



The European GNSS Programme EGNOS and Galileo

Last Updated : November 16, 2009

Directorate-General
for Energy
and Transport



Navigation solutions powered by Europe

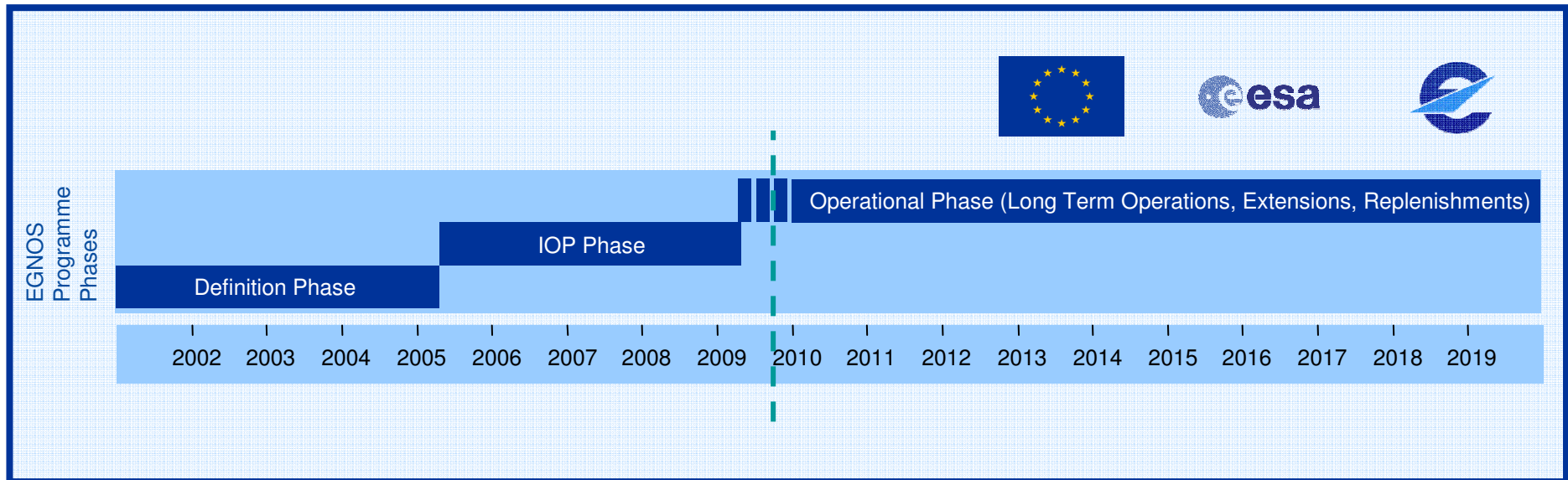


EGNOS

'It's there, use it'
(in Europe ... ☺)



