EGNOS Data Access Service (EDAS)

Service Definition Document

Issue 2.3

#EUSpace

DOCUMENT CHANGE RECORD

Revision	Date	Summary of changes
1.0	26/07/2012	First release of the document
2.0	10/04/2013	New services available: FTP, SISNeT, Data filtering, Ntrip
2.1	19/12/14	• SL1 decomissioned • Resolution time for EDAS request improved • Observed EDAS services performances updated • EDAS service is clarified to be free of charge
2.2	03/06/2019	• 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 performances updated
2.3	15/07/2022	• Iceland inclusion as an EGNOS Programme Participant Member • GSA to EUSPA entity name change • EDAS related contents update

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Precise navigation, powered by Europe

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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). Presently, 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 system 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 covering EDAS data format(s) and protocol(s) technical information, along with other practical aspects, is provided to users upon registration through the EGNOS User Support Website ([RD-7], [RD-16], [RD-17], [RD-18]).

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.

This document does not address EGNOS Open Service (OS) nor EGNOS Safety of Life (SoL) service. Information about the EGNOS OS is available in a separate document called the "EGNOS Service Definition Document – Open Service" (EGNOS SDD OS – [RD-1]), whilst information regarding EGNOS SoL can be found in the "EGNOS Service Definition Document – Safety of Life Service" (EGNOS SDD SoL - [RD-2]).

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

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, the relevant reference documentation and clarifies the terms and conditions of EDAS use including liability.
- Section 3 ("Description of EGNOS System and the EGNOS Data Service (EDAS) Provision Environment") gives a brief description of the EGNOS system and services, as well as its technical and organisational framework for EDAS service provision.
- Section 4 ("EGNOS Data Access 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 provides EDAS services availability performance between January 2022 and May 2022.

- APPENDIX B shows the application form that needs to be filled by those willing to register as EDAS users.
- APPENDIX C provides the current configuration of the EDAS Data Filtering Service, mainly in terms of groups of stations available.
- APPENDIX D includes the glossary of terms and presents relevant definitions.
- APPENDIX E provides the list of acronyms of the document.

This document does not address the Safety of Life Service (SoL) nor the Open Service (OS), which are described in separate dedicated Service Definition Documents.

2.2 Terms and Conditions of Use of EGNOS Data Access Service, Including Liability

EDAS provides ground-based access to EGNOS data. EDAS is accessible to EU users (within EU Member States, Norway, Switzerland and Iceland) upon registration and to non-EU users upon registration and authorisation by the EGNOS Service Provider. Access is provided through the connection to a dedicated Internet domain (egnos-edas.eu). EDAS is free of charge and can only be used for non-safety critical purposes, i.e. purposes that have no impact on the safety of human life and where a failure in availability, integrity, continuity or accuracy of the EDAS services could not cause any kind of direct or indirect personal damage, including bodily injuries or death.

Although care has been taken in designing, implementing and operating the EDAS system, as well as in providing EDAS services, it is not meant to offer a service guarantee or liability from the EGNOS service provider, the European Union, EUSPA or ESA. The minimum level of performance against which the EDAS system

has been designed is provided in this document (EDAS SDD) solely for the reasons of transparency in order to enable the user to make an informed decision regarding EDAS use. However, actual EDAS performance may differ in the future.

2.2.1. SCOPE OF THE EDAS COMMITMENT

The EGNOS Data Access Service (further "EDAS") comprises the provision of data collected, generated and delivered by the EGNOS infrastructure, with the specific committed performance and subject to the service limitations described here in the EGNOS EDAS Service Definition Document (further "**EDAS SDD**").

Only minimum performance characteristics are included in the commitment even though the users can usually experience a better performance.

2.2.2. USER RESPONSIBILITIES

The user retains his responsibility to exercise a level of care appropriate with respect to the uses to which he puts the EDAS, taking into account the considerations outlined above.

Before any use of the EDAS, all users should study this document in order to understand how they can use the service, as well as to familiarise themselves with the performance level and other aspects of the service they can rely on.

In case of doubt, the users and other parties should contact the EGNOS helpdesk (see section 3.2.2 for contact details).

EDAS users and/or service providers are not allowed to distribute EDAS data to parties who are non-EU[1] nationals or are not registered in the EU (for natural and legal persons respectively), unless the EGNOS Service Provider authorises to do so. Requests for such authorisations, indicating the non-EU party to whom such EDAS data would be made available and the uses the non-EU party would make of the EDAS data, shall be submitted to the EGNOS Helpdesk. In case EDAS data is published or make available to any third parties (both EU and non-EU based), the publishing or disclosing party shall acknowledge the original source of the data.

DISCLAIMER OF LIABILITY

The European Union, as the owner of the EDAS system, the European Union Agency for the Space Programme (EUSPA) as EGNOS Programme manager and ESSP SAS, as EGNOS services provider, expressly disclaim all warranties of any kind (whether expressed or implied) with respect to EDAS, including, but not limited to the warranties regarding availability, continuity, accuracy, integrity, reliability and fitness for a particular purpose or meeting the users' requirements. No advice or information, whether oral or written, obtained by a user from the European Union, EUSPA or ESSP SAS and its business partners shall create any such warranty.

By using EDAS, the user agrees that neither the European Union nor EUSPA nor ESSP SAS shall be held responsible or liable for any direct, indirect, incidental, special or consequential damages, including but not limited to, damages for interruption of business, loss of profits, goodwill or other intangible losses, resulting from the use of, misuse of or the inability to use EDAS.

Any damage as result or consequence of EDAS beyond the conditions and limitations of use set forth in this EDAS SDD shall not be entitled to any claim against ESSP SAS and/or the European Union and/or EUSPA.

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[1] Norway, Switzerland and Iceland have the same consideration than EU countries for this purpose

2.3   The Use of EDAS

EDAS is intended to deliver a wide range of benefits to European citizens 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.

2.4   Reference Documents

It is important to note that some of the EDAS related documents listed below are only available to EDAS registered users.

