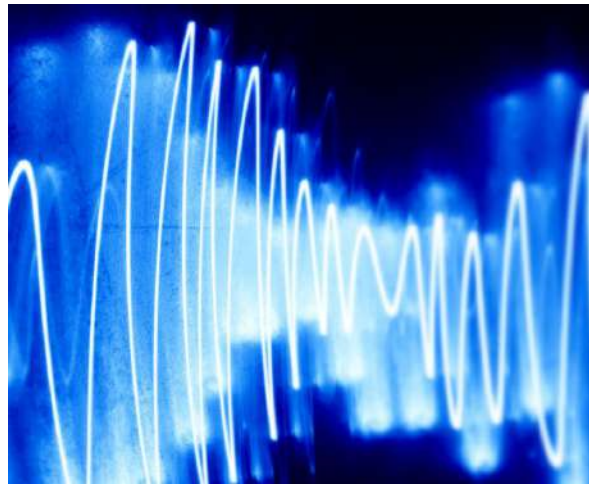




ITU PRIDA Workshop on spectrum monitoring 25 May 2023, Zanzibar



ITU-R studies on spectrum monitoring

ITU Radiocommunication Bureau



International spectrum management framework



ITU Constitution,
Convention

PP

High level principles

Radio Regulations
Agreements

WRC
RRC
RRB

Rights and Obligations
Table of Frequency Allocations
Satellite orbit/terrestrial Plans
Frequency coordination
Frequency registration
Interference
Rules of Procedure...

ITU-R Recommendations

RA

Technical characteristics
Sharing criteria/assessment
Spectrum management
Operational aspects ...

ITU-R Reports,
Handbooks, software tools

Study Groups
WPs, TGs



RRB: Radio Regulations Board
RRC: Regional Radiocommunication Conference
WRC: World Radiocommunication Conference

