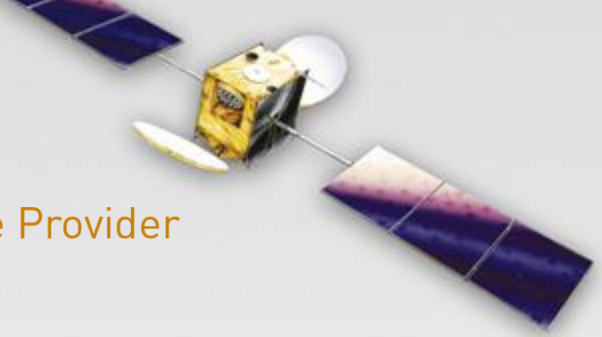


The **EGNOS** Service Provider



Monthly Performance Report December 2017



ESSP-DRD-21199 Iss. 01-00 Date: 08.01.2018

Table of Content

EXECUTIVE SUMMARY	4
1 EGNOS SIS AVAILABILITY	5
2 OPEN SERVICE (OS)	7
2.1 OPEN SERVICE HORIZONTAL AND VERTICAL ACCURACY	7
2.2 EGNOS OPEN SERVICE AVAILABILITY.....	10
3 SAFETY-OF-LIFE SERVICE (SOL)	11
3.1 EGNOS NON PRECISION APPROACH (NPA)	11
3.1.1 EGNOS NPA Availability	11
3.1.2 EGNOS NPA Continuity.....	13
3.1.3 EGNOS NPA Integrity Events.....	14
3.1.4 EGNOS NPA Accuracy.....	15
3.2 EGNOS APPROACH WITH VERTICAL GUIDANCE (APV-I)	17
3.2.1 EGNOS APV-I Availability	17
3.2.2 EGNOS APV-I Continuity Risk	18
3.2.3 EGNOS APV-I Integrity	19
3.2.4 EGNOS APV-I Accuracy.....	21
3.2.5 EGNOS APV-I Performance at airports.....	23
3.3 EGNOS LOCALIZER PERFORMANCE WITH VERTICAL GUIDANCE TO A DECISION ALTITUDE OF 200FT (LPV-200).....	24
3.3.1 EGNOS LPV-200 Availability.....	24
3.3.2 EGNOS LPV-200 Continuity Risk.....	26
3.3.3 EGNOS LPV-200 Integrity.....	27
3.3.4 EGNOS LPV-200 Accuracy	29
3.3.5 EGNOS LPV-200 Performance at airports	31
4 EGNOS DATA ACCESS SERVICE (EDAS)	32
5 EGNOS TIME SERVICE	33
APPENDIX A RECEIVER MONITORING NETWORK	36
APPENDIX B EGNOS APV-I PERFORMANCE AT AIRPORTS	38
APPENDIX C EGNOS LPV-200 PERFORMANCE AT AIRPORTS	45
APPENDIX D REFERENCE DOCUMENTS	48
APPENDIX E LIST OF ACRONYMS	49

Table of Figures

FIGURE 1 – EGNOS SIS & PRN AVAILABILITY FOR OCTOBER 2017.	5
FIGURE 2 – TREND OF EGNOS SIS AVAILABILITY PER GEO.	5
FIGURE 3 – EGNOS OPEN SERVICE HNSE HISTOGRAM AND CUMULATIVE PROBABILITY	8
FIGURE 4 – EGNOS OPEN SERVICE VNSE HISTOGRAM AND CUMULATIVE PROBABILITY.....	9
FIGURE 5 – EGNOS OPEN SERVICE AVAILABILITY AT REFERENCE STATIONS.....	10
FIGURE 6 – EGNOS NPA AVAILABILITY	11
FIGURE 7 – EGNOS NPA AVAILABILITY COMPLIANCE TREND	12
FIGURE 8 – EGNOS NPA CONTINUITY OVER THE LAST 6 MONTHS.....	13
FIGURE 9 – EGNOS NPA HORIZONTAL SAFETY INDEX OF THE MONTH	14
FIGURE 10 – EGNOS NPA HNSE HISTOGRAM AND CUMULATIVE PROBABILITY	16
FIGURE 11 – EGNOS APV-I AVAILABILITY.....	17
FIGURE 12 – EGNOS APV-I AVAILABILITY COMPLIANCE TREND	17
FIGURE 13 – EGNOS APV-I CONTINUITY.....	18

FIGURE 14 – EGNOS APV-I HORIZONTAL SAFETY INDEX OF THE MONTH	19
FIGURE 15 – EGNOS APV-I VERTICAL SAFETY INDEX OF THE MONTH	20
FIGURE 16 – EGNOS APV-I HNSE HISTOGRAM AND CUMULATIVE PROBABILITY	22
FIGURE 17 – EGNOS APV-I VNSE HISTOGRAM AND CUMULATIVE PROBABILITY	22
FIGURE 18 – EGNOS APV-I AVAILABILITY AT AIRPORTS	23
FIGURE 19 – EGNOS APV-I OUTAGES.....	23
FIGURE 20 – EGNOS LPV-200 AVAILABILITY	24
FIGURE 21 – EGNOS LPV-200 AVAILABILITY COMPLIANCE TREND	25
FIGURE 22 – EGNOS LPV-200 CONTINUITY	26
FIGURE 23 – EGNOS LPV-200 HORIZONTAL SAFETY INDEX OF THE MONTH.....	27
FIGURE 24 – EGNOS LPV-200 VERTICAL SAFETY INDEX OF THE MONTH.....	28
FIGURE 25 – EGNOS LPV-200 HNSE HISTOGRAM AND CUMULATIVE PROBABILITY.....	30
FIGURE 26 – EGNOS LPV-200 VNSE HISTOGRAM AND CUMULATIVE PROBABILITY	30
FIGURE 27 – EGNOS LPV-200 AVAILABILITY AT AIRPORTS.....	31
FIGURE 28 – EGNOS LPV-200 OUTAGES	31
FIGURE 29 – EGNOS TIME SERVICE AVAILABILITY	33
FIGURE 30 – ENT-GPS OFFSET EVOLUTION.....	34
FIGURE 31 – EGNOS RIMS SITES USED IN THIS REPORT	36

Table of Tables

TABLE 1 – EGNOS SIS AVAILABILITY (%) ON EGNOS GEO SATELLITES.	6
TABLE 2 – EGNOS OPEN SERVICE ACCURACY (95%)	8
TABLE 3 – EGNOS NPA HORIZONTAL ACCURACY (95%) AND PERCENTAGE OF TIME IN NPA MODE.....	15
TABLE 4 – EGNOS APV-I ACCURACY (95%) AND PERCENTAGE OF TIME IN APV-I MODE AT REFERENCE STATIONS.....	21
TABLE 5 – EGNOS LPV-200 ACCURACY (95%) AND PERCENTAGE OF TIME IN LPV-200 MODE AT REFERENCE STATIONS	29
TABLE 6 – PERFORMANCE OF EDAS SERVICES	32
TABLE 7 – LIST OF SITES WHERE PERFORMANCES ARE REPORTED	37
TABLE 8 – MONTHLY APV-I AVAILABILITY AT AIRPORTS WITH PUBLISHED PROCEDURES USING EGNOS.....	44
TABLE 9 – MONTHLY LPV-200 AVAILABILITY AT AIRPORTS WITH PUBLISHED PROCEDURES USING EGNOS	47

EXECUTIVE SUMMARY

This report presents the EGNOS services performance during December 2017. The report contains global results for the reported period, including maps and tables with the performance observed at different locations in Europe using GEO-combined values for PRN120 – PRN123. A list of the stations analyzed in this report, including their location can be found in Appendix A. Additional and more detailed information about EGNOS performance can be found at the EGNOS User Support website (<https://egnos-user-support.essp-sas.eu>).

Safety of Life Service (SoL)

The results corresponding to APV-I and LPV200 Availability and Continuity for this month have been excellent in terms of service area coverage.

The percentage¹ of SoL SDD service area [RD-2] covered by APV-I and LPV200 Availability (99%) performance map is 97.34% for APV-I and 99.07% for LPV200. The value achieved for continuity ($5 \times 10^{-4}/15s$) is 98.52% for APV-I and 98.71% for LPV200.

The APV-I and LPV200 performance at airports with approach operations based on the APV-I or LPV200 service level, respectively, has been outstanding and all airports presented availability higher than 99% and continuity risk lower than $5 \cdot 10^{-4}/15s$, with the exception of Kirkenes/Hoybuktoen (ENKR) in which the APV-I performance was 98.98% and $5.65 \cdot 10^{-4}$ (availability and continuity respectively).

The Horizontal and Vertical Safety Indexes remained below 0.33 for both APV-I and LPV200 service levels for all the analyzed sites, what represents a good integrity margin.

NPA Availability (99%) was compliant in the whole NPA service area (limited by the boundaries defined by MT27).

Open Service

The monitored stations presented an Open Service Availability higher than 99% for this month (and most of them equal or close to 100%).

The horizontal accuracy results for all the sites remained below 1.3 meters (95%) and the vertical accuracy below 2.3 meters (95%), which represents a very good level of accuracy.

EDAS Service

In terms of availability, the observed performance for all the EDAS services has fulfilled the targets [RD-3].

Regarding the EDAS Services latency, the observed delays (for the real-time services) were also better than the committed performance [RD-3].

EGNOS Time Service

The EGNOS Time Service was available during more than 99% of the time for each day during December 2017, except on 1st December with 14.28%, on 6th December with 74.18%, on 7th December with 51.68%, 13th December with 98.87% and on 19th December with 90.39%.

The offset between the EGNOS Network Time and the GPS time remained below 8 nanoseconds over the three previous months (September to December 2017).

¹ The coverage percentages presented represent the ratio of area after applying the mapping projection, there may be a difference compared to the actual geographical area.

1 EGNOS SIS AVAILABILITY

*In this document, **EGNOS SIS Availability** is defined as the percentage of time in the month during which at least one geostationary satellite broadcasts EGNOS messages.*

In addition to the SIS availability for PRN120 and PRN123, the following values are also reported:

- percentage of time in the month during which at least one geostationary satellite broadcasts EGNOS messages (PRN120 or PRN123);
- percentage of time in the month during which both geostationary satellites broadcast EGNOS messages (PRN120 and PRN123).

EGNOS SIS monitoring for December 2017, reports the following reception percentage of an SBAS message:

- PRN120 Availability: **99.97%**
- PRN123 Availability: **99.99%**
- SIS - PRN120 or PRN123: **100%**
- SIS - PRN120 and PRN123: **99.97%**

The following figure presents the availability of the signal in both EGNOS GEO satellites (PRN120 and PRN123). Red lines correspond to unavailability periods:

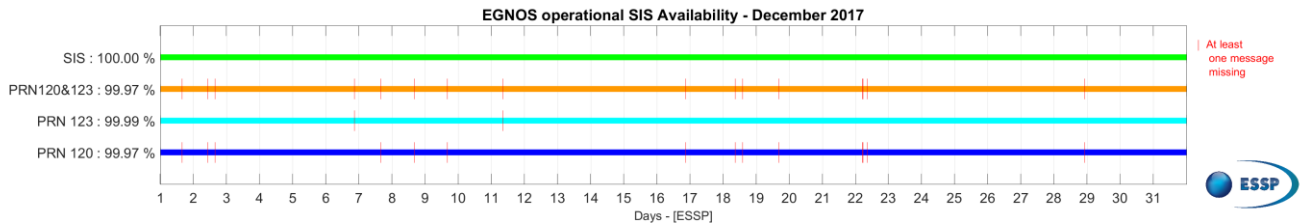


Figure 1 – EGNOS SIS & PRN Availability for December 2017.

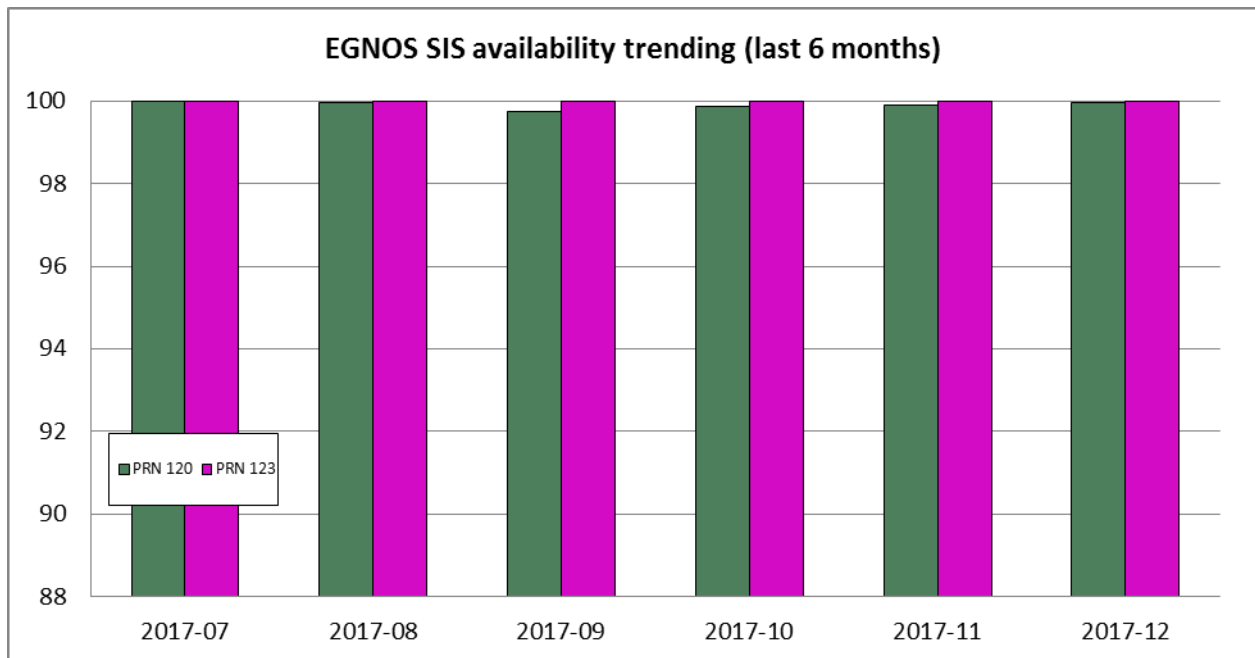


Figure 2 – Trend of EGNOS SIS Availability per GEO.

Availability (%)	2017-07	2017-08	2017-09	2017-10	2017-11	2017-12
PRN 120	99,99	99,97	99,74	99,88	99,90	99,97
PRN 123	99,99	99,99	99,99	99,99	99,99	99,99
At least one EGNOS GEO satellite	100	100	100	100	100	100

Table 1 – EGNOS SIS Availability (%) on EGNOS GEO satellites.

2 OPEN SERVICE (OS)

2.1 Open Service Horizontal and Vertical Accuracy

Accuracy is a measure of the position error, which is the difference between the estimated navigation position and the actual position.

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

The next table provides the values of accuracy (95%) in meters measured for this month. See Appendix A for further details of the stations where OS Accuracy are reported.

Station	HNSE 95% (meters)	VNSE 95% (meters)
Agadir	0.9	1.3
Aalborg	0.9	1.4
Alexandria	1.1	1.4
Athens	0.7	1.0
Berlin	0.9	1.1
Canarias ²	N/A	N/A
Cork	0.9	1.3
Catania	0.7	1.1
Djerba	0.8	1.1
Egilsstadir	0.6	1.5
Glasgow	1.0	1.4
Golbasi	0.8	1.2
Gavle	0.8	1.5
Jan Mayen	1.2	2.2
Kirkenes	0.8	1.8
Lappeenranta	0.8	1.4
La Palma	1.1	1.5
Lisboa	0.8	1.3
Madeira	0.7	1.1
Malaga	0.7	1.0
Palma de Mallorca	0.6	0.9
Reykjavik	0.8	1.7
Roma	0.6	1.0
S. Compostela	0.8	1.0
Sofia	1.0	1.9
Swanwick	1.0	1.5
Toulouse	0.7	1.0
Trondheim	0.6	1.4
Tromsoe	0.9	2.0

² No data for Canary Islands RIMS site are available as this station is, since 6th November, out of the operational chain.

Warsaw	0.9	1.1
Zurich	0.7	1.1

Table 2 – EGNOS Open Service accuracy (95%)

The next 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 current month.

