

TSG-RAN Meeting #13
Beijing, China, 18 - 21, September, 2001

TSGRP#13(01) 0581

Title: Agreed CRs to TS 25.415

Source: TSG-RAN WG3

Agenda item: 8.3.3/8.3.4/9.4.3

RP Tdoc	R3 Tdoc	Spec	CR_Num	Rev	Release	CR_Subject	Cat	Cur_Ver	New_Ver	Workitem
RP-010581	R3-012088	25.415	067		Rel-4	Clarification of "RFCI n Indicator"	A	4.1.0	4.2.0	TEI
RP-010581	R3-012087	25.415	068		R99	Clarification of "RFCI n Indicator"	F	3.7.0	3.8.0	TEI
RP-010581	R3-012531	25.415	071	1	R99	Coding of no_data mode	F	3.7.0	3.8.0	TEI
RP-010581	R3-012532	25.415	072	1	Rel-4	Coding of no_data mode	A	4.1.0	4.2.0	TEI
RP-010581	R3-012549	25.415	073	3	R99	General Corrections on lu User Plane	F	3.7.0	3.8.0	TEI
RP-010581	R3-012550	25.415	074	3	Rel-4	General Corrections on lu User Plane	A	4.1.0	4.2.0	TEI

CHANGE REQUEST

⌘ **25.415 CR 067** ⌘ rev **-** ⌘ Current version: **4.1.0** ⌘

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Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Clarification of "RFCI n Indicator" ⌘		
Source:	⌘ R-WG3 ⌘		
Work item code:	⌘ TEI ⌘	Date:	⌘ 2001-08-17 ⌘
Category:	⌘ A ⌘	Release:	⌘ REL-4 ⌘
	Use <u>one</u> of the following categories: F (essential correction) A (corresponds to a correction in an earlier release) B (Addition of feature), C (Functional modification of feature) D (Editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ The current definition of "RFCI n Indicator" is not crystal clear, and different interpretations are possible especially if only part of the initial RFCI set is indicated. ⌘
Summary of change:	⌘ Clarify that RFCI n Indicator indicates if the RFCI with value n is allowed or barred. Clarify that all the RFCIs in the initial set shall be indicated. ⌘
Consequences if not approved:	⌘ There is a risk that implementations may have different interpretations on how the RFCI n Indicators are used in rate control and this may lead to interoperability problems. Backwards compatibility: This CR is backwards compatible with the assumed interpretation of the previous version of the specification. However some implementations may not be compatible with this modification. ⌘

Clauses affected:	⌘ 6.5.3.1, 6.6.3.14 ⌘		
Other specs affected:	⌘ <input checked="" type="checkbox"/> Other core specifications ⌘ <input type="checkbox"/> Test specifications ⌘ <input type="checkbox"/> O&M Specifications ⌘	⌘ 25.415 v3.7.0 CR068 ⌘	
Other comments:	⌘ ⌘ ⌘		

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- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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 maximum rate 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. the SRNC. The Iu rate control procedure is invoked whenever the SRNC decides that the maximum rate permitted downlink over Iu shall be modified, or when a rate control command is received from the CN. Within the context of TrFO the SRNC may also receive rate control frames from the TrFO partner.

The rates that can be controlled by the SRNC are all the rates that are defined by the Iu-Initialisation procedure and which are above the guaranteed bitrate (indicated to the Iu UP at establishment) Rates below the guaranteed bitrate, e.g. the lowest speech rate or the SID frames, cannot be controlled (i.e. cannot be forbidden) by the SRNC.

The procedure can be signalled at any time when transfer of user data is not suspended by another control procedure. When the user plane was initiated due to SRNS relocation reasons no rate control shall be signalled before the reception of the relocation execution trigger (see [3]). At the reception of the relocation execution trigger the RNC shall start the rate control procedure. This enables both TrFO partners to exchange current maximum rates and proceed user data transport based on latest rate decisions. Further, the reception of the first rate control frame from the target RNC, which indicates the CN the successful relocation execution on user plane level, should cause the CN to switch the user plane from the source RNC to the target RNC.

The Procedure control function upon request of upper layer prepares the Rate control frame payload containing the maximum rate of the reverse direction of the rate control frame. To align the Rate Control procedure with version 1 of the Iu UP protocol the permitted maximum rate is given as a set of RFCI indicators, that shall contain the maximum rate and all rates below the maximum rate, i.e. all rate controllable and non rate controllable rates. In the context of TrFO and TFO the Rate Control procedure may also be controlled by a remote peer.

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.

A supervision timer T_{RC} is started after sending the Iu UP rate control frame. This timer supervises the reception of the rate control acknowledgement frame. Upon reception of a rate control acknowledgement frame, the Iu UP protocol layer in the SRNC stops the supervision timer T_{RC} .

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 all RFCIs in the initial RFCI set are indicated as either allowed or barred~~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 complete protocol data in a Iu-UP-Status indication primitive;
- Upon reception of the Iu-UP-Status request primitive, the procedure control functions shall acknowledge the Rate Control by including it's own maximum rate control information.

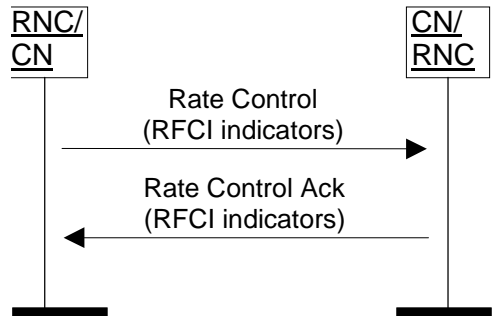


Figure 11: Successful Rate Control

6.5.3.2 Unsuccessful operation

If the Iu UP protocol layer receives a rate control frame that is badly formatted or corrupted, it shall ignore the rate control frame, but sent a negative rate control acknowledgement frame back (Figure 13a).

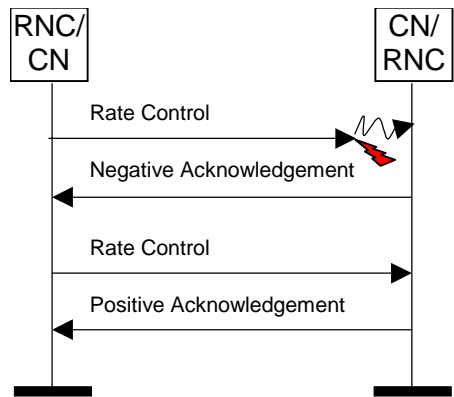


Figure 13a: Negative Acknowledgement received from the peer

If the Iu UP in the SRNC detects that the rate control command has not been correctly interpreted or received (e.g. the observed rate is outside the set of permitted rates in the reverse direction of the rate control frame (Figure 13b), or a NACK message has been received, or no ACK message was received before the supervision timer T_{RC} expires (Figure 13c)), 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.

