Regional Workshop for Europe
New Issues in Quality of Service Measuring and Monitoring
Bologna, Italy, 25-26 November 2015

ITU-T SG12 overview
Technical Standardization in the Quality of Service

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ITU/TSB

SG 12 Mandate

- Performance, QoS and QoE
- Responsible for Recommendations on performance, quality of service (QoS) and quality of experience (QoE) for
  - full spectrum of terminals, networks and services
    - ranging from speech over fixed circuit-based networks to multimedia applications over networks that are mobile and packet based
- Included are
  - operational aspects of performance, QoS and QoE
  - end-to-end quality aspects of interoperability
  - development of multimedia quality assessment methodologies, both subjective and objective.
- SG 12 is the Lead SG on
  - quality of service and quality of experience
  - driver distraction and voice aspects of car communications
- http://www.itu.int/en/ITU-T/studygroups/2013-2016/12/Pages/default.aspx

SG 12 Recommendations

- E-Series: Overall Network Operation, telephone service, telephone operation and human factors
  - E.420-E.479, E.800-E.859
- G-Series: Transmission Systems and media, digital systems and networks
  - G.100-series, except G.160-, G.180- and G.190-series, G-1000 series
- I-Series: Integrated Services Digital Network
  - I.350-series (including Y.1501/G.820/I.351), I.371, I.378, I.381
- P-Series, except P.900-series:Terminals, subjective and objective test methods
- Y-Series: Global Information infrastructure, Internet Protocol aspects and Next Generation Networks
  - Y.1220-, Y.1530-, Y.1540-, Y.1560-series

SG 12 Leadership Team

- Chairman
  - Kwame Baah-Acheamfuor (National Communications Authority, Ghana)
- Vice Chairmen
  - Paul Barrett (Netscout, United States)
  - Vincent Barriac (Orange, France)
  - Gamal Amin Elsayed (National Telecommunication Corporation, Sudan)
  - Hyung-Soo Kim (KT Corporation, Republic of Korea)
  - Al Morton (AT&T, United States)
  - Qi Feng (Beijing University of Posts and Telecommunications, China)
  - José Guadalupe Rojas Ramírez (Mexico)
  - Akira Takahashi (NTT, Japan)
  - Hassan Talib (Agence Nationale de Réglementation des télécommunications, Morocco)
- TSB Secretariat
  - Martin Adolph, Engineer / Hiroshi Ota, Advisor
  - Emmanuelle Labare, Assistant

Working Parties

- **WP 1 Terminals and multimedia subjective assessment**
- CHAIR: **Lars Birger Nielsen** (Brüel & Kjaer, Denmark)
  VICE CHAIR: **Gunilla Berndtsson** (Ericsson, Sweden)

Q3/12	Speech transmission characteristics of communication terminals for fixed circuit-switched, mobile and packet-switched (IP) networks
Q4/12	Hands-free communication and user interfaces in vehicles
Q5/12	Telephonometric methodologies for handset and headset terminals
Q6/12	Analysis methods using complex measurement signals including their application for speech enhancement techniques and hands-free telephony
Q7/12	Methods, tools and test plans for the subjective assessment of speech, audio and audiovisual quality interactions
Q10/12	Conferencing and telemeeting assessment

Working Parties

- **WP 2 Objective models and tools for multimedia quality**
- CHAIR: **Paul Barrett** (Netscout, United States)
  VICE CHAIR: **Vincent Barriac** (Orange, France)

Q8/12	E-Model extension in wideband transmission and future telecommunication and application scenarios
Q9/12	Perceptual-based objective methods for voice, audio and visual quality measurements in telecommunication services
Q14/12	Development of parametric models and tools for multimedia quality assessment
Q15/12	Objective assessment of speech and sound transmission performance quality in networks
Q16/12	Framework for diagnostic functions and their interaction with external objective models predicting media quality

Working Parties

- **WP 3 Multimedia QoS and QoE**
- CHAIR: **Paul Coverdale** (Huawei Technologies, China)
  VICE CHAIR: **Akira Takahashi** (NTT, Japan)

