TSG-RAN Working Group 2 (Radio layer 2 and Radio layer 3) ***TSGR2#4(99)385***
Berlin 25th to 28th May 1999

Agenda Item: 9.1

Source: NTT DoCoMo

Title: **Proposal on RESET/RESET ACK PDU for RLC**

Document for: Decision

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1. Introduction

Currently the method of resetting RLC connection has been kept as FFS, because two possibilities have been considered. One is using RESET/RESET ACK PDU of RLC and the other is using RRC level reset procedure. This paper compares these two methods and as a result proposes RESET/RESET ACK PDU.

2. Discussion

a) In case reset is done by RRC:
If RRC receives the error indication from RLC that detected error, RRC should send a RRC message that requests resetting RLC connection to peer entity immediately, because RLC connection should be reset as soon as possible. And then both RLC entities will be requested to reset by RRC. After the reset of RLC, RRC then needs to return to the previous state where it received the error indication. So, RRC must take the error indication from RLC into account in all of the RRC states. -> *It makes RRC states complicated.*

b) In case reset is done by RLC:
If a RLC entity detects error situation, it will send RESET PDU to the peer entity. Upon receiving the RESET PDU, the entity will be reset and send RESET ACK PDU. Then upon receiving the RESET ACK PDU, the entity that detected error will be reset. -> *Reset can be done within RLC without affecting RRC.*

Comparing these two methods, RLC connection should be reset by RLC itself.

3. Proposal

From the above discussion, RESET/RESET ACK PDUs are necessary to reset RLC connection. So it is proposed to add RESET/RESET ACK and PDU formats of them in [1] as follows.

9. Elements for peer-to-peer communication

In unacknowledged transmission, only one type of unacknowledged data PDU is exchanged between peer RLC entities. In acknowledged transmission, both (acknowledged) data PDUs and control PDUs are exchanged between peer RLC entities.

9.1. Protocol data units

[All the section shall be reviewed when the protocol is defined]

Data PDU

The AMD PDU is used to convey sequentially numbered PUs containing RLC SDU data. The AMD PDU is used by the

b) UMD PDU (Unacknowledged Mode Data PDU)

the unacknowledged data transfer.

a) BGN PDU (Begin)

b) BGAK PDU (Begin Acknowledge)

c) BGREJ PDU (Begin Reject)

d) END PDU (End)

e) ENDAK PDU (End Acknowledge)

f) STATUS PDU

a missing PU (unsolicited) or as a response to a polling request from the transmitting entity.

The RESET PDU is

h) RESET ACK PDU

The RESET ACK PDU is an acknowledgement to the RESET PDU.

Table 0-1: RLC PDU names and descriptions

Functionality	PDU name	Description
Management of the connection	BGN	Request Initialization
	BGAK	Request Acknowledgement
	BGREJ	Connection Reject
	END	Disconnect Command
	ENDAK	Disconnect Acknowledgement
	RESET	Reset Command
	RESET ACK	Reset Acknowledgement
Acknowledged Data Transfer	AMD	Sequenced acknowledged mode data
	STATUS [FFS]	Solicited or Unsolicited Status Report
Unacknowledged Data Transfer	UMD	Sequenced unacknowledged mode data

9.2. Formats and parameters

[All the section shall be reviewed when the protocol is defined]

AMD PDU

Note: R bit may be H bit. It is FFS.

Transfers user data and requests status report by setting Poll bit.

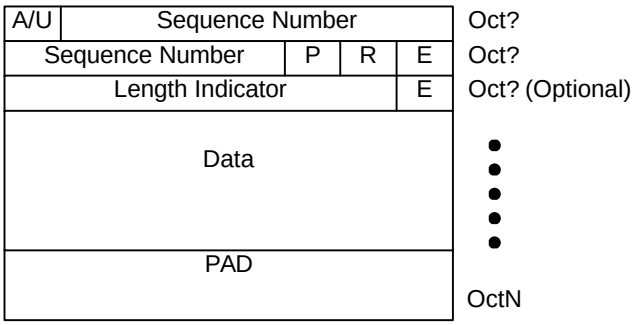

Figure - .

