

EUSPA/OP/02/25 - EGNSS Transversal Service Contractor Descriptive Document

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1 Introduction

1.1 Scope

This Descriptive document provides a high level description of the scope of the procurement “EGNSS Transversal Service Contractor” (hereafter referred to as “ETSC”).

The present version of this document is submitted as an applicable document SoW-03 to the Annex II.IV of the Contract (Statement of Work) in the procurement procedure EUSPA/OP/02/25 “EGNSS Transversal Service Contractor”.

1.2 Definitions

The meaning of the terms used in this document to indicate roles is as follows.

"Contract"	means the Contract for EUSPA/OP/02/25 “EGNSS Transversal Service Contractor”
"Contracting Authority"	means the European Union Agency for the Space Programme (EUSPA) - with the terms "EUSPA" and "Contracting Authority" used interchangeably throughout the document
"Tenderer"	means entity who has submitted a proposal
"Previous Contract"	means the Contract GSA/CD/14/14, “Galileo Service Operator”
"Contractor"	means the Tenderer who has been awarded the Contract EUSPA/OP/02/25 “EGNSS Transversal Service Contractor”
"Successor Contractor"	means the entity who has been awarded the next EGNSS Transversal Service Contractor contract to take over from the EGNSS Transversal Service Contractor.
"Incumbent"	indicates the company(ies) currently contracted to provide services subject of this procurement (including but not limited to the Previous Contract GSA/CD/14/14, “Galileo Service Operator”)

2 Acronyms and Abbreviations

Table 1 - Abbreviations

Abbreviation	Definition
BGD	Broadcast Group Delay

Abbreviation	Definition
CIP	Contribution to Ionosphere Prediction
CLA	Classified
EC	European Commission
EDD	E-GNSS Data Distribution
E-GSC	European GNSS Service Centre
ESD	E-GNSS Service Demonstrator
ETSC	E-GNSS Transversal Service Contractor
EU	European Union
EUSPA	European Union Agency for the Space Programme
G2G	Galileo Second Generation
GNSS	Global Navigation Satellite System
GRC	Galileo Reference Centre
GSMC	Galileo Security Monitoring Centre
GSS	Galileo Sensor Station
HAS	High Accuracy Service
ICD	Interface Control Document
ILS	Integrated Logistics Support
IOC	Initial Operational Capability
KPI	Key Performance Indicator
OPE	Operations
OSNMA	Open Service Navigation Message Authentication
PRS	Public Regulated Service

Abbreviation	Definition
RECS	Re-Encrypted Code Sequence
SAS	Signal Authentication Service
SECMON	Security Monitoring
SoW	Statement of Work
TESLA	Timed-Efficient Stream Loss-Tolerant Authentication
UNCLA	Unclassified
VAL	Validation

3 Baseline Documents

3.1 Applicable Documents

The applicable documents are all contained in the EGNSS Transversal Service Contractor - Contractual Index Status List ("CISL") (Annex II.VII of the Contract), which identifies the version of the document to be considered. The ID used in the Descriptive Document to identify these documents is the same used in the CISL.

3.2 Reference Documents

The reference documents are all contained in the ETSC List of Reference Documentation ("Reference Documentation List") (Annex II.VIII of the Contract), which identifies the version of the document to be considered. The ID used in the Descriptive Document to identify these documents is the same used therein.

4 The European GNSS Service Centre (E-GSC)

4.1 E-GSC Mission

The European GNSS Service Centre, E-GSC, is the element of the European GNSS infrastructure acting as the single interface between the system established under the Galileo programme and progressively other elements of the EU space programme (such as specific EGNOS services), on the one side, and the Users of the different E-GNSS Services under the responsibility of EUSPA as service provider (with the exception of the Public Regulated Service – PRS) on the other side.

The E-GSC shall act as an active means to engage Users in both upstream (e.g., early services' testing) and downstream activities (e.g., supporting the collection of relevant User communities' feedback, supporting different services adoption related activities and or related for a - e.g., working groups).

This centre is conceived as a centre of expertise, knowledge sharing, customised performance assessment, service status information, E-GNSS dissemination platform and support to the provision of value-added E-GNSS Galileo services.

To implement this mission, the E-GSC site, infrastructure and related operators will need to have interfaces with other key elements of the E-GNSS core infrastructure (e.g., Galileo and EGNOS), as well as with external entities. These interfaces will evolve during this Contract execution and new ones will be added.

4.2 E-GSC Site

The E-GSC is composed of a primary site and a backup site:

- The E-GSC primary site will be located within Enaire campus in Torrejón de Ardoz, Madrid (Spain).
- The E-GSC back up site will be located within CNES premises in Toulouse (France).

The different elements of infrastructure, related interfaces and operational entities involved are described in the following sections.

4.3 E-GSC Evolutions Roadmap

4.3.1 Major E-GSC infrastructure releases

The E-GSC v2.0 and the E-GSC v2.1 are envisaged to be the first E-GSC infrastructure releases to be procured under the E-GSC Framework Contract. Furthermore, it is expected that two other major¹ E-GSC infrastructure releases will be procured under the E-GSC Framework Contract (E-GSC v2.2 and E-GSC v2.3).

¹ A major GSC release implements a change to the E-GSC System Technical Requirement Baseline or a change to the existing design which requires an update of the E-GSC system design. Major releases shall be subject to Security Accreditation by the SAB.

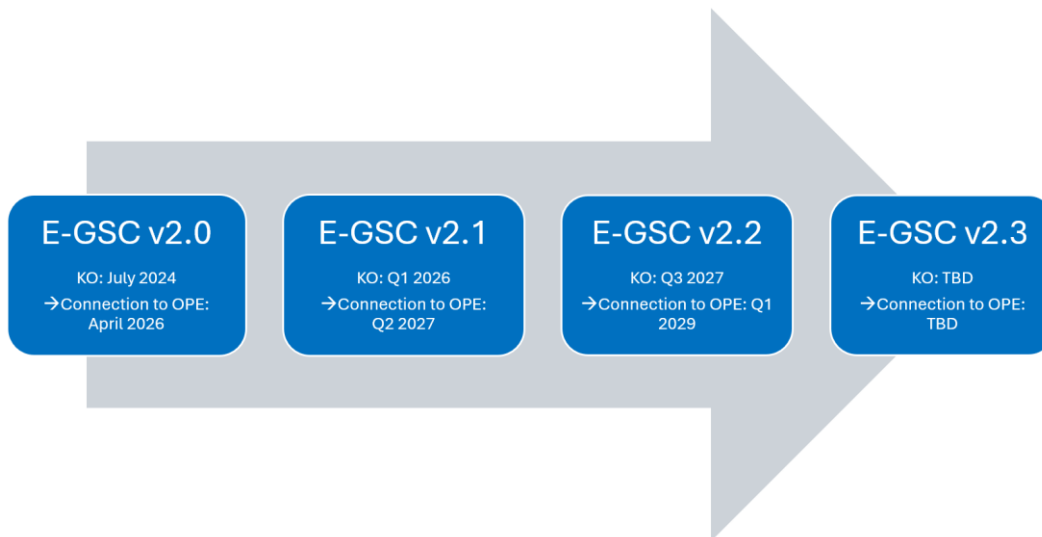


Figure 1 - Indicative planning of major E-GSC infrastructure releases

4.3.1.1 E-GSC v2.0

First E-GSC version procured in the new GSC INFRA Framework Contract EUSPA-CD-24-21. It will be focused on the following new services and functionality:

