MEDIACOM 2004
A Framework for Multimedia Standardization

Project Description – Version 3.0 March 2001

1. Introduction

The rapidly developing world of the multimedia related technologies and standards requires a framework to develop standards for applications, services and systems, which can respond to users requirements in terms of mobility, ease of use, flexibility of systems and end-to-end interoperability with specific quality requirements.

Considering:

- the continuing trend in digitization;
- the rapid growth of digital networks and in particular the Internet;
- the increasing computational power in personal computers;
- the convergence of various technologies including communications, broadcasting, information technology, and home electronics;
- that multimedia topics are discussed in both ITU-T SGs (e.g. 2, 7, 9, 12, 13, 16 and SSG), ITU-R SGs, international and regional SDOs, and also in external organisations;
- emerging new communication services and applications that are a result from the growth of the Internet and wireless technologies;
- that with the emergence of high-speed high-quality networks, society will request real-time multimedia communications as an extension of existing mono-media systems;
- that the end-to-end performance of multimedia systems and services defined in the ITU and elsewhere should be dimensioned; and
- that it will be necessary to study the interfaces in the Information Appliance environment as consumer devices increasingly perform multimedia functions.

ITU-T SG16, the lead SG for Multimedia, is working on project - **MEDIACOM 2004** (Multimedia Communication 2004). The objective of the Mediacom 2004 Project is to establish a framework for Multimedia standardization for use both inside and external to the ITU. This framework will support the harmonized and coordinated development of global multimedia communication standards across all ITU-T and ITU-R Study Groups, and in close cooperation with other regional and international standards development organizations (SDOs).

2. References

[1] ITU-T SG 13 *"IP Project Version 5"*; May 2001 [http://www.itu.int/ITU-T/com13/ip/index.html]

3. Scope of the Mediacom2004 Project

3.1 Scope

The scope of Mediacom 2004 will include the following applications:

- End-to-end multimedia systems and services over all network types including the Internet: videophone/videoconference, multipoint/multicast multimedia systems, multimedia on demand, electronic commerce, distance learning, tele-medicine, interactive TV services, web-casting, MBone, including their distribution within the home environment, etc.
- End-to-end multimedia systems and services over wireless access systems, e.g., using Radio Frequency or Infrared (IMT-2000, Wireless Application Protocol Forum, Bluetooth, HomeRF, IrDA, etc.), In this environment, computer or consumer Information Appliance devices will be used.
- Security system for/using multimedia systems (watermark in the video contents, individual authentication, etc)
- Multimedia broadcasting systems that interactively handle audio and video.
- The extension of E-mail and the WWW for the transmission of multimedia 'documents'.

3.2 Contents of the project

The Mediacom 2004 project will address:

- Definition of the framework concept (objectives, architecture)
- Definition of the framework study areas (including the relationship with existing ITU Projects, e.g. IP, GII, IMT-2000)
- Standardisation of services, systems and terminals for multimedia applications over existing and future platforms, providing end-to-end interoperability
- Co-ordination of the studies performed in the framework study areas defined within the ITU-T and ITU-R (to avoid duplication of work)
- Responsibility for relations with relevant standardisation bodies and fora/consortia outside the ITU

3.3 SG16 Responsibility

Within the framework of the Mediacom 2004 Project, SG16 is responsible for:

- developing a framework for multimedia services and systems that must be, as far as possible, independent from the underlying infrastructure
- developing appropriate services and systems related standards for applications in multimedia communications;
- defining the interface with the relevant work areas assigned to the other ITU-T and ITU-R SGs involved;
- liaison and coordination with relevant bodies outside the ITU;
- ensuring that end-to-end interoperability is accommodated either by full compatibility between systems or by specification of the appropriate gateways;
- maintaining a database of all multimedia standardisation activities.

4. Multimedia Framework Study Areas (MM FSAs)

4.1 Multimedia development process

Multimedia applications/services consist of many aspects, e.g. media coding, network interface and optional tools for security and privacy etc. Figure 1 shows the development environment of the individual application. Each application is developed using the related tools considering the terminal/system.

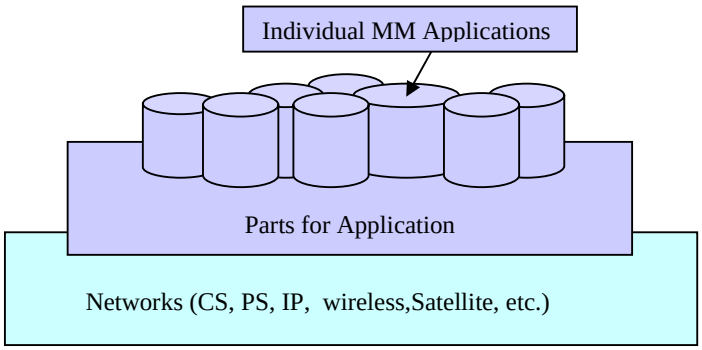


Figure 1 - Developing environment of the individual Application

The main task in the development of an application is the integration or assembling of the tools, considering the customer's requirements, market trends, applicable network features, etc. Figure 2 shows the development process for multimedia applications and services. The components consist of three Blocks, A: System Design and Integration, B: Common media tools and C: Network interface. Each multimedia application can be developed by A, considering the design document, and using the technology of B and C. For the development of MM systems, the role of block A (System Design and integration/assembling Group) is large. Arrows a, b, c and d show the flow of the MM Application developing process.

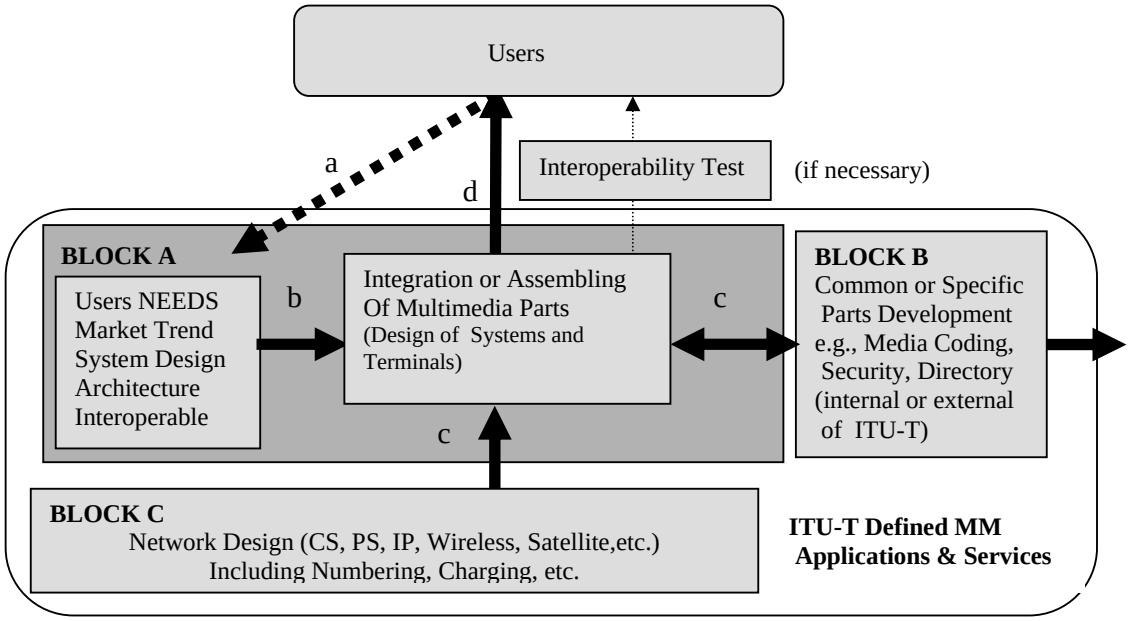


Figure 2 Development Process for Multimedia Applications and Services

Block A encompasses the transmission and /or usage protocols/ procedures necessary for the Media contents. That is, how to convey the media contents to the partner terminals with via a reliable process. The technology includes the connection establishment, device confirmation, error free/ flow control, and transmission confirmation procedures.
Interoperability of the Recommendations will be tested through the terminals/devices implemented by the appropriate organisations.

4.2 Multimedia Framework Study Areas (FSAs)

The study areas and developing organisations/bodies are shown in Figure 3.

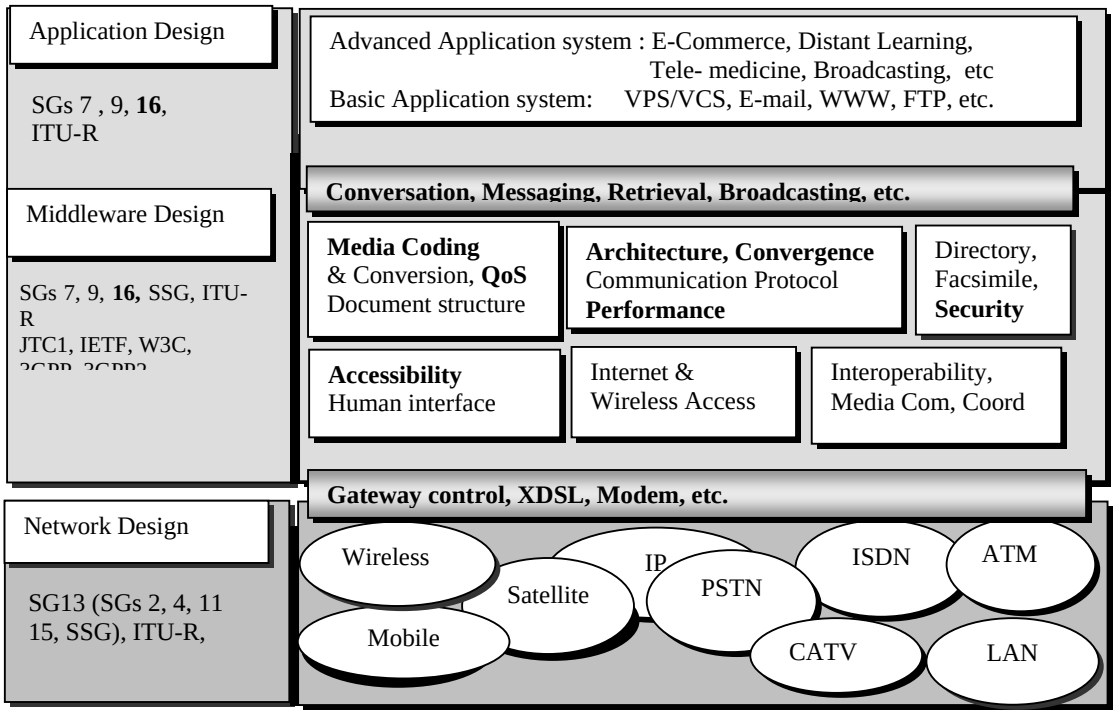


Figure 3 Study areas and developing organizations/bodies

The Mediacom 2004 project is divided into a number of main Framework Study Areas (FSAs) as in Table 1, each of which has an associated study Question in SG16.