UMD PDU

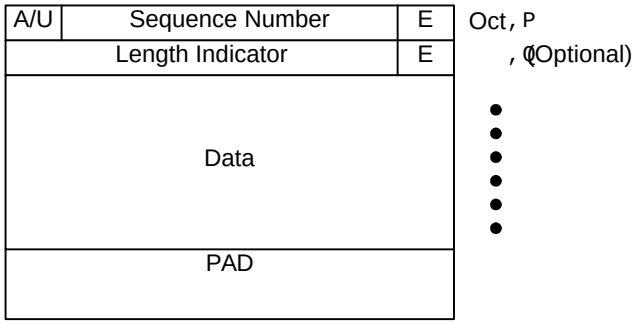

Figure 0-2. UMD PDU

BGN PDU

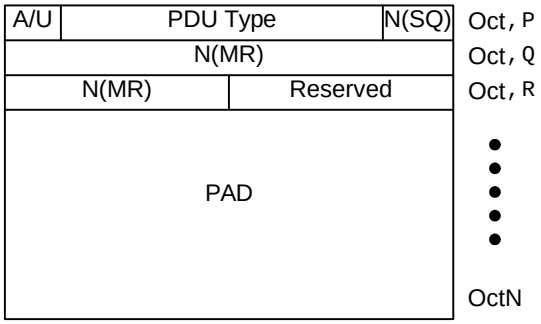

Figure 0-3. BGN PDU

BGAK PDU

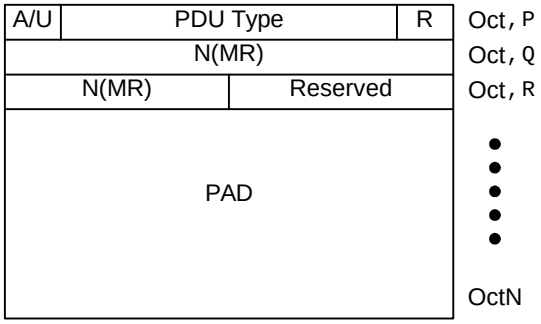

Figure 0-4. BGAK PDU

BGREJ, END, ENDAK PDU

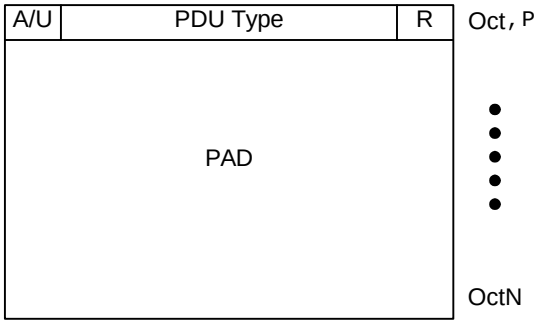

Figure 0-5. BGREJ, END, ENDAK PDU

STATUS PDU

Reports the status of receiver to transmitter when AMD PDU with status report request is received, or to inform the transmitting entity about missing PUs.

[The message format will be reconsidered when the protocol will be defined]

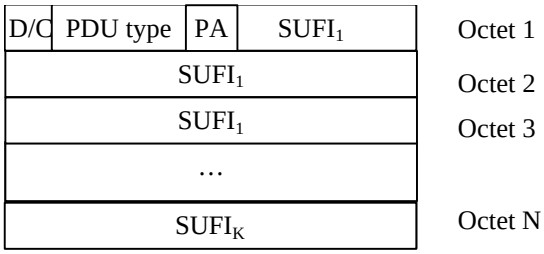

Figure 0-6. Status Information Control PDU (STATUS PDU)

The inclusion of a credit value/retransmission window size is FFS.
The maximum size of a STATUS PDU is bounded by the maximum RLC PDU size.

Note: Regarding STATUSPDU it is FFS. whether a bitmap type of PDU status indication would be more efficient than List elements.

RESET, RESET ACK PDU

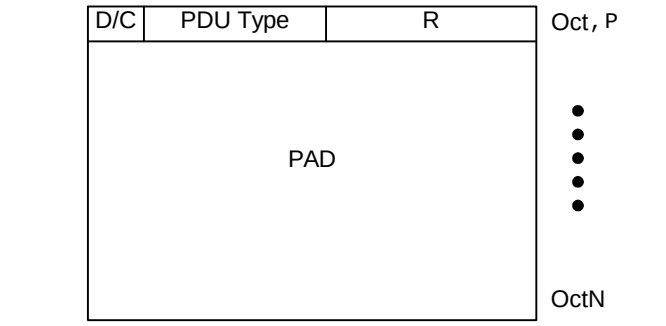

Figure 0-7. RESET, RESET ACK PDU

The RLC PDU parameters are defined as follows:

- A/U bit: 1bit
  This field indicates Acknowledged mode data PDU or Unacknowledged mode data PDU/ Control PDU. If it indicates Acknowledged mode, the PDU is AMD PDU.