- E-GNSS Transversal Infrastructure (as explained below), including integration of Galileo, EDAS and EGNOS Maritime service delivery, and inclusion of web-portal, helpdesk, E-GNSS data distribution, Centre of Expertise tools and CIP within its perimeter;
- Support to SAS initial service;
- Support to Contribution to Ionospheric Prediction service, including the interface with GRC;
- Support to Timing Service Test Phase, enabling the distribution of the Timing Service Message (TSM);
- Authentication of RLMS, necessary for EWSS, including readiness to interface with RLSP;
- Integration with SECMON;
- Support of OSNMA enhanced capabilities;
- Support to HAS phase 2;
- Inter-site synchronisation for cold backup.

4.3.1.2 E-GSC v2.1

The E-GSC v2.1 is envisaged to cover the implementation of new functionalities and improvements. It will support the following potential features:

- Support to ARAIM initial service: provision of hardcoded ISM via GSC-GMS interface;
- Support to Timing Initial Service enabling the distribution of the Timing Service Message;

- Support to dual site hot backup, needed for HAS phase 2 full service. Also additional HAS stations;
- Support to OSNMA enhanced service: higher availability and GPS authentication;
- Support to SAS full service: NAVSEC classification;
- Support to EWS-INAV initial service;
- Evolution of CIP;
- User interface evolutions (web portal and data distribution).

4.3.1.3 E-GSC v2.2

The E-GSC v2.2 infrastructure release is envisaged to cover the implementation of the necessary evolutions to the E-GSC v2.1 infrastructure supporting the following potential features:

- Support to HAS enhanced declaration: G2 IOC, enhanced accuracy;
- CIP evolutions;
- User interface evolutions (web portal, data distribution);
- Other service evolutions yet to be defined.

4.3.1.4 E-GSC v2.3

This version of the E-GSC will cover evolutions that are not yet known at the time of writing this document.

4.4 E-GSC Infrastructure

The E-GSC infrastructure is composed of two main sections:

1. E-GSC Core Infrastructure section – under GSOp II responsibility.
2. E-GNSS Transversal Infrastructure section – under ETSC responsibility.

The block diagram of the main functions included in each of the two E-GSC sections and the interfaces with external entities and E-GNSS Users is reported in the following figure.

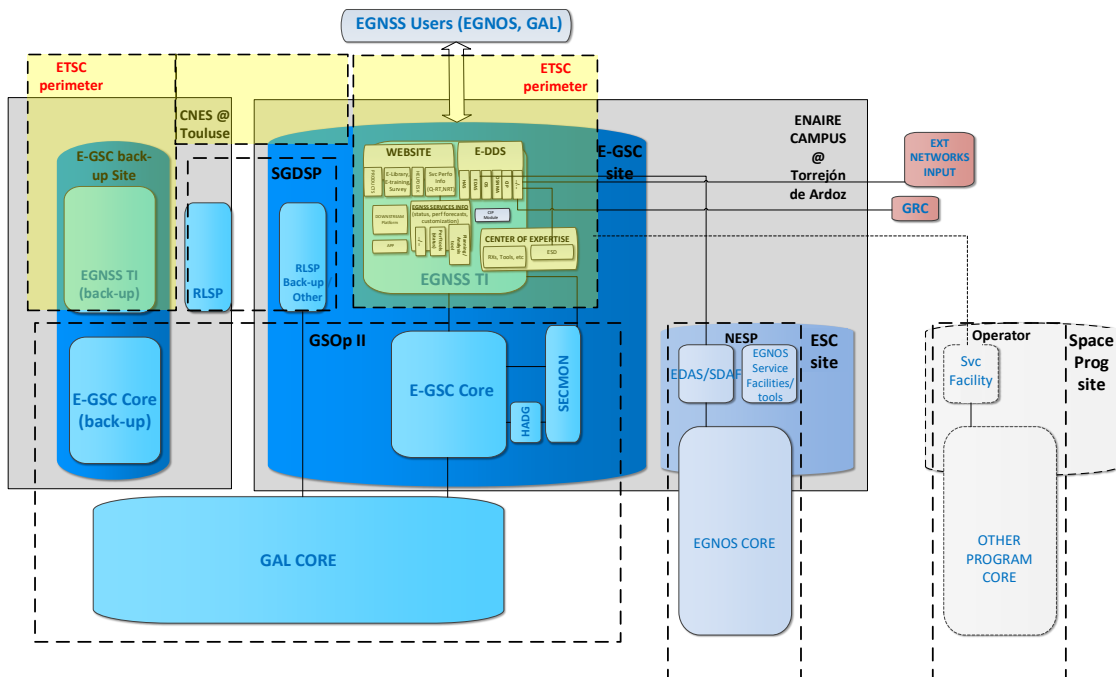


Figure 2 - E-GSC Infrastructure overview

4.4.1 E-GSC Core Infrastructure Description

The E-GSC Core is the infrastructure supporting the provision of Galileo services, in particular generating the data necessary for OSNMA, HAS and SAS services.

Using data received from external entities, the E-GSC Core contains several functional components to provide its services:

- **Open Service Navigation Message Authentication (OSNMA):** Provides cryptographic authentication of satellite navigation data (Galileo and GPS) using TESLA and Digital Signature protocols, which allows the external users to authenticate the navigation data received through E1B and E5 Galileo signals.
- **Signal Authentication Service (SAS):** using the NAVSEC received from GMS, the BGD data from HADG and the Derived TESLA keys from OSNMA, this component provides the aggregated RECS files which will allow the external users to perform the a-posteriori correlation of the Encrypted E6-C signal.
- **Issue Certification Authority (ICA):** Manages and issues digital certificates for cryptographic keys used in the E-GSC and related services, ensuring the validity and trustworthiness of the public keys distributed through the system.
- **External Input Output Data Handler (EIODH):** Manages the interface between the E-GSC Core system and external data sources, enabling the integration and exchange of information between the external entities, the internal E-GSC Core components and sending the necessary data to the E-GNSS Transversal Infrastructure.
- **E-GSC Service Monitoring (ESMON):** Continuously monitors the performance and availability of the services provided by the E-GSC Core (HAS, OSNMA and SAS), ensuring that the quality of the services

through the computation of KPIs. It provides alerts and reports on any service disruptions or anomalies, helping to maintain the reliability and integrity of the system.

Although developed independently, but also within the operational perimeter of the E-GSC Core, the following modules can also be identified:

- High Accuracy Data Generator (HADG): using Galileo data obtained through the E-GSC Core EIODH and external reference stations, the HADG generates the High Accuracy corrections which are provided to the E-GNSS Users both through signal-in-space and internet.
- E-GSC SECMON enclave: interfacing E-GSC components in order to forward security monitoring data to SECMON core (GSMC).