RD	Document Title
[RD-1]	EGNOS Service Definition Document – Open Service (OS SDD) https://egnos-user-support.essp-sas.eu/new_egnos_ops/documents/egnos-sdd/egnos-open-service-sdd
[RD-2]	EGNOS Service Definition Document – Safety of Life Service (SoL SDD) https://egnos-user-support.essp-sas.eu/new_egnos_ops/documents/egnos-sdd/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://egnos-user-support.essp-sas.eu/new_egnos_ops/services/edas-service/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://egnos-user-support.essp-sas.eu/new_egnos_ops/services/edas-service/downloads
[RD-17]	SISNeT User Information Package, only available after registration for EDAS users in: https://egnos-user-support.essp-sas.eu/new_egnos_ops/services/edas-service/downloads
[RD-18]	Ntrip User Information Package, only available after registration for EDAS users in: https://egnos-user-support.essp-sas.eu/new_egnos_ops/services/edas-service/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

3 DESCRIPTION OF THE EGNOS SYSTEM AND EGNOS DATA SERVICE (EDAS) PROVISION ENVIRONMENT

3.1 High Level Description of the EGNOS Technical Framework

3.1.1. OBJECTIVE OF EGNOS

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 (i.e. ionospheric errors, satellite position/clock errors, etc.). 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 the view of this network of monitoring stations are also broadcast, increasing the confidence that a user can have in the satellite navigation positioning solution.

3.1.2. EGNOS OVERVIEW

3.1.2.1 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:
- Open Service (OS), freely available to any user;
- Safety of Life (SoL) Service, that provides the most stringent level of signal-in-space performance to all Safety of Life user communities;
- 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.

OS and SoL services 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.

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].

Safety of Life (SoL) Service

The main objective of the EGNOS SoL service is to support civil aviation operations down to Localiser Performance with Vertical Guidance (LPV) minima. At this stage, a detailed performance characterisation has been conducted only against the requirements expressed by civil aviation but the EGNOS SoL service might also be used in a wide range of other application domains (e.g. maritime, rail, road...) in the future. 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 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]:

- 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.

The EGNOS SoL Service has been available since March 2nd 2011, and the corresponding SDD is [RD-2].

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 to final customers (refer to section 2.3 for examples of EDAS based services and applications).

The EDAS service is available since July 26th 2012 being this document the applicable SDD.

3.1.2.2 EGNOS: The European SBAS

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) and India (GPS Aided GEO Augmented Navigation – GAGAN). Analogous systems are under commissioning or deployment in other regions of the world (e.g. System

of Differential Correction and Monitoring – SDCM in Russia , Korea Augmentation Satellite System – KASS in South Korea) or under investigation (e.g. BeiDou SBAS – BDSBAS in China, Southern Positioning Augmentation Network – SPAN in Australia and New Zealand, and SBAS for Africa – A-SBAS in Africa and Indian Ocean). The worldwide existing and planned SBAS systems are shown in Figure 3.1.

In addition, EGNOS have plans to extend their service areas to neighbouring regions, thus paving the way for near global SBAS coverage.

Figure 3.1 **Existing and planned SBAS systems**
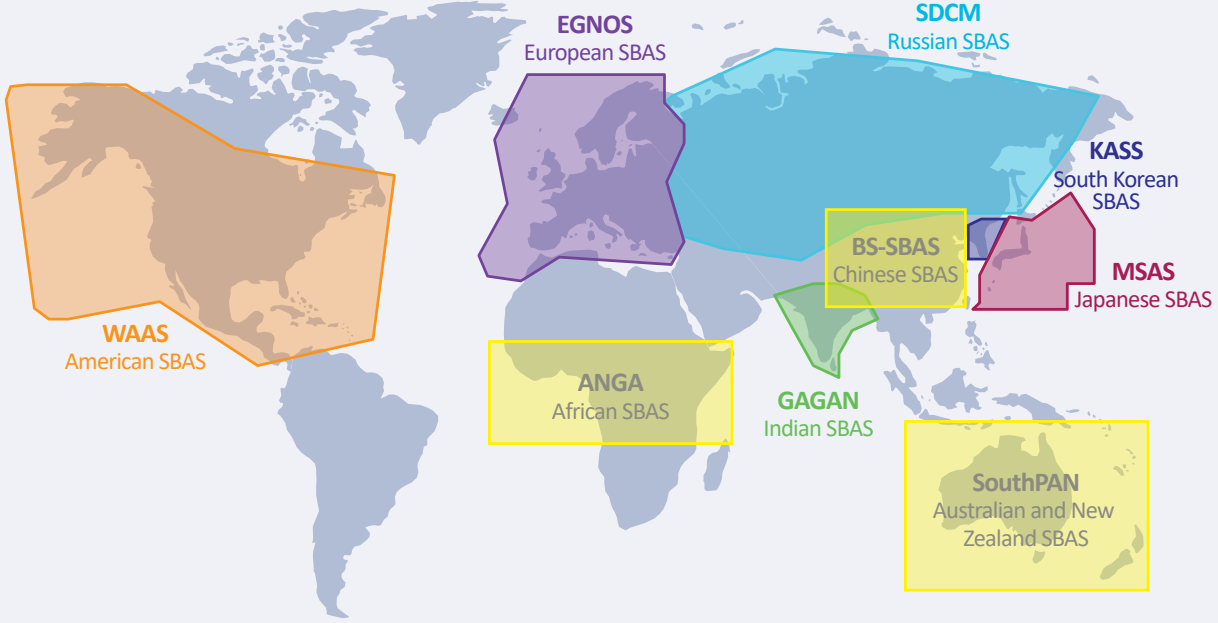
3.1.2.3 EGNOS Architecture

The EGNOS functional architecture is shown in Figure 3.2.

In order to provide its services to users equipped with appropriate receivers, the EGNOS system comprises two main segments: the Space Segment, and the Ground Segment.

