TSG-RAN Meeting #10
Bangkok, Thailand, 6 - 8 December 2000

TSGRP#10(00)0615

Title: **Agreed CRs to TS 25.415**

Source: **TSG-RAN WG3**

Agenda item: **5.3.3**

Tdoc_Num	Specification	CR_Num	Revision_Nu	CR_Subject	CR_Categor	WG_Status	Cur_Ver_Nu	New_Ver_Nu
R3-002885	25.415	036	2	Editorial Corrections	D	agreed	3.4.0	3.5.0
R3-002809	25.415	037	1	Corrections to Annex A	F	agreed	3.4.0	3.5.0
R3-002606	25.415	038		TI field in Initialisation frame	F	agreed	3.4.0	3.5.0
R3-002608	25.415	040		The Number of Octets for the IPTI fields	F	agreed	3.4.0	3.5.0
R3-003084	25.415	041	2	Number of RFCIs	F	agreed	3.4.0	3.5.0
R3-003083	25.415	042	1	TrFO and Iu UP Initialisation	F	agreed	3.4.0	3.5.0
R3-002836	25.415	043		Re-initialisaiton restriction	F	agreed	3.4.0	3.5.0
R3-003085	25.415	044		PDU type selection	F	agreed	3.4.0	3.5.0

R3-00~~2554~~288~~6~~5

3GPP/SMG Meeting #16
Windsor, England, 16-20 October 2000

Document **5**
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

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25.415	**CR**	**036r2**	Current Version:	3.4.0

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

For submission to:	TSG RAN#10	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: R-WG3 **Date:** October 30~~6~~, 2000

Subject: Editorial Corrections

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	
D	Editorial modification	X

Release:

Phase 2	
Release 96	
Release 97	
Release 98	
Release 99	X
Release 00	

Reason for change: There are two abbreviations that are not included in the abbreviations list and there are many grammatical and spelling mistakes that are also corrected.

Clauses affected: 3.1, 3.2 ,6.4.3 ,6.4.4.1.2, 6.5.2.1, 6.5.2.2, 6.5.3.1, 6.5.5.1, 6.5.5.2, 6.6.1, 6.6.3.4, 6.7.4, 6.7.6, 7.2.1, 7.3.3.1, 8.1.3, 8.1.4

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:

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3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Iu Timing Interval (ITI): Iu Timing Interval is the minimum time interval between sent Iu UP PDUs for a specific RAB. The ITI can be calculated for conversational and streaming traffic classes by the following formula:

$$ITI = \frac{MaxSDUsize}{MaxBitrate}$$

Inter PDU Transmission Interval (IPTI): Inter PDU Transmission Interval is the actual interval at which Iu UP PDUs can be sent at a certain time for a specific RAB. The IPTI of a RAB is calculated based on the RAB subflow combination size and the RAB subflow combination bitrate by dividing the RAB subflow combination size with the RAB subflow combination bitrate.

$$IPTI_g = \frac{RFC\_size_g}{RFC\_Bitrate_g}, \quad g = 1,\ldots,n, \quad n = number\ of\ subflowcombinations$$

NOTE: If RFC_Bitrate is not defined then IPTI=ITI. If RFC_size is not defined then RFC_size=MaxSDUsize.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AMR	Adaptive Multi-Rate codec
AS	Access Stratum
CN	Core Network
DS	Data Service
DTX	Discontinuous Transmission
DU	Data Unit
GF	Galois Field
IPTI	Inter PDU Transmission Interval
ITI	Iu Timing Interval
NAS	Non Access Stratum
PCE	Procedure Control Extension
PDU	Protocol Data Unit
PME	Procedure Control Bitmap Extension
QoS	Quality of Service
RAB	Radio Access Bearer
RANAP	Radio Access Network Application Part
RFC	RAB sub Flow Combination
RFCI	RFC Indicator
RNL	Radio Network Layer
SAP	Service Access Point
SDU	Service Data Unit
SMpSDU	Support Mode for predefined SDU size
SRNC	Serving RNC
SRNS	Serving RNS
SSSAR	Service Specific Segmentation And Reassembly
TFI	Transport Format Identification
TFO	Tandem Free Operation
TNL	Transport Network Layer
TrFO	Transcoder Free Operation
TrM	Transparent Mode
UP	User Plane
UUI	User to User Information

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 rates among the rates that can be controlled. The set of rates is represented by RFCI indicators and (when applicable) downlink send intervals. 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. This procedure is also used for negotiating the version of the Iu UP Mode requested for the related RAB.

- **Time Alignment:** is the procedure that controls the timing of the downlink data to the RNC over Iu. The function controlling this procedure interacts with functions outside of the Iu UP protocol layer.

- **Handling of Error Event:** 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.

6.4.4.1.2 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 shows the FQC field setting.

Table 1: FQC handling in RNC on uplink

INPUT (for each subflow)		**ACTION (on Iu UP frame)**
Delivery of erroneous SDUs	**Radio Frame Classification**	**Action taken in SRNC on the sending side**
Yes	Bad	Set FQC to 'bad radio'
No	Bad	Frame not sent
no-error-detection-consideration	Any value	Set FQC to good
Any value	Good	Set FQC to good

In the table above if for any of the subflows the ‘Delivery of erroneous SDUs’ is set to ‘No’ and for that subflow the Radio frame classification is ‘Bad’ then the Iu UP frame shall not be sent.

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.

Table 2: FQC handling in CN on uplink

INPUT		**ACTION (on Iu UP frame)**
Delivery of erroneous SDUs (for each subflow)	**Payload CRC check result (on Iu UP frame)**	**Actions taken at CN on the receiving side**
Yes (at least one of the subflows have this value but none have ‘No’)	Not OK	Frame forwarded with FQC set to 'bad'
No (at least one of the subflows have this value)	Not OK	Drop frame, send Iu-UP-Status primitive indicating 'No data' at the RNL-SAP
no-error-detection-consideration (All subflows have this value)	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.

Table 3: FQC handling in RNC on downlink

INPUT			ACTION (on Iu UP frame)
Delivery of erroneous SDUs (for each subflow)	**FQC (on Iu UP frame)**	**CRC check (if payload CRC present) (on Iu UP frame)**	**Actions taken at SRNC on the receiving side**
Yes	Bad	Any result	Drop frame
No	Bad	Any result	Drop frame
Yes	Bad radio	Any result	Drop frame
No	Bad radio	Any result	Drop frame
Yes	Any value	Not OK	Drop frame
No	Any value	Not OK	Drop frame
no-error-detection-consideration	Any value	Any result	Pass the frame to radio interface protocols
Any value	Good	OK	Pass the frame to radio interface protocols

In the table above if any of the subflows have the ‘Delivery of erroneous SDUs’ set to ‘Yes’ or ‘No’, and the FQC or CRC check indicates that the Iu UP is bad, then the Iu UP frame should be dropped.

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

6.5.2.1 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, such as the Inter PDU Timing Interval (IPTI) information.

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 RNC indicates the Iu UP Mode version it uses for the initialisation as well as the Iu UP Mode versions it supports for the related RAB. The sender should use the lowest version for the initialisation that has enough information to initialise the highest proposed protocol version.

The SRNC allocates a RAB sub-Flow Combination indicator (RFCI) to each RAB sub-Flow Combination it initialises. 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 sub-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 acknowledgement 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). The entity receiving the initialisation message shall choose a version that it supports and for which it has enough initialisation information. This entity could be in the CN, or in a RNC, e.g. in the case of TrFO.

If the initialisation frame is correctly formatted and treated by the receiving Iu UP protocol layer, this latter sends an initialisation acknowledgement frame using the version of the Iu UP Mode that is chosen.

Upon reception of an initialisation acknowledgement frame, the Iu UP protocol layer in the SRNC stops the supervision timer T_{INIT}.

If the initialisation procedure requires that several frames are to be sent, each frame shall be acknowledged individually.

If several initialisation frames are used for the initialisation procedure, the next frame shall wait for the acknowledgement of the previous frame to be received before sending. The supervision timer is used individually for each frame in a chain.

The frame number is always set to zero for the first frame in a chain and it shall be incremented in the sending direction

for each sent frame. The acknowledgement or negative acknowledgement carries the frame number of the frame being acknowledged.

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

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 Initialisation 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 initialisation frame.

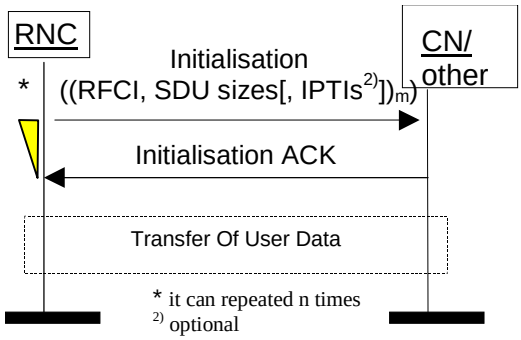

Figure 9: Successful Initialisation of Iu UP for m RFCIs

6.5.2.2 Unsuccessful operation

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

If the receiver does not support the Iu UP Mode version for the initialisation procedure, it shall send a negative acknowledgement using the highest version it supports among the versions proposed by the sender. If none of the proposed versions are supported, the receiver shall respond with a negative acknowledgement using the highest version it supports.

