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Univerzalni mobilni telekomunikacijski sistem (UMTS) - Strategije

Universal Mobile Telecommunications System (UMTS) - Strategies

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Universal Mobile Telecommunication Systems (UMTS); Strategies

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UMTS

Universal Mobile
Telecommunications System

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Foreword

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

Introduction

Broadband multimedia services, which can be accessed from fixed and mobile terminals, have considerable market potential. International standards are being developed to provide for such services and several technologies will soon be available. IMT-2 000 and UMTS requirements are the basis of a target network that will enable operators to offer such multimedia services. UMTS, which will be operational in 2002, gives a time frame within which the evolution of fixed networks could occur.

These developments offer opportunities and present challenges for fixed network operators. Systems capable of supporting mobile multimedia services require very large investments. Customers will only invest in expensive terminals if these offer attractive new services of the highest quality and at an acceptable price. Fixed network operators will have to develop and evolve their core and access networks to meet these demands.

The present document provides scenarios for the evolution of fixed networks to UMTS. Several starting points based on PSTN, N-ISDN and B-ISDN networks are being considered to support the different access options available for UMTS. Recognizing the importance of the Internet Protocol (IP) in today's networks, this technology has been included in the evolution strategies outlined in this document.

1 Scope

The scope of the present document is to describe possible strategies for the evolution of fixed networks towards UMTS. The following issues are covered by this document:

- Identification of access scenarios to UMTS.
- Definition of networks/network components that need to be upgraded with UMTS capabilities.
- Interworking with legacy networks / network components.
- Introduction of wireless access networks as specified by 3GPP RAN and EP BRAN and interconnection to the fixed network (e.g. ISDN, PSTN, IP, ATM) evolved to UMTS.
- Introduction of mobility-supporting capabilities in fixed networks to facilitate global roaming within the IMT-2 000 family of third generation systems.

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.
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261d002886dc/sist-v-etsi-eg-201-721-v1-1-2-2003
- [1] EN 301 061-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Generic functional protocol for the support of supplementary services at the "b" service entry point for Virtual Private Network (VPN) applications; Part 1: Protocol specification".
- [2] ITU-T Recommendation H.323: "Packet based multimedia communications systems".
- [3] ITU-T Recommendation T.120: "Data protocols for multimedia conferencing".
- [4] EN 301 005-1: "V interfaces at the digital Service Node (SN); Interfaces at the VB5.1 reference point for the support of broadband or combined narrowband and broadband Access Networks (ANs); Part 1: Interface specification".
- [5] EN 301 217-1: "V interfaces at the digital Service Node (SN); Interfaces at the VB5.2 reference point for the support of broadband or combined narrowband and broadband Access Networks (ANs); Part 1: Interface specification".

3 Definitions and abbreviations

3.1 Definitions

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

fixed network: network that does not deploy the infrastructure (equipment and protocols) that is required for mobility management. However, a fixed network may provide fixed wireless access to terminals or private networks. A fixed network does not provide support for continuous mobility (i.e. handover)

