29/1156/NP

NEW WORK ITEM PROPOSAL (NP)

PROPOSER:	DATE OF PROPOSAL:
Secretariat	**2023-09-07**
DATE OF CIRCULATION:	CLOSING DATE FOR VOTING:
2023-09-15	**2023-12-08**

IEC TC 29 : ELECTROACOUSTICS

SECRETARIAT:	SECRETARY:
Denmark	Ms Lise Aagesen
NEED FOR IEC COORDINATION: TC 100,TA 16	PROPOSED HORIZONTAL STANDARD: ☐
	Other TC/SCs are requested to indicate their interest, if any, in this NP to the TC/SC secretary

FUNCTIONS CONCERNED:

☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY

TITLE OF PROPOSAL:

Electroacoustics – Hearing aids – Part 17: Assistive listening system for hearing aid users based on 2,4 GHz audio streaming

☒ STANDARD	☐ TECHNICAL SPECIFICATION	☐ PUBLICLY AVAILABLE SPECIFICATION

PROPOSED PROJECT NUMBER: 60118-17

SCOPE

(AS DEFINED IN ISO/IEC DIRECTIVES, PART 2, 14):

This document is applicable to Assistive Listening Systems for hearing aid users based on broadcasting streaming audio in the ISM band.

This document covers the properties of the hearing aids as receivers of broadcasted streaming audio transmissions, the properties of the broadcasting streaming audio transmitters as well as methods for verifying the proper performance of the system. Furthermore, a method for measuring the coverage of a broadcasting streaming audio transmitters is specified. This document applies to single transmitter systems only.

This document specifies the signal levels for the audio signals to be transmitted for hearing aid purposes. This includes both average and peak input signal levels.

Throughout this standard it is assumed that the hearing aids used conform to all relevant parts of IEC 60118.

PURPOSE AND JUSTIFICATION

INCLUDING THE MARKET RELEVANCE AND WHETHER IT IS PROPOSED TO BE A HORIZONTAL STANDARD.

MARKET RELEVANCE SHOULD BE ADDRESSED BY INDICATING THE NEED FOR THE CORRESPONDING STANDARDS WORK AND ITS GLOBAL RELEVANCE (SEE ISO/IEC DIRECTIVES, PART 1 ANNEX C)

IF PROPOSED AS A HORIZONTAL STANDARD, IDENTIFY AS POSSIBLE, THE CORRESPONDING APPLICABLE GUIDE(S) AND ASSOCIATED ADVISORY COMMITTEE(S) (SEE GUIDE 108).

The need for Assistive Listening Systems for hearing aid users has for decades primarily been served by magnetic loop systems and hearing aids with telecoils.

New opportunities for audio streaming in the ISM band (2,3 GHz to 2,4 GHz) have arisen. The ISM band is free to use all over the world. The most common everyday uses of the ISM bands are for low-power and short-range telecommunications, such as WiFi, Bluetooth, Zigbee, wireless telephones, RFID, and NFC.

To benefit from these new opportunities and ensure their full potential, it is essential to have a standard that describes relevant measurement methods and sets performance requirements necessary for interoperability between transmitters and receivers.

Furthermore, this standard is relevant for reference purposes for regulators.

PLEASE SELECT ANY UN SUSTAINABLE DEVELOPMENT GOALS (SDGS) THAT THIS DOCUMENT WILL SUPPORT. FOR MORE INFORMATION ON SDGS, PLEASE VISIT OUR WEBSITE AT HTTPS://WWW.IEC.CH/SDG/

☐ GOAL 1: No Poverty	☒ GOAL 10: Reduced Inequalities
☐ GOAL 2: Zero Hunger	☐ GOAL 11: Sustainable Cities and Communities
☒ GOAL 3: Good Health and Well-being	☐ GOAL 12: Responsible Consumption and Production
☐ GOAL 4: Quality Education	☐ GOAL 13: Climate Action
☐ GOAL 5: Gender Equality	☐ GOAL 14: Life Below Water
☐ GOAL 6: Clean Water and Sanitation	☐ GOAL 15: Life on Land
☐ GOAL 7: Affordable and Clean Energy	☐ GOAL 16: Peace, Justice and Strong Institutions
☐ GOAL 8: Decent Work and Economic Growth	☐ GOAL 17: Partnerships for the Goals
☒ GOAL 9: Industry, Innovation and Infrastructure	