Bit	Description
0	Unacknowledged mode data PDU/ Control PDU
1	Acknowledged mode data PDU

- D/C bit: 1bit
  This field indicates the type of an acknowledged mode PDU. It can be either data or control PDU.

Bit	Description
0	Control PDU
1	Acknowledged mode data PDU

[Editor's note: at this stage the D/C field is related only to the STATUS PDU format. The replacement of A/D field with D/C field should be extended also to the other PDUs, since it was agreed that it is only necessary to distinghish between AMD- data and control PDU.]

- PDU Type: 6bit, for STATUS PDU this field is 3 bit length [FFS]
  This field indicates the type of Control PDU. They are indicated by the special values of sequence number field.

Bit	PDU Type	Bit	PDU Type
111111	BGN	111010 *[FFS]*	STATUS
111110	BGAK	FFS	RESET
111101	BGREJ	FFS	RESET ACK
111100	END	111000 – 110000	Reserved
111011	ENDAK		

[Editor's note:in accordance with the new STATUS PDU format reported, the PDU type is 3 bit length, but this differs from the other control PDU formats, which require a PDU type field of 6 bit length]

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9.3.3. State model for acknowledged mode entities

Figure 0-7 illustrates the state model for the acknowledged mode RLC entity. An acknowledged mode entity can be in one of following states.

9.3.3.1. Null State

In the null state the RLC entity does not exist and therefore it is not possible to transfer any data through it.

Upon reception of an C-RLC-CONFIG.req from higher layer the RLC entity is created and acknowledged data transfer ready state is entered.

9.3.3.2. Acknowledged Data Transfer Ready State

In the acknowledged data transfer ready, acknowledged mode data can be exchanged between the entities. Upon reception of an RLC-CONFIG.req from higher layer the RLC entity is terminated and the null state is entered.

9.3.3.3. Recovery Pending State

In the recovery pending state the entity waits for a response from its peer entity and no data can be exchanged between the entities. Upon reception of an RLC-CONFIG.req from higher layer the RLC entity is terminated and the null state is entered.

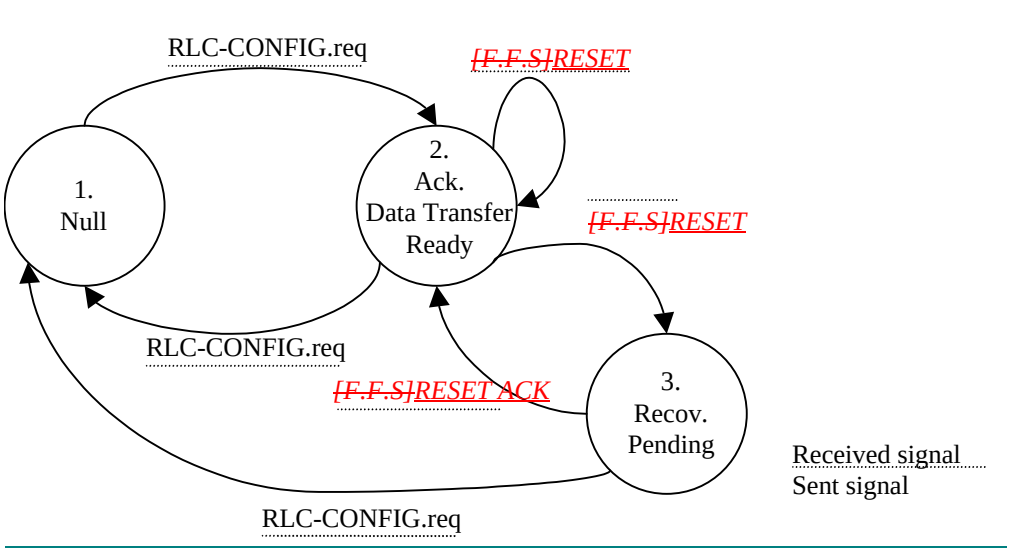

Figure 0-7. The state model for the acknoledged mode entities.

~~*The messages that cause the transition between the "Ack. Data Transfer Ready" state and the "Recovery Pending" State, are [F.F.S.].*~~

4. References

[1] TS 25.322 V1.0.0 RLC Protocol Specification