The EGNOS Service Provider

Service Provision Yearly Report (April 2015 - March 2016)

EGNOS Service Provision

ESSP

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ESSP organises an annual EGNOS Service Provision Workshop for EGNOS users and stakeholders. It is the perfect place to receive updated information on the EGNOS system and services, implementation information and success stories and to gather feedback from users and share ideas and experiences among EGNOS users in different domains.

The 2016 EGNOS Service Provision Workshop will be held on 27th-28th September in Warsaw.

REGISTRATION OPEN!

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1 A WORD FROM THE ESSP CEO

2015 has been an exciting year for EGNOS, as well as for ESSP. Indeed, while most of 2014 was spent on technical and service oriented preparatory works, 2015 saw a clear acceleration of EGNOS benefits for its users in many ways:

- The "EGNOS flight event" that took place in May 2015, with the contributions of Airbus and ATR demonstrated that EGNOS is not only beneficial to general and business aircraft, but is also of great interest for commercial aviation;
- The EGNOS 241M_YSR#1 version was successfully deployed in August 2015 bringing more robustness to the ionospheric effects to an enlarged coverage and, as a result, better service to EGNOS users;
- The LPV-200 service was declared on 29th September, making the EGNOS SoL service now equivalent to the ILS Cat 1 performance (in terms of minima); additionally, the first LPV-200 procedures were published at Charles de Gaulle Airport in France in April 2016;
- The EGNOS Yearly Workshop in Copenhagen was a success, bringing together more than 170 participants and enabling them to share their experiences using EGNOS services;
- 67 EGNOS multimodal adoption actions were successfully conducted (20 more than in 2014) in aviation, but also in agriculture, surveying, rail and maritime, with a growing interest in all these market segments and numerous trials started for the latter;
- 12 additional EGNOS working agreements were signed with Air Navigation Service Providers, reaching a total of 40 at the end of 2015;
- Also important are the works related to the next EGNOS releases to come (ESR 241N, YSR2) and to the EGNOS users (definition of working agreements for new aviation specific scenarios), which will bring additional assets in 2016.

All the above was conducted while the EGNOS service remained safely and securely delivered and the ISO-9001 certificate of the company was renewed in March 2015 with no non-conformity: congratulations to the ESSP and partners and subcontractors for these results and for having reached the targets we set at the beginning of 2015.

Lastly, I would like to thank our customer -the GSA- for our fruitful, always "EGNOS users oriented" relationship and cooperation in all these achievements.

Thank you,

Thierry Racaud
CEO, ESSP SAS

We certify you're there.

2 EXECUTIVE SUMMARY

This document covers the period from 1st April 2015 to 31st March 2016.

2.1 EGNOS Service Performances

During the period from 1st April 2015 to 31st March 2016, the EGNOS service performance has been excellent, covering (in general with some margin) the values committed in the Open Service, Safety of Life and EDAS SDDs (see https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds).

The EGNOS services performance during this yearly period can be summarised as follows:

EGNOS Safety of Life (SoL) Service – Non-Precision Approach (NPA)		
NPA Availability	100% of the service area (Message Type 27)	
NPA Integrity	No integrity event for any of the monitoring sites	
NPA Continuity	Values below $1x10^{-3}$/h in continental Europe	
EGNOS Safety of Life (SoL) Service – Approach with Vertical Guidance (APV-I)		
APV-I Availability	99.51% of the Service Area	
APV-I Integrity	No APV-I integrity event	
APV-I Continuity	100% of the commitment area ($5{\cdot}10^{-4}$/15seconds)	
EGNOS Safety of Life (SoL) Service – LPV-200 (from October 2015 to March 2016)		
LPV-200 Availability	99.78% of the Service Area	
LPV-200 Integrity	No LPV-200 integrity event	
LPV-200 Continuity	100% of the commitment area ($5{\cdot}10^{-4}$/15seconds)	
LPV-200 Accuracy	No accuracy events happened during the period	
EGNOS Open Service (OS)		
Horizontal Accuracy	1.0 metres (95th percentile of the cumulative data for all stations)	
Vertical Accuracy	1.6 metres (95th percentile of the cumulative data for all stations)	
Open Service Availability	Above 99% for all locations except Canary Islands, La Palma and Reykjavik stations	
EGNOS Data Access Service (EDAS)		
Service Level 0	99.89% availability	704.61 ms latency
Service Level 2	99.89% availability	705.26 ms latency
Ntrip	99.66% availability	622.51 ms latency
SISNeT	99.60% availability	78.08 ms latency
Data Filtering	99.68% availability	469.02 ms latency
FTP	99.78% availability	Not Applicable

Signal-In-Space (SIS) Availability	
PRN120 (EGNOS OP)	99.881%
PRN126 or PRN 136 (EGNOS OP)	99.935%
EGNOS OP (at least one SIS)	100%

Table 1: EGNOS service performance during April 2015 – March 2016 period

The main causes for the observed EGNOS Service Performance degradations were for:

- EGNOS OS and SoL:
  - Ionosphere monitoring: As in previous years, ionosphere issues related to the increase in solar activity (linked to solar cycle #24) have been the main cause of underperformances, impacting mainly the North and the South of the service area. It must be noted that after ESRv2.4.1M deployment, in July 2015, the observed degradations in the southern area decreased significantly thanks to the improvements introduced by this release.
  - GPS monitoring: The problems related to the monitoring of one or more GPS satellites represent the second cause of the underperformances of APV-I Availability and Continuity, contributing to degrade the performances in some areas. This loss of monitoring of some satellites has been especially relevant during periods with degraded ionosphere monitoring. Improvements to reduce the occurrences and impact of these events are expected in upcoming EGNOS releases.
- EDAS:
  - The reduced availability of EDAS Ntrip, SISNeT, Data Filtering and FTP services identified in July 2015 (only month when a deviation with respect to the target performance has been observed) was caused by an unexpected failure on 25th July. Corrective actions were taken afterwards to prevent its reoccurrence.

EGNOS RIMS Shelter - Jan Mayen (Norway)

2.2 Service Provision and Development

Service Declaration

As an important milestone, the LPV-200 service level was declared on 29th September 2015 during the EGNOS Service Provision Workshop held in Copenhagen. The first LPV-200 procedures were published at the Charles de Gaulle Airport in France in April 2016.

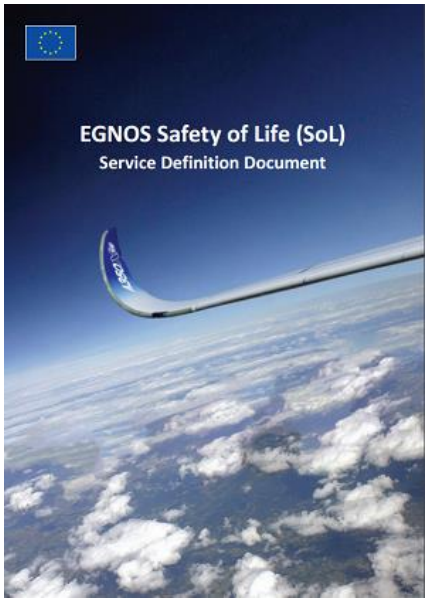
Service Definition Documents (SDD) and related documentation

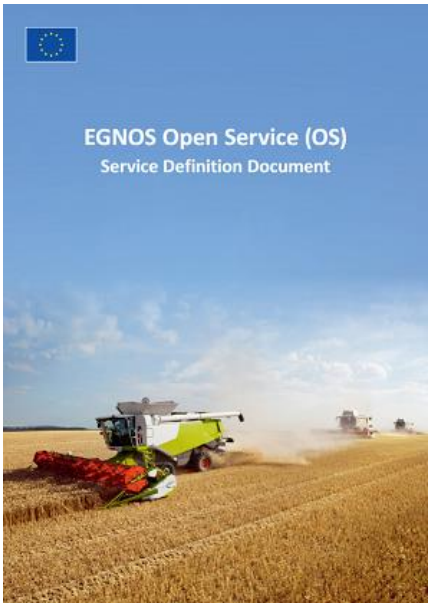
Following the deployment of the ESR 2.4.1M, a new version of the SoL SDD (v3.0) was published on 29th September 2015. The main changes of this new version of the SoL SDD were the introduction of the LPV-200 service level, the update of the EGNOS Space Segment, the new NPA continuity map and the update of Appendix D with the information of EGNOS Service Notice #13.

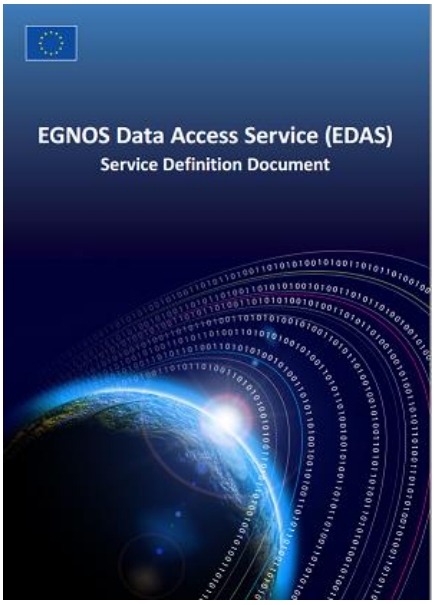
In relation to the entry in operation of ESR 241M, new versions of the OS and SoL SDD are under preparation to provide users with updated information on the EGNOS Services performance.

The content of the EGNOS Services' SDDs was complemented by the publication of Service Notices #13, #14 and #15 (see section 4.1.4).

Additionally, the three EGNOS Services' Roadmaps were updated twice from April 2015 to March 2016 going from v3.2 (on 5th June 2015) to v3.3 (on 29th January 2016).







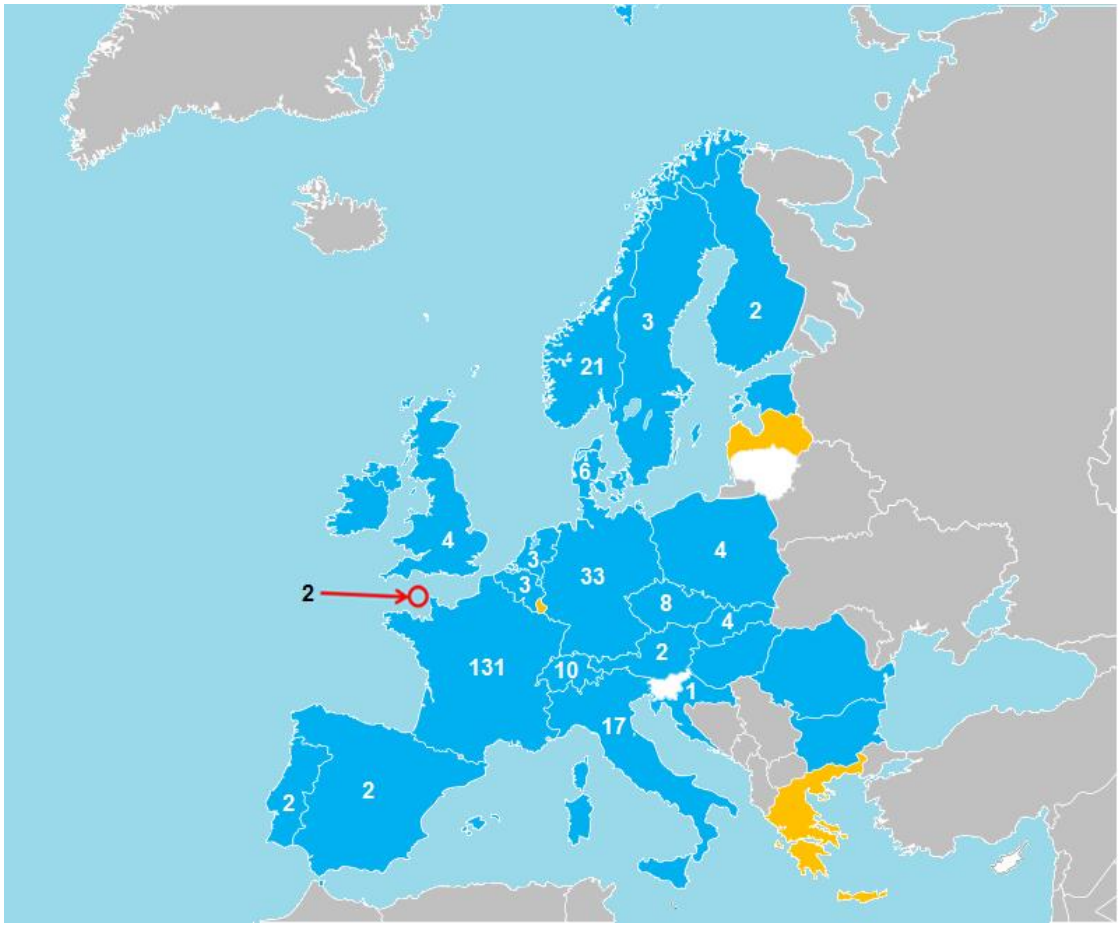
EGNOS Service Definition Documents (https://egnos-user-support.essp-sas.eu/)

User Agreements

EGNOS Working Agreement (EWA)

Concerning the EGNOS Service Development in aviation, the ESSP continued its specific dissemination and awareness campaign related to the EGNOS Working Agreement (EWA). As a result of this process, the ESSP has signed 9 new EWA over this period (total of 40). The new countries under EWA coverage are Hungary, Denmark, The Netherlands and Belgium. The target for 2016 is to have 10 more EWAs signed (total target 50).

The following figure provides the status of the EWA negotiations with European ANSPs (EU and non-EU). The following colour code is used to enable easy identification of the progress that has been made with each ANSP to date (see legend).



	No discussion / No need / No feedback
	Initiated Discussions
N	EWA signed (N=Number of published LPV procedures)

Figure 1: EGNOS Working Agreement Status

EGNOS Procedures Implementation

At the end of the reporting period (31st March 2016), ESSP was providing EGNOS NOTAM proposals to 19 countries, 187 airports and a total of 347 EGNOS-based approach procedures (258 LPV procedures, 89 APV Baro –EGNOS enabled- procedures).

User Agreements in other domains (SoL non-aviation applications)

Based on the previous interaction and a thorough analysis of the state of the art of GNSS/EGNOS applications in these domains, ESSP has been working on identifying whether an EWA-like interface scheme would fit with the corresponding users' needs in order to draft an initial version in such case.

The maritime domain seems to be more mature than rail for the implementation of an EWA-like framework scheme. In this regard, ESSP is supporting GSA, through specific EGNOS Workshops, on gathering specific user requirements aimed at establishing the Service Provision Scheme for EGNOS and notably the definition of the characteristics of an EWA-like working scheme. Along this line, the work underway within the EMRF (European Maritime Radio-Navigation Forum) Service provision Working group, led by ESSP, is especially relevant, where a document is currently in progress depicting the EGNOS Service provision scheme and notably including the main inputs to be considered in the elaboration of an EWA-like proposal for the maritime domain.

Cargo vessel approaching the coast

User Service Implementation

EGNOS Multimodal Adoption (EMA) Action Plan

In 2015, 67 actions were conducted and implemented successfully in the frame of the EMA Action Plan.

The EMA Action Plan 2016 was prepared and agreed upon. A total of 73 actions are defined and under implementation.

EGNOS Service Provision Workshops

The 2015 EGNOS Service Provision Workshop was held in Copenhagen in September 2015 with more than 170 participants over the two-day event, including African and North American representatives, who were highly satisfied with the event, according to the survey that was implemented, which provided an overall excellent satisfaction rating of 8.5 (8.7 in 2014).

EGNOS Service Workshop 2015 promotional advertisement

The 2016 EGNOS Service Provision Workshop is planned in Warsaw on 27th-28th September and is currently under preparation. The "Save the date" notification and the high-level agenda were notified to the expected participants by beginning of May. Regular updates as the event date approaches will be posted on the EGNOS User Support Website (https://egnos-user-support.essp-sas.eu/).

EGNOS Service Workshop 2016 promotional advertisement

EGNOS Users' Satisfaction surveys

The EGNOS Users' Satisfaction Survey was launched by the GSA and ESSP in October 2015 to cover the 2015 calendar year. The survey was open from 05/10/2015 to 16/12/2015 using a specific online platform and 200 answers were received from a total of 6,077 users consulted.

A total of 137 EGNOS users replied to the survey. The output from this survey was included in the EGNOS Bulletin Q1-2016. The overall satisfaction score shows a good level of satisfaction with respect to EGNOS in general terms, with a global satisfaction score of 7.6, similar to last year's.

Several recommendations were derived and a user satisfaction action plan defined to improve user satisfaction in 2016.

User Support

EGNOS Helpdesk activities

Between 1st April 2015 and 31st March 2016, the EGNOS Helpdesk processed 274 user requests, which represented an increase of 40% compared to the previous Yearly reporting period, where a total of 195 requests were processed.

From the total number of queries received, 8 were catalogued as urgent requests (asking about the current status of the EDAS service or a technical failure of the EGNOS system) and 18 were by phone.

On average, the number of questions per month was 22.83, while the average number of iterations per month was around 49, for an average of 2.15 iterations per user query.

Most of queries were related to EDAS (EDAS Registration requests represented 20%, EDAS Configuration and EDAS Information requests showed 6%).

On the other hand, in terms of market segment, most of the queries received during the reporting period were related to aviation (42%), followed by personal mobility (17%), surveying (14%), agriculture (6%), maritime (4%) and road (3%).

EGNOS User Support Website activities

EGNOS User Support Website had 2222 registered users. There were 655 new registered users in this period.

A brand new EGNOS User Support website was deployed in May 2015, providing a completely reshaped look and layout, more robust notifications system, better accessibility and improved user experience.

NOTAM proposal service status

The NOTAM proposal service has been very stable during this period, with actual delays observed in the notification of predicted EGNOS service outages ahead of unscheduled GNSS system events typically lower than 30 minutes (versus the 2 hours target in service level 4).

Additionally, full renewal of the NOTAM proposals service infrastructure was accomplished in the summer of 2015 to ensure its long-term reliability and improve the processing capabilities to cope with the continuous increase in the number of EGNOS based operations published.

EDAS Service status

Several EDAS releases were deployed to continuously improve the service stability, data quality, robustness and operations, and in particular very stable performance has been achieved since the summer of 2015. The number of user accounts has been continuously increasing, resulting in an increase of 25% in these last 12 months.

EGNOS-enabled devices (visit Handheld to check for details)

2.3 System Operation and Maintenance

During the past period, the main non-recurrent activities that were achieved in the System and Operational domain are under the scope of the deployment of the ESR2.4.1M/YSR#1 release. This very important milestone was achieved prior to the end of August 2015.

The main features of this new release were:

- Improvement of ionosphere monitoring: Additional changes aimed at improving the EGNOS system behaviour towards ionosphere disturbances leading to improvements in the EGNOS service robustness, in particular in continuity in almost the entire service area, mainly in the south-west of the service area. Improvements in the IONO monitoring will improve both SoL and OS service areas.
- Deployment of two new NLES G2 sites, Redu and Betzdorf, aimed at dealing with obsolescence issues and in particular linked to the update of the GEO space segment with the SES-5.
- Improvement of GPS Satellite monitoring leading to an increase in system robustness against certain specific events in the GPS constellation.
- LPV-200 service level capability.

EGNOS RIMS in Golbasi (Turkey)

3 SERVICE PERFORMANCE

3.1 EGNOS SIS Availability

This section presents the yearly performance of the SIS (Signal-In-Space) availability. It provides the yearly average availability for the SIS Operational mode for each GEO PRN 120 and 126 (then 136) and for the operational SIS (at least one SIS is available). It also provides the yearly trend based on the monthly data. Note that PRN126 was the second operational GEO until 19/08/2015 when this role was taken over by PRN136 (as communicated to users through Service Notice #14).

From April 2015 to March 2016, the average (per month) EGNOS message availability was the following:

- PRN120 (EGNOS OP): 99.881%
- PRN126 or PRN 136 (EGNOS OP): 99.935%
- EGNOS OP (at least one SIS): 100%

Monthly results are given by the following:

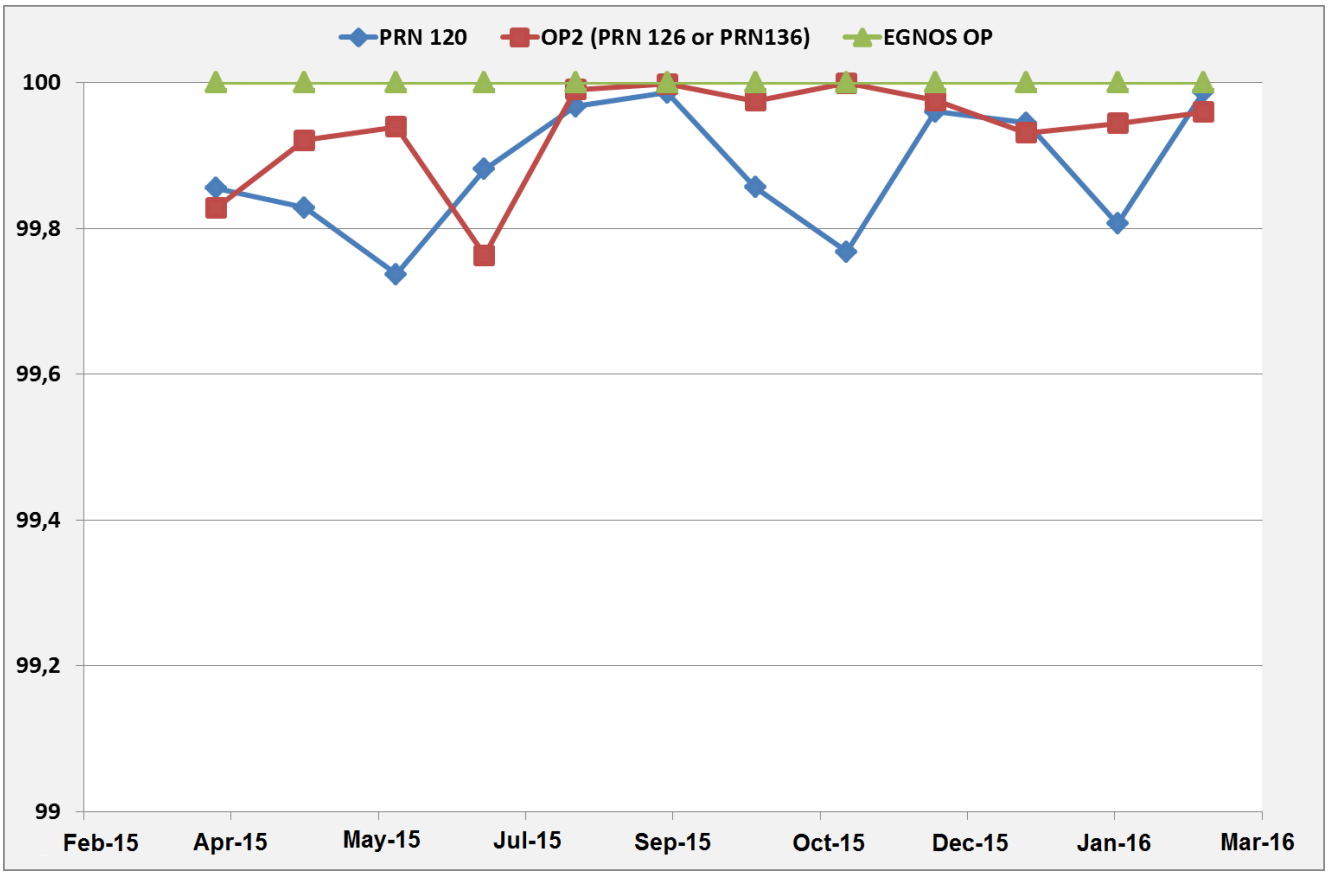


Figure 2: EGNOS SIS OP availability trend April 2015 to March 2016 (%)

Numerical values for each month and for each PRN are given in the following Table 2:

DATE	PRN 120	OP2 (PRN 126 or PRN136)	EGNOS OP
April 2015	99,86	99,83	100
May 2015	99,83	99,92	100
June 2015	99,74	99,94	100
July 2015	99,88	99,76	100
August 2015	99,97	99,99	100
September 2015	99,99	99,996	100
October 2015	99,86	99,98	100
November 2015	99,77	99,999	100
December 2015	99,96	99,98	100
January 2016	99,94	99,93	100
February 2016	99,81	99,94	100
March 2016	99,99	99,96	100
Average	**99,88**	**99,94**	**100**

Table 2: EGNOS SIS OP availability trend April 2015 to March 2016 (%)

3.2 SoL Service – Non-Precision Approach (NPA)

The following figures depict the minimum performance for the Non-Precision Approach (NPA) availability and continuity that can be expected from EGNOS, as defined in the EGNOS SoL Service Definition Document (see https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds). These values correspond to the expected average performance measured by a fault-free receiver using all GPS satellites in view over a period of one month, using all the operational EGNOS GEOs:

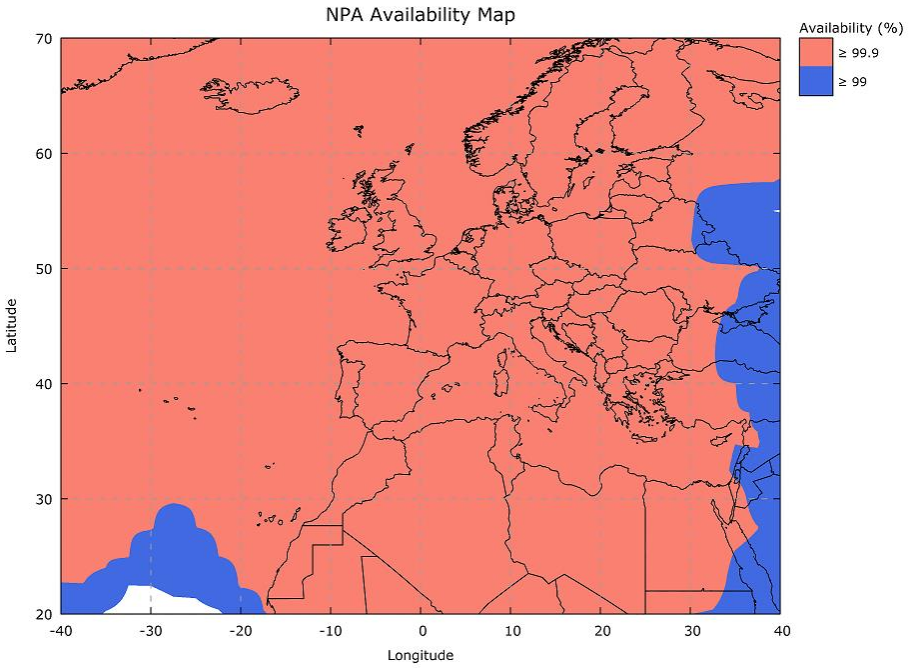


Figure 3: NPA Availability map

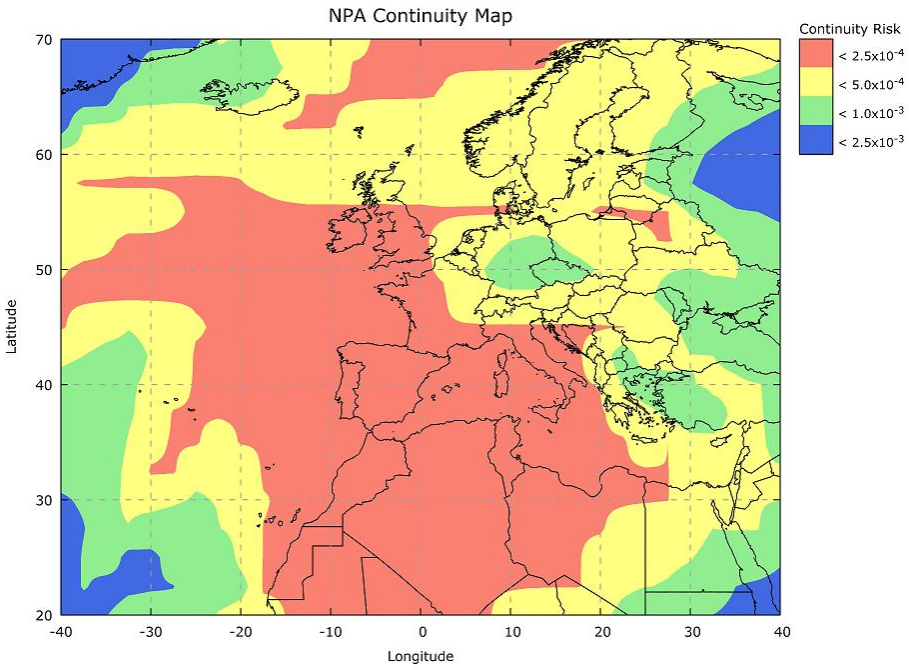


Figure 4: NPA Continuity map

Additionally, NPA performance is reported through the EGNOS Monthly Performance reports, available on the EGNOS User Support website (https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/monthly-performance-reports).

3.2.1 NPA availability – Yearly Performance

EGNOS NPA Availability *is defined as the percentage of samples in which the Horizontal Protection Level (HPL) is below the Alert Limit for NPA (HAL: 556m), computed over the total period.*

The following figure provides NPA availability for the reporting period, for combined GEO:

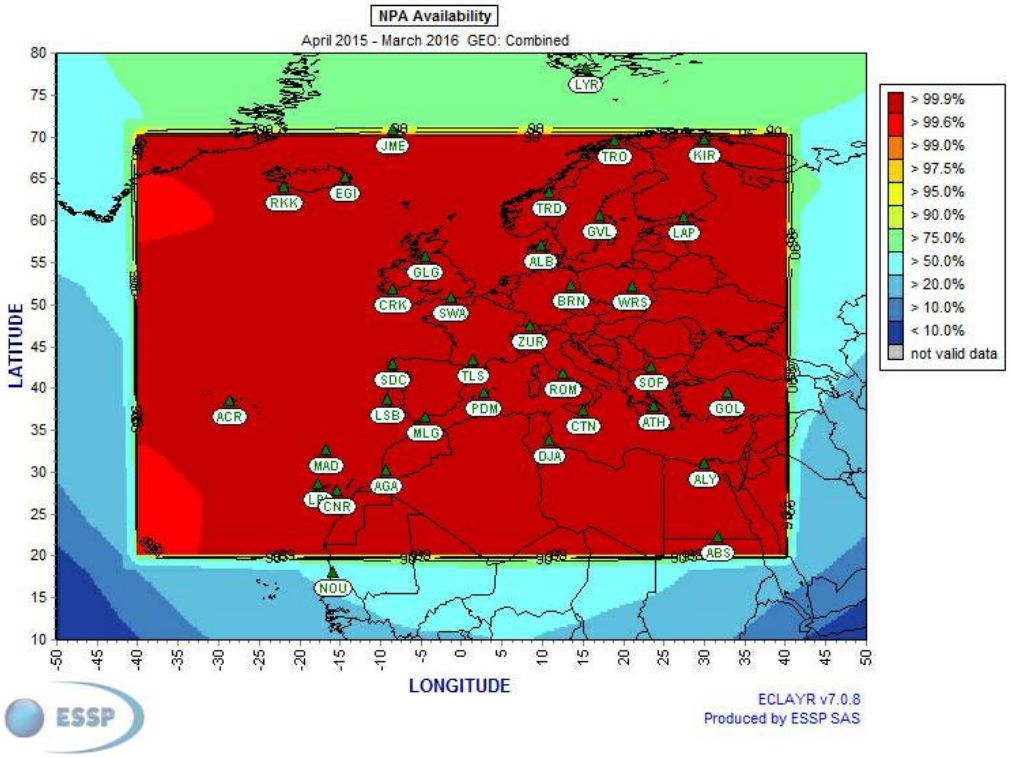


Figure 5: NPA Availability from 01/04/15 to 31/03/16

3.2.2 NPA availability – Achievement against target

During the reporting period, the most significant underperformance was detected on 30th June and 1st of 2015, impacting the entire MT27 region with the exception of some areas in the southeast. This issue was caused by the loss of monitoring by EGNOS of several GPS satellites.

Other degradations also slightly affected the southwest, and they were linked to the low number of satellites that were visible in that area during some periods of the day.

The combination of the 99% NPA Availability map and the Reference area gives the following:

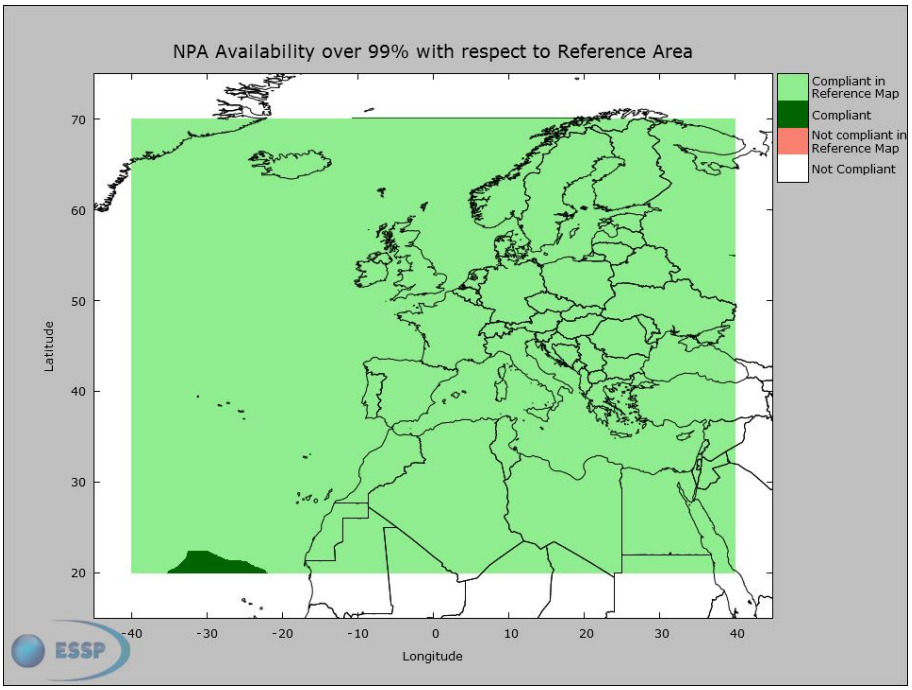


Figure 6: NPA Availability map with respect to the reference map – 01/04/15 - 31/03/16

In the picture, the legend is to be understood as follows:

- **Compliant in Reference Map**: This is the part of the Service Area[1] where NPA availability was above 99%.
- **Compliant**: This is the zone out of the Service Area[1] where NPA availability was also above 99% (extension of coverage with respect to the commitment).
- **Not compliant in Reference Map**: This is the part of the Service Area[1] where NPA availability was lower than 99%.
- **Not compliant (white)**: This is any other zone out of the Service Area[1] where NPA availability is lower than 99%.

As shown in the previous figure, NPA availability was greater than 99% over the entire MT27 area for the reporting period.

[1] Service Area is the 99% APV-I availability area depicted in the EGNOS Safety of Life SDD (https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds)

Considering the applicable Service Definition Document map used as the reference (see https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds), the percentage of points which were compliant with the reference area is **100%**.