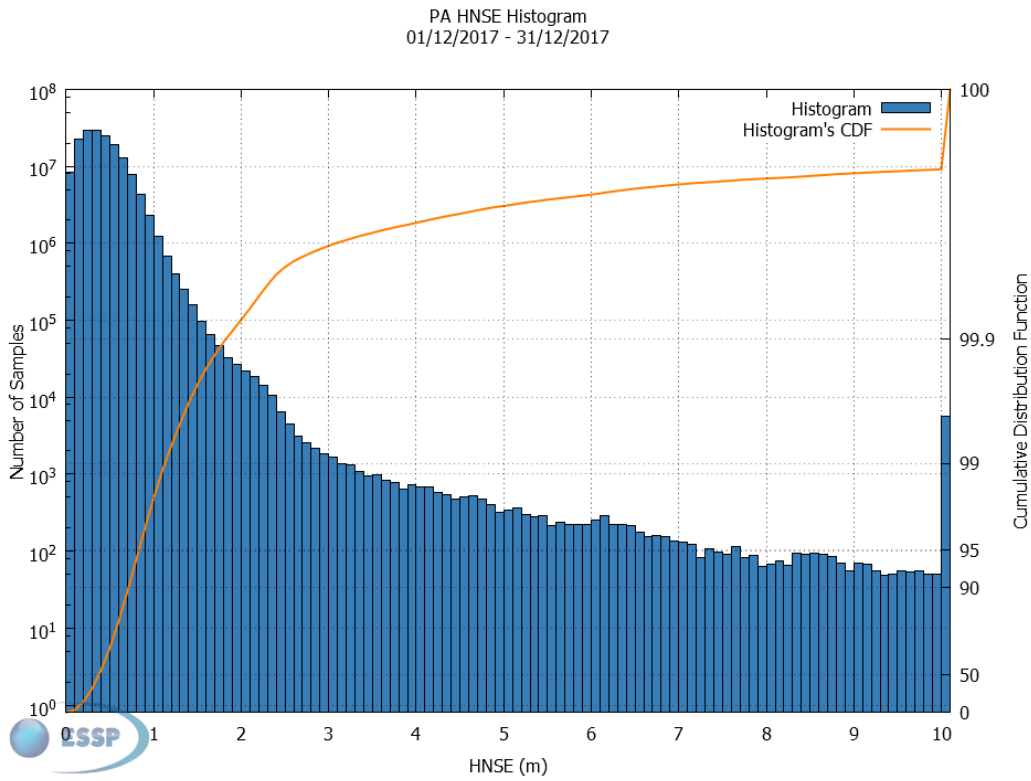


Figure 3 – EGNOS Open Service HNSE Histogram and Cumulative Probability

PA VNSE Histogram
01/12/2017 - 31/12/2017

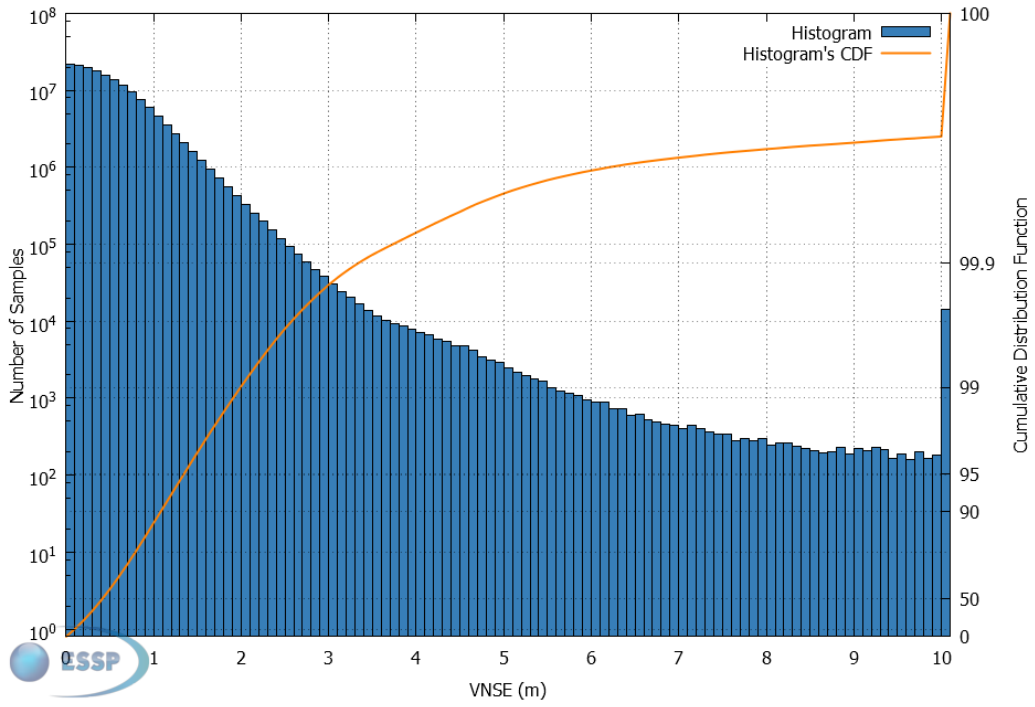


Figure 4 – EGNOS Open Service VNSE Histogram and Cumulative Probability

2.2 EGNOS Open Service Availability

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

The following figures present the Open Service Availability measured in the monitoring stations for the reported month (RIMS sites with OS Availability lower than 99%, if any, are shown in red). See Appendix A for further details of the stations where OS Accuracy are reported.

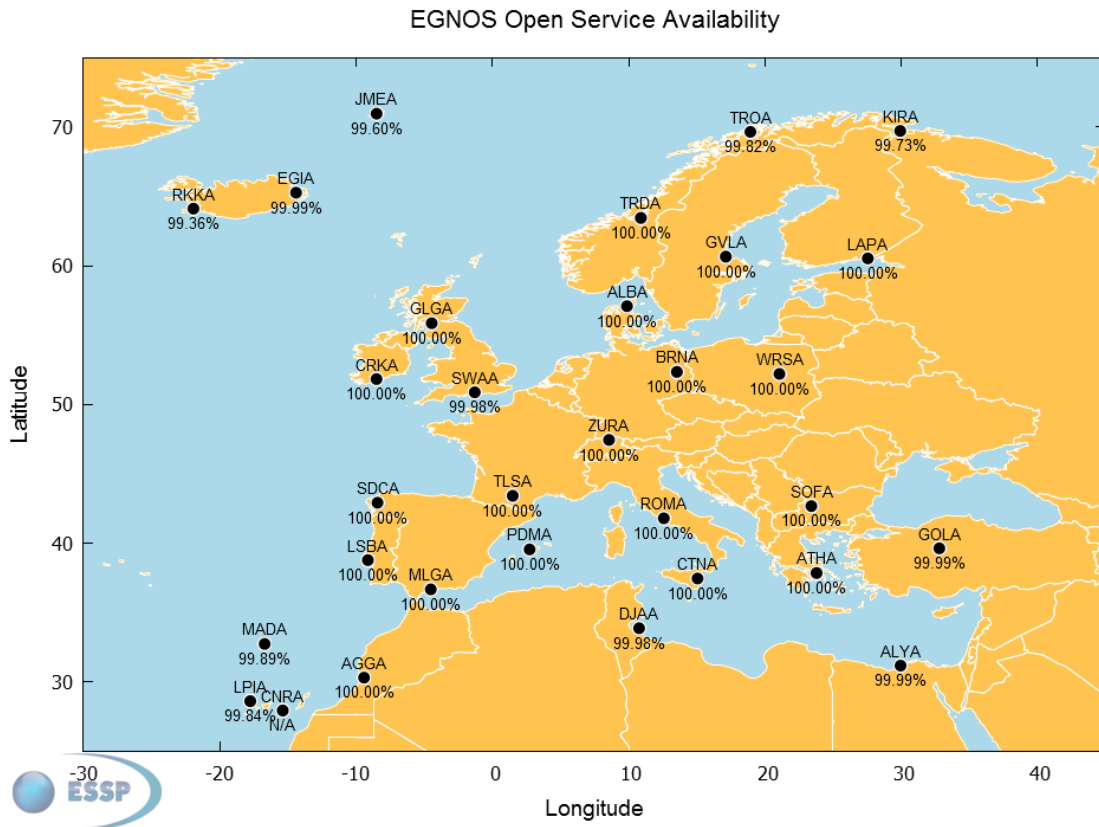


Figure 5 – EGNOS Open Service Availability at reference stations³

³ No data for Canary Islands RIMS site are available as this station is, since 6th November, out of the operational chain.

3 SAFETY-OF-LIFE SERVICE (SOL)

3.1 EGNOS Non Precision Approach (NPA)

3.1.1 EGNOS NPA Availability

EGNOS NPA Availability is defined as the percentage of samples in which the Horizontal Protection Level is below Alert Limit for NPA (HPL below 556m) over the total period. This value corresponds to the performance obtained under fault-free conditions using all satellites in view.

The following figure presents EGNOS NPA Availability over the current month. It must be noted that NPA Availability considering RAIM is not taken into account in this report.

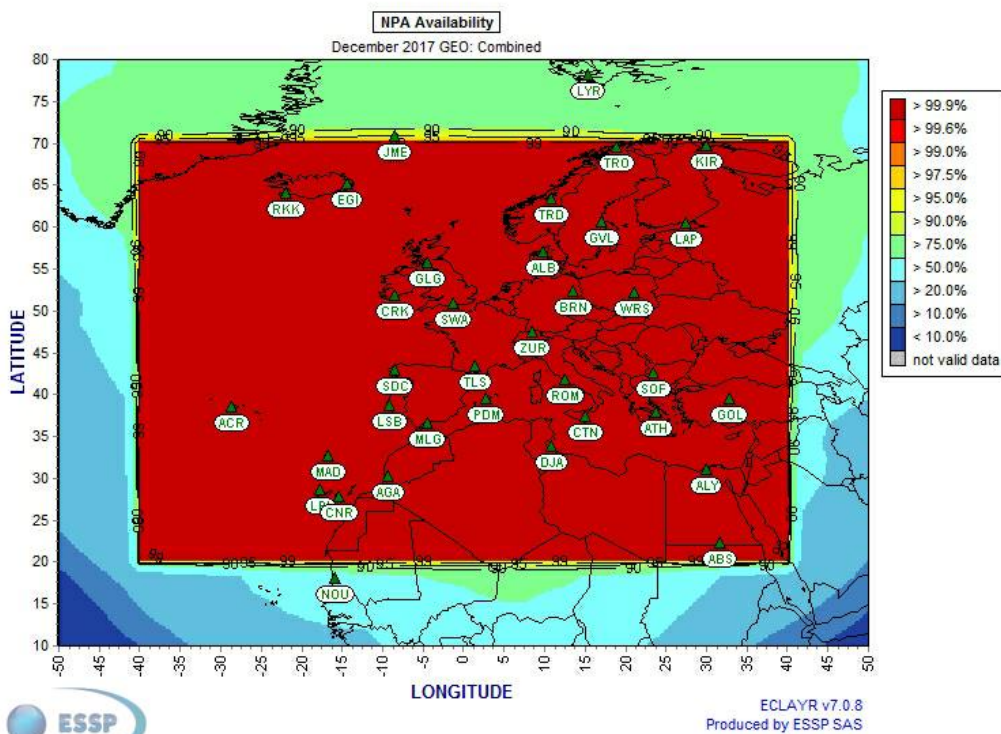


Figure 6 – EGNOS NPA availability

The evolution of the compliance area for a 30 days period with respect to NPA availability compliance area at 99% level as defined in the SoL SDD ([RD-2]) during the last 3 months is presented here:

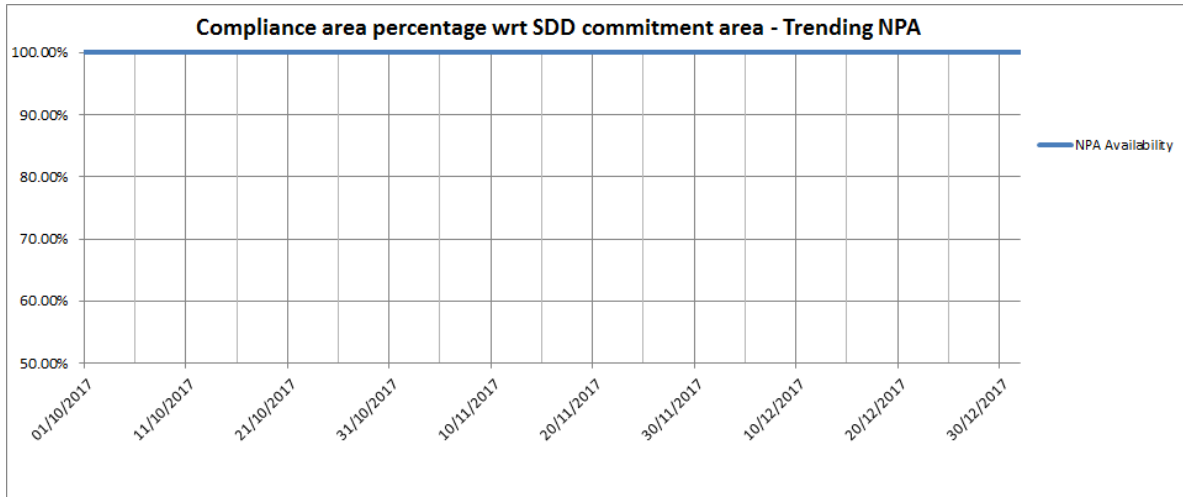


Figure 7 – EGNOS NPA availability compliance trend

3.1.2 EGNOS NPA Continuity

EGNOS NPA Continuity is reported as the result of dividing the total number of single continuity events using a time-sliding window of 1 hour by the number 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 inside the following time-sliding window of 1 hour the system becomes not available. This value corresponds to the performance obtained under fault-free conditions using all satellites in view.

The following picture presents the EGNOS NPA Continuity Risk measured for the last 6 months (in order to observe the minimum NPA Continuity performance committed in the SoL SDD (2.5×10^{-4} /hour), at least 6 months of data need to be evaluated due to the discrete nature of discontinuity events). It must be noted that NPA continuity is computed in this report using only the EGNOS NPA solution and not considering the GPS RAIM solution when the EGNOS one is not available.

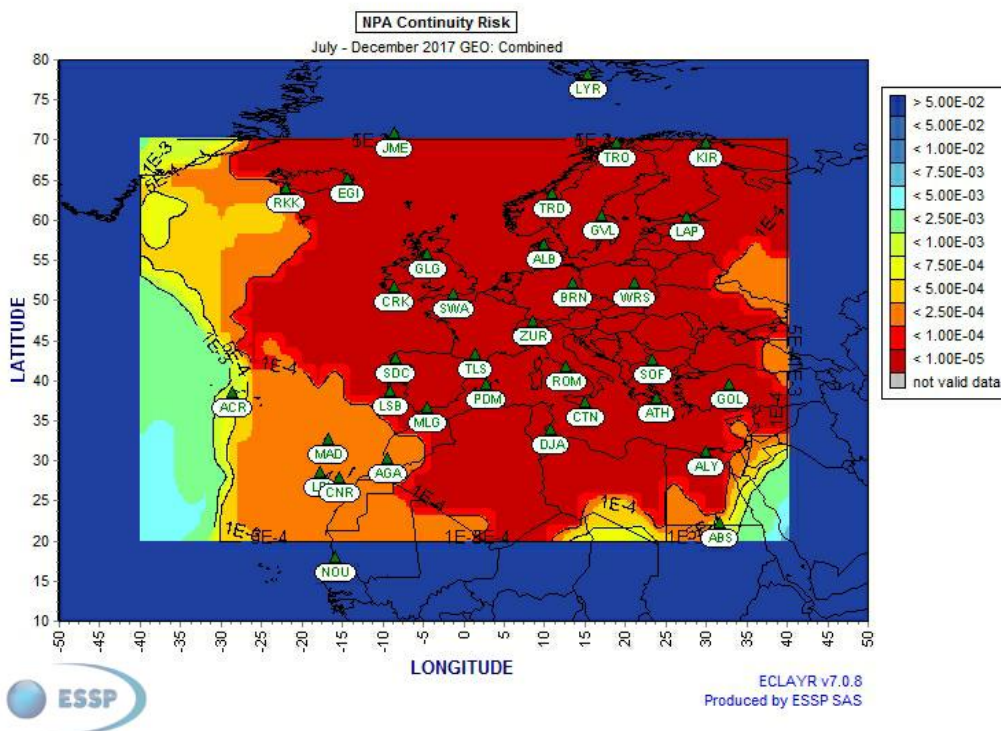


Figure 8 – EGNOS NPA Continuity over the last 6 months

3.1.3 EGNOS NPA Integrity Events

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

No integrity event was detected.

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

The next histograms show the distribution of HSI (Horizontal Safety Index), which is computed at the different EGNOS stations for each second over the current month. These histograms take into account the epochs in which the NPA service is available (Protection Level < NPA Alarm Limit).

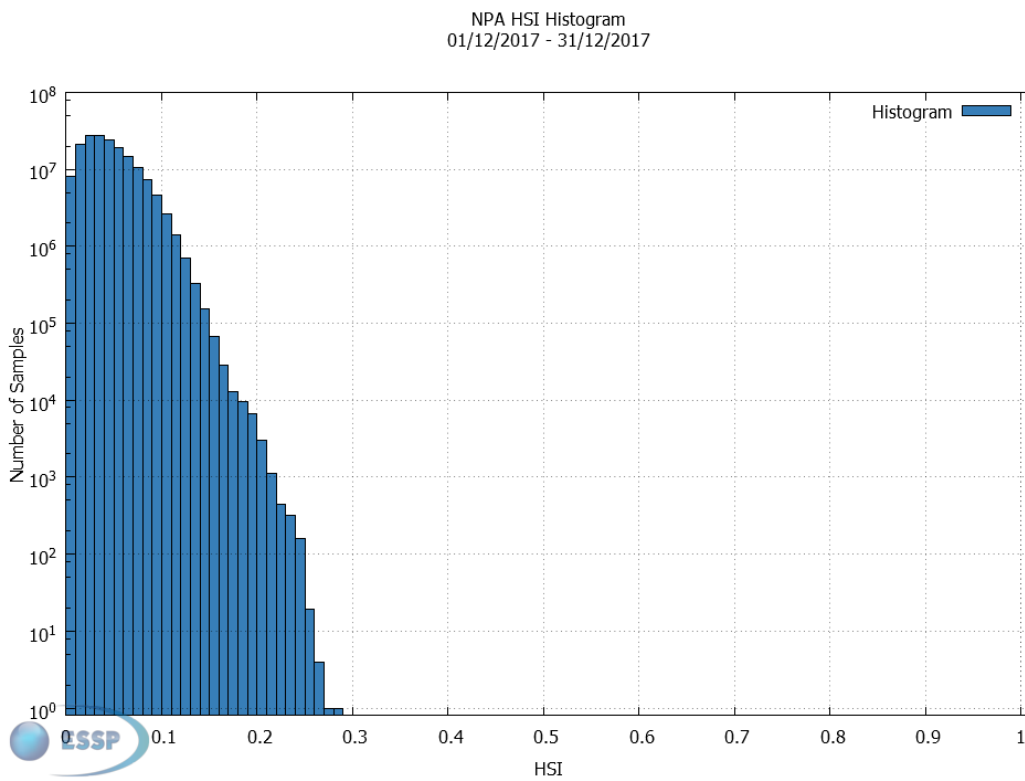


Figure 9 – EGNOS NPA Horizontal Safety Index of the month

3.1.4 EGNOS NPA Accuracy

EGNOS NPA Accuracy is reported as the 95th percentile of the Horizontal Navigation System Error (HNSE) over the month, at the monitored sites when the NPA service is available (HPL below 556 m).