Figure 3.2 EGNOS architecture
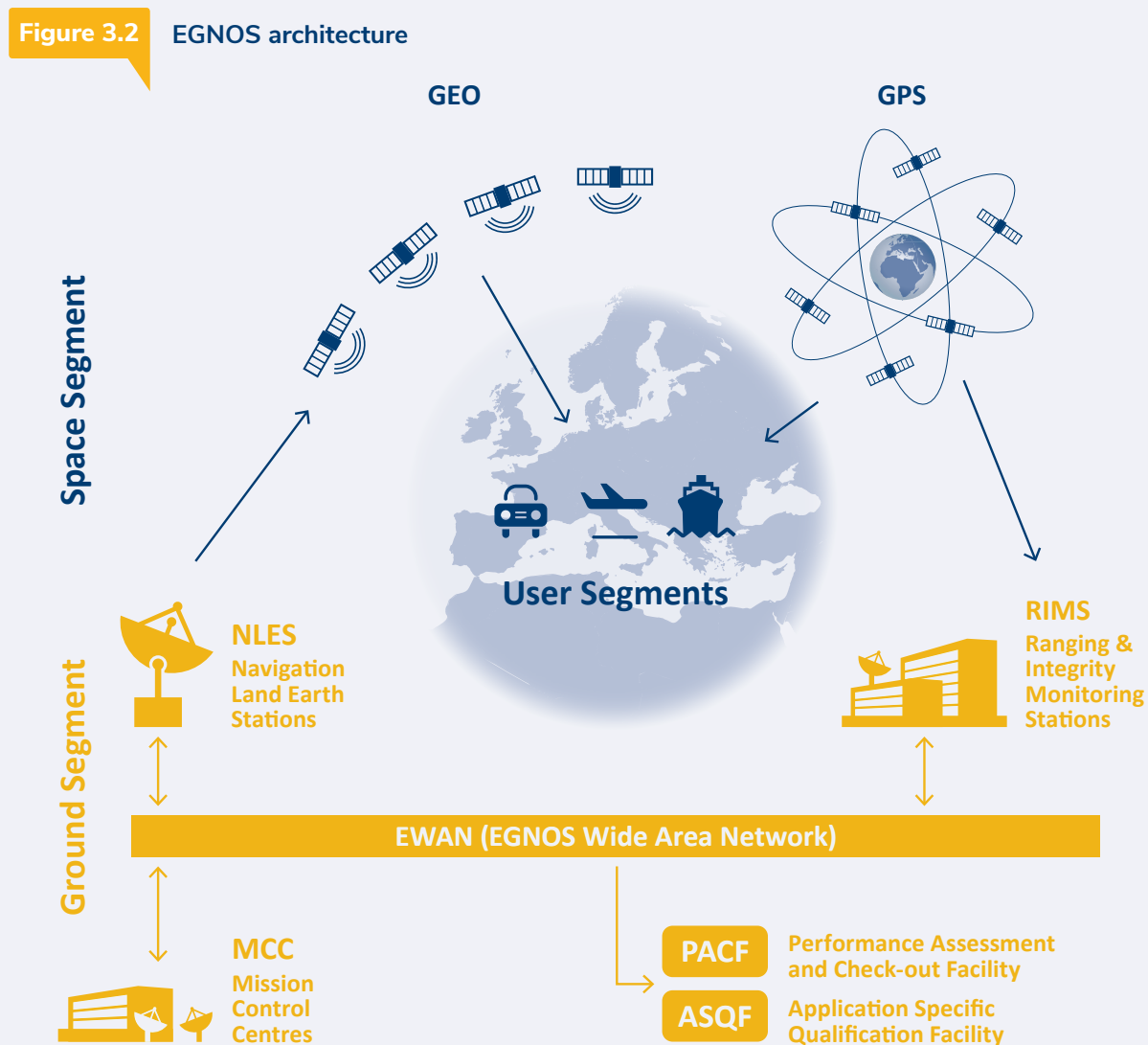
EGNOS Space Segment

The EGNOS Space Segment comprises 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:

Table 3.1 **GEOs used by EGNOS**

GEO Name	PRN Number	Orbital Slot
ASTRA-5B	PRN 123	31.5 E
ASTRA SES-5	PRN 136	5 E
INMARSAT 4F2 EMEA	PRN 126	64 E

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, the others broadcasting 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 (https://egnos-user-support.essp-sas.eu/new_egnos_ops/).

It is intended that the EGNOS space segment will be replenished over time in order to maintain a similar 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 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 (https://egnos-user-support.essp-sas.eu/new_egnos_ops/documents/field_gc_document_type/service-notices-87) and distributed.

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 (ESSP SAS).

- **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 39 RIMS sites located over a wide geographical area.

Figure 3.3 shows the geographical distribution of the deployed RIMS (in grey the ones not yet contributing to the EGNOS services).

Figure 3.3 EGNOS RIMS sites

• **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. These monitoring functions are tailored to the Safety of Life functions and will not be further detailed in this document.

• **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:
  - Select the CPF that broadcast the SBAS message
  - Modules the message provided by the CPF
  - Synchronizes the uplink signal with GPS time
  - Send data to the GEO satellites

• **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.

3.2 EGNOS Organisational Framework

3.2.1. 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 Satellite Services Provider (ESSP) SAS is the current EGNOS Services Provider within Europe, certified according to the Single European Sky (SES) regulation as Air Navigation Service Provider (ANSP). ESSP SAS provides the EGNOS OS, EDAS and SoL

Service compliant with ICAO (International Civil Aviation Organization) Standards and Recommended Practices throughout the European Civil Aviation Conference (ECAC) region. ESSP SAS as EGNOS service provider also generates EGNOS Notice To Airmen (NOTAM) proposals to the appropriate Aeronautical Information Service providers within Europe that should validate and distribute the final Official EGNOS NOTAM.

3.2.2. HOW TO GET INFORMATION ON EGNOS AND EGNOS APPLICATIONS OR CONTACT THE SERVICE PROVIDER

A number of websites and e-mail addresses are made available by the EC, EUSPA, ESSP SAS and other organisations to provide detailed information on the EGNOS programme, the system status and system performance, as well as a number of useful tools. Table 3.2 below lists the main sources of information about EGNOS.

Table 3.2   **Where to find information about EGNOS**

Topic	Organisation	Web/contact details
EGNOS Programme: EC institutional information about the EGNOS Programme	**EC**	http://ec.europa.eu/growth/sectors/space/egnos/
What is EGNOS? General information related to EGNOS Programme.	**EUSPA**	https://www.euspa.europa.eu/european-space/egnos/what-egnos
EGNOS User Support EGNOS website with general information and applications. It is the ESSP dedicated service to users on EGNOS status and performance, system description, historical and real time services performance, forecasts, EGNOS applicable documentation, FAQs, etc. A specific EDAS section is also available.	**ESSP**	https://egnos-user-support.essp-sas.eu/
EGNOS Helpdesk Direct point of contact for any question related with the EGNOS system, its performance and applications.	**ESSP**	https://egnos-user-support.essp-sas.eu/new_egnos_ops/helpdesk +34 911 236 555 egnos-helpdesk@essp-sas.eu
EGNOS app Direct point of contact for any question related with the EGNOS system, its performance and applications.	**ESSP**	https://itunes.apple.com/app/egnos/id1346540596?ls=1&mt=8 https://play.google.com/store/apps/details?id=com.essp.egnosapp
EGNOS Service Provider activity ESSP official reporting of service provider activities, news, etc.	**ESSP**	http://www.essp-sas.eu
EGNOS receivers EASA mailbox for any question related to service difficulties or malfunctions of EGNOS certified receivers	**EASA**	egnos@easa.europa.eu
EDAS General information about EDAS	**EUSPA/EC/ESSP**	https://egnos-user-support.essp-sas.eu/new_egnos_ops/services/about-edas

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 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.

