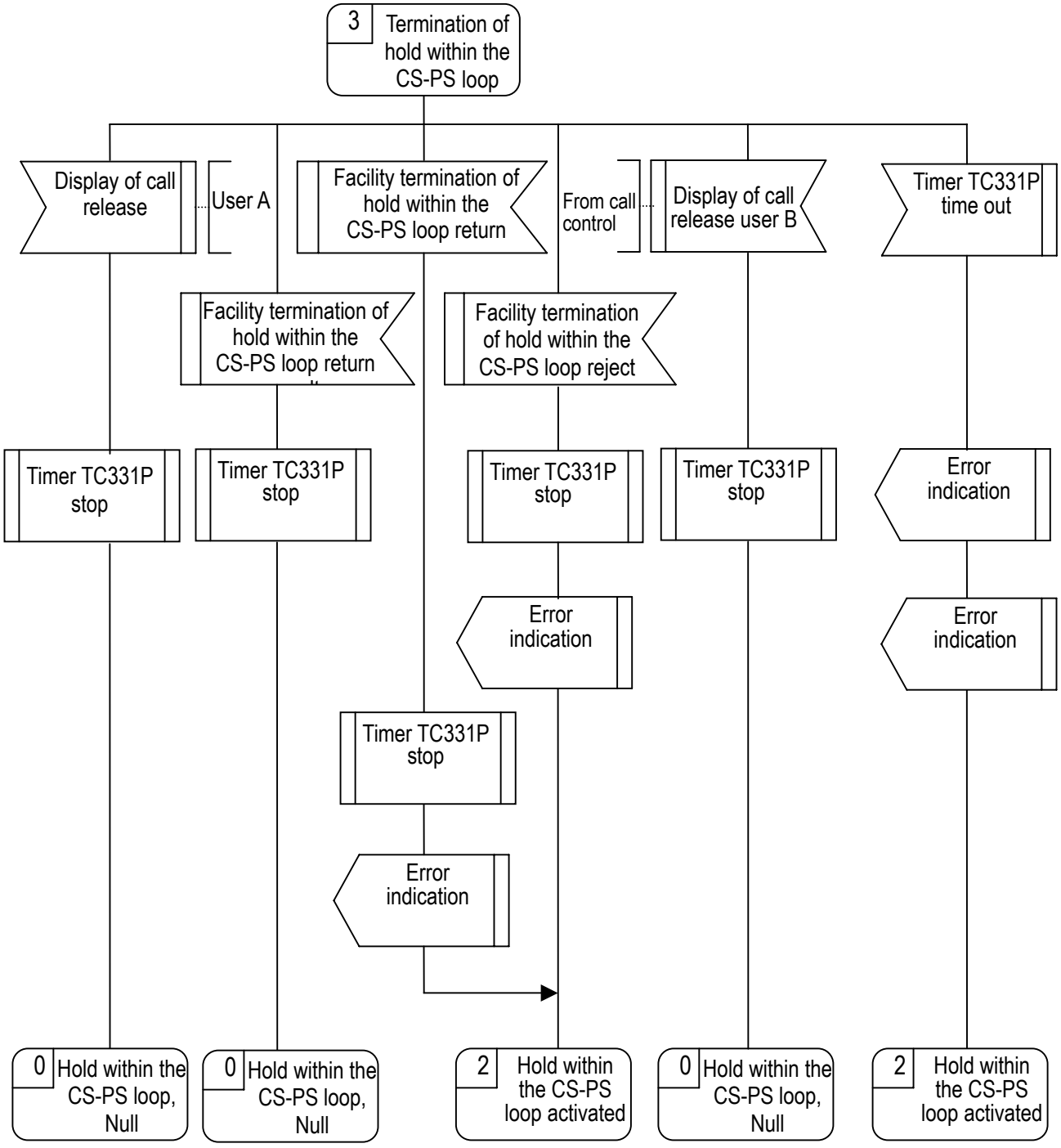


Figure 2.1.3.11-4 SDL diagram (PS side) (4/4)

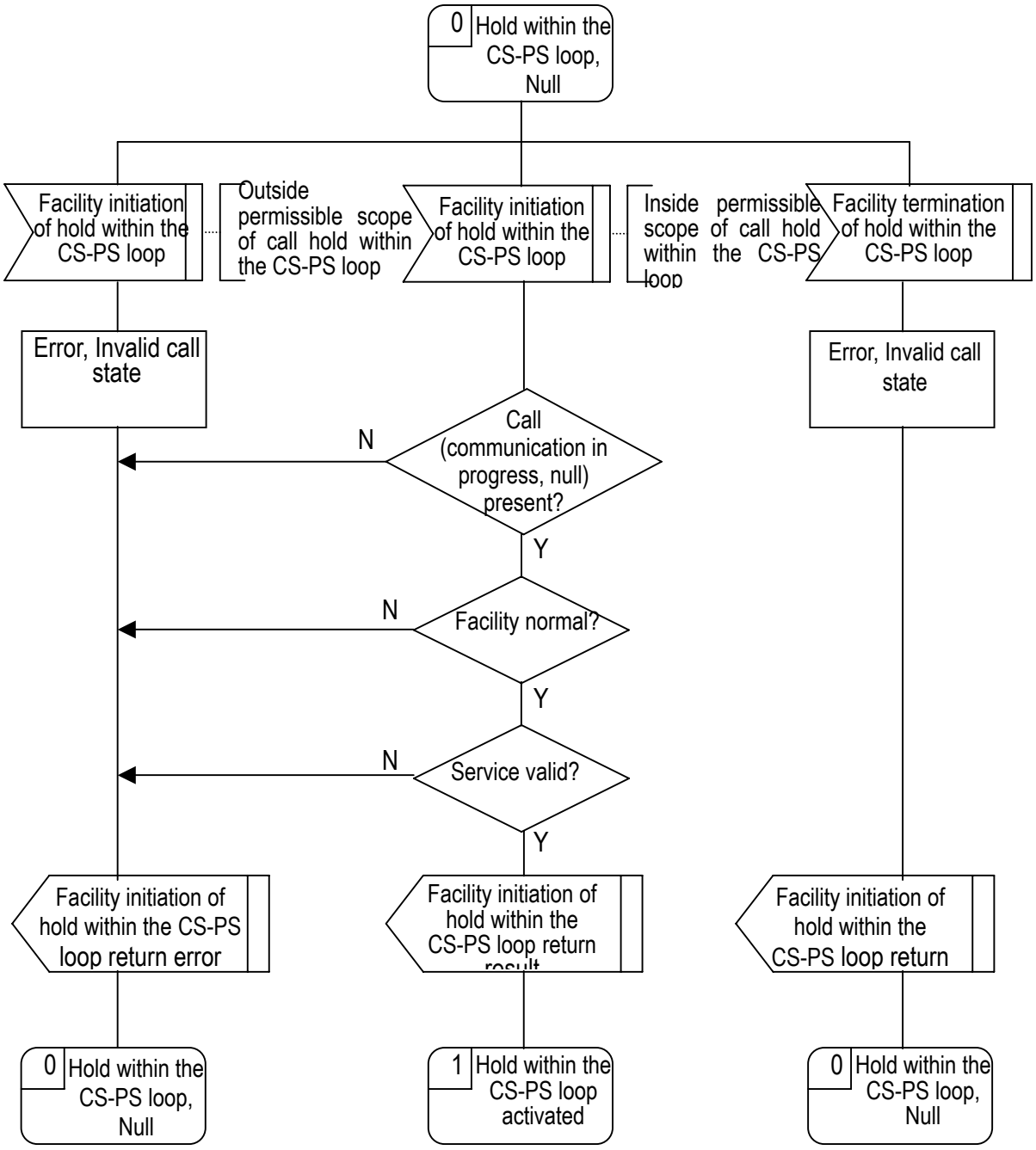


Figure 2.1.3.11-5 SDL diagram (CS side) (1/2)

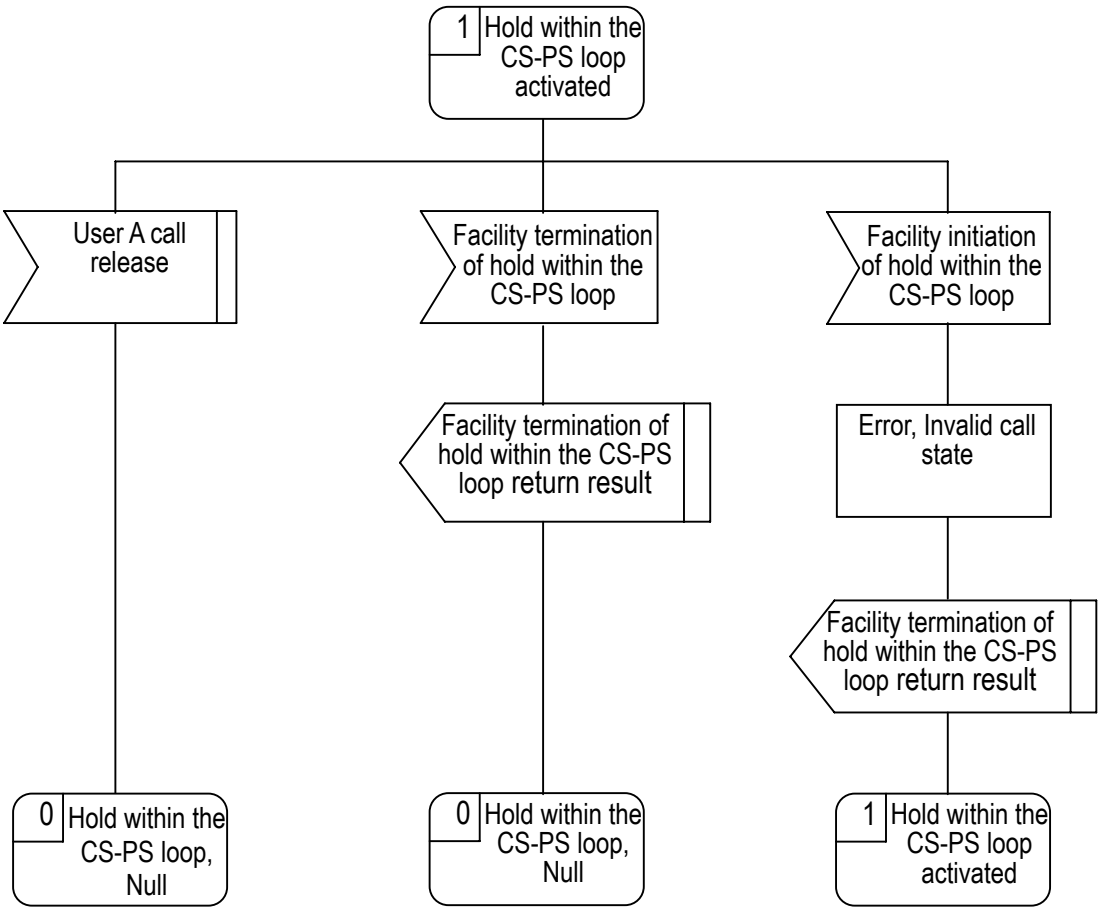


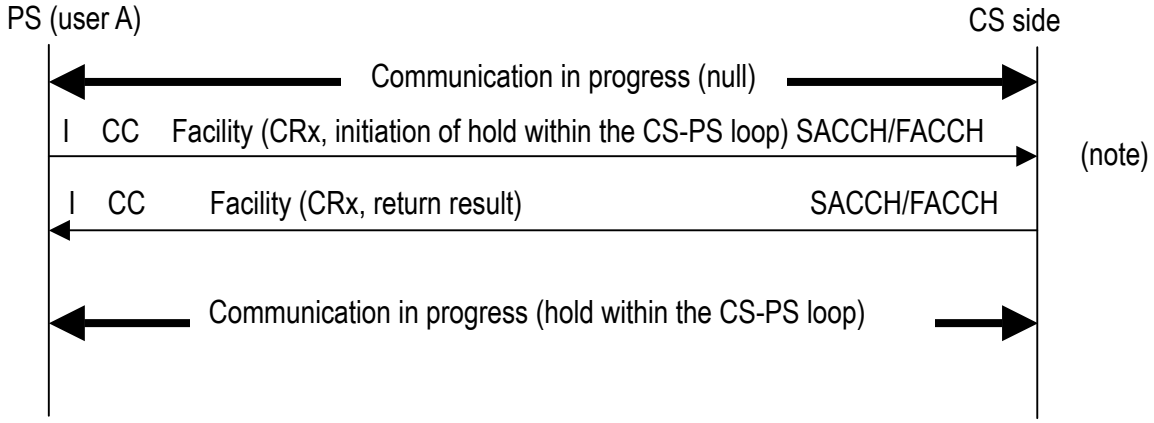
Figure 2.1.3.11-6 SDL diagram (CS side) (2/2)

2.1.3.12 Flow of signal

Refer to Figures 2.1.3.12.1-1 to 2.1.3.12.8-1.

2.1.3.12.1 Initiation of hold within the CS-PS loop

An example of the sequence when hold within the CS-PS loop is carried out is shown in Figure 2.1.3.12.1-1.

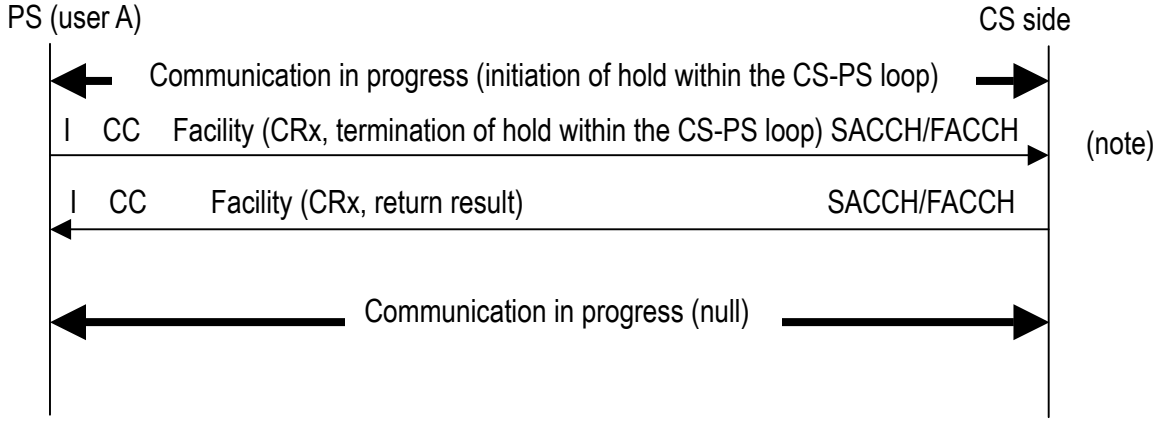


(Note) FACCH can be used only when the setup of the layer 2 multi-frame acknowledged operation mode of FACCH is completed before this message is sent.

Figure 2.1.3.12.1-1 Initiation of hold within the CS-PS loop

2.1.3.12.2 Termination of hold within the CS-PS loop

An example of the sequence when hold within the CS-PS loop is canceled is shown in Figure 2.1.3.12.2-1.

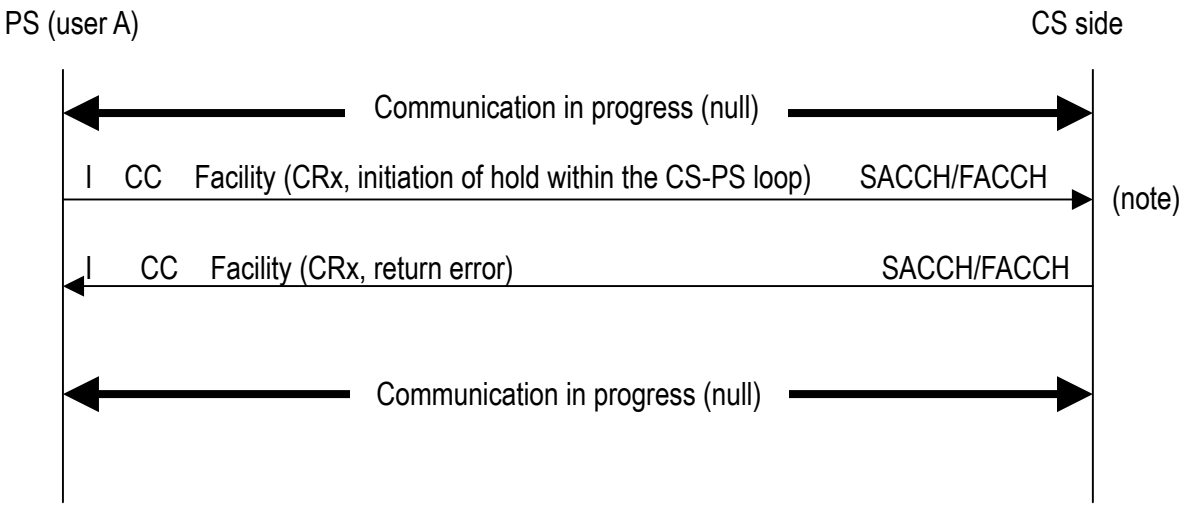


(Note) FACCH can be used only when the setup of the layer 2 multi-frame acknowledged operation mode of FACCH is completed before this message is sent.

Figure 2.1.3.12.2-1 Termination of hold within the CS-PS loop

2.1.3.12.3 Rejection of initiation of hold within the CS-PS loop

An example of the sequence that is rejected from CS when a hold within the CS-PS loop is carried out is shown in Figure 2.1.3.12.3-1.

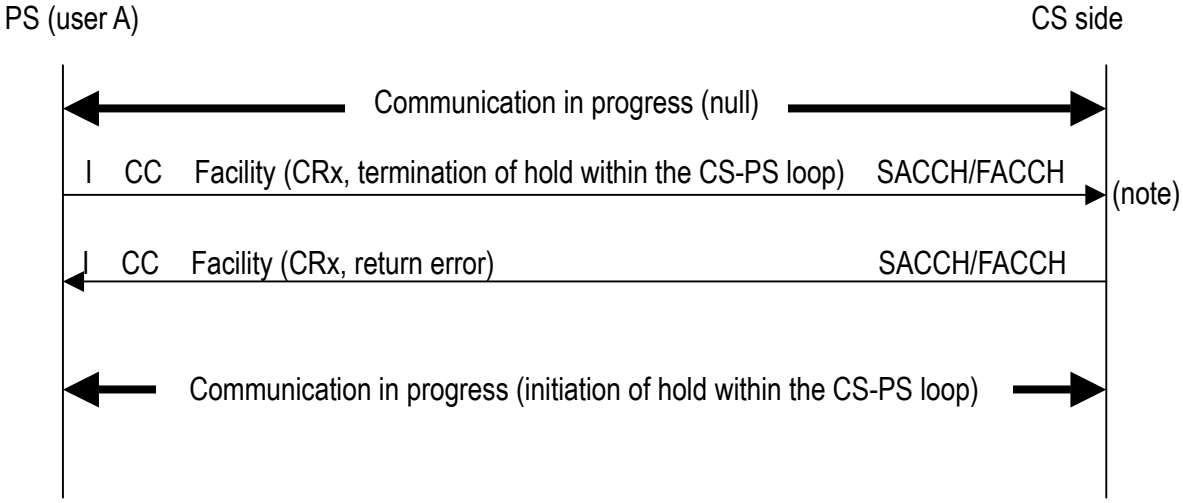


(Note) FACCH can be used only when the setup of the layer 2 multi-frame acknowledged operation mode of FACCH is completed before this message is sent.

Figure 2.1.3.12.3-1 Rejection of initiation of hold within the CS-PS loop

2.1.3.12.4 Rejection of termination of hold within the CS-PS loop

An example of the sequence that is rejected from CS when a hold within the CS-PS loop is terminated is shown in Figure 2.1.3.12.4-1.

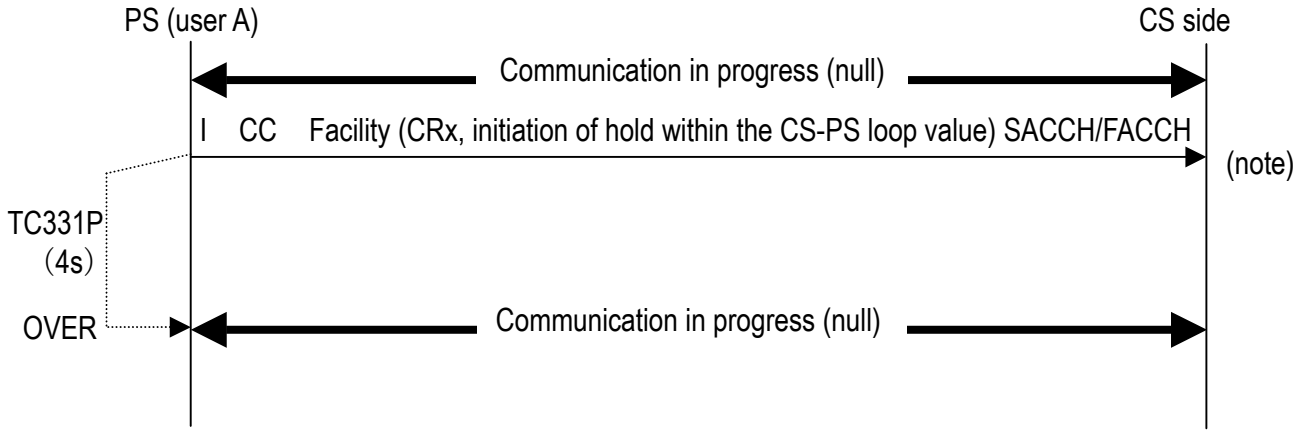


(Note) FACCH can be used only when the setup of the layer 2 multi-frame acknowledged operation mode of FACCH is completed before this message is sent.

Figure 2.1.3.12.4-1 Rejection of termination of hold within the CS-PS loop

2.1.3.12.5 No return value of initiate hold within the CS-PS loop

An example of the sequence when a hold within the CS-PS loop is carried out and the expected return value is not returned from CS is shown in Figure 2.1.3.12.5-1.

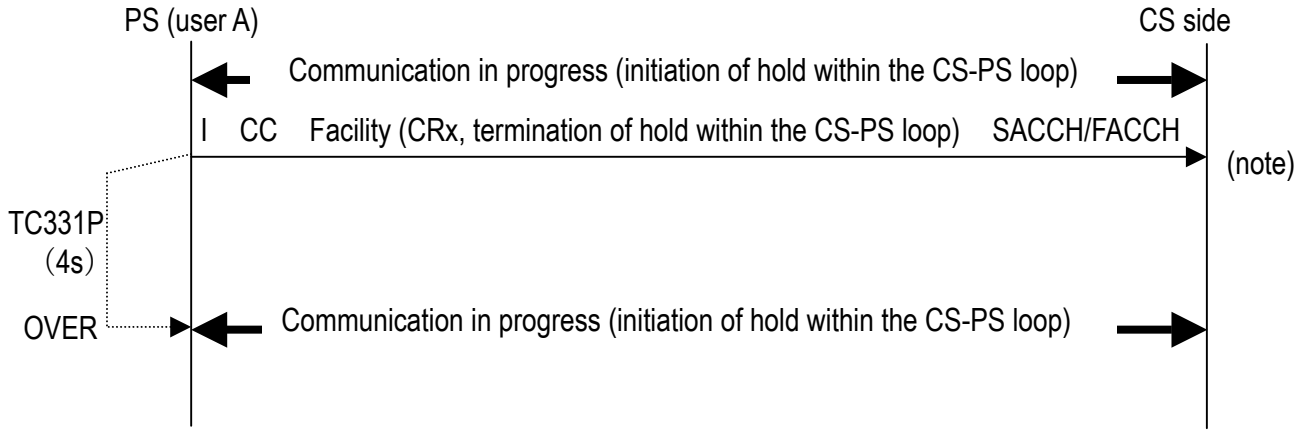


(Note) FACCH can be used only when the setup of the layer 2 multi-frame acknowledged operation mode of FACCH is completed before this message is sent.

Figure 2.1.3.12.5-1 No initiation of hold within the CS-PS loop return value

2.1.3.12.6 No return value of completion hold within the CS-PS loop

An example of the sequence when a hold within the CS-PS loop is canceled and the expected return value is not returned from CS is shown in Figure 2.1.3.12.6-1.



(Note) FACCH can be used only when the setup of the layer 2 multi-frame acknowledged operation mode of FACCH is completed before this message is sent.

Figure 2.1.3.12.6-1 No termination of hold within the CS-PS loop return value

2.1.3.12.7 Disconnection on PS side during hold within the CS-PS loop

An example of the sequence when disconnection is carried out from the PS side during hold within the CS-PS loop is shown in Figure 2.1.3.12.7-1.

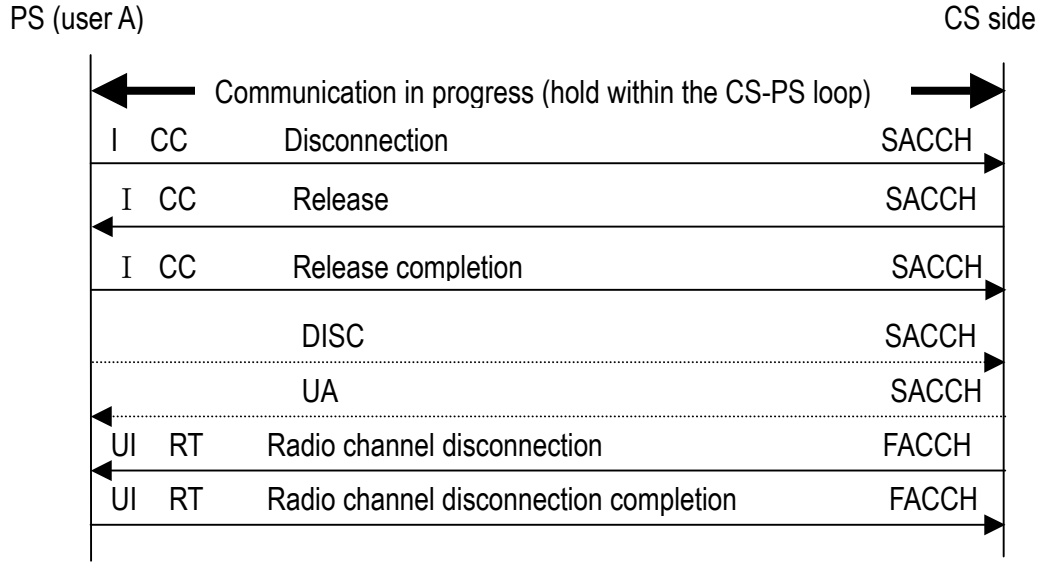


Figure 2.1.3.12.7-1 Disconnection on PS side during hold within the CS-PS loop

2.1.3.12.8 Disconnection on CS side during hold within the CS-PS loop

An example of the sequence when disconnection is carried out from the CS side during hold within the CS-PS loop is shown in Figure 2.1.3.12.8-1.

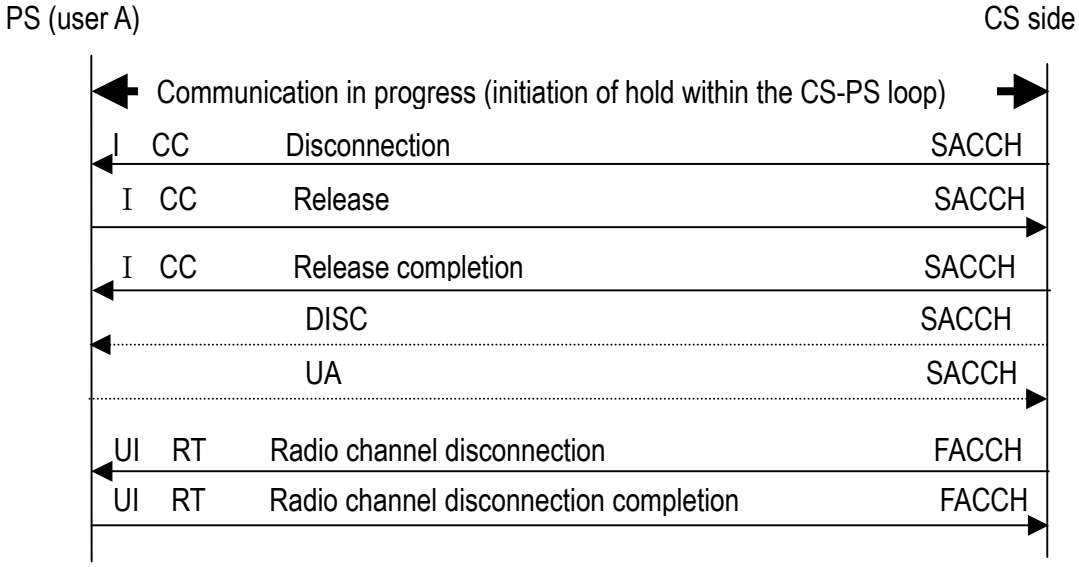


Figure 2.1.3.12.8-1 Disconnection on CS side during hold within the CS-PS loop

2.1.3.13 Coding method

The invoke components for hold within the CS-PS loop supplementary service is shown below.

Octet	Bit 8	7	6	5	4	3	2	1	
4	1	0	1	0	0	0	0	1	
	Component type tag								
5	Component length (note 1)								
6	0	0	0	0	0	0	1	0	
	Invoke identifier tag								
7	Invoke identifier length (note 2)								
8	Invoke identifier								(note 4)
12	0	0	0	0	0	1	1	0	
	Operation value tag								
13	Operation value length (note 3)								
14a	0	0	0	0	0	0	1	0	(note 5)
14b	1	0	0	0	0	0	1	1	
14c	0	0	1	1	1	0	0	0	
14d	1	0	0	0	1	1	0	0	
14e	1	0	0	1	1	0	1	0	
14f	0	1	0	1	1	1	0	0	
14g	0	1	0	0	0	0	0	1	
14h	0	0	0	0	0	0	0	1	
14i	0	Hold within the CS-PS loop							

(Note 1) The component length is coded to indicate the number of octets contained in the component (excluding component type tag and component length octets).
(Note 2) The invoke identifier length is coded to indicate the number of octets of the invoke identifier.
(Note 3) The operation value length is coded to indicate the number of octets of the object identifier specified by RCR.
(Note 4) Octets 9 - 11 are not sent.
(Note 5) Octets 14a - 14i are the object identifiers (hold within the CS-PS loop) specified by RCR.

Hold within the CS-PS loop (octet 14i)

Bit 7	6	5	4	3	2	1	
0	0	1	0	0	0	1	Initiation of hold within the CS-PS loop (cshldstart)
0	0	1	0	0	1	0	Termination of hold within the CS-PS loop (cshldend)

2.1.3.14 Parameter value

None identified.

2.2 Call Transfer within the CS-PS loop supplementary service (Private standard)

2.2.1 Definition

Call transferring within the CS-PS loop is an supplementary service to transfer a call set by the user to a third party. This service corresponds to remote operation class 2 which is always activated by the user.

(Note) This service stipulates provision of call transferring within the CS-PS loop at the CS side and provision of the public network service is therefore not within the scope of this standard.

2.2.2 Service model

Figure 2.2.2-1 below shows a service model:

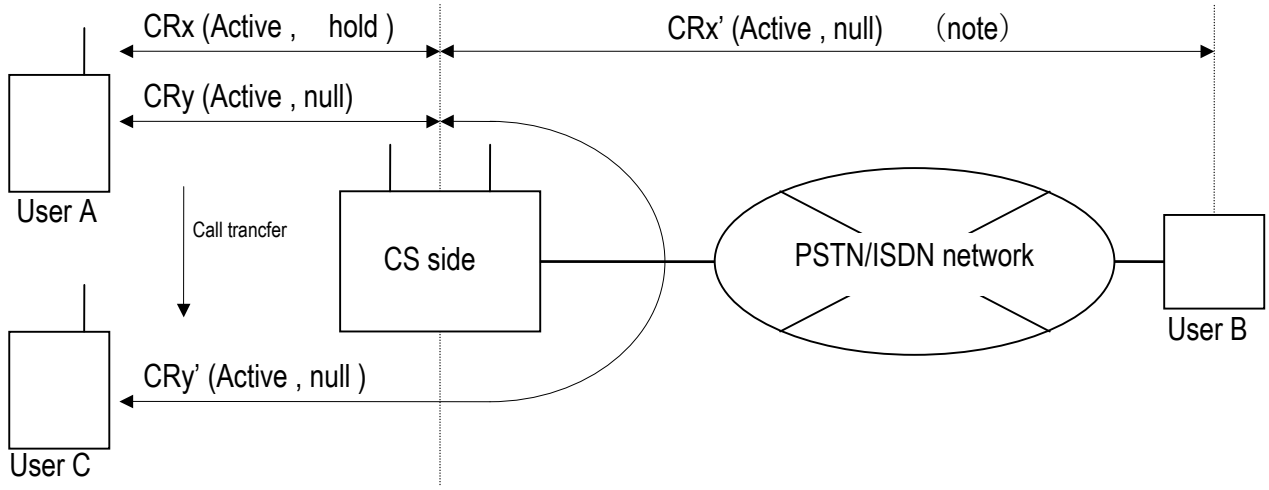


Figure 2.2.2-1 Service model

(Note) There might not be a call reference.

2.2.3 Detailed description of supplementary service

2.2.3.1 Overview

Call transferring within the CS-PS loop is an supplementary service that changes a call set by the serviced user to a new call between the other party of the established call and a third party. The original call which has been set by the user is once held within the CS-PS loop, a new call is set up between the user and the third party, and, when requested later by the user, the other party of the original call is connected to the third party set up for the new call through the CS-PS loop.

2.2.3.2 Special terms

The following terms are used in this definition:

・Service provider
The service provider can either be the person who manages the CS side or the CS side itself.

・User provided with service
The user who has the right to activate transfer of calls within the CS-PS loop and who has activated the service.
This user is called user A. (Transferring user).

・Remote user
Other parties who take part in this service are defined as follows:
－User B is the other party of the call before it is transferred.
－User C is the third party of the call after it is transferred. (Transfer destination user)

2.2.3.3 Restriction in application to telecommunication service

This supplementary service is applicable to the telephone service and the voice/3.1 kHz audio bearer service.

This service is not applicable to non-voice services.

2.2.3.4 Procedure

2.2.3.4.1 Provision/cancellation of service

Call transferring within the CS-PS loop is either provided after arrangement is made with the service provider or available at all times. Call transferring within the CS-PS loop is cancelled when requested by the user or for reasons of the service provider.

2.2.3.4.2 Sequence startup and operation

The description in this section is based on the following premises:

A call between user A and CS side (call of connected user B) uses call reference x for (communication in progress, holding within the CS-PS loop). (CRx)

A call between user A and CS side uses call reference y for (communication in progress and null). (CRy)

User A is already holding within the CS-PS loop a call set up with user B and continues to set up calls with other users or accept incoming calls.

User A requests the call with user B to be transferred to user C. According to this request, the service provider cancels connections among users A, B, and C while it connects user B to user C.

User A can request call transferring within the CS-PS loop while or after connection with user C is established.

2.2.3.4.2.1 Starting call transfer within the CS-PS loop

2.2.3.4.2.1.1 Regular operation

2.2.3.4.2.1.1.1 Call between user A and CS (user C connection call) request for transfer during (communications in progres, null)

While user A and CS side (call of connected user B) are in call state (communicating, being held within the CS-PS loop) and while user A and CS side (call of connected user C) are in call state (communicating, null), user A transmits to CS side the call reference of the call (communicating, being held within the CS-PS loop) and a “facility” message (CRx) of which the facility information element contains the invoke component to start call transfer within the CS-PS loop. Upon receipt of this request, the CS side connects user B with user C (bridge connection), returns a “facility” message (CRx) of which the facility information element contains the return result component for starting call transfer within the CS-PS loop, and disconnects and releases the calls between user A and CS side (calls of connected users B and C). As an option, CS side can notify the transfer destination user of the change in communication type using the supplementary service within the CS-PS loop.

2.2.3.4.2.1.1.2 Call between user A and CS (user C connection call) request for transfer during (paging in progres, null)

While user A and CS side (call of connected user B) are in call state (communicating, being held within the CS-PS loop) and while user A and CS side (call of connected user C) are in call state (paging, null), user A transmits to CS side the call reference of the call (communicating, being held within the CS-PS loop) and a “facility” message (CRx) of which the facility information element contains the invoke component to start call transfer within the CS-PS loop. Upon receipt of this request, the CS side connects user B with user C (bridge connection), returns a “facility” message (CRx) of which the facility information element contains the return result component for starting call transfer within the CS-PS loop, and disconnects and releases the calls between user A and CS side (calls of connected users B and C). As an option, CS side can notify the transfer destination user of the change in communication type using the supplementary service within the CS-PS loop.

2.2.3.4.2.1.2 Exceptional procedure

2.2.3.4.2.1.2.1 PS side

If user A receives a “facility” message containing either the return error component or the reject component after transmitting the “facility” message containing the invoke component to start call transfer within the CS-PS loop, call transfer within the loop does not start and communication in progress is maintained.

2.2.3.4.2.1.2.2 Private PHS (NW)

If CS side receives the call reference of a call in (communicating, null) state and a facility message (CRy) of which the facility element contains the invoke component to start call transfer within the CS-PS loop, CS side should reject the request to start call transfer within the CS-PS loop and return to user A a “facility” message containing an “invalid call state” return error component indicating the reason.

If CS side receives and cannot accept a “facility” message containing the invoke component to start call transfer within the CS-PS loop, CS side should return to user A a “facility” message containing an error component including one of the following reasons:

- Contract not yet signed by the user
- Invalid call state
- Supplementary service not allowed for mutual effect

2.2.3.4.3 Management of call transfer within the CS-PS loop

The user provided with the service can disconnect before starting call transfer within the CS-PS loop.

2.2.3.4.3.1 Disconnection of a single user

In order to explicitly disconnect one call, user A transmits a “disconnection” message having an appropriate call reference to CS side.

- Upon receipt of a “disconnection” message containing CRx (communication in progress, being held within the CS-PS loop), CS side returns a “release” message to user A and frees resources related to the call between user A and CS side (call of connected user B). As a result, the call becomes a single link call (communication in progress, null) between user A and CS side (call of connected user C).

- Upon receipt of a “disconnection” message containing CRx (communication in progress, null), CS side returns a “release” message to user A and frees resources related to the call between user A and CS side (call of connected user C). As a result, the call becomes a single link call (communication in progress, being held within the CS-PS loop) between user A and CS side (call of connected user B).

2.2.3.4.4 Request from remote user

User B (or user C) transmits a “disconnection” message to CS side. Upon receipt of this request, CS side applies the normal releasing procedure related to that call. The radio channel at user A interface is retained for remaining calls.

2.2.3.5 Substitution procedure

None identified.

2.2.3.6 Functions for charge

This standard does not cover charging principles.

2.2.3.7 Mutual effect with other supplementary service

2.2.3.7.1 Hold within the CS-PS loop

If a user provided with the service, who has already requested to transfer the call within the CS-PS loop, requests to start or cancel holding within the CS-PS loop, CS side applies the procedure described in section 2.2.3.4.2.1.2.2 to notify that it is an error of supplementary service not allowed for mutual effect.

2.2.3.7.2 Call transfer within the CS-PS loop

If a user provided with the service has already requested to transfer the call within the CS-PS loop, CS side applies the procedure described in section 2.2.3.4.2.1.2.2 to notify that it is an error of supplementary service not allowed for mutual effect.

2.2.3.7.3 Call waiting within the CS-PS loop

If a user provided with the service has already requested to transfer the call within the CS-PS loop, the call waiting supplementary service within the CS-PS loop cannot be started.

2.2.3.7.4 Conference call within the CS-PS loop

If a user provided with the service, who has already requested call transferring within that loop, requests a conference call within the CS-PS loop, CS side applies the procedure described in section 2.2.3.4.2.1.2.2 to notify that it is an error of supplementary service not allowed for mutual effect.

2.2.3.7.5 Hold within the CS-multiple PS

If a user provided with the service, who has already requested call transferring within the CS-PS loop, requests to hold within the CS-multiple PS, CS side applies the procedure described in section 2.2.3.4.2.1.2.2 to notify that it is an error of supplementary service not allowed for mutual effect.

2.2.3.7.6 Call type notification within the CS-PS loop

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

2.2.3.7.7 PS remote control function

If a user provided with the service, who has already requested call transferring within the CS-PS loop, requests the PS remote control function, CS side applies the procedure described in section 2.2.3.4.2.1.2.2 to notify that it is an error of supplementary service not allowed for mutual effect.

2.2.3.8 Mutual effect with handover

None identified.

2.2.3.9 Request condition by mutual connection

2.2.3.9.1 Mutual connection with public network

The operation of this feature is not affected by the nature (i.e. integrated services digital network (ISDN) or non-ISDN) of the far end of the connection.

2.2.3.10 Notification identifier information element

None identified.

2.2.3.11 Dynamic description

The SDL diagram is shown below.

The description of this service, except for the following, is provided in attachments T and V.

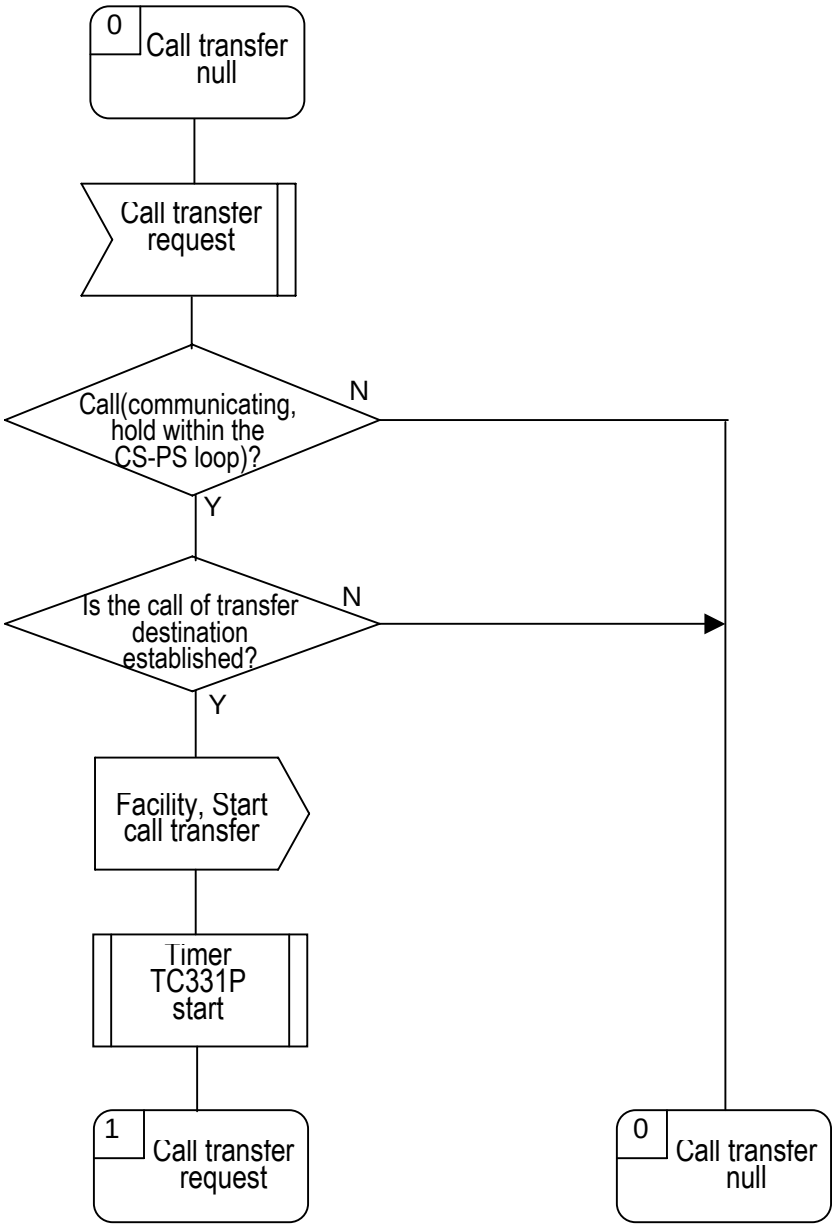


Figure 2.2.3.11-1 SDL diagram (PS side) (1/2)

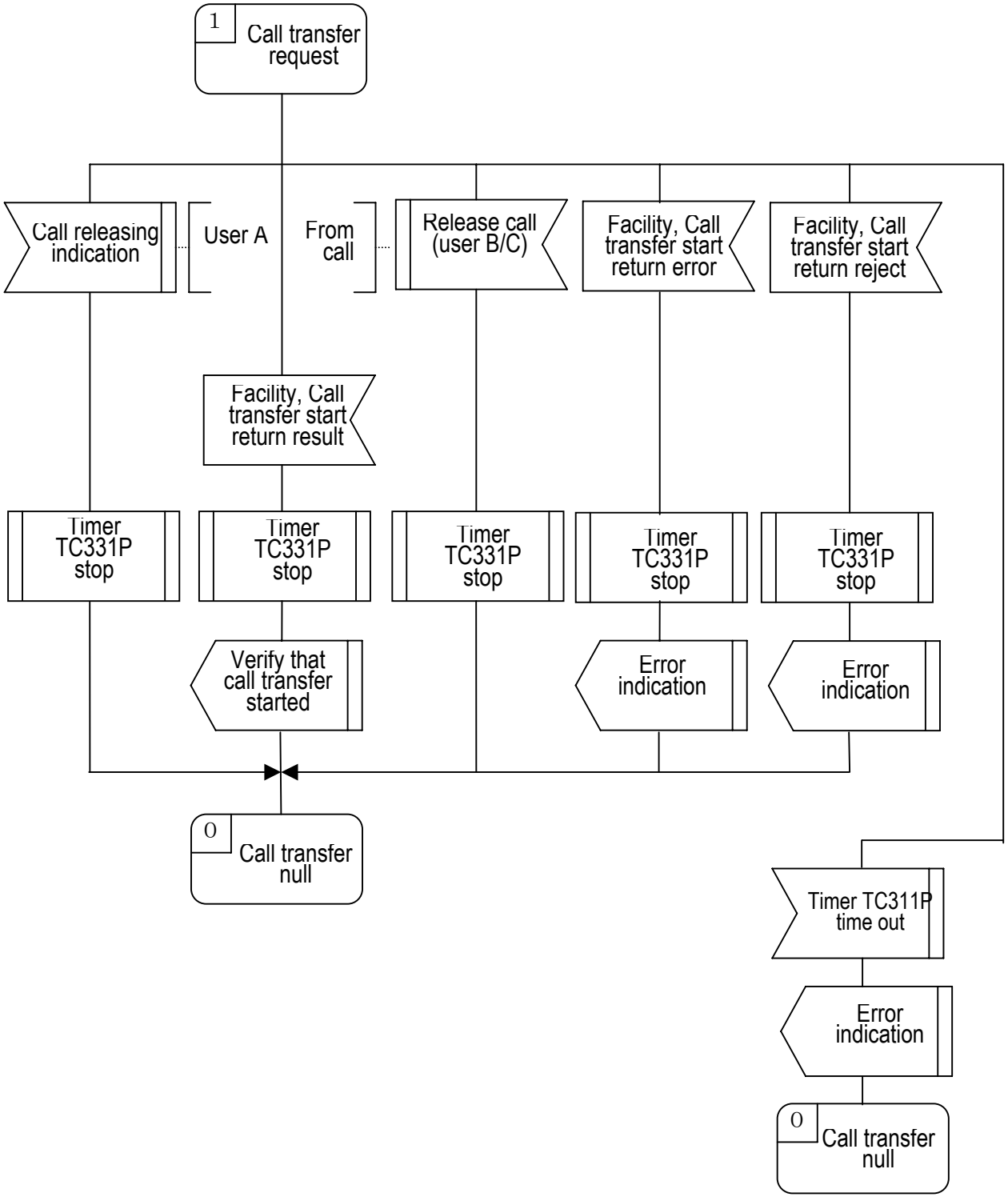


Figure 2.2.3.11-2 SDL Diagram（PS side） (2/2)

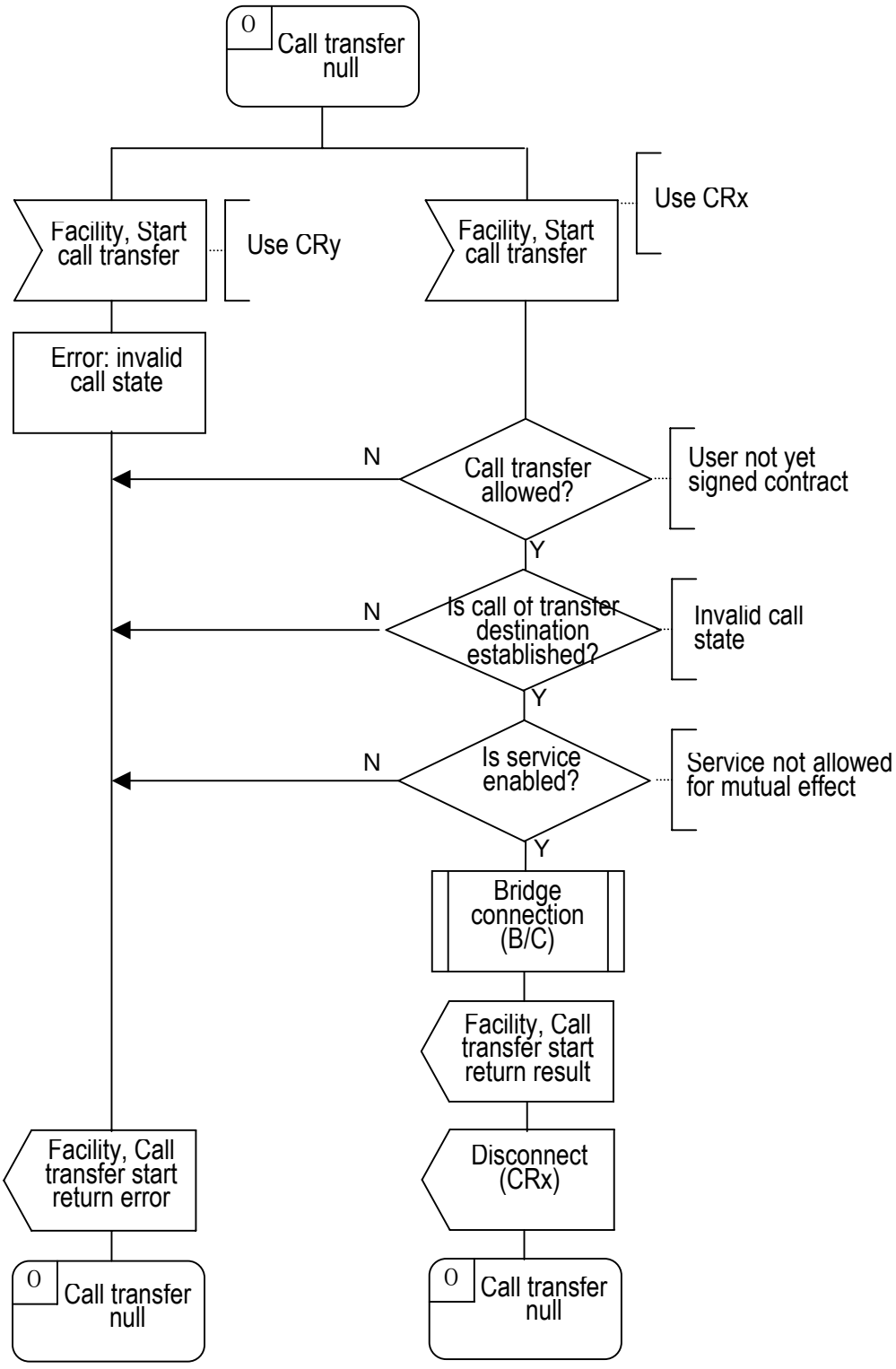


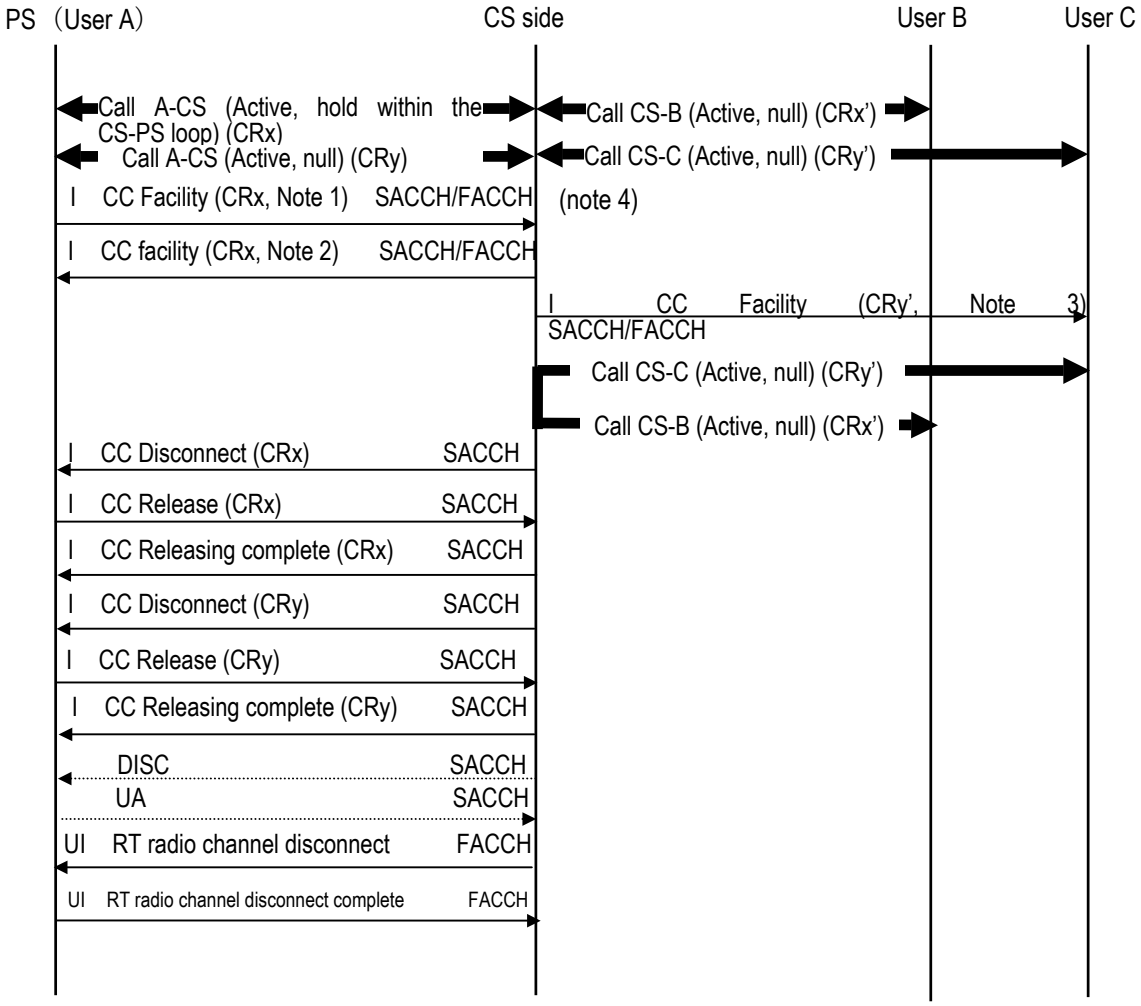
Figure 2.2.3.11-3 SDL diagram（CS side） (1/1)

2.2.3.12 Flow of signal

See figures 2.2.3.12.1-1 through 2.2.3.12.6-1.

2.2.3.12.1 Request for initiation of call transfer within the CS-PS loop 1

Figure 2.2.3.12.1-1 shows an example sequence for a transfer request from the call of connected user C in (communicating, null) state.

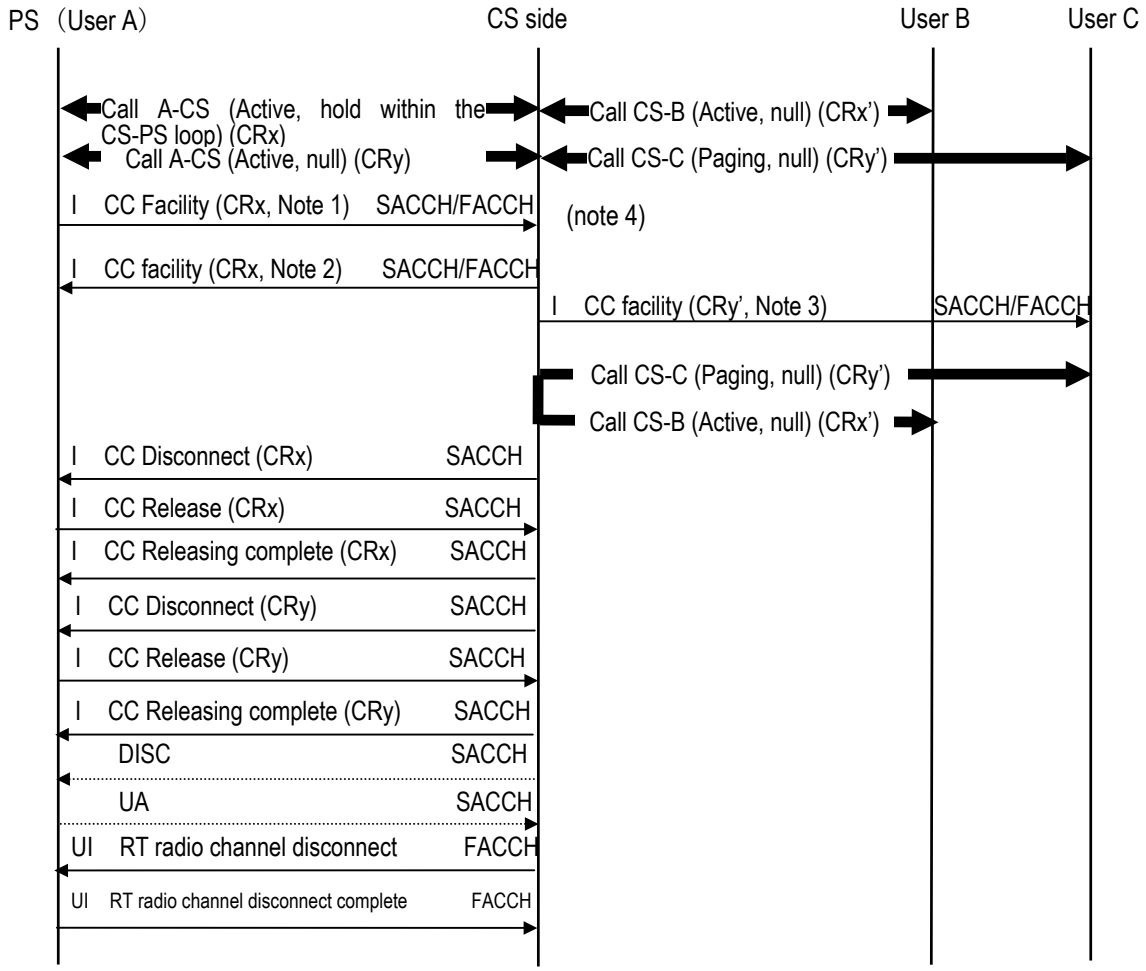


(Note 1) The facility information element for call reference CRx contains the invoke component to start call transfer within the CS-PS loop.
(Note 2) The facility information element for call reference CRx contains the return result component.
(Note 3) When user C is PS, the change in communication type is notified using the supplementary service within the CS-PS loop (option). For more information, see 2.6 Supplementary service within the CS-PS loop.
(Note 4) FACCH can be used only when the setup of the layer 2 multi-frame acknowledged operation mode of FACCH is completed before this message is sent.

Figure 2.2.3.12.1-1 Request 1 to start call transfer within the CS-PS loop

2.2.3.12.2 Request for initiation of call transfer within the CS-PS loop 2

Figure 2.2.3.12.2-1 shows an example sequence for a transfer request from the call of connected user C in (paging, null) state.



(Note 1) The facility information element for call reference CRx contains the invoke component to start call transfer within the CS-PS loop.
(Note 2) The facility information element for call reference CRx contains the return result component.
(Note 3) When user C is PS, the change in communication type is notified using the supplementary service within the CS-PS loop (option). For more information, see 2.6 Supplementary service within the CS-PS loop.
(Note 4) FACCH can be used only when the setup of the layer 2 multi-frame acknowledged operation mode of FACCH is completed before this message is sent.

Figure 2.2.3.12.2-1 Request 2 to start call transfer within the CS-PS loop

2.2.3.12.3 Disconnection reset procedure (transfer source startup)

Figure 2.2.3.12.3-1 shows an example disconnection and releasing sequence initiated by the transferring user.

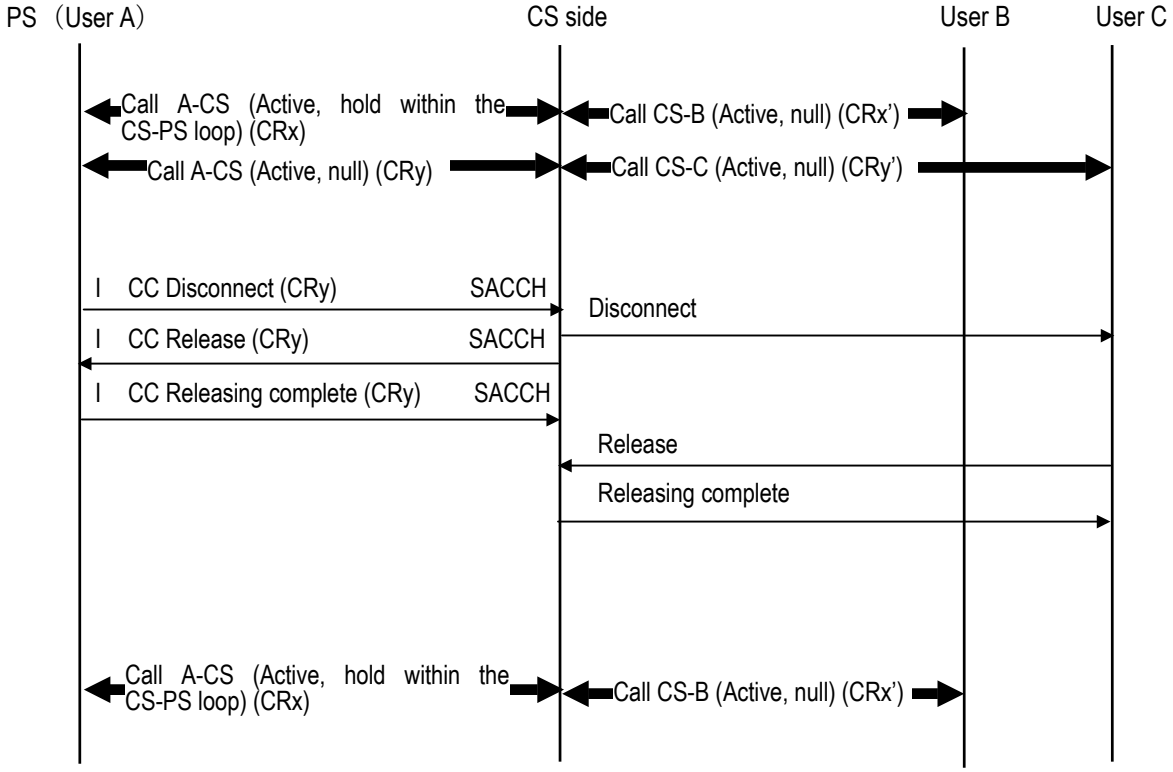


Figure 2.2.3.12.3-1 Disconnection and releasing procedure (to be started by the transferring user)

2.2.3.12.4 Disconnection reset procedure (transfer destination startup)

Figure 2.2.3.12.4-1 shows an example disconnection and releasing sequence initiated by the transfer destination user.

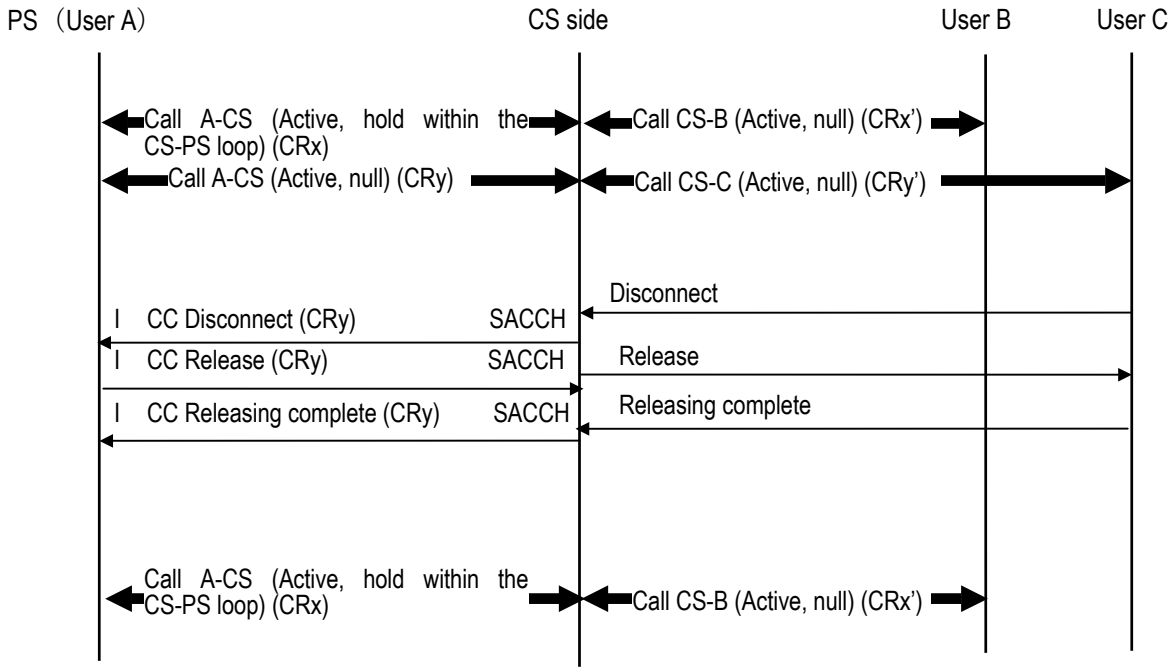


Figure 2.2.3.12.4-1 Disconnection and releasing procedure (to be started by the transfer destination user)

2.2.3.12.5 Disconnection reset procedure (hold call startup)

Figure 2.2.3.12.5-1 shows an example disconnection and releasing sequence initiated by the user whose call is held.

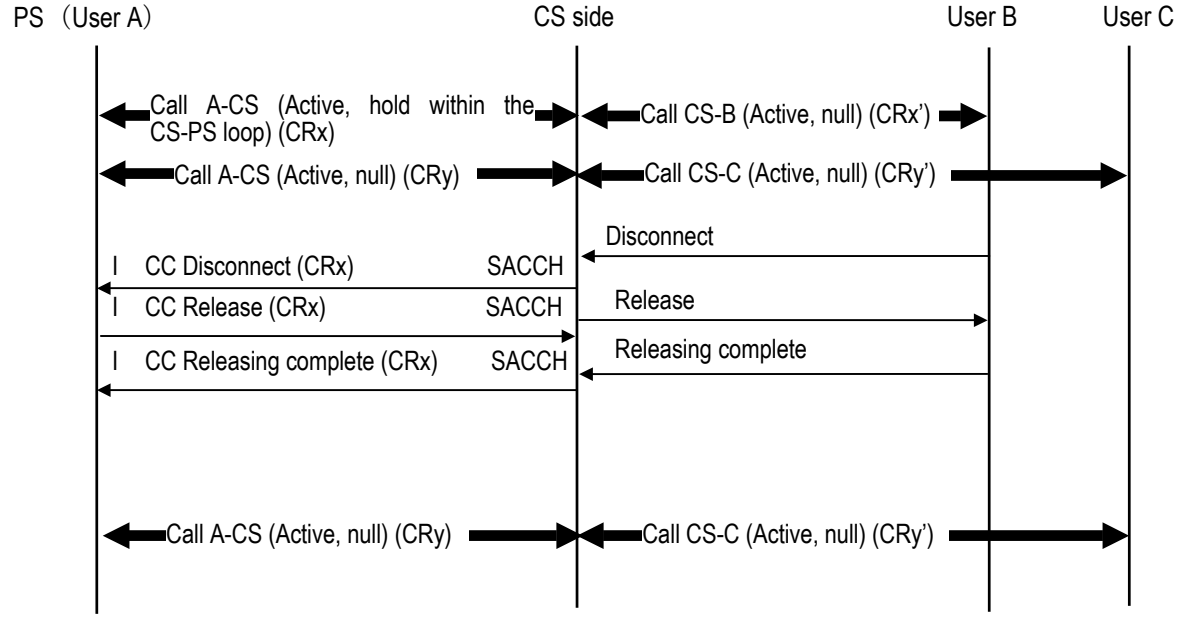
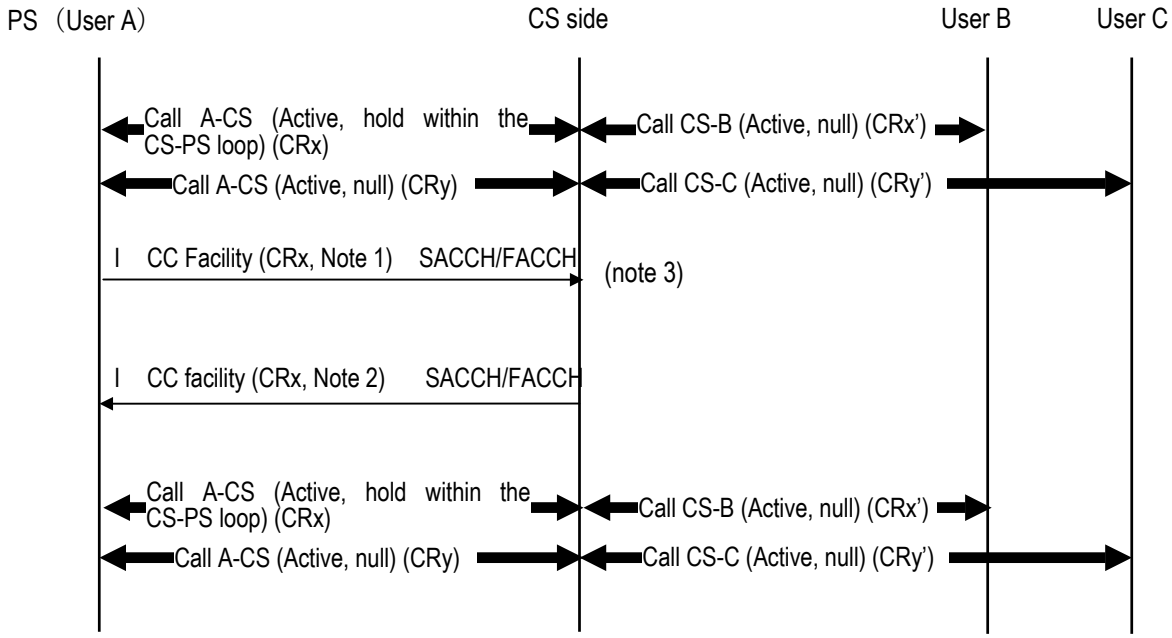


Figure 2.2.3.12.5-1 Disconnection and releasing procedure (to be started by the user whose call is held)

2.2.3.12.6 Service non-provision procedure

Figure 2.2.3.12.6-1 shows an example sequence when the call transfer supplementary service is not provided by the CS side.



(Note 1) The facility information element for call reference CRx contains the invoke component to start call transfer within the CS-PS loop.
(Note 2) The facility information element for call reference CRx contains the return error component.
(Note 3) FACCH can be used only when the setup of the layer 2 multi-frame acknowledged operation mode of FACCH is completed before this message is sent.

Figure 2.2.3.12.6-1 Procedure when the service is not provided

2.2.3.13 Coding method

The invoke component for call transfer within the CS-PS loop supplementary service is shown below.

Octet	Bits 8	7	6	5	4	3	2	1	
4	1	0	1	0	0	0	0	1	
	Component type tag								
5	Component length (Note 1)								
6	0	0	0	0	0	0	1	0	
	Invoke identifier tag								
7	Invoke identifier length (Note 2)								
8	Invoke identifier								(Note 4)
12	0	0	0	0	0	1	1	0	
	Operation value tag								
13	Operation value length (Note 3)								
14a	0	0	0	0	0	0	1	0	(Note 5)
14b	1	0	0	0	0	0	1	1	
14c	0	0	1	1	1	0	0	0	
14d	1	0	0	0	1	1	0	0	
14e	1	0	0	1	1	0	1	0	
14f	0	1	0	1	1	1	0	0	
14g	0	1	0	0	0	0	0	1	
14h	0	0	0	0	0	0	0	1	
14i	0	Call transfer within the CS-PS loop							

(Note 1) The component length is coded in order to indicate the number of octets contained in the component (except for octets for the component type tag and the component length).
(Note 2) The invoke identifier length is coded to indicate the number of octets of invoke identifier.
(Note 3) The operation value length is coded in order to indicate the number of octets for the object ID stipulated with RCR.
(Note 4) Octets 9 - 11 are not sent.
(Note 5) Octets 14a - 14i are the object identifiers (call transfer within the CS-PS loop) specified by RCR.

Call transfer within the CS-PS loop (octet 14i)

Bits 7	6	5	4	3	2	1	
0	0	1	0	0	1	1	Begin call transfer within the CS-PS loop. （begincsct）

2.2.3.14 Parameter value

None identified.

2.3 Call waiting within the CS-PS loop supplementary service (Private standard)

2.3.1 Definition

Call waiting within the CS-PS loop is the service that a user which stays in the communication in progress, can be notified incoming call. Another incoming call within the CS-PS loop or not within the CS-PS loop is available. A user can select whether it responds the incoming call or rejects.
This service is always initiated by a user and corresponds to the operation class 5.

Notes 1) This service specifies the offer of the call waiting within the CS-PS loop, and offer of the service in a public network is outside of the regulation range of this standard.

2.3.2 Service model

Services are shown in the following Figure 2.3.2-1.

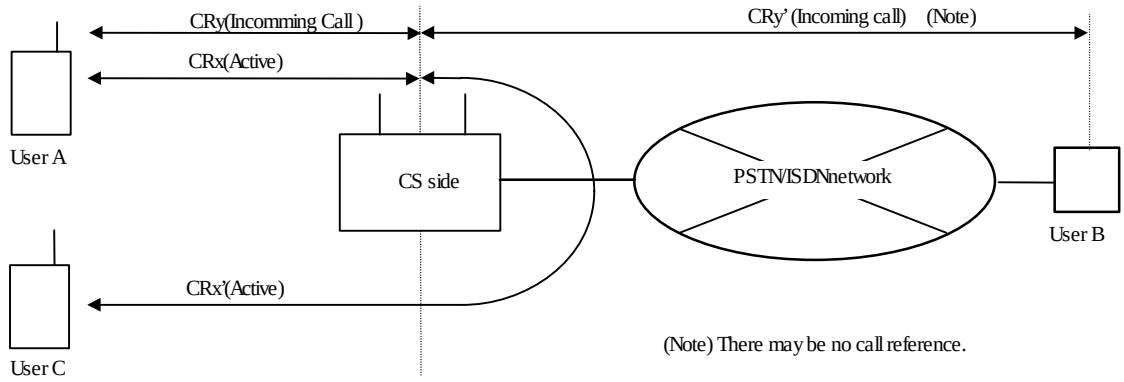


Figure 2.3.2-1 Service model

2.3.3 Detailed description of supplementary service

2.3.3.1 Overview

Call waiting within the CS-PS loop is supplementary service which a user (user A) can be initiated in the communication in progress, then can be notified incoming call by out of band signal. The maximum number of the calls, for example, communication in progress, hold, stand-by, which are able to be handled on one user interface, is two.

2.3.3.2 Special terms

Service Provider

The service provider can either be the person who manages the private PHS (NW), or the private PHS(NW) itself.

User provided with service

The user that has the initiative for starting up hold within the CS-PS loop, or the user that started up the service. This user shall be user A.

Remote user (user B and user C)

The user which directly initiates call waiting within the CS-PS loop to user A defines “user B”, on the other hand, the user which is concerned with the call with user A defines “user C”. (The state of the call is everything.)
User B and User C does not always include the group which includes user A, however,
In case of inter-work, partial of the function sometimes is restricted.

Incoming call

Zone paging is defined that incoming calls to all PSs registered CS,
On the other hand, incoming call to specified PS defines “incoming call” in order to distinguish.

2.3.3.3 Restriction in application to telecommunication service.

This supplementary service is applied to a telephone service and speech / 3.1kHz audio bearer service.
This supplementary service cannot be applied to non-speech services.

2.3.3.4 Procedure

2.3.3.4.1 Provision / cancellation of a service

Call waiting within the CS-PS loop is either provided after arrangement is made with the service provider or available at all times.

Cancellation of call waiting within the CS-PS loop is carried out when there is a user request or due to a reason from the service provider.

2.3.3.4.2 Sequence startup and operation

2.3.3.4.2.1 Initiation of call waiting within the CS-PS loop

It is based on the following premise here.

Call number “y” is used when the call is originated between user A and user B.
Call number “x” is used when the call is originated between user A and user C.

2.3.3.4.2.1.1 Regular operation

2.3.3.4.2.1.1.1 Individual paging

When the service provider receives incoming call from user B, on that condition, in the case that the service provider judges the initiation of the call waiting within the CS-PS loop and user B requests to call user A, the service provider transmits SETUP message including another call number differed from the call number of communication in progress. In addition to the sequence, the Facility information element including the invoke component for the request for call type notification within the CS-PS loop can be supplemented into the SETUP message.

The incoming call timer for the call waiting within the CS-PS loop is same as the one for the normal incoming call described Appendix X. The response message to the SETUP message is Call proceeding message or Alerting message.

2.3.3.4.2.1.1.2 Zone paging

When zone paging to plural users is initiated by user B, the service provider transmits Facility message including Facility information element which has the call number, CRx of the communication in progress and has the invoke components for call waiting initiation to the user A, then the service provider can notify zone paging. The invoke component in order to initiate the call waiting within the CS-PS loop can include line type and caller ID.

2.3.3.4.2.1.2 Exceptional procedure

2.3.3.4.2.1.2.1 PS side

When user A receives SETUP message including call number (Cry), the user A can select whether it receives or rejects the call according to the CC circuit-switched call control procedures, Appendix X. If the user A rejects the call, it transmits Release complete message including cause value #21 “ Call rejected”.

When the user A receives Facility message including invoke component for the call waiting within the CS-PS loop, it can ignore the message with the auxiliary status been idle.

2.3.3.4.2.1.2.2 Private PHS (NW)

When the number of calls becomes maximum on the user A interface, private PHS recognizes that the user A is busy, then does not initiate incoming call to the user A.

2.3.3.4.3 Management of CS call waiting within the CS-PS loop

User provided with service: A user provided with service can do below on the condition of the call waiting within the CS-PS loop.

1) Incoming response after termination of the current communication in progress.
2) Zone paging response after termination of the current communication in progress.
3) Incoming response utilizing the hold within the CS-PS loop.
4) Zone paging response utilizing the hold within the CS-PS loop.

2.3.3.4.3.1 Regular procedure

2.3.3.4.3.1.1 Response to individual paging by disconnection reset of communication in progress call

When Private PHS (NW) receives DIConnect message including call number (CRx), that is the call of the current communication in progress from the user A, the Private PHS (NW) transmits RELease message to the user A, and releases the resource concerning the call between user A and user C, on the other hand, reserves the traffic channel by itself for the call in the idle mode. As a result, the user A can respond the call having call number (Cry) by using the Appendix X " CC circuit-switched call control procedures.

2.3.3.4.3.1.2 Response to zone paging by disconnection reset of communication in progress call

When the Private PHS (NW) receives the Facility message including the call number (CRx) and the response invoke component for the call waiting within the CS-PS loop,
The Private PHS(NW) transmits SETUP message including another call number (Cry) differed from the current call number in order to supply the call to the user A.

When the user A receives SETUP message from the Private PHS (NW), the user A transmits CALL proceeding message to the Private PHS (NW). The procedure which the user A responds the call is as same as that of the Appendix X " CC circuit-switched call control procedures. However the user A must transmit DISConnect message including the call number (CRx) before it transmits CONnect message.

The Private PHS (NW) transmits Release message to the user A, and releases the resource concerning the call between the user A and the user C, and reserves the traffic channel for the call in the idle mode. As a result, the user A can respond the call having call number (Cry) by using the Appendix X " CC circuit-switched call control procedures.

The Private PHS (NW) transmits SETUP message to the user A, at the same time, it transmits Facility message including the invoke component for the termination of the call waiting within the CS-PS loop, moreover broadcasts the standstill of the zone paging to other users.

2.3.3.4.3.1.3 Response to individual paging using hold within the CS-PS loop

The Private PHS (NW) receives Facility message including the call number (CRx) and the invoke component for the hold within the CS-PS loop from the user A, the Private PHS (NW) accepts this requirement, and terminates the traffic channel using the call of the call number (CRx), then transmits Facility message including the return result component for the hold within the CS-PS loop. The user A can respond the incoming call by using the traffic channel according to the Appendix X " CC circuit-switched call control procedures.

2.3.3.4.3.1.4 Response to zone paging using hold within the CS-PS loop

The Private PHS (NW) receives Facility message including the call number (CRx) and the invoke component for the call waiting within the CS-PS loop from the user A, the Private PHS (NW) accecpts the request, and transmits SETUP message including another call number (CRy) differed from the current call number in order to supply the call to the user A. The message which the Private PHS (NW) transmits for the response for SETUP message from the user A is a CALL Proceeding message. The procedure which the user A responds the call of idle is as same as the appendix X " CC circuit-switched call control procedures". However the user A must transmit Facility message including the invoke component for the request of the hold within the CS-PS loop and the call number (CRx) before sending Connect message. The Private PHS (NW) transmits Facility message including the return result for the hold request within the CS-PS loop to the user A, and releases the resource concerning the call between the user A and the user C, moreover reserves the traffic channel for the call of the idle mode. The user A can respond the zone paging by using the traffic channel according to the appendix X "CC circuit switched call control procedures.

The Private PHS (NW) transmits SETUP message to the user A, at the same time,
Transmits Facility message including invoke component for the termination of the call waiting within the CS-PS loop, moreover broadcasts the termination of the zone paging to other users.

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2.3.3.4.3.2 Exceptional procedure

2.3.3.4.3.2.1 PS side

The user A can reject the call when the user cannot respond the call. The Private PHS (NW) receives DISConnect message including the call number (CRx) and the cause information element from the user A, the Private PHS (NW) notifies the not establishment of the call to the user B, and releases the call from the user B.

2.3.3.4.3.2.2 Private PHS(NW)

When the Private PHS (NW) does not have available channels and receives CONnect message from the user A; that receives incoming call, the service provider transmit STATUS message including the cause value #34, "no circuit/channel available" to the user A, then notifies the error condition.

When the Private PHS (NW) receives Facility message including the invoke component for the call waiting within the CS-PS loop, the Private PHS (NW) can recognize this message.

2.3.3.4.4 Request from remote user in the call waiting within the CS-PS loop

Release of the call in the idle mode:

The user B transmits DISConnect message to the Private PHS (NW). When the Private PHS (NW)

receives DISConnect message from the user B, it releases the call, and applies the normal release procedure concerning the call. The traffic channel on the user A interface is held for the remained call.

Release call in the communication in progress.

The user C transmits DISConnect message to the Private PHS (NW). When the Private PHS (NW) receives DISConnect message from the user C, it releases the call in the communication in progress, and applies the normal release procedure concerning the call. The traffic channel on the user A interface is held for the remained call.

However, on the condition that the zone paging of not originating the new call in the user A interface, the traffic channel is also released.

2.3.3.5 Substitution procedure

None identified.

2.3.3.6 Function for charge

This standard does not cover charging principles.

2.3.3.7 Mutual effect with other supplementary services

2.3.3.7.1 Hold within the CS-PS loop

When one user receives incoming call using the call waiting service within the CS-PS loop, the user can use the call waiting service within the CS-PS loop, and can use the hold service within the CS-PS loop in order to use the channel for the call.

2.3.3.7.2 Call transfer within the CS-PS loop

During the call waiting within the CS-PS loop, since a radio channel is released, call transfer within the CS-PS loop is incompatible.

2.3.3.7.3 Conference call within the CS-PS loop

During the call waiting within the CS-PS loop, since a radio channel is released, another call waiting within the CS-PS loop is incompatible.

2.3.3.7.4 Hold within the CS-multiple PS loop

During the call waiting within the CS-PS loop, since a radio channel is released, it is incompatible.

2.3.3.7.5 Call waiting within the CS-PS loop

During the call waiting within the CS-PS loop, since a radio channel is released, it is incompatible.

2.3.3.7.6 Call type notification within the CS-PS loop

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

2.3.3.7.7 PS remote control function

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

2.3.3.8 Mutual effect with handover

None identified.

2.3.3.9 Request condition by mutual connection

2.3.3.9.1 Mutual connection with public network

The operation of this feature is not affected by the nature (i.e. integrated services digital network (ISDN) or non-ISDN) of the far end of the connection.

2.3.3.10 Notification indicator information element

None identified.

2.3.3.11 Dynamic description

The dynamic description of this service is described by appendix T and appendix V except the following description.

The SDL diagrams are shown below.

