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| **Radiocommunication Assembly (RA-15)Geneva, 26-30 October 2015** |  |
| **INTERNATIONAL TELECOMMUNICATION UNION** |  |
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|  | **Document 1/1001-E** |
| **28 September 2015** |
|  |
| Chairman, Radiocommunication Study Group 1 |
| Chairman’s Report |
| Spectrum management |
|  |

# 1 Summary

Study Group (SG) 1 maintains three Working Parties in accordance with Section 2 of Resolution ITU‑R 1-6. The Study Group and Working Parties 1A and 1C met four times during this study period, while Working Party (WP) 1B met a total of five times.

During this study period, Study Group 1 adopted one draft new Question and draft revisions to four other Questions, and proposed the suppression of two Questions. The Member States approved these actions. Also during this period, Study Group 1 adopted five draft new Recommendations and draft revisions to twenty Recommendations, and proposed the suppression of three Recommendations. The Member States also approved these actions. Study Group 1 is submitting neither draft Questions nor draft Recommendations to the Radiocommunication Assembly for approval.

The Study Group approved fourteen new Reports and revisions to thirteen Reports during this period.

In preparation for the World Radiocommunication Conference 2015 (WRC-15) and the second session of the Conference Preparatory Meeting for WRC-15 (CPM15-2), WP 1B completed studies and developed draft CPM texts related to Issues 9.1.4 (Res. **67 (WRC-12)**), 9.1.6 (Res. **957 (WRC‑12)**) and 9.1.7 (Res. **647 (Rev.WRC-12)**) identified by CPM15-1 under WRC-15 agenda item 9.1.

In addition to its liaison activities with other ITU-R groups on an ad hoc basis, Study Group 1 continues to maintain liaison with various other groups, notably the ITU Development Sector, with which it is continuing work on spectrum management, software development and monitoring activities within the framework of ITU-D/ITU-R Joint Group to address Resolution 9 (Rev.WTDC‑06), the ITU Standardization Sector, in particular on issues related to compatibility between radiocommunication services and Power Line Telecommunication (PLT) systems, and the International Special Committee on Radio Interference (CISPR), where the concern is limiting radiation levels from industrial, scientific and medical (ISM) equipment to protect radiocommunication services.

During this study period, WP 1A developed the 2015 Edition of the *ITU* *Handbook on Computer-Aided Techniques (CAT) for Spectrum Management* andWP 1B developed the 2015 Edition of the *ITU* *Handbook on National Spectrum Management*, which were approved by SG 1.

In addition to this Chairman’s Report, SG 1 is presenting three other contributions to the Radiocommunication Assembly:

– a list of SM-series ITU-R Recommendations (Document 1/1002);

– a list of ITU-R Questions assigned to Study Group 1 (Document 1/1003);

– a proposal for action on eleven ITU‑R Resolutions of particular interest to Study Group 1, along with a draft revision to five of those Resolutions (Document 1/1004 and its Annexes 1 to 5).

# 2 Work programme

As of the Radiocommunication Assembly 2012, twelve Questions had been assigned to Study Group 1 (Annex 1 to Resolution ITU-R 5-5). During this study period, Study Group 1 adopted one draft new Question and draft revisions to four other Questions, while proposing the suppression of two Questions (see Section 5). The Member States subsequently approved these actions.

Study Group 1 activities in preparation for the World Radiocommunication Conference 2015 are described in Section 6.

# 3 Structure and leadership

## 3.1 Study Group 1

The Radiocommunication Assembly 2012 appointed a Chairman and nine Vice-Chairmen for Study Group 1:

|  |  |  |
| --- | --- | --- |
| *Chairman:* | Dr S.Y. PASTUKH | (Russian Federation) |
| *Vice-Chairmen:* | Mr N. AL-RASHEDI | (United Arab Emirates) |
|  | Dr E. AZZOUZ | (Egypt (Arab Republic of)) |
|  | Mr R. CHANG | (China (People's Republic of)) |
|  | Mr C. ELANGMANE | (Gabonese Republic) |
|  | Mr R. GARCIA DE SOUZA | (Brazil (Federative Republic of)) |
|  | Ms L. JEANTY | (Netherlands (Kingdom of the)) |
|  | Mr L. KIBET BORUETT | (Kenya (Republic of)) |
|  | Dr H. MAZAR | (Israel (State of)) |
|  | Mr V.V. SINGH | (India (Republic of)) |
|  | Mr D. SWARD | (Canada) |
|  | Mr R. TRAUTMANN | (Germany (Federal Republic of)) |

