



ECC Decision (18)06

Harmonised technical conditions for Mobile/Fixed
Communications Networks (MFCN) in the band
24.25-27.5 GHz

Approved 06 July 2018

EXPLANATORY MEMORANDUM

1 INTRODUCTION

This ECC Decision on harmonised technical conditions for mobile/fixed communications networks (MFCN) in the 26 GHz (24.25-27.5 GHz) band reflects the objective of CEPT to harmonise the 24.25-27.5 GHz band for Europe for 5G.

Studies have taken into account the compatibility with and protection of all existing services, including their future deployments, in the same and adjacent frequency bands.

2 BACKGROUND

CEPT recognises the importance of a harmonised frequency arrangement for MFCN and the need of common and minimal Least Restrictive Technical Conditions (LRTC) for MFCN in the band 24.25-27.5 GHz, including to ensure protection of other services and applications.

The following principles have been considered to define the MFCN frequency arrangement:

- Facilitating roaming and cross-border coordination to achieve global economies of scale for equipment;
- Use of a 200 MHz block size approach which is in line with the mobile systems foreseen to be used in the 26 GHz band;
- Spectrum efficiency and high level of flexibility in order to adapt to national circumstances as well as to meet the changing need and demand for capacity in time and geography.

The implementation of this ECC Decision will encompass different stages at the national level (e.g. national consultation processes and update of existing authorisations as required) with a varying complexity depending on the legal and regulatory framework of each country. The harmonised technical conditions for MFCN set out in this decision have been developed on the basis that the authorisation regime is expected to be on an individual authorisation basis. Individual authorisation may cover both nationwide licensing and licensing on a smaller geographic basis than nationwide. Further work will be necessary to determine if additional/supplementary technical conditions can be established to facilitate other regimes whilst ensuring protection of the other users of spectrum in this band (EESS/SRS/ISS/FSS).

In the 26 GHz band, MFCN will support mainly urban and suburban hotspot areas. The deployment of MFCN is expected to target only cells with a small range. Due to the characteristics of this frequency band, there is no expectation that it will be used for contiguous wide/nationwide coverage of MFCN networks areas. There may be a need for a limited number of hotspots in rural areas. MFCN networks at 26 GHz could be deployed indoor and outdoor.

The protection of the passive Earth Exploration-Satellite Service (EESS) requires the introduction of appropriate limits on unwanted emission power in the band 23.6-24 GHz, applying to MFCN operating in the band 24.25-27.5 GHz. Additionally, the protection of Radio Astronomy Service (RAS) observations in the 23.6- 24.0 GHz band will require the implementation of suitable separation distances between RAS stations and MFCN transmitters on a case-by-case basis.

Based on the harmonised technical conditions included in this ECC decision, coexistence with satellite data relay systems (including EDRS - European Data Relay System) and with FSS satellite services are feasible when considering assumed technical and operational characteristics for MFCN.

A regular assessment of the evolution of MFCN system characteristics, including network deployments, in a timeline consistent with the 5 years review process of the Decision, or sooner if necessary, will provide additional confidence that these LRTC ensure adequate protection of other services, in particular space services.

In a number of CEPT countries, fixed point-to-point and point-to-multipoint links are in operation in the 24.5-26.5 GHz band. The band is also heavily used in many countries to deploy fixed point-to-point backhaul links for cellular networks and governmental usage.

Coexistence issues between fixed links and MFCN in the 26 GHz frequency band will be managed at national level or through the cross-border coordination framework and do not impact the harmonised technical conditions as defined in this Decision. A “toolbox” will help CEPT administrations in the national decision process supporting introduction of 5G in 26 GHz with FS in operation providing mechanisms which allow for continued FS operation, where necessary.

CEPT administrations need to maintain, with appropriate provisions in their authorisation for MFCN, the possibility for existing and future EESS/SRS earth stations in the 25.5-27 GHz band and FSS earth stations in the 24.25-25.25 GHz to use their respective bands and to safeguard their future operations taking into account the Radio Regulations. The coexistence of these earth stations with MFCN deployments will be addressed in ECC Recommendations describing methodologies aiming at calculating relevant separation/coordination areas and/or defining any other solutions to ensure the protection of these earth stations.

For cases other than synchronised MFCN operations, administrations may define appropriate mitigation measures to be applied in case of unsynchronised or semi-synchronised operations, taking into account, if available, an ECC Report on a toolbox for coexistence of MFCN in unsynchronised or semi-synchronised operations. Alternatively, administrations may further develop and use an appropriate block edge mask at national level.

3 REQUIREMENT FOR AN ECC DECISION

The ECC recognises that implementation of MFCN including IMT-2020/5G systems in CEPT countries providing high data rate applications in the band 24.25-27.5 GHz based on a harmonised frequency arrangement and least restrictive technical conditions will reduce development and implementation costs of manufacturing equipment and will secure future long term investments by providing economies of scale. A harmonised frequency arrangement will reduce complexity in cross-border coordination. The opportunity to utilise larger channel bandwidths will assist the provision of high data rates.