3.2.3 NPA availability – 99% daily compliance

The percentage of days over the reporting period in which the daily NPA availability was over 99% is shown in the next figure:

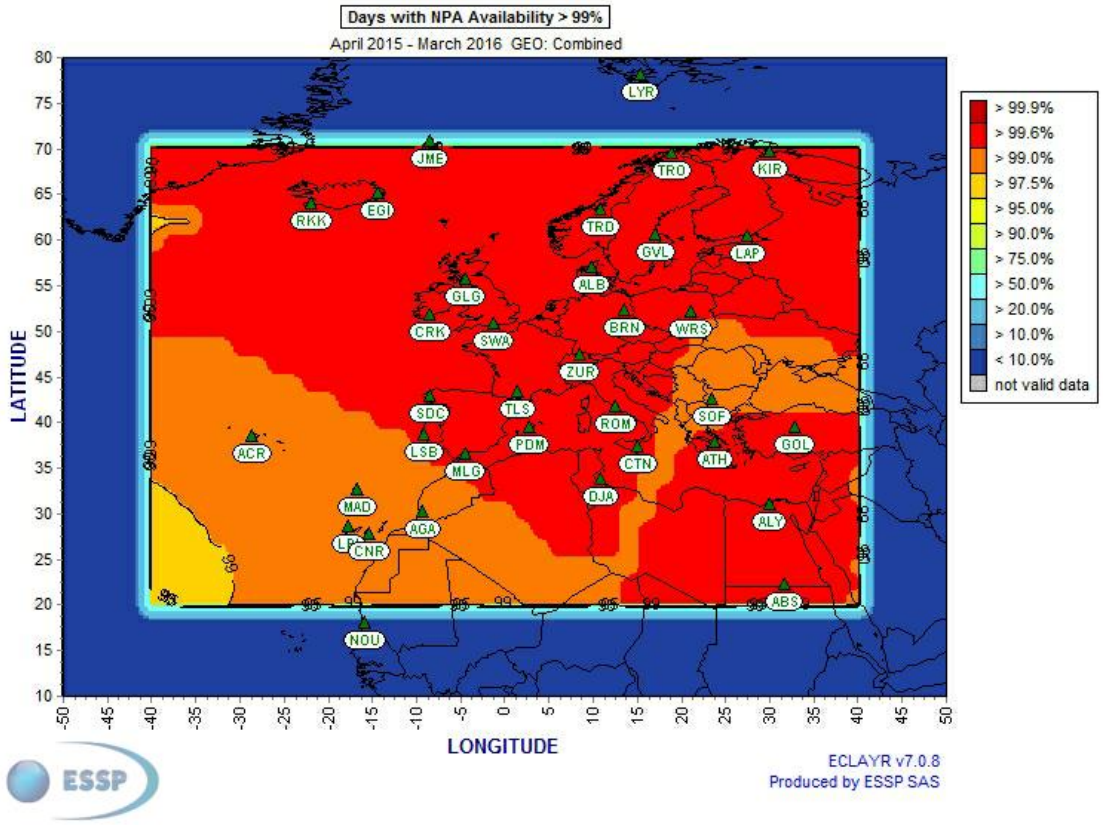


Figure 7: NPA Availability - Days over 99% - 01/04/15 to 31/03/16

As shown in the previous figure, most of the region had more than 99% of days compliant with the target availability performance. However, the worst results are obtained in the southwest of the MT27 region, mainly due to the lower number of monitored GPS satellites visible from this region.

3.2.4 NPA Integrity

EGNOS NPA Integrity Event *is defined as an event in which the Navigation System Error is greater than or equal to the corresponding Protection Level for NPA.*

None of the RIMS stations inside the SDD commitment area have been impacted by integrity events in the position domain during the period under analysis.

Safety index *is defined as the relation between Navigation System Error versus Protection Level (assuming NPA algorithms to compute xNSE and xPL) for each second. If the ratio xNSE/xPL is over 1, it indicates that a Misleading Information situation has occurred.*

Table 3 shows the maximum HSI at each RIMS inside the NPA reference area (see https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds).

Station	HSI	Station	HSI
Aalborg	0.22	Kirkenes	0.33
Azores	0.27	Palma de Mallorca	0.36
Berlin	0.27	Reykjavik[2]	--
Canary Islands	0.51	Roma	0.24
Catania	0.36	Lappeenranta	0.27
Cork	0.24	S. de Compostela	0.59
Warsaw	0.21	La Palma	0.38
Djerba	0.67	Sofia	0.40
Egilsstadir	0.24	Gävle	0.24
Glasgow	0.22	Toulouse	0.27
Golbasi	0.25	Trondheim	0.31
Lisbon	0.31	Tromsoe	0.22
Swanwick	0.29	Zürich	0.38
Madeira	0.58	Abu Simbel	0.66
Málaga	0.55	Agadir	0.25
Alexandria	0.52	Kirkenes	0.33

Table 3: NPA Safety Index (maximum) at reference stations

The following figure provides the histogram for HSI (Horizontal Safety Index) accumulating measurements from the different EGNOS stations and for both operational GEOs over the entire period.

[2] Data from RIMS Reykjavik are not taken into account due to a local issue at this site that has affected EGNOS performance at this site over most of the year.

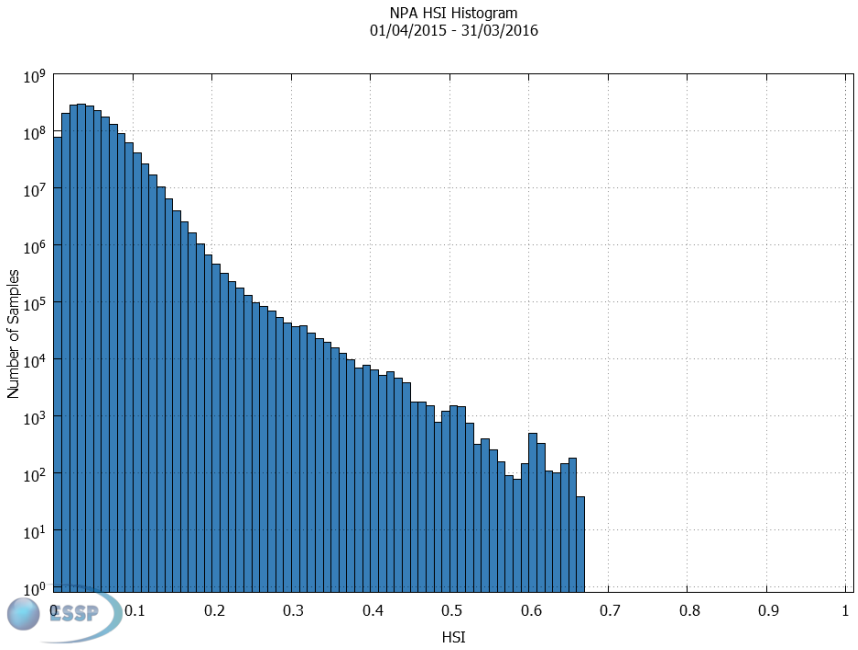


Figure 8: NPA Horizontal Safety Index

3.2.5 NPA Continuity - Yearly Performance

EGNOS NPA Continuity *is computed by dividing the total number of single continuity events, using a time-sliding window of 1 hour, by the number of samples with valid and available NPA navigation solution. A single continuity event occurs if the system is available at the start of the operation and, in at least one second within the following time-sliding window of 1 hour, the system becomes not available.*

The next figure shows the NPA Continuity Risk obtained for the GEO combined over the entire period under analysis.

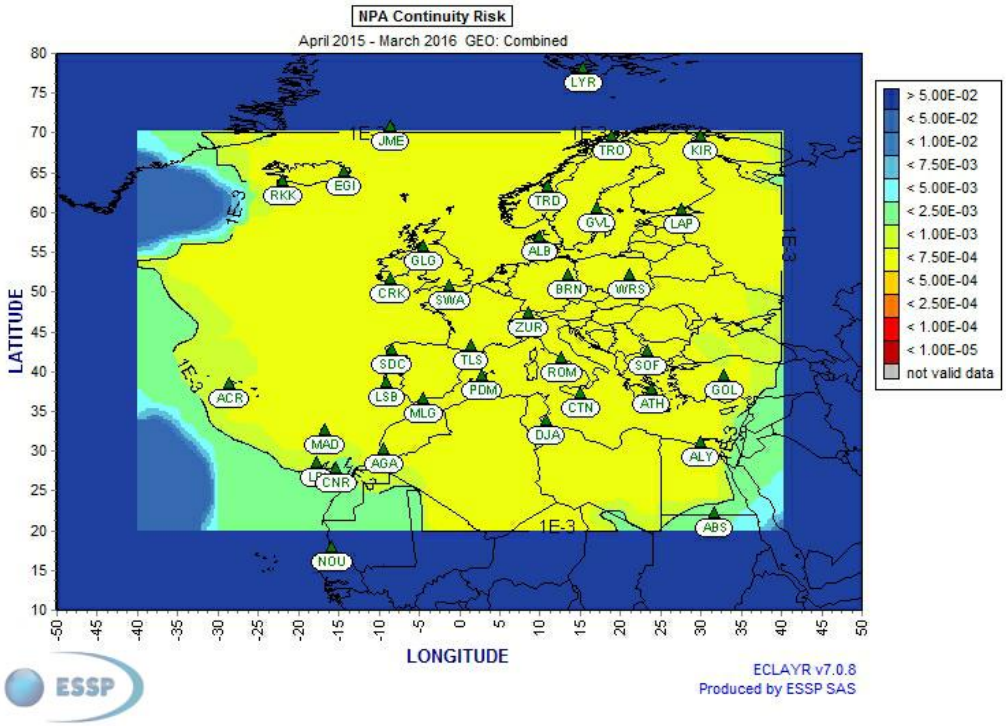


Figure 9: NPA Continuity Risk from 01/04/15 to 31/03/16

As shown in the previous figure, most of the MT27 Service Area presents a continuity risk lower than $7.5 \cdot 10^{-4}$. Performance in the corners of the service area presents worse values, mainly due to the low number of monitored satellites from these regions.

3.3 SoL Service – APproach with Vertical guidance (APV-I)

The following figures depict the minimum performance that can be expected from EGNOS for Approach with Vertical guidance (APV-I) availability and continuity, as defined in the EGNOS SoL Service Definition Document (see https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds). These values correspond to the expected minimum performance measured by a fault-free receiver using all satellites in view, when averaging over a period of one month, using all the operational EGNOS GEOs.

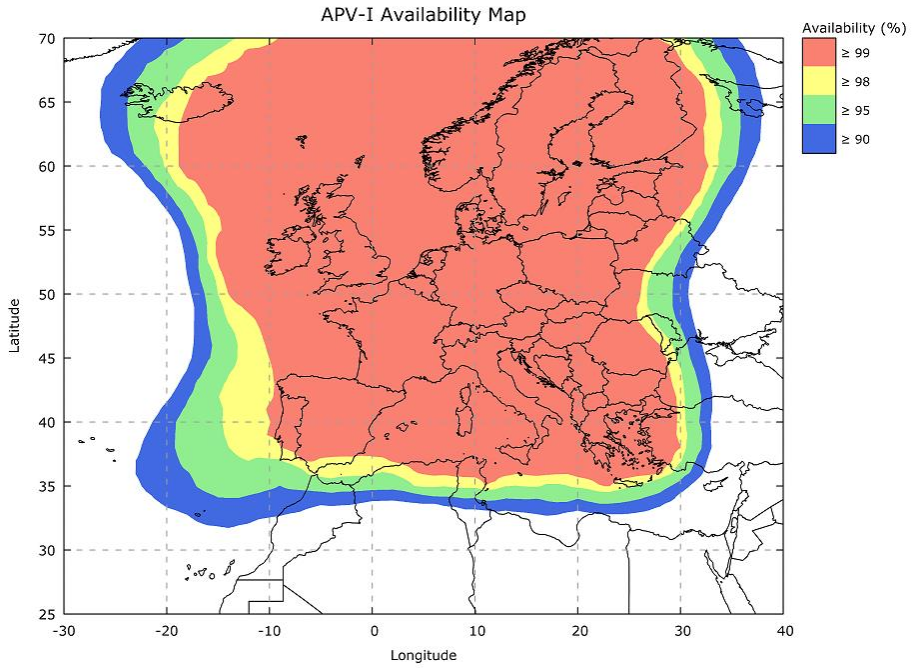


Figure 10: APV-I Availability map

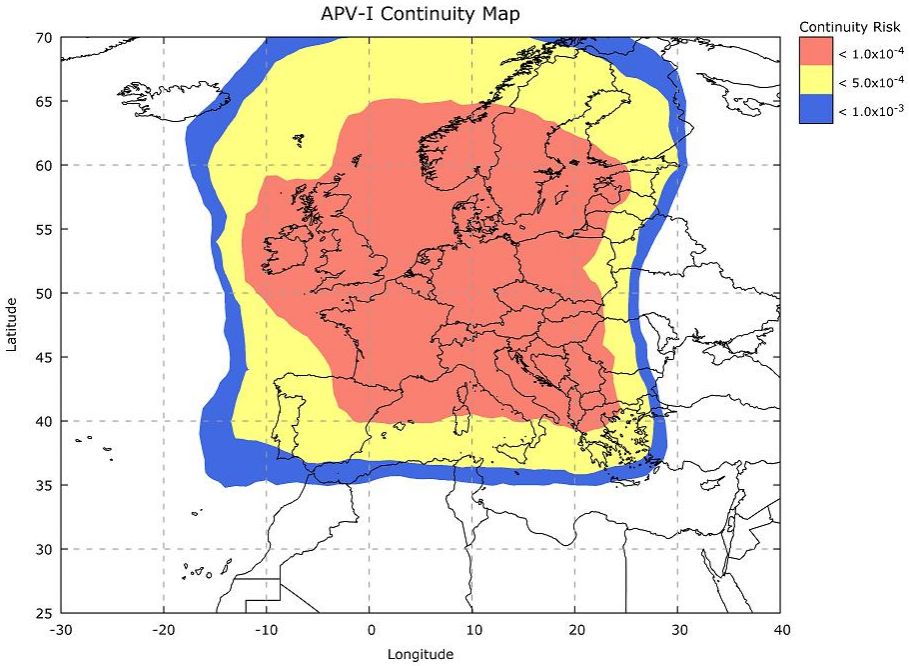


Figure 11: APV-I Continuity map

Additionally, APV-I performance is reported through the EGNOS Monthly Performance reports, available on the EGNOS User Support website (https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/monthly-performance-reports).

3.3.1 APV-I availability – Yearly Performance

EGNOS APV-I Availability *is defined as the percentage of epochs in the period in which the Protection Level (both HPL and VPL) is below Alert Limits for this APV-I service (HAL: 40m; VAL: 50m) over the total period.*

The following figure provides, for the combination of the operational GEOs, the GEO APV-I availability for the reporting period:

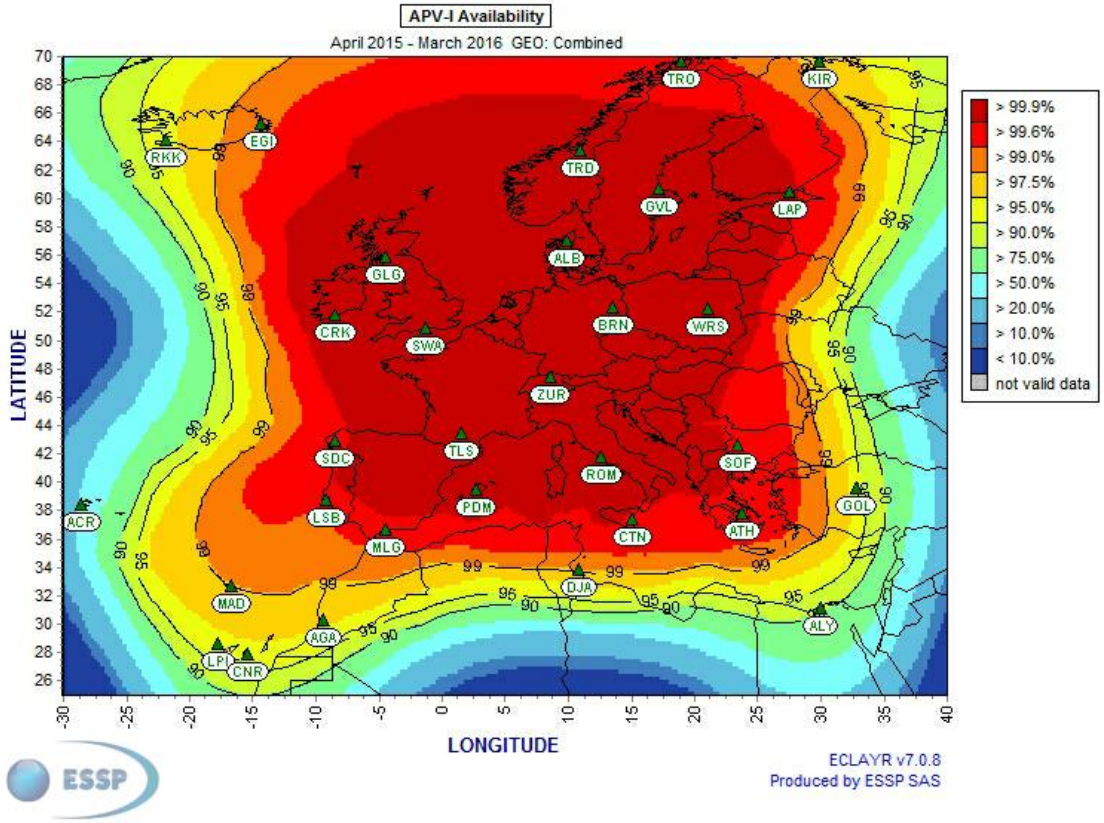


Figure 12: APV-I Availability from 01/04/15 to 31/03/16

APV-I availability performance has been excellent during the reporting period, being greater than 99% over the entire Service Area with only minor deviations observed in the northwestern and northeastern corners.

3.3.2 APV-I availability – Achievement against target

During the reporting period, the most significant underperformance was detected on 30th June and 1st July 2015, impacting the entire MT27 region with the exception of some areas in the southeast. This issue was caused by the loss of monitoring by EGNOS of several GPS satellites.

The combination of the 99% APV-I Availability map and the Reference area gives the following:

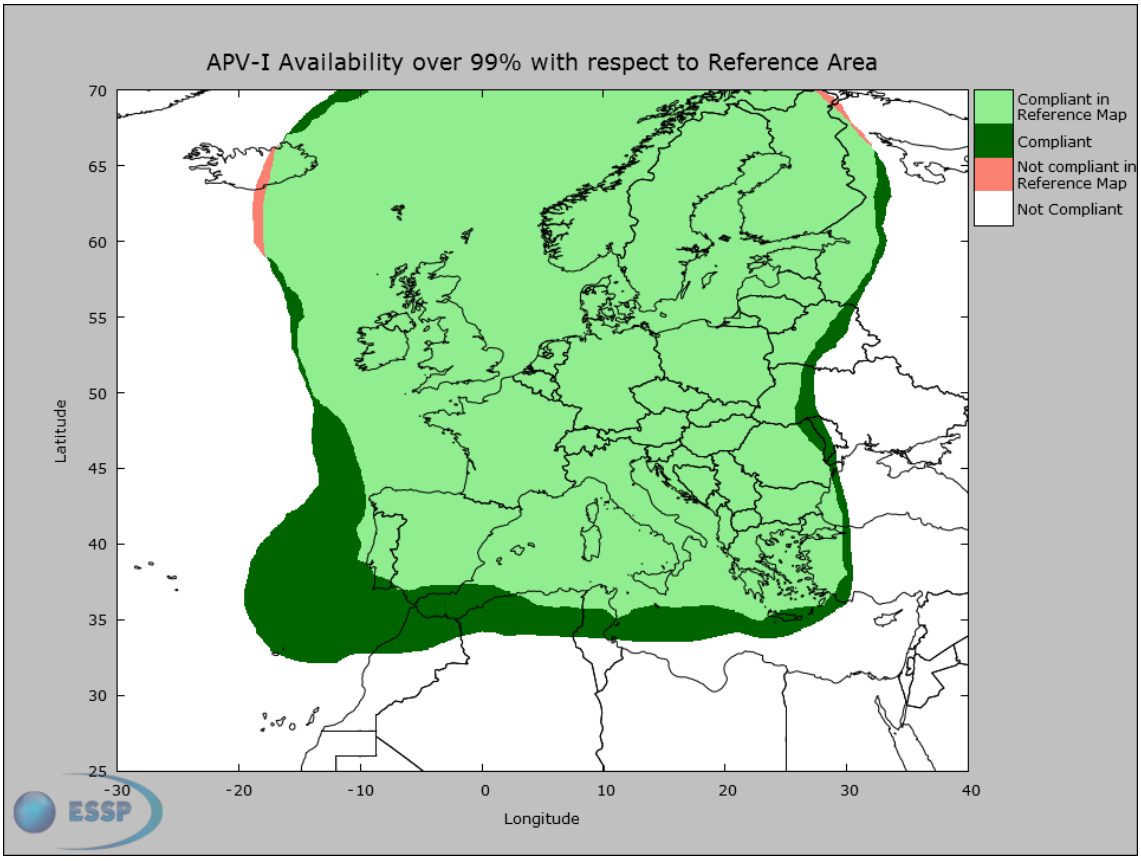


Figure 13: APV-I Availability map with respect to the reference map - 01/04/15 to 31/03/16

In the picture, the legend is to be understood as follows:

- **Compliant in Reference Map**: This is the part of the Service Area[3] where APV-I availability was above 99%.
- **Compliant**: This is the zone out of the Service Area[3] where APV-I availability was also above 99% (extension of coverage with respect to the commitment).
- **Not compliant in Reference Map**: This is the part of the Service Area[3] where APV-I availability was lower than 99%.
- **Not compliant (white)**: This is any other zone out of the Service Area[3] where APV-I availability is lower than 99%.

The percentage of points that were compliant with the reference area is **99.51%**. Just two small regions in the northwest, near Iceland, and in the northeast, at the border between Finland and Russia, present underperformance. The main reason of these deviations is the impact caused by different periods with increased geomagnetic activity, which impacted the service performance in the North of Europe.

[3] Service Area is the 99% APV-I availability area depicted in the EGNOS Safety of Life SDD (https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds)

3.3.3 APV-I availability – 99% daily compliance

The percentage of days over the reporting period in which the daily APV-I availability was over 99% is shown in the following figure:

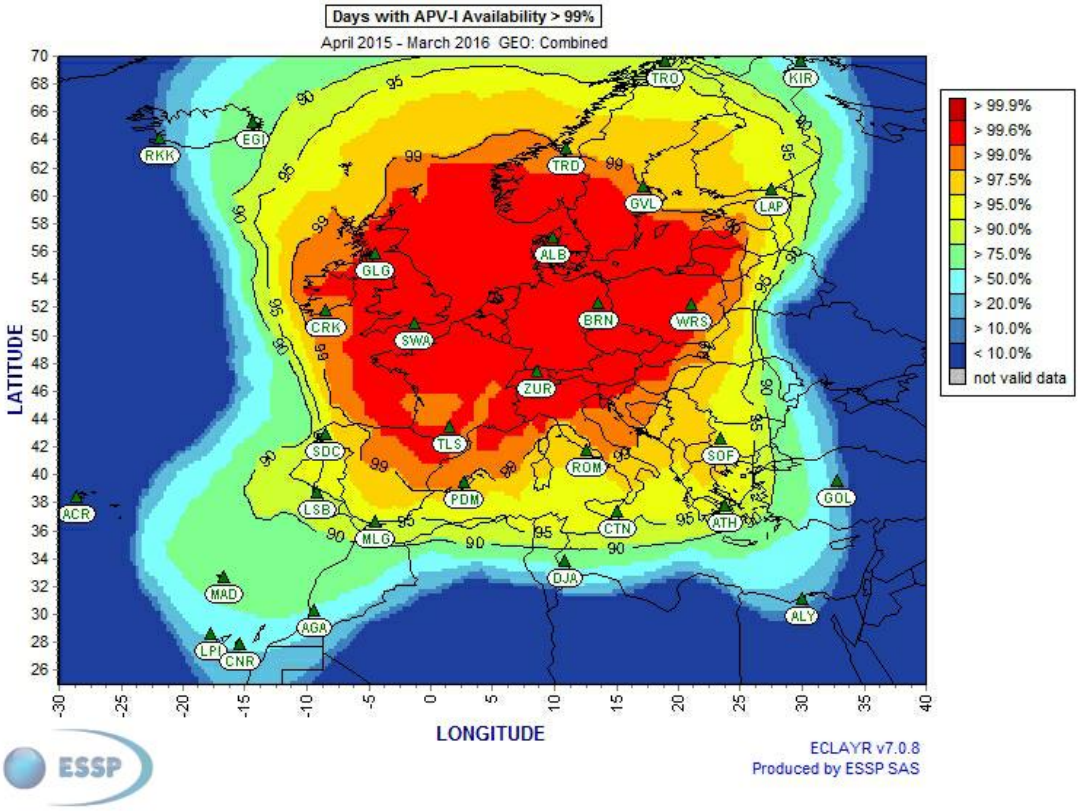


Figure 14: APV-I Availability – Days over 99% - 01/04/15 to 31/03/16

The previous figure shows that the APV-I Availability was higher than 99%:

- 99% of the days in 43.35% of the reference area defined in the SDD v3.0[4].
- 95% of the days in 80.24% of the reference area defined in the SDD v3.0[4].

[4] See https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds

The following figure shows the APV-I availability compliance with respect to 99% target at the airports with published EGNOS-based operations:

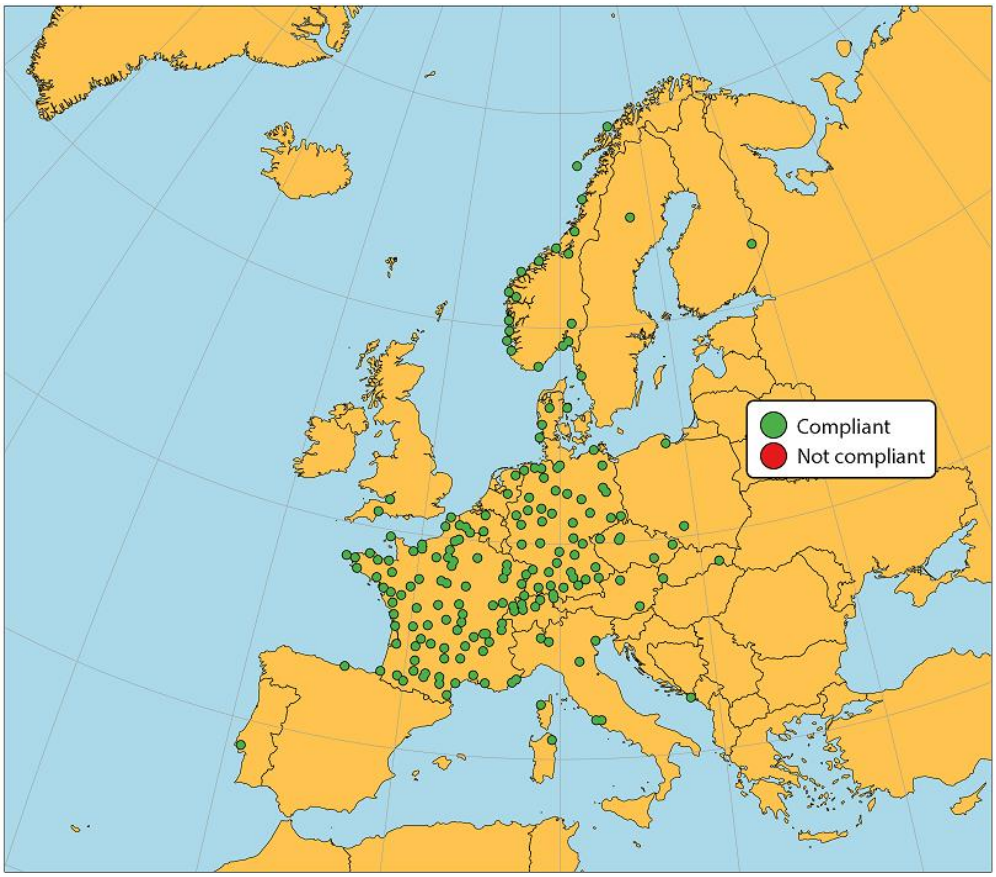


Figure 15: APV-I Availability compliance at airports with published EGNOS-based operations

Airplane on runway

3.3.4 APV-I Integrity events

EGNOS APV-I Integrity Event *is defined as an event in which the Navigation System Error is greater than or equal to the corresponding Protection Level for APV-I.*

No integrity events were detected.

Safety Index *is defined as the relation between Navigation System Error versus Protection Level (assuming PA algorithms to compute xNSE and xPL) for each second. If the ratio xPE/xPL is over 1, it indicates that a Misleading Information situation has occurred.*

Table 4 shows the maximum HSI and VSI at each RIMS inside of the APV-I reference area (see https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds). Moreover, Stanford plots are available on the EGNOS User Support website (https://egnos-user-support.essp-sas.eu/).

Station	HSI	VSI
Aalborg	0.23	0.31
Berlin	0.28	0.33
Catania	0.28	0.24
Cork	0.25	0.25
Warsaw	0.22	0.26
Djerba	0.36	0.40
Egilsstadir	0.24	0.29
Glasgow	0.23	0.28
Golbasi	0.26	0.24
Lisbon	0.32	0.41
Swanwick	0.29	0.36
Madeira	0.41	0.34
Málaga	0.43	0.41
Kirkenes	0.34	0.32
Palma de Mallorca	0.37	0.32
Reykjavik[5]	--	--
Roma	0.23	0.26
Lappeenranta	0.25	0.28
S. de Compostela	0.28	0.29
Sofia	0.39	0.37
Gävle	0.41	0.50
Toulouse	0.25	0.25
Trondheim	0.28	0.48
Tromsoe	0.32	0.39
Zürich	0.23	0.29
Athens	0.23	0.35

Table 4: EGNOS APV-I Safety Index (maximum) at reference stations

[5] Data from RIMS Reykjavik are not taken into account due to a local issue at this site that has affected EGNOS performance at this site over most of the year.

The following figures provide the histogram for HSI (Horizontal Safety Index) and VSI (Vertical Safety Index) for each second when accumulating measurements from the different EGNOS stations and for both operational GEOs over the reporting period.

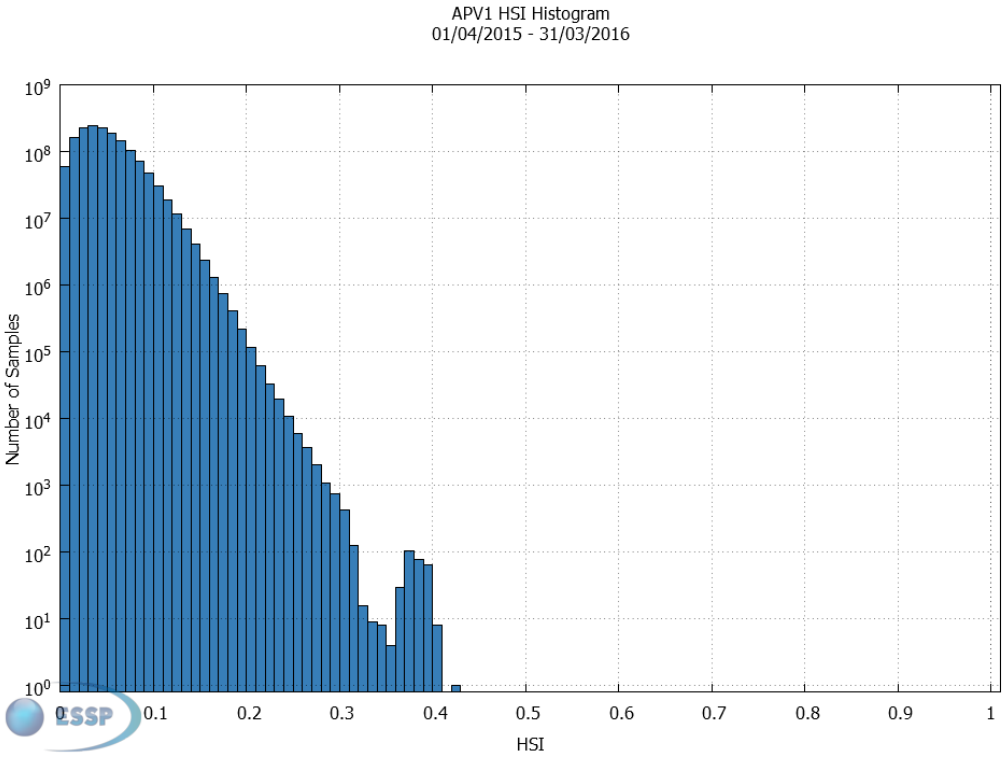


Figure 16: EGNOS APV-I Horizontal Safety Index

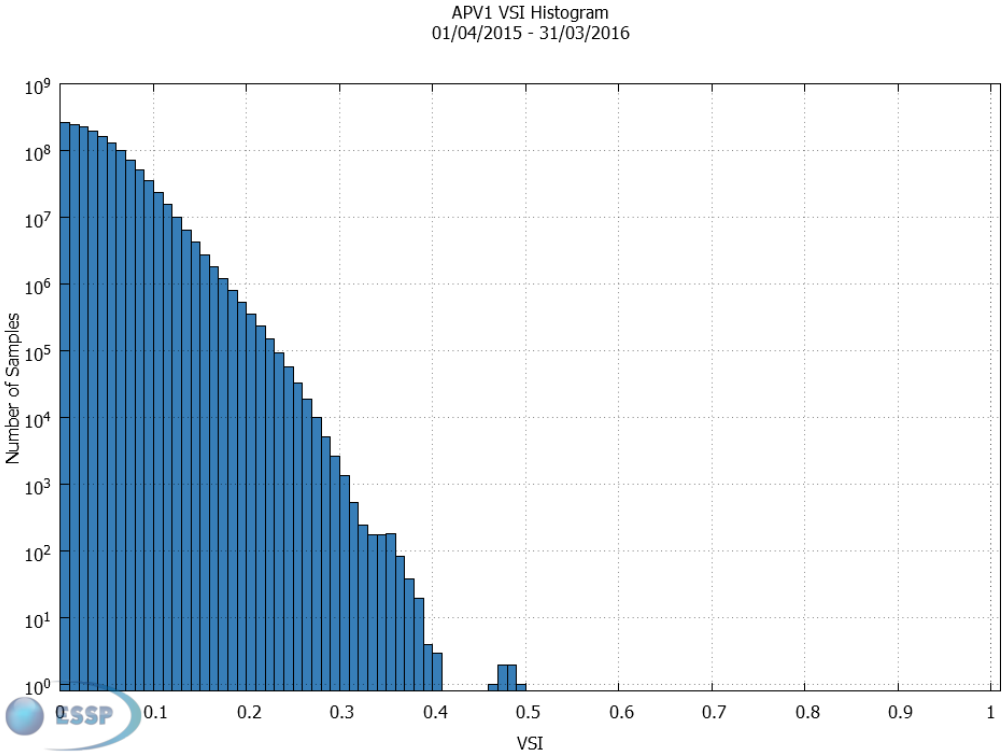


Figure 17: EGNOS APV-I Vertical Safety Index

3.3.5 APV-I Continuity risk – Yearly Performance

EGNOS APV-I Continuity Risk *is defined as the result of dividing the total number of single continuity events, using a time-sliding window of 15 seconds, by the number of samples with valid and available APV-I navigation solution.* A *single continuity break occurs if the system is available at the start of the operation and becomes unavailable during one of the following 15 seconds.*

The following figure provides the GEO combined APV-I continuity risk for the reporting period:

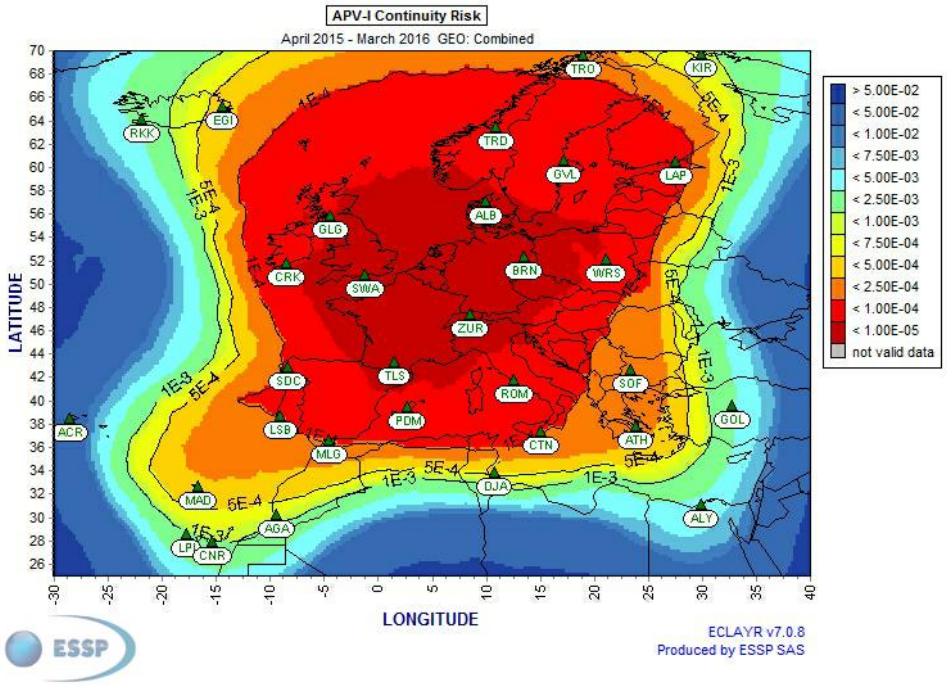


Figure 18: APV-I Continuity Risk from 01/04/15 to 31/03/16

3.3.6 APV-I Continuity – Achievement against target

The combination of the 5x10^{-4} APV-I Continuity Risk map and the Reference area gives the following:

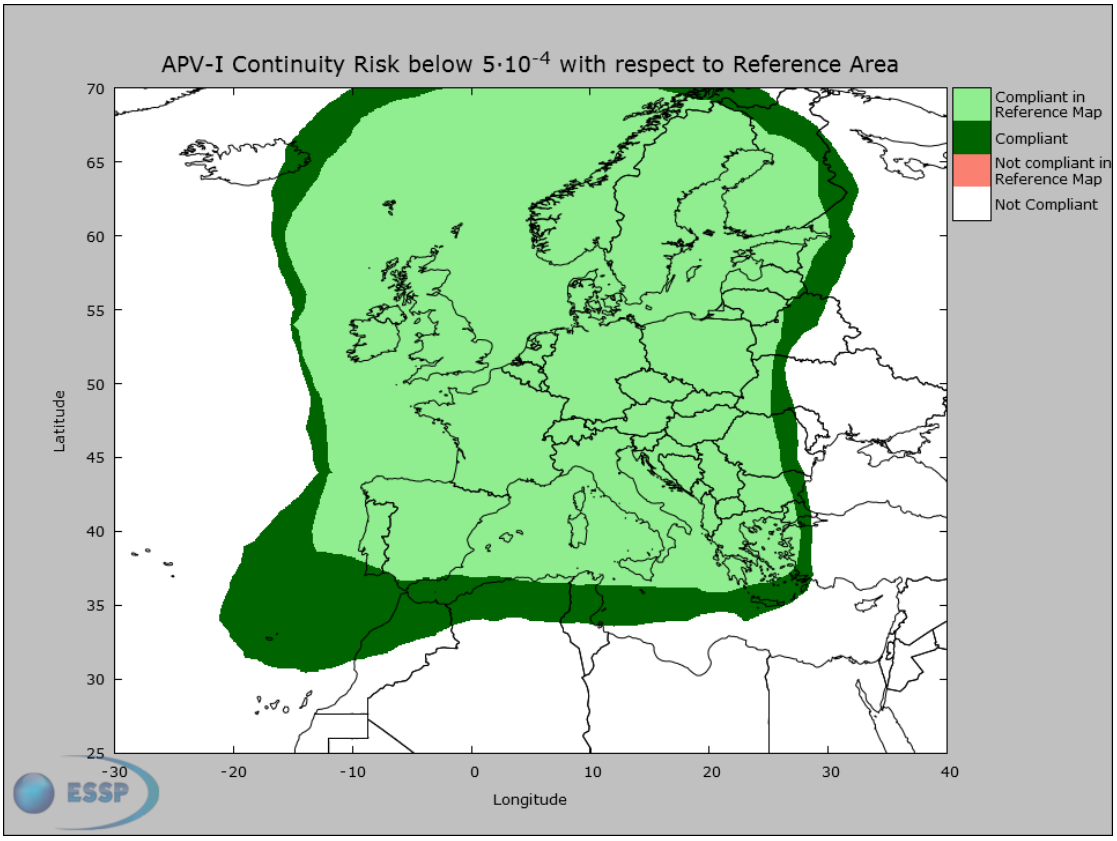


Figure 19: APV-I Continuity Risk (5·10^{-4}) map with respect to the reference map - 01/04/15 to 31/03/16

In the picture, the legend is to be understood as follows:

- **Compliant in Reference Map**: This is the part of the Service Area[6] where APV-I continuity risk was lower than the corresponding performance level (1·10^{-3}, 5·10^{-4} or 1·10^{-4}).
- **Compliant**: This is the zone out of the Service Area[6] where APV-I continuity risk was lower than the corresponding performance level (1·10^{-3}, 5·10^{-4} or 1·10^{-4}), representing a coverage extension with respect to the commitment.
- **Not compliant in Reference Map**: This is the part of the Service Area[6] where APV-I continuity risk was higher than the corresponding performance level (1·10^{-3}, 5·10^{-4} or 1·10^{-4}).
- **Not compliant (white)**: This is any other zone out of the Service Area[6] where APV-I continuity risk was higher than the corresponding performance level (1·10^{-3}, 5·10^{-4} or 1·10^{-4}).

