



EGNOS Data Access Service (EDAS)

Service Definition Document



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



EGNOS, it's there. Use it.

EGNOS Data Access Service (EDAS)

Service Definition Document



European
Global Navigation
Satellite Systems
Agency

The European GNSS Agency produced this document
under tasks entrusted by the European Commission

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The European Geostationary Navigation Overlay Service (EGNOS) provides an augmentation signal to the Global Positioning System (GPS) Standard Positioning Service (SPS). Presently, EGNOS augments GPS using the L1 (1,575.42 MHz) Coarse/ Acquisition (C/A) civilian signal function by providing correction data and integrity information for improving positioning and navigation services over Europe.

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 enhanced performance through Internet connection for commercial and professional use.

The EGNOS Data Access Service (EDAS) aims at providing ground-based access to EGNOS data. EDAS services are accessible through the Internet with the condition to be a registered user.

This version of the “EDAS Service Definition Document” (referred as EDAS SDD) is intended to provide information on the EDAS services, which 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.

The document describes the EDAS system architecture and provides an overview of the current EDAS services with regards to the information that is transmitted and data formats. The brief description of each EDAS Service is presented, along with the minimum EDAS services performance. The EDAS SDD does not intend to give an exhaustive description of the message structure and data formats; it is not intended to be an Interface Control Document (ICD).

The document also includes 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 B.

This document is not intended to address EGNOS Open Service (OS) or EGNOS Safety of Life (SoL) performance. Information about the EGNOS OS and the EGNOS SoL is available in separate documents called the “EGNOS Service Definition Document – Open Service” (EGNOS SDD OS – [RD-1]) and the “EGNOS Service Definition Document – Safety of Life Service” (EGNOS SDD SoL - [RD-2]) respectively.

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

2.1 Purpose and Scope of the Document

The EGNOS Data Access Service (hereinafter referred to as “EDAS”) Service Definition Document (hereinafter referred to as “EDAS Service Definition Document” or “EDAS SDD”) presents the characteristics of the services offered to users by EDAS, including a detailed description of all the necessary information for users to get access to EDAS services and benefit from them. The current EDAS SDD (this document) includes, with respect to the previous release, updated information related to the EDAS services: Service Level 0 and 2, Data Filtering, NTRIP, SISNET and FTP (available to users since 26th July 2012), along with the decommissioning of Service Level 1 on 1st July 2014.

The EDAS services performance currently available to registered users both in terms of availability and latency is also detailed.

The EDAS SDD comprises 8 main sections and 5 appendices:

- **Section 1 “Executive Summary”** is an executive summary of the document;
- **Section 2 “Introduction”** defines the scope of the document, the relevant reference documents and deals with the terms and conditions of EDAS use, including liability, and the intended lifetime of the Service;
- **Section 3 “EGNOS DATA SERVICE (EDAS) Overview”** gives a brief description of the EGNOS system and services, focusing mainly on a high-level description of EDAS architecture and the provided data;
- **Section 4 “EDAS Services”** introduces the EDAS services: Service Level 0, Service Level 2, Data Filtering, NTRIP and FTP Services;
- **Section 5 “EDAS Performances”** describes the EDAS services performance in terms of availability and latency (for the real-time data services);
- **Section 6 “EDAS User Support”** deals with the communication channels available to EDAS users for any request related to the service, the steps to be completed to become an EDAS user, and the support services and communications that EDAS users will receive in case of any incident;
- **Section 7 “EDAS Online Information”** provides the main sources of information available for EDAS users concerning EDAS performance and status;
- **Section 8 “EDAS Applications”** describes the application that allows users to access EDAS data and also some additional information of interest;
- **“Appendix A Definitions”** includes the glossary of terms and definitions;
- **“Appendix B Observed EDAS Performances”** provides EDAS services availability performance between January 2014 and May 2014;
- **“Appendix C Application Form for EDAS Service”** shows the application form that needs to be filled by those willing to register as EDAS users;
- **“Appendix D EDAS Data Filtering Service: configuration”** provides the initial configuration of the EDAS Data Filtering Service, mainly in terms of groups of stations available;
- **“Appendix E List of Acronyms”** provides a list of acronyms.

As mentioned, the fourth section introduces the EDAS services, which are the following:

- **Main Data Streams:** EGNOS data, which covers EGNOS messages, GNSS observation and navigation, is provided through Internet in real-time in different formats depending on the Service¹:
 - Service Level 0: ASN.1 format
 - Service Level 2: RTCM 3.1
- **Data Filtering:** Filtering capabilities to allow receiving EGNOS data from only certain subsets of RIMS stations when connecting to EDAS Service Level 0 and/or 2.
- **FTP Service:** An FTP historical site containing EGNOS ground stations data, SBAS messages, main data streams raw data and IONEX data files in different formats for downloading.
- **SISNET Service:** EGNOS messages provided in real time using the SISNeT protocol defined by European Space Agency (ESA).
- **Ntrip service:** GNSS data from EGNOS ground stations and DGNS corrections are sent in real time using Ntrip protocol.

The EDAS minimum performance is given in section 5. The sixth, seventh and eighth sections are oriented to EDAS users too, providing complementary information to section 4 and covering other important aspects like the user support services, the main sources of information available through the Internet with regards to EDAS services and performance as well as the user application side. Appendix A may be visited by all readers if a particular concept mentioned in this document is not familiar. Appendix B provides a summary of the real EDAS services availability performance from January 2014 to May 2014. Appendix C shows the application form that anyone interested in being registered as an

EDAS user has to fill in. Finally, Appendix D provides additional information about the EDAS Data Filtering Service.

2.2 Terms and Conditions of EDAS Services Use, Including Liability

EDAS has been designed and developed with the general goal to provide ground-based access to EGNOS data. EDAS is accessible upon registration 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 or from the European Union (EU). 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 a sound decision regarding EDAS use. However, actual EDAS performance may differ in the future.

Users have certain obligations to exercise due care in using EDAS. Before any use of EDAS, all users should study this EDAS SDD in order to understand if and how they can use EDAS, as well as to familiarise themselves with EDAS features.

¹ Service Level 1 was decommissioned on 1st July 2014. This Service is covered by Service Level 2.

DISCLAIMER OF LIABILITY

The European Union as the owner of the EDAS system, the European GNSS Agency (GSA) as EGNOS programme manager and ESSP SAS as its service 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, 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, GSA or ESSP SAS and its business partners shall create any such warranty.

By using EDAS, the user agrees that neither European Union nor GSA 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.

2.3 Reference Documents

RD	Document Title
[RD-1]	EGNOS Service Definition Document – Open Service http://egnos-portal.gsa.europa.eu/library/technical-documents
[RD-2]	EGNOS Service Definition Document – Safety of Life Service http://egnos-portal.gsa.europa.eu/library/technical-documents
[RD-3]	ICAO Annex10 Volume I (Radio Navigation Aids) – November 2012 amendment 87
[RD-4]	EGNOS Data Access Service Applications – GSA Leaflet v2 http://www.gsa.europa.eu/sites/default/files/content/edas_applications_v2_en.pdf
[RD-5]	The EGNOS Data Access System (EDAS): The Vehicle To The Future EGNOS Commercial Data Distribution Service, White Paper, GSA
[RD-6]	RTCM Recommended standards for Differential NavStar GPS service, RTCM Paper 194-93/SC104-STD, v2.1, 3 rd January 1994

RD	Document Title
[RD-7]	EDAS Content and Access – GSA Leaflet v3 http://www.gsa.europa.eu/sites/default/files/content/edas_applications_v3_en.pdf
[RD-8]	RTCM recommended standards for differential GNSS Service Version 3.0. Developed by RTCM Special Committee No. 104
[RD-9]	RTCM recommended standards for differential GNSS (Global Navigation Satellite Services Version 3.1. Developed by RTCM Special Committee No. 104 (1 st July 2011)
[RD-10]	EDAS Client SW User Manual, ESSP-DRD-6977. http://egnos-user-support.essp-sas.eu/egnos_ops/edas_doc/
[RD-11]	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-12]	Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation. INTERNATIONAL STANDARD ISO/IEC 8824-1. ITU-T RECOMMENDATION X.680
[RD-13]	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-14]	IONEX: The Ionosphere Map Exchange Format Version 1, Schaer, S., W. Gurtner, J. Feltens, February 25, 1998. ftp://igscb.jpl.nasa.gov/igscb/data/format/ionex1.pdf
[RD-15]	Networked Transport of RTCM via Internet Protocol (Ntrip), version 1.0, http://www.rtcn.org/orderinfo.php
[RD-16]	RINEX: The Receiver Independent Exchange Format Version 2.11, IGS/RTCM RINEX Working Group, 10 th December 2007. http://igscb.jpl.nasa.gov/igscb/data/format/rinex211.txt
[RD-17]	Proposal for a new RINEX-type Exchange File for GEO SBAS Broadcast Data, 19 th December 2003. ftp://igscb.jpl.nasa.gov/igscb/data/format/geo_sbas.txt

EGNOS DATA SERVICE (EDAS)

Overview

3.1 EGNOS Overview

3.1.1 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 Satellite-Based Augmentation Systems (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 enhanced performance for commercial and professional use.

