



European  
Global Navigation  
Satellite Systems  
Agency



aerodays2015

Aviation in Europe – Innovating for Growth

The 7<sup>th</sup> European Aeronautics Days



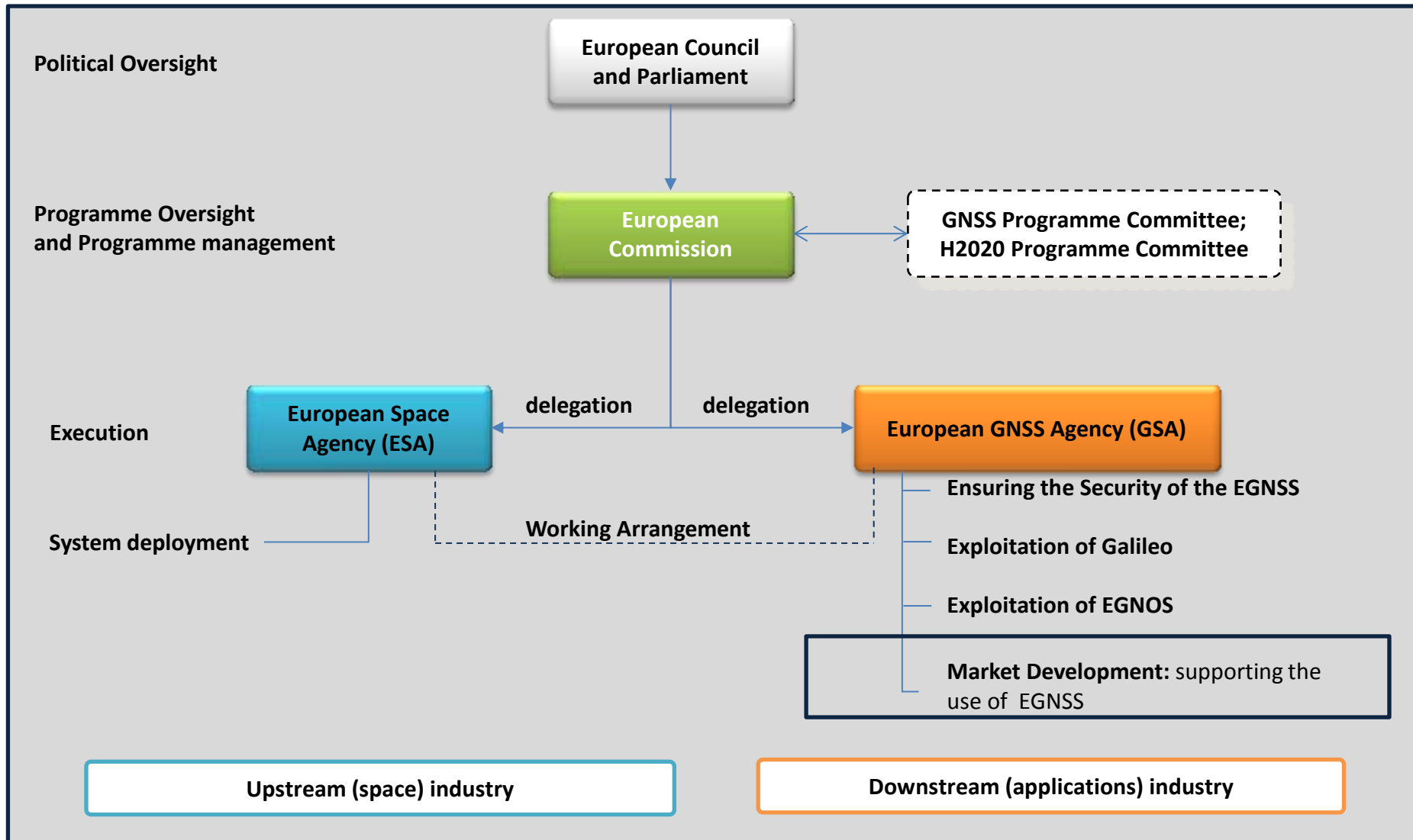
Aviation Keynotes

London, 23 October 2015

Carlo des Dorides

Executive Director, European GNSS Agency GSA

# GSA role within the EU GNSS programmes



# GSA 2015

## The European GNSS Agency (GSA) today:

- Staff: about **135**
- Nationalities: **21**
- Headquarters: **Prague**  
(since September 2012)
- Other Locations:  
St Germain en Laye, Swanwick, Torrejon



