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

Session 5 – Development trends in ITU-T: Multimedia

Dr. Leo Lehmann
Rapporteur Q.29 ITU-T Study Group 16
Federal Office of Communication
Switzerland

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International Telecommunication Union

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Contents

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

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

- 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
  - Multimedia Directory services (H.350) 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

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!**

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

Several generations of ITU-T Video coding standards:

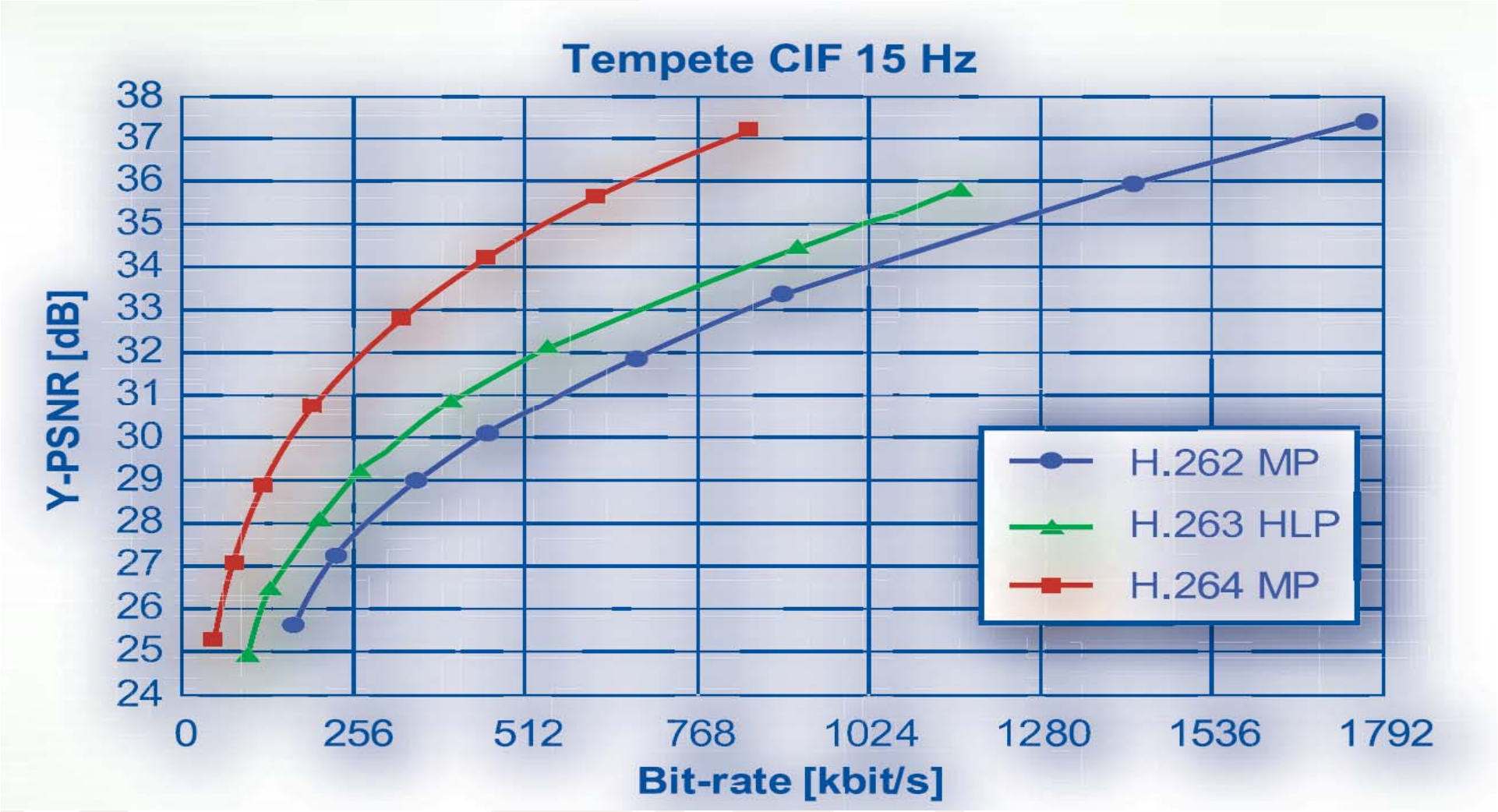
- *H.261* for videoconferencing over ISDN with a bit-rate of px64 kbit/s (p=1…30) [1990]
- *H.262* developed together with ISO/IEC MPEG, well known under MPEG-2 standards used worldwide for digital TV systems, DVD, … [1995]
- *H.263* for low bit rate audiovisual services [1996]
- *Advanced Video Coding (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!

