**Cover note for the Public Consultation on draft ECC Decision (18)FF on Harmonised technical conditions for Mobile/Fixed Communications Networks (MFCN) in the band 24.25-27.5 GHz**

This draft ECC Decision provides harmonised technical conditions for the use of 5G MFCN in the 24.25-27.5 GHz band.

During the development of these technical conditions, the following issues were highlighted:

**1 Limits to protect EESS (passive) in 23.6-24 GHz**

ECC considered the maximum unwanted emissions levels into the 23.6-24.0 GHz band from MFCN base stations and terminal stations (user equipment). It was not possible to conclude on a single value for the base station emission limit or the terminal station emission limit before launching the public consultation.

Although other values for these limits were proposed, the values that have been included in square brackets in the draft ECC decision reflect considerations within ECC on how best to ensure protection of passive EESS sensors while avoiding undue constraints on 5G base stations and terminal stations. ECC would welcome views on these proposed limits.

ECC also requests information on the active antenna system (AAS) radiation pattern in the adjacent band to assist the agreement of suitable values.

**2 Limits in the range 50.2-54.25 GHz**

It is noted that depending on information from industry about the second harmonic from 5G systems in the 26 GHz band, it might be necessary to define additional unwanted emission limits in the range 50.2-54.25 GHz.

**3 Elevation of the base station main beam**

 It was not possible to conclude on conditions applying to the elevation of the main beam from 5G AAS base stations to protect in the long term Fixed Satellite Service and Inter-Satellite Service.

Two options to define the condition on the elevation of the main beam are included in the draft ECC Decision: a requirement that it should not normally be above the horizon for outdoor base stations, or allowing the development of an e.i.r.p. elevation mask during the public consultation (a specific e.i.r.p. mask has been proposed)

**4 Monitoring**

Each ECC Decision is subject to regular review after no more than 5 years, and the review can be done sooner if necessary. As part of this review process,

It was proposed that ECC could monitor the evolution of 5G characteristics, including deployment, so as to be able to take corrective measures if the set of such characteristics would lead to a level of interference to other services at a point which could become detrimental.

Views on the text of the ECC Decision, and in particular on these aspects are requested during the public consultation.



ECC Decision (18)FF

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

**Approved Month YYYY**

# explanatory memorandum

## 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.

## 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.

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. 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. 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. The deployment of MFCN will target mainly cells with a range of around 150 m. This frequency band does not present the characteristics to support a national coverage objective and wide coverage 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) will require the implementation of suitable separation distances between RAS stations and MFCN transmitters on a case-by-case basis.

Editor’s note: option 1 or 2 in the following paragraph is linked to the option for an e.i.r.p. mask in the LRTC

[Option 1: Also, the protection of the Fixed Satellite Service (FSS) and the Inter-Satellite Service (ISS) requires the introduction of appropriate technical conditions applying to MFCN operating in the band the 24.25-27.5 GHz.

OR

Option 2: 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 are feasible when considering the assumed technical and operational characteristics for 5G in this Decision. ]

It may be necessary to consider mechanism to address the case of an unexpected development of 5G characteristics which would invalidate this conclusion. This would require ECC to monitor the evolution of 5G characteristics, including deployment, so as to be able to ensure that the set of such characteristics are not increasing the interference to other services to a detrimental level, taking into account that the decision will be in a review process each 5 years. Such monitoring would also be required within ITU-R for interference of international nature (i.e. satellite reception).

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 are encouraged to maintain the possibility for existing and future Earth stations (EESS/SRS and FSS) to be used in this band and to safeguard their future operations taking into account the Radio Regulations. Proportionate criteria to assess the coexistence of such earth stations with MFCN deployments will be addressed in CEPT in order to aid the process.