Considering the SDD v3.0 map used as the reference, the percentage of points that were compliant with the reference area (5·10^{-4}/15sec) is **100%**.

[6] Service Area is the corresponding performance level (1·10^{-3}, 5·10^{-4} or 1·10^{-4}) APV-I continuity area depicted in the EGNOS Safety of Life SDD (https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds)

For information purposes, the differences with respect to the Reference Map for the area corresponding to a continuity risk of 10^{-3} and 10^{-4} are included hereafter For both levels, the results obtained, as for the $5{\cdot}10^{-4}$ case, are quite good (100% for continuity risk of 10^{-3} and 95.75% for continuity risk of 10^{-4}).

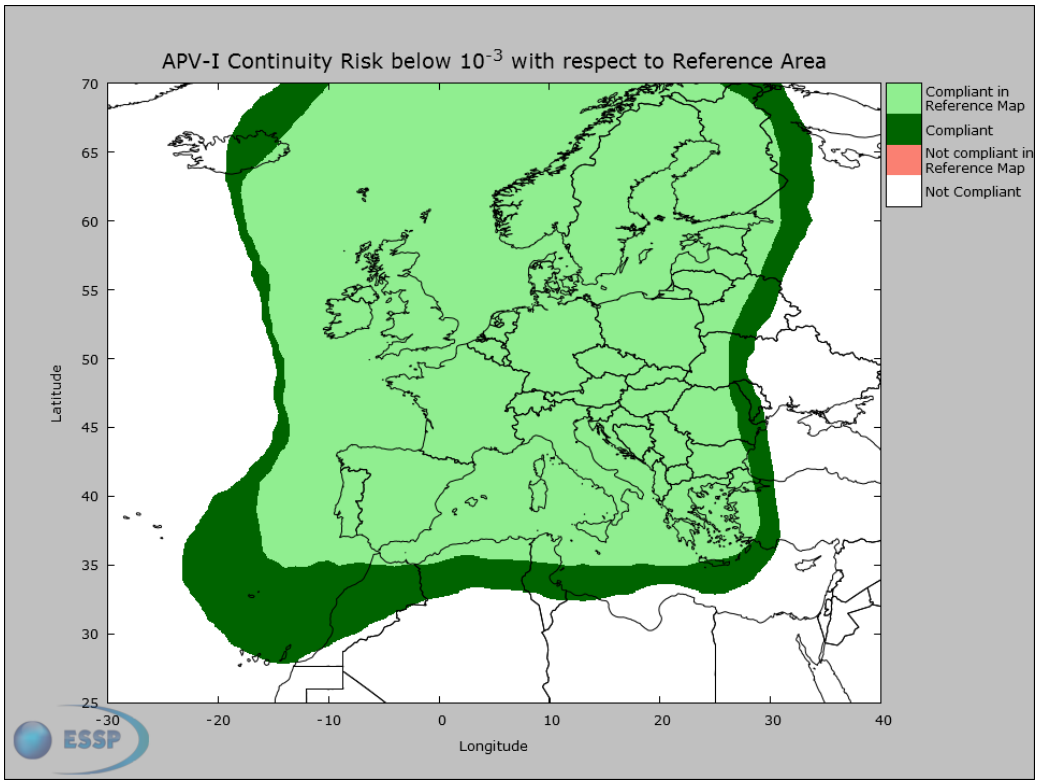


Figure 20: APV-I Continuity Risk ($1{\cdot}10^{-3}$) map with respect to the reference map - 01/04/15 to 31/03/16

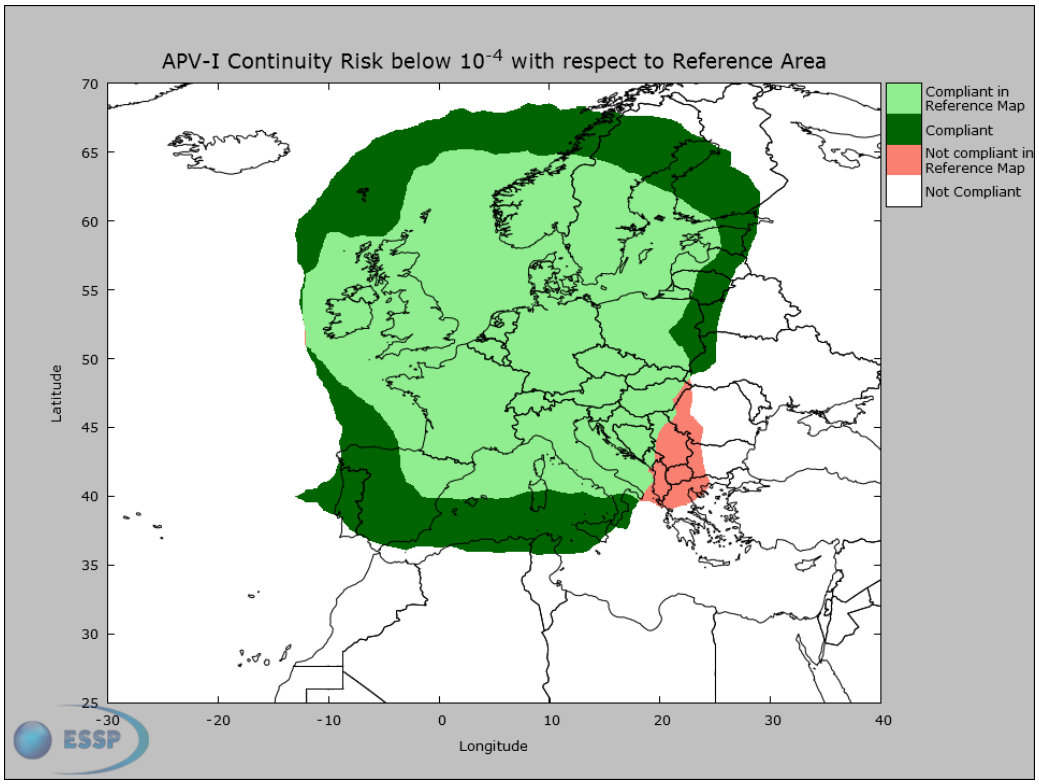


Figure 21: APV-I Continuity Risk ($1{\cdot}10^{-4}$) map with respect to the reference map - 01/04/15 to 31/03/16

3.4 SoL Service – EGNOS Localizer Performance with Vertical guidance to a decision altitude of 200 FT (LPV-200)

The following figures depict the minimum performance that can be expected from EGNOS for LPV-200 availability and continuity, as defined in the EGNOS SoL Service Definition Document (see https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds).

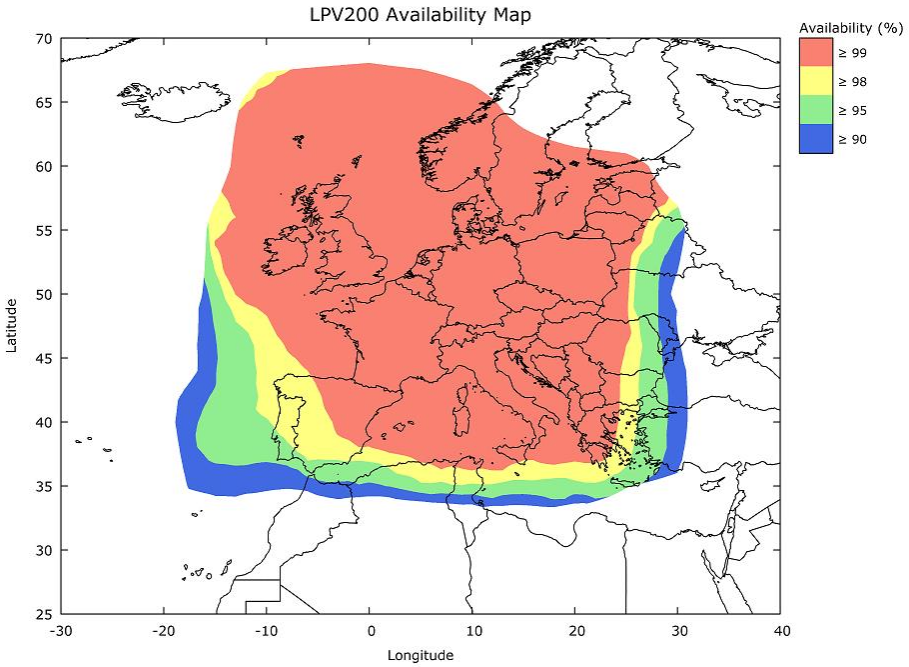


Figure 22: LPV-200 Availability map

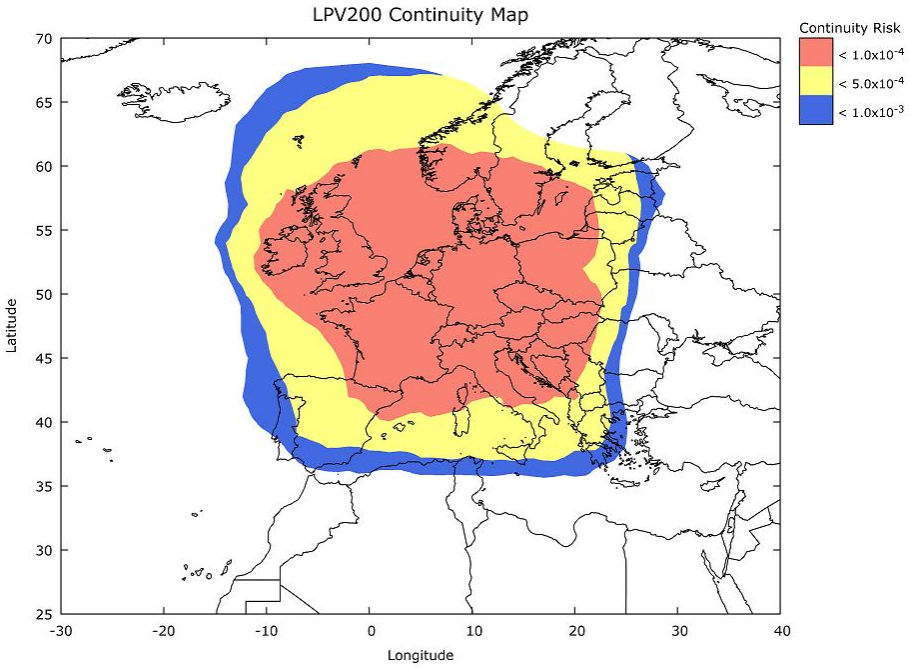


Figure 23: LPV-200 Continuity map

These values correspond to the expected average performance measured by a fault-free receiver using all GPS satellites in view over a period of one month, using all the operational EGNOS GEOs.

Additionally, LPV-200 performance is reported through the EGNOS Monthly Performance reports, available on the EGNOS User Support website (https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/monthly-performance-reports).

3.4.1 LPV-200 availability – Yearly Performance

EGNOS LPV-200 Availability *is defined as the percentage of epochs in the period in which the Protection Level (both HPL and VPL) is below Alert Limits for this LPV-200 service (HAL: 40m; VAL: 35m) over the total period.*

The following figure provides, for the combination of the operational GEOs, the LPV-200 availability for the period from October 2015 (after the LPV-200 service declaration) to March 2016:

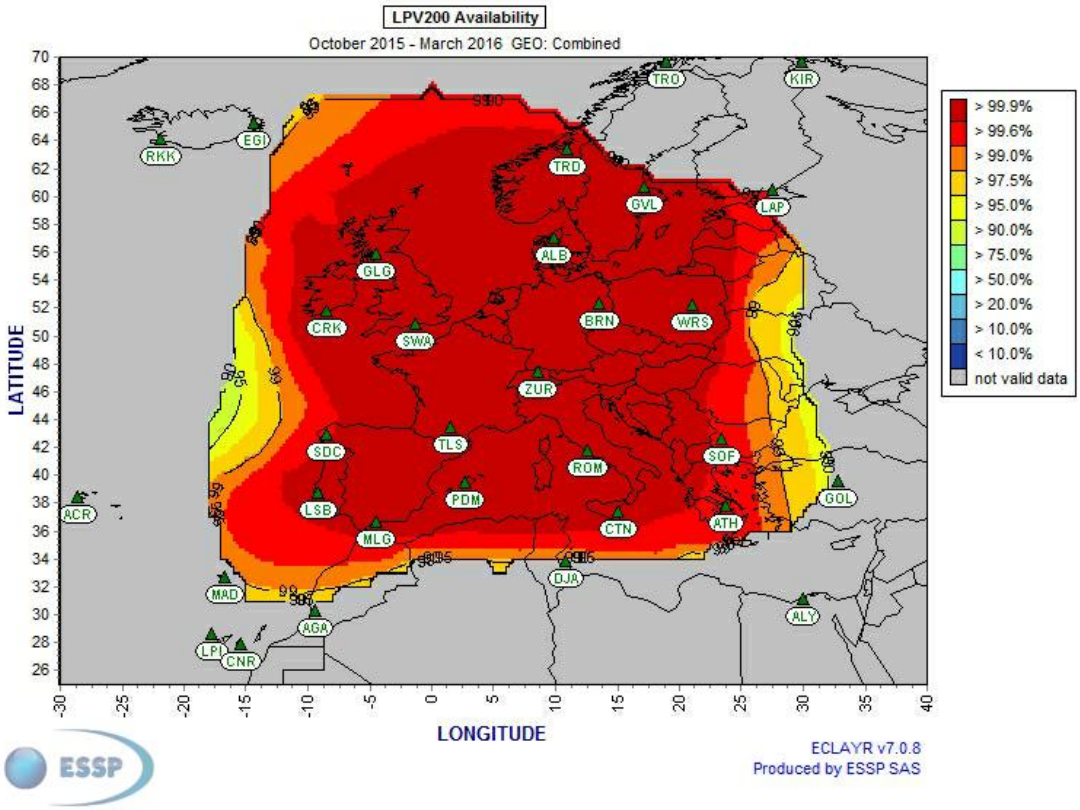


Figure 24: LPV-200 Availability from 01/10/15 to 31/03/16

LPV-200 availability performance over the Service Area has been excellent during the reporting period, being greater than 99% over the entire Service Area except for a small oceanic region in the northwest corner.

3.4.2 LPV-200 availability – Achievement against target

On 6th March 2016, LPV-200 Availability was deeply degraded due to the impact caused by the ionosphere monitoring degradation observed in the north and the loss of monitoring of some GPS satellites.

The combination of the 99% LPV-200 Availability map and the Reference area gives the following:

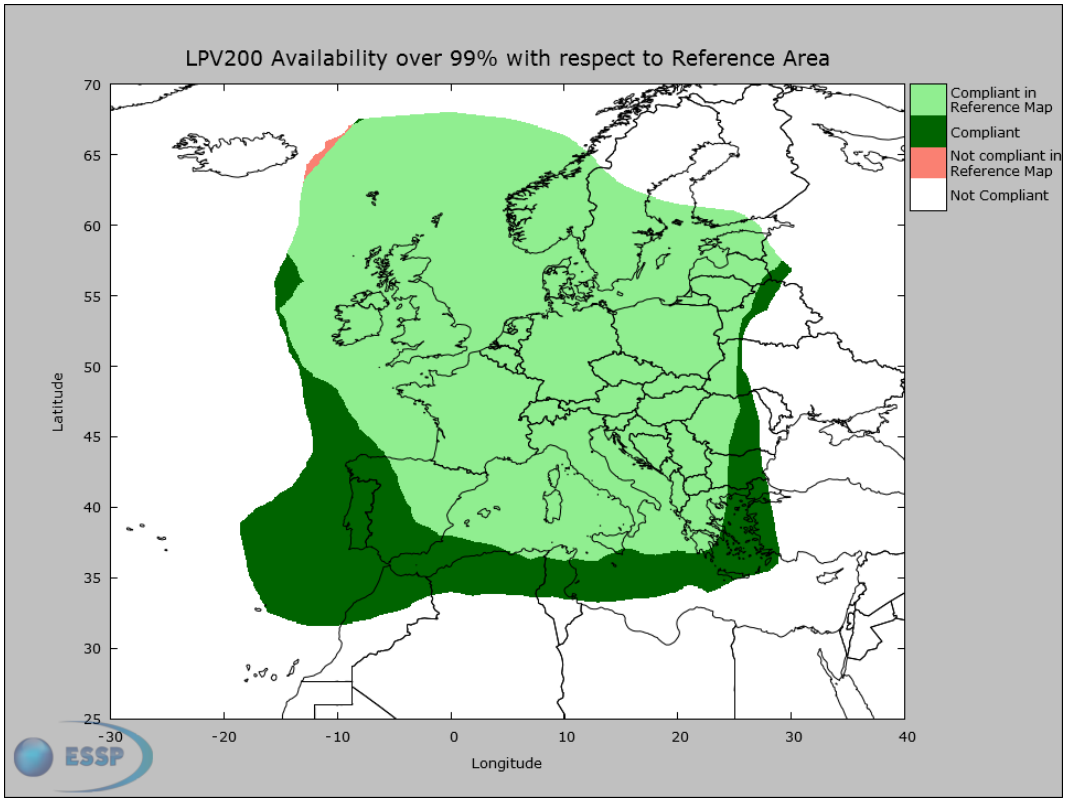


Figure 25: LPV-200 Availability map with respect to the reference map - 01/10/15 to 31/03/16

In the picture, the legend is to be understood as follows:

- **Compliant in Reference Map**: This is the part of the Service Area[7] where LPV-200 availability was above 99%.
- **Compliant**: This is the zone out of the Service Area[7] where LPV-200 availability was also above 99% (extension of coverage with respect to the commitment).
- **Not compliant in Reference Map**: This is the part of the Service Area[7] where LPV-200 availability was lower than 99%.
- **Not compliant (white)**: This is any other zone out of the Service Area[7] where LPV-200 availability is lower than 99%.

[7] Service Area is the 99% APV-I availability area depicted in the EGNOS Safety of Life SDD (https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds). Note that any area out of LPV-200 accuracy constraints is depicted as "Not Compliant".

Considering the applicable Service Definition Document (SDD) map as reference (see https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds), the percentage of points that were compliant with the reference area is **99.78%**. As for APV-I, only a small region in the northwest deviates with respect to the SDD commitment. The main reason for these deviations is the impact caused by different periods with increased geomagnetic activity, which impacted the service performance in the north of Europe.

3.4.3 LPV-200 availability – 99% daily compliance

The percentage of days over the reporting period in which the daily LPV200 availability was over 99% is shown in the figure below.

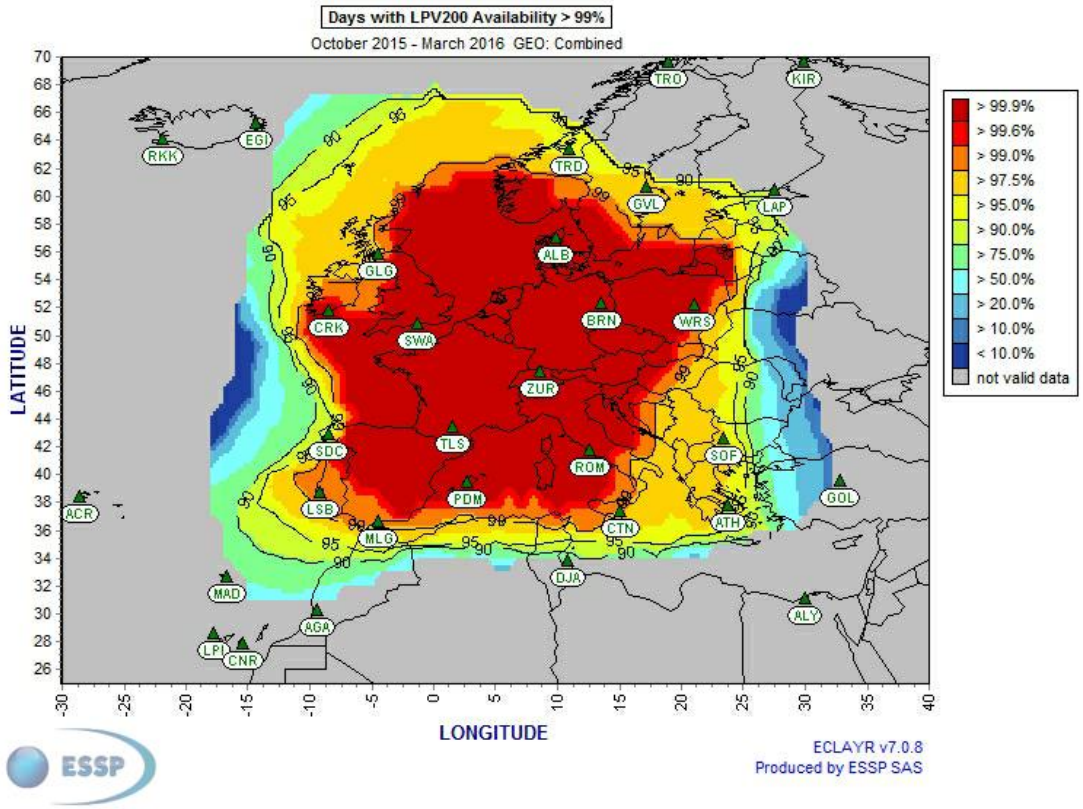


Figure 26: LPV-200 Availability – Days over 99% - 01/10/15 to 31/03/16

The previous figure shows that the LPV-200 Availability was higher than 99%:

- 100% of the days in 53.19% of the reference area defined in the SDD v3.0[8].
- 99% of the days in 60.06% of the reference area defined in the SDD v3.0[8].
- 95% of the days in 92.54% of the reference area defined in the SDD v3.0[8].

[8] See https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds

3.4.4 LPV-200 Integrity events

EGNOS LPV-200 Integrity Event *is defined as an event in which the Navigation System Error is greater than or equal to the corresponding Protection Level for LPV-200.*

No integrity events were detected.

Safety Index *is defined as the relation between Navigation System Error versus Protection Level (assuming PA algorithms to compute xNSE and xPL) for each second. If the ratio xPE/xPL is over 1, it indicates that a Misleading Information situation has occurred.*

Table 5 shows the maximum HSI and VSI at each RIMS inside of the LPV-200 reference area (see https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds). Moreover, Stanford plots are available on the EGNOS User Support website (https://egnos-user-support.essp-sas.eu/).

Station	HSI	VSI
Aalborg	0.21	0.31
Berlin	0.20	0.26
Catania	0.21	0.23
Cork	0.19	0.25
Warsaw	0.21	0.26
Djerba	0.36	0.21
Glasgow	0.20	0.28
Lisbon	0.31	0.34
Swanwick	0.29	0.31
Málaga	0.34	0.33
Palma de Mallorca	0.26	0.26
Roma	0.22	0.26
S. de Compostela	0.23	0.22
Sofia	0.39	0.37
Gävle	0.22	0.29
Toulouse	0.21	0.22
Trondheim	0.24	0.31
Zürich	0.21	0.25
Athens	0.21	0.27

Table 5: EGNOS LPV-200 Safety Index (maximum) at reference stations

The following figures provide the histogram for HSI (Horizontal Safety Index) and VSI (Vertical Safety Index) for each second when accumulating measurements from the different EGNOS stations and for both operational GEOs over the reporting period.

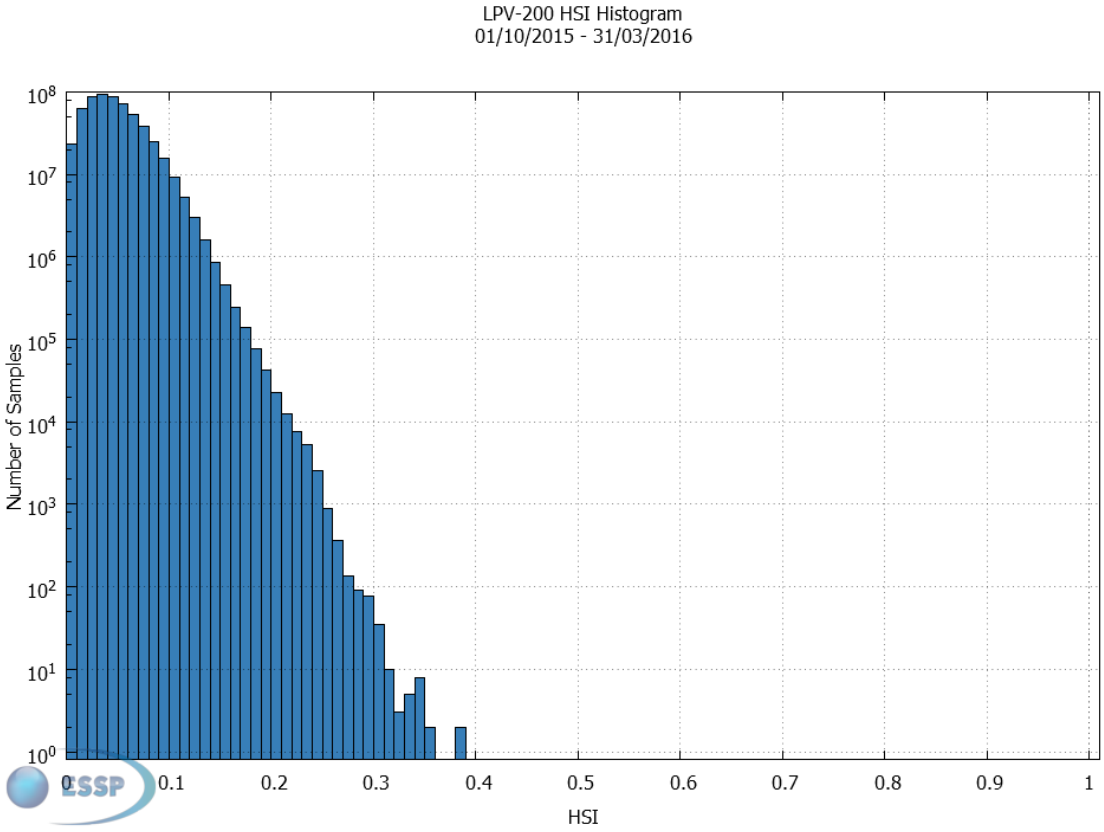


Figure 27: EGNOS LPV-200 Horizontal Safety Index

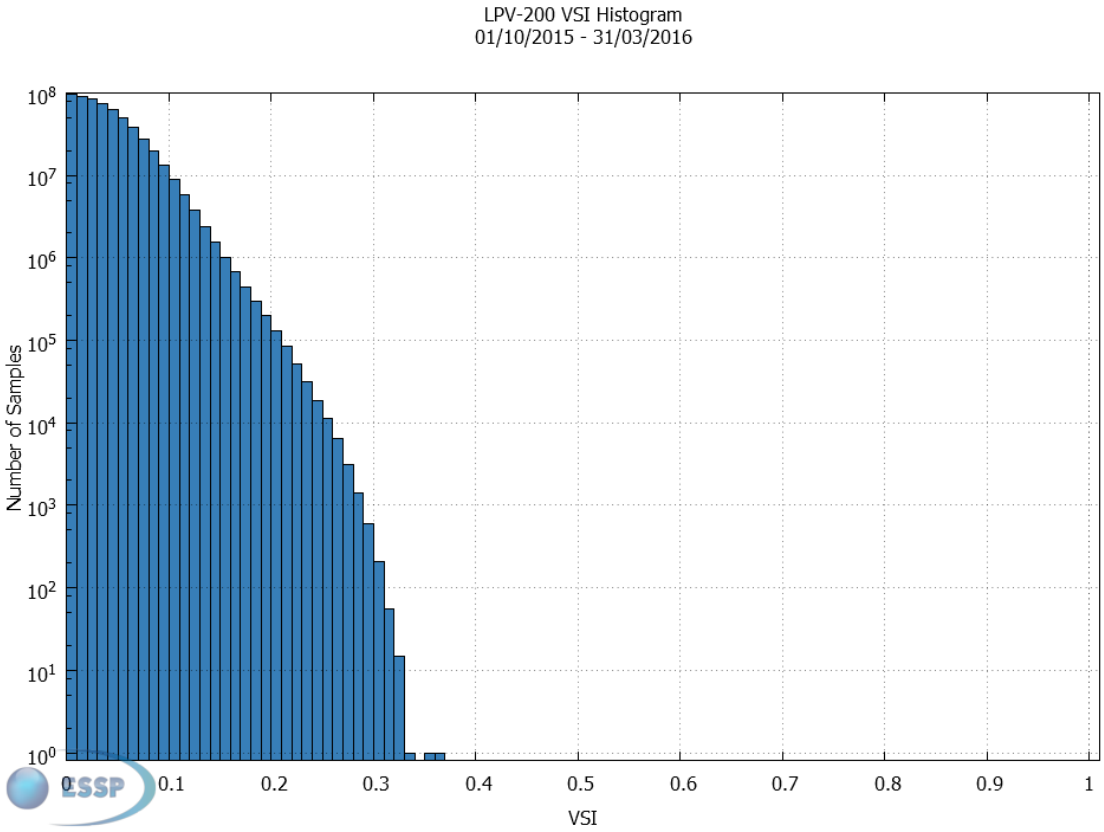


Figure 28: EGNOS LPV-200 Vertical Safety Index

3.4.5 LPV-200 Continuity risk

EGNOS LPV-200 Continuity Risk *is defined as the result of dividing the total number of single continuity events, using a time-sliding window of 15 seconds, by the number of samples with valid and available LPV-200 navigation solution. A single continuity event occurs if the system is available at the start of the operation and becomes unavailable in at least one of the following 15 seconds.*

The following figure provides the GEO combined LPV-200 continuity risk for the reporting period:

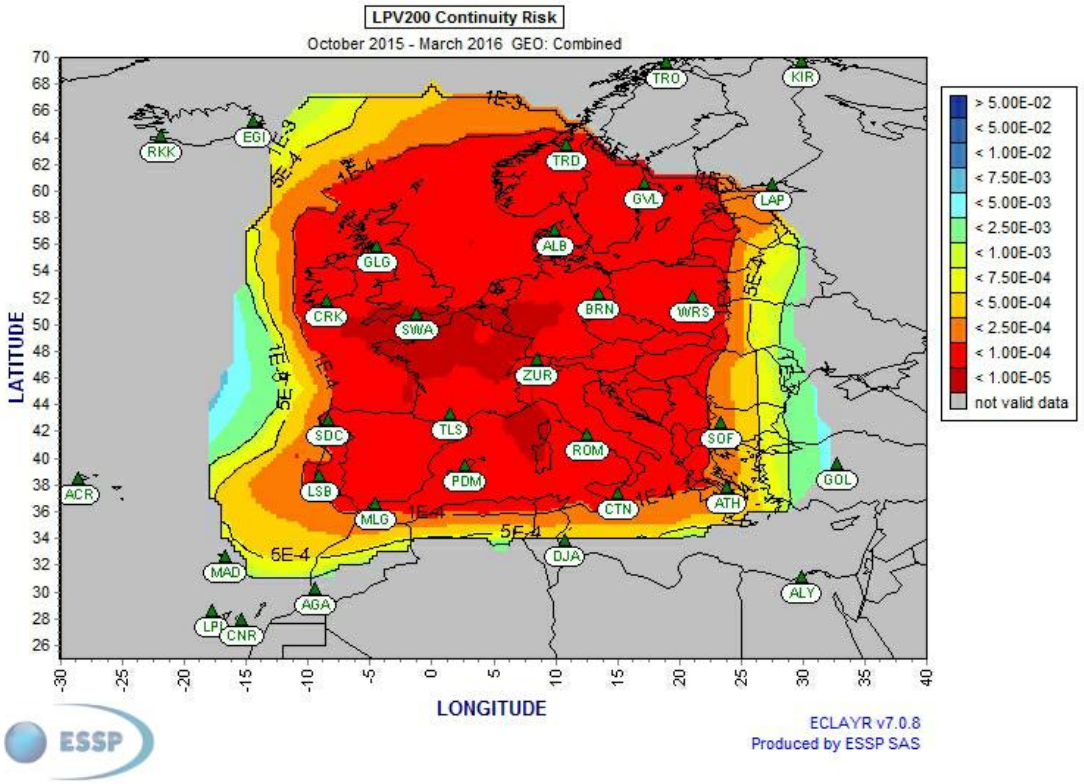


Figure 29: LPV-200 Continuity Risk from 01/10/15 to 31/03/16

3.4.6 LPV-200 Continuity – Achievement against target

LPV-200 Continuity was significantly degraded on 11th January and 6th March 2016 due to both ionosphere monitoring degradation and simultaneous losses of monitoring of some GPS satellites.

