

EU Space Surveillance and Tracking: State of play and main developments



Military Space Situational Awareness Conference 2021

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Evolution of EU SST into an EU Space Programme component



Dr Pascal Faucher, Chairman

EU SST Consortium (CNES)

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What is EU SST?



Our goals:

- Ensure resilience of European space infrastructures
- Higher level of strategic autonomy
- Global SSA burden-sharing

We:

- are **operational**: sensor network, database, services, users
- perform **research and innovation** activities to improve the level of performance: upgrades of sensors, architecture studies, etc.
- are **security** relevant: security and data sharing
- mature and expand: **upcoming EU Space Programme**



Governance

EU SST Consortium:

7 EU Member States

France, Germany, Italy, Spain, Poland, Portugal, Romania



Cooperation with **EU SatCen** as Front Desk



Overseen by **European Commission**





Governance - Security



- **Dual dimension** of SSA
- **Collaboration** between civilian, military and security actors
- Contributing sensors remain under control of Member States
- Precise information on the nature, specifications and location of certain space objects may affect the security of the EU, its Member States, or Third Countries



Service Provision Model





Sensors Network

Service provision • 3 Operational Services

* * **

| U space Surveillance and Tacking Service Portfolio | Collision Avoidance (CA) Risk assessment of collision and generation of collision avoidance alerts | Fragmentation Analysis (FG) Detection and characterisation of in-orbit fragmentations | Re-entry Analysis (RE) Risk assessment of space objects re-entry into the Earth's atmosphere Long-term (within 30 days) re-entry predictions Short-term (a few days) overflight predictions with ground tracks over customizable areas of interest | | |
|---|---|---|---|--|--|
| Key features | User-tailored service (SCD) Hot redundancy scheme involving ES (S3TOC) and FR (COO) with harmonised service level and single service provider per registered user Enhanced Analysis & Risk Mitigation support (e.g. covariance estimations, HBR estimations, PoC sensitivity analysis, CAM support) | Short-term notification to confirm quickly an FG event Medium-term FG analysis based on the orbital parameters of the catalogued fragments e.g. Gabbard Diagram Long-term FG analysis (with simulations with breakup model) | | | |
| Products | Autonomous and enhanced CDMsCA ReportsMonthly reports | Short-term notification Medium-term report Long-term report Technical notes | 30 days listRE reportsTechnical notes | | |
| Portal | Download and upload information (API and web interface) Access documentation and configure notifications alerts. View evolution of key parameters e.g. PoC | Download information (API and web interface) Access technical notes and dedicated content (e.g. fragments video) | Download information (API and web interface) Configure notifications View evolution of re-entry window | | |

Service provision - Galileo 1st Collision Avoidance Manoeuvre

European GNSS Agency @EU_GNSS

Last wknd, following the alert from the @EU_SST, a collision avoidance manoeuvre for the #Galileo satellite GSAT0219 was performed successfully. The satellite was taken out of service on 5/03 & is expected to be reintroduced into service during 15-21/03.

gsa.europa.eu/newsroom/news/...

Perspective • EU Space Programme

Following EU Space Strategy (2016), legislative proposal for an **EU space programme 2021-2027** (2018), agreed by Council and European Parliament (2020), foreseen to enter into force in 2021

All EU activities in one programme:

Galileo/EGNOS SSA (SST plus SWE, NEO)

Copernicus

GovSatCom

EU SST as...

- Working example of multilateral cooperation at the intersection of space safety and space security new SST partnership under construction with 18 EU MS
- Important **R&D** activity to improve **performance** and **strategic autonomy** at European level
- New possible **services** to ensure the safety and sustainability of space operations
- Fundamental operational capability in Europe "...precursor of a European Space Traffic Management system" -Commissioner Thierry Breton*

*Closing Speech at the 12th Annual Space Conference on 22 January 2019

Development of a European catalogue and considerations for SST data sharing

Marc Becker, Chairman

EU SST Security Committee (DLR)

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Service Provision Model

EU SST Database and Catalogue

Evolution of Data Sharing

| essage Type * | |
|---|---|
| TDM Tracking Data Message as defined in CCSDS Blue Book (CCSDS 503.0-B-1) | ` |
| | |
| | |
| acklet ID | |
| | |
| | |
| assification | |
| unclassified | |
| estrict distribution to ** | |

Alpha-2 country codes, separated by space.

