GNSS Information System for Europe - GISE
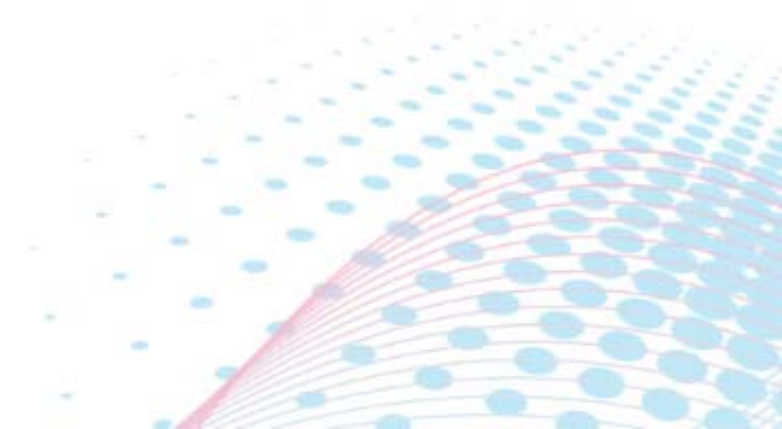
John Wilde
CEO, DW International
CGSIC IISC ION GNSS 2011
19th September

Agenda

- Introduction
- Background
- Architecture
- User Interface
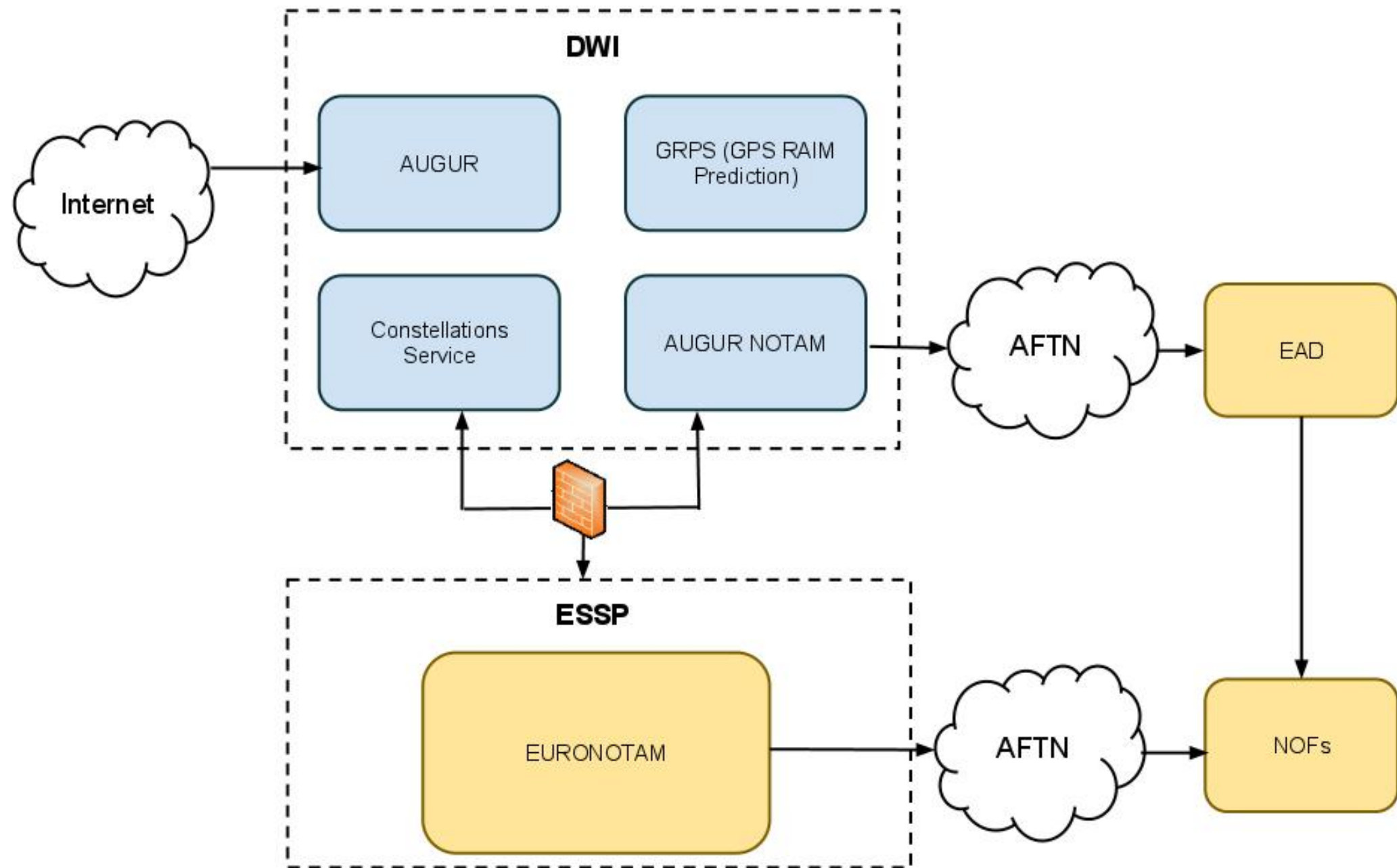- NOTAMs
- EGNOS NOTAM Proposals
- Summary

