TSG-RAN Meeting #6
Nice, France, 13 – 15 December 1999

TSGRP#6(99)749

Title: **Agreed CRs of category "C" (Modification) and "F" (Correction) to TS 25.415**

Source: **TSG-RAN WG3**

Agenda item: **5.4.3**

Doc #	Status-	Spec	CR	Rev	Subject	Cat	Versio	Versio
R3-99i97	agreed	25.415	001		Cleanup of coding section	C	3.0.0	3.1.0
R3-99f40	agreed	25.415	004		Header CRC check	C	3.0.0	3.1.0
R3-99g01	agreed	25.415	005		Initialisation procedure for UTRAN Iu	C	3.0.0	3.1.0
R3-99j01	agreed	25.415	006		Direction of Rate control	F	3.0.0	3.1.0
R3-99k16	agreed	25.415	009		Frame octet padding	F	3.0.0	3.1.0
R3-99j87	agreed	25.415	011		Iu-UP frame Quality Classification	C	3.0.0	3.1.0

3GPP TSG-RAN Meeting #6
Nice, France, 13-15 December 1999

Document* *R3-99i97

CHANGE REQUEST

25.415 **CR** **001** 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: TSG-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: TSG-RAN WG3 **Date:** 28th of Oct 1999

Subject: Cleanup of coding section

Work item:

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

F	Correction	[ ]
A	Corresponds to a correction in an earlier release	[ ]
B	Addition of feature	[ ]
C	Functional modification of feature	[X]
D	Editorial modification	[ ]

Release:

Phase 2	[ ]
Release 96	[ ]
Release 97	[ ]
Release 98	[ ]
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: Was R3-99F79 at RAN3 #8 Iu SWG

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	Octet 1	Header part
Field 3						Field 4		2	Octet 2	
Field 4 continue				Spare					Octet 3	
Field 6								1 ½	Octet 4	Payload part
Field 6 continue				(This greyed area is not part of the frame)					4 bits	

Figure x: Example frame format

Unless otherwise indicated, fields which consist of multiple bits within a octet 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 octets, more significant bits will be located in lower numbered octets (right of frame in Figure x).

On the Iu interface, the frame will be transmitted starting from the lowest numbered octet. Within each octet, 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.

The header part of the frame is always octet rounded. The payload part does not have to be octet rounded.

~~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 (=0)				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/8	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 (=1)				Frame Number				1	Frame Control Part
FQC		RFCI						1	
Header CRCSpare PDU type 1 Header CRC						Spare		1	Frame Check Sum Part
Payload Fields								0-n/8	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 145

6.6.1.3.1 General

PDU Type 145 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 145 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 145 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/8	Frame payload part

Figure 15: Iu UP PDU Type 145 Format for procedure sending

The Iu UP PDU Type 145 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 145 Frame Header.

6.6.1.3.2 Positive Acknowledgement

When the PDU Type 145 is used to positively acknowledge a control procedure, the PDU Type 145 frame 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 145 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 145 Format for positive acknowledgement

The Iu UP PDU Type 145 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~~4~~5 Frame Header for positive acknowledgement.

6.6.1.3.3 Negative Acknowledgement

When the PDU Type 1~~4~~5 is used to negatively acknowledge a control procedure, the PDU Type 1~~4~~5 frame 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~~4~~5 Frame Number		1	Frame Control Part
Spare				Procedure Indicator (indicating the procedure being negatively 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~~4~~5 Format for negative acknowledgement

The Iu UP PDU Type 1~~4~~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~~4~~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 frame is coded.

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
PDU Type (=145)				Ack/Nack (=0. I.e. Procedure)		PDU Type 145 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 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 145 used for Initialisz~~z~~ation

6.6.1.3.4.2 Rate Control

The Figure below specifies how the rate control procedure frame 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/8	Frame payload part
RFCI 0 Ind.~~Padding when needed (0)~~	RFCI 1 Ind	…	RFCI N-1 Ind	~~…~~ ~~RFCI 2 Ind~~ ~~RFCI 1 Ind~~ ~~RFCI0 Ind~~					

Figure 19: Iu UP PDU Type 145 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 identifies the structure 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.

3GPP TSG-RAN Meeting #6 *Document* ***R3-99f40***

Nice, France, 13-15 December 1999

3G CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.415 **CR** **004** Current Version: 3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submission to: TSG-RAN#6 for approval [X] *(only one box should be marked with an X)*
list TSG meeting no. here ↑ For information [ ]

Form: 3G CR cover sheet, version 1.0 *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

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

Source: TSG-RAN WG3 **Date:** 25/10/1999

Subject: Header CRC check

3G Work item:

Category: *(only one category Shall be marked With an X)*

F	Correction	[ ]	**Release:**	Phase 2	[ ]
A	Corresponds to a correction in a 2G specification	[ ]		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: When the result of header CRC check indicates the error, network cannot handle the error frame correctly. Therefore such frame should be discarded.

Clauses affected: 6.4.2

Other specs Affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other 2G 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:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

6.4.2 Frame Handler function

This function is responsible for framing and de-framing the different parts of an Iu UP protocol frame. This function takes the different part of the Iu UP protocol frame and set the control part field to the correct values. It also ensures that the frame control part is semantically correct. This function is responsible for interacting with the Transport layers. This function is also responsible for the CRC check of the Iu UP frame header. The Iu UP frame with header CRC check error is discarded.

3GPP TSG-RAN Meeting #6 *Document* ***R3-99g01***

Nice, France, 13-15 December 1999

3G CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.415	**CR**	**005**	Current Version:	3.0.0

3G specification number ↑ *↑ CR number as allocated by 3G support team*

For submission to: TSG-RAN#6 for approval [X] *(only one box should be marked with an X)*
list TSG meeting no. here ↑ For information [ ]

Form: 3G CR cover sheet, version 1.0 *The latest version of this form is available from: ftp://ftp.3gpp.org/Information/3GCRF-xx.rtf*

Proposed change affects: USIM [ ] ME [ ] UTRAN [X] Core Network [ ]
(at least one should be marked with an X)

Source: TSG-RAN WG3 **Date:** 25/10/1999

Subject: Initialisation procedure for UTRAN Iu UP protocol

3G Work item:

Category: *(only one category Shall be marked With an X)*

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in a 2G specification			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:

In the TrFO, the control frame of Iu UP Protocol is transmitted between RNCs. In the current Initialization procedure in Iu UP Protocol, it is not assumed that RNC receives the Initialization control frame.

In order to realize the TrFO, it is necessary to incorporate into Iu UP protocol the negotiation in Initialization procedure and the function for the reception of the Initialization frame.

