TSG-RAN Meeting #7
Madrid, Spain, 13 – 15 March 2000

RP-000039

Title: **Agreed CRs to TS 25.321**

Source: **TSG-RAN WG2**

Agenda item: **6.3.3**

Doc-1st-	Spec	CR	Rev	Subject	Cat	Version	Versio
R2-000057	25.321	032		Bit Aligned TDD MAC Headers	C	3.2.0	3.3.0
R2-000566	25.321	035	2	CPCH including Channel Assignment	C	3.2.0	3.3.0
R2-000433	25.321	036		UE-ID type indication	C	3.2.0	3.3.0
R2-000529	25.321	037	1	RACH transmission control procedure	C	3.2.0	3.3.0
R2-000525	25.321	039		CPCH start of message indication	B	3.2.0	3.3.0
R2-000570	25.321	040		Removal of SCH and SCCH	F	3.2.0	3.3.0
R2-000671	25.321	041	1	Clarification of bit order	F	3.2.0	3.3.0

3GPP TSG-RAN Meeting #7
Madrid, Spain, 13 - 15 March 2000

Document R2-000057
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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25.321	CR	032	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG-RAN#7	For approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		For information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME	X	UTRAN / Radio	X	Core Network	

Source: TSG-RAN WG2 **Date:** 06/01/00

Subject: Bit Aligned TDD MAC Headers

Work item:

Category: *(only one category Shall be marked With an X)*			**Release:**	
F	Correction		Phase 2	
A	Corresponds to a correction in an earlier release		Release 96	
B	Addition of feature		Release 97	
C	Functional modification of feature	X	Release 98	
D	Editorial modification		Release 99	X
			Release 00	

Reason for change: The number of TB sizes for each TF allowed on specific TrCH's needs to be minimised to reduce the layer 3 signalling load. It is also necessary to allow a maximum number of octet aligned RLC PDU sizes in AM and UM for efficient transfer of DCCH/DTCH data. In TDD mode bit shifted MAC headers potentially doubles the number of Transport Formats that need to be defined on RACH and FACH TrCH's. Additionally, variable bit shifted MAC headers result in requiring layer 2 bit shifting for all UE DL and UTRAN UL transmissions on RACH and FACH. MAC header bit alignment is proposed to avoid duplication of TB size definitions for octet aligned RLC PDUs and layer 2 bit shifting.

Clauses affected: 9.2.1 – 9.2.1.1 – 9.2.1.4 – 9.2.1.x

Other specs Affected:			
Other 3G core specifications		→ List of CRs:	
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

9.2.1 MAC Data PDU: Parameters of the MAC header

The following fields are defined for the MAC header:

- Target Channel Type Field
  The TCTF field is a flag that provides identification of the logical channel class on FACH and RACH transport channels, i.e. whether it carries BCCH, CCCH, CTCH, SHCCH or dedicated logical channel information. The size and coding of TCTF for FDD and TDD are shown in tables 9.2.1.1, 9.2.1.2 and 9.2.1.3. Note that the size

of the TCTF field of FACH for FDD is either 2 or 8 bits depending of the value of the 2 most significant bits and for TDD is either 3 or 5 bits depending on the value of the 3 most significant bits. The TCTF of the RACH for TDD is either 2 or 4 bits depending on the value of the 2 most significant bits.

Table 9.2.1.1: Coding of the Target Channel Type Field on FACH for TDD

TCTF	Designation
000	BCCH
001	CCCH
010	CTCH
01100	DCCH or DTCH over FACH
01101-01111	Reserved (PDUs with this coding will be discarded by this version of the protocol)
100	SHCCH
101-111	Reserved (PDUs with this coding will be discarded by this version of the protocol)

Table 9.2.1.2: Coding of the Target Channel Type Field on FACH for FDD

TCTF	Designation
00	BCCH
01000000	CCCH
01000001-01111111	Reserved (PDUs with this coding will be discarded by this version of the protocol)
10000000	CTCH
10000001-10111111	Reserved (PDUs with this coding will be discarded by this version of the protocol)
11	DCCH or DTCH over FACH

Table 9.2.1.3: Coding of the Target Channel Type Field on USCH or DSCH (TDD only)

TCTF	Designation
0	SHCCH
1	DCCH or DTCH over USCH or DSCH

Table 9.2.1.4: Coding of the Target Channel Type Field on RACH for FDD

TCTF	Designation
00	CCCH
01	DCCH or DTCH over RACH
~~10~~	~~TDD: SHCCH FDD: Reserved (PDUs with this coding will be discarded by this version of the protocol)~~
10-11	Reserved (PDUs with this coding will be discarded by this version of the protocol)

Table 9.2.1.x: Coding of the Target Channel Type Field on RACH for TDD

TCTF	Designation
00	CCCH
0100	DCCH or DTCH Over RACH
0101-0111	Reserved (PDUs with this coding will be discared by this version of the protocol)
10	SHCCH
11	Reserved (PDUs with this coding will be discarded by this version of the protocol)

3GPP TSG-RAN WG2 Meeting #11
Torino, Italy 28th Feb. – 3rd March. 2000

Document R2-000566
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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25.321	CR	035r2	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

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list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from:* ftp://ftp.3gpp.org/Information/CR-Form-v2.doc

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME	X	UTRAN / Radio	X	Core Network	

Source:	TSG-RAN WG2	**Date:** 2 Mar, 2000
Subject:	CPCH including Channel Assignment	
Work item:		

Category: *(only one category shall be marked with an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature	X		Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:
The addition of Channel assignment for CPCH has been agreed by RAN2 and the proponents of CPCH. This CR adds a new clause to MAC protocol specification which describes the MAC control of CPCH transmission with Channel Assignment. Other corrections for CPCH are also included.

Clauses affected: 4.2.3.1, 6.1, 8.3.2, 9.2.1.1, 11.3

Other specs affected:

Other 3G core specifications		→ List of CRs:
Other GSM core specifications		→ List of CRs:
MS test specifications		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:


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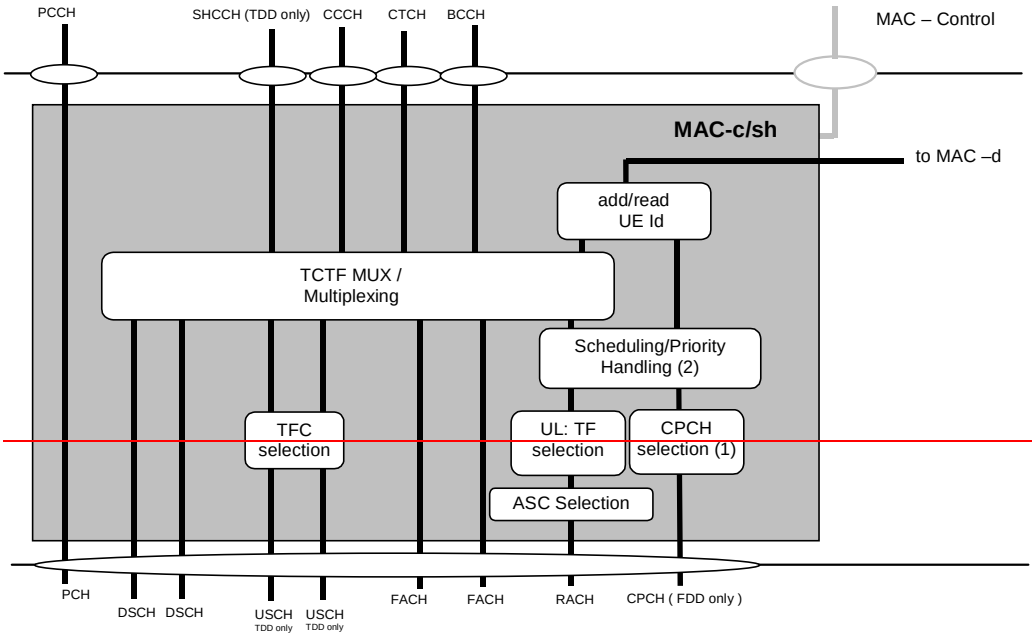
<--------- double-click here for help and instructions on how to create a CR.

4.2.3.1 MAC-c/sh entity – UE Side

Figure 4.2.3.1.1 shows the UE side MAC-c/sh entity. The following functionality is covered:

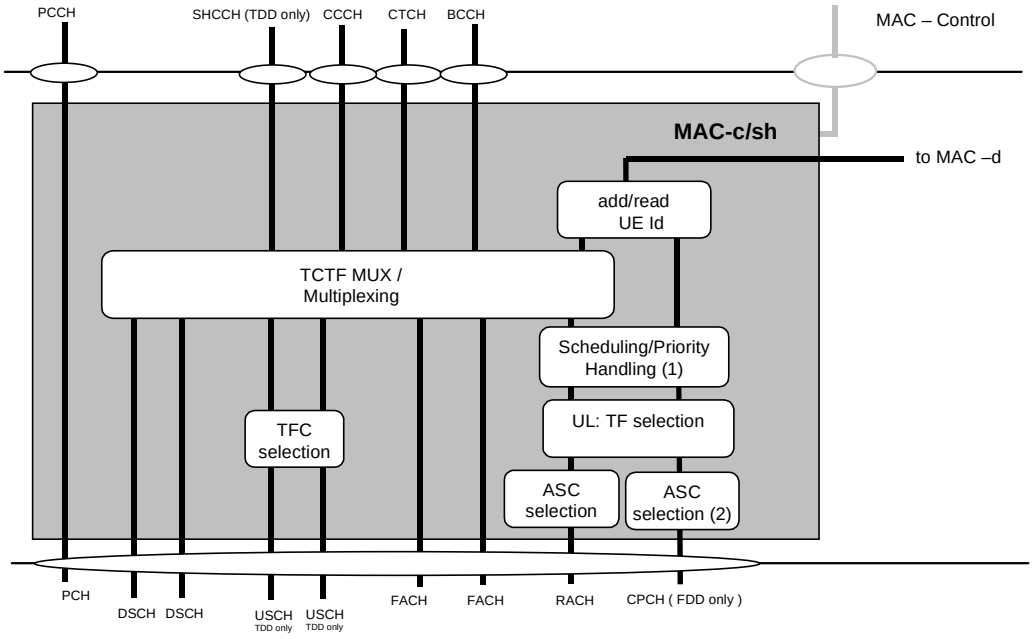
- The TCTF MUX box represents the handling (insertion or detection and deletion) of the TCTF field in the MAC header, and the respective mapping between logical and transport channels. The TCTF field indicates the common logical channel type, or if a dedicated logical channel is used.
- The UE Id field in the MAC header is used to distinguish between UEs.
- In the uplink, the possibility of transport format selection exists. In case of CPCH transmission, a TF is selected based on TF availability determined~~maximum available data rate~~ from status information on the CSICH.
- ASC selection: For RACH, MAC indicates the ASC associated with the PDU to the physical layer. For CPCH, MAC may indicate the ASC associated with the PDU to the Physical Layer. (this is to ensure that RACH and CPCH messages associated with a given Access Service Class (ASC) are sent on the appropriate signature(s) and time slot(s)~~ and CPCH AP preamble associated with a given Access Service Class (ASC) are sent on the appropriate signature(s)~~). MAC also applies the appropriate back-off parameter(s) associated with the given ASC.
- Scheduling /priority handling is used to transmit the information received from MAC-d on RACH and CPCH.
- ~~Channel selection is used to select an appropriately sized and available CPCH for transmission.~~
- Transport format combination selection (out of the RRC assigned transport format combination set) is performed to prioritise transport channels.
- Multiplexing is used to transmit the received information on DSCH to the MAC-d, for TDD the multiplexing is used to transfer data from MAC-d to USCH.

