Regional Development Forum 2008: Bridging the ICT standardization gap in developing countries

Session 3 – Current ITU standardization hot topics: Multimedia

Pierre-André Probst

Chairman ITU-T SG16

OFCOM/Switzerland

International Telecommunication Union

Contents

- Multimedia standardization work in ITU-T
  - Scope of the work
  - Service description and requirements
  - Media coding
  - Systems
  - Accessibility
  - E-Health
  - Trends

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ITU-T SG 16: MM terminals, systems and applications

- SG16 leads ITU-T work on MM terminals, systems and applications including the coordination of the studies among ITU-T Study Groups

- SG16 is also lead Study Group for ubiquitous applications ("e-everything")

- SG16 activities include:
  - Conferencing systems
  - Directory services and other enhanced applications
  - Speech, audio, still picture and video coding
  - Signal processing network equipment & terminals (e.g. PSTN modems and interfaces, facsimile including transport of voiceband data over IP networks)
  - ICT accessibility

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Taxonomy of ITU-T multimedia standards

- Service description and requirements
- MM terminals and systems
- System control
- MM multiplexing and synchronization
- Call control
- Media coding (audio, speech, image, video)
- Network signal processing
- Modems and fax (legacy PSTN and IP)
- MM security
- Interworking
- Data conferencing
- Advanced features (metadata, mobility, QoS)
- Media-rich (triple-play, IPTV)
- Accessibility
- E-health

MM Service descriptions: F-series

- *Videotelephony* services (F.720 to F.724)
- *MM Conference* services (F.731 to F.733)
- *Audiovisual interactive* services (F.740)
- *Audiovisual on demand* services (F.741)
- *Distance learning* services (F.742)
- *Accessibility* guidelines (F.790)
- *Service description and requirements for multimedia information delivery services triggered by tag-based identification* (F.771) **NEW!**

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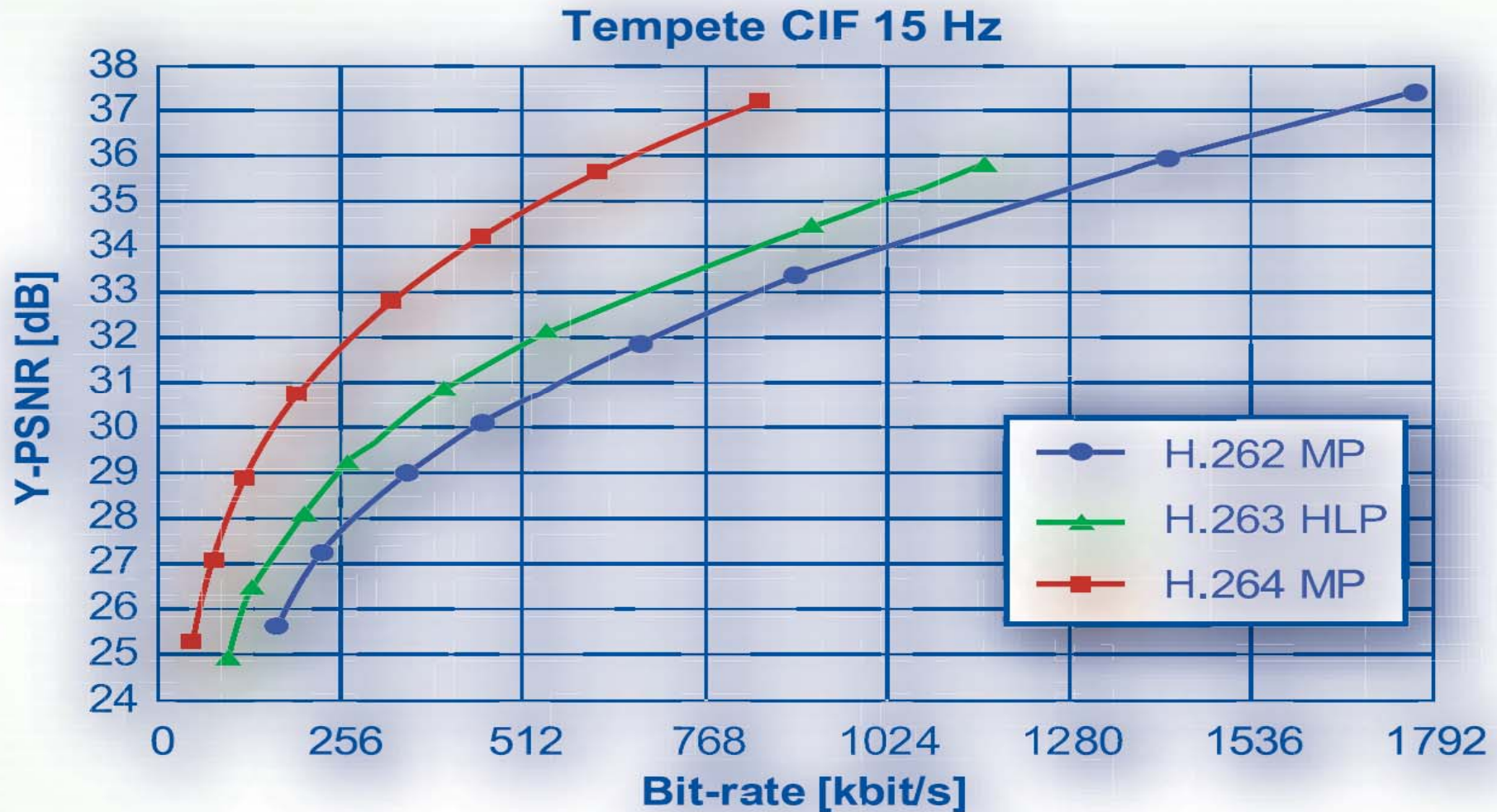# Current ITU-T Standardization topics: Multimedia – Video coding (1)