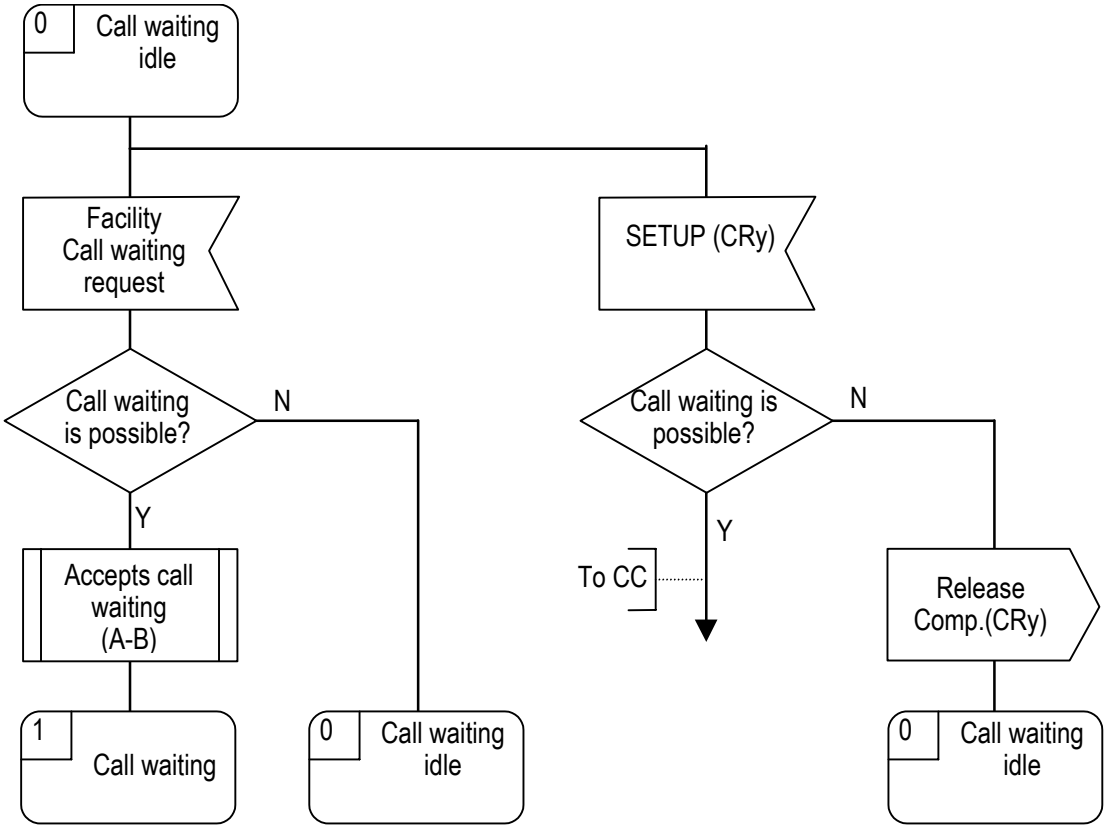


Figure 2.3.3.11-1 SDL diagram (PS side) (1/3)

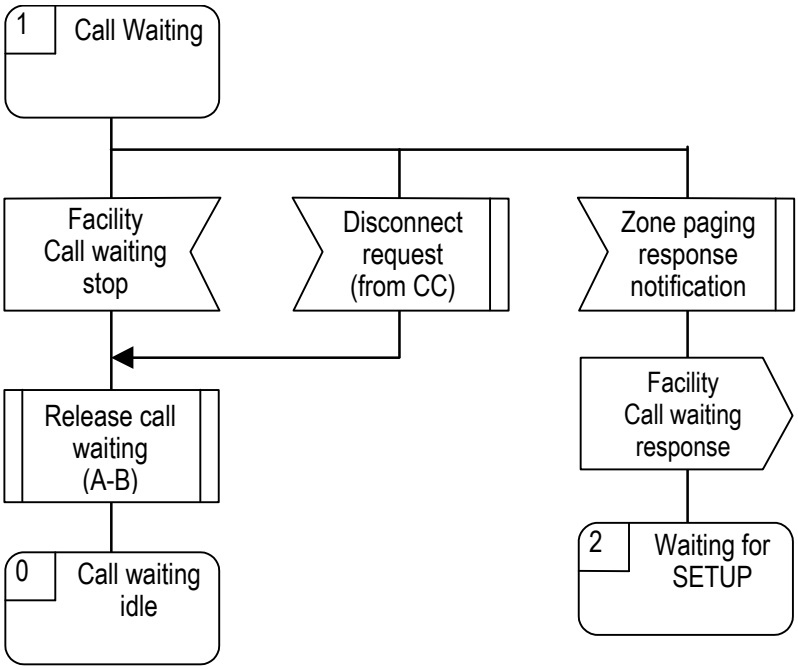


Figure 2.3.3.11-1 SDL diagram (PS side) (2/3)

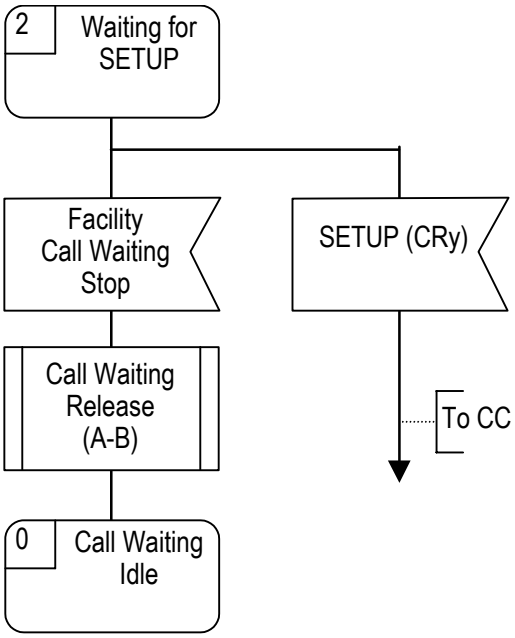


Figure 2.3.3.11-1 SDL diagram (PS side) (3/3)

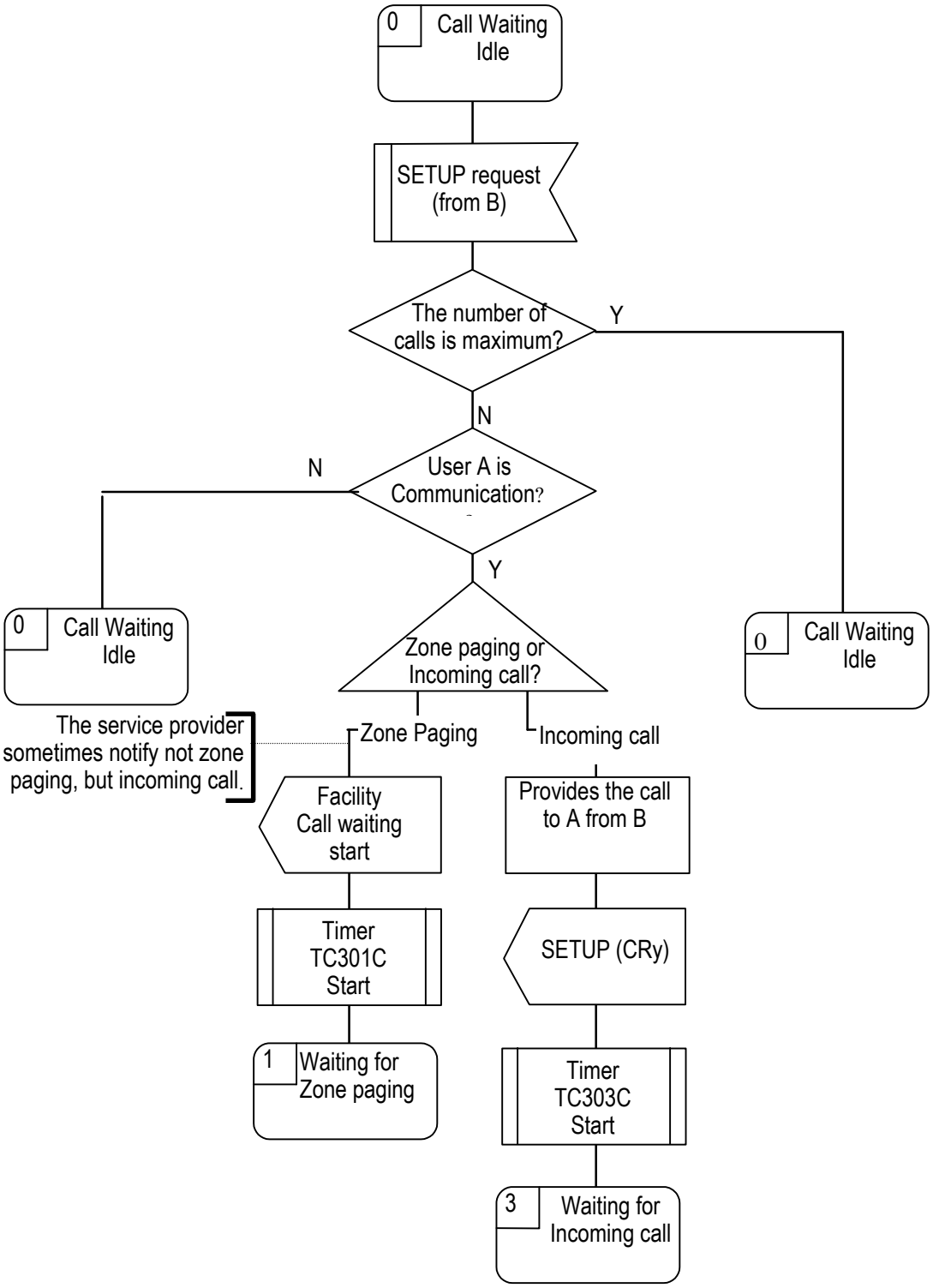


Figure 2.3.3.11-2 SDL diagram (CS side) (1/7)

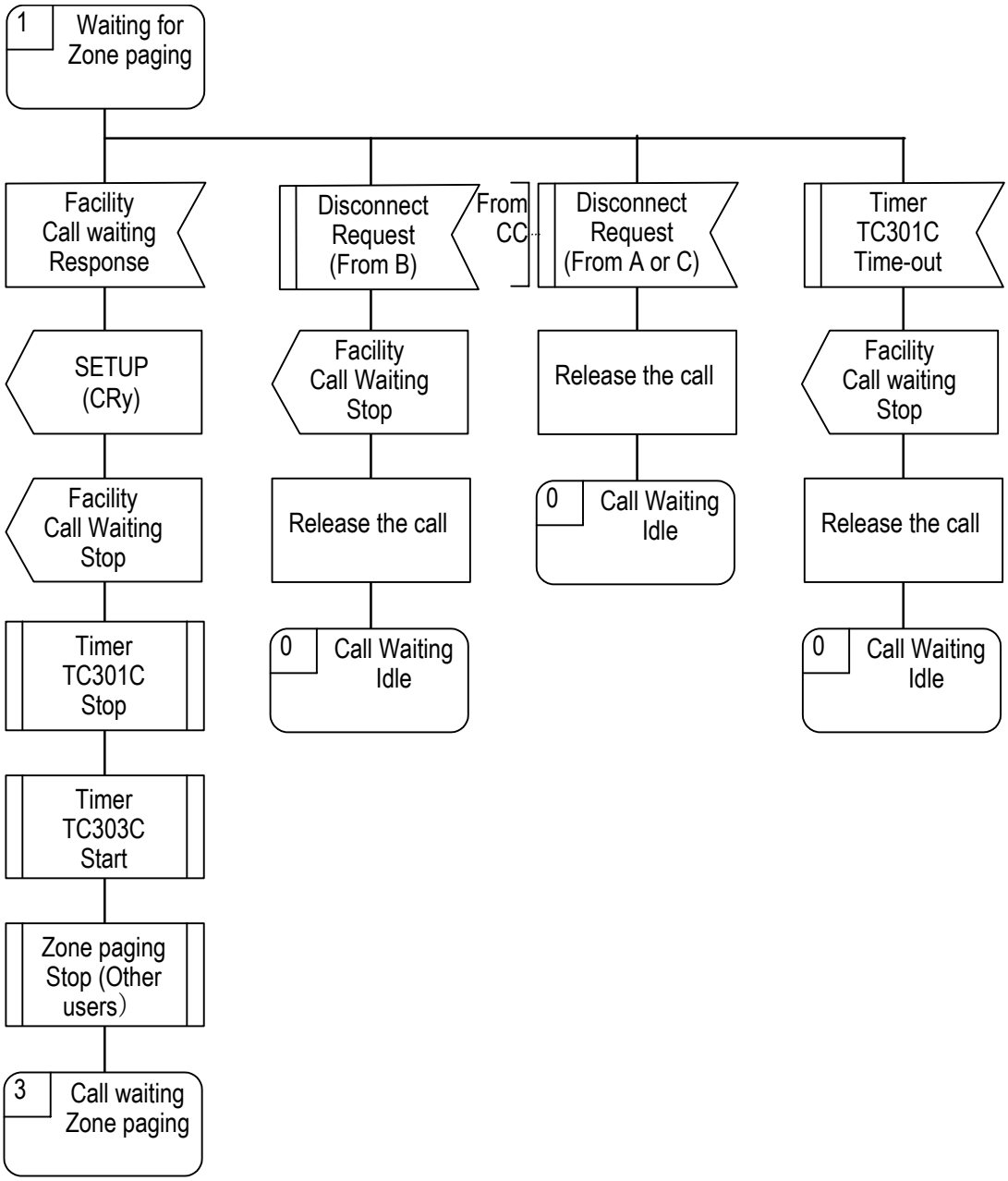


Figure 2.3.3.11-2 SDL diagram (CS side) (2/7)

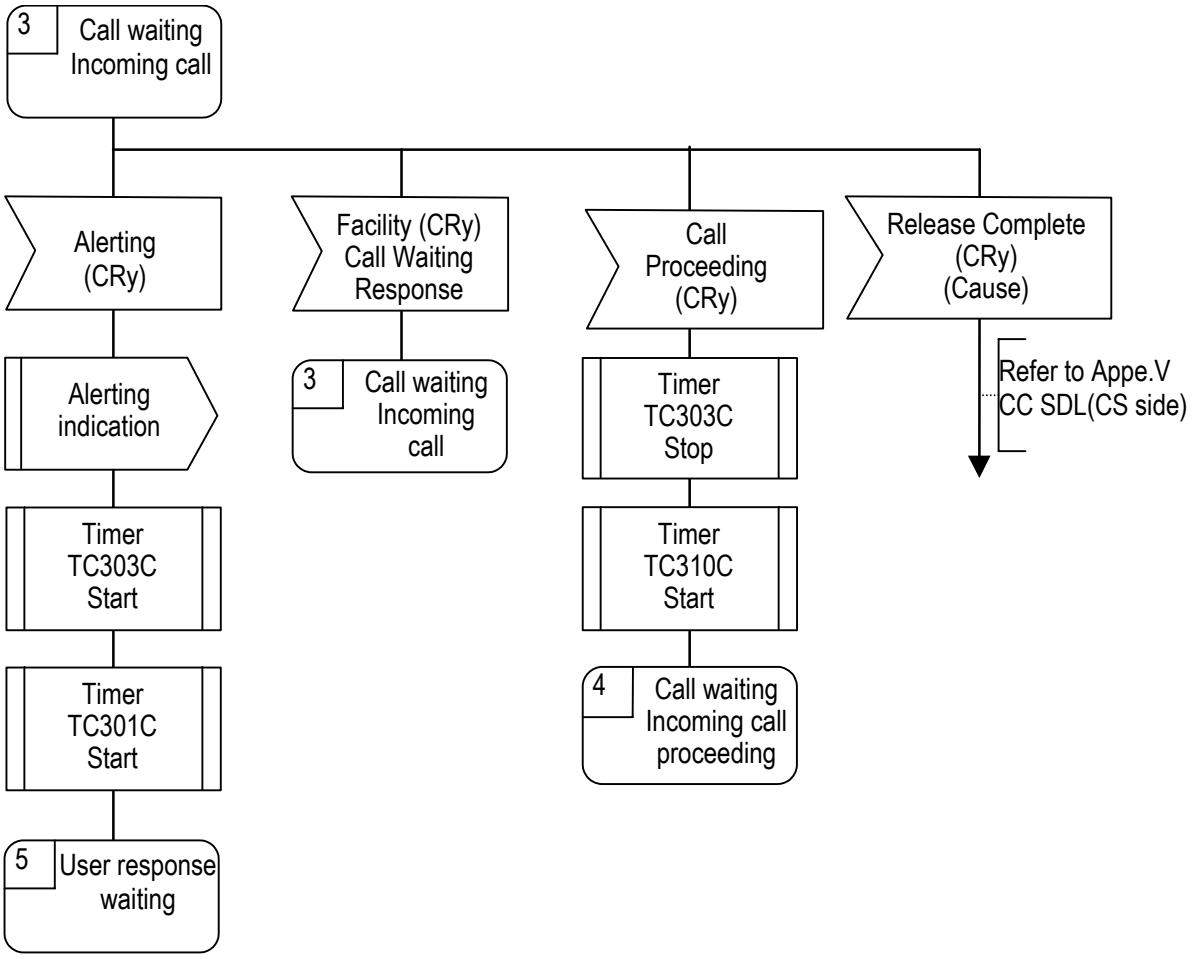


Figure 2.3.3.11-2 SDL diagram (CS side) (3/7)

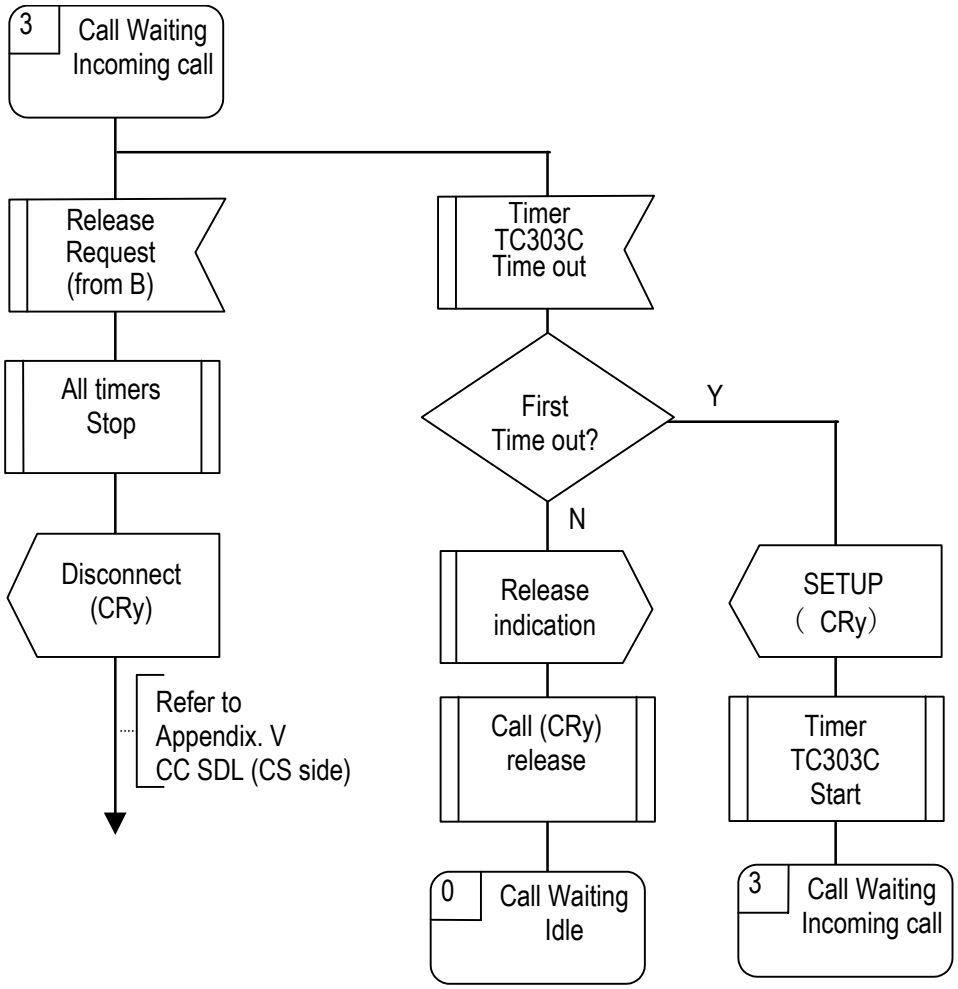


Figure 2.3.3.11-2 SDL diagram (CS side) (4/7)

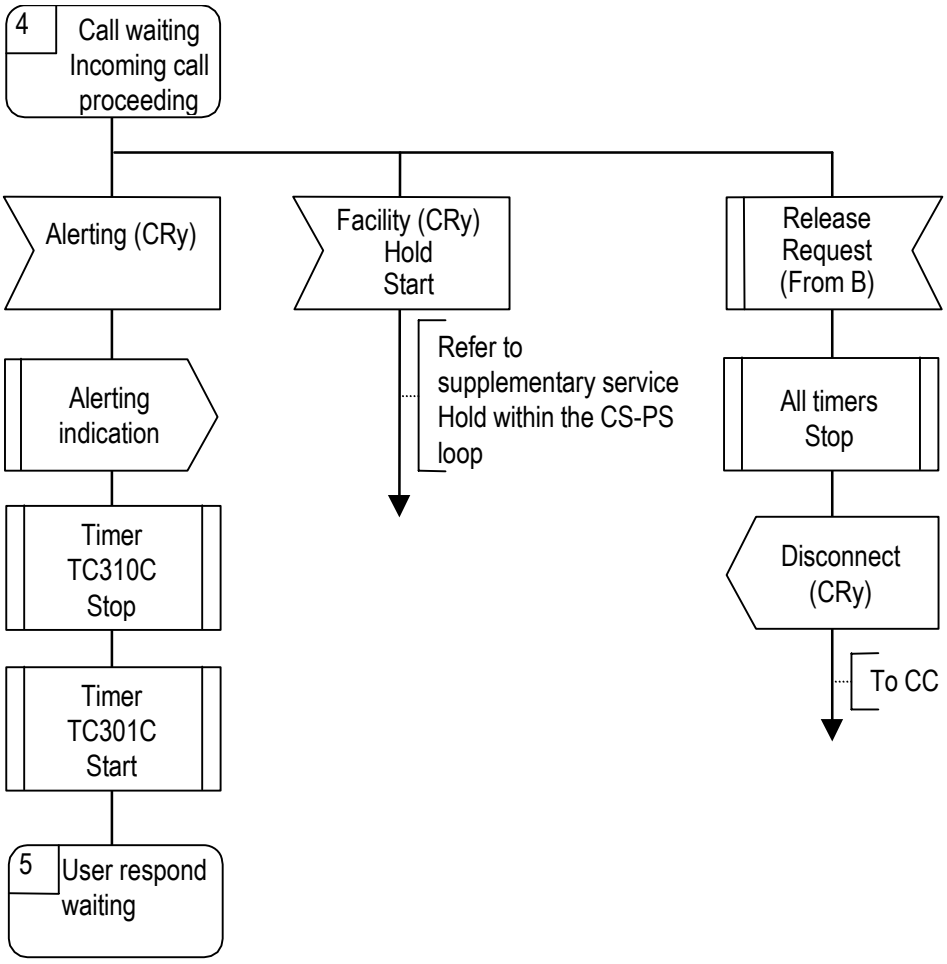


Figure 2.3.3.11-2 SDL diagram (CS side) (5/7)

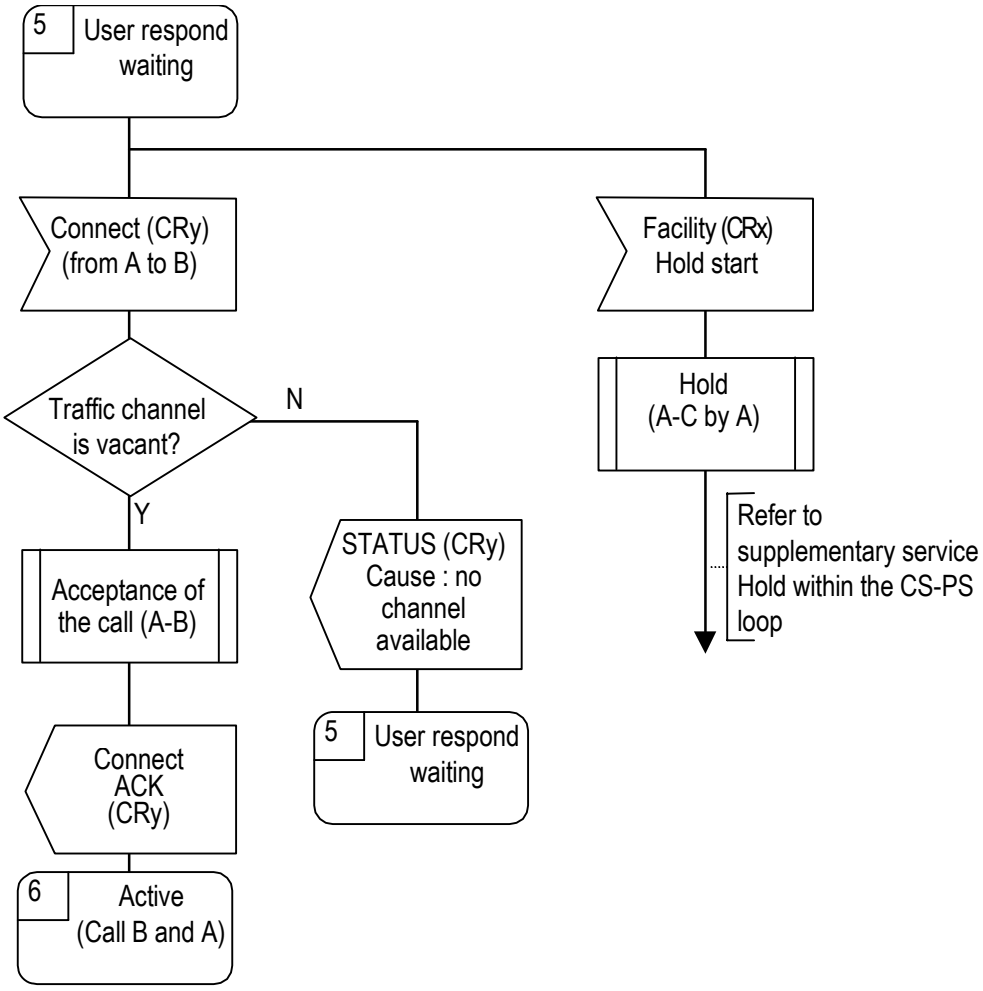


Figure 2.3.3.11-2 SDL diagram (CS side) (6/7)

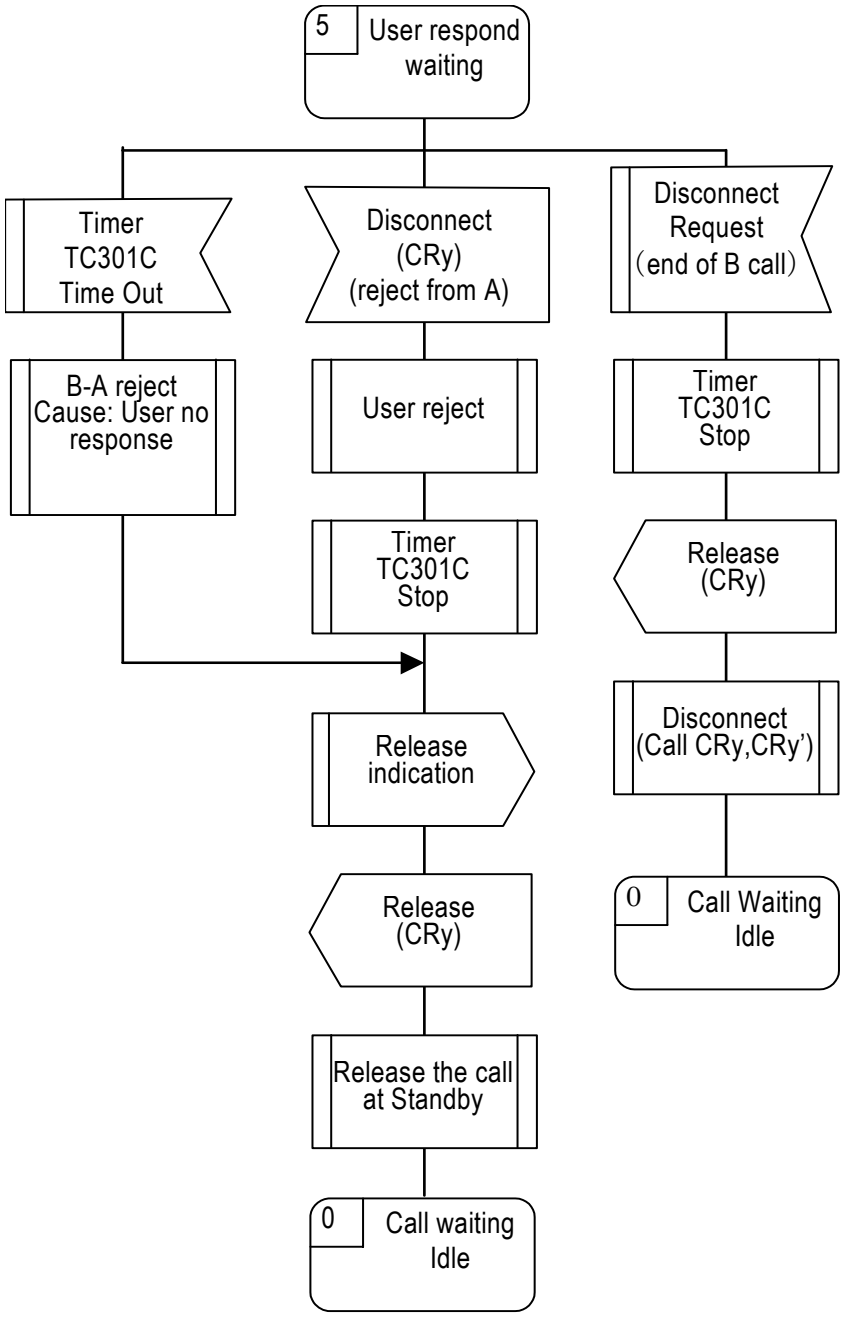
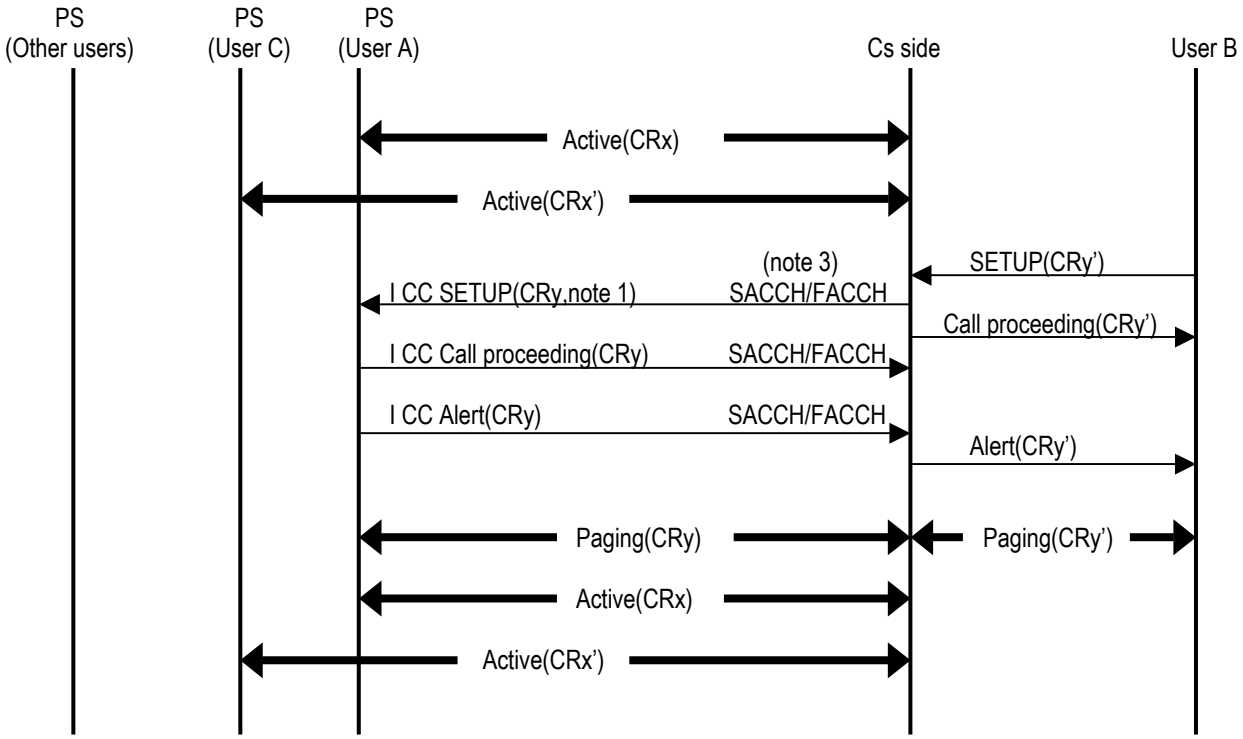


Figure 2.3.3.11-2 SDL diagram (CS side) (7/7)

2.3.3.12 Flow of signal

2.3.3.12.1 Initiation of call waiting within the CS-PS loop at individual paging

The control sequence of call waiting within the CS-PS loop shown in Figure 2.3.3.12.1-1.

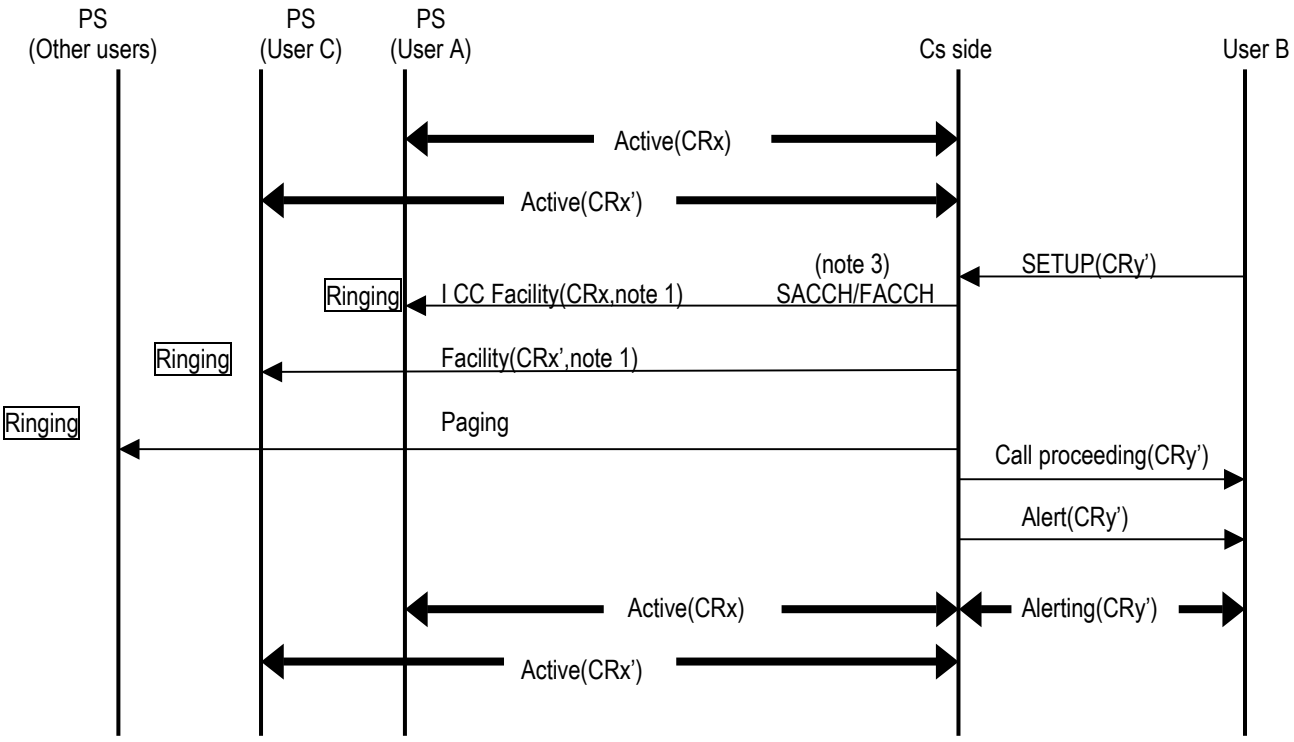


(Note 1) By using call type within the CS-PS loop, CS side sometimes notifies the line type which is originated by the call waiting.
(Note 2) For example, user B is connected to ISDN.
(Note 3) FACCH can be only used when the procedures of multiframe acknowledged operation mode is established.

Figure 2.3.3.12.1-1 Initiate of call waiting within the CS-PS loop In case of incoming call

2.3.3.12.2 Initiation of call waiting within the CS-PS loop at zone paging.

The control sequence of call waiting within the CS-PS loop in case of zone paging is shown in Figure 2.3.3.12.2-1.

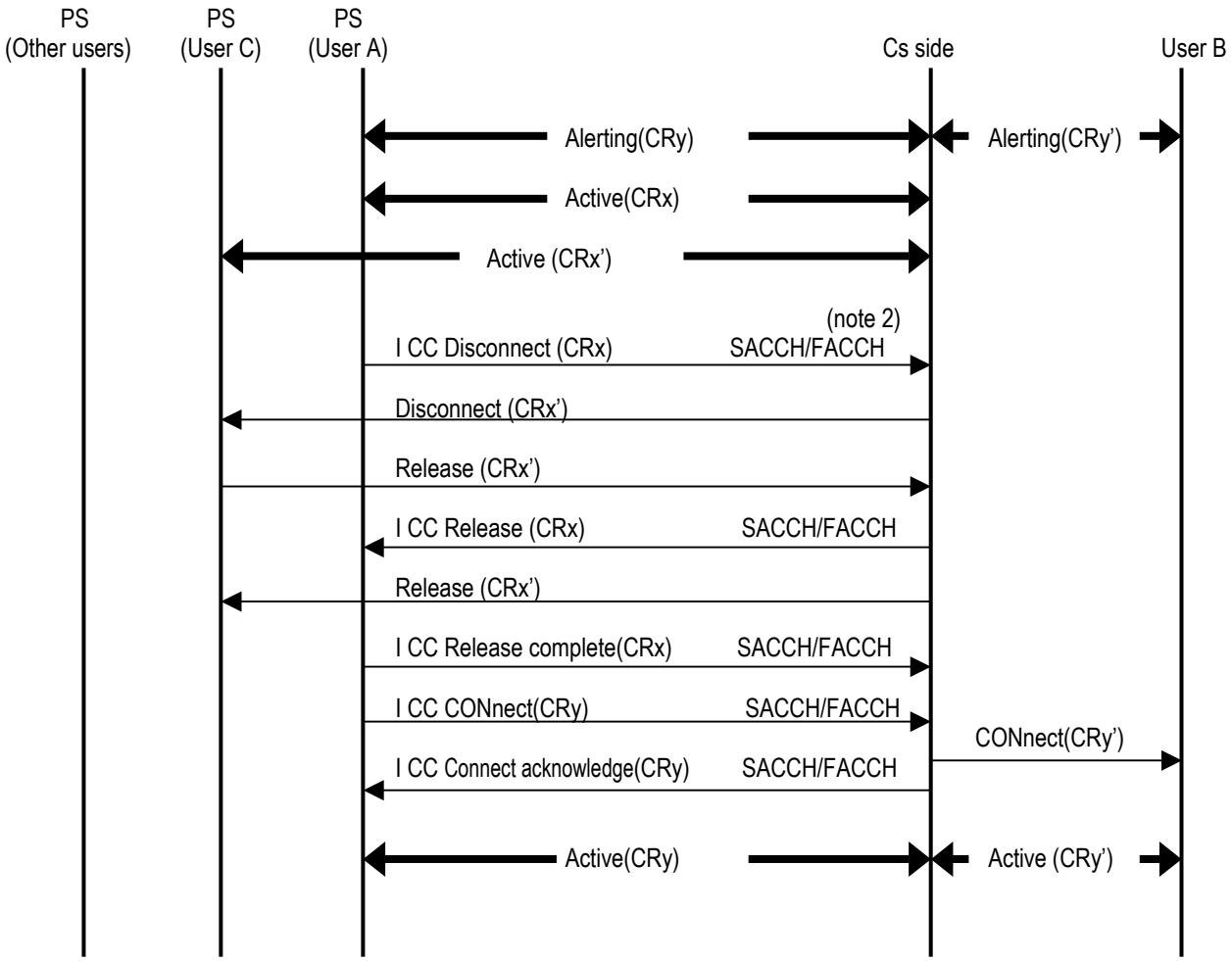


(Note 1) It includes call number CRx and invoke component for the start of call waiting. And as a option information, some parameters for the line type and the caller ID information element sometimes include in the Facility element.
(Note 2) For example, user B is connected to ISDN.
(Note 3) FACCH can be only used when the procedures of multiframe acknowledged operation mode is established.

Figure 2.3.3.12.2-1 Initiation of call waiting within the CS-PS loop at zone paging

2.3.3.12.3 Response for individual paging during standby by existing disconnection test

The control sequence of response for incoming call by termination of the communication in progress is shown in Figure 2.3.3.12.3-1.

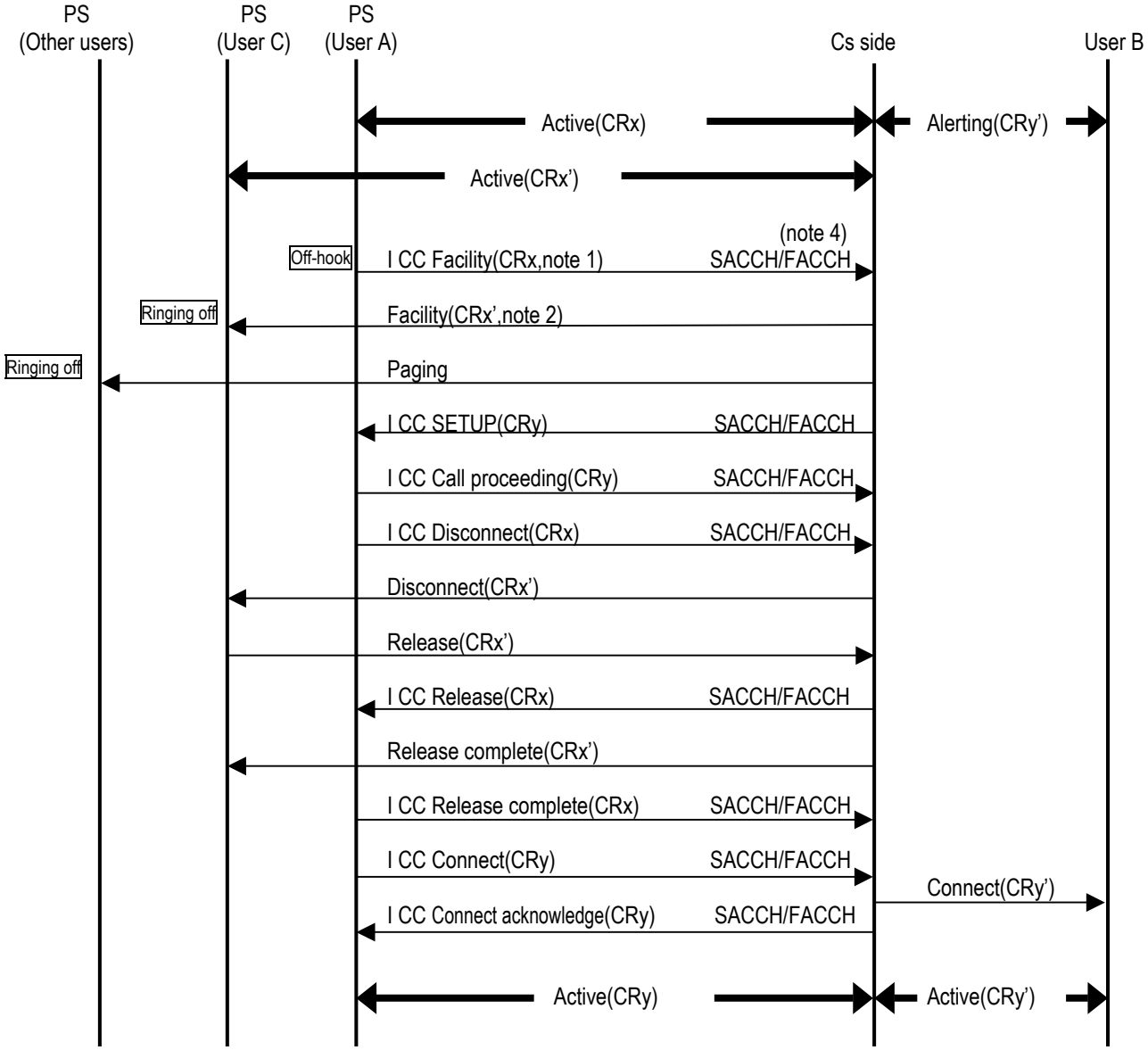


(Note 1) For example, user B is connected to ISDN.
(Note 2) FACCH can be only used when the procedures of multiframe acknowledged operation mode is established.

Figure 2.3.3.12.3-1 Response to individual paging during standby by existing disconnection reset

2.3.3.12.4 Response to zone paging during standby by existing disconnection reset

The control sequence of response for zone paging by termination of the communication in progress is shown in Figure 2.3.3.12.4-1.

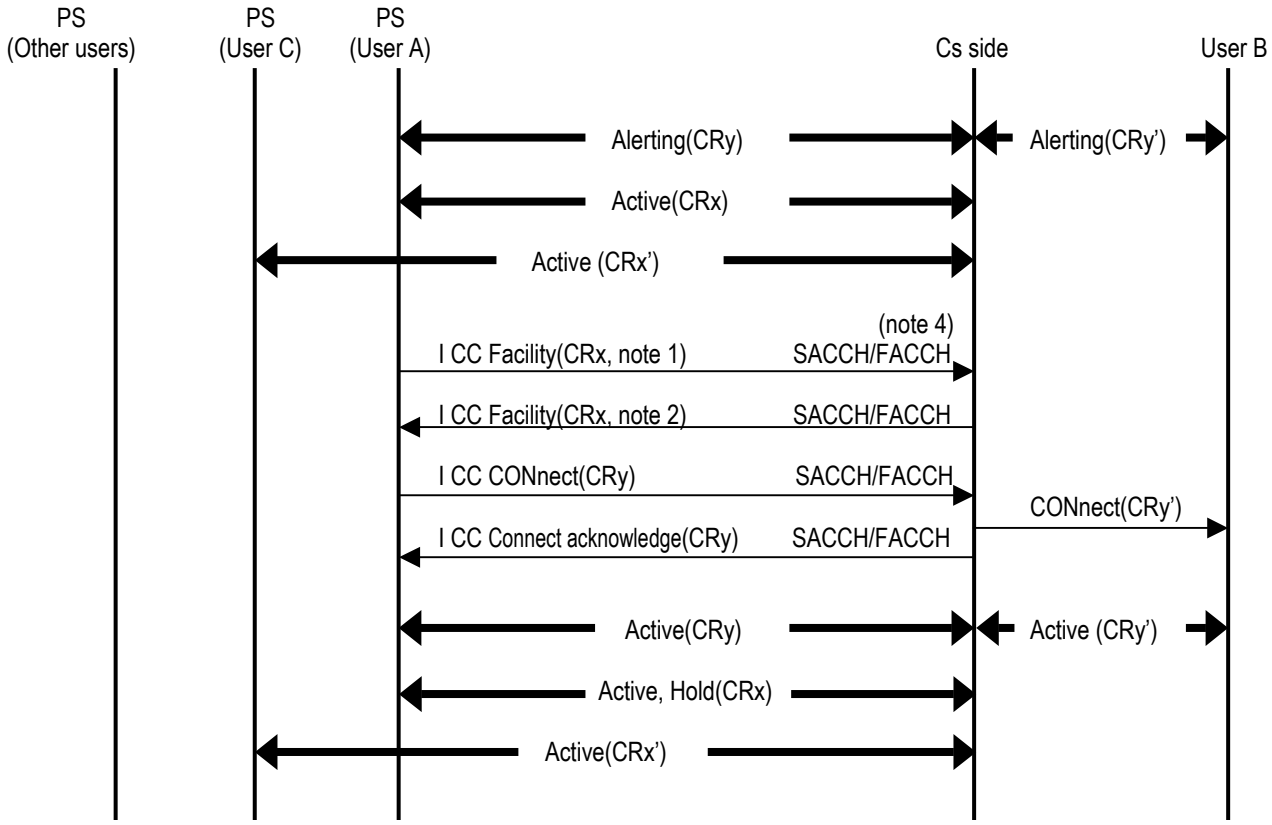


(Note 1) It includes call number CRx and invoke component for the response of call waiting.
(Note 2) It includes call number CRx and invoke component for the termination of call waiting.
(Note 3) For example, user B is connected to ISDN.
(Note 4) FACCH can be only used when the procedures of multiframe acknowledged operation mode is established.

Figure 2.3.3.12.4-1 Response to zone paging during standby by existing disconnection reset.

2.3.3.12.5 Response to individual paging during standby by hold within the CS-PS loop of the existing call

The control sequence chart of the incoming call response by utilizing hold within the CS-PS loop is shown in Figure 2.3.3.12.5-1.

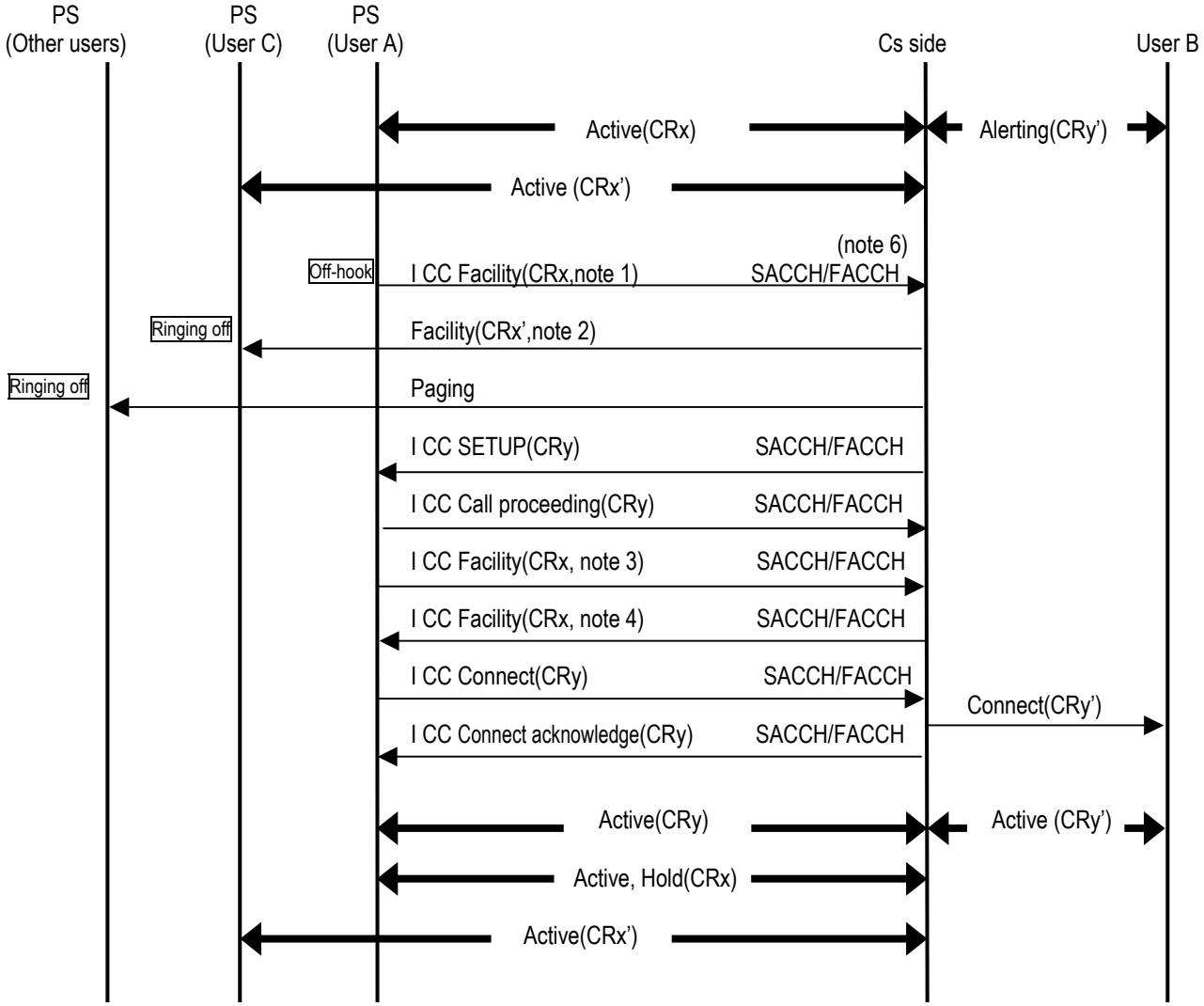


(Note 1) It includes call number CRx and invoke component for initiation of the hold.
(Note 2) It includes call number CRx and invoke component for return result.
(Note 3) For example, user B is connected to ISDN.
(Note 4) FACCH can be only used when the procedures of multiframe acknowledged operation mode is established.

Figure 2.3.3.12.5-1 Response to individual paging during standby by hold within the CS– PS loop of the existing call.

2.3.3.12.6 Response to zone paging during standby by hold within the CS-PS loop of the existing call

The control sequence chart of zone paging response by using hold within the CS-PS loop is shown in Figure2.3.3.12.6-1.



(Note 1) It includes call number CRx and invoke component of the call waiting response.
(Note 2) It includes call number CRx and invoke component of the call waiting termination.
(Note 3) It includes call number CRx and invoke component of the hold start.
(Note 4) It includes call number CRx and invoke component for return result.
(Note 5) For example, user B is connected to ISDN.
(Note 6) FACCH can be only used when the procedures of multiframe acknowledged operation mode is established.

Figure 2.3.3.12.6-1 Response to zone paging during standby by hold within the CS-PS loop of the existing call.

2.3.3.13 Coding method

The invoke component for call waiting within the CS-PS loop supplementary service is shown below.

octet	bit 8	7	6	5	4	3	2	1	
4	1	0	1	0	0	0	0	1	
	Component type tag								
5	Component length (Note 1)								
6	0	0	0	0	0	0	1	0	
	Invoke identifier tag								
7	Invoke identifier length （Note 2）								
8	Invoke identifier								(Note 6)
12	0	0	0	0	0	1	1	0	
	Operation value tag								
13	Operation value length （Note 3）								
14a	0	0	0	0	0	0	1	0	(Note 7)
14b	1	0	0	0	0	0	1	1	
14c	0	0	1	1	1	0	0	0	
14d	1	0	0	0	1	1	0	0	
14e	1	0	0	1	1	0	1	0	
14f	0	1	0	1	1	1	0	0	
14g	0	1	0	0	0	0	0	1	
14h	0	0	0	0	0	0	0	1	
14i	0	Call waiting within the CS-PS loop							
15.1	0	0	1	0	0	0	0	1	(Note 9)
	class		Property	SET					
15.2	0	Length （Note 4）							
15.3.1	1	0	0	0	0	1	0	1	
	class		Property	Line type ［５］					
	0	0	0	0	0	0	0	1	
	Length								
	Line type								
15.3.2	0	1	0	0	0	0	0	0	
	class		Property						
	0	Length (Note 8)							
	0	1	1	0	1	1	0	0	
	JT-Q931Calling party number information element								
	0	Call party number length (Note 8)							
	1	Type of number			Numbering plan identifier				
	Ext-ent-ion	(Note 5)			(Note 5)				
	0	Number digit (IA5 character (0~9, #, *))							

(Note 1) The component length is coded to indicate the number of octets contained in the component (excluding component type tag and component length octets).
(Note 2) The invoke identifier is coded to indicate the number of octets of the invoke identifier.
(Note 3) The operation value length is coded to indicate the number of octets of the object identifier specified by RCR.
(Note 4) The range of the length is the number of octets until last octet (except the concerned octet).
(Note 5) Type of number and Numbering plan identifier is defined as the private network.
(Note 6) Octets 9-11 are not sent.
(Note 7) Octets 14a –14i are the object identifiers (call waiting within the CS-PS loop) specified by RCR.
(Note 8) Length and call party number length are shown the number by the last octet in accordance with JT-Q931, calling party number information element.
(Note 9) Octet 15 is the parameter which is defined by the object identifier (Call waiting start).

Call waiting within the CS-PS loop (octet 14i)

bit

7	6	5	4	3	2	1	
0	0	1	0	1	0	0	Call waiting begin (begincscw)
0	0	1	0	1	0	1	Call waiting end (endcscw)
0	0	1	0	1	1	0	Call waiting answer (ansercscw)

2.3.3.14 Parameter value.

The invoke component for call waiting begin can include some parameters below.

2.3.3.14.1 Line type

Refer to 2.6 about details.

2.3.3.14.2 Calling party number information element

Refer to JT-Q931 “Calling party number information element” about details.

2.4 Conference call within the CS-PS loop supplementary service (Private standard)

2.4.1 Definition

The conference call within the CS-PS loop supplementary service enables user to establish a three-way conversation, i.e. simultaneous communication between user provided with service(user A) and two remote users(user B and user C).

This is remote operation class 2 service which is always invoked from user.

(note) This service is defined for providing conference call within the CS-PS loop. Therefore, providing service in public network is outside the scope of this document.

2.4.2 Service model

A service model is shown in the Figure 2.4.2.1

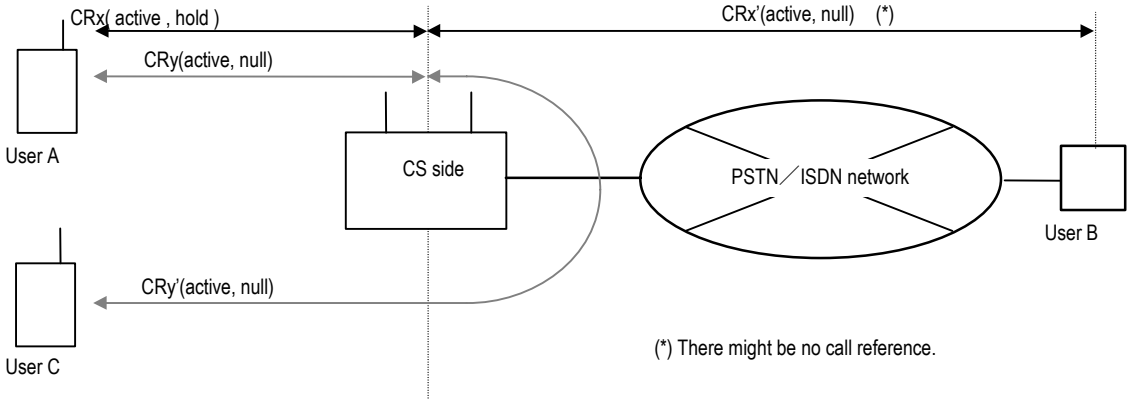


Figure 2.4.2.1 Service model

2.4.3 Detailed description of supplementary service

2.4.3.1 Overview

The user provided with service, who is involved in at least two calls (one active call and at least one call on hold within the CS-PS loop), can join the active call and one held call into a three-way conversation by requesting conference call within the CS-PS loop supplementary service. Both calls shall be answered prior to the invocation of conference call within the CS-PS loop supplementary service.

During an active three-way conversation the user A can request that the service provider:

1) explicitly disconnects one of the remote users.

2) terminates the three-way conversation.

3) creates a private communication with one of the remote users.(note)

(note) In this case, user A becomes same as previous state (one active call and at

least one call on hold)

Conference call within the CS-PS loop supplementary service is terminated by user action described above.

2.4.3.2 Special terms

・ Service provider

The service provider can either be the person who manages the Private PHS(NW), or be the Private PHS(NW) itself.

・ User provided with service (user A)

The user that has the initiative for starting up conference call within the CS-PS loop, or the user that started up the service. This user shall be user A.

・ Remote users (user B and user C)

The users involved in the two calls that are joined together into a three-way conversation (user A - CS - user B, user A - CS - user C). It is not always necessary that remote users (user B and user C) are included in same Network as user A, but when interworking, some functions might be restricted.

2.4.3.3 Restriction in application to telecommunication service

This supplementary service is applicable to the telephone service and the speech/3.1 kHz audio bearer services.

This supplementary service is not applicable to non-voice service.

2.4.3.4 Procedure

2.4.3.4.1 Provision / cancellation of service

The conference call within the CS-PS loop is either provided after arrangement is made with the service provider or available at all times.

Cancellation of conference call within the CS-PS loop is carried out when there is a user request or due to a reason from the service provider.

2.4.3.4.2 Sequence startup and operation

NOTE - It is assumed that

- The call between user A and CS(call of connected user B) is [active-hold] and uses Call Reference x. (CRx)
- The call between user A and CS(call of connected user C) is [active-null] and uses Call Reference y. (CRy)

2.4.3.4.2.1 Initiation of conference call within the CS-PS loop

2.4.3.4.2.1.1 Regular operation

The user provided with service, who is involved in at least two calls (one active call and at least one call on hold), can join the active call and one hold call into a three-way conversation by requesting conference call within the CS-PS loop supplementary service. Both calls shall be answered prior to the invocation of conference call supplementary service.

User A sends a FACILITY message to the Private PHS, containing the Call-reference of the [active-hold] call (CR x) and a "initiation of conference call within the CS-PS loop" invoke component in the Facility information element. The Private PHS accepting this request shall connect the three-way path and return a FACILITY message (CR x) to user A, containing a "initiation of conference call within the CS-PS loop" return result component in the facility information elements.

2.4.3.4.2.1.2 Exceptional procedure

2.4.3.4.2.1.2.1 PS side

If, after having sent a FACILITY message carrying a "initiation of conference call within the CS-PS loop" invoke component, user A receive a FACILITY message with a return error component or a reject component, the three-way conversation is assumed not to be activated and remains null.

2.4.3.4.2.1.2.2 Private PHS (NW)

If the Private PHS receives a FACILITY message, with the call reference of an [active-null] call, containing, a "initiation of conference call within the CS-PS loop" invoke component, the Private PHS shall reject the three-way connection request and return a FACILITY message to user A, containing a return error component "Service provision impossible state",

If the Private PHS receives a FACILITY message, with the call reference of an [active-hold] call, containing a "initiation of conference call within the CS-PS loop" invoke component that cannot be accepted, the Private PHS should reject the request and return a FACILITY message to user A, containing a return error component with one of the following:

- User non-contracted;
- Temporary resource use impossible;
- Provision impossible;
- Supplementary service with unauthorized mutual action.

If, while a three-way conversation is already in operation, the Private PHS receives a FACILITY message containing a "initiation of conference call within the CS-PS loop" invoke component for that same user A, the Private PHS should reject the request and return a FACILITY message to user A, containing a return error component "Supplementary service with unauthorized mutual action".

2.4.3.4.3 Management of conference call within the CS-PS loop

User A;
During three-way conversation, the user A can do the action shown below.

- explicitly disconnect one of the remote users;
  (accordingly, three-way conversation will be terminated automatically, and ends up in two-way communication).

- terminate the three-way conversation;
  (release both of remote users)

- Create a private communication with one of the remote users.
  (in this case, three-way communication is terminated(three-way communication resources were released).
  User A can choose to have private communication with either B or C. The other line is held on hold.
  If user A want to re-establish three-way communication, user A should request conference call to the Private PHS over again.)

User B or C;
- Either of the remote users(user B or C) can request that the Private PHS releases it from the three-way conversation. Then, one simple active call between user A and other remote user is remained.

2.4.3.4.3.1 Regular procedure

2.4.3.4.3.1.1 Disconnection of a single user

To explicitly disconnect one of the remote users, user A shall send a DISCONNECT message to the network, containing the appropriate call reference.

On receipt of a DISCONNECT message containing CRx (that call was in the [active-hold] auxiliary state), the Private PHS shall return a RELEASE message to the user A, release the three-way connection, and all resources associated with the call between user A and B. This results in a simple active call between user A and C via Private PHS.

On receipt of a DISCONNECT message containing CRy (that call was in the [active-null] auxiliary state), the Private PHS shall return a RELEASE message to the user A, release the three-way connection and all resources associated with the call between user A and C, and reserve a traffic channel(TCH) for the user A. This results in a simple call on hold within the CS-PS loop between user A and B via Private PHS.

Furthermore, user A shall send a FACILITY message containing CRx and "termination of hold within the CS-PS loop" invoke component to the Private PHS in order to retrieve the held call between user A and Private PHS. This results in a simple active call between users A and B.

2.4.3.4.3.1.2 Disconnection of entire conference call within the CS-PS loop

To terminate the three-way conversation, user A shall send two DISCONNECT messages to the Private PHS;

- for the first DISCONNECT message, see the procedures described in 2.4.3.4.3.1.1
- for the second DISCONNECT message, normal call clearing procedures are applicable (See Appendix X)

2.4.3.4.3.1.3 Establishment of private conversation with users of conference call within the CS-PS loop

To create a private communication with one of the remote users, user A shall send a FACILITY message to the Private PHS containing the call reference of one of the two calls, and an "termination of conference call within the CS-PS loop" invoke component in the Facility information element. The Private PHS accepting this request shall return FACILITY message to user A, containing an "termination of conference call within the CS-PS loop" return result component in the Facility information element.

In addition, if user A wants to create a private communication with user B while the call between A and CS(call of connected user B) is still [active-hold] and the call A and CS(call of connected user C) is still [active-null] , user A shall send a FACILITY message containing CRy and "initiation of hold within the CS-PS loop" invoke component, and then a FACILITY message containing CRx and "termination of hold within the CS-PS loop" invoke component to the Private PHS, then the hold and retrieve procedures within the CS-PS loop shall apply.

2.4.3.4.3.2 Exceptional procedure

2.4.3.4.3.2.1 PS side

If user A, involved in an active three-way conversation, has sent a FACILITY message carrying a "termination of conference call within the CS-PS loop" invoke component to the Private PHS, and receives a FACILITY message with a return error component or a reject component, the three-way conversation will remain activated.

2.4.3.4.3.2.2 Private PHS (NW)

If the Private PHS receives a FACILITY message containing an "termination of conference call within the CS-PS loop" invoke component for a call reference which is not involved in an active three-way conversation, the Private PHS should return a FACILITY message to the user containing a return error component "Service provision impossible state".

2.4.3.4.4 Request from remote user during conference call within the CS-PS loop

To release from the three-way conversation:

user B (or C) sends a DISCONNECT message to the Private PHS. On receipt of this request, the Private PHS shall release the three-way connection and apply normal call clearing procedures regarding that call. The traffic channel(TCH) at user A interface is held for the remaining call.

2.4.3.5 Substitution procedure

None identified.

2.4.3.6 Functions for charge

This standard does not cover charging principles.

2.4.3.7 Mutual effect with other supplementary service

2.4.3.7.1 Hold within the CS-PS loop

If the Private PHS receives a FACILITY message containing initiation or termination of hold within the CS-PS loop invoke component from user A for changing auxiliary status of call during conference call within the CS-PS loop, the Private PHS shall apply the procedure described in 2.4.3.4.2.1.2.2, and shall indicate the error ”Supplementary service with unauthorized mutual action”.

2.4.3.7.2 Call transfer within the CS-PS loop

If the user provided with service requests to transfer a call and this call is already involved in a three-way conversation as requested by the user provided with service, the Private PHS, shall apply the procedure described in 2.4.3.4.2.1.2.2, and shall indicate the error "Supplementary service with unauthorized mutual action".

2.4.3.7.3 Call waiting within the CS-PS loop

If call waiting is notified, while user A is engaged in three-way communication, user A must withdraw from three-way communication in order to receive waiting call.

2.4.3.7.4 Conference call within the CS-PS loop

If the user provided with service requests to join two calls and one of the calls is already involved in a three-way conversation established by the user provided with service, the private PHS shall apply the procedure described in 2.4.3.4.2.1.2.2, and shall indicate the error “Supplementary service with unauthorized mutual action".

2.4.3.7.5 Hold within the CS-multiple PS

If the Private PHS receive a FACILITY message containing "initiation of hold within the CS-multiple PS" invoke component from user A for holding within the CS-multiple PS of call during conference call within the CS-PS loop, the Private PHS shall apply the procedure described in 2.4.3.4.2.1.2.2, and shall indicate the error ”Supplementary service with unauthorized mutual action”.

2.4.3.7.6 Call type notification within the CS-PS loop

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

2.4.3.7.7 PS remote control function

If the Private PHS receives a FACILITY message containing "initiation of PS remote control function" invoke component from user A, the Private PHS shall apply the procedure described in 2.4.3.4.2.1.2.2, and shall indicate the error ”Supplementary service with unauthorized mutual action”.

2.4.3.8 Mutual effect with handover

None identified.

2.4.3.9 Request condition by mutual connection

2.4.3.9.1 Mutual connection with public network

The operation of this feature is not affected by the nature (i.e. Integrated Services Digital Network (ISDN) or non-ISDN) of the far end of the connection.

User B and C belonging to a non-ISDN, or specific network in the ISDN may not be notified of changes occurring.

2.4.3.10 Notification identifier information element

None identified.

2.4.3.11 Dynamic description

SDLs are shown in Figure 2.4.3.11-1 and Figure 2.4.3.11-2.

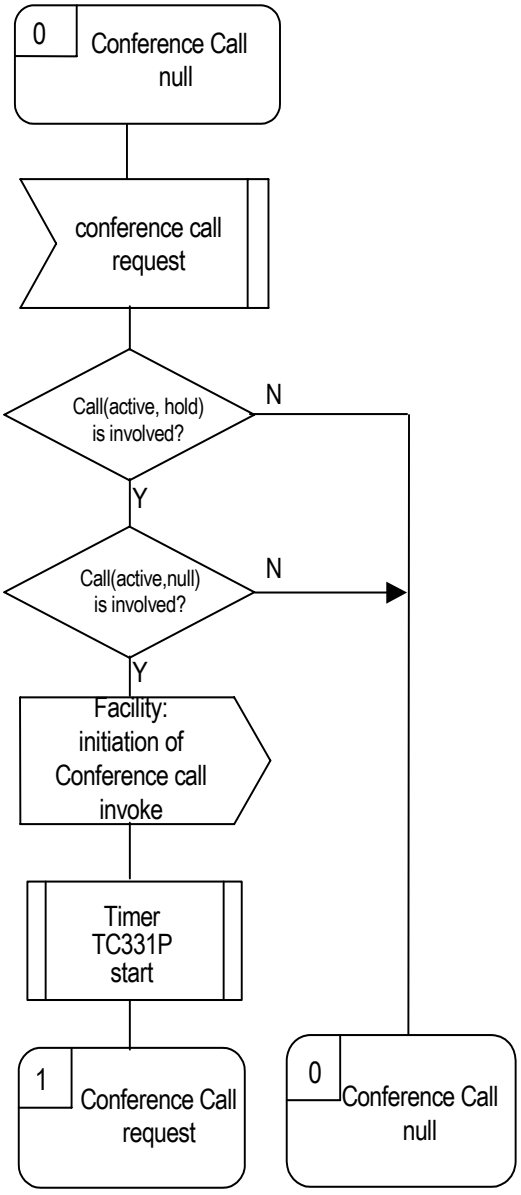


Figure 2.4.3.11-1 SDL（PS side）（1／4）

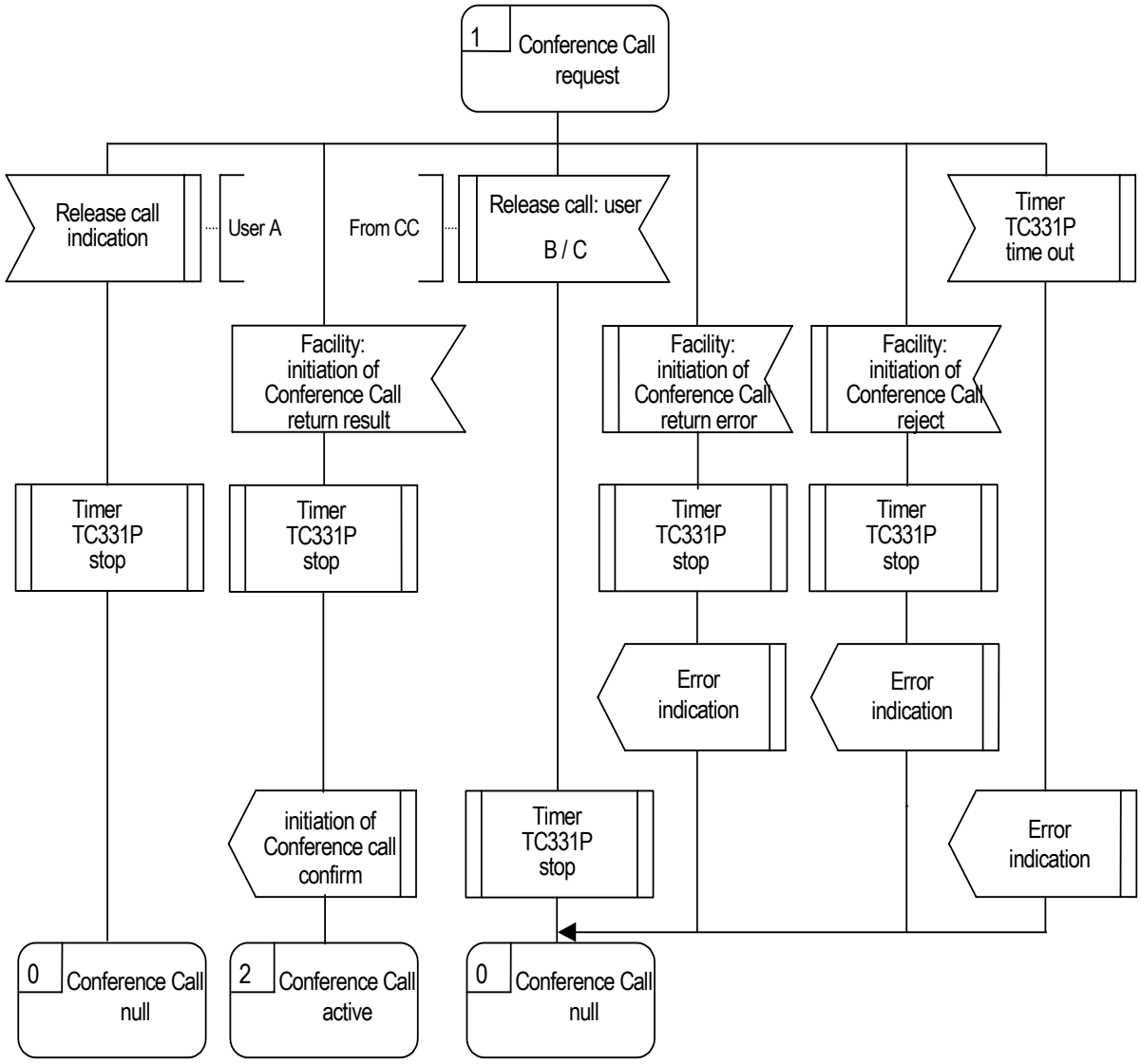


Figure 2.4.3.11-1　SDL（PS side）（2／4）

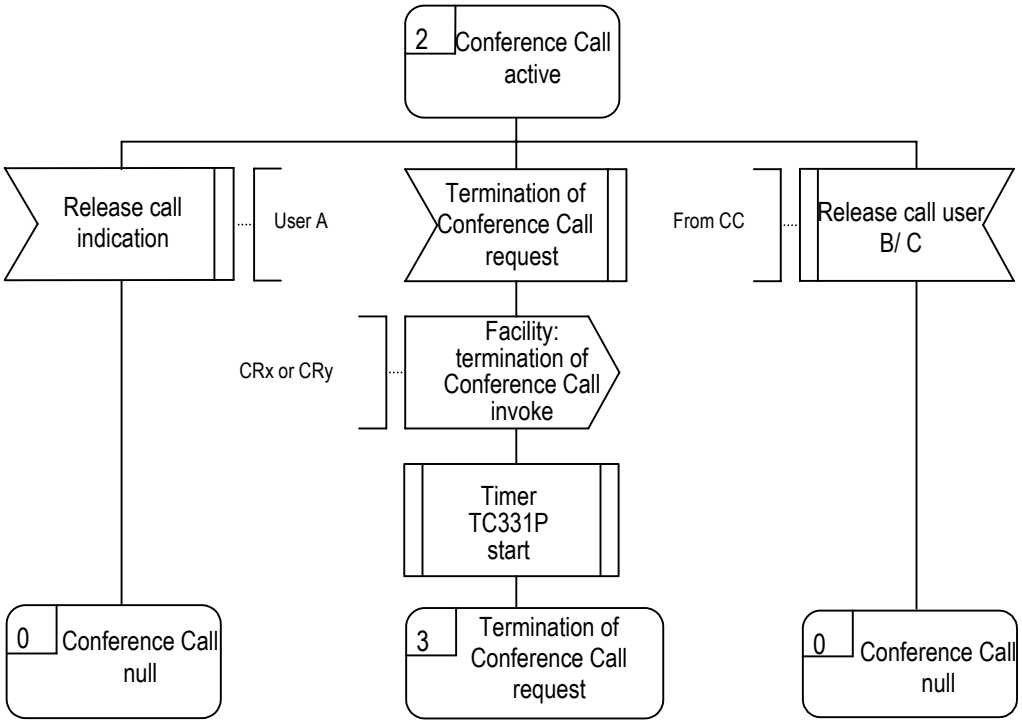


Figure 2.4.3.11-1　SDL（PS side）（3／4）

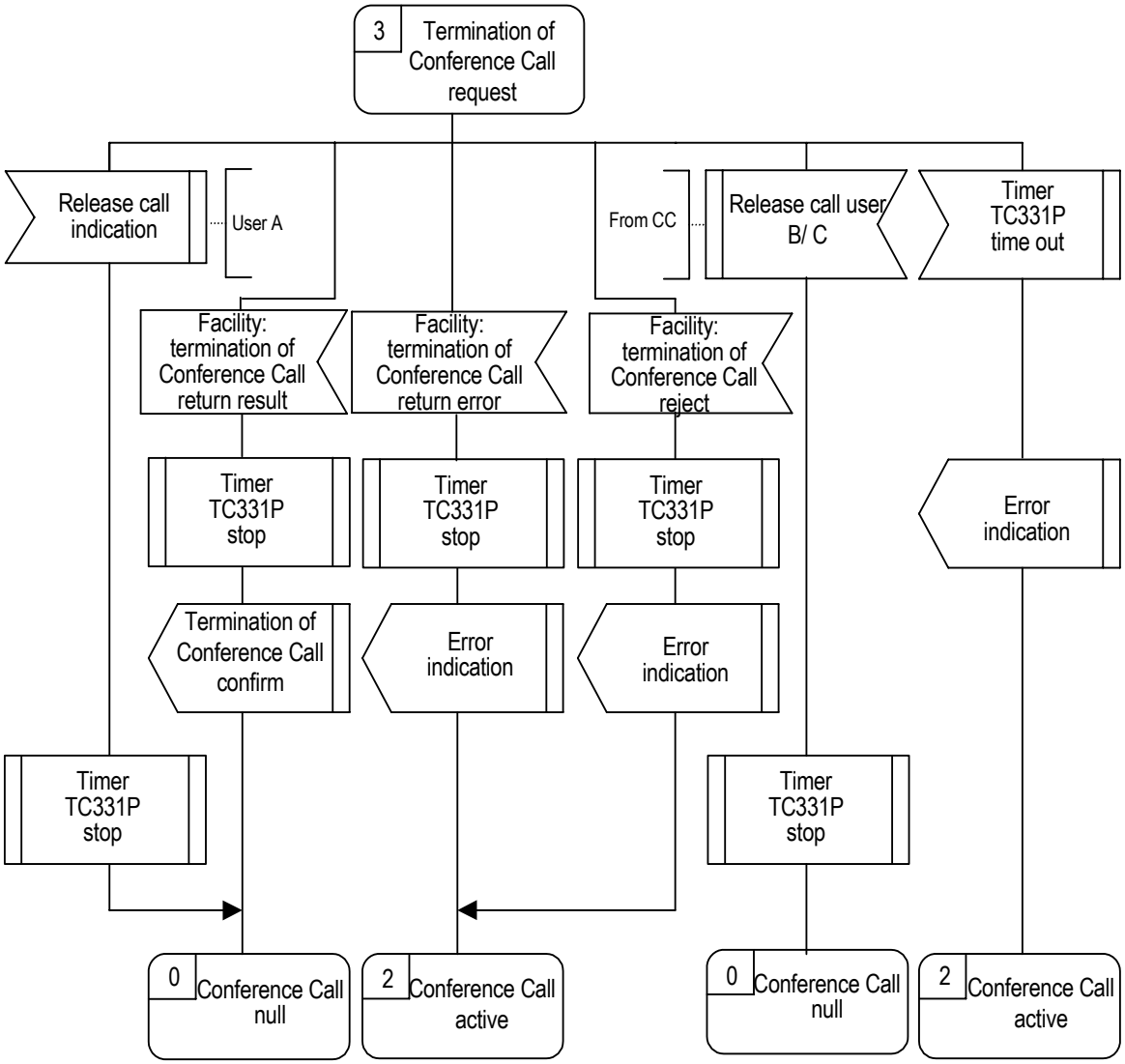


Figure 2.4.3.11-1　SDL（PS side）（4／4）

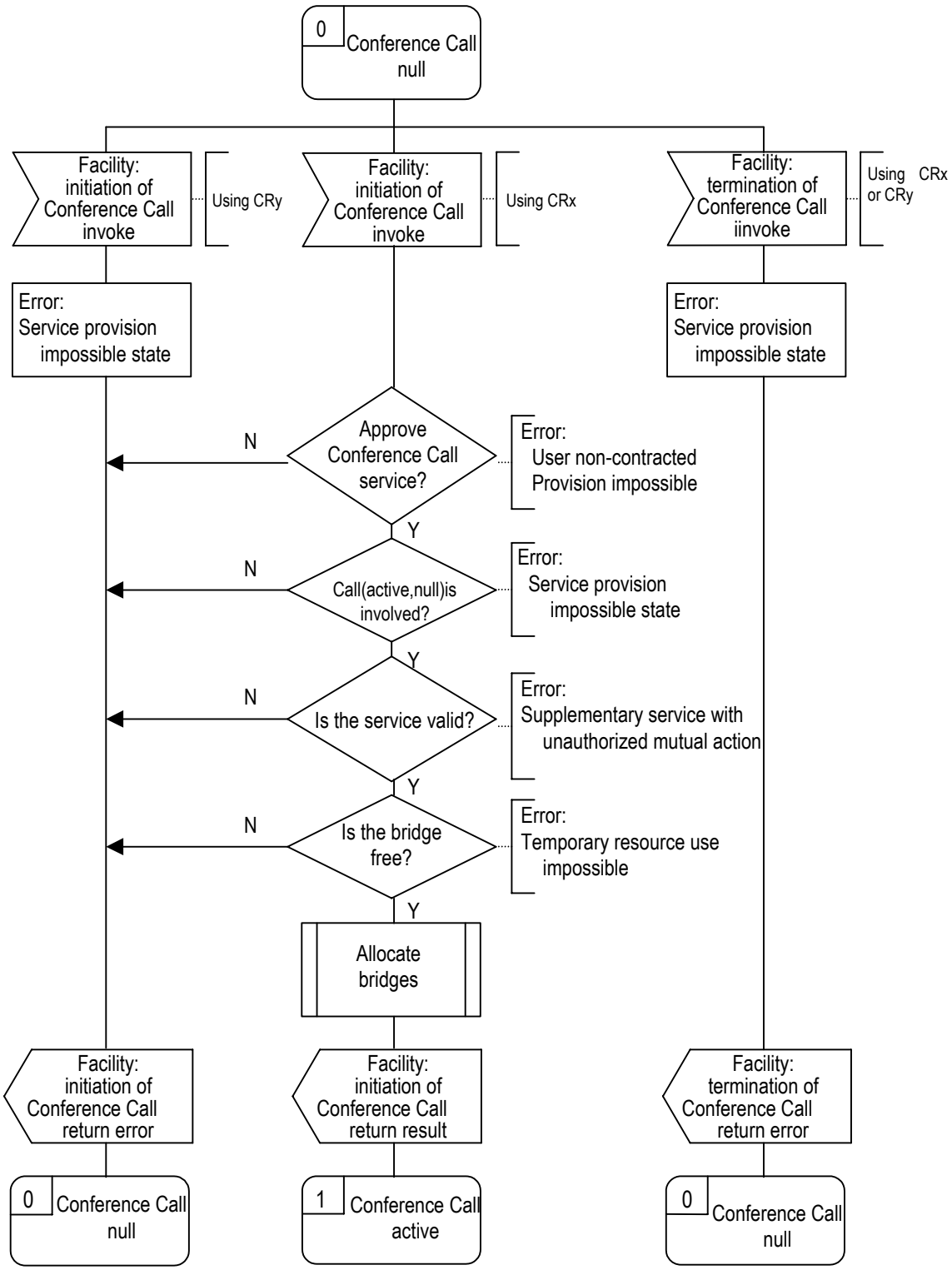


Figure 2.4.3.11-2　SDL（CS side）（1／2）

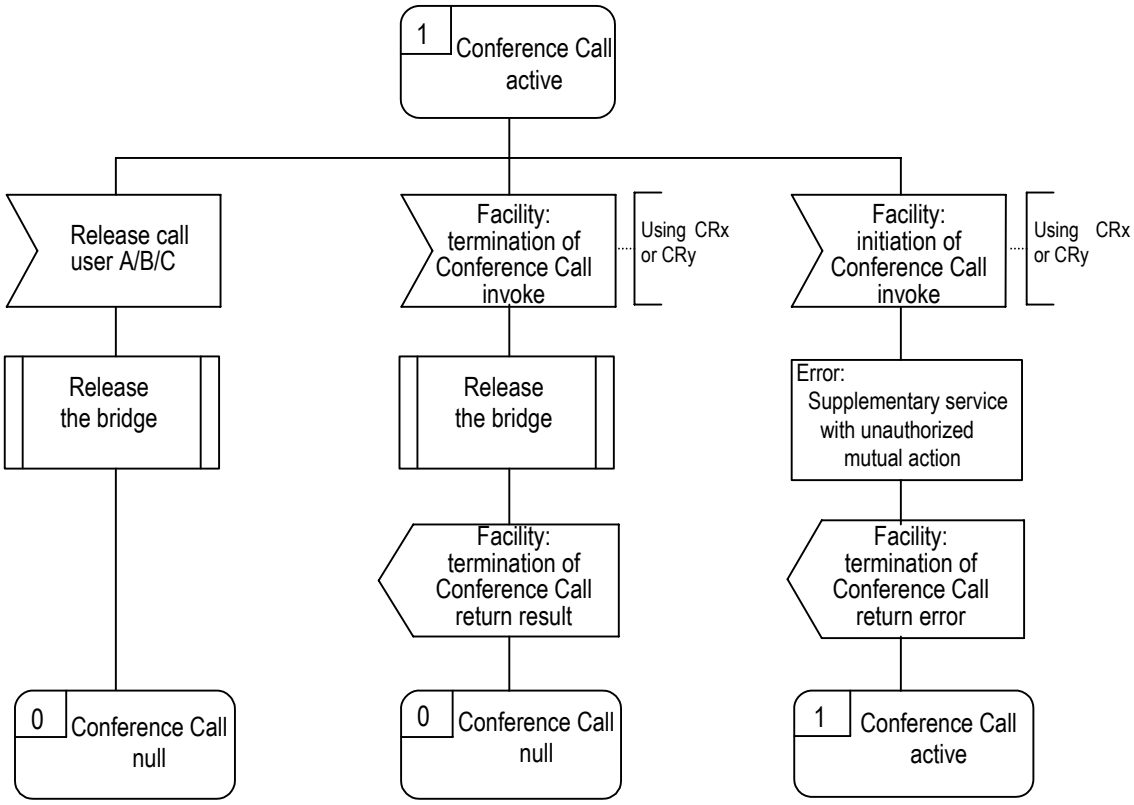
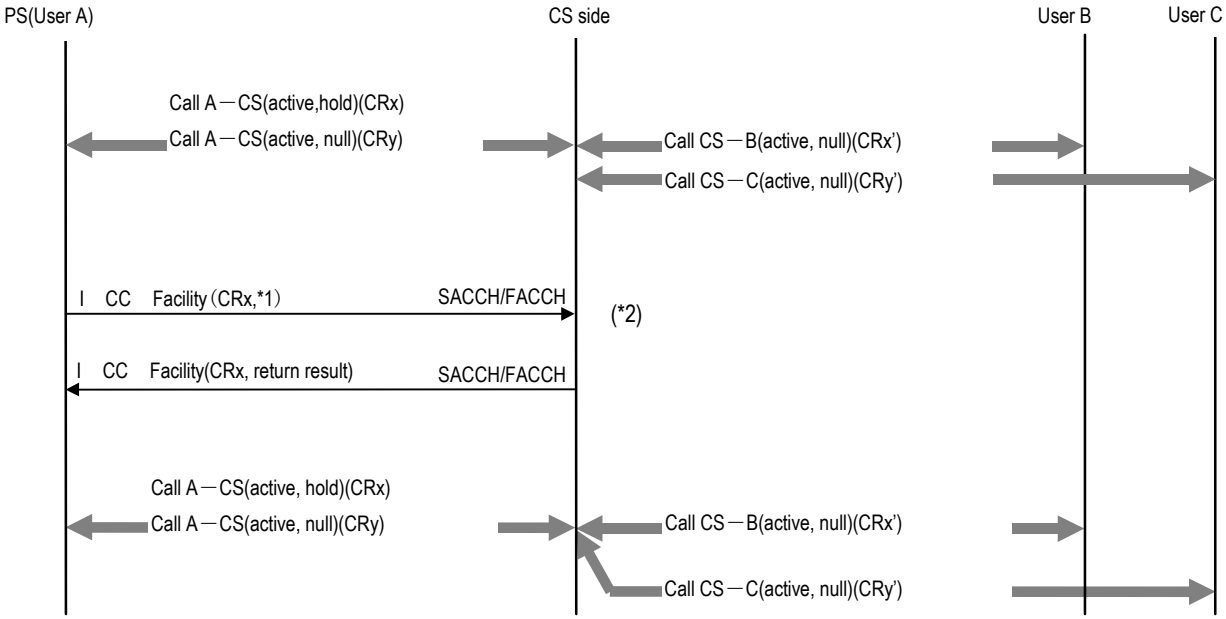


Figure 2.4.3.11-2　SDL（CS side）（2／2）

2.4.3.12 Flow of signal

2.4.3.12.1 Conference call within the CS-PS loop request

Sequence example is shown in Figure 2.4.3.12.1-1



(*1) A "initiation of conference call within the CS-PS loop" invoke component is contained in facility information element in CS with call reference CRx.
(*2) FACCH is available only when layer 2 multi-frame acknowledged operation mode of FACCH is completed before sending this message.

