

In-Ear Noise Dosimetry: Update on some research and possible standards



Make Listening Safe

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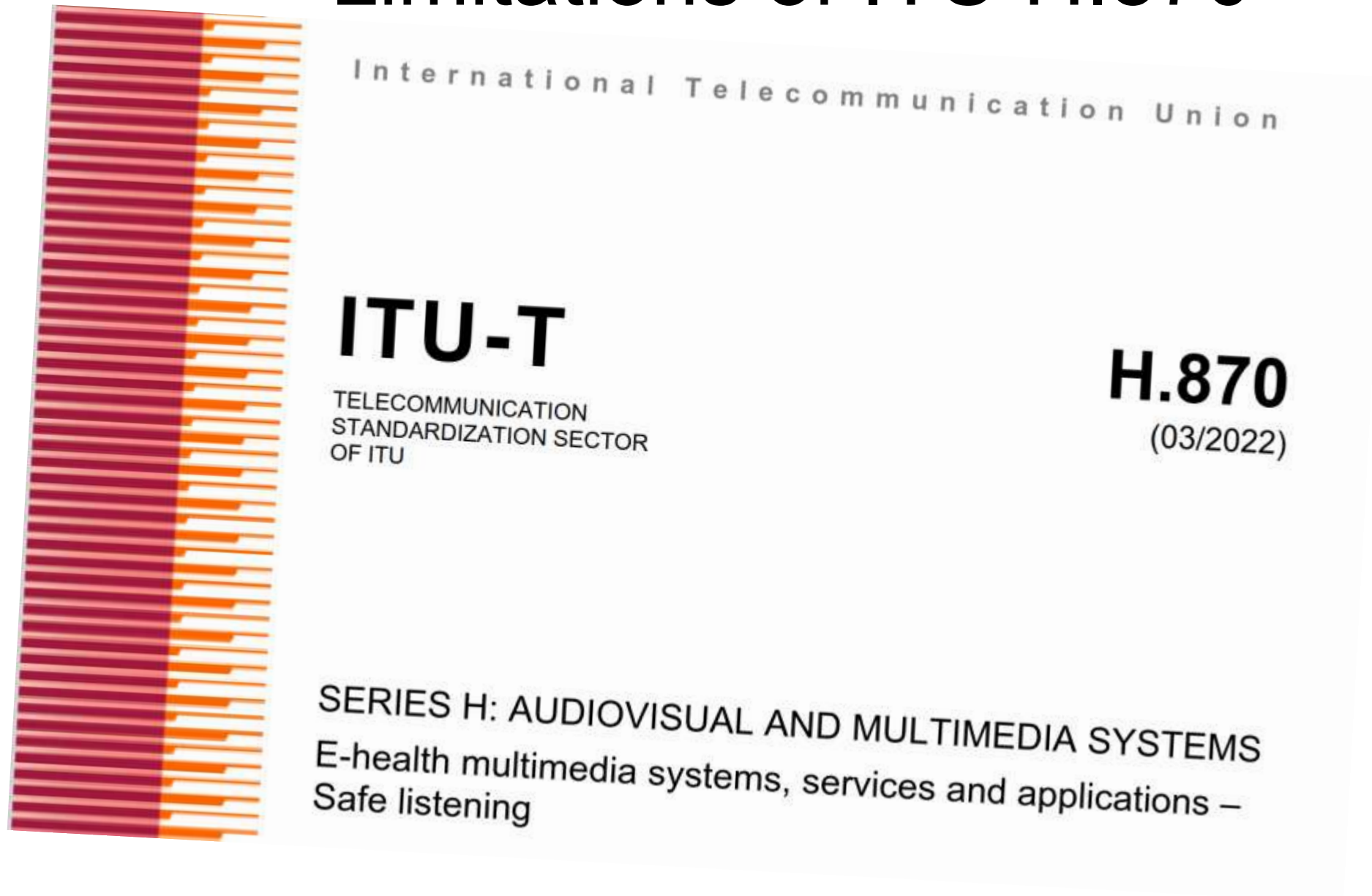
Outline

- Limitations of ITU H.870
- ANSI S1.46 draft standard
 - Source-separated dosimetry in an active hearing protection device
- ITU Q2/21 Proposal
 - Accurate Dosimetry for Close-Fitting Listening Devices

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Limitations of ITU H.870



7.2 Uncertainty in dose estimate

In estimating sound dose there is some uncertainty. Some sources for uncertainties are:

- sound source;
- variation in headphone characteristics of a single model, due to production tolerances;
- variation due to unknown headphone type;
- manufacturing tolerance;
- errors due to incorrect manual selection of headphone type;
- variations in fit to the artificial ear during characterization;
- imperfect relation between artificial ears and real ears;
- imperfect relation between a standardized diffuse-field correction and a variety of human head-related transfer functions;
- variations in fit to the human ears;
- uncertainties in characterization of player characteristics, especially due to non-linear processing in the alternative implementation shown in Figure II.5;
- errors in calculations;
- users' individual susceptibility to sound exposure;
- exposure from other sources.

Since some of these uncertainties are typically several dB, and an error of 3 dB constitutes a 100% dose error, uncertainties of dose estimation can be expected to be hundreds of percent. It is therefore suggested to refrain from signalling "safe" and "green" to the user based on dose readings below a certain limit.

The dose estimation is however relevant in accounting for the general trends:

- higher signal level means higher risk
- longer exposure means higher risk
- the spectral content of the music is accounted for.

