



EUROPEAN GNSS (GALILEO)

# SAR SERVICE

QUARTERLY PERFORMANCE REPORT

OCTOBER - DECEMBER 2023



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# 1 INTRODUCTION

This document is the *Galileo Enhanced Service Search and Rescue Service (SAR/GALILEO) Public Performance Report* for the period of October, November, and December 2023. Following the declaration of the SAR/Galileo Enhanced Services in January 2020, issue 2.0 of [SAR-SDD] was published and is the reference document for the present performance report.

This document reports on the following performance parameters, with respect to their Minimum Performance Levels (MPLs) declared in the [SAR-SDD]:

- ◇ Forward Link Service, Detection and Location Performance.
- ◇ Return Link Service, RLM Delivery Latency and Reception Probability Performance.
- ◇ European MEOLUT and Space Segment Availability Performance.

The document comprises the following sections:

**Section 1:** is an introduction to this report. It includes the status of Galileo constellation for the Search and Rescue Service over the quarterly reported period.

**Section 2:** Provides an executive summary of the achieved performance. Details are reported in the following chapters.

**Section 3:** Provides the detailed performance for the SAR/Galileo Forward Link Service.

**Section 4:** Provides the detailed performance of the SAR/Galileo Return Link Service.

**Section 5:** Provides the detailed performance for the SAR/Galileo Space Segment infrastructure availability.

**Section 6:** Provides supplementary performance metrics of interest, not subject to MPL.

**Section 7:** Lists the reference documents.

**Section 8:** Defines the acronyms and abbreviations used in the document.

Table 1 provides the status of the relevant SAR/Galileo space constellation, for which the performance data has been derived for the reported period. Forward Link Service (FLS) and Return Link Service (RLS) columns in the table show availability of SAR services for each Galileo satellite.

Table 1: Galileo Reported Constellation Information for the SAR/Galileo Service <sup>1</sup>

ID	PRN	Orbit slot	COSPAS- SARSAT ID	Availability for SAR	
				FLS	RLS
GSAT0101	E11	B05	-	<input type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0102	E12	B06	-	<input type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0103	E19	C04	419	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0104	E20	C14	420	<input checked="" type="checkbox"/>	<input type="checkbox"/>
GSAT0201	E18	Not-nominal <sup>2</sup>	418	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0202	E14	Not-nominal <sup>3</sup>	414	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0203	E26	B08	426	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0205	E24	A08	424	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0206	E30	A05	430	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0207	E07	C06	407	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0208	E08	C07	408	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0209	E09	C02	409	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0211	E02	A06	402	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0212	E03	C08	403	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0213	E04	C03	404	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0214	E05	C01	405	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0215	E21	A03	421	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0216	E25	A07	425	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0217	E27	A04	427	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0218	E31	A01	431	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0219	E36	B04	436	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0220	E13	B01	413	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0221	E15	B02	415	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0222	E33	B07	433	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0223	E34	B03	434	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
GSAT0224	E10	B15	410	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

For the most up-to-date information, please refer to the European GNSS Service Centre (GSC) Web pages listed in Table 2.

<sup>1</sup> GSAT0210 was removed from the active constellation until further notice, since 05.09.2023 (ref. NAGU [2023048](#))

<sup>2</sup> Although Galileo satellite GSAT0201 is in an eccentric orbit, it has been declared operational for the SAR/Galileo Services.

<sup>3</sup> Although Galileo satellite GSAT0202 is in an eccentric orbit, it has been declared operational for the SAR/Galileo Services

Table 2: GSC Main Information Web pages About Galileo Status

<b>GNSS Service Centre Web Resources</b>	
SAR Galileo Constellation Information	<a href="https://www.gsc-europa.eu/system-service-status/sar-information">https://www.gsc-europa.eu/system-service-status/sar-information</a>
Reference and Calibration Beacon Information	<a href="https://www.gsc-europa.eu/system-service-status/sar-information/sargalileo-reference-calibration-beacons">https://www.gsc-europa.eu/system-service-status/sar-information/sargalileo-reference-calibration-beacons</a>
Reference Constellation Orbital and Technical Parameters	<a href="http://www.gsc-europa.eu/system-service-status/orbital-and-technical-parameters">www.gsc-europa.eu/system-service-status/orbital-and-technical-parameters</a>
Incident Reporting	<a href="http://www.gsc-europa.eu/helpdesk">www.gsc-europa.eu/helpdesk</a> (Report a Galileo Incident)
Interactive support to users	<a href="http://www.gsc-europa.eu/helpdesk">www.gsc-europa.eu/helpdesk</a> (Raise your questions)
Operational Notifications	<a href="https://www.gsc-europa.eu/system-service-status/sar-information/sargalileo-operational-notifications">https://www.gsc-europa.eu/system-service-status/sar-information/sargalileo-operational-notifications</a>

Note that the Galileo Help Desk allows close interaction with users, both to support the exploitation of Galileo services and collect relevant information on signal performance as observed by the users. Finally, GSC provides an important service which consists in the provision of detailed orbit data for the Galileo satellites on a server accessible to the SAR community. Access to this server can be requested via the Galileo Help Desk.



## 2 EXECUTIVE SUMMARY

During the reported period, the measured SAR/Galileo Service performance figures exceeded the Minimum Performance Level (MPL) targets specified in the [SAR-SDD] with significant margins except for:

- SART availability for GSAT0201 over the whole reporting period, and for GSAT0202 in November and December.
- Availability of Larnaca EU MEOLUT facility in “Nominal” mode for the whole reporting period, due to a planned technical refresh activity which took place along April and May 2023.
- Availability of Maspalomas EU MEOLUT facility availability in “Nominal” and “Nominal or Degraded” modes for the whole reporting period, due to the planned technical refresh activity which took place in February 2023.
- Availability of Spitsbergen EU MEOLUT facility availability in “Nominal” and “Nominal or Degraded” modes for the whole reporting period, again due to a planned technical refresh activity which took place in July 2023.

The following dashboards (Table 3b , Table 3c, Table 3d) summarise the compliance with the MPLs, using the colour coding defined in the subsequent legend Table 3a.

Table 3a: Dashboards Legend Colour Code

Legend	Interpretation
■	target value for MPL is fulfilled
■	target value for MPL is not fulfilled, and measurement is less than 10% away from the required target
■	target value for MPL is not fulfilled, and measurement is more than 10% away from the required target

