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COSMIC

CONSORTIUM FOR SPACE MOBILITY AND ISAM CAPABILITIES

FUTURE OF ISAM SPECTRUM ALLOCATIONS

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1. Workshop Report

1.1 Panel 1: ISAM Spectrum Needs and Challenges

The first panel invited representatives from In-Space Servicing, Assembly, and Manufacturing (ISAM) sector companies to discuss the industry's spectrum needs and challenges. The speakers included Nick Simon of Impulse Space, an in-space mobility provider; Alex Coultrup of Starfish Space, a satellite servicing company; Janna Lewis of Astroscale U.S., a provider of on-orbit services, including debris removal, life extension, and inspection; and Dave Morse of Avaliant, an engineering services company. Jay Mills of Hogan Lovells moderated the panel.

1.1.1 What are the spectrum needs for commercial ISAM missions? How do they differ from non-ISAM missions?

The ISAM industry is diverse, and spectrum needs vary across missions. The industry's desire for flexible and variable spectrum options complicates its ability to coalesce around a few spectrum bands.

The temporal communication requirements of ISAM operators are different from conventional satellites. The latter often requires continuous uplink and downlink capabilities. By contrast, ISAM systems may have onboard data storage capacity, or they may be autonomous. Hence, ISAM communication needs may be more opportunistic, corresponding to specific maneuvers or operation phases and allowing easier coordination with other operators.

Clarity around spectrum is necessary for ISAM industry growth, but reaching consensus is challenging. ISAM is integral to the broader space community because of the important role servicing plays in the operational success of other space missions. Collaboration and coordination are critical to ensuring ISAM operators have access to spectrum for complex space maneuvers. A first step may be to focus on spectrum that can support docked servicing, since that is currently the primary ISAM operation.

1.1.2 Currently, no spectrum is explicitly allocated or identified for ISAM operations. How do you target spectrum bands that might be suitable?

Access to commercial off-the-shelf (COTS) transponders and gateway earth stations frequently drives spectrum decisions. To that end, many operators use the 8450-8500 MHz band due to its compatibility with COTS hardware and the large number of gateway earth stations. COTS availability is critical for emerging commercial companies, and some operators first evaluate ground station availability when identifying spectrum for their systems.

Interference risk and proximity to other satellites also drive spectrum choices. ISAM operations require careful frequency selection to avoid interference with nearby satellites and ground communications. Operators must consider interference and coordination in spectrum decisions, especially given competition for spectrum.

The 8450-8500 MHz band,[1] while currently dominant, may not be viable long-term. Deep space coordination issues and congestion—particularly around 8485-8490 MHz—make it unlikely to remain a permanent solution. At the same time, establishing a new frequency band designation for ISAM would likely entail a multi-year development period before network effects kick in and significant migration to the new band occurs. In the interim, continued availability of 8450-8500 MHz is critical.

While the need for additional spectrum is significant, uncertainty and the absence of network effects hinder investment due to lack of regulatory clarity. Ground station providers want to support industry movement but are constrained by the need for collective adoption. For example, the popularity of the Ku- and Ka-bands allowed ground station providers to invest in constructing earth stations capable of using those bands.

Industry faces significant challenges coordinating with the FCC for access to spectrum shared with federal users. A lack of visibility in the application process and filings that exaggerate bandwidth needs complicate coordination and impede sharing. Greater transparency and predictability in spectrum management will improve and streamline coordination.

1.1.3 How can coordination with U.S. authorities be improved?

Transparency is essential for effective spectrum coordination. For example, a clear understanding of the National Telecommunications and Information Administration's (NTIA) spectrum sharing simulations would enhance efficiency, as operators could run the simulations prior to initiating the coordination process. Clarity around NTIA's review processes and a checklist of requirements would increase trust both between regulators and industry and within the industry itself.

Industry can facilitate coordination by proactively developing tools and frameworks. Possible tools include a coordination process tracker and a user interface to improve visibility for commercial users. Industry alignment in how applications are submitted could also streamline the process. Regulators are more likely to be receptive to guidance and proposals when industry is aligned.