This table shows the NPA Accuracy values in meters. See Appendix A for further details of the stations where NPA accuracy are reported.

Station	HNSE 95% (meters)	% of samples in NPA mode
Abu Simbel	1.9	100.00%
Azores	1.3	100.00%
Agadir	0.9	100.00%
Aalborg	0.9	100.00%
Alexandria	1.1	100.00%
Athens	0.7	100.00%
Berlin	0.9	100.00%
Canary Islands ⁴	N/A	N/A
Cork	0.9	100.00%
Catania	0.6	100.00%
Djerba	0.8	100.00%
Egilsstadir	0.6	100.00%
Glasgow	1.0	100.00%
Golbasi	0.8	100.00%
Gavle	0.8	100.00%
Kirkenes	0.8	100.00%
Lappeenranta	0.8	100.00%
La Palma	1.1	100.00%
Lisbon	0.8	100.00%
Madeira	0.7	100.00%
Málaga	0.7	100.00%
Palma de Mallorca	0.6	100.00%
Reykjavik	0.8	100.00%
Roma	0.6	100.00%
S. de Compostela	0.8	100.00%
Sofia	1.0	100.00%
Swanwick	1.0	100.00%
Toulouse	0.7	100.00%
Trondheim	0.6	100.00%
Tromsøe	0.9	100.00%
Warsaw	0.9	100.00%
Zürich	0.7	100.00%

Table 3 – EGNOS NPA Horizontal Accuracy (95%) and percentage of time in NPA mode

⁴ No data for Canary Islands RIMS site are available as this station is, since 6th November, out of the operational chain.

The following figures show the histogram and cumulative probability function of HNSE (Horizontal Navigation System Error), which are computed at RIMS sites for each second over the current month.

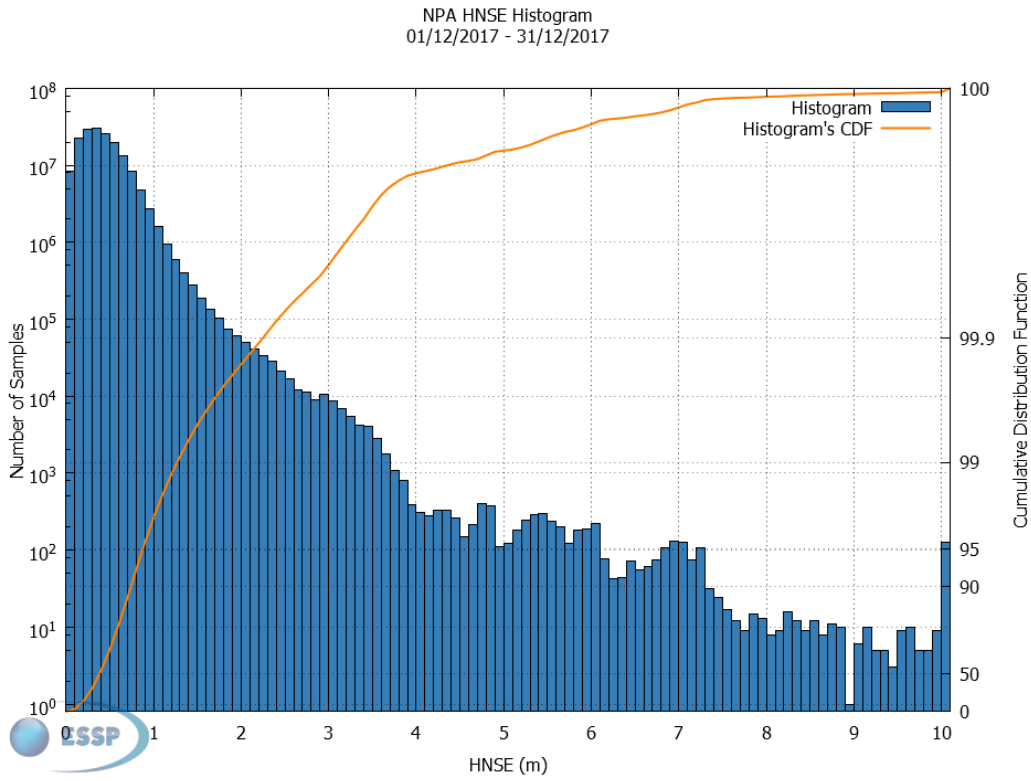


Figure 10 – EGNOS NPA HNSE Histogram and Cumulative Probability

3.2 EGNOS Approach with Vertical guidance (APV-I)

3.2.1 EGNOS APV-I Availability

EGNOS APV-I Availability is defined as the percentage of epochs in a month in which the Protection Level are below Alert Limits for this APV-I service (HPL<40m and VPL<50m) over the total period. This value corresponds to the performance obtained under fault-free conditions using all satellites in view.

The following picture presents the EGNOS APV-I Availability over the current month using GEO-combined maps for the operational EGNOS GEOs.

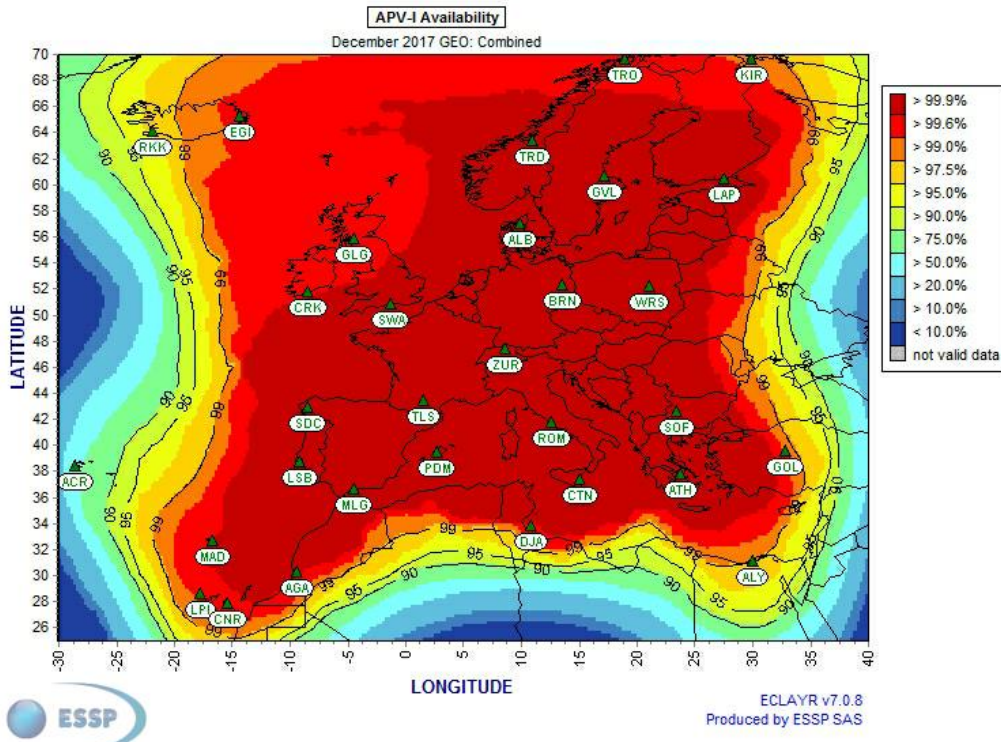


Figure 11 – EGNOS APV-I Availability

Below, the evolution of the monthly APV-I availability (99%) compliance area (30 days sliding window) is presented. The percentage is computed with respect to the commitment area at 99% level as defined in the SoL SDD ([RD-2]). The information is presented for the last 3 months.

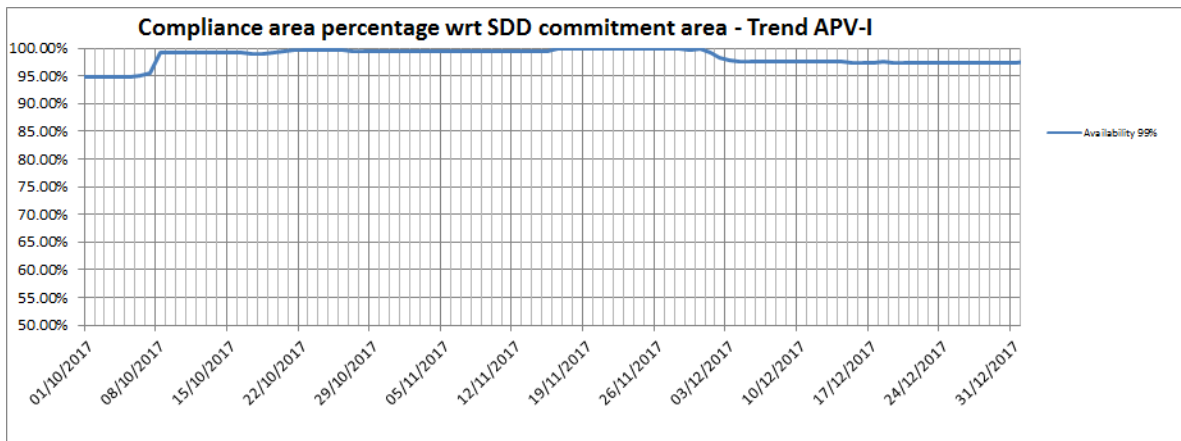


Figure 12 – EGNOS APV-I availability compliance trend

3.2.2 EGNOS APV-I Continuity Risk

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 event occurs if the system is available at the start of the operation and in at least one of the following 15 seconds the system becomes not available. This value corresponds to the performance obtained under fault-free conditions using all satellites in view.

The following picture presents the EGNOS APV-I Continuity over the current month using GEO-combined maps for the operational EGNOS GEOs.

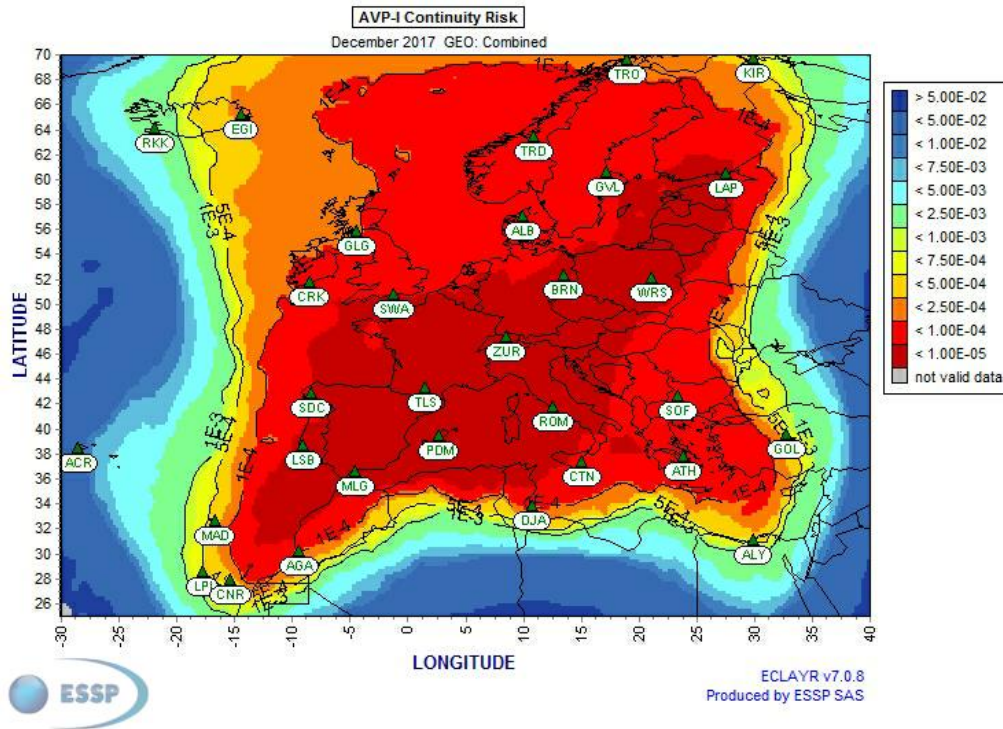


Figure 13 – EGNOS APV-I Continuity

3.2.3 EGNOS APV-I Integrity

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

No integrity event was 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. In case of ratio xPE/xPL is over 1; it indicates that a Misleading Information situation has occurred.

The next 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 over the current month. These histograms have considered that Protection Level is below APV-I Alarm Limit.

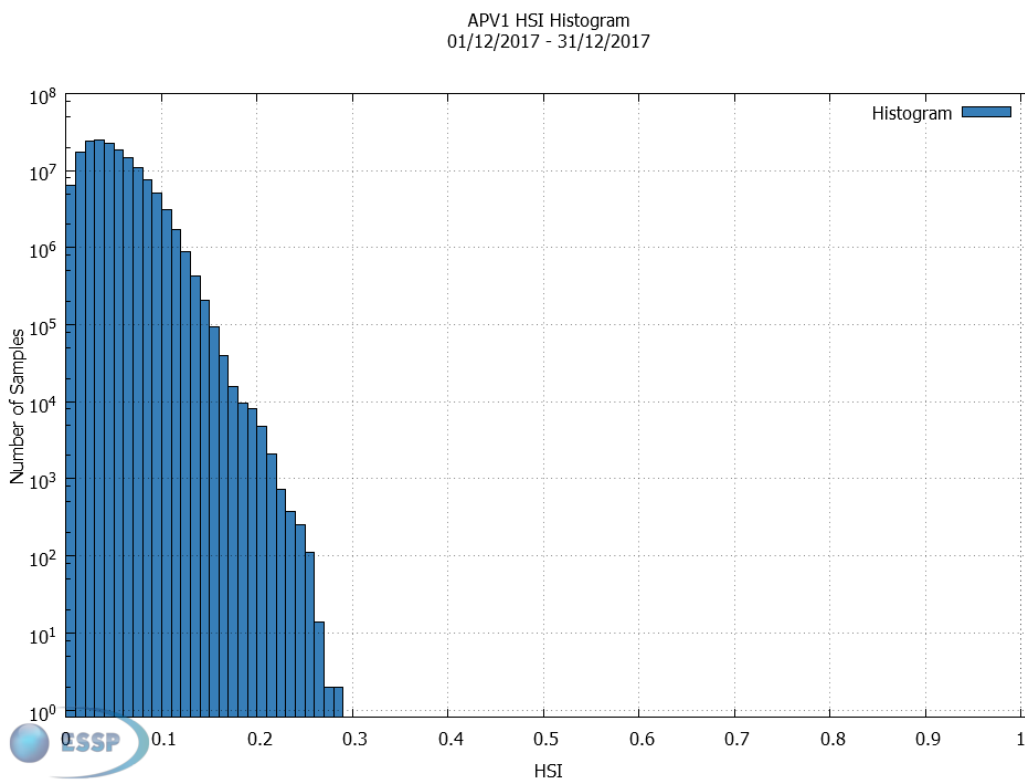


Figure 14 – EGNOS APV-I Horizontal Safety Index of the month

APV1 VSI Histogram
01/12/2017 - 31/12/2017

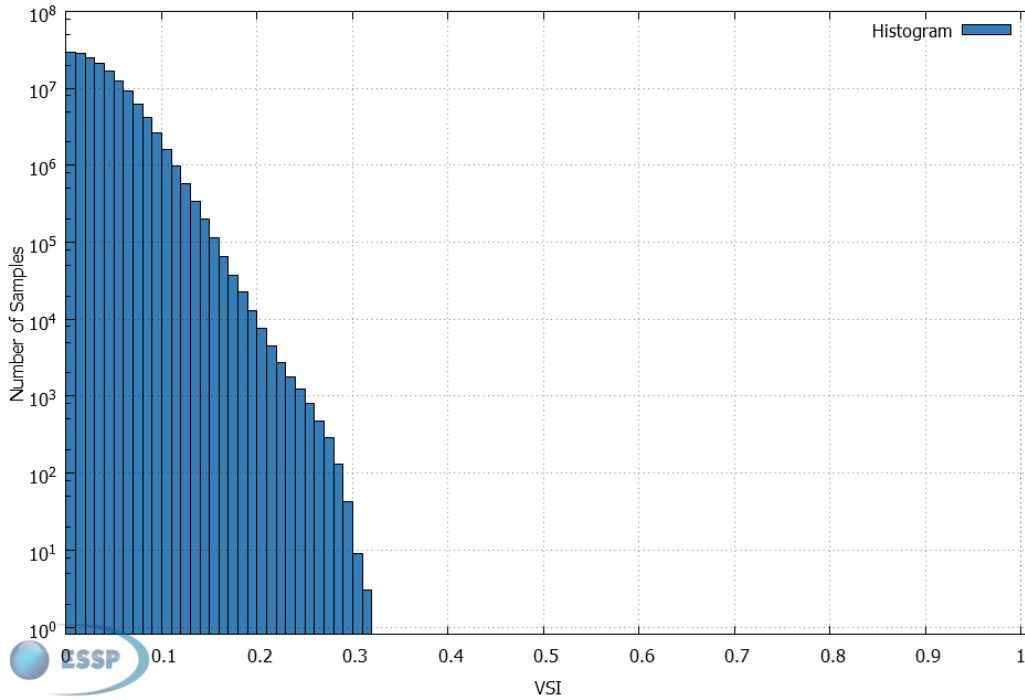


Figure 15 – EGNOS APV-I Vertical Safety Index of the month

3.2.4 EGNOS APV-I Accuracy

EGNOS APV-I Accuracy is reported as the 95th percentile of the Horizontal and Vertical Navigation System Error over the month, at the monitored sites when the APV-I service is available (HPL<40m and VPL<50m).

The following table shows the monthly APV-I Accuracy values in meters per operational GEO combined satellite. See Appendix A for further details of the stations where APV-I Accuracy are reported.

