European Commission

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Galileo and EGNOS Programmes
Status Update

Pieter De Smet, European Commission

ICG Conference, Dubai, 10 November 2013

- ★ **1. State of Play of EGNOS**
- ★ **2. State of Play of Galileo**


EGNOS

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EGNOS will deliver its services on a long-term basis (>20 years)

Service	Characteristics	Service Status	
Open Service	accuracy ~1m, free	available since October 2009	
Safety of Life Service	accuracy ~1m, compliant to aviation standards	Available since March 2011	
EDAS	accuracy <1m, corrections are provided by terrestrial networks	experimental service since 2008; official service made available in 2012	

EDAS: EGNOS Data Access Service

EGNOS key achievements

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EGNOS has entered into its operational phase

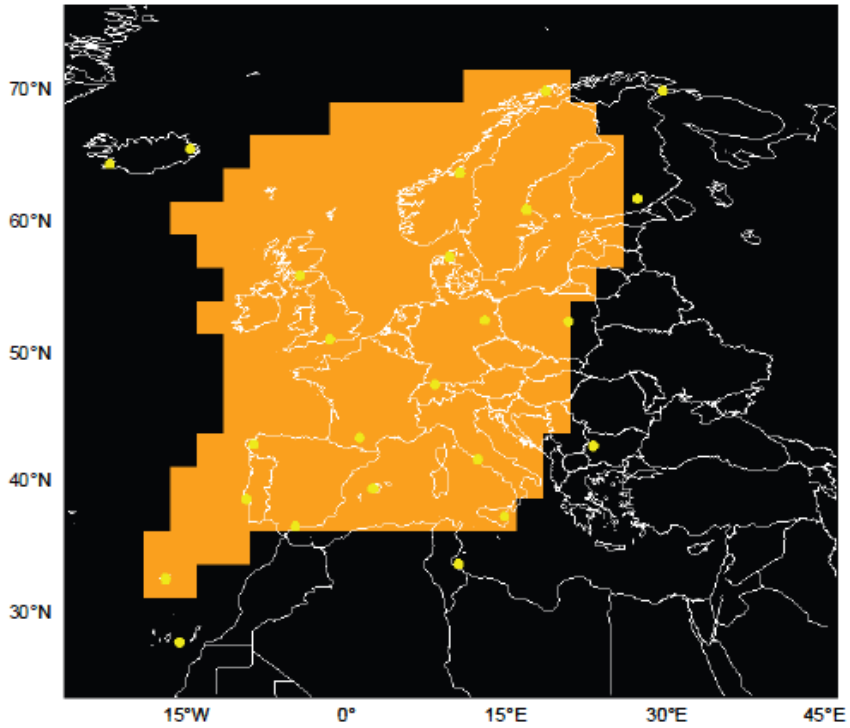
- ★ EGNOS declared operational: Open Service in 2009, Safety of Life in 2010, EDAS (EGNOS Data Access Service) in July 2012;
- ★ New Service provision contract with ESSP (European Satellite Service Provider) signed in June 2013;
- ★ New version of the Service Definition Documents (SDD) released between March and June 2013*.

