|  |  |
| --- | --- |
| **Radiocommunication Assembly (RA-15)Geneva, 26-30 October 2015** |  |
| **INTERNATIONAL TELECOMMUNICATION UNION** |  |
|  |  |
|  | **Document 4/1001-E** |
| **30 September 2015** |
|  |
| Chairman, Radiocommunication Study Group 4 |
| Chairman’s report |
| satellite services |
|  |

# 1 Introduction

Study Group 4 continued its work on the satellite services during the study period February 2012 – October 2015.

After the Radiocommunication Assembly 2012, it was noted that the activity of SG 4 was strongly influenced by the work for the preparation for WRC‑15, especially for Working Parties 4A and 4C. The main subjects for WRC‑15 that fall within the purview of SG 4, either as responsible or concerned study group, include:

– Agenda item 1.1: to consider additional spectrum allocations to the mobile service on a primary basis and identification of additional frequency bands for International Mobile Telecommunications (IMT) and related regulatory provisions, to facilitate the development of terrestrial mobile broadband applications, in accordance with Resolution **233 (WRC‑12)**.

– Agenda item 1.5: to consider the use of frequency bands allocated to the fixed-satellite service not subject to Appendices **30**, **30A** and **30B** for the control and non-payload communications of unmanned aircraft systems (UAS) in non-segregated airspaces, in accordance with Resolution **153 (WRC‑12)**.

– Agenda item 1.6: to consider possible additional primary allocations:

 1.6.1 to the fixed-satellite service (Earth-to-space and space-to-Earth) of 250 MHz in the range between 10 GHz and 17 GHz in Region 1;

 1.6.2 to the fixed-satellite service (Earth-to-space) of 250 MHz in Region 2 and 300 MHz in Region 3 within the range 13-17 GHz;

 and review the regulatory provisions on the current allocations to the fixed-satellite service within each range, taking into account the results of ITU‑R studies, in accordance with Resolutions **151 (WRC‑12)** and **152 (WRC‑12)**, respectively.

– Agenda item 1.7: to review the use of the band 5 091-5 150 MHz by the fixed-satellite service (Earth-to-space) (limited to feeder links of the non-geostationary mobile-satellite systems in the mobile-satellite service) in accordance with Resolution **114 (Rev.WRC‑12)**.

– Agenda item 1.8: to review the provisions relating to earth stations located on board vessels (ESVs), based on studies conducted in accordance with Resolution **909 (WRC‑12)**.

– Agenda item 1.9: to consider, in accordance with Resolution **758 (WRC‑12)**:

 1.9.1 possible new allocations to the fixed-satellite service in the frequency bands 7 150-7 250 MHz (space-to-Earth) and 8 400-8 500 MHz (Earth-to-space), subject to appropriate sharing conditions;

 1.9.2 the possibility of allocating the bands 7 375-7 750 MHz and 8 025-8 400 MHz to the maritime mobile-satellite service and additional regulatory measures, depending on the results of appropriate studies.

– Agenda item 1.10: to consider spectrum requirements and possible additional spectrum allocations for the mobile-satellite service in the Earth-to-space and space-to-Earth directions, including the satellite component for broadband applications, including International Mobile Telecommunications (IMT), within the frequency range from 22 GHz to 26 GHz, in accordance with Resolution **234 (WRC‑12)**.

– Agenda item 1.11: to consider a primary allocation for the Earth exploration-satellite service (Earth-to-space) in the 7-8 GHz range, in accordance with Resolution **650 (WRC‑12)**.

– Agenda item 1.16: to consider regulatory provisions and spectrum allocations to enable possible new Automatic Identification System (AIS) technology applications and possible new applications to improve maritime radiocommunication in accordance with Resolution **360 (WRC‑12)**.

– Agenda item 1.17: to consider possible spectrum requirements and regulatory actions, including appropriate aeronautical allocations, to support wireless avionics intra-communications (WAIC), in accordance withResolution **423 (WRC‑12)**.

– Agenda item 7: to consider possible changes, and other options, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution **86 (Rev.WRC‑07)** to facilitate rational, efficient, and economical use of radio frequencies and any associated orbits, including the geostationary‑satellite orbit.

– Agenda item 9: to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:

 9.1 on the activities of the Radiocommunication Sector since WRC‑12;

 9.1.1 Resolution **205 (Rev.WRC-12)**: Protection of the systems operating in the mobile-satellite service in the band 406-406.1 MHz;

 9.1.2 Resolution **756 (WRC-12)**: Studies on possible reduction of the coordination arc and technical criteria used in application of No. 9.41 in respect of coordination under No. 9.7;

 9.1.3 Resolution **11 (WRC-12)**: Use of satellite orbital positions and associated frequency spectrum to deliver international public telecommunication services in developing countries;

 9.1.5 Resolution **154 (WRC-12)**: Consideration of technical and regulatory actions in order to support existing and future operation of fixed‑satellite service earth stations within the band 3 400-4 200 MHz, as an aid to the safe operation of aircraft and reliable distribution of meteorological information in some countries in Region 1;

 9.1.6 Resolution **957 (WRC-12)**: Studies towards review of the definitions of *fixed service*, *fixed station* and *mobile station;*

 9.1.8 Resolution **757 (WRC‑12)**: Regulatory aspects for nano- and picosatellites;

 9.3 on action in response to Resolution **80 (Rev.WRC‑07)**: Due diligence in applying the principles embodied in the Constitution.

Relevant parts of the draft CPM Report were produced or contributed to for each of these agenda items. SG 4 has also achieved good progress in many other areas, including: FSS inter- and intra-service sharing and protection, antenna performance, RR Appendix **30/30A/30B** issues, use of FSS earth stations on mobile platforms, very small aperture terminals (VSATs), statistical methodology to assess time varying interference within the FSS, broadband access by FSS systems, methodology to estimate the sensitivity of GSO FSS interference levels to the geographical location of earth stations communicating with GSO FSS satellites, satellite component of IMT, Ultra High Definition Television (UHDTV) transmission via satellite, short-term performance, multicarrier/multidimensional signals for satellite use, digital carrier identification, satellite availability, disaster communications, satellite access procedures, adaptive coding and modulation, satellite performance, satellite news gathering, issues related to the radiodetermination/radionavigation-satellite service (RDSS/RNSS), methodology to calculate AMS(R)S spectrum requirements in the bands 1 545-1 555 MHz and 1 646.5-1 656.5 MHz related to the priority categories 1 to 6 of RR Article **44**, global flight tracking for civil aviation, satellite component of IMT at 2/2.2 GHz, non‑geostationary MSS systems in the band 399.9-400.05 MHz.

As for the Study Group and Working Party meetings after RA‑12, Working Party 4A, Working Party 4B and Working Party 4C each held seven meetings. Study Group 4 held four meetings during this study period in September 2012, October 2013, July 2014 and June 2015. In these meetings, 24 draft new and revised Recommendations were reviewed and subsequently approved by correspondence. In addition, 23 draft new and revised Reports were approved by Study Group 4.