TARGET DATE(S)	FOR FIRST CD: 2025-04-30	FOR PUBLICATION: 2027-04-30	
ESTIMATED NUMBER OF MEETINGS:	FREQUENCY OF MEETINGS:	DATE OF FIRST MEETING:	PLACE OF FIRST MEETING:
8	2 per year	2024-04-08	Warsaw

RELEVANT DOCUMENTS TO BE CONSIDERED:

RELATIONSHIP OF PROJECT TO ACTIVITIES OF OTHER INTERNATIONAL BODIES:

LIAISONS WITH INTERNATIONAL BODIES:	NEED FOR ISO COORDINATION:
ETSI	

DOCUMENT MATURITY:

☒ A DRAFT IS ATTACHED FOR COMMENT* ☐ AN OUTLINE IS ATTACHED

* Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

CONCERNS KNOWN PATENTED ITEMS (SEE ISO/IEC DIRECTIVES, PART 1) ☐ YES ☒ NO

PATENT DESCRIPTION:

RECIPIENTS OF THIS DOCUMENT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY LOCAL REGULATIONS OR TECHNICAL REASONS THAT MAY EXIST AND SHOULD BE CONSIDERED SHOULD THIS PROPOSAL PROCEED, RECOGNIZING THAT FAILURE TO ADDRESS SUCH REQUIREMENTS COULD RESULT IN THE NEED FOR "IN SOME COUNTRIES" CLAUSES.

CONCERNS LOCAL REGULATIONS OR TECHNICAL DIFFERENCES (SEE AC/22/2007) ☐ YES ☐ NO

DESCRIPTION:

WE NOMINATE A PROJECT LEADER IN ACCORDANCE WITH ISO/IEC DIRECTIVES, PART 1

LAST NAME:	FIRST NAME:	E-MAIL:	COUNTRY:
Bisgaard	Nikolai	nikolai@bisgaardhome.dk	Denmark

COMMENTS AND RECOMMENDATIONS FROM TC/SC OFFICERS:

WORK ALLOCATION:

☐ NEW PROJECT TEAM ☐ NEW WORKING GROUP ☒ EXISTING WORKING GROUP: WG 13

IF APPROVED, THE NEXT STAGE SHOULD BE:

☒ CD ☐ CDV

REMARKS FROM TC/SC OFFICERS:

At its meeting, November 2022 in San Francisco, TC 29 took the following decision, doc. 29/1139/DL refers:

DECISION 7

TC 29 decides to activate PWI 29-56 with the new title "Assistive listening system for hearing aid users using Bluetooth LE Audio (Auracast TM)" to become an International Standard and to ask Denmark to put forward a formal New Work Item Proposal for a 12-week voting. If approved, the item should be allocated to WG 13 with Nikolai Bisgaard, Denmark, as project leader. Target date for submission of the CD layout to the secretariat is 2023-09-30.

During the preparation of the proposal, the title has been amended.

APPROVAL CRITERIA

- Approval of the new work item proposal by a 2/3 majority of the P-members voting;
- At least 4 P-members in the case of a committee with 16 or fewer P-members, or at least 5 P-members in the case of committees with more than 17 P-members, have nominated or confirmed the name of an expert and approved the new work item proposal.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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ELECTROACOUSTICS – HEARING AIDS –

Part 17: Assistive listening system for hearing aid users based on 2,4 GHz audio streaming

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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IEC 60118-17 has been prepared by IEC technical committee 29: Electroacoustics. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
XX/XX/FDIS	XX/XX/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

99 The language used for the development of this International Standard is English.

100 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in
101 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available
102 at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are
103 described in greater detail at www.iec.ch/publications.