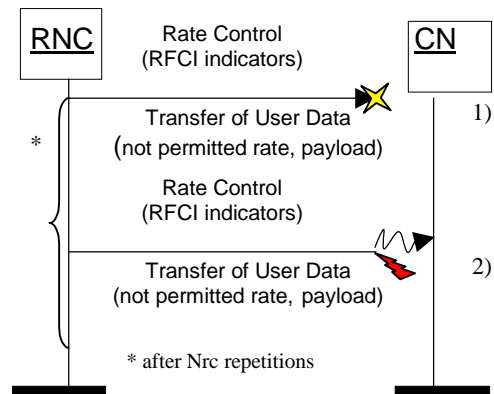


Figure 13: Unsuccessful Transfer of rate control from RNC: 1) Frame loss 2) Corrupted Frame

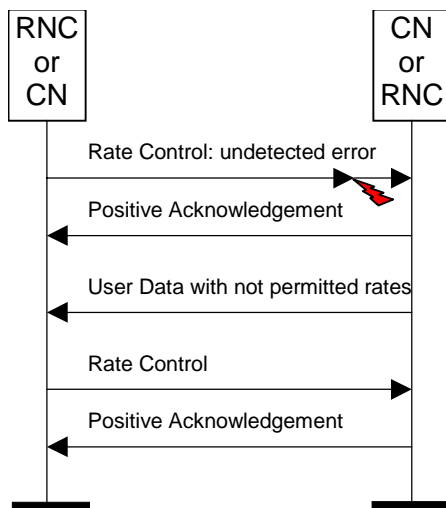


Figure 13b: Unsuccessful Transfer of rate control: undetected error

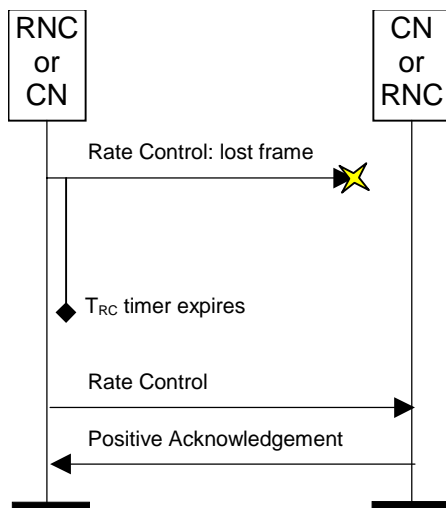


Figure 13c: Unsuccessful Transfer of rate control: lost rate control

6.5.3.2A Frequent Rate Control Procedures

Typically a new rate control command should not be sent in the same direction before the previous rate control procedure was terminated successfully.

If for some reasons (e.g. frequently received rate control commands from the CN in a TFO connection to GSM) a rate control command has to be sent before the previous rate control procedure was terminated successfully, then the previous rate control procedure is defined as terminated successfully: the supervision timer T_{RC} shall be stopped and acknowledgement frames (positive or negative) for the previous rate command shall be ignored, i.e. only the most recent rate control procedure shall be active in the same direction.

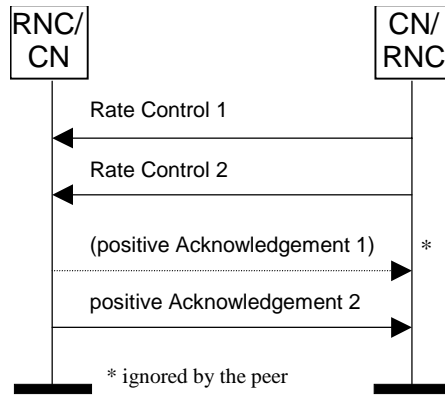


Figure 14: Frequent Rate Control: only most recent one is important

6.6.3.13 Number of RFCI Indicators

Description: Number of RFCI indicators indicates the number of RFCI indicators present in the control procedure frame.

Value range: {0-63}.

Field length: 6 bits.

6.6.3.14 RFCI n Indicator

Description: RFCI n Indicator indicates if the RFCI with value n is allowed or barred (n is a value between 0-62), points to an RFCI number e.g. RFCI 04 Indicator set to "0" indicates that RFCI 0=4 is allowed, RFCI 15 Indicator set to "1" indicates that RFCI 1=5 is barred, etc...

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

Field length: 1 bit.

CHANGE REQUEST

⌘ **25.415 CR 068** ⌘ rev **-** ⌘ Current version: **3.7.0** ⌘

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Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Clarification of "RFCI n Indicator" ⌘		
Source:	⌘ R-WG3 ⌘		
Work item code:	⌘ TEI ⌘	Date:	⌘ 2001-08-16 ⌘
Category:	⌘ F ⌘	Release:	⌘ R99 ⌘
	Use <u>one</u> of the following categories: F (essential correction) A (corresponds to a correction in an earlier release) B (Addition of feature), C (Functional modification of feature) D (Editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)

Reason for change:	⌘ The current definition of "RFCI n Indicator" is not crystal clear, and different interpretations are possible especially if only part of the initial RFCI set is indicated. ⌘
Summary of change:	⌘ Clarify that RFCI n Indicator indicates if the RFCI with value n is allowed or barred. Clarify that all the RFCIs in the initial set shall be indicated. ⌘
Consequences if not approved:	⌘ There is a risk that implementations may have different interpretations on how the RFCI n Indicators are used in rate control and this may lead to interoperability problems. Backwards compatibility: This CR is backwards compatible with the assumed interpretation of the previous version of the specification. However some implementations may not be compatible with this modification. ⌘

Clauses affected:	⌘ 6.5.3.1, 6.6.3.14 ⌘		
Other specs affected:	⌘ <input checked="" type="checkbox"/> Other core specifications ⌘ <input type="checkbox"/> Test specifications ⌘ <input type="checkbox"/> O&M Specifications ⌘	⌘ 25.415 v4.1.0 CR067 ⌘	
Other comments:	⌘ ⌘ ⌘		

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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 controlled by the entity controlling the rate control over UTRAN i.e. SRNC. 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 all RFCIs in the initial RFCI set are indicated as either allowed or barred~~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.