Further details on this subject remain for future study.



What about a microphone in the earcanal?



BSR/ASA S1.46-202X

AMERICAN NATIONAL STANDARD

Requirements for tympanic noise level monitoring
devices / tympanic noise dosimeter

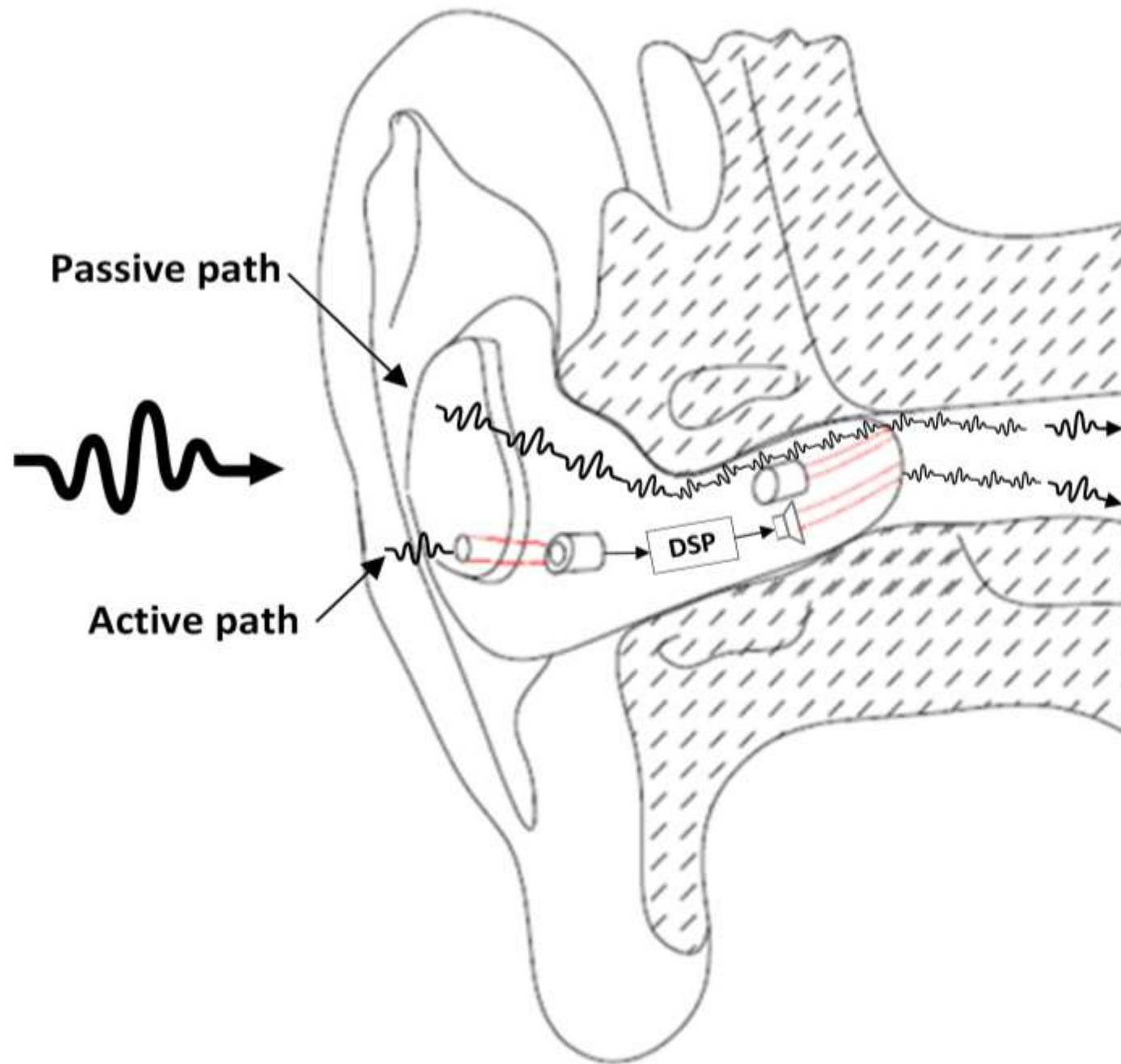
Working Group General Hybrid Meeting

Date: Tuesday Feb 4th 2025 at 1:30-5:00 pm (EST).

