TSG-RAN Meeting #21 ***RP-030490***
Frankfurt, Germany, 16-19 September 2003

Title: **CRs (Rel-4 and linked Rel-5) to TS 25.322.**

Source: **TSG-RAN WG2**

Agenda item: **7.3.4**

Spec	CR	Rev	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level	Workitem
25.322	246	-	Rel-4	Reconfiguration of RLC window size	F	4.9.0	4.10.0	R2-032023	TEI4
25.322	247	-	Rel-5	Reconfiguration of RLC window size	A	5.5.0	5.6.0	R2-032024	TEI4

3GPP TSG-RAN2 Meeting #37
Budapest, Hungary 25th to 29th August 2003

Tdoc ⌘R2-032023

CR-Form-v7

CHANGE REQUEST

⌘ **25.322** **CR** **246** ⌘ **rev** **-** ⌘ Current version: **4.9.0** ⌘

*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:	⌘	Reconfiguration of RLC window size
Source:	⌘	RAN WG2
Work item code:	⌘	TEI-4
Date:	⌘	August 2003
Category:	⌘	**F**
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)*
Rel-6	*(Release 6)*

Reason for change: ⌘ At WG2-36 a CR on 25.322 was accepted (R2-031469) which defines actions for reconfiguration of the RLC window size. However, the agreed revision does not include any memory handling.

When a new RAB using AM RLC is setup, the RLC window size for the existing RAB(s) may need to be reduced. During a transition phase the number of PDUs in the RLC buffers for the RAB existing prior to the reconfiguration may exceed the window size as defined in section 9.7.9.

This means that the buffer memory may not be sufficient to process incoming received AMD PDUs or to segment new SDUs into AMD PDUs. It is proposed to add text capturing this.

In addition it need to be specified that the UE must be able to process the AMD PDU with SN=VR(R) (i.e. at the bottom of the receiver window), otherwise the protocol is stalled and a deadlock situation is present.

The current protocol was only considering the case of a change in the transmitter window size. It is not clear what should be going on when VR(H)>VR(MR). If read litterally, the RLC entity would send NACKs for PDUs outside the receiver window.

Summary of change: ⌘ 1) It is clarified that the number of PDUs in the RLC buffers may exceed the window size. It is also clarified that the UE is not required to receive AMD PDUs (except for retransmissions of the PDU with SN=VR(R)) or segment SDUs into AMD PDUs.

2) It is clarified that any AMD PDUs that the UE discards at the reconfiguration shall be considered as not being received in transmitted status reports:

Consequences if not approved:	⌘	If the CR is not implemented buffer overflow results in undefined actions in cases where new RABs are setup, or RAB parameters are modified. Without a defined behaviour, stall situations and protocol errors may occur leading to interoperability problems. 3) It is clarified that Status reports should not be sent for data outside the receiver window (except ACK SUFI). 4) It was clarified that the transmitter should not re-transmit data outside the transmitter window since this case would no longer cause a RESET. **Impact analysis:** Impacted functionality: memory handling for RLC buffers. Correction type: Clarification of a function where the specification is incomplete, ambiguous and/ or inconsistent. Interoperability: • Isolated impact: the impact is isolated; only the corrected functionality is affected • CR implemented only by UTRAN: The CR has no UTRAN impact • CR implemented only by the UE: no interoperability problems are foreseen

Clauses affected:	⌘	9.7.9			
Other specs affected:	⌘	**Y** / **N**	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.

9.2.2.11 SUFI

Which SUFI fields to use is implementation dependent, but when a STATUS PDU includes information about which AMD PDUs have been received and which are detected as missing, information shall not be included about AMD PDUs with "Sequence Number"≥VR(H) or "Sequence Number"≥VR(MR), i.e. AMD PDUs that have not yet reached the Receiver or are above~~outside~~ the receiving window. Information about AMD PDUs with "Sequence Number"<VR(R) shall not be given except when this is necessary in order to use the BITMAP SUFI, see subclause 9.2.2.11.5.

Length: variable number of bits.

The SUFI can include three sub-fields: type information (type of super-field, e.g. list, bitmap, acknowledgement, etc), length information (providing the length of a variable length field within the following value field) and a value.

Figure 9.7 shows the structure of the super-field. The size of the type sub-field is non-zero but the size of the other sub-fields may be zero.

Type
Length
Value

Figure 9.7: The Structure of a Super-Field

The length of the type field is 4 bits and it may have any of following values.

