TSG-RAN Working Group 3 meeting #7*TSGR3#7(99)B52*
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Agenda Item: 9.1

Source: **Ericsson**

Title: Frame coding of PDU type 15 for Support Mode for predefined SDU size

Document for: Decision

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1 Introduction

In the contribution for PDU type 0 ,see [2], it is proposed to have separate PDU types for user data and procedue control data on the Iu UP. The purpose of this contribution is to propose the coding of PDU type 15 for Support mode for predefined SDU size. This PDU type is used for Iu UP control procedures. The coding of the 'Initialization' and the 'Rate Control' control procedures are also proposed in this contribution

2 PDU type 15

2.1 General

2.1.1 Iu UP Frame Format and Content definition

Figure 1 below shows the Iu frame structure of the Iu UP protocol at the SAP towards the transport layers:

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
PDU Type				Ack/Nack		Frame Number		1	Frame Control Part
Spare				Procedure Indicator				1	
PDU type 15 payload CRC		PDU type 15 header CRC						1	Frame Check-sum Part
PDU type 15 payload CRC								1	
Reserved for procedure data								0-n	Frame payload part

Figure 1: Iu UP PDU Type 15 Format

2.1.2 Frame Number

The Iu UP frame numbering is handled by a Frame Number. The purpose of the Frame Number is to provide the receiving entity with a mechanism to keep track of lost Iu UP frames.

For a given user data connection, there is no relations between the frame numbers of frames sent in the downlink direction and the frame numbers of frames sent in the uplink direction.

The value range of the Frame number is 0-3 for PDU type 15.

2.1.3 Ack/Nack

The Ack/Nack field tells if the frame is a procedure or an acknowledgement for a procedure.

Value	Definition
0	Procedure sending
1	Ack
2	Nack
3	Spare

2.1.4 PDU Type

The PDU type indicates the structure of the Iu UP frame. The field takes the value of the PDU Type it identifies. It has the value 15 for PDU Type 15. The PDU type is in bit 4 to bit 7 in the first octet of the frame.

2.1.5 Procedure Indicator

The Procedure Indicator tells what procedure the current frame is related to. The meaning of the Procedure Indicator is given in the table below.

Value	Definition
0	Initialization procedure
1	Rate control
2	TBD (Time Alignment)
3	TBD (Abnormal Event)
4-15	Spare

2.1.6 PDU type 15 Header CRC

This field contains the CRC of all fields in Frame Control Part. The CRC is a 6-bit checksum based on the generator polynom $G(D) = D^6+D^5+D^3+D^2+D^1+1$. See [3].

With this CRC all error bursts shorter than 7 bits are detected, as well as all odd number of bits faulty (and two-bit faults) when the protected area is shorter than 24 bits, (max 3 octets).

2.1.7 PDU type 15 Payload Check Sum

This field contains the CRC of the Frame Payload part. The CRC is a 10-bit checksum based on the generator polynom $G(D) = D^{10}+ D^9+D^5+D^4+D^1+1$. See [3].

With this CRC all error bursts shorter than 11 bits are detected, as well as all odd number of bits faulty (and two-bit faults) when the protected area is shorter than 500 bits (max 62 octets).

2.2 Procedures

2.2.1 General

The Procedure Control Fields contain information of the procedure as indicated by the Procedure Indicator.

2.2.2 Initialization

2.2.2.1 General

The Initialization procedure is described in section 6.5.3 (see [1]).

The Figure 2 below illustrates how the initialization procedure is coded.