Figure 2.4.3.12.1-1 Conference call within the CS-PS loop request

2.4.3.12.2 Expressed disconnection by user A

Sequence example is shown in Figure 2.4.3.12.2-1

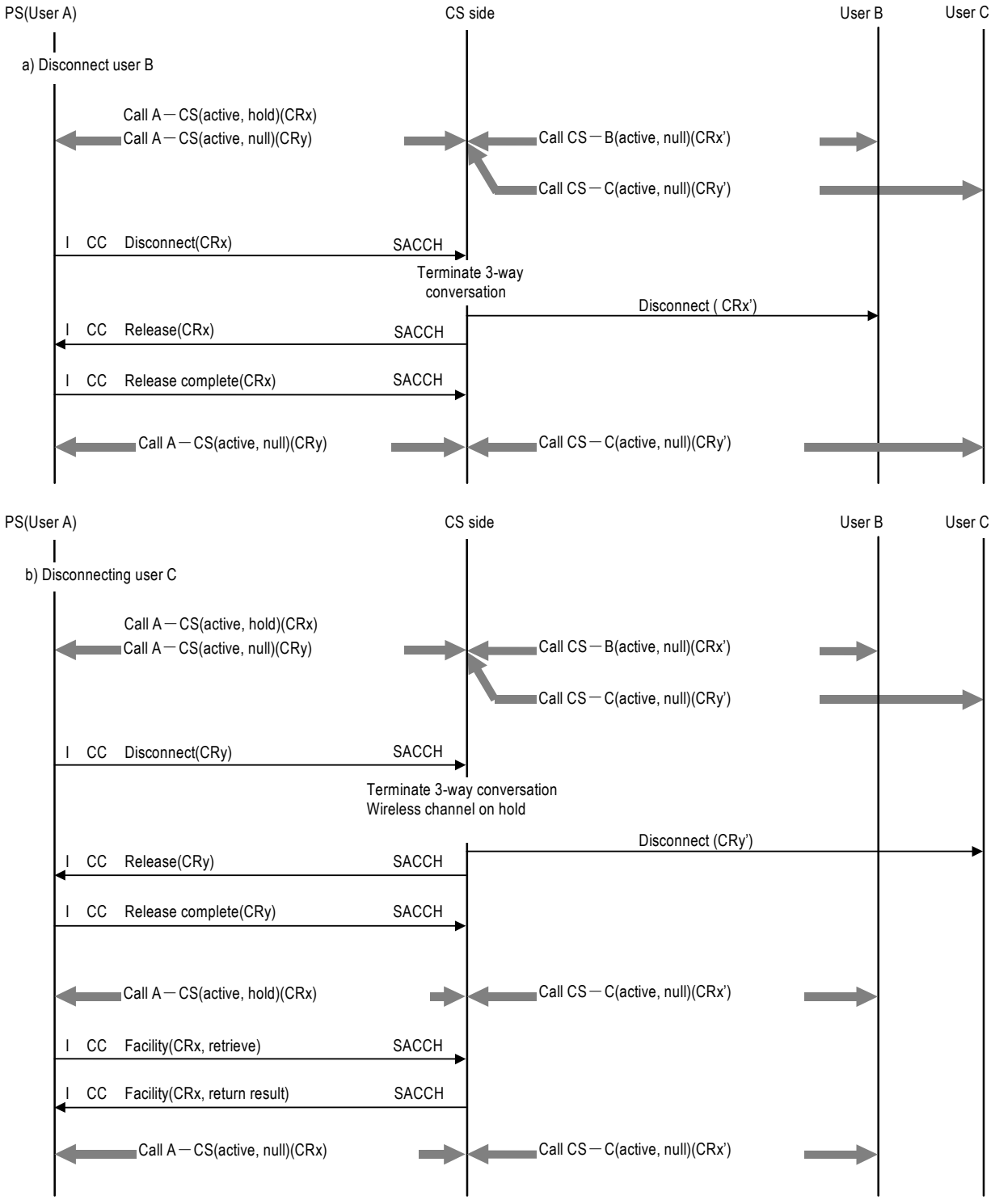


Figure 2.4.3.12.2-1 Expressed disconnection by user A

2.4.3.12.3 Conference call termination requested by user A

Sequence example is shown in Figure 2.4.3.12.3-1

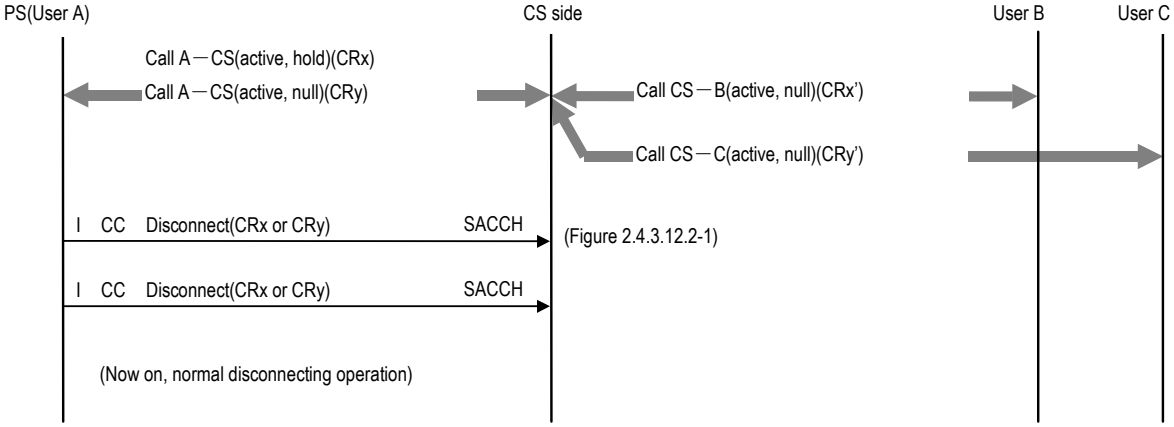
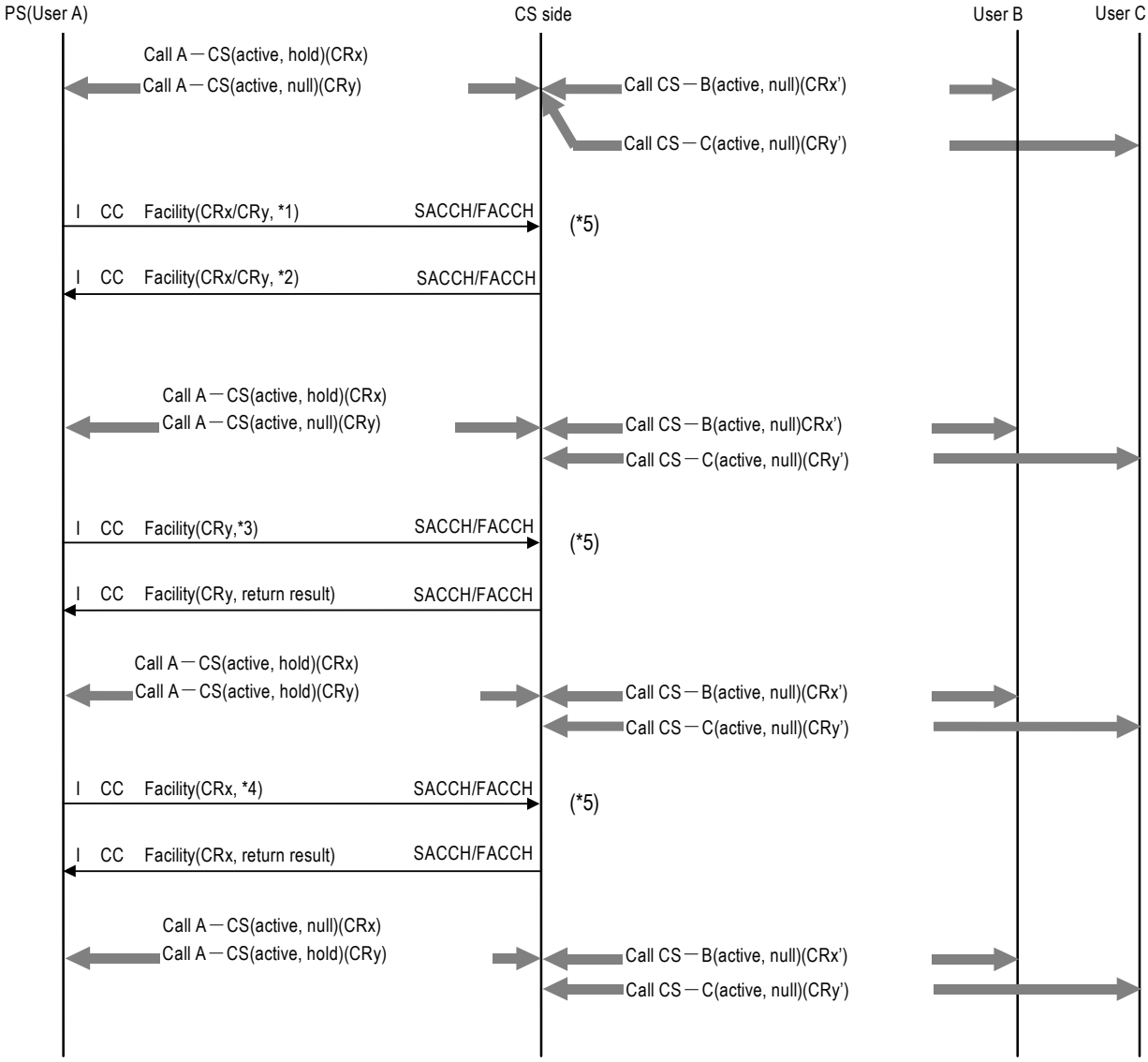


Figure 2.4.3.12.3-1 Conference call termination requested by user A

2.4.3.12.4 Private conversation request by user A

Sequence example is shown in Figure 2.4.3.12.4-1.

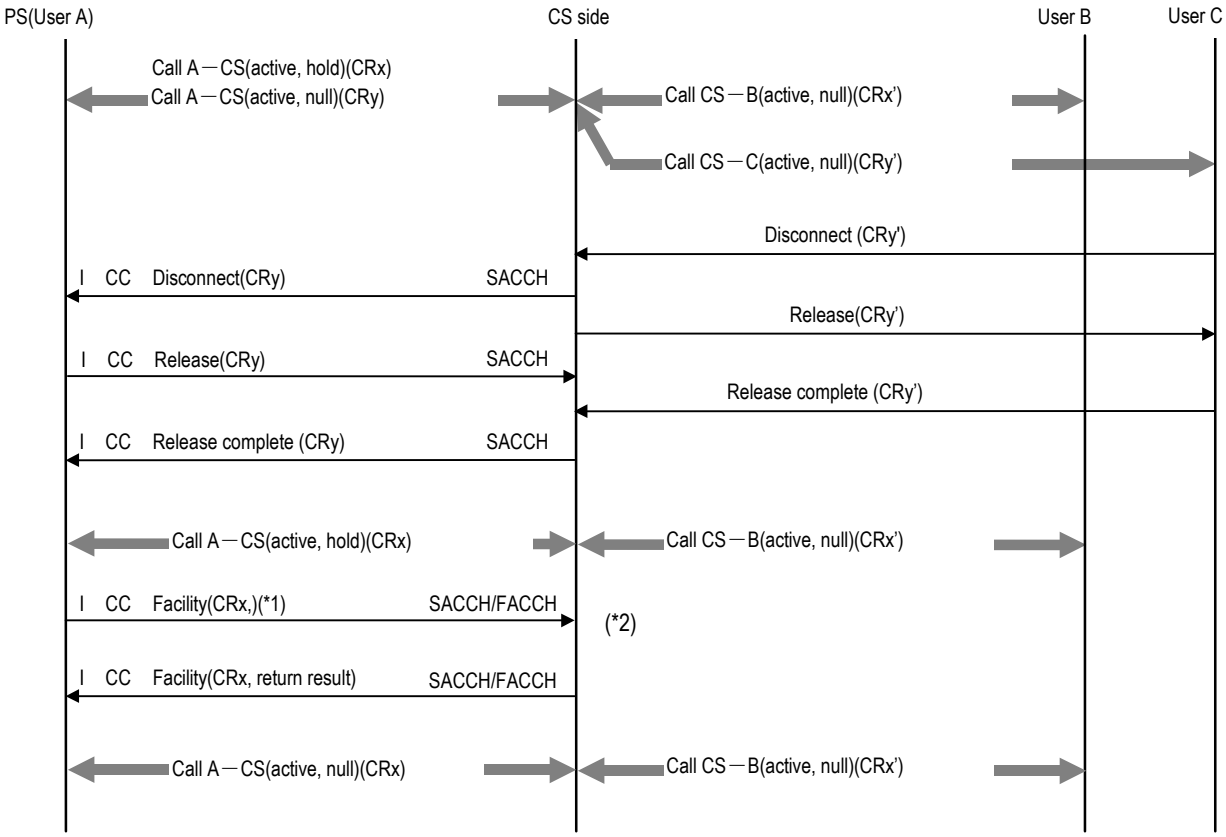


(*1) A "termination of conference call within the CS-PS loop" invoke component is contained in facility information element with call reference CRx or CRy.
(*2) A return result component is contained in facility information element with call reference CRx or CRy.
(*3) A "initiation of hold within the CS-PS loop" invoke component is contained in facility information element with call reference CRy.
(*4) A "termination of hold within the CS-PS loop" invoke component is contained in facility information element with call reference CRx.
(*5) FACCH is available only when layer 2 multi-frames acknowledged operation mode of FACCH is completed before sending this message.

Figure 2.4.3.12.4-1 Private conversation request by user A

2.4.3.12.5 Release (by user C) of conference call within the CS-PS loop requested by user B or C

Sequence example is shown in Fig. 2.4.3.12.5-1.



(*1) A "termination of hold within the CS-PS loop" invoke component is contained in facility information element with call reference CRx.

(*2) FACCH is available only when layer 2multi-frames acknowledged operation mode of FACCH is completed before sending this message.

Figure 2.4.3.12.5-1 Release of conference call within the CS-PS loop requested by user B or C

2.4.3.13 Coding method

The invoke component for Conference Call within the CS-PS loop supplementary service is shown below.

octet	bit 8	7	6	5	4	3	2	1	
4	1	0	1	0	0	0	0	1	
	Component type tag								
5	Component length (note 1)								
6	0	0	0	0	0	0	1	0	
	Invoke identifier tag								
7	Invoke identifier length (note 2)								
8	Invoke identifier								(note 4)
12	0	0	0	0	0	1	1	0	
	Operation value tag								
13	Operation value length (note 3)								
14a	0	0	0	0	0	0	1	0	(note 5)
14b	1	0	0	0	0	0	1	1	
14c	0	0	1	1	1	0	0	0	
14d	1	0	0	0	1	1	0	0	
14e	1	0	0	1	1	0	1	0	
14f	0	1	0	1	1	1	0	0	
14g	0	1	0	0	0	0	0	1	
14h	0	0	0	0	0	0	0	1	
14i	0	Conference call within the CS-PS loop							

(Note 1) The component length is coded to indicate the number of octets contained in the component (excluding component type tag and component length octets).
(Note 2) The invoke identifier length is coded to indicate the number of octets of the invoke identifier.
(Note 3) The operation value length is coded to indicate the number of octets of the object identifier specified by RCR.
(Note 4) Octet 9 - 11 are not sent.
(Note 5) Octet 14a - 14i are the object identifiers (conference call within the CS-PS loop) specified by RCR.

Conference call within the CS-PS loop supplementary service （octet 14i）

Bit 7	6	5	4	3	2	1	
0	0	1	0	1	1	1	Initiation of conference call within the CS-PS loop(begincstpy)
0	0	1	1	0	0	0	Termination of conference call within the CS-PS loop(endcstpy)

2.4.3.14 Parameter value

None identified.

2.5 Hold within the CS-multiple PS supplementary service (Private standard)

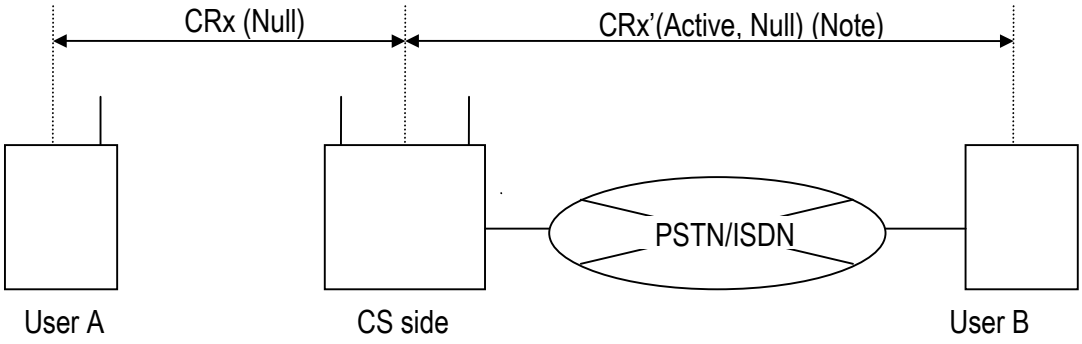
2.5.1 Definition

The hold within the CS-multiple PS is the service that a user can suspend a call temporarily between the terminal and the radio cell station which does not include a public network , and also release the radio channel (or the radio resource) in addition. It is also the service that an arbitrary user in standby state who is registered to the radio cell station can reconnect a suspended call. This service is always initiated by a user and corresponds to the operation class 2.

(Notes 1) The number of system suspension within the CS-multiple PS supplementary service is up to two hold.
(Notes 2) This service specifies the offer of the hold within the CS-multiple PS in CS, and offer of the service in a public network is outside of the regulation range of this standard.

2.5.2 Service model

The following figure 2.5.2-1 shows a service model.



（Note） There may be no call reference

Figure 2.5.2-1 Service model

2.5.3 Detailed description of supplementary service

2.5.3.1 Overview

If the hold within the CS-multiple PS is initiated , a communication on a radio channel is suspended , and the radio channel is released from the use by a call which is already established and releases a radio resource. That is, a call state as a terminal side becomes null , and the radio cell station side forces a call of a public network to be the hold state in the radio cell station , a call state between the radio cell station and the communication party is maintained in the communication.

In the event that a user (it is identified by the terminal) holds a call within the CS-multiple PS , a service provider holds the call. And in the event that the hold within the CS-multiple PS is started , a call hold within the CS-multiple PS can be reconnected and the communication on a radio channel can be established by establishing a call.

2.5.3.2 Special terms

In this definition the following terminology is used.

Service Provider : The service provider can either be the person who manages the private PHS(NW), or be the private PHS(NW) itself.

2.5.3.3 Restrictions in application to telecommunication service

This supplementary service is applied to a telephone service and speech / 3.1kHz audio bearer service. This supplementary service is inapplicable to non-speech service.

2.5.3.4 Procedure

2.5.3.4.1 Provision / cancellation of service

The hold within the CS-multiple PS is either provided after arrangement is made with the service provider or available at all times. The hold within the CS-multiple PS can be used independently.

Cancellation of the hold within the CS-multiple PS is carried out when there is a user request or due to a reason from the service provider.

2.5.3.4.2 Sequence startup and operation

2.5.3.4.2.1 Hold within the CS-multiple PS request

2.5.3.4.2.1.1 Regular operation

The calling user side , after a call receives a connect , becomes a state hold within the CS-multiple PS by the hold within the CS-multiple PS request at any time before the call is disconnected.

The called user side , after a call is connected , becomes a state hold within the CS-multiple PS by the called user at any time before a call disconnection operation is begun.

Next , the communication on the radio section is suspended. A service provider checks this operation , releases the corresponding radio channel and sets it be a standby state.

As an option , a the radio cell station side can notify a held side (user B) by the start of an in band tone that a call has been the state of the hold within the CS-multiple PS.

If a call has been the state of the hold within the CS-multiple PS , the peer entity can disconnect the call.

2.5.3.4.2.1.2 Exceptional procedure

2.5.3.4.2.1.2.1 PS side

If user A received "facility" message which includes Return error component or Reject component after it sends "facility" message which includes the hold within the CS-multiple PS request invoke component , the hold within the CS-multiple PS is not initiated instead maintains the communication state.

2.5.3.4.2.1.2.2 Private PHS (NW)

If a radio cell station has already more than two the hold within the CS-multiple PS and receives "facility " message which includes the hold within the CS-multiple PS start invoke component , it should reject the hold within the CS-multiple PS and return "facility" message which includes reason display ' a service offer improper state' error component to user A.

If a radio base station receives in communication "facility" message which includes the hold within the CS-multiple PS start invoke component and can not accept it , it should return to user A "facility" message which includes error component which includes one reason display among following reason displays.

- User non-contracted
- Provision impossible
- Information contents insufficient
- Service provision impossible state
- Service provision impossible by basic service
- Procedure error

2.5.3.4.3 Management of hold within the CS-multiple PS

A user in standby state : The following service are available for a user in standby state during the hold within CS-multiple PS.

1) Cancel hold within CS-multiple PS

2.5.3.4.3.1 Regular procedure

2.5.3.4.3.1.1 Request for cancellation of hold within the CS-multiple PS

If an arbitrary user in standby state who is registered to a radio base station notifies the establishment of the call hold within CS-multiple PS , a service provider will reconnect the call and establish the communication on a radio channel , and as an option notify a user in the hold that the call is active.

If a service provider can meet the request , the call goes back to the communication phase.

2.5.3.4.3.2 Exceptional procedure

In the event that an arbitrary user who is registered to a radio base station notifies the establishment of the call hold within CS-multiple PS , if a service provider can not meet the request , he returns the reason to the user and rejects it.

2.5.3.4.4 Request from remote user during hold within the CS-multiple PS

Release hold within CS-multiple PS:

If a call is in the hold within CS-multiple PS , a remote user can disconnect the call.

2.5.3.5 Substitution procedure

None identified.

2.5.3.6 Functions for charge

This standard does not cover charging principles.

2.5.3.7 Mutual effect with other supplementary service

2.5.3.7.1 Hold within the CS-PS loop

During the hold within the CS-multiple PS, since a radio channel is released, it is incompatible.

2.5.3.7.2 Call transfer within the CS-PS loop

During the hold within the CS-multiple PS, since a radio channel is released, it is incompatible.

2.5.3.7.3 Call waiting within the CS-PS loop

During the hold within the CS-multiple PS, since a radio channel is released, it is incompatible.

2.5.3.7.4 Hold within the CS-multiple PS

Suppose that the number of system suspension of the hold within the CS-multiple PS supplementary service is up to two.

2.5.3.7.5 Conference call within the CS-PS loop

During the hold within the CS-multiple PS, since a radio channel is released, it is incompatible.

2.5.3.7.6 Call type notification within the CS-PS loop

During the hold within the CS-multiple PS, since a radio channel is released, it is incompatible.

2.5.3.7.7 PS remote control function

During the hold within the CS-multiple PS, since a radio channel is released, it is incompatible.

2.5.3.8 Mutual effect with handover

Handover of call under the hold within the CS-multiple PS is not specified.

2.5.3.9 Request condition by mutual connection

2.5.3.9.1 Mutual connection with public network

The operation of this feature is not affected by the nature (i.e. Integrated Services Digital Network (ISDN) or non-ISDN) of the far end of the connection.

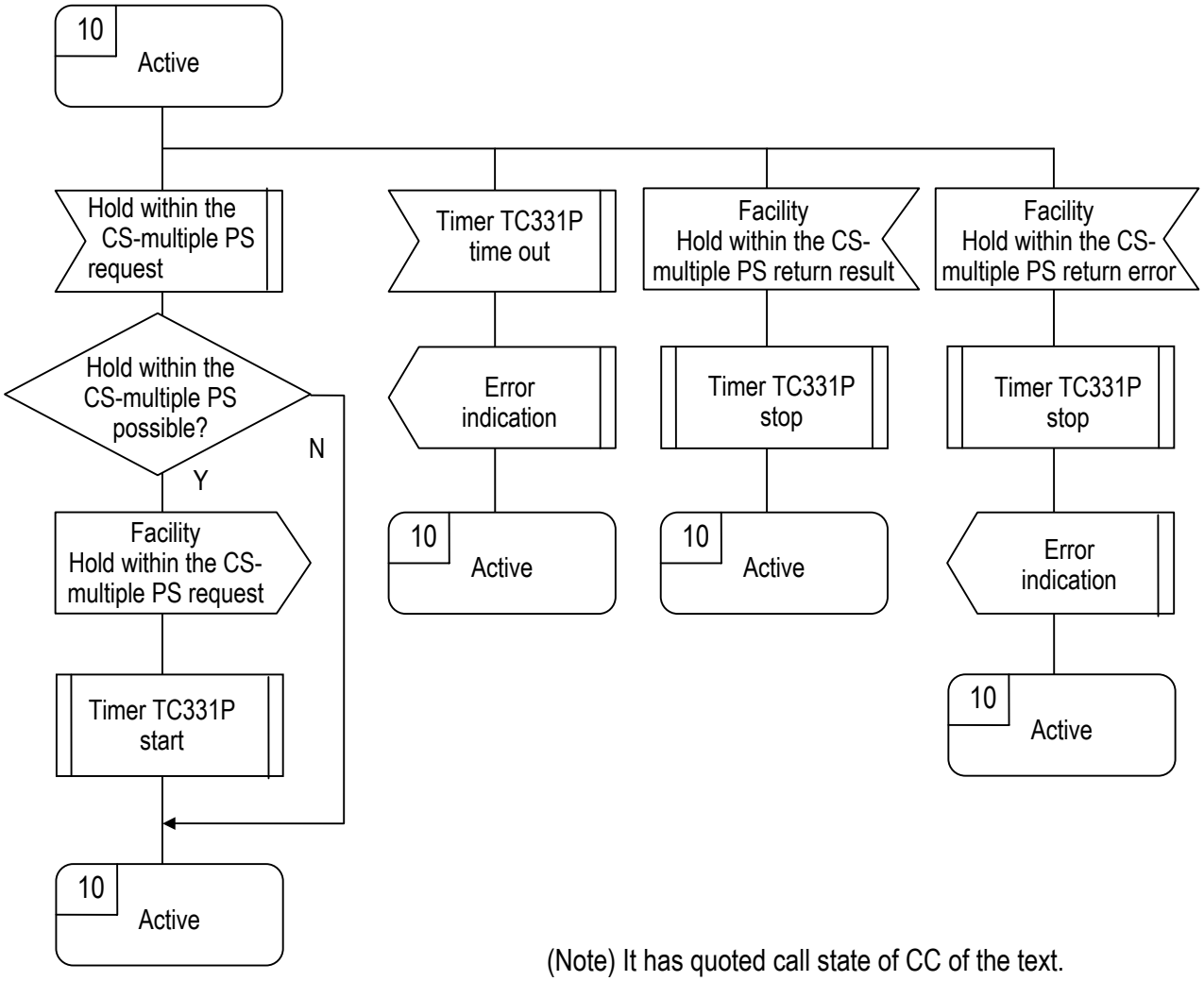
2.5.3.10 Notification identifier information element

None identified.

2.5.3.11 Dynamic description

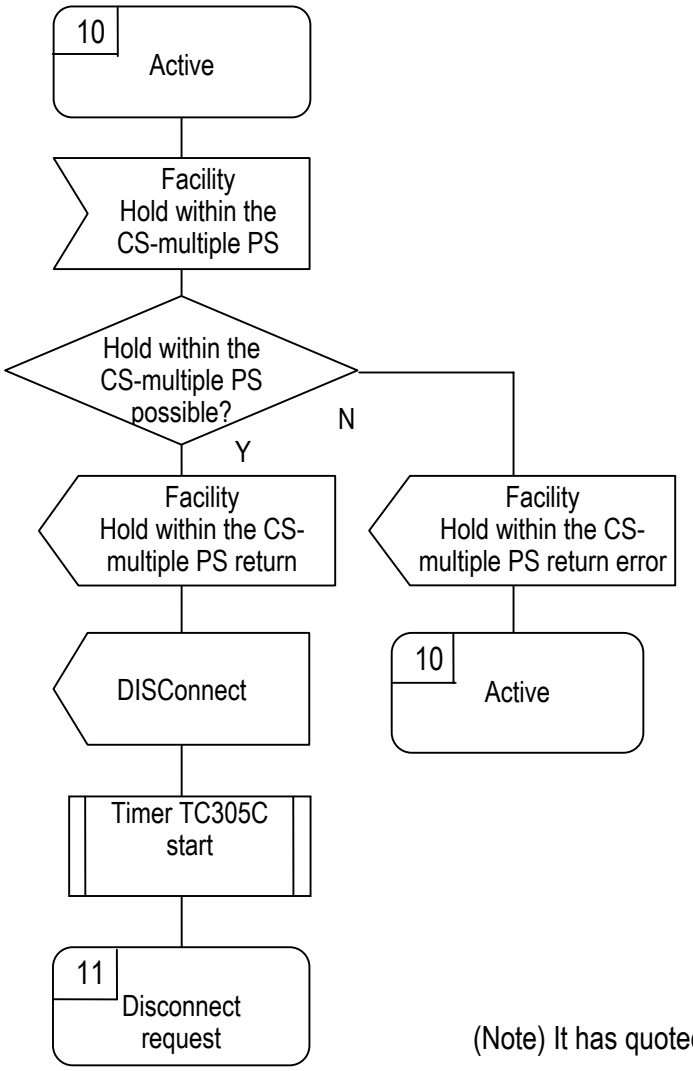
The dynamic description of this service is described by appendix T and appendix V except the following description.

The SDL diagrams are shown below.



(Note) It has quoted call state of CC of the text.

Figure 2.5.3.11-1 SDL diagram(PS side) (1/1)



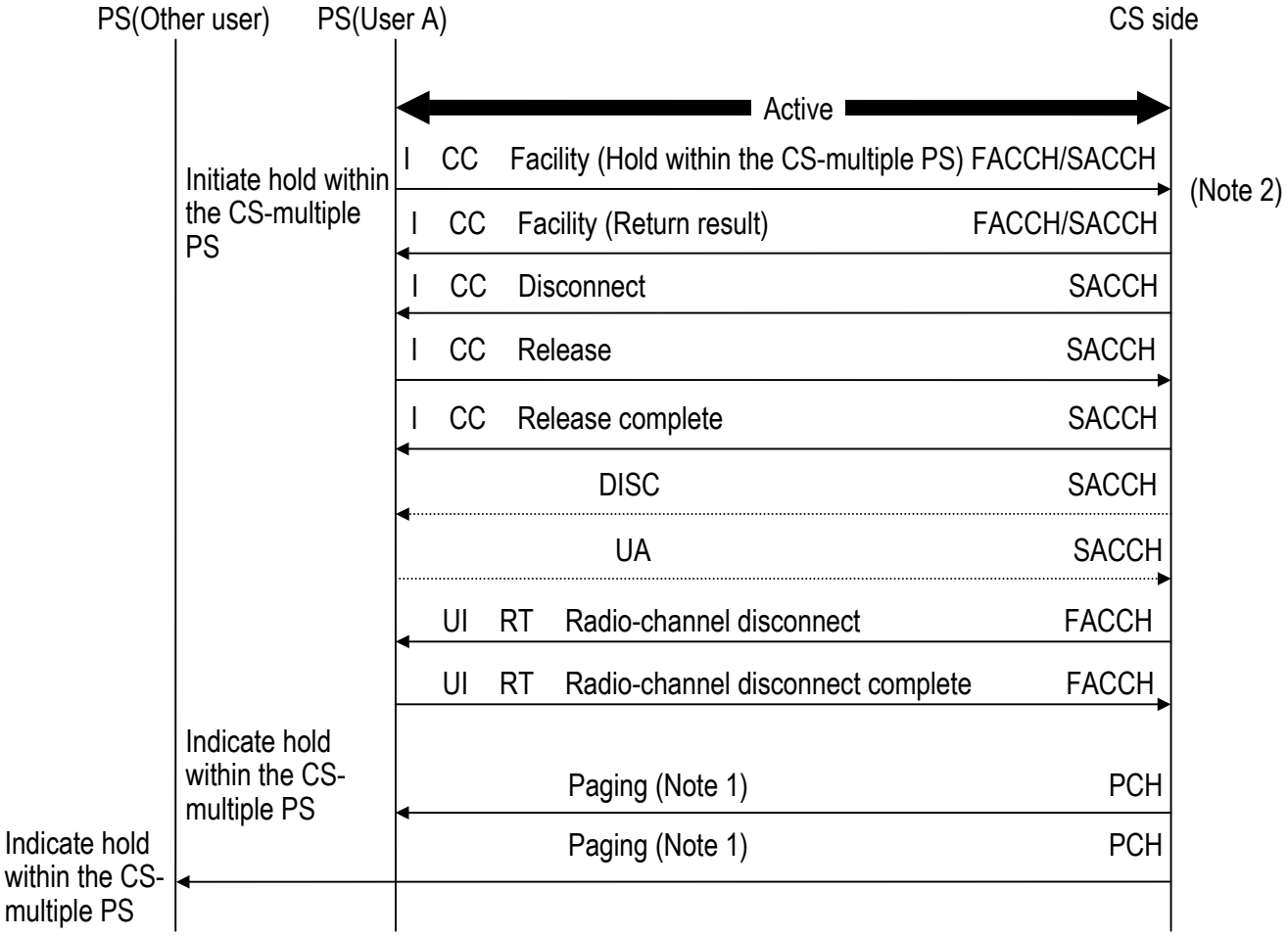
(Note) It has quoted call state of CC of the text.

Figure 2.5.3.11-2 SDL diagram(CS side) (1/1)

2.5.3.12 Flow of signal

2.5.3.12.1 Initiate hold within the CS-multiple PS

The control sequence of hold within the CS-multiple PS is shown in Figure 2.5.3.12.1-1.



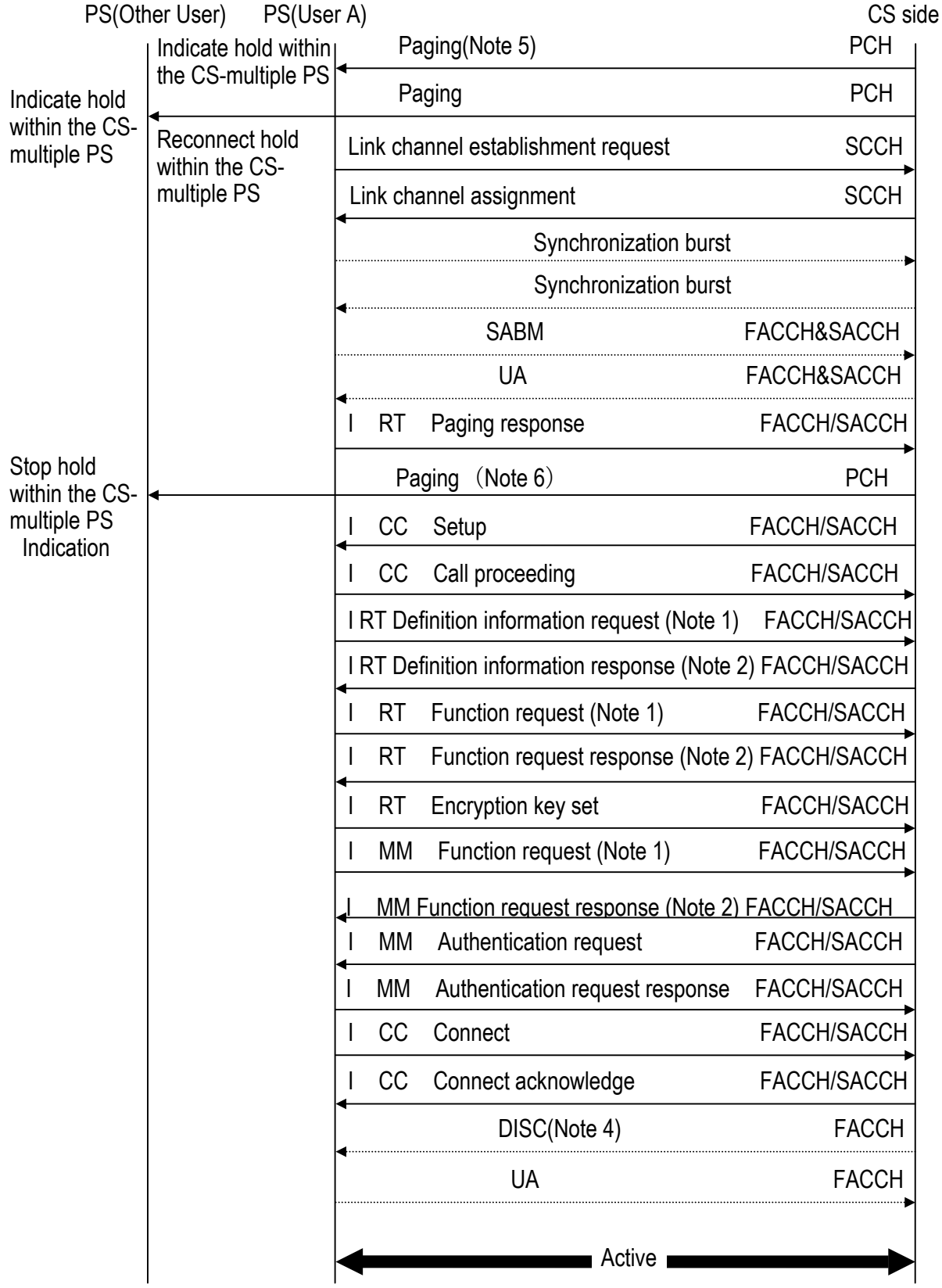
(Note 1) When PS is standby state, paging service type of "Paging" message show extension paging service type(101) and extension paging service type show basic incoming call service of the supplementary service within the CS-PS loop (0100), and the notification from the system 1, the notification from the system 2 or the notification from the system 3 show hold within the CS-multiple PS (11), it does not transmit "link channel establishment request" message and it displays that there is call hold within the CS-multiple PS.
Moreover PS suspends a display, when detect loss of synchronization.

(Note 2) The FACCH can be used only when establishment of the layer 2 multiframe acknowledged operation mode of FACCH is completed, before this message transmission.

Figure 2.5.3.12-1 Initiate hold within the CS-multiple PS

2.5.3.12.2 Reconnect hold within the CS-multiple PS

The control sequence of reconnect hold within the CS-multiple PS is shown in Figure 2.5.3.12.2-1.



(Note 1) This control signal can be omitted as necessary.
(Note 2) This control signal is for the previous control signal with the (Note 1) attached. It is transmitted only when the relevant control signal is received.
(Note 3) The layer 3 sequence of the service channel establishment phase is activated after the FACCH or SACCH layer 2 multiframe acknowledged operation mode is established.
(Note 4) Before layer 2 DISC transmission on FACCH, the layer 2 multiframe acknowledged operation mode should be established on SACCH.
(Note 5) When PS is standby state, paging service type of "Paging" message show extension paging service type(101) and extension paging service type show basic incoming call service of the supplementary service within the CS-PS loop, and the notification from the system 1, the notification from the system 2 or the notification from the system 3 show hold within the CS-multiple PS (11), it does not transmit "link channel establishment request" message and it displays that there is call hold within the CS-multiple PS.
Moreover PS suspends a display, when detect loss of synchronization.
(Note 6) CS sets extension paging service type of "Paging" message as "ringing cessation", when received "paging response" message from PS or detected call release.
PS which did not perform reconnect call hold within the CS-multiple PS (PS which shows that call hold within the CS-multiple PS exists) suspends a display, when received extension paging service type of "Paging" message with "ringing cessation".

Figure 2.5.3.12.2-1 Reconnect hold within the CS-multiple PS

2.5.3.13 Coding method

The invoke component for hold within the CS-multiple PS supplementary service are shown below.

Octet	Bit 8	7	6	5	4	3	2	1	
4	1	0	1	0	0	0	0	1	
	Component type tag								
5	Component length(Note 1)								
6	0	0	0	0	0	0	1	0	
	Invoke identifier tag								
7	Invoke identifier length(Note 2)								
8	Invoke identifier								(Note 4)
12	0	0	0	0	0	1	1	0	
	Operation value tag								
13	Operation value length(Note 3)								
14a	0	0	0	0	0	0	1	0	(Note 5)
14b	1	0	0	0	0	0	1	1	
14c	0	0	1	1	1	0	0	0	
14d	1	0	0	0	1	1	0	0	
14e	1	0	0	1	1	0	1	0	
14f	0	1	0	1	1	1	0	0	
14g	0	1	0	0	0	0	0	1	
14h	0	0	0	0	0	0	0	1	
14i	0	Hold within the CS-multiple PS							

(Note 1) The component length is coded to indicate the number of octets contained in the component(excluding component type tag and component length octets).
(Note 2) The invoke identifier is coded to indicate the number of octets of the invoke identifier.
(Note 3) The operation value length is coded to indicate the number of octets of the object identifier specified by RCR.
(Note 4) Octets 9-11 are not sent.
(Note 5) Octets 14a - 14i are the object identifiers(hold within the CS-multiple PS) specified by RCR.

Hold within the CS-multiple PS(Octet 14i)

Bit 7	6	5	4	3	2	1	
0	0	1	1	0	0	1	Hold within the CS-multiple PS(cssyshldreq)

2.5.3.14 Parameter value

None identified.

2.6 Call Type Notification Within the CS-PS loop Supplementary Services

2.6.1 Definitions

The call type notification within the CS-PS loop is the service that optional users registered in CS (including CS) mutually notify the following types.

1) Outgoing call type
2) Incoming call type
3) Communication type

This service corresponds to the Remote operation class 5.

2.6.2 Service model

The service model is as follows:

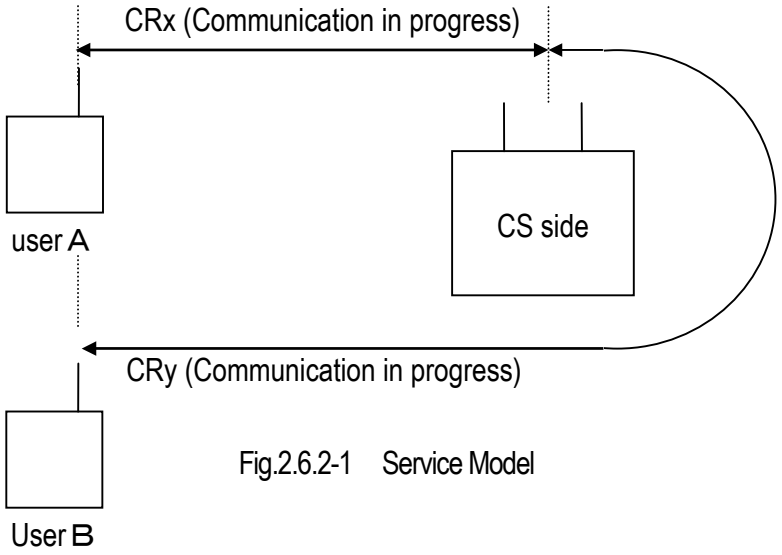


Fig.2.6.2-1 Service Model

2.6.3 Detailed description of supplementary services

2.6.3.1 Overview

During outgoing call, the user notifies CS of the other party's type when set up call. And during incoming call, the user notifies the optional user(s) registered through CS of the other party's type when set up call.

During communication, the change of the communication type is notified from the user to CS or from CS to the user.

2.6.3.2 Special terms

In this definition, the following words are used.

- Service Provider
  Service Provider as described here is the thing to manage the system on CS side or the CS itself.

_ Individual Paging
While paging service to all PS registered in CS is defined as the zone paging, the paging service to a set of specific PS is described as the individual paging to distinguish two exactly. (In this document, “Paging” is used.)

2.6.3.3 Restrictions in application to telecommunication services

This supplementary service applies to the telephone service, the voice / 3.1 kHz audio bearer service and the non-voice service.

2.6.3.4 Procedure

2.6.3.4.1 Provision/ cancellation of services

The call type notification within the CS-PS loop shall be provided after prior arrangement with the service provider or shall be always available.

The call type notification within the CS-PS loop shall be cancelled by the user’s request or for the service provider’s reason.

2.6.3.4.2 Activation and Operation of the Sequence

2.6.3.4.2.1 Request for call type notification within the CS-PS loop

A request for the call type notification within the CS-PS loop is activated:

1) When the outgoing call is established
2) When the individual paging is established
3) When the call type on communication is changed

(Note) The zone paging is not established when the incoming call is notified.

2.6.3.4.2.2 Cancellation of call type notification within the CS-PS loop

Just as the user releases the call, the call type notification within the CS-PS loop is cancelled.

2.6.3.4.3 Exceptional procedure

2.6.3.4.3.1 Activation and Operation of the Sequence

2.6.3.4.3.1.1 Request for call type notification within the CS-PS loop

If the service provider can not activate the call, they must indicate the reason for the failure to the user.

2.6.3.4.1.2 Cancellation of call type notification within the CS-PS loop

If the service provider can not cancel the service, they must indicate the case of the failure to the user.

2.6.3.5 Substitution procedure

This is not specified.

2.6.3.6 Feature for the charge

The principle of the charge is out of range of the standard.

2.6.3.7 Mutual effect with the other supplementary services

2.6.3.7.1 Hold within the CS-PS loop

Neither supplementary service affects the operation of the other supplementary services.

2.6.3.7.2 Call transfer within the CS-PS loop

Neither supplementary service affects the operation of the other supplementary services

2.6.3.7.3 Call waiting within the CS-PS loop

Neither supplementary service affects the operation of the other supplementary services

2.6.3.7.4 Conference call within the CS-PS loop

Neither supplementary service affects the operation of the other supplementary services

2.6.3.7.5 Hold within the CS-multiple PS

Neither supplementary service affects the operation of the other supplementary services

2.6.3.7.6 PS remote control function

Neither supplementary service affects the operation of the other supplementary services.

2.6.3.7.7 Call type notification within the CS-PS loop

The same supplementary service is not activated at the same time. Each service is independently provided.

2.6.3.8 Mutual effect with handover

This is not specified.

2.6.3.9 Requirements on the mutual connection

2.6.3.9.1 Mutual connection with PSTN

The operation of this service is not influenced by the attribute (ISDN or non-ISDN) at the other connection side.

2.6.3.10 Notification indication information element

This is not specified.

2.6.3.11 Dynamic description

To notify the type, no dynamic change

2.6.3.12 Flow of signal

2.6.3.12.1 The call type notification within the CS-PS loop is activated on the en-bloc sending.

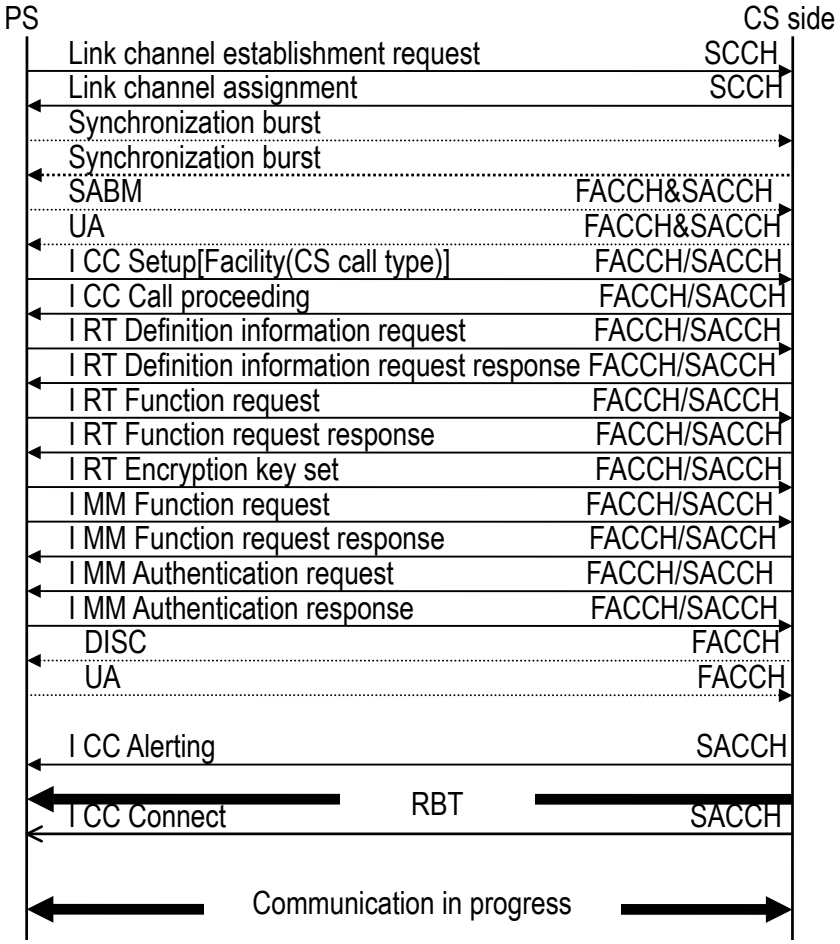


Fig. 2.6.3.12.1-1 Request for the call type notification within the CS-PS loop during en-bloc sending

2.6.3.12.2 The call type notification within the CS-PS loop is activated on the overlap sending.

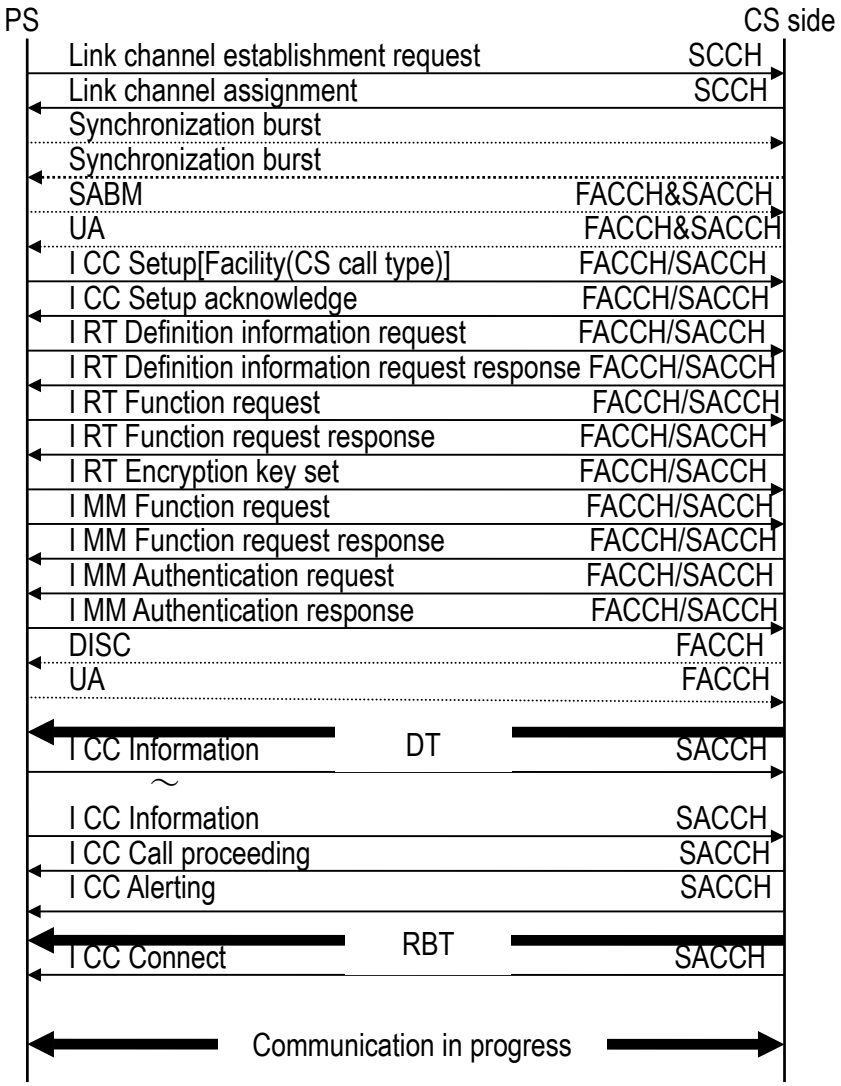


Fig. 2.6.3.12.2-1 Request for the call type notification within the CS-PS loop during overlap sending

2.6.3.12.3 The call type notification within the CS-PS loop is activated on the incoming call

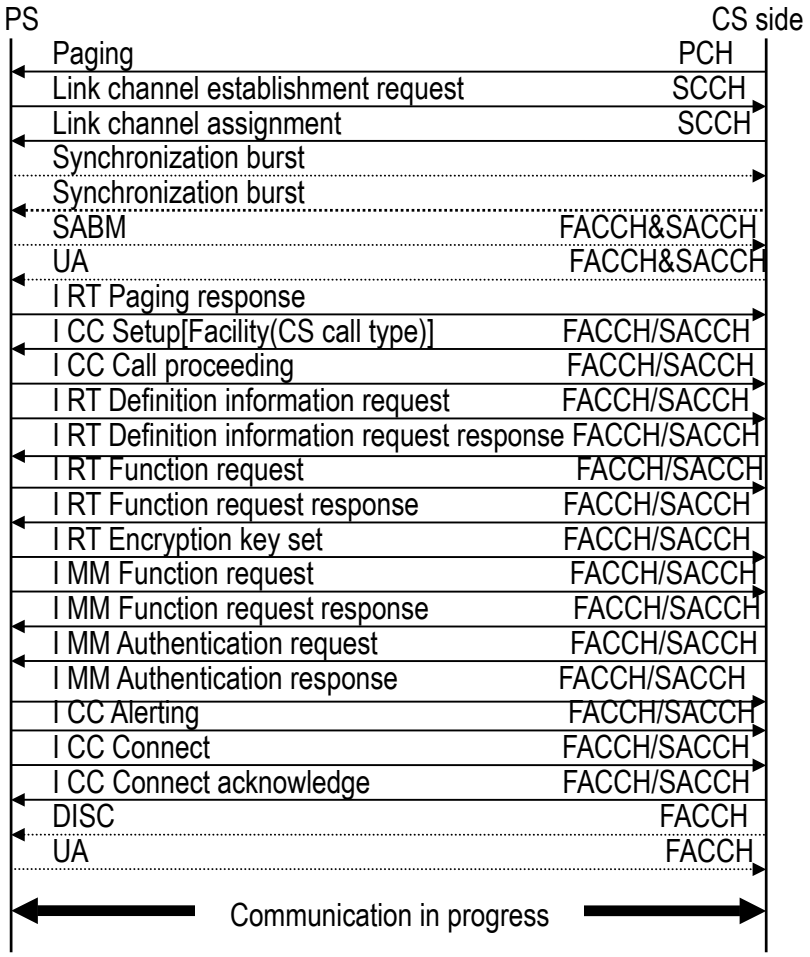


Fig. 2.6.3.12.3-1 Request for the call type notification within the CS-PS loop during incoming call

2.6.3.12.4 The call type notification within the CS-PS loop is activated on the PS side

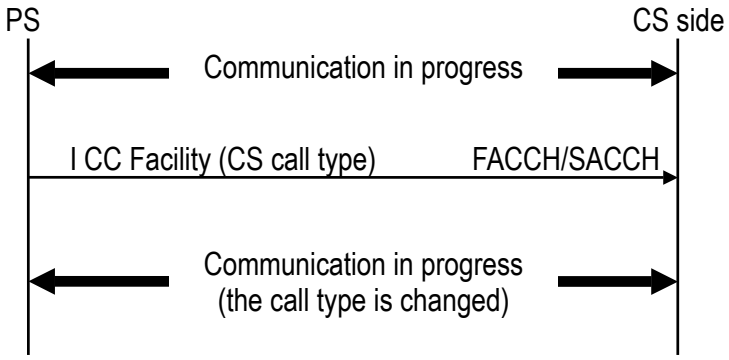


Fig. 2.6.3.12.4-1 Request for the call type notification within the CS-PS loop on the PS side during communication

2.6.3.12.5 The call type notification within the CS-PS loop is activated on the CS side

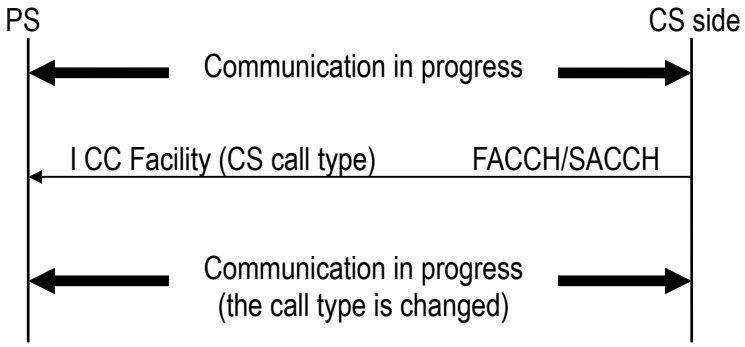


Fig. 2.6.3.12.5-1 Request for the call type notification within the CS-PS loop on the CS side during communication

2.6.3.13 Coding method

The invoke component for call type notification within the CS-PS loop supplementary service is shown below.

Octet	Bit 8	7	6	5	4	3	2	1	
4	1	0	1	0	0	0	0	1	
	Component type tag								
5	Component length (note 1)								
6	0	0	0	0	0	0	1	0	
	Invoke identifier tag								
7	Invoke identifier length (note 2)								
8	Invoke identifier								(note 4)
12	0	0	0	0	0	1	1	0	
	Operation value tag								
13	Operation value length (note 3)								
14a	0	0	0	0	0	0	1	0	(note 5)
14b	1	0	0	0	0	0	1	1	
14c	0	0	1	1	1	0	0	0	
14d	1	0	0	0	1	1	0	0	
14e	1	0	0	1	1	0	1	0	
14f	0	1	0	1	1	1	0	0	
14g	0	1	0	0	0	0	0	1	
14h	0	0	0	0	0	0	0	1	
14i	Call type notification within the CS-PS loop								
15.1	0	0	1	1	0	0	0	1	
	Class		For-mat	SET					
15.2	0	0	0	0	0	0	1	1	
15.3.1	1	0	1	0	0	1	0	1	
	Class		For-mat	Line type 〔5〕					
	0	0	0	0	0	0	0	1	
	Line type								

(Note 1) The component length is coded to indicate the number of octets contained in the component (excluding component type tag and component length octets).
(Note 2) The invoke identifier length is coded to indicate the number of octets of the invoke identifier.
(Note 3) The operation value length is coded to indicate the number of octets of the object identifier specified by RCR.
(Note 4) Octets 9 - 11 are not sent.
(Note 5) Octets 14a - 14i are the object identifiers (call type notification within the CS-PS loop) specified by RCR.

Call type notification within the CS-PS loop （Octet 14i）

Bit

7	6	5	4	3	2	1	
0	0	1	1	0	1	0	Call type notification within the CS-PS loop （cscalltyp）

2.6.3.14 Parameter value

Line type(Extension line, Door phone, Outside line) （Octet 15.3.1）

Bit

7	6	5	4	3	2	1	
0	0	0	0	0	0	0	Undetermined
0	0	0	0	0	0	1	Outside line 1
0	0	0	0	0	1	0	Outside line 2
0	0	0	0	0	1	1	Door phone A
0	0	0	0	1	0	0	Door phone B
0	0	0	0	1	0	1	Extension line 1
0	0	0	0	1	1	0	Extension line 2
0	0	0	0	1	1	1	Option

2.7 PS remote control function supplementary service (Private standard)

2.7.1 Definition

The PS remote control function is a service that any user registered in the CS-PS loop can activate the information exchange operation between the CS and PS.

This service operates as remote operation class 2.

2.7.2 Service model

The following figure 2.7.2-1 is service model.

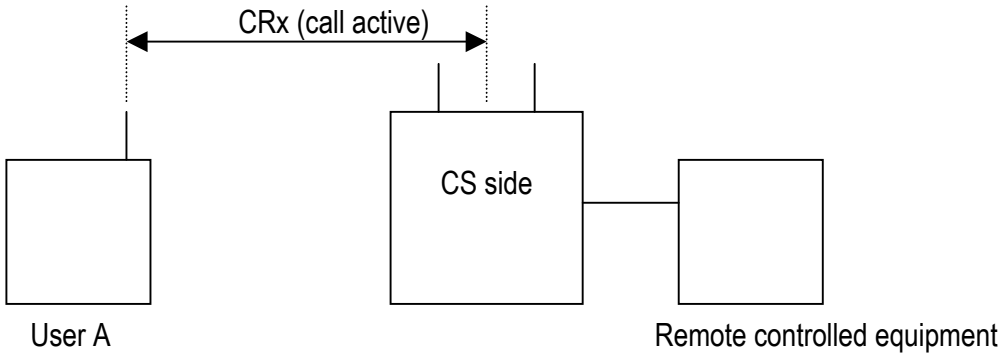


Figure 2.7.2-1 service model

2.7.3 Detailed description of supplementary service

2.7.3.1 Overview

PS remote control function supplementary service is a service that user terminal requesting the service can activate the information exchange operation between the CS and PS. The information exchange operation activated by the user operates until the user terminal or the CS side cancels the operation or radio disconnection.

2.7.3.2 Special terms

Use the following word in this definition

- Service provider
  The service provider can either be the person who manages the private PHS (NW) , or be the private PHS (NW) itself.

2.7.3.3 Restrictions in application to telecommunication service

This supplementary service is applicable to the telephony teleservice and the speech and 3.1kHz audio bearer service and non-voice service.

2.7.3.4 Procedure

2.7.3.4.1 Provision/cancellation of service

The PS remote control function is either provided after arrangement is made with the service provider or available at all times.

Cancellation of the PS remote control function is carried out when there is a user request or due to a reason from the service provider.

After the PS remote control function activated, information message is used for data transmission.

2.7.3.4.2 Sequence startup and operation

2.7.3.4.2.1 Request for PS remote control function

There are 2 types of initiation request as follows.

1. The PS remote control function can activate at the same time with call establishment.
2. After the call connected with the called user side, the PS remote control function can activate at any time until call disconnection.

2.7.3.4.2.2 Cancellation of PS remote control function

There are 2 types of termination request as follows.

1. The PS remote control function can disactivate at the same time with call disconnect.
2. After the call connected with the called user side, the PS remote control function can disactivate at any time until call disconnection.

2.7.3.4.3 Exceptional procedure

2.7.3.4.3.1 Sequence startup and operation

2.7.3.4.3.1.1 Request for PS remote control function

When service provider can not activate the service, the service provider send and indicates to the user one of following reasons.

- Not subscribed
- Provision impossible
- Information contents insufficient
- Service provision impossible state
- Supplementary service interaction not allowed

2.7.3.4.3.1.2 Cancellation of PS remote control function

When service provider can not terminate the service, the service provider send and indicates to the user one of following reasons.

- Not subscribed
- Provision impossible
- Information contents insufficient
- Service provision impossible state
- Supplementary service interaction not allowed

2.7.3.5 Substitution procedure

None identified.

2.7.3.6 Functions for charge

This standard does not cover principle of charge.

2.7.3.7 Mutual effect with other supplementary service

2.7.3.7.1 Hold within the CS-PS loop

The hold within the loop can't start on PS remote control function in progress. When the private PHS (NW) receives a facility message involved invoke component of initiation of hold within the CS-PS loop from a served user intend to activate hold within the CS-PS loop while remote control function in progress, then the private PHS (NW) applies the procedure described in 2.7.3.4.3.1.1 and returns the error, " supplementary service interaction not allowed".

2.7.3.7.2 Call transfer within the CS-PS loop

The call transfer within the CS-PS loop can't start on PS remote control function in progress. When the private PHS (NW) receives a facility message involved invoke component of request for call transfer within the CS-PS loop from a served user intend to activate call transfer within the CS-PS loop while remote control function in progress, then the private PHS (NW) applies the procedure described in 2.7.3.4.3.1.1 and returns the error, " supplementary service interaction not allowed".

2.7.3.7.3 Call waiting within the CS-PS loop

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

2.7.3.7.4 Conference call within the CS-PS loop

The conference call within the CS-PS loop can't start on PS remote control function in progress. When the private PHS (NW) receives a facility message involved invoke component of request for conference call within the CS-PS loop from a served user intend to activate conference call within the CS-PS loop while remote control function in progress, then the private PHS (NW) applies the procedure described in 2.7.3.4.3.1.1 and returns the error, " supplementary service interaction not allowed".

2.7.3.7.5 Hold within the CS-multiple PS

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

2.7.3.7.6 PS remote control function

No impact, i.e. neither supplementary service affects the operation of the other supplementary service.

2.7.3.7.7 Call type notification within the CS-PS loop

The same supplementary services can not start at the same time. When the private PHS (NW) receives a facility message involved invoke component of request for initiation of PS remote control function from a served user intend to activate PS remote control function while remote control function in progress, then the private PHS (NW) applies the procedure described in 2.7.3.4.3.1.1 and returns the error, " provision impossible".

2.7.3.8 Mutual effect with handover

None identified.

2.7.3.9 Request condition by mutual connection

2.7.3.9.1 Mutual connection with public network

The operation of this feature is not affected by the nature (i.e. integrated services digital network (ISDN) or non-ISDN) of the far end of the connection.

2.7.3.10 Notification identifier information element

None identified.

2.7.3.11 Dynamic description

The SDL diagrams are shown below.

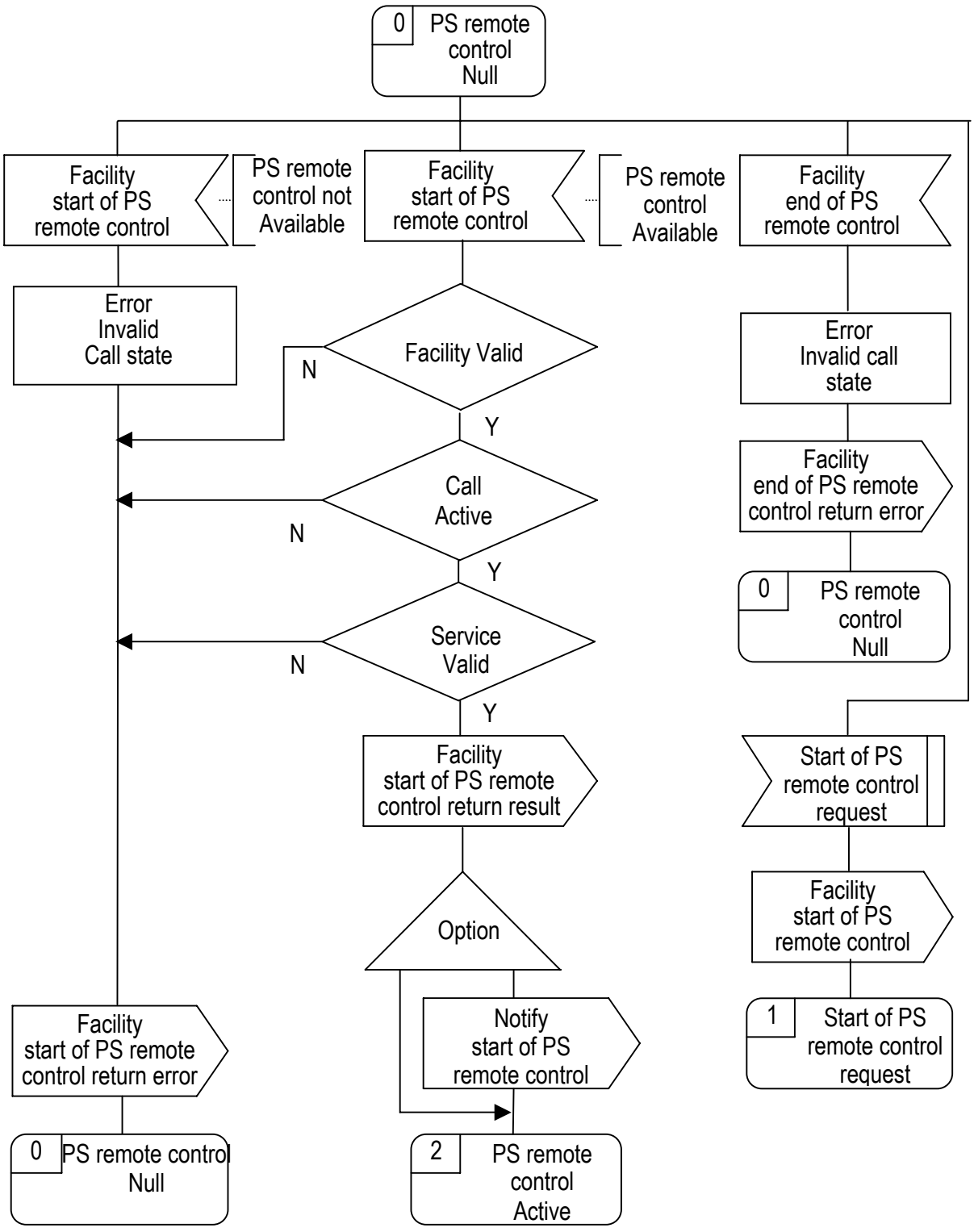


Figure 2.7.3.11-1 SDL Diagram (PS side) (1/4)

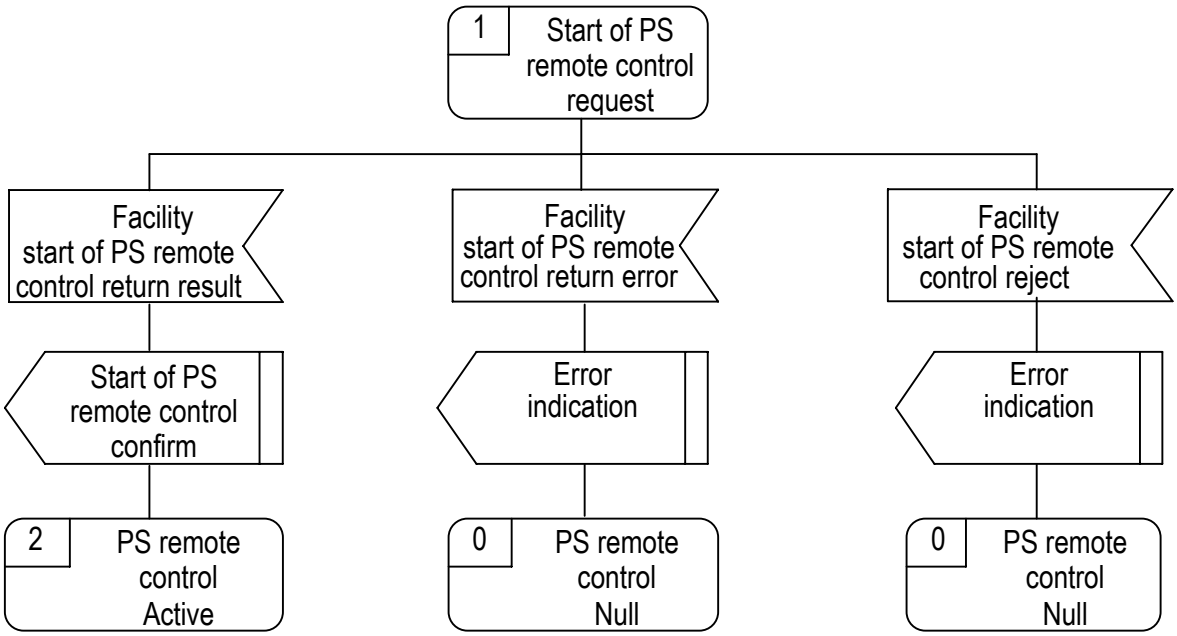


Figure 2.7.3.11-2 SDL Diagram (PS side) (2/4)

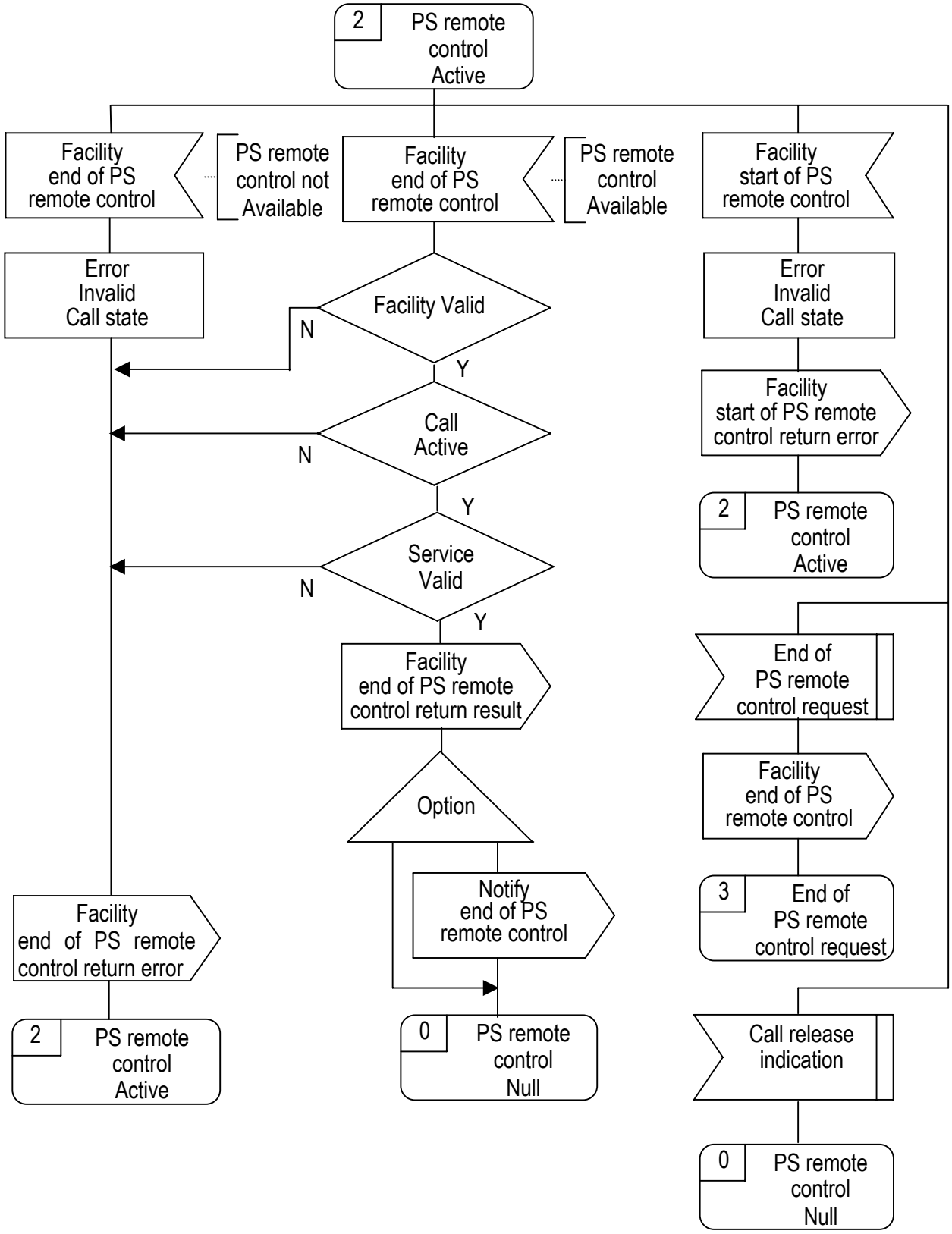


Figure 2.7.3.11-3 SDL Diagram (PS side) (3/4)

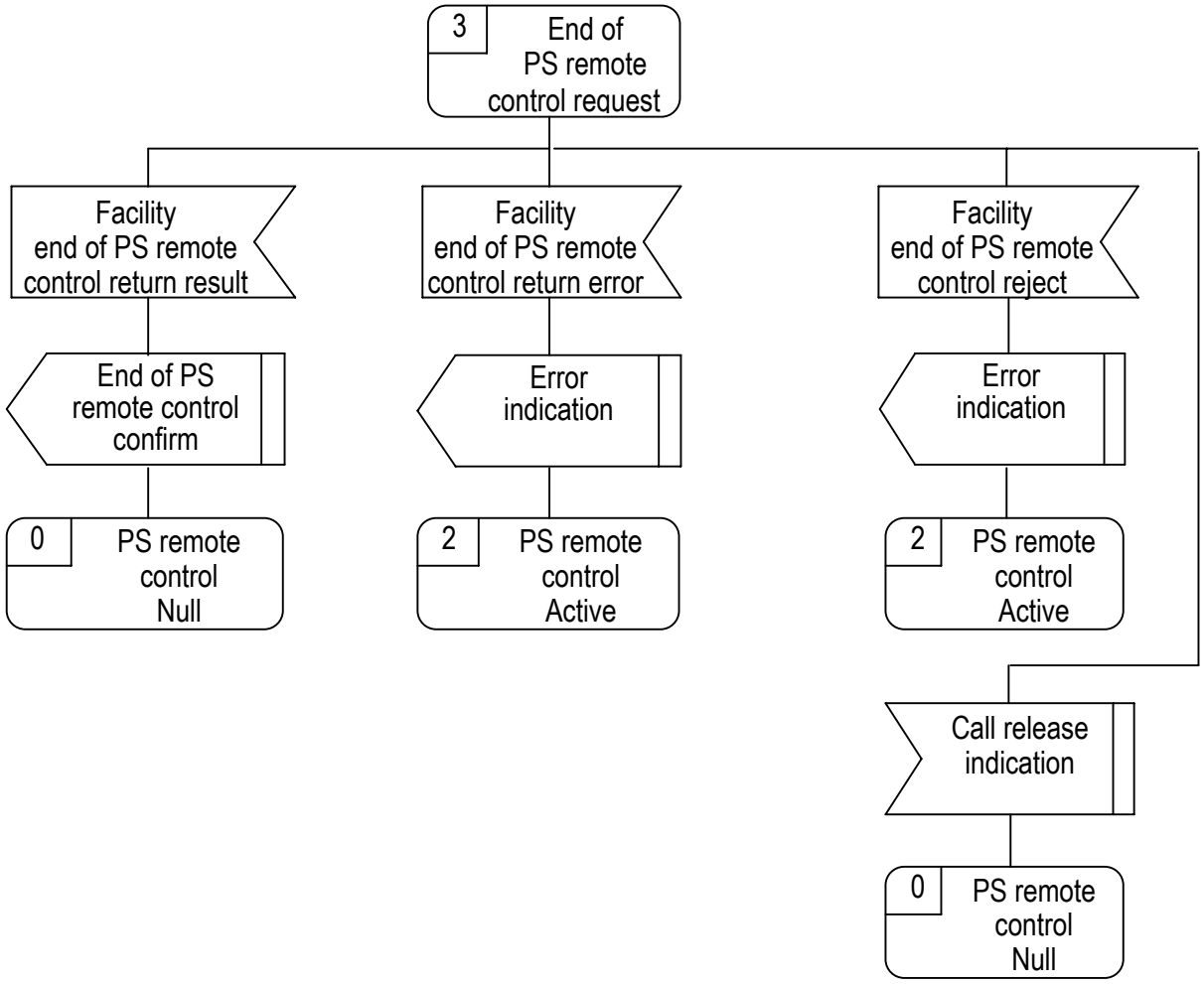


Figure 2.7.3.11-4 SDL Diagram (PS side) (4/4)

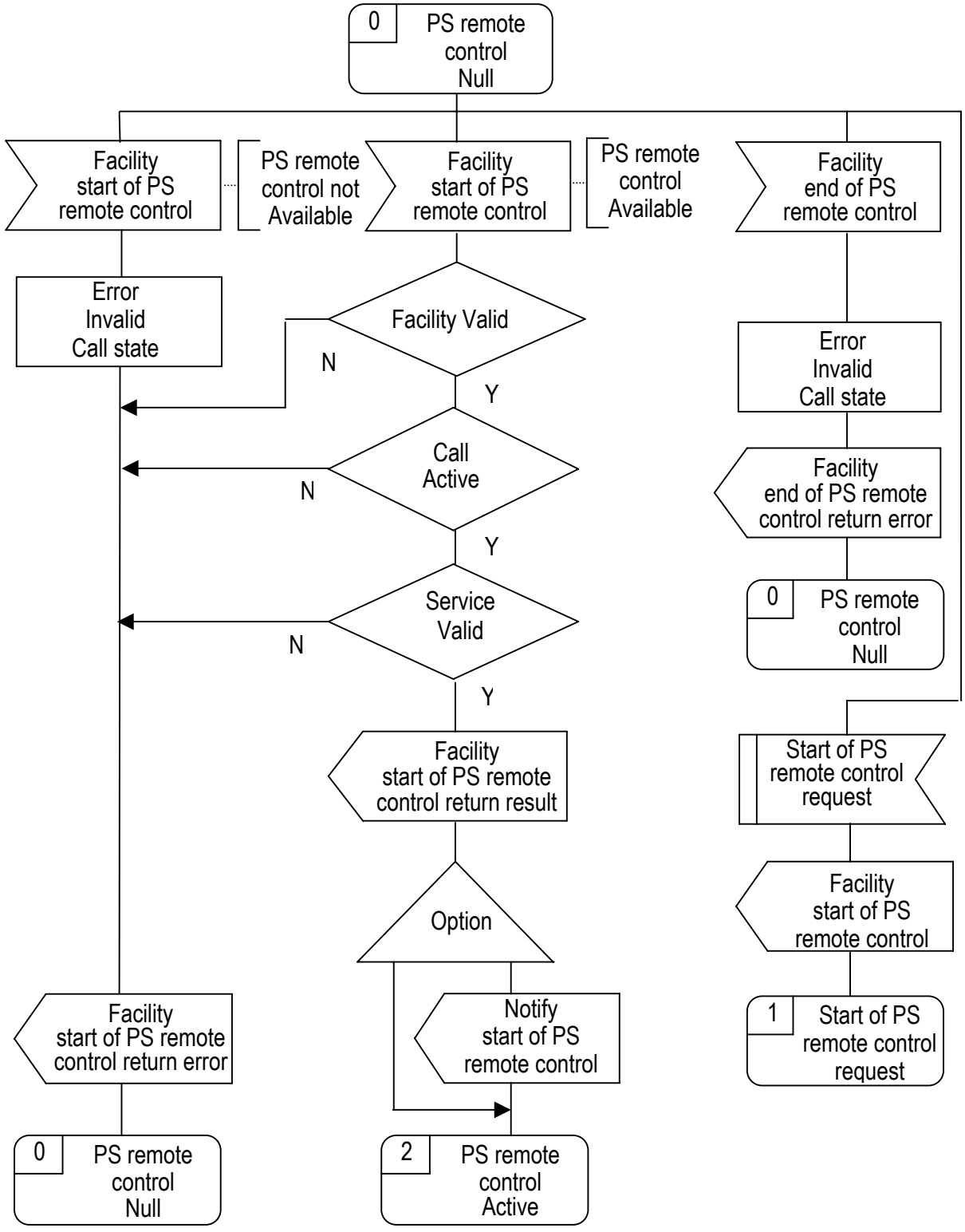


Figure 2.7.3.11-5 SDL Diagram (CS side) (1/4)

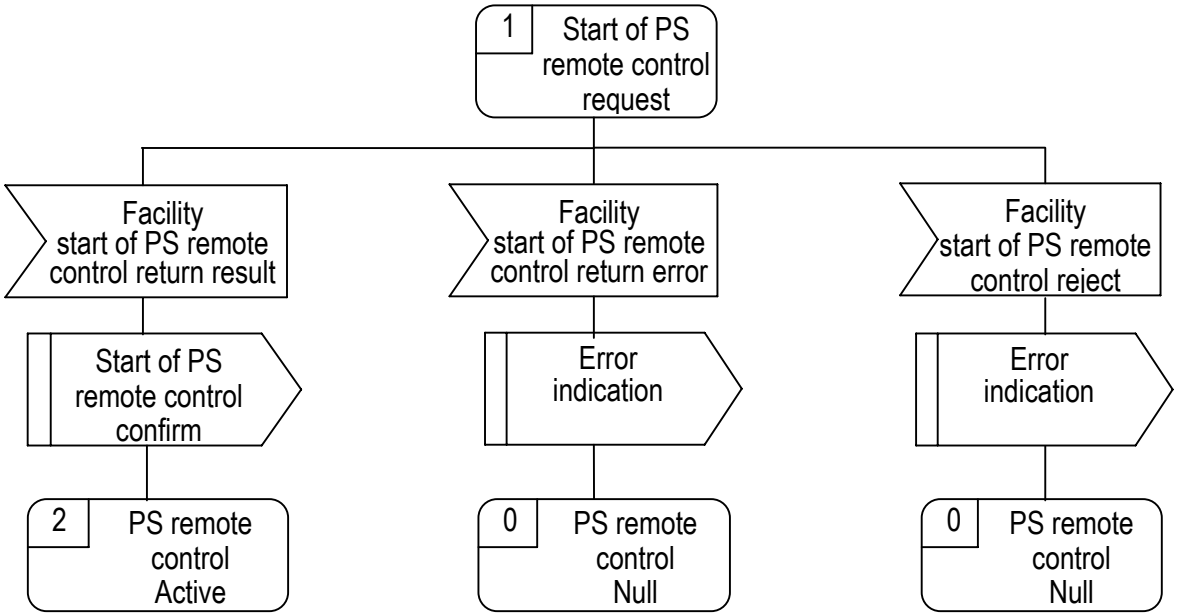


Figure 2.7.3.11-6 SDL Diagram (CS side) (2/4)

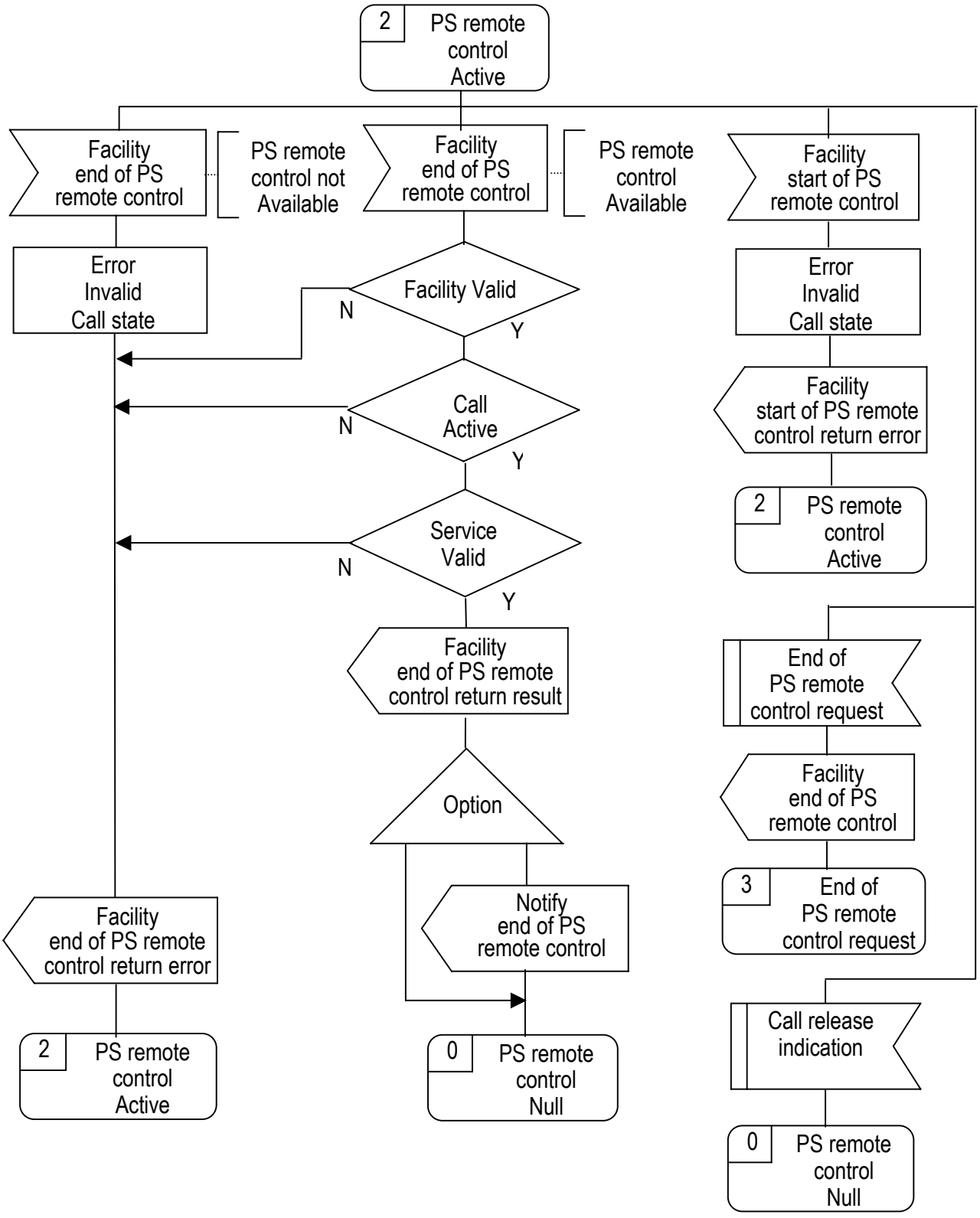


Figure 2.7.3.11-7 SDL Diagram (CS side) (3/4)

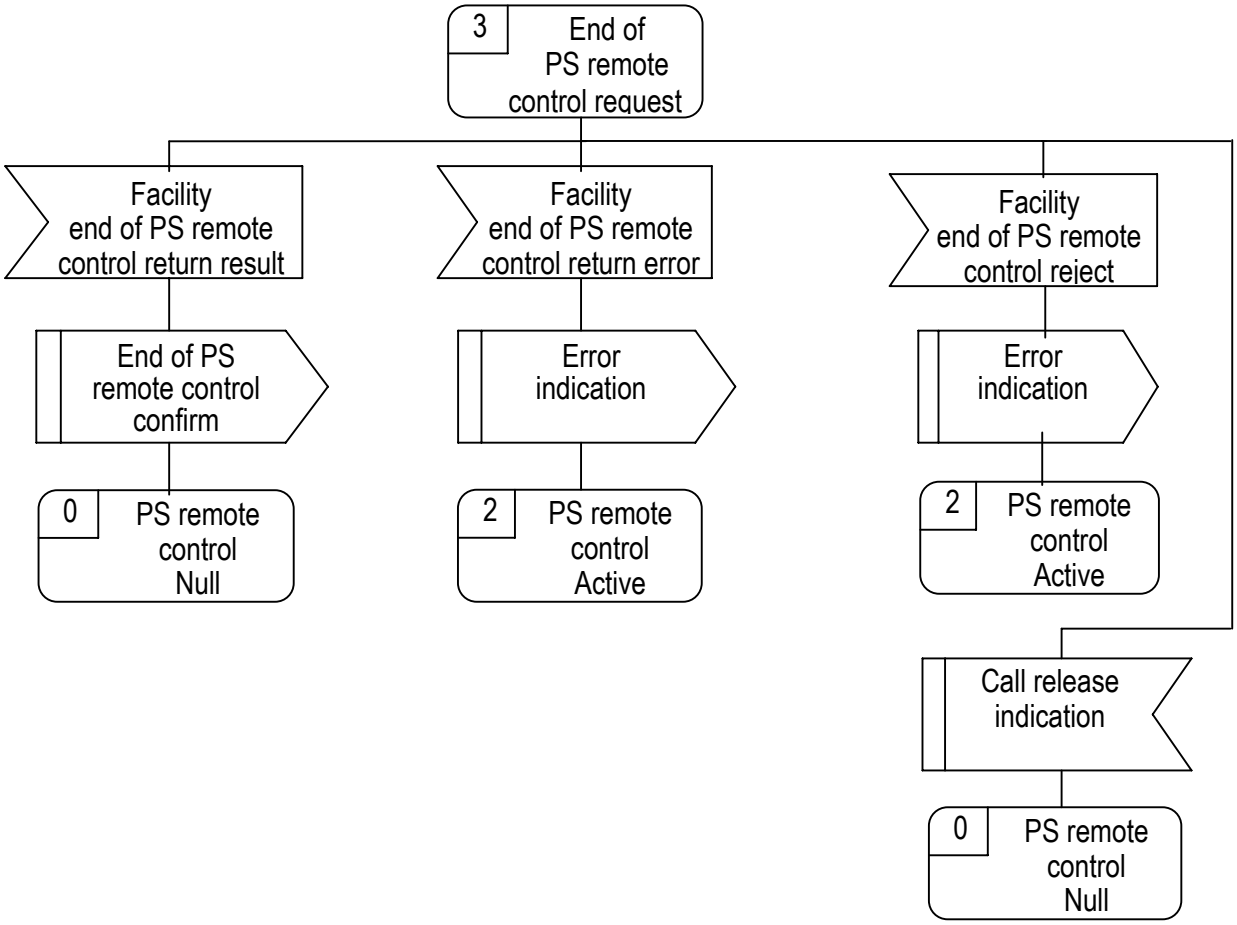
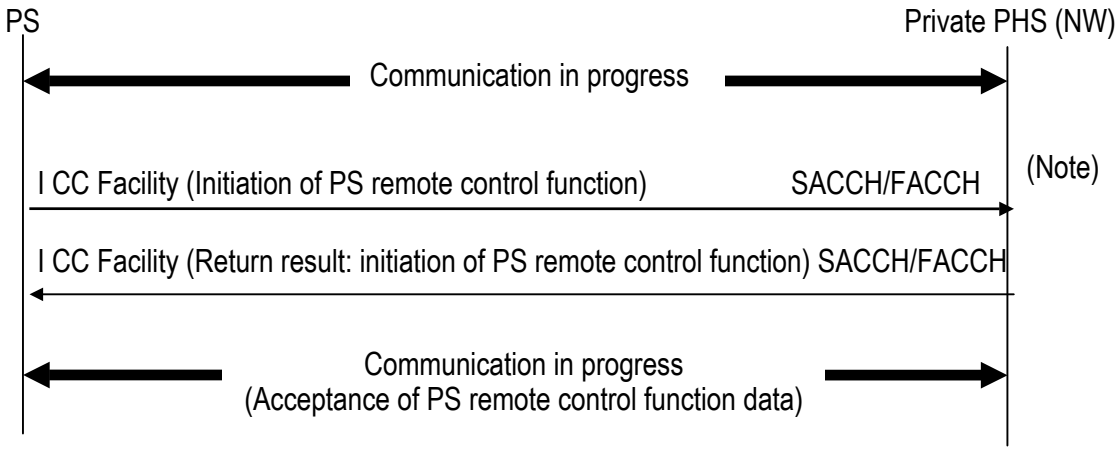


Figure 2.7.3.11-8 SDL Diagram (CS side) (4/4)

2.7.3.12 Flow of signal

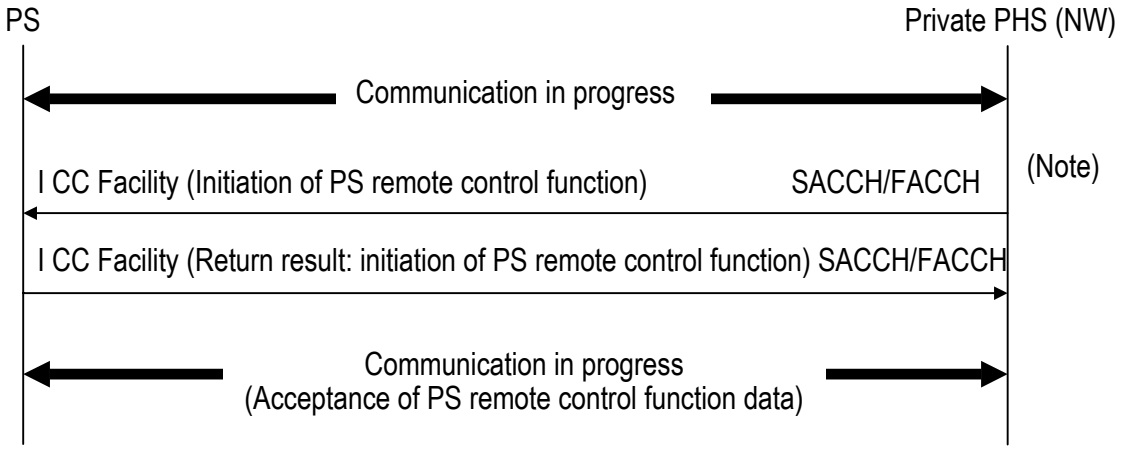
2.7.3.12.1 Control sequence of PS-started up PS remote control function



(Note) FACCH is able to use only in case of layer 2 multi-frame acknowledged operation mode of FACCH is established before sending this message.

