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HELLENIC TELECOMMUNICATIONS & POST COMMISSION

Spectrum Bands for 5G: Current status of technical work in ECC PT1 and EETT

Session 5: Spectrum Issues Related to 5G

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Mobile Bands in Europe – Technical Conditions for 5G

Bands already suitable for 5G use

- **700 MHz** (694-790 MHz, 2x30 MHz FDD +20 MHz SDL, ECC Decision (15)01)
- **800 MHz** (790-862 MHz, 2x30 MHz FDD, ECC Decision (09)01)
- **1.5 GHz** (1427-1517 MHz, 90 MHz SDL, ECC Decisions (17)06 & (13)03)

Pioneer 5G Bands – New harmonised technical framework

- **3.6 GHz** (3400-3800 MHz, 400 MHz TDD, ECC Decision (11)06)
- **26 GHz** (24.25-27.5 GHz, 3.25 GHz TDD, ECC Decision (18)06)

Bands already harmonised for mobile networks – Under review to develop technical conditions suitable for 5G use

- **900 MHz** (880-915 MHz /925-960 MHz, 2x35 MHz FDD, ECC Decision (06)13)
- **1800 MHz** (1710-1785 MHz/1805-1880 MHz, 2x75 MHz FDD, ECC Decision (06)13)
- **2.1 GHz** (1920-1980 MHz/2110-2170 MHz, 2x60 MHz FDD, ECC Decision (06)01)
- **2.6 GHz** (2500-2690 MHz, 2x70 MHz FDD + 50 MHz TDD, ECC Decision (05)05)

Focus of the presentation

FDD: Frequency Division Duplex (paired frequency arrangements)

SDL: Supplemental Downlink

TDD: Time Division Duplex (unpaired frequency arrangements)

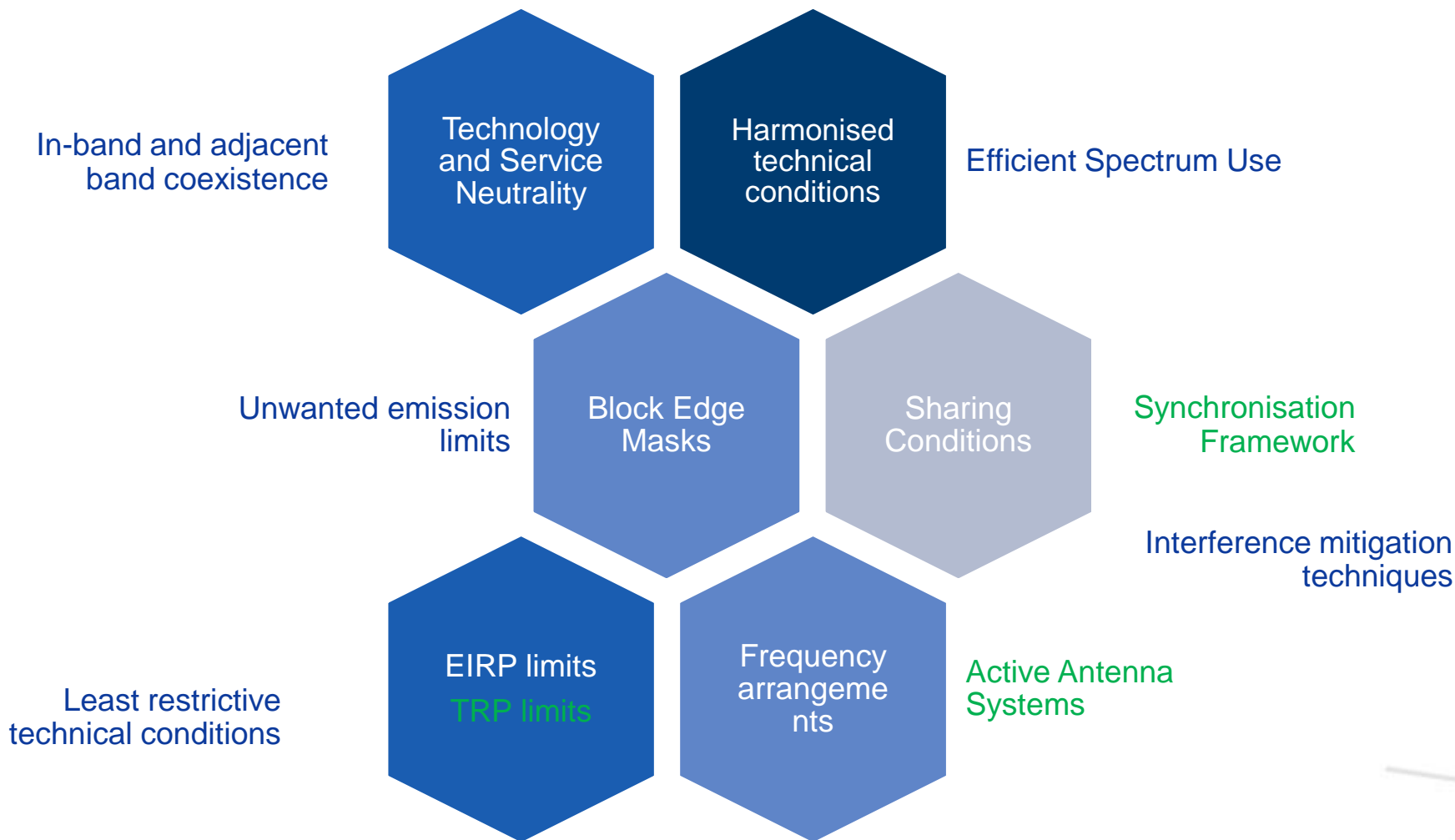
ECC Decisions: Electronic Communications Committee Decisions are measures on significant harmonisation matters, <https://www.ecodocdb.dk/>



