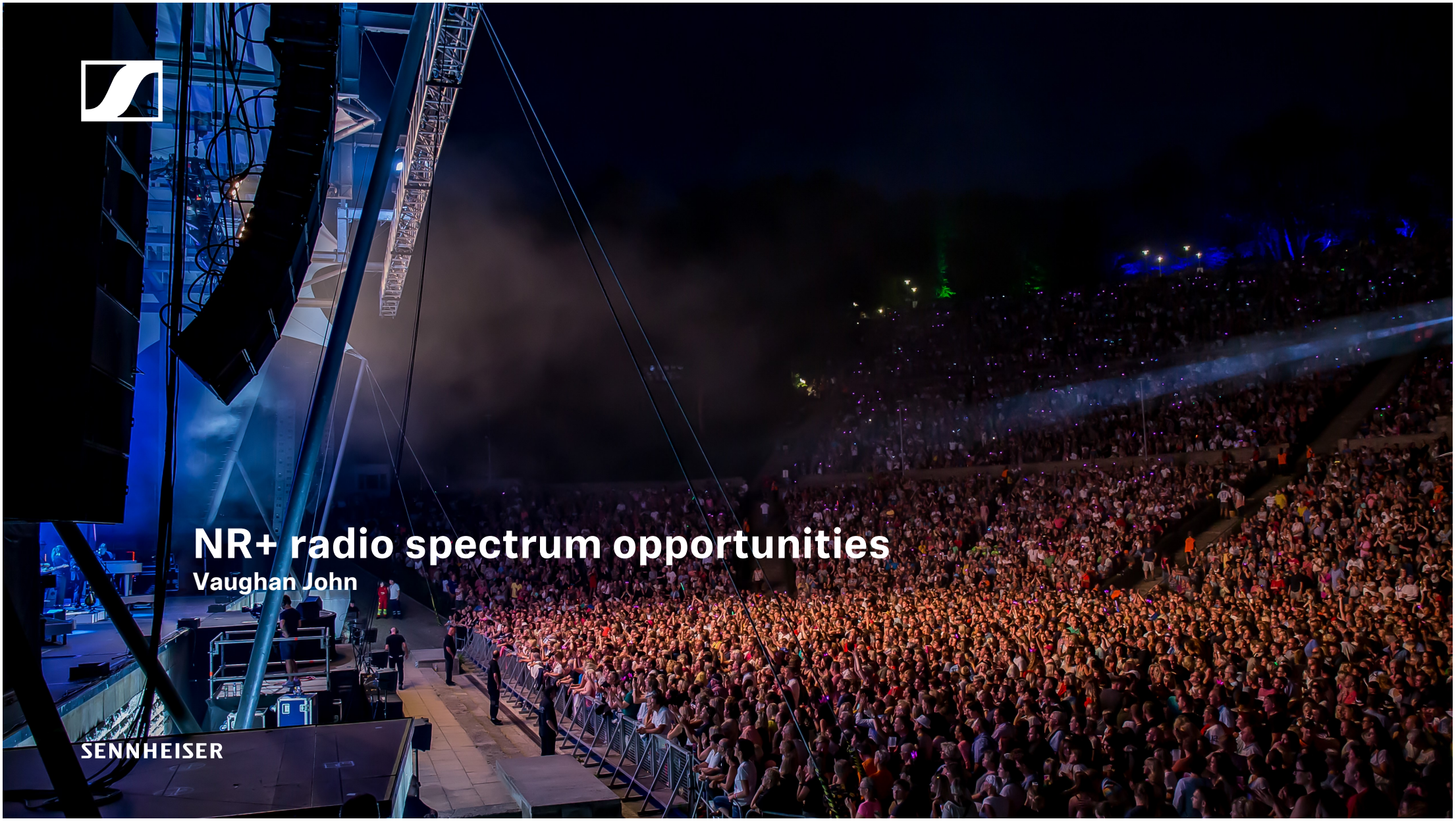
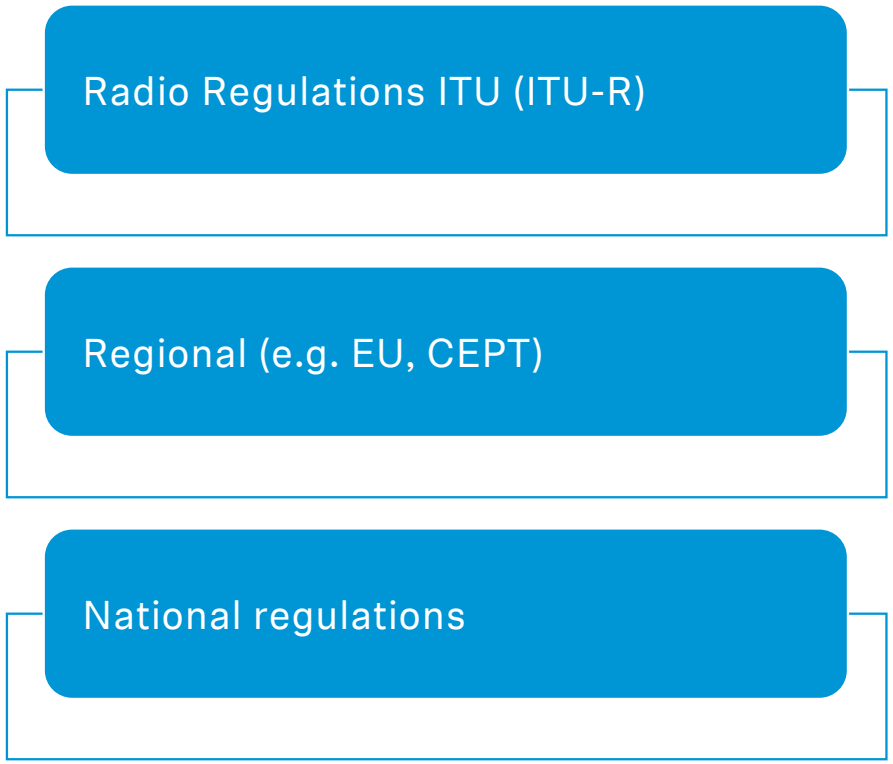