Q11/12	Performance interworking and traffic management for Next Generation Networks
Q12/12	Operational aspects of telecommunication network service quality
Q13/12	QoE, QoS and performance requirements and assessment methods for multimedia
Q17/12	Performance of packet-based networks and other networking technologies

Meetings and other activities

- **SG12 meeting (Geneva, 2-11 September 2014)**
- ITU Workshop on Quality of Service Regulatory and Operational Issues (Dubai, UAE, 2-3 November 2014)
- QSDG meeting (Dubai, UAE, 4-6 November 2014)
- ITU Workshop on QoS and QoE of Multimedia Services in Emerging Networks (Istanbul, Turkey, 9-11 February 2015)
- Meeting of ITU-T SG12 Regional Group for Africa (Dakar, Senegal, 23 March 2015)
- ITU Regional Standardization Forum, Dakar, Senegal, 24-25 March 2015)
- **SG12 meeting (Geneva, 5-14 May 2015)**
- ITU Workshop on Performance, QoS and QoE of Emerging Networks and Services (Athens, Greece, 7-8 September 2015)
- QSDG meeting (Athens, Greece, 9-11 September 2015)
- Stakeholders Forum on Quality of Service and Consumer Experience (Nairobi, Kenya, 23-25 November 2015)
- **SG12 meeting (Geneva, 12-21 January 2016)**

Groups under SG12

- QSDG (Quality of Service Development Group)
  - Meets once a year
  - Liaison/organize workshops on SG12 issues
  - Operational aspects and regional/country experiences are actively discussed
- SG12 RG-AFR (SG12 Regional Group for Africa)
  - Established under SG12 to facilitate discussions in the region.
  - Meets once a year
  - Assists the region to participate in and contribute to SG12 meetings and other activities.
  - Holds a session during every SG12 meeting
  - Regional Standardization Forum often collocates

Key topics

- Communication in vehicles (Q4/12)
- Conferencing and telemeeting assessment (Q10/12)
- Mobile terminal audio interface (Q3/12)
- Multimedia quality assessment (Q13 and Q14/12)
- Objective audiovisual quality assessment (Q8 and 9/12)
- Objective voice quality assessment (Q8, 9, 15 and 16/12)
- Operational aspects of QoS (Q12/12)
- Packet based network performance (Q11 and 17/12)
- QoS for terminals (Q5 and 6/12)
- QoS for voice over LTE (Q11/12)
- Subjective audiovisual quality assessment (Q7/12)

Recent new work items

- P.PHYSIO: Use of physiological measures as an additional test method for speech quality assessment (Q7/12)
- P.INTELL: Methods for evaluating speech intelligibility (Q7/12)
- P.VTQ-VT: Parametric model for videotelephony on IP (Q15/12)
- G.OM_HEVC: Opinion model for network planning of High Efficiency Video Coding (HEVC) media streaming quality (Q13/12)
- G.OMG: Opinion model for gaming applications (Q13/12)
- G.OMWeb: Opinion model for web-browsing (Q13/12)
- G.PoiCong: QoS of interconnection between telecom networks (Q11/12)
- Suppl-G-IpaQm: Supplement on IP aware QoS management (Q11/12)

Ongoing active work items (1)

- P.381 Revision: Technical requirements and test methods for the universal wired headset or headphone interface of digital mobile terminals (Q3/12)
- P.MMIC: Technical requirements and test methods for multi-microphone wired headset or headphone interfaces of digital wireless terminals (Q3/12)
- P.carSFS: Super-WideBand (SWB) and FullBand (FB) stereo hands-free communication in motor vehicles (Q4/12)
- P.UIA: User interface requirements for automotive applications (Q4/12)
- P.TBN: Setups and testing techniques for terminal performance measurements with background noise (Q5/12)
- P.CROWD: Crowdsourcing (Q7/12)
- P.DTM: Effect of delays on the telemeeting quality (Q10/12)
- P.SAM: Spatial audio meetings quality evaluation (Q10/12)