3.2 Abbreviations

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

3GPP	Third Generation Partnership Project
3GPP RAN	Third Generation Partnership Project - Radio Access Network
AAL2	ATM Adaptation Layer 2
ABR	Available Bit Rate
ATM	Abstract Test Method
B-ISDN	Broadband-ISDN
BRAN	Broadband Radio Access Networks
BS	Base Station
BSS	Base Station System
CBR	Constant Bit Rate
CN	Core Network
CT2	Cordless Telephone 2nd generation
DECT	Digital Enhanced Cordless Telecommunications
DSS1	Digital Signalling System number one
DSS2	Digital Signalling System number two
FT	Fixed Terminal
GK	Gatekeeper
GSM	Global System for Mobile communications
GW	Gateway
HLR	Home Location Register
VLR	Visitor Location Register
IMT-2 000	International Mobile Telecommunications for year 2000
IN	Intelligent Network
INAP	IN Application Protocol
IP	Internet Protocol
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
ISUP	ISDN User Part
IWU	InterWorking Unit
LAN	Local Area Network
MT	Mobile Terminal
N-ISDN	Narrowband Integrated Services Digital Network
NNI	Network Node Interface
PDN	Plesiochronous Digital Network
PHS	Portable HandSet
PIG	PSTN/Internet Gateway
POTS	Plain Old Telephone Service
PSTN	Public Switched Telephone Network
Q-SIG	Q Interface Signalling protocol (ECMA standard)
QoS	Quality of Service
RNC	Radio Network Controller
SCF	Selective Call Forwarding
SDF	Service Data Function
TDD	Time Division Duplex
TIPHON	Telecommunications and Internet Protocol Harmonization over Network
TUP	Telephone User Part
UBR	Unspecified Bit Rate
UMTS	Universal Mobile Telecommunications System
USIM	UMTS Subscriber Identity Module
VBR	Variable Bit Rate
WATM	Wireless ATM
WWW	World-Wide Web
xDSL	generic Digital Subscriber Line technology

4 Generic requirements

The target system shall provide a user access to broadband multimedia services from different access points and while on the move. From these general user requirements, target network requirements can be derived.

The target system resulting from the fixed network evolution shall satisfy the requirements in the following subclauses.

4.1 General requirements for support of mobile multimedia services

This subclause covers requirements related to Internet access and radio & network bearer capabilities. Fixed-evolved UMTS will be required to:

- be compatible with the Internet Protocol;
- provide routing capability based on IP version 4 and/or IP version 6;
- support a wide variety of services, including "push", "pull" and multicast-type services;
- provide packet mode bearers up to 2 Mbps;
- support of global mobility;
- support of terminal mobility, personal mobility and service portability;
- support roaming between UMTS and GSM;
- support global Roaming:
 - UMTS aims to be compatible with IMT-2 000 systems, to provide global terminal mobility (e.g. to provide access to the subscribers of various IMT-2 000 member networks), and to transparently provide all subscribed home services to roaming IMT-2 000 users;
 - UMTS aims to be inter-operable with all IMT-2 000 Family members in order to offer the global roaming capability to its users roaming in other IMT-2 000 networks. Therefore, UMTS standards need to be common to the maximum extent possible with the standards of other IMT-2 000 Family members;
 - the UMTS inter-operability with other IMT-2 000 networks is to be implemented via an inter-working function in the short term leading towards the development of a common NNI in the long-term.

4.2 Intelligent network capabilities

- Support of rapid service creation and introduction;
- Support of Virtual Home Environment (VHE) i.e. operator specific services.

4.3 Quality of Service requirements

- Speech quality comparable to fixed network;
- High quality audio, data, image, and video;
- Selection of QoS classes / parameters required by users' applications;
- QoS indication/negotiation (CBR, VBR, ABR, UBR).

4.4 Features related to security and privacy

- Protection from impersonation (authentication);
- Protection of user and service profile from malicious attacks;
- Privacy of communications (encryption of user data);
- Location privacy.

4.5 Cost-effective network

- Support of a multivendor environment based on open (standard) interfaces;
- Effective use of transmission facility:
 - ATM technology as one possible candidate:
 - ATM switching system;
 - AAL2 for efficient use of resources for low bandwidth applications;
 - circuit and packet switching capabilities on the same ATM platform.
- Support of a broad range of applications;
- Cellular, Wireless IP, WATM, ...;
- IP technology as a further possible candidate.

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4.6 Requirements for packet networks

Packet based networks as part of the fixed network evolved UMTS should provide the following capabilities:

- Wide area and large scale;
- Efficient use of radio and network resources;
- Mobile multimedia capabilities:
 - High Speed;
 - Support of point to point, point to multipoint, broadcast connections;
 - Support of QoS.
- To provide IP based applications (e.g. e-mail, WWW, ...)
Support of fixed and / or dynamic IP addresses.

