

European
Global Navigation
Satellite Systems
Agency



EGNOS

NAVIGATION SOLUTIONS
POWERED BY EUROPE

E-GNSS in Aviation: status and trends, aviation grants

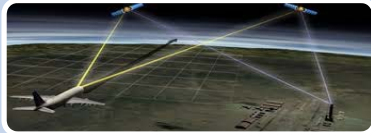
Workshop “Deployment of Galileo and EGNOS in Portugal”

Carmen Aguilera, Aviation & H2020 Coordinator

21st September, Lisbon



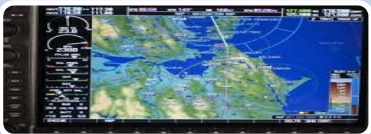
E-GNSS applications in aviation



Performance Based Navigation (PBN): applications used when an aircraft follows a specific procedure or route within a prescribed error margin (e.g. airport approach).

Different applications for fixed wing (e.g. LPV, SBAS Cat-I) and rotorcraft (PinS, SNI, RNP0.3)

GBAS: Galileo as an enabler for GBAS CAT II/III



Navigation aid: systems designed as additional aid to GA pilots flying according to (Visual Flight Rules). They are also used to alert when they get too close to restricted airspace



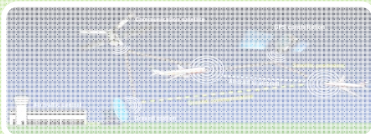
Emergency Locator Transmitters (ELTs): equipment helping Search & Rescue operations. Many ELTs utilize GNSS to report their position when triggered.

ELT is mandatory in all EU aircraft with more than 6 seats



Personal Locator Beacons (PLBs): portable devices which are almost always equipped with GNSS, that support localization in case of emergency.

PLB (or ELT) is mandatory in aircraft/helicopters of six or less seats.



Automatic Dependent Surveillance - Broadcast (ADS-B): surveillance technique whereby an aircraft automatically provide, via a data link, data derived from on-board navigation and position-fixing systems.

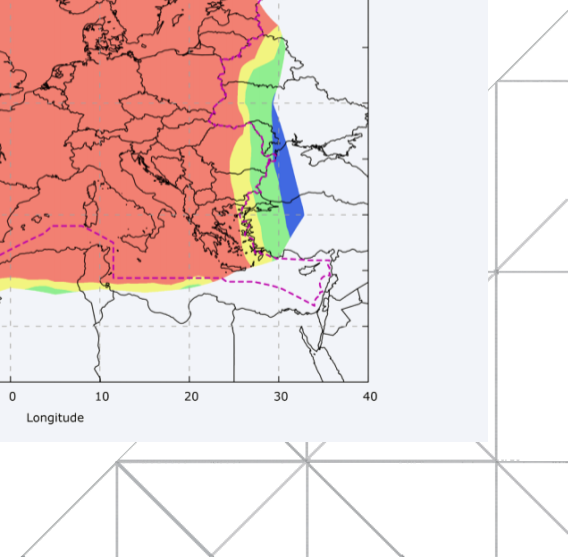
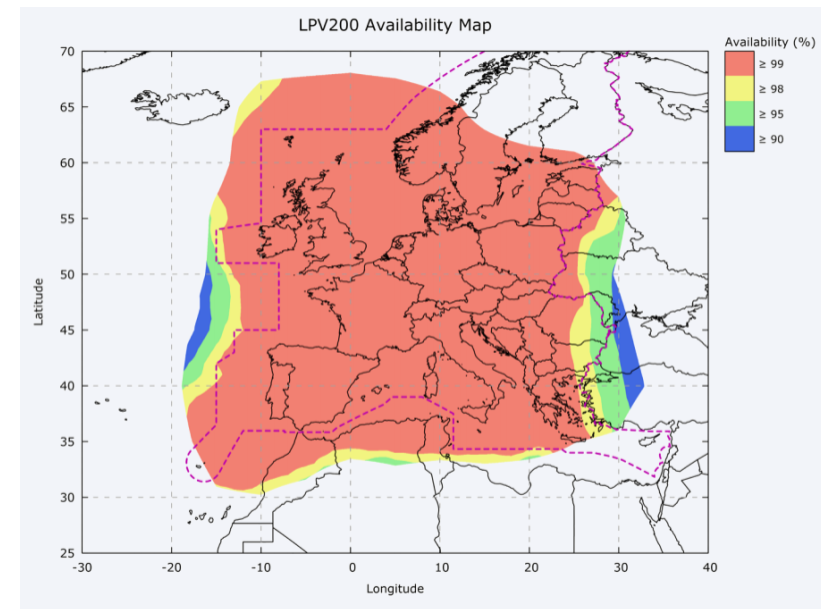
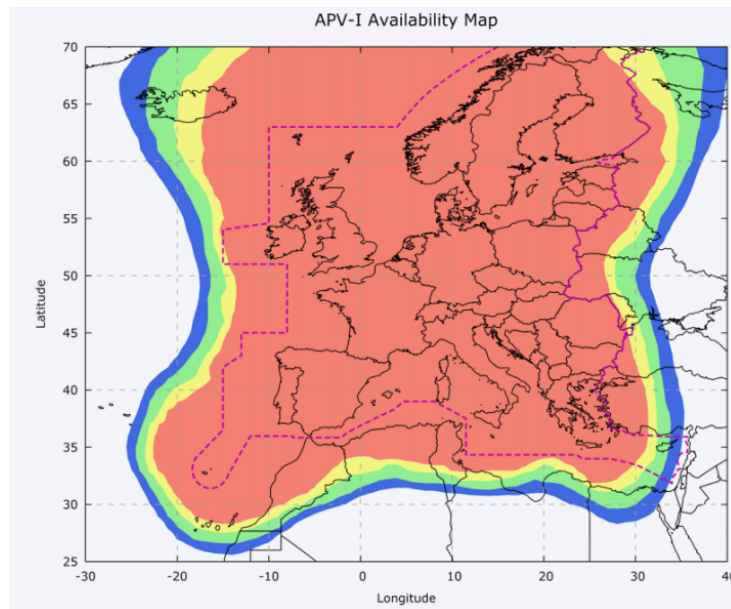
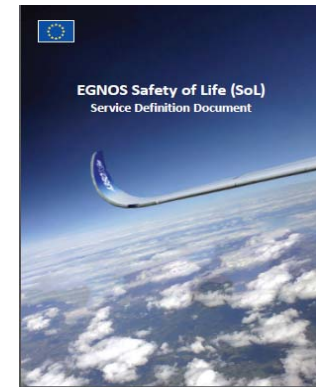


