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| **Radiocommunication Advisory GroupGeneva, 26-29 March 2018** |  |
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|  | **Addendum 1 to****Document RAG18/1-E** |
| **13 February 2018** |
| **Original: English** |
| Director, Radiocommunication Bureau |
| REPORT TO THE TWENTY-FIFTH MEETING OF THE RADIOCOMMUNICATION ADVISORY GROUPSTUDY GROUPS ACTIVITIES |

# 1 Working methods

Study Group activities were pursued within a stable Study Group (SG) and Working Party (WP) structure according to the work programmes defined in the ITU‑R Operational Plan. Working methods were satisfactorily applied in accordance with Resolution ITU‑R 1 and the associated Working Guidelines.

# 2 Access to meeting documents

In line with the provisions of Resolution ITU‑R 1, meeting documents are posted by SGD staff within one working day “as received” on a webpage established for this purpose, and the official versions are posted on the website within three working days.

# 3 Electronic working facilities

Continuing emphasis has been placed on the use of electronic facilities that have brought considerable benefit to delegates as well as a significant economy in paper.

## 3.1 Sharepoint website

Access to documentation during meetings via a dedicated Sharepoint website is the standard practice. All Study Group and Working Party meetings are now completely paperless.

Sharepoint sites for Correspondence and Rapporteur Groups are also used extensively in the periods between the Working Party meetings.

## 3.2 File synchronization

A file synchronization facility has been implemented for all Study Group/Working Party meetings to facilitate access to the most recent versions of documents during meetings.

## 3.3 Online list of participants

Online versions of the lists of participants for all Study Group and Working Party meetings have been implemented with access to the online version restricted to TIES users. The dynamic list can be searched based on parameters such as name, member and position in the delegation.

## 3.4 Remote participation

Since the last meeting of RAG, audio webcasts of all available languages have been provided during the Plenary sessions of all Study Group and Working Party meetings held in Geneva.

During the Working Party meetings, the possibility of active remote participation using Adobe Connect facilities in English only has been offered. Remote participants wishing to actively participate (e.g. to introduce a contribution) need to register for the meeting beforehand and coordinate their active participation with the responsible Counsellor.

Active remote participation was provided to allow participants in Working Parties to present contributions on only a few occasions since the last meeting of RAG. The general feedback received has been that such participation has been useful, but that it can be difficult to schedule and that it slows the meeting down.

While the Secretariat will make every effort to facilitate such active participation, it should be recognized that on some occasions this may not be possible due to factors such as the limited number of support staff, availability of equipped rooms, many parallel meetings and the need for the remote participants to have a high-quality Internet and phone connection.

However, remote participation has proven invaluable in the case of Correspondence and Rapporteur Group activities during intersessional periods. Such participation has enabled considerable progress in items relating to WRC-19 agenda items, where expected results are required at specified deadlines, and for meetings of smaller groups such as the Joint CCV-SCV meetings.

## 3.5 Study Group webpages

The ITU is continuing the process of changing the presentation of its webpages to provide an updated and consistent look across the ITU website. All of the main SG and WP pages have been changed to the new format, and associated pages are being changed progressively when they need to be updated.

## 3.6 Captioning

Since December 2013, all Study Group meetings have been provided with live captioning in English. Feedback on this facility has been generally positive as an aid to following discussions, however the accuracy of the captioning, particularly with respect to frequency bands and radiocommunication acronyms, tends to be poor.

# 4 Participation

As reported at the last RAG meeting, there has been a progressive increase in the level of participation in ITU-R Study Group and Working Party meetings since 2003. This is very encouraging, but at the same time it does create some logistical difficulties.

Participation in the largest groups can now exceed 300 – too large to be accommodated in large rooms on the ITU premises (Popov, C). The average participation per meeting is now of the order of 120 participants (see Figure 1 below) – too large to be comfortably accommodated in the medium size rooms at ITU (A, C1, C2, Popov 1, Popov 2, H, K). Even the smallest groups now have an average participation exceeding 60 participants, which in turn is too large to be comfortably accommodated in the smaller rooms at ITU (H1, H2, K1, K2, L, M).

Figure 1 - General average participation to ITU-R Study Group/

Working Party meeting per year since 2003

# 5 Meeting rooms

The shortage of meeting rooms at ITU Headquarters continues to hinder the effective planning of meetings. This problem has been exacerbated by the following factors:

* the increased number of meetings being arranged by all of the Sectors and the General Secretariat;
* the shortage of meeting rooms with a capacity of more than 120 participants;
* the need to avoid overlap and clashes of meeting dates;
* the limited availability and very long lead times required for bookings in alternative facilities such as CICG.