Table 3b: MPL Fulfilment Status Dashboard – Detection and Localisation

SAR MPLs	target value	2023		
		Oct.	Nov.	Dec.
detection (probability), in %				
Valid				
GAL-EU1 – Toulouse	≥ 99	■	■	■
GAL-EU2 – Spitsbergen		■	■	■
GAL-EU3 – Santa Maria		■	■	■
GAL-EU4 – Maspalomas		■	■	■
GAL-EU5 – Larnaca		■	■	■
GAL-EU6 – Søndre Strømfjord				■
localisation (quality), in %				
5 km [1–12 B]				
GAL-EU1 – Toulouse	≥ 95	■	■	■
GAL-EU2 – Spitsbergen		■	■	■
GAL-EU3 – Santa Maria		■	■	■
GAL-EU4 – Maspalomas		■	■	■
GAL-EU5 – Larnaca		■	■	■
GAL-EU6 – Søndre Strømfjord				■
5 km [SB]				
GAL-EU1 – Toulouse	≥ 90	■	■	■
GAL-EU2 – Spitsbergen		■	■	■
GAL-EU3 – Santa Maria		■	■	■
GAL-EU4 – Maspalomas		■	■	■
GAL-EU5 – Larnaca		■	■	■
GAL-EU6 – Søndre Strømfjord				■
L.Prob.[SB]				
GAL-EU1 – Toulouse	≥ 90	■	■	■
GAL-EU2 – Spitsbergen		■	■	■
GAL-EU3 – Santa Maria		■	■	■
GAL-EU4 – Maspalomas		■	■	■
GAL-EU5 – Larnaca		■	■	■
GAL-EU6 – Søndre Strømfjord				■
L.Prob.[1–12 B]				
GAL-EU1 – Toulouse	≥ 98	■	■	■
GAL-EU2 – Spitsbergen		■	■	■
GAL-EU3 – Santa Maria		■	■	■
GAL-EU4 – Maspalomas		■	■	■
GAL-EU5 – Larnaca		■	■	■
GAL-EU6 – Søndre Strømfjord				■

Table 3c: MPL Fulfilment Status Dashboard – Space Segment Availability

SAR MPLs		target value	2023		
			Oct.	Nov	Dec.
<b>SAR transponder availability, in %</b>					
GSAT0103	E19	≥ 95	■	■	■
GSAT0104	E20		■	■	■
GSAT0201	E18		■	■	■
GSAT0202	E14		■	■	■
GSAT0203	E26		■	■	■
GSAT0205	E24		■	■	■
GSAT0206	E30		■	■	■
GSAT0207	E07		■	■	■
GSAT0208	E08		■	■	■
GSAT0209	E09		■	■	■
GSAT0211	E02		■	■	■
GSAT0212	E03		■	■	■
GSAT0213	E04		■	■	■
GSAT0214	E05		■	■	■
GSAT0215	E21		■	■	■
GSAT0216	E25		■	■	■
GSAT0217	E27		■	■	■
GSAT0218	E31		■	■	■
GSAT0219	E36		■	■	■
GSAT0220	E13		■	■	■
GSAT0221	E15		■	■	■
GSAT0222	E33		■	■	■
GSAT0223	E34		■	■	■
GSAT0224	E10		■	■	■

Table 3d: MPL Fulfilment Status Dashboard – Ground Segment Availability

SAR MPLs	target value	2023		
		Oct.	Nov	Dec.
<b>SAR ground segment availability, in %</b>				
MEOLUT “Nominal” mode				
Larnaca	≥ 95	■	■	■
Maspalomas		■	■	■
Spitsbergen		■	■	■
MEOLUT “Nominal or Degraded” mode				
Larnaca	≥ 97.5	■	■	■
Maspalomas		■	■	■
Spitsbergen		■	■	■
<b>SAR service availability, in %</b>				
forward link service	≥ 99	■	■	■
return link service	≥ 95	■	■	■
RLM delivery latency < 15 min	≥ 99	■	■	■
RLM reception probability, in %	≥ 99	■	■	■

The SAR/Galileo Forward Link and Return Link Service MPLs are computed based on the five SAR/Galileo Reference Beacons (REFBE) located in the SAR/Galileo Coverage area (SGC) defined in the [SAR-SDD], plus an additional one available since December 2023: GAL-EU6, located in Søndre Strømfjord.

The **Availability of the SAR/Galileo Forward Link Service** met the MPL target set to 99% during the reporting period, with an annually normalised value ≥ **99.93%** over the whole reporting period.

Computation for the **Availability of the SAR/Galileo European MEOLUT Facilities** during the reporting period was significantly impacted by planned technical upgrades occurred in past periods and affecting the required “annual normalisation” of the reported figures.

Only Larnaca EU MEOLUT in “Nominal or Degraded” mode satisfied the MPL target of 97.5% over the quarter, while the other two EU MEOLUTs did not: not in “Nominal”, nor in “Nominal or Degraded” operating conditions. However, as said, this is mainly due to the computation strategy for the MPLs, as the monthly (not normalised) availability figures for the MEOLUT equipment was in line with MPL targets over the whole quarter.

More precisely, EU MEOLUT availability figures are as reported in the following Table 4:

Table 4: EU MEOLUTs Availability: MPL and short-term (monthly) Values

SAR MPLs	target	2023					
		Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
<b>SAR ground segment availability, in %</b>							
MEOLUT "Nominal" mode		MPL	monthly (short term)	MPL	monthly (short term)	MPL	monthly (short term)
Larnaca	≥ 95	93.8	95.9	93.8	99.8	93.8	99.8
Maspalomas		94.5	99.3	94.5	99.7	94.5	99.0
Spitsbergen		93.6	99.8	93.2	95.9	93.2	99.9
MEOLUT "Nominal or Degraded" mode							
Larnaca	≥ 97.5	97.6	99.2	97.6	99.8	97.6	99.9
Maspalomas		97.0	99.8	97.0	99.7	97.0	99.9
Spitsbergen		96.6	99.8	96.6	99.9	96.6	99.9

The **Performance of the Detection Service** is above expectations, with monthly values of a valid message detection probability after a single transmitted burst of **100%** every month of the reported period for all sites, except for GAL-EU5 (Larnaca) in December (**99.9%**), while the MPL target is 99%.

The **Performance of Location Probability** achieved excellent values with monthly values  $\geq 99.8\%$  for single-burst, where the MPL target is 90%, and  $\geq 99.9\%$  after twelve transmitted bursts (multi-burst), where the MPL target is 98%.

The **Performance of Location Accuracy within 5 km** exceeds the targets with monthly values  $\geq 99.1\%$  for single-burst and  $\geq 99.8\%$  for multi-burst transmission, while the MPL targets are 90% and 95% respectively.

The **Availability of the SAR/Galileo Return Link Service** was  $\geq 99.84\%$  every month of the reported period for an MPL target set to 95%.

The **RLM Delivery Latency within 15 min** was  $\geq 99.59\%$  every month of the reported period, for an MPL target set to 99%.

The **RLM Reception Probability** was  $\geq 99.80\%$  every month of the reported period for an MPL target set to 99%.

Except for the specific cases of GSAT0201 and GSAT0202, the **Availability of the SAR Transponders** achieved excellent levels of performance, with satellite long-term availability above the MPL target of 95% for all the SAR transponders.

### 3 SAR/GALILEO FORWARD LINK SERVICE PERFORMANCE

This section reports the following detailed performance figures for the SAR/Galileo Forward Link Service:

- ❖ Service availability in section 3.1
- ❖ European MEOLUT facility availability in section 3.2
- ❖ Detection Probability in section 3.3
- ❖ Location Probability in section 3.4.1
- ❖ Location Accuracy in section 3.4.2

#### 3.1 FORWARD LINK SERVICE AVAILABILITY

The MPL for the Forward Link Service (FLS) availability is defined in the [SAR-SDD] <sup>4</sup>. The Forward Link Service availability MPL is defined over a period of twelve months (long-term), with a sliding window moving one month ahead every month. However,

Figure 1 also report the short term (monthly) FLS availability to show the overall performance trend over time.