Unmanned Vehicles Systems: growing market, demanding robust positioning and navigation

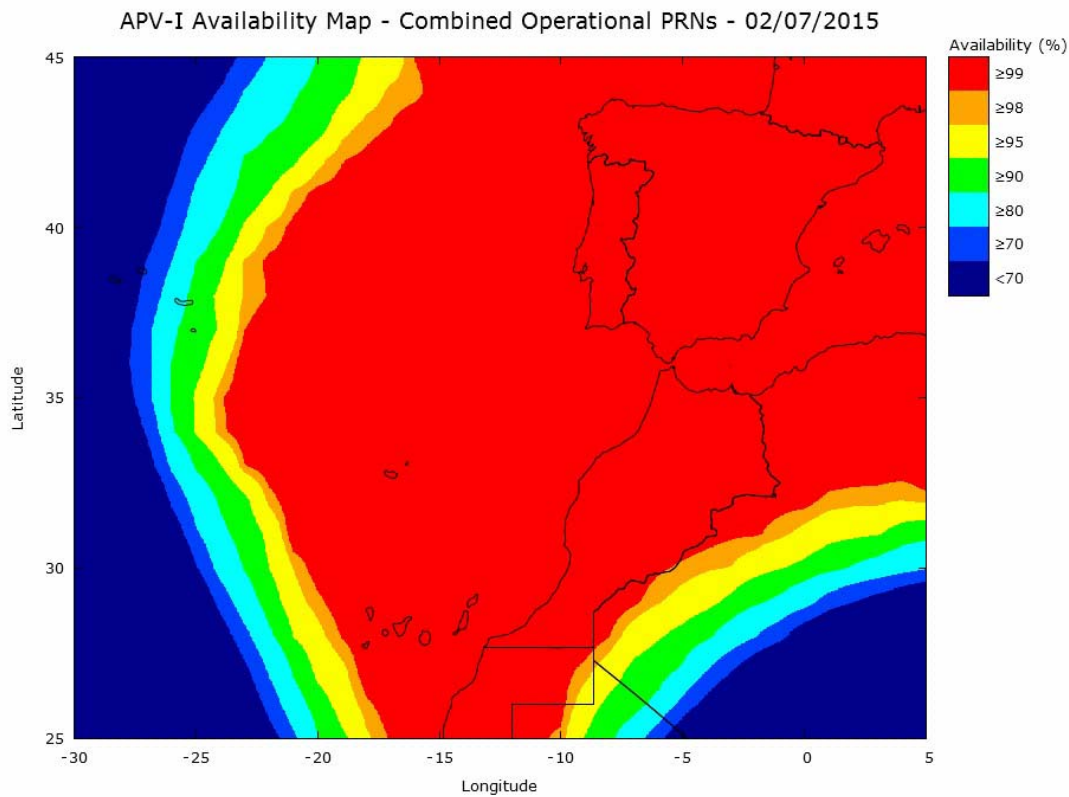
EGNOS Safety of Life



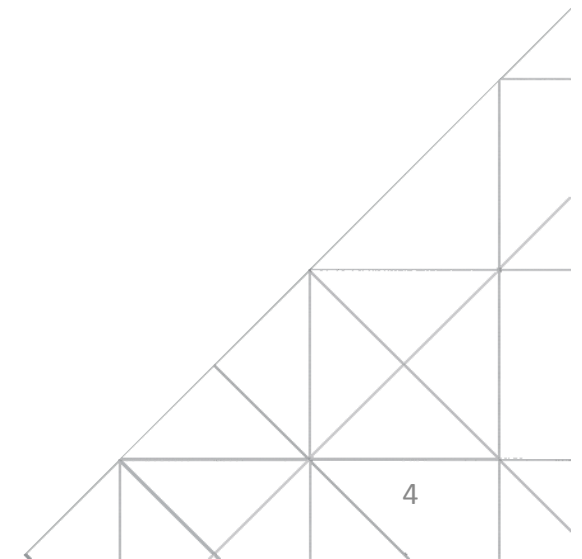
- EGNOS SoL service operational since 2nd March 2011
- Current SoL SDD commitment is *SoL SDD v3.1, Sept 2016*



