TSG-RAN Meeting #15
Jeju-do, Korea, 5 - 8 March 2002

Title: **Agreed CRs (Release '99 and Rel-4 category A) to TS 25.321**

Source: **TSG-RAN WG2**

Agenda item: **7.2.3**

Doc-1st-	Status-	Spec	CR	Rev	Phase	Subject	Cat	Version	Versio
R2-020451	agreed	25.321	102	1	R99	Clarification on ciphering	F	3.10.0	3.11.0
R2-020452	agreed	25.321	103		Rel-4	Clarification on ciphering	A	4.3.0	4.4.0
R2-020342	agreed	25.321	105		R99	TDD MAC Layer Subchannel Assignment	F	3.10.0	3.11.0
R2-020414	agreed	25.321	106		Rel-4	TDD MAC Layer Subchannel Assignment	A	4.3.0	4.4.0
R2-020420	agreed	25.321	109	1	R99	Missing DTCH channel type in UE-ID Type Indicator	F	3.10.0	3.11.0
R2-020449	agreed	25.321	110		Rel-4	Missing DTCH channel type in UE-ID Type Indicator	A	4.3.0	4.4.0
R2-020453	agreed	25.321	111	1	R99	Correction on UE Id for DSCH	F	3.10.0	3.11.0
R2-020454	agreed	25.321	112		Rel-4	Correction on UE Id for DSCH	A	4.3.0	4.4.0
R2-020505	agreed	25.321	113		R99	UE undefined behaviour when padding is required	F	3.10.0	3.11.0
R2-020577	agreed	25.321	114		Rel-4	UE undefined behaviour when padding is required	A	4.3.0	4.4.0

3GPP TSG-RAN2 Meeting #27   *R2-020451*
Orlando, USA, 18-22 of February

CR-Form-v5

CHANGE REQUEST

⌘   **25.321** CR **102**   ⌘**rev** **r1** ⌘   Current version: **3.10.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network **X**   Core Network ☐

Title: ⌘	Clarification on ciphering	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘	TEI	***Date:*** ⌘ 2002-02-21
Category: ⌘	**F**	***Release:*** ⌘ R99

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use one of the following releases:
2   *(GSM Phase 2)*
R96   *(Release 1996)*
R97   *(Release 1997)*
R98   *(Release 1998)*
R99   *(Release 1999)*
REL-4   *(Release 4)*
REL-5   *(Release 5)*

Reason for change: ⌘	It is not clear which CFN to use for ciphering when the TTI consists of 2,4,8 frames.

Summary of change: ⌘	1) It is clarified that the first CFN of the TTI shall be used for ciphering in the whole TTI. This is inline with Section 8.5.8 of 25.331

2) It is clarified that an activation time that is set in the middle of a TTI shall be applied at the beginning of the next TTI that is common to all the transport channels that are multiplexed onto the same CCTrCh. This is stated in 25.331 for DL activation times but not for UL activation times.

Impact analysis:

Impacted functionality: Setting of activation times for ciphering

Correction to a function where the specification was unclear. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.

If the UE does not implement the change, but the UTRAN does, a change of ciphering parameters may be applied at different CFNs in UE and UTRAN. This may lead to a lost TTI on TM RBs.

If the UTRAN does not implement the change, but the UE does, a change of ciphering parameters may be applied at different CFNs in UE and UTRAN. This may lead to a lost TTI on TM RBs.

In both cases there is a small risk that the activation time is exactly at a CFN wrap-arounf border. In that case the HFN may get out of sync between UTRAN

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		and UE leading to ciphering failure.
Consequences if not approved:	⌘	Potential loss of one TTI data for TM RBs when ciphering is started/modified. In rare cases the HFN may be unsynchronised, leading to ciphering failure.

Clauses affected:	⌘	11.5		

Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.321 v4.3.0, CR 103

Other comments:	⌘	

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Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

11.5 Ciphering

The ciphering function is performed in MAC (i.e. only in MAC-d) if a radio bearer is using the transparent RLC mode. The data unit that is ciphered is the MAC SDU and this is shown in Figure 11.5.1 below.
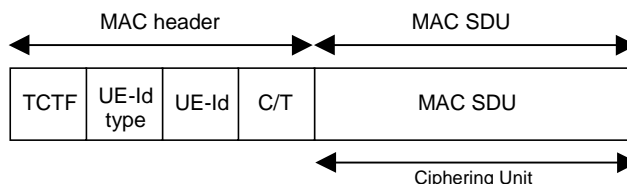

Figure 11.5.1: Ciphering unit for a MAC PDU

The ciphering algorithm and key to be used are configured by upper layers [7] and the ciphering method shall be applied as specified in [10].

The parameters that are required by MAC for ciphering are defined in [10] and are input to the ciphering algorithm. The parameters required by MAC which are provided by upper layers [7] are listed below:

- MAC-d HFN (Hyper frame number for radio bearers that are mapped onto transparent mode RLC)

- BEARER (Radio Bearer ID)

- CK (Ciphering Key)

If the TTI consists of more than one 10 ms radio frame, the CFN of the first radio frame in the TTI shall be used as input to the ciphering algorithm for all the data in the TTI. radio frames in the TTI.

If the activation time indicated by higher layers for start or stop of ciphering or change of ciphering parameters is not the first CFN in a TTI common to all the transport channels that are multiplexed onto the same CCTrCh, the activation time shall be applied at the first CFN in the following TTI common to all the transport channels that are multiplexed onto the same CCTrCh .

CR-Form-v4

CHANGE REQUEST

⌘ **25.321** CR **114** ⌘ ev **-** ⌘ Current version: **4.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title: ⌘	UE undefined behaviour when padding is required	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘	TEI	***Date:*** ⌘ 21/2/2002

Category: ⌘ **A**	***Release:*** ⌘ REL-4
Use one of the following categories: ***F*** *(correction)* ***A*** *(corresponds to a correction in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)* Detailed explanations of the above categories can be found in 3GPP TR 21.900.	*Use one of the following releases:* *2 (GSM Phase 2)* *R96 (Release 1996)* *R97 (Release 1997)* *R98 (Release 1998)* *R99 (Release 1999)* *REL-4 (Release 4)* *REL-5 (Release 5)*

Reason for change: ⌘	The procedure for generating padding at the mobile is not well defined. Therefore, specifying this as a mobile behaviour for some UTRAN defined configurations is misleading in that it legitimises these configurations.
Summary of change: ⌘	Specified that the UE behaviour is not defined when the TFCS configured by the network may require the mobile to generate padding.
Consequences if not approved: ⌘	When configurations that do not comply with these guidelines are used, the TFC selection may not give a result and the behaviour of the mobile would become unpredictable.

Clauses affected: ⌘	11.4
Other specs affected: ⌘	☐ Other core specifications ⌘ 25.321 v3.10.0, CR 113 ☐ Test specifications ☐ O&M Specifications
Other comments: ⌘	

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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

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11.4 Transport format combination selection in UE

RRC can control the scheduling of uplink data by giving each logical channel a priority between 1 and 8, where 1 is the highest priority and 8 the lowest. TFC selection in the UE shall be done in accordance with the priorities indicated by RRC. Logical channels have absolute priority, i.e. the UE shall maximise the transmission of higher priority data.

