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| **Radiocommunication Study Groups** |  |
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| Annex 4 to Working Party 5A Chairman’s Report |
| WORKING DOCUMENT TOWARDS Preliminary draft CPM text for WRC-23 Agenda Item 1.3 |
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CHAPTER 1

Fixed, Mobile and Broadcasting issues

(Agenda items 1.1, 1.2, 1.3, 1.4, 1.5)

Agenda item 1.3

**(WP 5A / WP 3K, WP 3M, WP 4A, WP 5B, WP 5C, WP 5D)**

*1.3 to consider primary allocation of the band 3 600-3 800 MHz to mobile service within Region 1 and take appropriate regulatory actions, in accordance with Resolution* ***246 (WRC-19)****;*

Resolution **246 (WRC-19)** – *Studies to consider possible allocation of the frequency band 3 600-3 800 MHz to the mobile, except aeronautical mobile, service on a primary basis within Region 1.*

[Editorial Note:

Different views have been expressed regarding the invites WRC-23 of Resolution **246 (WRC-19)** “to consider possible upgrade of the allocation of the frequency band 3 600-3 800 MHz to the mobile, except aeronautical mobile, service on a primary basis within Region 1, and to take appropriate regulatory actions.

View 1:

Some administrations, after consultation with the BR, are of the view that, while the framework of Res. **246 (WRC-19)** does not explicitly exclude studies on IMT from other studies on mobile service applications under the purview of WP5A, it does not address the possibility of an IMT identification of the band under consideration. WP5A may include IMT applications in its studies under AI 1.3 based on input information, e.g. from WP5D, but cannot propose an IMT identification because this task was not decided by WRC-19 when establishing AI 1.3. In this regard, it has to be noted that CPM23-1 followed the clear differentiation of WRC-19 between Agenda Items 1.2 and 1.3 and consequently assigned both to different groups with dedicated expertise. WP5A, when developing and concluding on this draft CPM text, must respect the above.

View 2:

Other Administrations have the view that the framework of Resolution **246 (WRC-19)** include the studies on IMT systems as part of mobile service applications as well as IMT identification within the scope of AI 1.3 considered under the purview of WP 5A. The resolution **246 (WRC-19)** invites the 2023 World Radiocommunication Conference:

“ … to consider possible upgrade of the allocation of the frequency band 3 600-3 800 MHz to the mobile, except aeronautical mobile, service on a primary basis within Region 1, and to take appropriate regulatory actions”

It is crystal clear from Resolution **246 (WRC-19)** that IMT studies and consequently potential for IMT identification in WRC-23 is part of the AI 1.3 scope as follow:

1) IMT identification is included within the scope of Resolution **246 (WRC-19)** by clearly calling WRC-2023 to consider taking appropriate regulatory actions in addition to upgrading the allocation to mobile service on a primary basis.

2) IMT is part of the mobile service since Resolution **246 (WRC-19)** resolve to invite the ITU Radiocommunication Sector …. to conduct sharing and compatibility studies in time for WRC-23 between the mobile service and other services allocated on a primary basis within the frequency band 3 600-3 800 MHz …,

3) In accordance with Administrative Circular CA/251 CA251, CPM23-1 decided that WP5D is contributing group in the AI 1.3, which is responsible for IMT aspects to be considered in the WP5A studies on this AI 1.3.]

Note: During the consideration of this document, some members were of the view that it is necessary to refer to considering d) of Res. **246 (WRC-19)** as reproduced below: “considering d)”

“d) that some administrations in Region 1 are currently using the frequency band 3 600- 3 800 MHz, or part of that frequency band, for the mobile service (for example International Mobile Telecommunications (IMT) implementation);”

Note: It was pointed out during the discussion, that once WRC-23 decides on the upgrading of the secondary allocation to primary in Region 1 the same WRC or forthcoming WRCs could also decide to identify that band for IMT if the results of sharing and compatibility studies indicated the feasibility.

[Editor’s note: The Note above is not agreed and will be further rephrased to clearly describe what the different views are on Res. **246 (WRC-19)** specifically. All views will then be included as per Res. 2]

# 1/1.3/1 Executive summary

*[Text of the executive summary, not more than half a page of text to describe briefly the purpose of the agenda item, summarize the results of the studies carried out and, most importantly, provide a brief description of the method(s) identified that may satisfy the agenda item. See also § A2.1 of Annex 2 to* [*Resolution ITU-R 2-8*](http://www.itu.int/pub/R-RES-R.2-8-2019)*]*

# 1/1.3/2 Background

*[Text of the background, not more than half a page of text to provide general information in a concise manner, in order to describe the rationale of the agenda items (or issue(s)). See also § A2.2 of Annex 2 to Resolution* [*ITU-R 2-8*](http://www.itu.int/pub/R-RES-R.2-8-2019)*]*