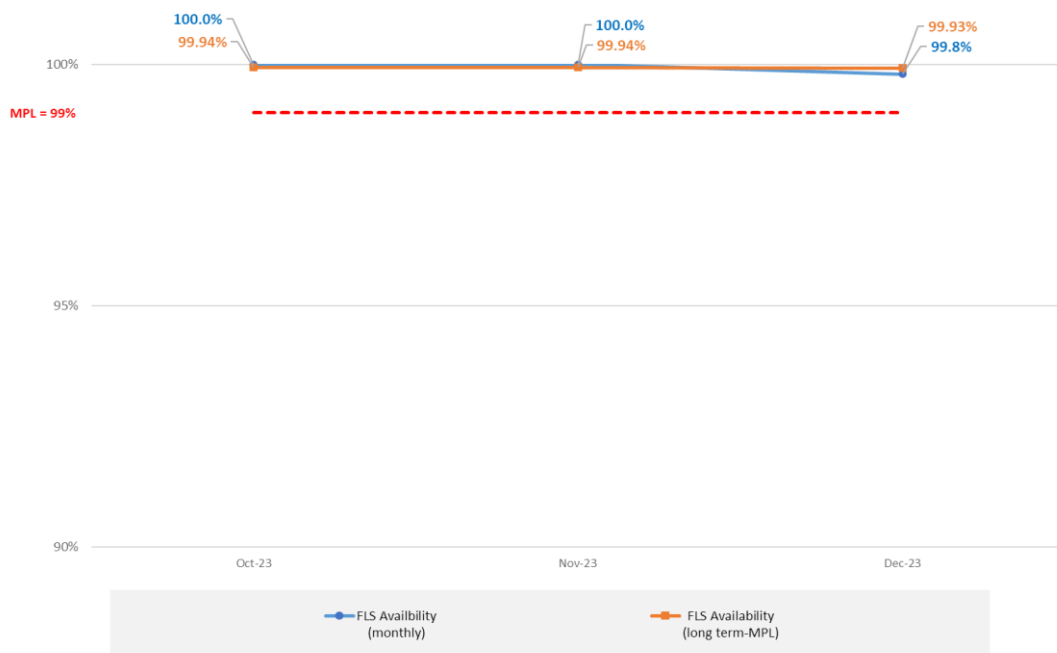


Figure 1: Forward Link Service Availability – Monthly and Long-term Trend

<sup>4</sup> Ref.: [SAR-SDD], §5.1.1 (Table 9)

During the reported period, the monthly (short-term) FLS availability was **100%** for October and November, **99.80%** in December. The normalised value was  $\geq 99.93\%$  every month, compliant with the MPL target of 99% defined over twelve months.

### 3.2 EUROPEAN MEOLUT FACILITY AVAILABILITY

The MPLs for the availability of the SAR/Galileo European MEOLUT facility are defined in the [SAR-SDD] <sup>5</sup> over a period of twelve months (long-term), with a sliding window moving one month ahead every month.

During the reported period, all three EU MEOLUT facilities show a long-term (annually normalised) availability performance “Nominal” mode not compliant with the MPL target specified at 95%, achieving values  $\geq 93.2\%$ .

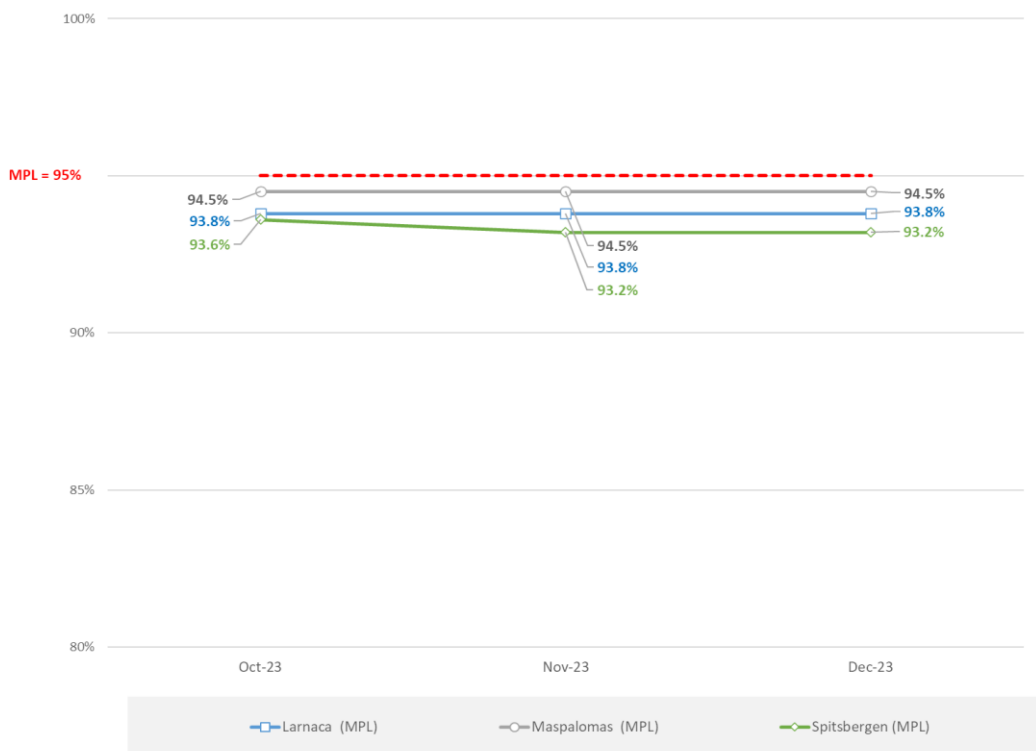


Figure 2: MPL per MEOLUT Facility Availability of “Nominal” Mode (in %)

As already pointed out, this is only due to planned technical refresh activities that took place in February 2023 (Maspalomas EU MLT), along April and May 2023 (Larnaca EU MLT), and in July 2023 (Spitsbergen EU MLT).

<sup>5</sup> Ref.: [SAR-SDD], §5.1.2 (Table 10)

Figure 3 provides EU MELOUT facility availability in “Nominal” mode but not normalised; as such, this performance measure is not subject to an MPL target and is provided for information.

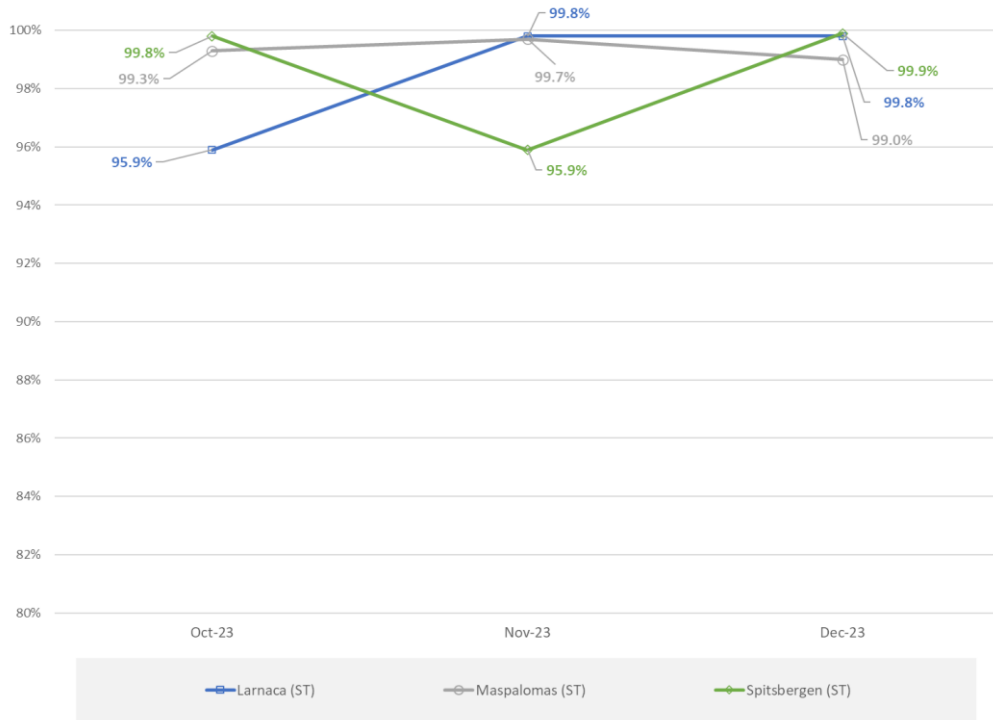


Figure 3: Monthly MEOLUT Facility Availability of “Nominal” mode, not normalised (in %)

