



European  
Global Navigation  
Satellite Systems  
Agency

# E-GNSS systems for GA

Workshop voor de general aviation

Dufourmont Tim

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NAVIGATION SOLUTIONS  
POWERED BY EUROPE

# GSA in a nutshell



## What?

### *Gateway to Services*

- Galileo & EGNOS Operations and Service Provision
- Market Development of the applications and the receivers

### *Gatekeeper of security*

- Security Accreditation
- Operation of Galileo Security Monitoring Centre, governmental service (PRS) activities



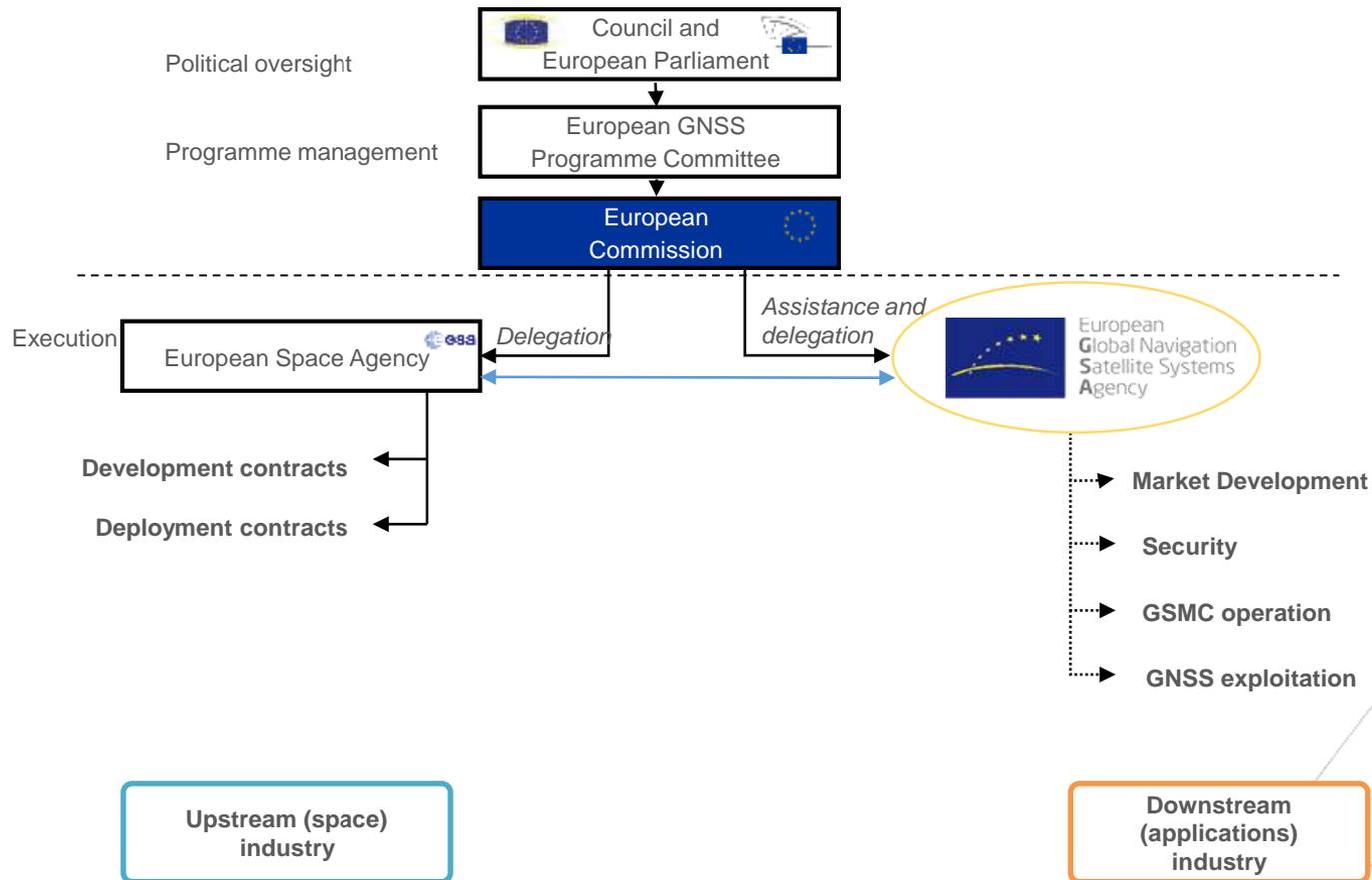
## Who and where?