If the uplink TFCS configured by UTRAN follows the guidelines described in [7] the UE shall perform the TFC selection according to the rules specified below. If these guidelines are not followed then the method by which the UE performs TFC selection is not specified.

The UE shall continuously monitor the state for each TFC based on its required transmit power versus the maximum UE transmit power. A given TFC can be in any of the following states:

- Supported state;

- Excess-power state;

- Blocked state.

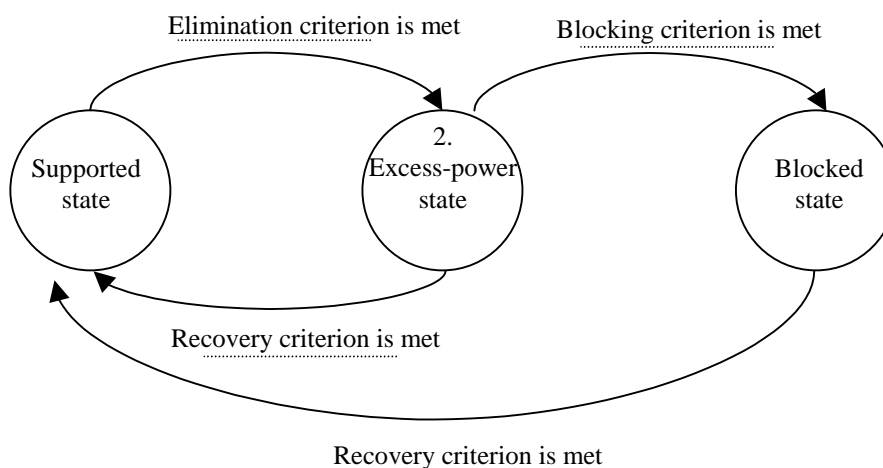The following diagram illustrates the state transitions for the state of a given TFC:

Figure 11.4.1: State transitions for the state of a given TFC

The state transition criteria and the associated requirements are described in [12]. The UE shall consider that the Blocking criterion is never met for TFCs included in the minimum set of TFCs (see [7]).

Every time the set of supported TFCs changes, the available bitrate shall be indicated to upper layers for each logical channel in order to facilitate the adaptation of codec data rates when codecs supporting variable-rate operation are used. The details of the computation of the available bitrate and the interaction with the application layer are not further specified.

Before selecting a TFC, i.e. at every boundary of the shortest TTI, the set of valid TFCs shall be established. All TFCs in the set of valid TFCs shall:

1. belong to the TFCS.

2. not be in the Blocked state.

3. be compatible with the RLC configuration.

4. not require RLC to produce padding PDUs (see [6] for definition).

5. not carry more bits than can be transmitted in a TTI (e.g. when compressed mode by higher layer scheduling is used and the presence of compressed frames reduces the number of bits that can be transmitted in a TTI using the Minimum SF configured).

The UE may remove from the set of valid TFCs, TFCs in Excess-power state in order to maintain the quality of service for sensitive applications (e.g. speech). Additionally, if compressed frames are present within the longest configured TTI to which the next transmission belongs, the UE may remove TFCs from the set of valid TFCs in order to account for the higher power requirements.

If the TFCS selected by UTRAN does not follow the guidelines specified in [7] the UE may ignore constraint number 4 mentioned above in determining the set of valid TFCs.

The chosen TFC shall be selected from within the set of valid TFCs and shall satisfy the following criteria in the order in which they are listed below:

1. No other TFC shall allow the transmission of more highest priority data than the chosen TFC.

2. No other TFC shall allow the transmission of more data from the next lower priority logical channels. Apply this criterion recursively for the remaining priority levels.

3. No other TFC shall have a lower bit rate than the chosen TFC.

The above rules for TFC selection in the UE shall apply to DCH, and the same rules shall apply for TF selection on RACH and CPCH.

CR-Form-v4

CHANGE REQUEST

⌘ **25.321** CR **113** ⌘ ev **-** ⌘ Current version: **3.10.0** ⌘

For HELP on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title: ⌘	UE undefined behaviour when padding is required	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘	TEI	*Date:* ⌘ 21/2/2002

Category: ⌘ **F**

Use <u>one</u> of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Release: ⌘ R99

Use <u>one</u> of the following releases:
2   (GSM Phase 2)
R96   (Release 1996)
R97   (Release 1997)
R98   (Release 1998)
R99   (Release 1999)
REL-4   (Release 4)
REL-5   (Release 5)

Reason for change: ⌘	The procedure for generating padding at the mobile is not well defined. Therefore, specifying this as a mobile behaviour for some UTRAN defined configurations is misleading in that it legitimises these configurations.
Summary of change: ⌘	Specified that the UE behaviour is not defined when the TFCS configured by the network may require the mobile to generate padding. Isolated impact: This CR has isolated impact to mobiles and networks when configurations incompatible with the guidelines defined in 25.331 are in use. Compatibility: Networks and mobiles with varying implementations of this change will be able to interoperate, albeit sub-optimally.
Consequences if not approved: ⌘	When configurations that do not comply with these guidelines are used, the TFC selection may not give a result and the behaviour of the mobile would become unpredictable.

Clauses affected: ⌘	11.4		
Other specs affected: ⌘	☐ Other core specifications ⌘	25.321 v4.3.0, CR 114	
	☐ Test specifications		
	☐ O&M Specifications		
Other comments: ⌘			

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If the uplink TFCS configured by UTRAN follows the guidelines described in [7] the UE shall perform the TFC selection according to the rules specified below. If these guidelines are not followed then the method by which the UE performs TFC selection is not specified.

The UE shall continuously monitor the state for each TFC based on its required transmit power versus the maximum UE transmit power. A given TFC can be in any of the following states:

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- Excess-power state;

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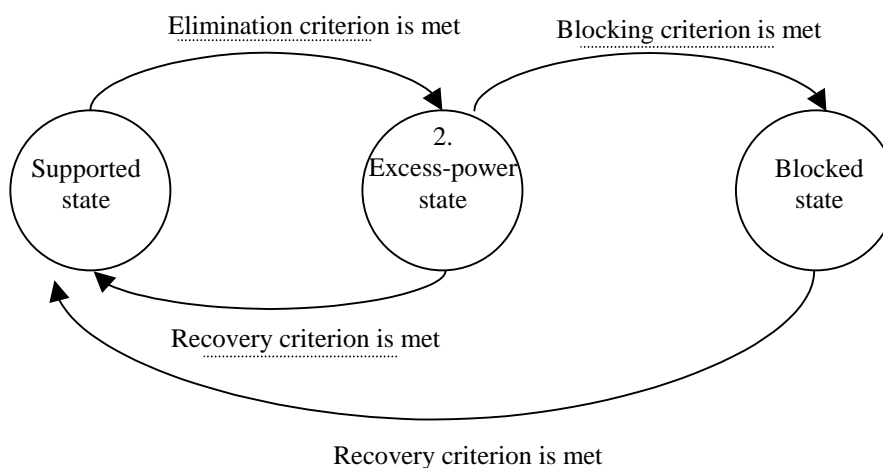The following diagram illustrates the state transitions for the state of a given TFC:

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Every time the set of supported TFCs changes, the available bitrate shall be indicated to upper layers for each logical channel in order to facilitate the adaptation of codec data rates when codecs supporting variable-rate operation are used. The details of the computation of the available bitrate and the interaction with the application layer are not further specified.