NTIA can support coordination by standardizing and clarifying its processes. A joint FCC-NTIA advisory group could be instrumental for establishing pre-coordinated channels for ISAM and defining standard technical parameters for short- and long-duration missions. Template coordination language and a checklist would make NTIA's process more accessible. Sending operators proposed license conditions—such as duty cycles—earlier in the process gives them time to adjust their proposed operations without potentially

[1] 8450-8500 MHz is currently allocated for non-federal operations in the space research service (space-to-Earth). *See* 47 C.F.R. § 2.106. The "space research service" supports operations "for scientific or technological research purposes." *See* 47 C.F.R. § 2.1.

delaying launch. These suggestions reflect a consistent call for NTIA to improve process visibility and predictability.

1.1.4 What about international coordination and the ITU filings themselves?

Procedural bottlenecks and inconsistent understanding of International Telecommunication Union (ITU) processes delay international coordination. For example, some jurisdictions will not accept ground station applications until ITU filings are published, potentially delaying authorization of ground stations until after the satellite launch date. While coordination is done in good faith, the ITU process can be "hit or miss," with many administrations misapplying exclusions and lacking a clear grasp of coordination requirements.

A mismatch between existing regulatory frameworks and ISAM missions complicates international coordination, as the ITU filing process was developed for traditional satellite and telecom services, not ISAM. Further, the process can be administratively burdensome and involve feedback timelines that jeopardize mission schedules. Alignment and consistency in both interference and multi-jurisdictional coordination is critical.

Dated filing templates make it difficult for ISAM operators to communicate mission objectives clearly.

The narrative formats ISAM operators use to describe their novel missions often do not align with existing regulatory forms. Clear and measurable requirements would allow operators to demonstrate compliance more easily. Machine-readable formats might also better support ISAM.

Inefficient and redundant regulatory documentation requirements create additional burdens. For example, applicants for experimental authorizations from the FCC must submit both the non-federal pre-coordination spreadsheet and the NTIA space data record. While the spreadsheet provides a succinct summary, the space data record is time-consuming to prepare. The FCC's Part 5 and Part 25 filings also require duplicative information. Consolidation of the various regulatory requirements would streamline the process, reduce administrative burdens, and improve efficiency. Such streamlining exists in other jurisdictions. For example, in the UK, Ofcom relies solely on the ITU filing.

Charles Cooper, NTIA's Chief of the Office of Spectrum Management attended the Workshop and spoke briefly in response to the panelists. He acknowledged industry's coordination challenges and confirmed that addressing them is a priority for NTIA. He highlighted significant congestion in the S-band, which is heavily used by federal systems, the International Space Station, and ground stations, making interference calculations complex. He stressed that federal use of the band will continue and suggested that the ISAM community explore alternative spectrum options.

1.2 Panel 2: ISAM Spectrum Identification and Access

The second panel invited participants to discuss international and domestic processes for identifying spectrum and how to increase spectrum access for ISAM operations. The panelists included Danny Weng Hoa Tham of the ITU; Steve Duall, Associate Chief of the Space Bureau at the FCC; Scott Kotler from Lockheed Martin; and Isaiah Wonnenberg of the Commercial Space Federation. George John of Hogan Lovells moderated the panel.

1.2.1 What has the ITU done to date regarding ISAM frequency allocation/identification?

The ITU increasingly receives questions about where and how ISAM fits within the Radio Regulations (RR), as the ITU developed the existing RR with traditional satellite and telecommunications operators in mind. ISAM missions have introduced new regulatory and coordination issues, and the ITU is aware of the challenges the ISAM industry faces in trying to address their unique operational needs within the existing RR framework.

The ITU is a contribution-based organization and is open to engagement with ISAM industry and other stakeholders to better understand what RR changes are required. The ISAM community can raise proposals at working parties between quadrennial WRC conferences. However, to date national administrations have been slow to engage on topics such as frequency allocation and form changes to accommodate ISAM services when those issues have been raised.

Although no ISAM-specific items appeared on the WRC-23 agenda, and none are planned for WRC-27, ISAM-related concerns have been raised. For example, the WRC-23 Radiocommunication Bureau Director's Report and a discussion on Radiocommunication Assembly Resolution ITU-R 74 (2023) on space sustainability addressed ISAM.[2] Also relevant to ISAM operators may be WRC-27 Agenda Item 1.11 on space-to-space data-relay links and Agenda Item 1.15 on adding Space Research Service allocations for cislunar surface and orbit communications.[3]

ISAM companies can accomplish a lot outside the WRC cycle by leveraging existing spectrum allocations and identifying gaps. New spectrum identification may not be necessary because ISAM operators can share spectrum more easily than traditional satellites. At the same time, ISAM industry stakeholders should pursue studies to understand the characteristics of ISAM operations and determine whether additional

[2] *See e.g.*, IOS Spectrum Requirement and Related Studies Under Resolution ITU-R 74 (RA-23), CONFERS, https://bit.ly/47GGOAm (last visited Oct. 27, 2025).

