TR 23.821 V0.~~1~~2.0 (2000-~~01~~03)

Technical Report

3rd Generation Partnership Project (3GPP); Technical Specification Group Services and System Aspects; Architecture Principles for Release 2000 (3G TR 23.821 version 0.~~1~~2.0)

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Contents

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Foreword

This Technical Report has been produced by the 3GPP.

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of this TR, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version 3.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 Indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the specification.

1 Scope

The scope of this Technical Report is to list architectural requirements, features, functions and solutions of UMTS inside the scope of UMTS Release 00. These are working assumptions agreed by TSG SA WG2. The TR focuses on

- new/modified functionality as compared to Release 99
- technical description of the features, functions and solutions of R00.

It is expected that this TR will act as a basis for the detailed Stage 2 specification work.

This TR has been created to ease the development of R00 work prior to the finalization of the R99 specifications. In conjunction with when R99 is finalized, work on the TR will cease and the relevant CRs will be produced to incorporate the contents of this TR within the R00 version of the specifications."

2 References

[Editor's note: Chapter to be completed]

The following documents contain provisions, which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1]

[2]

3 Definitions, symbols and abbreviations

[Editor's note: To be completed]

[Note: The following section is intended to be included in TS 23.002 (proposed chapter, if any):

- 3.1 (Chapter 3)]

3.1 Definitions

~~For the purposes of the present document, the [following] terms and definitions [given in ... and the following] apply.~~**CS Services**: Telecommunication services provided to "GSM/ISDN" clients via 24.008 CC.

PS Connectivity Services: IP connectivity service provided to IP clients via 24.008 SM.

IM Services: IP Multimedia Services that require support on the Call Control level carried on top of the PS connectivity services (this may include an equivalent set of services to the relevant subset of CS Services).

PS services: The superset of IM services and PS connectivity Services.

CS CN domain: comprises all core network elements for provision of CS services.

PS CN domain: comprises all core network elements for provision of PS connectivity services.

IM CN subsystem: (IP Multimedia CN subsystem) comprises all CN elements for provision of IM services

Service Subsystem: Comprises all elements providing capabilities to support operator specific services (e.g. IN and OSA)

External Applications: Applications on an external Host. Examples of such applications:

- PS connectivity external applications access the network via the PS connectivity services (e.g. Email server on a corporate LAN)
- Service Control External Applications access the network via the capabilities of the IM CN Subsystem (e.g text to speech conversion via web browsing) or the CS CN Domain (e.g CS speech freephone application).

User Equipment is a device allowing a user access to network services. For the purpose of 3GPP specifications the interface between the UE and the network is the radio interface. A User Equipment can be subdivided into a number of domains, the domains being separated by reference points. Currently defined domains are the USIM and ME Domains. The ME Domain can further be subdivided into several components showing the connectivity between multiple functional groups. These groups can be implemented in one or more hardware devices. An example of such a connectivity is the TE – MT interface.

The **Radio Access Network domain** consists of the physical entities, which manage the resources of the radio access network, and provides the user with a mechanism to access the core network. The Access Network Domain comprises roughly the functions specific to the access technology.

3.2 Symbols

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

3.3 Abbreviations

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

4 Introduction

5 Reference Architecture

[Editor's note: this chapter discusses overall reference architecture issues which are not covered in other chapters]

[Note: The following sections are intended to be included in TS 23.002 (proposed chapter, if any):

- Section 5.2 (Chapter 5)
- Section 5.3 (Chapter 4)
- Section 5.4 (Chapter 6. Alternatively, a chapter on Description of Reference Points may be created.)]

[Note: In which document the following section should be included is ffs:

- Section 5.1]

5.1 Architecture Principles

The following principles apply to the GSM/UMTS Reference Architecture for Release 00 and future releases.

Transport Independence (to control heterogeneous bearer mechanisms): The GSM/UMTS CN reference architecture shall be independent of the underlying transport mechanism (e.g. STM, ATM or IP). F~~f~~urther more the operators shall have the freedom to utilise a single or any combination of transport technologies.

Standardised alternatives for transport mechanisms: The alternatives for the signalling transport (e.g. SS7, SIGTRAN) for the service control, call control and bearer control protocols as well as the alternatives for the user plane transport shall be standardised for the relevant transport mechanisms.

Decomposition of network functions: The GSM/UMTS reference architecture all-IP option shall be defined in terms of separate functions and clear interfaces such that it is possible to separate transport from signaling. [With the objective of the separation of call/session, mobility and service control. This topic needs further study.] Thus operators shall have the freedom to provision, dimension and upgrade these network functions in a modular fashion. This modularity shall give operators flexibility and scaleability of network implementations.

Flexible traffic processing function placement: The GSM/UMTS reference architecture shall allow operators to place the traffic processing function in the most practical, cost-effective part of the network

Use of internet protocols: The GSM/UMTS reference architecture shall use, as appropriate, existing/evolving internet protocols e.g. to support multi-media services, interoperability with other next generation fixed or mobile networks (NGNs), and media gateway controllers.

Support for a variety of mobile equipment: The GSM/UMTS reference architecture shall support a range of different terminal types (simple speech only terminals, multi-media terminals, PDAs, Laptop, etc.). One particular aspect is that not all terminals may be able to support end-to-end IP capabilities.

Independence of access technology: The GSM/UMTS reference architecture shall be designed to ensure that a common core network can be used with multiple wireless and wireline access technologies (e.g. xDSL, Cable, Wireless LAN, Digital Broadcast, all IMT2000 radio access technologies).