The interfaces of the E-GSC Core include:

- E-GSC Transversal Infrastructure, to provide data for dissemination via internet.
- GMS, to obtain real-time and non-real-time data from the Galileo network, in particular the observation and navigation data from the Ground Sensor Stations (GSS), and to provide the data to be disseminated via signal-in-space.
- GRSP, to obtain products used by the HADG algorithms.
- RLSP, to obtain return link messages to be authenticated by OSNMA.
- G2STB (through HADG), providing additional data for HAS and potentially other services such as TSM.
- EDAS/SDAF (through HADG) for real-time reference stations.
- External reference stations (through HADG) for HAS.
- SECMON core (through SECMON enclave).

In addition, the E-GSC Core has general-purpose functions such as monitoring, control, archiving, security, etc.

4.4.2 E-GNSS Transversal Infrastructure Description

The E-GNSS Transversal Infrastructure is intended to cover the centralization of the users' interfaces for Galileo (excluding PRS) and EGNOS (excluding EGNOS SoL Aviation Service). This is achieved via E-GSC web portal interface combining Galileo, EDAS and EGNOS maritime related user services, and E-DDS (E-GNSS Data Distribution Service) component for the terrestrial distribution of all E-GNSS data made available by EGNOS and Galileo, either non-real time and/or quasi real time.

The E-GNSS Transversal Infrastructure is composed of the following functionalities:

1. **E-GSC Web portal**, including the E-GSC Help desk and the smartphone app back-end
2. **E-GNSS Data Distribution Service (E-DDS)**
3. **E-GNSS Services Information**
4. **E-GNSS Centre Of Expertise (CoE)**
5. **Contribution to Ionosphere Prediction (CIP) Module.**

For the management and operation of these functionalities the E-GNSS Transversal infrastructure includes:

- **User Access Control module** that will manage the access of the different users to the E-GNSS Transversal Infrastructure components and services.
- **Centralized Monitoring and Control function** that will interface also with the local Security Monitoring component (SECMON).

The E-GNSS Transversal Infrastructure is therefore kept separate, both in terms of configuration and accreditation from the E-GSC Core section.

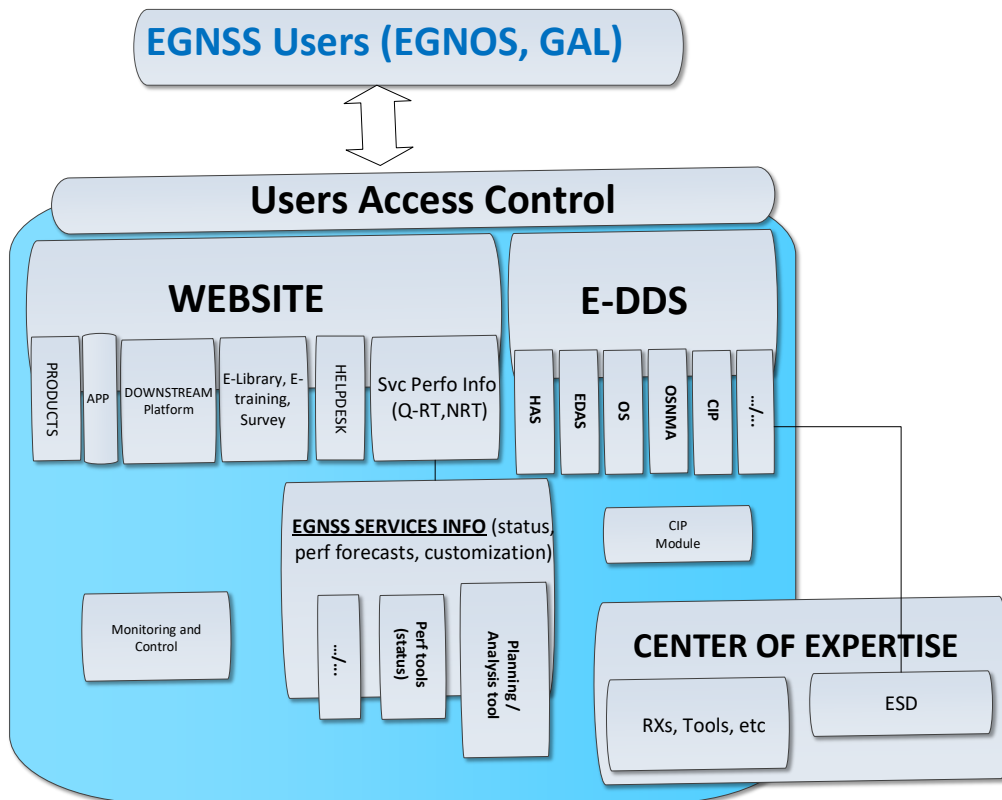


Figure 3 - EGNSS Transversal Infrastructure functional diagram

4.4.2.1 E-GNSS Transversal Infrastructure interfaces

The E-GNSS Transversal Infrastructure will interface with the following infrastructure elements:

- **E-GSC Core:** enabling the reception of the necessary Galileo Services data to feed the relevant functionalities (e.g., GAL services data distribution). Interface is defined in detail as part of the E-GSC Internal ICD [CISL ICD-03].
- **E-GNSS Service Demonstrator (ESD):** enabling the generation of test signal and related data in support to early Services testing activities. The ESD obtains data from the E-GNSS Data Distribution (EDD)

function, and generates data which is provided to E-GNSS Users also through the EDD. Some details on the interface are defined in [RD-SOW-12].

- **EDAS/SDAF:** To enable the delivery of the EDAS Services to the E-GNSS Users. This interface is defined in a specific ICD [CISL ICD-04].
- **GRC:** for the reception of CIP products and exchange of monitoring data from the core, data sets and other elements to support the relevant functionalities. This interface is defined in a specific ICD [CISL ICD-05].
- **External Network Inputs:** for the reception of input data to feed the CIP products processing and the E-GNSS Service Demonstrator in support to early Services testing activities.
- **SECMON:** to enable the necessary Security Monitoring Functions of the infrastructure being operated.
- **G2STB: to enable the provision of the G2G System Test Bed data to the ESD.** This interface is defined in a specific ICD [CISL ICD-06].
- **Other Programme Components infrastructure elements:** potentially as part of the future evolutions in link with the related synergies identified.