Bit	Description
0000	No More Data (**NO_MORE**)
0001	Window Size (**WINDOW**)
0010	Acknowledgement (**ACK**)
0011	List (**LIST**)
0100	Bitmap (**BITMAP**)
0101	Relative list (**Rlist)**
0110	Move Receiving Window **(MRW)**
0111	Move Receiving Window Acknowledgement **(MRW_ACK)**
1000-1111	Reserved (PDUs with this encoding are invalid for this version of the protocol)

The size and presence of the sub-fields "Length" and "Value" depend on the super-field type and is specified for each super field separately.

9.2.2.11.2 The Acknowledgement super-field

The 'Acknowledgement' super-field consists of a type identifier field (ACK) and a sequence number (LSN) as shown in figure 9.9 below. The acknowledgement super-field is also indicating the end of the data part of a STATUS PDU. Thus, no 'NO_MORE' super-field is needed in the STATUS PDU when the 'ACK' super-field is present. The ACK SUFI shall always be placed as the last SUFI if it is included in a STATUS PDU. All data after this SUFI shall be regarded as padding and shall be neglected.

Type = **ACK**
LSN

Figure 9.9: The ACK fields in a STATUS PDU

LSN

Length: 12 bits

Acknowledges the reception of all AMD PDUs with "Sequence Number" < LSN (Last Sequence Number) that are *not* indicated to be erroneous in earlier parts of the STATUS PDU. This means that if the LSN is set to a value greater than VR(R), all erroneous AMD PDUs shall be included in the same STATUS PDU and if the LSN is set to VR(R), the

erroneous AMD PDUs can be split into several STATUS PDUs. At the transmitter, if the value of the LSN =< the value of the first error indicated in the STATUS PDU, VT(A) will be updated according to the LSN, otherwise VT(A) will be updated according to the first error indicated in the STATUS PDU. VT(A) is only updated based on STATUS PDUs where ACK SUFI (or MRW_ACK SUFI) is included. The LSN shall not be set to a value > VR(H) nor < VR(R).

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;~~.~~
  - consider the discarded AMD PDUs as not having been~~ing~~ 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 clause 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 ~~by an ACK SUFI~~;
  - the UE may discard AMD PDUs that are positively acknowledged ~~by an ACK SUFI~~.

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 section 11.3.4.x).

~~While the buffer memory is full:~~

- ~~the UE may discard AMD PDUs received while the memory is full, except the AMD PDU with "Sequence Number" = VR(R) which shall always be processed;~~
- ~~the UE is not required to segment RLC SDUs into AMD PDUs according to Subclause 11.3.2;~~
- ~~retransmissions of AMD PDUs and processing of STATUS PDUs shall be performed as normal.~~

10.1 Erroneous Sequence Number

A STATUS PDU or Piggybacked STATUS PDU including "erroneous Sequence Number" is a STATUS PDU or Piggybacked STATUS PDU that contains:

- a LIST, BITMAP or RLIST SUFI in which the "Sequence Number" of at least one AMD PDU that is negatively acknowledged is outside the interval VT(A)≤"Sequence Number"≤ VT(S)-1; or
- an ACK SUFI in which "LSN" is outside the interval VT(A)≤"LSN"≤ VT(S).

If an AM RLC entity receives a STATUS PDU or a Piggybacked STATUS PDU including "erroneous Sequence Number", it shall:

- discard the STATUS PDU or the Piggybacked STATUS PDU;
- initiate the RLC reset procedure (see subclause 11.4).

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 the RLC SDUs into AMD PDUs where the fixed PDU size is configured by upper layer;
  - 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;
- ~~if one or several~~for each AMD PDU~~s have~~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~~s that were negatively acknowledged~~ for retransmission; [CHANGE OF INDENTATION]
- if a poll has been triggered by either the poll triggers "Poll timer" or "Timer based" (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:
  - 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 yet been acknowledged by the peer entity;
  - schedule the selected AMD PDU for retransmission (in order to transmit a poll).

Each time an AMD PDU is scheduled for transmission or retransmission, the Sender shall:

- increment the value of the corresponding VT(DAT);
- if VT(DAT) = MaxDAT:
  - perform the actions specified in subclause 11.3.3a;
- e1se:
  - notify the lower layer that data is available for transmission;
  - perform the actions specified in subclause 11.3.2.2.

In AM, a PDU shall be considered to be a padding PDU if it is:

- an AMD PDU consisting only of an RLC Header with one "Length Indicator" (indicating that the rest of the PDU is padding) and padding; or
- a STATUS PDU consisting only of a NO_MORE SUFI.