If after N_{INIT} repetition, the initialisation procedure is unsuccessfully terminated (because of N_{INIT} negative acknowledgement or timer T_{INIT} expires), the Iu UP protocol layers (sending and receiving) take appropriate local actions.

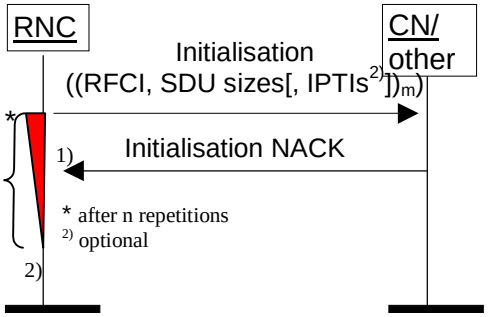

Figure 10: Unsuccessful initialisation of Iu UP: 1) N_{INIT} negative acknowledgement or 2) N_{INIT} timer expires

NOTE: 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.

6.5.3 Iu Rate Control procedure

6.5.3.1 Successful operation

The purpose of the rate control procedure is to signal to the peer Iu UP protocol layer the permitted rate(s) over Iu in the 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, such as TrFO and TFO, it is also controlled by the remote partner at the other end of the Iu UP.

The Iu 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 SRN

6.5.5 Handling of Error Event procedure

6.5.5.1 Successful operation

The purpose of the Error event procedure is to handle~~s~~ the error reporting. Over the Iu UP protocol the error reports are made with Error event frames. The Error event procedure in the Iu UP can be triggered by:

- an error detected by the Iu UP functions (by receiving an erroneous frame or by receiving a frame with unknown or unexpected data). In this case an Iu UP- Status Indication may be used to inform the upper layers;
- a request by the upper layers.

When an Error event is reported by an Error event frame the following information shall be included:

- a cause value;
- error distance (=0 if Iu UP function detected, =1 if requested by upper layers).

Upon reception of an Error report frame the Iu UP functions should take appropriate local actions based on the cause value. This may include ~~to~~ reporting the error to the upper layers with an Iu UP status indication.

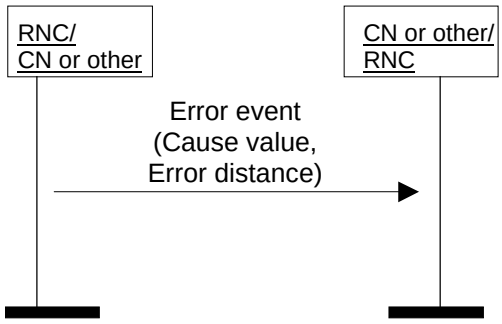

Figure 15b: Successful Error event

6.5.5.2 Unsuccessful operation

If the error event frame is incorrectly formatted and cannot be correctly treated by the receiving Iu UP protocol layer appropriate local actions are taken (e.g. upper layers are informed). An error in an Error event frame should not generate the sending of a~~n~~ new Error event frame.

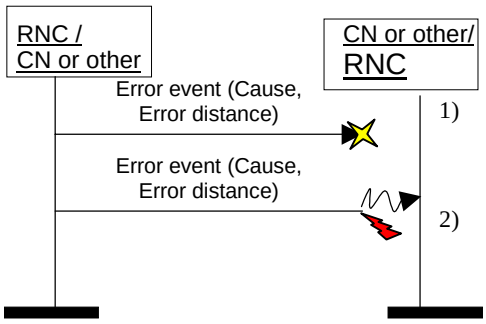

Figure 16b: Unsuccessful Transfer of Error event frame: 1) Frame loss 2) Corrupted Frame

6.6 Elements for Iu UP communication in Support mode

6.6.1 General

In the present document the structure of frames will be specified by using figures similar to figure 18.

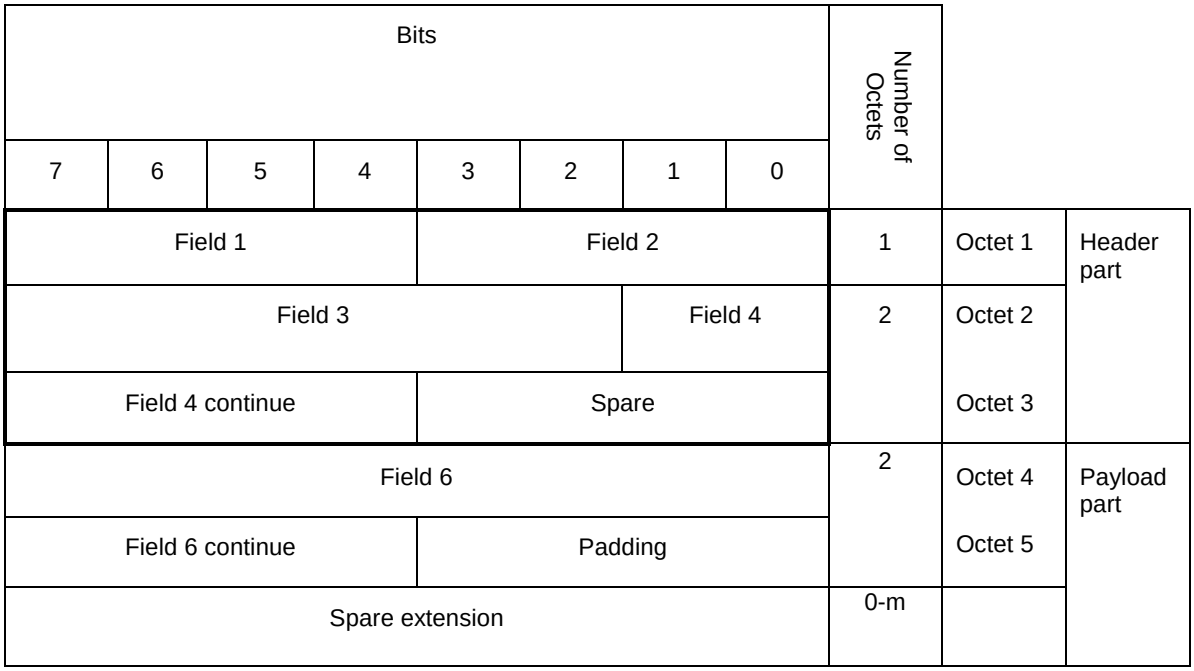

Figure 18: Example frame format

Unless otherwise indicated, fields which consist of multiple bits within an octet will have the more significant bit located at the higher bit position (indicated above frame in figure 18). In addition, if a field spans several octets, more significant bits will be located in lower numbered octets (right of frame in figure 18).

6.6.3.4 PDU Type 14 Frame Number

Description: The Iu UP frame numbering is handled by a Frame Number. The purpose of the PDU Type 14 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 14 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.

6.7.4 Error event frame over the Iu UP protocol

When an Error event frame is received over the Iu UP protocol an Iu-Status-Indication with 'Error event' information indicating the error type should be made to the upper layers. The Error event report contains a~~n~~ 'Cause value' that tells the type of the error. The Error event report also contains a field 'Error distance' that tells the distance to the entity reporting the error event. The 'Error distance' is 0 when the error is originally sent. When an Error event report is forwarded the 'Error distance' is incremented by one.

6.7.6 List of errors in Iu UP

Table 4: List of errors in Iu UP

Error Type	Error Cause	Recommended action by Error event procedure	Possibly detected by function	Comment
Syntactical	Bit error in Frame payload (CRC check)	No action	NAS data streams functions	Handled by Frame Quality Classification, when applied
	Bit error in Frame Header (CRC check)	Iu-UP-Status-Indication(Error event)	Frame handler functions	Frame discarded~~trashed~~
	Unexpected Frame Number	Iu-UP-Status-Indication(Error event)	NAS data streams functions	
	Frame loss	Iu-UP-Status-Indication(Error event) and Error event frame	NAS data streams functions	
	Unknown PDU type	Iu-UP-Status-Indication(Error event) and Error event frame	Frame handler functions	
	Unknown procedure	Iu-UP-Status-Indication(Error event) and Error event frame	Frame handler functions	
	Unknown or unexpected value	Iu-UP-Status-Indication(Error event) and Error event frame	Procedure control functions	
	Frame too short	Iu-UP-Status-Indication(Error event) and Error event frame	Frame handler functions	
	Missing fields	Iu-UP-Status-Indication(Error event) and Error event frame	Frame handler functions	
Semantical	Unexpected PDU type	Iu-UP-Status-Indication(Error event) and Error event frame	Frame handler functions	
	Unexpected procedure	Iu-UP-Status-Indication(Error event) and Error event frame	Frame handler functions	
	Unexpected RFCI	Iu-UP-Status-Indication(Error event) and Error event frame	NAS data streams functions	
	Unexpected value	Iu-UP-Status-Indication(Error event) and Error event frame	Procedure control functions	
Other error	Initialisation failure (outside Iu UP)	Error event frame	Function outside Iu UP	
	Initialisation failure (network error, timer expiry)	Iu-UP-Status-Indication(Error event)	Procedure control functions	
	Initialisation failure (Iu UP function error, repeated NACK)	Iu-UP-Status-Indication(Error event)	Procedure control functions	
	Rate control failure	Iu-UP-Status-Indication(Error event)	Procedure control functions	
	Error event failure	Iu-UP-Status-Indication(Error event)	Procedure control functions	
	Time Alignment not supported	Iu-UP-Status-Indication(Error event)	Procedure control functions	
	Requested Time Alignment not possible	Iu-UP-Status-Indication(Error event)	Function outside Iu UP	
	Iu UP version not supported	Iu-UP-Status-Indication(Error event)	Procedure control functions	

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	Subflow 1 SDU, ..., Subflow n SDU
		Iu-UP-control	RFCI
	Indication	Iu-UP-payload	Subflow 1 SDU, ..., Subflow n SDU
		Iu-UP-control	RFCI
			FQC
Iu-UP-Status	Indication	Iu-UP-Procedure-Control	Error Cause, Error Distance
			Initialisation
			RFCI indicators, Downlink send intervals (when applicable)
			Time Alignment
	Request	Iu-UP-Procedure-Control	Error Cause
			Time Alignment ACK/NACK
Iu-UP-UNIT-DATA	Request	Iu-UP-payload	
	Indication	Iu-UP-payload	

7.3.3.1 General

When the Iu UP protocol layer uses the services of a GTP-U transport, it uses an established GTP-U tunnel for transferring frames between the GTP-U tunnel endpoints at both ends of the Iu User plane access points. The RANAP Control Plane signalling over Iu handles the signalling to establish and release the GTP-U tunnels.

