

International Telecommunication Union

# **World Radiocommunication Conference 2019 (WRC-19)**

[www.itu.int/go/wrc-19](http://www.itu.int/go/wrc-19)

*Agenda and Relevant Resolutions*

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## PREFACE

In accordance with Council Resolution 1380 (C16, last amended C17) and Nos. 42 and 118 of the Convention, the forthcoming World Radiocommunication Conference will take place in Sharm el-Sheikh (Egypt) from 28 October to 22 November 2019 and will be a new landmark for the radiocommunication world and the use of the radio-frequency spectrum and satellite orbits.

This booklet provides an easy access to the WRC-19 agenda as well as to the pertinent resolutions referenced therein. It has been prepared following the past initiatives of the International Amateur Radio Union ([www.iaru.org](http://www.iaru.org)) and in order to maintain this good tradition to better assist the ITU membership in the preparations for the conference.

In addition, ITU-R preparatory studies and activities for WRC-19 can be found at [www.itu.int/go/rcpm-wrc-19-studies](http://www.itu.int/go/rcpm-wrc-19-studies).

I wish all of the participants to this exceptional event enlightening discussions based on a spirit of deep cooperation that will obviously lead, as for past events, to a most successful outcome.

François Rancy  
Director, Radiocommunication Bureau

Council RESOLUTION 1380 (C16, last amended C17)

**Place, dates and agenda of the  
World Radiocommunication Conference (WRC-19)**

The Council,

*noting*

that Resolution 809 of the World Radiocommunication Conference (Geneva, 2015):

- a) resolved to recommend to the Council that a world radiocommunication conference be held in 2019 for a maximum period of four weeks;
- b) recommended its agenda, and invited the Council to finalize the agenda and arrange for the convening of WRC-19 and to initiate as soon as possible the necessary consultation with Member States,

*noting further*

that the Government of the Arab Republic of Egypt has invited the International Telecommunication Union to hold the World Radiocommunication Conference 2019 in the city of Sharm el-Sheikh (Egypt),

*resolves*

to convene a World Radiocommunication Conference (WRC-19) in Sharm el-Sheikh (Egypt) from 28 October to 22 November 2019, preceded by the Radiocommunication Assembly from 21 to 25 October 2019, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC-15 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the frequency bands under consideration, to consider and take appropriate action in respect of the following items:

1.1 to consider an allocation of the frequency band 50-54 MHz to the amateur service in Region 1, in accordance with [Resolution 658 \(WRC-15\)](#);

1.2 to consider in-band power limits for earth stations operating in the mobile-satellite service, meteorological-satellite service and Earth exploration-satellite service in the frequency bands 401-403 MHz and 399.9-400.05 MHz, in accordance with [Resolution 765 \(WRC-15\)](#);

1.3 to consider possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a possible primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz, in accordance with [Resolution 766 \(WRC-15\)](#);

1.4 to consider the results of studies in accordance with [Resolution 557 \(WRC-15\)](#), and review, and revise if necessary, the limitations mentioned in Annex 7 to Appendix 30 (**Rev.WRC-15**), while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and the List and the future development of the broadcasting-satellite service within the Plan, and existing and planned fixed-satellite service networks;

1.5 to consider the use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service and take appropriate action, in accordance with [Resolution 158 \(WRC-15\)](#);

1.6 to consider the development of a regulatory framework for non-GSO FSS satellite systems that may operate in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5



GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), in accordance with [Resolution 159 \(WRC-15\)](#);

1.7 to study the spectrum needs for telemetry, tracking and command in the space operation service for non-GSO satellites with short duration missions, to assess the suitability of existing allocations to the space operation service and, if necessary, to consider new allocations, in accordance with [Resolution 659 \(WRC-15\)](#);

1.8 to consider possible regulatory actions to support Global Maritime Distress Safety Systems (GMDSS) modernization and to support the introduction of additional satellite systems into the GMDSS, in accordance with [Resolution 359 \(Rev.WRC-15\)](#);

1.9 to consider, based on the results of ITU-R studies:

1.9.1 regulatory actions within the frequency band 156-162.05 MHz for autonomous maritime radio devices to protect the GMDSS and automatic identifications system (AIS), in accordance with [Resolution 362 \(WRC-15\)](#);

1.9.2 modifications of the Radio Regulations, including new spectrum allocations to the maritime mobile-satellite service (Earth-to-space and space-to-Earth), preferably within the frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz of Appendix 18, to enable a new VHF data exchange system (VDES) satellite component, while ensuring that this component will not degrade the current terrestrial VDES components, applications specific messages (ASM) and AIS operations and not impose any additional constraints on existing services in these and adjacent frequency bands as stated in *recognizing d) and e)* of [Resolution 360 \(Rev.WRC-15\)](#);

1.10 to consider spectrum needs and regulatory provisions for the introduction and use of the Global Aeronautical Distress and Safety System (GADSS), in accordance with [Resolution 426 \(WRC-15\)](#);

1.11 to take necessary actions, as appropriate, to facilitate global or regional harmonized frequency bands to support railway radiocommunication systems between train and trackside within existing mobile service allocations, in accordance with [Resolution 236 \(WRC-15\)](#);

1.12 to consider possible global or regional harmonized frequency bands, to the maximum extent possible, for the implementation of evolving Intelligent Transport Systems (ITS) under existing mobile-service allocations, in accordance with [Resolution 237 \(WRC-15\)](#);

1.13 to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with [Resolution 238 \(WRC-15\)](#);

1.14 to consider, on the basis of ITU-R studies in accordance with [Resolution 160 \(WRC-15\)](#), appropriate regulatory actions for high-altitude platform stations (HAPS), within existing fixed-service allocations;

1.15 to consider identification of frequency bands for use by administrations for the land-mobile and fixed services applications operating in the frequency range 275-450 GHz, in accordance with [Resolution 767 \(WRC-15\)](#);

1.16 to consider issues related to wireless access systems, including radio local area networks (WAS/RLAN), in the frequency bands between 5 150 MHz and 5 925 MHz, and take the appropriate regulatory actions, including additional spectrum allocations to the mobile service, in accordance with [Resolution 239 \(WRC-15\)](#);

2 to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with [Resolution 28 \(Rev.WRC-15\)](#), and to decide whether or not to update the corresponding

references in the Radio Regulations, in accordance with the principles contained in Annex 1 to [Resolution 27 \(Rev.WRC-12\)](#);

3 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the conference;

4 in accordance with [Resolution 95 \(Rev.WRC-07\)](#), to review the resolutions and recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

5 to review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the Convention;

6 to identify those items requiring urgent action by the radiocommunication study groups in preparation for the next world radiocommunication conference;

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 \(Rev.WRC-07\)](#), in order to facilitate rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit;

8 to consider and take appropriate action on requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account [Resolution 26 \(Rev.WRC-07\)](#);

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-15;

9.2 on any difficulties or inconsistencies encountered in the application of the Radio Regulations\* ; and

9.3 on action in response to [Resolution 80 \(Rev.WRC-07\)](#);

10 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention,

*instructs the Director of the Radiocommunication Bureau*

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-19,

*instructs the Secretary-General*

1 to consult the Member States on the precise place and exact dates of the 2019 World Radiocommunication Conference and Radiocommunication Assembly, as well as on the agenda of the World Radiocommunication Conference 2019;

2 to make all the necessary arrangements, in agreement with the Director of the Radiocommunication Bureau, for the convening of the Conference;

3 to communicate this Resolution to international and regional organizations concerned.

*Ref.: Documents [C16/121](#) and [C16/130](#), [C17/130](#) and [C17/141](#)*

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\* This agenda item is strictly limited to the Report of the Director on any difficulties or inconsistencies encountered in the application of the Radio Regulations and the comments from administrations.

Note by the Secretariat: Nine issues have been identified at CPM19-1 (see Administrative Circular [CA/226](#)) in the relevant WRC-15 Resolutions for the preparation of WRC-19 agenda item 9.1, as follows:

- 9.1.1 [Resolution 212 \(Rev.WRC-15\)](#) – Implementation of International Mobile Telecommunications in the frequency bands 1 885-2 025 MHz and 2 110-2 200 MHz;
- 9.1.2 [Resolution 761 \(WRC-15\)](#) – Compatibility of International Mobile Telecommunications and broadcasting-satellite service (sound) in the frequency band 1 452-1 492 MHz in Regions 1 and 3;
- 9.1.3 [Resolution 157 \(WRC-15\)](#) – Study of technical and operational issues and regulatory provisions for new non-geostationary-satellite orbit systems in the 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725-7 025 MHz frequency bands allocated to the fixed-satellite service;
- 9.1.4 [Resolution 763 \(WRC-15\)](#) – Stations on board sub-orbital vehicles;
- 9.1.5 [Resolution 764 \(WRC-15\)](#) – Consideration of the technical and regulatory impacts of referencing Recommendations ITU-R M.1638-1 and ITU-R M.1849-1 in Nos. 5.447F and 5.450A of the Radio Regulations;
- 9.1.6 [Resolution 958 \(WRC-15\)](#) – Annex item 1) Studies concerning Wireless Power Transmission (WPT) for electric vehicles: a) to assess the impact of WPT for electric vehicles on radiocommunication services; b) to study suitable harmonized frequency ranges which would minimize the impact on radiocommunication services from WPT for electrical vehicles. These studies should take into account that the International Electrotechnical Commission (IEC), the International Organization for Standardization (ISO) and the Society of Automotive Engineers (SAE) are in the process of approving standards intended for global and regional harmonization of WPT technologies for electric vehicles;
- 9.1.7 [Resolution 958 \(WRC-15\)](#) – Annex item 2) Studies to examine: a) whether there is a need for possible additional measures in order to limit uplink transmissions of terminals to those authorized terminals in accordance with No. **18.1**; b) the possible methods that will assist administrations in managing the unauthorized operation of earth station terminals deployed within its territory, as a tool to guide their national spectrum management programme, in accordance with Resolution ITU-R 64 (RA-15);
- 9.1.8 [Resolution 958 \(WRC-15\)](#) – Annex item 3) Studies on the technical and operational aspects of radio networks and systems, as well as spectrum needed, including possible harmonized use of spectrum to support the implementation of narrowband and broadband machine-type communication infrastructures, in order to develop Recommendations, Reports and/or Handbooks, as appropriate, and to take appropriate actions within the ITU Radiocommunication Sector (ITU-R) scope of work;
- 9.1.9 [Resolution 162 \(WRC-15\)](#) – Studies relating to spectrum needs and possible allocation of the frequency band 51.4-52.4 GHz to the fixed-satellite service (Earth-to-space).RESOLUTION 809 (WRC-15)

### **Agenda for the 2019 World Radiocommunication Conference**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for a world radiocommunication conference should be established four to six years in advance and that a final agenda shall be established by the ITU Council two years before the conference;
- b) Article 13 of the ITU Constitution relating to the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention relating to their agendas;
- c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

*recognizing*

- a) that this conference has identified a number of urgent issues requiring further examination by WRC-19;
- b) that, in preparing this agenda, some items proposed by administrations could not be included and have had to be deferred to future conference agendas,

*resolves*

to recommend to the Council that a world radiocommunication conference be held in 2019 for a maximum period of four weeks, with the following agenda:

1 on the basis of proposals from administrations, taking account of the results of WRC-15 and the Report of the Conference Preparatory Meeting, and with due regard to the requirements of existing and future services in the frequency bands under consideration, to consider and take appropriate action in respect of the following items:

1.1 to consider an allocation of the frequency band 50-54 MHz to the amateur service in Region 1, in accordance with [Resolution 658 \(WRC-15\)](#);

1.2 to consider in-band power limits for earth stations operating in the mobile-satellite service, meteorological-satellite service and Earth exploration-satellite service in the frequency bands 401-403 MHz and 399.9-400.05 MHz, in accordance with [Resolution 765 \(WRC-15\)](#);

1.3 to consider possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a possible primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz, in accordance with [Resolution 766 \(WRC-15\)](#);

1.4 to consider the results of studies in accordance with [Resolution 557 \(WRC-15\)](#), and review, and revise if necessary, the limitations mentioned in Annex 7 to Appendix 30 (**Rev.WRC-15**), while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and the List and the future development of the broadcasting-satellite service within the Plan, and existing and planned fixed-satellite service networks;

1.5 to consider the use of the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with geostationary space stations in the fixed-satellite service and take appropriate action, in accordance with [Resolution 158 \(WRC-15\)](#);

1.6 to consider the development of a regulatory framework for non-GSO FSS satellite systems that may operate in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space), in accordance with [Resolution 159 \(WRC-15\)](#);

1.7 to study the spectrum needs for telemetry, tracking and command in the space operation service for non-GSO satellites with short duration missions, to assess the suitability of existing

allocations to the space operation service and, if necessary, to consider new allocations, in accordance with [Resolution 659 \(WRC-15\)](#);

1.8 to consider possible regulatory actions to support Global Maritime Distress Safety Systems (GMDSS) modernization and to support the introduction of additional satellite systems into the GMDSS, in accordance with [Resolution 359 \(Rev.WRC-15\)](#);

1.9 to consider, based on the results of ITU-R studies:

1.9.1 regulatory actions within the frequency band 156-162.05 MHz for autonomous maritime radio devices to protect the GMDSS and automatic identifications system (AIS), in accordance with [Resolution 362 \(WRC-15\)](#);

1.9.2 modifications of the Radio Regulations, including new spectrum allocations to the maritime mobile-satellite service (Earth-to-space and space-to-Earth), preferably within the frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz of Appendix 18, to enable a new VHF data exchange system (VDES) satellite component, while ensuring that this component will not degrade the current terrestrial VDES components, applications specific messages (ASM) and AIS operations and not impose any additional constraints on existing services in these and adjacent frequency bands as stated in *recognizing d) and e)* of [Resolution 360 \(Rev.WRC-15\)](#);

1.10 to consider spectrum needs and regulatory provisions for the introduction and use of the Global Aeronautical Distress and Safety System (GADSS), in accordance with [Resolution 426 \(WRC-15\)](#);

1.11 to take necessary actions, as appropriate, to facilitate global or regional harmonized frequency bands to support railway radiocommunication systems between train and trackside within existing mobile service allocations, in accordance with [Resolution 236 \(WRC-15\)](#);

1.12 to consider possible global or regional harmonized frequency bands, to the maximum extent possible, for the implementation of evolving Intelligent Transport Systems (ITS) under existing mobile-service allocations, in accordance with [Resolution 237 \(WRC-15\)](#);

1.13 to consider identification of frequency bands for the future development of International Mobile Telecommunications (IMT), including possible additional allocations to the mobile service on a primary basis, in accordance with [Resolution 238 \(WRC-15\)](#);

1.14 to consider, on the basis of ITU-R studies in accordance with [Resolution 160 \(WRC-15\)](#), appropriate regulatory actions for high-altitude platform stations (HAPS), within existing fixed-service allocations;

1.15 to consider identification of frequency bands for use by administrations for the land-mobile and fixed services applications operating in the frequency range 275-450 GHz, in accordance with [Resolution 767 \(WRC-15\)](#);

1.16 to consider issues related to wireless access systems, including radio local area networks (WAS/RLAN), in the frequency bands between 5 150 MHz and 5 925 MHz, and take the appropriate regulatory actions, including additional spectrum allocations to the mobile service, in accordance with [Resolution 239 \(WRC-15\)](#);

2 to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with [Resolution 28 \(Rev.WRC-15\)](#), and to decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in Annex 1 to [Resolution 27 \(Rev.WRC-12\)](#);

3 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the conference;



4 in accordance with [Resolution 95 \(Rev.WRC-07\)](#), to review the Resolutions and Recommendations of previous conferences with a view to their possible revision, replacement or abrogation;

5 to review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the Convention;

6 to identify those items requiring urgent action by the radiocommunication study groups in preparation for the next world radiocommunication conference;

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 \(Rev.WRC-07\)](#), in order to facilitate rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit;

8 to consider and take appropriate action on requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account [Resolution 26 \(Rev.WRC-07\)](#);

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-15;

9.2 on any difficulties or inconsistencies encountered in the application of the Radio Regulations\* ; and

9.3 on action in response to [Resolution 80 \(Rev.WRC-07\)](#);

10 to recommend to the Council items for inclusion in the agenda for the next WRC, and to give its views on the preliminary agenda for the subsequent conference and on possible agenda items for future conferences, in accordance with Article 7 of the Convention,

*resolves further*

to activate the Conference Preparatory Meeting,

*invites the Council*

to finalize the agenda and arrange for the convening of WRC-19, and to initiate as soon as possible the necessary consultations with Member States,

*instructs the Director of the Radiocommunication Bureau*

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-19,

*instructs the Secretary-General*

to communicate this Resolution to international and regional organizations concerned.

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\* This agenda item is strictly limited to the Report of the Director on any difficulties or inconsistencies encountered in the application of the Radio Regulations and the comments from administrations.

## RESOLUTION 810 (WRC-15)

### **Preliminary agenda for the 2023 World Radiocommunication Conference**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that, in accordance with No. 118 of the ITU Convention, the general scope of the agenda for WRC-23 should be established four to six years in advance;
- b) Article 13 of the ITU Constitution relating to the competence and scheduling of world radiocommunication conferences and Article 7 of the Convention relating to their agendas;
- c) the relevant resolutions and recommendations of previous world administrative radio conferences (WARCs) and world radiocommunication conferences (WRCs),

*resolves to give the view*

that the following items should be included in the preliminary agenda for WRC-23:

- 1 to take appropriate action in respect of those urgent issues that were specifically requested by WRC-19;
- 2 on the basis of proposals from administrations and the Report of the Conference Preparatory Meeting, and taking account of the results of WRC-19, to consider and take appropriate action in respect of the following items:
  - 2.1 to consider possible spectrum needs and regulatory actions to support Global Maritime Distress and Safety System (GMDSS) modernization and the implementation of e-navigation, in accordance with [Resolution 361 \(WRC-15\)](#);
  - 2.2 to conduct, and complete in time for WRC-23, studies for a possible new allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, in accordance with [Resolution 656 \(WRC-15\)](#);
  - 2.3 in accordance with [Resolution 657 \(WRC-15\)](#), to review the results of studies relating to the technical and operational characteristics, spectrum requirements and appropriate radio service designations for space weather sensors, with a view to providing appropriate recognition and protection in the Radio Regulations without placing additional constraints on incumbent services;
  - 2.4 study of spectrum needs and possible new allocations to the fixed-satellite service in the frequency band 37.5-39.5 GHz (Earth-to-space), in accordance with [Resolution 161 \(WRC-15\)](#);
  - 2.5 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 \(WRC-15\)](#);
- 3 to examine the revised ITU Radiocommunication Sector (ITU-R) Recommendations incorporated by reference in the Radio Regulations communicated by the Radiocommunication Assembly, in accordance with [Resolution 28 \(Rev.WRC-15\)](#), and to decide whether or not to update the corresponding references in the Radio Regulations, in accordance with the principles contained in Annex 1 to [Resolution 27 \(Rev.WRC-12\)](#);

- 4 to consider such consequential changes and amendments to the Radio Regulations as may be necessitated by the decisions of the conference;
- 5 in accordance with [Resolution 95 \(Rev.WRC-07\)](#), to review the Resolutions and Recommendations of previous conferences with a view to their possible revision, replacement or abrogation;
- 6 to review, and take appropriate action on, the Report from the Radiocommunication Assembly submitted in accordance with Nos. 135 and 136 of the Convention;
- 7 to identify those items requiring urgent action by the radiocommunication study groups;
- 8 to consider possible changes, and other options, in response to [Resolution 86 \(Rev. Marrakesh, 2002\)](#) of the Plenipotentiary Conference, on advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, in accordance with [Resolution 86 \(Rev.WRC-07\)](#), in order to facilitate the rational, efficient and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit;
- 9 to consider and take appropriate action on requests from administrations to delete their country footnotes or to have their country name deleted from footnotes, if no longer required, taking into account [Resolution 26 \(Rev.WRC-07\)](#);
- 10 to consider and approve the Report of the Director of the Radiocommunication Bureau, in accordance with Article 7 of the Convention:
  - 10.1 on the activities of ITU-R since WRC-19;
  - 10.2 on any difficulties or inconsistencies encountered in the application of the Radio Regulations; and
  - 10.3 on action in response to [Resolution 80 \(Rev.WRC-07\)](#);
- 11 to recommend to the ITU Council items for inclusion in the agenda for the following WRC, in accordance with Article 7 of the Convention,

*invites the Council*

to consider the views given in this Resolution,

*instructs the Director of the Radiocommunication Bureau*

to make the necessary arrangements to convene meetings of the Conference Preparatory Meeting and to prepare a report to WRC-23,

*instructs the Secretary-General*

to communicate this Resolution to international and regional organizations concerned.