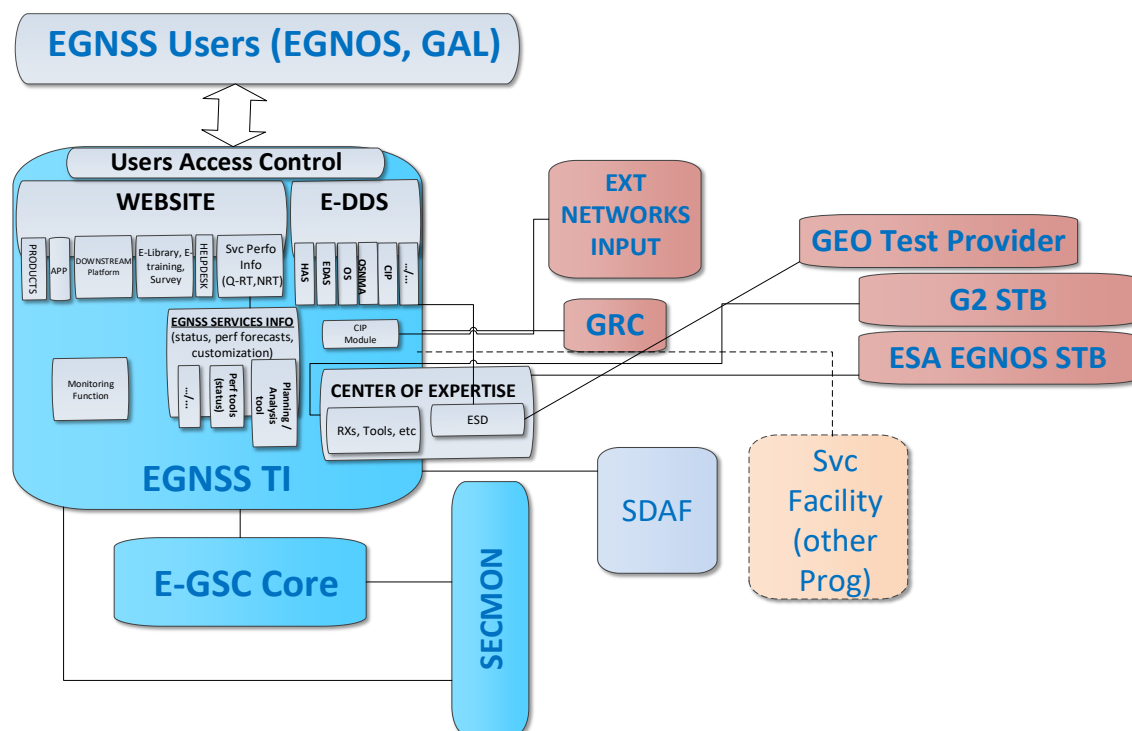


Figure 4 - E-GNSS Transversal Infrastructure interfaces

4.4.2.2 E-GNSS Transversal Infrastructure chains

The following chains of the E-GNSS Transversal Infrastructure will be made available to the Contractor:

- Operational platform (OPE).
- Validation platform (VAL).
- Back up chain (Back up).

4.4.2.2.1.1 Operational platform (OPE)

The Operational platform is the physical platform delivering E-GSC services to end-users at any point in time from the E-GSC main site (Torrejón de Ardoz, Spain). Due to the likely evolutions of the E-GSC, there is also a PreOPE platform on which the new E-GSC releases will be qualified, validated, and eventually migrated to become the OPE chain for the next release. The OPE chain for the previous release becomes the new PreOPE, and therefore OPE and PreOPE physical platforms will switch roles with each new E-GSC release (including both EGNSS Transversal Infrastructure and E-GSC core components).

4.4.2.2.1.2 Validation platform (VAL)

The Validation platform is a full replica used mainly for maintenance purposes and potentially operational validation of new releases. The same internal modules as the OPE chain will also make up the functionality of the VAL chain, and it is also located at the E-GSC main site (Torrejón de Ardoz, Spain). The E-GSC Core VAL will be connected to GMS VAL chain, and will potentially be capable of receiving inputs from OPE chain too.

4.4.2.2.1.3 Back up chain (Back up)

The E-GSC backup chain is located at the E-GSC backup site (Toulouse, France) and is able to take over operations from the main site in case of catastrophic events. It is foreseen to be in stand-by mode, i.e., not providing service but synchronised in terms of configuration and data with the main E-GSC site.

4.4.2.3 Users Access Control

The E-GNSS Transversal Infrastructure enables E-GNSS Users to request and access specific products tailored to their needs, under a secure and controlled environment. E-GNSS Users begin by registering on the E-GNSS Transversal platform, during which their profiles are created and secure credentials are generated. ETSC operators play a key role in managing these credentials — they are responsible for validating E-GNSS User information, assigning appropriate access levels, and maintaining the integrity of E-GNSS User profiles. Once registered in the E-GNSS Users database, anytime an E-GNSS User submits a request for a product, the system verifies the profile and credentials against the Database to ensure compliance before granting access. This access control approach ensures that only authorized users can retrieve data.

4.4.2.4 E-GSC web portal

The E-GNSS Transversal Infrastructure will allow the E-GNSS Users to access general contents and functionalities as well as the specific elements related to the services under EUSPA responsibility as Service Provider (Galileo Services plus EGNOS Maritime and EDAS, at the date of release of this document).

The main E-GSC web portal functionalities are described in the following sections.

4.4.2.4.1 Products and Information

The E-GSC web portal enables a wide portfolio of different products and information (non-exhaustive list):

- **General information, Products and Support tools:** including generic E-GNSS Service/Systems and markets information sections, FAQs together with some specific support products and tools like ionospheric correction algorithms, Satellite Metadata, etc.
- **E-Library:** including
 - Programme Reference Documentation (e.g. SDDs, ICDs, Guidelines, etc.)
 - Performance Reports
 - GNSS Market and User Reports
 - User Satisfaction Survey Reports
 - Multimedia
- **E-learning / training platform** supporting the development and adoption of Galileo services, including training material that shall be easily accessible to any interested E-GNSS User.
- **Access to:**
 - Helpdesk Function: web interface (see section 4.4.2.5)
 - Services under Registration:
 - E-GNSS Data Distribution Service (E-DDS)
 - Notifications, newsletter, alerts (under subscription): via email as a mean for end user, service provider communication and information exchange with external entities.
- **Downstream Platform**, which is a dedicated web page populated and updated by the relevant GNSS providers.

4.4.2.4.2 E-GSC Mobile Device Application

In order to keep the E-GSC current with advancing technology, it is planned to develop a mobile application for mobile and tablet devices (running Android and iOS operating systems) that can interface with the user-facing component of the E-GSC. It is envisaged to include push notifications, enhanced contact mechanisms, additional content, along with the already available content of the web portal.

4.4.2.5 E-GSC Help desk

The E-GSC help desk is intended for the E-GNSS Users to send their specific questions and requests. It is a means for end users, service providers, operators to raise problems and seek responses.

4.4.2.6 E-GNSS Data Distribution Service (E-DDS)

The E-GNSS Data Distribution Service (E-DDS) will provide a single web access point, under registration, to all E-GNSS data (real time and non-real time) enabled by the different EGNOS and Galileo services and related formats and protocols, such as:

- **Generic data / files:** e.g. ephemeris, almanac, etc. files

- **Galileo OS / HAS / OSNMA / SAR / CIP** etc. related data ([RD-HL-01, RD-HL-02, RD-HL-03, RD-HL-07, [CISL ICD-07]])
- **EDAS (EGNOS Data Access Service)** related data ([RD-HL-08])
- **Test data:**
 - NRT: test vectors, data sets, campaign based data
 - RT: enabled for specific campaigns supported by the ESD platform or other equivalent tools.