Introduction

- AUGUR → GPS RAIM Availability prediction outages operated by DWI
- EURONOTAM → EGNOS Availability outages operated by ESSP
- GISE combines the services:
  - GPS RAIM & EGNOS outage information available through AUGUR website and via NOTAM Proposals

- **G**NSS **I**nformation **S**ervice for **E**urope

AUGUR NOTAM System Overview
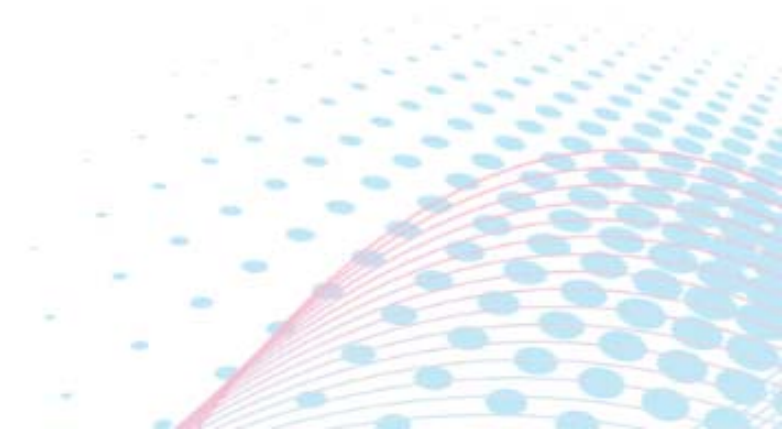
Functional Requirements

- Calculate GPS RAIM availability for various service levels at various airport locations
- Disseminate the GPS RAIM availability predictions to end users as NOTAM Proposals
- Process update of messages as underlying assumptions change - primarily constellation data monitored for change
- Provide additional AUGUR UI components to access EGNOS prediction information from EURONOTAM
- Provide GPS constellation information to EURONOTAM via web service

Functional Requirements

- Ensure updates to disseminated predictions are identified correctly and disseminated in timely manner
- Provide management capability to allow configuration of calculation behaviour and monitoring of calculation success / failure

- Existing AUGUR requirements:
  - Route calculations – ECAC waypoint lookup, worldwide capability
  - Aerodrome lookup – worldwide
  - Visibility Mode
  - GPS Constellation Status
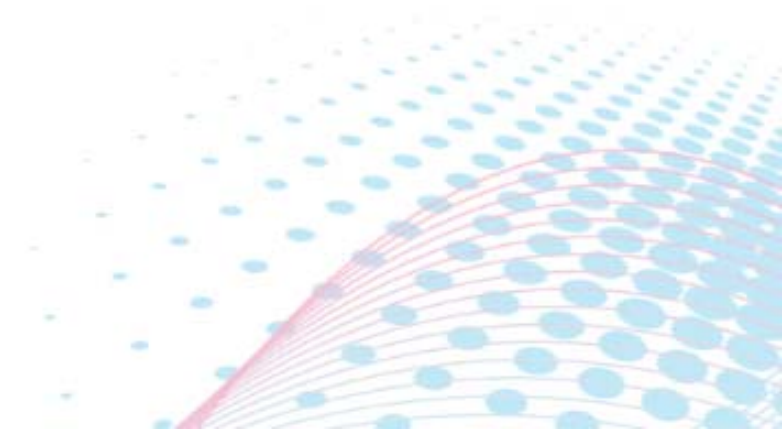
Existing Functionality – Route Tool