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

Main H.264 features:

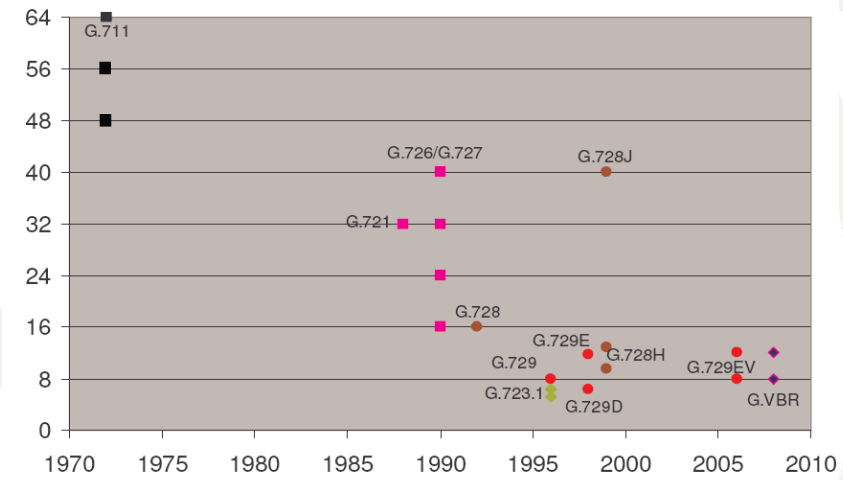
- Latest technology in terms of video compression
- First really scalable video codec
  - Different profiles
  - Bit-rates from 64 kbit/s to 960 Mbit/s
- Now being largely deployed in commercial products (both professional and consumer devices):
  - Videoconferencing systems
  - SD and HDTV Digital TV,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

Video coding – Comparative performance

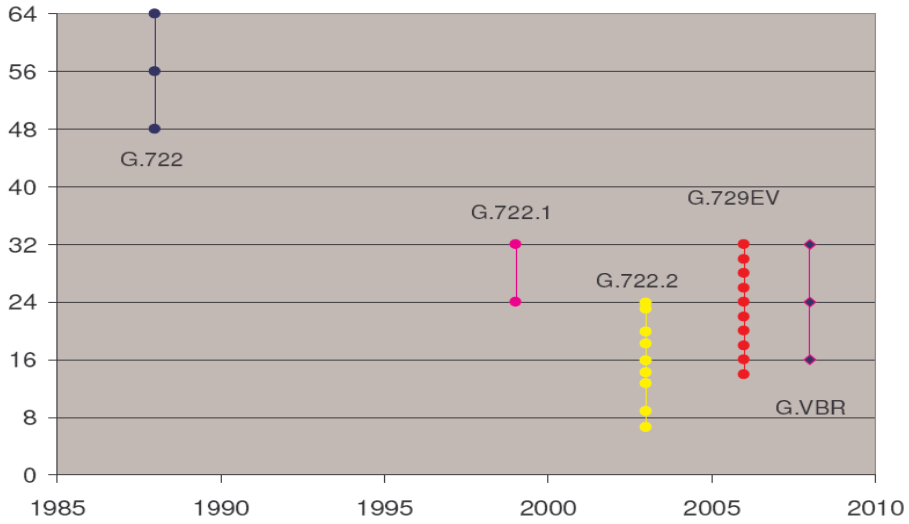


Current ITU-T Standardization topics: Multimedia – Audio/speech coding development

Narrowband (4kHz)



Wideband (7/14kHz)