The RLC has to provide RLC-PDUs to the MAC, which fit into the available transport blocks on the transport channels respectively.



DL	Downlink	UE	User Equipment
TF	Transport Format	UL	Uplink
TFC	Transport Format Combination		
TCTF	Target Channel Type Field		
(1)	Details are FFS		
(2)	Scheduling /Priority handling is applicable for CPCH, details are ffs.		

NOTE(1): The multiplexing function has to be reviewed,.



DL	Downlink	UE	User Equipment
TF	Transport Format	UL	Uplink
TFC	Transport Format Combination		
TCTF	Target Channel Type Field		
(1)	Scheduling /Priority handling is applicable for CPCH, details are ffs.		
(2)	In case of CPCH, ASC selection may be applicable for AP preamble.		

NOTE(1): The multiplexing function has to be reviewed,.

Figure 4.2.3.1.1: UE side MAC architecture / MAC-c/sh details

6.1 Description of the MAC functions

The functions of MAC include:

- Mapping between logical channels and transport channels.
- Selection of appropriate Transport Format for each Transport Channel depending on instantaneous source rate
- Priority handling between data flows of one UE
- Priority handling between UEs by means of dynamic scheduling
- Priority handling between data flows of several users on the DSCH and FACH
- Identification of UEs on common transport channels
- Multiplexing/demultiplexing of higher layer PDUs into/from transport blocks delivered to/from the physical layer on common transport channels
- Multiplexing/demultiplexing of higher layer PDUs into/from transport block sets delivered to/from the physical layer on dedicated transport channels
- Traffic volume monitoring
- Dynamic Transport Channel type switching
- Ciphering for transparent RLC
- Access Service Class selection for RACH and CPCH transmission

8.3.2 Parameters

See 25.331 for a detailed description of the UE, RB and TrCH information elements.

a) UE information elements
S-RNTI
SRNC identity
C-RNTI
Activation time

b) RB information elements
RB multiplexing info (Transport channel identity, Logical channel identity, MAC logical channel priority)

c) TrCH information elements
Transport Format Combination Set

d) Measurement information elements
Mode (periodic, event-triggered or both)
TH_U
TH_L (Optional)
Measurement quantity identifiers
Report Interval

e) Measurement result
Mode
Reporting Quantities
Event Type (overflow or underflow)

f) Status info
Maximum number of preamble ramping cycles reached.

g) RACH transmission control elements
Persistence value P
Maximum number of preamble ramping cycles M_{max}
Others (ffs., e.g. minimum and maximum number of time units between two preamble ramping cycles)

h) Ciphering elements
Ciphering mode
Ciphering key
Ciphering sequence number

i) CPCH transmission control element
CPCH persistency values ,Ps for each Transport Format~~data rate~~
Maximum number of preamble ramping cycles N_access_fails~~max~~
~~CPCH channel data rate (implicit in the UL channelisation code)~~
NF_max (~~Max packet length in frames~~Maximum number of frames for CPCH transmission for each Transport Format)
Backoff control timer parameters
Transport Format Set
Initial Priority Delays
Channel Assignment Active indication

9.2.1.1 MAC header for DTCH and DCCH

a) DTCH or DCCH mapped to DCH, no multiplexing of dedicated channels on MAC:
No MAC header is required.

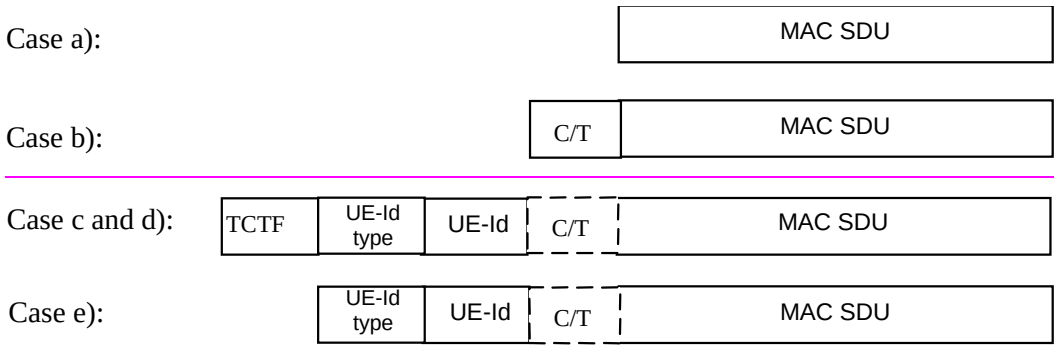
b) DTCH or DCCH mapped to DCH, with multiplexing of dedicated channels on MAC:
C/T field is included in MAC header.

c) DTCH or DCCH mapped to RACH/FACH:
TCTF field, C/T field, UE-Id type field and UE-Id are included in the MAC header.

d) DTCH or DCCH mapped to DSCH or USCH:
The TCTF field is included in the MAC header for TDD only. The UE-Id type and UE-Id are included in the MAC header for FDD only. The C/T field is included if multiplexing on MAC is applied.

e) ~~e)~~ DTCH or DCCH mapped to DSCH or USCH where DTCH or DCCH are the only logical channels:
The UE-Id type and UE-Id are included in the MAC header for FDD only. The C/T field is included in the MAC header if multiplexing on MAC is applied.

f) DTCH or DCCH mapped to CPCH
UE-Id type field and UE-Id are included in the MAC header. The C/T field is included in the MAC header if multiplexing on MAC is applied.



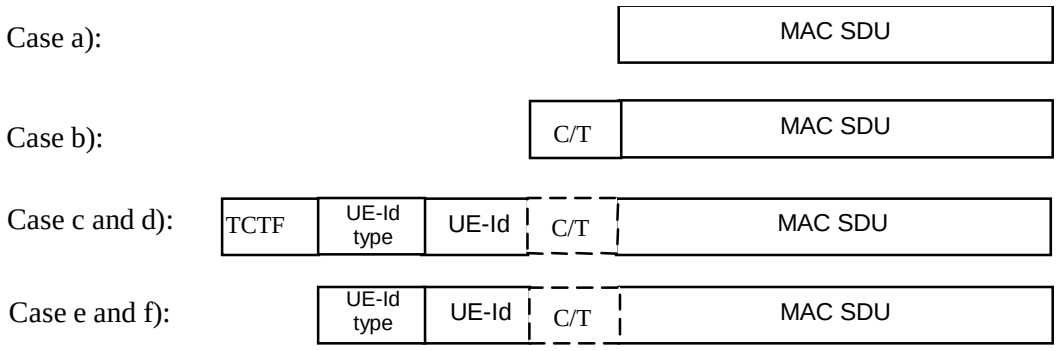


Figure 9.2.1.1.1: MAC Data PDU formats for DTCH and DCCH

11.3 Control of CPCH transmissions for FDD

The MAC layer controls the timing of CPCH transmissions on transmission time interval level (i.e. on 10, 20, 40 or 80 ms level); the timing on access slot level is controlled by L1. MAC controls the timing of each initial preamble ramping cycle as well as successive preamble ramping cycles. Note that retransmissions in case of erroneously received CPCH message part are under control of higher layers. The CPCH transmissions are performed by the UE as illustrated in Figures 11.3.1 and 11.3.2. Figure 11.3.1 procedure is used for initial access to CPCH channel. Figure 11.3.2 procedure is used for each TTI transmission while the UE continues to transmit on the CPCH channel obtained using the initial access procedure.

MAC receives the following CPCH transmission control parameters from RRC with the CMAC-Config-REQ primitive.

- persistence values, P (transmission probability for each Transport Format (TF)),
- N_access_fails, maximum number of preamble ramping cycles,
- NF_max, maximum number of frames for CPCH transmission for each TF,
- Backoff control timer parameters,
- Transport Format Set
- Initial Priority Delays
- Channel Assignment Active indication

The MAC procedure for transmission control of initial CPCH access shall be invoked when the UE has data to transmit and the UE is not currently transmitting on a previously accessed CPCH channel. The steps for this procedure are listed here:

1. The UE shall get all UL transmit parameters (CPCH Set Info, P values, Initial Priority Delays, N_access_fails, NF_max, etc) from RRC.
2. The UE shall reset counter M and Frame Count Transmitted (FCT) upon entry to the initial access procedure.
3. The UE shall send a PHY-CPCH_Status-REQ to Layer 1 to obtain CPCH TF subset status. If Layer 1 returns an error message, the UE shall increment counter M. If counter M is equal to N_access_fails, the UE shall execute an access failure error procedure and the CPCH access procedure ends. If counter M is less than N_access_fails, the procedure shall continue from step 3. If Layer 1 returns a PHY-CPCH_Status-CNF message which includes a TF subset indicating the currently available TFs of the requested TF subset, the procedure shall continue from step 4.
4. The UE shall initialize the Busy Table with the CPCH TF subset status from Layer 1. Those TFs in the TF subset of the Layer 1 PHY-CPCH_Status-CNF response will be marked available. All other TFs will be marked busy.
5. If all TFs are marked busy, the UE shall reset and start timer Tboc1, wait until timer expiry, and increment counter M. If counter M is equal to N_access_fails, the UE shall execute an access failure error procedure and the CPCH access procedure ends. If counter M is less than N_access_fails, the procedure shall continue from step 3.