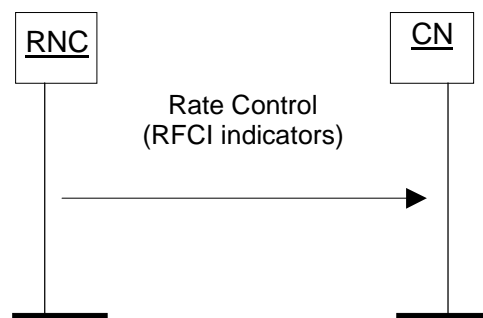


Figure 11: Successful Rate Control sent from SRNC

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.

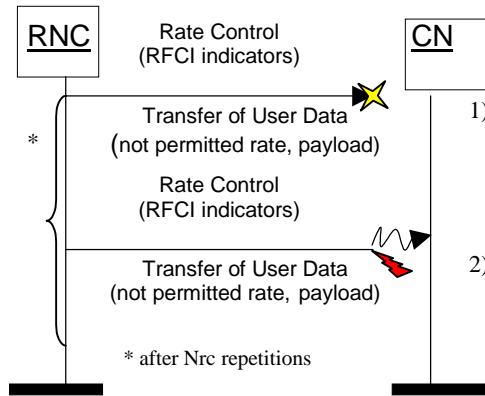


Figure 13: Unsuccessful Transfer of rate control from RNC: 1) Frame loss 2) Corrupted Frame

6.6.3.13 Number of RFCI Indicators

Description: Number of RFCI indicators indicates the number of RFCI indicators present in the control procedure frame.

Value range: {0-63}.

Field length: 6 bits.

6.6.3.14 RFCI n Indicator

Description: RFCI n Indicator indicates if the RFCI with value n is allowed or barred (n is a value between 0-62), points to an RFCI number e.g. RFCI 04 Indicator set to "0" indicates that RFCI 0=4 is allowed, RFCI 15 Indicator set to "1" indicates that RFCI 1=5 is barred, etc...

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

Field length: 1 bit.

CHANGE REQUEST

⌘ **25.415** **CR 071** ⌘ rev **1** ⌘ Current version: **3.7.0** ⌘

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Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Coding of No_Data mode		
Source:	⌘ R-WG3		
Work item code:	⌘ TEI	Date:	⌘ 30 July 2001
Category:	⌘ F	Release:	⌘ R99
<p>Use <u>one</u> of the following categories:</p> <p>F (essential correction) A (corresponds to a correction in an earlier release) B (Addition of feature), C (Functional modification of feature) D (Editorial modification)</p> <p>Detailed explanations of the above categories can be found in 3GPP TR 21.900.</p>		<p>Use <u>one</u> of the following releases:</p> <p>2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)</p>	

Reason for change:	⌘ In RAN3#22 it was agreed that “there could be the need that the RNC send no_data all 20ms but this should avoided to avoid service-related impacts”. Since the RNC decides on the initialised modes, it should be clearly stated that both termination points of the Iu UP shall be capable to operate without using the NO_DATA mode. The initialisation of the No_Data mode only means that it may be used by the sender and therefore means that it is of necessary support but not of mandatory use.		
Summary of change:	⌘ The use of no_data mode when initialised is clarified to be optional.		
Consequences if not approved:	⌘ Interoperability issues are foreseen due to different interpretations of the use of no_data mode. Compatibility: This CR is backwards compatible.		

Clauses affected:	⌘ 6.5.2.1		
Other specs affected:	⌘ <input checked="" type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘ TS25.415 CR072 REL-4	
Other comments:	⌘		

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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 RABs Subflow Combinations, RFCIs, FCI~~s and associated RAB Sub Flows SDU sizes necessary to be supported 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. 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 RAB sub-Flow Combination “NO DATA” (defined by the length of all subflows set to zero) shall not be used as the first RFC in the proposed list of RAB sub-Flow Combinations.

Any RAB Sub-Flow Combination of the set that is initialised shall be supported by the two Iu UP termination points and may optionally be used by the sender (except for the first in the list that shall be used when starting). In particular, the use by the sender of the RFC “NO DATA” is optional even when it is included in the initialisation procedure.

Conversely, any RAB Sub-Flow Combination that is not part of the initialised set shall not be used even if supported. In particular, the two Iu UP termination points shall be capable of operating without the use of the RFC NO DATA.

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_{INT} 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.

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 (i.e. any frame to be sent shall wait for the acknowledgement of the previous sent frame to be received before being sent). The supervision timer shall be used individually for each frame being sent.

The successful operation of the initialisation procedure may require that one or several chained frames are positively acknowledged. The number of initialisation frames in such a chain shall not exceed 4. Each chained frame shall be positively acknowledged before the one with the next frame number can be sent.

The frame number of an initialisation frame shall always be set to zero when the chain has only one frame. When several initialisation frames are used in a chain the frame number shall be set to zero for the first one and incremented by one in the sending direction for each new frame in the chain. The positive acknowledgement or negative acknowledgement shall carry the frame number of the frame being acknowledged.

Upon reception of an initialisation negative acknowledgement frame, an erroneous acknowledgement 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 one initialisation frame with the same frame number. The repetition shall be performed up to N_{INIT} times, N_{INIT} being chosen by the operator (default $N_{INIT} = 3$). The N_{INIT} (maximum number of allowed repetitions) is the aggregate count for each frame in the chain and is restart each time a frame is positively acknowledged.

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.

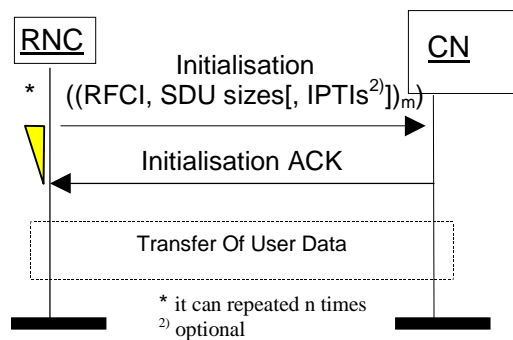


Figure 9: Successful Initialisation of Iu UP for m RFCIs

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.

After N_{INIT} successive negative acknowledgment, erroneous acknowledgment or timer T_{INIT} expiry for initialisation frames having the same frame number, the initialisation procedure is unsuccessfully terminated. The Iu UP protocol layers (sending and receiving) take appropriate local actions.