Figure 4.1 **EDAS High-Level Architecture**
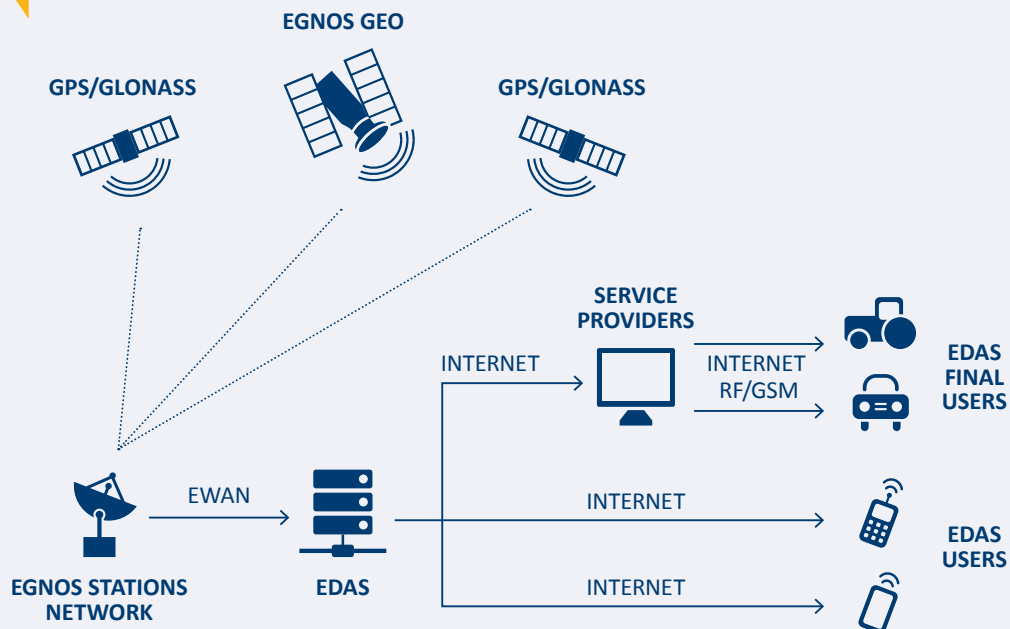
4.2 Overview of the Architecture

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 Dara Streams Service Level 0 (SL0), Service Level 2 (SL2)) and EDAS Data Filtering[2] (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].

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

Figure 4.2   **EDAS Architecture**
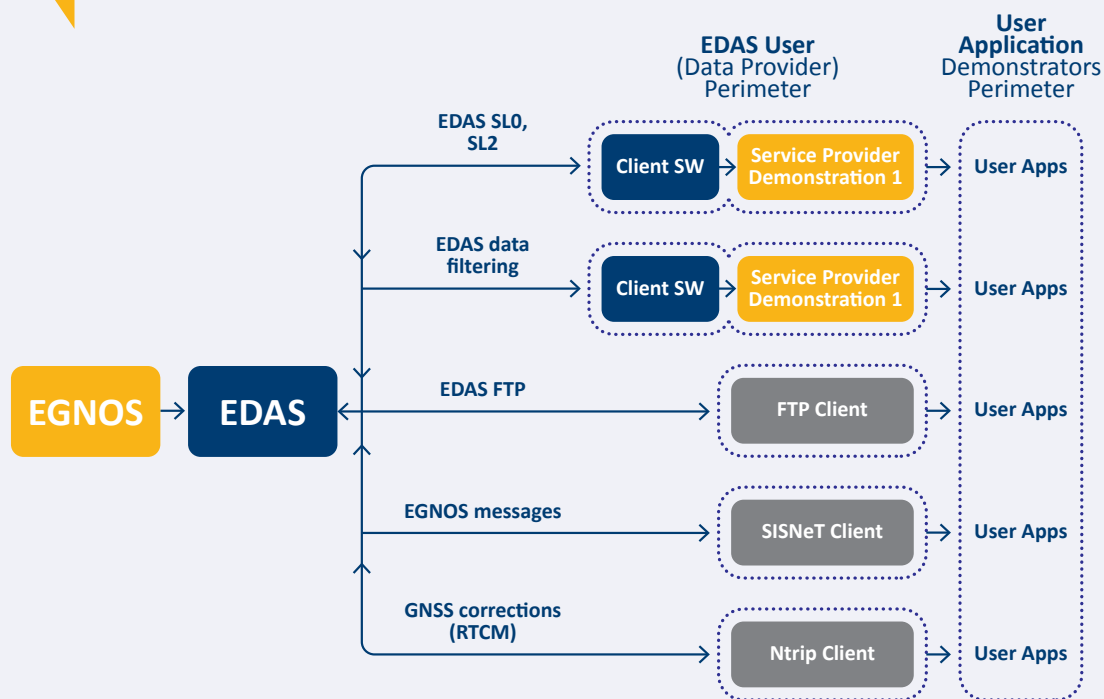
The EDAS Client SW component enables the users to obtain the EGNOS products in real-time from the EDAS system, then perform the necessary processing and finally provide services to end users via non-GEO means.

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[3] 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.

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.

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

4.3   Data Available from EDAS

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

- The GPS, GLONASS[4] 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 4.1 summarizes the types of data that can be retrieved via the different EDAS services.

Figure 4.3   **EDAS Client SW: login window**

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.

Table 4.1   **EDAS services summary**

Mode	EDAS Service	Type of Data				Protocol	Formats
		Observation & navigation	EGNOS messages	RTK messages	DGNSS corrections		
Real Time	SL/DF 0	X	X			EDAS[5]	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

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[4] No commitment on GLONASS data is provided
[5] EDAS proprietary protocol defining the communication rules between the EDAS system and the Client SW.

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 4.2 is made available to EDAS users, please refer to section 5 ("EDAS Services").

Table 4.2   **EDAS raw data summary**

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)
	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

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 4.3.

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

Table 4.3   **EGNOS Message Types**

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[6]	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[6]	GEO satellite almanacs	EGNOS GEO satellites Almanacs
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

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[6] 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.

