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EGNOS

EGNOS Data Access Service (EDAS)

Service Definition Document

Issue 3.0

#EUSpace

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DOCUMENT CHANGE RECORD

REASON FOR CHANGE	ISSUE	REVISION	DATE
First release of the document	1	0	26/07/2012
New services available: FTP, SISNeT, Data Filtering, Ntrip	2	0	10/04/2013
Update of the document according to: • SL1 decommissioned. • Resolution time for EDAS request improved • Observed EDAS services performance updated • EDAS service is clarified to be free of charge	2	1	19/12/2014
• EDAS related contents update • EGNOS system and service information update • Clarification regarding the redistribution of EDAS • Use of EDAS for IALA beacons • Observed EDAS services performance updated	2	2	14/02/2019
• Iceland inclusion as an EGNOS Programme Participant Member • GSA to EUSPA entity name change • EDAS related contents update	2	3	13/09/2022
• EUSPA as EDAS Service Provider • EGNOS Service Provision scheme updated after the declaration of the EGNOS Safety of Life assisted service for Maritime Users (ESMAS) • EGNOS system, service information and observed EDAS services performance are updated	3	0	18/12/2024

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1 EXECUTIVE SUMMARY

The European Geostationary Navigation Overlay Service (EGNOS) provides an augmentation service to the Global Positioning System (GPS) Standard Positioning Service (SPS). Today, EGNOS augments GPS using the L1 (1575.42 MHz) Coarse/Acquisition (C/A) civilian signal function by providing correction data and integrity information for improving positioning, navigation, and timing services over Europe. EGNOS will augment both GPS and Galileo in the future, using L1 and L5 (1176.45 MHz) frequencies.

EDAS provides ground-based access to EGNOS data, through a collection of services, which are accessible to registered users through the Internet and are oriented to users in different domains of application such as Location Based Services (LBS), a broad range of services in professional GNSS markets, Assisted-GNSS (A-GNSS) concepts, and related R&D activities.

This document is the "EDAS Service Definition Document" (referred as EDAS SDD). It describes the EDAS architecture and provides an overview of the information that is transmitted. A brief description of each EDAS Service is presented, along with its minimum performance. The EDAS SDD does not intend to give an exhaustive description of the message structure and data formats nor is it intended to be an Interface Control Document (ICD). A detailed documentary package ([RD-7], [RD-16], [RD-17], [RD-18]) covering EDAS data format(s) and protocol(s) technical information, along with other practical aspects, is provided to users upon registration through the EDAS User Support Website.

The document also includes complementary high level information on EGNOS interfaces with users, as well as guidelines to register as EDAS user or to check the monthly EDAS services performance (publicly available). The observed performance of the EDAS services over a specified period is also given in Appendix A Observed EDAS Performance.

This document does not address EGNOS Open Service (OS), nor EGNOS SoL Service for Aviation, nor EGNOS Safety of Life assisted service for Maritime users (ESMAS):

- Information about the EGNOS OS is available in a separate document called the "EGNOS Service Definition Document – Open Service" [RD-1],
- Information about the EGNOS SoL Service for Aviation is available in a separate document called the "EGNOS SoL for Aviation Service Definition Document"[RD-2],
- Information about the EGNOS SoL assisted service for maritime users is available in the document "EGNOS Safety of Life assisted service for Maritime users – Service Definition Document" [RD-21]

This document will be updated in the future as required in order to reflect any changes and improvements to the EDAS Service.

2 INTRODUCTION

2.1 Purpose and scope of the document

The EGNOS Service Definition Document – EGNOS Data Access Service (EGNOS SDD EDAS) presents the characteristics of the services offered by EDAS, the performance in terms of availability and latency and the instructions for users to get access to them.

The EDAS SDD comprises 7 main sections and 5 annexes:

- Section 1 is an Executive Summary of the document.
- Section 2 ("Introduction") defines the scope of the document and the relevant reference documentation.
- Section 3 ("Description of the EGNOS System and EGNOS Data Service (EDAS) Provision Environment") gives a brief overview of the EGNOS system, as well as its technical and organisational framework for EDAS service provision.
- Section 4 ("EGNOS Data Service (EDAS) Overview") provides a high-level description of EDAS architecture, the provided EDAS data as well as the EDAS application that allows users to access EDAS data and also some additional information of interest.
- Section 5 ("EDAS Services") introduces the EDAS services: Service Level 0, Service Level 2, Data Filtering, SISNeT, Ntrip and FTP Services.
- Section 6 ("EDAS Performance") describes the EDAS services performance in terms of availability and latency (for the real-time data services).
- Section 7 ("EDAS User Support") describes the support services and communication channels available to EDAS users for any request related to the service and the EDAS Registration process to become an EDAS user. It also provides the main sources of online information available for EDAS users concerning EDAS performance and status.
- Appendix A Observed EDAS Performanceprovides EDAS services availability performance between March 2024 and July 2024.
- Appendix B Application Form for EDAS Serviceshows the application form that needs to be filled by those willing to register as EDAS users.
- Appendix C EDAS Data Filtering Service: configuration provides the current configuration of the EDAS Data Filtering Service, mainly in terms of groups of stations available.
- Appendix D Definitions includes the glossary of terms and presents relevant definitions.
- Appendix E List of acronyms provides the list of acronyms of the document.

2.2 Reference Documents

RD	Document Title
[RD-1]	EGNOS Service Definition Document – Open Service (OS SDD) https://egnos.gsc-europa.eu/documents/egnos-open-service-sdd
[RD-2]	EGNOS Service Definition Document – Safety of Life for Aviation Service (SoL SDD) https://egnos.gsc-europa.eu/documents/egnos-safety-life-service-sdd
[RD-3]	ICAO Standards and Recommended Practices (SARPS) Annex10 Volume I (Radio Navigation Aids) 6th edition of July 2006, including all amendments up to and including No 92
[RD-4]	RTCM Recommended standards for Differential NavStar GPS service, RTCM Paper 194-93/SC104-STD, v2.1, 3rd January 1994

RD	Document Title
[RD-5]	RTCM 10402.3 RTCM Recommended standards for Differential GNSS (Global Navigation Satellite Systems) Services, Version 2.3. Developed by RTCM Special Committee No. 104. 20th August 2001.
[RD-6]	RTCM Standard 10403.1 RTCM Recommended standards for differential GNSS (Global Navigation Satellite Systems) Services, Version 3. Developed by RTCM Special Committee No. 104 (1st July 2011)
[RD-7]	EDAS Client SW User Manual, ESSP-PRC-6977. Only available after registration for EDAS users in: https://edas-maritime.gsc-europa.eu/resources-tools/downloads
[RD-8]	SISNeT User Interface Document, E-RD-SYS-31-010, Version 3, Revision 1, 15/05/2006. http://www.egnos-pro.esa.int/Publications/SISNET/SISNET_UID_3_1.pdf
[RD-9]	Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation. INTERNATIONAL STANDARD ISO/IEC 8824-1. ITU-T RECOMMENDATION X.680
[RD-10]	EGNOS Message Server (EMS) User Interface Document, E-RD-SYS-E31-011-ESA, Issue 2, Revision 0, November 26, 2004. http://www.egnos-pro.esa.int/ems/EMS_UID_2_0.pdf
[RD-11]	IONEX: The Ionosphere Map Exchange Format Version 1, Schaer, S., W. Gurtner, J. Feltens, February 25, 1998. https://files.igs.org/pub/data/format/ionex1.pdf
[RD-12]	Networked Transport of RTCM via Internet Protocol (Ntrip), version 1.0. RTCM 10410.0 (RTCM Paper 200-2004/SC104-STD, Version 1.0), with Amendment 1, Standard for Networked Transport of RTCM via Internet Protocol (Ntrip). https://rtcm.myshopify.com/collections/differential-global-navigation-satellite-dgnss-standards
[RD-13]	Networked Transport of RTCM via Internet Protocol (Ntrip), version 2.0. RTCM 10410.1 Standard for Networked Transport of RTCM via Internet Protocol (Ntrip), Version 2.0 with Amendment 1, June 28, 2011 https://rtcm.myshopify.com/collections/differential-global-navigation-satellite-dgnss-standards
[RD-14]	RINEX: The Receiver Independent Exchange Format Version 2.11, IGS/RTCM RINEX Working Group, 10th December 2007. https://files.igs.org/pub/data/format/rinex211.txt
[RD-15]	Proposal for a new RINEX-type Exchange File for GEO SBAS Broadcast Data, 19th December 2003. https://files.igs.org/pub/data/format/geo_sbas.txt
[RD-16]	FTP User Information Package, only available after registration for EDAS users in: https://edas-maritime.gsc-europa.eu/resources-tools/downloads
[RD-17]	SISNeT User Information Package, only available after registration for EDAS users in: https://edas-maritime.gsc-europa.eu/resources-tools/downloads
[RD-18]	Ntrip User Information Package, only available after registration for EDAS users in: https://edas-maritime.gsc-europa.eu/resources-tools/downloads
[RD-19]	IALA Guideline G1129 "The Retransmission of SBAS Corrections Using MF-Radio Beacon and AIS" https://www.iala-aism.org/product/g1129-retransmission-sbas-corrections-using-mf-radio-beacon-ais/
[RD-20]	REGULATION (EU) 2021/696 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 28 April 2021 establishing the Union Space Programme and the European Union Agency for the Space Programme and repealing Regulations (EU) No 912/2010, (EU) No 1285/2013 and (EU) No 377/2014 and Decision No 541/2014/EU
[RD-21]	EGNOS Service Definition Document – EGNOS Safety of Life assisted service for Maritime users (ESMAS) SDD https://edas-maritime.gsc-europa.eu/documents/egnos-safety-life-assisted-service-maritime-users-esmas

RD	Document Title
[RD-22]	IMO resolution A.1046 (27), 30 November 2011 https://wwwcdn.imo.org/localresources/en/KnowledgeCentre/IndexofIMOResolutions/Documents/A%20-%20Assembly/1046(27).pdf

Table 1: Reference documents

3 DESCRIPTION OF THE EGNOS SYSTEM AND EDAS PROVISION ENVIRONMENT

3.1 EGNOS: the European SBAS

Satellite navigation systems are designed to provide a positioning and timing service over vast geographical areas (typically continental or global coverage) with high accuracy performance. However, a number of events (either internal to the system elements or external, due to environmental conditions) may lead to positioning errors that are in excess of the typically observed navigation errors. For a large variety of users, such errors will not be noticed or may have a limited effect on the intended application. However, for a number of user communities, they may directly impact the quality of operations. Therefore, there is an absolute need to correct such errors, or to warn the user in due time when such errors occur and cannot be corrected. For this reason, augmentation systems have been designed to improve the performance of existing global constellations.

EGNOS is a Satellite Based Augmentation System (SBAS). SBAS systems are designed to augment the navigation system constellations by broadcasting additional signals from geostationary (GEO) satellites. The basic scheme is to use a set of monitoring stations (at very well-known position) to receive the navigation signals from core GNSS constellations that will be processed in order to obtain some estimations of these errors that are also applicable to the users (e.g. ionospheric errors and satellite position/clock errors). Once these estimations have been computed, they are transmitted in the form of “differential corrections” by means of a GEO satellite. Today, EGNOS augments GPS signals and will augment Galileo signal in the future.

Along with these correction messages which increase accuracy, some integrity data for the satellites that are in view of this network of monitoring stations and for the Ionospheric Grid Points visible from the service area are also broadcast, increasing the confidence that a user can have in the satellite navigation positioning solution.

EGNOS is part of a developing multi-modal inter-regional SBAS service, able to support a wide spectrum of applications in many different user communities, such as aviation, maritime, rail, road, agriculture.

Similar SBAS systems, designed according to the same standard (i.e. SARPs [RD-3]), have already been commissioned by the US (Wide Area Augmentation System – WAAS), Japan (MTSAT Satellite based Augmentation System – MSAS), India (GPS Aided GEO Augmented Navigation – GAGAN) and Republic of Korea (Korea Augmentation Satellite System – KASS). Analogous systems are under commissioning or deployment in other regions of the world (e.g. System of Differential Correction and Monitoring – SDCM - in Russia, BeiDou SBAS – BDSBAS - in China, Southern Positioning Augmentation Network - SouthPAN - in Australia and New Zealand, and African Satellite Augmentation System – ANGA in Africa and Indian Ocean).

EGNOS provides services to European Union Member States (EU-MS), to EGNOS Programme participating States (Switzerland, Norway, Iceland) and to other countries with an agreement with the EU on the provision of EGNOS services. The worldwide existing and planned SBAS systems are shown in Figure 1.