104 The committee has decided that the contents of this document will remain unchanged until the
105 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
106 specific document. At this date, the document will be

107 • reconfirmed,
108 • withdrawn,
109 • replaced by a revised edition, or
110 • amended.

INTRODUCTION

The need for Assistive Listening Systems for hearing aid users has for decades primarily been served by magnetic loop systems and hearing aids with telecoils. New opportunities have arisen for audio streaming in the ISM band (2,3 GHz to 2,4 GHz). The ISM band is free to use all over the world. The most common everyday uses of the ISM bands are for low-power and short-range telecommunications, such as WiFi, Bluetooth, Zigbee, wireless telephones, RFID, and NFC.

To benefit from the opportunity of broadcasting audio signals in the ISM band, it is important that the streaming protocol is well defined, and that products comply to the protocol to secure interoperability among all the products designed to take advantage of the technology. One of the widely known systems for this purpose is Auracast.[1] To assure that the full potential of the new system is reached there must be standards for transmitters and receivers and for how to deploy them and test the system for proper performance.

[1] Auracast is a wireless audio streaming system based on the Bluetooth LE Audio system offered by Bluetooth SIG. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the system named. Equivalent products may be used if they can be shown to lead to the same results.

ELECTROACOUSTICS – HEARING AIDS –

Part 17: Assistive listening system for hearing aid users based on 2,4 GHZ audio streaming

1 Scope

This document is applicable to Assistive Listening Systems for hearing aid users based on broadcasting streaming audio in the ISM band.

This document covers the properties of the hearing aids as receivers of broadcasted streaming audio transmissions, the properties of the broadcasting streaming audio transmitters as well as methods for verifying the proper performance of the system. Furthermore, a method for measuring the coverage of a broadcasting streaming audio transmitters is specified. This document applies to single transmitter systems only.

This document specifies the signal levels for the audio signals to be transmitted for hearing aid purposes. This includes both average and peak input signal levels.

Throughout this standard it is assumed that the hearing aids used conform to all relevant parts of IEC 60118.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60118-0:2022, *Electroacoustics – Hearing aids – Part 0: Measurement of the performance characteristics of hearing aids*

IEC 60318-5, *Electroacoustics - Simulators of human head and ear - Part 5: 2 cm^3 coupler for the measurement of hearing aids and earphones coupled to the ear by means of ear inserts*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp
- ISO Online browsing platform: available at https://www.iso.org/obp

TBD

4 Hearing aid requirements

4.1 System Requirements for hearing aids

This document specifies requirements for hearing aids intended to be used for receiving broadcasted streaming audio signals for assistive listening system purposes. One of the widely known systems for this purpose is Auracast[2].

4.2 User interface requirements for hearing aids

A hearing aid shall have means for the user to connect and disconnect to a broadcasting streaming audio source. Such means can be a push-button or similar. In case the hearing aid has no physical means for user interaction integrated in the hearing aid an assistant device shall be available. Such an assistant device could be a remote control or an app on a smartphone.

4.3 Hearing aid testing

Unless specified otherwise the testing of hearing aids with broadcasted streaming audio input shall take place in a radio frequency shielded room with a background level of less than -140 dBm (?). The hearing aid shall be connected to an acoustic coupler in accordance with IEC 60318-5 for recording of the hearing aid output.

The hearing aid shall be in Reference Test Setting as defined in 3.28 of IEC 60118-0. All adaptive features shall be disabled. The manufacturer shall specify this setting.

4.4 Signal source for hearing aid testing

Unless otherwise specified the signal sources for the testing shall be broadcasting streaming audio transmitters set up as specified in Clause 5 of this document. The primary audio input signal to the transmitter shall be International Speech Test Signal (ISTS) at a long-term RMS level of -35 dB FS. Other types of input signals can also be required.

4.5 Test procedure and results

4.5.1 Radio Frequency sensitivity

4.5.1.1 General

The RF sensitivity of the hearing aid shall be sufficient to secure a high-quality rendering of the broadcasting streaming audio transmitter signal. The effective RF sensitivity of the HA is the sum of the electrical input sensitivity and the antenna gain.