Consequently, in the coming years an increasing number of meetings will need to be held at other locations outside ITU. To that end, offers from the membership to host Study Group/Working Party meetings during this period will be particularly welcome. In the longer term, the requirements for meeting rooms at ITU will need to be carefully taken into account in the design of the Varembé 2 building.

# 6 Notable activities in the Study Groups

Since the last meeting of the RAG, Study Group activities largely focused on progressing the work on the RA-19 and CPM19-2 preparations and on the development of new or revised Recommendations/Reports associated with the WRC-19 agenda items. Some of the notable activities and other ongoing standardization studies in each Study Group are highlighted below. Table 1 summarizes the ITU-R Study Groups outputs in terms of Recommendations and Reports approved at or following their meetings in 2017.

|  |  |  |
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| **Subject** | **New or revised ITU-R Recommendations approved** | **New or revised Reports approved** |
| **International Mobile Telecommunications (IMT)** vision, frequency arrangements, radio interface, spectrum sharing and global circulation of terminals, enabling global mobile broadband development | M.[1457-13](https://www.itu.int/rec/R-REC-M.1457/en), [2012-3](https://www.itu.int/rec/R-REC-M.2012/en), [2070-1](https://www.itu.int/rec/R-REC-M.2070/en), [2071-1](https://www.itu.int/rec/R-REC-M.2071/en), [2101-0](https://www.itu.int/rec/R-REC-M.2101/en) | M[.2410-0](https://www.itu.int/pub/R-REP-M.2410), [2411-0](https://www.itu.int/pub/R-REP-M.2411) and [2412-0](https://www.itu.int/pub/R-REP-M.2412) |
| **Maritime and aeronautical systems** operational characteristics, identities and protection, including wireless avionics and global flight tracking | [M.2114-0](https://www.itu.int/rec/R-REC-M.2114) |  [M.2413-0](https://www.itu.int/pub/R-REP-M.2413) (flight tracking) |
| **Land mobile communications, including** cognitive radio systems, broadband wireless, railway communication and **Intelligent Transport Systems** (ITS) radio interface standards |  | M.[2227-2](https://www.itu.int/pub/R-REP-M.2227) [2417-0](https://www.itu.int/pub/R-REP-M.2417) and [2418-0](https://www.itu.int/pub/R-REP-M.2418) |
| **Television and sound** signals coding, production, exchange and broadcasting for HDTV, UHDTV and 3D, and sharing of broadcasting with other services, laying the foundation of the development of advanced television and sound technologies | **Television:** [BT.814-3](http://www.itu.int/rec/R-REC-BT.814/en), [1120-9](http://www.itu.int/rec/R-REC-BT.1120/en), [1368-13](https://www.itu.int/rec/R-REC-BT.1368/en), [1852-1](https://www.itu.int/rec/R-REC-BT.1852/en), [1871-2](https://www.itu.int/rec/R-REC-BT.1871/en), [1872-1](http://www.itu.int/rec/R-REC-BT.1872/en), [2074-1](http://www.itu.int/rec/R-REC-BT.2074/en), [2075-1](http://www.itu.int/rec/R-REC-BT.2075/en), [2077-2](http://www.itu.int/rec/R-REC-BT.2077/en), [2095-1](http://www.itu.int/rec/R-REC-BT.2095/en), [2100-1](http://www.itu.int/rec/R-REC-BT.2100/en), [2111-0](http://www.itu.int/rec/R-REC-BT.2111/en); **Sound:** BS.[1114-10](https://www.itu.int/rec/R-REC-BS.1114/en), [1196-6](https://www.itu.int/rec/R-REC-BS.1196/en), [1548-5](http://www.itu.int/rec/R-REC-BS.1548/en), [2051-1](https://www.itu.int/rec/R-REC-BS.2051/en), [2076-1](https://www.itu.int/rec/R-REC-BS.2076/en), [2094-1](https://www.itu.int/rec/R-REC-BS.2094/en) and [2102-0](https://www.itu.int/rec/R-REC-BS.2102/en) | BS.[2213-4](https://www.itu.int/pub/R-REP-BS.2213), [2388-2](https://www.itu.int/pub/R-REP-BS.2388) and [2399-0](https://www.itu.int/pub/R-REP-BS.2399), BT.[2069-7](https://www.itu.int/pub/R-REP-BT.2069), [2140-10](https://www.itu.int/pub/R-REP-BT.2140), [2207-3](https://www.itu.int/pub/R-REP-BT.2207), [2245-3](https://www.itu.int/pub/R-REP-BT.2245), [2246-6](https://www.itu.int/pub/R-REP-BT.2246), [2252-3](https://www.itu.int/pub/R-REP-BT.2252), [2254-3](https://www.itu.int/pub/R-REP-BT.2254), [2267-7](https://www.itu.int/pub/R-REP-BT.2267), [2295-2](https://www.itu.int/pub/R-REP-BT.2295), [2337-1](https://www.itu.int/pub/R-REP-BT.2337), [2380-1](https://www.itu.int/pub/R-REP-BT.2380), [2386-1](https://www.itu.int/pub/R-REP-BT.2386), [2390-2](https://www.itu.int/pub/R-REP-BT.2390), [2390-3](https://www.itu.int/pub/R-REP-BT.2390), [2400-0](https://www.itu.int/pub/R-REP-BT.2400), [2407-0](https://www.itu.int/pub/R-REP-BT.2407) and [2408-0](https://www.itu.int/pub/R-REP-BT.2408) |
