**3GPP TSG-CN Meeting #23** **NP-040017**
**10th - 12th March 2004. Phoenix, USA.**

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# 3GPP TSG-CN1 Meeting #33 Tdoc N1-040471
# Atlanta, Georgia, USA 16 – 20 February 2004

**Title:** LS on Technical Report on Mobility between H.323 Multimedia Systems and GPRS/IMT2000 Networks
**Response to:** COM 16 – LS 15 – E (N1-040349)
**Release:** ---
**Work Item:** ---

**Source:** CN1
**To:** CN, SA
**Cc:** ---

**Contact Person:**
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**Attachments:** COM 16 – LS 15 – E (N1-040349)

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**1. Overall Description:**

3GPP WG CN1 has received the attached liaison statement from ITU-T SG16, and would like to suggest the following general comments to be used in the response to this liaison statement.

As these comments are of a general nature, rather than of a specific technical nature, 3GPP WG CN1 considered that it was appropriate that these comments were reviewed and forwarded to ITU-T SG16 by the 3GPP plenaries, rather than being sent by 3GPP WG CN1 direct to ITU-T SG16.

GPRS provides a generally applicable mechanism of transferring IP packets between two UE, or between an UE and some centralized server. As such it can be generally applicable to the transport of any protocol that can be supported using IP, including H.323 protocols.

Although 3GPP specifies the IM CN subsystem for the support of SIP protocols carried over GPRS, 3GPP does not preclude the transport of SIP over GPRS to other SIP servers not using the IM CN subsystem. In the same manner it does not preclude the transport of H.323 protocols over GPRS to H.323 servers.

However, while the specifications for GPRS support of the transport of IP multimedia to the IM CN subsystem have been extensively checked and validated, transport of SIP to other servers using GPRS has not been likewise treated by 3GPP. Similarly 3GPP do not envisage conducting any such exercise for H.323 protocols. 3GPP would also not envisage making any specific changes to GPRS to cover these applications, although would obviously consider changes to GPRS that were considered to be generally useful enhancements, or flaws in the protocol. Note that GPRS has been specified since Release 97, and any enhancements would only be considered in Release 7 (equipment implementing these enhancements would therefore coexist in the field with six other GPRS supporting releases which did not support such enhancements). 3GPP does consider all proposals that meet its contribution rules.

It should also be noted that 3GPP is the appropriate point for specifying requirements on GPRS equipment. This does not preclude the specification of additional functionality which might be incorporated in GPRS equipment outside of 3GPP, however this additional functionality must not change the GPRS functionality as specified within 3GPP.

**2. Actions:**

**To CN, SA group.**

**ACTION:** 3GPP WG CN1 asks CN and SA group to consider the above text, and send an appropriate response to ITU-T SG 16.

**3. Date of Next TSG-CN1 Meetings:**

| | | |
|---|---|---|
| CN1_34 | 10th – 14th May 2004 | Zagreb, Croatia (EF3) |
| CN1_35 | 16th – 20th August 2004 | Sophia Antipolis, France (ETSI) |

**3GPP TSG-CN1 Meeting #33** **Tdoc N1-040349**
**Atlanta, Georgia, USA 16 – 20 February 2004**

**Agenda item:** 3

**Document for:** LS IN

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INTERNATIONAL TELECOMMUNICATION UNION

**TELECOMMUNICATION STANDARDIZATION SECTOR**

STUDY PERIOD 2001-2004

**COM 16 – LS 15 – E**

**English only**

**Original: English**

**Question(s):** 5/16 Geneva, 20-30 January 2004

**TEMPORARY DOCUMENT**
**(Ref.: TD 90/PLEN)**

**Source:** ITU-T SG 16

**Title:** LS on Technical Report on Mobility between H.323 Multimedia Systems and GPRS/IMT2000 Networks

**LIAISON STATEMENT**

**To:** 3GPP TSG CN WG1, WG3/ 3GPP TSG SA WG1, WG2

**Approval:** Agreed to at SG 16 meeting (Geneva, 20-30 January 2004)

**For:** Action

**Deadline:** 01 May 2004

**Contact:** Dr. Leo Lehmann Tel: +41 32 327 5752
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Switzerland Email: Leo.Lehmann@bakom.admin.ch