Support for roaming onto other 2G and 3G mobile networks: The GSM/UMTS reference architecture shall be designed to facilitate roaming between different network types.

Support of Service Requirements: The GSM/UMTS reference architecture shall include mechanisms for operators and third-parties to rapidly develop and provide services and for users to customise their service profile.

Support of regulatory requirements: The GSM/UMTS reference architecture shall include features to support regulatory requirements such as legal intercept, number portability, other regional requirements. To all terminal types and communication type (CS and PS) as appropriate.

Insertion of a new IP multimedia CN Subsystem with standard interface(s) with the service environment at home that can also be used in roaming cases.

Separation between Bearer level, Call control level and Service level:

- **Use of different access technology to connect the "IP multimedia CN Subsystem"**: The IP multimedia domain is connected to the bearer network at a fixed reference point (anchor point) thus hiding the micro mobility of the UE (it does not hide roaming). This reference point shall be independent from the access technology that can be GPRS, UMTS PS or any relevant wireless, wired-line access technology as long as they provide transport of user packets up to this reference point and as they hide micro-mobility of the UE. As a consequence, the behaviour of the multimedia call control server (CSCF) can be the same whatever the access technology (radio or wired-line). Multimedia call control/mobility management shall not be aware of the access technology: the multimedia Call Control (CSCF) does not handle notions such as Hand-Over,, RA, …

- **The access to the IP Multimedia CN Subsystem is supported by the PS domain at the Gi interface**: The PS domain provides bearers that are used by the UE for its signalling and provides user plane exchanges with multimedia (H323/SIP) call control servers (CSCF) and gateways. These servers / gateways are located behind the GGSN acting as an anchor point for the mobility which means that when the terminal is moving, the call control server is not changed as long as the UE is registered on this server. The bearer network is made up of radio access (e.g. UTRAN, GERAN,…) and of a backbone (SGSN and GGSN). [This principle

needs to be revisited after contributions on the subject of the interface from the IM CN SS to the access technology]

The specifications need to support both circuit-mode and packet-mode domains

- Considering the traffic mix resulting from the set of 3G services and the need for flexible evolution paths, it is necessary to have separate circuit switched domain and packet switched domain.

- Each domain will handle its own signalling traffic, switching and routing.

Keep network functions separate from radio access functions

- The same network should support a variety of access choices, and access technologies may evolve further. Therefore network functions such as call control, service control, etc. should remain separate from access functions and ideally should be independent of choice of access. This implies that the same CN should be able to interface with a variety of RANs.

Separate functions that are likely to evolve independently. The following bullets in the list are examples of major functions that may need to evolve independently. Further discussions are needed to establish an agreed list.

- Bearer control in both access and network

- Multimedia control for multimedia sessions

- Switching and routing

- PS Mobility management, session control and access security functions

- CS Call Control, Mobility Management and access security functions

- Security functions

- Control for and the traffic processing e.g. voice

- location-based service functionality

- Service control:

  - service capabilities, VHE for roamers
  - Mail services control
  - location-based services
  - Service features and applications

Break down mobility management into a set of independent functions. Mobility management will be a complex function in R'00. By breaking it down into independent components it will become more manageable. The list below is a suggested breakdown:

- Intersystem Mobility: Location of the terminal in terms of the address at which the terminal can be located. The terminal may be within any wireless or fixed network.

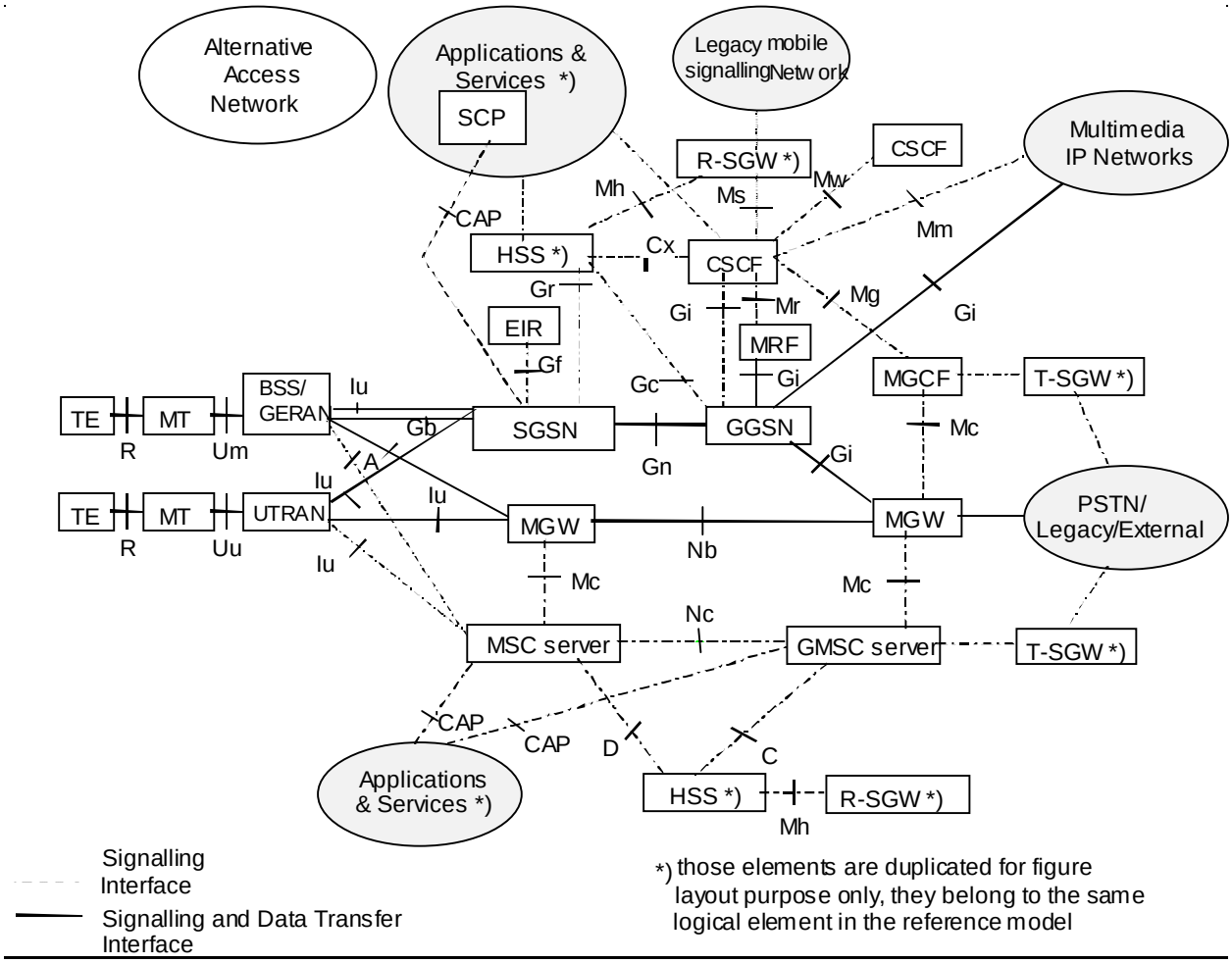
- Macro Mobility : Location management and management of the terminal associated changes in RA/LA.