Table 1 Framework Study Areas (FSAs)

Q. No	FSAs	Related Document
B	Architecture	Annex B
C	Applications and Services	Annex C
D	Interoperability	Annex D
E	Coding	Annex E
F	QoS & Performance	Annex F
G	Security	Annex G
H	Accessibility	Annex H

Note: Each of these is summarised as follows, and further project detail is contained in individual Annexes (Annexes B-H) to this Project description. This document will be updated on a regular basis, and it is intended that the Annexes may be updated independently of the main body of the document.

Q.B/16 - Architecture

The scope of this FSA is to define the architectural framework for future multimedia services and applications. Multimedia applications and services need to be independent of the networks they operate across. One impetus for this has been the growth in the use of the Internet with its concept of available anywhere and anytime at minimal cost. The short falls of the public Internet in terms of speed, bandwidth and real-time needs are now being addressed. With the concept of an open network architecture, the means of ensuring that new multimedia applications can be readily configured, using available network resources, to meet user needs in a network-independent way.

Q.C/16 - Applications and Services

Today we observe convergence in the fields of Information Technology, telecommunications, radio communications, broadcasting and the interactive computing environment, which is coupled with the development of new networks, especially networks based on IP technology and mobile networks. This convergence is fuelling the roll-out of all types of new multimedia services with the prospect of the concept of total multimedia mobility becoming a reality in the near future.

Convergence is an essential issue in the project. It will aim to ensure that the architecture is applicable to various services, independently from the networks that support them. Generic functional descriptions of services will rely on a modular approach allowing reusability for different services and flexibility in the design of new services. Network independent protocols such as the T.120 and T.130 series will be provided with extensions meeting the particular needs of different types of services and applications. As far as possible, Recommendations will be drafted with generic features and, when necessary, specific adaptations added so that they can be applied to different networks.

The aim of this FSA will be to generate a ‘Convergence Roadmap’ to show how diverse existing and planned MM services and applications can converge so as to provide seamless interworking from the user viewpoint.

Q.D/16 - Interoperability

Interoperability can be considered in terms of reliable end-to-end multimedia operation across a number of different networks. This view of interoperability is discussed at length in Annex A. However, there is an alternative view in terms of different applications and services (either network or end system based) interoperating efficiently and reliably in a given multimedia environment. Support of such interoperability requires agreement on a framework within which common tasks can locate and establish communications with their peers, and dissimilar tasks can exchange media streams of mutual interest.

SG16 will undertake the task of managing the process of harmonisation of new multimedia systems and services and ensuring their end-to-end interoperability.

Q.E/16 – Media Coding

The work on the Media Coding area will start from the identified emerging services and applications and the corresponding information elements (media) that need to be encoded/decoded/represented. In the videotelephony service only the audio and video signals need to be coded, but in more sophisticated services and applications (e.g. multimedia database search, telemedicine, etc.) other kinds of information elements should be considered. It is relevant to note the applicability of speech recognition and speaker verification standardisation.

This study will identify existing and planned media coding technologies and address the interworking issues arising. Once again, the project will also aim to identify a 'roadmap' for convergence in this area, along with the development of new coding methodologies where appropriate. This will be done taking full account of the Quality of Service requirements.

If new media are identified, beyond the traditional ones (video, audio and data) included in the existent services, studies should be started on the appropriate media coding techniques. Moreover, security aspects related to media coding will require additional media coding techniques.

The project will also include study of the requirements on media coding coming from the reference multimedia architecture. Key elements of the considered architecture (e.g. independence of services from underlying network, interoperability, etc.) will impact on the media coding techniques.

Q.F/16 - QoS and Performance

The aim of this FSA will be to:

- ensure that the required QoS levels required for the various media types are established and defined;
- ensure that the necessary mechanisms and protocols for providing these multimedia QoS levels are provided.

This FSA will focus on the end-to-end performance as perceived from an end user of a multimedia service or system and will identify the appropriate methods and guidelines suitable for:

- Measurement of the quality of media coding
- Measurement the end-to-end quality of multimedia services

Complementarily, this FSA will identify suitable end-to-end performance guidelines to assist the implementation of new multimedia systems and services

Q.G/16 - Security

There are a number of security considerations that need to be addressed when developing an architecture for the multimedia information infrastructure. Such considerations include end-to-end privacy of data, authentication (user identification), anonymous access, access control intrusion detection, electronic signature, encryption, non-repudiation and lawful intercept. Within a telecommunications context security issues can be grouped in terms of four roles: user, network operator, third party and government (ref. SG13's IP Project Description – Version 2).

The aim of this MM FSA will be to try to ensure maximum consistency and interoperability across the range of MM services and applications.

Q.H/16 - Accessibility

The capabilities to handle different information media and control actions vary within wide boundaries among users of telecommunications and multimedia services. This variation may have a cause in age related functional limitations, in disabilities because of other reasons, and in other natural causes. With the ageing populations in large parts of the world, many telecom users will have sensory and motor limitations. It is important to meet this wide variety in capabilities in the design of telecommunication services so that an increasing number of users can make benefit of them.

The work influences many aspects of multimedia systems, such as enabling multiple media streams, like video, text and voice. Adequate user control over services and devices should be possible without full use of all human senses and motor capabilities. This user control should be possible in alternative ways, assuring that information is provided in alternative media.

The aim of this area will be to ensure that standardised solutions improving human accessibility will be identified, designed and promoted.

5. Responsibilities of SG16

SG16 will address the harmonization of the end-to-end media interfaces, services and applications. In particular, SG16 is responsible for the protocol architecture higher than Network Layer, MM architecture, audio/ video components and interoperability.

SG 16 is also responsible for the Middleware Design (MM Services, Media Coding, MM Protocol Architecture, which are indicated in the grey colour blocks in Figure 1).

The current structure of SG16 is:
WP1/16 – Modems and Facsimile Terminals
WP2/16 – Multimedia Platforms and Interworking
WP3/16 – Media Coding
WP4/16 – Multimedia Framework
In addition to the above topics, SG16 will consider the following:

- MM Applications over IP, CATV, Home area wireless network, etc.
- Wireless Interfaces
- Security aspects related to video coding, etc.,

Table 2 shows the SG16 work programme for 2001-2004. Table 3 shows the relations between Framework Study Areas (FSA), "vertical" Questions and ITU-T priorities

Table 2 Questions for 2001-2004 in SG16

Q. No	Title
A	Mediacom2004
B	MM Architecture
C	MM Application and services
D	Interoperability of MM systems and Services
E	Media Coding
F	Quality of service in MM systems
G	Security of MM systems and services
H	Accessibility to MM Systems and Services
1	Multimedia systems, terminals and data conferencing
2	Multimedia over packet networks using H.323 systems
3	Infrastructure and interoperability for Multimedia over packet networks
4	Video and data conferencing using Internet-supported services
5	Mobility for MM systems
6	Advanced video coding
7	Wideband coding of speech at around 16 kbit/s
8	Encoding of speech signals at bit rates around 4 kbit/s
9	Variable bit rate coding of speech signals
10	Software tools for signal processing standardisation activities and maintenance of existing voice coding standards
11	Voiceband Modems: Specification and Performance Evolution
12	DCE-DCE Protocols for the PSTN and ISDN
13	DTE-DCE Interfaces and Protocols
14	Facsimile Terminals
15	Distributed speech recognition and speaker verification

Table 3 Relationship between Framework Study Areas (FSA), "vertical" Questions and priorities

FSA Horizontal		FSA Vertical	Priority Issues		
			Mobility	IP	Interactive-Broadcasting
QA	Architecture	Q.B	1,2,3,5,12,13,14, 15	2,3, 11-14, 15	
	Application & Services	Q.C	1,2,3,5,12,13,14, 15	2,3,4, 11-14, 15	
	Interoperability	Q.D	1,2,3,5,12,13,14	2,3,4, 11-14	
	Coding	Q.E	6,7,8,9,10,12,14, 15	6,7,8,9,10,12,14, 15	6,7,10,12,14, 15
	QoS & Performance	Q.F	2,3,5	2,3,4	
	Security	Q.G	2,3,4,12,13, 14	2,3,4,11,12, 13,14	
	Accessibility	Q.H	2,3,4,12,13, 14, 15	2,3,4,11,12, 13,14, 15	

6. Relationship with other organizations/bodies

6.1 Overview

This project requires liaison with the following organisations:

- ITU-T SGs and projects (e.g. GII, IP, SSG on IMT-2000 and beyond)
- ITU-R SGs, particularly ITU-R SG6 WP6M
- ISO/IEC (MPEG-4, MPEG-7, MPEG-21)
- W3C
- IETF
- Regional standardisation bodies (e.g. ETSI, T.1 (US), TIA (US), etc.)
- Other fora/consortia (e.g. 3GPP, 3GPP2, etc.)

It is important here to ensure that quick and effective communication channels are established between the key bodies. Liaison officers are appointed as appropriate.

6.2 Related Activities in other ITU-T Study Groups

Information on the work of other ITU-T Study Groups relevant to the Mediacom 2004 Project is provided in Annex I

6.3 Relations between ITU-T SG16 MM studies and ITU-R MM Areas

The key relationship with the ITU-R sector would is with ITU-R SG6 WP 6M, and it is intended to promote closer and more effective liaison through the joint Workshop “Convergence in Multimedia”, 12-15 March 2002.

Further information is provided in Annex J

6.3 ISO/IEC SGs

ISO/IEC JTC1 SC2 is the main international formal standardisation body for Character Coding, and SC29 is the main ISO/IEC standardisation body for multimedia coding and multimedia systems. The latter incorporates JPEG/JBIG – the ITU/ISO Collaborative Teams for still image coding. ISO/IEC JTC1 SC29 WG11 (MPEG) is the main body for audio and video coding, and for the standardisation of ISO/IEC Multimedia Platforms and Systems. The main projects completed are: MPEG-1, MPEG-2 and MPEG-4, MPEG-7 – and data base access for MPEG-4 is being finalised.

MPEG is also studying the viability to extend the existing MPEG-4 media coding algorithms including the Digital Cinema application.

MPEG-21 is the new draft project to incorporate a multimedia framework standard and with a strong emphasis on Electronic Commerce and Protection of Media Content. It addresses the entire chain of content value from generation to consumption. The relationship between the Mediacom 2004 and MPEG 21 projects is addressed in Annex I.

6.4 Relations between ITU-T SG16 MM studies and IETF-MM Areas

The relations between SG16 (2001-2004) MM Questions and IETF-MM Areas are addressed in Annex J.