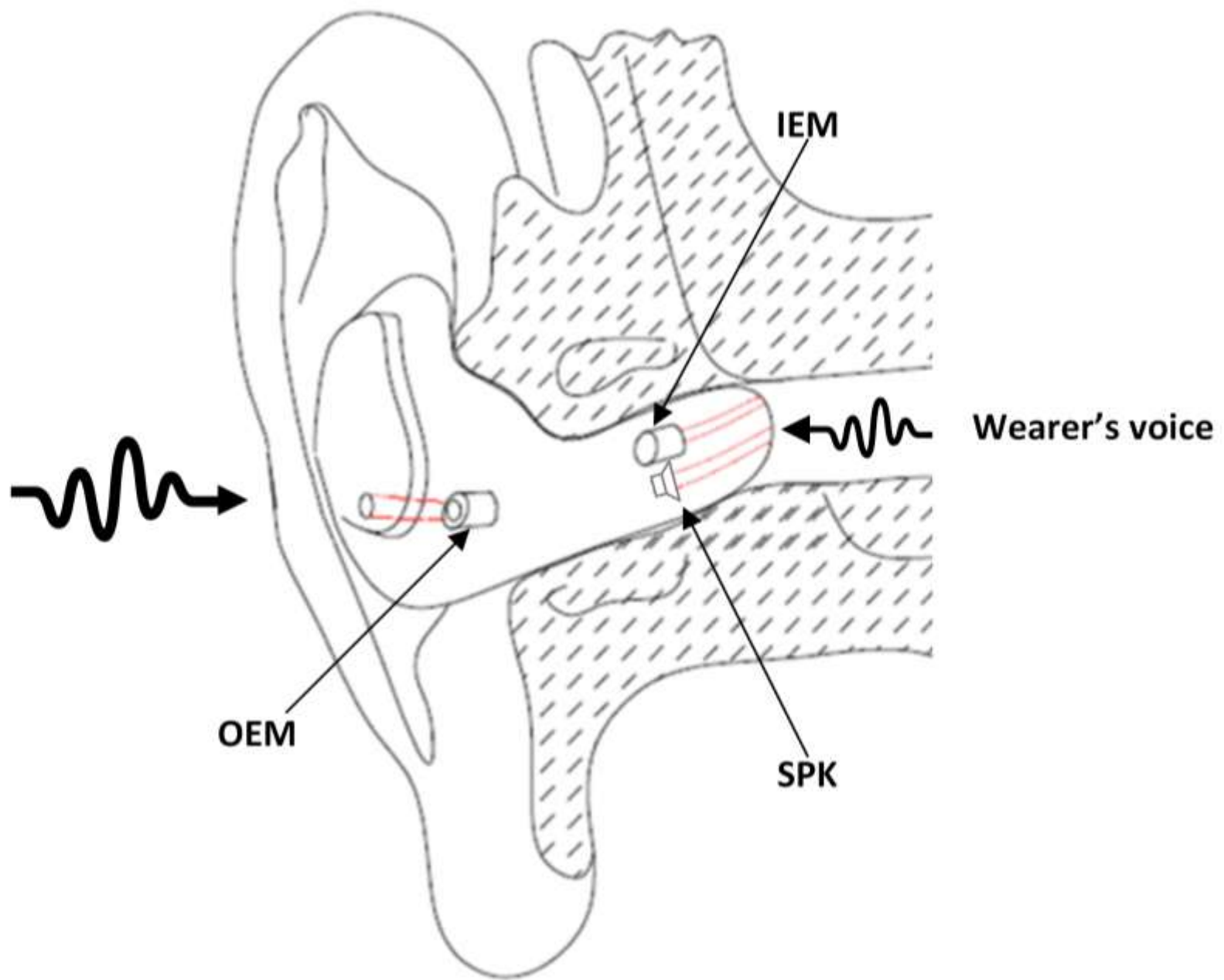
Physical Location: Yellow Topaz room, Charleston Marriott, 170 Lockwood Boulevard, Charleston, SC, USA

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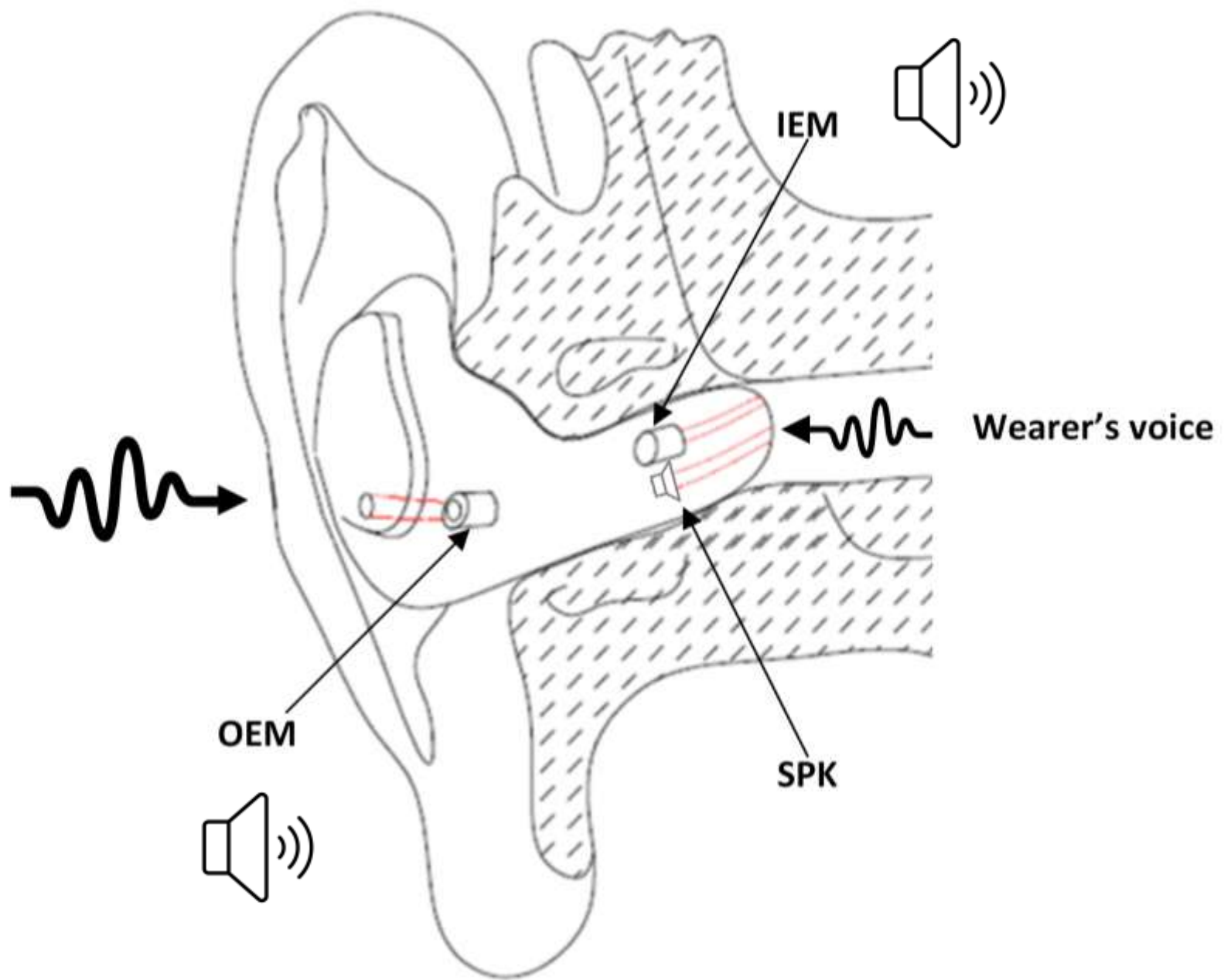
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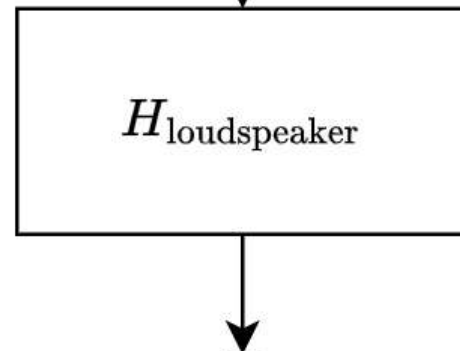
Wearer's voice &
ambient sounds