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:

Table 4.4   **EDAS GNSS Message Types**

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

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]:

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.

Table 4.5   **EDAS RTK Message Types**

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

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, SISNet 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 4.2) 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[7]. 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.
- 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.

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

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". 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).

Table 5.1 **EDAS FTP service: available data sets**

DATA SET	FORMAT	RATE	PERIODICITY OF PUBLICATION	MAXIMUM STORAGE PERIOD
GPS & GLONASS[8] Observations from RIMS A&B stations.	RINEX 2.11	1 Hz	15 min	2 years
		1/30 Hz	1 day	
GPS and GLONASS[8] Navigation Files from RIMS A&B Stations and consolidated[9].	RINEX 2.11	1 Hz	1 day	2 years
EGNOS messages	RINEX-B	1 Hz	1 day	2 years
	EMS	1 Hz	1 hour	
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

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[8] No commitment on GLONASS data is provided
[9] 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.

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[10]. 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.

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, such as BNC (further information in https://igs.bkg.bund.de/ntrip/bnc web site).

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

Table 5.2　**EDAS Ntrip Message Types provided in RTCM 2.1, 2.3 and 3.1 formats**

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
GPS Ephemerides	N/A	N/A	1019
GLONASS Ephemerides	N/A	N/A	1020

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 6.1   **EDAS services performance measurement point**
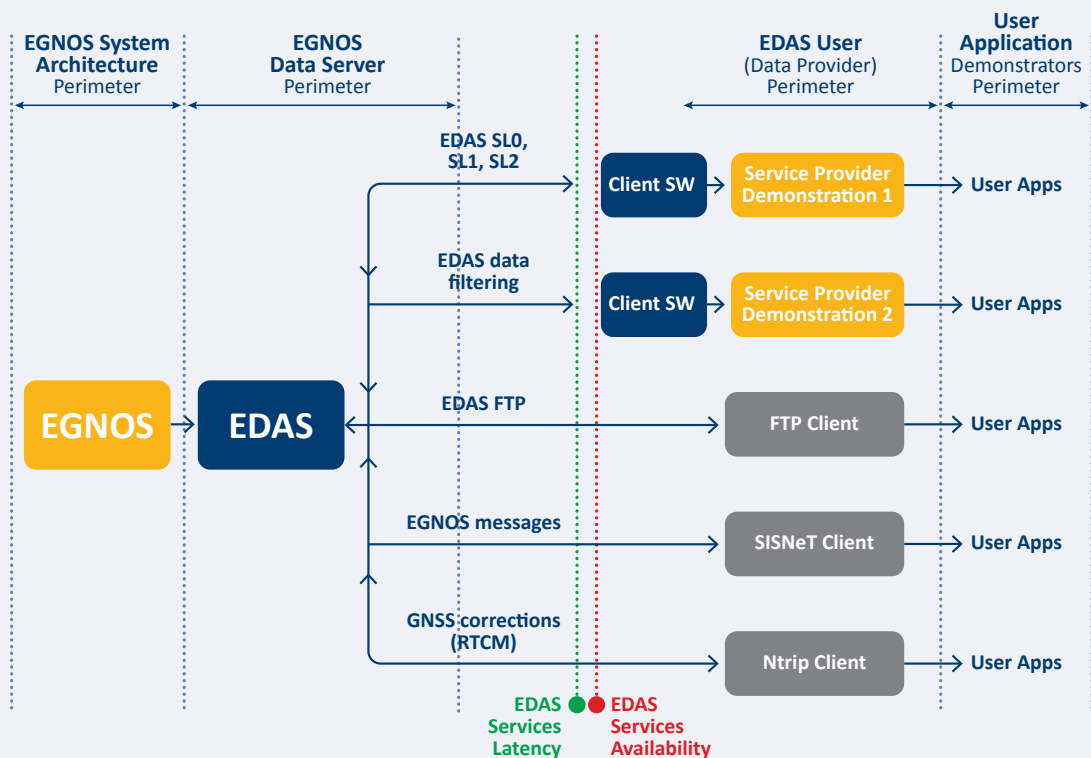
6.1 EDAS Services Availability

Table 6.1 provides the minimum monthly availability of the EDAS services.

Table 6.1　**EDAS services availability**

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

It should be noted that EDAS services availability performance is nominally higher than the above figures. Please refer to APPENDIX A (Observed EDAS Performances) to check the history of EDAS Services availability performance between January 2022 and May 2022.

6.2 EDAS Services Latency

Table 6.2 provides the maximum monthly latency (95th percentile) of the EDAS services:

Table 6.2　**EDAS services latency**

	SL0	SL2	SISNeT	FTP[11]	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

It should be highlighted that EDAS services latency performance is nominally lower than the above figures. Please refer to APPENDIX A (Observed EDAS Performances) to check the history of EDAS Services latency performance between January 2022 and May 2022.

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[11] Latency only defined for real-time services.

7 EDAS USER SUPPORT

7.1 EDAS Registration

EDAS is available to registered EU users (understood as EU Member States, Norway, Switzerland and Iceland). Access to EDAS services for non-EU users can be granted upon authorisation.

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 section of the User Support website[12].

Before proceeding with the submission to the EGNOS 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, the EGNOS 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 EGNOS User Support Website (see section 4 for details of EDAS system and EDAS Client Software).

7.2 EGNOS Helpdesk

A single point of contact for the EGNOS users' community, including EDAS users, is available through the EGNOS Helpdesk.

EDAS users are welcome to contact the EGNOS 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. Prior to that, users are kindly requested to read general information about EDAS at the EGNOS User Support website (https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/about-edas).

The EGNOS Helpdesk operates 365 days per year on an H24 basis (operating language is English). Users may contact the EGNOS Helpdesk by e-mail or by phone (more details in Table 3.2).

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 EGNOS Helpdesk.