4.4.2.7 E-GNSS Services Information

This function enables the generation of the relevant E-GNSS services information to be made available via the E-GSC web portal or to be used by the operator in support to the Help desk and Centre of Expertise related activities addressing:

- **Service Status information:** based on monitoring related tools, for example services' availability and other performance information.
- **Customised Performance Assessment/forecasts:** based on specific SW Tools, they are developed and deployed to perform E-GNSS performance evaluation, forecast, and dissemination to E-GNSS Users being part of E-GSC mission. This includes the assessment of different E-GNSS services tailored for the different user communities (aviation, maritime, agriculture, drones, space, surveying, LBS, rail, road, time and synchronization). Two performance tools are developed:
 - Analysis Tools: this tool will be isolated from the E-GSC core system apart from their operational interfaces. In addition, this tool can interact with external Ntrip casters, receivers and FTP servers.
 - Planning tool: this tool will be accessible through the E-GSC web portal.

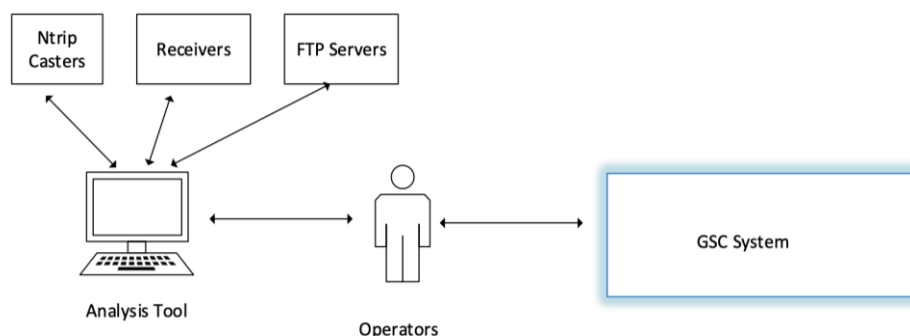


Figure 5 - Analysis tool interfaces

4.4.2.8 E-GNSS Centre of Expertise (CoE)

The E-GNSS Centre of Expertise (CoE) shall provide an integrated Galileo and EGNOS support expandable to additional Space Programme components where relevant.

To provide such support upon request of the Contracting Authority or the E-GNSS Users, the ETSC will count on the following capabilities and infrastructures:

- **The E-GSCoE Web capabilities:** Including the following main components, aiming to provide access/visibility to the users on relevant means available on the market, based on objective, non-discriminatory criteria - sorting by market segments (e.g., agriculture, aviation, transportation, etc..) or technology type, ensuring users can discover options without bias or preferential treatment, platforms that allow search system to provide visibility on equal terms: ~~(e.g., the e-learning platform and a dedicated web page populated and updated by the relevant GNSS providers)~~
 - Showroom: As a platform designed to showcase innovative technological solutions from the industry, enabling users to explore solutions' information and benefits across different market segments.
 - Virtual lab: The Virtual Lab will offer visitors a list of GNSS tools that support GNSS workflows, data processing, analysis, and visualization.
 - E-Learning Platform: Gathering on-line educational resources (i.e., courses, webinars and guidelines to enhance user knowledge).



Figure 6 - CoE Web based capabilities

- **The E-GNSS Service Demonstrator** (as described in the next subsection);
- **The User Workspace:** including representative receivers, hardware, software tools and data archive at the disposal of industry ~~(on-line and on-site)~~ described in subsection 4.4.2.8.2.

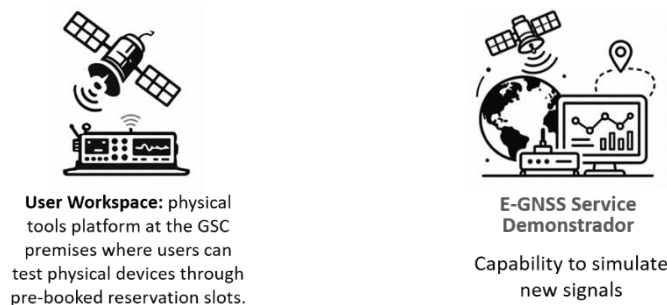


Figure 7 - CoE infrastructure tools

The Centre of Expertise presents only one chain.

4.4.2.8.1 E-GNSS Service Demonstrator (ESD)

The ESD will be operated at the E-GSC. It will not be part of the E-GNSS operational chain delivering E-GNSS services, but it will be connected on an ad-hoc basis to the E-GNSS Transversal infrastructure to be operated under a campaign-based approach to support pre-operational testing and experimentation activities.

The operations of the ESD will support the following scope of activities:

- Support the implementation of new E-GNSS Services or the evolution of existing services by:
 - Ensuring the early involvement of E-GNSS Users in new services testing, ensuring the introduction of users' feedback in the consolidation of the new service(s) definition, de-risking the later implementation.
 - Enabling pre-operational E-GNSS signals that can support early testing in realistic conditions to anticipate the implementation at receiver level.
 - Fostering the market penetration of E-GNSS services by enabling access to pre-operational signals can accelerate the user's readiness well before the operational services start.
 - Supporting standardization-related activities to validate the correct implementation of receiver standards and/or to support the publication process from standardization bodies.
- Implement an optimised scheme that allows benefiting from the synergies among similar activities identified for the different programmes under a modular and scalable approach enabling progressive expansion to support other programmes or new testing activities where relevant.
- Limit the use of the E-GNSS systems in operation for the execution of these activities as a clear improvement from the past where similar activities required the use of the operational infrastructure.

The ESD Security Baseline will be equivalent to the E-GNSS Transversal infrastructure one: flow down of the most demanding applicable requirements from EGNOS and Galileo and Cyber requirements.

The ESD accreditation aspects: The ESD will not be within the Galileo or EGNOS operational systems accreditation perimeter, but subject to ad-hoc authorization from the SAB when requiring connection to operational infrastructure (e.g. demonstrating the required segregation) and/or concerning specific "public" broadcasting campaigns.

4.4.2.8.1.1 High-level Architecture of the E-GNSS Service Demonstrator (ESD)

An E-GNSS Service Demonstrator generally makes use of a core constellation (or several ones) that provides ranging signals in different frequency bands enabling the positioning of users but also ranging, timing or any other new service for users equipped with suitable receivers.

The service demonstrator monitors the public-access signals broadcast by the Global Navigation Satellite Systems (GNSS) by means of a set of stations, and compiles a set of corrections for each GNSS satellite being monitored. These messages—which enhances the positioning data of the underlying GNSS constellation—are broadcast to all users.