Draft new Recommendation ITU-R M.[AMS(R)S.METHODOLOGY]-0 “Methodology to calculate spectrum requirements within the frequency bands 1 545-1 555 MHz (space-to-Earth) and 1 646.5‑1 656.5 MHz (Earth-to-space) for aeronautical mobile-satellite (R) service communications related to the priority categories 1 to 6 of Article **44** of the Radio Regulations”, which received an objection during the procedure for simultaneous adoption and approval by correspondence (PSAA) applied after the June 2015 meeting of Study Group 4, has been forwarded to RA‑15 (see Document [4/1005](http://www.itu.int/md/R12-SG04-RP-1005)).

This Recommendation provides a methodology to calculate aeronautical mobile-satellite (R) service spectrum requirements within the frequency bands 1 545-1 555 MHz (space-to-Earth) and 1 646.5‑1 656.5 MHz (Earth-to-space). It is intended to be used to quantify the spectrum requirements related to the AMS(R)S priority categories 1 to 6 of RR Article **44**, for which the provisions of Resolution **222 (Rev.WRC-12)** apply. The development of such a Recommendation was requested by Resolution **422 (WRC-12)**.

At the October 2013 meeting of Study Group 4, the draft new Recommendation ITU-R M.[AMS(R)S.METHODOLOGY]-0 was agreed to be sent for adoption by correspondence.

However, after the conclusion of the October 2013 meeting of Study Group 4, one administration raised some concerns about this draft new Recommendation, that the Chairman of Study Group 4 submitted to the thirteenth meeting of Working Party 4C: it was explained that the agreed-upon methodology contained in the proposed draft new Recommendation is based on the use of historical data for certain input parameters, which is by nature unavailable for new AMS(R)S satellite networks.

Furthermore, during the adoption process, another administration objected to the adoption for the following reasons (see Document [4C/296](http://www.itu.int/md/R12-WP4C-C-0296/en) from the Chairman of Study Group 4):

*“– Messages which are not related to the priority categories 1 to 6 of RR Article* ***44*** *may be included in the calculations and no mechanism prevents it;*

*– There might be other existing methods that could be used to calculate spectrum requirements;*

*– The new Recommendation may not completely avoid potential dispute in the annual MSS operators meetings;*

*– The input variables will not be confirmed by ICAO or any organization in the aircraft community.”*

At its fifteenth meeting, Working Party 4C considered the outcome of the correspondence group established in July 2014 to address this topic. During the discussions, Working Party 4C finally came to the conclusion that the concerns of the first administration mentioned above may be solved by inserting the additional *recommends* 2 and 3 that cover the case of new AMS(R)S satellite networks (established AMS(R)S operators should provide the relevant historical data for application of the methodology in a frequency coordination meeting, when such a meeting agrees on using the methodology contained in the proposed recommendation). Moreover, an additional *recommends* 4 was also included to alleviate the concerns of the second administration mentioned above (i.e. disputes about specific parameters of the methodology contained in the proposed recommendation should be resolved by mutual agreement).

Working Party 4C consequently finalized the draft new Recommendation ITU-R M.[AMS(R)S.METHODOLOGY]-0 and agreed to send it to Study Group 4 for consideration at its July 2015 meeting.

The same second administration mentioned above made a statement of concern for inclusion in the Working Party 4C Chairman’s Executive Report (see Document [4/106](http://www.itu.int/md/R12-SG04-C-0106/en)) and stated at the June 2015 meeting of Study Group 4 that it would not apply the draft new Recommendation in its entirety; however, it would not oppose adoption of the draft new Recommendation. The meeting agreed to apply the procedure for simultaneous adoption and approval by correspondence (PSAA) in accordance with § 10.3 of Resolution ITU‑R 1‑6 (see § 7.1.2 of Document [4/119](http://www.itu.int/md/R12-SG04-C-0119/en)).

Document 4/105(Rev.1), containing the final version of the draft new Recommendation ITU‑R M.[AMS(R)S.METHODOLOGY]-0, was then circulated for simultaneous adoption and approval by correspondence in Administrative Circular [CACE/737](http://www.itu.int/md/R00-CACE-CIR-0737/en) of 9 July 2015.

Further to that, an objection from the same second administration mentioned above was received at the end of the specified two-month consideration period with the following reasons provided in written form:

 *“The calculation methodologies set forth in the draft Recommendation were developed on the basis of the priorities indicated in Article* ***44*** *of the Radio Regulations. However, as is shown in ICAO Working Group F19 Document ACP-WGF 19/IP01 of 18 July 2008, certain categories of priority communication in Article* ***44*** *of the Radio Regulations are now no longer used and are not planned for use (priority categories 2 and 3). Thus, the methodologies developed do not take account of the types of aviation communication standardized by ICAO and are therefore unable to give a sufficiently objective appreciation of the priority traffic of the aeronautical mobile-satellite (route) service, but are able to take account of non-priority commercial traffic.*

 *At the same time, during the work of the correspondence group operating under the terms of reference in Annex 12 to Document 4C/369 of 18 July 2014, the administration of the Russian Federation proposed a structure for calculating requirements, conditions for possible use of satellite channels for priority communications, and also a master list of source data and requirements for their presentation. The taking into account of these proposals and development of corresponding methodologies would make it possible to exclude from the calculation commercial traffic, the repeated recording of the requirements of different air carriers, and traffic transmitted within the framework of the aeronautical mobile (R) service. However, the said proposals were not taken into account in the work and were presented by the Chairman of the correspondence group as an additional methodology, which in our view is incorrect.*

 *Bearing in mind the limited time that is available for carrying out the multilateral meetings or subsequent meetings pursuant to the provisions of Resolution 222 of the Radio Regulations, and also taking into account the complexity of the proposed methodologies and large number of parameters (some 150), it seems unlikely that the meeting will come to an agreement regarding the use of the proposed calculation methodologies and corresponding source data. Thus, the requirements of an operator transmitting exclusively priority communications 1–6 of Article****44*** *of the Radio Regulations will remain unsatisfied in the future.*

 *At the same time, we would draw your attention to the fact that in order to establish an effective methodology the following matters need to be fully addressed.*

*1) The priority categories of Article* ***44*** *of the Radio Regulations need to be brought in line with the current and future requirements of air services.*

*2) For priority communications, particularly where flight safety communications are concerned, dividing transmission reliability and time requirements according to whether those communications are transmitted in the terrestrial or space aviation radiocommunication service is unacceptable. In the event of the impracticability of those requirements when using the space segment, the question of the prioritization of communications must be reconsidered. It is thus advisable to examine the specific types of aviation communication that are transmitted via space vehicles in geostationary orbit, and priorities need to be assigned to those communications, taking into account the principles set out in the considering part of the Recommendation.*

*3) Information on the number of aircraft equipped with satellite communication stations, priority traffic to an aircraft according to the length of its route, and so on, must be confirmed by ICAO or by other representatives of the aviation community.*

 *The above problems call for more thorough analysis within ITU-R’s study groups and can be included in the study Questions as part of the planned consideration of an additional item on the agenda of WRC-15 on examination of issues relating to global flight tracking for civil aviation.”*

In view of the above, in accordance with § 10.2.1.2 of Resolution ITU-R 1-6 and considering that:

– there has been sufficient technical discussion on this subject at the WP 4C and SG 4 levels;

– the development of this Recommendation was requested by Resolution **422** (**WRC-12**);

– many administrations consider this Recommendation of extreme importance;

– there is no other Study Group 4 meeting scheduled before the Radiocommunication Assembly,

the draft new Recommendation ITU-R M.[AMS(R)S.METHODOLOGY]-0 has been forwarded to RA-15 for its guidance on this matter.