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2. not be in the Blocked state.

3. be compatible with the RLC configuration.

4. not require RLC to produce padding PDUs (see [6] for definition).

5. not carry more bits than can be transmitted in a TTI (e.g. when compressed mode by higher layer scheduling is used and the presence of compressed frames reduces the number of bits that can be transmitted in a TTI using the Minimum SF configured).

The UE may remove from the set of valid TFCs, TFCs in Excess-power state in order to maintain the quality of service for sensitive applications (e.g. speech). Additionally, if compressed frames are present within the longest configured TTI to which the next transmission belongs, the UE may remove TFCs from the set of valid TFCs in order to account for the higher power requirements.

If the TFCS selected by UTRAN does not follow the guidelines specified in [7] the UE may ignore constraint number 4 mentioned above in determining the set of valid TFCs.

The chosen TFC shall be selected from within the set of valid TFCs and shall satisfy the following criteria in the order in which they are listed below:

1. No other TFC shall allow the transmission of more highest priority data than the chosen TFC.

2. No other TFC shall allow the transmission of more data from the next lower priority logical channels. Apply this criterion recursively for the remaining priority levels.

3. No other TFC shall have a lower bit rate than the chosen TFC.

The above rules for TFC selection in the UE shall apply to DCH, and the same rules shall apply for TF selection on RACH and CPCH.

CR-Form-v4

CHANGE REQUEST

⌘   **25.321** CR **112**   ⌘ rev **-**   ⌘   Current version: **4.3.0**   ⌘

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Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network **X**   Core Network ☐

Title: ⌘	Correction to UE Id for DSCH	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘	TEI	***Date:*** ⌘ 18 February 02

Category: ⌘   **A**

Use <u>one</u> of the following categories:	*Use <u>one</u> of the following releases:*
F *(correction)*	*2* *(GSM Phase 2)*
A *(corresponds to a correction in an earlier release)*	*R96* *(Release 1996)*
B *(addition of feature),*	*R97* *(Release 1997)*
C *(functional modification of feature)*	*R98* *(Release 1998)*
D *(editorial modification)*	*R99* *(Release 1999)*
Detailed explanations of the above categories can	*REL-4* *(Release 4)*
be found in 3GPP TR 21.900.	*REL-5* *(Release 5)*

Release: ⌘   REL-4

Reason for change: ⌘	As indicated in R2-020262, MAC and RRC are misaligned regarding the UE Id used in the MAC header for FDD.
Summary of change: ⌘	A new UE Id called DSCH-RNTI is introduced for DTCH or DCCH mapped onto DSCH in FDD. Shadow CR for CR111r1.
Consequences if not approved: ⌘	The DSCH will not work in FDD.

Clauses affected: ⌘	9.2.1, 9.2.1.1

Other specs ⌘	**X** Other core specifications ⌘	25.331, 25.401, 25.423 25.321 v3.10.0, CR 111r1
affected:	☐ Test specifications	
	☐ O&M Specifications	

Other comments: ⌘	

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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, 9.2.1.3, 9.2.1.4 and 9.2.1.5.
     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
10-11	Reserved (PDUs with this coding will be discarded by this version of the protocol)

Table 9.2.1.5: 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 discarded by this version of the protocol)
10	SHCCH
11	Reserved (PDUs with this coding will be discarded by this version of the protocol)

- C/T field
  The C/T field provides identification of the logical channel instance when multiple logical channels are carried on the same transport channel. The C/T field is used also to provide identification of the logical channel type on dedicated transport channels and on FACH and RACH when used for user data transmission. The size of the C/T field is fixed to 4 bits for both common transport channels and dedicated transport channels. Table 9.2.1.5a shows the 4-bit C/T field.

Table 9.2.1.5a: Structure of the C/T field

C/T field	Designation
0000	Logical channel 1
0001	Logical channel 2
...	...
1110	Logical channel 15
1111	Reserved (PDUs with this coding will be discarded by this version of the protocol)

- UE-Id
  The UE-Id field provides an identifier of the UE on common transport channels. The following types of UE-Id used on MAC are defined:

  - UTRAN Radio Network Temporary Identity (U-RNTI) may be used in the MAC header of DCCH when mapped onto common transport channels in downlink direction; the U-RNTI is never used in uplink direction;

  - Cell Radio Network Temporary Identity (C-RNTI) is used on DTCH and DCCH in uplink, and may be used on DCCH in downlink and is used on DTCH in downlink when mapped onto common transport channels, except when mapped onto DSCH transport channel;

  - In FDD, DSCH Radio Network Temporary Identity (DSCH-RNTI) is used on DTCH and DCCH in downlink when mapped onto DSCH transport channel;

  - the UE id to be used by MAC is configured through the MAC control SAP. The lengths of the UE-id field of the MAC header are given in table 9.2.1.6.

Table 9.2.1.6: Lengths of UE Id field

UE Id type	Length of UE Id field
U-RNTI	32 bits
C-RNTI	16 bits
DSCH-RNTI	16 bits

- UE-Id Type
The UE-Id Type field is needed to ensure correct decoding of the UE-Id field in MAC Headers.

Table 9.2.1.7: UE-Id Type field definition

UE-Id Type field 2 bits	UE-Id Type
00	U-RNTI
01	C-RNTI or DSCH-RNTI
10	Reserved (PDUs with this coding will be discarded by this version of the protocol)
11	Reserved (PDUs with this coding will be discarded by this version of the protocol)

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. For FACH, the UE-Id type field used is the C-RNTI or U-RNTI. For RACH, the UE-Id type field used is the C-RNTI.

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 UE-Id type field used is the DSCH-RNTI. The C/T field is included if multiplexing on MAC is applied.

