

## User Group; Analysis of current End-to-End QoS standardization state

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Reference

DTR/USER-00031

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Keywords

QoS, Interface

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## Foreword

This Technical Report (TR) has been produced by ETSI User Group (USER).

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## Introduction

This analysis of the current End-to-End (E2E) QoS standardization state was carried out as a preliminary work to the drafting of the multipart deliverable TR 102 805 "User Group; End-to-end QoS management at the Network Interfaces". Its publication was decided, considering that it could be useful to other ETSI TB.

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## 1 Scope

The present document provides information on the standards and documents available in the area of end to end QoS.

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## 2 References

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### 2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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- [i.39] ETSI TS 129 207: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Policy control over Go interface (3GPP TS 29.207 Release 6)".
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## 3 Definitions and abbreviations

### 3.1 Definitions

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

**AmbientGrid:** information inference (AmbientGrid) based on the profiles' matching, to structure with grid covering the needed user centric environment

**Class of Service (CoS):** way of traffic management in the network by grouping similar types of traffic and treating them as its own level of service priority

**DiffServ networks:** classify packets into one of a small number of aggregated flows or 'classes', based on the DiffServ codepoint (DSCP) in the packet's IP header

NOTE: This is known as behaviour aggregate (BA) classification (RFC 2475 [i.35]). At each DiffServ router, packets are subjected to a 'per-hop behaviour' (PHB), which is invoked by the DSCP (RFC 2474 [i.36])

**horizontal handover:** handover within homogeneous access networks

NOTE 1: Generally it is referred to as the Intra-AN handover.

NOTE 2: ITU: Study Group 19 - Contribution 25: Considerations of horizontal handover and vertical handover, 2007 [i.40]

**infosphere:** decisional knowledge base managing, in the real time, all the personalization and ambient environment information

**IntServ (integrated services architecture):** set of extensions to the traditional best effort model of the Internet with the goal of allowing end-to-end QoS to be provided to applications

NOTE 1: One of the key components of the architecture is a set of service; the current set of services consists of the controlled load and guaranteed services. The architecture assumes that some explicit setup mechanism is used to convey information to routers so that they can provide requested services to flows that require them. While RSVP is the most widely known example of such a setup mechanism, the IntServ architecture is designed to accommodate other mechanisms.

NOTE 2: See RFC 1633 [i.37].

**multi-homing:** user's services can be provided by more than one service or network provider

**network mobility:** network's ability, where a set of fixed or mobile nodes are networked to each other, to change, as a unit, its point of attachment to the corresponding network upon the network's movement itself

**policy control:** adaptation and configuration of QoS according to particular goals dependent of user, network operator and service provider

**QoS Classification:** definition of class priority for QoS by describing traffic condition or performance parameters

**QoS handover:** ensures QoS state establishes when vertical/horizontal handover occurs

**QoS Interworking:** ensures the transfer of all different types of packet data with different QoS parameters in heterogeneous environment whenever the ANs and CNs are of different releases and types by mapping the QoS attributes

**service mobility:** ability to consistently provide services to the end-user, to maintain the expected QoS, at the system's initiative, regardless of the end-user's location, terminals, or networks.

NOTE: To maintain the service continuity, the session mobility is used.

**terminal mobility:** user uses his terminal to move across the same or different networks while having access to the same set of subscribed services

**user mobility:** ability for a subscriber to move to different physical locations and be able to use one or more devices connected to one or more access networks to gain access to their services without interruption

**user session:** period of communication between one user and another or other users or servers characterized by a starting time and a termination time, including setting up the relation of the user equipment, access network, core network and services

**userware:** innovative user centric middleware (Userware) enhancing the seamless feasibility along with the location and activity, personalization and user's ambient contexts

**vertical handover:** handover across heterogeneous access networks. Generally, it is referred to as the Inter-AN handover

NOTE: ITU STUDY GROUP 19 - CONTRIBUTION 25: Considerations of horizontal handover and vertical handover, 2007 [i.40].