## 3.2 Working Parties

SG 1 maintained its three Working Parties throughout this study period:

Working Party 1A – Spectrum engineering techniques

Chairman: Mr R. GARCIA DE SOUZA

Vice-Chairman: Dr H. MAZAR

Working Party 1B – Spectrum management methodologies and economic strategies

Chairman: Mr N. AL-RASHEDI

Vice-Chairman: Mr R. CHANG

Working Party 1C – Spectrum monitoring

Chairman: Mr R. TRAUTMANN

Vice-Chairman: Mr M. AL-SAWAFI (Oman (Sultanate of))

# 4 Meetings during this study period

During this study period, SG 1 and its Working Parties held meetings as shown below. All meetings were held in Geneva, Switzerland:

 6 to 13 June 2012 WP 1A, WP 1B and WP 1C

 14 June 2012 SG 1

 4 to 11 June 2013 WP 1A, WP 1B and WP 1C

 12 June 2013 SG 1

 20 to 24 January 2014 WP 1B\*

 4 to 11 June 2014 WP 1A, WP 1B and WP 1C\*\*

 12 June 2014 SG 1

 3 to 10 June 2015 WP 1A\*\*\*, WP 1B\*\*\* and WP 1C

 11-12 June 2015 SG 1

\* In conjunction with this meeting, the WP 1A Rapporteur Group on the revision of the CAT Handbook met on 20-22 January 2014 and an ITU Workshop on Spectrum Management issues related to the use of White Spaces by Cognitive Radio Systems was held on 20 January 2014 (see Section 8).

\*\* In conjunction with these meetings, an ITU Workshop on SRD and UWB was held on 3 June 2014 (see Section 8).

\*\*\* The WP 1A and WP 1B meetings started on 4 June 2015 and meetings of their Rapporteur Groups were held on 3 June 2015.

# 5 Major activities of the Working Parties

## 5.1 Activities with respect to the ITU-R Resolutions

During the study period SG 1 carried out activities with respect to the following ITU-R Resolutions.

| **Resolution** | **Title** | **Status of studies within SG 1 and SG 1 deliverables** |
| --- | --- | --- |
| 11-4 | Further development of the spectrum management system for developing countries | – New edition of the ITU Handbook on Computer-Aided Techniques for Spectrum Management– [Recommendation ITU-R SM.1370-2](http://www.itu.int/rec/R-REC-SM.1370) on Design guidelines for developing automated spectrum management systems |
| 22-3 | Improvement of national radio spectrum management practices and techniques | – [Recommendation ITU-R SM.1047-2](http://www.itu.int/rec/R-REC-SM.1047/en) on National spectrum management– [Recommendation ITU-R SM.1603-2](http://www.itu.int/rec/R-REC-SM.1603) on Spectrum redeployment as a method of national spectrum management– [Report ITU‑R SM.2012-4](http://www.itu.int/pub/R-REP-SM.2012) on Economic aspects of spectrum management– New edition of the ITU Handbook on National Spectrum Management |
| 23-2 | Extension of the international monitoring system to a worldwide scale | Completed and subject to the addition of new administrations to List VIII (e.g. see also [Report ITU-R SM.2182](http://www.itu.int/pub/R-REP-SM.2182)) |
| 54-1 | Studies to achieve harmonization for short-range devices | – [Recommendation ITU-R SM.1896-0](http://www.itu.int/rec/R-REC-SM.1896) on Frequency ranges for global or regional harmonization of SRDs– [Report ITU-R SM.2153-5](http://www.itu.int/pub/R-REP-SM.2153) on Technical and operating parameters and spectrum use for SRDs– [Report ITU‑R SM.2255](http://www.itu.int/pub/R-REP-SM.2255)-0 on Technical characteristics, standards, and frequency bands of operation for RFID and potential harmonization opportunities– An [ITU Workshop on SRD and UWB](http://www.itu.int/en/ITU-R/study-groups/workshops/RWP1B-SRD-UWB-14/Pages/default.aspx) was held on 3 June 2014 (see Section 8 of this Report)– Correspondence Group on the classification of SRDs |
| 58 | Studies on the implementation and use of cognitive radio systems | – Working document towards a preliminary draft new Report ITU-R SM.[CRS SPECTRUM MANAGEMENT CHALLENGES] - Spectrum management principles, challenges and issues related to dynamic access to frequency bands by means of radio systems employing cognitive capabilities– An [ITU Workshop – Spectrum Management issues on the use of White Spaces by Cognitive Radio Systems](http://www.itu.int/en/ITU-R/study-groups/workshops/RWP1B-SMWSCRS-14/Pages/default.aspx) was held on 20 January 2014 (see Section 8 of this Report)– [Recommendation ITU-R SM.2039-0](http://www.itu.int/rec/R-REC-SM.2039/en) on Spectrum monitoring evolution |

