# ETSI SMG Development of Standards for the UMTS

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***Summary:***
***ETSI SMG plays a key role at the development of standards for the UMTS Universal Mobile Telecommunications System, a set of standards aimed at the global market. It will be a real Third Generation Global System for Mobile Communications adding new features and introducing relevant technological innovations while evolving from both GSM and ISDN networks. UMTS is based on the carefully selected market requirements and belongs to the IMT-2000 family. UMTS standardisation is a market driven process being developed in a close co-operation with the UMTS Forum and GSM MoU.***

***The article does not necessarily express the opinions of any group or company I am affiliated with, neither of ETSI SMG, ETSI STF SMG or Ericsson.***

## 1 Introduction

### 1.1 Flexibility in a deregulated environment

The development trend in telecommunications is driven by users service requirements asking for access to a diversified range of personalised set of services to anyone, anywhere, anytime but not at any price. Borders between telecommunications, information technology and entertainment services are disappearing and user can combine service offerings from various operators. Deregulated world-wide market and rapid introduction of mobile services of the second generation, specifically GSM, has lead to conclusion that one "ultimate mobile solution ", one radio access network and one single core network standardised to a very detailed level are not realistic. Flexibility and opportunities of choice within mobile communications are available to the large extent already today. The choice is available for users, service operators, network operators and manufacturers. Consequently UMTS development takes into account the opportunity of the choice and the multiplicity of fixed and mobile telecommunication networks and services. Several of these systems can evolve towards UMTS with their own targets and pace. Such facts are influencing the current standardisation process at both national, regional or ITU level. Such a flexible approach opens possibilities for active collaboration between ETSI, other national or regional standardisation bodies and ITU. At the same time it offers possibilities for all players to continue development with own speed in order to achieve their time to market.

### 1.2 The role of the second generation, multi-band and multi-mode terminals

A mass market has been already achieved through the 2nd generation terminals in some markets, e.g. 30% penetration in Scandinavia. The second generation system in general and GSM specifically have been well introduced to the global market. These days 256 network operators and regulators in 110 countries world-wide are committed to GSM system. There are 203 networks in 106 countries on air serving 44 million subscribers at the end of June 1997.

The mass market development may be further strengthen through the multi-band terminals (i.e. GSM/DCS1800/PCS1900 ) or multi-mode multi-band terminals covering various combination of the 2nd generation terminals (e.g. DECT/GSM, PHS/GSM, GSM/satellite ). The expected penetration for mobile communication in the developed countries is expected to rise to 50 - 80 % within the time frame for the introduction of UMTS. The UMTS/GSM standards family offering dual-band, and multi-band terminals and networks will become the leading digital standard for mobile communications according the predictions of the leading players within mobile communications. The merging of the of GSM family networks in different bands (900, 1800, 1900 MHz ) and UMTS results in much higher capacity network, cheaper and better equipment optimised for various environments. It is important to note that regulatory bodies also support such trend by assignment of mixed bands to one operator.

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[1] The work of the ETSI SMG is supported by a permanent nucleus, Special Task Force STF SMG

## 2 The agreed key features of UMTS Phase 1[2]

Operators and manufacturers objectives can be fulfilled only if they serve customers. Their objectives were described through UMTS key features and key requirements. Key features and requirements are set by the operators and manufacturers. UMTS, as a market driven development of standards ensures that UMTS standards fulfil objectives of users and operators and not vice versa. High level requirements and essential key features of UMTS have been developed in close co-operation with GSM MoU 3GIG including operators world-wide and UMTS Forum.

Key features of the UMTS have been approved and are base for the development of standards for UMTS Phase 1. Further development should be on a yearly base introducing new functions in a timely response of the users and operators.

| | **UMTS Phase 1 standard (operation 2002 possible)** |
|---|---|
| **Services** | • multimedia services phase 1:<br>  • less than 2 Mbit/s with low mobility<br>  • up to approx. 150 kbit/s with high mobility<br>• high quality speech (like fixed networks) using low bitrates<br>• low and medium bitrates data (packet and circuit switched)<br>• service creation and measurement toolkit<br>• services portability, when roaming into other networks<br>• advanced addressing mechanisms, e.g. personal, Internet-style<br>• new charging mechanisms (e.g. volume)<br>• dual band/mode of operation UMTS/GSM incl. roaming between UMTS „islands"<br>• roaming between UMTS and GSM networks |
| **Terminals** | • mobiles and SIM with downloading capabilities over the air for e.g. data and applications (feasibility in phase 1 needs further study)<br>• multi media terminals<br>• dual mode/band GSM/UMTS terminals<br>• adaptive terminals |
| **Access network** | • New UMTS BSS<br>  • flexible bearer<br>  • rates <= 2 Mbit/s<br>  • fast, self adapting interface<br>• high capacity<br>• high spectrum efficiency for multimedia and low bit rate speech |
| **Core transport network** | • evolution of the GSM NSS and ISDN/IN<br>• new charging and accounting mechanisms<br>• downloading of subscriber and service data and service logic to visited networks and terminals<br>• support of variable bitrates and of mixed traffic types<br>• mobile fixed convergence elements<br>• support of packet data by Internet protocols |
| **Security** | • protection of network use<br>• provision of security services to the user<br>• control of misuse and/or abuse of the network |
| **Operation and Maintenance** | • automatic establishment of roaming relations<br>support of multivendor networks |

