

REPORT OF TOPIC CHAIRMAN SPECTRUM TOPIC AREA

Chairperson: Dr. Li Leilei (NRTA)
Period of Report: NOV. 2019 to OCT.2023
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Introduction about scope of the work:

This report is on the Topic Area Spectrum Issues which including the related WRC-23 Agenda items concerning broadcasting service and ABU spectrum issues.

Project Topic 1: to consider identification of the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution 245 (WRC-19) (WRC-23 AI 1.2)

Project Manager:
Co- Project Manager: Mr. Rajeev Kumar
Time Period: NOV. 2019 to OCT.2023

The following tasks were considered for this project:

1. Follow developments of studies in WP 5D to identify and possible impact on Broadcasting Services.
2. Possible impact on broadcasting service in Asia-Pacific Area.

This report was provided by Dr. Li Leilei

1 Background

WRC-23 agenda item 1.2 is to consider identification of the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz and 10.0-10.5 GHz for International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with Resolution 245 (WRC-19) “Studies on frequency-related matters for the terrestrial component of International Mobile Telecommunications identification in the frequency bands 3 300-3 400 MHz, 3 600-3 800 MHz, 6 425-7 025 MHz, 7 025-7 125 MHz, and 10.0-10.5 GHz”.

Resolution 245 (WRC-19) calls for studies of technical, operational and regulatory issues pertaining to the possible use of the terrestrial component of IMT in the frequency bands, as well as sharing and compatibility studies, with a view to ensuring the protection of services to which the frequency band is allocated on a primary basis, without imposing additional regulatory or technical constraints on those services, and also, as appropriate, on services in adjacent bands, for the frequency bands:

- 3 600-3 800 MHz and 3 300-3 400 MHz (Region 2);
- 3 300-3 400 MHz (amend footnote in Region 1);
- 7 025-7 125 MHz (globally);
- 6 425-7 025 MHz (Region 1);
- 10 000-10 500 MHz (Region 2).

ITU-R Working Party 5D (WP 5D) has developed supporting materials for agenda item 1.2, which contain the results of sharing and compatibility studies (Document 5D/1555).

2 Methods in CPM Text

A number of methods to satisfy this agenda item are proposed in section 1/1.2/4 of CPM and are summarized below:

Band 1 – 3 300-3 400 MHz (amend footnote in Region 1)

- Method 1A: This method proposes no change to the Radio Regulations, except for suppression of Resolution 245 (WRC-19).
- Method 1B: This method proposes to modify existing footnotes RR No. 5.429A and RR No. 5.429B to add interested Region 1 countries that are in the area defined in RR No. 5.429B (south of 30° parallel north) to allocate the frequency band 3 300-3 400 MHz to the mobile service (except aeronautical mobile) on a primary basis and to identify it for IMT in those countries.
- Method 1C: This method proposes to modify existing footnotes RR No. 5.429A and RR No. 5.429B including the revision of given conditions and to add interested Region 1 countries to allocate the frequency band 3 300-3 400 MHz to the mobile service (except aeronautical mobile) on a primary basis (RR No. 5.429A) and to identify it for IMT in those countries (RR No. 5.429B).
- Method 1D: This method proposes a primary allocation to the mobile service (except aeronautical mobile) in the frequency band 3 300-3 400 MHz in interested Region 1 countries and identification of IMT through a new footnote. Note: Resolution 245 (WRC-19) refers only to amending an existing footnote for the frequency band 3 300-3 400 MHz in Region 1, but this method was included according to contributions of some administrations.
- Method 1E: This method proposes a primary allocation to the mobile service (except aeronautical mobile) in the frequency band 3 300-3 400 MHz by adding the band in the Table of Frequency Allocations for Region 1 and identification to IMT by modification of RR No. 5.429B to apply to Region 1, and any consequent modifications to RR No. 5.429A. Note: Resolution 245 (WRC-19) refers only to amending an existing footnote for the frequency band 3 300-3 400 MHz in Region 1, but this method was included according to contributions of some administrations.
- Method 1F: This method proposes a primary allocation to the mobile service in the frequency band 3 300-3 400 MHz by adding the band in the Table of Frequency Allocations for Region 1 and identification to IMT without any condition by adding a new footnote. Note: Resolution 245 (WRC-19) refers only to amending an existing footnote for the frequency band 3 300-3 400 MHz in Region 1, but this method was included according to contributions of some administrations.

Band 2 – 3 300-3 400 MHz (Region 2)

- Method 2A: This method proposes no change to the Radio Regulations, except for suppression of Resolution 245 (WRC-19).
- Method 2B: This method proposes to allocate the frequency band 3 300-3 400 MHz to the mobile service on a primary basis in Region 2 and identify it for IMT, by:
 - upgrading the existing secondary mobile allocation on the Table of Frequency Allocations;
 - modifying the existing RR footnote (RR No. 5.429C) applying it only to the fixed service;
 - modifying the existing RR footnote (RR No. 5.429D) for IMT identification in Region 2, specifying that stations in the MS operating in the frequency band 3 300-3 400 MHz shall not cause harmful interference to or claim protection from systems in the RLS.
- Method 2C: This method proposes to allocate the frequency band 3 300-3 400 MHz to the mobile, except aeronautical mobile, service on a primary basis in Region 2 and identify it for IMT, by:
 - upgrading the existing secondary mobile allocation, except aeronautical mobile, on the Table of Frequency Allocations;
 - modifying the existing RR footnote (RR No. 5.429C) applying it only to the fixed service;
 - modifying the existing RR footnote for IMT (RR No. 5.429D) identification in Region 2, specifying that stations in the MS operating in the frequency band 3 300-3 400 MHz shall not cause harmful interference to or claim protection from systems in the RLS.

Band 3 – 3 600-3 800 MHz (Region 2)

- Method 3A: This method proposes no change to the Radio Regulations, except for suppression of Resolution 245 (WRC-19).