- Micro mobility: Location management and management of the terminal associated with changes within RA/LA.

The PS CN domain provides the PS Connectivity services to IP terminals. The PS domain maintains the service while the terminal moves and hides these moves to the other subsystems (i.e. IP multimedia CN Subsystem) using its bearer level service.

5.2 Reference Architecture Overview

The full view of Release 2000 architecture is provided in Figure 5-1.


Alternative Access Network
Applications & Services *)
SCP
Legacy mobile signalling Network
R-SGW *)
CSCF
Multimedia IP Networks
Mh
Ms
Mw
Mm
CAP
HSS *)
Cx
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EIR
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T-SGW *)
TE
MT
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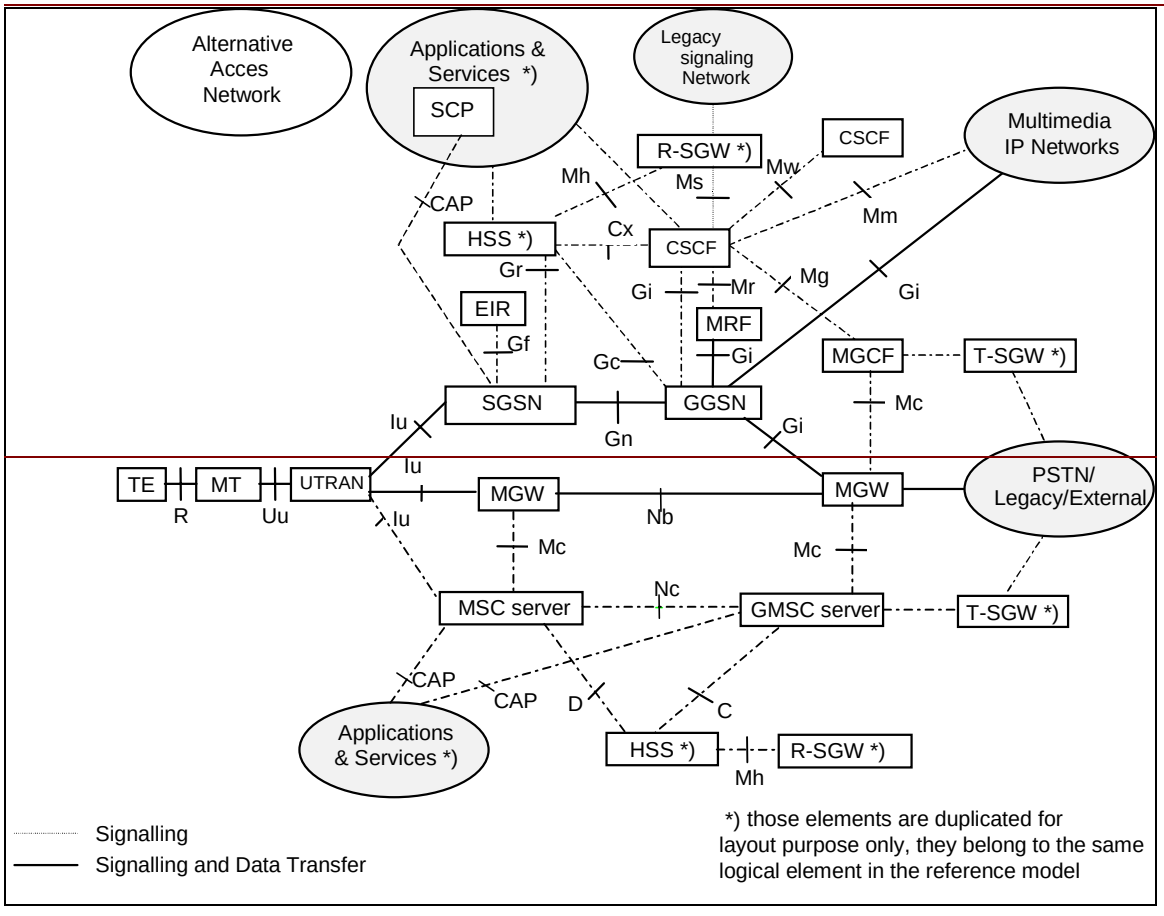
MSC server
GMSC server
T-SGW *)
CAP
CAP
D
C
Applications & Services *)
HSS *)
R-SGW *)
Mh
Signalling Interface
Signalling and Data Transfer Interface
*) those elements are duplicated for figure layout purpose only, they belong to the same logical element in the reference model