RESOLUTION 26 (Rev.WRC-07)

**Footnotes to the Table of Frequency Allocations in Article 5 of  
the Radio Regulations**

The World Radiocommunication Conference (Geneva, 2007),

*considering*

- a) that footnotes are an integral part of the Table of Frequency Allocations in the Radio Regulations and, as such, form part of an international treaty text;
- b) that footnotes to the Table of Frequency Allocations should be clear, concise and easy to understand;
- c) that footnotes should relate directly to matters of frequency allocation;
- d) that, in order to ensure that footnotes allow modification of the Table of Frequency Allocations without introducing unnecessary complications, principles relating to the use of footnotes are needed;
- e) that, currently, footnotes are adopted by competent world radiocommunication conferences and any addition, modification or deletion of a footnote is considered and adopted by the competent conference;
- f) that some problems concerning country footnotes may be resolved through the application of a special agreement envisaged by Article 6;
- g) that, in certain cases, administrations are confronted with major difficulties due to inconsistencies or omissions in footnotes;
- h) that, in order to keep the footnotes to the Table of Frequency Allocations up to date, there should be clear and effective guidelines for additions, modifications and deletions of footnotes,

*resolves*

- 1 that, wherever possible, footnotes to the Table of Frequency Allocations should be confined to altering, limiting or otherwise changing the relevant allocations rather than dealing with the operation of stations, assignment of frequencies or other matters;
- 2 that the Table of Frequency Allocations should include only those footnotes which have international implications for the use of the radio-frequency spectrum;
- 3 that new footnotes to the Table of Frequency Allocations should only be adopted in order to:
  - a) achieve flexibility in the Table of Frequency Allocations;
  - b) protect the relevant allocations in the body of the Table and in other footnotes in accordance with Section II of Article 5;
  - c) introduce either transitional or permanent restrictions on a new service to achieve compatibility; or
  - d) meet the specific requirements of a country or area when it is impracticable to satisfy such needs otherwise within the Table of Frequency Allocations;
- 4 that footnotes serving a common purpose should be in a common format, and, where possible, be grouped into a single footnote with appropriate references to the relevant frequency bands,

*further resolves*

1 that any addition of a new footnote or modification of an existing footnote should be considered by a world radiocommunication conference only when:

- a) the agenda of that conference explicitly includes the frequency band to which the proposed additional or modified footnote relates; or
- b) the frequency bands to which the desired additions or modifications of the footnote belong are considered during the conference and the conference decides to make a change in those bands; or
- c) the addition or modification of footnotes is specifically included in the agenda of the conference as a result of the consideration of proposals submitted by one or more interested administration(s);

2 that recommended agendas for future world radiocommunication conferences should include a standing agenda item which would allow for the consideration of proposals by administrations for deletion of country footnotes, or country names in footnotes, if no longer required;

3 that in cases not covered by *further resolves* 1 and 2, proposals for new footnotes or modification of existing footnotes could exceptionally be considered by a world radiocommunication conference if they concern corrections of obvious omissions, inconsistencies, ambiguities or editorial errors and have been submitted to ITU as stipulated in No. 40 of the General Rules of Conferences, Assemblies and Meetings of the Union (Antalya, 2006),

*urges administrations*

1 to review footnotes periodically and to propose the deletion of their country footnotes or of their country names from footnotes, as appropriate;

2 to take account of the *further resolves* above in making proposals to world radiocommunication conferences.

## RESOLUTION 27 (Rev.WRC-12)

### **Use of incorporation by reference in the Radio Regulations**

The World Radiocommunication Conference (Geneva, 2012),

*considering*

- a) that the principles of incorporation by reference were adopted by WRC-95 and revised by subsequent conferences (see Annexes 1 and 2 to this Resolution);
- b) that there are provisions in the Radio Regulations containing references which fail to distinguish adequately whether the status of the referenced text is mandatory or non-mandatory,

*noting*

that references to Resolutions or Recommendations of a world radiocommunication conference (WRC) require no special procedures, and are acceptable for consideration, since such texts will have been agreed by a WRC,

*resolves*

- 1 that for the purposes of the Radio Regulations, the term “incorporation by reference” shall only apply to those references intended to be mandatory;
- 2 that when considering the introduction of new cases of incorporation by reference, such incorporation shall be kept to a minimum and made by applying the following criteria:
  - only texts which are relevant to a specific WRC agenda item may be considered;
  - the correct method of reference shall be determined on the basis of the principles set out in Annex 1 to this Resolution;
  - the guidance contained in Annex 2 to this Resolution shall be applied in order to ensure that the correct method of reference for the intended purpose is employed;
- 3 that the procedure described in Annex 3 to this Resolution shall be applied for approving the incorporation by reference of ITU-R Recommendations or parts thereof;
- 4 that existing references to ITU-R Recommendations shall be reviewed to clarify whether the reference is mandatory or non-mandatory in accordance with Annex 2 to this Resolution;
- 5 that ITU-R Recommendations, or parts thereof, incorporated by reference at the conclusion of each WRC, and a cross-reference list of the regulatory provisions, including footnotes and Resolutions, incorporating such ITU-R Recommendations by reference, shall be collated and published in a volume of the Radio Regulations (see Annex 3 to this Resolution),

*instructs the Director of the Radiocommunication Bureau*

- 1 to bring this Resolution to the attention of the Radiocommunication Assembly and the ITU-R Study Groups;
- 2 to identify the provisions and footnotes of the Radio Regulations containing references to ITU-R Recommendations and make suggestions on any further action to the second session of the Conference Preparatory Meeting (CPM) for its consideration, as well as for inclusion in the Director’s Report to the next WRC;
- 3 to identify the provisions and footnotes of the Radio Regulations containing references to WRC Resolutions that contain references to ITU-R Recommendations, and make suggestions on any further action to the second session of the Conference Preparatory Meeting (CPM) for its consideration, as well as for inclusion in the Director’s Report to the next WRC,

*invites administrations*

to submit proposals to future conferences, taking into account the CPM Report, in order to clarify the status of references, where ambiguities remain regarding the mandatory or non-mandatory status of the references in question, with a view to amending those references:

- i) that appear to be of a mandatory nature, identifying such references as being incorporated by reference by using clear linking language in accordance with Annex 2;
- ii) that are of a non-mandatory character, so as to refer to “the most recent version” of the Recommendations.

## ANNEX 1 TO RESOLUTION 27 (REV.WRC-12)

### **Principles of incorporation by reference**

1 For the purposes of the Radio Regulations, the term “incorporation by reference” shall apply only to those references intended to be mandatory.

2 Where the relevant texts are brief, the referenced material should be placed in the body of the Radio Regulations rather than using incorporation by reference.

3 Where a mandatory reference to an ITU-R Recommendation, or parts thereof, is included in the *resolves* of a WRC Resolution, which is itself cited in a provision or footnote of the Radio Regulations using mandatory language (i.e. “shall”), that ITU-R Recommendation or parts thereof shall also be considered as incorporated by reference.

4 Texts which are of a non-mandatory nature or which refer to other texts of a non-mandatory nature shall not be considered for incorporation by reference.

5 If, on a case-by-case basis, it is decided to incorporate material by reference on a mandatory basis, then the following provisions shall apply:

5.1 the text incorporated by reference shall have the same treaty status as the Radio Regulations themselves;

5.2 the reference must be explicit, specifying the specific part of the text (if appropriate) and the version or issue number;

5.3 the text incorporated by reference must be submitted for adoption by a competent WRC in accordance with *resolves* 3;

5.4 all texts incorporated by reference shall be published following a WRC, in accordance with *resolves* 5.

6 If, between WRCs, a text incorporated by reference (e.g. an ITU-R Recommendation) is updated, the reference in the Radio Regulations shall continue to apply to the earlier version incorporated by reference until such time as a competent WRC agrees to incorporate the new version. The mechanism for considering such a step is given in [Resolution 28 \(Rev.WRC-03\)](#) \*.

## ANNEX 2 TO RESOLUTION 27 (REV.WRC-12)

### **Application of incorporation by reference**

When introducing new cases of incorporation by reference in the provisions of the Radio Regulations or reviewing existing cases of incorporation by reference, administrations and

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\* *Note by the Secretariat:* This Resolution was revised by WRC-15.

ITU-R should address the following factors in order to ensure that the correct method of reference is employed for the intended purpose, according to whether each reference is mandatory (i.e. incorporated by reference), or non-mandatory:

### **Mandatory references**

- 1 mandatory references shall use clear linking language, i.e. “shall”;
- 2 mandatory references shall be explicitly and specifically identified, e.g. ”Recommendation ITU-R M.541-8”;
- 3 if the intended reference material is, as a whole, unsuitable as treaty-status text, the reference shall be limited to just those portions of the material in question which are of a suitable nature, e.g. ”Annex A to Recommendation ITU-R Z.123-4”.

### **Non-mandatory references**

- 4 Non-mandatory references or ambiguous references that are determined to be of a non-mandatory character (i.e. not incorporated by reference) shall use appropriate language, such as “should” or “may”. This appropriate language may refer to “the most recent version” of a Recommendation. Any appropriate language may be changed at any future WRC.

## ANNEX 3 TO RESOLUTION 27 (REV.WRC-12)

### **Procedures applicable by WRC for approving the incorporation by reference of ITU-R Recommendations or parts thereof**

The referenced texts shall be made available to delegations in sufficient time for all administrations to consult them in the ITU languages. A single copy of the texts shall be made available to each administration as a conference document.

During the course of each WRC, a list of the texts incorporated by reference, and a cross-reference list of the regulatory provisions, including footnotes and Resolutions, incorporating such ITU-R Recommendations by reference, shall be developed and maintained by the committees. These lists shall be published as a conference document in line with developments during the conference.

Following the end of each WRC, the Bureau and General Secretariat will update the volume of the Radio Regulations which serves as the repository of texts incorporated by reference in line with developments at the conference as recorded in the above-mentioned document.

RESOLUTION 28 (Rev.WRC-15)

**Revision of references to the text of ITU-R Recommendations  
incorporated by reference in the Radio Regulations**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that the Voluntary Group of Experts (VGE) on simplification of the Radio Regulations proposed the transfer of certain texts of the Radio Regulations to other documents, especially to ITU-R Recommendations, using the incorporation by reference procedure;
- b) that, in some cases, the provisions of the Radio Regulations imply an obligation on Member States to conform to the criteria or specifications incorporated by reference;
- c) that references to incorporated texts shall be explicit and shall refer to a precisely identified provision (see [Resolution 27 \(Rev.WRC-12\)](#));
- d) that all texts of ITU-R Recommendations incorporated by reference are published in a volume of the Radio Regulations;
- e) that, taking into account the rapid evolution of technology, ITU-R may revise the ITU-R Recommendations containing text incorporated by reference at short intervals;
- f) that, following revision of an ITU-R Recommendation containing text incorporated by reference, the reference in the Radio Regulations shall continue to apply to the earlier version until such time as a competent world radiocommunication conference (WRC) agrees to incorporate the new version;
- g) that it would be desirable that texts incorporated by reference reflect the most recent technical developments,

*noting*

that administrations need sufficient time to examine the potential consequences of changes to ITU-R Recommendations containing text incorporated by reference and would therefore benefit greatly from being advised, as early as possible, of which ITU-R Recommendations have been revised and approved during the elapsed study period or at the Radiocommunication Assembly preceding the WRC,

*resolves*

- 1 that each radiocommunication assembly shall communicate to the following WRC a list of the ITU-R Recommendations containing text incorporated by reference in the Radio Regulations which have been revised and approved during the elapsed study period;
- 2 that, on this basis, WRC should examine those revised ITU-R Recommendations, and decide whether or not to update the corresponding references in the Radio Regulations;
- 3 that, if the WRC decides not to update the corresponding references, the currently referenced version shall be maintained in the Radio Regulations;
- 4 that WRCs shall place the examination of ITU-R Recommendations in conformity with *resolves 1* and *resolves 2* of this Resolution on the agenda of future WRCs,

*instructs the Director of the Radiocommunication Bureau*

to provide the CPM immediately preceding each WRC with a list, for inclusion in the CPM Report, of those ITU-R Recommendations containing texts incorporated by reference that have

been revised or approved since the previous WRC, or that may be revised in time for the following WRC,

*urges administrations*

- 1 to participate actively in the work of the radiocommunication study groups and the radiocommunication assembly on revision of those Recommendations to which mandatory references are made in the Radio Regulations;
- 2 to examine any indicated revisions of ITU-R Recommendations containing text incorporated by reference and to prepare proposals on possible updating of relevant references in the Radio Regulations.

RESOLUTION 80 (Rev.WRC-07)

**Due diligence in applying the principles embodied in the Constitution**

The World Radiocommunication Conference (Geneva, 2007),

*considering*

- a) that Articles 12 and 44 of the Constitution lay down the basic principles for the use of the radio-frequency spectrum and the geostationary-satellite and other satellite orbits;
- b) that those principles have been included in the Radio Regulations;
- c) that Article I of the Agreement between the United Nations and the International Telecommunication Union provides that “the United Nations recognizes the International Telecommunication Union (hereinafter called “the Union”) as the specialized agency responsible for taking such action as may be appropriate under its basic instrument for the accomplishment of the purposes set forth therein”;
- d) that, in accordance with Nos. **11.30**, **11.31** and **11.31.2**, notices shall be examined with respect to the provisions of the Radio Regulations, including the provision relating to the basic principles, appropriate rules of procedure being developed for the purpose;
- e) that WRC-97 instructed the Radio Regulations Board (RRB) to develop, within the framework of Nos. **11.30**, **11.31** and **11.31.2**, rules of procedure to be followed in order to be in compliance with the principles in No. **0.3** of the Preamble to the Radio Regulations;
- f) that the Board, in accordance with Resolution **80 (WRC-97)**, submitted a report to WRC-2000 suggesting possible solutions and stating that, after examining the Radio Regulations, it had concluded that there are no provisions currently in the Radio Regulations that link the formal notification or coordination procedures with the principles stated in No. **0.3** of the Preamble to the Radio Regulations;
- g) that the Legal Subcommittee of the Committee on the Peaceful Uses of Outer Space of the United Nations General Assembly has drawn up recommendations in this respect,

*noting*

- a) that, in accordance with the provisions of No. 127 of the Convention, the Conference may give instructions to the Sectors of the Union;
- b) that, according to No. 160C of the Convention, the Radiocommunication Advisory Group (RAG) shall review any matter as directed by a conference;
- c) the RRB report to WRC-2000 (see Annex 1);
- d) the RRB report to WRC-03 (see Annex 2);
- e) that some of the issues identified in the report referred to in *noting c)* have been resolved before WRC-07,

*resolves*

- 1 to instruct the Radiocommunication Sector, in accordance with No. 1 of Article 12 of the Constitution, to carry out studies on procedures for measurement and analysis of the application of the basic principles contained in Article 44 of the Constitution;
- 2 to instruct the RRB to consider and review possible draft recommendations and draft provisions linking the formal notification, coordination and registration procedures with the principles contained in Article 44 of the Constitution and No. **0.3** of the Preamble to the Radio



Regulations, and to report to each future World Radiocommunication Conference with regard to this Resolution;

3 to instruct the Director of the Radiocommunication Bureau to submit to each future World Radiocommunication Conference a detailed progress report on the action taken on this Resolution,

*invites*

1 the other organs of the Radiocommunication Sector, in particular the RAG, to make relevant contributions to the Director of the Radiocommunication Bureau for inclusion in his report to each future World Radiocommunication Conference;

2 administrations to contribute to the studies referred to in *resolves* 1 and to the work of the RRB as detailed in *resolves* 2.

## ANNEX 1 TO RESOLUTION 80 (REV.WRC-07)

### **RRB Report to WRC-2000**

In the RRB Report to WRC-2000<sup>1</sup>, several members of the Board noted some difficulties likely to be experienced by administrations, particularly administrations of developing countries, as follows:

- the “first-come first-served” concept restricts and sometimes prevents access to and use of certain frequency bands and orbit positions;
- a relative disadvantage for developing countries in coordination negotiations due to various reasons such as a lack of resources and expertise;
- perceived differences in consistency of application of the Radio Regulations;
- the submitting of “paper” satellites that restricts access options;
- the growing use of the bands of the Plans of Appendices **30** and **30A** by regional, multichannel systems, which may modify the main purpose of these Plans to provide equitable access to all countries;
- the considerable processing delays in the Radiocommunication Bureau are due to the very complex procedures required and the large number of filings submitted; these delays contribute to a coordination backlog of 18 months which could extend to three years and creates uncertain regulatory situations, additional delay in the coordination process that cannot be overcome by administrations, and the possible loss of the assignment because the allotted time is exceeded;
- satellite systems may already be in orbit before completion of coordination;
- statutory time-frames, such as those in No. **11.48**, may often be insufficient for developing countries to be able to complete the regulatory requirements as well as the design, construction and launch of satellite systems;
- no provisions for international monitoring to confirm the bringing into use of satellite networks (assignments and orbits).

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<sup>1</sup> This Report can be found in Document 29 to WRC-2000.