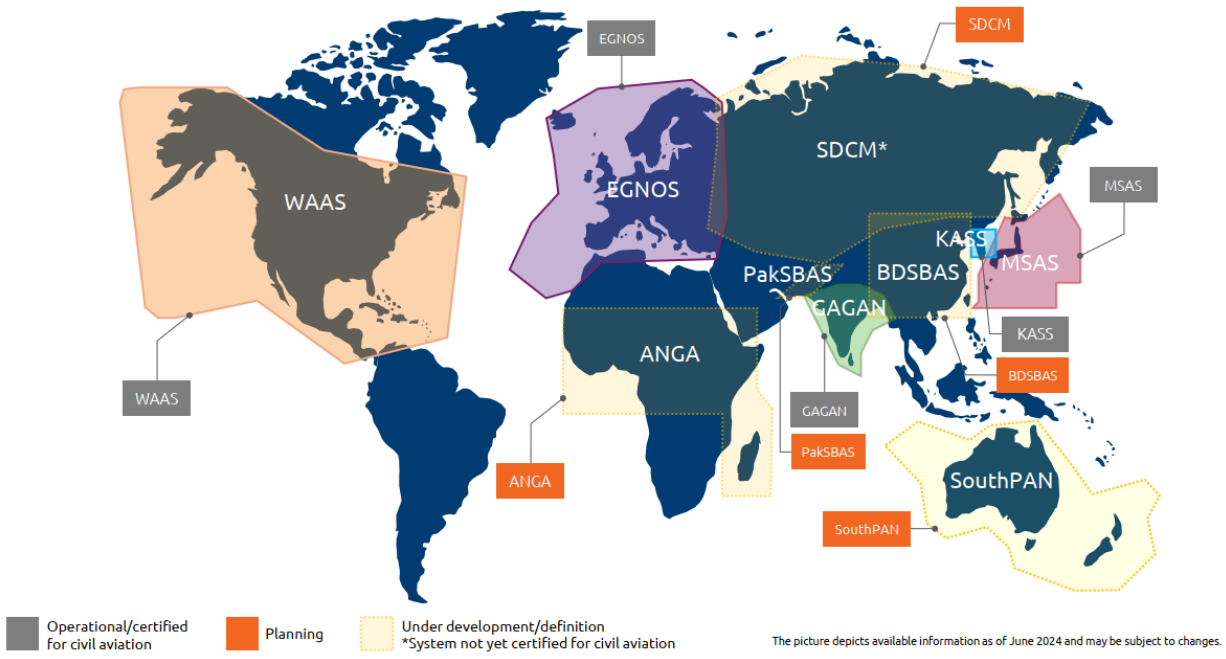


Figure 1: Existing and planned SBAS systems with indicative service areas[2]

3.2 EGNOS Services

EGNOS provides corrections and integrity information to GPS signals over a broad area centred over Europe and it is fully interoperable with other existing SBAS systems.

EGNOS provides three services:

- **Safety of Life (SoL) Service**, that provides the most stringent level of signal-in-space performance to all Safety of Life user communities, in particular for the aviation sector through the EGNOS Safety of Life for Aviation, and for the maritime sector through the EGNOS Safety of Life assisted service for MAritime userS (ESMAS);
- **Open Service (OS)**, freely available to any user;
- **EGNOS Data Access Service (EDAS)** for users who require access to specific GNSS data streams for the provision of added-value services, professional applications, commercial products, R&D, etc.

SoL for Aviation, ESMAS and OS are transmitted by GEO SiS whereas EDAS is provided by Internet access. All these EGNOS services are available and granted throughout their respective service areas.

3.2.1 Safety of Life Service (SoL) for Aviation

The main objective of the EGNOS SoL Service for Aviation is to support civil aviation operations down to Localiser Performance with Vertical Guidance (LPV) minima. In order to provide the SoL Service, the EGNOS system has been designed so that the EGNOS Signal-In-Space (SIS) is compliant to the ICAO SARPs for SBAS [RD-3].

Two EGNOS SoL Service for Aviation levels (NPA and APV-I) were declared with the first issue of the EGNOS SoL SDD v1.0 in March 2011 and an additional one (LPV-200) was declared with the EGNOS SoL SDD v3.0 in September 2015 enabling the following SBAS-based operations in compliance with requirements as defined by ICAO in Annex 10 [RD-3]:

[2] Represented SBAS according to the SBAS service provider identifiers defined in the ICAO SARPS [RD-1].

- Non-Precision Approach operations and other flight operations supporting PBN navigation specifications other than RNP APCH, not only for approaches but also for other phases of flight.
- Approach operations with Vertical Guidance supporting RNP APCH PBN navigation specification down to LPV minima as low as 250 ft.
- Category I precision approach with a Vertical Alert Limit (VAL) equal to 35m and supporting RNP APCH PBN navigation specification down to LPV minima as low as 200 ft, and in accordance with the ICAO SARPS [RD-3] accuracy requirements ensured through the corresponding system analysis.

The EGNOS SoL Service for Aviation has been available since March 2nd 2011, and the corresponding SDD is [RD-2], which defines a model for an aviation receiver bounding the local errors for an aircraft in flight. The receiver, based on this model, uses the EGNOS data to compute a high confidence bound on the residual error in the navigation solution (user level integrity) and compares it to a pre-established tolerance to determine whether the service can be used operationally or not within a limited geographical area, called the EGNOS service area. This high confidence bound together with the capacity to warn the user within a specific time (Time To Alert) is what has been defined as SBAS integrity (i.e., a measure of the trust that can be placed in the correctness of the information supplied by SBAS, including its ability to provide timely and valid warnings to the user (alerts).

3.2.2 EGNOS Safety of Life (SoL) Assisted for Maritime Users (ESMAS)

In an operational environment a vessel travels close to various obstacles for the GNSS signals: buildings, port infrastructure, other vessels or even bridges, that create multipath, interference or blockages of satellite signals. As such, the SBAS integrity model mentioned above is not valid for maritime applications. Current PVT user solutions usually rely on GNSS complemented by a variety of sensors and/or sensor fusion techniques to offer accuracy and a certain level of confidence in the position for safety purposes.

The ESMAS offers a service tailored to maritime users to enable marine navigation in harbour entrances, harbour approaches and coastal waters of the European Union Member States and EGNOS contributing countries (Iceland, Norway, and Switzerland) in line with IMO Resolution A.1046 [RD-22].

This service targets a large variety of users. It provides certain performance that the corrections being broadcast shall or shall not be used and up to which extent. Therefore, it increases the confidence that a user can have in the satellite SIS information. The receiver manufacturer will be responsible to combine this information with other sensor(s) to compute the navigation position and the associated confidence levels.

The ESMAS has been available since March 13th, 2024, and the corresponding SDD is [RD-21].

3.2.3 Open Service (OS)

The main objective of the EGNOS OS is to improve the achievable positioning accuracy by correcting several error sources affecting the GPS signals. The corrections transmitted by EGNOS contribute to mitigate the ranging error sources related to satellite clocks, satellite position and ionospheric effects. The other error sources (tropospheric effects, multipath and user receiver contributions) are local effects that cannot be corrected by a wide area augmentation system. Finally, EGNOS can also detect distortions affecting the signals transmitted by GPS and prevent users from tracking unhealthy or misleading signals.

The EGNOS OS is accessible in Europe to any user equipped with an appropriate GPS/SBAS compatible receiver for which no specific receiver certification is required.

The EGNOS OS has been available since 1st October 2009, and the corresponding SDD is [RD-1].

3.2.4 EGNOS Data Access Service (EDAS)

EDAS is the EGNOS terrestrial data service which offers ground-based access to EGNOS data in real time and also in a historical FTP archive to authorised users (e.g. added-value application providers). EDAS is the

single point of access for the data collected and generated by the EGNOS ground infrastructure (RIMS and NLES) mainly distributed over Europe and North Africa.

EDAS users and/or application Providers will be able to connect to EDAS, and directly exploit the EGNOS products or offer added-value services based on EDAS data (refer to section 'Who Can Use the EDAS Service?' for examples of EDAS based services and applications).

The EDAS service is available since July 26th 2012 being this document the applicable SDD. EUSPA is the EDAS Service Provider since 18/12/2024.

3.3 EGNOS Architecture

To provide its services to users equipped with appropriate receivers, the EGNOS system comprises three main segments: the Space Segment, the Ground Segment and the User Segment.

EGNOS functional architecture is shown in Figure 2.

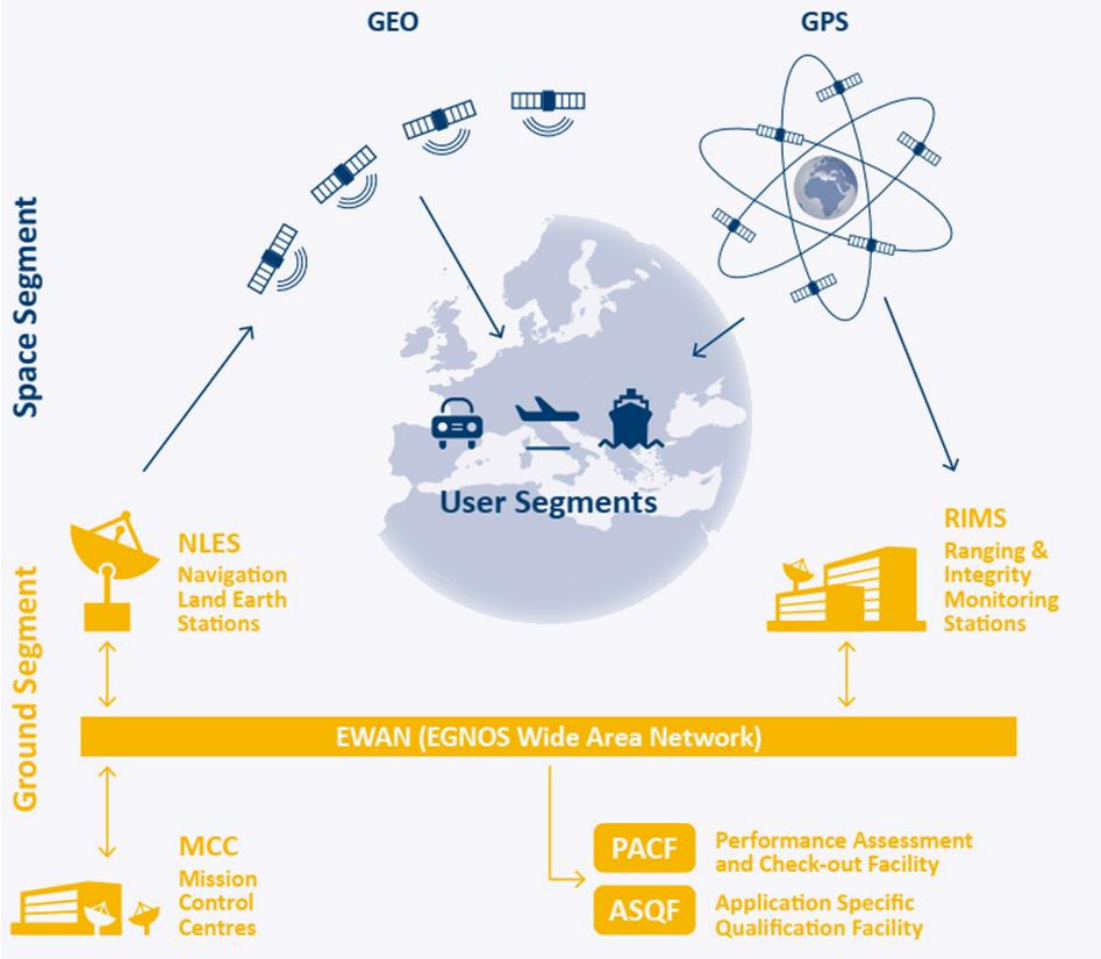


Figure 2: EGNOS architecture

3.3.1 EGNOS Space Segment

The EGNOS Space Segment comprises at least 3 geostationary (GEO) satellites broadcasting corrections and integrity information for GPS satellites in the L1 frequency band (1575.42 MHz). The configuration of the GEOs in operation does not change frequently but possible updates are nevertheless reported to users

by the EGNOS Service Provider. At the date of publication, the 3 GEOs used by EGNOS are the following ones.

GEO Name	PRN Number	Orbital Slot
ASTRA-5B	PRN 123	**23.5 E**
ASTRA SES-5	PRN 136	**5 E**
EUTELSAT 5 West B[3]	PRN 121	**5 W**

Table 2: GEOs used by EGNOS

This space segment configuration provides a high level of redundancy over the whole service area in case of a geostationary satellite link failure. The EGNOS operations are handled in such a way that, at any point in time, at least two of the GEOs broadcast an operational signal and the other one broadcasts a test signal. This secures a switching capability in case of interruption and ensures a high level of continuity of service.

The detailed configuration of operational and test satellites is reported in the EGNOS User Support webpage[4].

The EGNOS space segment is meant to be constantly replenished over time in order to maintain the required level of redundancy. The exact orbital location of future satellites may vary, though this will not impact the service offered to users. Similarly, different PRN code numbers may be assigned to future GEOs.

It is important to remark that these changes in the EGNOS GEO space segment are to be performed in a seamless manner without any interruption from an EGNOS user point of view and without compromising at any moment the EGNOS performance. For this purpose, and whenever there could be any relevant information complementing the SDD, an EGNOS Service Notice is published[5] and distributed among all EDAS Users. Non EDAS Users can receive such updates by subscribing to the documentation updates available in the EGNOS User Support Website (https://egnos.gsc-europa.eu/egnos-documentation-subscription) and EDAS and Maritime User Support Website (https://edas-maritime.gsc-europa.eu/subscription) respectively.