Station	HNSE 95% (meters)	VNSE 95% (meters)	% of samples with APV-I service available
Agadir	0.9	1.3	99.97%
Aalborg	0.9	1.4	100.00%
Alexandria	1.1	1.4	100.00%
Athens	0.7	1.0	99.94%
Berlin	0.9	1.1	100.00%
Canary Islands ⁵	N/A	N/A	N/A
Cork	0.9	1.3	99.71%
Catania	0.7	1.1	99.87%
Djerba	0.8	1.0	100.00%
Egilsstadir	0.6	1.5	99.98%
Glasgow	1.0	1.4	99.50%
Golbasi	0.8	1.2	100.00%
Gavle	0.8	1.5	98.97%
Kirkenes	0.8	1.7	100.00%
Lappeenranta	0.8	1.4	97.25%
La Palma	1.1	1.5	100.00%
Lisbon	0.8	1.3	99.94%
Madeira	0.7	1.1	100.00%
Málaga	0.7	1.0	99.97%
Palma de Mallorca	0.6	0.9	99.97%
Reykjavik	0.8	1.5	100.00%
Roma	0.6	1.0	99.94%
S. de Compostela	0.8	1.0	99.69%
Sofia	1.0	1.9	100.00%
Swanwick	1.0	1.5	99.97%
Toulouse	0.7	1.0	99.59%
Trondheim	0.6	1.4	99.90%
Tromsoe	0.9	2.0	99.72%
Warsaw	0.9	1.1	99.95%
Zürich	0.7	1.1	99.17%

Table 4 – EGNOS APV-I Accuracy (95%) and percentage of time in APV-I mode at reference stations

⁵ No data for Canary Islands RIMS site are available as this station is, since 6th November, out of the operational chain.

The next figures show the histogram and cumulative distribution function of HNSE (Horizontal Navigation System Error) and VNSE (Vertical Navigation System Error), which are computed at RIMS sites for each second over the current month.

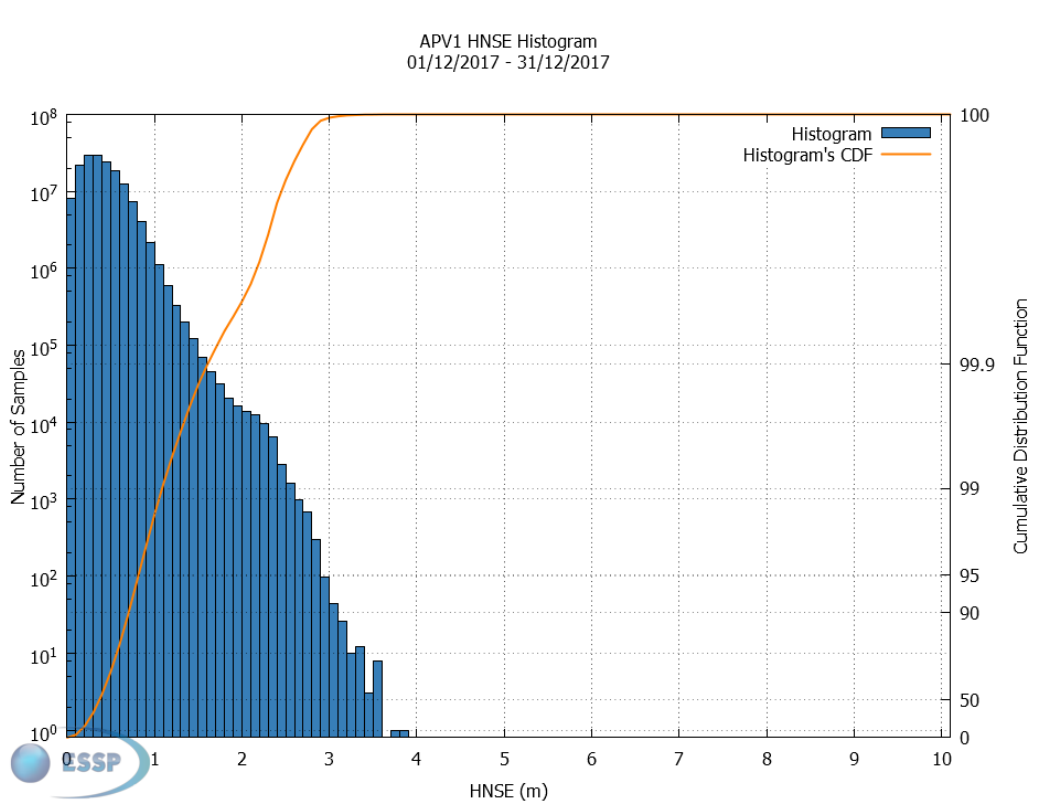


Figure 16 – EGNOS APV-I HNSE Histogram and Cumulative Probability

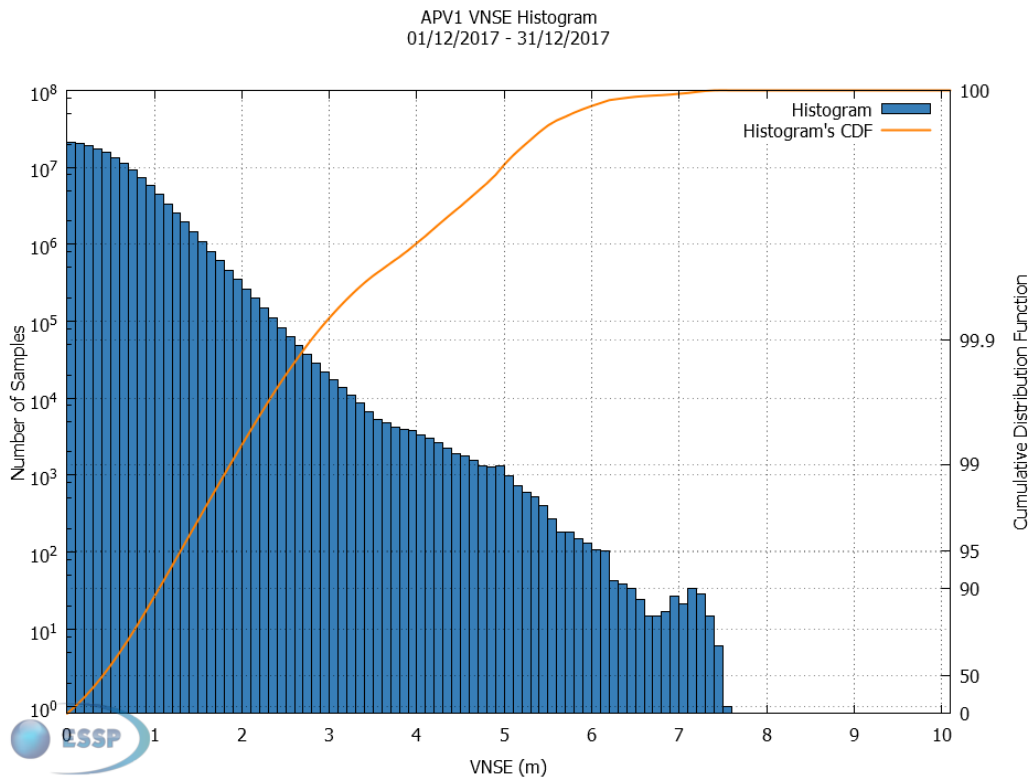


Figure 17 – EGNOS APV-I VNSE Histogram and Cumulative Probability

3.2.5 EGNOS APV-I Performance at airports

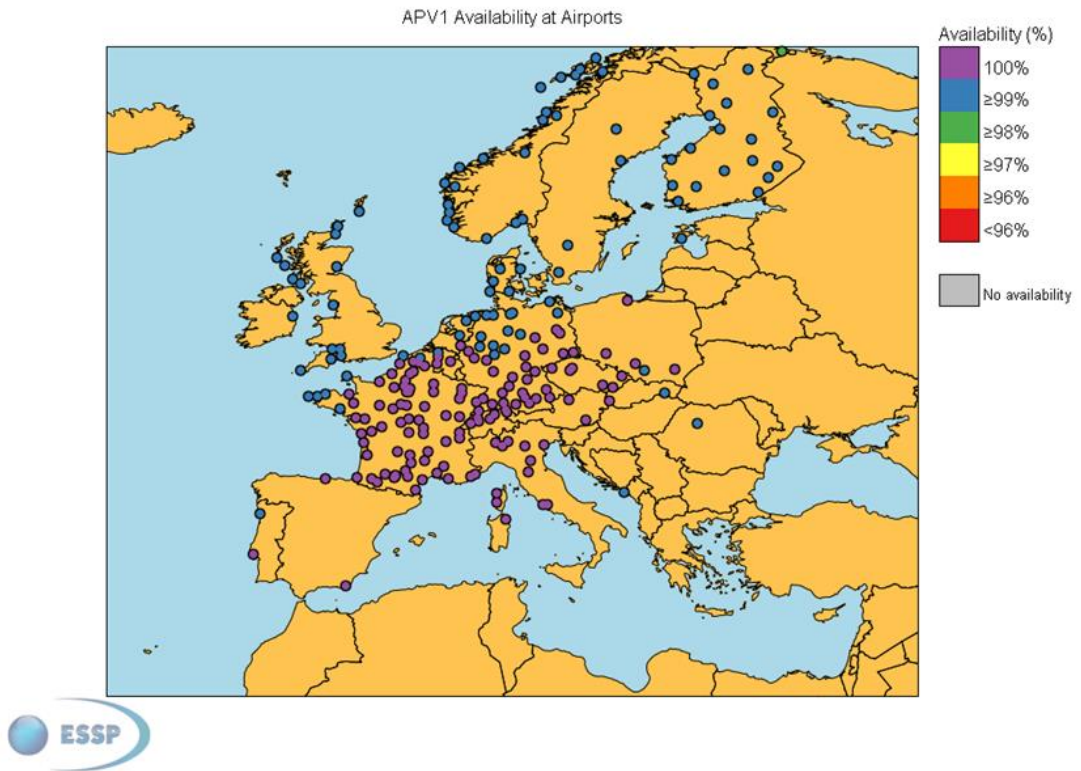


Figure 18 – EGNOS APV-I Availability at airports

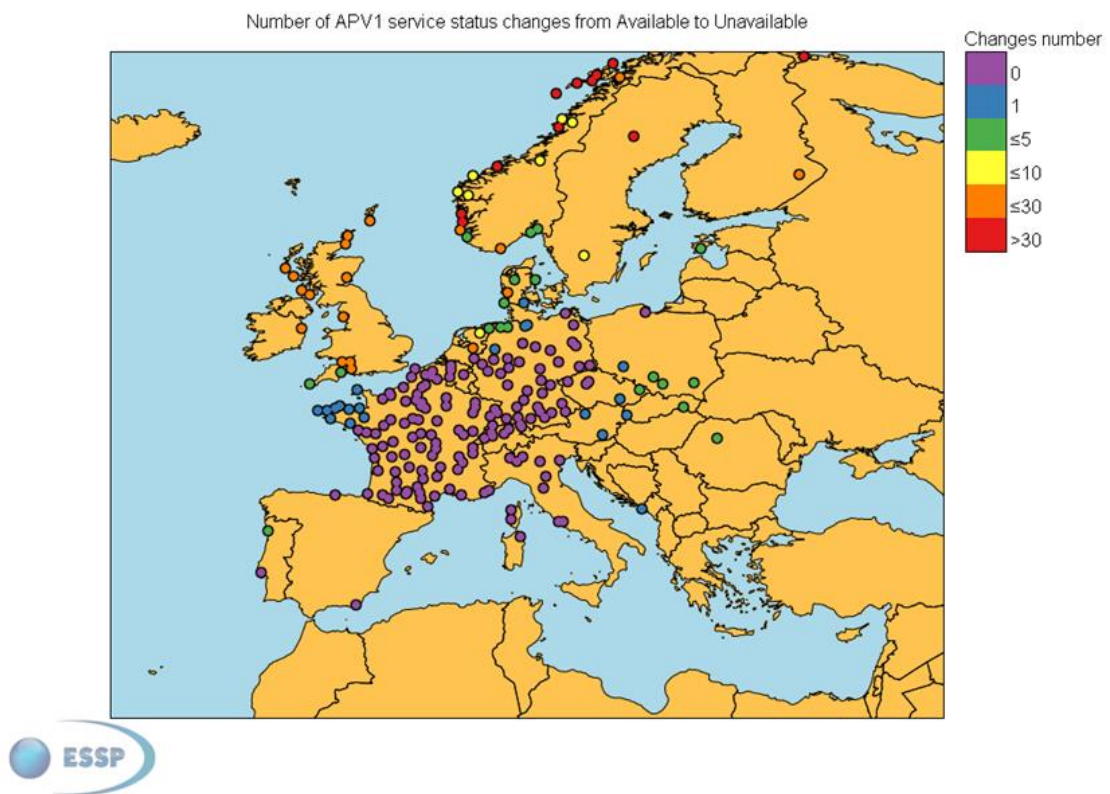


Figure 19 – EGNOS APV-I outages

See Appendix B for details of the APV-I Availability and Continuity at airports with published procedures using EGNOS.

3.3 EGNOS Localizer Performance with Vertical Guidance to a decision altitude of 200ft (LPV-200)

3.3.1 EGNOS LPV-200 Availability

EGNOS LPV-200 Availability is defined as the percentage of epochs in a month in which the Protection Level are below Alert Limits for this LPV-200 service ($HPL < 40m$ and $VPL < 35m$) over the total period. This value corresponds to the performance obtained under fault-free conditions using all satellites in view.

The following picture presents the EGNOS LPV-200 Availability over the current month using GEO-combined maps for the operational EGNOS GEOs.

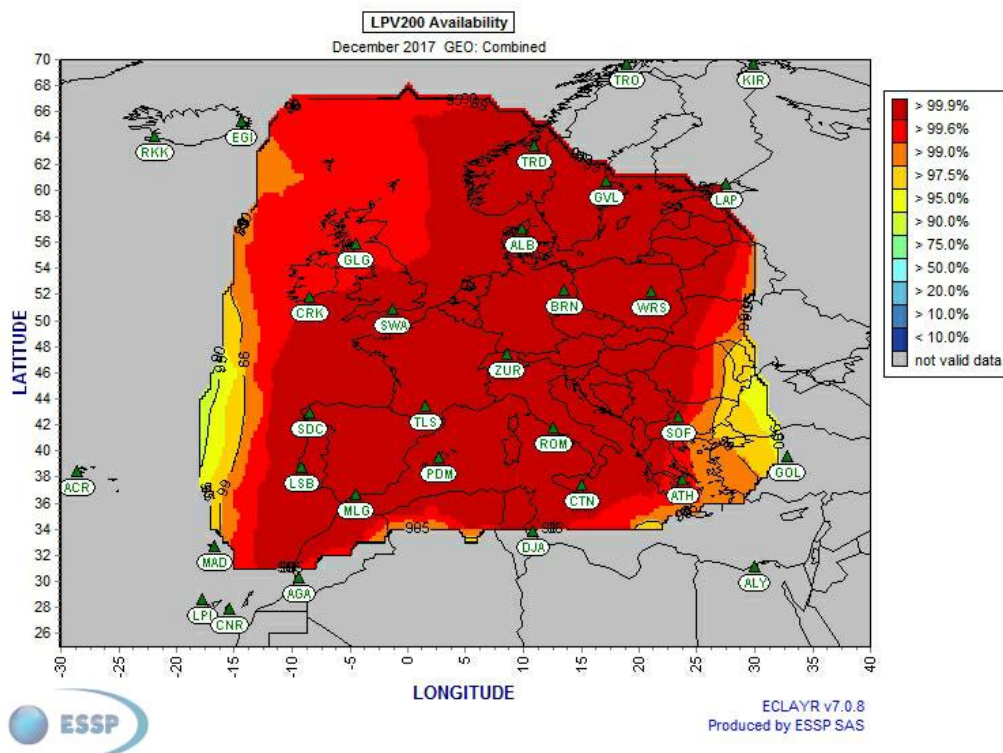


Figure 20 – EGNOS LPV-200 Availability

Below, the evolution of the monthly LPV-200 availability (99%) compliance area (30 days sliding window) is presented. The percentage is computed with respect to the commitment area at 99% level as defined in the SoL SDD ([RD-2]). The information is presented for the last 3 months.

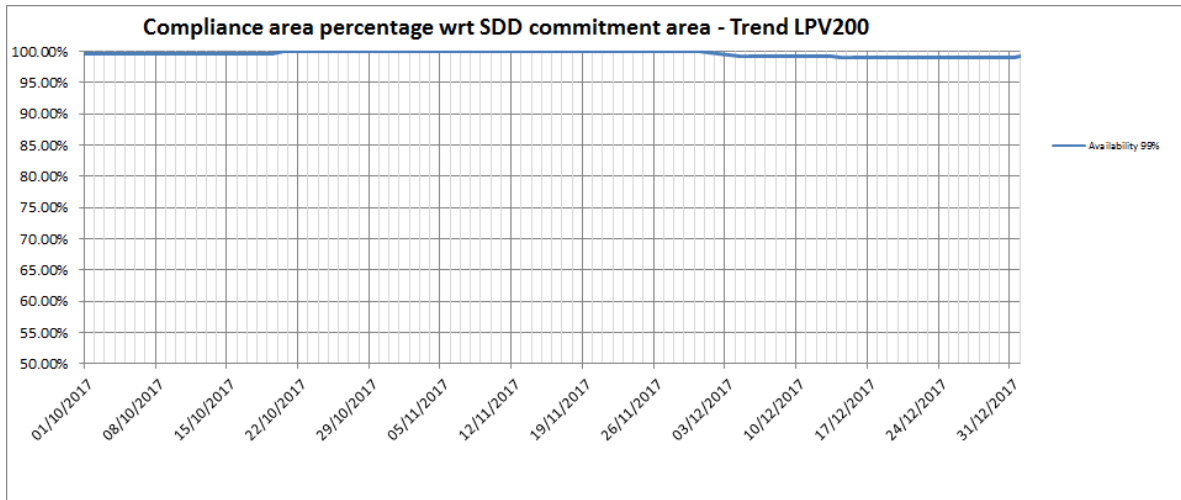


Figure 21 – EGNOS LPV-200 availability compliance trend

3.3.2 EGNOS 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 in at least one of the following 15 seconds the system becomes not available. This value corresponds to the performance obtained under fault-free conditions using all satellites in view.

The following picture presents the EGNOS LPV-200 Continuity over the current month using GEO-combined maps for the operational EGNOS GEOs.

