GNSS NOTAM in Europe
- State of the art

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<td>Updated version accounting for the stakeholders’ consultation (including removal of NOTAM proposal R, one format for NOTAM proposal, service levels as planned by the ESSP, etc...)</td>
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ACRONYMS AND ABBREVIATIONS
1. INTRODUCTION

This document has been developed on the basis of Stakeholder consultation, including discussions with the RNAV Approach Implementation Support Group (RAiSG, formerly called RATF) and with the Aeronautical Information Operations Sub-group (AI Operations), working arrangements of EUROCONTROL Navigation and AIM Domains (see [B1] to [B17] in §5). This also accounts for the comments provided by the AIM/SWIM team members in January 2012 and for the information on the upgraded EGNOS NOTAM service provided by ESSP in November 2012 to cover EGNOS degradation periods.

The document is proposed as a reference to the community.

It describes the GNSS NOTAM Services agreed to be put in place in Europe. This also includes references to other information flows when relevant.

The document focuses on GNSS NOTAM in support to RNAV (GNSS) approach operations. No requirement for GNSS NOTAM services in support to other GNSS-based operations, in en-route or in the Terminal area, has been identified so far.

The document clarifies the agreed types and format of GNSS NOTAM to be delivered to airspace users. It introduces the notion of “NOTAM proposal” as a basis for the origination of NOTAM. It also describes the role the State/ANSP, the NOTAM originator and the International NOTAM Office (NOF) should play in setting up and providing these NOTAM services.

Tools to support these services are in place. In particular the EURONOTAM tool supports the EGNOS NOTAM service and AUGUR has been upgraded to support a GPS RAIM NOTAM service:

- EURONOTAM was initially developed by EUROCONTROL. After its transfer to the European Commission (EC), EURONOTAM has been upgraded and is now maintained and operated by the ESSP (European Satellite Services Provider) under contract with EC. ESSP is the EGNOS Services Provider, certified as an ANSP according to the EC Single European Sky (SES) regulation in 2010.

- The GPS RAIM NOTAM service based on AUGUR is available in the catalogue of EAD, the European Aeronautical Database.

Both the EURONOTAM and the upgraded AUGUR tools are compatible with the current document.
2. GNSS NOTAM TO SUPPORT RNAV (GNSS) APPROACHES

2.1 Introduction to RNAV (GNSS) Approaches

2.1.1 From Conventional to Area navigation (RNAV) and PBN
Today with the widespread availability of RNAV capabilities on-board aircraft and in particular the use of GPS, navigation is moving from navigation based on conventional nav aids towards Area Navigation. Area Navigation is a method of navigation which permits aircraft operation on any desired flight path within the coverage of referenced navigation aids or within prescribed limits of self contained aids. RNAV systems can support Area Navigation in any phase of flight, including en-route, terminal area and the final approach, provided the procedure is described by a series of waypoints, legs and altitude constraints stored in the onboard navigation database. The ICAO PBN Manual describes the requirements for airworthiness certification and operational approval to use RNAV systems on these so called PBN procedures.

2.1.2 Approach categories
Traditionally there have been two different types of approach procedures (PA and NPA); and a third type has been introduced (APV):

- **Precision approach procedures (PA)** use an instrument landing system (e.g. ILS, GBAS, MLS) which provides both lateral and vertical guidance on a stabilized and continuous descent path.

- **Non Precision Approach procedures (NPA)** use conventional navigation aids such as DME, VOR and NDB, or GNSS to bring the aircraft to an altitude from which a visual landing can be performed. NPA procedures do not required vertical guidance to be flown. However, operators are expected to fly NPA operations using the Constant Descent Final Approach (CDFA) technique\(^1\) instead of a Dive and Drive technique with multiple level-offs at step down fixes during the approach.

- **Approaches with Vertical guidance (APV)** make use of both lateral and vertical guidance. The design of APV procedures takes credit from the availability of an onboard VNAV capability.

According to the new approach classification of ICAO Annex 6, PA, NPA and APV procedures are designed for **2D or 3D operations** type A or B. 3D operations use both lateral and vertical guidance, whereas lateral guidance only is available for 2D operations. The minima of a Type A operation is "at or above 250 ft", whereas for a Type B operation this is "below 250 ft". APV procedures are 3D operations, either type A or B depending on the minima obtained by the procedure design which accounts for obstacles.

APV and GNSS-based NPA procedures are RNAV approaches. RNAV approach procedures comply with the RNP APCH navigation specification of the ICAO PBN Manual.

2.1.3 RNAV Approach with Vertical guidance: APV
Two types of APV procedures exist:

- **APV Baro** is an RNAV (GNSS) approach procedure flown to LNAV/VNAV minima. APV Baro procedure design criteria assume **Barometric vertical guidance** is available

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\(^1\) CDFA should not be confused with the term Continuous Descent Approach (CDA) which applies primarily before the final approach segment.
onboard the aircraft. These criteria also allow the use of SBAS vertical guidance, however performing APV Baro procedure using SBAS-based vertical guidance shall explicitly be approved by the competent NSA.

- **APV SBAS** is an RNAV (GNSS) approach flown to LPV minima. APV SBAS procedure design criteria assume vertical guidance are based on a Satellite Based Augmentation Systems (SBAS) such as WAAS in the US and EGNOS in Europe. APV SBAS are designed according to APV-1 or LPV200 design criteria, depending on the performance of the SBAS system the approach will be based on. For instance, because EGNOS has not been declared to support LPV200 performance level yet, all APV SBAS procedures in Europe are designed according to APV-1 criteria. Operating minima consequently cannot be lower than 250ft. With LPV200, LPV minima could be as low as 200ft.

### 2.1.4 APV to replace other stabilized approaches

Barometric VNAV capability has been available onboard large air transport aircraft for many years and is often used to perform stabilized approaches on NPA procedures (CDFA).

APV now takes full advantage of the VNAV capability and accounts for this in the design of the procedure, with potential improved operating minima. While CDFA is only a flying technique that pilots and operators are free to chose and use, APV defines acceptable onboard equipment and pilot procedures for the conduct of a safe approach and descent towards the runway.

For APV the flight path angle is required to be coded in the navigation database. The flight crew workload is also significantly reduced by APV providing flight deck indications and alerts in a similar way to precision approaches.