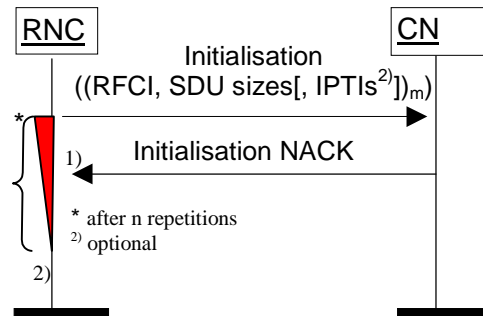


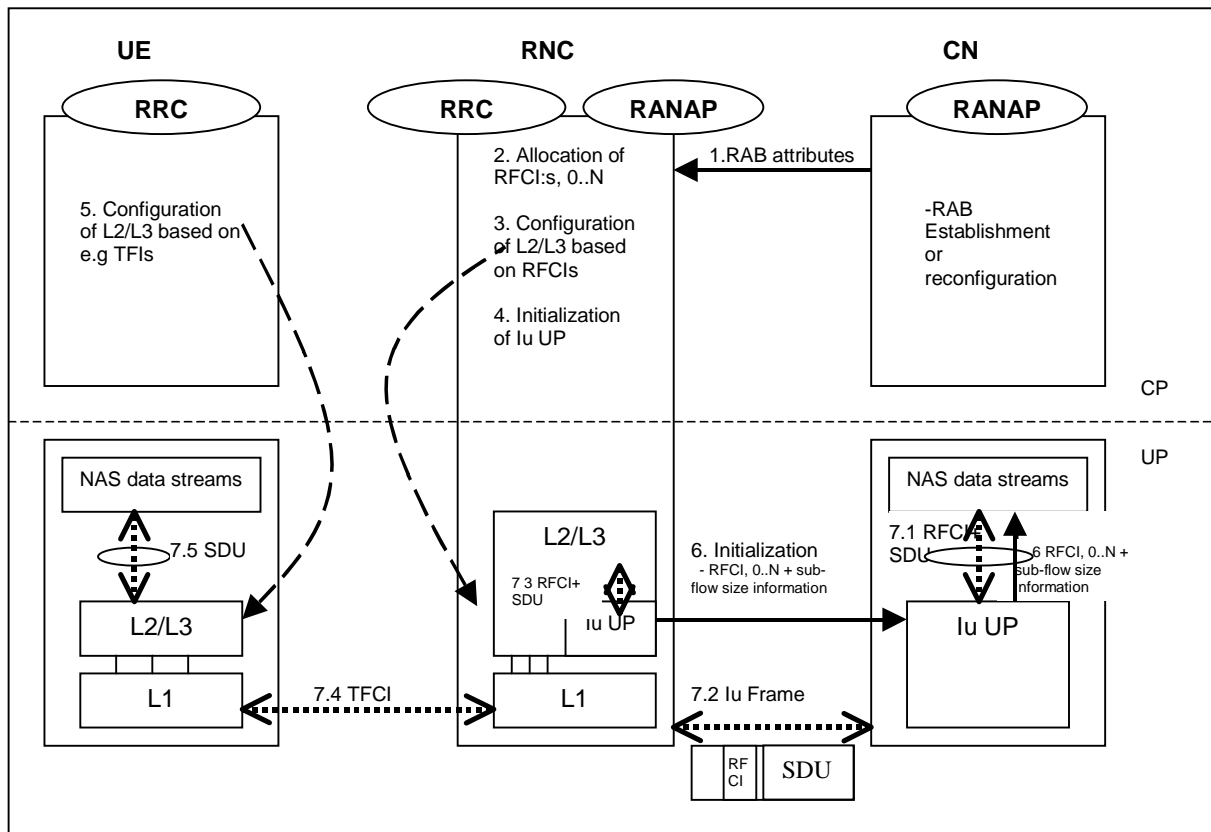
Figure 10: Unsuccessful initialisation of lu UP: 1) N_{INIT} negative acknowledgement or 2) N_{INIT} timer expires

Next Modified Section

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 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 Formation Information Parameters for RAB subflow 1 is [0,3981,39,39,084], for RAB subflow 2 is [1030,0,56,0,0403], and for RAB subflow 3 is [0,0,0,60,0,0,0]. The lu 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 34, for 4,75 kbits/s, the RNC allocates RFCI 2, and for 12,2. kbits/s, the RNC allocates RFCI 13 (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. MAC configures its co-ordinated DCHs with the RFCIs and associates one RFCI to one TFI.
4. **Initialisation of lu UP:** the RNC reports the permitted combinations it can offer to the transcoder using an inband lu initialisation frame containing the RFCIs and associated RAB sub Flow sizes.
5. **Configuration of L2/L3 based on e.g. TFIs:** 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 received within the lu 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 lu UP an SDU with an associated RFCI equals to 13 (in this example).
 - 7.2. The lu UP packs a frame with a header containing an RFCI set to value 13, and the payload made of the SDU received from the Codec.
 - 7.3. The lu UP passes to L2/L3, the lu frame payload (the Codec SDU) and the RFCI. The L2/L3 uses this RFCI to break the lu 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 TFI chosen by MAC.
 - 7.5. The L2/L3 receives the SDUs on the co-ordinated DCHs, combines them back and uses e.g. the TFI 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 combina tion set	0	0	0	0	0	Source rate 1
	1	8139	1039	609	39	Source rate 12
	2	39	56	0	95	Source rate 23
	3	3984	403	60	244	Source rate 34
	0	0	0	0	0	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.						

CHANGE REQUEST

⌘ **25.415** **CR 072** ⌘ rev **1** ⌘ Current version: **4.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ Coding of No_Data mode		
Source:	⌘ R-WG3		
Work item code:	⌘ TEI	Date:	⌘ 30 July 2001
Category:	⌘ A	Release:	⌘ REL-4
<p>Use <u>one</u> of the following categories:</p> <p>F (essential correction) A (corresponds to a correction in an earlier release) B (Addition of feature), C (Functional modification of feature) D (Editorial modification)</p> <p>Detailed explanations of the above categories can be found in 3GPP TR 21.900.</p>		<p>Use <u>one</u> of the following releases:</p> <p>2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)</p>	

Reason for change:	⌘ In RAN3#22 it was agreed that “there could be the need that the RNC send no_data all 20ms but this should avoided to avoid service-related impacts”.
	Since the RNC decides on the initialised modes, it should be clearly stated that both termination points of the Iu UP shall be capable to operate without using the NO_DATA mode. The initialisation of the No_Data mode only means that it may be used by the sender and therefore means that it is of necessary support but not of mandatory use.
Summary of change:	⌘ The use of no_data mode when initialised is clarified to be optional.
Consequences if not approved:	⌘ Interoperability issues are foreseen due to different interpretations of the use of no_data mode. Compatibility: This CR is backwards compatible.