6. The UE shall update all UL transmit parameters from RRC.
7. UE shall select a TF from the set of available TFs listed in the Busy Table. UE shall use the CPCH channel capacity (transport block set size, NF_max, and TTI interval), and Busy Table information to select one CPCH TF for L1 to access. The UE may select a TF which uses a lower data rate and a lower UL Tx power than the maximum UL Tx power allowed.
8. UE shall implement a test based on the Persistence value (P) to determine whether to attempt access to the selected CPCH TF. If access is allowed, the UE may implement an initial delay based on ASC of the data to be transmitted, then shall send a PHY-Access-REQ with the selected TF to L1 for CPCH access . If the P test does not allow access, the selected CPCH TF shall be marked busy in the Busy Table. If all TFs are marked busy, the UE shall reset and start timer Tboc1, wait until timer expiry, and increment counter M. If counter M is equal to N_access_fails, the UE shall execute an access failure error procedure and the CPCH access procedure ends. If counter M is less than N_access_fails, the procedure shall continue from step 3. If all TFs are not marked busy, the UE shall resume the procedure from step 6.
9. After the UE has sent the access request to L1 , L1 shall return a PHY-Acess-CNF including one of five access indications to MAC as shown in Figure 11.3.1. If the L1 access indication is that access is granted, then UE shall execute the transmission control procedure for the Nth TTI using the selected TF and the initial access procedure ends.
10. If L1 access indication is no AP-AICH received or no CD-AICH received, the UE shall reset and start timer Tboc3, wait until timer expiry, and increment counter M. If counter M is equal to N_access_fails, the UE shall execute a link failure error procedure and the CPCH access procedure ends. If counter M is less than N_access_fails, the UE shall proceed from step 3.
11. If L1 access indication is AP-AICH_nak received and Channel Assignment (CA) is active, the UE shall proceed from step 14. If L1 access indication is AP-AICH_nak received and Channel Assignment (CA) is not active,the UE shall reset and start timer Tboc2, wait unitl timer expiry, and mark the selected channel busy in the Busy Table. If all channels are marked busy, the UE shall reset and start timer Tboc1, wait until timer expiry, and increment counter M. If counter M is equal to N_access_fails, the UE shall execute an access failure error procedure and the CPCH access procedure ends. If counter M is less than N_access_fails, the procedure shall continue from step 3. If all channels are not marked busy, the UE shall resume the procedure from step 6.
12. If L1 access indication is CD-AICH signature mismatch, the UE shall reset and start timer Tboc4, wait until timer expiry, and increment counter M. If counter M is equal to N_access_fails, the UE shall execute an access failure error procedure and the CPCH access procedure ends. If counter M is less than N_access_fails, the procedure shall continue from step 3.
13. The UE shall reset and start timer Tboc4, wait until timer expiry, and increment counter M. If counter M is equal to N_access_fails, the UE shall execute an access failure error procedure and the CPCH access procedure ends. If counter M is less than N_access_fails, the procedure shall continue from step 3.
14. The UE shall reset and start timer Tboc2, wait unitl timer expiry, and increment counter M. If counter M is equal to N_access_fails, the UE shall execute an access failure error procedure and the CPCH access procedure ends. If counter M is less than N_access_fails, the procedure shall continue from step 3.

The MAC procedure for transmission control of Nth TTI shall be invoked when the UE has data to transmit and the UE is currently transmitting on a previously accessed CPCH channel. The steps for this procedure are listed here:

1. The UE shall build a transport block set for the next TTI.
2. If the sum of the Frame Count Transmitted counter plus the number of frames in the next TTI is greater than NF_max, the UE shall exit this procedure and start the MAC procedure for CPCH transmission of the first TTI. This shall release the CPCH channel in use and the UE will contend again for a new CPCH channel to continue transmission. If the sum of the Frame Count Transmitted counter plus the number of frames in the next TTI is greater than NF_max, the UE shall send a PHY-Data-REQ with the transport block set to L1 to continue transmission on the CPCH channel which has previously been accessed.
3. If L1 returns PHY-Status-IND indicating transmission error, the UE shall execute a transmission error procedure and the CPCH Nth TTI procedure ends.
4. If the L1 returns PHY-Status-IND indicating normal transmission, then the UE shall increment the Frame Count Transmitted counter by the length of the TTI just transmitted and the procedure ends.

Table 11.3: CPCH Backoff Delay Timer Values		
Timer	**Based on parameter**	**Fixed/random**
T_{BOC1} (all Busy)	NF_bo_all_busy	Random
T_{BOC2} (channel Busy)	NS_bo_busy	Fixed
T_{BOC3} (no AICH)	NF_bo_no_aich	Fixed
T_{BOC4} (mismatch)	NF_bo_mismatch	Random

For $T_{BOC4,}$ UE shall randomly select a timer value at each execution of the timer. A uniform random draw shall be made to select an integer number of frames within the range [0, NF_bo_mismatch]. For $T_{BOC1,}$ UE would randomly select a timer value at each execution of the timer. A uniform random draw shall be made to select an integer number of frames within the range [0, NF_bo_all busy]. NOTE: Backoff parameter range and units are specified in TS25.331, RRC Protocol Specification.

The UE MAC TF selection algorithm is left to implementation and is out of the scope of this specification. However the following example is presented to show one way UE may select a CPCH TF.

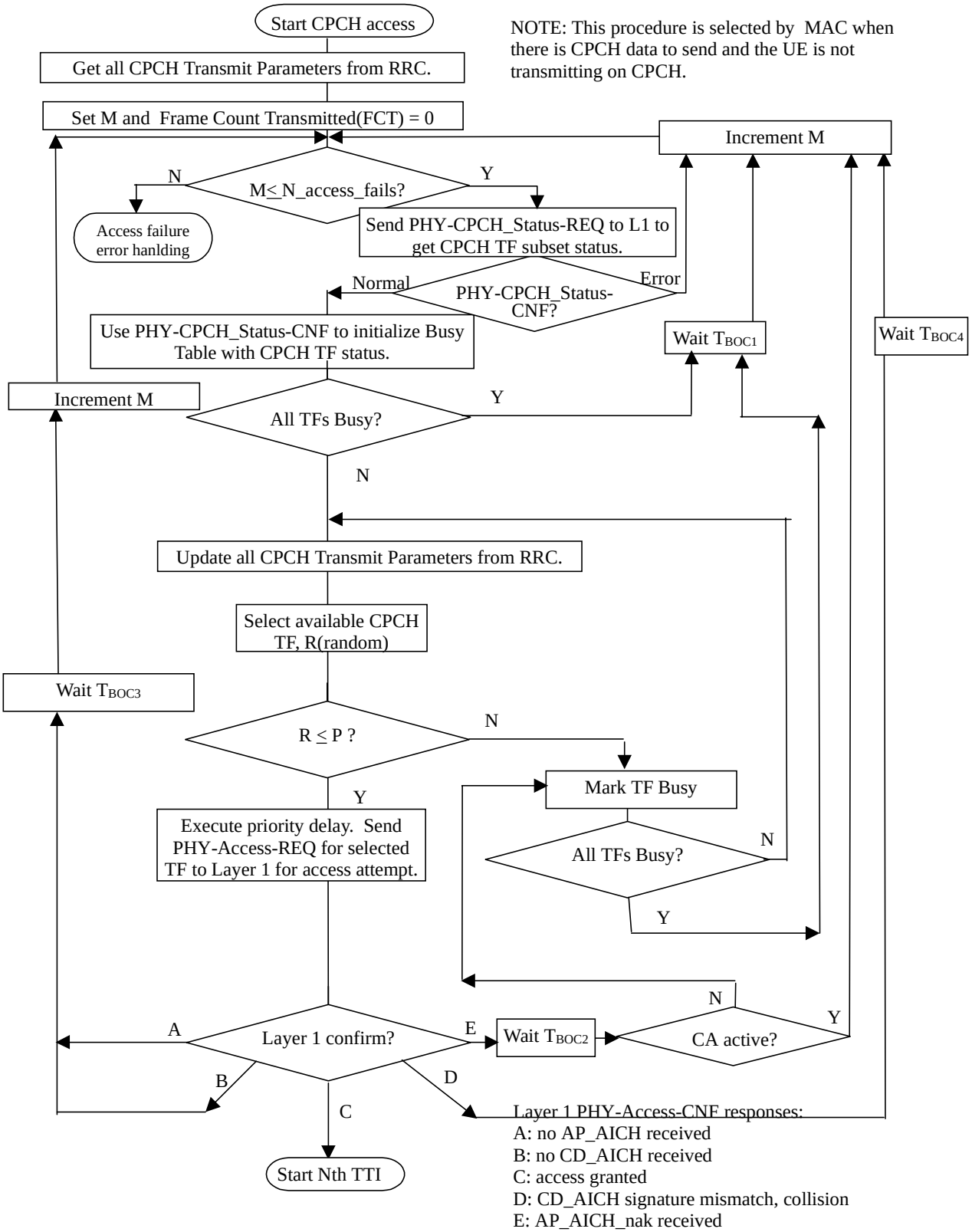
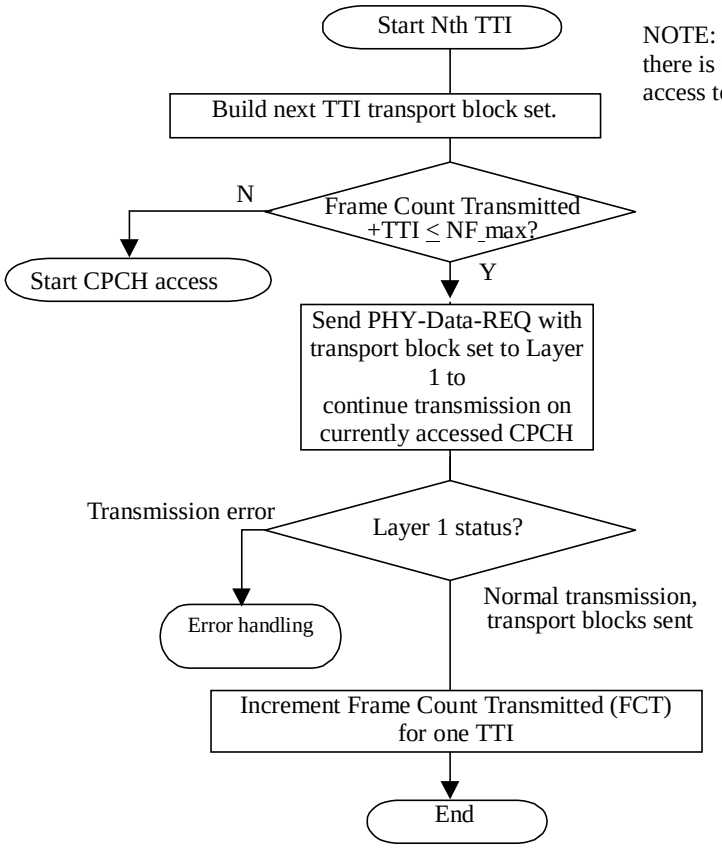


Figure 11.3.1: CPCH transmission control procedure for initial access (informative)



NOTE: This procedure is selected by MAC when there is CPCH data to send while the UE has access to a CPCH channel.