ITU-T SG 16 Q.5/16 would like to present for your information a report on how to use the H.323 mobility management protocol in combination with GPRS/IMT2000 mobility management procedures (see Annex A). Public Mobile Networks, which offers GPRS, EGPRS and/or UMTS services, could be extended by the H.323 environment to allow a combined GPRS/UMTS and H.323 Mobility Handling. H.323 users with an appropriate handset and an additional PLMN subscription would be able to conveniently move between H.323-based environments and mobile networks, as well as between public and private H.323 networks. To minimise the impact to the given GPRS/UMTS specification, it will be proposed to realize the H.323 environment in the GPRS user-plane (e.g. as an overlay to GPRS).

ITU-T SG16 Q5/16 would like 3GPP TSG CN and TSG SA to:

- take notice of the document;
- give a feedback to Q5/16 about the document;

- indicate to Q5/16 whether this proposal could be integrated in principal into the GPRS/UMTS standard.

ITU-T Study Group16 Q5 appreciates your contributions and is looking forward to further cooperation.

**Attached:** Technical Report on Mobility between H.323 multimedia systems and GPRS/IMT2000 networks

# Annex A:
# Technical Report on Mobility between H.323 multimedia systems and GPRS/IMT2000 networks

**Contents**

## 1 Scope

The scope of this report is to identify the Mobility Management Requirements and the system Architecture to allow the roaming of mobile users between H.323 systems and mobile networks which support GPRS[1] service. In detail this report tries to:

- point out the necessary extensions in GPRS networks to allow interoperability with H.323 systems
- analyse the possible reuse of existing specifications from ITU-T and 3GPP
- describe the necessary roaming procedures
- Focus on the issues on Global MM rather than Local MM.

Following [13], the presented document contains an investigation on using H.323 mobility management protocol in combination with GSM/UMTS mobility management in the packet domain of GPRS/UMTS Core Networks. The system architecture is described and necessary steps regarding the migration from the current GPRS architecture are shown.

This report will focus on the possibilities how one can offer H.323 functionality as an overlay to GPRS. The proposed solutions need to be balanced between the requirement to minimise the impact on the current GPRS standards and the requirements generated by further development of using H.323 within a GPRS system in an efficient way. Possible changes with respect to the GPRS standard have to be forwarded to 3GPP-SG SA-WG2.

## 2 References

The following ITU-T Recommendations and other references contain provisions, which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation

[1] ITU-T draft Technical Report (Q.2/SSG) Q.trmmr (working in progress), Technical Report on Mobility Management Requirements for Systems beyond IMT-2000

[2] ITU-T draft Recommendation Y.NGN-GRM (working in progress), Generic Reference Model for Next Generation Network

[3] ITU-T Technical Report Q.TRMMR Technical Report on Mobility Management Requirements for Systems Beyond IMT-2000

[5] ITU-T Recommendation G.805 (2000), Generic Functional Architecture of Transport Networks

[6] ITU-T Recommendation Q.1741.3 (2003), IMT-2000 References to Release 5 of GSM evolved UMTS Core Network

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[1] Implicitly this shall also include EDGE

[8] ETSI; TS 123.002 v.5.9.0 (2003): Network Architecture (Release 5)

[9] 3GPP TR 21.902 (2003), Evolution of 3GPP System;

[10] ITU-T Recommendation H.323 (2000), *Packet-based multimedia communications systems*.

[11] ITU-T Recommendation H.510 (2002), *Mobility for H.323 multimedia systems and services*

[12] ITU-T Recommendation H.225.0 Annex G (1999), *Communication between administrative domains*.

[13] 3GPP TR 23.923 Combined GSM and Mobile IP Mobility Handling

## 3 Definitions

**Mobility Management:**

The set of functions used to manage a mobile user accessing a network other than that user's home network. These functions include communication with the home network for purposes of authentication, authorization, location updating and download of user information.

**Global Mobility Management:**

Global MM addresses the issues on NNI mobility management between different ANs (including between different operators). It is crucially required that the Global MM should be performed independently of the underlying access technology of AN. Global MM is referred to the mobility in a wide area. This includes the support of the mobility and the procedures associated to the address register, needed when a mobile host moves from one to other domain.