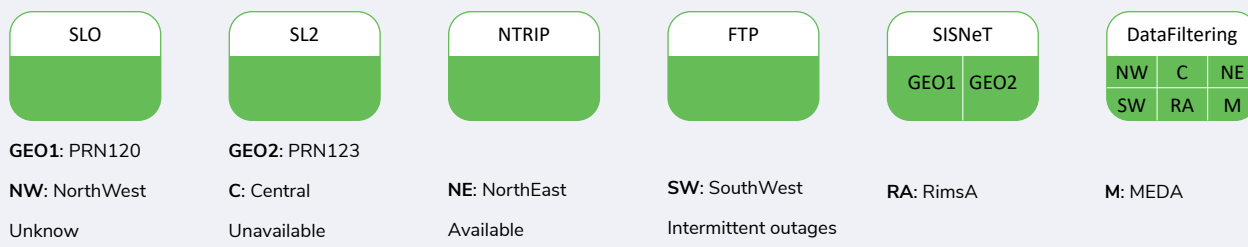## 7.4 EDAS Services Real-time Status

EDAS users can check real-ti me status of all EDAS services (SL0, SL2, Ntrip, FTP, SISNeT and Data Filtering), as shown in Figure 7.1, through the following link:
https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/edas-realtime.

Figure 7.1 EDAS Services real-time status example on EGNOS User Support Website

SLO	SL2	NTRIP	FTP	SISNeT	DataFiltering

GEO1: PRN120

NW: NorthWest

Unknow

GEO2: PRN123

C: Central

Unavailable

NE: NorthEast

Available

SW: SouthWest

Intermittent outages

RA: RimsA

M: MEDA

7.5   EDAS Regular/Urgent Request

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

- EDAS urgent request[13]: inquiries signalling technical failures of EDAS (temporary service outage) are tagged as high priority requests. The resolution time[14] 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[15] for this kind of requests is 3 working days[16].

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

EDAS services performance is regularly made available to EDAS users and the general public through the EGNOS Monthly Performance Report. The EGNOS Monthly Performance Report is published at EGNOS User Support Website since May 2011:

https://egnos-user-support.essp-sas.eu/new_egnos_ ops/documents/field_gc_document_type/monthly-performance-report-84

The EDAS services performance for the subject month can be found in section 4 of the EGNOS Monthly Performance Report.

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[13] For urgent requests, it is recommended to contact the EGNOS Helpdesk by phone.
[14] Resolution time for this kind of requests shall be understood as the time it takes to the EGNOS Helpdesk to inform the user on whether a specific EDAS service is up/down.
[15] Resolution time for this kind of requests shall be understood as time it takes to the EGNOS Helpdesk to provide the user with the requested information. In specific cases (e.g. interaction with other entity required), the EGNOS Helpdesk may contact the users to inform that the request is being processed and that the resolution time will be enlarged.
[16] Spanish working days.

APPENDIX A OBSERVED EDAS PERFORMANCES

Below, the performance of EDAS Services performance from January 2022 to May 2022 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.

Table A.1   **EDAS availability from January 2022 to May 2022**

EDAS Service	Availability (%)				
	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022
SL 0	99.99%	99.99%	100.00%	99.99%	99.93%
SL 2	100.00%	99.99%	100.00%	99.99%	99.93%
Ntrip Service	100.00%	100.00%	100.00%	100.00%	99.93%
SISNeT					
SISNeT GEO1	100.00%	99.99%	99.98%	99.99%	99.90%
SISNeT GEO2	99.99%	99.99%	99.99%	99.97%	99.93%
Data Filtering Service					
DF RIMS A	100.00%	99.99%	100.00%	100.00%	99.93%
DF Central	100.00%	99.99%	100.00%	100.00%	99.93%
DF MEDA	100.00%	99.99%	100.00%	100.00%	99.93%
DF NorthEast	100.00%	99.99%	100.00%	99.99%	99.93%
DF NorthWest	100.00%	99.99%	100.00%	100.00%	99.93%
DF SouthWest	100.00%	99.99%	100.00%	100.00%	99.93%
FTP Service	100.00%	100.00%	100.00%	100.00%	100.00%

Table A.2   **EDAS latency from January 2022 to May 2022**

EDAS Service	Latency (ms)				
	Jan 2022	Feb 2022	Mar 2022	Apr 2022	May 2022
SL 0	605.77	665.11	692.52	609.13	608.74
SL 2	606.26	665.68	693.06	609.63	609.16
Ntrip Service	610.03	612.21	612.90	613.70	613.55
SISNeT					
SISNeT GEO1	47.45	41.79	42.55	43.2	43.81
SISNeT GEO2	48	42.32	43.1	43.63	44.39
Data Filtering Service					
DF RIMS A	511.19	586.43	616.68	515.13	502.74
DF Central	509.7	512.67	515.07	511.38	501.47
DF MEDA	511.65	584.29	516.1	511.93	502.48
DF NorthEast	184.23	193.04	201.26	196.73	191.32
DF NorthWest	480.84	493.46	505.9	475.83	476.29
DF SouthWest	492.87	496.96	579.16	503.13	479.45

Figure A.1   **EDAS availability from January 2022 to May 2022**

EDAS Services Availability (%)
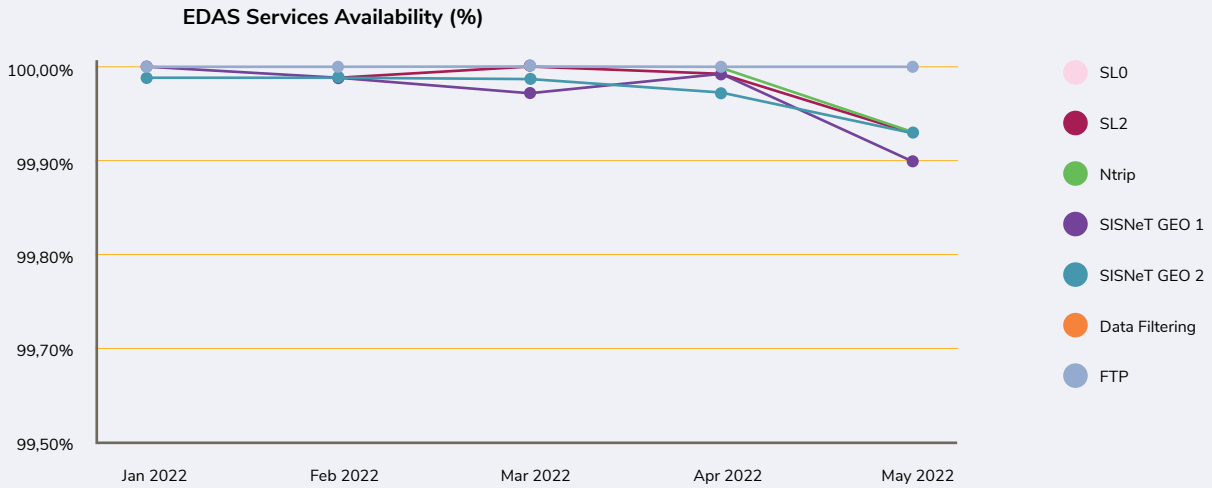
Figure A.2   **EDAS latency from January 2022 to May 2022**