6.5 World Wide Web Consortium (W3C)

World Wide Web Consortium (W3C) was established in 1994 to develop the Recommendations for web based prototype and sample applications, and to promote the WWW technologies and standardization. At present, the W3C has more than 390 membership are joined. The main activities of W3C are the following four domains.

- User Interface
- Technology and Society
- Architecture
- Web Accessibility Initiative (WAI)

Table 4- Analysis of MM Standardisation Roles (Draft)

Table 4 (Part 1/4): Role of ITU-T/ ITU-R SGs and other relevant bodies

	SG2	SG3	SG4	SG5	SG6	SG7	SG9	SG10	SG11	SG12	SG13	SG15	SG16	SSG-IMT2000 tba	ITU-R
E-commerce						**S**							**L**		
Distant learning													**M**		
Tele-medicine													**M**		
TV service							**M**								**X**
Web-casting							**M**						**M**		
MBone													**M**		
E-mail															
WWW															
Conversation conference		**S**											**L**		
Messaging						**M**									
Retrieval													**M**		
Broadcasting							**L**								**X**
Directory	**X**	**S**				**M**									
Security						**L**	**X**						**X**		
Facsimile													**L**		
Communication Protocols			**X**			**X**	**X**		**X**		**X**	**X**	**X**		
User Gateway Control							**X**	**S**	**S**		**S**		**X**		
Media coding & conversion										**S**			**L**		**X**
Internet access							**M**		**S**		**X**	**X**	**X**		
Wireless access									**S**				**M**		
Interoperability							**X**		**S**		**X**		**L**		
MediaCom coordination											**S**		**L**		

(L :Lead SG, **M** : Main part of the work, **S** :Support or Collaboration, **X** : Work on the subject)

Table 4 (Part 2/4):

The role of ITU-T/The Role of ITU-R SGs and other relevant bodies

	SG2	SG3	SG4	SG5	SG6	SG7	SG9	SG10	SG11	SG12	SG13	SG15	SG16	SSG IMT-2000	ITU-R
Network							**S**								
Mobile	**S**	**S**	**S**					**S**	**L**		**S**		**S**		**X**
Wireless LAN			**S**					**S**	**S**				**X**		
Satellite			**S**					**S**	**S**						**X**
IP							**X**				**L**		**X**		
PSTN(Modem)		**S**	**S**								**M**		**L**		
XDSL		**S**										**M**	**S**		
ISDN		**S**	**S**						**S**	**S**	**L**		**X**		
ATM		**S**	**S**					**S**	**S**		**L**		**X**		
CATV							**M**								
LAN							**X**					**M**	**X**		

(L :Lead SG, **M** : Main part of the work, **S** :Support or Collaboration, **X** : Work on the subject)

Table 4 (Part 3/4):

The role of ITU-T/The Role of ITU-R SGs and other relevant bodies

	ISO/IEC JTC1	ETSI	T1	IETF	ATMF	IMTC	IEEE	TIA	3GPP	3GPP2			
Application Design													
E-commerce				X									
Distant learning													
Tele-medicine													
TV service													
Web-casting													
MBone				M									
E-mail				M									
WWW				M									
Middleware Design (Services, Architecture, Media coding, Protocols)													
Conversation conference	X	X		X		M							
Messaging				X									
Retrieval	X			X									
Broadcasting	X	X											
Directory				X									
Security	X	X		X		X		X					
Facsimile				X				X					
Communication Protocols	M	X	X	X	X	X		X	X	X			
User Gateway Control								X					
Media coding & representation	M							X	X	X			
Internet access		X		M									
Wireless access		X						X					
Interoperability		X	X		M	M		X					
MediaCom coordination													

(L :Lead SG, M : Main part of the work, S :Support or Collaboration, X : Work on the subject)

Table 4 (Part 4/4):

The role of ITU-T/The Role of ITU-R SGs and other relevant bodies

	ISO/IEC JTC1	ETSI	T1	IETF	ATMF	IMTC	IEEE	TIA	3GPP	3GPP2			
Network Design (Architecture, Platform)													
Mobile		**X**	**X**					**X**	**X**	**X**			
Wireless LAN		**X**					**X**						
Satellite		**X**						**X**					
IP		**X**		**M**				**X**		**S**			
PSTN(Modem)		**X**						**X**					
XDSL		**X**						**X**					
ISDN		**X**	**X**										
ATM		**X**	**X**		**M**			**S**					
CATV		**X**											
LAN		**X**		**S**			**M**	**S**					

(L :Lead SG, **M** : Main part of the work, **S** :Support or Collaboration, **X** : Work on the subject)

Document History

Issue	Date	Remarks
V 1.0	Feb. 00	COM 16-R.61
V 1.1	Mar. 01	Updated to reflect WTSA agreements and new SG16 structure etc.
V 2.0	June 01	Document restructured, and action plans in Annexes updated.
V 2.1	February 02	Updated at the meeting of SG16
V 2.2	February 02	Updated at the meeting of SG16

Annex A - Background

This Annex reflects the situation at the start of the Mediacom 2004 Project.

We are regularly reminded that our society has entered an Information Revolution, much like the industrial revolution of the past.

The main technological trends in this new "Information Society" are:

- digitisation in the storage, processing and transmission of information;
- increasing computer and signal processing power;
- convergence between technologies, e.g. between information technology and telecommunications; and between interactive applications and broadcasting;
- increasing overlap of home and business markets, with consequent increase in functionality and decline in hardware prices;
- more rapid product launch times and reducing product lifecycles.

Recently the rise of the Internet and of wireless communications have led to the rapid development of many new multimedia (MM) services and systems.
At the same time, the rapid increase in diversity of services and systems increases the possibility of confusion amongst users, which can lead to them avoiding this new functionality. While not necessary in all fields of human social activity, the standardization of interfaces is necessary for connectivity and successful communications. Global standards and harmonised regulations are essential for an effective and democratic Information Society, and consistent multimedia systems and services are part of the core in this revolution.

Thus it is necessary to urgently develop a standards framework for multimedia applications, services and systems for the 21st century. This framework has to be able to respond to user requirements, in terms of mobility, ease of use, security, flexibility of systems and end-to-end interoperability, with specific quality of service requirements. So far the work in the ITU-T has been mainly in a reactive mode to the telecommunication market.

Two factors make security an even more complex issue within the context of Mediacom 2004 than it is elsewhere: the specific nature of multimedia communications (diverse media, multiple streams within one communication), and the use of multimedia communications in the course of e-commerce. While e-commerce puts even greater emphasis on the objectives of confidentiality, integrity, and non-repudiation of communications, it also raises new issues of protection of intellectual property distributed over the telecommunications network.

In response to the developing multimedia-related technologies and standards, Study Group 16 was established at the ITU-T World Telecommunication Standardisation Conference (WTSC) held in Geneva, October 1996. SG 16, with "multimedia services, systems and terminals" as its theme, has focused on integrating the multimedia-related activities, which in the previous Study Period were conducted separately as: multimedia service definition (SG 1); multimedia audiographic conferencing (SG 8), multimedia PSTN communications and modems (SG 14), and audio-visual terminals and systems (SG 15).
This is now one of the major activities in the ITU-T.

However, the present convergence trends are bringing further overlaps in standardization work. The situation is exacerbated as some SDOs seek to extend their activities beyong their original mandates. This calls for stronger co-ordination than achieved so far to reduce the need for gateways to maintain end-to-end interoperability. There is also a need to achieve agreement on

common protocol frameworks which will serve to reduce the cost and complexity of those gateways which are still necessary.

According to Resolution 2 of the World Telecommunication Standardization Assembly (WTSA) held in Montreal, 27 September to 6 October 2000, SG 16 is responsible for studies relating to multimedia service definition and multimedia systems, including the associated terminals, modems, protocols and signal processing.

As a consequence, SG 16 continues its work on the further development of the project MEDIACOM 2004 to create a framework for the harmonized and coordinated development of global multimedia communication standards across all the Study Groups of the ITU-T and ITU-R, and in close cooperation with other regional and international standardization organizations. This project was endorsed by the World Telecom Standardisation Assembly 2000.

A. 1 Current situation of Multimedia standardization

An information communication service or application can be roughly divided into real-time and non real-time communications. The former is stream type communication, e.g. telephone, fax, and audiovisual communication, over the PSTN, ISDN etc. On the other hand the latter is burst type communication, e.g. on IP networks. Figure A.1 shows examples of the existing composition of services and applications related to the network.

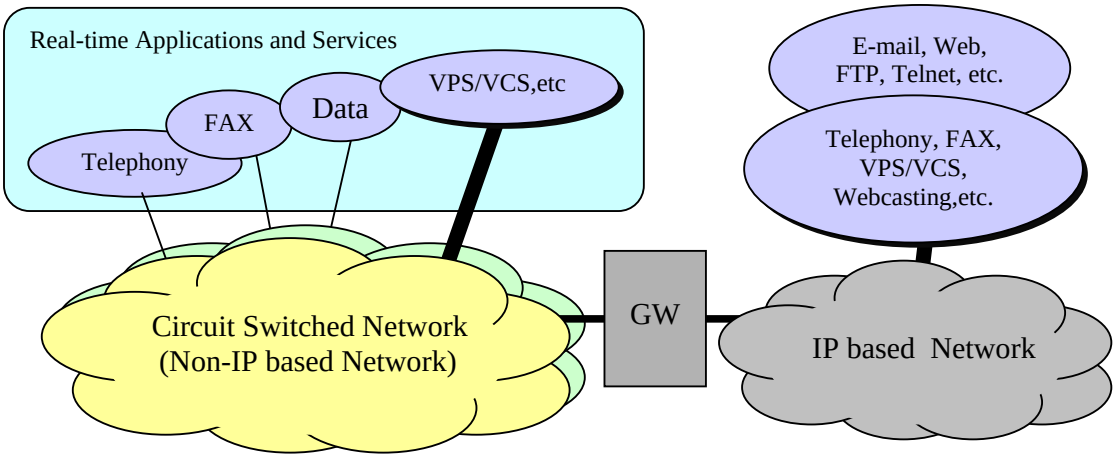


Fig.A.1 Current situation of Applications and Services

Typically, services and applications over circuit switched (CS) networks have been developed by different ITU-T SGs e.g. SG7 (Data transfer), SG8 (Facsimile), and SG16 (audiovisual multimedia). On the other hand, in IP based networks, the applications have typically been developed by the IETF or the W3C consortia. However there are exceptions, for example, atpresent, H.323 is the key Recommendation for real-time multimedia applications over IP based networks. The interworking of applications and services between the circuit switched and IP networks can be realized through Gateways (e.g., IP telephony, etc.)

