

Before the
U.S. DEPARTMENT OF COMMERCE
OFFICE OF SPACE COMMERCE
Washington, DC 20230

In the Matter of)
)
Response to National Oceanic and Atmospheric)
Administration Office of Space Commerce) RTID 0648–XV190
Request for Information on the Scope of Civil)
Space Situational Awareness Services)
)

COMMENTS OF IRIDIUM COMMUNICATIONS INC.

I. INTRODUCTION

Iridium Communications Inc. (“Iridium”) hereby responds to the request for information of the Office of Space Commerce (“OSC”) for input on the planned scope of basic safety services to be provided via the Traffic Management System for Space (“TraCSS”) program. OSC should ensure that its proposed basic space situational awareness (“SSA”) safety services provided through TraCSS include at a minimum the same fidelity, accuracy, and frequency of vital SSA data currently provided by the Department of Defense (“DoD”) at no additional cost to commercial owner/operators (“O/Os”). Likewise, OSC should ensure that operators who participate are obligated to use information provided through TraCSS for SSA only, and should clarify whether O/Os supporting government missions will be required to participate in TraCSS or another program. By tailoring its TraCSS services to how commercial O/Os use the SSA data currently provided by DoD, OSC can best fulfill its mandate to provide basic SSA safety services to all space operators, while supporting the development of new opportunities for non-governmental SSA services.

With over 20-years operating low-earth orbit (“LEO”) satellite constellations, Iridium has long been an industry leader in orbital debris mitigation and safe space practices. Iridium has worked closely with the Federal government and other satellite operators to improve tracking of objects in space and prevent collisions and continues to maintain close communication with the primary knowledge leader in the field of space debris, the 18th/19th Space Defense Squadrons. Iridium’s space operations team also partners closely with other government and private entities to monitor and share space traffic data, as well as to help educate and influence other organizations on the importance of SSA. Iridium also has a demonstrated commitment to space sustainability,¹ has worked to develop industry best practices, and has proposed a number of ways in which the government can better preserve the utility of the space operating environment, particularly in LEO.² Iridium has long worked to address SSA issues and has actively

¹ Iridium, Space Sustainability, <https://www.iridium.com/company-info/corporate-social-responsibility/sustainability/> (last visited Aug. 5, 2022).

² Comments of Iridium Communications Inc., Federal Communications Commission, IB Docket No. 18-313 (Apr. 5, 2019),

participated in OSC's prior requests for information.³ Iridium appreciates OSC's continued work to develop and provide basic SSA safety services which are critical to ensuring safe space operations in a rapidly developing space ecosystem. Iridium provides these additional comments to further support OSC's efforts to provide, free of charge, the SSA capabilities necessary to maintain the safety and stability of the orbital environment.⁴

II. DISCUSSION

TraCSS should provide at least the same services, and at the same level, as those currently provided by the DoD without imposing any additional cost to O/Os.⁵ OSC acknowledges the importance of establishing a list of proposed TraCSS services that "derives from existing practices by the ...DoD[] and National Aeronautics and Space Administration (NASA), augmented by other services that commercial entities have previously proposed and responses to prior RFIs."⁶ Likewise, O/Os should be encouraged to provide information to participate in the TraCSS program, but should not be held liable for the information they provide in good faith to ensure that maximum participation and cooperation is achieved. Considering these and other elements discussed below, OSC can successfully implement its TraCSS program.

A. The Scope of Basic SSA Safety Services

Iridium generally supports OSC's proposed scope of the basic SSA safety service, including routine collision assessment ("CA") screening and conjunction data message ("CDM") production. Iridium provides additional guidance on certain services that OSC proposes to include, as well as seeks clarification on certain excluded services that may implicate services currently provided by DoD.

<https://ecfsapi.fcc.gov/file/104050570315757/Iridium%20Orbital%20Debris%20Comments.pdf>; Comments of Iridium Communications Inc., Federal Communications Commission, IB Docket No. 18-313 (Oct. 9, 2020), https://www.fcc.gov/ecfs/file/download/DOC-5d43d3ef8fc00000-A.pdf?file_name=2020.10.09%20Iridium%20Orbital%20Debris%20FNPRM%20Comments.pdf. Iridium is also one of the 60 endorsees of the Space Safety Coalition's Best Practices for the Sustainability of Space Operations. Space Safety Coalition, Endorsees, <https://spacesafety.org/endorsees/> (last visited Feb. 27, 2023).

³ *Request for Information on Commercial Capabilities in Space Situational Awareness Data and Space Traffic Management Services*, 84 Fed. Reg. 14645 (Apr. 11, 2019); *Request for Information on Industry Needs for Space Situational Awareness Data and Value-Added Services, and Related Liability Considerations*, 87 FR 40820 (July 8, 2022).

