Hearing loss - the silent thief of cognition: international, regional and national regulations of the wireless part

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The Author expresses his own views, not binding ITU

Keynote lecture (08:50 - 09:20)

The Israel Society for Auditory Research A 'left-alone' hearing loss - the silent thief of cognition. The 2022 Meeting.
Oct. 21, 2022; 08:00 -14:00; the Council for a Beautiful Israel Center, Rokach Blvd 80, Tel Aviv-Yafo

Acknowledgments to Andrea J Saks Chair International Telecommunications Specialist for the Deaf ITU JCA-AHF (Joint Coordinating Activity on Accessibility and Human Factors) JCA-AHF Representative to IGF DCAD (Dynamic Coalition on Accessibility and Disability), and Brian Copsey see 'Safe Listening! How I Enjoy My Music and Avoid a Silent Future (ITU and WHO). ATDI contribution to ITU JCA-AHF

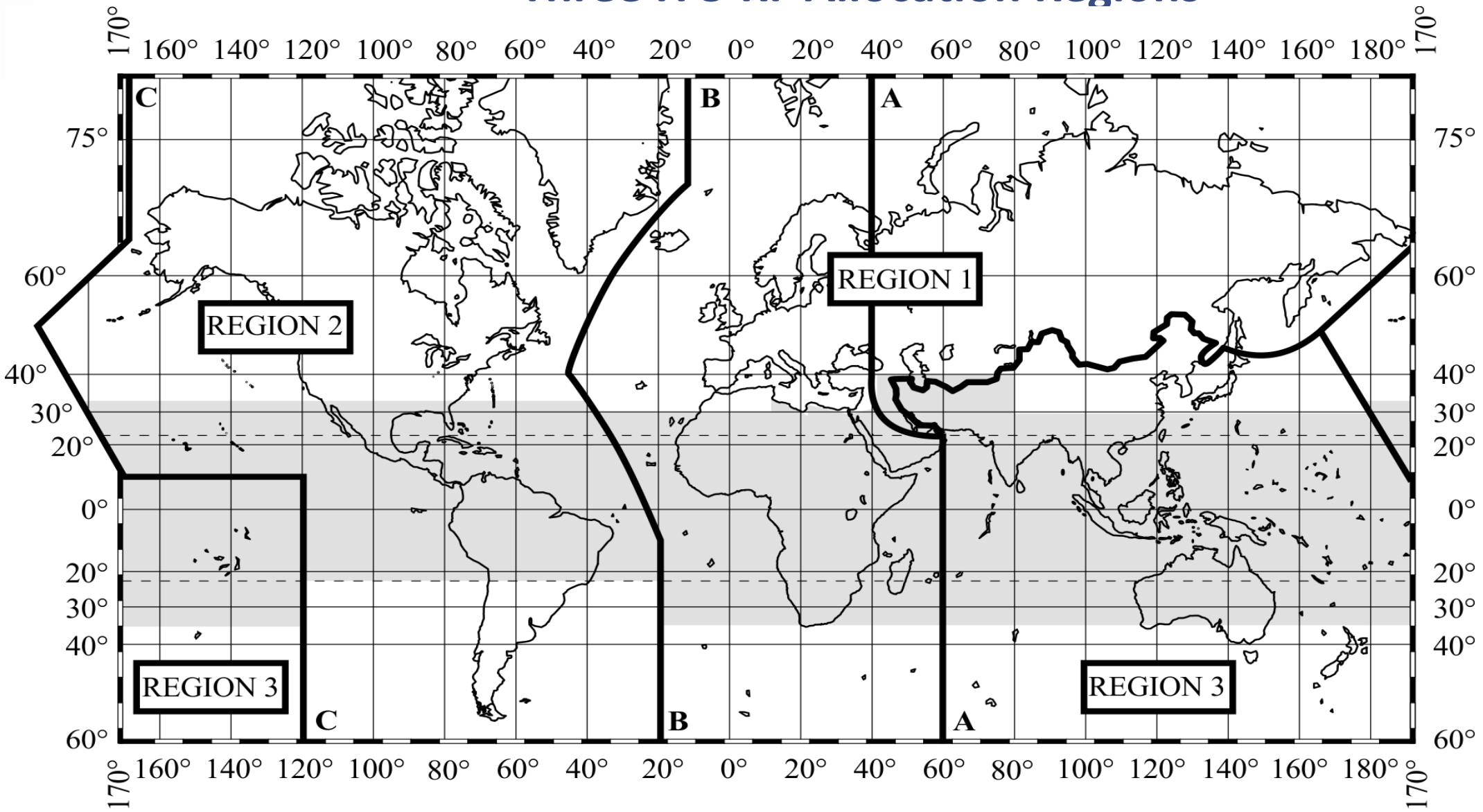
Click here to retrieve this presentation and at ITU Web
https://www.itu.int/en/ITU-T/jca/ahf/Documents/docs-2022/Oct/JCA-AHF-Doc477.zip