*[Editor’s note: Updated text proposal from D-F-LUX-SUI still to be discussed]*

[CPM23-1 decided that WP5A, which is responsible for land mobile service ([excluding IMT]), is to conduct and complete the studies as indicated in *resolves to invite ITU-R* 1 of Resolution **246 (WRC-19)**. Resolution **246** **(WRC-19)** recognises that for African countries, especially those in tropical areas, the operations of FSS systems are more reliable for use in at C-band frequencies (3 400-4 200 MHz), rather than in higher frequency bands. Further, Resolution **246** **(WRC-19)** recognizes that the ITU-R performed already studies in the frequency band 3 400-4 200 MHz between the fixed-satellite service (FSS) and IMT during previous study cycles resulting for example in Reports ITU-R S.2368 and ITU-R M.2109. [Furthermore, an identification for International Mobile Telecommunications (IMT) in this frequency band in Region 1 is not in the scope of this agenda item.]]

[Editor’s note: There is no need to discuss and indicate the task which was given by CPM23-1. There may be a need to avoid, as possible, to copy partially or totally the scope of Resolution **246 (WRC‑19)**.]

*[Editor’s note: Agreed text]*

In the Radio Regulations, the frequency band 3 600-3 800 MHz is allocated to the fixed and fixed-satellite services on a primary basis in all three Regions and is already allocated to the mobile, except aeronautical mobile, service on a primary basis within Regions 2 and 3; while the frequency band 3 600-3 800 MHz is allocated to the mobile service on a secondary basis within Region 1.

*[Editor’s note: Consider if Option 3 can be kept as the only one]*

[Option 1

Cost-effective implementation of [all forms of] broadband connectivity, provided by [any] various services, plays an important socio-economic development role in many countries.

Option 2

Affordable / Efficient implementation of broadband connectivity plays an important socio-economic development role in many countries taking into account *recognizing a)* of Resolution **246** **(WRC-19)**.

Option 3

Efficient implementation of broadband connectivity, inter alia, could play an important role in development of telecommunications services in many countries as referred to Resolution **246** **(WRC-19)**.

Option 4

Efficient implementation of broadband connectivity could play an important developmental role in many countries [taking into account *recognizing a)* of Resolution **246** **(WRC-19)**].

Option 5

Deletion of Options 1, 2, 3, 4]

*[Editor’s note: Updated text proposal from D-F-LUX-SUI still to be discussed]*

[A possible upgrade to the mobile allocation in the band 3 600-3 800 MHz, from secondary to primary, would give Administrations in Region 1 the flexibility to use this band also for mobile broadband applications.

For mobile systems, there is a demand for the 3 600-3 800 MHz which complements lower and higher frequency bands and enable more widespread availability for advanced broadband services.

The study of the band 3 600-3 800 MHz band under WRC-23 agenda item 1.3 will provide WRC‑23 with sharing and compatibility information required to consider potential upgrade of the status of the mobile allocation while ensuring the protection of incumbent services and imposing no undue constraints on the existing services and their future development. \*\*

Some administrations in Region 1 are currently using the frequency band 3 600-3 800 MHz, or part of that frequency band, for the mobile service (for example IMT implementation), which terrestrial systems of the mobile service are intended to provide telecommunication services on a worldwide scale, regardless of location.]

[Editor’s note: Updated text proposal from GSMA still to be discussed]

[WRC-23 agenda item 1.3 considers the upgrade of the mobile allocation in the band 3 600‑3 800 MHz to co‑primary in Region 1. The rationale for this is that affordable broadband connectivity plays an important role in supporting socio-economic development and consideration of an upgrade to the mobile allocation in the band 3 600-3 800 MHz, from secondary to primary, can allow Administrations in Region 1 the option to use this band for mobile broadband. In the Radio Regulations, the frequency band 3 600-3 800 MHz is allocated to the fixed and fixed-satellite services on a primary basis in all three Regions and is also allocated to the mobile, except aeronautical mobile, service on a primary basis within Regions 2 and 3; while the frequency band 3 600-3 800 MHz is allocated to the mobile service on a secondary basis within Region 1.

For mobile systems, 3 600-3 800 MHz is mid-band spectrum which is considered a means with which to meet rising demand for new mobile applications and services, including International Mobile Telecommunications (IMT). It can also enable future deployments where these applications and services might be difficult to implement using lower or higher frequency bands. Some administrations in Region 1 are currently using the frequency band 3 600-3 800 MHz, or part of that frequency band, for the mobile service (for example IMT implementation). Such terrestrial systems of the mobile service are intended to provide telecommunication services on an affordable, worldwide scale.