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 global 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 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 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].

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

EGNOS Data Access Service (EDAS)

EDAS is the EGNOS terrestrial commercial 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.

Next figure shows the EDAS high level architecture.

3.1.2 EGNOS: THE EUROPEAN SBAS

EGNOS is part of a 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) and Japan (MTSAT Satellite based Augmentation System –MSAS-). Implementation of analogous systems is being developed in other regions of the world (e.g. GPS Aided GEO Augmented Navigation –GAGAN- in India and System of Differential Correction and Monitoring –SDCM- in Russia). The worldwide existing and planned SBAS systems are shown in Figure 3.2.

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

Figure 3.1 EDAS High-Level Architecture

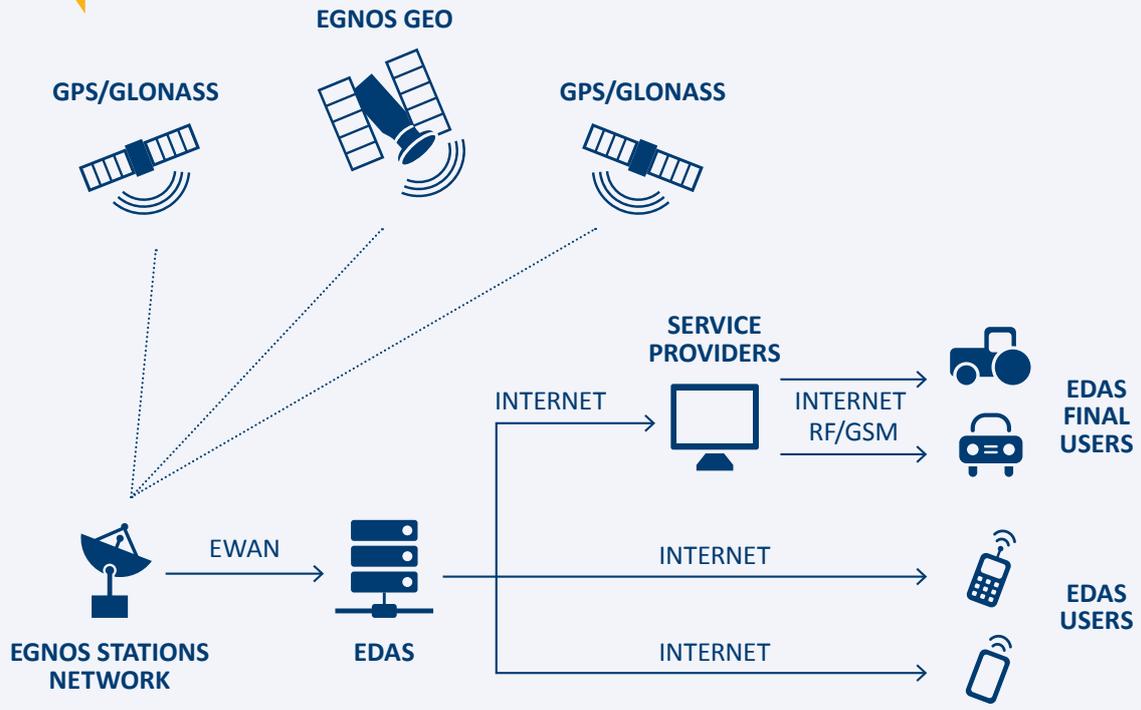
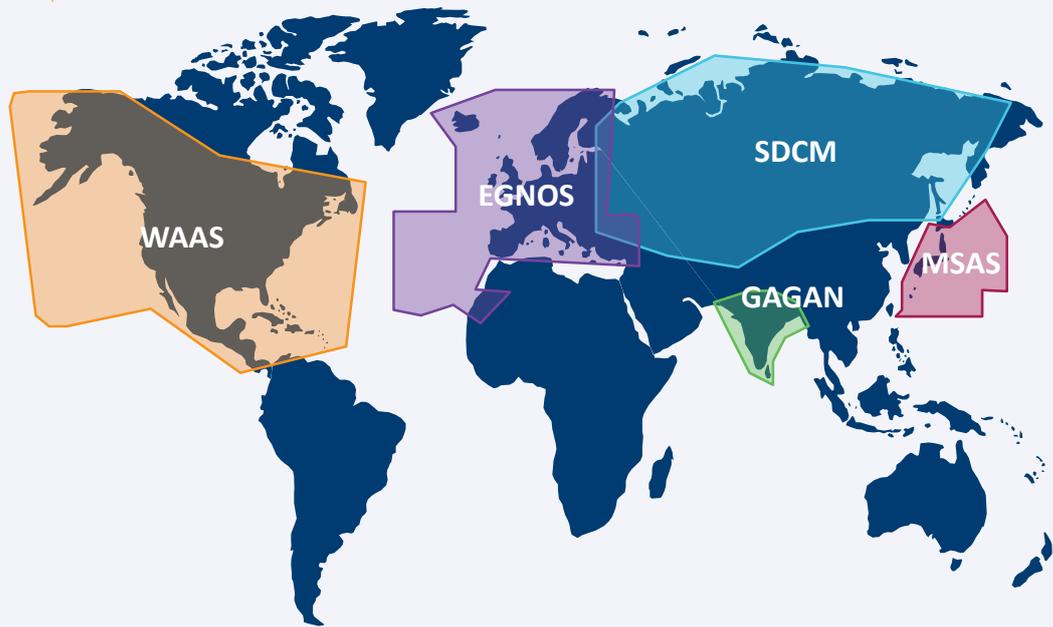


Figure 3.2 Existing and planned SBAS systems



3.1.3 EGNOS ARCHITECTURE

The EGNOS functional architecture is shown in Figure 3.3.

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.

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 (1,575.42 MHz). At the date of publication the 3 GEOs used by EGNOS are (see table 3.1).

EGNOS GEO satellites **INMARSAT 3F2 AOR-E** (PRN 120) and **4F2 EMEA** (PRN 126) are currently part of the EGNOS operational platform and are transmitting the operational Signal-In-Space (SIS) to be used by EGNOS users. **SES-5** (PRN 136) is part of the EGNOS TEST Platform broadcasting the TEST SIS.

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 three GEOs broadcast an operational signal. Since it is only necessary to track a single GEO satellite link to benefit from the EGNOS Services, this secures a switching capability in case of interruption and ensures a high level of continuity of service.

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. However, all SBAS user receivers are designed to automatically detect and use any code in a pre-allocated set reserved for SBAS. Such evolutions will therefore be transparent for end users and will not necessitate any human intervention or change of receiving equipment. For this purpose, and whenever there could be any relevant information complementing the SDD, an EGNOS Service Notice is published (http://www.essp-sas.eu/service_notices) and distributed.