- Method 3B: This method proposes to identify the frequency band 3 600-3 800 MHz for IMT in Region 2 by modifying RR No 5.434 to list the following condition: IMT systems shall not claim more protection from space stations than that provided in RR Table 21-4. In addition, conditions applicable to the MS in the frequency band equally apply to IMT.
- Method 3C: This method proposes to identify the frequency band 3 600-3 800 MHz for IMT in Region 2 by modifying RR No. 5.434 to list the following conditions:
 - pfd limit used in RR No. 5.431B for the MS/IMT;
 - IMT systems shall not claim more protection from space stations than that provided in RR Table 21-4;
 - RR Nos. 9.17, 9.18.
- Method 3D: This method proposes to identify the frequency band 3 600-3 800 MHz for IMT in Region 2 by modifying RR No. 5.434 listing the following conditions:
 - RR Nos. 9.17, 9.18;
 - RR No. 9.21;
 - IMT systems shall not claim more protection from space stations than that provided in RR Table 21-4;
 - revised pfd limit for the MS/IMT.
- Method 3E: This method proposes to identify the frequency band 3 600-3 700 MHz for IMT in additional countries in Region 2 by adding names of countries to RR No. 5.434 while maintaining all existing conditions.
- Method 3F: This method proposes to identify the frequency band 3 600-3 700 MHz for IMT in Region 2 by modifying RR No. 5.434 while maintaining all existing conditions.

Band 4 – 6 425-7 025 MHz (Region 1)

- Method 4A: This method proposes no change to the Radio Regulations, except for suppression of Resolution 245 (WRC-19).
- Method 4B: This method proposes to identify the frequency band 6 425-7 025 MHz in Region 1 for IMT by creating a new RR footnote associated with a new Resolution without any additional conditions or constraints to the IMT deployment other than those existing in the Radio Regulations.
- Method 4C: This method proposes to identify the frequency band 6 425-7 025 MHz in Region 1 for IMT by creating a new RR footnote with conditions which are contained in a draft new WRC Resolution. Concerning the protection of FSS uplink, there are several alternatives for regulatory conditions under this method.
 - Alternative 1: Pointing restrictions and power or TRP restriction (see Example 1 in resolves 2, of the draft new Resolution [A12-6 GHz])
 - Alternative 2: Limit on the expected e.i.r.p. (see Example 2, 3, 4 in resolves 2 of the draft new Resolution [A12-6 GHz])
 - Alternative 3: Maximum e.i.r.p. mask and base station density limit (see Example 5 in resolves 2 of the draft new Resolution [A12-6 GHz])
- Method 4D: This method proposes to identify the frequency band 6 425-7 025 MHz in Region 1 for IMT by creating a new RR footnote with conditions which are contained in a draft new WRC Resolution and which are applied only within portion of the frequency band 6 425-7 025 MHz.
- Method 4E: This method proposes to identify the frequency band 6 425-7 025 MHz in Region 1 for IMT by creating a new RR footnote, specifying the use is expected from 2030* onwards, in due time for launching IMT-2030 and in order to provide time for identifying solutions for users of the spectrum which may be affected (e.g. fixed links and EESS, with sea surface temperature measurements), with conditions which are contained in a new WRC Resolution.

Band 5 – 7 025-7 125 MHz (globally)

- Method 5A: This method proposes no change to the Radio Regulations, except for suppression of Resolution 245 (WRC-19).
- Method 5B: This method proposes to identify the frequency band 7 025-7 125 MHz for IMT by creating a new RR footnote associated with a new Resolution without any additional conditions or constraints to the IMT deployment other than those existing in the RRs.
- Method 5C: This method proposes to identify the frequency band 7 025-7 125 MHz for IMT by creating a new RR footnote with conditions which are contained in a draft new WRC Resolution.

- Method 5D: This method proposes to identify the frequency band 7 025-7 100 MHz for IMT by creating a new RR footnote with a requirement to implement technical and regulatory measures to protect and not impose constraints on existing services in the band above 7 100 MHz.
- Method 5E: This method proposes to identify the frequency band 7 025-7 125 MHz for IMT by creating a new RR footnote, clarifying that the use is expected from 2030* onwards, in due time for launching IMT-2030 and in order to provide time for identifying solutions for users of the spectrum which may be affected (e.g. fixed links at a national level and EESS, with sea-surface temperature measurements), with conditions which are contained in a draft new WRC Resolution.

Band 6 – 10.0-10.5 GHz (Region 2)

- Method 6A: This method proposes no change to the Radio Regulations, except for suppression of Resolution 245 (WRC-19).
- Method 6B: This method proposes to allocate the frequency band 10-10.5 GHz to the mobile service on a primary basis in the Frequency Allocation Table in Region 2, modify RR Nos. 5.480 and 5.481, and identify the frequency band for IMT by creating a new RR footnote with conditions which are contained in a draft new WRC Resolution. Various examples of resolves are included in the draft Resolution for conditions that may be considered when developing proposals, as appropriate.
- Method 6C: This method proposes to allocate the frequency band 10-10.5 GHz to the mobile, except aeronautical mobile, service on a primary basis in the Frequency Allocation Table in Region 2, and modify RR Nos. 5.480 and 5.481. In making the mobile service primary in Region 2, two RR footnotes are provided through two examples shown in Section 5 to ensure the protection of the radiolocation service, including those stations of the radiolocation service in 10.45-10.5 GHz in Regions 1 and 3.

All methods propose to suppress Resolution 245 (WRC-19).

3 Preliminary views

The frequency band 3 600-3 800 MHz (Region 2) is related to the frequency band 3 700-4 200MHz (air-to-earth), which is used for broadcasting service by some countries in Region 3. Consequently, these countries should pay attention to this agenda item.

The common views of the six regional telecommunity organizations were supportive in one case and neutral in five cases. CITELE expressed support for this agenda item by recommending the addition of IMT identification and simplification of the conditions in footnote No. 5.434, as a means of obtaining the consent of neighbouring countries. APT, on the other hand, maintained neutrality but stressed the importance of safeguarding existing businesses in Region 3. ASMG and ATU did not express any particular views and remained neutral. CEPT maintained a neutral stance but advocated the preservation of existing conditions, such as the 3400-3600MHz band. RCC similarly remained neutral and stressed the need to ensure the protection of FSS and FS.