The ECC recognises that for the continuation of the successful development of MFCN including IMT-2020/5G, the regulatory framework needs to provide the confidence and certainty for industry to make the necessary investment. ECC recognises that administrations need flexibility to adapt their use of the band 24.25-27.5 GHz to national circumstances due to the current fixed links usage. Furthermore, administrations need to maintain the possibility of existing and future earth stations (EESS/SRS and FSS) to operate.

The ECC also recognises the need to include relevant technical conditions for MFCN including IMT-2020/5G to ensure protection of the EESS (passive) sensors in the 23.6-24.0 GHz band. Additionally, the protection of RAS will require the implementation of suitable separation distances between RAS stations and MFCN transmitters on a case-by-case basis.

ECC DECISION OF 6 JULY 2018 ON HARMONISED TECHNICAL CONDITIONS FOR MOBILE/FIXED COMMUNICATIONS NETWORKS (MFCN) IN THE BAND 24.25-27.5 GHZ (ECC DECISION (18)06)

“The European Conference of Postal and Telecommunications Administrations,

considering

- a) that MFCN for the purpose of this Decision includes IMT-2020/5G and other mobile and fixed communications networks;
- b) that harmonised technical conditions (including a harmonised frequency arrangement) will support the implementation of MFCN in this band and facilitate global roaming, economies of scale and reduce the cost of equipment;
- c) that the use of contiguous blocks of spectrum for MFCN reduces equipment complexity and provides a more efficient use of spectrum compared to the use of fragmented, non-contiguous blocks of spectrum;
- d) that for a single MFCN network a contiguous block of 800-1000 MHz is desirable to enable the full capabilities of IMT-2020/5G systems;
- e) that differences in the market demand for spectrum for MFCN and different authorisations regimes across CEPT countries is likely to lead to different timescales concerning the introduction of MFCN in the band 24.25-27.5 GHz;
- f) that some administrations may wish to implement MFCN in parts of this frequency band on a progressive basis depending on national market demand;
- g) that in many CEPT administrations the 26.5-27.5 GHz frequency range is less used by incumbent systems than the 24.5-26.5 GHz frequency range;
- h) that therefore, initial MFCN deployments in many CEPT administrations are expected in the 26.5-27.5 GHz frequency range;
- i) that the block edge mask (BEM) concept has been developed by CEPT to facilitate implementation of spectrum rights of use which are as technology neutral as possible;
- j) that the technical conditions related to coexistence with other services attached to this Decision have been developed on the assumption of an individual authorisation framework; any other assumption on the authorisation framework, such as general authorisation or a combined individual/general authorisation regime may require different and/or supplementary technical conditions;
- k) that it is beneficial to synchronise MFCN networks operating in the same location (avoid simultaneous uplink and downlink transmissions) since this would increase the efficient usage of spectrum;
- l) that the technical conditions for co-existence between adjacent MFCN systems in the 26 GHz band have been developed based on the assumption of synchronised operation and CEPT is developing a toolbox for coexistence of MFCN in unsynchronised or semi-synchronised operations;
- m) that the 26 GHz band will mainly be used for urban and suburban hotspot areas; however there may be a need for a limited number of hotspots in rural areas; it is not expected that the band will be used for contiguous wide/nationwide coverage of MFCN;
- n) that a regular assessment of the evolution of MFCN system characteristics, including network deployments, in a timeline consistent with the 5 years review process of the Decision, or sooner if necessary, will provide additional confidence that these LRTC ensure adequate protection of other services, in particular space services;