AUGUR GPS RAIM Prediction Tool - Route Tool

GPS Status	Terminal/Approach Tool	Visibility Tool	Route Tool	Nav Domain Home	Mirror Site	Help

Route

The Time Offset field holds the total time, in minutes from the start time, for each waypoint.

Waypoint #	ICAO Identifier	Latitude	Longitude	Mode	Time Offset	State	Type	Action
0	EGLL	51.4775	-0.46139	ROUTE ▼	0 mins	EG	Airport	Lookup | Down | Delete
1	LFPG	49.00972	2.54778	ROUTE ▼	60 mins	LF	Airport	Lookup | Up | Delete

[Lookup Waypoint...] [New Route] [Save Route to Session] [Session data...]

Scenario

Start Date (DD/MM/YYYY) 26 / 01 / 2011

Start Time (HH:MM) 16 : 11

Configuration

Mask Angle 5.0 degrees ▼

Algorithm FD ▼

Result

Graphic Width (Minimum applies) 750 pixels ▼

[Check Route]

Existing Functionality – Waypoint

AUGUR GPS RAIM Prediction Tool - Route Tool

| GPS Status | Terminal/Approach Tool | Visibility Tool | Route Tool | Nav Domain Home | Mirror Site | Help |

Waypoint Lookup

Partial/Full ICAO Identifier

State   EG

Note:
The Route Tool database only contains data for en-route waypoints and navaids in the ECAC area.
En-route waypoints and navaids are updated every AIRAC (current cycle is 1101) .
Users may define their own waypoints for the session but these will not be saved once the session is closed.
The list of States includes only those that contain any waypoints.
Those States that contain only user waypoints are appended onto the end of the list.
A maximum of 250 waypoints will be returned.

Lookup

ICAO Identifier	State	Latitude Decimal Deg	Latitude Deg Min Sec	Longitude Decimal Deg	Longitude Deg Min Sec	Type	User
ADN	EG	57.31045	N571837.62	-2.26721	W0021601.95	VHFNavaid	public
BCL	EG	57.47509	N572830.31	-7.37032	W0072213.16	VHFNavaid	public
BCN	EG	51.72556	N514332.00	-3.26306	W0031547.00	VHFNavaid	public

Existing Functionality – Visibility Tool

Existing Functionality – GPS Status

AUGUR GPS RAIM Prediction Tool - GPS Status

GPS Status	Terminal/Approach Tool	Visibility Tool	Route Tool	Nav Domain Home	Mirror Site	Help

A minimum of 30 satellites are available during the query period.

B-RNAV en-route predictive RAIM check **not** required.

Scenario Information

Start Time	26/01/2011 00:00:00 UTC
End Time	29/01/2011 00:00:00 UTC
Request Time	26/01/2011 16:21:29 UTC

Current Almanac

GPS Week	596
GPS TOA	503808
Total Satellites	31
Unhealthy Satellite PRNs	[]
Details	Full Text	Sat Info

Current NANUs

Number	PRN	Start	Stop	Type
2011009	12	26/01/2011 09:15:00 UTC	26/01/2011 21:15:00 UTC	FCSTDV

AUGUR Disclaimer

Terminal/Approach Tool Prediction

AUGUR Prediction Results GPS RAIM

AUGUR GPS RAIM Prediction Tool - Terminal/Approach Tool

| GPS Status | Terminal/Approach Tool | Visibility Tool | Route Tool | Nav Domain Home | Mirror Site | Help |

Airports

Airport 01	LFPG	...
Airport 02		...
Airport 03		...
Airport 04		...
Airport 05		...
Airport 06		...
Airport 07		...
Airport 08		...
Airport 09		...
Airport 10		...