Several generations of ITU-T Video coding standards:

- *H.261* for videoconferencing over ISDN with a bit-rate of px64 kbit/s (p=1...30) [1990]

- *H.262* developed together with ISO/IEC MPEG, well known under MPEG-2 standards used worldwide for digital TV systems, DVD, ... [1995]

- *H.263* for low bit rate audiovisual services [1996]

- *Advanced Video Coding (AVC)* developed by the joint video team between ITU-T SG16 and ISO/IEC MPEG
  - Published as H.264 and MPEG-4/Part 10 [2003]

- Work item for next generation is open for contributions (codenamed "H.265")
  - Opportunity to get involved!

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Video coding – main H.264 features

- Latest technology in terms of video compression
- First really scalable video codec
    - Different profiles
    - Bit-rates from 64 kbit/s to 960 Mbit/s
- Now being largely deployed in commercial products (both professional and consumer devices):
    - Videoconferencing systems
    - SD and HDTV Digital TV, IPTV
    - HD DVD, Blue-ray disc formats, ...
- Outperforms prior standards by a factor of more than 2 (bit-rate versus quality)

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Video coding – Comparative performance

Tempete CIF 15 Hz

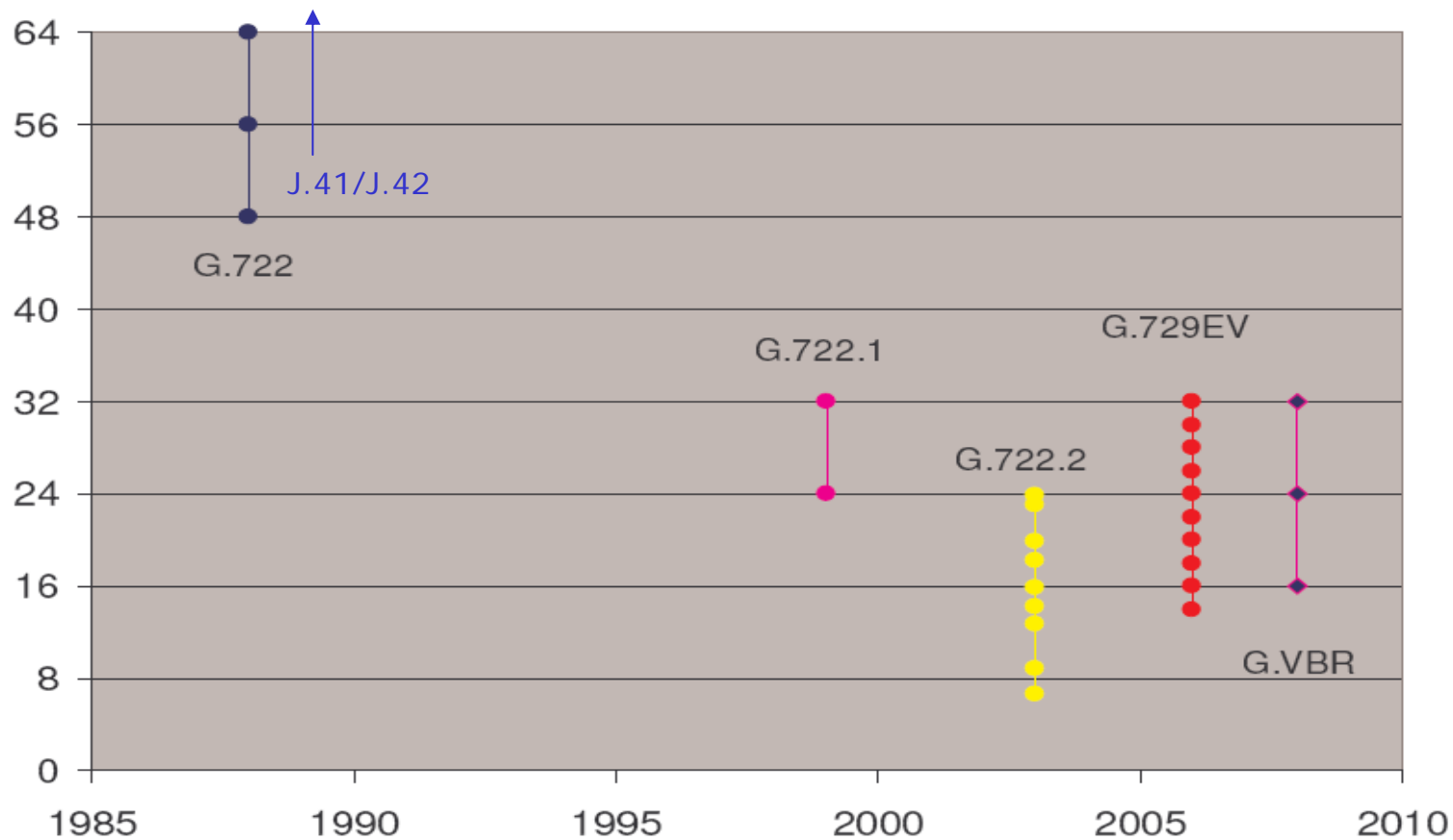# Current ITU-T Standardization topics: Multimedia – Audio/speech coding

ITU-T narrowband codecs (4 kHz)