The status of the Questions assigned to Study Group 4 is given in Document 4/1003.

# 2 Activities of the Working Parties

## 2.1 Working Party 4A

During the current study period Working Party 4A held seven meetings under the chairmanship of Mr Jack Wengryniuk (United States). In these meetings WP 4A produced a total of two draft new Recommendations, seven draft revisions of Recommendations, twelve draft new Reports and one draft revision of Report which are listed in Annex 1.

WP 4A finalized the draft CPM text on WRC‑15 agenda items/issues for which it was the lead group. WP 4A was responsible for nine agenda items/issues as a lead group and contributed to eleven agenda items/issues as a contributing group. The studies in preparation for WRC‑15 on those agenda items for which WP 4A was the responsible group have significantly increased its work:

A.I. 1.6: to consider possible additional primary allocations:

**1.6.1 to the fixed-satellite service (Earth-to-space and space-to-Earth) of 250 MHz in the range between 10 GHz and 17 GHz in Region 1;**

**1.6.2 to the fixed-satellite service (Earth-to-space) of 250 MHz in Region 2 and 300 MHz in Region 3 within the range 13-17 GHz;**

**and review the regulatory provisions on the current allocations to the fixed-satellite service within each range, taking into account the results of ITU‑R studies, in accordance with Resolutions 151 (WRC‑12) and 152 (WRC‑12), respectively**

WP 4A finalized the draft CPM text on these agenda items. WP 4A also finalized two very large Reports, one associated with each of the sub-agenda items, containing the results of the sharing studies contributed to the Working Party, as well as a third Report containing more detailed characteristics and deployment models of FSS earth stations to be used in sharing studies.

A.I. 1.7: to review the use of the band 5 091-5 150 MHz by the fixed-satellite service (Earth‑to-space) (limited to feeder links of the non-geostationary mobile-satellite systems in the mobile-satellite service) in accordance with Resolution 114 (Rev.WRC‑12)

WP 4A finalized the draft CPM text on this agenda item. The text includes a single method to satisfy the agenda item and this method appears to be well accepted by other concerned Working Parties.

A.I. 1.8: to review the provisions relating to earth stations located on board vessels (ESVs), based on studies conducted in accordance with Resolution 909 (WRC‑12)

WP 4A finalized the draft CPM text on this agenda item. WP 4A also finalized a Report associated with this agenda item on interference effects of transmissions from earth stations on board vessels operating in fixed-satellite service networks on terrestrial co-frequency stations. This Report summarizes in detail the work done in the three studies that were reported to CPM15-2, and also contains areas that some believe require further study. As such, the approved Report accurately describes the current status of work done within ITU-R on this issue.

A.I. 1.9.1: to consider, in accordance with Resolution 758 (WRC‑12): possible new allocations to the fixed-satellite service in the frequency bands 7 150-7 250 MHz (space-to-Earth) and 8 400-8 500 MHz (Earth-to-space), subject to appropriate sharing conditions

WP 4A finalized the draft CPM text on this agenda item. WP 4A also developed a draft Report which represents the collection of the studies conducted in association with this agenda item. After considerable effort it was concluded that the Working Party was simply not in a position to finalize a draft new Report for this topic. The existing substantial draft Report represents the large amount of work done on this issue and was carried forward for possible additional development in the future.

A.I. 7: to consider possible changes, and other options, in response to Resolution 86 (Rev. Marrakesh, 2002) of the Plenipotentiary Conference, an advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with Resolution 86 (Rev.WRC‑07) to facilitate rational, efficient, and economical use of radio frequencies and any associated orbits, including the geostationary‑satellite orbit

WP 4A finalized draft CPM text for five separate WRC-15 agenda item 7 issues and near-complete draft CPM text for two additional issues. All of this text was brought to the attention of the Special Committee for its review and the complete draft CPM text was sent to CPM15-2.

A.I. 9.1, issue 9.1.2: Resolution 756 (WRC-12): Studies on possible reduction of the coordination arc and technical criteria used in application of No. 9.41 in respect of coordination under No. 9.7

WP 4A finalized the draft CPM text on this issue. WP 4A also developed a comprehensive draft Report compiling multiple studies in association with this issue. Given the significance of this topic and the volume of material already assembled in the draft Report, the Working Party decided, rather than rush to try and complete a draft new Report, to simply carry the existing draft Report forward for additional development in the future.

A.I. 9.1, issue 9.1.3: Resolution 11 (WRC-12): Use of satellite orbital positions and associated frequency spectrum to deliver international public telecommunication services in developing countries

WP 4A finalized the draft CPM text on this issue.

A.I. 9.1, issue 9.1.5: Resolution 154 (WRC-12): Consideration of technical and regulatory actions in order to support existing and future operation of fixed‑satellite service earth stations within the band 3 400-4 200 MHz, as an aid to the safe operation of aircraft and reliable distribution of meteorological information in some countries in Region 1

WP 4A finalized the draft CPM text on this issue.

A.I. 9.3: Resolution 80 (Rev.WRC‑07): Due diligence in applying the principles embodied in the Constitution

As the sole contributing group, WP 4A finalized the draft CPM text on this agenda item.

The Working Party also liaised closely with the groups responsible for preparing draft CPM text on other WRC‑15 agenda items mentioned above that impact on the FSS and BSS, i.e. WRC‑15 agenda items 1.1, 1.2, 1.5, 1.9.2, 1.10, 1.11, 1.15, 1.17 and 9.1 issues 9.1.6 and 9.1.8.

Finally, during the study period WP 4A sent liaison statements to and/or received liaison statements from Working Parties 1A, 1B, 3K, 3L, 3M, 4B, 4C, 5A, 5B, 5C, 5D, 6A, 7B, 7C and 7D, WP-SC, JTG 4-5-6-7, ITU-D SG 2, ITU-T SG 5, ITU-T FGAC, ITU-T FG-DR&NRR, IMO, WMO, ICAO, ESA and BR.

## 2.2 Working Party 4B

During the current study period Working Party 4B held seven meetings under the chairmanship of Mr David Weinreich (United States). In these meetings WP 4B produced a total of three draft new Recommendations, three draft revisions of Recommendations, three draft new Reports and three draft revisions of Reports, which are listed in Annex 2.

WP 4B considered topics that included the satellite component of IMT, UHDTV transmission via satellite, short-term performance, multicarrier/multidimensional signals for satellite use, digital carrier identification, satellite availability, very small aperture terminals, satellite performance, adaptive coding and modulation, disaster communications, satellite access procedures and satellite news gathering (SNG).

On the topic of digital carrier identification, WP 4B developed a new recommendation on carrier identification system for digital-modulation transmissions for fixed-satellite service (FSS) occasional use (OU) carrier earth station transmissions using geostationary-satellite networks in the 4/6 GHz and 11-12/13/14 GHz FSS bands.

