TSG-RAN Meeting #12
Stockholm, Sweden, 12 - 15 June 2001

TSGRP#12(01) 0393

Title: **Agreed CRs to TS 25.415**

Source: **TSG-RAN WG3**

Agenda item: **8.3.3/8.3.4**

Tdoc_Num	Specification	CR_Num	Revision_Num	CR_Subject	CR_Category	WG_Status	Cur_Ver_Num	New_Ver_Num	Workitem
R3-011549	25.415	063		Initial Rate Control clarification	F	agreed	4.0.0	4.1.0	TrFO
R3-011559	25.415	064		TrFO clarifications and corrections	F	agreed	4.0.0	4.1.0	TrFO

3GPP TSG-RAN3 Meeting #21
Pusan, Korea, 21st – 25th May, 2001

R3-011549

CR-Form-v3

CHANGE REQUEST

⌘ **25.415** **CR** **063** ⌘ rev **-** ⌘ Current version: **4.0.0** ⌘

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

Title:	⌘	Immediate Rate Control clarification
Source:	⌘	R-WG3
Work item code:	⌘	TrFO
Date:	⌘	2001-05-15
Category:	⌘	**F**
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:	⌘	This CR clarifies the reasons why rate control shall be issued immediately by the target RNC after detection of relocation execution trigger and gives the proposed behaviour of the CN, similar to the description of the behaviour of the CN on receipt of RELOCATION DETECT, where "... the CN may switch the user plane from the source RNC to the target RNC." The difference is that - given through the split cs CN architecture in Rel-4 – switching the user plane on RELOCATION DETECT will in most cases cause too much delay. Additionally, a typo has been corrected.
Summary of change:	⌘	Clarification on the concept behind the immediate rate control procedure (after relocation).
Consequences if not approved:	⌘	The concept behind the immediate rate control procedure (after relocation) might be misunderstood and cause incomplete implementations.

Clauses affected:	⌘			
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	
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. 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 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 including maximum rate control information. If the entity receiving the rate control frame is not the TrFO partner, it shall not acknowledge the rate control frame.

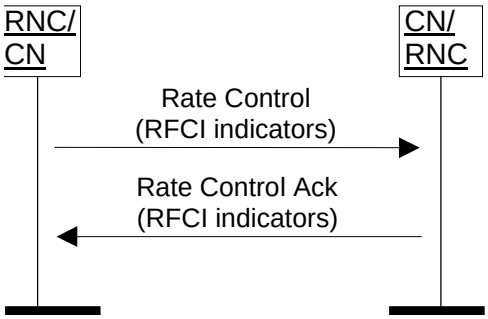

Figure 11: Successful Rate Control

3GPP TSG-RAN WG3 Meeting #21
Busan, Korea, 21st – 25th May, 2001

R3-011559

CR-Form-v3

CHANGE REQUEST

⌘ **25.415** **CR** **064** ⌘ rev **-** ⌘ Current version: **4.0.0** ⌘

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

Title:	⌘	TrFO clarifications and corrections
Source:	⌘	R-WG3
Work item code:	⌘	TrFO
Date:	⌘	2001-05-11
Category:	⌘	**F**
Release:	⌘	REL-4

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
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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 procedure text for initialisation needs to be clarified since it is not obvious from the current text that receipt of a new INIT frame replaces the current RFCI information for both the uplink and downlink direction. The term “relocation execution trigger” refers to text in RANAP, and it is proposed to add the RANAP reference after the term. It is not clear from the specification that Rate Control commands shall always be acknowledged and that the own Rate Control information shall be returned in the acknowledgement frame. The indication of the frame payload part (right most part) in figure 25a is wrong, (this mistake was also present in the initial CR that introduced TrFO).
Summary of change:	⌘	Clarify that receipt of a new INIT frame can replace the current stored RFCI information. Clarify that when the receiver acknowledges a Rate Control frame then the own maximum rate control information is included. Add a RANAP reference after the term “relocation execution trigger”. Correct figure 25a.
Consequences if not approved:	⌘	Different implementations can interpret the specification differently and this may lead to inter working problems in a multi-vendor environment. The proposed change is backward compatible

Clauses affected:	⌘	6.5.2.1, 6.5.3.1, 6.6.2.3.4.2.2		
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications	⌘	

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.

6.5.2 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, 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 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 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.

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 number of initialisation frames in a chain (with different frame numbers) shall not exceed 4.

The frame number is always set to zero for the first initialisation frame. When chained initialisation frames are used the frame number shall be incremented in the sending direction for each new frame in the chain. The acknowledgement or negative acknowledgement carries 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 an initialisation frame with the same frame number. 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.

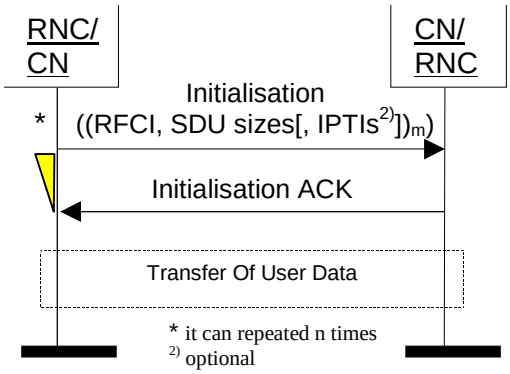

Figure 9: Successful Initialisation of Iu UP for m RFCIs

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.

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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.

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 ~~remove~~ 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 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 its own maximum rate control information. ~~If the entity receiving the rate control frame is not the TrFO partner, it shall not acknowledge the rate control frame.~~

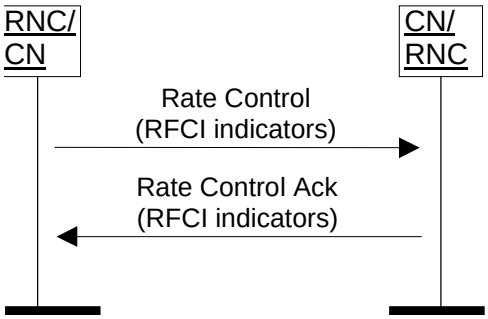

Figure 11: Successful Rate Control

6.6.2.3.4.2.2 Rate Control positive acknowledgement

Figure 25a specifies how the rate control positive acknowledgement frame is coded.

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
PDU Type (=14)				Ack/Nack (=1, i.e. Ack)		PDU Type 14 Frame Number		1	Frame Control Part
Iu UP Mode version				Procedure Indicator (indicating the procedure being positively acknowledged)				1	
Header CRC						Spare		1	Frame Checksum Part
Spare								1	
Spare		Number of RFCI Indicators (M)						1	
RFCI 0 Ind.	RFCI 1 Ind	...	RFCI M-1 Ind	Padding				0-n	
Spare extension								0 – (31-n)	Frame Payload part

Figure 25a: Iu UP PDU Type 14 Format for positive acknowledgement

Bits								Number of Octets	
7	6	5	4	3	2	1	0		
PDU Type (=14)				Ack/Nack (=1, i.e. Ack)		PDU Type 14 Frame Number		1	Frame Control Part
Iu UP Mode version				Procedure Indicator (indicating the procedure being positively acknowledged)				1	
Header CRC						Spare		1	Frame Checksum Part
Spare								1	
Spare				Number of RFCI Indicators (M)				1	Frame Payload part
RFCI 0 Ind.	RFCI 1 Ind	...	RFCI M-1 Ind	Padding				0-n	
Spare extension								0 - (31-n)	

Figure 25a: Iu UP PDU Type 14 Format for positive acknowledgement