The study of the band 3 600-3 800 MHz band under WRC-23 agenda item 1.3 will give sharing and compatibility information to Administrations when considering the future use of the band and the protection of incumbent services. This information will facilitate coordination between those that use it for new mobile systems, including mobile broadband, and those that continue to use it for incumbent systems.]

# 1/1.3/3 Summary and analysis of the results of ITU-R studies

*[This section should contain a summary of the technical and operational studies performed within ITU-R, including a list of relevant ITU-R Recommendations. Depending on the agenda item, this section could be divided in two parts, one part dealing with the summary and the other part dealing with the analysis. The results of the ITU-R studies should also be analysed with respect to the possible methods of satisfying the agenda item and presented in a concise manner.]*

*[Editor’s note: Text proposals still to be discussed.*

## 1/1.3/3.1 Applicable ITU-R Recommendations and Reports

ITU-R Recommendations: P.452, P.1238, P.2040, P.2001, M.2150, …

ITU-R Reports: S.2368, M.2109, S.2199, M.2111, M.2116-2, F.2328, ...

## 1/1.3/3.2 Summary of the results of studies

[This section provides a summary for the conducted sharing and compatibility studies.]

Compatibility studies of the band 3 300-4 200 MHz for mobile service applications including IMT have been carried out at previous World Radiocommunication Conferences including WRC-07 and WRC-15 in order to ensure the co-existence between IMT stations and other existing services. And the results of the studies have led to the allocation of bands to the mobile service and also to identifications to IMT in the Radio Regulations.

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| Allocation to services |
| Region 1 | Region 2 | Region 3 |
| 3 300-3 400RADIOLOCATION5.149 5.429 5.429A 5.429B5.430 | 3 300-3 400RADIOLOCATIONAmateurFixedMobile5.149 5.429C 5.429D | 3 300-3 400RADIOLOCATIONAmateur5.149 5.429 5.429E 5.429F |
| 3 400-3 600FIXEDFIXED-SATELLITE (space-to-Earth)MOBILE except aeronautical mobile 5.430ARadiolocation5.431 | 3 400-3 500FIXEDFIXED-SATELLITE (space-to-Earth)MOBILE except aeronautical mobile 5.431A 5.431BAmateurRadiolocation 5.4335.282 | 3 400-3 500FIXEDFIXED-SATELLITE (space-to-Earth)AmateurMobile 5.432 5.432BRadiolocation 5.4335.282 5.432A |
| 3 500-3 600FIXEDFIXED-SATELLITE (space-to-Earth)MOBILE except aeronautical mobile 5.431BRadiolocation 5.433 | 3 500-3 600FIXEDFIXED-SATELLITE (space-to-Earth)MOBILE except aeronautical mobile 5.433ARadiolocation 5.433 |
| 3 600-4 200FIXEDFIXED-SATELLITE(space-to-Earth)Mobile | 3 600-3 700FIXEDFIXED-SATELLITE (space-to-Earth)MOBILE except aeronautical mobile 5.434Radiolocation 5.433 | 3 600-3 700FIXEDFIXED-SATELLITE (space-to-Earth)MOBILE except aeronautical mobileRadiolocation5.435 |
| 3 700-4 200FIXEDFIXED-SATELLITE (space-to-Earth)MOBILE except aeronautical mobile |

### 1/1.3/3.2.1 With FSS system

Report ITU-R S.2368 also includes studies on compatibility of IMT with fixed‑satellite services (FSS) in the range 3 400‑4 200 MHz. Results of some studies indicated that for adjacent channel configurations with a 0 MHz guard band, the deployment separation distances to ensure co‑existence could be less than 0.6 km for suburban deployments. For some co-channel configurations studies, separation distances of < 2 km was sufficient to negate interference for urban and suburban deployments, with < 0.3 km for small cells as well.

Report ITU-R S.2199 examined the compatibility of Broadband Wireless Access systems (BWA) with FSS systems as well in the frequency range 3 400‑4 200 MHz. The minimum separation distance between BWA BS/TS and FSS ES was derived according to the FSS ES receiver tolerance. Several studies found that successful co-existence depends on the channel allocations and their deployment scenarios, as well as on the propagation environments. Many of the interference scenarios involving BWA TS/BS stations and FSS ES for rural, urban, and fixed-outdoor BWA systems indicated that separation distances for co-channel and adjacent channel allocations are mostly less than 1 km, and can be as low as 100 m for some cases, depending on the pointing direction of the ES, height of the ES, etc.