Clauses affected:	⌘ 6.5.2.1	
Other specs affected:	⌘ <input checked="" type="checkbox"/> Other core specifications	⌘ TS25.415 CR071 R99
	<input type="checkbox"/> Test specifications	
	<input type="checkbox"/> O&M Specifications	
Other comments:	⌘	

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- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.

- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://www.3gpp.org/specs/> For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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 RABs Subflows Combinations, RFCIs, FCI~~s and associated RAB Sub Flows SDU sizes necessary to be supported 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 may be controlled at both end of the Iu access point, i.e. the CN and UTRAN.

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 or if the CN decides to resolve RFCI mismatch in case of TrFO (see [13]). The initialisation procedure shall not be re-invoked by the SRNC 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 Iu UP protocol entity invoking this procedure 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 invoking entity 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 for both the uplink and downlink direction 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 RAB sub-Flow Combination “NO DATA” (defined by the length of all subflows set to zero) shall not be used as the first RFC in the proposed list of RAB sub-Flow Combinations.

Any RAB Sub-Flow Combination of the set that is initialised shall be supported by the two Iu UP termination points and may optionally be used by the sender (except for the first in the list that shall be used when starting). In particular, the use by the sender of the RFC “NO DATA” is optional even when it is included in the initialisation procedure.

Conversely, any RAB Sub-Flow Combination that is not part of the initialised set shall not be used even if supported. In particular, the two Iu UP termination points shall be capable of operating without the use of the RFC NO DATA.

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_{INT} 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 the whole protocol information contained in the initialisation frame to the upper layers. It also stores the RAB sub-Flow Combination set (and thus replaces a possible previous 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 peer Iu UP entity receiving the initialisation message shall choose a version that it supports and for which it has enough initialisation information.

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 (i.e. any frame to be sent shall wait for the acknowledgement of the previous sent frame to be received before being sent. The supervision timer shall be used individually for each frame being sent.

The successful operation of the initialisation procedure may require that one or several chained frames are positively acknowledged. The number of initialisation frames in such a chain shall not exceed 4. Each chained frame shall be positively acknowledged before the one with the next frame number can be sent.

The frame number of an initialisation frame shall always be set to zero when the chain has only one frame. When several initialisation frames are used in a chain the frame number shall be set to zero for the first one and incremented by one in the sending direction for each new frame in the chain. The positive acknowledgement or negative acknowledgement shall carry the frame number of the frame being acknowledged.

Upon reception of an initialisation negative acknowledgement frame, an erroneous acknowledgement or at timer T_{INIT} expiry, the Iu UP protocol entity controlling the initialisation procedure shall reset and restart the T_{INIT} supervision timer and repeat one initialisation frame with the same frame number. The repetition shall be performed up to N_{INIT} times, N_{INIT} being chosen by the operator (default $N_{INIT} = 3$). The N_{INIT} (maximum number of allowed repetition) is the aggregate count for each frame in the chain and is restart each time a frame is positively acknowledged.

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.

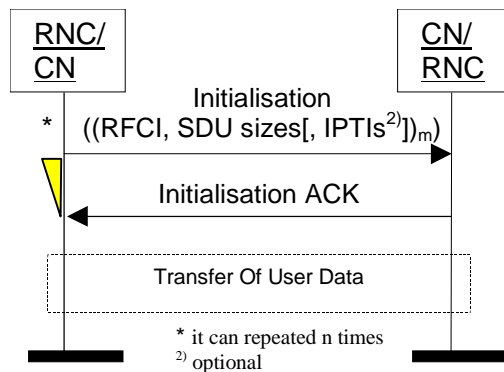


Figure 9: Successful Initialisation of Iu UP for m RFCIs

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.

After N_{INIT} successive negative acknowledgment, erroneous acknowledgment or T_{INIT} expiry for initialisation frames having the same frame number, the initialisation procedure is unsuccessfully terminated and the Iu UP protocol layers in RNC take appropriate local actions.

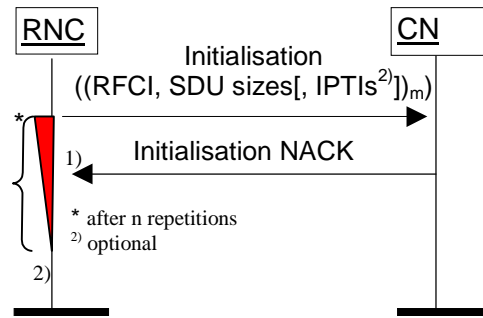
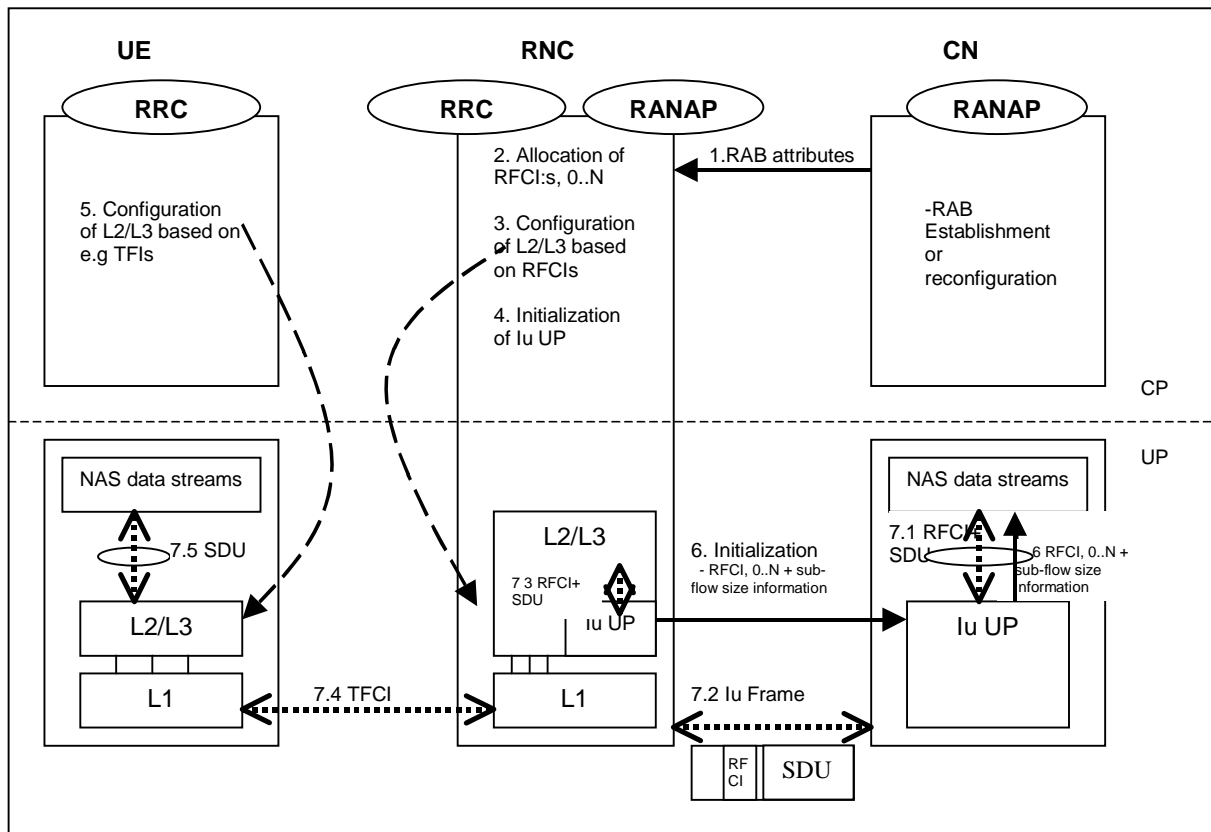


