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Electronic Working Tools;
Roadmap including recommendations for the deployment and usage of electronic working tools in the ETSI standardization process

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Foreword

This Special Report (SR) has been produced by the ETSI Board GREEN AGENDA strategic topic group.

Introduction

The present document describes high level guidance for the use of electronic working tools considering performance, privacy and security, with a phased introduction of the collaboration tools necessary for effective remote participation in ETSI. The present document provides recommendations on when to use GoToWebinar and when to use GoToMeeting, and also takes into account the time zone differences to ensure the maximum participation of members to electronic meetings.

1 Scope

The present document describes electronic working tools, and a roadmap for their implementation including guidelines for the deployment and usage in the ETSI standardization process.

Annexes provide additional information on questionnaires to be completed by the users of these tools, concerning technical issues and standards that could help manufacturers to develop such tools.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

2.1 Normative references

The following referenced documents are necessary for the application of the present document.

Not applicable.

2.2 Informative references

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] EBU Recommendation R37-2007: "The relative timing of the sound and vision components of a television signal".

Speech Terminals

[i.2] ETSI ES 202 740: "Speech and multimedia Transmission Quality (STQ);Transmission requirements for wideband VoIP loudspeaking and handsfree terminals from a QoS perspective as perceived by the user".

[i.3] ETSI ES 202 739: "Speech and multimedia Transmission Quality (STQ);Transmission requirements for wideband VoIP terminals (handset and headset) from a QoS perspective as perceived by the user".

[i.4] ETSI ES 202 738: "Speech and multimedia Transmission Quality (STQ);Transmission requirements for narrowband VoIP loudspeaking and handsfree terminals from a QoS perspective as perceived by the user".

[i.5] ETSI ES 202 737: "Speech and multimedia Transmission Quality (STQ);Transmission requirements for narrowband VoIP terminals (handset and headset) from a QoS perspective as perceived by the user".

QoS and network performance metrics and measurement methods

[i.6] ETSI ES 202 765-2: "Speech and multimedia Transmission Quality (STQ); QoS and network performance metrics and measurement methods; Part 2 : Transmission Quality Indicator combining Voice Quality Metrics".

[i.7] ETSI ES 202 765-4: "Speech and multimedia Transmission Quality (STQ); QoS and network performance metrics and measurement methods; Part 4: Indicators for supervision of Multiplay services".

Specification and measurement of speech transmission quality

[i.8] ETSI EG 201 377-1: "Speech and multimedia Transmission Quality (STQ); Specification and measurement of speech transmission quality; Part 1: Introduction to objective comparison measurement methods for one-way speech quality across networks".

[i.9] ETSI ES 201 377-2: "Speech and multimediaTransmission Quality (STQ); Specification and measurement of speech transmission quality; Part 2: Mouth-to-ear speech transmission quality including terminals".

[i.10] ETSI EG 201 377-3: "Speech Processing, Transmission and Quality Aspects (STQ); Specification and measurement of speech transmission quality; Part 3 : Non-intrusive objective measurement methods applicable to networks and links with classes of services".

Audiovisual QoS for communication over IP networks

[i.11] ETSI ES 202 667: "Speech and multimedia Transmission Quality (STQ); Audiovisual QoS for communication over IP networks".

[i.12] ITU-R Recommendation BT.1359-1: "Relative timing of sound and vision for broadcasting".

[i.13] ETSI ETS 300 807: "Integrated Services Digital Network (ISDN); Audio characteristics of terminals designed to support conference services in the ISDN".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

application sharing: feature of many web conferencing applications that enables the conference participants to simultaneously share the same application

NOTE: The application itself resides on only one of the machines connected to the conference.

attendee (or participant): any person who joins a conference call or an electronic meeting with no pre-specified role

NOTE: By default, attendees can view the presenter's screen. An attendee may remotely control the presenter's computer screen if assigned the function. An attendee may optionally chat with other attendees, use drawing tools or view the participants list.

blog: web page that is made up of information about a particular subject, in which the newest information is always at the top of the page

chairman: presiding officer of a meeting who has the responsibility to determine the agenda for each meeting, and ensure that everyone operates in an efficient manner and in accordance with any previously agreed rules

chat: online real-time electronic text based conversation on the same screen (room) between two users or all users viewing the same screen

co-located participants: participants to an electronic meeting located in the same physical room

conferencing terminal: equipment that allows real-time point-to-point communications as well as multicast communication

control panel: gives organizers, panellists and attendees access to various in-session functions in the frame of an electronic meeting

desktop/screen sharing: feature of many web conferencing applications that enables the conference participants to simultaneously view (the contents of) the presenter's desktop

NOTE: The desktop itself resides on only one of the machines connected to the conference.

drawing tools: feature that allows organizers and panelists to use annotation tools to highlight elements of their presentation content

NOTE: These tools include highlighter, pen, spotlight and arrow functions.

electronic mail: computer-based messaging system where electronic text files (e-mails) can be exchanged across gateways linking different computer networks through the internet

host: person in charge of the organization of a physical meeting with co-located participants and remote participants

NOTE: The host has to ensure that the necessary Internet bandwidth is provided at the physical meeting place as well as the relevant conferencing terminals (and/or required audio/video equipment).

keyboard/mouse control: feature that allows organizers grant keyboard and mouse control to attendees during meetings

organizer: person with the corresponding account, who schedules, starts, manages and ends an electronic meeting

NOTE: An organizer can temporarily designate other attendees to be organizers or panelists (there can be simultaneously more than one organizer). Once an electronic meeting starts, the initial organizer is the default presenter and may either begin presenting or pass the presenter controls to any other organizer or panelist. The organizer can grant and revoke attendee privileges, such as passing the presenter role, sharing keyboard and mouse, inviting and dismissing attendees.

panellist: guest who will be presenting (guest speaker) or answering questions (subject-matter expert) forwarded to him/her during a Webinar

NOTE: A panellist can be promoted to presenter at any time during the Webinar. An attendee can be promoted to a panellist.

participant (or Attendee): any person who joins a conference call or an electronic meeting with no pre-specified role

NOTE: By default, participants can view the presenter's screen. A participant may remotely control the presenter's computer screen if assigned the function. A participant may optionally chat with other participants, use drawing tools or view the participants list.

practice Session: allows organizers to practice their Webinar before going live

NOTE: Only organizers and panellists can join a Practice Session.

presenter: person showing his or her desktop to the electronic meeting audience

NOTE: The organizer is always designated as the first presenter. The presenter role can then be passed to another organizer, panelist or attendee. Presenters can show their complete desktops, a clean screen (with no icons or taskbar) or a specific application window to all attendees. Presenters may choose to pause showing their desktops or applications at any time. Presenters may grant other organizers or panelists the ability to control the presenter's mouse and keyboard.