LPV availability in South-West region



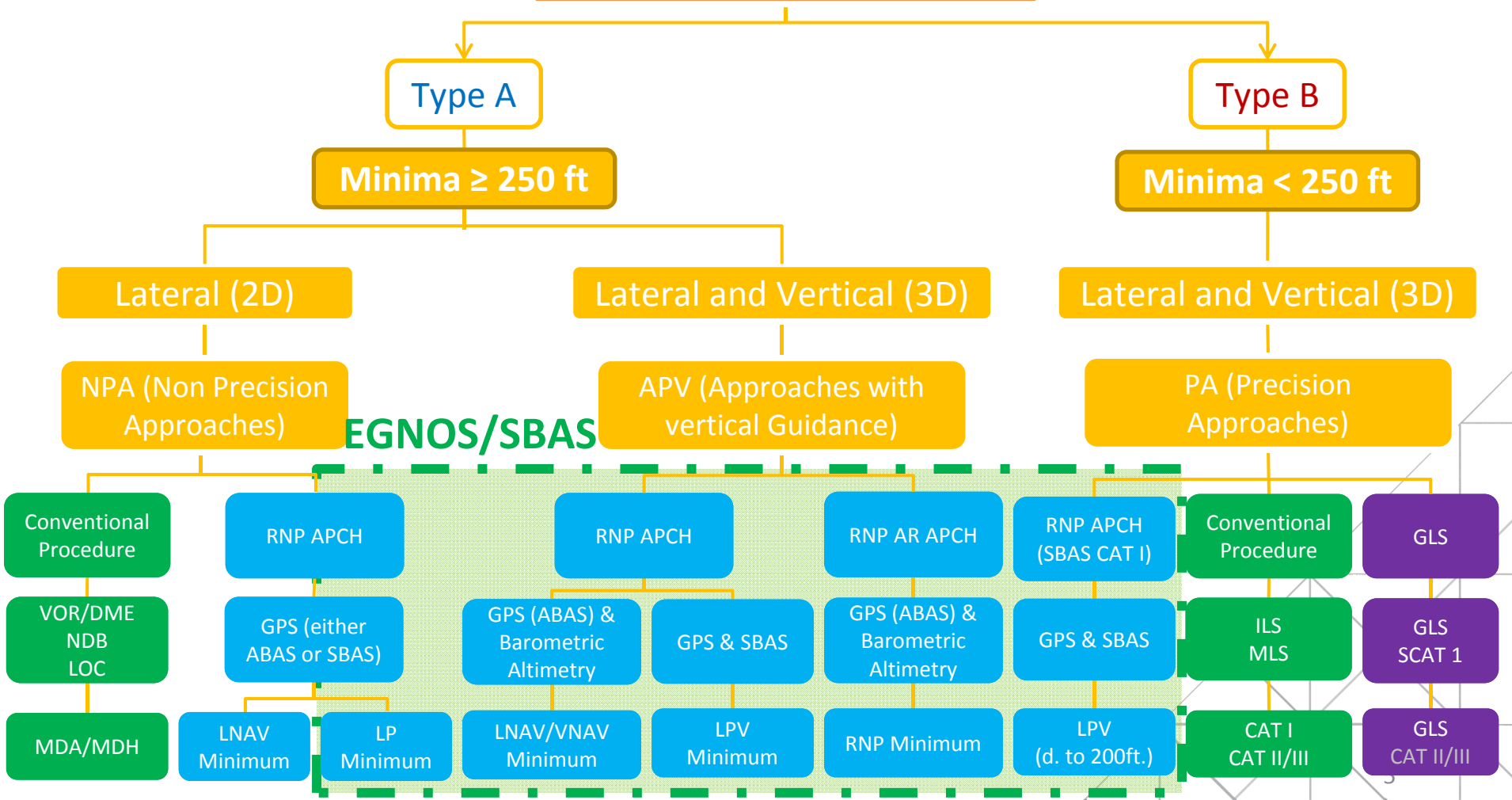
From July-2015
until March-2017



Main EGNOS application in aviation: Navigation: EGNOS for 3D Approaches



ICAO Approach Classifications



EGNOS based approaches in the Regulatory Framework



- **Global and European Air Navigation Strategy is moving to GNSS based solutions**
- **PBN IR (under development): RNP APCH including LPV minima**
 - After 2020, at all Instrument Runway Ends (IRE) without existing Precision Approach (PA)
 - 2020-2024: develop RNP APCH for all IRE (with existing PA)
 - After 2024 all IRE with RNP APCH in place
 - Rationalisation of conventional nav aids
- **REGULATION (EU) No 716/2014 (PCP):**
 - PBN RNP APCH vertically guided (LPV or LNAV/VNAV) at all major 24+1 airports by 01/01/2024
- **Commission Regulation (EU) 2016/539 (Crew training) & 2016/1199 (Air Ops)**
 - 2016/539 → PBN on regular training before **25/8/2020**
 - PBN as standard procedures for authorities and operators (vs previous SPA.)