Proposal for action on the ITU‑R Resolutions of particular interest to SG 1, along with a draft revision to five of those Resolutions are presented in Document 1/1004 and its Annexes 1 to 5.

## 5.2 Working Party 1A

(Questions 210-3/1, 221-2/1, 222/1, 236/1, 237/1)

During this study period, WP 1A presented one draft new Question and the draft revision of one Question to Study Group 1 for adoption.

| Question and action | Title | AdministrativeCircular |
| --- | --- | --- |
| 210-3/1revised | Wireless power transmission | CACE/593 |
| 237/1new | Technical and operational characteristics of the active services operating in the range 275-1 000 GHz | CACE/641 |

It also presented to Study Group 1 one draft new Recommendation, two draft revisions of one Recommendation and the draft revision of two other Recommendations, as well as four draft new Reports, the subsequent draft revision of one of them and the draft revision of two other Reports.

| Recommendation and action | Title | AdministrativeCircular |
| --- | --- | --- |
| SM.329-12Revised | Unwanted emissions in the spurious domain | CACE/585 |
| SM.1541-6Revised twice | Unwanted emissions in the out-of-band domain | CACE/627CACE/750 |
| SM.1879-2Revised | The impact of power line high data rate telecommunication systems on radiocommunication systems below 470 MHz | CACE/627 |
| SM.2028-0New | Protection distance calculation between inductive systems and radiocommunication services using frequencies below 30 MHz | CACE/585 |

| Report and action | Title |
| --- | --- |
| SM.2158-3Revised | Impact of power line telecommunication systems on radiocommunication systems operating below 80 MHz |
| SM.2212-1Revised | Impact of power line telecommunication systems on radiocommunication systems operating in above 80 MHz |
| SM.2269-0New | Methodologies to relate radiation from power line telecommunication installations to power line telecommunication modem output |
| SM.2303-1New and revised | Wireless power transmission using technologies other than radio frequency beam |
| SM.2351-0New | Smart grid utility management systems |
| SM.2352-0New | Technology trends of active services in the frequency range 275-3 000 GHz |

Section 7.1 describes WP 1A activities related to the 2015 Edition of the ITU Handbook on computer-aided techniques for Spectrum Management.