## ANNEX 2 TO RESOLUTION 80 (REV.WRC-07)

### RRB Report to WRC-03

In the RRB Report to WRC-03<sup>2</sup>, concepts to satisfy *resolves* 2 of Resolution **80 (WRC-2000)** were provided, as follows:

- special measures for countries submitting their first satellite filing:
  - on an exceptional basis, special consideration could be given to countries submitting their first filing for a satellite system, taking into account the special needs of developing countries;
  - such consideration should take into account the following:
    - impact on other administrations;
    - satellite service of the system (i.e. FSS, MSS, BSS);
    - frequency band covered by the filing;
    - system is intended to meet the direct needs of the country(s) concerned;
- extension of the regulatory time-limit for bringing into use:
  - conditions could be specified under which extensions might be granted on an exceptional basis to developing countries when they are not able to complete the regulatory date requirements, so that sufficient time for design, construction and launch of satellite systems is made available;
- the conditions created under the previous paragraph should be included in the Radio Regulations as provisions that would allow the Radiocommunication Bureau to grant the extension.

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<sup>2</sup> This Report can be found in Addendum 5 to Document 4 to WRC-03.

RESOLUTION 86 (Rev.WRC-07)

**Implementation of Resolution 86 (Rev. Marrakesh, 2002)  
of the Plenipotentiary Conference**

The World Radiocommunication Conference (Geneva, 2007),

*considering*

a) that the Plenipotentiary Conference (Marrakesh, 2002) discussed the application of Resolution 86 (Minneapolis, 1998) and decided to request WRC-03 to determine the scope and criteria to be used by future world radiocommunication conferences (WRCs) in the application of [Resolution 86 \(Rev. Marrakesh, 2002\)](#);

b) that the Plenipotentiary Conference (Antalya, 2006) invited WRC-07 to consider Resolution 86 (Marrakesh, 2002) and to report the results to the 2010 Plenipotentiary Conference,

*recognizing*

that the Radio Regulations Board makes suggestions to transform the content of the Rules of Procedure into a regulatory text in accordance with Nos. **13.0.1** and **13.0.2** of Article **13** of the Radio Regulations,

*noting*

that administrations may also wish to make proposals to transform the content of the Rules of Procedure into a regulatory text for possible inclusion in the Radio Regulations,

*resolves to invite future world radiocommunication conferences*

1 to consider any proposals which deal with deficiencies and improvements in the advance publication, coordination, notification and recording procedures of the Radio Regulations for frequency assignments pertaining to space services which have either been identified by the Board and included in the Rules of Procedure or which have been identified by administrations or by the Radiocommunication Bureau, as appropriate;

2 to ensure that these procedures, and the related appendices of the Radio Regulations reflect the latest technologies, as far as possible,

*invites administrations*

to consider, in preparing for PP-10, appropriate action with regard to [Resolution 86 \(Rev. Marrakesh, 2002\)](#).

RESOLUTION 86 (Rev. Marrakesh, 2002)

**Advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks**

The Plenipotentiary Conference of the International Telecommunication Union (Marrakesh, 2002),

*considering*

- a) that the Voluntary Group of Experts (VGE) created to study allocation and improved use of the radio-frequency spectrum and the simplification of the Radio Regulations proposed changes to the Radio Regulations, including the coordination and notification procedures for satellite networks, with the aim of simplifying the procedures;
- b) that Resolution 18 (Kyoto, 1994) of the Plenipotentiary Conference instructed the Director of the Radiocommunication Bureau (BR) to initiate a review of some issues concerning international satellite network coordination;
- c) that the World Radiocommunication Conference (Geneva, 1997) adopted changes to the Radio Regulations that entered into force 1 January 1999;
- d) that the coordination and notification procedures for satellite networks are the foundation for discharging the ITU's role and mandate in space telecommunication matters;
- e) that the scope of application of this resolution has already been extended beyond its intended objectives;
- f) that there are no criteria for how this resolution is to be applied in order to properly achieve the objectives set forth therein,

*considering further*

that it is important that these procedures be kept as current and simple as possible in order to reduce the cost for administrations and BR,

*noting*

- a) that all matters relating to administrative due diligence are covered in Resolution 85 (Minneapolis, 1998) of the Plenipotentiary Conference and Resolution 49 (Rev. WRC-2000) of the World Radiocommunication Conference;
- b) Resolution 80 (Rev. WRC-2000) of the World Radiocommunication Conference, regarding due diligence in applying the principles embodied in the ITU Constitution,

*resolves to request the 2003 and subsequent world radiocommunication conferences*

to review and update the advance publication, coordination, notification and recording procedures for frequency assignments pertaining to satellite networks, including the associated technical characteristics, and the related appendices of the Radio Regulations, so as to:

- i) facilitate, in accordance with Article 44 of the Constitution, the rational, efficient, and economical use of radio frequencies and any associated orbits, including the geostationary-satellite orbit, in conformity with the provisions of the Radio Regulations, so that countries or groups of countries may have equitable access to those orbits and frequencies, taking into account the special needs of the developing countries and the geographical situation of particular countries;

- ii) ensure that these procedures, characteristics and appendices reflect the latest technologies;
- iii) achieve simplification and cost savings for BR and administrations,

*further resolves to request the 2003 World Radiocommunication Conference*  
to determine the scope and the criteria to be used for the implementation of this resolution.

(Minneapolis, 1998) – (Rev. Marrakesh, 2002)

RESOLUTION 95 (Rev.WRC-07)

**General review of the Resolutions and Recommendations of  
world administrative radio conferences and world  
radiocommunication conferences**

The World Radiocommunication Conference (Geneva, 2007),

*considering*

- a) that it is important to keep the Resolutions and Recommendations of past world administrative radio conferences and world radiocommunication conferences under constant review, in order to keep them up to date;
- b) that the reports of the Director of the Radiocommunication Bureau submitted to previous conferences provided a useful basis for a general review of the Resolutions and Recommendations of past conferences;
- c) that some principles and guidelines are necessary for future conferences to treat the Resolutions and Recommendations of previous conferences which are not related to the agenda of the Conference,

*resolves to invite future competent world radiocommunication conferences*

- 1 to review the Resolutions and Recommendations of previous conferences that are related to the agenda of the Conference with a view to their possible revision, replacement or abrogation and to take appropriate action;
- 2 to review the Resolutions and Recommendations of previous conferences that are not related to any agenda item of the Conference with a view to:
  - abrogating those Resolutions and Recommendations that have served their purpose or have become no longer necessary;
  - reviewing the need for those Resolutions and Recommendations, or parts thereof, requesting ITU-R studies on which no progress has been made during the last two periods between conferences;
  - updating and modifying Resolutions and Recommendations, or parts thereof that have become out of date, and to correct obvious omissions, inconsistencies, ambiguities or editorial errors and effect any necessary alignment;
- 3 at the beginning of the conference, to determine which committee within the conference has the primary responsibility to review each of the Resolutions and Recommendations referred to in *resolves* 1 and 2 above,

*instructs the Director of the Radiocommunication Bureau*

- 1 to conduct a general review of the Resolutions and Recommendations of previous conferences and, after consultation with the Radiocommunication Advisory Group and the Chairmen and Vice-Chairmen of the Radiocommunication Study Groups, submit a report to the second session of the Conference Preparatory Meeting (CPM) in respect of *resolves* 1 and *resolves* 2, including an indication of any associated agenda items;
- 2 to include in the above report, with the cooperation of the chairmen of the Radiocommunication Study Groups, the progress reports of ITU-R studies on the issues which have been requested by the Resolutions and Recommendations of previous conferences, but which are not placed on the agendas of the forthcoming two conferences,

*invites administrations*

to submit contributions on the implementation of this Resolution to CPM,

*invites the Conference Preparatory Meeting*

to include, in its Report, the results of the general review of the Resolutions and Recommendations of previous conferences, based on the contributions by administrations to CPM, in order to facilitate the follow-up by future WRCs.

RESOLUTION 157 (WRC-15)

**Study of technical and operational issues and regulatory provisions for new non-geostationary-satellite orbit systems in the 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725-7 025 MHz frequency bands allocated to the fixed-satellite service**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that systems based on the use of new technologies associated with both geostationary-satellite orbit (GSO) and non-geostationary-satellite orbit (non-GSO) constellations are capable of providing high-capacity and low-cost means of communication even to the most isolated regions of the world;
- b) that GSO and non-GSO satellite orbits and associated spectrum are valuable resources and equitable access to these resources should be protected for the benefit of all countries in the world;
- c) that facilitating the use of new non-GSO systems has the potential to augment substantially the capacity, spectrum efficiency and benefits derived from GSO and non-GSO systems operating in the frequency bands: 3 700-4 200 MHz, 4 500-4 800 MHz, 5 925-6 425 MHz and 6 725-7 025 MHz,

*noting*

- a) that the Article **21** power flux-density (pfd) limits and Article **22** equivalent power flux-density (epfd↓) limits in the frequency band 3 700-4 200 MHz (space-to-Earth) and the Article **22** epfd↑ limits in the frequency band 5 925-6 725 MHz (Earth-to-space) were developed under agenda item 1.37 at WRC-03 based on a particular highly-elliptical orbit (HEO) configuration, while new non-GSO systems that seek to operate in these frequency bands may utilize different types of orbits;
- b) that Article **22** does not contain epfd↓ and epfd↑ limits for non-GSO systems in the frequency bands 4 500-4 800 MHz (space-to-Earth) and 6 725-7 025 MHz (Earth-to-space) allocated to the fixed-satellite service (FSS), the use of which is subject to the provisions of Appendix **30B**;
- c) that the Report of the Director of the Radiocommunication Bureau to this conference acknowledges that there may be a need for “reviewing or confirming” assumptions that led to the current values of the Article **21** and Article **22** power limits, taking into account the characteristics of systems recently submitted “and the overall trend for a growing interest in operating non-GSO FSS systems, with the view to ensure that all existing services are adequately protected”;
- d) that specifically identified studies taking into account current technical and operational characteristics will help to determine appropriate Article **21** pfd limits and Article **22** epfd limits for the frequency bands 3 700-4 200 MHz, 4 500-4 800 MHz and 5 925-7 025 MHz for non-GSO systems,

*recognizing*

- a) that enabling GSO networks and non-GSO systems to make the most efficient use of satellite orbits and frequency bands allocated to the FSS shall take into consideration the other services to which those frequency bands are also allocated on a primary basis;



- b) that the frequency bands 3 700-4 200 MHz, 4 500-4 800 MHz and 5 925-7 025 MHz are also allocated in one or more Regions to the fixed and mobile services on a primary basis;
- c) that in the frequency bands 3 700-4 200 MHz, 4 500-4 800 MHz and 5 925-7 025 MHz, non-GSO FSS systems are obligated by No. **22.2** not to cause unacceptable interference to or claim protection from GSO FSS networks;
- d) that under No. **5.458B** the frequency band 6 700-7 025 MHz allocated to the FSS on a primary basis in the space-to-Earth direction is limited to feeder links for non-GSO systems of the mobile-satellite service (MSS);
- e) that Nos. **5.440A** and **5.457C** were adopted to address the operation of aeronautical mobile telemetry (AMT) for flight testing by aircraft stations (see No. **1.83**) in the frequency bands 4 400-4 940 MHz and 5 925-6 700 MHz with respect to the FSS only using GSO networks;
- f) that there are specific protection criteria, and protection levels defined in those criteria, for the FSS, the mobile service and the fixed service;
- g) that new non-GSO systems with circular orbits shall ensure that existing non-GSO systems with highly-elliptical orbits should be protected,

*resolves to invite the ITU Radiocommunication Sector*

to study the following issues relating to non-GSO systems in the following frequency bands allocated to the FSS:

- a) in the frequency band 3 700-4 200 MHz (space-to-Earth), identification of possible revision of Article **21**, Table 21-4 for non-GSO FSS satellites, with a view to enabling new non-GSO systems to operate in these FSS frequency bands, while ensuring that existing primary services, i.e. the mobile service and fixed service, are protected and maintaining the existing Article **21** pfd limits for GSO networks;
- b) in the frequency bands 3 700-4 200 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space), the Article **22** epfd↓ limits and epfd↑ limits applicable to non-GSO systems with a view to enabling additional non-GSO systems to operate in these frequency bands, while ensuring that GSO networks are protected from unacceptable interference pursuant to No. **22.2** and existing protection criteria;
- c) in the frequency bands 4 500-4 800 MHz (space-to-Earth) and 6 725-7 025 MHz (Earth-to-space), the possible development of Article **22** epfd↓ and epfd↑ limits similar to those in other FSS frequency bands with a view to enabling non-GSO systems to operate in these frequency bands, while ensuring that GSO networks are protected from unacceptable interference pursuant to No. **22.2** and existing protection criteria taking into account *recognizing f)* above;
- d) in the frequency band 6 700-7 025 MHz, the protection of feeder links for MSS systems operating in the space-to-Earth direction from unacceptable interference, pursuant to existing criteria, from non-GSO FSS system earth stations operating in the Earth-to-space direction;
- e) in the frequency band 4 500-4 800 MHz (space-to-Earth), the development of appropriate regulatory provisions for non-GSO FSS systems to protect terrestrial services;
- f) in the frequency bands 4 500-4 800 MHz (space-to-Earth) and 5 925-6 425 MHz (Earth-to-space), the development of regulatory provisions to clarify that Nos. **5.440A** and **5.457C** would apply in a manner to ensure that non-GSO FSS systems do not cause harmful interference to, or claim protection from, AMT for flight testing by aircraft stations,

*further resolves*

- 1 that the results of studies referred to in the *resolves* above shall:
  - in no way change the protection criteria and protection levels defined in those criteria for the GSO FSS, the fixed service and the mobile service;
  - ensure protection of the existing non-GSO FSS systems with highly-elliptical orbits,
- 2 that new non-GSO systems that operate in FSS bands subject to the provisions of Appendix **30B** shall ensure that the allotments appearing in the Plan and the assignments of the List of Appendix **30B** will be fully protected,

*invites administrations*

to participate in the studies by submitting contributions to the ITU Radiocommunication Sector,

*instructs the Director of the Radiocommunication Bureau*

to include in his report, for consideration by WRC-19, the results of the ITU-R studies referred to in *resolves to invite the ITU Radiocommunication Sector* above.

RESOLUTION 158 (WRC-15)

**Use of the frequency bands 17.7-19.7 GHz (space-to-Earth)  
and 27.5-29.5 GHz (Earth-to-space) by earth stations in motion communicating with  
geostationary space stations in the fixed-satellite service**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) are globally allocated on a primary basis to the fixed-satellite service (FSS) and that there are a large number of geostationary FSS satellite networks operating in these frequency bands, as well as non-geostationary FSS systems;
- b) that in these frequency bands there are a large number of fixed-service stations, as well as mobile-service stations;
- c) that regulatory and technical procedures exist in these frequency bands between geostationary FSS networks and non-geostationary FSS systems;
- d) that there is an need for mobile communications, including global broadband satellite services, and that some of this need can be met by allowing earth stations in motion to communicate with space stations of the FSS operating in the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space);
- e) that some administrations have already deployed, and plan to expand their use of, earth stations in motion with operational and future geostationary FSS networks;
- f) that geostationary FSS networks in the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) are required to be coordinated and notified in accordance with the provisions of Articles **9** and **11** of the Radio Regulations;
- g) that the frequency bands 17.7-19.7 GHz (space-to-Earth) and 27.5-29.5 GHz (Earth-to-space) are also allocated to several other services on a primary basis, the allocated services are used by a variety of different systems in many administrations and these existing services and their future development should be protected without undue constraints;
- h) that currently there is no specific regulatory procedure for the coordination of the earth stations in motion with regard to stations of terrestrial services,

*considering further*

- a) that a consistent approach to deployment of these earth stations in motion will support these important and growing global communication requirements;
- b) that the ITU Radiocommunication Sector (ITU-R) has adopted Reports ITU-R S.2223 and ITU-R S.2357;
- c) that the technical characteristics of the earth stations in motion operating within a given geostationary-satellite network should be within the envelope of the coordination agreements reached between administrations,

*recognizing*

- a) that Article **21** contains power flux-density (pfd) limits for geostationary fixed-satellite services;
- b) that earth stations in motion addressed by this Resolution are not to be used for safety-of-life applications;

- c) that this conference has adopted footnote No. **5.527A** and Resolution **156 (WRC-15)** related to earth stations in motion;
- d) that advances in technology, including the use of tracking techniques, allow earth stations in motion to operate within the characteristics of fixed earth stations of the FSS;
- e) that No. **1.21** defines the fixed-satellite service and No. **1.25** defines the mobile-satellite service (MSS);
- f) that the use of earth stations in motion under the FSS regime is not much different from MSS applications, taking into account the definition of mobile-satellite service in No. **1.25**;
- g) that the main difference between earth stations in motion and mobile earth stations is that earth stations in motion comply with the technical requirements of fixed-satellite earth stations,
  - recognizing further*
    - a) that parts of the frequency band 17.7-18.1 GHz are used by feeder links for the broadcasting-satellite service, subject to Appendix **30A** (No. **5.516**);
    - b) that the frequency bands 18.3-19.3 GHz (Region 2), 27.5-27.82 GHz (Region 1), 28.35-28.45 GHz (Region 2), 28.45-28.94 GHz (all Regions), 28.94-29.1 GHz (Regions 2 and 3), 29.25-29.46 GHz (Region 2) and 29.46-29.5 GHz (all Regions) are identified for use by high-density applications in the fixed-satellite service (No. **5.516B**);
    - c) that use of the frequency band 18.1-18.4 GHz by the fixed-satellite service (Earth-to-space) is limited to feeder links of geostationary-satellite systems in the broadcasting-satellite service (No. **5.520**);
    - d) that use of the frequency band 18.6-18.8 GHz by the fixed-satellite service is limited to geostationary systems and systems with an orbit of apogee greater than 20 000 km (No. **5.522B**);
    - e) that the use of the frequency bands 17.8-18.6 GHz and 27.5-28.6 GHz by non-geostationary fixed-satellite service systems is subject to the application of the provisions of Nos. **5.484A**, **22.5C** and **22.5I**;
    - f) that use of the frequency bands 18.8-19.3 GHz and 28.6-29.1 GHz by geostationary and non-geostationary fixed-satellite service networks is subject to the application of the provisions of No. **9.11A**, and No. **22.2** does not apply (No. **5.523A**);
    - g) that use of the frequency band 19.3-19.7 GHz by geostationary fixed-satellite service systems and by feeder links for non-geostationary satellite systems in the mobile-satellite service is subject to the application of the provisions of No. **9.11A**, but not subject to the provisions of No. **22.2**, and that the use of this frequency band for other non-geostationary fixed-satellite service systems, or for the cases indicated in Nos. **5.523C** and **5.523E**, is not subject to the provisions of No. **9.11A** and shall continue to be subject to Articles **9** (except No. **9.11A**) and **11** procedures, and to the provisions of No. **22.2** (No. **5.523D**);
    - h) that use of the frequency band 29.1-29.5 GHz (Earth-to-space) by the fixed-satellite service is limited to geostationary-satellite systems and feeder links to non-geostationary satellite systems in the mobile-satellite service, and that such use is subject to the application of the provisions of No. **9.11A**, but not subject to the provisions of No. **22.2**, except as indicated in Nos. **5.523C** and **5.523E**, where such use is not subject to the provisions of No. **9.11A** and shall continue to be subject to Articles **9** (except No. **9.11A**) and **11** procedures, and to the provisions of No. **22.2** (No. **5.535A**);
    - i) that the frequency band 27.5-30 GHz may be used by the fixed-satellite service (Earth-to-space) for the provision of feeder links for the broadcasting-satellite service (No. **5.539**);

j) that feeder links of non-geostationary networks in the mobile-satellite service and geostationary networks in the fixed-satellite service operating in the frequency band 29.1-29.5 GHz (Earth-to-space) shall employ uplink adaptive power control or other methods of fade compensation, such that the earth station transmissions shall be conducted at the power level required to meet the desired link performance while reducing the level of mutual interference between both networks (No. **5.541A**);

k) that the fixed and mobile services are allocated on a primary basis in the frequency bands 27.5-29.5 GHz on a global basis;

l) that the frequency band 18.6-18.8 GHz is used by the Earth exploration-satellite service (EESS) (passive) in remote sensing by Earth exploration and meteorological satellites, and protection from interference is essential for passive sensing measurements and applications, especially for measurements of known spectral lines, which are of particular importance;

m) that the frequency bands 28.5-29.5 GHz (Earth-to-space) are also allocated to the Earth exploration-satellite service on a secondary basis, and no additional constraints should be imposed on the EESS;

n) that all allocated services in these frequency bands should be taken into account,

*resolves to invite ITU-R*

1 to study the technical and operational characteristics and user requirements of different types of earth stations in motion that operate or plan to operate within geostationary FSS allocations in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz, including the use of spectrum to provide the envisioned services to various types of earth station in motion and the degree to which flexible access to spectrum can facilitate sharing with services identified in *recognizing further a) to n)*;

2 to study sharing and compatibility between earth stations in motion operating with geostationary FSS networks and current and planned stations of existing services allocated in the frequency bands 17.7-19.7 GHz and 27.5-29.5 GHz to ensure protection of, and not impose undue constraints on, services allocated in those frequency bands, and taking into account *recognizing further a) to n)*;

3 to develop, for different types of earth stations in motion and different portions of the frequency bands studied, technical conditions and regulatory provisions for their operation, taking into account the results of the studies above,

*resolves*

that these earth stations not be used or relied upon for safety-of-life applications,

*resolves to further invite the 2019 World Radiocommunication Conference*

to consider the results of the above studies and take necessary actions, as appropriate, provided that the results of the studies referred to in *resolves to invite ITU-R* are complete and agreed by ITU-R study groups.