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Main Elements of the Harmonised Technical Framework



➤ 3.6 GHz

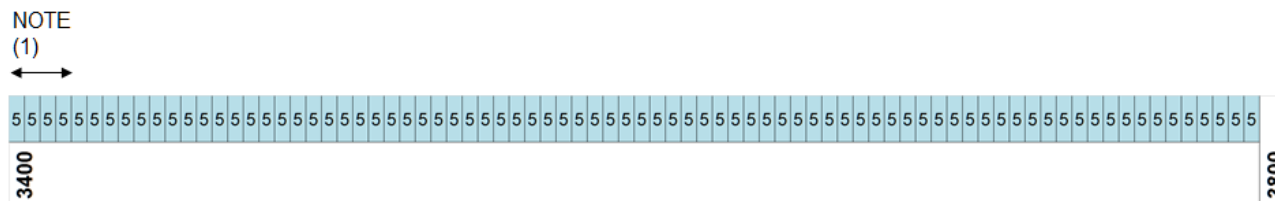
Harmonised Technical Conditions for 5G in 3.4-3.8 GHz (1/2)

ECC PT1 deliverables

- i. **ECC Report 281** “Analysis of the suitability of the regulatory technical conditions for 5G MFCN operation in the 3400-3800 MHz band”, July 2018.
- ii. **CEPT Report 67** “Report A from CEPT to the European Commission in response to the 5G Mandate -Review of the harmonised technical conditions applicable to the 3.4-3.8 GHz ('3.6 GHz') frequency band, July 2018.
- iii. **Revised ECC Decision (11)06** “Harmonised frequency arrangements and least restrictive technical conditions (LRTC) for mobile/fixed communications networks (MFCN) operating in the band 3400-3800 MHz”, planned for October 2018.
- iv. **ECC Report 287** “Guidance on defragmentation of the frequency band 3400-3800 MHz”, planned for October 2018.
- v. **Draft ECC Report** “National synchronisation regulatory framework options in 3400-3800 MHz: a toolbox for coexistence of MFCNs in synchronised, unsynchronised and semi-synchronised operation in 3400-3800 MHz”, expected March 2019.