11.3.4 Abnormal cases

11.3.4.1 Void

11.3.4.2 Receiving an AMD PDU outside the reception window

Upon reception of an AMD PDU with "Sequence Number" outside the interval VR(R)≤SN<VR(MR), the Receiver shall:

- discard the AMD PDU;
- if the "polling bit" in the discarded AMD PDU is set to "1":
  - initiate the STATUS PDU transfer procedure.

11.3.4.3 Timer_Discard timeout

11.3.4.3.1 SDU discard with explicit signalling

Upon expiry of the timer Timer_Discard, the Sender shall:

- initiate the SDU discard with explicit signalling procedure, see subclause 11.6.2.

In the case where the TFC selection exchange has been initiated by sending the RLC Entity Info parameter to MAC, the UE may wait until after it provides MAC with the requested set of PDUs before discarding the afore-mentioned SDUs.

11.3.4.4 Void

11.3.4.5 Invalid length indicator value

If the "Length Indicator" of an AMD PDU has a value that is larger than the PDU size – RLC header size and is not one of the predefined values listed in the table of subclause 9.2.2.8, the Receiver shall:

- ignore that AMD PDU.

11.3.4.6 Length Indicator value reserved for AMD PDU

Upon delivery by the lower layer of an AMD PDU that contains a "Length Indicator" value specified to be reserved for AMD PDUs in this version of the protocol, the Receiver shall:

- ignore that AMD PDU.

11.3.4.7 Void

11.3.4.x Full Buffer Behavior

It is foreseen that in some ~~rare~~ conditions, e.g. when the window size is re-configured, the UE may have memory limitations.

~~In this case~~While the buffer memory is full:

- the UE is not required to segment RLC SDUs into AMD PDUs as per Subclause 11.3.2;
- the UE shall ~~always~~:

- be able to process incoming AMD PDUs (especially to be able to ~~receive~~process and store the AMD PDU with "Sequence Number" = VR(R));
- operate according to the normal protocol, e.g. process STATUS reports and perform retransmissions;

- the UE may discard received AMD PDUs with “Sequence Number” within the receiving window and consider the discarded AMD PDUs as not having been received.

11.5.2.2 STATUS PDU contents to set

On triggering of a status report, the Receiver shall:

- if neither the "STATUS prohibit" nor "EPC mechanism" are active:
  - include negative acknowledgements for all AMD PDUs detected as missing;
  - include positive acknowledgements for all AMD PDUs received up to at least VR(R);
- if an MRW SUFI assembled as specified in subclause 11.6.2.2 had not been sent:
  - optionally include the MRW SUFI;
- if an MRW_ACK SUFI assembled as specified in subclause 11.6.2.2 is awaiting transmission:
  - optionally include the MRW_ACK SUFI;
- if the Sender's transmission window is to be updated:
  - optionally include the WINDOW SUFI;
- if all SUFIs can be accommodated in one STATUS PDU:
  - construct the status report using one STATUS PDU, using one of the allowed PDU sizes;
  - if the SUFIs included do not fill the entire STATUS PDU:
    - terminate the STATUS PDU with the ACK or NO_MORE SUFI;
    - use padding in the remainder of the STATUS PDU;
  - otherwise (SUFIs included fill the entire STATUS PDU):
    - ACK or NO_MORE SUFIs need not be included in that STATUS PDU;
- otherwise (the status report is segmented):
  - construct STATUS PDUs including only complete SUFIs using one of the allowed PDU sizes. The set of STATUS PDUs shall accommodate all the SUFIs to form the complete status report. Indication of the same AMD PDU shall not be given in more than one STATUS PDU of a status report, but the ACK SUFI can be present in more than one STATUS PDU of a status report;
  - if any STATUS PDU constructed is not entirely filled with SUFIs:
    - terminate that STATUS PDU with the ACK or NO_MORE SUFI;
    - use padding in the remainder of that STATUS PDU.
  - otherwise (SUFIs included fill the entire STATUS PDU):
    - ACK or NO_MORE SUFIs should not be included in that STATUS PDU.

Which SUFI fields to use is implementation dependent. Bitmap SUFI is used to indicate both received and/or missing AMD PDUs. List SUFI and/or Relative List SUFI are used to indicate missing AMD PDUs only. Acknowledgement SUFI is used to indicate the received AMD PDUs. (For SUFI details see 9.2.2.11.) ~~No information shall be given for AMD PDUs with "Sequence Number"≥VR(H) or “Sequence Number"≥VR(MR), i.e. AMD PDUs that have not yet reached the Receiver or are outside above the receiver window~~.

