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SERIES P: TERMINALS AND SUBJECTIVE AND OBJECTIVE ASSESSMENT METHODS

Methods for objective and subjective assessment of
speech quality

Extension of the methodology for the derivation of equipment impairment factors from instrumental models for wideband speech codecs

Recommendation ITU-T P.834.1

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Recommendation ITU-T P.834.1

Extension of the methodology for the derivation of equipment impairment factors from instrumental models for wideband speech codecs

Summary

Recommendation ITU-T P.834.1 describes an extension of the methodology for deriving equipment impairment factors from instrumental models of Recommendation ITU-T P.834. It is intended that it be primarily applied to determine wideband equipment impairment factors $I_{e,wb}$, capturing the degradation introduced by wideband speech codecs. The resulting wideband equipment impairment factors derived by this methodology are intended to be used on the extended transmission rating scale underlying the E-model (see Appendix II of Recommendation ITU-T G.107). They reflect the auditory impairments of the corresponding equipment in a listening-only mode.

The methodology of Recommendation ITU-T P.834.1 makes use of instrumental models (so called "objective methods"), e.g., the model defined in Recommendation ITU-T P.862.2. It is to be considered as supplementary to the methodology based on auditory listening-only tests, described in Recommendation ITU-T P.833.1. It provides valid $I_{e,wb}$ values only for those codecs for which the instrumental model used produces meaningful estimations.

Speech material associated with Recommendation ITU-T P.834.1 is freely available on the test signal database at www.itu.int/net/ITU-T/sigdb.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
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Codec, E-model, equipment impairment factor, impairment factor method, objective method, wideband speech transmission.

* 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 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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Introduction

ITU-T has introduced the impairment factor method in order to describe the joint effect of different types of degradations on the overall transmission quality. According to this method, transmission impairments can be transformed into so-called "psychological factors", which are assumed to be additive on a psychological scale. The transmission rating scale (R scale) underlying the E-model (see [ITU-T G.107]) is assumed to reflect such a psychological scale.

The impairment factor method allocates a value of impairment to each parameter describing the transmission channel, and then allows the simple addition of these impairments to determine the overall impairment. The overall transmission rating, R , is finally calculated by subtracting the overall impairment from the maximum value R_{max} . Whereas the R scale and the E-model were originally formulated for narrowband (300-3400 Hz) speech transmission only, Appendix II of [ITU-T G.107] presents an extension of this scale to wideband (50-7000 Hz) speech transmission. Although a complete wideband version of the E-model is not yet available, Appendix IV to [ITU-T G.113] provides values for wideband equipment impairment factors $I_{e,wb}$, which describe the degradation resulting from selected wideband speech codecs on the extended R scale. This Recommendation describes a methodology for the derivation of $I_{e,wb}$ values for other wideband speech codecs, based on the results of so-called "objective methods".