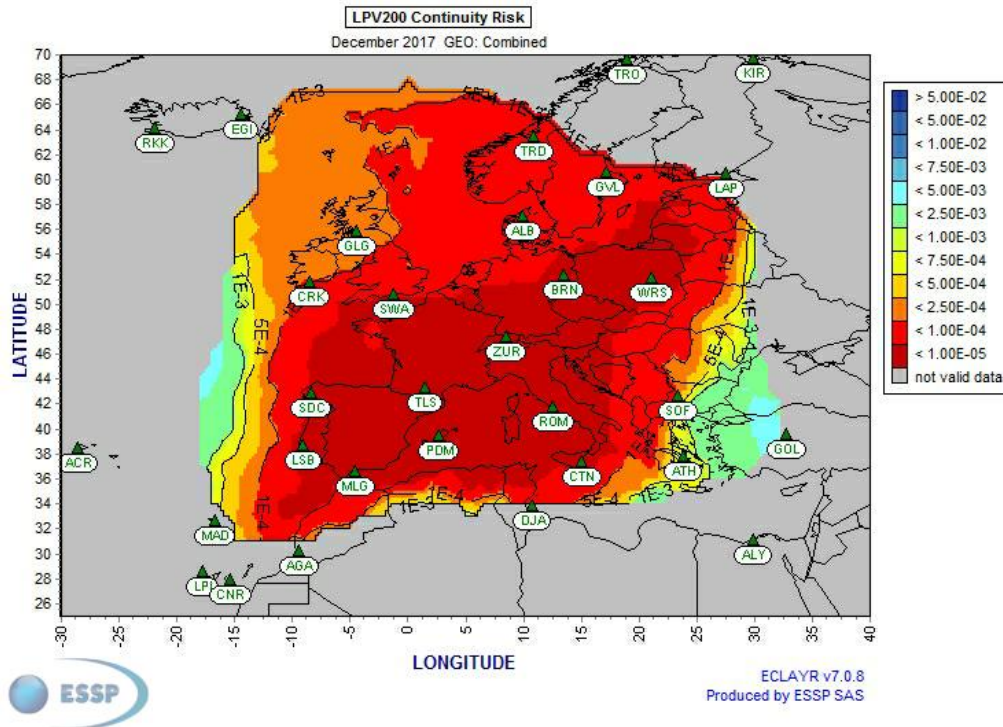


Figure 22 – EGNOS LPV-200 Continuity⁶

⁶ The lack of additional performance levels in grey areas is due to the non-compliance in this region with the accuracy requirements imposed to LPV-200 service level. For more details please refer to section 6.3.3.1 of the EGNOS Safety of Life SDD [RD-2].

3.3.3 EGNOS LPV-200 Integrity

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

No integrity event was 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. In case of ratio xPE/xPL is over 1; it indicates that a Misleading Information situation has occurred.

The next 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 over the current month. These histograms have considered that Protection Level is below LPV-200 Alarm Limit.

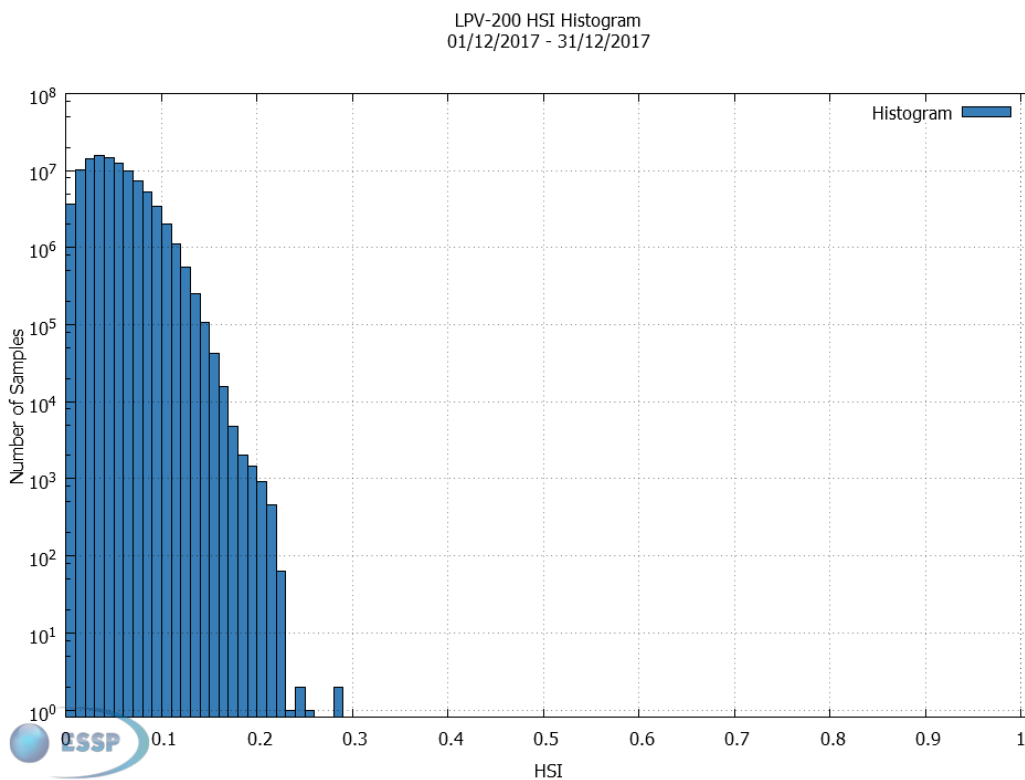


Figure 23 – EGNOS LPV-200 Horizontal Safety Index of the month

LPV-200 VSI Histogram
01/12/2017 - 31/12/2017

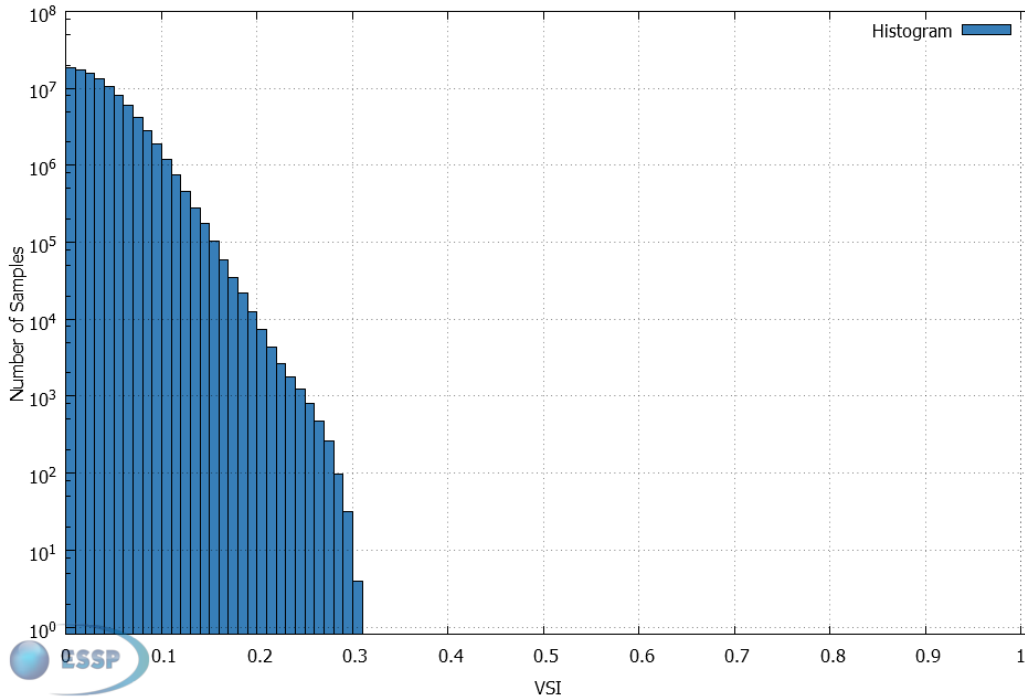


Figure 24 – EGNOS LPV-200 Vertical Safety Index of the month

3.3.4 EGNOS LPV-200 Accuracy

EGNOS LPV-200 Accuracy is reported as the 95th percentile of the Horizontal and Vertical Navigation System Error over the month, at the monitored sites when the LPV-200 service is available (HPL<40m and VPL<35m).

The following table shows the monthly LPV-200 Accuracy values in meters per operational GEO combined satellite. See Appendix A for further details of the stations where LPV-200 Accuracy are reported.

Station	HNSE 95% (meters)	VNSE 95% (meters)	% of samples with LPV-200 service available
Aalborg	0.9	1.4	99.94%
Athens	0.7	1.0	100.00%
Berlin	0.9	1.1	100.00%
Cork	0.9	1.3	99.90%
Catania	0.7	1.1	100.00%
Djerba	0.8	1.0	99.93%
Glasgow	1.0	1.4	99.80%
Gavle	0.8	1.5	100.00%
Lisboa	0.8	1.3	99.97%
Málaga	0.7	1.0	100.00%
Palma de Mallorca	0.6	0.9	100.00%
Roma	0.6	1.0	100.00%
S. de Compostela	0.8	1.0	100.00%
Sofia	1.0	1.9	99.95%
Swanwick	1.0	1.5	99.96%
Toulouse	0.7	1.0	100.00%
Trondheim	0.6	1.4	99.93%
Warsaw	0.9	1.1	100.00%
Zürich	0.7	1.1	99.66%

Table 5 – EGNOS LPV-200 Accuracy (95%) and percentage of time in LPV-200 mode at reference stations

The next figures show the histogram and cumulative distribution function of HNSE (Horizontal Navigation System Error) and VNSE (Vertical Navigation System Error), which are computed at RIMS sites for each second over the current month.

LPV-200 HNSE Histogram
01/12/2017 - 31/12/2017

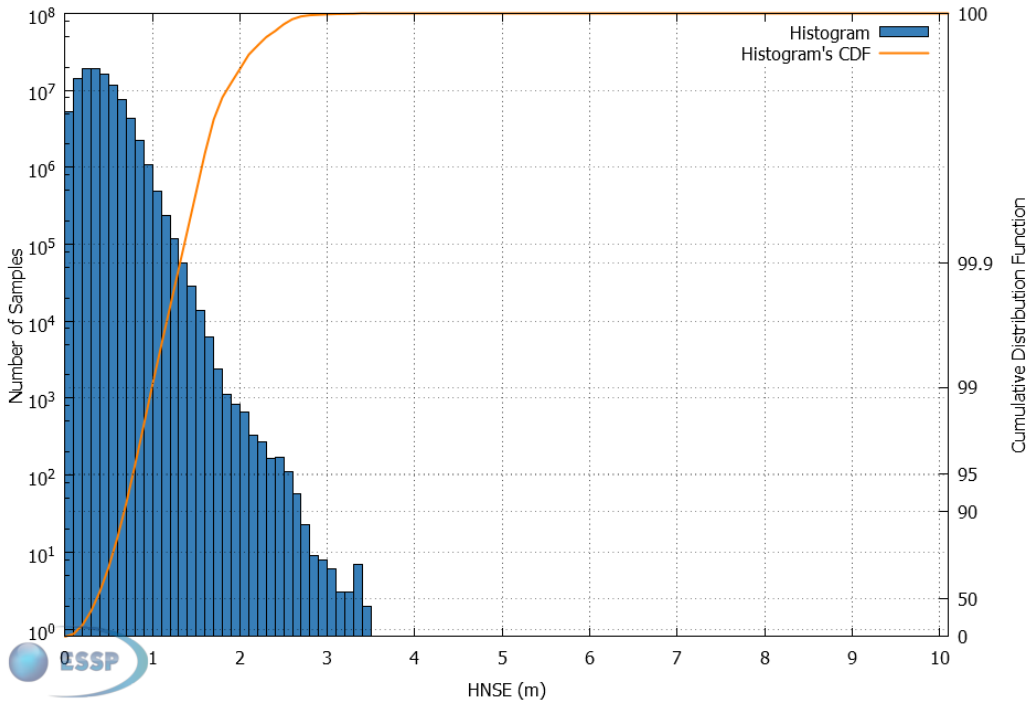


Figure 25 – EGNOS LPV-200 HNSE Histogram and Cumulative Probability

LPV-200 VNSE Histogram
01/12/2017 - 31/12/2017

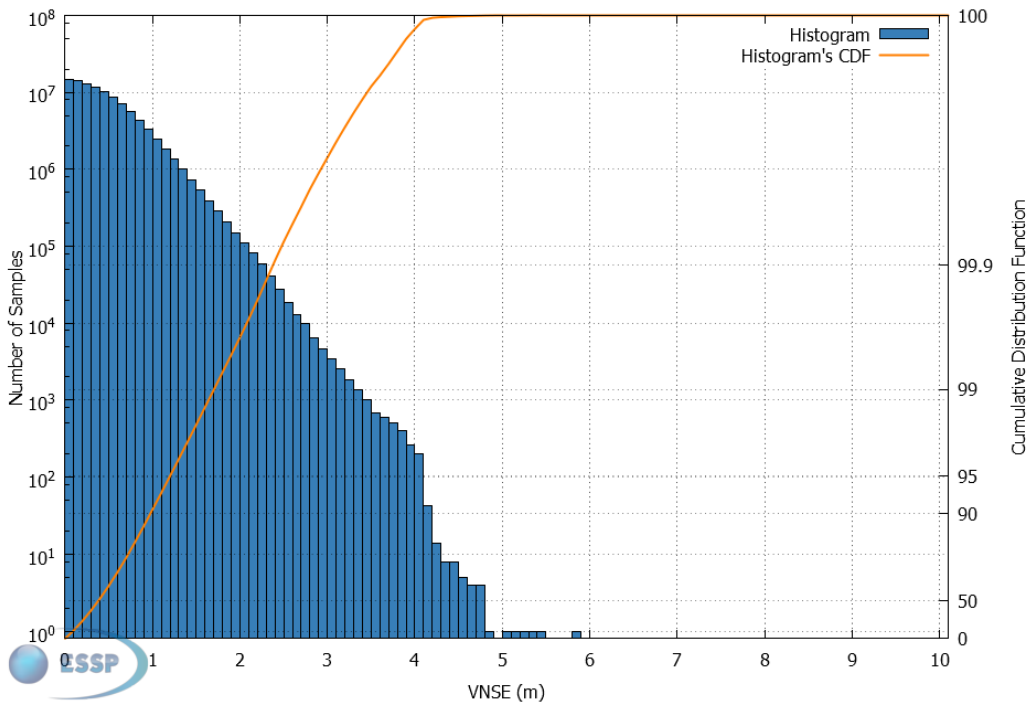


Figure 26 – EGNOS LPV-200 VNSE Histogram and Cumulative Probability

3.3.5 EGNOS LPV-200 Performance at airports

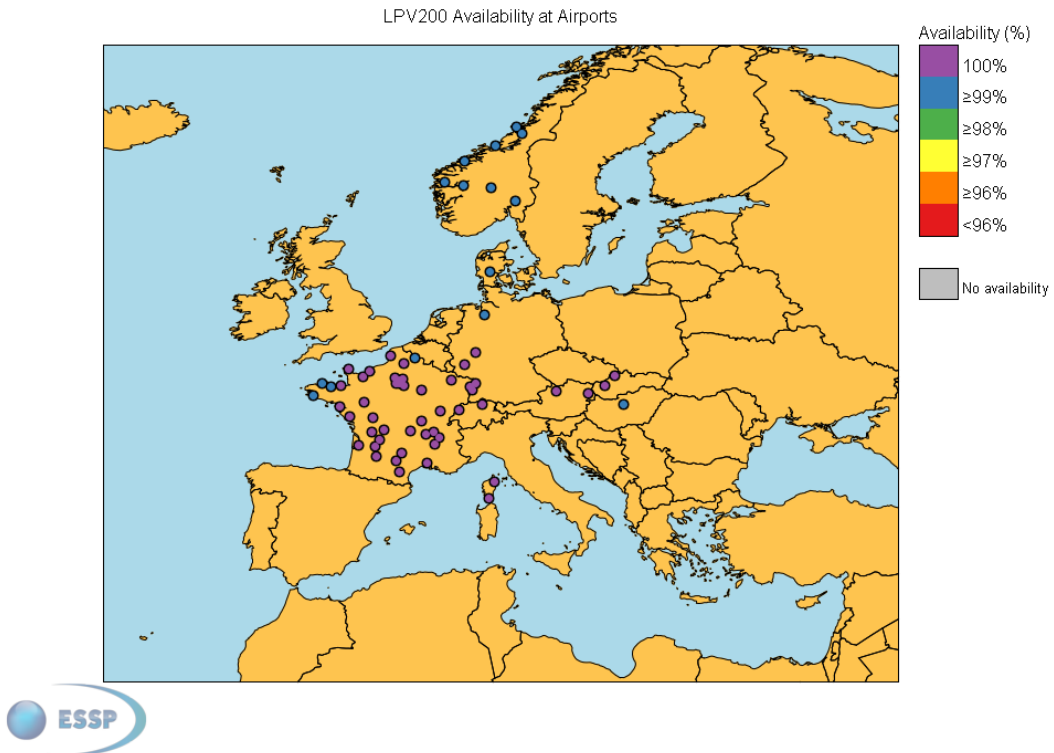


Figure 27 – EGNOS LPV-200 Availability at airports

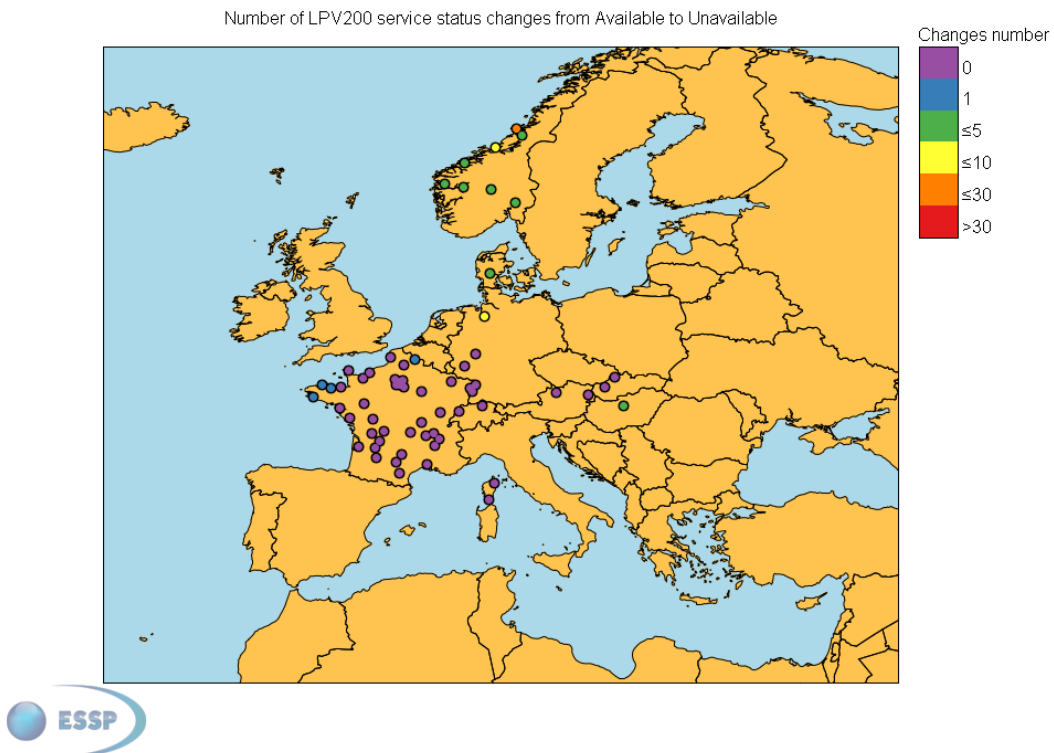


Figure 28 – EGNOS LPV-200 outages

See Appendix C for details of the LPV-200 Availability and Continuity at airports with published procedures using EGNOS.