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 UE-Id type field used is the DSCH-RNTI. 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. The UE-Id type field used is the C-RNTI.
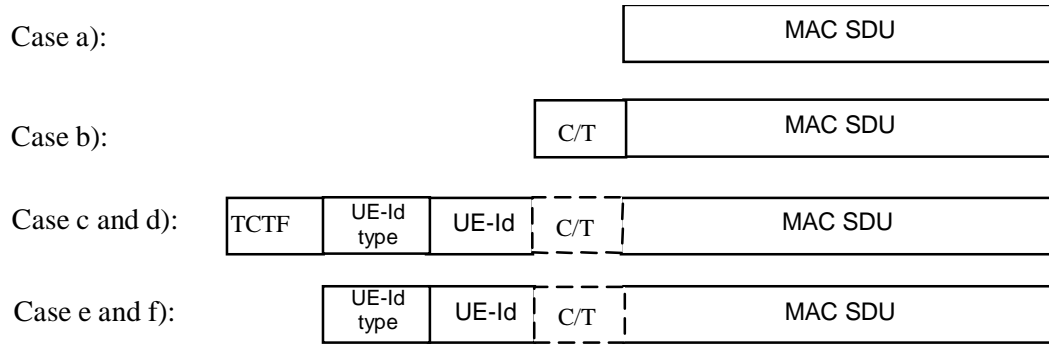
Case a):

	MAC SDU

Case b):

C/T	MAC SDU

Case c and d):

TCTF	UE-Id type	UE-Id	C/T	MAC SDU

Case e and f):

UE-Id type	UE-Id	C/T	MAC SDU

Figure 9.2.1.1.1: MAC Data PDU formats for DTCH and DCCH

CR-Form-v4

CHANGE REQUEST

⌘	**25.321** CR **111**	⌘ rev **r1** ⌘	Current version: **3.10.0** ⌘

For **HELP** *on using this form, see bottom of this page or look at the pop-up text over the* ⌘ *symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title: ⌘	Correction to UE Id for DSCH	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘	TEI	***Date:*** ⌘ 18 February 02
Category: ⌘	**F**	***Release:*** ⌘ R99

Use <u>one</u> of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
2 *(GSM Phase 2)*
R96 *(Release 1996)*
R97 *(Release 1997)*
R98 *(Release 1998)*
R99 *(Release 1999)*
REL-4 *(Release 4)*
REL-5 *(Release 5)*

Reason for change: ⌘	As indicated in R2-020262, MAC and RRC are misaligned regarding the UE Id used in the MAC header for FDD.
Summary of change: ⌘	A new UE Id called DSCH-RNTI is introduced for DTCH or DCCH mapped onto DSCH in FDD. ***Impact analysis:*** • Impacted functionality: DSCH transport channel • Correction: Isolated impact • Correction to a function where the specification was: Containing some contradictions. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.
Consequences if not approved: ⌘	The DSCH will not work in FDD.

Clauses affected: ⌘	9.2.1, 9.2.1.1	
Other specs ⌘	**X** Other core specifications ⌘	25.331, 25.401, 25.423 25.321 v4.3.0, CR 112
affected:	☐ Test specifications ☐ O&M Specifications	
Other comments: ⌘		

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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, 9.2.1.3, 9.2.1.4 and 9.2.1.5. 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
10-11	Reserved (PDUs with this coding will be discarded by this version of the protocol)

Table 9.2.1.5: 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 discarded by this version of the protocol)
10	SHCCH
11	Reserved (PDUs with this coding will be discarded by this version of the protocol)

- C/T field
  The C/T field provides identification of the logical channel instance when multiple logical channels are carried on the same transport channel. The C/T field is used also to provide identification of the logical channel type on dedicated transport channels and on FACH and RACH when used for user data transmission. The size of the C/T field is fixed to 4 bits for both common transport channels and dedicated transport channels. Table 9.2.1.5a shows the 4-bit C/T field.

Table 9.2.1.5a: Structure of the C/T field

C/T field	Designation
0000	Logical channel 1
0001	Logical channel 2
...	...
1110	Logical channel 15
1111	Reserved (PDUs with this coding will be discarded by this version of the protocol)

- UE-Id
  The UE-Id field provides an identifier of the UE on common transport channels. The following types of UE-Id used on MAC are defined:

  - UTRAN Radio Network Temporary Identity (U-RNTI) may be used in the MAC header of DCCH when mapped onto common transport channels in downlink direction; the U-RNTI is never used in uplink direction;

  - Cell Radio Network Temporary Identity (C-RNTI) is used on DTCH and DCCH in uplink, and may be used on DCCH in downlink and is used on DTCH in downlink when mapped onto common transport channels, except when mapped onto DSCH transport channel;

  - In FDD, DSCH Radio Network Temporary Identity (DSCH-RNTI) is used on DTCH and DCCH in downlink when mapped onto DSCH transport channel;

  - the UE id to be used by MAC is configured through the MAC control SAP. The lengths of the UE-id field of the MAC header are given in table 9.2.1.6.

Table 9.2.1.6: Lengths of UE Id field

UE Id type	Length of UE Id field
U-RNTI	32 bits
C-RNTI	16 bits
DSCH-RNTI	16 bits

- UE-Id Type
  The UE-Id Type field is needed to ensure correct decoding of the UE-Id field in MAC Headers.

Table 9.2.1.7: UE-Id Type field definition

UE-Id Type field 2 bits	UE-Id Type
00	U-RNTI
01	C-RNTI or DSCH-RNTI
10	Reserved (PDUs with this coding will be discarded by this version of the protocol)
11	Reserved (PDUs with this coding will be discarded by this version of the protocol)

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. TheFor FACH, the UE-Id type field used is the C-RNTI or U-RNTI. For RACH, the UE-Id type field used is the C-RNTI.

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 UE-Id type field used is the DSCH-RNTI. The C/T field is included if multiplexing on MAC is applied.

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 UE-Id type field used is the DSCH-RNTI. 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. The UE-Id type field used is the C-RNTI.
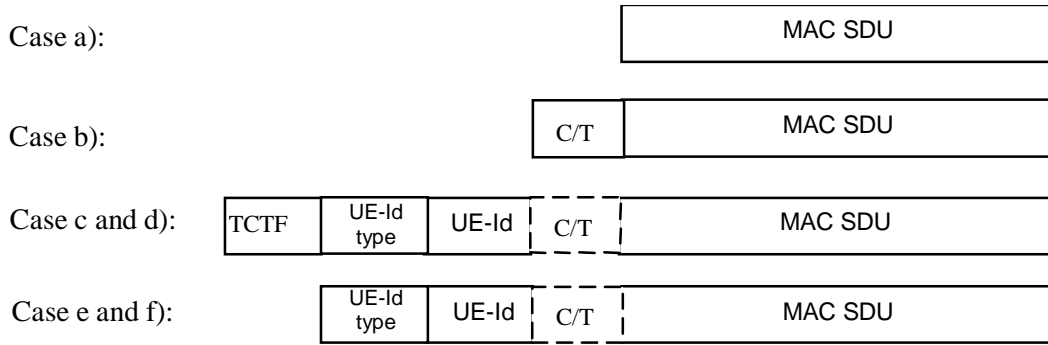
Case a):						MAC SDU

Case b):					C/T	MAC SDU

Case c and d):	TCTF	UE-Id type	UE-Id	C/T	MAC SDU

Case e and f):	UE-Id type	UE-Id	C/T	MAC SDU

Figure 9.2.1.1.1: MAC Data PDU formats for DTCH and DCCH

CR-Form-v5

CHANGE REQUEST

⌘ **25.321** CR **110** ⌘ **rev** **-** ⌘ Current version: **4.3.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title:	⌘	Missing DTCH channel type in UE-ID Type Indicator
Source:	⌘	TSG-RAN WG2

Work item code: ⌘	TEI		***Date:*** ⌘	February 21, 2002

Category: ⌘ **A**

Use <u>one</u> of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Release: ⌘ REL-4

Use <u>one</u> of the following releases:
2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
REL-4	*(Release 4)*
REL-5	*(Release 5)*

Reason for change:	⌘	"DTCH" channel type missing from the definition of UE-ID-Type parameter

Summary of change:	⌘	Clarification that UE-ID Type parameter is used when either or both DCCH and DTCH channels are mapped to common transport channels. "DTCH" channel type is added in the definition of UE-ID Type parameter.
		Isolated impact analysis: the CR has isolated impact on the inclusion of UE-ID type indicator in MAC.
		It would not affect implementations behaving like indicated in the CR, yet it would affect implementations supporting the corrected functionality otherwise.