SG16 has continued to extend the Recommendations for audiovisual (AV) communication over each type of circuit switched network. For example, Table A.1 shows the relationship between Recommendations for AV systems and the related networks. Interoperation between any two systems in Table 1 requires four levels of interworking: conversion between bearer formats,

conversion between supported media formats, conversion between multiplexes, and signalling interworking. These must be accomplished in gateways of greater or lesser cost and complexity depending on the systems involved.

Table A.1 Relationship between Recommendations for multimedia systems and related networks

Recommendations for AV systems	Related Networks
H.310	B-ISDN(ATM)
H.320	N-ISDN
H.321	B-ISDN
H.322	LAN(QoS)
H.323	LAN(Non QoS)
H.324	PSTN
H.324M(H.324Annex.D)	For Mobile
H.324i (H.324 Annex ?)	For N-ISDN

SG16 began several years ago to reduce the cost of this interworking by defining common components (e.g. H.245) at the signalling level. It is possible to go further in this direction by using a common signalling protocol for different networks. Study Group 11 has taken such a step in its modification of ISUP to create BICC (Bearer Independent Call Control, Q.19xx series). However, the limits of this strategy must be investigated in the light of the restrictions (e.g. in bandwidth, terminal capability) imposed by some networks. Figure 2 illustrates the goal of this line of inquiry.

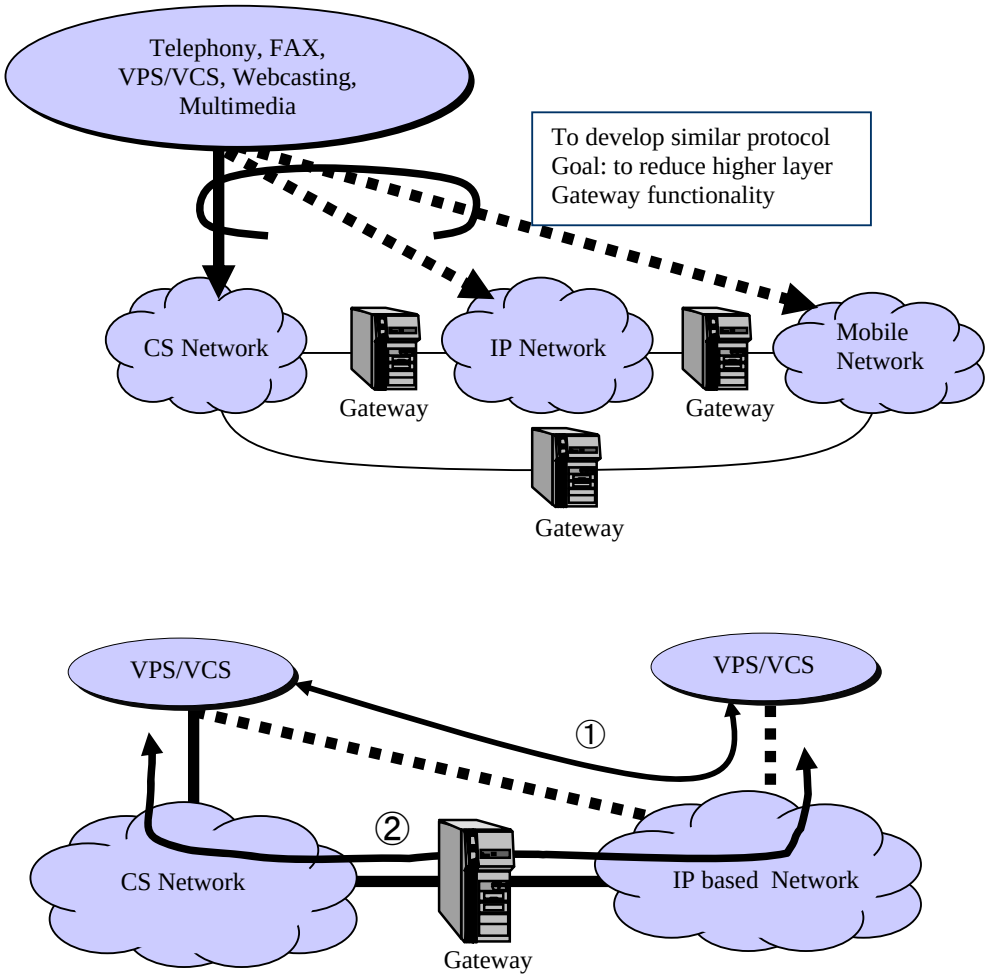


Figure A.2 Near term solution for Multimedia development

The development of H.248 has made possible the physical separation of call processing from the multiplex, media conversion, and bearer conversion functions, with the latter realized in the Media Gateway. This increases the attractiveness of separate transport of signalling and media. Again, inherent limitations may make such separation impossible in some networks.

Unfortunately, multiple candidates vie for the role of universal signalling protocol. SG16 would offer an extended H.323. SG11 is considering the addition of multimedia capability to BICC. SIP is the centre of attention in the IETF, with possible SG9 support. Further candidates will undoubtedly appear. It would seem more realistic to attempt to minimize the cost of interworking these protocols by obtaining agreement on a common framework for interoperation. The precedent for such a solution has been provided by the Instant Messaging and Presence Protocol (IMPP) framework in the IETF. It may also be helpful to promote common signalling components, for example by influencing the design of SDPng (a new protocol being developed in the IETF) so that it can serve as a replacement for SDP in SIP, BICC, and H.248, and for H.245 in the H.3xx systems.

End-to-end interoperability is not just a matter of signalling. It is also necessary to ensure that a common subset of solutions is available for infrastructural components such as addressing, QOS and security. Mediacom 2004 has made provision to ensure coordination in these areas too.

Annex B – Architecture

B.1 Scope

Multimedia applications and services need to be independent of the networks they operate across. The impetus for this has been the growth in the use of the Internet with its concept of "*available anywhere and anytime at minimal cost*". The speed, bandwidth and real-time shortfalls of the public Internet are now being addressed. Additionally, an open network architecture will ensure that new multimedia applications can be readily configured to meet user needs using available network resources in an network-independent way.

A multimedia information infrastructure will need to encompass all types of services and connections, including conferencing, home networks and WEB-based applications.

Figure B.1 shows the generalized Multimedia Terminal Functional Model.

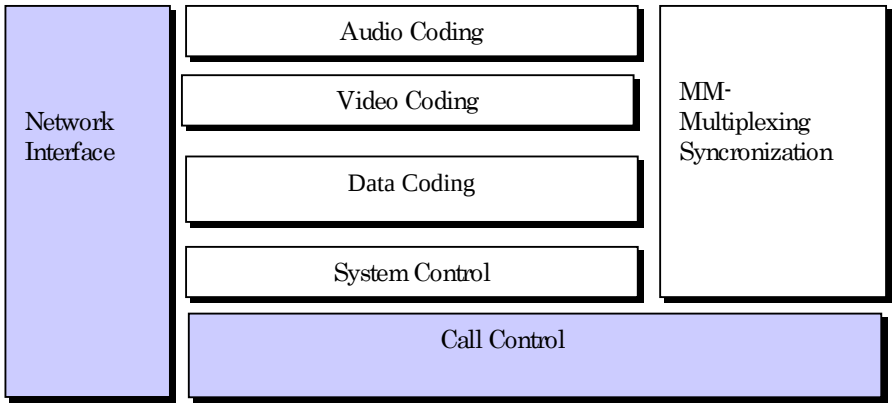


Figure B.2
The general MM Functional Model for terminal

B.2 Standardisation

It is expected that ITU-T SG13 will play a major role in this activity.

The Parlay specification defines such an open network API architecture aimed at easing the process of integration of applications across different networks.

Mainly in ITU-T (SG13, SG15, SG16, others)
Some related activities going on in ETSI TIPHON (WG2) and ETSI SPAN.

B.3 Players

Joint initiative through **OMG** (Object Management Group which provide the **CORBA**:Common ORB Architecture). Some related activity going on in ETSI NA6.

B.4 Work Items

B.4.1 Act as a point within SG16 for considering new work items and collecting together requirements for new works items. Also assessing how new work items will impact on existing work underway in SG16.

B.4.2 To produce a general architecture **H.mmarch** for multimedia services and applications which should encompass the following aspects:

- General Architectural Requirements
- Emergency Services
- QoS
- Mobility
- Security
- Addressing Issues
- Interworking (PSTN -ISUP, Q.931, SIP, BICC, etc)

Annex C - Applications and Services

C.1 Scope

There is a need for standardized international multimedia applications and services which will fully meet evolving user needs and guarantee the compatibility of multimedia systems and terminals on a worldwide basis. Across different networks SG 16 has developed a general methodology for description of services as F.700 and applied it to F.700-series service Recommendations. The user requirements are captured through specific application scenarios and a modular approach facilitates evolution and interoperability.

This work is motivated to study a consistent approach for various generic multimedia applications and services taking into consideration the increasing technical convergence of the telecommunications, television and computer fields.

The convergence of information technology, telecommunications, radio communications, broadcasting and the interactive computing environment coupled with the development of new networks (especially those based on IP technology and mobile networks) is fuelling the roll-out of all types of new multimedia services. This Convergence will make the prospect of the concept of total multimedia mobility become a reality in the near future.

Convergence is an essential issue in the MediaCom 2004 Project. It will ensure that the architecture is applicable to various services, independently from the networks that support them. Generic functional descriptions of services will rely on a modular approach allowing reusability for different services and flexibility in the design of new services. Although Recommendations will be drafted with generic features, specific adaptations will be provided when necessary, so that the Recommendations can be applied to different networks.

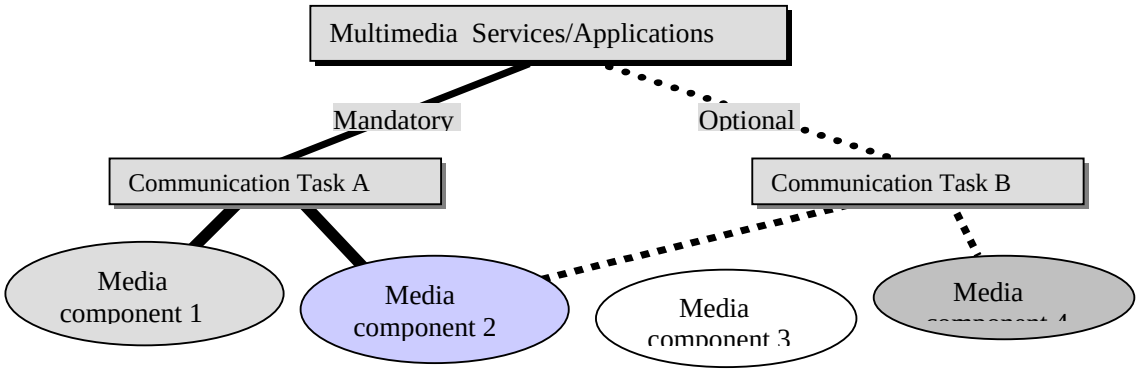


Figure C.1:
Application of the reference model to the description of a multimedia services
(Figure 4/F.700)

C.2 Work and Study Items

- Identify multimedia services and applications studied by the ITU and other bodies and produce a map of their inter-relationship.
- Identify priorities to respond to Administration requirements and market demand.