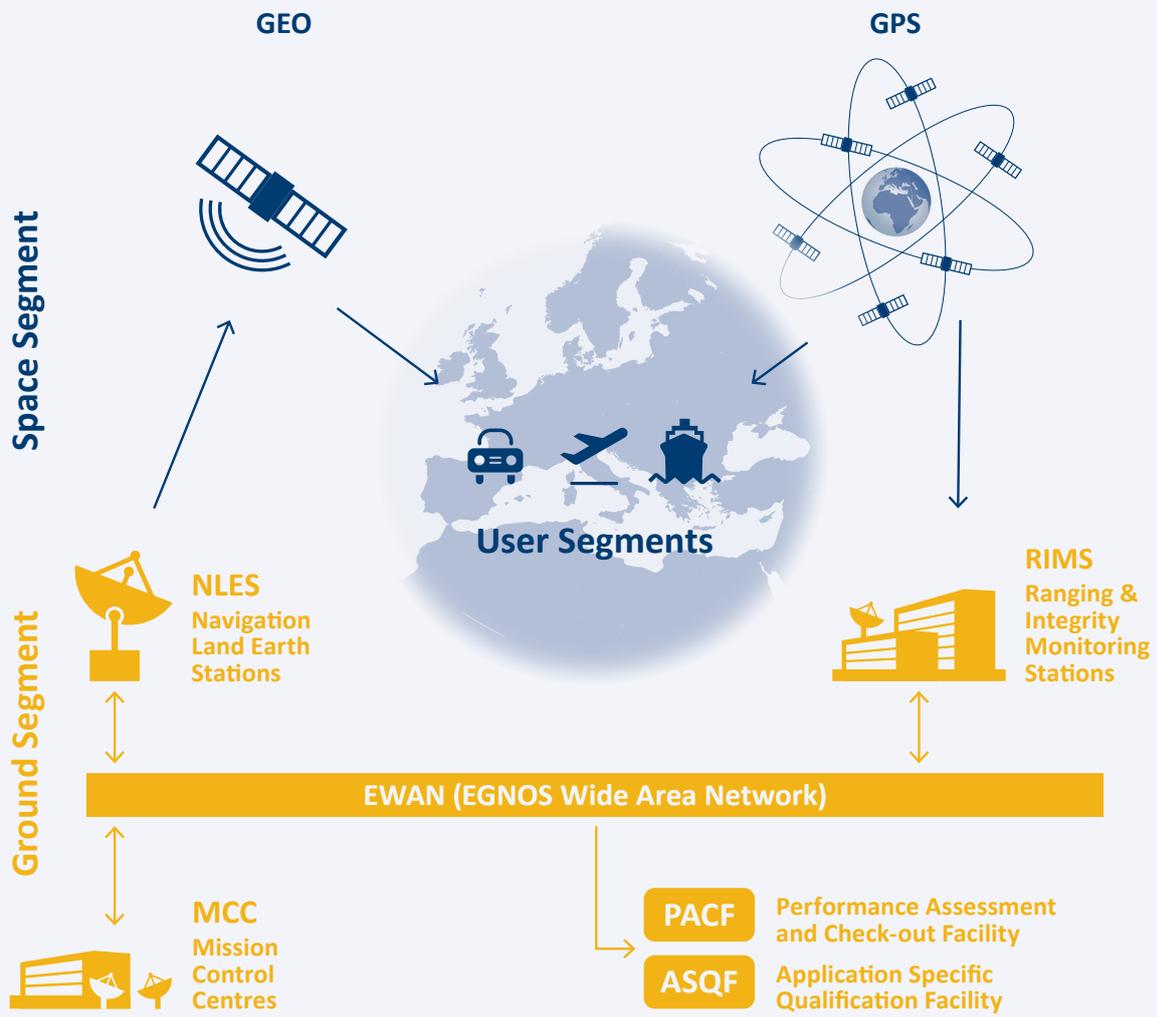
EGNOS Ground Segment

The EGNOS Ground Segment comprises a network of Ranging Integrity Monitoring Stations (RIMS), four Mission Control Centres (MCC), six Navigation Land Earth Stations

Table 3.1 GEOs used by EGNOS

GEO Name	PRN Number	Orbital Slot
INMARSAT 3F2 AOR-E	PRN 120	15.5 W
INMARSAT 4F2 EMEA	PRN 126	25.0 E
SES-5	PRN 136	5 E

Figure 3.3 EGNOS architecture



(NLES), 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 3.4 shows the geographical distribution of the RIMS already in operation and the RIMS currently under deployment.

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:

- 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).
- 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 service area.
- Elaborate a model for ionospheric errors over the EGNOS service area in order to compensate for ionospheric perturbations to the navigation signals.

This function requires a dense network of monitoring stations. For this reason, the ionospheric model broadcast by EGNOS is not available for the whole geostationary broadcast area but is only provided for a region centred over Europe.

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 (less than Time To Alert (TTA)) 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.

Figure 3.4 EGNOS RIMS sites



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.

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.

3.1.4 EGNOS ORGANISATIONAL FRAMEWORK

3.1.4.1 Bodies Involved in the EGNOS Programme and Service Delivery

The European Union (EU) is the owner of the EGNOS system. The European GNSS Agency (GSA) according to the delegation agreements with the European Commission (EC) is in charge of the tasks associated with the exploitation phase of EGNOS, overall EGNOS operational programme management and as such, is responsible for taking decisions regarding the system exploitation, evolutions and promotion of the services and applications. The European Space Agency (ESA) led the technical development of the EGNOS system in the past and is now mandated by the European Commission to play the role of a design and procurement agent for system evolutions. The European Satellite Services Provider (ESSP) SAS is the 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 Services and SoL Service compliant with

ICAO (International Civil Aviation Organization) Standards and Recommended Practices throughout the European Civil Aviation Conference (ECAC) region, including the operation and technical management of EGNOS.

ESSP SAS is a company established by a number of major European Air Navigation Service Providers. The founding members of ESSP are the Air Navigation Service Providers of France (DGAC/DSNA), Germany (DFS), Italy (ENAV SpA), Portugal (NAV-EP), Spain (ENAIRES), Switzerland (skyguide) and the United Kingdom (NATS). The ESSP SAS has its headquarters and operations unit in Toulouse (France), and its service provision unit in Madrid (Spain).

3.1.4.2 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, GSA, the ESA, the EGNOS Service Provider 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 lists the main sources of information about EGNOS.

3.2 EDAS Overview

3.2.1 INTRODUCTION²

EDAS allows registered users to plug into EGNOS to receive the internal data collected, generated and delivered by EGNOS. 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. EDAS services are intended to be delivered and maintained over the long term.

² From EGNOS Data Access Service Applications – GSA Leaflet v2
http://www.gsa.europa.eu/sites/default/files/content/edas_applications_v2_en.pdf

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/enterprise/policies/satnav/index_en.htm
EGNOS general information and EGNOS applications	GSA	http://www.egnos-portal.eu
EGNOS Status and Performance ESSP official reporting of the system status, performances, services, news, applicable documentation, service notices etc.	ESSP	http://www.essp-sas.eu
EGNOS User Support ESSP dedicated service to users on EGNOS status, system description, real time services performances, forecasts, FAQs, etc. A specific EDAS section is also available.	ESSP	http://egnos-user-support.essp-sas.eu/
EGNOS Helpdesk Direct point of contact for any question related with the EGNOS system, its performances and applications.	ESSP	egnos-helpdesk@essp-sas.eu +34 911 236 555
EGNOS System ESA dedicated services and detailed technical information on EGNOS	ESA	http://www.esa.int/esaNA/egnos.html
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	GSA/EC/ ESSP	http://www.gsa.europa.eu/egnos/edas

3.2.2 OVERVIEW OF THE CURRENT ARCHITECTURE³

The EDAS architecture is decomposed into two separate elements:

- EDAS system, implementing the interface with the EGNOS infrastructure and performing the necessary data processing to provide the different EDAS Services through Internet.
- The EDAS Client SW, resident at user level, implementing the external interface of some of the EDAS services (EDAS Main Data Streams and EDAS Data Filtering service). The EDAS Client SW is responsible for basic security functions and for the interface with the EDAS through the appropriate communication means. The SW tool is provided to EDAS users after registration (see section 6.2 for EDAS registration details) in order to retrieve data from the Main Data Services (SLO and SL2) and the Data Filtering Service.

EDAS comprises a number of communication protocols defined by the following interfaces:

- The interface between the EGNOS core and EDAS system. This interface belongs to the EGNOS system.