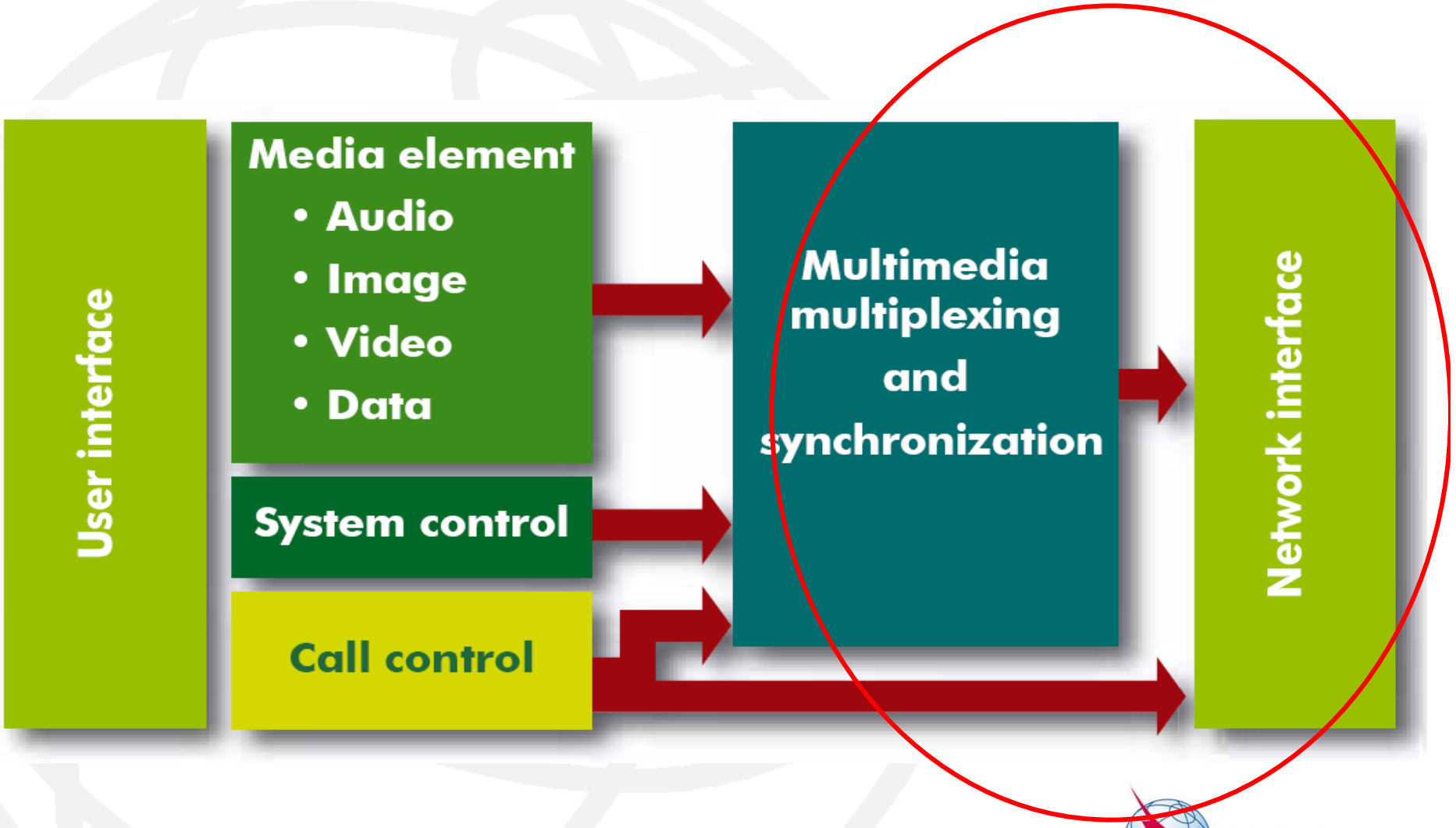


Source:Joint ITU-T/IMTC Workshop, San Diego, May 2006

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

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)

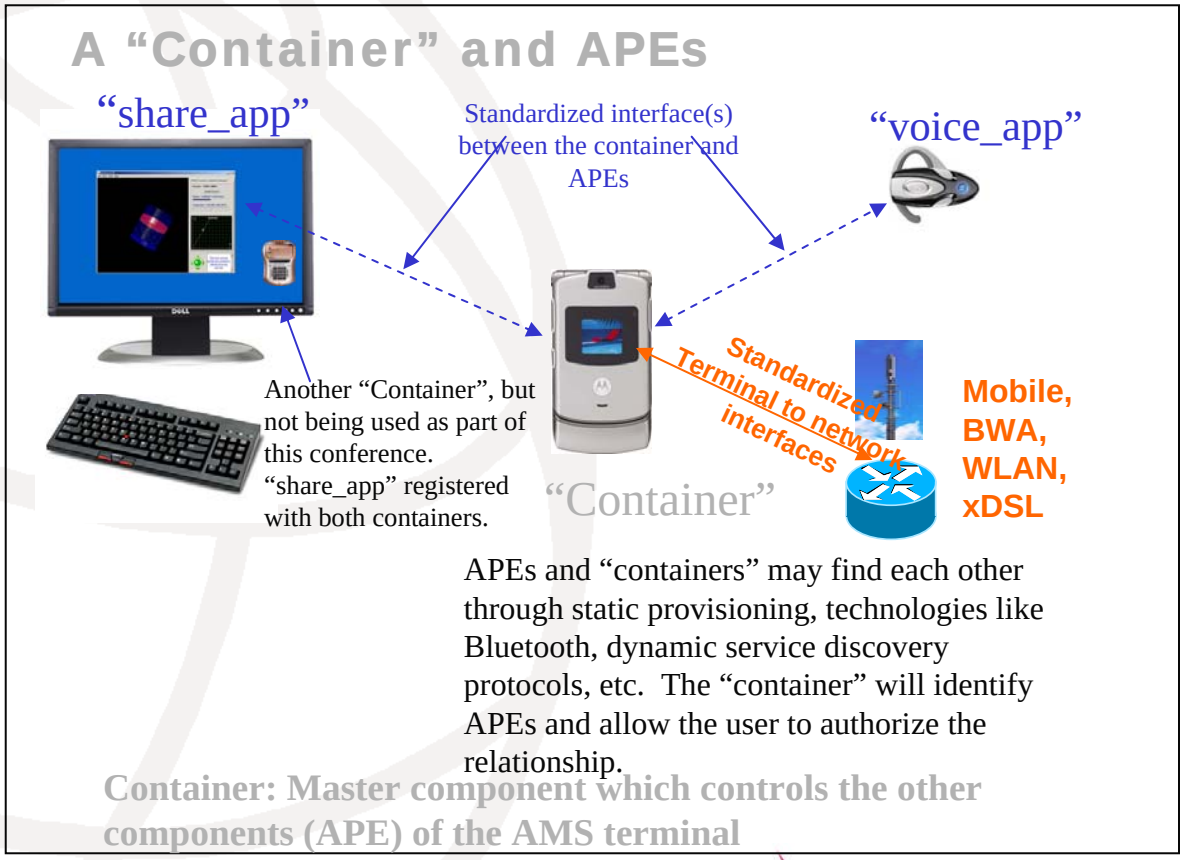
Multimedia – Next generation of conferencing systems: AMS