The combination of the $5 \cdot 10^{-4}$ LPV-200 Continuity Risk map and the Reference area gives the following:

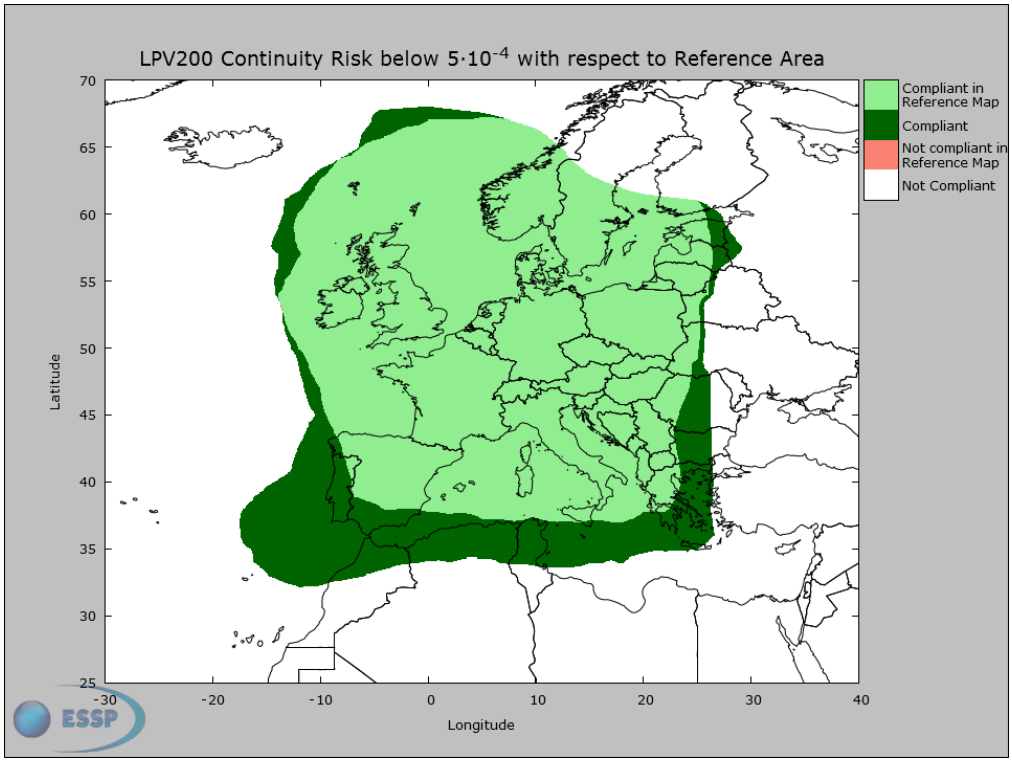


Figure 30: LPV-200 Continuity Risk ($5 \cdot 10^{-4}$) map with respect to the reference map - 01/10/15 to 31/03/16

In the picture, the legend is to be understood as follows:

- **Compliant in Reference Map**: This is the part of the Service Area[9] where LPV-200 continuity risk was lower than the corresponding performance level ($1 \cdot 10^{-3}$, $5 \cdot 10^{-4}$ or $1 \cdot 10^{-4}$).
- **Compliant**: This is the zone out of the Service Area[9] where LPV-200 continuity risk was lower than the corresponding performance level ($1 \cdot 10^{-3}$, $5 \cdot 10^{-4}$ or $1 \cdot 10^{-4}$), representing a coverage extension with respect to the commitment.
- **Not compliant in Reference Map**: This is the part of the Service Area[9] where LPV-200 continuity risk was higher than the corresponding performance level ($1 \cdot 10^{-3}$, $5 \cdot 10^{-4}$ or $1 \cdot 10^{-4}$).
- **Not compliant (white)**: This is any other zone out of the Service Area[9] where LPV-200 continuity risk was higher than the corresponding performance level ($1 \cdot 10^{-3}$, $5 \cdot 10^{-4}$ or $1 \cdot 10^{-4}$).

Considering the SDD v3.0 map used as the reference, the percentage of points which were compliant with the reference area ($5 \cdot 10^{-4}$/15sec) is **100%**.

For information purposes, the differences with respect to the Reference Map for the area corresponding to a continuity risk of 10^{-3} and 10^{-4} are included below. For both levels, the results obtained, as for the $5 \cdot 10^{-4}$ case, are quite good (100% for continuity risk of 10^{-3} and 99.99% for continuity risk of 10^{-4}).

[9] Service Area is the corresponding performance level ($1 \cdot 10^{-3}$, $5 \cdot 10^{-4}$ or $1 \cdot 10^{-4}$) LPV-200 continuity area depicted in the EGNOS Safety of Life SDD (https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds). Note that any area out of LPV-200 accuracy constraints is depicted as "Not Compliant".

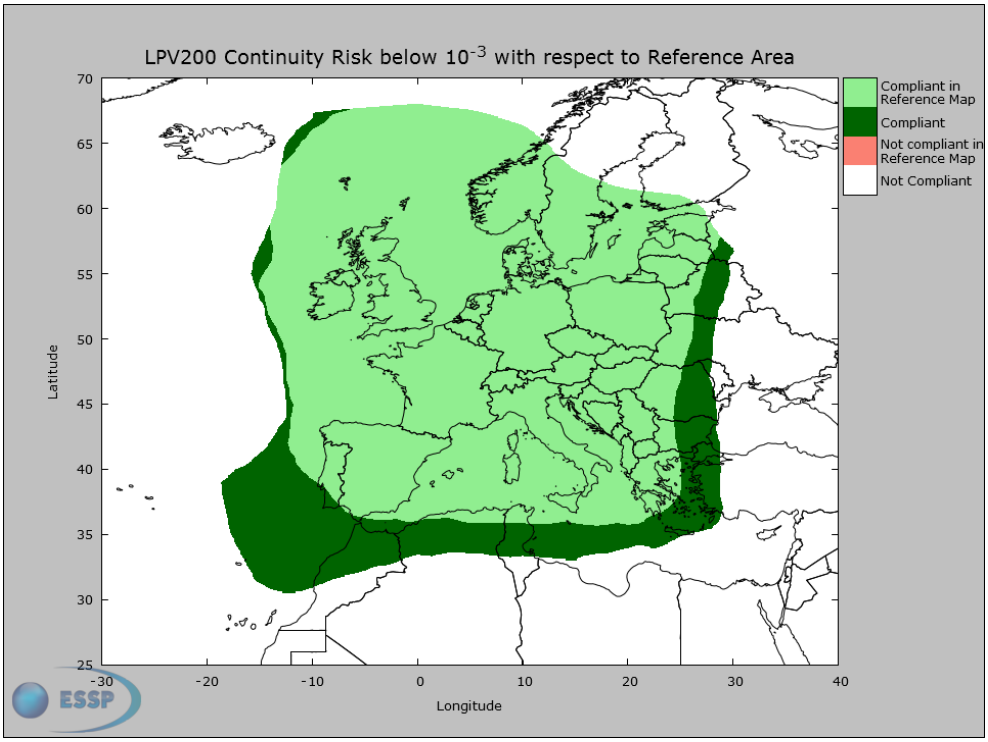


Figure 31: LPV-200 Continuity Risk ($1 \cdot 10^{-3}$) map with respect to the reference map - 01/10/15 to 31/03/16

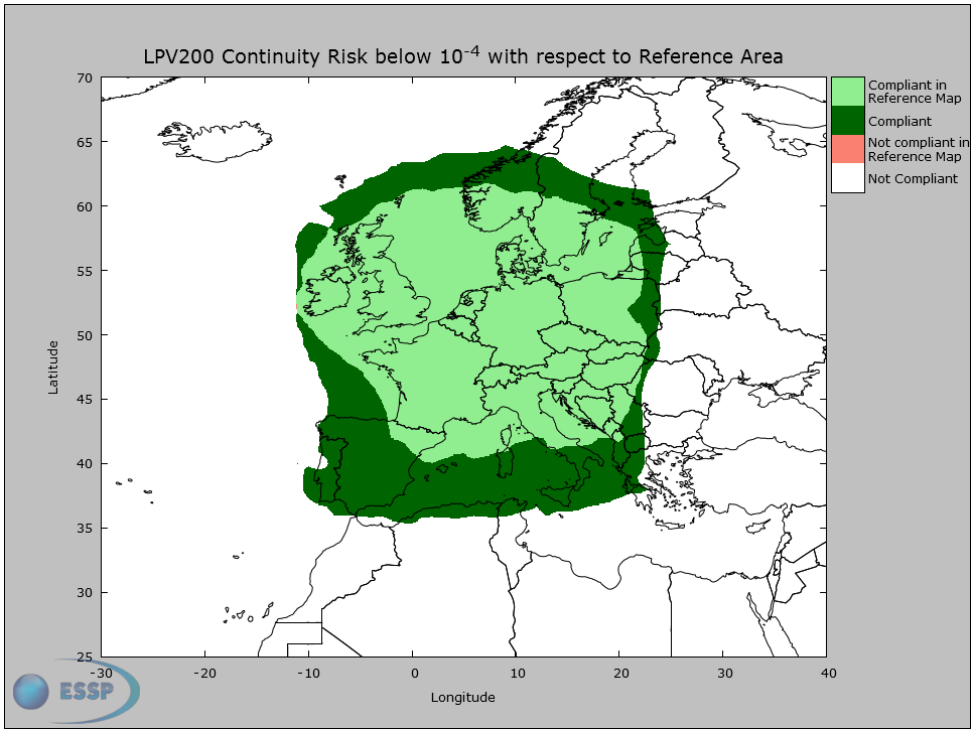


Figure 32: LPV-200 Continuity Risk ($1 \cdot 10^{-4}$) map with respect to the reference map - 01/10/15 to 31/03/16

3.4.7 EGNOS LPV-200 vertical accuracy

When compared to APV-I, LPV-200 is based on more stringent performance requirements, such as Vertical Navigation System Error (VNSE) of 4 m (95%), and Vertical Alert Limit (VAL) of 35m. In addition, specific requirements are defined regarding the probability that the VNSE exceeds 10m in nominal system operation conditions, set to 10^{-7}/per approach, or 15m in degraded system operation conditions, defined as 10^{-5}/per approach.

These LPV-200 requirements relative to the maximum VNSE probability do not exist for APV-I and whenever the instantaneous VNSE exceeds 10m, in nominal conditions, or 15m under degraded scenarios, it is said that an Accuracy Major Event (AME) occurs.

The following figures show the histogram and cumulative distribution function of VNSE, which are computed at the RIMS stations inside the LPV-200 commitment region for each second over the entire period, since the LPV-200 service was declared.

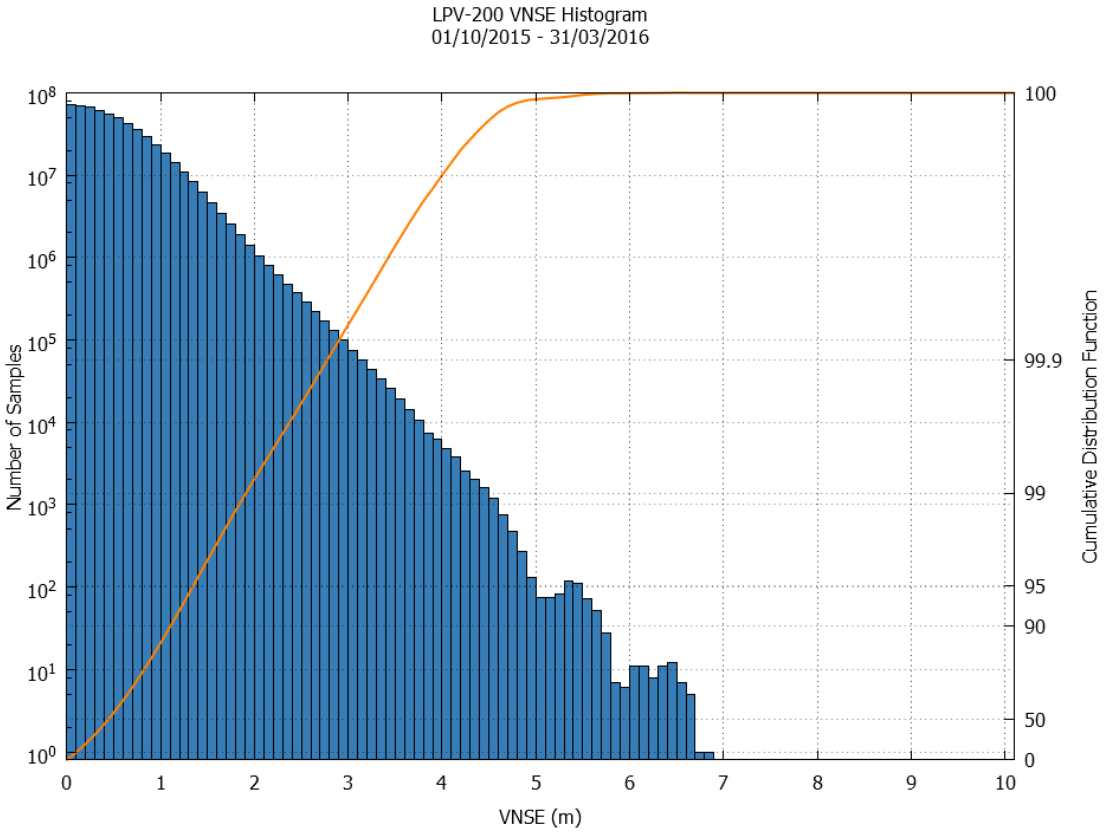


Figure 33: EGNOS LPV-200 Vertical Accuracy Histogram and Cumulative Probability

As shown, the cumulated results confirm that the vertical accuracy remained below 10 metres during the period under analysis. In other words, no AME took place during this period. The 95th percentile is below 1.4 metres. The worst accuracy measured in any of the stations is lower than 7 metres.

3.4.8 EGNOS LPV-200 accuracy extrapolated at 10^{-7}/150s

This section presents the results of extrapolating the accuracy results for every station to 10^{-7}/150 sec. This extrapolation enables the characterisation of the accuracy distribution tails by means of a Gaussian extrapolation applied to the vertical navigation error.

This information is updated every six months, in January and July, containing the reporting period corresponding to each semester of the year.

The following results present the values obtained from 22nd September 2015 to 31st December 2015[10]. For this period, all the RIMS within the LPV-200 service area (see https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds) present extrapolated accuracy values within the requirement: Pr(VNSE>10m) < 10^{-7}/150s.

For the analysis period, the accuracy tail extrapolated at 10^{-7}/150s values for the RIMS within the LPV-200 commitment are:

RIMS	Extrapolated VNSE at 10^{-7}/150s (m)	
	PRN 120	PRN 136
Aalborg	4.41	4.41
Berlin	4.36	4.39
Catania	4.78	5.34
Cork	4.31	3.96
Warsaw	4.79	4.57
Djerba	4.61	4.66
Glasgow	7.72	7.56
Lisbon	8.44	8.28
Swanwick	6.16	6.12
Malaga	6.21	5.98
Palma de Mallorca	7.78	8.29
Rome	7.11	7.11
Santiago de Compostela	4.58	5.81
Sofia	6.95	6.90
Gavle	6.23	6.14
Toulouse	3.50	3.61
Trondheim	6.91	7.35
Zurich	4.08	4.08
Athens	6.07	6.39

Table 6: Extrapolated VNSE at 10^{-7}/150s in the RIMS within the LPV-200 commitment

[10] Although the analysis period for the LPV-200 accuracy tail extrapolation will typically be six months (January to June and July to December), this first analysis is limited to the period from LPV-200 service declaration to the end of the semester.

The highest value is 8.44 m, which was obtained for RIMS Lisbon.

The following maps show this information from a geographical point of view:

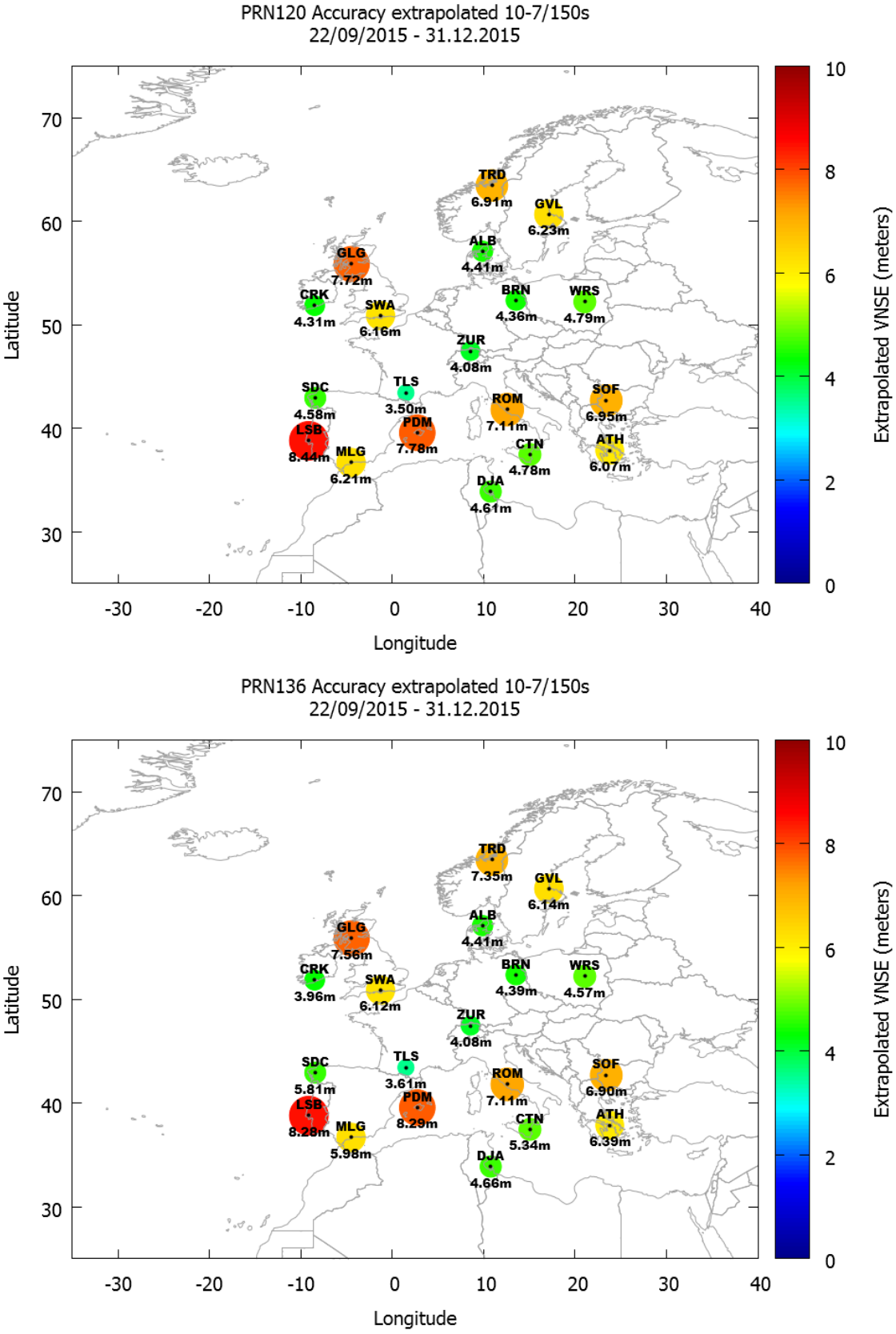


Figure 34: Extrapolated VNSE at 10^{-7}/150s in the RIMS within the LPV-200 commitment

3.5 Open Service (OS)

The EGNOS OS has been qualified by defining the minimum compliance area where 99% of the time the user is able to calculate its position and the accuracy performance is better than 3 metres horizontally and 4 metres vertically. This minimum compliance area has been obtained by using the 39 reference stations currently included in the EGNOS network and can be seen in the following figure:

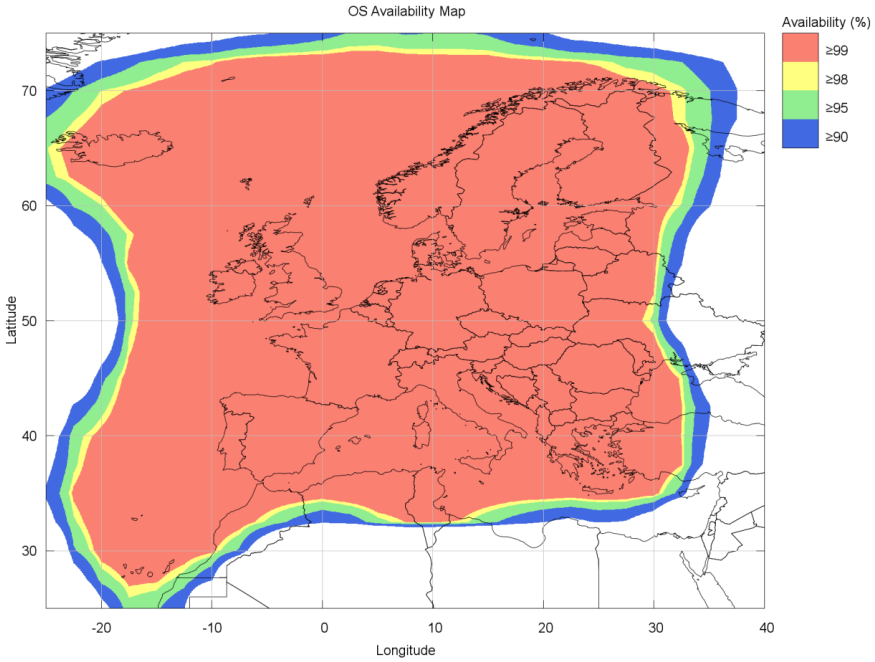


Figure 35: EGNOS OS compliance area

Further details can be found in the EGNOS OS Service Definition Document (see https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds). Additionally, OS performance is reported through the EGNOS Monthly Performance reports, available on the EGNOS User Support website (https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/monthly-performance-reports).

3.5.1 RIMS monitoring network

The following map shows the location of the deployed RIMS:

Figure 36: RIMS locations[11]

The receiver network used to report Open Service corresponds to the subset of RIMS that are inside the OS SDD (see https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds) commitment map.

[11] Source: EGNOS SDDs (OS, SoL, EDAS). See https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds

ID	Location name	Country	ID	Location name	Country
TRO	Tromsoe	Norway	TRD	Trondheim	Norway
CRK	Cork	Ireland	LSB	Lisbon	Portugal
ZUR	Zürich	Switzerland	WRS	Warsaw	Poland
MLG	Málaga	Spain	ROM	Rome	Italy
BRN	Berlin	Germany	ALB	Alborg	Denmark
TLS	Toulouse	France	GLG	Glasgow	United Kingdom
SWA	Swanwick	United Kingdom	GVL	Gävle	Sweden
SDC	S. de Compostela	Spain	CTN	Catania	Italy
PDM	Palma de Mallorca	Spain	MAD	Madeira	Portugal
KIR	Kirkenes	Norway	LAP	Lappeenranta	Finland
JME	Jan Mayen	Norway	EGI	Egilsstadir	Iceland
RKK	Reykjavik	Iceland	SOF	Sofia	Bulgaria
ATH	Athens	Greece	DJA	Djerba	Tunisia
CNR	Canary Islands	Spain	LPI	La Palma	Spain
GOL	Golbasi	Turkey			

Table 7: List of RIMS sites where performance is reported

3.5.2 Horizontal and Vertical Accuracy

EGNOS OS Horizontal (resp Vertical) Accuracy *is reported as the 95th percentile of the Horizontal (resp Vertical) Navigation System Error (HNSE/VNSE) over the period, at the monitored sites when applying EGNOS messages.*

The following table provides the values of accuracy (95%) in metres measured for the reporting period.

Station	HNSE 95% (metres)	VNSE 95% (metres)
Aalborg	0.7	1.3
Berlin	0.8	1.2
Catania	0.8	1.2
Cork	1.0	1.3
Warsaw	0.9	1.4
Djerba	1.0	1.4
Egilsstadir	1.0	1.8
Glasgow	0.8	1.4
Golbasi	1.1	1.7
Lisbon	1.2	1.6
Swanwick	1.1	1.7
Madeira	1.1	1.5
Málaga	1.0	1.2
Kirkenes	1.1	2.1
Palma de Mallorca	0.8	1.1

Station	HNSE 95% (metres)	VNSE 95% (metres)
Reykjavik[12]	--	--
Roma	0.8	1.2
Lappeenranta	0.8	1.7
S. de Compostela	1.1	1.1
Sofia	1.1	2.3
Gävle	0.7	1.5
Toulouse	0.8	1.1
Trondheim	0.8	1.5
Tromsoe	1.2	2.3
Zürich	0.8	1.2
Jan Mayen	1.3	2.3
Athens	0.8	1.3

Table 8: EGNOS Open Service accuracy (95%)

The horizontal accuracy results for all the stations remained below 1.4 metres (95%), and the vertical accuracy below 2.4 metres (95%), which represent a very good level of accuracy.

The following figures show the histogram and cumulative distribution function of HNSE (Horizontal Navigation System Error) and VNSE (Vertical Navigation System Error), which are computed at the previous stations for each second over the entire period, across the range of values.

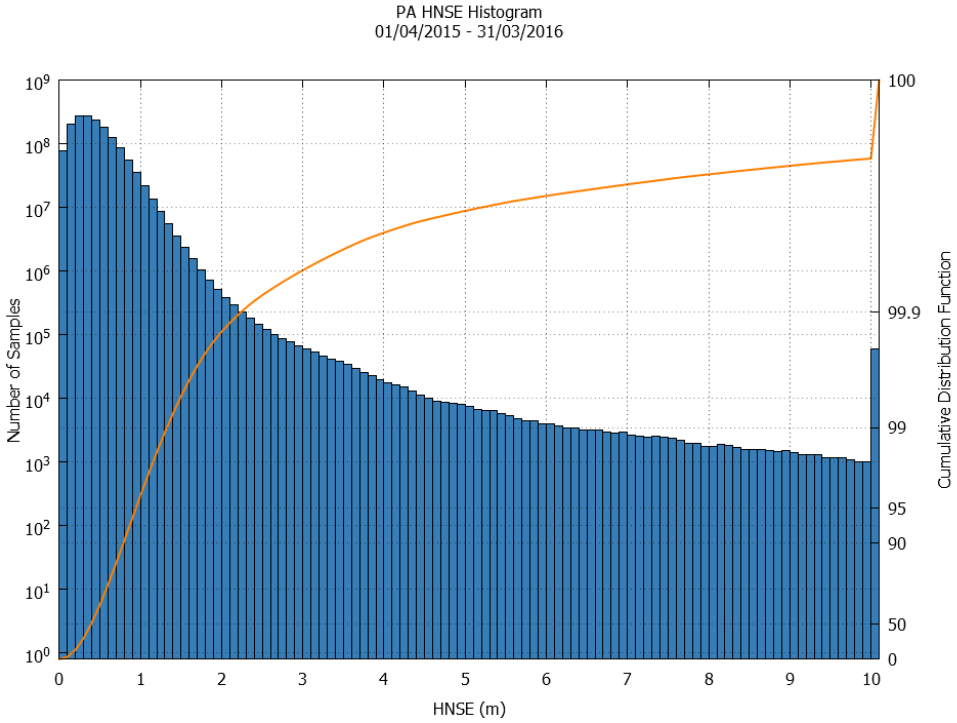


Figure 37: EGNOS Open Service HNSE Histogram and Cumulative Probability

[12] Data from RIMS Reykjavik are not taken into account due to a local issue at this site that has affected EGNOS performance at this site over most of the year.

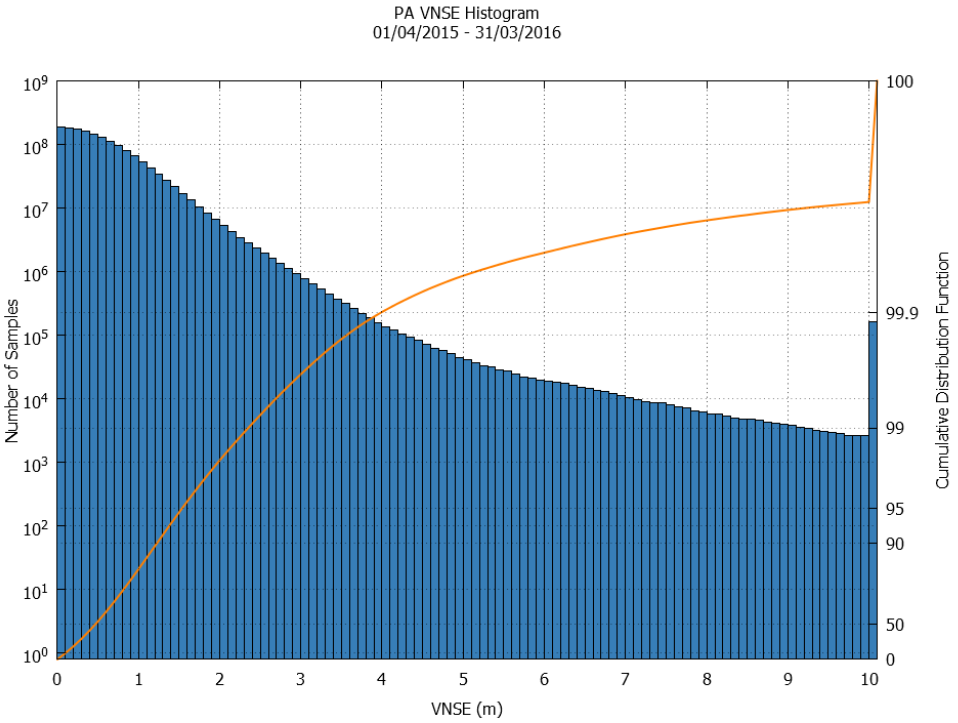


Figure 38: EGNOS Open Service VNSE Histogram and Cumulative Probability

As shown, the cumulated results confirm the good values observed in the stations. The 95th percentile is below 1.0 metres in the horizontal domain and below 1.6 metres in the vertical one.

Table 9 and Table 10 below provide the monthly maximum of the daily values for Horizontal and Vertical Accuracy (95%) while using EGNOS message broadcast by PRN120 and PRN126/136 respectively.

Maritime Lighthouse

PRN 120		04/15	05/15	06/15	07/15	08/15	09/15	10/15	11/15	12/15	01/16	02/16	03/16	Average
MLG	HPE	2.19	1.55	3.72	1.18	1.06	1.00	1.12	1.27	1.05	0.92	0.95	1.16	1.43
	VPE	2.95	1.69	5.07	1.28	1.43	1.58	1.97	1.98	1.40	1.47	1.44	1.35	1.97
SDC	HPE	1.78	1.73	1.78	1.44	1.11	1.10	1.20	1.09	0.93	0.95	0.95	1.23	1.27
	VPE	1.59	1.34	1.88	1.17	1.47	1.60	1.58	1.64	1.36	1.33	1.28	1.27	1.46
PDM	HPE	1.29	1.19	1.72	1.07	0.96	0.84	1.11	0.89	0.70	0.68	0.70	0.88	1.00
	VPE	2.03	1.44	1.67	1.27	1.22	1.51	1.93	2.03	1.36	1.46	1.42	1.33	1.56
LSB	HPE	1.86	1.64	2.97	1.33	1.20	1.20	1.19	1.45	0.99	1.08	1.00	1.33	1.44
	VPE	2.41	1.96	3.26	1.71	1.82	1.87	1.88	1.85	1.72	1.80	1.96	1.77	2.00
TRD	HPE	1.53	1.07	1.04	0.83	0.99	1.18	1.13	1.11	1.14	0.93	1.08	1.22	1.10
	VPE	2.29	2.65	2.19	1.67	1.67	2.27	2.60	2.76	2.15	2.09	2.08	2.85	2.27
CRK	HPE	1.69	1.45	1.50	1.04	1.17	1.21	1.15	1.12	1.07	1.12	1.00	1.01	1.21
	VPE	1.79	1.59	1.66	1.78	1.36	1.57	1.47	1.71	1.63	1.81	1.94	1.87	1.68
ZUR	HPE	1.30	1.42	1.16	1.10	0.91	0.86	1.08	1.00	0.83	1.05	0.79	0.95	1.04
	VPE	1.63	1.67	1.27	1.62	1.29	1.22	1.26	1.33	1.46	1.57	1.60	1.49	1.45
BRN	HPE	0.98	0.97	1.33	0.93	0.78	0.84	0.92	1.05	0.97	0.95	0.92	0.92	0.96
	VPE	1.62	1.50	1.37	1.52	1.40	1.28	1.52	1.40	1.40	1.41	1.68	1.49	1.47
TLS	HPE			1.54	1.10	0.90	0.85	0.94	1.02	0.76	0.79	0.77	0.90	0.80
	VPE			1.44	1.33	1.13	1.28	1.33	1.28	1.19	1.71	1.44	1.55	1.14
TRO	HPE	1.99	1.33	1.41	1.21	1.25	1.73	1.85	1.79	1.64	1.27	1.36	2.38	1.60
	VPE	3.60	3.03	2.49	2.84	2.65	3.43	3.66	3.24	2.66	2.39	2.89	3.64	3.04
SWA	HPE	1.62	1.64	1.58	1.18	1.17	1.34	1.34	1.35	1.14	1.28	1.14	1.19	1.33
	VPE	1.91	1.86	1.75	2.09	1.92	1.80	1.96	2.18	1.99	2.18	2.18	2.24	2.01
ROM	HPE	1.20	1.00	1.09	0.94	0.86	0.81	0.79	0.92	0.73	0.69	0.72	0.79	0.88
	VPE	1.80	1.46	1.39	1.29	1.34	1.57	1.67	1.39	1.26	1.48	1.31	1.39	1.45
ALB	HPE	1.23	0.86	0.82	0.75	0.74	0.88	0.96	0.99	0.92	0.92	0.84	1.05	0.91
	VPE	2.40	1.56	1.68	1.59	1.77	1.65	1.61	1.78	1.54	1.80	1.84	2.14	1.78
GLG	HPE	1.23	0.98	0.91	0.93	0.88	1.04	1.09	1.03	0.96	1.07	1.04	0.97	1.01
	VPE	2.29	2.01	1.78	1.38	1.61	1.56	1.47	1.51	1.40	1.90	1.98	2.16	1.75
GVL	HPE	1.35	1.02	1.01	0.80	1.06	0.99	1.02	0.99	1.06	1.01	1.03	1.23	1.05
	VPE	3.25	2.48	1.74	2.00	2.06	1.98	2.25	2.10	1.99	1.82	1.89	2.11	2.14
WRS	HPE	1.31	1.12	1.18	1.04	0.88	0.91	1.02	1.14	0.91	1.09	0.89	0.93	1.04
	VPE	2.36	1.95	1.89	1.84	1.51	1.85	1.81	1.67	1.68	1.49	1.80	1.62	1.79
CTN	HPE	1.39	1.21	1.20	1.03	1.11	0.87	0.81	0.76	0.70	0.71	0.81	0.88	0.96
	VPE	2.04	1.52	1.78	1.41	1.25	1.38	1.89	1.76	1.28	1.44	1.37	1.33	1.54
MAD	HPE	3.09	1.81	2.03	1.29	1.08	1.31	1.52	1.43	1.39	1.21	1.43	1.50	1.59
	VPE	4.95	2.46	4.37	2.31	1.70	2.37	2.63	1.98	1.71	1.71	1.79	2.18	2.51
TOR	HPE	1.58	1.56	1.91	1.23	1.08	1.04	1.06	1.25	0.91	0.93	0.89	1.23	1.22
	VPE	1.66	1.39	2.07	1.44	1.35	1.42	1.90	1.42	1.22	1.47	1.44	1.40	1.52
ATH	HPE	1.32	1.05	1.23	1.14	1.10	1.12	0.91	0.82	0.82	0.81	0.84	1.01	1.01
	VPE	2.26	1.82	2.06	1.85	1.49	1.68	2.16	1.89	1.56	1.67	1.31	1.45	1.77
DJA	HPE	1.89	1.53	1.75	1.25	1.10	1.19	1.16	1.22	0.83	0.96	1.07	1.03	1.25
	VPE	2.99	1.95	3.46	1.80	1.82	1.65	2.08	1.80	1.40	1.33	1.44	1.45	1.93
SOF	HPE	1.57	1.46	1.34	1.37	1.85	1.19	1.22	1.42	1.62	1.54	1.26	1.44	1.44
	VPE	3.74	2.72	2.63	3.31	3.00	2.74	2.57	2.73	2.42	2.54	2.34	2.86	2.80
LAP	HPE	1.52	1.24	1.02	0.88	1.06	1.24	1.22	1.02	1.33	1.01	1.09	1.53	1.18
	VPE	3.46	2.89	1.94	2.35	1.90	2.20	2.70	2.38	2.19	1.94	2.01	2.50	2.37
KIR	HPE	2.44	1.72	1.35	1.35	1.36	1.87	2.18	1.77	1.81	1.33	1.43	2.52	1.76
	VPE	4.69	2.66	2.39	2.88	2.26	3.39	3.98	3.68	2.87	2.58	2.66	3.46	3.13
JME	HPE	1.97	1.47	1.79	1.47	1.46	1.62	1.79	1.73	1.48	1.59	1.46	2.05	1.66
	VPE	3.61	3.16	2.77	2.41	2.66	3.33	3.61	3.84	2.68	2.71	3.08	3.10	3.08
EGI	HPE	1.74	1.24	1.32	1.24	1.13	1.26	1.62	1.56	1.36	1.27	1.22	1.72	1.39
	VPE	3.09	2.49	2.47	2.58	2.49	2.78	3.42	3.33	2.50	2.23	2.48	3.15	2.75
RKK	HPE	2.50	1.84	1.69	1.57	1.72	2.92	2.00	1.82	1.95	1.67	2.12	2.39	2.02
	VPE	3.96	3.23	3.07	2.91	3.16	3.81	3.70	3.94	3.50	3.02	2.98	4.73	3.50
LPI	HPE	4.88	3.32	2.83	2.39	1.99	2.68	3.57	3.61	3.06	2.16	3.36	3.18	3.09
	VPE	6.72	3.06	8.03	1.95	2.23	3.22	3.51	3.08	2.26	2.09	2.69	3.23	3.51
CNR	HPE	5.03	3.92	2.82	2.61	2.14	2.75	3.97	3.64	2.91	2.61	3.47	3.26	3.26
	VPE	6.88	3.04	7.10	2.54	2.10	3.11	4.16	3.27	2.57	2.75	3.17	3.55	3.69
GOL	HPE	2.47	1.41	1.59	4.09	9.38	1.58	1.38	1.33	1.19	1.19	1.43	1.39	2.37
	VPE	4.20	3.08	2.47	6.21	9.37	2.62	3.00	2.31	2.09	1.78	2.02	2.08	3.44