For the EDAS Service Level 0 (SLO), Service Level 2 (SL2) and the Data Filtering, the following interfaces are available:

- The interface between the EDAS system and the EDAS Client SW. This interface is internal to the EDAS perimeter, and it is not accessible to the Users.
- The interface between the EDAS system Client SW and the Users. This is the interface available to Users, in order to obtain and process the EGNOS data according to their specific needs.

For FTP Service, SISNET Service and NTRIP Service, the EDAS Client SW is not required and in consequence, only one interface exists:

- The interface between the EDAS system and the Users. This interface is external to the EDAS perimeter.

3.2.3 THE EDAS SYSTEM

The EDAS system is fed by EGNOS data. It provides, among others, the following functions:

- Allows accepting connection from Users with correct credentials.
- Introduces an additional security layer between EGNOS and the Users.
- Protects EGNOS proprietary protocols and data formats.
- Processes EGNOS data and produces the different products provided through EDAS services.

The interface with the Users is done via Internet or dedicated Frame Relay lines.

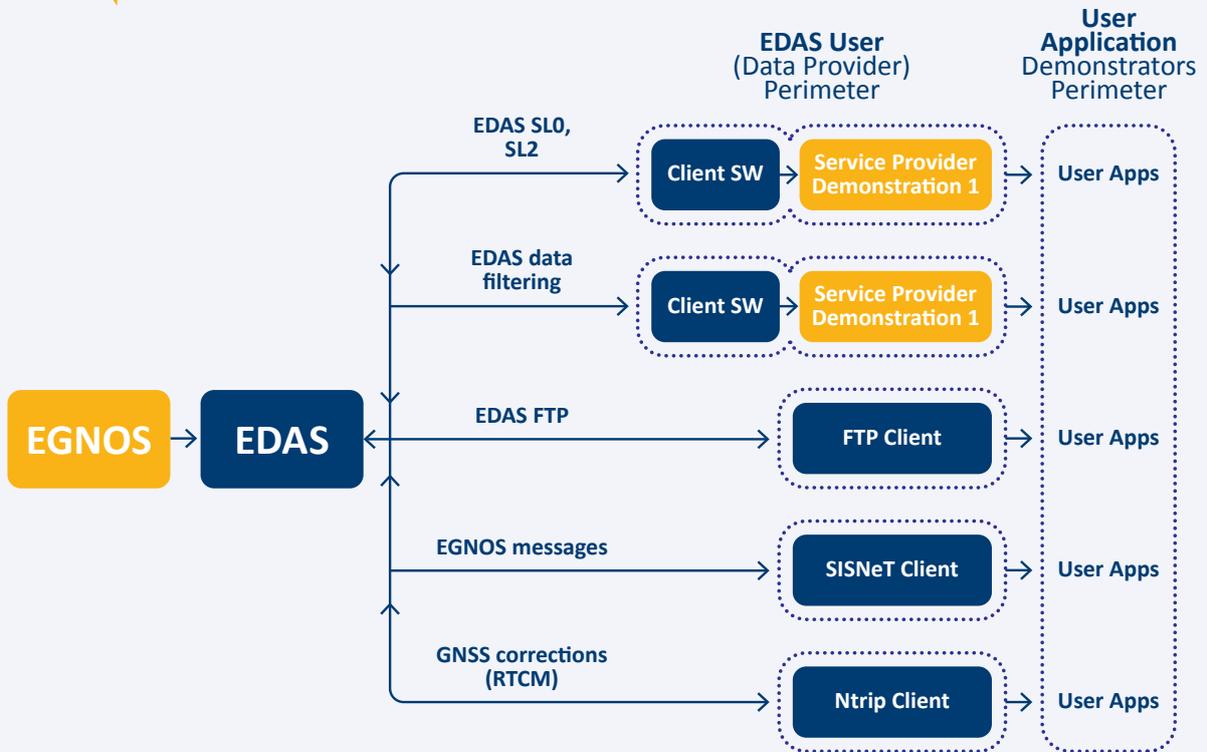
3.2.4 THE EDAS CLIENT SOFTWARE

The EDAS Client SW is a platform-independent interface element allowing the connection of Users to the EDAS system for the reception of Service Level 0, Service Level 2 and Data Filtering (both over Service Level 0 and Service Level 2).

Users make use of this software component 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.

³ Updated from EGNOS Data Access Service Applications – GSA Leaflet v2
http://www.gsa.europa.eu/sites/default/files/content/edas_applications_v2_en.pdf

Figure 3.5 EDAS Architecture



The generic information needed by users to make use of the EDAS Client SW is provided in [RD-10]. The EDAS Client SW is made available to EDAS users upon registration. However, the interface between the Client Software and the EDAS system belongs to the EDAS internal perimeter, so the corresponding Interface Control Document (ICD) will not be visible to the Service Providers/EDAS users.

3.2.5 DATA AVAILABLE FROM EDAS⁴

Service providers can access EDAS to form new innovative applications, to integrate into existing services, or to support research programmes. These uses exploit the different types of the data available from EDAS.

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

- The GPS, GLONASS⁵ 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) and RTK (Real-Time Kinematic) messages allowing users implementing advanced positioning techniques.

Please refer to section 4 for a description of the different services and the formats in which the above data are made available to EDAS users.

3.2.5.1 Raw Observations from the RIMS and NLES Networks⁶

The data collected by the RIMS network includes dual-frequency GPS data, GLONASS L1, and the EGNOS geostationary L1 SIS. The data collected by the NLES network includes only the GPS data. For each RIMS/NLES and each tracked satellite a set of observables is provided. Therefore, at a given time, information from each RIMS/NLES will be provided with a set of observables 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 in which the information summarized in Table 3.3 is made available to EDAS users, please refer to section 4 (“EDAS Services”).

3.2.5.2 EGNOS Augmentation Message⁷

This is the EGNOS augmentation message as uplinked and broadcast from the EGNOS geostationary satellites. The augmentation message from EGNOS has been internationally standardized along with all other space-based augmentation system (SBAS) [RD-3].

The EGNOS SIS Navigation Data is composed of distinct Message Types (MT) as defined in the SBAS standard. The provided message types are summarized in the table (Table 3.4).

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

⁴ Extracted from EGNOS Data Access Service Applications – GSA Leaflet v2
http://www.gsa.europa.eu/sites/default/files/content/edas_applications_v2_en.pdf

⁵ No commitment on GLONASS data is provided.

⁶ Extracted from EDAS Content and Access – GSA Leaflet v3
http://www.gsa.europa.eu/sites/default/files/content/edas_applications_v3_en.pdf

⁷ Extracted from EDAS Content and Access – GSA Leaflet v3
http://www.gsa.europa.eu/sites/default/files/content/edas_applications_v3_en.pdf

Table 3.3 EDAS raw data summary

For each RIMS (and NLES) and each visible GPS satellite			For each RIMS (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	GEO navigation data	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

Table 3.4 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 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 ⁸	GEO ranging function	EGNOS 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 SBAS Network time with UTC
17	GEO satellite almanacs	GEO 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

⁸ MT9 is broadcast with some information about the orbital position of the broadcasting 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.

This section presents a high level description of the EDAS services, classified as “Main Data Stream Services” (section 4.1) and the rest of services (Data Filtering, FTP, SISNet and Ntrip) in sections from 4.2 to 4.5 respectively.

4.1 Main Data Stream Services

The following Service Levels and Formats are provided by EDAS:

- Service Level 0 (SLO): it is needed to either 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-9]. It includes data from Service Level 1 which was decommissioned on 1st July 2014.

In order to retrieve data from these services, a software application named “Client Software”, which is made available to users after registration (see section 6.2 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-10], which is available to EDAS users after registration.

Apart from the messages defined in the RTCM 3.1 standard [RD-9], some EDAS specific messages have been defined for SL2. In SL2, all EDAS defined messages are encoded with Message Number 4085 (EDAS proprietary message), and can be distinguished by the message subtype [RD-10].

4.1.1 EDAS SLO (ASN.1)

A detailed definition of the SLO messages delivered through the EDAS Client SW can be found in [RD-10].

The messages delivered through EDAS SLO are:

- EGNOS SBAS messages.
- Receiver measurement messages.
 - RIMS raw measurements.
 - NLES cyclic feedback.
- ATC information⁹.
- RIMS APC data.