**160  
Staff**

**21  
Nationalities**

**Prague, CZ Rep – HQ  
St. Germain en Laye, FR – GSMC  
Swanwick, UK – GSMC  
Torrejon, ES – GSC  
Noordwijk, NL – GRC  
Toulouse, FR – EGNOS**

# How GSA fits in the EU structure



# E-GNSS: EGNOS and Galileo



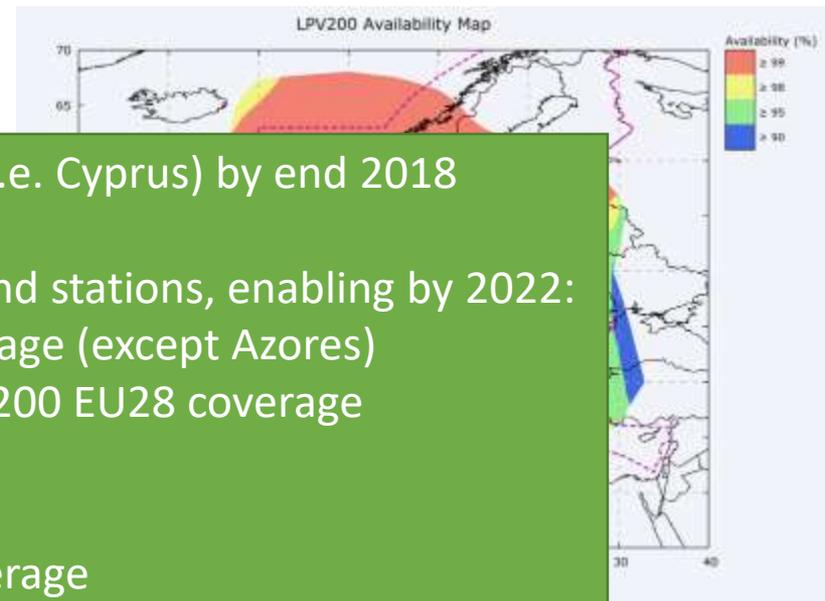
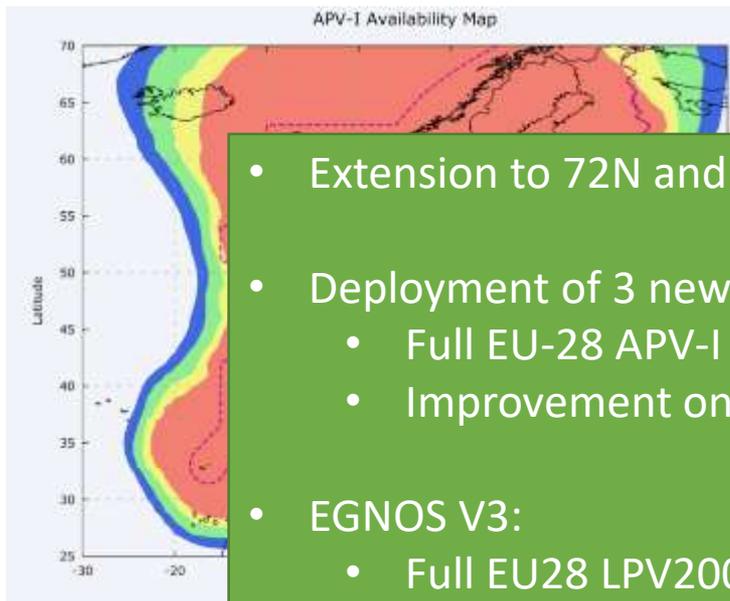
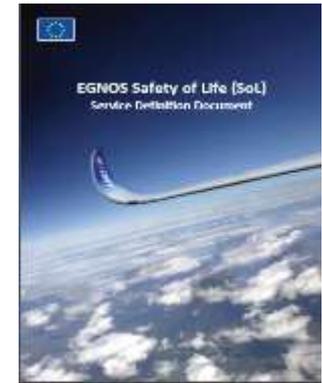
- Global Navigation Satellite System (GNSS)
- Autonomous infrastructure under EU civilian control
- 22 Satellites constellation today
- Full Operational Capability by 2020