Clauses affected: 6.5.3, 6.6

Other specs Affected:

Other 3G core specifications	[ ]	→ List of CRs:
Other 2G 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:

help.doc

<--------- double-click here for help and instructions on how to create a CR.

8.6.3 Initialisation procedure

8.6.3.1 Successful operation

This procedure is mandatory for RABs using the support mode for predefined SDU size. The purpose of the initialisation procedure is to configure both termination points of the Iu UP with the RFCIs and associated RAB Sub Flows SDU sizes necessary during the transfer of user data phase. Additional parameters may also be passed.

The initialisation procedure is always controlled by the entity in charge of establishing the Radio Network Layer User Plane i.e. SRNC.

The initialisation procedure is invoked whenever indicated by the Iu UP Procedure Control function e.g. as a result of a relocation of SRNS or at RAB establishment over Iu.

When this procedure is invoked all other Iu UP procedures are suspended until termination of the initialisation procedure.

The SRNC allocates an indicator to each RAB sub-Flow Combination (RFCI). The association of indicators to RAB Flow Combinations is valid in the Iu UP until a new initialisation procedure is performed or the connection is terminated.

The procedure control function may also generate additional Iu UP protocol parameters necessary for the RAB service to operate properly over Iu.

To each RAB sub-Flow combination indicator is associated the size of each RAB sub-Flow SDU of that combination. The list of RAB Flow Combination Indicators and their respective SDU sizes constitutes the RAB sub-Flow Combination set passed over the Iu UP in the initialisation frame i.e. into an appropriate Iu UP PDU Type.

The first RAB sub-Flow Combination proposed in the list of RAB sub-Flow Combination indicates the initial RAB sub-Flow Combination i.e. the first RAB sub-Flow Combination to be used when starting the communication phase i.e. the transfer of user data procedure.

The complete set of information is framed by the Iu UP Frame Handler function and transferred in an Iu UP initialisation frame. If needed, the initialisation frame CRC is calculated and set accordingly in the respective frame field.

A supervision timer T INIT is started after sending the Iu UP initialisation frame. This timer supervises the reception of the initialisation acknowledgment frame.

Upon reception of a frame indicating that an initialisation control procedure is active in the peer Iu UP entity, the Iu UP protocol layer forwards to the upper layers the RAB sub-Flow Combination set to be used by the Control procedure function. It also stores the RAB sub-Flow Combination set in order to control during the transfer of user data, that the Iu UP payload is correctly formatted (e.g. RFCI matches the expected Iu UP frame payload total length).

If the initialisation frame is correctly formatted and treated by the receiving Iu UP protocol layer, this latter sends an initialisation acknowledgment frame.

Upon reception of an initialisation acknowledgment frame, the Iu UP protocol layer in the SRNC stops the supervision timer T INIT.

Upon reception of an initialisation negative acknowledgment frame or at timer T INIT expiry, the Iu UP protocol layer in the SRNC reset and restart the T INIT supervision timer and repeat an initialisation frame. The repetition can be performed n times, n being chosen by the operator (default n=3).

Consequently, when in the communication phase (as indicated by internal functions in the Radio Network layer), the frame transmission starts in downlink in the initial RFCI.

In the case where an SRNC receives an Iu frame indicating that an initialisation procedure is active at the other end of the Iu UP, RFCI is applied as follows:

- For the sending frame, i.e. UL direction, RNC uses the RAB sub-Flows Combination set indicated in Initialization phase of the peer TFO or TrFO partner.
- For the receiving frame, i.e. DL direction, RNC uses the RAB sub-Flows Combination set as sent in its own intialisation frame.

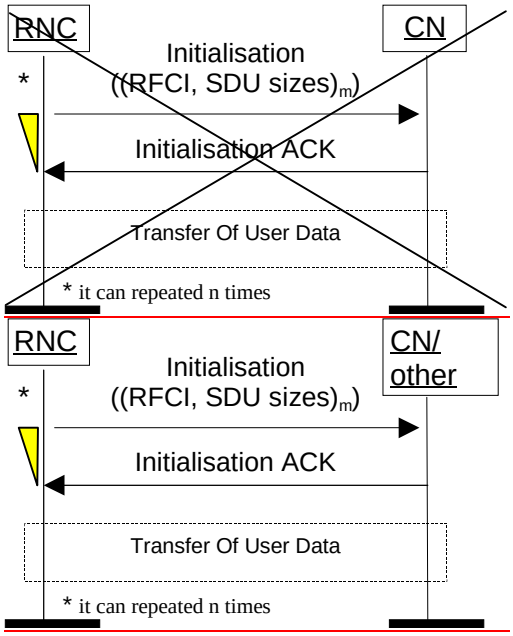

Figure 8: Successful Initialisation of Iu UP for m RFCIs

8.6.3.2 Unsuccessful operation

If the initialisation frame is uncorrectly formatted and cannot be correctly treated by the receiving Iu UP protocol layer, this latter sends an initialisation negative acknowledgment frame.

If after n repetition, the initialisation procedure is unsuccesfully terminated (because of n negative acknowledgment or timer T INIT expiries), the Iu UP protocol layers (sending and receiving) take the appropriate actions (Abnormal Event is TBD).

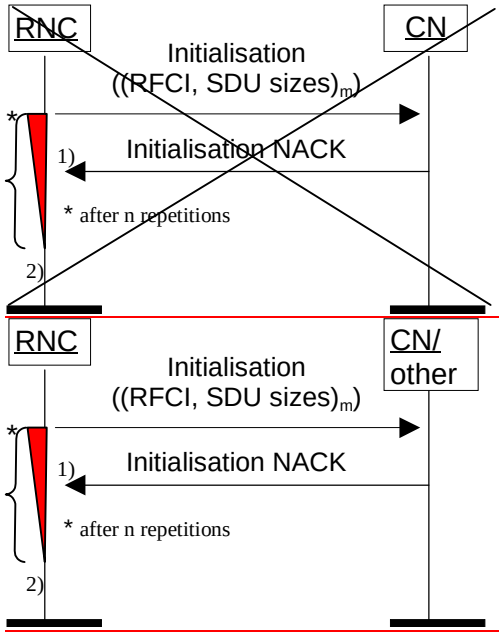

Figure 9: Unuccessful initialisation of Iu UP: 1) n negative acknowledgment or 2) n timer expiries

Note of the editor: The case where an SRNC receives an Iu frame indicating that an initialisation procedure is active at the other end of the Iu UP could be related to a TFO or TrFO negotiation. How TFO or TrFO protocol and codec negotiation is performed is FFS.