RA: Radiocommunication Assembly
WPs: Working Parties
TG: Task Groups



Radiocommunication Assembly 2019

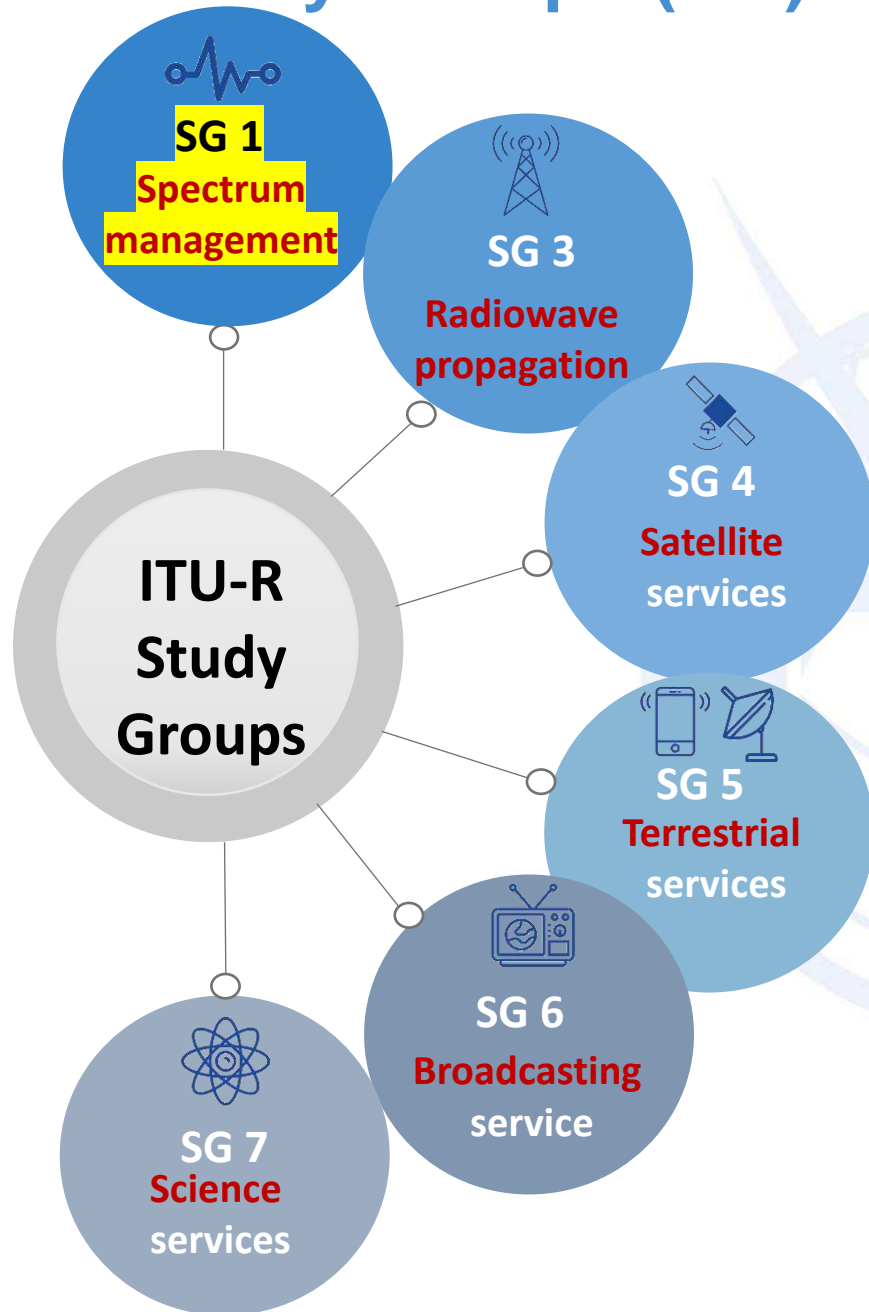


- Held on 21 – 25 October 2019, in Sharm El-Sheikh, Egypt
- **521** participants, **91** ITU Member States, **48** ITU-R Sector members
- Maintained the ITU-R structure with **6 ITU-R Study Groups**, **CCV**, **RAG** and **CPM**, Appointed **Chairmen and Vice-Chairmen** of these groups (see [Res. ITU-R 4-8](#) & [Doc. 84](#))
Approved **programme of work/Questions** ([Res. ITU-R 5-8](#)) & **working methods** (Res. ITU-R [1-8](#) & [2-8](#))
- Approved **23** revised **ITU-R Resolutions** and **2** new **ITU-R Resolutions** (on broadcasting)
- Approved **5 ITU-R Recommendations** (including one on frequency arrangements for terrestrial IMT)





ITU-R Study Groups (SG)



SG 1

- [WP 1A](#) – Spectrum engineering techniques
- [WP 1B](#) – Spectrum management methodologies and economic strategies
- [WP 1C](#) – Spectrum monitoring

SG 3

- [WP 3J](#) – Propagation fundamentals
- [WP 3K](#) – Point-to-point propagation
- [WP 3L](#) – Ionospheric propagation and radio noise
- [WP 3M](#) – Point-to-point and Earth-space propagation

SG 4

- [WP 4A](#) – Efficient orbit/satellite utilization for FSS and BSS
- [WP 4B](#) – Systems, air interfaces, performance and availability objectives for FSS, BSS and MSS (incl. IP-based applications and SNG)
- [WP 4C](#) – Efficient orbit/satellite utilization for MSS and RDSS

SG 5

- [WP 5A](#) – Land mobile > 30 MHz, fixed WAS, amateur & amateur-satellite
- [WP 5B](#) – Maritime and aeronautical mobile services and radiodetermination
- [WP 5C](#) – HF and other systems < 30 MHz in the fixed and land mobile services
- [WP 5D](#) – IMT systems

SG 6

- [WP 6A](#) – Terrestrial broadcasting delivery
- [WP 6B](#) – Broadcast service assembly and access
- [WP 6C](#) – Programme production and quality assessment
- [TG 6/1](#) – **WRC-23 agenda item 1.5** (use of the band 470-960 MHz)



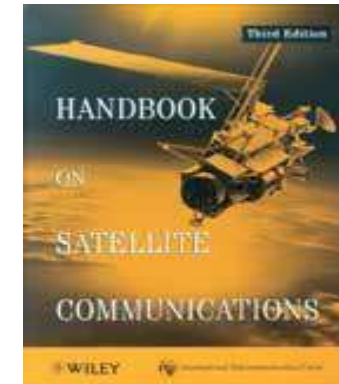
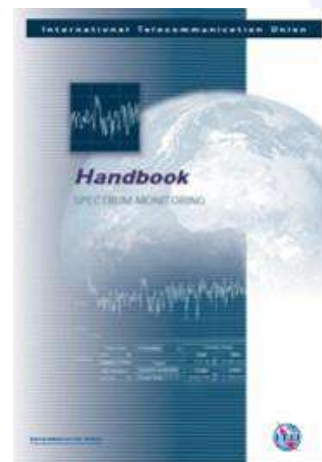
SG 7

- [WP 7A](#) – Time signals and frequency standard emissions
- [WP 7B](#) – Space radiocommunication applications: space operation, space research, Earth exploration, meteorological satellite services
- [WP 7C](#) – Remote sensing systems (active and passive): Earth exploration-satellite, MetAids, space research services
- [WP 7D](#) – Radio astronomy