8.1.3 Adding a new PDU type

In the future, the Iu UP protocol may evolve so that there is a need to add a new PDU type. The criteria for introducing a new PDU type could be e.g.:

- the Procedure Indicators may run out and there is a need to have more;
- there is a need to change the header mask, e.g. the Frame Number field may need to be increased or the CRC field needs to be modified.

While the PDU type 15 is reserved for future PDU type extensions, there may be 'subtypes' under PDU type 15 in the future and there also may be new procedures in these 'subtypes'.

Thus it has to be ensured that if the same Procedure Indicator value is used under several PDU types, it should be made clear e.g. in the Error Event cause element, which PDU type it concerns.

The maximum length of the Spare Extension field is defined per PDU type. Thus when a new PDU type is added, an appropriate length for the Spare Extension field (if any) has to be defined. For Release ’99, a length of 4 octets has been used for data PDUs, and 32 octets for control PDUs.

8.1.4 Protocol version handling

In the future, new versions of the Iu UP protocol may be introduced. A reason for a new version of the protocol could be, e.g.:

- the earlier introduced new features or functions are required to be mandatory in the new version;
- due to technical development, the new version of the protocol could be totally different (and incompatible) from the earlier version.

The following principles shall be applied to version handling of Iu UP protocol:

- it shall be possible to introduce additional modes of operation;
- it shall be possible to evolve the operation modes independently of each other;
- there shall be independent version numbers for each mode of operation;
- the mode of operation of an Iu UP protocol instance is decided by the CN, but the version of the mode shall be negotiated between the CN and UTRAN during initialisation procedure;
- the version number of a UP operation mode may change or be unchanged between different releases;
- when the protocol is evolved it shall be made clear in the specification, which features belong to which versions;
- a new version may be an evolution (i.e. compatible) of the old version or the new version may be totally different from the old version.

- The structure of the PDU Type 14 header, up to and including header CRC, shall remain unchanged whatever the Iu UP version.

3GPP/SMG Meeting #16
Windsor, England, 16-20 October 2000

Document R3-00280925~~55~~
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or for SMG, use the format P-99-xxx

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25.415	**CR**	**037rev1**	Current Version:	3.4.0

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

For submission to:	TSG RAN#10	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: R-WG3 **Date:** October 17~~6~~, 2000

Subject: Corrections to Annex A

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 correct parts of Annex A as well as to add three~~two~~ abbreviations to the abbreviations list.

If this CR is not included it could mislead implementers of how AMR SDU packets are coded and used.

Clauses affected: 3.2, Annex A

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:

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

3.2 Abbreviations

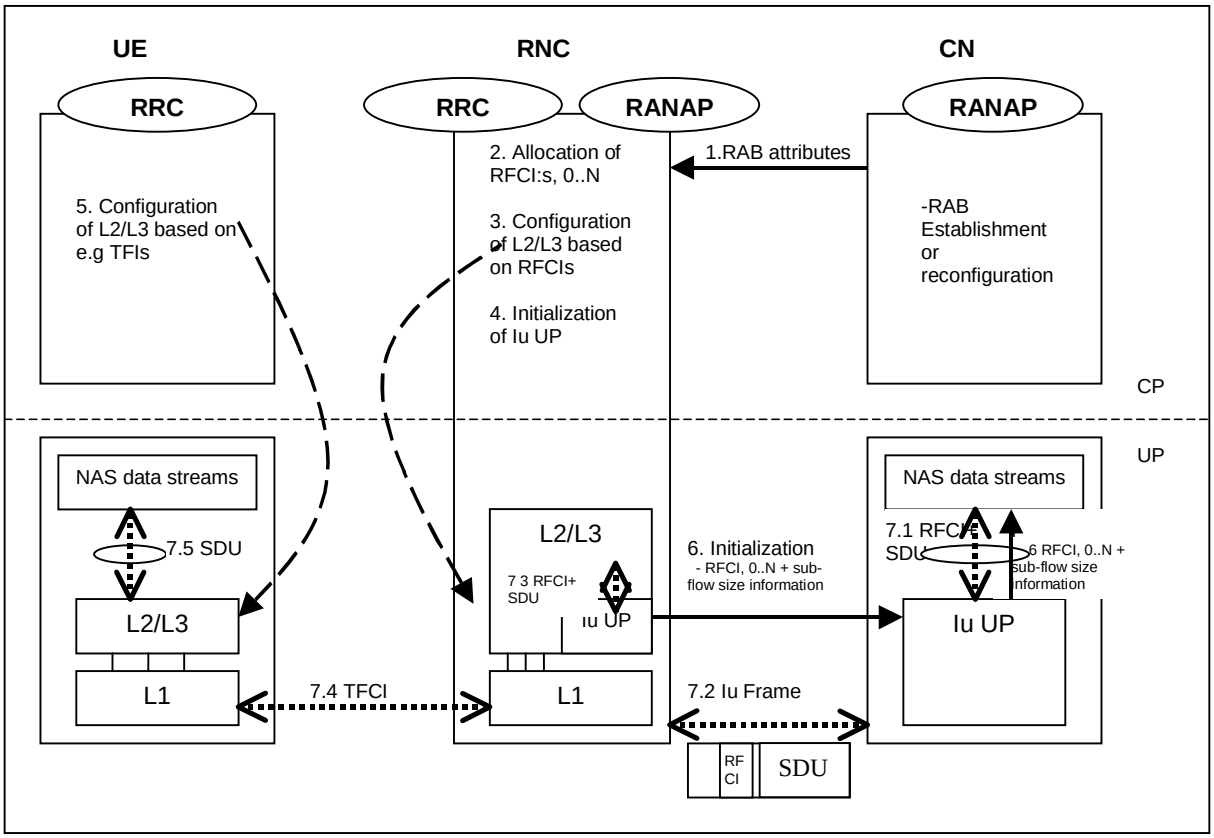
For the purposes of the present document, the following abbreviations apply:

AMR	Adaptive Multi-Rate codec
AS	Access Stratum
BER	Bit Error Rate
CN	Core Network
DTX	Discontinuous Transmission
GF	Galois Field
IPTI	Inter PDU Transmission Interval
ITI	Iu Timing Interval
NAS	Non Access Stratum
PCE	Procedure Control Extension
PDU	Protocol Data Unit
PME	Procedure Control Bitmap Extension
QoS	Quality of Service
RAB	Radio Access Bearer
RANAP	Radio Access Network Application Part
RFC	RAB sub Flow Combination
RFCI	RFC Indicator
RNL	Radio Network Layer
SAP	Service Access Point
SDU	Service Data Unit
SID	Silence Insertion Descriptor
SMpSDU	Support Mode for predefined SDU size
SRNC	Serving RNC
SRNS	Serving RNS
SSSAR	Service Specific Segmentation And Reassembly
TFCI	Transport Format Combination Indicator
TFI	Transport Format Identification
TFO	Tandem Free Operation
TNL	Transport Network Layer
TrFO	Transcoder Free Operation
TrM	Transparent Mode
UP	User Plane
UUI	User to User Information

Annex A (informative): Illustration of usage of RFCI for AMR speech RAB

This annex contains information related to usage of RFCIs in the context of AMR speech RAB.

The following figure illustrates the RFCI allocation and flow throughout the UTRAN.