3GPP TSG-RAN Meeting #6
Nice, France, 13-15 December 1999

Document R3-99j01
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.415	CR	006	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:	TSG-RAN#6	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

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	X

Source: TSG-RAN WG3 **Date:** 2nd Dec 1999

Subject: Direction of Rate control

Work item:

Category: *(only one category shall be marked with an X)*			**Release:**	
F	Correction	X	Phase 2	
A	Corresponds to a correction in an earlier release		Release 96	
B	Addition of feature		Release 97	
C	Functional modification of feature		Release 98	
D	Editorial modification		Release 99	X
			Release 00	

Reason for change: In the current version of the specification it is talked about “downlink rate control”. This CR chages “downlink rate control” to “rate control” since the term “downlink” is not applicable to all cases of “Rate control”.

Clauses affected:

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:


help.doc

<---------- double-click here for help and instructions on how to create a CR.

6.4.3 Procedure Control functions

This set of functions offers the control of a number of procedures handled at the Iu UP protocol level. These functions are responsible for the procedure control part of the Iu UP frames.

Namely, these procedures are:

- **Rate Control**: is the procedure which controls over the Iu UP the set of permitted ~~downlink~~ rates among the rates that can be controled ~~by UTRAN~~. The set of rates is represented by an RFCI bitmap. The function controlling this procedure interacts with functions outside of the Iu UP protocol layer.

- **Initialisation:** is the procedure which controls the exchange of initialisation information that is required for operation in support mode for predefined SDU size. Such information can contain the RFCI Set to be used until termination of the connection or until the next initialisation procedure.

- **Time Alignment (FFS)**: is the procedure that controls the information exchanged over the Iu related to the sending time of Iu UP frames. The function controlling this procedure interacts with functions outside of the Iu UP protocol layer.

- **Handling of Abnormal Event (TBD):** is the procedure that controls the information exchanged over the Iu related to detection of a fault situation. The function controlling this procedure interacts with functions outside of the Iu UP protocol layer.

6.5.4 Iu ~~Downlink~~ Rate Control procedure

6.5.4.1 Successful operation

The purpose of the rate control procedure is to signal ~~in the uplink direction~~ to the peer Iu UP protocol layer the permitted rate(s) over Iu in the ~~downlink~~ reverse direction of the sent rate control frame.

The rate control procedure over Iu UP is normally controlled by the entity controlling the rate control over UTRAN i.e. SRNC. In some cases, as TrFO and TFO, it is also controlled by the remote partner at the other end of the Iu UP.

The Iu ~~downlink~~ rate control procedure is invoked whenever the SRNC decides that the set of ~~downlink~~ permitted rates over Iu shall be modified. This set can be made of only one permitted rate among the rates that are permitted for rate control or several rates among the rates that can be rate controlled by the SRNC.

The rates that can be controlled by the SRNC are indicated to the Iu UP at establishment in addition to the rates that cannot be controlled by the RNC e.g. such as DTX rates for certain RABs.

The procedure can be signalled at any time when transfer of user data is not suspended by another control procedure.

The Procedure control function upon request of upper layer prepares the RFCI bitmap of ~~downlink~~ permitted rates of the reverse direction of the rate control frame.

The frame handler function calculates the frame CRC, formats the frame header into the appropriate PDU Type and sends the Iu UP frame PDU to the lower layers for trasnfer across the Iu interface.

Upon reception of a rate control frame, the Iu UP protocol layer checks the consistency of the Iu UP frame as follows:

- The Frame handler checks the consistency of the frame header and associated CRC. If correct, the frame handler passes procedure control part to the procedure control functions.
- The procedure control functions check that the new ~~downlink~~ permitted rate(s) are consistent with the RFCI set received at initialisation. They also verify that non-rate controllable rates are still permitted. If the whole rate control information is correct, the procedure control functions passes the rate control information to the NAS Data Streams specific functions.
- The NAS data streams specific functions forward to the upper layers the rate control information in a Iu-UP-Status indication primitive.

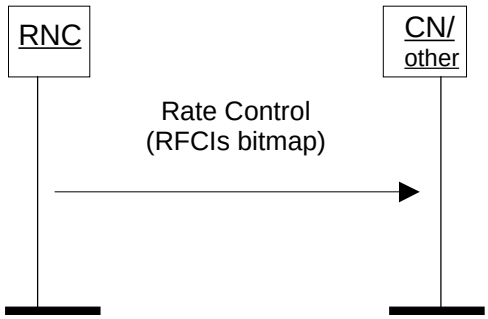

Figure 10: Successful Rate Control sent from SRNC

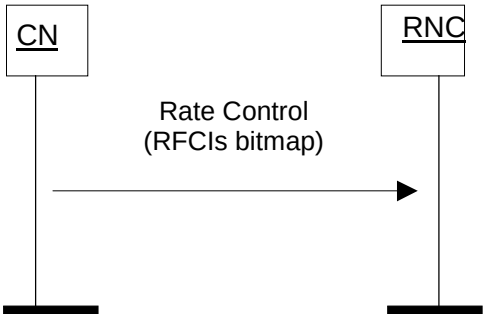

Figure 11: Successful Rate Control sent from CN

6.5.4.2 Unsuccessful operation

If the Iu UP in the SRNC detects that the rate control command has not been correctly interpreted or received (e.g. the ~~downlink~~ rate is outside the set of permitted ~~downlink~~ rates in the reverse direction of the rate control frame), the Iu UP shall retrigger a rate control procedure. If after "m" repetitions, the error situation persists, the Iu UP informs the upper layers.

If the Iu UP protocol layer receives a rate control frame that is badly formatted or corrupted, it shall ignore the rate control frame.

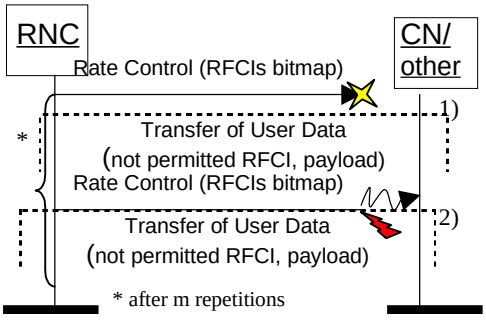

Figure ~~11~~12: Unsuccessful Transfers of rate control from RNC: 1) Frame loss 2) Corrupted Frame

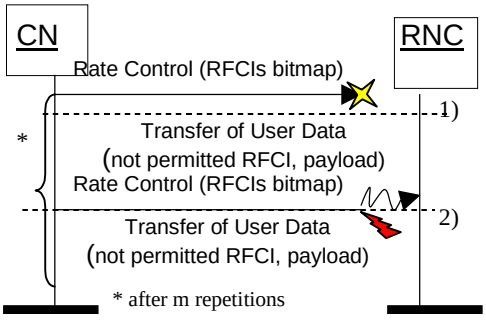

Figure 13: Unsuccessful Transfers of rate control from CN: 1) Frame loss 2) Corrupted Frame

7.2 Primitives towards the upper layers at the RNL SAP

7.2.1 General

The Iu UP protocol layer interacts with upper layers as illustrated in the figure above. The interactions with the upper layers are shown in terms of primitives where the primitives represent the logical exchange of information and control between the upper layer and the Iu UP protocol layer. They do not specify or constraint implementations.