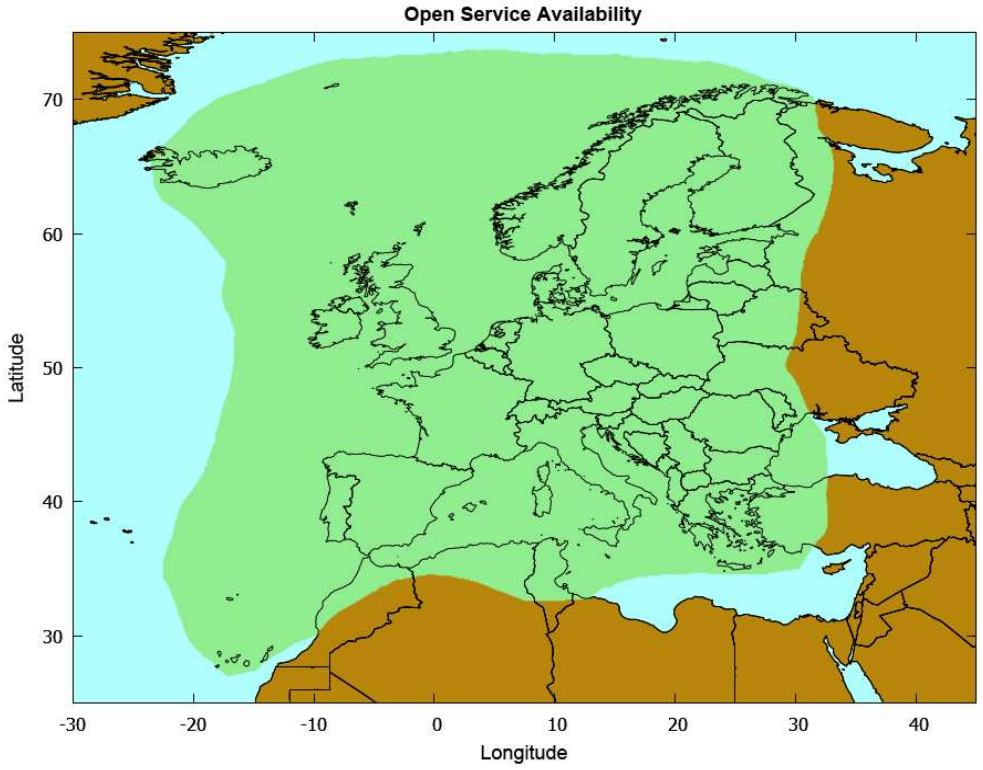
* http://www.essp-sas.eu/service_definition_documents

OS SDD (nov 2009)

OS SDD (march 2013)