EDAS Services Latency Trending (ms)
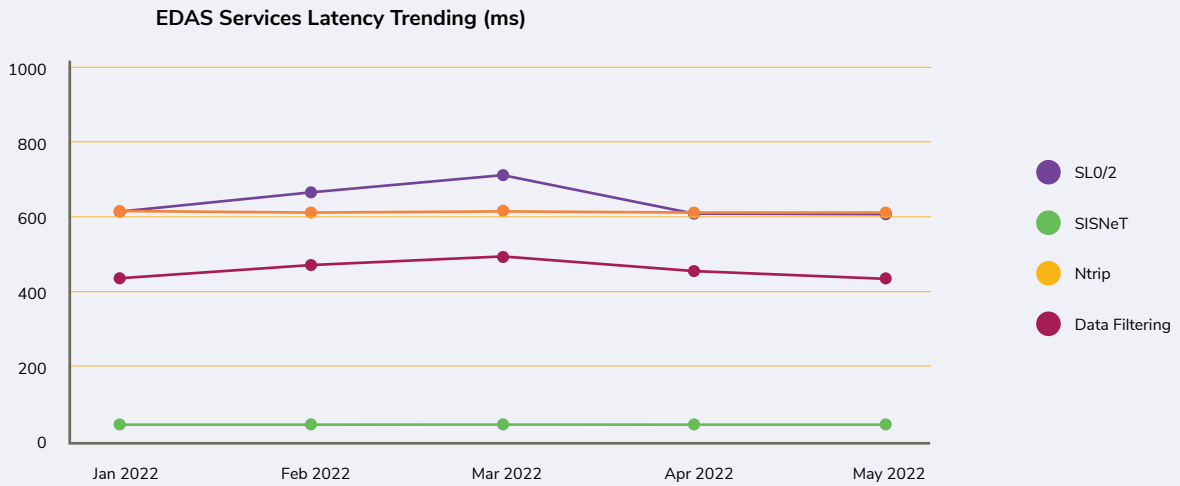
APPENDIX B   APPLICATION FORM FOR EDAS SERVICE

The EDAS application form is implemented through a form that can be filled on-line at the EGNOS User Support website (https://egnos-user-support.essp-sas.eu/new_egnos_ops/registration), only for registered users.

Also, it is necessary to pinpoint that an application form is not automatically accepted, it has to be approved in order to obtain the EDAS access credentials.

Before submitting this form please log into your EGNOS User Support website account. If you are not a registered user please create your account **here**.

Submitting the application form does not mean that you get automatic access to EDAS. Only after the application is approved, you will get registered (and notified) as EDAS user.

All processing of personal data collected by the ESSP within the performance of its activities shall be processed according to the personal data and privacy policy stated in the following **Legal Notice**

Username

E-mail

Type of Organization / Company for EDAS use

○ Public organization
○ Semi-public organization
○ Private organization
○ Natural person

Name of Organization/Company for EDAS use *

Country *

- Select - ▾

Phone *

Fax

Area of activity *

Purpose of the project *

○ Commercial use
○ Professional use
○ Evaluation for commercial purposes
○ Research project
○ Other

Figure B.2   **Second part of the Application Form**

Project description *

Please provide a description, as extensive as possible, in order to allow in-depth understanding of your project. *End user market segments, geographical areas. *Estimated number of potencial end users *Expected usage for which EDAS connection is required.

Service Level Request *

☐ SL0_ASN1
☐ SL2_RTCM
☐ SL0-Data filtering
☐ SL2-Data filtering
☐ SISNET
☐ FTP
☐ NTRIP

IP Address

Internet service Provider Name *

Internet Service Provider (ISP) should contain the identity of the company that provides the Internet connectivity service. Please note that your IP address and ISP will be verified and compared with the postal address that was set in the Connection point address field.

Connection point address *

Duration

- None -   ▼

Please provide us with the estimated duration of your EDAS account. This filed 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

1. Access to the EDAS server

The European Satellite Services Provider (hereinafter referred to as "ESSP") together with the European Commission, grants access to the EDAS server and allows the use of EDAS data in different domains of application such as Location Based Systems (LBS), Assisted GNSS (A-GNSS) concepts, a broad range of services in professional GNSS markets, and related Research and Development activities.

EDAS conditions and privacy statement *

☐ I agree the EDAS Conditions of use and the terms of the privacy statement.

Submit

# 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 EGNOS User Support Website (https://egnos-user-support.essp-sas.eu/new_egnos_ops/).

The following groups are currently configured for the EDAS Data Filtering service (see Figure C.1):