Alternative Acces Network
Applications & Services *)
SCP
Legacy signaling Network
R-SGW *)
CSCF
Multimedia IP Networks
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MGCF
T-SGW *)
SGSN
GGSN
Mc
Iu
Gn
Gi
TE
MT
UTRAN
Iu
MGW
MGW
PSTN/ Legacy/External
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Nb
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MSC server
GMSC server
T-SGW *)
CAP
CAP
D
C
Applications & Services *)
HSS *)
R-SGW *)
Mh
Signalling
Signalling and Data Transfer
*) those elements are duplicated for layout purpose only, they belong to the same logical element in the reference model

Figure 5-1: Reference Architecture for Release 2000

~~Note~~NOTE 1: ~~-~~A (G)MSC Server and associated MGW can be implemented as a single node as with the (G)MSC in R99.

NOTE 2: The following interfaces are also part of the R00 reference architecture, but are not shown for layout purposes only:

- between MSC's (including MSC server / MGW), E interface;
- between VLR's, G interface;
- between SGSN's, Gn interface;
- between CSCF and UE, Gm interface;
- between MSC (or MSC server) and SGSN, Gs interface (optional).

[Editor's note: The final approval of Figure 5-1 and related text is dependent on e.g.:

- *The specification of R00 requirements.*
- *The relationship between different call control models (H.323/H.324 etc.) needs to be clarified.*
- *Clarification of which interfaces/reference points that require standardization and which standardized protocols (from which standard body) to use, including those that 3GPP still has work on.*
- *~~-~~Addition of potentially missing reference points, e.g. Gs and a reference point between the MGW and the multimedia related control nodes (e.g., CSCF, etc.) when multimedia is going to be operated in the CS Services domain. Also, further reference points should be considered, e.g. internal to the proposed HSS as well as components of the HSS to the other nodes.*
- ~~*Clarification of the terminology for domains (ps, cs domains vs GPRS, Multimedia, Teleservices domains).*~~
- *This reference architecture is subject to verification through the inclusion of flow charts showing signalling flows for MM, SM etc. in, e.g., an annex or other chapters in the TR.*
- *The inclusion of separate CBC node in the figure.*
- *Clarify the relationship with Mobile IP.*
- ~~*GERAN has been removed from the reference architecture in Figure 5.1 since the issue of GERAN and related interfaces, i.e., Iu_ps, Gb, A are currently being handled in SMG2 and SMG12.*~~ *Appropriate description on the GERAN will be added ~~when results are available~~.]*

The architecture shown and the components of which are described in subsequent sections allow for flexible and scaleable mechanisms to support global roaming and interoperability with external networks such as PLMN, 2G Legacy networks, PDNs and other multimedia VoIP networks.

5.3 Functional Elements

5.3.1 Call State Control Function (CSCF)

In the following section, CSCF has been divided into several logical components. Currently, these logical components are internal to the CSCF.

Every CSCF acting as a Serving CSCF has a CCF function.

ICGW (Incoming call gateway)

- Acts as a first entry point and performs routing of incoming calls,
- Incoming call service triggering(e.g. call screening/call forwarding unconditional) may need to reside for optimisation purposes,

- Query Address Handling (implies administrative dependency with other entities)
- Communicates with HSS

CCF (Call Control Function)

- Call set-up/termination and state/event management
- Interact with MRF in order to support multi-party and other services
- Reports call events for billing, auditing, intercept or other purpose
- Receives and process application level registration
- Query Address Handling (implies administrative dependency)
- May provide service trigger mechanisms (service capabilities features) towards Application & services network (VHE/OSA)
- May invoke location based services relevant to the serving network
- May check whether the requested outgoing communication is allowed given the current subscription.

SPD (Serving Profile Database)

- Interacts with HSS in the home domain to receive profile information for the R00 all-IP network user and may store them depending on the SLA with the home domain
- Notifies the home domain of initial user's access (includes e.g. CSCF signalling transport address, user ID etc. needs further study)
- May cache access related information (e.g. terminal IP address(es) where the user may be reached etc.)

AH (Address Handling)

- Analysis, translation, modification if required, address portability, mapping of alias addresses
- May do temporary address handling for inter-network routing.

5.3.2 Home Subscriber Server (HSS)

The Home Subscriber Server (HSS) is the master database for a given user. It is responsible for keeping a master list of features and services (either directly or via servers) associated with a user, and for tracking of location of and means of access for its users. It provides user profile information, either directly or via servers. It is a superset of the Home Location Register (HLR) functionality, for example as defined in GSM MAP, but differs in that it needs to also communicate via new IP based interfaces. The HSS shall support a subscription profile which identifies for a given user for example:

- user identities
- subscribed services and profiles
- service specific information
- mobility management information
- authorization information

Like the HLR, the HSS contains or has access to the authentication centers/servers (e.g. AUC, AAA).