4.5.1.2 Electrical RF input sensitivity

The electrical RF input sensitivity is measured with a hearing aid test device with direct electrical input to the terminals where the antenna is normally connected. An adjustable RF source with a test signal at 2,45 GHz is attenuated to the lowest level where the test signal is detected by the hearing aid circuit. This level is the electrical RF input sensitivity measured in dBm.

4.5.1.3 Antenna gain

A hearing aid test device with direct electrical input to the integral antenna is mounted on a standard anthropomorphic mannequin (SAM). The head is then placed on a two-axis rotary

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[2] Auracast is a wireless audio streaming system based on the Bluetooth LE Audio system offered by Bluetooth SIG. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the system named. Equivalent products may be used if they can be shown to lead to the same results.

system in the middle of a Radio Frequency Anechoic room. The antenna is excited with an electrical signal of a known magnitude and the emitted power is measured with a spectrum analyser. This measurement is repeated as the rotary fixture is used to vary the position of the SAM head with the hearing aid with the first axis to horizontal angles of 0°, 45°, 90°, 135°, 180°, 225°, 270° and 315°.

The vertical angle is adjusted with a second axis to 45° and then to 90° and the measurements at the 8 first axis angles repeated. The power measurements are integrated to give a measure of the total emitted power. The antenna gain is then:

10*log (total emitted power/ the input electrical power) in dB.

4.5.1.4 Radio Frequency sensitivity requirement

The Radio Frequency Sensitivity is the sum of the electrical radio frequency input sensitivity measured in dBm plus the antenna gain in dB.

The Radio Frequency Sensitivity shall be better than -80 dBm.

4.5.2 Measurement of connection time

The hearing aid is put in scanning mode by the means indicated by the hearing aid manufacturer and a timer is started.

The time that lapses until the hearing aid output presents the audio signal is recorded as T_c.

T_c shall be less than 2 seconds.

4.5.3 Measurement of connection priority

Two broadcasting streaming audio sources are activated. Along with the streamed audio signal a parameter named Streaming_Audio_Contexts is transmitted. This parameter is used to signal the nature of the streamed audio signal. Source 1 has the Streaming_Audio_Contexts parameter set to “ALS” and a 1 kHz sinewave is applied to the input at an average level of -25 dB FS.

Source 2 has the Streaming_Audio_Contexts parameter set to “Media” and a 2 kHz sinewave is applied to the input at an average level of -25 dB FS.

The hearing aid is put in scanning mode by the means indicated by the hearing aid manufacturer and the output of the hearing aid is monitored. Once connected the hearing aid shall render a 1 kHz sinewave.

4.5.4 Measurement of automatic switching (if available)

A broadcasting streaming audio source is activated. Along with the streamed audio signal a parameter named Audio_Active_State is transmitted. This parameter is used to signal the status of the audio streaming process. A value of 0 indicates that the streaming transmitter is active, but no audio content is being streamed. A value of 1 indicates that the streaming transmitter is active and audio content is being streamed. For this test Audio_Active_State parameter is initially set to 1.

The hearing aid is put in scanning mode by the means indicated by the hearing aid manufacturer. When the hearing aid is connected, the streamed audio signal will appear in the output of the hearing aid.

The Audio_Active_State parameter is then changed to 0 and it is verified that the streamed audio signal stops. The hearing aid shall switch to acoustic input. This is verified by having an easily recognized acoustic signal present in the test room.

The Audio_Active_State parameter is then set to 1 and it is verified that the hearing aid switches from acoustic input to the streamed audio signal.

4.5.5 Latency

4.5.5.1 General

The hearing aid is connected to a broadcasting streaming audio source with ISTS applied at the input. The input signal to the transmitter and the output signal from the hearing aid are fed to a two-channel analyser. The latency T_{la} is measured by the correlation function of the two signals.

T_{la} shall be less than 50 msec.

4.5.5.2 Minimum Latency

Along with the streamed audio signal a parameter named Broadcast_Audio_Immedate_Rendering_Flag is transmitted. This parameter is used to signal to receiver with what delay that the streaming audio content shall be rendered. A value of 0 indicates that the delay shall be set to 20 000 µsec. A value of 1 indicates that the delay shall be set to 0.