### 2.1.5 RNAV (GNSS) Approaches

RNAV (GNSS) Approaches include:

<table>
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<tr>
<td>GPS NPA</td>
<td>RNAV (GNSS) Approach to LNAV minima</td>
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<td>Based on GPS and RAIM</td>
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<td>EGNOS NPA</td>
<td>RNAV (GNSS) Approach to LP minima</td>
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<td></td>
<td>Based on GPS and EGNOS</td>
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<tr>
<td>APV Baro</td>
<td>RNAV (GNSS) Approach to LNAV/VNAV minima</td>
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<td></td>
<td>Based on GPS, RAIM and Baro-VNAV</td>
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<tr>
<td>APV SBAS</td>
<td>RNAV (GNSS) Approach to LPV minima</td>
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<td>Based on GPS and EGNOS</td>
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These approaches can be charted on the same RNAV (GNSS) chart. Figure 1 gives an example of how GPS NPA, APV Baro and APV SBAS can be published on one single chart with the different operating minima appearing at the bottom of the chart.
Figure 1: RNAV (GNSS) Approach chart example (Brest/France)
2.2 GNSS NOTAM for RNAV (GNSS) Approaches

2.2.1 High level principle of GNSS NOTAM

One of the specificities of PBN operations is that the availability of service is highly dependent on the airborne and aircrew capability. For instance, a pilot using highly integrated and sophisticated airborne equipment is likely to experience a higher availability of service than a pilot who will use a standalone GNSS receiver.

In order to allow aircrew to decide whether the approach can be planned, GNSS NOTAM are proposed to indicate whether the minimum navigation system or function required to perform the RNAV (GNSS) approach will be available, or not.

There can be different ways to determine the future availability of an RNAV (GNSS) approach:

- **Predictions** obtained using a mathematical model of the system/function; Predictions inform about predictable and scheduled unavailability.

- **Forecast**: in that case, no mathematical model exists to accurately predict unavailability. Forecasts are derived from observations and analysis of the actual performance of a system, which can show that the service degrades and that there is a higher risk of unavailability in the near future. This risk cannot be quantified. Forecasts cannot say precisely when the service will be unavailable; this can only be used to warn airspace users so that they are better prepared for the potential of a loss of service.

This document describes GNSS NOTAM services covering both cases described above (Predicted unavailability – as a result of Predictions – and Warnings – as a result of Forecasts).

This could be further updated in the future to address the cases of GNSS degradations due to some specific feared events, like interference.

2.2.2 Content of GNSS NOTAM

The minimum navigation function required for RNAV (GNSS) approach to LNAV and LNAV/VNAV minima is RAIM (Receiver Autonomous Integrity Monitoring\(^2\)). EGNOS is the required system for RNAV (GNSS) Approach to LPV minima. In case the only on-board system to provide vertical guidance is based on EGNOS and the use of EGNOS is permitted on RNAV (GNSS) approach to LNAV/VNAV minima, EGNOS is the minimum required system for this approach operation.

As a result, two types of GNSS NOTAM exist: GPS RAIM NOTAM and EGNOS NOTAM:

- **GPS RAIM NOTAM**
  
  Only the need for GPS RAIM NOTAM based on Predictions (obtained with a mathematical model of RAIM) has been identified so far:
  
  - GPS RAIM NOTAM will indicate periods of time at an airport when RAIM is predicted not to be available to support RNAV (GNSS) approach to LNAV minima: “GPS RAIM IS NOT AVAILABLE FOR LNAV”.

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\(^2\) The RAIM function is implemented in the onboard GPS receiver. RAIM monitors in flight and in real-time the integrity of the GPS signals. Several RAIM algorithms exist (FD – Fault Detection, FDE – Fault Detection and Exclusion, for baro-aided or non baro-aided airborne architectures, etc...). They all rely on the redundancy in the GPS constellation to check the coherency and consistency of GPS signals, identify a faulty satellite (FD) and potentially exclude it (FDE).
o When GPS RAIM is not available for LNAV it isn’t available for LNAV/VNAV either\(^3\). Consequently, in the case an LNAV/VNAV minima is also published on the RNAV\(_\text{GNSS}\) approach chart, the GPS RAIM NOTAM could indicate: “GPS RAIM IS NOT AVAILABLE FOR LNAV OR LNAV/VNAV”.

- **EGNOS NOTAM**

  The need for 2 types of EGNOS NOTAM has been identified: EGNOS NOTAM for predicted unavailability (obtained with a mathematical model which inform about the periods of time when EGNOS will not be available for RNAV\(_\text{GNSS}\) approach operations - flight planning isn’t possible); and EGNOS NOTAM for a higher than nominal but non quantifiable risk of unavailability (which warn about a potential EGNOS unavailability but don’t prevent from flight planning the EGNOS-based operation).

  **EGNOS NOTAM for predicted unavailability:**

  o EGNOS NOTAM will indicate periods of time at an airport when EGNOS is predicted not to be available to support RNAV\(_\text{GNSS}\) approach to LPV minima: “EGNOS IS NOT AVAILABLE FOR LPV”.

  o The criteria for EGNOS to support LPV apply for EGNOS to support LNAV/VNAV\(^4\). Consequently, in the case the local supervisory authority allows the use of EGNOS for approaches to LNAV/VNAV minima, the EGNOS NOTAM could indicate “EGNOS IS NOT AVAILABLE FOR LNAV/VNAV”.

  o In case the RNAV\(_\text{GNSS}\) approach includes both LPV and LNAV/VNAV minima, the corresponding EGNOS NOTAM would indicate “EGNOS IS NOT AVAILABLE FOR LPV” as EGNOS-equipped users will always fly to LPV minima even if approach to LNAV/VNAV minima is also available.

  **EGNOS NOTAM for warning:**

  o EGNOS NOTAM will inform about possible EGNOS unavailability to support RNAV\(_\text{GNSS}\) approach to LPV minima:

    “BE AWARE OF POTENTIAL EGNOS UNAVAILABILITIES:
    - LPV FLIGHT PLANNING STILL POSSIBLE
    - FOR MORE INFORMATION, PLEASE REFER TO XXXX”

  o In the case the local supervisory authority allows the use of EGNOS for approaches to LNAV/VNAV minima, the EGNOS NOTAM could indicate:

    “BE AWARE OF POTENTIAL EGNOS UNAVAILABILITIES:
    - EGNOS-BASED LNAV/VNAV FLIGHT PLANNING STILL POSSIBLE
    - FOR MORE INFORMATION, PLEASE REFER TO XXXX”

  o In case the RNAV\(_\text{GNSS}\) approach includes both LPV and LNAV/VNAV minima, the corresponding EGNOS NOTAM could indicate:

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\(^3\) Indeed, the GNSS and RAIM performances required for LNAV/VNAV are the same as for LNAV (Lateral navigation for LNAV and LNAV/VNAV are identical and based on GNSS. Vertical navigation for LNAV/VNAV is based on baro).

\(^4\) This is true for LNAV/VNAV and LPV designed according to APV-1 service level. In that case; lateral performance required for LNAV/VNAV is much lower than the one required for LPV (i.e. lower than APV-1 lateral performance) and vertical performance required for LNAV/VNAV is similar to the one required for LPV (similar to APV-1 vertical performance). Hence the loss of vertical performance is most likely to happen first whenever navigation performances degrade. In conclusion, and because the loss of vertical guidance results in the loss of the selected approach capability in total, the monitoring of EGNOS performance against APV-1 criteria illustrates the capability of EGNOS to support both LPV and LNAV/VNAV approaches.
“BE AWARE OF POTENTIAL EGNOS UNAVAILABILITIES:
- LPV FLIGHT PLANNING STILL POSSIBLE
- FOR MORE INFORMATION, PLEASE REFER TO XXXX”

as EGNOS-equipped users will always fly to LPV minima even if approach to LNAV/VNAV minima is also available.