- Identify missing and overlapped areas.
- Review the methodology for service definition to include techniques such as:
    - Service development through scenarios;
    - Definition of ‘service capabilities’ rather than full ‘services’.
- Harmonize development of multimedia applications and services with that of network services.
- Identify the services and applications to be explored by SG 16.
- Define the scope of those services and applications under SG 16 responsibility.
- Define the requirements for these services and applications.

C.3 Co-operation and interaction

This activity will be led by ITU-T SG16.

Other bodies will include ITU-T and ITU-R SGs; ISO; IETF; CEN/ISSS; ETSI; MPEG; DVB; DAVIC; TV Anytime. The H series recommendations that are presently designed for fixed networks will also be extended to mobiles and to satellites so that the user will be able to access all services in various environments.

The design of gatekeepers, which has already started to be standardised in the H.323 family, will be extended so as to ensure transparency for the users over the boundary between IP and non-IP networks for most of his applications.

- ITU-T SGs 2, 9, 11, 12, 13 and 15;
- ITU-R SGs 10 and 11 for broadcast services and applications.
- IETF for Internet services.
- SG 13 IP & GII Projects.

C.4 Workplan

- Production of an initial map of multimedia services and applications: 2002.
- Update of the map: 2003-4.
- Production of the scope and requirements capture for the services and applications under SG 16 responsibility: 2002.
- Revise Recommendation F.700 to take account of:
    - IP based services and capabilities;
    - New service definition processes.
- Develop generic multimedia service definitions as needed

Annex D - Interoperability

D.1 Scope

Interoperability can be considered in terms of reliable end-to-end multimedia operation across a number of different networks. Interoperability between Information Appliances depends on two terminals being able to operate in a compatible manner and to use compatible interfaces, coding schemes and information media after connection is established. Figure C.1 shows audio-visual system Recommendations over different networks.

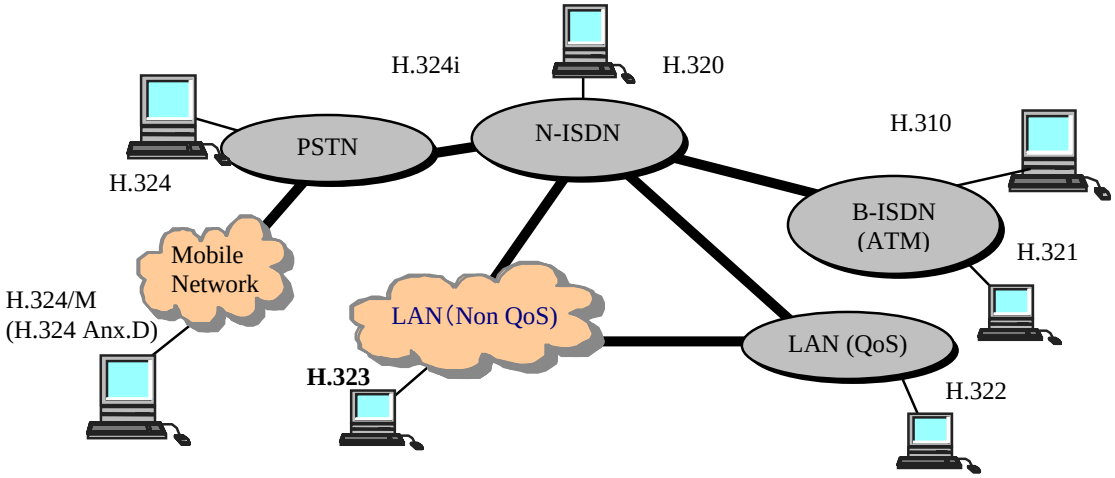


Figure D.1:
Audio-visual system Recommendations over different networks

In this heterogeneous environment, networks and end systems have to interoperate efficiently for different applications and services to deliver good perform. Gateways are a vital element to ensure interoperability or interworking of legacy systems with the new IP-based networks.

SG16 will manage the process of harmonisation of new multimedia systems and services and will ensure their end-to-end interoperability. SG16 will create and maintain the necessary service definition databases.

The desirable end-to-end interoperability is to use common interfaces and media components. However, for historical reasons, this rarely is possible.

In general, the communication between two terminals can be realized by the following procedure.

1) The connection of the terminals through the network.

2) The identification and selection of the partner’s terminal

3) The connection establishment and selection of the parameters and know about the performance of the network.

4) The selection of the QoS (network QoS and terminal QoS)

5) Transfer the Information data, coded data, etc.

6) Disconnect the network.

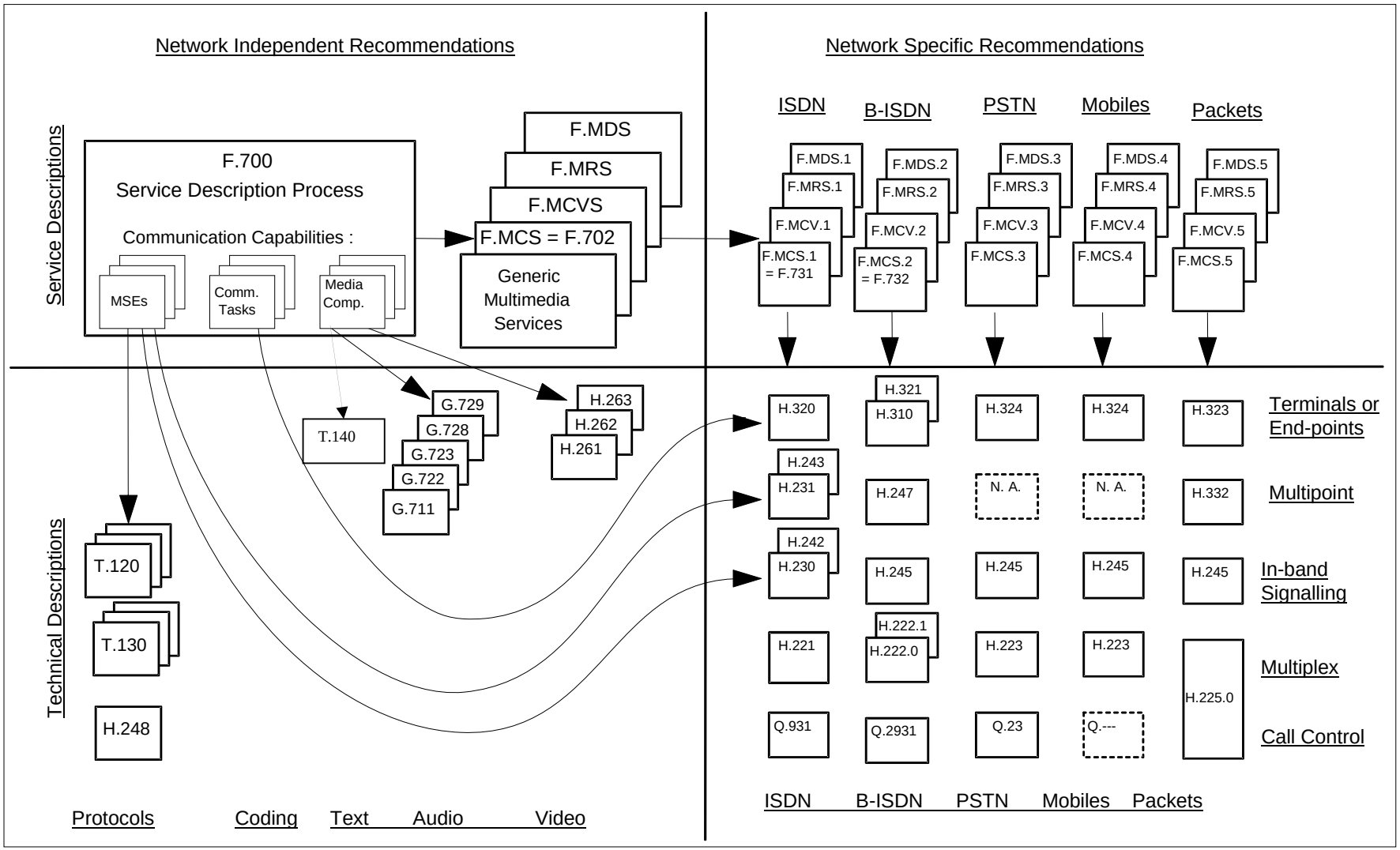
In the case of communication between two terminals, it is necessary that both terminals can identify the capabilities of the terminal in the other end and to know the appropriate terminal. In order to know the partner’s capability, the definition of the service/application of the multimedia terminals is

important. The defined capabilities of the services/applications should be registered through Information Database for the terminals.

D.2 Standardisation

ITU-T (SG16); JRG-GII (Pr.F.4), IETF.

Figure D.2 shows the relationship between service description and technical description.



MSEs = middleware service elements

Figure D.2

Annex E - Coding

There is a growing market for multimedia applications over different networks. Moreover, due to the convergence of the different networks (wireless, wired, etc.), users would like to experience the same high degree of quality when using the same service through different access networks.

The work on the Media Coding area is based on the identified emerging services and applications and the corresponding information elements (media) that need to be encoded/decoded, or otherwise represented. In the videotelephony service only the audio and video signals need to be coded, but in more sophisticated services and applications (e.g. multimedia database search, telemedicine, etc.) other kinds of information elements should be considered. In particular, speech recognition and speaker verification are of importance.

If new media are identified, beyond the traditional ones (video, audio and data) included in the existent services, studies should be started on the appropriate media coding techniques. Moreover, security aspects related to media coding will require additional coding techniques.

The project also includes study of the requirements on media coding media coming from the reference multimedia architecture. Key elements of the considered architecture (e.g. independence of services from underlying network, interoperability, etc.) have an impact on the media coding techniques.

The area of the project will address, hence, a number of issues, including:

- Types of information elements (media) to be considered depending on the identified services and applications;
- Appropriate coding or representation techniques for the information elements;
- Security aspects (watermark, privacy, etc.) related to media coding;
- Requirements on media coding for interoperability of networks and services;
- Requirements on media coding to provide the same end-to-end quality when using different access network;
- Requirements on media coding to provide satisfactory end-to-end performance;
- Requirements on media coding to provide different QoS (within the same service) using the same terminal;
- Requirements on media coding to achieve platform/service independence.