The ESD envisaged infrastructure is divided into space, ground, support and user segments as can be observed in the figure below:

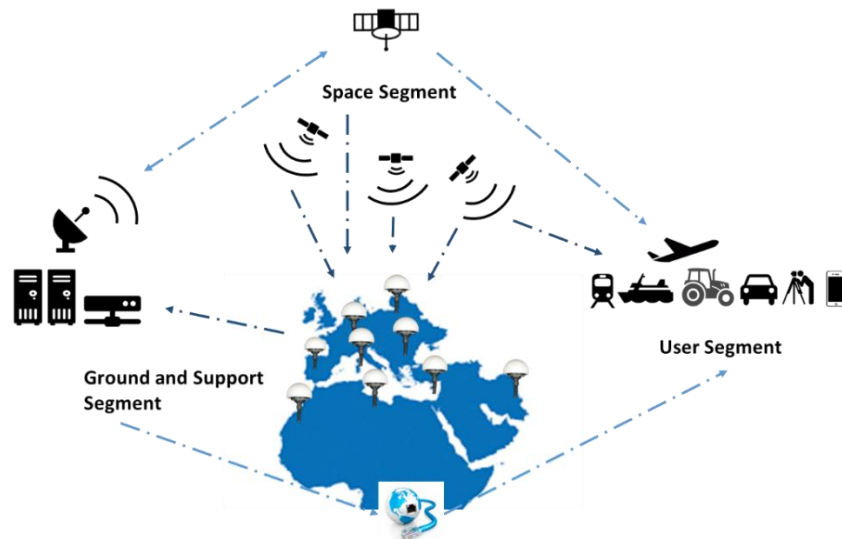


Figure 8 - End-to-End EGNSS Service Demonstrator proposed infrastructure

- **Space Segment:** The space segment is composed of the core GNSS constellations to be augmented (Galileo, GPS, GLONASS and BeiDou) and the dissemination payloads on GEO (e.g. L5, E5b) or other dissemination satellites (e.g. LEO, MEO, HEO).
- **Ground Segment:** The ground segment is composed of:
 - Reference Station Network: It is a set of reference stations acquiring navigation and observation measurements from the GNSS core constellations and the SBAS GEOs.
 - ESD Centralised platform: it is a set of elements in charge of processing the navigation and observation measurements acquired from the reference stations mentioned above. It computes the satellite and ionosphere corrections (for SBAS single frequency users), high accuracy corrections, integrity bounds or any other data for a new service that shall be broadcast to the user.
 - Dissemination System: it is set of elements to interface with the GEO operator uplink facilities or other RF facilities in charge of transmitting the Galileo/EGNOS mission data or SBAS corrections to the GEOs or other dissemination means (e.g. EDAS-like, HAPS, pseudolites, internet) using the appropriate channel.
- **User Segment:** it is composed of the user receivers able to process the EGNSS signals and to provide a Position Velocity and Timing (PVT) solution or any other new solution defined, including also dedicated user interfaces for aviation, maritime or other transport means operations.
- **Support Segment:** This segment consists of all the elements needed to operate and maintain the ESD system infrastructure active like performance monitoring, configuration management, maintenance, etc.

4.4.2.8.1.2 E-GNSS Service Demonstrator Functional Breakdown

To illustrate the scope and processing logic of this infrastructure a functional breakdown of the ESD is presented in the following figure:

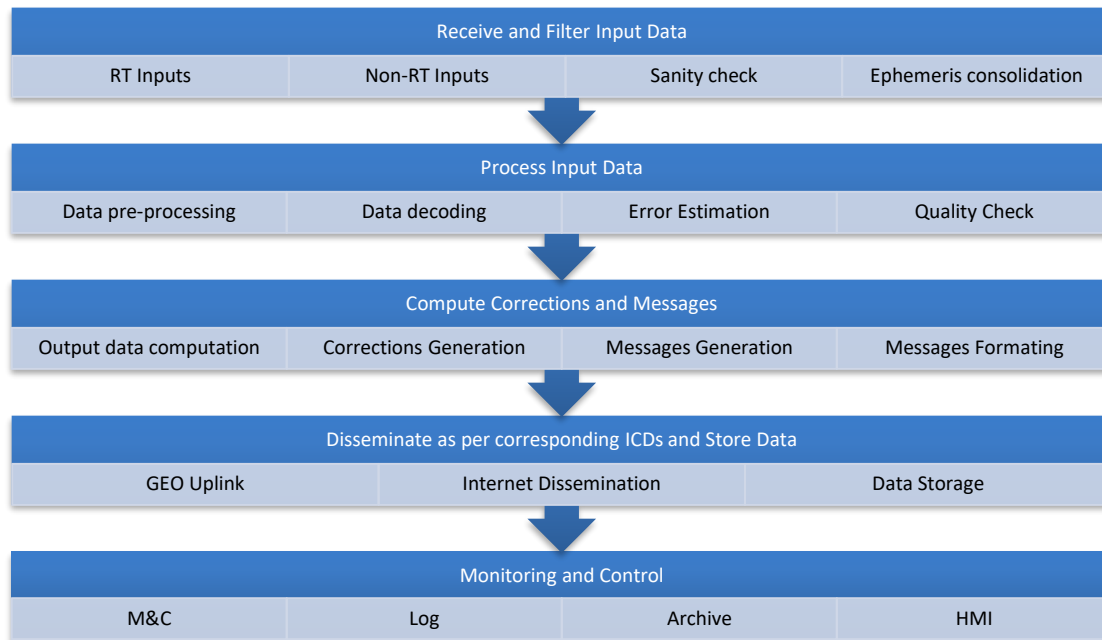


Figure 9 - ESD Functional breakdown

The full specification of the ESD is provided in [RD-SOW-12].

The ESD will be designed to run mainly automatically in order to optimise its operations and maintenance, therefore requiring no or minimal operator intervention. This infrastructure is under procurement and all relevant documentation for its operation will be made available to the Contractor (e.g. Infrastructure Operation Manuals).

The ESD will interface with the following main infrastructure elements:

Elements to provide input data:

- **ESA GAL G2 System Test Bed:** enabling the reception of the necessary Galileo G2 Services Test data to feed the relevant functionalities [CISL ICD-06].
- **ESA EGNOS System Test Bed (DSD-P):** enabling the generation of test signal and related data in support to early Services testing activities [RD-SOW-15].
- **External Networks:** Potentially to feed the platform with the necessary input data.

Elements to distribute the ESD output test data

- **EGNOS GEO test provider / NLES:** to enable the broadcast of the ESD test data.
- **E-GNSS Transversal infra:** to enable the distribution of the ESD test data via internet to a dedicated audience.

All the details and related requirements for the ESD interfaces can be found in the corresponding Interface Requirement Document (IRD) [RD-SOW-13] and other related documents [RD-SOW-16, RD-SOW-17, RD-SOW-18, RD-SOW-19, RD-SOW-20, RD-SOW-21, RD-SOW-22, RD-SOW-23].