4.1.2 EDAS SL2 (RTCM 3.1)

A detailed description of the Service Level 2 Messages can be found in [RD-10]. 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 Information⁹.
 - Subtype 4. RIMS APC data.
 - Subtype 5. Ionospheric and UTC data.
 - Subtype 6. GPS Almanac.
 - Subtype 7. RIMS Status.

⁹ currently not provided by EDAS.

4.2 EDAS Data Filtering Services

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 6.2 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-10], which is available to users after registration. For information, the current service configuration is illustrated in Appendix D (“EDAS Data Filtering Service: configuration”).

4.3 EDAS FTP Services

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 A Definitions”.

Table 4.1 EDAS FTP service: available data sets

DATA SET	FORMAT	RATE	PERIODICITY OF PUBLICATION	MAXIMUM STORAGE PERIOD
GPS & GLONASS ¹⁰ Observations from RIMS A&B stations.	RINEX 2.11	1 Hz	15 min	2 years ¹¹
		1/30 Hz	1 day	
GPS and GLONASS ¹⁰ Navigation Files from RIMS A&B Stations and consolidated ¹² .	RINEX 2.11	1 Hz	1 day	2 years ¹³
EGNOS messages	RINEX-B	1 Hz	1 day	2 years ¹³
	EMS	1 Hz	1 hour	
EDAS SL0 raw data	ASN.1	1 Hz	15 min	6 months ¹³
EDAS SL2 raw data	RTCM 3.1	1 Hz	15 min	6 months ¹³
Ionospheric data	IONEX 1.0	1 / 2 h	1 day	2 years ¹³

¹⁰ No commitment on GLONASS data is provided.

¹¹ Starting from April 08th 2014.

¹² 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.

¹³ Starting from March 1st 2013.

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 6.2 for EDAS registration details).

4.4 EDAS SISNeT Service

The EDAS SISNeT service provides access to the EGNOS GEO satellites messages transmitted over the Internet through the SISNeT protocol. 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-11] 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 6.2 for EDAS registration details).

4.5 EDAS Ntrip Service

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

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 becoming 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) are available for users after registration (see section 6.2 for EDAS registration details).

Table 4.2 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

EDAS Performances

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

- **Availability:** percentage of time in which EDAS is providing its services according to specifications (see [RD-10] 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:** 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.

5.1 EDAS Services Availability

Table 5.1 provides the minimum availability of the EDAS services.

It should be noted that EDAS services availability performance is nominally higher than the above figures. Please refer to Appendix B (Observed EDAS Performances) to check the history of EDAS Services availability performance between January 2014 and May 2014.

5.2 EDAS Service Latency

Table 5.2 provides the maximum latency of the EDAS services.

It should be highlighted that EDAS services latency performance is nominally lower than the above figures. Please refer to Appendix B (Observed EDAS Performances) to check the history of EDAS Services latency performance between January 2014 and May 2014.

Table 5.1 EDAS services availability

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

Figure 5.1 EDAS services performance measurement point

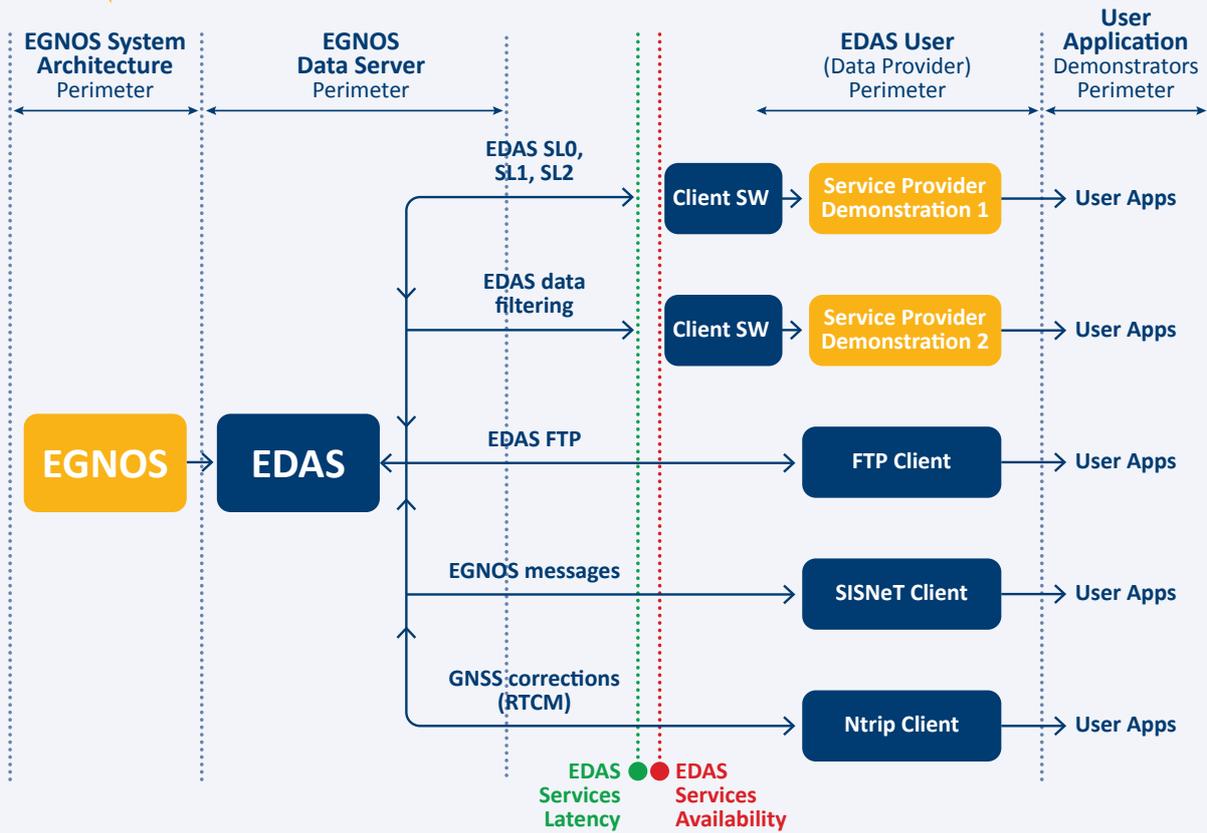


Table 5.2 EDAS services latency

	SLO	SL2	SISNeT	FTP ¹⁴	Data Filtering		Ntrip
					SLO	SL2	
EDAS Services Latency	1,3 seconds	1,450 seconds	1,150 seconds	N/A	1,6 seconds	1,75 seconds	1,75 seconds

¹⁴ Latency only defined for real-time services.

6.1 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 the FAQs available at the ESSP (www.essp-sas.eu) and EGNOS User Support websites (<http://egnos-user-support.essp-sas.eu/>).

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.

- EGNOS Helpdesk e-mail: egnos-helpdesk@essp-sas.eu.
- EGNOS Helpdesk phone number: +34 911 236 555.

6.2 EDAS Registration

EDAS is accessible upon registration. In order to request an EDAS account, the online version of the application form described in "Appendix C Application Form for EDAS Service" and available at the EDAS section of the User Support website (<http://egnos-user-support.essp-sas.eu/>) shall be submitted to the EGNOS Helpdesk (egnos-helpdesk@essp-sas.eu).

Before proceeding with the submission 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 (<http://egnos-user-support.essp-sas.eu/>).

6.3 EDAS Regular/Urgent Request

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

- EDAS urgent request¹⁵: inquiries signalling technical failures of EDAS (temporary service outage) are tagged as high priority requests. The resolution time¹⁶ 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 time¹⁷ for this kind of requests is 3 working days¹⁸.

¹⁵ For urgent requests, it is recommended to contact the EGNOS Helpdesk by phone.

¹⁶ 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.

¹⁷ 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.

¹⁸ Spanish working days.

6.4 EDAS First Connection Support

In order to set up the EDAS Client SW, the user has to follow the indications provided in [RD-10]. In case that the connection is not achieved, the user is advised to refer to the troubleshooting section of [RD-10].

If the case is not covered in [RD-10], the user should submit the case to the EGNOS Helpdesk.