Global MM may address the “nomadic” mobility between different ANs, which may include the location management and AAA functionality. The Global MM may not provide the seamless mobility.

**Local Mobility Management**

The Local MM addresses the mobility management issues within an AN (which is concerned with a single operator and a single radio technology). The local MM may depend on the specific radio link technology of the AN. Local MM is referred to the mobility in a reduced area. Normally, it is concerned with the mobility inside an IP domain, with emphasis in the support of active nodes by handovers, although it may include procedures related to passive nodes. With local MM protocols, the mobility signalling remains inside the access network.

The Local MM may support the “seamless mobility” as well as nomadic mobility. It will address seamless handover and location registrations/updates for the mobile terminals within the AN.

**Terminal Mobility:**

The ability of a terminal to access telecommunication services from different locations and while in motion

**User Mobility:**

The ability of a user to access telecommunication services at any terminal on the basis of a personal identifier, and the capability of the network to provide those services delineated in the user's service profile.

**Service Mobility:**

The ability of a user to use the particular (subscribed) service irrespective of his current location.

**Roaming**

Action whereby users are able to access services while outside of their subscribed home network.

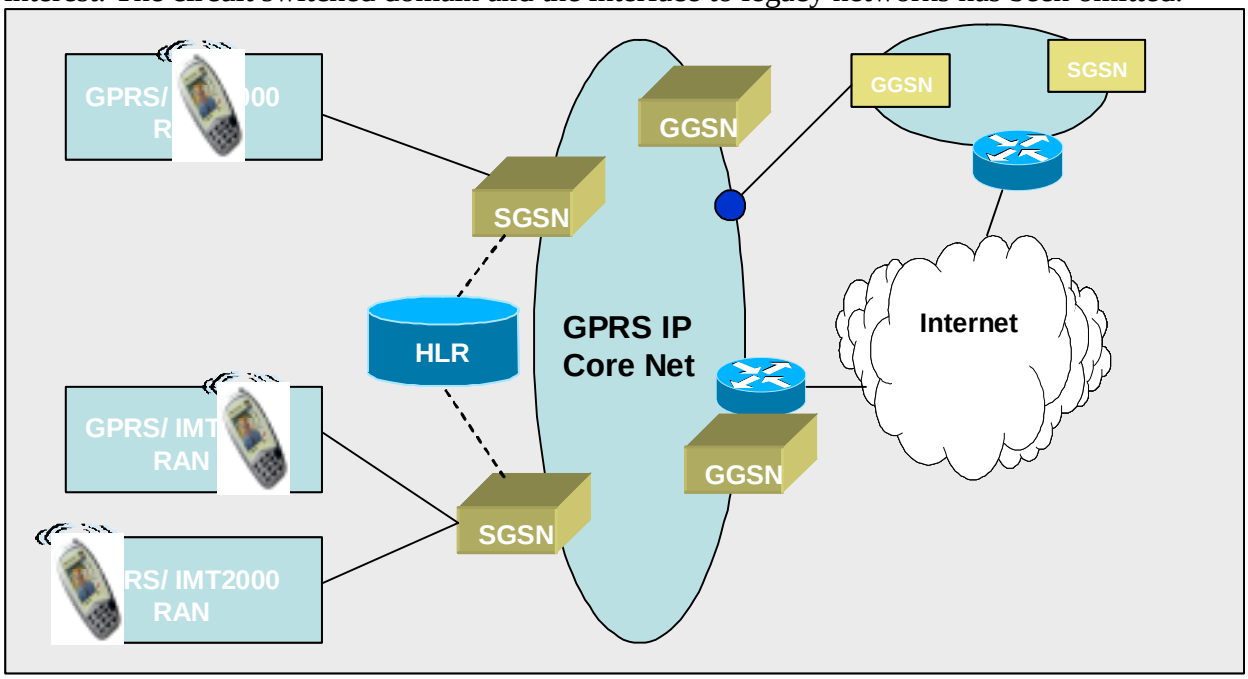
## 4 Abbreviations

| | |
|---|---|
| 3GPP | 3rd Generation Partnership Project |
| AAA | Authentication, Authorization and Accounting |
| AN | Access Network |
| AuF | Authentication Function |
| APN | Access Point Name |
| BE | Border Element |
| BG | Border Gateway |
| BS | Base Station |
| CGF | Charging Gateway Functionality |
| CN | Core Network(s) |
| CS | Circuit Switched |
| GERAN | GSM EDGE Radio Access Network |
| GGSN | Gateway GPRS Support Node |
| GK | Gate Keeper |
| GMSC | Gateway Mobile Station Controller |
| GPRS | General Packet Radio Service |
| GSM | Global System for Mobile Communications |
| GW | Gateway |
| HA | Home Agent |
| HLR | Home Location Register |
| HLF | Home Location Function |

