

# A Technical Comparison of the Public SSA Services in the United States and the European Union

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# Goal of This Study

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- Space Situational Awareness (SSA) products and services are critical to support safe operations in space and space sustainability amid rapidly growing global space activity
- United States and the European Union are both committed to providing SSA services to spacecraft operators around the world free of charge.
- Spacecraft operators need clarity on what SSA services will be provided by governments to support operational safety decisions. Similarly, commercial SSA providers need clarity on government SSA plans in order to best support government efforts and develop their own unique service offerings.
- This study describes and compares the services provided by both systems
  - Study was completed in August 2024 - both systems, and the products and services they provide, will continue to evolve over time

# TraCSS & EU SST

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## European Union Space Surveillance & Tracking Program (EU SST)

- Established in 2015
- In 2024 composed of 15 Member States<sup>1</sup> of the European Union and EUSPA (EU Agency for the Space Programme)
- Builds and runs an operational SSA system 24/7 to provide public services in collision avoidance, reentry and fragmentation analysis to ensure a minimum level of space safety and sustainability
- Relies on EU industry and start-ups and supports the consolidation of a commercial ecosystem around SSA
- Coordinates development of SST capabilities
- Contributes to the global burden sharing of the SSA domain through a regional SSA approach

<sup>1</sup> Austria, The Czech Republic, Denmark, Finland, France, Germany, Greece, Italy, Latvia, The Netherlands, Poland, Portugal, Romania, Spain and Sweden

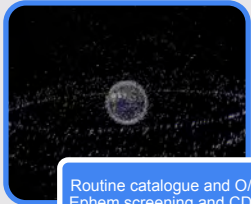
## Traffic Coordination System for Space (TraCSS)

- Initial capability begins in September 2024; additional users, capability added in phases
- Run by Office of Space Commerce, U.S. Department of Commerce,
- Development and transition coordinated with U.S. Department of Defense
- Utilizes commercial SSA information and capabilities
- Responsible for the provision of SSA safety services in the United States free of charge to the end user

## EUSST & TraCSS Services Comparison Summary Table (as of August 2024)

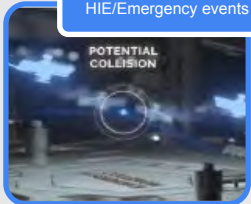
Service	EU SST	TraCSS
<b>1. SSA Information As a Service</b>		
1.1 Contact information	No	Yes
1.2 Satellite attributes	No	Yes
1.3 O/O ephemerides with planned maneuvers	No	Yes
1.4 Catalog of space objects	Future Phase	Yes
<b>2. In-Orbit Collision Avoidance Service</b>		
2.1 Routine catalog and O/O ephemerides screening and CDM production	Yes	Yes
2.2 Risk Assessment <sup>1</sup> and Detection and Notification of High Interest Events/Emergency Events	Yes	Yes
2.3 Additional tracking on the secondary and/or primary objects	Yes	Yes
2.4 Basic CAM Options for selection by O/O <sup>2</sup>	Yes	Yes
2.5 Candidate CAM Screening	Yes	Yes
2.6 For selected HIE/Emergency Events, dialogue with O/O <sup>2</sup>	Yes	Yes
<b>3. Candidate Maneuver Screening</b>	No	Yes
<b>4. Spacecraft Anomaly Reporting</b>	No	Yes
<b>5. Reentry Monitoring Service</b>	Yes	Future Phase
<b>6. Fragmentation Notification and Analysis Service</b>	Yes	Yes (Notification only)
<b>7. Potential Future Services Under Consideration</b>		
7.1 Launch Collision Avoidance service	TBD	Future Phase
7.2 Improved O/O Ephemerides	TBD	TBD
7.3 Space Weather Information and Atmospheric Drag Model	No	TBD
7.4 Traffic Coordination Platform as a Service	TBD	TBD

# In Orbit Collision Avoidance Service



Routine catalogue and O/O Ephem screening and CDM production

Definition	In order to identify potential conjunction for a S/C, it is necessary to examine the predicted future path of the primary spacecraft in relation to the predicted future path of all other objects in their catalog <b>to determine whether any objects come within a designated physical volume</b> , i.e., screen primary objects against a robust satellite catalog. The screening results in Conjunction Data Messages (CDMs) for objects within the screening volume.
Product	CDMs (including Pc) for their spacecraft (US and EU)



Risk assessment and detection and notification of HIE/Emergency events

Definition	After the CDMs are generated for a given conjunction, additional risk assessment is conducted, and it is <b>determined whether they meet criteria for further action</b> . These criteria typically include time to closest approach, probability of collision, and geometry (miss distance and radial distance). In addition to providing individual CDMs, additional information and visualizations may be generated to aid in risk assessment.
Product	<ul style="list-style-type: none"><li>• HIE Flag on CDMs (EU)</li><li>• Notifications to spacecraft owner/ operators involved (EU and US)</li><li>• Notifications posted to TraCSS website (U.S.)</li><li>• Risk Evolution Plot (EU and US)</li><li>• Space Weather Sensitivity Plot (US)</li><li>• Conjunction consequence information (U.S.)</li></ul>

# Key Findings and Future Work

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- Significant alignment between SSA products and services provided by EU SST and TraCSS, particularly with regard to core in-orbit collision avoidance services; some similarities in re-entry services and fragmentation notification
- Differences include U.S. provision of SSA data and information as a service, U.S. screening of candidate maneuvers for routine maneuvers, and U.S. spacecraft anomaly reporting service; EU has more developed re-entry and fragmentation services and is considering releasing a subset of the EU catalog at a future stage.
- Both organizations see an important role for the commercial SSA ecosystem that is developing at a fast pace. To foster the growth of this ecosystem, both systems intend to continue to leverage commercial capabilities.
- Additional/ future areas of research:
  - Discussion of potential future services under consideration
  - Potential for data fusion and information sharing between systems to improve spaceflight safety
  - Comparison of architectures, processes, and algorithms used in each system
  - Comparison of implementation of High Interest Events and Emergency Events

# Thank you!

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At this time we welcome any questions from the audience.



**TraCSS**

<https://www.space.commerce.gov/tracss>



**EU SST**

<https://www.eusst.eu/>

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