Currently, there appears to be minimal impact on broadcasting satellite service in Region 3. Nevertheless, it remains crucial to strive for higher service standards in order to safeguard the rights and interests of broadcasting satellite service, especially in future ITU-R studies.

Project Topic 2: to consider, in accordance with Resolution 247 (WRC-19), the use of high-altitude platform stations as IMT base stations (HIBS) in the mobile service in certain frequency bands below 2.7 GHz already identified for IMT, on a global or regional level (WRC-23 AI 1.4)

Project Manager:

Co- Project Manager: Mr. Rajeev Kumar

Time Period: NOV. 2019 to OCT.2023

The following tasks were considered for this project:

1. Follow developments of studies in WP 5D to identify and possible impact on Broadcasting Services.
2. Possible impact on broadcasting service in Asia-Pacific Area.

This report was provided by Dr. Li Leilei

1 Background

HIBS are located in the stratosphere, providing both uplink and downlink mobile connectivity to the ground-based IMT mobile stations. HIBS are intended to be used as part of terrestrial IMT networks, as an application of the mobile service, and may use the same frequency bands with ground-based IMT base stations. The IMT mobile stations to be served by HIBS are proposed to be the same as the ground-based IMT base stations. Currently, the IMT mobile stations support a variety of frequency bands identified for IMT, including frequency bands below 2.7 GHz.

WRC-2000 identified through RR No. 5.388A the frequency bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz in Regions 1 and 3, and the frequency bands 1 885-1 980 MHz and 2 110-2 160 MHz in Region 2 that may be used by high-altitude platform stations as base stations to provide IMT, in accordance with Resolution 221 (Rev.WRC-07). Furthermore, Resolution 221 (Rev.WRC-07) provides the technical conditions that need to be met by these high-altitude platform stations to ensure that emissions to neighbouring countries do not cause co-channel harmful interference to the other services and applications allocated in these frequency bands, including terrestrial IMT-2000 stations.

The work under WRC-23 agenda item 1.4 includes studying sharing and compatibility in the frequency bands 694-960 MHz, 1 710-1 885 MHz and 2 500-2 690 MHz, as well as appropriate modifications to the existing RR No. 5.388A and associated Resolution 221 (Rev.WRC-07). These studies are intended to allow the use of such frequency bands by HIBS. This would allow HIBS to provide mobile-broadband connectivity to underserved communities, and in rural and remote areas, while ensuring the protection of existing primary services in the same and adjacent frequency bands.

2 Methods in CPM text

- Issue A: HIBS in the frequency band 694-960 MHz

Method A1: No changes to Vols. I and II of the Radio Regulations, and suppression of Resolution 247 (WRC-19).

Method A2: Identification of the frequency band 694-960 MHz, or portions thereof, for the use of HIBS and to include a new WRC Resolution for the use of this band by HIBS.

Method A3: Identification of the frequency band 694-960 MHz, or portions thereof, for the use of HIBS not claiming protection from existing primary services and to include a new WRC Resolution for the use of this band by HIBS. HIBS shall be notified to the Bureau and RR Nos. 11.2, 11.9 and 11.26A are applicable for purposes of aiding planning and coordination with neighbouring and concerned countries. For the implementation of the above, the notifying administration of HIBS at the time of submission of the RR Appendix 4 information to the Radiocommunication Bureau (BR) shall send an objective, measurable and enforceable commitment undertaking that in case of causing unacceptable interference, those administrations shall immediately reduce the interference to the acceptable level.

Method A4: HIBS in 694-862 MHz and 862-960 MHz per Region. Due to the differences in existing services per Region, identify the relevant frequency bands within the frequency ranges 694-862 MHz and 862-960 MHz for the use of HIBS on a regional basis and to include a new WRC Resolution for the use of these bands by HIBS.

- Issue B: HIBS in the frequency band 1 710-1 885 MHz

Method B1: No changes to Vols. I and II of the Radio Regulations, and suppression of Resolution 247 (WRC-19).

Method B2: Identification of the frequency band 1 710-1 885 MHz, or portions thereof, for the use of HIBS in accordance with revised RR No. 5.388A and revised Resolution 221 (Rev.WRC-07).

Method B3: Identification of the frequency band 1 710-1 885 MHz, or portions thereof, for the use of HIBS not claiming protection from existing primary services in accordance with revised RR No. 5.388A and revised Resolution 221 (Rev.WRC-07). HIBS shall be notified to the Bureau and RR Nos. 11.2, 11.9 and 11.26A are applicable for purposes of aiding planning and coordination with neighbouring and concerned countries. For the implementation of the above, the notifying administration of HIBS at the time of submission of the RR Appendix 4 information to the Radiocommunication Bureau (BR) shall send an objective, measurable and enforceable commitment undertaking that in case of causing unacceptable interference, those administration shall immediately reduce the interference to the acceptable level.

Method B4: HIBS in 1 710-1 885 MHz per Region. Due to the differences in existing services per Region, identify the relevant frequency band within the frequency range 1 710-1 885 MHz for the use of HIBS on a regional basis in accordance with revised RR No. 5.388A, additional regional footnotes, and revised Resolution 221 (Rev.WRC-07) .

- Issue C: HIBS in the frequency bands 1 885-1 980 MHz, 2 010-2 025 MHz, and 2 110-2 170 MHz

Method C1: No changes to Vols. I and II of the Radio Regulations, and suppression of Resolution 247 (WRC-19).

Method C2: Review existing conditions in the frequency bands 1 885-1 980 MHz, 2 010-2 025 MHz, and 2 110-2 170 MHz, or portions thereof, for the use of HIBS in accordance with revised RR No. 5.388A and revised Resolution 221 (Rev.WRC-07) .