## 3 Evolution approach and its influence on UMTS/IMT-2000 standardisation

SMG played the key role for the introduction of the UMTS/IMT-2000 evolutionary views at the standardisation process as requested by the telecommunications industry. Evolution studies started both within ITU and ETSI as an expression of market needs to continue service offering to the very large and increasing number of customers of the second generation mobile networks. The customer must have

[2] UMTS Baseline document, ETSI SMG#23, 13-17 October 1997, Budapest

choice and opportunities to use new services governed only by own needs without being pushed for change for the sake of technology or regulation. Therefore the acceptance of UMTS should depend on to the availability of new multimedia services and enhanced speech quality. The ETSI study clearly stressed evolutionary approach:

"The third generation mobile communications systems will be introduced in the early years of the 21st century. They will consist of radio interfaces, supporting infrastructure and connections to networks. In this frame, the third generation systems are likely to evolve from existing (also called pre-UMTS) mobile systems and at the same time integrate new system components and concepts. The form of the evolution will be strongly influenced by market considerations. UMTS should be standardised by a managed evolution process starting from GSM and N/B-ISDN, using a generic access part"[3].

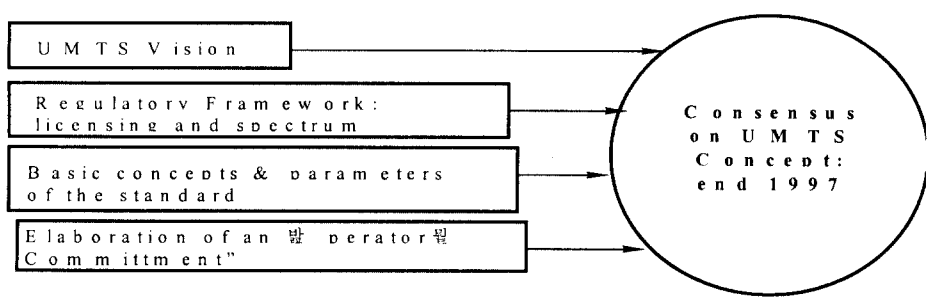
. The UMTS standardisation process requires:

- standards for new terminals
- standards for a new access network
- enhanced or new network capabilities in existing core transport networks

The evolution paths from GSM and narrowband ISDN networks to support UMTS and other future mobile services were accentuated specifically[4].

## 4 Focus of the UMTS work[5]

The great emphasis has been put on the concept development. The other two elements of the equal importance are availability and allocation of the UMTS related to spectrum and regulative and licensing framework. Therefore the standardisation process must be accompanied by the activities of the other bodies relevant for the introduction of UMTS to the market place. For those reasons an early licensing of the UMTS frequencies to operators is a prerequisite. Operators commitment plays important role for the acceptance of the UMTS as SMG MoU has played role at the introduction of GSM.




**Focus of the UMTS work for 1997**

## 5 UMTS time schedule[6]

The overall UMTS work programme as approved by ETSI SMG is given in the following table:

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[3] ETR 312 "Scenarios and considerations for the introduction of the UMTS"
[4] ETSI GMM Global Multimedia Mobility report
[5] SMG UMTS Work Programme, ETSI SMG#23, 13 - 17 October 1997, Budapest
[6] SMG UMTS Work Programme, ETSI SMG#23, 13 - 17 October 1997, Budapest