On the topic of satellite access procedures, WP 4B developed a new recommendation on access procedures for fixed-satellite service occasional use (OU) carrier earth station transmissions to geostationary-satellite orbit space stations.

On the topic of multicarrier/multidimensional signals for satellite use, WP 4B developed a new report on multidimensional signal mapping technique for satellite communications and a revised report on multicarrier based transmission techniques for satellite systems.

On the topic of very small aperture terminals, WP 4B developed jointly with WP 4A a new report on the use of very small aperture terminals (VSATs).

On the topic of satellite component of IMT, the Working Party developed a new recommendation on detailed specifications of the satellite radio interfaces of International Mobile Telecommunications-Advanced (IMT-Advanced) and a new report on the outcome of the evaluation, consensus-building and decision of the IMT-Advanced satellite process (Steps 4 to 7), including characteristics of IMT-Advanced satellite radio interfaces. This work was guided by Resolution ITU‑R 57-1, which outlines the essential criteria and principles which were used in the process of developing the Recommendations and Reports for IMT‑Advanced, including Recommendation(s) for the radio interface specifications. The Working Party also developed a revised recommendation on the global circulation of IMT satellite terminals.

On the topic of satellite news gathering, WP 4B established a database containing information on points of contact for SNG matters (also ENG matters). The purpose of this database is to provide the necessary information to facilitate the temporary authorization for SNG operations in a country (or area), in accordance with the procedures contained in Recommendation ITU-R SNG.770-2 “Uniform operational procedures for digital satellite news gathering (DSNG)”.

Finally, during the study period WP 4B sent liaison statements to Working Parties 3K, 3M, 4A, 5A, 5B, 5D, 6A, 6B, 6C, ITU‑D SG 2, ITU‑T SGs 5, 9, 15, ITU-T FG-DR&NRR and ETSI.

## 2.3 Working Party 4C

During the current study period, Working Party 4C held seven meetings under the chairmanship of Mr Alexandre Vallet (France). In these meetings WP 4C produced a total of five draft new Recommendations, six draft revisions of Recommendations and five draft new Reports which are listed in Annex 3.

WP 4C finalized the draft CPM text on WRC‑15 agenda items for which it was the lead group. WP 4C was responsible for three agenda items/issues as a lead group and contributed to nine agenda items/issues as a contributing group. The studies in preparation for WRC‑15 on those agenda items for which WP 4C was the responsible group have significantly increased its work:

A.I. 1.9.2: to consider, in accordance with Resolution 758 (WRC‑12): the possibility of allocating the bands 7 375-7 750 MHz and 8 025-8 400 MHz to the maritime mobile-satellite service and additional regulatory measures, depending on the results of appropriate studies

WP 4C finalized the draft CPM text. WRC-12 invites the ITU-R in Resolution **758 (WRC-12)** to conduct technical and regulatory studies on the possibility of allocating the bands 7 375-7 750 MHz and 8 025-8 400 MHz or portion of those bands to the MMSS while ensuring the compatibility with existing services. Studies conducted in ITU-R show that there are many satellite earth stations, all over the world, operating in science services, as well as fixed and mobile terrestrial stations which need to be protected from harmful interference from MMSS stations in those frequency bands. In accordance with those studies, separation distances in the order of several hundred kilometres are required to protect the earth stations in the EESS and also fixed stations from interference. Studies also show that SRS deep space earth stations operating in adjacent band would have to be protected through combination of unwanted emission limit and/or separation distance. Moreover, there is uncertainty on how to apply RR Nos. **9.17**, **9.17A** and **9.18** for MMSS earth stations. The report gathering the studies for this agenda item was also finalized.

A.I. 1.10: to consider spectrum requirements and possible additional spectrum allocations for the mobile-satellite service in the Earth-to-space and space-to-Earth directions, including the satellite component for broadband applications, including International Mobile Telecommunications (IMT), within the frequency range from 22 GHz to 26 GHz, in accordance with Resolution 234 (WRC‑12)

WP 4C finalized the draft CPM text. ITU-R has undertaken studies of possible bands for new allocations to the MSS in the Earth-to-space and space-to-Earth directions within the frequency range 22-26 GHz, taking into account numerous sharing and compatibility aspects. Resolution **234 (WRC-12)** has considered and recognized that the lack of spectrum to implement IMT and broadband applications in the range 4‑16 GHz for MSS by 240 MHz and 335 MHz has not been satisfied, but the ITU-R has not yet estimated the total requirements for the MSS in the 22-26 GHz frequency range. A number of frequency bands in the 22-26 GHz frequency range have been assessed for possible sharing with new MSS systems, although not all services within those bands have been studied for sharing with new MSS systems. Some frequency bands within the 22-26 GHz range have had no studies. The report gathering the studies for this agenda item was also finalized.

A.I. 9.1, issue 9.1.1: Resolution 205 (Rev.WRC-12): Protection of the systems operating in the mobile-satellite service in the band 406-406.1 MHz

WP 4C finalized the draft CPM text. In accordance with the direction of Resolution **205 (Rev.WRC-12)**, ITU-R undertakes to conduct appropriate regulatory, technical and operational studies with a view to ensuring adequate protection of mobile-satellite service (MSS) systems operating in the frequency band 406-406.1 MHz as required by RR Nos. **4.22**, **5.267** and Appendix **15** (Table **15-2**), taking into account the current and future services operating in the lower adjacent bands (390-406 MHz) and upper adjacent bands (406.1-420 MHz) or in separate parts of these bands.

Permissible levels of interference for narrowband and wideband emissions were developed for three space segments (LEO, MEO and GSO) in operation within the frequency band 406‑406.1 MHz. Specified spurious emission levels indicate that the data collection platforms operating in the Earth exploration-satellite service (EESS) do not produce in-band emissions exceeding the narrow band interference criteria. In addition, operation of radiosondes in the meteorological aids service will not exceed the broadband measured sensitivity levels of the search‑and-rescue receivers for LEO, MEO or GEO satellites.

Simulations run assuming deployment scenarios typical from CEPT countries show that the LEO component experiences interference due to mobile deployment from 406.1 to 407 MHz, while the MEO component receives interference up to 410 MHz depending on the constellation. The geostationary component shows severe interference due to mobile deployment within the 406.1 to 406.2 MHz band.

Increased deployment of the land mobile stations in the 406.1-420 MHz range may cause performance degradation for the LEOSAR SARP processor, according to simulations run using characteristics of Canadian systems, which may not be representative of other Region 2 countries. The hypothetical deployment and growth rate scenario used, are not representative of current and may not represent future deployment in Region 2 countries. According to this study, MEOSAR (Galileo) within its larger footprint may be also affected by an increase of land mobile systems in the 406.1-406.2 MHz band.

Two options have been identified to ensure the protection of MSS systems operating in the frequency band 406-406.1 MHz. Both consist in adding a footnote to the Table of Frequency Allocations of RR Article **5** and modifying Resolution **205 (Rev.WRC-12)**. The difference between the two proposed options is the way Resolution **205 (Rev.WRC-12)** is modified. The report gathering the studies for this issue was also finalized and concludes that two guardbands from 405.9 to 406 MHz and 406.1 to 406.2 MHz would be needed to ensure adequate protection to MSS systems operating in the 406-406.1 MHz band. The implementation of these two guardbands require regulatory measures that may be considered by WRC-15. Other methods of mitigation are also indicated, which may be used by administrations.

