TSG-SA Working Group 1 (Services) meeting #2
Edinburgh, 9th – 12th March, 1999

TSGS1#2(99)197

Agenda Item: 9.6

Source: Ericsson

Title: QoS Requirements – Proposed List of Contents

Document for: Discussion

QoS Requirements in UMTS 22.05 – List of contents

This list of contents is meant to be the sceleton for a new chapter 5 in UMTS 22.05. (Parts of the existing text in those sections may of course be reproduced in the new text as a result of this Work Item.)

5 Bearer Services

Ref. to UMTS 22.00: UMTS release ´99 shall support single- and multi-media N-ISDN applications and single- and multi-media IP applications.

5.1 Definition of Bearer Services

5.2 UMTS Bearer Service QoS Requirements

5.2.1 Communication Schemes

[To be reviewed by TSGS1.]

5.2.2 UMTS Bearer Service Parameters

[Definitions and possible classifications as adviced by the TSGS2 QoS ad-hoc group.]

5.2.3 UMTS Bearer Service Parameter Values and/or Value Ranges

Value [x]
and/or
value range [x – y]

[To be specified by TSGS1 down to the level of actual numbers.]

5.2.4 UMTS Bearer Service Negotiation and Re-Negotiation

[High level user requirements to be defined by TSGS1.]

5.2.5 Types of External Networks

Ref to UMTS 22.00: UMTS release ´99 shall support interworking with PSTN, N-ISDN, GSM, X.25 and IP networks.

CHANGE REQUEST No :		*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*			
Technical Specification 3GPP:	22.05	Version	3.3.0		
Submitted to TSG SA *list plenary meeting or STC here ↑*	#3	for approval	**X**	without presentation ("non-strategic")	**X**
		for information		with presentation ("strategic")	

PT SMG CR cover form. Filename: crf26_3.doc

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

Work item: QoS Requirements

Source: Ericsson **Date:** 1999-02-26

Subject: Quality of Service requirements – List of Contents

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

F	Correction		**Release:**	Phase 2	
A	Corresponds to a correction in an earlier release			Release 96	
B	Addition of feature			Release 97	
C	Functional modification of feature	X		Release 98	
D	Editorial modification			Release 99	
				UMTS	X

Reason for change: The QoS Requirements Work Item is defined to carefully study and formulate QoS requirements to both fulfill the needs of users and applications, and to give the necessary freedom for other groups to select the most appropriate implementation mechanism(s).

Clauses affected: Chapter 5

Other specs affected:

Other releases of same spec		→ List of CRs:
Other core specifications		→ List of CRs:
MS test specifications / TBRs		→ List of CRs:
BSS test specifications		→ List of CRs:
O&M specifications		→ List of CRs:

Other comments:

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- The second method enables the provision of HE/SN specific supplementary services. To make this possible, standardised building blocks referred to as service features are specified in clause 8. The combination and parametrisation of these service features allow the creation of supplementary services.

UMTS shall be able to handle multiple supplementary services within a call. Interactions shall be handled when several supplementary services are activated in the same call.. When multiple supplementary services can be activated concurrently, some prioritisation of the services will be necessary. Certain services may override or deactivate other services.
Interactions between operator specific supplementary services are not defined.

The following issues need consideration when interactions between services occur;

- Different phases of a call.
- A service spanning on more than one network.
- Service interactions that may occur between services offered to a single user, as well as between services offered to different interacting users.

NOTE: The methods defined for characterisation of services are description methods. They do not imply or restrict different implementations.

4.4 Service features

UMTS service features are based on functionality and mechanisms such as provided by SAT, MExE, IN and CAMEL. These toolkits are the basic building blocks for the VHE. These features can be used both by standardised and non-standardised services through the UMTS Application Programming Interface. The UMTS services and applications get access to UMTS service capabilities (bearers) for transport of user data through the UMTS adaptation layer. This lowest layer of the VHE is responsible for the selection of appropriate service capabilities according to the requirements of services and applications.

High level service features requirements :
. support of wide range of user applications,
. support of rapid application/service development,
. support of easy deployment of new services,
. scalability.

5 Bearer Services

Ref. to UMTS 22.00: UMTS release ´99 shall support single- and multi-media N-ISDN applications and single- and multi-media IP applications.

5.1 Definition of bearer services

Bearer services provide the capability for information transfer between access points and involve only low layer functions. These functions are sometimes referred as low layer capabilities (in reference to OSI layers). The user may choose any set of high layer protocols for his communication and the UMTS network does not ascertain compatibility at these layers between users.