All EU Instrument Runway Ends with EGNOS approaches by 2024

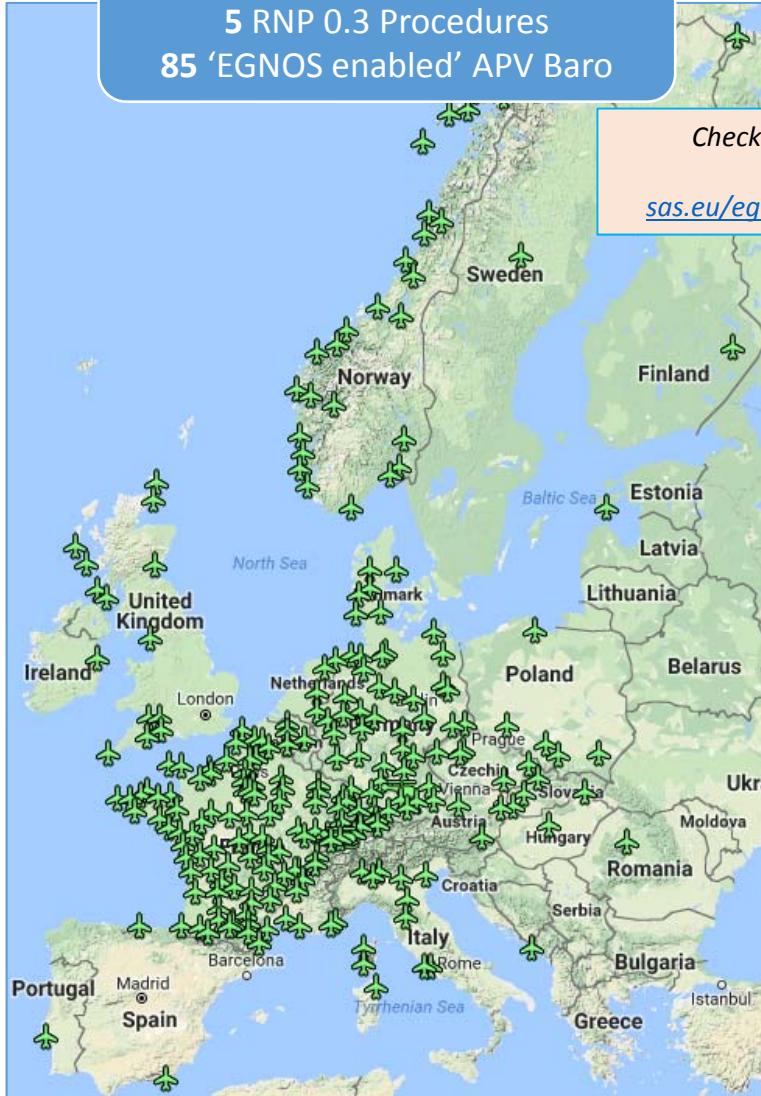
450 EGNOS based procedures operational today (September 2017)



365 LPV approaches
5 RNP 0.3 Procedures
85 'EGNOS enabled' APV Baro

Plans by 2018
> 500 EGNOS procedures planned

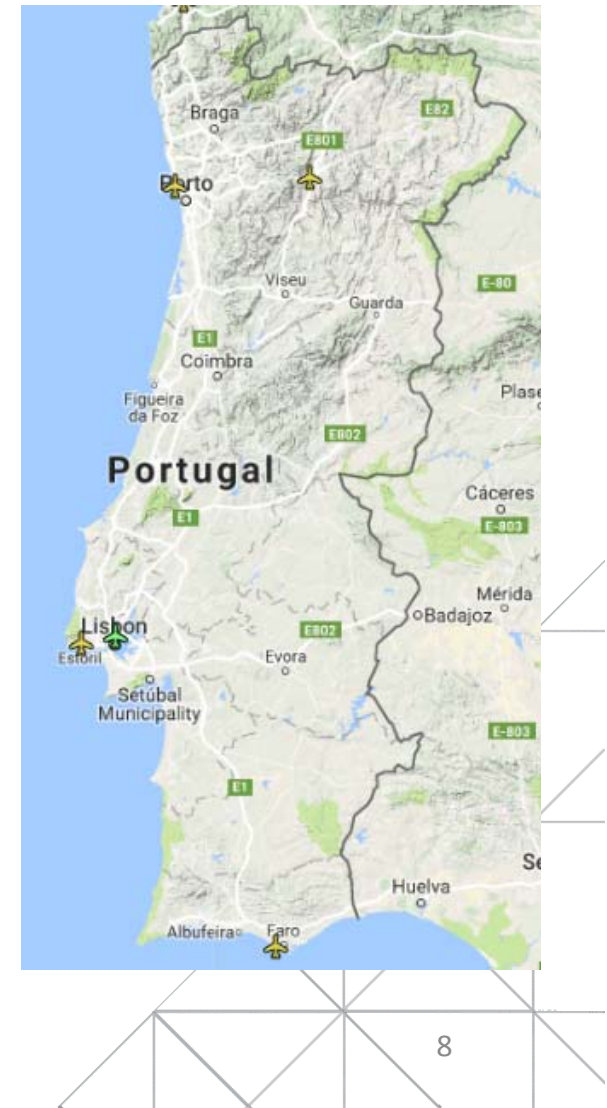
Check link: http://egnos-user-support.essp-sas.eu/egnos_ops/lpv_map/map.php