6.5 EDAS Point-To-Point Connectivity Support

For those EDAS users interested in having a guaranteed bandwidth, it is possible to contract a Point-To-Point (PTP) line. In case of deciding to contract a dedicated line, users are welcome to contact the EGNOS Helpdesk (egnos-helpdesk@essp-sas.eu) for support. Note that the procurement of the line (including negotiation with local telecomm providers) shall be done by the user.

6.6 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.

7.1 EGNOS Monthly Performance Report

(http://www.essp-sas.eu/monthly_performance_reports) since May 2011.

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 ESSP website

The EDAS services performance for the subject month can be found in section 5 of the EGNOS Monthly Performance Report.

Figure 7.1

EDAS section in May 2014 EGNOS Monthly Performance Report

5 EGNOS DATA ACCESS SERVICE (EDAS)

EDAS (EGNOS Data Access Service) offers ground-based access to EGNOS data [RD-3]. It is the single point of access for the data collected and generated by the EGNOS infrastructure composed of ground stations distributed over Europe and North Africa.

The main data provided by EDAS are:

- Raw GPS, GLONASS and EGNOS GEO observations and navigation data collected by the entire network of Ranging and Integrity Monitoring Stations (RIMS) and Navigation Land Earth Stations (NLES).
- EGNOS augmentation messages, as normally received by users via the EGNOS Geostationary satellites.

These data are provided through different EDAS Services in different formats in order to meet different set of applications and needs. For a description of the EDAS services, please refer to the EDAS SDD [RD-3].

Additional information on the EDAS services is available at the EDAS specific section of the EGNOS User Support website (<http://egnos-user-support.essp-sas.eu>).

Below, the performance of EDAS Services (please refer to the EDAS SDD [RD-3] for definition details) corresponding to May 2014 is presented:

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

EDAS Service	Availability	Latency (ms)
Service Level 0	100.00%	531.10
Service Level 1 ³	100%	534.58
Service Level 2	100.00%	534.77
Ntrip Service	99.46%	391.23
SISNeT Service		
GEO Operational 1	99.39%	133.32
GEO Operational 2	99.49%	135.58
Data Filtering Service		
RIMS A	99.96%	548.71
Central	99.96%	486.83
MEDA	99.96%	537.77
North-East	99.96%	251.42
North-West	99.96%	520.45
South-West	99.96%	554.42
FTP Service	99.87%	N/A

Table 6 – Performance of EDAS Services

7.2 EDAS Website

The EDAS dedicated section at the EGNOS User Support website (http://egnos-user-support.essp-sas.eu/egnos_ops/edas_intro) provides all the relevant information regarding EDAS to the general public. Upon registration, EDAS users are granted access to the EDAS restricted area of the EGNOS User Support Website where the necessary development material is available for download.

information regarding EDAS to the general public. Upon registration, EDAS users are granted access to the EDAS restricted area of the EGNOS User Support Website where the necessary development material is available for download.

Figure 7.2 EDAS section at the EGNOS User Support Website

The screenshot shows the EGNOS User Support website's EDAS section. The page is titled "Introduction to EDAS" and features a large "EGNOS Data Access Service (EDAS)" logo. The main content area includes an introduction to the service, contact information for registration, and a list of services provided. A sidebar on the left contains sections for "SIGNAL IN SPACE" (listing PRN 120, 124, 126, and 128), "PLANNED SIS OUTAGE" (with dates and times), and "EGNOS Implementation Status European Airports" (with a map of Europe).

8.1 EDAS Client SW

The EDAS Client SW is a platform-independent interface element allowing users to connect to the following EDAS services: SLO, SL2 and Data Filtering¹⁹ (both over SLO and SL2). This tool is available for users after registration (see section 6.2 for EDAS registration details).

Users make use of this software component to obtain the EGNOS products in real-time from the EDS, then perform the necessary processing and finally provide services to end users via non-GEO means.

The EDAS Client SW is in charge of handling the connection between users and EDAS servers 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. Details on the EDAS Client SW installation, behaviour and typical connection issues that new EDAS users may face can be found in [RD-10].

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 capabilities²⁰ 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 8.1

EDAS Client SW: login window



¹⁹ In order to access the EDAS Data Filtering Service, EDAS Client SW version 2 or later is required.

²⁰ Data Stamping functions may require a duly synchronized user platform (e.g. NTP server)

8.2 Examples of EDAS based services/applications

There are different manufacturers that provide tools and/or compilers to use the information packaged in RTCM (SL2) and ASN.1 (SLO) standards.

Regarding RTCM, there are several available tools through the Ntrip protocol, such as the BKG NTRIP Client (BNC) (further information in http://igs.bkg.bund.de/index_ntrip.htm web site). For Linux environment there is also a `gpsd`²¹ package containing a RTCM decoder (its manual page can be found at <http://manpages.ubuntu.com/manpages/hardy/man1/rctmdecode.1.html>).

Regarding EDAS services applications, there is an extensive range of possibilities, such as the ones listed here:

- Redistribution of EGNOS augmentation messages: used in urban canyons for user communities with their own equipment standards
 - A-GNSS for LBS: this application can be used by many user communities, such as:
 - Mobile network operators.
 - 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.
 - Professional GNSS Services/products: for users within surveying, oil and gas exploration, 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 through SISNeT for mobile receivers with Internet access, irrespective of the GEO visibility conditions in order to improve accuracy with respect to GPS.
 - Research initiatives linked to the analysis of the atmosphere behaviour.
 - Offline and real-time processing for GNSS performance analysis.

²¹ Global Positioning System - daemon

APPENDIX A

Definitions

Term	Definition
Availability	When applied to EDAS services, percentage of time in which EDAS is providing its services according to specifications (see [RD-10] 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 level 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-12] 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.
EMS	EGNOS Message Server format has been defined by ESA for the provision of EGNOS messages. EMS format 2.0 is described in [RD-13].
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-14].
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 [RD-15] can be purchased at http://www.rtcn.org/orderinfo.php .

Term	Definition
RINEX	<p>Receiver Independent Exchange Format (RINEX) is data interchange format for raw satellite navigation system data.</p> <p>RINEX 2.11 version (the one selected for the EDAS FTP Service) is described in [RD-16].</p>
RINEX-B	<p>Receiver Independent Exchange Format (RINEX) type for broadcasting of GEO satellite data.</p> <p>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-17].</p>
RTCM	<p>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 centimeter-level accuracy positioning service over large regions.</p> <p>Full description of RTCM formats are given respectively in [RD-6], [RD-8] and [RD-9].</p>
RTK	<p>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.</p>
SISNeT	<p>Specific protocol for the transmission of EGNOS messages over TCP/IP developed by ESA.</p> <p>Please refer to [RD-11] for a detailed description of SISNeT protocol.</p>

APPENDIX B

Observed EDAS performances

Below, the performance of EDAS Services performance from January 2014 to September 2014 is presented:

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

Table 8.1 EDAS availability from January 2014 to September 2014

Availability (%)									
EDAS Service	Jan 2014	Feb 2014	Mar 2014	Apr 2014	May 2014	Jun 2014	July 2014	Aug 2014	Sept 2014
SL 0	99.95%	99.99%	100.00%	99.99%	100.00%	99.32%	100%	100%	99,93%
SL 2	99.95%	99.99%	100.00%	99.99%	100.00%	99.30%	100%	100%	99,89%
Ntrip Service	99.13%	99.96%	99.99%	99.96%	99.46%	99.41%	99.98%	100%	99,69%
SISNET									
SISNET GEO1	99.36%	99.38%	99.45%	99.29%	99.39%	98.58%	99.14%	99.26%	98.92%
SISNET GEO2	99.33%	99.41%	99.38%	99.25%	99.49%	98.27%	98.06%	99.25%	99.05%
Data Filtering Service									
DF RIMS A	99.93%	99.98%	99.98%	99.93%	99.96%	99.26%	99.96%	99.96%	99.82%
DF Central	99.93%	99.98%	99.97%	99.93%	99.96%	99.24%	99.95%	99.98%	99.81%
DF MEDA	99.93%	99.96%	99.97%	99.92%	99.96%	99.24%	99.95%	99.94%	99.81%
DF NorthEast	99.93%	99.97%	99.97%	99.92%	99.96%	99.24%	99.93%	99.96%	99.82%
DF NorthWest	99.93%	99.96%	99.97%	99.94%	99.96%	99.25%	99.97%	99.98%	99.81%
DF SouthWest	99.93%	99.98%	99.97%	99.92%	99.96%	99.26%	99.95%	99.91%	99.80%
FTP Service	99.35%	99.49%	99.85%	99.95%	99.87%	98.40%	100%	99.96%	99.76%