## 5.3 Working Party 1B

(Questions 205-2/1, 208-1/1, 216-1/1 and also 210-3/1 once the necessary technical and operational parameters will be available from WP 1A)

During this study period, WP 1B presented the draft revision of three Questions to Study Group 1 for adoption and proposed the suppression of one Question.

| Question and action | Title | AdministrativeCircular |
| --- | --- | --- |
| 205-2/1Revised | Long-term strategies for spectrum utilization | CACE/751 |
| 208-1/1Revised | Alternative methods of national spectrum management | CACE/751 |
| 216-1/1Revised | Spectrum redeployment as a method of national spectrum management | CACE/751 |
| 224/1Suppressed | Technical convergence with respect to terrestrial fixed, mobile, and broadcasting interactive multimedia applications and the associated regulatory environment | CACE/751 |

It also presented to Study Group 1 two draft revisions of one Recommendation and the draft revision of three other Recommendations, as well as three draft revisions of one Report, the draft revision of two other Reports and two draft new Reports.

| Recommendation and action | Title | AdministrativeCircular |
| --- | --- | --- |
| SM.1047-2Revised | National spectrum management | CACE/585 |
| SM.1370-2Revised | Design guidelines for developing automated spectrum management systems | CACE/627 |
| SM.1413-3Revised | Radiocommunication data dictionary for notification and coordination purposes | CACE/687 |
| SM.1603-2Revised twice | Spectrum redeployment as a method of national spectrum management | CACE/585CACE/687 |

| Report and action | Title |
| --- | --- |
| SM.2012-4Revised | Economic aspects of spectrum management |
| SM.2093-2Revised | Guidance on the regulatory framework for national spectrum management |
| SM.2153-5Revised three times | Technical and operating parameters and spectrum use for short‑range radiocommunication devices |
| SM.2255-0New | Technical characteristics, standards and frequency bands of operation for radio-frequency identification (RFID) and potential harmonization opportunities |
| SM.2353-0New | The challenges and opportunities for spectrum management resulting from the transition to digital terrestrial television in the UHF bands |

Section 7.2 describes WP 1B activities related to the 2015 Edition of the ITU Handbook on National Spectrum Management.

## 5.4 Working Party 1C

(Questions 232/1, 233-1/1, 235/1)

During this study period, WP 1C proposed to Study Group 1 the suppression of one Question.

| Question and action | Title | AdministrativeCircular |
| --- | --- | --- |
| 214/1Suppressed | Monitoring of digital broadcasting signals | CACE/593 |

It also presented four draft new Recommendations, two draft revisions of two Recommendations and the draft revision of seven other Recommendations and proposed the suppression of three Recommendations to Study Group 1. It also presented eight draft new Reports, three subsequent draft revisions of one of them and the draft revision to two other Reports to Study Group 1.

| Recommendation and action | Title | AdministrativeCircular |
| --- | --- | --- |
| SM.575-2Revised | Protection of fixed monitoring stations against interference from nearby or strong transmitters | CACE/640 |
| SM.1051-3Revised | Priority of identifying and eliminating harmful interference in the band 406 406.1 MHz | CACE/687 |
| SM.1052Suppressed | Automatic identification of radio stations | CACE/585 |
| SM.1267Suppressed | Collection and publication of monitoring data to assist frequency assignment for geostationary satellite systems | CACE/585 |
| SM.1268-3Revised | Method of measuring the maximum frequency deviation of FM broadcast emissions at monitoring stations | CACE/687 |
| SM.1537-1Revised | Automation and integration of spectrum monitoring systems with automated spectrum management | CACE/627 |
| SM.1600-2Revised twice | Technical identification of digital signals | CACE/585CACE/750 |
| SM.1752Suppressed | Limits for unwanted emissions under free-space condition | CACE/585 |
| SM.1753-2Revised | Methods for measurements of radio noise | CACE/ |
| SM.1837-1Revised | Test procedure for measuring the 3rd order intercept point (IP3) level of radio monitoring receivers | CACE/627 |
| SM.1875-2Revised twice | DVB-T coverage measurements and verification of planning criteria | CACE/627CACE/687 |
| SM.1880-1Revised | Spectrum occupancy measurement and evaluation | CACE/750 |
| SM.2039-0New | Spectrum monitoring evolution | CACE/627 |
| SM.2060-0New | Test procedure for measuring direction finder accuracy | CACE/697 |
| SM.2061-0New | Test procedure for measuring direction finder immunity against multi-path propagation | CACE/697 |
| SM.2080-0New | Precision of time information in output data of monitoring receivers | CACE/750 |