Figure 2.7.3.12.1-1 Request for initiation of PS remote control function by PS

2.7.3.12.2 Control sequence of CS-started up PS remote control function



(Note) FACCH is able to use only in case of layer 2 multi-frame acknowledged operation mode of FACCH is established before sending this message.

Figure 2.7.3.12.2-1 Request for initiation of PS remote control function by Private PHS

2.7.3.12.3 Control sequence of startup PS remote control function during direct outgoing call

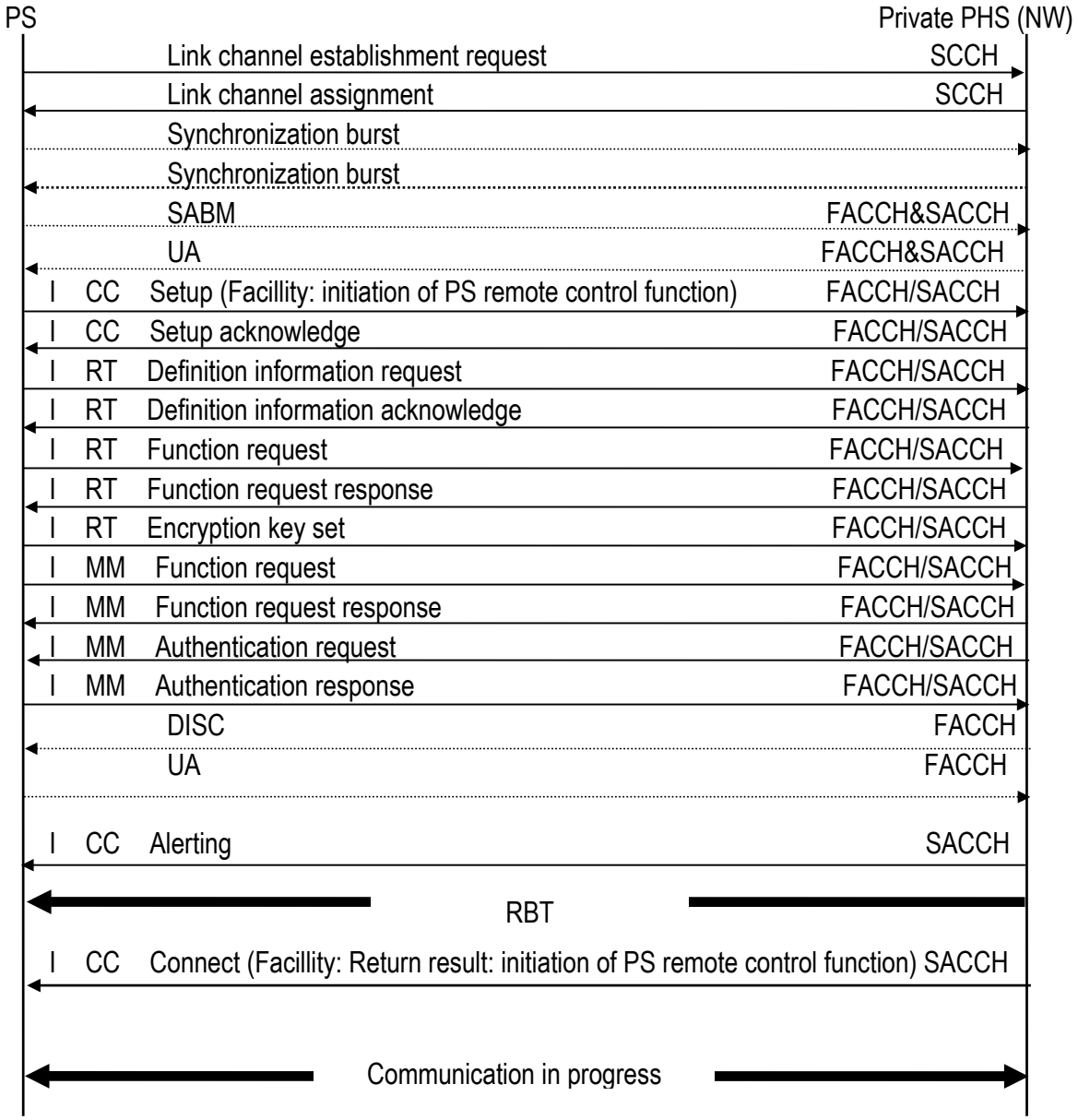


Figure 2.7.3.12.3-1 Request for initiation of PS remote control function by PS

2.7.3.12.4 Control sequence of startup PS remote control function during direct incoming call

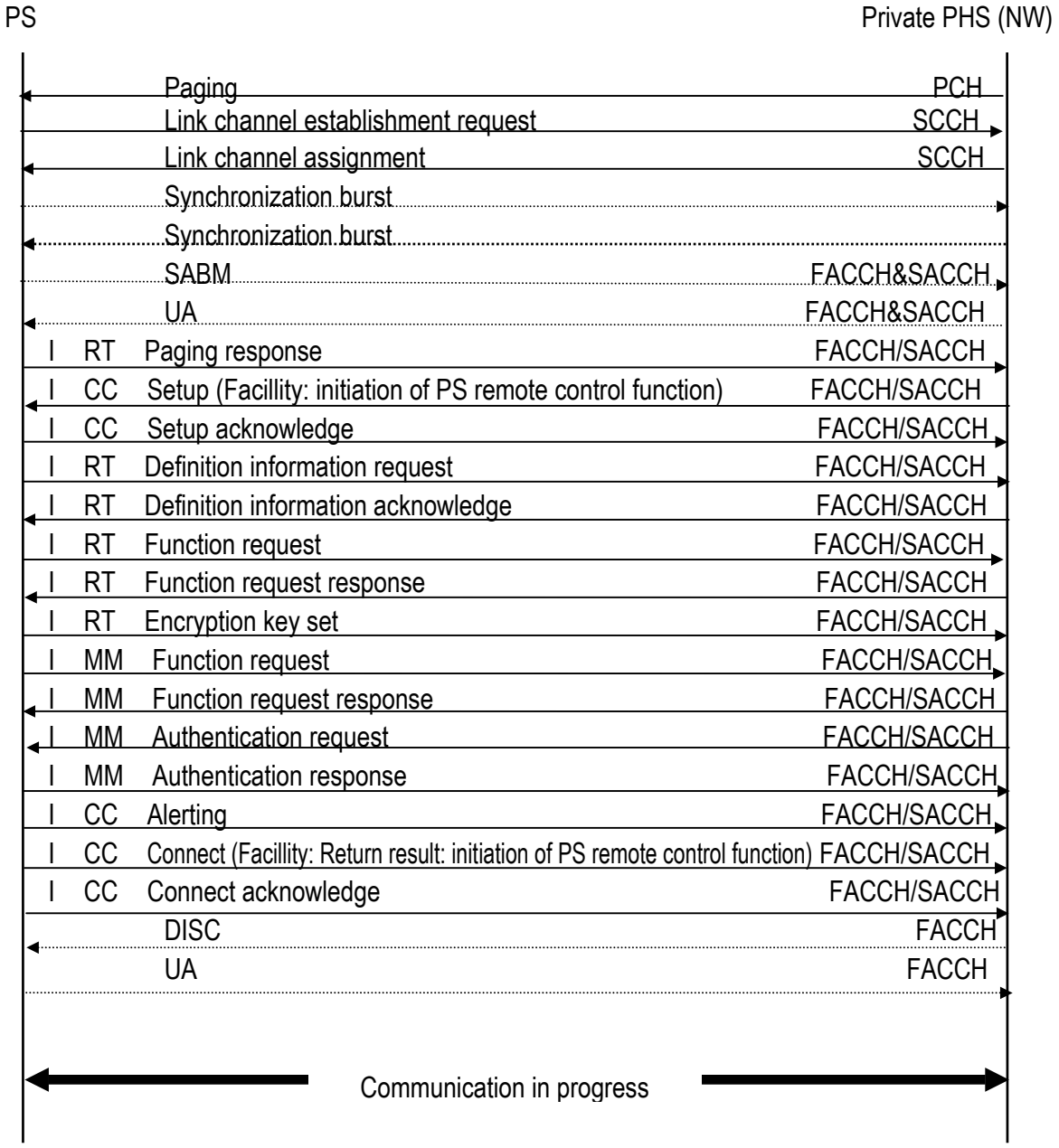
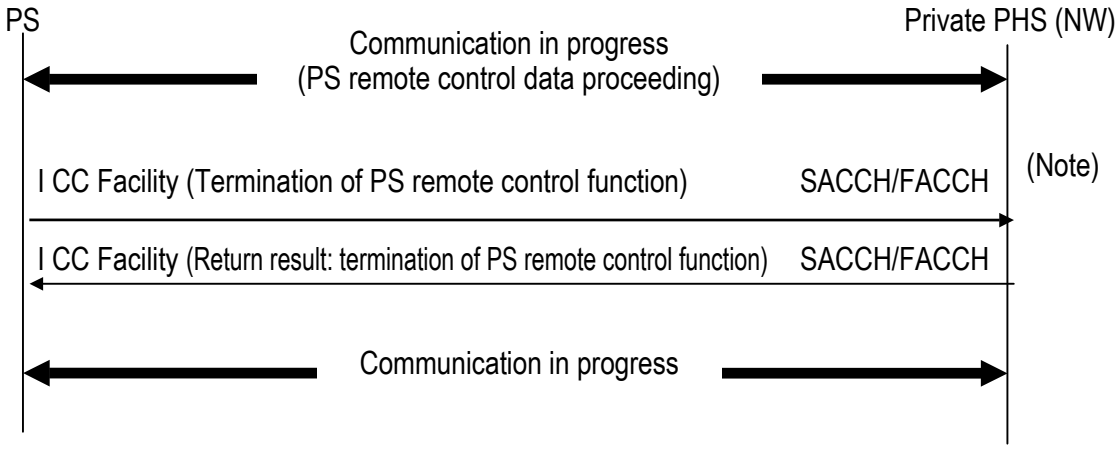


Figure 2.7.3.12.4-1 Request for initiation of PS remote control function by Private PHS

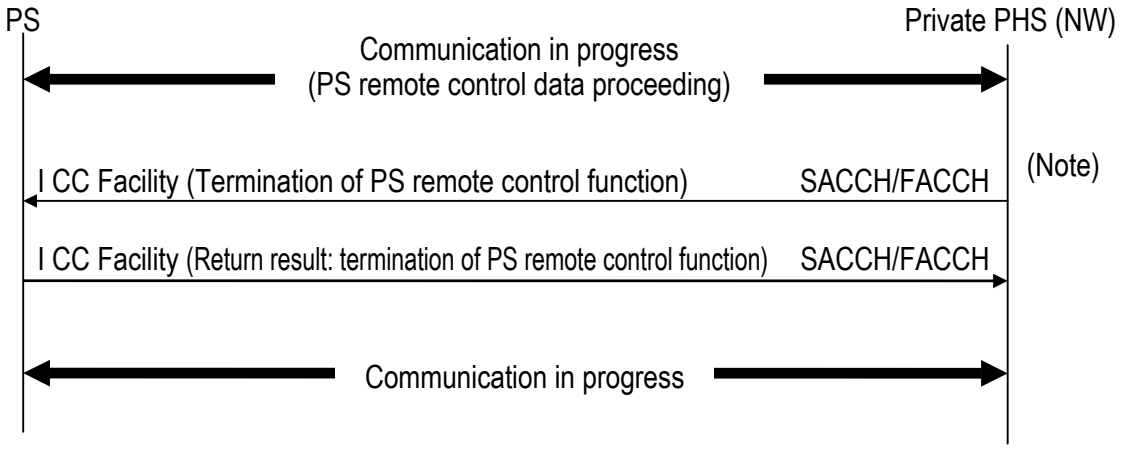
2.7.3.12.5 Control sequence of PS-started up PS remote control function termination



(Note) FACCH is able to use only in case of layer 2 multi-frame acknowledged operation mode of FACCH is established before sending this message.

Figure 2.7.3.12.5-1 Request for termination of PS remote control function by PS

2.7.3.12.6 Control sequence of CS-started up PS remote control function termination



(Note) FACCH is able to use only in case of layer 2 multi-frame acknowledged operation mode of FACCH is established before sending this message.

Figure 2.7.3.12.6-1 Request for termination of PS remote control function by Private PHS

2.7.3.13 Coding method

The invoke component for supplementary service of PS remote control function is shown below.

Octet	Bit 8	7	6	5	4	3	2	1	
4	1	0	1	0	0	0	0	1	
	Component type tag								
5	Component length (Note 1)								
6	0	0	0	0	0	0	1	0	
	Invoke identifier tag								
7	Invoke identifier length (Note 2)								
8	Invoke identifier								(Note 4)
12	0	0	0	0	0	1	1	0	
	Operation value tag								
13	Operation value length (Note 3)								
14a	0	0	0	0	0	0	1	0	(Note 5)
14b	1	0	0	0	0	0	1	1	
14c	0	0	1	1	1	0	0	0	
14d	1	0	0	0	1	1	0	0	
14e	1	0	0	1	1	0	1	0	
14f	0	1	0	1	1	1	0	0	
14g	0	1	0	0	0	0	0	1	
14h	0	0	0	0	0	0	0	1	
14i	0	PS remote control function							

(Note 1) The component length is coded to indicate the number of octets contained in the component (excluding component type tag and component length octets).
(Note 2) The invoke identifier length is coded to indicate the number of octets of the invoke identifier.
(Note 3) The operation value length is coded to indicate the number of octets of the object identifier specified by RCR.
(Note 4) Octets 9-11 (link identifier) are not sent.
(Note 5) Octets 14a - 14i are the object identifiers (PS remote control function) specified by RCR.

PS remote control function (Octet 14i)

Bit 7	6	5	4	3	2	1	
0	0	1	1	0	1	1	Initiation of PS remote control function (csrmtstart)
0	0	1	1	1	0	0	Termination of PS remote control function (csrmtend)

2.7.3.14 Parameter value

None identified.

Appendix AM Standard relating to supplementary service functions within PHS User-to-User Signalling (PHS-UUS) Public standard

This appendix is a summary, as for radio interface to PHS User-to-User Signalling (PHS-UUS) service.

CONTENTS

1 PHS User-to-User Signalling (PHS-UUS)

1.1 Definition

The PHS User-to-User Signalling (PHS-UUS) supplementary service allows PS send/receive the limited amount of the user to user information to/from PS via PHS network.

1.2 Description

1.2.1 General description

The PHS-UUS supplementary services provide the communication between two public PS users by using the radio protocol specified in main text for the base protocol. User-user signalling is used to exchange information between two users to provide the services described in PHS MoU Specification B-SV2.70 [1] Description. The exchange of uset-to-user information is not a network acknowledged service. Any acknowledgement procedure shall be controlled at a higher layer between public CSs.
PHS-UUS service associated with circuit-switched calls that may be provided by the network to users is:

i) *PHS-UUS service 1* - User-to-User information exchanged during the setup and clearing phases of a call by transporting User-user information element within section 4.4.3.7 of the main text call control messages:

1.2.2 Specific terminology

The public CS is the protocol entity at the public CS side of the public CS-PS interface.

The PS is the protocol entity at the PS side of the public CS-PS interface.

The called PS is the PS who is offered an incoming call at the terminating interface.

The calling PS is the PS who initiales an outgoing call at the originating interface.

The served user is the user requesting the PHS User-to-User (PHS-UUS) supplementary service.

PHS network is defined to include public CS in PHS MoU Specification B-NW0.00 [2]

1.2.3 Qualifications on the applicability to telecommunications services

See PHS MoU Specification B-SV2.70 [1].

1.2.4 State definitions

The states associated with basic call control according to section 4.4.3.7 of the main text are applicable.

1.3 Operational requirements

1.3.1 Provision/withdrawal

PHS-UUS services 1 must be subscribed to by the calling user.

1.3.2 Requirements on the originating CS side

The basic call control procedures according to section 2 of the appendix X are applicable.
The public CS and PS supporting PHS-UUS service 1 is expected to be able to receive and send the User-user information element (see section 4.4.3.7.3.5.26 of the main text) as described in section 1.5.2.1 below.

1.3.3 Requirements in PHS network

Not applicable to this ARIB Standard.

1.3.4 Requirements on the terminating CS side

The basic call control procedures according to section 3 of the appendix X are applicable.
The public CS and PS supporting PHS-UUS service 1 is expected to be able to receive and send the User-user information element (see section 4.4.3.7.3.5.26 of the main text) as described in section 1.5.2.1 below.

1.3.5 Assumptions made about the terminal

Terminal equipment using PHS-UUS service 1 is expected to be able to generate and accept the User-user information element (see section 4.4.3.7.3.5.26 of the main text) as described in section 1.5.2.1 below.

1.4 Coding Requirements

1.4.1 Messages

The following messages are applicable to service activation for PHS-UUS service 1:SETUP. The following messages are applicable to the operation of PHS-UUS service 1:SETUP, ALERTing, CONNect, DISConnect, RELease, RELease COMPlete.
The following are message contents for PHS-UUS services.

Massage Type:ALERTing

Information element	Reference	Direction	Type	Length	Remarks
Protocol discriminator	Section 4.4.3.7.3.2 of the main text	Both	M	1	
Call reference	Section 4.4.3.7.3.3 of the main text	Both	M	2-3	
Message type	Section 4.4.3.7.3.4 of the main text	Both	M	1	
User-user	Section 4.4.3.7.3.5.26 of the main text	Both	O	2-131	(Note)
Other mandatory information elements and/or optional information elements also be used according to section 4.4.3.7 of the main text.					

(Note) May be included for PHS-UUS service 1 (explicit or implicit activation).

Message Type ; CONNect

Information element	Reference	Direction	Type	Length	Remarks
Protocol discriminator	Section 4.4.3.7.3.2 of the main text	Both	M	1	
Call reference	Section 4.4.3.7.3.3 of the main text	Both	M	2-3	
Message type	Section 4.4.3.7.3.4 of the main text	Both	M	1	
User-user	Section 4.4.3.7.3.5.26 of the main text	Both	O	2-131	(Note)
Other mandatory information elements and/or optional information elements also be used according to section 4.4.3.7 of the main text.					

(Note) May be included for PHS-UUS service 1 (explicit or implicit activation).

Message Type ; DISConnect

Information element	Reference	Direction	Type	Length	Remarks
Protocol discriminator	Section 4.4.3.7.3.2 of the main text	Both	M	1	
Call reference	Section 4.4.3.7.3.3 of the main text	Both	M	2-3	
Message type	Section 4.4.3.7.3.4 of the main text	Both	M	1	
User-user	Section 4.4.3.7.3.5.26 of the main text	Both	O	2-131	(Note)
Other mandatory information elements and/or optional information elements also be used according to section 4.4.3.7 of the main text.					

(Note) May be included for PHS-UUS service 1 where DISConnect is the first clearing message, Not included otherwise.

Message Type ; PROGress

Information element	Reference	Direction	Type	Length	Remarks
Protocol discriminator	Section 4.4.3.7.3.2 of the main text	Both	M	1	
Call reference	Section 4.4.3.7.3.3 of the main text	Both	M	2-3	
Message type	Section 4.4.3.7.3.4 of the main text	Both	M	1	
User-user	Section 4.4.3.7.3.5.26 of the main text	Downlink	O	2-131	(Note)
Other mandatory information elements and/or optional information elements also be used according to section 4.4.3.7 of the main text.					

(Note) Included (e.g. in conjunction with in-band tones or announcements) when the PROGress message is sent by the network to indicate that the call has been cleared before reaching the active state by the remote user, and a User-user information element was present in the clearing message.

Message Type ; RELease

Information element	Reference	Direction	Type	Length	Remarks
Protocol discriminator	Section 4.4.3.7.3.2 of the main text	Both	M	1	
Call reference	Section 4.4.3.7.3.3 of the main text	Both	M	2-3	
Message type	Section 4.4.3.7.3.4 of the main text	Both	M	1	
User-user	Section 4.4.3.7.3.5.26 of the main text	Both	O	2-131	(Note)
Other mandatory information elements and/or optional information elements also be used according to section 4.4.3.7 of the main text.					

(Note) May be included for PHS-UUS service 1 where RELease is the first clearing message, Not included otherwise.

Message Type ; RELease COMPlete

Information element	Reference	Direction	Type	Length	Remarks
Protocol discriminator	Section 4.4.3.7.3.2 of the main text	Both	M	1	
Call reference	Section 4.4.3.7.3.3 of the main text	Both	M	2-3	
Message type	Section 4.4.3.7.3.4 of the main text	Both	M	1	
User-user	Section 4.4.3.7.3.5.26 of the main text	Uplink	O	2-131	(Note)
Other mandatory information elements and/or optional information elements also be used according to section 4.4.3.7 of the main text.					

(Note) May be included for PHS-UUS service 1 where a RELease COMPlete message is sent by the PS to reject an incoming SETUP message, Not included otherwise.

Message Type ; SETUP

Information element	Reference	Direction	Type	Length	Remarks
Protocol discriminator	Section 4.4.3.7.3.2 of the main text	Both	M	1	
Call reference	Section 4.4.3.7.3.3 of the main text	Both	M	2-3	
Message type	Section 4.4.3.7.3.4 of the main text	Both	M	1	
User-user	Section 4.4.3.7.3.5.26 of the main text	Both	O	2-131	(Note)
Other mandatory information elements and/or optional information elements also be used according to section 4.4.3.7 of the main text.					

(Note) Always included for implicit PHS-UUS service 1 activation, the length must be at least three octets.

1.4.2 Codesets

All information elements are in codeset 0.

1.4.3 Information elements

The User-user information element is applicable to functional service activation for PHS-UUS service 1.

1.4.4 Codepoint

Not applicable to this ARIB Standard.

1.5 Signalling requirements

1.5.1 Activation/deactivation/registration

PHS-UUS service 1 may also be activated implicitly as described in section 1.5.2.1.1.1 below. In this case, activation and operation of the service are indistinguishable.
Deactivation procedures are not required to support these services.

1.5.2 Invocation and operation

1.5.2.1 PHS-UUS service 1

1.5.2.1.1 Call establishment phase

1.5.2.1.1.1 Implicit operation

PHS-UUS service 1 may be implicitly requested by including a User-user information element of variable length as specified in section 4.4.3.7.3.5.26 of the main text in the SETUP massage transferred across the public CS-PS interface at the calling side as described in Appendix X2.1.
This information elements is transported by the PHS network and delivered unchanged in the User-user information element included in the SETUP message transferred across the PS-Public CS interface at the called side as described in Appendix X3.1. For activation purposes, this information element must be at least three octets long, as defined in section 4.4.3.7.3.5.26 of the main text.
A User-user information element may be included in the ALERTing and/or CONNect messages transferred across the public CS-PS in the interface at the called side as described in Appendix X3.3. It may also be included in the DISConnect or RELease COMPlete message. The content of this information element is transported by the PHS network and delivered in the User-user information element included in the corresponding message (s) transferred across the user-network interface at the calling side as described Appendix X2.6 and X2.7.

1.5.2.1.1.2 Explicit operation(preferred or required)

Not applicable to this ARIB Standard.

1.5.2.1.2 Call clearing phase

A User-user information element may be included in the first message used to initiate the normal call clearing phase (see Appendix X4.3 and X4.4).
The information contained in such an information element is transferred to the remote PS in the first clearing message (see Appendix X4.3 and X4.4). Such a transfer is only performed if the information is

received at the local exchange of the remote PS befor sending a clearing message to that PS:otherwise, the information is discarded without sending any notification.
A User-user information element may be included in the first normal clearing message sent by the called PS during call establishment at the destination interface.
If the called PS rejects the call with a clearing message containing a User-user information element, the PHS network shall deliver the User-user information element in the DISConnect massage sent to the calling PS. However, if the PHS network is providing in band information to the calling PS, and chooses not to initiate clearing procedures at that time, the PHS network may deliver the User-user information element in a PROGress message sent to the calling PS.

1.5.2.1.3 Actions at the transit exchange

Not applicable to this ARIB Standard.

1.5.2.1.4 Exceptional procedures

1.5.2.1.4.1 Rejection of implicit service requests

The User-user information element is not transferred to the called PS from the calling user(PS)who had not suscribed to the PHS-UUS service 1. Because such as User-user information element will be discarded in the PHS network. If the discard occurs, the PHS network shall continue to process the call request. The calling PS will receive the indication that the UUS request is not accepted by way of the sending a STATUS message containing cause #50, "Requested facility not subscribed", or cause #43, "Access information discarded". The called PS may not be able to interpret incoming User-user information elements. In such situations, the PS should discard this information without disrupting normal call handling. No specific signalling is provided by the Public CS to accommodate this situation.

1.5.2.1.4.2 Rejection of explicit service requests

Not applicable to this ARIB Standard.

1.5.2.1.4.3 Unexpected User-user information element in call control messages

The User-user information element in ALERTing or CONNect message from called PS will be discarded in the PHS network, if there was not the indication either explicitly or implicitly, of PHS UUS request in the SETUP message to called PS from the PHS network via the public CS before. If the discard is occurred, the called PS will receive the cause of the discard as cause #43, "Access information discarded"in the STATus message from PHS network via public PS.
The PHS network shall discard the User-user information element if it is received from either PS in a DISConnect, RELease or RELease COMPlete message, but a request for PHS-UUS was not indicated in the SETUP message delivered to the called PS. If discard occurs, the PHS network shall take action on the remaining contents of the message received from the PS. If the clearing party has sent a DISConnect (or RELease) message, the Public CS shall send to the clearing party a RELease(or RELease COMPlete)message containing cause #43, "Access information discarded". If the clearing party had sent a RELease COMPlete message, the PHS network shall consider the call as cleared to that party; no additiomal action shall be taken.
The User-user information element will be discarded by PHS network in the following cases not explicitly discussed elsewhere in Chapter 1.5:

- the overall length of the User-user information element is greater than 131 octets and PHS-UUS service 1 was activated either explicitly or implicitly:
- the PHS network receives a message containing the User-user information element, but that

message is not allowed to contain PHS-UUS as defined by this document.

If discard occurs, the PHS network shall take action on the remaining contents of the message received from the sending PS and shall send a STATUS message to that PS containing cause #43, “Access information discarded". However, if the PHS network discards a User-user information element from a received clearing message, the PHS network shall include cause #43, “Access information discarded", in the next sequential clearing message sent to the PS as specified in B-IF1.01 [2]. If the PHS network discards a User-user information element from a RELease COMPlete message,the PHS network shall consider the call as cleared to that party; no additional action shall be taken.

1.5.2.2 PHS-UUS service 2

Not applicable to this ARIB Standard.

1.5.2.3 PHS-UUS service 3

Not applicable to this ARIB Standard.

Reference

1) PHS MoU Specification B-SV2.70 Public Personal Handy-Phone System:Service Specification of PHS User-to-user Signalling. (PHS UUS)
2) PHS MoU Specification B-NW0.00 Public Personal Handy-Phone System:Network and System Configurations.

Appendix AN Importation of operation defined in other organizations in functional operation. (Reference)

1.Introduction

The operation defined by another organization or excluding this RCR Standard is offered can be imported, when the addition service is provided, which uses the functional operation provided with this RCR Standard.
In this appendix, a basic concept of the importation is described.

2.Basic concept

The principle of the importation of the operation defined another organization or excluding this RCR Standard is shown in Appendix AA. A variety of addition service is assumed to be a standard function besides peculiar addition service to PHS defined by this RCR Standard if it follows the principle and the realization become possible.
The operation thought that the offer imported referring is possible and the importation origin are shown in table 1. However, it is not the one to disturb any importations excluding this.

Table 1 Operation name and importation origin

Operation name	Importation origin
Calling Line Identification Presentation	TTC Standard JT-Q951.3-b

Appendix AO Operation of PS that is ready for the control career shift

(Public standard)

This appendix specifies outline of operation of PHS personal stations that are ready for the public control career shift.

1. Outline

This document describes requirements for the personal station that is ready for both new and old control careers, as a way to change an old frequency into new one of PHS public control careers. Operations based on this document are applied for personal stations in which two or more control career frequencies are written (reffering Annex2).

2. Effective control career frequencies

Generally, the personal station has two or more memory areas to store control career frequencies and operator identification codes. The two control career frequencies written into the highest two memory areas are effective.

3. Mandatory triggers for search timing

With regard to the personal station in which two or more control career frequencies are written, mandatory triggers for search timing using the two control career frequencies written into the highest two memory areas of the personal station are at turning on power supply and at searching for control channel in no service area. Other triggers for search timing are optional.

3.1 Turning on power supply

When power supply is turned on, PS searches both new and old control career frequencies for control channel. PS enters standby at the frequency that is found first.

3.2 Searching for control channel in no service area

When control channel is searched for in no service area, PS searches both new and old control career frequencies for control channel at regular intervals. PS enters standby at the frequency that is found first.

Appendix AP Terminal Independent TX Power control

(Private reference/ Public standard)

This appendix specifies the example of PS's behavior about the terminal independent TX power control function.

1 Function summary

According to the information element notified by "RT function request response" message , it determine the TX power up-down from RSSI level which has been measured by PS on communication phase and materialize independent TX power control function. The example of the TX power control is indicated figure 1.

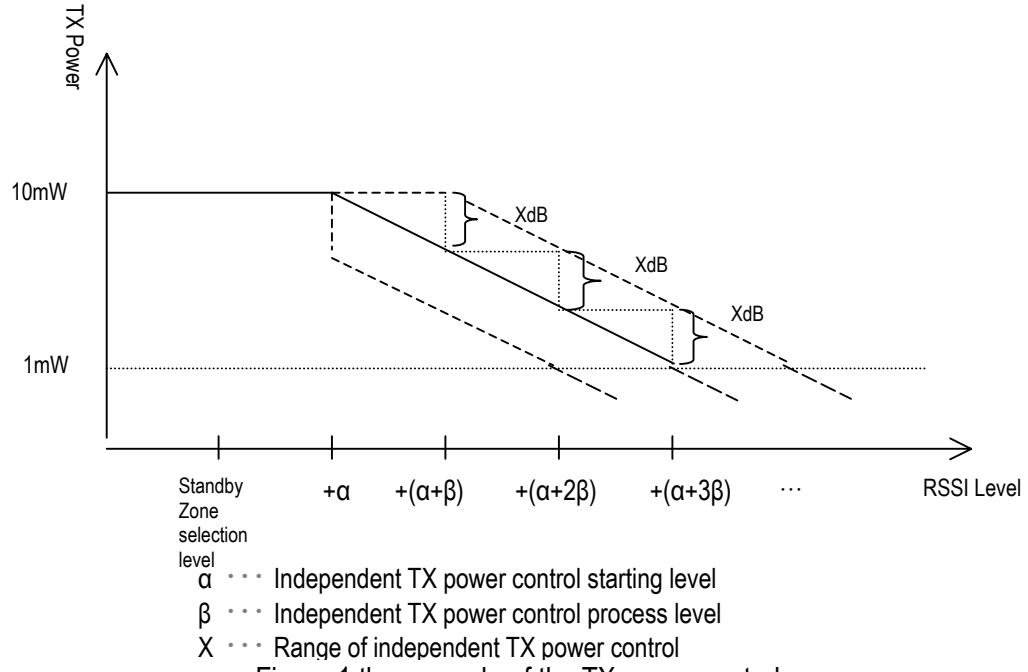


Figure 1 the example of the TX power control

2 Function contents

(1) Function negotiation

When PS and CS support the function of RT-MM protocol version 4 , PS send "RT function request" message for the demand of independent TX power control function and CS notify PS that CS is acceptable or not this function.

If CS notifies PS of reject this function, PS can not perform it.

PS can activate this function on communication phase only.

(2) The judgment of transmission power down

When RSSI level of PS is more than a certain level ("standbay zone selection level" + α＋(n×β)

dB(n=0,1,2…)) on communication phase,PS can turn down the TX power (one-step: XdB).

(Note) α…Independent TX power control starting level
β…Independent TX power control process level
X…Range of independent TX power control

(3) The judgment of TX power up

When RSSI level of PS is less than a certain level (“standby zone selection lever” + α＋(n×β)dB(n=0,1,2…)) on communication phase, PS can turn up the TX power (on-step: XdB).

(Note) α…Independent TX power control starting level
β…Independent TX power control process level
X…Range of independent TX power control

Appendix AQ Operation when Timer TR104P, TR104C are expired.

(Private reference/Public standard)

1. When the timer is expired while trying to make the multiple value number bigger.

The switch back operation of modulation shall be provided so as to enable continuous communications by switching back to the previous modulation when the timer is expired while trying to reassign the modulation from $\pi/4$ shift QPSK to D8PSK, from $\pi/4$ shift QPSK to 16QAM or from D8PSK to 16QAM.

1.1 PS operation at the time of switch back

When timer TR104P is expired, switch back the modulation for both transmission and reception to the previous modulation and move to the state 'communication in progress.'

1.2 CS operation at the time of switch back

When timer TR104C is expired while trying to make the multiple value number bigger, communication shall be continued if CS is waiting for TCH idle burst 2 because it can be considered that PS could not receive Modulation Reassign indication message properly or PS did not initiate the reassign based on the Modulation Reassign indication message.

If CS is waiting for TCH idle burst at the time when timer TR104C is expired, modulation for both transmission and reception shall be reassigned to the modulation before the reassign, and move to the state 'communication in progress."

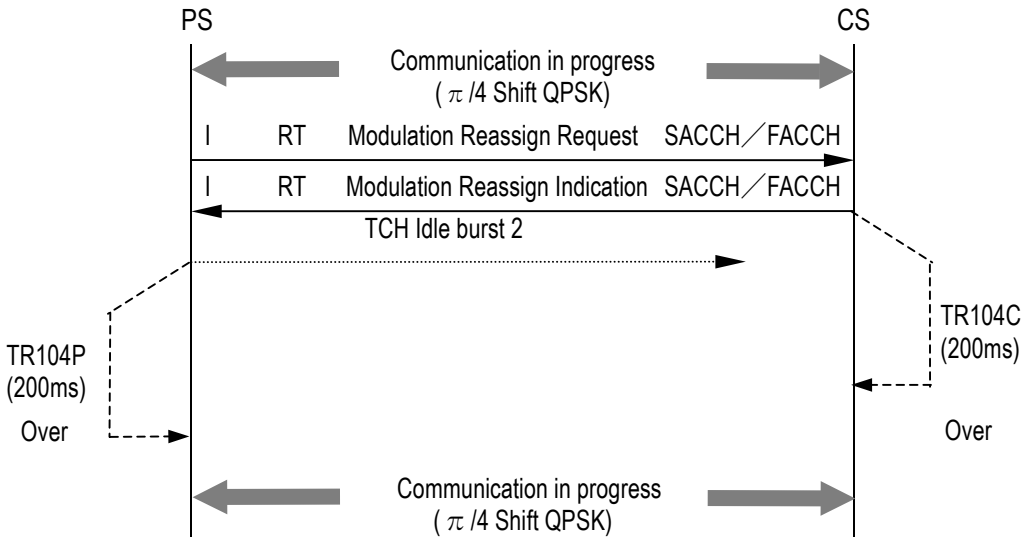


Figure 1 Switch back operation 1 when modulation reassign is failed while communication is in progress

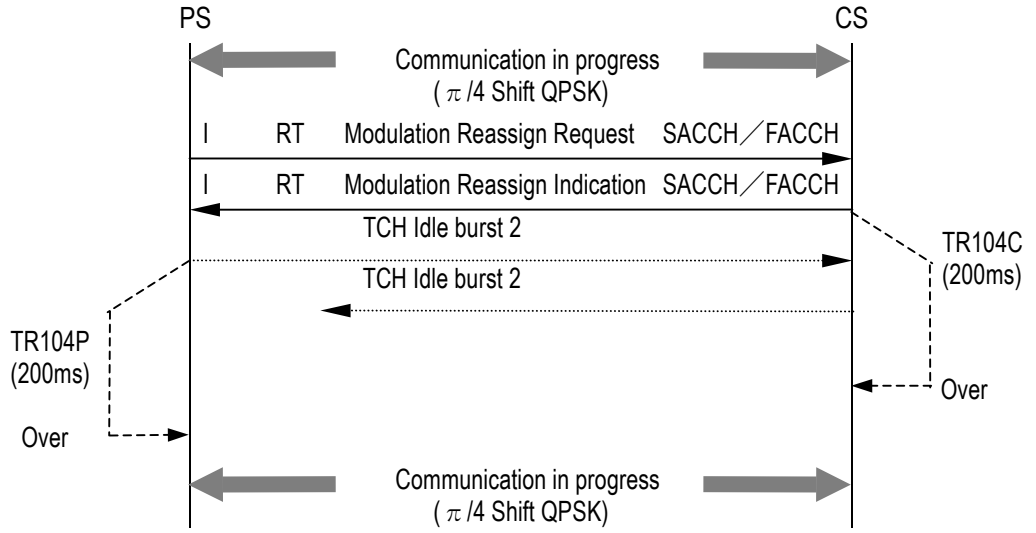


Figure 2 Switch back operation 2 when modulation reassign is failed while communication is in progress

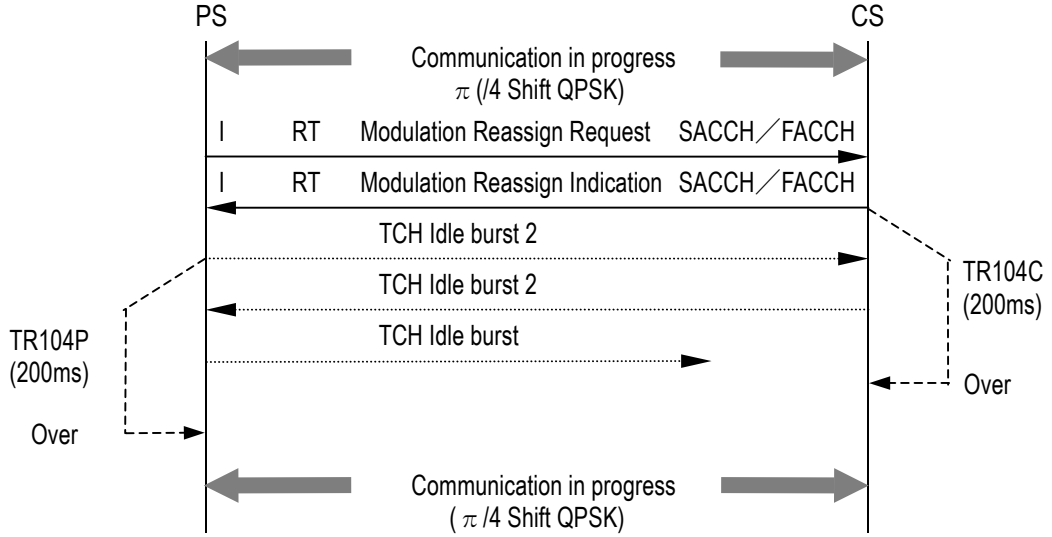


Figure 3 Switch back operation 3 when modulation reassign is failed while communication is in progress

2. When the timer is expired while trying to make the multiple value number smaller

It is desirable to move to resynchronization procedure when the timer is expired while trying to reassign the modulation from D08PSK to π/4 Shift QPSK or from 16QAM to π/4 Shift QPSK. However, when the timer is expired while trying to reassign from 16QAM to D8PSK, it is desirable not to move to resynchronization procedure but to reassign to π/4 Shift QPSK to continue the communication.

Therefore, when the timer is expired, layer 3 Radio frequency transmission management (RT) makes the modulation to π/4 Shift QPSK and return the state to “Initiate TCH” and notify the upper layer of the expiry of the timer. The upper layer notified of the timer’s expiry indicates the resynchronization procedure as appropriate.

2.1 PS operation at the time of switch back

When timer TR104P is expired while trying to make the multiple value number smaller, switch back the modulation for both transmission and reception to π/4 Shift QPSK and move to the state ‘communication in progress.’

2.2 CS operation at the time of switch back

When timer TR104C is expired while trying to make the multiple value number smaller, communication shall be continued if CS is waiting for TCH idle burst 2 because it can be considered that PS could not receive Modulation Reassign indication message properly or PS did not initiate the reassign based on the Modulation Reassign indication message.

If CS is waiting for TCH idle burst at the time when timer TR104C is expired, modulation for both transmission and reception shall be reassigned to π/4 Shift QPSK and move to the state ‘communication in progress.’

Annexes

Annex 1
Standard Pertaining to Authentication of Personal Handy Phone System (Public)

Caution:
Disclosure of this standard is specified in accordance with the “Procedure Rules of Disclosing the Standard pertaining to Authentication and Subscriber Data Write-in of the Personal Handy Phone System (Public)” approved in the Standard Assembly Meeting.

Annex 2
Standard Pertaining to Subscriber Data Write-in of Personal Handy Phone System (Public)

Caution:
Disclosure of this standard is specified in accordance with the “Procedure Rules of Disclosing the Standard pertaining to Authentication and Subscriber Data Write-in of the Personal Handy Phone System (Public)” approved in the Standard Assembly Meeting.

Annex 3
Standard Pertaining to Authentication of Personal Handy Phone System (Private)

Caution:

Disclosure of this standard is specified in accordance with the “Procedure Rules of Disclosing the Standard pertaining to Authentication and Subscriber Data Write-in of the Personal Handy Phone System (Private)” approved in the Standard Assembly Meeting.

However, "RCR STD-28 version 2" in this standard is applied to "RCR STD-28 version 4.0".

Annex 4
Standard Pertaining to Subscriber Data Write-in of Personal Handy Phone System (Private)

Caution:
Disclosure of this standard is specified in accordance with the “Procedure Rules of Disclosing the Standard pertaining to Authentication and Subscriber Data Write-in of the Personal Handy Phone System (Private)” approved in the Standard Assembly Meeting.
However, "RCR STD-28 version 2" in this standard is applied to "RCR STD-28 version 4.0", “ARIB TR-T2 version 1.0” in this standard is applied to “ARIB TR-T2 version 2.2”, “ARIB TR-T5 version 1.0” in this standard is applied to “ARIB TR-T5 version 2.2”.

RCR STD-28 Version 5.3 AMENDMENT HISTORY

Notes:
1) The pages and items in this list shows the pages and items after amendment.
2) "____" shows added part.
3) "~~====~~" shows deleted part
4) The line number shows the number of the line in the specified item, etc. unless otherwise noted.

Number	Page	Amendments
1	5	2.1.3 Relay station (RS) (Public standard) The relay station relays mobile radio communication between cell station and personal stations on land. A cell station or personal station opposing part of relay station consists of radio equipment made up of antenna, transmitter, and receiver; voice coding equipment; and control equipment. The relay station, which shall be registered (in accordance with Paragraph 1.2, Execute-article16) , is defined as the registered relay station.
2	55	3.4.2.1 Transmission power (Execute-article 6 and Equipment-item 8.3 of article 49) (Private mandatory/Public mandatory) (omission) (2) Standards Maximum transmission power: For public cell stations, maximum transmission power is 500 mW or less. For other cell stations, personal stations, and relay stations, maximum transmission power is 10 mW or less. However, in cases where public cell stations use frequency band 1893.65MHz - 1905.95MHz, maximum transmission power is 20mW or less, and in cases of using frequency band 1906.25MHz – 1908.05MHz and 1915.85MHz - 1918.25MHz, maximum transmission power is 2W or less.(In case that it is used as communication carrier, maximum transmission power is 500mW or less.) Also, in case that it is relay stations, using 1884.65MHz - 1893.35MHz or 1906.25MHz – 1919.45MHz and using for personal stations, maximum transmission power is 20mW or less. (For the registered relay station, maximum transmission power is 10mW or less.) Output accuracy: Within + 20%, -50%

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>3</td><td>57

59</td><td>3.4.2.6 Tolerance limits of the intensity of spurious emission or unwanted emission (Private mandatory/Public mandatory)
(omission)
(2) Standards
(omission)
b.The registered relay station

Tolerance limits of the intensity of unwanted emission in spurious domain for the registered relay station are shown below.

Table 3.6.3 Tolerance limits of the intensity of unwanted emission (The registered relay station)
<table>
<tr><th>Frequency band</th><th>Tolerance limits of the intensity of unwanted emission in spurious domain</th></tr>
<tr><td>(1)From 1,884.5MHz up to 1,919.6MHz</td><td>Average power of the bandwidth of any 1MHz is 794nW or less</td></tr>
<tr><td>(2)Less than 1,884.5MHz and more than 1,919.6MHz (except those frequencies shown in (3) and (4))
(Note 1)</td><td>Average power of the bandwidth of any 1MHz is 794nW or less</td></tr>
<tr><td>(3)From 815MHz up to 845MHz,
from 860MHz up to 890MHz ,
from 898MHz up to 901MHz,
from 915MHz up to 925MHz,
from 1,427.9MHz up to 1,452.9MHz,
from 1,475.9MHz up to 1,500.9MHz,
from 1,749.9MHz up to 1,784.9MHz,
from 1,844.9MHz up to 1,879.9MHz and
from 2,010MHz up to 2,025MHz
(Note 1)</td><td>Average power of the bandwidth of any 1MHz is 251nW or less</td></tr>
<tr><td>(4)From 1,920MHz up to 1,980MHz and from 2,110MHz up to 2,170MHz
(Note 1)</td><td>Average power of the bandwidth of any 1MHz is 79.4nW or less</td></tr>
</table>
(Note 1) Limited to the frequency band where detuning frequency is 2.25MHz or more.
(Note 2) Tolerance limits of the intensity of unwanted emissions are the average power value in the duration of unwanted emissions for each frequency supplied to the power line.
(Note 3) Frequency at the boundary of out-of-band domain and spurious domain is the carrier of ±996kHz in case of transmission equipment with the occupied bandwidth 288kHz or less, or ±1,296kHz in case of transmission equipment with the occupied bandwidth exceeding 288kHz.</td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>4</td><td>67

68</td><td>3.4.4 Antennas (Equipment-item 8.2 of article 49 and item 8.3 of article 49)
(Private mandatory/Public mandatory)

(omission)

(3) Relay station

(omission)

When 1884.65MHz - 1893.35MHz, antenna gain is 21 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 21 dBi, the portion by which it is lower may be compensated by the gain of the antenna.
Antenna gain for the registered relay station is 4dBi or less. However, in case where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 4dBi, the portion by which it is lower may be compensated by the antenna gain.</td></tr>
</table>

Revision Summary of RCR STD-28 Version 5.2

1. Reason of revision

The Personal Handy Phone System ARIB Standard (RCR STD-28) was revised to RCR STD-28 Ver.5.1 at the 60th Standard Assembly (on November 30, 2005).

The revision of this time responds to the revision of the ministerial ordinance and notification regarding PHS enhancement which took effect on December 1, 2005 as follows: (a) Regarding the addition of 64QAM and 256QAM, transmission rate up to 1152kbps and 1536kbps is now possible when the occupied bandwidth is 288kHz or less, and the provisions for adjacent channel selectivity, intermodulation characteristics and spurious response immunity were established; (b) Regarding the addition of BPSK for private system, area expansion was introduced; (c) Regarding the change in available frequency band for BPSK for public system, the limited use only for the frequency band of advanced PHS has been expanded to all frequency band; (d) Regarding the change in antenna gain for control channel, the antenna gain for control channel responding to the expansion of EIRP of the traffic channel for advanced PHS's public system revised in RCR STD-28 Ver. 4.0 was established.
Also, apart from the above revision of the ministerial ordinance and notification, clarification of the description in case of half rate communication is achieved by adding supplemental remarks on the peak power for transmission power.
By including the above provisions, the Standard is now revised to RCR STD-28 v.5.2.

2. Main content of the revision

RCR STD－28
Version 5.3
AMENDMENT
HISTORY

(a) Addition of 64QAM and 256QAM establishment of provisions for adjacent channel selectivity, intermodulation c ious response immunity.
(b) Addition of BPSK for private syst
(c) Addition of BPSK for public syste
(d) Change in antenna gain for contr
(e) Addition of supplemental remarks r

3. Deliberation of the amendment plan of this standard

The amendment plan of this standard was deliberated and prepared in the Standard Assembly No. 28 Working Group.

4. Confirmation of the items regarding the Radio Law related rules

Investigation of the specifications which have been added or changed this time was made in terms of the relation with the Radio Law related rules, etc. As a result, it was confirmed that there would be no problem in this revision.

RCR STD-28 Version 5.2 AMENDMENT HISTORY

Notes:
1) The pages and items in this list shows the pages and items after amendment.
2) "____" shows added part.
3) "~~====~~" shows deleted part
4) The line number shows the number of the line in the specified item, etc. unless otherwise noted.

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>1</td><td>10</td><td>2.4.1 Transmission method (Private standard/Public standard)

Table 2.3 Transmission method parameters
<table><tr><td>Transmission rate</td><td>192~~3200~~ 5120k bit/s</td></tr></table></td></tr>
<tr><td>2</td><td>19</td><td>3.2.6 Modulation method (Equipment-item 8.2 of article 49 and item 8.3 of article 49)
(Private mandatory/Public mandatory)
The modulation method is π/4 shift QPSK modulation (quaternary phase modulation which has been shifted by π/4 each symbol period).
~~If needed, when frequency of 1884.65MHz – 1893.35MHz is transmitted,~~ BPSK, QPSK, 8PSK, 12QAM, 16QAM, 24QAM, 32QAM, 64QAM and 256QAM ~~and when frequency of 1893.65MHz – 1919.45MHz is transmitted, QPSK, 8PSK, 12QAM, 16QAM, 24QAM, 32QAM~~ are usable for public and ~~QPSK, 8PSK, 12QAM , 16QAM, 24QAM, 32QAM, 64QAM, 256QAM are usable for~~ private. Adaptive modulation method which changes modulation method according to data communications speed or radio condition is usable.
In case that occupied bandwidth is 288kHz or less, transmission side filtering is Square Root of Raised Cosine with Roll off factor (α) of 0.5. In case that occupied bandwidth exceeds 288kHz, transmission side filtering is Square Root of Raised Cosine with Roll off factor (α) of 0.5/0.38.</td></tr>
<tr><td>3</td><td>20</td><td>3.2.7 Transmission rate (Equipment-item 8.2 of article 49 and item 8.3 of article 49)
(Private mandatory/Public mandatory)
Each signal transmission rate is as follows.

In case that occupied bandwidth is 288kHz or less

π/4 shift QPSK 384kbps
BPSK 192kbps
QPSK 384kbps
8PSK 576kbps
12QAM 672kbps
16QAM 768kbps
24QAM 864kbps
32QAM 960kbps
64QAM 1152kbps
256QAM 1536kbps

In case that occupied bandwidth exceeds 288kHz and Roll off factor (α) is 0.5
π/4 shift QPSK 1152kbps
BPSK 576kbps
QPSK 1152kbps
8PSK 1728kbps
12QAM 2016kbps</td></tr>
</table>

Number	Page	Amendments
		16QAM 2304kbps 24QAM 2592kbps 32QAM 2880kbps 64QAM 3456kbps 256QAM 4608kbps In case that occupied bandwidth exceeds 288kHz and Roll off factor (α) is 0.38 π/4 shift QPSK 1280kbps BPSK 640kbps QPSK 1280kbps 8PSK 1920kbps 12QAM 2240kbps 16QAM 2560kbps 24QAM 2880kbps 32QAM 3200kbps 64QAM 3840kbps 256QAM 5120kbps
4	27	3.2.18 Transmission timing and transmission jitter (Private standard/Public standard) (omission) (3) CS transmission jitter a. When roll off factor of base band band-pass filter is 0.5 π/4 shift QPSK 1/8 symbol or less BPSK 1/8 symbol or less QPSK 1/8 symbol or less 8PSK 1/16 symbol or less 12QAM 1/16 symbol or less 16QAM 1/16 symbol or less 24QAM 1/32 symbol or less 32QAM 1/32 symbol or less 64QAM 1/32 symbol or less 256QAM 1/32 symbol or less (4) PS transmission jitter When PS is detecting UW from CS PS transmission jitter are as follows. a. When roll off factor of base band band-pass filter is 0.5. π/4 shift QPSK 1/8 symbol or less BPSK 1/8 symbol or less QPSK 1/8 symbol or less 8PSK 1/16 symbol or less 12QAM 1/16 symbol or less 16QAM 1/16 symbol or less 24QAM 1/32 symbol or less 32QAM 1/32 symbol or less 64QAM 1/32 symbol or less 256QAM 1/32 symbol or less
5	34	3.3 Conditions for modulation method (Private standard/public standard) 3.3.1 Modulation method π/4 shift QPSK, BPSK(in case of π/2 shift BPSK), QPSK, 8PSK(in case of D8PSK), 12QAM, 16QAM, 24QAM, ~~and~~ 32QAM, 64QAM and 256QAM are prescribed as follows.

Number	Page	Amendments
		3.3.1.1 Modulation method The modulation procedures for stipulating modulation methods are shown in Figure 3.6.1 – 3.6.~~8~~10. (omission) Figure 3.6.9 64QAM modulation circuit Figure 3.6.10 256QAM modulation circuit
6	37	3.3.1.2 Coding (Private standard/Public standard) (omission) (i) 64QAM (1) The serial signal input is... Table 3.4.12 64QAM coding regulations (2) The signal space diagram is... Figure 3.7.9 64QAM signal space diagram (j) 256QAM (1) The serial signal input is... Table 3.4.13 256QAM coding regulations (2) The signal space diagram is... Figure 3.710 256QAM signal space diagram
7	55	3.4.2 Transmission characteristics (Private standard/Public standard) 3.4.2.1 Transmission power (Execute-article 6 and Equipment-item 8.3 of article 49) (Private mandatory/Public mandatory) (omission) (3) Supplemental remarks (Private standard/Public standard) Peak power for the average power 10mW, 20mW, 500mW or less shall be: a. 80mW, 160mW, 4W or less respectively in case of full rate communication. b. 160mW, 320mW, 8W or less respectively in case of half rate communication.
8	56	3.4.2.4 Transient response characteristics of burst transmission (Private standard/Public standard) (1) Definition (omission) (2) Standards a. Time characteristics: The time characteristics standards are 13.0 μs or less. Also, the instantaneous Power is π/4 shift QPSK : [Average power within burst + 4dB] or less BPSK : [Average power within burst + 6dB] or less QPSK : [Average power within burst + 5dB] or less 8PSK : [Average power within burst + 5dB] or less 12QAM : [Average power within burst + 7dB] or less 16QAM : [Average power within burst + 8dB] or less 24QAM : [Average power within burst + 8dB] or less 32QAM : [Average power within burst + 8dB] or less 64QAM : [Average power within burst + 9dB] or less 256QAM: [Average power within burst + 9dB] or less

Number	Page	Amendments
9	60	3.4.2.9 Modulation accuracy (Private standard/Public standard) (1) Definition (omission) (2) Standards In case that Roll off factor of base band band-pass filter is 0.5 π/4 shift QPSK 12.5% or less BPSK 12.5% or less QPSK 12.5% or less 8PSK 8% or less 12QAM 8% or less 16QAM 8% or less 24QAM 6% or less 32QAM 5% or less 64QAM 5% or less 256QAM 2.5% or less
10	62	3.4.3.2 Sensitivity (PS: Private standard/Public standard) (CS: Private standard/Public mandatory) (1) Definition (omission) (2) Standards a. In case that occupied bandwidth is 288kHz or less π/4 shift QPSK 16.0dBμV or less BPSK 12.5dBμV or less QPSK 15.5dBμV or less 8PSK 20.0dBμV or less 12QAM 21.5dBμV or less 16QAM 22.0dBμV or less 24QAM 24.5dBμV or less 32QAM 26.5dBμV or less 64QAM ~~28.0~~30.0dBμV or less 256QAM ~~33.5~~37.5dBμV or less In case that occupied bandwidth exceeds 288kHz π/4 shift QPSK 21.2dBμV or less BPSK 17.7dBμV or less QPSK 20.7dBμV or less 8PSK 25.2dBμV or less 12QAM 26.7dBμV or less 16QAM 27.2dBμV or less 24QAM 29.7dBμV or less 32QAM 31.7dBμV or less 64QAM 35.2 dBμV or less 256QAM 42.7 dBμV or less * Above specified value of each bandwidth signal and each modulation method is each “specified sensitivity”.

Number	Page	Amendments
11	59	3.4.3.4 Adjacent channel selectivity (Private standard/Public standard) (1) Definition (omission) (2) Standards ~~In spite of modulation method,~~ a. When occupied frequency bandwidth is 288kHz or less - see below ~~More than 50dB~~ at detuning frequency 600kHz. π/4 shift QPSK 50.0dB or more BPSK 50.0dB or more QPSK 50.0dB or more 8PSK 46.0dB or more 12QAM 44.5dB or more 16QAM 44.0dB or more 24QAM 41.5dB or more 32QAM 39.5dB or more 64QAM 36.0dB or more 256QAM 28.5dB or more b. When occupied frequency bandwidth exceeds 288kHz - More than 50dB at detuning frequency 900kHz.
12	63	3.4.3.5 Intermodulation performance (Private standard/Public standard) (1) Definition (omission) (2) Standards ~~It is 47 dB or more.~~ π/4 shift QPSK 47.0dB or more BPSK 47.0dB or more QPSK 47.0dB or more 8PSK 43.0dB or more 12QAM 41.5dB or more 16QAM 41.0dB or more 24QAM 38.5dB or more 32QAM 36.5dB or more 64QAM 33.0dB or more 256QAM 25.5dB or more
13	64	3.4.3.6 Spurious response immunity (Private standard/Public standard) (1) Definition (omission) (2) Standards ~~It is 47 dB or more.~~ π/4 shift QPSK 47.0dB or more BPSK 47.0dB or more QPSK 47.0dB or more 8PSK 43.0dB or more 12QAM 41.5dB or more 16QAM 41.0dB or more

Number	Page	Amendments
		24QAM 38.5dB or more 32QAM 36.5dB or more 64QAM 33.0dB or more 256QAM 25.5dB or more
14	66	3.4.3.10 Bit error rate floor performance (Public standard) (1) Definition (omission) (2) Standards In case that occupied bandwidth is 288kHz or less π/4 shift QPSK 25.0dBμV or less BPSK 21.5dBμV or less QPSK 24.5dBμV or less 8PSK 29.0dBμV or less 12QAM 30.5dBμV or less 16QAM 31.0dBμV or less 24QAM 33.5dBμV or less 32QAM 35.5dBμV or less 64QAM 39.0dBμV or less 256QAM 46.5dBμV or less
15	67	3.4.4 Antennas (Equipment-item 8.2 of article 49 and item 8.3 of article 49) (Private mandatory/Public mandatory) (1) Cell station Antenna for private system is cabinet-built-in-type with gain of 4 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 4 dBi, the portion by which it is lower may be compensated by the gain of the antenna. When 1893.65MHz – ~~1919.45~~1905.95MHz, 1908.35MHz – 1915.55MHz as well as 1918.55MHz – 1919.45MHz, antenna for public system has a gain of 10 dBi or less (except 1898.45 MHz and 1900.25 MHz). However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 10 dBi, the portion by which it is lower may be compensated by the gain of the antenna. When 1906.25MHz – 1908.05MHz as well as 1915.85MHz – 1918.25MHz, antenna for public system has a gain of 15 dBi or less (but should be 10dBi or less when used as traffic channel). However, in cases where the EIRP is less than the value when the specified antenna power is applied to an antenna of absolute gain 15 dBi, the portion by which it is lower may be compensated by the gain of the antenna. When adaptive array antenna (The antenna which increase the antenna gain in the direction of the other party of communication, and decrease the antenna gain in the direction of the other radio stations which use same channel) is applied to public system and 1893.65MHz – 1919.45MHz, antenna gain is 16 dBi or less (except 1898.45 MHz and 1900.25 MHz). However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 16 dBi, the portion by which it is lower may be compensated by the gain of the antenna. When 1884.65MHz – 1893.35MHz, antenna for public system has a gain of 21 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 21 dBi, the portion by which it is lower may be compensated by the gain of the antenna.

Reference Material 60-2

Summary of the Revision of Personal Handy Phone System ARIB Standard (RCR STD-28)

1. Summary

The Personal Handy Phone System ARIB Standard (RCR STD-28) was revised to RCR STD-28 Ver.5.0 at the 59th Standard Assembly (on September 29, 2005).

The revision of this time is with regard to the revision of “Permissible value of the intensity of spurious emission” and the increase of transmission power for traffic channels of base station, and the Standard is now revised to Personal Handy Phone System ARIB Standard (RCR STD-28 v.5.1).

2. Increase of transmission power for traffic channels of base station

With the global popularization of PHS (especially in the Asian region), the study to increase the maximum transmission power of traffic channel from 500mW to 2W in view of reducing the amount of infrastructure investment in foreign countries, has been conducted by Working Group No.28. As a result, it was confirmed that the applicable increase would cause no technical problem in the system configuration in foreign countries, which enables its introduction in the scope of the national ordinances of each country. However, the maximum transmission power in Japan remains unchanged (500mW) therefore there was no change of the standard for Japan in the revision of this time.

Issued December 2005

RCR STD-28 Version 5.1

AMENDMENT HISTORY

"____" Added; "~~====~~" Deleted

Number	Page	Amendments
1	51	3.4.2.1 Transmission power (Private mandatory/Public mandatory) (1) Definition (Omitted) c. ~~In spite of~~ Regardless of modulation method, transmission power is average supplied power of one channel. (2) Standards Maximum transmission power: For public cell stations, maximum transmission power is 500mW or less. For other cell stations~~,~~ personal stations and relay stations, maximum transmission power is 10mW or less. However, in cases where public cell stations use frequency band 1893.65MHz – 1905.95MHz, maximum transmission power is 20mW or less, and in cases of using frequency band 1906.25MHz – 1908.05MHz and 1915.85MHz – 1918.25MHz, maximum transmission power is 2W or less. (In case that it is used as communication channel, maximum transmission power is 500mW or less) Also, in case that it is relay stations, using 1884.65MHz – 1893.35MHz or 1906.25MHz – 1919.45MHz and using for personal stations, maximum transmission power is 20mW or less. Output accuracy: Within +20%, -50% However, in foreign countries, namely the countries except Japan, the followings shall be applied on condition that it is in conformity with national legislations of each of the countries. Maximum transmission power: For public cell stations, maximum transmission power is 2W or less. For other cell stations, personal stations and relay stations maximum transmission power is 10mW or less. However, in cases where relay stations are for personal stations, the maximum transmission power is 20mW or less. On the other hand, when using shared frequencies for private and public systems, the maximum transmission power of public cell stations is 20mW or less, and that of relay station is 10mW or less even if it is for personal stations. Output accuracy: within +20%, -50%
2	63	3.4.4 Antennas (Equipment-item 8.2 of article 49 and item 8.3 of article 49) (Private mandatory/Public mandatory) (1) Cell station Antenna for private system is cabinet-built-in-type with gain of 4dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 4dBi, the portion by which it is lower may be compensated by the gain of the antenna. (Omitted) When 1884.65MHz – 1893.35MHz, antenna for public system has a gain of 21 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 21 dBi, the portion by which it is lower may be compensated by the gain of the antenna.

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>3</td><td>55</td><td>
However, in foreign countries, namely the countries except Japan, the specifications for the cell station antennas shall be kept flexible with the system design and not provided in this standard, on condition that they are in conformity with national legislations of each of the countries.

(2) Personal station

3.4.2.6 Tolerance limits of the intensity of spurious emission or unwanted emission

(1) Definition (Execute - Item 1 of Article 2)
“Spurious emission” is emission(s) on a frequency or frequencies which are outside the required bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, subharmonic emissions, parasitic emissions, and intermodulation products, but exclude out-of-band emissions. (No.63 of Item 1)

“Out-of-band emission” is the radio emission of frequency adjacent to the required frequency band which is generated in the course of modulation for information transmission. (No.63-2 of Item 1)

“Unwanted emission” refers to the spurious emission and out-of-band emission. (No.63-3 of Item 1)

“Spurious domain” is the frequency bandwidth in which the spurious emission outside the out-of-band domain is dominant. (No.63-4 of Item 1)

“Out-of-band domain" is the frequency bandwidth in which the out-of-band emission outside the required frequency band is dominant. (No.63-5 of Item 1)

(2) Standards

Tolerance limits to be applied after December 1, 2005 (Equipment Regulation Appendix No.3 -20, 21)

Tolerance limits of the intensity of spurious emission in out-of-band domain and unwanted emission in spurious domain for digital cordless telephone are shown below.

Table 3.6.1 Tolerance limits of the intensity of spurious emission or unwanted emission (Digital cordless telephone)
<table>
<tr><th>Frequency band</th><th>Tolerance limits of the intensity of spurious emission in out-of-band domain</th><th>Tolerance limits of the intensity of unwanted emission in spurious domain</th></tr>
<tr><td>More than 1,893.5MHz up to 1,919.6MHz</td><td>250nW or less</td><td>250nW or less</td></tr>
<tr><td>1,893.5MHz or less and more than 1,919.6MHz</td><td>2.5 μ W or less</td><td>2.5 μ W or less</td></tr>
</table>
(Note 1) Tolerance limits of the intensity of spurious or unwanted emissions are the average power value in the duration of spurious or unwanted emissions for each frequency supplied to the power line.
(Note 2) Frequency at the boundary of out-of-band domain and spurious domain is the carrier of ±996kHz.

Tolerance limits of the intensity of unwanted emission in spurious domain for systems except digital cordless telephone are shown below.
</td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td></td><td></td><td>
Table 3.6.2 Tolerance limits of the intensity of unwanted emission (except digital cordless telephone)
<table>
<tr><td>Frequency band</td><td>Tolerance limits of the intensity of unwanted emission in spurious domain</td></tr>
<tr><td>(1) From 1,884.5MHz up to 1,919.6MHz</td><td>Average power of the bandwidth of any 1MHz is 794nW or less</td></tr>
<tr><td>(2) Less than 1,884.5MHz and more than 1,919.6MHz (except those frequencies shown in (3))(Note 1)</td><td>Average power of the bandwidth of any 1MHz is 794nW or less</td></tr>
<tr><td>(3) From 1,920MHz up to 1,980MHz and from 2,110MHz up to 2,170MHz (Note 1)</td><td>Average power of bandwidth of any 1MHz is 251nW or less</td></tr>
</table>
(Note 1) Limited to the frequency band where detuning frequency is 2.25MHz or more.
(Note 2) Tolerance limits of the intensity of unwanted emissions are the average power value in the duration of unwanted emissions for each frequency supplied to the power line.
(Note 3) Frequency at the boundary of out-of-band domain and spurious domain is the carrier of ±996kHz in case of transmission equipment with the occupied bandwidth 288kHz or less, or ±1,296kHz in case of transmission equipment with the occupied bandwidth exceeding 288kHz.

However, the following transitional measure shall be noted. (Based on supplementary provision of the Radio Equipment Rules (Ministerial ordinance No.119 dated August 9, 2005))

a. Tolerance limits based on the Radio Equipment Rules before November 30 2005.

(2) Standards
Digital cordless telephone
a. Within band (1,893.5 MHz 1,919.6 MHz): 250nW or less.
b. Out of band (except above): 2.5 μW or less.
Except above
a. Within band: 794nW/MHz or less.
b. Out of band (Detuning frequency exceeds 2.25MHz): 794nW/MHz or less.
c. Out of band (Detuning frequency exceeds 2.25MHz and 1920MHz-1980MHz and 2110MHz-2170MHz): 251nW/MHz or less.
(RCR STD-28 v.5.0)
</td></tr>
<tr><td>4</td><td>550</td><td>
7.1.2 Intensity of spurious emission or unwanted emission
Measurement method is based on the notification(Note 1) of Ministry of Internal Affairs and Communications provided in Proof Rules Appendix No. 1-1(3).

(Note 1) As of the time when the standard is revised to version 5.1 (November 30, 2005), the notification refers to No.88 notification of Ministry of Internal Affairs and Communications dated January 26, 2004, “method of characteristic test.” However, from the time onward, when the notification or the description of the notification is revised, the latest version shall be followed.
</td></tr>
</table>

Revision Summary of Version 5.0

1. Reason of revision

The Personal Handy Phone System ARIB Standard (RCR STD-28) was revised to RCR STD-28 Ver.4.1 at the 53rd Standard Assembly (on May 26, 2004).

The revision of this time introduces π /4 shift QPSK as well as π /2 shift BPSK, D8PSK and 16QAM as advanced modulation methods in order to reduce the network cost of PHS and increase the transmission speed and incorporates provisions about channel coding format and connection method. Thus, the Standard is now revised to RCR STD-28 v.5.0.

2. Main content of the revision

(1) Advancement of the modulation method

With the addition of π /2 shift BPSK, connection procedure for the establishment of communications has been added. Also, with the addition of D8PSK and 16QAM, modulation reassign during communication has become acceptable, enabling the provision of communication service according to communication environment.

(2) Summary of revision

(a) Change in the definition, etc. of service (Chapter 2)
(b) Change of the part relating to modulation, coding, etc. (Chapter 3)
(c) Addition of slot structure and channel coding format, etc. (Chapter 4)
(d) Change in protocol specifications (link channel establishment phase, radio control (RT)) and addition of control sequence (Chapter 4)
(e) Change in measurement method (Chapter 7)
(f) Change in state transition figure (Appendix)

(3) Others: Clerical errors, etc. are corrected.

Please see the Amendment History for details.

3. Deliberation of the amendment plan of this standard

The amendment plan of this standard was deliberated and prepared in the Standard Assembly No. 28 Working Group.

4. Confirmation of the items regarding the Radio Law related rules

Investigation of the specifications which have been added or changed this time was made in terms of the relation with the Radio Law related rules, etc. As a result, it was confirmed that there would be no problem in this revision.

Issued December 2005
RCR STD-28 Version 5.0

AMENDMENT HISTORY

"____" Added; "~~====~~" Deleted

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>1</td><td>3</td><td>1.4 Document conformity

In the standard, "execute" refers to radio law execution rules, "equipment" refers to radio equipment rules, "notification" refers to ~~Ministry of Posts and Telecommunications notifications~~ Ministry of Internal Affairs and Communications notifications, ...</td></tr>
<tr><td>2</td><td>9</td><td>Table 2.2 Transmission method parameters
<table>
<tr><th>Type</th><th>Item</th><th>Overview</th></tr>
<tr><td rowspan="4">Bearer service</td><td>32k bit/s speech
(note 5) (note 6)</td><td>Provides bearer capability suited for voice communication with terminal; 32k bit/s ADPCM CODEC or 16k bit/s ADPCM CODEC is inserted.(note 8)</td></tr>
<tr><td>32k bit/s 3.1kHz audio
(note 5) (note 6)</td><td>Provides bearer capability suited for 3.1kHz bandwidths communication with terminal; 32k bit/s ADPCM CODEC or 16k bit/s ADPCM CODEC is inserted. (note 8)</td></tr>
<tr><td>32k bit/s unrestricted digital
(note 2) (note 5) (note 9)</td><td>Provides bearer capability suited for digital data communication with terminal; information is transmitted transparently.</td></tr>
<tr><td>64k bit/s unrestricted digital
(note 3) (note 5) (note 7)
(note 10)</td><td>Using max 2 channels on Um point, provides bearer capability suited for digital data communication with terminal; information is transmitted transparently.</td></tr>
<tr><td>・・・</td><td>・・・</td><td>・・・</td></tr>
</table>
・・・</td></tr>
<tr><td></td><td>10</td><td>(Note5) When π/4 shift QPSK half rate (16k bit/s) (Public only) communication is used, standard protocol can be used RT/MM protocol version newer than RCR STD-28(version 4.1).
(Note 6) When BPSK full rate (16kbit/s) (Public only) communication is used, standard protocol can be used RT/MM protocol version newer than RCR STD-28 (version 5.0).
(Note 7) When 8PSK (48kbit/s) or 16QAM(64kbit/s) communication is used, standard protocol can be used RT/MM protocol version newer than RCR STD-28 (version 5.0).
(Note 8) 16kbit/s ADPCM CODEC is used for π/4 shift QPSK half rate (16k bit/s) or BPSK full rate (16kbit/s) communication for Public use
(Note 9) π/4 shift QPSK full rate (32bit/s) is used for 32kbit/s unrestricted digital, but π/4 shift QPSK half rate (16k bit/s) is allowed to be used for Public.
(Note 10) For 64kbit/s unrestricted digital information service, see clause 2.6.</td></tr>
<tr><td>3</td><td>10</td><td>Table 2.3 Transmission method parameters
<table>
<tr><td>Radio access method</td><td>TDMA-TDD</td></tr>
<tr><td>Number of TDMA multiplexed circuits</td><td>4 (when full rate CODEC is used)</td></tr>
<tr><td>Carrier frequency spacing</td><td>300 kHz</td></tr>
<tr><td>Modulation method</td><td>π/4 shift QPSK, BPSK(note 1), QPSK, 8PSK(note 2), 12QAM, 16QAM, 24QAM, 24QAM, 32QAM, 64QAM (roll-off rate = 0.5, 0.38)</td></tr>
<tr><td>Transmission rate</td><td>192~3200k bit/s</td></tr>
</table>
(Note 1) π/2 shift BPSK (BPSK which has been shifted by π/2 each symbol period) is included.
(Note 2) D8PSK (Differentially encoded 8PSK) is included.</td></tr>
<tr><td>4</td><td>16</td><td>2.5.2 Hierarchical structure</td></tr>
</table>

Number	Page	Amendments
		(3) Communications phase The hierarchical structure of communication used via one radio channel (32k bit/s speech, 32k bit/s 3.1kHz audio ~~and~~, 32k bit/s unrestricted digital and 64kbit/s unrestricted digital) shown in Figure 2.8, ...
5	17	2.5.3 Transmission rate support ・・・ And under unrestricted digital, 32k bit/s and 64k bit/s, and additional 16k bit/s (Public only) and 48 kbit/s are standardized. ~~Furthermore, half rate (16k bit/s) and quarter rate (8k bit/s) voice coding methods are not standardized at present.~~
6	17	2.6 64k bit/s Unrestricted Digital Information service In the 64k bit/s Unrestricted Digital Information service, the following ~~two~~ three methods are standardized.
7	17	2.6.2 Slot changeable type 64k bit/s Unrestricted Digital Information service Using 2 slot on radio is allowed slot switching during communications as necessary and 64k bit/s Unrestricted Digital Information service is provided. Also, π /4 shift QPSK half rate (16bit/s) communication (Public only) is allowed as necessary.
8	17	2.6.3 Variable Modulation Method Type 64kbit/s Unrestricted Digital Information service Change of modulation methods (π /4 shift QPSK, 8PSK, 16QAM) during communication is allowed as necessary to provide 64kbit/s unrestricted digital information service. Also, variable slot type 64kbit/s unrestricted digital is allowed as necessary.
9	22	Figure 3.1 Carrier sensing method ・・・ In case that occupied bandwidth is 288kHz or less and π /4 shift QPSK (a) Carrier sensing method on PS side ・・・ In case that occupied bandwidth is 288kHz or less and π /4 shift QPSK (b) Carrier sensing method on CS side
10	29	3.2.18 Transmission timing and transmission jitter (4) PS transmission jitter When PS is detecting UW from CS PS transmission jitter are as follows. When roll off factor of base band band-pass filter is 0.5 π /4 shift QPSK 1/8 symbol or less BPSK 1/8 symbol or less QPSK 1/8 symbol or less 8PSK 1/16 symbol or less 12QAM 1/16 symbol or less 16QAM 1/16 symbol or less 24QAM 1/32 symbol or less

Number	Page	Amendments
		32QAM 1/32 symbol or less
11	34	3.3.1 Modulation method π /4 shift QPSK, BPSK(in case of π /2 shift BPSK), QPSK, 8PSK(in case of D8PSK), 12QAM, 16QAM, 24QAM, and 32QAM are prescribed as follows.
12	34	3.3.1.1 Modulation method ~~(Equipment item 8.2 and item 8.3 of article 49)~~ (Private ~~mandatory~~ standard/Public ~~mandatory~~ standard)
13	34	Figure 3.6.2 BPSK modulation circuit (in case of π /2 shift BPSK) (To change from BPSK modulation circuit to π /2 shift BPSK modulation circuit)
14	35	Figure 3.6.4 8PSK modulation circuit (in case of D8PSK) (To change from 8PSK modulation circuit to D8PSK modulation circuit)
15	35	Figure 3.6.5 12QAM modulation circuit (Figure is changed.)
16	36	Figure 3.6.7 24QAM modulation circuit (Figure is changed.)
17	36	Figure 3.6.8 32QAM modulation circuit (Figure is changed.)
18	37	3.3.1.2 Coding (a) π /4 shift QPSK (1) • • • ..... performed according to equation 3.3-1.1 and Table 3.4.1. • • • $I_k = I_{k-1} \cos [\Delta \varnothing (X_k, Y_k)] - Q_{k-1} \sin [\Delta \varnothing (X_k, Y_k)]$ $Q_k = I_{k-1} \sin [\Delta \varnothing (X_k, Y_k)] + Q_{k-1} \cos [\Delta \varnothing (X_k, Y_k)]$ Equation (3.3-1.1)
19	37	Table 3.4.1 π /4 shift QPSK Differential coding regulations
20	37	Figure 3.7.1 π /4 shift QPSK signal space diagram (Figure is changed according to the other modulation methods.)
21	38	(b) BPSK (in case of π /2 shift BPSK) (Description is changed.) Table 3.4.2 BPSK coding regulations (π /2 shift BPSK differential coding regulations) (Description is changed.) Figure 3.7.2 BPSK signal space diagram (in case of π /2 shift BPSK) (Description is changed.)
22	39	(c) QPSK Figure 3.7.3 QPSK signal space diagram (Figure is changed according to the other modulation methods.)

Number	Page	Amendments
23	40	(d) 8PSK (in case of D8PSK) (Description is changed.) Table 3.4.4 8PSK coding regulations (D8PSK differential coding regulations) (Content is changed.) Figure 3.7.4 8PSK signal space diagram (in case of D8PSK) (Content is changed.)
24	41	(e) 12QAM (Description of the body text is changed.) Table 3.4.5 12QAM ~~coding~~ shaper conversion regulations (Content is changed to reflect the changes in title and the body text.) Table 3.4.6 12QAM ~~shaper conversion~~ coding regulations (Content is changed to reflect the changes in title and the body text.)
	42	Figure 3.7.5 12QAM signal space diagram (Content is changed according to the other modulation methods.)
25	42	(f) 16QAM Table 3.4.~~5~~7 16QAM coding regulations (Content is changed according to the other modulation methods.)
	43	Figure 3.7.6 16QAM signal space diagram (Content is changed according to the other modulation methods.)
26	44	(g) 24QAM Table 3.4.8 24QAM ~~coding~~ shaper conversion regulations (Content is changed to reflect the changes in title and the body text.) Table 3.4.9 24QAM ~~shaper conversion~~ coding regulations (Content is changed to reflect the changes in title and the body text.)
	45	Figure 3.7.7 24QAM signal space diagram (Content is changed according to the other modulation methods.)
27	45	(h) 32QAM (Description of the body text is changed.) Table 3.4.10 32QAM ~~coding~~ shaper conversion regulations (Content is changed to reflect the changes in title and the body text.) Table 3.4.11 32QAM ~~shaper conversion~~ coding regulations (Content is changed to reflect the changes in title and the body text.)
	46	Figure 3.7.8 32QAM signal space diagram (Content is changed according to the other modulation methods.)

Number	Page	Amendments
28	47	3.3.1.4 Orthogonal modulation S(t) shown in Figure 3.6.1 through 3.6.8 is represented by the following equation. ・・・ I_k (t), Q_k (t) are the continuous impulse functions possessing energy that is proportional to the square power of the amplitude of orthogonal signals I_k, and Q_k respectively. ~~In case of QPSK, q (t)=0.~~
29	53	3.4.2.4 Transient response characteristics of burst transmission (3) Relationship between slot structure and burst wave on/off control Figure 3.8 shows the relationship between the slot structure ~~shown in Figure 3.8~~ and burst wave on/off control when the occupied bandwidth is 288kHz or less and in case of π /4 shift QPSK. The relationship between the slot structure and burst wave on/off control in other band signals and modulation methods is the absolute time which is equal to the timing when the occupied bandwidth is 288kHz or less and in case of π /4 shift QPSK as shown in Figure 3.8.
30	53	Figure 3.8 Relationship between slot structure and burst wave on/off control ・・・ [When the occupied bandwidth is 288kHz or less and in case of π /4 shift QPSK] Figure 3.8 Relationship between slot structure and burst wave on/off control
31	56	3.4.2.9 Modulation accuracy (2) Standards In case that Roll off factor of base band band-pass filter is 0.5 π /4 shift QPSK 12.5% or less BPSK 12.5% or less QPSK 12.5% or less 8PSK 8% or less ・・・ In case that Roll off factor of base band band-pass filter is 0.38 π /4 shift QPSK 8% or less BPSK 8% or less QPSK 8% or less 8PSK 8% or less ・・・ Note: In case multiple modulation methods are prepared for the slot structure, specifications of all modulation methods prepared must be satisfied.
32	62	3.4.3.10 Bit error rate floor performance ・・・ ・・・ In case that occupied bandwidth exceeds 288kHz π /4 shift QPSK 30.2dB μ V or less

Number	Page	Amendments
33	69	4.2.4.1 Function channel types and method of use TCH2 is added in Figure 4.2.1 Correspondence between protocol phase channels and function channels
34	71	4.2.4.1 Function channel types and method of use (8) TCH2 It is used to change the modulation method.
35	71	4.2.4.2 Function channel and protocol phase as well as physical slot correspondence TCH2 is added in Figure 4.2.2 Protocol phase, physical slot and function channel correspondence.
36	72	Private use (Home, office, etc.) / Public use 1884.5MHz 1) In case of communication carrier Communication physical slot Control physical slot [USCCH (option) only] (2) In case of control carrier Control physical slot Common usage for communication carrier on public (30 frequencies) [note 1] 1893.5MHz ・・・ Figure 4.2.3 Mapping of physical slots on frequency axis
37	89	4.2.9 Slot structure Slot structure follows the general rules below, and the structures of the control physical slots and the communication physical slots are shown in Figure 4.2.14.1 – 4.2.17.2.
38	90-98	4.2.9 Slot structure Figure 4.2.14.1 Control physical slot structure of π/4 shift QPSK (uplink) Figure 4.2.14.2 Control physical slot structure of π/2 shift BPSK (uplink) Figure is added. Figure 4.2.16.1 Communication physical slot structure of π/4 shift QPSK (uplink/downlink) Figure 4.2.16.2 Communication physical slot structure of π/2 shift BPSK (uplink/downlink) Figure is added. Figure 4.2.16.3 Communication physical slot structure of D8PSK (uplink/downlink) Figure is added. Figure 4.2.16.4 Communication physical slot structure of 16QAM (uplink/downlink) Figure is added. Figure 4.2.17.1 Communication physical slot (synchronization burst and USPCH(2)) structure of π/4 shift QPSK (uplink/downlink) Figure 4.2.17.2 Communication physical slot(synchronization burst and USPCH(2)) structure of π/2 shift BPSK (uplink/downlink) Figure is added.
39	98	4.2.9 Slot structure

Number	Page	Amendments
	99	(1) Guard bit, Ramp time (π /4 shift QPSK) Guard bit and ramp time in the other modulation methods is the absolute time equal to the time in case of π /4 shift QPSK. (2) Preamble pattern Control physical slot(π /4 shift QPSK) SS:10 SS + PR: 1001 repetitions Control physical slot(π /2 shift BPSK) SS:10 SS + PR: 1010 repetitions Communication physical slot (π /4 shift QPSK) SS: 10 SS +PR: 1001 repetitions Communication physical slot (π /2 shift QPSK) SS:10 SS + PR: 1010 repetitions Communication physical slot(D8PSK) S: 10 SS +PR: 1001 repetitions Communication physical slot (16QAM) S: 10 SS +PR: 1001 repetitions Synchronization burst(π /4 shift QPSK) SS: 10 SS +PR: 1001 repetitions Synchronization burst(π /2 shift BPSK) SS:1 SS+PR: 1010 repetitions (3) Unique word pattern (a) Control physical slot, synchronization burst, USPCH (2) [Opion] π /4 shift QPSK Uplink 0110 1011 1000 1001 1001 1010 1111 0000 32-bit pattern Downlink 0101 0000 1110 1111 0010 1001 1001 0011 32-bit pattern π /2 shift BPSK Control physical slot Uplink 1001 0100 1000 0011 16-bit pattern π /2 shift BPSK Synchronization burst Uplink 0000 1010 1011 0000 16-bit pattern Downlink 1110 1000 0100 1110 16-bit pattern (b) Communication physical slot (except synchronization burst, USPCH(2) [Option] π /4 shift QPSK, D8PSK, 16QAM Uplink 1110 0001 0100 1001 16-bit pattern Downlink 0011 1101 0100 1100 16-bit pattern π /2 shift BPSK Uplink 0001 0101 10 10-bit pattern Downlink 1001 1010 01 10-bit pattern
40	100	4.2.10.1 Channel coding rules (2) When receiving unique words, the allowable number of erroneous bits detected is as follows: Unique word length 16 bits: Permitted error 1 bit or less equivalent Unique word length 32 bits: Permitted error 1 bit or less equivalent Unique word length 10 bits: Permitted error 1 bit or less equivalent

Number	Page	Amendments
		(3) The error detection CRC code is as follows: (a) π/4 shift QPSK, D8PSK, 16QAM ITU-T 16 bit CRC Generator polynomial: $1 + X^5 + X^{12} + X^{16}$ (b) π/2 shift BPSK 12 bit CRC Generator polynomial: $1 + X + X^2 + X^3 + X^{11} + X^{12}$ A standard CRC coding method is shown in Figure 4.2.18.2. The initial values of the shift register S15-S0 are all set to 1. While the coder in Figure 4.2.18.2 is reading from D108 to D1, T1 reaches the bottom and T2 is closed. Then, while outputting 16-bit detection bits, T1 reaches the top and T2 is opened. When the information bit length is 196 bits, ~~D108 is read instead of D180~~ 292 bits and 372 bits, D108 is read D180, D276 and D356 respectively. Also, 12bit CRC coding method is shown in Figure 4.2.18.4. The initial values of the shift register S11-S0 are all set to 1. When the coder in Figure 4.2.18.4 is reading from D50 to D1, T1 reaches the bottom and T2 is closed. When the information bit length is 86 bits and 96 bits, D50 is read D74 and D84 respectively.
41	101-102	4.2.10.1 Channel coding rules Figure 4.2.18.1 Data series that carries out CRC coding When CRC application range=292bits (D8PSK) is added When CRC application range=372 bits (16QAM) is added. Figure 4.2.18.2 CRC encoder (ITU-T 16bit CRC) Figure 4.2.18.3 Data series that carries out CRC coding The figure is added. Figure 4.2.18.4 CRC encoder (12bit CRC) The figure is added.
42	103	4.2.10.2.1 Structure of calling station identification code and called station identification code (1) Calling station identification code: Shows the “identification code” of the transmitting station of the relevant function channel. If the transmitting station is CS: (CS-ID) (Private system): System identification code + additional ID (Public system): Operator identification code + Public system additional ID (paging area number + additional ID) (π/4 shift QPSK) Operator identification code + part of Public system additional ID (π/2 shift BPSK) (See Figure 4.2.20.2.1 – 4.2.20.2.3)
43	106-107	4.2.10.2.2 Bit transmission order of calling station identification code and called station identification

Number	Page	Amendments
		Figure 4.2.19 Structure of calling station identification code and called station identification code (e) Public system (PS -> CS (SCCH)) (π /2 shift BPSK) (f) Public system (CS -> PS (synchronization burst) (π /2 shift BPSK) (h) Public system (PS -> CS (synchronization burst) (π /2 shift BPSK) These items are added. (2) Public system CS-ID (a) In case the modulation method is π /4 shift QPSK is added. Figure 4.2.20.2.1 CS-ID bit transmission order in public system (b) In case the modulation method is π /2 shift BPSK In π /2 shift BPSK Control physical slot, the lower 8 bits of the CS-ID (42 bits) are transmitted from MSB side. Also, in synchronization burst, the lower 18 bits of the CS-ID (42 bits) are transmitted from MSB side. Figure 4.2.20.2.2 CS-ID bit transmission order in public system (π /2 shift BPSK control physical slot) The figure is added. Figure 4.2.20.2.3 CS-ID bit transmission order in public system (π /2 shift BPSK synchronization burst) The figure is added.
44	109-116	4.2.10.3 Channel coding format In Figure 4.2.21.1-4.2.23.4 below, each physical slot channel coding format is shown. Figure 4.2.21.1 Control physical slot signals and communication physical slot synchronization burst channel coding format for π /4 shift QPSK Figure 4.2.21.2 Control physical slot signals channel coding format for π /2 shift BPSK The figure is added. Figure 4.2.21.3 Synchronization burst channel coding format for π /2 shift BPSK The figure is added. Figure 4.2.23.1 Communication physical slot signal (uplink/downlink) channel coding format for π /4 shift QPSK (TCH, TCH2, FACCH, VOX signals, USPCH(1)) TCH2 is added. Figure 4.2.23.2 Communication physical slot signal (uplink/downlink) channel coding format for π /2 shift BPSK (TCH, FACCH, VOX signals, USPCH(1)) The figure is added. Figure 4.2.23.3 Communication physical slot signal (uplink/downlink) channel coding format for D8PSK (TCH, TCH2, FACCH, USPCH(1)) The figure is added. Figure 4.2.23.4 Communication physical slot signal (uplink/downlink) channel coding format for 16QAM (TCH, TCH2, FACCH, USPCH(1)) The figure is added.