Source: Joint ITU-T/IMTC Workshop, San Diego, May 2006

Current ITU-T Standardization topics: Multimedia – Audio/speech coding

ITU-T wideband codecs (7/14 KHz)
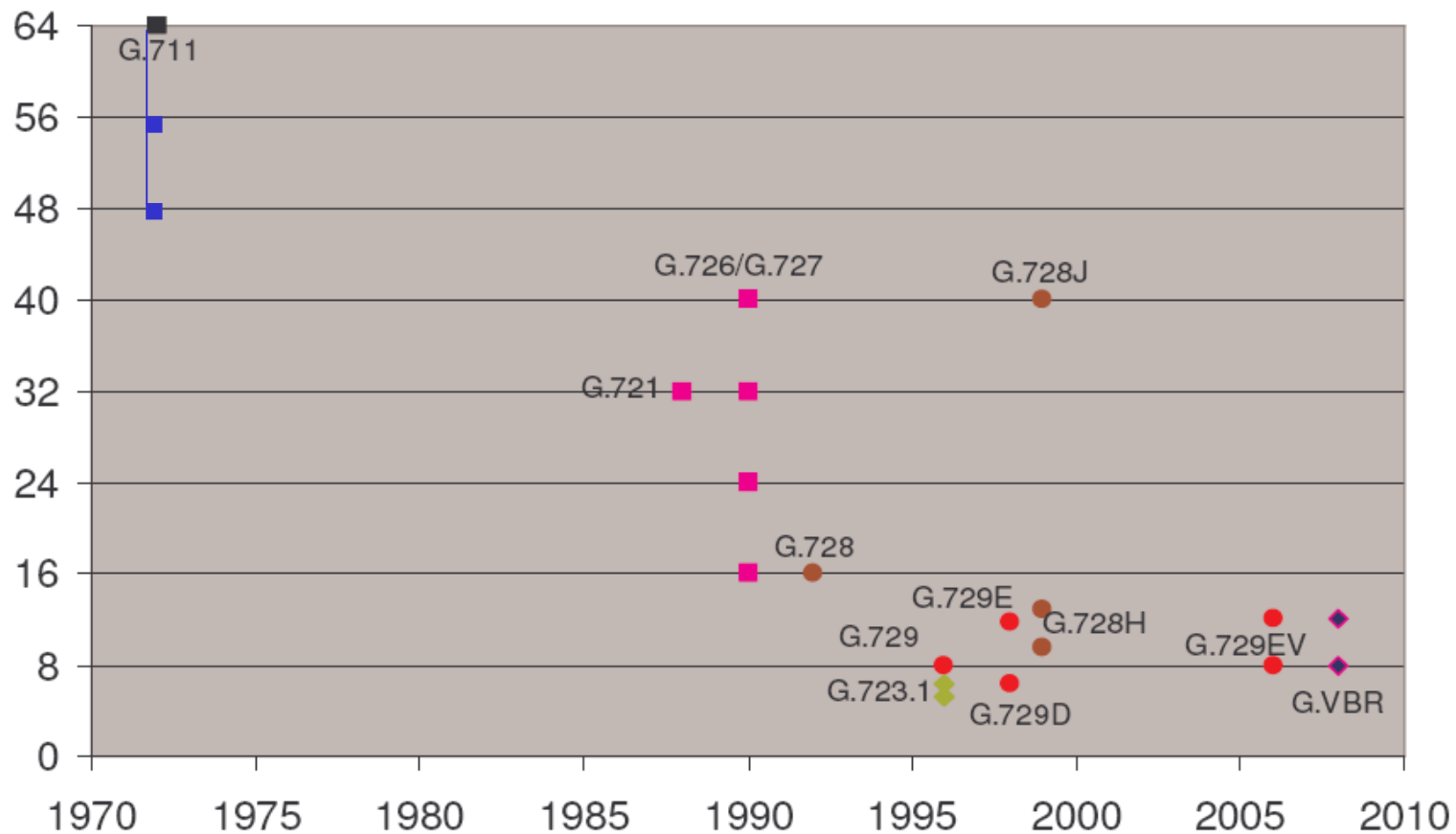
Source: Joint ITU-T/IMTC Workshop, San Diego, May 2006

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Current ITU-T Standardization topics: Multimedia – Audio/Speech coding

- **Trends:**
 - *Enhance quality, flexibility, robustness*
  - *Backward compatibility*
- **New standards:**
  - *G.718 (ex G.VBR-EV)* - Variable bit-rate embedded coding of speech signals **NEW!**
  - G.718 superwideband extension - scheduled for 2009
- **Extensions to existing standards:**
  - **G.711.1:**
    - Embedded wideband extension to G.711
  - **G.729.1:**
    - Low delay and silence removal (DTX/CNG) extensions
    - Floating point implementation
    - Superwideband extension
  - **G.722:**
    -Packet Loss Concealment (PLC)
  - **G.722.1:**
    - Floating point version
    - Fullband extension → G.719 **NEW!**
  - **G.722.2:**
    - Embedded VBR extension

