3GPP TSG-RAN-WG3 meeting #8
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CHANGE REQUEST

25.415 **CR** Current Version: 3.0.0

GSM (AA.BB) or 3G (AA.BBB) specification number ↑ *↑ CR number as allocated by MCC support team*

For submission to: RAN#6 *list expected approval meeting # here ↑*

for approval [X] for information [ ]

strategic [ ] non-strategic [ ] *(for SMG use only)*

Form: CR cover sheet, version 2 for 3GPP and SMG *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/CR-Form-v2.doc*

Proposed change affects: *(at least one should be marked with an X)* (U)SIM [ ] ME [ ] UTRAN / Radio [X] Core Network [ ]

Source: Ericsson **Date:** 20th of Oct 1999

Subject: Cleanup of coding section (Agenda Item: 9)

Work item:

Category: *(only one category shall be marked with an X)*

F	Correction	[ ]	**Release:** Phase 2	[ ]
A	Corresponds to a correction in an earlier release	[ ]	Release 96	[ ]
B	Addition of feature	[ ]	Release 97	[ ]
C	Functional modification of feature	[X]	Release 98	[ ]
D	Editorial modification	[ ]	Release 99	[X]
			Release 00	[ ]

Reason for change:

Reason 1: To clean up the description of the content definition and coding in chapter 6.6.2. The order of the sections are aligned according to the order of the fields in the frame. The format of the description is aligned with how it is described in Iur/Iub UP (see TS 25.427 v2.0.0).

Reason 2: To reserve PDU type 15 for future extensions of PDU types and have instead PDU type 14 for control procedures on Iu UP.

Reason 3: To define the bit and field order of the fields in the frames. The ordering is made so that it is in alignment with principles used in Iur/Iub SWG (see Tdoc R3-99C09).

Clauses affected: 6.6.1 (new), 6.6.2, 6.6.3, 6.6.4 (only paragraph number changed)

Other specs affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other GSM core specifications	[ ]	→ List of CRs:
MS test specifications	[ ]	→ List of CRs:
BSS test specifications	[ ]	→ List of CRs:
O&M specifications	[ ]	→ List of CRs:

Other comments:

~~6.6~~Elements for Iu UP communication in Support mode

General

In this specification the structure of frames will be specified by using figures similar to Figure x below.

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
Field 1				Field 2				1	Byte 1
Field 3						Field 4		2	Byte 2
Field 4 continue				Field 5					Byte 3

Figure x: Example frame format

Unless otherwise indicated, fields which consist of multiple bits within a byte will have the more significant bit located at the higher bit position (indicated above frame in Figure x). In addition, if a field spans several bytes, more significant bits will be located in lower numbered bytes (right of frame in Figure x).

On the Iu interface, the frame will be transmitted starting from the lowest numbered byte. Within each byte, the bits are sent according decreasing bit position (bit position 7 first).

Spare bits should be set to 0 by the sender and should not be checked by the receiver.

~~6.6.1~~Frames Format for predefined size SDUs

6.6.1.1 PDU Type 0

PDU Type 0 is defined to transfer user data over the Iu UP in support mode for pre-defined SDU sizes ~~mode~~. Error detection scheme is provided over the Iu UP for the payload part.

The following shows the Iu frame structure for PDU type 0 of the Iu UP protocol at the SAP towards the transport layers (TNL-SAP):

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
PDU Type				Frame Number				1	Frame Control Part
FQC		RFCI						1	
~~PDU type 0 Payload CRC~~ ~~PDU type 0~~ Header CRC							Payload CRC	2	Frame Check Sum Part
~~PDU type 0~~ Payload CRC									
Payload Fields								0-n	Frame Payload part

Figure 13: Iu UP PDU Type 0 Format

The Iu UP PDU Type 0 is made of three parts:

1) Iu UP Frame Control part (fixed size)
2) Iu UP Frame Check Sum part (fixed size)
3) Iu UP Frame Payload part (pre-defined SDU sizes)

The Iu UP Frame Control Part and the Iu UP Frame Check Sum constitute the Iu UP PDU Type 0 Frame Header.

6.6.1.2 PDU Type 1

PDU Type 1 is defined to transfer user data over the Iu UP in support mode for pre-defined SDU sizes ~~mode~~ when no payload error detection scheme is necessary over Iu UP (i.e. no payload CRC).

