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SERIES P: TELEPHONE TRANSMISSION QUALITY,
TELEPHONE INSTALLATIONS, LOCAL LINE
NETWORKS

Telemeeting assessment

Spatial audio meetings quality evaluation

Recommendation ITU-T P.1310

ITU-T

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Recommendation ITU-T P.1310

Spatial audio meetings quality evaluation

Summary

Recommendation ITU-T P.1310 concerns the quality assessment of telemeeting systems that apply spatial audio rendering techniques to facilitate communication between parties at remote locations.

History

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Performance measures, spatial audio, subjective testing, telemeeting.

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Recommendation ITU-T P.1310

Spatial audio meetings quality evaluation

1 Scope

The focus of this Recommendation is on test methods involving test participants, which collect subjective ratings, task performance measures, and/or descriptors of communication aspects. For that purpose, this Recommendation extends the testing procedures for telemeeting systems described in [ITU-T P.1301] by specifying test methods dedicated to spatial audio telemeeting systems and – where appropriate – referring to stand-alone methods that are also suitable for spatial audio, which are [ITU-T P.1311], [ITU-T P.1312]. Further test methods related to spatial audio will be under study within ITU and this Recommendation will be updated with the relevant references when new methods are available.

In addition, this Recommendation also provides some guidance on testing spatial audio systems which include video communication. The focus is on the perceived alignment of the audio and the video source locations.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T P.800] Recommendation ITU-T P.800 (1996), *Methods for subjective determination of transmission quality*.
- [ITU-T P.805] Recommendation ITU-T P.805 (2007), *Subjective evaluation of conversational quality*.
- [ITU-T P.806] Recommendation ITU-T P.806 (2014), *A subjective quality test methodology using multiple rating scales*.
- [ITU-T P.1301] Recommendation ITU-T P.1301 (2012), *Subjective quality evaluation of audio and audiovisual multiparty telemeetings*.
- [ITU-T P.1311] Recommendation ITU-T P.1311 (2014), *Method for determining the intelligibility of multiple concurrent talkers*.
- [ITU-T P.1312] Recommendation ITU-T P.1312 (2016), *Method for the measurement of the communication effectiveness of multiparty telemeetings using task performance*.
- [ITU-T P-Sup.26] ITU-T P-series Recommendations – Supplement 26 (2012), *Scenarios for the subjective quality evaluation of audio and audiovisual multiparty telemeetings*.

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in this Recommendation

None.

4 Abbreviations and acronyms

None.

5 Conventions

None.

6 General recommendations concerning assessment of spatial audio telemeeting systems

It is recommended that subjective quality evaluations of spatial audio telemeetings are carried out as much as possible according to existing test methods recommended by ITU-T and ITU-R.

It is also recommended that the purpose of the test is taken into account when selecting and, if necessary, adapting appropriate test methods. Test purposes differentiate, for example, by the following aspects:

- rendering scenarios (e.g., audiovisual or audio only systems);
- the focus on the system components under test (e.g., overall system or individual system components);
- the target variables (e.g., overall quality, timbral quality, spatial quality, cognitive load, or task performance);
- the desired measurement sensitivity (e.g., differentiating just spatial audio vs. non-spatial audio or differentiating several instances of spatial audio); or
- by the measurement paradigm (e.g., subjective ratings or performance measures).

In case of multiparty tests, it is recommended that [ITU-T P.1301] is consulted for multiparty-specific advice when selecting the appropriate test methods.

It is recommended that spatial-audio-specific considerations are taken into account when selecting and, if necessary, adapting appropriate test methods. Such considerations may be based on the spatial-audio-specific aspects described in this Recommendation.

The selection, and if necessary adaptation of an appropriate test method may be done using the guidelines provided in this present Recommendation.

Finally, practitioners should be aware that spatial audio telemeeting systems can and should be evaluated on several metrics. For that reason, it is recommended that practitioners evaluate which set of aspects is important for a complete evaluation of a system under test and choose the test methods accordingly.

7 Guidance on appropriate test method

It is recommended that the actual test purpose at hand is first analysed in terms of the decision criteria in clause 7.1. Then, the guidance in clauses 7.2 and 7.3 can be applied to identify the most appropriate test method.

7.1 Decision criteria

The choice for a particular test method described in this Recommendation depends on the following six decision criteria:

- **Rendering scenario:**
To utilize their full potential, spatial audio rendering approaches differ between use cases, and thus the assessment methodology should be chosen accordingly. Two main rendering scenarios are considered :
 - 1 audio-only or audiovisual systems using spatial audio for improved communication experience, independently from the video signal;
 - 2 audiovisual systems showing multiple participants for which the rendered audio space is expected to be aligned with the visual location of the participants.
- **Test Focus:**
Spatial audio telemeeting systems in real networks consist of more components than just the spatial audio capturing and rendering engines, e.g., codecs, bandwidth, noise and echo reduction. For that reason, the test method should be aligned with the test focus; that is the evaluation of:
 - 1 the overall system; or
 - 2 individual system components.
- **Target variables:**
The media signal quality of spatial audio has two main aspects; its spatial quality component and its non-spatial quality component:
 - The spatial quality component refers to the quality features related to the spatial attributes of sound. Examples of such attributes are immersion, envelopment, localization blur and source width.
 - The non-spatial quality component refers to the quality features related to the non-spatial attributes of sound. Examples of such attributes are loudness, timbre, noisiness and sharpness.

Furthermore, the added value of spatial audio in telemeetings goes beyond media signal quality since it benefits communicative aspects such as conversation flow, communication effort, cognitive load and task performance. As a result, the perceived overall quality may be different from the perceived media signal quality.

For that reason, the selected test method should be appropriate for the desired target variable(s). The variables considered here are:

 - 1 Overall quality (consisting of media-signal quality and communication quality components).
 - 2 Media-signal-quality component (consisting of non-spatial quality and spatial quality components).
 - 3 Communication-quality component.
- **Measurement sensitivity:**
Assessment methods that have been proposed and used in the state-of-the-art can be divided into two categories in terms of their sensitivity:
 - 1 Methods that are able to show the added value of spatial audio systems, i.e., non-spatial audio vs. spatial audio.
 - 2 Methods that are – in addition – able to distinguish different variants of spatial audio systems.

This needs to be considered when selecting a test method.
- **Test paradigm: listening-only tests, conversation tests**
Both, listening-only (non-interactive) tests and conversation tests can be used for evaluating spatial audio telemeeting systems.