# The European GNSS programmes

## GALILEO

- Global Navigation Satellite Systems (GNSS)
- Autonomous infrastructure
- Performances similar to GPS
- 4 services (under development)
- Worldwide coverage



## EGNOS

- Satellite Based Augmentation System (SBAS)
- Improves GPS performance
- 3 services. Certified for Civil Aviation use in 2011
- Sends corrections to users via satellite or terrestrial links (EDAS)
- Continental coverage
- EGNOS SOL Compliant with ICAO SARPS definition for APV1 and SBAS Cat I



Accuracy

Continuity

Integrity

Availability



# Galileo is being implemented

## One third of Galileo constellation now in orbit

### GALILEO:

- **Fully autonomous** satellite-based **positioning**, navigation and timing capability , for global high performance services.
- Run by civil authorities.
- By offering dual frequencies as standard, **metre accuracy** real-time positioning will be delivered.
- Galileo will be **interoperable with other GNSS**.

Galileo System Testbed v1  
Validation of critical algorithms

2003



GIOVE A/B  
2 test satellites  
2005/2008



In-Orbit Validation  
4 operational satellites and  
ground segment

2013



First services for OS, SAR,  
and demonstrator for CS

2016



4 satellites launched  
in 2015:

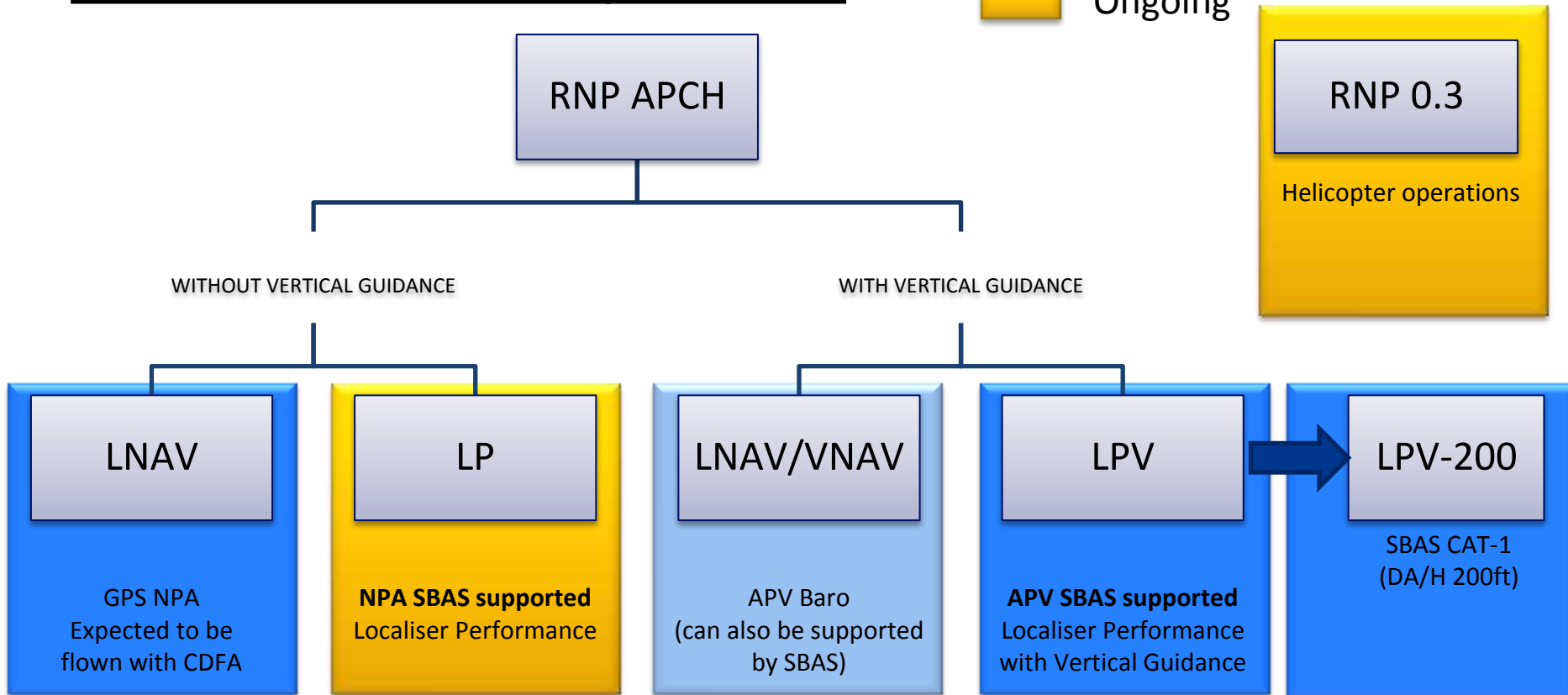
- 26 March
- 11 September

Full Operational Capability  
Full services, 30 satellites  
2020



# The EGNOS SoL service for aviation

## PBN EGNOS-based operations





# GSA and aviation stakeholders join forces to bring EGNOS to users



EGNOS Service provider  
Technical assistance to foster EGNOS adoption



Cooperation agreement to implement European Union GNSS policies as they apply to the field of aviation.



Safety oversight  