Method C3: Review of existing conditions in the frequency bands 1 885-1 980 MHz, 2 010-2 025 MHz, and

2 110-2 170 MHz, or portions thereof, for the use of HIBS not claiming protection from existing primary services in accordance with revised RR No. 5.388A and revised Resolution 221 (Rev.WRC-07) . HIBS shall be notified to the Bureau and RR Nos. 11.2, 11.9 and 11.26A are applicable for purposes of aiding planning and coordination with neighbouring and concerned countries. For the implementation of the above, the notifying administration of HIBS at the time of submission of the RR Appendix 4 information to the Radiocommunication Bureau (BR) shall send an objective, measurable and enforceable commitment undertaking that in case of causing unacceptable interference, those administration shall immediately reduce the interference to the acceptable level.

- Issue D: HIBS in the frequency band 2 500-2 690 MHz

Method D1: No changes to Vols. I and II of the Radio Regulations, and suppression of Resolution 247 (WRC-19).

Method D2: Identification of the frequency band 2 500-2 690 MHz, or portions thereof, for the use of HIBS and to include a new WRC Resolution for the use of this band by HIBS.

Method D3: Identification of the frequency band 2 500-2 690 MHz, or portions thereof, for the use of HIBS not claiming protection from existing primary services and to include a new WRC Resolution for the use of this band by HIBS. HIBS shall be notified to the Bureau and RR Nos. 11.2, 11.9 and 11.26A are applicable for purposes of aiding planning and coordination with neighbouring and concerned countries. For the implementation of the above, the notifying administration of HIBS at the time of submission of the RR Appendix 4 information to the Radiocommunication Bureau (BR) shall send an objective, measurable and enforceable commitment undertaking that in case of causing unacceptable interference, those administrations shall immediately reduce the interference to the acceptable level.

Method D4: HIBS in 2 500-2 690 MHz per Region. Due to the differences in existing services per Region, identify the relevant frequency band within the frequency range 2 500-2 690 MHz for the use of HIBS on a regional basis and to include a new WRC Resolution for the use of this band by HIBS.

3 Preliminary views

We should pay attention to Issue A: HIBS in the frequency band 694-960MHz, which is related to the frequency band 470-702MHz used for terrestrial TV in Region 3 countries.

The common views of the six regional telecommunity organizations were supportive in four cases, opposed in one case and neutral in one case. RCC supports NOC (Method A1); ATU, CEPT and ASMG support identification for the use of HIBS without causing interference to neighbouring and concerned countries and without claiming protection from existing primary services (Method A3); CITELE supports identification for the use of HIBS (Method A2); APT does not reach a common view, but proposes to protect existing services.

Project Topic 3:	to review the spectrum use and spectrum needs of existing services in the frequency band 470-960 MHz in Region 1 and consider possible regulatory actions in the frequency band 470-694 MHz in Region 1 on the basis of the review in accordance with Resolution 235 (WRC-15)(WRC-23 AI 1.5)
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Project Manager:

Co- Project Manager: Mr. Rajeev Kumar

Time Period: NOV. 2019 to JUN.2023

The following tasks were considered for this project:

1. Follow developments of study results on WRC-23 AI 1.5 conducted in ITU-R TG 6/1
2. Possible impact on broadcasting service in Asia-Pacific Area.

This report was provided by Dr. Li Leilei

1 Background

Focus on scope and work of TG6/1 are as follows: to review the current spectrum use and study future spectrum needs in the frequency band 470-960 MHz as well as an assessment of the results of sharing and compatibility studies between the broadcasting and mobile, except aeronautical mobile, services in the frequency band 470-694 MHz, as well as other existing services for consideration of possible regulatory actions.

This agenda item addresses the future spectrum use of the band 470-694 MHz in Region 1. In that regard, a review of the current spectrum use and a study of future spectrum needs in the frequency band 470-960 MHz were requested as well as an assessment of the results of sharing and compatibility studies between the broadcasting and mobile, except aeronautical mobile, services in the frequency band 470-694 MHz, as well as other existing services in accordance with Resolution 235 (WRC-15) for consideration of possible regulatory actions.

The band 470-960 MHz, or parts thereof, is allocated to the following services on primary basis in Region 1: Broadcasting within the band, mobile, except aeronautical mobile, within 694-960 MHz, fixed within 790-960 MHz. The band, or parts thereof, is also allocated to the following services on a primary basis in some countries of Region 1: aeronautical radionavigation within the band 645-862 MHz and radio astronomy within 606-614 MHz.

In addition, parts of the band 470-960 MHz, are allocated to the following services on secondary basis in some countries of Region 1: radiolocation within 470-494 MHz, radio astronomy within 608-614 MHz, fixed within 470-582 MHz and 582-790 MHz, mobile, except aeronautical mobile, within 582-694 MHz, the land mobile service within 470-694 MHz, mobile-satellite, except aeronautical mobile-satellite, within 806-840 MHz and 856-890 MHz.

The Geneva 2006 Agreement (“GE06”) applies.

2 Methods in CPM text

- Method A: No Change. For this method, two alternatives are developed.

Alternative A1: No change

Alternative A2: No change. Revision of Resolution 235 (WRC-15) to review the situation at future competent WRCs.

- Method B: Primary allocation to the mobile service in the frequency band 470-694 MHz with or without identification to IMT in the frequency band 470-694 MHz or parts thereof in Region 1. Suppression of Resolution 235 (WRC-15). For this method, three alternatives are developed.

Alternative B1: This alternative proposes an allocation to the mobile service on a primary basis in the Table of Frequency Allocations of the frequency band 470-694 MHz in Region 1 and identification of the band 614-694 MHz for IMT through modification of RR No. 5.317A without any additional conditions to protect other services. RR No. 5.296 will be suppressed.

Alternative B2: This alternative proposes an allocation to the mobile service on a primary basis in the Table of Frequency Allocations of the frequency band 470-694 MHz in Region 1 and identification of the band 470-694 MHz for IMT through modification of RR No. 5.317A without any additional conditions to protect other services. RR No. 5.296 will be suppressed.

Alternative B3: This alternative proposes an allocation to the mobile service on a primary basis in the Table of Frequency Allocations of the frequency band 470-694 MHz in Region 1 without any additional conditions. RR No. 5.296 will be suppressed.

- Method C: Primary allocation to the mobile, except aeronautical mobile, service in the frequency band 470-694 MHz and identification to IMT in the frequency band 470-694 MHz or parts thereof in Region 1. Suppression of Resolution 235 (WRC-15). For this method, nine alternatives are developed.