Ongoing active work items (2)

- P.ONRA: Perceptual objective noise reduction (Q9/12)
- P.SPELQ: No-reference models for quality prediction (Q9/12)
- P.NATS: Parametric non-intrusive assessment of TCP-based multimedia streaming quality, considering adaptive streaming (Q14/12)
- P.INQX: Integral index of quality for general service monitoring (per user-session); KQI definitions (Q14/12)
- P.CQO: Conversational model (Q15/12)
- P.TCA: Technical cause analysis (Q16/12)
- G.VoLTE: Specific requirements on end-to-end QoS for voice over 4G mobile networks (Q11/12)
- E.SUPPL.FTSO: QoS/QoE Framework for the transition from network oriented to service oriented operations) (Q12/12)
- G.MFWT: Measurement framework for web-site traffic characteristics (Q13/12)
- G.102y: Buffer Models for Media Streams on TCP Transport (Q17/12)

Recently completed work items

- P.1100 Revision: Narrowband hands-free communication in motor vehicles (Q4/12)
- P.1110 Revision: Wideband hands-free communication in motor vehicles (Q4/12)
- P.1130 (ex. P.VSSR): Subsystem requirements for automotive speech services (Q4/12)
- P.1140 (ex. P.emergency): Speech Quality Requirements for Emergency Calls (Q4/12)
- P.1302 (ex. P.ACQ): Subjective method for simulated conversation tests addressing speech and audiovisual call quality (Q10/12)
- P.863 Revision: Perceptual objective listening quality assessment (Q9/12)
- G.1091 (ex. G.QRTP): QoE Requirements for Telepresence Services (Q13/12)
- Y.1546 (ex. Y.15HO): Hand-over performance among multiple access networks (Q17/12)
- G.1071 (ex. G.OMVAS): Opinion model for video and audio streaming applications (Q13/12)

Some key elements of the work in ITU-T SG12

Basic definitions: ITU-T Rec. E.800

- Network Performance (NP)
  - Pre-requisite to Quality of Service (QoS)
  - Not directly visible to the user
- Quality of Service (QoS)
  - Performance of the Service offered to the User
  - Some QoS Aspects directly perceivable, some indirectly

Network Performance

- Charging Performance
- Provisioning Performance
- Administration Performance
- Availability Performance
- Transmission Performance

Quality of Service

- Service Support Performance
- Service Operability Performance
- Serveability
- Service Security Performance

QoE Definition

- ITU-T Rec. G.100 / P.10 defines
  - Quality of Experience (QoE): The overall acceptability of an application or service, as perceived subjectively by the end-user.
  - NOTE 1 – Quality of experience includes the complete end-to-end system effects (client, terminal, network, services infrastructure, etc.).
  - NOTE 2 – Overall acceptability may be influenced by user expectations and context.

MOS = Mean Opinion Score

- The mean of opinion scores, i.e., of the values on a predefined scale that subjects assign to their opinion of the performance of the telephone transmission system used either for conversation or for listening to spoken material
- True MOS values can only be derived from subjective tests
- Usefulness of MOS values outside the original subjective test depends on statistical exercises:
  - Selection of subjects
  - Compilation of speech samples
  - Normalization of results
  - Language Dependency