File Format*

Data-File ³

- EU SST Database as central platform for data sharing, managing sensor tasking requests, and hosting additional information (e.g. status of sensors)
- EU SST partners have agreed on joint definitions of terms and concepts that guide the operational exchange of SST data and information
- Continuous evolution of data sharing: More than 17M autonomous measurements of space objects shared through the EU SST Database in 2020

| rile rormat^ | | | | | | | | | |
|--|---------------|--------------------------|--------------------------|--------------------------|----------------|-------------|-------------|---------|---------------------|
| TXT Plain text format (KVN, CRD, TLE,) | Tracks | | | | | | | | |
| Data-File * | Shown entries | | | | | | | | Search for |
| | ID | ↓ Measurement Start Time | ↓↑ Measurement End Time | Creation Date | 11 Tracklet ID | Lî Sensor | .lî Object | lî Type | 11 Options |
| Suitable for calibration | 1681325 | 2021-01-19T11:45:22.374Z | 2021-01-19T11:52:32.741Z | 2021-01-19T14:31:09.000Z | | DE_TIRA | 1999-025ETC | TDM | ● View □ Download |
| Upload | 1618119 | 2021-01-15T20:40:07.000Z | 2021-01-16T20:40:04.000Z | 2021-01-17T05:00:00.000Z | DE_o_1085691 | DE_SLR-GRAZ | 2016-011A | CRD | • View Download |
| | 1618118 | 2021-01-15T20:14:45.000Z | 2021-01-16T20:13:19.000Z | 2021-01-17T05:00:00.000Z | DE_o_1085690 | DE_SLR-GRAZ | 2014-050A | CRD | ● View □ Download |
| | 1618117 | 2021-01-16T20:09:40.000Z | 2021-01-17T20:08:56.000Z | 2021-01-17T05:00:00.000Z | DE_o_1085689 | DE_SLR-GRAZ | 2011-060B | CRD | ● View □ Download |
| | 1618116 | 2021-01-15T19:53:47.000Z | 2021-01-16T19:53:28.000Z | 2021-01-17T05:00:00.000Z | DE_o_1085688 | DE_SLR-GRAZ | 1992-070B | CRD | ● View □ Download |
| | 1618115 | 2021-01-15T20:20:10.000Z | 2021-01-16T20:20:00.000Z | 2021-01-17T05:00:00.000Z | DE_0_1085687 | DE_SLR-GRAZ | 1992-052A | CRD | • View Download |
| | 1618114 | 2021-01-15T21:31:13.000Z | 2021-01-16T21:30:50.000Z | 2021-01-17T05:00:00.000Z | DE_o_1085686 | DE_SLR-GRAZ | 1976-039A | CRD | ● View □ Download |
| | | | | | | | | | |

Security and Data Policy

- The EU SST **Security Committee** oversees all matters relating to data security and operational risk, and includes, inter alia, representatives from the ministries of defence and national security agencies
- In the absence of a comprehensive set of SSA data sharing agreements in Europe, EU SST deals with the security interests of the respective partners and their allies through an internal Data Policy
- Security principles put in place by the Consortium include Database access control, ownership control of any generated data, and provisions on the use of shared SST data
- The EU SST Security Committee develops classification guidance and security requirements that cover for instance how EU SST protects sensitive information such as data on allied space objects

Security and Data Policy

Need to consider the existing architecture of bilateral SSA sharing agreements in Europe:

* IT and ES are working on the MoD-DoD channel to update the current SSA data sharing agreement at classified level

Security Framework of the new Space Regulation

| | European Union | Brussels, 18 Dec (OR. en) | ember 2020 |
|--|---|--|---|
| | | | |
| Interinst 2018/ | itutional File: 0236(COD) | 14200/20 | |
| | | ESPACE 84 RECH 540 COMPET 657 IND 285 EU-GNSS 25 TRANS 622 AVIATION 257 MAR 169 TELECOM 278 | MI 593 ENER 513 EMPL 577 CSC 372 CSCGNSS 7 CSDP/PSDC 654 CFSP/PESC 1156 CADREFIN 475 CODEC 1396 |
| OUTCOME OF | PROCEEDINGS | | |
| From: | General Secretariat of the Council | | |
| To: | Delegations | | |
| No. Cion doc.: | 9898/18 + ADD 1 | | |
| | | | |
| | OF THE COUNCIL establishing th European Union Agency for the Sp Regulations (EU) No 912/2010, (E and Decision 541/2014/EU | e space programme bace Programme and U) No 1285/2013, (E | of the Union and the d repealing SU) No 377/2014 |
| | OF THE COUNCIL establishing th European Union Agency for the Sp Regulations (EU) No 91/22010, (E and Decision 541/2014/EU - Outcome of proceedings: final co | e space programme pace Programme and U) No 1285/2013, (E mpromise text | of the Union and the d repealing U) No 377/2014 |
| Delegations will Regulation adopt the third trilogue | OF THE COUNCIL establishing the European Union Agency for the St Reputations (EU) No 9122010, (E and Decision SA12014/EU - Outcome of proceedings: final co- find in the <u>Amers</u> , the compromise text or e8 by the Permanent Representatives Co on 15 December 2020. | e space programme anace Programme an U) No 1285/2013, (E mpromise text on the above mentions on the above mentions on the above mentions on the above mentions on the above mentions | of the Union and the repealing U) No 377/2014 di Proposal for a aber 2020, following |