PBN Implementation, GNSS regulatory advice  
Safety, pilot training, airworthiness criteria



User organisations: business, general aviation, user associations, avionics manufacturers



# Procedures results and trend are encouraging: 271 EGNOS based procedures

As of 2<sup>nd</sup> October 2015

271 EGNOS based procedures  
(202 LPV) – serving 157 airports



Plans by 2018

> 440 LPV procedures





# EGNOS is the preferred option for Business Operators

*Memorandum of Understanding (MoU) to promote the wide use of EGNOS – precision-based navigation (PBN) – at regional airports in Europe*



+



## Demand for LPV procedures

- 10 priority airfields selected
- Implementation ongoing

## The fleet is already equipped and ready to fly LPV.

- Most OEMs for business aviation and high end helicopters provide SBAS/EGNOS equipage in new models
- Analysis of members fleet and availability of retrofit solutions

## Operational approval guidelines developed with ESSP



# GSA support to Regional airlines

**DONE!**

## Upgrade in 2015

**Chalair**



**Beechcraft1900**

**Wideroe**



**DHC 8-100**

## New funded projects

**ON-GOING**

**HOP!**



**13xATR42-500**

Equipment: CMC electronics  
STC development: AeroConseil

**Air Baltic**



**12xDHC-8-402**

Equipment: x8 UNS-1E, x4 UNS-1Ew



**17x Jetstream 41**

Equipment: UNS1-LW FMS + LPV monitor  
STC development: CranField Aerospace Ltd



**9x Saab 2000**

# EGNOS for rotorcraft operations: a technology enabler in SESAR

## Current situation and needs

IFR Rotorcraft are constrained to use procedures designed for airplanes

Generally heliports are not well equipped in terms of ground navigation aids

Rotorcraft operations should not be limited to VFR/VMC conditions (specially HEMS)!