| Report and action | Title |
| --- | --- |
| SM.2056-1Revised | Airborne verification of antenna patterns of broadcasting stations |
| SM.2211-1Revised | Comparison of Time-Difference-of-Arrival and Angle-of-Arrival Methods of signal geolocation |
| SM.2256-0New | Spectrum occupancy measurements and evaluation |
| SM.2257-3New and revised three times | Spectrum management and monitoring during major events |
| SM.2258-0New | Overview of interference source detection and geolocation affecting the 406.0-406.1 MHz band used by emergency beacons |
| SM.2270-0New | The radio source visualizing technology for spectrum monitoring |
| SM.2304-0New | Application of technical identification and analysis of specific digital signals |
| SM.2354-0 New | Alternative test procedure for measuring accuracy and immunity of direction finder using a simulator |
| SM.2355-0 New | Spectrum monitoring evolution |
| SM.2356-0New | Procedures for planning and optimization of spectrum-monitoring networks in the VHF/UHF frequency range |

# 6 Preparations for the World Radiocommunication Conference 2015 (WRC-15) and for the second session of the Conference Preparatory Meeting (CPM) for WRC-15

In accordance with Annex 1, § 2.2 of Resolution ITU-R 2-6, the first session of the Conference Preparatory Meeting for WRC-15 (CPM15-1) had designated Working Party 1B as the Responsible Group for Issues 9.1.4, 9.1.6 and 9.1.7 identified under WRC-15 agenda item 9.1 in order to carry out studies and develop draft CPM texts in response to Resolutions **67 (WRC-12)**, **957 (WRC-12)** and **647 (Rev.WRC‑12)** respectively.

WP 1B studied the issues and developed the draft CPM texts prior to the established deadline, which were included in the draft CPM Report. These texts were considered during the second session of the CPM and included in the Report of the CPM to WRC-15 with some modifications to one of the option under Issue 9.1.7.

# 7 ITU‑R Handbooks

Study Group 1 is responsible for three Handbooks, the *Handbook on National Spectrum Management (NSM)* and the *Handbook on Computer-Aided Techniques for Spectrum Management (CAT)* and the Handbook on Spectrum Monitoring. During this study period WP 1A and WP 1B worked on the revision of the first two Handbooks in close cooperation with WP 1C.

## 7.1 Handbook on Computer-Aided Techniques for Spectrum Management

In June 2011, WP 1A established a Rapporteur Group to prepare a revision of the 2005 edition of the CAT Handbook. The work was completed at the June 2014 meeting of WP 1A and the new edition of this Handbook was approved by SG 1.

## 7.2 Handbook on National Spectrum Management

In June 2011, WP 1B established a Correspondence Group which was replaced in June 2012 by a Rapporteur Group to prepare a revision of the 2005 edition of the NSM Handbook. The work was completed at the June 2014 meeting of WP 1B and the new edition of this Handbook was approved by SG 1.

## 7.3 Handbook on Spectrum Monitoring

The last revision of the Handbook on Spectrum Monitoring was approved in 2010 and is still in force.

# 8 ITU Workshops organized by Study Group 1

• ITU Workshop: Spectrum Management issues on the use of White Spaces by Cognitive Radio Systems (Geneva, 20 January 2014)

The purpose of the Workshop was to provide a high level view on some Spectrum Management issues for the use of White Spaces (WS) by Cognitive Radio Systems (CRS) in Radiocommunications, in the light of the results of RA-12 and WRC-12 (agenda item 1.19), including the approval of Recommendation 76 (WRC-12) and Resolution ITU-R 58. The Workshop included a summary of the related ongoing ITU-R studies, as well as presentations on the possible issues indicated in the programme (Creation and responsibility/maintenance of spectrum/geo-location database for use by WS Devices; WS network authorization/licensing regime; iii) Protection of incumbent radiocommunication services; iv) coordination in border areas; v) economic aspects/business cases, etc.). Experiences from case studies, experiments and/or trials, including some related regulatory aspects and regional activities, were also provided and a fruitful discussion with the exchange of ideas and views was possible. Further details about this Workshop are available online at: [www.itu.int/go/ITU-R/RWP1B-SMWSCRS-14](http://www.itu.int/go/ITU-R/RWP1B-SMWSCRS-14). This Workshop permitted an open discussion on the above-mentioned issues as well as a good exchange of ideas, views and possible ways forward. A summary was provided by in Document [1/INFO/4](http://www.itu.int/md/R12-SG01-INF-0004/en).