- European Geostationary Navigation Overlay System
- Increased accuracy and integrity over GPS
- Next version will augment Galileo

# EGNOS overview



- EGNOS SoL service operational since 2<sup>nd</sup> March 2011
- Current SoL SDD commitment is *SoL SDD v3.1, Sept 2018*
- All civil Dutch airports are within the 99% availability for EGNOS LPV200 service



- Extension to 72N and SW (i.e. Cyprus) by end 2018
- Deployment of 3 new ground stations, enabling by 2022:
  - Full EU-28 APV-I coverage (except Azores)
  - Improvement on LPV-200 EU28 coverage
- EGNOS V3:
  - Full EU28 LPV200 coverage
  - GPS + Galileo augmentations

AP

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# Galileo overview



See afternoon session of Mr Willems

# E-GNSS: aviation applications



**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.

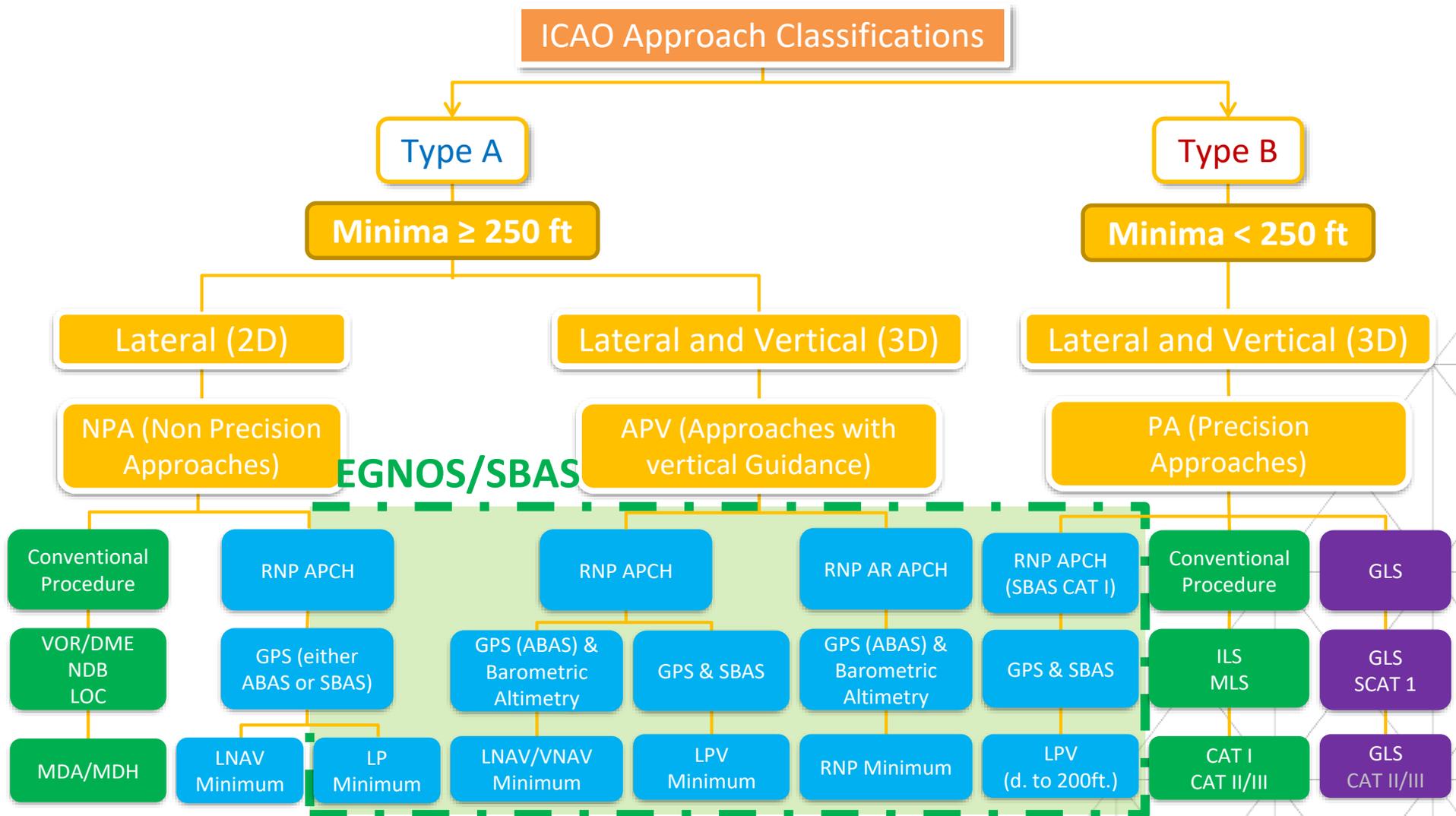


**Automatic Dependent Surveillance – Broadcast (ADS-B):** surveillance technique whereby an aircraft automatically provide, via a data link, data derived from on-board navigation and position-fixing systems.