4 EGNOS DATA ACCESS SERVICE (EDAS)

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

The main data provided by EDAS are:

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

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

Additional information on the EDAS services is available at the EDAS specific section of the EGNOS User Support website (<https://egnos-user-support.essp-sas.eu>), including a new entry with the [EDAS services status in real-time](#).

Below, the performance of EDAS Services (please refer to the EDAS SDD [RD-3] for definition details) corresponding to December 2017 is presented:

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

EDAS Service		Availability	Latency (ms)
Service Level 0	-	99.99%	555.58
Service Level 2	-	99.99%	560.39
Ntrip Service	-	99.74%	636.35
SISNeT Service	GEO Operational 1	99.69%	83.03
	GEO Operational 2	99.72%	83.20
Data Filtering Service	RIMS A	99.96%	505.68
	Central	99.95%	461.10
	MEDA	99.95%	489.10
	North-East	99.95%	192.13
	North-West	99.96%	492.42
	South-West	99.95%	497.81
FTP Service	-	99.96%	N/A

Table 6 – Performance of EDAS Services

5 EGNOS TIME SERVICE

The EGNOS Time Service supports timing application by providing specific corrections that allow the tracing of EGNOS Network Time (ENT) to the physical realisation of the Coordinated Universal Time by Observatoire de Paris, UTC (OP).

The **EGNOS Time Service availability**⁷ is computed as the percentage of time per day in which it is possible to obtain the time solution referred to UTC scale by applying a valid offset between the EGNOS Network Time (ENT) and the UTC scale, provided through the EGNOS Message Type 12.

The information is presented for the combination of both operational GEOs. As it can be observed, it is 100% or very close to 100% all days of the month, except on 1st December with 14.28%, on 6th December with 74.18%, on 7th December with 51.68%, 13th December with 98.87% and on 19th December with 90.39%.

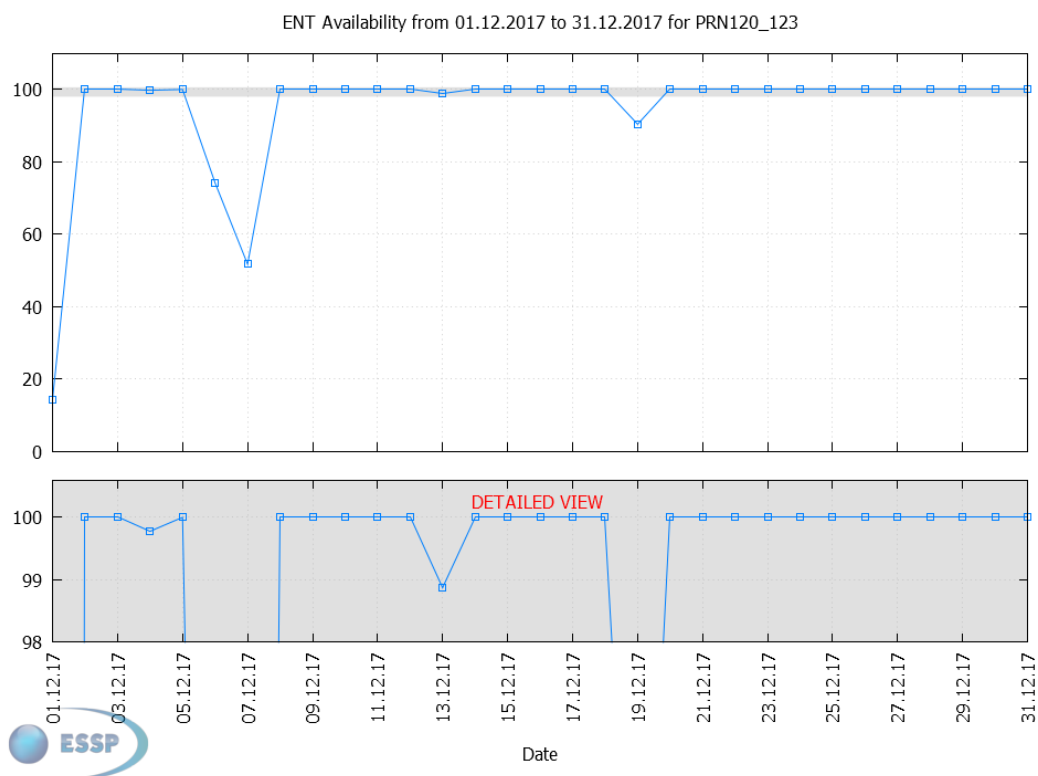


Figure 29 – EGNOS Time Service availability

The EGNOS Network Time is computed assuring its alignment with the GPS timescale, due to this requirement it must be satisfied that the offset between both timescales is below 50ns. The next figure shows the relative consistency of both ENT and GPS timescales from August to October 2017. It can be observed that the offset between them remains below 7 nanoseconds.

⁷ EGNOS Time Service availability is computed taking into account that it is not possible to obtain the time solution if the navigation solution is not obtained. Therefore, if a SiS outage longer than 3 seconds happens the MT12 data will be set as invalid in order to simulate the unavailability of the receiver to compute the PVT solution and no Time Service will be available until a new valid MT12 is received. In order to take into account the user capability of switching from one operational GEO to the other in case of SiS outage, the EGNOS Time Service availability is computed over the combination of both GEOs.

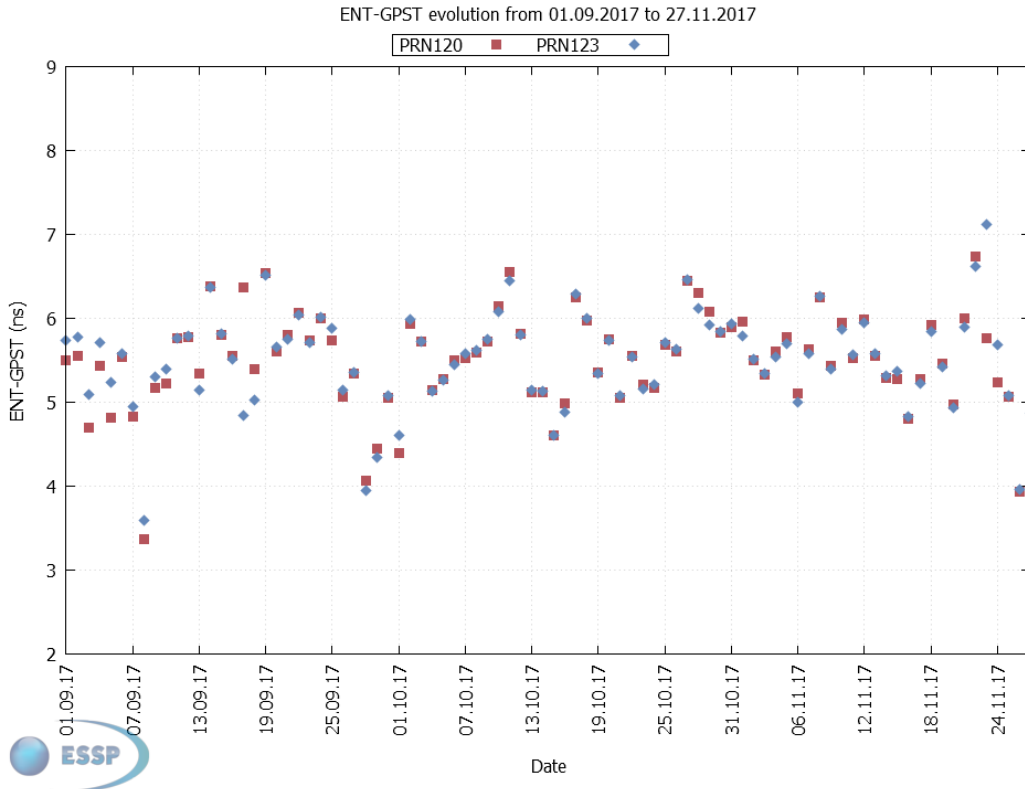


Figure 30 – ENT-GPS offset evolution

FOR MORE INFORMATION

To get more information about EGNOS performance:

Please visit the EGNOS User Support website:

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

or

Contact the EGNOS helpdesk:

egnos-helpdesk@essp-sas.eu

+34 911 236 555

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APPENDIX A RECEIVER MONITORING NETWORK

The receiver network used to report EGNOS performances in this document is based on the EGNOS monitoring stations (RIMS).

Next map shows the location of this receiver monitoring network, used in this report to present the EGNOS performances:

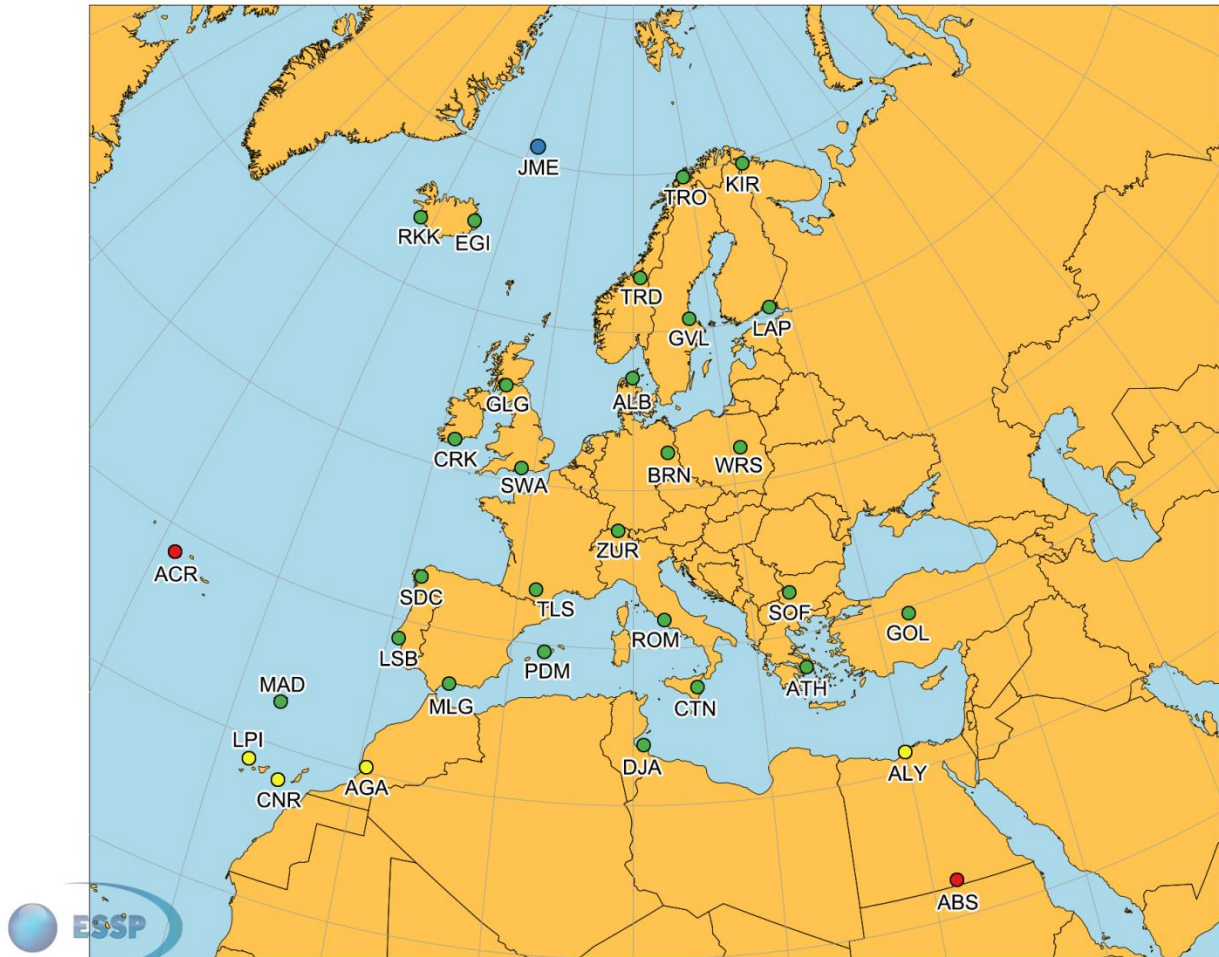


Figure 31 – EGNOS RIMS sites used in this report

The stations in green colour are used to report LPV-200⁸, APV-I and Open Service results. Performances corresponding to NPA include all the stations in green and red colour. Jan Mayen RIMS site (JME) (blue colour) is used only to report Open Service results. Canary Island (CNR), La Palma Island (LPI), Agadir (AGA) and Alexandria (ALY) RIMS sites (yellow colour) are used to report Open Service and NPA results.

Next table shows the name and location of each one, so as to calculate which service is used each one of them.

⁸ Except RIMS Egilsstadir, Reykjavik, Tromsø, Lappeeranta, Kirkenes, Madeira and Golbasi stations.

Id	Location name	Country	APV-I	LPV-200	OS	NPA
ABS	RIMS Abu Simbel	Egypt				X
ACR	RIMS Azores	Portugal				X
ALB	RIMS Aalborg	Denmark	X	X	X	X
AGA	RIMS Agadir	Morocco			X	X
ALY	RIMS Alexandria	Egypt			X	X
ATH	RIMS Athens	Greece	X	X	X	X
BRN	RIMS Berlin	Germany	X	X	X	X
CNR	RIMS Canary Isl.	Spain			X	X
CRK	RIMS Cork	Ireland	X	X	X	X
CTN	RIMS Catania	Italy	X	X	X	X
DJA	RIMS Djerba	Tunisia	X	X	X	X
EGI	RIMS Egilsstadir	Iceland	X		X	X
GLG	RIMS Glasgow	United Kingdom	X	X	X	X
GOL	RIMS Golbasi	Turkey	X		X	X
GVL	RIMS Gävle	Sweden	X	X	X	X
JME	RIMS Jan Mayen	Norway			X	
KIR	RIMS Kirkenes	Norway	X		X	X
LAP	RIMS Lappeenranta	Finland	X		X	X
LPI	RIMS La Palma	Spain			X	X
LSB	RIMS Lisbon	Portugal	X	X	X	X
MAD	RIMS Madeira	Portugal	X		X	X
MLG	RIMS Málaga	Spain	X	X	X	X
PDM	RIMS Palma de Mallorca	Spain	X	X	X	X
RKK	RIMS Reykjavik	Iceland	X		X	X
ROM	RIMS Roma	Italy	X	X	X	X
SDC	RIMS S. de Compostela	Spain	X	X	X	X
SOF	RIMS Sofia	Bulgaria	X	X	X	X
SWA	RIMS Swanwick	United Kingdom	X	X	X	X
TLS	RIMS Toulouse	France	X	X	X	X
TRD	RIMS Trondheim	Norway	X	X	X	X
TRO	RIMS Tromsoe	Norway	X		X	X
WRS	RIMS Warsaw	Poland	X	X	X	X
ZUR	RIMS Zürich	Switzerland	X	X	X	X

Table 7 – List of sites where performances are reported

Note that for the computation of the different histograms presented in this document, some periods may have been removed, corresponding to stations presenting bad quality of data linked to local environment.