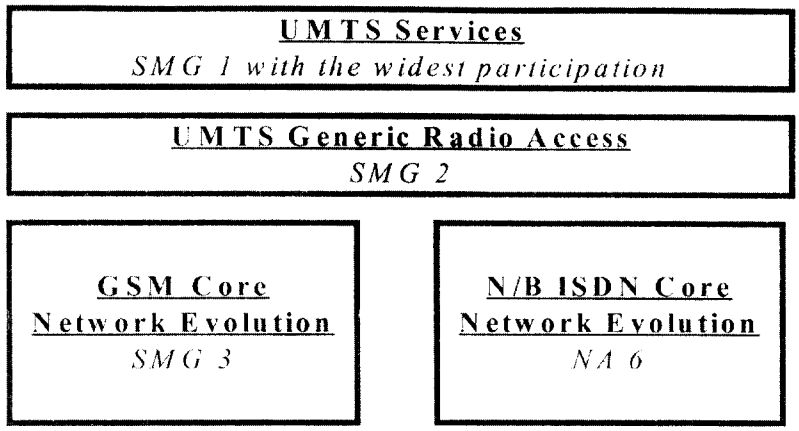
| Task Name | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 |
|---|---|---|---|---|---|---|---|
| GSM900 Phase 2+ implementation | | | | | | | |
| UMTS Vision | | | | | | | |
| Co-operative research: ACTS | | | | | | | |
| Regulation: framework (report UMTS Forum) | | | | | | | |
| Regulation: CEC, ECTRA, ERC decisions | | | | | | | |
| Regulation: national licence conditions | | | | | | | |
| Regulation: licence awards | | | | | | | |
| Operators' commitment: elaboration of draft | | | | | | | |
| Operators' commitment: signature | | | | | | | |
| ETSI: basic UMTS standards studies | | | | | | | |
| ETSI: freezing basic parameters of standard | | | | | | | |
| ETSI: UMTS Phase 1 standards | | | | | | | |
| Regulation: Conformity assessment | | | | | | | |
| Pre-operational trials | | | | | | | |
| UMTS Phase 1: commercial operation | | | | | | | |

# 6 UMTS standardisation

## 6.1 Responsibilities for UMTS standardisation

The UMTS work programme and responsibilities were restructured due to further influence of the market and due to the general ETSI restructuring. The UMTS standards are being developed for the known customers represented today in the UMTS Forum and the MoU GSM 3GIG ( The 3rd Generation Interest Group ). SMG and UMTS Forum work according to the common UMTS work plan in order to strengthen the market driven UMTS standardisation.

The following picture illustrates the distribution of the UMTS standardisation within ETSI.




Technical co-ordination in order to facilitate convergence is implemented by a bilateral co-ordination mechanism between the groups responsible for the technical specifications.

### 6.2 UTRA (UMTS Terrestrial Radio Access) definition and time table

The originally planned selection procedure , "beauty contest" type selection, has been replaced with well-experienced ETSI contributions and consensus driven process. The procedure is open for a large number of participants without requesting a complete system. Such a procedure maximises the benefits by using expertise from all players within a large number of the areas of radio access technology The utilisation of contributions from all competent players should result in a UTRA with an overall performance superior to that obtainable by a traditional "beauty contest" type of selection. The new defined procedure ensures a timely definition of the UMTS Terrestrial Radio Access. The time frame set by the market demand for introducing UMTS at the year 2002 should be fulfilled. Another important aim of the procedure is to submit one and only one radio access candidate for IMT-2000/FPLMTS to ITU during the summer 1998.

The procedure for defining the UTRA consists of three phases as approved by SMG:

| | | | |
|---|---|---|---|
| **SMG#22** | **9-13 June 97** | **(milestone M1)** | **Approval of the definition of a limited number of UTRA concepts** |
| **SMG#24** | **15-19 Dec. 97** | **(milestone M2)** | **Approval of the selection of one UMTS terrestrial radio access concept** |
| **SMG#25** | **22-26 June 98** | **(milestone M3)** | **Approval of the specification of key technical aspects of the UMTS terrestrial radio access and submission to ITU-R** |

The following five groups have been approved by SMG#22 ( milestone M1):

- Wideband Direct-Sequence CDMA
- OFDMA Orthogonal Frequency Division Multiple Access
- Wideband TDMA
- Hybrid Wideband TDMA/CDMA
- ODMA Opportunity Driven Multiple Access

### 6.3 UMTS Network principles

The principles of the evolving core network supporting UMTS services have been studied by SMG. The work on "UMTS Network principles" is being carried by SMG3 SA (System Architecture) group combining both GSM and UMTS network experts. The work concentrates on the clarifications of the requirements, the proposal of the network principles and network architecture. Some requirements already being accentuated includes :

- high data rate and asymmetric data transmission
- importance of the Internet
- VHE Virtual Home Environment

A core issue will be the split of functionality and the definition of the interface between core networks and a radio access network.. Such decisions will have influence on interfaces towards various evolving networks and their evolution. The decisions related to the network principles and network architecture will be done at SMG#24 at December 1997. Detailed specifications of the network aspects for the different network parts of UMTS shall be developed during 1998-1999.