EGNOS Timeline



IOP ... Initial Operations

EGNOS Services – Current Status

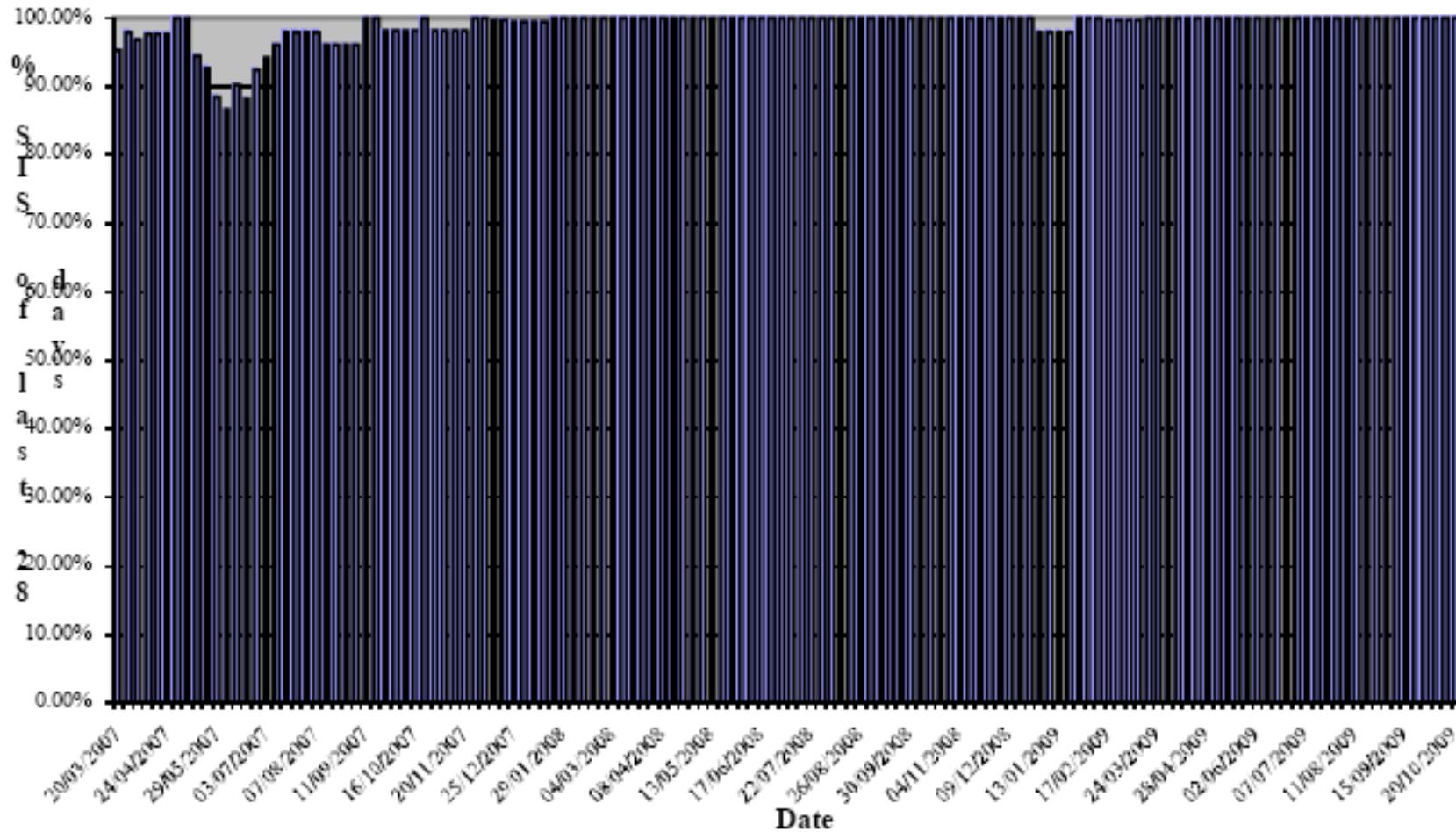
Service	Accuracy	Service Status	Expected Lifetime
Open Service	Typical vertical and horizontal positioning accuracy in the centre of Europe around 1m (spec: 3m horizontal, 4m vertical)	SIS available, declaration of "entry into service" planned for late 2009	20 years
Safety of Life Service	Same accuracy as Open Service. SoL service levels compliant to ICAO SARPS definition for APV1	Test SIS available, declaration of "entry into service" planned for mid-2010	20 years
Commercial Service (EDAS)	Corrections provided by terrestrial network allow for sub-meter accuracy locally or regionally through additional processing	Experimental service available since 2008	20 years

SIS ... Signal in Space, SARPS ... Standards and Recommended Practices, SoL ... Safety of Life



EGNOS Performance (Jan 2007 – October 2009)