EGNOS Implementation Status & Plans in Portugal



Airport name	Code	LPV Status	Publication Date	#ILS
Lisbon RWY 03/21	LPPT	Operational	2015	2
Porto RWY 17/35	LPPR	Ongoing	12/10/2017	1
Faro RWY 10/28	LPFR	Planned	2017	1
Vila Real RWY 02	LPVR	Planned	TBD	0
Cascais RWY 35	LPCS	Planned	TBD	0
Horta RWY 10/28	LPHR	Planned	2018	0



Operators flying with EGNOS today



Over 45 operators in 18 countries approved and certified to fly LPV



Bristow

AIR AISE

aurigny.com
channel island

Blink

Hebridean
Air Services Ltd

AVIATION SOUTH WEST

nlr
Dedicated to Innovation in aerospace

FLYINGGROUP

ASL

FLYINGGROUP

IXAIR
BUSINESS JETS

ENAC
Ecole Nationale de l'Aviation Civile

Finistair
compagnie aérienne

CHALAIR
AVIATION

VG
Aviation

regal

JET AVIATION
A GENERAL DYNAMICS COMPANY

CAT AVIATION

SWISS

NETJETS

FLÄSKFLYG

SJÖFARTSVERKET

SVENSK PILOTUTBILDNING

JETFLITE

SUOMEN ILMAILUOPISTO
FINNISH AVIATION ACADEMY

airBaltic

T-air
for you to fly

ABS JETS

Aircraft Industries

GLOBE AIR
your private jet

JJM

TRÉNER

20

AIRGREEN

VISTA JET

Operators flying to/from Portugal have LPV solutions ready to use



LPV capable operators flying to/from Portugal

NETJETS



Bombardier Global 6000



Bombardier CRJ1000



Bombardier CS100

Planned LPV capable operator flying to/from Portugal

Confirmed

easyJet



- Lunch customer of first LPV ready A320neos

Operators flying to/from Portugal with LPV SB or STC solutions available today



More LPV retrofit solutions and new LPV ready aircraft entering the market

EGNOS for rotorcraft operations



GSA supports ca. 50 % of all operational/planned PinS to LPV in Europe
Raising interest in connecting RNP routes