Alternative C1: This alternative proposes an allocation to the mobile, except aeronautical mobile, service on a primary basis in the Table of Frequency Allocations of the frequency band 470-694 MHz in Region 1 and identification of the band 614-694 MHz for IMT through modification of RR No. 5.317A without any additional conditions to protect other services. RR No. 5.296 will be suppressed.

Alternative C2: This alternative proposes an allocation to the mobile, except aeronautical mobile, service on a primary basis in the Table of Frequency Allocations of the frequency band 470-694 MHz in Region 1 and identification of the band 470-694 MHz for IMT through modification of RR No. 5.317A without any additional conditions to protect other services. RR No. 5.296 will be suppressed.

Alternative C3: This alternative proposes an allocation to the mobile, except aeronautical mobile, service on a primary basis in the Table of Frequency Allocations of the frequency band 470-694 MHz in Region 1 and identification of the band 614-694 MHz for IMT. This identification will be done by amending RR No. 5.317A. A new WRC Resolution will be referred to in a new footnote RR No. 5.A15 to establish regulatory/technical conditions for the use of the mobile, except aeronautical mobile, service (i.e. MMS and LMS) in addition to the GE06 Agreement, in particular to protect existing services in the band 470-694 MHz. RR No. 5.296 is modified to highlight the continued use of the frequency band 470-694 MHz for applications ancillary to broadcasting and programme-making in some countries in Region 1.

Alternative C4: This alternative proposes an allocation to the mobile, except aeronautical mobile, service on a primary basis in the Table of Frequency Allocations of the frequency band 470-694 MHz in Region 1 and identification of the band 470-694 MHz for IMT. This identification will be done by amending RR No. 5.317A. A new WRC Resolution

will be referred to in a new footnote RR No. 5.B15 to establish regulatory/technical conditions for the use of the mobile, except aeronautical mobile, service (i.e. MMS and LMS) in addition to the GE06 Agreement, in particular to protect existing services in the band 470-694 MHz. RR No. 5.296 is modified to highlight the continued use of the frequency band 470-694 MHz for applications ancillary to broadcasting and programme-making in some countries in Region 1.

Alternative C5: This alternative proposes an allocation to the mobile, except aeronautical mobile, service on a primary basis in the Table of Frequency Allocations of the frequency band 614-694 MHz in Region 1 and identification of the band 614-694 MHz for IMT through modification of RR No. 5.317A. RR No. 5.296 is modified to highlight the continued use of the frequency band 470-614 MHz for applications ancillary to broadcasting and programme-making in some countries in Region 1. New footnote RR No. 5.C15 is proposed to clarify the use of applications ancillary to broadcasting and programme-making in the band 614-694 MHz in some countries in Region 1.

Alternative C6: This alternative proposes an allocation to the mobile, except aeronautical mobile, service on a primary basis in the Table of Frequency Allocations of the frequency band 614-694 MHz in Region 1 and identification of the band 614-694 MHz for IMT through modification of RR No. 5.317A. A new WRC Resolution will be referred to in a new footnote RR No. 5.D15 to establish regulatory/technical conditions for the use of the mobile, except aeronautical mobile, service (i.e. MMS and LMS) in addition to the GE06 Agreement, in particular to protect existing services. RR No. 5.296 is modified to highlight the continued use of the frequency band 470-614 MHz for applications ancillary to broadcasting and programme-making in some countries in Region 1. New footnote RR No. 5.E15 is proposed to clarify the use of applications ancillary to broadcasting and programme-making in the band 614-694 MHz in some countries in Region 1.

Alternative C7: This alternative proposes an allocation to the mobile, except aeronautical mobile, service on a primary basis of the frequency band 470-694 MHz and identification of the band 614-694 MHz for IMT in some countries in Region 1. The allocation will be done by adding a new country footnote RR No. 5.F15 while the identification will be done via a modification to RR No. 5.317A. A new WRC Resolution is developed to establish regulatory/technical conditions for the use of the mobile, except aeronautical mobile, service (i.e. MMS and LMS) in addition to the GE06 Agreement, in particular to protect existing services in the band 470-694 MHz. RR No. 5.296 is modified to highlight the continued use of applications ancillary to broadcasting and programme-making in the band 470-694 MHz in some countries in Region 1. New footnote RR No. 5.G15 is proposed to clarify the use of applications ancillary to broadcasting and programme-making in the band 470-694 MHz in some countries in Region 1.

Alternative C8: This alternative proposes an allocation to the mobile, except aeronautical mobile, service on a primary basis of the frequency band 470-694 MHz and identification of the band 470-694 MHz for IMT in some countries in Region 1. The allocation will be done by adding a new country footnote RR No. 5.H15 while the identification will be done via a modification to RR No. 5.317A. A new WRC Resolution is developed to establish regulatory/technical conditions for the use of the mobile, except aeronautical mobile, service (i.e. MMS and LMS) in addition to the GE06 Agreement, in particular to protect existing services in the frequency band 470-694 MHz. RR No. 5.296 is modified to highlight the continued use of applications ancillary to broadcasting and programme-making in the band 470-694 MHz in some countries in Region 1. New footnote RR No. 5.I15 is proposed to clarify the use of applications ancillary to broadcasting and programme-making in the band 470-694 MHz in some countries in Region 1.

Alternative C9: This alternative proposes an allocation to the mobile, except aeronautical mobile, service on a primary basis of the frequency band 614-694 MHz and identification of the band 614-694 MHz for IMT in some countries in Region 1. The allocation will be done by adding a new country footnote RR No. 5.J15 while the identification will be done via a modification to RR No. 5.317A. A new WRC Resolution is developed to establish regulatory/technical conditions for the use of the mobile, except aeronautical mobile, service (i.e. MMS and LMS) in addition to the GE06 Agreement, in particular to protect existing services in the band 614-694 MHz. RR No. 5.296 is modified to highlight the continued use of applications ancillary to broadcasting and programme-making in the band 470-614 MHz and 614-694 MHz in some countries in Region 1. New footnote RR No. 5.K15 is proposed to clarify the use of applications ancillary to broadcasting and programme-making in the band 614-694 MHz in some countries in Region 1.