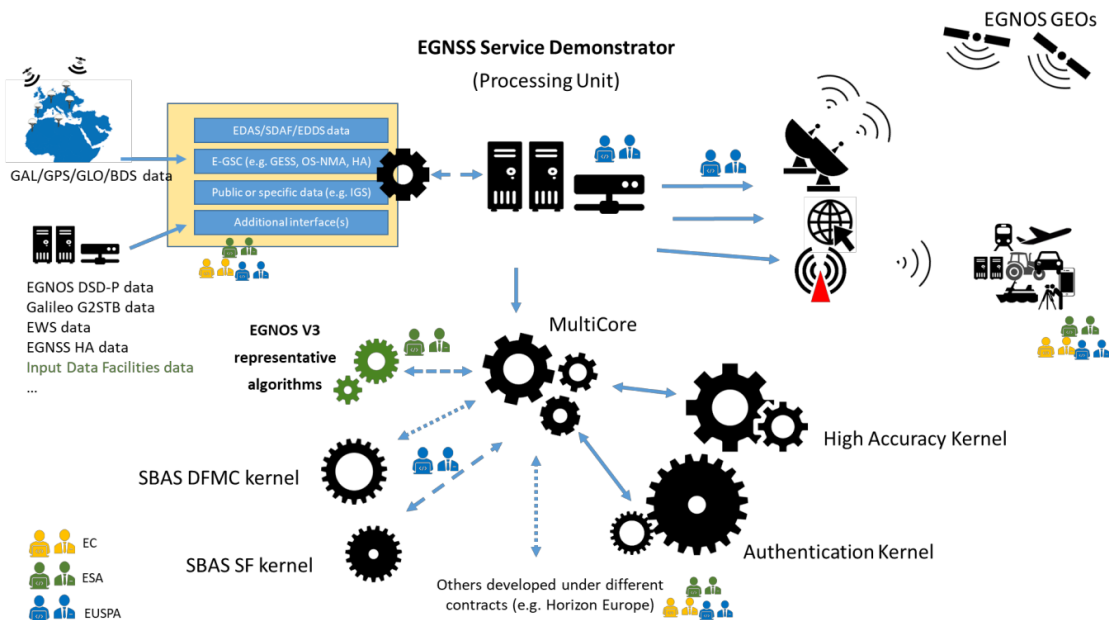


Figure 10 - ESD Interfaces

4.4.2.8.2 Centre of Expertise (CoE) User Workspace tools

The Centre of Expertise User Workspace includes the following tools:

- User terminals / RXs
- Other tools provided by EUSPA as Handover Assets (e.g. Drones, smartphones,...).
- Other tools provided/made available by the contractor.

A preliminary list of tools provided by EUSPA is provided in [CISL SoW-01]. **These physical tools at the E-GSC premises can be pre-booked by the users to test physical devices and applications under certain conditions.**

4.4.2.9 CIP module

Ionospheric disturbances are a known source of degradation for GNSS signals. Variations in the ionosphere caused by solar activity, geomagnetic storms, or natural atmospheric fluctuations can significantly degrade GNSS signal quality, leading to reduced accuracy and signal delays. To help mitigate such effects, it is crucial for E-GNSS Users to receive advance warnings of potential ionospheric disturbances. E-GNSS Users will then be empowered to take preventive measures—such as rescheduling or adapting planned activities—to avoid or reduce the impact of degraded GNSS performance. The CIP is designed to provide timely notifications about upcoming ionospheric degradations.

4.4.2.10 Monitoring and Control Function

The monitoring and control function provides comprehensive, automated supervision of the platform by continuously gathering logs, status updates, and performance metrics from all monitored hardware and software components. It analyses the data to detect anomalies and summarizes the operational state of the

E-GNSS Transversal platform through a structured view tailored for operators, offering different levels of abstraction allowing to navigate the information at different levels. The function enables operators to configure alarm thresholds based on specific performance or operational criteria. When anomalies or issues are detected, it automatically generates alarms that are categorized by their criticality, helping operators prioritize the responses and prompt react.

4.4.3 ETSC Service Operational Set up and related interfaces

The ETSC will need to have operational interfaces, for the execution of its tasks, with the following parties:

- **EUSPA:**
 - As contracting authority in the frame of the ETSC.
 - As Galileo / EDAS & Maritime Service Provider in relation to the corresponding Service related functions.
 - GSMC: responsible for the Security Monitoring and related processes and procedures.
 - GRC: providing input data to the EGNSS TI.
 - External Networks input providers.
- **ESA:** The Contractor will have to interact, through EUSPA, with ESA to support the End-to-End System Integration and Verification (SIV) activities as part of the E-GSC full verification activities.
- **GSOp II:** operating the GSC core and Galileo core infrastructure.
- **NESP:** operating SDAF Data Centre, the EGNOS Service Facilities and the EGNOS core infrastructure.
- **SGDSP:** operating the SAR and EWSS core infrastructure hosted in CNES.
- **External Networks input providers:** It may be possible, that in order to satisfy the elements set out in this SoW, the Contractor needs to interface with external data providers identified as part of the design of the relevant platforms by EUSPA (e.g. CIP and/or ESD). The Contractor will need to establish the necessary operational interface with such external providers (e.g. related to the availability of the input data) in line with the applicable contractual scheme that will be confirmed by EUSPA (when relevant).
- **E-GNSS Users.**

4.4.4 E-GNSS Transversal Infrastructure accreditation perimeter

This infrastructure will be subject to a specific accreditation process, different from the one applied to the E-GSC Core infrastructure, as described in the E-GNSS Transversal Infrastructure Security Accreditation and Certification Plan ([CISL SEC-10]). This accreditation process is done in consideration to the most demanding requirements from those flowing down from the relevant EGNOS and Galileo baselines, as per [RD-SOW-14].

The ETSC will need to support EUSPA by delivering the necessary documents listed in the E-GNSS Transversal Infrastructure Security Accreditation and Certification Plan and annexes ([CISL SEC-10]) and execute the relevant tasks.

4.5 E-GSC Dual-Site Operations

4.5.1 Overview

To ensure system availability and operational continuity in the face of potential disruptions—whether caused by natural disasters, cyberattacks, hardware failures, or human error—the Dual-Site concept has been introduced. This strategic approach mitigates the risk of service downtime by providing a secondary operational facility capable of taking over the Service provision if the primary site becomes unavailable.

It is highlighted that the need to perform a site handover can be generated by either GSOp II or by ETSC.

4.5.2 E-GSC 2.0 Dual-Site logic

Beginning with GSC version 1.4.1, the Dual-Site architecture was realized through the deployment of a Backup facility in Toulouse. This design philosophy is inherited in the E-GSC 2.0, which represents the natural evolution of the previous element version.

The configuration adopted in this Dual-site concept is the “Cold-Inactive” redundancy.

This kind of configuration envisages:

- Prime Site in a nominal condition: Running state and receiving input data and providing mission data to be disseminated through one Ground Segment.
- Backup Site in “Cold-Inactive” condition: Infrastructure is
 - “Cold” meaning in an “Off state” : no operation in place, limited maintenance activities (later defined in this section) and reduced spare parts;
 - “Inactive” that refers to a centre that is neither receiving input data nor providing mission data.

In this context, the E-GSC 2.0 support a complete handover from the Prime to the Backup site.