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SG 16 Generic model for multimedia terminals
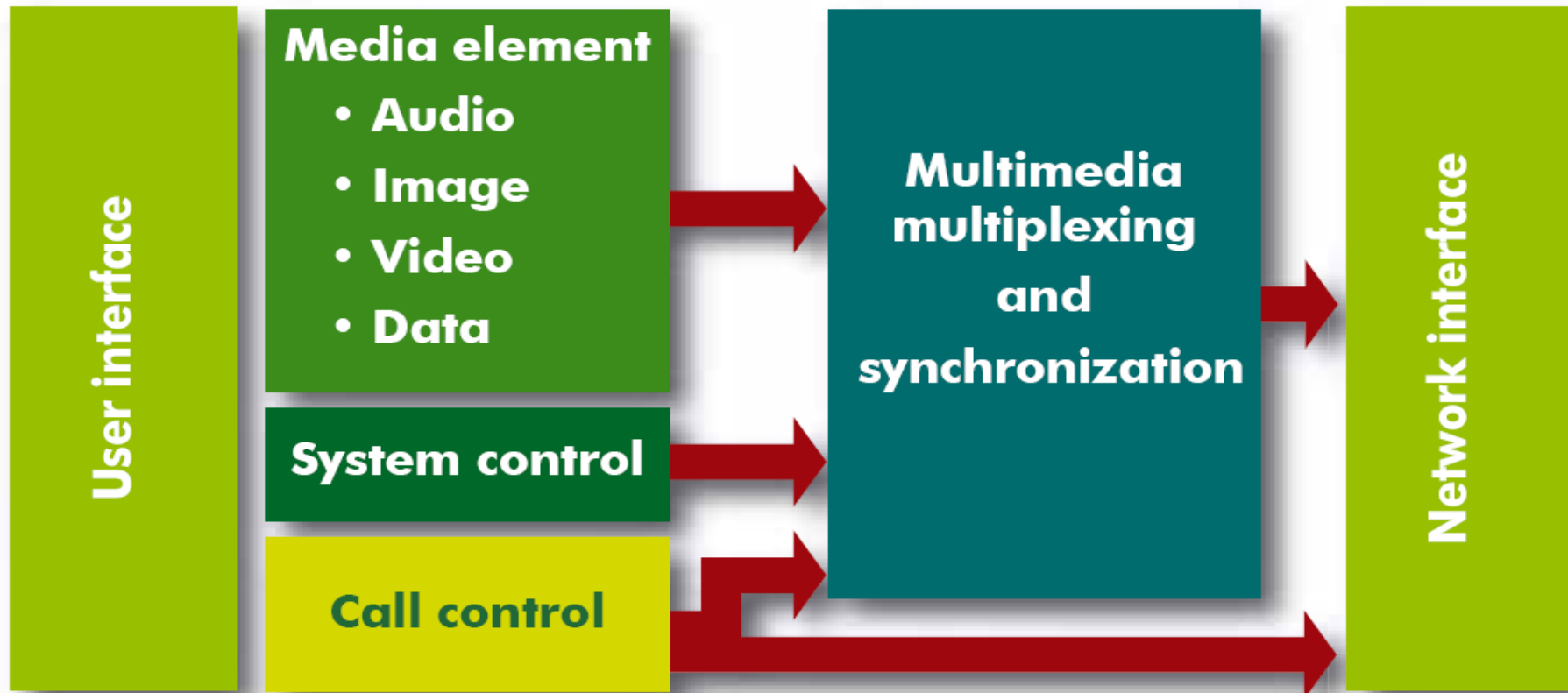
Multimedia – Various generations of Conferencing Systems in use

- ## *First Generation (ISDN)*
  - H.320-Series (H.321/H322) – Narrowband visual telephone systems and terminal equipment [1992]

- ## *Second Generation*
  - **IP-based networks:** H.323-Packet-based multimedia communications systems [1996]
    - packet-switched networks
    - LANs, WLANs
    - VoIP
    - Similar to SIP developed by IETF

  - **Mobile networks:** H.324-Terminals for low bit-rate MM communications
    - H.324 is now implemented in many mobile phone terminals for video-telephony applications (adopted by 3GPP)

Multimedia – Next generation of conferencing systems: AMS

- Third Generation (NGN and beyond) – Advanced Multimedia System (aka "H.325")
  - New project initiated by SG16, gaining momentum
  - Flexible, user-centric and scalable approach to support multi modes communications (e.g. audio, voice, electronic whiteboard) on NGN and non-NGN packet-based platforms.
  - **Change in paradigm**: from "monolithic applications" to a "plug in" based system (e.g. downloadable codecs)
  - Based on the experiences with H.323 and SIP
  - Currently discussing requirements and applications that will shape the system → a good moment to get involved