APPENDIX B EGNOS APV-I PERFORMANCE AT AIRPORTS

The table reports APV-I Availability and Continuity at airports with published procedures using EGNOS. These values correspond to the performance obtained under fault-free conditions using all satellites in view:

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages ⁹	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
EBAW / Antwerpen / Deurne	Belgium	≥99.99%	1.12E-05	2	10/12/2015	99.98%	5.75E-06
EBBR / Brussels-National	Belgium	100.00%	0.00E+00	0	02/03/2017	99.96%	5.14E-06
EBCI / Charleroi / Brussels South	Belgium	100.00%	0.00E+00	0	31/03/2016	99.98%	4.33E-06
EBLG / Liège	Belgium	100.00%	0.00E+00	0	13/10/2016	99.98%	3.54E-06
EBKT / Kortrijk/Wevelgem	Belgium	≥99.99%	5.60E-06	1	09/11/2017	≥99.99%	3.62E-06
EDAB / Bautzen	Germany	100.00%	0.00E+00	0	27/04/2017	99.90%	1.81E-05
EDBH / Barth	Germany	99.98%	1.68E-05	3	03/06/2010	99.89%	2.05E-05
EDBM / Magdeburg/City	Germany	100.00%	0.00E+00	0	13/12/2012	99.90%	1.83E-05
EDBN / Neubrandenburg	Germany	≥99.99%	5.60E-06	1	02/04/2015	99.99%	1.00E-05
EDDB / Berlin/Schönefeld	Germany	100.00%	0.00E+00	0	04/06/2009	99.90%	2.06E-05
EDDC / Dresden	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.62E-05
EDDE / Erfurt-Weimar	Germany	100.00%	0.00E+00	0	15/12/2011	99.91%	1.44E-05
EDDF / Frankfurt Main	Germany	100.00%	0.00E+00	0	15/12/2011	99.91%	1.52E-05
EDDG / Münster/Osnabrück	Germany	≥99.99%	5.60E-06	1	15/12/2011	99.90%	1.65E-05
EDDH / Hamburg	Germany	99.98%	1.90E-05	4	15/12/2011	99.89%	2.03E-05
EDDK / Köln/Bonn	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.50E-05
EDDL / Düsseldorf	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.39E-05
EDDM / München	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.97E-05
EDDN / Nürnberg	Germany	100.00%	0.00E+00	0	15/12/2011	99.91%	1.47E-05
EDDP / Leipzig/Halle	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.70E-05
EDDS / Stuttgart	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.99E-05
EDDT / Berlin-Tegel	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	2.00E-05
EDDV / Hannover	Germany	99.99%	2.31E-05	5	15/12/2011	99.90%	1.85E-05
EDFQ / Allendorf/Eder	Germany	≥99.99%	5.60E-06	1	21/08/2014	99.90%	1.55E-05
EDGS / Siegerland	Germany	100.00%	0.00E+00	0	12/10/2017	100.00%	0.00E+00
EDHI / Hamburg-Finkenwerder	Germany	99.98%	1.68E-05	3	13/12/2012	99.89%	2.09E-05
EDJA / Memmingen	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.99E-05
EDLP / Paderborn/Lippstadt	Germany	≥99.99%	5.60E-06	1	13/12/2012	99.90%	1.77E-05
EDLV / Niederrhein	Germany	100.00%	0.00E+00	0	23/06/2016	99.98%	3.12E-06

⁹ Outages refer to events when the APV-I service changes its status from Available to Unavailable for the reported month.

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages ⁹	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
EDLW / Dortmund	Germany	≥99.99%	5.60E-06	1	12/12/2013	99.90%	1.57E-05
EDMA / Augsburg	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.95E-05
EDME / Eggenfelden	Germany	100.00%	0.00E+00	0	11/12/2014	99.90%	2.05E-05
EDMO / Oberpfaffenhofen	Germany	100.00%	0.00E+00	0	13/12/2012	99.90%	1.98E-05
EDMS / Straubing	Germany	100.00%	0.00E+00	0	11/12/2014	99.90%	1.66E-05
EDNY / Friedrichshafen	Germany	100.00%	0.00E+00	0	15/12/2011	99.90%	1.91E-05
EDPR / Donauwörth	Germany	100.00%	0.00E+00	0	08/12/2016	99.99%	3.12E-06
EDQC / Coburg-Brandensteinebene	Germany	100.00%	0.00E+00	0	11/12/2014	99.91%	1.39E-05
EDQD / Bayreuth	Germany	100.00%	0.00E+00	0	15/12/2011	99.91%	1.45E-05
EDQG / Giebelstadt	Germany	100.00%	0.00E+00	0	14/02/2012	99.91%	1.45E-05
EDTD / Donaueschingen-Villingen	Germany	100.00%	0.00E+00	0	11/12/2014	99.90%	1.92E-05
EDTL / Lahr	Germany	100.00%	0.00E+00	0	23/06/2016	99.99%	7.63E-06
EDTM / Mengen-Hohentengen	Germany	100.00%	0.00E+00	0	11/12/2014	99.90%	2.04E-05
EDTY / Schwäbisch-Hall	Germany	100.00%	0.00E+00	0	13/12/2012	99.90%	1.70E-05
EDVE / Braunschweig-Wolfsburg	Germany	99.99%	1.12E-05	2	18/10/2012	99.90%	1.83E-05
EDVK / Kassel-Calden	Germany	≥99.99%	5.60E-06	1	04/04/2013	99.96%	1.02E-05
EDWB / Bremerhaven	Germany	99.99%	1.12E-05	2	15/12/2011	99.89%	1.87E-05
EDWE / Emden	Germany	99.98%	1.53E-05	6	30/05/2013	99.98%	1.02E-05
EDWI / Wilhelmshaven JadeWeserAirport	Germany	99.99%	1.27E-05	4	15/12/2011	99.89%	1.82E-05
EDXW / Sylt	Germany	99.98%	2.95E-05	11	10/12/2015	99.98%	1.08E-05
EEKE / Kuressaare	Estonia	99.99%	5.60E-06	1	02/03/2017	99.98%	1.40E-05
EFET / Enontekiö	Finland	99.68%	1.24E-04	28	07/12/2017	99.68%	1.24E-04
EFIV / Ivalo	Finland	99.54%	1.97E-04	37	07/12/2017	99.54%	1.97E-04
EFJO / Joensuu	Finland	99.91%	5.08E-05	16	12/12/2013	99.72%	1.62E-04
EFJY / Jyväskylä	Finland	99.98%	1.39E-05	2	07/12/2017	99.98%	1.39E-05
EFKE / Kemi-Tornio	Finland	99.89%	1.00E-04	48	07/12/2017	99.89%	1.00E-04
EFKI / Kajaani	Finland	99.94%	2.78E-05	4	07/12/2017	99.94%	2.78E-05
EFKK / Kokkola-Pietarsaari	Finland	99.97%	2.18E-05	5	07/12/2017	99.97%	2.18E-05
EFKS / Kuusamo	Finland	99.75%	2.17E-04	77	07/12/2017	99.75%	2.17E-04
EFKT / Kittilä	Finland	99.71%	1.04E-04	18	07/12/2017	99.71%	1.04E-04
EFKU / Kuopio	Finland	99.93%	2.78E-05	4	07/12/2017	99.93%	2.78E-05
EFLP / Lappeenranta	Finland	99.99%	6.95E-06	1	07/12/2017	99.99%	6.95E-06
EFOU / Oulu	Finland	99.93%	3.47E-05	5	07/12/2017	99.93%	3.47E-05
EFPO / Pori	Finland	99.98%	1.39E-05	2	07/12/2017	99.98%	1.39E-05

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages ⁹	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
EFRO / Rovaniemi	Finland	99.82%	9.74E-05	15	07/12/2017	99.82%	9.74E-05
EFSA / Savonlinna	Finland	99.94%	4.86E-05	7	07/12/2017	99.94%	4.86E-05
EFTP / Tampere-Pirkkala	Finland	99.99%	6.95E-06	1	07/12/2017	99.99%	6.95E-06
EFTU / Turku	Finland	99.98%	1.39E-05	2	07/12/2017	99.98%	1.39E-05
EFVA / Vaasa	Finland	99.97%	4.31E-05	24	07/12/2017	99.97%	4.31E-05
EGEC / Campbeltown	United Kingdom	99.86%	1.24E-04	42	23/06/2016	99.93%	2.95E-05
EGFF / Cardiff	United Kingdom	99.97%	2.24E-05	4	13/10/2016	99.96%	1.55E-05
EGGD / Bristol	United Kingdom	99.97%	2.24E-05	4	21/08/2014	99.98%	1.21E-05
EGHC / Lands End	United Kingdom	99.99%	5.60E-06	1	27/04/2017	99.99%	6.28E-06
EGHG / Yeovil	United Kingdom	99.98%	1.12E-05	2	09/06/2017	99.99%	8.84E-06
EGJA / Alderney	Guernsey	99.99%	5.60E-06	1	07/12/2011	99.90%	1.67E-05
EGNL / Barrow/Walney Island	United Kingdom	99.94%	4.97E-05	12	23/06/2016	99.94%	1.91E-05
EGPA / Kirkwall	United Kingdom	99.86%	1.02E-04	20	21/07/2016	99.92%	2.81E-05
EGPB / Sumburgh	United Kingdom	99.85%	8.97E-05	16	27/04/2017	99.94%	3.67E-05
EGPC / Wick	United Kingdom	99.89%	9.01E-05	17	23/06/2016	99.92%	2.48E-05
EGPI / Islay	United Kingdom	99.85%	1.36E-04	28	18/08/2016	99.93%	2.79E-05
EGPN / Dundee	United Kingdom	99.89%	9.49E-05	18	30/03/2017	99.93%	2.17E-05
EGPR / Barra	United Kingdom	99.77%	1.54E-04	28	18/08/2016	99.92%	3.25E-05
EGPU / Tiree	United Kingdom	99.81%	1.62E-04	31	04/02/2016	99.92%	3.23E-05
EGTE / Exeter	United Kingdom	99.98%	2.20E-05	9	21/08/2014	99.98%	9.96E-06
EHGG / Eelde	Netherlands	99.98%	1.27E-05	4	13/11/2014	99.98%	9.86E-06
EHTE / Teuge	Netherlands	≥99.99%	8.21E-06	4	13/11/2014	99.98%	8.81E-06
EIDW / Dublin	Ireland	99.92%	6.54E-05	14	25/05/2017	99.97%	1.93E-05
EKAH / Aarhus	Denmark	99.98%	2.24E-05	4	05/03/2015	99.98%	1.24E-05
EKEB / Esbjerg	Denmark	99.97%	2.84E-05	6	15/10/2015	99.98%	1.32E-05
EKKA / Karup	Denmark	99.97%	2.24E-05	4	02/04/2015	99.98%	1.11E-05
EKSB / Sønderborg	Denmark	99.98%	2.24E-05	4	18/08/2016	99.98%	9.79E-06
ENAL / Ålesund/Vigra	Norway	99.94%	2.80E-05	5	03/03/2016	99.96%	2.30E-05
ENAN / Andøya/Andenes	Norway	99.74%	1.16E-04	31	02/04/2015	99.79%	1.18E-04
ENBL / Førde/Bringeland	Norway	99.94%	3.59E-05	8	28/05/2015	99.97%	1.92E-05
ENBN / Brønnøysund/Brønnøy	Norway	99.97%	2.32E-05	7	08/12/2016	99.93%	3.69E-05
ENBR / Bergen/Flesland	Norway	99.95%	2.24E-05	4	03/03/2016	99.97%	1.81E-05

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages ⁹	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
ENCN / Kristiansand/Kjevik	Norway	99.95%	2.24E-05	4	03/03/2016	99.98%	1.33E-05
ENEV / Harstad/Narvik/Evenes	Norway	99.81%	1.17E-04	44	30/03/2017	99.75%	9.37E-05
ENFL / Florø	Norway	99.94%	4.52E-05	13	02/04/2015	99.97%	1.98E-05
ENHD / Haugesund/Karmøy	Norway	99.95%	2.24E-05	4	03/03/2016	99.97%	1.60E-05
ENKB / Kristiansund/Kvernberget	Norway	99.94%	2.80E-05	5	26/05/2016	99.96%	2.46E-05
ENKR / Kirkenes/Hoybuktnoen	Norway	98.98%	5.65E-04	250	27/04/2017	99.17%	4.84E-04
ENLK / Leknes	Norway	99.87%	7.18E-05	19	02/02/2017	99.81%	8.92E-05
ENMS / Mosjøen/Kjærstad	Norway	99.98%	2.80E-05	6	30/03/2017	99.90%	4.43E-05
ENRS / Røst	Norway	99.89%	7.66E-05	44	06/03/2014	99.81%	1.01E-04
ENRY / Moss/Rygge	Norway	99.95%	2.24E-05	4	10/12/2015	99.98%	1.56E-05
ENSH / Svolvær/Helle	Norway	99.85%	8.30E-05	28	08/12/2016	99.82%	8.73E-05
ENSK / Stokmarknes/Skagen	Norway	99.83%	1.04E-04	27	08/12/2016	99.80%	9.83E-05
ENSO / Stord/Sørstokken	Norway	99.95%	2.50E-05	11	03/03/2016	99.97%	1.61E-05
ENST / Sandnessjøen/Stokka	Norway	99.98%	2.24E-05	5	23/07/2015	99.93%	4.07E-05
ENTO / Sandefjord/Torp	Norway	99.95%	2.24E-05	4	20/08/2015	99.98%	1.43E-05
ENVA / Trondheim/Vårnes	Norway	99.94%	2.80E-05	6	03/03/2016	99.96%	2.45E-05
EPGD / Gdańsk Lech Wałęsa	Poland	100.00%	0.00E+00	0	28/05/2015	99.98%	1.26E-05
EPKK / Kraków - Balice	Poland	≥99.99%	5.60E-06	1	18/08/2016	99.98%	1.31E-05
EPKT / Katowice	Poland	100.00%	0.00E+00	0	03/04/2014	99.98%	1.24E-05
EPRZ / Rzeszów - Jasionka	Poland	100.00%	0.00E+00	0	15/09/2016	99.97%	2.02E-05
EPWR / Wrocław/Strachowice	Poland	100.00%	0.00E+00	0	13/10/2016	99.99%	6.69E-06
ESGJ / Jönköping	Sweden	99.98%	2.17E-05	9	09/11/2017	99.98%	2.36E-05
ESNO / Örnköldsvik	Sweden	99.97%	2.78E-05	4	07/12/2017	99.97%	2.78E-05
ESTL / Ljungbyhed	Sweden	99.97%	2.08E-05	3	07/12/2017	99.97%	2.08E-05
ESUD / Storuman	Sweden	99.98%	1.68E-05	4	11/12/2014	99.91%	6.41E-05
LDDU / Dubrovnik	Croatia	99.98%	1.68E-05	3	10/12/2015	99.98%	1.17E-05
LEAM / Almería	Spain	100.00%	0.00E+00	0	02/02/2017	99.99%	3.86E-06
LEXJ / Santander	Spain	100.00%	0.00E+00	0	17/10/2013	99.94%	4.77E-05
LFAB / Dieppe Saint Aubin	France	100.00%	0.00E+00	0	02/03/2017	99.96%	4.00E-06
LFAC / Calais	France	≥99.99%	1.68E-05	3	20/09/2012	99.95%	1.49E-05
LFAQ / Albert Bray	France	100.00%	0.00E+00	0	15/11/2012	99.95%	1.36E-05
LFAT / Le Touquet Paris Plage	France	100.00%	0.00E+00	0	04/02/2016	99.98%	5.38E-06

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages ⁹	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
LFAV / Valenciennes Denain	France	100.00%	0.00E+00	0	19/09/2013	99.98%	9.51E-06
LFAY / Amiens Glisy	France	100.00%	0.00E+00	0	27/06/2013	99.95%	1.18E-05
LFBD / Bordeaux Merignac	France	100.00%	0.00E+00	0	08/03/2012	99.89%	2.04E-05
LFBF / Toulouse Francazal	France	100.00%	0.00E+00	0	23/06/2016	99.99%	4.97E-06
LFBH / La Rochelle	France	100.00%	0.00E+00	0	20/09/2012	99.94%	1.88E-05
LFBI / Poitiers Biard	France	100.00%	0.00E+00	0	12/11/2015	99.98%	6.33E-06
LFBK / Montluçon Gueret	France	100.00%	0.00E+00	0	17/12/2013	99.98%	1.72E-05
LFBN / Niort Marais Poitevin	France	100.00%	0.00E+00	0	02/03/2017	99.96%	5.37E-06
LFBO / Toulouse Blagnac	France	100.00%	0.00E+00	0	03/05/2012	99.89%	2.02E-05
LFBP / Pau-Pyrénées	France	100.00%	0.00E+00	0	17/03/2011	99.88%	2.82E-05
LFBR / Muret Lherm	France	100.00%	0.00E+00	0	15/10/2015	99.99%	7.20E-06
LFBT / Tarbes Lourdes Pyrénées	France	100.00%	0.00E+00	0	28/05/2015	99.98%	8.32E-06
LFBZ / Biarritz Bayonne Anglet	France	100.00%	0.00E+00	0	09/02/2012	99.87%	3.98E-05
LFCE / Albi Le Sequestre	France	100.00%	0.00E+00	0	26/05/2016	99.99%	8.48E-06
LFCK / Castres Mazamet	France	100.00%	0.00E+00	0	22/08/2013	99.97%	1.99E-05
LFCL / Rodez Marcillac	France	100.00%	0.00E+00	0	31/05/2012	99.89%	2.09E-05
LFCS / Royan Médis	France	100.00%	0.00E+00	0	30/04/2015	99.98%	8.04E-06
LFDD / Auch Lamothe	France	100.00%	0.00E+00	0	28/05/2015	99.98%	7.66E-06
LFDE / Ouessant	France	99.99%	5.60E-06	1	11/12/2014	99.98%	1.20E-05
LFDF / Colmar Houssen	France	100.00%	0.00E+00	0	02/05/2013	99.95%	1.87E-05
LFDP / Le Puy Loudes	France	100.00%	0.00E+00	0	04/02/2016	99.99%	7.09E-06
LFDS / Moulins Montbeugny	France	100.00%	0.00E+00	0	01/05/2014	99.98%	8.77E-06
LFDT / Metz Nancy Lorraine	France	100.00%	0.00E+00	0	04/04/2013	99.95%	1.61E-05
LFDE / Calvi Sainte Catherine	France	100.00%	0.00E+00	0	30/04/2015	99.99%	6.93E-06
LFDF / Ajaccio Napoléon Bonaparte	France	100.00%	0.00E+00	0	23/06/2016	99.99%	2.87E-06
LFDA / Auxerre Branches	France	100.00%	0.00E+00	0	21/08/2014	99.98%	9.21E-06
LFDD / Bourges	France	100.00%	0.00E+00	0	18/08/2016	99.98%	3.63E-06
LFDE / Lyon St Exupery	France	100.00%	0.00E+00	0	07/02/2013	99.95%	1.72E-05
LFDF / Annecy Meythet	France	100.00%	0.00E+00	0	19/09/2013	99.98%	1.89E-05
LFDE / Vichy Charmeil	France	100.00%	0.00E+00	0	05/02/2015	99.98%	1.17E-05
LFDF / Aurillac	France	100.00%	0.00E+00	0	26/06/2014	99.98%	1.48E-05
LFDE / Chateauroux Deols	France	100.00%	0.00E+00	0	06/02/2014	99.98%	1.31E-05