Figure 10: Unsuccessful initialisation of lu UP: 1) N_{INIT} negative acknowledgement or 2) N_{INIT} timer expires

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 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 Formation Information Parameters for RAB subflow 1 is [81,39,39,84], for RAB subflow 2 is [103,56,56,40], and for RAB subflow 3 is [60,0,0,60]. The Iu UP is used in support mode for predefined SDU size.
2. **Allocation of RFCI:s:** 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 43, for 4,75 kbits/s, the RNC allocates RFCI 2, and for 12,2. kbits/s, the RNC allocates RFCI 31 (according to the example table A.1).
3. **Configuration of L2/L3 based on RFCI:s:** RFCI:s are used to configure the L2/L3. RLC is used in transparent mode. MAC configures its co-ordinated DCHs with the RFCI:s 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 RFCI:s and associated RAB sub Flow sizes.
5. **Configuration of L2/L3 based on e.g. TFI:s:** 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. **RFCI:s + SDU size information:** the RFCI:s and associated RAB sub Flow sizes 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 SDU with an associated RFCI equals to 13 (in this example).
 - 7.2. The Iu UP packs a frame with a header containing an RFCI set to value 13, 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 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 TFI chosen by MAC.
 - 7.5. The L2/L3 receives the SDUs on the co-ordinated DCHs, combines them back and uses e.g. the TFI 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 combina tion set	0	0	0	0	0	Source rate 1
	1	8139	103	60	39	Source rate 12
	2	39	56	0	95	Source rate 23
	3	3984	403	60	244	Source rate 34
	0	0	0	0	0	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.						

CR-Form-v3

CHANGE REQUEST

⌘ **25.415** **CR** **073** ⌘ rev **3** ⌘ Current version: **3.7.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title:	⌘ General Corrections on Iu User Plane		
Source:	⌘ R-WG3		
Work item code:	⌘ TEI	Date:	⌘ August 2001
Category:	⌘ F	Release:	⌘ R99
	Use <u>one</u> of the following categories: F (essential correction) A (corresponds to a correction in an earlier release) B (Addition of feature), C (Functional modification of feature) D (Editorial modification)		Use <u>one</u> of the following releases: 2 (GSM Phase 2) R96 (Release 1996) R97 (Release 1997) R98 (Release 1998) R99 (Release 1999) REL-4 (Release 4) REL-5 (Release 5)
	Detailed explanations of the above categories can be found in 3GPP TR 21.900.		

Reason for change:	⌘ Corrections of erroneous descriptions		
Summary of change:	⌘ In 6.5.2.2, 'N _{INIT} timer expires' is corrected to the 'N _{INIT} expiries of timer T _{INIT} '. In 6.5.4.2, 'N _{TA} timer expiries' is corrected to the 'N _{TA} expiries of timer T _{TA} '. The Iu UP in 6.5.4.2 is changed to the Iu UP protocol layer. The 'procedure' needs to be added to the Frame Quality Classification in 6.5.6. In the specification notations, there is the notation that the procedure name is followed by the word 'procedure'. In 6.7.4, the primitive, 'Iu-UP-Status-Indication' changes the 'Iu-Status-Indication'. In 7.2.1, the article 'a' is added in front of 'function of the mode'. In 7.3.2.1, the 'both end' is changed to 'both ends'.		
Consequences if not approved:	⌘ If this CR is not approved erroneous descriptions will remain in the specification Backward compatibility: This CR is backward compatible.		

Clauses affected:	⌘ 6.5.2.2, 6.5.4.2, 6.5.6, 6.7.4, 7.2.1, 7.3.2.1		
Other specs affected:	⌘ <input checked="" type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘ 25.415 V4.1.0, CR074	
Other comments:	⌘		

How to create CRs using this form:

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- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://www.3gpp.org/specs/>. For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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} repetitions of initialisation frames (because of NACK, erroneous ACK and/or timer T_{INIT} expiry) for one initialisation procedure, the initialisation procedure is unsuccessfully terminated and the Iu UP protocol layers in RNC take appropriate local actions.

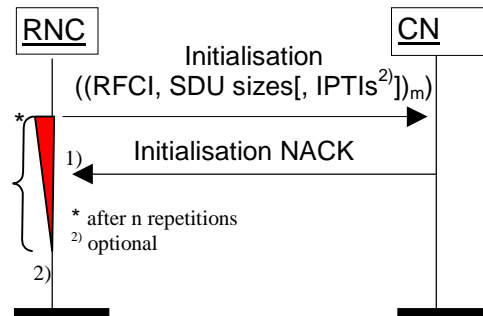


Figure 10: Unsuccessful initialisation of Iu UP: 1) N_{INIT} negative acknowledgement or 2) N_{INIT} expires of timer T_{INIT} expires

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 protocol layer 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 Time Alignment is received by the RNC, it shall respond with a NACK with the cause "Time Alignment not supported".