The following primitives are defined:

- Iu-UP-DATA
- Iu-UP-STATUS
- Iu-UP-UNIT-DATA

Table 1: Iu UP protocol layer service primitives towards the upper layer at the RNL SAP

Primitive	Type	Parameters	Comments
Iu-UP-DATA	Request	Iu-UP-payload	
		Iu-UP-control	RFCI
	Indication	Iu-UP-payload	
		Iu-UP-control	RFCI
			FQC
Iu-UP-Status	Indication	Iu-UP-Procedure-Control	Abnormal Event (TBD)
			Initialisation
			RFCI bitmap
			Time Alignment (FFS Note 1)
	Request	Iu-UP-Procedure-Control	Abnormal Event
			RFCI bitmap
Iu-UP-UNIT-DATA	Request	Iu-UP-payload	
	Indication	Iu-UP-payload	

Primitive usage is function of the mode of operation of the Iu UP protocol. The following table provides the association between Iu UP primitives towards the upper layers and the Iu UP mode of operation:

Table 2: Iu UP protocol layer service primitives related to the Iu UP mode of operation and function within the mode of operation

Primitive	Type	Mode of Operation
Iu-UP-DATA	Request	SMpSDU
	Indication	SMpSDU
Iu-UP-Status	Request	SMpSDU
	Indication	SMpSDU
Iu-UP-UNIT-DATA	Request	TrM
	Indication	TrM

7.2.2 Iu-UP-DATA-REQUEST

This primitive is used as a request from the upper layer Iu NAS Data Stream entity to send a RAB SDU on the established transport connection. This primitive also includes the RFCI of the payload information included in the primitive.

The Iu UP Frame protocol layer forms the Iu UP data frame, the Iu Data Stream DU being the payload of the Iu UP frame, and transfers the frame by means of the lower layer services.

7.2.3 Iu-UP-DATA-INDICATION

This primitive is used as an indication to the upper layer entity to pass the Iu NAS Data Stream User Plane information of a received Iu UP frame.

This primitive also includes the RFCI of the payload information included in the primitive.

At the RNL-SAP, this primitive may include an Frame Quality Classification indication.

This primitive may also include information aiming at informing the upper layers of a faulty situation that relates to the payload included in the primitive.

NOTE 1: Time Alignment is FFS.

7.2.4 Iu-UP-STATUS-REQUEST

This primitive is used to pass down to the Iu UP, the rate control information necessary for changing the permitted ~~downlink~~ rate(s) in the reverse direction over Iu. The rate control information consists of the RFCI bitmap.

7.2.5 Iu-UP-STATUS-INDICATION

This primitive is used to report to the upper layer entity that a fault has been detected. The information concerning that fault is characterised by the Abnormal event information passed to the upper layer.

This primitive is also used in the context of the initialisation control procedure to pass to the upper Iu DS layer e.g. the RFC set and the associated RFCIs to be used in the communication phase.

This primitive is used to indicate to the upper layers the set of permitted rate(s) in the ~~downlink~~ reverse direction over Iu. The set of permitted rate(s) is represented by the RFCI bitmap.

This primitive is also used to indicate when a frame has been dropped as a result of frame quality classification handling.

7.2.6 Iu-UP-UNIT-DATA-REQUEST

This primitive is used as a request from the upper layer to send an Iu UP payloadon the established transport connection.

The Iu UP protocol layer transfers the Iu Data Stream DU by means of the lower layer services without adding any protocol header overhead.

7.2.7 Iu-UP-UNIT-DATA-INDICATION

This primitive is used as an indication to the upper layer entity to pass the Iu UP payload.

3GPP TSG-RAN Meeting #6
Nice, France, 13-15 December 1999

Document R3-99K16
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.415	CR	009	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:	TSG-RAN#6	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

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	X

Source: TSG-RAN WG3 **Date:** 9th Dec 1999

Subject: Frame octet padding

Work item:

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

F	Correction	X	**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			Release 98	
D	Editorial modification			Release 99	X
				Release 00	

Reason for change: To support packet based transport networks such as AAL2 or IP based networks, the length of the Iu UP frames needs to be an integer number of octets. For this the payload part of the frames need to be padded before sent and depadded when received over the Iu interface. Usage of the RFCI (associated to subflow length expressed at bit level during the initialisation) allows the padding/depadding function for the support mode for predefined SDU size.

Clauses affected: 6.6.1, 6.6.1.3.4.2, 6.6.2, 6.6.3

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: This CR relates for the Iu frame formats of the “Coding cleanup” CR that has been agreed of in the RAN3 Iu SWG. It is meant that the frame formats in clause 6.6.1 and 6.6.2.1, 6.6.2.2, 6.6.2.3.1 and the clause Payload CRC (6.6.3.Y) shall overrule the changes proposed in the “Coding cleanup” CR. The same applies for a CR “Enhament of Rate control” that affects the clause 6.6.1.3.4.2. In these clauses the changes from “Coding cleanup” CR is shown with highlighted text.


help.doc

<--------- double-click here for help and instructions on how to create a CR.

6 Support mode

6.1 General

6.1.1 Operation of the Iu UP in Support mode

The Iu UP protocol layer in Support mode is present for data streams that need frame handling in the UP.

The two strata communicate through a Service Access Point for Non Access Stratum (NAS) Data Streams. There can be one or several data streams towards one Iu UP protocol instance. These non-access stratum data streams need to be co-ordinated in the Non-Access Stratum.

6.1.2 Interfaces of the Iu UP protocol layer in Support mode

As part of the Access Stratum responsibility, the Iu UP protocol layer in support mode provides the services and functions that are necessary to handle non access stratum data streams. The Iu UP protocol layer in support modeis providing these services to the UP upper layers through a Dedicated Service Access Point used for Information Transfer as specified in [5].

The Iu UP protocol layer in support mode is using services of the Transport layers in order to transfer the Iu UP PDUs over the Iu interface.

