

# **SG 7: Science services ITU-R Activities**

By Viresh Goel  
Jt Wireless Advisor  
WPC Wing, RLO, ER &  
Vice-Chairman ITU-R SG 7

# Scope: Science services

“Science services” refer to:

- ❑ the standard frequency and time signal, space research (**SRS**),
- ❑ space operation, Earth exploration-satellite (**EESS**), meteorological-satellite (**MetSat**),
- ❑ meteorological aids (**MetAids**) and radio astronomy (**RAS**) services. It studies as well
- ❑ radiocommunication systems for use with manned and unmanned spacecraft,
- ❑ communication links between planetary bodies and the use of data relay satellites.

# SG 7: Science services...(1)

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.

# SG 7: Science services...(2)

Study Group 7 also encompasses systems for the study of outer space:

- ☐ satellites for studying the sun, the magnetosphere and all the elements of our solar system;
- ☐ spacecraft for human and robotic exploration of extraterrestrial bodies;
- ☐ lunar, Lagrangian, deep space research systems and space-very long baseline interferometry, including their associated earth stations;
- ☐ Earth and satellite-based radioastronomy to study the universe and its phenomena.

# Structure: SG 7

- WP 7A:** Time signals and frequency standard emissions: Systems and applications (terrestrial and satellite) for dissemination of standard time and frequency signals;
- WP 7B:** Space radiocommunication applications: Systems for transmission/ reception of telecommand, tracking and telemetry data for space operations, space research, Earth exploration-satellite, and meteorological satellite services including the related use of links in the inter-satellite service;
- WP 7C:** Remote sensing systems: active and passive remote sensing applications in the Earth exploration-satellite service and systems of the MetAids service, as well as ground based passive sensors, space weather sensors and space research sensors, including planetary sensors;
- WP 7D :** Radio astronomy: radio astronomy and radar astronomy sensors, both Earth-based and space-based, including space very long baseline interferometry (VLBI).

# National Study Group 7

**Chairman:** Sh. Viresh Goel, Joint Wireless Adviser

**Rapporteur:** Sh. Vishal Singh Yadav, Sr. DWA and Sh. Prateek Srivastava, AWA

## National Working Party 7A

**Chairman:** Dr. Ashish Agarwal, Chief Scientist, CSIR-NPL

**Coordinator:** Sh. Sunil Kumar Rawat, DWA

## National Working Party 7B

**Chairman:** Sh. M. R. Raghavendra, Associate Director, ISRO

**Coordinator:** Sh. Kshitij Gupta, Engineer

## National Working Party 7C

**Chairman:** Shri K. Koteswara Rao, Dy. Director, NRSC, Hyderabad

**Coordinator:** Sh. Raju Dey, Engineer

## National Working Party 7D

**Chairman:** Dr. Divya Oberoi, Associate Professor, NCRA

**Coordinator:** Smt. Shalini Gupta, Engineer

**Agenda Item wise Responsible and Contributory WPs i.r.o. Science Services  
WPs i.e. 7A, 7B, 7C and 7D**

AI	Responsible WPs	Contributing WPs i.r.o. Chapter 4 Science Services			
		7A	7B	7C	7D
1.1	4A		Y	Y	Y
1.2	4A	Y	Y	Y	
1.3	4A			Y	Y
1.4	4A			Y	
1.5	4A				
1.6	4A		Y	Y	Y
1.7	5D		Y	Y	Y
1.8	5B			Y	Y
1.9	5B	Y			
1.10	5C			Y	Y
1.11	4C		Y	Y	Y
1.12	4C		Y	Y	Y
1.13	4C		Y	Y	Y
1.14	4C		Y	Y	
1.15	7B	Y		Y	Y
1.16	7D				
1.17	7C		Y		Y
1.18	7C (Resl. 1); 7D (Resl. 2)				
1.19	7C		Y		