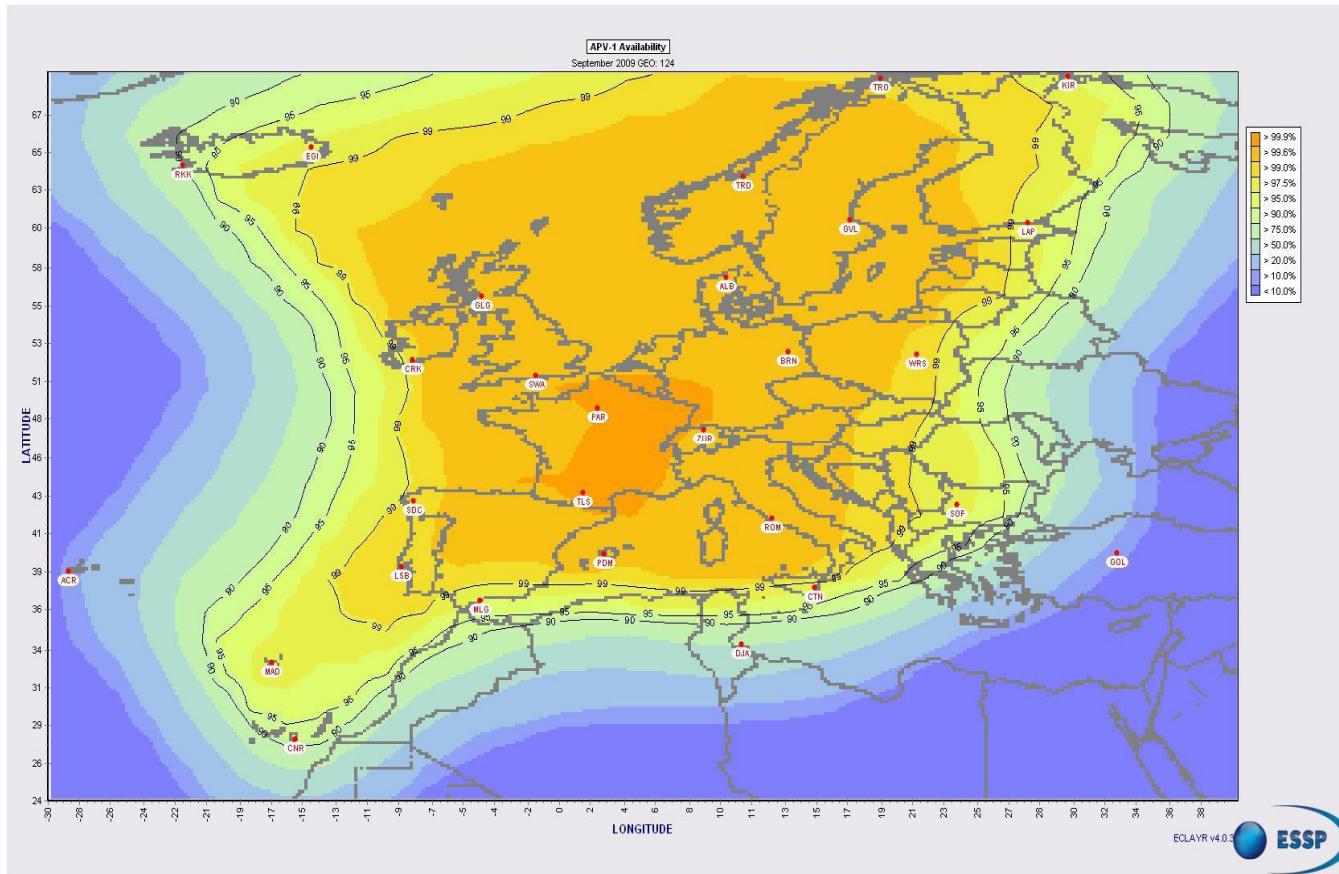
Accumulative SIS



=> More than 99% availability over the last months



EGNOS Performance (Sep 2009)