Number	Page	Amendments
45	118	4.2.10.4 CI bit coding rules Table 4.2.3 Communication physical slot uplink CI coding TCH2 is added in the table. Table 4.2.4 Communication physical slot downlink CI coding TCH 2 is added in the table.
46	102	4.2.10.5 Layer 1 bit transmission order 4.2.10.5.1 Control physical slot uplink (PS --> CS) Figure 4.2.2~~3~~4.1-1 Structure of control physical slot (SCCH) (π /4 shift QPSK)(uplink) Figure 4.2.24.1-2 Structure of control physical slot (SCCH) (π /2 shift BPSK)(uplink) The figure is added.
47	123-131	4.2.10.5 Layer 1 bit transmission order 4.2.10.5.3 Communication physical slot uplink (PS --> CS) Figure 4.2.2~~3~~4.7-1 Structure of communication physical slot (TCH) (π /4 shift QPSK) (uplink) Figure 4.2.24.7-2 Structure of communication physical slot (TCH) (π /2 shift BPSK) (uplink) The figure is added. Figure 4.2.24.7-3 Structure of communication physical slot (TCH) (D8PSK) (uplink) The figure is added. Figure 4.2.24.7-4 Structure of communication physical slot (TCH) (16QAM) (uplink) The figure is added. Figure 4.2.24.7-5 Structure of communication physical slot (TCH2) (π /4 shift QPSK) (uplink) The figure is added. Figure 4.2.24.7-6 Structure of communication physical slot (TCH2) (D8PSK) (uplink) The figure is added. Figure 4.2.24.7-7 Structure of communication physical slot (TCH2) (16QAM) (uplink) The figure is added. Figure 4.2.2~~3~~4.8-1 Structure of communication physical slot (FACCH) (π /4 shift QPSK) (uplink) Figure 4.2.24.8-2 Structure of communication physical slot (FACCH) (π /2 shift BPSK) (uplink) The figure is added. Figure 4.2.24.8-3 Structure of communication physical slot (FACCH) (D8PSK) (uplink) The figure is added. Figure 4.2.24.8-4 Structure of communication physical slot (FACCH) (16QAM) (uplink) The figure is added. Figure 4.2.2~~3~~4.9-1 Structure of communication physical slot (uplink synchronization burst) (π /4 shift QPSK) (uplink)

Number	Page	Amendments
		Figure 4.2.2~~3~~4.9-2 Structure of communication physical slot (uplink 2nd synchronization burst) (π /4 shift QPSK) (uplink) Figure 4.2.24.9-3 Structure of communication physical slot (uplink synchronization burst) (π /2 shift BPSK) (uplink) The figure is added. Figure 4.2.2~~3~~4.10-1 Structure of communication physical slot (USPCH(1)) (π /4 shift QPSK) (uplink) Figure 4.2.24.10-2 Structure of communication physical slot (USPCH(1)) (π /2 shift BPSK) (uplink) The figure is added. Figure 4.2.24.10-3 Structure of communication physical slot (USPCH(1)) (D8PSK) (uplink) The figure is added. Figure 4.2.24.10-4 Structure of communication physical slot (USPCH(1)) (16QAM) (uplink) The figure is added.
48	131-138	4.2.10.5 Layer 1 bit transmission order 4.2.10.5.4 Communication physical slot downlink (CS --> PS) Figure 4.2.2~~3~~4.11-1 Structure of communication physical slot (TCH) (π /4 shift QPSK) (downlink) Figure 4.2.24.11-2 Structure of communication physical slot (TCH) (π /2 shift BPSK) (downlink) The figure is added. Figure 4.2.24.11-3 Structure of communication physical slot (TCH) (D8PSK) (downlink) The figure is added. Figure 4.2.24.11-4 Structure of communication physical slot (TCH) (16QAM) (downlink) The figure is added. Figure 4.2.24.11-5 Structure of communication physical slot (TCH2) (π /4 shift QPSK) (downlink) The figure is added. Figure 4.2.24.11-6 Structure of communication physical slot (TCH2) (D8PSK) (downlink) The figure is added. Figure 4.2.24.11-7 Structure of communication physical slot (TCH2) (16QAM) (downlink) The figure is added. Figure 4.2.2~~3~~4.12-1 Structure of communication physical slot (FACCH) (π /4 shift QPSK) (downlink) Figure 4.2.24.12-2 Structure of communication physical slot (FACCH) (π /2 shift BPSK) (downlink) The figure is added. Figure 4.2.24.12-3 Structure of communication physical slot (FACCH) (D8PSK) (downlink) The figure is added.

Number	Page	Amendments
		Figure 4.2.24.12-4 Structure of communication physical slot (FACCH) (16QAM) (downlink) The figure is added. Figure 4.2.2~~3~~4.13-1 Structure of communication physical slot (uplink synchronization burst) (π /4 shift QPSK) (downlink) Figure 4.2.2~~3~~4.13-2 Structure of communication physical slot (uplink 2nd synchronization burst) (π /4 shift QPSK) (downlink) Figure 4.2.24.13-3 Structure of communication physical slot (uplink synchronization burst) (π /2 shift BPSK) (downlink) The figure is added. Figure 4.2.2~~3~~4.14-1 Structure of communication physical slot (USPCH(1)) (π /4 shift QPSK) (~~up~~downlink) Figure 4.2.24.14-2 Structure of communication physical slot (USPCH(1)) (π /2 shift BPSK) (downlink) The figure is added. Figure 4.2.24.14-3 Structure of communication physical slot (USPCH(1)) (D8PSK) (downlink) The figure is added. Figure 4.2.2~~3~~4.14-4 Structure of communication physical slot (USPCH(1)) (16QAM) (downlink) The figure is added.
49	139	4.2.11.2 Scramble method Figure 4.2.2~~4~~5.1 Scrambling method Figure 4.2.25.2 PN pattern generation circuit structure
50	140-142	4.2.11.3 Scramble application area (1) Control physical slots (basic physical slots, extension physical slots) (a) (π /4 shift QPSK) is added. (b) (π /2 shift BPSK) is added. The figures for these items are added. (2) USPCH (2) (option), synchronization burst (a) (π /4 shift QPSK) is added. (b) (π /2 shift BPSK) is added. The figures for these items are added. (3) Communication physical slots (excluding synchronization burst, USPCH (2)) (a) (π /4 shift QPSK) is added. (b) (π /2 shift BPSK) is added. The figures for these items are added. (c) D8PSK is added. The figure is added.

Number	Page	Amendments
		(d) 16QAM is added. The figure is added. (4) USPCH (1) (option) (a) (π /4 shift QPSK) is added. (b) (π /2 shift BPSK) is added. The figures for these items are added. (c) D8PSK is added. The figure is added. (d) 16QAM is added. The figure is added.
51	150-152	4.2.14.2 Example in basic physical slot (TCH) (1) Bit arrangement in I (TCH) (π /4 shift QPSK) Figure 4.2.34.1 Example of bit arrangement in I (TCH) (π /4 shift QPSK) Figure 4.2.34.2 Example of bit arrangement in I (TCH) (π /2 shift BPSK) The figure is added. Figure 4.2.34.3 Example of bit arrangement in I (TCH) (D8PSK) The figure is added. Figure 4.2.34.4 Example of bit arrangement in I (TCH) (16QAM) The figure is added.
52	160	Table 4.3.1-3 Method of processing unrecognized options
53	163	Figure 4.3.1 SCCH message format (π /2 shift BPSK is added)
54	170	4.3.2.6.1 Version management rules (1) ・・・ (2) ・・・ (3) This standard specifies the protocols of version ~~4~~5. (4) ・・・
55	175	Table 4.3.10 Information elements in link channel establishment request message LCH type (octet 2) Bit 8 7 6 0 0 0 Standard (π /4 shift QPSK 32 kbit/s) 0 0 1 Reserved 0 1 0 Reserved 0 1 1 Reserved (private)/Standard (π /4 shift QPSK 32 kbit/s or 16 kbit/s) (public) 1 0 0 Reserved (private)/ Standard (π /4 shift QPSK 32 kbit/s or 16 kbit/s

Number	Page	Amendments
		or π/2 shift BPSK 16 kbit/s) (public) 1 0 1 Reserved 1 1 0 Option (private)/reserved (public) 1 1 1 Option (private)/reserved (public)
56	176	Table 4.3.10 Information elements in link channel establishment request message RT-MM protocol version (octet 3) Shows the RT-MM protocol version held by PS. Bit 3 2 1 0 0 0 Version 1 (RCR STD-28 (version 1)) 0 0 1 Version 2 (RCR STD-28 (version 2)) 0 1 0 Version 3 (RCR STD-28 (version 3)) 0 1 1 Version 4 (RCR STD-28 (version 4)) 1 0 0 Version 5 (~~reserved~~ RCR STD-28 (version 5)) 1 0 1 Version 6 (reserved) . . . . 1 1 1 Version 8 (reserved)
57	176	Table 4.3.10 Information elements in link channel establishment request message Notification of usable band (octet 4) This element notifies usable frequency band for PS. Bit 5 4 0 0 Frequency band which is specified by RCR STD-28 version 1/version 2/ version 3 0 1 In case of public system, corresponds to the frequency band specified by RCR STD-28 version 3 Rev.-1 or newer version. In case of private system, corresponds to the frequency band specified by RCR STD-28 version 3.2 or newer version. 1 0 In case of public system, corresponds to the frequency band specified by RCR STD-28 version 4 or newer version. For the case of private system, reserved. 1 1 reserved (Note) CS is expected to have the usable band which is informed from the PS.
58	178	Table 4.3.12 Information elements in link channel assignment message LCH type (octet 2) Bit 8 7 6 0 0 0 Standard (π/4 shift QPSK 32 kbit/s) 0 0 1 Reserved (private)/Standard (π/4 shift QPSK 16 kbit/s) (public) 0 1 0 Reserved ~~(8 kbit/s)~~ 0 1 1 Reserved (private)/ Standard (π/2 shift BPSK 16 kbit/s) (public) 1 0 0 Reserved 1 0 1 Reserved 1 1 0 Option (private)/Reserved (public)

Number	Page	Amendments
		1 1 1 Option (private)/Reserved (public)
59	179	Table 4.3.12 Information elements in link channel assignment message Carrier number n_f (octet 4) Bit 8 7 6 5 4 3 2 1 (carrier number) 0 0 0 0 0 0 0 0 Reserved 0 0 0 0 0 0 0 1 First carrier (1,895.15 MHz) 0 1 0 0 0 0 1 0 Second carrier (1,895.45 MHz) . . . . 0 1 0 1 0 0 1 0 Eighty second carrier (1,919.45 MHz) 0 1 0 1 0 0 1 1 Reserved . . . . ~~1 1 1 1 1 0 1 0 Reserved~~ 1 1 0 1 1 1 0 0 Reserved ~~1 1 1 1 1 0 1 1 Two hundreds fifty first carrier (1,893.65MHz)~~ 1 1 0 1 1 1 0 1 Two hundreds twenty first carrier (1,884.65MHz) ~~1 1 1 1 1 1 0 0 Two hundreds fifty second carrier (1,893.95MHz)~~ 1 1 0 1 1 1 1 0 Two hundreds twenty second carrier (1,884.95MHz) . . 1 1 1 1 1 1 1 1 Two hundreds fifty fifth carrier (1,894.85MHz)
60	182	Table 4.3.16 Information elements in link channel establishment re-request message LCH type (octet 2) Bit 8 7 6 0 0 0 Standard (π /4 shift QPSK 32 kbit/s) 0 0 1 Reserved ~~(16 kbit/s)~~ 0 1 0 Reserved~~(8 kbit/s)~~ 0 1 1 Reserved (private)/ Standard (π /4 shift QPSK 32 kbit/s or 16 kbit/s) (public) 1 0 0 Reserved(private)/ Standard (π /4 shift QPSK 32 kbit/s or 16 kbit/s or π /2 shift BPSK 16 kbit/s) (public) 1 0 1 Reserved 1 1 0 Option (private)/Reserved (public) 1 1 1 Option (private)/Reserved (public)
61	184	Table 4.3.16 Information elements in link channel establishment re-request message RT-MM protocol version (octet 3) Shows RT-MM protocol version held by PS. Bit 3 2 1

Number	Page	Amendments
		0 0 0 Version 1 (RCR STD-28 (version 1)) 0 0 1 Version 2 (RCR STD-28 (version 2)) 0 1 0 Version 3 (RCR STD-28 (version 3)) 0 1 1 Version 4 (RCR STD-28 (version 4)) 1 0 0 Version 5 (~~reserved~~ RCR STD-28 (version 5)) 1 0 1 Version 6 (reserved) . . . . 1 1 1 Version 8 (reserved)
62	195	Table 4.3.21 Information elements of system information broadcasting message LCH type (octet 2) Bit 8 7 6 0 0 0 Standard (π /4 shift QPSK 32 kbit/s) 0 0 1 Reserved ~~(16 kbit/s)~~ 0 1 0 Reserved ~~(8 kbit/s)~~ 0 1 1 Reserved ~~(32 kbit/s or 16 kbit/s)~~ 1 0 0 Reserved 1 0 1 Reserved 1 1 0 Option (private)/Reserved (public) 1 1 1 Option (private)/Reserved (public)
63	199	Table 4.2.21 Information elements of system information broadcasting message RT-MM protocol version (octet 4) Shows the RT-MM protocol version supported by CS. However in public system this information element shows whether CS supports version 1 or not. Bit 8 7 6 5 4 3 2 1 (carrier number) x x x x x x x 1/0 Version 1 (RCR STD-28 (version 1)) present/absent x x x x x x 1/0 x Version 2 (RCR STD-28 (version 2)) present/absent (reserved for public system) x x x x x 1/0 x x Version 3 (RCR STD-28 (version 3)) present/absent (reserved for public system) x x x x 1/0 x x x Version 4 (RCR STD-28 (version 4)) present/absent (reserved for public system) x x x 1/0 x x x x Version 5 (RCR STD-28 (version 5)) present/absent (reserved for public system) x x 1/0 x x x x x Version 6 present/absent (reserved) Other Reserved X: Don't care (Note) If multiple protocol versions are held, the relevant multiple bits are "1".

Number	Page	Amendments
64	204	Table 4.3.22 2nd system information broadcasting message Message type : 2nd system information broadcasting Direction : CS --> PS (downlink) Function channel : BCCH

Octet \ Bit	8	7	6	5	4	3	2	1
1	Re-served	0	0	0	1	0	1	1
	Message type							
2	Country code *							
3								
4	System type *							
5	RT-MM protocol version							
6	Reserved					Reserved/ modulation method (note 3)	Available slot number of simultaneous using	
7	Absolute slot number	Broadcasting message status number m_2				Paging area type*/Reserved (note 2)		
8		Broadcasting reception indication						

. . .

(Note 3) This information element is used for a public system, reserved for a private system.

65	205	Table 4.3.23 Information elements in 2nd system information broadcasting message RT-MM protocol version (octet 5) Shows RT-MM protocol version held by CS. Bit 8 7 6 5 4 3 2 1 x x x x x x x 1/0 Version 1 (RCR STD-28 (version 1)) present/absent x x x x x x 1/0 x Version 2 (RCR STD-28 (version 2)) present/absent x x x x x 1/0 x x Version 3 (RCR STD-28 (version 3)) present/absent x x x x 1/0 x x x Version 4 (RCR STD-28 (version 4)) present/absent x x x 1/0 x x x x Version 5 (RCR STD-28 (version 5)) present/absent x x 1/0 x x x x x Version 6 present/absent (reserved) Other Reserved X: Don't care (Note) If CS holds multiple protocol versions, the relevant multiple bits are "1".

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>66</td><td>205</td><td>Table 4.3.23 Information elements in 2nd system information broadcasting message

Modulation method (octet 6)

It shows if CS supports the modulation method (π /2 shift BPSK) or not.
Bit
3
0 The station does not support π /2 shift BPSK
1 The station supports π /2 shift BPSK</td></tr>
<tr><td>67</td><td>231</td><td>4.4.2.2.1 Relationship between physical slot and frame (Private standard/Public standard)

(1) Relationship of SACCH radio channel slot and layer frame

(Refer to 4.2.9 Slot structure for D8PSK and 16AQAM.) is added.

(2) FACCH's layer 2 frame structure

(Refer to 4.2.9 Slot structure for π /2 shift BPSK, D8PSK and 16AQAM.) is added.</td></tr>
<tr><td>68</td><td>250</td><td>4.4.2.8.2 System constants (Private standard/Public standard)

Table 4.4.11 System constant list
<table>
<tr><th>System constants</th><th>Abbreviated name</th><th>Definition of value</th><th>value</th></tr>
<tr><td>Max. number of bits in I frame information part</td><td>N1</td><td>Maximum number of bits in I frame information part</td><td>FACCH = 136 bits
SACCH = 16 bits</td></tr>
<tr><td>Number of time outs Until moving to system Recovery</td><td>N2</td><td>Number of consecutive time outs until it moves to system recovery</td><td>10 times</td></tr>
<tr><td>Maximum number of outstanding I frames</td><td>N3</td><td>Maximum number of I frames that can be transmitted without acknowledging peer reception</td><td>7 frames</td></tr>
<tr><td>Response acknowledge timer</td><td>T1</td><td>Timer value for acknowledging if peer received 1 or multiple frames</td><td>0.2 seconds</td></tr>
<tr><td>Response transmission timer</td><td>T2</td><td>Timer value for delaying response transmission to I frames received normally</td><td>1 second</td></tr>
<tr><td>Peer station reception busy supervisory timer</td><td>T3</td><td>Timer value for supervisory (S) frame transmission of peer station busy state</td><td>1 second</td></tr>
<tr><td>Link supervisory timer</td><td>T4</td><td>Timer for supervising link normality when I frames and S frames are not sent or received and T1 is not activated</td><td>10 seconds (Note)</td></tr>
</table>
(Note) The value is not specified in case of π /2 shift BPSK communication.</td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>69</td><td>268</td><td>
4.4.3.1.1 Range of standard (Private standard/Public standard)

The followings are added.

Table 4.4.3.1.1 Defaults of RT function request contents (private) (note)
<table>
<tr><th>Function request</th><th>Default</th><th>Notes</th></tr>
<tr><td>Encryption</td><td>No active encryption control; user scrambling; key set for each call; no passcode</td><td></td></tr>
<tr><td>TCH switching</td><td>PS/CS common: Switching function within carrier within CS, among carriers present. No TCH switching function to other CS. No CS-ID designation switching function to other CS. Recalling-type connection function to other CS within paging area present.
Recalling-type connection function to other CS between paging areas present.</td><td></td></tr>
</table>
(Note) “Condition report function”, “PS-ID Notification control information”, “Transmission Power Control”, “VOX Function Information”, ~~and~~ “Zone information indication function” and “Modulation method” are not specified because of private reference. Therefore, they are treated as no function.

Table 4.4.3.1.2 Defaults of RT function request contents (public) (note)
<table>
<tr><th>Function request</th><th>Default</th><th>Notes</th></tr>
<tr><td>Encryption</td><td>No active encryption control; user scrambling; key set for each call; no passcode</td><td></td></tr>
<tr><td>TCH switching</td><td>PS/CS common: Switching function within carrier within CS, among carriers present. No TCH switching function to other CS. No CS-ID designation switching function to other CS. Recalling-type connection function to other CS within paging area present</td><td></td></tr>
<tr><td></td><td>CS: Recalling-type connection function to other CS between paging areas absent</td><td></td></tr>
<tr><td></td><td>PS: Recalling-type connection function to other CS between paging areas present</td><td></td></tr>
<tr><td>Transmission Power Control information</td><td>Transmission Power Control Function absent, Independent
Transmission Power Control Function absent</td><td></td></tr>
<tr><td>Zone information indication function</td><td>Zone information indication function absent</td><td></td></tr>
<tr><td>Modulation method</td><td>Modulation method switching function absent (Modulation method support π/4 shift QPSK only.</td><td></td></tr>
</table>
</td></tr>
<tr><td>70</td><td>272</td><td>
4.4.3.5.1.1 RT state in PS (Private standard/Public standard)

The following item is added.

[21] Modulation reassign (P22)

State of modulation reassign after receiving Modulation Reassign indication.
</td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>71</td><td>273</td><td>4.4.3.5.1.2 RT state in CS (Private standard/Public standard)

The following item is added.

[10] Modulation reassign (C14)

State of modulation reassign.</td></tr>
<tr><td>72</td><td>275</td><td>Table 4.4.3.5.1 Messages for radio frequency transmission management

The following items are added.

<table>
<tr><th>Message pertaining to channel establishing</th><th>Reference</th></tr>
<tr><td>・ ・ ・ ・</td><td></td></tr>
<tr><td>Modulation Reassign</td><td>4.4.3.5.2.28</td></tr>
<tr><td>Modulation Reassign Reject</td><td>4.4.3.5.2.29</td></tr>
<tr><td>Modulation Reassign Request</td><td>4.4.3.5.2.30</td></tr>
</table>
</td></tr>
<tr><td>73</td><td>280</td><td>4.4.3.5.2.8 Function request (Private standard/Public standard)

Table 4.4.3.5.9 Function request message contents

The following is added.

<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classica-tion</th><th>Information length</th><th>Remarks</th></tr>
<tr><td colspan="6">・ ・ ・ ・</td></tr>
<tr><td>Modulation</td><td>4.4.3.5.3.4.30</td><td>uplink</td><td>O</td><td>3 - *</td><td>(Note 1)
(Note 3)</td></tr>
</table>
(Note 3) This information element is used only to declare the modulation that PS itself supports. Also, the PS that can reassign the modulation is to set this information element regardless of the communication method.</td></tr>
<tr><td>74</td><td>281</td><td>4.4.3.5.2.9 Function response (Private standard/Public standard)

Table 4.4.3.5.10 Function request response message contents

The following is added.

<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classica-tion</th><th>Information length</th><th>Remarks</th></tr>
<tr><td colspan="6">・ ・ ・ ・</td></tr>
<tr><td>Modulation</td><td>4.4.3.5.3.4.30</td><td>downlink</td><td>O</td><td>2 - *</td><td>(Note 1)
(Note 4)</td></tr>
</table>
(Note 4) This information element is used indicate the modulation that can be reassigned during communication.
In case the CS that does not support the Modulation Reassign received a function request message including modulation information element, it sets modulation information element with modulation content length 0 (i.e. modulation information element with information element identifier and content length 2 octet only) to this message and transmit it.</td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>75</td><td>283</td><td>
4.4.3.5.2.12 Radio-channel Disconnect (Private standard/Public standard)

Table 4.4.3.5.13 Radio-channel Disconnect message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classica-tion</th><th>Information length</th><th>Remarks</th></tr>
<tr><td colspan="6">・ ・ ・ ・</td></tr>
<tr><td>Cause</td><td>4.4.3.5.3.4.5</td><td>downlink</td><td>M</td><td>2</td><td>(Note)</td></tr>
<tr><td>CS-ID</td><td>4.4.3.5.3.4.7</td><td>downlink</td><td>M</td><td>7</td><td>(Note)</td></tr>
<tr><td>PS-ID</td><td>4.4.3.5.3.4.12</td><td>downlink</td><td>M</td><td>5</td><td></td></tr>
</table>
(Note) Can be omitted in case of π/2 shift BPSK.
</td></tr>
<tr><td>76</td><td>283</td><td>
4.4.3.5.2.13 Radio-channel Disconnect Complete (Private standard/Public standard)

Table 4.4.3.5.14 Radio-channel Disconnect Complete message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classica-tion</th><th>Information length</th><th>Remarks</th></tr>
<tr><td colspan="6">・ ・ ・ ・</td></tr>
<tr><td>CS-ID</td><td>4.4.3.5.3.4.7</td><td>downlink</td><td>M</td><td>7</td><td>(Note)</td></tr>
<tr><td>PS-ID</td><td>4.4.3.5.3.4.12</td><td>downlink</td><td>M</td><td>5</td><td></td></tr>
</table>
(Note) Can be omitted in case of π/2 shift BPSK.
</td></tr>
<tr><td>77</td><td>284</td><td>
4.4.3.5.2.14 TCH Switching Indication (Private standard/Public standard)
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classification</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Protocol discriminator</td><td>4.4.3.5.3.2</td><td>downlink</td><td>M</td><td>1</td><td></td></tr>
<tr><td>Message type</td><td>4.4.3.5.3.3</td><td>downlink</td><td>M</td><td>1</td><td></td></tr>
<tr><td>Carrier number</td><td>4.4.3.5.3.4.4</td><td>downlink</td><td>O</td><td>2</td><td>(note 1)
~~(note 3)~~
~~(note 5)~~
(note 4)</td></tr>
<tr><td>CS-ID</td><td>4.4.3.5.3.4.7</td><td>downlink</td><td>O</td><td>7</td><td>(note 1)
~~(note 4)~~
(note 3)</td></tr>
<tr><td>SCH type</td><td>4.4.3.5.3.4.16</td><td>downlink</td><td>O</td><td>3</td><td>(note 2)
~~(note 3)~~</td></tr>
<tr><td>Slot Number</td><td>4.4.3.5.3.4.17</td><td>downlink</td><td>O</td><td>2</td><td>~~(note 3)~~</td></tr>
</table>
(Note 1) If all of these information elements are contained in the TCH Switching Indication from CS to PS, the TCH switching process is indicated to PS. ~~Otherwise, the recalling process is indicated to PS.~~
(Note 2) If standard (π/4 shift QPSK 32 kbit/s) was specified as the SCH type in π/4 shift QPSK communication, ~~this message does not have to be included~~ it does not have to be contained in this message. Also, if (π/2 shift BPSK 16kbit/s) is specified in π/2 shift BPSK communication, it does not have to be contained in this message.
~~(Note 3) If a CS-ID is not contained in the information elements, this information element has no meaning.~~
~~(Note 4)~~ If this information element is included, PS selects the specified CS.
~~(Note 5)~~ Appropriate frequency band for the PS should be chosen.
</td></tr>
</table>

Number	Page	Amendments
78	286	4.4.3.5.2.16 TCH Switching Request (Private standard/Public standard) (Note 4) If standard (π /4 shift QPSK 32 kbit/s) is requested as the SCH type in π /4 shift QPSK communication, it does not have to be contained in this message. Also, if (π /2 shift BPSK 16kbit/s) is specified in π /2 shift BPSK communication, it does not have to be contained in this message.
79	287	4.4.3.5.2.17 TCH-Switching Re-Request (Private standard/Public standard) (Note 4) If standard (π /4 shift QPSK 32 kbit/s) is requested as the SCH type in π /4 shift QPSK communication, it does not have to be contained in this message. Also, if (π /2 shift BPSK 16kbit/s) is specified in π /2 shift BPSK communication, it does not have to be contained in this message.
80	295	4.4.3.5.2.28 Modulation Reassign Indication (Private reference/Public standard) This item is added.
81	295	4.4.3.5.2.29 Modulation Reassign Reject (Private reference/Public standard) This item is added.
82	296	4.4.3.5.2.30 Modulation Reassign Request (Private reference/Public standard) This item is added.
83	299	Figure 4.4.3.5.3-1 Message types (private) The following definitions are added. Message type (octet 1): Bit 8 7 6 5 4 3 2 1 • • • • 0 1 0 - - - - - Messages related to channel set-up • • • • 1 0 0 1 0 Modulation Reassign 1 0 0 1 1 Modulation Reassign Reject 1 0 1 0 0 Modulation Reassign Request
84	300	Figure 4.4.3.5.3-2 Message types (publicv) The following definitions are added. Message type (octet 1): Bit 8 7 6 5 4 3 2 1 • • • • 0 1 0 - - - - - Messages related to channel set-up • • • • 1 0 0 1 0 Modulation Reassign 1 0 0 1 1 Modulation Reassign Reject 1 0 1 0 0 Modulation Reassign Request

Number	Page	Amendments
85	302	Table 4.4.3.5.32~~29~~-1 Information element coding (private) The following definitions are added. Bit 8 7 6 5 4 3 2 1 0 - - - - - - - Multiple octet information elements • • • 0 0 1 1 1 1 1 Modulation
86	303	Table 4.4.3.5.32~~29~~-2 Information element coding (public) The following definitions are added. Bit 8 7 6 5 4 3 2 1 0 - - - - - - - Multiple octet information elements • • • 0 0 1 1 1 1 1 Modulation
87	304	4.4.3.5.3.4.1 Area Information (Private standard/Public standard) The followings are added. Bit Octet 8 7 6 5 4 3 2 1 1: Area Information; 0 0 0 0 0 0 0 1; Information element identifier 2: Standby zone selection level 3: Standby zone hold level 4: Recalling-type handover process level 5: Recalling-type handover destination zone selection level 6: TCH switching-type handover process level 7: Channel switching FER threshold value 8: Reserved | BPSK area information | Area information report status number BPSK area information (octet 8) To be used in case of π /2 shift BPSK communication. Bit 6 5 4 0 0 0 0dB μ V ↓ 1 1 1 7dB μ V (Note 1) Octets 2 - 6 level minus this value is used to for π /2 shift BPSK. (Note 2) This information is granted only when BPSK area information request is present in the Definition Information Request information element.

Number	Page	Amendments
88	309-310	4.4.3.5.3.4.2 Broadcasting information (Private reference/Public standard) Figure 4.4.3.5.7 Broadcasting information Following definition is added in octet 20. Bit Octet 8 7 6 5 4 3 2 1 1 Broadcasting Information: 0 0 0 0 0 1 0 0 (Information element identifier) 8 Reserved / Reserved/Modulat-ion(note 8) (Note 8) This information element is used in public system, reserved in private systems.
89	310	4.4.3.5.3.4.3 Definition information request (Private standard/Public standard) The following is added. Definition information type (octet 1) Bit 4 3 2 1 x x x 1/0 Area information request present/absent x x 1/0 x BPSK area information request present/absent Other Reserved X: Don't care Figure 4.4.2.5.8 Definition information request
90	311	4.4.3.5.3.4.4 Carrier number (Private standard/Public standard) Figure 4.4.3.5.9 Carrier number Following definitions are added. Carrier number (octet 2) Bit 8 7 6 5 4 3 2 1 (Carrier number) 0 0 0 0 0 0 0 1 First carrier (1,895.15 MHz) 0 0 0 0 0 0 1 0 Second carrier (1,895.45 MHz) . . . 0 1 0 1 0 0 1 0 Eighty second carrier (1,919.45 MHz) 0 1 0 1 0 0 1 1 Reserved . . . 1 1 ~~1~~ 0 1 1 ~~0~~ 1 ~~1~~ 0 0 Reserved 1 1 ~~1~~ 0 1 1 ~~0~~ 1 ~~1~~ 0 1 Two hundreds ~~fifty~~ twenty first carrier (~~1,893.65~~ 1,884.65MHz)

Number	Page	Amendments
		1 1 ~~1~~ 0 1 1 1 ~~0~~ 1 0 Two hundreds ~~fifty~~ twenty second carrier (1,~~893~~ 1,884.95 MHz) • • • • 1 1 1 1 1 1 1 Two hundreds fifty fifth carrier (1,894.85 MHz) Other Reserved
91	313	4.4.3.5.3.4.5 Cause (Private standard/Public standard) Figure 4.4.3.5.10 Cause The following definitions are added. Cause value (octet 2) Bit 7 6 5 4 3 2 1 • • • • 0 1 0 - - - - Resource use impossible class • • • • 0 1 0 1 No available modulation 0 1 1 0 Modulation reassign impossible 0 1 1 1 Modulation reassign not supported 1 0 0 1 Reception level degradation (including specified channel use impossible)
92	326	4.4.3.5.3.4.16 SCH Type (Private standard/Public standard) SCH type (octet 2) Bit 3 2 1 0 0 0 Standard (π /4 shift QPSK 32 kbit/s) 0 0 1 Reserved (private)/Standard (π /4 shift QPSK 16 kbit/s) (public) 0 1 0 Reserved~~ (8 kbit/s)~~ 0 1 1 Reserved (private)/Standard (π /4 shift QPSK 32 kbit/s or 16 kbit/s) (public) (note) 1 0 0 Reserved 1 0 1 Reserved (for extension classification) 1 1 0 Option (private)/Reserved (public) 1 1 1 Option (private)/Reserved (public) (Note) Valid only in TCH switching (re)request message.

Number	Page	Amendments
93	341	4.4.3.5.3.4.28 Additional TCH Information (Private standard/Public standard) The following definitions are added. Carrier number (octet 4) Bit 8 7 6 5 4 3 2 1 (Carrier number) 0 0 0 0 0 0 0 1 First carrier (1,895.15 MHz) 0 0 0 0 0 0 1 0 Second carrier (1,895.45 MHz) • • • • 0 1 0 1 0 0 1 0 Eighty second carrier (1,919.45 MHz) 0 1 0 1 0 0 1 1 Reserved • • • • 1 1 ~~1~~ 0 1 1 ~~0~~ 1 ~~1~~ 0 0 Reserved 1 1 ~~1~~ 0 1 1 ~~0~~ 1 ~~1~~ 0 1 Two hundreds ~~fifty~~ twenty first carrier (~~1,893.65~~ 1,884.65MHz) 1 1 ~~1~~ 0 1 1 1 ~~0~~ 1 0 Two hundreds ~~fifty~~ twenty second carrier (1~~,893~~ 1,884.95 MHz) • • • • 1 1 1 1 1 1 1 Two hundreds fifty fifth carrier (1,894.85 MHz) Other Reserved
94	343	4.4.3.5.3.4.30 Modulation (Private reference/Public standard) This items is added.
95	346	4.4.3.5.4 RT supplementary regulations (Private standard/Public standard) [3] Process when level degradation or reception quality degradation is detected by CS (Private standard/Public standard) (Note 4) and (Note 5) are added in the figure. (Note 4) The process can be omitted in case of π /2 shift BPSK communication. (Note 5) When adaptive modulation that reassigns modulation is supported, this interference avoidance can be omitted if effect of the interference can be reduced and the communication can be maintained by reassigning the modulation.
96	348-349	[4] Process when TCH Switching Request message is received (Private standard/Public standard) (Note 3) is added in the figure. (Note 3) The process can be omitted in case of π /2 shift BPSK communication.
97	349	[5] Process when Modulation Reassign Request message is received (Private reference/Public standard) The figure is added.

Number	Page	Amendments
98	350	[6] Process when Modulation Reassign conditions are fulfilled by CS (Private reference/Public standard) The figure is added.
99	351	(2) Operation of personal station [2] Process when TCH Switching Indication message is received. (Private standard/Public standard) Partly addition is made to the figure.
100	352	[3] Process when level degradation or reception quality degradation is detected by PS (Private standard/Public standard) (Note 1) Selection of (a) – (c) is by PS judgment. However, it follows the indication of area information reported by CS. Also, when transmission stop conditions arise, (c) must be selected. When adaptive modulation that reassigns modulation is supported, this interference avoidance can be omitted if effect of the interference can be reduced and the communication can be maintained by reassigning the modulation.
101	353	[4] Process when Modulation Reassign conditions are fulfilled by PS (Private reference/Public standard) The figure is added.
102	563	4.4.3.8.8.7 Modulation reassign during communication (Private reference/Public standard) This item is added.
103	564	4.4.3.8.9 π /2 shift BPSK communication (Public standard) This item is added.
104	603	Chapter 7 Measurement Methods The cover page is added and asterisk (*) is added to the relevant items. Chapter 7 Basically, measurement methods are in accordance with the statutes of interested countries. However, those test items that are not specified in the interested country shall be based on the provisions in this chapter. In Japan, the test items specified in the Notification of Ministry of Internal Affairs and Communications (note 1) provided in the Proof Rules Attachment 1-1 (3) (items marked with asterisk in this chapter) shall follow the test methods indicated in the Notification. Note 1) As of time point of revision of Version 5.0 (as of September 29, 2005), this means

Number	Page	Amendments
		Ministry of Internal Affairs and Communications' Notification No. 88 "Test Methods of Characteristics Tests" of January 26, 2004. However, from the time when the description of the Notification as well as the description of the Notification's Attachment No. 49 is revised, the content of the latest version must be followed. Asterisks (*) are added to the following items. 7.1.1* Frequency error 7.1.1.1* Frequency error (frequency counter method) 7.1.1.2* Measurement equipment conditions, etc. 7.1.2* Spurious emission 7.1.3* Occupied bandwidth 7.1.4* Antenna power 7.1.4.1* Antenna power (1) 7.1.4.2* Antenna power (2) 7.1.5* Carrier off time leakage power 7.1.8* Adjacent channel leakage power 7.2.5* Conducted spurious component 7.2.7* Carrier sensing (slot transmission conditions) 7.3.1.1* Frequency error 7.3.1.2* Spurious emission 7.3.1.3* Occupied bandwidth 7.3.1.4* Antenna power 7.3.1.5* Carrier off time leakage power 7.3.1.8* Adjacent channel leakage power 7.3.2.6* Conducted spurious components 7.3.2.8* Carrier sensing (slot transmission conditions)
105	605	7.1.1.1 Frequency error (frequency counter method) (3) Status of equipment under test ・ ・ ・ ・ b. In test mode measurement and so forth, in cases where special modulation is used for the traffic channel or all slot intervals and special code modulation is possible ~~in the traffic channel or all slot intervals~~, it can be measured and the offset portion can be corrected. (Reference: If there is zero continuation, Offset is 24 kHz in case of π /4 shift QPSK modulation and 0Hz in case of 16QAM modulation.) e. In case the modulation of the equipment under test is the one other than π /4 shift

Number	Page	Amendments
		QPSK or π/2 shift BPSK, the test mode measurements specified in (b) and (c) instead of the standard coding test signals.
106	606	7.1.2 Spurious emission ・・・・ (2) Measurement equipment conditions, etc. a. Detection of spurious emission The spectrum analyzer and the wave form recorder at the time of spurious detection are to be set as follows:

	(within the band) transmission carrier within ±6MHz except ±1MHz	within the band except transmission carrier ±6MHz	(out of the band) out of the band
Sweep frequency width	12MHz	35MHz	100MHz
Resolution bandwidth	30kHz	100kHz	1MHz
Video bandwidth	10kHz	1MHz	1MHz
Y axis scale	10db/div		
Input level	Value of the maximum dynamic range (e.g. from -5 to -10dBm)		
Sweep mode	Single sweep		
Sweep time	One bust per sample e.g. 5 sec or more for 1001 points.		
Detection mode	Positive peak		

Note 1: "Within the band" means the specified band (from 1,884.5MHz to 1,919.6MHz) and "without the band" means the band range other than the abovementioned band.
Note 2: The description "except transmission carrier ±1MHz" within the band should read as "except transmission carrier ±1.3MHz for those exceeding 288kHz of occupied bandwidth.
Note 3. When being "out of band," the frequency as low as possible up to the frequency that is more than triple the transmission carrier (e.g. 10MHz to 6GHz) are searched for every 100MHz sweep frequency width or by continuous sweep.

b. At the time of amplitude measurement
The spectrum analyzer and the wave form recorder at the time of amplitude measurement are to be set as follows. ~~The descriptions within parentheses show the settings for measuring item (4) a. detection of spurious emission.~~

Center frequency	Frequency of defined frequency range~~ (frequency necessary for measurement)~~
Sweep frequency width	0 Hz~~ (band necessary for measurement)~~
Resolution bandwidth	1MHz ~~Approximately300 kHz, but when offset of carrier is left, 100 kHz or less.~~
Video bandwidth	About~~ 10 times~~ the same level as the resolution band width ~~or more~~
Y axis scale	10 dB/div
Input level	Value of the maximum dynamic range (e.g. from -5 to -10dBm) ~~Make the maximum value of the amplitude about 70-90% of full scale.~~
Sweep mode	Single sweep
Sweep trigger	The video trigger or free run, generally + voltage, but adjustment is necessary.
Sweep time	Within the band: 1ms, outside the band: 5ms ~~About 1msec (one or more bursts per sample; for example, if there are 1001 points, 5 seconds or more)~~
Detection mode	Sample ~~(positive peak)~~

Number	Page	Amendments
107	607	(4) Measurement procedures a. Detection of spurious emission For the required band, sweep slowly and confirm spurious frequency. Frequency band to be detected is in a band are the frequency as low as possible up to the frequency that is more than triple the transmission carrier (e.g. 10MHz to 6GHz) in the band except transmission carrier ±1MHz and the out of the band except transmission carrier±2.25MHz~~, from 100 kHz to 4 GHz detuned at least ±1MHz from the transmission frequency~~. ・・・ C. Measurement Make a single sweep in the time domain and measure power per 1MHz ~~distribution~~. In case of spectrum analyzer without power measurement function, bandwidth 1MHz is measured by the same method as the one for adjacent channel leakage power. When the center frequency is within the band and within the transmission carrier±2.75MHz, the transmission carrier ±2.75MHz becomes the center frequency. ~~When the resolution bandwidth is varied and the level varies, convert to designated bandwidth (19skHz) for adjacent channel leakage power.~~ ・・・
108	613-614	7.1.7 Modulation accuracy (1) Definition of modulation accuracy a. Definition If ideal transmitter out put passes through an ideal root roll-off reception filter and is sampled at ideal points with one symbol spacing, since interference between codes does not occur, modulation sequence values can be defined by the following equation. In case of π/4 shift QPSK or π/2 shift BPSK or D8PSK, S(k)=S(k-1) $e^{j(\Delta\Phi\ \sim\pi/4 + B(k)\cdot\pi/2\sim)}$ ・・・・・(7.1.7-1) Here, ⊿Φ is in accordance with 3.3.1.2 Coding rule. ~~the following table shows B(k)=0, 1, 2, 3.~~

~~Xk~~	~~Yk~~	~~B(k)~~
~~0~~	~~0~~	~~0~~
~~0~~	~~1~~	~~1~~
~~1~~	~~1~~	~~2~~
~~1~~	~~0~~	~~3~~

In case of 16QAM,

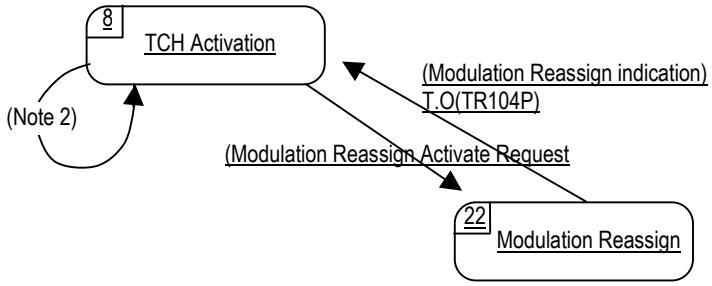
S(k) = a ・{I(k)＋j・Q(k)}・・・・・ (7.1.7－2)

Here, I(k) and Q(k) are in accordance with 3.3.1.2 Coding rule.
Also, a is 1/√10.

Xk and Yk indicate two pieces of data that have been converted by serial-parallel conversion from a binary data series.

On the other hand, for actual transmitted signals, interference between codes occurs. The modulation accuracy is defined by measuring this error.

b. Modulation accuracy definition formula

Number	Page	Amendments
		When transmission is done with actual transmitters and passes through an ideal reception filter, if Z(k) is the signal obtained at instant k with 1-symbol spacing, we can show the following using S(k). ・ ・ ・ ・ The r.m.s. value for vector error is calculated as the square root of the result of dividing the sum of the second power of the vector error by the number of phase identification points in slot~~ (111)~~. The r.m.s value of this vector error is defined as the modulation accuracy.
109	614	(5) Measurement procedures a. Measure difference between actual transmission wave and ideal vector convergence point in signal space. b. Add the square of the vector errors for each point obtained in a. above; divide it by the number of phase identification points within a slot; find the square root of this.
110	649	Acronym List The followings are added. BPSK Binary Phase Shift Keying PAD Padding PSK Phase Shift Keying QAM Quadrature Amplitude Modulation
111	685	Appendix F RT state transition diagram (PS side) Underlined parts are added.  (Note 2) (Incoming call response request), (RT function request), RT function request response, Retry out (TCH switching (re-)request), (Definition information request), Definition information response, (Encryption key set request), T.O(TR302-1/2P), (TR304P), (TR305P), (TR311P), (additional TCH request), additional TCH assignment, additional TCH reject, (additional TCH re-request), additional TCH request indication, (additional TCH request indication reject), (Modulation Reassign request), Modulation Reassign indication, Modulation Reassign reject

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>112</td><td>705-706</td><td>Appendix G RT SDK diagrams (PS Side)

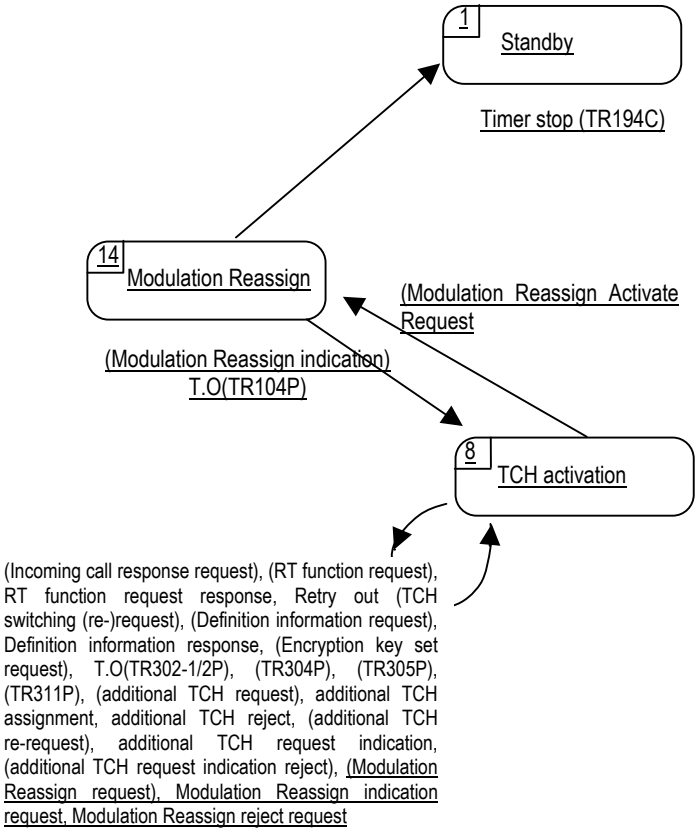
Following figures are added.

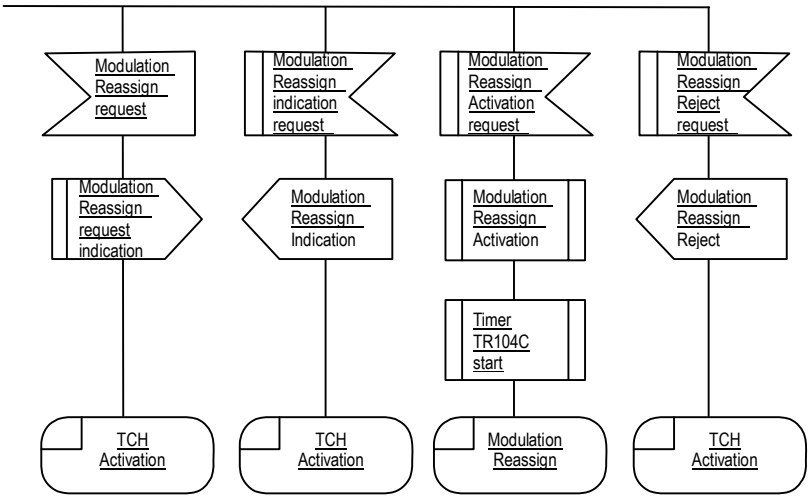
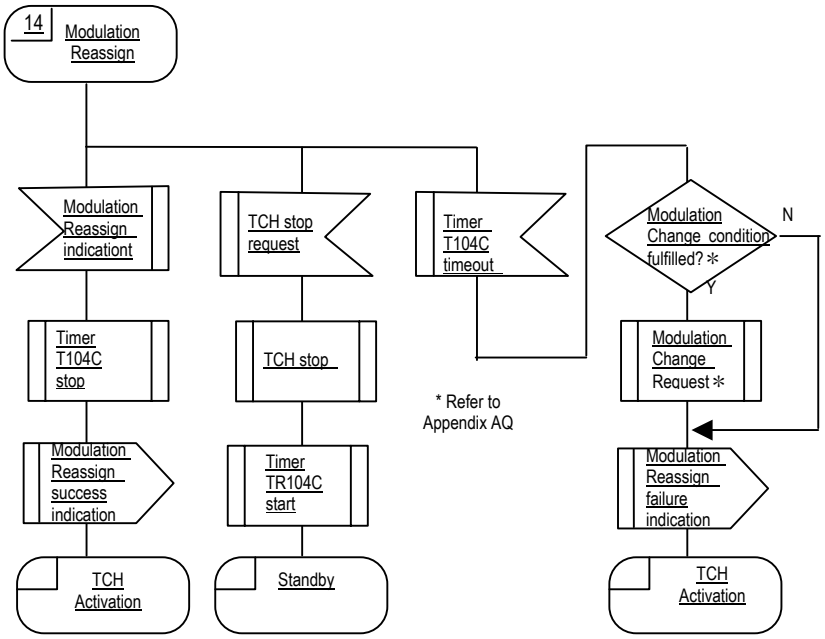
RT SKL diagram (PS side TCH) 18/19
RT SDL diagram (PS side TCH) 19/19</td></tr>
<tr><td>113</td><td>716</td><td>Appendix H RT PS side timers

TR104P is added to the table.

<table>
<tr><th rowspan="2">Timer No. (Value)</th><th rowspan="2">Status</th><th rowspan="2">Start conditions</th><th rowspan="2">Stop conditions</th><th rowspan="2">Expiration (Retry)</th><th rowspan="2">Expiration (Retry out)</th><th colspan="2">Mandatory/Optional</th></tr>
<tr><th>Timer</th><th>Timer value</th></tr>
<tr><td>TR104P (200ms)</td><td>Modulation Reassign</td><td>“Modulation reassign activation request” primitive reception</td><td>“Modulation reassign indication” primitive reception</td><td></td><td>TCH activation</td><td>Man-datory</td><td>Man-datory</td></tr>
</table>
</td></tr>
<tr><td>114</td><td>718</td><td>Appendix I RT state transition diagram (CS side)

Underlined parts are added.

 
</td></tr>
</table>

Number	Page	Amendments
115	726	Appendix J RT SDL diagram (CS side) RT SDL diagram (CS side TCH) 6/12 is added.  Appendix J: RT SDL diagram (CS side TCH) 6/12
	731	RT SDL diagram (CS side TCH) 11/12 is added.  Appendix J: RT SDL diagram (CS side TCH) 11/12

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>116</td><td>739</td><td>
Appendix K RT CS side timers

Timer TR104C is added to the table.

<table>
<tr><th rowspan="2">Timer No.(value)</th><th rowspan="2">State</th><th rowspan="2">Start conditions</th><th rowspan="2">Stop conditions</th><th rowspan="2">Time out (Retry)</th><th rowspan="2">Time out (Retry out)</th><th colspan="2">Mandatory/Optional</th></tr>
<tr><th>Timer</th><th>Timer value</th></tr>
<tr><td>TR104C (200ms)</td><td>Modulation Reassign</td><td>“Modulation Reassign activation request” primitive reception</td><td>“Modulation Reassign indication” primitive reception</td><td></td><td>TCH activation</td><td>Man-datory</td><td>Man-datory</td></tr>
</table>
</td></tr>
<tr><td>117</td><td>938</td><td>
Appendix AI Rate adaption rule at Um point in when communicating with the standardized V.110 terminals (Private standard/Public standard)

This appendix describes the rate adaption rule into I (TCH) at Um point when Personal Handy phone System provides the unrestricted digital information transfer capability.

The rate adaption specified in this appendix is the operation converting the ~~intermediate~~ rate of standardized V.110 (after RA1 function) into the information transfer rate ~~(32k bit/s)~~ at Um point.

The rule is shown in Figure 1.

<table>
<tr><th rowspan="2">~~Intermediate~~ rRate of Rec. V. 110</th><th colspan="8">Bit position</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th></tr>
<tr><td>8kbit/s</td><td>b1</td><td>1</td><td>1</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>16kbit/s</td><td>b1</td><td>b2</td><td>1</td><td>1</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>32kbit/s</td><td>b1</td><td>b2</td><td>b3</td><td>b4</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>48kbit/s</td><td>b1</td><td>b2</td><td>b3</td><td>b4</td><td>b5</td><td>b6</td><td>-</td><td>-</td></tr>
<tr><td>64kbit/s</td><td>b1</td><td>b2</td><td>b3</td><td>b4</td><td>b5</td><td>b6</td><td>b7</td><td>b8</td></tr>
</table>
(Note 1) When information transfer rate at Um point is 32k bit/s, rate adaption shall be processed by 4 bit unit.
(Note 2) bn is the content of information and the unused bits are filled with “1”.
(Note 3) The order of transmission if from left to right.
(Note 4) When information transfer rate at Um point is 48kbit/s, The rate adaption shall be processed by 4 bit unit.
(Note 5) When information transfer rate at Um point is 64kbit/s, The rate adaption shall be processed by 8 bit unit.

Figure 1 The rate adaption rule on Um point ~~(Intermediate rate is less than or equal to 32k bit/s)~~

Mapping of 2TCH

The direct mapping rate adaption rule without intermediate rate of standardized V.110 (RA1 operation data), is shown in Figure 2.

<table>
<tr><th rowspan="2"></th><th colspan="8">Bit position</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th></tr>
<tr><td>JT-V110 64k bit/s</td><td>b1</td><td>b2</td><td>b3</td><td>b4</td><td>b5</td><td>b6</td><td>b7</td><td>b8</td></tr>
<tr><td rowspan="2">Data on Um point</td><td>b11</td><td>b12</td><td>b13</td><td>b14</td><td>b21</td><td>b22</td><td>b23</td><td>b24</td></tr>
<tr><td colspan="4">1st TCH</td><td colspan="4">2nd TCH</td></tr>
</table>
(Note 1) Data is divided into 2 groups of 4 bits unit on Um point.
(Note 2) bnm is the content of information. b11 to b14 are datum of the first 32k bit/s data and also b21 to b24 are datum of the second 32k bit/s data.
(Note 3) Information is transmitted to Um point in the order from b11 to b1n on 1st TCH and also b21 to b2n on 2nd TCH.

Figure 2 The rate adaption rule on Um point (Not using intermediate rate)
</td></tr>
</table>

Number	Page	Amendments
118	1124	Appendix AP Terminal Independent TX Power control (Private reference/Public standard) This item is added.
119	1126	Appendix AQ Operation when Timer TR104P, TR104C are expired (Private reference/Public standard) This item is added.

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RCR STD-28 Version 4.1

AMENDMENT HISTORY

"____" Added; "~~____~~" Deleted

Number	Page	Amendments
INTRODUCTION		Note 1: Although this ARIB Standard contains no specific reference to any Essential Industrial Property Right relating thereto, the holders of such Essential Industrial Property Rights state to the effect that the rights listed in ~~Attached Table~~ Attachment 1 which are the Industrial Property Rights relating to this standard are held by the parties also listed therein and that to the users of this standard such holders shall not assert any rights and shall unconditionally grant a license to practice such Industrial Property Rights contained therein. However, this does not apply to anyone who uses this ARIB Standard and also owns and lays claim to any other Essential Industrial Property Right of which the scope is included in any or all parts of contents of the provisions of this ARIB Standard. Note 2: Although this ARIB Standard contains no specific reference to any Essential Industrial Property Right relating thereto, the holders of such Essential Industrial Property Rights state to the effect that the rights listed in Attachment 2 which are the Industrial Property Rights relating to this standard are held by the parties also listed therein and that to the users of this standard such holders shall grant, under the reasonable terms and conditions, a non-exclusive and non-discriminatory license to practice the Industrial Property Rights contained therein. However, this does not apply to anyone who uses this ARIB Standard and also owns and lays claim to any other Essential Industrial Property Right of which the scope is included in any or all parts of contents of the provisions of this ARIB Standard.
ATTACHMENT		~~Attached Table~~Attachment 1 List of Essential Industry Property Rights for RCR STD-28 . . . Attachment 2 List of Essential Industry Property Rights for RCR STD-28 Ver.4.1 Patent Holder | Name of Patent | Registration No./Application No. | Remarks Motorola CORPORATION*41 | A comprehensive confirmation form has been submitted with regard to RCR STD-28 Ver.4.1 |
CONTENTS	viii	4.4.3.5.3.4.29 Independent TX Power Control Information
CH2	9	Table 2.2 Transmission method parameters Type | Item | Overview Bearer service | 32k bit/s speech (note 5) | Provides bearer capability suited for voice communication with terminal; 32k bit/s ADPCM CODEC or 16k bit/s ADPCM CODEC is inserted. 32k bit/s 3.1kHz audio (note 5) | Provides bearer capability suited for 3.1kHz bandwidths communication with terminal; 32k bit/s ADPCM CODEC or 16k bit/s ADPCM CODEC is inserted. 32k bit/s unrestricted digital (note 2) (note 5) | Provides bearer capability suited for digital data communication with terminal; information is transmitted transparently. . . . | . . . . . . | . . . | . . . . . . (Note4) Public only (Note5) When half rate (16k bit/s) (Public only)communication is used, standard protocol can be used RT/NM protocol version newer than RCR STD-28(version 4.1).

Number	Page	Amendments
	10	2.4.1 Transmission method (Private standard/Public standard) The radio access method for the personal handy phone system is the four-channel multiplex multi-carrier TDMA-TDD shown in Table 2.3. CODEC is full rate CODEC (32k bit/s ADPCM) and half rate CODEC (16k bit/s ADPCM) (Public only), but in the future quarter rate (8k bit/s) CODEC applications can be imagined.
	17	2.5.3 Transmission rate support (Private standard/Public standard) ~~For the transmission rate, 32k bit/s is standard, and 16k bit/s and 8k bit/s protocols are standardized as reserved.~~ For the transmission rate, 32k bit/s and 16k bit/s (Public only) are standard, and 8k bit/s protocols are standardized as reserved. ~~And under unrestricted digital, 32k bit/s and additional 64k bit/s are standardized.~~ And under unrestricted digital, 32k bit/s and 64k bit/s, and additional 16k bit/s (Public only) are standardized.
CH3	20	3.2.8 Voice coding rate (Notification/ '98 year, number 612) (Private mandatory/Public mandatory) The voice coding rate is 32k bit/s-ADPCM (when applying full rate CODEC) and 16k bit/s ADPCM (when applying half rate CODEC) (Public only).
	22	(2) Communications carrier In the communications carrier, the appropriate corresponding slots are transmitted and used only after sensing the carrier within 2 seconds after transmission and confirming that the appropriate slot interval (called interval of 1 slot length) which can be used is idle across 4 or more continuous frames (when full rate), or 2 or more continuous significant frames (when half rate) (public only). In the case where the preceding burst and continuing burst exceed the prescribed interference level, ・・・
	24	(4) Example of carrier sensing position on PS side ・・・ Judgment: If [1] [2] [3] are all below the specified level for at least 4 continuous frames (when full rate) or 2 or more continuous significant frames (when half rate) (Public only), that slot is judged as "free".
	25	(5) Example of carrier sensing position on CS side ・・・ Judgment: If [1] [2] [3] are all below the specified level for at least 4 continuous frames (when full rate), or 2 or more continuous significant frames (when half rate) (Public only), that slot is judged as "free".

Number	Page	Amendments
	26	3.2.16.1 Interference avoidance (Private standard/Public standard) The cell station and personal station perform continuous line monitoring after service channel establishment. The number of slots which have slot errors (unique word non-detection or CRC error) among valid slots (slots for which transmission is scheduled by peer station in response to transmission of own station) are monitored (called FER measurement) for 1.2 seconds (when full rate: 240 slots equivalent, when half rate: 120 slots equivalent (Public only)), and if that number is above the channel switching FER threshold value reported from the cell station (when half rate, half of the channel switching FER threshold value reported from the cell station (rounding off under a decimal point) (Public only)) , interference avoidance is performed by any of items [1] – [4] of 3.2.16 interference avoidance and transmission stop, according to the regulations of 4.4.3.5 Radio frequency transmission management (RT).
	62	Antenna gain is 4 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 4 dBi, the portion by which it is lower may be compensated by the antenna gain. However, when public system for personal station, when ~~1983.65~~1906.25MHz – 1919.45MHz, antenna gain is 410 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 410 dBi, the portion by which it is lower may be compensated by the gain of the antenna. When 1884.65MHz – 1893.35MHz, antenna gain is 21 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 21 dBi, the portion by which it is lower may be compensated by the gain of the antenna.
CH4	86	The emthod of designating the relative slot numbers for various transmission rates (when the link channel assignment signal is on the first slot), is shown in Figure 4.2.13. ~~(Note) 16 kbit/s/8 kbit/s will be specified in detail in the future.~~
	140	4.3.2.6.1 Version management rules (3) This standard specifies the protocols of version ~~3~~4.
	145	Table 4.3.10 Information elements in link channel establishment request message LCH type (octet 2) Bit 8 7 6 0 0 0 Standard (32 kbit/s) 0 0 1 Reserved (16 kbit/s) 0 1 0 Reserved (8 kbit/s) 0 1 1 Reserved (pirvate)/Standard (32 kbit/s ~~+~~or 16 kbit/s) (public) 1 0 0 Reserved • • •

Number	Page	Amendments
	146	RT-MM protocol version (octet 3) Shows the RT-MM protocol version held by PS. Bit 3 2 1 0 0 0 Version 1 (RCR STD-28 (version 1)) 0 0 1 Version 2 (RCR STD-28 (version 2)) 0 1 0 Version 3 (RCR STD-28 (version 3)) 0 1 1 Version 4 ~~(reserved)~~ (RCR STD-28 (version 4)) 1 0 0 Version 5 (reserved) • • •
	148	Table 4.3.12 Information elements in link channel assignment message LCH type (octet 2) Bit 8 7 6 0 0 0 Standard (32 kbit/s) 0 0 1 Reserved (pirvate)/Standard (16 kbit/s) (public) 0 1 0 Reserved (8 kbit/s) • • •
	152	Table 4.3.16 Information elements in link channel establishment re-request message LCH type (octet 2) Bit 8 7 6 0 0 0 Standard (32 kbit/s) 0 0 1 Reserved (16 kbit/s) 0 1 0 Reserved (8 kbit/s) 0 1 1 Reserved (pirvate)/Standard (32 kbit/s ~~,~~or 16 kbit/s) (public) 1 0 0 Reserved • • •
	154	RT-MM protocol version (octet 3) Shows RT-MM protocol version held by PS. Bit 3 2 1 0 0 0 Version 1 (RCR STD-28 (version 1)) 0 0 1 Version 2 (RCR STD-28 (version 2)) 0 1 0 Version 3 (RCR STD-28 (version 3)) 0 1 1 Version 4 ~~(reserved)~~ (RCR STD-28 (version 4)) 1 0 0 Version 5 (reserved) • • •

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RT-MM protocol version (octet 5)

Shows RT-MM protocol version held by CS.

Bit

8	7	6	5	4	3	2	1	
x	x	x	x	x	x	x	1/0	Version 1 (RCR STD-28 (version 1)) present/absent
x	x	x	x	x	x	1/0	x	Version 2 (RCR STD-28 (version 2)) present/absent
x	x	x	x	x	1/0	x	x	Version 3 (RCR STD-28 (version 3)) present/ absent
x	x	x	x	1/0	x	x	x	Version 4 (RCR STD-28 (version 4)) present/ absent ~~(reserved)~~
x	x	x	1/0	x	x	x	x	Version 5 present/ absent (reserved)

Other

Reserved

x: Don't care

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Table 4.4.3.1.2 Defaults of RT function request contents (public) (note)

Function request	Default	Notes
Encryption	No active encryption control; user scrambling; key set for each call; no passcode	
TCH switching	PS/CS common: Switching function within carrier within CS, among carriers present. No TCH switching function to other CS. No CS-ID designation switching function to other CS. Recalling-type connection function to other CS with in paging area present.	
	CS: Recalling-type connection function to other CS between paging areas absent	
	PS: Recalling-type connection function to other CS between paging areas present	
Transmission Power Control information	Transmission Power Control Function absent, Independent Transmission Power Control Function absent	
Zone information indication function	Zone information indication function absent	

(Note) "Condition report function", "PS-ID Notification control information",~~"Transmission Power Control",~~ and "VOX Function Information" are not specified. Therefore, they are treated as no function.

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Table 4.4.3.5.10 Function request response message contents

・・・

Information element	Reference	Direction	Classifica-tion	Information length	Remarks
・・・					
Independence Transmission Power Control information	4.4.3.5.3.4.29	downlink	O	5~*	

Number	Page	Amendments
	271	Table 4.4.3.5.29-2 Information element coding (public) • • • Bit 8 7 6 5 4 3 2 1 0 - - - - - - - Multiple octet information elements 0 0 0 0 0 0 1 Area informaiton • • • 0 0 1 0 1 0 1 TCH switching 0 0 1 0 1 1 0 Transmission Power Control 0 0 1 1 0 1 1 Additional TCH Adoption Capability 0 0 1 1 1 0 0 Additional TCH Identification 0 0 1 1 1 0 1 Additional TCH Information 0 0 1 1 1 1 0 Independence Transmission Power Control Information 1 x x x x x x Option Other Reserved x: Don't care
	275	Channel switching FER threshold value (octet 7) Specifies, when full rate in number of slot errors n in 240 slots, the FER (frame error rate) threshold value (communication channel) at which PS performs channel switching because of reception quality degradation. When half rate (Public only), the value which is half of the number of slot errors n is applied. (if he value calculated into half is not an integral number, round off under decimal point) (Refer to section 4.4.3.5.4 for method of use.)
	281	Cause value (octet 2) Bit 7 6 5 4 3 2 1 0 0 0 - - - - Normal class 0 0 0 0 Normal disconnect 1 1 1 1 Other normal events 0 1 0 - - - - Resource use impossible class 0 0 0 1 No vacant channel (includes no slot available) • • • 1 1 0 0 Equipment abnormal 1 1 0 1 rate up 1 1 1 0 rate down 1 1 1 1 Other resource use impossible class
	294	SCH type (octet 2) Bit 3 2 1 0 0 0 Standard (32 kbit/s) 0 0 1 Reserved (private)/Standard(16 kbit/s) (public) 0 1 0 Reserved (8 kbit/s) 0 1 1 Reserved (private)/Standard(32 kbit/s +or 16 kbit/s) (public) (note) 1 0 0 Reserved • • •

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	298	4.4.3.5.3.4.19 Transmission Power Control (Private reference/public Standard)

Octet	Bit 8	7	6	5	4	3	2	1
1	0	Transmission Power Control 0	0	1	0	1	1	0 Information element identifier
2	Reserved						Independent Transmission Power function	Trans-mis-sio n power func-tio n

Independent Transmission power function (octet 2)

Bit
~~1~~2
0 Independent Transmission Power Control function absent
1 Independent Transmission Power Control function present

	310	4.4.3.5.3.4.29 Independent TX Power Control Information
CH5	527	5.2 Voice coding method (Private standard/Public standard) The full rate voice coding method in the personal handy phone system is 32 kbit/s ADPCM as per ITU-T recommendation G.726. Half rate voice coding method is 16 kbit/s AD PCM as per ITU-T recommendation G.726 (Public Only). ~~q~~Quarter-rate voice coding methods are not specified at present.

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AMENDMENT HISTORY

"<u>　　</u>" Added; "~~　　~~" Deleted

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<u>3.2.23 Error-correcting coding</u>
<u>3.2.24 Slot connection</u></td></tr>
<tr><td></td><td>xv</td><td><u>Appendix AO Operation of PS that is ready for the control career shift</u></td></tr>
<tr><td>CH2</td><td>10</td><td>Table 2.3 Transmission method parameters
<table>
<tr><td>Radio access method</td><td>TDMA-TDD</td></tr>
<tr><td>Number of TDMA multiplexed circuits</td><td>4 (when full rate CODEC is used)</td></tr>
<tr><td>Carrier frequency spacing</td><td>300 kHz</td></tr>
<tr><td>Modulation method</td><td>π /4 shift QPSK, <u>BPSK, QPSK, 8PSK, 12QAM, 16QAM, 24QAM, 24QAM, 32QAM, 64QAM</u>
(roll-off rate = 0.5<u>, 0.38</u>)</td></tr>
<tr><td>Transmission rate</td><td><s>384</s><u>192~3200</u>k bit/s</td></tr>
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<tr><td></td><td>12</td><td>Table 2.4 Carrier structure
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<tr><td>(b) Common usage for Private and Public</td><td>30 frequencies</td><td>Decreases the number of control carriers for public system. (note)</td></tr>
<tr><td>(c) Public</td><td><s>45</s><u>75</u> frequencies</td><td>Decreases the number of control carriers for public system. (note)</td></tr>
</table></td></tr>
<tr><td>CH3</td><td>19</td><td>3.2.1 Radio frequency band (Execute-article 6, Equipment-article 7 and item 8.2 of article 49) (Private mandatory/Public mandatory)
The radio frequency band used is the 1,900 MHz band (Private system: 1,893.5 MHz-1,906.1 MHz and Public system: <s>1,893.5</s><u>1,884.5</u>MHz-1,919.6 MHz).

3.2.2 Carrier frequency spacing (Execute-article 6, Equipment-article 7 and item 8.2 of article 49) (Private mandatory/Public mandatory)
The carrier frequency spacing is 300 kHz.

The carrier frequency is <s>1,893.65</s><u>1,884.65</u>MHz or <s>1,893.65</s><u>1884.65</u>MHz plus some integer multiple of 300 kHz.

3.2.5 Number of multiplexed circuits (Notification/ '98 year, number 612) (Private mandatory/Public mandatory)

The number of multiplexed circuits for TDMA is 4 (when using full rate codec).

Also, with the exception of during channel switching, the maximum number of channels that can be simultaneously by a personal station is four. Further, in the case of direct communication between personal stations, the maximum number of <u>simultaneous</u> usable channels is <s>two</s><u>four</u>.</td></tr>
</table>

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	19-20	3.2.6 Modulation method (Equipment-item 8.2 of article 49 and item 8.3 of article 49) (Private mandatory/Public mandatory) The modulation method is π/4 shift QPSK modulation (quaternary phase modulation which has been shifted by π/4 each symbol period). If needed, when frequency of 1884.65MHz – 1893.35MHz is transmitted, BPSK, QPSK, 8PSK, 12QAM, 16QAM, 24QAM, 32QAM and when frequency of 1893.65MHz – 1919.45MHz is transmitted, QPSK, 8PSK, 12QAM, 16QAM, 24QAM, 32QAM are usable for public and QPSK, 8PSK, 12QAM , 16QAM, 24QAM, 32QAM, 64QAM, 256QAM are usable for private. Adaptive modulation method which change modulation method according to data communications speed or radio condition are usable. In case that occupied bandwidth is 288kHz or less, ~~T~~transmission side filtering is Square Root of Raised Cosine with Roll off factor ~~(a)~~(α) of 0.5. In case that occupied bandwidth exceeds 288kHz, transmission side filtering is Square Root of Raised Cosine with Roll off factor (α) of 0.5/0.38.
	20	3.2.7 Transmission rate (Equipment-item 8.2 of article 49 and item 8.3 of article 49) (Private mandatory/Public mandatory) The signal transmission rate is ~~384 kbit/s~~are as follows. In case that occupied bandwidth is 288kHz or less π/4 shift QPSK 384kbps BPSK 192kbps QPSK 384kbps 8PSK 576kbps 12QAM 672kbps 16QAM 768kbps 24QAM 864kbps 32QAM 960kbps 64QAM 1152kbps 256QAM 1536kbps In case that occupied bandwidth exceeds 288kHz and Roll off factor (α) is 0.5 π/4 shift QPSK 1152kbps BPSK 576kbps QPSK 1152kbps 8PSK 1728kbps 12QAM 2016kbps 16QAM 2304kbps 24QAM 2592kbps 32QAM 2880kbps In case that occupied bandwidth exceeds 288kHz and Roll off factor (α) is 0.38 π/4 shift QPSK 1280kbps BPSK 640kbps QPSK 1280kbps 8PSK 1920kbps 12QAM 2240kbps 16QAM 2560kbps 24QAM 2880kbps 32QAM 3200kbps

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	22	(2) Communications carrier In the communications carrier, the appropriate corresponding slots are transmitted and used only after sensing the carrier within 2 seconds after transmission and confirming that the appropriate slot interval (called interval of 1 slot length) which can be used is idle across 4 or more frames. In the case where the preceding burst and continuing burst exceed the prescribed interference level, and they are present within or including the timing shown in Figures 3.1 (a) and (b) in case that occupied bandwidth is 288kHz or less and π /4 shift QPSK, and they overlap the slot scheduled for use, or the existing burst overlaps with the same timing as the slot scheduled for use, it is judged that there is a carrier. Each timing in case other band signal and modulation method should be same as shown in Figures 3.1 in case that occupied bandwidth is 288kHz or less and π /4 shift QPSK. In case that occupied bandwidth exceeds 288kHz, career sense should be carried out about continuous 3 frequencies. ・ ・ ・ In case that occupied bandwidth is 288kHz or less and π /4 shift QPSK (a) Carrier sensing method on PS side ・ ・ ・ In case that occupied bandwidth is 288kHz or less and π /4 shift QPSK (b) Carrier sensing method on CS side Figure 3.1 Carrier sensing method
	24	(4) Example of carrier sensing position on PS side The measurement points are within the following range in case that occupied bandwidth is 288kHz or less and π /4 shift QPSK. Judgment uses the average value of any length of time, or the instantaneous value of any point. Furthermore, in the modulated signal, since the deviation of instantaneous power is large with respect to average power, use caution in judgment.
	25	Each timing in case other band signal and modulation method should be same as shown in Figures 3-2-1 in case that occupied bandwidth is 288kHz or less and π /4 shift QPSK. (5) Example of carrier sensing position on CS side The measurement points are within the following range in case that occupied bandwidth is 288kHz or less and π /4 shift QPSK. Judgment uses the average value of any length of time, or the instantaneous value of any point. Furthermore, in the modulated signal, since the deviation of instantaneous power is large with respect to average power, use caution in judgment.
	26	Each timing in case other band signal and modulation method should be same as shown in Figures 3-2-2 in case that occupied bandwidth is 288kHz or less and π /4 shift QPSK. 3.2.16 Interference avoidance and transmission disable (Private standard/Public standard) ・ ・ ・ [6] Release of radio line In case that cell stations and personal stations has an adaptive modulation method, it is possible that interference is reduced by changing modulation method and communication is continued.
	27	If transmission continues for 30 minutes, the personal station unconditionally stops transmission. Also, transmission is not to be restarted for 1/90 or more periods of the communication time (minimum 2 seconds) after transmission is stopped.

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	27	3.2.18 Transmission timing and transmission jitter (Private standard/Public standard) (1) CS transmission timing At the antenna terminal, standard transmission timing of control physical slot~~standard control physical slot transmission timing~~ is taken as (5 x n) ms (n is LCCH interval value) after the last transmitted control physical slot. Also, at the antenna terminal standard transmission timing of control physical slot~~, standard control physical slot transmission timing~~ is taken as (5 x l) ms (l is 1 when full rate, 2 when half rate, or 4 when quarter rate) after the last transmitted communication physical slot. CS transmission timing in this case is within ±5 ppm of the interval accuracy with respect to standard timing. As for the relationship of transmission timing between the last control or communication physical slot that contains a message that specifies the communication physical slot to PS (abbreviated as designation physical slot) and the ~~relative~~applicable communication physical slot, at the antenna terminal, standard transmission timing of the ~~relative~~applicable communication physical slot is taken as (5 x k1 + 0.625 x {absolute slot number of communication physical slot - absolute slot number of designation physical slot}) ms (k1 is a natural number) ~~from~~after the timing of the designation physical slot. CS transmission timing in this case is within ±1 symbol of the timing where interval accuracy of ±5 ppm is added to standard timing.
	27	(2) PS transmission timing At the antenna terminal, standard transmission timing of the control physical slot is taken as (5 x k2 - 2.5) ms (k2 is a natural number less than or equal to LCCH interval value) after the timing of the received control physical slot. Also, at the antenna terminal, standard transmission timing of the communication physical slot is taken as (5 x l - 2.5) ms (l is same as that in (1) above) after the timing of the received communication physical slot. However, as for the relationship with the timing of the received designation physical slot (same meaning as that in (1) above), at the antenna terminal, standard ~~timing of the~~transmission timing of the relative communication physical slot is (5 x k3 - 2.5 + 0.625 x {absolute slot number of communication physical slot - absolute slot number of designation physical slot}) ms (k3 is a natural number) after the timing of received designation physical slot. ⋮ ~~Refer to~~See Figure 3.3.
	28	(3) CS transmission jitter ~~1/8 symbol or less.~~ When roll off factor of base band band-pass filter is 0.5 π /4 shift QPSK 1/8 symbol or less BPSK 1/8 symbol or less QPSK 1/8 symbol or less 8PSK 1/16 symbol or less 12QAM 1/16 symbol or less 16QAM 1/16 symbol or less 24QAM 1/32 symbol or less 32QAM 1/32 symbol or less When roll off factor of base band band-pass filter is 0.38 π /4 shift QPSK 1/8 symbol or less BPSK 1/8 symbol or less QPSK 1/8 symbol or less 8PSK 1/32 symbol or less 12QAM 1/32 symbol or less 16QAM 1/32 symbol or less 24QAM 1/32 symbol or less 32QAM 1/32 symbol or less

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	29	(4) PS transmission jitter ~~PS transmission jitter is 1/8 symbol or less when~~ When PS is detecting ~~16 bit~~ UW from CS~~.~~ PS transmission jitter are as follows. When roll off factor of base band band-pass filter is 0.5 π/4 shift QPSK 1/8 symbol or less BPSK 1/8 symbol or less QPSK 1/8 symbol or less 8PSK 1/16 symbol or less 12QAM 1/16 symbol or less 16QAM 1/16 symbol or less 24QAM 1/32 symbol or less 32QAM 1/32 symbol or less When roll off factor of base band band-pass filter is 0.38 π/4 shift QPSK 1/8 symbol or less BPSK 1/8 symbol or less QPSK 1/8 symbol or less 8PSK 1/32 symbol or less 12QAM 1/32 symbol or less 16QAM 1/32 symbol or less 24QAM 1/32 symbol or less 32QAM 1/32 symbol or less Note that value after extracting affected portion by CS transmission jitter shall be applicable, ~~However,~~ if CS has transmission jitter~~., it is the value minus the affected portion of CS transmission jitter.~~ (Note) Transmission jitter specifies deviation between frames, and the maximum value of deviation between ~~continuous~~adjacent frames ~~is to~~shall satisfy the above standards of (3) and (4).
	30	3.2.19 Communication quality (Private standard/Public standard) (1) Communication quality when CS is connected to digital network (~~PS~~communication quality of PS) ~~Refer to~~See Table 3.2.1 and Figure 3.4. ~~The s~~Specified values of Table 3.2.1 ~~are for the case where~~ shall apply when only the mutual conversion between ADPCM <—> μ-law PCM according to ITU-T recommendation G.726 for voice coding is performed. Table 3.2.1 Communication quality standards Item / Standard ~~Transmission~~Sending loudness rating (SLR) / 5 ~ 11 dB Reception loudness rating (RLR) / -1 ~ 5 dB Sidetone masking rating (STMR) / 10 ~ 15 dB (Note 1) The loudness rating constant conforms to ITU-T recommendations. P. 76 Determination of loudness ratings: Fundamental ~~rules~~principles P. 79 Calculation of loudness ratings (Note 2) The sidetone masking rating is equivalent to "Talker Sidetone" ~~of~~on P. 66 of ITU-T recommendation.

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	31	(2) Communication quality when CS is connected to analog network ~~Refer to~~ See Table 3.2.2 and Figure 3.5. Specified ~~The~~ values ~~are shown~~ of in Table 3.2.2 ~~provided that~~ shall apply when PS satisfies communication quality standards of (1).

Table 3.2.2 Communication quality standards

Item	Standard	Measurement conditions (pseudo-line)
~~Transmission~~ Sending loudness rating (SLR)	12 dB or less	0.4 mm ϕ ~~f~~ -7 dB
Reception loudness rating (RLR)	-2 ~ -10 dB	0.4 mm ϕ ~~f~~ -7 dB
Sidetone masking rating (STMR)	3 dB or more	0.4 mm ϕ ~~f~~ -7 dB 0.5 mm ϕ ~~f~~ -7 dB 0.65 mm ϕ ~~f~~ -7 dB, 0 dB

3.2.20 Output power specified ~~by~~ in the Terminal Equipment Regulations (Private standard/Public standard)

(1) Output power of PS

If PS is used for non-speech communication, ~~the~~ output power to the ADPCM coder input point of ~~the~~ that PS is as shown in Table 3.3.1.

・
・
・

(Note) "Mean level" refers to the average ~~signal~~ output power level (effective value) when the terminal equipment ~~are~~ is in ~~the~~ operational state. "Maximum level" refers to the highest possible signal power level (effective value) ~~that can be~~ settable when adjusting the output level of the terminal equipment.

32 (2) Output power of CS (Output power when CS is connected to analog network) (Private standard)

If CS is used for non-speech communication, ~~the~~ output power of the CS to network is as shown in Table 3.3.2, provided that PS satisfies values shown in Table 3.3.1.

Table 3.3.2 Output power tolerance limits of CS

Item	Output power tolerance limits
~~Signal o~~Output level up to 4kHz	Less than -8 dBm (Mean level), and not exceeding 0dBm (Maximum level).

(Note 1) "Mean level" refers to the average signal power level (effective value) when the terminal equipment ~~are~~ is in ~~the operating~~ operational state. "Maximum level" refers to the highest possible signal power level (effective value) ~~that can be set~~settable when adjusting the output level of the terminal equipment.
(Note 2) Output power should be measured with the output connected to a balanced impedance of 600 ohm ~~for measurement~~, and be expressed in ~~the result as~~ an absolute value.
(Note 3) If CS has the signal source of non-speech communication, spurious output level is stipulated other than this stipulation. (Refer to article 14 of specifications for terminal equipment.)

Number	Page	Amendments
	32	(3) Output power of CS (Output power when CS is connected to digital network) (Private standard) If CS is used for non-speech communication, the output power ~~of~~ when digital signals are converted into analog signals is shown in Table 3.3.3, provided that PS satisfies values shown in Table 3.3.1. ・ ・ ・ (Note) "Mean level" refers to the average signal power level (effective value) when the terminal equipment ~~are~~ is in ~~the operating~~ operational state. "Maximum level" refers to the highest possible signal power level (effective value) ~~that can be set~~ settable when adjusting the output level of the terminal equipment. 3.2.21 Time alignment control (Private reference/Public reference) 3.2.22 Unsymmetrical communication (Private reference/Public reference)
	33	3.2.23 Error-correcting coding (Private reference/Public reference) 3.2.24 Slot connection (Private reference/Public reference)
	34	3.3.1 Modulation method (Private standard/Public standard) π/4 shift QPSK, BPSK,, QPSK, 8PSK, 12QAM, 16QAM, 24QAM, and 32QAM are prescribed as follows. 3.3.1.1 Modulation method (Equipment-item 8.2 ~~of article 49~~ and item 8.3 of article 49) (Private mandatory/Public mandatory) ~~π/4 shift QPSK is used.~~ The modulation procedures for stipulating modulation methods are shown in Figure 3.6.1 – 3.6.8 Figure 3.6.1 π/4 shift QPSK modulation circuit] Figure 3.6.2 BPSK modulation circuit
	35	Figure 3.6.3 QPSK modulation circuit Figure 3.6.4 8PSK modulation circuit Figure 3.6.5 12QAM modulation circuit
	36	Figure 3.6.6 16QAM modulation circuit Figure 3.6.7 24QAM modulation circuit Figure 3.6.8 32QAM modulation circuit

Number	Page	Amendments
	37	3.3.1.2 Coding (Private standard/Public standard) (a) π /4 shift QPSK (1) The serial signal input is converted to (Xk, Yk) symbols by the serial/parallel converter and then changed to corresponding signals (Ik, Qk) by the differential encoder. Conversion from serial signal input to (Xk, Yk) (binary/quaternary conversion) is performed as noted below, and conversion from (Xk, Yk) to (Ik, Qk) is performed according to equation 3.3-1 and Table 3.4.1. ・ ・ ・ Table 3.4.1 Differential coding regulations ・ ・ ・ (2) The signal space diagram is shown in Figure 3.7.1. ・ ・ ・ Figure 3.7.1 π /4 shift QPSK signal space diagram
	38-46	(b) BPSK～(h) 32QAM added
	47	3.3.1.3 Spectrum shaping of baseband signal (Private standard/Public standard) ・ ・ ・ Where, ~~T=(1 / 192) x 10^{-3} sec~~ Equation (3.3-2) T = (1 / 192) x 10^{-3} sec (When occupied bandwidth is 288kHz or less and Roll off factor (α) is 0.5) T = (1 / 576) x 10^{-3} sec (When occupied bandwidth exceeds 288kHz and Roll off factor (α) is 0.5) T = (1 / 640) x 10^{-3} sec (When occupied bandwidth exceeds 288kHz and Roll off factor (α) is 0.38) (2) Roll off factor ~~Roll off rate~~ (Equipment-item 8.2 of article 49 and item 8.3 of article 49) (Private mandatory/Public mandatory) When occupied bandwidth is 288kHz or less, Roll off factor (α) = 0.5. When occupied bandwidth exceeds 288kHz, Roll off factor (α) = 0.5 or 0.38. ・ ・ ・ 3.3.1.4 Orthogonal modulation (Private standard/Public standard) ・ ・ ・ Ik (t), Qk (t) are the continuous impulse functions possessing energy that is proportional to the ~~second~~ square power of the amplitude of orthogonal signals Ik, and Qk respectively. In case of QPSK, q (t)=0.
	48	3.3.1.5 Transient characteristics of burst edges (Private standard/Public standard) In spite of modulation method, ~~T~~the burst rise (and fall) ramp time is ~~4 bits (2 symbols).~~ occupied bandwidth is 288kHz or less : 2 symbols occupied bandwidth exceeds 288kHz : 4 symbols 3.3.2 Transmission rate (Equipment-item 8.2 of article 49 and item 8.3 of article 49) (Private mandatory/Public mandatory) It is ~~384~~192~3200 kbit/s.