| **Fixed communications** technical and operational characteristics, channelling arrangements and spectrum sharing for radio-relays and fixed wireless access  | F.[1249-5](https://www.itu.int/rec/R-REC-F.1249/en), [1509-4](https://www.itu.int/rec/R-REC-F.1509/en) and [2113-0](https://www.itu.int/rec/R-REC-F.2113)M.[2003-2](https://www.itu.int/rec/R-REC-M.2003/en) | [F.2323-1](https://www.itu.int/pub/R-REP-F.2323) and [2416-0](https://www.itu.int/pub/R-REP-F.2416) |
| **Radars** technical and operational characteristics, protection, including aeronautical, meteorological and automotive radars |  [M.1466-1](https://www.itu.int/rec/R-REC-M.1466/en) | [M.2414-0](https://www.itu.int/pub/R-REP-M.2414) |
| **Search and rescue**, Public Protection and Disaster Relief (**PPDR**) radio interface standards, frequency arrangements and provision of services, enabling global harmonization  | [BS.2107-0](https://www.itu.int/rec/R-REC-BS.2107/en) | [BT.2299-2](https://www.itu.int/pub/R-REP-BT.2299) [M.2377-1](https://www.itu.int/pub/R-REP-M.2377) and [2415-0](https://www.itu.int/pub/R-REP-M.2415) |
| **Fixed, mobile, broadcasting and radiodetermination-satellite systems** characteristics and sharing of orbit/spectrum resources among GSO and non-GSO satellite systems, enabling the sustainable development of the space ecosystem | [M.1184-3](https://www.itu.int/rec/R-REC-M.1184) and [1787-3](https://www.itu.int/rec/R-REC-M.1787/en) (in the course of approval)[S.1503-3](https://www.itu.int/rec/R-REC-S.1503) and [2112-0](https://www.itu.int/rec/R-REC-S.2112) | S.[2409-0](https://www.itu.int/pub/R-REP-S.2409) |
| **Radio amateur communications**  |  [M.1732-2](https://www.itu.int/rec/R-REC-M.1732/en) |  |
| **Propagation** measurement, data analysis, modelling and prediction in various parts of the spectrum up to 375 THz, laying the foundation for the design of radiocommunication systems and the assessment of interference | [P.311-17](https://www.itu.int/rec/R-REC-P.311/en), [341-6](https://www.itu.int/rec/R-REC-P.341/en), [372-13](https://www.itu.int/rec/R-REC-P.372/en), [453-13](https://www.itu.int/rec/R-REC-P.453/en), [525-3](https://www.itu.int/rec/R-REC-P.525/en), 526-14, [527-4](https://www.itu.int/rec/R-REC-P.527/en), [530-17](https://www.itu.int/rec/R-REC-P.530/en), [531-13](https://www.itu.int/rec/R-REC-P.531/en), [617-4](https://www.itu.int/rec/R-REC-P.617/en), [618-13](https://www.itu.int/rec/R-REC-P.618/en), [619-3](https://www.itu.int/rec/R-REC-P.619/en), [620-7](https://www.itu.int/rec/R-REC-P.620/en), [676-1](https://www.itu.int/rec/R-REC-P.676/en)1, [681-10](https://www.itu.int/rec/R-REC-P.681/en), [684-7](https://www.itu.int/rec/R-REC-P.684/en), [833-9](https://www.itu.int/rec/R-REC-P.833/en), [834-9](https://www.itu.int/rec/R-REC-P.834/en), [835-6](https://www.itu.int/rec/R-REC-P.835/en), [836-6](https://www.itu.int/rec/R-REC-P.836/en), [837-7](https://www.itu.int/rec/R-REC-P.837/en), [840-7](https://www.itu.int/rec/R-REC-P.840/en), [841-5](https://www.itu.int/rec/R-REC-P.841/en), [1057-5](https://www.itu.int/rec/R-REC-P.1057/en), [1144-9](https://www.itu.int/rec/R-REC-P.1144/en), [1238-9](https://www.itu.int/rec/R-REC-P.1238/en), [1407-6](https://www.itu.int/rec/R-REC-P.1407/en), [1411-9](https://www.itu.int/rec/R-REC-P.1411/en), [1510-1](https://www.itu.int/rec/R-REC-P.1510/en), [2108-0](https://www.itu.int/rec/R-REC-P.2108/en) and [2109-0](https://www.itu.int/rec/R-REC-P.2109/en) | [P.2145-2](https://www.itu.int/pub/R-REP-P.2145), [2346-2](https://www.itu.int/pub/R-REP-P.2346), [2402-0](https://www.itu.int/pub/R-REP-P.2402) and [2406-0](https://www.itu.int/pub/R-REP-P.2406) |
| **Earth exploration-satellite, Meteorological-satellite, Space Research and Radioastronomy services** characteristics, protection/sharing, including manned research, data relay, nano satellites, enabling prediction of weather, monitoring of Earth’s resources and understanding of climate change | [RS.1260-2](https://www.itu.int/rec/R-REC-RS.1260), [2105-0](https://www.itu.int/rec/R-REC-RS.2105/en) and [2106-0](https://www.itu.int/rec/R-REC-RS.2106/en), [SA.510-3](https://www.itu.int/rec/R-REC-SA.510/en), [1014-3](https://www.itu.int/rec/R-REC-SA.1014/en), [1018-1](https://www.itu.int/rec/R-REC-SA.1018/en), [1019-1](https://www.itu.int/rec/R-REC-SA.1019/en), [1026-5](https://www.itu.int/rec/R-REC-SA.1026/en), [1027-5](https://www.itu.int/rec/R-REC-SA.1027/en), [1155-2](https://www.itu.int/rec/R-REC-SA.1155/en), [1159-4](https://www.itu.int/rec/R-REC-SA.1159/en), [1160-3](https://www.itu.int/rec/R-REC-SA.1160/en), [1161-2](https://www.itu.int/rec/R-REC-SA.1161/en), [1276-5](https://www.itu.int/rec/R-REC-SA.1276/en), [1414-2](https://www.itu.int/rec/R-REC-SA.1414/en) and [1810-1](https://www.itu.int/rec/R-REC-SA.1810/en). | [RA.2403-0](https://www.itu.int/pub/R-REP-RA.2403)RS.[2310-1](https://www.itu.int/pub/R-REP-RS.2310)[SA.2401-0](https://www.itu.int/pub/R-REP-SA.2401), [2403-0](https://www.itu.int/pub/R-REP-SA.2403) |