Third Generation (NGN and beyond) – Advanced Multimedia System (aka "H.325"); New Question Q.12/16, gaining momentum

- Flexible, user-centric, scalable, support multi mode (audio, voice, e. whiteboard) on NGN and non-NGN packet-based platforms.
- Support of various business models
- Open interface to Independent application developers
- Based on the experience with H.323 and SIP
- Open for independent application developers

Currently discussing requirements and appl. that will shape the system

=>good moment to get involved



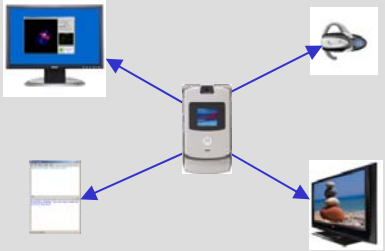
MM - AMS Characters Mulimode Communication

Change of Paradigm

2G – "Monolithic"

Features are either integrated into the SW or through proprietary interfaces. Adding any new feature means upgrading the device.

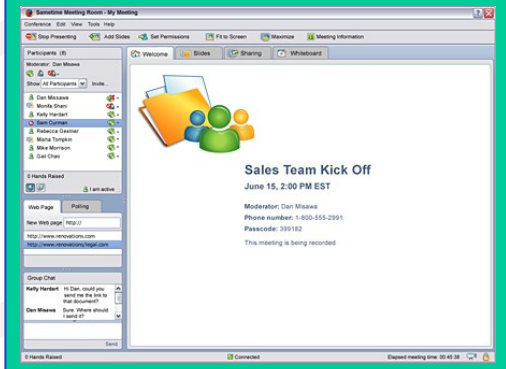
3G – "Distributed Plug -in"



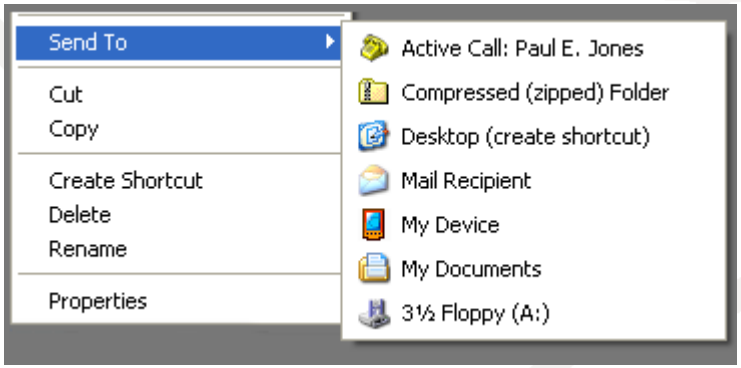
The user's device may sport few basic applications, but many applications can be added through interfaces with external devices

Transcoding (text to speech)