- **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 C.1   RIMS group distribution
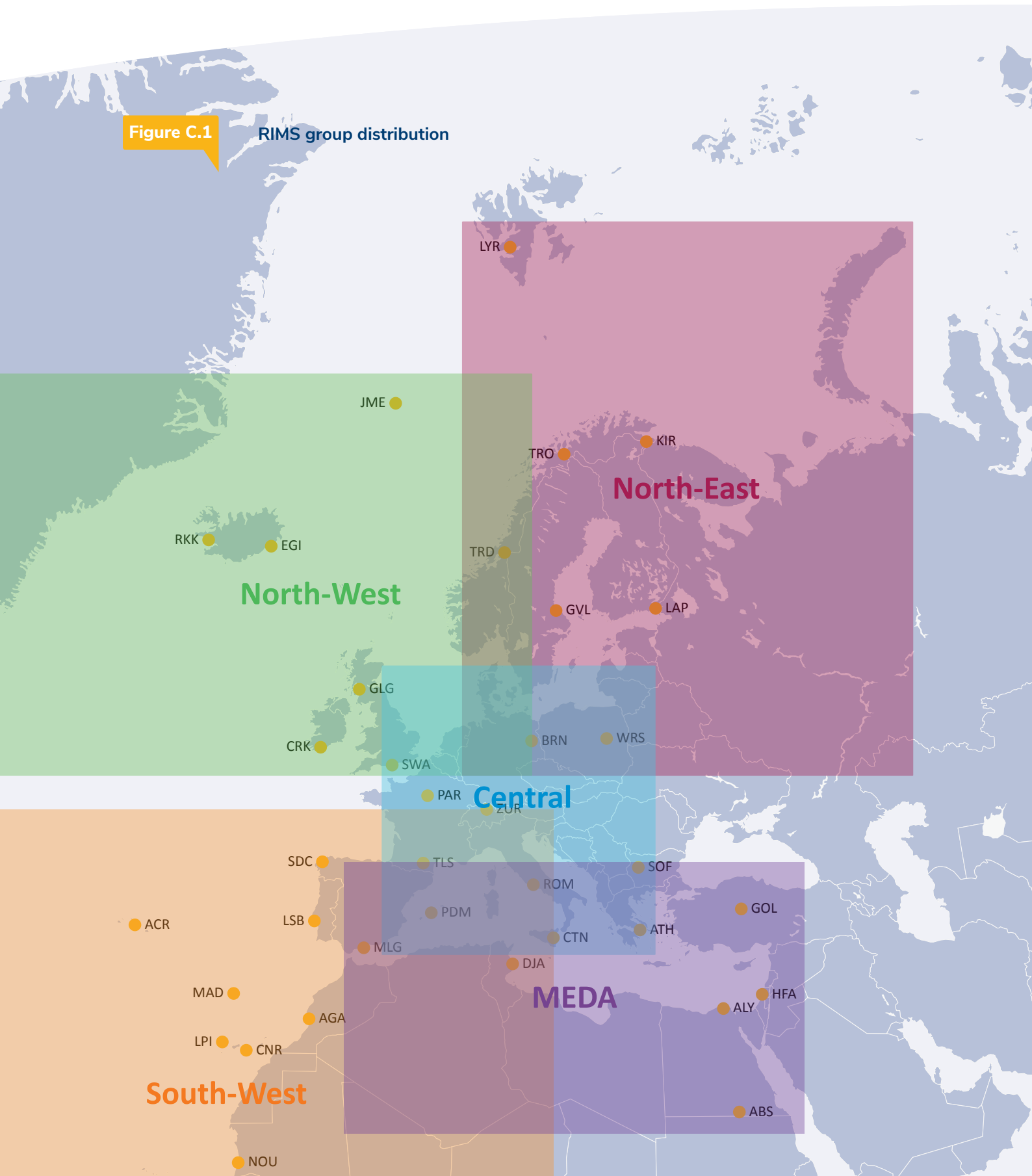
The exhaustive list of the RIMS stations included in each group name is listed below:

Table C.1   **RIMS sites included per Group Name**

Group Name	RIMS sites included
GROUP RIMS_A	All RIMS A
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
GROUP SouthWest	ROMA, CTNA, DJAA, TLSA, SDCA, LSBA, MLGA, PDMA, MADA, ACRA, LPIA, CNRA, NOUA, AGAA
GROUP MEDA	MLGA, PDMA, CTNA, DJAA, ATHA, ALYA, GOLA, TLSA, ROMA, SOFA, ABSA, HFAA

APPENDIX D   DEFINITIONS

Term	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].

Term	Definition
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 3.03 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].
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.

APPENDIX E   LIST OF ACRONYMS

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

Acronym	Definition
A-GNSS	Assisted GNSS
ANSP	Air Navigation Service Provider
AOR	Atlantic Ocean Region
APC	Antenna Phase Centre
APCH	Approach
APV	Approach with Vertical guidance
ARP	Antenna Reference Point
ASECNA	L'Agence pour la Sécurité de la Navigation aérienne en Afrique et à Madagascar
ASN	Abstract Syntax Notation
ASQF	Application Specific Qualification Facility
ATC	Air Traffic Control
C/A	Coarse/Acquisition
CCF	Central Control Facility
CPF	Central Processing Facility
CRC	Cyclic Redundancy Check
DAB	Digital Audio Broadcast
DGNSS	Differential GNSS
EASA	European Aviation Safety Agency
EC	European Commission
ECAC	European Civil Aviation Conference
EDAS	EGNOS Data Access Service
EDS	EGNOS Data Server
EGNOS	European Geostationary Navigation Overlay Service
EMS	EGNOS Message Server
ESA	European Space Agency
ESSP	European Satellite Services Provider
EU	European Union
EUSPA	European Union Agency for the Space Programme
EWAN	EGNOS Wide Area Network

Acronym	Definition
FAQ	Frequently Asked Questions
FTP	File Transfer Protocol
GAGAN	GPS Aided GEO Augmented Navigation
GEO	Geostationary Satellite
GIVE	Grid Ionospheric Vertical Error
GLONASS	(Russian) Global Navigation Satellite System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSA	European GNSS Agency
HTTP	HyperText Transfer Protocol
ICAO	International Civil Aviation Organization
ICD	Interface Control Document
IONEX	IONosphere map Exchange format.
IOR	Indian Ocean Region
IP	Internet Protocol
ISO	International Organization for Standardization
ITU	International Telecommunications Union
KASS	Korea Augmentation Satellite System
LBS	Location Based Services
LPV	Localizer Performance with Vertical guidance
MCC	Mission Control Centre
MSAS	MTSAT Satellite-based Augmentation System
MTSAT	Multi-Function Transport Satellite
NLES	Navigation Land Earth Station
NOF	Navigation Overlay Frame
NPA	Non-Precision Approach
NTP	Network Time Protocol
Ntrip	Networked Transport of RTCM via Internet Protocol
OS	Open Service

Acronym	Definition
PACF	Performance Assessment and Check-out Facility
PBN	Performance Based Navigation
PRN	Pseudo-Random Number
PTP	Point-To-Point
R&D	Research & Development
RD	Reference Document
RDS	Radio Data System
RIMS	Range and Integrity Monitoring Station
RINEX	Receiver Independent Exchange Format
RNP	Required Navigation Performance
RTCM	Real Time Correction Message
RTK	Real Time Kinematic
RTP	Real-Time Transport Protocol
RTSP	Real Time Streaming Protocol
SARPs	Standards and Recommended Practices
SBAS	Satellite-Based Augmentation System
SDCM	System of Differential Correction and Monitoring
SDD	Service Definition Document
SES	Single European Sky
SIS	Signal-in-Space
SoL	Safety of Life
SP	Service Provider
SPS	Standard Positioning Service
SW	Software
TCP	Transport Control Protocol
UDRE	User Differential Range Error
US	United States
UTC	Coordinated Universal Time
VAL	Vertical Alert Limit
WAAS	Wide Area Augmentation System

NOTES

NOTES

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