ITU-R Study Groups Products

- ITU-R Recommendations
- ITU-R Reports and Handbooks
- Technical bases for radio conferences





ITU-R Recommendations/Report series

Series	Title
BO	Satellite delivery
BR	Recording for production, archival and play-out; film for television
BS	Broadcasting service (sound)
BT	Broadcasting service (television)
F	Fixed service
M	Mobile, radiodetermination, amateur and related satellite services
P	Radiowave propagation
RA	Radio astronomy
RS	Remote sensing systems
S	Fixed-satellite service
SA	Space applications and meteorology
SF	Frequency sharing and coordination between fixed-satellite and fixed service systems
SM	Spectrum management
SNG	Satellite news gathering
TF	Time signals and frequency standards emissions
V	Vocabulary and related subjects

SG 1 → **SM**

SG 3 → **P**

SG 4 → **M, S, SF, SNG**

SG 5 → **M, F, SF**

SG 6 → **BO, BR, BS, BT**

SG 7 → **RA, RS, SA, TF**

CCV → **V**

[BR Publication Search Tool](#)



Study Group 1

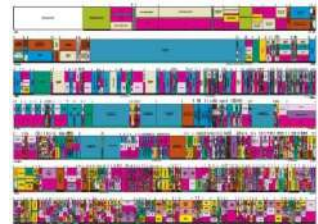
Spectrum Management

Scope

- 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 ITU-D

Structure

- Working Party 1A (WP 1A) - Spectrum engineering techniques
- Working Party 1B (WP 1B) - Spectrum management methodologies and economic strategies
- Working Party 1C (WP 1C) - Spectrum monitoring





RA Resolutions of interest to SG 1

Res. ITU-R	Title	WP
11-5	Further development of the SM system for developing countries	1A
22-5 *	Improvement of national radio SM practices and techniques	1B
23-3	Extension of the international monitoring system to a worldwide scale	1C
54-3 *	Studies to achieve harmonization for short-range devices	1B **
55-3 *	ITU studies of disaster prediction, detection, mitigation and relief	1B, 1C
58-2 *	Studies on the implementation and use of cognitive radio systems	1A, 1B
59-2 *	Studies on availability of frequency bands for worldwide and/or regional harmonization and conditions for their use by terrestrial electronic news gathering systems	1B
60-2 *	Reduction of energy consumption for environmental protection and mitigating climate change by use of ICT/radiocommunication technologies and systems	1B
61-2 *	ITU-R's contribution in implementing the outcomes of the World Summit on the Information Society and the 2030 Agenda for Sustainable Development	1A, 1B
62-2 *	Studies related to testing for conformance with ITU-R Recommendations and interoperability of radiocommunication equipment and systems	1B
64	Guidelines for the management of unauthorized operation of earth station terminals	1B, 1C
66-1 *	Studies related to wireless systems and applications for the development of the Internet of Things (IoT)	1A, 1B
67-1 *	Telecommunication/ICT accessibility for persons with disabilities and persons with specific needs	1A, 1B, 1C

* Revised at RA-19


** Working Party 1A may also be involved upon request from Working Party 1B



ITU-R Questions within SG 1

Question ITU-R	Title	WP
<u>205-2/1</u>	Long-term strategies for spectrum utilization	1B
<u>208-1/1</u>	Alternative methods of national spectrum management	1B
<u>210-4/1</u>	Wireless power transmission (WPT)	1A
<u>216-1/1</u>	Spectrum redeployment as a method of national spectrum management	1B
<u>221-2/1</u>	Compatibility between radiocommunication systems and high data telecommunication systems using wired electrical power supply	1A
<u>222/1</u>	Definition of the spectral properties of transmitter emissions	1A
<u>232/1</u>	Methods and techniques used in space radio monitoring	1C
<u>235/1</u>	Spectrum monitoring evolution	1C
<u>236/1</u>	Impact on radiocommunication systems from wireless & wired data transmission technologies used for the support of power grid management systems	1A
<u>237/1</u>	Technical and operational characteristics of the active services operating in the range 275-1 000 GHz	1A
<u>238/1</u>	Characteristics for use of visible light for broadband communications	1A
<u>239/1</u>	Electromagnetic field measurements to assess human exposure	1C
<u>240/1</u>	Assessment of spectrum efficiency and economic value	1B
<u>241/1</u>	Methodologies for assessing or predicting spectrum availability	1B
<u>242/1</u>	Spectrum management framework for the introduction of Ground- and Wall- Penetrating Radar (GPR/WPR) imaging systems	1B
<u>243/1</u>	Impact of unintentional radio frequency energy generated by electrical or electronic apparatus to the radiocommunication services	1A