## 3.2 Abbreviations

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

3GPP	The 3rd Generation Partnership Project
AAA	Authentication, Authorization and Accounting
ACF	Admission Control Function
ACK	ACKnowledgement
AMF	Access Management Function
AN	Access Network
API	Application Programming Interface
A-RACF	Access Resource and Admission Control Function
ARF	Access Relay Function
AS	Application Server
ASF	Application Server Functions
ASP	Application Service Provider
AVP	Attribute-Value-Pair
BA	Binding Acknowledgement
BGCF	Breakout Gateway Control Function
BGF	Border Gateway Function
BU	Binding Update
CAC	Connection Admission Control
C-BGF	Core Border Gateway Function
CCA	Credit-Control Answer
CCR	Credit-Control Request
CDR	Charging Data Records
CN	Core Network
CND	Customer Network Devices
CNG	Customer Network Gateway
CNGCF	Customer Network Gateway Configuration Function
CoA	Care of Address
COPS	Common Open Policy Service
CoS	Class of Service
CPE	Customer Premises Equipment
CPN	Customer Premises Network
CSCF	Call Session Control Function
CTF	Charging Trigger Function
DCCP	Datagram Congestion Control Protocol
DiffServ	Differentiated Services
DSCP	DiffServ CodePoint
E2E QoS	End-to-End QoS
ETSI	European Telecommunications Standards Institute
FBC	Flow Based Charging
GIST	Generic Internet Signalling Transport
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
HA	Home Agent
HHO	Horizontal HandOver
HLR	Home Location Register
HoA	Home Address
HSS	Home Subscriber Server
I/S CSCF	Interrogating/Serving CSCF
I-BGF	Interconnection Border Gateway Function
IEEE	Institute of Electrical & Electronic Engineers
IETF	Internet Engineering Task Force
IM	IP Multimedia
IMS	IP based Multimedia Subsystem
IN	Intelligent Network
IntServ	Integrated Services
IP-CAN	IP-Connectivity Access Networks
IPTV	Internet Protocol TeleVision

ISC	IP multimedia Service Control
ISP	Internet Service Provider
ITU-T	International Telecommunication Union - Telecommunication standardization sector
IWU	InterWorking Unit
L2TF	Layer 2 Terminal Function
M2M	Machine-to-Machine
MAC	Medium Access Control
MGCF	Media Gateway Control Function
MICS	Media Independent Command Service
MIES	Media Independent Event Service
MIH	Media Independent Handover
MIHF	Media Independent Handover Function
MIIS	Media Independent Information Service
MIPv4	Mobile IP v4
MIPv6	Mobile IP v6
MN	Mobile Node
MRFC	Media Resource Function Controller
MRFP	Media Resource Function Processor
NACF	Network Access Configuration Function
NASS	Network Attachment SubSystem
NAT	Network Address Translation
NGN	Next Generation Network
NGS	Next Generation Service
NSIS	Next Steps In Signalling
NSLP	NSIS Signalling Layer Protocols
NTLP	NSIS Transport Layer Protocol
OCS	Online Charging System
OSA	Open Service Access
OSI	Open System Interconnection
PCC	Policy and Charging Control
PCEF	Policy Enforcement Point
PCRF	Policy and Charging Rule Function
P-CSCF	Proxy CSCF
PDA	Personal Digital Assistant
PDBF	Profile Data Base Function
PDG	Packet Data Gateway
PDP	Policy Decision Point
PDU	Protocol Data Unit
PEF	Policy Enforcement Function
PEP	Policy Enforcement Point
PES	PSTN/ISDN Emulation Subsystem
PHB	Per Hop Behaviour
PHY	PHYsical layer
PLMN	Public Land Mobile Network
PS	Proxy Server
PSTN	Public Switched Telephone Network
QNF	QoS NLSP Forwarder
QNI	QoS NLSP Initiator
QNR	QoS NLSP Responder
QoS	Quality of Service
QoSM	Quality of Service Managemer
QSPEC	QoS SPECification
RACS	Resource and Admission Control Subsystem
RCEF	Resource Control Enforcement Function
RMF	Resource Management Function
RS	Register Server
RSVP	Resource Reservation Protocol
RTP	Real Time Protocol
SBLP	Service Based Local Policy
SCIM	Service Capability Interaction Manager
SCP	Service Control Point
SCS	Service Capability Server

SCTP	Stream Control Transmission Protocol
SDP	Session Description Protocol
SID	Session IDentifier
SIP	Session Initiation Protocol
SLA	Service Level Agreement
SLF	Subscription Locator Function
SLS	Service Level Specification
SP	Service Provider
SPDF	Service Policy Decision Function
SSF	Service Switch Function
TCP	Transmission Control Protocol
TE	Terminal Equipment
T-MGF	Trunk Media Gateway Function
TPF	Traffic Plane Function
UAAF	User Access Authorization Function
UDP	User Datagram Protocol
UE	User Equipment
UMA	Unlicensed Mobile Access
UMTS	Universal Mobile Telecommunications Systems
UMTSc	Universal Mobile Telecommunications Systems
URL	Universal Resource Locator
VHE	Virtual Home Environment
VHO	Vertical HandOver
VoIP	Voice over IP
WAG	Wireless Access Gateway
WLAN	Wireless Local Area Network

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## 4 NGN Context

The successor of the 3G network is a single All-IP infrastructure which is referred to as NGN (Next Generation Network). A major characteristic of the Next Generation Network is its ability to handle heterogeneous and mobile environments for users and service providers.