pre-session waiting room: screen displayed any time attendees wait for a presenter to begin showing his or her screen

Q&A: feature that allows attendees to send text questions to organizers and panelists, who can respond with answers privately or to the entire audience

raise hand: feature that allows the participants of an electronic meeting to ask for microphone rights

NOTE: If the Chairman (with organizer rights) acknowledges an attendee's raised hand by "accepting" it, that allows the participant voice rights.

recording: feature that allows organizers to record meetings for later playback

NOTE: If an attendee is promoted to the role of organizer, he or she will be enabled to record the meeting.

remote access: access to a meeting through an electronic tool

remote collaboration: opportunity given to participants to be fully involved into an electronic or physical meeting through an electronic tool (e.g. online edition of a shared document)

remote participants: participants to a meeting through an electronic tool

secretary: person who has similar roles to a secretary in a physical meeting

viewer window: window that appears during an electronic meeting on the attendee's computer displaying the presenter's desktop or shared application

web conferencing: refers to a service that allows conferencing events to be shared with remote locations

NOTE: In general the service is made possible by Internet technologies, particularly on TCP/IP connections. The service allows real-time point-to-point communications as well as multicast communications from one sender to many receivers. It offers information of text-based messages, voice and video chat to be shared simultaneously, across geographically dispersed locations. Applications for web conferencing include meetings, events, or short presentations from any computer.

wiki: website whose users can add, modify, or delete its content via a web browser using a simplified markup language or a rich-text editor

NOTE: Wikis are typically powered by wiki software and are often used to create collaborative websites, to power community websites, for personal note taking, in corporate intranets, and in knowledge management systems.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AES	Advanced Encryption Standard
CEST	Central European Summer Time
CET	Central European Time
CPU	Central Processing Unit
CSN	Circuit Switching Network
DECT	Digital Enhanced Cordless Telephone
DST	Daylight Saving Time
DVB	Digital Video Broadcasting
EBU	European Broadcasting Union
EG	ETSI Guide
ES	ETSI Standard
ETS	ETSI Technical Specification
ETSI	European Telecommunications Standards Institute
HF	Human Factors
HTTP	HyperText Transfer Protocol
IEC	International Electrotechnical Commission
IETF	Internet Engineering Task Force
IP	Internet Protocol
IPR	Intellectual Property Rights
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ITU	International Telecommunication Union
ITU-R	ITU Radiocommunication Sector
ITU-T	ITU Telecommunication Standardization Sector
JTC	Joint Technical Committee
M2M	Machine-To-Machine
MCU	Multipoint Control Unit
PC	Personal Computer
PLMN	Public Land Mobile Networks
PSN	Packet Switching Network
PSTN	Public Switched Telephone Network
QoS	Quality of Service

RAM	Random Access Memory
SD	Standing Document
SMS	Short Message System
SR	Special Report
SSL	Secure Socket Layer
STF	Specialist Task Force
STQ	Speech and multimedia Transmission Quality
TC	Technical Committee
US	United States
USB	Universal Serial Bus
UTC	Universal Time Coordinated
VoIP	Voice over Internet Protocol

4 Electronic working tools and their usage in the standardization work

Several kinds of electronic tools may be used.

Some of them are to be used in real-time and simultaneously by the participants, others do not need the participants to be connected simultaneously.

The priority should be given, as far as possible, by ETSI to the provision and use of open and standardized tools. These tools should avoid as much as possible any intrusion on the Personal Computers of the participants. Privacy, security and access for all should be also major criteria to be taken into account.

The ETSI STF 354 website contains guidelines derived from the main known empirical user test results when user experience has been examined for one or more technical parameter. The user experience of an electronic working tool can be expected to vary according to many characteristics of the users, their communication purpose, the communication situation and technical parameters of the communication service. This information is available at: http://portal.etsi.org/stfs/STF_HomePages/STF354/.

Detailed information on these guidelines is available in annex B.

4.1 Electronic working tools

As indicated in the introduction, different types of electronic working tools may be used depending on the types of participations planned:

Case 1: If all the participants are located in different physical locations and are using individual tools, these tools are mainly implemented on Personal Computers and are using the interfaces available on the Personal Computer (or that may be connected to the PC, e.g. headsets) and may be associated to phone terminals and conference bridges.

Case 2: If some participants are located in one meeting room, the other participants are using individual tools, special attention should be paid to the equipment in the meeting room: all the participants in the meeting room should be close to the microphones to avoid impairment from background noises and room reverberation. The number of loudspeakers and their locations should be implemented to ensure the best hearing to the local participants and to avoid any howling. The distant users will use equipment similar to case 1.

Case 3: When several groups of participants are located in different locations using group tools, telepresence systems could be used.

4.1.1 Teleconferencing (audio conferencing)

A teleconference offers the possibility to several participants in different locations to participate to a meeting by means of telephones connected to a central switching unit.

Telephone conference is a very powerful tool as long as the speech quality is good enough for all the participants.

4.1.1.1 Terminal equipment (for speech)

The participants to teleconferences may use different types of terminal equipment. The quality provided by this terminal equipment may have a strong impact on the quality.

References [i.2], [i.3], [i.4] and [i.5] provide requirements for speech terminals providing good speech quality.

Wider speech bandwidth may also improve the quality and, in particular, the intelligibility and the naturalness of the participants speeches.

The different types of terminal equipment may be defined as:

For individual usage:

- Headset (connected to a personal computer);

  For optimum audio quality, we recommend a USB headset connected to the computer, or USB headphones and standalone microphone connected to the computer. It is not recommended to use the microphone and speakers built in to the laptop or separate USB webcam.

- Handset terminals; and

- Handsfree terminals.

For collective usage (several users located in the same room):

- Group Audio Terminals; and

- Conference Phones.

  The most traditional way of conducting teleconferences involves gathering onsite participants in a room and calling other participants on the phone. Good sound quality is critical for keeping concentration levels high and meetings efficient in this situation and expansion microphones can more than double the phone's pickup range, allowing more people to actively participate.

4.1.1.2 Audio Conference bridge/MCU

An audio conference bridge, or Multipoint Control Unit (MCU), is a device in audio conferencing capable of mixing audio from multiple endpoints (audio terminals) to create one single audio conference or virtual meeting space. The MCU collects information about the capabilities of the systems at each of the audio conference endpoints and sets the conference at the lowest common denominator so that everyone can participate.

More detailed information is available in annex B.