The following shows the Iu frame structure for PDU type 1 of the Iu UP protocol at the SAP towards the transport layers (TNL-SAP):

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
PDU Type				Frame Number				1	Frame Control Part
FQC		RFCI						1	
Header CRC~~Spare~~ ~~PDU type 1 Header CRC~~						Spare		1	Frame Check Sum Part
Payload Fields								0-n	Frame Payload part

Figure 14: Iu UP PDU Type 1 Format

The Iu UP PDU Type 1 is made of three parts:

1) Iu UP Frame Control part (fixed size)
2) Iu UP Frame Check Sum part (fixed size)
3) Iu UP Frame Payload part (pre-defined SDU sizes)

The Iu UP Frame Control Part and the Iu UP Frame Check Sum constitute the Iu UP PDU Type 1 Frame Header.

6.6.1.3 PDU Type 1~~4~~5

6.6.1.3.1 General

PDU Type 1~~4~~5 is defined to perform control procedures over the Iu UP in support mode for pre-defined SDU sizes ~~mode~~. The control procedure is identified by the procedure indicator. The Frame Payload contains the data information related to the control procedure.

Figure 15 below shows the Iu frame structure for PDU Type 1~~4~~5 of the Iu UP protocol at the SAP towards the transport layers (TNL-SAP):

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
PDU Type (=14)				Ack/Nack (=0, i.e. procedure)		PDU Type 1~~45~~ Frame Number		1	Frame Control Part
Spare				Procedure Indicator				1	
~~PDU type 15 payload CRC~~ ~~PDU type 15 h~~Header CRC						Payload CRC		1	Frame Checksum Part
~~PDU type 15 p~~Payload CRC								1	
Reserved for procedure data								0-n	Frame payload part

Figure 15: Iu UP PDU Type 1~~45~~ Format for procedure sending

The Iu UP PDU Type 1~~45~~ is made of three parts:

1) Iu UP Frame Control part (fixed size)
2) Iu UP Frame Check Sum part (fixed size)
3) Iu UP Frame Payload part (variable length, rounded up to octet)

The Iu UP Frame Control Part and the Iu UP Frame Check Sum constitute the Iu UP PDU Type 1~~45~~ Frame Header.

6.6.1.3.2 Positive Acknowledgement

When the PDU Type 1~~45~~ is used to positively acknowledge a control procedure, the PDU Type 1~~45~~ takes the following structure at the TNL-SAP:

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
PDU Type (=14)				Ack/Nack (=1, i.e. Ack)		PDU Type 1~~45~~ Frame Number		1	Frame Control Part
Spare				Procedure Indicator (indicating the procedure being positively acknowledged)				1	
~~Spare~~ ~~PDU type 15 h~~Header CRC						Spare		1	Frame Checksum Part
Spare								1	

Figure 16: Iu UP PDU Type 1~~45~~ Format for positive acknowledgement

The Iu UP PDU Type 1~~45~~ for positive acknowledgment is made of two parts:

1) Iu UP Frame Control part (fixed size)
2) Iu UP Frame Check Sum part (fixed size)

The Iu UP Frame Control Part and the Iu UP Frame Check Sum constitute the Iu UP PDU Type 1~~5~~ Frame Header for positive acknowledgement.

6.6.1.3.3 Negative Acknowledgement

When the PDU Type 1~~5~~ is used to negatively acknowledge a control procedure, the PDU Type 1~~5~~ takes the following structure at the TNL-SAP:

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
PDU Type (=14)				Ack/Nack (=2, i.e. Nack)		PDU Type 1~~5~~ Frame Number		1	Frame Control Part
Spare				Procedure Indicator (indicating the procedure being neatively acknowledged)				1	
~~Spare~~ PDU type 15 hHeader CRC						Spare		1	Frame Checksum Part
Spare								1	
Cause Indicator								1	Frame payload part

Figure 17: Iu UP PDU Type 1~~5~~ Format for negative acknowledgement

The Iu UP PDU Type 1~~5~~ for negative acknowledgment is made of three parts:

1. Iu UP Frame Control part (fixed size)
2. Iu UP Frame Check Sum part (fixed size)
3. Iu UP Frame Payload part (fixed size)

The Iu UP Frame Control Part and the Iu UP Frame Check Sum constitute the Iu UP PDU Type 1~~5~~ Frame Header for negative acknowledgment.