The Working Party also liaised closely with the groups responsible for preparing draft CPM text on other WRC‑15 agenda items mentioned above that impact on the MSS and RDSS, i.e. WRC‑15 agenda items 1.1, 1.6, 1.7, 1.8, 1.11, 1.15, 1.17, 7 and 9.1 issue 9.1.6.

Finally, during the study period WP 4C sent liaison statements to and/or received liaison statements from Working Parties 1A, 1B, 1C, 3J, 3K, 3L, 3M, 4A, 4B, 5A, 5B, 5C, 5D, 6A, 7A, 7B, 7C, 7D, JTG 4-5-6-7, ICAO, WMO, IMO, ESA, ITU‑D SG 2, ITU‑T SGs 5, 9, 15, ITU‑T WP 2/5, ITU-T FG-DR&NRR, ITU-T FGAC and BR.

# 3 Activities of the Joint Task Group 4-5-6-7

The report on the activities of the Joint Task Group 4-5-6-7 can be found in Annex 4.

Annex 1

Approved Recommendations and Reports produced by Working Party 4A

During the current study period Working Party 4A held its meetings in May/June 2012, September 2012, May 2013, October 2013, February 2014, July 2014 and June 2015 under the chairmanship of Mr Jack Wengryniuk (United States). In these meetings WP 4A produced a total of two new Recommendations, seven revised Recommendations, twelve new Reports and one revised Report which are listed below.

New Recommendations

– ITU‑R S.2029-0 “Statistical methodology to assess time-varying interference produced by a geostationary fixed-satellite service network of earth stations operating with MF‑TDMA schemes to geostationary fixed-satellite service networks”

– ITU‑R BO.2063-0 “Alternative BSS earth station antenna radiation pattern for 12 GHz BSS bands with effective apertures in the range 55-75 cm”.

Revised Recommendations

– ITU‑R BO.1898-1 “Power flux-density value required for the protection of receiving earth stations in the broadcasting-satellite service in Regions 1 and 3 from emissions by a station in the fixed and/or mobile services in the band 21.4-22 GHz”

– ITU‑R S.732-1 “Method for statistical processing of earth station antenna side-lobe peaks to determine excess over antenna reference patterns and conditions for acceptability of any excess”

– ITU‑R SF.674-3 “Determination of the impact on the fixed service operating in the 11.7-12.2 GHz band when geostationary fixed-satellite service networks in Region 2 exceed power flux-density thresholds for coordination”

– ITU‑R S.1503-2 “Functional description to be used in developing software tools for determining conformity of non-geostationary-satellite orbit fixed-satellite system networks with limits contained in Article **22** of the Radio Regulations”

– ITU‑R BO.1443-3 “Reference BSS earth station antenna patterns for use in interference assessment involving non-GSO satellites in frequency bands covered by RR Appendix **30**”

– ITU‑R S.1717-1 “Electronic data file format for earth station antenna patterns”

– ITU‑R S.1587-3 “Technical characteristics of earth stations on board vessels communicating with FSS satellites in the frequency bands 5 925-6 425 MHz and 14‑14.5 GHz which are allocated to the fixed-satellite service”.

New Reports

– ITU‑R S.2261-0 “Technical and operational requirements for earth stations on mobile platforms operating in non-GSO FSS systems in the frequency bands from 17.3 to 19.3, 19.7 to 20.2, 27 to 29.1 and from 29.5 to 30.0 GHz”

– ITU‑R S.2278-0 “Use of very small aperture terminals (VSATs)”

– ITU‑R S.2280-0 “Assessment of the orbital-frequency resource used by a geostationary satellite communication network”

– ITU‑R S.2357-0 “Technical and operational guidelines for earth stations on mobile platforms communicating with geostationary space stations in the fixed-satellite service in the frequency bands 19.7-20.2 GHz and 29.5-30.0 GHz”

– ITU‑R S.2361-0 “Broadband access by fixed-satellite service systems”

– ITU‑R S.2362-0 “Methodology to estimate the sensitivity of GSO FSS interference levels to the geographical location of earth stations communicating with GSO satellites in the fixed-satellite service in the 14 GHz and 30 GHz frequency ranges”

– ITU‑R S.2363-0 “Interference effect of transmissions from earth stations on board vessels operating in fixed-satellite service networks on terrestrial co-frequency stations”

– ITU‑R S.2364-0 “GSO FSS deployment characteristics in the 14-14.5 GHz band”

– ITU‑R S.2365-0 “Assessment on use of spectrum in the 10-17 GHz band for the GSO fixed-satellite service in Region 1”

– ITU‑R S.2366-0 “Assessment on use of spectrum in the 13-17 GHz range for the GSO fixed-satellite service in Regions 2 and 3”

– ITU‑R S.2367-0 “Sharing and compatibility between International Mobile Telecommunication systems and fixed-satellite service networks in the 5 850‑6 425 MHz frequency range”

– ITU‑R S.2368-0 “Sharing studies between International Mobile Telecommunication-Advanced systems and geostationary satellite networks in the fixed-satellite service in the 3 400-4 200 MHz and 4 500-4 800 MHz frequency bands in the WRC study cycle leading to WRC-15”.

Revised Report

– ITU‑R BO.2007-2 “Considerations for the introduction of broadcasting-satellite service of high-definition television and ultra-high-definition television systems in the band 21.4-22 GHz”.

Working Party 4A also developed a preliminary draft new Recommendation (PDNR), preliminary draft new Reports (PDNRep) and preliminary draft revision of Reports (PDRRep) which are listed below.

PDNR

– ITU‑R S.[FSS-REF\_FOR\_UA] “Technical and operational characteristics of Unmanned Aircraft Control and Non-Payload satellite communication links operated in certain frequency bands allocated to the fixed-satellite service not subject to RR Appendices **30**, **30A** and **30B**”.

PDNRep

– ITU‑R S.[FSS 7/8 GHZ COMPATIBILITY] “Compatibility studies between the fixed‑satellite service and the terrestrial and other space services in the frequency bands 7 150-7 250 MHz (space-to-Earth) and 8 400-8 500 MHz (Earth-to-space)”

– ITU‑R S.[FSS/BSS] “Review of the inter-regional sharing provisions contained in Annex 7 To RR Appendix **30**”

– ITU‑R S.[RES756] “Studies on possible reduction of the coordination arc and technical criteria used in application of RR No. **9.41** in respect of coordination under RR No. **9.7**”.

PDRRep

– ITU‑R BO.2019 “Interference calculation methods”

– ITU‑R S.2223 “Technical and operational requirements for GSO FSS earth stations on mobile platforms in bands from 17.3 to 30.0 GHz”.