Application Sharing

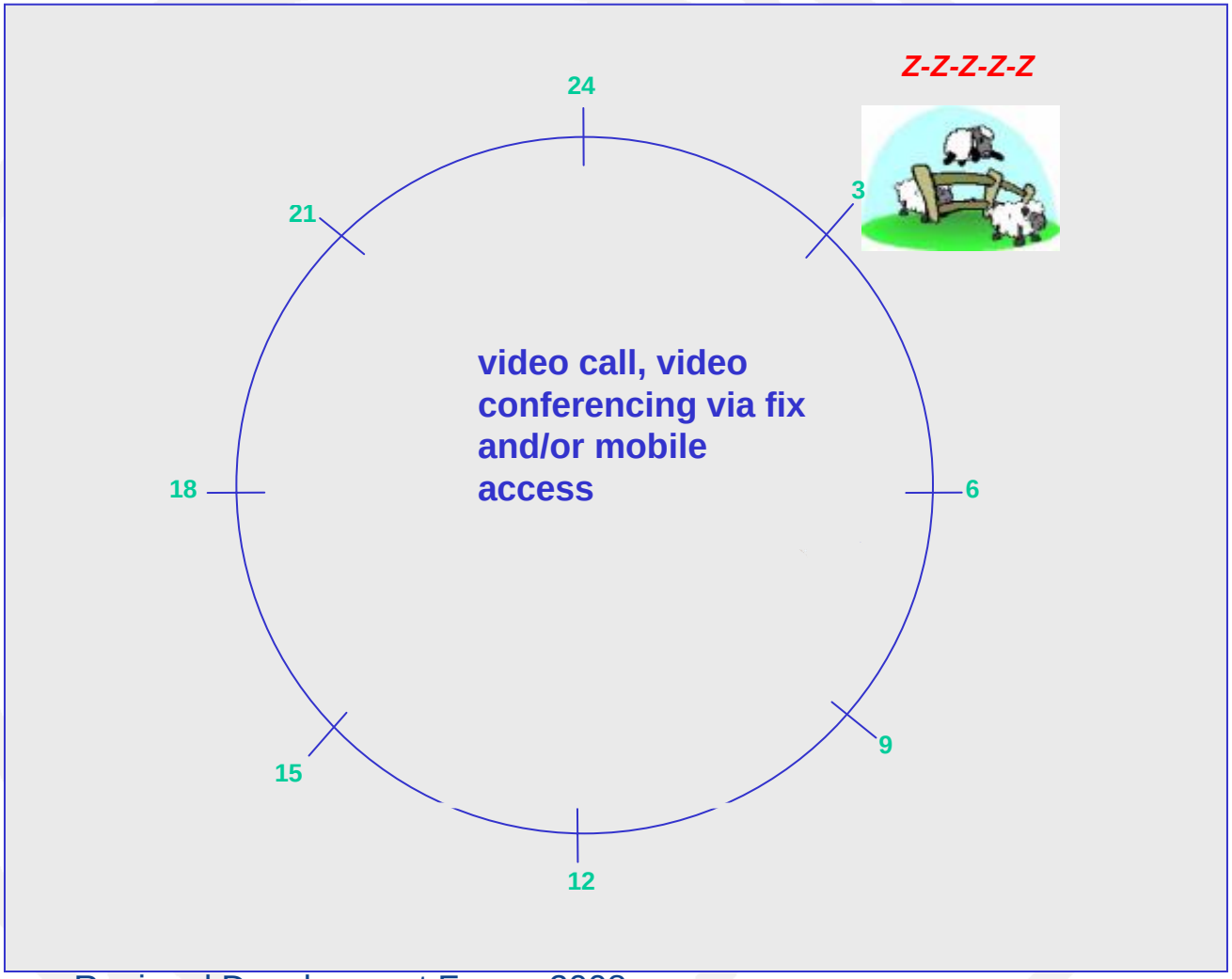


User-centric

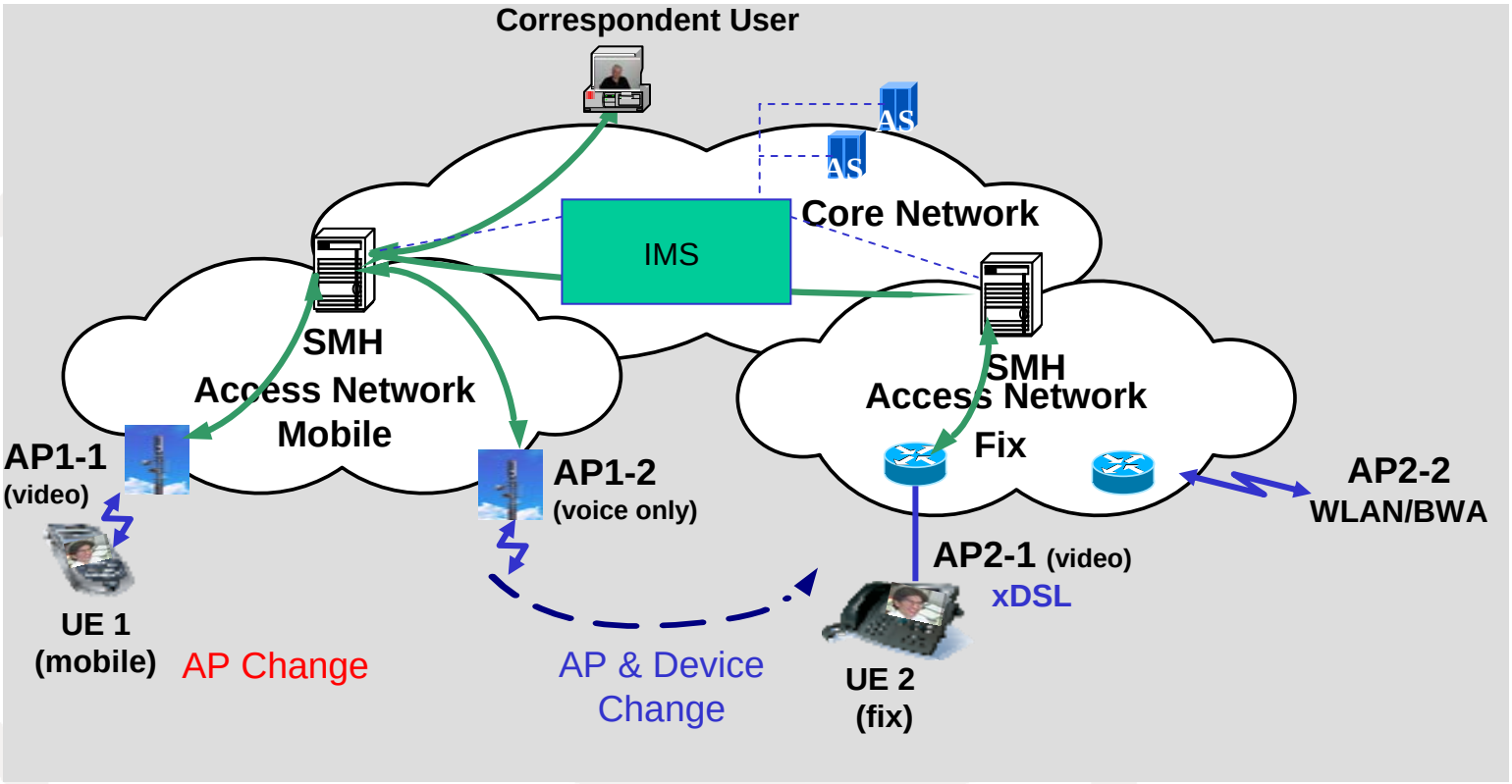


Multimedia Service Mobility

- Question Q.29/16: Mobility for Multimedia Systems and Services
- H. 501: Protocol for mobility management and intra/inter-domain communication in multimedia systems; standardization on multimedia service mobility requirements and functional architecture in closed cooperation with Q.6/13, Q2,5/19 (NGN-GSI)



Multimedia Service Mobility (2)



1. Movement of UE1 requires handover to AP1-2 (only voice streams)
