TSG-RAN Working Group 2 (Radio layer 2 and Radio layer 3) **_TSGR2#2(99)150_**
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Title: **RLC PDU Types and Formats**

Document for: Decision

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RLC PDU Types and Formats

1   Introduction

[1] This document proposes new PDUs and new PDU formats, which are more in line with documents Ericsson, Tdoc RAN WG2 147/99, "Model of RLC".

[2] Ericsson, Tdoc RAN WG2 148/99, "RLC protocol states".

[3] 3GPP TSG RAN WG2, Tdoc RAN WG2 /99, "Description of the RLC protocol", v 0.0.1.

 and Ericsson, Tdoc RAN WG2 148/99, "RLC protocol states".. The main difference from 3GPP TSG RAN WG2, Tdoc RAN WG2 /99, "Description of the RLC protocol", v 0.0.1. is that some of the control PDUs (BGN, BGN ACK, END and END ACK) are regarded as FFS and that two new control PDUs (RESET and RESET ACK) are introduced. The document also proposes new PDU formats for the AMD, UMD and STAT PDUs.

2   Some elements for peer to peer communications

2.1 RLC PDU Types

Table 1 below summerizes the different RLC control PDU types.

Functionality	PDU name	Description
Resynchronisation	RESET	Reset request
	RESET ACK	Reset acknowledgement
Acknowledged Data Transfer	STAT	Status Report
Establishment	BGN	Request Initialization is FFS.
	BGAK	Request Acknowledgement is FFS.
	BGREJ	Connection Reject is FFS.
Release	END	Disconnect Command is FFS.
	ENDAK	Disconnect Acknowledgement is FFS.

Table 1. RLC control PDU types.

The RLC control PDU are used only by the acknowledged mode entities. The types are defined as follows:

RESET PDU (Synchronisation Request):

The RESET PDU is transmitted in order to resynchronize the RLC peer entities.

RESET ACK PDU (Synchronisation Request Acknowledgement):

The RESET ACK PDU is transmitted as a response to the RESET PDU.

STAT PDU (Solicited Status Report):

The STAT PDU is transmitted upon detection of an erroneous transmission of one or more data PDUs or as a response to a status request, which is transmitted through piggybacking a poll bit in a RLC data PDU.

BGN PDU (Begin PDU)

The BGN PDU is used by an RLC entity in order to establish an RLC link between the entity and its peer entity. The need of this PDU is FFS.

BGAK PDU (Begin Acknowledgement PDU)

The BGAK PDU is an acknowledgement to the BGN PDU. The need of this PDU is FFS.

END PDU (End PDU)

The END PDU is used by an RLC entity in order to release the RLC link between the entity and its peer entity. The need of this PDU is FFS.

ENDAK PDU (End Acknowledgement PDU)

The ENDAK PDU is an acknowledgement to the END PDU. The need of this PDU is FFS.

Table 2 below summerizes the different RLC data PDU types.

Functionality	PDU name	Description
Acknowledged ModeData Transfer	AMD	Sequenced acknowledged mode data
Unacknowledged Mode Data Transfer	UMD	Sequenced unacknowledged mode data

Table 2. RLC data PDU types.

The RLC data PDU types are defined as follows:

AMD PDU (Acknowledged Mode Data PDU):

The AMD PDU is used to convey sequentially numbered PDUs containing user data. The AMD PDU is used by the acknowledged mode RLC entities.

UMD PDU (Unacknowledged Mode Data PDU):

The UMD PDU is used to convey sequentially numbered PDUs containing user data. The UMD PDU is used by the unacknowledged mode RLC entities.

2.2 RLC PDU Formats and Parameters

2.2.1 RLC PDU Formats

2.2.1.1 Control PDUs

In Figure 1 the format of the STAT PDU is illustrated. This control PDU is used to inform the transmitting side of an acknowledged mode entity about missing AMD PDUs at the receiving side of its peer entity.
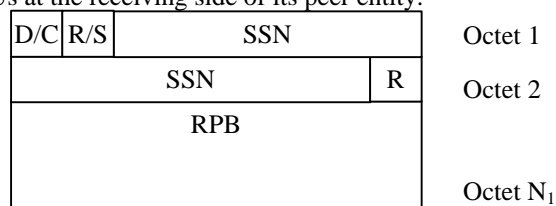
D/C	R/S	SSN		Octet 1
	SSN		R	Octet 2
	RPB			
				Octet N$_1$

Figure 1. Status Report PDU (STAT PDU).