Performance Status: Open Service



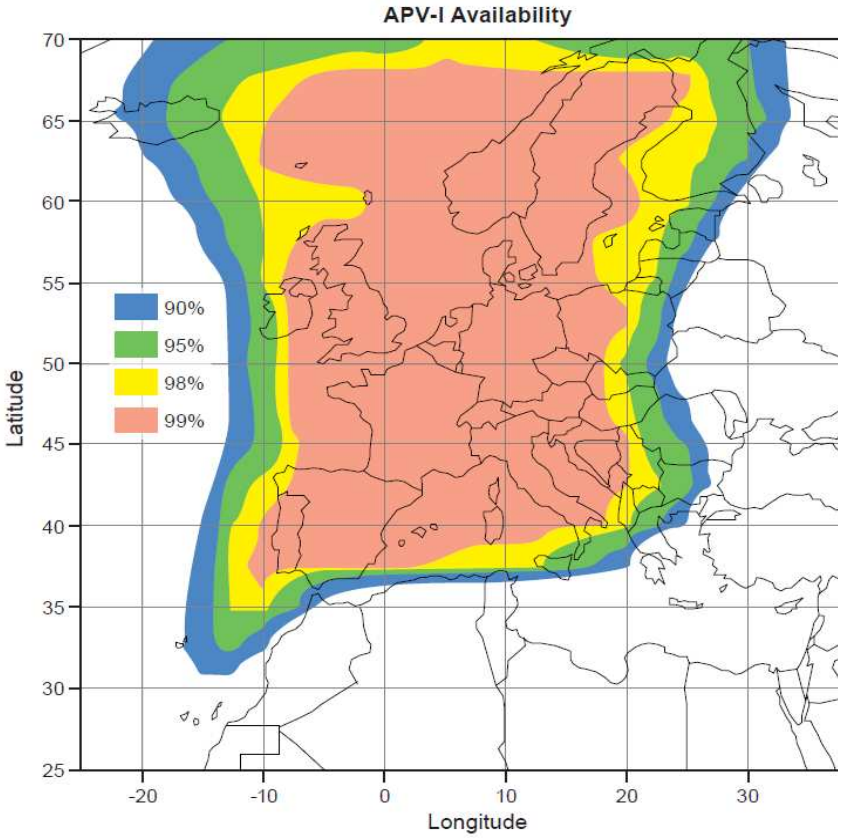


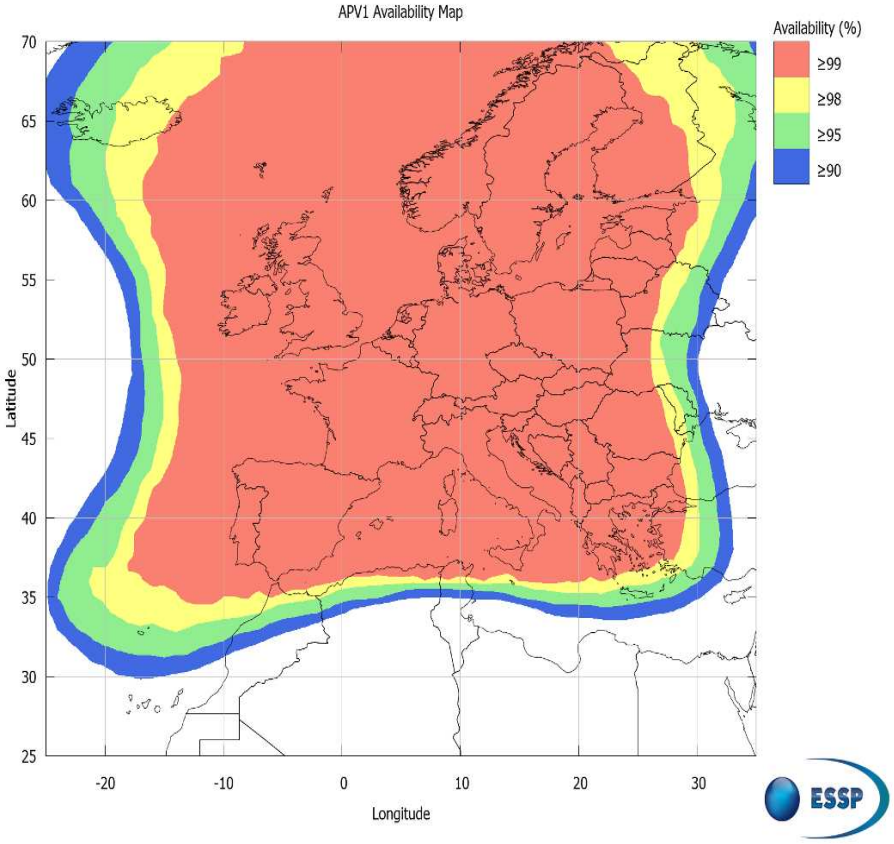
SoL SDD (March 2011)

SoL SDD (June 2013)