• ITU Workshop on Short Range Devices and Ultra-Wideband (3 June 2014)

Noting that the harmonization of spectrum usage to facilitate maximum gain and efficiency of SRD global adoption is imperative in order to accommodate the explosive growth and cross border proliferation of short range radiocommunication devices (SRDs), including global adoption of Ultra Wide Band (UWB), in an effort to encourage both an organized and fully realized implementation of the newest technologies available, the purpose of the Workshop was to identify the areas of spectrum that can be globally or regionally harmonized to facilitate global adoption of SRD applications and their related technologies. The Workshop included a brief introduction of the ITU‑R framework for the studies on these topics (including Resolution ITU-R 54-1), a review of the status of SRD harmonization around the world, the status of the ITU-R studies, as well as some examples of specific SRDs for regional or global harmonization and latest developments and new studies on UWB and RFID. The information presented during the workshop as well as the views, comments, prescriptive measures and suggestions exchanged during fruitful discussions were considered further within WP 1B, as appropriate. Further details about this Workshop are available online at: [www.itu.int/go/ITU-R/RWP1B-SRD-UWB-14](http://www.itu.int/go/ITU-R/RWP1B-SRD-UWB-14).

# 9 Liaison with other groups

In addition to normal liaison on an ad hoc basis with Study Groups, Working Parties and other groups within the ITU Radiocommunication Sector, SG 1 maintains ongoing cooperation on a variety of issues with the Telecommunication Development Sector, the Telecommunication Standardization Sector and the International Special Committee on Radio Interference, as well as with some external organizations.

## 9.1 ITU Telecommunication Development Sector (ITU-D)

In order to support spectrum management, primarily in developing countries, Study Group 1 continues to cooperate with ITU‑D Study Group 2 (before WTDC-14) and ITU-D Study Group 1 (since WTDC‑14) under ITU-D Resolution 9, *Participation of countries, particularly developing countries, in spectrum management*, which was revised at the World Telecommunication Development Conference 2014 (WTDC-14) (Dubai).

During the study period six meetings of the ITU-D/ITU-R Joint Group on Resolution 9 were held in Geneva on:

*(before WTDC-14)* 21 September 2012, during the ITU-D SG 2 meeting;

 13 June 2013, immediately after the ITU-R SG 1 meeting;

 19 September 2013, during the ITU-D SG 2 meeting;

*(since WTDC-14)* 18 September 2014, during the ITU-D SG 1 meeting;

 20 April 2015, during the ITU-D SG 1 Rapporteur Group meetings;

 16 September 2015, during the ITU-D SG 1 meeting.

The Chairman of SG 1 was appointed as a Co-Chairman of this ITU-R/ITU-D Joint Group for Resolution 9. ITU-R SG 1 will continue to collaborate actively with the ITU-D Study Groups not only to support ITU-D but also in order to avoid duplication of the work between the two sectors and ensure that the planned Report to the next WTDC on Resolution 9 will not be in contradiction with relevant ITU-R Recommendations and Reports.

## 9.2 ITU Telecommunication Standardization Sector (ITU-T)

Study Group 1 continues to cooperate with various ITU-T groups on a number of issues:

• recommendations for levels of radiation from PLT equipment and different cable systems;

• recommendations for frequency bands for wireless home networking;

• measurement issues related to human exposure to electromagnetic fields;

• responding to a request from the ITU-T focus group on climate change for information on the impact of radiocommunication technologies.