Table 9: Maximum monthly value of the daily Horizontal/Vertical Accuracy (95%) at RIMS-A sites for PRN120 (in metres)

PRN 126/136		04/15	05/15	06/15	07/15	08/15	09/15	10/15	11/15	12/15	01/16	02/16	03/16	Average
MLG	HPE	2.22	1.53	3.54	1.18	1.06	1.00	1.13	1.27	1.04	0.94	0.95	1.16	1.42
	VPE	2.80	1.74	4.54	1.22	1.42	1.62	2.04	1.97	1.36	1.42	1.40	1.35	1.91
SDC	HPE	1.78	1.63	1.83	1.44	1.11	1.11	1.19	1.13	0.94	0.93	0.95	1.22	1.27
	VPE	1.58	1.36	1.93	1.18	1.58	1.61	1.57	1.64	1.35	1.33	1.30	1.34	1.48
PDM	HPE	1.24	1.20	1.70	1.07	0.96	0.83	1.11	0.89	0.70	0.68	0.70	0.89	1.00
	VPE	1.99	1.25	1.68	1.26	1.24	1.47	1.86	2.05	1.36	1.42	1.39	1.39	1.53
LSB	HPE	1.87	1.67	3.01	1.28	1.20	1.22	1.17	1.46	0.99	1.09	1.02	1.33	1.44
	VPE	2.56	1.90	3.23	1.73	1.79	1.90	1.88	1.86	1.72	1.83	1.94	1.77	2.01
TRD	HPE	1.56	1.04	0.98	0.85	1.05	1.18	1.11	1.11	1.12	0.92	1.11	1.21	1.10
	VPE	2.29	2.62	2.21	1.66	1.70	2.26	2.54	2.73	2.11	2.10	2.07	2.87	2.26
CRK	HPE	1.60	1.31	1.53	1.08	1.18	1.20	1.15	1.10	1.07	1.11	1.01	1.01	1.20
	VPE	1.70	1.58	1.64	1.77	1.34	1.58	1.47	1.70	1.60	1.82	1.93	1.88	1.67
ZUR	HPE	1.31	1.41	1.16	1.14	0.89	0.86	1.08	1.00	0.83	1.05	0.81	0.95	1.04
	VPE	1.63	1.50	1.28	1.63	1.28	1.24	1.25	1.32	1.46	1.59	1.61	1.48	1.44
BRN	HPE	0.97	0.96	1.33	0.92	0.78	0.85	0.92	1.05	0.98	0.94	0.90	0.92	0.96
	VPE	1.61	1.48	1.34	1.48	1.39	1.26	1.51	1.42	1.40	1.45	1.63	1.49	1.46
TLS	HPE			1.57	1.09	0.91	0.86	0.94	1.02	0.77	0.79	0.76	0.90	0.80
	VPE			1.47	1.33	1.10	1.31	1.33	1.27	1.19	1.69	1.43	1.71	1.15
TRO	HPE	2.00	1.34	1.39	1.21	1.41	1.74	2.07	1.74	1.65	1.26	1.40	2.37	1.63
	VPE	3.49	3.09	2.48	2.68	2.65	3.53	3.70	3.22	2.65	2.39	2.78	3.56	3.02
SWA	HPE	1.57	1.62	1.59	1.20	1.17	1.34	1.37	1.35	1.16	1.28	1.15	1.20	1.33
	VPE	1.99	1.94	1.79	2.11	1.88	1.81	1.97	2.19	1.98	2.22	2.17	2.22	2.02
ROM	HPE	1.12	0.96	1.06	0.94	0.84	0.82	0.79	0.93	0.73	0.70	0.73	0.79	0.87
	VPE	1.88	1.51	1.38	1.28	1.36	1.58	1.66	1.38	1.26	1.48	1.30	1.38	1.45
ALB	HPE	1.20	0.86	0.84	0.74	0.67	0.86	0.96	1.00	0.92	0.92	0.84	1.04	0.90
	VPE	2.34	1.57	1.74	1.62	1.75	1.64	1.60	1.78	1.54	1.80	1.84	2.14	1.78
GLG	HPE	1.28	0.88	0.91	0.93	0.85	1.03	1.07	1.02	0.96	1.06	1.03	0.96	1.00
	VPE	2.32	1.96	1.76	1.42	1.41	1.56	1.45	1.50	1.39	1.88	2.00	2.17	1.74
GVL	HPE	1.32	0.99	1.06	0.77	1.07	1.00	1.04	0.99	1.06	1.02	1.05	1.22	1.05
	VPE	3.09	2.31	1.69	1.99	2.17	1.98	2.24	2.10	1.99	1.86	1.87	2.12	2.12
WRS	HPE	1.22	1.13	1.22	1.01	0.90	0.90	1.02	1.14	0.91	1.09	0.89	0.92	1.03
	VPE	2.23	2.00	1.90	1.84	1.54	1.79	1.76	1.72	1.67	1.47	1.75	1.61	1.77
CTN	HPE	1.36	1.06	1.23	1.04	1.13	0.86	0.82	0.75	0.69	0.71	0.80	0.88	0.94
	VPE	2.12	1.57	1.74	1.41	1.28	1.36	1.95	1.81	1.27	1.49	1.36	1.33	1.56
MAD	HPE	2.98	1.85	2.05	1.25	1.12	1.33	1.50	1.48	1.41	1.20	1.48	1.51	1.60
	VPE	4.71	2.42	4.30	2.26	1.79	2.41	2.55	2.01	1.65	1.70	1.76	2.17	2.48
TOR	HPE	1.60	1.51	2.00	1.20	1.07	1.03	1.06	1.25	0.92	0.91	0.90	1.23	1.22
	VPE	1.63	1.33	2.19	1.41	1.37	1.42	1.86	1.41	1.22	1.50	1.43	1.40	1.51
ATH	HPE	1.34	1.04	1.25	1.16	1.11	1.10	0.89	0.81	0.82	0.82	0.82	1.01	1.01
	VPE	2.30	1.82	1.98	1.83	1.53	1.69	2.22	1.88	1.56	1.66	1.31	1.44	1.77
DJA	HPE	1.94	1.53	2.14	1.23	1.13	1.16	1.15	1.23	0.83	0.98	1.04	1.03	1.28
	VPE	2.99	1.92	3.52	1.79	1.74	1.62	2.12	1.80	1.40	1.41	1.48	1.45	1.94
SOF	HPE	1.56	1.51	1.38	1.39	1.84	1.22	1.19	1.40	1.60	1.59	1.26	1.45	1.45
	VPE	3.64	2.96	2.61	3.33	3.01	2.78	2.59	2.79	2.42	2.57	2.37	2.84	2.83
LAP	HPE	1.54	1.23	1.06	0.85	1.13	1.26	1.20	1.04	1.34	1.00	1.13	1.60	1.20
	VPE	3.34	2.80	1.99	2.36	1.92	2.17	2.67	2.34	2.23	1.98	2.11	2.52	2.37
KIR	HPE	2.38	1.65	1.34	1.33	1.38	1.89	2.15	1.75	1.79	1.28	1.44	2.47	1.74
	VPE	4.41	2.59	2.44	2.56	2.39	3.25	3.90	3.57	2.93	2.59	2.57	3.46	3.06
JME	HPE	1.95	1.45	1.75	1.45	2.19	1.68	1.78	1.71	1.50	1.51	1.51	2.04	1.71
	VPE	3.61	3.08	2.85	2.41	2.74	3.37	3.59	3.89	2.70	2.71	3.24	3.06	3.10
EGI	HPE	1.77	1.25	1.31	1.26	1.22	1.23	1.55	1.55	1.36	1.26	1.24	1.70	1.39
	VPE	2.93	2.46	2.37	2.40	2.37	2.78	3.43	3.33	2.51	2.23	2.56	3.18	2.71
RKK	HPE	2.44	1.95	1.86	1.55	1.79	2.66	2.02	1.82	1.96	1.57	2.04	2.36	2.00
	VPE	3.82	3.74	3.49	2.93	3.33	3.74	3.60	4.06	3.52	3.02	2.87	4.80	3.58
LPI	HPE	4.90	3.36	2.82	2.43	2.06	2.71	3.31	3.82	3.11	2.15	3.35	3.17	3.10
	VPE	7.92	2.91	7.43	2.03	2.21	3.21	3.52	3.16	2.25	2.11	2.67	3.15	3.55
CNR	HPE	5.10	3.91	2.86	2.63	2.24	2.77	3.99	3.72	2.95	2.65	3.47	3.26	3.30
	VPE	7.49	3.32	6.62	2.33	2.09	3.08	4.11	3.20	2.61	2.78	3.13	3.50	3.69
GOL	HPE	2.62	1.40	1.59	5.20	9.95	1.62	1.38	1.22	1.19	1.19	1.38	1.36	2.51
	VPE	4.27	3.19	2.42	6.06	9.38	2.62	2.89	2.32	2.08	1.79	2.04	2.10	3.43

Table 10: Maximum monthly value of the daily Horizontal/Vertical Accuracy (95%) at RIMS-A sites for PRN126/136 (in metres)

3.5.3 Open Service Availability

EGNOS OS Availability performance *is defined in the present document as the percentage of time in the month when the instantaneous HNSE is lower than 3 metres and the instantaneous VNSE is lower than 4 metres over the total number of samples with valid PA navigation solution.*

The following tables provide the values measured using PRN120 and PRN126/136[13] respectively.

PRN120	04/15	05/15	06/15	07/15	08/15	09/15	10/15	11/15	12/15	01/16	02/16	03/16	Average
MLGA	99.67%	99.88%	99.57%	100.00%	100.00%	100.00%	99.96%	99.92%	99.88%	100.00%	100.00%	100.00%	99.91%
SDCA	99.82%	99.98%	99.96%	100.00%	100.00%	100.00%	100.00%	99.95%	99.99%	100.00%	99.99%	100.00%	99.97%
PDMA	99.90%	99.99%	99.92%	100.00%	100.00%	100.00%	99.85%	99.89%	100.00%	100.00%	100.00%	99.98%	99.96%
LSBA	99.09%	99.73%	99.71%	100.00%	100.00%	99.97%	99.98%	99.99%	99.98%	100.00%	100.00%	99.98%	99.87%
TRDA	99.98%	99.97%	99.97%	100.00%	100.00%	99.99%	99.96%	99.99%	99.96%	100.00%	99.92%	99.98%	99.98%
CRKA	100.00%	100.00%	99.97%	100.00%	99.98%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	99.98%	99.99%
ZURA	100.00%	99.94%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	99.99%
BRNA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	99.99%	100.00%	100.00%
TLSA			99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
TROA	99.41%	99.74%	99.71%	99.88%	99.87%	99.51%	99.22%	99.64%	99.87%	99.88%	99.78%	99.54%	99.67%
LAPA	99.93%	99.98%	99.99%	100.00%	100.00%	100.00%	100.00%	99.98%	100.00%	100.00%	100.00%	100.00%	99.99%
SWAA	99.85%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	99.98%
ROMA	100.00%	100.00%	99.98%	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	100.00%
ALBA	99.99%	100.00%	99.95%	99.98%	99.99%	99.99%	99.99%	100.00%	100.00%	100.00%	99.99%	99.97%	99.99%
GLGA	99.90%	100.00%	99.99%	99.99%	99.98%	99.98%	99.99%	100.00%	100.00%	100.00%	99.98%	99.99%	99.98%
KIRA	99.89%	99.99%	99.98%	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	99.99%	99.99%	100.00%	99.99%
GVLA	99.73%	99.95%	99.99%	99.98%	100.00%	100.00%	100.00%	99.97%	100.00%	99.99%	100.00%	99.99%	99.97%
WRSA	96.95%	98.88%	99.60%	100.00%	99.99%	99.73%	99.94%	99.88%	99.94%	100.00%	99.97%	99.93%	99.57%
CTNA	99.85%	99.93%	99.89%	99.92%	96.75%	99.94%	99.96%	99.98%	99.99%	99.99%	99.99%	100.00%	99.68%
MADA	98.36%	99.57%	99.47%	99.67%	99.72%	99.58%	99.15%	99.31%	99.49%	99.52%	99.51%	98.85%	99.35%
SPU1	99.85%	99.99%	99.94%	100.00%	100.00%	99.96%	99.94%	100.00%	99.99%	99.96%	99.97%	99.97%	99.97%
ATHA	99.87%	100.00%	100.00%	99.98%	100.00%	100.00%	100.00%	99.97%	100.00%	99.92%	100.00%	100.00%	99.98%
DJAA	99.46%	99.93%	99.85%	99.98%	99.99%	99.93%	99.99%	99.96%	100.00%	99.99%	100.00%	99.99%	99.92%
SOFA	99.63%	99.79%	99.83%	99.60%	99.80%	99.73%	99.96%	99.85%	99.88%	99.76%	99.88%	99.84%	99.80%
JMEA	99.36%	99.62%	99.78%	99.96%	99.76%	99.55%	99.40%	99.61%	99.76%	99.64%	99.49%	99.69%	99.63%
EGIA	99.69%	99.91%	99.85%	99.95%	99.89%	99.81%	99.59%	99.78%	99.81%	99.90%	99.92%	99.78%	99.82%
RKKA	98.50%	99.17%	98.70%	99.16%	98.45%	98.26%	98.57%	98.59%	99.18%	99.08%	98.94%	98.91%	98.79%
LPIA	92.39%	98.38%	99.38%	99.91%	99.91%	99.50%	99.02%	98.35%	99.40%	99.83%	99.40%	98.74%	98.68%
CNRA	88.67%	98.28%	99.53%	99.86%	99.91%	99.42%	98.07%	97.29%	99.14%	99.57%	98.70%	98.21%	98.05%
GOLA	98.74%	99.36%	99.61%	98.88%	99.24%	99.91%	99.87%	99.76%	99.87%	99.78%	99.78%	99.78%	99.55%

Table 11: OS Availability at RIMS-A sites for PRN120

[13] GEO PRN126 was operational until 20th August and GEO PRN136 is operational since 13th August. The results presented have been obtained considering GEOs PRN120 and PRN126 as the pair of operational GEOs until 19th August and GEOs PRN120 and PRN136 for the rest of the reporting period.

PRN126/136	04/15	05/15	06/15	07/15	08/15	09/15	10/15	11/15	12/15	01/16	02/16	03/16	Average
MLGA	99.64%	99.95%	99.61%	100.00%	100.00%	100.00%	99.96%	99.92%	99.89%	100.00%	99.99%	99.98%	99.91%
SDCA	99.83%	99.99%	99.95%	100.00%	100.00%	100.00%	100.00%	99.94%	99.99%	99.99%	100.00%	99.99%	99.97%
PDMA	99.92%	100.00%	99.93%	100.00%	100.00%	100.00%	99.85%	99.89%	100.00%	100.00%	100.00%	99.97%	99.96%
LSBA	99.06%	99.81%	99.74%	100.00%	100.00%	99.97%	99.98%	99.99%	99.98%	100.00%	100.00%	99.95%	99.87%
TRDA	99.98%	99.98%	99.99%	99.99%	100.00%	99.99%	99.97%	99.99%	99.97%	100.00%	99.93%	99.98%	99.98%
CRKA	100.00%	100.00%	99.98%	100.00%	99.97%	100.00%	100.00%	100.00%	100.00%	99.98%	100.00%	99.98%	99.99%
ZURA	100.00%	99.94%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	99.99%	99.99%
BRNA	100.00%	100.00%	100.00%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	99.99%	99.99%	100.00%
TLSA			100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.98%	100.00%
TROA	99.42%	99.74%	99.69%	99.87%	99.80%	99.47%	99.22%	99.65%	99.84%	99.87%	99.79%	99.53%	99.66%
LAPA	99.86%	100.00%	99.94%	100.00%	100.00%	100.00%	100.00%	99.98%	100.00%	100.00%	100.00%	100.00%	99.98%
SWAA	99.94%	99.98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	99.98%	100.00%	100.00%	99.99%
ROMA	99.89%	99.99%	99.99%	100.00%	99.98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.99%	99.99%
ALBA	100.00%	100.00%	99.99%	99.98%	99.99%	99.99%	100.00%	100.00%	100.00%	100.00%	100.00%	99.96%	99.99%
GLGA	99.98%	100.00%	100.00%	99.96%	99.97%	99.98%	99.99%	100.00%	100.00%	100.00%	100.00%	99.99%	99.99%
KIRA	98.68%	99.63%	99.47%	99.66%	100.00%	99.99%	100.00%	100.00%	100.00%	99.99%	99.99%	100.00%	99.78%
GVLA	99.92%	100.00%	99.99%	99.99%	100.00%	100.00%	100.00%	99.96%	100.00%	99.98%	100.00%	99.99%	99.99%
WRSA	99.94%	99.99%	99.98%	100.00%	99.97%	99.71%	99.93%	99.86%	99.94%	100.00%	99.98%	99.93%	99.93%
CTNA	99.80%	99.96%	99.99%	100.00%	99.94%	99.94%	99.96%	99.99%	100.00%	99.99%	99.99%	99.99%	99.96%
MADA	96.97%	99.29%	99.61%	100.00%	99.67%	99.59%	99.09%	99.28%	99.48%	99.53%	99.53%	98.84%	99.24%
SPU1	99.86%	99.93%	99.88%	99.92%	100.00%	99.96%	99.95%	100.00%	99.99%	99.96%	99.99%	99.96%	99.95%
ATHA	99.90%	100.00%	100.00%	99.99%	99.98%	100.00%	100.00%	99.98%	99.99%	99.90%	100.00%	100.00%	99.98%
DJAA	99.40%	99.95%	99.83%	99.98%	100.00%	99.93%	99.99%	99.97%	100.00%	99.99%	100.00%	99.99%	99.92%
SOFA	99.66%	99.63%	99.84%	99.62%	99.77%	99.74%	99.95%	99.85%	99.88%	99.71%	99.87%	99.83%	99.78%
JMEA	99.39%	99.63%	99.80%	99.95%	99.76%	99.54%	99.35%	99.58%	99.75%	99.61%	99.49%	99.69%	99.63%
EGIA	99.71%	99.93%	99.90%	99.92%	99.86%	99.80%	99.56%	99.77%	99.82%	99.90%	99.93%	99.77%	99.82%
RKKA	98.60%	99.00%	98.06%	99.11%	98.54%	98.31%	98.64%	98.56%	99.19%	99.09%	98.95%	98.90%	98.75%
LPIA	92.26%	98.62%	99.38%	99.88%	99.92%	99.48%	99.06%	98.40%	99.40%	99.83%	99.42%	98.77%	98.70%
CNRA	88.72%	98.49%	99.47%	99.86%	99.90%	99.38%	98.06%	97.35%	99.12%	99.59%	98.66%	98.23%	98.07%
GOLA	98.87%	99.40%	99.62%	98.92%	99.20%	99.90%	99.85%	99.75%	99.88%	99.76%	99.75%	99.78%	99.56%

Table 12: OS Availability at RIMS-A sites for PRN126/136

The following map shows, for each location, the value of the average OS availability value during the year. The worst value between PRN120 and PRN126/136 is shown:

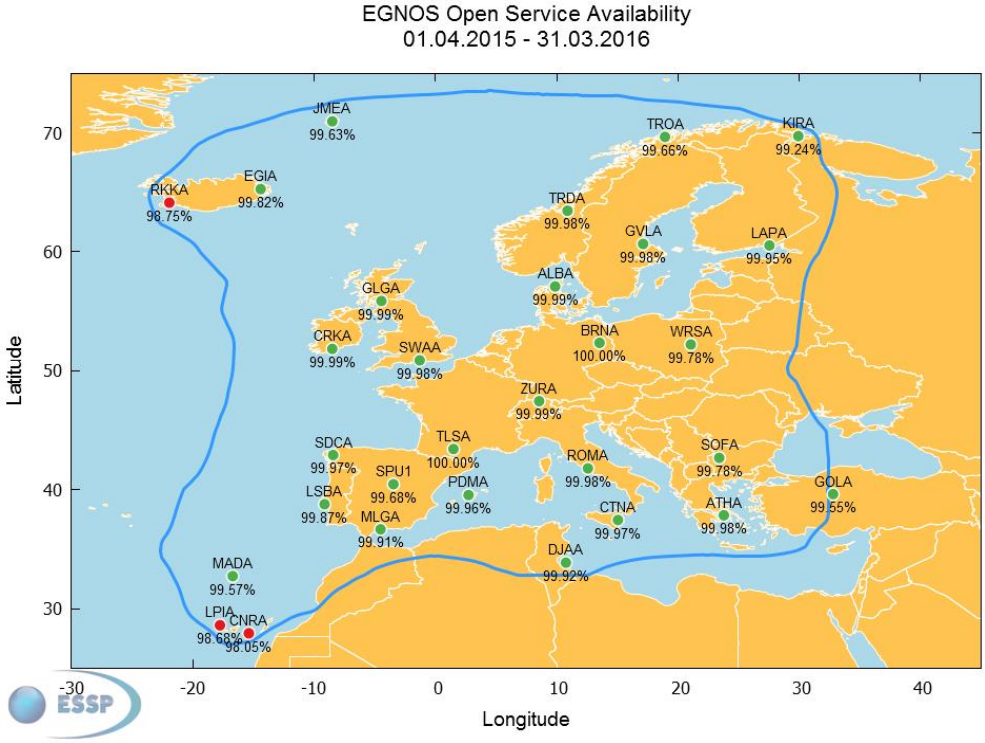


Figure 39: OS average availability for the RIMS stations

As shown in the previous figure, Open Service Availability performance has been greater than 99% in all the stations, with the exception of Reykjavik, La Palma and Canary Islands, where the achieved performance has been slightly lower than the commitment.

3.6 EGNOS Data Access Service (EDAS)

EDAS (EGNOS Data Access Service) is the free-of-charge ground-based access (through the Internet) to EGNOS and GNSS (GPS&GLONASS) data in real-time, as well as through a historical archive, which collects all the data generated by the EGNOS ground stations, mainly distributed over Europe and North Africa.

EDAS, as all the other EGNOS Services, has its own EDAS SDD (Service Definition Document, see https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds). Among other content, the EDAS SDD defines the committed performances for EDAS (those that should always be met in a nominal situation) in terms of availability and latency:

- **Availability:** percentage of time in which EDAS is providing its services according to specifications. The availability of EDAS services is measured at the EDAS system output (excluding external network performance).
- **Latency:** time elapsed from 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.

Based on the above definitions, the tables below provide EDAS services' minimum availability and maximum latency:

SL0	SL2	SISNeT	FTP	Data Filtering	Ntrip
98.5%	98.5%	98%	98%	98%	98%

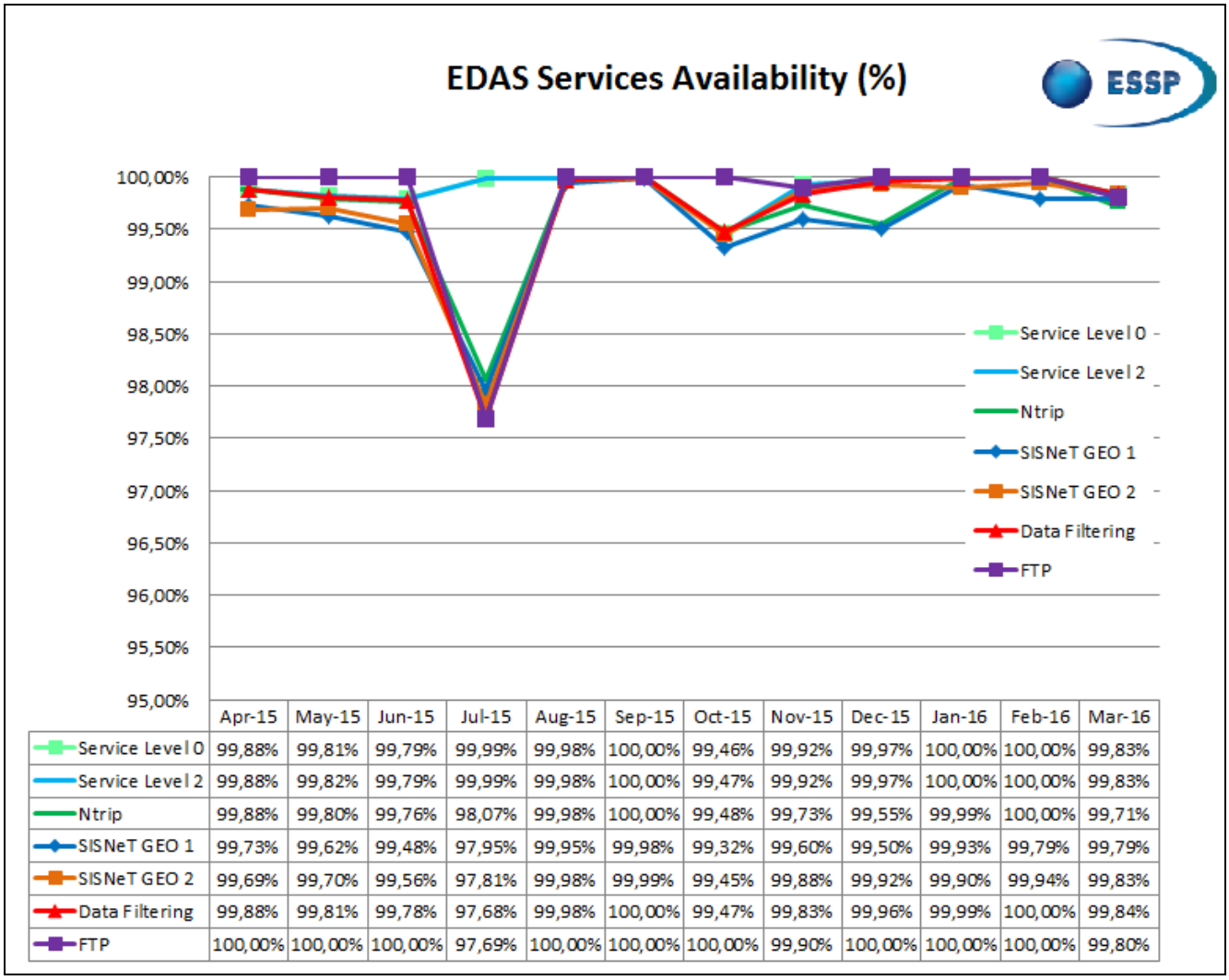
Table 13: EDAS services minimum availability

SL0	SL2	SISNeT	FTP	Ntrip	Data Filtering	
					SL0	SL2
1.3 seconds	1.450 seconds	1.150 seconds	N/A	1.75 seconds	1.6 seconds	1.75 seconds

Table 14: EDAS services maximum latency for EDAS Services

EDAS performance is reported through the EGNOS Monthly Performance reports, available on the EGNOS User Support website (https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/monthly-performance-reports).

The availability achieved during the last yearly period is shown in the figure below.



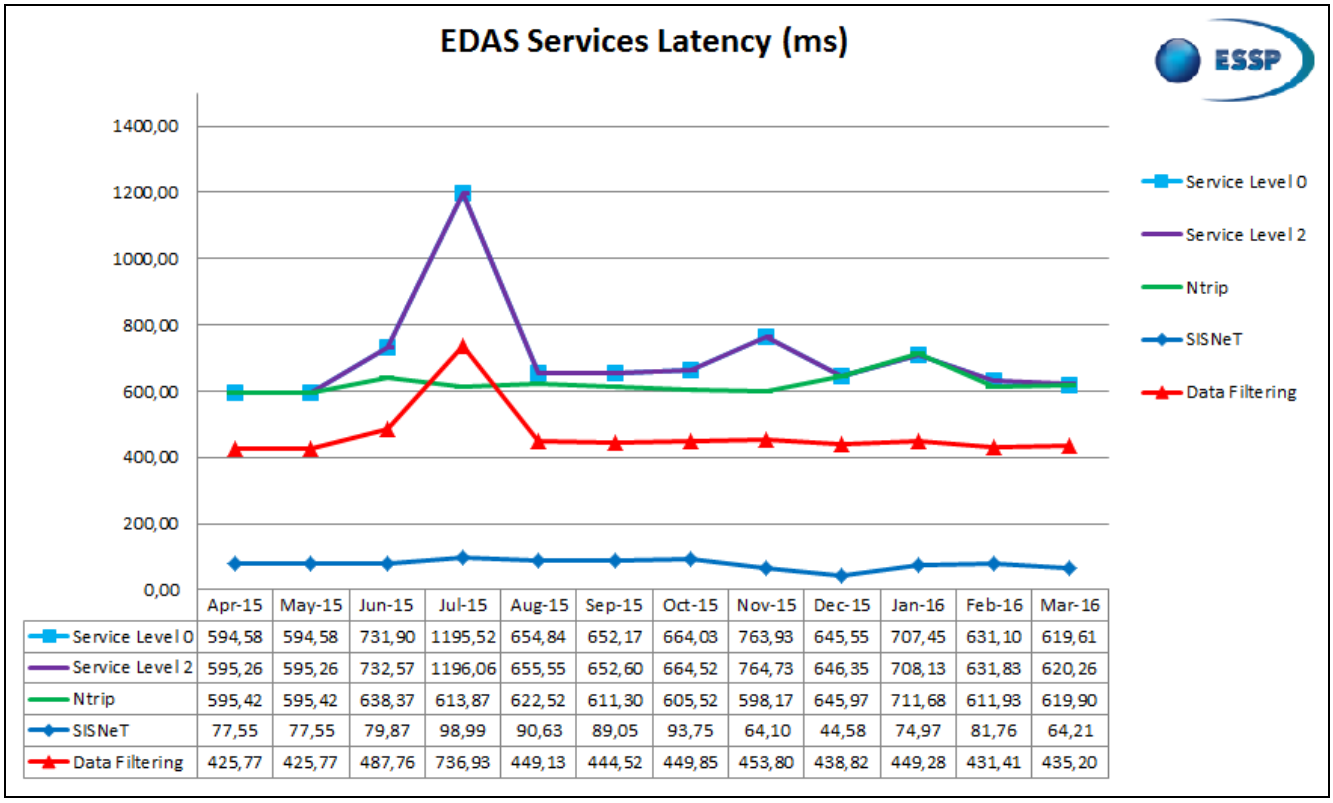
	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16
Service Level 0	99,88%	99,81%	99,79%	99,99%	99,98%	100,00%	99,46%	99,92%	99,97%	100,00%	100,00%	99,83%
Service Level 2	99,88%	99,82%	99,79%	99,99%	99,98%	100,00%	99,47%	99,92%	99,97%	100,00%	100,00%	99,83%
Ntrip	99,88%	99,80%	99,76%	98,07%	99,98%	100,00%	99,48%	99,73%	99,55%	99,99%	100,00%	99,71%
SISNeT GEO 1	99,73%	99,62%	99,48%	97,95%	99,95%	99,98%	99,32%	99,60%	99,50%	99,93%	99,79%	99,79%
SISNeT GEO 2	99,69%	99,70%	99,56%	97,81%	99,98%	99,99%	99,45%	99,88%	99,92%	99,90%	99,94%	99,83%
Data Filtering	99,88%	99,81%	99,78%	97,68%	99,98%	100,00%	99,47%	99,83%	99,96%	99,99%	100,00%	99,84%
FTP	100,00%	100,00%	100,00%	97,69%	100,00%	100,00%	100,00%	99,90%	100,00%	100,00%	100,00%	99,80%

Table 15: EDAS Services Availability (April 2015-March 2016)

As shown above, the EDAS availability performance has typically been above 99.5% for all services and consistently above the targets (98% to 98.5% depending on the service) during the entire period, with the exception of July 2015.

The reduced availability of EDAS Ntrip, SISNeT, Data Filtering and FTP services identified in July 2015 was caused by a failure on 25th July. Corrective actions were taken afterwards to prevent its reoccurrence.

The latency during the last yearly period for the real-time services (not applicable for the FTP) is shown below, computed as the average of the 95th percentile of latencies monitored for each 5-minute period during the month.



	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16
Service Level 0	594,58	594,58	731,90	1195,52	654,84	652,17	664,03	763,93	645,55	707,45	631,10	619,61
Service Level 2	595,26	595,26	732,57	1196,06	655,55	652,60	664,52	764,73	646,35	708,13	631,83	620,26
Ntrip	595,42	595,42	638,37	613,87	622,52	611,30	605,52	598,17	645,97	711,68	611,93	619,90
SISNeT	77,55	77,55	79,87	98,99	90,63	89,05	93,75	64,10	44,58	74,97	81,76	64,21
Data Filtering	425,77	425,77	487,76	736,93	449,13	444,52	449,85	453,80	438,82	449,28	431,41	435,20

Figure 40: EDAS Services Latency (April 2015-March 2016)

As shown above, the EDAS service latency has been consistently below the target delays for all the services throughout the entire reporting period. Moreover, except for the specific case of the EDAS Service Level 0 and Service Level 2 in July 2015, measured delays have been below the 1-second threshold consistently.