The availability of EU MEOLUTS in “Nominal or Degraded” mode is reported in Figure 4; MPLs correspond again to long-term normalised values, obtained per each EU MEOLUT facility during the last twelve months of service.

MPL value slightly exceeds the 97.5% target only for Larnaca EU MLT; in the case of Maspalomas and Spitsbergen EU MEOLUT facilities, values are  $\geq 96.6\%$ . Root cause for low availability figures is the same already illustrated in the case of previous graphics.

Figure 5 provides EU MELOUT facility availability of “Nominal or Degraded” mode but not normalised; as such, this performance measure is not subject to an MPL target and is provided for information:



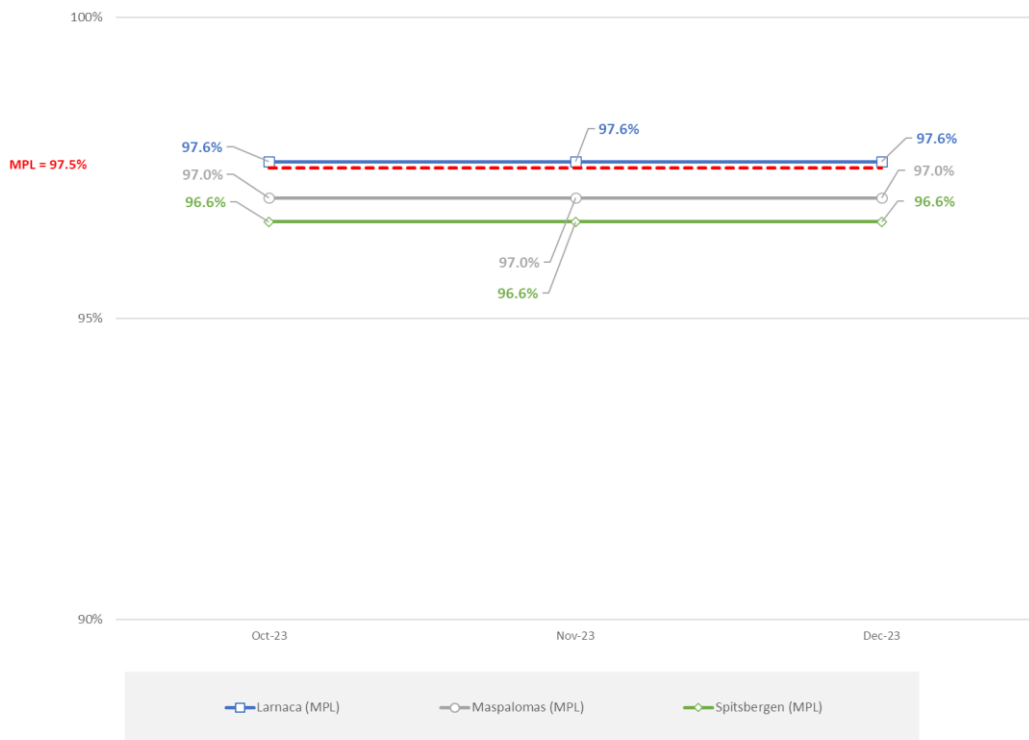


Figure 4: MPL Per MEOLUT Facility Availability of "Nominal or Degraded" mode (in %)

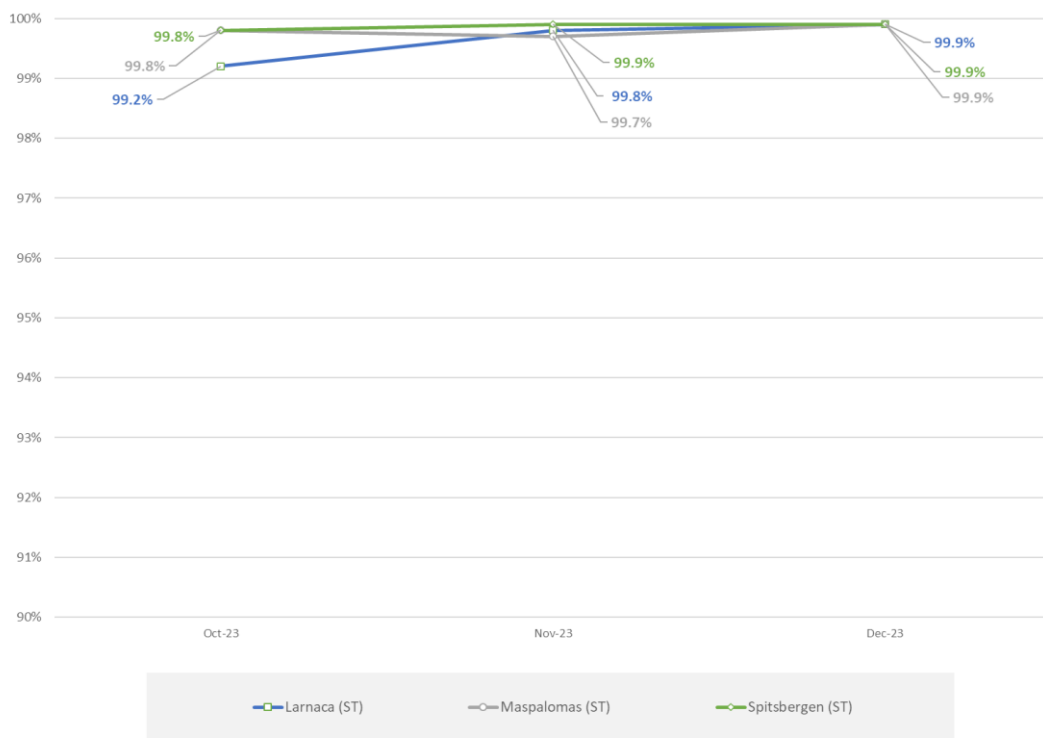


Figure 5: Monthly MEOLUT Facility Availability of "Nominal or Degraded" mode, not normalised (in %)

### 3.3 DETECTION PERFORMANCE

The detection probability performance is computed for each Reference Beacon as the valid message detection probability after 1 transmitted burst. The detailed computation process for this performance parameter is described in the [SAR-SDD]. The MPL target specified at 99%<sup>6</sup> is valid whether the SAR/Galileo MEOLUT Facilities are in “Nominal or Degraded” mode.