| | |
|---|---|
| IMT2K | IMT-2000 |
| IMSI | International Mobile Subscriber Identity |
| IMT-2000 | International Mobile Telecommunications-2000 |
| IP | Internet Protocol |
| ISDN | Integrated Services Digital Network |
| ISP | Internet Service Provider |
| IWF | Interworking Function |
| MAP | Mobile Application Part |
| MM | Mobility Management |
| MN | Mobile Node |
| MMP | Mobility Management Protocol |
| MMR | Mobility Management Requirements |
| MSC | Mobile Switching Center |
| MSID | Mobile Station Identifier |
| MT | Mobile Terminal |
| NAI | Networks Access Identifier |
| NNI | Network-to-Network Interface |
| PDN | Packet Data Network |
| PDP | Packet Data Protocol, e.g. IP |
| PLMN | Public Land Mobile Network |
| QoS | Quality of Service |
| RA | Routing Area |
| RAN | Radio Access Network |
| RFC | Request for Comments |
| RRC | Radio Resource Control |
| SGSN | Serving GPRS Support Node |
| SIM | Subscriber Identity Module |
| SMS | Short Message Service |
| TR | Technical Report |
| UMTS | Universal Mobile Telecommunications System |
| UTRAN | UMTS Terrestrial Radio Access Network |
| VLF | Visited Location Function |
| VoIP | Voice over IP |
| WLAN | Wireless LAN |
| WWW | World Wide Web |

## 6 Current Status of GPRS /IMT2000 Mobility

In Q.1741.3 the basic 3GPP network architecture is presented, including the interfaces and network elements required for Mobility Management. An overview of a Public Land Mobile Network (PLMN) supporting GPRS is shown in the picture below. Herby only the packet domain is of interest. The circuit switched domain and the interface to legacy networks has been omitted.




As already described in [1] TS 23.060 defines the stage 2 service description for the General Packet Radio Service (GPRS) which is a packet bearer service and a main part of the packet domain. ITU-T Recommendation I.130 describes a three-stage method for characterisation of telecommunication services

A common packet domain Core Network (GPRS IP Core Net) is used for both Radio Access Networks (RAN) GPRS RAN and IMT2000 RAN (note: the exact definitions for GPRS RAN and IMT 2000 RAN according 3GPP are GERAN and UTRAN). This common Core Network provides together with these RANs GPRS services. It is designed to support several quality of service levels to allow efficient transfer of non real-time traffic (e.g. intermittent and bursty data transfers, occasional transmission of large volumes of data) and real-time traffic.

The packet domain uses packet-mode techniques to transfer high-speed and low-speed data and signalling in an efficient manner. The packet domain optimises the use of network and radio resources. Applications based on standard data protocols and SMS are supported, and interworking is defined with IP networks.

The Serving GPRS Support Node (SGSN) keeps track of the location of an individual MT and performs security functions and access control. It performs protocol conversion between the IP core network and the protocols used in the GERAN and UTRAN. It also performs collection of charging data and traffic statistics. The SGSN is connected to the GERAN base station subsystem system (BSS) through the Gb or Iu interface (3GPP Rel 6) and/or to the UTRAN through the Iu interface.

The Gateway GPRS Support Node (GGSN) provides interworking with packet data networks (Gi interface), and is connected with SGSNs via an IP-based packet domain PLMN backbone network. The interface between SGSN and GGSN is called Gn. A further task of the GGSN is also the allocation of dynamic or static IP addresses to a GPRS MT either by itself or with the support of a DHCP or a RADIUS service.