5.2 ~~Description of bearer services~~UMTS Bearer Service Quality of Service Requirements

~~Bearer services are characterised from a static point of view by a set of low layer attributes. This set has been chosen so that a bearer service can be entirely defined by giving a value to each attribute of the set. In particular, the set and the associated allowed values enable characterisation of future (not yet used or foreseen) transfer needs.~~
~~Giving one of the possible values to each attribute defines a possible bearer service. However, any combination is neither meaningful nor necessarily supported by the UMTS system. This section defines the attributes and their possible values. The authorised combinations are specified in the following sections.~~
~~The parameters of the set are grouped into two categories;~~

- Information transfer attributes, which characterise the network transfer capabilities required for transferring user information between two or more access points.

- Information quality attributes, which characterise the quality of the user information transferred between two or more access points.

Most of the attributes presented further down may be attributed several values when the bearer service required by an application involves more than one traffic type (connection/connectionless) or more than one connection.
It shall be possible to negotiate/re-negotiate all of the attributes presented in this clause at call set-up/ during the call (mobile or network initiated).

5.2.1 Information transfer attributes

Connection mode attribute
The two possible values for this attribute are connection oriented and connectionless. In a connection oriented mode, information is delivered to the destination entity in the same order as it was provided by the source entity, but an establishment/release phase is required at the beginning and the end of the information transfer. In a connectionless mode, information can directly be transferred, but with no guaranty of ordered delivery.

Traffic type attribute
The four possible values for this attribute are constant bit rate, variable bit rate, available bit rate and unspecified bit rate.

Symmetry attribute
The three possible values for this attribute are unidirectional, bi-directional symmetric and bi-directional asymmetric.

Communication configuration attribute
This attribute indicate the spatial arrangement for transferring information between the implicated access points. The possible values are point-to-point, and point-to-multipoint. When the value of the attribute is point-to-multipoint, it shall be further characterised as multicast or broadcast. The addresses of the source entity and the destination entities should also be provided. One multipoint address should be reserved for broadcasting.

Information transfer rate attributes
Information transfer rate is the amount of information transmitted per unit of time from a source access point to destination access point(s).
The three attributes used to characterise the information transfer rate are the peak bit rate, the minimum bit rate and the mean bit rate. . The possible values for these three attributes are not a limited set, but a continuous range of values. More parameters may certainly be needed, such as the sustainable bit rate or the occupancy (FFS).

5.2.2 Information quality attributes

Information quality attributes characterise the bit integrity and delay requirements of the applications.
Other parameters may be needed.

Maximum transfer delay attribute
This attribute sets the maximum transfer delay of the information. The two reference points for the maximum transfer delay are the Iu interface and the point located between the mobile termination and the terminal adaptation function.
The possible values for this attribute are not a limited set, but a continuous range of values.

Delay variation attribute
This attribute sets the variation in the received information. This attribute is important for real-time services, e.g. video conference, where a value approaching 0 would typically be requested. The possible values for this attribute are not a limited set, but a continuous range of values.

Bit error ratio attribute
The ratio between incorrect and total transferred information bits. The possible values for this attribute are not a limited set, but a continuous range of values.

Error characteristics attribute
This attribute characterises the arrivals of errors. The two possible values are uniform and bursty.

5.3 Supported bit rates

It shall be possible for one application to specify its traffic requirements to the network by requesting a bearer service with any value for the connection mode, traffic type, symmetry and information transfer rate attributes. It shall be possible for the network to satisfy these requirements without wasting resources on the radio and network interfaces due to granularity limitations in bit rates.
It shall be possible for one mobile termination to have several active bearer services simultaneously, each of which could be connection oriented or connectionless.
The only limiting factor for satisfying application requirements shall be the cumulative bit rate per mobile termination at a given instant (i.e. when summing the bit rates of one mobile termination's simultaneous connection oriented and connectionless traffic, irrespective of the traffic being real time or non real time) in each radio environment :
- At least 144 kbits/s in satellite radio environment (Note 1).
- At least 144 kbits/s in rural outdoor radio environment.
- At least 384 kbits/s in urban/suburban outdoor radio environments.
- At least 2048 kbits/s in indoor/low range outdoor radio environment.

NOTE 1 : This Peak Bit Rate may only be achieved in a nomadic operating mode.