NR+ radio spectrum opportunities
Vaughan John
SENNHEISER

Regulatory overview



- The ITU Radio Regulations govern global radio communication services and are updated regularly to reflect technological advancements and international agreements
- To facilitate coordination, harmonisation, and create a unified framework across its member states e.g. EC Harmonising Decisions and ECC Decisions/Recommendations
- Manage and authorise access to spectrum in accordance with their national policies and priorities while respecting the international treaties and agreements

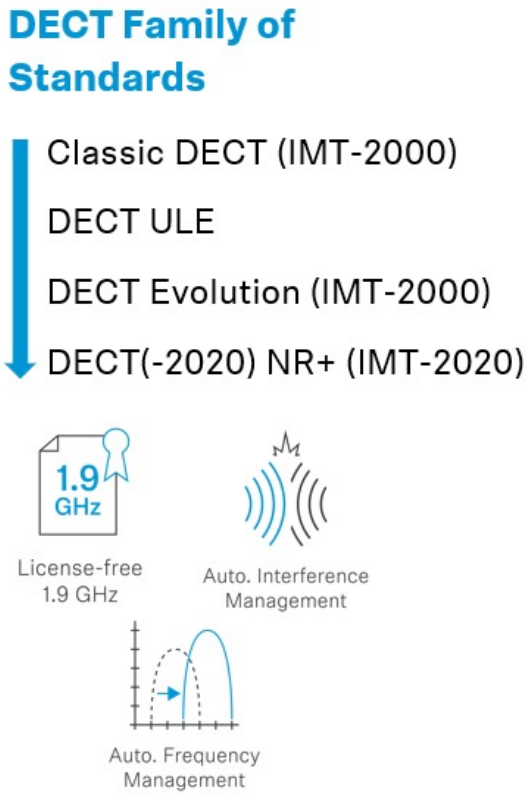
- To influence spectrum management decisions DECT stakeholders need to be active at all levels