- Method D: Primary allocation to the mobile, except aeronautical mobile, service within the band 470-694 MHz without IMT identification. Suppression of Resolution 235 (WRC-15). For this method, five alternatives are developed.

Alternative D1: This alternative proposes an allocation to the mobile, except aeronautical mobile, service on a primary basis in the Table of Frequency Allocations of the frequency band 470-694 MHz in Region 1. It recognizes that a co-primary allocation to the mobile service of the band 470-694 MHz in Region 1 would provide a regulatory option for administrations wishing to introduce mobile, except aeronautical mobile, services. RR No. 5.296 is proposed to be modified to highlight the continued use of this frequency band for applications ancillary to broadcasting and programme-making in Region 1. A new WRC Resolution [G15-ALTERNATIVE D1], which is referred to in a proposed new footnote RR No. 5.L15, will address the use of the frequency band 470-694 MHz by the mobile, except

aeronautical mobile, service.

Alternative D2: This alternative proposes an allocation to the mobile, except aeronautical mobile, service on a primary basis in the Table of Frequency Allocations of the frequency band 470-694 MHz in Region 1 without any additional conditions. RR No. 5.296 is also proposed to be suppressed.

Alternative D3: This alternative proposes an allocation to the mobile, except aeronautical mobile, service on a primary basis in the band 470-694 MHz in some countries in Region 1. This alternative would limit the co-primary allocation to the mobile service for to those countries listed in a new footnote (RR No. 5.M15). In addition, some bilateral discussions with affected countries could take place during WRC-23 to ensure that there is no objection for inclusion of a country name in this new footnote. Thus, the definition of this list of countries would take into account the possibility of coexistence with continued broadcasting use in neighbouring countries. In this respect, the possibility of use of the band by mobile and broadcasting services would be initially considered at WRC-23, not prejudging later bilateral or multilateral detailed agreements. RR No. 5.296 is proposed to be modified to address countries included both in RR No. 5.296 and in the new footnote RR No. 5.M15. New footnote RR No. 5.N15 is proposed to clarify the use of applications ancillary to broadcasting and programme-making in the band 470-694 MHz in some countries in Region 1. A new WRC Resolution, which is referred to in a proposed new footnote RR No. 5.M15, will address the use of the frequency band 470-694 MHz by the mobile, except aeronautical mobile, service.

Alternative D4: This alternative proposes a primary allocation to the mobile, except aeronautical mobile, service of the frequency band 470-694 MHz in Region 1 with later date of entry into force (e.g. not earlier than [01/01/2031]) in order to provide a regulatory option for administrations wishing to introduce mobile, except aeronautical mobile, service in the long term. Radio Regulations No. 5.296 is proposed to be modified to highlight the use of this frequency band by applications ancillary to broadcasting and programme-making in Region 1. A new WRC Resolution, which is referred to in a proposed new footnote RR No. 5.O15, will address the use of the frequency band 470-694 MHz by the mobile, except aeronautical mobile, service.

Alternative D5: This alternative proposes to apply similar regulatory actions for a new allocation to the mobile, except aeronautical mobile, service on a primary basis as described in Alternatives D1, D2, D3 or D4 above but limited to only a part of the frequency band 470-694 MHz (e.g. 614-694 MHz). Radio Regulations No. 5.296 will need to be modified to reflect continued use of the rest of the frequency band 470-694 MHz (e.g. 470-614 MHz) by applications ancillary to broadcasting and programme-making under a secondary mobile service in countries of Region 1 currently listed in RR No. 5.296 while a new footnote and/or amendment RR No. 5.296 will be needed to reflect the use of the newly allocated band (e.g. 614-694 MHz) by these applications under the primary mobile service and continued use under a secondary mobile service for those countries where a new allocation to the mobile, except aeronautical mobile, service has not been made.

- Method E: Primary allocation to the mobile, except aeronautical mobile, service of the band 470-694 MHz in Region 1 with technical conditions limiting mobile service operations to downlink in this band. Suppression of Resolution 235 (WRC-15).
- For Method F: Secondary allocation to the mobile, except aeronautical mobile, service in the band 470-694 MHz in Region 1. For this method three alternatives are developed.

Alternative F1: Secondary allocation to the mobile, except aeronautical mobile, service in the band 470-694 MHz in Region 1. This method recognizes the need for regulatory options in the short or long term and introduces the mobile, except aeronautical mobile, service with a secondary status only. Thus, for continued broadcasting service operations in countries wishing to do so, regulatory protection will be provided from a secondary mobile, except aeronautical mobile, service deployment in neighbouring countries. Some revisions to RR No. 5.296 should continue to highlight the use of this frequency band by applications ancillary to broadcasting and programme-making in Region 1. In addition, WRC-31 is invited to consider a possible upgrade of this allocation and Resolution 235 (WRC-15) is revised accordingly.

Alternative F2: The secondary allocation of the frequency band 470-694 MHz to the mobile, except aeronautical mobile, service in Region 1 would be conditioned that, such a secondary allocation also applies RR No. 9.21 with respect to neighbouring and concerned countries. In addition to that for the implementation of non-interference and non-protection of such a secondary allocation, if agreed by the WRC-23 shall also apply RR No. 9.21 together with a firm commitment to the Bureau when notifying the assignments in question that, in the case unacceptable interference is caused, the notifying administration of such secondary allocation shall immediately reduce the interference to the acceptable level or cease the emission. Some revisions to RR No. 5.296 should continue to highlight the use of this frequency band for applications ancillary to broadcasting and programme-making in Region 1.

Alternative F3: Secondary allocation to the mobile, except aeronautical mobile, service in the band 470-694 MHz in some countries in Region 1 with suppression of Resolution 235 (WRC-15). This alternative recognizes the need for

regulatory options in the short or long term and introduces the mobile, except aeronautical mobile, service with a secondary status only to those countries listed in a new footnote (RR No. 5.M15). Some revisions to the countries list of RR No. 5.296 are needed to highlight the use of this frequency band for applications ancillary to broadcasting and programme-making in countries not listed in the new footnote RR No. 5.M15. A new footnote RR No. 5.N15 should continue to highlight the use of this frequency band for applications ancillary to broadcasting and programme-making in countries listed in the new footnote RR No. 5.M15.