Please note that the aforementioned EGNOS NOTAM are different from a NOTAM that would indicate that ‘the procedure is not available’ and would unambiguously forbid the procedure to be conducted. This could be due to other reasons than GNSS performance, like for instance an identified error in the design of the procedure or in the coding of the procedure inside aircraft navigation database, or the procedure still not active because ATC is not trained, etc…This type of NOTAM is not a GNSS NOTAM but a NOTAM on a procedure consequently this is not addressed in the current document.

Please note that because EGNOS is not the minimum system required for navigation in en-route and terminal area, no EGNOS NOTAM is proposed for these phases of flight.

Concerning GPS RAIM, this is the minimum function required for en-route and terminal area as well as for the approach and GPS RAIM NOTAM could also be proposed for these phases of flight. However and because no requirement exists for NOTAM for these phases of flight in TGL 10 and AMC 20-4, this is not retained in this concept document.

2.2.3 GPS RAIM NOTAM

GPS RAIM New and Cancellation NOTAM will be issued per airport.

No Replacement NOTAM will be issued. In case a NOTAM is to be replaced, a Cancellation NOTAM (NOTAM C) will be issued first and then a new NOTAM (NOTAM N) with the updated information.

A non baro-aided GPS RAIM FD algorithm is proposed to be used for the prediction of service unavailability to be distributed via NOTAM.

In particular, the following RAIM prediction configuration is used inside AUGUR:
- FD and non baro-aided C129 receiver assuming SA off,
- 5 degrees mask angle, and
- 0.3NM Horizontal Alert Limit (HAL).

Predictions based on other algorithms or a different settings (e.g. baro-aided, FDE or with another mask angle) are made available on the web via the EUROCONTROL AUGUR tool ([http://augur.ecacnav.com/](http://augur.ecacnav.com/)).

GPS RAIM NOTAMs formatting rules and examples are provided in §2.2.4.2 and 2.2.6.

Alternative means to GPS RAIM NOTAM exist for aircraft operators to check GPS RAIM availability for RNAV (GNSS) approach to LNAV and LNAV/VNAV minima (e.g. prediction tools provided by avionic manufacturers, Flight Planning Companies and web tools like AUGUR). These alternative means can be more relevant to their operations and some NSAs allow the use of them instead of or in complement to GPS RAIM NOTAM.

2.2.4 EGNOS NOTAM

2.2.4.1 EGNOS NOTAM for predicted unavailability

In this case, EGNOS New and Cancellation NOTAM will be issued per airport.
No Replacement NOTAM will be issued. In case a NOTAM is to be replaced, a Cancellation
NOTAM (NOTAM C) will be issued first and then a new NOTAM (NOTAM N) will be issued
with the updated information.

As introduced in section 2.2.1, EGNOS NOTAM will provide information on the periods when
EGNOS is predicted not to be available to support RNAV\(^{(\text{GNSS})}\) approach to LPV and/or
LNAV/VNAV minima. This assumes that all LPV procedures published at one airport are
designed according to the same design criteria: APV-1. Discussions about NOTAM on
EGNOS capability to support other levels of service than APV-1 (e.g. LPV 200) or multiple
levels of service at the same airport are reserved for the future.

EGNOS NOTAM formatting rules and examples are provided in sections 2.2.4.2 and 2.2.6.

2.2.4.2 EGNOS NOTAM for warning
In this case, only EGNOS New NOTAM will be issued per airport. Such NOTAMs will be valid
for a period of a week. If users still need to be warned about potential EGNOS unavailability,
a New NOTAM will be issued per airport for an additional week.

No Cancellation or Replacement NOTAM will be issued in that case.

As introduced in section 2.2.1, these EGNOS NOTAM warn the airspace users of possible
EGNOS unavailability to support RNAV\(^{(\text{GNSS})}\) approach to LPV and/or LNAV/VNAV minima.
This assumes that all LPV procedures published at one airport are designed according to the
same design criteria: APV-1.

Such EGNOS warnings could also be made available on the web via the EUROCONTROL

EGNOS NOTAMs formatting rules and examples are provided in section 2.2.4.2 and 2.2.6.

2.2.5 ICAO GNSS NOTAM FORMAT
This section describes the different fields and values that can be used in a GNSS NOTAM in
compatibility with ICAO formatting rules. It addresses both EGNOS and GPS RAIM NOTAM.

It should be noted that this paragraph provides additional guidelines to ICAO Annex 15, Doc
8126 and the OPADD ([Ref 1, 2 and 3]), which remain the applicable documents concerning
NOTAM format specifications.

**Item Q**
This Item is divided in eight fields, each separated by a stroke. All fields of Item Q must be
given a value (ICAO doc 8126 [Ref 3]) and for each NOTAM type (OPADD [Ref 1]).

The definition of each field is as follows:
1. **FIR:** 4 letters ICAO location indicator corresponding to FIR where the
aerodrome for which the NOTAM is issued [See Item A] is allocated.
2. **NOTAM CODE:** ICAO five-letter Q-code
   - **QGAAU** for New NOTAMs
   - **QGAXX** for Cancellation NOTAMs in case a New NOTAM is to follow
   - **QGAAK** for Cancellation NOTAMs in case no new NOTAM follows.
3. **TRAFFIC:** I = IFR.
4. **PURPOSE:** Combination NBO shall be used.
   - **N** = NOTAM selected for the immediate attention of aircraft operators.
B = NOTAM selected for Pre-flight Information Bulletins (PIB) entry.
O = Operationally significant for IFR flights.

5. **SCOPE:** A (Aerodrome).

6. **LOWER:** The value for this field will be always 000.

7. **UPPER:** The value for this field will be always 999.

8. **COORDINATES, RADIUS:** The Aerodrome Reference Point (ARP) coordinates (latitude and longitude accurate to one minute), and a range of 005NM.

Example:

\[ Q)LFBB/QGAAU/I/NBO/A/000/999/4100N00200E005 \]

**Item A**
Aerodrome Location indicator for which the NOTAM is issued.

Example:

\[ A)LFBO \quad \text{for Toulouse/France} \]

**Item B**
‘From’: The beginning of the occurrence (a ten-figure date-time group giving the year, month, day, hours and minutes in UTC).

Example:

\[ B)0910241230 \quad \text{meaning 24 October 2009 at 1230 UTC} \]

Note: According to OPADD §2.2.14 and §2.4.1.5 [Ref 1] the date-time in item B) of a NOTAMC shall be the actual date and time that this NOTAMC is created.

**Item C**
‘To’: The end of the occurrence (a ten-figure date-time group given the year, month, day, hours and minutes in UTC).

Example:

\[ C)0910250600 \quad \text{meaning 25 October 2009 at 0600 UTC} \]

Note: No EST (estimated) NOTAM shall be issued.