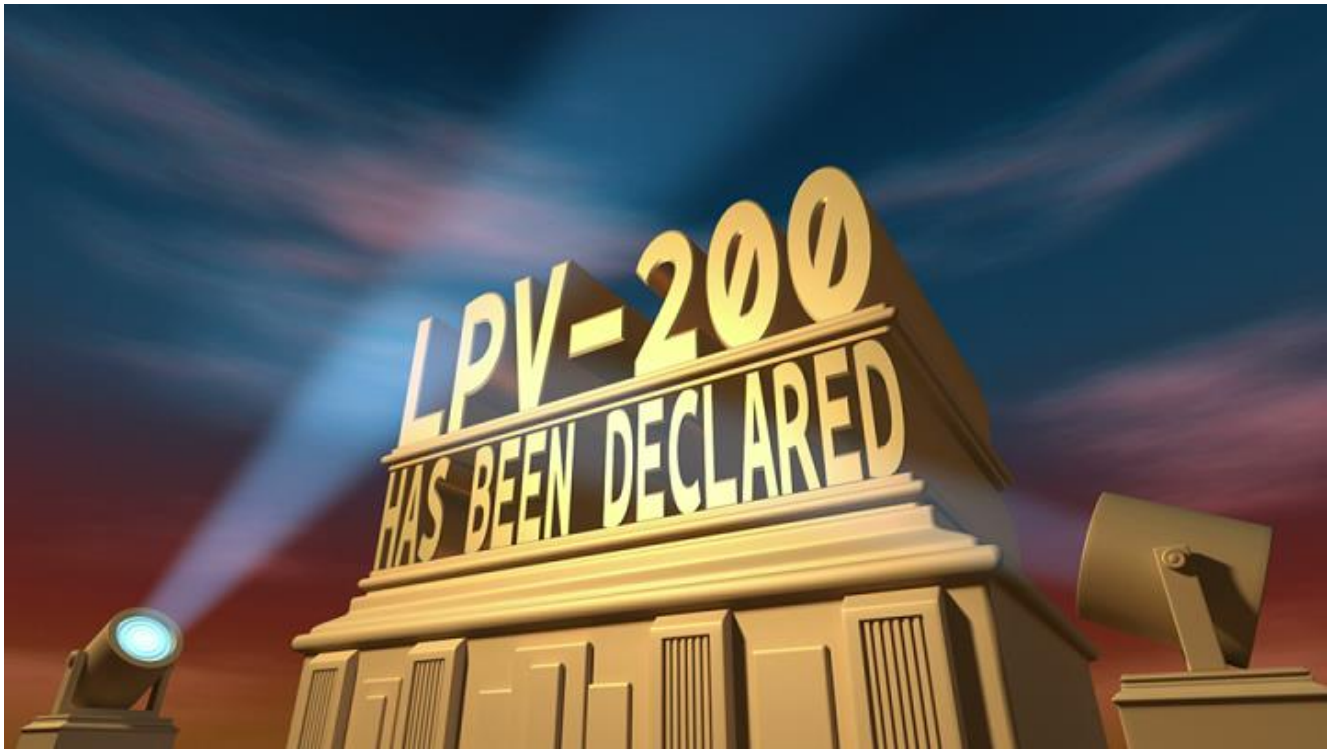
Data servers

4 EGNOS SERVICES PROVISION

4.1 SoL Aviation Service Status

One of the key EGNOS Programme milestones has been the declaration of the new EGNOS SoL service level named "LPV-200". The EGNOS LPV-200 (Localizer Performance with Vertical guidance) service level enables aircraft approaches that are operationally equivalent to ILS CAT I: providing lateral and angular vertical guidance without the need for visual contact with the ground until a Decision Height (DH) of down to only 200 ft. above the runway. EGNOS LPV-200 based approaches guarantee the advantages provided by an ILS CAT I approach with the airspace design flexibility of a PBN approach.

The LPV-200 Service Level Declaration was made officially during the EGNOS Service Provision Workshop in Copenhagen (29th – 30th September 2015). The SoL Service Definition Document (SDD 3.0) including LPV-200 service level was published by EC/GSA on 29th September 2015.



LPV-200 Service Level Declaration (EGNOS Service Provision Workshop 2015)

4.1.1 EGNOS Working Agreement (EWA) Status

The EGNOS Working Agreement (EWA) lays the operational and legal foundations formalising the working procedures and required interfaces between ESSP and the SES Certified Air Navigation Service Provider (ANSP) willing to use the EGNOS Safety-of-Life Service as a navigation aid. The Agreement is the necessary step before the publication of SBAS-based operations.

ESSP continued its proactive dissemination and awareness campaign related to the EWA, presenting the EWA proposed approach, as consolidated at the European level, and providing all required support to the interested ANSPs upon request.

Many ANSPs (at the European and non-EU level) have shown interest in either discussing or being informed about the EWA, which is identified as a key driver with regards to EGNOS implementation in civil aviation.

ESSP has also provided support to the European Commission (EC) to define the process for the establishment of an EWA for EGNOS SoL use within non-EU States (MEDA region).

Beyond the SES Regulation and, therefore, beyond the defined EWA framework, ESSP has provided support in finding the optimal solution for the implementation of EGNOS-based procedures by Helicopter Operators and non-SES-certified Aerodrome Operators (for the implementation of IAPs at non-instrument RWYs). This work is still in progress during 2016.

During the reporting period, 9 new EWAs were signed, for a total of 40 EWAs in place:

EGNOS Working Agreement (EWA)	Signature Date	Country
Belgocontrol	13/07/2015	Belgium BE
Royal Netherlands Air Force (RNLAF)	26/06/2015	Netherlands NL
Biggin Hill Airport Ltd	24/07/2015	United Kingdom UK
Royal Danish Air Force (RDAF)	21/08/2015	Denmark DK
Hungarocontrol	03/09/2015	Hungary HU
Saint Mary’s Airport	21/08/2015	United Kingdom UK
Irish Aviation Authority (IAA Operations Directorate)	13/11/2015	Ireland IE
Airways Aero Association Ltd	01/12/2015	United Kingdom UK
Agusta Westland Ltd	30/12/2015	United Kingdom UK

Table 16: EWAs signed during April 2015 – March 2016 period

4.1.2 EGNOS Procedures Implementation

The number of EGNOS-based LPV approach procedures is continuously growing since the EGNOS SoL declaration in March 2011. In fact, it is expected that, by the end of 2016, the total number of operational LPVs deployed in Europe will be over 350, serving more than 250 European destinations.

The full list of airports having at least one EGNOS-based approach procedure, including the type and number of procedures available per airport, can be found on the EGNOS User Support website (https://egnos-user-support.essp-sas.eu/). The aforementioned list is regularly updated by ESSP. Moreover, a summary of the airports subscribed and procedures published in each country is detailed in the following figure:

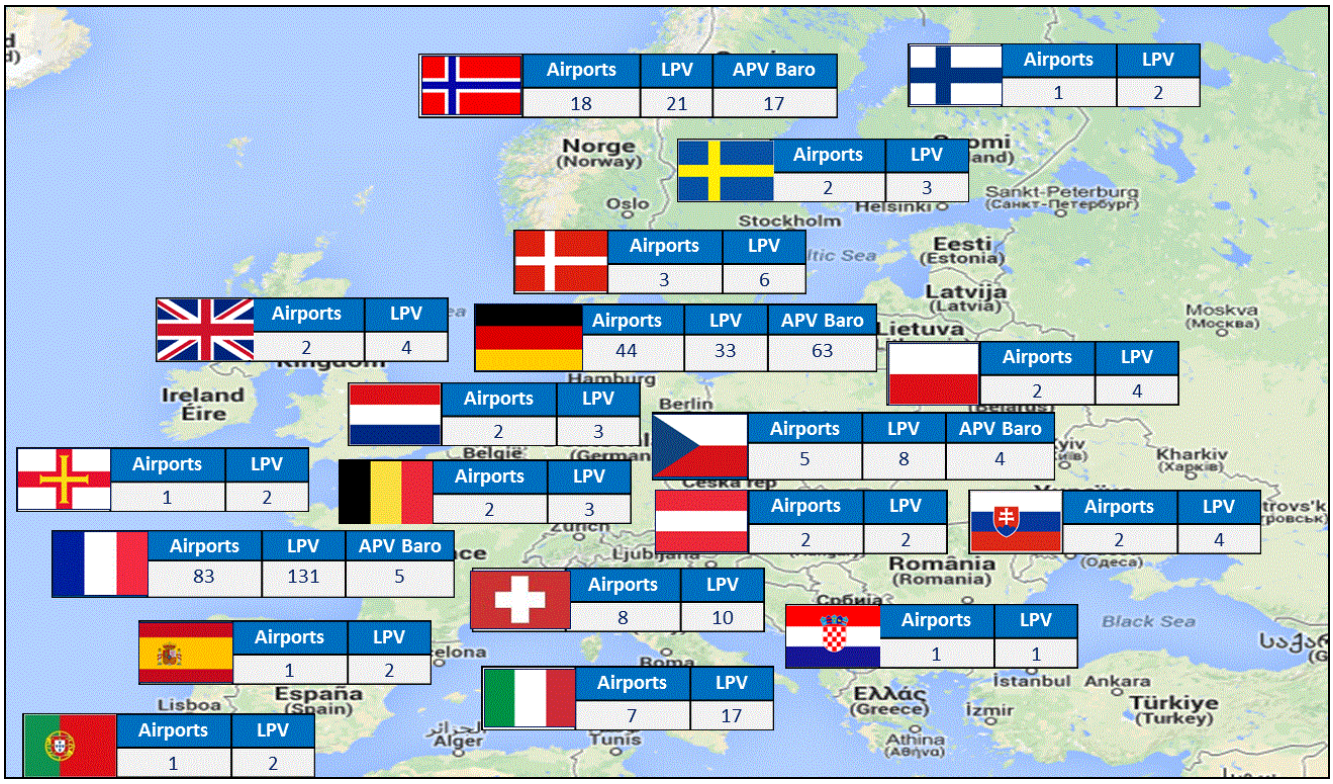


Figure 41: Airports subscribed and procedures published in each country (end of March 2016)

The evolution of the number of published APV SBAS (LPV) procedures is shown below.

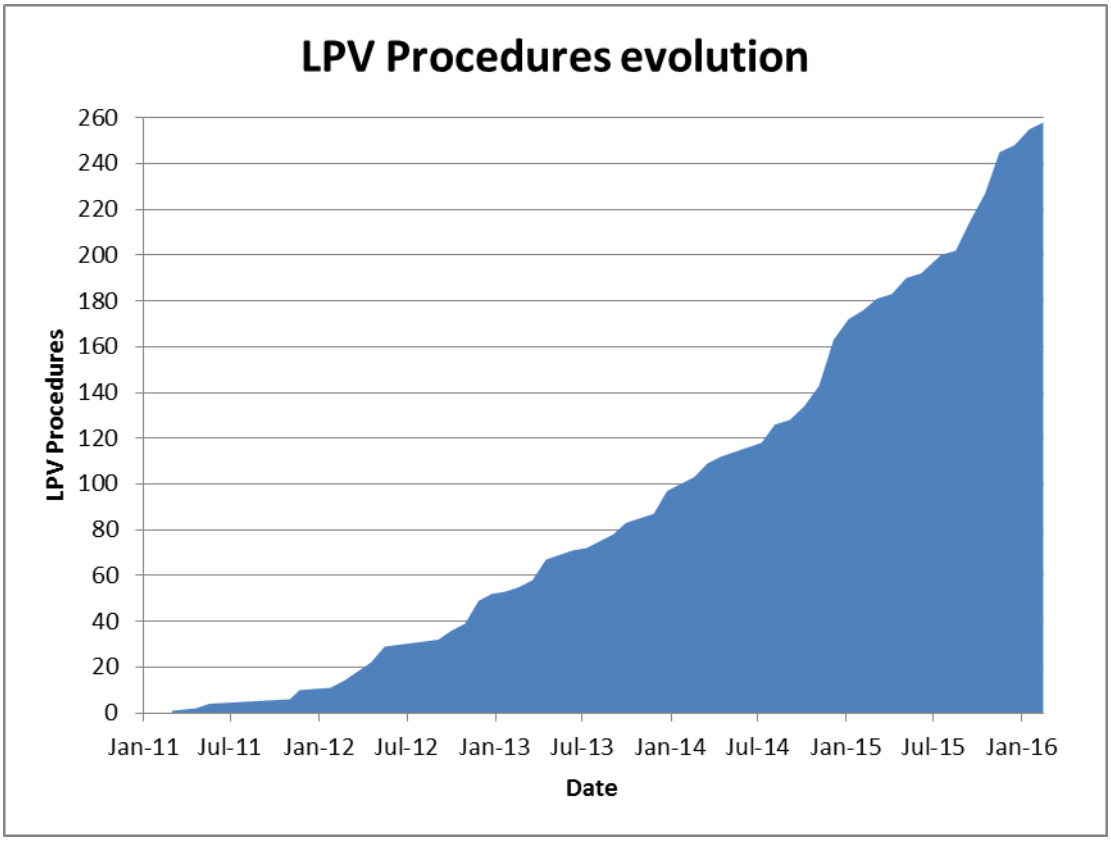


Figure 42: EGNOS-based procedures – publication status as of 31/03/2016

In summary, at the end of the reporting period (31st March 2016), ESSP was providing EGNOS NOTAM proposals to 19 countries, 187 airports and a total of 347 EGNOS-based approach procedures (258 LPV procedures, 89 APV Baro –EGNOS enabled- procedures).

4.1.3 NOTAM Proposals Service Status

The EGNOS NOTAM proposals provision is a key enabler for the publication of RNP approaches down to LPV minima in Europe, as it provides the different AIS (Aeronautical Information Service) the information required to establish a NOTAM service covering this type of procedures, in line with the ICAO standards.

Since ESSP started providing EGNOS NOTAM Proposals for Pau Airport in France (17th March 2011), the EGNOS NOTAM Proposals Provision has grown both in terms of countries subscribed (following the signature of an EGNOS Working Agreement between the ESSP and the corresponding ANSP) and operational airports. By end of March 2016 (AIRAC cycle 1604 – 31st March -), 40 ANSPs were subscribed to the EGNOS NOTAM Proposals Provision (see section 4.1.1).

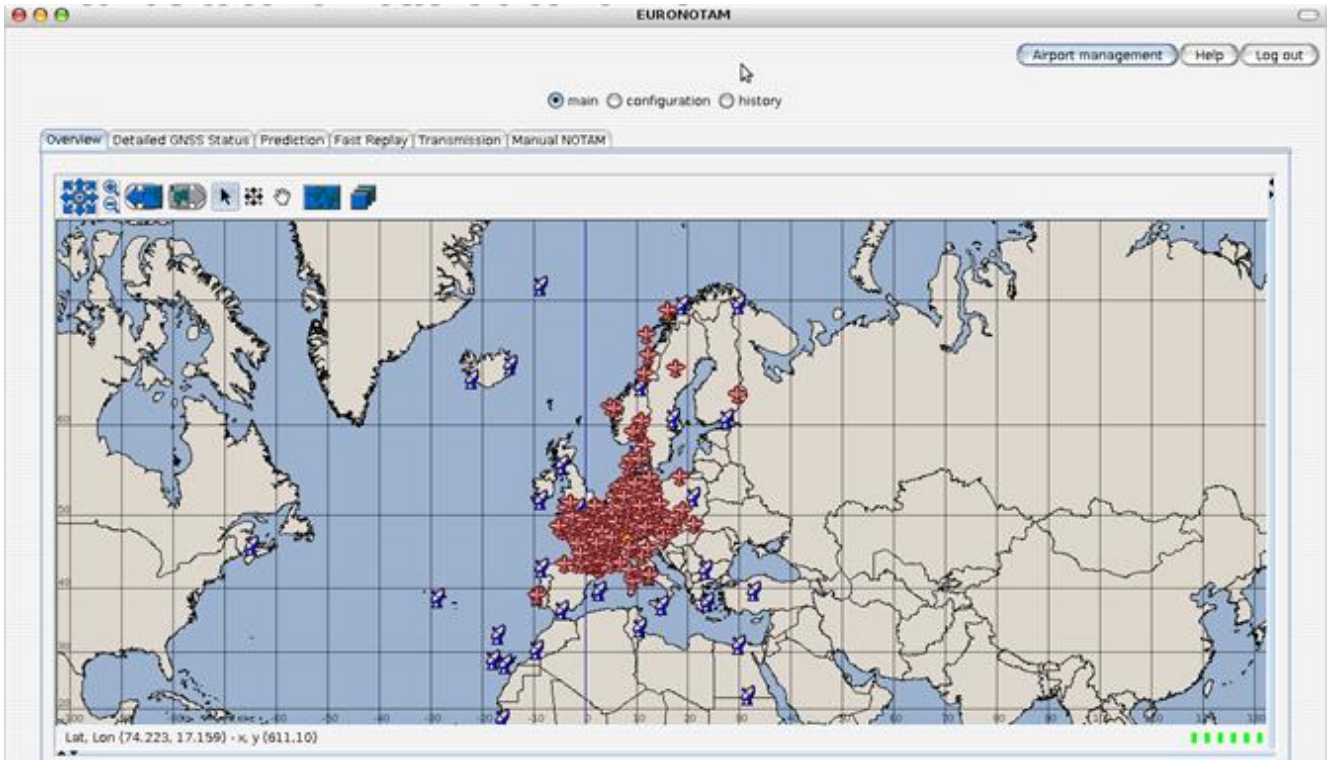
The EURONOTAM tool is responsible for the EGNOS NOTAM Proposal generation considering GPS and EGNOS GEO satellites, and EGNOS stations (RIMS) outages. The service volume implemented in the tool propagates the orbits of the satellites based on the GPS almanacs, computing the protection levels for each airport. Then, the prediction module assesses the level of service available at each

aerodrome and if an unavailability of the EGNOS service is predicted, the EURONOTAM tool generates airport-specific EGNOS NOTAM proposals in ICAO format. These NOTAM proposals are then delivered to the concerned NOF through the AFTN network, either directly or via EAD (European Aeronautical Database).

Since 1st January 2014, ESSP is providing the EGNOS NOTAM Proposals with the following targets as regards notification timeliness:

- GNSS scheduled events notified a minimum of 72 hours in advance.
- GNSS (EGNOS and GPS) unscheduled events notified within 2 hours (7D/H24).

As a result, the current service level is in line with the ICAO recommendation for notification of scheduled events (72 hours' notice) although not yet fully in line with the recommendation for unscheduled events (15 minutes delay). However, the actual delays observed in the notification of predicted EGNOS service outages ahead of unscheduled GNSS system events has typically been lower than 30 minutes.



EGNOS NOTAM system interface

4.1.4 Service Definition Documents and Service Notices

Following the deployment of the ESR 2.4.1M, a new version of the SoL SDD (v3.0) was published on 29th September 2015 when the LPV-200 service level was officially declared available to users during the EGNOS Service Provision Workshop held in Copenhagen. The main changes of this new version of the SoL SDD were:

- Introduction of the LPV-200 service level (Approach operations based on SBAS down to a Decision Height not lower than 200 ft) information and commitment maps.
- EGNOS Space Segment updated as per EGNOS Service.
- New NPA continuity map.
- Update of Appendix D with the information of EGNOS Service Notice #13.

Linked to the entry in operation of ESR 241M, a new version of the SoL SDD is being prepared to provide users with updated information on the EGNOS Services performance. This new SoL SDD will show:

- NPA coverage extension to fully ENI with 99.9% availability.
- APV-I coverage extension in the south of the Service Area mainly improving the coverage in the southwest, such as Portugal and Spain. In addition to this continuity level 10-4 is extended to most of EU landmass areas.
- LPV-200 coverage extension is foreseen in line with the APV-I coverage trend.

ESSP generates Service Notices whenever there is any complementary information to be provided to users that could affect any SDD content. Therefore, an EGNOS Service Notice is a temporal amendment to the applicable version of the EGNOS Service Definition Documents.

As part of the continuous improvement to the EGNOS service provision, and in order to provide full visibility and transparency on EGNOS service status and evolution, a new classification of the EGNOS Service Notices based on their corresponding status was defined in June 2015. The new categories of the Service Notices are defined as follows:

- IN FORCE: The Service Notice is currently in force. That means the information presented in the Service Notice is relevant and valid. Therefore, the Service Notice shall be used as a complement to the corresponding in-force SDD.
- SUPERSEDED: The information in the Service Notice is already included in the corresponding in-force SDD. So, although the information of the Service Notice is still valid, the Service Notice itself does not complement the in-force SDD.
- EXPIRED: The information in the Service Notice is no longer valid. That means the information presented in the Service Notice is currently lapsed or obsolete and, consequently, the Service Notice shall no longer be used.

During the period reported here, ESSP published/updated 3 Service Notices (#13 to #15):

- Service Notice #13 "Upgrade of EGNOS performances status" (v1.0) provided an update on the status of the EGNOS APV-I (Availability and Continuity) and Open Service (OS) performances after the improvement observed from March 2015 to June 2015 with respect to the periods when the degradations reported in EGNOS Service Notices #10 and #12 were detected. Therefore, SN#10 and SN#12 were replaced by this SN and their statuses were changed from "In Force" to "Expired". SN#13 was published on 29th June 2015.
- Service Notice #14 "EGNOS System Release 2.4.1.M entry in operation" (v1.0) informed of the entry into service of EGNOS System Release (ESR) v2.4.1M. During the night of 29th-30th June 2015, the entry into operation of ESR v2.4.1M was initiated when the first GEO (PRN 120) began SiS broadcasting and was completed with the SiS broadcasting by the second GEO (PRN 126) on 9th July 2015. SN#14 was published on 29th June 2015.
- Service Notice #15 "EGNOS Space Segment Update" (v1.1) provided an update on the EGNOS Test Platform Space segment configuration: New GEO ASTRA-5B (PRN 123) included in the Platform and INMARSAT 4F2 EMEA (PRN126) reaching its final orbital slot. SN#15 was published on 21st December 2015.

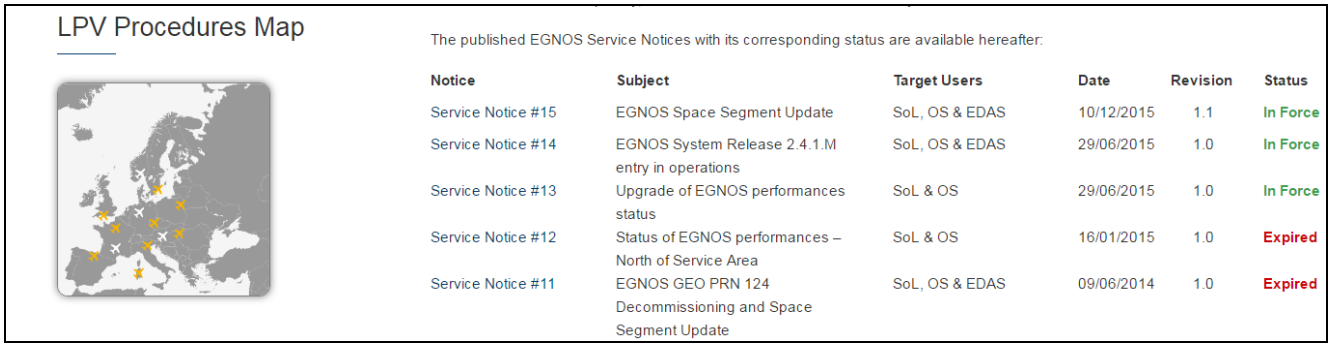


Figure 43: Service Notices section at EGNOS User support website

4.2 Open Service Status

The EGNOS Open Service (OS) was declared available by the European Commission to European citizens on 1st October 2009, officially enabling EGNOS capable devices available throughout Europe benefit from this service.

The conditions for access to the service and the minimum performance achievable by OS-enabled equipment are described in the EGNOS Open Service SDD v2.2 published on 12th February 2015 (https://egnos-user-support.essp-sas.eu).

ESSP is actively supporting Open Service user communities via the EGNOS Helpdesk and EGNOS User Support website.

The following figure shows the relative number of OS-related queries versus the total number of queries arriving at the EGNOS helpdesk over the reporting period.

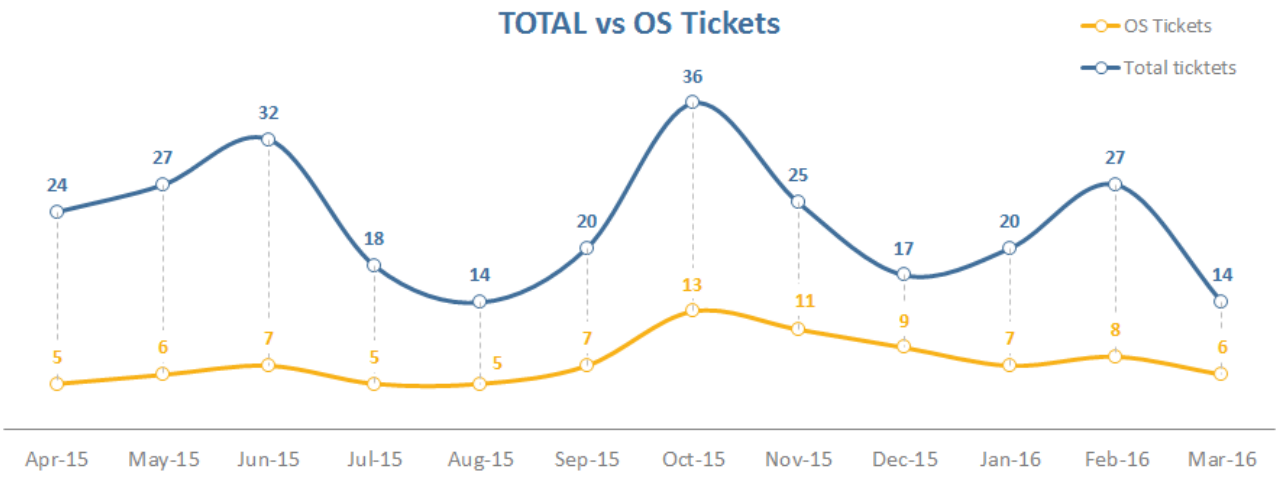


Figure 44: Total number of queries and OS-related tickets received by the Helpdesk

According to EGNOS Helpdesk requests[14], the Open Service user distribution by area of activity can be shown in the following figure:

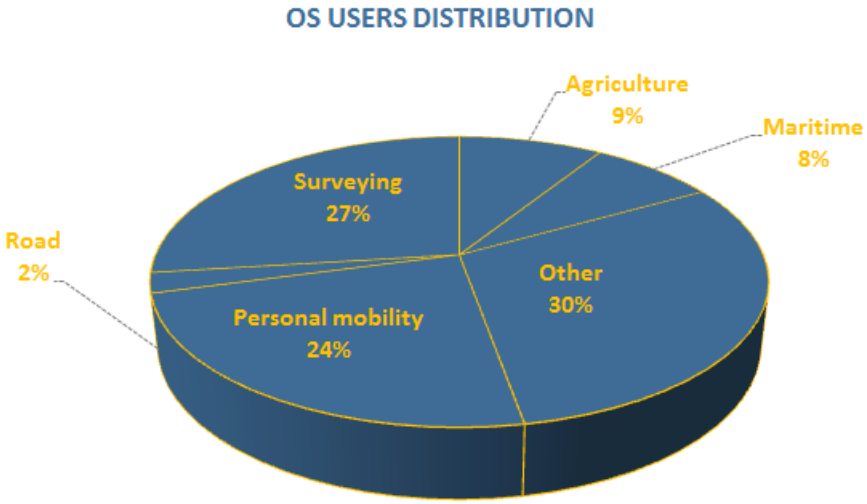


Figure 45: Open Service user distribution according to EGNOS Helpdesk information

ESSP is also in close contact with OS users and stakeholders via different GNSS cross-platform or specific events and working groups. In particular:

- ESSP is also contributing to the adoption of EGNOS OS in different application domains via the different actions included in the EGNOS Multimodal Adoption (EMA) Action Plan (section 4.7).
- ESSP is also attending and contributing to different multimodal events. See section 4.8.2 for more details.
- ESSP is organising the EGNOS Service Provision Workshop (section 4.8.1) as the key EGNOS event bringing together users and stakeholders from the different EGNOS Services (including OS) and from different application domains.
- ESSP is also in close contact with OS receiver manufacturers
- ESSP is receiving all valuable feedback from OS user communities through the corresponding Customer/User Satisfaction process as described in section 4.4.

[14] Since Open Service users do not need to register, ESSP is unable to know the exact distribution of these users with respect to their area of activity, as is the case with EDAS users. As such, an estimation based on EGNOS Helpdesk requests has been computed, taking into account that this approximation gives a partial view of the Open Service usage distribution.

4.3 EDAS Service Status

4.3.1 EDAS Services

The following table summarises the types of data that can be retrieved through the different EDAS services. For further details on the formats and protocols, users are kindly advised to check the EDAS Service Definition Document –EDAS SDD- (https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/egnos-sdds).

Mode	EDAS Service	Type of Data			
		Observation &navigation	EGNOS messages	RTK corrections	DGNSS corrections
Real Time	Service Level 0&2	✓	✓		
	Data Filtering 0&2	✓	✓		
	SISNET		✓		
	NTRIP	✓		✓	✓
Archive	FTP	✓	✓		

Table 17: EDAS data sheet

The EGNOS data received from the EDAS Services can be used for the development of applications based on GNSS streams or for the provision of value-added positioning services based on EDAS. EDAS services are currently used for tracking hazardous goods, high-precision positioning, engineering activities in the EGNOS programme, provision of positioning services, monitoring GNSS performance, fleet management, atmospheric research and R&D activities.

Through EDAS, GNSS users with Internet access can access EGNOS, DGPS or RTK corrections, regardless of the GEO visibility conditions and improve accuracy with respect to GPS only (see table below). In addition, EDAS Services also feed commercial services that provide value-added positioning services locally or to a range of registered users for a specific domain.

The positioning techniques supported by EDAS are the following, enabling higher accuracy (from sub-metre to centimetre accuracy) than the GPS standalone solution:

- EGNOS augmented position: EGNOS corrections can be applied in real time using the EDAS SISNET Service through the Internet. This option is especially relevant in areas when the lay of the land obstructs the visibility of EGNOS Geostationary satellites.
- Differential GNSS solution: DGNSS technique can be used in real time through the EDAS NTRIP Service, applying DGNSS corrections from a close EGNOS station to improve the GPS standalone solution (up to 300-500 km, depending on the target accuracy) and even enabling sub-metre accuracy for short to medium baselines.
- RTK position: using the measurements (code and phase) and station information provided by the EDAS NTRIP service for all EGNOS stations, EDAS can be used to support RTK positioning when located in the vicinity of an EGNOS station (up to 40-50 km typically) enabling users to obtain centimetre-level accuracies.

The following figure shows the horizontal error at Berlin RIMS (BRN-A) station using GPS standalone with respect to the positioning techniques enabled by EDAS (DGPS, RTK) taking the neighbouring RIMS-B as the reference station.

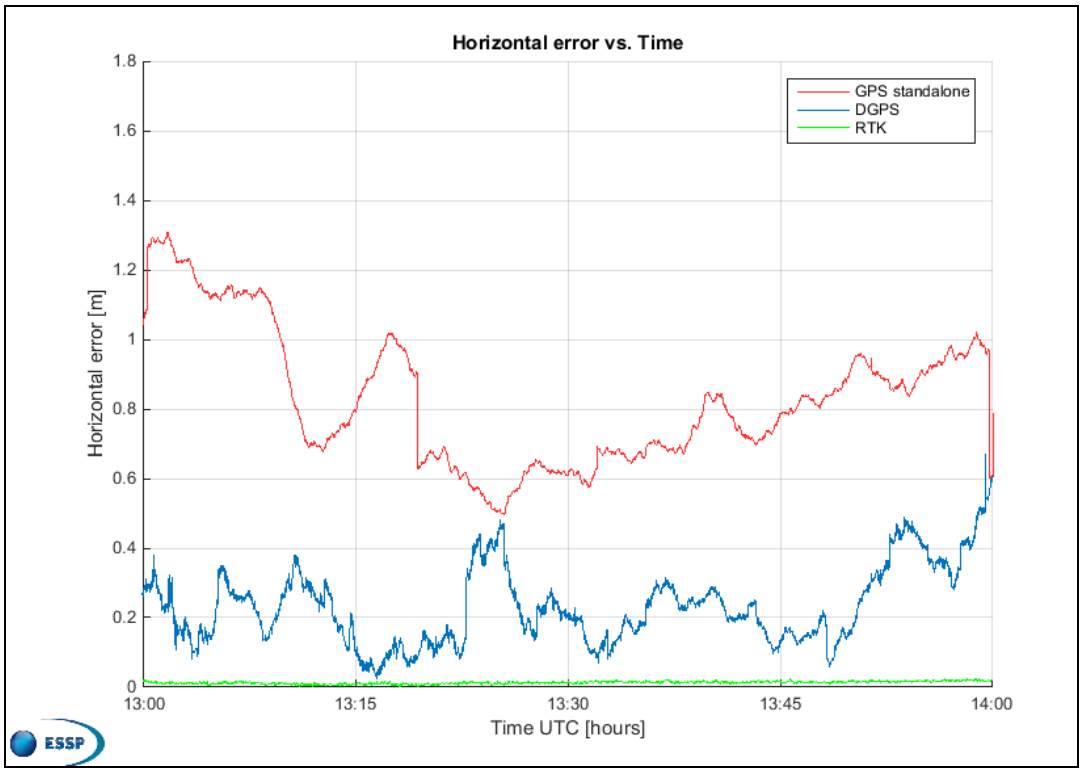


Table 18: EDAS based DGPS and RTK performance.

The performance of all EDAS services in terms of availability and latency is very stable and in line with the EDAS SDD commitments (please refer to the EGNOS User Support Website) or to section 3.6 of this document for an overview of the last yearly period.

In order to request an EDAS account, users must follow the steps detailed below:

1. Visit the EGNOS User Support Website:

   https://egnos-user-support.essp-sas.eu/

2. Complete and submit the EDAS registration form under *EDAS Service → Registration*.

4.3.2 EDAS Usage

Considering the variety of data provided by the different EDAS services and the diverse protocols/formats supported, EDAS can provide a benefit in multiple application domains and for different purposes (from R&D activities to commercial service provision).

The figure below provides an overview of the market segment in which EDAS users are working, according to the information provided by them when registering to the service.

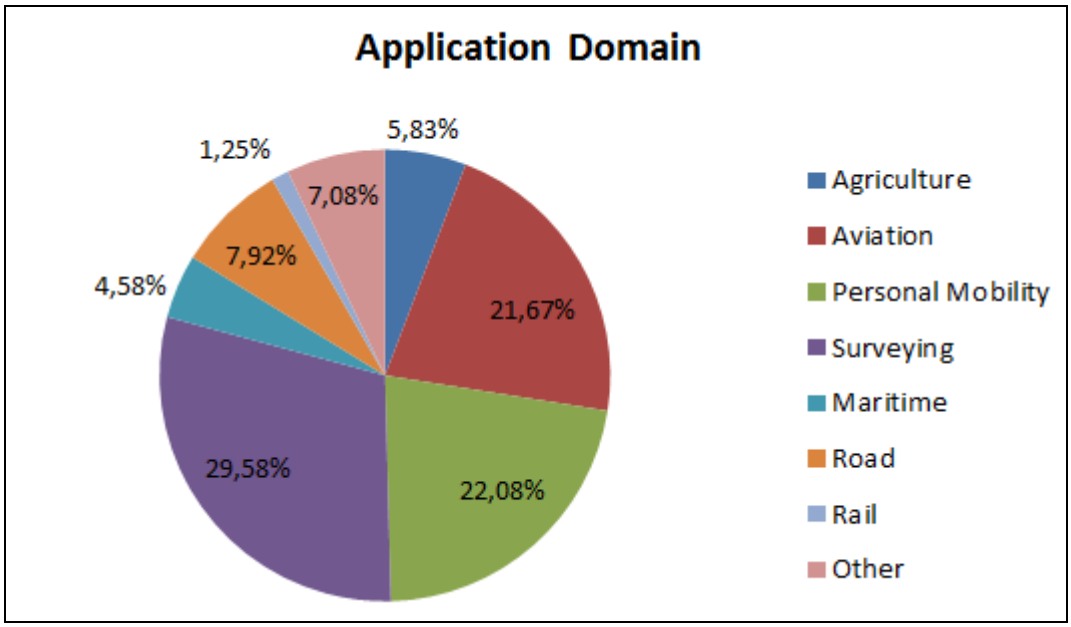


Figure 46: EDAS users and area of activity

In terms of the type of EDAS application/use, five high-level groups are used to classify active EDAS users:

- **Commercial product(s):** Product/tool/application that uses EDAS data as input and that is commercialised by the manufacturer/developer.
- **Commercial service(s):** value-added services that use EDAS data as input and distribute the data locally or to a set of users, usually positioning services that use EDAS to complement the corresponding service infrastructure (data from additional stations, new GNSS products) or to enhance navigation based on the GNSS corrections provided through the EDAS Service.
- **Professional use:** companies using EDAS Services to support their business objectives and for their own interests (efficiency productivity, reliability).
- **EGNOS programme:** activities within the scope of the EGNOS programme (EU funding) for different purposes: EGNOS service provision, EGNOS system maintenance and evolution, etc.
- **Research & Development:** EU research programs (i.e. Horizon 2020, FP7...) or University research/academic activities.

