Conformance and Interoperability testing of Multimedia Terminals and Systems: ITU-T SG16 and IMTC, a successful cooperation

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Agenda

- About ITU-T SG 16
- Conformance testing for audio & video codecs
- About IMTC
- IMTC Interoperability Testing and Certification Activities
- Conclusions

ITU-T Study Group 16

Mandate of SG16 for the period 2005-2008

- **Mandate:**
  Studies related to MM service capabilities (including those supported by NGN):
  - MM Terminals, systems (including network signal processing equipment, MCU, GWs, GKs, Modems and Facsimile)
  - Protocols and signal processing (media coding)
- **Lead SG on:**
  - MM Terminals, systems and applications
  - Ubiquitous applications (“e-everything”)

SG16 structure

- **SG16 Structure:**
  - WP1 Modem, fax and equipment transmission (Y. Naito)
  - WP2 MM Systems and Terminals (I. Sebestyen/S. Okubo)
  - WP3 Media Coding (P. Barrett/C. Lamblin)
  - Q 20 and Q26 → report directly to the SG plenary

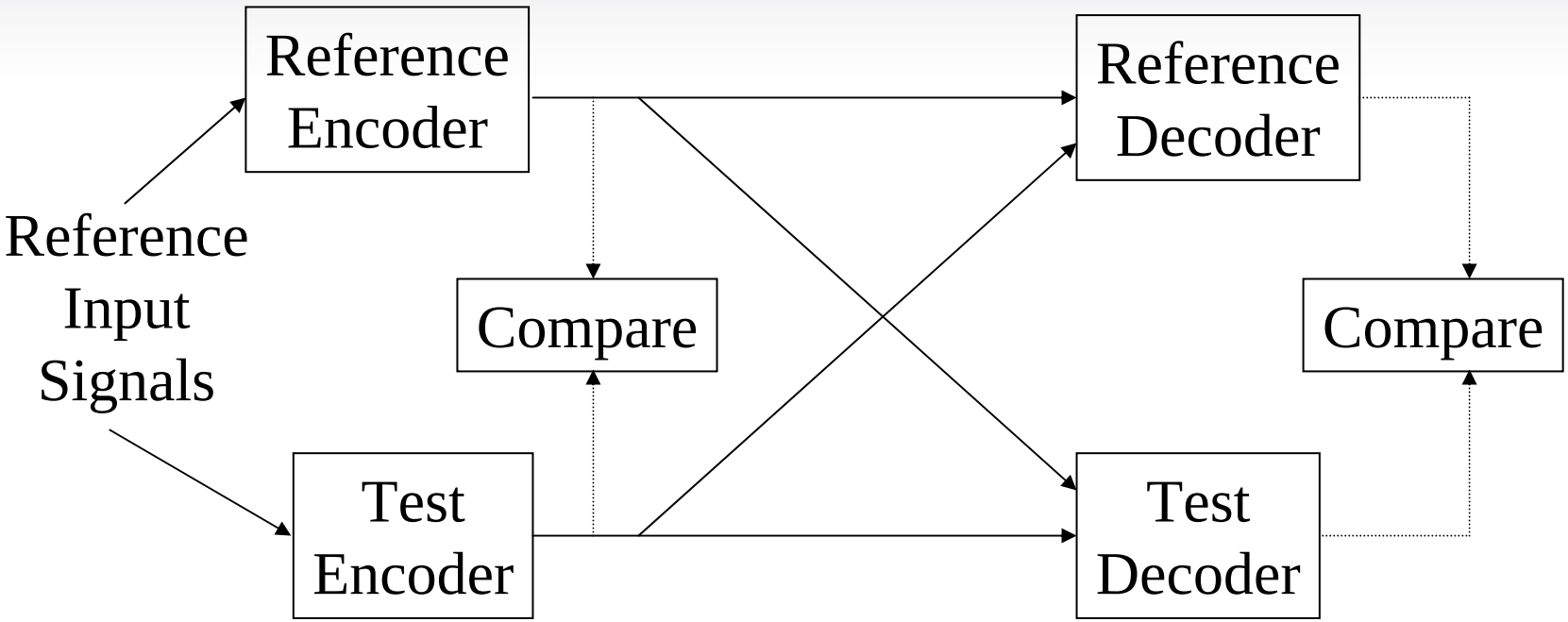
- **Management team:**
  - **Chairman:** P.A. Probst / OFCOM (CH), Aethra (I), Polycom (USA), Siemens (GER), Tandberg (N)
  - **Vice-Chairmen:**
    - P. Barrett / Psytechnics(UK)
    - Ms C. Lamblin / FT (F)
    - Y. Naito / Mitsubishi (Japan)
    - I. Sebestyen / Siemens (GER)
  - **Secretariat (TSB):**
    - S.F. de Campos Neto (Counsellor) / I.Frost (Assistant)

What's new in this study period?