For a cancellation NOTAM (NOTAM C), the Item C) shall not be used.

**Item D**
This field aggregates groups of outages predicted for the same location, within the timeframe stated in item B) and C).

Example:

\[ B)0911051000 \quad \text{meaning 5 November 2009 at 10:00 UTC. (beginning of the 1st outage)} \]
\[ C)0911061600 \quad \text{meaning 6 November 2009 at 16:00 UTC. (end of the last outage)} \]
\[ D)05 1000-1100 06 1400-1600 \]

Two outages:
- From 5 November 2009 at 10:00 UTC to 5 November 2009 at 11:00 UTC.
From 6 November 2009 at 14:00 UTC to 5 November 2009 at 16:00 UTC. The first time indication shall correspond to the start time in item B). The last time indication shall correspond to the end time in item C).

Item D) shall not be used for NOTAM C

Item E

Text of NOTAM.

- For a New NOTAM (NOTAMN):
  - For GPS RAIM unavailable: GPS RAIM IS NOT AVAILABLE FOR LNAV
  - For EGNOS predicted unavailability: EGNOS IS NOT AVAILABLE FOR LPV
  - For EGNOS warnings: BE AWARE OF POTENTIAL EGNOS UNAVAILABILITIES:
    - LPV FLIGHT PLANNING STILL POSSIBLE
    - FOR MORE INFORMATION, PLEASE REFER TO XXXX.

- For Cancellation NOTAMs (NOTAMC):
  - If a New NOTAM is to follow:
    GPS RAIM IS NOT AVAILABLE FOR LNAV NEW NOTAM TO FOLLOW
    Or: EGNOS IS NOT AVAILABLE FOR LPV NEW NOTAM TO FOLLOW
  - If no New NOTAM follows:
    GPS RAIM RESUMED NORMAL OPERATION
    Or: EGNOS RESUMED NORMAL OPERATION
    (no Cancellation NOTAM for EGNOS warnings)

Item F and G

These fields shall not be created for Aerodrome NOTAM.
## 2.2.6 GPS RAIM and EGNOS NOTAM examples

### NOTAM N example

For GPS RAIM NOTAM N:

```
A1234/09 NOTAMN
Q)LFBB/QGAAU/I/NBO/A/000/999/4100N00200E005
A)LFBO
B)0908240145
C)0908250225
D)24 0145-0230 0630-0645 25 0155-0225
E)GPS RAIM IS NOT AVAILABLE FOR LNAV
```

This NOTAM is a new NOTAM (NOTAMN). Its reference is A1234/09

For EGNOS NOTAM N (predicted unavailability):

```
A1234/09 NOTAMN
Q)LFBB/QGAAU/I/NBO/A/000/999/4100N00200E005
A)LFBO
B)0908240145
C)0908250225
D)24 0145-0230 0630-0645 25 0155-0225
E)EGNOS IS NOT AVAILABLE FOR LPV
```

OR

For EGNOS NOTAM N (warning):

```
A1234/09 NOTAMN
Q)LFBB/QGAAU/I/NBO/A/000/999/4100N00200E005
A)LFBO
B)0908240000
C)0908302359
E)BE AWARE OF POTENTIAL EGNOS UNAVAILABILITIES:
   - LPV FLIGHT PLANNING STILL POSSIBLE
   - FOR MORE INFORMATION, PLEASE REFER TO XXXX
```

### NOTAM C example

For GPS RAIM NOTAM C:

```
A1235/09 NOTAMC A1234/09
Q)LFBB/QGAAK/I/NBO/A/000/999/4100N00200E005
A)LFBO
B)0908240145
E)GPS RAIM RESUMED NORMAL OPERATION
```

This NOTAM is a NOTAMC. Its reference is A1235/09 and it cancels NOTAM reference A1234/09. NOTAMC can cancel NOTAMN. NOTAMC does not include Item C and D. Item E of a NOTAMC includes the text of the decoded NOTAM Code, together with details of the NOTAM subject. (ref OPADD §2.4.3 [Ref 1])

Alternatively: In the case the Q code is QGAXX in the NOTAMC, the XX indicates that a NOTAMN immediately will follow (ref OPADD §2.4.3 [Ref 1]). Item E) should include the remark NEW NOTAM TO FOLLOW at the end of the text.

```
A1235/09 NOTAMC A1234/09
Q)LFBB/QGAXX/I/NBO/A/000/999/4100N00200E005
A)LFBO
B)0908240145
E)EGNOS RESUMED NORMAL OPERATION
```

For EGNOS NOTAM C (predictions only):

```
A1235/09 NOTAMC A1234/09
Q)LFBB/QGAAK/I/NBO/A/000/999/4100N00200E005
A)LFBO
B)0908240145
E)EGNOS RESUMED NORMAL OPERATION
```

OR

```
A1235/09 NOTAMC A1234/09
Q)LFBB/QGAXX/I/NBO/A/000/999/4100N00200E005
A)LFBO
B)0908240145
E)EGNOS IS NOT AVAILABLE FOR LPV NEW NOTAM TO FOLLOW
```
3. PROPOSED GNSS NOTAM PROCESS

3.1 Introduction

The International NOTAM Office (NOF) will receive outage information in the form of NOTAM proposals from a Data Originator for them to create a NOTAM for end users.

Figure 2: The GNSS NOTAM process

3.2 GNSS NOTAM ORIGINATION

GNSS NOTAM origination includes in this context GNSS prediction and formatting of the information into a NOTAM proposal.

3.2.1 Origination of GPS RAIM NOTAM

Today, several States in Europe provide a GPS RAIM NOTAM as part of their AIS. These GPS RAIM services use NOTAM proposals provided by a NOTAM proposal originator. There used to be only one GPS RAIM NOTAM proposals originator in Europe: the DFS. But EUROCONTROL/EAD is another one since 2012.

---

5 as per EC Implementing Rule for quality on aeronautical information and aeronautical data (ADQ regulation).
The DFS and EUROCONTROL tools predict RAIM availability as a function of GPS satellite status provided by the FAA (NOTAM on GPS satellite) and package this information into NOTAM proposals.

DFS has been providing a fully automated GPS RAIM NOTAM service since 1998 based on national legislation. The national GPS RAIM NOTAM service of the DFS is in line with the ICAO GNSS NOTAM requirements. Additionally DFS provides information about GPS RAIM status to the international cooperation partners.

EUROCONTROL upgraded the AUGUR tool so that this can also create GPS RAIM NOTAM proposals. The NOTAM proposals based on AUGUR are in line with the NOTAM description provided in the current document. The EUROCONTROL/EAD service based on AUGUR has been operational since 2012.

