Technical Specification Group Services and System Aspects
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Title: **CR to 22.129 on Performance requirements for real time services and requirements for handover between UMTS and GPRS**

Document for: **Approval**

Agenda Item: **5.1.4**

Status	Spec	CR	Rev	Phase	Subject	CAT	Vers	New Vers	TSG Meeting	TSG Doc.No.	Pres
	22.129	011		R99	Performance requirements for real time services and requirements for handover between UMTS and GPRS	C	3.1.0	3.2.0	S1#06	S1-99868	No

TSG-SA Working Group 1 (Services) meeting #4
Bernried, Starnberger, Germany 27th Sept – 1st Oct 1999

TSG S1 (99)868
Agenda Item: 6.3.6

CHANGE REQUEST No :	**011**	*Please see embedded help file at the bottom of this page for instructions on how to fill in this form correctly.*			
Technical Specification / Report UMTS	22.129	Version:	3.1.0		
Submitted to TSG_SA *list TSG plenary meeting no. here ↑*	TSG-SA#6	for approval	X	without presentation ("non-strategic")	
		for information		with presentation ("strategic")	

PT SMG CR cover form is available from: http://docbox.etsi.org/tech-org/smg/Document/smg/tools/CR_form/crf28_1.zip

Proposed change affects: *(at least one should be marked with an X)* USIM [ ] TE [X] Network [X]

Work item: GSM UMTS Handover

Source: S1 **Date:** 25.10.99

Subject: Performance requirements for real time services and requirements for handover between UMTS and GPRS

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			UMTS 99	X

Reason for change:

Addressing performance requirements for UMTS to UMTS handover of real time services.
- The temporal discontinuity experienced by real time services should be shorter than the same event in GSM.

Addressing requirements for handover between UMTS and GPRS.
- Handover to GPRS R97 core network shall be implemented.
- Handover of real time PS services to GPRS R99 is out of the scope of UMTS R99 phase 1 and shall be considered in subsequent phases. (GPRS can't handle QoS requirements other than best effort)

Clauses affected: 4 ; 4.3 (new) ; 4.3.1 (new) ; 6.2.4

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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4 General Principles governing handover requirements

This section describes the general principles governing the operation of UMTS when preparing for and executing handover both within UMTS and to another radio system such as GSM. It also describes the additional concepts required to be included in GSM to allow preparation for and handover to UMTS. As a principle, the requirements on handover characteristics should be according to the network to which the handover is made.

The handover matrix

handover possible?	to UMTS	to GSM-cs	to GSM-GPRS	to IMT2000 ≠ UMTS
From UMTS	1	1	1	X
From GSM-cs	1	Oos	oos	Oos
From GSM-GPRS	1	Oos	oos	Oos
From IMT2000 ≠ UMTS	X	Oos	oos	Oos

oos = out of scope of UMTS specifications

1= supporting standards required for UMTS release 99.

x= supporting standards required, not necessarily for release 99.

GSM-GPRS in the table refers to R97, R98 and R99 GPRS.

For UMTS release 99 means shall be defined which:

1) enable handover to a GSM network from a UMTS network;

2) enable handover to a UMTS network from a GSM network.

In both the cases above the GSM network may be operated by either the same network operator as the UMTS network or a different network operator.

Handover of real time PS services between UMTS and GPRS R99 is out of the scope of UMTS R99 phase 1 and shall be considered in subsequent phases. Service continuity of best effort packet services between UMTS and GPRS is required.

4.1 Requirements for Service Capabilities

UMTS standardises service capabilities, not services. As part of the service capabilities it is envisaged that applications may wish to respond to events related to handover that either has occurred, is about to occur or could potentially occur. The service capabilities described in this section should be available at least to UE hosted applications.

The following list is of uses is exemplary and is not intended to be exhaustive:

- an application may wish to accept or reject offered QoS;
- an application may wish to cope to the effect that handover has on a service, for example facsimile retransmission;
- an application may with to preferentially choose radio resources, for purposes such as SoLSA.

It is therefore required that the service capability set available to an application be able to provide an indication that handover has occurred or could occur with information about the type of handover and radio resources involved. The service capabilities should support QoS negotiation.

4.1.1 Support of localised service area (SoLSA)

The UMTS service capability set shall support the Localised Service Area (LSA) concept. It shall facilitate the creation of applications that implement user-dependent radio resource selection based on LSA (e.g. when user is located at his office, radio coverage provided with indoor radio solutions should be preferred). This may cause handover to be take place within UMTS or into other radio systems. Corresponding GSM feature has been specified in GSM 02.43.

4.2 General Operational Considerations

4.2.1 Coverage environment

Mechanisms defined to support handover between UMTS and other radio systems (such as other UMTS modes, other IMT 2000 family members, or GSM) should effectively cope with a number of coverage scenarios:

- limited UMTS coverage in a 'sea' of coverage provided by another radio system , or vice-versa;

- selective operation at a geographical boundary, with extensive UMTS coverage on one side and extensive coverage from another radio system on the other side;

- geographically co-located areas of UMTS coverage and another radio system.

However the standards should impose no restrictions or assumptions on how an operator might deploy or operate the network in both GSM and UMTS.

4.2.2 Inter Operator Handover Issues

Handovers between GSM and UMTS networks operated by different operators should remain an optional feature to implement. It is envisaged that handover would take place due to changing radio conditions caused eg by movement of the terminal causing it toleave the coverage area of a network.
The following networks may be involved with an inter-network handover procedure. These concepts are illustrated in Annex A:

- the user's *home network*, i.e. the operator where the user's subscription may be found;

- the user's *visited network* where the subscriber user is currently registered, i.e. the network where the subscriber user has performed the last successful update location procedure. As long as the subscriber user is roaming roams within the home network, home and visited network are identical.