## 9.3 International Special Committee on Radio Interference (CISPR)

Through its Rapporteur, Mr Ollivier (France) and then Ms Mendel (Germany (Federal Republic of)), Study Group 1 continues to work closely with CISPR on limits and measurement methods for radiation from industrial, scientific and medical (ISM) equipment as well as frequency harmonization for wireless power transmission (WPT). SG 1 also worked with CISPR to collect data on characteristics of the radiocommunication services for use in setting ISM radiation limits for development of CISPR database.

# 10 Objectives for 2016-2019

According to the 2016-2019 rolling Operational Plan for the ITU-R, one of the key priorities for the ITU-R is to establish and update international regulations on the use of the radio-frequency spectrum and satellite orbits, as well as worldwide Recommendations, Reports and Handbooks for the most efficient use of the radio-frequency spectrum and satellite orbits.

New challenges for efficient spectrum management on international and national levels arises from specific requirements of new technologies such as CRS, IMT-2020, IoT, M2M, RFIDs, nano- and pico- satellite for spectrum access. Spectrum management should allow timely respond to spectrum demand of new technologies, guarantee interference free environment for existing and new systems and encourage innovative and efficient use of spectrum.

ITU-R SG 1 will contribute to this activity in 2016-2019 with the development of new ITU-R deliverables requested by RA-15 and WRC-15, as well as with the identification of best practices and the review of existing ITU-R Recommendations/Reports with regard to the spectrum engineering techniques, spectrum management methodologies and spectrum monitoring.

For the spectrum engineering techniques the following items will be the main objectives in the 2016-2019 period:

– review deliverables on general principles and methods for sharing between radiocommunication services or between radio stations;

– study tools for evaluating interference from cable systems including aggregation effect and the egress of radiated interference from buildings;

– progress the studies on smart grid power management systems;

– complete the studies on wireless power transmission systems;

– progress the studies on technical and operational characteristics of the active services operating in the range 275-1 000 GHz;

– complete the studies on the characteristics of the unwanted emissions in the out-of-band and spurious domains for digital modulation technology used in broadband communication systems;

– continue to exchange information and views between interested parties in ITU-T, ITU-R and other SDOs on issues of mutual interest, especially on the coexistence of wired telecommunication with radio communication systems.

For the spectrum management methodologies and economic strategies the works will be continued in accordance with the ITU‑R Resolutions and Questions (including those established during 2016-2019), such as:

– review deliverables on the long-term spectrum management strategy;

– develop deliverables on innovative spectrum regulatory approaches on sharing spectrum between different services;

– develop deliverables on implementation of dynamic spectrum access;

– develop deliverables for frequency harmonization and other spectrum management aspects for different radio applications (e.g. SRD, RFIDs, Wireless Power Transmission, IoT);

– review deliverables on spectrum economic issues including spectrum pricing, spectrum auction and spectrum redeployment.

For the spectrum monitoring the following main objectives will be:

– develop deliverables with regard to satellite network monitoring;

– develop deliverables on technical identification of digital signals to supplement the information contained in the Recommendation ITU-R SM.1600 Technical identification of digital signals;

– develop deliverables with regard to the monitoring of service area for digital systems;

– develop deliverables on direction finding accuracy and sensitivity;

– develop deliverables on storage of I/Q data.

It is also the objective for 2016-2019 study period to further review of existing ITU-R deliverables taking into account new needs in monitoring and evolution of radio systems in particular:

– review deliverables with regard to the inspection of radio stations;

– review monitoring technique for spectrum occupancy measurements.

Additionally, following the success of the workshops organized during the study cycle in conjunction with the SG 1 and/or working party meetings, SG 1 and/or its working parties may again organize workshops to facilitate exchange of information on important issues within the scope of SG 1.

# 11 Concluding remarks

I would like to extend my sincere thanks to the Vice-Chairmen of Study Group 1 and the Chairmen and Vice-Chairmen of the Working Parties. I would also like to thank those who served as Rapporteur of the Rapporteur Groups or as Chairman of the Correspondence Groups, as well as the members of these groups and the Chairmen of the working groups, drafting groups or other sub-groups during the meetings. All of us greatly appreciate the continued support of the Radiocommunication Bureau and its Study Group Department, in particular the Counsellor and the Secretariat staff.

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