SGSN and GGSN can also exchange data packets with GSNs of packet domains of other PLMN via the Gp interface. This allows a MT, which is visiting another GPRS network to use the GGSN of its home network.

The home location register (HLR) contains subscriber information. Signalling between SGSN and HLR via the Gr interface is supported by the MAP protocol (Mobile Application Part). The MAP protocol is defined in 3GPP TS 29.002 (earlier GSM 09.02 Rel98).

The Charging Gateway Functionality (CGF) collects charging records from SGSNs and GGSNs...

When a MT wants to connect to a GPRS network in order to use GPRS services, it performs first a GPRS attach to make its presence known to the network. This makes the MT available for SMS over GPRS, paging via the SGSN, and notification of incoming packet data.

So far, a MT is not able to send or to receive IP packets. In order to send and receive packet data by means of GPRS services, the MT has to activate the Packet Data Protocol context (PDP Context) that it wants to use. This operation makes the MT known in the corresponding GGSN, and interworking with data networks can commence.

User data are transferred transparently between the MT and the packet data networks with a method known as encapsulation and tunnelling: data packets are equipped with GPRS-specific protocol information and transferred between the MT and the GGSN. This transparent transfer method lessens the requirement for the PLMN to interpret external data protocols, and it enables easy introduction of additional interworking protocols in the future.

## 7 System Architecture

### General Design Criteria

The introduction of H.323 functionality into a GPRS/IMT2000 packet domain shall be done with a minimum of changes on the existing GPRS network structure. This document deals with mobility aspects above the transport layer. The current GPRS structure shall be kept and handles the mobility within the PLMN, while the H.323 extension is implemented as an overlay and offers user mobility in the context of H.323 between other systems (e.g. Local Networks). Seamless handover procedures are not covered so far.

### Basic Assumptions

The following basic assumptions were made:

- GK and VLF as defined in H.510, should be located in or at the GGSN
- The registration and authentication processes of GSM/GPRS/UMTS and H.323 should be independent to facilitate roaming between access networks based on different technologies.
- When defining standards for how to deploy H.323 as an overlay to GPRS/UMTS the full H.323 scenario should be kept in mind to avoid unnecessary future changes.

## Functional Elements

### GGSN-GK/VLF/BE

The GGSN-GK/VLF/BE is a GGSN enhanced with the Gatekeeper and VLF functionality, as defined in H.510. However, as a GPRS/IMT2000 release is finalised, the specific standards that should be taken into account may be specified by 3GPP/ETSI for easier interoperability between operators. The GGSN-GK/VLF/BE is considered to be one integrated node. Not all GGSNs may have GK/VLF functionality. One GK/VLF in a network is sufficient for offering H.323 service, however for capacity, efficiency (routing) and domain administration reasons it may be desirable, to have more than one. The Mobile Terminal must be able to find a GGSN, which offers GK/VLF functionality. This means that the Mobile Terminal must request a PDP context to be set up with a GGSN that offers GK/VLF functionality. The solution is to define an appropriate Access Point Name (APN) for this issue.