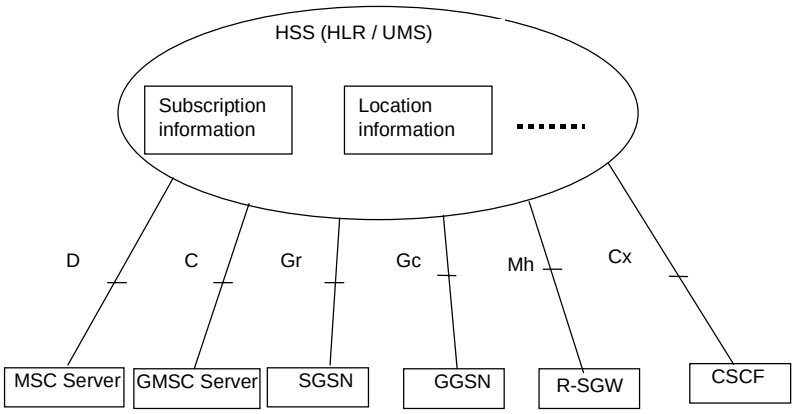

Figure 5-2: Example of a Generic HSS structure and basic interfaces

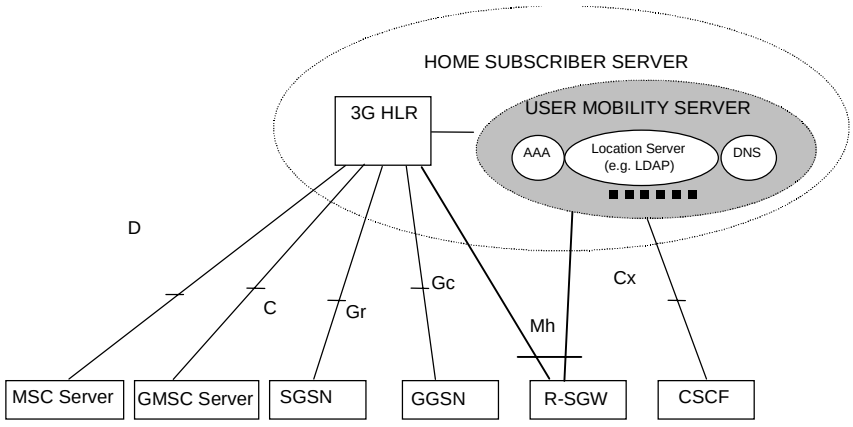

Figure 5-3: Example of HSS structure with UMS Specific Functionality

The HSS may consist of the following elements as shown in the Figure 5-3:

1) User Mobility Server (UMS): it stores Service Profile for the Multimedia domain and stores Service Mobility or Serving CSCF related information for the users. UMS might also generate, store and/or manage security data and policies (e.g. IETF features). UMS should provide logical name to transport address translation in order to provide answer to DNS queries.

2) 3G HLR: A UMTS HLR enhanced to support Release 2000 access specific information.

5.3.3 Transport Signalling Gateway Function (T-SGW)

This is component in the R00 network is PSTN/PLMN termination point for a defined network. The functionality defined within T-SGW should be consistent with existing/ongoing industry protocols/interfaces that will satisfy the requirements.

- Maps call related signalling from/to PSTN/PLMN on an IP bearer and sends it to/from the MGCF.
- Needs to provide PSTN/PLMN <-> IP transport level address mapping.

5.3.4 Roaming Signalling Gateway Function (R-SGW)

The role of the R-SGW described in the following bullets is related only to roaming to/from 2G/R99 CS and GPRS domain to/from R00 UMTS Teleservices domain and UMTS GPRS domain and is not involving the Multimedia domain.

- In order to ensure proper roaming, the R-SGW performs the signaling conversion at transport level (conversion: Sigtran SCTP/IP versus SS7 MTP) between the legacy SS7 based transport of signaling and the IP based transport of signaling. The R-SGW does not interpret the MAP / CAP messages but may have to interpret the underlying SCCP layer to ensure proper routing of the signaling.

- (For the support of 2G / R99 CS terminals): The services of the R_SGW are used to ensure transport interworking between the SS7 and the IP transport of MAP_E and MAP_G signalling interfaces with a 2G / R99 MSC/VLR

5.3.5 Media Gateway Control Function (MGCF)

This component is PSTN/PLMN termination point for a defined network. The functionality defined within MGCF should be consistent with existing/ongoing industry protocols/interfaces that will satisfy the requirements.

- Controls the parts of the call state that pertain to connection control for media channels in a MGW.

- Communicates with CSCF.

- MGCF selects the CSCF depending on the routing number for incoming calls from legacy networks.

- Performs protocol conversion between the Legacy (e.g. ISUP, R1/R2 etc.) and the R00 network call control protocols.

- Out of band information assumed to be received in MGCF and may be forwarded to CSCF/MGW.

5.3.6 Media Gateway Function (MGW)

This component is PSTN/PLMN transport termination point for a defined network and interfaces UTRAN with the core network over Iu.

The functionality defined within MGW should be consistent with existing/ongoing industry protocols/interfaces that will satisfy the requirements.