⁴ See, e.g., Comments of Iridium Communications Inc., RIN 0605-XD01 (Dec. 23, 2020); Comments of Iridium Communications Inc., RIN 0648-XV188 (Aug. 8, 2022) ("2022 RFI Comments").

⁵ DoD provides information via Space-Track.org and TraCSS should cover all services currently defined by the Combined Force Space Component Command's 18th Space Defense Squadron as "advanced". SSA Sharing & Orbital Data Requests, <https://www.space-track.org/documentation#odr> (last visited Aug. 5, 2022).

⁶ *Request for Information on the Scope of Civil Space Situational Awareness Services*, 88 Fed. Reg. 4970, 4971 (Jan. 26, 2023) ("SSA RFI").

Which services should be included in TraCSS, and should they be added now or in the future?

Routine CA Screening and CDM Production (included): OSC should ensure that the information included in routine CA screenings is the same or better than the currently available high accuracy catalog maintained by the DoD, and that the service would be maintained to ensure continued accuracy. The proposed screening service would screen primary objects against a robust satellite catalog, both routinely and on demand to generate CDMs for objects that violate the particular physical volumes used for the screening activity.⁷ OSC should specify the definition of “particular physical volumes” and the repeat rate (i.e., once a day, 3 times a day, continuous at measurement updates) to ensure that OSC maintains the current capabilities provided by the DoD. Indeed, the screening volume must be of sufficient size – at least at the 25 km x 25 km x 2km volume applied today – to ensure O/Os are able to plan maneuvers efficiently and maintain situational awareness. Smaller screening volumes could easily miss high-risk events and result in more collisions. In conjunction with the receipt and sharing of predicted O/O ephemerides which OSC has included in the TraCSS program, providing routine CA screening and CDM productions are key elements of a robust collision assessment and OSC should clarify that its screening service will include regular updates and maintenance.

The CA screening and CDM production service should account for additional factors not included in standard CDM forms. OSC should ensure the service includes atmospheric density variability parameters, including dynamic consider parameters (“DCPs”) and density forecast uncertainty and sensitivity vectors which are important in improving accuracy of the CA. Existing CDMs include this information in a comment field to the main form because such parameters are not part of the CDM standard. However, this information is critical even though the need for its inclusion may not be immediately apparent as OSC seeks to provide a comparable service to DoD. Moreover, space weather sensitivity is listed as an included service, but the specific details of what would be included in that service remain unclear and such information is currently outside the CDM standard and could easily be overlooked. Therefore, OSC should clarify what would be included in the space weather sensitivity service.

O/O Ephemeris Generation and Curation with Covariance (included): OSC should clarify the scope of this potential service as it is currently beyond the expected basic SSA safety service. The OSC states that this service would use O/O measurements to estimate the orbit for the O/O. It is unclear who OSC intends to receive the information (i.e., whether it benefits OSC’s catalog and saves resources by using O/O measurements, or if it would benefit the O/O alone). If the former, it raises concerns about the quality of measurements being used for OSC’s service.⁸ If the latter, it would be beyond the expectations of a basic service and could discourage O/Os from maintaining their own solution. Nevertheless, if OSC uses O/O measurements to confirm agreement between OSC’s internal solution and the O/O’s measurements, while still expecting O/Os to maintain independent orbit estimations of their own assets, then O/Os could benefit from better detection of biases in the differences between the

⁷ *Id.*

⁸ O/O measurement quality is understood to be an underlying reason why the 18th Space Defense Squadron does not use such data in lieu of its internal solution.

solutions. OSC should exercise care in its approach to this service to ensure the commercial market for such services is not inadvertently eliminated through reliance on OSC’s solution.

Fusion of CA Products (Not Included): OSC indicates that this item would combine CA products, such as CDMs or predicted ephemerides, from multiple providers into a single, higher-fidelity product that can then be used to enable CA risk assessment. Although OSC does not plan to include this as part of the basic SSA safety service, the description raises questions of whether OSC will use any O/O data that is not already in the DoD-provided tracking network. To facilitate a better understanding of TraCSS, OSC should clarify whether it will utilize any commercial tracking data to populate its basic SSA safety service.

Design-time Assistance for Improved CA (Not Included): OSC should clarify whether the design-time assistance would also encompass pre-launch virtual screenings currently offered by the 18th Space Defense Squadron. These virtual screenings, while applicable to the safety of an impending launch, are offered without a time restriction and are beneficial to new entrants who do not already have substantial internal databases with conjunction data. At a minimum, OSC should provide virtual screenings shortly before launch to avoid incomplete Launch COLA screenings.