### HLF/AuF/BE

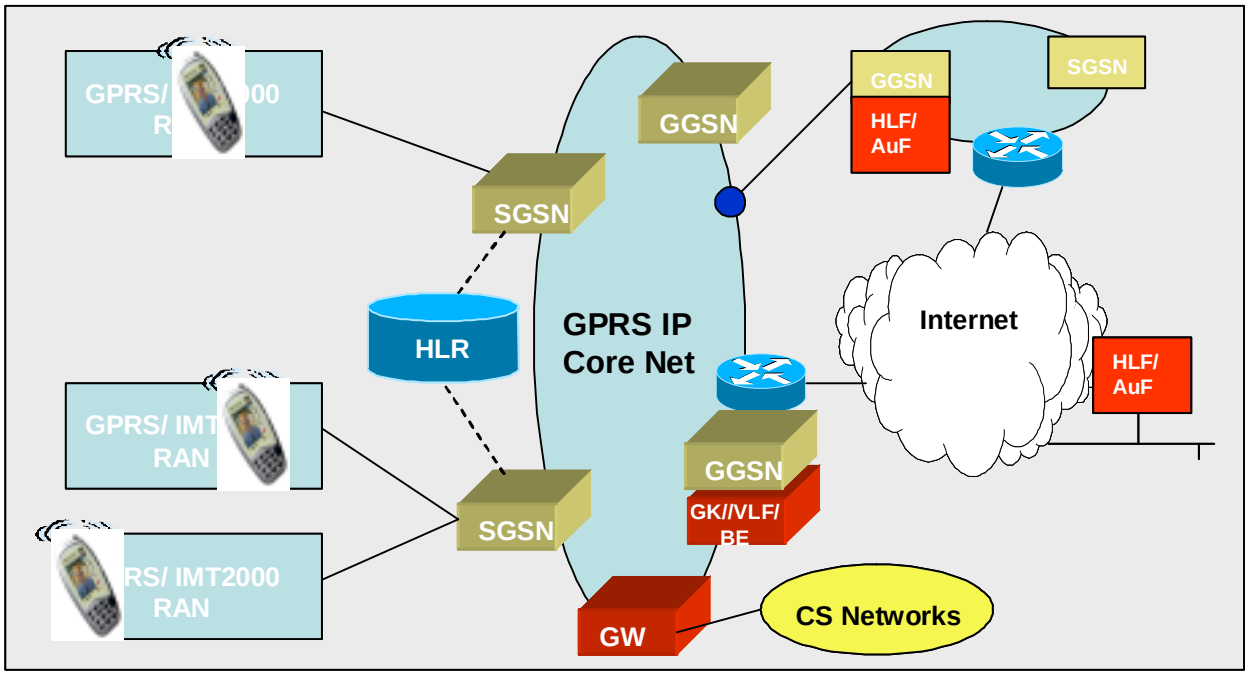
Other then the GK/VLF functionality which has to be implemented at least once within the network of a GPRS/IMT2000 operator, the HLF/AuF functions may be in a different network. The following are examples of HLF/AuF placements:

- HLF/AuF can be placed in a cooperate network if appropriate agreements exist
- HLF/AuF can be placed in the network of the home provider, which is not a GPRS/IMT2000 network provided appropriate agreements
- If the user has subscribed to H.323 service with his home GPRS/IMT2000 operator or with the operator he visits, then the HLF/AuF is in the network of the appropriate GPRS/IMT2000 operator.

### GW

An H.323 Gateway (GW) is added to the GPRS IP Core Net, to provide real-time, two-way communications between H.323 Terminals on the packet based network and other ITU Terminals on a switched circuit network.

The picture below summarizes the network structure. The relevant elements which provide H.323 roaming functionality are highlighted by red colour.



**Home Domain**

The home domain is the administrative domain, which is related by subscription to the mobile user (where the mobile node has its "H.323" subscription). The home domain contains user-specific data including location, authentication, and service profile information related to the mobile user. It may be a PLMN, but also a corporate network, or another provider. The HLF/AuF [11] that the mobile node uses is located in the home domain. The use of H.323 authentication functionality will not require any changes to GPRS specific standards, as it is external to GPRS/IMT2000 networks. It shall be noted that the H.323 service may be offered by a different operator than the home GPRS/IMT2000 operator.

**Visited Domain**

The administrative domain that is not the home domain and that is serving a mobile user. The administrative domain hosts a VLF.

**Terminal aspects**

The mobile terminals need to be enhanced with H.323 functionality. Any interaction, which occurs between the “H.323 layer “and the "GPRS layer", needs to be identified and defined. The above activity should be considered in a phased manner: In a first phase the standards could be evolved to make this applications available on existing customer devices only. In the subsequent phases the standards on the integrated mobile devices & terminals may be evolved in liaison with the other Study Groups or Standardisation Bodies:

## 8 Roaming Schemes

Depending on the capabilities of a visited network, two roaming schemes can be identified; GPRS roaming and H.323 roaming.

**GPRS roaming**

By GPRS roaming all roaming activities are understood, which take place because of a change between radio cells or routing areas of a GPRS network. These activities are controlled by SGSN in cooperation with a HLR and fully transparent for the H.323 layer. It should be noted that a mobile terminal can still remain in the same visited H.323 domain even if it changes several times the radio cell or the routing area of an underlying GPRS network (the H.323 terminal does not change its network point of attachment). It is assumed that the MT stays with the same GGSN for the duration of the GPRS session.