Figure 11.3.2: CPCH transmission control procedure for Nth TTI (informative)

3GPP RAN WG2#11

Turin, Italy, Feb. 28 – March 3, 2000

***Document* R2-000433**

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or for SMG, use the format P-99-xxx

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25.321	CR	036	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG-RAN #7	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)*	(U)SIM		ME	X	UTRAN / Radio	X	Core Network	

Source: TSG-RAN WG2 **Date:** 2000-02-26

Subject: UE-ID type indication

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature	X		Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change:

When dedicated logical channels are transmitted on common transport, a UE-ID is included into the MAC header. For certain RRC messages, MAC needs to select between different UE-ID types, referred to as U-RNTI and C-RNTI. Since the UE-ID is included in the MAC-c/sh entity, at the UTRAN side, the UE-ID type needs to be indicated over the Iur interface in case MAC-d and MAC-c/sh entities are not co-located in the same RNC. This CR proposes to include a UE-ID type indication into the MAC-Data-REQ primitive. This information element shall be used on MAC for selection of the UE-ID type. At the network side it shall be conveyed on Iur by the FACH Frame Protocol.

Clauses affected:

Other specs affected:

Other 3G core specifications		→ List of CRs:	TS 25.425
Other GSM core specifications		→ List of CRs:	
MS test specifications		→ List of CRs:	
BSS test specifications		→ List of CRs:	
O&M specifications		→ List of CRs:	

Other comments:

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<--------- double-click here for help and instructions on how to create a CR.

8.2 Primitives between MAC and RLC

8.2.1 Primitives

The primitives between MAC layer and RLC layer are shown in Table 8.2.1.1.

Table 8.2.1.1: Primitives between MAC layer and RLC layer

Generic Name	Type				Parameters
	Request	Indication	Response	Confirm	
MAC-DATA	X	X			Data, Number of transmitted RLC PDUs, BO, UE-ID type indicator, TD (NOTE 1)
MAC-STATUS		X	X		No_PDU, PDU_Size

NOTE 1: TDD only

MAC-DATA-Req/Ind

- MAC-DATA-Req primitive is used to request that an upper layer PDU be sent using the procedures for the information transfer service.
- MAC-DATA-Ind primitive indicates the arrival of upper layer PDUs received within one transmission time interval by means of the information transfer service.

MAC-STATUS-Ind/Resp

- MAC-STATUS-Ind primitive indicates to RLC the rate at which it may transfer data to MAC. Parameters are the number of PDUs that can be transferred in each transmission time interval and the PDU size.
- MAC-STATUS-Resp primitive enables RLC to acknowledge a MAC-STATUS-Ind. It is possible that RLC would use this primitive to indicate that it has nothing to send or that it is in a suspended state.

8.2.2 Parameters

a) Data
It contains the RLC layer message (RLC-PDU) to be transmitted, or the RLC layer messages that have been received by the MAC sub-layer.

b) Number of transmitted RLC PDUs (indication only)
Indicates the number of RLC PDUs transmitted within the transmission time interval, based on the TFI value.

c) Buffer Occupancy (BO)
The parameter Buffer Occupancy (BO) indicates the amount of data that is currently queued for transmission (or retransmission) in RLC layer

d) RX Timing Deviation (TD), TDD only
It contains the RX Timing Deviation as measured by the physical layer for the physical resources carrying the data of the Message Unit. This parameter is optional and only for Indication. It is needed for the transfer of the RX Timing Deviation measurement of RACH transmissions carrying CCCH data to RRC.

e) Number of PDU (No_PDU)
Specifies the number of PDUs that the RLC is permitted to transfer to MAC within a transmission time interval.

f) PDU Size (PDU_Size)
Specifies the size of PDU that can be transferred to MAC within a transmission time interval.

g) UE-ID Type Indicator

Indicates the UE-ID type to be included on MAC for a DCCH when it is mapped onto a common transport channel (i.e. FACH or RACH)

3GPP RAN WG2#11

Turin, Italy, Feb. 28 – March 3, 2000

Document R2-000529

e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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25.321	CR	037r1	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: TSG-RAN #7 *list expected approval meeting # here ↑*

for approval [X]
for information [ ]

strategic [ ]
non-strategic [ ]
(for SMG use only)

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]

Source: TSG-RAN WG2 **Date:** 2000-03-02

Subject: RACH transmission control on MAC sublayer

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	[ ]
A	Corresponds to a correction in an earlier release	[ ]
B	Addition of feature	[ ]
C	Functional modification of feature	[X]
D	Editorial modification	[ ]

Release:

Phase 2	[ ]
Release 96	[ ]
Release 97	[ ]
Release 98	[ ]
Release 99	[X]
Release 00	[ ]

Reason for change:

The model of RACH transmission control on the MAC sublayer has been revised by introducing new primitives for access control, PHY-ACCESS-REQ and PHY-ACCESS-CNF. The proposed changes were implied by the revision of the CPCH transmission control procedure (see CR 032 to 25.302) and allow for a more harmonised modelling of RACH and CPCH access procedures. The proposed changes impact only the modelling of RACH transmission control. There is no impact on implementation expected.

In Sec 11.2.1 furthermore it is proposed to remove the Note 1 on an alternative method of MAC access control for negative acknowledgements. Note 2 on multiple persistence values (one for each Access Service Class) is removed and an appropriate scheme is proposed.

Clauses affected: 8.3.2, 11.2

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:


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8.3.2 Parameters

See 25.331 for a detailed description of the UE, RB and TrCH information elements.

a) UE information elements
S-RNTI
SRNC identity
C-RNTI
Activation time

b) RB information elements
RB multiplexing info (Transport channel identity, Logical channel identity, MAC logical channel priority)

c) TrCH information elements
Transport Format Combination Set

d) Measurement information elements
Mode (periodic, event-triggered or both)
TH_U
TH_L (Optional)
Measurement quantity identifiers
Report Interval

e) Measurement result
Mode
Reporting Quantities
Event Type (overflow or underflow)

f) Status info
Maximum number of preamble ramping cycles reached.

g) RACH transmission control elements
~~Persistence value P~~Set of ASC parameters (identifier for PRACH partitions, persistence values)
Maximum number of preamble ramping cycles M_{max}
~~Others (ffs., e.g.~~ minimum and maximum number of time units between two preamble ramping cycles, $N_{BO1main}$ and N_{BO1max}~~)~~

h) Ciphering elements
Ciphering mode
Ciphering key
Ciphering sequence number

i) CPCH transmission control elements
CPCH persistency value
CPCH channel data rate (implicit in the UL channelisation code)
NFmax (Max packet length in frames)

11.2 Control of RACH transmissions

The MAC sublayer is in charge of controlling the timing of RACH transmissions on transmission time interval level (i.e. on 10 ms-radio frame level; the timing on access slot level is controlled by L1). Note that retransmissions in case of erroneously received RACH message part are under control of higher layers, i.e. RLC, or RRC for CCCH (and SHCCH for TDD).

11.2.1 Access Service Class selection

The physical RACH resources (i.e. access slots and preamble signatures for FDD, timeslot and channelisation code for TDD) may be divided between different Access Service Classes in order to provide different priorities of RACH usage. It is possible for more than one ASC or for all ASCs to be assigned to the same access slot/signature space.

Access Service Classes are numbered in the range $0 \le i \le \text{NumASC} \le 7$ (i.e. the maximum number of ASCs is NumASC+1 = 8). An ASC is defined by an identifier *i* that defines a certain partition of the PRACH resources and an associated persistence value P_i. A set of ASC parameters consists of NumASC+1 such parameters (i, P_i), i = 0, …, NumASC. The PRACH partitions (for TDD defined by the information element "ASC info", cf. TS 25.331 [7]) and the persistence values P_i are derived by the RRC protocol from system information (see TS 25.331 [7]). The set of ASC parameters is provided to MAC with the CMAC-Config-REQ primitive. The ASC enumeration is such that it corresponds to the order of priority (ASC 0 = highest priority, ASC 7 = lowest priority). ASC 0 shall be used in case of Emergency Call or for reasons with equivalent priority.

At radio bearer setup/reconfiguration each involved logical channel is assigned a MAC Logeical channel Priority (MLP) in the range 1,…,8. When the MAC sublayer is configured for RACH transmission in the UE, these MLP levels shall be employed for ASC selection on MAC.

The following ASC selection scheme shall be applied, where NumASC is the highest available ASC number and MinMLP the highest logical channel priority assigned to one logical channel:

In case all TBs in the TB set have the same MLP, select ASC = min(NumASC, MLP).

In case TBs in a TB set have different priority, determine the highest priority level MinMLP and select ASC = min(NumASC, MinMLP).

11.2.21 Control of RACH transmissions for FDD mode

The RACH transmissions are controlled by the UE MAC sublayer as outlined in Figure 11.2.21.1.
Note that the figure shall illustrate the operation of the transmission control procedure as specified below. It shall not impose restrictions on implementation. MAC controls the timing of each initial preamble ramping cycle as well as successive preamble ramping cycles in case that none or a negative acknowledgement is received on AICH.

MAC receives the following RACH transmission control parameters from RRC with the CMAC-Config-REQ primitive:

- a set of Access Service Class (ASC) parameters, which includes for each ASC, i=0,…,NumASC an identification of a PRACH partition and a persistence value P_i (transmission probability),
- maximum number of preamble ramping cycles M_{max},
- range of backoff interval for timer T_{BO1}, given in terms of numbers of transmission time intervals N_{BO1max} and N_{BO1min}, applicable when negative acknowledgement on AICH is received.,
- Access Service Class (ASC) parameters.

When there is data to be transmitted, MAC selects the ASC from the available set of ASCs, which consists of an identifier *i* of a certain PRACH partition and an associated persistence value P_i. The procedure to be applied for ASC selection is described in Section 11.2.1.

Based on the persistence value P_i, the UE decides whether to start the L1 PRACH transmission procedure (see TS 25.214) in the present transmission time interval or not. If transmission is allowed, the PRACH transmission procedure (starting with a preamble power ramping cycle) is initiated by sending of a PHY-AccessData-REQ primitive. MAC then waits for status indicationaccess information from L1 via PHY-StatusACCESS-IND-CNF primitive. If transmission is not allowed, a new persistency check is performed in the next transmission time interval. The persistency check is repeated until transmission is permitted.

When the preamble has been acknowledged on AICH, respective L1 status access information with (parameter value "requestready for data transmission" is indicated to MAC with PHY-StatusACCESS-IND-CNF primitive. , and Then data transmission is requested with PHY-DATA-REQ primitive, and the PRACH transmission procedure shall be completed with transmission of the PRACH message part according to L1 specifications.

When PHY indicates that no acknowledgement on AICH is received while the maximum number of preamble retransmissions is reached (defined by parameter Preamble_Retrans_Max on L1), a new persistency test is performed in the next transmission time interval. The timer T_2 ensures that two successive persistency tests are separated by at least one transmission time interval.