## 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 IMT­2020/5G, 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 be able 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 passive 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 [day month 2018] on harmonisED TECHNICAL CONDITIONS FOR mobile/fixed communications networks (MFCN) in the band 24.25-27.5 GHz

“The European Conference of Postal and Telecommunications Administrations,

*considering*

1. that MFCN for the purpose of this Decision includes IMT-2020/5G and other mobile and fixed communications networks;
2. 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;
3. 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;
4. 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;
5. 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;
6. that some administrations may wish to implement MFCN in parts of this frequency band on a progressive basis depending on national market demand;
7. that in many CEPT administrations the 26.5-27.5 GHz frequency range is less used by incumbent systems as the 24.5-26.5 GHz frequency range;
8. that therefore, initial MFCN deployments in many CEPT administrations are expected in the 26.5-27.5 GHz frequency range;
9. 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;
10. that some 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;
11. 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;
12. that the monitoring of the evolution of 5G characteristics, including deployment, is necessary to ensure that such evolution will continue to ensure the adequate protection of other services, in particular space services, and would be undertaken in a timeline consistent with the 5 years review process of the Decision;
13. that appropriate provisions are needed in the authorisation for MFCN to define precisely how to safeguard in a proportionate way the use of existing earth stations and the possibility for future deployment of EESS/SRS earth stations in the 25.5-27 GHz frequency band;
14. that appropriate provisions are needed in the authorisation for MFCN to define precisely how to safeguard in a proportionate way the use of existing earth stations and the possibility for future deployment of FSS Earth stations in the 24.65-25.25 GHz and 27.0-27.5 GHz frequency bands;

Editor’s note: considering o is linked to the option for an e.i.r.p. mask in the LRTC

1. [that the protection of the Fixed Satellite Service (FSS) and the Inter-Satellite Service (ISS) requires the introduction of appropriate technical conditions applying to MFCN operating in the 24.25-27.5 GHz band, e.g. e.i.r.p. mask for positive elevation angles];
2. 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;
3. 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);
4. 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 and 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;
5. 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), m) and n);
2. that CEPT administrations shall make available by 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 and 5;
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 this Decision **enters into force** on [day month] 2018;
8. that the preferred date for implementation of this Decision shall be [day month year]
9. 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 http://www.ecodocdb.dk for the up to date position on the implementation of this and other ECC Decisions.*

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.



1. Example of possible frequency arrangements for MFCN in the 24.25-27.5 GHz band
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 emission limits in the band 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 in-block and out-of-block components which specify the permitted emission levels over frequencies inside and outside the licensed block of spectrum respectively. The out-of-block component of the BEM itself consists of a baseline level and, where applicable, intermediate (transition) levels which describe the transition from the in-block level to the baseline level as a function of frequency.

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 the band and in adjacent bands. Additional measures may be required at a national level to achieve coexistence with other services and applications.

* 1. Base station

The MFCN Base Station (BS) BEM consists of several elements. The out-of-block elements consist of a baseline level, designed to protect the spectrum of other MFCN operators as well as adjacent services (additional baseline level(s)), and transitional levels enabling filter roll-off from in-block to baseline levels.

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 maximum emission limit is used.

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, where the roll-off from in-block to baseline levels takes place. |
| 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

| **Frequency range**  | **Maximum mean 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 blocks in the band

| **Frequency range**  | **Protected frequency range** | **Maximum mean TRP** | **Measurement bandwidth** |
| --- | --- | --- | --- |
| In-band baseline | 24.25-27.5 GHz | 4 dBm | 50 MHz |

Table 4: MFCN BS 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/-44] 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, …)

[Editor’s note: depending on information from industry about second harmonic, similar level might be necessary in the range 50.2-54.25 GHz]

Table 5: Other conditions applying to MFCN BS operated in the 24.25-27.5 GHz band

| **Parameter** | **Value** |
| --- | --- |
| [Operators shall ensure that when deploying outdoor base stations the antenna beam is normally not above the horizon.]OR |
| [EIRP mask for positive elevation angles] | [51-13\*log(Θ/5) dBm/200 MHz, where Θ is strictly positive elevation angle in degrees]OR[to be developed during public consultation] |

* 1. 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/-40] 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)

[Editor’s note: depending on information from industry about second harmonic, similar level might be necessary in the range 50.2-54.25 GHz]

1. 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)