3GPP TSG-RAN2 Meeting #37
Budapest, Hungary 25th to 29th August 2003

Tdoc ⌘R2-032024

CR-Form-v7

CHANGE REQUEST

⌘ **25.322** **CR** **247** ⌘ **rev** **-** ⌘ Current version: **5.5.0** ⌘

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

Title:	⌘	Reconfiguration of RLC window size
Source:	⌘	RAN WG2
Work item code:	⌘	TEI-4
Date:	⌘	August 2003
Category:	⌘	**A**
Release:	⌘	Rel-5

Use one of the following categories:
F *(correction)*
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Rel-4	*(Release 4)*
Rel-5	*(Release 5)*
Rel-6	*(Release 6)*

Reason for change: ⌘ At WG2-36 a CR on 25.322 was accepted (R2-031469) which defines actions for reconfiguration of the RLC window size. However, the agreed revision does not include any memory handling.

When a new RAB using AM RLC is setup, the RLC window size for the existing RAB(s) may need to be reduced. During a transition phase the number of PDUs in the RLC buffers for the RAB existing prior to the reconfiguration may exceed the window size as defined in section 9.7.9.

This means that the buffer memory may not be sufficient to process incoming received AMD PDUs or to segment new SDUs into AMD PDUs. It is proposed to add text capturing this.

In addition it need to be specified that the UE must be able to process the AMD PDU with SN=VR(R) (i.e. at the bottom of the receiver window), otherwise the protocol is stalled and a deadlock situation is present.

The current protocol was only considering the case of a change in the transmitter window size. It is not clear what should be going on when VR(H)>VR(MR). If read litterally, the RLC entity would send NACKs for PDUs outside the receiver window.

Summary of change: ⌘ 1) It is clarified that the number of PDUs in the RLC buffers may exceed the window size. It is also clarified that the UE is not required to receive AMD PDUs (except for retransmissions of the PDU with SN=VR(R)) or segment SDUs into AMD PDUs.

2) It is clarified that any AMD PDUs that the UE discards at the reconfiguration shall be considered as not being received in transmitted status reports:

Consequences if not approved:	⌘	If the CR is not implemented buffer overflow results in undefined actions in cases where new RABs are setup, or RAB parameters are modified. Without a defined behaviour, stall situations and protocol errors may occur leading to interoperability problems. 3) It is clarified that Status reports should not be sent for data outside the receiver window (except ACK SUFI). 4) It was clarified that the transmitter should not re-transmit data outside the transmitter window since this case would no longer cause a RESET. **Impact analysis:** Impacted functionality: memory handling for RLC buffers. Correction type: Clarification of a function where the specification is incomplete, ambiguous and/ or inconsistent. Interoperability: • Isolated impact: the impact is isolated; only the corrected functionality is affected • CR implemented only by UTRAN: The CR has no UTRAN impact • CR implemented only by the UE: no interoperability problems are foreseen

Clauses affected:	⌘	9.2.2.11, 9.7.9, 11.3.2, 11.3.4.x (new), 11.5.2.2			
Other specs affected:	⌘	**Y** / **N** **X** **X** **X**	Other core specifications Test specifications O&M Specifications	⌘	
Other comments:	⌘				

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9.2.2.11 SUFI

Which SUFI fields to use is implementation dependent, but when a STATUS PDU includes information about which AMD PDUs have been received and which are detected as missing, information shall not be included about AMD PDUs with "Sequence Number"≥VR(H) or "Sequence Number"[3]VR(MR), i.e. AMD PDUs that have not yet reached the Receiver or are above the receiving window. Information about AMD PDUs with "Sequence Number"<VR(R) shall not be given except when this is necessary in order to use the BITMAP SUFI, see subclause 9.2.2.11.5.

Length: variable number of bits.

The SUFI can include three sub-fields: type information (type of super-field, e.g. list, bitmap, acknowledgement, etc), length information (providing the length of a variable length field within the following value field) and a value.

Figure 9.7 shows the structure of the super-field. The size of the type sub-field is non-zero but the size of the other sub-fields may be zero.

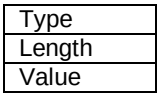

Figure 9.7: The Structure of a Super-Field

The length of the type field is 4 bits and it may have any of following values.

