

Source: TSG SA WG2
Title: CRs on 23.107 v.3.2.0 (QoS stage 2)
Agenda Item: 6.2.3

The following Change Requests (CRs) have been approved by TSG SA WG2 and are requested to be approved by TSG SA plenary #8.

Note: the source of all these CRs is now S2, even if the name of the originating company(ies) is still reflected on the cover page of all the attached CRs.

CRs on 23.107 v.3.2.0

spec	release	CR #	category	Title	S2 TDoc #
23.107	R99	020	F	Add subflow bit-rate to description of SDU format information	S2-000839

CHANGE REQUEST		Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.	
23.107 CR 020		Current Version: 3.2.0	
GSM (AA.BB) or 3G (AA.BBB) specification number ↑		↑ CR number as allocated by MCC support team	
For submission to: SA#8	for approval <input checked="" type="checkbox"/>	strategic <input type="checkbox"/>	(for SMG use only)
list expected approval meeting # here ↑	for information <input type="checkbox"/>	non-strategic <input type="checkbox"/>	

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 Core Network
(at least one should be marked with an X)

Source: Ericsson **Date:** May 19, 2000

Subject: Add subflow bit-rate to description of SDU format information

Work item: End-to-end QoS

Category:	F Correction <input checked="" type="checkbox"/> A Corresponds to a correction in an earlier release <input type="checkbox"/> B Addition of feature <input type="checkbox"/> C Functional modification of feature <input type="checkbox"/> D Editorial modification <input type="checkbox"/>	Release:	Phase 2 <input type="checkbox"/> Release 96 <input type="checkbox"/> Release 97 <input type="checkbox"/> Release 98 <input type="checkbox"/> Release 99 <input checked="" type="checkbox"/> Release 00 <input type="checkbox"/>
------------------	--	-----------------	--

(only one category shall be marked with an X)

Reason for change: This CR proposes a correction to align 23.107 with TS 25.413 ver 3.1.0. For circuit switched data rate control may be performed by UTRAN. The SDUs of circuit switched data traffic flows is of a constant length, rate control is thus performed by changing the inter PDU transmission interval (IPTI), i.e. changing the periodicity of the PDU stream. For this type of rate control the RNC needs to know the possible subflow bit rates the RNC may use for rate control. In RANAP specification (TS 25.413 ver 3.1.0), a bitrate element in SDU format information attribute is used for this purpose. This CR proposes to add support of a subflow bit rate to the description of SDU format information attribute.

Clauses affected: 6.4.4.1, 6.4.4.2

Other specs affected:	Other 3G core specifications <input type="checkbox"/> Other GSM core specifications <input type="checkbox"/> MS test specifications <input type="checkbox"/> BSS test specifications <input type="checkbox"/> O&M specifications <input type="checkbox"/>	→ List of CRs: → List of CRs: → List of CRs: → List of CRs: → List of CRs:	
------------------------------	---	--	--

Other comments:



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

6.4.4 Radio Access Bearer Service Attributes

Radio Access Bearer Service Attributes shall be applied to both CS and PS domains.

6.4.4.1 List of attributes

Traffic class ('conversational', 'streaming', 'interactive', 'background')

Definition: type of application for which the Radio Access Bearer service is optimised

[Purpose: By including the traffic class itself as an attribute, UTRAN can make assumptions about the traffic source and optimise the transport for that traffic type. In particular, buffer allocation may be based on traffic class.]

Maximum bitrate (kbps)

Definition: maximum number of bits delivered by UTRAN and to UTRAN at a SAP within a period of time, divided by the duration of the period. The traffic is conformant with the Maximum bitrate as long as it follows a token bucket algorithm where token rate equals Maximum bitrate and bucket size equals Maximum SDU size.

The conformance definition should not be interpreted as a required implementation algorithm. The token bucket algorithm is described in Annex B.

[Purpose: 1) to limit the delivered bitrate to applications or external networks with such limitations, 2) to allow maximum wanted RAB bitrate to be defined for applications able to operate with different rates (e.g. non transparent circuit switched data)]

Guaranteed bitrate (kbps)

Definition: guaranteed number of bits delivered at a SAP within a period of time (provided that there is data to deliver), divided by the duration of the period. The traffic is conformant with the Guaranteed bitrate as long as it follows a token bucket algorithm where token rate equals Guaranteed bitrate and bucket size equals k Maximum SDU size. For Release 99, k = 1. A value of k greater than one Maximum SDU size may be specified in future releases to capture burstiness of sources. Signalling to specify the value of k may be provided in future releases.

The conformance definition should not be interpreted as a required implementation algorithm. The token bucket algorithm is described in Annex B.