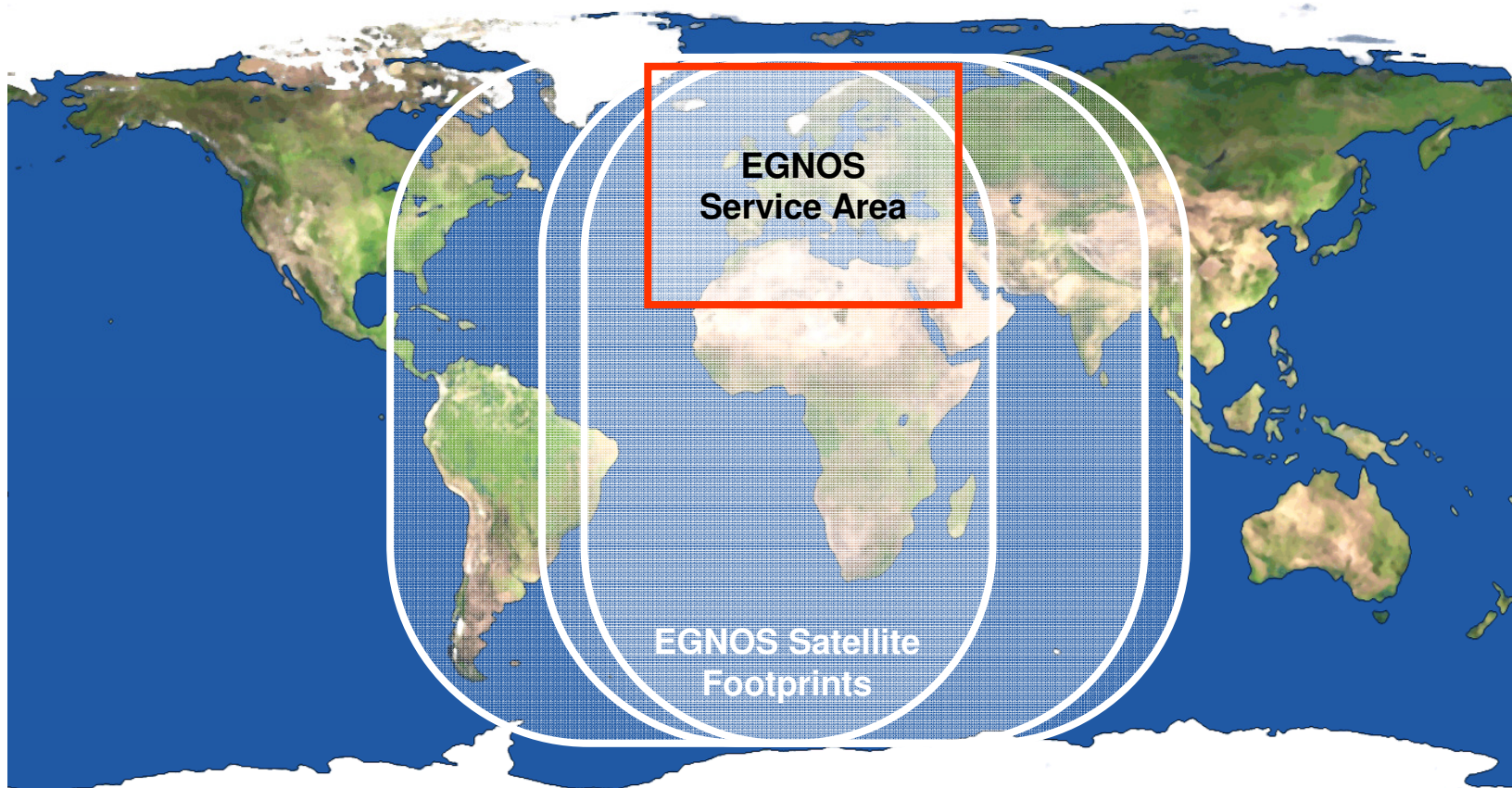


APV ... Approach with vertical guidance

Note : the deployment of additional RIMS in Northern and Eastern Europe, Southern Europe, Northern Africa and the Middle East will increase the availability area of APV-1



EGNOS Service Area



INMARSAT AOR-E (15.5°W), ARTEMIS (21.3°E), INMARSAT IOR-W (25°E)



EGNOS Service Evolutions

- ★ Service Provision Improvements ▶ short/medium term
- ★ Coverage Evolution
 - ★ Eastern Europe, Southern Europe/MEDA, Middle East/ACAC ▶ medium term
 - ★ Africa ▶ medium/long term
- ★ Frequency Evolution
 - ★ Extension to the E5a/E5b frequency decided on ARTEMIS replacement
- ★ Evolution of Standards ▶ long term
 - ★ Standardisation of E5a and E5b, L1 CBOC on-going
 - ★ Augmentation of new GNSS
- ★ Additional Services
 - ★ LPV200 service level ▶ medium term (2011)
EGNOS capability to meet this service level currently under technical evaluation
 - ★ EGNOS time service ▶ medium term
 - ★ Possible critical communication message (ALIVE concept)

