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ETSI Guide

Speech and multimedia Transmission Quality (STQ);
Speech Quality performance
in the presence of background noise
Part 3: Background noise transmission -
Objective test methods

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Foreword

This ETSI Guide (EG) has been produced by ETSI Technical Committee Speech and multimedia Transmission Quality (STQ).

The present document is a deliverable of ETSI Specialized Task Force (STF) 294 entitled: "Improving the quality of eEurope wideband speech applications by developing a performance testing and evaluation methodology for background noise transmission".

The present document is part 3 of a multi-part deliverable covering Speech and multimedia Transmission Quality (STQ); speech quality performance in the presence of background noise, as identified below:

Part 1: "Background noise simulation technique and background noise database";

Part 2: "Background noise transmission - Network simulation - Subjective test database and results";

Part 3: "Background noise transmission - Objective test methods".

1 Scope

The present document aims to identify and define testing methodologies which can be used to objectively evaluate the performance of narrowband and wideband terminals and systems for speech communication in the presence of background noise.

Background noise is a problem in mostly all situations and conditions and need to be taken into account in both, terminals and networks. The present document provides information about the testing methods applicable to objectively evaluate the speech quality in the presence of background noise. The present document includes:

- The description of the experts post evaluation process chosen to select the subjective test data being within the scope of the objective methods.
- The results of the performance evaluation of the currently existing methods described in ITU-T Recommendation P.862 [i.16], [i.17] and in TOSQA2001 [i.19] which is chosen for the evaluation of terminals in the framework of ETSI VoIP speech quality test events [i.8], [i.9], [i.10] and [i.11].
- The method which is applicable to objectively determine the different parameters influencing the speech quality in the presence of background noise taking into account:
  - the speech quality;
  - the background noise transmission quality;
  - the overall quality.
- The document is to be used in conjunction with:
  - EG 202 396-1 [i.1] which describes a recording and reproduction setup for realistic simulation of background noise scenarios in lab-type environments for the performance evaluation of terminals and communication systems.
  - EG 202 396-2 [i.2] which describes the simulation of network impairments and how to simulate realistic transmission network scenarios and which contains the methodology and results of the subjective scoring for the data forming the basis of the present document.
  - French speech sentences as defined in ITU-T Recommendation P.501 [i.13] for wideband and English speech sentences as defined in ITU-T Recommendation P.501 [i.13] for narrowband.

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] ETSI EG 202 396-1: "Speech and multimedia Transmission Quality (STQ); Speech quality performance in the presence of background noise; Part 1: Background noise simulation technique and background noise database".

[i.2] ETSI EG 202 396-2: "Speech Processing, Transmission and Quality Aspects (STQ); Speech Quality performance in the presence of background noise; Part 2: Background Noise Transmission - Network Simulation - Subjective Test Database and Results".

[i.3] ITU-T Recommendation P.835: "Subjective test methodology for evaluating speech communication systems that include noise suppression algorithm".

[i.4] ITU-T Recommendation P.800: "Methods for subjective determination of transmission quality".

[i.5] ITU-T Recommendation P.831: "Subjective performance evaluation of network echo cancellers".

[i.6] Genuit, K.: "Objective Evaluation of Acoustic Quality Based on a Relative Approach", InterNoise '96, Liverpool, UK.

[i.7] ITU-T Recommendation SG 12 Contribution 34: "Evaluation of the quality of background noise transmission using the "Relative Approach"".

[i.8] ETSI 2nd Speech Quality Test Event: "Anonymized Test Report", ETSI Plugtests, HEAD acoustics, T-Systems Nova.

NOTE: Available at: http://www.etsi.org/WebSite/OurServices/Plugtests/History.aspx.
Also available as ETSI TR 102 648-3.

[i.9] ETSI 3rd Speech Quality Test Event: "Anonymized Test Report "IP Gateways"".

NOTE: Available at: http://www.etsi.org/WebSite/OurServices/Plugtests/History.aspx.

[i.10] ETSI 3rd Speech Quality Test Event: "Anonymized Test Report "IP Phones"".

[i.11] ETSI 4th Speech Quality Test Event: "Anonymized Test Report "IP Gateways and IP Phones"".

NOTE: Available at: http://www.etsi.org/WebSite/OurServices/Plugtests/History.aspx.

[i.12] F. Kettler, H.W. Gierlich, F. Rosenberger: "Application of the Relative Approach to Optimize Packet Loss Concealment Implementations", DAGA, March 2003, Aachen, Germany.

[i.13] ITU-T Recommendation P.501: "Test Signals for Use in Telephonometry".

[i.14] R. Sottek, K. Genuit: "Models of Signal Processing in human hearing", International Journal of Electronics and Communications (AEÜ) vol. 59, 2005, p. 157-165.

NOTE: Available at: http://www.elsevier.de/aeue.

[i.15] SAE International - Document 2005-01-2513: "Tools and Methods for Product Sound Design of Vehicles" R. Sottek, W. Krebber, G. Stanley.

[i.16] ITU-T Recommendation P.862: "Perceptual evaluation of speech quality (PESQ): An objective method for end-to-end speech quality assessment of narrowband telephone networks and speech codecs".

[i.17] ITU-T Recommendation P.862.1: "Mapping function for transforming P.862 raw result scores to MOS-LQO".

[i.18] ITU-T Recommendation P.862.2: "Wideband extension to Recommendation P.862 for the assessment of wideband telephone networks and speech codecs".