[Purpose: Guaranteed bitrate may be used to facilitate admission control based on available resources, and for resource allocation within UTRAN. Quality requirements expressed by e.g. delay and reliability attributes only apply to incoming traffic up to the guaranteed bitrate. The guaranteed bitrate at the RAB level may be different from that on UMTS bearer level, for example due to header compression.]

Delivery order (y/n)

Definition: indicates whether the UMTS bearer shall provide in-sequence SDU delivery or not.

[Purpose: specifies if out-of-sequence SDUs are acceptable or not. This information cannot be extracted from the traffic class. Whether out-of-sequence SDUs are dropped or re-ordered depends on the specified reliability]

Maximum SDU size (octets)

Definition: the maximum allowed SDU size

[Purpose: The maximum SDU size is used for admission control and policing.]

SDU format information (bits)

Definition: list of possible exact sizes of SDUs. If unequal error protection shall be used by a Radio Access Bearer service, SDU format information defines the exact subflow format of the SDU payload. SDU format information also supports definition of allowed subflow bitrates.

NOTE 2: SDU format information is used by UTRAN to define which bits of the payload that belongs to each subflow. Exact syntax of SDU format information attribute is the task of RAN WG3.

[Purpose: UTRAN needs SDU format information to be able to operate in transparent RLC protocol mode, which is beneficial to spectral efficiency and delay when RLC re-transmission is not used. Thus, if the application can specify SDU sizes, the bearer is less expensive. Moreover, in case of unequal error protection, UTRAN needs to know the exact format of SDU payload to be able to demultiplex the SDU onto different radio bearer services. When rate control is applied to services having a constant SDU size, e.g. CS data, the subflow bitrate is used to calculate the allowed inter PDU transmission interval (IPTI).]

SDU error ratio

Definition: Indicates the fraction of SDUs lost or detected as erroneous. SDU error ratio is defined only for conforming traffic. In case of unequal error protection., SDU error ratio is set per subflow and represents the error ratio in each subflow. SDU error ratio is only set for subflows for which error detection is requested.

NOTE 3: By reserving resources, SDU error ratio performance is independent of the loading conditions, whereas without reserved resources, such as in Interactive and Background classes, SDU error ratio is used as target value.

[Purpose: Used to configure protocols, algorithms and error detection schemes, primarily within UTRAN.]

Residual bit error ratio

Definition: Indicates the undetected bit error ratio for each subflow in the delivered SDUs. For equal error protection, only one value is needed. If no error detection is requested for a subflow, Residual bit error ratio indicates the bit error ratio in that subflow of the delivered SDUs.

[Purpose: Used to configure radio interface protocols, algorithms and error detection coding. For services requiring unequal error protection, residual bit error ratio is given for each subflow.]

Delivery of erroneous SDUs (y/n/-)

Definition: Indicates whether SDUs with detected errors shall be delivered or not. In case of unequal error protection, the attribute is set per subflow.

NOTE 4: 'yes' implies that error detection is employed and that erroneous SDUs are delivered together with an error indication, 'no' implies that error detection is employed and that erroneous SDUs are discarded, and '-' implies that SDUs are delivered without considering error detection.

In case of unequal protection, different subflows may have different settings. Whenever there is a detected error in a subflow with 'no', the SDU is discarded, irrespective of settings in other subflows. For an SDU with multiple subflows with a 'yes' setting, there may be one error indication per subflow, or, if there is only one error indication per SDU, it indicates that an error was detected in at least one of these subflows. Exact definitions are the task of RAN3.

[Purpose: Used to decide whether error detection is needed and whether frames with detected errors shall be forwarded or discarded.]

Transfer delay (ms)

Definition: Indicates maximum delay for 95th percentile of the distribution of delay for all delivered SDUs during the lifetime of a bearer service, where delay for an SDU is defined as the time from a request to transfer an SDU at one SAP to its delivery at the other SAP.

[Purpose: specifies the UTRAN part of the total transfer delay for the UMTS bearer. It allows UTRAN to set transport formats and ARQ parameters.]

Traffic handling priority

Definition: specifies the relative importance for handling of all SDUs belonging to the radio access bearer compared to the SDUs of other bearers.

[Purpose: Within the interactive class, there is a definite need to differentiate between bearer qualities. This is handled by using the traffic handling priority attribute, to allow UTRAN to schedule traffic accordingly. By definition, priority is an alternative to absolute guarantees, and thus these two attribute types cannot be used together for a single bearer.]

Allocation/Retention Priority

Definition: specifies the relative importance compared to other Radio access bearers for allocation and retention of the Radio access bearer. The Allocation/Retention Priority attribute is a subscription parameter which is not negotiated from the mobile terminal.