The Israel Society for Auditory Research
On Hearing Loss, Hearing Rehabilitation, and their Effect on the Individual's Life

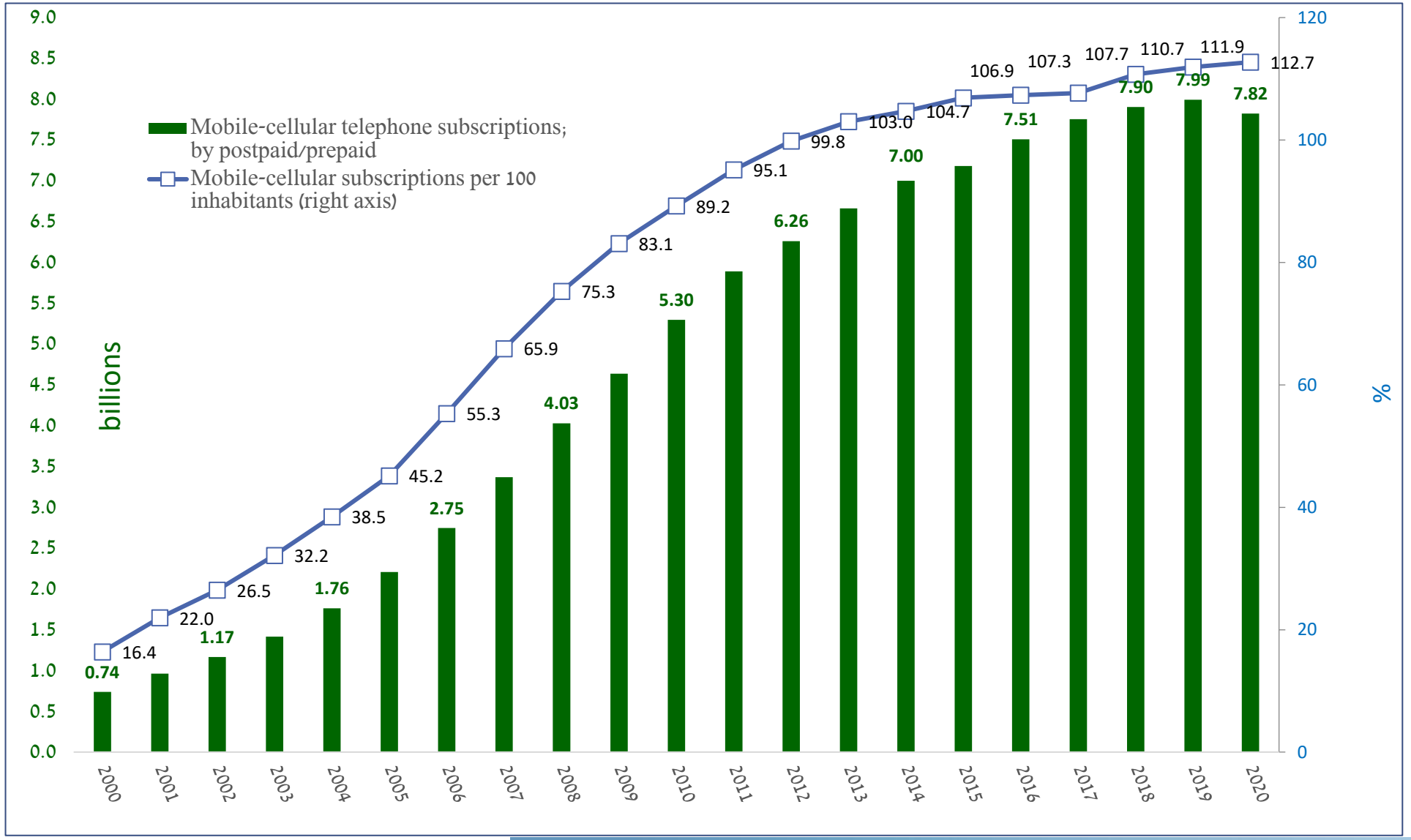
ITU ruling to reduce discrimination against persons with disabilities and those with specific needs, decrease barriers to wireless connections for hearing aids and medical devices