E.2 Standardization Activities

SG 16 will lead this activity. The following is a summary of the standardisation activities in media coding.

Body	Contact person	Deliverables	Timing
ITU-T			
Ad-hoc on still image coding	I. Sebestyen (Siemens)	T.800 (JPEG2000) T.870 (JPEG1)	2001-2003 2001
Q.6/16	G. Sullivan (Microsoft Corp.) T. Wiegand (Heinrich Hertz Institute)	H.262 H.263++ H.26L (co-ord with MPEG)	published published 2002
Q.10/16		G.191 G.192 G.728 and Annexes G.728 Annex J G.729 and Annexes	published published published published published
Q.7/16	R. Drogo De Iacovo (TILAB)	G.722.1 G.722.2	published 2001
Q.8/16	TBA	G.4kbit/s	2003
ITU-R SG6 SG 6 - Digital Cinema	TBD	 BS 1115 BS 1196 BT 1208-1	 Published Published Published Ongoing
ISO-IEC JTC1 SC29 JTC1 SC29 JTC1 SC2	 Still image coding WG1 WG11: L. Chiariglione (TILAB) Character Coding	 JPEG1 BIG(JPEG2000) MPEG4 MPEG4 Part 10 (co-ord. with Q.6/16) MPEG4 extensions MPEG7 MPEG21	 Published Published Published 2002 Ongoing 2002 Ongoing
T1A1.1	John Grigg (US West)	• Coding Algorithm(s) for B-ISDN and Wideband Packet Video Applications • Narrowband Voice and Voiceband Data Network Performance • Voice Encoding at Rates Lower than 16 kbit/s • Impact of Digital Techniques in Voice Networks • Coding of Wideband Audio and Speech Into a Bit Rate of 32 kbit/s or Less • Interaction between the PSTN and other	Ongoing

		networks and terminals • Objective measures for the assessment of audio quality	
TIA	TBD		
3GPP TSG S4 (Codec)	K. Jarvinen (Nokia)	Coding for circuit-switched service Coding for packet-switched service AMR Narrowband AMR Wideband	Published TBD Published Published
3GPP-2 SMV	Craig Greer (Nokia)	SMV	2001-2002
IETF	TBD		
ETSI Aurora	David Pearce (Motorola)	Speech Recognition for distributed systems	
W3C	TBD	HTML	

Annex F - QoS, Service Priority and Performance

F.1 QoS

F.1.1 Scope

The aim of this FSA will be to:

- specify mechanisms and protocols that permit required QoS service levels for each media type and application to be established ;
- specify mechanisms and protocols for session and media flow set-up, mid-session changes and session or media flow close down;

F.1.2 New Recommendations

The following new recommendations are planned:

F.1.2.1. H.qos.arch QoS Architecture

- General architecture for multimedia QoS signalling and control.
- QoS definitions

Note: this work will be done in close collaboration with Q.B/16 (architecture) and will form part of the general multimedia architecturework item in Q.B/16. It may ultimately be subsumed as part of a more general architecture document.

Note: this work item recognises that there is little scope within existing circuit switched networks to influence QoS, however the scope of Q.F is multimedia systems over all transport mechanisms.

F.1.2.2 H.323 Annex N QoS signalling and control in H.323 systems

Signalling of QoS related information between functional elements in H.323 systems:

- between User Domains and Service Administrative Domains
- within Service Administrative Domains, and
- between Service Administrative Domains

Note: This work will be carried out jointly with Q.2/16.

F.1.2.3 H.trans.control QoS signalling to Transport Domains

Signalling of QoS related information:

- between service administrative domains and transport administrative domains, and

- between transport administrative domains

The protocol shall support procedures for accepting. rejecting or modifying requests.

Note: this work needs to be done in close collaboration with Q.G/16 (security) as firewall control will also involve information flows across the same interfaces and a common protocol may be possible. Also in close collaboration with SG11 and SG13.

F.1.2.4 H.qos.m QoS managemant issues

- QoS data collection & reporting (to support billing requirements)
- Real time performance monitoring and measurements
- QoS diagnostic procedures in multimedia systems
- system and network QoS provisioning and configuration.

F.1.2.5 H.policy QoS Policy Server Signalling

- Signalling for data entry and access to QoS policy servers and other servers containing QoS profiles.

Note: this work will be done by Q.5/16 in the context of a general protocol for access to policy servers and back-end services. Q.F will feed requirements into the Q.5 work item.

F.1.3 Standardisation

This activity is currently being developed under ITU-T SG 2, 12, 13, and 16. SG 12 is the lead Study Group on Quality of Service Outside the ITU, ETSI Project TIPHON is also working in this area.

F.2 Service Priority

F.2.1 Scope

The aim of this FSA will be to :

- specify mechanisms for the signalling of service priority information within multimedia systems:
- specify mechanisms for the allocation and reservation of transport resources to support service priority.
- specify all processing procedures to support service priority.
- specify procedures to support Internal Emergency Service Requirements as specified in F.IEMS.

F.2.2 New Recommendations

The following new recommendation is planned:

F.2.2.1 H.priority Techniques and procedures for controlling service priority

Definition of service priority levels:

- per media type (e.g. speech, audio, video, still image, data etc)
- at the application level for different applications (IP telephony, audiovisual conferencing, audio streaming, audiographic conferencing etc.)

Note: the applicability ofspecifying service priority levels per media type and application will be examined.

Signalling of service priority information:

- between User Domains and Service Administrative Domains,
- within Service Administrative Domains,
- between Service Administrative Domains,
- between Service Administrative Domains and Transport Administrative Domains, and
- between Transport Administrative Domains.

Procedures to be adopted in allocating and reserving transport resources to support service priority.

Call processing procedures to support service priority.

Procedures to support special cases e.g. International Emergency Service Requirements as specified in F.IEMS.

Note: The possibility of grouping all service related specifications for QoS, call processing and service priority into a common recommendation will be examined.

F.2.3 Standardisation

This activity will involve close collaboration with other ITU-T groups including SG11, SG12 and SG4.

F.3 Performance

F.3.1 Scope

This FSA will focus on the end-to-end performance of a multimedia service or system as perceived by the end user. It will:

- provide multimedia QoS service classifications per media type and per application,
- provide recommended times in multimedia applications and systems for session and media flow set-up, mid-session changes and session and media flow close down. Provide guidelines also for the reliability and accuracy of such procedures;
- define operational parameters that affect media and signalling performance;
- define how values or ranges of values of these parameters will affect the end-to-end performance as perceived by the user,
- define procedures for error resilience for different audio and video codecs, applications and and systems.

Complementarily, this FSA will identify suitable end-to-end performance guidelines to assist the implementation of new multimedia systems and services

F.3.2 New Recommendations

The following new recommendations are planned:

F.3.2.1 H.mmclass Multimedia QoS Service classification

Classification of QoS Service levels and recommended performance parameters:

- per media type (e.g. speech, audio, video, still image, data etc)
- at the application level for different applications (IP telephony, audiovisual conferencing, audio streaming, audiographic conferencing etc.

Note: This work will be carried out in close collaboration with SG 12.

F.3.2.2 H.mmcp Call processing performance in Multimedia Systems

Recommended times in multimedia applications and systems for:

- session and media flow set-up,
- mid-session changes,
- session and media flow close down.

Reliability and accuracy of session and media flow set-up, mid-session changes and session or media flow close down.

Requirements for:

- signalling latency,
- signalling reliability.

F.3.2.3 H.resilience Error Resilience for media codecs

- Procedures for passive error resilience (receiver side) for different audio and video codecs. Recommend policies for packet loss and for bit errors.
- Procedures for error resilience that involve source and destination. Enhance signalling protocols if needed.

Note: This work will be done in collaboration with WP3/16 questions. The first stage will be to define recommended methods and if needed work with Q2/16 and Q3/16 on protocol enhancement. The work will help overcome packet loss and errors at the codec layer and will help achieve higher audio and video quality even when the transport infrastructure does not support QoS.

F.3.3 Standardisation

The main thrust of this activity currently falls under the mandate of ITU-T 2, 12, 13 and 16. SG 12 is the lead Study Group on performance and is responsible for the end-to-end transmission performance of networks and terminals. Outside the ITU, ETSI Project TIPHON is also working in this area

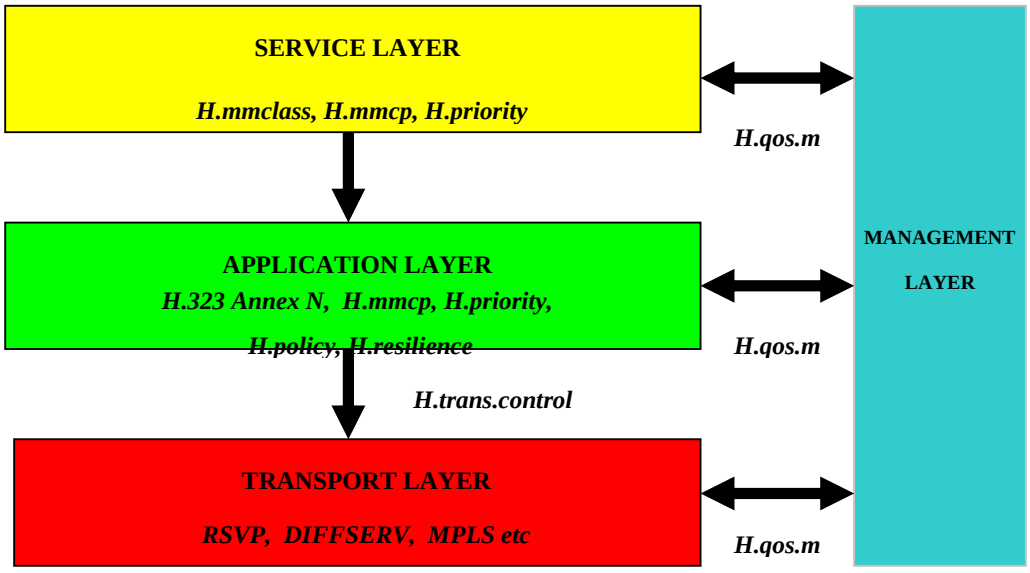


Figure 1. Positioning of Q.F/16 Recommendations in relation to QoS Architecture

Annex G - Security

G.1 Scope

The prime focus of this question is about all aspects of multimedia security. The scope is obviously rather broad and therefore has many interesting aspects.
This Question shall have the following general responsibilities:

- assisting in the threat analysis of existing and proposed multimedia systems and services;
- maintaining and continue developing Recommendation H.235 as a security framework providing the mechanisms needed to protect multimedia systems and services from identified threats;
- maintaining Recommendations H.233 and H.234;
- encouraging the development of documentation within Recommendations on multimedia systems and services, providing guidance on potential threats to security, the mechanisms provided to counter those threats, and the policies which system operators should put in place to use those mechanisms for their intended purpose;
- contributing to the work of the Question on multimedia architecture to ensure that the architectural framework includes due consideration of functions associated with security;
- providing advice on the application of the security framework in specific cases of system design;
- collaborating with other questions and bodies as far as multimedia security is of concern.