Enabler for IFR rotorcraft operations

**Direct Approach with Vertical guidance (LPV)**

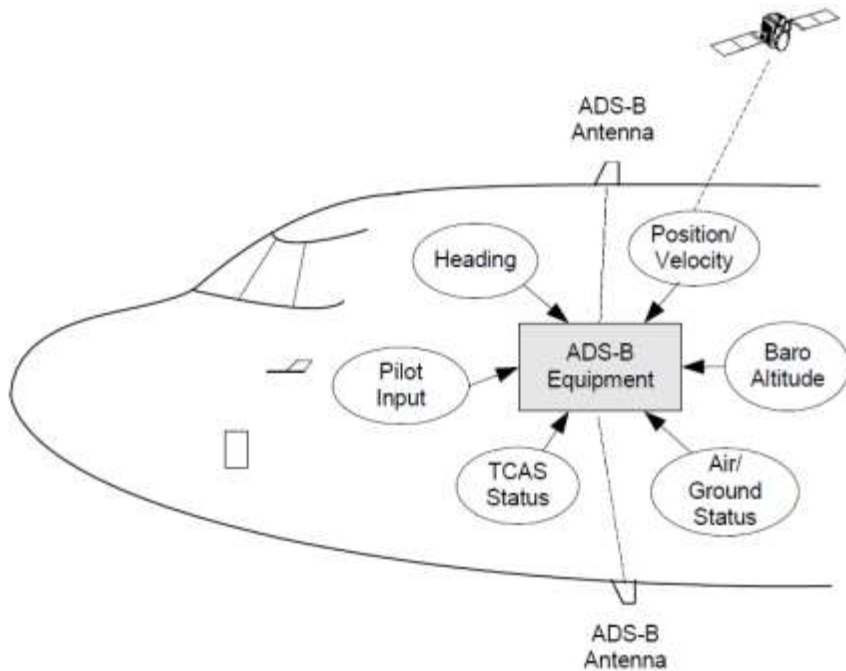
**Point in Space**

**Curved procedures/RNP-AR (with RF)**

**Low Level RNAV routes**

**Simultaneous non interfering operations**

# GNSS source for ADS-B



GNSS is required for the horizontal position and velocity data source

In principle, EGNOS (SBAS) and GNSS + RAIM (ABAS) can support ADS-B Out

Only SBAS source can provide an equivalent level of service as for Radar Surveillance:

**SBAS ensures 99.9 % of availability**

# GSA support towards E-GNSS implementation and adoption: Horizon 2020 and Fundamental Elements

Supporting a EU

COMPETITIVE  
OFFER

of services, applications and receivers



A core part of Europe 2020, Innovation Union and  
European Research Area  
€80 billion funding available over 7 years (2014-2020)

- GSA entrusted by EC to implement **2014-2017 Work Programmes calls on Galileo, 100 mln€.**
- Next call:
  - Opening: 08 Nov 2016
  - Overall indicative budget : 33 mln €
- Additional calls under preparation

