TSG-RAN Meeting #28
Quebec, Canada, 01-03 June 2005

RP-050319
agenda item 8.11

Source: **TSG-RAN WG2.**

Title: **CRs on 25.321, 25.322 and 25.324 on TEI6**

The following CR is in RP-050319:

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level	Workitem
25.321	0208	-	Rel-6	Corrections to the description of TCTF field	F	6.4.0	6.5.0	R2-051160	TEI6
25.322	0272	-	Rel-6	Correction on actions taken Upon reception of an duplicated AMD PDU within the reception window	F	6.3.0	6.4.0	R2-051154	TEI6
25.322	0274	-	Rel-6	Reconfiguration of RLC parameters by upper layers may lead to Logic inconsistency of state variable VrH	F	6.3.0	6.4.0	R2-051155	TEI6
25.322	0277	-	Rel-6	Selecting a PDU to transmit a poll	F	6.3.0	6.4.0	R2-051541	TEI6
25.322	0278	-	Rel-6	Support for out-of-sequence PDUs in RLC-UM	B	6.3.0	6.4.0	R2-051579	TEI6
25.324	0025	-	Rel-6	Clarification of RLC concatenation procedure with BMC	F	6.2.0	6.3.0	R2-051147	TEI6

3GPP TSG-RAN WG2 Meeting #46-bis
Beijing, China, 4-8 Apr 2005

Tdoc R2-051160

CR-Form-v3

CHANGE REQUEST

⌘ **25.321** **CR** **0208** ⌘ rev **-** ⌘ Current version: **6.4.0** ⌘

*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:	⌘	Corrections to the description of TCTF field
Source:	⌘	RAN WG2
Work item code:	⌘	TEI6
Date:	⌘	07/04/2005
Category:	⌘	**F**
Release:	⌘	REL-6

Use one of the following categories:
F *(essential 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)
REL-6 (Release 6)

Reason for change:	⌘	In the description of TCTF field, the transport channel types of USCH and DSCH are missing.
Summary of change:	⌘	Add USCH and DSCH transport channel types in the description of TCTF field.
Consequences if not approved:	⌘	part of descriptions on TCTF field are not given.

Clauses affected:	⌘	9.2.1			
Other specs affected:	⌘	Y	N		⌘
			X	Other core specifications	
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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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.

9.2.1 MAC PDU: Parameters of the MAC PDU header (not HS-DSCH or E-DCH) and MAC-d PDU header (HS-DSCH and E-DCH)

NOTE: In this subclause coding and format of MAC header fields for MBMS need to be further studied e.g. based on multiplexing options.

The following fields are defined for the MAC header for transport channels other than HS-DSCH and for the MAC-d PDU header for HS-DSCH:

- Target Channel Type Field
  The TCTF field is a flag that provides identification of the logical channel class on FACH, USCH(TDD only), DSCH（TDD only） and RACH transport channels, i.e. whether it carries BCCH, CCCH, CTCH, SHCCH, MCCH, MTCH, MSCH 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 2,4 or 8 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	MCCH
01110	MTCH
01111	MSCH
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- 01001111	Reserved (PDUs with this coding will be discarded by this version of the protocol)
01010000	MCCH
01010001- 01011110	Reserved (PDUs with this coding will be discarded by this version of the protocol)
01011111	MSCH
0110	MTCH
0111	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)

…

3GPP TSG-RAN2 Meeting #46bis
Beijing, China, 4th-8th April, 2005

Tdoc R2-051154

CR-Form-v7.1

CHANGE REQUEST

⌘ **25.322** **CR** **0272** ⌘ **rev** ⌘ Current version: **6.3.0** ⌘

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

Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☒ Core Network ☐

Title:	⌘	Correction on actions taken Upon reception of an duplicated AMD PDU within the reception window.
Source:	⌘	RAN WG2
Work item code:	⌘	TEI6
Date:	⌘	04/04/2005
Category:	⌘	**F**
Release:	⌘	*Rel-6*

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:

Ph2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change:	⌘	According to the current specification, piggybacked STATUS REPORT may be discarded.
Summary of change:	⌘	Correction on actions taken Upon reception of an duplicated AMD PDU within the reception window
Consequences if not approved:	⌘	Piggybacked STATUS REPORT may be discarded.
Clauses affected:	⌘	11.3.4.8

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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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.

11.3.4.8 Receiving an AMD PDU within the reception window more than once (Handling of Duplicates)

Upon reception of an AMD PDU with a “Sequence Number” within the interval VR(R)≤SN<VR(MR), for which "Sequence Number" an AMD PDU has already been received, the Receiver shall:

- discard the AMD PDU;
- consider the AMD PDU with this "Sequence Number" as having been correctly received in the next status report to be transmitted;
- if the "polling bit" in the discarded AMD PDU is set to "1":

- initiate the STATUS PDU transfer procedure.