DECT-2020 NR

- Is an application of the Mobile Service (“A radiocommunication service between mobile and land stations, or between mobile stations”)
- DECT is an IMT technology and NR+ is a recognised 5G (IMT-2020) technology 
- In theory, could operate in any frequency band allocated to the Mobile Service and/or identified for IMT. However,...
  - Candidate bands already assigned to other applications e.g. public mobile, GSM-R, FRMCS
  - Regional and national technical and regulatory conditions limit opportunities (e.g. 450 MHz is FDD and DECT is TDD)
  - Policy makers equate 5G with 3GPP technology only (and 3GPP is keen to promote this view)
- DECT is ‘invisible’ to regulators
  - General authorisation – regulators never have to deal with DECT
  - Misunderstanding that DECT is ‘just’ indoor cordless audio

DECT NR+ Regulatory Status

- Europe
  - 1880 to 1900 MHz [20 MHz] dedicated to DECT Technologies
  - 1910 to 1920 MHz [10 MHz] SRD employing DECT channel access mechanism
  - 3.8 to 4.2 GHz, under study
- Middle East, Africa
  - Most Middle East and African countries follow Europe: 1880-1900 MHz [20 MHz]
- Americas
  - US/Canada: UPCS Band 1920 to1930 MHz [10 MHz]
  - Brazil: 1910 to 1920 MHz [10 MHz]
  - Most Latin Americas: 1910 to 1930 MHz [20 MHz]
- Asia
  - Australia: 1880 to 1900 MHz [20 MHz] + 1900 to 1920 MHz [20 MHz]
  - Japan: 1894 to 1905 MHz [11 MHz]
  - S. Korea: 1785-1792 MHz [7 MHz]
  - Most others: 1880 to 1900 MHz [20 MHz]
  - Indonesia is reconsidering DECT due to DECT NR+



Opportunities to expand access to spectrum

- ETSI TR 103 943 (SRDoc: DECT-2020 NR technology operating in frequency bands below 6 GHz) lists frequency bands that support NR+
- Draft ETSI TR 103 897 (Study on radio spectrum and related technical requirements for DECT-2020) expands on this (see table)

Would need to meet existing regulations and applicable standards

Table 4.1-1: Operating band numbering (based on TS 103 636-2)

Band number	Operating band (MHz)	Comment
1	1 880 to 1 900	DECT Core Band
2	1 900 to 1 920	DECT Expansion Band
3	2 400 to 2 483,5	2,4 GHz ISM Band
4	902 to 928	900 MHz ISM Band
5	450 to 470	PMR, LTE450, IoT
6	698 to 806	IMT
7	716 to 728	LTE Band 28A
8	1 432 to 1 517	L-Band
9	1 920 to 1 930	UPCS Band
10	2 010 to 2 025	LTE Band 34(Asia)
11	2 300 to 2 400	Wireless Broadband
12	2 500 to 2 620	LTE Bands 7,38,41
13	3 300 to 3 400	5G NR midband
14	3 400 to 3 600	C-Band
15	3 600 to 3 700	C-Band extension
16	4 800 to 4 990	Wi-Fi 6E extension, n79 band
17	5 725 to 5 875	ISM band
18	5 150 to 5 350	RLAN band, radar sharing
19	5 470 to 5 725	RLAN band, radar sharing
20	3 800 to 4 200	5G Campus network band
21	3 700 to 3 800	5G Campus network band, e.g. Germany
22	1 910 to 1 930	UPCS band
Missing	3 550 to 3 700	CBRS band
Missing	1 910 to 1 920	DECT SRD Band

