

NATIONAL PREPARATORY COMMITTEE TOWARDS WRC-27 AGENDA ITEM 1.8 BRIEF

Chapter: 2

Service: *Radiolocation issues*

Agenda Item: 1.8

Description of Agenda Item: *To consider possible additional spectrum allocations to the radiolocation service on a primary basis in the frequency range 231.5-275 GHz and possible new identifications for radiolocation service applications in frequency bands within the frequency range 275-700 GHz for millimetric and sub-millimetric wave imaging systems, in accordance with Resolution 663 (Rev.WRC-23).*

Focus: *Millimetric and sub-millimetric wave radiolocation systems and applications, including near-range vehicular radar, close proximity detection, non-destructive inspection and security imaging systems.*

Status of Studies

The ITU-R studies for WRC-27 Agenda Item 1.8 are being conducted primarily by Working Party 5B (WP 5B), with contributing work from WP 3J, WP 3K, WP 3M, WP 4A, WP 4C, WP 5A, WP 5C, WP 7C and WP 7D.

So far, a working document towards a preliminary draft new Report ITU-R M.[RLS_231.5-700GHz] has been developed as supporting material for the agenda item. The document contains technical characteristics, spectrum needs and sharing/compatibility material for possible RLS allocations or identifications in the frequency range 231.5-700 GHz. WP 5B has also progressed draft CPM text and a working document towards a new Recommendation ITU-R M.[RLS_FREQ_ABOVE_252 GHz] on RLS technical and operational characteristics.

The studies remain ongoing. The draft CPM text still requires further work, since results of studies have not yet been submitted.

Objective of the Studies

The objective is to determine whether additional primary allocations to the radiolocation service can be made in 231.5-275 GHz and whether new RLS application identifications can be made in selected bands within 275-700 GHz, while maintaining protection of incumbent services and applications.

The studies aim to:

- i. Describe technical and operational characteristics, spectrum requirements and protection criteria for active and receive-only millimetric/sub-millimetric wave RLS systems;
- ii. Identify globally harmonized spectrum opportunities for RLS applications above 231.5 GHz;
- iii. Assess in-band and adjacent-band sharing with incumbent services in 231.5-275 GHz;
- iv. Assess compatibility with EESS (passive), SRS (passive), RAS, fixed and land mobile applications in 275-700 GHz;
- v. Develop suitable regulatory and technical conditions for possible WRC-27 actions.

Studied Frequency Bands

The agenda item covers two regulatory ranges. The first is 231.5-275 GHz, where possible additional primary RLS allocations are being considered. The second is 275-700 GHz, where possible new identifications for RLS applications are being studied. The draft CPM text identifies 252-296 GHz and 356-439 GHz as the most suitable ranges for ITS-related and security applications, based on the studies available at this stage.

Key incumbent and adjacent services under consideration include fixed service, mobile service, fixed-satellite service, mobile-satellite service, amateur and amateur-satellite services, radionavigation and radionavigation-satellite services, EESS (passive), SRS (passive) and radio astronomy. Particular attention is being given to RR No. 5.340 bands where emissions are prohibited, RR No. 5.564A fixed and land mobile identifications in 275-450 GHz, and RR No. 5.565 passive service applications above 275 GHz.

Methods to Satisfy the Agenda Item

The draft CPM text currently contains one proposed method, with an editor's note that additional methods may be added based on future input contributions.

- i. Method A has two parts, reflecting the split in RR Article 5 below and above 275 GHz. It proposes a primary allocation to the radiolocation service in the band 252-275 GHz in all three ITU-R Regions.
- ii. For the range above 275 GHz, Method A proposes identification of 275-296 GHz and 356-439 GHz in all three ITU-R Regions for use by applications of the radiolocation service.
- iii. Regulatory examples include modifications to Article 5 and new footnotes to limit RLS use to listed applications and clarify that identifications above 275 GHz do not preclude other services or create priority over other applications in the 275-450 GHz range.

Regulatory and Technical Framework

The emerging framework is intended to support globally harmonized spectrum for high-frequency RLS while protecting incumbent and passive services. The work includes:

- i. definition of the relevant RLS applications and their operating characteristics;
- ii. use of technical characteristics and protection criteria in a new ITU-R Recommendation;
- iii. compatibility studies for in-band and adjacent-band scenarios across the studied ranges;
- iv. regulatory footnotes and limitations to ensure that RLS operation remains within agreed applications and technical conditions.

Interference Protection Mechanisms

The studies indicate that atmospheric attenuation and free-space loss alone are not sufficient to prevent harmful interference in much of the studied frequency range. Additional measures may therefore be required, depending on deployment environment and frequency range:

- i. Separation distances and/or avoidance angles between RLS systems and radio astronomy stations;
- ii. Consideration of clutter, building entry/exit losses, shielding and deployment environment;
- iii. Limits on RLS systems and applications through reference to ITU-R Recommendation characteristics;
- iv. protection of EESS (passive) frequency bands, including cases where co-channel operation below 439 GHz may not be feasible for all envisaged applications;
- v. Attention to aggregate interference, antenna pointing, duty cycle, activity factor and RLS protection criteria such as $I/N = -6$ dB where appropriate.

Technical and Regulatory Challenges

- i. Protection of Passive Services: EESS (passive), SRS (passive) and RAS applications are highly sensitive, particularly in bands identified under RR No. 5.565 and RR No. 5.340.
- ii. Feasibility of Co-channel Operation: Studies indicate that co-channel protection of EESS (passive) below 439 GHz is not possible for all envisaged RLS applications.

- iii. Selection of Suitable Bands: Current studies point to 252-296 GHz and 356-439 GHz as suitable ranges, while other ranges may present greater compatibility difficulties.
- iv. Application Scope: Further clarity is required on which RLS systems are within scope, particularly receive-only systems, short-range devices and applications operating without protection.
- v. Regulatory Treatment: WP 5B still needs to determine whether the supporting material should remain CPM support only or become a permanent ITU-R Report, and to finalize the method and regulatory examples.

Conclusion

Agenda Item 1.8 provides an opportunity to establish harmonised spectrum arrangements for emerging millimetric and sub-millimetric wave radiolocation applications, including vehicular safety, close proximity detection, security imaging and non-destructive inspection. However, the studies show that protection of incumbent and passive services remains a central consideration. Further work is required to finalize the results of studies, confirm suitable frequency ranges, complete the draft CPM text and define enforceable regulatory conditions for any WRC-27 allocation or identification.