- if a piggybacked STATUS PDU is included in the AMD PDU:
  - perform the actions specified in subclause 11.5.3.

3GPP TSG-RAN2 Meeting #46bis
Beijing, China, 4th-8th April, 2005

Tdoc ⌘ R2-051155

CR-Form-v7.1

CHANGE REQUEST

⌘ **25.322** **CR** **0274** ⌘ **rev** ⌘ Current version: **6.3.0** ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☒ Core Network ☐

Title:	⌘	Reconfiguration of RLC parameters by upper layers may lead to Logic inconsistency of state variable VrH.
Source:	⌘	RAN WG2
Work item code:	⌘	TEI6
Date:	⌘	04/04/2005
Category:	⌘	**F**
Release:	⌘	*Rel-6*

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:
Ph2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
Rel-4 (Release 4)
Rel-5 (Release 5)
Rel-6 (Release 6)
Rel-7 (Release 7)

Reason for change: ⌘

Clause 9.7.9 Reconfiguration of RLC parameters by upper layers specifies as follows:
The RLC parameters for an RLC entity may be reconfigured (modifed) by upper layers.
When an RLC parameter is reconfigured by the upper layer, the UE shall:
- start using the reconfigured value of the RLC parameter.

If the parameter Configured_Rx_Window_Size is reconfigured:
- the UE shall update the state variable VR(MR), (see clause 9.4);
- for AMD PDUs with "Sequence Number" x such that VR(MR)<=x<VR(H):
- the UE may discard these AMD PDUs:
- consider the discarded AMD PDUs as not having been received

According to the specification , if the reconfiguration cause the situation that some AMD PDUs with "Sequence Number" x such that VR(MR)<=x<VR(H) occurs,

the UE may discard these AMD PDUs,but the specification does not require update the state variable VR(H).According to Clause 9.4

VR(R) - Receive state variable.

This state variable contains the "Sequence Number" following that of the last in-sequence AMD PDU received. It shall be updated upon the receipt of the AMD PDU with "Sequence Number" equal to VR(R).

The initial value of this variable is 0. For the purpose of initialising the protocol, this value shall be assumed to be the first "Sequence Number" following the last in-sequence

	received AMD PDU. VR(H) - Highest expected state variable. This state variable contains the "Sequence Number" following the highest "Sequence Number" of any received AMD PDU. When a AMD PDU is received with "Sequence Number" x such that VR(H) x<VR(MR), this state variable shall be set equal to x+1. The initial value of this variable is 0. if VR(R) is not equal to VR(H),the AMD PDU with "Sequence Number" VR(H)-1,must have been correctly received,if the UE in the above situation chooses to discard these AMD PDUs and not update the state variable VR(H),a protocol logic inconsistency is resulted since the AMD PDU with "Sequence Number" VR(H)-1 has been discarded and consider as not having been received which is clearly not consistent with description of the state variable VR(H).
Summary of change: ⌘	The state variable VR(H) should been updated if all the AMD PDUs with "Sequence Number" x and VR(MR)<=x<VR(H) are discard.
Consequences if not approved: ⌘	Logic inconsistency of state variable VrH. No Iot problem could been forseen.

Clauses affected:	⌘	9.7.9			
		Y	**N**		
Other specs affected:	⌘		**X**	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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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.

9.7.9 Reconfiguration of RLC parameters by upper layers

The RLC parameters for an RLC entity may be reconfigured (modifed) by upper layers.

When an RLC parameter is reconfigured by the upper layer, the UE shall:

- start using the reconfigured value of the RLC parameter.

If the parameter Configured_Rx_Window_Size is reconfigured:

- the UE shall update the state variable VR(MR), (see clause 9.4);
- for AMD PDUs with "Sequence Number" x such that VR(MR)<=x<VR(H):
  - the UE may discard these AMD PDUs, if discarded, the state variable VR(H) should be updated accordingly;
  - consider the discarded AMD PDUs as not having been received.

If the parameter Configured_Tx_Window_Size is reconfigured:

- the UE shall set the state variable VT(WS) equal to the Configured_Tx_Window_Size;
- the UE shall update the state variable VT(MS), (see subclause 9.4);
- for AMD PDUs with "Sequence Number" x such that VT(MS)<=x<VT(S):
  - the UE shall not discard any AMD PDUs that are not positively acknowledged;
  - the UE may discard AMD PDUs that are positively acknowledged.