RESOLUTION 159 (WRC-15)

**Studies of technical, operational issues and regulatory provisions for non-geostationary fixed-satellite services satellite systems in the frequency bands 37.5-39.5 GHz (space-to-Earth), 39.5-42.5 GHz (space-to-Earth), 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space)**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) the need to encourage the development and implementation of new technologies in the fixed-satellite service (FSS) at frequencies above 30 GHz;
- b) that FSS systems based on the use of new technologies above 30 GHz and associated with both geostationary (GSO) and non-geostationary (non-GSO) satellite constellations are capable of providing high-capacity and low-cost means of communication even to the most isolated regions of the world;
- c) that the Radio Regulations should enable the introduction of new applications of radiocommunication technology to ensure the operation of as many systems as possible in order to ensure efficient use of the spectrum;
- d) that, in accordance with No. **22.2**, non-GSO systems shall not cause unacceptable interference to GSO FSS and broadcasting-satellite service (BSS) networks and, unless otherwise specified in the Radio Regulations, shall not claim protection from GSO FSS and BSS satellite networks;
- e) that non-GSO FSS systems would benefit from the certainty that would result from the specification of measures required to protect GSO FSS and BSS satellite networks under No. **22.2**;
- f) that in the FSS, there are GSO satellite networks and non-GSO satellite systems operating and/or planned for near-term operation in the frequency band allocated to the FSS in the range 37.5-51.4 GHz;
- g) that technical studies are required in order to ascertain the feasibility of, and conditions for, non-GSO FSS satellite systems sharing the frequency bands 37.5-42.5 GHz (space-to-Earth) and 47.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space): 1) with GSO satellite networks (FSS, MSS and BSS, as appropriate to the band), and 2) with other non-GSO FSS satellite systems;
- h) that review of Resolution **750 (Rev.WRC-15)** may be required to take into account new development of non-GSO satellites,

*considering further*

that Recommendations ITU-R S.1323, ITU-R S.1325, ITU-R S.1328, ITU-R S.1529 and ITU-R S.1557 provide information on system characteristics, operational requirements and protection criteria that may be used in sharing studies,

*noting*

- a) that filing information for GSO FSS satellite networks in the frequency bands 37.5-42.5 GHz (space-to-Earth), 49.2-50.2 GHz (Earth-to-space) and 50.4-51.4 GHz (Earth-to-space) has been communicated to the Radiocommunication Bureau;
- b) that some of these GSO satellite networks are in operation and others will be operated in the near future;

c) that the frequency band 37.5-38 GHz is allocated to the space research service (deep space) in the space-to-Earth direction and the frequency band 40.0-40.5 GHz is allocated to the space research service and the Earth exploration-satellite service in the Earth-to-space direction on a primary basis;

d) that the frequency band 37.5-40.5 GHz is allocated to the Earth exploration-satellite service in the space-to-Earth direction on a secondary basis,

*recognizing*

a) that WRC-2000 adopted provisions, including efd limits in Nos. **22.5C**, **22.5D** and **22.5F** to quantify No. **22.2**, in order to protect GSO FSS and BSS satellite networks from non-GSO FSS satellite systems in the 10-30 GHz frequency range;

b) that Resolution **76 (Rev.WRC-15)** contains aggregate power levels not to be exceeded by non-GSO FSS systems in order to protect against interference GSO FSS and GSO BSS networks in the 10-30 GHz frequency range;

c) that No. **5.552** urges administrations to take all practicable steps to reserve the frequency band 47.2-49.2 GHz for feeder links for the broadcasting-satellite service operating in the frequency band 40.5-42.5 GHz;

d) that No. **5.554A** limits the use of the frequency bands 47.5-47.9 GHz, 48.2-48.54 GHz and 49.44-50.2 GHz by the fixed-satellite service (space-to-Earth) to geostationary satellites;

e) that No. **21.16** contains power flux-density limits applicable to non-GSO satellite systems to protect fixed and mobile services with allocations in the frequency band 37.5-42.5 GHz;

f) that the frequency band 50.2-50.4 GHz is allocated on a primary basis to the EESS (passive) and space research (passive) services, which must be adequately protected;

g) that WRC-03, having considered the outcome of preliminary ITU-R studies, decided that further studies would be needed to determine the conditions for non-GSO FSS satellite systems to share the 37.5-50.2 GHz frequency range with GSO FSS satellite networks;

h) that No. **5.556** indicates that radio astronomy observations are carried out in the frequency band 51.4-54.25 GHz and that mitigation measures may have to be defined in this regard;

i) that any potential revisions to limitations for the protection of passive services or radio astronomy observations will necessarily be forward-looking, and will be impractical to apply to FSS networks and systems described in *considering f)* and *noting a)* and *b)*,

*resolves to invite ITU-R*

to conduct, and complete in time for WRC-19:

1 studies of technical and operational issues and regulatory provisions for the operation of non-GSO FSS satellite systems in the frequency bands 37.5-42.5 GHz (space-to-Earth) and 47.2-48.9 GHz (limited to feeder links only), 48.9-50.2 GHz and 50.4-51.4 GHz (all Earth-to-space), while ensuring protection of GSO satellite networks in the FSS, MSS and BSS, without limiting or unduly constraining the future development of GSO networks across those bands, and without modifying the provisions of Article **21**;

2 studies carried out under *resolves to invite ITU-R 1* shall focus exclusively on the development of equivalent power flux-density limits produced at any point in the GSO by emissions from all the earth stations of a non-GSO system in the fixed-satellite service or into any geostationary FSS earth station, as appropriate;

3 studies and development of sharing conditions between non-GSO FSS systems operating in the frequency bands listed in *resolves to invite ITU-R 1* above;

4 studies of possible necessary revisions to Resolution **750 (Rev.WRC-15)** to ensure protection of the EESS (passive) in the frequency bands 36-37 GHz and 50.2-50.4 GHz from non-GSO FSS transmission, taking into account *recognizing i*) above, including study of aggregate FSS interference effects from networks and systems operating or planned to operate in the frequency bands described in *resolves to invite ITU-R 1* above;

5 studies towards ensuring protection of the radio astronomy frequency bands 42.5-43.5 GHz, 48.94-49.04 GHz and 51.4-54.25 GHz from non-GSO FSS transmissions, taking into account *recognizing i*) above, including study of aggregate FSS interference effects from networks and systems operating or planned to operate in the frequency bands described in *resolves to invite ITU-R 1* above,

*further resolves*

to invite WRC-19 to consider the results of the above studies and take appropriate action,

*invites administrations*

to participate in the studies by submitting contributions to ITU-R.



## RESOLUTION 160 (WRC-15)

### **Facilitating access to broadband applications delivered by high-altitude platform stations**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that there is a need for greater broadband connectivity and telecommunication services in underserved communities and in rural and remote areas;
- b) that current technologies can be used for broadband applications delivered by base stations operating at high altitudes;
- c) that high-altitude platform stations (HAPS) are one possible means for providing fixed broadband connectivity that would enable wireless broadband deployment in remote areas, including mountainous, coastal and sandy desert areas;
- d) that HAPS using inter-HAPS links can provide broadband connectivity with minimal ground network infrastructure;
- e) that HAPS may also be used for disaster recovery communications;
- f) that some new entities are currently testing the delivery of broadband over lightweight, solar-powered aircraft and airships at an altitude of 20-50 kilometres for several months at a nominal fixed point relative to the ground below,

*recognizing*

- a) that existing services and their applications shall be protected from HAPS applications, and no undue constraints shall be imposed on the future development of existing services by HAPS;
- b) that HAPS is defined in No. **1.66A** of the Radio Regulations as a station located on an object at an altitude of 20-50 km and at a specified, nominal, fixed point relative to the Earth, and is subject to No. **4.23**;
- c) that WRC-97 added a global identification for HAPS in the frequency bands 47.2-47.5 GHz and 47.9-48.2 GHz, that WRC-2000 agreed, because of concerns with rain fade in that frequency range, on a HAPS identification for the frequency band 27.9-28.2 GHz (fixed downlink), paired with the frequency band 31.0-31.3 GHz (fixed uplink), outside Region 2, and that at WRC-12 five countries joined footnote **5.457** for a HAPS designation in the fixed service for frequency bands 6 440-6 520 MHz (HAPS-to-ground) and 6 560-6 640 MHz (ground-to-HAPS);
- d) that WRC-2000 decided on additional spectrum identifications for HAPS links under No. **5.388A** and No. **5.388B** in some countries;
- e) that the existing HAPS identifications were established without reference to today's broadband capabilities;
- f) that Recommendation **34 (Rev.WRC-12)** noted that the development of common worldwide allocations is desirable in order to improve and harmonize utilization of the radio-frequency spectrum;
- g) that, since WRC-12, the evolution of technology through advances in solar panel efficiency, battery energy density, lightweight composite materials, autonomous avionics and antenna technology may improve HAPS viability;

h) that the allotments of the Appendix **30B** Plan, assignments in the Plans and the List subject to Appendix **30** and **30A** and assignments in the Appendix **30B** List shall be protected,

*resolves to invite ITU-R*

1 to study additional spectrum needs for gateway and fixed terminal links for HAPS to provide broadband connectivity in the fixed service taking into account:

- the existing identifications and deployments of HAPS systems;
- the deployment scenarios envisioned for HAPS broadband systems and related requirements such as in remote areas;
- the technical and operational characteristics of HAPS systems, including the evolution of HAPS through advances in technology and spectrally-efficient techniques, and their deployment;

2 to study the suitability of using the existing identifications in *recognizing c)*, on a global or regional level, taking into account the regulatory provisions, such as geographical and technical restrictions associated with existing HAPS identifications based on the study performed in *resolves to invite ITU-R 1*;

3 to study appropriate modifications to the existing footnotes and associated resolutions in the identifications in *recognizing c)* in order to facilitate the use of HAPS links on a global or regional level, limited to the currently identified frequency bands and, where the use of an identification is not technically feasible for HAPS use, the possible removal of the unsuitable identification;

4 to study, in order to meet any spectrum needs which could not be satisfied under *resolves to invite ITU-R 2* and *3*, for the use of gateway and fixed terminal links for HAPS, the following frequency bands already allocated to the fixed service on a primary basis, not subject to Appendices **30**, **30A**, and **30B** in any region:

- on a global level: 38-39.5 GHz, and
- on a regional level: in Region 2, 21.4-22 GHz and 24.25-27.5 GHz,

*further resolves*

1 that the studies referred to in *resolves to invite ITU-R 3* and *4* include sharing and compatibility studies to ensure protection of existing services allocated in the frequency ranges identified and, as appropriate, adjacent band studies, taking into account studies already performed in ITU-R;

2 that modifications studied under *resolves to invite ITU-R 3* shall not consider the use of HAPS links in the frequency bands subject to Appendix **30B**;

3 to develop ITU-R Recommendations and Reports, as appropriate, on the basis of the studies called for in *resolves to invite ITU-R 1, 2, 3, and 4* above,

*invites administrations*

to participate in the studies and to provide input contributions,

*resolves to invite the 2019 World Radiocommunication Conference*

to consider the results of the above studies and take necessary regulatory actions, as appropriate, provided that the results referred to in *resolves to invite ITU-R* are complete and agreed by ITU-R study groups.

RESOLUTION 161 (WRC-15)

**Studies relating to spectrum needs and possible allocation of the frequency band 37.5-39.5 GHz to the fixed-satellite service**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that satellite systems are increasingly being used to deliver broadband services and can help enable universal broadband access;
- b) that next-generation fixed-satellite service technologies for broadband will increase speeds (45 Mbps is already available), with faster rates expected in the near future;
- c) that technological developments such as advances in spot-beam technologies and frequency re-use are used by the fixed-satellite service (FSS) in spectrum above 30 GHz to increase the efficient use of spectrum;
- d) that fixed-satellite applications in spectrum above 30 GHz, such as gateways, should be easier to share with other radiocommunication services than high-density fixed-satellite service (HDFSS) applications;
- e) that FSS systems based on the use of new technologies above 30 GHz and associated with both geostationary (GSO) and non-geostationary (non-GSO) satellite constellations are capable of providing high-capacity and economically feasible communications even to the most isolated regions of the world;
- f) that the frequency band 36-37 GHz is allocated on a primary basis to the Earth exploration-satellite service (EESS) (passive) and the space research service (SRS) (passive), which must be adequately protected,

*considering further*

- a) that Recommendations ITU-R S.1323, S.1325, S.1328, S.1529 and S.1557 provide information on system characteristics, operational requirements and protection criteria to be used in sharing studies;
- b) that it may be technically feasible to have a new FSS allocation in the frequency band 37.5-39.5 GHz (Earth-to-space) for operations of gateway earth stations, depending on the results of technical studies,

*noting*

- a) that filing information for GSO satellite networks in the frequency band 37.5-42.5 GHz (space-to-Earth) has been communicated to the Radiocommunication Bureau;
- b) that some of these GSO satellite networks are in operation and others will be operated in the near future;
- c) that the frequency band 37.5-38 GHz is allocated to SRS on a primary basis in the space-to-Earth direction;
- d) that the frequency band 37.5-39.5 GHz is allocated to EESS on a secondary basis in the space-to-Earth direction,

*recognizing*

the need to protect existing services when considering frequency bands for possible additional allocations to any service,

*resolves to invite ITU-R*

to conduct, and complete in time for WRC-23:

1 studies considering additional spectrum needs for development of the fixed-satellite service, taking into account the frequency bands currently allocated to FSS, the technical conditions of their use and the possibility of optimizing the use of these frequency bands with a view to increasing spectrum efficiency;

2 sharing and compatibility studies with existing services, on primary and secondary basis, including in adjacent bands as appropriate, to determine the suitability of new primary allocations to the FSS in the frequency band 37.5-39.5 GHz (Earth-to-space, limited to FSS feeder links only) for both GSO and non-GSO orbit use;

3 studies towards possible revision of Resolution **750 (Rev.WRC-15)** so that systems operating in the passive frequency band 36-37 GHz are protected,

*further resolves*

to invite WRC-23 to consider the results of the above studies and take appropriate actions,

*invites administrations*

to participate actively in these studies by submitting contributions to ITU-R.

RESOLUTION 162 (WRC-15)

**Studies relating to spectrum needs and possible allocation of the frequency band  
51.4-52.4 GHz to the fixed-satellite service (Earth-to-space)**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that satellite systems are increasingly being used to deliver broadband services and can help enable universal broadband access;
- b) that next-generation fixed-satellite service technologies for broadband will increase speeds (45 Mbps is already available), with faster rates expected in the near future;
- c) that technological developments such as advances in spot-beam technologies and frequency reuse are used by the fixed-satellite service in spectrum above 30 GHz to increase the efficient use of spectrum;
- d) that fixed-satellite applications in spectrum above 30 GHz, such as feeder links, should be easier to share with other radiocommunication services than high-density fixed-satellite service (HDFSS) applications,

*recognizing*

- a) the need to protect existing services when considering frequency bands for possible additional allocations to any service;
- b) that the frequency band 51.4-52.4 GHz is allocated to fixed and mobile services, which will need to be protected, and is available for high-density applications in the fixed service as indicated in No. **5.547**;
- c) that No. **5.556** indicates that radio astronomy observations are carried out in the frequency band 51.4-54.25 GHz and that appropriate measures may have to be defined to protect radio astronomy service,

*resolves to invite ITU-R*

to conduct, and complete in time for WRC-19:

- 1 studies considering additional spectrum needs for development of the fixed-satellite service, taking into account the frequency bands currently allocated to the fixed-satellite service, the technical conditions of their use, and the possibility of optimizing the use of these frequency bands with a view to increasing spectrum efficiency;
- 2 subject to justification resulting from studies conducted under *resolves to invite ITU-R 1*, sharing and compatibility studies with existing services, on a primary and secondary basis, including in adjacent bands as appropriate, to determine the suitability, including protection of fixed and mobile services, of new primary allocations to the FSS in the frequency band 51.4-52.4 GHz (Earth-to-space) limited to FSS feeder links for geostationary orbit use, and the possible associated regulatory actions;
- 3 studies towards possible revision of Resolution **750 (Rev.WRC-15)** so that systems operating in the passive frequency band 52.6-54.25 GHz are protected;
- 4 studies regarding the protection of radio astronomy, as described in *recognizing c)*, including regulatory measures, as appropriate,

*instructs the Director of the Radiocommunication Bureau*

to report on the results of the ITU-R studies to WRC-19,

*invites administrations*  
to participate actively in these studies by submitting contributions to ITU-R.