6.2 Iu UP Protocol layer Services in Support mode

Support mode for predefined SDU size Service

The following functions are needed to support this mode:

- Transfer of user data;
- Initialisation;
- Rate Control;
- Time Alignment (FFS);
- Handling of abnormal event (TBD);
- Frame Quality Classification.

6.3 Services Expected from the UP Data Transport layer

The Iu UP protocol layer expects the following services from the Transport Network Layer:

- Transfer of user data.

6.4 Functions of the Iu UP Protocol Layer in Support mode

6.4.1 Functional model of the Iu UP Protocol Layer in Support mode

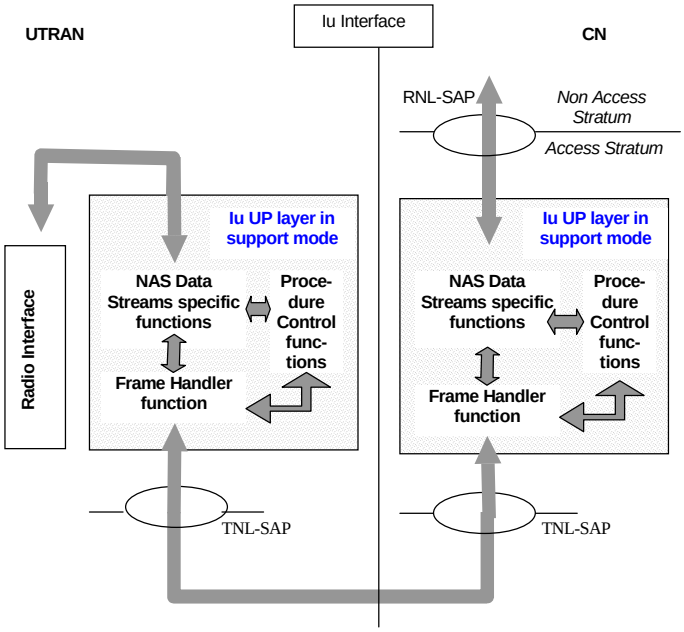

Figure 4: Functional model of the Iu UP protocol layer in Support mode

The Iu UP protocol layer in Support mode is made of three sets of functions:

1) Frame Handler function
2) Procedure Control functions
3) Non Access Stratum Data Streams specific functions.

6.4.2 Frame Handler function

This function is responsible for framing and de-framing the different parts of an Iu UP protocol frame. This function takes the different part of the Iu UP protocol frame and set the control part field to the correct values. It also ensures that the frame control part is semantically correct. This function is responsible for interacting with the Transport layers. This function is also responsible for the CRC check of the Iu UP frame header.

6.4.3 Procedure Control functions

This set of functions offers the control of a number of procedures handled at the Iu UP protocol level. These functions are responsible for the procedure control part of the Iu UP frames.

Namely, these procedures are:

- **Rate Control**: is the procedure which controls over the Iu UP the set of permitted downlink rates among the rates that can be controled by UTRAN. The set of rates is represented by an RFCI bitmap. The function controlling this procedure interacts with functions outside of the Iu UP protocol layer.

- **Initialisation:** is the procedure which controls the exchange of initialisation information that is required for operation in support mode for predefined SDU size. Such information can contain the RFCI Set to be used until termination of the connection or until the next initialisation procedure.

- **Time Alignment (FFS)**: is the procedure that controls the information exchanged over the Iu related to the sending time of Iu UP frames. The function controlling this procedure interacts with functions outside of the Iu UP protocol layer.

- **Handling of Abnormal Event (TBD):** is the procedure that controls the information exchanged over the Iu related to detection of a fault situation. The function controlling this procedure interacts with functions outside of the Iu UP protocol layer.

6.4.4 Non Access Stratum Data Streams specific function(s)

These functions are responsible for a "limited" manipulation" of the payload and the consistency check of the frame number. If a frame loss is detected due a gap in the sequence of the received frame numbers, this shall be reported to the procedure control function. These functions are responsible for the CRC check and calculation of the Iu UP frame payload part. These functions are also responsible for the Frame Quality Classification handling as described below.

These functions interact with the upper layers through a SAP by exchanging Iu data stream blocks of Iu UP frame payload. These functions also handles the padding and depadding of the Iu UP frame payloads when needed.

These functions interact with the procedure control functions.

These functions provide service access to the upper layers for the procedure control functions.

6.4.4.1 Frame Quality Classification function

6.4.4.1.1 General

On the Iu UP in Support Mode the frames are classified with the Frame Quality Classifier (FQC). This classifying is based on the radio frame classification and the setting of the RAB attributes 'Delivery of erroneous SDUs'. The RAB attribute 'Delivery of erroneous SDUs' tells if erroneous frames shall be delivered or not.

Figure 5 below shows the main input and output information for frame quality classification function on the Iu UP.

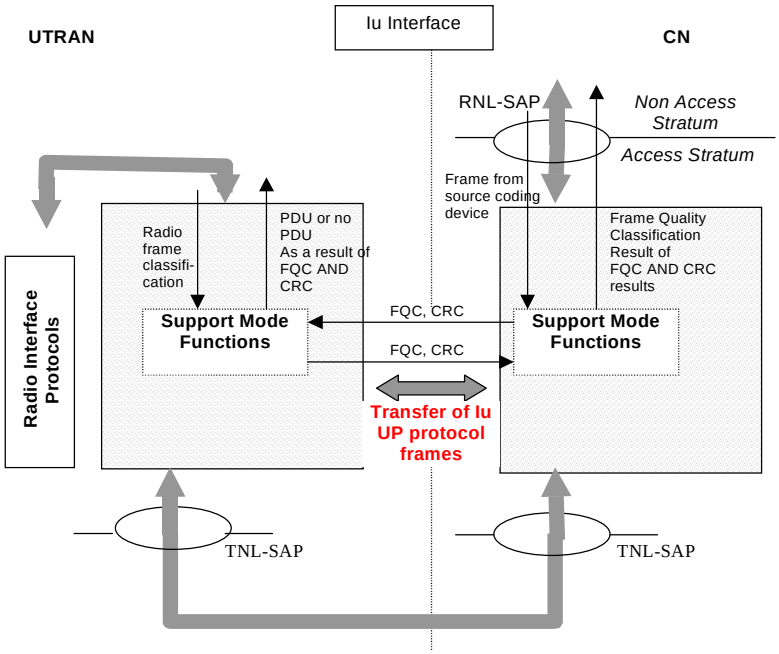

Figure 5: Frame quality classification in Iu UP

6.4.4.1.2 Handling of FQC information

In SRNC on the sending side, the Support Mode Functions takes as input the radio frame quality information together with the frame. Based on this, the FQC is set for the frame, a CRC is added, if needed and the frame is sent to CN. The following table is shows the FQC field setting:

Delivery of erroneous SDUs	Radio Frame Classification	Action taken in SRNC on the sending side
Yes	Bad	Set FQC to 'bad'
No	Bad	Drop frame
Not Applicable	Any value	Set FQC to good
Any value	Good	Set FQC to good

The Support Mode Functions in CN on the receiving side makes a CRC check of the frame payload, if CRC is present and passes the frame and the frame quality classification information through the RNL-SAP.