When the transmission window size or the reception window size is reconfigured the required buffer memory may temporarily exceed the size of the configured window and thus exceed the available buffer memory (see subclause 11.3.4.9)

3GPP TSG-RAN2 Meeting #47
Athens, Greece, 9-13 May 2005

Tdoc ⌘R2-051541

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CHANGE REQUEST

⌘ **25.322** **CR** **0277** ⌘**rev** **-** ⌘ Current version: **6.3.0** ⌘

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Proposed change affects: UICC apps⌘ ☐ ME ☒ Radio Access Network ☒ Core Network ☐

Title:	⌘	Selecting a PDU to transmit a poll
Source:	⌘	RAN WG2
Work item code:	⌘	TEI6
Date:	⌘	03/05/2005
Category:	⌘	**F**
Release:	⌘	Rel-6

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:

Ph2	*(GSM Phase 2)*
R96	*(Release 1996)*
R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change: ⌘

In current subclause 11.3.2, when a poll has been triggered and is not prohibited, if there is no AMD PDU being scheduled for transmission or retransmission, an AMD PDU will be selected to transmit the poll under the condition that there is at least one PDU that has been transmitted and has not yet been acknowledged. It is specified this way because there is no need to transmit a poll if all transmitted AMD PDUs have been positively acknowledged.

Furthermore, in current subclause 11.6.2, upon initiation of an SDU discard with explicit signalling procedure, the Sender shall discard all AMD PDUs including segments of the discarded SDUs or LIs indicating the end of the SDUs, unless they also carry a segment of a SDU whose timer has not expired.

1. The condition to select an AMD PDU to transmit a poll does not consider the possibility of SDU discard. If the AMD PDU which has not yet been acknowledged has been discarded or if all the transmitted PDUs have been discarded, the Sender may choose an AMD PDU, which has been discarded from the Sender's buffer, to transmit the poll. There will be problem when UE tries to sumbit to the lower layer with the selected PDU which does not exist in the buffer. In addition, if all the transmitted PDUs have been discarded, the poll will not be needed.

2. If Timer based discard is not configured, there is no timer associated with each SDU. The above PDU discard behavior may mislead to keep all the PDUs undiscarded because there is no expired timer for discarded SDUs if Timer based discard is not configured.

Summary of change: ⌘ 1. One extra condition, the PDU having not been discarded, is added when

		selecting an AMD PDU to transmit a poll. In addition, the selected PDU shall not have been discarded. 2. "a SDU whose timer has not expired" is corrected to "a SDU which is not discarded". **Isolated Impact Change Analysis.** This change only impacts the behaviours of (1) selecting an AMD PDU to transmit a poll and (2) PDU discarding during SDU discard procedure. No backward compatibility issues are foreseen. ***Implementation of this CR by a R99/Rel-4/Rel-5 UE will not cause backwards compatibility issues.*** If UTRAN implements the change while UE does not: UTRAN will work normally. UE may select and schedule an AMD PDU that has been discarded from the buffer. IF UE implements the change while UTRAN does not: UE will work normally while UTRAN may select and schedule an AMD PDU that has been discarded from the buffer.
Consequences if not approved:	⌘	The behaviors specified in the specification are incomplete and may mislead UE with incorrect behaviors.

Clauses affected:	⌘	11.3.2 and 11.6.2			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			X	Test specifications	
			X	O&M Specifications	
Other comments:	⌘				

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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.

11.3.2 Transmission of AMD PDU

Upon a request of acknowledged mode data transfer from upper layers or upon retransmission of AMD PDUs, the Sender shall:

- when RLC SDUs are received from upper layers:
  - segment, and if possible concatenate the RLC SDUs into AMD PDUs where the fixed PDU size is configured by upper layer (see subclause 9.2.2.9);
  - set a "Length Indicator" field for each SDU that ends in the AMD PDU according to subclause 9.2.2.8;
  - if "Timer based SDU Discard with explicit signalling" is configured:
    - start a timer Timer_Discard for each SDU received from upper layer (see subclause 9.7.3);
  - schedule the AMD PDUs for transmission;
- for each AMD PDU which has been negatively acknowledged (see subclause 11.5.3):
  - if the "Sequence Number" of the AMD PDU is less than VT(MS):
    - schedule the AMD PDU for retransmission;
- if a poll has been triggered by one of configured polling functions (see subclause 9.7.1); and
- if polling is not prohibited (see subclause 9.5); and
- if no AMD PDU is scheduled for transmission or retransmission; and
- if there is at least one PDU that has been transmitted, has not been discarded and has not yet been acknowledged:
  - if the value of "Configured_Tx_Window_Size" is larger than or equal to "2048":
    - select the AMD PDU with "Sequence Number" equal to VT(S)-1.
  - otherwise if the "Configured_Tx_Window_Size" is less than "2048";
    - select the AMD PDU with "Sequence Number" equal to VT(S)-1; or
    - select an AMD PDU that has not been discarded and has not yet been acknowledged by the peer entity;
- schedule the selected AMD PDU for retransmission (in order to transmit a poll).