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| **Spectrum Management,** including methods for identification and elimination of interference, data dictionary, spectrum redeployment, spectrum use measurement, unlicensed and shared uses of spectrum, dynamic spectrum access, smart grids and wireless power transmission  | [SM.1046-3](https://www.itu.int/rec/R-REC-SM.1046/en), [1268-4](https://www.itu.int/rec/R-REC-SM.1268/en), [1413-4](https://www.itu.int/rec/R-REC-SM.1413/en), [1600-3](https://www.itu.int/rec/R-REC-SM.1600/en), [1880-2](https://www.itu.int/rec/R-REC-SM.1880/en), [2103-0](https://www.itu.int/rec/R-REC-SM.2103/en), [2104-0](https://www.itu.int/rec/R-REC-SM.2104/en) and [2110-0](https://www.itu.int/rec/R-REC-SM.2110/en) | [SM.2028-2](https://www.itu.int/pub/R-REP-SM.2028), [2130-1](https://www.itu.int/pub/R-REP-SM.2130), [2153-6](https://www.itu.int/pub/R-REP-SM.2153), [2182-1](https://www.itu.int/pub/R-REP-SM.2182), [2257-4](https://www.itu.int/pub/R-REP-SM.2257), [2303-2](https://www.itu.int/pub/R-REP-SM.2303), [2351-2](https://www.itu.int/pub/R-REP-SM.2351), [2356-1](https://www.itu.int/pub/R-REP-SM.2356), [2404-0](https://www.itu.int/pub/R-REP-SM.2404) and [2405-0](https://www.itu.int/pub/R-REP-SM.2405)  |
| Accurate **Time and Frequency signals** transmission, including consideration of the leap second | [TF.538-4](https://www.itu.int/rec/R-REC-TF.538/en) |  |
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| Radiocommunication systems for **persons with disabilities** |  | [BT. 2207-3](https://www.itu.int/pub/R-REP-BT.2207) |

## 6.1 Study Group 1

Study Group (SG) 1 is continuing to develop ITU-R Recommendations, Reports and Handbooks related to spectrum management principles and techniques, general principles of sharing, spectrum monitoring, long-term strategies for spectrum utilization, economic approaches to national spectrum management, automated techniques and assistance to developing countries in cooperation with the Telecommunication Development Sector. The studies also include methods for identification and elimination of interference, data dictionary, spectrum redeployment, spectrum use measurement, unlicensed and shared uses of spectrum, dynamic spectrum access, smart grids and wireless power transmission.