The following collected questions are specific examples targeted to the topic of multimedia security. They should guide in our work.
The overall aspect of multimedia security has many different aspects and issues; we identify them and group them into related categories as follows. It is true, that the categories are dependent and there is a certain overlap among them. It is also true that these questions provide guidance but depending on the concrete example they might not always fully be applied. We list the questions in each category without any preference or indicated priority.

G.1.1 Security Requirements and Security Services

This topic identifies the need for multimedia security for a concrete example by understanding the security requirements and security goals that should be achieved.

- Which kind of security precautions should be addressed?
- Which security weaknesses in a multimedia system should be countered?
- Which security threats are of concern? Which security threats have been adequately covered, which security weaknesses have been discovered anew?
- Which security services and security mechanisms are appropriate for Multimedia applications with stringent real-time and performance constraints?

- Which security techniques are best suited for packet based communication with real time constraints?
- Which security level(s) are required and how can they be provided?
- How much flexibility and liberty is necessary in the architecture for different grades or security policies?
- Which other services and multimedia features need security?
- Which security concepts are best suited to cover mobility requirements?
- Which multimedia applications demand security? Secure Video-applications are becoming of interest....
- How can security support group-based communication and group-based key-management?
- What specific security requirements are part of e-commerce applications?

G.1.2 Security Architecture and Infrastructure

Once the security requirements and objectives have been sufficiently understood, this topic deals with how the target system should look like from an architectural point of view. It also addresses the issue on the security infrastructure that is either assumed or has to be built as well.

- How should a sound secure system look alike?
- How should a sound security architecture for distributed multimedia systems and services look alike?
- At which logical layer should the security mechanisms be placed?
- Is there a unified scalable security approach that spans from the small scale multimedia end devices, over enterprise environments to the large carrier class multimedia gateways?
- How should the concepts of network layer security and application layer security interact? Where is end-to-end security necessary?
- How does security interact with other factors such as QoS, performance, user friendliness?
- How should multimedia security interact with available security infrastructures (Public-key infrastructures)? Should a security infrastructure adapt to the requirements of multimedia?
- How can security concepts migrate from simple, basic security techniques to sophisticated advanced security techniques? How to design multimedia security architectures such that they are future-proof?
- How does a multimedia security architecture fit into an overall security framework taking into account also other security relevant applications such as e-commerce, secure network management and others?
- How can a heterogeneous network infrastructure be best deployed for multimedia security purposes?

G.1.3 Multimedia Communication Security

Multimedia systems are usually distributed and interconnected through networks for networked communications. This topic looks at the security issues of communication. It identifies the different

communication types, the multimedia aspects of the different streams and their security ramifications.

- How to make the signaling for multimedia applications secure?
- How to make the data transport and the multimedia-stream for multimedia applications secure?
- How to efficiently integrate key management into the multimedia protocols?
- How to protect multimedia content in terms of authorship, copyright, copy protection?

G.1.4 Interdomain Security

Distributed multimedia systems are usually placed in different domains operated by some authority each potentially under a different set of security policies and rules. Such domains could reflect corporate policies or more general also national legislative policies.

This topic tries to identify such domains where they might occur and how the multimedia-systems within such domains could securely interact across domain boundaries.

- Where in a multimedia architecture are potential security domains?
- How should security interworking across security domains be accomplished? How much security capability negotiation is necessary?
- How do security devices such as firewalls or security gateways affect the multimedia security?
- How can sophisticated security architectures take heterogeneous network infrastructures into account?

G.1.5 Management and Usability

Multimedia systems might need some form of management, configuration for setup and maintenance.

- To which degree should we address security administration, secure management and security MIBs?

G.1.6 Security Standards

We do not intend to re-invent the wheel, rather we recognize that other standardization bodies have developed or are developing useful security standards.

- Which available security standards are appropriate? Which security standards can be re-used?
- How can standardized security APIs facilitate deployment and interoperability?

Understand which security aspects relate to a specific scenario, and which security aspects are applicable in a general environment.

G.2 Work and Study items

ITU-T SG 16 has been developing several multimedia security standards: Recommendations H.233 and H.234 for securing circuit-switched multimedia data and H.235 and H.323 Annex J for securing packet-switched multimedia data.

With the general understanding of this question as stated in chapter 3, Q.G specifically currently considers the following work and study items.

The following list should be seen as suggestions with some examples. Of course, there are many potential work item, several of them are addressing ongoing matters.
Those items are highlighted, which are currently recognized as being more/highly important and would see concrete interest for the next time.
It is recognized and understood that substantial progress of work within Mediacom 2004 can only be achieved with the provisioning of written contributions. It is also true that contributions are demand driven from the individual organizations and members.

New security issues or issues of high interest where contributions and significant progress are expected which might result in recommendations:

- Maintain and further develop recommendation H.235 and its new Annexes F and G.
- Investigate confidentiality of all signaling, provide security and privacy for call signaling, privacy for RAS channel, study how the idea of "light-weight SSL/TLS" could be deployed using only some security functions from the transport layer and leave other key-management security tasks to the H.323 application.
- Identify the need for a centralized key management and how this facility has advantages over end-to-end key management.
- Provide security for mobility multimedia environments, define security for H.MMS.1/H.235 Annex G; clarify security aspects of "multimedia over wireless"
- Address the security issues for multimedia presence applications such as for example privacy, authentication and authorization.
- Optimize voice encryption: consider stream ciphers vs. block chaining modes, consider new encryption algorithms and chaining modes with beneficial real-time properties (e,g., OFB mode,...), research the characteristics of the AES encryption algorithm as an improvement over the DES for real-time voice and/or video encryption, try to provide/obtain a codepoint for AES, optimized key usage on multiple media connections; develop a video encryption profile.
- Provide multimedia security support for emergency services IEPS, F.IEMS.
- Optimize security profiles, define interoperable security profiles, progress the hybrid security profile with PKI usage;

Further on, there are several security issues of general interest, where it is not fully clear, if and when there would be any progress:

- Maintain recommendation H.323 Annex J
- Maintain recommendations H.233 and H.234 with the security for H.320 systems
- Security for the Direct call model or security for the non-GK-routed model, definition of access tokens, interzone scenarios
- Architect the security for a decomposed Multimedia Systems (decomposed Gatekeeper, decomposed MCU); security among alternate Gatekeepers
- Provide security for H.324/H.235 Annex C
- Work on Megaco/H.248 security; IPSEC;

- Investigate challenge/response techniques vs. synchronized time clocks
- Security support for multimedia supplementary services, definition of specific H.450 security features
- Security aspects of H.323/H.246 systems interworking, H.323-SIP security interworking, H.323 – H.323 secure domain interworking an firewall proxies
- Secure interworking H.323 – H.248; how could H.235 key management be extended such that media keys are conveyed towards the MG?
- Security for data conferencing, T.120.secure, security interworking between H.323 and T.120
- Adequately address the multimedia security issues of network address translation (NAT) and firewalls, application layer security proxies; firewall control protocol
- Study the security aspects of e-commerce and new multimedia applications for e-business, security integration of multimedia applications into secure e-business environments
- Research security for multimedia systems using biometric techniques?
- (Security aspects for QoS)
- Security for multimedia charging/billing/accounting
- Security for simple multimedia devices, H.323 Annex J, application of elliptic curve cryptography
- Security for ATM-based multimedia systems (H.310 security)

Security architecture for distributed, multimedia systems, security frameworks, security aspects of decomposed systems

- Harmonization of security interfaces for broadband cable modems (jointly with SG9)
- Ongoing monitoring of multimedia security threats
- Ongoing re-investigation of multimedia security requirements
- … (other items to be identified)

G.3 Cooperation and interaction

The team of experts working on this Question will cooperate with and advise the other Questions of this Study Group and multimedia-related Questions of other study groups. They will coordinate with experts working in the area of security in other study groups, and the experts in other Fora and standardization bodies.

G.3.1 Interaction with other Questions inside SG 16

The following table identifies interaction with other questions within SG16 from a security point of view. Question G as a horizontal question closely interacts with the identified horizontal and vertical questions shown below. It is envisioned that Question G as a horizontal question acts as a coordinator among the other SG16 questions for the aspect of multimedia security. Further, Question G would advise other questions with technical security expertise.

At present, no specific interaction is recognized for any other questions than shown.

Question	Title	Question in study period 1997-2000	Subject
Q.1/16	Multimedia Systems, Terminals and Data Conferencing	Former Q3, Q11,..	with H.324 and T.120 series recommendations and related security aspects
Q.2/16	Multimedia over Packet Networks using H.323 Systems	Former Q13	with H.225.0, H.323, H.450.x and security aspects
Q.3/16	Infrastructure and Interoperability for Multimedia over Packet Network Systems	Former Q14	H.248, H.245, H.246 with security aspects
Q.5/16	Mobility for Multimedia Systems and Services	New	mobility and security aspects in H.32x series, H.323 Annex H
Q.C/16	Multimedia applications and services	Former Q1, Q2	security aspects for e-commerce, M3 project, e-business and emergency services; F.iems
Q.D/16	Interoperability of Multimedia Systems and Services	New	security interworking and security interoprability
Q.G/16	Security of Multimedia Systems and Services	**New**	H.233, H.234, H.235, …

G.3.2 Interaction with other ITU-T Study Groups

There are other groups within ITU-T which deal with security issues. At present, the following groups are identified as candidates for cooperation/liaison:

- SG17 (former SG7/WP3/Q13): security “general”
- SG9/WP1: security for IP CableCom systems
- SG13: GII and ITU-T IP Project with security aspects
- SSG “IMT2000 and beyond”: security aspects of mobile communications

G.3.3 Interaction with other bodies

Outside of ITU there are several other bodies, which address security in general or relate to multimedia security.

- ETSI Tiphon WG8: Tiphon security architecture, threat analysis, security profiles, etc
- ETSI TC SEC: security for ETSI, SAGE
- IMTC: several activity groups (iNOW!, Conferencing AG, aHIT!)