11.6.2 Initiation

The Sender shall initiate the SDU discard with explicit signalling procedure if one of the following triggers is detected:

- "Timer based SDU discard with explicit signalling" is configured, Timer_Discard expires for an SDU, and one or more segments of the SDU have been submitted to lower layer;
- "Timer based SDU discard with explicit signalling" is configured, Timer_Discard expires for an SDU, and "Send MRW" is configured;
- "SDU discard after MaxDAT number of transmissions" is configured, and MaxDAT number of transmissions is reached (i.e. VT(DAT) ≥ MaxDAT) for an AMD PDU.

Upon initiation of the SDU discard with explicit signalling procedure, the Sender shall:

- if "Timer based SDU discard with explicit signalling" is configured:
  - discard all SDUs up to and including the SDU for which the timer Timer_Discard expired.
- if "SDU discard after MaxDAT number of transmissions" is configured:
  - discard all SDUs that have segments or "Length Indicators" indicating the end of the SDUs in AMD PDUs with "Sequence Number" SN inside the interval VT(A) ≤ SN ≤ X, where X is the value of the "Sequence Number" of the AMD PDU with VT(DAT) ≥ MaxDAT.
- if requested:
  - inform the upper layers of the discarded SDUs
- discard all AMD PDUs including segments of the discarded SDUs or "Length Indicators" indicating the end of the SDUs, unless they also carry a segment of a SDU which is not discarded ~~whose timer has not expired~~;

3GPP TSG-RAN-WG2 Meeting #47
Athens, Greece, 8-14 May 2005

Tdoc ⌘R2-051579

CR-Form-v7.1

CHANGE REQUEST

⌘ **25.322** **CR** **0278** ⌘ **rev** **-** ⌘ Current version: **6.3.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [ ] Core Network [ ]

Title:	⌘	Support for out-of-sequence PDUs in RLC-UM
Source:	⌘	RAN WG2
Work item code:	⌘	TEI6
Date:	⌘	May 2005
Category:	⌘	**B**
Release:	⌘	Rel-6

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)*
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R97	*(Release 1997)*
R98	*(Release 1998)*
R99	*(Release 1999)*
Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*
Rel-7	*(Release 7)*

Reason for change:	⌘	Support out-of-sequence reception in order to support data duplication for seemless serving cell change.
Summary of change:	⌘	Dintinguish between early and late PDUs based on their sequence numbers.
Consequences if not approved:	⌘	It will be impossible to support seemless serving cell changes.

Clauses affected:	⌘	8.2, 9.4, 9.6, 11.2.3.1

Other specs affected: ⌘	Y	N	
		X	Other core specifications
		X	Test specifications
		X	O&M Specifications

⌘

Other comments:	⌘	

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8.2 Primitive parameters

Following parameters are used in the primitives:

1) The parameter Data is the RLC SDU that is mapped onto the Data field in RLC PDUs. When AM or UM RLC entities are used, the length of the Data parameter is a multiple of 8 bits, otherwise (TM RLC entity) the length of Data parameter is a bit-string whose length may not be a multiple of 8 bits.

2) The parameter Confirmation Request (CNF) indicates whether the transmitting side of the AM RLC entity needs to confirm the reception of the RLC SDU by the peer-RLC AM entity. If required, once all AMD PDUs that make up the RLC SDU are positively acknowledged by the receiving AM RLC entity, the transmitting AM RLC entity notifies upper layers.

3) The parameter Message Unit Identifier (MUI) is an identity of the RLC SDU, which is used to indicate which RLC SDU that is confirmed with the RLC-AM-DATA-Conf. primitive, or discarded with the RLC-AM/UM/TM-DATA-Conf. Primitive.

4) The parameter E/R indicates establishment, re-establishment, release or modification of an RLC entity, where re-establishment is applicable to AM and UM RLC entities only. If re-establishment is requested, the state variables and configurable parameters are initialised according to subclause 9.7.7. If release is requested, all protocol parameters, variables and timers are released and the RLC entity enters the NULL state. If modification is requested, the protocol parameters indicated by upper layers (e.g. ciphering parameters) are only modified, while keeping the other protocol parameters, such as the protocol variables, protocol timers and protocol state unchanged. AM RLC entities are always re-established if any of the uplink or downlink AMD PDU size is changed. The modification of other protocol parameters does not require a re-establishment.

5) The parameter Event Code (EVC) indicates the reason for the CRLC-STATUS-Ind e.g., unrecoverable errors such as data link layer loss or recoverable status events such as reset.