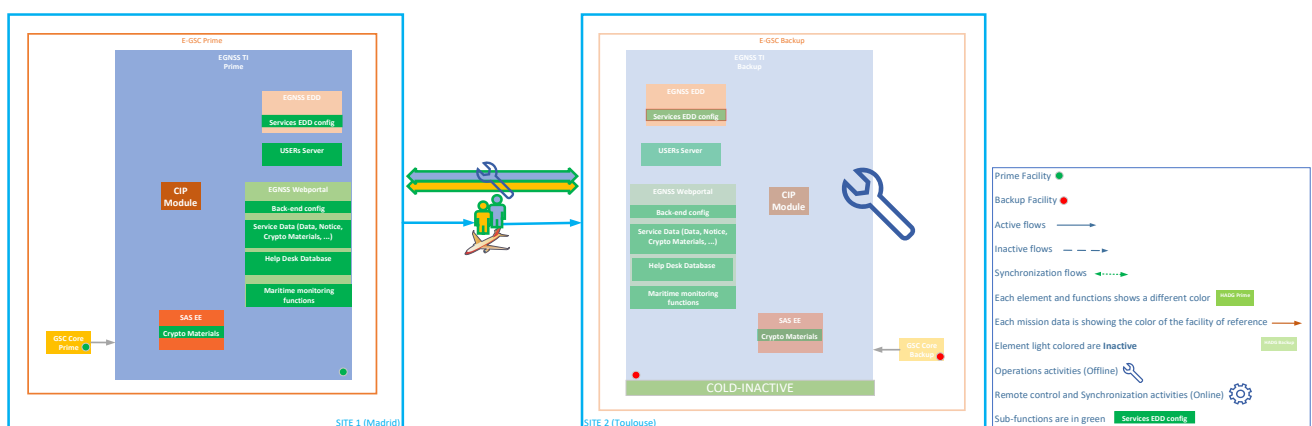


Figure 11 - E-GSC v2.0 Dual-Site Logic

4.5.3 E-GSC 2.1 Dual-Site Logic

From E-GSC 2.1 the introduction of significant infrastructure advancements will allow remote-control, real-time remote monitoring, and online synchronization between the Prime and Backup facilities.

These enhancements will not only increase operational flexibility but also establish a more resilient and responsive infrastructure, increasing the capability for continuous configuration alignment of critical equipment across both sites.

The E-GSC 2.1 envisages the following capabilities:

- **Full** remote control: enabling centralized command over key operational functions, minimizing manual interventions, and ensuring rapid execution of system adjustments.
- **Full** remote monitoring: allowing real-time oversight of system health, performance metrics, and potential anomalies across both sites, ensuring proactive issue resolution.
- **Online** synchronization: facilitating seamless data exchange and real-time configuration updates between the Prime and Backup facilities and guaranteeing operational continuity.

These advancements significantly enhance the facility readiness, enabling swift response and service recovery during handovers. This objective will be achieved through a secure and accredited network, enabling reliable connectivity between sites to support routine operations.

The configuration adopted in this Dual-site concept is the “Hot-Passive” redundancy.

This kind of configuration envisages:

- Prime Site in a nominal condition: Running state and receiving input data and providing mission data to be disseminated through one Ground Segment.
- Backup Site in “**Hot-Passive**” condition: Infrastructure is
 - “**Hot**” meaning in an “**Running state**”;
 - “**Passive**” that refers to a centre that is receiving input data but **not** providing mission data.

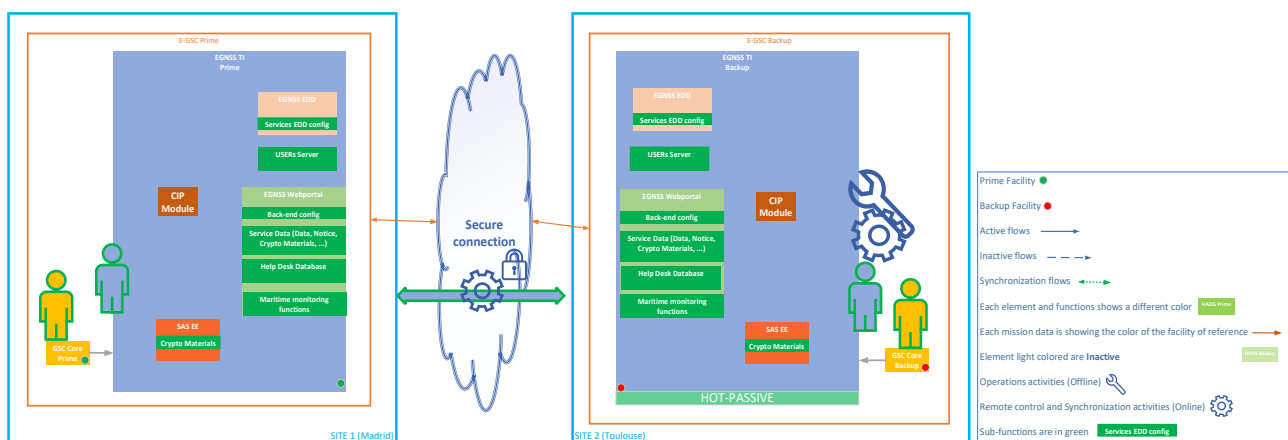


Figure 12 - E-GSC v2.1 Dual-Site Logic

5 Scope of the Procurement

The E-GNSS Transversal Service operations to be performed within the Contract include, at high level, the following activities:

- Managing the E-GNSS Transversal Infrastructure to provide the following services:
 - Operations of the E-GNSS Transversal Infrastructure, in particular for what concerns:
 - E-GSC Web portal management, including the E-GSC Help-desk and the E-GNSS Terrestrial Data Distribution (EDD).
 - Interface with other E-GSC operators (e.g., GSOp II, NESP, etc.).
 - Management of the E-GSC Centre of Expertise (CoE), including operations and maintenance of the E-GNSS Demonstrator (ESD).
 - Performance of the Infrastructure Logistic Support (ILS), including all levels of maintenance, of the E-GNSS Transversal Infrastructure.
 - Support to security, including cybersecurity activities related to the E-GNSS Transversal Infrastructure.

The Contractor to whom this contract will be awarded, will be a key partner of EUSPA for the provision of the E-GNSS Transversal Service operations for all the duration of the Contract, and will receive a significant level of delegation (and associated responsibilities) for the management of the wide scope of activities to be performed.

6 Overview of the Tasks

The activities to be performed by the ETSC are grouped under the following Tasks:

- Task 1 (“General and Service Management requirements”) contains requirements related to the management and control of the work during the Contract period.
- Task 2 (“E-GNSS Transversal Infrastructure Service Provision”) contains the technical requirements describing the services to be provided during the Contract.
- Task 3 (“ILS and Maintenance”) contains the ILS and Maintenance requirements necessary to support the E-GNSS Transversal Infrastructure Service Provision.
- Task 4 (“Cybersecurity”) contains the requirements related to Cybersecurity activities.
- Task 5 (“E-GSC Dual-Site Operations”) describes the logic to operate the E-GSC in a dual-site configuration (prime and backup).
- Task 6 (“E-GSC Infrastructure Evolutions”) contains the requirements to be applied during the commissioning phase of new E-GSC Infrastructure releases.
- Task 7 (“Handover”) contains the requirements applicable during the Contract handover from the Incumbent.

- Task 8 (“Hand-back”) contains the requirements applicable at the end of the Contract, during the hand-back to the Successor Contractor.

A detailed description of each Task is provided in the SOW (Annex IV).

End of Document