Work also proceeded on topics that may lead to further new Recommendations and/or Reports in the near future. Such topics include:

– methodology for providing compatibility between ubiquitously deployed earth stations of the fixed-satellite service and stations of the fixed and/or mobile services in adjacent areas for the cases described in the Tables of Appendix 7 of the Radio Regulations;

– methodology for calculating separation distances for sharing in the 3 400-3 600 MHz range between earth stations of the fixed-satellite service and stations in the mobile service;

– suggested guidelines on the application of Recommendation ITU-R S.1432;

– guidelines that could be used by administrations wishing to license ESOMPs mounted on vessels and operating in non-GSO FSS systems in the frequency range 27-29.1 GHz while ensuring protection of terrestrial services;

– guidelines that could be used by administrations wishing to license airborne ESOMPs operating in non-GSO FSS systems in the frequency range 27-29.1 GHz while ensuring protection of terrestrial services.

Annex 2

Approved Recommendations and Reports produced by Working Party 4B

During the current study period Working Party 4B held its meetings in May/June 2012, September 2012, April/May 2013, September/October 2013, February 2014, June/July 2014 and June 2015 under the chairmanship of Mr David Weinreich (United States). In these meetings WP 4B produced a total of three new Recommendations, three revised Recommendations, three new Reports and three revised Reports which are listed below.

New Recommendations

– ITU‑R M.2047-0 “Detailed specifications of the satellite radio interfaces of International Mobile Telecommunications-Advanced (IMT-Advanced)”

– ITU‑R S.2049-0 “Access procedures for fixed-satellite service occasional use, transmissions to geostationary-satellite orbit space stations, in the 4/6 GHz and 11‑12/13/14 GHz FSS bands”

– ITU‑R S.2062-0 “Carrier identification system for digital-modulation transmissions of fixed-satellite service occasional use carrier earth station transmissions using geostationary-satellite networks in the 4/6 GHz and 11-12/13/14 GHz FSS bands”.

Revised Recommendations

– ITU‑R M.1850-1 “Detailed specifications of the radio interfaces for the satellite component of International Mobile Telecommunications-2000 (IMT-2000)”

– ITU‑R M.1850-2 “Detailed specifications of the radio interfaces for the satellite component of International Mobile Telecommunications-2000 (IMT-2000)”

– ITU‑R M.2014-1 “Global circulation of IMT satellite terminals”.

New Reports

– ITU‑R S.2278-0 “Use of very small aperture terminals (VSATs)”

– ITU‑R S.2279-0 “Outcome of the evaluation, consensus building and decision of the IMT-Advanced satellite process (Steps 4 to 7), including characteristics of IMT-Advanced satellite radio interfaces”

– ITU‑R S.2306-0 “Multidimensional signal mapping technique for satellite communications”.

Revised Reports

– ITU‑R S.2151-1 “Use and examples of systems in the fixed-satellite service in the event of natural disasters and similar emergencies for warning and relief operations”

– ITU‑R M.2176-1 “Vision and requirements for the satellite radio interface(s) of IMT‑Advanced”

– ITU‑R S.2173-1 “Multicarrier based transmission techniques for satellite systems”.

Working Party 4B also developed preliminary draft new Recommendations (PDNR) and preliminary draft revision of Recommendations (PDRR) which are listed below.

PDNR

– ITU-R BO.[UHDTV\_TRANSMISSION] “Transmission system for UHDTV satellite broadcasting”;

– ITU‑R S.[SHORT-TERM-PERF] “Allowable short-term error performance for a satellite hypothetical reference digital path”.

PDRR

– ITU-R BO.1784 “Digital satellite broadcasting system with flexible configuration (television, sound and data)”.

Work also proceeded on topics that may lead to further new Recommendations and/or Reports in the near future. Such topics include:

– satellite transmission experiments for UHDTV satellite broadcasting;

– scenarios and performance of an integrated MSS system operating in frequency bands below 3 GHz.

Annex 3

Approved Recommendations and Reports produced by Working Party 4C

During the current study period Working Party 4C held its meetings in May 2012, September 2012, April/May 2013, September/October 2013, February 2014, June/July 2014 and June 2015 under the chairmanship of Mr Alexandre Vallet (France). In these meetings WP 4C produced a total of five new Recommendations, six revised Recommendations and five new Reports which are listed below.

New Recommendations

– ITU‑R M.2030-0 “Evaluation method for pulsed interference from relevant radio sources other than in the radionavigation-satellite service to the radionavigation-satellite service systems and networks operating in the 1 164-1 215 MHz, 1 215-1 300 MHz and 1 559-1 610 MHz frequency bands”;

– ITU‑R M.2031-0 “Characteristics and protection criteria of receiving earth stations and characteristics of transmitting space stations of the radionavigation-satellite service (space-to-Earth) operating in the band 5 010-5 030 MHz”;

– ITU‑R M.2046-0 “Characteristics and protection criteria for non-geostationary mobile-satellite service systems operating in the band 399.9-400.05 MHz”;

– Draft new Recommendation ITU‑R M.[AMS(R)S.METHODOLOGY]-0 “Methodology to calculate spectrum requirements within the frequency bands 1 545-1 555 MHz (space-to-Earth) and 1 646.5-1 656.5 MHz (Earth-to-space) for aeronautical mobile‑satellite (R) service communications related to the priority categories 1 to 6 of Article **44** of the Radio Regulations” (see Document 4/1005);

– Draft new Recommendation ITU‑R M.[MSS-RDSS-SHARE]-0 “Methodology and technical example to assist coordination of the mobile-satellite service and the radiodetermination-satellite service with the fixed service based on the power flux‑density coordination trigger levels in the 2 483.5-2 500 MHz band” (see Administrative Circular CACE/753).

Revised Recommendations

– ITU‑R M.1901-1 “Guidance on ITU-R Recommendations related to systems and networks in the radionavigation-satellite service operating in the frequency bands 1 164‑1 215 MHz, 1 215-1 300 MHz, 1 559-1 610 MHz, 5 000-5 010 MHz and 5 010‑5 030 MHz”;

– ITU‑R M.1787-2 “Description of systems and networks in the radionavigation-satellite service (space-to-Earth and space-to-space) and technical characteristics of transmitting space stations operating in the bands 1 164-1 215 MHz, 1 215-1 300 MHz and 1 559‑1 610 MHz”;

– ITU‑R M.1478-3 “Protection criteria for Cospas-Sarsat search and rescue instruments in the band 406-406.1 MHz”;

– ITU‑R M.1831-1 “A coordination methodology for RNSS inter-system interference estimation”;

– ITU‑R M.2031-1 “Characteristics and protection criteria of receiving earth stations and characteristics of transmitting space stations of the radionavigation-satellite service (space-to-Earth) operating in the band 5 010-5 030 MHz”;

– ITU‑R M.1906-1 “Characteristics and protection criteria of receiving space stations and characteristics of transmitting earth stations in the radionavigation-satellite service (Earth-to-space) operating in the band 5 000-5 010 MHz”.