3.3.2 EGNOS Ground Segment

The EGNOS Ground Segment comprises a network of Ranging Integrity Monitoring Stations (RIMS), two Mission Control Centres (MCC), two Navigation Land Earth Stations (NLES) per GEO, and the EGNOS Wide Area Network (EWAN) which provides the communication network for all the components of the ground segment.

Two additional facilities are also deployed as part of the ground segment to support system operations and service provision, namely the Performance Assessment and Checkout Facility (PACF) and the Application Specific Qualification Facility (ASQF), which are operated by the EGNOS Service Provider.

The EGNOS ground segment configuration can be redefined over time, and for this purpose, whenever there could be any relevant information complementing the SDD, an EGNOS Service Notice is published[6] and distributed among all EDAS Users. Non EDAS Users can receive such updates by subscribing to the documentation updates available in the EGNOS User Support Website and EDAS and Maritime User Support Website respectively.

[3] At the time of the publication of this document, EUTELSAT 5 West B is used for testing purposes and broadcasts Message Type 0 indicating it cannot be used for SoL applications by the certified receivers. This satellite will not be used in EGNOS OP until its qualification is completed.

[4] https://egnos.gsc-europa.eu/

[5] https://egnos.gsc-europa.eu/documents/field_gc_document_type/service-notices-87

[6] https://egnos.gsc-europa.eu/documents/field_gc_document_type/service-notices-87

3.3.2.1 Ranging Integrity Monitoring Stations (RIMS)

The main function of the RIMS is to collect measurements from GPS satellites and to transmit these raw data every second to the Central Processing Facilities (CPF) of each MCC. The current RIMS network comprises 38 RIMS sites located over a wide geographical area described in Figure 3.

Figure 3: EGNOS RIMS sites

3.3.2.2 Central Processing Facility (CPF)

The Central Processing Facility (CPF) is a module of the MCC that uses the data received from the network of RIMS stations to:

1. Elaborate clock corrections for each GPS satellite in view of the network of RIMS stations. These corrections are valid throughout the geostationary broadcast area (i.e. wherever the EGNOS signal is received).

2. Elaborate ephemeris corrections to improve the accuracy of spacecraft orbital positions. In principle, these corrections are also valid throughout the geostationary broadcast area. However, due to the geographical distribution of the EGNOS ground monitoring network, the accuracy of these corrections will degrade when moving away from the core of the EGNOS service area.
3. Elaborate a model for ionospheric errors over the EGNOS service area in order to compensate for ionospheric perturbations to the navigation signals.

These three sets of corrections are then broadcast to users to improve positioning accuracy.

In addition, the CPF estimates the residual errors that can be expected by the users once they have applied the set of corrections broadcast by EGNOS. These residual errors are characterised by two parameters:

- User Differential Range Error (UDRE): this is an estimate of the residual range error after the application of clock and ephemeris error correction for a given GPS satellite.
- Grid Ionospheric Vertical Error (GIVE): this is an estimate of the vertical residual error after application of the ionospheric corrections for a given geographical grid point.

These two parameters can be used to determine an aggregate error bounded by the horizontal and vertical position errors. Such information is of special interest for Safety of Life users but may also be beneficial to other communities needing to know the uncertainty in the position determined by the user receiver.

Finally, the CPF includes a large number of monitoring functions designed to detect any anomaly in GPS and in the EGNOS system itself and is able to warn users within a very short timeframe in case of an error exceeding a certain threshold.

3.3.2.3 Navigation Land Earth Stations (NLES)

The messages elaborated by the CPF are transmitted to the NLESs. The NLESs (two for each GEO for redundancy purposes) transmit the EGNOS message received by the CPF to the GEO satellites for broadcast to users and to ensure the synchronisation with the GPS signal.

The NLES are grouped by pairs, pointing to a Geostationary satellite. For each GEO, one NLES is active (broadcasts) and the other in Back-up mode.

The main functions of the NLES include:

- the selection of the CPF that broadcasts the SBAS message,
- the modulation of the message provided by the CPF,
- the synchronization of the uplink signal with GPS time,
- the transmission of the data to the GEO satellites,
- the real-time monitoring of received signal from the GEO satellites to ensure it is the one transmitted and within the expected power levels.

3.3.2.4 Central Control Facility (CCF)

The EGNOS system is controlled through a Central Control Facility (CCF) located in each of the Mission Control Centres. These facilities are manned on a 24/7 basis in order to ensure permanent service monitoring and control.

3.3.3 EGNOS User Segment

The user segment consists of the user equipment that processes the received signals from the GNSS satellites (EGNOS and GPS) and uses them to derive and apply position, time, and integrity information. The equipment ranges from smartphones and handheld receivers, to sophisticated, specialized receivers used for high-end safety critical applications.

3.4 EGNOS Organisational Framework

3.4.1 Bodies involved in the EGNOS Programme and Service Delivery

The European Union (EU) is the owner of the EGNOS system.

As per the EU Space Regulation [RD-20]:

- The European Commission has the overall responsibility for the implementation of the EGNOS Programme, including for security and determines the priorities and long-term evolutions.
- The European Union Agency for the Space Programme (EUSPA) is in charge of the EGNOS exploitation and - according to the Financial Framework Partnership Agreement between the European Commission representing the European Union, EUSPA and ESA- acts as System Prime for the System in Operations for EGNOS, i.e. is responsible for maintenance changes and mid-term improvement of the System in operations.
- ESA is in charge of the System evolution and - according to the Financial Framework Partnership Agreement between the European Commission representing the European Union, EUSPA and ESA- acts as Design Authority, i.e. holds the technical responsibility of the system baseline, design integrity and consistency including for the System in Operations.

The European Union Agency for the Space Programme (EUSPA) is the EDAS and ESMAS Service Provider.

ESSP is the current EGNOS Service Provider within Europe for SoL Service for Aviation and OS. It is certified according to the Single European Sky (SES) regulation as Air Navigation Service Provider (ANSP).

3.4.2 How to get information on EGNOS and EGNOS applications or contact the service provider

Detailed information about the EGNOS programme, EGNOS system status, and EGNOS services performance can be found by accessing the sources listed in Table 3.

Topic	Description and Web/contact details
EGNOS Programme	EC institutional information about the EGNOS Programme https://defence-industry-space.ec.europa.eu/eu-space/egnos-satellite-navigation_en
What is EGNOS?	General information related to EGNOS Programme. https://www.euspa.europa.eu/eu-space-programme/egnos
EGNOS User Support Website and Helpdesk	EGNOS user support website is the main source of information for EGNOS OS and EGNOS SoL aviation users: EGNOS OS and EGNOS SoL Service for Aviation status and performance, system description, historical and real time services performance, forecasts, EGNOS OS and EGNOS SoL Service for Aviation applicable documentation, FAQs, etc. The helpdesk is accessible on-line through the website and also by e-mail and by phone (24/7). It is the direct point of contact for any question related with the EGNOS OS and EGNOS SoL Service for Aviation, including performance and applications. https://egnos.gsc-europa.eu/ **helpdesk@egnos.gsc-europa.eu** **Helpdesk line: +34 911 236 555**
EDAS and Maritime User Support	EDAS and Maritime User Support Website is the main source of information for ESMAS and EDAS status and performance, system description, historical and real time services performance, forecasts, applicable documentation, FAQs, etc.

Topic	Description and Web/contact details
Website and Helpdesk	The helpdesk is accessible on-line through the website and also by e-mail and by phone (24/7). It is the direct point of contact for any question related with the EDAS and ESMAS service, including performance and applications. https://edas-maritime.gsc-europa.eu/ helpdesk@edas-maritime.gsc-europa.eu Helpdesk line: +34 911 236 555
EGNOS certified receivers	EASA mailbox for any question related to service difficulties or malfunctions of EGNOS certified receivers egnos@easa.europa.eu
EGNOS Working Agreements (EWA)	Formalization between ESSP and a specific organization for introducing EGNOS procedures. EGNOS-working-agreement@essp-sas.eu
EGNOS app	Direct point of contact for any question related with the EGNOS system, its performance, and applications. https://itunes.apple.com/app/egnos/egnosApp https://play.google.com/store/apps/egnosApp

Table 3: Where to find information about EGNOS

4 EGNOS DATA ACCESS SERVICE (EDAS) OVERVIEW

4.1 Introduction

EDAS allows registered users to plug into EGNOS to receive the internal data collected, generated and delivered by EGNOS as shown in the figure below.

EDAS is intended to deliver a wide range of benefits to users in the multimodal domains.

Shown below are some examples of EDAS based services and applications:

- A-GNSS for LBS: this application can be used by many user communities, such as:
  - Third parties in order to offer successful LBS in urban areas.
  - Emergency services using the position information of mobile phones.
  - Network operators in order to use input data to support current or future A-GNSS services because it can reduce the time to first fix, using the up-to-date GPS ephemerides and the last EGNOS messages provided directly by EDAS.
- Professional GNSS Services/products: for users within surveying, mapping, construction, tracking, agriculture and more.
- Development and validation of added value applications.
- Supporting geodetic and mapping research.
- Application of DGNSS and RTK positioning techniques in areas close to EGNOS stations in order to enhance precision.
- EGNOS messages obtained through EDAS SISNeT in mobile devices regardless the GEO satellite visibility to compute an enhanced navigation solution with respect to GPS based on EGNOS messages. Especially important in urban canyons, mountain terrains or other areas with limited visibility of the GEO satellites.
- Research initiatives linked to the analysis of the atmosphere behaviour.
- Offline and real-time processing for GNSS performance analysis.
- Retransmission of DGPS corrections based on EDAS (either directly obtained from the EDAS Ntrip service or generated based on EGNOS message obtained from SISNeT) through existing Maritime and Inland Waterways transmission infrastructure (IALA beacons and/or AIS base stations). Refer to [RD-19] for more details.

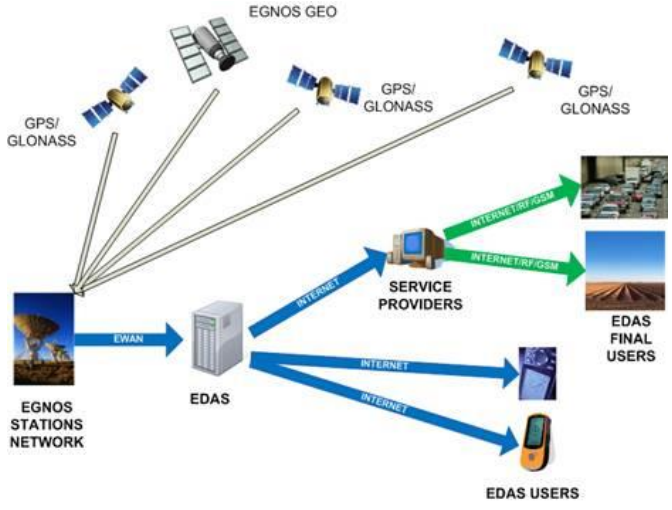


Figure 4: EDAS Hight-Level System

EDAS therefore provides an opportunity to deliver EGNOS data to users who cannot always view the EGNOS satellites (such as in urban canyons), or to support a variety of other services, applications and research programmes.

4.2 Overview of the Architecture

The EDAS architecture is decomposed into two separate elements:

- The EDAS system, implementing the interface with the EGNOS infrastructure and performing the necessary data processing to provide the different EDAS Services through Internet. Users can connect directly to EDAS system for some of the services which are based on standard protocols (FTP, SISNeT and Ntrip).
- The EDAS Client SW, hosted in the user system, implementing the external interface of some of the EDAS services (Main Data Streams (Service Level 0 (SL0), Service Level 2 (SL2)) and EDAS Data Filtering[7] (DF) service, see section 5). The EDAS Client SW is responsible for basic security functions and for the interface with the EDAS system through the appropriate communication means. The SW tool is provided to EDAS users after registration (see section 7.1 for EDAS registration details). The generic information needed by users to make use of the EDAS Client SW is provided in [RD-7].