In case that a negative acknowledgement has been received on AICH a backoff timer T_{BO1} is started. After expiry of the timer, persistence check is performed again. Backoff timer T_{BO1} is set to an integer number N_{BO1} of transmission time intervals, randomly drawn within an interval $0 \leq N_{BO1min} \leq N_{BO1} \leq N_{BO1max}$ (with uniform distribution). N_{BO1min} and N_{BO1max} may be set equal when a fixed delay is desired, and even to zero when no delay other than the one due to persistency is desired.

Before a persistency test is performed it shall be checked whether any new RACH transmission control parameters have been received from RRC with CMAC-Config-REQ primitive. The latest set of RACH transmission control parameters shall be applied.

~~NOTE 1: An alternative proposal for determining the backoff additional to persistency drawing and testing in the case of a negative acknowledgement on AICH (L1 status "NACK") has been proposed which is for further study.~~

~~NOTE 2: There is a need to study the use of multiple persistence values when there are multiple Access Service Classes and multiple RACH partitions.~~

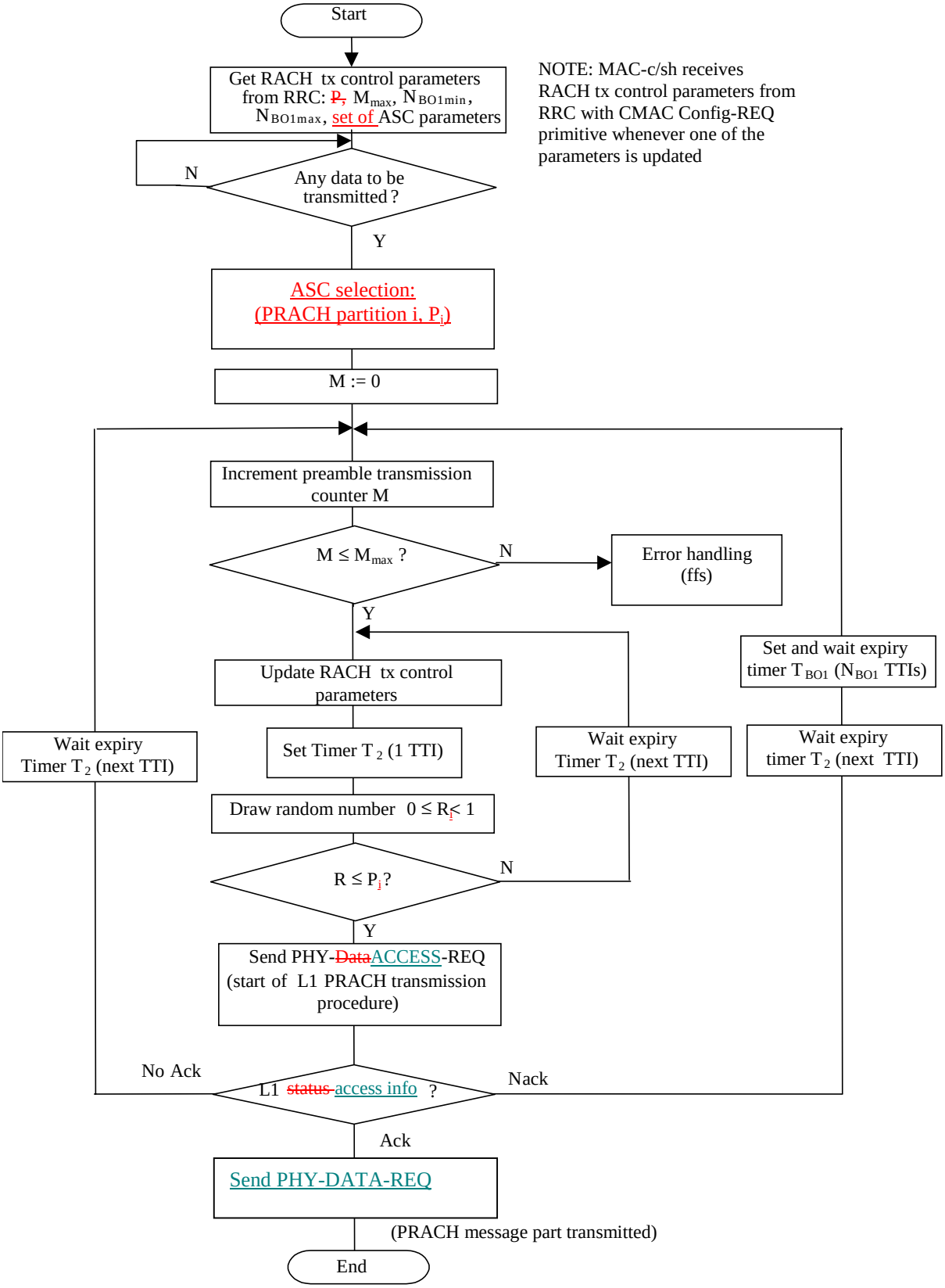

Figure 11.2.12.1: RACH transmission control procedure (UE side, informative)

11.2.32 Control of RACH transmissions for TDD

The RACH transmissions are performed by the UE as shown in Figure 11.2.32.1. Note that the figure shall illustrate the operation of the transmission control procedure as specified below. It shall not impose restrictions on implementation.

MAC receives the following RACH transmission control parameters from RRC with the CMAC-Config-REQ primitive:

- a set of Access Service Class (ASC) parameters, which includes for each ASC, i=0,…,NumASC an identification of a PRACH partition (as defined by system information element "ASC info" [7]) and a persistence value P_i (transmission probability),

- ~~Access Service Class parameters~~

When there is data to be transmitted, MAC selects the ASC from the available set of ASCs, which consists of an identifier *i* of a certain PRACH partition and an associated persistence value P_i. The procedure to be applied for ASC selection is described in Section 11.2.1.

Based on the persistence value P_i, the UE decides whether to send the message on the RACH. If transmission is allowed, the PRACH transmission procedure is initiated by sending of a PHY-Data-REQ primitive. If transmission is not allowed, a new persistency check is performed in the next transmission time interval. The persistency check is repeated until transmission is permitted.

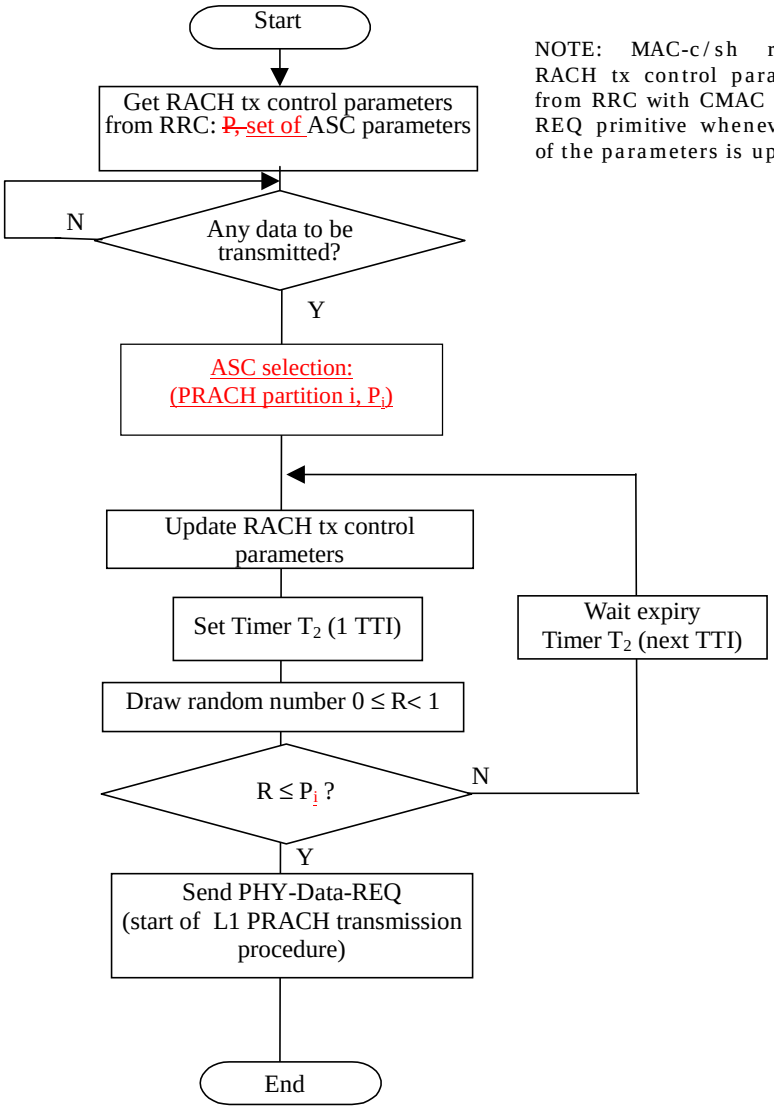

Figure 11.2.32.1: RACH transmission control procedure for TDD (UE side, informative)

3GPP RAN WG2 #11
Torino, Italy, 28 February - 03 March 2000

Document R2-000525
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25.321	CR	039	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG-RAN #7	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]
(at least one should be marked with an X)

Source: TSG-RAN WG2 **Date:** 2nd Feb 2000

Subject: CPCH start of message indication

Work item:

Category: *(only one category Shall be marked With an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature	X		Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: To support CPCH abnormal situation handling such as emergency stop and start of message indication, this CR adds abnormal situation handling procedure in the CPCH transmission control procedure.

Clauses affected: 11.3

Other specs Affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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11.3 Control of CPCH transmissions for FDD

The MAC layer controls the timing of CPCH transmissions on transmission time interval level (i.e. on 10, 20, 40 or 80 ms level); the timing on access slot level is controlled by L1. MAC controls the timing of each initial preamble ramping cycle as well as successive preamble ramping cycles. Note that retransmissions in case of erroneously received CPCH message part are under control of higher layers (i.e. RLC, or RRC for CCCH data). The CPCH transmissions are performed by the UE as illustrated in Figures 11.3.1 and 11.3.2. Figure 11.3.1 procedure is used for initial access to CPCH channel. Figure 11.3.2 procedure is used for each TTI transmission while the UE continues to transmit on the CPCH channel obtained using the initial access procedure.

MAC receives the following CPCH transmission control parameters from RRC with the CMAC-Config-REQ primitive. A set of transmission control parameters is received for the Transport Format Set (TFS) specified for the CPCH set.

- persistence value, PV (transmission probability for each Transport Format (TF)),
- N_access_fails, maximum number of preamble ramping cycles,
- CPCH channel data rate (implicit in each TF),
- NF_max, maximum frame length for CPCH transmission for each TF,
- Transmission Time Interval (TTI)
- Backoff control timer parameters,
- others .