Table 8.2 EDAS latency from January 2014 to September 2014

Availability (%)									
EDAS Service	Jan 2014	Feb 2014	Mar 2014	Apr 2014	May 2014	Jun 2014	July 2014	Aug 2014	Sept 2014
SL 0	554.10	539.54	528.87	525.53	531.10	529.17	539.77	532.87	501.01
SL 2	559.42	543.93	532.94	529.63	534.77	533.83	544.58	539.77	542.43
Ntrip Service	931.26	255.57	256.97	336.83	391.23	262.23	267.84	246.97	246.57
SISNET									
SISNET GEO1	323.90	262.25	175.61	249.37	133.32	72.50	314.68	300.71	315.77
SISNET GEO2	331.32	253.00	167.39	241.17	135.58	72.53	308.74	301.52	318.10
Data Filtering Service									
DF RIMS A	502.23	489.14	502.48	569.13	548.71	507.30	581.39	2174.42	1017.57
DF Central	584.20	452.60	428.17	477.62	486.83	431.14	902.47	1369.03	946.79
DF MEDA	597.90	482.76	482.87	530.63	537.77	479.4	934.19	712.61	835.3
DF NorthEast	187.03	184.67	200.19	249.53	251.42	201.53	747.9	1545.45	818.4
DF NorthWest	457.26	444.57	460.90	527.80	520.45	492.97	780.03	2109.77	985.5
DF SouthWest	644.32	498.48	504.77	575.10	554.42	498.53	580.68	2173.26	444.00

APPENDIX C

application form for EDAS service

The EDAS application form is implemented through a web form that can be filled on-line at the EGNOS User Support website (http://egnos-user-support.essp-sas.eu/egnos_ops/user/register)

User account [Create new account](#) [Log in](#) [Request new password](#)

Account information

Username: *

Spaces are allowed; punctuation is not allowed except for periods, hyphens, and underscores.

E-mail address: *

A valid e-mail address. All e-mails from the system will be sent to this address. The e-mail address is not made public and will only be used if you wish to receive a new password or wish to receive certain news or notifications by e-mail.

For successful registration, please introduce the required info. An e-mail will be sent in order to verify your account.

Groups

Join *Advisories* group.
The group whose members receive advisories via email

Join *Alerts* group.
The group whose members receive alerts via email

Personal information

First Name: *

Second Name: *

Professional Profile: *

Organization: *

EGNOS main application: *

Aviation ▾
Please select the field you usually employ EGNOS for.

Type of receiver used: *

Terms and Conditions of Use

Please indicate your agreement with the Legal Notice

Accept Terms & Conditions of Use *

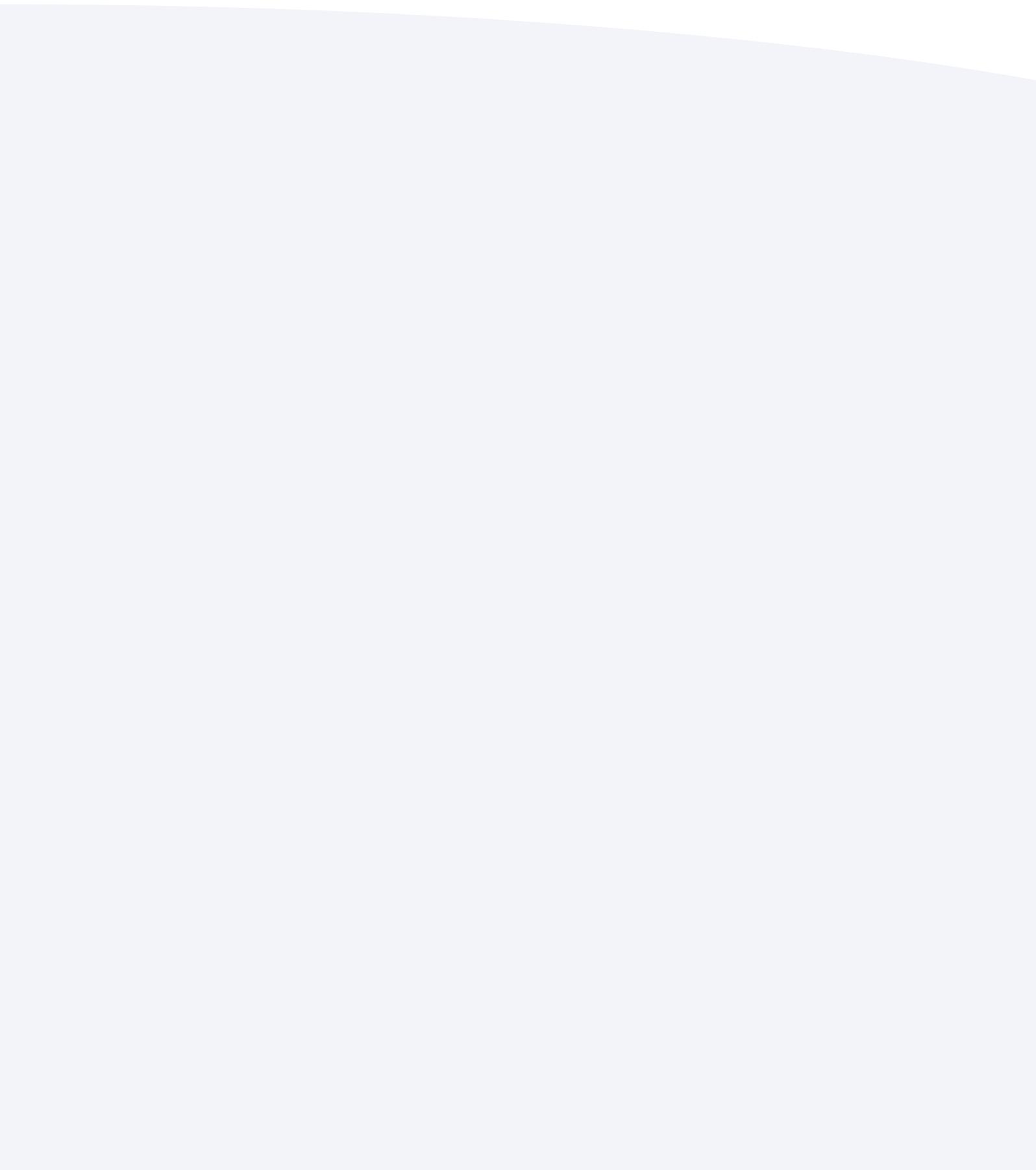
CAPTCHA

This question is for testing whether you are a human visitor and to prevent automated spam submissions.



What code is in the image?: *

Enter the characters shown in the image.



APPENDIX D

EDAS data filtering service

Configuration

As a complement to the information provided about the EDAS Data Filtering Service in section 4.2, 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-10] available at the EDAS specific section of the EGNOS User Support Website (<http://egnos-user-support.essp-sas.eu/>).