Consequences if not approved:	⌘	This incomplete definition will bring inconsistency in the specification which leads to potential different implementation.

Clauses affected:	⌘	8.2.2

Other specs affected:	⌘	☐ Other core specifications	⌘	25.321 v3.10.0, CR 109r1
		☐ Test specifications		
		☐ O&M Specifications		

Other comments:	⌘	None.

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

8.2.2   Parameters

a) Data:

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

b) Number of transmitted transport blocks (No_TB) :

- indicates the number of transport blocks transmitted by the peer entity within the transmission time interval, based on the TFI value.

c) Buffer Occupancy (BO):

- the parameter Buffer Occupancy (BO) indicates for each logical channel the amount of data in number of bytes that is available for transmission and retransmission in RLC layer. When MAC is connected to an AM RLC entity, control PDUs to be transmitted and RLC PDUs outside the RLC Tx window shall also be included in the BO. RLC PDUs that have been transmitted but not negatively acknowledged by the peer entity shall not be included in the BO.

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 in MAC for a DCCH and DTCH when they areit is mapped onto a common transport channel (i.e. FACH, RACH, DSCH in FDD or CPCH). On the UE side UE-ID Type Indicator shall always be set to C-RNTI.

h) TX status:

- when set to value "transmission unsuccessful" this parameter indicates to RLC that transmission of an RLC PDU failed in the previous Transmission Time Interval, when set to value "transmission successful" this parameter indicates to RLC that the requested RLC PDU(s) has been submitted for transmission by the physical layer.

i) RLC Entity Info

- indicates to MAC the configuration parameters that are critical to TFC selection depending on its mode and the amount of data that could be transmitted at the next TTI. This primitive is meant to insure that MAC can perform TFC selection (see subclause 11.4).

j) Error indication

- When a MAC SDU is delivered to upper layer, an error indication is given for the SDU to upper layer if an error indication for the SDU has been received from lower layer.

CR-Form-v5

CHANGE REQUEST

⌘ **25.321** CR **109** ⌘**rev** **r1** ⌘ Current version: **3.10.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE **X** Radio Access Network **X** Core Network ☐

Title:	⌘	Missing DTCH channel type in UE-ID Type Indicator
Source:	⌘	TSG-RAN WG2

Work item code: ⌘	TEI	***Date:*** ⌘	February 18, 2002

Category:	⌘	**F**		***Release:*** ⌘	R99

Use one of the following categories:
 F (correction)
 A (corresponds to a correction in an earlier release)
 B (addition of feature),
 C (functional modification of feature)
 D (editorial modification)
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use one of the following releases:
 2 (GSM Phase 2)
 R96 (Release 1996)
 R97 (Release 1997)
 R98 (Release 1998)
 R99 (Release 1999)
 REL-4 (Release 4)
 REL-5 (Release 5)

Reason for change:	⌘	"DTCH" channel type missing from the definition of UE-ID Type parameter
Summary of change:	⌘	Clarification that UE-ID Type parameter is used when either or both DCCH and DTCH channels are mapped to common transport channels. "DTCH" channel type is added in the definition of UE-ID Type parameter. Isolated impact analysis: the CR has isolated impact on the inclusion of UE-ID type indicator in MAC. It would not affect implementations behaving like indicated in the CR, yet it would affect implementations supporting the corrected functionality otherwise.
Consequences if not approved:	⌘	This incomplete definition will bring inconsistency in the specification which leads to potential different implementation.

Clauses affected:	⌘	8.2.2

Other specs affected:	⌘	☐ Other core specifications	⌘	25.321 v4.3.0, CR 110
		☐ Test specifications		
		☐ O&M Specifications		

Other comments:	⌘	None.

How to create CRs using this form:
Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be

downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

8.2.2   Parameters

a) Data:

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

b) Number of transmitted transport blocks (No_TB) :

- indicates the number of transport blocks transmitted by the peer entity within the transmission time interval, based on the TFI value.

c) Buffer Occupancy (BO):

- the parameter Buffer Occupancy (BO) indicates for each logical channel the amount of data in number of bytes that is available for transmission and retransmission in RLC layer. When MAC is connected to an AM RLC entity, control PDUs to be transmitted and RLC PDUs outside the RLC Tx window shall also be included in the BO. RLC PDUs that have been transmitted but not negatively acknowledged by the peer entity shall not be included in the BO.

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 in MAC for a DCCH and DTCH when they are~~it is~~ mapped onto a common transport channel (i.e. FACH, RACH, DSCH in FDD or CPCH). On the UE side UE-ID Type Indicator shall always be set to C-RNTI.

h) TX status:

- when set to value "transmission unsuccessful" this parameter indicates to RLC that transmission of an RLC PDU failed in the previous Transmission Time Interval, when set to value "transmission successful" this parameter indicates to RLC that the requested RLC PDU(s) has been submitted for transmission by the physical layer.

i) RLC Entity Info

- indicates to MAC the configuration parameters that are critical to TFC selection depending on its mode and the amount of data that could be transmitted at the next TTI. This primitive is meant to insure that MAC can perform TFC selection (see subclause 11.4).

j) Error indication

- When a MAC SDU is delivered to upper layer, an error indication is given for the SDU to upper layer if an error indication for the SDU has been received from lower layer.

CR-Form-v4

CHANGE REQUEST

| ⌘ | **25.321** CR **106** | ⌘ rev | **-** | ⌘ | Current version: | **4.3.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network ☐   Core Network ☐

Title: ⌘	TDD MAC Layer Subchannel Assignment	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘	TEI	**Date:** ⌘ 02-18-2002
Category: ⌘ **A**	Use one of the following categories: **F** (correction) **A** (corresponds to a correction in an earlier release) **B** (addition of feature), **C** (functional modification of feature) **D** (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.	**Release:** ⌘ REL-4 Use one of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change: ⌘	TDD PRACH subchannel assignment in physical layer does not allow for proper handling of sequential delivery and subchannel assignment failure.
Summary of change: ⌘	Subchannel assignment logic moved from physical to MAC layer. Text 25.224 section 4.7.1 moved to 25.321 section 11.2.3 Impact analysis: Impacted functionality: PRACH access procedure – ASC subchannel assignment Correction to a function where the specification was found erroneous. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.
Consequences if not approved: ⌘	Loss of sequential delivery and RACH transmissions in the UE.

Clauses affected: ⌘	11.2.3	
Other specs Affected: ⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications	25.321 v3.10.0, CR 105
Other comments: ⌘		

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.

3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

11.2.3 Control of RACH transmissions for TDD

11.2.3.1 Control of RACH transmissions for 3.84 Mcps TDD

The RACH transmissions are performed by the UE as shown in figure 11.2.3.2~~1~~.