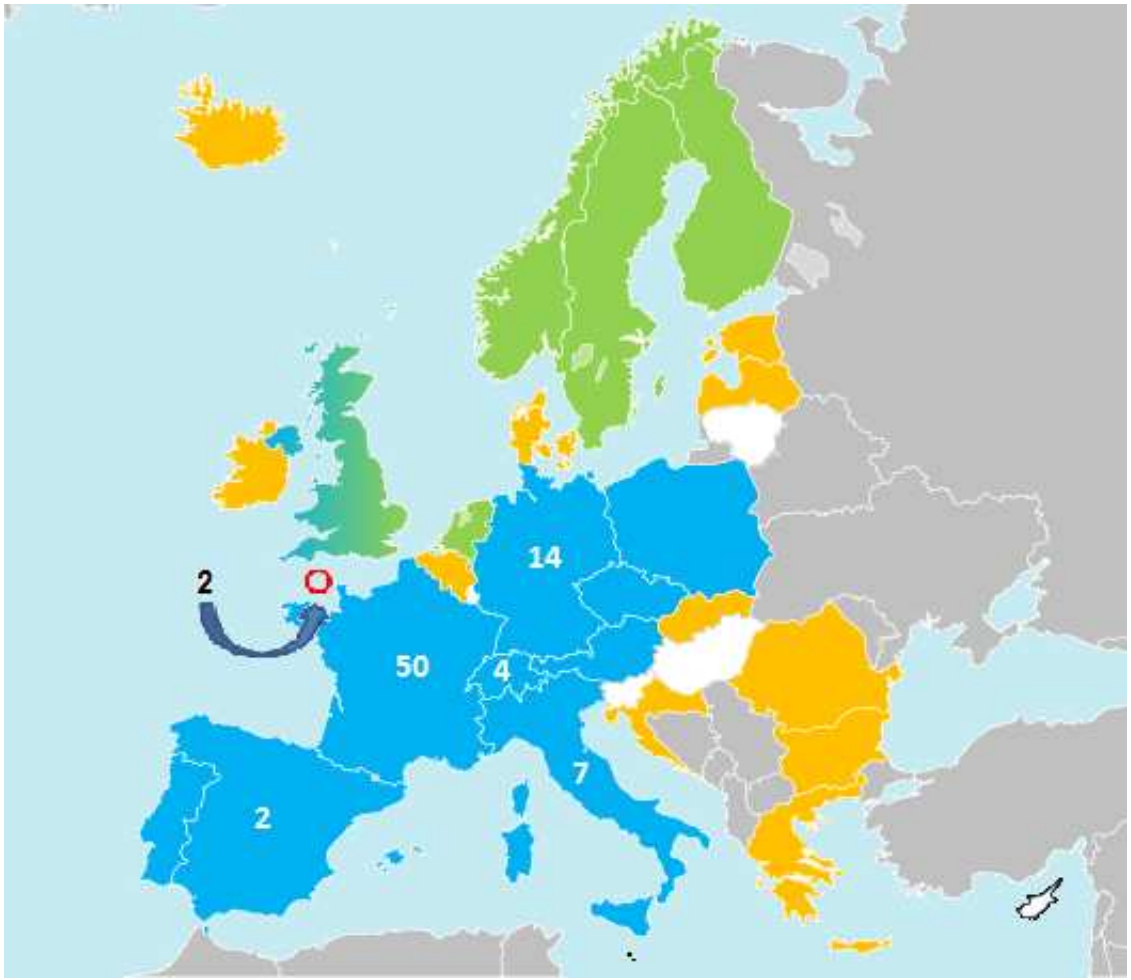
6 month observed performance

Performance Status: Safety-of-Life Service





LPV implementation status



	Airports	LPV	APV Baro
	40	50	1

	Airports	LPV	APV Baro
	4	4	0

	Airports	LPV	APV Baro
	1	2	0

	Airports	LPV	APV Baro
	4	7	0

	Airports	LPV	APV Baro
	41	14	73

	Airports	LPV	APV Baro
	1	2	0

	Initiated Discussions
	Advanced Discussions
	EWA signed

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EGNOS services will further improve over time

2013

- ★ Publication of the SDD for the OS, SoL and EDAS
- ★ New contract with ESSP (European Satellite Service Provider) and operational budget secured until 2021
- ★ EGNOS programme management transferred from European Commission to the European GNSS Agency (GSA) in Prague.

Medium term

- ★ Full coverage of 28 EU Member States territory (geographically located in Europe)
- ★ Implement LPV200 service level

Long term

- ★ EGNOS version with dual (L1/L5) frequencies, also to enable augmentation of Galileo and potentially other GNSS
- ★ Subject to available funding and conclusion of necessary contracts and agreements, extension of the EGNOS coverage to EU neighbouring countries and regions, including Africa.