Figure 6 shows the monthly valid message detection probability for each Reference Beacon which an excellent performance  $\geq 99.9\%$  every month during the reported period.

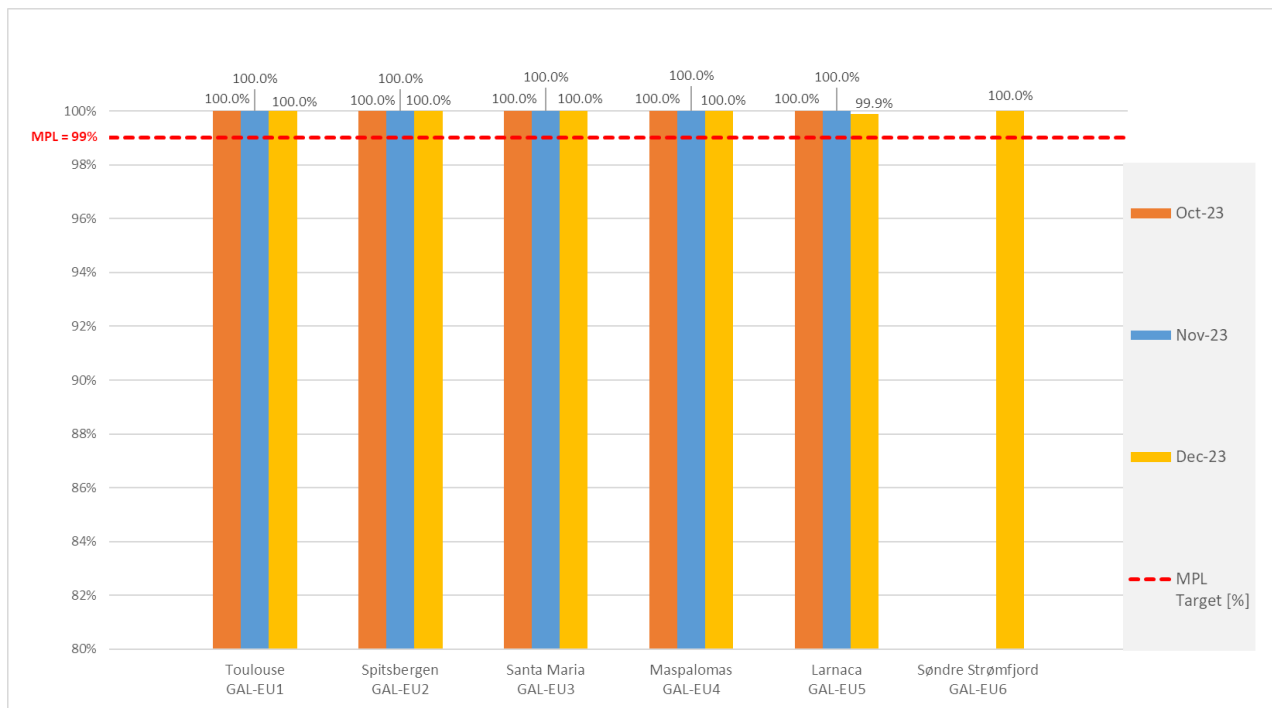


Figure 6: Per Reference Beacon Valid Message Detection Probability (in %)

<sup>6</sup> Ref.: [SAR-SDD], §5.1.3 (Table 11)

## 3.4 LOCATION PERFORMANCE

### 3.4.1 LOCATION PROBABILITY

The location probability performance is computed for each Reference Beacon after 1 transmitted burst (single-burst) and after 12 transmitted bursts (multi-burst). The detailed computation process for this performance parameter is described in the [SAR-SDD] and the MPL target specified at 90%<sup>7</sup> in single-burst and 98% in multi-burst are valid when the SAR/Galileo MEOLUT Facilities are operating in "Nominal" mode.

Figure 7 shows the monthly single-burst location probability which achieved performance  $\geq 99.9\%$  every month during the reported period.

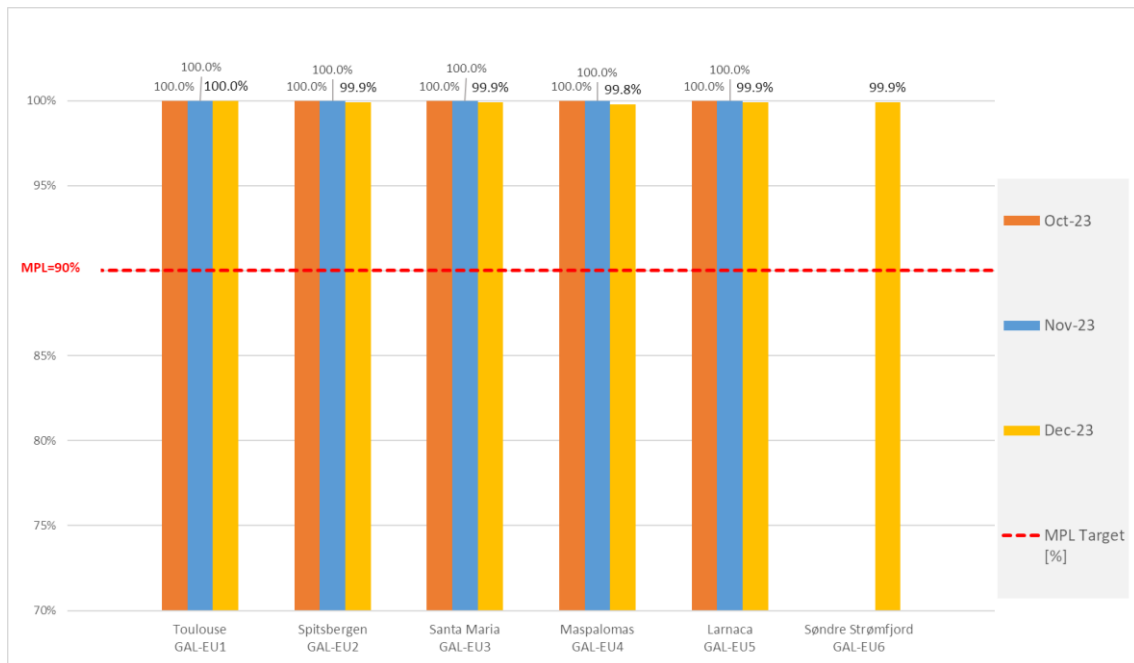


Figure 7: Per Reference Beacon Single-Burst Location Probability (in %)

Figure 8 shows the monthly multi-burst location probability which meets the defined MPL of 98% for each of the SAR/Galileo Reference Beacons, with a performance of  $\geq 99.9\%$  for each beacon and month of the reporting period.