1. The International Telecommunication Union (ITU) is the United Nations specialized agency for information and communication technologies (ICTs)
2. **Founded in 1865**, oldest international organization, to facilitate international connectivity in communications networks
3. ITU allocates global radio spectrum and satellite orbits, develops the technical standards that ensure networks and technologies seamlessly interconnect, and strives to improve access to information and communication technologies to underserved communities worldwide
4. There are three ITU Sectors: Radio (R), Development (D), and Standardization (T)
5. Every time you make a phone call via the mobile, access the Internet or send an email, you are benefitting from the work of ITU
6. Efforts to reduce digital-divide: inequality around access to information and resources

Three ITU RF Allocation Regions



Cellular telephone subscription (billion) and cellular per 100 inhabitant, 2000-2019



Three ITU RF Allocation at 890-942 MHz

Allocation to services (only allocations related to hearing aids are depicted)		
Region 1	**Region 2**	**Region 3**
890-942 FIXED MOBILE except aeronautical mobile 5.317A BROADCASTING 5.322 Radiolocation	**902-928** FIXED Mobile except aeronautical mobile 5.150 5.325 5.326 Note: 5.150: 902-928 MHz in Region 2 are also designated for industrial, scientific and medical (ISM) applications. Radiocommunication services operating within these bands must accept harmful interference which may be caused by these applications.	**890-942** FIXED MOBILE 5.317A BROADCASTING Radiolocation

1. The European (Region 1) uplink of GSM, UMTS, 5G operating 880-915 MHz interfere American (Region 2) hearing aids at 902-925 MHz
2. Will hearing aids operate as licensed protected Mobile, instead of unlicensed- unprotected (FCC Part 15 devices)?

ITU Plenipotentiary Resolution on accessibility for persons with disabilities, and ruling to reduce their discrimination

- **ITU Plenipotentiary (PP) Resolution 175** 'Telecommunication/information and communication technology accessibility for persons with disabilities and persons with specific needs' PP Bucharest Oct. 2022
  - *"Recognizing* a) the ongoing work of ITU R, ITU T and ITU D on telecommunication/ ICT accessibility for persons with disabilities and persons with specific needs, including JCA-AHF"
  - "*Resolves* to maximize use of accessible webcasting facilities, captioning (including transcripts of the captioning) and sign language and, if possible, within the financial and technical limitations of the Union, provide these services in all six official languages of the Union both during and after the conclusion of any session when convening conferences, assemblies and meetings of the Union"…
  - "*Invites* to encourage the international community to make voluntary contributions to the special trust fund set up by ITU to support activities relating to the implementation of this resolution."
  - Encourages greater engagement of persons with disabilities, persons with specific needs. The revised Rev. 175 also calls for improvements to organizational culture and relevant internal systems to ensure equal opportunities in the recruitment and retention process. The resolution encourages continuity in workshops and management training to help ITU staff understand and champion accessibility and disability inclusion

ITU D and R Resolutions on accessibility for persons with disabilities and ruling to reduce their discrimination

1. ITU-D Resolution 58 (Rev. Kigali, 2022) Telecommunication/information and communication technology accessibility for persons with disabilities and persons with specific needs
2. ITU-D Question 7/1- Access to telecommunication/ICT services by persons with disabilities and other persons with specific needs. The 2021 Report
3. ITU-R Resolution 67 Telecommunication/ICT accessibility for persons with disabilities

ITU-T Resolutions on accessibility for persons with disabilities and ruling to reduce their discrimination

- ITU-T 2022 Resolution 70– Telecommunication/information and communication technology accessibility for persons with disabilities and persons with specific needs
- *resolves* 3: that ITU-T employ the technical papers FSTP-AM "Guidelines for accessible meetings" and FSTP-ACC-RemPart "Guidelines for supporting remote participation for all", as appropriate, to make it possible for persons with disabilities to be able to attend ITU meetings and events