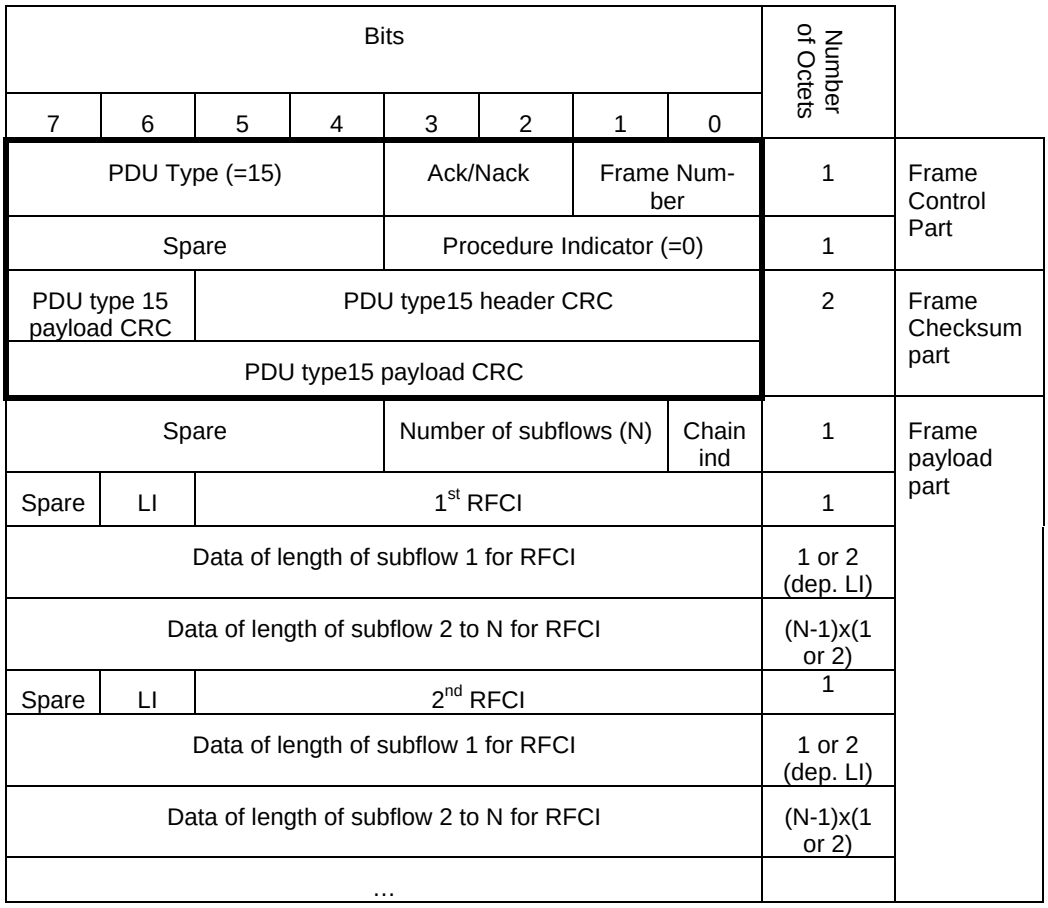

Figure 2: Iu UP PDU Type 15 used for Initialization

2.2.2.2 Parameters

Chain ind: Is set to 1 when this is not the last frame containing initialization information.

Number of subflows: Indicates how many subflows is present in a RAB.

LI: Length Indicator, indicates if 1 (LI=0) or 2 (LI=1) octets is used for the RAB subflow size information. LI is 1 when more than 255 bits is used for a subflow.

RFCI: Indicates the RFCI. The first RFCI sent is used as the initial codec mode.

2.2.3 Rate Control

With rate control certain RAB subflow combinations can be prevented from being used. The rate control information is sent in a PDU of type 15 over the Iu UP. The Iu frame consist of a bitmap indicating with 1, when the RFCI is allowed to be used and 0 for a RFCI that is not allowed. The information is presented in Figure 3 below.

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
PDU Type				Ack/Nack		Frame Number		1	Frame Control Part
Spare				Procedure Indicator				1	
PDU type 15 payload CRC		PDU type 15 header CRC						1	Frame Check-sum Part
PDU type 15 payload CRC								1	
Spare		Number of RFCIs (N)						0-n	Frame payload part
Padding when needed (0)			RFCI N-1 Ind	…	RFCI 2 Ind	RFCI 1 Ind	RFCI0 Ind		

Figure 3: Iu UP PDU Type 15 Format used for Rate Control

In the Rate Control procedure there is one bit for each RFCI. There can be at maximum 63 RFCI:s so the Iu frame used for Rate control can be max 13 octets.

For more information on Rate Control see separate contribution [4].

2.2.4 Time Alignment

FFS.

2.2.5 Abnormal Event

TBD.

3 Proposal

It is proposed to introduce the PDU type 15, including initialization and rate control, as described above into [1]. The usage of several initialization frames has an impact on chapter 6.5.3.1 in [1].

4 References

[1] TS 25.415 (V1.0.2) Iu Interface CN-UTRAN User Plane Protocol

[2] TSGR3#7(99)B51, Frame coding of PDU type 0 for Support Mode for predefined SDU size

[3] TSGR3#7(99)C10, CRC Lengths in the frame protocol

[4] TSGR3#7(99)B50, Rate Control