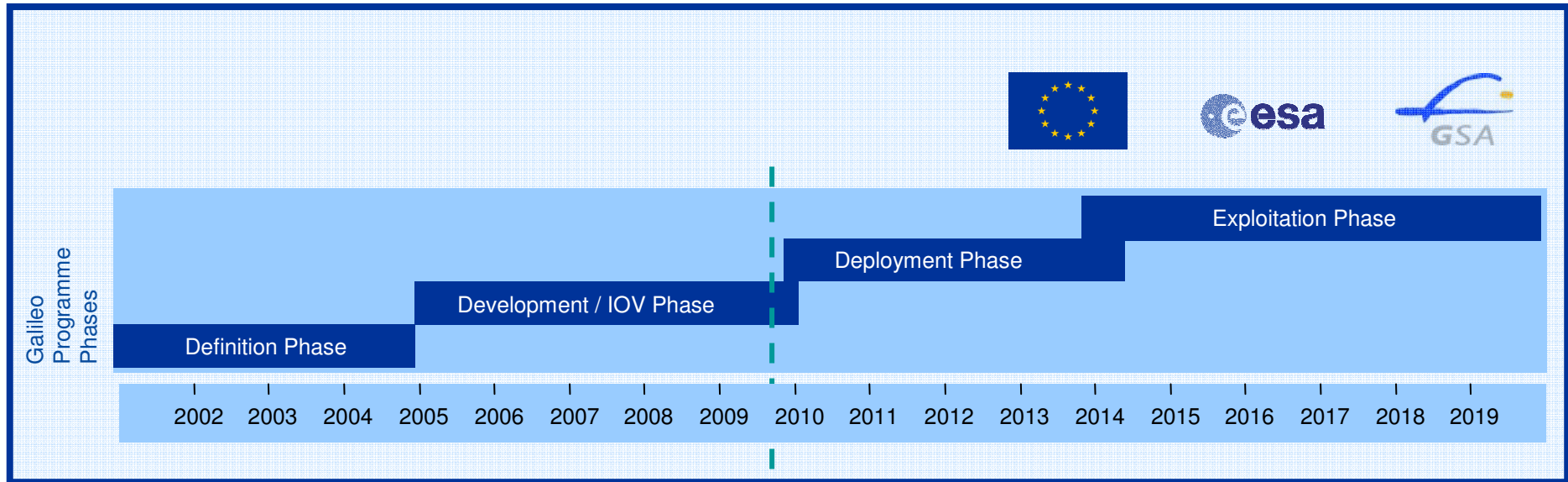




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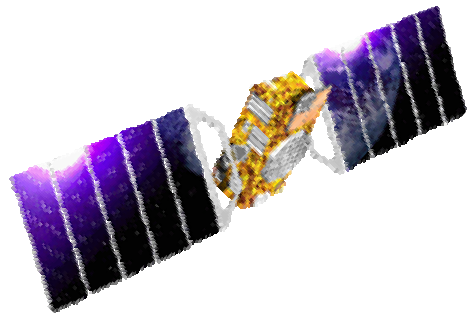
Galileo Timeline



IOP ... Initial Operations



Galileo Implementation Plan



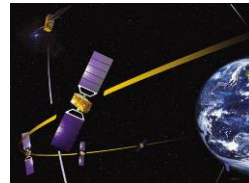
Galileo System Testbed v1
Validation of critical algorithms