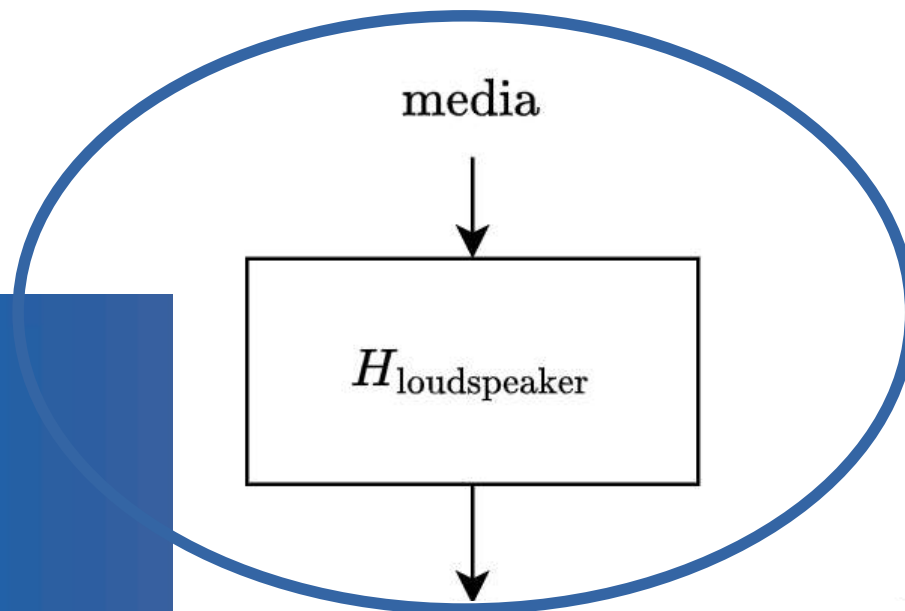


Wearer's voice &
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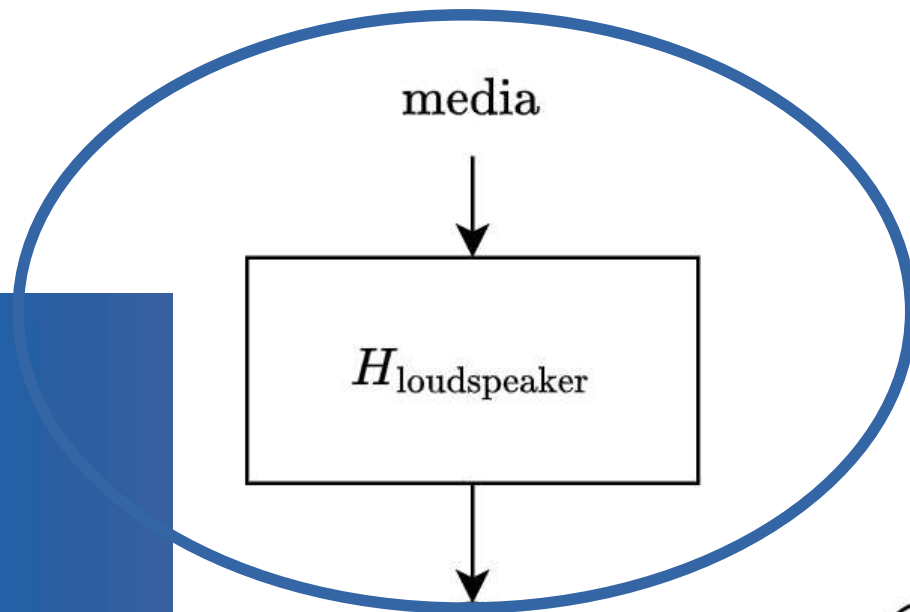
media