- New Question 12/16: "Advanced MM systems (AMS) for next generation and other packet-switched networks":
  - Downloadable codecs
  - Discovery of services
  - Support for transcoding functionality (e.g. text to speech)
  - Application plug in
  - Support of various business models

MM Interworking

ITU-T Rec. H.246:

- Defines how the different existing generations of conferencing protocols can interwork

Next study period ↓

ITU-T Rec. H.248.1 (originally H.248) → Q3/16 [QB6/16]

- Started evolving H.246 by decomposing its H.323 Gateway function into functional subcomponents to specify the protocols these components use to communicate [Diagram]

- Base protocol expanded via add-on, need-based modules called "packages"
→ Highly scalable implementations and interconnection of IP (H.323 and SIP) and/or non-IP systems (PSTN, 3G mobile, etc)
  - e.g. Facsimile, text conversation and call discrimination packages; RTP streaming via RTSP (used for IPTV)

- Consequence 1: encourages leverage of widely deployed Switched Circuit Network (SCN) capabilities such as SS7 switches

- Consequence 2: exposure of interfaces that were hidden in various switching and PBX systems

- Consequence 3: adoption of H.248 beyond the H.323 context, in particular for NGN

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New MM systems aspects being addressed

- IPTV
  - New Question 13/16
  - Coordination with SG 9 in the context of IPTV-GSI, in particular Q4/9 and 5/9
  - Developed initial list of target Recommendations to be developed

- Home networking
  - IPTV and multimedia architecture aspects (New H.622, ex H.GHNA)

- Vehicular gateway
  - Identify global Vehicle Gateway standards needed to allow plug-and-play of consumer devices working in vehicles to support global, seamless services/applications using Intelligent Transportation Systems
  - New Question proposed by SG 16 to WTSA-08 … but …
  - Ad hoc group already working to progress the issue

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Current ITU-T Standardization topics: Multimedia – Accessibility (1)

- **Q26/16: Accessibility to MM Services and Systems**
  - At present focus on the needs of non-signing deaf and hard-of-hearing communities
  - Need in future to address standards to support other types of disabilities
  - Text telephony is evolving towards accessible mainstream multimedia (NGN, IPTV,...)
  - Several Recs of the F-, H-, T- and V-series describe accessibility features (V.18, V.151, T.134, H.323, H.324, H.248.2, Supplement 1 to the H-Series)

- **Cooperation with Human Factors work in ITU-T SG 2**
  - JCA-Accessibility and Human Factors (JCA-AHF)

- **Coordination with the development sector**

Current ITU-T Standardization topics: Multimedia – Accessibility (2)

- ITU-T Rec F.790 "Telecommunications accessibility guidelines for older persons and persons with disabilities":
  - General guidelines for standardizing, planning, developing, designing and distributing all forms of telecommunications equipment, software and services
  - Guidance on understanding the topic of accessibility and the ways that accessibility may be incorporated in products and services.

- Technical Paper: "Telecommunications Accessibility Checklist"
  - To ensure that accessibility needs are taken into account from the beginning
  - "Design for all" = "Inclusive design"
  - Aligned with the new UN Convention on the rights of persons with disabilities (Dec 2006 → May 2008)

Multimedia – e-Health

- **MM Framework for e-health applications (Q28/16):**
  - Standardization of MM systems to support e-health applications (e.g. telemedecine):
  - Main objectives:
    - interoperability
    - cost savings
    - promote the use of MM for e-health
  - Coordination within ITU and with other SDOs

- **Main achievements:**
  - Technical Paper: "Roadmap for Telemedicine"
  - Creation of the e-health Standardization Coordination Group (eHSCG) with WHO, ISO/TC 215, CEN/TC 251, IEEE/1073, IEC/TC 62, DICOM, HL7 and
  - Compilation of standards in e-health (www.ehscg.org)

- **Challenges:**
  - Members need to share their experiences and requirements
  - Need to increase experts base, users

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Present trends in Multimedia