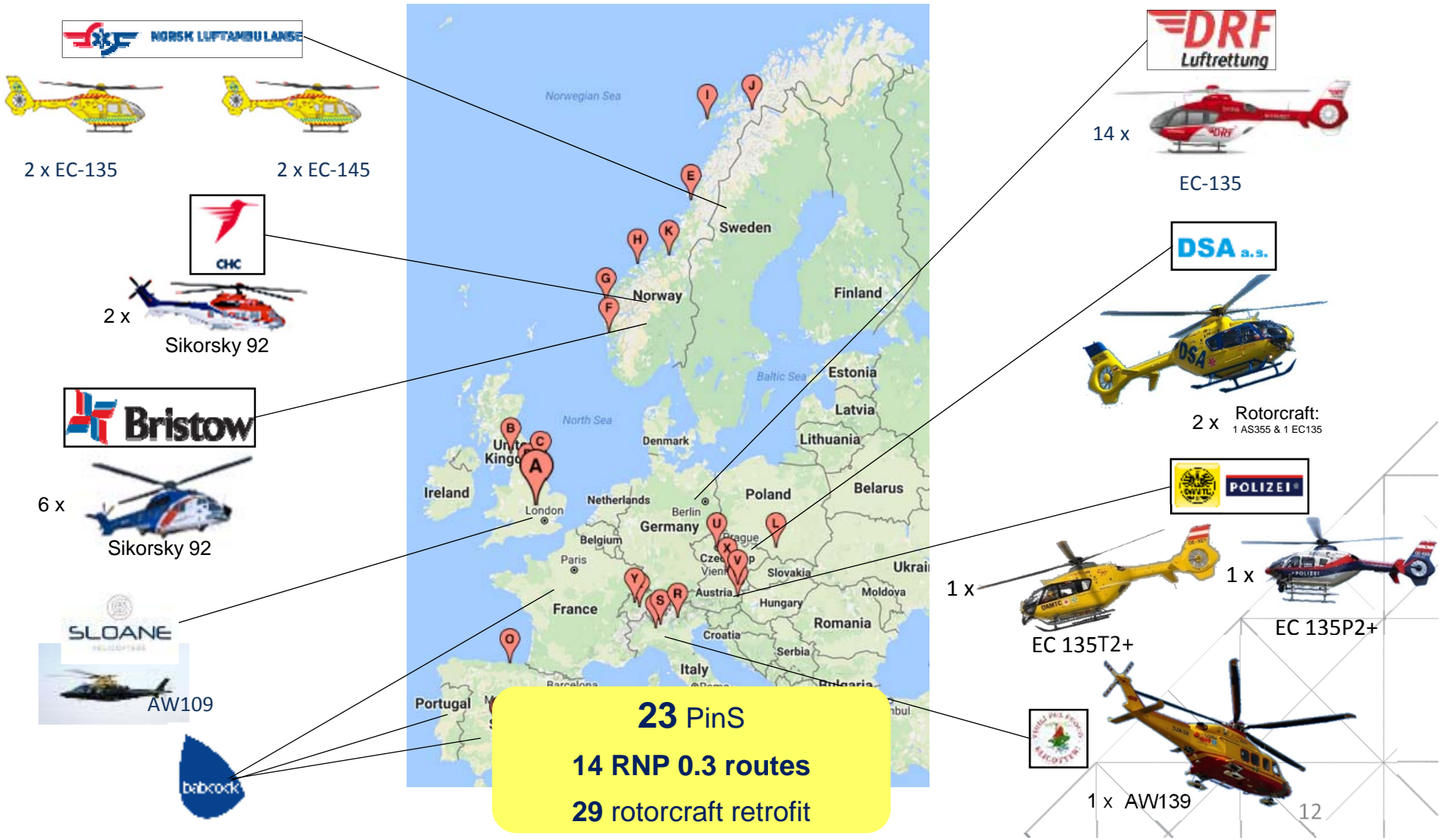


600 flights/year cannot be performed to patients in need of urgent care

7.350.000 of profit/year is not perceived

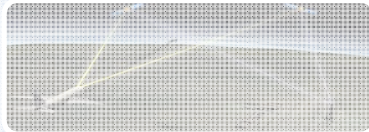
Many lives cannot receive appropriate help when needed

Main HEMS operators are getting ready to fly with EGNOS

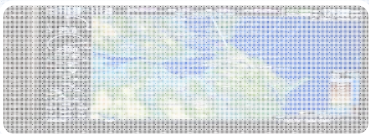


23 PinS
14 RNP 0.3 routes
29 rotorcraft retrofit

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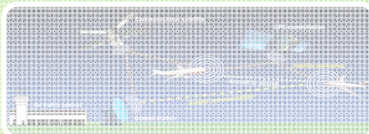
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Unmanned Vehicles Systems: growing market, demanding robust positioning and navigation

SAR/Galileo Initial Service declared operational by EC on 15th December 2016



and Performances are defined on the Galileo Service Definition Document available on www.gsc-europa.eu)

Single Burst Detection Probability > 90%

Location Probability after 10 min > 98%

Probability of Location Accuracy higher than 5km after 10 min > 95%

SAR Ground Segment Availability > 95%



Galileo Return Link provides and
unique capability to save more lives



Return Link Service (RLS) will acknowledge the reception of
distress signals (GNSS Regulation (EU) 1285/2013)

Galileo is the only GNSS system offering return link

Manufacturers are implementing Galileo RLS in new beacons:

Agreement on the message protocols in the beacon standard
(T.001/T.007)

Modifications in the MCC for the routing of messages
(A.001/A.002)

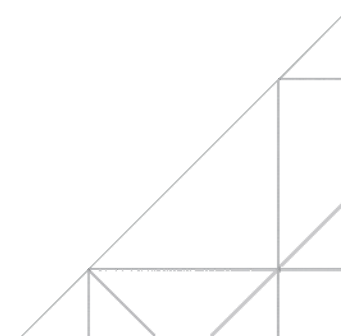
Second generation beacons specifications and type approval

AR beacons for aviation users

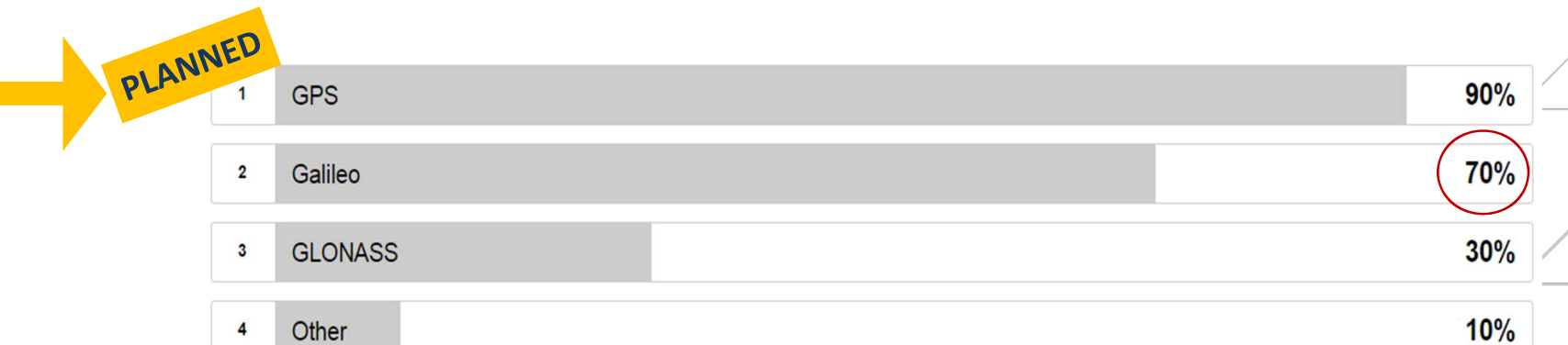


Personal Location Beacons (PLBs)