SG 1 and Working Parties 1A, 1B and 1C met in June 2017 and additional meetings of Working Parties 1A and 1B were held in November 2017 to progress the work on the preparatory studies for WRC-19 agenda items and issues, as well as on other urgent topics, under the responsibility of these Working Parties, such as Wireless Power Transmission (WPT) and the Report on WTDC Resolution 9.

The June 2017 meetings developed three new Recommendations, subsequently adopted and approved, which provide i) frequency ranges for operation of non-beam WPT systems; ii) guidelines for the categories recommended for short-range devices (SRDs) requiring operation on a globally harmonized basis; iii) guidelines pertaining to spectrum usage of Narrow-Band Wireless Home Networking (NWHN) transceivers complying with Recommendation ITU-T G.9959. The June 2017 meetings also developed five revised Recommendations, subsequently adopted and approved. A new Question was also developed and subsequently approved on assessment of spectrum efficiency and economic value. It has been assigned to Working Party (WP) 1B. Question ITU-R 233-1/1 on measurement of spectrum occupancy was suppressed in view of the available ITU-R publications on this subject.

The meetings approved two new ITU-R Reports describing i) regulatory tools to support enhanced shared use of spectrum; ii) spectrum management principles, challenges and issues related to dynamic access to frequency bands by means of radio systems employing cognitive capabilities. The June 2017 meetings developed and approved also eight revised Reports.

A number of editorial updates were also made to several Recommendations and Reports in accordance with Resolution ITU-R 1-7.

In response to the liaison statements from the RAG and TDAG, WP 1B prepared a significant draft revision of the Report on WTDC Resolution 9 (Rev. Dubai, 2014) in order to address all the concerns expressed at the previous RAG meeting. This draft revision was subsequently approved by SG 1 without any modifications. SG 1 also approved to send this revised Report in a liaison statement to ITU-D SG 1 with the indication that the report received full consensus in both Working Party 1B and Study Group 1 (see also section 7 below). As agreed by TDAG following RAG request, this revised Report was submitted to the ITU-D SG 1 management team. It was subsequently endorsed by WTDC-17 without comments.

SG 1 also approved a reply liaison statement to ITU-T SG 3 regarding development by ITU-T WP 2/3 of two draft ITU T Series D Recommendations on shared use of spectrum and telecommunication infrastructure and on various methodologies for valuation of spectrum in response to ITU-T Question 3/3 - Study of economic and policy factors relevant to the efficient provision of international telecommunication services. In this reply liaison statement, it has been indicated that the shared use of spectrum, including spectrum management aspect of infrastructure sharing, as well as economic aspects of spectrum management, including spectrum valuation and spectrum pricing are within the terms of reference of ITU-R WP 1B. ITU-T SG 3 attention was also drawn to the existing ITU-R publications on these topics, which may overlap with the activity of ITU-T SG 3 on shared use of spectrum and telecommunication infrastructure as a regulatory method, for lowering the telecommunication tariffs and on methodologies for spectrum valuation. ITU-T SG 3 was then invited to participate in the ITU-R activities and take into account above mentioned ITU-R deliverables to avoid as much as possible overlapping activity between the ITU Sectors.

In addition to other activities in preparation for the next SG 1 block of meetings in June 2018, including studies assigned to WP 1A and WP 1B on some WRC-19 agenda items and issues, correspondence studies continued on topics such as:

– the coexistence of wired telecommunication with radiocommunication systems;

– spectrum monitoring evolution;

– measurement techniques and new technologies for satellite monitoring;

– other technical studies related to spectrum monitoring (Storage of I/Q data, DVB-T/T2 coverage measurements and evaluation of planning criteria, essential requirements for developing countries, unmanned aerial vehicles for spectrum monitoring and measurements; field strength measurement accuracy; practical estimation of electromagnetic and interference environment in GNSS frequency bands; EMF measurements to assess human exposure; test procedure for measuring geolocation accuracy based on TDOA; performance evaluation of mobile DF units in operational environment).