SG 1 & WP 1C outcomes from June-July 2022 meetings

WP 1C Chairman's Report	Document 1C/113	
SG 1 Summary Record	Document 1/112	

Texts (Questions, Rec., Rep., Res., HB) assigned to SG 1/WPs:
see latest version of [Doc. 1/1](#) at: <http://www.itu.int/md/R19-SG01-C-0001/en>

SG 1 blocks of meetings

WP 1C on 29 May-2 June 2023 Greece, Thessaloniki

SG 1 on 5-6 June 2023 Switzerland, Geneva



Recommendations & Reports from WP 1C recently approved

- Rec. [ITU-R SM.1392-3 \(02/2021\)](#) – **Essential requirements for a spectrum monitoring system for developing countries**
- Rec. [ITU-R SM.1875-4 \(09/2022\)](#) – **DVB T/T2 coverage measurements and verification of planning criteria**
- Report [ITU-R SM.2179-1 \(07/2022\)](#) – **Short-range radiocommunication devices measurements**
- Report [ITU-R SM.2257-6 \(07/2022\)](#) – **Spectrum management and monitoring during major events**
- Report [ITU-R SM.2452-1 \(07/2022\)](#) – **Electromagnetic field measurements to assess human exposure**
- Report [ITU-R SM.2504-0 \(07/2022\)](#) – **Methods for the estimation of coverage for terrestrial radio services based on population**



WP 1C on-going studies (1/2)

✓ on **Use of small satellites for Spectrum Monitoring**

- **PDR** (1st part) of [Report ITU-R SM.2355-1](#) - **Spectrum monitoring evolution**
(see Annex 1 to the [WP 1C Chairman's Report](#))
-

✓ on **Use of the Hybrid Time Difference of Arrival (TDOA) and Frequency Difference of Arrival (FDOA) method of geolocation**

- **WD PDR** (2nd part) of [Report ITU-R SM.2355-1](#) - **Spectrum monitoring evolution**
(see Annex 2 to the [WP 1C Chairman's Report](#))
-

✓ on **Use of commercial drones for ITU-R spectrum monitoring tasks**

- **WD PDR** of [Report ITU-R SM.2486-0](#)
(see Annexes 5 and 6 to the [WP 1C Chairman's Report](#))



WP 1C on-going studies (2/2)

- ✓ **on national experiences regarding Test methods for field measurements of Total Radiated Power (TRP) and over-the-air inspection of stations with Active Antenna Systems (AAS)**

➤ Working documents with elements on this topic (Annexes 3 and 4 to the [WP 1C Chairman's Report](#))

- ✓ **on Automation and integration of spectrum monitoring systems with automated spectrum managements**

➤ WD PDR of [Rec. ITU-R SM.1537-1](#) (see Annex 7 to the [WP 1C Chairman's Report](#))

- ✓ **on Spectrum monitoring techniques in the radionavigation-satellite service (RNSS) frequency bands**

➤ Revision of [Rep. ITU-R SM.2454-0](#) (see Annex 8 to a previous [WP 1C Chairman's Report](#))

- ✓ **on Spectrum Monitoring Handbook**

(see Annex 8 to the [WP 1C Chairman's Report](#))



Thank you for your attention

ITU-R Study Groups: www.itu.int/ITU-R/go/rsg

Email: brsgd@itu.int

ITU-R Study Group 1:

www.itu.int/ITU-R/go/rsg1, Email: rsg1@itu.int

WP 1C on 29 May-2 June 2023 Greece, Thessaloniki
SG 1 on 5-6 June 2023 Switzerland, Geneva



ITU-R Recommendations on monitoring

General requirements to monitoring stations:

- [SM.575](#) Protection of fixed monitoring stations against interference
- [SM.1050](#) Tasks of a monitoring service
- [SM.1392](#) Essential requirements for a spectrum monitoring system for developing countries
- [SM.1723](#) Mobile spectrum monitoring unit

Methods of spectrum monitoring

- [SM.378](#) Field-strength measurements at monitoring stations
- [SM.1447](#) Monitoring of the radio coverage of land mobile networks to verify compliance with a given license
- [SM.854](#) Direction finding and location determination

Automation of monitoring

- [SM.1537](#) Automation and integration of spectrum monitoring systems with automated spectrum management

International cooperation in spectrum monitoring

- [SM.377](#) Accuracy of frequency measurements at stations for international monitoring
- [SM.1139](#) International monitoring system
- [SM.1393](#) Common formats for the exchange of information between monitoring stations
- [SM.1394](#) Common format for Memorandum of Understanding between the agreeing countries regarding cooperation in spectrum monitoring matters