LPV: Localizer Performance with Vertical guidance


GALILEO

2012 – Reminder

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★First 2 satellites already in orbit since October 2011

★On 12th October 2012, the second launch of Galileo satellites took place from Europe's Spaceport in Kourou, French Guiana

★The 2 satellites were successfully declared operational after the in orbit testing phase

2013 – A Pivotal Year

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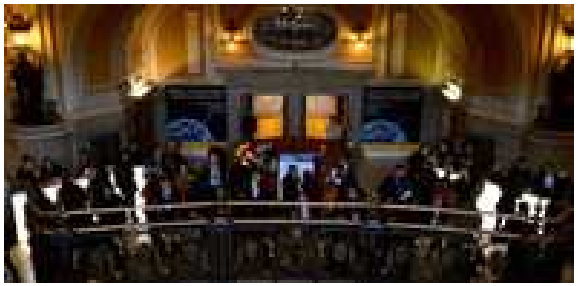
★The satellite production continues with new design

★The infrastructure deployment continues



★The service delivery preparation starts

★The Programme long term management structure is adopted

★Links with other providers, receiver manufacturers and users are strengthened

Galileo implementation plan

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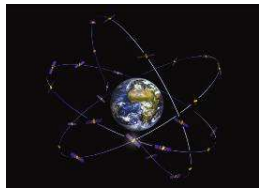
The IOV phase will be completed by the end of 2013

Full Operational Capability
Full services, 30 satellites
2018

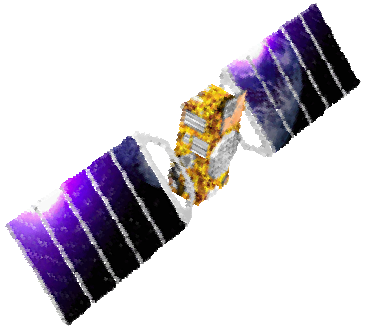
Initial Operational Capability
Early services for OS, SAR
PRS and CS
2014/2015



In-Orbit Validation
4 fully operational satellites
and ground segment
2013

GIOVE A/B
2 test satellites
2005/2008

Galileo System Testbed v1
Validation of critical algorithms
2003



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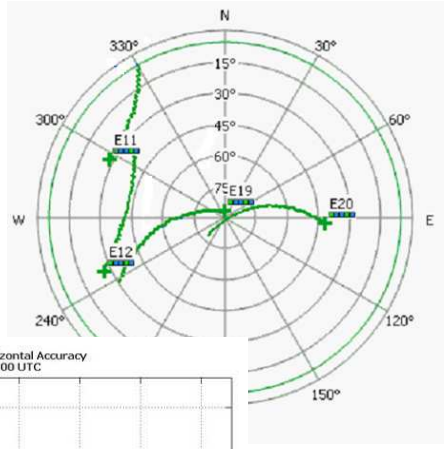
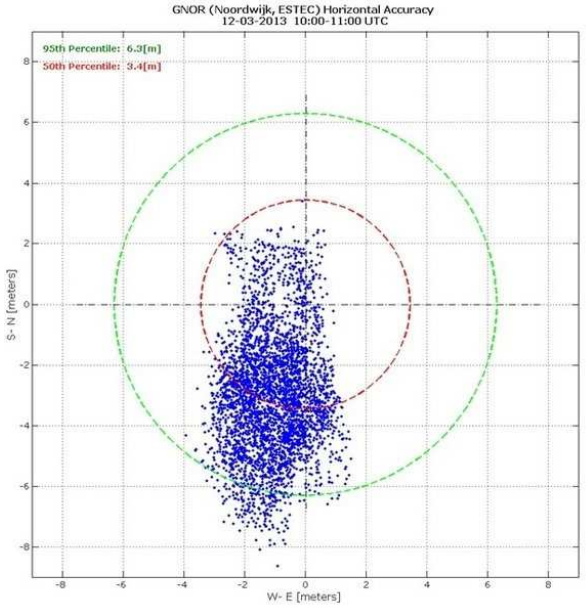
First Position Fix with Galileo: A good start