1. **RAB Attributes**: at RAB establishment or reconfiguration, the SDU format~~size~~ information parameter is passed to UTRAN. The SDU information is organised per BER i.e. RAB sub Flow. For instance, ~~,~~ 12,2 kbits/s AMR codec is passed as RAB sub flow 1 SDU size: 81 bits –class A bits-, as RAB sub flow 2 SDU size: 103 bits –class B bits-, as RAB sub flow 3 SDU size: 60 bits –class C-~~)~~, which makes one RAB sub Flow Combination. This is done for all source rates (i.e. all codec modes, DTX also if included). So using the RAB subflows combination set from Table A.1, the SDU Format Information Parameters for RAB subflow 1 is [0,39,39,81], for RAB subflow 2 is [0,0,56,103], and for RAB subflow 3 is [0,0,0,60]. The Iu UP is used in support mode for predefined SDU size.
2. **Allocation of RFCIs**: the RNC dynamically allocates an identification (RFCI) to each permitted/possible combinations it can offer. E.g. for 0 kbits/s, the RNC allocates RFCI 0, for the SID, the RNC allocates RFCI 1, for 4,75 kbits/s, the RNC allocates RFCI 2, and for 12,2~~,~~ kbits/s, the RNC allocates RFCI 3 (according to the example table A.1).
3. **Configuration of L2/L3 based on RFCIs**: RFCIs are used to configure the L2/L3. RLC is used in transparent mode~~ly~~. MAC configures its co-~~-~~ordinated DCHs with the RFCIs and associates one RFCI to one TFI.
4. **Initialisation of Iu UP**: the RNC reports the permitted combinations it can offer to the transcoder using an inband Iu initialisation frame containing the RFCIs and associated RAB sub Flow sizes.
5. **Configuration of L2/L3 based on e.g. TF~~C~~Is**: idem as 3. L2/L3 may use e.g. TFI to communicate with the Codec about the RAB sub-Flow structure of the SDU received or to be sent.
6. **RFCIs+ SDU size information**: the RFCIs and associated RAB sub Flow sizes ~~are~~ received within the Iu initialisation frame are passed to the Codec for configuration.
7. **Example of DL frame transfer:**
   - 7.1. The Codec encodes a 12,2 kbits/s frame. It sends down to the Iu UP an~~d~~ SDU with an associated RFCI equals to 3 (in this example).
   - 7.2. The Iu UP packs a frame with a header containing an RFCI set to value 3, and the payload made of the SDU received from the Codec.
   - 7.3. The Iu UP passes to L2/L3, the Iu frame payload (the Codec SDU) and the RFCI. The L2/L3 uses ~~this~~ this RFCI to break the Iu frame onto the co-ordinated DCHs corresponding to the different bits protection classes. The corresponding TFI is selected.
   - 7.4. The radio frame is sent with the TFCI chosen by MAC.
   - 7.5. The L2/L3 receives the SDUs on the co-ordinated DCHs, combine~~d~~s them back and uses e.g. the TF~~C~~I to indicate to the codec the structure of the received frame.

Figure A.1

For information on RAB subflow combinations used for AMR speech see reference [12].

SRNC allocates one or more possible/available RAB sub-flow combination(s) and generates RAB sub-flow combination set. RAB sub-flow combination number is dynamically generated by SRNC. This RAB sub-flow combination set is signalled towards CN with user plane signalling as described in [1]. The signalling towards UE is to be defined by TSG-RAN WG2.

RAB sub-flow combination set:

A RAB sub-flow combination indicator, RFCI, indicates which RAB sub flow combination will be used for the Iu user frames. In the communication phase the RFCI is included in the user frame, and the RFCI state the structure of the user frame.

Table A.1 exemplifies the allocation of 4 different RAB sub-flows combinations for 3 sub-flows and generating of RAB sub-flows combination set.

Table A.1: Example of Allocation of RAB sub-flows combination indicator

	RFCI (RAB sub-Flow Combination Indicator)	RAB sub-Flow 1	RAB sub-flow 2	RAB sub-flow 3	Total	Source rate
RAB sub-flows combination set	**0**	**0**	**0**	**0**	0	Source rate 1
	1	**39**	**0**	**0**	39	Source rate 2
	2	**39**	**56**	**0**	95	Source rate 3
	3	**81**	**103**	**60**	244	Source rate 4
NOTE:	In the table above the greyed area shows the part that is sent in the initialisation procedure in Iu UP. This is what constitutes the RAB subflow combination set.					

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25.415	CR	038	Current Version:	3.4.0

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

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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: R-WG3 **Date:** 9th October 2000

Subject: TI field in Initialisation frame

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 correct the length of the TI field in the Initialisation frame. CR8r1 tdoc R3-000783 introduced the TI field as a 1 bit field. The CR had however been incorrectly implemented in the standard, since the TI field had become a 2 bit field in the figure.

If this CR is not approved, the TI field is ambiguously specified.

Clauses affected: 6.6.2.3.4.1

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:

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6.6.2.3.4.1 Initialisation

Figure 24 specifies how the initialisation 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 14 Frame Number		1	Frame Control Part
Iu UP Mode version				Procedure Indicator (=0)				1	
Header CRC						Payload CRC		2	Frame Checksum part
Payload CRC									
Spare			TI	Number of subflows per RFCI (N)			Chain Ind	1	Frame payload part
LRI	LI	1st RFCI						1	
Length of subflow 1								1 or 2 (dep. LI)	
Length of subflow 2 to N								(N-1)x(1 or 2)	
LRI	LI	2nd RFCI						1	
Length of subflow 1								1 or 2 (dep. LI)	
Length of subflow 2 to N								(N-1)x(1 or 2)	
…									
IPTI of 1st RFCI				IPTI of 2nd RFCI				0 or N/2	
IPTI of 3rd RFCI				…					
Iu UP Mode Versions supported (bitmap)								2	
Data PDU type				Spare				1	
Spare extension								0-32	

Figure 24: Iu UP PDU Type 14 used for Initialisation

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
Iu UP Mode version				Procedure Indicator (=0)				1	
Header CRC						Payload CRC		2	Frame Checksum part
Payload CRC									
Spare				TI	Number of subflows per RFCI (N)		Chain Ind	1	Frame payload part
LRI	LI	1st RFCI						1	
Length of subflow 1								1 or 2 (dep. LI)	
Length of subflow 2 to N								(N-1)x(1 or 2)	
LRI	LI	2nd RFCI						1	
Length of subflow 1								1 or 2 (dep. LI)	
Length of subflow 2 to N								(N-1)x(1 or 2)	
…									
IPTI of 1st RFCI				IPTI of 2nd RFCI				0 or N/2	
IPTI of 3rd RFCI				…					
Iu UP Mode Versions supported (bitmap)								2	
Data PDU type				Spare				1	
Spare extension								0-32	

Figure 24: Iu UP PDU Type 14 used for Initialisation

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25.415	CR	040	Current Version:	3.4.0

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

For submission to:	RAN#10	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: R-WG3 **Date:** 2000-10-10

Subject: The Number of Octets for the IPTI fields

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:
Correction of the character used to represent the number of RFCIs in the control frame figures. The currently used character 'N' is also used for number of subflows. It is therefore proposed that 'M' is used for number of RFCIs.

If this CR is not accepted there is a fault in the specification.

Clauses affected: 6.6.2.3.4.1, 6.6.2.3.4.2

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:


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6.6.2.3.4 Procedures Coding

6.6.2.3.4.1 Initialisation

Figure 24 specifies how the initialisation 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 14 Frame Number		1	Frame Control Part
Iu UP Mode version				Procedure Indicator (=0)				1	
Header CRC						Payload CRC		2	Frame Checksum part
Payload CRC									
Spare				TI		Number of subflows per RFCI (N)	Chain Ind	1	Frame payload part
LRI	LI	1st RFCI						1	
Length of subflow 1								1 or 2 (dep. LI)	
Length of subflow 2 to N								(N-1)x(1 or 2)	
LRI	LI	2nd RFCI						1	
Length of subflow 1								1 or 2 (dep. LI)	
Length of subflow 2 to N								(N-1)x(1 or 2)	
…									
IPTI of 1st RFCI				IPTI of 2nd RFCI				0 or ~~N~~M/2 (M: Number of RFCIs in frame)	
IPTI of 3rd RFCI				…					
Iu UP Mode Versions supported (bitmap)								2	
Data PDU type				Spare				1	
Spare extension								0-32	

Figure 24: Iu UP PDU Type 14 used for Initialisation

6.6.2.3.4.2 Rate Control

Figure 25 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 14 Frame Number		1	Frame Control Part
Iu UP Mode version				Procedure Indicator (=1)				1	
Header CRC						Payload CRC		1	Frame Checksum Part
Payload CRC								1	
Spare				Number of RFCIs (~~N~~M)				1	Frame payload part
RFCI 0 Ind.	RFCI 1 Ind	…	RFCI ~~N~~M-1 Ind	Padding				0–n	
Spare extension								0-32	

Figure 25: Iu UP PDU Type 14 Format used for Rate Control

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25.415	CR	041r2	Current Version:	3.4.0

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

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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: R-WG3 **Date:** 2000-11-14

Subject Number of RFCIs

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			Release 98	
D	Editorial modification	X		Release 99	X
				Release 00	

Reason for change: The field "Number of RFCIs (N)" in figure 25 is explained by chapter 6.6.3.13 (Number of RFCI Indicators). There is a misalignment between the chapter heading of 6.6.3.13 and the field text in figure 25. In order to achieve alignment it is proposed to correct the field name in figure 25.

Clauses affected: 6.6.2.3.42

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:


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

6.6.2.3.4.2 Rate Control

Figure 25 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 14 Frame Number		1	Frame Control Part
Iu UP Mode version				Procedure Indicator (=1)				1	
Header CRC						Payload CRC		1	Frame Checksum Part
Payload CRC								1	
Spare				Number of RFCI Indicators (N)				1	Frame payload part
RFCI 0 Ind.	RFCI 1 Ind	…	RFCI N-1 Ind	Padding				0–n	
Spare extension								0-32	

Figure 25: Iu UP PDU Type 14 Format used for Rate Control

3GPP TSG-RAN-WG3 meeting #17
Chicago, USA, 20–24 November 2000

***Document* R3-003083**
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25.415	CR	042r1	Current Version:	3.4.0

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

For submission to:	RAN#10	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: R-WG3 **Date:** 2000-11-14

Subject TrFO and Iu UP Initialisation

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:

The handling of Iu UP initialisations are described based on the assumption that the Iu UP can be a RNC to RNC protocol and not an RNC to CN peer protocol. This is however outside the scope of R'99, and therefore it is proposed to remove this description.