# WP 7B, 7C and 7D: Agenda Items (AIs)

- AI 1.15:** to consider studies on frequency-related matters, including possible new or modified space research service (space-to-space) **allocations, for future development of communications on the lunar surface and between lunar orbit and the lunar surface**, in accordance with Resolution **680 (WRC-23)**; [\[WP 7B\]](#)
- AI 1.16:** to consider studies on the ***technical and regulatory provisions necessary to protect radio astronomy operating in specific Radio Quiet Zones and, in frequency bands allocated to the radio astronomy*** service on a primary basis globally, from aggregate radio-frequency interference caused by non-geostationary-satellite orbit systems, in accordance with Resolution **681 (WRC-23)**; [\[WP 7D\]](#)
- AI 1.17:** to consider **regulatory provisions for receive-only space weather sensors and their protection** in the Radio Regulations, taking into account the results of ITU Radiocommunication Sector studies, in accordance with Resolution **682 (WRC-23)**; [\[WP 7C\]](#)
- AI 1.18:** to consider, based on the results of ITU Radiocommunication Sector studies, possible regulatory measures regarding the **protection of the Earth exploration-satellite service (passive) and the radio astronomy service in certain frequency bands above 76 GHz** from unwanted emissions of active services, in accordance with Resolution **712 (WRC-23)**; [\[WP 7C & WP 7D\]](#)
- AI 1.19:** to consider possible primary allocations in all Regions to the **Earth exploration-satellite service (passive) in the frequency bands 4 200-4 400 MHz and 8 400-8 500 MHz**, in accordance with Resolution 674 (WRC-23)



# Meetings: Concluded of SG 7 WPs

- ❑ 19<sup>th</sup> – 22<sup>nd</sup> March 2024 at Geneva;
- ❑ 17<sup>th</sup> – 25<sup>th</sup> September 2024 at Almaty
- ❑ 17<sup>th</sup> - 27<sup>th</sup> March 2025 at Geneva

# WP 7A: Proceedings

- ❑ **Recommendation ITU-R TF.460-6:** WP7A in last meeting produced a working document for draft revision of Recommendation ITU-R TF.460-6 regarding standard frequency and time signal emissions;
- ❑ **Handbook on the Selection and Use of Precise Frequency and Time Systems:** It was originally published in 1997 and is currently being updated to reflect advancements;
- ❑ **PDNR ITU-R TF.[UTC\_dissemination]:** This report focuses on the content and structure of time signals disseminated via radiocommunication and wired technologies.

# WP 7B: Proceedings ..(1)

- ❑ **PDNR ITU-R SA.[LUNAR.SRS STATIONS CHAR]** : WP 7B finalized a new report on the technical and operational characteristics of lunar SRS stations to support WRC-27 AI 1.15 studies;

**Contribution by India:** NWP 7B also contributed ***(Doc 7B/138)*** towards development of this document; The contribution:

- Focuses on technical and operational characteristics of lunar space research systems.
- Provides updates derived from Chandrayaan-3 mission data.

# WP 7B: Proceedings ..(2)

- ❑ **WD towards a PDNR ITU-R SA.[LUNAR 1.15 STUDIES]:** This document details Sharing studies of space research systems for lunar operations under WRC-27 AI 1.15;
- ❑ **Draft CPM Text for AI 1.15:** Framework Initiated; A preliminary draft CPM text framework was introduced. The work plan for WRC-27 AI 1.15 aims to finalize sharing and compatibility studies by early 2026. The final draft CPM text is expected to be ready by September 2026;

# WP 7B: Proceedings ..(3)

- ❑ **Revision of Recommendation ITU-R SA.2141:** This update follows WRC-23's decision on AI 1.13, which upgraded the space research service from secondary to primary status with additional conditions; This revision is crucial to support WRC-27 AI 1.2, where the 14.8-13.35 GHz frequency band is under study;
- ❑ **New Recommendation ITU-R SA.[2 GHz SOS CHAR]:** This document supports WRC 27 MSS related AIs 1.11, 1.12 and 1.13 where 2 GHz shared spectrum with SOS, SRS, EESS, METSat.

**Contribution by India:** NWP 7B also contributed (***Doc 7B/139***) towards development of this document; the contribution focused on technical specifications for SOS systems using 2 025-2 110 MHz (Earth-to-space and space-to-space) and 2 200-2 290 MHz (space-to-Earth and space-to-space).

# WP 7B: Proceedings ..(4)

- ❑ **Coordination on Overlapping Frequency Studies:** WP 7B has engaged in technical exchanges and consultations with WPs 5D and 4C regarding overlapping frequency studies for WRC-27 AIs 1.7/1.15, 1.11/1.15, and 1.13/1.15.
- ❑ **PDN Reco ITU-R SA.[2.0 GHz SRS & EESS CHAR]**
- ❑ **WD toward a revision of PDR ITU-R SA.2488-0** - Characteristics to be used for assessing interference to systems operating in the EESS and meteorological-SS, and sharing studies.
- ❑ **WD towards a PDNR ITU-R SA.[EESS NGS 7-8GHZ]** - Evolution of EESS systems in the frequency range 7 190 to 8 400 MHz.
- ❑ **WD toward a PD rev. RecoITU-R SA.514-3** - Interference criteria for command and data transmission systems operating in the EESS and meteorological-SS .
- ❑ **WD in support of possible ITU-R SA.[EESS-UPLINKS-23GHZ]** - Potential future EESS (Earth-to-space) in the 22.55-23.15 GHz band.
- ❑ **WD in support of possible ITU-R SA.[EESS-DOWNLINKS-37.5 TO 52.4 GHZ]** - Potential future EESS (space-to-Earth) in the frequency range [37.5-52.4 GHz].