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td></td><td>49</td><td>Table 3.5 Relationship between frequency bands and carrier numbers
<table>
<tr><th>Carrier Numbers</th><th>Frequency bands (MHz)</th><th>Usefulness</th><th>Carrier Numbers</th><th>Frequency bands (MHz)</th><th>Usefulness</th></tr>
<tr><td>221
222
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1885.250
550
850
1886.150
450
750
1887.050
350
650
950
1888.250
550
850
1889.150
450
750
1890.050
350
650
950
1891.250
550
850
1892.150
450
750
1893.050
350
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.</td><td>Communication carrier for Public (note 1)
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</table>
</td></tr>
<tr><td></td><td>51</td><td>3.4.2.1 Transmission power (Execute-article 6 and Equipment-item 8.3 of article 49)
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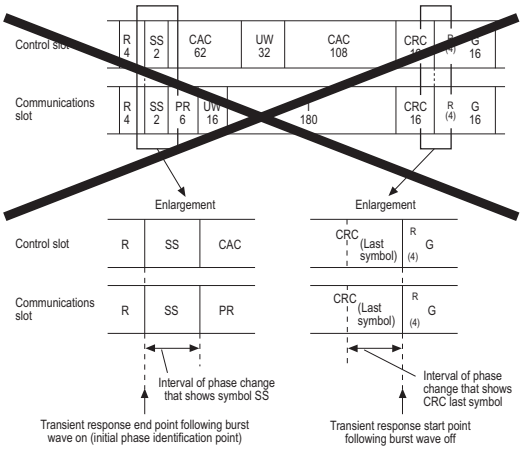
c. In spite of modulation method, transmission power is average supplied power of one channel.

(2) Standards

Maximum transmission power: For public cell stations, maximum transmission power ~~it~~ is 500 mW or less. For other cell stations, personal stations, and relay stations maximum transmission power ~~it~~ is 10 mW or less. However, in cases where public cell stations use frequency band 1893.65 MHz - 1905.95 MHz maximum transmission power is 20 mW or less, and incases of using frequency band 1906.25MHz – 1908.05MHz and 1915.85 MHz - 1918.25 MHz, maximum transmission power ~~it~~ is 2 w or less.(In case that it is used as communication channel, maximum transmission power 500mW or less.) Also, in case that it is relay stations, using 1884.65 MHz - 1893.35 MHz or 1906.25MHz – 1919.45MHz and using for personal stations, maximum transmission power is 20mW or less.</td></tr>
</table>

Number	Page	Amendments
	52	(2) Standards In case that occupied bandwidth is 288kHz or less a. 600 kHz detuned: 800 nW or less b. 900 kHz detuned: 250 nW or less In case that occupied bandwidth exceeds 288kHz a. 900 kHz detuned: 800 nW or less b. 1200 kHz detuned: 250 nW or less 3.4.2.4 Transient response characteristics of burst transmission (Private standard/Public standard) (1) Definition When burst waves modulated by the digital signal at the radio station are ON/OFF, the burst transmission transient response characteristics is the time which is from the starting point of the transient response accompanying the turning off of the burst waves (refer Figure 3.~~9~~8) until 80 nW is reached, or from 80 nW until the point at the end of the transient response accompanying turning on of the burst waves (refer Figure 3.~~9~~8). (2) Standards a. Time characteristics: The time characteristics standards are 13.0 μ s or less. Also, the instantaneous Power is ~~in the range of the template shown in Figure 3.8.~~ π /4 shift QPSK : [Average power within burst + 4dB] or less BPSK : [Average power within burst + 6dB] or less QPSK : [Average power within burst + 5dB] or less 8PSK : [Average power within burst + 5dB] or less 12QAM : [Average power within burst + 7dB] or less 16QAM : [Average power within burst + 8dB] or less 24QAM : [Average power within burst + 8dB] or less 32QAM : [Average power within burst + 8dB] or less b. The power when off satisfies section 3.4.2.5.
	53	~~Figure 3.8 Stanadrds of transmission power time resopnse~~ (3) Relationship between slot structure and burst wave on/off control Figure 3.~~9~~8 shows the relationship between the slot structure shown in Figure 3.8 and burst wave on/off control.  Figure 3.~~9~~8 Relationship between slot structure and burst wave on/off control

Number	Page	Amendments
	54	3.4.2.6 Transmission spurious (Equipment-article 7) (Private mandatory/Public mandatory) ・ ・ ・ (2) Standards Digital cordless telephone a. Within band (1,893.5 MHz ~ 1,919.6 MHz) : 250 nW or less. b. Outside of band (except above) : 2.5 μ W or less. Except above a. Within band (1,845.5 MHz ~ 1,919.6 MHz) : 794 nW or less. b. Outside of band (Detuning frequency exceeds 2.25MHz) : 794 nW/MHz or less. c. Outside of band (Detuning frequency exceeds 2.25MHz and 1920MHz – 1980MHz and 2110MHz – 2179MHz) : 251 nW/MHz or less. ・ ・ ・ 3.4.2.7 Allowed value for occupied bandwidth (Equipment - attached table/number 2) ・ ・ ・ (2) Standards In case that 1893.5MHz – 1919.6MHz is used, ~~T~~the allowed value is 288 kHz or less and in case that 1884.5MHz – 1893.5MHz, the allowed value is used, 884kHz or less.
	55	(2) Standards ~~It is 12.5% or less.~~ In case that Roll off factor of base band band-pass filter is 0.5 π /4 shift QPSK 12.5% or less BPSK 12.5% or less QPSK 12.5% or less 8PSK 8% or less 12QAM 8% or less 16QAM 8% or less 24QAM 6% or less 32QAM 5% or less In case that Roll off factor of base band band-pass filter is 0.38 π /4 shift QPSK 8% or less BPSK 8% or less QPSK 8% or less 8PSK 8% or less 12QAM 8% or less 16QAM 8% or less 24QAM 6% or less 32QAM 5% or less
	56	3.4.2.11 Cabinet radiation (Private standard/Public standard) Device which is using only modulation method π /4 shift QPSK and carrier frequency spacing 300kHz is ~~it is~~ 2.5 μ W or less. Except that, except 1920MHz – 1980MHz and 2110MHz – 2170MHz is 794 nW/MHz or less, within 1920MHz – 1980MHz and 2110MHz – 2170MHz is 251nW/MHz.

Number	Page	Amendments
	57	(2) Standards ~~It is 16 dB μ or less.~~ In case that occupied bandwidth is 288kHz or less π /4 shift QPSK 16.0dB μ V or less BPSK 12.5dB μ V or less QPSK 15.5dB μ V or less 8PSK 20.0dB μ V or less 12QAM 21.5dB μ V or less 16QAM 22.0dB μ V or less 24QAM 24.5dB μ V or less 32QAM 26.5dB μ V or less 64QAM 28.0dB μ V or less 256QAM 33.5dB μ V or less In case that occupied bandwidth exceeds 288kHz π /4 shift QPSK 21.2dB μ V or less BPSK 17.7dB μ V or less QPSK 20.7dB μ V or less 8PSK 25.2dB μ V or less 12QAM 26.7dB μ V or less 16QAM 27.2dB μ V or less 24QAM 29.7dB μ V or less 32QAM 31.7dB μ V or less * Above specified value of each bandwidth signal and each modulation method is each "specified sensitivity".
	58	3.4.3.4 Adjacent channel selectivity (Private standard/Public standard) (1) Definition Adjacent channel selectivity is the ratio of (specified sensitivity ~~(16dB μ V) +~~ 3 dB) and the unwanted wave level at which the TCH bit error rate (BER) becomes 1 x 10–2 due to unwanted signals added to the wanted signal of specified sensitivity ~~(16dB μ V) +~~ 3 dB (detuned by Δ f kHz) modulated by a digital signal (binary pseudo-noise series with code length 32,767 bits). Signal of occupied frequency band under 288kHz is used as unwanted wave. (2) Standards In spite of modulation method, ~~It is 50 dB or more when detuned 600 kHz.~~ a. When occupied frequency bandwidth is 288kHz or less - More than 50dB at detuning frequency 600kHz. b. When occupied frequency bandwidth exceeds 288kHz - More than 50dB at detuning frequency 900kHz. 3.4.3.5 Intermodulation performance (Private standard/Public standard) (1) Definition Intermodulation characteristics are the ratio of (specified sensitivity ~~(16dB μ V) +~~ 3 dB) and the unwanted signal level at which the TCH bit error rate (BER) becomes 1 x 10–2 due to 2 unwanted signals added to the wanted signal of specified sensitivity ~~(16dB μ V) +~~ 3 dB and detuned by 600 kHz and 1.2 MHz when occupied frequency bandwidth is 288kHz or less, or 900 kHz and 1.8 MHz when occupied frequency bandwidth exceeds 288kHz.

Number	Page	Amendments
	59	3.4.3.6 Spurious response immunity (Private standard/Public standard) (1) Definition Spurious response immunity is the ratio of (specified sensitivity ~~(16dB μ V) +~~ 3 dB) and the unwanted signal level at which the TCH bit error rate (BER) becomes 1 x 10–2 due to unmodulated unwanted signals added to the wanted signal of specified sensitivity ~~(16dB μ V) +~~ 3 dB.
	61	(2) Standard ~~25dB μ V or less.~~ In case that occupied bandwidth is 288kHz or less π /4 shift QPSK 25.0dB μ V or less BPSK 21.5dB μ V or less QPSK 24.5dB μ V or less 8PSK 29.0dB μ V or less 12QAM 30.5dB μ V or less 16QAM 31.0dB μ V or less 24QAM 33.5dB μ V or less 32QAM 35.5dB μ V or less In case that occupied bandwidth exceeds 288kHz π /4 shift QPSK 30.2dB μ V or less BPSK 26.7dB μ V or less QPSK 29.7dB μ V or less 8PSK 34.2dB μ V or less 12QAM 35.7dB μ V or less 16QAM 36.2dB μ V or less 24QAM 38.7dB μ V or less 32QAM 40.7dB μ V or less
	62	When 1893.65MHz – 1919.45MHz, ~~A~~antenna for public system has a gain of 10 dBi or less (except 1898.45 MHz and 1900.25 MHz). However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 10 dBi, the portion by which it is lower may be compensated by the gain of the antenna. When adaptive allay antenna (The antenna which increase the antenna gain in the direction of the other party of communication, and decrease the antenna gain in the direction of the other radio stations which use same channel) is applied to public system and 1893.65MHz – 1919.45MHz, antenna gain is 16 dBi or less (except 1898.45 MHz and 1900.25 MHz). However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 16 dBi, the portion by which it is lower may be compensated by the gain of the antenna. When 1884.65MHz – 1893.35MHz, antenna for public system has a gain of 21 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 21 dBi, the portion by which it is lower may be compensated by the gain of the antenna. (2) Personal station ~~Cabinet built in type antenna with g~~Gain is~~of~~ 4 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 4 dBi, the portion by which it is lower may be compensated by the gain of the antenna.

Number	Page	Amendments
	62	(3) Relay station Antenna gain is 4 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 4 dBi, the portion by which it is lower may be compensated by the antenna gain. However, when public system for personal station, when 1893.65MHz – 1919.45MHz, antenna gain is 4 dBi or less (except 1898.45 MHz and 1900.25 MHz).). However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 4 dBi, the portion by which it is lower may be compensated by the gain of the antenna. When 1884.65MHz – 1893.35MHz, antenna gain is 21dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 21 dBi, the portion by which it is lower may be compensated by the gain of the antenna.
CH6	529	6.2.3 Transmission disable conditions (Private mandatory) Transmission disable conditions are according to section 3.2.16. ~~Also, communication must end within the transmission time limit (3 minutes). After communication is ended (including when connection establishment fails), at least 2 seconds of inhibit time is taken.~~
Appendix AL	924	Introduction This appendix is provided for the radio interface for carrying out supplementary services within the CS-PS loop. In particular, it summarizes the regulations needed when applying private use supplementary services within the CS-PS loop to the "Personal Handy Phone System." Though the regulations are also described later on as all supplementary services have been appended to within the CS-PS loop, they are treated singularly for supplementary services within the CS-PS loop. "Digital Cordless Telephone Interconnection <SD>" has been established as a technical document that specified a communication protocol, display and operation of digital cordless telephone by Communications and Information network Association of Japan (CIAJ) in connection with supplementary services described in this appendix.
AO	1068	Appendix AO Operation of PS that is ready for the control career shift
Annex 3	1071	Caution: Disclosure of this standard is specified in accordance with the "Procedure Rules of Disclosing the Standard pertaining to Authentication and Subscriber Data Write-in of the Personal Handy Phone System (Private)" approved in the Standard Assembly Meeting. ~~This standard is "RCR STD-28 Annex 3 version 2".~~ However, "RCR STD-28 version 2" in this standard is applied to "RCR STD-28 version ~~3.24~~.0".
Annex 4	1072	Caution: Disclosure of this standard is specified in accordance with the "Procedure Rules of Disclosing the Standard pertaining to Authentication and Subscriber Data Write-in of the Personal Handy Phone System (Private)" approved in the Standard Assembly Meeting. ~~This standard is "RCR STD-28 Annex 4 version 2".~~ However, "RCR STD-28 version 2" in this standard is applied to "RCR STD-28 version ~~3.24~~.0", "ARIB TR-T2 version 1.0" in this standard is applied to "ARIB TR-T2 version 2.2", "ARIB TR-T5 version 1.0" in this standard is applied to "ARIB TR-T5 version 2.2".

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AMENDMENT HISTORY

"____" Added; "═══" Deleted

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<tr><td>CH4</td><td>349</td><td>Table 4.4.3.7.12 SETUP message contents
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<tr><td>Redirecting number</td><td>4.4.3.7.3.5.27</td><td>downlink</td><td>O</td><td>2 ~ 25</td><td>(note 19)</td></tr>
<tr><td>Repeat indicator</td><td>4.4.3.7.3.5.21</td><td>both</td><td>O</td><td>1</td><td>(note 12)</td></tr>
</table>
(Note 19) When Redirecting number is forwarded from CS to PS, it is included.</td></tr>
<tr><td></td><td>361</td><td>Table 4.4.3.7.18 Information element coding
1 1 1 0 1 0 0 Redirecting number (note 3)</td></tr>
<tr><td></td><td>403</td><td>4.4.3.7.3.5.19 High layer compatibility
Figure 4.4.3.7.22 High layer compatibility Revised</td></tr>
<tr><td></td><td>408</td><td>Figure 4.4.3.7.23 Low layer Compatibility Revised</td></tr>
<tr><td></td><td>426</td><td>4.4.3.7.3.5.26 User-user
Figure 4.4.3.7.29 User-user information element Revised</td></tr>
<tr><td></td><td>428</td><td>4.4.3.7.3.5.27 Redirecting number (Private standard/Public standard)
This item is added.</td></tr>
</table>

Number	Page	Amendments
AB-1	765	Appendix AB ~~WLL~~ PHS-FWA standard ~~(Standard)~~
AB-2	766	INTRODUCTION This appendix is being developed for "The radio interface of the system for ~~Wireless Local Loop (WLL) 1.9G~~ PHS -FWA(hereinafter referred to the FWA system) " and especially for the regulations necessary to apply "Personal Handy Phone System" to "The system for ~~wireless local loop~~ FWA" ~~in the countries except Japan~~. About description methods in this appendix 1. This appendix (the ~~WLL~~ PHS-FWA standard) is fundamentally based on the public standard of the main text (The main text is defined in the chapter 1.) and has the same structure as the one of the main text. The appendix, however, describes only the parts changed from the main text and refers to the main text when the contents of this appendix have the same as the main text. 2. The chapter 1 in the appendix is newly described and refers to the main text in case of need. The chapters 2, 3, 4, 5, and the appendices print the same tables of contents as the main text for contrast which show whether the text is changed or not. This appendix only describes the items changed form the main text. 3. The chapters ~~5~~ 7, and 8 refer to the public standard of the main text because they have the same contents as the main text. The chapter 6 in the main text and attachment is not applied to this appendix. ~~Remarks~~ ~~1. This appendix is not applied to the systems in Japan. The equipments and the systems manufactured according to this appendix are not to be used in Japan.~~ ~~2. The declaration concerning the industrial properties written in "The note of the introduction of the Personal Handy Phone System ARIB Standard (RCR STD-28)" is not applied to this appendix.~~
AB-3	767	Chapter 5 Voice Coding method
AB-4	767	Attached document 1 ~~WLL~~ FWA overview
AB-5	768	1.1 Overview (Domestic standard) The appendix is provided to specify the radio interface of the ~~Wireless Local Loop~~ 1.9G-FWA system (hereinafter referred to the ~~WLL~~ FWA system) by using the "Personal Handy Phone System".
	768	1.2 Application scope (Domestic standard) The ~~WLL~~ FWA system are constructed from the personal stations, the cell stations and relay station (radio stations which relay communication between cell station and personal stations) shown in Figure 1.1. (Refer to Attached document 1.) The appendix specifies the radio interface as shown in Figure 1.1 for this ~~WLL~~ FWA system. Figure 1.1 The regulated point of the radio interface of the ~~WLL~~ FWA system
	768	1.3 Basic rules of standardization (Domestic standard)

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AB-6	768	1.4 Document conformity (Domestic standard) The "main text" used in this appendix refers the chapters from 1 to 8 and the appendices except appendix AB of the Personal Handy Phone System ARIB Standard (RCR STD-28). "Test items and conditions for public personal station compatibility confirmation" (RCR TR-23) for "Personal Handy Phone System" is also the related document. ~~Because this appendix is applicable in the countries except Japan, it has no domestic laws (legal ordinance, rules and notifications) which the appendix conforms to~~. ~~Accordingly there is no legal ordination corresponding to the radio interface regulation specified by this appendix~~. In the standard, "execute" refers to radio law execution rules, "equipment" refers to radio equipment rules, "notification" refers to Ministry of Posts and Telecommunications notifications, "formal authorization" refers to radio equipment formal authorization rules, "technological conformity" refers to technological standards conformity for certain radio equipment. Also, the relationship between radio equipment established by legal ordinance and the radio interface provisions specified by this standard is shown in Table 1.1. Table 1.1 Distinction between cell station and personal station, and applicable Um point interface provisions
AB-7	773	2.1 System structure (Domestic standard) The ~~WLL~~ FWA system is made up of personal stations, cell stations and radio stations which relay communications between cell stations and personal stations (hereinafter, referred as relay stations). (Refer to Attached document 1.)
AB-8	773	2.1.1 Personal station (PS) (Domestic standard) Hereinafter unless otherwise noted, "Personal Station" or "PS" described in this appendix denotes "The personal station of the ~~WLL~~ FWA system or PS of the ~~WLL~~ FWA system" but does not denote the general personal station or general PS of the Personal Handy Phone System.("Personal Station" in this appendix is "Fixed Station" in Japanese law.)
AB-9	773	2.1.2 Cell station (CS) (Domestic standard) Hereinafter unless otherwise noted, "Cell Station" or "CS" described in this appendix denotes "The cell station of the ~~WLL~~ FWA system or CS of the ~~WLL~~ FWA system" but does not denote the general cell station or CS of the Personal Handy Phone System.
AB-10	773	2.1.3 Relay station (RS) (Domestic standard) Hereinafter unless otherwise noted, "Relay station" or "RS" described in this appendix denotes "The relay station of the ~~WLL~~ FWA system" but does not denote the general relay station or RS of the Personal Handy Phone System.
AB-11	773	2.2 Interface definition (Domestic standard) There is one interface point for the ~~WLL~~ FWA system (Um point), as shown in Figure 2.1.
AB-12	774	2.3 System basic functions (Domestic standard)
AB-13	774	2.3.1 System conditions (Domestic standard)
AB-14	774	2.3.1.1 Basic functions (Domestic standard)

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<tr><td>AB-15</td><td>774</td><td>2.3.1.a Classification of systems (Domestic standard)
This item is added.</td></tr>
<tr><td>AB-16</td><td>774</td><td>2.3.2 Services that can be used by this system (Domestic standard)</td></tr>
<tr><td>AB-17</td><td>774</td><td>2.3.2.2 Service types (Domestic standard)
Service types of Type 1 system are as shown below</td></tr>
<tr><td>AB-18</td><td>775</td><td>In Type 2 system, services which are offered by network can be used.</td></tr>
<tr><td>AB-19</td><td>776</td><td>Table 2.2 Service types
<table>
<tr><td>Bearer services</td><td>64 kbit/s voice(note 2)</td><td>Using max 2 channels on Um point, provides transmission function suited for voice communication with terminal; 64 kbit/s PCM CODEC is inserted.</td></tr>
<tr><td></td><td>64 kbit/s 3.1 kHz audio(note 2)</td><td>Using max 2 channels on Um point, provides transmission function suited for 3.1 kHz bandwidths communication with terminal; 64 kbit/s PCM CODEC is inserted.</td></tr>
</table>
(Note 1) This item, however which is defined only for the private system in the main text, is standard in the ~~WLL~~ FWA system.</td></tr>
<tr><td>AB-20</td><td>777</td><td>2.4 Access method (Domestic standard)</td></tr>
<tr><td>AB-21</td><td>777</td><td>2.4.4 Carrier structure (Domestic mandatory)
Except for the following items changed, this section conforms to the public standard in the section 2.4.4 of the main text.
The structure of the radio carrier in the ~~WLL~~ FWA system is fundamentally based on the legal ordinance of the relevant country. It, however, is to be desired that the structure should be based on "The carrier structure" for public system shown in the Table 2.4 of the main text. The control carrier, however, is given one carrier for each ~~WLL~~ FWA system.</td></tr>
<tr><td>AB-22</td><td>777</td><td>2.5 Protocol basic rules (Domestic standard)
This item is added.</td></tr>
<tr><td>AB-23</td><td>778</td><td>2.7 Encryption method (Domestic standard)
This item is added.</td></tr>
<tr><td>AB-24</td><td>778</td><td>2.9 PS Number (Domestic standard)
This item is added.</td></tr>
</table>

Number	Page	Amendments
AB-26	779	Chapter 3 Technical Requirements for Radio Facilities Except for the specified items changed, this chapter conforms to the public standard in the chapter 3 of the main text. The items including the changed contents are shown in the reference table made from the table of contents of the chapter 3 of the main text and shown in the following pages. This chapter only describes the changed items and contents. ~~The Japanese legal ordinances including the radio law execution rules, the radio equipment rules and so on referred in the main text are not referred in this appendix.~~ When the conditions relating to the emission of the radio wave do not conform to the legal ordinances of the relevant country, they are to conform to the legal ordinances of the relevant country.
AB-27	783	3.2 General conditions (Domestic mandatory)
AB-28	783	3.2.1 Radio frequency band (Equipment-article 7) (Domestic mandatory) It is to be desired that the radio frequency ~~band~~ used in the ~~WLL~~ FWA system should be as follows; ~~as the same as that of the public system (1893.5 MHz ~ 1919.6 MHz) shown in the chapter 3.2.1 of the main text.~~ (1) Domestic :1,893.65MHz ~ 1,919.45MHz. (This is to be defined both ends of the carrier frequencies.) (2) Overseas :1,893.5 MHz ~ 1,919.6 MHz. (This is to be defined both edges of the frequency band.)
AB-29	783	3.2.2 Carrier frequency spacing (Domestic standard)
AB-30	783	3.2.4 Communications system (Equipment-item 2.12 of article 58) (Domestic mandatory) This item is added.
AB-31	783	3.2.5 Number of multiplexed circuits (Notification/ '98 year, number 463) (Domestic mandatory) This item is added.
AB-32	783	3.2.6 Modulation method (Equipment-item 2.12 of article 58) (Domestic mandatory) This item is added.
AB-33	783	3.2.7 Transmission rate (Equipment-item 2.12 of article 58) (Domestic mandatory) This item is added.
AB-34	783	3.2.8 Voice coding rate (Notification/ '98 year, number 463) (Domestic mandatory) This item is added.
AB-35	783	3.2.9 Frame length (Notification/ '98 year, number 463) (Domestic mandatory) This item is added.
AB-36	784	3.2.12 Radio station identification number (Domestic standard)
AB-37	784	3.2.12.1 Selective calling systems (Domestic standard) The calling identification memory device and the calling identification discrimination device for personal station shall be of a type conforming the established technical requirements for the public standard.
AB-38	784	3.2.12.2 Calling identification memory device requirements (Domestic standard) a) It should be possible to ~~Must~~ store calling identification code

Number	Page	Amendments
AB-39	784	3.2.12.3 Calling identification discrimination system requirement (Domestic standard) This item is added.
AB-40	784	3.2.16 Interference avoidance and transmission disable (Domestic standard)
AB-41	784	3.2.16.1 Interference avoidance (Domestic standard) This item is added.
AB-42	784	3.2.16.2 Transmission disable (Domestic standard)
AB-43	784	3.2.18 Transmission timing and transmission jitter (Domestic standard)
AB-44	784	3.3 Conditions for modulation method This item is added.
AB-45	784	3.3.1 Modulation method (Domestic standard) This item is added.
AB-46	784	3.3.1.1 Modulation method (Equipment-item 2.12 of article 58) (Domestic mandatory) This item is added.
AB-47	785	3.3.1.3 Spectrum shaping of baseband signal (Domestic standard) This item is added.
AB-48	785	3.3.2 Transmission rate (Equipment-item 2.12 of article 58) (Domestic mandatory) This item is added.
AB-49	785	3.4 Conditions relating to transmitter and receiver (Domestic standard)
AB-50	785	3.4.1 Frequency bands and carrier (Domestic standard) It is to be desired that the frequency bands and the carrier numbers of the ~~WLL~~ FWA system for overseas area should be based on the frequency bands and the carrier numbers for public system shown in Table 3.5 specified in Appendix AC of the main text. In case the system is not able to operate in the frequency bands for public system shown in Table 3.5 specified in Appendix AC of the main text, it is to be desired that the carrier number should be named in order from the lowest frequency as No.1 of the frequency number. In this case, however the carrier frequency spacing is to be 300 kHz and each frequency is to be some integral multiple of the carrier frequency spacing or of its divisor. The control carrier for each ~~WLL~~ FWA system is to be selected one carrier from the communication carriers for the public system.
AB-51	785	3.4.2 Transmission characteristics (Domestic standard) This item is added.
AB-52	785	3.4.2.1 Transmission power (Equipment-item 2.12 of article 58) (Domestic mandatory) This item is added.
AB-53	785	3.4.2.2 Transmission of calling identification code (Domestic standard) This item is added.
AB-54	786	3.4.2.3 Adjacent channel power (Equipment-item 2.12 of article 58) (Domestic mandatory) This item is added.
AB-55	786	3.4.2.5 Carrier off time leakage power (Equipment-item 2.12 of article 58) (Domestic mandatory) This item is added.

Number	Page	Amendments
AB-56	786	3.4.2.6 Transmission spurious (Equipment-article 7) (Domestic standard) This item is added.
AB-57	787	3.4.4 Antennas (Equipment- item 2.12 of article 58) (Domestic mandatory) (1) Cell station Antenna has a gain of ~~10~~ 22 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain ~~10~~ 22 dBi, the portion by which it is lower may be compensated by the gain of the antenna. ~~When adaptive allay antenna (The antenna which increases the antenna gain in the direction of the other party of communication, and decreases the antenna gain in the direction of the other radio stations which use the same channel) is applied to public system, antenna gain is 16dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 16 dBi, the portion by which it is lower may be compensated by the gain of the antenna.~~ (2) Personal station a) Cabinet-built-in-type antenna has a gain of ~~4~~ 22 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain ~~4~~ 22 dBi, the portion by which it is lower may be compensated by the gain of the antenna. (3) Relay station Antenna gain is ~~4~~ 22 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain ~~4~~ 22 dBi, the portion by which it is lower may be compensated by the antenna gain.
AB-58	804	4.2 Layer 1 standards (Domestic standard)
AB-59	804	4.2.5 Physical slot usage method (Domestic standard)
AB-60	804	4.2.5.1 Mapping of physical slots on frequency axis (Domestic standard) Except for the following items changed, this section conforms to the public standard in the section 4.2.5.1 of the main text. It is to be desired that the correspondence relationship of each physical slot with the control carrier exclusively used for control and communications carriers other than control carrier for the ~~WLL~~ FWA system for overseas conforms to Figure 4.2.3 specified in Appendix AC of the main text.
AB-61	804	4.2.7 Structure of logical control channel (Domestic standard)
AB-62	804	4.2.7.6 PS logical control channel usage (Domestic standard) (5) LCCH reception start operation A CS may be operated in 2LCCH usage mode in the ~~WLL~~ FWA system, and it is possible that each LCCH is independent. So, in this case, either LCCH must be received.
AB-63	804	(Note) In the ~~WLL~~ FWA system, recalling-type handover is a functional option.
	804	4.2.9 Slot structure (Domestic standard) This item is added.

Number	Page	Amendments
AB-64	806	4.3 Link channel establishment phase (Domestic standard)
AB-65	806	4.3.4 Message format (Domestic standard) Except for the following items changed, this section conforms to the public standard in the section 4.3.4 of the main text. System type 3, which is in link channel establishment request message, link channel establishment re-request message and 2nd system information broadcasting message, indicates the ~~WLL~~ FWA system.
AB-66	806	4.3.4.1.2 Link channel establishment request (Domestic standard) This item is added.
AB-67	806	4.3.4.1.3 Link channel assignment (Domestic standard) This item is added.
AB-68	806	4.3.4.1.5 Link channel establishment re-request (Domestic standard) This item is added.
AB-69	806	4.3.4.2 Broadcasting messages (Domestic standard) Except for the following items changed, this section conforms to the public standard in the section 4.3.4.2 of the main text. In the ~~WLL~~ FWA system, the control carrier structure (0 1) is standard, and in this time, n_{offset} is valid in the ~~WLL~~ FWA system as standard. Obtainable values of downlink LCCH profile data in the ~~WLL~~ FWA system are as follows. [LCCH structure parameters in the ~~WLL~~ FWA system]
AB-70	807	4.3.4.2.2 System information broadcasting message (Domestic standard) This item is added.
AB-71	808	4.4 Service channel establishment phase and communications phase (Domestic standard)
AB-72	808	4.4.3 Layer 3 standards (Domestic standard)
AB-73	808	4.4.3.1 Type 1 Overview (Domestic standard)
AB-74	808	4.4.3.1.1 Range of standard (Domestic standard)
AB-75	808	Table 4.4.3.1.2 RT function request contents default values (the ~~WLL~~ FWA system) (note)
AB-76	809	4.4.3.7 Call control (CC) (Domestic standard)
AB-77	809	4.4.3.7.1 Call control (CC) state definitions (Domestic standard) This item is added.
AB-78	809	4.4.3.7.1.1 CC state at PS This item is added.
AB-79	809	4.4.3.7.1.2 CC state at CS This item is added.
AB-80	809	4.4.3.7.2 Message function definitions and contents (Domestic standard)

Number	Page	Amendments
AB-81	809	4.4.3.7.2.1 CC message overview (Domestic standard) Except for the following items changed, this section conforms to the public standard in section 4.4.3.7.2.1 of the main text. Signal information element is referred to section 4.4.3.7.3.5.15. SETUP ACKnowledge message and USER INFOrmation message in Table 4.4.3.7.1 are also specified. Also, SETUP ACKnowledge message is standard, and USER INFOrmation message is a functional option.
AB-82	809	4.4.3.7.2.1.7 INFOrmation (Domestic standard)
AB-83	809	4.4.3.7.2.1.1.2 SETUP ACKnowledge This item is added.
AB-84	810	4.4.3.7.2.1.16 USER INFOrmation This item is added.
AB-85	810	Table 4.4.3.7.8 Information message contents (Note 2) Included when PS sends hooking signal during PS in active (P10) state in the ~~WLL~~ FWA system. (Note 12) Included when supplementary service that is not specified in the ~~WLL~~ FWA system is executed. Multiple extended supplementary service information elements indicated in section 4.4.3.7.3.5.f can be included.
AB-86	811	4.4.3.7.3 Message format and information element coding (Domestic standard)
AB-87	811	4.4.3.7.3.5 Other information elements (Domestic standard)
AB-88	811	4.4.3.7.3.5.1 Coding regulations (Domestic standard)
AB-89	811-812	Table 4.4.3.7.17 Information element coding (Note 3) This is a functional option in public, private and the ~~WLL~~ FWA system. (Note 4) Private and the FWA system only. This is a functional option in Private and the FWA system. (Note 5) This is used in the ~~WLL~~ FWA system when operators subjoin supplementary service individually. (Note 6) Private and the ~~WLL~~ FWA system only.
AB-90	813	4.4.3.7.3.5.4 Bearer capability (Domestic standard) This item is added.
AB-91	813	4.4.3.7.3.5.15 Signal (Domestic standard)
AB-92	814	Figure 4.4.3.7.18 Signal (Note) Used when only to request auto offhook to PS in case of subscriber line test signal transmission which is supplementary service of the ~~WLL~~ FWA system.
AB-93	814	4.4.3.7.3.5.25 More data This item is added.
AB-94	814	4.4.3.7.3.5.26 User-user This item is added.
AB-95	815	4.4.3.7.3.5.a Test starting (Domestic standard)
AB-96	816	4.4.3.7.3.5.b Test result (Domestic standard)

Number	Page	Amendments
AB-97	817	4.4.3.7.3.5.c Meter pulsing signal (Domestic standard)
AB-98	818	4.4.3.7.3.5.d Coin collection signal (Domestic standard)
AB-99	819	4.4.3.7.3.5.e Ground start signal (Domestic standard)
AB-100	820	4.4.3.7.3.5.f Extended supplementary service (Domestic standard) The extended supplementary service is used for the supplementary services that aren't specified beforehand by standards for the ~~WLL~~ FWA system. This information element is coded as shown in Figure 4.4.3.7.3.5.f.1 ~ Figure 4.4.3.7.3.5.f.2 (single octet) and Figure 4.4.3.7.3.5.f.3 ~ Figure 4.4.3.7.3.5.f.6 (multiple octets).
AB-101	822	4.4.3.7.4 Supplementary services (Domestic standard)
AB-102	822	4.4.3.7.4.1 Supplementary service types (Domestic standard)
AB-103	822	Table 4.4.3.7.18 Supplementary service types (Note) This supplementary service, which is defined only for the private system in the main test text, is standard in the ~~WLL~~ FWA system.
AB-104	822	4.4.3.7.4.1.a Subscriber line test signal transmission (Domestic standard)
AB-105	823	4.4.3.7.4.1.b Meter pulsing signal transmission (Domestic standard)
AB-106	824	4.4.3.7.4.1.c Coin collection signal transmission (Domestic standard)
AB-107	824	4.4.3.7.4.1.d Ground start signal transmission (Domestic standard)
AB-108	825	4.4.3.8 Control sequence (Domestic standard) This item is added.
AB-109	825	4.4.3.8.1 Outgoing call (Domestic standard) This item is added.
AB-110	825	4.4.3.8.1.2 Overlap sending (Domestic standard) This item is added.
AB-111	825	4.4.3.8.a Type 2 radio channel establishment sequence (Domestic standard) This item is added.
AB-112	826	Chapter 5 Voice Coding Method This item is added.
AB-113	828	5.2 Voice coding method (Domestic standard) This item is added.
AB-114	832	Appendix T CC SDL diagrams (PS side) (Domestic standard) This item is added.
AB-115	832	Appendix V CC SDL diagrams (CS side) (Domestic standard) This item is added.
AB-116	832	Appendix X CC circuit-switched call control procedures (Domestic standard) This item is added.

Number	Page	Amendments
AB-117	832	Appendix Z Operation of PS that has automatic location registration function (Domestic standard) This item is added.
AB-118	834	Attached document 1 ~~WLL~~ FWA system overview
AB-119	834	1. Definition of FWA system (1) The concepts of ~~WLL~~ FWA (Fixed Wireless Access) system are to provide the subscribers with the subscriber telephone services by changing the whole or a part of the subscriber line into the radio link in order to reduce the costs of the installation and of the maintenance of the subscriber line and to make the subscriber telephone services start rapidly.
AB-120	834-842	~~WLL~~ FWA
AN	1053	Appendix AN Importation of operation defined in other organizations in functional operation. This item is added.

Issued February 1999
RCR STD-28 Version 3 Rev.-2

AMENDMENT HISTORY

"____" Added; "═══" Deleted

Number	Page	Amendments
About description methods in this document		◆ The descriptions about version numbers of RCR STD-28 in this document, related standards and other related technical reports are defined as below. Basically, there are 2 patterns in the description on version numbers. 1. Regarding the description on the protocol version, in most of cases, a version number shall be expressed just itself as indicated in (1), but including all of its revision numbers if the revision numbers exit (See (1)). 2. However, in some cases, a version number might be expressed as "version number + its revision number" style as indicated in (2). (1) Version x → Version x.0 and Version x.n (n: If described only "Version x", Version x include all revision number of Version x. n=1, 2, …) (2) Version x Rev. - y → Version x.y
contents 1	i	Contents 2.1.3 Relay station (RS)
contents 2	i	2.6 64k bit/s Unrestricted Digital Information Service
contents 3	i	2.6.1 2slots fixed type 64k bit/s Unrestricted Digital Information Service
contents 4	i	2.6.2 Slot changeable type 64k bit/s Unrestricted Digital Information Service
contents 5	x	4.4.3.7.4.1.5 PHS User-to-User Signalling (PHS-UUS) supplementary service
contents 6	x	4.4.3.8.8.1.1 2slots fixed type 64k bit/s UDI Outgoing call (En-bloc sending)
contents 7	x	4.4.3.8.8.1.2 2slots fixed type 64k bit/s UDI Outgoing call (Overlap sending)
contents 8	x	4.4.3.8.8.1.3 Slot changeable type 64k bit/s UDI Outgoing call (En-bloc sending)
contents 9	x	4.4.3.8.8.1.4 Slot changeable type 64k bit/s UDI Outgoing call (Overlap sending)
contents 10	x	4.4.3.8.8.2.1 2slots fixed type 64k bit/s UDI Incoming call
contents 11	x	4.4.3.8.8.2.2 Slot changeable type 64k bit/s UDI Incoming call
contents 12	x	4.4.3.8.8.4.2 2slots fixed type 64k bit/s UDI Channel switching during communication (switching to other CS: PS recalling-type)
contents 13	x	4.4.3.8.8.4.3 2slots fixed type 64k bit/s UDI Channel switching during communication (switching to other CS: Recalling-type with PS request)
contents 14	x	4.4.3.8.8.4.4 2slots fixed type 64k bit/s UDI Channel switching during communication (switching to other CS: Recalling-type with CS indication)
contents 15	x	4.4.3.8.8.4.5 Slot changeable type 64k bit/s UDI Channel switching during communication (switching to other CS: PS recalling-type)
contents 16	xi	4.4.3.8.8.4.6 Slot changeable type 64k bit/s UDI Channel switching during communication (switching to other CS: Recalling-type with PS request)
contents 17	xi	4.4.3.8.8.4.7 Slot changeable type 64k bit/s UDI Channel switching during communication (switching to other CS: Recalling-type with CS indication)
contents 18	xi	4.4.3.8.8.5 Additional 2nd TCH during communication (Slot changeable type 64k bit/s UDI)
contents 19	xi	4.4.3.8.8.5.1 Additional 2nd TCH during communication (With PS request)
contents 20	xi	4.4.3.8.8.5.2 Additional 2nd TCH during communication (With CS indication)
contents 21	xi	4.4.3.8.8.6 2nd TCH disconnection processing procedure
contents 22	xi	6.3.1.2.1 Calling/Called of the 32k communication
contents 23	xi	6.3.1.2.2 Calling/Called of the 64k communication
contents 24	xi	6.3.2.2.1 Disconnect of the 32k communication
contents 25	xi	6.3.2.2.2 Disconnect of the 64k communication
contents 26	xi	6.3.3.2.1 Channel switching during of the 32k communication
contents 27	xi	6.3.3.2.2 Channel switching during of the 64k communication
contents 28	xii	6.4 Forwarding of group identification code for direct communication between PSs
contents 29	xii	6.4.1 Overview
contents 30	xii	6.4.2 Application scope

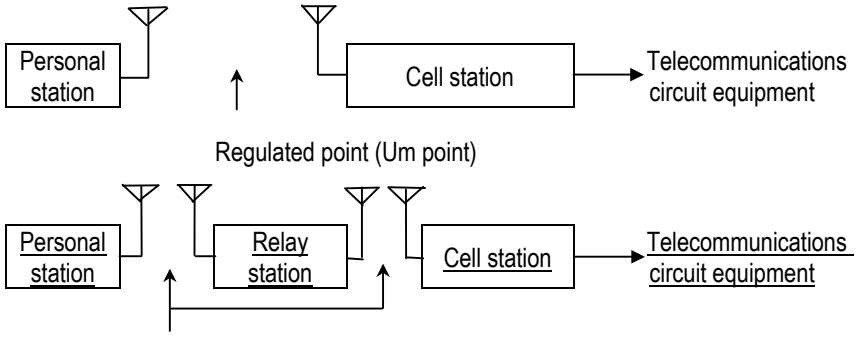
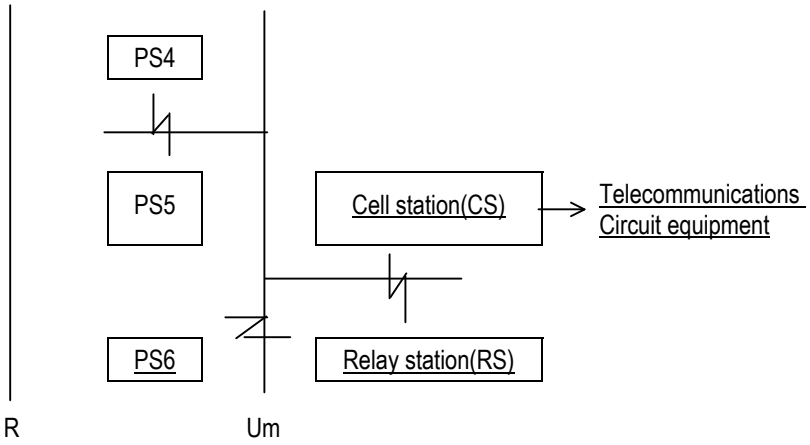
<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>contents 31</td><td>xii</td><td>6.4.3 Basic functions of forwarding of group identification code for direct communication between PSs</td></tr>
<tr><td>contents 32</td><td>xii</td><td>6.4.4 Available frequencies</td></tr>
<tr><td>contents 33</td><td>xii</td><td>6.4.5 Forwarding of group identification code for direct communication between PSs</td></tr>
<tr><td>contents 34</td><td>xii</td><td>6.4.6 Message</td></tr>
<tr><td>contents 35</td><td>xii</td><td>6.4.7 Control sequence</td></tr>
<tr><td>contents 36</td><td>xiv</td><td>Appendix AM Standard relating to supplementary service functions within PHS User-to-User Signaling (PHS-UUS)</td></tr>
<tr><td>contents 37</td><td>xv</td><td>RCR STD-28 Version 3 Rev.-2 Amendment History</td></tr>
<tr><td>1-1</td><td>1</td><td>1.1 Overview
(Line-2)
~~personal handy phone~~ → PHS</td></tr>
<tr><td>1-2</td><td>1</td><td>1.2 Application scope
Personal handy phone systems are constructed from the personal stations, ~~and~~ cell stations and relay stations (radio stations which relay communication between cell station and personal stations) shown in Figure 1.1.
 

Figure 1.1 Structure of personal handy phone system</td></tr>
<tr><td>1-3</td><td>3</td><td>1.4 Document conformity
Table 1.1 Distinction between cell station and personal station, and applicable Um point interface provisions.
<table>
<tr><th>Cell station / Personal Station</th><th>Digital cordless telephone Base station</th><th>~~Personal handy-phone~~ PHS Cell station</th><th>radio station which relay communication between cell station and personal stations</th></tr>
<tr><td>Digital cordless telephone personal station</td><td rowspan="2">Private system standard</td><td></td><td></td></tr>
<tr><td>~~Personal handy phone~~ PHS personal station (on-land)</td><td>Public system standard</td><td>Public system standard</td></tr>
<tr><td>radio station which relay communication between cell station and personal stations</td><td></td><td>Public system standard</td><td></td></tr>
</table></td></tr>
<tr><td>2-1</td><td>5</td><td>2.1 System structure
The personal handy phone system is made up of personal stations, ~~and~~ cell stations and radio stations which relay communications between cell stations and personal stations (hereinafter, referred as relay stations).</td></tr>
<tr><td>2-2</td><td>5</td><td>2.1.3 Relay station (RS) (Public standard)
This item is added.</td></tr>
</table>

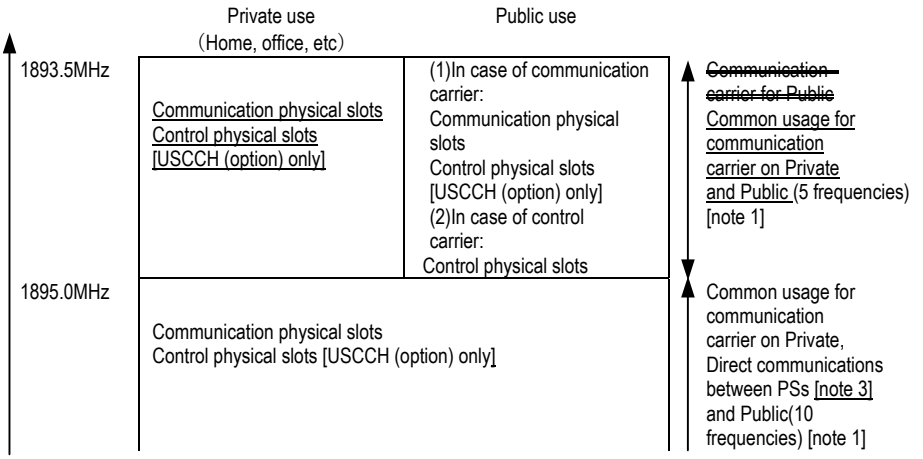
<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>2-3</td><td>6</td><td>2.2 Interface definition
 

(1) Um point : Interface point between personal station and cell station, interface point between relay station and cell station or personal station, or, interface point between personal station and personal station.
PS0, PS4, PS5, PS6 : Personal station, including integrated man/machine interface of terminals, etc.</td></tr>
<tr><td>2-4</td><td>7</td><td>2.3.1.1 Basic functions
(3) The personal station, ~~and~~ cell station and relay station have a slot-unit interference detection function, and can automatically allocate a less interfered channel.
(4) If interference is received during communication, the personal station, ~~and~~ cell station and relay station can avoid interference in slot units.</td></tr>
<tr><td>2-5</td><td>9</td><td>2.3.2.2 Service types
Table 2.2 Service types
<table>
<tr><th>Type</th><th>Item</th><th>Overview</th></tr>
<tr><td>Bearer service</td><td>64k bit/s unrestricted digital
(note 3)</td><td>Using max 2 channels on Um point, provides bearer capability suited for digital data communication with terminal; information is transmitted transparently.</td></tr>
<tr><td>Supplementary services</td><td>PHS User-to-User Signaling (PHS-UUS) supplementary service
(note 3)(note 4)</td><td>Service which allows PS to send/receive a limited amount of information to/from another PS over the communication channel in association with a call to the other PS.</td></tr>
</table>
(Note 4) Public only</td></tr>
<tr><td>2-6</td><td>12</td><td>2.4.4 Carrier structure
Table 2.4 Carrier structure
<table>
<tr><td rowspan="3">Communications carriers</td><td>(a) Common usage for Private, Direct communication between PSs, and Public</td><td>10 frequencies</td><td>Decreases the number of control carriers for public. (note)
In direct communication between personal stations in a specific group, is made use of 3 carriers from 10 carriers for direct communication between personal stations.</td></tr>
<tr><td>(b) Common usage for Private and Public</td><td>~~25~~30 frequencies</td><td>Decreases the number of control carriers for public system. (note)</td></tr>
<tr><td>(c) Public</td><td>~~50~~45 frequencies</td><td>Decreases the number of control carriers for public system. (note)</td></tr>
</table></td></tr>
</table>

Number	Page	Amendments
2-7	17	2.6 64k bit/s Unrestricted Digital Information Service This item is added. 2.6.1 2slots fixed type 64k bit/s Unrestricted Digital Information Service This item is added. 2.6.2 Slot changeable type 64k bit/s Unrestricted Digital Information Service This item is added.
2-8	17	~~2.6~~ 2.7 Encryption method
2-9	17	~~2.7~~ 2.8 VOX control
2-10	18	~~2.8~~ 2.9 PS numbers
2-11	18	~~2.9~~ 2.10 Direct communication between personal stations As an auxiliary means of communication in locations where communication cannot be performed via a cell station, the personal stations of this system can perform direct communication between personal stations without going through a cell station (below called "direct communication between personal stations"). And, direct communication between personal stations that can communicate in a specific group according to necessary(below called “direct communication between personal stations in a specific group”)can perform within limited carriers. (below called standard of “direct communication between personal stations” apply to “direct communications between personal stations in a specific group”, but standard of “direct communication between personal stations in a specific group” doesn’t apply to “direct communication between personal stations”.)
3-1	19	3.2.1 Radio frequency band (Execute-article 6, Equipment-article 7 and item 8.2 of article 49) The radio frequency band used is the 1,900 MHz band (Private system: ~~1, 895~~ 1,893.5 MHz-1, 906.1 MHz and Public system: 1,893.5 MHz-1,919.6 MHz).
3-2	19	3.2.5 Number of multiplexed circuits (Notification/ ~~'93 year, number 522~~ ’98 year, number 612) The number of multiplexed circuits for TDMA is 4 (when using full rate codec). Also, with the exception of during channel switching, the maximum number of channels that can be simultaneously by a personal station is ~~two~~ four. Further, in the case of direct communication between personal stations, the maximum number of usable channels is ~~one~~ two.
3-3	20	3.2.8 Voice coding rate (Notification/ ~~'93 year, number 522~~ ’98 year, number 612)
3-4	20	3.2.9 Frame length (Notification/ ~~'93 year, number 522~~ ’98 year, number 612)
3-5	20	3.2.12.1 Selective calling systems (Equipment-item 2 of article 9) (Private mandatory/Public ~~mandatory~~ standard) The calling identification memory device and the calling identification discrimination device ~~each~~ for ~~radio~~ base station~~s~~ (meaning the radio station which is mainly used fixedly) of digital cordless telephone ~~and personal station (on land) of personal handy phone~~ shall be of a type conforming the established technical requirements.
3-6	20	3.2.12.2 Calling identification memory device requirements (Notification/ ~~'93 year, number 522~~ ’98 year, number 517) (Private mandatory/Public ~~mandatory~~ standard) ~~a) Must store calling identification code by a method approved by Minister of Posts and Telecommunications.~~ ~~b)~~ a) The stored calling identification code must not be easily erasable. ~~c)~~ b) Transmission must not be possible if the calling identification code has not been stored. ~~d)~~ c) The calling identification memory device must not be easily retrievable.
3-7	21	3.2.12.3 Calling identification discrimination system requirements (Notification/ ~~'93 year, number 522~~ ’98 year, number 517) (Private mandatory/Public ~~mandatory~~ standard) The calling identification code ~~of the peer radio station~~ (meaning the code for the purpose of identifying person(s) with whom the radio communication service is performed, excluding the identification signal under Article 8 paragraph (1) item iii) of the Radio Law) must be detectable from the radio waves received.

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>3-8</td><td>21~23</td><td>3.2.15 Physical slot transmission condition
(1) Control carrier (Notification/ '~~93 year, number 522~~ '98 year, number 612)
Table 3.1 Carrier sensing levels
<table>
<tr><td>Level 1</td><td>26 dBμV</td></tr>
<tr><td>Level 2</td><td>~~40~~ 44 dBμV</td></tr>
</table></td></tr>
<tr><td>3-9</td><td>30</td><td>3.2.20 Output power specified by the Terminal Equipment Regulations
(1) Output power of PS
Table 3.3.1 Output power tolerance limits of PS
<table>
<tr><th>Item</th><th>Output power tolerance limits</th></tr>
<tr><td>Output power</td><td>Less than ~~–15~~ –8 dBm (Mean level), and not exceeding 0dBm (Maximum level).</td></tr>
</table></td></tr>
<tr><td>3-10</td><td>31</td><td>(2) Output power of CS (Output power when CS is connected to analog network)
Table 3.3.2 Output power tolerance limits of CS
<table>
<tr><th>Item</th><th>Output power tolerance limits</th></tr>
<tr><td>Signal output level up to 4kHz</td><td>Less than ~~(15+ L)~~ –8 dBm (Mean level), and not exceeding 0dBm (Maximum level).</td></tr>
</table>
~~(Note 1) L is the line transmission loss between the switching facilities of the type I telecommunications carrier and the point of connection to the terminal equipment at 1,500Hz.~~
~~(Note 2)~~ → (Note 1) , ~~(Note 3)~~ → (Note 2) , ~~(Note 4)~~ → (Note 3)</td></tr>
<tr><td>3-11</td><td>31</td><td>(3) Output power of CS (Output power when CS is connected to digital network)
Table 3.3.3 Output power tolerance limits of CS
<table>
<tr><th>Item</th><th>Output power tolerance limits</th></tr>
<tr><td>Output power</td><td>Less than ~~–15~~ –8 dBm (Mean level), and not exceeding 0dBm (Maximum level).</td></tr>
</table></td></tr>
<tr><td>3-12</td><td>35</td><td>3.4.1 Frequency bands and carrier
Table 3.5 Relationship between frequency bands and carrier numbers
<table>
<tr><th>Carrier numbers</th><th>Frequency bands (MHz)</th><th>Usefulness</th><th>Carrier numbers</th><th>Frequency bands (MHz)</th><th>Usefulness</th></tr>
<tr><td>251</td><td>1,893.650</td><td></td><td>.38</td><td>1,906.250</td><td></td></tr>
<tr><td>252</td><td>950</td><td rowspan="4">Common usage for communication carrier ~~for~~ on Private and Public (note 1)</td><td>39</td><td>550</td><td rowspan="4"></td></tr>
<tr><td>253</td><td>1,894.250</td><td>40</td><td>850</td></tr>
<tr><td>254</td><td>550</td><td>41</td><td>1,907.150</td></tr>
<tr><td>255</td><td>850</td><td>42</td><td>450</td></tr>
<tr><td>1</td><td>1,895.150</td><td></td><td>43</td><td>750</td><td></td></tr>
<tr><td>2</td><td>.450</td><td rowspan="6">Common usage for communication carrier on Private, Direct communications between PSs (note 2) and Public (note 1)</td><td>44</td><td>1,908.050</td><td rowspan="6"></td></tr>
<tr><td>3</td><td>750</td><td>45</td><td>350</td></tr>
<tr><td>4</td><td>1,896.050</td><td>46</td><td>650</td></tr>
<tr><td>5</td><td>350</td><td>.47</td><td>950</td></tr>
<tr><td>6</td><td>650</td><td>48</td><td>1,909.250</td></tr>
<tr><td>7</td><td>950</td><td>.49</td><td>550</td></tr>
</table>
In the Table, ~~(Note)~~ → (Note 1)
(Note 1) Includes more than one control carrier for public system, as the case may be.
(Note 2) Includes 3 carriers(4,7,9) for direct communication between personal stations in a specific group.</td></tr>
</table>

Number	Page	Amendments
3-13	36	3.4.2.1 Transmission power (Execute-article 6 and Equipment-item 8.3 of article 49) (2) Standards Maximum transmission power: For public cell stations, it is 500 mW or less. For other cell stations, ~~and~~ personal stations and relay stations, it is 10 mW or less. However, in cases where public cell stations use frequency band ~~1895.15~~ 1893.65 MHz – 1905.95 MHz ~~which is common usage for communication carrier on private and public band~~, maximum transmission power is ~~10~~ 20mW or less, and in cases of using frequency band 1915.85 MHz – 1918.25 MHz, it is 2W or less. Output accuracy: Within + 20%, -50%
3-14	36	3.4.2.2 Transmission of calling identification code (Notification/'94 year, number 424 and ~~'93 year, number 521~~ '98 year, number 517) (Private mandatory/Public mandatory) When the calling identification code is transmitted, the signal transmitted from the transmitter must be as follows: (1) For personal stations, the signal is 28 bits, and for digital cordless telephone base stations, the signal comprises 29 bits. (Refer to section 4.2.10.) (Private mandatory/Public mandatory) (2) The signal has the established slot configuration, and transmits using channel coding and scrambling methods. (Refer to section 4.2.9, section 4.2.10, and section 4.2.11.) (Private mandatory/Public standard)
3-15	45	3.4.4 Antennas (Equipment-item 8.2 of article 49 and item 8.3 of article 49) (1) Cell station Antenna for private system is cabinet-built-in-type with gain of ~~2.14~~ 4 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain ~~2.14~~ 4 dBi, the portion by which it is lower may be compensated by the gain of the antenna. Antenna for public system has a gain of 10 dBi or less (except 1898.45 MHz and 1900.25 MHz). However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 10 dBi, the portion by which it is lower may be compensated by the gain of the antenna. When adaptive allay antenna (The antenna which increase the antenna gain in the direction of the other party of communication, and decrease the antenna gain in the direction of the other radio stations which use same channel) is applied to public system, antenna gain is 16 dBi or less (except 1898.45 MHz and 1900.25 MHz). However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 16 dBi, the portion by which it is lower may be compensated by the gain of the antenna. ~~However, in cases where public cell stations use frequency band 1895.15 MHz – 1905.95 MHz (except 1898.45 MHz and 1900.25 MHz) which is common usage for communication carrier on private and public band, antenna has a gain of 2.14 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 2.14 dBi, the portion by which it is lower may be compensated by the gain of the antenna.~~
3-16	45	(2) Personal station Cabinet-built-in-type antenna with gain of ~~2.14~~ 4 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain ~~2.14~~ 4 dBi, the portion by which it is lower may be compensated by the gain of the antenna.
3-17	45	(3) Relay station Antenna gain is 4 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 4 dBi, the portion by which it is lower may be compensated by the antenna gain.

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>4.2－1</td><td>54</td><td>4.2.5.1 Mapping of physical slots on frequency axis
 

[note 3] Includes 3 carriers(4,7,9) for direct communication between personal stations in a specific group.
Figure 4.2.3 Mapping of physical slots on frequency axis</td></tr>
<tr><td>4.2-2</td><td>76</td><td>4.2.9 Slot structure
(2) Preamble pattern (Private mandatory/Public ~~mandatory~~ standard)</td></tr>
<tr><td>4.2-3</td><td>76</td><td>(3) Unique word pattern (Private mandatory/Public ~~mandatory~~ standard)</td></tr>
<tr><td>4.2-4</td><td>76</td><td>4.2.10.1 Channel coding rules
(3) The error detection CRC code is as follows:
(Private mandatory/Public ~~mandatory~~ standard)</td></tr>
<tr><td>4.2-5</td><td>77</td><td>4.2.10.2.1 Structure of calling station identification code and called station identification code
(3) Identification code format (Private mandatory/Public ~~mandatory~~ standard)</td></tr>
<tr><td>4.2-6</td><td>79</td><td>4.2.10.2.2 Bit transmission order of calling station identification code and called station identification code
(3) PS-ID (Private mandatory/Public ~~mandatory~~ standard)</td></tr>
<tr><td>4.2-7</td><td>96</td><td>4.2.11.1 Scramble pattern
(2) For control physical slots (Private mandatory/Public ~~mandatory~~ standard)</td></tr>
<tr><td>4.2-8</td><td>97</td><td>4.2.11.2 Scramble method
(2) Scramble processing (Private mandatory/Public ~~mandatory~~ standard)</td></tr>
<tr><td>4.2-9</td><td>98</td><td>4.2.11.3 Scramble application area
(1) Control physical slots (basic physical slots, extension physical slots)
(Private mandatory/Public ~~mandatory~~ standard)</td></tr>
<tr><td>4.3-1</td><td>116</td><td>4.3.2.2.3 System information default regulations
Table 4.3.2-2 System information default values (public system)
<table>
<tr><th>Function</th><th>Default</th><th>Notes</th></tr>
<tr><td>RT-MM protocol version</td><td>Version 1 (RCR STD-28 (version 1) ~~or RCR STD-28 (version 1 Rev. 1)~~)</td><td></td></tr>
</table></td></tr>
<tr><td>4.3-2</td><td>128</td><td>4.3.4.1.2 Link channel establishment request
Table 4.3.9 Link channel establishment request message
<table>
<tr><th>Bit / Octet</th><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th></tr>
<tr><td>4</td><td colspan="3">Reserved</td><td colspan="2">Notification of usable band ~~(note)~~</td><td colspan="3">Area information notification status number</td></tr>
</table>
~~(Note) This information elements is used only in public system, and it is reserved in private system.~~</td></tr>
</table>

Number	Page	Amendments
4.3-3	128	4.3.4.1.2 Link channel establishment request Table 4.3.10 Information elements in link channel establishment request message System type (octet 3) Bit 6 5 4 0 0 0 Public sytem (including private system based on RCR STD-28 (version 1) ~~or RCR STD-28 (version 1 Rev. 1)~~) 0 0 1 Private system based on RCR STD-28 (version 2) or RCR STD-28 (version 3)
4.3-4	129	Table 4.3.10 Information elements in link channel establishment request message RT-MM protocol version (octet 3) Bit 3 2 1 0 0 0 Version 1 (RCR STD-28 (version 1)~~or RCR STD-28 (version 1 Rev. 1)~~) 0 0 1 Version 2 (RCR STD-28 (version 2)) 0 1 0 Version 3 (RCR STD-28 (version 3) ~~or RCR STD-28 (version 3 Rev. 1)~~) Notification of usable band (octet 4) This element notifies usable frequency band for the PS. Bit 5 4 0 0 Corresponds to the frequency band specified by RCR STD-28 version 1 ~~/ version 1 Rev. 1~~ / version 2 / version 3. 0 1 ~~Frequency band which is specified by RCR STD-28 version 3 Rev. 1~~ In case of public system, corresponds to the frequency band specified by RCR STD-28 version 3 Rev.-1 or newer version. In case of private system, corresponds to the frequency band specified by RCR STD-28 version 3.2 or newer version.
4.3-5	136~138	4.3.4.1.5 Link channel establishment re-request Table 4.3.16 Information elements in link channel establishment re-request message System type (octet 3) Bit 6 5 4 0 0 0 Public system (including private system based on RCR STD-28 (version 1) ~~or on RCR STD-28 (version 1 Rev. 1)~~) 0 0 1 Private system based on RCR STD-28 (version 2) or RCR STD-28 (version 3) RT-MM protocol version (octet 3) Bit 3 2 1 0 0 0 Version 1 (RCR STD-28 (version 1) ~~or RCR STD-28 (version 1 Rev. 1)~~) 0 0 1 Version 2 (RCR STD-28 (version 2)) 0 1 0 Version 3 (RCR STD-28 (version 3)~~or RCR STD-28 (version 3 Rev. 1)~~
4.3-6	140	4.3.4.2.1 Radio channel information broadcasting message Table 4.3.18 Information elements in radio channel information broadcasting message 2nd system information broadcasting usage method (octet 4) Bit 7 0 2nd system information broadcasting usage method is in according to the method indicated by RCR STD-28 (version 1) ~~or RCR STD-28 (version 1 REV. 1)~~. 1 2nd system information broadcasting usage method is according to the method indicated by RCR STD-28 (version 2) to follow thereafter.

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>4.3-7</td><td>153</td><td>4.3.4.2.2 System information broadcasting message
RT-MM protocol version (octet 4)
Bit
8 7 6 5 4 3 2 1
x x x x x x x 1/0 Version 1 (RCR STD-28 (version 1) ~~or RCR STD-28 (version 1 REV. 1)~~) present/absent
x x x x x x 1/0 x Version 2 (RCR STD-28 (version2)) present/absent (reserved for public system)
x x x x x 1/0 x x Version 3 (RCR STD-28 (version3)) present/absent (reserved for public system)</td></tr>
<tr><td>4.3-8</td><td>158</td><td>4.3.4.2.3 2nd system information broadcasting message
Table 4.3.23 Information elements in 2nd system information broadcasting message
System type (octet 4)
Bit
8 7 6 5 4 3 2 1
x x x x x x x 1/0 Public system (include private system based on RCR STD-28 (version 1) ~~or RCR STD-28 (version 1 Rev. 1)~~ present/absent
x x x x x x 1/0 x Private system based on RCR STD-28 (version 2) or RCR STD-28 (version 3) present/absent

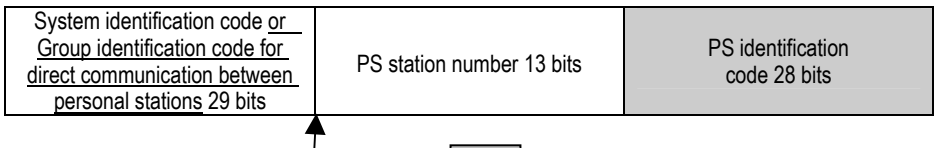
RT-MM protocol version (octet 5)
Bit
8 7 6 5 4 3 2 1
x x x x x x x 1/0 Version 1 (RCR STD-28 (version 1) ~~or RCR STD-28 (version 1 Rev. 1)~~) present/absent
x x x x x x 1/0 x Version 2 (RCR STD-28 (version 2)) present/absent
x x x x x 1/0 x x Version 3(RCR STD-28 (version 3) ~~or RCR STD-28 (version 3 Rev. 1)~~) present/ absent</td></tr>
<tr><td>4.4-1</td><td>225</td><td>4.4.3.1.1 Range of standard
Table 4.4.3.1.3 Defaults of additional TCH assignment function under 64k unrestricted digital (public/private)(note)
<table><tr><th>Function request</th><th>Default</th><th>Notes</th></tr><tr><td>Additional TCH assignment function type</td><td>PS/CS common: Same carrier, adjacent slot, additional TCH assignment function present.
Optional carrier, one slot separation, additional TCH assignment function present.
Optional carrier, not same slot, additional TCH assignment function present.
Slot changeable type Information function absent.</td><td></td></tr></table></td></tr>
<tr><td>4.4-2</td><td>267</td><td>4.4.3.5.3.4.5 Cause
Cause value (octet 2)
Bit
7 6 5 4 3 2 1
0 1 0 - - - - Resource use impossible class
0 1 0 0 No additional channel (TCH) (Slot changeable information possible)
1 1 1 1 Other resource use impossible (Includes no channel adding function)
Figure 4.4.3.5.10 Cause</td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>4.4-3</td><td>282~283</td><td>4.4.3.5.3.4.18 TCH switching
TCH switching function type (octet 2)
Bit
8 7 6 5 4 3 2 1
0 x x x x x x 1/0 Switching control function for communications physical slots within carrier within CS present/absent
~~{Standard (mandatory) }~~ {PS standard (mandatory) : CS option (note 6) in private. Standard (mandatory) in public.}
0 x x x x x 1/0 x Switching control function for communications physical slots between carriers within CS present/absent
~~{Standard (mandatory) }~~ {PS standard (mandatory) : CS option (note 6) in private. Standard (mandatory) in public.}
(Note 6) It shall be required to be equipped with both or one of the following functions; switching control function for communications physical slots within carrier within CS or/and switching control function for communications physical slots between carriers within CS.</td></tr>
<tr><td>4.4-4</td><td>292</td><td>4.4.3.5.3.4.26 Additional TCH Adoption Capability
Additional TCH assignment function type (octet 3)
Bit
8 7 6 5 4 3 2 1
0 x x x x x x 1/0 Slot changeable information function prezent/absent
Other Reserved
1:present, 0:absent, x: Don't care

~~(note) Octet 3 of Additional TCH assignment function type is reserved in the public standard, and is optional in the private standard.~~</td></tr>
<tr><td>4.4-5</td><td>360</td><td>4.4.3.7.3.5.1 Coding regulations
Table 4.4.3.7.18 Information element coding
Bit
8 7 6 5 4 3 2 1
0 - - - - - - - Multiple octet information element
1 1 1 1 1 1 0 User-user (note ~~4~~ 3)</td></tr>
<tr><td>4.4-6</td><td>417</td><td>4.4.3.7.3.5.26 User-user (Private standard/Public standard)
Protocol discriminator (octet 3)
Bit
8 7 6 5 4 3 2 1
0 1 0 0 0 0 1 1 Common format of specific application identifications</td></tr>
<tr><td>4.4-7</td><td>418</td><td>4.4.3.7.4.1 Supplementary service types
Table 4.4.3.7.19 Supplementary service types
<table><tr><th>Supplementary service</th><th>Reference</th></tr><tr><td>DTMF signal transmission</td><td>4.4.3.7.4.1.1</td></tr><tr><td>Hooking signal transmission (note 1)</td><td>4.4.3.7.4.1.2</td></tr><tr><td>Supplementary service within the CS – PS loop (note 1)</td><td>4.4.3.7.4.1.3</td></tr><tr><td>Pause signal transmission (note 1)</td><td>4.4.3.7.4.1.4</td></tr><tr><td>PHS User-to-User Signaling (PHS-UUS) supplementary service (note 2)</td><td>4.4.3.7.4.1.5</td></tr></table>(Note 1) Only in private system</td></tr>
<tr><td>4.4-8</td><td>421</td><td>4.4.3.7.4.1.5 PHS User-to-User Signaling (PHS-UUS) supplementary service (Public standard)
This item is added.</td></tr>
</table>

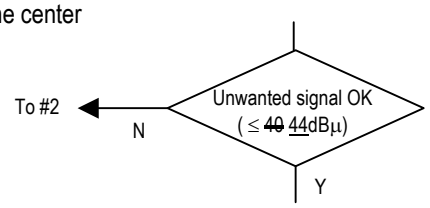
Number	Page	Amendments
4.4-9	454	4.4.3.8.8.1.1 2 slots fixed type 64kbit/sUDI Outgoing call (En-bloc sending) The Control Sequence of en-bloc sending in 2 slots fixed type 64kbit/s Unrestricted Digital Information is shown in Figure 4.4.3.8.15.
4.4-10	456	Figure 4.4.3.8.15 Control sequence (2 slots fixed type 64kbit/s UDI Outgoing call (En-bloc sending))
4.4-11	457	4.4.3.8.8.1.2 2 slots fixed type 64kbit/s UDI Outgoing call (Overlap sending) The control sequence of overlap sending in 2 slots fixed type 64k bit/s Unrestricted Digital Information service is shown in Figure 4.4.3.8.16.
4.4-12	457	Figure 4.4.3.8.16 Control sequence (2 slots fixed type 64kbit/s UDI Outgoing call (Overlap sending))
4.4-13	459~462	4.4.3.8.8.1.3 Slot changeable type 64k bit/s UDI Outgoing call (En-bloc sending) (Private standard/Public standard) This item is added. Figure 4.4.3.8.17 Control sequence (Slot changeable type 64kbit/s UDI Outgoing call (En-bloc sending)) This figure is added.
4.4.-14	463~464	4.4.3.8.8.1.4 Slot changeable type 64k bit/s UDI Outgoing call (Overlap sending) (Private standard) This item is added. Figure 4.4.3.8.18 Control sequence (Slot changeable type 64kbit/s UDI Outgoing call (Overlap sending)) This figure is added.
4.4-15	465~467	4.4.3.8.8.2.1 2 slots fixed type 64k bit/s UDI Incoming call (Private standard/ Public standard) This item number is newly added. The control sequence of incoming call is shown in Figure 4.4.3.8.~~17~~ 19. Figure 4.4.3.8.~~17~~ 19 Control sequence (2 slots fixed type 64kbit/s UDI Incoming call)
4.4-16	468~471	4.4.3.8.2.2 Slot changeable type 64k bit/s UDI Incoming call (Private standard/ Public standard) (Private standard/Public standard) This item is added. Figure 4.4.3.8.20 Control sequence (Slot changeable type 64kbit/s UDI Incoming call) This figure is added.
4.4-17	472	4.4.3.8.8.3 64kbit/s UDI Disconnect The control sequence of disconnect is shown in Figures 4.4.3.8.~~18~~ 21 and ~~19~~ 22. Figure 4.4.3.8.~~18~~ 21 Control sequence (64kbit/s UDI PS side disconnect) Figure 4.4.3.8.~~19~~ 22 Control sequence (64kbit/s UDI CS side disconnect)
4.4-18	473~474	4.4.3.8.8.4.1 64kbit/s UDI Channel switching during communication (switching on same CS) The control sequence is shown in Figure 4.4.3.8.~~20~~ 23 and ~~21~~ 24. Figure 4.4.3.8.~~20~~ 23 Control sequence (64kbit/s UDI Channel switching during communication (switching on same CS, 1st TCH)) Figure 4.4.3.8.~~21~~ 24 Control sequence (64kbit/s UDI Channel switching during communication (switching on same CS, 2nd TCH))
4.4-19	475~478	4.4.3.8.8.4.2 2 slots fixed type 64kbit/s UDI Channel switching during communication (switching to other CS : PS recalling-type) The control sequence is shown in Figure 4.4.3.8.~~22~~ 25. Figure 4.4.3.8.~~22~~ 25 Control sequence (2 slots fixed type 64kbit/s UDI Channel switching during communication (switching to other CS : PS recalling-type)
4.4-20	479~482	4.4.3.8.8.4.3 2 slots fixed type 64kbit/s UDI Channel switching during communication (switching to other CS : Recalling-type with PS request) The control sequence is shown in Figure 4.4.3.8.~~23~~ 26 and ~~24~~ 27. Figure 4.4.3.8.~~23~~ 26 Control sequence (2 slots fixed type 64kbit/s UDI Channel switching during communication (Switching to other CS **:** Recalling-type with PS request from 1st TCH side)) Figure 4.4.3.8.~~24~~ 27 Control sequence (2 slots fixed type 64kbit/s UDI Channel switching during communication (Switching to other CS **:** Recalling-type with PS request from 2nd TCH side))

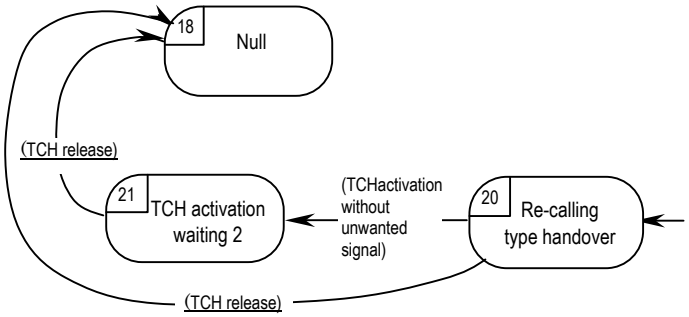
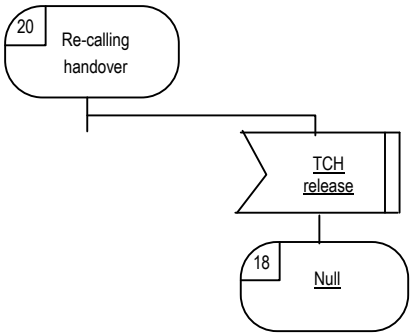
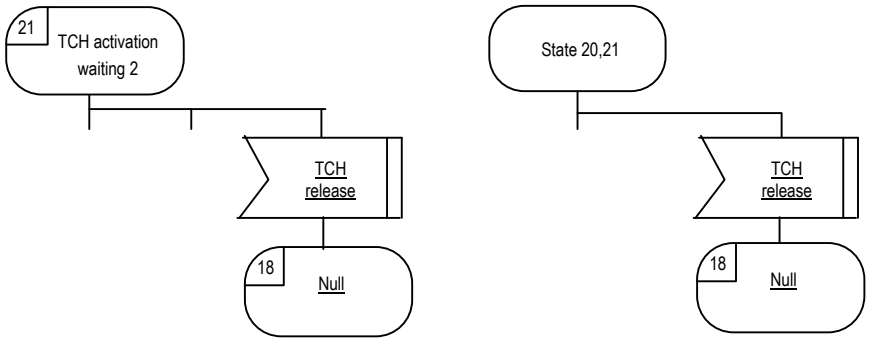
Number	Page	Amendments
4.4-21	483~486	4.4.3.8.8.4.4 2 slots fixed type 64kbit/s UDI Channel switching during communication (switching to other CS : Recalling-type with CS indication) The control sequence is shown in Figure 4.4.3.8.~~25~~ 28 and ~~26~~ 29. Figure 4.4.3.8.~~25~~ 28 Control sequence (2 slots fixed type 64kbit/s UDI Channel switching during communication (Switching to other CS **:** Recalling-type with CS indication from 1st TCH side)) Figure 4.4.3.8.~~26~~ 29 Control sequence (2 slots fixed type 64kbit/s UDI Channel switching during communication (Switching to other CS **:** Recalling-type with CS indication from 2nd TCH side))
4.4-22	487~490	4.4.3.8.8.4.5 Slot changeable type 64k bit/s UDI Channel switching during communication (switching to other CS : PS recalling-type) (Private standard/Public standard) This item is added. Figure 4.4.3.8.30 Control sequence (Slot changeable type 64k bit/s UDI Channel switching during communication (Switching to other CS : PS recalling-type)) This figure is added.
4.4-23	491~494	4.4.3.8.8.4.6 Slot changeable type 64k bit/s UDI Channel switching during communication (switching to other CS : Recalling-type with PS request) (Private standard/Public standard) This item is added. Figure 4.4.3.8.31 Control sequence (Slot changeable type 64k bit/s UDI Channel switching during communication (Switching to other CS : Recalling-type with PS request from 1st TCH side)) This figure is added. Figure 4.4.3.8.32 Control sequence (Slot changeable type 64k bit/s UDI Channel switching during communication (Switching to other CS : Recalling-type with PS request from 2nd TCH side)) This figure is added.
4.4-24	495~498	4.4.3.8.8.4.7 Slot changeable type 64k bit/s UDI Channel switching during communication (switching to other CS : Recalling-type with CS indication) (Private standard/Public standard) This item is added. Figure 4.4.3.8.33 Control sequence (Slot changeable type 64k bit/s UDI Channel switching during communication (Switching to other CS : Recalling-type with CS indication from 1st TCH side)) This figure is added. Figure 4.4.3.8.34 Control sequence (Slot changeable type 64k bit/s UDI Channel switching during communication (Switching to other CS : Recalling-type with CS indication from 2nd TCH side)) This figure is added.
4.4-25	499~500	4.4.3.8.8.5 Additional 2nd TCH during communication (Slot changeable type 64k bit/s UDI) (Private standard/Public standard) This item is added. 4.4.3.8.8.5.1 Additional 2nd TCH during communication (With PS request) (Private standard/Public standard) This item is added. Figure 4.4.3.8.35 Control sequence (Additional 2nd TCH during communication (With PS request)) This figure is added. 4.4.3.8.8.5.2 Additional 2nd TCH during communication (With CS indication) (Private standard/Public standard) This item is added. Figure 4.4.3.8.36 Control sequence (Additional 2nd TCH during communication (With CS indication)) This figure is added.
4.4-26	501	4.4.3.8.8.6 2nd TCH disconnection processing procedure (Slot changeable type) (Private standard/Public standard) This item is added. Figure 4.4.3.8.37 Control sequence (PS side 2nd TCH disconnect) This figure is added. Figure 4.4.3.8.38 Control sequence (CS side 2nd TCH disconnect) This figure is added.

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>6-1</td><td>505</td><td>
6.2.1 Multichannel access method
Communication between PSs in which the origination-side detects a free slot in the communications carrier and makes the call without setting up a dedicated control carrier, and the destination-side scans all channels. In the case of direct communication between PSs in a specific group, the destination-side scans decided 3 carriers. And in the case two channels are used, combinations and a use order of carriers and slots are shown in Table 6.2.1.
Table 6.2.1 Usage of carriers and slots in the case of two-slots communication
<table>
<tr><th>Communication status</th><th>Mandatory functions</th><th>Use order of functions</th></tr>
<tr><td>The second alerting or the second synchronization in the case of channel switching on 64kbit/s communication</td><td>(1) The same carrier and two sequential slots
(2) The same carrier or different two carriers, and a slot and every other slot</td><td>(1) should be used in preference.
(2) is used by necessity.</td></tr>
</table>
Note: The first TCH of the origination-side should be the first slot.
</td></tr>
<tr><td>6-2</td><td>507</td><td>
6.2.5.3 Structure of calling station identification code/called station identification code
The structure and methods of use of the calling station identification code and called station identification code in communication between PSs are shown below.
(1) Calling station identification code: Origination-side PS identification code (PS-ID)
(2) Called station identification code: System identification code or Group identification code for direct communication between personal stations + destination-side PS station number
The PS station number is the PS logical number valid only in communication between PSs mode, and is the part that is open to the user. The lead bit of the PS station number which consists of 13bits starts from the 30th bit (*) of the called station identification code.
Communication between PSs(*) is valid only between PSs that share either the same system identification code or the same group identification code for direct communication between personal stations.
Called station identification code 42 bits Calling station identification code 28 bits


PS station number lead bit (*) : Code necessary for radio supervision
Figure 6.2.2 Structure of calling station identification code, called station identification code
</td></tr>
<tr><td>6-3</td><td>508</td><td>
6.2.5.4 CI bit coding
Table 6.2.~~1~~ 2 CI coding
</td></tr>
<tr><td>6-4</td><td>508</td><td>
6.2.5.5 Scramble
(2) For communication physical slots
The scramble pattern register initial value of the communication physical slots is a pattern in which a lead bit (fixed at "1") is added to the lower 9 bits of either the system identification code or the group identification code for direct communication between personal stations (29 bits).
</td></tr>
<tr><td>6-5</td><td>509</td><td>
6.3.1.1 Message format for communication between personal stations
Table 6.3.2 Information elements in message for direct communication between personal stations
Message type (octet 1)
Bit
<table>
<tr><th>8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th><th></th></tr>
<tr><td>1</td><td>0</td><td>0</td><td>0</td><td>0</td><td>-</td><td>-</td><td>-</td><td>Messages of communication between PSs</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>0</td><td>0</td><td>0</td><td>Alerting</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>0</td><td>0</td><td>1</td><td>Connect</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>0</td><td>1</td><td>0</td><td>Synchronization</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>0</td><td>1</td><td>1</td><td>1st Alerting (note)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>1</td><td>0</td><td>0</td><td>1st Synchronization(note)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>1</td><td>0</td><td>1</td><td>2nd Alerting (note)</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>1</td><td>1</td><td>0</td><td>2nd Synchronization(note)</td></tr>
<tr><td></td><td></td><td></td><td>other</td><td></td><td></td><td></td><td></td><td>Reserved</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>6-6</td><td>510</td><td>Protocol version of communication between PSs (octet 2)
Bit
2 1
0 0 Version 0 (RCR STD-28 (version 1) or RCR STD-28(version 2) Communication between PSs)
0 1 Version 1 (RCR STD-28 (version 3) or RCR STD-28 (version 3 Rev.-1) Communication between PSs)
1 0 Version 2 (RCR STD-28 (version 3.2) Communication between PSs)
Other Reserved</td></tr>
<tr><td>6-7</td><td>510~511</td><td>6.3.1.2 Control sequence
6.3.1.2.1 Calling/Called of the 32k communication (Private standard)
These item number and item name are added.
Figure 6.3.1 Control sequence (Calling/Called of the 32k communication)</td></tr>
<tr><td>6-8</td><td>512</td><td>6.3.1.2.2 Calling/Called of the 64k communication (Private standard)
This item is added.</td></tr>
<tr><td>6-9</td><td>514</td><td>6.3.2.2 Control sequence
6.3.2.2.1 Disconnect of the 32k communication (Private standard)
These item number and item name are added.
Figure 6.3.2 Control sequence (disconnect of the 32k communication)</td></tr>
<tr><td>6-10</td><td>514</td><td>6.3.2.2.2 Disconnect of the 64k communication (Private standard)
This item is added.</td></tr>
<tr><td>6-11</td><td>516</td><td>6.3.3.2 Control sequence
6.3.3.2.1 Channel switching during of the 32k communication (Private standard)
These item number and item name are added.
Figure 6.3.~~3~~ 5 Control sequence (channel switching during of the 32k communication)</td></tr>
<tr><td>6-12</td><td>517</td><td>6.3.3.2.2 Channel switching during of the 64k communication (Private standard)
This item is added.</td></tr>
<tr><td>6-13</td><td>518</td><td>6.3.4.1 Calling side timers
Table 6.3.6 Calling side timers
(Note) "1st or 2nd Alerting" and "1st or 2nd Synchronization" are made "Alerting" and Synchronization".</td></tr>
<tr><td>6-14</td><td>519</td><td>6.3.4.2 Called side timers
Table 6.3.7 Called side timers
<table>
<tr><th>Timer No. (Value)</th><th>Operation type</th><th>Start conditions</th><th>Stop conditions</th><th>Expiration (Retry)</th><th>Expiration (Retry out)</th><th>Mandatory / Option
Timer</th><th>Mandatory / Option
Timer value</th></tr>
<tr><td>T105P (180s)</td><td>transmission time</td><td>"Synchronization" transmission (note ~~1~~2)</td><td>when call released</td><td>"Radio-channel Disconnect" transmission</td><td>Standby</td><td>Mandatory</td><td>Mandatory</td></tr>
<tr><td>T106P (10s)</td><td>Paging</td><td>The "TCH idle burst" reception(note 3) of "1st Alerting" or "1st Synchronization" transmission(note4)</td><td>"1st Alerting " reception (note3) "1st Synchronization" reception (note4)</td><td>-</td><td>Standby</td><td>Mandatory</td><td>Mandatory</td></tr>
</table>
(Note 1) "1st or 2nd Alerting" and "1st or 2nd Synchronization" are made "Alerting" and Synchronization".
(Note ~~1~~ 2) If "Synchronization" is omitted, timer start at "Connect" transmission.
(Note 3) The case that the number of the use channels is "Paging" of 2.
(Note 4) In the case of the channel switching that the number of the use channels is 2.</td></tr>
<tr><td>6-15</td><td>520</td><td>6.4 Forwarding of group identification code for direct communication between PSs. (Private standard)
This item is added.</td></tr>
<tr><td>6-16</td><td>520</td><td>6.4.1 Overview
This item is added.</td></tr>
</table>

Number	Page	Amendments
6-17	520	6.4.2 Application scope This item is added.
6-18	520	6.4.3 Basic functions of forwarding of group identification code for direct communication between PSs This item is added.
6-19	520	6.4.4 Available frequencies This item is added.
6-20	520	6.4.5 Forwarding of group identification code for direct communication between PSs This item is added.
6-21	521	6.4.6 Message This item is added.
6-22	522	6.4.7 Control sequence This item is added.
7-1	549	7.2.7 Carrier sensing (slot transmission conditions) (3) Measurement procedures [1] PS measurement (including direct communication between personal stations) (a) line 1~2 ~~41dBμ~~ →45dBμ (b) line 1 ~~41dBμ~~ →45dBμ [2] CS measurement (b) line 1 ~~41dBμ~~ →45dBμ
8-1	573	Acronym List MoU Memorandum of Understanding
B-1	581	Appendix B Link channel establishment sequence In the center 
D-1	586	Appendix D PS switchback operation during channel switching during communication 1 Timing after which switchback is impossible After PS receives a new channel downlink idle burst (new channel synchronization establishment), it may not switch back to the old channel. ~~However,~~ And switchback is possible if the new channel synchronization is established after receiving downlink burst of 2nd TCH during the handover of 2 slots fixed type 64k bit/s communication and if receiving downlink idle burst on only TCH is completed and receive 2nd TCH downlink synchronization burst is disabled. However, if receiving downlink idle burst on only TCH is completed during the handover of Slot changeable type 64k bit/s Unrestricted Digital Information, it may not switch back to the old channel.
D-2	586	2 PS operation during switchback The switchback operation sequence is shown in Figures 1 and 2, and the PS flow during TCH switching is shown in Figure 3. And the handover switchback operation sequence in case of 2 slots fixed type 64k bit/s communication is shown in Figure 4 and 5.