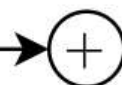


ITU H.870



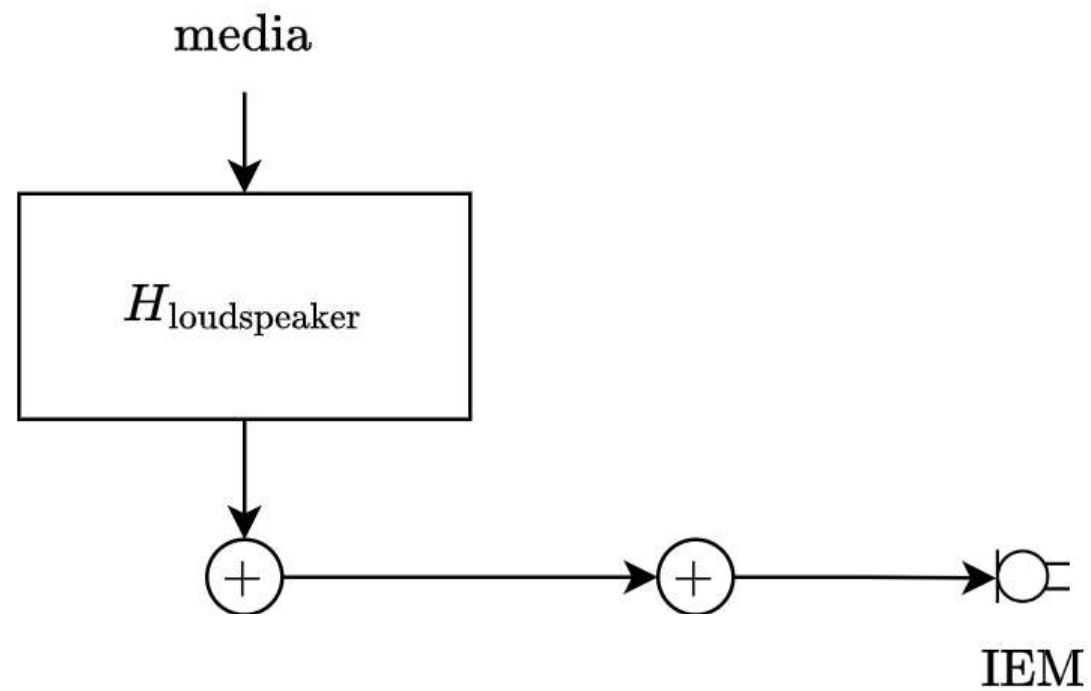


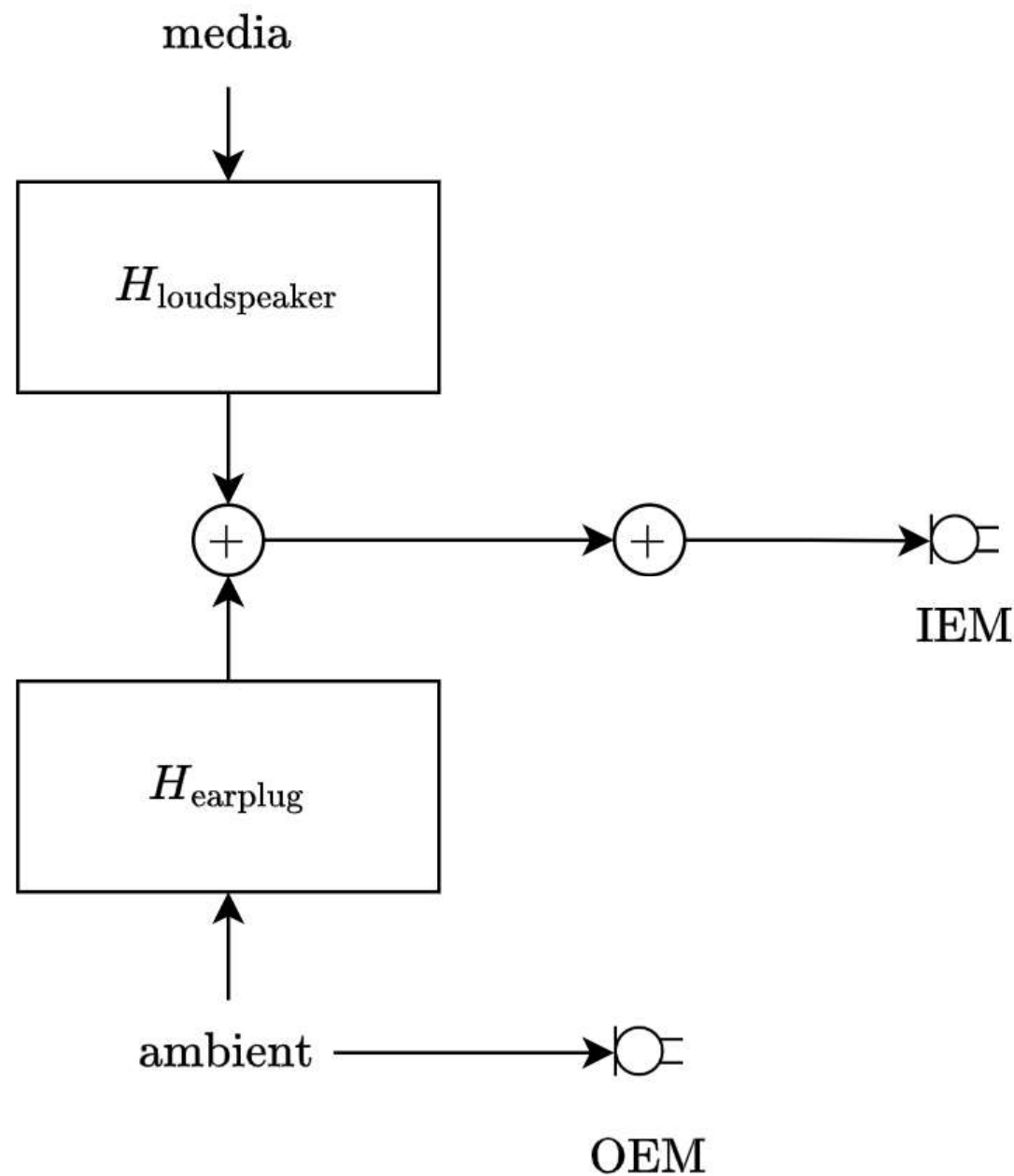
ITU H.870

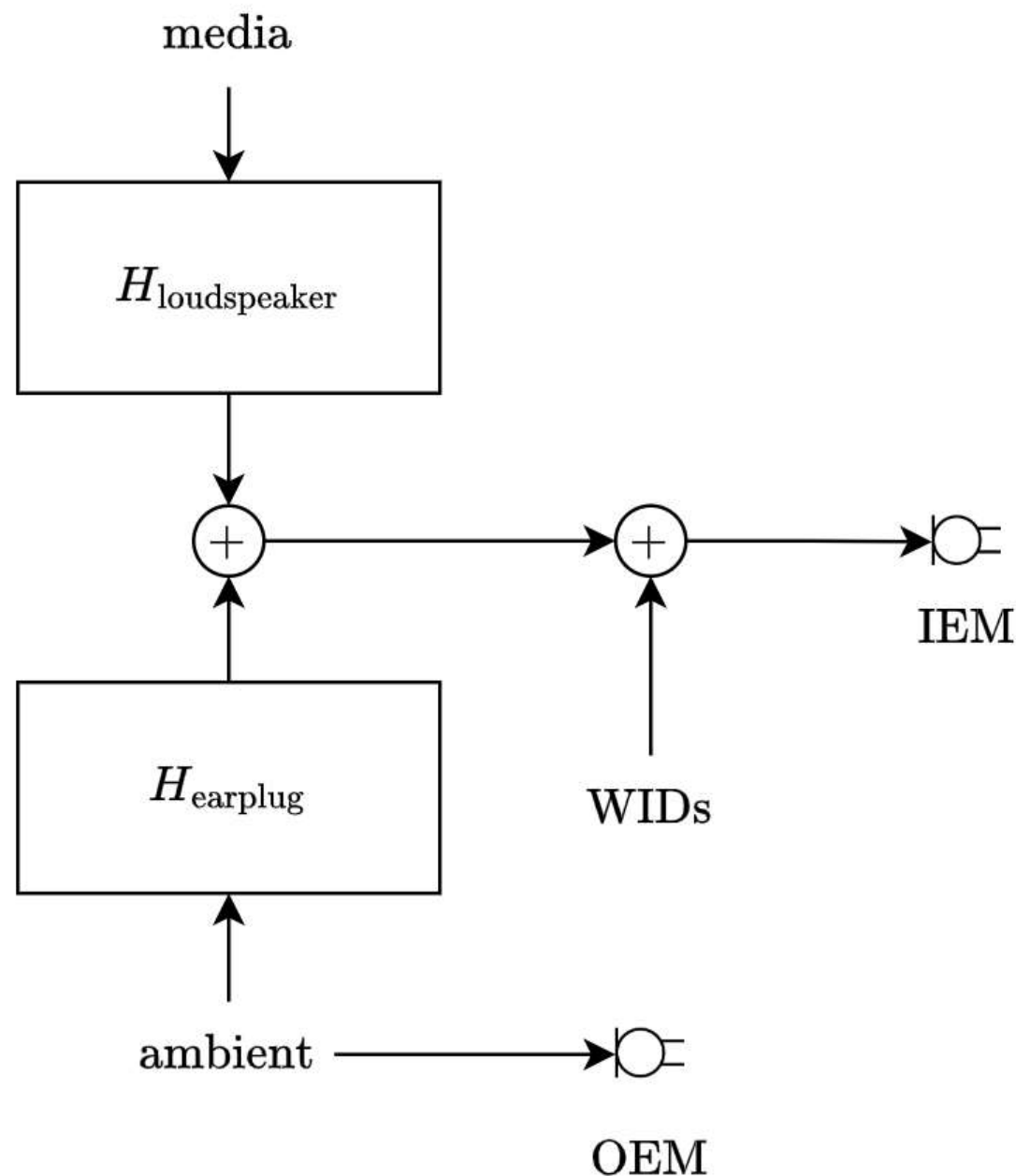


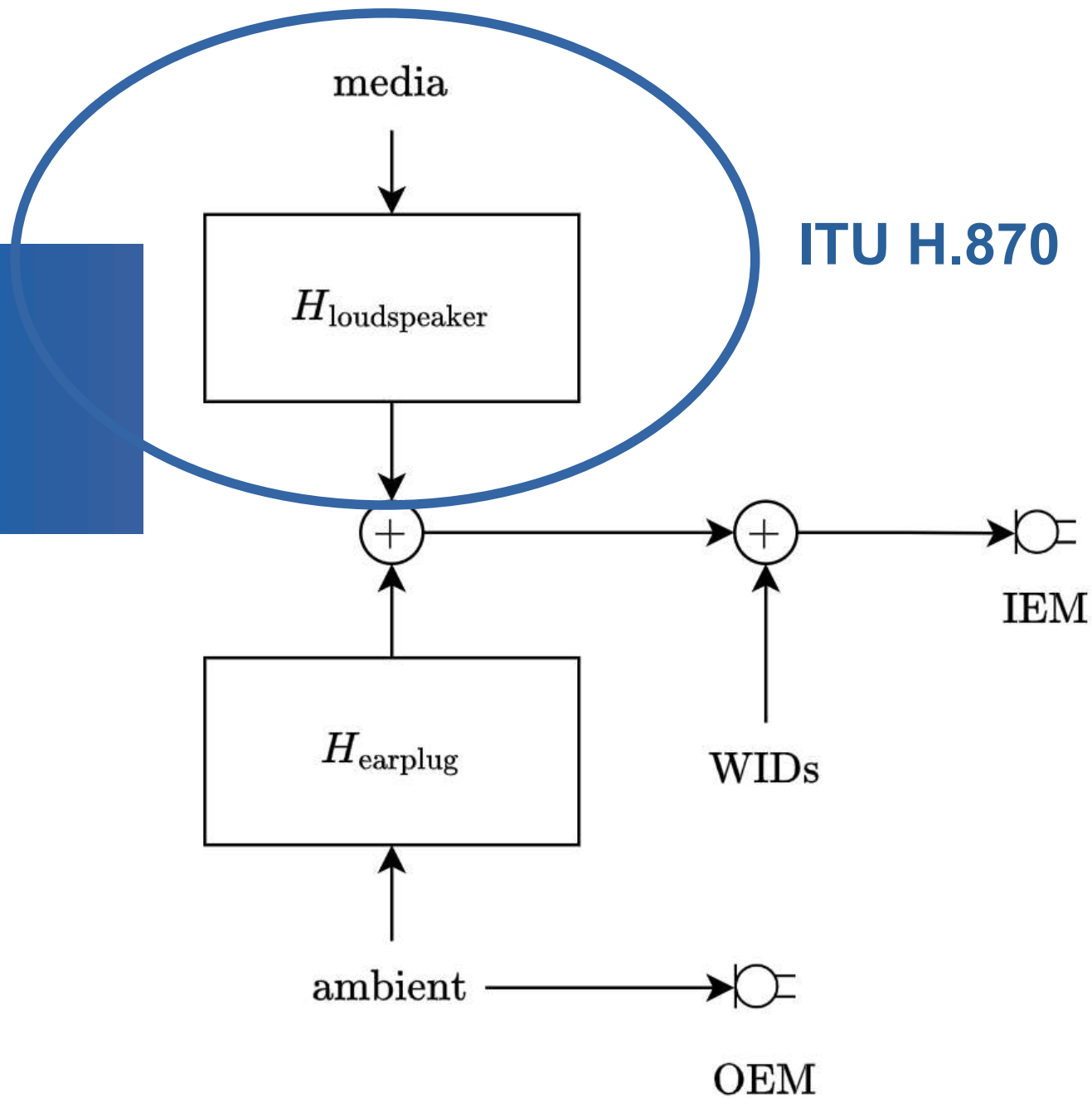
IEM

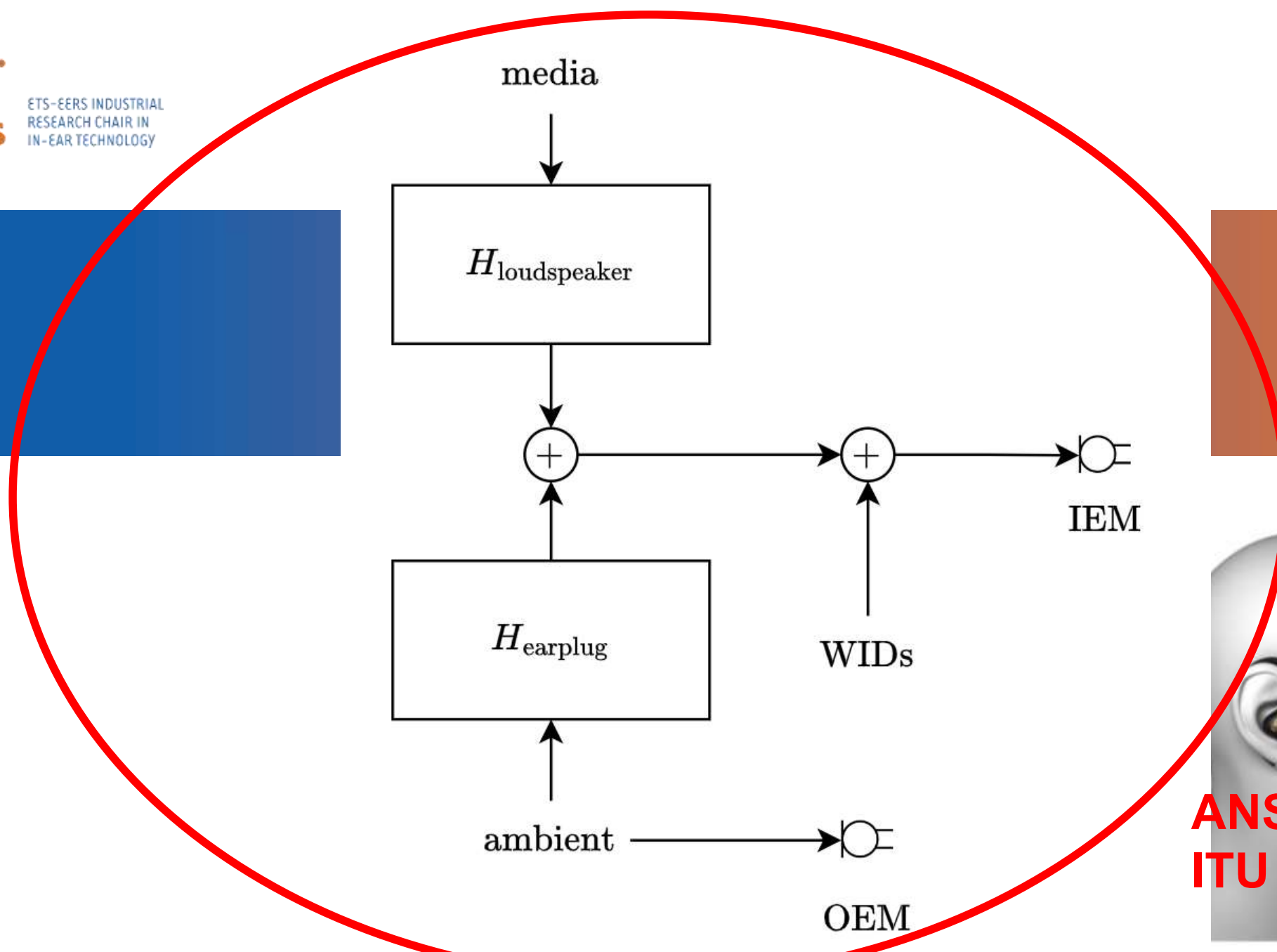












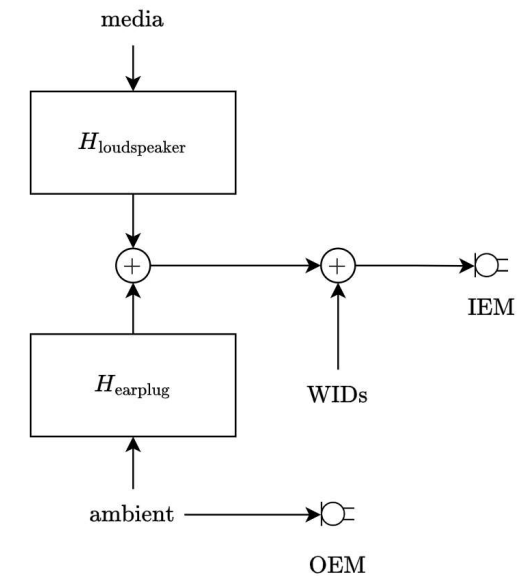
ANSI S1.46-202x
ITU Q2/21

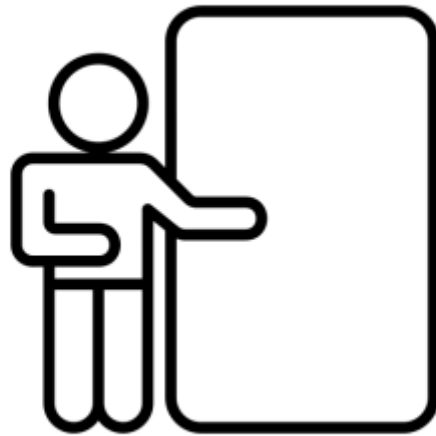


