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| Summary:  |
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| Proposal: |
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1. The following pages are intended to be compiled in one CEPT Brief on AI 9

DRAFT CEPT BRIEF ON AGENDA ITEM 9.1 Issue 9.1.1

9.1.1 Resolution 212 (Rev.WRC-15). Implementation of International Mobile Telecommunications in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz

# ISSUE

Under agenda item 9.1, issue 9.1.1 CEPT member states should consider the results of the studies of possible technical and operational measures to ensure the co-existence and compatibility between the satellite and terrestrial components of IMT in the 1 980-2 010 MHz and 2 170-2 200 MHz bands in different countries.

# Preliminary CEPT position

CEPT supports adequate measures to ensure the compatibility and co-existence of the satellite and terrestrial components of IMT, taking into account that the bands 1 980-2 010 MHz and 2 170-2 200 MHz are prioritised for MSS (mobile satellite service) use in CEPT (see Decisions ECC/DEC/(06)09, ECC/DEC/(06)10, and European Commission Decision 2007/98/EC) while MSS and MS (mobile service) have co-primary status in the RR.

CEPT is of the view that protection of the MSS uplinks in CEPT countries (Interference scenario A1) is not ensured by the current Radio Regulations (RR). There is currently no provision in the RR that would prevent interference from IMT base stations to IMT space stations and there is no coordination process between the administration responsible for MS and the administration responsible for MSS and no process to identify the concerned administrations. Therefore potential revisions to the RR should be developed at least for Region 1 and 3:

* to ensure that the band 1980-2010 MHz is not used for IMT base station transmitters or
* limiting the e.i.r.p. of IMT base stations in the uplink band (1980-2010 MHz)

CEPT is of the view that potential interference between the terrestrial IMT systems and MSS earth stations and vice versa (Interference scenarios A2 and B1) can be managed by cross-border coordination provisions in the RR Appendix 7 and there is no requirement for additional regulatory measures.

CEPT is of the view that the protection of the terrestrial component of IMT (Interference scenario B2) could be achieved by using the current space station pfd thresholds contained in Table 5-2 of Appendix 5 RR, and by removing Note 3 of this table CEPT is studying a revision of the threshold value, , in order to avoid the need of unnecessary coordination by MSS systems with respect to countries which operate terrestrial IMT systems.

# Background

In accordance with Resolution 212 (Rev. WRC-15) noting further a) and b):

* co‑coverage, co-frequency deployment of independent satellite and terrestrial IMT components is not feasible unless techniques, such as the use of an appropriate guard band or other mitigation techniques, are applied to ensure coexistence and compatibility between the terrestrial and satellite components of IMT;
* when the satellite and terrestrial components of IMT are deployed in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz in adjacent geographical areas, technical or operational measures may need to be implemented to avoid harmful interference, and further studies by ITU‑R are required in this regard.

The bands 1 980-2 010 MHz and 2 170-2 200 MHz are prioritised for MSS use in CEPT.

In CEPT the bands 1 980-2 010 MHz and 2 170-2 200 MHz are designated to the MSS (see Decisions ECC/DEC/(06)09 and ECC/DEC/(06)10, and European Commission Decision 2007/98/EC). MSS operations may include a “complementary ground component”, however it is a requirement of that Decision that the ground component operates in the same direction as the satellite links (i.e. base station transmit in the MSS downlink band; base station receive in the MSS uplink band). If independent terrestrial mobile systems were to operate in the opposite direction, this would increase the risk of interference.

ITU-R WP 4C and WP 5D have joint responsibilities for compatibility and coexistence studies under this issue. WP 4C is responsible for the studies with respect to the satellite component of IMT, taking into account the technical and operational characteristics of terrestrial component of IMT provided by WP 5D, while WP 5D is responsible for the studies with respect to the terrestrial component of IMT, taking into account the technical and operational characteristics of satellite component of IMT provided by WP 4C.