It was also agreed during RAN3 #16 to remove all mentioning of TrFO from the specification. The mentioning of TFO has also been removed for similar reasons

If this CR is not accepted the specification contains description of features that are out of the scope of R'99 and are therefore not used.

Clauses affected: 3.2, 3.3, 6.4.4.1.2, 6.5.2~~.1~~, 6.5.3, 6.5.4.2, 6.5.5, Annex B

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:

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

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AMR	Adaptive Multi-Rate codec
AS	Access Stratum
CN	Core Network
DTX	Discontinuous Transmission
GF	Galois Field
IPTI	Inter PDU Transmission Interval
ITI	Iu Timing Interval
NAS	Non Access Stratum
PCE	Procedure Control Extension
PDU	Protocol Data Unit
PME	Procedure Control Bitmap Extension
QoS	Quality of Service
RAB	Radio Access Bearer
RANAP	Radio Access Network Application Part
RFC	RAB sub Flow Combination
RFCI	RFC Indicator
RNL	Radio Network Layer
SAP	Service Access Point
SDU	Service Data Unit
SMpSDU	Support Mode for predefined SDU size
SRNC	Serving RNC
SRNS	Serving RNS
SSSAR	Service Specific Segmentation And Reassembly
TFI	Transport Format Identification
~~TFO~~	~~Tandem Free Operation~~
TNL	Transport Network Layer
~~TrFO~~	~~Transcoder Free Operation~~
TrM	Transparent Mode
UP	User Plane
UUI	User to User Information

3.3 Concepts

Iu UP mode of operation:

One objective of the Iu User Plane (UP) protocol is to remain independent of the CN domain (Circuit Switched or Packet Switched) and to have limited or no dependency with the Transport Network Layer. Meeting this objective provides the flexibility to evolve services regardless of the CN domain and to migrate services across CN domains.

The Iu UP protocol is therefore defined with modes of operation that can be activated on a RAB basis rather than on a CN domain basis or (tele)service basis. The Iu UP mode of operation determines if and which set of features shall be provided to meet e.g. the RAB QoS requirements.

Iu UP protocol PDU Type:

The Iu UP protocol PDU Types are defined for a given Iu UP mode of operation. An Iu UP PDU Type represents a defined structure of an Iu UP protocol frame. For instance, a frame made of a certain Frame Header mask part and a Frame Payload part would be specified as a certain PDU type valid for a given Iu UP mode of operation.

~~**Tandem Free Operation (TFO):**~~

~~Configuration of a Speech or Multimedia call for which Transcoders are physically present in the communication path but transcoding functions are disabled or partially disabled. The Transcoders may perform control and/or protocol conversion functions.~~

Transcoder (TC):

Physical device present in the network responsible for the transcoding of the speech data between two speech codecs or coding schemes (The Transcoder may also include other functions, i.e. Rate Adaptation in GSM).

~~**Transcoder Free Operation (TrFO):**~~

~~Configuration of a Speech or Multimedia call for which Transcoders are not present in the communication path.~~

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 shows the FQC field setting.

Table 1: FQC handling in RNC on uplink

INPUT (for each subflow)		ACTION (on Iu UP frame)
Delivery of erroneous SDUs	**Radio Frame Classification**	**Action taken in SRNC on the sending side**
Yes	Bad	Set FQC to 'bad radio'
No	Bad	Frame not sent
no-error-detection-consideration	Any value	Set FQC to good
Any value	Good	Set FQC to good

In the table above if for any of the subflows the ‘Delivery of erroneous SDUs’ is set to ‘No’ and for that subflow the Radio frame classification is ‘Bad’ then the Iu UP frame shall not be sent.

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.

Table 2: FQC handling in CN on uplink

INPUT		ACTION (on Iu UP frame)
Delivery of erroneous SDUs (for each subflow)	**Payload CRC check result (on Iu UP frame)**	**Actions taken at CN on the receiving side**
Yes (at least one of the subflows have this value but none have ‘No’)	Not OK	Frame forwarded with FQC set to 'bad'
No (at least one of the subflows have this value)	Not OK	Drop frame, send Iu-UP-Status primitive indicating 'No data' at the RNL-SAP
no-error-detection-consideration (All subflows have this value)	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 the CRC is present. Based on the ~~received FQC and eventually the~~ CRC check, a decision is made whether to deliver the frame or not.

Table 3: FQC handling in RNC on downlink

INPUT			ACTION (on Iu UP frame)
Delivery of erroneous SDUs (for each subflow)	**~~FQC (on Iu UP frame)~~**	**CRC check (if payload CRC present) (on Iu UP frame)**	**Actions taken at SRNC on the receiving side**
~~Yes~~	~~Bad~~	~~Any result~~	~~Drop frame~~
~~No~~	~~Bad~~	~~Any result~~	~~Drop frame~~
~~Yes~~	~~Bad radio~~	~~Any result~~	~~Drop frame~~
~~No~~	~~Bad radio~~	~~Any result~~	~~Drop frame~~
Yes	~~Any value~~	Not OK	Drop frame
No	~~Any value~~	Not OK	Drop frame
no-error-detection-consideration	~~Any value~~	Any result	Pass the frame to radio interface protocols
Any value	~~Good~~	OK	Pass the frame to radio interface protocols

In the table above if any of the sublows have the 'Delivery of erroneous SDUs' set to 'Yes' or 'No', and the ~~FQC or~~ CRC check indicates that the Iu UP is bad, then the Iu UP frame should be dropped.

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

6.5.2 Initialisation procedure

6.5.2.1 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, as the Inter PDU Timing Interval (IPTI) information.

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 RNC indicates the Iu UP Mode version it uses for the initialisation as well as the Iu UP Mode versions it supports for the related RAB. The sender should use the lowest version for the initialisation that has enough information to initialise the highest proposed protocol version.

The SRNC allocates a RAB sub-Flow Combination indicator (RFCI) to each RAB sub-Flow Combination it initialises. 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 sub-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 acknowledgement 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). The CN entity receiving the initialisation message shall choose a version that it supports and for which it has enough initialisation information. ~~This entity could be in the CN, or in a RNC, e.g. in case of TrFO.~~

If the initialisation frame is correctly formatted and treated by the receiving Iu UP protocol layer, this latter sends an initialisation acknowledgement frame using the version of the Iu UP Mode that is chosen.

Upon reception of an initialisation acknowledgement frame, the Iu UP protocol layer in the SRNC stops the supervision timer T_{INIT}.

If the initialisation procedure requires that several frames are to be sent, each frame shall be acknowledged individually.

If several initialisation frames are used for the initialisation procedure, the next frame shall wait for the acknowledgement of the previous frame to be received before sending. The supervision timer is used individually for each frame in a chain.

The frame number is always set to zero for the first frame in a chain and it shall be incremented in the sending direction for each sent frame. The acknowledgement or negative acknowledgement carries the frame number of the frame being acknowledged.

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

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 Initialisation 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 initialisation frame.~~

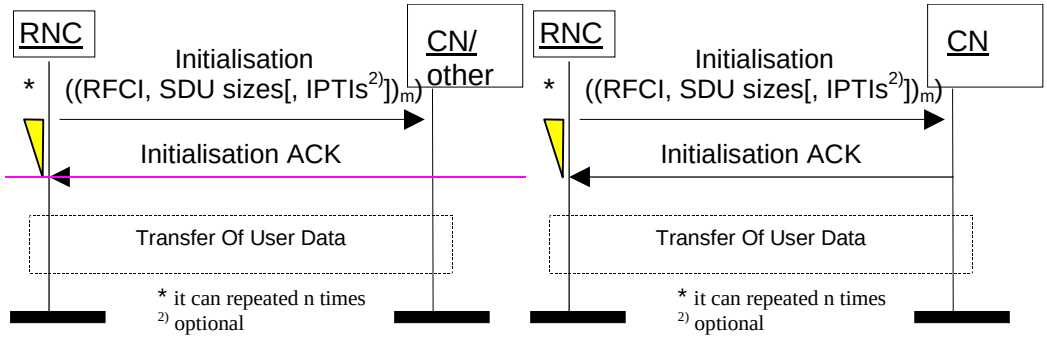


Figure 9: Successful Initialisation of Iu UP for m RFCIs

6.5.2.2 Unsuccessful operation

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

If the receiver does not support the Iu UP Mode version for the initialisation procedure, it shall send a negative acknowledgement using the highest version it supports among the versions proposed by the sender. If none of the proposed versions are supported, the receiver shall respond a negative acknowledgement using the highest version it supports.

If after N_{INIT} repetition, the initialisation procedure is unsuccessfully terminated (because of N_{INIT} negative acknowledgement or timer T_{INIT} expires), the Iu UP protocol layers (sending and receiving) take appropriate local actions.