3.2.2 Origination of EGNOS NOTAM

The EGNOS SoL Service, provided by the European Satellite Services Provider (ESSP), is operational for use by Aviation as described in the EGNOS Safety of Life Service Definition Document (EGNOS SoL SDD [Ref 4]). In addition to the EGNOS SoL Service, and in the frame of the EGNOS Working Agreement (EWA) signed with each ANSP publishing RNAV(GNSS) procedures using EGNOS, ESSP provides EGNOS NOTAM proposals for individual airports to the corresponding NOF. ESSP is the EGNOS NOTAM proposal originator.

The EGNOS NOTAM proposals origination is based on the EURONOTAM tool developed by EUROCONTROL and transferred to the European Commission for use by the ESSP. The tool operated and maintained by ESSP generates proposals for the two types of EGNOS NOTAM described in section 2.2.2:

- Concerning EGNOS predicted outages; the tool translates EGNOS and GPS system failures/unavailability information into approach unavailability information to be packaged into NOTAM proposals.

- EURONOTAM also generates NOTAM proposals for airports which are likely to be affected by EGNOS performance degradations. Such warning NOTAM result from observed EGNOS performance in the context of the daily performance monitoring activities by ESSP. They will be generated only in the context of a contingency situation, when information about EGNOS underperformance is also provided by means of Service Notices (published on the ESSP website [W1]) and Weekly Performance Reports (sent to EWA partners/signatories). This approach is defined in the frame of the ESSP Contingency Master Plan under EASA oversight.

3.2.3 Formatting of GNSS NOTAM proposals

NOTAM Proposal originators (as introduced above in §3.2.1 and 3.2.2) are not allowed to distribute NOTAM to end users. Only the NOF can do that today. However and to ease the tasks of the NOF, the NOTAM proposals will be provided in a format as close as possible to the one of the NOTAM described in section 2.2. In fact what differentiates a “NOTAM” from its corresponding “NOTAM proposal” is the number it is given. Item A, B, C, D will be identical, and Item E can contain additional information to support the creation of the NOTAM.

The NOTAM proposal originator doesn’t have access to NOTAMs and so doesn’t know the NOTAM reference number to indicate for NOTAM C. The NOTAM Proposals have their
internal numbers and NOTAM Proposal C would make reference to the NOTAM Proposal (N) they intend to cancel.

The following figure illustrates the numbering principles of NOTAM Proposals and NOTAM.

![Numbering principles of NOTAM proposals and NOTAM](image)

**Figure 3: Numbering principles of NOTAM proposals and NOTAM**

The NOTAM Proposal numbering and type will be put on the first line of Item E in order to ease the formatting task of the NOF operator who will publish the NOTAM (see task 3 below in §4.3).

Here follow examples of NOTAM proposals:

<table>
<thead>
<tr>
<th>NOTAM N proposal example</th>
<th>For GPS RAIM NOTAM proposal:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q)LFBB/QGAUU/INBO/A/000/999/4100N00200E005</td>
<td>For EGNOS NOTAM proposal (predicted unavailability):</td>
</tr>
<tr>
<td>A) LFBO</td>
<td>Q)LFBB/QGAUU/INBO/A/000/999/4100N00200E005</td>
</tr>
<tr>
<td>B)0908240145</td>
<td>A) LFBO</td>
</tr>
<tr>
<td>C)0908250225</td>
<td>B)0908240145</td>
</tr>
<tr>
<td>D)24 0145-0230 0630-0645 25 0155-0225</td>
<td>C)0908250225</td>
</tr>
<tr>
<td>E)0011/09 NOTAMPN</td>
<td>D)24 0145-0230 0630-0645 25 0155-0225</td>
</tr>
<tr>
<td>GPS RAIM IS NOT AVAILABLE FOR LNAV</td>
<td>E)0011/09 NOTAMPN</td>
</tr>
</tbody>
</table>

EGNOS IS NOT AVAILABLE FOR LPV

**OR** for EGNOS NOTAM proposal (warning):

Q)LFBB/QGAUU/INBO/A/000/999/4100N00200E005
A) LFBO
B)0908240000
C)0908302359
### NOTAM C proposal example

<table>
<thead>
<tr>
<th>For GPS RAIM NOTAM proposal:</th>
<th>For EGNOS NOTAM proposal (predicted unavailability only):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q)LFBB/QGAAK/I/NBO/A/000/999/4100N00200E005</td>
<td>Q)LFBB/QGAAX/I/NBO/A/000/999/4100N00200E005</td>
</tr>
<tr>
<td>A)LFBO</td>
<td>A)LFBO</td>
</tr>
<tr>
<td>B)0908240145</td>
<td>B)0908240145</td>
</tr>
<tr>
<td>E)0011/09 NOTAMPN</td>
<td>E)0011/09 NOTAMPN</td>
</tr>
<tr>
<td>GPS RAIM RESUMED NORMAL OPERATION</td>
<td>GPS RAIM IS NOT AVAILABLE FOR LNAV NEW NOTAM TO FOLLOW</td>
</tr>
</tbody>
</table>

OR

| Q)LFBB/QGAXX/I/NBO/A/000/999/4100N00200E005  | Q)LFBB/QGAXX/I/NBO/A/000/999/4100N00200E005             |
| A)LFBO                        | A)LFBO                                                   |
| B)0908240145                  | B)0908240145                                            |
| E)0011/09 NOTAMPN             | E)0011/09 NOTAMPN                                        |
| GPS RAIM IS NOT AVAILABLE FOR LNAV NEW NOTAM TO FOLLOW | EGNOS RESUMED NORMAL OPERATION |

Information received by the NOF will be the same whichever option (EAD or AFTN) is selected to receive the NOTAM proposals (see §3.3.1).

### 3.3 Provision of NOTAM proposals to the NOF

Figure 4 hereafter illustrates how NOTAM proposals are made available to the NOF and NOTAM are sent to the end users. The figure also illustrates that GNSS predictions to be made available to end users through other channels (e.g. web like AUGUR [W2]) should be from the same source as the NOTAM proposals so that the information is consistent.

Note that although not illustrated in Figure 4, agreements / contracts should exist in order to define the communication network to be used, the framework and conditions for each of the data links illustrated in the figure.
Figure 4: Overall architecture to support the services
3.3.1 How?

On the **EGNOS** side, once the corresponding EWA is signed and following NOF’s demand, ESSP provides EGNOS NOTAM proposals through a direct AFTN to AFTN link or via EAD. ESSP will use EAD for the provision of EGNOS NOTAM proposals to a NOF only if NOTAM proposals are requested on an EAD interface (ESI or ECIT). Otherwise, a direct AFTN to AFTN link will be used.

The **GPS RAIM NOTAM** proposals generated by AUGUR will be sent from an AFTN address to NOF via EAD.

Whenever EAD is used, this is capable of identifying the right channel of communication for individual NOF and of forwarding the NOTAM proposal to the appropriate interface (an AFTN address, an ECIT interface to EAD or an ESI interface to EAD). This is a matter of configuration inside EAD, in line with an agreement to be contracted between EAD and the responsible NOF.

3.3.2 When?

**EGNOS NOTAM proposals**

Since 2nd March 2011 (when the EGNOS SoL Service was declared available for aviation use by the European Commission), ESSP has been originating and providing EGNOS NOTAM proposals.