> NOTE: 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 and a persistence value P_i (transmission probability).

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 subclause 11.2.1.

In order to separate different ASCs each PRACH has N sub-channels associated with it (numbered from 0 to N-1). N may be assigned the value 1,2,4, or 8 by higher layer signaling. Sub-channel i for a PRACH defined in timeslot k is defined as the k:th slot in the frames where SFN mod N = i. Therefore follows the definition:

- Sub-channel i associated to a PRACH defined in timeslot k is defined as the k:th timeslot in the frames where SFN mod N = i.

Figure 11.2.2.1 illustrates the eight possible subchannels for the case, N=8. For illustration, the figure assumes that the PRACH is assigned timeslot 3.
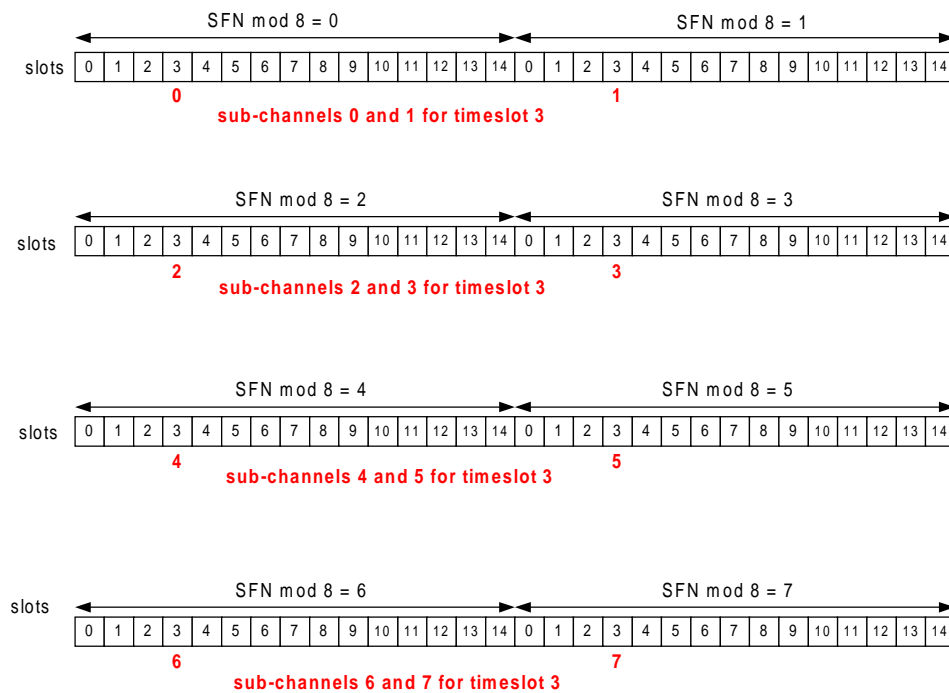

Figure 11.2.3.1 Eight sub-channels for timeslot 3

Based on the persistence value P, 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. If transmission is allowed, a subchannel is randomly selected from the set of available subchannels for this ASC. The random subchannel selection shall be such that each of the allowed selections is chosen with equal probability. If an available subchannel is not found, the persistency check and subchannel assignment is repeated for the next subchannel period. If an available subchannel is found the PRACH transmission procedure is initiated by sending of a PHY-Data-REQ primitive.

Successful completion (TX status) of the MAC transmission control procedure shall be indicated to higher layer individually for each logical channel of which data was included in the transport block set of that access attempt. When transparent mode RLC is employed (i.e. for CCCH), transmission status is reported to RRC with CMAC-STATUS-Ind primitive. For logical channels employing acknowledged or unacknowledged mode RLC, transmission status is reported to RLC with MAC-STATUS-Ind primitive.
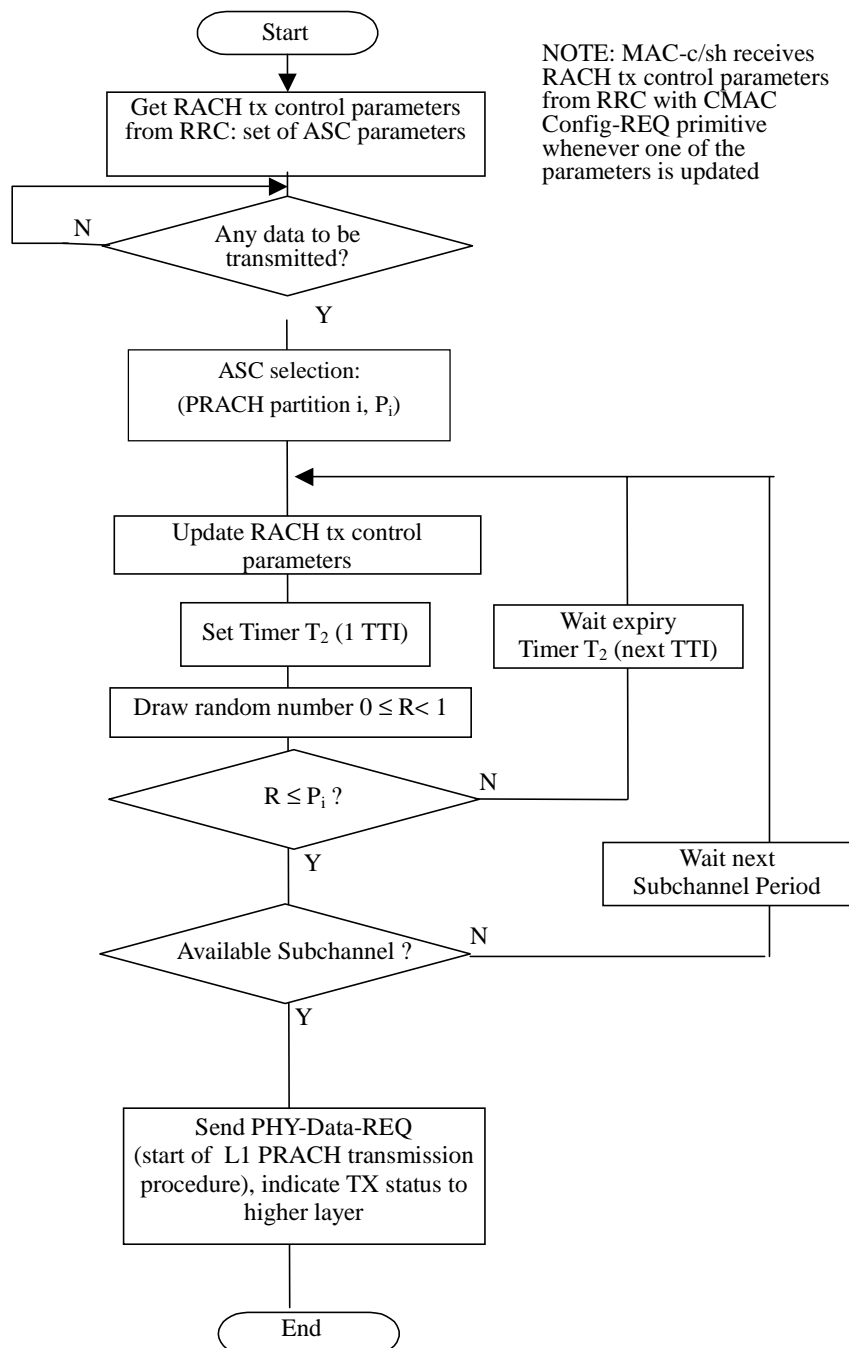