Currently WP 4C and WP 5D are developing the Working Document towards the Preliminary Draft New Report or Recommendation ITU-R M.[MSS&IMT-ADVANCED SHARING].The scope of this document is to address the studies under Resolution 212 (Rev. WRC-15) and covers the satellite component of IMT and the terrestrial component of IMT-Advanced.

Considering the recommended frequency arrangements for the terrestrial component for IMT, as contained in Recommendation ITU-R M.1036, there are four interference scenarios to be considered as showed in Table 1 and Figure 1.

Table 1: Interference scenarios to consider (ITU-R M.1036)

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| Scenario | From | To |
| A1 | Terrestrial IMT base station or mobile station | Satellite IMT space station |
| A2 | Terrestrial IMT base station | Satellite IMT MES |
| B1 | Satellite IMT MES | Terrestrial IMT base station or UE |
| B2 | Satellite IMT space station | Terrestrial IMT UE |



Figure 1: Interference scenarios between the satellite and terrestrial components of IMT

There is potential for harmful interference from the terrestrial component of IMT to the space stations in the satellite component of IMT (Scenario A1), including interference arising from a different country. Studies show that interference levels from transmitting IMT UEs into space stations in the band 1 980-2 010 MHz is generally acceptable, but interference levels from transmitting IMT base stations into space stations in that band could lead to interference levels exceeding the criterion by up to 52 dB. By avoiding base station transmission in the band 1 980-2 010 MHz, this situation is prevented.

While avoiding base stations transmitting in the band 1980-2010 MHz is consistent with some of the recommended frequency arrangements for terrestrial IMT (frequency arrangements “B1”, “B6” and “B7” in Table 4 in Recommendation ITU-R M.1036), there are other recommended frequency arrangements for terrestrial IMT that would place the base station transmitter in part of the MSS uplink band (frequency arrangements “B3” and “B5” in Table 4 in Recommendation ITU-R M.1036). The use of either of these two frequency arrangements could cause harmful interference to MSS space stations in the satellite component of IMT.

For scenario A1, there is currently no provision in the RR that would prevent interference from IMT base stations to IMT space stations. There is no coordination process between the administration responsible for MS and the administration responsible for MSS; and there is no process to identify the concerned administrations. There are e.i.r.p. limits for terrestrial stations defined in Article 21, which in the band 1 980-2 010 MHz is +47 dBW (+77 dBm) in any direction within 0.5° of the geostationary-satellite orbit. This is 16 dB higher than the value assumed in the studies for IMT base stations, which would anyway cause excessive interference, and hence the Article 21 limits do not provide effective protection against interference from terrestrial IMT systems.

[It should be noted that the above mentioned EIRP limits in Article 21 cover both the MS and FS stations. The stations in FS, to which 1980-2010 MHz and 2170-2200 MHz bands are allocated on a co-primary basis, are currently operating in some countries in order to meet particular user demand and other national considerations. However, the consideration by the WRC-19 of potential revisions to the RR cannot impose any constraints on FS, because this issue is obviously out of scope of Agenda Item 9.1, issue 9.1.1.]

To address the potential interference to MSS space stations, one option is to recommend limits on MS stations to ensure that the band is not used for terrestrial IMT downlinks. Alternatively, inclusion in the RR of a 20dBm/5MHz e.i.r.p. limit (Report ITU-R M. 2292 specifies an "output power" of 23 dBm, that with a -3dB antenna gain) ±2dB tolerance in 1 980-2 010 MHz, to limit terrestrial IMT emissions towards an MSS satellite would effectively limit use of the band to IMT UTs and provide adequate protection to MSS uplinks. An exception could be made for MS in the 1 980-1 990 MHz band for those countries listed in RR No. 5.389B where terrestrial systems have already been authorised.As part of the studies, several technical and operational measures have been identified to improve the compatibility between the terrestrial and satellite components of IMT. The studies show that if some of them are used along with the actual system characteristics, the interference level may not exceed the criterion in some cases. However there is no assurance that mitigation measures would be implemented by terrestrial IMT operators. The proposed mitigation measures include requiring the use of high performance base station antennas, the repointing of all base station antennas, and/or the operation of the network at reduced capacity. Such mitigations would not normally be implemented unilaterally. There is currently no requirement in the RR for administrations to require their mobile operators to implement such mitigations. In some cases, interference would exceed the criterion even if all analysed mitigations are taken into account.