Prediction Type GPS RAIM ▲▼

Configuration

Mask Angle 5.0 degrees ▲▼
Algorithm FD ▲▼
Integrity Level APPROACH ▲▼

Result

Format Graphic ▲▼

(Check Terminal/Approach)

Output

Terminal/Approach Check

Generated: 02/02/2011 08:34:27 UTC

Scenario Start: 02/02/2011 00:00:00 UTC Scenario Stop: 05/02/2011 00:00:00 UTC
Mask Angle: 5.00, Algorithm: Fault Detection Only (FD), Integrity Level: APPROACH
Active NANUs: 2011013

LFPG

02/02 00:00   02/02 12:00   03/02 00:00   03/02 12:00   04/02 00:00   04/02 12:00   05/02 00:00

Time (UTC)
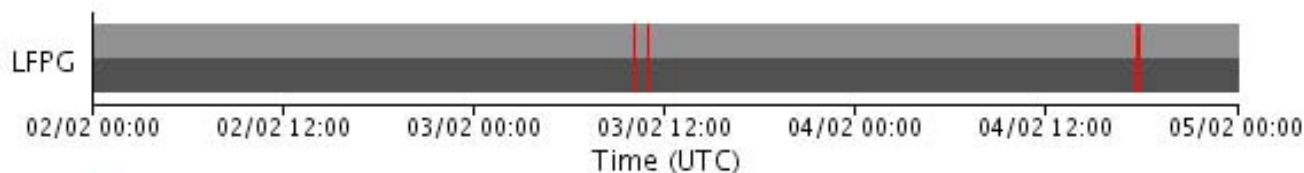
■ RAIM Unavailable   ■ Baro Aided   ■ Non Baro Aided

Almanac – Week: 597   TOA: 405504

AUGUR Prediction Results GPS RAIM

AUGUR GPS RAIM Prediction Tool - Terminal/Approach Tool

| GPS Status | Terminal/Approach Tool | Visibility Tool | Route Tool | Nav Domain Home | Mirror Site | Help |

Airports

Airport 01	LFPG	...
Airport 02		...
Airport 03		...
Airport 04		...
Airport 05		...
Airport 06		...
Airport 07		...
Airport 08		...
Airport 09		...
Airport 10		...

Prediction Type: GPS RAIM

Configuration

Mask Angle: 5.0 degrees
Algorithm: FD
Integrity Level: APPROACH

Result

Format: Text

(Check Terminal/Approach)

Output

Scenario

Start	26/01/2011 00:00:00 UTC
Stop	29/01/2011 00:00:00 UTC
Request	26/01/2011 16:35:13 UTC

Configuration

Mask Angle	5.0 degrees
Algorithm	FD
Integrity Level	APPROACH

Constellation

Almanac	Week:420, TOA:405504
NANUs	2007136

LFPG (Charles-De-Gaulle, 49.00972, 2.54778, 119.4816)

Baro Aided Outages	Non Baro Aided Outages
25/01/2011 23:59:30 until 26/01/2011 00:04:30 26/01/2011 00:42:30 until 26/01/2011 01:19:30	25/01/2011 23:59:30 until 26/01/2011 00:08:30 26/01/2011 00:42:30 until 26/01/2011 04:48:30

Terminal/Approach EGNOS Prediction

AUGUR GPS RAIM Prediction Tool - Terminal/Approach Tool

| GPS Status | Terminal/Approach Tool | Visibility Tool | Route Tool | Nav Domain Home | Mirror Site | Help |

Airports

Airport 01	...
Airport 02	...
Airport 03	...
Airport 04	...
Airport 05	...
Airport 06	...
Airport 07	...
Airport 08	...
Airport 09	...
Airport 10	...

Prediction Type

Type   EGNOS

Result

Format   Graphic

Check Terminal/Approach

AUGUR Prediction Results EGNOS

AUGUR GPS RAIM Prediction Tool - Terminal/Approach Tool

| GPS Status | Terminal/Approach Tool | Visibility Tool | Route Tool | Nav Domain Home | Mirror Site | Help |

Airports

Airport 01	LFPG	...
Airport 02		...
Airport 03		...
Airport 04		...
Airport 05		...
Airport 06		...
Airport 07		...
Airport 08		...
Airport 09		...
Airport 10		...