6.6.1.3.4 Procedures Coding

6.6.1.3.4.1 Initialis~~z~~ation

The Figure below specifies how the initialis~~z~~ation procedure is coded.

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
PDU Type (=1~~4~~5)				Ack/Nack (=0. I.e. Procedure)		PDU Type 1~~4~~5 Frame Number		1	Frame Control Part
Spare				Procedure Indicator (=0)				1	
~~PDU type 15 payload CRC~~ ~~PDU type15 h~~Header CRC						Payload CRC		2	Frame Checksum part
~~PDU type15 p~~Payload CRC									
Spare				Number of subflows per RFCI (N)			Chain ~~I~~ind	1	Frame payload part
Spare	LI	1st RFCI						1	
~~Data of l~~Length of subflow 1 ~~for RFCI~~								1 or 2 (dep. LI)	
~~Data of l~~Length of subflow 2 to N ~~for RFCI~~								(N-1)x(1 or 2)	
Spare	LI	2nd RFCI						1	
~~Data of l~~Length of subflow 1 ~~for RFCI~~								1 or 2 (dep. LI)	
~~Data of l~~Length of subflow 2 to N ~~for RFCI~~								(N-1)x(1 or 2)	
…									

Figure 18: Iu UP PDU Type 1~~4~~5 used for Initiali~~s~~zation

6.6.1.3.4.2 Rate Control

The Figure below specifies how the rate control procedure is coded.

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
PDU Type (=14)				Ack/Nack (=0, i.e. Procedure)		PDU Type 145 Frame Number		1	Frame Control Part
Spare				Procedure Indicator (=1)				1	
~~PDU type 15 payload CRC~~ ~~PDU type 15 h~~Header CRC						Payload CRC		1	Frame Checksum Part
~~PDU type 15 p~~Payload CRC								1	
Spare		Number of RFCIs ~~Indicator~~ (N)						0-n	Frame payload part
Padding when needed (0)			RFCI N-1 Ind	…	RFCI 2 Ind	RFCI 1 Ind	RFCI0 Ind		

Figure 19: Iu UP PDU Type 1~~4~~5 Format used for Rate Control

6.6.1.3.4.3 Time Alignment (FFS)

6.6.1.3.4.4 Abnormal Event (TBD)

This is to be defined

~~6.6.2~~Coding of information elements in frames~~Frames content definition and Frames coding~~

~~6.6.2.3~~6.6.1.4 PDU Type

Description: The PDU type indicates the structure of the Iu UP frame. The field takes the value of the PDU Type it identifies: i.e. 0 for PDU Type 0. The PDU type is in bit 4 to bit 7 in the first octet of the frame.

Value range: {0-14, 15=reserved for future PDU type extensions}

Field length: 4 bits

~~6.6.2.5~~6.6.1.5 Ack/Nack

Description: The Ack/Nack field tells if the frame is ~~a~~:

- ~~a~~ control procedure frame
- ~~or a~~n positive acknowledgement (ACK) of a control procedure frame
- a negative acknowledgement (NACK) ~~for~~ of a control procedure frame.~~.~~

Value range: {0=control procedure frame, 1=ACK, 2=NACK, 3=spare}

Field length: 2 bits

Value	Definition
0	Procedure sending
1	Ack
2	Nack
3	Spare

6.6.2.16.6.1.6 Frame Number

Description: 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.

Value range: {0-15}

Field length: 4 bits

The frame number is in bit 0 to bit 3 in the first octet of the frame the value varying from 0 to 15.

6.6.2.26.6.1.7 PDU Type 145 Frame Number

Description: The Iu UP frame numbering is handled by a Frame Number. The purpose of the PDU Type 145 Frame Number is to provide the receiving entity with a mechanism to keep track of lost Iu UP frames.

It is also used to relate the acknowledgment frame to the frame being acknowledged i.e. the same PDU Type 145 Frame Number is used in the acknowledgement frame as the one used in the frame being acknowledged.

Value range: {0-3}

Field length: 2 bits

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

6.6.2.176.6.1.8 Frame Quality Classification (FQC)

Description: Frame Quality Classification is used to classify the Iu UP frames depending on whether errors have occurred in the frame or not. Frame Quality Classification is dependent on the RAB attribute 'Delivery of erroneous SDUs'.