Potential interference between the terrestrial IMT systems and MSS earth stations (Scenarios A2 and B1) can be managed by the current cross-border coordination provisions in the RR. Appendix 7 of the RR contains parameter values to allow coordination distances to be established.

The studies for Scenario B2 show that transmissions from some IMT space stations could cause interference levels into the IMT UEs to exceed the criterion by 8.9 to 22.9 dB. Some IMT UEs which are used for machine type communications are more sensitive to interference than standard mobile phones, which lead to the larger interference excess. Potential interference from MSS satellites to terrestrial IMT systems can be managed by the establishment of pfd threshold values in the RR. The pfd thresholds currently contained in Table 5-2 of Appendix 5 for this band (i.e. -128/-118 dB(W/m2) for GSO MSS, -123/-113 dB(W/m2) for non-GSO MSS) would provide protection to the terrestrial component of IMT and other terrestrial services that may use the band 2 170-2 200 MHz. Some MSS systems could exceed these threshold values in some areas in which case coordination of the MSS downlink would be needed with the relevant administrations. [It is also proposed to add an additional pfd coordination threshold value of ‑105.8 dB(W/m2) in 1 MHz in Table 5-2 of Appendix 5 RR in the band 2 170-2 200 MHz for protection of terrestrial stations of IMT systems, together with creating new Note 11 “The coordination thresholds in the band 2 170-2 200 MHz (all Regions) apply to protect terrestrial stations of IMT systems”.]

[There is some ambiguity about the effectiveness of the current threshold values, given Note 3 of Table 5-2 of Appendix 5: “The coordination thresholds in the band 2 160-2 170 MHz (Region 2) and 2 170-2 200 MHz (all Regions) to protect other terrestrial services do not apply to International Mobile Telecommunications (IMT) systems, as the satellite and the terrestrial components are not intended to operate in the same area or on common frequencies within these bands.” This footnote may be considered for deletion in order to remove the ambiguity.]

# List of relevant documents

ITU-Documentation (Recommendations, Reports, other)

* Annex 8 to Working Party 4C Chairman’s Report (4C/343) WORKING DOCUMENT TOWARDS A PRELIMINARY DRAFT NEW [RECOMMENDATION OR REPORT] ITU-R M.[MSS&IMT-ADVANCED SHARING] Coexistence and compatibility study between mobile satellite systems and terrestrial IMT-Advanced systems in the IMT-2 GHz bands in different countries.

CEPT and/or ECC Documentation (Decisions, Recommendations, Reports)

* ECC/DEC/(06)09
* ECC/DEC/(06)10

EU Documentation (Directives, Decisions, Recommendations, other), if applicable

* Commission Decision of 14 February 2007 on the harmonised use of radio spectrum in the 2 GHz frequency bands for the implementation of systems providing mobile satellite services: (2007/98/EC)
* Commission Decision of 13 May 2009 on the selection of operators of pan-European systems providing mobile satellite services (MSS): (2009/449/EC).
* Commission Implementing Decision of 05 November 2012 on the harmonisation of the frequency bands 1 920-1 980 MHz and 2 110-2 170 MHz for terrestrial systems capable of providing electronic communications services in the Union: (2012/688/EU)

# Actions to be taken

Study a revision of the threshold value for scenario B2

Develop a draft ECP on the issue

# Relevant information from outside CEPT (examples of these are below)

## European Union (date of proposal)

## Regional telecommunication organisations

APT (June 2018)

Preliminary view

APT Members supports conducting ITU-R studies on possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT and the satellite component of IMT in the frequency bands 1 980–2 010 MHz and 2 170–2 200 MHz in different countries, in accordance with Resolution 212 (Rev.WRC-15).