4.1.1.3 VoIP vs. Analog Telephony

The two technologies differ in the way how data is transmitted:

- VoIP technology, based on Packet Switching Network (PSN), converts voice signals into packets of data and sends them through the Internet. These packets reach their destination and are converted back into voice;

- standard analog telephony technology uses Circuit Switching Network (CSN) where the user is connected to the receiver by means of electric circuits;

and the two technologies have their own advantages and disadvantages:

- VoIP is easier to use in the frame of an online meeting (calling process greatly simplified);

- VoIP can provide the same quality of service as regular telephony, while utilizing cost-effective internet technologies (avoidance of long distance charges);

however:

- VoIP requires high-speed Internet connections (384 kbps or better, per attendee);
- VoIP quality of sound can be severely affected by the traffic on the Internet.

4.1.2 Web Conferencing (desktop/screen sharing)

Web conferencing is a form of real-time communications in which multiple computer users, all connected to the Internet, see the same screen at all times in their Web browsers. Some Web conferencing systems include features such as Chat, VoIP (Voice over IP) and full-motion video.

Web conferencing allows users to carry on meetings and seminars, make presentations, and conduct demonstrations. Control of the session can be passed among users so that any attendee can act as the main presenter. The most effective Web conferencing solutions require high-speed Internet connections at all user sites.

Several vendors offer Web conferencing services for a nominal monthly fee. System requirements are modest. Most personal computers have sufficient resources to use Web conferencing through their existing browsers. Installation of the supporting software, if any, is easy and there is practically no learning curve.

4.1.2.1 Terminal equipment (for speech)

See clause 4.1.1.

4.1.2.2 Terminal equipment (for desktop/screen sharing)

It is recommended that the meeting organizer uses the following equipment:

- Windows-based or Mac/OS-based device with the latest version of operating system and web browser, connected to a video-projector for the co-located participants;
- high-speed Internet connection.

It is recommended that the organizer's equipment complies with the following requirements for recording the meeting (optional):

- Windows Media® Player Version 9.0 or newer;
- 1 024 x 768 or higher screen resolution;
- 1 GB of hard disk space.

It is recommended that the participants use the following equipment:

- Windows-based or Mac/OS-based device with the latest version of operating system;
- High-speed Internet connection.

4.1.3 Video Conferencing

Video conferencing refers to real-time video and audio sessions, meetings and discussions between two or more users in two or more locations.

4.1.3.1 Terminal equipment (for speech)

See clause 4.1.1.

4.1.3.2 Terminal equipment (for desktop/screen sharing)

See clause 4.1.2.

4.1.3.3 Terminal equipment (for video sharing)

It is recommended that the meeting organizer and the remote participants use:

- PC equipped with a dual core 1,6 GHz CPU and 2 Gb RAM;
- webcam and microphone;
- high-speed Internet connection with at least 700 Kbps of Internet bandwidth per participant.

4.1.3.4 Audio/Video Conference bridge/MCU

An audio/video conference bridge, or Multipoint Control Unit (MCU), is a device in audio/videoconferencing capable of mixing audio and video from multiple endpoints (audio/video terminals) to create one single audio/video conference or virtual meeting space. The MCU collects information about the capabilities of the systems at each of the audio/videoconference endpoints and sets the conference at the lowest common denominator so that everyone can participate.

More detailed information is available in annex B.

4.2 General Guidelines

4.2.1 Selecting the appropriate tool

The Chairman should map her/his requirements to table 1 and identify which tool would best fit.

Some requirements imply that one particular tool shall be selected (e.g. videoconference is only available with GoToMeeting® whereas the "Raise Hand" feature is only offered by GoToWebinar®), and some others can be fulfilled by both tools.

Table 1: Electronic tools comparison table

REQUIREMENTS	GoToMeeting®	GoToWebinar®	Other tool
Number of attendees	Up to 25	Up to 1 000	
Real-time video	☑		
Instant meeting initiation or meeting scheduling in advance	☑	☑	
Desktop sharing	☑	☑	
Application sharing	☑	☑	
Audio conferencing via telephone and/or VoIP	☑	☑	
Keyboard and mouse control sharing	☑	☑	
Recording	☑	☑	
Drawing tools	☑	☑	
Chat (see note 1)	☑	☑	
Customizable invitation and registration		☑	
Automated reminder emails and follow-up		☑	
Polls and surveys		☑	
Raise Hand		☑	
Dashboard to monitor attendee participation		☑	
Detailed reports (pre and post-session)		☑	
Panellists (see note 2)		☑	
Pre-session waiting room		☑	
Q&A (see note 1)		☑	
Practice sessions (presentation rehearsal)		☑	

NOTE 1: **What differentiates Chat from Q&A feature?**

- "Chat" (available in GoToMeeting® and GoToWebinar®) allows attendee to send private messages or broadcast messages to all attendees and get private responses or responses to the entire audience.
- "Question & Answer" (available in GoToWebinar® only) allows attendee to send text questions to organisers who can respond with answers privately or to the entire audience.

NOTE 2: **What differentiates Panellist and Attendee?**

A panellist is an attendee with special pre-specified roles:

- Present (guest speaker);
- Answer questions forwarded to her/him during a Webinar (subject-matter expert).

An Attendee can be promoted to a Panellist at any time during the Webinar.

What differentiates Panellist and Presenter?

- A Panellist can be promoted to a Presenter at any time during the Webinar.

Some additional guidelines for the Chairman:

- GoToWebinar® shall be used when:
  - more than 25 participants are expected;
  - registration is mandatory;
  - online polls/surveys are planned;
  - Q&A sessions are scheduled.
- GoToWebinar® is recommended when:
  - more than 5 participants are expected;
  - the Chairman needs to have a high level of control over the participants e.g. to control who speaks next using the raise hand feature;
  - most of the participants are co-located and some are remotely attending.
- GoToMeeting® shall be used when:
  - videoconferencing is required.
- GoToMeeting® is recommended when:
  - few participants (up to 5) are remotely attending the meeting.

NOTE: There should be an effort to minimize costs to each participant, for example through the use of a service provider that offers local calling numbers in all countries considered and VoIP.

4.2.1.1 Security

It is recommended to use online meetings and webinars tools that are completely private and secure, based for example on end-to-end Secure Sockets Layer (SSL) and 128-bit Advanced Encryption Standard (AES) encryption.

It is also recommended to ensure that no unencrypted information is ever stored on the online meetings servers.

4.2.1.2 Firewall settings adjustments

Firewalls are a popular and effective security option that are designed to block unauthorized outgoing and incoming communications with a computer and additional steps might be required to authorize trusted applications like online meetings tools.