For this test the Broadcast_Audio_Immedate_Rendering_Flag is set to 1 and the procedure of 4.5.2 is repeated to measure $T_{la\text{-}min}$.

5 Broadcasting streaming audio transmitters

5.1 General

This document specifies requirements for broadcasting streaming audio transmitters intended to be used for disseminating audio signals for assistive listening system purposes. One of the widely known systems for this purpose is Auracast[3]. Multiple types of supplementary information can be added to the streams. To secure optimum performance of broadcasting streaming audio sources for Assistive Listening System purposes there are requirements for the supplementary information.

5.2 Requirements for broadcasting streaming audio transmitters

5.2.1 General

Broadcasting streaming audio transmitters intended for use as Assistive Listening Systems for hearing aids shall be set up to transmit a standard quality public broadcast audio stream using the LC3 Codec. The audio signals can be streamed at either 16 kHz or 24 kHz sampling frequency (QoS configuration).

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[3] Auracast is a wireless audio streaming system based on the Bluetooth LE Audio system offered by Bluetooth SIG. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the system named. Equivalent products may be used if they can be shown to lead to the same results.

5.2.2 Broadcasting streaming audio transmitters advertising

5.2.2.1 General

A broadcasting streaming audio transmitter is required to send out Public Broadcast Announcements with information about the stream. The Public Broadcast Announcements comprise both extended and periodic advertising data. Furthermore, metadata parameters for special purposes can be provided with both extended and periodic advertising data. Periodic advertising data is only transmitted when an audio stream is active (see 4.5.4).

5.2.2.2 Advertising data

The transmitter shall have a “Local_Name” that uniquely identifies the device.

The transmitter shall have an “Appearance Value” of 0x0885 (Generic broadcasting audio source).

The transmitted audio stream shall have a “Broadcast_Name” that uniquely identifies the audio content of the stream.

The Public Broadcast Announcement shall indicate if the stream is encrypted and a “Broadcast_Code” must be supported.

The Public Broadcast Announcement shall indicate the number of streams in the group.

The “Presentation Delay” shall be set to 20 000.

The QoS configuration shall be set to either 16_2_1 (Speech) or 24_2_1 (Music).

5.2.3 Broadcasting streaming audio transmitter metadata

5.2.3.1 General

Metadata are optional parameters defined to secure optimum performance for hearing aids connecting to broadcasting streaming audio transmitters for Assistive Listening purposes.

5.2.3.2 Program_Info

The Public Broadcast Announcement can be enhanced with “Program_Info” data with additional information about the audio content of the stream as a supplement to the “Broadcast_Name”.

5.2.3.3 Streaming_Audio_Context

The Extended Advertising shall provide “Streaming_Audio_Context” metadata to indicate the type of service provided.

The value ALS shall be used for Assistive Listening Systems.

5.2.3.4 Audio_Active_State

The state of an audio signal stream shall be indicated by the “Audio_Active_State” parameter in the metadata of the Periodic advertising.

The value equals 1 when an audio signal is streamed and 0 otherwise.

5.2.3.5 Broadcast_Audio_Immedate_Rendering_Flag

The Public Broadcast Announcement shall include the metadata Broadcast_Audio_Immedate_Rendering_Flag". The default value shall be 0. Setting the value to 1 sets the presentation delay in the hearing aid to 0 to provide the earliest possible rendering of this Audio Stream for the best user experience.

5.3 Transmit power

The transmit power specified in this standard is for global use and is set to the power level that will comply with requirements of all regulatory domains known at the date of this standard.

A broadcasting streaming audio transmitter shall have a maximum transmit level of 10 dBm (10 mW).

A broadcasting streaming audio transmitter should have adjustable transmitter power.

5.4 Configurability

A broadcasting streaming audio transmitter shall have a commission mode where the various parameters of the system set up can be adjusted.

6 Installation of broadcasting streaming audio transmitters

6.1 General

The deployment of broadcasting streaming audio transmitters for assistive listening system purposes is subject to several different requirements to achieve the desired performance. The proper performance shall be verified by measurements.