EU Space Regulation, Final Compromise Text

- EU SST as a **fully-fledged**, **security-relevant programme** as part of the SSA component of the upcoming EU Space Programme
- General governance and security principles will remain in place: Role of the Member States in security accreditation; sensors remain under sovereign national control
- At the same time, EU SST will be integrated in the **institutional security framework** of the EU Space Programme, joining the current flagships Galileo and Copernicus
 - Interface with EU programme committee in security configuration (27 MS), independent Security Accreditation Board (SAB) hosted by EUSPA, EEAS/HR and COM
 - Elaboration of general security requirements in view of potential threats to the confidentiality, integrity and availability of SST services
 - Exploring synergies between the security aspects of the different Programme components

EU SatCen as EU SST Front Desk and part of the SST Cooperation

Amb. Sorin Ducaru Ph.D., Director

European Union Satellite Centre (EU SatCen)

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SST Cooperation

EU SST Consortium:

7 EU Member States

France, Germany, Italy, Spain, Poland, Portugal, Romania

Cooperation with **EU SatCen** as Front Desk

Overseen by **European Commission**

EU SatCen, the EU SST Front Desk

SST

Portal

the SST

Delivery of

information

and services

SST Consortium

Responsible for generating the SST services and their information

SST Front Desk

Interface for the delivery of the SST services in accordance with the Data and Information Policy

SST Users SST services to be provided to:

| <u> </u> | |
|----------|--|

User

User

needs

Coordination

approval,

collection

support and

Engagement & Promotion

Communication. Dissemination and interaction activities

- All Member States:
- the Council;
- the Commission:
- the EEAS:
- European public and private spacecraft owners and operators, and
- European public authorities concerned with civil protection.

* Future Space Regulation (next MFF) proposes services to be open also to non-EU users

Service

Key

Performance

Performance

Indicators

evaluation

SST Portal & Helpdesk

SST Portal

User platform for the delivery of the SST services

User coordination Highly available user support

Key Performance Indicators Overview: 2020 metrics

| sens | ors data sharing | database | tasking | services | front desk / users | |
|-------------------------|-------------------------------|----------------------------------|---------------------------------|--|---|--|
| Data Sharing | CA service | | | | FG service | |
| >17M | >5.8l >1.8M 18 | M CDMs 8 th SPCS C | processed DMs proce | l* essed | 2 | <pre>3 events 1 reports</pre> |
| measurements | 377 H | ligh Inte | rest Event | ts | 8 auton | omous reports |
| >9 500 space objects | >140 000 0 ~23 0 >31 av | DMs pro 00 autono oidance | wided to mous CDN manoeuv | users** /s res atellites registered | CE Service 6 238 repo 34 autor | 5 events orts 197 30DRL nomous reports |

*Includes total number of CDMs processed by the OCs(based on EU SST data, 18th SPCS, user data). **Includes **enhanced** CDMs (based on 18th SPCS, user data) and **autonomous** CDMs (based on EU SST and user data). The CDMs are provided to users according to the thresholds (e.g. PoC, miss distance) set in the SCD.

Users

Satellites

User feedback

"The CA service was really appreciated during LEOP operations"

AIRBUS

SES

"The reports from the Collision Avoidance service are very comprehensive and meet our needs"

"Excellent support provided for troubleshooting and to access the functionalities of the Front Desk"

*Feedback obtained at the latest User Feedback Campaign (December 2020)

EU SST Taskforce: Potential Collision of two large inactive space objects SL-8 R/B – DMSP 5D-1/F-3

National Operational Centres (NOCs) detect the event. First estimates point to a probability of 1.5%¹ and miss distance of 40m.

Sensor network tasked and predictions refined by ES & FR OCs. Fragmentation event simulated by IT OC. Last estimates: 21m miss distance. 20% scaled probability. SatCen coordinates with NOCs and communicates on the event.

Thank you

User Registration https://portal.eusst.eu

General Information