The MAC procedure for transmission control of initial CPCH access shall be invoked when the UE has data to transmit and the UE is not currently transmitting on a previously accessed CPCH channel. The steps for this procedure are listed here:

1. The UE shall reset counters M1, M2 and Frame Count Transmitted (FCT) upon entry to the initial access procedure.
2. The UE shall send a PHY-CPCH_Status-REQ to Layer 1 to obtain CPCH TF subset status. If Layer 1 returns an error message, the UE shall increment counter M2. If counter M2 is equal to N_access_fails, the UE shall execute an access failure error procedure and the CPCH access procedure ends. If counter M2 is less than N_access_fails, the procedure shall continue from step 2. If Layer 1 returns a PHY-CPCH_Status-CNF message which includes a TF subset indicating the currently available TFs of the requested TF subset, the procedure shall continue from step 3.
3. The UE shall initialize the Busy Table with the CPCH TF subset status from Layer 1. Those TFs in the TF subset of the Layer 1 PHY-CPCH_Status-CNF response will be marked available. All other TFs will be marked busy.
4. The UE shall update the CPCH transmission control parameters, including CPCH Set Info, Persistency P, Naccess_fails, priority delays, NF_max, Backoff timer parameters, etc.
5. UE shall select a TF from the set of avaialable TFs listed in the Busy Table. UE shall use the CPCH channel capacity (transport block set size, NF_max, and TTI interval), and Busy Table information to select one CPCH TF for L1 to access.
6. UE shall implement a test based on the Persistence value (P) to determine whether to attempt access to the selected CPCH TF. If access is allowed, the UE may implement an initial delay based on ASC of the data to be transmitted, then shall send a PHY-Access-REQ with the selected TF to L1 for CPCH access . If the P test does not allow access, the selected CPCH TF shall be marked busy in the Busy Table. If all TFs are marked busy, the UE shall reset and start timer Tboc1, wait until timer expiry, and increment counter M2. If counter M2 is equal to N_access_fails, the UE shall execute an access failure error procedure and the CPCH access procedure ends. If counter M2 is less than N_access_fails, the procedure shall continue from step 2. If all TFs are not marked busy, the UE shall resume the procedure from step 4.
7. After the UE has sent the access request to L1 , L1 shall return a PHY-Access-CNF including one of five access indications to MAC as shown in Figure 11.3.1. If the L1 access indication is that access is granted, then UE shall execute the transmission control procedure for the Nth TTI using the selected TF and the initial access procedure ends.
8. If L1 access indication is no AP-AICH received or no CD-AICH received, the UE shall reset and start timer Tboc3, wait until timer expiry, and increment counter M1. If counter M1 is equal to Nlink_fails, the UE shall execute a link failure error procedure and the CPCH access procedure ends. If counter M1 is less than Nlink_fails, the UE shall proceed from step 2.

9. If L1 access indication is AP-AICH nak received and Channel Assignment (CA) is active, the UE shall proceed from step 11. If L1 access indication is AP-AICH nak received and Channel Assignment (CA) is not active,the UE shall reset and start timer Tboc2, wait unitl timer expiry, and mark the selected channel busy in the Busy Table. If all channels are marked busy, the UE shall reset and start timer Tboc1, wait until timer expiry, and increment counter M2. If counter M2 is equal to N_access_fails, the UE shall execute an access failure error procedure and the CPCH access procedure ends. If counter M2 is less than N_access_fails, the procedure shall continue from step 2. If all channels are not marked busy, the UE shall resume the procedure from step 4.
10. If L1 access indication is CD-AICH signature mismatch, the UE shall reset and start timer Tboc4, wait until timer expiry, and increment counter M2. If counter M2 is equal to N_access_fails, the UE shall execute an access failure error procedure and the CPCH access procedure ends. If counter M2 is less than N_access_fails, the procedure shall continue from step 2.
11. The UE shall reset and start timer Tboc4, wait until timer expiry, and increment counter M2. If counter M2 is equal to N_access_fails, the UE shall execute an access failure error procedure and the CPCH access procedure ends. If counter M2 is less than N_access_fails, the procedure shall continue from step 2.

The MAC procedure for transmission control of Nth TTI shall be invoked when the UE has data to transmit and the UE is currently transmitting on a previously accessed CPCH channel. The steps for this procedure are listed here:

1. The UE shall build a transport block set for the next TTI.
2. If the sum of the Frame Count Transmitted counter plus the number of frames in the next TTI is greater than NF_max, the UE shall exit this procedure and start the MAC procedure for CPCH transmission of the first TTI. This shall release the CPCH channel in use and the UE will contend again for a new CPCH channel to continue transmission. If the sum of the Frame Count Transmitted counter plus the number of frames in the next TTI is greater than NF_max, the UE shall send a PHY-Data-REQ with the transport block set to L1 to continue transmission on the CPCH channel which has previously been accessed.
3. If L1 returns PHY-Status-IND indicating abnormal situation the UE shall execute an abnormal situation handling procedure and the CPCH Nth TTI procedure ends. Reasons for abnormal situation may include the following:
   - Emergency stop was received
   - Start of Message Indicator was not received
   - L1 hardware failure has occurred
4. If the L1 returns PHY-Status-IND indicating normal transmission, then the UE shall increment the Frame Count Transmitted counter by the length of the TTI just transmitted and the procedure ends.

Table 11.3: CPCH Backoff Delay Timer Values

Timer	Based on parameter	Fixed/random	Suggested parameter range and units (informative)
T_{BOC1} (all Busy)	NF_bo_all_busy	Random	1 - 16 frames
T_{BOC2} (channel Busy)	NS_bo_busy	Fixed	0 - 15 access slots
T_{BOC3} (no AICH)	NF_bo_no_aich	Fixed	1 - 16 frames
T_{BOC4} (mismatch)	NF_bo_mismatch	Random	10 – 100 frames

For $T_{BOC4,}$ UE shall randomly select a timer value at each execution of the timer. A uniform random draw shall be made to select an integer number of frames within the range [1, NF_bo_collision]. For $T_{BOC1,}$ UE would randomly select a timer value at each execution of the timer. A uniform random draw shall be made to select an integer number of frames within the range [1, NF_bo_all busy]. NOTE: Backoff parameter range and units are specified in TS25.331, RRC Protocol Specification.

Example CPCH TF Selection Algorithm:

The UE MAC TF selection algorithm is left to implementation and is out of the scope of this specification. However the following example is presented to show one way UE may select a CPCH TF. In this example CPCH TF selection is a 3 step process:

1. From the set of all TFs defined in the CPCH TFS, UE eliminates all TFs marked busy in the busy table.
2. Then it selects from the non-busy(available) TFs the set of TFs with capacity adequate to transmit the amount of queued data in a single packet. If there are none, then it randomly selects one of the available TFs and selection is complete.
3. If there are multiple channels selected at step 2, the UE randomly selects selects the lowest data rate TF which can send the queued data in a single packet.

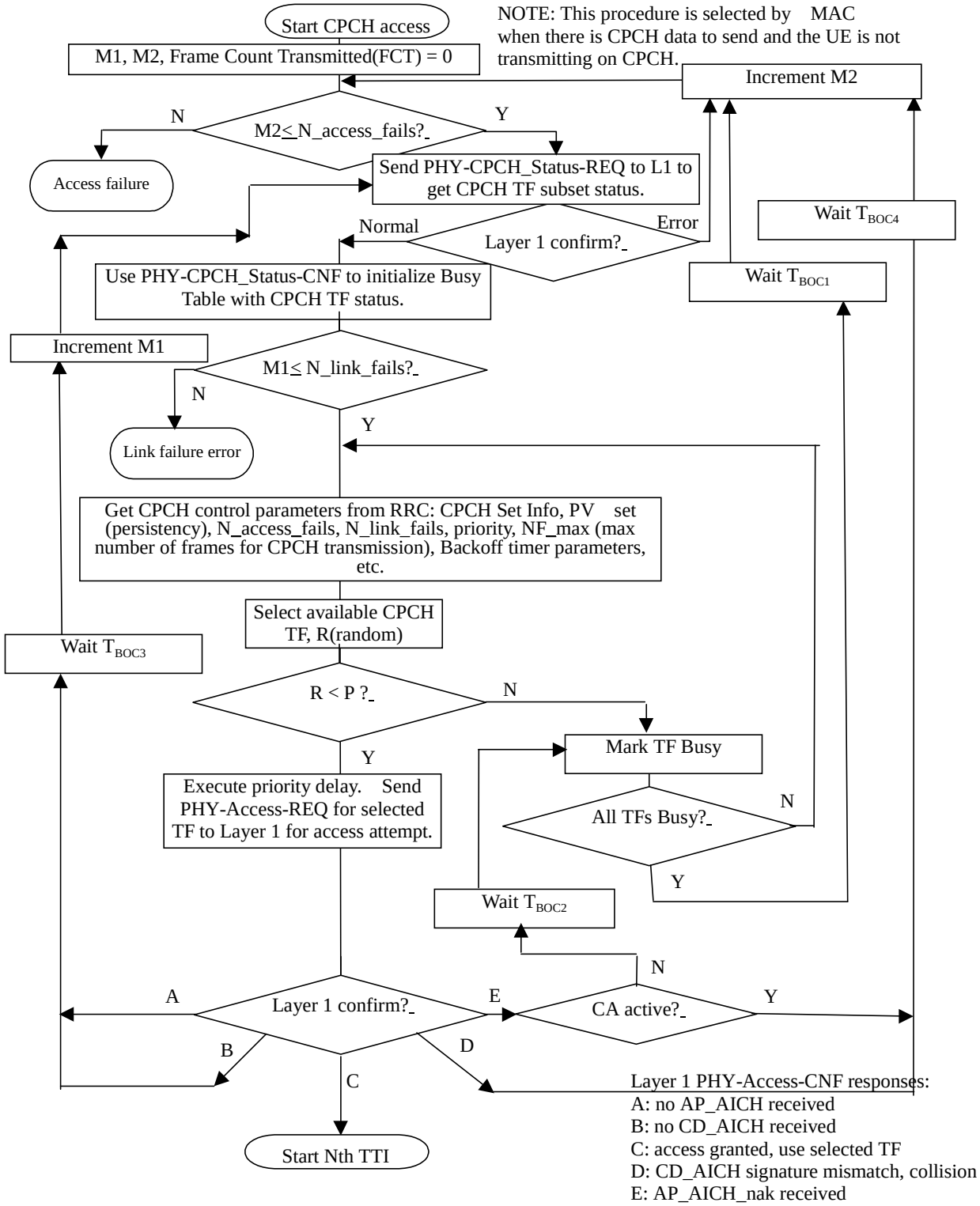
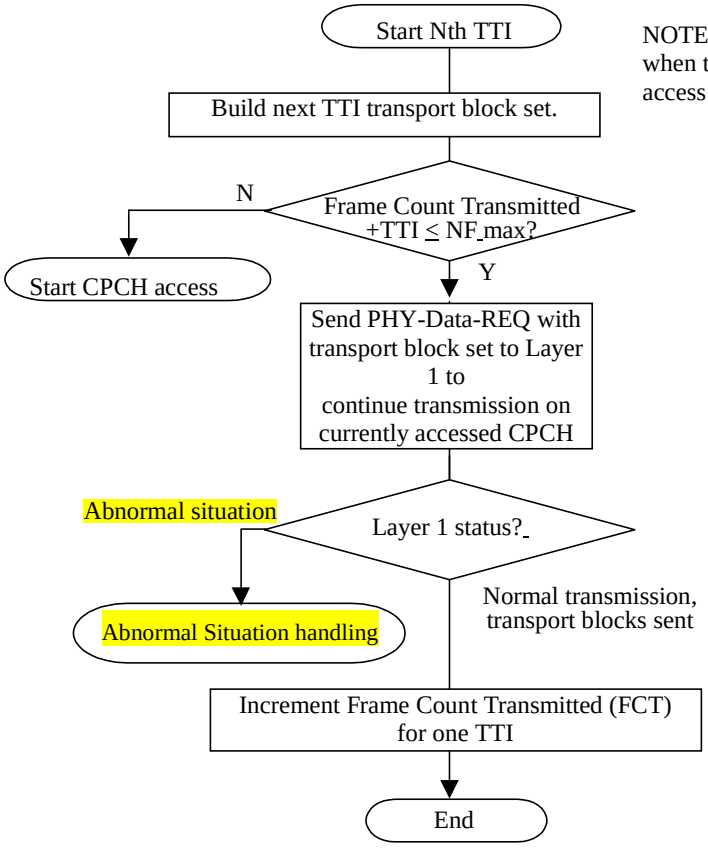