Other views

Some APT Members have a view that since the Radio Regulations did not establish priority neither between terrestrial and satellite components of IMT, nor between mobile and mobile-satellite services in the bands 1 980-2 010 MHz and 2 170-2 200 MHz. Implementation of these technical and operational measures could be considered for new services to be deployed after a specific future date decided by WRC-19 while existing services already deployed before this date would not be constrained by these measures.

Some APT Members expressed the view that studies should be conducted with a view of protecting terrestrial IMT systems operating in the adjacent frequency bands 1 920 – 1 980 MHz and 2 110–2 170 MHz.

Some APT Members expressed the view that preliminary results of sharing study show that potential harmful interference would occur from terrestrial IMT BSs into satellites in the band 1 980-2 010 MHz and also from satellites into terrestrial IMT UEs in the band 2 170-2 200 MHz. Therefore, it should be taken measures by both terrestrial IMT and satellite IMT systems to ensure coexistence and compatibility, as appropriate. The ITU-R studies regarding this issue have not been completed yet.

Some APT Members are of the view that the compatibility between stations in terrestrial component of IMT and earth stations in satellite component of IMT can be ensured by application of the current coordination procedure specified in the provisions of RR Article 9.

ATU (October 2018)

To be developed

ASMG Arab Group (7-11 April 2018)

Follow up the studies on this issue in the ITU Radio Sector Working Groups and support technical, operational and procedural measures for IMT systems to ensure compatibility between the terrestrial and satellite components of IMT systems in the frequency bands 1 980 -2 010 MHz and 2 170-2 200MHz.

Preference for using the terrestrial component of IMT in these bands.

CITEL (June 2018)

Preliminary Views from several countries supporting studies

Need to ensure compatibility of both IMT components in neighbouring countries without undue constraints.

RCC (October 2018)

To facilitate compatibility between IMT terrestrial component (in mobile service) and IMT satellite component (in mobile-satellite service) in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz, the RCC Administrations support adoption of relevant ITU-R Recommendations and Reports and also relevant regulatory provisions facilitating such compatibility.

The RCC Administrations are of view that compatibility between IMT terrestrial component (in mobile service) and IMT satellite component (in mobile-satellite service) may be achieved through application of existing provisions of RR Article 9 and introduction of appropriate modifications to RR Appendices 5 and 70 to identify coordination thresholds between stations in mobile and mobile-satellite services in the frequency bands under consideration.

The RCC Administrations support adoption of relevant modifications of RR Appendices 5 and 7, based on the materials of Report ITU-R M.2292.

## International organisations

IATA (date of proposal)

ICAO (date of proposal)

IMO (date of proposal)

NATO (23 June 2017)

This NATO military assessment summary is a common military assessment of the NATO Nations on the potential impacts and benefits of Agenda Item 9.1, Issue 9.1.1. It does not constitute a common position of the NATO Nations.

From a military perspective, studies under this issue present a limited risk on NATO military usage in adjacent bands.

SFCG (October 2018)

SFCG should continue to monitor the developments of this issue in WPs 4C and 5D for any potential outcomes that could degrade the use of the 2200-2290 MHz and 2025-2110 MHz bands by the space science services. It is to be noted that unwanted emissions by SRS/EESS/SOS (Earth-to-space) may in turn interfere with terrestrial IMT and satellite-based IMT (MSS) in the 1885-2025 MHz band.

WMO and EUMETNET (date of proposal)

## Regional organisations

ESA (date of proposal)

Eurocontrol (date of proposal)

## OTHER INTERNATIONAL AND REGIONAL ORGANISATIONS

EBU (date of proposal)

GSMA (date of proposal)

CRAF (date of proposal)