<sup>7</sup> Ref.: [SAR-SDD], §5.1.4 (Table 12)

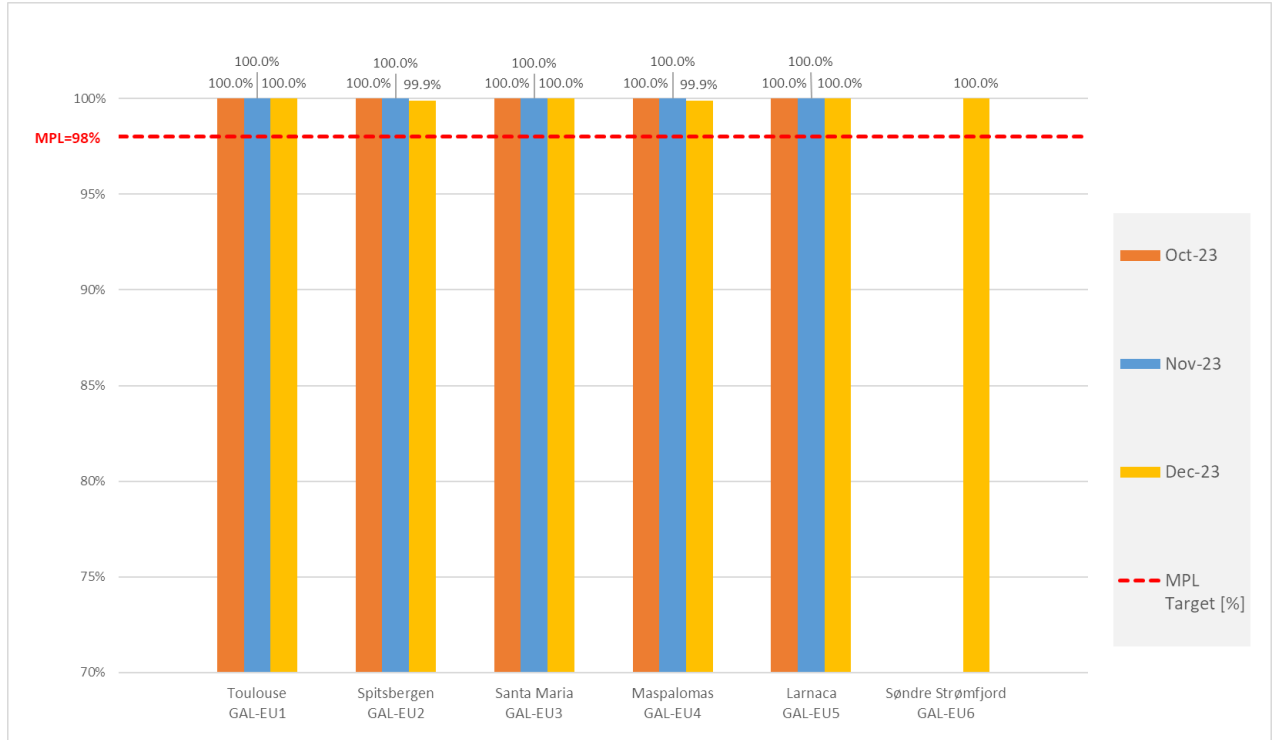


Figure 8: Per Reference Beacon Multi-Burst Location Probability (in %)

### 3.4.2 LOCATION ACCURACY

The location accuracy performance is defined in the [SAR-SDD] as the probability to produce a location with an error bounded by given thresholds, namely two and five kilometres. The location accuracy MPLs specified in the [SAR-SDD] <sup>8</sup> are valid when the MEOLUT is in “Nominal” mode.

MPL concerns with the five-kilometre error; results are presented per Reference Beacon in single-burst and multi-burst. In particular, Figure 9 shows the monthly single-burst five-kilometre location accuracy, which meets the defined MPL of 90% for each of the SAR/Galileo Reference Beacons, with a minimum value of **99.1%**, a best value of **99.9%** and an average over the reported period of **99.49%**.

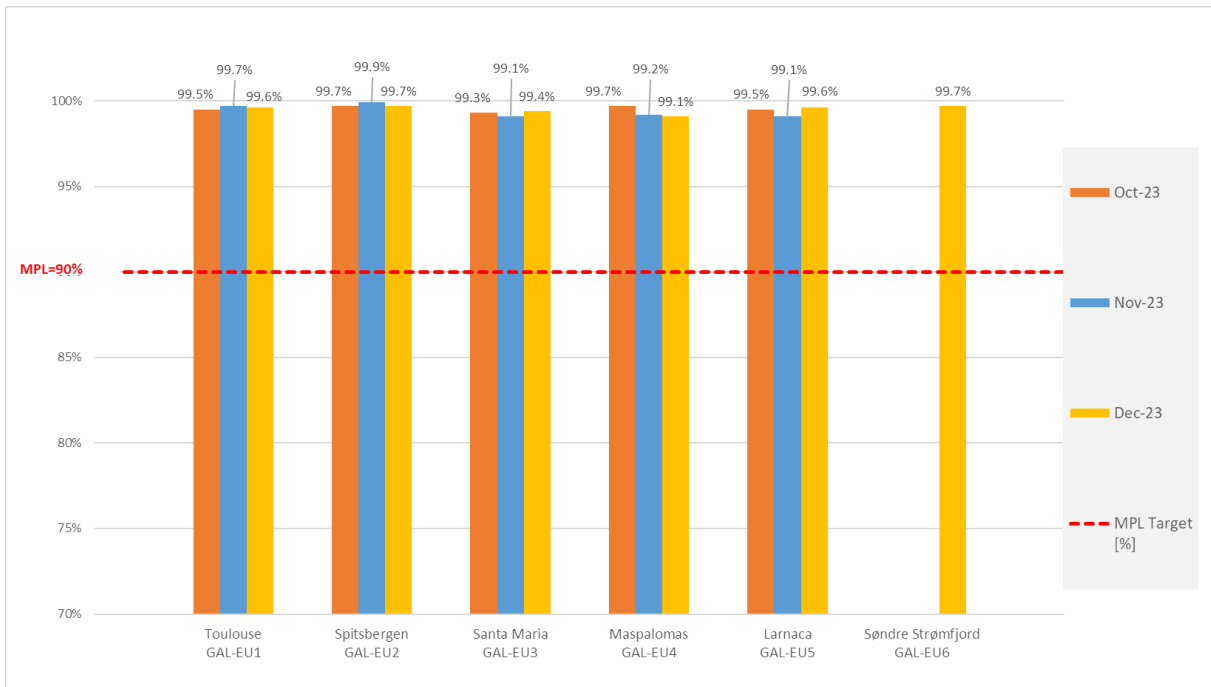


Figure 9: Per Reference Beacon Probability of five-kilometre Accuracy in Single-Burst (in %)

<sup>8</sup> Ref.: [SAR-SDD], §5.1.4 (Table 12)

Figure 10 shows the monthly multi-burst five-kilometre location accuracy, which also meets the defined MPL of 95% for each of the SAR/Galileo Reference Beacons, with a minimum value of **99.8%**, a best value of **100%** and an average over the reported period of **99.93%**.