It is recommended to use firewall-friendly online meetings tools that use, for example, HTTP outbound connections to transparently enable screen-sharing sessions, even with corporate firewalls in place.

In most cases, organisers and attendees should be able to connect to online meetings' servers without re-configuring firewall settings.

In the case that a firewall prevents from connecting, it might be needed to adjust some settings by opening some identified ports (e.g. 80, 443, and 8200) or disabling the content scanning and filtering of some identified IP ranges.

4.2.2 Organizing electronic meetings spanning over different time zones

4.2.2.1 General

It is recommended that a meeting is scheduled within "waking hours" and therefore meeting times between 24:00 (midnight) and 06:00 (morning) (ideally 23:00 and 07:00, respectively) should be avoided.

For example the World Clock Meeting Planner™, http://www.timeanddate.com/worldclock/meeting.html, is a useful tool when arranging meetings spanning over different time zones and taking into account the daylight saving times.

4.2.2.2 Electronic meetings with participants from North America and Europe

For meetings with participants from North America and Europe it is recommended that the meeting is within the time frame 15:00-19:00 CET/CEST.

4.2.2.3 Electronic meetings with participants from Europe and Asia

For meetings with participants from Europe and Asia it is recommended that the meeting is within the time frame 07:00-12:00 CET/CEST.

4.2.2.4 Electronic meetings with participants from North America, Europe and Asia

For meetings with participants from North America, Europe and Asia it is recommended that the meeting is within the time frame in table 2.

Table 2: Electronic meetings in different time zones

14:00 UTC	Asia (e.g. Tokyo)	Asia (e.g. Beijing)	Central Europe (e.g. Paris)	US East Coast (e.g. New York)	US West Coast (e.g. San Francisco)
DST	UTC+9	UTC+8	UTC+2	UTC-4	UTC-7
	22:00	21:00	15:00	09:00	06:00
Standard	UTC+9	UTC+8	UTC+1	UTC-5	UTC-8
	23:00	22:00	15:00	09:00	06:00

4.2.3 Planning the duration of electronic meetings

It is recommended that each meeting session should not be longer than 2 hours before a break occurs.

4.2.4 Scheduling an electronic meeting

4.2.4.1 Finding a date

Doodle® (http://www.doodle.com/) or Meet-O-Matic™ (http://www.meetomatic.com) can help with the scheduling of meetings. These tools allow the meeting organizer to propose several dates and times and the participants can indicate their availability online. Then, with one look, the meeting organizer will be able to identify the best time for the meeting.

4.2.4.2 Inviting the participants

To schedule a **meeting** in advance, the meeting organizer should log in the selected electronic meeting tool by entering her/his account information and the meeting information i.e. subject, date, time, audio conference option (e.g. local number, VoIP, call service, both), co-organizer(s) and panellist(s), and password (optional). Then, the organizer will be automatically notified that the meeting has been scheduled, a reminder will be generated and she/he will be given the option to invite attendees via a calendar appointment (email).

To schedule a **webinar** in advance, the meeting organizer should log in the selected electronic meeting tool by entering her/his account information and the webinar information i.e. title, description, date, time, audio conference option (e.g. local number, VoIP, call service, both), branding and theme, registration details and settings. Then, the organizer will be automatically notified that the meeting has been scheduled, a reminder will be generated and she/he will be given the option to invite attendees via a calendar appointment (email).

The link to join the meeting shall not be shared with others; it is unique to the corresponding recipient.

4.2.5 Planning of the agenda for an electronic meeting

4.2.5.1 Rough planning of the agenda

The draft agenda should be disseminated by the Chairman to all the participants well in advance of the meeting.

For example, for ETSI Technical Body meetings the agenda should be disseminated at least 30 days before a meeting.

4.2.5.2 Detailed planning of the agenda

The most effective electronic meetings have a limited scope, clear objectives and a limited number of participants.

The following can help in the organisation of electronic meetings:

A "Living Agenda" with document allocation to time slots provides the following advantages:

- it serves as a detailed living meeting agenda, which guides participants through the meeting;
- it can be used to show the allocation of received contributions to agenda items;
- it can be used to show the order of treating documents during the meeting sessions;
- it can be used to show decisions taken on the contributions.

Distribution of the 1st draft of the Agenda: this should be performed after the provision document deadline.

Distribution of further drafts: this should be performed 1 hour after end of each meeting day and should:

- record the meeting day's decisions/results on contributions;
- update the planning for the next meeting day.

Table 3: Example of "Living Agenda" content per agenda item

LIVING AGENDA Template								
PLANNING						RECORDING		
Agenda Item	Document Title	*Document Number*	*Time Allocation (minutes)*	*For Information, Discussion, or Decision*	*Document Available, Late or Not available*	*Document treated in meeting: YES / NO*	*Approved, Revised, Postponed or Rejected*	*New Document Revision Number*
1								
2								
3								

4.2.6 Chairing an electronic meeting

The Chairman should:

- open the electronic meeting at least 10 minutes before the meeting is intended to start, and start the meeting on time;
- greet the attendees as they arrive;
- ask participants to be brief and clear;
- introduce her/himself when she/he begins speaking and ask other attendees to also identify themselves before speaking;
- make sure that all participants are identified. It is very important, for various reasons (e.g. voting or IPR), to have a record of who participated in the electronic meeting. This can be done manually before the meeting starts or delegated to the registration process (pre-session) and the detailed attendance reporting (post-session);
- provide an agenda at the start of the meeting, including estimated duration, and stick to it;
- inform attendees what the purpose/goal of the meeting is, what to expect and when and how to ask questions and participate in the meeting;
- give everyone who wants it the opportunity to speak but not allow participants to repeat points already made;
- frequently restate the current proposal, offer summaries of the discussions and refer to the agenda item under discussion;
- handle the decisions very carefully to make sure that everybody on the call is fully aware of what is being adopted. Written text available to all, roll call of delegates, confirmation by email in the days following the conference are possible methods to ensure this. The protocol for making decisions should be established in advance;
- make sure that all participants are included in the attendance list and that proper notice and summaries are distributed.

5 Deployment roadmap for electronic working tools

5.1 Introduction

The following steps define the roadmap for the deployment and usage of electronic working tools in the ETSI standardization process.

Step 1: Teleconferencing (audio only).

Step 2: Web Conferencing (screen sharing).

Step 3: Web/Video Conferencing (screen sharing plus speaker on video).

Step 4: Web/Video Conferencing (screen sharing plus multiple participants on video).

Step 5: Telepresence (full video conferencing).

Before ETSI validates any choice or installation of new electronic working tools it should set up a number of assessment processes such as:

- user tests to check that all the steps of the use of a new system are fully valid;
- technical assessment of the quality through objective and subjective measurement methods. These assessments will check the different media implemented, e.g. speech, video and data quality.

