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Universal Mobile Telecommunications System (UMTS) - Virtual Home Environment (VHE) in the Integrated Services Digital Network (ISDN) - Evolved UMTS core network

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ETSI Guide

Universal Mobile Telecommunications System (UMTS); Virtual Home Environment (VHE) in the Integrated Services Digital Network (ISDN); Evolved UMTS core network

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Foreword

This ETSI Guide (EG) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN).

1   Scope

The present document covers scenarios and procedures to support the UMTS Virtual Home Environment (VHE). The Virtual Home Environment is a capability for providing operator-specific services to end users with a consistent look and feel which is independent of location and serving network. It facilitates service adaptation to different network environments supporting directly connected, cordless and cellular access. The philosophy of VHE has been proposed by GSM MoU and implementation scenarios have been identified and studied by ITU-T for IMT-2000 work.

2   References

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]   TR 101 695: "Integrated Services Digital Network (ISDN); Universal Mobile Telecommunications System (UMTS); ISDN-UMTS Framework".

[2]   ITU-T Recommendation E.164 (1997): "The international public telecommunication numbering plan".

[3]   ITU-T Recommendation E.212 (1998): "The international identification plan for mobile terminals and mobile users".

[4]   ITU-T Recommendation E.191 (1996): "B-ISDN numbering and addressing".

[5]   ITU-T Recommendation Q.1701 (1999): "Framework for IMT-2000 Networks".

[6]   ITU-T Recommendation Q.1711 (1999): "Network functional model for IMT-2000".

3   Definitions and abbreviations

3.1   Definitions

For the purposes of the present document, the following terms and definition applies:

Virtual Home Environment (VHE): system concept for personalized service portability across network boundaries and between terminals. The concept of the VHE is such that UMTS users are consistently presented with the same personalized features, user interface capabilities and services in whatever network and whatever terminal, whereever the user may be located. The exact configuration available to the user at any instant will be dependent upon the capabilities of the USIM, Terminal Equipment and Network currently being used or on the subscription restriction (user roaming being restricted)

3.2   Abbreviations

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

AAL	ATM Adaptation Layer
API	Application Programme Interface
API	Application Programming Interface
ATM	Abstract Test Method
CAMEL	Customized Application for Mobile Enhanced Logic
CoC	Communication Control
CORBA	Common Object Request Broker Architecture
DAT	Service-Profile/Data
EXE	Service Execution Environment
GPRS	General Packet Radio Service
HSCSD	High Speed Circuit Switched Data
IC	Integrated Circuit
INAP	IN Application Protocol
IP	Information Processing
ISDN	Integrated Services Digital Network
ME	Mobile Equipment
MExE	Mobile application Execution Environment
MMI	Man Machine Interface
MMIC	MMI Control
PAD	Packet Assembly/Disassembly facility
PCMCIA	Personal Computer Memory Card International Association
PRG	Service Programme
Q.gft	Generic Functional Transport
Q.sig	Private Network Spelling
RPC	Remote Procedure Calls
SCF	Selective Call Forwarding
SDH	Synchronous Digital Hierarchy
SIM	Subscriber Identity Module
SMS	Service Management System
SONET	Synchronous Optical NETwork
SS7	Signalling System N°7
SSF	Service Switching Function
UMTS	Universal Mobile Telecommunications System
UPT	Universal Personal Telecommunications
URL	User Requirements Language
USIM	UMTS Subscriber Identity Module
USIM	User Service Identity Module
VASP	Value Added Service Providers
VHE	Virtual Home Environment
WAP	Wireless Application Protocol

4   Description of VHE

4.1   Virtual Home Environment capabilities

The Virtual Home Environment supports:

- **service transparency:** between different IMT-2000 networks;

- **transparent execution:** of the "Virtual Home Environment" service features: the VHE service features are used by mobile operators to provide more functionality to mobile users than basic mobility. The services may be executed without necessary sharing of service and subscriber information with the visited mobile operator (except of roaming agreements);

- **customized services:** the means for network operators, service providers and users to define their own specific features/service;

- **a personalized service set:** with user personalization of features/services;

- **service level:** it is desirable that the roaming mobile end-users will experience the same service level as within their home networks (the Virtual Home Environment concept). Therefore, it is desirable that services are provided transparently by the visited networks;

- **provisioning of subscriber specific services:** mobile users may have custom demands for functionality from their home service providers. The Virtual Home Environment intends to make management access to customized services available to mobile users when roaming;

- **limited network load:** the current mobile networks already manage a considerable signalling load to handle a mobile call. This signalling is required to maintain the mobility information of the mobile subscriber up to date. Therefore, the signalling load of new features must be limited as far as possible to ensure that the mobile network's signalling capacity will not be overloaded;

- **activation of mobile related call events;**

- **perform charging activities:** the VHE may be able to exchange charging parameters between the Home Service Provider and Serving (Visited) Network. This exchange is required to have services such as Advice of Charge;

- **perform in-band user interaction:** the VHE shall provide the capabilities to order the playing of announcements and tones towards calling/called subscribers during the call-setup, call disconnection, unsuccessful call establishment, and incoming call procedures;

- **allow for subscriber interaction:** the subscriber should have control capabilities to activate/register/invoke supplementary services. The VHE should be able to add functionality to these supplementary service control mechanisms;

- **interaction with the supplementary services:** the mobile network provides a number of supplementary services; interaction with these services needs to be considered.

4.2   Structure of the issues for mapping functional modularity

The above categories will need to be structured into the following categories.

4.2.1   Applications

Applications by their nature are in the open competitive market and should not be standardized. However, a few widely used applications may benefit from standardization since significant performance advantages may be gained from features having a static distribution.

A basic level of standardization may be and has proven useful to made applications accessible to the marketplace and simpler to use: e.g. the layout of the telephone and typewriter/PC keyboard. Definition of examples is highly useful to understand the implied requirements on the lower layers.

4.2.2   Application support

A vast number of technologies are being pursued in this category some of which are being standardized: e.g. the ISO ECMA-script, based on JAVAscript. Other technologies are being pursued in industry fora: e.g. WTML in the WAP Forum. An initial list of the supporting technologies by which VHE is facilitated is included below:

- CAMEL (Customized Application for Mobile Enhanced Logic), INAP SSF-SCF interaction;

- SIM Toolkit/Smart Card applications;

- WAP (Wireless Application Protocol);

- MExE (Mobile application Execution Environment);

- Internet Protocols Service Negotiation;

- IP Media Controllers and Gateways;

- INAP CS3 SCF-SCF secure interaction;

- Software Agent technologies;

- Technologies for software download;

- Distributed Processing/CORBA.

It is clear that for these technologies to be transparently supported across networks whilst being recognized at the endpoints (terminals and servers) and in the network access points and gateways some standardization is required. It must be noted that that some of the above technologies aim at network independence but all of them are based on a network specific evolution. Some cases imply that the serving network supports knowledge on the service; e.g. CAMEL uses IN triggering.

The major challenge for the computing distributed processing based technologies is the efficiency and speed; it is unlikely that in a competitive world that distributed processing technologies like CORBA will be deployed to interwork throughout global networks. However the software architecture may be deployed on several endpoints (terminals and servers) with high speed links between these endpoints, thus divorcing the software platform from the underlying physical network.

Resource Control in such a scenario is a complex issue of the software requesting resources for handling multiple media streams without having direct control of knowledge of the configuration of where the resources may be sited. Service Mediation is required in an end-to-end sense when setting up the requested service, however negotiation and fall back procedures require definition where one endpoint fails to maintain the service or an intermediate transport network cannot support the required resource.