Figure 11.3.1: CPCH transmission control procedure for initial access (informative)



NOTE: This procedure is selected by MAC when there is CPCH data to send while the UE ha access to a CPCH channel.

Figure 11.3.2: CPCH transmission control procedure for Nth TTI (informative)

3GPP TSG-RAN WG2 #11 ***Document R2-000570***

Turin, 28th February - 3rd March

3G CHANGE REQUEST

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25.321 **CR** **040** Current Version: 3.2.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submision to TSG-RAN #7 *list TSG meeting no. here ↑*

for approval [X]
for information [ ]

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Form: 3G CR cover sheet, version 1.0 *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

Proposed change affects: *(at least one should be marked with an X)* USIM [ ] ME [ ] UTRAN [X] Core Network [ ]

Source: TSG-RAN WG2 **Date:** 01/03/2000

Subject: Removal of SCCH and SCH

3G Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X
A	Corresponds to a correction in a 2G specification	
B	Addition of feature	
C	Functional modification of feature	
D	Editorial modification	

Reason for change: Due to performance reasons synchronisation case 3 is removed from WG1 specifications and SCH and SCCH became obsolete.

Clauses affected: 3.2, 4.2.1, 4.2.2, 4.3.1, 4.3.2.1, 4.3.2.2, 4.3.2.3, 4.3.3, 6.2.1, 6.2.2

Other specs affected:

Other 3G core specifications	[X]	→ List of CRs: CR034 on 25.301, CR045 on 25.302, CR031 on 25.322, CR268 on 25.331
Other 2G core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

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3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ARQ	Automatic Repeat Request
ASC	Access Service Class
BCCH	Broadcast Control Channel
BCH	Broadcast Channel
C-	Control-
CC	Call Control
CCCH	Common Control Channel
CCTrCH	Coded Composite Transport Channel
CPCH	Common Packet Channel (UL)
CN	Core Network
CRC	Cyclic Redundancy Check
DC	Dedicated Control (SAP)
DCA	Dynamic Channel Allocation
DCCH	Dedicated Control Channel
DCH	Dedicated Channel
DL	Downlink
DRNC	Drift Radio Network Controller
DSCH	Downlink Shared Channel
DTCH	Dedicated Traffic Channel
FACH	Forward Link Access Channel
FAUSCH	Fast Uplink Signalling Channel
FCS	Frame Check Sequence
FDD	Frequency Division Duplex
GC	General Control (SAP)
HO	Handover
ITU	International Telecommunication Union
kbps	kilo-bits per second
L1	Layer 1 (physical layer)
L2	Layer 2 (data link layer)
L3	Layer 3 (network layer)
LAI	Location Area Identity
MAC	Medium Access Control
MM	Mobility Management
Nt	Notification (SAP)
OCCCH	ODMA Common Control Channel
ODCCH	ODMA Dedicated Control Channel
ODCH	ODMA Dedicated Channel
ODMA	Opportunity Driven Multiple Access
ORACH	ODMA Random Access Channel
ODTCH	ODMA Dedicated Traffic Channel
PCCH	Paging Control Channel
PCH	Paging Channel
PDU	Protocol Data Unit
PHY	Physical layer
PhyCH	Physical Channels
RACH	Random Access Channel
RLC	Radio Link Control
RNC	Radio Network Controller
RNS	Radio Network Subsystem
RNTI	Radio Network Temporary Identity
RRC	Radio Resource Control
SAP	Service Access Point
~~SCCH~~	~~Synchronization Control Channel~~
~~SCH~~	~~Synchronization Channel~~
SDU	Service Data Unit

SHCCH	Shared Channel Control Channel
SRNC	Serving Radio Network Controller
SRNS	Serving Radio Network Subsystem
TDD	Time Division Duplex
TFCI	Transport Format Combination Indicator
TFI	Transport Format Indicator
TMSI	Temporary Mobile Subscriber Identity
TPC	Transmit Power Control
U-	User-
UE	User Equipment
UE_R	User Equipment with ODMA relay operation enabled
UL	Uplink
UMTS	Universal Mobile Telecommunications System
URA	UTRAN Registration Area
USCH	Uplink Shared Channel
UTRA	UMTS Terrestrial Radio Access
UTRAN	UMTS Terrestrial Radio Access Network

4.2.1 MAC Entities

The diagrams that describe the MAC architecture are constructed from MAC entities. The entities are assigned the following names. The functions completed by the entities are different in the UE from those completed in the UTRAN:

- MAC-b, which identifies the MAC entity that handles the broadcast channel (BCH). There is one MAC-b entity in each UE and one MAC-b in the UTRAN for each cell.

- MAC-c/sh, which identifies the MAC entity that handles the paging channel (PCH), the forward access channel (FACH), the random access channel (RACH), the Common Packet Channel (UL CPCH) for FDD, downlink shared channels (DSCH) for both FDD and TDD and uplink shared channels (USCH) for TDD. There is one MAC-c/sh entity in each UE and one in the UTRAN for each cell.

- MAC-d, denotes the MAC entity that is responsible for handling of dedicated logical channels and dedicated transport channels (DCH) allocated to a UE. There is one MAC-d entity in the UE and one MAC-d entity in the UTRAN for each UE.

NOTE: When a UE is allocated resources for exclusive use by the bearers that it supports the MAC-d entities dynamically share the resources between the bearers and are responsible for selecting the TFI/ TFCI that is to be used in each transmission time interval.

~~- MAC-sy, identifies the MAC entity used in TDD operation to handle the information received on the synchronisation channel SCH~~

According to the RRC functions the RRC is generally in control of the internal configuration of the MAC.

4.2.2 MAC-b ~~, and MAC-sy~~

The following diagram illustrates the connectivity of the MAC-b and MAC-sy entities in a UE and in each cell of the UTRAN:

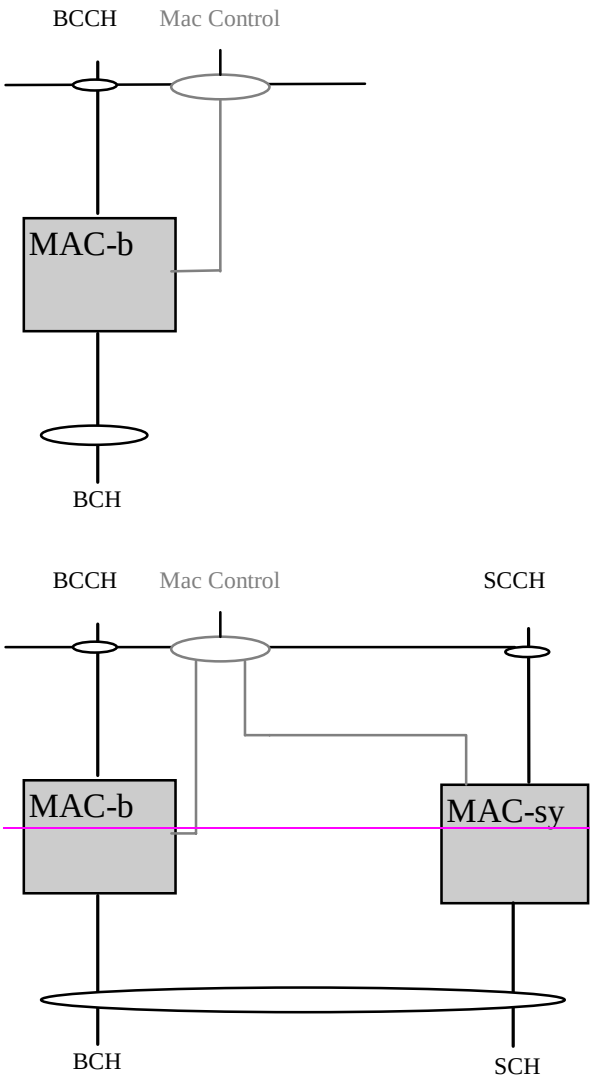

Figure 4.2.2.1: UE side and UTRAN side architecture (BCCH ~~,~~and PCCH ~~and SCCH~~)

MAC-b~~, and MAC-sy~~ represents ~~SCH and~~ the BCH control entity~~ies~~, which are cell-specific MAC entities in the UTRAN. In the UE side there is one SCH and BCH control entity per UE. ~~The SCH control entity handles synchronisation channels for the TDD mode.~~ The BCH control entity handles the broadcast channel. The MAC Control SAP is used to transfer Control information to each MAC entity.