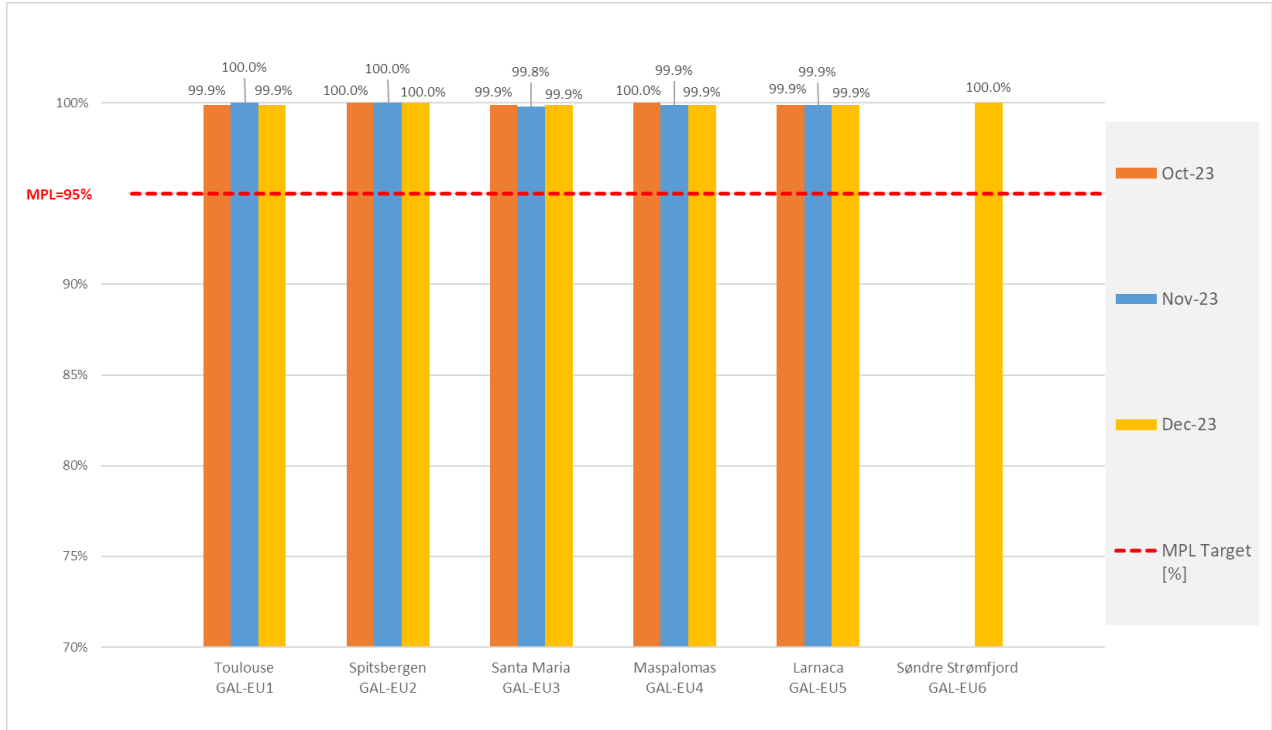


Figure 10: Per Reference Beacon Probability of five-kilometre Accuracy in Multi-Burst (in %)

## 4 RETURN LINK SERVICE PERFORMANCE

This section reports the following detailed performance figures for the SAR/Galileo Return Link Service, which is a special feature offered by Galileo:

- ◇ Service availability in section 4.1
- ◇ Delivery latency of return link message (RLM) in section 4.2.1
- ◇ Reception probability of RLM in section 4.2.2

### 4.1 RETURN LINK SERVICE AVAILABILITY

The MPL for the Return Link Service availability is defined in the [SAR-SDD]<sup>9</sup>. The Return Link Service availability MPL is defined over a period of twelve months (long-term), with a sliding window moving one month ahead every month.

During the reported period, the monthly (short term) RLS availability was **100%** every month of the reported period. The normalised value was  $\geq$  **99.84%** % every month, compliant with the MPL target of 95% defined over twelve months.

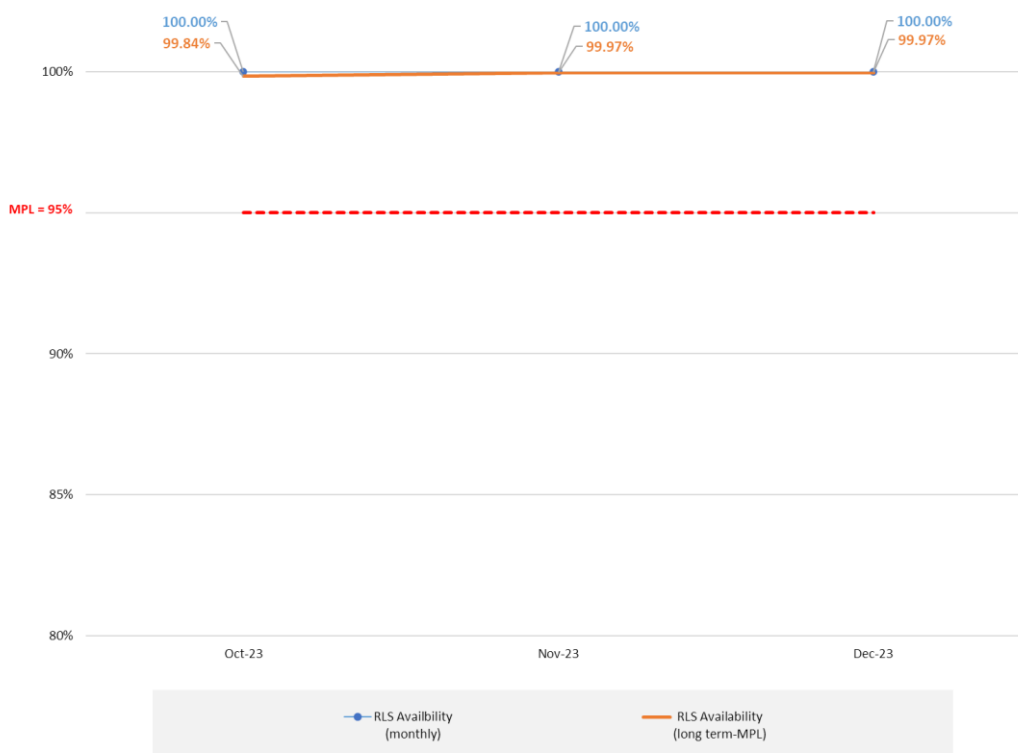


Figure 11: Return Link Service Availability – monthly and long-term Trends

<sup>9</sup> Ref.: [SAR-SDD], §5.2.1 (Table 14)

## 4.2 RLM DELIVERY LATENCY AND RECEPTION PROBABILITY

The Galileo System delivery latency and RLM Reception Probability MPLs always refer to the percentage of time that the RLS is available and are bounded by transmission of the Galileo Navigation Message in the SIS and the probability of an error free decoding of the RLM fields of the Galileo Navigation Message retrieved from the SIS at the GNSS receiver in, or connected to, the originating alert beacon.

### 4.2.1 DELIVERY LATENCY

The RLS delivery latency within 15-min performance is computed over a calendar month. The boundaries of the monitored loop are defined in the [SAR-SDD] and the MPL is specified at 99%<sup>10</sup>.

During the reported period, the monthly delivery latency was above the MPL with a minimum value of **99.59%** and an average value of **99.72%**.

Table 5: Return Link Service Monthly Delivery Latency within 15 min

SAR MPL	target	2023		
		Oct.	Nov.	Dec.
Delivery Latency within 15 min (in %)	≥ 99	<b>99.59</b>	<b>99.78</b>	<b>99.80</b>

### 4.2.2 RECEPTION PROBABILITY

The RLS reception probability performance is computed over a calendar month. The MPL defined in the [SAR-SDD] is set to 99%<sup>10</sup>.

During the reported period, the monthly reception probability was above the MPL with a minimal value of **99.80%** and an average value of **99.86%**.