5 Access scenarios to UMTS

Fixed network operators will have a variety of options at their disposal for providing customers access to UMTS services. These options are identified as access scenarios in this clause, and may have different implications on the protocol requirements at the user-network interface.

The basis for the description of these access scenarios is Figure 1, which identifies different system / network domains in UMTS.

These scenarios are:

- fixed Terminal Access;
- fixed Access Roaming in Private Networks;
- radio Access Roaming in Private Networks;
- support of Private Access Systems;
- public Cellular Access to the Fixed Network.

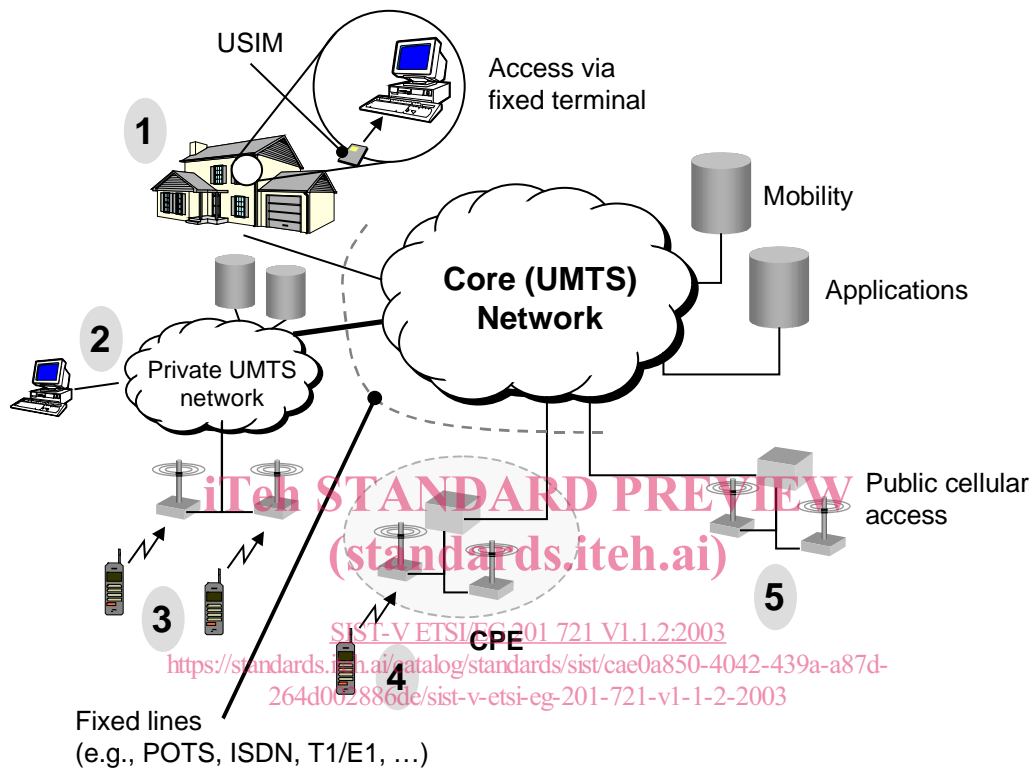


Figure 1: Implementation of the different access scenarios

5.1 Scenario 1 - fixed terminal access

In this scenario, USIM roaming is assumed, i.e. the only type of mobility supported is personal mobility. This scenario can be accomplished by providing a wired terminal with a USIM. This arrangement would be beneficial when the user:

- is out of range of public UMTS radio coverage;
- only requires terminal transportability, thus releasing UMTS radio capacity for other users;
- needs higher data rates than supported by UMTS radio access.

The support of UMTS capabilities on fixed terminals (including support of discrete mobility between UMTS-capable fixed terminals) offers opportunities both in the business and residential user environment.

In a residential environment, this scenario allows a UMTS user (more specifically the USIM) to roam between wired terminals giving the user same support of his service profile on these terminals. This scenario takes advantage of the network operator's significant investment in the access network.