Opportunities to expand access to spectrum: 3.8-4.2 GHz band

- Long-standing demand for private, local, broadband connectivity – access to spectrum is the challenge
- 3.8-4.2 GHz identified for low/medium power wireless broadband networks (WBB LMP) – ECC Decision (24)01
- European Commission to harmonise the band for WBB LMP in the EU in line with ECC Decision technical conditions

Table 1: Maximum in-block e.i.r.p. per cell for base stations operating in 3800-4200 MHz

Category	e.i.r.p. per cell (Note1 and Note 2)
Low power base station	≤ 24 dBm/channel for BW ≤ 20 MHz ≤ 18 dBm/5 MHz for BW > 20 MHz
Medium power base station	≤ 44 dBm/channel for BW ≤ 20 MHz ≤ 38 dBm/5MHz for BW > 20 MHz

Note 1: In a multi-sector site, the value per 'cell' corresponds to the value for one of the sectors.

Note 2: Higher e.i.r.p. levels may be authorised by national administrations in exceptional and duly justified cases, provided that protection of FSS receiving earth stations and FS links (where appropriate nationally) in the band as well as MFCN below 3.8 GHz and radio altimeters above 4.2 GHz is ensured, taking into account their future development, including in the neighbouring countries. Coverage shall remain local, i.e. no nationwide networks.

A1.5 WBB LMP TERMINAL IN-BLOCK REQUIREMENTS

- Maximum terminal station power: 28 dBm t.r.p. (including a 2 dB tolerance);
- For fixed terminals an in-block e.i.r.p. limit may be defined at national level, provided that protection of in-band and adjacent band incumbent services and cross-border obligations are fulfilled;
- Transmission power control is mandatory and shall be activated.

- Mobile operators see private 5G as a high-growth, strategic opportunity to monetize 5G beyond consumer services
- Regulatory conditions reflect 3GPP technology – and contradicts the principle of technical neutrality
- DECT community needs to be more vocal at a national and international level to promote DECT NR+ and challenge regulators

NR+ in IMT duplex gaps for audio PMSE

- Sennheiser is exploring the potential of NR+ for wireless microphones in the IMT duplex gaps as a 2 or 4 MHz WMAS (Wireless Multichannel Audio System)
- Existing technical conditions give sufficient flexibility although compliance with the relevant out of band limits and DECT operating bands need to be addressed

Summary of Annex 10 of ERC Recommendation 70-03 (Radio microphone applications including ALDs and personal cordless audio devices)

Frequency band	Power	Modulation / occupied bandwidth	Notes
733-757.5 MHz (DECT band 6)	**20 mW e.i.r.p. / 100 mW e.i.r.p.**	**Not specified**	**Radio microphones. On a tuning range basis. Individual licence may be required. 100 mW restricted to body-worn equipment**
821.5-826 MHz	20 mW e.i.r.p. / 100 mW e.i.r.p.	Not specified	Radio microphones. Individual licence may be required. 100 mW restricted to body-worn equipment
826-832 MHz	100 mW e.i.r.p.	Not specified	Radio microphones. Individual licence may be required
1785-1805 MHz	**20 mW e.i.r.p. / 50 mW e.i.r.p.**	**Not specified**	**Radio microphones. Individual licence may be required. 50 mW restricted to body-worn equipment or equipment implementing Spectrum Scanning Procedure (SSP)**

Summary

- Ongoing engagement in FM60 (developing the ECC Recommendations on the 3.8-4.2 GHz band) is vital so that technical and regulatory conditions are technology neutral
- Ongoing work in TC DECT on radio spectrum and related technical requirements for DECT-2020 NR
- Promote DECT as a technology ideally suited for private broadband connectivity across a range of sectors
- What can you do?
  - Lobby on behalf of DECT, particularly with national regulators
  - Follow and participate in international spectrum discussions
  - Test and demonstrate DECT e.g. DECT sharing in bands already in use, such as 1900-1910 MHz for FRMCS

The future of wireless audio.