Delivery of erroneous SDUs	CRC check result	Actions taken at CN on the receiving side
Yes	Not OK	Frame forwarded with FQC set to 'bad'
No	Not OK	Drop frame, send Iu-UP-Status primitive indicating 'No data' at the RNL-SAP
Not Applicable	Any result	Frame forwarded with FQC as set by UTRAN
Any value	OK	Frame forwarded with FQC as set by UTRAN

The Support Mode Functions in CN on the sending side adds a CRC, if necessary to the frame payload and passes it together with the FQC (in the transcoded case always set to good).

The Support Mode Functions in SRNC then makes a CRC-check, if CRC present. Based on the received FQC and eventually the CRC check, decision is made whether to deliver the frame or not.

Delivery of erroneous SDUs	FQC	CRC check (if payload CRC present)	Actions taken at SRNC on the receiving side
Yes	Bad	Any result	Drop frame
No	Any value	Not OK	Drop frame
N/A	Any value	Any result	Pass the frame to radio interface protocols
Any value	Good	OK	Pass the frame to radio interface protocols

NOTE: The case where SRNC receives a frame with the FQC set to bad, corresponds to a TFO or TrFO case. The frame is then trashed by the receiving RNC since there is currently no means to pass down to the UE the frame quality indicator.

6.5 Elementary procedures

6.5.1 General

It shall be possible to perform any of the control procedures regardless of the user data transmission.

6.5.2 Transfer of User Data procedure

6.5.2.1 Successful operation

The purpose of the transfer of user data procedure is to transfer Iu UP frames between the two Iu UP protocol layers at both ends of the Iu interface. Since an Iu UP instance is associated to a RAB and a RAB only, the user data being

transferred only relate to the associated RAB.

The procedure is controlled at both ends of the Iu UP instance i.e. SRNC and the CN.

The transfer of user data procedure is invoked whenever user data for that particular RAB needs to be sent accross the Iu interface.

The procedure is invoked by the Iu UP upper layers upon reception of the upper layer PDU and associated control information: RFCI.

In SRNC, the upper layers may deliver a frame quality classification information together with the RFCI.

The NAS Data streams functions makes the padding of the payload (if needed) so that the Iu UP frame payload will be an integer number of octets. Then ~~The~~ the NAS Data streams functions perform, if needed, CRC calculation of the ~~uper layer PDU~~Iu frame payload ~~-~~and passes the Iu UP frame payload down to the frame handler together with the RFCI.

The frame handler function retrieves the frame number from its internal memory, format the frame header and frame payload into the appropriate PDU Type and sends the Iu UP frame PDU to the lower layers for transfer across the Iu interface.

Upon reception of a user data frame, the Iu UP protocol layer checks the consistency of the Iu UP frame as follows:

- The Frame handler checks the consistency of the frame header. If correct, the frame handler stores the frame number and passes the Iu UP frame payload and associated CRC, if any to the NAS Data Streams functions. The received RFCI is passed to the Procedure Control Function.

- The NAS Data Streams functions check the payload CRC, if any. If the RFCI is correct and matches the Iu UP frame payload as indicated by the Procedure Control functions the NAS Data Streams removes the padding bits from the Iu UP frame payload based on the RFCI information. Then~~,~~ the NAS Data Streams forwards to the upper layers the RFCI and ~~Iu UP frame~~ the payload.

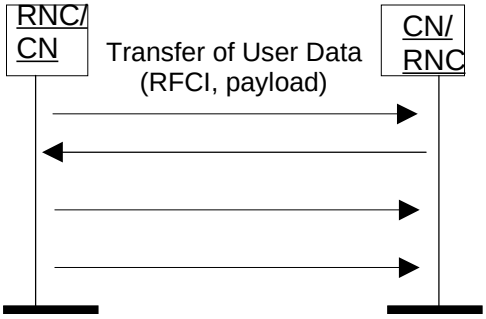

Figure 6. Successful Transfers of User Data

6.5.2.2 Unsuccessful operation

If the Iu UP frame carrying the user data is uncorrectly formatted or cannot be correctly treated by the receiving Iu UP protocol layer, the Iu UP protocol layer shall either discard the frame or pass it to the upper layers with a frame classification indicating a corrupted frame. This decision is based on configuration data of the Iu UP instance for that particular RAB (i.e. if the RAB requests delivery of corrupted frame)..

If the Iu UP protocol layer detects a frame loss because of a gap in the received frame number sequence while the frame number does not relate to time (see section Time Alignment), the receiving Iu UP protocol layer shall report to the procedure control function.

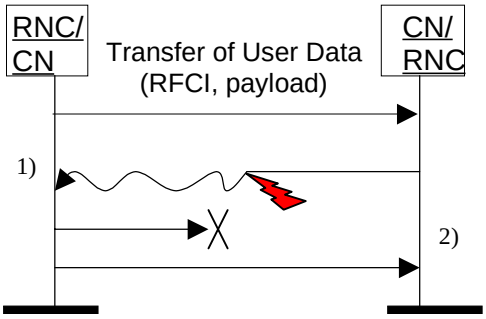

Figure 7. Unsuccessful Transfers of User Data: 1) Corrupted Frame, 2) Detection of Frame loss

6.6 Elements for Iu UP communication in Support mode

6.6.1 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	Octet 1	Header part
Field 3							Field 4	2	Octet 2	
Field 4 continue				Spare					Octet 3	
Field 6								2	Octet 4	Payload part
Field 6 continue				Padding					Octet 5	

Figure x: Example frame format

Unless otherwise indicated, fields which consist of multiple bits within a octet 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 octets, more significant bits will be located in lower numbered octets (right of frame in Figure x).

On the Iu interface, the frame will be transmitted starting from the lowest numbered octet. Within each octet, 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.

The header part of the frame is always an integer number of octets. The payload part is octet rounded (by adding 'Padding' when needed).