2. If the user profile of one of the communication partners mandatory requires video the call has to be terminated. Otherwise the video stream component of the conversation is terminated
3. The user forces a handover from mobile device UE1 to fix device UE2
4. UE2 connected to AP2-1 enables video stream functionality, thus video call can be resumed between communication partners

MM Interworking

ITU-T Rec. H.246:

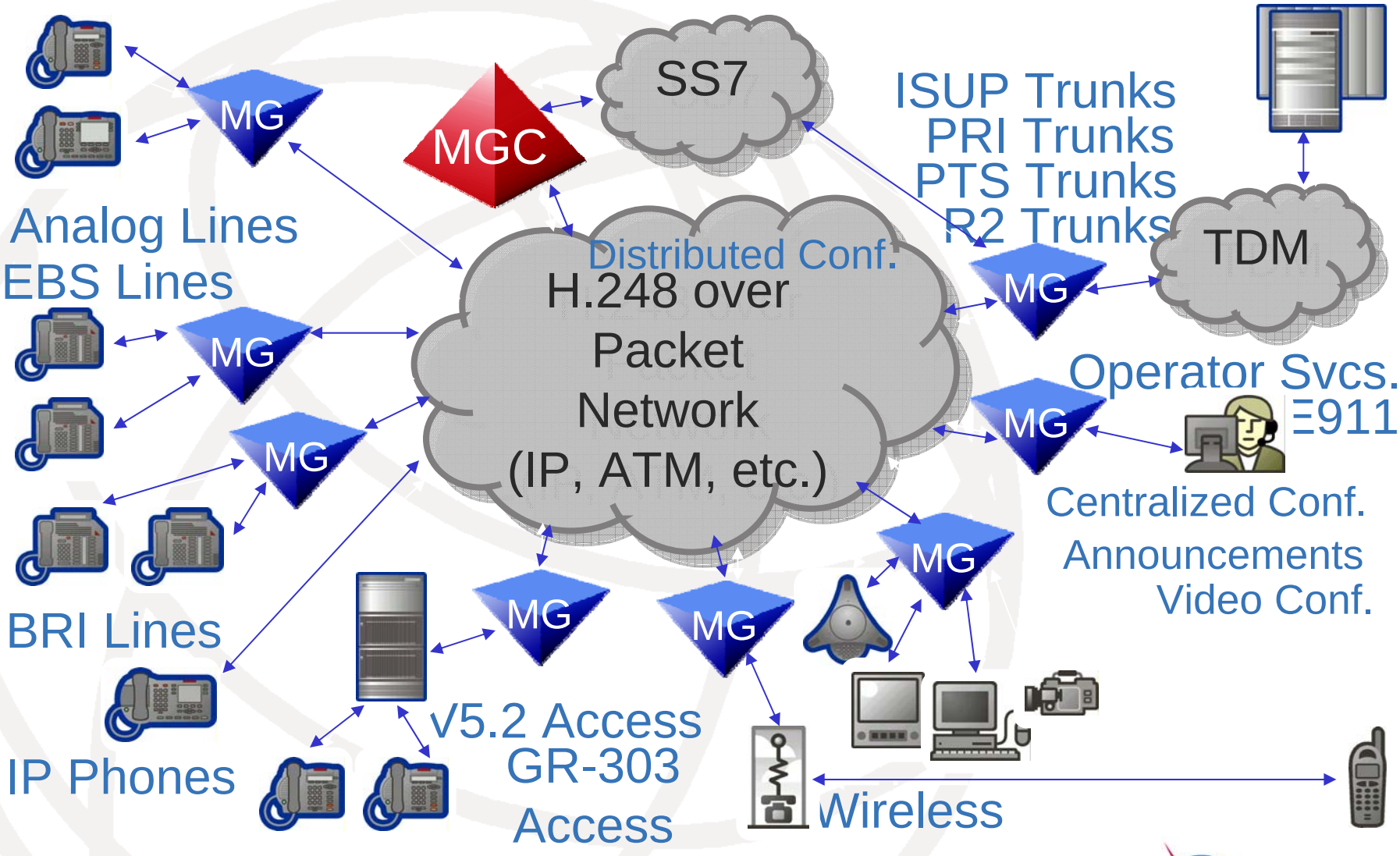
- Defines how the different existing generations of conferencing protocols can interwork