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages ⁹	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
LFMD / Cannes Mandelieu	France	100.00%	0.00E+00	0	05/02/2015	99.99%	1.13E-05
LFML / Marseille	France	100.00%	0.00E+00	0	08/01/2015	99.99%	9.38E-06
LFMN / Nice Côte d'Azur	France	100.00%	0.00E+00	0	25/06/2015	99.99%	5.63E-06
LFMP / Perpignan Rivesaltes	France	100.00%	0.00E+00	0	15/10/2015	99.99%	7.33E-06
LFMU / Béziers Vias	France	100.00%	0.00E+00	0	18/10/2012	99.95%	1.84E-05
LFNB / Mende	France	100.00%	0.00E+00	0	17/12/2013	99.98%	1.71E-05
LFOB / Beauvais	France	100.00%	0.00E+00	0	20/09/2012	99.95%	1.43E-05
LFOE / Évreux Fauville	France	100.00%	0.00E+00	0	15/11/2012	99.98%	9.24E-06
LFOJ / Orleans Bricy	France	100.00%	0.00E+00	0	18/09/2014	99.98%	9.76E-06
LFOK / Chalons Vatry	France	100.00%	0.00E+00	0	02/02/2017	99.98%	4.17E-06
LFOQ / Blois Le Breuil	France	100.00%	0.00E+00	0	15/09/2016	99.98%	4.04E-06
LFOU / Cholet le Pontreau	France	100.00%	0.00E+00	0	04/02/2016	99.97%	6.79E-06
LFOZ / Orléans St. Denis De L'Hotel	France	100.00%	0.00E+00	0	28/06/2012	99.95%	1.50E-05
LFPB / Paris-Le Bourget	France	100.00%	0.00E+00	0	02/06/2011	99.90%	1.48E-05
LFPO / Paris Orly	France	100.00%	0.00E+00	0	30/05/2013	99.95%	1.43E-05
LFPT / Pontoise Corneilles en Vexin	France	100.00%	0.00E+00	0	01/05/2014	99.98%	9.48E-06
LFQA / Reims Prunay	France	100.00%	0.00E+00	0	03/04/2014	100.00%	0.00E+00
LFQG / Nevers Fouchambault	France	100.00%	0.00E+00	0	13/12/2012	99.98%	1.04E-05
LFQM / Besançon La Vèze	France	100.00%	0.00E+00	0	18/09/2014	99.95%	1.61E-05
LFQQ / Lille Lesquin	France	100.00%	0.00E+00	0	26/06/2014	99.99%	1.27E-05
LFQT / Merville	France	100.00%	0.00E+00	0	15/11/2012	99.98%	6.08E-06
LFRB / Brest Bretagne	France	100.00%	0.00E+00	0	03/05/2012	99.95%	1.30E-05
LFRD / Dinard	France	99.99%	5.60E-06	1	06/02/2014	99.89%	2.07E-05
LFRG / Deauville Saint Gatien	France	100.00%	0.00E+00	0	18/09/2014	99.98%	1.19E-05
LFRM / Le Mans	France	100.00%	0.00E+00	0	15/11/2012	99.98%	9.16E-06
LFRN / Rennes	France	100.00%	0.00E+00	0	30/05/2013	99.95%	1.60E-05
LFRS / Nantes	France	100.00%	0.00E+00	0	28/06/2012	99.94%	1.62E-05
LFRU / Morlaix Ploujean	France	100.00%	0.00E+00	0	13/10/2016	99.95%	1.89E-05
LFRV / Vannes Meucon	France	99.99%	5.60E-06	1	31/05/2012	99.97%	5.75E-06
LFSB / Bâle-Mulhouse	France	≥99.99%	4.93E-05	49	10/12/2015	99.89%	1.90E-05
LFSD / Dijon-Longvic	France	100.00%	0.00E+00	0	28/04/2016	99.99%	8.42E-06
LFSG / Epinal Mirecourt	France	100.00%	0.00E+00	0	30/05/2013	99.99%	6.59E-06
LFSL / Brive Souillac	France	100.00%	0.00E+00	0	22/08/2013	99.95%	1.73E-05
LFSN / Nancy Essey	France	100.00%	0.00E+00	0	02/05/2013	99.97%	1.85E-05

Airports	Country	Monthly APV-I Availability	Monthly APV-I Continuity Risk	Outages ⁹	Publication date of first APV-I procedure	APV-I Availability since procedure publication	APV-I Continuity Risk since procedure publication
LFTW / Nîmes Garons	France	100.00%	0.00E+00	0	18/10/2012	99.95%	1.66E-05
LIEO / Olbia/Costa Smeralda	Italy	100.00%	0.00E+00	0	12/11/2015	99.95%	1.77E-05
LIMC / Milano/Malpensa	Italy	100.00%	0.00E+00	0	21/08/2014	99.99%	6.15E-06
LIME / Bergamo / Orio al Serio	Italy	100.00%	0.00E+00	0	20/07/2017	99.98%	1.11E-05
LIML / Milano/Linate	Italy	100.00%	0.00E+00	0	13/12/2012	100.00%	2.10E-06
LIPE / Bologna Borgo Panigale	Italy	100.00%	0.00E+00	0	18/11/2014	99.95%	1.80E-05
LIPZ / Venezia/Tessera	Italy	100.00%	0.00E+00	0	27/06/2013	99.98%	1.76E-05
LIPX / Verona/Villafranca	Italy	100.00%	0.00E+00	0	22/06/2017	99.93%	2.33E-05
LIRA / Roma/Ciampino	Italy	100.00%	0.00E+00	0	10/01/2013	≥99.99%	1.80E-06
LIRF / Roma/Fiumicino	Italy	100.00%	0.00E+00	0	10/01/2013	99.91%	3.98E-05
LIRQ / Firenze/Peretola	Italy	100.00%	0.00E+00	0	22/06/2017	99.91%	4.11E-05
LKKU / Kunovice	Czech Republic	100.00%	0.00E+00	0	01/12/2017	≥99.99%	1.80E-06
LKKV / Karlovy Vary	Czech Republic	100.00%	0.00E+00	0	13/11/2014	100.00%	0.00E+00
LKMT / Ostrava	Czech Republic	100.00%	0.00E+00	0	09/01/2014	99.99%	8.45E-06
LKPR / Praha	Czech Republic	100.00%	0.00E+00	0	09/01/2014	99.98%	1.60E-05
LKTB / Brno	Czech Republic	100.00%	0.00E+00	0	09/01/2014	99.99%	9.64E-06
LKVO / Praha/Vodochody	Czech republic	100.00%	0.00E+00	0	25/06/2015	99.98%	1.62E-05
LOWG / Graz	Austria	100.00%	0.00E+00	0	09/01/2014	99.99%	7.94E-06
LOWL / Linz	Austria	100.00%	0.00E+00	0	09/01/2014	99.96%	2.05E-05
LPPR / Porto	Portugal	100.00%	0.00E+00	0	12/10/2017	99.98%	1.87E-05
LPPT / Lisboa	Portugal	≥99.99%	4.14E-05	37	28/05/2015	≥99.99%	2.14E-05
LRCL / Cluj - Napoca / Avram Iancu	Romania	100.00%	0.00E+00	0	10/11/2016	99.98%	1.42E-05
LSGG / Genève	Switzerland	99.98%	1.68E-05	3	12/11/2015	99.96%	2.66E-05
LSHI / Bern-Insel Hospital	Switzerland	100.00%	0.00E+00	0	23/07/2015	99.99%	8.49E-06
LSMD / Dübendorf	Switzerland	100.00%	0.00E+00	0	21/08/2014	99.99%	1.33E-05
LSME / Emmen	Switzerland	100.00%	0.00E+00	0	03/04/2014	99.99%	1.15E-05
LSMP / Payerne	Switzerland	100.00%	0.00E+00	0	17/09/2015	99.99%	7.54E-06
LSZB / Berne-Belp	Switzerland	100.00%	0.00E+00	0	07/03/2013	99.95%	1.75E-05
LSZG / Grenchen	Switzerland	100.00%	0.00E+00	0	25/07/2013	99.95%	1.94E-05
LSZR / St. Gallen-Altenrhein	Switzerland	100.00%	0.00E+00	0	17/11/2011	99.90%	1.88E-05
LZIB / Bratislava-Milan Rastislav Štefánik	Slovak Republic	100.00%	0.00E+00	0	05/02/2015	99.98%	2.65E-05
LZKZ / Košice	Slovak Republic	99.99%	2.13E-05	7	05/02/2015	99.96%	6.68E-05

Table 8 – Monthly APV-I Availability at airports with published procedures using EGNOS

APPENDIX C EGNOS LPV-200 PERFORMANCE AT AIRPORTS

The table reports LPV-200 Availability and Continuity at airports with published procedures using EGNOS. These values correspond to the performance obtained under fault-free conditions using all satellites in view:

Airports	Country	Monthly LPV-200 Availability	Monthly LPV-200 Continuity Risk	Outages ¹⁰	Publication date of first LPV-200 procedure	LPV-200 Availability since procedure publication	LPV-200 Continuity Risk since procedure publication
EDDW / Bremen	Germany	99.98%	2.76E-05	10	30/03/2017	99.97%	1.27E-05
EDFH / Frankfurt Hahn	Germany	100.00%	0.00E+00	0	14/09/2017	100.00%	0.00E+00
EDGS / Siegerland	Germany	100.00%	0.00E+00	0	12/10/2017	100.00%	0.00E+00
EDSB / Karlsruhe/Baden-Baden	Germany	100.00%	0.00E+00	0	27/04/2017	99.99%	4.18E-06
EDTL / Lahr	Germany	100.00%	0.00E+00	0	27/04/2017	99.99%	4.18E-06
EKBI / Billund	Denmark	99.95%	2.24E-05	4	20/07/2017	99.98%	1.69E-05
ENBL / Førde/Bringeland	Norway	99.93%	2.80E-05	5	27/04/2017	99.95%	2.33E-05
ENFG / Fagernes	Norway	99.95%	2.24E-05	4	14/09/2017	99.96%	2.23E-05
ENGM / Gardermoen	Norway	99.94%	2.80E-05	5	10/11/2016	99.96%	1.95E-05
ENML / Molde/Årø	Norway	99.93%	2.80E-05	5	30/03/2017	99.94%	2.54E-05
ENNM / Namsos	Norway	99.94%	2.80E-05	5	27/04/2017	99.90%	6.07E-05
ENOL / Ørland	Norway	99.93%	3.36E-05	7	12/10/2017	99.95%	4.07E-05
ENRM / Rørvik/Ryum	Norway	99.93%	5.12E-05	19	02/02/2017	99.90%	5.92E-05
ENSG / Sogndal/Haukasen	Norway	99.94%	2.80E-05	5	14/09/2017	99.95%	2.09E-05
ENZV / Stavanger/Sola	Norway	N/A	N/A	N/A	09/11/2017	N/A	N/A
LFAQ / Albert Bray	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFAT / Le Touquet Paris Plage	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFAV / Valenciennes Denain	France	≥99.99%	6.94E-06	1	21/11/2017	100.00%	6.94E-06
LFBA / Agen La Garenne	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFBD / Bordeaux Merignac	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFBE / Bergerac	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFBI / Poitiers Biard	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFBL / Limoges	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFBU / Angoulême Brie Champniers	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFBX / Périgueux Bassillac	France	100.00%	0.00E+00	0	25/05/2017	100.00%	8.00E-07
LFCE / Albi Le Sequestre	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFCE / Rodez Marcillac	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00

¹⁰ Outages refer to events when the LPV-200 service changes its status from Available to Unavailable for the reported month.

Airports	Country	Monthly LPV-200 Availability	Monthly LPV-200 Continuity Risk	Outages ¹⁰	Publication date of first LPV-200 procedure	LPV-200 Availability since procedure publication	LPV-200 Continuity Risk since procedure publication
LFGJ / Dole Tavaux	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFJL / Metz Nancy Lorraine	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFJR / Angers Marcé	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFKB / Bastia Poretta	France	100.00%	0.00E+00	0	07/12/2017	100.00%	0.00E+00
LFKF / Figari Sud Corse	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFLC / Clermont-Ferrand Auvergne	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFLN / Saint Yan	France	100.00%	0.00E+00	0	02/03/2017	99.97%	8.00E-06
LFLS / Grenoble Isere	France	100.00%	0.00E+00	0	13/10/2016	99.98%	6.64E-06
LFLU / Valence	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFLY / Lyon Bron	France	100.00%	0.00E+00	0	28/09/2016	99.98%	6.70E-06
LFMH / Saint Étienne Bouthéon	France	100.00%	0.00E+00	0	02/02/2017	99.98%	6.95E-06
LFMK / Carcassonne Salvaza	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFOH / Le Havre Octeville	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFPB / Paris-Le Bourget	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFPG / Paris Charles de Gaulle	France	100.00%	0.00E+00	0	28/04/2016	99.98%	3.97E-06
LFPM / Melun Villaroche	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFPN / Toussus Le Noble	France	100.00%	0.00E+00	0	27/04/2017	99.99%	3.49E-06
LFPO / Paris Orly	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFPT / Pontoise Cormeilles en Vexin	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFQB / Troyes Barberey	France	100.00%	0.00E+00	0	18/08/2016	99.98%	3.12E-06
LFRC / Cherbourg Maupertus	France	100.00%	0.00E+00	0	23/06/2016	99.98%	5.50E-06
LFRD / Dinard	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFRI / La Roche Sur Yon	France	100.00%	0.00E+00	0	10/11/2016	99.97%	7.11E-06
LFRK / Caen Carpiquet	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFRO / Lannion	France	99.99%	6.95E-06	1	21/11/2017	99.99%	6.95E-06
LFRQ / Quimper	France	99.99%	6.95E-06	1	21/11/2017	99.99%	6.95E-06
LFRT / Saint Briec Armor	France	99.99%	6.95E-06	1	21/11/2017	99.99%	6.95E-06
LFMZ / Saint Nazaire Montoir	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFST / Strasbourg Entzheim	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LFTW / Nîmes Garons	France	100.00%	0.00E+00	0	21/11/2017	100.00%	0.00E+00
LHBP / Budapest Liszt Ferenc	Hungary	99.98%	1.68E-05	3	15/09/2016	99.98%	1.87E-05
LOWL / Linz	Austria	100.00%	0.00E+00	0	02/02/2017	99.99%	2.42E-05

Airports	Country	Monthly LPV-200 Availability	Monthly LPV-200 Continuity Risk	Outages ¹⁰	Publication date of first LPV-200 procedure	LPV-200 Availability since procedure publication	LPV-200 Continuity Risk since procedure publication
LOWW / Wien - Schwechat	Austria	100.00%	0.00E+00	0	02/02/2017	99.99%	2.07E-05
LSGC / Les Eplatures	Switzerland	100.00%	0.00E+00	0	26/05/2016	99.99%	4.25E-06
LSZH / Zurich	Switzerland	100.00%	0.00E+00	0	25/05/2017	100.00%	8.00E-07
LZPP / Piešťany	Slovak Republic	100.00%	0.00E+00	0	02/02/2017	99.99%	1.85E-05
LZZI / Žilina	Slovak Republic	100.00%	0.00E+00	0	25/05/2017	99.99%	1.38E-05

Table 9 – Monthly LPV-200 Availability at airports with published procedures using EGNOS

APPENDIX D REFERENCE DOCUMENTS

[RD-1]	Open Service Definition Document, EGN-SDD-OS; v.02-03 (https://egnos-user-support.essp-sas.eu/new_egnos_ops/sites/default/files/library/official_docs/egnos_os_sdd_in_force.pdf)
[RD-2]	Safety Of Life Definition Document, EGN-SDD-SoL; v.03-01 (https://egnos-user-support.essp-sas.eu/new_egnos_ops/sites/default/files/library/official_docs/egnos_sol_sdd_in_force.pdf)
[RD-3]	EGNOS Data Access Service (EDAS) Service Definition Document, EGN-SDD-EDAS; v.02-01 (https://egnos-user-support.essp-sas.eu/new_egnos_ops/sites/default/files/library/official_docs/egnos_edas_sdd_v2_1.pdf)

APPENDIX E LIST OF ACRONYMS

Acronym	Definition
APV	Approach with Vertical Guidance
ASN	Abstract Syntax Notation
ECAC	European Civil Aviation Conference
EDAS	EGNOS Data Access Service
EGNOS	European Geostationary Navigation Overlay Service
ENT	EGNOS Network Time
ESSP	European Satellite Services Provider
FTP	File Transfer Protocol
GEO	Geostationary Satellite
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HAL	Horizontal Alarm Limit
HNSE	Horizontal Navigation System Error
HPE	Horizontal Position Error
HPL	Horizontal Protection Level
HSI	Horizontal Safety Index
LPV	Localizer Performance with vertical guidance
MI	Misleading Information
MT27	Message Type 27
NA	Not Applicable/ Not Available
NLES	Navigation Land Earth Station
NPA	Non-Precision Approach
NTRIP	Networked Transport of RTCM via Internet Protocol
OP	Operation
OPS	Operations
OS	Open Service
PA	Precision Approach
PL	Protection Level
PRN	Pseudo-Random Number
RAIM	Receiver Autonomous Integrity Monitoring
RD	Reference Document
RIMS	Ranging and Integrity Monitoring Station
RTCM	Radio Technical Commission for Maritime Services
SBAS	Satellite-Based Augmentation System
SDD	Service Definition Document
SIS	Signal-In-Space
SL0	Service Level 0
SL2	Service Level 2
SoL	Safety of Life
UTC	Universal Time Coordinated
VAL	Vertical Alarm Limit
VNSE	Vertical Navigation System Error
VPE	Vertical Position Error
VPL	Vertical Protection Level
VSI	Vertical Safety Index

END OF THE DOCUMENT