Figure 11.2.3.24: RACH transmission control procedure for TDD (UE side, informative

<Figure updated>

CR-Form-v4

CHANGE REQUEST

| ⌘ | **25.321** CR **105** | ⌘ | rev | **-** | ⌘ | Current version: | **3.10.0** | ⌘ |

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network ☐   Core Network ☐

Title: ⌘	TDD MAC Layer Subchannel Assignment	
Source: ⌘	TSG-RAN WG2	
Work item code: ⌘	TEI	**Date:** ⌘ 02-10-02
Category: ⌘ **F**		**Release:** ⌘ R99

Use one of the following categories:
F (correction)
A (corresponds to a correction in an earlier release)
B (addition of feature),
C (functional modification of feature)
D (editorial modification)
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change: ⌘	TDD PRACH subchannel assignment in physical layer does not allow for proper handling of sequential delivery and subchannel assignment failure.
Summary of change: ⌘	Subchannel assignment logic moved from physical to MAC layer. Text 25.224 section 4.7.1 moved to 25.321 section 11.2.3

Impact analysis:

Impacted functionality: PRACH access procedure – ASC subchannel assignment

Correction to a function where the specification was found erroneous. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise. |
| **Consequences if not approved:** ⌘ | Loss of sequential delivery and RACH transmissions in the UE. |

Clauses affected: ⌘	11.2.3
Other specs Affected: ⌘	☐ Other core specifications ⌘ 25.321 v4.3.0, CR 106
☐ Test specifications
☐ O&M Specifications
Other comments: ⌘	

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

11.2.3 Control of RACH transmissions for TDD

The RACH transmissions are performed by the UE as shown in figure 11.2.3.2~~1~~.

> NOTE: 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 and a persistence value P_i (transmission probability).

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 subclause 11.2.1.

In order to separate different ASCs each PRACH has N sub-channels associated with it (numbered from 0 to N-1). N may be assigned the value 1,2,4, or 8 by higher layer signaling. Sub-channel i for a PRACH defined in timeslot k is defined as the k:th slot in the frames where SFN mod N = i. Therefore follows the definition:

- Sub-channel i associated to a PRACH defined in timeslot k is defined as the k:th timeslot in the frames where SFN mod N = i.

Figure 11.2.2.1 illustrates the eight possible subchannels for the case, N=8. For illustration, the figure assumes that the PRACH is assigned timeslot 3.
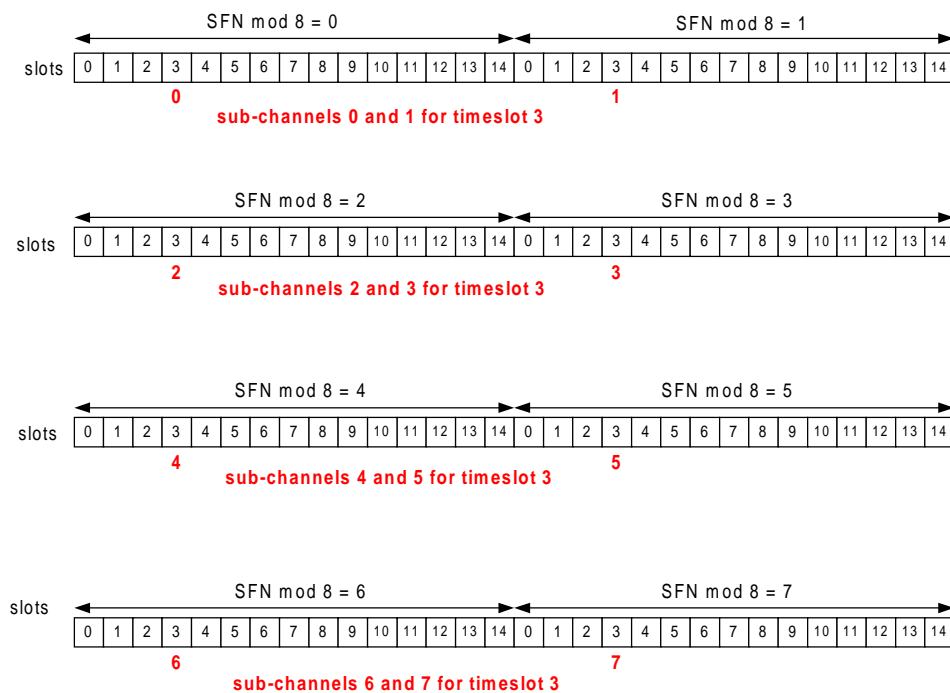

Figure 11.2.3.1 Eight sub-channels for timeslot 3

Based on the persistence value P, 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. If transmission is allowed, a subchannel is randomly selected from the set of available subchannels for this ASC. The random subchannel selection shall be such that each of the allowed selections is chosen with equal probability. If an available subchannel is not found, the persistency check and subchannel assignment is repeated for the next subchannel period. If an available subchannel is found the PRACH transmission procedure is initiated by sending of a PHY-Data-REQ primitive.