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
- 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

H.248 MEGACO


MG
MGC
SS7
ISUP Trunks
PRI Trunks
PTS Trunks
R2 Trunks
TDM
Analog Lines
EBS Lines
Distributed Conf.
H.248 over
Packet
Network
(IP, ATM, etc.)
MG
MG
MG
MG
Operator Svcs.
911
Centralized Conf.
Announcements
Video Conf.
MG
MG
MG
BRI Lines
V5.2 Access
GR-303
Access
IP Phones
Wireless

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
  - Ad hoc group already working to progress the issue

Current ITU-T Standardization topics: Multimedia – Accessibility

- Q.26/16:
- see specific presentation on multimedia accesibility aspects

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
  - Compilation of standards in e-health (www.ehscg.org)
  - e-health workshop (ITU-D & ITU-T) 2003

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

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)

Future work (apart from restruct. 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)

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

Supplemental slides

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

F.771: Service description and requirements for MM information delivery services triggered by tag based identification

- Identity: represents relationship between real world entity and its information/ attributes in computers
- Identifier: Series of digits, characters or symbols to identify a real world entity
- Id-tag: Physical object which stores and includes identifier and further information (e.g. RFID, barcode)
- Tag based identification: Capturing the identifier of a real world object from an ID-tag
- ID resolution: Processing the identifier of an ID-tag in order to access information

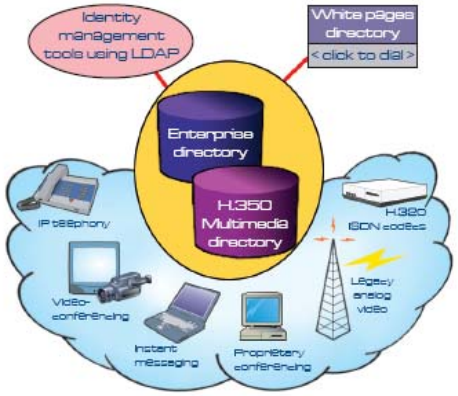
H.350 Directory Services for Multimedia

Overview of ITU-T H.350

Videoconferencing via the Internet is now easier and less expensive using the new ITU-T H.350 series of Recommendations "Directory services architecture for multimedia conferencing". H.350 results from an Internet2 Video Middleware working group, and was endorsed by ITU members from 189 countries.

Using LDAP (Lightweight Directory Access Protocol), H.350 provides a uniform way to store and locate user information related to VoIP, video and collaborative multimedia information in a way that integrates with directory and identity management systems already in place at universities, large enterprises and service provider networks. Extensions to support X.500 directory services are also available. The newly standardized technology enables providers to scale-up video and VoIP operations from a few hundred endpoints to full enterprise- and carrier-level deployments. Account configuration details, authentication and authorization are linked to the enterprise directory.

H.350 supports SIP (Session Initiation Protocol), H.320 and H.323, as well as proprietary or non-standardized collaborative and conferencing protocols.



H.350 allows multiple applications, call servers and protocols to access the same master directory information source

H.350 family of Recommendations

The H.350-series defines a standardized directory services support association of individuals with endpoints, searchable directories (a.k.a. white pages), and clickable dialing. Directory services can also assist in user authentication based on trusted data sources by providing standardized management and storage of authentication credentials.

H.350 – Directory services architecture for multimedia conferencing
Describes a directory services architecture for multimedia conferencing and a standardized LDAP schema to represent endpoints on the network and associate those endpoints with users. It also discusses design and implementation considerations for the interconnection of video- and voice-specific directories, enterprise directories, call servers and endpoints.

H.350.1 – Directory services architecture for H.323
Describes an LDAP schema to represent H.323 endpoints.

H.350.2 – Directory services architecture for H.235
Describes an LDAP schema to represent H.235 elements.

H.350.3 – Directory services architecture for H.320
Describes an LDAP schema to represent H.320 endpoints.

H.350.4 – Directory services architecture for SIP
Describes an LDAP schema to represent SIP user agents.

H.350.5 – Directory services architecture for non-standard protocols
Describes an LDAP schema to represent non-standard multimedia communications endpoints, and is meant to provide a very basic framework for representing these elements in a directory.