- the user's *serving network* covering the cell that serves the subscriber. After successful completion of the update location update procedure, the serving network is identical with the visited network. After an inter-network handover, the visited network is different from the serving network until a location update procedure has been successfully completed (excepted the case that the subscriber returns into the visited network).

- the *target network* covering candidate target cell(s) for inter-network handover. The target network has overlapping radio coverage with the serving network but not necessarily with the visited network.

The minimum requirements for inter network HO are:

- continuity of an *active call* across the handover procedure, where this would be possible for intra-operator handover;

- charging, billing and accounting for inter-network handover should be according to the principles defined in UMTS 22.15. For R'99 the mechanisms currently used in GSM should be provided as a minimum (charging for handover leg is based on vistited network tariff, etc., settlement between operators is based on bulk metering, etc.);

- the ability to check with the home network whether the user is permitted to handover from the visited network to a target network;

- the decision whether the handover request is accepted must be taken by the target network;

- invocation of the handover procedure only occurs if the target network provides the radio channel type required for the respective call;

- the avoidance of "network hopping", i.e. successive handover procedures between neighbouring networks for the same call;

- the possibility of user notification of inter network HO (eg possible tariff change) when it occurs.

4.2.3 Charging and Network Management

Means shall be standardised which allow charging records to record the time of handover in the case of inter network operator handover. Charging records must be able to reflect the level of service , operation mode (eg. FDD or TDD) and network type afterhandover.
A capability to provide network management information relating to frequency of occurrence and type of handover should be defined.

4.2.4 Cost and efficiency

The UTRAN standards shall facilitate the cost effective implementation both on the network and on the terminal side, of multi mode operation between GSM and UMTS. Impacts on the GSM network shall be minimised. Such handover shall not require user intervention.

4.2.5 Security

Security requirements relating to handover shall be elaborated in a separate document (UMTS 33.21, security requirements), but should embody the principle that handover shall not compromise the security of: the network providing the new radio resources; the (possibly different) network providing the original radio resources; and the terminalUE. The security mechanisms should also cater for appropriate authentication processes and meet the requirements of national administrations in terms of lawful interception.

4.3 Performance Requirements

4.3.1 Temporary degradation of service caused by handover

Any degradation of service during intra UMTS handover or in the case of handover from UMTS to GSM, shall be no worse than during intra GSM handover.
The duration of the discontinuity experienced by PS and CS real time services should be shorter than that in the handover of GSM CS speech calls.

5 Requirements for Handover from UMTS to UMTS

5.1 Handover due to UE Movement

It should be possible to provide a technical implementation of handover such that there is no measurable impact on the quality of any service when handover due to UE movement occurs. This does not imply that all UMTS handovers will achieve this ideal. However, the standards shall define at least one UTRA mode in which this is possible given the following:

- UE speed stays within limits for given service;
- UE stays constantly within UMTS coverage of a single UTRAN.

5.2 Handover Between UMTS Modes

The standards shall permit a technical implementation in which service is continued, although there may be a temporary degradation which may affect teleservices at the time of handover.

5.3 Handover Between Environments

UMTS is expected to provide coverage in a number of environments including fixed and mobile. The standard shall enable handover between these environments as described in the table below. The following are indicative of long term requirements and do not necessarily apply to R99. However, technical standardisation should not preclude the possiblity of implementing these requirements.

To / From	Terrestrial Cellular	Fixed/Cordless	Satellite
Terrestrial Cellular	Yes	Yes	Yes
Fixed/Cordless	Yes	Yes	Yes
Satellite	Yes	Yes	No

5.4 UMTS cell capacity

Consideration must be given services such as multimedia which may involve use of multiple bearers. Due for example to cell loading, it may happen that a target cell cannot support the combination of bearer services provided by the current serving cell. Means shall be provided for the application(s) to indicate minimum acceptable QoS for services continuation after handover. Although all UMTS bearer services may not be handed over, the handover to another UMTS cell should not be precluded.

6 Requirements for Handover from UMTS to GSM

6.1 Operational Requirements

6.1.2 GSM bands

The standard shall support handover to any combination of GSM bands supported by the GSM standards.

6.2 Performance Requirements

The following service principles apply to performance requirements:

- when the UE performs handover to GSM then the service requirements of GSM that relate to handover between different cells in different location areas is taken as the benchmark. It is not the intention to setmore stringent service requirements for UMTS to GSM handover than are already commonly accepted for handover within GSM.

6.2.1 Detection Time of Potential GSM Handover Candidates

Means shall be defined which allow the UE to achieve as good detection time performance as the GSM benchmark: ie to behave in such a way as to detect potential GSM handover candidates as quickly as a GSM mobile performing an intra GSM handover is required to do so.

6.2.2 Number of GSM handover candidates to detect

Means shall be available which allow UE to detect an equal number of GSM handover candidates relative to the GSM benchmark, ie to behave in such a way as to detect as many potential GSM handover candidates as a GSM mobile performing an intra GSM handover is required to do so.

6.2.3 Probability of Connection Loss

The service requirement is that it should be possible to hand over to GSM from UMTS with a probability of connection loss that fulfils the corresponding service requirement for intra GSM handover.

~~6.2.4 Temporary degradation of service caused by handover~~

~~The service requirement is that means should be defined so that it is possible to construct networks comprising GSM and UTRA radio resources in such a way that the duration and extent of any degradation of service during handover from UMTS to GSM is no worse than during intra GSM handover.~~