NOTE 5: The addition of a user-controlled Allocation/Retention Priority attribute is for further study in future releases.

[Purpose: Priority is used for differentiating between bearers when performing allocation and retention of a bearer. In situations where resources are scarce, the relevant network elements can use the Allocation/Retention Priority to prioritize bearers with a high Allocation/Retention Priority over bearers with a low Allocation/Retention Priority when performing admission control.]

Source statistics descriptor ('speech'/'unknown')

Definition: specifies characteristics of the source of submitted SDUs.

[Purpose: Conversational speech has a well-known statistical behaviour (or the discontinuous transmission (DTX) factor). By being informed that the SDUs for a RAB are generated by a speech source, UTRAN may, based on experience, calculate a statistical multiplex gain for use in admission control on the radio and Iu interfaces.]

6.4.4.2 Attributes discussed per class

Conversational class

If the RAB carries a speech service, **Source statistics descriptor** can be set, which allows UTRAN to calculate a statistical multiplexing gain on radio and Iu interfaces and use that for admission control.

Unequal error protection can be supported in conversational class. In case unequal error protection is requested for a given RAB, the attributes Delivery of erroneous SDUs, Residual bit error ratio and SDU error ratio are specified per subflow. **Delivery of erroneous SDUs** determines whether error detection shall be used and, if so, whether SDUs with error in a certain subflow shall be delivered or not. **Residual bit error ratio** specifies the bit error ratio for undetected delivered bits. **SDU error ratio** specifies the fraction of SDUs with detected error in each subflow. It is only set for subflows for which error detection is requested.

In case of unequal error protection the payload of the user data SDU, transported by the Radio Access Bearer Service, shall conform to a SDU format defined with possible exact sizes. The payload bits are statically structured into subflows. The **SDU format information** attribute defines the exact subflow format of SDU payload.

UTRAN includes a rate control protocol, making it able of controlling the rate of sources requesting this, provided that they are periodic and that **SDU format information** is specified. UTRAN is allowed to control the rate between **Guaranteed bitrate** and **Maximum bitrate**. Each of these two rates shall correspond to an SDU format specified in **SDU format information**. For the case the SDU size is constant, as is the case for CS data, SDU format information may include a list of possible bitrates per subflow, to allow rate control of the subflows by change of inter PDU transmission interval (IPTI).

Streaming class

If the RAB carries streaming speech, **Source statistics descriptor** can be set, which allows UTRAN to calculate a statistical multiplexing gain on radio and Iu interfaces and use that for admission control.

Unequal error protection can be supported in streaming class. In case unequal error protection is requested for a given RAB, the attributes Delivery of erroneous SDUs, Residual bit error ratio and SDU error ratio are specified per subflow. **Delivery of erroneous SDUs** determines whether error detection shall be used and, if so, whether SDUs with error in a certain subflow shall be delivered or not. **Residual bit error ratio** specifies the bit error ratio for undetected delivered bits. **SDU error ratio** specifies the fraction of SDUs with detected error in each subflow. It is only set for subflows for which error detection is requested.

In case of unequal error protection the payload of the user data SDU, transported by the Radio Access Bearer Service, shall conform to a SDU format defined with possible exact sizes. The payload bits are statically structured into subflows. The **SDU format information** attribute defines the exact subflow format of SDU payload.

UTRAN includes a rate control protocol, making it able of controlling the rate of sources requesting this, provided that they are periodic and that **SDU format information** is specified. UTRAN is allowed to control the rate between **Guaranteed bitrate** and **Maximum bitrate**. Each of these two rates shall correspond to an SDU format specified in

SDU format information. For the case the SDU size is constant, as is the case for CS data, SDU format information may include a list of possible bitrates per subflow, to allow rate control of the subflows by change of inter PDU transmission interval (IPTI).

Other classes

The RAB attribute sets and their use in, interactive and background classes are identical to those of UMTS bearer services (subclause 6.4.2.2).

6.4.4.3 Radio Access Bearer attributes: summary

In Table 3, the defined Radio Access Bearer attributes and their relevancy for each bearer class are summarised. Observe that traffic class is an attribute itself.

Table 3: Radio Access Bearer attributes defined for each bearer class

Traffic class	Conversational class	Streaming class	Interactive class	Background class
Maximum bitrate	X	X	X	X
Delivery order	X	X	X	X
Maximum SDU size	X	X	X	X
SDU format information	X	X		
SDU error ratio	X	X	X	X
Residual bit error ratio	X	X	X	X
Delivery of erroneous SDUs	X	X	X	X
Transfer delay	X	X		
Guaranteed bit rate	X	X		
Traffic handling priority			X	
Allocation/ Retention priority	X	X	X	X
Source statistics descriptor	X	X		