Every week, ESSP predicts the availability of the EGNOS APV-1 service over a one week period (from Wednesday morning to the following Tuesday night) accounting for GNSS system planned maintenance activities. In case the service is predicted not to be available, ESSP will originate NOTAM proposals. Additionally, every day of the week, 3 GNSS system checks are performed, in order to account for unscheduled GNSS system failures. ESSP updates the weekly predictions accordingly and issues additional NOTAM proposals if required (so called Service Level 1+ 3C).

ESSP intends to upgrade the NOTAM Proposal service gradually in order to update its predictions in a timelier manner, as per ICAO recommendations:

*ICAO Annex 10, Appendix II, §9.3. Timing for Notification: “For scheduled events, notification should be given to the NOTAM authority at least 72 hours prior to the event. For unscheduled events, notification to the NOTAM authority should be given within 15 minutes. Notification should be given for events of 15-minute, or longer, duration.”*

Currently, the EGNOS NOTAM proposals service complies with the part of this ICAO recommendation dealing with scheduled events; but a roadmap has been defined with the final objective to fully comply with ICAO recommendation for unscheduled events. This is

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6 In the case a State would like to receive the NOTAM proposals on their ESI interface to EAD, it will have to upgrade this interface in order to allow the management of NOTAM proposals. These States could also decide to receive NOTAM proposals on an AFTN address.

7 EAD is able to manage NOTAM proposals since release 6 in March 2011.

8 including bank holidays and weekends

9 ESSP will gradually upgrade its service from SL1+ to SL4. SL2, SL3 and SL4 are defined as follows:
- SL2: reduced reaction time (2 hours) in case of a GPS or EGNOS during working hours
- SL3: updated prediction within 2 hours in case of a GPS or EGNOS failure during working hours and non-working days (H24)
mainly dependent on EGNOS evolutions and EURONOTAM tool evolutions procured by the European Commission, the end user needs, and on the conclusion of discussions at ICAO level on timing recommendations for SBAS NOTAM. For more information on upcoming EGNOS NOTAM Proposals Service upgrades including the EGNOS NOTAM Roadmap [Ref 5], please contact the ESSP.

A strict application of this recommendation would require the NOF to convert the NOTAM proposal into an NOTAM as soon as possible (see also §4.2 and 4.3).

Daily EGNOS performance monitoring may also generate NOTAM proposals (warnings). These will cover unpredicted and unscheduled EGNOS underperformance. The generation of these NOTAM proposals will be triggered by the monitoring of two indicators. One indicator will check that the APV-1 availability over the last 14 calendar days is compliant with ICAO SARPS requirements for APV-1 (99%). The other indicator will check APV-1 daily availability for each of the last 14 days against ICAO requirements and verify APV-1 performance was met for at least 11 of the 14 days (in case APV-1 daily availability is outside of tolerance for 4 days out of 14, an alert would be triggered). If any of the 2 indicators raises an alert, than a Contingency situation is declared and warning EGNOS NOTAM proposals will be generated as part of the ESSP Master Contingency Communication Plan.

**GPS RAIM NOTAM proposals**

AUGUR makes GPS RAIM predictions publicly available on its web interface ([http://augur.ecacnav.com](http://augur.ecacnav.com)). EUROCONTROL also makes GPS RAIM predictions available in a NOTAM proposal format and sends them to interested NOFs via EAD on any interface (AFTN, ESI or ECIT).

AUGUR provides NOTAM proposals for events of 15-minutes, or longer, duration.

AUGUR predicts GPS RAIM unavailability and originates corresponding GPS RAIM NOTAM proposals once per day at 1900 UTC. The predictions are calculated for a 48 hour period from the calculation time each day.

The most recent information on the GPS system status available from the USCG is used as input to GPS RAIM predictions.

In case the USCG forecast information on changes in the GPS status and the predictions for the 48 hours need to be updated, additional NOTAM proposals will be originated and sent to the NOF immediately.

The GPS RAIM NOTAM proposals based on AUGUR described above do not strictly comply with ICAO recommendations in terms of timing for notification. It should also be noted that an assessment conducted by EUROCONTROL clarified that the GPS status information provided by USCG in the NANUs does not strictly comply with these recommendations either [B8].

**3.4 GNSS NOTAM Validation**

This includes different tasks to be performed by the NOF in order to convert NOTAM proposals into NOTAM. A detailed description of these tasks is provided in section 4.
3.5 GNSS NOTAM Distribution

GNSS NOTAM will be distributed to the end users using the existing NOTAM distribution network used by the State (AFTN and/or EAD depending on the migration status).

4. STATE/ANSP ROLE IN THE PROPOSED GNSS NOTAM PROCESS

4.1 Task 1: Coordination between the States/ANSP and the NOTAM proposal originator(s)

GNSS NOTAM proposals will be provided for a list of airports agreed between the data originator (ESSP or EUROCONTROL/EAD) and the interested States/ANSPs. Both EGNOS and GPS RAIM NOTAM services are relevant only for airports where RNAV (GNSS) approach procedures are published. The State/ANSP must clarify for which airports and procedures the service is required, and also provide required information on the airports.

This coordination takes place in the context of a formal agreement between the State/ANSP and the NOTAM proposal originator: the EWA for the EGNOS NOTAM proposal service by ESSP and the EAD Data Agreement for the GPS RAIM NOTAM proposal service based on AUGUR and set up with the EAD Service Desk.

The NOF will be the main actor in the provision of the GNSS NOTAM service to the end user. It should consequently also be involved at that stage; in particular concerning the definition of the interface on which it will receive the NOTAM proposals from the Originator (see point 5 below in Table 1).

In both GPS RAIM and EGNOS NOTAM proposal cases, the following list of parameters is required:

| Data to be provided to the GPS RAIM NOTAM proposal originator for each airport where LNAV and/or LNAV/VNAV procedures are published | 1. the airport ICAO code  
2. the FIR for the airport  
3. the coordinates of the Airport Reference Point (ARP) – lat, long and elevation  
4. the date from which the GPS RAIM NOTAM proposals shall be provided to the NOF  
5. the interface on which the GPS RAIM NOTAM proposals shall be provided to the NOF (AFTN address, ECIT interface to EAD or ESI interface to EAD) |
| --- | --- |
| Data to be provided to the EGNOS NOTAM proposal originator for each airport where LPV and/or LNAV/VNAV(*) procedures are published [*] where EGNOS use is allowed. | (same as above)  
1. the airport ICAO code  
2. the FIR for the airport  
3. the coordinates of the Airport Reference Point (ARP) – lat, long and elevation  
4. the date from which the EGNOS NOTAM proposals shall be provided to the NOF  
5. the interface on which the EGNOS NOTAM proposals shall be provided to the NOF (AFTN address, ECIT interface to EAD or ESI interface to EAD) |
Table 1: Data required for setting up a NOTAM proposal service

Note that in the case of an LNAV/VNAV procedure, the setting-up of both GPS RAIM and EGNOS NOTAM services may be required by the local supervisory authority in case they allow the use of EGNOS for this approach type.