A MGW may terminate bearer channels from a switched circuit network (i.e., DSOs) and media streams from a packet network (e.g., RTP streams in an IP network). Over Iu MGW may support media conversion, bearer control and payload processing (e.g. codec, echo canceller, conference bridge) for support of different Iu options for CS services: AAL2/ATM based as well as RTP/UDP/IP based.

- Interacts with MGCF, MSC server and GMSC server for resource control.

- Owns and handles resources such as echo cancellers etc.

- May need to have codecs.

The MGW will be provisioned with the necessary resources for supporting UMTS/GSM transport media. Further tailoring (i.e packages) of the H.248 may be required to support additional codecs and framing protocols, etc.

The MGW bearer control and payload processing capabilities will also need to support mobile specific functions such as SRNS relocation/handover and anchoring It is expected that current H.248 standard mechanisms can be applied to enable this.

5.3.7 Multimedia Resource Function (MRF)

This component:

- performs multiparty call and multi media conferencing functions. MRF would have the same functions of an MCU in an H.323 network.
- Is responsible for bearer control (with GGSN and MGW) in case of multi party/multi media conference
- may communicate with CSCF for service validation for multiparty/multimedia sessions.

5.3.8 MSC Server

MSC server mainly comprises the call control and mobility control parts of a GSM/UMTS MSC.

The MSC Server is responsible for the control of mobile originated and mobile terminated 04.08CC CS Domain calls. It terminates the user-network signalling (04.08+ CC+MM) and translates it into the relevant network – network signalling. The MSC Server also contains a VLR to hold the mobile subscriber's service data and CAMEL related data.

MSC server controls the parts of the call state that pertain to connection control for media channels in a MGW.

5.3.9 Gateway MSC Server

The GMSC server mainly comprises the call control and mobility control parts of a GSM/UMTS GMSC.

5.3.10 MSC

A MSC server and a MGW make up the full functionality of a MSC as defined in 23.002 Gateway MSC

5.3.11 Gateway MSC

A GMSC server and a MGW make up the full functionality of a GMSC as defined in 23.002

[*Editor's note: There is a need to consider possibilities that call incoming to the PLMN may be routed to entities other than the GMSC, e.g., for networks that do not deploy CS domain.]*

~~1.4~~5.4 Description of Reference Points

~~1.1.1~~5.4.1 Cx Reference Point (HSS – CSCF)

This reference point supports the transfer of data between the HSS and the CSCF.

When a UE has registered with a CSCF, the CSCF can update its location towards HSS. This will allow the HSS to determine which CSCF to direct incoming calls to. On this update towards the HSS, the HSS sends the subscriber data (application related) to CSCF.

For a MT call, CSCF asks the HSS for call routing information.

5.4.2 Gf Reference Point (SGSN – EIR)

Refer to TS 23.060 for a description of this reference point.

5.4.3 Gi (GGSN – Multimedia IP Network)

Refer to TS 23.060 for a description of this reference point.

~~5.4.2~~5.4.4 Gm Reference Point (CSCF – UE)

This interface is to allow UE to communicate with the CSCF e.g.

- register with a CSCF,
- Call origination and termination
- Supplementary services control.

5.4.5 Gn Reference Point (GGSN – SGSN)

Refer to TS 23.060 for a description of this reference point.

~~5.4.3~~5.4.6 Mc Reference Point (MGCF – MGW)

The Mc reference point describes the interfaces between the MGCF and MGW, between the MSC Server and MGW, and between the GMSC Server and MGW. It has the following properties:

- full compliance with the H.248 standard, baseline work of which is currently carried out in ITU-T Study Group 16, in conjunction with IETF MEGACO WG.
- flexible connection handling which allows support of different call models and different media processing purposes not restricted to H.323 usage.
- open architecture where extensions/Packages definition work on the interface may be carried out.
- dynamic sharing of MGW physical node resources. A physical MGW can be partitioned into logically separate virtual MGWs/domains consisting of a set of statically allocated Terminations.
- dynamic sharing of transmission resources between the domains as the MGW controls bearers and manage resources according to the H.248 protocols.

The functionality across the Mc reference point will need to support mobile specific functions such as SRNS relocation/handover and anchoring. It is expected that current H.248/IETF Megaco standard mechanisms can be applied to enable this.

5.4.7 Mg Reference Point (MGCF – CSCF)

The Mg reference point is based on external specifications, e.g. H.323 or SIP *[Editor~~'~~'s note: to be decided]*

~~5.4.4~~5.4.8 Mh Reference Point (HSS – R-SGW)

This interface supports the exchange of mobility management and subscription data information between HSS and R99 and 2G networks. This is required to support Release 2000 network users who are roaming in R99 and 2G networks.

~~5.4.5~~5.4.9 Mm Reference Point (CSCF – Multimedia IP networks)

This is an IP interface between CSCF and IP networks. This interface is used, for example, to receive a call request from another VoIP call control server or terminal.

~~5.4.6~~5.4.10 Mr Reference Point (CSCF - MRF)

Allows the CSCF to control the resources within the MRF.

~~5.4.7~~5.4.11 Ms Reference Point (CSCF – R-SGW)

This is an interface between the CSCF and R-SGW.

~~5.4.8~~5.4.12 Mw Reference Point (CSCF – CSCF)

The interface allows one CSCF (e.g. home CSCF) to relay the call request to another CSCF (eg serving CSCF).