6) The parameter Ciphering Elements are only applicable for UM and AM operations. These parameters are Ciphering Mode, Ciphering Key, Transmitting Activation Time (Sequence Number to activate a new ciphering configuration at the Sender), Receiving Activation Time (Sequence Number to activate a new ciphering configuration at the Receiver) and HFN (Hyper Frame Number).

7) The AM_parameters are only applicable for AM operation. These parameters are AMD PDU size, In-sequence Delivery Indication (indicating that RLC SDUs are delivered to upper layers in sequence or that they can be delivered out of sequence), Timer values (see subclause 9.5), Protocol parameter values (see subclause 9.6), Polling triggers (see subclause 9.7.1), Status triggers (see subclause 9.7.2), Periodical Status blocking configuration (see subclause 9.7.2), SDU discard mode (see subclause 9.7.3), Minimum WSN (see subclause 9.2.2.11.3), and Send MRW. The Minimum WSN is always greater than or equal to the number of transport blocks in the smallest transport block set. The Send MRW indicates that the information of each discarded RLC SDU is sent to the Receiver, and the MRW SUFI is sent to the Receiver even if no segments of the RLC SDU to be discarded were submitted to a lower layer.

8) The parameter DiscardInfo indicates to upper layer the discarded RLC SDU in the peer-RLC AM entity. It is applicable only when in-sequence delivery is configured and it is to be used when upper layers require the reliable data transfer.

9) The Stop parameter is applicable to AM and UM RLC entities only and indicates to the RLC entity to (see subclause 9.7.6):

   - not transmit nor receive any RLC PDUs.

10) The Continue parameter is applicable to AM and UM RLC entities only and indicates to the RLC entity to continue transmission and reception of RLC PDUs.

11) The UM_parameters are only applicable for UM operation. It contains Timer_Discard value (see subclause 9.5), largest UL UMD PDU size (see subclause 9.2.2.8) and DL RLC UM LI size (see subclause 9.2.2.8). For a receiving UM RLC in a UE, an additional parameter indicating use/ no use of out of sequence SDU delivery is included (see subclause 11.2.3.2). If out of sequence SDU delivery is used, the parameters OSD_Window_Size (see subclause 9.6) and the timeout value of Timer_OSD (see subclause 9.5) are included. For a receiving UM RLC in a UE, an additional parameter indicating use/ no use of duplicate avoidance and reordering is included

(see subclause 9.7.10). If duplicate avoidance and reordering is used, the parameters DAR_Window_Size (see subclause 9.6) and the timeout value of Timer_DAR (see subclause 9.5) are included. If out-of-sequence support is configured,, the parameter Configured_Rx_Window_Size is included.

12) The TM_parameters are only applicable for TM operation. It contains e.g. segmentation indication (see subclauses 9.2.2.9 and 11.1.2.1), Timer_Discard value (see subclause 9.5) and delivery of erroneous SDU indication (see subclause 11.1.3).

13) The N parameter indicates that an RLC entity will not send a PDU with "Sequence Number">=VT(S)+N for AM and "Sequence Number">=VT(US)+N for UM, where N is a non-negative integer.

14) The VT(S) parameter indicates the value of the Send State Variable for the case of the AM.

15) The VT(US) parameter indicates the value of the UM Data State Variable, for the case of the UM.

16) The Error_Indicator parameter indicates that the RLC SDU is erroneous (see subclause 11.1.3).

17) The parameter UE-ID type indicator indicates the RNTI type (U-RNTI or C-RNTI) to be used for the associated RLC SDU. This parameter is not required at the UE.

18) The parameter DiscardReq indicates whether the transmitting RLC entity needs to inform the upper layers of the discarded RLC SDU. If required, the transmitting RLC entity notifies upper layers when the SDU is discarded.

19) The parameter Status is only applicable for AM operation. This parameter indicates whether a RLC SDU is successfully transmitted or discarded.

9.4 State variables

The state variables defined in this subclause are normative.

This sub-clause describes the state variables used in AM and UM in order to specify the peer-to-peer protocol. All state variables are non-negative integers. UMD and AMD PDUs are numbered by modulo integer sequence numbers (SN) cycling through the field: 0 to $2^{12} - 1$ for AM and 0 to $2^{7} - 1$ for UM. All arithmetic operations contained in the present document on VT(S), VT(A), VT(MS), VR(R), VR(H) and VR(MR) are affected by the AM modulus. All arithmetic operations contained in the present document on VT(US), VR(US), VR(UDH), VR(UDR) and VR(UOH) are affected by the UM modulus. When performing arithmetic comparisons of state variables or Sequence number values a modulus base shall be used. This modulus base is subtracted (within the appropriate field) from all the values involved and then an absolute comparison is performed. At the Sender, VT(A) and VT(US) shall be assumed to be the modulus base in AM and UM respectively. At the Receiver, VR(R) and VR(US) shall be assumed to be the modulus base in AM and UM respectively.