5.4 Supported QoS

It shall be possible for one application to specify its QoS requirements to the network by requesting a bearer service with any value for the maximum transfer delay, delay variation, bit error rate and error characteristic attributes.
The following table indicates the range of values that shall be supported by UMTS for the QoS attributes. These requirements are valid for both connection and connectionless traffic. It shall be possible for the network to satisfy these requirements without wasting resources on the radio and network interfaces due to granularity limitations in QoS.

	Real Time (Constant Delay)	Non Real Time (Variable Delay)
Operating environment	BER/Max Transfer Delay	BER/Max Transfer Delay
Satellite (Terminal relative speed to ground up to 1000 km/h for plane)	Max Transfer Delay less than 400 ms BER 10-3 - 10-7 (Note 1)	Max Transfer Delay 1200 ms or more (Note 2) BER = 10-5 to 10-8
Rural outdoor (Terminal relative speed to ground up to 500 km/h) (Note 3)	Max Transfer Delay 20 - 300 ms BER 10-3 - 10-7 (Note 1)	Max Transfer Delay 150 ms or more (Note 2) BER = 10-5 to 10-8
Urban/ Suburban outdoor (Terminal relative speed to ground up to 120 km/h)	Max Transfer Delay 20 - 300 ms BER 10-3 - 10-7 (Note 1)	Max Transfer Delay 150 ms or more (Note 2) BER = 10-5 to 10-8
Indoor/ Low range outdoor (Terminal relative speed to ground up to 10 km/h)	Max Transfer Delay 20 - 300 ms BER 10-3 - 10-7 (Note 1)	Max Transfer Delay 150 ms or more (Note 2) BER = 10-5 to 10-8
NOTE 1; There is likely to be a compromise between BER and delay. NOTE 2; The Max Transfer Delay should be here regarded as the target value for 95% of the data. NOTE 3; The value of 500 km/h as the maximum speed to be supported in the rural outdoor environment was selected in order to provide service on high speed vehicles (e.g. trains). This is not meant to be the typical value for this environment (250 km/h is more typical).		

5.5 Supported topologies

It shall be possible for an application to specify its traffic topology requirements to the network by requesting a bearer service with any value for the communication configuration attribute. However, some combinations with the symmetry attribute are not authorised. The supported configurations are :

1) Point-to-Point

- Uni-Directional
- Bi-Directional
  - Symmetric
  - Asymmetric

2) Uni-Directional Point-to-Multipoint

- Multicast
- Broadcast

A multicast topology is one in which sink parties are specified before the connection is established, or by subsequent operations to add or remove parties from the connection. The source of the connection will always be aware of all parties to which the connection travels.

~~A broadcast topology is one in which the sink parties are not always known to the source. The connection to individual sink parties is not under the control of the source, but is by request of each sink party.~~
~~In the case of a mobile termination with several active bearer services simultaneously, it shall be possible for each bearer service to have independent topologies and source/sink parties.~~

~~5.6 Radio Interface optimisation~~

~~The following requirements shall lead the radio interface optimisation process;~~

- ~~support of high bit rate (around the Peak Bit Rate), bursty, asymmetric, non-real time bearer capabilities;~~
- ~~support of high bit rate (around the Peak Bit Rate), bursty, asymmetric, real time bearer capabilities;~~
- ~~the ability to extend or reduce bandwidth associated to a bearer capability in order to adapt to bit rate or radio condition variations, to add or drop service components.~~

~~However, the services provided by GSM (speech in particular) shall be supported in a spectrally efficient manner (at least as efficiently as in GSM) for the same quality of service.~~
~~In order to allow the support of flexible, bandwidth on demand services, bearer services should be provided with the finest possible granularity that can be efficiently supported.~~

5.2.1 Communication Schemes

[To be reviewed by TSGS1.]

5.2.2 UMTS Bearer Service Parameters

[Definitions and possible classifications as adviced by the TSGS2 QoS ad-hoc group]

5.2.3 UMTS Bearer Service Parameter Values and/or Value Ranges

Value [x]
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[To be specified by TSGS1 down to the level of actual numbers.]

5.2.4 UMTS Bearer Service Negotiation and Re-Negotiation

[High level user requirements to be defined by TSGS1.]

5.2.5 Types of external networks

Ref to UMTS 22.00: UMTS release ´99 shall support interworking with PSTN, N-ISDN, GSM, X.25 and IP networks.

6 Teleservices

6.1 Definition of teleservices

Teleservices provide the full capabilities for communications by means of terminal equipment, network functions and possibly functions provided by dedicated centres.