Number	Page	Amendments
F-1	610	Appendix F RT state transition diagram (PS side)  RT state transition diagram (PS side 2nd TCH)
G-1	636	Appendix G RT SDL diagram (PS Side)  Appendix G RT SDL diagram (PS Side : 2nd TCH) 8/9
G-2	637	 Appendix G RT SDL diagram (PS Side : 2nd TCH) 9/9

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>H-1</td><td>638~639</td><td>Appendix H RT PS side timers
<table>
<tr><th rowspan="2">Timer
No. Value</th><th rowspan="2">Status</th><th rowspan="2">Start conditions</th><th rowspan="2">Stop conditions</th><th rowspan="2">Expiration (Retry)</th><th rowspan="2">Expiration (Retry out)</th><th colspan="2">Mandatory /Optional</th></tr>
<tr><th>Timer</th><th>Timer value</th></tr>
<tr><td rowspan="5">TR101P (200ms)</td><td>Outgoing call link channel assignment

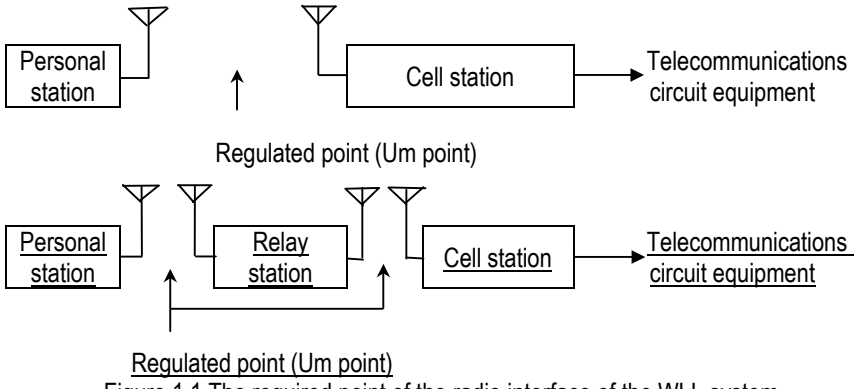
Incoming call link channel assignment</td><td rowspan="5">Without U wave</td><td rowspan="5">“Synchronization establishment” reception</td><td rowspan="4">“Link channel establishment request” transmission</td><td>Standby</td><td rowspan="2">Mandatory (note 2)</td><td rowspan="2">Mandatory</td></tr>
<tr><td>Recalling link channel assignment</td><td>Downlink synchronization burst waiting (old TCH)</td></tr>
<tr><td>TCH switching indication</td><td>Downlink synchronization burst waiting</td><td rowspan="3">Mandatory</td><td rowspan="3">Mandatory</td></tr>
<tr><td>TCH activation (1st TCH)
TCH activation waiting (2nd TCH)</td><td>TCH activation (1st TCH)
Null (2nd TCH)</td></tr>
<tr><td>TCH activation (1st TCH)
TCH activation waiting 2 (2nd TCH)</td><td></td><td>Downlink synchronization burst waiting (old TCH)
(note 8)</td></tr>
</table>
(Note 8) Connection of only 1st TCH is allowed in Slot changeable type 64k bit/s Unrestricted Digital Information connection, so state of TCH activation (1st TCH) and Null (2nd TCH) can enter.</td></tr>
<tr><td>AB-1</td><td>758</td><td>1.2 Application scope
The WLL system are constructed from the personal stations, ~~and~~ cell stations and relay stations (radio stations which relay communication between cell station and personal stations) shown in Figure 1.1. (Refer to Attached document 1.)
 

Figure 1.1 The required point of the radio interface of the WLL system</td></tr>
<tr><td>AB-2</td><td>760</td><td>[Reference table to the main text]
2.1.3 Relay station (RS) ····· *
2.6 64k bit/s Unrestricted Digital Information Service
2.6.1 2slots fixed type 64k bit/s Unrestricted Digital Information Service
2.6.2 Slot changeable type 64k bit/s Unrestricted Digital Information Service
~~2.6~~ 2.7 Encryption method
~~2.7~~ 2.8 VOX control
~~2.8~~ 2.9 PS numbers
~~2.9~~ 2.10 Direct communication between personal stations</td></tr>
</table>

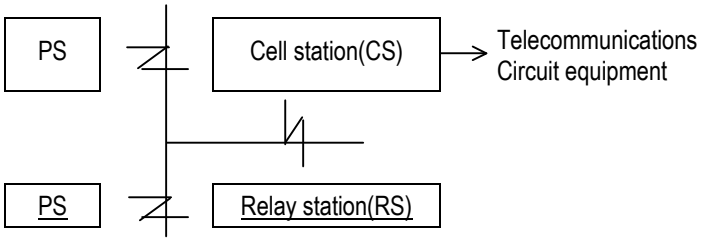
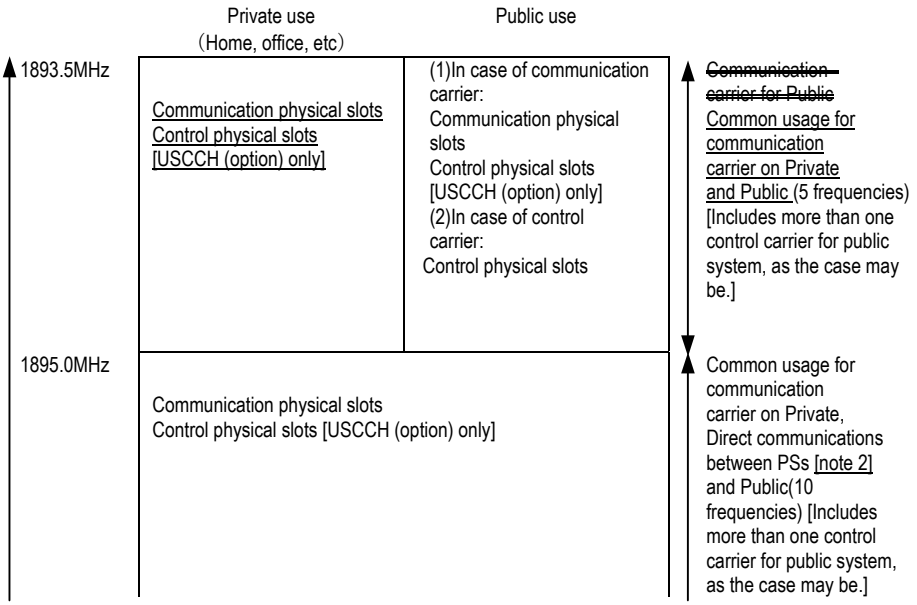
<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>AB-3</td><td>762</td><td>2.1 System structure
The WLL system is made up of personal stations<u>,</u> ~~and~~ cell stations <u>and radio stations which relay communications between cell stations and personal stations (hereinafter, referred as relay stations)</u>. (Refer to Attached document 1.)</td></tr>
<tr><td>AB-4</td><td>762</td><td><u>2.1.3 Relay station (RS)</u>
This item is added.</td></tr>
<tr><td>AB-5</td><td>763</td><td>2.2 Interface definition
 

Figure 2.1 Interface point</td></tr>
<tr><td>AB-6</td><td>764</td><td>2.3.2.2 Service types
Table 2.2 Service types
<table>
<tr><th>Type</th><th>Item</th><th>Overview</th></tr>
<tr><td>Bearer service</td><td>64k bit/s unrestricted digital
(note 3)</td><td>Using <u>max</u> 2 channels on Um point, provides bearer capability suited for digital data communication with terminal; information is transmitted transparently.</td></tr>
<tr><td>Supplementary services</td><td><u>PHS User-to-User Signaling (PHS-UUS) supplementary service (note 2)</u></td><td><u>Service which allows PS to send/receive a limited amount of information to/from another PS over the communication channel in association with a call to the other PS.</u></td></tr>
</table></td></tr>
<tr><td>AB-7</td><td>770</td><td>3.4.4 Antennas
(1) Cell station
Antenna has a gain of 10 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 10 dBi, the portion by which it is lower may be compensated by the gain of the antenna.
<u>When adaptive allay antenna (The antenna which increase the antenna gain in the direction of the other party of communication, and decrease the antenna gain in the direction of the other radio stations which use same channel) is applied to public system, antenna gain is 16 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 16 dBi, the portion by which it is lower may be compensated by the gain of the antenna.</u>
(2) Personal station
a) Cabinet-built-in-type antenna with gain of ~~2.14~~ <u>4</u> dBi or less.
However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain ~~2.14~~ <u>4</u> dBi, the portion by which it is lower may be compensated by the gain of the antenna.
<u>(3) Relay station</u>
<u>Antenna gain is 4 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 4 dBi, the portion by which it is lower may be compensated by the antenna gain.</u></td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>AB-8</td><td>776,
784~786</td><td>[Reference table to the main text]
4.3.4.3.1 Zone paging for supplementary service in private system
4.4.3.7.4.1.5 PHS User-to-User Signalling (PHS-UUS) supplementary service
4.4.3.8.8.1.1 2slots fixed type 64k bit/s UDI Outgoing call (En-bloc sending)
4.4.3.8.8.1.2 2slots fixed type 64k bit/s UDI Outgoing call (Overlap sending)
4.4.3.8.8.1.3 Slot changeable type 64k bit/s UDI Outgoing call (En-bloc sending)
4.4.3.8.8.1.4 Slot changeable type 64k bit/s UDI Outgoing call (Overlap sending)
4.4.3.8.8.2.1 2slots fixed type 64k bit/s UDI Incoming call
4.4.3.8.8.2.2 Slot changeable type 64k bit/s UDI Incoming call
4.4.3.8.8.4.2 2slots fixed type 64k bit/s UDI Channel switching during communication (switching to other CS: PS recalling-type)
4.4.3.8.8.4.3 2slots fixed type 64k bit/s UDI Channel switching during communication (switching to other CS: Recalling-type with PS request)
4.4.3.8.8.4.4 2slots fixed type 64k bit/s UDI Channel switching during communication (switching to other CS: Recalling-type with CS indication)
4.4.3.8.8.4.5 Slot changeable type 64k bit/s UDI Channel switching during communication (switching to other CS: PS recalling-type)
4.4.3.8.8.4.6 Slot changeable type 64k bit/s UDI Channel switching during communication (switching to other CS: Recalling-type with PS request)
4.4.3.8.8.4.7 Slot changeable type 64k bit/s UDI Channel switching during communication (switching to other CS: Recalling-type with CS indication)
4.4.3.8.8.5 Additional 2nd TCH during communication (Slot changeable type 64k bit/s UDI)
4.4.3.8.8.5.1 Additional 2nd TCH during communication (With PS request)
4.4.3.8.8.5.2 Additional 2nd TCH during communication (With CS indication)
4.4.3.8.8.6 2nd TCH disconnection processing procedure</td></tr>
<tr><td>AB-9</td><td>791</td><td>4.4.3.7.3.5.1 Coding regulations
Table 4.4.3.7.17 Information element coding
Bit
8 7 6 5 4 3 2 1
0 - - - - - - - Multiple octet information element
1 1 1 1 1 1 0 User-user (note ~~4~~ 3)</td></tr>
<tr><td>AB-10</td><td>799</td><td>4.4.3.7.4.1 Supplementary service types
Table 4.4.3.7.18 Supplementary service types
<table><tr><th>Supplementary service</th><th>Reference</th></tr><tr><td>PHS User-to-User Signaling (PHS-UUS) supplementary service</td><td>4.4.3.7.4.1.5 (Main text)</td></tr></table></td></tr>
<tr><td>AB-11</td><td>805</td><td>[Reference table to the main text]
Appendix AM Standard relating to supplementary service functions within PHS User-to-User Signaling (PHS-UUS)</td></tr>
<tr><td>AB-12</td><td>815</td><td>Attached document 4 Supplementary services overview
2. Supplementary service overview
<table><tr><th>Items</th><th>Direction</th><th>Overview</th></tr><tr><td>PHS User-to-User Signaling (PHS-UUS) supplementary service</td><td>both directions</td><td>Service which allows PS to send/receive a limited amount of information to/from another PS over the communication channel in association with a call to the other PS.</td></tr></table></td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>AC-1</td><td>820</td><td>1. Carrier structure
Table 2.4 Carrier structure
<table>
<tr><td rowspan="3">Communications carriers</td><td>(a) Common usage for Private, Direct communication between PSs, and Public</td><td>10 frequencies</td><td>Decreases the number of control carriers for public. (note)
<u>In direct communication between personal stations in a specific group, is made use of 3 carriers from 10 carriers for direct communication between personal stations.</u></td></tr>
<tr><td>(b) Common usage for Private and Public</td><td><s>25</s><u>30</u> frequencies</td><td>Decreases the number of control carriers for public system. (note)</td></tr>
<tr><td>(c) Public</td><td><s>50</s><u>45</u> frequencies</td><td>Decreases the number of control carriers for public system. (note)</td></tr>
</table></td></tr>
<tr><td>AC-2</td><td>821</td><td>Table 3.5 Relationship between frequency bands and carrier numbers
<table>
<tr><th>Carrier numbers</th><th>Frequency bands (MHz)</th><th>Usefulness</th><th>Carrier numbers</th><th>Frequency bands (MHz)</th><th>Usefulness</th></tr>
<tr><td>251</td><td>1,893.650</td><td rowspan="5"><u>Common usage for</u> communication carrier <s>for</s> <u>on Private and</u> Public (note <u>1</u>)</td><td>.38</td><td>1,906.250</td><td rowspan="5"></td></tr>
<tr><td>252</td><td>950</td><td>39</td><td>550</td></tr>
<tr><td>253</td><td>1,894.250</td><td>40</td><td>850</td></tr>
<tr><td>254</td><td>550</td><td>41</td><td>1,907.150</td></tr>
<tr><td>255</td><td>850</td><td>42</td><td>450</td></tr>
<tr><td>1</td><td>1,895.150</td><td rowspan="7">Common usage for communication carrier on Private, Direct communications between PSs (<u>note 2</u>) and Public (note <u>1</u>)</td><td>43</td><td>750</td><td rowspan="7"></td></tr>
<tr><td>2</td><td>.450</td><td>44</td><td>1,908.050</td></tr>
<tr><td>3</td><td>750</td><td>45</td><td>350</td></tr>
<tr><td>4</td><td>1,896.050</td><td>46</td><td>650</td></tr>
<tr><td>5</td><td>350</td><td>.47</td><td>950</td></tr>
<tr><td>6</td><td>650</td><td>48</td><td>1,909.250</td></tr>
<tr><td>7</td><td>950</td><td>.49</td><td>550</td></tr>
</table>
In the Table, <s>(Note)</s> → <u>(Note 1)</u>
<u>(Note 1)</u> Includes more than one control carrier for public system, as the case may be.
<u>(Note 2)</u> <u>Includes 3 carriers(4,7,9) for direct communication between personal stations in a specific group.</u></td></tr>
</table>

Number	Page	Amendments
AC-3	822	 [Note 1] It is desirable not to use carriers adjacent to control carriers for private system and public system. [Note 2] Includes 3 carriers(4,7,9) for direct communication between personal stations in a specific group. Figure 4.2.3 Mapping of physical slots on frequency axis
AG-1	828	Appendix AG Interface between PS and external terminal Table 1.1 Input level at PS side for 2 wire interface Maximum input level: 0 dBs Average input level: ~~-15.0~~ –8.0 dBs
AG-2	829	Table 2.2 Input level at PS side for 3 wire interface Maximum input level: -35.5 dBs Average input level: ~~-50.5~~ –43.5 dBs
AG-3	830	Table 3.2 Input level at PS side for specific interface (12 pins) Maximum input level: -10.5 dBs Average input level: ~~-25.5~~ –18.5 dBs
AG-4	832	Table 3.4 Input level at PS side for specific interface (16 pins) Maximum input level: -10.5 dBs Average input level: ~~-25.5~~ –18.5 dBs

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>AH-1</td><td>842</td><td>
Appendix AH Rate adaption procedure on CS for interworking with ISDN-based network providing unrestricted digital information services
4. The cause at call release in Unrestricted Digital information
Table 2 The cause at call release in 64k bit/s Unrestricted digital information (unpermitted bearer capability)
<table>
<tr><td colspan="2">CS version</td><td>Ver 2</td><td colspan="3">Ver 3</td></tr>
<tr><td colspan="2">PS version</td><td>-</td><td>Ver 1 & Ver 2</td><td colspan="2">Ver 3</td></tr>
<tr><td colspan="2">Free radio channel</td><td>-</td><td>-</td><td><s>More than 2</s>
Present</td><td><s>Less than 2</s>
Absent</td></tr>
<tr><td rowspan="3">PS presence</td><td>present</td><td>Call release cause #65</td><td>Call release cause #88</td><td>Normal procedure</td><td>Call release cause #34</td></tr>
<tr><td>cause location</td><td>CS</td><td>PS*</td><td>-</td><td>CS</td></tr>
<tr><td>Absent</td><td colspan="4">No reply</td></tr>
</table>
</td></tr>
<tr><td>AM-1</td><td>1017</td><td>
Appendix AM Standard relating to supplementary service functions within PHS User-to-User Signaling (PHS-UUS) (Public standard)
This item is added.
</td></tr>
</table>

Issued March 1998
RCR STD-28 Version 3 Rev.-1

AMENDMENT HISTORY

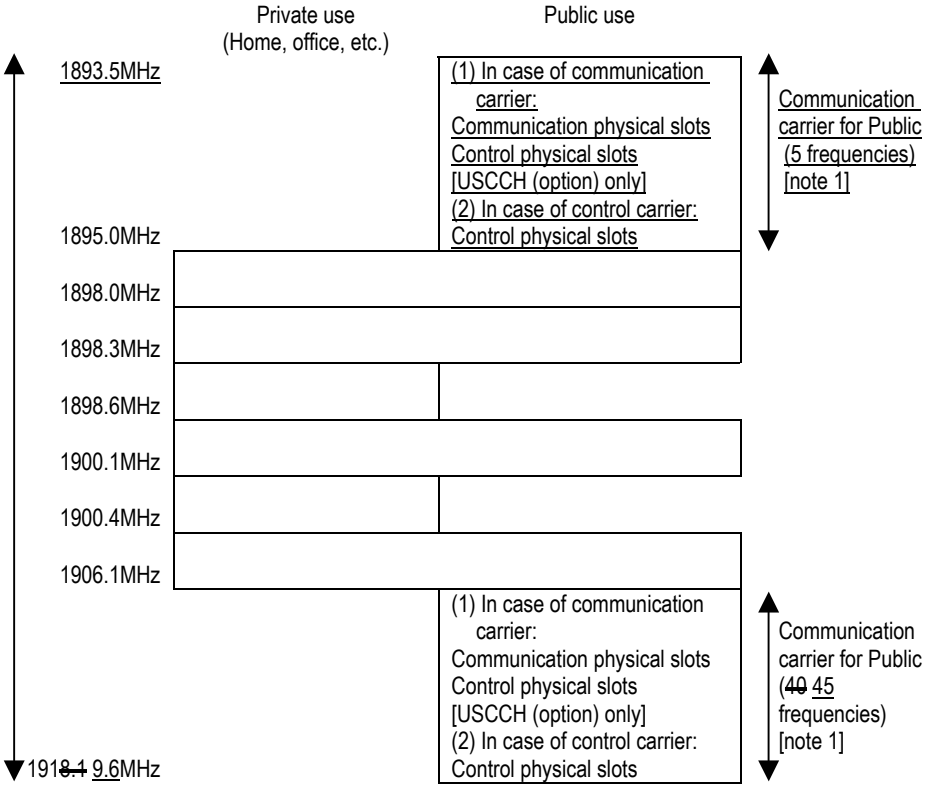
"____" Added; "~~====~~" Deleted

Number	Page	Amendments
contents 1	Ix	Contents 4.4.3.7.4.1.4 Pause signal transmission
contents 2	Xiv	RCR STD-28 Version 3 Rev.-1 Amendment History
2-1	8	2.3.2.2 Service types (3) Supplementary services (circuit mode) Supplementary services proper to PHS used as circuit mode services are presently as shown in Table 2.2.
2-2	9	Table 2.2 Service types
2-3	13	Table 2.4 Carrier structure
3-1	19	3.2.1 Radio frequency band (Execute-article 6, Equipment-article 7 and item 8.2 of article 49) (Private mandatory/Public mandatory) The radio frequency band used is the 1,900 MHz band (Private system: 1, 895 MHz-1, 906.1 MHz and Public system: 1,89~~5~~ 3.5 MHz-1,91~~8.1~~ 9.6 MHz).
3-2	19	3.2.2 Carrier frequency spacing (Execute-article 6, Equipment-article 7 and item 8.2 of article 49) (Private mandatory/Public mandatory) The carrier frequency spacing is 300 kHz. The carrier frequency is 1,89~~5.15~~ 3.65 MHz or 1,89~~5.15~~ 3.65 MHz plus some integer multiple of 300 kHz.
3-3	35	Table 3.5 Relationship between frequency bands and carrier numbers

Supplementary services		
	Hooking signal transmission (note 1) (note 2)	……
	Pause signal transmission (note 1) (note 3)	Service which generates pause signals on CS side from message from PS.
	Hold within the CS-PS loop (note 1) (note 3)	……

Communications carriers	(c) Public	~~40~~ 50 frequencies	Decreases the number of control carriers for public system. (note)

Carrier numbers	Frequency bands (MHz)	Usefulness	Carrier numbers	Frequency bands (MHz)	Usefulness
251	1,893.650	Communication carrier Public(note)	.	.	Communication carrier Public(note)
252	950		.	.	
253	1,894.250		.	.	
254	550		78	1,918,250	
255	850		79	550	
.	.		80	850	
.	.		81	1,919.150	
.	.		82	450	

Number	Page	Amendments
3-4	36	3.4.2.1 Transmission power (Execute-article 6 and Equipment-item 8.3 of article 49) (Private mandatory/Public mandatory) (2) Standards Maximum transmission power: For public cell stations, it is 500 mW or less. For other cell stations and personal stations, it is 10 mW or less. However, in cases where public cell stations use frequency band 1895.15MHz - 1905.95MHz which is common usage for communication carrier on private and public band, maximum transmission power is 10mW or less. Output accuracy: Within + 20%, -50%
3-5	40	3.4.2.6 Transmission spurious (Equipment-article 7) (Private mandatory/Public mandatory) (2) Standards a. Within band (1,89~~5~~ 3.5 MHz ~ 1,91~~8.1~~ 9.6 MHz) : 250 nW or less.
3-6	45	3.4.4 Antennas (Equipment-item 8.2 of article 49 and item 8.3 of article 49) (Private mandatory/Public mandatory) (1) Cell station In the 8th Line, However, in cases where public cell stations use frequency band 1895.15MHz - 1905.95MHz (except 1898.45MHz and 1900.25MHz) which is common usage for communication carrier on private and public band, antenna has a gain of 2.14 dBi or less. However, in cases where the effective radiated power is less than the value when the specified antenna power is applied to an antenna of absolute gain 2.14dBi, the portion by which it is lower may be compensated by the gain of the antenna.
4-1	54	Figure 4.2.3 Mapping of physical slots on frequency axis 

Number	Page	Amendments
4-2	128	Table 4.3.9 Link channel establishment request message

Octet \ Bit	8	7	6	5	4	3	2	1
1	Re-served	0	0	0	0	0	0	1
	Message type							
2	LCH type			LCH protocol type		Extension LCH protocol type		
3	CC protocol type		System type			RT-MM protocol version		
4	Reserved			Notification of usable band (note)		Area information notification status number		
5							Option	

(Note) This information elements is used for only in public system, and it is reserved in private system.

4-3	130	Table 4.3.10 Information elements in link channel establishment request message RT-MM protocol version (octet 3) Bit 3 2 1 . . . . 0 1 0 Version 3 (RCR STD-28 (version 3) or RCR STD-28 (version 3 Rev-1)) . .
4-4	131	Table 4.3.10 Information elements in link channel establishment request message Notify of usable band (octet 4) This element notifies usable frequency band for the PS. Bit 5 4 0 0 Frequency band which is specified by RCR STD-28 version 1 /version 1 rev-1 /version 2 /version 3. 0 1 Frequency band which is specified by RCR STD-28 version 3 rev-1 1 0 reserved 1 1 reserved (Note) CS is expected to have the usable band which is informed from the PS.
4-5	131	Table 4.3.11 Link channel assignment message Octet 4 Carrier number n_f (note) (Note) Frequency band which is available for the PS, should be specified.
4-6	133	Table 4.3.12 Information elements in link channel assignment message Carrier number n_f (octet 4) Bit 8 7 6 5 4 3 2 1 (carrier number) 0 0 0 0 0 0 0 0 Reserved 0 0 0 0 0 0 0 1 First carrier (1,895.15 MHz) 0 0 0 0 0 0 1 0 Second carrier (1,895.45 MHz) . . ~~0 1 0 0 1 1 0 1 Seventy seventh carrier (1,917.95 MHz)~~ 0 1 0 1 0 0 1 0 Eighty second carrier (1,919.45 MHz) 0 1 0 1 0 0 1 1 Reserved . . 1 1 1 1 1 0 1 0 Reserved 1 1 1 1 1 0 1 1 Two hundreds fifty first carrier (1,893.65 MHz) 1 1 1 1 1 1 0 0 Two hundreds fifty second carrier (1,893.95 MHz) . 1 1 1 1 1 1 1 1 Two hundreds fifty fifth carrier (1,894.85 MHz) ~~Other~~ ~~Reserved~~

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>4-7</td><td>138</td><td>Table 4.3.16 Information elements in link channel establishment re-request message
RT-MM protocol version (octet 3)
Bit
3 2 1
.
.
0 1 0 Version 3 (RCR STD-28 (version 3) or RCR STD-28 (version 3 Rev-1))
.</td></tr>
<tr><td>4-8</td><td>138</td><td>Table 4.3.16 Information elements in link channel establishment re-request message
Cause (octet 4)
Bit
8 7 6 5 4
. .
. .
. .
0 1 0 0 0 ~~Reserved~~ Assigned channel non-corresponding PS (shows that it is not the radio station that corresponds to the assigned carrier.)
0 1 0 0 1 Reserved
. .
. .</td></tr>
<tr><td>4-9</td><td>159</td><td>Table 4.3.23 Information elements in 2nd system information broadcasting message
RT-MM protocol version (octet 5)
Bit
8 7 6 5 4 3 2 1
.
.
x x x x x 1/0 x x Version 3 (RCR STD-28(version 3) or RCR STD-28 (version 3 Rev-1)) present/ absent
.
.</td></tr>
<tr><td>4-10</td><td>240</td><td>Table 4.4.3.5.15 TCH Switching Indication message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classification</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Carrier number</td><td>4.4.3.5.3.4.4</td><td>downlink</td><td>O</td><td>2</td><td>(note 1)
(note 3)
(note 5)</td></tr>
</table>
(Note 5) Appropriate frequency band for the PS should be chosen.</td></tr>
<tr><td>4-11</td><td>246</td><td>Table 4.4.3.5.23 Additional channel Assign message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classification</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Additional TCH Information</td><td>4.4.3.5.3.4.28</td><td>downlink</td><td>M</td><td>5~*</td><td>(note 2)</td></tr>
</table>
(Note 2) Appropriate frequency band for the PS should be chosen.</td></tr>
</table>

Number	Page	Amendments
4-12	265	Figure 4.4.3.5.9 Carrier number Carrier number (octet 2) Bit 8 7 6 5 4 3 2 1 (carrier number) 0 0 0 0 0 0 0 1 First carrier (1,895.15 MHz) 0 0 0 0 0 0 1 0 Second carrier (1,895.45 MHz) . . ~~0 1 0 0 1 1 0 1 Seventy seventh carrier (1,917.95 MHz)~~ 0 1 0 1 0 0 1 0 Eighty second carrier (1,919.45 MHz) 0 1 0 1 0 0 1 1 Reserved . . 1 1 1 1 1 0 1 0 Reserved 1 1 1 1 1 0 1 1 Two hundreds fifty first carrier (1,893.65 MHz) 1 1 1 1 1 1 0 0 Two hundreds fifty second carrier (1,893.95 MHz) . 1 1 1 1 1 1 1 1 Two hundreds fifty fifth carrier (1,894.85 MHz) Other Reserved
4-13	295	Figure 4.4.3.5.33 Additional TCH information Carrier number (octet 4) Bit 8 7 6 5 4 3 2 1 (carrier number) 0 0 0 0 0 0 0 1 First carrier (1,895.15 MHz) 0 0 0 0 0 0 1 0 Second carrier (1,895.45 MHz) . . ~~0 1 0 0 1 1 0 1 Seventy seventh carrier (1,917.95 MHz)~~ 0 1 0 1 0 0 1 0 Eighty second carrier (1,919.45 MHz) 0 1 0 1 0 0 1 1 Reserved . . 1 1 1 1 1 0 1 0 Reserved 1 1 1 1 1 0 1 1 Two hundreds fifty first carrier (1,893.65 MHz) 1 1 1 1 1 1 0 0 Two hundreds fifty second carrier (1,893.95 MHz) . 1 1 1 1 1 1 1 1 Two hundreds fifty fifth carrier (1,894.85 MHz) Other Reserved
4-14	345	Table 4.4.3.7.8 INFOrmation message contents (Note 2) Included when PS sends dial information and so forth to CS in overlap sending (P2) state and thereafter. In addition, included when PS sends hooking signal and pause signal to CS.
4-15	349	Table 4.4.3.7.12 SETUP message contents

Information element	Reference	Direction	Type	Information length	Remarks
. .	. .	. .	. .	. .	. .
~~Display~~ Progress indicator	~~4.4.3.7.3.5.24~~ 4.4.3.7.3.5.13	~~downlink~~ both	O	~~2~82~~ 2~4	~~(note 18)~~ (note 3)
~~Progress indicator~~ Display	~~4.4.3.7.3.5.13~~ 4.4.3.7.3.5.24	~~both~~ downlink	O	~~2~4~~ 2~82	~~(note 3)~~ (note 18)
. .	. .	. .	. .	. .	. .

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>4-16</td><td>389</td><td>4.4.3.7.3.5.12 Keypad facility
The keypad facility is used to carry IA5 characters set by the terminal keypad. In addition, the keypad facility is used to carry the hooking signal information <u>and pause signal information</u> from PS.

(Note) IA5 character ESC (1B) + H (48) is defined as the hooking signal information. To use the hooking signal information is a functional option.
<u>IA5 character ESC (1B) + P (50) is defined as the pause signal information. To use the pause signal information is a functional option.</u>
Figure 4.4.3.7.15 Keypad facility</td></tr>
<tr><td>4-17</td><td>418</td><td>Table 4.4.3.7.19 Supplementary service types
<table><tr><th>Supplementary service</th><th>Reference</th></tr><tr><td>DTMF signal transmission</td><td>4.4.3.7.4.1.1</td></tr><tr><td>Hooking signal transmission (note)</td><td>4.4.3.7.4.1.2</td></tr><tr><td>Supplementary service within the CS-PS loop (note)</td><td>4.4.3.7.4.1.3</td></tr><tr><td><u>Pause signal transmission (note)</u></td><td><u>4.4.3.7.4.1.4</u></td></tr></table>(Note) Only in private system</td></tr>
<tr><td>4-18</td><td>420</td><td><u>4.4.3.7.4.1.4 Pause signal transmission</u>
This item is added.</td></tr>
<tr><td>4-19</td><td>421</td><td>4.4.3.7.5.1 State transition table description method
The functional operation state transition table description method is shown in Figure 4.4.3.7.~~32~~ <u>33</u>.

Figure 4.4.3.7.~~32~~ <u>33</u> State transition table description method</td></tr>
<tr><td>4-20</td><td>438</td><td>Figure 4.4.3.8.7 Control sequence (channel switching during communication (switching on same CS))
In the figure,
TCH switching indication <u>(note 3)</u> is added.
<u>(Note 3) Appropriate frequency band for the PS should be chosen.</u></td></tr>
<tr><td>4-21</td><td>447</td><td>Figure 4.4.3.8.11 Control sequence (channel switching to other CS : TCH switching-type with PS request))
In the figure,
TCH switching indication <u>(note 5)</u> is added.
<u>(Note 5) Appropriate frequency band for the PS should be chosen.</u></td></tr>
<tr><td>4-22</td><td>448</td><td>Figure 4.4.3.8.12 Control sequence (channel switching during communication (switching to other CS : TCH switching-type with CS indication))
In the figure,
TCH switching indication <u>(note 5)</u> is added.
<u>(Note 5) Appropriate frequency band for the PS should be chosen.</u></td></tr>
<tr><td>4-23</td><td>456</td><td>Figure 4.4.3.8.15 Control sequence (64k bit/s UDI Outgoing call (En-bloc sending))
In the figure,
TCH additional channel Assign <u>(note 5)</u> is added.
<u>(Note 5) Appropriate frequency band for the PS should be chosen.</u></td></tr>
<tr><td>4-24</td><td>457
~458</td><td>Figure 4.4.3.8.16 Control sequence (64k bit/s UDI Outgoing call (Overlap sending))
In the figure,
TCH additional channel Assign <u>(note 6)</u> is added.
<u>(Note 6) Appropriate frequency band for the PS should be chosen.</u></td></tr>
<tr><td>4-25</td><td>461
~462</td><td>Figure 4.4.3.8.17 Control sequence (64k bit/s UDI Incoming call)
In the figure,
TCH additional channel Assign <u>(note 5)</u> is added.
<u>(Note 5) Appropriate frequency band for the PS should be chosen.</u></td></tr>
</table>

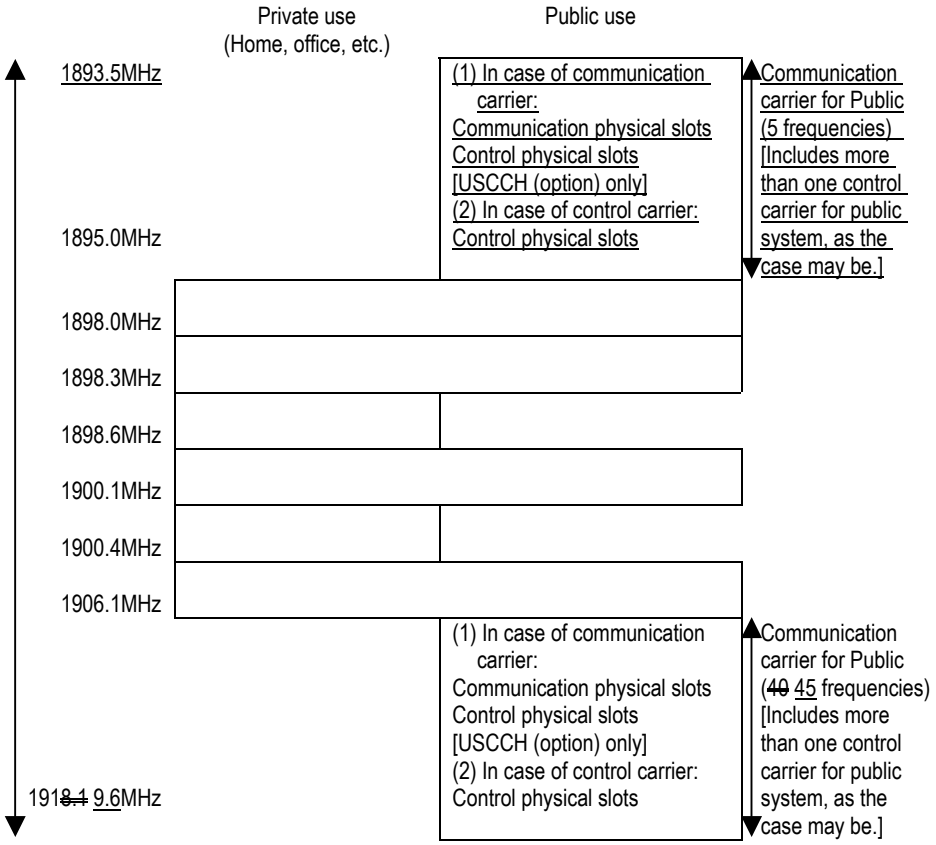
<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>4-26</td><td>464</td><td>Figure 4.4.3.8.20 Control sequence (64k bit/s UDI Channel switching during communication (switching on same CS, 1st TCH))
In the figure,
TCH switching indication (note 4) is added.
(Note 4) Appropriate frequency band for the PS should be chosen.</td></tr>
<tr><td>4-27</td><td>465</td><td>Figure 4.4.3.8.21 Control sequence (64k bit/s UDI Channel switching during communication (switching on same CS, 2nd TCH))
In the figure,
TCH switching indication (note 4) is added.
(Note 4) Appropriate frequency band for the PS should be chosen.</td></tr>
<tr><td>4-28</td><td>468
~469</td><td>Figure 4.4.3.8.22 Control sequence (64k bit/s UDI Channel switching during communication (switching to other CS : PS recalling-type)
In the figure,
TCH additional channel Assign (note 12) is added.
(Note 12) Appropriate frequency band for the PS should be chosen.</td></tr>
<tr><td>4-29</td><td>470
~471</td><td>Figure 4.4.3.8.23 Control sequence (64k bit/s UDI Channel switching during communication (Switching to other CS : the recalling type 1st TCH with PS request))
In the figure,
TCH additional channel Assign (note 12) is added.
(Note 12) Appropriate frequency band for the PS should be chosen.</td></tr>
<tr><td>4-30</td><td>472
~473</td><td>Figure 4.4.3.8.24 Control sequence (64k bit/s UDI Channel switching during communication (Switching to other CS : the recalling type 2nd TCH with PS request))
In the figure,
TCH additional channel Assign (note 12) is added.
(Note 12) Appropriate frequency band for the PS should be chosen.</td></tr>
<tr><td>4-31</td><td>474
~475</td><td>Figure 4.4.3.8.25 Control sequence (64k bit/s UDI Channel switching during communication (Switching to other CS : the recalling type 1st TCH with CS indication))
In the figure,
TCH additional channel Assign (note 12) is added.
(Note 12) Appropriate frequency band for the PS should be chosen.</td></tr>
<tr><td>4-32</td><td>476
~477</td><td>Figure 4.4.3.8.26 Control sequence (64k bit/s UDI Channel switching during communication (Switching to other CS : the recalling type 2nd TCH with CS indication))
In the figure,
TCH additional channel Assign (note 12) is added.
(Note 12) Appropriate frequency band for the PS should be chosen.</td></tr>
<tr><td>AB-1</td><td>739</td><td>Appendix AB WLL standard (Standard)
3.2.1 Radio frequency band
It is to be desired that the radio frequency band used in the WLL system should be as the same as that of the public system (189~~5~~ 3.5 MHz ~ 191~~8.1~~ 9.6 MHz) shown in the chapter 3.2.1 of the main text.</td></tr>
<tr><td>AB-2</td><td>739</td><td>3.2.2 Carrier frequency spacing
The carrier frequency spacing is 300 kHz.
It is to be desired that the carrier frequency should be 1,89~~5.15~~ 3.65 MHz and 1,89~~5.15~~ 3.65 MHz plus some integer multiple of 300 kHz.</td></tr>
<tr><td>AC-1</td><td>790</td><td>Appendix AC Control/communication carrier of private system used in the countries outside of Japan (Standard)
<table>
<tr><td>Communications carriers</td><td>(c) Public</td><td>~~40~~ 50 frequencies</td><td>Decreases the number of control carriers for public system. (note)</td></tr>
</table>
</td></tr>
</table>

Number	Page	Amendments
AC-2	791	Table 3.5 Relationship between frequency bands and carrier number

Carrier numbers	Frequency bands (MHz)	Usefulness	Carrier numbers	Frequency bands (MHz)	Usefulness
251	1,893.650	Communication carrier Public(note)	.	.	Communication carrier Public(note)
252	950		.	.	
253	1,894.250		.	.	
254	550		78	1,918,250	
255	850		79	550	
.	.		80	850	
.	.		81	1,919.150	
.	.		82	450	

AC-3 792

Figure 4.2.3 Mapping of physical slots on frequency axis



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AMENDMENT HISTORY

"____" Added; "~~====~~" Deleted

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contents 1	i	— Fascicle 1 —
contents 2	v	4.3.4.3.1 Zone paging for supplementary service in private system
contents 3	vii	4.4.3.5.2.22 Additional channel Assign
contents 4	vii	4.4.3.5.2.23 Additional channel Assign Reject
contents 5	vii	4.4.3.5.2.24 Additional channel Request
contents 6	vii	4.4.3.5.2.25 Additional channel Assign Request Indicate
contents 7	vii	4.4.3.5.2.26 Additional channel Request Indicate Reject
contents 8	vii	4.4.3.5.2.27 Additional channel Re-request
contents 9	viii	4.4.3.5.3.4.26 Additional TCH Adoption Capability
contents 10	viii	4.4.3.5.3.4.27 Additional TCH Identification
contents 11	viii	4.4.3.5.3.4.28 Additional TCH Information
contents 12	ix	4.4.3.7.2.1.16 USER INFOrmation
contents 13	ix	4.4.3.7.3.5.24 Display
contents 14	ix	4.4.3.7.3.5.25 More Data
contents 15	ix	4.4.3.7.3.5.26 User - user
contents 16	ix	4.4.3.7.4.1.3 Supplementary service within the CS-PS loop
contents 17	x	4.4.3.8.8 64k bit/s Unrestricted Digital Information(64k bit/s UDI)
contents 18	x	4.4.3.8.8.1 64k bit/s UDI Outgoing call
contents 19	x	4.4.3.8.8.1.1 64k bit/s UDI Outgoing call (En-bloc sending)
contents 20	x	4.4.3.8.8.1.2 64k bit/s UDI Outgoing call (Overlap sending)
contents 21	x	4.4.3.8.8.2 64k bit/s UDI Incoming call
contents 22	x	4.4.3.8.8.3 64k bit/s UDI Disconeect
contents 23	x	4.4.3.8.8.4 64k bit/s UDI Channel switching during communication
contents 24	x	4.4.3.8.8.4.1 64k bit/s UDI Channel switching during communication (switching on same CS)
contents 25	x	4.4.3.8.8.4.2 64k bit/s UDI Channel switching during communication (switching to other CS: PS recalling-type)
contents 26	x	4.4.3.8.8.4.3 64k bit/s UDI Channel switching during communication (switching to other CS: Recalling-type with PS request)
contents 27	x	4.4.3.8.8.4.4 64k bit/s UDIChannel switching during communication (switching to other CS: Recalling-type with CS indication)
contents 28	xi	6.2.5.7 ~~VOX control~~ Voice coding method
contents 29	xi	6.3.4 Communication between PSs timers
contents 30	xi	6.3.4.1 Calling side timers
contents 31	xi	6.3.4.2 Called side timers
contents 32	xiii	— Fascicle 2 —
contents 33	xiii	Appendix AJ Optional procedures for bearer service change
contents 34	xiii	Appendix AK Generic procedures for the control of PHS supplementary services
contents 35	xiii	Appendix AL Standard relating to supplementary service functions within the CS-PS loop
contents 36	xiv	Annex 3 Standard Pertaining to Authentication of Personal Handy Phone System (Private)
contents 37	xiv	Annex 4 Standard Pertaining to Subscriber Data Write-in of Personal Handy Phone System (Private)
contents 38	xiv	RCR STD-28 Version 3 Amendment History
contents 39	xiv	RCR STD-28 Version 2 Rev.-2 Amendment History
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<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>2-1</td><td>8</td><td>Table 2.1 Service attributes
<table>
<tr><th>Service attribute</th><th>Service item</th></tr>
<tr><td>Information transfer capability</td><td>Speech, 3.1kHz audio, unrestricted digital</td></tr>
<tr><td>Transfer mode</td><td>Circuit mode</td></tr>
<tr><td>Information transfer rate</td><td>32k bit/s, 64k bit/s (Only for unrestricted digital)</td></tr>
<tr><td>Communications format</td><td>Point-to-point</td></tr>
</table></td></tr>
<tr><td>2-2</td><td>9</td><td>Table 2.2 Service types
<table>
<tr><th>Type</th><th>Item</th><th>Overview</th></tr>
<tr><td rowspan="4"></td><td></td><td></td></tr>
<tr><td></td><td></td></tr>
<tr><td>32k bit/s unrestricted digital (note 2)</td><td></td></tr>
<tr><td>64k bit/s unrestricted digital (note 3)</td><td>Using 2 channels on Um point, provides bearer capability suited for digital data communication with terminal; information is transmitted transparently.</td></tr>
<tr><td rowspan="9"></td><td></td><td></td></tr>
<tr><td>Hooking signal transmission (note 1) (note 2)</td><td></td></tr>
<tr><td>Hold within the CS-PS loop (note 1) (note 3)</td><td>Service which holds call on CS side from message from PS.</td></tr>
<tr><td>Call transfer within the CS-PS loop (note 1) (note 3)</td><td>Service which provides call transfer on CS side from message from PS.</td></tr>
<tr><td>Call waiting within the CS-PS loop (note 1) (note 3)</td><td>Service which provides call waiting on CS side from message from PS.</td></tr>
<tr><td>Conference call within the CS-PS loop (note 1) (note 3)</td><td>Service which provides three-party service on CS side from message from PS.</td></tr>
<tr><td>The hold within the CS-multiple PS (note 1) (note 3)</td><td>Service which provides hold within the CS-multiple PS additional service on CS side from message from PS.</td></tr>
<tr><td>Call type notification within the CS-PS loop (note 1) (note 3)</td><td>Service which provides calling party number, called party number and so on from message from PS and/or CS.</td></tr>
<tr><td>PS remote control function (note 1) (note 3)</td><td>Service which provides remote control function from message from PS and/or CS.</td></tr>
</table>
(Note 1) Private only
(Note 2) Standard protocol can be used RT-MM protocol version from RCR STD-28(version 2)
(Note 3) Standard protocol can be used RT-MM protocol version from RCR STD-28(version 3)</td></tr>
<tr><td>2-3</td><td>16</td><td>2.5.2 Hierarchical structure
(2) Service channel establishment phase ~~and communications phase~~</td></tr>
<tr><td>2-4</td><td>16</td><td>Figure 2.7 Hierarchical structure of service channel establishment phase ~~and communications phase~~</td></tr>
</table>

Number	Page	Amendments
2-5	17	2.5.2 Hierarchical structure (3) Communications phase The hierarchical structure of communication used via one radio channel (32k bit/s speech, 32k bit/s 3.1kHz audio and 32k bit/s unrestricted digital) shown in Figure 2.8, the hierarchical structure of communication used via two radio channel (64k bit/s unrestricted digital) shown in Figure 2.9. As shown in Figure 2.8 and Figure 2.9, layer 3 functions have a hierarchical structure that conforms to the OSI model that can be divided into RT, MM, and CC.However, in the case of 64k bit/s unrestricted digital information communication, the second TCH has only layer 1 function and RT function of layer 3.
2-6	17	Figure 2.8 Hierarchical structure (communication using 1 radio channel) is added.
2-7	17	Figure 2.9 Hierarchical structure (communication using 2 radio channels) is added.
2-8	18	2.5.3 Transmission rate support And under unrestricted didital, 32k bit/s and additional 64k bit/s are standardized.
4.2-1	56	4.2.5.2 Physical slot transmission condition (2) Communications carriers (a) Rules And under 64k bit/s/s unrestricted digital, when a request for additional TCH is received from PS, it is necessary to designate the appropriate free and confirmed physical channel (slot and frequency) and to transmit the additional TCH assignment.
4.2-2	56	4.2.5.2 Physical slot transmission condition (3) Transmission Frequency The frequency of the signal transmitted from PS must be selected automatically according to the reception of the signal of the CS link channel assignment and additional TCH assignment under 64k bit/s/s digital.
4.2-3	91 ~92	4.2.10.5.3 Communication physical slot uplink (PS—>CS) 4.2.10.5.3.1 Basic physical slot (3) Uplink synchronization burst Figure 4.2.23.9-1 Structure of communication physical slot (uplink synchronization burst) (uplink) Figure 4.2.23.9-2 Structure of communication physical slot (uplink 2nd synchronization burst) (uplink)
4.2-4	94 ~95	4.2.10.5.4 Communication physical slot downlink (CS—>PS) 4.2.10.5.4.1 Basic physical slot (3) Downlink synchronization burst Figure 4.2.23.13-1 Structure of communication physical slot (downlink synchronization burst) (downlink) Figure 4.2.23.13-2 Structure of communication physical slot (downlink 2nd synchronization burst) (downlink)
4.2-5	108	4.2.15 TCH activation procedure and detailed regulations (1) PS synchronization burst transmission timing In case of TCH reassignment in the same CS and 2nd TCH additional process on 64kbps/s unrestricted digital, the permitted timing accuracy when the first uplink synchronization burst is transmitted is equal to the standard timing accuracy specified value based on the downlink signal of RT message of the traffic channel includes TCH reassign or additional TCH assign last received by PS, plus the error due to the fact that it operates by the autonomous clock during the process that includes frequency switching/unwanted signal measurement until the uplink synchronization burst is actually transmitted (process time is less than TR101C - 1).
4.2-6	108	(2) Synchronization burst reception process 4) The modifier contained in the synchronization burst is to agree with bit paturn of the channel.
4.2-7	109	(4) Regulations on TCH re-establishment procedure 4) The modifier contained in the synchronization burst is to agree with bit paturn of the channel.

Number	Page	Amendments
4.3-1	124	4.3.2.6.1 Version management rules (3) This standard specifies the protocols of version ~~2~~ 3.
4.3-2	130	Table 4.3.10 Information elements in link channel establishment request message System type (octet 3) Bit 6 5 4 0 0 1 Private system based on RCR STD-28 (version 2) or RCR STD-28 (version 3) RT-MM protocol version (octet 3) Bit 3 2 1 0 1 0 Version 3 (~~reserved~~ RCR STD-28 (version 3)) 0 1 1 Version 4 (reserved)
4.3-3	138	Table 4.3.16 Information elements in link channel establishment re-request message System type (octet 3) Bit 6 5 4 0 0 1 Private system based on RCR STD-28 (version 2) or RCR STD-28 (version 3) RT-MM protocol version (octet 3) Bit 3 2 1 0 1 0 Version 3 (~~reserved~~ RCR STD-28 version 3) 0 1 1 Version 4 (reserved)
4.3-4	153	Table 4.3.21 Information elements of system information broadcasting message RT-MM protocol version (octet 4) Bit 8 7 6 5 4 3 2 1 x x x x x 1/0 x x Version 3 (RCR STD-28 (version 3)) present/absent (reserved for public system)
4.3-5	158	Table 4.3.22 2nd system information broadcasting message In the table, octet 6, bit 1, 2 ~~Reserved~~ → Available slot number of simultaneous using
4.3-6	158 ~159	Table 4.3.23 Information elements in 2nd system information broadcasting message System type (octet 4) Bit 8 7 6 5 4 3 2 1 x x x x x x 1/0 x Private system based on RCR STD-28 (version 2) or RCR STD-28 (version 3) present/absent RT-MM protocol version (octet 5) Bit 8 7 6 5 4 3 2 1 x x x x x 1/0 x x Version 3 (RCR STD-28(version 3)) present/ absent (~~reserved~~) Available slot number of simultaneous using (octet 6) It shows available slot number of simultaneous using which one CS can same call. Bit 2 1 0 0 1 slot 0 1 2 slots Other Reserved

Number	Page	Amendments
4.3-7	166 ~167	Table 4.3.29 Information elements in paging message Paging service type (octet 1) Bit 7 6 5 0 1 1 Shows paging service by PS number of 13 digits hexadecimal (note) ~~(Reserved in public system)~~ 1 0 0 ~~Reserved~~ Shows paging service by BCD 13 digits or less domestic PS number. (Note) As for the public system, the PS number that it is expressed with number from 0 to 9 of the N individuals is considered the integer of N digits decimal system where number of digit K is the place of 10n-k(1≦ k ≦n), and the thing that is was changed into 13 digits hexadecimal is shown. (Example) PS number before conversion : 050-12-34567 Decimal system : 501,234,567 13 digits hexadecimal : 000001DE03B87 Extension paging service type (octet 7) Bit 4 3 2 1 0 1 0 0 Shows paging service by supplementary service within the CS-PS loop. (note 3) (Note 3) Used for supplementary service within the CS-PS loop in a private system. (refer to 4.3.4.3.1)
4.3-8	168	Table 4.3.29 Information elements in paging message PS number (octets 1-7) For PS numbers, the 2 types of number digits shown below can be used. ・ In the case of BCD, PS number is put in such that the first number, that is, the number dialed first, is transmitted first. ・ In the case of BCD, the number of digits of PS number, if smaller than the maximum number of digits for each paging service type, adds filler following PS number up to the maximum number of digits. ・ Number digits are determined as BCD or hexadecimal as shown below. ~~(BCD only in public system)~~ ・ When used in a public system, if paging service type is (001), the types of number/numbering plan identifier of the PS number are considered undetermined / undetermined. ・ When used in a public system, if paging service type is (011), the type of number of the PS number is considered as international number, and number plan identifier is considered as ISDN/telephony numbering plan. ・ When used in a public system, if paging service type is (100), the type of number of the PS number is considered as domestic number, and number plan identifier is considered as ISDN/telephony numbering plan.
4.3-9	171~177	4.3.4.3.1. Zone paging for supplementary service in private system (Private standard) This item is added.
4.3-10	178	4.3.4.4.3 PCH paging group calculation examples (1) Calculation methods [2] When paging service type is "hexadecimal" ~~(private only)~~

<table>
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(2) Handling of additional TCH adoption capability under 64k unrestricted dividal.
Information element of the additional TCH adoption capability under 64k unrestricted dividal has a default of "omit". Also, if the Information element of the additional TCH adoption capability is omitted, the defaults are as shown in Table 4.4.3.1.3. In case of select except a default by PS side, must be included Information element of the additional TCH adoption capability in the additional TCH request or a additional TCH re-request message.
If the negosiation of additional channel request function is used, PS reports its has function to CS by the additional channel assignment function in the additional channel request or a additional channel re-request message. CS judges whether or not that function is allowed, or whether a function other than that requested is used, and it reports to PS by the Information element of the additional TCH adoption capability of additional channel assign message or additional channel assign reject message.</td></tr>
<tr><td>4.4-2</td><td>224</td><td>Table 4.4.3.1.3 Defaults of additional TCH assignment function under 64k (public/private) (note) is added.</td></tr>
<tr><td>4.4-3</td><td>225</td><td>~~(2)~~ (3) Handling of MM function request
Table 4.4.3.1.~~3~~ 4 Defaults of MM function request contents (private)
Table 4.4.3.1.~~4~~ 5 Defaults of MM function request contents (public) (note)</td></tr>
<tr><td>4.4-4</td><td>228</td><td>4.4.3.5.1.1 RT state in PS
[17] Null (P18)
State of 2ndTCH that the activation of TCH is not required.
[18] TCH activation waiting (P19)
State of 2ndTCH that PS is designated 2ndTCH originating from CS.
[19] Recalling type handover (P20)
State of 2ndTCH that PS has not received designation for 2ndTCH, while recalling connection (recalling type handover) process being activated.
[20] TCH activation waiting 2 (P21)
State of 2ndTCH that PS has assigned 2ndTCH, while recalling connection (recalling type handover) process being activated.</td></tr>
<tr><td>4.4-5</td><td>230</td><td>4.4.3.5.2 Definition and contents of message functions
(3) Usage regulations of messages/information elements in private and public systems
The messages and information elements used in private systems and public systems follow the message type diagrams (Figure 4.4.3.5.3-1, 2) and information element coding tables (Tables 4.4.3.5.~~23~~ 29 -1, 2) specified for each system.</td></tr>
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<table>
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<tr><td>Additional channel Assign Reject</td><td>4.4.3.5.2.23</td></tr>
<tr><td>Additional channel Request</td><td>4.4.3.5.2.24</td></tr>
<tr><td>Additional channel Request Indicate</td><td>4.4.3.5.2.25</td></tr>
<tr><td>Additional channel Request Indicate Reject</td><td>4.4.3.5.2.26</td></tr>
<tr><td>Additional channel Re-request</td><td>4.4.3.5.2.27</td></tr>
</table></td></tr>
<tr><td>4.4-7</td><td>235</td><td>4.4.3.5.2.7 Encryption key set
In the 5th line,
In case of 64k bit/s communication, Encryption key is common to TCH & 2ndTCH, which means that Encryption key set on TCH is also used on 2ndTCH.</td></tr>
<tr><td>4.4-8</td><td>238</td><td>4.4.3.5.2.10 Paging response
Table 4.4.3.5.11 Paging response message contents
<table>
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<tr><td>Paging response type</td><td>4.4.3.5.3.4.25</td><td>uplink</td><td>O</td><td>~~3~~ 3~4</td><td>(note)</td></tr>
</table></td></tr>
</table>

Number	Page	Amendments
4.4-9	246	4.4.3.5.2.22 Additional channel Assign (Private standard/Public standard) This item is added.
4.4-10	246	Table 4.4.3.5.23 Additional channel Assign message contents is added.
4.4-11	246	4.4.3.5.2.23 Additional channel Assign Reject (Private standard/Public standard) This item is added.
4.4-12	246	Table 4.4.3.5.24 Additional channel Assign Reject message contents is added.
4.4-13	247	4.4.3.5.2.24 Additional channel Request (Private standard/Public standard) This item is added.
4.4-14	247	Table 4.4.3.5.25 Additional channel Request message contents is added.
4.4-15	248	4.4.3.5.2.25 Additional channel Request Indicate (Private standard/Public standard) This item is added.
4.4-16	248	Table 4.4.3.5.26 Additional channel Request Indicate message contents is added.
4.4-17	249	4.4.3.5.2.26 Additional channel Request Indicate Reject (Private standard/Public standard) This item is added.
4.4-18	249	Table 4.4.3.5.27 Additional channel Request Indicate Reject message contents is added.
4.4-19	250	4.4.3.5.2.27 Additional channel Re-request (Private standard/Public standard) This item is added.
4.4-20	250	Table 4.4.3.5.28 Additional channel Re-request message contents is added.
4.4-21	253	4.4.3.5.3.3 Message type Figure 4.4.3.5.3-1 Message types (private) Message type (octet 1): Bit 8 7 6 5 4 3 2 1 0 1 0 0 1 1 0 0 Additional channel Assign 0 1 1 0 1 Additional channel Assign Reject 0 1 1 1 0 Additional channel Request 0 1 1 1 1 Additional channel Request Indicate 1 0 0 0 0 Additional channel Request Indicate Reject 1 0 0 0 1 Additional channel Re-request
4.4-22	254	Figure 4.4.3.5.3-2 Message types (public) Bit 8 7 6 5 4 3 2 1 0 1 0 0 1 1 0 0 Additional channel Assign 0 1 1 0 1 Additional channel Assign Reject 0 1 1 1 0 Additional channel Request 0 1 1 1 1 Additional channel Request Indicate 1 0 0 0 0 Additional channel Request Indicate Reject 1 0 0 0 1 Additional channel Re-request
4.4-23	256	The information element identifier bit coding for the information elements shown in this section is shown in Table 4.4.3.5.~~23~~ 29 -1 and Table 4.4.3.5.~~23~~ 29 -2.
4.4-24	256	Table 4.4.3.5.29-1 Information element coding (private) Bit 8 7 6 5 4 3 2 1 0 0 0 1 1 0 1 1 Additional TCH Adoption Capability 0 0 1 1 1 0 0 Additional TCH Identification 0 0 1 1 1 0 1 Additional TCH Information
4.4-25	257	Table 4.4.3.5.29-2 Information element coding (public) Bit 8 7 6 5 4 3 2 1 0 0 0 1 1 0 1 1 Additional TCH Adoption Capability 0 0 1 1 1 0 0 Additional TCH Identification 0 0 1 1 1 0 1 Additional TCH Information

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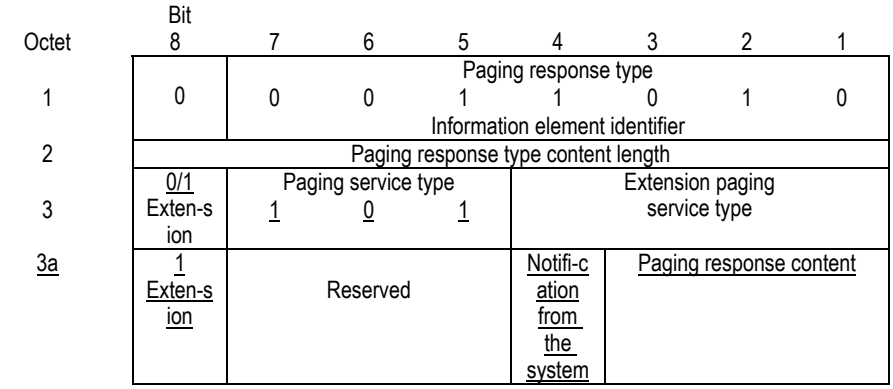
4.4-26	263	4.4.3.5.3.4.2 Broadcasting information Figure 4.4.3.5.7 Broadcasting information In the Figure, octet 20, bit 1, 2 ~~Reserved~~ → Available slot number of simultaneous using
4.4-27	267	4.4.3.5.3.4.5 Cause Figure 4.4.3.5.10 Cause Cause value (octet 2) Bit 7 6 5 4 3 2 1 0 1 0 0 0 0 1 No vacant channel (includes no slot available) 0 0 1 1 No out going circuit available 1 0 0 - - - - Service or option not implemented class 1 1 1 1 Service or option not implemented, unspecified (includes no channel adding function at CS side) 1 0 1 - - - - Invalid message (e.g. parameter out of range) class 0 0 0 1 Assigned carrier non-corresponding (PS side) 1 0 0 0 No channel adding function (PS side)
4.4-28	272	4.4.3.5.3.4.10 Encryption key set In the 4th line, In case of 64k bit/s communication, Encryption key is common to TCH & 2ndTCH, which means that Encryption key set on TCH is also used on 2ndTCH.
4.4-29	273 ~274	4.4.3.5.3.4.11 PS number Figure 4.4.3.5.16 PS number Paging service type (octet 2) Bit 7 6 5 0 1 1 Shows paging service by hexadecimal 13-digit PS number. ~~(however, reserved in public system)~~ 1 0 0 ~~Reserved~~ Shows paging service by BCD 13 digits or less domestic PS number. Extension paging service type (octet 8) Bit 4 3 2 1 0 0 1 0 Shows paging service by PS number of BCD 12 digits of less. (note 1) 0 1 0 0 Shows paging service by supplementary service within the CS-PS loop. (note 2) (Note 1) Paging service by PS number of BCD 12 digits or less is used for showing that the PS number is based on the original numbering plan defined in each private system. (Note 2) Used for supplementary service within the CS-PS loop in a private system.

Number	Page	Amendments
4.4-30	275	Figure 4.4.3.5.16 PS number PS number (octets 2-8) For PS numbers, for each paging service type, it is possible to use two types of number indication method. ・ In the case of BCD, the first number, that is the number first dialed, is packed in the PS number in order from the lowest octet. ・ In the case of BCD, the number of digits of PS number, if smaller than the maximum number of digits for each paging service type, adds filler following PS number up to the maximum number of digits. ・ As the number digits, BCD and hexadecimal are determined as shown below. ~~(BCD is only in public system)~~ ・ When used in a public system, if paging service type is (001), the types of number/numbering plan identifier of the PS number are considered undetermined / undetermined. ・ When used in a public system, if paging service type is (011), the type of number of the PS number is considered as international number, and number plan identifier is considered as ISDN/telephony numbering plan. ・ When used in a public system, if paging service type is (100), the type of number of the PS number is considered as domestic number, and number plan identifier is considered as ISDN/telephony numbering plan.
4.4-31	290	4.4.3.5.3.4.25 Paging response type Figure 4.4.3.5.30 Paging response type  Extension of this information element is used in supplementary service within the CS-PS loop for the private system. Extension method is as follows. ・0/1 Extension : The 8th bit is used for extension bit, and octet(N) is extended to the following octets(Na, Nb, ……). ・The 8th bit "0" shows next octet follows this octet. ・The 8th bit "1" shows this octet is the last of the octet group. ・When another octet follows, the 8th bit in the format description is described as "0/1 Extension". ・When the last octet in extended area, 8th bit in the format description is described as "1 Extension".

Number	Page	Amendments
4.4-32	291	Figure 4.4.3.5.30 Paging response type Extension paging service type (octet 3) Bit 4 3 2 1 0 1 0 0 shows responding to zone paging call that shows " shows paging service (supplementary service within the CS-PS loop) to all PS receiving this paging message " in the PCH. Notification from the system (zone paging, hold within the CS-multiple PS) (octet 3a) This is the bit of the octet for supplementary service within the CS-PS loop. Responding to zone paging or to hold within the CS-multiple PS, it has the following meaning. Bit 4 0 Zone paging 1 Hold within the CS-multiple PS Paging response content (octet 3a) This information is a part of the octet for supplementary service within the CS-PS loop. Responding to zone paging or to hold within the CS-multiple PS, it has the following meaning. Bit 3 2 1 0 0 0 Undetermined 0 0 1 Outside line 1 0 1 0 Outside line 2 0 1 1 Door phone A 1 0 0 Door phone B 1 0 1 Extension line 1 1 1 0 Extension line 2 1 1 1 Option
4.4-33	292	4.4.3.5.3.4.26 Additional TCH Adoption Capability (Private standard/Public standard) This item is added.
4.4-34	292	Figure 4.4.3.5.31 Additional TCH Adoption Capability is added.
4.4-35	293	4.4.3.5.3.4.27 Additional TCH Identification (Private standard/Public standard) This item is added.
4.4-36	293	Figure 4.4.3.5.32 Additional TCH Identification is added.
4.4-37	294	4.4.3.5.3.4.28 Additional TCH Information (Private standard/Public standard) This item is added.
4.4-38	294 ~295	Figure 4.4.3.5.33 Additional Tch information is added.

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<tr><td>4.4-39</td><td>329
~330</td><td>4.4.3.6.3.4.10 PS number
Figure 4.4.3.6.13 PS number
Paging service type (octet 2)
Bit
7 6 5
0 1 1 Shows paging service by hexadecimal 13-digit PS number. ~~(however, reserved in public system)~~
1 0 0 ~~Reserved~~ Shows paging service by BCD 13 digits or less domestic PS number.

Extension Paging Service Type (octet 8)
Bit
4 3 2 1
0 0 1 0 Paging by PS number with 12 BCD digits or less (note 1)
0 1 0 0 Shows paging service by supplementary service within the CS-PS loop. (note 2)

(Note 1) Paging service dependent on the PS number following the 12th digit of BCD is used to clearly indicate that the PS number is based on the unique numbering plan defined on a per private system basis.
(Note 2) Used for supplementary service within the CS-PS loop in a private system.

PS number (octet 2 ~ 8)
For PS numbers, for each paging service type, it is possible to use two types of number indication method.
・ In the case of BCD, the first number, that is the number first dialed, is packed in the PS number in order from the lowest octet.
・ In the case of BCD, the number of digits of PS number, if smaller than the maximum number of digits for each paging service type, adds filler following PS number up to the maximum number of digits.
・ As the number digits, BCD and hexadecimal are determined as shown below. ~~(BCD is only in public system)~~
・ When used in a public system, if paging service type is (001), the types of number/numbering plan identifier of the PS number are considered undetermined / undetermined.
・ When used in a public system, if paging service type is (011), the type of number of the PS number is considered as international number, and number plan identifier is considered as ISDN / telephony numbering plan.
・ When used in a public system, if paging service type is (100), the type of number of the PS number is considered as domestic number, and number plan identifier is considered as ISDN/telephony numbering plan.</td></tr>
<tr><td>4.4-40</td><td>338</td><td>Table 4.4.3.7.1 CC message overview

<table><tr><th>Call Information phase message</th><th>Reference</th></tr><tr><td>USER INFOrmation (note 1)</td><td>4.4.3.7.2.1.16</td></tr></table></td></tr>
<tr><td>4.4-41</td><td>339</td><td>Table 4.4.3.7.2 ALERTing message contents

<table><tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classification</th><th>Information length</th><th>Remarks</th></tr><tr><td>Display</td><td>4.4.3.7.3.5.24</td><td>downlink</td><td>O</td><td>2~82</td><td>(note 4)</td></tr></table>
(note 4) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.</td></tr>
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<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>4.4-42</td><td>340</td><td>Table 4.4.3.7.3 CALL PROCeeding message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classifi-cation</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Progress indicator</td><td>4.4.3.7.3.5.13</td><td>both</td><td>O</td><td>2~4</td><td>(note 1)</td></tr>
<tr><td>Display</td><td>4.4.3.7.3.5.24</td><td>downlink</td><td>O</td><td>2~82</td><td>(note 2)</td></tr>
</table>
(note 1) Included when in-band information/pattern is offered.
(note 2) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.</td></tr>
<tr><td>4.4-43</td><td>341</td><td>Table 4.4.3.7.4 CONNect message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classifi-cation</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Bearer capability</td><td>4.4.3.7.3.5.4</td><td>both</td><td>O</td><td>4~11</td><td>(note 5)</td></tr>
<tr><td>Display</td><td>4.4.3.7.3.5.24</td><td>downlink</td><td>O</td><td>2~82</td><td>(note 6)</td></tr>
</table>
(note 5) The Bearer capability information element is included when the procedures shown in Appendix X for bearer capability selection apply.
(note 6) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.</td></tr>
<tr><td>4.4-44</td><td>342</td><td>Table 4.4.3.7.5 CONNect ACKnowledge message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classifi-cation</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Display</td><td>4.4.3.7.3.5.24</td><td>downlink</td><td>O</td><td>2~82</td><td>(note 2)</td></tr>
<tr><td>Signal</td><td>4.4.3.7.3.5.15</td><td>downlink</td><td>O</td><td>2~3</td><td>(note 1)</td></tr>
</table>
(note 1) Included when information is offered that shows the tone.
(note 2) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.</td></tr>
<tr><td>4.4-45</td><td>343</td><td>Table 4.4.3.7.6 DISConnect message contents
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<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classifi-cation</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Display</td><td>4.4.3.7.3.5.24</td><td>downlink</td><td>O</td><td>2~82</td><td>(note 6)</td></tr>
</table>
(note 6) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.</td></tr>
<tr><td>4.4-46</td><td>344</td><td>Table 4.4.3.7.7 FACility message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classifi-cation</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Display</td><td>4.4.3.7.3.5.24</td><td>downlink</td><td>O</td><td>2~82</td><td>(note)</td></tr>
</table>
(note) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.</td></tr>
</table>

Number	Page	Amendments
4.4-47	345	Table 4.4.3.7.8 INFOrmation message contents

Information element	Reference	Direction	Classification	Information length	Remarks
Display	4.4.3.7.3.5.24	downlink	O	2~82	(note 7)

(note 7) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.

4.4-48 346 Table 4.4.3.7.9 PROGress message contents

Information element	Reference	Direction	Classification	Information length	Remarks
Cause	4.4.3.7.3.5.10	both	O	2~5	(note 1)
Display	4.4.3.7.3.5.24	downlink	O	2~82	(note 2)

(note 1) Included when information pertaining to provision of in-band information/pattern is offered by PS or CS.

(note 2) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.

4.4-49 347 Table 4.4.3.7.10 RELease message contents

Information element	Reference	Direction	Classification	Information length	Remarks
Display	4.4.3.7.3.5.24	downlink	O	2~82	(note 6)

(note 6) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.

4.4-50 348 Table 4.4.3.7.11 RELease COMPlete message contents

Information element	Reference	Direction	Classification	Information length	Remarks
Display	4.4.3.7.3.5.24	downlink	O	2~82	(note 6)

(note 6) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.

4.4-51 349 ~350 Table 4.4.3.7.12 SETUP message contents

Information element	Reference	Direction	Classification	Information length	Remarks
Repeat indicator	4.4.3.7.3.5.21	both	O	1	(note 16)
Bearer capability	4.4.3.7.3.5.4	both	M	4~11	(note 17)
Display	4.4.3.7.3.5.24	downlink	O	2~82	(note 18)

(note 16) The Repeat indicator information element is included immediately before the first Bearer capability information element when the bearer capability negotiation procedure is used. (Refer to Appendix AJ)

(note 17) May be repeated if the bearer capability negotiation procedure is used (Refer to Appendix AJ). For bearer capability negotiation, two Bearer capability information elements may be included in descending order of priority, i.e., highest priority first. Although support of multiple Bearer capability information elements may not be supported on all networks, on networks that do support it, and through suitable subscription arrangements, two Bearer capability information elements may be included (Refer to Appendix X). When they are not presented by a Repeat indicator information element, they are included in ascending order of priority.

(note 18) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>4.4-52</td><td>351</td><td>Table 4.4.3.7.13 SETUP ACKnowkedge message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classifi-cation</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Display</td><td>4.4.3.7.3.5.24</td><td>downlink</td><td>O</td><td>2~82</td><td>(note 3)</td></tr>
</table>
(note 3) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.</td></tr>
<tr><td>4.4-53</td><td>352</td><td>Table 4.4.3.7.14 STATus message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classifi-cation</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Display</td><td>4.4.3.7.3.5.24</td><td>downlink</td><td>O</td><td>2~82</td><td>(note)</td></tr>
</table>
(note) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.</td></tr>
<tr><td>4.4-54</td><td>352</td><td>Table 4.4.3.7.15 STATus ENQuiry message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classifi-cation</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Display</td><td>4.4.3.7.3.5.24</td><td>downlink</td><td>O</td><td>2~82</td><td>(note)</td></tr>
</table>
(note) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.</td></tr>
<tr><td>4.4-55</td><td>353</td><td>Table 4.4.3.7.16 NOTIFY message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classifi-cation</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Display</td><td>4.4.3.7.3.5.24</td><td>downlink</td><td>O</td><td>2~82</td><td>(note)</td></tr>
</table>
(note) In the private system, included the information which CS provides to display on PS. The minimum length is 2 octets; the maximum length is CS-side dependent and is either 34 or 82 octets.</td></tr>
<tr><td>4.4-56</td><td>353</td><td>4.4.3.7.2.1.16 USER INFOrmation (Private standard)
This item is added.</td></tr>
<tr><td>4.4-57</td><td>353</td><td>Table 4.4.3.7.17 USER INFOrmation message contents is added.</td></tr>
<tr><td>4.4-58</td><td>356</td><td>4.4.3.7.3.3 Call reference
Figure 4.4.3.7.3 shows the call reference coding
(note 2) In RCR STD-28(version 1 ~~and~~ , version 2 and version 3), call reference length is limited to 1 octet.</td></tr>
<tr><td>4.4-59</td><td>357</td><td>4.4.3.7.3.4 Message type
Figure 4.4.3.7.4 Message type
Bit
8 7 6 5 4 3 2 1
0 0 1 - - - - - Call information phase message
0 0 0 0 0 USER INFOrmation (note 1)</td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>4.4-60</td><td>360</td><td>(2) The coding for information element identification bits for the information elements shown in this section is displayed in Table 4.4.3.7.18.
Table 4.4.3.7.18 Information element coding
Bit
8 7 6 5 4 3 2 1
1 0 1 0 0 0 0 0 More data (note 4)
0 0 1 0 1 0 0 0 Display (note 4)
0 1 1 1 1 1 1 0 User-user (note 4)</td></tr>
<tr><td>4.4-61</td><td>364
~365</td><td>4.4.3.7.3.5.4 Bearer capability
Figure 4.4.3.7.7 Bearer capability
Information transfer rate (octet 4)
Bit
5 4 3 2 1
1 0 0 0 0 ~~Reserved (~~Circuit mode 64k bit/s~~)~~

User rate (octet 5a)
Bit
5 4 3 2 1
0 1 1 1 0 ~~Reserved (~~48k bit/s Recommendations X.1 and V.6~~)~~
0 1 1 1 1 ~~Reserved (~~56k bit/s Recommendation V.6~~)~~</td></tr>
<tr><td>4.4-62</td><td>379
~380</td><td>4.4.3.7.3.5.11 Facility
Figure 4.4.3.7.14 Facility
<table><tr><th>Octet</th><th>Bit 8</th><th>7</th><th>6</th><th>5</th><th>4</th><th>3</th><th>2</th><th>1</th></tr><tr><td rowspan="2">15.3.3</td><td colspan="2">0 1 Class</td><td>0 Format</td><td colspan="5">0 0 0 0 0</td></tr><tr><td></td><td colspan="7">Length (note 10)</td></tr><tr><td>0</td><td colspan="7">1 1 0 1 1 0 0 JT-Q931 calling party number information element</td></tr><tr><td>0</td><td colspan="7">Calling party number content length (note 10)</td></tr><tr><td>1 Exten-sion</td><td colspan="3">~~0 1 0~~ ~~Domestic number~~ Type of number (note 6)</td><td colspan="4">0 0 0 1 ISDN/telephone numbering plan (note 6)</td></tr><tr><td>0</td><td colspan="7">Number digit
IA5 character (0 to 9, #, *)</td></tr></table>
(Note 6) The type of the number is the domestic number (010) when the country which gave the PS number, and the identification code of the CS is same, otherwise, international number (001). ~~and~~ The numbering plan identifier is the ISDN/ telephony numbering plan. ~~(Because the handover calling party number becomes the relevant PS number, and type of number is assigned in a fixed manner.)~~</td></tr>
<tr><td>4.4-63</td><td>386</td><td>Q.950 error values
Bit
8 7 6 5 4 3 2 1
0 0 0 0 0 0 0 0 User non-contracted
0 0 0 0 1 0 1 0 Supplementary service with unauthorized mutual action
0 0 0 0 1 0 1 1 Temporary resource use impossible</td></tr>
<tr><td>4.4-64</td><td>390</td><td>4.4.3.7.3.5.13 Progress indicator
Figure 4.4.3.7.16 Progress indicator
Progress description (octet 4)
Bit
7 6 5 4 3 2 1
0 0 0 0 1 0 1 Interworking has occurred and has resulted in a telecommunication service change.</td></tr>
</table>

Number	Page	Amendments
4.4-65	395	4.4.3.7.3.5.18 PS identity Figure 4.4.3.7.21 PS identity Paging service type (Octet 3) Bit 7 6 5 1 0 0 ~~Reserved~~ Shows paging service by BCD 13 digits or less domestic PS number.
4.4-66	395 ~396	4.4.3.7.3.5.18 PS identity Figure 4.4.3.7.21 PS identity Extended paging service type (Octet 9) Bit 4 3 2 1 0 0 1 0 Paging service by PS number of BCD 12 digits or less. (note 1) 0 1 0 0 Shows paging service by supplementary service within the CS-PS loop. (note 2) (Note 1) Paging service by PS number of BCD 12 digits or less is used to explicitly indicate that PS number is based on a numbering plan defined in each private system. (Note 2) Used for supplementary service within the CS-PS loop in a private system. PS number (Octets 3-9) The two types of number digit shown below can be used for PS number. ・ In the case of BCD, the first number, that is the number first dialed, is packed in the PS number in order from the lowest octet. ・ In the case of BCD, the number of digits of PS number, if smaller than the maximum number of digits for each paging service type, adds filler following PS number up to the maximum number of digits.
4.4-67	402 ~408	4.4.3.7.3.5.20 Low layer compatibility Figure 4.4.3.7.23 Low layer compatibility Information transfer capability (octet 3) Bit 5 4 3 2 1 1 0 0 0 1 ~~Reserved (~~Unrestricted digital information with tone/announcements~~)~~ (note) 1 1 0 0 0 ~~Reserved (~~Video~~)~~ Information transfer rate (octet 4) Bit 5 4 3 2 1 Circuit mode Packet-mode 1 0 0 0 0 ~~Reserved (~~64k bit/s~~)~~ - In-band/out-band negotiation (octet 5b) (Note) Private only. In public system, ~~RCR STD-28 does not allows this negotiation procedure because of~~ “User INFOrmation” message is not ~~defined in it~~ standardized.
4.4-68	416	4.4.3.7.3.5.24 Display (Private standard) This item is added.
4.4-69	416	Figure 4.4.3.7.27 Display information element is added.
4.4-70	416	4.4.3.7.3.5.25 More data (Private standard) This item is added.
4.4-71	416	Figure 4.4.3.7.28 More data information element is added.
4.4-72	417	4.4.3.7.3.5.26 User-user (Private standard) This item is added.
4.4-73	417	Figure 4.4.3.7.29 User-user information element is added.

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>4.4-74</td><td>418</td><td>4.4.3.7.4.1 Supplementary service types
The supplementary services provided in the personal handy phone system are shown in Table 4.4.3.7.~~18~~ 19.
Table 4.4.3.7.~~18~~ 19 Supplementary service types
<table><tr><th>Supplementary service</th><th>Reference</th></tr><tr><td>Supplementary service within the CS-PS loop (note)</td><td>4.4.3.7.4.1.3</td></tr></table></td></tr>
<tr><td>4.4-75</td><td>418</td><td>4.4.3.7.4.1.1 DTMF signal transmission
(2) Sequence
The DTMF signal transmission sequence is shown in Figure 4.4.3.7.~~27~~ 30.
Figure 4.4.3.7.~~27~~ 30 DTMF signal transmission sequence</td></tr>
<tr><td>4.4-76</td><td>419</td><td>4.4.3.7.4.1.2 Hooking signal transmission
(2) Sequence
The hooking signal transmission sequence is shown in Figure 4.4.3.7.~~28~~ 31.
Figure 4.4.3.7.~~28~~ 31 Hooking signal transmission sequence</td></tr>
<tr><td>4.4-77</td><td>420</td><td>4.4.3.7.4.1.3 Supplementary services within the CS-PS loop (Private standard)
This item is added.</td></tr>
<tr><td>4.4-78</td><td>421</td><td>4.4.3.7.5.1 State transition table description method
The functional operation state transition table description method is shown in Figure 4.4.3.7.~~29~~ 32.
Figure 4.4.3.7.~~29~~ 32 State transition table description method</td></tr>
<tr><td>4.4-79</td><td>424
~425</td><td>4.4.3.7.5.2 Functional operation state
(1) Recalling-type channel switching
The PS-side state transition table is shown in Table 4.4.3.7.~~19~~ 20, and the CS-side state transition table is shown in Table 4.4.3.7.~~20~~ 21.

(2) Recalling-type channel switching for private system
The PS-side state transition table is shown in Table 4.4.3.7.~~19~~ 20, and the CS-side state transition table is shown in Table 4.4.3.7.~~20~~ 21.

Table 4.4.3.7.~~19~~ 20 Recalling-type channel switching state (PS side) / Recalling-type channel switching for private system state (PS side)
Table 4.4.3.7.~~20~~ 21 Recalling-type channel switching state (CS side of new channel) (note 1) /Recalling-type channel switching for private system state (CS side of new channel)(note 1)</td></tr>
<tr><td>4.4-80</td><td>454</td><td>4.4.3.8.8 64k bit/s Unrestricted Digital Information (64k bit/s UDI) (Private standard/ Public standard)
This item is added.</td></tr>
<tr><td>4.4-81</td><td>454</td><td>4.4.3.8.8.1 64k bit/s UDI Outgoing call (Private standard/ Public standard)
This item is added.</td></tr>
<tr><td>4.4-82</td><td>454
~456</td><td>4.4.3.8.8.1.1 64k bit/sUDI Outgoing call (En-bloc sending) (Private standard/ Public standard)
This item is added.</td></tr>
<tr><td>4.4-83</td><td>456</td><td>Figure 4.4.3.8.15 Control sequence (64k bit/s UDI Outgoing call (En-bloc sending)) is added.</td></tr>
<tr><td>4.4-84</td><td>457
~458</td><td>4.4.3.8.8.1.2 64k bit/s UDI Outgoing call (Overlap sending) (Private standard)
This item is added.</td></tr>
<tr><td>4.4-85</td><td>457
~458</td><td>Figure 4.4.3.8.16 Control sequence (64k bit/s UDI Outgoing call (Overlap sending)) is added.</td></tr>
<tr><td>4.4-86</td><td>459
~462</td><td>4.4.3.8.8.2 64k bit/s UDI Incoming call (Private standard/ Public standard)
This item is added.</td></tr>
<tr><td>4.4-87</td><td>461
~462</td><td>Figure 4.4.3.8.17 Control sequence (64k bit/s UDI Incoming call) is added.</td></tr>
</table>

Number	Page	Amendments
4.4-88	463	4.4.3.8.8.3 64k bit/s UDI Disconnect (Private standard/ Public standard) This item is added.
4.4-89	463	Figure 4.4.3.8.18 Control sequence (64k bit/s UDI PS side disconnect) is added.
4.4-90	463	Figure 4.4.3.8.19 Control sequence (64k bit/s UDI CS side disconnect) is added.
4.4-91	464	4.4.3.8.8.4 64k bit/s UDI Channel switching during communication (Private standard/ Public standard) This item is added.
4.4-92	464 ~465	4.4.3.8.8.4.1 64k bit/s UDI Channel switching during communication (switching on same CS) (Private standard/ Public standard) This item is added.
4.4-93	464	Figure 4.4.3.8.20 Control sequence (64k bit/s UDI Channel switching during communication (switching on same CS, 1st TCH)) is added.
4.4-94	465	Figure 4.4.3.8.21 Control sequence (64k bit/s UDI Channel switching during communication (switching on same CS, 2nd TCH)) is added.
4.4-95	466 ~469	4.4.3.8.8.4.2 64k bit/s UDI Channel switching during communication (switching to other CS : PS recalling-type) (Private standard/ Public standard) This item is added.
4.4-96	468 ~469	Figure 4.4.3.8.22 Control sequence (64k bit/s UDI Channel switching during communication (switching to other CS : PS recalling-type) is added.
4.4-97	470 ~473	4.4.3.8.8.4.3 64k bit/s UDI Channel switching during communication (switching to other CS : Recalling-type with PS request) (Private standard/ Public standard) This item is added.
4.4-98	470 ~471	Figure 4.4.3.8.23 Control sequence (64k bit/s UDI Channel switching during communication (Switching to other CS : the recalling type 1st TCH with PS request)) is added.
4.4-99	472 ~473	Figure 4.4.3.8.24 Control sequence (64k bit/s UDI Channel switching during communication (Switching to other CS : the recalling type 2nd TCH with PS request)) is added.
4.4-100	474 ~477	4.4.3.8.8.4.4 64k bit/s UDI Channel switching during communication (switching to other CS : Recalling-type with CS indication) (Private standard/ Public standard) This item is added.
4.4-101	474 ~475	Figure 4.4.3.8.25 Control sequence (64k bit/s UDI Channel switching during communication (Switching to other CS : the recalling type 1st TCH with CS indication)) is added.
4.4-102	476 ~477	Figure 4.4.3.8.26 Control sequence (64k bit/s UDI Channel switching during communication (Switching to other CS : the recalling type 2nd TCH with CS indication)) is added.
6-1	483	6.2.5.3 Structure of calling station identification code/called station identification code In the 6th line, The PS station number is the PS logical number valid only in communication between PSs mode, and is the part that is open to the user. The lead bit of the PS station number which consist of 13bits starts from the 30th bit (*) of the called station identification code.
6-2	484	6.2.5.6 User scrambling (Private ~~reference~~ standard) In communication between PSs, since unique standard scrambling (section 6.2.5.5) is used for each system, User scrambling also uses this~~, user scrambling is not standardized~~.
6-3	484	~~6.2.5.7 VOX control~~ ~~(Private reference)~~ This item is deleted.
6-4	484	6.2.5.7 Voice coding method (Private standard) This item is added.
6-5	484	6.3 Control procedures (Private ~~reference~~ standard)
6-6	484	6.3.1 Connection procedures (Private ~~reference~~ standard)
6-7	484	6.3.1.1 Message format for communication between personal stations (Private ~~reference~~ standard)

Number	Page	Amendments
6-8	485 ~486	Table 6.3.1 Message format for communication between personal stations

Octet \ Bit	8	7	6	5	4	3	2	1
1	Message type							
2	LCH type			LCH protocol type		~~Reserved~~ (note 1)	~~Reserved~~ (note 2)	
3	(MSB) Origination-side PS station number							
4	Option			Origination-side PS station number (LSB)				
5							Option	

note1: Information type
note2: Protocol version of communication between PSs

Table 6.3.2 Information elements in message for direct communication between personal stations

Information type (octet 2)
Bit
3
0 Speech
1 Unrestricted digital information

Protocol version of communication between PSs (octet 2)
Bit
2 1
0 0 Version 0 (RCR STD-28 (version 1) or RCR STD-28(version 2) Communication between PSs)
0 1 Version 1 (RCR STD-28 (version 3) Communication between PSs)
Other Reserved

6-9	486	6.3.1.2 Control sequence (Private ~~reference~~ standard)
6-10	486	Figure 6.3.1 Control sequence (Calling/Called) (Note 1) "Alerting" has a ~~maximum~~ transmission time of 10 seconds, taking battery saving of the destination-side into consideration. "Alerting" is continuously transmitted.
6-11	487	6.3.2 Disconnect (Private ~~reference~~ standard)
6-12	487	6.3.2.1 Message format (Private ~~reference~~ standard) Disconnect is performed using a UI command by FACCH. The messages used are RT "Radio-channel disconnect" and "Radio-channel Disconnect Complete". "Radio-channel disconnect" and "Radio-channel Disconnect Complete" are continuously transmitted three time.
6-13	488	6.3.2.2 Control sequence (Private ~~reference~~ standard)
6-14	488	6.3.3 Channel switching during communication (Private ~~reference~~ standard)
6-15	488	6.3.3.1 Message format (Private ~~reference~~ standard) Channel switching is performed using a UI command by FACCH. The message used is RT "TCH Switching Request". "TCH Switching Request" are continuously transmitted three time.
6-16	489	6.3.3.2 Control sequence (Private ~~reference~~ standard)
6-17	490	6.3.4 Communication between PSs timers (Private standard) This item is added.
6-18	490	6.3.4.1 Calling side timers (Private standard) This item is added.
6-19	491	6.3.4.2 Called side timers (Private standard) This item is added.