The RLC shall maintain the following state variables in the Sender.

a) VT(S) - Send state variable.

   This state variable contains the "Sequence Number" of the next AMD PDU to be transmitted for the first time (i.e. excluding retransmitted PDUs). It shall be updated after the aforementioned AMD PDU is transmitted or after transmission of a MRW SUFI which includes SN_MRW_{LENGTH} >VT(S) (see subclause 11.6).

   The initial value of this variable is 0.

b) VT(A) - Acknowledge state variable.

   This state variable contains the "Sequence Number" following the "Sequence Number" of the last in-sequence acknowledged AMD PDU. This forms the lower edge of the transmission window of acceptable acknowledgements. VT(A) shall be updated based on the receipt of a STATUS PDU including an ACK (see subclause 9.2.2.11.2) and/or an MRW_ACK SUFI (see subclause 11.6).

   The initial value of this variable is 0. For the purpose of initialising the protocol, this value shall be assumed to be the first "Sequence Number" following the last in-sequence acknowledged AMD PDU.

c) VT(DAT).

This state variable counts the number of times a AMD PDU has been scheduled to be transmitted. There shall be one VT(DAT) for each PDU and each shall be incremented every time the corresponding AMD PDU is scheduled to be transmitted.

The initial value of this variable is 0.

d) VT(MS) - Maximum Send state variable.

This state variable contains the "Sequence Number" of the first AMD PDU that can be rejected by the peer Receiver, VT(MS) = VT(A) + VT(WS). This value represents the upper edge of the transmission window. The transmitter shall not transmit AMD PDUs with "Sequence Number" $\geq$ VT(MS) unless VT(S) $\geq$ VT(MS). In that case, the AMD PDU with "Sequence Number" = VT(S) - 1 can also be transmitted. VT(MS) shall be updated when VT(A) or VT(WS) is updated.

The initial value of this variable is Configured_Tx_Window_size.

e) VT(US) – UM data state variable.

This state variable contains the "Sequence Number" of the next UMD PDU to be transmitted. It shall be incremented by 1 each time a UMD PDU is transmitted.

The initial value of this variable is 0.

NOTE: For the UTRAN side, the initial value of this variable can be different from 0.

f) VT(PDU).

This state variable is used when the "poll every Poll_PDU PDU" polling trigger is configured. It shall be incremented by 1 for each AMD PDU that is transmitted including both new and retransmitted AMD PDUs. When it becomes equal to the value Poll_PDU, a new poll shall be transmitted and the state variable shall be set to zero.

The initial value of this variable is 0.

g) VT(SDU).

This state variable is used when the "poll every Poll_SDU SDU" polling trigger is configured. It shall be incremented by 1 for a given SDU when the AMD PDU carrying the first segment of this SDU is scheduled to be transmitted for the first time. When it becomes equal to the value Poll_SDU a new poll shall be transmitted and the state variable shall be set to zero. The "Polling bit" shall be set to "1" in the first transmission of the AMD PDU that contains the "Length Indicator" indicating the end of the SDU.

The initial value of this variable is 0.

h) VT(RST) - Reset state variable.

This state variable is used to count the number of times a RESET PDU is scheduled to be transmitted before the reset procedure is completed. VT(RST) shall be incremented by 1 according to subclauses 11.4.2 and 11.4.5.1. VT(RST) shall only be reset upon the reception of a RESET ACK PDU, i.e. VT(RST) shall not be reset when an RLC reset initiated by the peer RLC entity occurs.

The initial value of this variable is 0.

i) VT(MRW) – MRW command send state variable.

This state variable is used to count the number of times a MRW command is transmitted. VT(MRW) is incremented by 1 each time a timer Timer_MRW expires. VT(MRW) shall be reset when the SDU discard with explicit signalling procedure is terminated.

The initial value of this variable is 0.

j) VT(WS) – Transmission window size state variable.

This state variable contains the size that shall be used for the transmission window. VT(WS) shall be set equal to the WSN field when the transmitter receives a STATUS PDU including a WINDOW SUFI.

The initial value of this variable is Configured_Tx_Window_size.

The RLC shall maintain the following state variables in the Receiver:

a) VR(R) - Receive state variable.

This state variable contains the "Sequence Number" following that of the last in-sequence AMD PDU received. It shall be updated upon the receipt of the AMD PDU with "Sequence Number" equal to VR(R).