RESOLUTION 212 (Rev.WRC-15)

**Implementation of International Mobile Telecommunications in the frequency bands  
1 885-2 025 MHz and 2 110-2 200 MHz**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that Resolution ITU-R 56 defines the naming for International Mobile Telecommunications (IMT);
- b) that the ITU Radiocommunication Sector (ITU-R), for WRC-97, recommended approximately 230 MHz for use by the terrestrial and satellite components of IMT;
- c) that ITU-R studies forecast that additional spectrum may be required to support the future services of IMT and to accommodate future user requirements and network deployments;
- d) that ITU-R has recognized that space techniques are an integral part of IMT;
- e) that, in No. **5.388**, WARC-92 identified frequency bands to accommodate certain mobile services, now called IMT,

*noting*

- a) that the terrestrial component of IMT has already been deployed or is being considered for deployment in the frequency bands 1 885-1 980 MHz, 2 010-2 025 MHz and 2 110-2 170 MHz;
- b) that both the terrestrial and satellite components of IMT have already been deployed or are being considered for deployment in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz;
- c) that the availability of the satellite component of IMT in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz simultaneously with the terrestrial component of IMT in the frequency bands identified in No. **5.388** would improve the overall implementation and the attractiveness of IMT,

*noting further*

- a) that co-coverage, co-frequency deployment of independent satellite and terrestrial IMT components is not feasible unless techniques, such as the use of an appropriate guardband or other mitigation techniques, are applied to ensure coexistence and compatibility between the terrestrial and satellite components of IMT;
- b) that, when the satellite and terrestrial components of IMT are deployed in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz in adjacent geographical areas, technical or operational measures may need to be implemented to avoid harmful interference, and further studies by ITU-R are required in this regard;
- c) that some difficulties have been raised in addressing potential interference between the satellite and terrestrial components of IMT;
- d) that Report ITU-R M.2041 addresses sharing and adjacent band compatibility in the 2.5 GHz band between the terrestrial and satellite components of IMT-2000,

*resolves*

that administrations which implement IMT:

- a) should make the necessary frequencies available for system development;
- b) should use those frequencies when IMT is implemented;

c) should use the relevant international technical characteristics, as identified by ITU-R and ITU-T Recommendations,

*invites ITU-R*

to study possible technical and operational measures to ensure coexistence and compatibility between the terrestrial component of IMT (in the mobile service) and the satellite component of IMT (in the mobile service and the mobile-satellite service) in the frequency bands 1 980-2 010 MHz and 2 170-2 200 MHz where those frequency bands are shared by the mobile service and the mobile-satellite service in different countries, in particular for the deployment of independent satellite and terrestrial components of IMT and to facilitate development of both the satellite and terrestrial components of IMT,

*encourages administrations*

1 to give due consideration to the accommodation of other services currently operating in these frequency bands when implementing IMT;

2 to participate actively in the ITU-R studies in accordance with *invites ITU-R* above,

*instructs the Director of the Radiocommunication Bureau*

to include in his report, for consideration by WRC-19, the results of the ITU-R studies referred to in *invites ITU-R* above,

*further invites ITU-R*

to continue its studies with a view to developing suitable and acceptable technical characteristics for IMT that will facilitate worldwide use and roaming, and ensure that IMT can also meet the telecommunication needs of the developing countries and rural areas.



## RESOLUTION 235 (WRC-15)

### **Review of the spectrum use of the frequency band 470-960 MHz in Region 1**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that the favourable propagation characteristics in the frequency bands below 1 GHz are beneficial in providing cost-effective solutions for coverage;
- b) that there is a need to continually take advantage of technological developments in order to increase the efficient use of the spectrum and facilitate spectrum access;
- c) that the frequency band 470-862 MHz is a harmonized band used to provide terrestrial television broadcasting services on a worldwide scale;
- d) that, in many countries, there is a sovereign obligation to provide broadcasting services;
- e) that terrestrial broadcasting networks have a long life cycle, and a stable regulatory environment is necessary to provide protection of investment and future development;
- f) that, in many countries, there is a need for investment in the next decade for the migration of broadcasting into the frequency band below 694 MHz and for the implementation of new-generation broadcasting technologies, in order to take advantage of technological developments to increase the efficient use of the spectrum;
- g) that in many developing countries terrestrial broadcasting is the only viable means of delivery of broadcast services;
- h) that the technology trend in digital terrestrial television (DTT) is towards high-definition television which requires a higher bit rate than standard-definition television;
- i) that it is necessary to adequately protect all primary services in the frequency band 470-694 MHz and in adjacent frequency bands;
- j) that International Mobile Telecommunications (IMT) systems, utilizing some parts of the frequency band 694/698-960 MHz, are intended to provide telecommunication services on a worldwide scale, regardless of location, network or terminal used;
- k) that, for countries listed in No. **5.296**, an additional allocation to the land-mobile service on a secondary basis is in place, intended for applications ancillary to broadcasting and programme-making;
- l) that the frequency band 645-862 MHz is allocated on a primary basis to the aeronautical radionavigation service (ARNS) in the countries listed in No. **5.312**;
- m) that, in some countries, parts of the frequency band are also allocated to the radiolocation service on a secondary basis, limited to the operation of wind profiler radars (No. **5.291A**), and also to the radio astronomy service on a secondary basis (No. **5.306**), and, according to No. **5.149**, administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference when making assignments to stations of other services,

*recognizing*

- a) that the GE06 Agreement applies in all Region 1 countries, except Mongolia, and in Iran (Islamic Republic of), in particular for the frequency band 470-862 MHz;
- b) that the GE06 Agreement contains provisions for the terrestrial broadcasting service and other primary terrestrial services, a Plan for digital television and a list of stations of other primary terrestrial services;

c) that a digital entry in the GE06 Plan may also be used for transmissions in a service other than the broadcasting service under the conditions set out in § 5.1.3 of the GE06 Agreement and the provisions of No. 4.4 of the Radio Regulations;

d) that information on implementation of the digital dividend and on the transition to digital television and its technological evolution is needed and may not be available before 2019,

*noting*

the ongoing development of new applications and technologies of both the broadcasting and mobile services,

*resolves to invite ITU-R, after the 2019 World Radiocommunication Conference and in time for the 2023 World Radiocommunication Conference*

1 to review the spectrum use and study the spectrum needs of existing services within the frequency band 470-960 MHz in Region 1, in particular the spectrum requirements of the broadcasting and mobile, except aeronautical mobile, services, taking into account the relevant ITU Radiocommunication Sector (ITU-R) studies, Recommendations and Reports;

2 to carry out sharing and compatibility studies, as appropriate, in the frequency band 470-694 MHz in Region 1 between the broadcasting and mobile, except aeronautical mobile, services, taking into account relevant ITU-R studies, Recommendations and Reports;

3 to conduct sharing and compatibility studies, as appropriate, in order to provide relevant protection of systems of other existing services,

*invites administrations*

to participate actively in the studies by submitting contributions to ITU-R,

*resolves to invite the 2023 World Radiocommunication Conference*

to consider, based on the results of studies above, provided that these studies are completed and approved by ITU-R, possible regulatory actions in the frequency band 470-694 MHz in Region 1, as appropriate,

*further invites ITU-R*

to ensure intersectoral collaboration with the ITU Telecommunication Development Sector (ITU-D) in the implementation of this Resolution.

RESOLUTION 236 (WRC-15)

**Railway radiocommunication systems between  
train and trackside**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that railway transportation systems are evolving;
- b) that there is a need to integrate different technologies in order to facilitate various functions, for instance dispatching commands, operating control and data transmission, into railway train and trackside systems to meet the needs of a high-speed railway environment;
- c) that the current railway radiocommunication systems supporting railway train and trackside are narrowband systems;
- d) that the deployment of railway radiocommunication systems between train and trackside requires infrastructure investment,

*recognizing*

- a) that information and radiocommunication technologies in railway radiocommunication systems between train and trackside provide improved railway traffic control, passenger safety and improved security for train operations;
- b) that timely studies are required on technologies providing for railway radiocommunication;
- c) that international standards and harmonized spectrum would facilitate worldwide deployment of railway radiocommunication systems between train and trackside and provide for economies of scale in railway transportation for the public;
- d) that there is a need to benefit from the experiences in achieving compatibility between current railway radiocommunication systems between train and trackside and other radiocommunication systems,

*noting*

- a) that railway transportation contributes to global economic and social development, especially for developing countries;
- b) that some national and international railway organizations have begun investigations on new technologies for railway radiocommunication systems;
- c) that ITU Radiocommunication Sector (ITU-R) Study Group 5 is studying relevant technical and operational characteristics for railway radiocommunication systems;
- d) that, in some countries, railway radiocommunication systems may assist in providing passenger services,

*emphasizing*

- a) that, in the frequency bands in which these current and future systems operate, railway radiocommunication systems between train and trackside should be compatible with a variety of other systems;
- b) that the provisions of Nos. **1.59** and **4.10** do not apply for railway radiocommunication systems,

*resolves to invite the 2019 World Radiocommunication Conference*

based on the results of ITU-R studies, to take necessary actions, as appropriate, to facilitate global or regional harmonized frequency bands, to the extent possible, for the implementation of railway radiocommunication systems between train and trackside, within existing mobile-service allocations,

*invites ITU-R*

to study the spectrum needs, technical and operational characteristics and implementation of railway radiocommunication systems between train and trackside,

*invites Member States, Sector Members, Associates and Academia*

to participate actively in the study by submitting contributions to ITU-R,

instructs the Secretary-General

to bring this Resolution to the attention of International Union of Railways (UIC) and other relevant international and regional organizations.

## RESOLUTION 237 (WRC-15)

### **Intelligent Transport Systems applications**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that information and communication technologies are integrated in a vehicle system to provide Intelligent Transport Systems (ITS) communication applications for the purpose of improving traffic management and assisting safe driving;
- b) that there is a need for consideration of spectrum harmonization for ITS applications, which are being used globally or regionally;
- c) that there is a need to integrate various technologies, including radiocommunications, into land transportation systems;
- d) that many new connected vehicles use intelligent technologies in the vehicles' combined advanced traffic management, advanced traveller information, advanced public transportation management systems and/or advanced fleet management systems to improve traffic management;
- e) that the International Organization for Standardization (ISO) is standardizing ITS (non-radio aspects) in ISO/TC204, including applications for "cooperative systems" which require vehicle-to-vehicle and vehicle-to-infrastructure radiocommunications;
- f) that the 3rd Generation Partnership Project (3GPP) is standardizing radio interface, system architecture and service requirements of "LTE-based V2X Services" for ITS application;
- g) that future vehicular radiocommunication technologies and ITS broadcast systems are emerging;
- h) that some administrations have harmonized frequency bands for ITS radiocommunication applications,

*recognizing*

that harmonized spectrum and international standards would facilitate worldwide deployment of ITS radiocommunications and provide for economies of scale in bringing ITS equipment and services to the public,

*noting*

- a) that the guidelines for radio interface requirements of ITS are described in Recommendation ITU-R M.1890;
- b) that outlines of technologies and characteristics for dedicated short-range communications at 5.8 GHz are described in Recommendation ITU-R M.1453-2;
- c) that some administrations in each of the three Regions have deployed radiocommunication local area networks in the frequency band 5 725-5 825 MHz, which is also identified for industrial, scientific and medical (ISM) applications;
- d) that studies and feasibility tests on advanced ITS radiocommunications have been actively conducted towards the realization of traffic safety and a reduction of environmental impact as described in Report ITU-R M.2228;
- e) that radio interface standards of vehicle-to-vehicle and vehicle-to-infrastructure communications for ITS applications are described in Recommendation ITU-R M.2084,

*emphasizing*

- a) that ITS applications currently operate within frequency bands allocated to a number of radiocommunication services in accordance with the relevant provisions of the Radio Regulations;
- b) that the provisions of Nos. **1.59** and **4.10** do not apply to ITS applications,

*resolves to invite the 2019 World Radiocommunication Conference*

taking into account the results of ITU Radiocommunication Sector (ITU-R) studies, to consider possible global or regional harmonized frequency bands for the implementation of evolving ITS under existing mobile-service allocations,

*invites ITU-R*

to carry out studies on technical and operational aspects of evolving ITS implementation using existing mobile-service allocations,

*invites administrations*

to contribute actively to the ITU-R studies on this issue.

RESOLUTION 238 (WRC-15)

**Studies on frequency-related matters for International Mobile Telecommunications identification including possible additional allocations to the mobile services on a primary basis in portion(s) of the frequency range between 24.25 and 86 GHz for the future development of International Mobile Telecommunications for 2020 and beyond**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that International Mobile Telecommunications (IMT) is intended to provide telecommunication services on a worldwide scale, regardless of location and type of network or terminal;
- b) that IMT systems have contributed to global economic and social development;
- c) that IMT systems are now being evolved to provide diverse usage scenarios and applications such as enhanced mobile broadband, massive machine-type communications and ultra-reliable and low-latency communications;
- d) that ultra-low latency and very high bit rate applications of IMT will require larger contiguous blocks of spectrum than those available in frequency bands that are currently identified for use by administrations wishing to implement IMT;
- e) that it may be suitable to examine higher frequency bands for these larger blocks of spectrum;
- f) that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;
- g) that the properties of higher frequency bands, such as shorter wavelength, would better enable the use of advanced antenna systems including MIMO and beam-forming techniques in supporting enhanced broadband;
- h) that ITU-T has initiated the study of network standardization for IMT for 2020 and beyond;
- i) that adequate and timely availability of spectrum and supporting regulatory provisions is essential to realize the objectives in Recommendation ITU-R M.2083;
- j) that harmonized worldwide bands and harmonized frequency arrangements for IMT are highly desirable in order to achieve global roaming and the benefits of economies of scale;
- k) that identification of frequency bands allocated to mobile service for IMT may change the sharing situation regarding applications of services to which the frequency band is already allocated, and may require additional regulatory actions;
- l) the need to protect existing services and to allow for their continued development when considering frequency bands for possible additional allocations to any service,

*noting*

- a) that Resolution ITU-R 65 addresses the principles for the process of development of IMT for 2020 and beyond, and that Question ITU-R 77-7/5 considers the needs of developing countries in the development and implementation of IMT;
- b) that Question ITU-R 229/5 seeks to address the further development of IMT;
- c) that IMT encompasses both IMT-2000, IMT-Advanced, and IMT-2020 collectively, as described in Resolution ITU-R 56-2;

- d) Recommendation ITU-R M.2083, on the framework and objectives of the future development of IMT for 2020 and beyond;
- e) that Report ITU-R M.2320 addresses future technology trends of terrestrial IMT systems;
- f) Report ITU-R M.2376, on technical feasibility of IMT in the frequency bands above 6 GHz;
- g) that Report ITU-R M.2370 analyses trends impacting future IMT traffic growth beyond the year 2020 and estimates global traffic demands for the period 2020 to 2030;
- h) that there are ongoing studies within ITU-R on the propagation characteristics for mobile systems in higher frequency bands;
- i) the relevance of provisions in Nos. **5.340**, **5.516B**, **5.547** and **5.553**, which may need to be taken into account in studies;
- j) that the FSS allocation in the frequency band 24.65-25.25 GHz was made by WRC-12,
  - recognizing*
    - a) that there is a lead time between the allocation of frequency bands by world radiocommunication conferences and the deployment of systems in those bands, and that timely availability of wide and contiguous blocks of spectrum is therefore important to support the development of IMT;
    - b) that frequency bands allocated to passive services on an exclusive basis are not suitable for an allocation to the mobile service;
    - c) that any identification of frequency bands for IMT should take into account the use of the bands by other services and the evolving needs of these services;
    - d) that there should be no additional regulatory or technical constraints imposed to services to which the band is currently allocated on a primary basis,

*resolves to invite ITU-R*

- 1 to conduct and complete in time for WRC-19 the appropriate studies to determine the spectrum needs for the terrestrial component of IMT in the frequency range between 24.25 GHz and 86 GHz, taking into account:
  - technical and operational characteristics of terrestrial IMT systems that would operate in this frequency range, including the evolution of IMT through advances in technology and spectrally efficient techniques;
  - the deployment scenarios envisaged for IMT-2020 systems and the related requirements of high data traffic such as in dense urban areas and/or in peak times;
  - the needs of developing countries;
  - the time-frame in which spectrum would be needed;
- 2 to conduct and complete in time for WRC-19 the appropriate sharing and compatibility studies<sup>1</sup>, taking into account the protection of services to which the band is allocated on a primary basis, for the frequency bands:

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<sup>1</sup> Including studies with respect to services in adjacent bands, as appropriate.



- 24.25-27.5 GHz<sup>2</sup>, 37-40.5 GHz, 42.5-43.5 GHz, 45.5-47 GHz, 47.2-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz, which have allocations to the mobile service on a primary basis; and
- 31.8-33.4 GHz, 40.5-42.5 GHz and 47-47.2 GHz, which may require additional allocations to the mobile service on a primary basis,

*further resolves*

1 to invite CPM19-1 to define the date by which technical and operational characteristics needed for sharing and compatibility studies are to be available, to ensure that studies referred to in *resolves to invite ITU-R* can be completed in time for consideration at WRC-19;

2 to invite WRC-19 to consider, based on the results of the above studies, additional spectrum allocations to the mobile service on a primary basis and to consider identification of frequency bands for the terrestrial component of IMT; the bands to be considered being limited to part or all of the bands listed in *resolves to invite ITU-R 2*,

*invites administrations*

to participate actively in these studies by submitting contributions to ITU-R.

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<sup>2</sup> When conducting studies in the band 24.5-27.5 GHz, to take into account the need to ensure the protection of existing earth stations and the deployment of future receiving earth stations under the EESS (space-to-Earth) and SRS (space-to-Earth) allocation in the frequency band 25.5-27 GHz.