Harmonised Technical Conditions for 5G in 3.4-3.8 GHz (2/2)

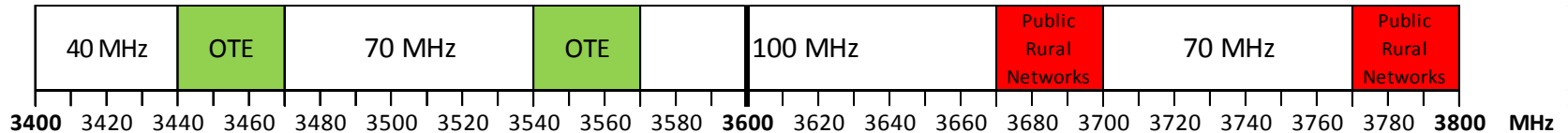
- **Frequency arrangement based on TDD** for the whole range.



- **LRTC-Least Restrictive Technical Conditions (Power limits) for non-AAS and AAS base stations:**
 - for the coexistence between **synchronised** MFCN networks,
 - for the coexistence between **unsynchronised** or **semi-synchronised** MFCN networks (Restrictive)
 - for the **protection of radars** below 3400 MHz (Additional)
 - for the **protection of fixed links and fixed satellite earth stations** above 3800 MHz (Additional)

Technical Work in EETT for the 3400-3800 MHz band

■ Current Status



■ Work done

3rd quarter 2017: EETT's Technical Public Consultation for 3400-3800 MHz

1st quarter 2018: EETT publishes Consultation's Results*

2nd quarter 2018: Bilateral meetings with Incumbent users, Mobile Operators, Manufacturers and Ministry of National Defence.

■ Work to be done

4th quarter 2018: (i) Collaboration with operators/manufacturers for synchronisation issues, (ii) Collaboration with all the involved Stakeholders for defragmentation issues.

2019: (i) Licenses for Pilot Trials, (ii) Work for the development of national license terms for the 3400-3800 MHz award

*www.eett.gr/opencms/opencms/admin/News_new/news_0781.html

➤ 26 GHz

Harmonised Technical Conditions for 5G in 24.25-27.5 GHz (1/2)

ECC PT1 deliverables

- i. ECC Decision (18)06** “Harmonised technical conditions for Mobile/Fixed Communications Networks (MFCN) in the band 24.25-27.5 GHz”, July 2018.
- ii. CEPT Report 68** ““Report B from CEPT to the European Commission in response to the 5G Mandate-Harmonised technical conditions for the 24.25-27.5 GHz ('26 GHz') frequency band”, July 2018.
- iii. Draft ECC Recommendation** “Technical toolkit to support the introduction of 5G while ensuring, in a proportionate way, the use of existing and planned EESS/SRS receiving earth stations in the 26 GHz band and the possibility for future deployment of these earth stations”, expected March 2019.
- iv. Draft ECC Report** “Guidance to administrations for Coexistence between 5G and Fixed Links in the 26 GHz ("Toolbox")”, expected June 2019.
- v. Draft ECC Recommendation** “Guidelines to support the introduction of 5G while ensuring, in a proportionate way, the use of existing and planned FSS transmitting earth stations in the frequency band 24.65-25.25 GHz and the possibility for future deployment of these earth stations”, expected June 2019.
- vi. Draft ECC Report** “Toolbox for the most appropriate synchronisation regulatory framework including coexistence of MFCN in 24.25-27.5 GHz in unsynchronised and semi-synchronised mode”, expected July 2019.