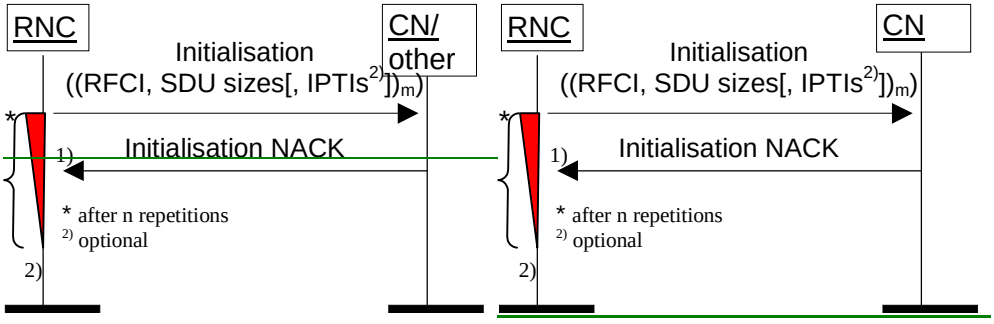


Figure 10: Unsuccessful initialisation of Iu UP: 1) N_{INIT} negative acknowledgement or 2) N_{INIT} timer expires

~~NOTE: 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.~~

6.5.3 Iu Rate Control procedure

6.5.3.1 Successful operation

The purpose of the rate control procedure is to signal to the peer Iu UP protocol layer the permitted rate(s) over Iu in the 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 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 the rates that are above the guaranteed bitrate (indicated to the Iu UP at establishment) Rates below the guaranteed bitrate, e.g. SID frames, cannot be controlled by the RNC.

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 Rate control frame payload containing the permitted rates of the reverse direction of the rate control frame. The permitted rate is given as RFCI indicators.

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 transfer 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 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.

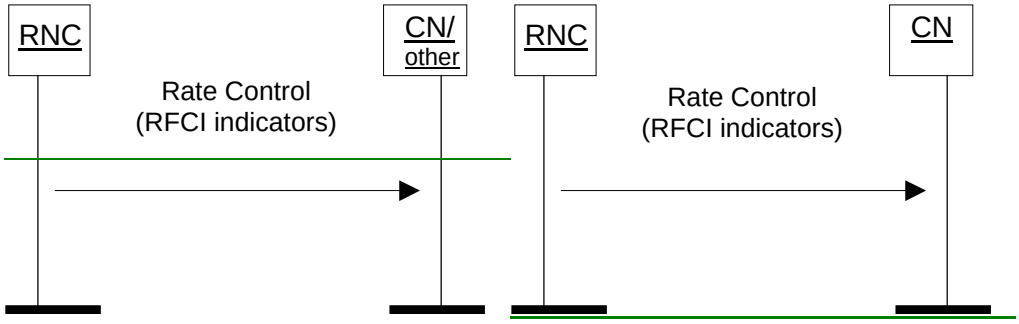
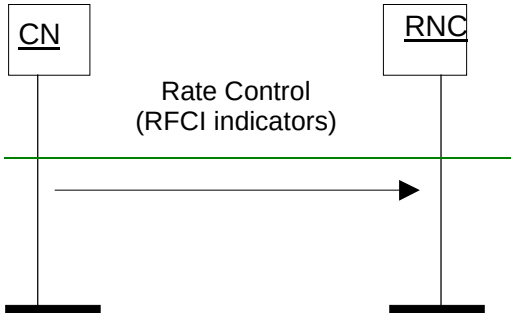


Figure 11: Successful Rate Control sent from SRNC



~~Figure 12: Successful Rate Control sent from CN~~

6.5.3.2 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 rate is outside the set of permitted rates in the reverse direction of the rate control frame), the Iu UP shall retrigger a rate control procedure. If after N_{RC} repetitions, the error situation persists, the Iu UP protocol layers (sending and receiving) take the appropriate local actions.

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

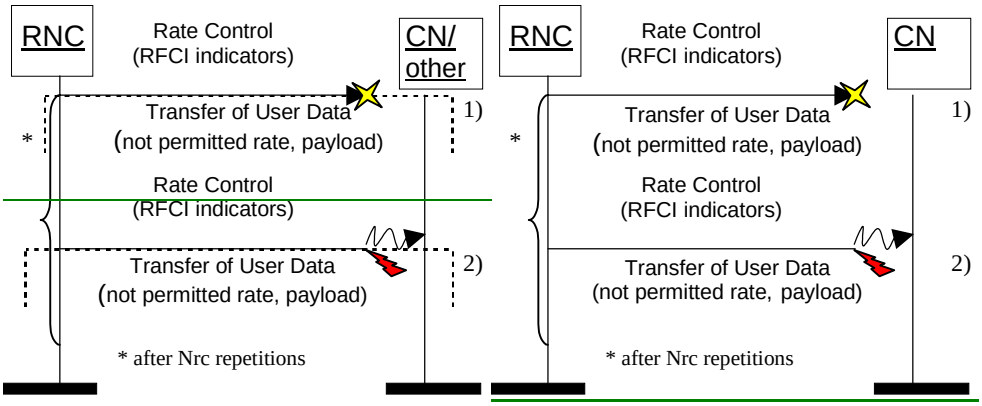
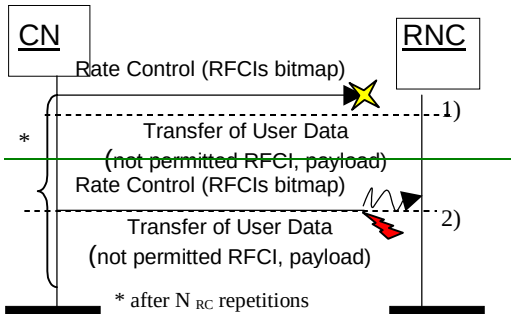


Figure 13: Unsuccessful Transfer of rate control from RNC: 1) Frame loss 2) Corrupted Frame



~~Figure 14: Unsuccessful Transfer of rate control from CN: 1) Frame loss 2) Corrupted Frame~~

6.5.4.2 Unsuccessful operation

If the Time Alignment could not be handled by the peer side, the peer side should send a NACK with a corresponding cause. When the Iu UP in the SRNC receives a NACK with cause "Time Alignment not supported", then the SRNC shall not send additional Time Alignment frames for that RAB (unless the Iu UP conditions change for that RAB). The cause value "Requested Time Alignment not possible" is used to indicate that the requested time alignment was not possible at that moment. At a later moment the SRNC may initiate a new Time Alignment command when needed.

If the Iu UP in the SRNC detects that the time alignment command has not been correctly interpreted or received, i.e NACK received or timer expires, and the time alignment need still persists, the Iu UP should retrigger a time alignment procedure. If after N_{TA} repetitions, the error situation persists, the Iu UP protocol layers take appropriate local actions.

Upon reception of a time alignment negative acknowledgement frame, the Iu UP protocol layer in the SRNC stops the supervision timer T_{TA}.

~~If the Iu UP protocol layer in RNC receives a Time Alignment frame (e.g. at TrFO case) a NACK shall be sent with the cause value "Time Alignment not supported".~~

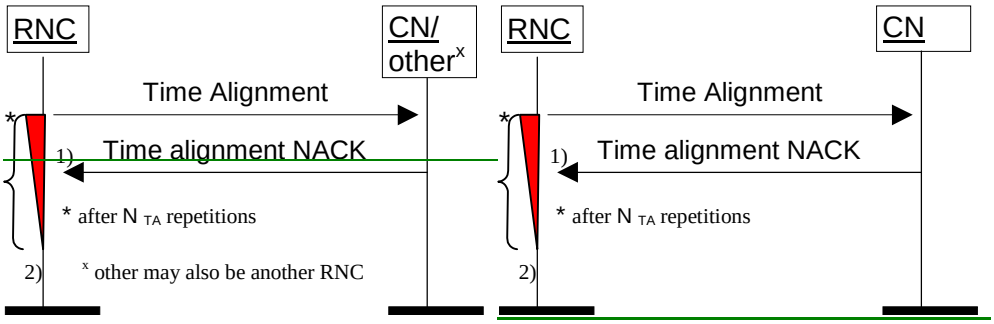


Figure 16a: Unsuccessful Time Alignment: 1) N_{TA} negative acknowledgements or 2) N_{TA} timer expiries

6.5.5 Handling of Error Event procedure

6.5.5.1 Successful operation

The purpose of the Error event procedure handles the error reporting. Over the Iu UP protocol the error reports are made with Error event frames. The Error event procedure in the Iu UP can be triggered by:

- an error detected by the Iu UP functions (by receiving an erroneous frame or by receiving a frame with unknown or unexpected data). In this case an Iu UP- Status Indication may be used to inform the upper layers;
- a request by the upper layers.

When an Error event is reported by an Error event frame the following information shall be included:

- a cause value;
- error distance (=0 if Iu UP function detected, =1 if requested by upper layers).

Upon reception of an Error report frame the Iu UP functions should take appropriate local actions based on the cause value. This may include to report the error to the upper layers with an Iu UP status indication.