If the Iu UP protocol layer 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} .

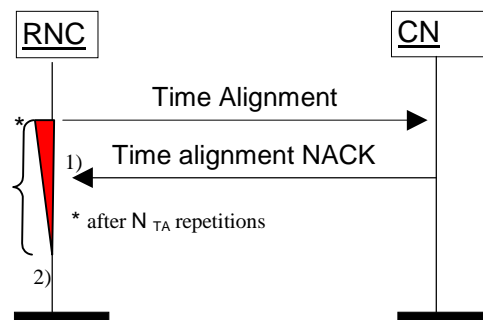


Figure 16a: Unsuccessful Time Alignment: 1) N_{TA} negative acknowledgements or 2) N_{TA} expires of timer T_{TA} expires

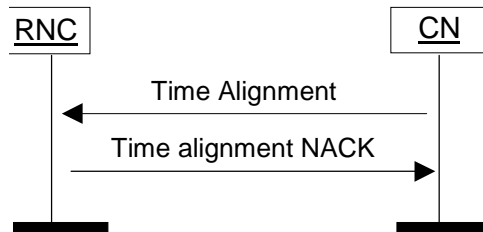


Figure 16b: Time Alignment received by the RNC

6.5.6 Frame Quality Classification procedure

The Frame Quality Classification procedure uses the services of the Transfer of User Data procedure to exchange across the Iu UP interface the Frame Quality Classification information.

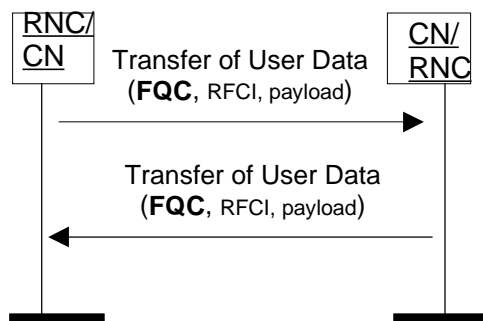


Figure 17: Successful Transfers of User Data with FQC information

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-UP-Status-Indication with 'Error event' information indicating the error type should be made to the upper layers. The Error event report contains a '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.

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 constrain 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
			FQC
	Indication	Iu-UP-payload	Subflow 1 SDU, ..., Subflow n SDU
			Iu-UP-control
			FQC
Iu-UP-Status	Indication	Iu-UP-Procedure-Control	Error Cause, Error Distance
			Complete protocol data for Initialisation, Rate Control, Time Alignment and Error Event
	Request	Iu-UP-Procedure-Control	Error Cause
			Complete protocol data for Initialisation, Rate Control, Time Alignment and Error Event
Iu-UP-UNIT-DATA	Request	Iu-UP-payload	
	Indication	Iu-UP-payload	

Primitive usage is a function of the mode of operation of the Iu UP protocol. Table 2 provides the association between Iu UP primitives towards the upper layers and the Iu UP modes 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

7.3.2 ATM/AAL2 based Transport layer

7.3.2.1 General

When the Iu UP protocol layer uses the services of an ATM/AAL2 transport, it uses an established AAL2 connection for transferring frames between the peer TNL-SAPs at both ends of the Iu User plane access points. The Transport Network Control Plane over Iu handles the signalling to establish and release the AAL2 call connections.

CHANGE REQUEST

⌘ **25.415** **CR** **074** ⌘ rev **3** ⌘ Current version: **4.1.0** ⌘

For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.

Proposed change affects: ⌘ (U)SIM ME/UE Radio Access Network Core Network

Title: ⌘ General Corrections on lu User Plane

Source: ⌘ R-WG3

Work item code: ⌘ TEI

Date: ⌘ August 2001

Category: ⌘ **A**

Release: ⌘ **REL-4**

Use one of the following categories:

- F** (essential correction)
- A** (corresponds to a correction in an earlier release)
- B** (Addition of feature),
- C** (Functional modification of feature)
- D** (Editorial modification)

Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:

- 2** (GSM Phase 2)
- R96** (Release 1996)
- R97** (Release 1997)
- R98** (Release 1998)
- R99** (Release 1999)
- REL-4** (Release 4)
- REL-5** (Release 5)

Reason for change: ⌘ Corrections of erroneous descriptions

Summary of change: ⌘ In 6.5.2.2, 'N_{INIT} timer expires' is corrected to the 'N_{INIT} expiries of timer T_{INIT}'.

In 6.5.4.2, 'N_{TA} timer expiries' is corrected to the 'N_{TA} expiries of timer T_{TA}'.

The lu UP in 6.5.4.2 and the lu UP Frame protocol layer in 7.2.2 are changed to the lu UP protocol layer.

The 'procedure' needs to be added to the Frame Quality Classification in 6.5.6. In the specification notations, there is the notation that the procedure name is followed by the word 'procedure'.

In 6.7.1, the typo is changed to the article 'An'.

In 6.7.4, the primitive, 'lu-UP-Status-Indication' changes the 'lu-Status-Indication'.

In 7.2.1, the article 'a' is added in front of 'function of the mode'.

In 7.2.2 and 7.2.3, 'frame number' is changed to the 'Frame Number'.

In 7.2.4 and 7.2.5, the control procedure information is the more correct usage rather than procedural information.

In 7.3.2.1, the 'both end' is changed to 'both ends'.

Consequences if not approved: ⌘ If this CR is not approved erroneous descriptions will remain in the specification

Backward compatibility:
This CR is backward compatible.

Clauses affected: ⌘ 6.5.2.2, 6.5.4.2, 6.5.6, 6.7.1, 6.7.4, 7.2.1, 7.2.2, 7.2.3, 7.2.4, 7.2.5, 7.3.2.1

Other specs affected:	<input checked="" type="checkbox"/>	Other core specifications	⌘ 25.415 V3.7.0, CR073
	<input type="checkbox"/>	Test specifications	
	<input type="checkbox"/>	O&M Specifications	
Other comments:	⌘		

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at: http://www.3gpp.org/3G_Specs/CRs.htm. Below is a brief summary:

- 1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
- 2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under <ftp://www.3gpp.org/specs/>. For the latest version, look for the directory name with the latest date e.g. 2000-09 contains the specifications resulting from the September 2000 TSG meetings.
- 3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

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} repetitions of initialisation frames (because of NACK, erroneous ACK and/or timer T_{INIT} expiry) for one initialisation procedure, the initialisation procedure is unsuccessfully terminated and the Iu UP protocol layers in RNC take appropriate local actions.