Prediction Type EGNOS

Result

Format Graphic

Check Terminal/Approach

Output

Terminal/Approach Check

Generated: 26/01/2011 16:36:52 UTC

Scenario Start: 26/01/2011 00:00:00 UTC Scenario Stop: 29/01/2011 00:00:00 UTC

LFPG

26/01 00:00   26/01 12:00   27/01 00:00   27/01 12:00   28/01 00:00   28/01 12:00   29/01 00:00

Time (UTC)

■ EGNOS Unavailable

Almanac - Week: 420   TOA: 405504

AUGUR Prediction Results EGNOS

AUGUR GPS RAIM Prediction Tool - Terminal/Approach Tool

| GPS Status | Terminal/Approach Tool | Visibility Tool | Route Tool | Nav Domain Home | Mirror Site | Help |

Airports

Airport 01	LFPG	...
Airport 02		...
Airport 03		...
Airport 04		...
Airport 05		...
Airport 06		...
Airport 07		...
Airport 08		...
Airport 09		...
Airport 10		...

Prediction Type EGNOS

Result

Format Text

Check Terminal/Approach

Output

Scenario

Start	26/01/2011 00:00:00 UTC
Stop	29/01/2011 00:00:00 UTC
Request	26/01/2011 16:36:30 UTC

LFPG (Charles-De-Gaulle, 49.00972, 2.54778, 119.4816)

EGNOS Outages
2011-01-27 00:00 until 00:05

AUGUR Disclaimer

NOTAMs

- Using information from Almanacs and NANUs GISE issues NOTAM Proposals

- EAD relays the Proposal to subscribing State NOTAM Offices (NOFs)

GISE → NOTAM Proposal → EAD → NOTAM Proposal → NOF → NOTAM → End users
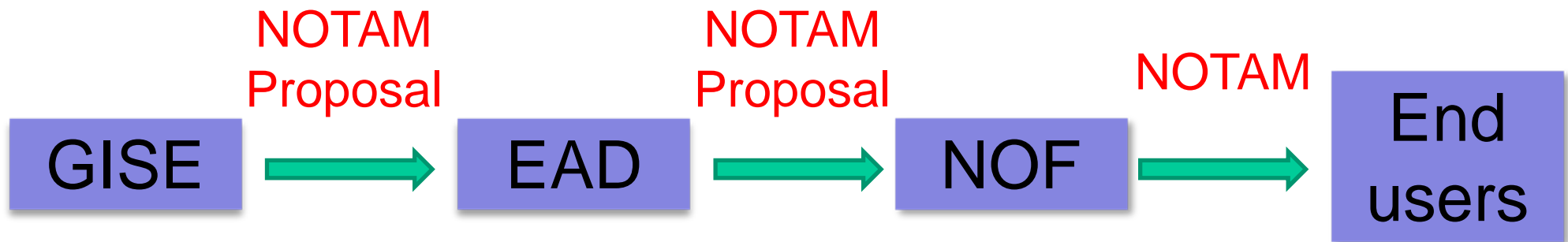
- NOF then creates a NOTAM based on this Proposal