RESOLUTION 239 (WRC-15)

**Studies concerning Wireless Access Systems including radio local area networks  
in the frequency bands between 5 150 MHz and 5 925 MHz**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that there has been considerable growth in the demand for Wireless Access Systems including radio local area networks (WAS/RLAN) applications with multimedia capabilities;
- b) that WAS/RLAN applications contribute to global economic and social development by providing a wide range of multimedia applications;
- c) that there is a need to continually take advantage of technological developments in order to increase the efficient use of spectrum and facilitate spectrum access;
- d) that as technology evolves to meet increasing performance demands and traffic on broadband WAS increases, the use of wider bandwidth channels in order to support high data rates creates a need for additional spectrum;
- e) that the frequency band 5 350-5 460 MHz is allocated worldwide on a primary basis to the aeronautical radionavigation service (No. **5.449**);
- f) that the frequency band 5 460-5 470 MHz is allocated worldwide on a primary basis to the radionavigation service (No. **5.449**);
- g) that the frequency band 5 350 to 5 470 MHz is allocated worldwide on a co-primary basis to the Earth exploration-satellite service (active) (No. **5.448B**), the space research service (active) (No. **5.448C**) and the radiolocation service (No. **5.448D**);
- h) that the frequency bands between 5 725 and 5 850 MHz are allocated worldwide on a primary basis to the radiolocation service and, in Region 1, to the fixed-satellite service;
- i) that the frequency band 5 850-5 925 MHz is allocated worldwide on a primary basis to the mobile service, the fixed service and the fixed-satellite service;
- j) that there is a need to protect the incumbent primary services including their current and planned use;
- k) that there may be a need to specify potential technical and operational restrictions for WAS/RLAN operating in the mobile service within the 5 GHz frequency range to facilitate sharing with systems of incumbent services,

*considering further*

- a) that adequate and timely availability of spectrum and supporting regulatory provisions are essential to support future growth of WAS/RLAN applications;
- b) that harmonized worldwide bands that support future growth of WAS/RLAN applications are highly desirable in order to achieve the benefits of economies of scale,

*noting*

- a) that the frequency bands 5 150-5 250 MHz, 5 250-5 350 MHz and 5 470-5 725 MHz are allocated to the mobile service on a primary basis for the implementation of WAS/RLAN applications in accordance with Resolution **229 (Rev.WRC-12)**;
- b) that the frequency band 5 250-5 850 MHz is allocated worldwide on a primary basis to the radiolocation service;
- c) that in the frequency bands 5 350 -5 470 MHz there are no primary mobile allocations;

- d) that in the frequency band 5 725-5 850 MHz there is no primary mobile allocation, however, the band is allocated by footnote to the fixed and mobile service in some countries, and additionally WAS/RLAN use is already authorized in some countries situated in each of the ITU-R regions;
- e) that the Earth exploration-satellite service (active) allocations in the frequency bands 5 350-5 460 MHz and 5 460-5 470 MHz are essential for Earth-observation programmes such as Copernicus (Sentinel-1 and Sentinel-3), Jason, Sentinel-6 and RADARSAT (RADARSAT-2 and RADARSAT-3) and that the data these provide is vital for reliable and up-to-date information on how our planet and its climate are changing;
- f) that future Earth exploration-satellite service (active) systems are being planned to utilize up to 300 MHz of bandwidth within the 5 GHz EESS allocated frequency band to improve image resolution and provide improved applications to users;
- g) that the frequency band 5 150-5 250 MHz is also allocated worldwide on a primary basis to the aeronautical radionavigation service and to the fixed-satellite service (No. **5.447A**);
- h) that the frequency bands between 5 250 and 5 350 MHz are also allocated worldwide on a primary basis to the Earth exploration-satellite service (active), the space research service and the space research (active) service;
- i) that protection and performance criteria for systems of incumbent services are available in ITU-R,

*recognizing*

- a) that the compatibility studies performed by ITU-R in preparation for this conference indicate that when assuming the use of WAS/RLAN mitigation measures limited to the regulatory provisions of Resolution **229 (Rev.WRC-12)**, sharing between WAS/RLAN and the EESS (active) systems in the frequency bands 5 350 to 5 470 MHz would not be feasible, as well as being insufficient to ensure protection of certain radar types in this frequency band; for these cases, sharing may only be feasible if additional WAS/RLAN mitigation measures are implemented, however, no agreement was reached on the applicability of any additional WAS/RLAN mitigation techniques;
- b) that the results of ITU-R studies indicate that the minimum spectrum need for WAS/RLAN in the 5 GHz frequency range in the year 2018 is estimated at 880 MHz; this figure includes 455-580 MHz already utilized by non-IMT mobile broadband applications operating within the 5 GHz range resulting in 300-425 MHz additional spectrum being required;
- c) that WAS/RLAN devices utilize the following frequency bands in the 5 GHz frequency range: 5 150-5 250 MHz, 5 250-5 350 MHz, 5 470-5 725 MHz and, in some countries 5 725-5 850 MHz;
- d) that the frequency band 5 850-5 925 MHz is extensively used in some countries by the fixed-satellite service;
- e) that additional global allocations to the mobile service in the frequency bands 5 350-5 470 MHz and 5 725-5 850 MHz would facilitate contiguous spectrum for WAS/RLAN, thereby enabling the use of wider channel bandwidths to support higher data throughput;
- f) that sharing studies should consider additional mitigation techniques to ensure that WAS/RLAN devices would not result in degradation of the performance for existing systems;

g) that the application of possible additional WAS/RLAN mitigation measures referred to in *recognizing a)* may also be relevant to enable WAS/RLAN outdoor operation in other frequency bands;

h) that the frequency band 5 725-5 875 MHz is also designated for industrial, scientific and medical (ISM) applications and that radiocommunication services operating within this frequency band must accept harmful interference which may be caused by these applications in accordance with No. **5.150**,

*resolves to invite the 2019 World Radiocommunication Conference*

to consider the results of the ITU-R studies and take appropriate actions,

*invites ITU-R*

to conduct and complete the following in time for WRC-19:

a) to study WAS/RLAN technical characteristics and operational requirements in the 5 GHz frequency range;

b) to conduct studies with a view to identify potential WAS/RLAN mitigation techniques to facilitate sharing with incumbent systems in the frequency bands 5 150-5 350 MHz, 5 350-5 470 MHz, 5 725-5 850 MHz and 5 850-5 925 MHz, while ensuring the protection of incumbent services including their current and planned use;

c) to perform sharing and compatibility studies between WAS/RLAN applications and incumbent services in the frequency band 5 150-5 350 MHz with the possibility of enabling outdoor WAS/RLAN operations including possible associated conditions;

d) to conduct further sharing and compatibility studies between WAS/RLAN applications and incumbent services addressing:

i) whether any additional mitigation techniques in the frequency band 5 350-5 470 MHz beyond those analysed in the studies referred to in *recognizing a)* would provide coexistence between WAS/RLAN systems and EESS (active) and SRS (active) systems;

ii) whether any mitigation techniques in the frequency band 5 350-5 470 MHz would provide compatibility between WAS/RLAN systems and radio determination systems;

iii) whether the results of studies under points i) and ii) would enable an allocation of the frequency band 5 350-5 470 MHz to the mobile service with a view to accommodating WAS/RLAN use;

e) to also conduct detailed sharing and compatibility studies, including mitigation techniques, between WAS/RLAN and incumbent services in the frequency band 5 725-5 850 MHz with a view to enabling a mobile service allocation to accommodate WAS/RLAN use;

f) to also conduct detailed sharing and compatibility studies, including mitigation techniques, between WAS/RLAN and incumbent services in the frequency band 5 850-5 925 MHz with a view to accommodating WAS/RLAN use under the existing primary mobile service allocation while not imposing any additional constraints on the existing services,

*invites administrations*

to participate in the studies by submitting contributions to ITU-R.

RESOLUTION 359 (REV.WRC-15)

**Consideration of regulatory provisions for updating and modernization of the Global Maritime Distress and Safety System**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that there is a continuing need in the Global Maritime Distress and Safety System (GMDSS), on a global basis, for improved communications to enhance maritime capabilities;
- b) that the International Maritime Organization (IMO) is considering GMDSS modernization;
- c) that advanced maritime MF/HF/VHF data systems and satellite communication systems may be used to deliver Maritime Safety Information (MSI) and other GMDSS communications;
- d) that IMO is considering recognition of additional global and regional GMDSS satellite communication systems;
- e) that GMDSS satellite systems need to provide protection of incumbent services in accordance with the Radio Regulations, including those in adjacent frequency bands, from harmful interference, and such GMDSS satellite systems should operate within the interference environment of existing systems,

*noting*

- a) that WRC-12 reviewed Appendix 17 to improve efficiency and introduce bands for new digital technology;
- b) that WRC-12 reviewed the regulatory provisions and spectrum allocations for use by maritime safety systems for ships and ports,

*further noting*

that WRC-12 and this conference have reviewed Appendix 18 to improve efficiency and introduce bands for new digital technology,

*recognizing*

- a) that advanced maritime communication systems may support the implementation of GMDSS modernization;
- b) that IMO efforts to implement GMDSS modernization may require modification of the Radio Regulations to accommodate advanced maritime communication systems;
- c) that due to the importance of GMDSS communication systems in ensuring the safe operation of shipping and commerce and security at sea, they must be resilient to interference;
- d) that IMO has received an application to recognize an existing satellite system as part of the GMDSS, and consequential regulatory actions may need to be considered;
- e) that Nos. 4.6, 5.369 and 5.372 provide information on the use of the frequency band 1 616-1 626.5 MHz, or parts thereof,

*resolves to invite ITU-R*

1 to conduct studies, taking into consideration the activities of IMO, as well as information and requirements provided by IMO, in order to determine the regulatory provisions to support GMDSS modernization;

2 to conduct studies, taking into consideration the activities of IMO and the recognition of additional satellite systems for use in the GMDSS, including consideration of the mobile-satellite service (MSS) allocations used and the potential impact of possible modifications to the provisions of the Radio Regulations on sharing and compatibility with other services and systems in the frequency band and adjacent frequency bands,

*invites the 2019 World Radiocommunication Conference*

1 to consider the result of ITU Radiocommunication Sector (ITU-R) studies and take necessary actions, as appropriate, to support GMDSS modernization;

2 to consider regulatory provisions, if appropriate, based on the ITU-R studies, and taking into consideration the activities of IMO, related to the introduction of additional satellite systems into the GMDSS, including consideration of the MSS allocations used, while ensuring the protection of all incumbent services, including those in adjacent frequency bands, from harmful interference, as stated in *recognizing e*),

*invites*

1 IMO to actively participate in the studies by providing requirements and information that should be taken into account in ITU-R studies;

2 the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the International Electrotechnical Commission (IEC), the International Hydrographic Organization (IHO), the International Organization for Standardization (ISO) and the World Meteorological Organization (WMO) to contribute to these studies,

*instructs the Secretary-General*

to bring this Resolution to the attention of IMO and other international and regional organizations concerned.

## RESOLUTION 360 (REV.WRC-15)

### **Consideration of regulatory provisions and spectrum allocations to the maritime mobile-satellite service to enable the satellite component of the VHF Data Exchange System and enhanced maritime radiocommunication**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that the ITU Radiocommunication Sector (ITU-R) has developed the technical characteristics of a VHF Data Exchange System (VDES) as described in Recommendation ITU-R M.2092;
- b) that the Automatic Identification System (AIS) as described in Recommendation ITU-R M.1371 is an integral part of the VDES;
- c) that VDES uses the timing and frame structure of AIS;
- d) that AIS is used primarily for surveillance and safety of navigation purposes in ship-to-ship use, ship reporting and vessel traffic services applications;
- e) that there is a growing need for the establishment of a future VDES satellite component which would offer potential enhancements to maritime safety;
- f) that the VDES satellite component should not interfere with AIS, application specific messages (ASM) and the VDES terrestrial component, while making efficient use of the VHF maritime spectrum and accommodating all users;
- g) that the VDES satellite component should not cause harmful interference to digital selective calling (DSC), AIS, voice distress, safety and calling channels;
- h) that the VDES satellite component may operate in the relevant part of the VHF maritime frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz,

*noting*

that the International Maritime Organization (IMO) has developed an international code for ships operating in polar waters (“Polar Code”),

*recognizing*

- a) that a satellite component for VDES is necessary to expand the system from the coastal area to a global coverage;
- b) that a satellite component of the VDES offers potential enhancement to VHF safety communication on a global basis to satisfy the increasing need for maritime communication for enhanced maritime safety;
- c) that this satellite component should be capable of operating with the terrestrial VDES (AIS, ASM and VDE) and should not interfere with it, or block it;
- d) that the satellite component should not cause harmful interference to incumbent services and those in adjacent frequency bands, which are defined for the lower adjacent frequency band from 154 MHz to 156 MHz and for the higher adjacent frequency band from 162 to 164 MHz, and to all other components of the existing VDES as described in Recommendation ITU-R M.2092, DSC, AIS and voice distress, safety and calling channels;
- e) that the receiver on the satellite should be resilient to harmful interference from incumbent services and those services in adjacent bands, which are defined for the lower

adjacent frequency band from 154 MHz to 156 MHz and for the higher adjacent frequency band from 162 MHz to 164 MHz;

f) that since the VDES as described in Recommendation ITU-R M.2092 uses the frequency bands of Appendix 18, the implementation of the VDES satellite component would be more effective when using the frequency bands within Appendix 18;

g) that studies should be carried out to identify spectrum needed for the VDES satellite component;

h) that some administrations have initiated testing of the satellite component for VDES which will continue,

*resolves to invite the 2019 World Radiocommunication Conference*

to consider, based on the results of ITU-R studies, modifications of the Radio Regulations, including new spectrum allocations to the maritime mobile-satellite service (MMSS) (Earth-to-space and space-to-Earth), preferably within the frequency bands 156.0125-157.4375 MHz and 160.6125-162.0375 MHz of Appendix 18, to enable a new VDES satellite component, while ensuring that this component will not degrade the current terrestrial VDES components, ASM and AIS operations and not impose any additional constraints on existing services in these and adjacent frequency bands as stated in *recognizing d) and e)*,

*invites ITU-R*

to conduct, as a matter of urgency, and in time for WRC-19, sharing and compatibility studies between VDES satellite components and incumbent services in the same and adjacent frequency bands specified in *recognizing d) and e)* to determine potential regulatory actions, including spectrum allocations to the MMSS (Earth-to-space and space-to-Earth) for VDES applications,

*further invites*

all members of ITU-R, IMO, the World Meteorological Organization (WMO), the International Hydrographic Organization (IHO), the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the International Electrotechnical Commission (IEC) and the International Radio Maritime Committee (CIRM) to contribute to these studies,

*invites administrations*

to participate in, and support, field trials of the VDES satellite component,

*instructs the Secretary-General*

to bring this Resolution to the attention of IMO, WMO, IHO, IEC, IALA, CIRM and other international and regional organizations concerned.



RESOLUTION 361 (WRC-15)

**Consideration of regulatory provisions for modernization of the  
Global Maritime Distress and Safety System and  
related to the implementation of e-navigation**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that there is a continuing need in the Global Maritime Distress and Safety System (GMDSS), on a global basis, for improved communications to enhance maritime capabilities;
- b) that the International Maritime Organization (IMO) is considering GMDSS modernization;
- c) that advanced maritime MF/HF/VHF data systems and satellite communication systems may be used to deliver Maritime Safety Information (MSI) and other GMDSS communications;
- d) that IMO is considering additional global and regional GMDSS satellite service providers;
- e) that WRC-19 will have commenced regulatory actions in regard to modernization of the GMDSS;
- f) that IMO is in the process of implementing e-navigation, defined as the harmonized collection, integration, exchange, presentation and analysis of marine information on board and ashore by electronic means to enhance berth-to-berth navigation and related services for safety and security at sea and protection of the marine environment;
- g) that GMDSS modernization may be influenced by the development of e-navigation,

*noting*

- a) that WRC-12 reviewed Appendix **17** and Appendix **18** to improve efficiency and introduce frequency bands for new digital technology;
- b) that WRC-12 has reviewed the regulatory provisions and spectrum allocations for use by maritime safety systems for ships and ports,

*further noting*

that WRC-12 and this conference have reviewed Appendix **18** to improve efficiency and introduce frequency bands for new digital technology,

*recognizing*

- a) that advanced maritime communication systems may support the implementation of GMDSS modernization and e-navigation;
- b) that IMO efforts to implement GMDSS modernization and e-navigation may require a review of the Radio Regulations to accommodate advanced maritime communication systems;
- c) that, due to the importance of these radio links in ensuring the safe operation of shipping and commerce and security at sea, they must be resilient to interference,

*resolves to invite the 2023 World Radiocommunication Conference*

1 to take into consideration the activities of IMO, as well as information and requirements provided by IMO, in order to determine the regulatory actions to support GMDSS modernization;

2 to consider possible regulatory actions, including spectrum allocations based on the ITU Radiocommunication Sector (ITU-R) studies, for the maritime mobile service, supporting e-navigation,

*invites ITU-R*

to conduct studies taking into consideration the activities of IMO, in order to determine spectrum needs and regulatory actions to support GMDSS modernization and the implementation of e-navigation,

*invites*

1 IMO to actively participate in the studies by providing requirements and information that should be taken into account in ITU-R studies;

2 the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the International Civil Aviation Organization (ICAO), the International Electrotechnical Commission (IEC), the International Hydrographic Organization (IHO), the International Organization for Standardization (ISO) and the World Meteorological Organization (WMO) to contribute to these studies,

*instructs the Secretary-General*

to bring this Resolution to the attention of IMO and other international and regional organizations concerned.

RESOLUTION 362 (WRC-15)

**Autonomous maritime radio devices operating in  
the frequency band 156-162.05 MHz**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that, in order to enhance safety of navigation, there is a need to identify and categorize maritime radio devices which operate autonomously in the maritime environment, including but not limited to: devices on towed unpowered ships and barges, derelict ships, floating ice and wave-gliders, “man overboard” devices, diver locating, alerting and radiotelephony devices, fishing net marker buoys, oil spill tracking buoys, oceanographic and other drifting buoys;
- b) that such autonomous maritime radio devices are operating with automatic identification system (AIS) technology or digital selective calling (DSC) technology, or transmitting synthetic voice messages, or with a combination of those technologies, and have been developed for safety-related purposes, and their number is expected to increase;
- c) that AIS is a proven technology for maritime safety applications, providing identification functions, safety of navigation functions, aids to navigation, locating signals and data communications;
- d) that some of these autonomous maritime radio devices may need different maritime identifiers from those used for personal or shipborne equipment,

*recognizing*

- a) that the integrity of AIS and the Global Maritime Distress and Safety System (GMDSS) should be protected;
- b) that ships complying with the International Convention for the Safety of Life at Sea (SOLAS) 1974 (as amended) and other ships equipped with automated radiocommunication systems, including AIS, DSC and/or other GMDSS alerting devices should be assigned maritime mobile service identities (MMSIs) in accordance with Recommendation ITU-R M.585;
- c) that the usage of frequencies of Appendix **18** to the Radio Regulations and maritime identities described in Recommendation ITU-R M.585 should be limited to devices which are identified as part of the maritime mobile service;
- d) that these autonomous maritime radio devices, which do not fall under the definition of No. **1.28** and the ITU Radiocommunication Sector (ITU-R) Recommendations, require a new categorization,

*further recognizing*

- a) that the majority of autonomous maritime radio devices using AIS technology are operating in AIS 1 and AIS 2 frequency bands, and, to some extent, occupying the resources of MMSIs for ship stations or aids to navigation;
- b) that Recommendations ITU-R M.493, ITU-R M.1371 and ITU-R M.541 describe technical and operational characteristics for some relevant maritime radio devices;
- c) that Report ITU-R M.2285 provides an overview of systems and their mode of operation for some maritime devices used as maritime survivor locating systems and devices (man overboard systems);

d) that an evaluation of the effects on the functioning of AIS used for the safety of navigation, and especially search and rescue activities implemented by AIS-search and rescue transmitters (AIS-SARTs), is required,

*noting*

a) that WRC-12 designated channels in Appendix 18 of the Radio Regulations for experiments and testing for the future new AIS applications or systems;

b) that ITU-R has been requested to study a future new maritime identification scheme,

*resolves to invite the 2019 World Radiocommunication Conference*

to consider the results of ITU-R studies and take appropriate actions,

*invites ITU-R*

1 to conduct the necessary studies in time for WRC-19 to determine the spectrum needs and technical and operational characteristics of autonomous maritime radio devices operating in the frequency band 156-162.05 MHz;

2 to conduct the necessary studies to categorize the various autonomous maritime radio devices;

3 to conduct sharing and compatibility studies, based on the results of *invites ITU-R* 1 and 2, to ensure that no undue constraints are placed on the GMDSS and AIS;

4 to conduct studies, taking into account the results of *invites ITU-R* 1 to 3, and existing maritime technology, to determine potential regulatory actions and appropriate frequencies for autonomous maritime radio devices within the frequency band 156-162.05 MHz,

*further invites*

the International Maritime Organization (IMO), the International Civil Aviation Organization (ICAO), the World Meteorological Organization (WMO), the International Hydrographic Organization (IHO), the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), the International Electrotechnical Commission (IEC) and the International Radio Maritime Committee (CIRM) to contribute to these studies,

*instructs the Secretary-General*

to bring this Resolution to the attention of IMO, ICAO, WMO, IEC, IALA, IHO, CIRM and other international and regional organizations concerned.