Emergency Locator Transmitter: ELT, Distress tracking ELT: ELT (DT), Survival ELT, ELT (S)



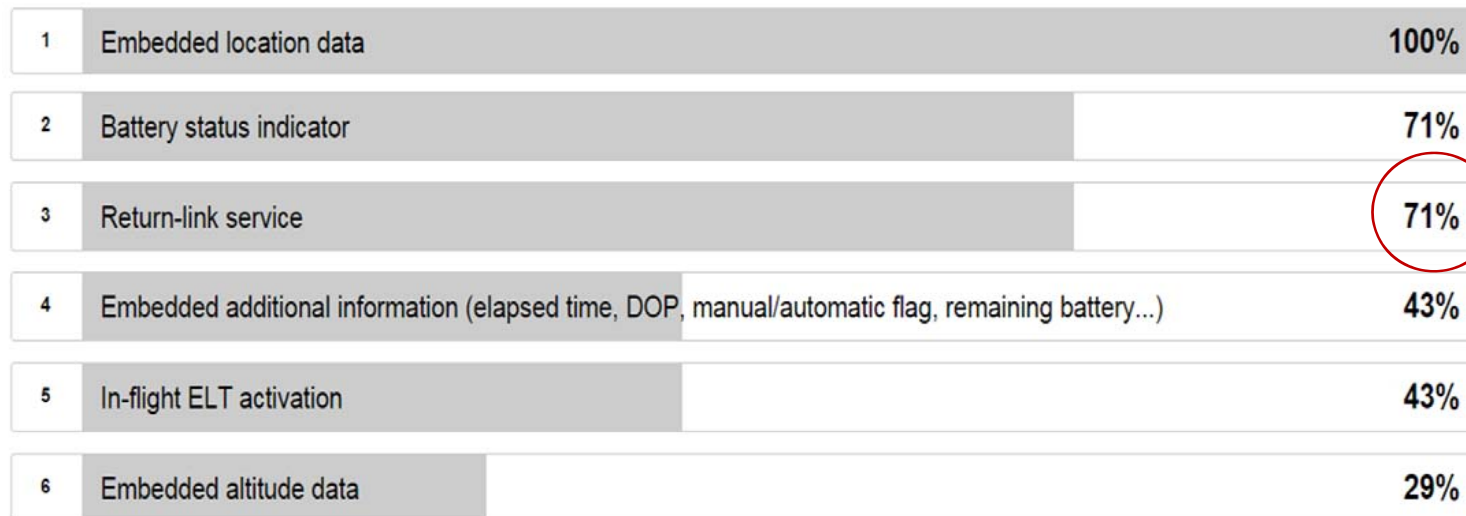
0% of SAR manufacturers include Galileo positioning in their product roadmaps...



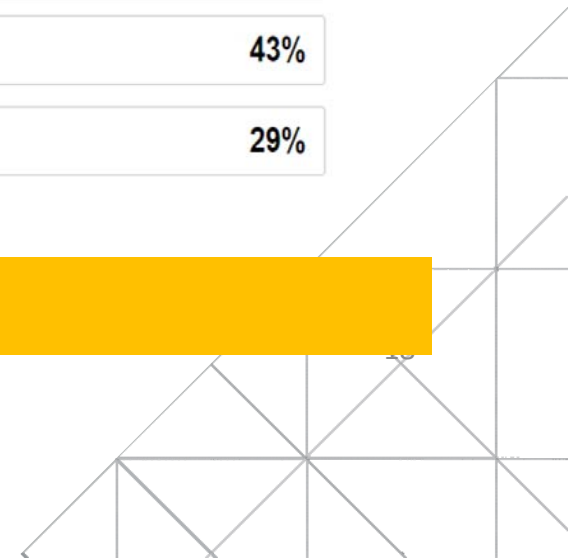
...and Galileo Return Link is foreseen in most of new developments



Features foreseen in future beacons:



