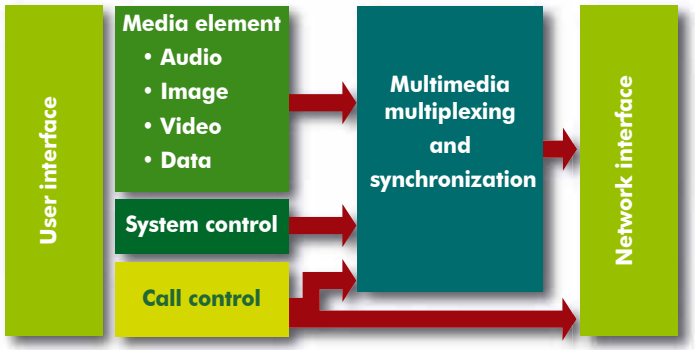
ITU-T SG16 Leader in multimedia

Study Group 16 leads the ITU-T work on multimedia (MM) terminals, systems and applications, including the coordination of the studies among the various ITU-T SGs. It is also the lead study group for ubiquitous applications ("e-everything", such as e-health and e-business).

SG16 is active in all aspects of MM standardization, including terminals, architecture, protocols, security, mobility, interworking and quality of service. It focuses its studies on conferencing systems, directory services, speech, audio and visual coding, PSTN modems and interfaces, facsimile terminals, ICT accessibility, etc.

SG16 developed a **generic functional model for MM terminals** which allows reuse of elements to create terminals and services that ensure interoperability across a range of different networks. The figure below illustrates that the higher-layer elements (media, systems and call control) are multiplexed according to the special requirements of the different underlying network interfaces (PSTN, IP, mobile, etc.)



SG16 highlights

Visual coding

SG16's video coding activities are world leading. Its suite of video standards was voted in July 2006 as ITU-T's most influential work. Building on the success of H.262 (MPEG-2 video) in digital TV and DVD systems, and of H.263 in videoconferencing, SG16 has developed, in conjunction with the MPEG committee of ISO/IEC, the next generation of video coding technology. **H.264**/AVC (also known as MPEG-4/ Part 10), adopted in 2003, is the first truly scalable video codec. Due to its excellent performance and compression gains when compared to legacy video codecs, H.264 is now being deployed in products from companies including Apple, BT, France Telecom, Intel, Microsoft, Motorola, Nokia, Polycom, Samsung, Sony, Tandberg and Toshiba and in services such as over-the-air broadcast television (including satellite), the new HD DVD and Blu-ray disc formats, as well as IP-based television and videoconferencing systems. SG16 is also involved in the development of the JPEG and JPEG2000 image compression standards. Video, still-image, and other visual coding standards will continue to be developed, focusing on improving flexibility to accommodate a diverse number of transport types (Internet, LAN, Mobile, ISDN, PSTN, NGN, etc.).

Multimedia over IP

- **H.323** is widely deployed in IP telephony networks worldwide. Carrying billions of minutes of voice traffic per month, H.323 is a market leading and an extremely scalable solution that meets the needs of both service providers and enterprises.
- **H.248** has been developed in close cooperation with the IETF and defines the protocols used by media gateways, a vital component in VoIP networks and NGN.
- SG16 is also active in the field of **telecommunications for disaster relief**. **H.460.21**, for example, provides a message broadcast mechanism in H.323 systems. This ability to multicast in VoIP is especially useful in order to provide early warnings in disaster scenarios.

Speech coding

G.729 speech coding standard is widely used in VoIP systems. Fully interoperable with it, **G.729.1** is an embedded wideband extension allowing smooth transition from narrow band to wideband VoIP telephony. Its flexible bit-rate adaptation avoids network congestion and overall quality impairment.

Accessibility in ICTs

With its work on the **telecommunication accessibility checklist** and **F.790's accessibility guidelines for standards writers**, SG16 will ensure that standard makers and the telecommunication industry take into account the needs of those whose accessibility to ICTs is restricted (the deaf or hard-of-hearing for example).

E-health

The evolution of advanced digital telecommunication techniques has enabled the development of multimedia systems to support e-health applications, in particular in the area of telemedicine. SG16 developed a **roadmap** that aims at defining the areas in which open global standards for e-health applications are currently needed.

Moving forward

SG16 continues its tradition to innovate MM communications. Work includes defining the requirements for the H.325 next generation of MM conferencing systems and media coding (here including audio, speech, video and image). SG16 will also address MM aspects of networked identification (NID). Why not join us and be part of all that?

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Multimedia
Communications

Audio
Video
Image
Text
Data

ITU-T

ITU-T Multimedia Recommendations

Multimedia terminals and systems
H.310 – Broadband audiovisual communication
H.320 – Narrowband visual telephone systems and terminal equipment
H.321 – Adaptation of H.320 visual telephone terminals to B ISDN environments
H.322 – MM communications in LANs with guaranteed QoS
H.323 – Packet-based MM communications systems
H.324 – Terminal for low bit-rate MM communication
H.610 – VDSL triple-play – architecture and customer premises
H.611 – VDSL triple-play – OAM&P

Multimedia multiplexing and synchronization
H.221 – Frame structure for a 64 to 1920 kbit/s channel in audiovisual teleservices
H.222.0 – MPEG2 system specification
H.222.1 – MM multiplexing for MM communication over ATM
H.223 – Multiplexing for low bit-rate MM communication