- o) that appropriate provisions are needed in the authorisation for MFCN to define precisely how to safeguard in a proportionate way the use of existing EESS/SRS receiving earth stations and the possibility for future earth station deployments in the 25.5-27 GHz frequency band;
- p) that appropriate provisions are needed in the authorisation for MFCN to define precisely how to safeguard in a proportionate way the use of existing FSS transmitting earth stations and the possibility for future earth station deployments in the 24.65-25.25 GHz frequency band;
- q) that methodologies will be developed to support coordination/coexistence between MFCN and earth stations in the 26 GHz band (receiving EESS/SRS and transmitting FSS earth stations) through the definition of suitable separation/coordination areas and/or any other solutions as part of appropriate provisions mentioned in considerations o) and p));
- r) that most sharing studies have shown that Fixed-Satellite Service (FSS) and the Inter-Satellite Service (ISS) would be protected with a margin of more than 12 dB, based on agreed assumptions, and it will be necessary to ensure that these services remain protected (see considering n);
- s) that the pointing elevation of the main beam (electrical and mechanical) should normally be below the horizon for outdoor base stations;
- t) that coexistence issues between fixed links and MFCN in the 26 GHz frequency band will be managed at national level or through the cross-border coordination framework;
- u) that the protection of the Earth Exploration-Satellite Service (EESS) (passive), requires the introduction of appropriate limits of unwanted emission power in the band 23.6-24 GHz, applying to MFCN operating in the band the 24.25-27.5 GHz; additionally the protection of RAS will require the implementation of suitable separation distances between RAS stations and MFCN transmitters on a case-by-case basis;
- v) that the protection of the Earth Exploration-Satellite Service (EESS) (passive) in the band 50.2-50.4 GHz and 52.6-54.25 GHz is ensured by the existing generic spurious limits of -30 dBm/MHz applying to base stations;
- w) that the coverage of outdoor hotspot has been assumed in sharing studies to be achieved with the deployment of base stations communicating with terminals on the ground and a very limited number of indoor terminals with positive elevation, resulting in an elevation of the main beam of outdoor base stations normally below the horizon, thus with high discrimination towards the satellites;
- x) that CEPT is studying usage of MFCN for the command, control and payload link of unmanned aircraft systems (UAS) in MFCN bands, including in the 26 GHz band. However, due to its specific characteristics and usage, the 24.25-27.5 GHz MFCN band is not to be used for connectivity from base stations to terminals on board unmanned aircraft vehicles (UAV). In addition, the connectivity from terminals on board UAV to base stations may have a significant impact, e.g. on separation distance from EESS/SRS earth stations, which requires further study. These UAV operations should not be an obstacle to the deployment of future EESS/SRS earth stations;
- y) that in EU/EFTA countries the radio equipment that is under the scope of this Decision shall comply with the RE Directive [1]. Conformity with the essential requirements of the RE Directive may be demonstrated by compliance with the applicable harmonised European standard(s) or by using the other conformity assessment procedures set out in the RE Directive.

DECIDES

1. that CEPT administrations shall designate the frequency band 24.25-27.5 GHz for MFCN on a non-exclusive basis to Mobile/Fixed Communications Networks (MFCN) taking into account *considerings* j), o) and p);
2. that CEPT administrations shall make available by the end of 2020 at least 1 GHz for MFCN in this band, subject to market demand;
3. that CEPT administrations wishing to introduce MFCN in the band 24.25-27.5 GHz shall apply the frequency arrangement and technical conditions according to decides 4, 5 and 7;
4. that the MFCN frequency arrangement in the band 24.25-27.5 GHz is an unpaired Time Division Duplex (TDD) frequency arrangement as provided in Annex 1;
5. that the Least Restrictive Technical Conditions (LRTC) specified in Annex 2 shall apply to the MFCN systems;
6. that this Decision does not preclude the use of the band by other services to which the band is allocated;
7. that MFCN in the 24.25-27.5 GHz band shall not be used for connectivity from base stations to terminals on-board UAV and that only communications for connectivity from terminals on-board UAV to base stations is authorised taking into account considering x) ;
8. that this Decision **enters into force** on 6 July 2018;
9. that the preferred **date for implementation** of this Decision shall be 6 January 2019
10. that CEPT administrations shall communicate the **national measures** implementing this Decision to the ECC Chairman and the Office when the Decision is nationally implemented.

Note:

Please check the Office documentation database <https://www.ecodocdb.dk> for the up to date position on the implementation of this and other ECC Decisions.

ANNEX 1: HARMONISED FREQUENCY ARRANGEMENT FOR THE BAND 24.25–27.5 GHZ

- The frequency arrangement is a TDD arrangement with a block size of 200 MHz;
- This block size could be adjusted to narrower blocks (multiples of 50 MHz) adjacent to other users, to allow full use of spectrum, if required (see Annex 2);
- If blocks need to be offset to accommodate other uses, this shift should be done in 10 MHz steps.

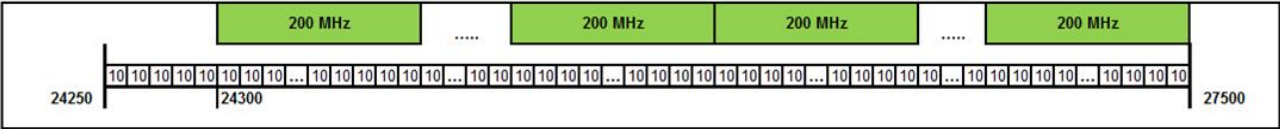


Figure 1: Example of possible frequency arrangements for MFCN in the 24.25-27.5 GHz band

ANNEX 2: LEAST RESTRICTIVE TECHNICAL CONDITIONS (LRTC) FOR THE MFCN SYSTEMS

The technical conditions presented in this annex have been developed on the basis that the authorisation regime is expected to be on an individual authorisation basis. These conditions include provisions related to the coexistence between MFCN systems in the form of block edge masks (BEMs), i.e. related to spectrum licensing and the avoidance of interference between users of spectrum, as well as provisions related to the coexistence with EESS (passive) in the form of unwanted emission limits in the bands 23.6-24 GHz.