~~5.4.9~~5.4.13 Nc Reference Point (MSC Server – GMSC Server)

Over the Nc reference point the Network-Network based call control is performed. Examples of this are ISUP or an evolvement of ISUP for bearer independent call control (BICC). In the R'00 architecture different options for signalling transport on Nc shall be possible including IP.

~~5.4.10~~5.4.14 Nb Reference Point (MGW-MGW)

Over the Nb reference point the bearer control and transport are performed. The transport may be RTP/UDP/IP or AAL2 for transport of user data. In the R00 architecture different options for user data transport and bearer control shall be possible on Nb, for example: AAL2/Q.AAL2, STM/none, RTP/H.245.

~~5.4.11~~5.4.15 Reference Points towards SCP (CAP based interfaces)

This includes the interfaces from the SGSN to the SCP, from the MSC Server to the SCP, and the GMSC Server to the SCP.

The interface from the SGSN to the SCP in the Applications and services domain is the interface defined for UMTS GPRS to support Charging Application Interworking.

The interface from the MSC Server to the SCP, and the GMSC Server to the SCP is the standard interface defined for CAMEL feature, which provides the mechanisms to support services of operators which are not covered by standardized UMTS/GSM services even when roaming outside the home PLMN.

The CAP based interfaces may be implemented using CAP over IP, or CAP over SS7 as shown in Figure 5-4.

<table>
<tr><td colspan="3">CAP</td></tr>
<tr><td colspan="3">TCAP</td></tr>
<tr><td colspan="3">SCCP</td></tr>
<tr><td>M3UA</td><td>MTP-3B</td><td rowspan="2">Narrow-band SS7</td></tr>
<tr><td>SCTP (1)</td><td>SAAL</td></tr>
<tr><td>IP (2)</td><td>ATM(2)</td><td>STM (2)</td></tr>
</table>

Figure 5-4: Protocol Stack for CAP

Note:

(1) In IETF work is ongoing (e.g., SCTP/UDP/IP or directly SCTP/IP). The finally selected protocol stack is meant here.

(2) The protocols do not correspond to the same OSI layer. They are drawn on the same height as they are "transport alternatives".

~~5.4.12~~5.4.16 Gc, Gr, C, D Reference Points MAP based interfaces)

This includes the interfaces from the GGSN to the HSS (Gc reference point), from the SGSN to the HSS (Gr reference point), from the GMSC Server to the HSS (C reference point), and the MSC Server to the HSS (D reference point).

The MAP based interfaces may be implemented using MAP transported over IP, or MAP over SS7.

MAP can be transported on the same protocol stacks as CAP (refer to protocol stack in Figure 5-4)

~~5.4.13~~5.4.17 Iu Reference Point

This is the reference point between UTRAN and the R00 core network. This reference point is realized by one or more interfaces:

- Between UTRAN and SGSN, transport of user data is IP based.
- Between UTRAN and SGSN, transport of signalling is based on IP or SS#7.
- Between UTRAN and MGW, transport of user data is based on different technologies (e.g., IP, AAL2), and includes the relevant bearer control protocol in the interface.
- Between UTRAN and MSC server, transport of signalling is based on IP or SS#7.

When the Iu_cs is ATM based, then the protocols used can be based on R99 protocols or an evolved version.

When Iu_cs is IP based, new IP transport related protocols need to be added as part of the Iu protocols. It shall be possible to have R99 Iu interface with MSCs compliant to R99 specifications in the network.

It shall be possible to have a R99 CS domain with R99 Iu_cs reference point coexisting with a R00 Iu reference point.

6 Mobility Management

6.1 Location Management

6.2 Handover

6.3 Mobility across networks

[Editor's note: this section with deal with e.g. Mobile IP related issues]

7 Service Platforms

[Editor's note: this chapter deals withVHE/OSA, SAT, CAMEL etc.]

7.1 Location Services

8 Multimedia

[Editor's note: this chapter deals with multimedia related issues such as H.323, H.324, their impact on the reference architecture etc.]

8.1 Signalling

8.2 Transcoder

9 QoS

[Note: The following sections ~~is~~ are intended to be included in TS 23.107 (proposed chapter, if any):

- 9.1 (new Chapter 4.4)
- 9.~~2~~1 (Chapter 6.2)]

9.1 End-to-End QoS Negotiation Requirements

– The UMTS QoS negotiation mechanisms used for providing end-to-end QoS in UMTS Release 2000 shall be backward compatible with UMTS Release 99.

– The UMTS QoS negotiation mechanisms used for providing end-to-end QoS shall not make any assumptions about the situation in external networks which are not within the scope of 3GPP specifications.

– The UMTS QoS negotiation mechanisms used for providing end-to-end QoS shall not make any assumptions about application layer signalling protocols.

– No changes to non-UMTS specific QoS negotiation mechanisms.

– The UMTS QoS negotiation mechanisms used for providing end-to-end QoS shall not make any assumptions about applications which may be used on terminal equipment attached to mobile terminals.

– Unnecessary signalling complexity and processing complexity in the network elements as well as the mobile terminal shall be avoided.

– Unnecessary signalling traffic due to end-to-end QoS negotiation shall be avoided.

– Methods for user authentication as well as billing and charging mechanisms related to the end-to-end QoS negotiation shall be kept as simple as possible.

– Minimum changes to network architecture and mechanisms due to introduction of end-to-end QoS negotiation.

– The UMTS network shall be able to negotiate end-to-end QoS also for mobile terminals and applications which are not able to use QoS negotiation mechanisms other than the ones provided by UMTS.