6.6.21 Frames Format for predefined size SDUs

~~6.6.1.1~~6.6.2.1 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):

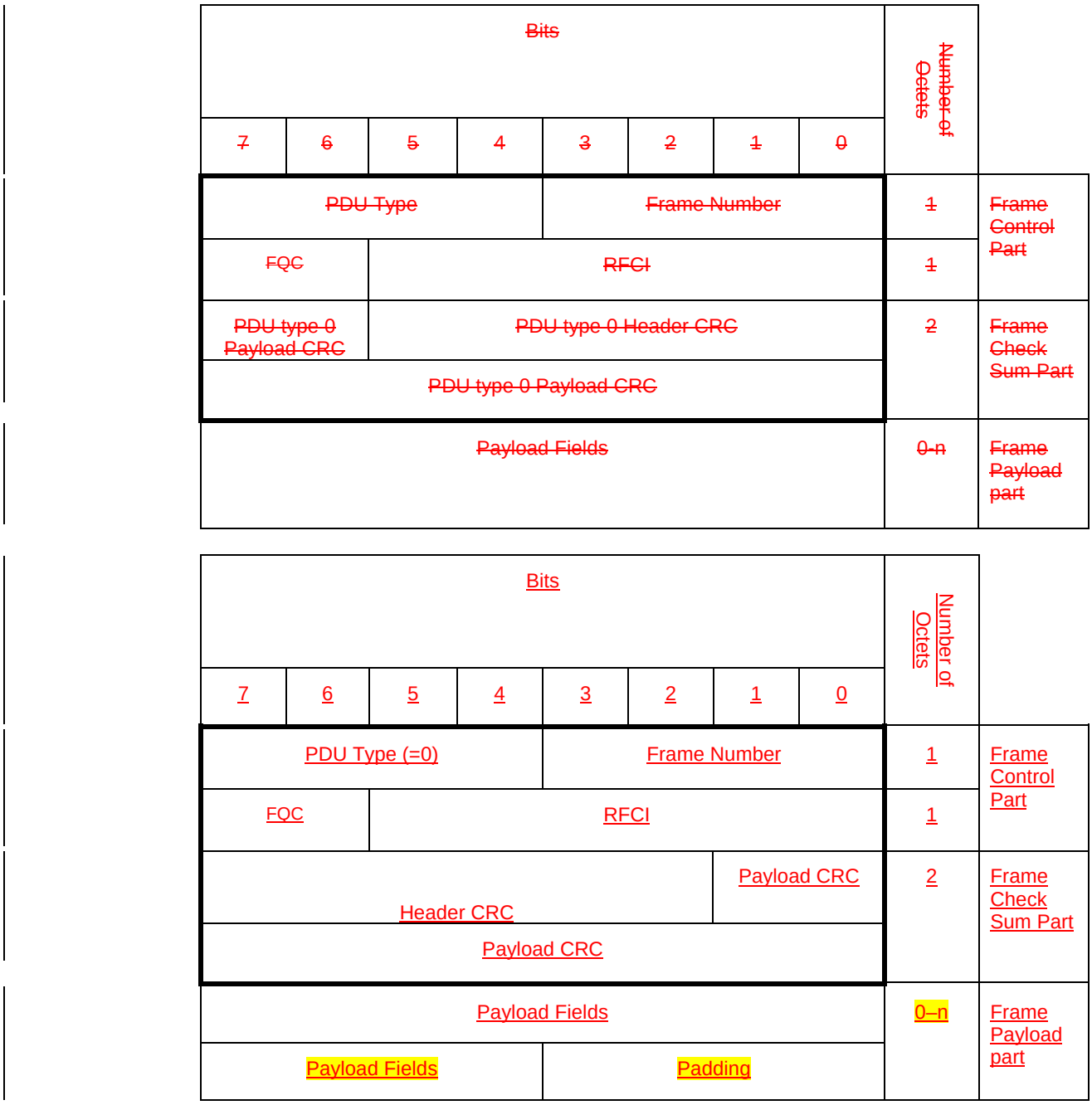

Figure 13: Iu UP PDU Type 0 Format

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.

6.6.1.26.6.2.2 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):