Bit	Description
0000	No More Data (**NO_MORE**)
0001	Window Size (**WINDOW**)
0010	Acknowledgement (**ACK**)
0011	List (**LIST**)
0100	Bitmap (**BITMAP**)
0101	Relative list (**Rlist)**
0110	Move Receiving Window **(MRW)**
0111	Move Receiving Window Acknowledgement **(MRW_ACK)**
1000-1111	Reserved (PDUs with this encoding are invalid for this version of the protocol)

The size and presence of the sub-fields "Length" and "Value" depend on the super-field type and is specified for each super field separately.

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;
  - 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 section 11.3.4.x).

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 the RLC SDUs into AMD PDUs where the fixed PDU size is configured by upper layer;
    - 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;
- ~~if one or several~~ for each AMD PDU~~s have~~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~~s that were negatively acknowledged~~ for retransmission; [CHANGE OF INDENTATION]
- if a poll has been triggered by either the poll triggers "Poll timer" or "Timer based" (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:
    - 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 yet been acknowledged by the peer entity;
- schedule the selected AMD PDU for retransmission (in order to transmit a poll).

Each time an AMD PDU is scheduled for transmission or retransmission, the Sender shall:

- increment the value of the corresponding VT(DAT);
- if VT(DAT) = MaxDAT:
    - perform the actions specified in subclause 11.3.3a;
- e1se:
    - notify the lower layer that data is available for transmission;
    - perform the actions specified in subclause 11.3.2.2.

In AM, a PDU shall be considered to be a padding PDU if it is:

- an AMD PDU consisting only of an RLC Header with one "Length Indicator" (indicating that the rest of the PDU is padding) and padding; or
- a STATUS PDU consisting only of a NO_MORE SUFI.

11.3.4.7 Void

11.3.4.x Full Buffer Behavior

It is foreseen that in some conditions, e.g. when the window size is re-configured, the UE may have memory limitations.

While the buffer memory is full:

- the UE is not required to segment RLC SDUs into AMD PDUs as per Subclause 11.3.2;
- the UE shall:
  - be able to process incoming AMD PDUs (especially to be able to process and store the AMD PDU with "Sequence Number" = VR(R));
  - operate according to the normal protocol, e.g. process STATUS reports and perform retransmissions;
- the UE may discard received AMD PDUs with “Sequence Number” within the receiving window and consider the discarded AMD PDUs as not having been received.

11.5.2.2 STATUS PDU contents to set

On triggering of a status report, the Receiver shall:

- if neither the "STATUS prohibit" nor "EPC mechanism" are active:
  - include negative acknowledgements for all AMD PDUs detected as missing;
  - include positive acknowledgements for all AMD PDUs received up to at least VR(R);
- if an MRW SUFI assembled as specified in subclause 11.6.2.2 had not been sent:
  - optionally include the MRW SUFI;
- if an MRW_ACK SUFI assembled as specified in subclause 11.6.2.2 is awaiting transmission:
  - optionally include the MRW_ACK SUFI;
- if the Sender's transmission window is to be updated:
  - optionally include the WINDOW SUFI;
- if all SUFIs can be accommodated in one STATUS PDU:
  - construct the status report using one STATUS PDU, using one of the allowed PDU sizes;
  - if the SUFIs included do not fill the entire STATUS PDU:
    - terminate the STATUS PDU with the ACK or NO_MORE SUFI;
    - use padding in the remainder of the STATUS PDU;
  - otherwise (SUFIs included fill the entire STATUS PDU):
    - ACK or NO_MORE SUFIs need not be included in that STATUS PDU;
- otherwise (the status report is segmented):
  - construct STATUS PDUs including only complete SUFIs using one of the allowed PDU sizes. The set of STATUS PDUs shall accommodate all the SUFIs to form the complete status report. Indication of the same

AMD PDU shall not be given in more than one STATUS PDU of a status report, but the ACK SUFI can be present in more than one STATUS PDU of a status report;

- if any STATUS PDU constructed is not entirely filled with SUFIs:
  - terminate that STATUS PDU with the ACK or NO_MORE SUFI;
  - use padding in the remainder of that STATUS PDU.
- otherwise (SUFIs included fill the entire STATUS PDU):
  - ACK or NO_MORE SUFIs should not be included in that STATUS PDU.

Which SUFI fields to use is implementation dependent. Bitmap SUFI is used to indicate both received and/or missing AMD PDUs. List SUFI and/or Relative List SUFI are used to indicate missing AMD PDUs only. Acknowledgement SUFI is used to indicate the received AMD PDUs. (For SUFI details see 9.2.2.11.) ~~No information shall be given for AMD PDUs with "Sequence Number"≥VR(H), i.e. AMD PDUs that have not yet reached the Receiver.~~