# WP 7C: Proceedings ..(1)

WP 7C is the responsible group, i.e. WRC-27 agenda items **1.17, 1.18 (resolves 1) and 1.19:**

- ❑ **AI 1.17:** to consider **regulatory provisions for receive-only space weather sensors** and their protection:
  - WD-PDN-Recommendation ITU-R RS. [RXSW\_PROTECT\_CRITERIA];;
  - WD-PDN-Report ITU-R RS.[SW\_STUDIES];.
  - Draft CPM text for WRC-27 agenda item 1.17
- ❑ **AI 1.18:** protection of the **Earth exploration-satellite service (passive) and the radio astronomy service in certain frequency bands above 76 GHz:**
  - Working Party 7C has initiated a working document towards preliminary draft new Report ITU-R RS.[1.18 - EESS];
  - Working Party 7C is liaising with the concerned WPs to address the matter further;

# WP 7C: Proceedings ..(2)

- ❑ **AI 1.19:** to consider possible **primary allocations in all Regions to the Earth exploration-satellite service (passive) in the frequency bands 4 200-4 400 MHz and 8 400-8 500 MHz**, in accordance with Resolution 674 (WRC-23);
  - Characteristics of EESS (passive) in the bands 4.2-4.4 GHz and 8.4-8.5 GHz are derived from those defined in Recommendation RS.1861 for the frequency range 6 425-7 250 MHz;
  - Characteristics for incumbent services have been provided by the contributing Working Parties.
  - WP 7C is liaising with the WP 3J and WP 3M in order to get additional clarification on the application of Recommendation ITU-R P.2146;
  - **WP 7C and WP 5D agreed that** the adjacent band studies between EESS (passive) in the bands 4.2-4.4 GHz and 8.4-8.5 GHz and potential new IMT identifications in the adjacent bands 4.4-4.8 GHz and 7.125-8.4 GHz, subject to WRC-27 agenda item 1.7, would be performed within WP 7C and the results of study would be submitted to WP 5D.



# WP 7C: Proceedings ..(3)

The following sections list the draft new Reports and draft revisions of Recommendations and Reports have been finalised:

- ❑ **Draft revision of Reco ITU-R RS.1166-5** – Performance and interference criteria for active spaceborne sensors;
- ❑ **Draft revision of Reco ITU-R RS.2105-2** – Typical technical and operational characteristics of EESS (active) systems using allocations between 432 MHz and 238 GHz;
- ❑ **Draft revision of Report ITU-R RS. 2310-1** – Worst-case interference levels from mainlobe-to-mainlobe antenna coupling of systems operating in the radiolocation service into active sensor receivers operating in the EESS (active) in the 35.5-36.0 GHz band;
- ❑ **Draft revision of Report ITU-R RS.2489-0** – Technical and operational characteristics of ground-based passive sensors operating in the 51-58 GHz frequency range;

# WP 7D: Proceedings ..(1)

WP 7D is the responsible group, i.e. WRC-27 agenda item: **1.16**

❑ **AI 1.16:1.16 to protect radio astronomy operating in specific Radio Quiet Zones** and, in frequency bands allocated to the radio astronomy service on a primary basis globally:

- Continued discussions on the scope of Agenda Item and procedures for CPM text production
- Sent one liaison statement to WP 4A with clarification questions and reiterating understanding of intentions regarding Resolves 3-6 of Resolution 681 (WRC-23)
- Began work on a new document: PDNRep ITU-R RA. [RAS-NGSO] with broader scope than AI 1.16
- Created an Elements document on Resolves 3/IRQZ combining input documents with extensive background information
- Advanced PDNRec RA.[NGSO-RAS-RQZ] with modifications and editor's note indicating the document is for information;

# WP 7D: Proceedings ..(2)

Following Draft new Recommendations and Reports, have been finalised:

- ❑ Draft new **Report ITU-R RA.[HARMONICS]** - Harmonics-related unwanted emissions in radio astronomy bands;
- ❑ Draft **new Report RA.[RAS-IMT-COMPAT-43-GHz]** - Methodology for coordination of IMT systems and radio astronomy service stations;
- ❑ Draft new **Report RA.[RAS-IMT-COMPAT-43-GHz]** – Methodology for the coordination of IMT systems and stations of the radio astronomy service operating in the frequency band 42.5-43.5 GHz;

**Thank You**