NOTAM Example 1

- NOTAM showing GPS RAIM outage

NOTAM N example

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

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

NOTAM Example 2

- NOTAM <u>Proposal</u> showing GPS RAIM outage

NOTAM N proposal example

Q) LFBB/ QGAAU/ I/ NBO/ A/ 000/ 999/ 4100N00200E005
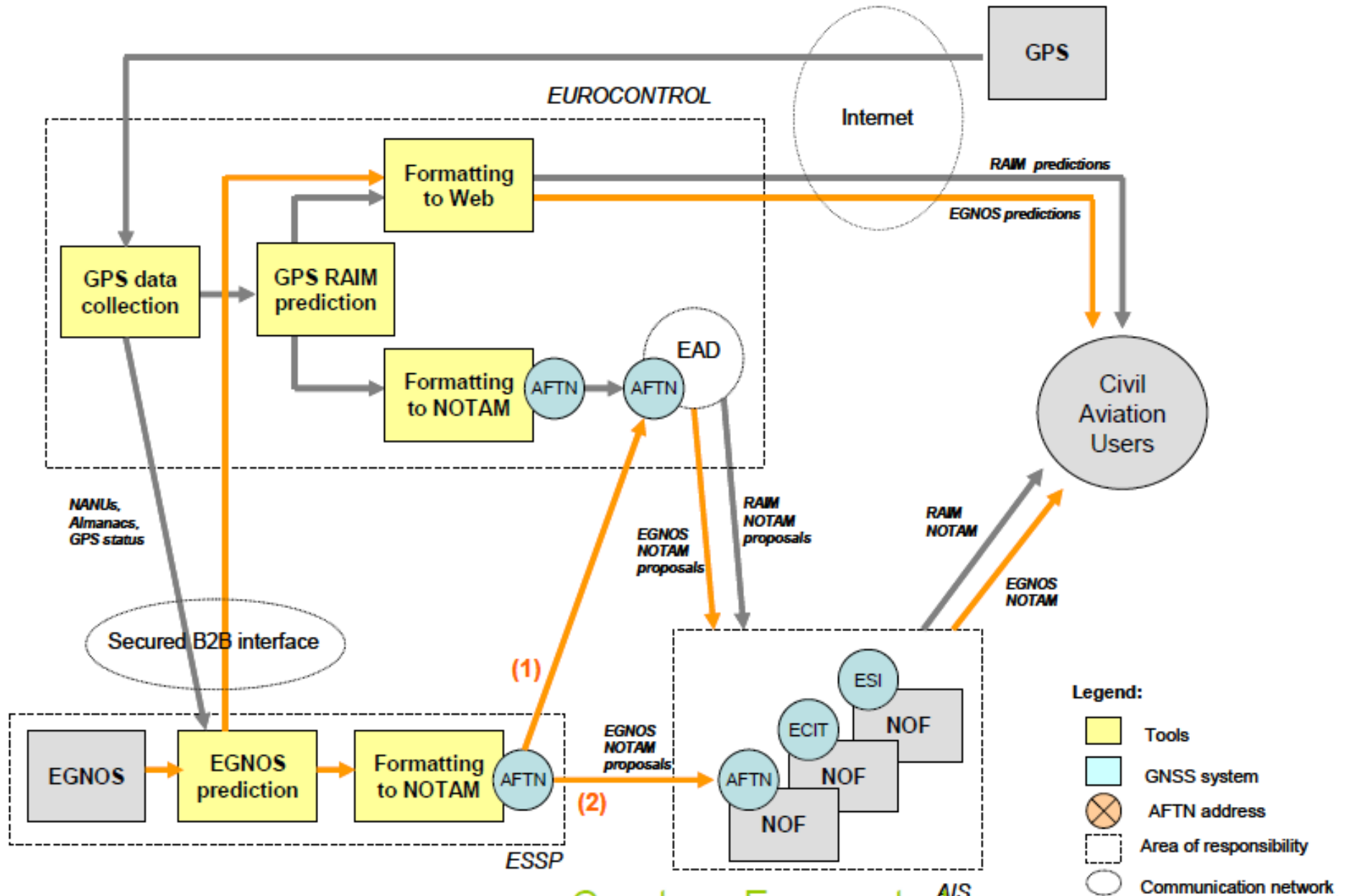A) LFBO
B) 0908240145
C) 0908250225
D) 24 0145-0230 0630-0645 25 0155-0225
E) NOTAMPN 0001/10
GPS RAIM IS NOT AVAILABLE FOR LNAV

Roles & Responsibilities

Courtesy Eurocontrol

Summary

- GISE makes GPS RAIM and EGNOS availability information available to users via
  - AUGUR website
  - NOTAM Proposals
- AUGUR has been updated to accept EGNOS availability data from EURONOTAM
- AUGUR Website will offer EGNOS availability prediction in the Terminal/Approach Tool
- AUGUR issues GPS RAIM NOTAM proposals in ICAO format to NOF via AFTN/EAD

Thank you for listening - Any questions?

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