Service descriptions and requirements
F.700 – Framework for multimedia services
F.701 – Guideline for identifying MM service requirements
F.702 – MM conference services
F.703 – MM conversational services
F.720 – Videotelephony services – General
F.721 – Videotelephony teleservice for ISDN
F.723 – Videophone service in the PSTN
F.724 – Videotelephony service over IP networks
F.731 – MM conference services in the ISDN
F.732 – MM conference services in the B-ISDN
F.733 – MM conference services over IP networks
F.740 – Audiovisual interactive services
F.741 – Audiovisual on-demand services
F.742 – Distance learning services

E-health
Technical paper – Roadmap for telemedicine

Data conferencing
T.120 and T.130 series – Data protocols for multimedia conferencing

Speech and audio coding
G.191 – Software tools library for speech coding
Narrowband (4 kHz bandwidth - 8 kHz sampling frequency)
G.711 – Pulse code modulation (PCM)
G.723.1 – 5.3 and 6.3 kbit/s speech coder for MM communications
G.726 – 40, 32, 24, 16 kbit/s ADPCM speech coding
G.727 – 5-, 4-, 3- and 2-bit/sample embedded ADPCM
G.728 – Coding of speech at 16 kbit/s using low-delay CELP
G.729 – Coding of speech at 8 kbit/s using CS-ACELP
Wideband (7 kHz bandwidth - 16 kHz sampling frequency)
G.722 – 7 kHz audio-coding within 64 kbit/s
G.722.1 – Coding at 24 and 32 kbit/s for hands-free operation in systems with low frame loss
G.722.2 – Wideband coding of speech at around 16 kbit/s using adaptive multi-rate wideband (AMR-WB)
G.729.1 – 8-32 kbit/s scalable wideband coder bitstream interoperable with G.729
Superwideband (14 kHz bandwidth - 32 kHz sampling frequency)
G.722.1 – Annex C – Superwideband extension at 24, 32 and 48 kbit/s

Accessibility
T.140 – Protocol for multimedia application text conversation
V.18 – Text telephony
F.790 – Accessibility guidelines for standards makers
T.134 – Text chat in data conferencing
Technical paper – Telecommunication accessibility checklist

Modems and fax
V.34 – Up to 33.6 kbit/s modem for PSTN
V.90 – Up to 56 kbit/s downstream and up to 33.6 kbit/s upstream digital and analogue modem for PSTN
V.150 series – Transport of modulated signals (including text and voiceband data) over IP
T.30 – Facsimile transmission over PSTN
T.38 – Real-time Group 3 facsimile communication over IP networks

Image and video coding
H.261 – Video codec for audiovisual services p x 64 kbit/s
H.262 – (MPEG-2) video coding
H.263 – Video coding for low bit-rate communication
H.264 – Advanced video coding for generic audiovisual services
H.272 – Video gamma compensation in MM systems
T.80 series – JPEG image compression
T.800 series – JPEG 2000 image compression
T.851 – Image coding based on JPEG-1 with alternative arithmetic coder

Advanced features
F.750 – Metadata framework
H.350 series – Directory services architecture for MM conferencing
H.360 series – End-to-end QoS control and signalling
H.510 – Mobility for H.323 MM systems and services

Call control
H.225.0 – Call signalling and media stream packetization for packet-based MM communication
H.450 series – Supplementary services for H.323 systems
H.460 series – H.323 Generic Extensible Framework
H.501 – Protocol for mobility management and intra/inter-domain communication in MM systems

System control
H.224 – A real-time control protocol for simplex applications using the H.221 LSD/HSD/MLP channels
H.230 – Frame-synchronous control and indication signals for audiovisual systems
H.239 – Role management and additional media channels for H.300-series terminals
H.241 – Extended video procedures and control signals for H.300-series terminals
H.242 – Communication establishment between MM terminals up to 2 Mbit/s
H.243 – Communication establishment between three or more MM terminals up to 1920 kbit/s
H.245 – Control protocol for multimedia communication
H.249 – Extended user input indications
H.271 – Video back channel for status and requests messages
H.281 – A far end camera control protocol for videoconferences using H.221 LSD/HSD/MLP channels

Network signal processing
G.161 – Interaction aspects of signal processing network equipment
G.168 – Digital network echo cancellers
G.169 – Automatic level control devices
G.763 – Digital circuit multiplication equipment (DCME) using G.726 ADPCM and digital speech interpolation
G.766 – Facsimile demodulation/remodulation for DCME
G.767 – DCME using 16 kbit/s LD-CELP, digital speech interpolation and facsimile demodulation/remodulation
G.768 – DCME using 8 kbit/s CS-ACELP
G.769 – Circuit multiplication equipment over IP networks
G.799.1 – PSTN functionality and interface specifications to interconnect PSTN and IP networks
Q.115 series – Network signal processing control

Multimedia security
H.233 – Confidentiality system for audiovisual services
H.234 – Encryption key management and authentication system for audiovisual services
H.235 series – H.323 security
H.323 Annex J – Security for simple H.323 endpoint types
H.530 – Symmetric security procedures for H.323 mobility in H.510

Interworking
H.246 – Interworking of H-Series multimedia terminals
H.248 series – Gateway control protocol

For more information on the work of Study Group 16 visit the ITU-T website at: **www.itu.int/ITU-T/studygroups/com16**