6.2 Signing

The availability of a broadcasting streaming audio transmitter for assistive listening system purposes shall be indicated by signposts at the entrance to the location. The logo of figure 1 shall be used supplemented by the Broadcast_Name. If the location is only covered in part the coverage area shall be indicated.

If the broadcast stream is encrypted the "Broadcast_Code" shall also be shown.

6.3 Installation

Broadcasting streaming audio transmitters can be installed in many ways, but it is recommended to place the transmitters in line-of-sight to as many receivers (hearing aids) as possible. That can preferably be high up on walls or on ceilings.

6.4 Set-up requirements for broadcasting streaming audio transmitters

6.4.1 General

The broadcasting streaming audio transmitter shall be set up in accordance with the requirement of Clause 5 with the transmitter in commission mode.

6.4.2 Transmit power

The transmit power of the broadcasting streaming audio transmitter shall be adjusted to fit the size of the location. In large locations full power (+10 dBm) can be used. For smaller locations the power should be reduced to a level that give full coverage without spill over to adjacent locations.

6.4.3 Audio levels

The long-term RMS level of the input signal to broadcasting streaming audio transmitters shall be -35 dB relative to full scale digital representation (-35 dB FS). The peak levels shall be less than -3 dB FS.

6.5 Location registration

When the broadcasting streaming audio transmitter has been installed and performance verified the location should be registered in a public database of broadcasting streaming audio transmitter locations.

7 Verification of broadcasting streaming audio transmitter system performance

7.1 General

Broadcasting streaming audio transmitters for assistive listening system purposes shall broadcast across the entire location or in the area stated to be covered according to 6.2. Local conditions and building structure elements can influence the transmission of the signal considerably. The performance of the system installed shall be tested after installation.

7.2 System performance parameters

Broadcasting streaming audio transmitter data are transmitted in packages. If too many packages are lost the signal will have discontinuities (fall outs) that are clearly heard by the users. The packet loss measured over 1 second shall be less than 1% for proper broadcasting streaming audio transmitter system performance.

7.3 Test equipment for broadcasting streaming audio transmitter system performance measurements

7.3.1 General

The test equipment for broadcasting streaming audio transmitter system performance measurements should be based on a portable broadcasting streaming audio transmitter receiver with an isotropic antenna and a radio frequency sensitivity of -70 dBm [4].

The equipment shall be capable of continuously showing if the packet loss rate (PLR) exceeds 1%.

7.3.2 Test signal for Packet Loss Rate measurements

The broadcasting streaming audio transmitter shall be excited by a signal that generates 25 unique 10 msec frames that are repeated every second. The level should be in accordance with 6.4.3.

The test equipment will compare the incoming signals with the stored test signal and compute the packet loss.

7.4 Test equipment mounting

The antenna of the test equipment shall be placed more than 1 metre away from the test operator at a height of 1,5 meters above the floor.

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[4] This is 10 dB poorer than for hearing aids (4.5.1.4) to compensate for the absence of people in the room when doing the measurements.

7.5 Coverage measurement

The antenna of the test system is moved along the boundaries of the location at a speed of 0,5 meters per second. A distance of 0,5 metres from the walls is maintained and the packet loss rate is observed. The sections where the packet loss rate exceeds 1 % are recorded.

At the sections with too high packet loss the test system should be moved towards the transmitter until the packet loss falls below 1%. The test system is then moved parallel to the boundaries to verify that the packet loss stays below the 1% limit. Using this technique, a map of good system performance shall be charted and made available in connection with the signpost (6.2).

7.6 Audio signal levels

The broadcasting streaming audio transmitter shall be excited by the audio signal also disseminated acoustically at the location. The test equipment records the long-term RMS signal level and the peak levels over a period of 30 seconds. The average signal level shall be -35 dB Full Scaler (FS) and the peak levels less than -3 dB FS.

An audio signal generated by a microphone with an input of 70 dB SPL shall generate an average input signal level of -35 dB FS to the broadcasting streaming audio transmitter.

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