- ***What's new compared to the last study period?***
  - Concentration of the studies on Modems and Facsimile (one Question each)
  - Transfer of work from ITU-T/SG15 on Network Signal Processing Equipment to SG16
  - New work on FW and NAT in H.300 Series of MM Systems
  - MM Service and Application aspects of NGN included in the relevant questions
  - Coordination on TDR/ETS transferred to ITU-T/SG2
  - Continuation of the ongoing work….!

Video and Image Coding Conformance testing in SG 16

Conformance testing for audio & video codecs



Conformance in audio codecs

- Recommendations with extensive test sequences (e.g. G.722, G.722.2, G.726, G.727, G.728)
  - Earlier approach
  - Digital test sequences for a bit-exact implementation of the decoder
  - Encoded output and decoded output comparison (algorithmic output)
  - Example: Appendix II/G.722 - Digital test sequences for the verification of the G.722 64 kbit/s SB-ADPCM 7 kHz codec
- Recommendations without extensive test sequences (e.g.G.722.1, G.723.1, G.729)
  - More modern approach
  - Test vectors provided in the standard are only to check that the reference C compiled properly in a target platform
  - Provision of reference implementation (e.g. C code) allows creation of own test sequences.
  - Compliance testing is to be done using a large set of speech material (not part of the standard) and checking code coverage

Audio codecs – approach in other SDOs

- TIA: Minimum performance specifications
  - "Homologation" via performance of a reference performance test methodology (usually: using a standardized subjective test plan)
  - Self-performed or by a lab paid by implementor
- MPEG Audio
  - Part of the MPEG-1, MPEG-2, MPEG-4 specifications
  - Similar to the video case (see H.264, next slide)

Comparison of methodologies

- Exact match
  - applicable to fixed-point algorithm descriptions
  - possible to establish the exactness of an implementation re: the standard
  - does not allow design innovation
  - cheap implementation
- Minimum performance
  - applicable to any type of description
  - does not verify / guarantee interoperability
  - allows design innovation
  - may be expensive (subjective tests)

Conformance in video codecs

- H.264.1 - Conformance specification for H.264
  - contains the conformance bitstreams, uses the Reference decoder software capable of decoding bitstreams in H.264.2 (*Reference software for H.264*)
- H.263 Appendix III - Examples for H.263 encoder/decoder implementations
  - Contains several examples of encoder and decoder implementations for information only
- H.262 (same as MPEG-2/Video)
  - Uses the conformance testing spec in the MPEG-2 suite

For the future…

- Document better the existing conformance verification methodologies
- Study the definition of subjective / objective minimum performance conformance verification methodologies

IMTC

What is IMTC?