[3] *See* ITU-R Preparatory Studies for WRC-27, ITU, https://bit.ly/49p8bAf (last visited Oct. 27, 2025) (listing WRC-27 agenda items, including Items 1.11 ad 1.15).

spectrum is needed. Companies can simultaneously engage with the ITU to ensure their operational needs are considered in future regulatory revisions.

1.2.2 What has the FCC done to date regarding ISAM frequency allocation/identification?

In February 2024, the FCC released a Notice of Proposed Rulemaking (NPRM)[4] proposing to continue licensing ISAM operations under existing spectrum allocations using flexible interpretations of those allocations. No further action has been taken on the NPRM. Extensive engagement with the ISAM community, especially COSMIC, has led the FCC to question various elements of its approach to ISAM and the Part 25 rules in general. Issues considered include: (a) whether Part 25, which is focused on communications satellites, is appropriate for ISAM; and (b) whether it makes sense to continue treating ISAM as a carve-out like small satellites rather than creating modernized rules that reflect new space environments. (Subsequent developments in the Space Modernization for the 21st Century proceeding indicate this NPRM may be superseded.[5])

The path forward for a dedicated ISAM spectrum allocation is unclear. The ITU and FCC would need to explore whether spectrum could be repurposed for ISAM, assess compatibility and spectrum sharing with other operations, and whether any bands can be harmonized internationally.

Shared, non-exclusive spectrum use avoids the FCC's processing round framework.[6] The FCC uses processing rounds to assign exclusive-use licenses to satellite operators in specific bands, but the process is lengthy and resource-intensive. ISAM missions typically need less spectrum than conventional satellites, so sharing spectrum on a protected non-interference basis should be possible.

Reforming federal spectrum coordination processes will reduce uncertainty and workload for both industry and government. The ISAM community should advocate for simplifying coordination procedures, fostering greater agency engagement with industry, and adopting a "default to yes" mindset in spectrum coordination decisions.

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[4] *Space Innovation Facilitating Capabilities for In-space Servicing, Assembly, and Manufacturing*, Notice of Proposed Rulemaking, 39 FCC Rcd 1864 (2024).

[5] A few weeks after the Workshop, the FCC released a draft NPRM proposing to modernize its space and earth station licensing process. Among the proposals is the creation of a new category for novel missions that do not fit the traditional GSO or NGSO categories called "Variable Trajectory Spacecraft Systems" (VTSS). The item does not address spectrum issues. *See Space Modernization for the 21st Century*, SB Docket No. 25-306, Notice of Proposed Rulemaking, FCC-CIRC2510-01 (rel. Oct. 7, 2025). The Commission approved the item at its Open Meeting on October 28, 2025.

[6] *See* 47 C.F.R. § 25.157 (describing the processing round procedure).

1.2.3 In the FCC ISAM proceeding, commenters suggested a variety of spectrum bands for ISAM. Which bands hold the most potential?

Prior to the Workshop, the Hogan Lovells team surveyed the Table of Frequency Allocations to identify spectrum bands that might be available for ISAM use and produced the table in **Error! Reference source not found.** for reference.

The S-band (2025-2100 MHz and 2200-2290 MHz) is a promising, but already congested, band. The same is true for the 17 and 18 GHz bands.

The Ka-band frequencies named in RR 5.521A (18.1-18.6 GHz, 18.8-20.2 GHz and 27.5-30 GHz) could be feasible.

Terrestrial Wi-Fi bands (2.4 GHz, 5 GHz, and 6 GHz) may support inter-satellite service. COTS hardware already exists for these bands, making them more cost-effective for operators.

1.2.4 Final Remarks: Concrete Things COSMIC Can Help Deliver to Support Industry Growth

The ITU and FCC representatives expressed a desire to support ISAM operators but also noted the importance of structure and process. They promised flexibility but reiterated the need for greater specificity from industry.

The ITU needs the ISAM industry to identify frequency preferences and bandwidth. It can accommodate narratives and adjust the application process but the timeline for any changes will take at least nine months to a year.