Harmonised Technical Conditions for 5G in 24.25-27.5 GHz (2/2)

- ❑ CEPT decided to harmonise the 24.25-27.5 GHz for Europe for 5G.
- The frequency arrangement is a **TDD arrangement** with a block size of 200 MHz. A 50 MHz option is also provided.
- **Power limits** for coexistence **between MFCN networks in adjacent blocks** assuming **synchronised** operation.
- **Power limits** for coexistence with **MFCN networks in other (non-adjacent) blocks** in the band assuming **synchronised** operation
- **Maximum emissions** into the 23.6-24.0 GHz band to **protect Earth Exploration Satellite Service** stations (passive satellite sensors)
- Conditions applying to the elevation of the main beam from 5G AAS outdoor base stations to **protect receivers of Fixed Satellite and Inter-Satellite Services**

Status of the 24.25-27.5 GHz band in Greece

- **1st quarter 2017:** EETT's Auction for the 24.5-26.5 GHz band.
 - ➔ 3 Spectrum Rights of Use were granted to Operators Cosmote, Vodafone and Wind. A total of 448 MHz (2x112 MHz, 2x56 MHz, 2x56 MHz) was licensed for the provision of Fixed Wireless Access services.
- **2019-2020:** EETT will work on the basis of the EC 26 GHz Implementing Decision (expected 2019)
 - ➔ in order to make available as much as possible spectrum for 5G in the 24.25-27.5 GHz band,
 - ➔ with appropriate license conditions including sharing conditions with in-band and adjacent services.
- **2019-2020:** Licenses for Pilot Trials
 - ➔ high bandwidth to be used for innovative new services
 - ➔ initial use of the 26.5-27.5 GHz range.

➤ 900/1800/2100/2600 MHz

Review of ECC Decisions for Mobile Bands below 3 GHz for 5G

- ❖ ECC PT1 works on the revision of ECC Decision (06)01 (2.1 GHz), ECC Decision (05)05 (2.6 GHz), ECC Decision (06)13 (900 and 1800 MHz) and will have to work in response to the European Commission's 5G follow-up Mandate (RSCOM18-19rev1, July 2018).

Scope of work

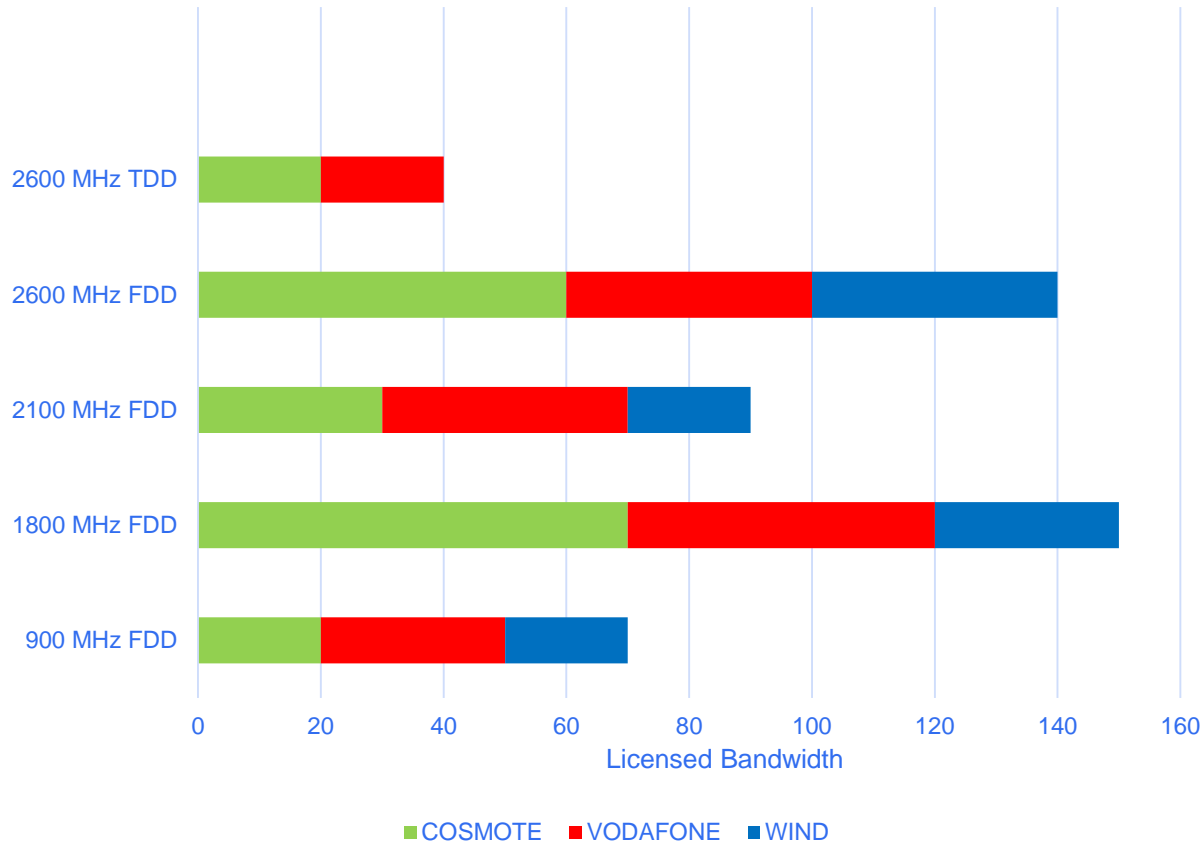
- Review technical conditions to enable timely introduction of 5G and, when applicable, AAS, while ensuring adequate protection of other services and applications.