Breakup Detection, Tracking, and Cataloguing (Not Included): OSC should clarify whether it intends for DoD to continue providing this service if OSC will not include it in the TraCSS program. As described, the service covers routine tracking to detect breakups, monitor for break-up uncorrelated tracts, and perform cataloguing for new candidate objects – all of which are important components of SSA and should be provided. If OSC intends for DoD to continue to perform this service, as it has historically, then its inclusion in the OSC basic SSA safety service would not be necessary. Nevertheless, it is vital that some entity maintain the catalog and OSC should clarify which entity will do so.

Are there any additional capabilities not listed that should be included in the basic SSA safety service to provide a baseline level of safety for owners and operators?

OSC’s “basic” services should not be static or defined solely in terms of what is available today. As the number of satellites in LEO increases and as the quality of SSA data improves, services that might be considered “advanced” today will necessarily become “basic” in the future. The OSC should therefore periodically, and at least every two years, update the definition of “basic” services through subsequent consultations with the O/Os using the TraCSS to ensure that it still reflects what is needed for safety of flight.⁹

B. Impacts of Proposed Basic SSA Services on Commercial Operators

Are any basic SSA safety services available from the current U.S. SSA industry at affordable levels to O/Os?

Although there are a variety of commercially available “pay for play” SSA services, OSC should ensure that all basic SSA safety services necessary for safety of flight collision

⁹ 2022 RFI Comments at 2.

assessments are freely available in the TraCSS and not hidden behind a paywall.¹⁰ Imposing costs on the sharing or receipt of safety-of-flight information could have the unintended consequence of making space less safe for all operators by incentivizing some O/Os to choose not to spend for the services. Any accident in space could have widespread impacts on other operators and, in higher LEO orbits, can effectively limit or prevent access to orbits in perpetuity. Consequently, SSA information necessary for basic safety of flight operations and collision assessments should be included for free in the TraCSS, regardless of whether such services could be provided by commercial SSA providers. The decision to procure additional analysis or expansion of such basic SSA safety services through value-added commercial offerings, such as proprietary modeling technologies or innovative methods of processing the basic data in the TraCSS, would then be appropriately left to the individual O/Os.

C. Tenets of Participation and Receipt of Basic SSA Safety Services

What information should owners and operators of spacecraft be required to provide to OSC to participate in TraCSS?

The data provided by members of the SSA community should include ephemerides, maneuver plans, and maneuver capabilities (in terms of delta-V per unit time) and should be shared freely at least among operators at the same altitudes or orbital regimes where the potential for conjunction events exists.¹¹ Such information is not proprietary and is essential to space safety, SSA, and the future development of any STM capabilities.

What actions should owners and operators agree to take to participate in TraCSS as part of the tenets of participation?

O/Os should be required to adopt terms-of-service or an end user agreement whereby participants in TraCSS must seek to provide timely and accurate information to facilitate TraCSS and limit the use of data provided by other TraCSS users to safety of flight purposes.¹² OSC should also consider development of appropriate enforcement mechanisms should any members abuse the data and use it for non-safety of flight purposes. Such limits would ensure O/Os, value-added service providers, and other stakeholders enhance the SSA environment, rather than exploit the SSA data for other, potentially anti-competitive reasons.

What should happen when owners or operators fail to provide the relevant information to OSC or fail to take actions consistent with the tenets of participation?

Operators should all strive in good faith to provide the information required for the TraCSS services and such information should be complete and correct. In the event an operator fails to provide information required by OSC, or takes action inconsistent with the tenets of participation, then that O/O should not be permitted to benefit from the TraCSS service beyond basic information that OSC makes publicly available (including those made available through the Space-Track.org website), as well as any minimum services necessary for safety of flight. In the

¹⁰ *See id.* at 3-4.

¹¹ *Id.* at 3.

¹² *Id.*

event an operator does participate but, despite good faith efforts, provides incomplete information, such operators should not be held liable. Instead, OSC should take steps to verify or cross-reference O/O inputs with other available sources of information to ensure accuracy.¹³ By limiting liability and validating the information provided, OSC can encourage maximum participation in TraCSS which is critical to ensuring a safe space environment.

D. General Feedback

Considering the transition of SSA services from DoD to DoC, O/Os would also benefit from additional clarity on treatment of SSA for government contracts. In particular, will O/Os be required to use OSC's TraCSS solution to fulfill government contract obligations, or will DoD continue to provide screening services to O/Os supporting DoD-specific missions. Clarifying the obligations that will be placed on commercial operators, and where responsibilities will be allocated, will promote efficient allocation of resources and enhance efforts to ensure a safe space environment.

III. CONCLUSION

The OSC's continued efforts to improve space safety and engage with industry, including O/Os, on the critical issues regarding SSA are vital to future operations in space and maintaining a safe orbital environment. We look forward to continuing this discussion with the OSC on the development of the TraCSS going forward.

Respectfully submitted,

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February 27, 2023

¹³ *Id.* at 4.