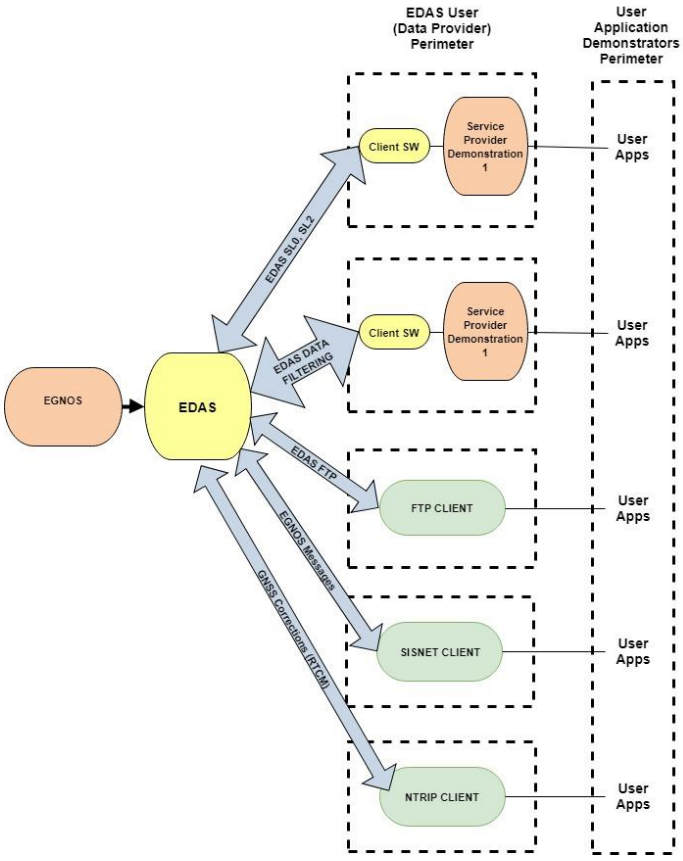


Figure 5: EDAS Architecture

The EDAS Client SW component enables the users to obtain the EGNOS products in real-time from the EDAS system, then perform the necessary processing and finally provide services to end users via non-GEO means.

[7] In order to access the EDAS Data Filtering Service, EDAS Client SW version 2 or later is required.

This software is in charge of handling the connection between users and EDAS for the Main Data Streams and the Data Filtering Services, through a specific protocol (this protocol is internal to EDAS perimeter and hence not made available to the general public). Once the connection is established, the EDAS servers will start sending EDAS data to the preferred port of the machine where the EDAS Client SW is running.

EDAS Client SW can be launched through a user-friendly Graphical User Interface and through command line. Using this application, user can easily configure the Service from which retrieving data and for the case of Data Filtering, the RIMS site group and the data rate. Additionally, time stamping capabilities[8] are also offered to EDAS users as the EDAS Client SW allows discarding EDAS messages if older than a certain configurable threshold and also delaying the delivery of EDAS messages a certain configurable time.

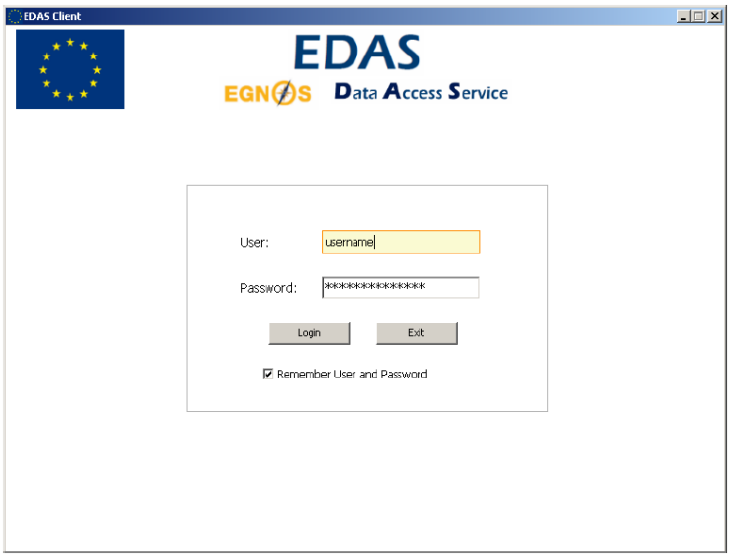


Figure 6: EDAS Client SW: login window

For its specific use in EDAS based service / applications, there are different manufacturers that provide tools and/or compilers to use the information packaged in RTCM (SL2) and ASN.1 (SL0) standards.

4.3 Data Available from EDAS

The real-time and historic GNSS data provided by EDAS are mainly:

- The GPS, GLONASS[9] and EGNOS GEO observations and navigation data collected by the entire network of RIMS (RIMS A, B) and NLES.
- The EGNOS augmentation messages, as normally received by users via the EGNOS geostationary satellites.
- Differential GNSS (DGNSS) corrections and RTK (Real-Time Kinematic) messages for the EGNOS stations allowing users implementing advanced positioning techniques.

Table 4 summarizes the types of data that can be retrieved via the different EDAS services.

[8] Data Stamping functions may require a duly synchronized user platform (e.g. NTP server).

[9] No commitment on GLONASS data is provided.

Mode	EDAS Service	Type of data				Protocol	Formats
		Observation & navigation	EGNOS messages	RTK messages	DGNSS corrections		
Real time	SL/DF 0	X	X			EDAS[10]	ASN.1
	SL/DF 2	X	X			EDAS	RTCM 3.1
	SISNeT		X			SISNeT	RTCA DO-229D
	Ntrip	X		X	X	Ntrip v1.0 Ntrip v2.0	RTCM 2.1, 2.3, 3.1
Archive	FTP	X	X			FTP	RINEX 2.11, RINEX B 2.10, EMS, IONEX, SL0 and SL2 raw binary data

Table 4: EDAS services summary

Please refer to section 5 for a description of the different services and the formats in which the data are made available to EDAS users.

4.3.1 Raw Observations from the RIMS and NLES Networks

The data collected by the RIMS network includes dual-frequency GPS data (L1 and L2), GLONASS L1, and EGNOS L1. The data collected by the NLES network includes only the GPS data. For each RIMS/NLES and each tracked satellite a set of observables and navigation data is provided. Therefore, at a given time, information from each RIMS/NLES will be provided as a set of observables and navigation data from visible satellites.

This data is provided by EDAS in real-time with an update rate of one second. Each message contains a variable number of sections (depending on the number of tracked satellites). The summary table below lists all the raw observables provided from the RIMS/NLES network. For details on the format and specific EDAS service level in which the information summarized in Table 5 is made available to EDAS users, please refer to section 5 ("EDAS Services").

For each RIMS (and NLES) and each visible GPS satellite			For each RIMS type B (not NLES) and each visible GLONASS satellite		For each RIMS (not NLES) and each visible EGNOS GEO	
GPS navigation data	GPS L1 code measurements	GPS L2 code measurements	GLONASS navigation data	GLONASS L1 code measurements	SBAS Message	GEO L1 code measurements
GPS receiver channel status	GPS L1 phase measurements (accumulated Doppler from satellite acquisition)	GPS L2 phase measurements (accumulated Doppler)	GLONASS receiver channel status	GLONASS L1 phase measurements (accumulated Doppler)	GEO receiver channel status	GEO L1 phase measurements (accumulated Doppler)

[10] EDAS proprietary protocol defining the communication rules between the EDAS system and the Client SW.

For each RIMS (and NLES) and each visible GPS satellite			For each RIMS type B (not NLES) and each visible GLONASS satellite		For each RIMS (not NLES) and each visible EGNOS GEO	
	GPS L1 signal C/N0 ratio	GPS L2 signal C/N0 ratio		GLONASS L1 signal C/N0 ratio		GEO L1 signal C/N0 ratio
	GPS L1 code carrier phase coherency indicator	GPS L2 code carrier phase coherency indicator		GLONASS L1 code carrier phase coherency indicator		GEO L1 code carrier phase coherency indicator
	GPS L1 signal status	GPS L2 signal status		GLONASS L1 signal status		GEO L1 signal status
	GPS L1 signal quality	GPS L2 signal quality		GLONASS L1 signal quality		GEO L1 signal quality

Table 5: EDAS raw data summary

4.3.2 EGNOS Augmentation Message

The EGNOS augmentation message is the EGNOS SIS Navigation Data that has been uplinked and broadcast from the EGNOS geostationary satellites. The augmentation message from EGNOS is composed of distinct Message Types (MT) as defined in the SBAS standard [RD-3]. The provided message types are summarized in Table 6.

The EGNOS augmentation message is transmitted per second and each message is 250 bits long.

Message type	Contents	Purpose
0	Don't Use (SBAS test mode)	Discard any ranging, corrections and integrity data from that PRN signal. Used also during system testing
1	PRN Mask	Indicates the slots for GPS and EGNOS GEO satellites provided data
2-5	Fast corrections	Range corrections and accuracy
6	Integrity information	Accuracy-bounding information for all satellites in one message
7	Fast correction degradation factor	Information about the degradation of the fast term corrections
9[11]	GEO ranging function	EGNOS GEO satellites orbit information (ephemeris)
10	Degradation parameters	Information about the correction degradation upon message loss
12	SBAS network Time/UTC offset parameters	Parameters for synchronisation of EGNOS Network time with UTC
17	GEO satellite almanacs	EGNOS GEO satellites Almanacs

[11] MT9 is broadcast with some information about the orbital position of the broadcasting EGNOS GEO satellite. At this stage, the EGNOS system does not support the Ranging function which is described in ICAO SARPs as an option. This is indicated by a special bit coding of the Health and Status parameter broadcast in MT17. In particular, GEO satellite position broadcast in both MT9 and MT17 are set to fixed position (x, y, z), and GEO position rate of change in MT9 & MT17, as well as GEO acceleration and a_{Gf0} & a_{Gf1} parameters in MT 9, are permanently set to zero.

Message type	Contents	Purpose
18	Ionospheric grid point masks	Indicates for which geographical point ionospheric correction data is provided
24	Mixed fast/long-term satellite error corrections	Fast-term error corrections for up to six satellites and long-term satellite error correction for one satellite in one message
25	Long-term satellite error corrections	Corrections for satellite ephemeris and clock errors for up to two satellites
26	Ionospheric delay corrections	Vertical delays/accuracy bounds at given geographical points
27	EGNOS service message	Defines the geographic region of the service
63	Null message	Filler message if no other message is available

Table 6: EGNOS Message types

4.3.3 Differential GNSS (DGNSS) and RTK (Real-Time Kinematic) Messages

4.3.3.1 Differential GNSS Corrections

The EGNOS Stations are considered as static reference receivers, which are placed at fixed and known surveyed locations. Then, since the satellite positions and the reference antenna location are known, the ranges can be determined precisely. By comparing these ranges to those obtained from the satellite observation measurements, the pseudorange errors can be accurately estimated (i.e. ionospheric delays, tropospheric delays, ephemeris errors and satellite clock errors), and corrections determined.

The DGNSS corrections are sent through the EDAS Ntrip Service in RTCM 2.1 [RD-4] and RTCM 2.3 [RD-5] formats, using the messages shown in table below:

EDAS DGNSS Messages	Message Types	
	RTCM 2.1	RTCM 2.3
Differential GPS Corrections	1	1
GPS Reference Station Parameters	3	3
Reference Station Datum	N/A	4
Extended Reference Station Parameters	N/A	22
Antenna Type Definition Record	N/A	23
Antenna Reference Point (ARP)	N/A	24
Differential GLONASS Corrections	N/A	31
GLONASS Reference Station Parameters	N/A	32

Table 7: EDAS GNSS Message Types

4.3.3.2 RTK Messages

EDAS provides access to the EGNOS stations phase measurements as well as the auxiliary operation and station information required for the implementation of RTK positioning through the EDAS Ntrip Service in RTCM 3.1 [RD-6]:

EDAS RTK Messages	Message Types
	RTCM 3.1
GPS (dual-frequency) Observations	1004
GLONASS (mono-frequency) Observations	1010
Reference station antenna coordinates	1005
Antenna Descriptor	1007
System Parameters	1013
GPS satellite ephemeris	1019
GLONASS satellite ephemeris	1020

Table 8: EDAS RTK Message Types

Although some of the above information is also available in RTCM 2.3 [RD-5], the use of RTCM 3.1 [RD-6] is recommended for RTK positioning.

5 EDAS SERVICES

This section presents a high level description of the EDAS services, classified as Main Data Stream services (SL0 and SL2, section 5.1), and Added Value Services (Data Filtering, FTP, 4SISNeT and Ntrip in sections from 5.2 to 5.5 respectively).

5.1 Main Data Stream Services

The Main Data Stream services provide the complete set of GNSS observation data (see Table 5) gathered by all EGNOS stations (including RIMS sites and NLES stations), which is sent in real-time with an update rate of one second. This GNSS data is encoded in different formats, resulting in the following Service Levels and Formats provided by EDAS:

- Service Level 0 (SL0): it provides data encoded in ASN.1 format[12]. It is recommended for those users willing to transmit data in raw format, or transmit them in a format that allows a complete reconstruction after decoding.
- Service Level 2 (SL2): it is used to transmit data in RTCM 3.1 standard [RD-6]. It includes data from Service Level 1 (which was decommissioned on 1st July 2014) and an EDAS proprietary message (RTCM Message Number 4085) with additional information (i.e. RIMS status, RIMS APC data, ionospheric and UTC data...).

In order to retrieve data from these services, a software application named “Client Software”, which is made available to users after registration (see section 7.1 for EDAS registration details), is to be used.

The data format and the detailed information about how to retrieve data from Main Data Streams Services is described in [RD-7], which is available to EDAS users after registration.

5.1.1 EDAS SL0 (ASN.1)

A detailed definition of the SL0 messages delivered through the EDAS Client SW can be found in [RD-7]. The messages delivered through EDAS SL0 are:

- EGNOS SBAS messages.
- Receiver measurement messages.
  - RIMS raw measurements.
  - NLES cyclic feedback.
- RIMS APC data.