The initial value of this variable is 0. For the purpose of initialising the protocol, this value shall be assumed to be the first "Sequence Number" following the last in-sequence received AMD PDU.

b) VR(H) - Highest expected state variable.

This state variable contains the "Sequence Number" following the highest "Sequence Number" of any received AMD PDU. When a AMD PDU is received with "Sequence Number" x such that VR(H)≤x<VR(MR), this state variable shall be set equal to x+1.

The initial value of this variable is 0.

c) VR(MR) - Maximum acceptable Receive state variable.

This state variable contains the "Sequence Number" of the first AMD PDU that shall be rejected by the Receiver, VR(MR) = VR(R) + Configured_Rx_Window_Size.

d) VR(US) - Receiver Send Sequence state variable.

This state variable contains the "Sequence Number" following that of the last UMD PDU received. When a UMD PDU with "Sequence Number" equal to x is received, the state variable shall set equal to x + 1.

The initial value of this variable is 0.

e) VR(UOH) –UM out of sequence SDU delivery highest received state variable.

This state variable contains the "Sequence Number" of the highest numbered UMD PDU that has been received.

The initial value of this variable is set according to subclause 11.2.3.2.

f) VR(UDR) –UM duplicate avoidance and reordering send state variable.

This state variable contains the "Sequence Number" of the next UMD PDU that is expected to be received in sequence. Its value is set according to subclause 9.7.10.

The initial value of this variable is set according to subclause 9.7.10.

g) VR(UDH) – UM duplicate avoidance and reordering highest received state variable.

This state variable contains the "Sequence Number" of the highest numbered UMD PDU that has been received by the duplicate avoidance and reordering function.

The initial value of this variable is set according to 9.7.10.

h) VR(UDT) – UM duplicate avoidance and reordering timer state variable.

This state variable contains the sequence number of the UMD PDU associated with Timer_DAR when the timer is running. Its value is set according to subclause 9.7.10.

i) VR(UM) - Maximum acceptable Receive state variable.

This state variable contains the "Sequence Number" of the first UMD PDU that shall be rejected by the Receiver, VR(UM) = VR(US) + Configured_Rx_Window_Size. This state variable is only applicable when out-of-sequence reception is configured by higher layers.

9.6 Protocol Parameters

The behaviour defined in this subclause is normative. The values of the protocol parameters defined in this subclause are signalled by upper layers.

a) MaxDAT.

The maximum number of transmissions of an AMD PDU is equal to MaxDAT – 1. This protocol parameter represents the upper limit for state variable VT(DAT). When VT(DAT) equals the value MaxDAT, either RLC RESET procedure or SDU discard procedure shall be initiated according to the configuration by upper layers.

b) Poll_PDU.

This protocol parameter indicates how often the transmitter shall poll the Receiver in the case where "polling every Poll_PDU PDU" is configured by upper layers. It represents the upper limit for the state variable VT(PDU). When VT(PDU) equals the value Poll_PDU a poll shall be transmitted to the peer entity.

c) Poll_SDU.

This protocol parameter indicates how often the transmitter shall poll the Receiver in the case where "polling every Poll_SDU SDU" is configured by upper layers. It represents the upper limit for state variable VT(SDU). When VT(SDU) equals the value Poll_SDU a poll shall be transmitted to the peer entity.

d) Poll_Window.

This protocol parameter indicates when the transmitter shall poll the Receiver in the case where "window-based polling" is configured by upper layers. A poll is triggered for each AMD PDU when $J \geq$ Poll_Window, where J is the transmission window percentage defined as:

$$J = \frac{(4096+VT(S)+1-VT(A)) \textbf{ mod } 4096}{VT(WS)} * 100 ,$$

where the constant 4096 is the modulus for AM described in subclause 9.4 and VT(S) is the value of the variable before the AMD PDU is submitted to lower layer.

e) MaxRST.

The maximum number of transmissions of a RESET PDU is equal to MaxRST – 1. This protocol parameter represents the upper limit for state variable VT(RST). When VT(RST) equals the value MaxRST, unrecoverable error shall be indicated to upper layers.

f) Configured_Tx_Window_Size.

This protocol parameter indicates both the maximum allowed transmission window size and the value for the state variable VT(WS).

g) Configured_Rx_Window_Size.

This protocol parameter indicates the reception window size. This parameter is applicable both for RLC UM and AM. This parameter is only configured for RLC-UM in case out-of-sequence reception is supported.

h) MaxMRW.

The maximum number of transmissions of an MRW command is equal to MaxMRW. This protocol parameter represents the upper limit for state variable VT(MRW). When VT(MRW) equals the value MaxMRW, the RLC RESET procedure shall be initiated.

i) OSD_Window_Size

This protocol parameter indicates the size of the out of sequence SDU delivery storage window.

j) DAR_Window_Size

This protocol parameter indicates the size of the duplicate avoidance and reordering receive window.