H.350.6 – Directory services architecture for call forwarding and preferences
Describes simple LDAP and X.500 schemas to represent call forwarding and call preference information in an H.350 directory. It is intended to represent addresses to which calls should be forwarded in case an endpoint does not answer a call. It can also represent advanced functionality, such as directing a caller to a web page or e-mail screen when the called endpoint is not available.

What is needed to support H.350?

- Ability to operate an LDAP and/or X.500 directory service. Many large enterprises already use this service and have staff trained to manage it. Where there is an existing directory, the directory service manager must be willing to add a single line of text (an LDAP Uniform Resource Identifier) for each endpoint to users' existing directory entries. Experience at several organizations has shown that this request has met with no resistance.
- Minor modifications in the call server (H.323 Gatekeeper or SIP Proxy/Registrar Server). The call server's access to the external H.350 directory can be enabled with a single access control rule.

Usage examples

Name:	Peter Law
Organization:	ITU
Department:	Finance
E-mail:	law@itu.int
Title:	Head of Finance
Phone:	+41 22 732 5000
Street Address:	Varembé 12
City:	Geneva
State/Province:	Geneva
Country:	Switzerland
Postal Code:	1211
Videoconferencing Address:	My Desktop Video

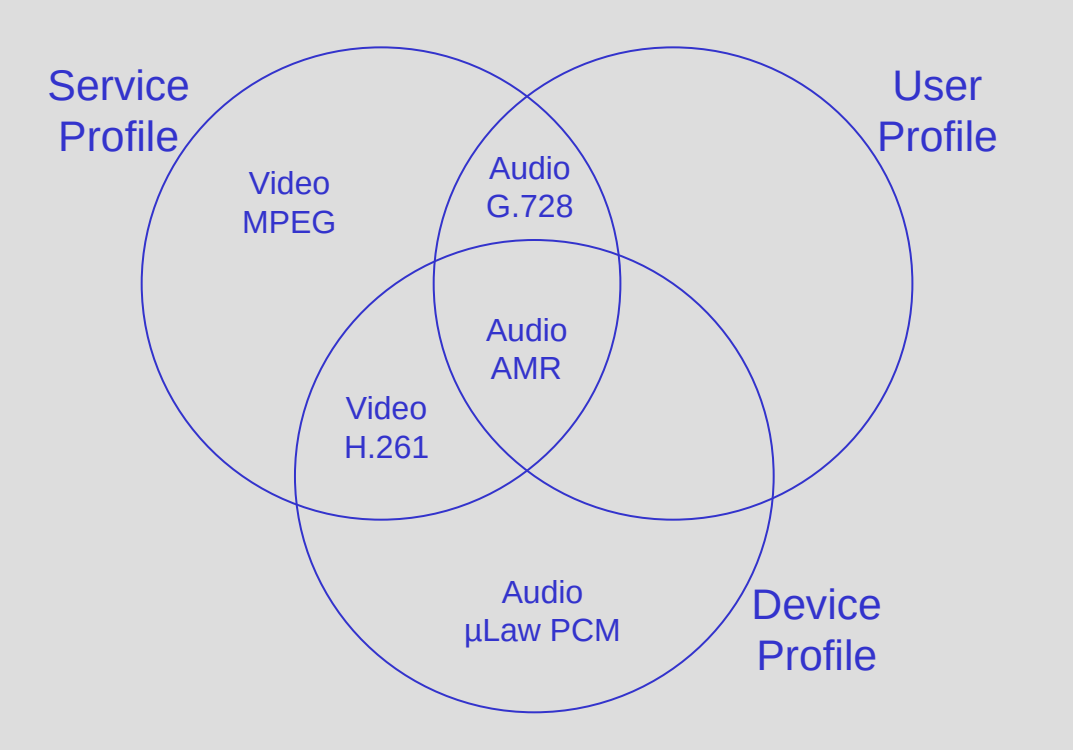
The figure above shows a directory entry for a person stored in an enterprise directory. The yellow arrow points to the multimedia information available for this person (commURI). The figure below shows the various dialing addresses that can be used to contact the person at the "My Desktop Video" endpoint.

My Desktop Video	
H.323 DialedDigits Alias:	+41 22 732 5000
H.323 Id Alias:	Peter Law
H.323 URL:	h323:law@itu.int
H.323 Transport ID Alias:	165.160.172.14
Owner:	plaw

Non-standard conferencing protocols such as MPEG-2 videoconferencing systems can also be listed in H.350 directories, providing useful contact information and instructions for end users, as illustrated below.

genericIdentity ProtocolIdentifier:	MPEG-2
Generic Identity Message:	See: http://www.itu.int/plaw/mpeg2/ for locations and connection instructions

Example: Adaptation / adjustment audio / video codec's



H.510: Service mobility defines the ability of a user to access during an ongoing session the particular subscribed (multimedia) - services irrespective of the location of the user and the terminal that is used for that purpose

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

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

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