5.1.2 EDAS SL2 (RTCM 3.1)

A detailed description of the Service Level 2 Messages can be found in [RD-7]. The following RTCM messages are provided:

- Message 1004. Extended L1&L2 GPS RTK Observables.
- Message 1005. Stationary RTK Reference Station ARP.
- Message 1007. Antenna Descriptor.
- Message 1010. Extended L1-Only GLONASS RTK Observables
- Message 1013. System Parameters.
- Message 1019. GPS ephemerides.

[12] Introduction to ASN.1 – http://www.itu.int/ITU-T/asn1/introduction/index.htm

- Message 1020. GLONASS ephemerides.
- Message 4085.
    - Subtype 0. GPS/GLONASS/GEO Ephemeris.
    - Subtype 1. GEO Observations.
    - Subtype 2. NLES Cyclic Feedback.
    - Subtype 3. ATC Information.
    - Subtype 4. RIMS APC data.
    - Subtype 5. Ionospheric and UTC data.
    - Subtype 6. GPS Almanac.
    - Subtype 7. RIMS Status.

5.2 EDAS Data Filtering Service

The EDAS Data Filtering Service allows EDAS users to access a subset of the SL0 or SL2 data (hence the data are available in ASN.1 and RTCM 3.1 formats respectively). By selecting one of the predefined RIMS groups available and the data rate (1 Hz or 1/30 Hz), EDAS users may reduce the bandwidth consumption and amount of data to be processed on the user side with respect to the corresponding SL0 or SL2.

In order to retrieve data from these Service Levels, it is necessary the same Client Software application as for the Main Data Stream Services, which will be available to users after registration (see section 7.1 for EDAS registration details). The list of groups available, the exhaustive list of data delivered and the user manual to retrieve the data can be found in the Client Software User Manual [RD-7], which is available to users after registration. For information, the current service configuration is illustrated in Appendix C EDAS Data Filtering Service: configuration.

5.3 EDAS FTP Service

The EDAS FTP Service enables EDAS users to get EDAS/EGNOS historical data in different formats and data rates. The different sets of data available for download, as well as their format, data rates and maximum storage period, are summarized hereafter. For a high-level definition of each format, please refer to Appendix D Definitions.

DATA SET	FORMAT	RATE	PERIODICITY OF PUBLICATION	MAXIMUM STORAGE PERIOD
GPS & GLONASS[13] Observations from RIMS A&B stations.	RINEX 2.11	1 Hz 1/30 Hz	15 min 1 day	2 years
GPS and GLONASS[85] Navigation Files from RIMS A&B Stations and consolidated[14].	RINEX 2.11	1 Hz	1 day	2 years
EGNOS messages	RINEX-B EMS	1 Hz 1 Hz	1 day 1 hour	2 years
EDAS SL0 raw data	ASN.1	1 Hz	15 min	6 months
EDAS SL2 raw data	RTCM 3.1	1 Hz	15 min	6 months
Ionospheric data	IONEX 1.0	1 / 2 h	1 day	2 years

[13] No commitment on GLONASS data is provided

[14] Consolidated GPS/GLONASS navigation file: daily GPS/GLONASS broadcast ephemeris file. This daily file is a merge of the individual RIMS site navigation files into one, providing non-redundant ephemerides data. In consequence, this consolidated navigation file can be utilized by users instead of the individual navigation files per station.

Table 9: EDAS FTP service: available data sets

EDAS users may access this service using a standard FTP client.

Specific guidelines for the access and usage of the EDAS FTP service, including naming conventions and folder structure (EDAS FTP-User Information Package), are available for users after registration (see section 7.1 for EDAS registration details).

5.4 EDAS SISNeT Service

The EDAS SISNeT service provides access to the EGNOS GEO satellites messages transmitted over the Internet through the SISNeT protocol [RD-8]. The EDAS SISNeT service is fully compliant with the SISNeT protocol which has been defined by ESA. For a full description of this protocol, please refer to SISNeT User Interface Document [RD-8] which is publicly available.

EDAS SISNeT users can select the most convenient way for retrieving SISNeT Messages. Since the information is sent by means of an open standard protocol, it is possible for the user to develop its own application or use an existing one.

Specific guidelines for the access and usage of the EDAS SISNeT service (EDAS SISNeT-User Information Package) are available for users after registration (see section 7.1 for EDAS registration details).

5.5 EDAS Ntrip Service

The EDAS Ntrip Service provides GNSS data (RTCM format) coming from the EGNOS network through the Ntrip protocol ([RD-12]and [RD-13]) in real-time[15]. In fact, EDAS disseminates GNSS data in RTCM 2.1 [RD-4], 2.3 [RD-5] and 3.1 [RD-6] formats through the Ntrip protocol. Below, the different Message Types provided, according to the RTCM format, are presented.

Message Name	Message types		
	RTCM 2.1	RTCM 2.3	RTCM 3.1
Differential GPS Corrections	1	1	N/A
GPS Reference Station Parameters	3	3	N/A
Reference Station Datum	N/A	4	N/A
RTK Uncorrected Carrier Phases	18	18	N/A
RTK Uncorrected Pseudoranges	19	19	N/A
Extended Reference Station Parameters	N/A	22	N/A
Antenna Type Definition Record	N/A	23	N/A
Antenna Reference Point (ARP)	N/A	24	N/A
Differential GLONASS Corrections	N/A	31	N/A
Differential GLONASS Reference Station Parameters	N/A	32	N/A
Extended L1&L2 GPS RTK Observables	N/A	N/A	1004
Stationary RTK Reference Station ARP	N/A	N/A	1005
Antenna Description	N/A	N/A	1007
L1-Only GLONASS RTK Observables	N/A	N/A	1010
Auxiliary Operation Information	N/A	N/A	1013

[15] The EDAS Ntrip Service supports Ntrip v1.0 and Ntrip v2.0 (HTTP and RTSP/RTP options).

Message Name	Message types		
	RTCM 2.1	RTCM 2.3	RTCM 3.1
GPS Ephemerides	N/A	N/A	1019
GLONASS Ephemerides	N/A	N/A	1020

Table 10: EDAS Ntrip Message Types provided in RTCM 2.1, 2.3 and 3.1 formats

The Ntrip protocol has been designed to disseminate differential correction data or other kinds of GNSS streaming data to stationary or mobile users over the Internet. Ntrip is the “de facto” protocol for GNSS data dissemination in real time.

Specific guidelines for the access and usage of the EDAS Ntrip service (EDAS Ntrip-User Information Package [RD-18]) are available for users after registration (see section 7.1 for EDAS registration details).

Regarding RTCM, there are several Ntrip clients available, like BNC (further information in https://igs.bkg.bund.de/ntrip/bnc web site).

6 EDAS PERFORMANCE

This section presents the EDAS Services performance in terms of availability and latency:

- Availability: percentage of time in which an EDAS service is delivering data according to specifications (see section 5, where all services are introduced). The availability of EDAS services is measured at the EDAS system output (excluding external network performance).
- Latency: time elapsed since the transmission of the last bit of the navigation message from the space segment (EGNOS and GPS/GLONASS satellites) until the data leave the EDAS system (formatted according to the corresponding service level specification). EDAS latency is a one-way parameter defined for real-time services.

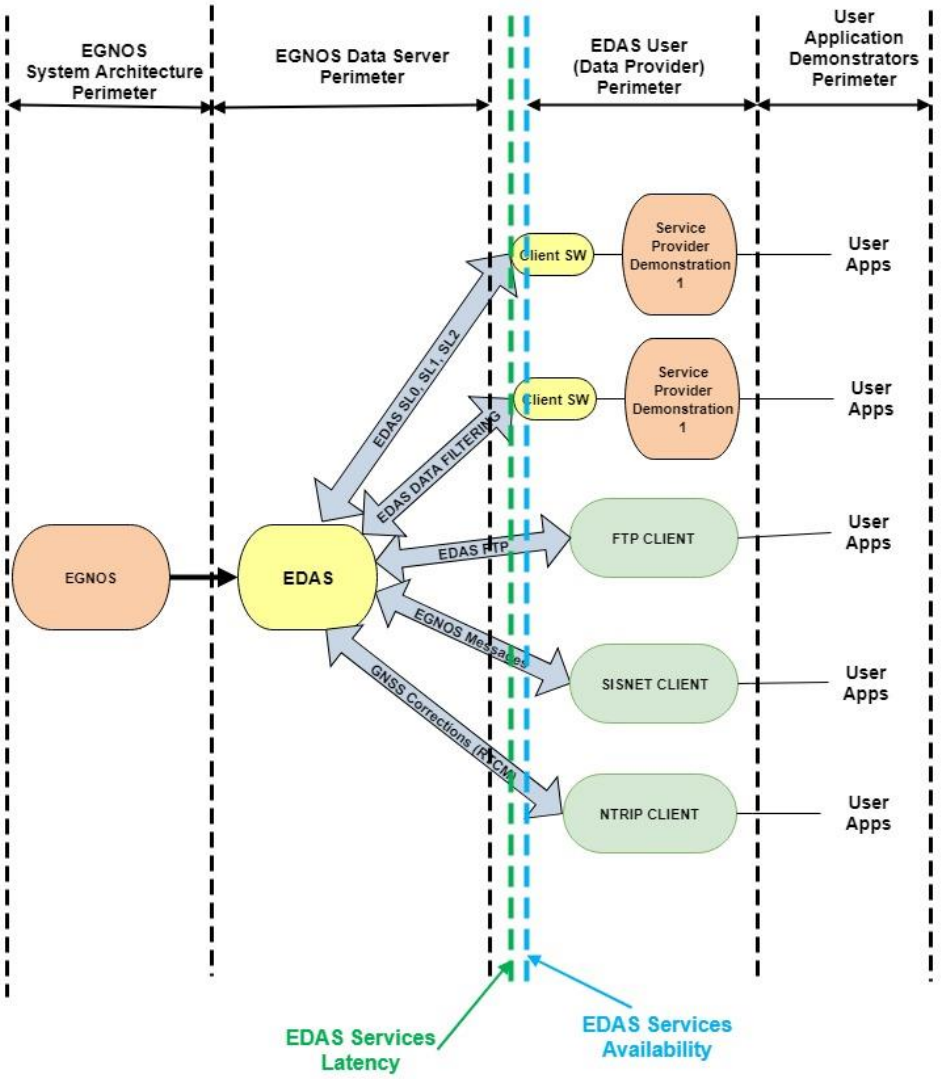


Figure 7: EDAS services performance measurement points

6.1 EDAS Services Availability

Table 11 provides the minimum monthly availability of the EDAS services.

	SL0	SL2	SISNeT	FTP	Data Filtering	Ntrip
EDAS Services Availability	98.5%	98.5%	98%	98%	98%	98%

Table 11: EDAS services availability

It should be noted that EDAS services availability performance is nominally higher than the above figures. Please refer to Appendix A Observed EDAS Performance to check the history of EDAS Services availability performance between March 2024 and July 2024.

6.2 EDAS Services Latency

Table 12 provides the maximum monthly latency (95th percentile) of the EDAS services:

	SL0	SL2	SISNeT	FTP[16]	Data Filtering		Ntrip
					SL0	SL2	
EDAS Services Latency	1.3 seconds	1.450 seconds	1.150 seconds	N/A	1.6 seconds	1.75 seconds	1.75 seconds

Table 12: EDAS services latency

It should be highlighted that EDAS services latency performance is nominally lower than the above figures. Please refer to Appendix A Observed EDAS Performance to check the history of EDAS Services latency performance between March 2024 and July 2024.

[16] Latency only defined for real-time services

7 EDAS USER SUPPORT

7.1 EDAS Registration

EDAS is accessible to registered users from EU Member States and third countries participating on the EGNOS Programme (Norway, Switzerland and Iceland). Exceptionally, upon authorisation of European Commission, access to EDAS may be granted to users from other third countries.

In order to request an EDAS account, the online version of the application form described in Appendix B Application Form for EDAS Service is available at the EDAS User Support website[17].

Before proceeding with the submission to the EDAS Helpdesk of the registration information, users are asked to carefully read and explicitly accept the conditions of use for the EDAS Service and personal data management.

After the verification of the provided data and the approval of the EDAS Service Provider, the EDAS Helpdesk will provide the user with the configuration details necessary to activate the requested EDAS account.

Additionally, the necessary credentials will be provided in order to allow the user to download the EDAS Client SW and specific user documentation from the EDAS User Support Website (see section 4 for details of EDAS system and EDAS Client Software).

7.2 EGNOS & EDAS and Maritime Helpdesk

The EGNOS Helpdesk is the single point of contact for the EGNOS users' community providing information of the system and OS & SoL services. The EDAS/Maritime Helpdesk performs the same function for the EDAS and ESMAS users.

EDAS users are welcome to contact the EDAS/Maritime Helpdesk for EDAS registration and for any request or question related to EDAS including but not limited to EDAS services status and performance, connectivity issues, technical specifications, data streams structure, conditions of use, etc.