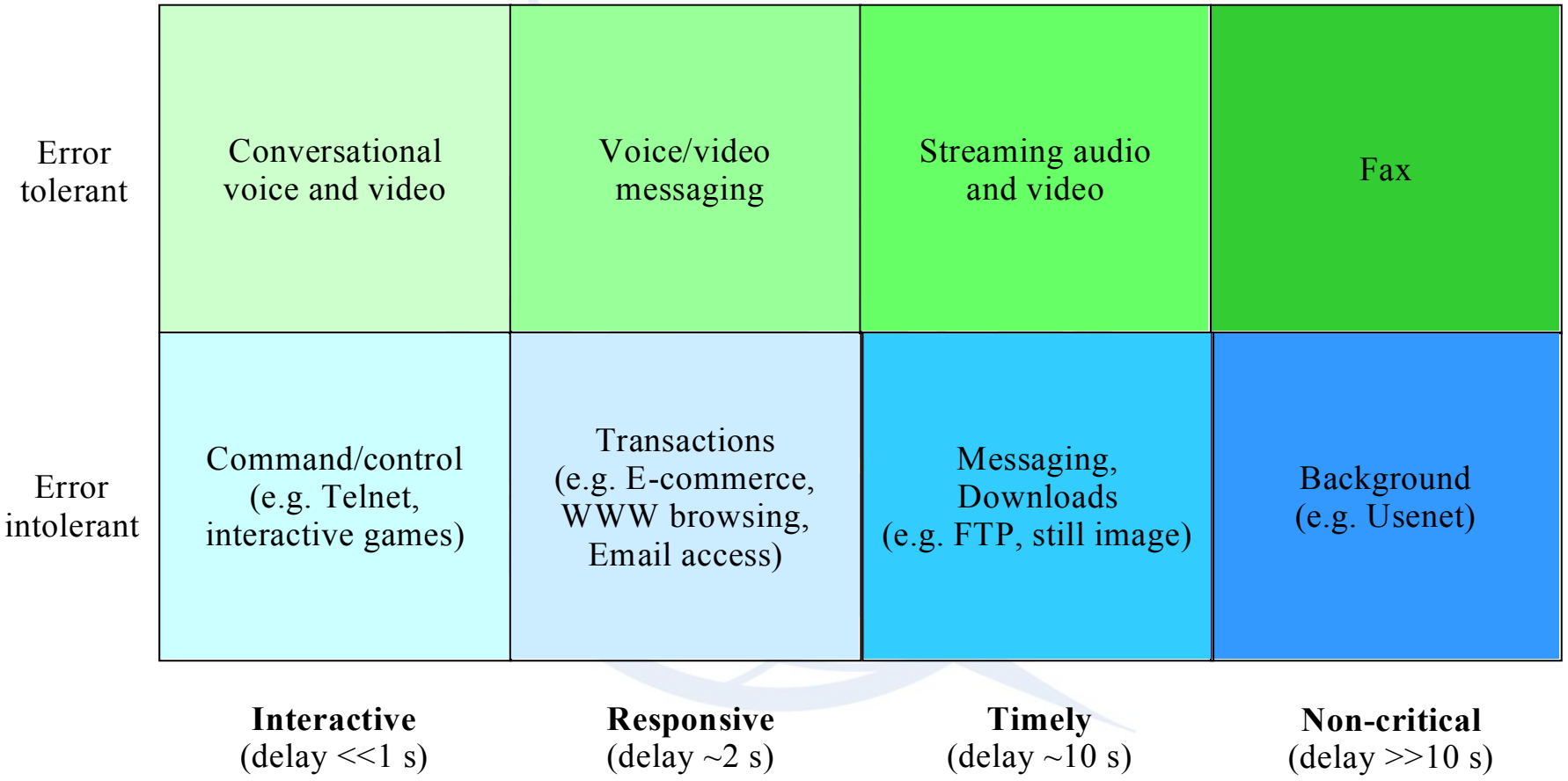
Subjective Tests

- Require large group of people
- Very costly and time-consuming
- Cannot be done in real-time
- But it is the Reference for the other methods:
  - Objective models
  - Estimation models

Objective Models

- Reproducing human perception as accurate as possible
- Real-time Recording or Monitoring of Waveform Signals
- Use of an algorithm to predict the results of a subjective test
- Faster and cheaper but correlation with subjective test may vary
- Current Models include P.862 (PESQ), P.563 and the new P.863 (POLQA)
- Obsolete Models include P.861 (PSQM, for Codec Validation only) and a variety of vendors' proprietary Models

Rec. G.1010 – Model for user-centric QoS categories



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Thank you