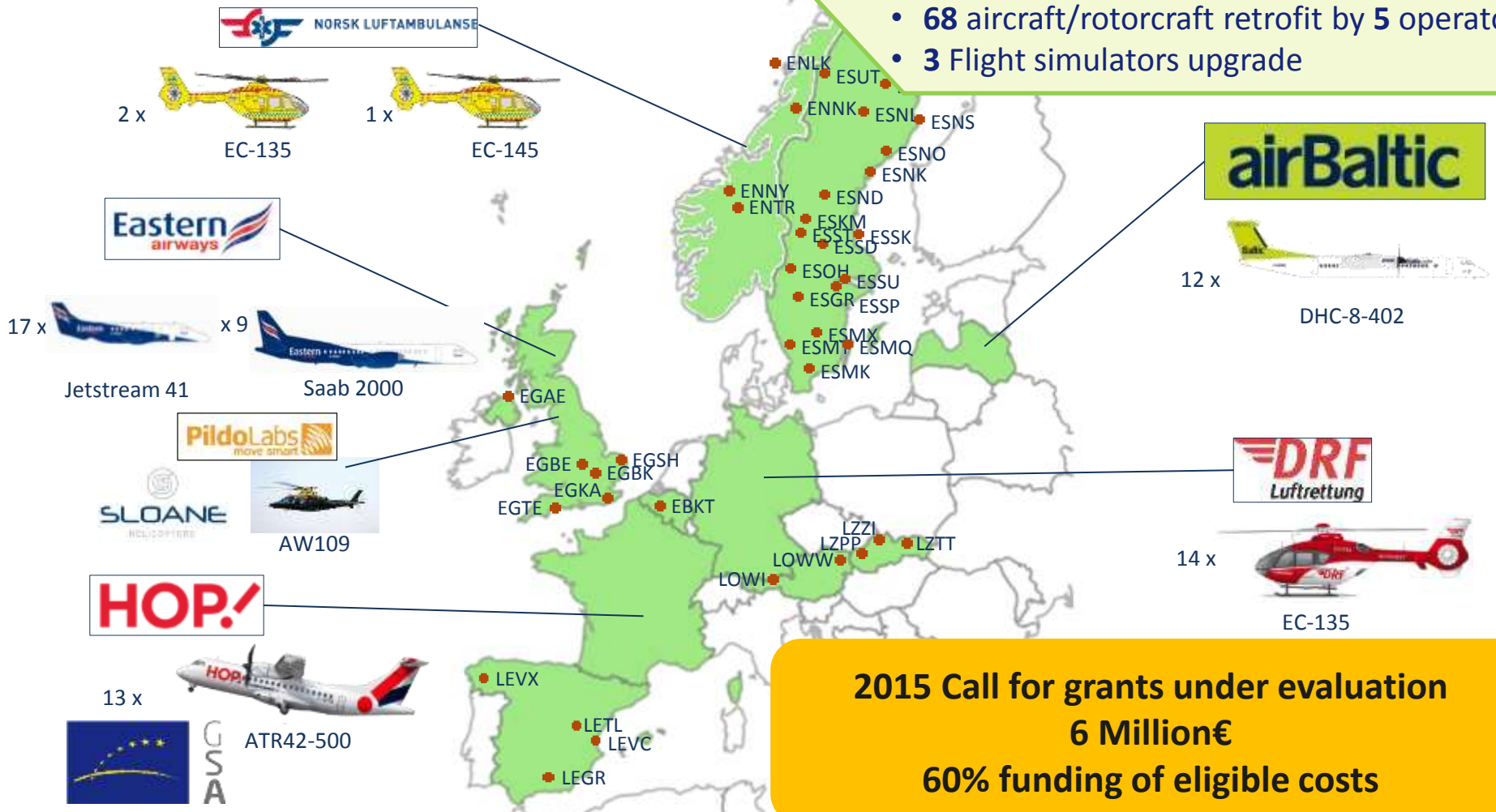
## Fundamental Elements

- Programme created by the **2013 GNSS Regulation**
- Budget envelope of **100 m€ (2014 and 2020)**
- **High-level objectives:**
  - Promote the development of Galileo-enabled chipsets, receivers and other associated technologies that will facilitate the adoption of the European GNSS
  - Develop receiver technology addressing user needs in priority market segments
  - Contribute to the economy by creating technologies that can be commercialised by the industry to produce revenues
- **Aviation receivers project included:** updated information in GSA website



# GSA support towards EGNOS adoption in aviation: 1<sup>st</sup> Call for grants results

- 72 EGNOS based procedures in 37 airports
- 8 PinS at 7 helipads
- 68 aircraft/rotorcraft retrofit by 5 operators
- 3 Flight simulators upgrade



**2015 Call for grants under evaluation  
6 Million€  
60% funding of eligible costs**

# Communication, Navigation and Surveillance applications will rely on E-GNSS



COMMUNICATIONS



NAVIGATION



SURVEILLANCE

Time distribution for  
synchronisation

RNP and Precision  
Approaches  
Advanced SID/STAR  
All phases of flight with  
improved accuracy and  
integrity  
Fleet management

Reliable PVT for  
cooperative ADS-B  
  
Location Protocol  
Emergency locator &  
Personal Locator Beacon



**GALILEO S&R**





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Global Navigation  
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Agency

**THANK YOU**

Carlo Des Dorides  
Executive Director