Based on the above criteria, the figure below shows the classification among the EDAS users that were active in March 2016.

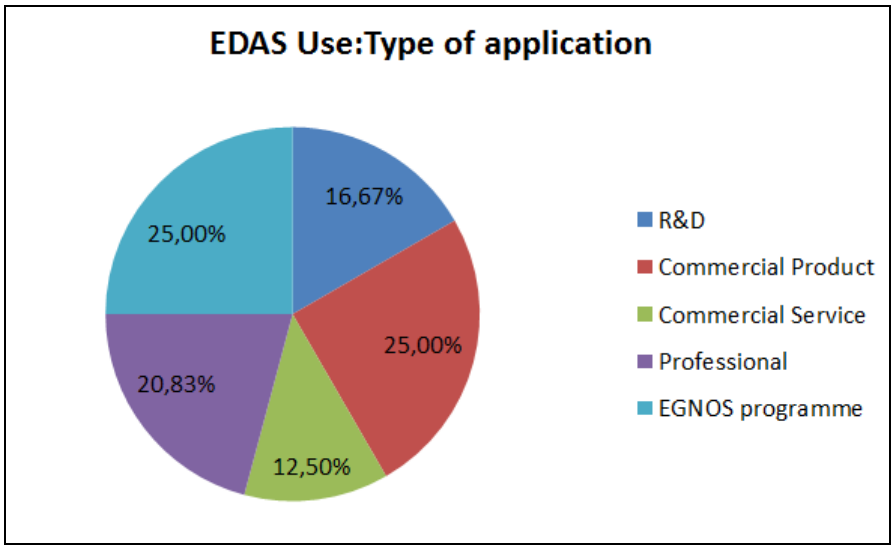


Figure 47: EDAS users and type of use in March 2016

An important measure of the popularity and use of EDAS Services is the weight of the EDAS related requests received at the EGNOS Helpdesk (33% overall during the reporting period). Also, the fact that EDAS users are becoming more expert on the services is reflected in the fact that requests linked to EDAS are becoming highly complex, as seen in the number of iterations (query + reply) that are needed to close the EDAS tickets. As shown below, the weight of EDAS related activities in the context of the EGNOS Helpdesk when measured in terms of iterations with the user is even larger, accounting for roughly 41% of the overall exchanges.

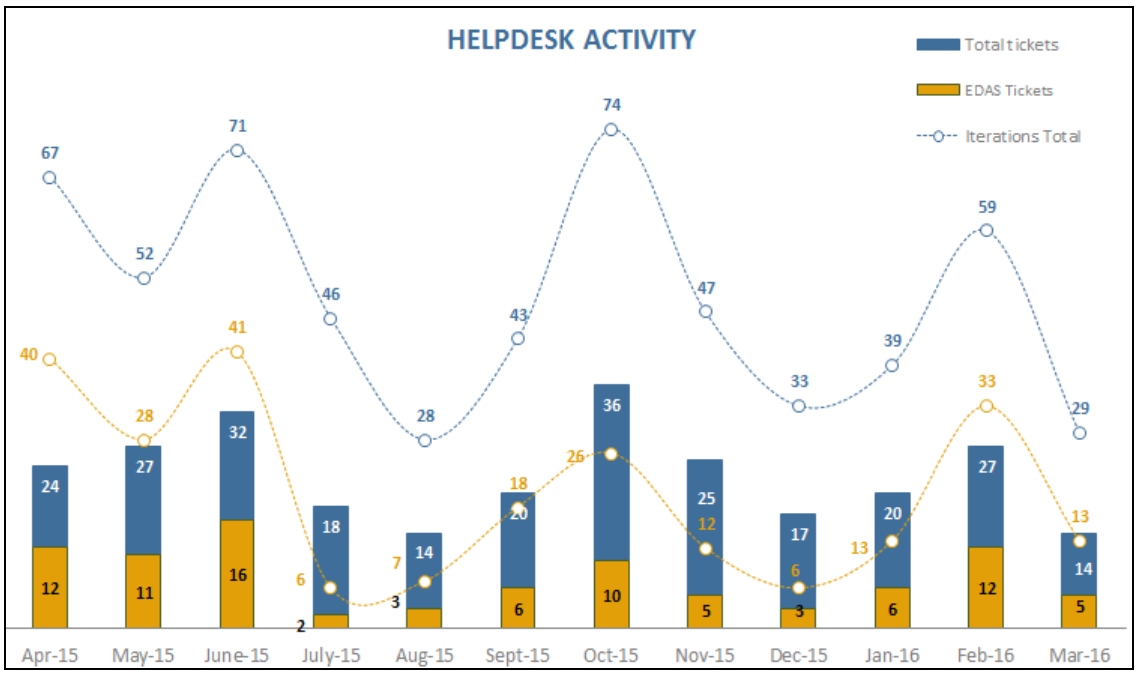


Figure 48: EDAS related tickets in the EGNOS Helpdesk

4.4 User Consultations and Improvements Actions

EGNOS user satisfaction is measured by ESSP as part of the User Satisfaction Process.

Each year an overall EGNOS User Satisfaction Process is jointly performed by the GSA and ESSP on the three EGNOS Services (SoL, OS and EDAS), providing valuable feedback about EGNOS and ESSP performance in order to define areas for improvement and recommendations on EGNOS and ESSP activities as the EGNOS Services Provider.

This process considers the feedback received via different means and interfaces, such as the EGNOS Service Provision Workshop, the EGNOS User Support activities or ESSP participation in multimodal forums, GNSS implementation projects, working groups or relevant events. However, the primary input are the customised satisfaction surveys by service type that are widely distributed to the main users and stakeholders of each EGNOS Service.

Apart from supporting the continuous improvement of ESSP and EGNOS services, this process covers specific regulatory and quality requirements that apply to ESSP:

- As certified Air Navigation Service Provider (ANSP) according to the EC Single European Sky (SES) regulation.
- As certified organisation according to ISO-9001:2008.

The EGNOS User Satisfaction Survey has provided very valuable information and recommendations to continuously improve the EGNOS users' satisfaction.

The EGNOS User Satisfaction Survey was launched in October 2015 to cover the 2015 calendar year. The survey was open from 05/10/2015 to 16/12/2015 using a specific online platform, and 200 answers were received from a total of 6,077 consulted users.

The outputs of this survey were included in EGNOS Bulletin Q1-2016. They will also be included in the ESSP annual report published on the ESSP corporate website (https://www.essp-sas.eu/) and on the EGNOS User Support Website (https://egnos-user-support.essp-sas.eu/).

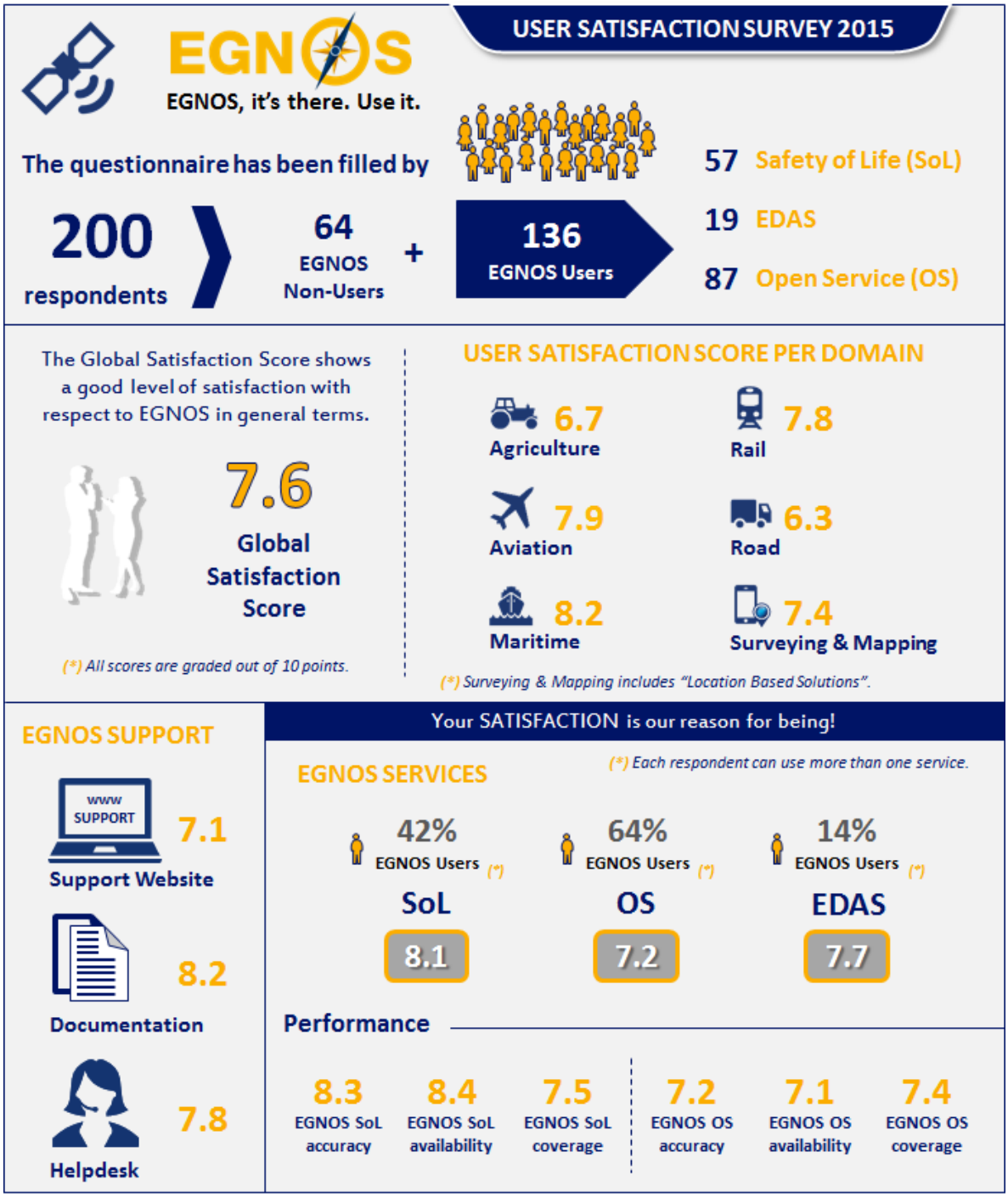


Figure 49: Summary of results from User Satisfaction Survey

4.5 User Support

4.5.1 EGNOS Helpdesk

Between 1st April 2015 and 31st March 2016, the EGNOS Helpdesk operated by the ESSP has processed 274 user requests, which represented an increase of 40% with respect to the previous Yearly reporting period where a total of 195 requests were processed.

The EGNOS Helpdesk is available 24/7 and may be reached by e-mail (egnos-helpdesk@essp-sas.eu) and by telephone (+34 911 236 555). There were 18 requests via phone through the telephone number below.

From the total number of queries received, 8 were catalogued as urgent requests (asking about the current status of the EDAS service or a technical failure of the EGNOS system) and all but one of them were resolved in accordance with the committed response time (1 hour). Standard queries (those considered non-urgent) had a response commitment of 3 working days, and that response time was always respected for the 274 user requests received during the reporting period.

It should be noted that, in general, the questions received through the EGNOS helpdesk followed the same trends shown for last period (see the following figures), with increasing complexity and generally requiring different iterations with the user. On average, the number of queries per month was 22.83 while the average number of iterations per month was around 49, making an average of 2.15 iterations per user query.

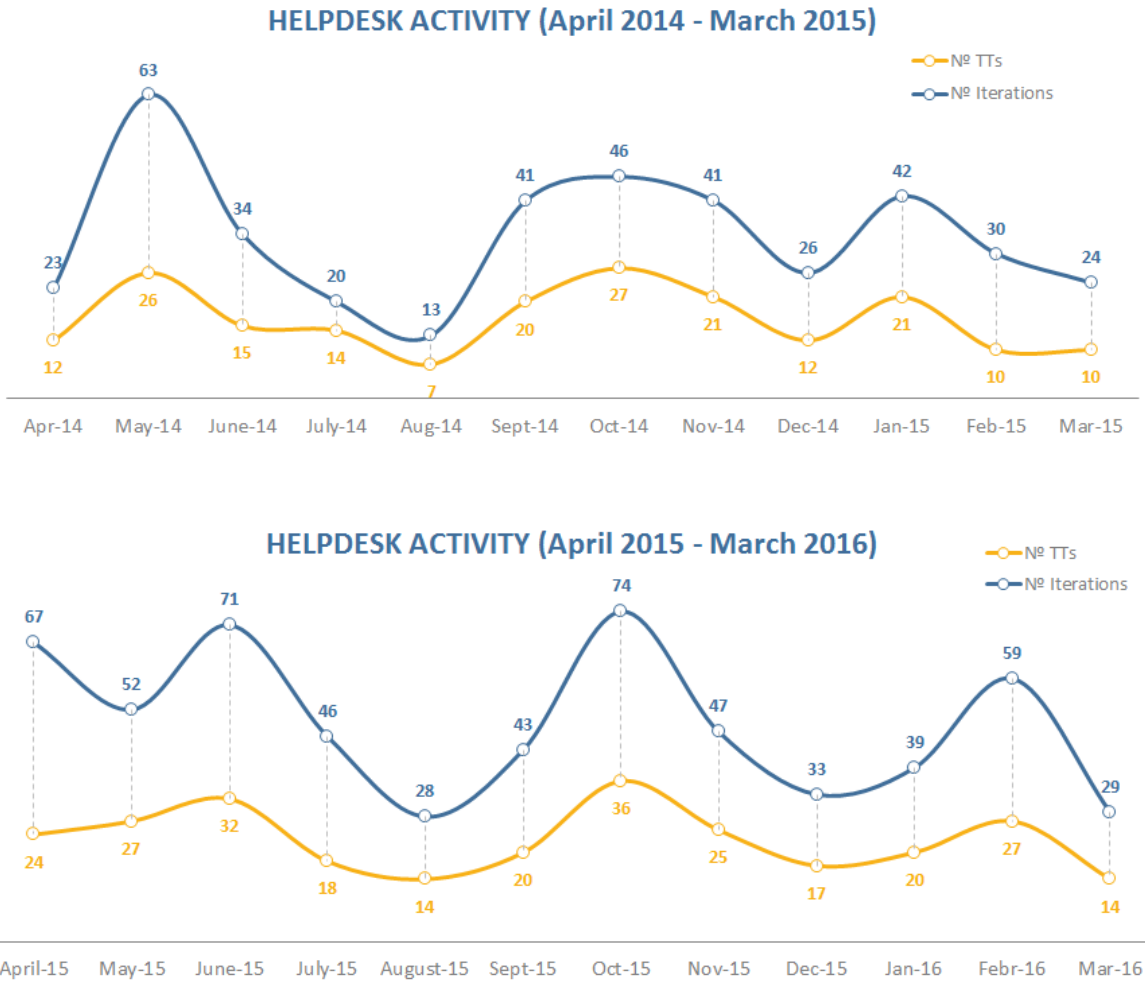


Figure 50: Helpdesk activity evolution

According the following figure, most queries were related to EDAS (EDAS Registration requests represented 20%, EDAS Configuration and EDAS Information requests were 6%). However, there is a huge increase in the requests related to the Documentation and Subscriptions and Unsubscriptions.

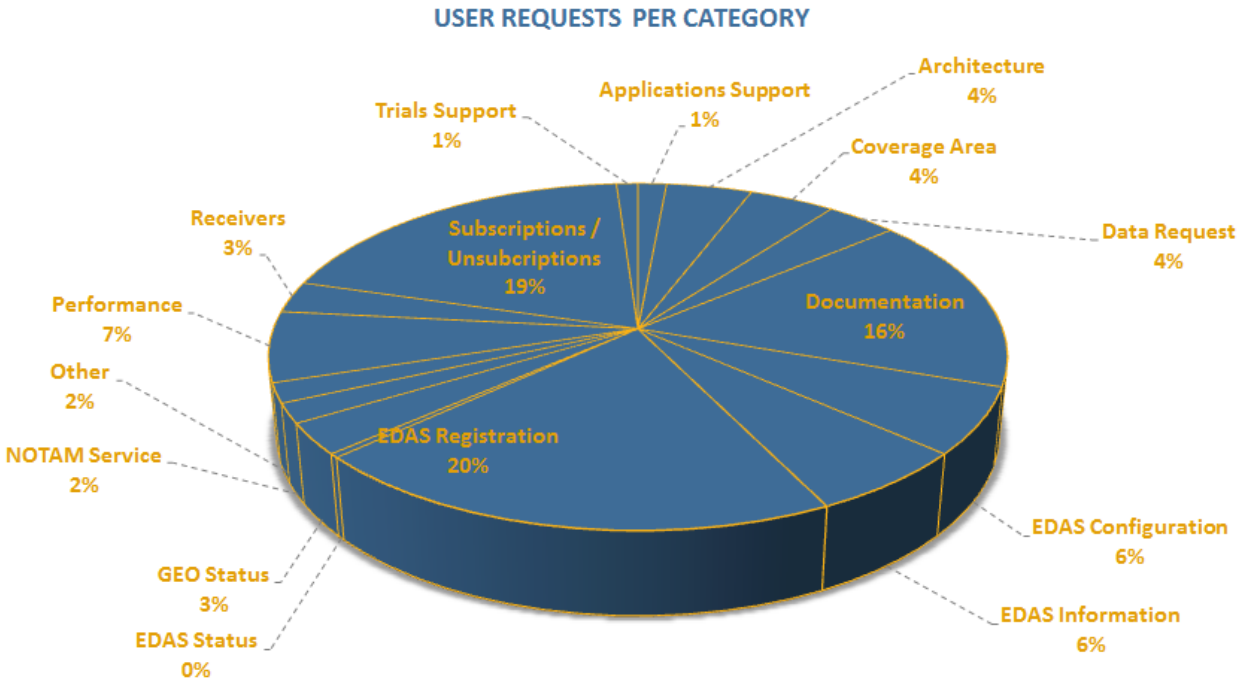


Figure 51: Helpdesk user requests by category

On the other hand, most of the queries received during the reporting period were related to aviation (42%), followed by personal mobility (17%), surveying (14%), agriculture (6%), maritime (4%) and road (3%). Other queries were generic and could not be classified in a specific domain of application.

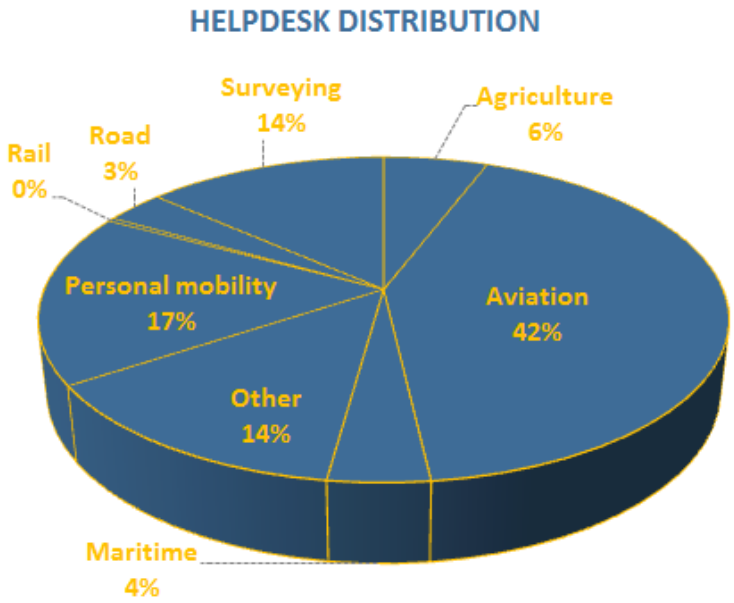


Figure 52: Helpdesk user requests by domain

A similar distribution can be found amongst the EDAS-related queries (including technical questions about configuration, information and registration requests). Open Service queries were mainly from surveying (27%) and personal mobility (24%) users. All SoL queries were aviation-related, as this is the only domain where SoL applications have been developed so far.

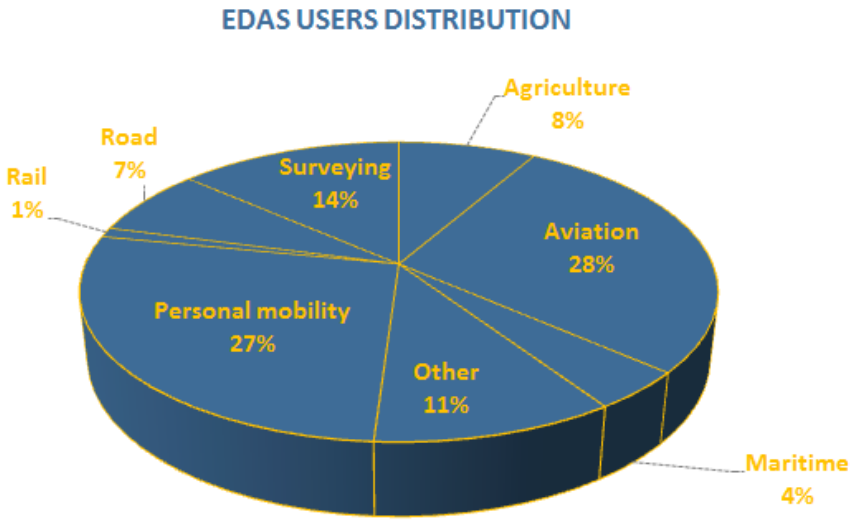


Figure 53: Helpdesk user requests by domain for EDAS

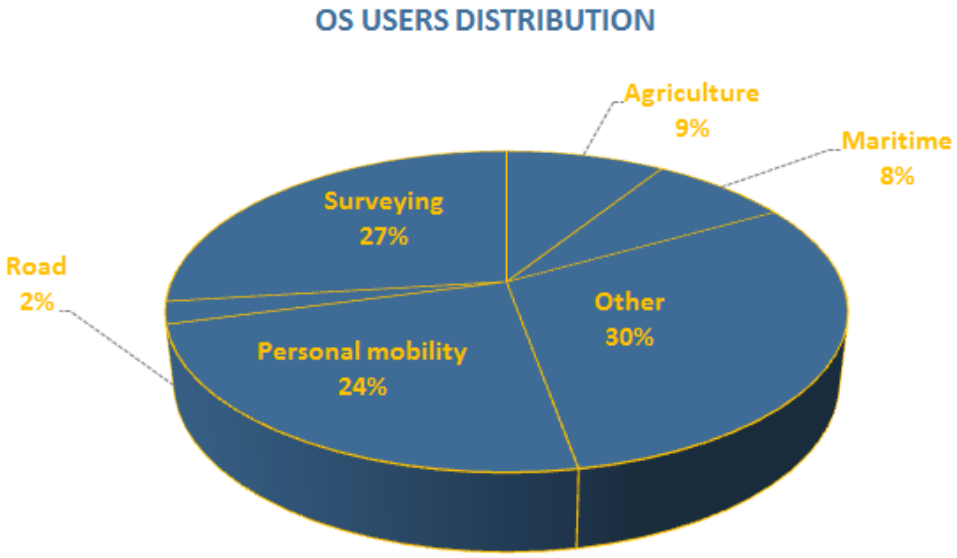
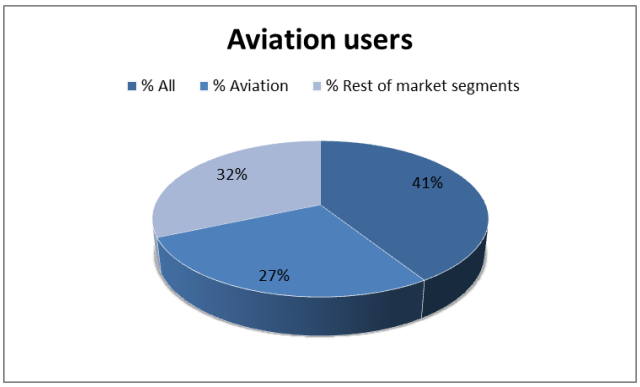
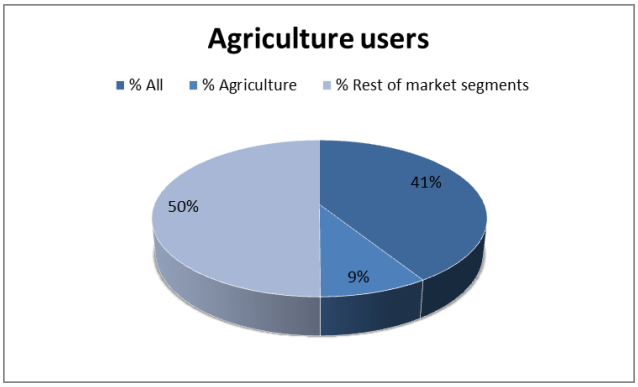


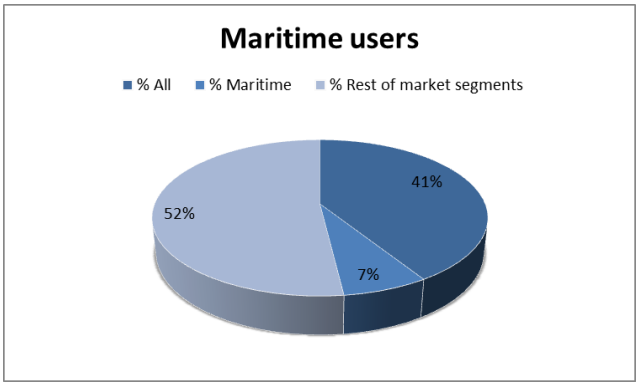
Figure 54: Helpdesk user requests by domain for OS

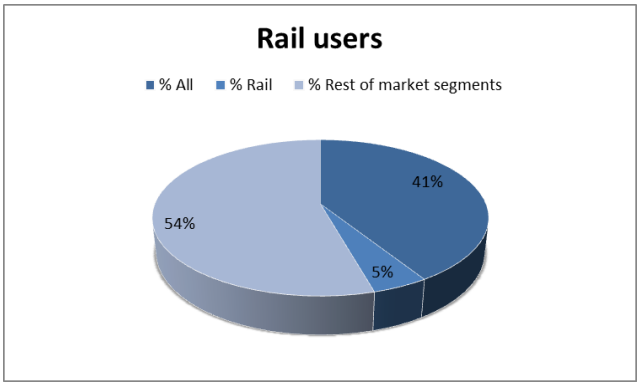
4.5.2 EGNOS User Support Website

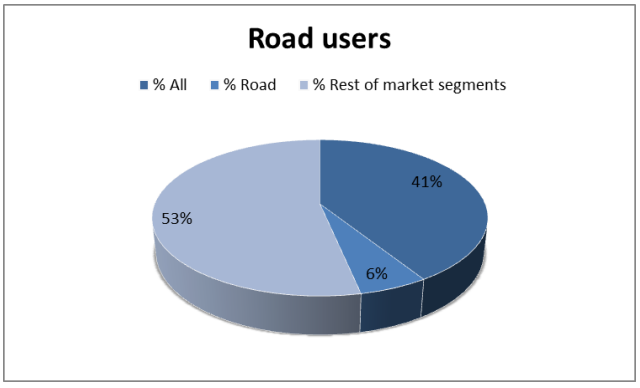
At the end of the reporting period the EGNOS User Support Website had 2222 registered users. There were 655 newly registered users in this period. For the new website the application domains list was extended in the user registration profile and, since the new website was launched, these domains are not exclusive, so many users can be identified in many market segments at the same time. As shown in the following figures, during the reporting period there is a significant percentage of registered users identified in all market segments (41%). Besides that, there is an smaller percentage of users identified with a single domain or a combination of them (but not identified with all the available domains): aviation (27%), agriculture (9%), maritime (7%), rail (5%), road (6%), personal mobility (5%), surveying mapping (7%), Location Based Services (LBS 8%), Intelligent Transportation Systems (ITS 6%) and other market segments (3%).

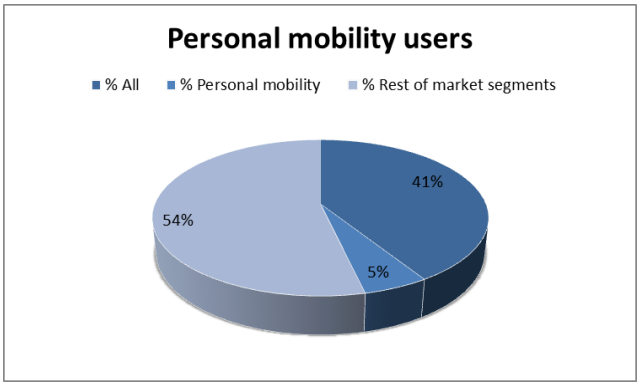












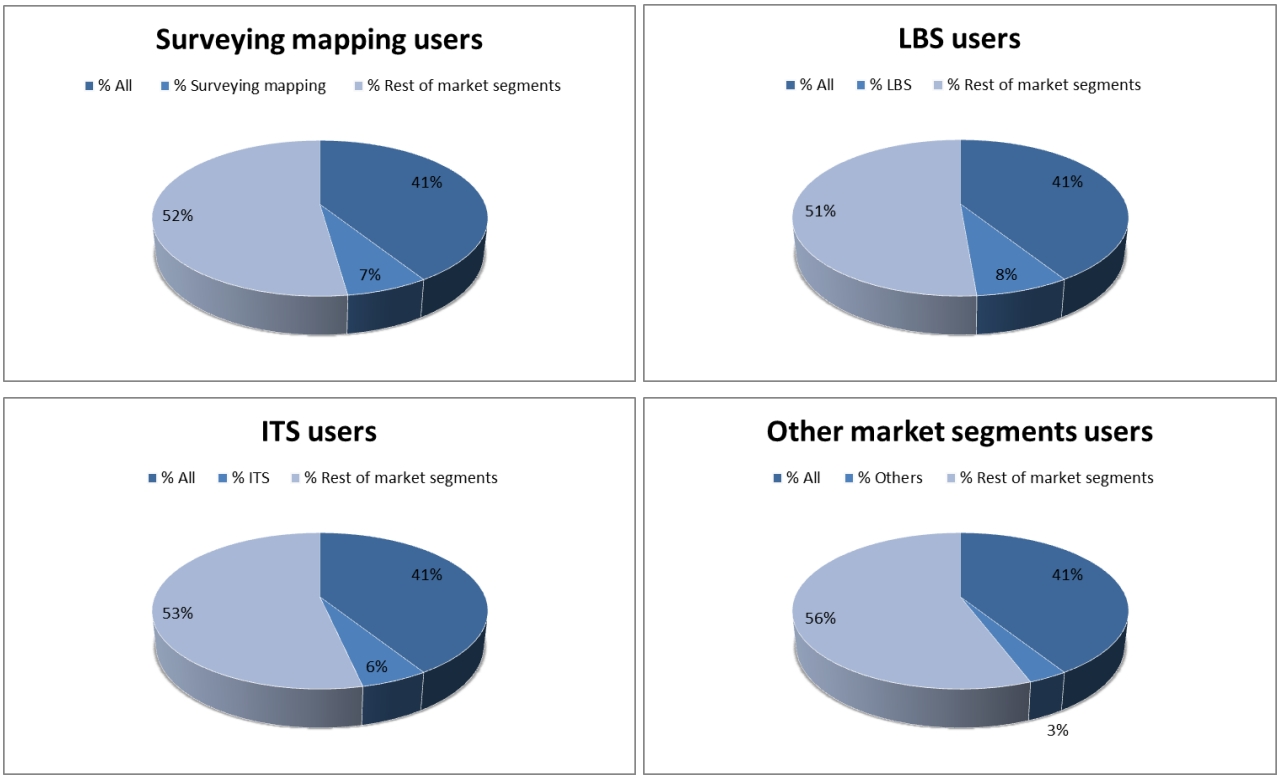


Figure 55: EGNOS User Support Website application domains

4.6 Service Implementation Roadmaps

EGNOS Services' Roadmaps provide a high-level overview of the EGNOS Services current status and their expected evolution in a 3-year timeframe linked to the consecutive EGNOS System Releases' deployments and information/interfaces improvements/changes. These roadmaps are mainly focused on 4 different areas: Service Area / Data Availability, Service Level, Service Robustness and User Interfaces.

The three EGNOS Services Roadmaps were updated twice from April 2015 to March 2016 going from v3.1 (in November 2014), to v3.2 (on 5th June 2015) and finally to v3.3 (on 29th January 2016). The current applicable version is:

i. ESSP-COM-7462 (EGN_OS_ROADMAP) v3.3.

ii. ESSP-COM-7463 (EGN_SOL_ROADMAP) v3.3.

iii. ESSP-COM-7464 (EDAS_SERV_ROADMAP) v3.3.

Improvements to the SIR contents were made in these last two versions of the documents mainly by reorganising the information in the figure with the axis of the roadmap and by the addition of a new section (based on the applicable version of the Service Evolution Plan) explaining the trends/lines of actions/high-level goals (for example, areas where the extension of coverage is foreseen, potential deployment of new RIMS, etc.) beyond the three-year timeframe. The Service Evolution Plan agreed between the European Commission and GSA constitutes the baseline for the implementation of the EGNOS Mission and Security evolutions.

4.7 EGNOS Multimodal Adoption Plan 2015

The ultimate goal of the EGNOS Adoption plan is to maximise the use of the EGNOS services across the different European markets or domains, with the leitmotif being "EGNOS has to be used as much as possible and as much as feasible".

This multimodal plan is discussed, designed and agreed upon with the GSA on a yearly basis and it encompasses a large number of different activities with clearly stated objectives, expected outcomes, assumptions, inputs, estimated effort and people responsible.

The tables below provide a breakdown of activities for 2015 and 2016 by domain:

2015	 Aviation	 Maritime	 Rail	 Surveying & Agriculture	Total
	19	25	7	14	**67**
	Transversal actions: 2				

Table 19: Number of EMA actions to be performed during 2015 per domain

2016	 Aviation	 Maritime	 Rail	 Surveying & Agriculture	Total
	18	26	6	22	**73**
	Transversal actions: 1				

Table 20: Number of EMA actions to be performed during 2016 by domain

In the case of aviation, where the market is more mature, the activities revolve around two main axes: the engagement of new ANSPs and airports in the publication of EGNOS-based procedures and the engagement of new operators in equipping, certification and training for their use. These two drivers lead to undertaking different activities such as a precise monitoring of procedures and users, active communication with them, drafting Cost Benefit Analysis or tailored guidance and training material and even analysis of technical and regulatory matters.

In the case of rail and maritime, the activities are mainly focused on gaining a better understanding of the specifics of these domains first, and later to define the best strategy for the EGNOS uptake by these users. For maritime, the use of EGNOS messages to feed DGPS and AIS networks deployed on EU shores and inland waterways is being analysed, both technically and with the support of Cost Benefit Analyses.

Finally, the adoption of EGNOS in surveying and agriculture requires being aware of the current technology trends and user needs; a better understanding of the market and of the different subareas it contains where EGNOS can provide added value. New market niches within agriculture and surveying are being researched, such as cereals, natural environment inventories, archaeological surveys, etc.

4.8 Communication and EGNOS Promotion Activities

Apart from the regular promotion activities, additional communication initiatives are individually taken to encourage the use of EGNOS across different domains.

Two main tools have been used during the 2015-16 period to inform about and promote EGNOS services:

- Quarterly publications of the EGNOS Bulletin as the main mechanism to advertise the latest EGNOS news, service improvements, implementation status, etc., as well as to inform users about performance status and any other matter related to the provision of the service.
- Active participation and attendance at different conferences, workshops and events related to the GNSS world and to some other specific domains where the EGNOS services are being used or could be used in the near future (mainly in the Aviation domain, but also in rail, road, maritime and agriculture).

  ESSP participation at events is being conducted in three different ways:

  - By exhibiting at congresses with an EGNOS stand, supported by ESSP staff;
  - By contacting and meeting with targeted key players at these events;
  - By submitting and presenting papers related to the EGNOS Services; and
  - By supporting other EGNOS stakeholders' stand (i.e. GSA, EC and ESA).

In addition, a portable flight simulator has been purchased and arranged to show the benefits of EGNOS to interested participants at these events. The device, which replicates a Garmin G1000 cockpit (see picture below), enables the user to experience, amongst other things, an actual LPV approach to any published runway under certain weather conditions that would prevent the landing if other navigation aids where to be used instead.