Value range: {0=frame good, 1=frame bad, 2-3=spare}

Field length: 2 bits

The meaning of the FQC field is specified below:

FQC Value	Definition
0	Frame good
1	Frame bad
2	Spare
3	Spare

6.6.2.46.6.1.9 RAB sub-Flow Combination Indicator (RFCI)

Description: The RFCI tells the content of the payload. This can be used to specify the sizes of the subflows. The RFCI is stored in bit 0 to bit 5 of the second octet of the frame control part. The RFCI can get values ranging from 0 to 62. The value 63 is reserved for indicating that RFCI is not applicable for the current PDU.

Value range: {0-62, 63=RFCI not applicable}

Field length: 6 bits

~~6.6.2.6~~6.6.1.10 Procedure Indicator

Description: The Procedure Indicator identifies the control procedure in the current frame.

Value range: {0=initialization, 1=rate control, 2=time alignment, 3=abnormal event, 4-15=spare}

Field length: 4 bits

~~The meaning of the Procedure Indicator is given in the table below.~~

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

~~6.6.2.7~~6.6.1.11 ~~PDU type 0~~ Header CRC

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

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).

Field length: 6 bits

~~6.6.2.8~~6.6.1.12 ~~PDU type 0~~ Payload CRC

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

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).

Field length: 10 bits

~~6.6.2.9PDU type 1 Header CRC~~

~~Same as PDU Type 0 Header CRC.~~

~~6.6.2.10PDU 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 $G(D) = D^6+D^5+D^3+D^2+D^1+1$.~~

~~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).~~

~~6.6.2.11PDU 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 $G(D) = D^{10} + D^9 + D^5 + D^4 + D^1 + 1$.~~

~~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).~~

~~6.6.2.12~~6.6.1.13 Chain Indicator

Description: Chain indicator is used to indicate whether the control procedure frame is the last frame related to the control procedure.

Value range: {0=this frame is the last frame for the procedure, 1=additional frames will be sent for the procedure}

Field length: 1 bit

~~The Chain Indicator is set to 0 when this is the last frame.~~

~~The Chain Indicator is set to 1 when this is not the last frame.~~

~~6.6.2.13~~6.6.1.14 Number of Subflows per RFCI

Description: Number of Subflows per RFCI field indicates the number of subflows the RAB is made of. It is used to decode the SDU size information data lengths. All RFCs consist of the same number of subflows within a specific RAB.

Value range: {0=reserved, 1-7}

Field length: 3 bits

~~The Number of Subflows can range from 1 to 7.~~

~~6.6.2.14~~6.6.1.15 Length Indicator (LI)

~~LI:~~ **Description:** 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.~~

Value range: {0=one octet used, 1=two octets used}

Field length: 1 bit

~~6.6.2.15~~6.6.1.16 Number of RFCIs ~~Indicator~~

Description: Number of RFCIs ~~Indicator~~ indicates the number of RFCIs ~~Indicators~~ present in the control procedure frame.

Value range: {0-63}

Field length: 6 bits

~~Number of RFCI Indicator can range from 0 to 63.~~

~~6.6.2.16~~6.6.1.17 RFCI n Indicator

Description: RFCI n Indicator points to an RFCI number e.g. RFCI 0 Indicator ~~0~~ points to RFCI 0, RFCI 1 Indicator ~~1~~ points to RFCI 1, etc…

Value range: {0=RFCI allowed, 1=RFCI barred}

Field length: 1 bit

~~RFCI Indicator set to 0 indicates that the corresponding RFCI number is punctured out of the RFCI set.~~

~~RFCI Indicator set to 1 indicates that the corresponding RFCI number remains in the RFCI set.~~

~~6.6.2.18~~6.6.1.18 Cause Indicator

Description: Cause field is used to indicate the reason for the control procedure execution.

Value range: {0=reserved, 1=frame format error, 2-15=spare,16=unknown field, 17-255=spare}

Field length: 8 bits

~~The meaning of the Cause Indicator is given in the table below.~~

~~Value~~	~~Definition~~
~~0~~	~~Reserved~~
~~1~~	~~Frame Format Error~~
~~2-15~~	~~Spare~~
~~16~~	~~Unknown field~~
~~17-31~~	~~Spare~~
~~32-255~~	~~Spare~~

~~6.6.3.1~~

~~6.6.3~~Timers

T_{INIT}

This Timer is used to supervise the reception of the initialisation acknowledgement frame from the peer Iu UP instance. This Timer is set by O&M.