A BEM is an emission mask that is defined, as a function of frequency, relative to the edge of a block of spectrum that is licensed to an operator. It consists of components which specify the permitted emission levels in adjacent blocks (transitional region 0-50 MHz below or above operator block) and non-adjacent blocks in the band.

The technical conditions derived below for the frequency range 24.25-27.5 GHz are optimised for, but not limited to, fixed/mobile communications networks (two-way). Therefore, they are derived both for base stations (BS) and terminal stations (TS). The BEMs have been developed to ensure coexistence with other MFCN blocks, as well as other services and applications in adjacent bands. Additional measures may be required at a national level to achieve coexistence with other services and applications.

A2.1 BASE STATION

The MFCN Base Station (BS) BEM consists of a baseline level, designed to protect the spectrum of other MFCN operators as well as emission limits to protect adjacent services (additional baseline level(s)), and transitional levels for coexistence between MFCN networks in adjacent blocks.

Table 1 contains the different elements of the BS BEM, and Table 2 to Table 4 contain the power limits for the different BEM elements.

To obtain a BS BEM for a specific block the BEM elements that are defined in Table 1 are used as follows:

- Transitional regions are determined, and corresponding power limits are used;
- For remaining spectrum assigned to MFCN, baseline power limits are used;
- For protection of services in adjacent bands, additional baseline is used.

For MFCN base stations, baseline requirements and requirements for transitional regions in Table 2 and Table 3 assume synchronised operation. Operators of mobile/fixed communications networks (MFCN) in the 24.25-27.5 GHz band may agree, on a bilateral or multilateral basis, less stringent technical parameters provided that they continue to comply with the technical conditions applicable for the protection of other services, applications or networks and with their cross-border obligations. Administrations should ensure that these less stringent technical parameters can be used, if agreed among all affected parties.

Table 1: MFCN BS BEM elements

BEM element	Definition
Baseline	Applies in spectrum used for MFCN, except from the operator block in question and corresponding transitional regions.
Transitional region	These are the regions adjacent to an operator block.
Additional baseline	Additional baseline limits apply in adjacent bands where specific limits for other services are necessary.

Table 2: MFCN BS transitional region requirements for coexistence between MFCN networks in adjacent blocks (assuming synchronised operation, see note 1)

Frequency range	Maximum TRP	Measurement Bandwidth
0-50 MHz below or above operator block	12 dBm	50 MHz

Table 3: MFCN BS baseline requirements for coexistence with MFCN networks in other (non-adjacent) blocks in the band (assuming synchronised operation, see note 1)

Frequency range	Protected frequency range	Maximum TRP	Measurement bandwidth
In-band baseline	24.25-27.5 GHz	4 dBm	50 MHz
Note 1: Administrations may define appropriate mitigation measures to be applied in case of unsynchronised or semi-synchronised operations, taking into account, if available, an ECC Report on a toolbox for coexistence of MFCN in unsynchronised or semi-synchronised operations. Alternatively, administrations may further develop and use an appropriate block edge mask at national level.			

Table 4: MFCN BS additional baseline requirement: maximum emissions into the 23.6-24.0 GHz band

Frequency range	Maximum Total Radiated Power (TRP) (see note)	Measurement bandwidth
23.6-24.0 GHz	-42 dBW	200 MHz
Note: This level requirement applies for BS for all foreseen modes of operation (i.e. maximum in-band power, electrical pointing, carrier configurations)		

Table 5: Conditions applying to the elevation of the main beam from 5G AAS outdoor base stations

Requirement on elevation of the main beam of 5G AAS outdoor base stations
When deploying outdoor base stations, it shall be ensured that each antenna is normally transmitting only with main beam pointing below the horizon and in addition the antenna shall have mechanical pointing below the horizon except when the base station is only receiving

This requirement refers to the elevation of the main beam of 5G AAS outdoor base stations to ensure coexistence with space station receivers.

A2.2 TERMINAL STATION

Table 6: MFCN terminal station maximum emissions into the 23.6-24.0 GHz band

Frequency range	Maximum emissions (see note)	Measurement bandwidth
23.6-24.0 GHz	-38 dBW	200 MHz
Note: This level requirement applies for terminal station for all foreseen modes of operation (i.e. maximum in-band power, electrical pointing, carrier configurations)		

ANNEX 3: LIST OF REFERENCES

This annex contains the list of relevant reference documents.

- [1] Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC (Radio Equipment Directive)
- [2] CEPT Report 68: "Harmonised technical conditions for the 24.25-27.5 GHz ('26 GHz') frequency band", July 2018