- For Method G: Considerations of the radio astronomy service.

3 Preliminary views

Although this agenda item is Region 1 issue, some Region 3 countries has borders with Region 1. In addition, in order to avoid this agenda item expanding to Region 3, we need to closely track its research progress and put forward the protection requirements for broadcasting service.

The common views of the six regional telecommunity organizations were supportive in two cases, opposed in two cases and neutral in two cases. RCC and ATU support NOC (Method A1); CEPT supports mobile service allocated in the band 470-694MHz as a secondary service (Method F); ASMG supports mobile service allocated in the band 614-694MHz as a primary service and IMT identification (Method B). CITEL requests that the WRC-23 decision should not have any negative impact on Region 2; APT does not reach a common view on this agenda item, but expresses the view that the WRC-23 decision should not have any negative impact on Region 3.

Project Topic 4: **to consider a new primary allocation to the fixed-satellite service in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 2, while protecting existing primary services in the band, in accordance with Resolution 174 (WRC-19)(WRC-23 AI 1.19).**

Project Manager: Dr. Li Leilei

Co- Project Manager:

Time Period: NOV. 2019 to OCT.2023

The following tasks were considered for this project:

1. Follow developments of study results on WRC-23 AI 1.19 conducted in ITU-R WP 4A
2. Possible impact on broadcasting services.

This report was provided by Dr. Li Leilei

1 Background

In the 2019 World Radiocommunication Conference, Resolution **174 (WRC-19)** was established to consider a new primary allocation to the FSS in the space-to-Earth direction in the frequency band 17.3-17.7 GHz in Region 2, which is already allocated to the broadcasting-satellite service (BSS) on primary status.

An FSS (space-to-Earth) emission is similar to a BSS (space-to-Earth) emission. Both consist of a space station transmitting a signal towards the Earth that will be received by fixed earth station terminals. In principle, the interference scenario with respect to other services should not be different; however, with this new allocation, the flexibility in possible uses of the band would be increased.

In Region 1, the frequency band is already allocated to the FSS, a new allocation in Region 2 progresses the principle of Regional harmonization, which allows for synchronization of frequency bands across both Regions. The consideration of Recommendation ITU-R BO.1834 and Recommendation ITU-R BO.1835, which address compatibility and sharing between the BSS networks using the Region 2 BSS allocation in the frequency band 17.3-17.8 GHz and feeder links of BSS networks using the worldwide FSS (Earth-to-space) allocation in the frequency band 17.3-17.8 GHz, is well suited for addressing an approach to study the proposed FSS (space-to-Earth) allocation with existing feeder links of BSS networks using the frequency band 17.3-17.8 GHz.

For the coordination between new FSS GSO (space-to-Earth) frequency assignments with respect to BSS frequency assignments and between new FSS GSO (space-to-Earth) frequency assignments, no modification to Radio Regulations would be required, since RR No. 9.7 already covers the coordination process and RR Appendix 5, Table 5-1 already contemplates a coordination trigger (8° of orbital arc).

2 Methods in CPM text

- Method A

Under this method, no change is proposed to the RR and the suppression of Resolution 174 (WRC-19).

- Method B

Modify footnotes in RR Article 5 that refer to the allocation of the frequency band 17.3-17.7 GHz in Region 2 to the FSS in the space-to-Earth direction and the suppression of Resolution 174 (WRC-19).

To address the new FSS allocation in the space-to-Earth direction, a modification to the Table of Frequency Allocations in Region 2, in the frequency band 17.3-17.7 GHz, is proposed.

To address the coordination between the FSS (space-to-Earth) in Region 2 and the receiving BSS feeder-link (Earth-to-space) operating under RR Appendix 30A, this method proposes modifications to Article 7 of RR Appendix 30A, to RR Article 22 and extend the coordination procedure (RR No. 9.7) that currently applies to similar services in Region 2 in the contiguous adjacent upper frequency band 17.7-17.8 GHz, by modifying RR Appendix 5.

Furthermore, this method contains two alternatives for several items to provide a wide range of options. The selection of Alternative 1 for all the items extends provisions used in Region 1 to Region 2, as well as the addition of other provisions, while the selection of Alternative 2 for all items results in more conservative conditions with the objective to provide further protection of the BSS feeder link AP30A receiving space station and GSO FSS system.

In order to avoid potential unacceptable interference to the receiving BSS feeder-link (Earth-to-space) operating under RR Appendix 30A, this method proposes some conditions for the operation of FSS (space-to-Earth) in Region 2 if Alternative 2 is selected in relevant items. Based on that Region 2 FSS requires to comply with a pfd limit at the edge of Earth's surface by modifying Annex 4 to RR Appendix 30A. This limitation would result in producing a low pfd value over portions of the Earth's surface with a very low receiving elevation angle which is also consistent with the mitigation technique outlined for the equatorial-limb case in Study 1. According to another item when Alternative 2 is being selected, Region 2 FSS, requires obtaining the explicit agreement of the affected administrations which have indicated disagreement (RR No. 11.41 does not apply) as well as those who fail to reply or to give a decision within the regulatory deadline (RR Nos. 9.60 to 9.62 do not apply) by adding a new provision in Article 7 to RR Appendix 30A.

In addition to the above-mentioned procedure it is proposed in Alternative 1 to modify RR No. 5.516A by adding Region 2 in this footnote. In Alternative 2, in order to ensure the protection of space stations receivers operating under RR Appendix 30A, it is proposed to also add to RR No. 5.516A a text indicating that in Region 2, the use of the fixed-satellite service in the frequency band 17.3-17.7 GHz shall not cause unacceptable interference to the space station receivers of the BSS feeder link in Regions 1 and 3 operating and those to be operated in the future under RR Appendix 30A; if such interference occurs the notifying administration of the FSS shall immediately eliminate this unacceptable interference.