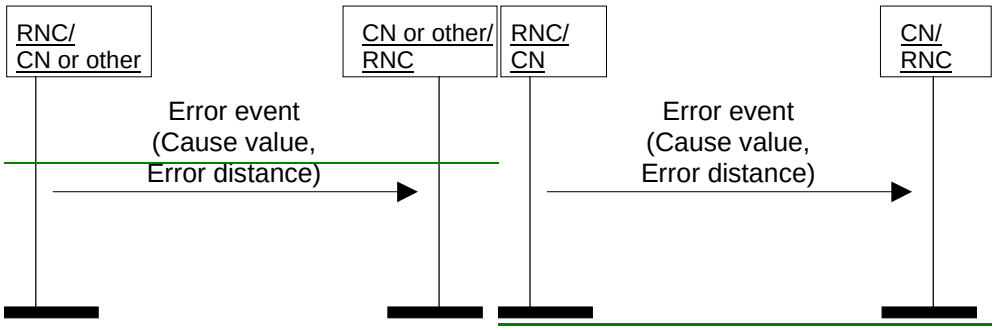


Figure 15b: Successful Error event

6.5.5.2 Unsuccessful operation

If the error event frame is incorrectly formatted and cannot be correctly treated by the receiving Iu UP protocol layer appropriate local actions are taken (e.g. upper layers are informed). An error in an Error event frame should not generate the sending of an new Error event frame.

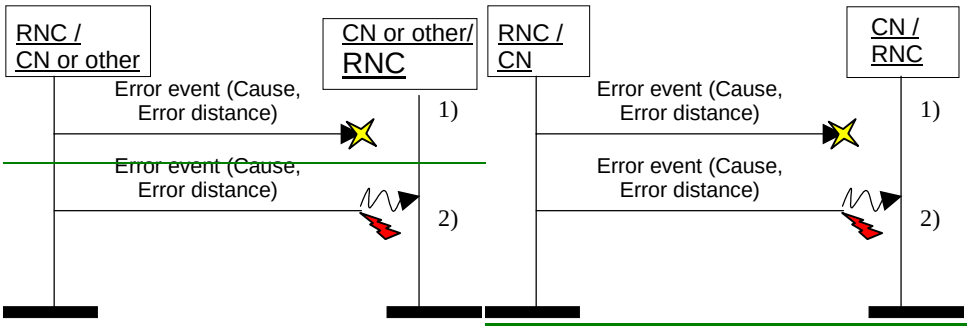


Figure 16b: Unsuccessful Transfer of Error event frame: 1) Frame loss 2) Corrupted Frame

Annex B (informative): Illustration of protocol states in the Iu UP

This annex contains information related to possible protocol states for operation of the Iu UP. This annex does not constraint implementation and is for illustration purposes only.

The state model is common for both ends of the Iu UP so that the protocol machines are operating symmetrically. This approach is taken to facilitate state description for all cases including possible future scenarios where the Iu UP could be terminated elsewhere~~TFO and TrFO~~.

NOTE: Primitive Iu-UP-CONFIG-Req is used by upper layers to configure the Iu UP protocol layer. It is used in this annex for illustrative purposes and therefore it is not defined in clause 7.

B.1 Protocol state model for transparent mode

Figure B.1 illustrates the state model for transparent mode Iu UP instances. A transparent mode instance can be in one of following states.

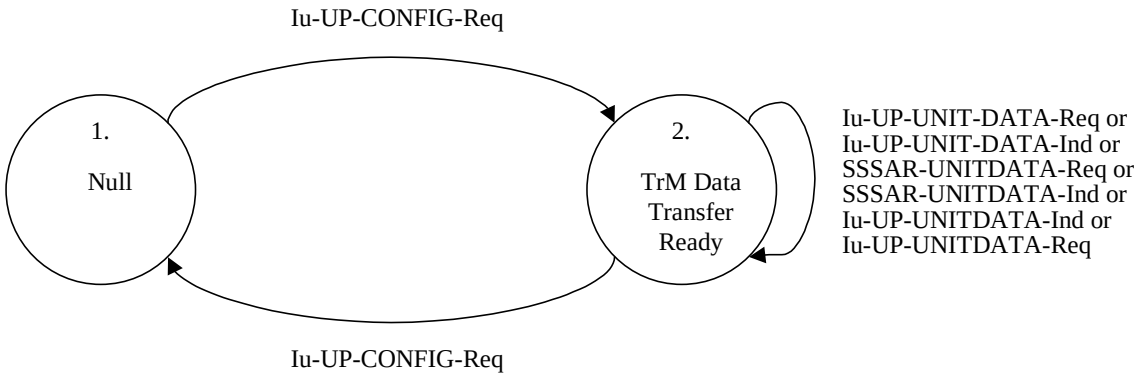


Figure B.1: Protocol state model for transparent mode

B.1.1 Null State

In the null state the Iu UP instance does not exist and therefore it is not possible to transfer any data through it.

Upon reception of a Iu-UP-CONFIG-Req from higher layer the Iu UP instance is created and transparent mode data transfer ready state is entered. The mode information is received either through RANAP signalling or directly in the CN node. In the Iu-UP-CONFIG-Req e.g. the following information will be indicated:

- transparent mode.

B.1.2 Transparent Mode Data Transfer Ready State

In the transparent mode data transfer ready state, transparent mode data can be exchanged between the entities.

Upon reception of Iu-UP-CONFIG-Req indicating release from higher layer, the Iu UP instance is terminated and the null state is entered.

B.2 Protocol state model for support mode for predefined SDU sizes

Figure B.2 illustrates the state model for support mode Iu UP instances. A support mode instance can be in one of the following states.

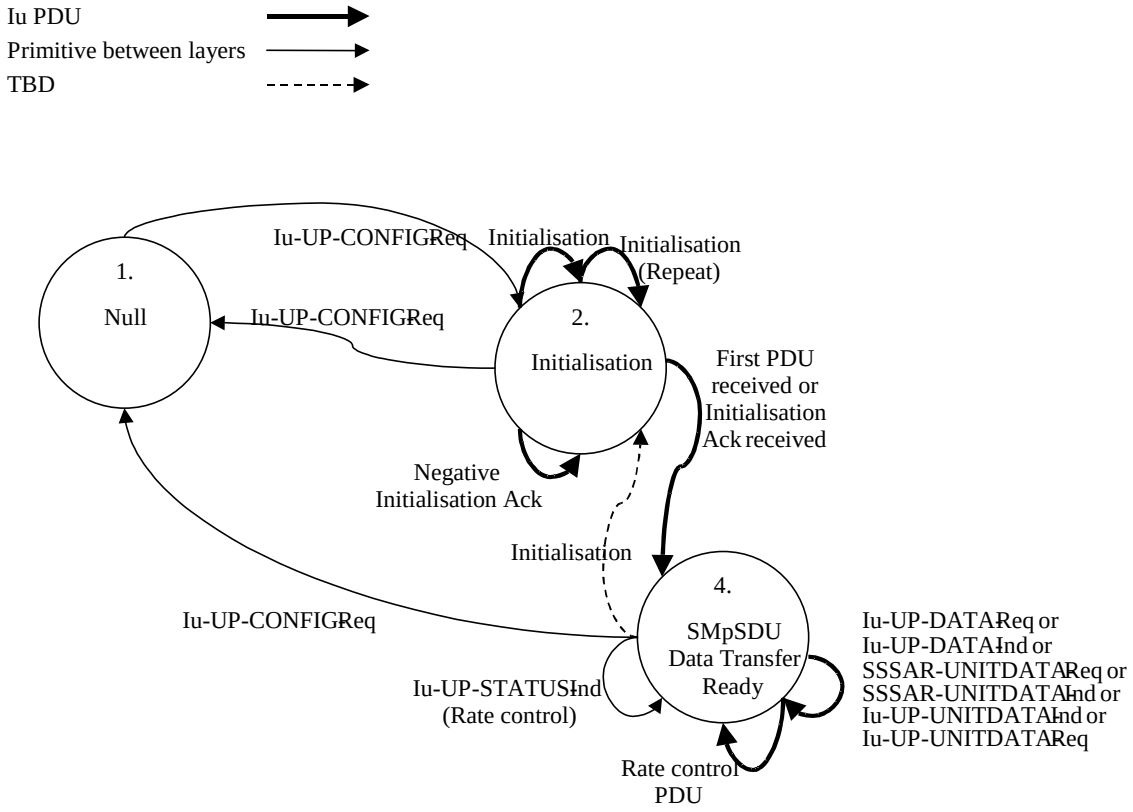


Figure B.2: Protocol state model for support mode

B.2.1 Null State

In the null state the Iu UP instance does not exist and therefore it is not possible to transfer any data through it.

Upon reception of a Iu-UP-CONFIG-Req from higher layer the Iu UP instance is created and initialisation state is entered. In the Iu-UP-CONFIG-Req e.g. the following information could be indicated:

- support mode for predefined SDU sizes;
- time alignment (FFS);
- indication of delivery of erroneous SDUs;
- periodicity.

B.2.2 Initialisation State

In the initialisation state the instance exchanges initialisation information with its peer Iu UP instance.

Upon reception of Iu-UP-CONFIG-Req indicating release from higher layer, the Iu UP instance is terminated and the null state is entered.

Upon sending or receiving of an initialisation frame the Iu UP instance remains in the Initialisation state. The sending side starts a supervision timer T_{INIT}. The receiving side acknowledges the initialisation frame with a positive acknowledgement or a negative acknowledgement. The Iu UP remains in initialisation state.