## 6.2 Study Group 3

In furthering its work on propagation measurement, data analysis, modelling and prediction in various parts of the spectrum up to 375 THz, thereby laying the foundation for the design of radiocommunication systems and the assessment of interference, Study Group 3 continues to revise or develop new recommendations, reports and handbooks under its purview. Following the Study Group 3 meetings in March and August 2017, two new and 29 draft revisions to ITU-R Recommendations, two new and two draft revisions to ITU-R Reports, and one new and the suppression of one ITU-R Questions were approved. Study Group 3 continued to progress studies necessary for WRC-19 agenda items, particularly dealing with propagation prediction for broadband applications in the mobile service (agenda item 1.13) and at higher frequencies (agenda item 1.15). A key priority is liaison with other ITU-R Study Groups to provide advice on the application of Study Group 3 prediction methods to emerging requirements. Another major activity is the provision of software tools to implement Study Group 3 prediction methods; this was the result of significant work within a number of administrations to develop and test software. Recommendations in the P‑series remain the most popular series and statistics for 2017 indicate that they received the highest number of downloads (more than 310 000).

## 6.3 Study Group 4

Study Group 4 is continuing to study fixed, mobile, broadcasting and radiodetermination-satellite systems and networks characteristics, air interfaces, performance and availability objectives as well as sharing of orbit/spectrum resources among GSO and non-GSO satellite systems, enabling the sustainable development of the space ecosystem.

Study Group 4 Working Parties progressed the preparatory work for WRC-19 under the agenda items for which they are the leading groups as well as for other agenda items for which they are contributing groups.

New and revised Recommendations pertaining to the scope of SG 4 were approved, in particular Recommendation ITU-R M.1787-3 (in the course of approval) “Description of systems and networks in the radionavigation-satellite service (space-to-Earth and space-to-space) and technical characteristics of transmitting space stations operating in the bands 1 164-1 215 MHz, 1 215-1 300 MHz and 1 559-1 610 MHz”, Recommendations ITU-R M.1184-3 “Technical characteristics of mobile satellite systems in the frequency bands below 3 GHz for use in developing criteria for sharing between the mobile-satellite service and other services”, ITU-R S.1503-3 “Functional description to be used in developing software tools for determining conformity of non-geostationary-satellite orbit fixed-satellite service systems or networks with limits contained in Article 22 of the Radio Regulations”, and ITU-R S.2112-0 “Guidelines to conduct bilateral coordination for explicit agreements, in the frequency band 14.5-14.75 GHz for Regions 1 and 2 countries, or in the frequency band 14.5-14.8 GHz for Region 3 countries, in the fixed-satellite service (Earth-to-space) not for feeder links for the broadcasting-satellite service, in order to protect all existing and planned systems of allocated services in 14.5-14.8 GHz in the territories of those administrations engaging in such agreements”.

A new report pertaining to the scope of SG 4 was approved, Report ITU‑R S.2409-0 “Uplink interference issues associated with closely separated GSO FSS VSAT networks in the 27.5-30 GHz frequency band”.

## 6.4 Study Group 5

Study Group 5 is continuing studies on systems and networks for the fixed, mobile, radiodetermination, amateur and amateur-satellite services, paving the way for the continuing development of all these services, including IMT and PPDR.

Sixteen Recommendations and twelve Reports pertaining to the scope of SG 5 were approved, some of which are in support of the studies carried out in relation to WRC‑19 agenda items. Other than the normal revision of existing documents the WPs have worked on several studies producing relevant Reports/Recommendations.

Working Party 5A produced the following new documents:

* Report ITU-R M.2415 “Spectrum needs for Public Protection and Disaster Relief (PPDR)”. The report discusses the estimations of spectrum needs for PPDR. The expanding scope of PPDR capabilities, ranging from narrowband through wideband and broadband, offers greater utility for emergency response operations around the world, including in developing countries.
* Report ITU-R M.2417 “Technical and operational characteristics of land-mobile service applications in the frequency range 275-450 GHz”. Due to the progress of RF integrated devices and circuits operating in the frequency band above 275 GHz, the contiguous frequency bands become available for land-mobile service applications.
* Report ITU-R M.2418 “Description of Railway Radiocommunication Systems between Train and Trackside (RSTT)”. The report addresses the architecture, applications, technologies and operational scenarios of Railway Radiocommunication Systems between Train and Trackside (RSTT) for all types of trains (e.g., high-speed trains, passenger trains, freight trains, and metro trains).

Working Party 5B produced the following new documents:

* Report ITU-R M.2413 “Reception of automatic dependent surveillance broadcast via satellite and compatibility studies with incumbent systems in the frequency band 1 087.7-1 092.3 MHz”. Automatic dependent surveillance (ADS) is a surveillance technique in which aircraft automatically provide, via a data link, data from the on-board navigation and position fixing systems, including aircraft identification, four-dimensional position (latitude, longitude, altitude and time) and additional data as appropriate.
* Report ITU-R M.2414 “Performance measurements of interference into one example of a Radar operating under the aeronautical radionavigation service in the frequency band 2 700-2 900 MHz”. The document reports the measured radar receiver performance of an example airport surveillance radar that operates in the 2 700 2 900 MHz frequency band.
* Recommendations ITU-R M.2114 and M.2115 dealing with “Technical and operational characteristics of and protection criteria for aeronautical mobile service systems in the frequency bands 22.5-23.6 GHz and 25.25 27.5 GHz” and “Technical and operational characteristics of and protection criteria for aeronautical mobile systems operating in the 45.5-47 GHz frequency range”, respectively.