To address the coordination between the FSS (space-to-Earth) and the BSS (space-to-Earth), no modifications to the RR are required, since the RR Article 9 coordination triggers are already contained in the RR Appendix 5, Table 5-1.

● Method C

Modify footnotes in RR Article 5 that refer to the allocation of the frequency band 17.3-17.7 GHz in Region 2 to the GSO FSS in the space-to-Earth direction and the suppression of Resolution 174 (WRC-19).

To address the new FSS allocation in the space-to-Earth direction, a modification to the Table of Frequency Allocations in Region 2, in the frequency band 17.3-17.7 GHz, is proposed.

To address the compatibility between earth stations of the FSS (space-to-Earth) in Region 2 and the BSS feeder-link earth stations operating under RR Appendix 30A, this method proposes to modify RR No. 5.516A by extending its application to Region 2. These modified footnotes including Region 2 also indicate that earth stations of the FSS (space-to-Earth) in Region 2 shall not claim protection from the BSS service feeder-link earth stations operating under RR Appendix 30A, nor put any limitations or restrictions on the locations of the BSS feeder-link earth stations anywhere within the service area of the feeder link.

To address the coordination between the FSS (space-to-Earth) in Region 2 and the receiving BSS feeder-link (Earth-to-space) operating under RR Appendix 30A, this method proposes modifications to Article 7 of RR Appendix 30A, to RR Article 22 and extend the coordination procedure (RR No. 9.7) that currently applies to similar services in Region 2 in the contiguous adjacent upper frequency band 17.7-17.8 GHz, by modifying RR Appendix 5.

In addition to the above-mentioned procedure it is proposed in Alternative 1 to modify RR No. 5.516A by adding Region 2 in this footnote. In Alternative 2, in order to ensure the protection of space stations receivers operating under RR Appendix 30A, it is proposed to also add to RR No. 5.516A a text indicating that in Region 2, the use of the fixed-satellite service in the frequency band 17.3-17.7 GHz shall not cause unacceptable interference to the space station receivers of the BSS feeder link in Regions 1 and 3 operating and those to be operated in the future under RR Appendix 30A; if such interference occurs the notifying administration of the FSS shall immediately eliminate this unacceptable interference.

To address the coordination between the FSS (space-to-Earth) and the BSS (space-to-Earth), no modifications to the RR are required, since the RR Article 9 coordination triggers are already contained in the RR Appendix 5, Table 5-1.

- **Method D**

Modify footnotes in RR Article 5 that refer to the allocation of the frequency band 17.3-17.7 GHz in Region 2 to the FSS in the space-to-Earth direction and the suppression of Resolution 174 (WRC-19).

To address the new FSS allocation in the space-to-Earth direction, a modification to the Table of Frequency Allocations in Region 2, in the frequency band 17.3-17.7 GHz, is proposed.

To address the compatibility between earth stations of the FSS (space-to-Earth) in Region 2 and the BSS feeder-link earth stations operating under RR Appendix 30A, this method proposes to modify RR No. 5.516A by extending its application to Region 2. These modified footnotes including Region 2 also indicate that earth stations of the FSS (space-to-Earth) in Region 2 shall not claim protection from the BSS service feeder-link earth stations operating under RR Appendix 30A, nor put any limitations or restrictions on the locations of the BSS feeder-link earth stations anywhere within the service area of the feeder link.

To address the coordination between the FSS (space-to-Earth) in Region 2 and the receiving BSS feeder-link (Earth-to-space) operating under RR Appendix 30A, this method proposes modifications to Article 7 of RR Appendix 30A, to RR Article 22 and extend the coordination procedure (RR No. 9.7) that currently applies to similar services in Region 2 in the contiguous adjacent upper frequency band 17.7-17.8 GHz, by modifying RR Appendix 5.

In addition to the above-mentioned procedure it is proposed in Method D to modify RR No. 5.516A by adding Region 2 in this footnote and also proposed footnote RR No. 22.5F.Y, for which “non-geostationary-satellite system operating in Region 2 shall meet the limits” to protect a receiving space station in the broadcasting-satellite feeder link of RR Appendix 30A.

To address the coordination between the FSS (space-to-Earth) and the BSS (space-to-Earth), modifications to RR No. 5.517 extend the applicability to the frequency range 17.3-17.8 GHz.

Finally, the modification to include the frequency range 17.3-17.7 GHz for Region 2, with respect to footnote RR No. 5.484A address the coordination of non-GSO FSS vis-à-vis other non-GSO and GSO FSS systems and networks. Additionally, the extension of the frequency range 17.3-17.7 GHz for Region 2, with respect to RR Article 22 limits found in RR Tables 22-1B and 22-3 addresses and ensures the protection of BSS and AP30A feeder link services, respectively.

At present, except for Method A, which is no change, three other methods consider the protection for the BSS feeder-link earth stations operating.

3 Preliminary views

The common views of the six regional telecommunity organizations were supportive in six cases. APT supports alternative 2 of Method B (except NGSO), and requests that it should not affect existing services in Region 3 and should be limited to the GSO system; CITELE supports the new allocation and NGSO needs to consider the restrictions in Article 22; RCC also requests that the protection of existing services be fully considered in this agenda item, then Method B can be considered. ASMG requires that any new allocation of FSS in Region 2 have no impact on existing services in the same and adjacent band in Region 1, and that technical and operational procedures be provided to protect these services; CEPT supports the new allocation of FSS in Region 2 and the extension of the conditions of use of Region 1 to Region 2.

Although this agenda item is a Region 2 issue, it is related to the receiving BSS feeder-link (Earth-to-space) operating in Region 3 under RR No. 5.516. In the draft CPM report, the new allocation of FSS has been added to the unconditional protection of BSS planning, and the hard limits of Table 22-1B and 22-3 in Article 22 have been added to achieve the protection of BSS Earth stations. Although this agenda item is limited to Region 2, it has the potential to achieve a uniform allocation of service globally. At WRC-23, we will strive for higher service protection standards in order to better protect the use of broadcasting satellite services in future analytical studies.