On 17 October 2022 at ITU-T Study Group 5 opening ceremonial plenary meeting, I asked to include automatic or manual captioning for persons with disabilities at the next SG 5 Plenary

Two ITU-R Study Group 6 (Broadcasting Service) Questions

1. Question ITU-R 144/6: Use of Artificial Intelligence (AI) for broadcasting
   - Access service for people with disabilities
   - Automated summarization
   - Audio and visual quality evaluation
   - Early warning of emergencies, disaster prevention and relief
   - Language translation
   - Text-voice/voice-text translation
2. Question 145/6: Systems for enabling access to broadcast and cooperative media for persons with disabilities ;
   - Services will allow persons with disabilities to enjoy access to the media equivalent to those without disabilities

Situation: Radio and T-COIL, see Safe Listening!

1. Assistive Listening Devices (ALD) use radio spectrum to provide a link between the hearing aid and a microphone held by a speaker (e.g. teacher), or between:
   1) mobile phone and hearing aid (Bluetooth protocol)
   2) TV and hearing aid
2. The majority of these systems use the 2.4-2.483 GHz spectrum which they share with WiFi and thousands of other systems near them
3. Radio aids have the potential to greatly enhance the listening experience of deaf children by improving the audibility of speech in situations where distance, background noise and reverberation make listening difficult
4. T-Coil is an magnetic field system using a wire loop to generate inductive currents which are picked up by a receiver in the hearing aid
5. The majority of hearing Aids contain a T-Coil receiver

T-Coil Use; Audio frequency induction loop systems, see Safe Listening!

1. Audio frequency induction loop systems (AFILS) are installed in places of worship, places of entertainment, places of education, ticket booths and service counters etc., as well as in domestic situations, providing benefits to users with impaired hearing.
2. AFILS provide an audio frequency magnetic field that couples with a receiving coil (Telecoil) fitted in hearing aids, cochlear implants and loop receiving and testing devices. This magnetic field is generated in a wire loop that is fed by an audio frequency amplifier which is capable of driving current through the 'induction loop' which, in turn, is fed from external signals such as those generated by microphones, audio-visual equipment and musical instruments.
3. AFILS operate below 9 kHz (so, the Out of Band emission of 20 kHz may interfere) have a very limited range (some few metres) and there is no known evidence of interference with radio equipment

Possible Problems from Wireless Power Transmission, see Safe Listening!

1. Wireless Power Transmission (WPT) allows charging by transferring of electromagnetic power without the use of a cable; as example: non-beam WPT charging electrical vehicle (EV), WPT-EV
2. The lowest WPT-EV operates 20 kHz, different from 10 kHz T-Coil
3. But, WPT-EV are close neighbours. Many bus stops have miniature wire loops to inform those with hearing aids of the Bus timetable or other information. A heavy-duty electric Bus (~70 kW) or vehicle require a high charging current
4. When EV charging is switched on and off there may be a large transient pulse which will affect the T-coil loop and receiver, producing a very large click or splat in the users ear

Radio Interruptions to ALD at 863-865 MHz & 2.4 GHz; see Safe Listening!

1. ALDs use a number of radio frequencies, the prime frequency band is the 2,400-2,483 MHz which is the worldwide spectrum available for the Short Range Devices- ALDs, WiFi, Bluetooth and many more.
2. The adjacent band 2,300-2,400 MHz is allocated for mobile phones. Dependant upon the proximity of a mobile phone (1-5 meter) using this spectrum may cause either interference or loss of audio
3. The 863-865MHz band is used for cordless-audio within Europe, this is home to many ALD systems. See Dr H.B Karcher has carried out testing with cordless headphones(very similar to ALDs) and the link below provides access to his work. See Dr H.B Karcher. Mobile allocations below 862 MHz have produced similar proximity problems to those at 2.4 GHz

with Prof. Michal Luntz
Director of Ear and Hearing Center

Typical photos Oct 21, 2022; The Council for a Beautiful Israel Center, Rokach Blvd 80, Tel Aviv-Yafo

The three ITU Regions

Audience looking to the first slide