~~9.1~~9.2 QoS End-to-End Functional Architecture

To provide QoS end-to-end, it is necessary to manage the QoS within each domain. An IP BS Manager is used to control the external IP bearer service. Due to the different techniques used within the IP network, this communicates to the UMTS BS manager through the Translation function.

Whenever resources not owned or controlled by the UMTS network are required to provide QoS, it is necessary to interwork with an external resource manager that controls those resources.

IP BS Manager

The IP BS Manager uses standard IP mechanisms to manage the IP bearer service. These mechanisms may be different from mechanisms used within the UMTS, and may have different parameters controlling the service. The translation/mapping function must provide the interworking between the mechanisms and parameters used within the UMTS and the external IP bearer service.

Resource Manager

Within the UMTS network, there is resource management performed by various nodes in the admission control decision. The resources considered here are under the direct control of the UMTS network.

In IP Networks, it is also necessary to perform resource management to ensure that resources required for a service are available. Where the resources for the IP Bearer Service to be managed are not owned by the UMTS network, the resource management of those resources would be performed through an external resource management function for the IP network.

In addition, where the UMTS network is also using external IP network resources as part of the UMTS bearer service (for example for the backbone bearer service), it may also be necessary to interwork with an external IP resource manager.

Figure 9-1 shows the scenario for control of an IP service using an IP BS Manager and an external Resource Manager.

[Editor's note: The end-to-end IP bearers may have several BS Managers throughout the path, specifically the modeling of IP based BS Manager in MT and/or TE needs to be studied. This issue is FFS.]

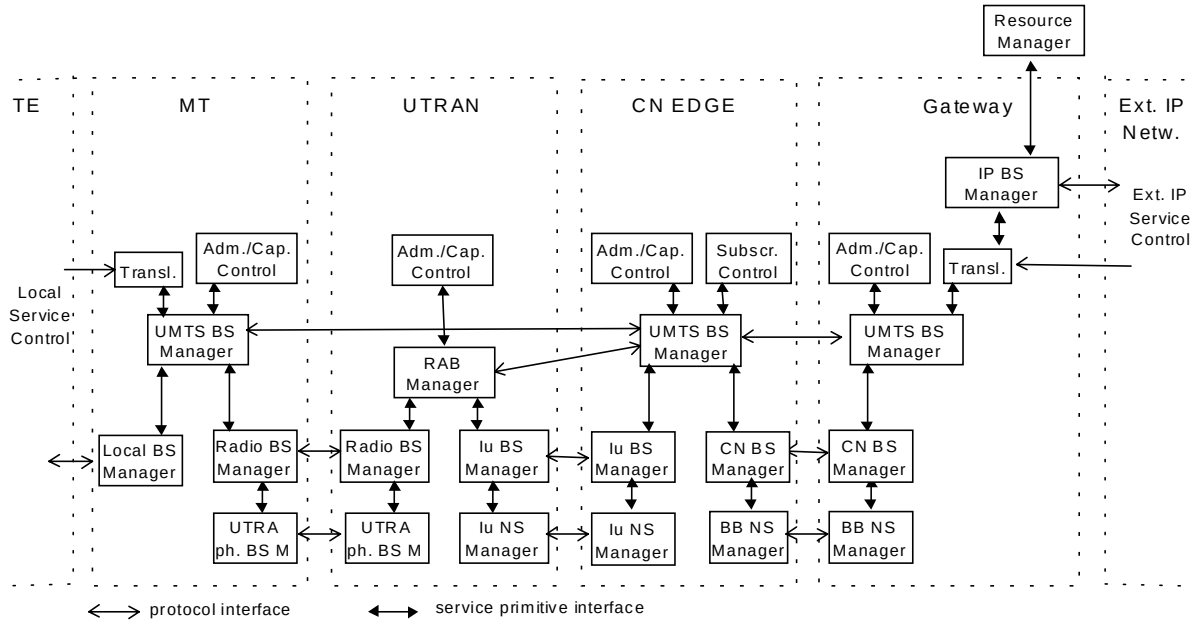

Figure 9-1: QoS management functions for UMTS bearer service in the control plane for an external IP Service

Note: This proposal does not cover the cases of a circuit switched service, or an IP service interworking with an ATM service at the gateway node.

10 Transport

[Editor's note: this chapter deals with user and control plane transport issues for relevant interfaces]

11 Point-to-Multipoint

12 Security

13 Charging

14 UTRAN Aspects

[Editor's note: requirements on UTRAN from a system perspective]

15 BSS Aspects

16 Alternative Access Networks

[Editor's note: this chapter deals with system aspects relating to other access tehnologies than UTRAN, e.g. EDGE and Hiperlan2]

17 Multi-mode

[Editor's note: this chapter deals with issues in relation to the handling of multimode terminals]

18 Compatibility

[Editor's note: this chapter deals with ~~compabitility~~compatibility issues between different releases, and between different options]

19 Work Plan

[Editor's note: an overall workplan is specified here]

An overall work plan for R00 may be found in TR 30.801 v.1.1.0.

20 History

Document history		
V0.0.0	1999-10	Document created
V0.1.0	2000-01	Reference architecture description added in Chapter 5. New Section 5.1. QoS end-to-end functional architecture added in new Chapter 9.1
V0.2.0~~0.2~~	2000-03	Definitions added in Ch 3. Architecture principles added in Ch 5.1. BSS/GERAN added in the reference architecture. Text on reference points added in Ch 5.2. New Ch 9.1.
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