Table 6: Return Link Service Monthly Reception Probability

SAR MPL	target	2023		
		Oct.	Nov.	Dec.
Reception probability (in %)	≥ 99	<b>99.80</b>	<b>99.86</b>	<b>99.93</b>

<sup>10</sup> Ref.: [SAR-SDD], §4.4 and §5.2.2 (Table 16)



## 5 SAR/GALILEO SPACE SEGMENT AVAILABILITY

The MPL defined in the [SAR-SDD] is set to 95% <sup>11</sup> for every single SAR transponder (SART), to be normalised annually.

Two space vehicles did not meet the above-mentioned (normalised) availability target:

- GSAT0201 had MPL values of **93.01%** in October, **86.46%** in November and December.
- GSAT0202 had MPL values of **87.69%** in November, and **84.04%** in December.

This materially corresponds to monthly (short term) figures as follows:

- GSAT0201 had SART availability of **27.69%** in October, **21.50%** in November and **100%** in December.
- GSAT0202 had had SART availability of **52.33%** in October, **0%** in November and **56.17%** in December.

All the remaining satellites met the SAR Transponder availability MPL target for the reporting period, with values  $\geq$  **95.41%**. Their short-term figures were:

- **72.98%** for GSAT0214 in November, **100%** for same space vehicle in October and December, **100%** for the rest of the constellation.

We remind that GSAT0210 was excluded from the Galileo active constellation since September 5<sup>th</sup>, 2023.

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<sup>11</sup> Ref.: [SAR-SDD], §5.3 (Table 18)

## 6 SUPPLEMENTARY METRICS

This section reports relevant performance metrics of the SAR/Galileo Service that are not MPLs.

### 6.1 LOCATION ACCURACY PERFORMANCE WITHIN 2KM

Multi-burst location accuracy within two kilometres has an expected value of 90%<sup>12</sup> defined in the [SAR-SDD]. Such availability figure is met during the reported period for all the reference beacons as displayed in Figure 12.

Figure 12 shows the monthly multi-burst two-kilometre location accuracy which comfortably exceeds the expected value of 90% for each of the SAR/Galileo Reference Beacons, with a minimum value of **96.8%**, a best value of **98.8%** and an average over the reported period of **97.9%**.

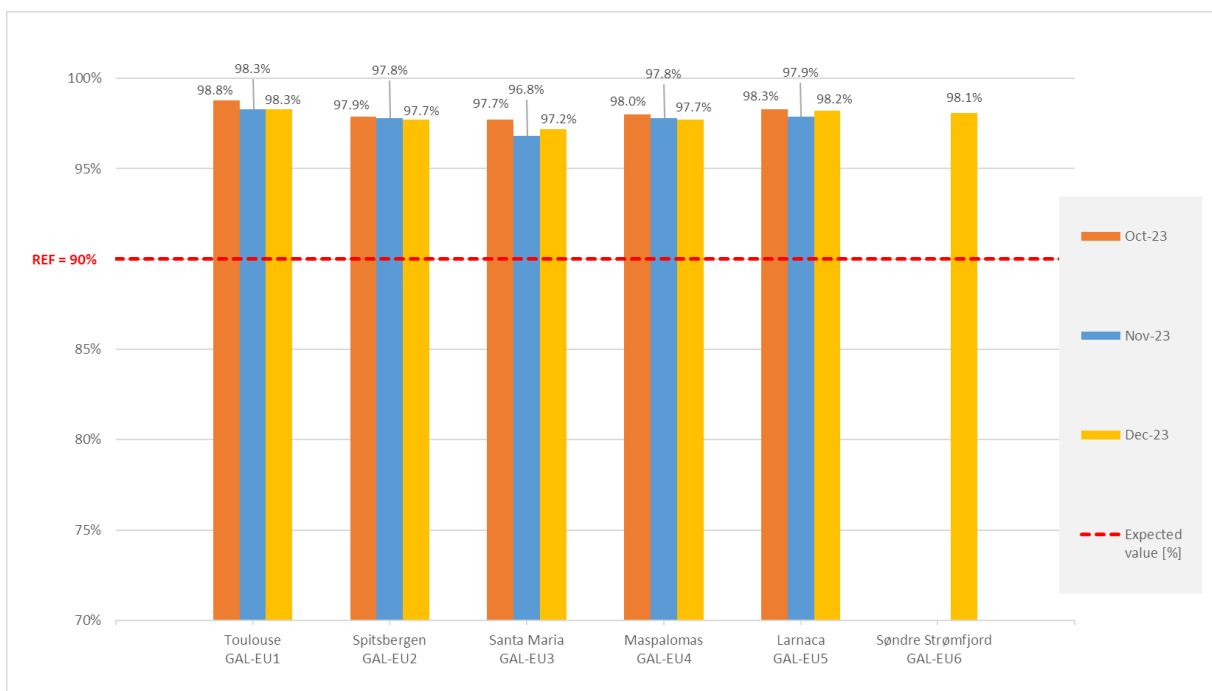


Figure 12: Per Reference Beacon Probability of two-kilometre Accuracy in Multi-Burst (in %)

<sup>12</sup> Ref.: [SAR-SDD], §5.1.4 (Table 13)

## 6.2 SAR/GALILEO SERVER AVAILABILITY

The [SAR-SDD] does not define a specific target for the SAR/Galileo Orbit Data Server availability, nevertheless it achieved an average value of **98.33%** during the reported period, excluding GSAT0201, GSAT0202, GSAT0210.

The monthly average availability of orbital data for all Galileo satellites equipped with SAR Transponders and declared available for service is shown in Table 7 for information.

Table 7: SAR/Galileo Orbit Data Server Monthly Availability

Other SAR Ground Segment Elements	2023		
	Jul.	Aug.	Sep.
SAR/Galileo Orbit Data Server Availability (in %)	≥ <b>88.36</b>	≥ <b>78.61</b>	≥ <b>99.33</b>

## 7 REFERENCES

This section identifies the documents explicitly referenced in this SAR/Galileo Enhanced Service Public Performance Report.

[SAR-SDD] *European GNSS (Galileo) SAR/GALILEO Service Definition Document (SAR-SDD), Issue 2.0, European Union, January 2020.*

The [SAR-SDD] defines the SAR/Galileo Enhanced Service and its associated Minimum Performance Levels (MPLs).

## 8 LIST OF ACRONYMS

<i>Acronym</i>	<b>Definition</b>
<i>Cospas-Sarsat</i>	Cosmicheskaya Sistyema Poiska Avariynich Sudow-Search and Rescue Satellite-Aided Tracking
<i>EU</i>	European Union
<i>EUSPA</i>	European Union Agency for the Space Programme
<i>FLS</i>	Forward Link Service
<i>GSAT</i>	Galileo Satellite
<i>GNSS</i>	Global Navigation Satellite System
<i>GSC</i>	(European) GNSS Service Centre
<i>MEOLUT</i>	Medium Earth Orbit Local User Terminal
<i>MPL</i>	Minimum Performance Level
<i>MTCF</i>	MEOLUT Tracking Coordination Facility
<i>PRN</i>	Pseudo-Random Noise
<i>REFBE</i>	SAR/Galileo Reference Beacon
<i>RLM</i>	Return Link message
<i>RLS</i>	Return Link Service
<i>SAR</i>	Search And Rescue
<i>SART</i>	Search And Rescue Transponder
<i>SDD</i>	Service Definition Document
<i>SGC</i>	SAR/Galileo Coverage
<i>SIS</i>	Signal In Space
<i>SV</i>	Space Vehicle

End of Document



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