Figure 56: EGNOS Flight Simulator at World ATM Congress in Madrid

A third leg for EGNOS communication and promotion is the organisation of the EGNOS Service Provision Workshop, which is detailed below.

4.8.1 EGNOS Service Provision Workshop 2015

Figure 57: EGNOS Service Provision Workshop 2015

Each year, ESSP organises the EGNOS workshop for EGNOS stakeholders to get together and learn about the latest news, projects and improvements on the EGNOS services. This two-day event serves as a milestone in the EGNOS service provision, where users, manufacturers, industry, institutions and regulators can get together and share information.

The event includes changes each year, but the core objective remains the same: **information, success stories by EGNOS users, promotion and networking.**

The 2015 Workshop was held on 29th and 30th September, in Copenhagen, where numerous EGNOS stakeholders from aviation, agriculture, surveying, road, maritime and rail market segments were present. The EGNOS user community keeps on growing every year, and the increasing number of participants is proof of that.

Opening speeches by GSA Executive Director Carlo des Dorides, who announced the Declaration of the new EGNOS LPV-200 Service for Aviation, and ESSP CEO Thierry Racaud welcomed the Workshop attendees.

The first day was devoted to explaining the latest updates in EGNOS services & program and in particular the EGNOS LPV-200 Service Declaration, together with an overview of the status of the implementation of EGNOS. On top of that, Eurocontrol and UK CAA provided a glimpse of the regulatory and standardisation perspective from their side. The afternoon session started with an

international flavour: both FAA and ASECNA presented, respectively, the status of WAAS and African progress within their SBAS programmes. Aviation-related EGNOS success stories took up a significant part of the afternoon: all the relevant stakeholders around PBN implementation were present: aircraft manufacturer (Airbus), avionics manufacturer (Universal); business operator (FlyingGroup), regional one (Air Baltic); Navigation service provider (skyguide) and a flying school (Ljungbyhed flygklub).

The first day's session ended with awarding four European ANSPs that had recently signed an EGNOS Working Agreement (EWA) with Hungarocontrol, Belgocontrol, Royal Netherland Airforce and Danish Netherland Airforce. A fifth ANSP, PANSA from Poland, was also awarded for the publication of the first EGNOS-based procedures at their local airports.

The second day was devoted to EGNOS in land-based and maritime applications. The EDAS service for value-added applications was also a main theme of the day. The GSA and ESSP explained in depth the current status of EGNOS markets and the actions taken for further EGNOS adoption in multimodal domains. There were presentations from Puertos del Estado in Spain, the General Lighthouse Authority of the UK & Ireland and Alberding for the Maritime stakeholders, Ansaldo for the Rail sector, Geograma for Mapping and Surveying, and CLAAS, devoted to precision Agriculture.

EGNOS in Sailing competition

4.8.2 ESSP Event Participation April 2015 – March 2016

ESSP supported the GSA in their promotion initiatives, while also developing communication initiatives on their own, to promote the use of EGNOS in different fields, mainly in the Aviation sector.

The events attended to promote EGNOS in the different market segments during April 2015 and March 2016 were:

Event name	Date	Location
General GNSS		
European Navigation Conference (ENC)	7-10 April, 2015	Bordeaux
ION GNSS 2015	14-18 September, 2015	Tampa
International Conference on Localization and GNSS	22-24 June, 2015	Goteborg
IAIN 2015	20-23 October, 2015	Prague
International Technical Symposium Navigation and Timing	17-18 November, 2015	Toulouse
Munich Satellite Navigation Summit	1-3 March, 2016	Munich
Aviation		
Aero Expo	15-18 April, 2015	Friedrichshafen
ERA Operations Advisory Group	28-29 April, 2015	Cologne
ACI 8th Regional Airports Conference Europe	18-20 May, 2015	Reykjavik
EBACE	19-21 May, 2015	Geneva
EGNOS Flight Event	6-7 May, 2015	Toulouse
Le Bourget 2015	15-22 June, 2015	Paris
Helitech International	6-8 October, 2015	Amsterdam
ERA General Assembly	13-15 October, 2015	Berlin
PBN Symposium	26-27 January, 2016	Dublin
EUROCAE UAS Workshop	4 March, 2016	Brussels
World ATM Congress	8-10 March, 2016	Madrid
Aviation and Space Weather	17 March, 2016	Paris
Maritime		
METS 2015	11-19 November, 2015	Amsterdam
e-Navigation Underway	2-4 February, 2016	Copenhagen & Oslo

Event name	Date	Location
Surveying & Agriculture		
Geospatial World Forum	25-29 May, 2015	Lisbon
INTERGEO	15-17 September, 2015	Berlin
Agritechnica	10-14 November, 2015	Hanover
Rail		
BCNRail 2015	17-19 November, 2015	Barcelona
Workshop on Rail and GNSS applications	24 March, 2016	Toulouse
Road		
ITS World Congress	5-9 October, 2015	Bordeaux

Table 21: Events attended to promote EGNOS during April 2015 and March 2016

EGNOS stands at different events (Geospatial World Forum, ERA General Assembly and Helitech 2015)

5 MAIN ACTIVITIES PLANNED FOR THE YEAR AHEAD

5.1 Service Provision and Development

5.1.1 EGNOS Working Agreement Implementation in Aviation

ESSP will continue with the EWA dissemination and awareness activities to ensure that the approach followed is understood and well adopted by all European ANSPs supporting any additional discussion with non-EU countries upon EC's prior request.

According to the strategy that ESSP presented to GSA at the beginning of 2016, a total of at least 10 more EWAs are foreseen as the objective to be put in force during 2016, which means more than 50 cumulative EWAs targeted by the end of 2016.

The EWA contents are expected to evolve and to be improved to cover any user needs and the applicable EU regulation. The main activities planned with regards to the EWA are:

- EWAs harmonisation analysis: To analyse the agreements in place by comparing them with the applicable template and the previous legacy EWAs, opening the possibility to perform a reverse update, if needed, to ensure consistency of all agreements in place.
- Improvement of the Collaborative Decision Making and GNSS Data recording service arrangements.
- Support to the GSA/EC in the establishment of an EWA for non-EU countries (non-SES countries, such as MEDA countries, the Balkans, Ukraine or similar) beyond the EU-28 Member States, and progress on the related discussions.
- Signing of LPV-200 Amendment#1. Due to the LPV-200 Service Level Declaration the legacy EWAs (37) must be amended. The appropriate signature process has already been initiated and will be further developed during 2016.
- Elaboration of an EWA-like concept facilitating the implementation of EGNOS-based procedures in scenarios where non-SES certified ANSPs operate, supporting the application of National Regulation (e.g.: CAP1122 in UK).
- Definition of the EWA strategy for 2017, based on both the content of the 2016 strategy and the outputs of its implementation, plus any new input that may arise due to GSA's funding scheme or PBN implementation requirements to be covered.

Aviation chart detail

5.1.2 EGNOS Services' related documents evolutions

EGNOS Service Definition Documents (SDD)

Linked to the entry in operation of ESR v2.4.1.M, new versions of the OS and SoL SDD are being prepared to give users the most accurate detail of the system behaviour and the associated context.

Service Implementation Roadmaps

The next update of these roadmaps is scheduled at the end of June 2016 and a new one by the end of 2016. The main changes expected in the short term can be summarised as follows:

- The SoL SDD linked to ESR v2.4.1.M will show the following expected improvements in the Service Area with regard to the previously published SDD:
  - NPA coverage extension to full ENI with 99.9% availability.
  - APV-I coverage extension in the south of the Service Area mainly improving the coverage in the south-west such as Portugal and Spain. In addition to this, continuity level 10^{-4} is extended to most EU landmass areas.
  - LPV-200 coverage extension is foreseen in line with the APV-I coverage trend.
- The OS SDD linked to ESR v2.4.1.M will show an OS service area extension to the southern regions.
- The deployment of the new EGNOS release (ESR v2.4.1N) in Q4-2016 will bring modernisation of the GEO satellite constellation. ASTRA-5B (PRN 123) will enter in operations and will replace ASTRA SES-5 (PRN 136) in the operational platform.

5.1.3 EDAS Service Evolution

Potential EDAS service evolutions are being defined for next year at the time of writing.

Regional Train equipped with EGNOS receiver for trials within H2020 ERSAT Project

5.1.4 EGNOS Helpdesk and User Support Web-site Evolution

The EGNOS User Support website is continuously evolving to better support the adoption of EGNOS and the needs of the different user communities.

The main priorities for the next period are:

- Website Performance and Robustness: To maintain the excellent level of availability and robustness of the website, placing special emphasis on security management.
- Website Accessibility: To improve accessibility to the different content areas in order to facilitate website usage. In this sense, the main evolution foreseen for the next period is the implementation of a dashboard or scorecard containing the most relevant information about the EGNOS services status and links to the most popular sections.
- EGNOS Performance Notifications/Alerts: To include additional notification types to cover the different EGNOS Services. The alerts related to the EDAS service outages (scheduled and unscheduled) will be implemented in the next period. Additional improvements are also foreseen in the formatting and texts of the notification/alerts sent to users.
- EGNOS Communications Subscriptions: A specific functionality will be implemented on the website enabling subscription/unsubscription to the different EGNOS communications and official publications (EGNOS Service Definition Documents, EGNOS Service Notices, EGNOS Service Implementation Roadmaps, EGNOS Monthly Performance Reports, EGNOS Public Service Provision Yearly Reports, EGNOS Bulletins…).
- EGNOS Adoption: To implement additional functionalities supporting the adoption of EGNOS, as well as to maintain and improve the existing ones.
- Innovative visualizations: Different new visualizations will be designed to simplify information usage and to support advanced analyses.
- Customised EGNOS performance: To include additional performance figures customised for different user communities or market segments, with special focus on agriculture and surveying.
- Customised EGNOS adoption material: To continue populating the website with adoption and promotion material specific to different market segments.

New EGNOS User Support website look and feel

5.1.5 User Support Improvement Process

Amongst the actions to be performed during this year within the framework of the User Support Improvement Process, there are a number of them focused on improving the means available to the users, as:

- the EGNOS User Support website to facilitate navigation and to make finding information easy.
- the frontdesk procedures for processing helpdesk calls.

5.1.6 EGNOS Multimodal Adoption Action Plan

The EGNOS Multimodal Adoption (EMA) plan establishes, on a yearly basis, the different activities to be put in place to leverage the use of EGNOS by all different market segments. These are agreed upon between the GSA and the ESSP at the beginning of the year and their progress is reviewed on a regular basis. The activities being undertaken during 2016 are distributed into four different market segments: aviation (where the major effort is placed), maritime, rail and agriculture and surveying. Depending on the maturity of the market form the perspective of EGNOS Adoption, different tasks are performed. Of note is the EGNOS implementation monitoring activity (both for aerodromes and operators), as a cornerstone task that makes it possible to settle a clear view of the actual EGNOS implementation status.

The current EMA progress is well on track and expected to continue as throughout the year.

Maritime cargo vessels during operations

5.1.7 EGNOS Promotion plan

5.1.7.1 *EGNOS Service Provision Workshop 2016*

The EGNOS Service Provision Workshop 2016 will be hosted in Warsaw on 27th-28th September.

Figure 58: EGNOS Service Provision Workshop 2016

5.1.7.2 *EGNOS Planned Event Participation 2016*

Next table shows the events planned for participation (supporting GSA stand, as visitors or as attendees) during 2016 (as of April 2016).

The event planning reflects the GSA mandate to boost EGNOS adoption on multimodal domains:

Event name	Date	Location	Domain
Aero EXPO	20-23 April	Friedrichshafen	Aviation
EUROCAE Symposium & General Assembly	28-29 April	Vienna	Aviation
ESRI Transportation Summit	19-20 May	Rotterdam	Surveying
Geospatial World Forum	23-26 May	Rotterdam	Surveying
EBACE	24-26 May	Geneva	Aviation
European Navigation Conference	30 May-2 June	Helsinki	Navigation GNSS
European Space Solutions	30 May-3 June	The Hague	Navigation GNSS
Aero Expo UK 2016 & Heli Expo	1-3 July	Sywell Aerodrome	Aviation
Farnborough 2016	11-17 July	Farnborough	Aviation
ION GNSS+ 2016	12-16 September	Portland, US	Navigation GNSS
Innotrans	20-23 September	Berlin	Rail
ERA General Assembly	11-13 October	Madrid	Aviation
Helitech	11-13 October	Amsterdam	Aviation
European Airline Training symposium	3-4 November	Warsaw	Aviation
METS	15-17 November	Amsterdam	Maritime

Table 22: External communication events for 2016

APPENDIX A FULL LIST OF EGNOS-BASED APPROACH PROCEDURES

The table below provides the full list of EGNOS-based procedures published as of April 2016. For the most up-to-date information, please refer to the EGNOS User Support website (https://egnos-user-support.essp-sas.eu/new_egnos_ops/content/lpv-procedures-map).

Operational Airports								
Airport	**Country**	**ICAO Code**	**LPV Procedure**	**Activation LPV procedure[15]**	**APV Baro Procedure**	**LPV-200 Procedure**	**Total Nr Procedure (LPV+ APV Baro+LPV200)**	**Purpose**
Antwerpen / Deurne	Belgium	EBAW	1	10/12/2015	0	0	1	CIVIL
Charleroi / Brussels South	Belgium	EBCI	2	31/03/2016	0	0	2	CIVIL
Bautzen	Germany	EDAB	0		1	0	1	CIVIL
Barth	Germany	EDBH	0		1	0	1	CIVIL
Magdeburg/City	Germany	EDBM	1	13/12/2012	0	0	1	CIVIL
Neubrandenburg	Germany	EDBN	2	02/04/2015		0	2	CIVIL
Berlin/Schönefeld	Germany	EDDB	0		4	0	4	CIVIL
Dresden	Germany	EDDC	0		2	0	2	CIVIL
Erfurt-Weimar	Germany	EDDE	0		2	0	2	CIVIL
Frankfurt Main	Germany	EDDF	0		4	0	4	CIVIL
Münster/Osnabrück	Germany	EDDG	0		2	0	2	CIVIL
Hamburg	Germany	EDDH	0		4	0	4	CIVIL
Köln/Bonn	Germany	EDDK	0		6	0	6	CIVIL
Düsseldorf	Germany	EDDL	0		4	0	4	CIVIL
München	Germany	EDDM	0		4	0	4	CIVIL
Nürnberg	Germany	EDDN	0		1	0	1	CIVIL
Leipzig/Halle	Germany	EDDP	0		4	0	4	CIVIL
Stuttgart	Germany	EDDS	0		1	0	1	CIVIL
Berlin-Tegel	Germany	EDDT	0		4	0	4	CIVIL
Hannover	Germany	EDDV	0		4	0	4	CIVIL
Bremen	Germany	EDDW	0		2	0	2	CIVIL
Frankfurt Hahn	Germany	EDFH	2	23/07/2015		0	2	CIVIL
Allendorf/Eder	Germany	EDFQ	1	21/08/2014		0	1	CIVIL
Hamburg-Finkenwerder	Germany	EDHI	2	13/12/2012		0	2	CIVIL
Memmingen	Germany	EDJA	0		2	0	2	CIVIL
Paderborn/Lippstadt	Germany	EDLP	2	13/12/2012		0	2	CIVIL
Dortmund	Germany	EDLW	2	12/12/2013		0	2	CIVIL
Augsburg	Germany	EDMA	0		2	0	2	CIVIL
Eggenfelden	Germany	EDME	1	11/12/2014		0	1	CIVIL
Oberpfaffenhofen	Germany	EDMO	1	13/12/2012	0	0	1	CIVIL

[15] First publication date of an LPV procedure

Operational Airports								
Airport	**Country**	**ICAO Code**	**LPV Procedure**	**Activation LPV procedure[15]**	**APV Baro Procedure**	**LPV-200 Procedure**	**Total Nr Procedure (LPV+ APV Baro+LPV200)**	**Purpose**
Straubing	Germany	EDMS	1	11/12/2014		0	1	CIVIL
Friedrichshafen	Germany	EDNY	0		2	0	2	CIVIL
Donauwörth	Germany	EDPR	1	15/10/2013		0	1	CIVIL
Coburg-Brandensteinsebene	Germany	EDQC	1	11/12/2014		0	1	CIVIL
Bayreuth	Germany	EDQD	0		1	0	1	CIVIL
Giebelstadt	Germany	EDQG	0		2	0	2	CIVIL
Karlsruhe/Baden-Baden	Germany	EDSB	2	17/09/2015		0	2	CIVIL
Donaueschingen-Villingen	Germany	EDTD	1	11/12/2014		0	1	CIVIL
Mengen-Hohentengen	Germany	EDTM	1	11/12/2014		0	1	CIVIL
Schwäbisch-Hall	Germany	EDTY	2	13/12/2012	0	0	2	CIVIL
Braunschweig-Wolfsburg	Germany	EDVE	2	18/10/2012	0	0	2	CIVIL
Kassel-Calden	Germany	EDVK	2	04/04/2013		0	2	CIVIL
Bremerhaven	Germany	EDWB	0		2	0	2	CIVIL
Emden	Germany	EDWE	4	30/05/2013		0	4	CIVIL
Wilhelmshaven JadeWeserAirport	Germany	EDWI	0		2	0	2	CIVIL
Sylt	Germany	EDXW	2	10/12/2015		0	2	CIVIL
Joensuu	Finland	EFJO	2	12/12/2013	0	0	2	CIVIL
Bristol	United Kingdom	EGGD	2	21/08/2014	0	0	2	CIVIL
Alderney	Guernsey	EGJA	2	07/12/2011	0	0	2	CIVIL
Exeter	United Kingdom	EGTE	2	21/08/2014	0	0	2	CIVIL
Eelde	Netherlands	EHGG	2	13/11/2014	0	0	2	CIVIL
Teuge	Netherlands	EHTE	1	13/11/2014	0	0	1	CIVIL
Aarhus	Denmark	EKAH	2	05/03/2015	0	0	2	CIVIL
Esbjerg	Denmark	EKEB	2	15/10/2015	0	0	2	CIVIL
Karup	Denmark	EKKA	2	02/04/2015	0	0	2	MILITARY
Alesund/Vigra	Norway	ENAL	2	03/03/2016	0	0	2	CIVIL
Andoya/Andenes	Norway	ENAN	2	02/04/2015	0	0	2	CIVIL
Forde/Bringeland	Norway	ENBL	2	28/05/2015	0	0	2	CIVIL
Bergen/Flesland	Norway	ENBR	0		2	0	2	CIVIL
Kristiansand/Kjevik	Norway	ENCN	0		2	0	2	CIVIL
Floro	Norway	ENFL	1	02/04/2015	0	0	1	CIVIL
Gardermoen	Norway	ENGM	4	11/12/2014	0	0	4	CIVIL
Haugesund/Karmoey	Norway	ENHD	0		2	0	2	CIVIL
Kristiansund/Kvernberget	Norway	ENKB	0		1	0	1	CIVIL
Namsos	Norway	ENNM	2	02/04/2015	0	0	2	CIVIL
Orland	Norway	ENOL	0		2	0	2	MILITARY

Operational Airports								
Airport	**Country**	**ICAO Code**	**LPV Procedure**	**Activation LPV procedure[15]**	**APV Baro Procedure**	**LPV-200 Procedure**	**Total Nr Procedure (LPV+ APV Baro+LPV200)**	**Purpose**
Rost	Norway	ENRS	2	06/03/2014	0	0	2	CIVIL
Moss/Rygge	Norway	ENRY	2	10/12/2015	0	0	2	CIVIL
Stord/Sorstokken	Norway	ENSO	0		2	0	2	CIVIL
Sandnessjoen/Stokka	Norway	ENST	2	23/07/2015	0	0	2	CIVIL
Sandefjord/Torp	Norway	ENTO	2	20/08/2015	0	0	2	CIVIL
Trondheim/Varnes	Norway	ENVA	0		2	0	2	CIVIL
Stavanger/Sola	Norway	ENZV	0		4	0	4	CIVIL
Gdańsk Lech Wałęsa	Poland	EPGD	2	28/05/2015	0	0	2	CIVIL
Katowice	Poland	EPKT	2	03/04/2014	0	0	2	CIVIL
Göteborg/Säve	Sweden	ESGP	2	18/09/2014	0	0	2	CIVIL
Storuman	Sweden	ESUD	1	11/12/2014	0	0	1	CIVIL
Dubrovnik	Croatia	LDDU	1	10/12/2015	0	0	1	CIVIL
Santander	Spain	LEXJ	2	17/10/2013	0	0	2	CIVIL
Calais	France	LFAC	1	20/09/2012	0	0	1	CIVIL
Albert Bray	France	LFAQ	1	15/11/2012	0	0	1	CIVIL
Le Touquet Paris Plage	France	LFAT	2	04/02/2016	0	0	2	CIVIL
Valenciennes Denain	France	LFAV	2	19/09/2013	0	0	2	CIVIL
Amiens Glisy	France	LFAY	1	27/06/2013	0	0	1	CIVIL
Agen La Garenne	France	LFBA	1	06/03/2014	0	0	1	CIVIL
Bordeaux Merignac	France	LFBD	3	08/03/2012	0	0	3	CIVIL
Bergerac	France	LFBE	2	09/01/2014	0	0	2	CIVIL
La Rochelle	France	LFBH	1	20/09/2012	0	0	1	CIVIL
Poitiers Biard	France	LFBI	2	12/11/2015	0	0	2	CIVIL
Montluçon Gueret	France	LFBK	1	17/12/2013	0	0	1	CIVIL
Limoges	France	LFBL	2	28/06/2012	0	0	2	CIVIL
Toulouse Blagnac	France	LFBO	4	03/05/2012	0	0	4	CIVIL
Pau-Pyrénées	France	LFBP	1	17/03/2011	0	0	1	CIVIL
Muret Lherm	France	LFBR	2	15/10/2015	0	0	2	CIVIL
Tarbes Lourdes Pyrenees	France	LFBT	1	28/05/2015	0	0	1	CIVIL
Angouleme Brie Champniers	France	LFBU	2	03/04/2014	0	0	2	CIVIL
Perigueux Bassillac	France	LFBX	1	28/05/2015	0	0	1	CIVIL
Biarritz Bayonne Anglet	France	LFBZ	1	09/02/2012	1	0	2	CIVIL
Castres Mazamet	France	LFCK	1	22/08/2013	0	0	1	CIVIL
Rodez Marcillac	France	LFCR	2	31/05/2012	0	0	2	CIVIL
Royan Medis	France	LFCY	1	30/04/2015	0	0	1	CIVIL
Auch Lamothe	France	LFDH	2	28/05/2015	0	0	2	CIVIL
Ouessant	France	LFEC	2	11/12/2014	0	0	2	CIVIL
Colmar Houssen	France	LFGA	2	28/10/2014	0	0	2	CIVIL

Operational Airports								
Airport	**Country**	**ICAO Code**	**LPV Procedure**	**Activation LPV procedure[15]**	**APV Baro Procedure**	**LPV-200 Procedure**	**Total Nr Procedure (LPV+ APV Baro+LPV200)**	**Purpose**
Dole Tavaux	France	LFGJ	1	09/01/2014	0	0	1	CIVIL
Le Puy Loudes	France	LFHP	2	04/02/2016	0	0	2	CIVIL
Moulins Montbeugny	France	LFHY	1	01/05/2014	0	0	1	CIVIL
Metz Nancy Lorraine	France	LFJL	2	04/04/2013	0	0	2	CIVIL
Angers Marce	France	LFJR	1	07/01/2016	0	0	1	CIVIL
Calvi Sainte Catherine	France	LFKC	2	30/04/2015	0	0	2	CIVIL
Auxerre Branches	France	LFLA	2	21/08/2014	0	0	2	CIVIL
Clermont-Ferrand Auvergne	France	LFLC	1	05/05/2011	0	0	1	CIVIL
Lyon St Exupery	France	LFLL	4	07/02/2013	0	0	4	CIVIL
Annecy Meythet	France	LFLP	2	19/09/2013	0	0	2	CIVIL
Grenoble Isere	France	LFLS	1	07/03/2013	0	0	1	CIVIL
Valence	France	LFLU	1	13/12/2012	0	0	1	CIVIL
Vichy Charmeil	France	LFLV	1	05/02/2015	0	0	1	CIVIL
Aurillac	France	LFLW	1	26/06/2014	0	0	1	CIVIL
Chateauroux Deols	France	LFLX	1	06/02/2014	0	0	1	CIVIL
Lyon Bron	France	LFLY	2	25/06/2015	0	0	2	CIVIL
Cannes Mandelieu	France	LFMD	1	05/02/2015	0	0	1	CIVIL
Saint Etienne Boutheon	France	LFMH	1	24/07/2014	0	0	1	CIVIL
Carcassonne Salvaza	France	LFMK	1	03/05/2012	0	0	1	CIVIL
Marseille	France	LFML	4	08/01/2015	2	0	6	CIVIL
Nice Cote D'Azur	France	LFMN	2	25/06/2015	0	0	2	CIVIL
Perpignan Rivesaltes	France	LFMP	1	15/10/2015	0	0	1	CIVIL
Beziers Vias	France	LFMU	2	18/10/2012	0	0	2	CIVIL
Mende	France	LFNB	1	17/12/2013	0	0	1	CIVIL
Beauvais	France	LFOB	1	20/09/2012	0	0	1	CIVIL
Evreux Fauville	France	LFOE	2	15/11/2012	0	0	2	MILITARY
Le Havre Octeville	France	LFOH	1	10/12/2015	0	0	1	CIVIL
Orleans Bricy	France	LFOJ	2	18/09/2014	0	0	2	MILITARY
Cholet le Pontreau	France	LFOU	2	04/02/2016	0	0	2	CIVIL
Orléans St. Denis De L´Hotel	France	LFOZ	2	28/06/2012	0	0	2	CIVIL
Paris-Le Bourget	France	LFPB	2	02/06/2011	0	0	2	CIVIL
Paris Charles de Gaulle	France	LFPG	0		0	4	4	CIVIL
Melun Villaroche	France	LFPM	2	10/12/2015	0	0	2	CIVIL
Paris Orly	France	LFPO	5	30/05/2013	1	0	6	CIVIL
Pontoise Cormeilles en Vexin	France	LFPT	3	01/05/2014	0	0	3	CIVIL
Reims Prunay	France	LFQA	1	03/04/2014	0	0	1	CIVIL

Operational Airports								
Airport	**Country**	**ICAO Code**	**LPV Procedure**	**Activation LPV procedure[15]**	**APV Baro Procedure**	**LPV-200 Procedure**	**Total Nr Procedure (LPV+ APV Baro+LPV200)**	**Purpose**
Nevers Fouchambault	France	LFQG	1	13/12/2012	0	0	1	CIVIL
Besancon La Veze	France	LFQM	1	18/09/2014	0	0	1	CIVIL
Lille Lesquin	France	LFQQ	3	26/06/2014	0	0	3	CIVIL
Merville	France	LFQT	1	15/11/2012	0	0	1	CIVIL
Brest Bretagne	France	LFRB	1	03/05/2012	1	0	2	CIVIL
Dinard	France	LFRD	2	06/02/2014	0	0	2	CIVIL
Deauville Saint Gatien	France	LFRG	1	18/09/2014	0	0	1	CIVIL
La Roche Sur Yon	France	LFRI	1	13/12/2012	0	0	1	CIVIL
Caen Carpiquet	France	LFRK	1	11/12/2014	0	0	1	CIVIL
Le Mans	France	LFRM	1	15/11/2012	0	0	1	CIVIL
Rennes	France	LFRN	2	30/05/2013	0	0	2	CIVIL
Lannion	France	LFRO	1	07/01/2016	0	0	1	CIVIL
Quimper	France	LFRQ	1	09/01/2014	0	0	1	CIVIL
Nantes	France	LFRS	1	28/06/2012	0	0	1	CIVIL
Saint Brieuc Armor	France	LFRT	1	10/12/2015	0	0	1	CIVIL
Vannes Meucon	France	LFRV	1	31/05/2012	0	0	1	CIVIL
Saint Nazaire Montoir	France	LFRZ	1	28/10/2014	0	0	1	CIVIL
Bale-Mulhouse	France	LFSB	2	10/12/2015	0	0	2	CIVIL
Dijon-Longvic	France	LFSD	1	28/04/2016	0	0	1	CIVIL
Epinal Mirecourt	France	LFSG	1	30/05/2013	0	0	1	CIVIL
Brive Souillac	France	LFSL	2	22/08/2013	0	0	2	CIVIL
Nancy Essey	France	LFSN	1	02/05/2013	0	0	1	CIVIL
Strasbourg Entzheim	France	LFST	2	10/12/2015	0	0	2	CIVIL
Nimes Garons	France	LFTW	2	18/10/2012	0	0	2	CIVIL
Olbia/Costa Smeralda	Italy	LIEO	2	12/11/2015	0	0	2	CIVIL
Milano/Malpensa	Italy	LIMC	2	21/08/2014;	0	0	2	CIVIL
Milano/Linate	Italy	LIML	2	13/12/2012	0	0	2	CIVIL
Bologna Borgo Panigale	Italy	LIPE	1	18/11/2014	0	0	1	CIVIL
Venezia/Tessera	Italy	LIPZ	3	27/06/2013	0	0	3	CIVIL
Roma/Ciampino	Italy	LIRA	1	10/01/2013	0	0	1	CIVIL
Roma/Fiumicino	Italy	LIRF	6	10/01/2013	0	0	6	CIVIL
Karlovy Vary	Czech Republic	LKKV	2	13/11/2014	0	0	2	CIVIL
Ostrava	Czech Republic	LKMT	2	09/01/2014	0	0	2	CIVIL
Praha	Czech Republic	LKPR	0		4	0	4	CIVIL
Brno	Czech Republic	LKTB	2	09/01/2014	0	0	2	CIVIL

Operational Airports								
Airport	**Country**	**ICAO Code**	**LPV Procedure**	**Activation LPV procedure[15]**	**APV Baro Procedure**	**LPV-200 Procedure**	**Total Nr Procedure (LPV+ APV Baro+LPV200)**	**Purpose**
Praha/ Vodochody	Czech republic	LKVO	2	25/06/2015	0	0	2	CIVIL
Graz	Austria	LOWG	1	09/01/2014	0	0	1	CIVIL
Linz	Austria	LOWL	1	09/01/2014	0	0	1	CIVIL
Lisboa	Portugal	LPPT	2	28/05/2015	0	0	2	CIVIL
Les Eplatures	Switzerland	LSGC	1	17/11/2011	0	0	1	CIVIL
Geneva	Switzerland	LSGG	2	12/11/2015	0	0	2	CIVIL
Dübendorf	Switzerland	LSMD	2	21/08/2014	0	0	2	CIVIL
Emmen	Switzerland	LSME	1	03/04/2014	0	0	1	CIVIL
Payerne Air Base	Switzerland	LSMP	1	17/09/2015	0	0	1	MILITARY
Berne-Belp	Switzerland	LSZB	1	07/03/2013	0	0	1	CIVIL
Grenchen	Switzerland	LSZG	1	25/07/2013	0	0	1	CIVIL
St. Gallen-Altenrhein	Switzerland	LSZR	1	17/11/2011	0	0	1	CIVIL
Bratislava/M. R. Stefanik	Slovak Republic	LZIB	2	05/02/2015	0	0	2	CIVIL
Kosice	Slovak Republic	LZKZ	2	05/02/2015	0	0	2	CIVIL

Table 23: Full list of EGNOS-based Approach Procedures

APPENDIX B LIST OF ACRONYMS

Acronym	Definition
ABS	Abu Simbel
ACI	Airports Council International
ACR	Azores
AFTN	Aeronautical Fixed Telecommunication Network
AGA	Agadir
AIRAC	Aeronautical Information Regulation And Control
AIS	Aeronautical Information Service
ALB	Aalborg
ALY	Alexandria
AME	Accuracy Major Event
ANSP	Air Navigation Service Provider
APV	Approach with Vertical Guidance
ASECNA	Agency for Aerial Navigation Safety in Africa and Madagascar
ATH	Athens
ATM	Air Traffic Management
BE	Belgium
BRN	Berlin
CCB	Configuration Control Board
CCF	Central Control Facility
CEO	Chief Executive Officer
CNR	Canary Islands
CRK	Cork
CTN	Catania
DGNSS	Differential GNSS
DGPS	Differential GPS
DJA	Djerba
DK	Denmark
EAD	European Aeronautical Database
EBACE	European Business Aviation Conference & Exhibition
EC	European Commission
EDAS	EGNOS Data Access Service

Acronym	Definition
EGI	Egilsstadir
EGNOS	European Geostationary Navigation Overlay Service
EMA	EGNOS Multimodal Adoption
EMRF	European Maritime Radio-Navigation Forum
ENC	European Navigation Conference
ENI	European Neighbourhood Instrument
ERA	European Regions Airline Association
ESA	European Space Agency
ESR	EGNOS System Release
ESRI	Environmental Systems Research Institute
ESSP	European Satellite Services Provider
EU	European Union
EUROCAE	European Organisation for Civil Aviation Equipment
EWA	EGNOS Working Agreement
FAA	Federal Aviation Administration
FP7	Seventh Framework Programme
FTP	File Transfer Protocol
GEO	Geostationary Satellite
GLG	Glasgow
GLONASS	Globalnaya Navigatsionnaya Sputnikovaya Sistema
GNSS	Global Navigation Satellite System
GOL	Gölbasi
GPS	Global Positioning System
GSA	European GNSS Agency
GVL	Gävle
HAL	Horizontal Alert Limit
HBK	Hartebeeshoek
HNSE	Horizontal Navigation System Error
HPL	Horizontal Protection Level
HIS	Horizontal Safety Index
HU	Hungary
IAA	Irish Aviation Authority
IAIN	International Association of Institutes of Navigation

Acronym	Definition
IAP	Instrument Approach Procedure
ICAO	International Civil Aviation Organisation
IE	Ireland
ILS	Instrument Landing System
ION	Institute Of Navigation
ISO	International Organisation for Standardisation
ITS	Intelligent Transportation Systems
IWG	Interoperability Working Group
JME	Jan Mayen
KIR	Kirkeness
KOU	Kourou
LAP	Lappeenranta
LBS	Location Bases Services
LPI	La Palma
LPV	Localizer Performance with Vertical guidance
LSB	Lisbon
LYR	Longyearbyen
MAD	Madeira
MCC	Mission Control Centre
MEDA	Euro-Mediterranean Partnership
METS	Marine Equipment Trade Show
MLG	Malaga
MON	Moncton
MRD	Mission Requirement Document
MT	Message Type
N/A	Not Applicable/ Not Available
NL	Netherlands
NLES	Navigation Land Earth Station
NOF	NOTAM Offices
NOTAM	Notice to Airmen
NOU	Nouakchott
NPA	Non-Precision Approach
NSE	Navigation System Error

Acronym	Definition
NSG	Navigation Steering Group
NTRIP	Networked Transport of RTCM via Internet Protocol
OP	Operation
OS	Open Service
PA	Precision Approach
PANSA	Polish Air Navigation Services Agency
PAR	Paris
PBN	Performance Based Navigation
PDM	Palma De Mallorca
PRN	Pseudo-Random Noise
R&D	Research and Development
RAISG	RNAV Approach Implementation Support Group
RDAF	Royal Danish Air Force
RIMS	Ranging and Integrity Monitoring Station
RKK	Reykjavík
RNAV	Area Navigation
RNLAF	Royal Netherlands Air Force
RNP	Required Navigation Performance
ROM	Roma
RTCA	Radio Technical Commission for Aeronautics
RTK	Real Time Kinematic
RWY	Runway
SBAS	Satellite-Based Augmentation System
SC	Special Committee
SDC	Santiago De Compostela
SDD	Service Definition Document
SES	Single European Sky
SIS	Signal-In-Space
SISNeT	Signal-In-Space through the Internet
SL0	Service Level 0
SL2	Service Level 2
SOF	Sofia
SoL	Safety-Of-Life

Acronym	Definition
SWA	Swanwick
TF	Task Force
TLS	Toulouse
TRD	Trondheim
TRO	Tromsoe
UAS	Unmanned Aircraft Systems
UK	United Kingdom
VAL	Vertical Alert Limit
VNSE	Vertical Navigation System Error
VPL	Vertical Protection Level
VSI	Vertical Safety Index
WAAS	Wide Area Augmentation System
WG	Working Group
WRS	Warsaw
YSR	Yearly System Release
ZUR	Zurich

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