Working Party 5C produced the following new documents:

* Report ITU-R F.2416 “Technical and operational characteristics and applications of the point-to-point fixed service applications operating in the frequency band 275-450 GHz”. This Report intends to provide the technical and operational characteristics of the fixed service applications operating in the frequency range 275-450 GHz which will be useful for the sharing and compatibility studies between the fixed service applications and the already identified passive services.
* Recommendation ITU-R F.2113 “Error performance and availability objectives and requirements for real point-to-point packet-based radio links”. This Recommendation describes error performance and availability events and parameters for packet based FWS equipment and links, provides a formula for link objectives, includes relations between packet and non-packet based systems, and shows examples of applications to real cases.

Working Party 5D produced the following new documents:

* Report ITU-R F.2410 “Minimum requirements related to technical performance for IMT-2020 radio interface(s)”. The report describes key requirements related to the minimum technical performance of IMT-2020 candidate radio interface technologies. It also provides the necessary background information about the individual requirements and the justification for the items and values chosen.
* Report ITU-R F.2411 “Requirements, evaluation criteria and submission templates for the development of IMT-2020”. The report supports the submission and evaluation process for IMT-2020 initiated by Circular Letter 5/LCCE/59 and its Addenda. It addresses the requirements, evaluation criteria, as well as submission templates required for a complete submission of RITs and SRITs for IMT-2020.
* Report ITU-R F.2412 “Guidelines for evaluation of radio interface technologies for IMT-2020”. This Report provides, for proponents, developers of candidate RITs/SRITs and independent evaluation groups, the common evaluation methodology and evaluation configurations to evaluate the candidate RITs/SRITs and system aspects impacting the radio performance.

Adhering to its published schedule related to IMT-2020 terrestrial radio interface technology development, ITU-R Working Party 5D has in 2017 completed on schedule the above mentioned three draft new reports that make up the three critical pillars underpinning the IMT-2020 process for technologies to attain the global IMT-2020 designation by ITU in early 2020. These three critical documents have been advance shared with the relevant external organization industry partners in anticipation of final approval in ITU-R by Study Group 5 in November and are a key cog in the global 5G work program.

## 6.5 Study Group 6

Study Group 6 is continuing studies on radiocommunication broadcasting, including vision, sound, multimedia and data services principally intended for delivery to the general public.

Following the SG 6 block meetings in March 2017 and October 2017, 3 new Recommendations, 17 revised Recommendations, 4 new Reports, and 17 revised Reports were approved on topics such as digital terrestrial broadcasting systems and their sharing with and protection from other services, emergency broadcasting, a global platform for the broadcasting service, integrated broadcast-broadband (IBB) systems, new audio codec for digital broadcasting, audio metadata for advanced sound systems, requirements for broadcast auxiliary services, digital interfaces for studio signals, high dynamic range television (HDR-TV), and accessibility to broadcasting services. A new Question was also approved on Advanced Immersive Audio-Visual (AIAV) systems for programme production and exchange for broadcasting, and studies continue toward developing a new Recommendation and Report.

On 3 October 2017 SG 6 organized a special session to celebrate the 90th anniversary of CCIR/ITU-R and the 45th anniversary of digital TV/HDTV studies in Study Group 6 and former Study Group 10 and 11.

## 6.6 Study Group 7

Study Group 7 is continuing to develop ITU-R Recommendations, Reports and handbooks used for development, and ensuring non-interference operation, of space operation, space research, Earth-exploration and meteorological systems (including the related use of links in the inter-satellite service), radio astronomy and radar astronomy, dissemination, reception and coordination of standard-frequency and time-signal services (including the application of satellite techniques) on a worldwide basis.

The systems linked with Study Group 7 are used in activities that are a critical part of our everyday life such as:

• global environment monitoring – atmosphere (including greenhouse gases emissions), oceans, land surface, biomass, etc.;

• weather forecasting and climate change monitoring and prediction;

• detection and tracking of many natural and man-made disasters (earthquakes, tsunamis, hurricanes, forest fires, oil leaks, etc);

• providing alerting/warning information;

• damage assessment and planning relief operations.

Study Group 7 approved 17 new and revised Recommendations and 3 new Reports.

The joint WMO/ITU Handbook “Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction” was revised and published.

The joint WMO/ITU seminar on meteorology took place 23-24 October 2017 in Geneva with about 80 participants. Openning was inaugurated by WMO and ITU SecGens and BR Director.