- ATM Forum Security Subgroup: Elliptic Curves
- IETF: Transport security (TLS; IPSEC), SIP, PKIX, AAA, …
- ISO MPEG: ...content and copy protection, watermarking,…
- NIST: AES algorithm, normative referencing NIST standards,…

G.4 Workplan

Status of Recommendations:

Recommendation	**Determination**	**Decision/ consent**	**Editor**
H.235 V3	-	Q1/02	M. Euchner (Siemens AG)
H.235 Annex F (Hybrid Profile)	-	Q1/02	M. Euchner (Siemens AG)
H.235 Annex G (H.323 Annex H security)	-	Q1/02	M. Euchner (Siemens AG)
H.324 security enhancements & H.235 Annex C	-	??	??

Annex H Accessibility

H.1 Scope

It is the task of the Accessibility question to participate in the general development of multimedia Recommendations with the goal to assure optimised accessibility for users with a broad variation in human capabilities. This requires methods for providing and controlling alternative selectable media presentation forms. That in turn requires structures for storage and transport of logically linked media of different kinds, but also methods for transformation between media forms. Furthermore, systems and services need accessible user control mechanisms that can be selected to give control in a perceivable and manageable way suiting the user's capabilities.

The Total Conversation concept was developed as an accessibility activity, adding Text conversation to Video and Voice telephony. This concept will be further exploited

H.2 Standardisation

This activity will be led by SG16.

The Total Conversation concept offering conversation in Video, Text and Voice simultaneously is a recent accessibility achievement from SG16. Most components of this concept are in place, but awareness is needed that this concept is capable of replacing traditional text telephony and video telephony.

Minor additions to the collection of recommendations for accessibility may be needed when a new network environment is to be explored.

In the Mediacom project, Recommendations for alternative control and media handling will be made together with other SG16 actors, or developed in co-operation with other bodies. This includes production, storage, selection, transmission and consumption and control of alternative media.

Recommendations are also foreseen in the area of interfaces within a terminal to provide for accessible control and media handling, as well as for interchangeable user interface devices adapted to different user preferences. Such interfaces may in many cases by preference be wireless.

Annex I – Summary of Related work in Other ITU-T Study Groups

Editorial Note: to be completed following the Workshop – "Multimedia Convergence" 12-15 March 2002, and incorporating material presented to the February meeting of ITU-T SG16, and a review of the Work Programmes of ITU-T Study Groups.

Annex J – Summary of Related work in the ITU-R

Editorial Note: to be completed following the Workshop – "Multimedia Convergence" 12-15 March 2002, and incorporating material presented to the February meeting of ITU-T SG16.

Annex K – Relationship with MPEG 21

K.1 Introduction

ISO/IEC JTC1/SC29 has initiated the MPEG 21 project, and ITU-T Study Group 16 has initiated the project Mediacom 2004, both of which address the development of multimedia frameworks for the ongoing development of related standards. The intent of this Annex is to review the relationship between these two projects. The document also identifies the areas of overlap. Section 4 discusses the ongoing co-operation between the two organisations. It is intended to maintain this document as both projects progress and as the co-operation between the projects develops.

K.2 Summary of the MPEG 21 Project

The MPEG-21 information is available at: http://mpeg.telecomitalialab.com

The scope of MPEG-21 is the integration of the critical technologies enabling *transparent and augmented use of multimedia resources across a wide range of networks and devices*. The aim is to support functions such as content creation, content production, content distribution, content consumption and usage, content packaging, intellectual property management and protection, content identification and description, financial management, user privacy, terminals and network resource abstraction, content representation and event reporting.

The MPEG-21 multimedia framework has identified seven key architectural elements in its "Vision, Technologies and Strategy" technical report (ISO/IEC 21000-1) that are needed to support the multimedia delivery chain, and is in the process of defining the relationships between and the operations supported by them. MPEG will elaborate the elements by defining the syntax and semantics of their characteristics, such as interfaces to the elements. MPEG-21 will also address the necessary framework functionality, such as the protocols associated with the interfaces, and mechanisms to provide a repository, composition, conformance, etc.

The seven key architectural elements defined in MPEG-21 are:

1. Digital Item Declaration (a uniform and flexible abstraction and interoperable schema for declaring Digital Items);
2. Digital Item Identification and Description (a framework for identification and description of any entity regardless of its nature, type or granularity);
3. Content Handling and Usage (provide interfaces and protocols that enable creation, manipulation, search, access, storage, delivery, and (re)use of content across the content distribution and consumption value chain);

4. Intellectual Property Management and Protection (the means to enable content to be persistently and reliably managed and protected across a wide range of networks and devices);
5. Terminals and Networks (the ability to provide interoperable and transparent access to content across networks and terminals);
6. Content Representation (how the media resources are represented);
7. Event Reporting (the metrics and interfaces that enable Users to understand precisely the performance of all reportable events within the framework);

MPEG-21 recommendations will be determined by interoperability requirements, and their level of detail may vary for each architectural element. The actual instantiation and implementation of the framework elements below the abstraction level required to achieve interoperability, will not be specified.

During the MPEG-21 standardization process, Calls for Proposals are issued by MPEG that result in different parts of the MPEG-21 standard (i.e. ISO/IEC 21000-X). There is not necessarily a one-to-one mapping between architectural elements (key technologies to support the multimedia delivery chain) and MPEG-21 parts (normative technology).

The following table sets out the current timetable for MPEG-21standardisation (more MPEG-21 parts may be added as MPEG-21 progresses):

Part	Title	CfP	WD	CD PDAM PDTR	FCD FPDAM	FDIS FDAM DTR DCOR	IS AMD TR COR
MPEG-21							
1	Vision, Technologies and Strategy						01/09
2	Digital Item Declaration				01/12	02/03	02/05
3	Digital Item Identification and Description			01/12	02/03	02/07	02/09
4	Intellectual Property Management and Protection Architecture				01/12	02/03	02/05
5	Rights Expression Language		01/12	02/07	02/10	02/03	03/05
6	Rights Data Dictionary		01/12	02/07	02/10	02/03	03/05
7	Digital Item Adaptation	02/03	02/12			03/07	

K.3 Relationship Between the Projects

Although both projects involve the definition of a "multimedia framework", in very general terms the two projects can be differentiated as follows:

- MPEG 21 addresses primarily the augmented use of multimedia resources across a wide range of networks and devices by all the users of the value-chain (including end-users, content creators, right holders etc.)
- Mediacom 2004 addresses primarily a framework for multimedia communications standardisation.

However there are clearly overlaps between these two perspectives and these will become increasingly clear as the projects evolve.

One way to review areas of common interest is to look at the matrix of relationships between Mediacom 2004 Framework Study Areas and MPEG-21 architectural elements and parts. The following is an attempt to show this matrix.

	Digital Item Declaration	Digital Item Identification and Description	Content Handling and Usage	Intellectual Property Management and Protection	Terminals and Networks	Content Representation	Event Reporting
Architecture	X	X			X		X
Applications and Services	X	X	X	X	X	X	
Interoperability	X				X		
Coding				X	X	X	
Quality of Service					X		
Security	X		X	X	X		
Accessibility					X		

	Vision, Technologies and Strategy	Digital Item Declaration	Digital Item Identification and Description	Intellectual Property Management and Protection Architecture	Rights Expression Language	Rights Data Dictionary	Digital Item Adaptation
Architecture	X	X	X				X
Applications and Services	X	X	X	X	X	X	X
Interoperability	X	X					X
Coding	X			X			X
Quality of Service	X						X
Security	X	X		X	X	X	
Accessibility	X				X		X

K.4. Co-operation between ISO/IEC JTC1 SC29 and ITU-T SG16.

It is proposed that this document and the supporting project documents be reviewed by the experts from both MPEG and SG16 at their forthcoming meetings during March 2002.

The following people are the editors of the current MPEG-21 parts (see also http://www.itscj.ipsj.or.jp/sc29/29w42911.htm#MPEG-21 for the latest version):

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Annex L – Relations between SG16 MM Questions and IETF-MM Areas

Table L.1

Editors Note: - To be reviewed during March 2002.

SG16 Question in 2004	SG13 IP Project	IETF Questions
Applications area		
Q.B: MM Architecture Q.C: MM Application And services Q.D: Interoperability of MM systems and Services Q.H: Accessibility to MM Systems and Services Q.1: Multimedia systems, terminals and data conferencing Q.2: Multimedia over packet networks using H.323 systems Q.4:Video and data conferencing using Internet-supported Services Q.14 Facsimile terminals (Group 3 and Group 4)		Application Configuration Access Protocol (acap)
		Calendaring and Scheduling (calsch)
		Content Negotiation (conneg)
		DAV Searching and Locating (dasl)
		Detailed Revision/Update of Message Standards (drums)
		Electronic Data Interchange-Internet Integration (ediint)
		Extensions to FTP (ftpext)
		HyperText Transfer Protocol (http)
		Instant Messaging and Presence Protocol (impp)
	Area 4 - Multimedia Applications over IP	Internet Fax (fax)
		Internet Open Trading Protocol (trade)
		Internet Printing Protocol (ipp)
		LDAP Duplication/Replication/Update Protocols (ldup)
		LDAP Extension (ldapext)
		Large Scale Multicast Applications (lsma)
		Mail and Directory Management (madman)
		Massage Tracking Protocol (msgtrk)
		NNTP Extensions (nntpext)
		Printer MIB (printmib9
		Schema Registration (schema)
		Telnet TN3270 Enhancements (tn3270e)
		Uniform Resource Locator Registration Procedures (urlreg)
		Uniform Resource Names (urn)
		Usent Article Standard Update (usefor)
		WWW Distributed Authoring and Versioning (webdaw)
		Web Replication and Caching (wrec)
		Web Version and Configuration Managem
User Service Area		
Q.C:		FYI Updates (fyiup)
		Responsible Use of the Network (run)
		User Services (uswg)
		Web Elucidation of Internet-Related Developments (weird)
Security Area		
Q.G: Security of MM systems and services		An Open Specification for Pretty Good Privacy (openpgp)
		Authenticated Firewall Traversal (aft)
		Common Authentication Technology (cat)
		Domain Name System Security (dnsspec)
		IP Security Protocol (insec)
		Intrusion Detection Exchange Format (idwg)
		One time Password Authentication (otp)
		Public-Key Infrastructure (X.509) (pkix)
		S/MIME Mail Security (smime)
		Secure Network Time Protocol (stime)
		Secure Shell (secsh)
		Simple Public Key Infrastructure (spki)
	Area 10:Security aspects	Transport Layer Security (tls)
		Web Transaction Security (wts)
		XML Digital Signature (xmldsig)
Transport Area		

Q.B, Q.E	Area 4	Audio/Video Transport (avt)
Q.C, Q.D, Q.2	Area 4 Area 7: Signalling support, IN, Routing for services on IP-based networks	IP telephony (iptel)
		Media Gateway Control (magaco)
		Multiperty Multimedia Session Control (mmusic)
		PSTN and Internet Interworking (pint)
		Session Initiation Protocol (sigtran)