The task description is summarised in the following table:

<table>
<thead>
<tr>
<th>Task</th>
<th>State/ANSP/NOF and NOTAM proposal originator(s) coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of the task</td>
<td>The State/ANSP must provide the detailed information required by the NOTAM proposal originator(s) (according to Table 1). The coordination should be made with the GPS RAIM NOTAM proposal originator and/or the EGNOS NOTAM proposal originator depending on the GNSS NOTAM service required.</td>
</tr>
<tr>
<td>Periodicity of the task</td>
<td>Once &amp; Every time a new airport is to be added to the list of airports covered by the NOTAM proposal service (e.g. each time a new RNAV (GNSS) approach procedure is published).</td>
</tr>
</tbody>
</table>

Table 2: Task 1 - State / NOTAM proposal originator(s) coordination task

4.2 Task 2: NOTAM verification (by the NOF)

The NOF will receive GNSS NOTAM proposals and is responsible to convert these into NOTAM for distribution to end users.

The NOF does not have access to the current and future status of the GNSS systems, nor to the tools/indicators useful to estimate their impact on the navigation service. Consequently it is not able to verify the correctness of the predictions or forecast information contained in Item E of the NOTAM proposals. According to the agreement between the Data Originator and the State/ANSP (including the Aeronautical Information Service Provider (AISP)) introduced in section 4.1 above, the NOF can trust the content of the NOTAM proposal (unavailability or potential degradation of service foreseen).

Verifications under the responsibility of the NOF in the context of Task 2 will consist of performing syntax checks, NOTAM formatting checks and possibly Item A/E cross-checks.

NOF would not be asked to perform consistency and coherency checks against information provided to the GNSS NOTAM proposal originator(s) (see §4.1). Indeed NOF may not have access to all the data provided by the State/ANSP to the GNSS NOTAM proposal originator.

In addition to the verification, NOF may also have to edit Item E in the following three cases:

- **Case 1:** Concerning GPS RAIM NOTAM provided by AUGUR, the NOF may have to edit the Item E in the case he wants to make explicit the fact that the NOTAM is valid also for LNAV/VNAV approach to this airport. This would consist in changing “GPS RAIM IS NOT AVAILABLE FOR LNAV” into “GPS RAIM IS NOT AVAILABLE FOR LNAV OR LNAV/VNAV”.

- **Case 2:** Concerning EGNOS NOTAM proposals, the NOF will receive NOTAM proposals with the following Item E: “EGNOS IS NOT AVAILABLE FOR LPV”. In case an LNAV/VNAV procedure is published and the use of EGNOS is permitted for this approach, the NOF would have to change Item E into “EGNOS IS NOT AVAILABLE FOR LNAV/VNAV” or “EGNOS IS NOT AVAILABLE FOR LPV OR LNAV/VNAV” in order to reflect the local conditions (if LPV procedure is published in addition).

- **Case 3:** Concerning EGNOS NOTAM proposals for warnings, the NOF will receive NOTAM proposals with the following Item E:

“BE AWARE OF POTENTIAL EGNOS UNAVAILABILITIES:
- LPV FLIGHT PLANNING STILL POSSIBLE
- FOR MORE INFORMATION, PLEASE REFER TO XXXX”

In case there is no need to refer to other source of information, the NOF will remove the second sentence in proposed Item E (delete “FOR MORE INFORMATION PLEASE REFER TO XXXX”). Otherwise, the NOF can replace “XXXX” by a reference to an AIC, the ESSP Service Notices, the ESSP website [W1], or any other relevant source of information which would be useful for a pilot in a contingency situation, as agreed with their State/ANSP.

The task description is summarised in the following table:

<table>
<thead>
<tr>
<th>Task</th>
<th>NOF task</th>
</tr>
</thead>
</table>
| **Description of the task** | The list of checks that could be performed by the NOF:  
- syntax checks  
- NOTAM formatting checks  
- Item A/E cross-checks  
- Optional: Item E editing according to case 1 and 2 above. |
| **Periodicity of the task** | Once per NOTAM proposal received  
Note: EGNOS NOTAMs are not expected under nominal conditions. They should only be required in the case of a failure. Therefore the number of EGNOS NOTAMs is expected to be low. Very few GPS RAIM NOTAM would be originated per day and per airport with the current GPS constellation. |

**Table 3: Task 2 - NOTAM Verification task**

### 4.3 Task 3: Creation of NOTAM (by the NOF)

Once the content of the NOTAM proposal has been checked as described in Task 2 above (§4.2), the NOF will decide what type of NOTAM to create (New or Cancellation – NOTAM N or C).
NOTAM proposal N and C are received by the NOF, making reference to an internal numbering scheme (one per NOTAM proposal originator). The NOF will need to keep records of the NOTAM numbers allocated to individual NOTAM proposals, allowing the conversion of NOTAM C Proposals into NOTAM C.

For example, a NOTAM proposal 0011/09 NOTAMPN was published by the NOF as NOTAM A1234/09 NOTAMN. Then a NOTAM C Proposal 0013/09 NOTAMPC 0011/09 is received by the NOF (0013/09 cancels 0011/09). The NOF will keep a record that indicates the NOTAM Proposal 0011/09 corresponds to the NOTAM A1234/09. They will therefore know which NOTAM number to make reference to in the NOTAM C to be created. For example A1236/09 NOTAMC A1234/09 will be created. This example is illustrated in Figure 3 / section 3.2.3.

The task description is summarised in the following table:

<table>
<thead>
<tr>
<th>Task</th>
<th>Creation of NOTAM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description of the task</strong></td>
<td>The NOF gives a new number to the NOTAM to be published and keeps a record of it (traceability table). NOTAM proposal C will be converted into NOTAM C. The NOTAM C will make reference to the NOTAM published earlier, corresponding to the NOTAM proposal identified in the NOTAM proposal C.</td>
</tr>
<tr>
<td><strong>Periodicity of the task</strong></td>
<td>Once per NOTAM proposal received</td>
</tr>
</tbody>
</table>