Status of work:

- Revised ECC Decision (06)01
 - new BEMs for AAS, reference for Supplemental Uplink
 - finalised for approval for public consultation (October 2018)
- Revision of ECC Decision (05)05
 - Work continues
- Revised ECC Decision (06)13
 - 900MHz band for 5G non-AAS technology including SUL mode of operation
 - 1800MHz for LTE-AAS and 5G (AAS and non AAS) including SUL
 - finalised for approval for public consultation (October 2018)



Status of the 900 MHz/1800 MHz/2.1 GHz/2.6 GHz bands in Greece



900 MHz:

- 2x35 MHz licensed,
- expiry date 9/2027

1800 MHz:

- 2x75 MHz licensed,
- expiry dates
 - 2x10 MHz 12/2027,
 - 2x55 MHz 12/2035.

2.1 GHz:

- 2x45 MHz licensed (expiry date 8/2021)
- 2x15 MHz available

2.6 GHz:

- FDD 2x70 MHz licensed
- TDD 40 MHz licensed
- expiry date 2/2030

Thank you!

- Additional slides
- Internet of Things in mobile bands
- Mm-wave bands for 5G

Internet of Things (IoT) in Mobile Bands

ECC PT1 deliverables

- **ECC Report 266** “The suitability of the current ECC regulatory framework for the usage of Wideband and Narrowband M2M in the frequency bands 700 MHz, 800 MHz, 900 MHz, 1800 MHz, 2.1 GHz and 2.6 GHz”
- **CEPT Report 66** “Report from CEPT to the European Commission in response to the Mandate - to review the harmonised technical conditions for use of the 900 MHz and 1800 MHz frequency bands for terrestrial wireless broadband electronic communications services in support of the Internet of Things in the Union”

EETT's work on IoT

- Public Consultation for IoT until 19 October 2018

https://www.eett.gr/opencms/opencms/admin/PublicCons/cons_0365.html

- Amendment of radio frequency bands' terms of use with the aim to modify the regulatory framework for IoT in the following bands:
 - ➔ 900 MHz and 1800 MHz based on new EC Implementing Decision 2018/637/EC
 - ➔ 800 MHz, 2100 MHz and 2600 MHz based on ECC Report 266

Mobile mm-wave bands

WRC-19

The frequency bands under study (**ITU-R Resolution 238**) are:

- 24.25-27.5 GHz, 37-40.5 GHz, 42.5-43.5 GHz, 45.5-47 GHz, 47.2-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz, which have allocations to the mobile service on a primary basis.
- 31.8-33.4 GHz, 40.5-42.5 GHz and 47-47.2 GHz, which may require additional allocations to the mobile service on a primary basis.

CEPT

The current list of priority bands (**CEPT 5G Roadmap**) covers:

- 24.25-27.5 GHz,
- 40-43.5 GHz,
- 66-71 GHz