- Great development potential for MM and multi-mode Services and applications towards AAA (Ubiquitous Services and Applications):
  - Conversational services
  - User-defined / customized services
  - Multicast/broadcast
  - Object-to-people / object-to-object communications
- New conferencing systems with greater user friendliness
- Media coding
- Network aspects of ID systems (including RFID, USN, tag-based MM info retrieval)
- IPTV
- Home networking
- Mobile office and mobile extensions (e.g. fully networked cars)

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Future work

- Trends within SG (*apart from restructuring discussions*)
- Improve speech, audio and video coding algorithms: new codecs or extended features
- Advanced multimedia communication system
- Vehicular gateway studies
- Media-rich content delivery (e.g. tag-based MM retrieval, home networking, IPTV, video surveillance)
- Expand media gateway control protocol suite to respond to MM interoperability needs
- Tender to legacy systems and their interoperation with packet-based networks (e.g. modem over IP, conferencing, codec transcoding, etc)

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Conclusions

- **Many new technology developments happening in SG 16**
- **Response to trends and market needs**
- **Increase in contributions *and* participation indicate interest of members in this field of work**
- **Opportunities for contribution from developing countries as new system and technology standards are defined**
- **SG 16 has been a pragmatic, efficient, high-productivity study group over its 12-years of existence**
  - Proposed set of Questions reflect that philosophy

Resources (1/2)

- SG16 flyers: → http://itu.int/ITU-T/lighthouse/tflyers.html
  - Multimedia
  - H.264
  - Accessibility

- SG16 webpage: → http://itu.int/ITU-T/studygroups/com16

- Workshops: → http://itu.int/ITU-T/worksem
  - Special session in EUSIPCO on advances in speech and audio coding – Lausanne, CH, 25-29 Aug 2008
  - Joint ITU and G3ict forum – Geneva, 21 Apr 2008
  - ITU-T Workshop "MM in NGN" – Geneva, 10-11 Sep 2007
  - Joint ITU-T and IMTC Forum 2006 on "H.323, SIP: is H.325 next?" - San Diego, CA, US, 9-11 May 2006
  - Workshop on "Video and Image Coding and Applications" (VICA) - Geneva, 22 - 23 July 2005

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Resources (2/2)

- AMS – H.325
  → http://itu.int/ITU-T/studygroups/com16/ams

- Accessibility:
  → http://itu.int/ITU-T/studygroups/com16/accessibility

- E-Health:
  - SG16 Special projects
    → http://itu.int/ITU-T/studygroups/com16/e-health

  - eHSCG website
    → http://www.ehscg.org

- Last meeting results:
  → http://itu.int/ITU-T/studygroups/com16/results.html

- Contacts for more information:
  → probst-pa@bluewin.ch, simao.campos@itu.int

Supplemental slides

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H.248/MEGACO Media Gate Control Protocol

- Used in a decomposed gateway architecture linking the Media Gateway Controller (Server) and Media Gateway (Client).

- Developed in a joint effort by ITU-T SG16 and the IETF MEGACO working group. ITU-T SG16 is now the lead.

- Used for many types of gateways: traditional TDM gateways through to VoIP gateways. Small residential gateways to large operator gateways.

- Used for various media function driven scenarios: Trunking, Transcoding, Transframing, Media Server Resources, Conferencing, NAT and Firewall.

- Adopted by many standards bodies: ETSI Tispan, 3GPP, ITU-T SG11, MSF, ATIS and others.

- The core protocol H.248.1 is now version 3. H.248 "Packages" extend the functionality of the protocol. For a list see: http://itu.int/ITU-T/recommendations/index.aspx?parent=1305

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H.248 Network usage sample

H.248 provides the "glue" between Session/Control signalling and the media resources

SS7

MGC

ISUP Trunks
PRI Trunks
PTS Trunks
R2 Trunks

MG

TDM

MG

Analog Lines

EBS Lines

MG

H.248 over
Packet Network
(IP, ATM, etc.)

Distributed Conf.

MG

MG

MG

Operator Svcs.
E911

Centralized Conf.
Announcements
Video Conf.
Multimedia Serv

BRI Lines

MG

MG

MG

IP Phones

V5.2 Access
GR-303
Access

Wireless