The EGNOS and EDAS/Maritime Helpdesk operates 365 days per year on an H24 basis (operating language is English). Users may contact the EDAS Helpdesk by e-mail or by phone (more details in Table 3).

7.3 EDAS First Connection Support

In order to set up the first connection, the user has to follow the indications provided in the Client SW user manual [RD-7] for SL0/SL2 and DF and in the user info packages for FTP [RD-16], SISNeT [RD-17] and Ntrip [RD-18]. In case that the connection is not achieved, the user is advised to contact the EDAS Helpdesk.

7.4 EDAS Services Real-time Status

EDAS users can check real-time status of all EDAS services (SL0, SL2, Ntrip, FTP, SISNeT and Data Filtering), as shown in Figure 8, through the following link:

[17] User shall be previously logged on the EDAS User Support Website.

https://edas-maritime.gsc-europa.eu/edas/edas-realtime-performance.

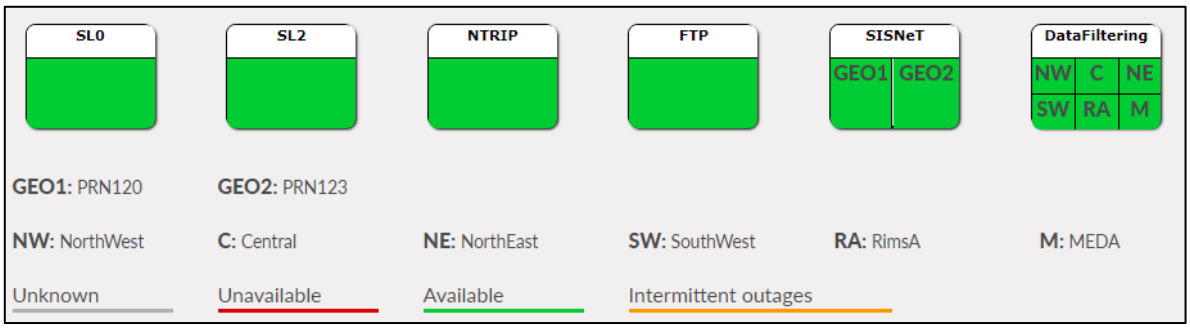


Figure 8: EDAS Services real-time status example on EGNOS User Support Website

7.5 EDAS Regular/Urgent Request

EDAS related requests are classified in two categories by the EDAS Helpdesk:

- EDAS urgent request[18]: inquiries signalling technical failures of EDAS (temporary service outage) are tagged as high priority requests. The resolution time[19] for this kind of requests is one hour at maximum.
- EDAS regular request: all the inquiries not falling in the previous category are normal priority requests. The resolution time[20] for this kind of requests is 3 working days[21].

7.6 EDAS Incident Management/Communication

Planned maintenance activities on the EDAS system that could result in a service outage or degradation will be notified to registered EDAS users by e-mail at least three working days in advance.

7.7 EGNOS Monthly Performance Report (including EDAS)

EDAS services performance is regularly made available to EDAS users and the general public through the EGNOS Monthly Performance Report published at the EDAS user Support Website[22].

[18] For urgent requests, it is recommended to contact the EDAS Helpdesk by phone.

[19] Resolution time for this kind of requests shall be understood as the time it takes to the EDAS Helpdesk to inform the user on whether a specific EDAS service is up/down.

[20]Resolution time for this kind of requests shall be understood as time it takes to the EDAS Helpdesk to provide the user with the requested information. In specific cases (e.g. interaction with other entity required), the EDAS Helpdesk may contact the users to inform that the request is being processed and that the resolution time will be enlarged.

[21] Spanish working days.

[22] Refer to Table 3.

APPENDIX A OBSERVED EDAS PERFORMANCE

Below, the performance of EDAS Services performance from March 2024 to July 2024 is presented:

- Availability: Percentage of time over the month during which the service provides the data according to the specifications.
- Latency: Average of the percentile 95th latencies monitored for every 5 minutes period within the month.

	Availability (%)				
EDAS Service	**Mar 2024**	**Apr 2024**	**May 2024**	**Jun 2024**	**Jul 2024**
SL 0	99.74%	100.00%	100.00%	100.00%	99.99%
SL 2	99.75%	100.00%	100.00%	100.00%	99.99%
Ntrip Service	99.78%	99.99%	99.98%	100.00%	99.99%
SISNeT					
SISNeT GEO1	99.75%	99.98%	99.91%	100.00%	99.98%
SISNeT GEO2	99.74%	99.98%	99.98%	99.99%	99.98%
Data Filtering Service					
DF RIMS A	99.69%	100.00%	100.00%	100.00%	99.99%
DF Central	99.69%	99.99%	100.00%	100.00%	99.99%
DF MEDA	99.70%	99.99%	100.00%	100.00%	99.99%
DF NorthEast	99.69%	99.99%	100.00%	100.00%	99.99%
DF NorthWest	99.69%	99.99%	100.00%	100.00%	99.99%
DF SouthWest	99.70%	100.00%	100.00%	100.00%	99.99%
FTP Service	99.87%	100.00%	100.00%	100.00%	100.00%

Table 13: EDAS availability from March 2024 to July 2024

	Latency (ms)				
EDAS Service	**Mar 2024**	**Apr 2024**	**May 2024**	**Jun 2024**	**Jul 2024**
SL 0	628.42	686.00	815.65	685.20	638.84
SL 2	610.61	681.60	817.97	687.70	641.06
Ntrip Service	642.68	618.55	607.45	609.17	602.65
SISNeT					
SISNeT GEO1	52.35	47.13	47.03	46.37	48.06
SISNeT GEO2	53.26	47.66	47.26	46.90	48.35
Data Filtering Service					
DF RIMS A	533.71	618.91	793.77	636.90	572.23
DF Central	436.37	529.26	730.27	442.90	442.23
DF MEDA	467.52	454.96	632.26	487.50	471.97
DF NorthEast	181.84	189.96	191.90	349.50	269.48
DF NorthWest	532.94	527.35	540.19	537.30	516.55
DF SouthWest	495.55	491.71	666.68	500.03	502.52

Table 14: EDAS latency from March 2024 to July 2024

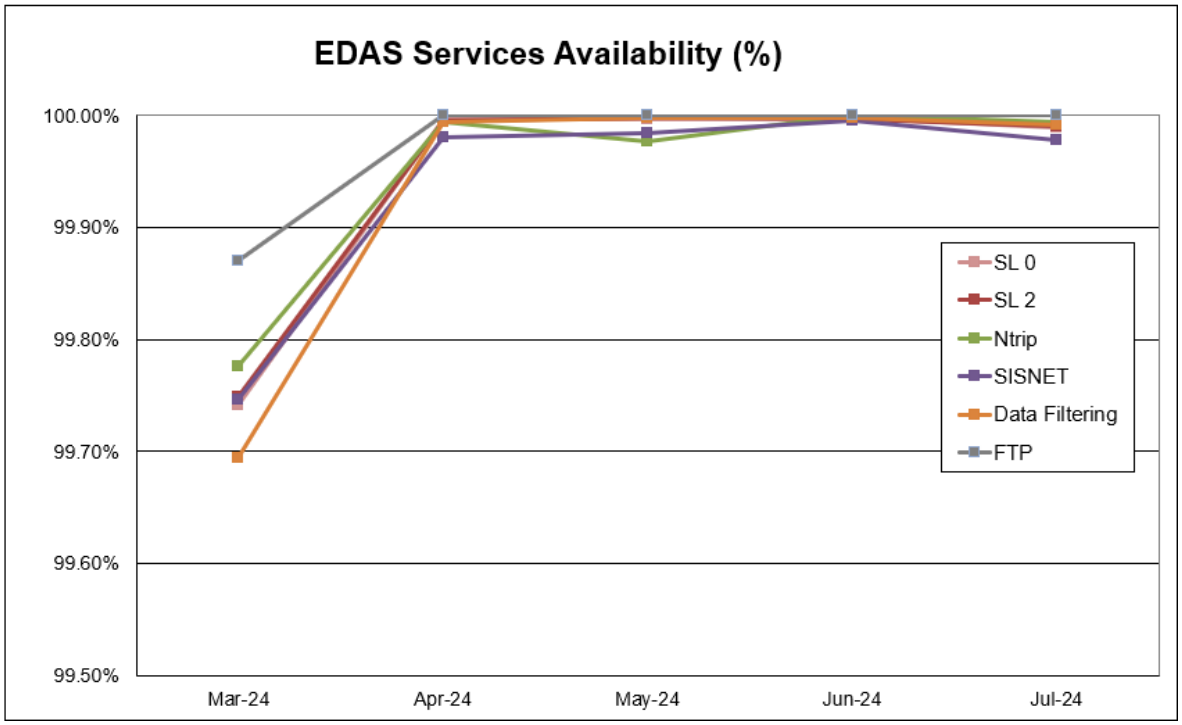


Figure 9: EDAS availability from March 2024 to July 2024

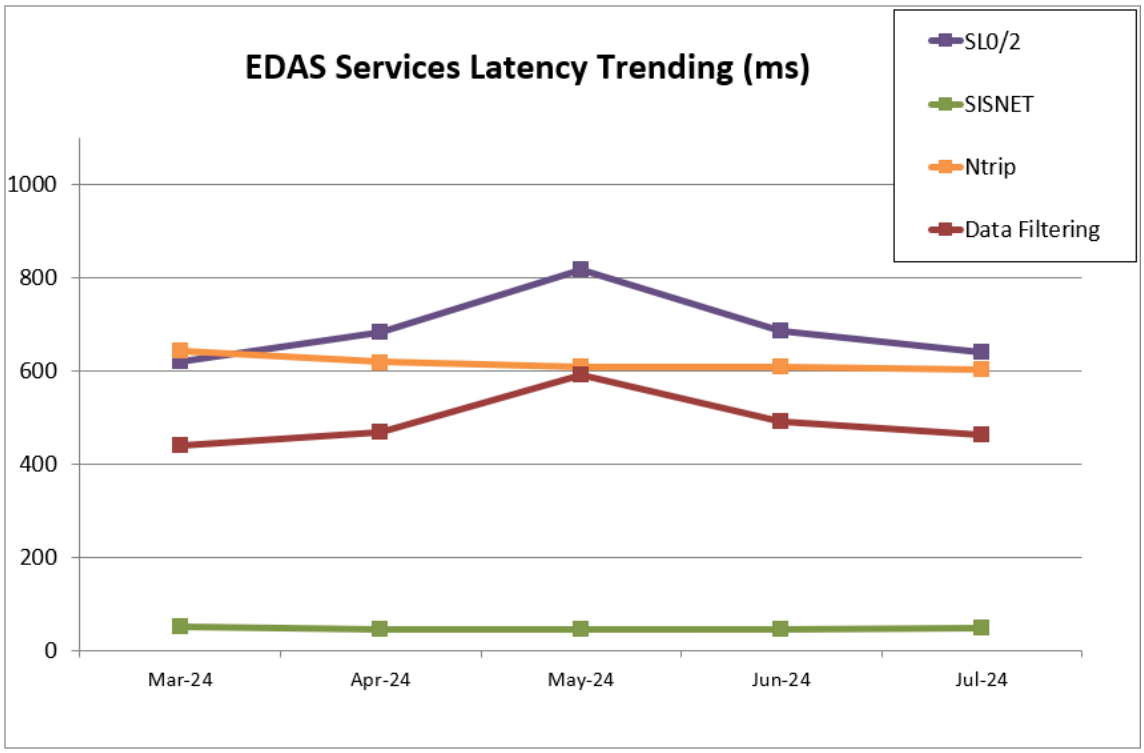


Figure 10: EDAS latency from March 2024 to July 2024

APPENDIX B APPLICATION FORM FOR EDAS SERVICE

The EDAS application form is implemented through a web form that can be filled on-line at the EDAS User Support website (https://edas-maritime.gsc-europa.eu/edas/edas-account-generation), only for registered users.

A submitted application form is not automatically accepted, it has to be approved by the EDAS Service Provider in order to obtain the EDAS access credentials.