Annex A provides a set of questions to be used for such "qualification" tests.

5.2 Step 1: Teleconferencing (audio conferencing)

Any member may participate remotely and submit/present contributions using audio. The audio connection should be good enough for remote participants to hear all comments/questions. Contributions should be sent prior to the meeting by E-mail or made available on a server.

5.2.1 Guidelines for the Chairman

The Chairman should:

- call in to the meeting from a location where there is little background noise;
- avoid using cellular and cordless phones and use the phone handset or a headset instead of speakerphones because of background noise, tunnel effect and sentence clipping;
- avoid putting the phone call on hold during a teleconference. The hold music or message will play into the conference call, and make it impossible for the other attendees to continue the meeting;
- hang up and dial back in if she/he finds she/he is having a sound quality issue. Sometimes these problems clear themselves up when the bad connection is terminated;
- consider globally muting all participants at the start of the meeting to avoid noise issues and give the floor when needed;
- invite participants not to carry on side conversations or shuffle paper when the microphone is not muted;
- invite participants to keep the microphone muted when not speaking. If a muting function is not available on the terminal, the muting function of the conference system should be used;
- invite participants to turn the mobile phones to silent mode;
- monitor the quality of the connections and take action if the quality is not acceptable or if those joining via Internet are not managing to maintain adequate connectivity and are consequently disrupting the meeting;
- ask participants who are operating in a noisy environment to mute their connections;
- mute participants whose quality of audio is not acceptable;
- mute all the lines when it is difficult to identify the lines that impair the global quality of the meeting.

5.2.2 Performance criteria

- Every word understandable (100 % audible recognition).
- Ability to recognize voice of person speaking (if pre-learned or just learned).
- A multinational group should successfully share a foreign language (e.g. English).

- Any room location of talker at physical meeting should provide adequate volume to remote person(s).
- Set-up time < 30 s.

The participants are requested to use terminal equipment fulfilling the ETSI ESs referred to in clause 4.1.1.1.

In particular it is very important for the overall quality:

- that the end-to-end delay should be as low as possible;
- that no echo should be perceptible from any terminal or network equipment.

Prior to the meeting the participants should ensure that the terminal equipment used makes available a muting function.

NOTE 1: There are several ways to assess or to monitor the speech quality of calls. See [i.6] to [i.10].

NOTE 2: It could be relevant to implement monitoring tools to ensure that the participant connections provide adequate levels of Quality. This could be done prior to the acceptance of the connection to the meeting tool.

5.2.3 Timescales for introduction

Available now for narrowband speech.

Wider bandwidth for speech is for further study.

5.2.4 Measured/estimated improvement

Provides an improvement compared to E-mail as an online dialogue can be established.

5.3 Step 2: Web Conferencing (screen sharing)

Screen sharing is offered by most web conferencing tools as it enables all participants to view documents or presentations simultaneously from a single presenter. By using screen sharing (incl. desktop sharing and/or application sharing), online meeting attendees do not have to download any slides and/or documents before the meeting, making the web conference preparation much smoother. In addition, screen sharing allows all participants to see the same images at the same time, so there is no need to wait until all are on the same part of the presentation to continue the meeting. The audio connection needs to be good enough so that no remote participant is disadvantaged and all participants need to be identified by name.

5.3.1 Guidelines for the Chairman

See clauses 4.2 and 5.2.

Prior to meeting or event start, the Chairman should:

- turn off any instant-messaging applications, notification software or other programs that may interrupt or distract from the meeting;
- turn off any streaming media applications that may take up bandwidth and resource-intensive applications that may be taxing processor ability;
- set the desktop display to a neutral background and adjust display settings to a mid-range resolution (e.g. 1 024 x 768) to improve the display for attendees with lesser settings (this is also the optimal setting for recording a meeting);
- ensure that all participants can "Chat"(option);
- ensure that all participants can view the "Attendees List" (option);

- make sure that the shared desktop is not concealed by the "Control Panel" of the Web Conferencing tool. Some tools offer a "Docking/Undocking" feature that can help rearrange the Control Panel to optimize the desktop sharing;
- have the documents to share ready to be accessed in one or two clicks;
- run a trial to familiarize with the tool;
- have a welcome presentation ready for opening the meeting, it can help establish the tone and direction of the meeting;
- consider the nomination of a co-organizer to monitor and respond to the chat log or hands raised when someone is presenting.

During the meeting, the Chairman should:

- allow all participants with their hand raised the opportunity to speak;
- keep the participants focused on one subject and refrain from discussing every single aspect of a topic during one meeting - this will often make the meeting too long and difficult to follow and could be dealt by correspondence;
- make sure that the documents or presentations are clean and easy to present - that means not packing too much information into them;
- avoid speaking in monotone, and be sure to sound patient and welcoming, to encourage audience participation;
- end the meeting clearly, make sure all the attendees know that the meeting is formally over and stay on the line to address any last questions.

5.3.2 Performance criteria

Audio: The same criteria as clause 5.2.2 should be applied.

Data: The user performance requirements for the data part are:

- Legible documents consisting of mainly text and graphics.
- PowerPoint slides containing fonts > 10 pt. so that they are readable by remote participants.
- Set-up time < 1 minute.

5.3.3 Timescales for introduction

Available now with proprietary solutions.

Standardized technology is for further study.

5.3.4 Measured/estimated improvement

Provides an improvement compared to audio only as documents can be presented and edited online by different authors.

5.4 Step 3: Web/Video Conferencing (screen sharing plus speaker on video)

Video conferencing brings together for a meeting two or more locations by video image as well as by audio and screen sharing. Documents and speaker both visible to all participants.

5.4.1 Guidelines for the Chairman

See clauses 4.2, 5.2 and 5.3.

Prior to meeting or event start, the Chairman should:

- turn on audio and video devices and adjust the settings of microphone, speakers and camera;
- pre-set camera position in advance so that there is no need to move the camera during the meeting;
- eliminate as much natural light as possible as it may cause problems with contrast and/or silhouetting;
- give preference to indirect light from shaded sources, or reflected light from pale walls. A 60/40 split of diffused light from ceiling and wall-mounted sources has been found to work well;
- verify that overhead lights and/or reflections are not in the camera's view;
- test run audio/video equipment with a participant to familiarize with the video functionality;
- verify that the video box of the person who is currently speaking is automatically displayed.

During the meeting, the Chairman should:

- avoid excessive movement during the conference, this has a direct impact on the performance of the video quality received at the remote end;
- adjust speech and movement for the time lag between sites;
- check with the distance audience as to whether or not they see and understand correctly;
- assume she/he is always on camera, even when not speaking;
- stay within camera and microphone ranges.