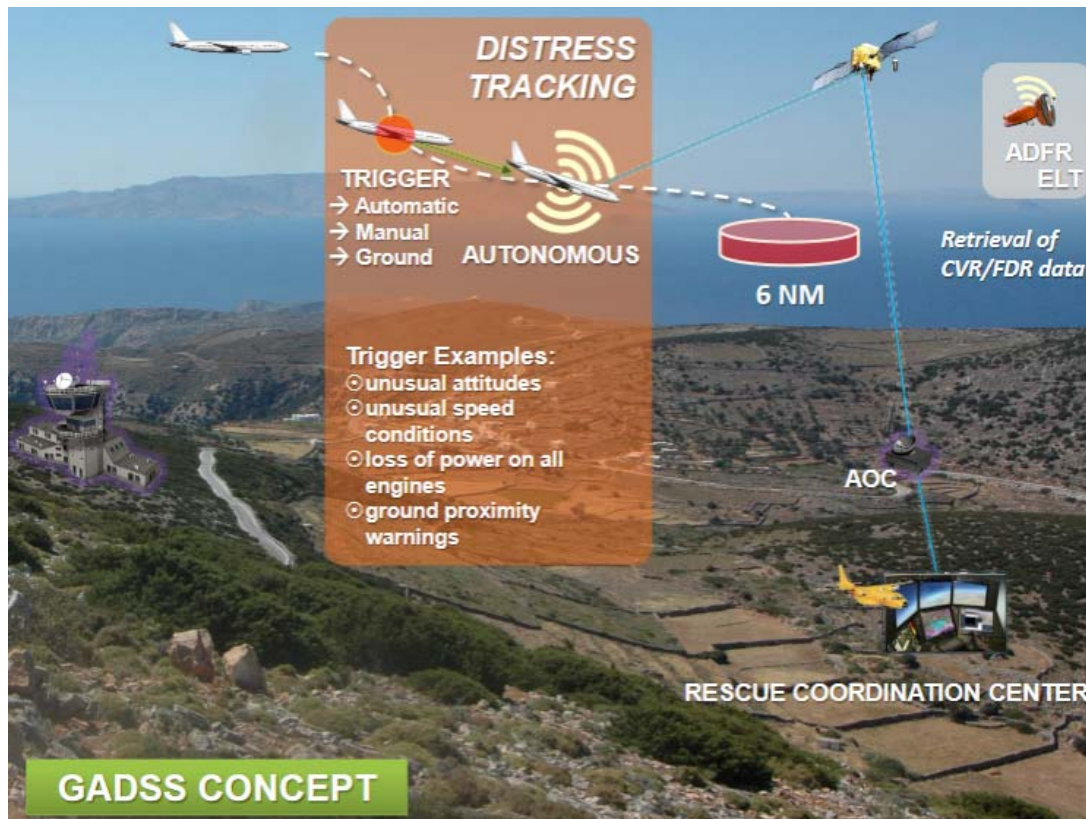
Source: GSA survey to beacons manufacturers, 2015



ICAO requires for in-flight tracking of aircraft in distress by 2021



New!



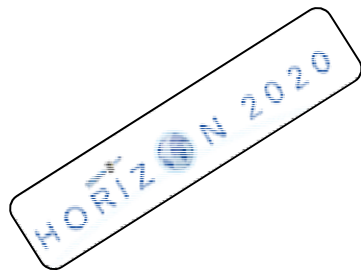
Global Aeronautical Distress and Safety System

1. Aircraft tracking
2. Autonomous Distress Tracking
3. Post Flight Localisation and Recovery

Objectives:

- Timely detection of aircraft in distress
- Tracking of aircraft in distress, timely/accurate location of end of flight
- Efficient & effective SAR operations
- Timely retrieval of Flight Recorder Data

Leading beacon manufacturers are developing advanced uses of Galileo RLS for aviation



Operational concept and demonstration of automatic and remote beacon activation

Commercial aviation beacons (ELT-DT) in the market by 2019





GSA support tools for aviation users

Image source: <http://www.cornerstonecontent.com/27-marketing-experts-share-their-favorite-content-marketing-tools-and-how-they-use-them/>

GSA support: Aviation call for grants



AVIATION
GRANT
PROGRAMME
EGNOS

- 12 Million € in 2 calls
- more than 100 EGNOS based approach procedures
- STC for 5 aircraft types with a potential retrofit solution for more than 260 aircraft in EU
- more than 15 operators equipped and certified for EGNOS based operations
- 6 EGNOS enabled simulators
- More than 20 EGNOS enabled PinS procedures for rotorcraft

Projects selected to be funded in 1st Call

14 Projects selected to be funded in 2nd Call

Stay tuned!
3rd Call to be open in October 2017
More information at:
<https://www.gsa.europa.eu/gsa/grants>



EASA is actively contributing to relevant rulemaking activities...



**PBN implementation in the European Air Traffic Management Network
PBN Guidance Material Task Force**

Revision of surveillance performance and interoperability - RMT.0679

**Unmanned Aircraft Systems (UAS) and Remotely Piloted Aircraft Systems (RPAS) –
RMT.0230**

EASA General Aviation (GA) Sectorial Committee

and provide first hand answers user needs



Join Us!

-EBAA LPV WG



- ✓ LPV implementation to priority aerodromes
- ✓ Guidance on operation approval
- ✓ Retrofit solutions availability for the EBAA fleet

Brussels
22 September

ort to ERA members



- ✓ Enable LPV operations to priority airports
- ✓ Foster development of avionics solutions for E-GNSS opera
- ✓ Increase awareness of EGNOS RNP APCH benefits to region

ERA General Assembly,
Operations group:
Athens 17-19 October

craft Working Group



- ✓ Harmonise implementation of EGNOS based Rotorcraft operations
- ✓ Address operational and regulatory aspects
- ✓ Identify service provision needs
- ✓ Compliance criteria

FLAG workshop
Barcelona, 30 Nov-1 Dec

linking space to user needs



Get in touch:



www.GSA.europa.eu



EGNOS-portal.eu



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GSC-europa.eu



UseGalileo.eu



European GNSS Agency is hiring!