New Reports

– ITU‑R M.2262-0 “Potential interference between the ICAO standard microwave landing system (MLS) operating above 5 030 MHz and radionavigation-satellite service (RNSS) systems in the band 5 000-5 030 MHz”;

– ITU‑R M.2305-0 “Consideration of aggregate radio frequency interference event potentials from multiple Earth exploration-satellite service systems on radionavigation-satellite service receivers operating in the 1 215-1 300 MHz frequency band”;

– ITU‑R M.2358-0 “Possible allocations to the maritime mobile-satellite service in the 7/8 GHz range”;

– ITU‑R M.2359-0 “Protection of the 406-406.1 MHz band”;

– ITU‑R M.2360-0 “Sharing between GSO MSS and other services in the allocations in the 22-26 GHz range”.

Working Party 4C also developed a preliminary draft new Report (PDNRep) which is listed below.

PDNRep

– ITU‑R M.[ADS-MSS] “Use of existing mobile-satellite service systems for aircraft tracking”.

Work also proceeded on topics that may lead to further new Recommendations and/or Reports in the near future. Such topics include:

– Traffic forecasts and estimated spectrum requirements for future development of broadband applications of the mobile-satellite service in the range 22-26 GHz;

– RNSS applications in the 1 164-1 215 MHz, 1 215-1 300 MHz, and 1 559-1 610 MHz frequency bands;

– Sharing study between mobile satellite systems and terrestrial LTE systems in the IMT‑S2.1G bands.

Annex 4

Joint Task Group 4-5-6-7 – WRC-15 agenda items 1.1 and 1.2

# 1 Introduction

Joint Task Group 4-5-6-7 (JTG 4-5-6-7) was established by a decision of the first session of the Conference Preparatory Meeting (CPM15-1) as the responsible group for WRC-15 agenda items 1.1 and 1.2. Its terms of reference required it to conduct studies and develop draft CPM text in accordance with Resolution 232 (WRC-12) and Resolution 233 (WRC-12). Its terms of reference also allowed JTG 4-5-6-7 to develop, as appropriate, draft ITU-R Recommendations and Reports concerning the results of spectrum sharing and compatibility studies, where required for later submission to relevant Study Groups for adoption in accordance with Resolution ITU-R 1-6.

JTG 4-5-6-7 met six times between July 2012 and July 2014. The first two meetings were held under the chairmanship of Thomas EWERS (Germany) and the last four meetings were held under the Chairmanship of Martin FENTON (UK). Table 1 below shows the level of participation and the number of contributions dealt with at each meeting. It also provides a reference to the Chairman’s Report for each meeting.

Table 1

Joint Task Group 4-5-6-7 meetings

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | First meetingJuly 2012 | Second meetingNov. 2012 | Third meetingJuly 2013 | Fourth meetingOct. 2013 | Fifth meetingFeb. 2014 | Sixth meetingJuly 2014 |
| Location | Geneva | Geneva | South Africa | Geneva | Geneva | Geneva |
| Participants | 241 | 280 | 270 | 349 | 394 | 420 |
| Administrations | 51 | 55 | 42 | 59 | 70 | 70 |
| Input documents | 39 | 67 | 132 | 154 | 189 | 131 |
| Chairman’s Report | 4-5-6-7/[042](http://www.itu.int/md/R12-JTG4567-C-0042/en) | 4-5-6-7/[113](http://www.itu.int/md/R12-JTG4567-C-0113/en) | 4-5-6-7/[242](http://www.itu.int/md/R12-JTG4567-C-0242/en) | 4-5-6-7/[393](http://www.itu.int/md/R12-JTG4567-C-0393/en) | 4-5-6-7/[584](http://www.itu.int/md/R12-JTG4567-C-0584/en) | 4-5-6-7/[715](http://www.itu.int/md/R12-JTG4567-C-0715/en) |

# 2 Results

## 2.1 Preparation for WRC-15

JTG 4-5-6-7 successfully completed its main task of finalizing the draft CPM texts for WRC-15 agenda items 1.1 and 1.2 (see Annexes 3 and 4 to the final JTG 4‑5‑6‑7 Chairman’s Report (Document 4-5-6-7/[715](http://www.itu.int/md/R12-JTG4567-C-0715/en)).

## 2.2 Reports

JTG 4-5-6-7 agreed 16 draft new (DN) Reports on sharing and compatibility studies, these are listed in Table 2 below and they were forwarded to the relevant Study Groups for their consideration. They are attached as Annexes 5 to 20 to the final JTG 4-5-6-7 Chairman’s Report (Document 4-5-6-7/[715](http://www.itu.int/md/R12-JTG4567-C-0715/en)).

Table 2

DN Reports agreed by JTG 4-5-6-7

| Reports | Title | Annex to Document 4-5-6-7/[715](http://www.itu.int/md/R12-JTG4567-C-0715/en) | Relevant Study Group(s) |
| --- | --- | --- | --- |
| DN Report ITU-R BT.[MBB\_DTTB\_470\_694](Report ITU-R BT.2337) | Sharing and compatibility studies between digital terrestrial television broadcasting and terrestrial mobile broadband applications, including IMT, in the frequency band 470‑694/698 MHz | 5 | 5 & 6 |
| DN Report ITU-R F.[IMT-FS 470-694/698 MHz SHARING](Report ITU-R F.2331) | Sharing and compatibility between IMT systems and fixed service systems in the 470‑694/698 MHz frequency range | 6 | 5 |
| DN Report ITU-R RA.[RAS-IMT](Report ITU-R RA.2332) | Compatibility and sharing studies between the radio astronomy service and IMT systems in the frequency bands 608-614 MHz, 1 330‑1 400 MHz, 1 400-1 427 MHz, 1 610.6‑1 613.8 MHz, 1 660 1 670 MHz, 2 690-2 700 MHz, 4 800‑4 990 MHz and 4 990-5 000 MHz | 7 | 5 & 7 |
| DN Report ITU-R BT.[SAB\_SAP](Report ITU-R BT.2338) | SAB/SAP spectrum use in Region 1 and the implication of a co-primary allocation for the mobile service in the frequency band 694‑790 MHz | 8 | 5 & 6 |
| DN Report ITU-R BT.[IMT\_DTTB\_694-790-Co-Channel](Report ITU-R BT.2339) | Co-channel sharing and compatibility studies between digital terrestrial television broadcasting and IMT in the frequency band 694-790 MHz in the GE06 planning area | 9 | 5 & 6 |
| DN Report ITU-R F.[FS-IMT 1 350‑1 530 MHz CO‑CHANNEL SHARING](Report ITU-R F.2333) | Sharing and compatibility study between IMT and the fixed service | 10 | 5 |
| DN Report ITU-R RS.[EESS-IMT 1.4 GHz](Report ITU-R RS.2336) | Consideration of the frequency bands 1 375‑1 400 MHz and 1 427‑1 452 MHz for the mobile service – compatibility with systems of the Earth exploration-satellite service (EESS) within the 1 400-1 427 MHz frequency band | 11 | 5 & 7 |
| DN Report ITU-R M.[AMT-IMT.SHARING.L-BAND](Report ITU-R M.2324) | Sharing studies between potential IMT systems and aeronautical mobile telemetry systems in the frequency band 1 429-1 535 MHz | 12 | 5 |
| DN Report ITU-R BS.[BS\_IMT](Report ITU-R BS.2340) | Sharing between the mobile service (MS) and the broadcasting service (BS) in the 1 452-1 492 MHz frequency band | 13 | 5 & 6 |
| DN Report ITU-R SA.[METSAT-IMT 1.7 GHz](Report ITU-R SA.2329) | Sharing assessment between meteorological satellite systems and IMT stations in the 1 695-1 710 MHz frequency band | 14 | 5 & 7 |
| DN Report ITU-R SA.[EESS-IMT2 025-2 290 MHz](Report ITU-R SA.2325) | Sharing between space-to-space links in space research, space operation and Earth exploration-satellite services and IMT systems in the frequency bands 2 025-2 110 MHz and 2 200‑2 290 MHz | 15 | 5 & 7 |
| DN Report ITU-R F.[IMT-FS 3 400-4 200 MHz SHARING](Report ITU-R F.2328) | Sharing and compatibility between IMT systems and fixed service systems in the 3 400‑4 200 MHz frequency range | 16 | 5 |
| DN Report ITU-R [FSS-IMT C-BAND DOWNLINK](Report ITU-R S.2368) | Sharing studies between IMT-Advanced systems and geostationary satellite networks in the fixed-satellite service in the 3 400-4 200 MHz and 4 500-4 800 MHz frequency bands | 17 | 4 & 5 |
| DN Report ITU-R F.[FS-IMT 4 400‑4 990 MHz SHARING AND COMPATIBILITY](Report ITU-R F.2327) | Sharing and compatibility study between IMT systems and point-to-point fixed wireless systems in the frequency band 4 400-4 990 MHz | 18 | 5 |
| DN Report ITU-R [FSS-IMT C-BAND UPLINK](Report ITU-R S.2367) | Sharing and compatibility between IMT systems and fixed-satellite service networks in 5 850-6 425 MHz frequency range | 19 | 4 & 5 |
| DN Report ITU-R F.[IMT-FS 5 925-6 425 MHz SHARING](Report ITU-R F.2326) | Sharing and compatibility study between indoor IMT small cells and fixed service stations in the 5 925-6 425 MHz frequency band | 20 | 5 |