5.4.2 Performance criteria

Audio: The same criteria as clause 5.2.2 should be applied.

Data: The same criteria as clause 5.3.2 should be applied.

Video: User performance requirement for the video part:

- participants can adequately see the speaker,
- Set-up time < 1 minute.

Additional performance criteria may be found in [i.6] and [i.10].

Note that information on lip synchronization is available in clause 5.5.2. Note also that some systems offer fine lip-synchronisations but this may introduce long end-to-end delays which limit the interactivity between participants.

5.4.3 Timescales for introduction

Available now with proprietary solution.

Standardized technology is for further study.

Timescale for introduction of a proprietary solution: 2011/2012.

5.4.4 Measured/estimated improvement

Videoconferencing provides an improvement compared to audio and screen sharing by adding another dynamic to web conferencing. With videoconferencing there is a greater emphasis on the speaker's image that stimulates interaction with participants.

5.5 Step 4: Web/Video Conferencing (screen sharing plus multiple participants on video)

Documents, Chairman and the last 3 speakers visible to all participants.

5.5.1 Guidelines for the Chairman

See clauses 4.2, 5.2, 5.3 and 5.4.

Prior to meeting or event start, the Chairman should:

- ask the meeting organizer to start-up the meeting 10-15 minutes before the official start time so that the attendees can connect and establish the necessary audio and video connections;
- connect at least 5 minutes early to establish the necessary audio and video connections;
- encourage participants to connect at least 5 minutes early before the official start time of the meeting so that they can establish the necessary audio and video connections without disturbing the first 5 minutes of the meeting;
- ensure that all participants have correctly carried out all technical adjustments; audio levels, camera placement, etc. Adjusting the audio/video during the meeting can be very distracting to other parties and this can also impede the discussion;
- invite participants to provide good lighting (avoid back lighting) and make sure that overhead lights and any other reflections do not show;
- make sure that everyone involved in the videoconference is clear on how the technology works;
- make participants aware of the transmission delay and invite the speakers to allow a sufficient pause for others to comment;
- verify that the video box of the person who is currently speaking is highlighted, and the video boxes of the last 3 speakers are automatically displayed (when the tool permits).

During the meeting the Chairman should:

- optimize how the participants' webcams and/or screen sharing window are displayed by expanding or minimizing the viewers and adjusting their position.

5.5.2 Performance criteria

Audio: The same criteria as clause 5.2.2 should be applied.

Data: The same criteria as clause 5.3.2 should be applied.

Video: The same criteria as clause 5.4.2 should be applied. In addition the User performance requirements for the video part are:

- participants can adequately see the last 3 speakers (e.g. independent of sitting location);
- participants see the Chairman in "continual presence" (i.e. not "voice activated" window configuration);
- Set-up time < 1 minute.

Lip asynchrony should be less than 200 ms. The detectability thresholds are 125 ms when sound is delayed with respect to the video, and 45 ms when sound is advanced with respect to the video.

5.5.3 Timescales for introduction

Available now with proprietary solution.

Standardized technology is for further study.

Timescales for introduction of a proprietary solution: 2012/2013.

5.5.4 Measured/estimated improvement

For further study.

5.6 Step 5: Telepresence (full video conferencing)

Telepresence is similar to video conferencing but generally offers higher definition views and more facilities. With telepresence, the video conference is more realistic (lifelike) and a series of cameras is used to create a panoramic picture of the room. This allows participants to see the entire room and interact with multiple people at the same time.

No standards are available for the time being. However, on-going work in ETSI STQ and ITU-T SG12 and SG16 in collaboration with IETF should provide some standards after 2013.

5.6.1 Guidelines for the Chairman

For further study.

5.6.2 Performance criteria

For further study.

NOTE: These systems are intended to provide a high level of quality. In particular the speech/audio bandwidth should be wider that those currently implemented for audio conferences. The size of the screen and the interactivity performance should give to the participants the impression of being in the same room.

5.6.3 Timescales for introduction

Timescales for introduction: trial to be organized in 2013.

5.6.4 Measured/estimated improvement

For further study.

NOTE: The size of the screens and the interactivity performance (for audio and video) should give to the participants the impression of being in the same room.

It could be an effective alternative to physical meetings for a small number of participants.

Annex A:
Questionnaires for Quality of Remote meetings

The following questions have been adapted from several ITU-T Recommendations. These recommendations are considered as the references for subjective assessments.

A.1 Overall opinion about the quality during the meeting

A.1.1 What is your overall opinion about the quality of the tools provided by the meeting's system?

The five-point scale descriptors are:

Excellent	5
Good	4
Fair	3
Poor	2
Bad	1

Note that for systems providing videoconference, the evaluation should reflect the user's opinion of the overall combined audio and video quality.

A.1.2 What is your overall opinion about the effort required to follow and participate to the discussions?

The five-point scale descriptors are:

Complete relaxation possible; no effort required	5
Attention necessary; no appreciable effort required	4
Moderate effort required	3
Considerable effort required	2
No meaning understood with any feasible effort	1

A.1.3 What is your overall opinion about the connection (speech quality) you have just been using?

The five-point scale descriptors are:

Excellent	5
Good	4
Fair	3
Poor	2
Bad	1

A.1.4 How would you assess the sound quality of the other participants' voices?

The five-point scale descriptors are:

No distortion at all, natural	5
Minimal distortion	4
Moderate distortion	3
Considerable distortion	2
Severe distortion	1

A.1.5 How well did you understand what the other participants were saying?

The five-point scale descriptors are:

No loss of understanding	5
Minimal loss of understanding	4
Moderate loss of understanding	3
Considerable loss of understanding	2
Severe loss of understanding	1

A.1.6 What level of effort did you need to understand what the other participants were saying?

The five-point scale descriptors are:

No special effort required	5
Minimal effort required	4
Moderate effort required	3
Considerable effort required	2
Severe effort required	1

A.1.7 How would you assess your level of effort to converse back and forth during the conversation?

The five-point scale descriptors are:

No special effort required	5
Minimal effort required	4
Moderate effort required	3
Considerable effort required	2
Severe effort required	1

A.1.8 Did you detect Impairments?

The five-point scale descriptors are:

No, never	5
Yes, one or two times	4
Yes, sometimes	3
Yes, most of the time	2
Yes, always	1

Could you define the impairments detected?

……

……

A.1.9 If yes, how annoying was it?