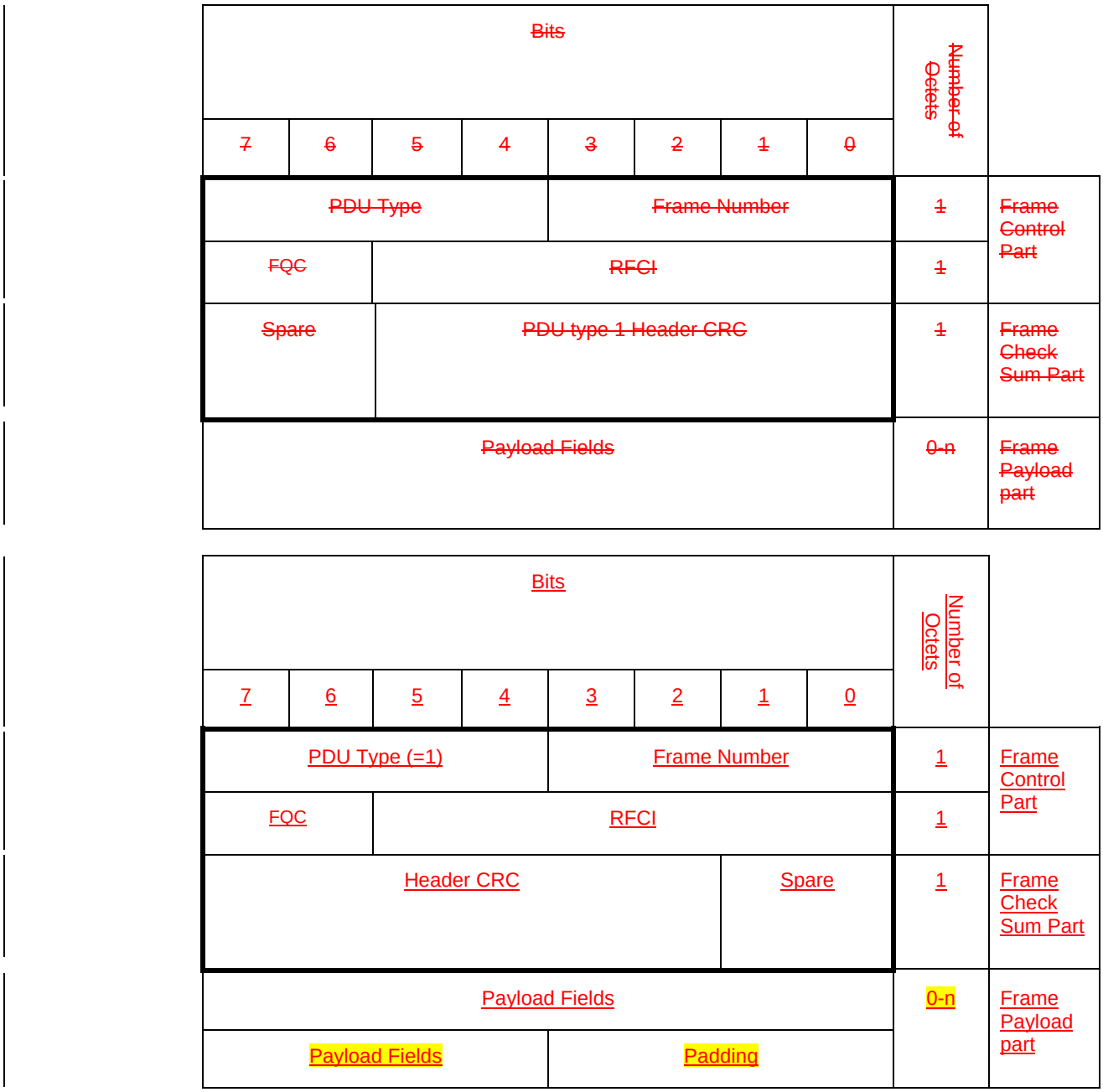

Figure 14: Iu UP PDU Type 1 Format

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.

6.6.1.36.6.2.3 PDU Type 1514

6.6.1.3.16.6.2.3.1 General

PDU Type 15 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 ~~15~~ 14 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~~				~~Ack/Nack~~		~~PDU Type 15 Frame Number~~		~~1~~	~~Frame Control Part~~
~~Spare~~				~~Procedure Indicator~~				~~1~~	
~~PDU type 15 payload CRC~~				~~PDU type 15 header CRC~~				~~1~~	~~Frame Checksum Part~~
~~PDU type 15 payload CRC~~								~~1~~	
~~Reserved for procedure data~~								~~0 n~~	~~Frame payload part~~

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

Figure 15: Iu UP PDU Type ~~15~~ 14 Format for procedure sending

The Iu UP PDU Type ~~15~~ 14 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 ~~15~~ 14 Frame Header.

6.6.1.3.4.2 Rate Control

The Figure below specifies how the rate control procedure is coded when the rate control uses only RFCI indicators.

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

Figure 19: Iu UP PDU Type 14 Format used for Rate Control

The Figure below specifies how the rate control procedure is coded when both RFCI indicators and Downlink send intervals are used.

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
PDU Type (=14)				Ack/Nack (=0)		PDU Type 14 Frame Number		1	Frame Control Part
Spare				Procedure Indicator (=1)				1	
Header CRC						Payload CRC		1	Frame Checksum Part
Payload CRC								1	
Spare	Rate Contr. Type (=1)			Number of RFCI Indicators (N)				1	Frame payload part
RFCI 0 Ind.	Downlink send interval (for RFCI 0)			RFCI 1 Ind.	Downlink send interval (for RFCI 1)			0–n	
...	...			RFCI N-2 Ind	Downlink send interval (for RFCI N-2)				
RFCI N-1 Ind.	Downlink send interval (for RFCI N-1)			Padding					

Figure 20: Iu UP PDU Type 14 Format used for Rate Control

6.6.3.Y Payload CRC

Description: This field contains the CRC of all the fields (including Padding) 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

~~6.6.1.3.2~~6.6.3.X Padding

Description: This field is an additional field used to make the frame payload part an integer number of octets when needed. Padding is set to 0 by the sender and is not interpreted by the receiver.

Value range: {0–127}

Field length: 0–7 bits

3GPP TSG-RAN Meeting #6
Nice, France, 13-15 December 1999

Document R3-99j87
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.

25.415	CR	011	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:	TSG-RAN#6	for approval	X	strategic		(for SMG use only)
list expected approval meeting # here ↑		for information		non-strategic		

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

Source: TSG-RAN WG3 **Date:** 01/12/99

Subject: Iu-UP frame Quality Classification

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:

Following recent work at S4, it appeared that it would be of some interest form the transcoder point of view to differentiate the 2 situations:

- the frame is corrupted due to the transport on the network interface
- the frame is corrupted due to the radio interface

Clauses affected: 6.4.4.1.2, 6.6.2.17

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:

6.4.4.1.2 Handling of FQC information

In SRNC on the sending side, the Support Mode Functions takes as input the radio frame quality information together with the frame. Based on this, the FQC is set for the frame, a CRC is added, if needed and the frame is sent to CN. The following table is shows the FQC field setting:

Delivery of erroneous SDUs	Radio Frame Classification	Action taken in SRNC on the sending side
Yes	Bad	Set FQC to 'bad radio'
No	Bad	Drop frame
Not Applicable	Any value	Set FQC to good
Any value	Good	Set FQC to good

The Support Mode Functions in CN on the receiving side makes a CRC check of the frame payload, if CRC is present and passes the frame and the frame quality classification information through the RNL-SAP.

Delivery of erroneous SDUs	CRC check result	Actions taken at CN on the receiving side
Yes	Not OK	Frame forwarded with FQC set to 'bad'
No	Not OK	Drop frame, send Iu-UP-Status primitive indicating 'No data' at the RNL-SAP
Not Applicable	Any result	Frame forwarded with FQC as set by UTRAN
Any value	OK	Frame forwarded with FQC as set by UTRAN

The Support Mode Functions in CN on the sending side adds a CRC, if necessary to the frame payload and passes it together with the FQC (in the transcoded case always set to good).

The Support Mode Functions in SRNC then makes a CRC-check, if CRC present. Based on the received FQC and eventually the CRC check, decision is made whether to deliver the frame or not.

Delivery of erroneous SDUs	FQC	CRC check (if payload CRC present)	Actions taken at SRNC on the receiving side
Yes	Bad	Any result	Drop frame
Yes	Bad radio	Any result	Drop frame
No	Any value	Not OK	Drop frame
N/A	Any value	Any result	Pass the frame to radio interface protocols
Any value	Good	OK	Pass the frame to radio interface protocols

NOTE: The case where SRNC receives a frame with the FQC set to "bad radio" (respectively: "bad"), corresponds to a ~~TFO or~~ TrFO (respectively: TFO) case. The frame is then trashed by the receiving RNC since there is currently no means to pass down to the UE the frame quality indicator.

6.6.2.17 Frame Quality Classification (FQC)

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'.

The meaning of the FQC field is specified below:

FQC Value	Definition
0	Frame good
1	Frame bad
2	~~Spare~~Frame bad due to radio
3	Spare