One can consider four different types of mobility: User mobility, Terminal mobility, Network mobility and Service mobility. Moreover, heterogeneity exists in user's terminals, access networks, core networks as well as in services.

The ability to provide seamless mobility and adaptive quality of service in such a heterogeneous environment is THE key to the success of Next-Generation Networks.

Our analysis of the context led us to highlight innovative properties (clause 4.1).

Users wish to have a continuous multimedia service in a single session whether they are moving around (terminal mobility) or changing terminal (user mobility). This service session is user-centric, meaning that a user should have a continuity of service based on customization. Next service generation should have the self-management ability to dynamically accommodate user requests by adding or changing service components in a single service session.

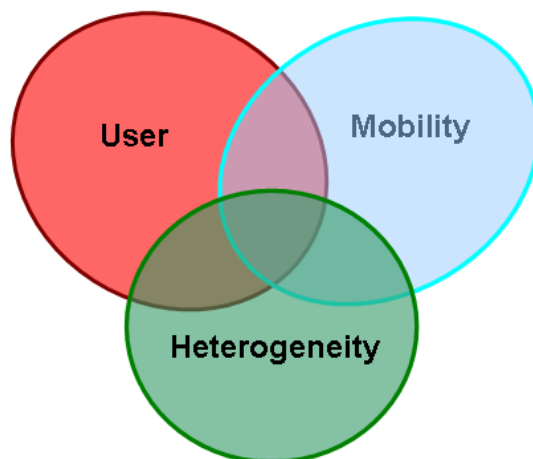


Figure 1: NGN context

In this clause, a basic introduction on the three main characteristics of NGN is provided: the User Centric conception (clause 4.1), the heterogeneous environment (clause 4.2), and the general mobility in NGN (clause 4.3). A conclusion is then proposed in clause 4.4.

## 4.1 User centric

Telecommunication evolved from system centric (user has to comply with various treatments) to network centric (user has to comply with various connections), and now to User centric. User information, QoS requirements and preferences are defined in the user's profile (Figure 2). In this new context, a common understanding about services, priorities, responsibilities, etc, is needed between the service provider and the user. This is expected to lead, in the case of business users, to a formal Service Level Agreement (SLA) or, in the case of the general public, to QoS commitments of the provider included in the service contract according to the relevant regulation.

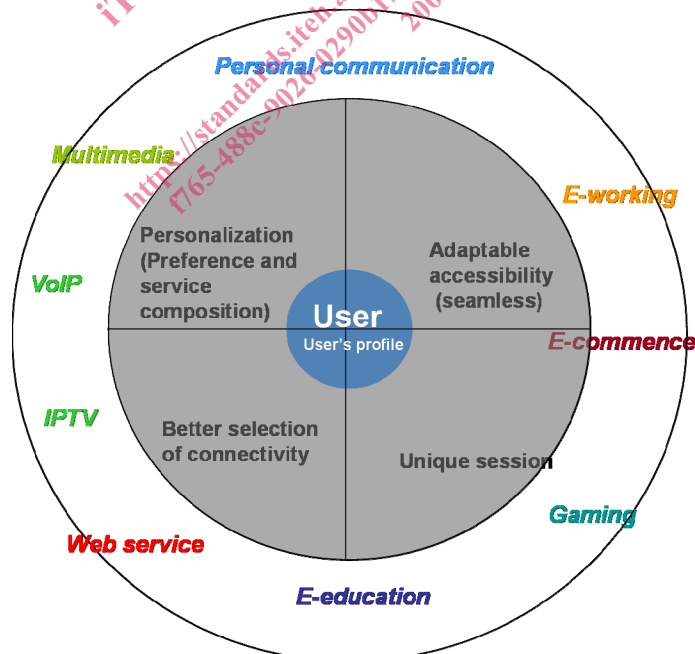


Figure 2: User centric