The five-point scale descriptors are:

No annoyance	5
Minimal annoyance	4
Moderate annoyance	3
Considerable annoyance	2
Severe annoyance	1

A.1.10 How would you qualify the communication?

The five-point scale descriptors are:

Very Acceptable	5
Acceptable	4
Neither acceptable nor unacceptable	3
Unacceptable	2
Completely unacceptable	1

A.1.11 Did you experience any echo?

The five-point scale descriptors are:

No, never	5
Yes, one or two times	4
Yes, sometimes	3
Yes, most of the time	2
Yes, always	1

If yes:

- On your own voice
- On another voice

A.1.12 How would you judge the degradation from echo of your own voice?

The five-point scale descriptors are:

Imperceptible	5
Perceptible but not annoying	4
Slightly annoying	3
Annoying	2
Very annoying	1

A.2 Questions about the connection

A.2.1 What kind of speech connection did you use?

PC built-in microphone/speaker

Headset connected to your PC

PSTN fixed phone/handset

PSTN fixed phone/handsfree

Cordless phone (e.g. DECT)

Mobile phone/handset

Mobile phone/handsfree

VoIP fixed phone/handset VoIP fixed phone/handsfree

A.2.2 Did you or the other participants have any difficulty in talking or hearing over the connection?

The five-point scale descriptors are:

No, never	5
Yes, one or two times	4
Yes, sometimes	3
Yes, most of the time	2
Yes, always	1

A.2.3 How did you find the voices of the other participants?

Very natural	5
Natural	4
Neither natural nor unnatural	3
Unnatural	2
Very unnatural	1

A.2.4 If there was noise on the connection, how annoying was it?

The five-point scale descriptors are:

Not noticeable	5
Noticeable, but not annoying	4
Slightly annoying	3
Annoying	2
Very annoying	1

A.3 Information on the meeting system

A.3.1 The meeting system provided the desired information

Strongly agree	5
Agree	4
Neither agree nor disagree	3
Disagree	2
Strongly disagree	1

A.3.2 The provided information was:

Excellent (complete)	5
Good	4
Fair	3
Poor	2
Bad (incomplete)	1

Excellent (clear)	5
Good	4
Fair	3
Poor	2
Bad (unclear)	1

A.4 User's overall impression of the system

A.4.1 Overall, you are satisfied with the meeting system

Strongly agree	5
Agree	4
Neither agree nor disagree	3
Disagree	2
Strongly disagree	1

A.4.2 You perceived the meeting arrangement as:

Very pleasant	5
Pleasant	4
Neither pleasant nor unpleasant	3
Unpleasant	2
Very unpleasant	1

Very relaxed	5
Relaxed	4
Neither relaxed nor stressed	3
Stressed	2
Very stressed	1

A.5 Questions on the usage of electronic tools

A.5.1 Prior to the meeting

A.5.1.1 How was the Information about the meeting arrangements?

The five-point scale descriptors are:

Excellent	5
Good	4
Fair	3
Poor	2
Bad	1

A.5.1.2 Was it easy to join the electronic meeting?

The five-point scale descriptors are:

No special effort required	5
Minimal effort required	4
Moderate effort required	3
Considerable effort required	2
Severe effort required	1

A.5.1.3 If you had any difficulty to join the electronic meeting, could you indicate why?

……

……

A.5.2 During the meeting

A.5.2.1 Was it easy to use the Chat feature?

The five-point scale descriptors are:

Very easy	5
Easy	4
Neither easy nor difficult	3
Difficult	2
Very difficult	1

A.5.2.2 Was it easy to use the Hand Raise feature?

The five-point scale descriptors are:

Very easy	5
Easy	4
Neither easy nor difficult	3
Difficult	2
Very difficult	1

A.5.2.3 Was it easy to use the Mute/Unmute feature?

The five-point scale descriptors are:

Very easy	5
Easy	4
Neither easy nor difficult	3
Difficult	2
Very difficult	1

A.5.3 After meeting

A.5.3.1 Was it easy to access the meeting recorded information?

The five-point scale descriptors are:

Very easy	5
Easy	4
Neither easy nor difficult	3
Difficult	2
Very difficult	1

A.5.3.2 Was it easy to produce the meeting reports?

The five-point scale descriptors are:

Very easy	5
Easy	4
Neither easy nor difficult	3
Difficult	2
Very difficult	1

A.5.3.3 Was it easy to access the meeting archives?

The five-point scale descriptors are:

Very easy	5
Easy	4
Neither easy nor difficult	3
Difficult	2
Very difficult	1

Annex B:
Additional elements to be taken into account

The elements provided in this annex are not detailed but refer to publications in which very detailed information may be found.

B.1 Different types of equipment

The different types of equipment should be considered:

- **Audio listening only (mainly for presentations)**

The participants may only listen the speaker(s). The audio presentation may be associated to screen sharing and video.

This may be used in real time or recorded for a later listening/viewing.

Potential applications are workshops.

- **Real time interactive audio (for meetings)**

All the participants may listen and speak in an interactive way.

This kind of electronic tool may associate other tools such as screen sharing, chat,…

- **Real time interactive Audio/video (for meetings)**

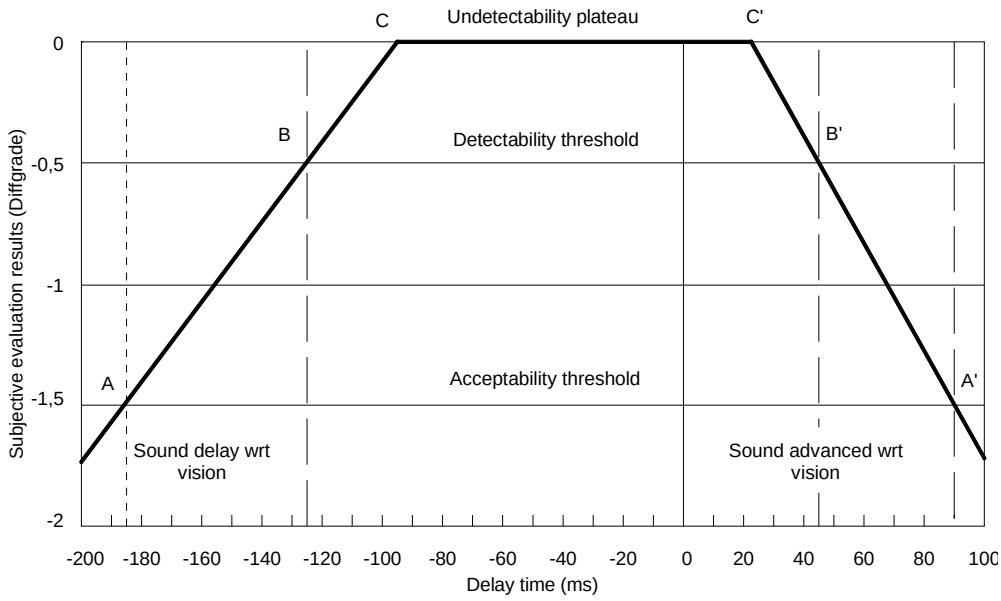
It may be useful to add video to the audio conversation, in particular when it is expected to offer to the participants similar (or as close as possible) conditions as in a physical meeting.