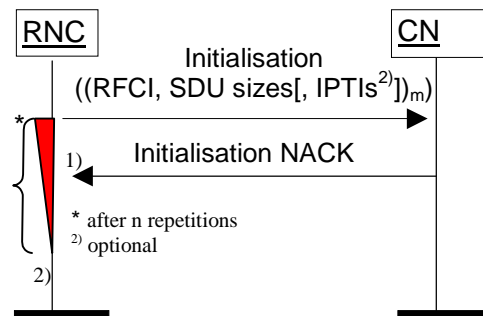


Figure 10: Unsuccessful initialisation of Iu UP: 1) N_{INIT} negative acknowledgement or 2) N_{INIT} expires of timer T_{INIT} expires

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 protocol layer 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 Time Alignment is received by the RNC, it shall respond with a NACK with the cause "Time Alignment not supported".

If the Iu UP protocol layer 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} .

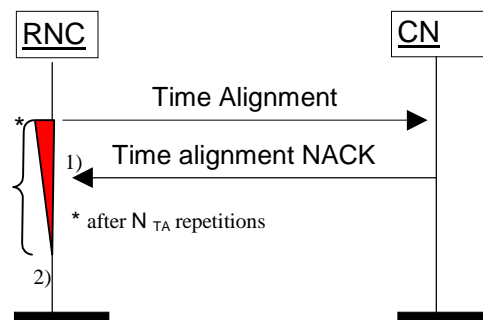


Figure 16a: Unsuccessful Time Alignment: 1) N_{TA} negative acknowledgements or 2) N_{TA} expires of timer T_{TA} expires

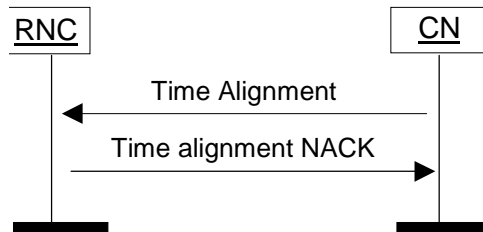


Figure 16b: Time Alignment received by the RNC

6.5.6 Frame Quality Classification procedure

The Frame Quality Classification procedure uses the services of the Transfer of User Data procedure to exchange across the Iu UP interface the Frame Quality Classification information.

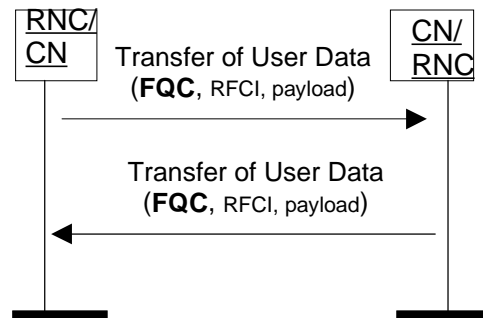


Figure 17: Successful Transfers of User Data with FQC information

6.7 Handling of unknown, unforeseen and erroneous protocol data

6.7.1 General

Error handling in Iu UP protocol is applicable only for Iu UP in Support mode.

The Error Event procedure is the procedure handling error reporting. 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);
- A request by the upper layers;
- ~~An Sn~~ Error event frame over the Iu UP protocol.

The error can be reported either by:

- An Error event frame over the Iu UP protocol;
- An Iu UP Status Indication to upper layers (e.g. to be used by O&M).

When an Error event is reported, either by an Iu-UP-Status-Indication, or by an Error event frame the following information shall be included:

- Type of the error (syntactical error, semantical error or other error);
- Error distance, i.e. information where the error occurred.

6.7.2 Error detected by Iu UP functions

When an error is detected within the Iu UP functions (by receiving a frame containing erroneous, unknown or unexpected data) one of the following actions is taken depending on the type of the error:

1. Error indicated to upper layers by sending a Iu-UP-Status-Indication primitive;
2. Error event frame sent;
3. Error event frame sent and error indicated to upper layers by sending a Iu-UP-Status-Indication primitive;
4. No action.

6.7.3 Request by upper layers

When the Iu UP receives an Iu-UP-Status-Request indicating Error event then an Error event frame should be sent over the Iu UP protocol indicating the appropriate error type.

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-UP-Status-Indication with 'Error event' information indicating the error type should be made to the upper layers. The Error event report contains a '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.

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 constrain 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
			FQC
	Frame Number		
Iu-UP-DATA	Indication	Iu-UP-payload	Subflow 1 SDU, ..., Subflow n SDU
		Iu-UP-control	RFCI
			FQC
	Frame Number		
Iu-UP-Status	Indication	Iu-UP-Procedure-Control	Error Cause, Error Distance
			Complete protocol data for Initialisation, Rate Control, Time Alignment and Error Event
	Request	Iu-UP-Procedure-Control	Error Cause
			Complete protocol data for Initialisation, Rate Control, Time Alignment and Error Event
Iu-UP-UNIT-DATA	Request	Iu-UP-payload	
	Indication	Iu-UP-payload	

Primitive usage is a function of the mode of operation of the Iu UP protocol. Table 2 provides the association between Iu UP primitives towards the upper layers and the Iu UP modes 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 the RAB subflow SDU(s) on the established transport connection. This primitive includes the RFCI, the Fframe Number and FQC information of the payload.

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 includes the RFCI, the Fframe Number and FQC information of the payload.

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.

7.2.4 Iu-UP-STATUS-REQUEST

This primitive is used to pass control procedure~~procedural~~ information from the upper layer.

This primitive shall contain the complete protocol data for the respective procedure.

7.2.5 Iu-UP-STATUS-INDICATION

This primitive is used to pass control procedure~~procedural~~ information to the upper layer.

This primitive shall contain the complete protocol data for the respective procedure.

7.2.6 Iu-UP-UNIT-DATA-REQUEST

This primitive is used as a request from the upper layer to send an Iu UP payload on 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.

7.3.2 ATM/AAL2 based Transport layer

7.3.2.1 General

When the Iu UP protocol layer uses the services of an ATM/AAL2 transport, it uses an established AAL2 connection for transferring frames between the peer TNL-SAPs at both ends of the Iu User plane access points. The Transport Network Control Plane over Iu handles the signalling to establish and release the AAL2 call connections.