Successful completion (TX status) of the MAC transmission control procedure shall be indicated to higher layer individually for each logical channel of which data was included in the transport block set of that access attempt. When transparent mode RLC is employed (i.e. for CCCH), transmission status is reported to RRC with CMAC-STATUS-Ind primitive. For logical channels employing acknowledged or unacknowledged mode RLC, transmission status is reported to RLC with MAC-STATUS-Ind primitive.
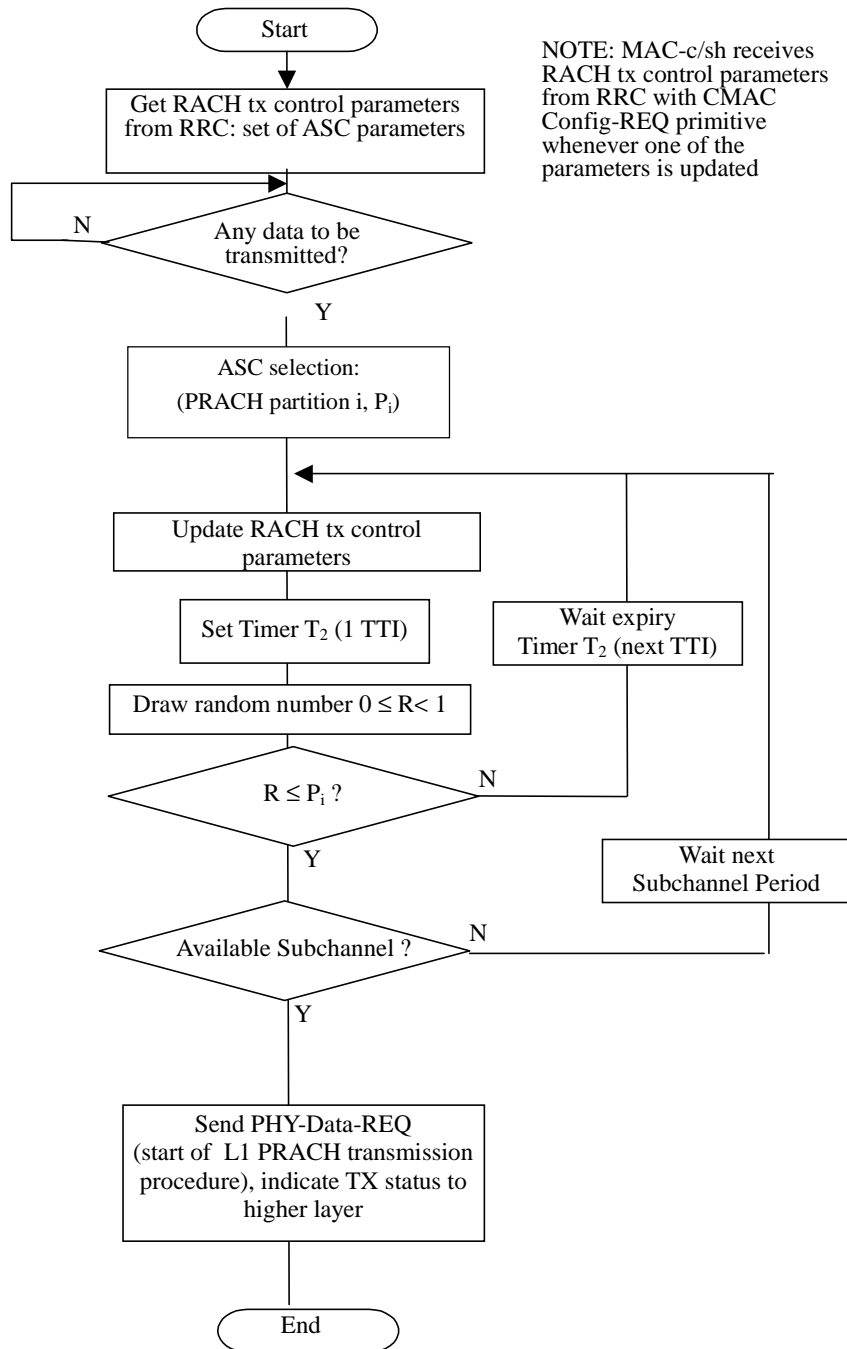

Figure 11.2.3.24: RACH transmission control procedure for TDD (UE side, informative)

<Figure updated>

3GPP TSG-RAN2 Meeting #27   *R2-020452*
Orlando, USA, 18-22 of February

<table>
<tr><td colspan="7" align="right">CR-Form-v5</td></tr>
<tr><td colspan="7" align="center"><h2>CHANGE REQUEST</h2></td></tr>
<tr><td>⌘</td><td>25.321 CR 103</td><td>⌘rev</td><td>-</td><td>⌘</td><td>Current version:</td><td>4.3.0 ⌘</td></tr>
</table>

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘   (U)SIM ☐   ME/UE **X**   Radio Access Network **X**   Core Network ☐

Title:	⌘	Clarification on ciphering
Source:	⌘	TSG-RAN WG2
Work item code: ⌘	TEI	***Date:*** ⌘ 2002-02-21

Category: ⌘ **A**	***Release:*** ⌘ REL-4

Use <u>one</u> of the following categories:
   F *(correction)*
   A *(corresponds to a correction in an earlier release)*
   B *(addition of feature),*
   C *(functional modification of feature)*
   D *(editorial modification)*
Detailed explanations of the above categories can
be found in 3GPP TR 21.900.

Use <u>one</u> of the following releases:
   2   *(GSM Phase 2)*
   R96   *(Release 1996)*
   R97   *(Release 1997)*
   R98   *(Release 1998)*
   R99   *(Release 1999)*
   REL-4 *(Release 4)*
   REL-5 *(Release 5)*

Reason for change:	⌘	It is not clear which CFN to use for ciphering when the TTI consists of 2,4,8 frames.

Summary of change: ⌘		1) It is clarified that the first CFN of the TTI shall be used for ciphering in the whole TTI. This is inline with Section 8.5.8 of 25.331

2) It is clarified that an activation time that is set in the middle of a TTI shall be applied at the beginning of the next TTI that is common to all the transport channels that are multiplexed onto the same CCTrCh. This is stated in 25.331 for DL activation times but not for UL activation times.

Impact analysis:

<u>Impacted functionality</u>: Setting of activation times for ciphering

Correction to a function where the specification was unclear. Would not affect implementations behaving like indicated in the CR, would affect implementations supporting the corrected functionality otherwise.

If the UE does not implement the change, but the UTRAN does, a change of ciphering parameters may be applied at different CFNs in UE and UTRAN. This may lead to a lost TTI on TM RBs.

If the UTRAN does not implement the change, but the UE does, a change of ciphering parameters may be applied at different CFNs in UE and UTRAN. This may lead to a lost TTI on TM RBs.

In both cases there is a small risk that the activation time is exactly at a CFN wrap-arounf border. In that case the HFN may get out of sync between UTRAN

		and UE leading to ciphering failure.
Consequences if not approved:	⌘	Potential loss of one TTI data for TM RBs when ciphering is started/modified. In rare cases the HFN may be unsynchronised, leading to ciphering failure.

Clauses affected:	⌘	11.5		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	25.321 v3.10.0, CR 102r1
Other comments:	⌘			

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11.5 Ciphering

The ciphering function is performed in MAC (i.e. only in MAC-d) if a radio bearer is using the transparent RLC mode. The data unit that is ciphered is the MAC SDU and this is shown in Figure 11.5.1 below.
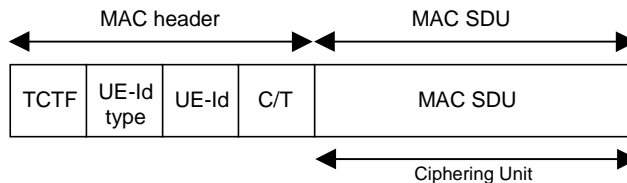

Figure 11.5.1: Ciphering unit for a MAC PDU

The ciphering algorithm and key to be used are configured by upper layers [7] and the ciphering method shall be applied as specified in [10].

The parameters that are required by MAC for ciphering are defined in [10] and are input to the ciphering algorithm. The parameters required by MAC which are provided by upper layers [7] are listed below:

- MAC-d HFN (Hyper frame number for radio bearers that are mapped onto transparent mode RLC)

- BEARER (Radio Bearer ID)

- CK (Ciphering Key)

If the TTI consists of more than one 10 ms radio frame, the CFN of the first radio frame in the TTI shall be used as input to the ciphering algorithm for all the data in the TTI. radio frames in the TTI.

If the activation time indicated by higher layers for start or stop of ciphering or change of ciphering parameters is not the first CFN in a TTI common to all the transport channels that are multiplexed onto the same CCTrCh, the activation time shall be applied at the first CFN in the following TTI common to all the transport channels that are multiplexed onto the same CCTrCh .