This type of approach is in particular the objective of systems such as Telepresence. For the time being, there is no standards for these types of services but ETSI STQ, ITU-T SG12 and SG16 are currently working on this and in collaboration with IETF.

B.2 Lip synchronisation

The EBU has long recommended that, for the broadcast signal, the relative delay between audio and video signals should be within the range -40 ms to +60 ms (i.e. the sound signal should not arrive more than 40 ms before the picture or later than 60 ms after the picture) [i.1]. Note the excerpt from ES 202 667 [i.11], clause 4.2.4:

*"For broadcasting purposes ITU-R Recommendation BT.1359-1 [*i.12*] defines detectability and acceptability threshold for lip synchronization. Figure 2 describes these thresholds. The detectability thresholds are 125 ms when sound is delayed with respect to the video, and 45 ms when sound is advanced with respect to the video. The acceptability thresholds are 185 ms when sound is delayed with respect to the video, and 90 ms when sound is advanced with respect to the video."*



NOTE: Figure B.1 is corresponds to figure 2 of ES 202 667 [i.11].

Figure B.1: Detectability and acceptability thresholds for lip synchronization

B.3 Speech bandwidth

Several ETSI Standards and Specifications define requirements to be fulfilled by terminal equipment. A set of these standards are listed in clause 2 of the present document, other references are available in annex C. The speech bandwidths:

- Narrow-Band bandwidth: 300 Hz to 3,4 kHz
- Wide-Band bandwidth: 150 Hz to 7 kHz
- Super wideband bandwidth: 50 Hz to 14 kHz
- Full band bandwidth: 20 Hz to 20 kHz

B.4 Chat

A "chat" or instant messaging service among participants can be a very useful tool to keep all participants fully aware of the current stage of on-going discussions and decisions. No transcription of this will be included in the meeting report. A moderator would be helpful to control the pace and order of conversation.

B.5 Room acoustics and electroacoustic equipment positioning

The positioning of transducers in the acoustic environment can strongly influence their effective performances and suitable installation criteria should be followed in order to maximize the signal-to-noise and signal-to-reverberation ratios.

In particular the main parameters to be taken into account when installing teleconference/videoconference systems are:

- room acoustics (e.g. reverberation);
- background noise;

- sound insulation (privacy), mainly for individual use.

Additional parameters to be taken into account are at least:

- A room suitable for a normal face-to-face conference should be selected.
- Maximum talker to microphone distance should be determined taking into account both the noise and reverberation dependencies.
- The microphones and loudspeakers should be positioned in accordance with both these distances.
- The microphone type should be chosen according to the room environment.

More detailed information are available in ETS 300 807 [i.13]. Audio characteristics of terminals designed to support conference services ITU-T Supplement P16; 16 Guidelines for placement of microphones and loudspeakers in telephone conference rooms and for Group Audio Terminals.

B.6 User experience

STF354 (http://portal.etsi.org/stfs/STF_HomePages/STF354/) has worked for the guidelines give quality of experience results for particular communication situations. They are based on user test results and expressed in QoS terms.

Regarding suggestions on the use of it for the work on "electronic working tools", the website contains guidelines derived from the main known empirical user test results when user experience has been examined for one or more technical parameter (e.g. QoS). The user experience of an electronic working tool can be expected to vary according to many characteristics of the users, their communication purpose, the communication situation and technical parameters of the communication service. For example, it could be that "audio" is "excellent" for some "standards body drafting sessions" but "fair" or "poor" for some other "standards body drafting sessions", depending on different elements of the communication situation (such as whether the users know each other well and already share common understanding) and the technical parameters of the service.

Annex C: Bibliography

ETSI EG 202 534: "Human Factors (HF); Guidelines for real-time person-to-person communication services".

ETSI EG 202 670: "Human Factors (HF); User Experience Guidelines for real-time communication services expressed in Quality of Service terms".

ETSI TC M2M #8 Meeting Tool "DAD".

NOTE: Available at: http://webapp.etsi.org/DocumentFinder/LocateFile.asp?file_name=M2M(10)0004r6_Meeting_DAD.zip&docID=185782.

ETSI TR 102 469: "Digital Video Broadcasting (DVB); IP Datacast over DVB-H: Architecture".

C.1 For speech terminals

ETSI TS 103 740: "Speech and multimedia Transmission Quality (STQ);Transmission requirements for wideband wireless loudspeaking and handsfree terminals from a QoS perspective as perceived by the user".

ETSI TS 103 739: "Speech and multimedia Transmission Quality (STQ);Transmission requirements for wideband wireless terminals (handset and headset) from a QoS perspective as perceived by the user".

ETSI TS 103 738: "Speech and multimedia Transmission Quality (STQ);Transmission requirements for narrowband wireless loudspeaking and handsfree terminals from a QoS perspective as perceived by the user".

ETSI TS 103 737: "Speech and multimedia Transmission Quality (STQ);Transmission requirements for narrowband wireless terminals (handset and headset) from a QoS perspective as perceived by the user".

C.2 User related QoS

ETSI EG 202 057-1: "Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 1 General".

ETSI EG 202 057-2: "Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 2: Voice telephony, Group 3 fax, modem data services and SMS".

ETSI EG 202 057-3: "Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 3: QoS parameters specific to Public Land Mobile Networks (PLMN)".

ETSI EG 202 057-4: "Speech Processing, Transmission and Quality Aspects (STQ); User related QoS parameter definitions and measurements; Part 4: Internet access".

C.3 Speech quality (subjective assessment)

ITU-T Recommendation P.800: "Methods for subjective determination of transmission quality".

ITU-T Recommendation P.805: "Subjective evaluation of conversational quality".

ITU-T Recommendation P.851: "Subjective quality evaluation of telephone services based on spoken dialogue systems".

C.4 Multimedia quality (subjective assessment)

ITU-T Recommendation P.911: "Subjective audiovisual quality assessment methods for multimedia applications".

C.5 Audiovisual QoS for communication over IP networks

ISO/IEC JTC 1 N 9476 2009-01-12: "JTC 1 Standing Document 1 (SD 1) Best Practices on Teleconferencing".

History

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