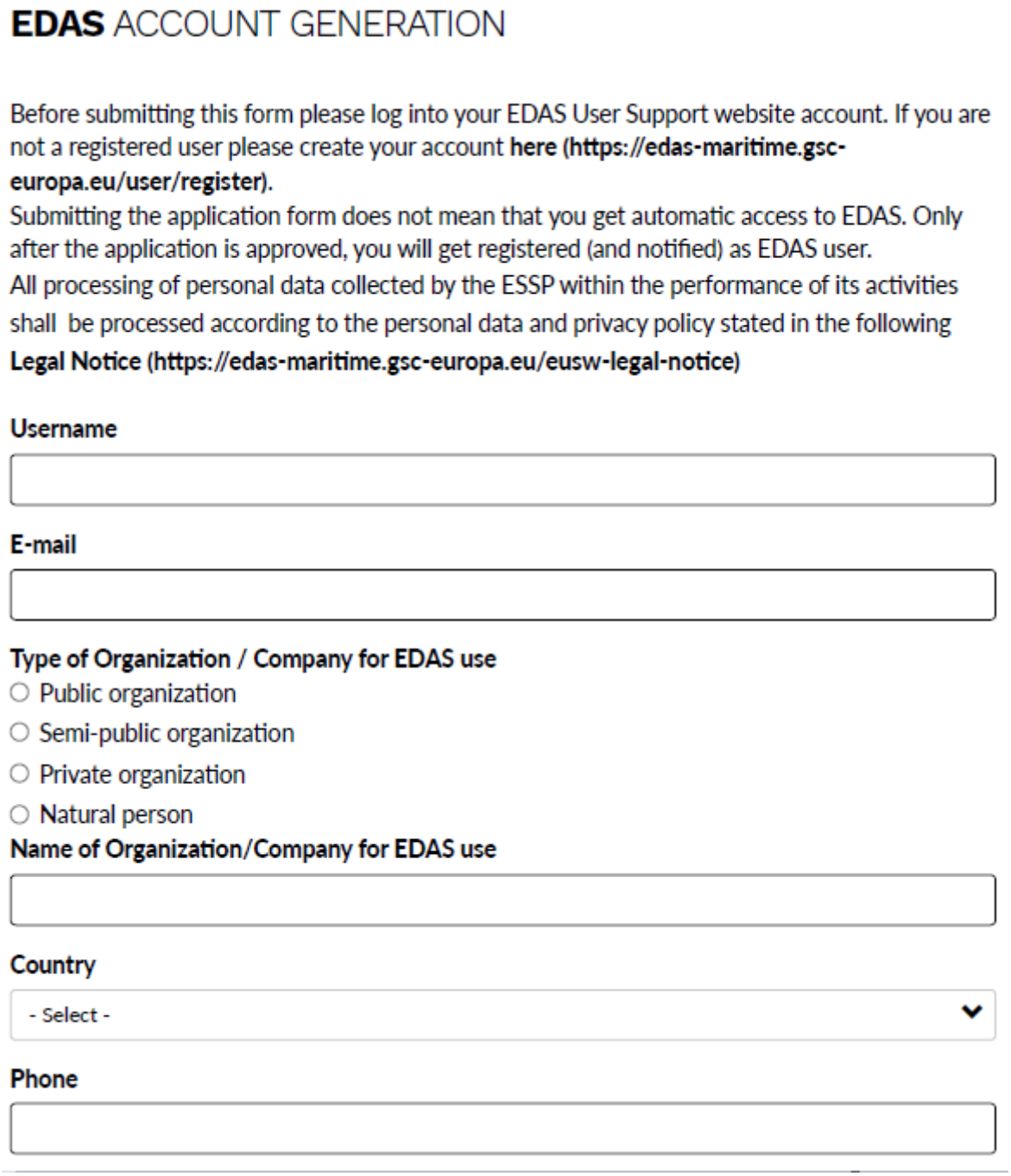


Figure 11: First part of the Application Form

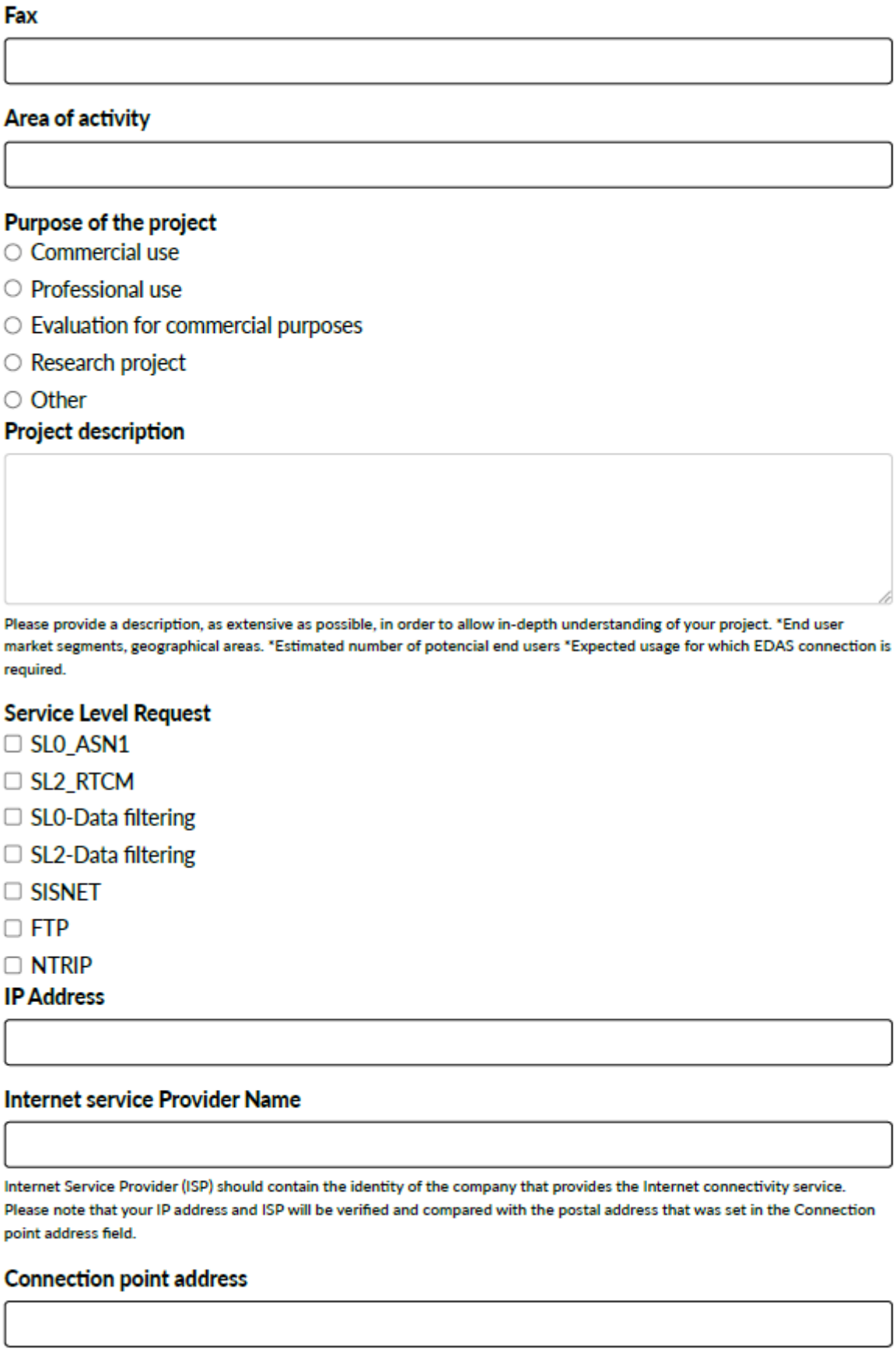


Figure 12: Second part of the Application Form

Duration

- None -

Please provide us with the estimated duration of your EDAS account. This field is not mandatory and the information will only be used to estimate the EDAS usage evolution and to size the EDAS capacity. In case you decide to stop using EDAS, please inform us to EGNOS-helpdesk@essp-sas.eu in order to deactivate your EDAS account and free up resources for other potential new EDAS users.

EDAS Conditions

2.1 Requirements for using EDAS

The usage of EDAS requires the following elements :

(Each application will be approved or rejected according to the Conditions of Use).

☐ EDAS conditions and **privacy statement (/eusw-privacy-statement)**

Consent form related to the EGNOS and EDAS and Maritime User Support Websites, E-GNSS Call Centre, and EDAS and Maritime and EGNOS Helpdesk

Information on the consent form:

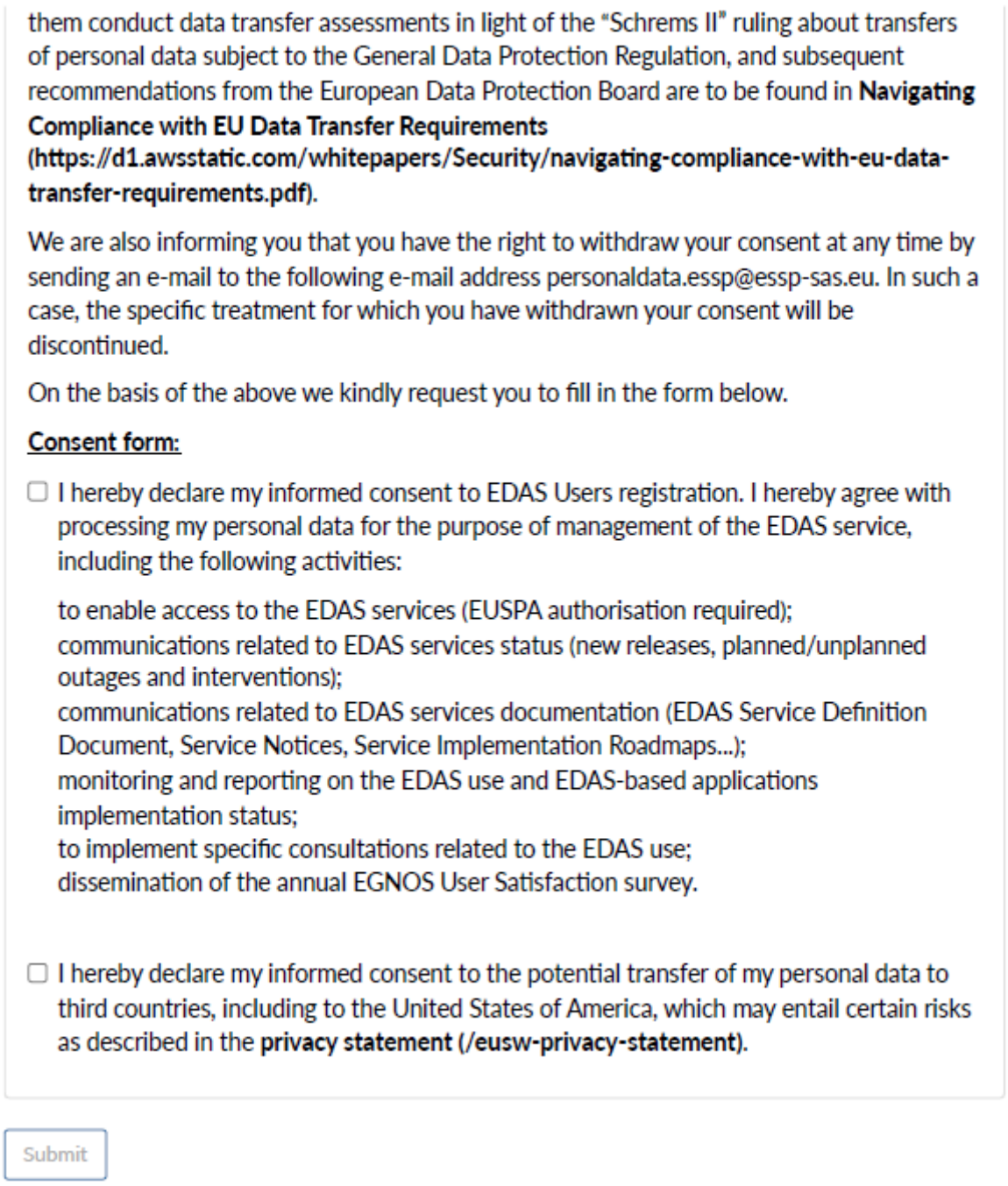
When using the EGNOS and EDAS and Maritime User Support Website, E-GNSS Call Centre, and EDAS and Maritime and EGNOS Helpdesk, the European Union Agency for the Space Programme might process your personal data.

If you choose not to use the EGNOS and EDAS and Maritime User Support Website, E-GNSS Call Centre, and EDAS and Maritime and EGNOS Helpdesk, there will be no negative consequences for you. Your consent shall be free, specific, informed and unambiguous.

Information about the way EUSPA collects, handles and ensures protection of all personal data provided and further information on personal data processing are provided in the **Privacy Statement regarding protection of personal data in relation to the EGNOS and EDAS and Maritime User Support Websites, E-GNSS Call Centre, and EDAS and EGNOS Helpdesk.**

Please be informed that EGNOS User Support website database's hosting services, sub-contracted to GMV, use Amazon Web Services servers located in Europe. Amazon Web Services (AWS) are provided by Amazon.com Inc, US incorporated/based company. According to AWS, a small number of AWS services might involve the transfer of data to the US, for example, to develop and improve those services or because transfer is an essential part of the service (such as a content delivery service). Personal data that may be transferred to the United States of America may be subject to (a) disclosure to governmental authorities and/or (b) further transfer to other economic operators established in third countries; the EUSPA has no visibility on such processing operations. Detailed information about services and resources that AWS offers customers to help

Figure 13: Third part of the Application Form


them conduct data transfer assessments in light of the "Schrems II" ruling about transfers of personal data subject to the General Data Protection Regulation, and subsequent recommendations from the European Data Protection Board are to be found in **Navigating Compliance with EU Data Transfer Requirements (https://d1.awsstatic.com/whitepapers/Security/navigating-compliance-with-eu-data-transfer-requirements.pdf)**.