Number	Page	Amendments
8-1	537	Chapter 8 Terminology 2nd TCH This is a traffic channel which is used for 64k bit/s UDI communication, the channel does not contain neither LAPDC function in Layer 2 nor CC and MM entities in Layer 3 but has only RT entity in Layer 3.
8-2	537	2nd synchronization burst This is the signal which is transmitted for the synchronization to establish communication physical slot and channel switching of 2nd TCH. It includes 32 bits unique word.
C-1	552 ~553	Appendix C Restriction control 1 Access group restriction (2) Restriction contents (Note 2) The PS number for determining the PS restriction group is calculated as follows. [1] If the PS number type is BCD ~~(public system, private system)~~, the lower 4 digits …… [2] If the PS number type is hexadecimal ~~(private system only)~~, the lower 16 bits ……
D-1	556	Appendix D PS switchback operation during channel switching during communication 1 Timing after which switchback is impossible In the 3rd line, However, switchback is possible if the new channel synchronization is established after receiving downlink burst of 2nd TCH during the handover of 64k bit/s communication and if receiving downlink idle burst on only TCH is completed and receive 2nd TCH downlink synchronization burst is disabled.
D-2	556	2 PS operation during switchback In the 3rd line, And the handover switchback operation sequence in case of 64k bit/s communication is shown in Figures 4 and 5.
D-3	561	Figure 4 64k bit/s UDI Switchback operation during handover (this switchback operation is owing to the factor of 1st TCH side) is added.
D-4	562	Figure 5 64k bit/s UDI Switchback operation during handover (this switchback operation is owing to the factor of 2nd TCH side) is added.
F-1	579	Appendix F RT state transition diagram (PS side) RT state transition diagram (PS side TCH) In the left , ,(TR311P), (additional TCH request), additional TCH assignment, additional TCH reject, (additional TCH re-request), additional TCH request indication, (additional TCH request indication reject) are added.
F-2	580	RT state transition diagram (PS side 2nd TCH) is added.
G-1	581	Appendix G RT SDL diagrams (PS side) Figure 1 RT SDL diagram description method (PS side) This figure is revised. RT (1st TCH), RT (2nd TCH), Layer 2 (1st TCH), Layer 1 (1st TCH), Layer 1 (2nd TCH) is added.
G-2	582 ~598	Appendix G RT SDL diagrams (PS side TCH) 1/17~17/17 In the right of 5/17 (Same channel) is added. 6/17 and 7/17 are newly added.
G-3	599 ~607	Appendix G RT SDL diagrams (PS side: 2nd TCH) 1/9~9/9 are added.

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>H-1</td><td>608
~609</td><td>Appendix H RT PS side timers
<table>
<tr><th rowspan="2">Timer
No. Value</th><th rowspan="2">Status</th><th rowspan="2">Start conditions</th><th rowspan="2">Stop conditions</th><th rowspan="2">Expiration (Retry)</th><th rowspan="2">Expiration (Retry out)</th><th colspan="2">Mandatory/Option</th></tr>
<tr><th>Timer</th><th>Timer value</th></tr>
<tr><td>TR101P
(200 ms)</td><td>TCH activation (1st TCH)
TCH activation waiting (2nd TCH)
TCH activation (1st TCH)
TCH activation waiting 2 (2nd TCH)</td><td>Without U wave</td><td>“Synchroni-zation establish-ment” reception</td><td></td><td>TCH activation (1st TCH)
Null (2nd TCH)
Downlink synchroni-zation burst waiting (old TCH)</td><td>Man-dat ory</td><td>Man-dat ory</td></tr>
<tr><td>TR311P
(4S)</td><td>TCH activation (1st TCH)
Null (2nd TCH)</td><td>“Additional TCH request” transmission
“Additional TCH re-request” transmission</td><td>“Additional TCH assignment” reception
“Additional TCH reject” reception</td><td></td><td>TCH activation (1st TCH)
Null (2nd TCH)</td><td>Man-dat ory</td><td>Man-dat ory</td></tr>
</table></td></tr>
<tr><td>I-1</td><td>610</td><td>Appendix I RT state transition diagram (CS side)
RT state transition diagram (CS side TCH)
In the left ,
T.O (TR311C), Additional TCH request, (Additional TCH assignment), (Additional TCH reject), Additional TCH re-request, (Additional TCH request indication), Additional TCH request indication reject are added.</td></tr>
<tr><td>I-2</td><td>611</td><td>RT state transition diagram (CS side : 2nd TCH) is added.</td></tr>
<tr><td>J-1</td><td>612</td><td>Appendix J RT SDL diagrams (CS side)
Figure 1 RT SDL diagram description method (CS side)
This figure is revised.
RT (1st TCH), RT (2nd TCH), Layer 2 (1st TCH), Layer 1 (1st TCH), Layer 1 (2nd TCH) is added.</td></tr>
<tr><td>J-2</td><td>613
~623</td><td>Appendix J RT SDL diagrams (CS side TCH) 1/11~11/11
5/11 and 6/11 are newly added.</td></tr>
<tr><td>J-3</td><td>624
~629</td><td>Appendix J RT SDL diagrams (CS side 2nd TCH) 1/6~6/6 are added.</td></tr>
<tr><td>K-1</td><td>630</td><td>Appendix K RT CS side timers
<table>
<tr><th colspan="2" rowspan="2">Timer
No. Value</th><th rowspan="2">State</th><th rowspan="2">Start conditions</th><th rowspan="2">Stop conditions</th><th rowspan="2">Time out (Retry)</th><th rowspan="2">Time out (Retry out)</th><th colspan="2">Mandatory/Optional</th></tr>
<tr><th>Timer</th><th>Timer value</th></tr>
<tr><td colspan="2">TR311C
(4S)</td><td>TCH activation (1st TCH)
Waiting (2nd TCH)</td><td>“Additional TCH request indication” transmission</td><td>“Additional TCH request” reception
“Additional TCH request indication reject” reception</td><td>-</td><td>TCH activation (1st TCH)
Waiting (2nd TCH)</td><td>Man-dat ory</td><td>Man-dat ory</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>L-1</td><td>631</td><td>Appendix L Error state processes in RT
4.2 ~~Overlapping~~ Multiplexed information elements
~~If repetition of one information element within a message is not permitted and if an information element is repeated in a message, only the first of that information element that appears is processed, and the repeated information element after that are ignored.~~ If information elements are repeated within a message when repetition of information elements within a message is not permitted, only the contents of the information element seen first should be processed, and all further repetition of information elements should be ignored. If repetition of information elements is permitted, only the permitted information element contents are processed. If it exceeds the limit of information element repetition, the information element contents up to the limit are processed, and information element repetition exceeding the limit is ignored.</td></tr>
<tr><td>S-1</td><td>646</td><td>Appendix S Error state processes in MM
4.2 ~~Overlapping~~ Multiplexed information elements
~~If repetition of one information element within a message is not permitted and if an information element is repeated in a message, only the first of that information element that appears is processed, and the repeated information element after that are ignored.~~ If information elements are repeated within a message when repetition of information elements within a message is not permitted, only the contents of the information element seen first should be processed, and all further repetition of information elements should be ignored. If repetition of information elements is permitted, only the permitted information element contents are processed. If it exceeds the limit of information element repetition, the information element contents up to the limit are processed, and information element repetition exceeding the limit is ignored.</td></tr>
<tr><td>W-1</td><td>688</td><td>Appendix W CC CS side timers
<table>
<tr><th rowspan="2">Timer No.</th><th rowspan="2">Timer Value</th><th rowspan="2">State of call</th><th rowspan="2">Start conditions</th><th rowspan="2">Normal stop conditions</th><th rowspan="2">Time out (Retry)</th><th rowspan="2">Time out (Retry out)</th><th colspan="2">Mandatory/Option</th></tr>
<tr><th>Timer</th><th>Timer value</th></tr>
<tr><td>TC306C</td><td>30 sec (note 4)</td><td>Dis-connect in-dication</td><td>“DIS-Connect” with progress indicator #8 sent.</td><td>“RELease” or “DIS-Connect” received.</td><td></td><td>Stop the tone/an-nounce-ment and send “RELease”.</td><td>Manda-tory if inband tones/announcements are provided</td><td>Manda-tory</td></tr>
</table>
Note 4: The value of timer TC306C may depend on the length of the announcement.</td></tr>
<tr><td>X-1</td><td>703</td><td>Appendix X CC circuit-switched call control procedures
5.7.1 Unrecognized information elements
If a message is received that has one or more unrecognized information elements, the receiving entity checks whether or not the information element is coded to indicate that "understanding is required" (refer to Table 4.4.3.7.~~16~~ 17 of the main text for reserved information element identifiers indicated as "understanding is required"). ……</td></tr>
<tr><td>X-2</td><td>708
~710</td><td>6 Signalling procedures for bearer capability selection
This item is added.</td></tr>
<tr><td>X-3</td><td>708
~709</td><td>6.1 Procedures for the originating user to indicate bearer capability selection is allowed
This item is added.</td></tr>
<tr><td>X-4</td><td>708</td><td>6.1.1 Normal operation
This item is added.</td></tr>
<tr><td>X-5</td><td>709</td><td>6.1.2 Exceptional procedures
This item is added.</td></tr>
<tr><td>X-6</td><td>709
~710</td><td>6.2 Procedures for bearer capability selection at the destination side
This item is added.</td></tr>
<tr><td>X-7</td><td>709</td><td>6.2.1 Normal operation
This item is added.</td></tr>
<tr><td>X-8</td><td>710</td><td>6.2.2 Exceptional procedures
This item is added.</td></tr>
<tr><td>X-9</td><td>710</td><td>7 User notification procedure
This item is added.</td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>AA-1</td><td>719
~724</td><td>
Appendix AA　Definition of functional operations
1. Management of object identifiers for RCR organization
Figure 1.　Management of object identifiers for RCR organization

initiation of hold within the CS-PS loop (17)
termination of hold within the CS-PS loop (18)
initiation of call transfer within the CS-PS loop (19)
initiation of call waiting within the CS-PS loop (20)
termination of call waiting within the CS-PS loop (21)
response of call waiting within the CS-PS loop (22)
initiation of conference call within the CS-PS loop (23)
termination of conference call within the CS-PS loop (24)
hold within the CS-multiple PS (25)
call type notification within the CS-PS loop (26)
initiation of PS remote control function (27)
termination of PS remote control function (28)

2. Definition of operations

The definitions of the DTMF tone transmission operation, handover operation, and supplementary service operations for private system are shown in Figure2.

Figure 2.　Definition of DTMF tone transmission operation, handover operation, and supplementary service operations for private system

CsHldStartType : : =
.
.
-- termination of PS remote control function　) are added.

CallType : : =　ENUMERATED　{
.
.
-- optional　) are added.
</td></tr>
<tr><td>AB-1</td><td>734</td><td>
Appendix AB　WLL standard
Table 2.2　Service types
<table>
<tr><th>Type</th><th>Item</th><th>Overview</th></tr>
<tr><td>Bearer services</td><td>64k bit/s unrestricted digital (note 2)</td><td>Using 2 channels on Um point, provides transmission function suited for digital data communication with terminal; information is transmitted transparently.</td></tr>
<tr><td>Supplementary services</td><td>Hooking signal transmission (note 1)</td><td>Service which generates hooking signal on CS side according to the message from PS.</td></tr>
</table>
(Note 1)　This item, however which is defined only for the private system in the main text, is standard in the WLL system.
(Note 2)　This service can be used on RT-MM protocol vertsion after version 3 of RCR STD-28.
</td></tr>
<tr><td>AB-2</td><td>749
~750</td><td>
4.4.3.5.2.22　Additional channel Assign
4.4.3.5.2.23　Additional channel Assign Reject
4.4.3.5.2.24　Additional channel Request
4.4.3.5.2.25　Additional channel Assign Request Indicate
4.4.3.5.2.26　Additional channel Request Indicate Reject
4.4.3.5.2.27　Additional channel Re-request
</td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>AB-3</td><td>751</td><td>4.4.3.5.3.4.26 Additional TCH Adoption Capability
4.4.3.5.3.4.27 Additional TCH Identification
4.4.3.5.3.4.28 Additional TCH Information</td></tr>
<tr><td>AB-4</td><td>753</td><td>4.4.3.7.2.1.16 USER INFOrmation</td></tr>
<tr><td>AB-5</td><td>754</td><td>4.4.3.7.3.5.24 Display
4.4.3.7.3.5.25 More Data
4.4.3.7.3.5.26 User - user</td></tr>
<tr><td>AB-6</td><td>755
~756</td><td>4.4.3.8.8 64k bit/s Unrestricted Digital Information(64k bit/s UDI)
4.4.3.8.8.1 64k bit/s UDI Outgoing call
4.4.3.8.8.1.1 64k bit/s UDI Outgoing call (En-bloc sending)
4.4.3.8.8.1.2 64k bit/s UDI Outgoing call (Overlap sending)
4.4.3.8.8.2 64k bit/s UDI Incoming call
4.4.3.8.8.3 64k bit/s UDI Disconnect
4.4.3.8.8.4 64k bit/s UDI Channel switching during communication
4.4.3.8.8.4.1 64k bit/s UDI Channel switching during communication (switching on same CS)
4.4.3.8.8.4.2 64k bit/s UDI Channel switching during communication (switching to other CS: PS recalling-type)
4.4.3.8.8.4.2 64k bit/s UDI Channel switching during communication (switching to other CS: PS recalling-type)
4.4.3.8.8.4.3 64k bit/s UDI Channel switching during communication (switching to other CS: Recalling-type with PS request)
4.4.3.8.8.4.4 64k bit/s UDI Channel switching during communication (switching to other CS: Recalling-type with CS indication)</td></tr>
<tr><td>AB-7</td><td>760</td><td>4.4.3.7.2.1.7 INFOrmation
Table 4.4.3.7.8 Information message contents
<table><tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Classifi-cation</th><th>Information length</th><th>Remarks</th></tr><tr><td>Display</td><td>4.4.3.7.3.5.24</td><td>downlink</td><td>O</td><td>2~82</td><td>(note 6)</td></tr></table></td></tr>
<tr><td>AB-8</td><td>761
~762</td><td>4.4.3.7.3.5.1 Coding regulations
Table 4.4.3.7.17 Information element coding
[Codeset 0] (note 1)
Bit
8 7 6 5 4 3 2 1
1 - - - - - - - Single octet information element
0 1 0 0 0 0 0 More data (note 4)
0 - - - - - - - Multiple octet information element
0 1 0 1 0 0 0 Display (note 4)
1 1 1 1 1 1 0 User-user (note 4)</td></tr>
<tr><td>AB-9</td><td>775</td><td>Appendix AJ Optional procedures for bearer service change
Appendix AK Generic procedures for the control of PHS supplementary services</td></tr>
<tr><td>AD-1</td><td>793</td><td>Appendix AD Compatibility checking
In the 27th line,
(Note) ~~The User-user Information has not defined in RCR STD-28 (Version 2).~~ ~~However,~~ In the case of Private system which is based on RCR STD-28 (Ver.3 or newer one), some terminal equipment, upon bilateral agreement with other users or in accordance with other standards (e.g. Recommendation X.213) may employ the User-user information element for additional compatibility check. ……</td></tr>
<tr><td>AD-2</td><td>793</td><td>In the 33rd line,
However, the User – user information has not standardized in the public system nor the private system which is based on RCR STD-28 (Ver.2 or Ver.1).</td></tr>
</table>

Number	Page	Amendments
AH-1	803	Appendix AH Rate adaption procedure on CS for interworking with ISDN-based network providing unrestricted digital information services 2. Handling of interworking on rate adaption in CS 2.1 Communication with data terminals not conforming to V.110 (a) Outgoing call (i) 32k bit/s Unrestricted Digital Information (UDI) When CS interworks with ISDN-based network, if the information transfer rate of the Bearer capability information element is set to “32k bit/s”, CS shall execute the rate adaption interworking for 32k bit/s UDI. In above case, if the Low layer compatibility information element is ……
AH-2	804 ~805	(ii) 64k bit/s Unrestricted Digital Information (UDI) This item is added.
AH-3	805	Figure 2.1.2 Interworking procedure in CS (2) is added.
AH-4	805	(b) Incoming call (i) 32k bit/s Unrestricted Digital Information (UDI) When CS interworks with ISDN-based network, if the information transfer rate of the Bearer capability information element is set to “32k bit/s”, CS shall execute the rate adaption interworking for 32k bit/s UDI. In above case, CS shall execute the compatibility information check. In this check, it shall be verified that the user information layer 1 protocol (octet 5) in the Bearer capability information is set to "Standardized rate adaption V.110/X.30" ~~and whether the user rate (octet 5a) in the Bearer capability information element is set to the information transfer rate which the CS supports~~. In the 12nd line, The interworking procedure is as shown in figure 2.1.~~2~~ 3.
AH-5	806	Figure 2.1.~~2~~ 3 Interworking procedure in CS ~~(2)~~ (3)
AH-6	806 ~807	(ii) 64k bit/s Unrestricted Digital Information (UDI) This item is added.
AH-7	807	Figure 2.1.4 Interworking procedure in CS (4) is added.
AH-8	807	2.2 Communication with V.110 terminals (a) Outgoing call (i) Communication with V.110 terminals on 32k bit/s UDI When CS interworks with ISDN-based network, if the information transfer rate of the Bearer capability information element is set to “32k bit/s” and if the user information layer 1 protocol (octet 5) in the Low layer compatibility information is set to standardized rate adaption V. 110/X. 30, CS shall execute the rate adaption interworking for communication with V.110 terminals on 32k bit/s UDI. In above case, CS shall ~~set~~ change the information transfer rate (octet 4) in the Bearer capability information ~~element at~~ on ISDN-based network interface from 32k bit/s to 64k bit/s and omit the contents ~~after and including~~ in the octet 5 and after in the Bearer capability information ~~element~~. ……
AH-9	807 ~808	Figure 2.2.1 Interworking procedure in CS ~~(3)~~ (5)
AH-10	808	(ii) Communication with V.110 terminals on 64k bit/s UDI This item is added.
AH-11	808	Figure 2.2.2 Interworking procedure in CS (6) is added.

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>AH-12</td><td>809</td><td>(b) Incoming call
(i) Communication with V.110 terminals on 32k bit/s UDI
When CS interworks with ISDN-based network, CS shall execute the compatibility information check.
~~CS shall check whether~~ In this check, it shall be verified that both the user information layer 1 protocol (octet 5) in the Low layer compatibility information ~~element~~ is set to "Standardized rate adaption V.110/X.30" and ~~whether the intermediate rate which is converted from the user rate (octet 5a) is set to the information transfer rate which the CS supports.~~ the required user rate (i.e. the intermediate rate which is uniquely calculated from the user rate (octet 5a) indicated in the Low layer compatibility information by using recommendation V.110 rate adaption method) is less or equal to 32k bit/s.If the intermediate rate (octet 5b) is indicated ~~explicitly~~ clearly, CS can use this information as the required user rate.
~~In the case that both conditions are not satisfied, CS shall recognize the SETUP message as incompatible and the incoming call shall be rejected or ignored.~~
In the case ~~the conditions are satisfied,~~ of the verification is successful, CS shall change the information transfer rate (octet 4) both in the Bearer capability information ~~element~~ and the Low layer compatibility information ~~element at~~ on ISDN-based network interface from 64k bit/s to 32k bit/s and ~~accept the incoming call.~~ continue interworking for communication with V.110 terminals on 32k bit/s UDI. The interworking procedure is as shown in figure 2.2.~~2~~ 3.
In the case of the verification is failure, CS shall execute the interworking for communication with V.110 terminals on 64k bit/s UDI.</td></tr>
<tr><td>AH-13</td><td>809</td><td>Figure 2.2.3 Interworking procedure in CS ~~(4)~~ (7)</td></tr>
<tr><td>AH-14</td><td>810</td><td>(i) Communication with V.110 terminals on 64k bit/s UDI
This item is added.</td></tr>
<tr><td>AH-15</td><td>810</td><td>Figure 2.2.4 Interworking procedure in CS (8) is added.</td></tr>
<tr><td>AH-16</td><td>811</td><td>3. Rate adaption method in CS from the information transfer rate (32k bit/s) at Um point up to the information transfer rate (64k bit/s) of ISDN-based network

The rate adaption method ~~in CS~~ used for interworking with ISDN-based network ~~(mapping from 32k bit/s to 64k bit/s) shall be the same as the second rate adaption (RA2) when the intermediate rate is 32k bit/s in recommendation V.110~~ is recommendation I.460.

Figure 3.1 shows the ~~second~~ rate adaption rule when the information rate is 32k bit/s.
Figure 3.2 shows the data multiplex rule for the two 32k bit/s data.
Figure 3.1 The ~~second~~ rate adaption rule when the information rate is 32k bit/s.

<table>
<tr><td rowspan="2">Intermediate rate
~~in Rec.V.110~~</td><td colspan="8">Bit position</td></tr>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr>
<tr><td>32k bit/s</td><td>b1</td><td>b2</td><td>b3</td><td>b4</td><td>1</td><td>1</td><td>1</td><td>1</td></tr>
</table>
</td></tr>
<tr><td>AH-17</td><td>811</td><td>Figure 3.2 The data multiplex rule for the two 32k bit/s data. is added.</td></tr>
<tr><td>AH-18</td><td>812</td><td>4. The cause at call release in Unrestricted Digital information
This item is added.</td></tr>
<tr><td>AH-19</td><td>812</td><td>Table 1 The cause at call release in 32k bit/s Unrestricted digital information (unpermitted bearer capability) is added.</td></tr>
<tr><td>AH-20</td><td>812</td><td>Table 2 The cause at call release in 64k bit/s Unrestricted digital information (unpermitted bearer capability) is added.</td></tr>
<tr><td>AI-1</td><td>813</td><td>Appendix AI Rate adaption rule at the Um point in when communicating with the standardized V.110 terminals
Figure 1 The rate adaption rule on Um point (Intermediate rate is less than or equal to 32k bit/s)</td></tr>
<tr><td>AI-2</td><td>813</td><td>In the 11th line,
The direct mapping rate adaption rule without intermediate rate of standardized V.110 (RA1 operation data), is shown in Figure 2.</td></tr>
</table>

Number	Page	Amendments
AI-3	813	Figure 2 The rate adaption rule on Um point (Not using intermediate rate) is added.
AJ-1	814	Appendix AJ Optional procedures for bearer service change (Private standard/ Public standard) This item is added.
AK-1	815 ~852	Appendix AK Generic procedures for the control of PHS supplementary services (Private standard/ Public standard) This item is added.
AL-1	853 ~	Appendix AL Standard relating to supplementary service functions within the CS-PS loop (Private standard) This item is added.
Annex-1	989	Annex 3 Standard Pertaining to Authentication of Personal Handy Phone System (Private) Caution: Disclosure of this standard is specified in accordance with the “Procedure Rules of Disclosing the Standard pertaining to Authentication and Subscriber Data Write-in of the Personal Handy Phone System (Private)” approved in the Standard Assembly Meeting. This standard is “RCR STD-28 Annex 3 version 2”. However, "RCR STD-28 version 2" in this standard is applied to "RCR STD-28 version 3 rev.-1".
Annex-2	990	Annex 4 Standard Pertaining to Subscriber Data Write-in of Personal Handy Phone System (Private) Caution: Disclosure of this standard is specified in accordance with the “Procedure Rules of Disclosing the Standard pertaining to Authentication and Subscriber Data Write-in of the Personal Handy Phone System (Private)” approved in the Standard Assembly Meeting. This standard is “RCR STD-28 Annex 4 version 2”. However, "RCR STD-28 version 2" in this standard is applied to "RCR STD-28 version 3 rev.-1", “ARIB TR-T2 version 1.0” in this standard is applied to “ARIB TR-T2 version 2.1”, “ARIB TR-T5 version 1.0” in this standard is applied to “ARIB TR-T5 version 2.1”.

Issued June 1996
RCR STD-28 Version 2 Revision 2

AMENDMENT HISTORY

"_____" Added; "═══" Deleted

Number	Page	Amendments
	INTRO-DUCTION	Attached Table

Patent Applicant	Title of invention	Application No. and Publication No.	Remarks
Motorola	(1) Cellular radio telephone system and method with dropped call protection	Application No. 1-19398	

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AMENDMENT HISTORY

"_____" Added; "═══" Deleted

Number	Page	Amendments
	989	Annex 3 Standard Pertaining to Authentication of Personal Handy Phone System (Private) Caution: Disclosure of this standard is specified in accordance with the "Procedure Rules of Disclosing the Standard pertaining to Authentication and Subscriber Data Write-in of the Personal Handy Phone System (Private)" approved in the Standard Assembly Meeting. This standard is "RCR STD-28 Annex 3 version 2". However, "RCR STD-28 version 2" in this standard is applied to "RCR STD-28 version 3 rev.-1".
	990	Annex 4 Standard Pertaining to Subscriber Data Write-in of Personal Handy Phone System (Private) Caution: Disclosure of this standard is specified in accordance with the "Procedure Rules of Disclosing the Standard pertaining to Authentication and Subscriber Data Write-in of the Personal Handy Phone System (Private)" approved in the Standard Assembly Meeting. This standard is "RCR STD-28 Annex 4 version 2". However, "RCR STD-28 version 2" in this standard is applied to "RCR STD-28 version 3 rev.-1", "ARIB TR-T2 version 1.0" in this standard is applied to "ARIB TR-T2 version 2.1", "ARIB TR-T5 version 1.0" in this standard is applied to "ARIB TR-T5 version 2.1".

Issued December 1995
RCR STD-28 Version 2

AMENDMENT HISTORY

"____" Added; "~~====~~" Deleted

Number	Page	Amendments
	COVER	~~RCR~~ STANDARD→ARIB STANDARD
	INTRO-DUCTION	(Line-1) ~~The Research & Development Center for Radio System (RCR)~~ has been → The Association of Radio Industries and Businesses (ARIB) has been (Line-15) in the activities of the ~~Standards Committee~~ so as to → in the activities of the Standard Assembly so as to (About description methods in this document) ~~(Note)~~ (Standard) Standardized items for overseas private/WLL systems ◆ ARIB was formerly called as RCR
contents 1	ii	3.2.20 Output power specified by the Terminal Equipment Regulations
contents 2	iv	4.3.2.7 Function request method 4.3.2.7.1 Usage of the extension LCH protocol type at the link channel establishment phase 4.3.2.7.2 Conditions for execution of function request sequence
contents 3	v	4.3.4.5 Coding example of country code
contents 4	vii	4.4.3.5.3.4.25 Paging response type
contents 5	ix	4.4.3.7.3.5.18 PS identity
contents 6	ix	4.4.3.7.3.5.19 High layer compatibility
contents 7	ix	4.4.3.7.3.5.20 Low layer compatibility
contents 8	ix	4.4.3.7.3.5.21 Repeat indicator
contents 9	ix	4.4.3.7.3.5.22 Manual call origination indicator
contents 10	ix	4.4.3.7.3.5.23 Communication type
contents 11	ix	4.4.3.7.4.1.2 Hooking signal transmission
contents 12	x	4.4.3.8.7 Zone paging
contents 13	xii	7.4.2 Output power specified by Terminal Equipment Regulations
contents 14	xii	7.4.2.1 Output power of PS
contents 15	xii	7.4.2.1.1 When the signal source is located inside of equipment under test
contents 16	xii	7.4.2.1.2 When equipment having signal source other than speech can be connected behind equipment under test

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>contents 17</td><td>xii</td><td>7.4.2.2 Output power of CS</td></tr>
<tr><td>contents 18</td><td>xiii</td><td>Appendix AB WLL standard</td></tr>
<tr><td>contents 19</td><td>xiii</td><td>Appendix AC Control / communication carriers of private system used in the countries outside of Japan</td></tr>
<tr><td>contents 20</td><td>xiii</td><td>Appendix AD Compatibility checking</td></tr>
<tr><td>contents 21</td><td>xiii</td><td>Appendix AE Low layer information coding principles</td></tr>
<tr><td>contents 22</td><td>xiii</td><td>Appendix AF Low layer compatibility negotiation</td></tr>
<tr><td>contents 23</td><td>xiii</td><td>Appendix AG Interface between PS and external terminal</td></tr>
<tr><td>contents 24</td><td>xiii</td><td>Appendix AH Rate adaption procedure on CS for interworking with ISDN-based Network providing unrestricted digital information services</td></tr>
<tr><td>contents 25</td><td>xiii</td><td>Appendix AI Rate adaption rule at the Um reference point when communicating with V.110 terminals</td></tr>
<tr><td>1-1</td><td>2</td><td>1.3 Basic rules of standardization (Line-6)
Also, options are classified as follows~~, but in the standard, only functional options are specified at present~~. Furthermore, functional options will be divided into CS options and PS options in the future.</td></tr>
<tr><td>2-1</td><td>6</td><td>2.2 Interface definition
(1) UM point : Interface point ····· and personal station. ~~... Per the standard~~
(2) R point : Interface point ····· or terminal adapter. ~~... Outside scope of the standard.~~
(3) S point : Interface point ····· and mobile terminal equipment. ~~... Conforms to I interface.~~</td></tr>
<tr><td>2-2</td><td>8</td><td>Table 2.1 Service attributes
<table>
<tr><th>Service attribute</th><th>Service item</th></tr>
<tr><td>Information transfer capability</td><td>Speech, 3.1kHz audio, unrestricted digital</td></tr>
<tr><td>Transfer mode</td><td>Circuit mode</td></tr>
<tr><td>Information transfer rate</td><td>32 kbit/s</td></tr>
<tr><td>Communications format</td><td>Point-to-point</td></tr>
</table></td></tr>
<tr><td>2-3</td><td>9</td><td>Table 2.2 Service types
<table>
<tr><th>Type</th><th>Item</th><th>Overview</th></tr>
<tr><td rowspan="3">Bearer service</td><td>32 kbit/s speech</td><td>Provides bearer capability suited for voice communication with terminal; 32 kbit/s ADPCM CODEC is inserted.</td></tr>
<tr><td>32 kbit/s 3.1kHz audio</td><td>Provides bearer capability suited for 3.1 kHz bandwidths communication with terminal; 32 kbit/s ADPCM CODEC is inserted.</td></tr>
<tr><td>32 kbit/s unrestricted digital</td><td>Provides bearer capability suited for digital data communication with terminal; information is transmitted transparently.</td></tr>
<tr><td rowspan="2">Supplementary services</td><td>DTMF signal transmission</td><td>Service which generates DTMF signals on CS side from message from PS.</td></tr>
<tr><td>Hooking signal transmission (Note)</td><td>Service which generates DTMF signals on CS side from message from PS.</td></tr>
</table>
(Note) Private only</td></tr>
</table>

Number	Page	Amendments
2-4	18	2.6 Encryption method ~~Private reference~~ → Private standard (2) The standard ~~encryption~~ user scrambling method is standardized ~~for public use~~.
2-5	18	2.8 PS numbers ~~Private reference~~ → Private standard (1) Subscriber numbers: Numbers for identifying personal stations in connections with telecommunications network. In public system. PS numbers always express subscriber numbers. (2) ~~Extension line~~ The other numbers: Numbers for identifying personal stations within a certain system (contains extension numbers). In private system, numbering plan is allowed to be independent each system.
3-1	26	3.2.16.1 Interference avoidance ~~Private reference~~ → Private standard
3-2	29	3.2.19 Communication quality (Line-2) ~~Communication quality standards are used only in handset communication of personal handy phone system having a CS and PS structure (1:1).~~ ~~Also, in cases where mutual connection is performed with another PS or CS, spontaneous communication without problems is possible.~~
3-3	29	(1) Communication quality when CS is connected to digital network (PS communication quality) Table ~~3.2~~ → Table 3.2.1
3-4	30	(2) Communication quality when CS is connected to analog network Table ~~3.3~~ → Table 3.2.2 The values are shown in Table 3.2.2 provided that PS satisfies communication quality standards of (1).
3-5	30	3.2.20 Output power specified by the Terminal Equipment Regulations This section is newly added.
3-6	44	3.4.3.9 Receive signal strength indicator accuracy ~~Private reference~~ → Private standard (Line-2) ~~Applied to public radio stations.~~
3-7	45	3.4.3.10 Bit error rate floor performance ~~Private reference~~
4.2-1	49 ~108	4.2 Layer 1 standards ~~Private reference~~ → Private standard Except following paragraphs 4.2.13 VOX control, 4.2.13.1 VOX function setting, 4.2.13.2 VOX implementation example
4.2-2	49	4.2.2 Definition of functions (7) Encryption ~~Specified as standard in a public system, and as an optional function in a private system.~~

Number	Page	Amendments
4.2-3	55	4.2.5.2 (1) (b) 2) ~~Constraint~~ → Constraint 1 3) Constraint 2 Even through the system identification code or the operator identification code matches the given identification code, the PS must not transmit the control carrier to that CS, if the country code included in the 2nd system information broadcasting message from the CS does not match the given country code. However, in case of recalling-type handover, PS can transmit the control carrier to that CS regardless of information of the 2nd system information broadcasting message.
4.2-4	66	4.2.7.5 (2) When PCH paging group are inter-related However, in aprivate system, the frequency of smaller carrier number shall be f1 and the frequency of larger carrier number shall be f2.
4.2-5	67	4.2.7.6 PS logical control channel usage (1) Global definition information reception operation (Line-3) Furthermore, the 2nd system information broadcasting message must be sent from CS, and this message must contain a country code and a system type. In case of private systems, this message also contains a paging area type. (Line-12) As a rule, before LCCH steady reception, PS must receive a radio channel information broadcasting message and a 2nd system information broadcasting message. However, if PS stores a valid global definition information pattern, ~~the radio channel information broadcasting message contents~~ the contents of a global definition information ~~do~~ is not ~~have to be~~ necessarily received because the LCCH uplink access timing, ~~and LCCH~~ downlink superframe profile data, a country code, and system type for public and private system, and paging area type for private system ~~required when~~ which are necessary for starting LCCH reception from a new CS are already known. The conditions under which the global definition information pattern is valid are as follows. [1] By receiving the radio channel information broadcasting message and the 2nd system information broadcasting message, the global definition information pattern is valid from the point where the global definition information and global definition information pattern are stored.
4.2-6	68	(2) Local information broadcasting message reception operation (Line-17) However, the reception process of the broadcasting contents of the ~~2nd/3rd system information broadcasting messages and~~ option information broadcasting message is not specified.
4.2-7	69	(5) LCCH reception start operation (Line-15) ~~Furthermore, when a global definition information pattern is indicated by a CS in 2LCCH usage mode of a public system, the LCCH structure in the case where the PCH paging groups are mutually related is shown by the odd-even identification designation bit and odd-even identification bit. Thus, LCCH contained in the own paging group PCH is received according to those contents.~~ Note that in the case where PCH paging groups are mutually related, CS in 2LCCH mode of a public system indicates LCCH structure by odd-even identification designation bit and odd-even identification bit in a global definition information pattern. In this case LCCH which includes the own paging group PCH shall be selected and received.

Number	Page	Amendments
4.2-8	76	4.2.9 Slot structure (3) Unique word pattern (a) Control physical slot, synchronization burst, USPCH (2) [Option] (b) Communication physical slot (except synchronization burst, USPCH (2) [Option])
4.2-9	77	4.2.10.2.1 Structure of calling station identification code and called station identification code (1) Calling station identification code: Shows the "identification code" of the transmitting station of the relevant function channel. (Line-6) When an additional ID (13 bits) of private system is used for paging area number, additional ID consists of paging area number (np bit) and additional ID (13-np bit).
4.2-10	100	4.2.12 ~~Standard encryption mechanism~~ → User scrambling mechanism ~~As a standard in public systems and as an option in private systems,~~ The standard determines a standard encryption mechanism procedure for scrambling TCH information based on data input by PS keys (hereafter referred to as encryption key).
4.2-11	100	4.2.12.2 Transmission of encryption key The encryption code is transmitted by encryption key set message in the service channel establishment phase ~~(standard in public system, optional in private system)~~.
4.3-1	111 ~181	4.3 Link channel establishment phase In all pages of this chapter, Private reference is changed to Private standard. (Private standard/Public standard)
4.3-2	111	4.3.2.2.1 Rules about unused elements …… Reserved: …… …… transmits "0". When an old-version equipment receives a bit other than "0" in a reserved area of the old version, it must ignore the bit and act as if the bit is "0".
4.3-3	112	4.3.2.2.2 Standard protocol regulations (1) …… BCCH (B) is functional option. Other types are ignored by the reception side. (2) …… Bit 7=1 (but public is SCCH only) is functional option. Other types are ignored by the reception side. …… Method of processing unrecognized options is shown in Table 4.3.1-3.

Number	Page	Amendments
4.3-4	112	Table 4.3.1-1 Option classifications of link channel establishment phase (private systems)

CI	Message type	LCH protocol type	Information element
BCCH	Radio channel information broadcasting (bit7=0)	—	With options in control carrier. When optional, offset area optional
BCCH	System information broadcasting (bit7=0)	Standard/ Optional	With options in paging area, CS information.
BCCH	2nd system information broadcasting (bit7=0)	—	Omittable, with option area.
BCCH	Option information broadcasting (bit7=0)	—	Optional other than broadcasting reception indication.
PCH	Paging	—	Options in calling service classification.
SCCH	Link channel establishment request (bit7=0)	Standard/ Optional	Options in LCH type, extension LCH protocol type, CC protocol type. Octet 5 is optional.
SCCH	Link channel assignment (bit7=0)	Standard/ Optional	Option is LCH type, extension LCH protocol type, CC protocol type.
SCCH	Link channel assignment rejection (bit7=0)	—	Option is LCH type, extension LCH protocol type, CC protocol type. Octets 4, 5 are optional. Options in rejection reason.
SCCH	Link channel establishment re-request (bit7=0)	Standard/ Optional	Option is LCH type, extension LCH protocol type, CC protocol type. Octet 5 is optional.

↓

CI	Message type	LCH protocol type	Information element
BCCH	Radio channel information broadcasting (bit7=0)	—	With options in paging grouping factor, paging area number length, number of same paging groups, battery saving cycle maximum value, n offset, number of PCH, frame basic unit length and control carrier structure. Bit 5, 6 of octet 8 are optional.
BCCH	System information broadcasting (bit7=0)	Standard/ Reserved/Optional	With options in LCH type, LCH protocol type, extension LCH protocol type, CC protocol type, octet 4-5, octet 4-5 usage designation, Broadcasting reception indication.
BCCH	2nd system information broadcasting (bit7=0)	—	With options in broadcasting reception indication.
BCCH	Option information broadcasting (bit7=0)	—	Octets 2~6 and bits 1~3 for octet 7 are optional, with options in broadcasting reception indication.
PCH	Paging	—	Options in calling service classification, Broadcasting reception indication.
SCCH	Link channel establishment request (bit7=0)	Standard/ Reserved/Optional	Option is LCH type, LCH protocol type, extension LCH protocol type, CC protocol type. Octet 5 is optional.
SCCH	Link channel assignment (bit7=0)	—	Option is LCH type, extension LCH protocol type, CC protocol type.
SCCH	Link channel assignment rejection (bit7=0)	—	Octets 4, 5 are optional. Options in rejection reason.
SCCH	Link channel establishment re-request (bit7=0)	Standard/ Reserved/Optional	Option is LCH type, LCH protocol type, extension LCH protocol type, CC protocol type, and causes. Octet 5 is optional.

Number	Page	Amendments
4.3-5	114 ~115	"Table 4.3.1-3 Method of Processing Unrecognized Option (Private Use)" is newly added.
4.3-6	111	4.3.2.2.3 System information default regulations Defaults for the contents of system information broadcasting are specified, and in systems operating by default values ~~(especially public systems)~~, system information broadcasting can be omitted. Table 4.3.2-1 and Table 4.3.2-2 show defaults ~~pertaining to CS individual system information~~ to be used in system information broadcasting. ~~However, for private systems, examples are shown, and defaults may vary in each system.~~
4.3-7	116	Table 4.3.2-1 CS individual system information default values (private system)
4.3-8	116	Table 4.3.2-2 System information default values (public system)
4.3-9	119	4.3.2.4.1 Types of definition information …… (1) Global definition information ~~(note)~~ (2) Local definition information …… ~~(Note) If the paging area is undefined in the private system (if paging area number length np = option), it is treated as local definition information.~~
4.3-10	120	Table 4.3.3 Definition information and transmission methods Column No 5 is newly added. Column No 6 is newly added.

Function	Default	Notes
CC protocol type	~~Dial signal en bloc transmission mandatory~~ Overlap sending is possible	
Extension LCH protocol type	~~MM~~ function request omittable RT	
Extension LCH protocol type	~~RT~~ function request omittable MM	

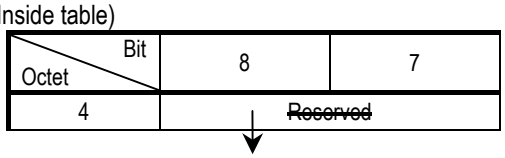
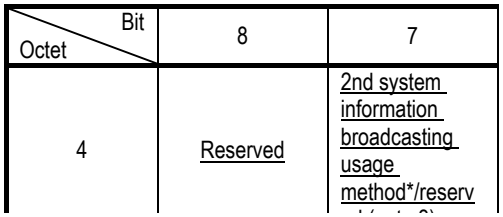
Function	Default	Notes
RT-MM protcol version	Version 1 (RCR STD-28 (version 1) or RCR STD-28 (Version 1 Rev.-1))	

No.	Definition information	Global Local	Transmission method	Private system	Public system
Broadcasting information					
~~5~~ 7	2nd system operating information			~~Functional option~~ Mandatory	~~Reserved~~ Mandatory
~~6~~ 8	3rd system operating information				
~~7~~ 9					
Notification information					
~~8~~ 10					

Number	Page	Amendments
4.3-11	120 ~121	4.3.2.4.2 Definition information and transmission methods (Note)…… BCCH (SYS2): 2nd system operating information broadcasting message; Country code. System type; Paging area type; 2nd system operation information. BCCH (SYS3): 3rd system operating information broadcasting message (exclusive use by public systems). 3rd system operating information. …… Furthermore, the following terms are defined. …… (3) Local definition information: ~~Shows local information broadcasting message information and local definition element information of radio channel information broadcasting message.~~ Shows information included in local definition information elements shown in Table 4.3.3.
4.3-12	121	4.3.2.4.3 Relationship between global definition information and local definition information ~~In a public system, if~~ If global definition information is changed, ……. ~~In a private system, the relationship between global broadcasting information and local broadcasting information can be mutually independent.~~
4.3-13	121	4.3.2.5.1 Classification of definition information …… (1) Broadcasting information (information that should be received by PSs before LCH establishment); …… ・Country code, System type (G); ・Paging area type (G); ……
4.3-14	122	4.3.2.5.2.1 Broadcasting information transmission method …… Furthermore, if it is determined that there is a zone information indication function by the RT function request/response sequence for a public system, ……
4.3-15	123	4.3.2.5.2.3 Handling of notification status number of notification information (1) Private system (CS option) ~~[1] If a paging area is defined, the same regulations as public use are applied.~~ ~~[2] If no paging area is defined, the handling of the notification status number of notification information is not specified.~~ Regulation is the same as the one for a public system.
4.3-16	124	4.3.2.6.1 Version management rules (3) The standard specifies the protocols of version ~~1~~ 2. (4) is newly added

Number	Page	Amendments
4.3-17	124	4.3.2.6.2 Version determination method (3) ~~If CS reports a system information broadcasting message and its 4th octet is specified in the RT-MM protocol version, PS can know in advance the RT-MM protocol version held by the relevant CS.~~ If CS broadcasts a 2nd system information broadcasting message in a public system, or if CS broadcasts a 2nd system information broadcasting message and the 2nd system information broadcasting usage method of the radio channel information broadcasting is specified in the "the 2nd system information broadcasting usage method is according to the method indicated in RCR STD-28 version 2 or after" in a private system, the RT-MM protocol version indicated by the 2nd system information broadcasting message specified by RCR STD-28 version 2 or after is the version which the CS supports. (4) If CS does not broadcast either a system information broadcasting message or a 2nd system information broadcasting message according to the method specified by RCR STD-28 (version 2) and versions to follow thereafter, PS can take this as meaning that the RT-MM protocol version held by the relevant CS is version 1.
4.3-18	125	4.3.2.7 Function request method This item is newly added.
4.3-19	126	4.3.3 Message type list Table 4.3.~~4~~→ Table 4.3.5 Table 4.3.~~5~~→ Table 4.3.6 Table 4.3.~~6~~→ Table 4.3.7
4.3-20	126	Table 4.3.~~4~~ 5 Messages for link channel establishment phase
4.3-21	127	Table 4.3.~~5~~ 6 Uplink (PS → CS) message type coding …… Option message (note ~~4~~ 1) ……
4.3-22	127	Table 4.3.~~6~~ 7 Downlink (CS → PS) message type coding …… 2nd system information broadcasting ~~(note 1)~~ …… Option message (note ~~4~~ 1) ……
4.3-23	127	When there is a reception indication of 2nd 3rd system information broadcasting …… …… (Note 1) Private system ~~(functional option)~~ and public system (~~reserved~~ functional option) Only for SCCH in public system ~~(Note 4) Private system and public system (functional option)~~ ~~Only for SCCH in public system~~
4.3-24	128	4.3.4.1.1 Idle Table 4.3.~~7~~→ Table 4.3.8 Table 4.3.~~7~~ 8 Idle message
4.3-25	128	4.3.4.1.2 Link channel establishment request Table 4.3.~~8~~→ Table 4.3.9 Table 4.3.~~9~~→ Table 4.3.10

Number	Page	Amendments
4.3-26	128	Table 4.3.~~8~~ 9 Link channel establishment request message (Octet 3, Bit 4~6) ~~Reserved~~ → System type
4.3-27	129	Table4.3.~~9~~ 10 Information elements in link channel establishment request message
4.3-28	130	System type (octet 3) This item is newly added.
4.3-29	130	RT-MM protocol version (octet 3) Bit 3 2 1 0 0 0 Version 1 (RCR STD-28 (version 1) or RCR STD-28 (version 1 Rev.-1)) 0 0 1 Version 2 (~~reserved~~ RCR STD-28 (version 2)) 0 1 0 Version 3 (reserved) ……
4.3-30	131	4.3.4.1.3 Link channel assignment Table 4.3.~~10~~ → Table 4.3.11 Table 4.3.~~11~~ → Table 4.3.12 …… Table 4.3.~~10~~ 11 Link channel assignment message Table 4.3.~~11~~ 12 Information elements in link channel assignment message
4.3-31	134	4.3.4.1.4 Link channel assignment reject Table 4.3.~~12~~ → Table 4.3.13 Table 4.3.~~13~~ → Table 4.3.14 …… Table 4.3.~~12~~ 13 Link channel assignment reject message Table 4.3.~~13~~ 14 Information elements of link channel assignment reject message
4.3-32	135	(On line 9 from bottom) LCH protocol disagreement: Shows that CS does not have the LCH protocol (including system type) that can be used ……
4.3-33	136	4.3.4.1.5 Link channel establishment re-request Table 4.3.~~14~~ → Table 4.3.15 Table 4.3.~~15~~ → Table 4.3.16 …… Table 4.3.~~14~~ 15 Link channel establishment re-request (Octet 3, Bit 4~6) ~~Reserved~~ → System type Table 4.3.~~15~~ 16 Information elements in link channel establishment re-request message
4.3-34	138	System type (octet 3) This item is newly added.
4.3-35	138	RT-MM protocol version (octet 3) Bit 3 2 1 0 0 0 Version 1 (RCR STD-28 (version 1) or RCR STD-28 (version 1 Rev.-1)) 0 0 1 Version 2 (~~reserved~~ RCR STD-28 (version 2)) 0 1 0 Version 3 (reserved) ……

Number	Page	Amendments
4.3-36	139	4.3.4.2.1 Radio channel information broadcasting message Table 4.3.~~16~~ → Table 4.3.17 Table 4.3.~~17~~ → Table 4.3.18 …… Table 4.3.~~16~~ 17 Radio channel information broadcasting message (Inside table)   (Note 1) Among the information elements …… information elements. ~~However, in a private system, if option is selected in paging area number length nP, the global definition information elements are treated as local definition information elements.~~ (Note 3) is newly added.
4.3-37	140 ~141	Table 4.3.~~17~~ 18 Information elements in radio channel information broadcasting message Paging grouping factor nGROUP (octet 3) (Note 1) Table 4.3.~~18~~ → Table 4.3.19 Paging area number nP (octet 3) In a private system, it shows …… in the system information broadcasting message or the bit length of paging area number within the additional ID when the fixed paging area method with the additional ID is used. ~~(If an option is selected, the entire bit area of the relevant information element is optional.)~~ In a public system, it shows the bit length of the paging area number ~~of public system~~ included in the CS-ID. Bit 4 3 2 1 (Private) 1 0 0 0 ~~Reserved~~ nP = 0 (Note 1) 1 0 0 1 ~~Reserved~~ nP = 1 1 0 1 0 ~~Reserved~~ nP = 5 1 0 1 1 ~~Reserved~~ nP = 9 1 1 0 0 ~~Reserved~~ nP = 13 (Note 2) (Note 1) is newly added. (Note 2) is newly added. ~~(Note)~~ → (Note 3) (Note 4) is newly added. 2nd system information broadcasting usage method (octet 4) This item is newly added.

Number	Page	Amendments
4.3-38	143	Number of PCHs nPCH (octet 5) (Note 1) Table 4.3.~~18~~ → Table 4.3.19
4.3-39	143	Frame basic unit length nSUB (octet 5) (Note) Table 4.3.~~18~~ → Table 4.3.19
4.3-40	145	(b) Public system Uplink LCCH timing has the following meanings in combination with the control carrier structure (octet 7, bit 2, 1) Bit 3 2 1 - 0 1 Shows that 2 LCCHs are used, and each LCCH is independent. This item is newly added. - ~~0~~1 ~~1~~0 Shows that 2 ~~LCCH~~ LCCHs are used, and the PCH paging groups are inter-related.
4.3-41	146	Control carrier structure(octet 7) Bit 2 1 0 1 Shows that 2 ~~frequencies~~ LCCHs are used, and each individual LCCH is independent. (~~However, reserved in public system.~~ In private system, 2 frequencies are used; reserved in public system)
4.3-42	147	[The LCCH structure parameters in public system] Table 4.3.~~18~~ 19 Obtainable values of nSUB, nGROUP, nPCH in public system
4.3-43	147	[The LCCH structure parameters in private system] This item is newly added.
4.3-44	148	4.3.4.2.2 System information broadcasting message Table 4.3.~~19~~ → Table 4.3.20 Table 4.3.~~20~~ → Table 4.3.21 Table 4.3.~~19~~ 20 System information broadcasting message (Note 1) This is a local definition ……. In parentheses are the ~~public~~ default values for public system. ~~If CS does not broadcast a system information broadcasting message, PS can see this as meaning that the system information held by CS is the default value.~~
4.3-45	149	Table 4.3.~~20~~ 21 Information elements of system information broadcasting message
4.3-46	150	CS information (octet 3) Bit 2 0 Non-originating-exclusive CS (~~and~~ reception standby zone selection possible) 1 Originating-exclusive CS (~~and~~ reception standby zone selection impossible) (reserved in public system)

Number	Page	Amendments
4.3-47	151	~~Paging area number (octets 4-5)~~ Method of use of octet 4 and octet 5 ~~Shows paging area number in a private system. As long as this number is the same within the same system, the same reception information is guaranteed without performing location registration again.~~
4.3-48	151 ~152	(2) When nP = 0 This item is newly added. (3) When 8 > nP > 0 This item is newly added. ~~(2)~~ (4) When nP = 8 ~~(3)~~ (5) When 16 > nP > 8 ~~(4)~~ (6) When nP = 16 ~~(In this case traffic restriction is subjected to of all PS's.)~~ ~~(5)~~ (7) When nP = reserved
4.3-49	153	When nP = 5, "Octet 4, 5 usage designation (octet 7)" is (01) This item is newly added.
4.3-50	153	When nP = 5, "Octet 4, 5 usage designation (octet 7)" is (10) This item is newly added.
4.3-51	153	Paging area number (octet 4, 5) This item is newly added.
4.3-52	153	RT-MM protocol version (octet 4) …… However in public system this information element shows whether CS supports version 1 or not. Bit 8 7 6 5 4 3 2 1 x x x x x x x 1/0 Version 1 (RCR STD-28 (version 1) or RCR STD-28 (version 1 REV.-1)) present/absent x x x x x x 1/0 x Version 2 (RCR STD-28 (version 2)) present/absent ~~(reserved)~~ (reserved for public system) x x x x x 1/0 x x Version 3 present/absent (reserved)
4.3-53	155	Octet 4, 5 usage designation (octet 7) (Note 4) If (10) is used, all groups become the object of restriction groups, and the paging area number ~~nP = 8~~ 0 < nP ≦8 is used.
4.3-54	156	Broadcasting reception indication (octet 8) Bit 6 5 4 3 2 1 …… - - - 0 1 1 2nd system information broadcasting reception indication ~~(note)~~ ……

Number	Page	Amendments
4.3-55	158	4.3.4.2.3 2nd system information broadcasting message Table 4.3.~~21~~ → Table 4.3.22 Table 4.3.~~22~~ → Table 4.3.23
4.3-56	158	Table 4.3.~~21~~ 22 2nd system information broadcasting message

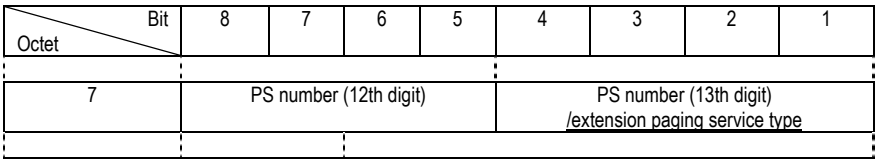
Octet \ Bit	8	7	6	5	4	3	2	1
1	Re-served	0	0	0	1	0	1	1
		Message type						
2	~~Country identification code*~~							
3								
4								
5								
6								
7	Absolute slot number		Broadcasting message status number m2			~~Option~~/Reserved (note)		
8			Broadcasting reception indication					

↓

Octet \ Bit	8	7	6	5	4	3	2	1
1	Re-served	0	0	0	1	0	1	1
		Message type						
2	Country identification code*							
3								
4	System type*							
5	RT-MM protocol version							
6	Reserved							
7	Absolute slot number		Broadcasting message status number m2			Paging area Type*/Reserved (note 2)		
8			Broadcasting reception indication					

(Note 1) is newly added.
(Note) → (Note 2) This information element is ~~optional in~~ used for a private system, reserved in a public system.

4.3-57	158	Table 4.3.~~22~~ 23 Information elements in 2nd system information broadcasting message
4.3-58	158 ~159	Country code (octets 2-3) This item is newly added. System type (octet 4) This item is newly added. RT-MM protocol version (octet 5) This item is newly added.
4.3-59	160	Paging area type (octet 7) This item is newly added.
4.3-60	160	Broadcasting reception indication (octet 8) Bit 6 5 4 3 2 1 …… - - - 0 1 1 2nd system information reception indication ~~(note)~~ ……

Number	Page	Amendments
4.3-61	162	4.3.4.2.4 3rd system information broadcasting message. Table 4.3.~~23~~ → Table 4.3.24 Table 4.3.~~24~~ → Table 4.3.25 Table 4.3.~~23~~ 24 3rd system information broadcasting message Table 4.3.~~24~~ 25 Information elements in 3rd system information broadcasting message
4.3-62	164	4.3.4.2.5 Option information broadcasting message Table 4.3.~~25~~ → Table 4.3.26 Table 4.3.~~26~~ → Table 4.3.27 Table 4.3.~~25~~ 26 Option information broadcasting message Table 4.3.~~26~~ 27 Information elements in option information broadcasting message
4.3-63	166	4.3.4.3 Paging message Table 4.3.~~27~~ → Table 4.3.28 Table 4.3.~~28~~ → Table 4.3.29 Table 4.3.~~27~~ 28 Paging message  Table 4.3.~~28~~ 29 Information elements in paging message Paging service type (octet 1) Bit 7 6 5 …… 1 0 1 ~~Reserved~~ Shows the paging service by the extension paging service (reserved in public system). ……
4.3-64	167	Extension paging service type (octet 7) This item is newly added.
4.3-65	169	Broadcasting reception indication (octet 8) Bit 6 5 4 3 2 1 …… - - - 0 1 1 2nd system information reception indication ~~(note)~~ ……
4.3-66	180	(Example 5) is newly added.
4.3-67	181	4.3.4.5 Coding example of country code This item is newly added.
4.4-1	183 ~226	Chapter from 4.4 to 4.4.3.4 were changed [private standard] from [private reference].

Number	Page	Amendments
4.4-2	223	4.4.3.1.1 Range of standard (1) Handling of RT function requests The RT function …… and Table 4.4.3.1.2. ~~However, examples for a private system are shown, and defaults can be varied in each system.~~ ……
4.4-3	224	Table 4.4.3.1.1 Defaults of RT function request contents (private) (note) Function request in table: ~~Condition report function~~ ~~Encryption~~ User Scrambling ~~PS ID Notification control information~~ ~~Transmission Power Control~~ ~~VOX Function information~~ ~~Zone information indication function~~ Defaults in table: ~~No condition report~~ No active encryption control; ~~standard encryption~~ user scrambling; ~ ~~No PS ID Notification~~ ~~CS: Recalling type connection function to other CS between paging areas absent~~ ~~PS:~~ Recalling-type connection ~ ~~No Transmission Power Control~~ ~~No VOX function~~ ~~Zone information indication function absent~~
4.4-4	224	Table 4.4.3.1.1 (Note) is newly added.
4.4-5	225	4.4.3.1.1 Range of standard (2) Handling of MM function requests The MM function …… and Table 4.4.3.1.4. ~~However, examples for a private system are shown, and defaults can be varied in each system.~~ ……
4.4-6	225	Table 4.4.3.1.3 Defaults of MM function request contents (private) ~~(note)~~ defaults in table: ~~Standard authentication function present (note)~~ Standard authentication sequence for private systems present (note) Fixed paging area by Additional ID (Note) The authentication ~~method~~ algorithm in private systems ~
4.4-7	227 ~303	4.4.3.5 Radio frequency transmission management (RT) ~~Private reference~~ → Private standard except following paragraph ・4.4.3.5.2.3 Condition inquiry ・4.4.3.5.2.4 Condition report ・4.4.3.5.2.5 Encryption control ・4.4.3.5.2.6 Encryption control acknowledge ・4.4.3.5.2.11 PS Release ・4.4.3.5.2.18 Transmission Power Control ・4.4.3.5.2.19 VOX control ・4.4.3.5.2.20 PS-ID notification ・4.4.3.5.2.21 Zone information indication ・4.4.3.5.3.4.2 Broadcasting information ・4.4.3.5.3.4.6 Condition report function ・4.4.3.5.3.4.9 Encryption control information ・4.4.3.5.3.4.13 PS-ID Notification control information ・4.4.3.5.3.4.14 Reception level ・4.4.3.5.3.4.15 Report Condition

Number	Page	Amendments
	227 ~303	・4.4.3.5.3.4.19 Transmission Power Control ・4.4.3.5.3.4.20 Transmission Power Control Request ・4.4.3.5.3.4.21 VOX Control ・4.4.3.5.3.4.22 VOX Function information ・4.4.3.5.3.4.23 Zone condition report ・4.4.3.5.3.4.24 Zone information indication function ・4.4.3.5.4 RT supplementary (1) [1] Condition inquiry ・4.4.3.5.4 RT supplementary (1) [2] Process when condition report message is received ・4.4.3.5.4 RT supplementary (2) [1] Process when condition inquiry message is received
4.4-8	235	Table 4.4.3.5.8 Encryption key set massage contents (Note) ……that ~~standard~~ default encryption is specified
4.4-9	238	Table 4.4.3.5.11 Paging response message contents In the lower part of the Table, Paging response type and Note are added.
4.4-10	256	Table 4.4.3.5.23-1 Information element coding (private) In the lower part of the Table, 0 0 1 1 0 1 0 Paging Response Type This column is added.
4.4-11	263	Figure 4.4.3.5.7 Broadcasting information ・Octet 5・Bit 7: ~~Reserved~~ → 2nd system information broadcasting usage method* / reserved (note 7) ・Octet 9・Bit 5: ~~(note 6)~~ → (note 5) ・Octet 13: ~~(note 7)~~ → (note 6) ・Octet 16~20: ~~Option / reserved (note 3)~~ → Octet 16,17: Country identification Code* → Octet 18: System type* → Octet 19: RT-MM protocol version → Octet 20: Reserved ・Octet 21・Bit 1~3: ~~Reserved~~ → Paging area type* / Reserved (Note 7) ・Octet 22~26: ~~(Note4)~~ → (Note 3)
4.4-12	264	・~~(Note 3)~~ → Note 3 is deleted ・~~(Note 4)~~ → (Note 3) This information element (octets 22~26) is…… ・~~(Note 5)~~ → (Note 4) …… ~~However, in a private system, if option is selected for the paging area number length np, the global definition information elements are treated as local definition information elements.~~ ・~~(Note 6)~~ → (Note 5) ・~~(Note 7)~~ → (Note 6) ・(Note 7) This information element is used in private system, reserved in public systems. (Note 7) is newly added. LCCH interval value n (octet 3) 〈 Broadcasting message status numbers m1/m2/m3 (octets 15/21/27) } These items are deleted. Coding regulations about each information element in octet 3~27 are the same specification as coding regulations about information elements in the each broadcasting message specified in "4.3.4.2 Broadcasting messages". However, "Octets 4, 5 usage designation" in 4.3.4.2 broadcasting messages is applied to "Octets 12, 13 usage designation".

Number	Page	Amendments
4.4-13	264 ~291	~~Figure 4.4.3.5.9~~ → Figure 4.4.3.5.8 〃 ~~Figure 4.4.3.5.30~~ → Figure 4.4.3.5.29
4.4-14	270	4.4.3.5.3.4.8 Encryption Encryption (octet 2) x x x 1/0 ~~Standard encryption~~ User scrambling present/absent
4.4-15	272	4.4.3.5.3.4.10 Encryption key set Encryption (octet 3~*) ~~Standard encryption~~ User scrambling is shown in Appendix Y.
4.4-16	273	4.4.3.5.3.4.11 PS number Octet 8・Bit 1~4: PS number (thirteenth number) / Extended paging service type
4.4-17	273	Paging service type (octet 2) 1 0 1 Reserved Shows paging service by extension paging service type (however, reserved in public system).
4.4-18	274	Extension paging service type (octet 8) This item is added.
4.4-19	269	4.4.3.5.3.4.13 PS-ID notification control information In the 2nd line, This information element is ~~1 octet~~ a single octet information element (type 1)
4.4-20	282	4.4.3.5.3.4.18 TCH switching TCH switching function type (octet 2) 0 x x x x 1/0 x x Recalling-type connection function to other CS within paging area present/absent (note 1, 2) ~~{Standard (mandatory)}~~ {PS standard (mandatory): CS option in private. Standard (mandatory) in public.}
4.4-21	286	4.4.3.5.3.4.21 VOX Control In the 2nd line, This information element is ~~1 octet~~ a single octet information element (type 1)
4.4-22	290	4.4.3.5.3.4.25 Paging response type This item is added.
4.4-23	296	4.4.3.5.4 RT supplementary regulations (1) Cell station operation ~~(Private reference)~~ [1] Condition inquiry (Private reference)
4.4-24	299	(Note 3) CS-ID designation switching to another CS is a function option. ~~(for public system)~~
4.4-25	301	(Note 2) CS-ID designation switching to another CS is a function option. ~~(for public system)~~
4.4-26	305 ~332	~~Private reference~~ → Private standard

Number	Page	Amendments
4.4-27	310	Table 4.4.3.6.7 Location Registration Area ~~Broadcasting~~ Report message contents (Note) If PS send this message, MM function request must be required.
4.4-28	314	in Fig. 4.4.3.6.3-1 Message types (private) 0 0 1 0 0 1 0 0 Location Registration Area Report (Note) (Note) Functional option
4.4-29	317	Table 4.4.3.6.10-1 Information element coding (private) 1 0 0 0 - - - - Active Authentication (note 1) 0 0 0 0 1 0 0 1 Location registration area report (note 1) 0 0 0 0 1 0 1 0 Paging area (note 1) 0 0 0 0 1 1 0 0 Paging Group (note 2) 0 0 0 0 1 1 0 1 Reception level(note 1) (Note 1) Functional option (Note 2) CS option
4.4-30	319	4.4.3.6.3.4.3 Authentication Ciphering Pattern The authentication ciphering pattern is the element which be found from the Authentication Random Pattern at PS to inform the calculation result to CS, and it is shown in Figure 4.4.3.6.6. This information element is of variable length. in Fig 4.4.3.6.6 Authentication Ciphering Pattern Authentication Ciphering Pattern (octets 3 ~ *) : Shows ~~ciphered~~ calculation result bit string which be found from the Authentication Random Pattern.
4.4-31	320	Figure 4.4.3.6.7 Authentication Type Authentication Type (octet 2) Bit 8 7 6 5 4 3 2 1 - - - - - - - - …… x x x x x x x 1/0 Standard authentication function present/absent (however, reserved in private system). - - - - - - - - …… x x x 1/0 x x x x Standard authentication sequence for private systems present/absent x x 1/0 x x x x x Reserved (authentication sequence present/absent) Other Option x: Don't care (Note 1) Bits 1~3 indicate whether or not there is an independent authentication ~~sequence in each bit~~ function available. (Note 2) Bits 5 and 6 indicate whether or not there is an independent authentication function available.

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>4.4-32</td><td>324</td><td>4.4.3.6.3.4.8 Paging Area
Paging area (octet 2)
Bit
8 7 6 5 4 3 2 1
0 x x x x x x 1/0 Fixed paging area by System Information Broadcasting (BCCH(SYS)) present/absent
- - - - - - - - ……
0 x x x x 1/0 x x Fixed paging area by Additional ID present/absent
- - - - - - - - ……</td></tr>
<tr><td>4.4-33</td><td>328</td><td>[Example 5] is added.</td></tr>
<tr><td>4.4-34</td><td>329</td><td>4.4.3.6.3.4.10 PS number
Bit
Octet 8 7 6 5 4 3 2 1
8 | PS number (twelfth number) | PS number (thirteenth number) /Extension Paging Service Type</td></tr>
<tr><td>4.4-35</td><td>329</td><td>Paging service type (octet 2)
Bit
7 6 5
1 0 1 ~~Reserved~~ Shows paging service by extension Paging Service Type (however, reserved in public system).</td></tr>
<tr><td>4.4-36</td><td>329</td><td>Extension Paging Service Type (octet 8) is added.</td></tr>
<tr><td>4.4-37</td><td>333
~425</td><td>~~Private reference~~ → Private standard</td></tr>
<tr><td>4.4-38</td><td>336</td><td>4.4.3.7.1.3 [2] Recalling (P1)
State in which “setup (facility: ~~Handover~~ Recalling-type channel switching or Recalling-type channel switching for private system)” was transmitted by PS to CS.</td></tr>
<tr><td>4.4-39</td><td>336</td><td>4.4.3.7.1.4 [2] Recalling (C1)
State in which “setup (facility: ~~Handover~~ Recalling-type channel switching or Recalling-type channel switching for private system)” was transmitted by CS.</td></tr>
<tr><td>4.4-40</td><td>338</td><td>Table 4.4.3.7.1 CC message overview
(Note 1) Private only. Functional option in private system.
(Note 2) Functional option in both public and private system.</td></tr>
<tr><td>4.4-41</td><td>341</td><td>Table 4.4.3.7.4 CONNect message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Type</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Low layer compatibility</td><td>4.4.3.7.3.5.20</td><td>both</td><td>O</td><td>2~18</td><td>(note 4)</td></tr>
</table>
(Note 4) is added.</td></tr>
<tr><td>4.4-42</td><td>345</td><td>Table 4.4.3.7.8 INFOrmation message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Type</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Locking shift</td><td>4.4.3.7.3.5.3</td><td>uplink</td><td>O</td><td>1</td><td>Codest 5 (note 5)</td></tr>
<tr><td>Communication type</td><td>4.4.3.7.3.5.23</td><td>uplink</td><td>O</td><td>2~3</td><td>(note 6)</td></tr>
</table>
(Note 2) …… In addition, included when PS sends hooking signal to CS.
(Note 5)~(Note 6) is added.</td></tr>
</table>

<table>
<tr><th>Number</th><th>Page</th><th>Amendments</th></tr>
<tr><td>4.4-43</td><td>349</td><td>Table 4.4.3.7.12 SETUP message contents
<table>
<tr><th>Information element</th><th>Reference</th><th>Direction</th><th>Type</th><th>Information length</th><th>Remarks</th></tr>
<tr><td>Bearer capability</td><td>4.4.3.7.3.5.4</td><td>both</td><td>M</td><td>4~~10~~ 11</td><td></td></tr>
<tr><td>Repeat indicator</td><td>4.4.3.7.3.5.21</td><td>both</td><td>O</td><td>1</td><td>(note 12)</td></tr>
<tr><td>Low layer compatibility</td><td>4.4.3.7.3.5.20</td><td>both</td><td>O</td><td>2~18</td><td>(note 13)</td></tr>
<tr><td>High layer compatibility</td><td>4.4.3.7.3.5.19</td><td>both</td><td>O</td><td>2~5</td><td>(note 14)</td></tr>
<tr><td>Locking shift</td><td>4.4.3.7.3.5.3</td><td>uplink</td><td>O</td><td>1</td><td>Codeset 5 (note 10)</td></tr>
<tr><td>PS identity</td><td>4.4.3.7.3.5.18</td><td>uplink</td><td>O</td><td>2~9</td><td>(note 11)</td></tr>
<tr><td>Manual call origination indicator</td><td>4.4.3.7.3.5.22</td><td>uplink</td><td>O</td><td>2~3</td><td>(note 15)</td></tr>
</table></td></tr>
<tr><td>4.4-44</td><td>350</td><td>(Note 10) ~ (Note 15) is added.</td></tr>
<tr><td>4.4-45</td><td>356</td><td>and Version 2 is added in Note 2 of Fig 4.4.3.7.3</td></tr>
<tr><td>4.4-46</td><td>357</td><td>Figure 4.4.3.7.4 Message type
(Note 1) Private only, Functional option in private system.
(Note 2) Functional option in ~~public~~ both public and private system.</td></tr>
<tr><td>4.4-47</td><td>360</td><td>Table 4.4.8.7.17 Information element coding
[Codeset 0]
Single octet information element
1 0 1 - - - - Repeat indicator

Multiple octet information element
1 1 1 1 1 0 0 Low layer compatibility
1 1 1 1 1 0 1 High layer compatibility
[Codeset 5]
0 1 0 0 0 0 0 1 PS identity (note 4)
0 1 0 0 0 0 1 0 Manual Call origination indicator (note 4)
0 1 0 0 0 0 1 1 Communication type (note 4)</td></tr>
<tr><td>4.4-48</td><td>360
~361</td><td>(Note 3) This is a functional option in both ~~a~~ public and private system.
(Note 4) Private only. Functional option in private system.

(3) Descriptions of the information elements shown in this section and below are in alphabetical order (except the shift procedure and information elements defined after version 1) as a rule. ……</td></tr>
</table>

Number	Page	Amendments
4.4-49	363 ～368	Figure 4.4.3.7.7 Bearer capability "Octet 4a" and "Octet 4b" are deleted.

Octet	Bit 8	7	6	5	4	3	2	1
5	0/1 Extension	0	1	User information layer 1 protocol				
		Layer 1						
5a	0/1 Extension	Synch./ async.	Negotia-ti on	User rate				
5b	0/1 Extension	Intermediate rate		NIC on Tx	NIC on RX	Flow control on Tx	Flow control on Rx	0 Spare
5c	0/1 Extension	Number of stop bits		Number of data bits		Parity information		
5d	1 Extension	Duplex mode	Modem type					
6	1 Extension	1	0	User information layer 2 protocol				
		Layer 2						
7	1 Extension	1	1	User information layer 3 protocol				
		Layer 3						

Coding standard (octet 3)
0 0 ~~Reserved~~ → RCR standard
1 0 ~~RCR standard~~ → Reserved

Information transfer capability (octet 3)
0 0 0 0 0 ~~Voice~~ Speech
0 1 0 0 0 Unrestricted digital information
0 1 0 0 0 Reserved (Restricted digital information)
1 0 0 0 0 3.1kHz audio

Information transfer rate (octet 4~~,4b~~)
~~1 1 0 0 0 Circuit mode 32 kbit/s~~
~~1 1 0 0 1 Reserved (circuit mode 16 kbit/s)~~
~~1 1 0 1 0 Reserved (circuit mode 8 kbit/s)~~
0 0 1 1 1 Reserved (Circuit mode 8 kbit/s)
0 1 0 1 0 Reserved (Circuit mode 16 kbit/s)
0 1 1 0 0 Circuit mode 32 kbit/s
1 0 0 0 0 Reserved (Circuit mode 64 kbit/s)

(Note) ~~If octet 4b is omitted, bearer capability is symmetrical in both directions at the information transfer rate specified by octet 4. If octet 4b is included, the information transfer rate in octet 4 shows the direction from origination side to destination side.~~
If reserved information transfer rate code is pointed, the call should be rejected. In that case, the cause of "Incompatible destination" should be indicated if PS is termination side and the cause of "Bearer service not implemented" should be indicated if PS is origination side.

User information layer 1 protocol (octet 5)
0 0 0 0 1 Standardized rate adaption JT-V 110/X 30.·····
0 0 1 1 1 Non-ITU-T standardized rate adaption.·····
(Note) is added.

Bit coding of octet 5a, 6 and 7 are defined and octet 5b ~ 5d are added.

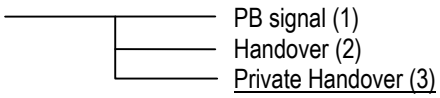
Number	Page	Amendments
4.4-50	369	4.4.3.7.3.5.5 Call state Coding standard (octet 3) 0 0 ~~Reserved~~ → RCR standard 1 0 ~~RCR standard~~ → Reserved
4.4-51	375	4.4.3.7.3.5.10 Cause Coding standard (octet 3) 0 0 ~~Reserved~~ → RCR standard 1 0 ~~RCR standard~~ → Reserved
4.4-52	378	4.4.3.7.3.5.11 Facility [1] Recalling-type channel switching (Private standard/ Public standard)
	379	Octet 15.3.3 Length ~~(note 4)~~ (note 10) Octet 15.3.3 Calling party number content length ~~(note 4)~~ (note 10)
4.4-53	380	(note 10) is added.
4.4-54	381	[2] Recalling-type channel switching for private system This item is added.
4.4-55	384	~~[2] PB signal~~ [3] DTMF signal Octet 15.3.1 Length ~~(note 4)~~ (note 8) (note 8) is added.
4.4-56	389	4.4.3.7.3.5.12 Keypad facility The keypad facility is …… by the terminal keypad. In addition, the keypad facility is used to carry the hooking signal information from PS to CS. The keypad facility information …… in Figure 4.4.3.7.15. (Note) is added.
4.4-57	389	4.4.3.7.3.5.13 Progress indicator Coding standard (octet 3) 0 0 ~~Reserved~~ → RCR standard 1 0 ~~RCR standard~~ → Reserved
4.4-58	394 ~396	4.4.3.7.3.5.18 PS identity This item is added.
4.4-59	397 ~399	4.4.3.7.3.5.19 High layer compatibility This item is added.
4.4-60	400 ~412	4.4.3.7.3.5.20 Low layer compatibility This item is added.
4.4-61	413	4.4.3.7.3.5.21 Repeat indicator This item is added.
	414	4.4.3.7.3.5.22 Manual call origination indicator This item is added.
	415	4.4.3.7.3.5.23 Communication type This item is added.
4.4-62	418	Table 4.4.3.7.18 Supplementary service types Hooking signal transmission (note) is added. (note) is added.
4.4-63	418	4.4.3.7.4.1.1 DTMF signal transmission (1) Definition ~~PB button numbers~~ DTMF signal information are……
4.4-64	418	Table 4.4.3.7.~~21~~ 27 ~~PB~~ DTMF transmission sequence

Number	Page	Amendments
4.4-65	419	4.4.3.7.4.1.2 Hooking signal transmission This item is added.
4.4-66	421	Figure 4.4.3.7.~~22~~ 29
4.4-67	424	4.4.3.7.5.2 Functional operation state (2) Recalling-type channel switching for private system This item is added.
4.4-68	424	Table 4.4.3.7.19 Recalling-type channel switching state (PS side) / Recalling-type channel switching for private system state (PS side)
4.4-69	425	Table 4.4.3.7.20 Recalling-type channel switching state (CS side of new channel) (note 1) / Recalling-type channel switching for private system state (CS side of new channel) (note 1)
4.4-70	427 ~453	4.4.3.8 Control sequences ~~Private reference~~ → Private standard But "Private reference" in following items does not change. 4.4.3.8.5.5 Channel switching during communication (switching to other CS: TCH switching-type with PS request) 4.4.3.8.5.6 Channel switching during communication (switching to other CS: TCH switching-type with CS indication) 4.4.3.8.6 Zone information indication
4.4-71	431	Figure 4.4.3.8.2 Control sequence (overlap sending) (note 5) Overlap sending is a functional option.
4.4-72	436 436	4.4.3.8.4 Location registration [6] Location registration area report (MM) This item is added. ~~[6]~~ [7] Authentication (MM) ~~[7]~~ [8] Location registration acknowledge (MM)
4.4-73	436 ~437 437	Figure 4.4.3.8.6 Control sequence (location registration) I MM Location registration area report (note 4) (note 4) is newly added.
4.4-74	439	4.4.3.8.5.2 Channel switching during communication (switching to other CS: PS recalling-type) [1] Recalling-type handover request (CC) In the 2nd line, (facility: ~~Handover~~ Recalling-type channel switching or Private recalling-type channel switching) [2] Recalling-type handover proceeding (CC) In the 2nd line, (facility: ~~Handover~~ Recalling-type channel switching or Private recalling-type channel switching) In the 13th line, Only in a private system, the network can do the authentication with the authentication request message (MM) and the authentication response message (MM) by the judgment of the network, without the reference of the authentication ciphering pattern in the setup message (facility: Private recalling-type channel switching) (CC). [6] Authentication (MM) This item is added.
4.4-75	440	~~[6]~~ [7] Call connected In the 3rd line, …… connect message (facility: ~~Handover~~ Recalling-type channel switching or Private recalling-type channel switching) (CC) to the user. …… connect message (facility: ~~Handover~~ Recalling-type channel switching or Private recalling-type channel switching) (CC) terminates ……

Number	Page	Amendments
4.4-76	441	Figure 4.4.3.8.8 Control sequence (channel switching during communication (switching to other CS: PS recalling-type)) I MM Authentication request (note 10) SACCH／FACCH I MM Authentication response (note 10) SACCH／FACCH
	442	(note 10) is added.
4.4-77	443	Figure 4.4.3.8.9 Control sequence (channel switching during communication (switching to other CS: Recalling-type with PS request)) I MM Authentication request (note 10) SACCH／FACCH I MM Authentication response (note 10) SACCH／FACCH
	444	(note 10) is added.
4.4-78	445	Figure 4.4.3.8.10 Control sequence (channel switching during communication (switching to other CS: Recalling-type with CS indication)) I MM Authentication request (note 10) SACCH／FACCH I MM Authentication response (note 10) SACCH／FACCH
	446	(note 10) is added.
4.4-79	450	4.4.3.8.7 Zone paging This item is added.
4.4-80	452 ~453	Figure 4.4.3.8.14 Control sequence (zone paging) This item is added.
5-1	479	5.1 Overview This chapter specifies the voice coding method for ~~the second-generation cordless telephone system~~ the personal handy phone system. 5.2 Voice coding method The full rate voice coding method …… is 32 kbit/s ADPCM as per ITU-T recommendation ~~G.721~~ G-726. ~~However, this excludes the A-law coding method.~~
6-1	484	6.2.5.6 ~~Standard encryption~~ User scrambling In communication between PSs, since unique standard scrambling (section ~~6.2.2.5~~ 6.2.5.5) …… , ~~standard encryption~~ User scrambling also uses this, ……
7-1	521	7.2.8 Received signal strength indicator accuracy ~~Private reference~~ → Private standard
7-2	521	7.2.8.1 Method by area information and standby zone holding function ~~Private reference~~ → Private standard
7-3	522	7.2.8.2 Method by condition report function ~~or location registration area report function~~ (2) Measurement equipment conditions, etc. a. …… ~~Also, it detect the received signal strength of the location registration area report signal from the equipment under test, and can display its contents.~~ (4) Measurement procedures b. …… ~~or the received signal strength from the location registration area report signal from the equipment under test~~, and it displays these contents.
7-4	523	7.2.8.3 Method by whitch reception level value is display or provided display equipment ~~Private reference~~ → Private standard
7-5	523	7.2.9 Bit error rate floor characterristics ~~Private reference~~
7-6	532	7.3.2.9 Received signal strength indicator accuracy ~~Private reference~~ → Private standard
7-7	532	7.3.2.10 Bit error rate floor characteristics (test site measurement) ~~Private reference~~
7-8	532	7.3.2.11 Bit error rate floor characteristics (RFCD measurement) ~~Private reference~~
	534	7.4.2 Output power specified by Terminal Equipment Regulations This item is added.

Number	Page	Amendments
8-1	537 ~542	Chapter 8 Terminology ~~Bearer capability~~ This item is deleted. ~~Encryption~~ This item is deleted. Ramp time This item is added. Scramble This is the randomization of the transmission code series …… (Maximum ~~cyclo~~ period sequence: Largest ~~cyclo~~ period series) and …… User Scramble This item is added.
8-2	543	Acronym List ARIB**, ARM, CONS, DT, DTE, FFT, IEC*, LAN, LAPB, LLI, NIC, NRM, PB, RA, RBT, SLP, WLL is added.
A~Z-1	545 ~718	Appendix A~Z ~~Private reference~~ → Private standard
A-1	545	Appendix A Broadcasting signal transmission method on logical control channel and PS reception operation 1. Type of broadcasting signal transmitted on BCCH (A) (1) Broadcasting signal must be transmitted Broadcasting signal that reports global definition information: Radio channel information broadcasting 2nd system information broadcasting (2) Omittable broadcasting signal Broadcasting signal that informs only local definition information: System information broadcasting, ~~2nd system information broadcasting,~~ 3rd system information broadcasting (exclusively for public systems)
A-2	545	3. Method of use of broadcasting reception indication region (1) In case where broadcasting reception indication displays global definition information pattern in the 3rd line, ... in the radio channel information broadcasting and the 2nd system information broadcasting informed by BCCH (A).
A-3	548	4.2 PS operation (private and public) (5) Recalling-type handover PS ~~does not~~ can transmit recalling-type handover request to the relevant CS regardless of CS information and information of 2nd system information broadcasting message.
C-1	552	Appendix C Restriction control 1 Access group restriction (1) Restriction process overview In the 6th line, ~~(16 - n_p)~~ (8 for $0 < n_p \leqq 8$, 16- n_p for $8 < n_p$), In the 13th line, In private system however, this restriction process applies only if octet 4, 5 usage designnation indicated in octet 7 of System information broadcasting message is (00) or (01).
F-1	579	Appendix F RT state transition diagram (PS side) In the upper middle, Incoming call (ringing cessation) (Private)

Number	Page	Amendments
G-1	582	Appendix G RT SDL diagrams (PS side) 1/15 In the center, (private only), message of "Incoming call (note 2)", primitive of "Ringing cessation indication", and state of "Standby" is added. (Note 2) is added.
K-1	630	Appendix K RT CS side timers (Note 5) is added.
M-1	634	Appendix M MM state transition diagram (PS side) In the right, (Location registration area report) (private only) (note) (Note) is added.
N-1	637	Appendix N MM SDL diagrams (PS side) 2/3 In the left, Location registration area report request (note) (Note) is added.
P-1	640	Appendix P MM state transition diagram (CS side) In the middle of diagram, T.O (TM303C) (Note) is added.
Q-1	642	Appendix Q MM SDL diagrams (CS side) 1/3 Location registration area report (note) (Note) is added.
Q-2	643	Appendix Q MM SDL diagrams (CS side) 2/3 Under the 3rd step of the leftmost row, Zone paging area method with PS indication is added. In the 3rd row from left, "Timer TM303C time out" is added.
R-1	645	Appendix R MM CS side timers In the 4th column, TM303C (4S) This item is added. In the 3rd column of the 6th row, Optional (note 1) (Note 1) Mandatory when data link re-establish performed. (Note 2) Mandatory in case of paging area method with PS indication. This item is added.
T-1	658	Appendix T CC SDL diagrams (PS side) 10/17 In the left, (Functional option)
T-2	665	Appendix T CC SDL diagrams (PS side) 17/17 In the middle, "N", "Y" is added.
V-1	674	Appendix V CC SDL diagrams (CS side) 6/19 In the left, (Functional option)
W-1	688	Appendix W CC CS side timers In the column "TC302C", of the row "Mandatory/ Optional timer", Mandatory if overlap sending is implemented. (note 3)
Y-1	711	Appendix Y ~~Encryption~~ User Scrambling control methods 1.2 Setting of presence or absence of ~~encryption~~ user scrambling PS applies ..... ~~encryption~~ user scrambling key is set. Temporary encryption ..... (However, with certain ~~encryption keys~~ user scrambling, ... before and after ~~encryption~~ user scramble) 1.3 Phase in which ~~encryption key~~ user scrambling is set ~~Encryption key~~ User scrambling set is ..... phase. (Note 1) Underline ..... ~~for private system, and default value for public system~~. (Note 2) Standard encryption is the ~~standard encryption~~ user scrambling mechanism method.

Number	Page	Amendments
Z-1	714	Appendix Z Operation of PS that has automatic location registration function Location registration reception data, location registration reception information → location registration data
Z-2	715	2 Location registration operation In the 4th line, …… If valid location registration ~~reception~~ data ~~(the operator indication code and paging area number)~~ (Note 1) is stored by the PS, the …… In the 7th line, The condition for valid location registration ~~reception~~ data of PS are as follows:
	715	In the 13th line, [3] ……, if the relevant ~~paging area number~~ location registration data transmitted by …… In the 22nd line, [2] …… registration differ from the ~~operator identification code or paging area number~~ location registration data of the CS …… In the 25th line, (Note 1) Location registration data ・ In public, location registration data is country code, operator identification code or paging area number. ・ In private, when it is "fixed paging area method by system information broadcasting" or "paging area method by additional ID", location registration data is country code or system identification, when it is "paging area method with PS indication", location registration data is country code or CS-ID.
Z-3	716	6 Reception of location registration reject message ・ Location registration retry impossible: ……Also, for a location registration prohibited area, the ~~operator identification code and paging area number~~ location registration data of the relevant CS must be stored. Figure 2 PS operation in location registration (1/2) Location registration reject (retry impossible) For location registration prohibited area, ~~operator ID code and paging area number~~ location registration data of relevant CS are stored.
AA-1	719	Appendix AA Definition of functional operations In the shade part of Figure 1, 
AA-2	720	~~2.1 PB tone transmission operation and handover operation~~ The definitions of ~~the PB tone~~ DTMF transmission operation ~~and~~ , handover operation and handover operation in private system are shown in Figure 2.
AA-3	720	In the 5th line of Figure 2, PBSendingService, handover, privatehandover

Number	Page	Amendments
AA-4	721	In the 35th line of Figure 2, privateHandoverType : : = OPERATION ARGUMENT SET {handoverCategory …… …… …… (65) operation(1) privatehandover(3)} This description is added.
AA-5	724	Figure 2 Definitions of ~~PB~~ DTMF tone transmission operation and handover operation
AB-1	725	Appendix AB WLL standard This item is added.
AC-1	790	Appendix AC Control/ communication carriers of private system used in the countries outside of Japan This item is added.
AD-1	793	Appendix AD Compatibility checking This item is added.
AE-1	794	Appendix AE Low layer information coding principles This item is added.
AF-1	796	Appendix AF Low layer compatibility negotiation This item is added.
AG-1	798	Appendix AG Interface between PS and external terminal This item is added.
AH-1	803	Appendix AH Rate adaption procedure for unrestricted service on CS for interworking with ISDN- based Network This item is added.
AI-1	813	Appendix AI Rate adaption rule at the Um reference when communicating with V-110 terminals This item is added.

PERSONAL HANDY PHONE SYSTEM

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