Upon reception of an initialisation acknowledgement frame, the supervision timer T_{INIT} is stopped and the Iu UP instance enters SMpSDU data transfer ready state.

Upon reception of a first PDU after sending a positive acknowledgement, the Iu UP instance enters SMpSDU data transfer ready state.

Upon reception of an initialisation negative acknowledgement frame (INIT NACK) initialisation frame can be repeated n times.

If after n repetitions, the initialisation procedure is unsuccessfully terminated (due to n negative acknowledgements or timer expires) the Error event procedure is used to report the Initialisation failure and the Iu UP instance remains in the initialisation state.

B.2.3 Support Mode Data Transfer Ready State

In the support mode data transfer ready state, support mode data can be exchanged between the peer Iu UP instances.

Upon reception of Iu-UP-DATA-Request from the upper layer or SSSAR-UNITDATA-Indication or Iu-UP-UNITDATA-Indication from TNL layer, appropriate user data transfer procedures are performed. Iu UP instance remains in the SMpSDU data transfer ready state.

Upon sending of Iu-UP-DATA- Indication or SSSAR-UNITDATA-Request or Iu-UP-UNITDATA-Request the Iu UP instance remains in the SMpSDU data transfer ready state.

Upon sending or receiving of a rate control PDU the Iu UP instance remains in the SMpSDU data transfer ready state.

Upon sending of a Iu-UP-STATUS-Indication (rate control) the Iu UP instance remains in the SMpSDU data transfer ready state.

Upon reception of Iu-UP-CONFIG-Req from higher layer the Iu UP instance is terminated and the null state is entered.

Upon detection of a protocol fault, Iu-UP-STATUS-Indication is sent to upper layer an error event frame may be sent over Iu UP.

In case of handover or relocation, initialisation procedures may have to be performed and Iu UP instance may have to enter the initialisation state.

3GPP TSG-RAN-WG3 eeting #15
Windsor, UK, 16th–20th of October 2000

Document R3-002836
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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25.415	CR	043	Current Version:	3.4.0

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

For submission to:	RAN#10	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: R-WG3 **Date:** 2000-10-19

Subject: Re-initialisation restriction

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:
During the joint TrFO/RAN3 Iu SWG meeting in Windsor 2000-10-18 it was agreed to remove the possibility for the RNC to perform unsolicited re-initialisations of the Iu User Plane.

If this CR is not accepted then the specification of a TrFO solution will be harder to achieve.

Clauses affected: 6.5.2.1

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.

6.5.2 Initialisation procedure

6.5.2.1 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, as the Inter PDU Timing Interval (IPTI) information.

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. The initialisation procedure shall not be re-invoked for the RAB without a RAB modification requested via RANAP [3].

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

The RNC indicates the Iu UP Mode version it uses for the initialisation as well as the Iu UP Mode versions it supports for the related RAB. The sender should use the lowest version for the initialisation that has enough information to initialise the highest proposed protocol version.

The SRNC allocates a RAB sub-Flow Combination indicator (RFCI) to each RAB sub-Flow Combination it initialises. 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 sub-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 acknowledgement 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). The entity receiving the initialisation message shall choose a version that it supports and for which it has enough initialisation information. This entity could be in the CN, or in a RNC, e.g. in case of TrFO.

If the initialisation frame is correctly formatted and treated by the receiving Iu UP protocol layer, this latter sends an initialisation acknowledgement frame using the version of the Iu UP Mode that is chosen.

Upon reception of an initialisation acknowledgement frame, the Iu UP protocol layer in the SRNC stops the supervision timer T_{INIT}.

If the initialisation procedure requires that several frames are to be sent, each frame shall be acknowledged individually.

If several initialisation frames are used for the initialisation procedure, the next frame shall wait for the acknowledgement of the previous frame to be received before sending. The supervision timer is used individually for each frame in a chain.

The frame number is always set to zero for the first frame in a chain and it shall be incremented in the sending direction for each sent frame. The acknowledgement or negative acknowledgement carries the frame number of the frame being acknowledged.

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

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 Initialisation 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 initialisation frame.

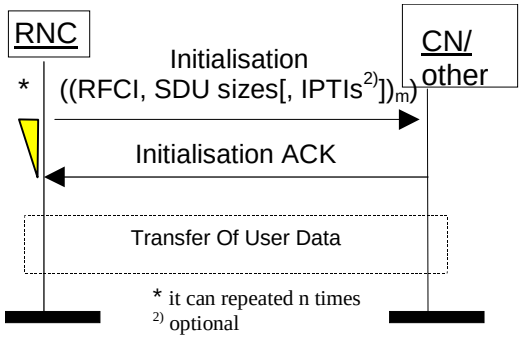

Figure 9: Successful Initialisation of Iu UP for m RFCIs

6.5.2.2 Unsuccessful operation

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

If the receiver does not support the Iu UP Mode version for the initialisation procedure, it shall send a negative acknowledgement using the highest version it supports among the versions proposed by the sender. If none of the proposed versions are supported, the receiver shall respond a negative acknowledgement using the highest version it supports.

If after N_{INIT} repetition, the initialisation procedure is unsuccessfully terminated (because of N_{INIT} negative acknowledgement or timer T_{INIT} expires), the Iu UP protocol layers (sending and receiving) take appropriate local actions.

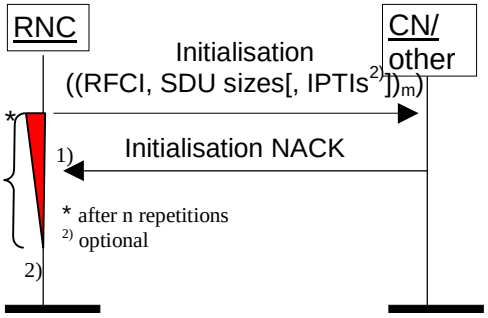

Figure 10: Unsuccessful initialisation of Iu UP: 1) N_{INIT} negative acknowledgement or 2) N_{INIT} timer expires

NOTE: 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-WG3 meeting #17
Chicago, USA, 20–24 November 2000

Document R3-003085
e.g. for 3GPP use the format TP-99xxx
or for SMG, use the format P-99-xxx

CHANGE REQUEST

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25.415	CR	044	Current Version:	3.4.0

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

For submission to:	RAN#10	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: R-WG3 **Date:** 2000-11-13

Subject PDU type selection

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:

The PDU type selection is based on attributes sent over Iu CP. There is no explicit parameter for the selection of the PDU type available in the RAB parameters. The current version of Iu UP specification says that when the reliability attribute 'Delivery of erroneous SDUs' has the value 'no-error-detection-consideration' for all sub-flows then PDU type 1 shall be used. This since the payload CRC in the Iu UP frame is not needed (only difference between PDU type 1 and PDU type 0 is that PDU type 0 includes a CRC for the payload of the frame).

This CR clarifies that in all other cases PDU type 0 shall be used. This is in line with what SA4 (see R3-002467) has required from the Iu UP; to always ensure that PDU type 0 shall be used for AMR speech. (AMR speech has 'delivery of erroneous SDUs' set to 'Yes' for the first sub-flow.)

If this CR is not accepted then the Iu UP does not fulfil the requirements that SA4 has put on the Iu UP.

Clauses affected: 6.5.1.1, 6.6.3.28

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: **See LS from SA4: R3-002467**

6.5.1 Transfer of User Data procedure

6.5.1.1 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 across 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 NAS Data streams functions perform, if needed, CRC calculation of the 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, formats 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. The selection of the PDU type (in both directions) shall be made by UTRAN based on the reliability attributes (see [3]) for the RAB. If the reliability attribute 'Delivery of erroneous SDUs' equals 'no-error-detection-consideration' for all subflows then PDU type 1 shall be used, otherwise PDU type 0 shall be used.

For RABs with the traffic class conversational or streaming the frame number shall be based on time (stepped at each ITI). For RABs with another type of traffic class the frame numbering shall be based on sent Iu UP PDU (stepped at each sent Iu UP PDU). See description of Frame number.

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 (i.e. RFCI is used at Initialisation) and matches the Iu UP frame payload (i.e. frame payload is not too short for the RFCI) as indicated by the Procedure Control functions, the NAS Data Streams removes the padding bits and the spare extension field when present from the Iu UP frame payload based on the RFCI information. Then the NAS Data Streams forwards to the upper layers the RFCI and the payload.

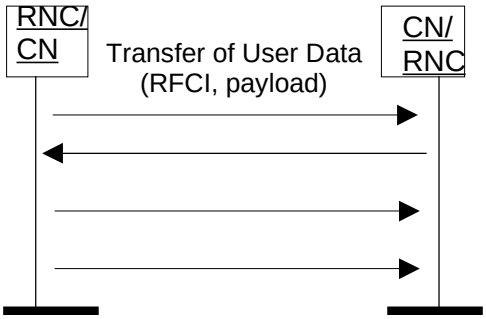

Figure 7: Successful Transfers of User Data

6.6.3.28 Data PDU type

Description: This field indicates the PDU type that shall be used (in both directions) for transferring user data. ~~. The selection of the PDU type is made by UTRAN based on the reliability attributes. If the reliability attribute 'Delivery of erroneous SDUs' equals 'no error detection consideration' for all subflows then PDU type 1 shall be used.~~

Value range: {0: PDU type 0, 1: PDU type 1, 2–15: Reserved for future use}.

Field length: 4 bits.