2003



Galileo System Testbed v2
2 initial test satellites

2005



In-Orbit Validation
4 IOV satellites plus
ground segment

2010/2011



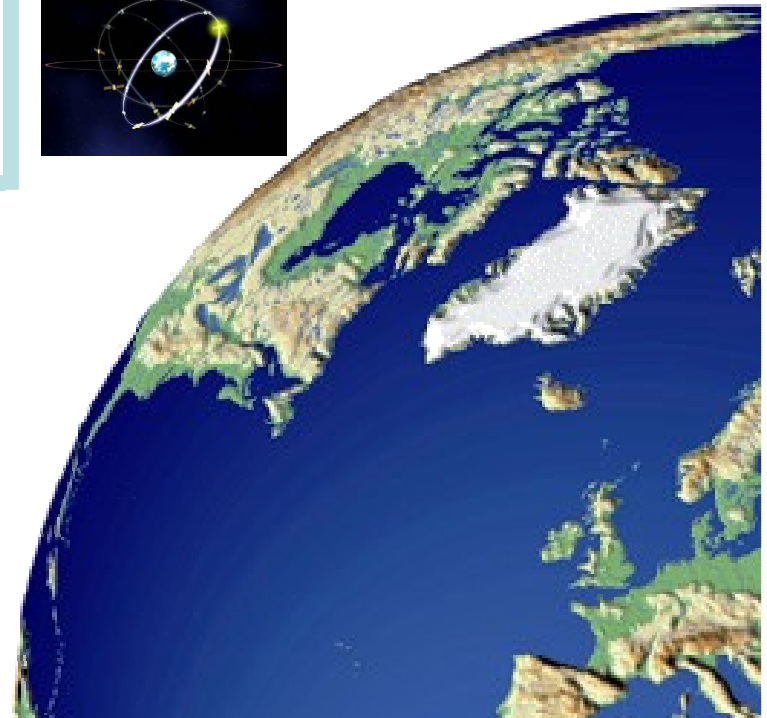
**Open Service, Search & Rescue
Service, Public Regulated Service**
minimum 16 satellites