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

# Main EGNOS application: LPV



# LPV implementation status



410 LPV approaches  
5 RNP 0.3 Procedures  
108 'EGNOS enabled' APV Baro



Plans by end 2018  
> 500 additional EGNOS procedures planned



Check link: [http://egnos-user-support.essp-sas.eu/egnos\\_ops/lpv\\_map/map.php](http://egnos-user-support.essp-sas.eu/egnos_ops/lpv_map/map.php)

# EGNOS airborne implementation status



Popular GA aircraft have SBAS standard equipment

Manufacturer	Models
 Cessna	Citation, Caravan and all single engine
 DAHER-SOCATA	TBM900
 PILATUS	PC6, PC12
 Diamond AIRCRAFT	DA20, 40XLT, 40CS, 42
 CIRRUS	SR20, SR22, SF50
 Piper	Meridian, Seminole, Mirage, Matrix, Archer, Seneca V and Arrow

Avionics for GA certified to ETSO C145 or C146 (SBAS)

 GNS 430W / 530W	 GTN 6XX / 7XX TS	 G1000, G2000, G3000, G5000	 IFD540 & IFD440 TS EASA cert. pending	 KSN 765/770 TS EASA cert. pending
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# Examples of GSA support to early GA adopters of E-GNSS



12 x



Raytheon Beech 58  
Equipment: GTN650

‘Retrofit of 12 Be58 aircraft with GTN650 and the corresponding upgrade of 3 Be58 FNTF II simulators. All ENAC flight instructors IR-ME training, and operational feedback sessions to authorities, other ATO’s and airlines’



SVENSK PILOTUTBILDNING

2 x



DA40

Equipment: G430W  
Existing STC used: GAMA



1 x

DA40

Equipment: TBC

‘Svensk Pilotutbildning, an ATO based at ESGP – Sweden, plans to upgrade **3 airplanes and 2 simulators** in order to be able to provide PBN/EGNOS/LPV in existing IR students and other customers’

DSA a.s.



1 Piper PA-28-161, 1 Piper PA28-181, 1 Cessna C172 SP, 1 Tecnam P2010, 1 Tecnam P2006T, 2 Cessna C172 S, 4 Cessna 172, 2 Piper Seneca PA34, 1 Cessna jet 525, 1 Beechcraft C90

‘LPV capabilities at two industry leaders in CZ (DSA and F-Air) for pilot training, covering +- 60% of national market, and +- 20 % of market share in Central Europe. First PiNS in CZ to be used by HEMS, other hospitals waiting for operational feedback of this procedure. ‘

# Examples of GSA support to early GA adopters of E-GNSS



‘Accelerate the adoption of EGNOS in the General Aviation sector in the UK. Develop APV (SBAS) LPV approach procedures at GA airports: Haverfordwest, Gloucestershire and Stapleford’

## Internationale Luchthaven Kortrijk Wevelgem

‘implement RNAV GNSS-LNAV and SBAS ICAO instrument flight procedures and charts for both runway ends at Kortrijk airport (EBKT). Airport is in Class G airspace.’



‘Develop and implement LPV capability with 2 Garmin units GTN650 and G1000 for its European fleet of 70 FSTDs. Producing SBs for retrofit amongst over 50 clients based on small airfields and seeking to train for LPV in their FSTDs. Alsim will also develop LPV for its FMS and will be able to code its own databases to Arinc 424 standard in order to integrate new or unpublished LPV procedures. The later will be a cost effective way for procedure designers and active pilots testing and train LPV approaches.’

# Linking space to user needs



Get in touch:



[www.GSA.europa.eu](http://www.GSA.europa.eu)



[EGNOS-portal.eu](http://EGNOS-portal.eu)



GALILEO

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