#### 1/1.3/3.2.1.1 Co-channel case scenario

Sharing studies from Report ITU-R S.2368 showing that to protect the FSS earth station, the required separation distances stations is within 56-61 km (urban) and 67-72 km (sub-urban) from IMT-Advanced networks macro-cell for an FSS antenna elevation angle from 48° to 5°. However, for IMT-Advanced networks using small-cell, the required distance is of 15-25 km (outdoor deployment and FSS antenna elevation angle of 6.5/36º with mountain terrain profile) and from 4.1 to 8.4 km (indoor deployment) for building penetration loss = 20 to 5 dB and FSS antenna elevation angle of 5°).

#### 1/1.3/3.2.1.2 Adjacent case scenario

Adjacent band compatibility studies show that for an IMT-Advanced networks using macro-cell deployment, the required separation distance is, for a single entry, about 13.8 km (suburban) and 9.3 km (urban) and for the aggregate effect, is of 19 km (suburban) and 12 km (urban) when the FSS antenna elevation angle is of 5°.

However, for IMT-Advanced networks using small-cell, the required distance is of 5-10 km (outdoor deployment and FSS antenna elevation angle of 6.5/36º with mountain terrain profile) and from 0.5 to 1.5 km for single entry and aggregate: when building penetration loss = 20 to 5 dB (FSS antenna elevation angle of 5°).

### 1/1.3/3.2.2 With FS system

Report ITU-R F.2328 examined the compatibility of IMT and FS systems operating in the 3 400‑4 200 MHz band. Two interference scenarios were considered: IMT base station into FS receive station and IMT user equipment (UE) into FS receive station, along with single and multiple interferer scenarios. The co-frequency channel results show that the required separation distance can be < 1 km for IMT BS co-existence with FS systems depending on the interference scenario and deployment environment, with adjacent frequency channel separations yielding similar or better results. These results were also based on worst-case assumptions including the pointing direction of the IMT station and the application of the propagation model. Interference from IMT UE’s into FS systems is relatively low, and can be mitigated with a frequency separation of a single channel.

#### 1/1.3/3.2.2.1 Co-channel case scenario

For the co-channel scenario, the interference from a single IMT base station or UE pointing in azimuth toward the FS receive station is computed over a range of azimuths and distances. The interference from a single IMT base station or UE pointing in azimuth toward the FS receive station is computed over a range of azimuths and distances. The required separation distance between the IMT base station and the FS receiver is within 50.4-92.0 km (Macro Suburban), 41.7-81.0 km (Macro Urban), 13.4-45.0 km (Small Cell Outdoor) and 1-10 km (Small Cell Indoor).

#### 1/1.3/3.2.2.2 Adjacent case scenario

For the adjacent channel scenario, the FS receive station is positioned adjacent to the IMT network base stations. The aggregate interference into the FS station is computed assuming varying separation distances. At each distance, the required rejection is determined based on a specified protection requirement. The required frequency separation between the two systems is then determined based on the out-of-band emission characteristics of the IMT base station signal and the adjacent channel selectivity of the FS receiver.

Table 6 of Report ITU-R F.2328 provides results for selected separation distances for the various interference scenarios and deployment environments considered here.

For example, for a Macro suburban system, the required separation distance is of 1 km (for a frequency separation of 27.7 MHz) and 20 km (for a frequency separation of 9 MHz).

## 1/1.3/3.3 Analysis of the results of studies

[This section provides the analysis of the results of studies]

When reviewing the studies in Report ITU-R S.2368, Report ITU-R M.2109 and Report ITU-R S.2328, it appears that the portion of band 3.6-3.8 GHz is similar to 3.4-3.6 GHz in terms of the sharing and compatibility studies results.

In the band 3 400-3 600 MHz, FSS is protected at the border of neighbouring countries through a power flux-density (pfd) limit, applicable to stations of the mobile service, of −154.5 dB(W/(m2· 4 kHz)) at 3 m above ground not to be exceeded for more than 20% of time at the border of the territory of any other administration.

Therefore, the same technical provision could ensure the protection of FSS operation in the bands 3.6-3.8 GHz in neighbouring countries from the usage of a possible primary allocation of the frequency band 3.6-3.8 GHz to the mobile service.

# 1/1.3/4 Methods to satisfy the agenda item

*[This section should contain the brief description of the Method or Methods to satisfy the agenda item as per Section A2.4 of Annex 2 to Resolution* [*ITU-R 2-8*](http://www.itu.int/pub/R-RES-R.2-8-2019)*]*

## 1/1.3/4.1 Method A: [title of Method A]

*[Brief text describing Method A]*

## 1/1.3/4.2 Method B: [title of Method B]

*[Brief text describing Method B]*

# 1/1.3/5 Regulatory and procedural considerations

*[Example(s) of regulatory text relating to the Method(s) to satisfy the agenda item]*

## 1/1.3/5.1 Method A: [title of Method A]

*[Example(s) of regulatory text for the first method to satisfy the agenda item]*