2013

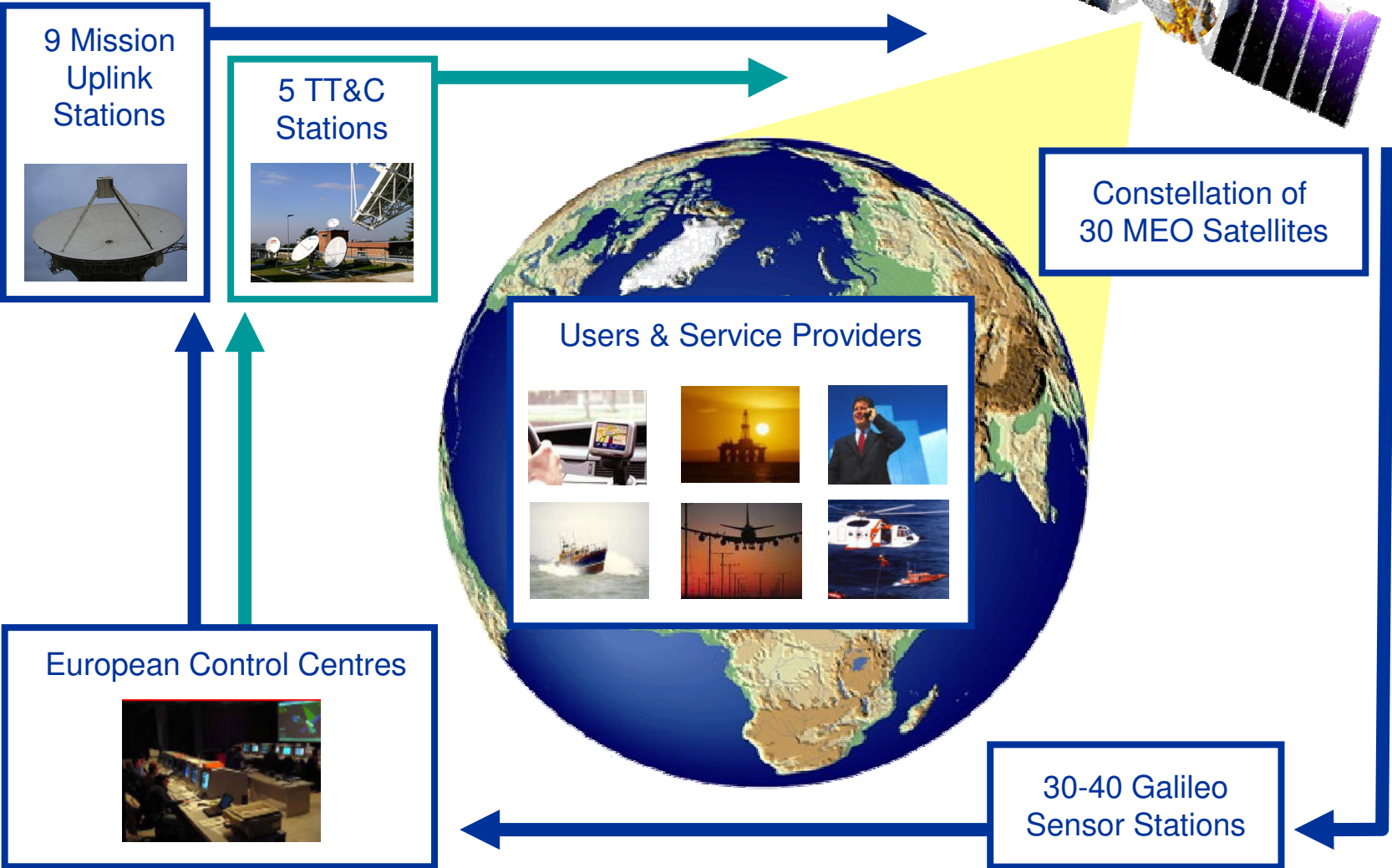


All services
30 satellites

2015








Galileo System Architecture



Galileo Services



Open Service	Free to air; Mass market; Simple positioning	
Commercial Service	Encrypted; High accuracy; Guaranteed service	
Safety of Life Service	Open Service + Integrity of signal	
Public Regulated Service	Encrypted; Continuous availability	
Search and Rescue Service	Near real-time; Precise; Return link feasible	



Galileo Performance Requirements (Dual frequency)

Service	Horizontal Accuracy (95%) <small>(incl. system margins)</small>	Vertical Accuracy (95%) <small>(incl. system margins)</small>	Availability for global coverage	Integrity
Open Service	4 m	8 m	> 99.5%	NO
Commercial Service	Detailed performance requirements under elaboration			
Safety of Life Service	4 m	8 m	> 99.5%	YES (LPV200)
Public Regulated Service	4 m	8 m	> 99.5%	NO

Guaranteed performance in the worst case situation. Actual measured performance is expected to be higher than these requirements



Galileo International Activities

★ Agreements with:

P.R. of China, USA, Israel,
South Korea, Ukraine,
Morocco

★ Multilateral:

Founding member of UN
International Committee on
GNSS & Providers Forum,
candidate to host ICG in
2010

★ Cooperation *inter alia* on:

- ★ Compatibility
- ★ Interoperability
- ★ Standardisation
- ★ Development activities
- ★ Galileo applications
- ★ Research
- ★ Trade matters

★ Regional training centers:

- ★ Asia, Africa,
Latin America



Galileo Programme Status

★ 2009

- ★ IOV : ground infrastructure deployments
- ★ FOC : first procurement contracts to be signed from Fall 2009 onwards

★ 2010

- ★ IOV : first two operational satellites to be launched in Nov 2010
- ★ FOC : remaining procurements contracts to be signed by early 2010

★ 2011

- ★ IOV : third and fourth operational satellites to be launched early 2011
- ★ FOC : ground infrastructure deployments

★ 2012 onwards

- ★ Progressive FOC deployment with step-wise service introduction as of 2013



Conclusions



EGNOS enters its operational phase

- ★ EGNOS Open Service since Oct 2009
- ★ EGNOS Safety-of-Life-Service and Commercial Service in 2010




Galileo is progressing, at the crossing between the development (IOV) and deployment (FOC) phases

- ★ GIOVE-A, GIOVE-B missions on-going
- ★ FOC procurement on-going
- ★ First two operational satellites in 2010
- ★ OS, S&R Service, PRS as of 2013

International coordination is an important feature

- ★ Ensure compatibility as a minimum
- ★ Achieve interoperability when desired



A composite image showing several satellites in space. The satellites are purple and gold, with solar panels. They are positioned around a central point, with yellow lines indicating their orbits. The Earth is visible on the right side of the image, showing blue oceans and white clouds. The background is a dark, starry space.

Thank you for your attention