RESOLUTION 426 (WRC-15)

**Studies on spectrum needs and regulatory provisions for  
the introduction and use of the Global Aeronautical Distress  
and Safety System**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that the International Civil Aviation Organization (ICAO) has developed the initial version of the concept of operations for the Global Aeronautical Distress and Safety System (GADSS);
- b) that GADSS is intended to address the timely identification and location of an aircraft during all phases of flight as well as distress and emergency situations;
- c) that GADSS is intended to use existing and new applications to support search and rescue (SAR) and flight data retrieval;
- d) that GADSS is intended to include terrestrial and satellite components supporting different terrestrial and space applications;
- e) that not all requirements in the concept of operation for GADSS are currently fulfilled by existing technologies;
- f) that future systems based on new technologies are being developed to contribute to fully meeting the GADSS requirements;
- g) that, as stated by ICAO, “the full GADSS concept can be realized in an evolutionary manner”, and some applications may be developed after 2019;
- h) that the performance-based elements of the GADSS are still being defined by ICAO, and should be provided by ICAO in time to use them in ITU Radiocommunication Sector (ITU-R) studies;
- i) that the introduction of the GADSS needs to ensure the protection of, and impose no additional constraints on, all existing services,

*recognizing*

- a) that there are provisions in the Radio Regulations, including frequency band allocations, related to aeronautical services that support distress and safety systems;
- b) that Annex 10 to the Convention on International Civil Aviation is a part of International Standards and Recommended Practices (SARPs) for aeronautical telecommunication systems used by international civil aviation,

*noting*

that the concept of operations and requirements for GADSS is general, its components and applications currently provide only scenarios, and it is being developed in an evolutionary manner in ICAO,

*resolves to invite the 2019 World Radiocommunication Conference*

- 1 to take appropriate actions, taking into account the results of ITU-R studies;
- 2 to analyse the necessity for further studies, and consider whether this matter should be brought to the attention of a future competent conference,

*invites ITU-R*

1 to conduct the relevant studies, taking into account information and requirements provided by ICAO for both the terrestrial and satellite components, including:

- a) quantification and characterization of radiocommunication requirements related to GADSS, such as:
  - data traffic requirements for different system components of GADSS (such as the aircraft tracking, autonomous distress and flight data recovery systems) and their terrestrial and satellite components at each phase of the operation;
  - information on the radiocommunication requirement related to safety-of-life applications;
  - performance criteria for terrestrial and satellite systems;
- b) analysis of the existing allocations to the relevant aeronautical services and determining whether any additional spectrum is required;
- c) studies on sharing and/or compatibility with the existing services;

2 to undertake studies of the existing regulatory provisions to determine whether it might be necessary to apply additional regulatory measures,

*invites the International Civil Aviation Organization*

to participate actively in the studies by providing requirements and information that should be taken into account in ITU-R studies, in particular those mentioned in *invites ITU-R 1a*),

*instructs the Secretary-General*

to bring this Resolution to the attention of the ICAO, the International Air Transport Association (IATA) and the International Maritime Organization (IMO).

RESOLUTION 557 (WRC-15)

**Consideration of possible revision of Annex 7 to  
Appendix 30 of the Radio Regulations**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that the provisions applying to the broadcasting-satellite service (BSS) in the frequency bands 11.7-12.5 GHz in Region 1, 12.2-12.7 GHz in Region 2 and 11.7-12.2 GHz in Region 3 are contained in Appendix 30;
- b) that fixed-satellite service (FSS) networks operate in the frequency bands 12.5-12.75 GHz in Region 1, 11.7-12.2 GHz in Region 2 and 12.2-12.75 GHz in Region 3;
- c) that Annex 7 to Appendix 30 (**Rev.WRC-15**) specifies limitations, including orbital position limitations,

*noting*

- a) that the ITU Radiocommunication Sector (ITU-R) has carried out a significant amount of studies in preparation for conferences on BSS planning, and has developed a number of Reports and Recommendations;
- b) that BSS and FSS networks from different Regions may coexist, operate simultaneously and share orbit resource in their respective Regions;
- c) that special consideration needs to be given to operational networks implemented under the current Annex 7 to Appendix 30 regime;
- d) that BSS is subject to orbital position limitations while FSS in the same frequency bands is not,

*recognizing*

- a) that WRC-2000 developed new Plans for Regions 1 and 3 assuming digital BSS and feeder-link assignments;
- b) that existing FSS networks operating in the frequency bands mentioned in *considering b)* and BSS networks implemented in accordance with the current provisions of Annex 7 to Appendix 30 shall continue to be protected;
- c) that the frequency bands 11.7-12.2 GHz in Region 3, 11.7-12.5 GHz in Region 1 and 12.2-12.7 GHz in Region 2 are widely used by BSS networks, subject to the current provisions of Annex 7 to Appendix 30 (**Rev.WRC-15**);
- d) that the frequency bands 12.5-12.75 GHz in Region 1, 11.7-12.2 GHz in Region 2 and 12.2-12.75 GHz in Region 3 are widely used by FSS networks,

*resolves to invite the 2019 World Radiocommunication Conference*

to consider the results of the ITU-R studies and take necessary actions, as appropriate,

*invites ITU-R*

to conduct studies on, review, and identify possible revisions to, if necessary, the limitations mentioned in Annex 7 to Appendix 30 (**Rev.WRC-15**), while ensuring the protection of, and without imposing additional constraints on, assignments in the Plan and in the List and the future of BSS networks mentioned in *recognizing c)* and existing and planned FSS networks mentioned in *recognizing d)*.

## RESOLUTION 656 (WRC-15)

### **Possible allocation to the Earth exploration-satellite service (active) for spaceborne radar sounders in the range of frequencies around 45 MHz**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that the 40-50 MHz range is allocated to the fixed, mobile and broadcasting services on a primary basis;
- b) that the uses of the 40.98 to 41.015 MHz frequency range by the space research service are on a secondary basis;
- c) that country footnotes in the Table of Frequency Allocations for the 40-50 MHz frequency range provide primary allocations for the aeronautical radionavigation and radiolocation services in certain parts of the world;
- d) that spaceborne radars are intended to be operated only in either uninhabited or sparsely populated areas of the globe, with particular focus on deserts and polar ice fields, and only at night-time from 3 a.m. to 6 a.m. locally;
- e) that Recommendation ITU-R RS.2042-0 provides typical technical and operating characteristics for spaceborne radar sounder systems using the 40-50 MHz frequency range that should be used for interference and compatibility studies,

*recognizing*

- a) that spaceborne active radio-frequency sensors can provide unique information on physical properties of the Earth and other planets;
- b) that spaceborne active remote sensing requires specific frequency ranges depending on the physical phenomena to be observed;
- c) that there is an interest in using active spaceborne sensors in the vicinity of the 40-50 MHz frequency range for measurements of the Earth's subsurface to provide radar maps of subsurface scattering layers with the intent to locate water/ice/deposits;
- d) that worldwide, periodic measurements of subsurface water deposits require the use of spaceborne active sensors;
- e) that the 40-50 MHz frequency range is preferable to satisfy all requirements for spaceborne radar sounders,

*resolves to invite the 2023 World Radiocommunication Conference*

to consider the results of studies on spectrum needs for a possible new allocation to the Earth exploration-satellite (active) service for spaceborne radar sounders within the range of frequencies around 45 MHz, taking into account the protection of incumbent services, and take appropriate action,

*invites ITU-R*

- 1 to conduct studies on spectrum needs and sharing studies between the Earth exploration-satellite (active) service and the radiolocation, fixed, mobile, broadcasting and space research services in the 40-50 MHz frequency range;
- 2 to complete the studies, taking into account the present use of the allocated band, with a view to presenting, at the appropriate time, the technical basis for the work of WRC-23,



*invites administrations*

to participate actively in the studies by submitting contributions to the ITU Radiocommunication Sector,

*instructs the Secretary-General*

to bring this Resolution to the attention of international and regional organizations concerned.

## RESOLUTION 657 (WRC-15)

### **Spectrum needs and protection of space weather sensors**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that space weather observations are becoming increasingly important in detecting solar activity events that could impact on services critical to the economy, safety and security of administrations;
- b) that these observations are also made from platforms that may be ground-based, airborne or space-based;
- c) that some of the sensors operate by receiving low-level natural emissions of the Sun or the Earth's atmosphere, and therefore may suffer harmful interference at levels which could be tolerated by other radio systems;
- d) that space weather sensor technology has been developed and operational systems have been deployed without much regard for domestic or international spectrum regulations, or for the potential need for protection from interference,

*recognizing*

- a) that no frequency bands have been documented in any manner in the Radio Regulations for space weather sensor applications;
- b) that the ITU Radiocommunication Sector (ITU-R) has a Study Question ITU-R 256/7 to study the technical and operational characteristics, frequency requirements and appropriate radio service designation for space weather sensors;
- c) that any regulatory action associated with space weather sensor applications should take into account incumbent services that are already operating in the frequency bands of interest,

*resolves to invite the 2023 World Radiocommunication Conference*

while taking into account the results of ITU-R studies and without placing additional constraints on incumbent services, to consider regulatory provisions necessary to provide protection to space weather sensors operating in the appropriately designated radio service that is to be determined during ITU-R studies,

*invites ITU-R*

- 1 to document, in time for WRC-19, the technical and operational characteristics of space weather sensors;
- 2 to determine, in time for WRC-19, the appropriate radio service designations for space weather sensors;
- 3 to conduct, in time for WRC-23, any necessary sharing studies for incumbent systems operating in frequency bands used by space weather sensors, with the objective of determining regulatory protection that can be provided while not placing additional constraints on incumbent services,

*invites administrations*

to participate actively in the studies and provide the technical and operational characteristics of the systems involved by submitting contributions to ITU-R,

*instructs the Secretary-General*

to bring this Resolution to the attention of the World Meteorological Organization (WMO) and other international and regional organizations concerned.

RESOLUTION 658 (WRC-15)

**Allocation of the frequency band 50-54 MHz to the amateur service in Region 1**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that fully or partially harmonized worldwide frequency bands for radiocommunication services are desirable in order to achieve international operability;
- b) that there is a need to establish sharing conditions when considering frequency bands for possible additional allocations to any service,

*noting*

- a) that the frequency band 50-54 MHz is allocated to the amateur service on a primary basis in Region 2 and Region 3;
- b) that No. **5.169** of the Radio Regulations provides for an alternative allocation to the amateur service on a primary basis in a number of countries in Region 1;
- c) that No. **5.162A** of the Radio Regulations provides for an additional allocation to the radiolocation service on a secondary basis in a number of countries, limited to the operation of wind profiler radars in accordance with Resolution **217 (WRC-97)**;
- d) that the frequency band 47-68 MHz is allocated to the broadcasting service on a primary basis in Region 1, and this band, or part of it, is allocated to the mobile service on a primary basis in a number of countries in Region 1;
- e) that No. **5.167** of the Radio Regulations and other relevant footnotes in this frequency band provide for alternative and additional allocations to the fixed, mobile and broadcasting services on a primary basis,

*resolves to invite the 2019 World Radiocommunication Conference*

to consider the results of the studies below and take appropriate actions, including spectrum allocation,

*invites ITU-R*

- 1 to study spectrum needs in Region 1 for the amateur service in the frequency band 50-54 MHz;
- 2 taking into account the results of the above studies, to study sharing between the amateur service and the mobile, fixed, radiolocation and broadcasting services, in order to ensure protection of these services.

## RESOLUTION 659 (WRC-15)

### **Studies to accommodate requirements in the space operation service for non-geostationary satellites with short duration missions**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that the term “short duration mission” used in this Resolution refers to a mission having a limited period of validity of not more than typically three years;
- b) that examples of such satellites are given in Report ITU-R SA.2312, which provides technical characteristics;
- c) that Report ITU-R SA.2348 provides an overview of the current practice and procedures for notifying space networks currently applicable to these satellites;
- d) that, since the number of these satellites is growing, the demand for suitable allocations to the space operation service may increase;
- e) that it is important to ensure that any satellite radio-frequency operation avoids harmful interference to other systems and services;
- f) that the frequency bands below 1 GHz are used for a wide variety of terrestrial and space applications, that some of these frequency bands are heavily used and new allocations to the space operation service in these frequency bands should not put undue constraints on incumbent services;
- g) that some non-amateur satellites have used frequencies for telemetry, tracking and command in the frequency bands 144-146 MHz and 435-438 MHz which are allocated to the amateur-satellite service, and that such use is not in accordance with Nos. **1.56** and **1.57**;
- h) that, according to No. **1.23**, telemetry, tracking and command functions for satellites will normally be provided within the service in which the space station is operating;
- i) that these satellites are constrained in terms of low on-board power and low antenna gain as described in Report ITU-R SA.2312;
- j) that the bandwidth currently used by these satellites for telemetry, tracking and command in frequency bands below 1 GHz, as described in Report ITU-R SA.2312, is generally 0.1 MHz or less,

*further considering*

- a) that these satellites may provide an affordable means to access orbital resources (spectrum and orbit) for new entrants in space;
- b) that the mass and dimensions of these satellites have been some of the major contributing factors to their success among new spacefaring nations;
- c) that the reliable control and tracking of satellites is important for the management of space debris,

*recognizing*

- a) that the existing allocations to the space operation service below 1 GHz, where No. **9.21** applies, are not suitable for the satellites referred to in *considering a)* and *b)*;
- b) that there are other frequency bands already allocated to the space operation service below 1 GHz where No. **9.21** does not apply;

c) the provisions contained in No. **5.266** and No. **5.267** and Resolution **205 (Rev.WRC-15)**,

*resolves to invite the 2019 World Radiocommunication Conference*

to consider the results of ITU-R studies and take necessary action, as appropriate, provided that the results of the studies referred to in *invites ITU-R* below are complete and agreed by ITU-R study groups,

*invites ITU-R*

1 to study the spectrum requirements for telemetry, tracking and command in the space operation service for the growing number of non-GSO satellites with short duration missions, taking into account No. **1.23**;

2 to assess the suitability of existing allocations to the space operation service in the frequency range below 1 GHz, taking into account *recognizing a)* and current use;

3 if studies of the current allocations to the space operations service indicate that requirements cannot be met under *invites ITU-R* 1 and 2, to conduct sharing and compatibility studies, and study mitigation techniques to protect the incumbent services, both in-band as well as in adjacent bands, in order to consider possible new allocations or an upgrade of the existing allocations to the space operation service within the frequency ranges 150.05-174 MHz and 400.15-420 MHz,

*invites Member States and ITU-R Sector Members, Associates and Academia*

to participate in studies by submitting contributions to ITU-R.

RESOLUTION 761 (WRC-15)

**Compatibility of International Mobile Telecommunications and  
broadcasting-satellite service (sound) in the frequency band  
1 452-1 492 MHz in Regions 1 and 3**

The World Radiocommunication Conference (Geneva, 2015),

*noting*

a) Recommendation ITU-R M.1459, “Protection criteria for telemetry systems in the aeronautical mobile service and mitigation techniques to facilitate sharing with geostationary broadcasting-satellite and mobile-satellite services in the frequency bands 1 452-1 525 MHz and 2 310-2 360 MHz”;

b) that ITU Radiocommunication Bureau (ITU-R) studies provide useful information on the power flux-density (pfd) level to protect broadcasting-satellite service (BSS) earth stations that could be used for coordination purposes,

*recognizing*

a) that the frequency band 1 452-1 492 MHz is allocated to BSS (sound) and the mobile service (MS) on a primary basis;

b) that the sharing conditions between BSS (sound) and MS are currently governed by No. **9.11**;

c) that the application of No. **9.11** does not provide long-term stability for the operation of International Mobile Telecommunications (IMT) due to the fact that only the IMT systems that would come into operation within the next three years would be protected if their coordination is agreed, and only for those three years;

d) that coordination requests for BSS (sound) in the frequency band 1 467-1 492 MHz have been submitted to the ITU Radiocommunication Bureau, moreover some BSS (sound) satellite systems are planned to be launched before WRC-19,

*taking into account*

a) that currently there is no power flux-density (pfd) limit for the frequency band 1 452-1 492 MHz in Article **21** to protect MS (service area protection);

b) that agreement was not reached at this conference on the results of technical and regulatory studies so far carried out on sharing of the frequency band 1 452-1 492 MHz by IMT and BSS;

c) that there is no pfd limit at the border for IMT systems, and IMT systems which will be deployed in this frequency band will have to apply the coordination procedure under No. **9.19** in order to protect BSS (sound) systems deployed in neighbouring countries,

*further recognizing*

a) that this conference has identified the frequency band 1 452-1 492 MHz for IMT on a worldwide basis;

b) that compatibility studies need to be completed in order to establish appropriate sharing criteria between BSS (sound) and MS in the frequency band 1 452-1 492 MHz,

*resolves to invite ITU-R*

1 to conduct, in time for WRC-19, the appropriate regulatory and technical studies, with a view to ensuring the compatibility of IMT and BSS (sound) in the frequency band

1 452-1 492 MHz in Regions 1 and 3, taking into account IMT and BSS (sound) operational requirements;

2 to prepare, *inter alia*, the regulatory action that could be taken, based on the studies carried out under *resolves to invite ITU-R 1* above, in order to facilitate the long-term stability of IMT and BSS (sound) in the frequency band 1 452-1 492 MHz,

*invites the 2019 World Radiocommunication Conference*

to consider the above-mentioned results and to take necessary actions, as appropriate,

*invites Member States*

1 to actively participate in the ITU-R activities with regard to the studies referred to above;

2 in Region 1, to use guidance from the ITU-R studies to determine the need for bilateral coordination between IMT systems and BSS earth stations, taking into account *noting b*), until WRC-19 defines regulatory and technical conditions for this bilateral coordination;

3 in Region 3, to use guidance from ITU-R studies to determine the need for bilateral coordination to protect BSS earth stations, taking into account *noting b*), until WRC-19 defines regulatory and technical conditions for this bilateral coordination,

*instructs the Director of the Radiocommunication Bureau*

to report to WRC-19, under agenda item 9.1, the results of the studies referred to in *resolves to invite ITU-R 1*.