Table 4: Task 3 - Creation of NOTAM
5. REFERENCES

5.1 Background material

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Title</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>B 1</td>
<td>AISOPS-16 IP 10 GNSS NOTAM_final.pdf</td>
<td>09/06/08</td>
</tr>
<tr>
<td>B2</td>
<td>AISOPS-16 IP10 GNSS NOTAM.doc</td>
<td>02/06/08</td>
</tr>
<tr>
<td>B3</td>
<td>AISOPS-17 WP4 GNSS NOTAM formatting and concept.pdf</td>
<td>29/10/08</td>
</tr>
<tr>
<td>B4</td>
<td>AISOPS-17 WP4 GNSS NOTAM formatting and concept.ppt</td>
<td>10/11/08</td>
</tr>
<tr>
<td>B5</td>
<td>RATF 7_Minutes_v2.0.doc</td>
<td>07/10/09</td>
</tr>
<tr>
<td>B6</td>
<td>AI OPS-1 WP 3 a GNSS NOTAM concept.doc (including Annex A and B) –</td>
<td>12/11/2010</td>
</tr>
<tr>
<td></td>
<td>distributed at RATF 9</td>
<td></td>
</tr>
<tr>
<td>B7</td>
<td>AI OPS-1_ACT 6 Follow up.doc – distributed at RATF 9</td>
<td>10/02/2010</td>
</tr>
<tr>
<td>B8</td>
<td>RATF10_WP3_ICAO timing requirements and GPS NANU.doc</td>
<td>02/06/2010</td>
</tr>
<tr>
<td>B9</td>
<td>Al Operations-2 WP 11 GNSS NOTAM evolutions - distributed at RATF 10</td>
<td>June 2010</td>
</tr>
<tr>
<td>B10</td>
<td>Al Operations-3 WP4 Status report on GNSS NOTAM (and attachment)</td>
<td>04/11/2010</td>
</tr>
<tr>
<td>B11</td>
<td>RATF12_IP12-D3_Final GNSS NOTAM Concept_v2.3.pdf</td>
<td>26/01/2011</td>
</tr>
<tr>
<td>B12</td>
<td>Al Operations-4 WP5 GNSS NOTAM service and attachment – distributed</td>
<td>June 2011</td>
</tr>
<tr>
<td></td>
<td>at RATF13</td>
<td></td>
</tr>
<tr>
<td>B13</td>
<td>RATF13 IP9_Final GNSS NOTAM Concept_v2.5</td>
<td>17/08/2011</td>
</tr>
<tr>
<td>B14</td>
<td>Al Operations-5 WP8 GNSS NOTAM services – distributed at RAiSG1</td>
<td>November 2011</td>
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<tr>
<td>B15</td>
<td>RAiSG1_IP5_Final European GNSS NOTAM Concept_v2.7_final</td>
<td>29/11/2011</td>
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<td>B16</td>
<td>RAiSG2_WP1_GNSS status information</td>
<td>25/05/2012</td>
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<td>B17</td>
<td>RAiSG3_Item 08_ESSP_EGNOS Status</td>
<td>20/11/2012</td>
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5.2 Reference documentation

<table>
<thead>
<tr>
<th>Ref.</th>
<th>Description</th>
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<tbody>
<tr>
<td>Ref 1</td>
<td>OPADD – Operating Procedures for AIS Dynamic Data (<a href="http://www.eurocontrol.int/documents/opadd-operating-procedures-ais-dynamic-data">http://www.eurocontrol.int/documents/opadd-operating-procedures-ais-dynamic-data</a>)</td>
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<tr>
<td>Ref 2</td>
<td>ICAO Annex 15 – Aeronautical Information Services</td>
</tr>
<tr>
<td>Ref 3</td>
<td>ICAO Doc 8126 – Aeronautical Information Services Manual</td>
</tr>
<tr>
<td>Ref 4</td>
<td>EGNOS Safety of Life Service Definition document (EGNOS SoL SDD) - <a href="http://www.essp-sas.eu/service_definition_documents">http://www.essp-sas.eu/service_definition_documents</a></td>
</tr>
<tr>
<td>Ref 5</td>
<td>The EGNOS NOTAM proposal service roadmap (ESSP MEMO 8228, version 01-01, dated 25/03/2013)</td>
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5.3 Reference website

<table>
<thead>
<tr>
<th>Ref.</th>
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<tbody>
<tr>
<td>W1</td>
<td>The ESSP website: <a href="http://www.essp-sas.eu">www.essp-sas.eu</a></td>
</tr>
<tr>
<td>W2</td>
<td>AUGUR online tool: <a href="http://augur.ecacnav.com">http://augur.ecacnav.com</a></td>
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# ACRONYMS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>AFTN</td>
<td>Aeronautical Fixed Telecommunication Network</td>
</tr>
<tr>
<td>AI</td>
<td>Aeronautical Information</td>
</tr>
<tr>
<td>AIS</td>
<td>Aeronautical Information Services</td>
</tr>
<tr>
<td>AISP</td>
<td>Aeronautical Information Services Provider</td>
</tr>
<tr>
<td>ANSP</td>
<td>Air Navigation Service Provider</td>
</tr>
<tr>
<td>APV</td>
<td>APpproach with Vertical guidance</td>
</tr>
<tr>
<td>EAD</td>
<td>European AIS Database</td>
</tr>
<tr>
<td>EGNOS</td>
<td>European Geostationary Navigation Overlay Service</td>
</tr>
<tr>
<td>ESSP</td>
<td>European Satellite Services Provider</td>
</tr>
<tr>
<td>EWA</td>
<td>EGNOS Working Agreement</td>
</tr>
<tr>
<td>FAA</td>
<td>Federal Aviation Administration (USA)</td>
</tr>
<tr>
<td>FD</td>
<td>Fault Detection (RAIM algorithm)</td>
</tr>
<tr>
<td>FDE</td>
<td>Fault Detection and Exclusion (RAIM algorithm)</td>
</tr>
<tr>
<td>GEO</td>
<td>Geostationary Satellite</td>
</tr>
<tr>
<td>GNSS</td>
<td>Global Navigation Satellite System</td>
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<tr>
<td>GPS</td>
<td>Global Position System</td>
</tr>
<tr>
<td>ICAO</td>
<td>International Civil Aviation Organisation</td>
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<tr>
<td>LNAV</td>
<td>Lateral Navigation</td>
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<tr>
<td>LP</td>
<td>Localiser Performance</td>
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<tr>
<td>LPV</td>
<td>Localizer Performance with Vertical guidance</td>
</tr>
<tr>
<td>NANU</td>
<td>Notice Advisory to Navstar Users</td>
</tr>
<tr>
<td>NOF</td>
<td>International NOTAM Office</td>
</tr>
<tr>
<td>NOTAM</td>
<td>Notice To AirMen</td>
</tr>
<tr>
<td>NPA</td>
<td>Non-Precision Approach procedure</td>
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<tr>
<td>OPADD</td>
<td>Operating Procedures for AIS Dynamic Data (Eurocontrol Guidelines ref EUROCONTROL-GUID-0121 [Ref 1])</td>
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<tr>
<td>PA</td>
<td>Precision Approach procedure</td>
</tr>
<tr>
<td>RAIM</td>
<td>Receiver Autonomous Integrity Monitoring</td>
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<tr>
<td>RNAV</td>
<td>Area navigation</td>
</tr>
<tr>
<td>SA</td>
<td>Selective Availability (SA is currently off on GPS signals)</td>
</tr>
<tr>
<td>SBAS</td>
<td>Satellite-Based Augmentation System</td>
</tr>
<tr>
<td>USCG</td>
<td>United States Coast Guard</td>
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<tr>
<td>VNAV</td>
<td>Vertical Navigation</td>
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