The FCC always tries to approve proposed operations, but radiofrequency decisions require concrete information. ISAM operators must provide specific information about their missions, so that the FCC can understand what it is being asked to approve.

While dedicated ISAM spectrum might be ideal, there may be more practical, lower-lift opportunities available. As more ISAM satellites are deployed patterns may emerge around duty cycles, data throughput needs, and target bands, to allow the community to establish a framework for ISAM to operate as an application within existing services. The goal is to move toward a “presumptive yes” model, where systems that meet clear, measurable criteria can operate on a non-interference basis without needing individualized review, providing clarity and predictability for companies.

Earth-stations-in-motion (ESIMs) are an example of an incremental approach that has progressively secured the spectrum and resources needed. ESIM proponents began with a report, took advantage of the ITU’s continual working party structure, and iteratively advanced their agenda over several conferences.

Workshop participants recommended that COSMIC continue to explore ISAM spectrum identification and access issues in 2026.

Appendix A. Initial ISAM Frequency Survey[7]

Frequency Band	International Table Allocation[8]	U.S. Non-Federal Table Allocation
Space-to-Earth		
137-138 MHz	SOS; SRS; MSS[9]	SOS; SRS; MSS[10]
272-273 MHz	SOS; MSS[11]	
401-402 MHz	SOS	SOS
1525-1535 MHz	SOS; MSS	MSS
2200-2290 MHz	SOS; SRS	
6700-7075 MHz	FSS	FSS
8450-8500 MHz	SRS	SRS
17.3-18.6 GHz	FSS	FSS
18.8-20.2 GHz	FSS	FSS
25.5-27.0 GHz	SRS	SRS
Earth-to-space		
148-149.9 MHz[12]	MSS	MSS
1427-1429 MHz	SOS	
2025-2110 MHz	SOS; SRS	SOS; SRS[13]
5091-5150 MHz	FSS[14]	

[7] The Ku-band fixed-satellite service frequencies are omitted given their substantial and ubiquitous usage.

[8] SOS is space operations service; SRS is space research service; FSS is fixed-satellite service; MSS is mobile-satellite service; and ISS is inter-satellite service.

[9] MSS is limited to NGSO systems. n.5.209.

[10] MSS is limited to NGSO systems. n.US320.

[11] MSS is permitted on a non-interference basis. n.5.254.

[12] Allocation is limited to NGSO systems. n.5.209, US320.

[13] Earth-to-space and space-to-space transmissions in the space research and Earth exploration-satellite services are permitted on a case-by-case basis. n.US347.

[14] Allocation is limited to NGSO feeder links. n.5444A.

Frequency Band	International Table Allocation[8]	U.S. Non-Federal Table Allocation
5150-5250 MHz[15]	FSS	FSS
15.43-15.63 GHz[16]	FSS	FSS
22.55-23.15 GHz	SRS	SRS
27.5-30.0 GHz	FSS	FSS
Space-to-space		
400.15-401 MHz[17]	SRS	SRS
410-420 MHz	SRS[18]	
1525-1559 MHz	MSS[19]	
1610-1617.775-1626.5 MHz (TDD)	MSS[20]	
1626.5-1660.5 MHz	MSS[21]	
2025-2110 MHz[22]	SOS; SRS	SOS; SRS
2200-2290 MHz	SOS; SRS[23]	
2400-2483.5 MHz or other unlicensed Bluetooth and Wi-Fi bands		
22.55-23.55 GHz	ISS	ISS
24.45-24.75 GHz	ISS	ISS

[15] Allocation is limited to NGSO feeder links. n.5447A.

[16] Allocation is limited to NGSO feeder links. n.511A, US359.

[17] Allocation is limited to crewed vehicles. n.5.263.

[18] Allocation is limited to crewed vehicles. n.5.268.

[19] WRC-27 Agenda Item 1.11.

[20] WRC-27 Agenda Item 1.11.

[21] WRC-27 Agenda Item 1.11.

[22] Space-to-space transmissions between two NGSO satellites should not interfere with other space communications. n.5.392, US347.

[23] Space-to-space transmissions between two NGSO satellites should not interfere with other space communications. n.5.392.

Frequency Band	International Table Allocation[8]	U.S. Non-Federal Table Allocation
25.25-27.5 GHz[24]	ISS	ISS
Optical	N/A	N/A

[24] Limited to the space research and Earth exploration-satellite services. n.5.536.