## RESOLUTION 763 (WRC-15)

### Stations on board sub-orbital vehicles

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that the radio spectrum is a limited resource;
- b) that the boundary between the Earth's atmosphere and space is usually assumed to be 100 kilometres above the Earth's surface;
- c) that some vehicles, including aircraft, are being developed which can fly at altitudes of over 100 km into sub-orbital trajectories;
- d) that other vehicles may also operate at altitudes over 100 km and use non-orbital trajectories;
- e) that some of these vehicles reach space and after releasing the spacecraft, accelerate away and land on Earth as a sub-orbital space flight;
- f) that stations onboard sub-orbital vehicles may be using frequencies allocated to space and terrestrial services for the purpose of telemetry, tracking and command (TT&C) and voice communications,

*recognizing*

that the current regulatory provisions and procedures for terrestrial and space services may not be adequate for international recognition of the use of relevant frequency assignments by stations on board sub-orbital vehicles,

*recognizing further*

that the spectrum requirements for TT&C and voice communications on stations on board sub-orbital vehicles have not been studied,

*noting*

- a) Question ITU-R 259/5, on Operational and radio regulatory aspects for planes operating in the upper level of the atmosphere;
- b) that provisions of No. **4.10** may apply for certain aspects of these operations,

*resolves to invite the ITU Radiocommunication Sector*

- 1 to conduct studies to identify any required technical and operational measures, in relation to stations on board sub-orbital vehicles, that could assist in avoiding harmful interference between radiocommunication services;
- 2 to conduct studies to determine spectrum requirements and, based on the outcome of those studies, to consider a possible future agenda item for WRC-23;
- 3 to complete the studies within the next ITU Radiocommunication Sector (ITU-R) study cycle,

*instructs the Director of the Radiocommunication Bureau*

- 1 to bring this Resolution to the attention of the ITU-R study groups;
- 2 to include in his report, for consideration by WRC-19, the results of the ITU-R studies referred to in *resolves to invite the ITU Radiocommunication Sector* above,

*invites administrations*

to participate actively in the studies by submitting contributions to ITU-R,

*instructs the Secretary-General*

to bring this Resolution to the attention of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) and International Civil Aviation Organization (ICAO) and other international and regional organizations concerned.

RESOLUTION 764 (WRC-15)

**Consideration of the technical and regulatory impacts of referencing  
Recommendations ITU-R M.1638-1 and ITU-R M.1849-1  
in Nos. 5.447F and 5.450A of the Radio Regulations**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that the frequency bands 5 250-5 350 MHz and 5 470-5 725 MHz are allocated worldwide on a primary basis to the radiolocation service;
- b) that WRC-03 allocated the frequency bands 5 150-5 350 MHz and 5 470-5 725 MHz on a primary basis to the mobile service for the implementation of wireless access systems (WAS) including radio local area networks (RLANs);
- c) that Resolution **229 (Rev.WRC-12)** defines the conditions for the use of the frequency bands 5 150-5 250 MHz, 5 250-5 350 MHz and 5 470-5 725 MHz by the mobile service for the implementation of WAS including RLANs while protecting existing primary services;
- d) that No **5.447F** states that in the frequency band 5 250-5 350 MHz, stations in the mobile service shall not claim protection from the radiolocation service, the Earth exploration-satellite service (active) and the space research service (active) and that these services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendations ITU-R M.1638-0 and ITU-R RS.1632-0;
- e) that No **5.450A** states that in the frequency band 5 470-5 725 MHz, stations in the mobile service shall not claim protection from radiodetermination services and that radiodetermination services shall not impose on the mobile service more stringent protection criteria, based on system characteristics and interference criteria, than those stated in Recommendation ITU-R M.1638-0,

*noting*

- a) that Recommendation ITU-R M.1638-0 identifies the characteristics of, and protection criteria for sharing studies for, radiolocation, aeronautical radionavigation and meteorological radars operating in the frequency range 5 250-5 850 MHz;
- b) that Recommendation ITU-R M.1638-1 identifies the characteristics of, and protection criteria for sharing studies for, radiolocation (except ground-based meteorological radars) and aeronautical radionavigation radars operating in the frequency bands between 5 250 and 5 850 MHz and that Recommendation ITU-R M.1849-1 identifies the technical and operational aspects of ground-based meteorological radars;
- c) that Recommendation ITU-R M.1638-1 includes additional new radar characteristics not included in Recommendation ITU-R M.1638-0,

*further noting*

that, according to Annex 1 to [Resolution 27 \(Rev.WRC-12\)](#), the reference of material which is incorporated by reference on a mandatory basis must be explicit, specifying the specific part of the text, if appropriate,

*resolves to invite the ITU Radiocommunication Sector*

1 to investigate the technical and regulatory impacts on the services referred to in Nos. **5.447F** and **5.450A** that would result from referencing Recommendation

ITU-R M.1638-1 in place of Recommendation ITU-R M.1638-0 in those footnotes, while ensuring that no undue constraints are imposed on the services referenced in these footnotes;

2 to investigate the technical and regulatory impacts on the services referred to in Nos **5.447F** and **5.450A** that would result from adding a new reference to Recommendation ITU-R M.1849-1 to these footnotes, while ensuring that no undue constraints are imposed on the services referenced in these footnotes,

*instructs the Director of the Radiocommunication Bureau*

to include the results of these studies in the Director's Report to WRC-19 for consideration of any regulatory action in response to *resolves to invite the ITU Radiocommunication Sector* above.

RESOLUTION 765 (WRC-15)

**Establishment of in-band power limits for earth stations operating in mobile-satellite service, the meteorological-satellite service and the Earth exploration-satellite service in the frequency bands 401-403 MHz and 399.9-400.05 MHz**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that the Earth exploration-satellite service (EESS) (Earth-to-space) and meteorological-satellite service (MetSat) (Earth-to-space) systems deployed in the frequency band 401-403 MHz and mobile-satellite service (MSS) (Earth-to-space) systems in the frequency band 399.9-400.05 MHz are currently used for data collection;
- b) that these systems usually operate using moderate/low power levels;
- c) that Recommendation ITU-R SA.2045 provides information on the performance and interference criteria for relevant geostationary-satellite orbit (GSO) and non-geostationary satellite (non-GSO) data collection systems (DCS) in the frequency band 401-403 MHz;
- d) that Recommendation ITU-R SA.2044 provides information on the current and future usage of non-GSO DCS in the frequency band 401-403 MHz, and the portioning of the frequency band to allow all DCS equal access to the spectrum;
- e) that Recommendation ITU-R M.2046 provides a description, and the corresponding protection criteria for broadband noise and narrowband interference, of one MSS system that uses the frequency band 399.9-400.05 MHz (Earth-to-space);
- f) that these EESS, MetSat and MSS systems are essential for monitoring and predicting climate change, monitoring oceans, weather and water resources, weather forecasting and assisting in protecting biodiversity, improving maritime security;
- g) that a growing number of satellites are planned to use these frequency bands mainly for telecommand (see No. **1.135**) (Earth-to-space) purposes under the EESS, MetSat or MSS allocations,

*considering further*

- a) that the output power levels of the earth stations referred to in *considering g*), at the antenna port of these telecommand links (Earth-to-space), can be much higher than the moderate/low power levels traditionally used for the operation of EESS, MetSat or MSS system, service links in the frequency bands 401-403 MHz and 399.9-400.05 MHz referred to in *considering a*);
- b) that, according to the ITU Radiocommunication Sector (ITU-R) Recommendations referred to in *considering c*), *d*), and *e*), the frequency bands 401-403 MHz and 399.9-400.05 MHz are mainly currently dedicated to data collection platforms;
- c) that the operation of the telecommand links referred to in *considering g*) would cause harmful interference to the satellite receivers on board the satellites referred to in *considering a*),

*recognizing*

- a) that it is necessary to have stable regulatory certainty in order to be able to provide long-term continuity for the operation of DCS;
- b) that these DCS represent a long-term effort and investment;

c) that it is necessary to ensure the operations of existing and future systems that usually implement low or moderate output power levels for EESS, MetSat and MSS systems referred to in *considering a*);

d) that the establishment of in-band power limits for earth stations within the Radio Regulations applicable to the EESS, MetSat and MSS will bring confidence for DCS using these frequency bands,

*resolves to invite the 2019 World Radiocommunication Conference*

to take into account the results of ITU-R studies, and consider the possibility of establishing in-band power limits for earth stations in the EESS and MetSat in the frequency bands 401-403 MHz and in the MSS frequency band 399.9-400.05 MHz,

*invites ITU-R*

to conduct and complete, in time for WRC-19, the necessary technical, operational and regulatory studies on the possibility of establishing in-band power limits for earth stations in the EESS and MetSat in the frequency band 401-403 MHz and the MSS in the frequency band 399.9-400.05 MHz,

*invites administrations*

to participate actively in the studies and provide the technical and operational characteristics of the systems involved by submitting contributions to ITU-R,

*instructs the Secretary-General*

to bring this Resolution to the attention of the World Meteorological Organization (WMO) and other international and regional organizations concerned.

RESOLUTION 766 (WRC-15)

**Consideration of possible upgrading of the secondary allocation to the meteorological-satellite service (space-to-Earth) to primary status and a primary allocation to the Earth exploration-satellite service (space-to-Earth) in the frequency band 460-470 MHz**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that data collection systems (DCS) operate on geostationary and non-geostationary orbits in the meteorological-satellite (MetSat) service and the Earth exploration-satellite service (EESS) (Earth-to-space) systems in the frequency band 401-403 MHz;
- b) that DCS are essential for monitoring and predicting climate change, monitoring oceans, and water resources, weather forecasting and assisting in protecting biodiversity, improving maritime security;
- c) that most of these DCS have implemented satellite downlinks (space-to-Earth) in the frequency band 460-470 MHz which bring significant improvements to the operation of satellite DCS, such as the transmission of information to optimize the usage of the terrestrial data collection platforms;
- d) that the frequency band 460-470 MHz is currently allocated to MetSat (space-to-Earth) on a secondary basis;
- e) that No. **5.290** identifies some administrations that already have a primary MetSat allocation, subject to agreement obtained under No. **9.21**;
- f) that the frequency band 460-470 MHz is currently allocated to the fixed and mobile services on a primary basis and is widely used by these services;
- g) that there is a need to protect the fixed and mobile services in the frequency band 460-470 MHz and not to constrain their future development;
- h) that, according to No. **5.289**, EESS applications, other than MetSat, may also be used in the frequency bands 460-470 MHz and 1 690-1 710 MHz for space-to-Earth transmissions, subject to not causing harmful interference to stations operating in accordance with the Table of Frequency Allocations;
- i) that No. **5.286AA** identifies the frequency band 450-470 MHz for use by administrations wishing to implement International Mobile Telecommunications (IMT),

*considering further*

- a) that at least one administration has adopted national regulatory provisions providing a power flux-density (pfd) limit of  $-152$  dBW/m<sup>2</sup>/4 kHz for protecting systems of the terrestrial services;
- b) that, in order to meet this limit, space agencies have designed and are implementing a spread spectrum solution, making the operation of at least one satellite DCS downlink operating in the frequency band 460-470 MHz compliant with the pfd limit mentioned in *considering further a)*,

*recognizing*

- a) that it is necessary for MetSat and EESS operators to have stable regulatory certainty in order to be able to provide long-term continuity for this service of public interest, and that operating under a secondary allocation status is conflicting with this objective;
- b) that these space programmes represent long-term effort and investment that span across decades from the time when the programme is officially decided, through the development period and the launch phase to the time when the corresponding satellites are in operation;
- c) that space and meteorological agencies are investing in the continuity of these programmes providing subsequent satellites and payloads;
- d) that an upgrade to a primary status of the allocation of the frequency band 460-470 MHz to MetSat and EESS (space-to-Earth), alongside appropriate measures to ensure adequate protection of existing primary allocated services in that frequency band, will bring confidence for administrations and space agencies involved in satellite data collection programmes and for the public sectors funding the development and operation of such systems;
- e) that it is necessary to keep the priority of MetSat over EESS in the frequency band 460-470 MHz;
- f) that MetSat and EESS earth stations will not claim protection from stations in the fixed and mobile services;
- g) that the agreements obtained under No. **5.290** remain in force,

*resolves to invite the 2019 World Radiocommunication Conference*

to consider, based on the results of ITU Radiocommunication Sector (ITU-R) studies, the possibility of upgrading the secondary MetSat (space-to-Earth) allocation to primary status and adding a primary EESS (space-to-Earth) allocation in the frequency band 460-470 MHz, while providing protection and not imposing any additional constraints on existing primary services to which the frequency band is already allocated and in the adjacent frequency bands,

*invites ITU-R*

1 to conduct and complete, in time for WRC-19, sharing and compatibility studies to determine the feasibility of upgrading the MetSat (space-to-Earth) allocation to primary status, and the addition of a primary EESS (space-to-Earth) allocation in the frequency band 460-470 MHz, while protecting the primary fixed and mobile services to which the frequency band is already allocated and maintaining the conditions contained in No. **5.289**;

2 to complete the studies, taking into account the present usage of the frequency band 460-470 MHz by incumbent services, to determine the appropriate pfd limit to be placed on MetSat (space-to-Earth) and EESS (space-to-Earth) to protect the existing primary services to which this frequency band is already allocated, provided that, if the studies conclude that a less restrictive pfd limit than that contained in *considering further a)* can protect incumbent services, then the pfd limit contained in *considering further a)* shall apply,

*invites administrations*

to participate actively in the studies and provide the technical and operational characteristics of the systems involved by submitting contributions to ITU-R,

*instructs the Secretary-General*

to bring this Resolution to the attention of the World Meteorological Organization (WMO) and other international and regional organizations concerned.



RESOLUTION 767 (WRC-15)

**Studies towards an identification for use by administrations for land-mobile and fixed services applications operating in the frequency range 275-450 GHz**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that a number of bands in the frequency range 275-1 000 GHz are identified for use by administrations for passive services, such as the radio astronomy service, the Earth exploration-satellite service (passive) and the space research service (passive);
- b) that No. **5.565** states that the use of the range above 275 GHz by the passive services does not preclude use of this range by active services;
- c) that administrations wishing to make available frequencies in the 275-1 000 GHz range for active service applications are urged to take all practicable steps to protect these passive services from harmful interference until the date when the Table of Frequency Allocations is established for the relevant frequencies;
- d) that active devices which can operate at frequencies above 275 GHz are available due to technology developments;
- e) that studies on technical and operational characteristics of some active services operating in the range 275-1 000 GHz have been carried out by the ITU Radiocommunication Sector (ITU-R);
- f) that the technical and operational characteristics of land-mobile and fixed services operating in the bands above 275 GHz have not been specified, and further studies are required;
- g) that propagation characteristics of the frequencies above 275 GHz are being studied by ITU-R Study Group 3;
- h) that propagation models for the land-mobile and fixed services operating in the band above 275 GHz are required;
- i) that sharing and compatibility studies between land-mobile, fixed and passive services identified by No. **5.565** operating in the band above 275 GHz are required,

*noting*

- a) that Question ITU-R 228-1/3 addresses the study of which propagation models best describe the relationship between atmospheric parameters and electromagnetic wave characteristics on terrestrial links operating at frequencies above 275 GHz;
- b) that Question ITU-R 235-1/7 addresses the study of the technical and operational characteristics of systems operating at frequencies above 275 GHz within the science services;
- c) that Question ITU-R 237/1 addresses the study of the technical and operational characteristics of active services in the frequency range 275-1 000 GHz;
- d) that Question ITU-R 256-0/5 addresses studies on the technical and operational characteristics of the land-mobile service in the frequency range 275-1 000 GHz;
- e) that Question ITU-R 257-0/5 addresses studies on the technical and operational characteristics of the fixed service in the frequency range 275-1 000 GHz;
- f) that other international organizations are developing standards for the suitable frequency ranges for ultra-high-speed (100 Gbit/s) data communication systems for Wireless Personal Area Network (WPAN);

g) that several ultra-high-speed data communication systems are identified by other international standards bodies,

*recognizing*

that other active services, including the radiolocation service and the amateur service, are also developing and demonstrating applications above 275 GHz,

*resolves to invite the 2019 World Radiocommunication Conference*

taking into account the results of ITU-R studies on sharing and compatibility between passive and active services as well as spectrum needs for those services, to consider identification for use by administrations for the land-mobile and fixed service applications operating in the frequency range 275-450 GHz, while maintaining protection of the passive services identified in No. **5.565**, and take appropriate action,

*invites ITU-R*

1 to identify technical and operational characteristics of systems in the land-mobile and fixed services operating at frequencies above 275 GHz;

2 to study spectrum needs of systems in the land-mobile and fixed services, taking into account the results of the above studies;

3 to develop propagation models within the frequency range 275-450 GHz so as to enable sharing and compatibility studies between the land-mobile, fixed and passive services in this frequency range;

4 to conduct sharing and compatibility studies between the land-mobile, fixed and passive services operating in the frequency range 275-450 GHz, while maintaining protection of the passive services identified in No. **5.565**;

5 to identify candidate frequency bands for use by systems in the land-mobile and fixed services, taking into account the results of the studies under *invites ITU-R* 1, 2 and 4, and the protection of passive services identified in No. **5.565**,

*encourages Member States, Sector Members, Associates and Academia*

to submit contributions during the study period on their assessment of the impact on the identified services, based on the studies carried out under this Resolution.

RESOLUTION 958 (WRC-15)

**Urgent studies required in preparation for the  
2019 World Radiocommunication Conference**

The World Radiocommunication Conference (Geneva, 2015),

*considering*

- a) that the agenda of this conference included consideration of items for the agenda for the 2019 World Radiocommunication Conference (WRC-19);
- b) that the agenda of this conference included consideration of items for the preliminary agenda for the 2023 World Radiocommunication Conference (WRC-23);
- c) that items for the agenda for WRC-19 have been identified in [Resolution 809 \(WRC-15\)](#);
- d) that items for the preliminary agenda for WRC-23 have been identified in [Resolution 810 \(WRC-15\)](#),

*resolves*

to complete studies on the topics identified in this Resolution and its annex,

*invites ITU-R*

as a matter of urgency, to complete the studies called for in this Resolution,

*instructs the Director of the Radiocommunication Bureau*

to report on these studies under agenda item 9.1 of WRC-19, as appropriate, based on the results of studies.

ANNEX TO RESOLUTION 958 (WRC-15)

**Urgent studies required in preparation for the  
2019 World Radiocommunication Conference**

- 1) Studies concerning Wireless Power Transmission (WPT) for electric vehicles:
  - a) to assess the impact of WPT for electric vehicles on radiocommunication services;
  - b) to study suitable harmonized frequency ranges which would minimize the impact on radiocommunication services from WPT for electrical vehicles.

These studies should take into account that the International Electrotechnical Commission (IEC), the International Organization for Standardization (ISO) and the Society of Automotive Engineers (SAE) are in the process of approving standards intended for global and regional harmonization of WPT technologies for electric vehicles.

- 2) Studies to examine:
  - a) whether there is a need for possible additional measures in order to limit uplink transmissions of terminals to those authorized terminals in accordance with No. **18.1**;
  - b) the possible methods that will assist administrations in managing the unauthorized operation of earth station terminals deployed within its territory, as a tool to guide their national spectrum management programme, in accordance with Resolution ITU-R 64 (RA-15).

3) Studies on the technical and operational aspects of radio networks and systems, as well as spectrum needed, including possible harmonized use of spectrum to support the implementation of narrowband and broadband machine-type communication infrastructures, in order to develop Recommendations, Reports and/or Handbooks, as appropriate, and to take appropriate actions within the ITU Radiocommunication Sector (ITU-R) scope of work.