**H.323 roaming**

H.323 roaming describes these procedures which provide the mobility management functions in H.323 systems (e.g. Location updating procedures, Call related procedures). Due to the fact, that H.323 mobility is introduced into mobile networks as an overlay to the GPRS/IMT2000 layer (e.g. H.323 is realized at the user plane) all procedures like defined in H.510 can be reused mainly unchanged. The basic process sequence how the MT can be connected to a GGSN with GK/VLF functionality and how to register with its H.323 HLF with a minimum of enhancements to the existing GPRS attach and PDP context activation messages for location update can be described as follows. GPRS specific parts like the setup of the PPP connection and the GPRS attach procedure have been omitted for clarity. Furthermore for simplicity only location changes between different visited domains or between home domain and visited domain are considered.

- GPRS PDP Context Request

  The MT sends the "Activate PDP Context Request" to the SGSN. The message includes the Access Point Name (APN) which points at a requested GGSN. The SGSN will base the selection of the GGSN on the APN that is given by the MT. The APN specify any GGSN with a specific service. In the given case a GGSN offering GK/VLF functionality has to be requested. The format of the APN is specified in []. A default mechanism is also needed to use a GGSN in the MT's home network if the visited SGSN does not support the requested service. Finally, an agreement between operators is needed on the possible APNs.

  The SGSN requests the selected GGSN to set up a PDP Context for the ME.

- GPRS PDP Context Response

  A Create PDP Context Response is sent from the GGSN-GK/VLF to the SGSN. This message contains among other information a dynamic IP address, assigned by the GGSN to the MT for the duration of the GPRS session. The SGSN forwards these information via an “activate PDP Context accept” message to the MT.

- Gatekeeper Address Advertisement

  As the GGSN-GK/VLF is aware of that a new MT has entered the network, it will send a dedicated Gatekeeper Address Advertisement message, which contains the necessary address information for the serving gatekeeper discovery, to the MT. The Gatekeeper Address Advertisement should be sent in the user plane to avoid defining new messages in GPRS/UMTS.

  After the exchange of the Gatekeeper Address the location update procedure follows the processes, which are already specified in H.510.

- H.323 Gatekeeper Discovery

  Using the Address, obtained from the Gatekeeper Address Advertisement message the MT sends a GRQ message to the GGSN-GK/HLF. The GRQ message shall include all the user identities (including the primary user identity) that can be used to identify the user. After successful authentication the GGSN-GK/VLF returns GCF to the H.323 MT to indicate that it will accept registration.

- H.323 Registration

  The H.323 MT sends a registration request (RRQ) to the (already known) gatekeeper GGSN-GK/VLF. If the H.323 MT and the user using it are already registered, the gatekeeper only updates the registration. If the GGSN-GK/VLF notices that the user is not already registered the GGSN-GH/VLF deduces the address of the user's HLF/BE from the primary user identity and sends the DescriptorUpdate message to the HLF/BE. The HLF/BE stores the address of the GGSN-GK/VLF as the location information about the user indicated by the primary user identity and sends a DescriptorUpdateAck message as a response to the GGSN-GK/VLF. The GGSN-GK/VLF stores all obtained information (user identities, address of the user's HLF/BE, address of serving SGSN) send an RCF message to the H.323 MT indicating a successful location updating.

  If previous location information about the user was present in the HLF/BE, the HLF/BE has to start a process which discards all user information which is kept in the “old” VLF (note: the old VLF is not necessary a GGSN-GK/VLF, it can be also a VLF/BE of a H.323 system which is not realized as an overlay to a PRS/IMT2000 network). The HLF/BE shall send a DescriptorUpdate message to the old VLF/BE, which indicates, that all location information of the specified user has to be removed. After all information is discarded (if necessary also the information handled by the gatekeeper within the old domain), the VLF/BE shall respond to the HLF/BE with a DescriptorUpdateAck message.

## 9 Call Establishment mobility management procedures

These procedures are realised within the GPRS user plain and fully transparent for the GPRS network. All procedures follow the specifications, given by H.225.0 in general and by H.510 with respect to H.323 mobility

## 10 Security

Remains for further study

## 11 AAA

Remains for further study