4.3.1 Transport channels

Common transport channel types are:

- Random Access Channel(s) (RACH)
- Forward Access Channel(s) (FACH)
- Downlink Shared Channel(s) (DSCH)
- DSCH Control Channel
- Common Packet Channel(s) (CPCH) for UL FDD operation only
- Uplink Shared Channel(s) (USCH), for TDD operation only
- ODMA Random Access Channel(s) (ORACH)

- Broadcast Channel (BCH)
- ~~Synchronisation Channel (SCH), for TDD operation only~~
- Paging Channel (PCH)

Dedicated transport channel types are:

- Dedicated Channel (DCH)
- Fast Uplink Signalling Channel (FAUSCH)
- ODMA Dedicated Channel (ODCH)

4.3.2.1 Logical channel structure

The configuration of logical channel types is depicted in Figure 4.3.2.1:

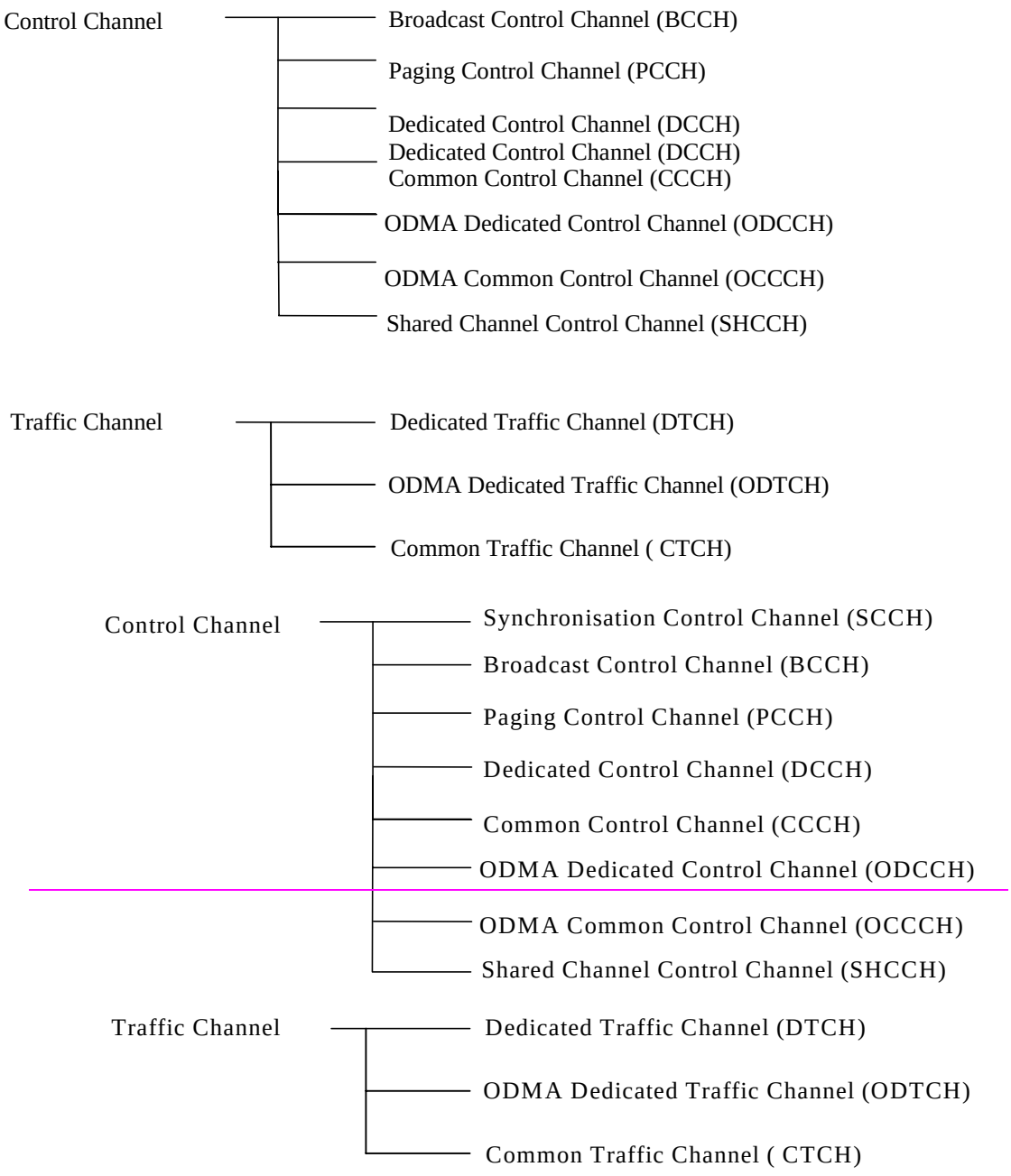

Figure 4.3.2.1: Logical channel structure

4.3.2.2 Control Channels

Following control channels are used for transfer of control plane information only:

- ~~Synchronisation Control Channel (SCCH)~~
- Broadcast Control Channel (BCCH)
- Paging Control Channel (PCCH)
- Common Control Channel (CCCH)
- Dedicated Control Channel (DCCH)
- ODMA Common Control Channel (OCCCH)
- ODMA Dedicated Control Channel (ODCCH)
- Shared Channel Control Channel (SHCCH)

4.3.3 Mapping between logical channels and transport channels

The following connections between logical channels and transport channels exist:

- ~~SCCH is connected to SCH~~
- BCCH is connected to BCH and may also be connected toFACH
- PCCH is connected to PCH
- CCCH is connected to RACH and FACH
- DCCH and DTCH can be connected to either RACH and FACH, to CPCH and FACH, to RACH and DSCH, to DCH and DSCH, or to a DCH, the DCCH can be connected to FAUSCH.
- ODCCH, OCCCH and ODTCH can be connected to ORACH, ODCCH and ODTCH can be connected to ODCH.
- CTCH is connected to FACH.
- DCCH and DTCH can be mapped to the USCH (TDD only).
- SHCCH is connected to RACH and USCH/FACH and DSCH.

6.2.1 Relation between MAC Functions and Transport Channels

Table 6.2.1.1: UTRAN MAC functions corresponding to the transport channel

Associated MAC Functions	Logical Ch	Transport Ch	TF Selection	Priority handling between users	Priority handling (one user)	Scheduling	Identification of UEs	Mux/ Demux on common transport CH	Mux/ Demux on dedicated transport CH	Dynamic transport CH switching
Uplink (Rx)	CCCH	RACH						X		
	DCCH	RACH					X	X		
	DCCH	CPCH					X	X		X
	DCCH	DCH							X	
	DTCH	RACH					X	X		
	DTCH	CPCH					X	X		X
	DTCH	DCH							X	
	SHCCH	RACH					X	X		
	SHCCH	USCH						X		X
	DTCH	USCH	X					X		X
	DCCH	USCH	X					X		X
Downlink (Tx)	~~SCCH~~	~~SCH~~								
	BCCH	BCH				X				
	BCCH	FACH	X			X		X		
	PCCH	PCH	X			X				
	CCCH	FACH	X	X		X		X		
	CTCH	FACH	X			X		X		
	DCCH	FACH	X	X		X	X	X		
	DCCH	DSCH	X	X				X		
	DCCH	DCH	X		X				X	
	DTCH	FACH	X	X		X	X	X		X
	DTCH	DSCH	X	X				X		X
	DTCH	DCH	X		X				X	X
	SHCCH	FACH	X	X		X		X		
	SHCCH	DSCH	X	X				X		X

6.2.2 Relation of UE MAC functions corresponding to the Transport Channel MAC Functions and Transport Channels

Table 6.2.2.1: UE MAC functions corresponding to the transport channel

Functions	Logical Ch	Transport Ch	TF Selection	Priority handling data of one user	Identification	Mux/Demux on common transport channels	Mux/Demux on dedicated transport channels	Dynamic transport channel type switching
Uplink (Tx)	CCCH	RACH				X		
	DCCH	RACH	X	X	X	X		
	DCCH	CPCH	X	X	X	X		X
	DCCH	DCH	X	X			X	
	DTCH	RACH	X	X	X	X		X
	DTCH	CPCH	X	X	X	X		X
	DTCH	DCH	X	X			X	X
	SHCCH	RACH				X		
	SHCCH	USCH	X	X		X		X
	DCCH	USCH	X	X		X		X
	DTCH	USCH	X	X		X		X
Downlink (Rx)	~~SCCH~~	~~SCH~~						
	BCCH	BCH						
	BCCH	FACH				X		
	PCCH	PCH						
	CCCH	FACH				X		
	CTCH	FACH				X		
	DCCH	FACH			X	X		
	DCCH	DSCH				X		
	DCCH	DCH					X	
	DTCH	FACH			X	X		
	DTCH	DSCH				X		
	DTCH	DCH					X	
	SHCCH	FACH				X		
	SHCCH	DSCH				X		

3GPP RAN WG2#11

Turin, Italy, Feb. 28 – March 3, 2000

Document R2-000671

e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.321	CR	041r1	Current Version:	3.2.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to:	TSG-RAN #7	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [X] UTRAN / Radio [X] Core Network [ ]

Source: TSG-RAN WG2 **Date:** 2000-03-01

Subject: Clarification of bit order

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	X	**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: This contribution includes a short description of bit ordering of MAC PDUs.

Clauses affected: 9.1

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

9 Elements for peer-to-peer communication

The interaction between the MAC layer and other layers are described in terms of primitives where the primitives represent the logical exchange of information and control between the MAC layer and other layers. The primitives shall not specify or constrain implementations.

9.1 Protocol data units

9.1.1 General

A MAC PDU is a bit string, with a length not necessarily a multiple of 8 bits. In the drawings in clause 9.1, bit strings are represented by tables in which the first bit is the leftmost one on the first line of the table, the last bit is the rightmost on the last line of the table, and more generally the bit string is to be read from left to right and then in the reading order of the lines.

Depending on the provided service, MAC SDUs are bit strings, with any non null length, or bit strings with an integer number of octets in length. An SDU is included into a MAC PDU from first bit onward.

In the UE for the uplink, all MAC PDUs delivered to the physical layer within one TTI are defined as Transport Block Set (TBS). It consists of one or several Transport Blocks, each containing one MAC PDU. The Transport Blocks, shall be transmitted in the order as delivered from RLC. When multiplexing of RLC PDUs from different logical channels is performed on MAC, the order of all Transport Blocks originating from the same logical channel shall be the same as the order of the sequence delivered from RLC. The order of the different logical channels in a TBS is set by the MAC protocol.

9.1.21 MAC Data PDU

MAC PDU consists of an optional MAC header and a MAC Service Data Unit (MAC SDU), see Figure 9.1.1.1. Both the MAC header and the MAC SDU are of variable size.

The content and the size of the MAC header depends on the type of the logical channel, and in some cases none of the parameters in the MAC header are needed.

The size of the MAC-SDU depends on the size of the RLC-PDU, which is defined during the setup procedure.

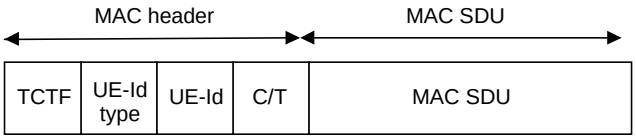

Figure 9.1.1.1: MAC data PDU