$$x_{\text{playback}}(t) \approx x_{\text{media}} * h_{\text{loudspeaker}}(t)$$

$$x_{\text{ambient}}(t) \approx x_{\text{OEM}} * h_{\text{earplug}}(t)$$

$$P_{\text{WID}} = P_{\text{IEM}} - (P_{\text{ambient}} + P_{\text{playback}})$$





ANSI S1.46-202x
Online Fall 2025 meeting

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ITU Q2/21 Proposal

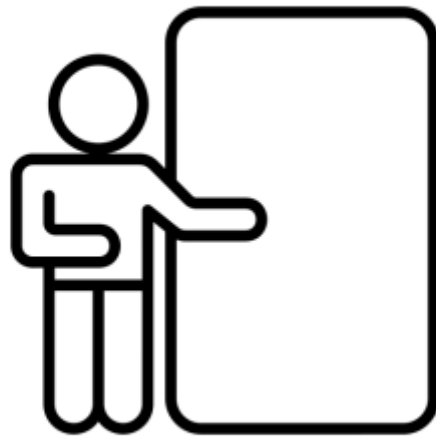
- Uncertainty budgets for all components
 - From literature (for ITU)
 - From measurements conducted per ANSI S1.46-202x

ITU Q2/21 Proposal

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- Overall “conservative” exposure level

ITU Q2/21 Proposal

- Uncertainty budgets for all components
 - From literature (for ITU)
 - From measurements conducted per ANSI S1.46-202x
- Overall “conservative” exposure level
- Simple and clear uncertainty statement, like:
 - “With 84% confidence, your weekly exposure level was below 80 dBA”



ITU Q2/21 session “H.SF-AD”
on Thursday 14h-17h



Jérémie Voix



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PARTENAIRES DE LA CHAIRE



prompt

COLLABORATEURS



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