It should be noted that at the time of writing, 14 of these Reports have been approved by the relevant Study Groups. The final two are pending approval by Study Group 4. It should also be noted that in Table 2, where two Study Groups are indicated as relevant for a particular Report, approve of that Report is the joint responsibility of both Study Groups.

In addition to the DN Reports listed above, JTG 4-5-6-7 worked on a number of other working documents toward preliminary draft new (WDPDN) Reports and preliminary draft new (PDN) Reports. These are listed in Table 3 below and attached as Annexes 22 to 36 to the final JTG 4‑5‑6‑7 Chairman’s Report (Document 4-5-6-7/[715](http://www.itu.int/md/R12-JTG4567-C-0715/en)). It should be noted, however, that no distinction should be made on the status of these annexes regardless of whether they are indicated as a PDN or a WDPDN Report/Recommendation; they have not been forwarded to the Study Groups for consideration.

Table 3

WDPD & PDN Reports attached to the JTG 4-5-6-7 Chairman’s Report

| Reports | Title | Annex to Document 4-5-6-7/[715](http://www.itu.int/md/R12-JTG4567-C-0715/en) |
| --- | --- | --- |
| PDN ITU-R Report on sharing and compatibility studies under agenda item 1.2 | Adjacent channel compatibility between IMT in the frequency band 694-790 MHz and digital terrestrial television broadcasting in the GE06 planning area | 22 |
| WDPDN Report ITU-R M.[ARNS‑MS] | Compatibility studies of the mobile service with the aeronautical radionavigation service in the frequency band 694-790 MHz in Region 1 | 23 |
| PDN Recommendation ITU-R BT.[DVBTPROT700] | Assessment of the protection of DTTB reception considering the cumulative interference from IMT base stations for application in the GE06 area | 24 |
| WDPDN Report ITU-R M.[RADAR1300] | Studies on the impact of IMT use on radar systems in the frequency range 1 300-1 400 MHz | 25 |
| WDPDN Report ITU-R F.[IMT 1 350‑1 530 MHz ADJACENT CHANNEL SHARING] | [Adjacent channel / adjacent band coexistence between IMT systems and fixed service point-to-point links currently operating in 1 350-1 527 MHz] | 26 |
| WDPDN Report ITU-R M.[BSS-MS] | Sharing and compatibility studies between IMT systems and BSS systems in the frequency band 1 452-1 492 MHz | 27 |
| WDPDN Report for attachment to the JTG 4-5-6-7 Chairman’s Report | Adjacent band compatibility studies of IMT‑Advanced systems in the mobile service in the band below 1 518 MHz with respect to systems in the mobile-satellite service in the frequency band 1 518‑1 559 MHz | 28 |
| WDPDN Report for attachment to the JTG 4-5-6-7 Chairman’s Report | Sharing studies of IMT-Advanced systems in the mobile service with respect to systems in the mobile-satellite service in the frequency bands 1 518‑1 559 MHz, 1 626.5-1 660.5 MHz and 1 668‑1 675 MHz | 29 |
| WDPDN Report ITU-R M.[RADAR2700] | Studies on the impact of IMT use on radar systems in the frequency band 2 700-2 900 MHz | 30 |
| WDPDN new Report ITU-R M.[RADAR2900] | Studies on the impact of IMT use on radar systems in the frequency band 2 900-3 100 MHz | 31 |
| PDN Report ITU-R M.[RADAR3300] | Sharing between indoor IMT systems and radar systems in the frequency band 3 300‑3 400 MHz  | 32 |
| PDN Report ITU-R M.[AERO-IMT.SHARING.C-BAND] | Sharing and compatibility studies between aeronautical mobile[/ground mobile] applications and potential IMT systems in the 4 400-4 990 MHz band | 33 |
| WDPDN Report ITU-R M.[RLAN5GHz.SHAR] | Compatibility studies between radio local area network systems and radiodetermination systems in the 5 350-5 470 MHz frequency band | 34 |
| PDN Report ITU R RS.[EESS RLAN 5 GHz] | Sharing studies between RLAN and EESS (active) systems in the frequency range 5 350-5 470 MHz | 35 |
| PDN Report ITU-R M.[5 350 MHz AERO] | Compatibility studies between radio local area network systems and aeronautical airborne radar systems in the 5 350‑5 470 MHz frequency band | 36 |

## 2.3 Recommendations

JTG 4-5-6-7 also developed one PDN Recommendation, ITU-R M.[BSMS700] on “Out-of-band emission limit of IMT mobile stations operating in the frequency band 694-790 MHz in Region 1” (see Annex 21 to Document 4-5-6-7/[715](http://www.itu.int/md/R12-JTG4567-C-0715/en)). A number of administrations considered that this Recommendation was mature and were of the view that, as it is important to the work of WRC‑15 under agenda item 1.2, it should have been forwarded to the relevant Study Groups for adoption and approval and that if it could not be approved by the Study Groups that it should then be forwarded to the Radiocommunication Assembly. A number of other administrations were of the opposite view, believing that the draft recommendation was not mature enough to be agreed. No consensus could be reached on this PDN Recommendation and, as a consequence, it was not agreed for submission to the relevant Study Groups for adoption and approval.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_