### 6.4 UMTS Service principles

Standardisation concentrates on UMTS service capabilities rather than the services themselves. Standardisation of service capabilities includes standardisation of bearers , Quality of Service QoS parameters and additional mechanisms needed to realise required services. These additional mechanisms include the service creation functionality of various network elements, the communication between element and the storage of associated data. Such standardised service capabilities should provide a defined platform that will enable support of speech, video, multi-media, access to Internet, messaging, data, other teleservices, user applications and supplementary services. A set of service capabilities should enable users, service providers and network operators to define services themselves according to their needs. A focus for the UMTS service work should be :

- support of speech services with increased quality
- multimedia services
- access to Internet and Intranet
- service creation by users and service providers
- VHE Virtual Home Environment making possible offering of user specific services across various range of networks
- advanced addressing
- world wide roaming
- production of standards for identified customers

## 7 Third generation standardisation policy - UMTS and IMT-2000 relationship

### 7.1 Co-operation with other standardisation bodies

ETSI SMG is working together with the North American standards organisation T1P1 on GSM standardisation. GSM is implemented in the North America in the 1900 MHz band. With T1P1 exchange of the information have been arranged for the UMTS standardisation. Recently ETSI SMG has started dialogue with Japanese standardisation bodies, ARIB Association of Radio Industry and Businesses, and TTC Telecommunication Technology Committee. ARIB is responsible within Japan for the IMT-2000 radio standardisation and TTC is responsible within Japan for IMT-2000 network standardisation. The exchange of information has been agreed and further co-operation will be discussed between ETSI and ARIB/TTC. The area of common interest should cover work on the 3rd generation systems including both network and radio aspects. UMTS standards shall be further enhanced through the participation of the Chinese delegation at SMG. This co-operation started at SMG#23 in October 1997.

### 7.2 Relationship with IMT-2000/FPLMTS

Several international groups, including FAMOUS ( Future Advanced Mobile Universal Systems, trilateral group USA, Japan and Europe ), RAST (Radio Standardisation, meeting of standardisation bodies dealing with radio standardisation) and ETSI GMM Global Multimedia Mobility (ETSI report on multimedia mobility) have recognised that there are large number of the cellular networks in operation with capabilities of further development. It has been also recognised that future systems are expected to evolve from the existing systems. Therefore there may be several compatible systems belonging to FPLMTS family. Relationship between UMTS and IMT-2000/FPLMTS are of great importance for entire communication community. All 3rd generation systems should be seen as a FPLMTS family and these facts are being positively accepted by ITU study groups.

IMT-2000 family concept offers needed flexibility and at the same time opens considerable commonality. ETSI SMG has provided several contributions to ITU on the principles for the 3rd generation framework standardisation justifying importance of the "IMT-2000 family" concept. The general concept of "IMT-2000 Family" is recognized by ITU as a suitable approach to accommodate the need for evolution/ migration toward IMT-2000 in the wireless communications industry. All efforts should be made to enable roaming

between IMT-2000 family members and free circulation of IMT-2000/UMTS terminals. IMT-2000 Family Concept has been accepted as a basic principle while defining standards for the 3rd generation mobile systems. The concept has been earlier accepted by TG8/1 and reflected at the work on IMT-2000 radio aspects. ITU-T SG11 accepted the family concept at its September 1997 meeting. A new recommendation on this topic has been started under the responsibilities of ITU-T SG11. Such approach opens way for recognition of differences while exploiting similarities expressed by motto:

**"Getting together without being the same"**

**AUTHOR:**

**Mr. Antun Samukic** holds ETSI STF SMG position of Programme Manager UMTS.

Mr. Samukic held several manager or Chairman positions within Ericsson, ETSI and ITU in several projects related to product planning and standardisation:

- UMTS and FPLMTS/IMT-2000
- Private network mobility based on DECT and PABX
- Mobility between private and public networks based on DECT and/or GSM,
- VPN Virtual Private Networks

During 1993 - 1995 Mr. Samukic held the position of the RACE Consensus Manager for the UMTS and Satellite Systems. During that time Mr. Samukic initiated and chaired the SMG Ad-hoc Group "Evolution towards UMTS" that contributed to the acceptance of the UMTS evolution approach.

Mr. Samukic was also member of the ERO European Radio Office Study Team "UMTS Frequency Allocations" and one of the editors for the ITU-R TG8/1 study "Evolution/migration towards FPLMTS"

**Education:**

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| 1976 | M.Sc.E.E. | Croatian University, Zagreb |
| 1984 | Bachelor of Commerce | Institute for Higher Marketing Education, Stockholm |

**Mr. Antun Samukic** was born at 10 December 1951 in Croatia. He has been employed by Ericsson since 1976.