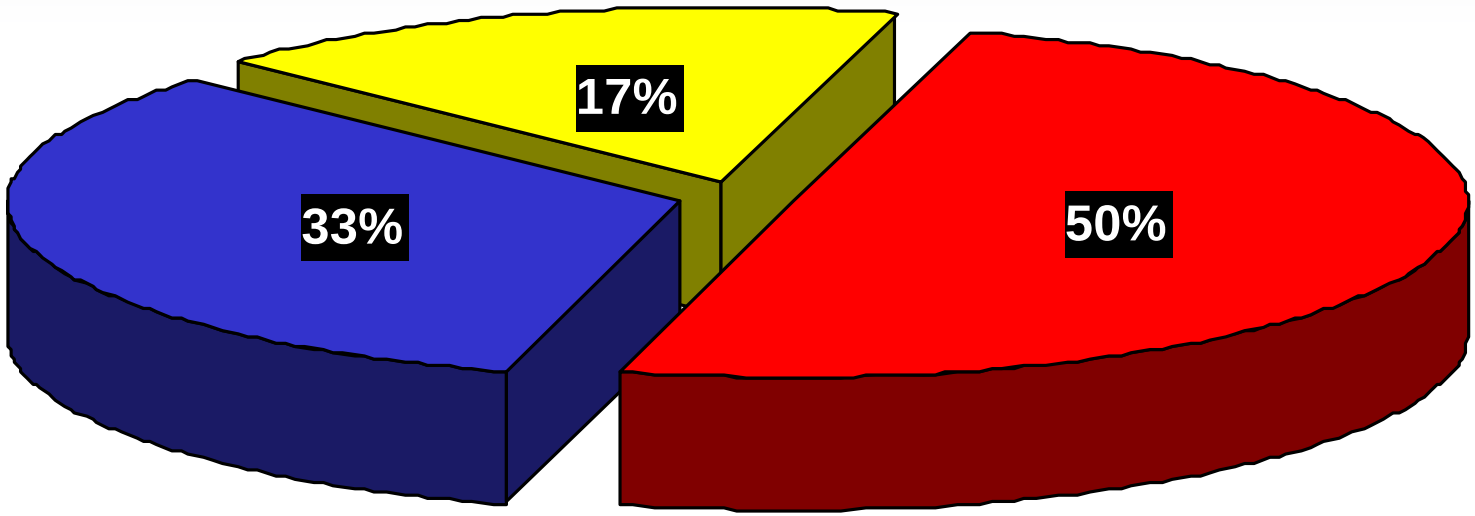
- Stands for International Multimedia Telecommunication Consortium
- It is a standardization supporting organization, that does things that are complementary to standardization and are supportive of those (e.g.):
  - Interoperability Testing of products under development
  - Forming standardization requirements
  - Makes recommendations to Standards Bodies
  - Promoting technology and Industry...

IMTC structure

- Working Groups (WG):
  - Network Infrastructure, Protocols & Systems
  - Requirements
- Each WG is comprised of Activity Groups (AG):
  - Conferencing Interoperability
  - 3G-324M
  - Packet Switched Streaming (PSS)
  - Session Initiation Protocol (SIP)
  - IPR
  - Media Processing

IMTC Members

- About 60 members worldwide



IMTC 2005 Highlights

- Highlight IMTC Historic Archive to members (EPO became IMTC member)
- Continued successful InterOP!/SuperOP! (PSS, H324M, H323-SIP,…)
- Continued successful WG/AGs (some are active, others almost dormant)
- Continued strong liaison with other bodies (SDOs / Fora) – ITU-T, 3GPPs, ISO SC29…
- Continued marketing / promotion / education of MM communication technologies (restart…)

e.g. “Conferencing Over IP” Activity Group - Goals

- To facilitate standards-based interoperability among various implementations from all vendors involved in the Multimedia Communications Industry
- Facilitates testing for all related protocols (SIP, H.323, H.320, etc.) and technologies (Security, QoS, FW/NAT Traversal and more)
- Very successful! Should be done outsize SDO

IMTC Interoperability Testing and Certification Activities

2004-2005 Results: Face to Face testing

- Spring 2004 Interoperability, San Jose, California, hosted by SONY
- SuperOp! 2004 (September), Lillestrom, Norway, hosted by TANDBERG
- Summer 2005 Interoperability, Belleville, Canada, hosted by NORTEL
- SuperOP! 2005 (September), Jesi, Italy, hosted by AETHRA

Certification / Type Approval

- This has been more difficult…
- IMTC made 2 attempts to create an IMTC Certification Program (Conferencing Compatibility Program for H.320, H.323 Forum certification)
- Only some “Self-Certification Spec” was possible
- Could NOT get agreement on features/options to be included at each certification level
- Legal responsibility (e.g. indemnification) of IMTC and neutrality of testing institution were the main issue
- Should definitely not be done by an SDO!

Conclusions

- SG16 has been addressing conformance in some way in both audio and video coding
  - Better documentation and new methodologies could be studied
- For systems Recommendations (H.320, H.323, H.324, etc.), mandatory parameters to support are documented.
- Too many options to be able to define even a set of compliant terminals
- The IMTC has been a good partner to perform interoperability testing in neutral environments that gave different manufacturers the confidence to participate

Thank You!