11.2.3.1 SDU discard and re-assembly

Upon delivery of a set of UMD PDUs from the lower layer or from the duplicate avoidance and reordering subentity, the Receiver shall:

- if out-of-sequence reception is configured and SN > VR(UM):
  - discard the UMD PDU.
- else: [NOTE TO EDITOR: SHIFTED THE BULLETS BELOW TO THE RIGHT]
  - update VR(US) according to each received UMD PDU (see subclause 9.4);
  - if the updating step of VR(US) is not equal to one (i.e. one or more UMD PDUs are missing):
    - discard the SDUs that could have segments or "Length Indicators" indicating the end of the SDUs in the missing UMD PDUs according to subclauses 9.2.2.8 and 9.2.2.9.
  - if the special "Length Indicator" "1111 100" or "1111 1111 1111 100" is the first "Length Indicator" of a UMD PDU received on the downlink:
    - consider the first data octet in this UMD PDU as the first octet of an RLC SDU.
  - reassemble the received UMD PDUs into RLC SDUs;
  - submit the RLC SDUs to upper layers through the UM-SAP.

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CR-Form-v7

CHANGE REQUEST

⌘ **25.324** **CR** **0025** ⌘ **rev** **-** ⌘ Current version: **6.2.0** ⌘

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

Proposed change affects: UICC apps⌘ [ ] ME [X] Radio Access Network [X] Core Network [ ]

Title:	⌘	Clarification of RLC concatenation procedure with BMC
Source:	⌘	RAN WG2
Work item code:	⌘	TEI6
Date:	⌘	08/04/2005
Category:	⌘	**F**
Release:	⌘	Rel-6

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)*
Rel-6	*(Release 6)*

Reason for change:	⌘	The BMC specification does not clearly specify whether RLC Length Indicators can be concatenated with RLC SDUs they don't refer to.
Summary of change:	⌘	**A R99/R4/R5 UE can expect the behaviour described by this CR from UTRAN** The second note in section 9.2 of BMC is worded differently to clarify that RLC Length Indicators cannot be concatenated with RLC SDUs they don't refer to. Isolated Impact analysis: This will only impact the BMC function at the UTRAN and the RLC transmitter function at the UTRAN
Consequences if not approved:	⌘	UE behaviour will remain undefined. A UTRAN implementation of BMC which doesn't implement this change will transmit RLC SDUs which may be ignored at the RLC receiver in the UE.

Clauses affected:	⌘	9.2

Other specs affected:	⌘	Y	N		⌘
			X	Other core specifications	
			X	Test specifications	
			X	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/specs/CR.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 Generation of Schedule message

NOTE: Principles and examples are described in [6].

This procedure calculates the CBS schedule periods and assigns BMC messages (i.e. CBS Messages, CBS41 Messages and Schedule Messages) to the CBS schedule periods and gives an indication which of the CTCH Block Sets containing a part of or a complete BMC messages has the status "new".

NOTE: The concatenation function of RLC shall not be applied. RLC Length Indicators shall not be concatenated with RLC SDUs they do not refer to.

Algorithms used for scheduling are implementation dependent and thus do not need to be specified. Some parameters may be set by CBC or O&M system.

CTCH Block Sets are indicated in a New Message Bitmap IE of BMC Schedule Message as new (bit position of a CTCH Block Set is set to value "1") when one of the following conditions is met:

The CTCH Block Set contains part of or a complete BMC message which
was either not sent during the previous CBS schedule period,
or sent unscheduled during the preceding CBS schedule period;
or, the CTCH Block Set is indicated as of free usage, reading advised,
or it contains the Schedule Message partly or complete of the following CBS schedule period,
or it contains a CBS41 Message partly or complete.

Other BMC messages sent in the same CBS schedule messages are indicated as "old" (bit position of CTCH Block Set containing this message partly or complete is set to value 0).

The indication "new" is set both for the first transmission of a BMC message in the CBS schedule period or a repetition of it within the CBS schedule period. For CBS41 Messages, repetition is not specified.

The input parameters of the scheduling procedure are set by CBC or RRC or by the O&M system for the BMC.

The CBC input parameters are:

CB messages (i.e. BMC SDUs),
Message Identifier per CB message,
Serial Number per CB message,
CB repetition period per CB message,
Number of Broadcast Requested per CB message.

The RRC input parameters are:

Sizes of CTCH Block Sets,
Timing of CTCH Block Set sequence.

The O&M (BMC) input parameters are:

DRX Schedule Period (cell related parameter) requested optionally,
Reserved CB Capacity (cell related parameter) requested optionally.