2.2.1.2 Data PDUs

In Figure 2 and Figure 3 the formats of the AMD PDU and UMD PDU are illustrated. From the figures it is seen that the RLC PDUs are octet based. The difference between the two PDU types is that the AMD PDU has a Poll field, whereas the UMD PDU does not. Another difference is that the sequence number of the AMD PDU is longer than the one of the UMD PDU. For the unacknowledged mode, the presence of a sequence number is for the purpose of detecting missing PDUs, while assembling higher layer SDUs.
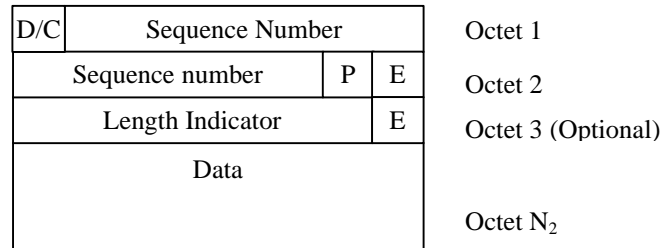
D/C	Sequence Number			Octet 1
Sequence number		P	E	Octet 2
Length Indicator			E	Octet 3 (Optional)
Data				
				Octet N_2

Figure 2. Acknowledged Mode Data PDU (AMD PDU).

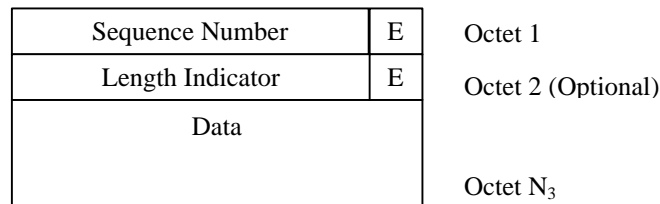| Sequence Number | | E | Octet 1 |
Length Indicator		E	Octet 2 (Optional)
Data			
			Octet N_3

Figure 3. Unacknowledged Mode Data PDU (UMD PDU)

2.2.2 RLC PDU parameters

Data or control PDU (D/C):
This field indicates the type of an acknowledged mode PDU. It can be either a data or control PDU.

Resynchronisation or Status Report PDU (R/S):
This field indicates if it is a resynchronisation or status report PDU.

Reserved field (R):
This field is reserved for future use.

Starting Sequence Number (SSN):
This field indicates the sequence number of the last in-sequence AMD PDU received by the receiver RLC. All AMD PDUs with sequence numbers less or equal to SSN are positively acknowledged.

Received PDU Bitmap (RPB):
The received PDU bitmap is a variable length parameter, which indicates the erroneous or missing AMD PDUs after the SSN.

Sequence Number (SN):
This field indicates the sequence number of an AMD PDU or UMD PDU.

Polling bit (P):
This field is used to request a status report (STAT PDU) from the receiver RLC.

Extension bit (E):
This bit indicates whether the next octet will be header information (LI) or data.

Length Indicator (LI):
This field is optional and is used if concatenation or padding takes place. It indicates the end of the last segment of an SDU, when the remaining of the RLC PDU will be filled with either padding or data of a following SDU.

Data:
Data from higher layers are mapped onto this field.

3   Proposal

In section 2.1 a new list of RLC PDUs is presented. It is proposed that this list replaces the current list in section 9.1 in S2.22 3GPP TSG RAN WG2, Tdoc RAN WG2 /99, "Description of the RLC protocol", v 0.0.1.. New PDU formats for the STAT, AMD, UMD PDUs is presented in sections 2.2.1.1 and 2.2.1.2. It is proposed that these PDU formats replaces the old PDU formats of corresponding PDUs in section 9.2 in 3GPP TSG RAN WG2, Tdoc RAN WG2 /99, "Description of the RLC protocol", v 0.0.1.. Further, it is proposed that the parameters presented in section 2.2.2 are included in section 9.2 in 3GPP TSG RAN WG2, Tdoc RAN WG2 /99, "Description of the RLC protocol", v 0.0.1..

4   References

[1] Ericsson, Tdoc RAN WG2 147/99, "Model of RLC".
[2] Ericsson, Tdoc RAN WG2 148/99, "RLC protocol states".
[3] 3GPP TSG RAN WG2, Tdoc RAN WG2 /99, "Description of the RLC protocol", v 0.0.1.