This seminar was organized by ITU and WMO with the objective of providing information on the use and further development of radio-based space and terrestrial systems and applications employed for weather, water and climate monitoring and relevant radio-frequency spectrum management activities.

The seminar aimed and hopefully managed to increase awareness of national meteorological or hydrological services (NMHS) of the importance of meteorological related spectrum protection and the growing need for their participation in national and international spectrum management activities.

The seminar provided an excellent overview of contemporary meteorological applications’ use of radio spectrum and their future development as well as to illustrate the socio-economic importance of these services.

The presentations can be downloaded from:

https://www.itu.int/en/ITU-R/study-groups/workshops/RSG7-ITU-WMO-RSM-17/Pages/RSG7-ITU-WMO-RSM-17---Presentations.aspx

## 6.7 Coordination Committee for Vocabulary

The Coordination Committee for Vocabulary (CCV) is continuing to assist in ensuring the consistency among the various ITU-R terms and definitions, filter all the proposals coming from the Radiocommunication Study Groups and validate the terms and definitions before introducing them into the ITU terminology database.

The ITU‑R CCV and ITU‑T SCV meetings continue to be conducted jointly, with extensive use of electronic methods. Work is on-going on improvements to the ITU terminology database. Council Resolution 1386 “ITU Coordination Committee for Terminology (ITU CCT)” was adopted.

# 7 Liaison and collaboration with ITU‑D and ITU‑T, and with other organizations

Intersectoral activities have continued throughout the period, particularly concerning ITU’s priority topics of climate change, emergency communications and accessibility.

*Concerning ITU‑D*: BR continues to contribute to the BDT workshops and seminars. These events provide an opportunity to present ITU‑R’s standardization activities and, in turn, to demonstrate their contribution to Resolution 123 (Rev. Busan, 2014) in bridging the standardization gap.

BR actively participated in WTDC-17, during which the Report on WTDC Resolution 9 (Rev. Dubai, 2014), as revised by ITU-R Study Group 1 (see section 6.1 above), was endorsed without comments. The BR participation was very useful to follow the development of the new version of that Resolution 9, as well of the Buenos Aires Action Plan, Regional Initiatives and revised or new ITU-D Questions and WTDC Resolutions, in order to provide information on the ITU-R activities and existing publications and avoid as much as possible overlapping activity between the ITU Sectors.

*Concerning ITU‑T*:In addition to climate change and emergency communications, topics of mutual interest between ITU‑R and ITU‑T include IMT-2020, the effects of human exposure to radio frequencies, power line transmission systems, intelligent transport systems, common patent policy and intellectual property rights and audiovisual media accessibility.

There continues to be a requirement for close coordination on the various topics being addressed by ITU‑T that impinge on radiocommunication issues to reduce the potential for overlap, duplication and conflict of work undertaken by the two Sectors.

*Concerning other organizations*:Healthy liaison has continued between ITU‑R Study Groups and other organizations, with due reference to Resolution ITU‑R 9, where required. ITU‑R and BR representatives have continued their involvement in the Global Standards Collaboration (GSC), the World Standards Cooperation (WSC), CISPR and IEC. Liaison has also been evident with UN bodies and agencies in various fields, e.g. space weather, climate change and climate monitoring (WMO, UNFCCC, Global Humanitarian Forum, GEO, SFCG, NASA, ESA) and EMF exposure (WHO).

# 8 Other intersectoral activities

BR has actively participated in other intersectoral activities, which are relevant to the work of ITU‑R Study Groups, as described below.

* *Climate Change and Emergency Communications*: Intersectoral activities continue to be coordinated by the ITU Climate Change and Emergency Telecommunications Task Force related to the implementation of Resolution 136 (Rev. Busan, 2014), in which BR has active participation. There are also studies in response to Resolution ITU‑R 60-1 (Reduction of energy consumption for environmental protection and mitigating climate change by use of ICT/radiocommunication technologies and systems. The ITU‑R webpage on climate change has been updated to reflect the latest developments in this field.
* *Accessibility*: ITU-R has been actively participating in the ITU-T JCA-AHF (Joint Coordination Activity on Accessibility and Human Factors). When addressing spectrum related/EMC issues close coordination with the relevant ITU-R groups should be ensured before liaising with external organizations on those issues, particularly where well-established and efficient collaboration between ITU-R and those organizations already exists.
* *Preparation for ITU meetings*: BR is continuing its participation in the activities related to the major ITU events, conferences and meetings and their preparation in relation to the work of the ITU-R Study Groups. This includes the Plenipotentiary Conference, the ITU Council, WTSA, WTDC, WSIS, ITU TELECOM World and GSR (See also Section 8.4 of the main body of this Report).

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