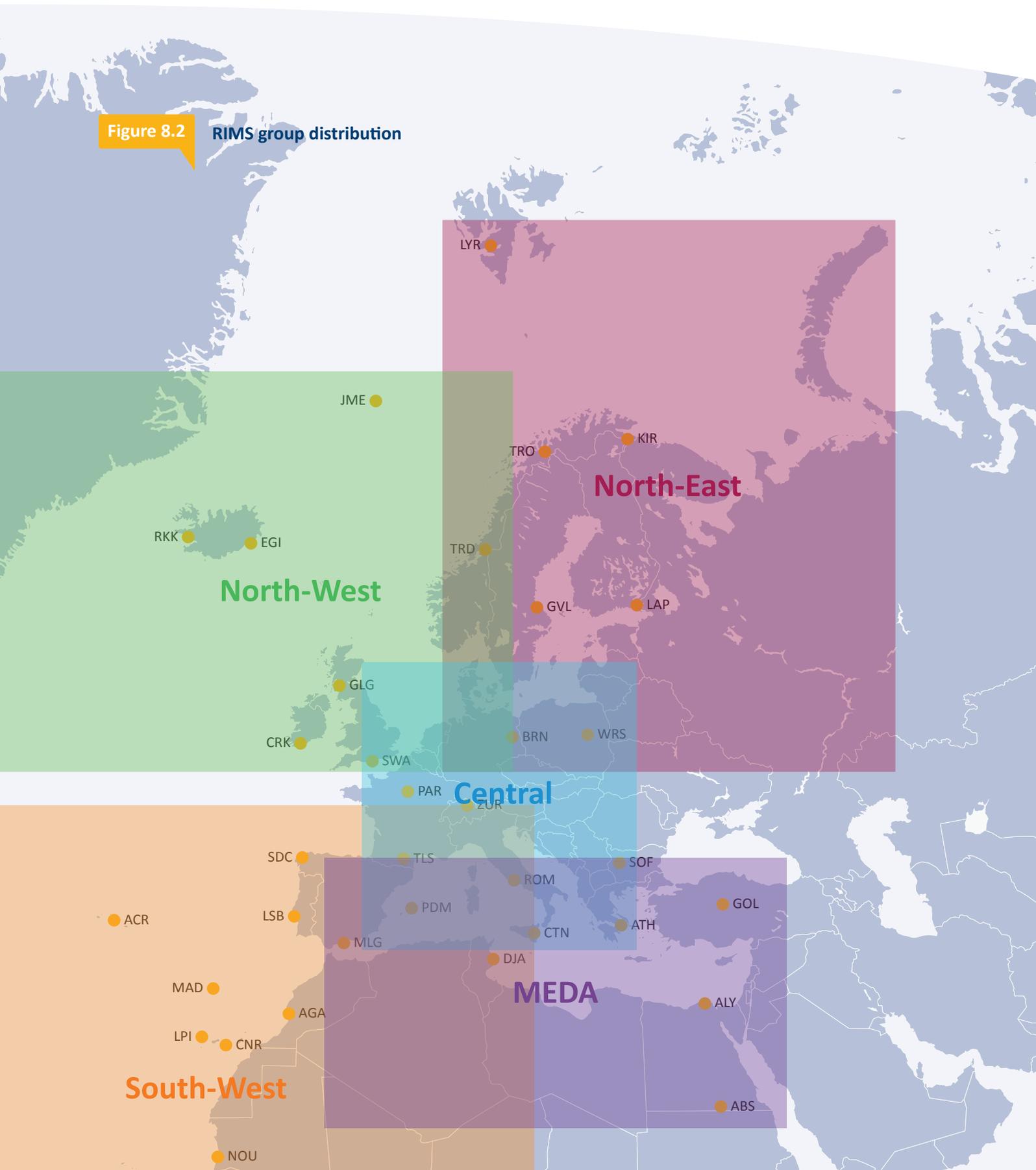
The following groups are currently configured for the EDAS Data Filtering service (see Figure 8.2):

- **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.

Table 8.3 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

Figure 8.2 RIMS group distribution



APPENDIX E

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
ARP	Antenna Reference Point
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
DFS	Deutsche Flugsicherung
DGAC	Direction Générale de l'Aviation Civile
DSNA	Direction des Services de la Navigation Aérienne
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
ENAIRE	Aeropuertos Españoles y Navegación Aérea
ENAV	Ente Nazionale Di Assistenza Al Volo
ESA	European Space Agency
ESSP	European Satellite Services Provider
EU	European Union

Acronym	Definition
EWAN	EGNOS Wide Area Network
FAQ	Frequently Asked Questions
FTP	File Transfer Protocol
GAGAN	GPS Aided GEO Augmented Navigation
GEO	Geostationary Satellite
GIVE	Grid Ionospheric Vertical Error
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
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
NATS	National Air Traffic Services
NLES	Navigation Land Earth Station
NTP	Network Time Protocol
NOF	Navigation Overlay Frame
NTRIP	Networked Transport of RTCM via Internet Protocol
OS	Open Service

APPENDIX E - ACRONYMS

Acronym	Definition
PA	Product Assurance
PACF	Performance and Check-out Facility
PRN	Pseudo-Random Number
PTP	Point-To-Point
QA	Quality Assurance
RD	Reference Document
R&D	Research & Development
RDS	Radio Data System
RIMS	Range and Integrity Monitoring Station
RINEX	Receiver Independent Exchange Format
RTCM	Real Time Correction Message
RTK	Real Time Kinematic
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
SP	Service Provider
SPS	Standard Positioning Service
SW	Software
TEC	Total Electron Content
TCP	Transport Control Protocol
TTA	Time-To-Alert
UDRE	User Differential Range Error
US	United States
UTC	Coordinated Universal Time
WAAS	Wide Area Augmentation System

More information on the European Union is available on the Internet (<http://europa.eu>).
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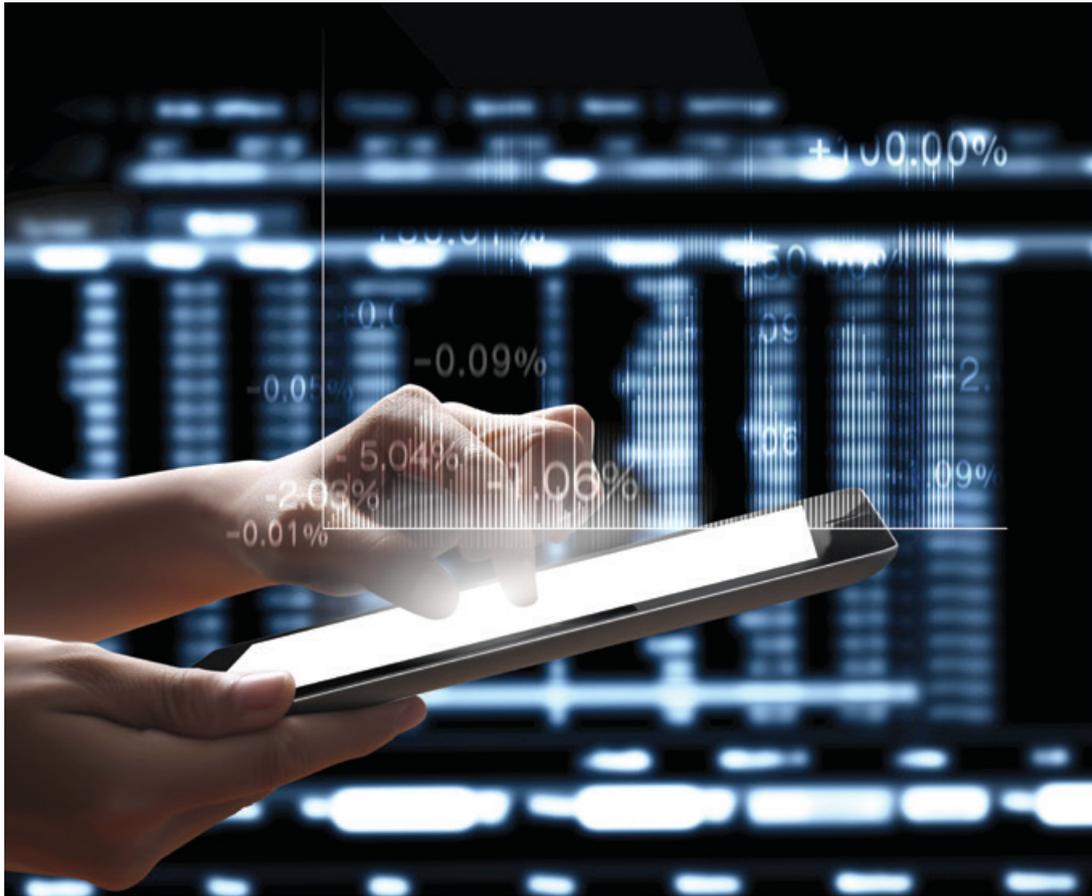
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