We are also informing you that you have the right to withdraw your consent at any time by sending an e-mail to the following e-mail address personaldata.essp@essp-sas.eu. In such a case, the specific treatment for which you have withdrawn your consent will be discontinued.

On the basis of the above we kindly request you to fill in the form below.

Consent form:

☐ I hereby declare my informed consent to EDAS Users registration. I hereby agree with processing my personal data for the purpose of management of the EDAS service, including the following activities:

to enable access to the EDAS services (EUSPA authorisation required);
communications related to EDAS services status (new releases, planned/unplanned outages and interventions);
communications related to EDAS services documentation (EDAS Service Definition Document, Service Notices, Service Implementation Roadmaps...);
monitoring and reporting on the EDAS use and EDAS-based applications implementation status;
to implement specific consultations related to the EDAS use;
dissemination of the annual EGNOS User Satisfaction survey.

☐ I hereby declare my informed consent to the potential transfer of my personal data to third countries, including to the United States of America, which may entail certain risks as described in the **privacy statement (/eusw-privacy-statement)**.

Submit

Figure 14: Forth part of the Application Form

APPENDIX C EDAS DATA FILTERING SERVICE: CONFIGURATION

As a complement to the information provided about the EDAS Data Filtering Service in section 5.2, the configuration of this service is described hereafter (in terms of groups of RIMS stations available in the service configuration). The information in this section intends to illustrate the way in which the EDAS Data Filtering service groups can be defined.

Please be aware that this information is only indicative and the list of RIMS groups available may evolve with time. In order to check the up to date service configuration, the reader may refer to [RD-7] available at the EDAS specific section of the EDAS User Support Website (https://edas-maritime.gsc-europa.eu/).

The following groups are currently configured for the EDAS Data Filtering service (see Figure 15):

- **GROUP RIMS_A**: This group corresponds to all the RIMS A of the EGNOS system.
- **GROUP Central**: This geographical group involves all the RIMS A sites located approximately in the centre of Europe.
- **GROUP NorthWest**: This geographical group gathers the RIMS A sites located over the Northwest of Europe.
- **GROUP NorthEast**: This geographical group includes the RIMS A sites located over the Northeast of Europe.
- **GROUP SouthWest**: This geographical group gathers the RIMS A sites located over the Southwest of Europe.
- **GROUP MEDA**: This geographical group gathers the RIMS A sites located over the Mediterranean area.

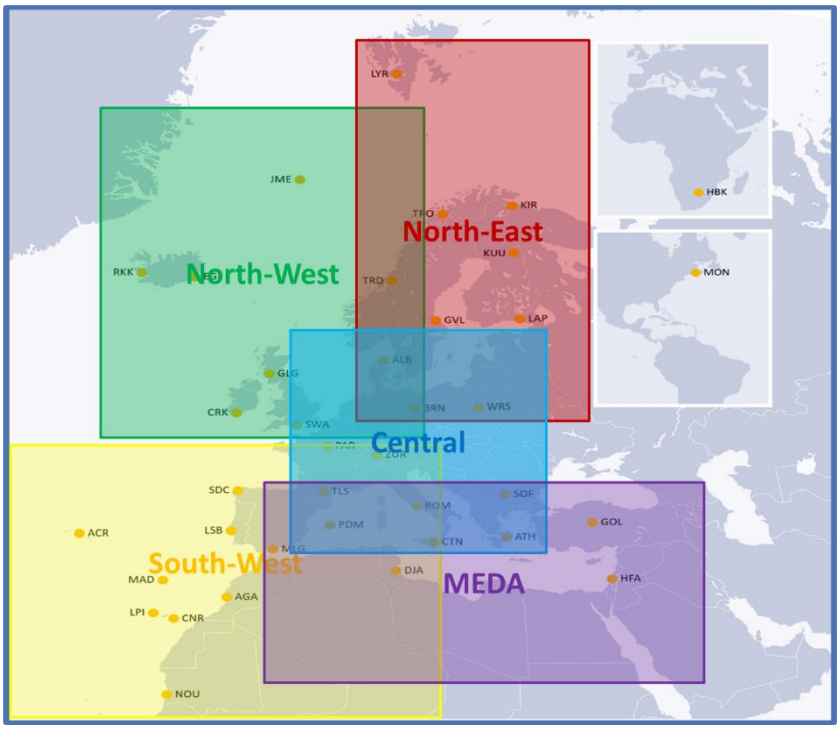


Figure 15: RIMS group distribution

The exhaustive list of the RIMS stations included in each group name is listed below:

Group Name	RIMS sites
GROUP RIMS_A	All RIMS A[23]
GROUP Central	ZURA, BRNA, TLSA, PDMA, SWAA, ALBA, WRSA, ROMA, SOFA, ATHA, CTNA
GROUP NorthWest	RKKA, EGIA, JMEA, TRDA, ALBA, SWAA, GLGA, CRKA, BRNA
GROUP NorthEast	TRDA, ALBA, WRSA, BRNA, GVLA, LAPA, TROA, KIRA, LYRA, KUUA
GROUP SouthWest	ROMA, CTNA, DJAA, TLSA, SDCA, LSBA, MLGA, PDMA, MADA, ACRA, LPIA, CNRA, NOUA, AGAA
GROUP MEDA	MLGA, PDMA, CTNA, DJAA, ATHA, GOLA, TLSA, ROMA, SOFA, HFAA

Table 15: RIMS sites included per Group Name

[23] This group includes RIMS PAR A, which is not part of any other defined group.

APPENDIX D DEFINITIONS

Terms	Definition
Availability	When applied to EDAS services, percentage of time over one month in which EDAS is providing its services according to specifications (see [RD-7] for a detailed description of EDAS services messages). The availability of EDAS services is measured at the EDAS system output (excluding external network performance).
Latency	When applied to EDAS services, it shall be understood as time elapsed since the transmission of the last bit of the navigation message from the space segment (EGNOS and GPS/GLONASS satellites) until the data leave the EDAS system (formatted according to the corresponding service specification). EDAS latency is a one-way parameter.
A-GNSS	Technique that allows a GNSS receiver acquiring a position fix within seconds by sending assistance data from a server via the radio network.
ASN.1	Notation called Abstract Syntax Notation One (ASN.1) to define the syntax of information data. It defines a number of simple data types and specifies a notation for referencing these types and for specifying values of these types. Please refer to [RD-9] for further details.
Cyclic Redundancy Check (CRC)	Error-detecting code commonly used in digital networks and storage devices to detect accidental changes to raw data.
DGNSS	Differential GNSS is a kind of GNSS augmentation system based on an enhancement to primary GNSS constellation(s) information by the use of a network of ground-based reference stations which enable broadcasting of differential information to the user to improve the accuracy of his position, but the integrity is not assured.
EMS	EGNOS Message Server format has been defined by ESA for the provision of EGNOS messages. EMS format 2.0 is described in [RD-10]
IONEX	IONosphere map Exchange format: Common data format that supports the exchange of 2 and 3 dimensional TEC maps given in an ionospheric grid. IONEX 1.0 format (the one selected for the provision of ionosphere related information for the EDAS FTP Service) is described in [RD-11].
Ntrip	“Networked Transport of RTCM via Internet Protocol” (Ntrip) stands for an application-level protocol streaming Global Navigation Satellite System (GNSS) data over the Internet. Ntrip is a generic, stateless protocol based on the Hypertext Transfer Protocol HTTP/1.1. The full protocol description (version 1.0 [RD-12] and version 2.0 [RD-13]) can be purchased at https://rtcm.myshopify.com/collections/differential-global-navigation-satellite-dgnss-standards
RINEX	Receiver Independent Exchange Format (RINEX) is data interchange format for raw satellite navigation system data. RINEX 2.11 version (the one selected for the EDAS FTP Service) is described in [RD-14].
RINEX-B	Receiver Independent Exchange Format (RINEX) type for broadcasting of GEO satellite data. RINEX-B format (one of the formats selected for the EGNOS GEO satellites navigation message provision for the EDAS FTP Service) is described in [RD-15].

Terms	Definition
RTCM	Standard format that is used on Differential GNSS services worldwide. Version 3 of this standard supports very high accuracy navigation and positioning through a broadcast to mobile GNSS receivers, which allows the receivers to compensate for errors that exist in satellite positioning without augmentation. This latest edition includes an interoperable definition for Network Real-Time Kinematic (Network RTK) operation, which supports centimetre-level accuracy positioning service over large regions. Full description of RTCM formats are given respectively in [RD-4], [RD-5] and [RD-6].
RTK	Real Time Kinematic (RTK) navigation is a technique which based on the phase measurements of GNSS signals and real-time corrections from a reference station, can provide centimetre level accuracy.
SISNeT	Specific protocol for the transmission of EGNOS messages over TCP/IP developed by ESA. Please refer to [RD-8] for a detailed description of SISNeT protocol.

Table 16: Definitions

APPENDIX E LIST OF ACRONYMS

The following table provides the definition of the acronyms used in this document.

ACRONYM	DEFINITION	ACRONYM	DEFINITION
A-GNSS	Assisted GNSS	**ISO**	International Organization for Standardization
ANGA	Augmented Navigation for Africa	**ITU**	International Telecommunications Union
ANSP	Air Navigation Service Provider	**KASS**	Korea Augmentation Satellite System
AOR	Atlantic Ocean Region	**LBS**	Location Based Services
APC	Antenna Phase Centre	**LBS**	Location Based Services
APCH	Approach	**LPV**	Localizer Performance with Vertical guidance
APV	Approach with Vertical guidance	**MCC**	Mission Control Centre
ARP	Antenna Reference Point	**MSAS**	MTSAT Satellite-based Augmentation System
ASECNA	L'Agence pour la Sécurité de la Navigation aérienne en Afrique et à Madagascar	**MTSAT**	Multi-Function Transport Satellite
ASN	Abstract Syntax Notation	**NLES**	Navigation Land Earth Station
ASQF	Application Specific Qualification Facility	**NOF**	Navigation Overlay Frame
ATC	Air Traffic Control	**NPA**	Non-Precision Approach
C/A	Coarse/Acquisition	**NTP**	Network Time Protocol
CCF	Central Control Facility	**Ntrip**	Networked Transport of RTCM via Internet Protocol
CPF	Central Processing Facility	**OS**	Open Service
CRC	Cyclic Redundancy Check	**PACF**	Performance Assessment and Check-out Facility

ACRONYM	DEFINITION	ACRONYM	DEFINITION
DAB	Digital Audio Broadcast	**PBN**	Performance Based Navigation
DGNSS	Differential GNSS	**PRN**	Pseudo-Random Number
EASA	European Aviation Safety Agency	**PTP**	Point-To-Point
EC	European Commission	**PVT**	Position Velocity and Timing
ECAC	European Civil Aviation Conference	**R&D**	Research & Development
EDAS	EGNOS Data Access Service	**RD**	Reference Document
EDS	EGNOS Data Server	**RDS**	Radio Data System
EGNOS	European Geostationary Navigation Overlay Service	**RIMS**	Range and Integrity Monitoring Station
EMS	EGNOS Message Server	**RINEX**	Receiver Independent Exchange Format
ESA	European Space Agency	**RNP**	Required Navigation Performance
ESMAS	EGNOS Safety of Life assisted service for Maritime userS	**RTCM**	Real Time Correction Message
ESSP	European Satellite Services Provider	**RTK**	Real Time Kinematic
EU	European Union	**RTP**	Real-Time Transport Protocol
EUSPA	European Union Agency for the Space Programme	**RTSP**	Real Time Streaming Protocol
EWAN	EGNOS Wide Area Network	**SARPs**	Standards and Recommended Practices
FAQ	Frequently Asked Questions	**SBAS**	Satellite-Based Augmentation System
FTP	File Transfer Protocol	**SDCM**	System of Differential Correction and Monitoring
GAGAN	GPS Aided GEO Augmented Navigation	**SDD**	Service Definition Document
GEO	Geostationary Satellite	**SES**	Single European Sky

ACRONYM	DEFINITION	ACRONYM	DEFINITION
GIVE	Grid Ionospheric Vertical Error	**SIS**	Signal-in-Space
GLONASS	(Russian) Global Navigation Satellite System	**SoL**	Safety of Life
GNSS	Global Navigation Satellite System	**SP**	Service Provider
GPS	Global Positioning System	**SPS**	Standard Positioning Service
GSA	European GNSS Agency	**SW**	Software
HTTP	HyperText Transfer Protocol	**TCP**	Transport Control Protocol
ICAO	International Civil Aviation Organization	**UDRE**	User Differential Range Error
ICD	Interface Control Document	**US**	United States
IONEX	IONosphere map Exchange format.	**UTC**	Coordinated Universal Time
IOR	Indian Ocean Region	**VAL**	Vertical Alert Limit
IP	Internet Protocol	**WAAS**	Wide Area Augmentation System

Table 17: List of acronyms

TS-01-24-002-EN-N

EUSPA
European Union Agency for the Space Programme

LINKING SPACE TO USER NEEDS

www.euspa.europa.eu

@EU4Space

EUSPA

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EGNOS