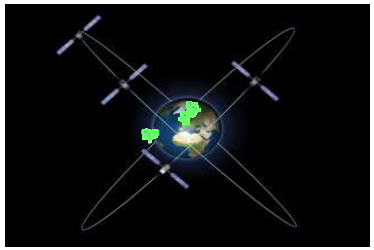
- ★ **First Fix on 12th March 2013**
- ★ **Limited Configuration**

  4 satellites in view over Europe for close to 3 hours

  – 3 Control Stations
- ★ **Results exceed expectations**







IOV: In-Orbit Validation
Photo: ESA

Other Firsts for Galileo

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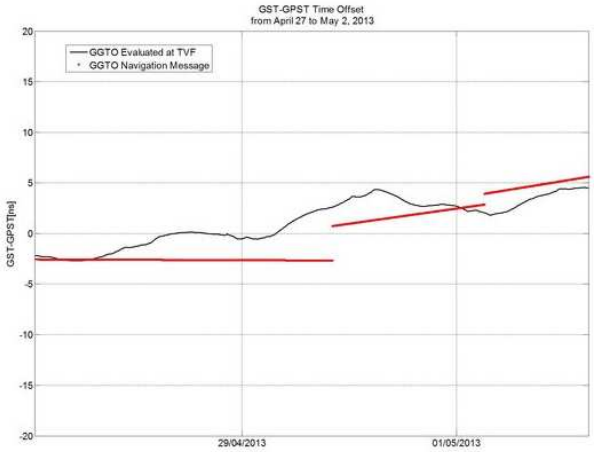
★ **23rd January 2013 : First Galileo Search And Rescue Transponder put into service**



★ **3rd May 2013 : First broadcast of time offset parameters between GPS and Galileo**

★ **1st July 2013 : First secured Public Regulated Service fix by EU Member States in the UK**

Photo: ESA

The deployment plan of the Galileo constellation has been secured

★Following the purchase of 8 additional satellites in February 2012, a constellation of 26 satellites in total has been ordered:

- ★ 4 IOV + 22 FOC

★The launcher service contracts for the full constellation have been signed with Arianespace:

- ★ Soyouz: 7 launches for 14 satellites (incl. the launches in 2011 and 2012)
- ★ Ariane 5: 3 launches for 12 satellites

IOV: In-Orbit Validation
Photo: ESA

Galileo system architecture

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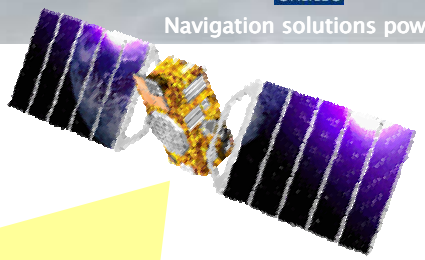

5 mission uplink stations

5 TT&C stations

Constellation of 30 MEO satellites

Users & service providers

2 control centres

IOT centre

2 launch and early operations centres

16-20 Galileo sensor stations

MEO: Medium Earth Orbit TT&C: Telemetry, Tracking and Command IOT: In-Orbit Testing

Galileo ground segment for IOC

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Note: Target set-up for IOC. Not all facilities are shown. IOC: Initial Operational Capability

Galileo launch facility

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The Galileo launch pad is located in Kourou, French Guiana

Photo: ESA

The site deployments continue all around the globe


MEOLUT Maspalomas


TTC Noumea


MEOLUT Cyprus

Photos: ESA

Galileo services

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Open Service (OS)	Freely accessible service for positioning and timing	
Public Regulated Service (PRS)	Encrypted service designed for greater robustness and higher availability	
Search and Rescue Service (SAR)	Assists locating people in distress and confirms that help is on the way	
Commercial Service (CS)	Delivers authentication and high accuracy services for commercial applications	

The SoL service is currently being re-profiled

Safety of Life Service (SoL)	Provides vital integrity information for life-critical applications	

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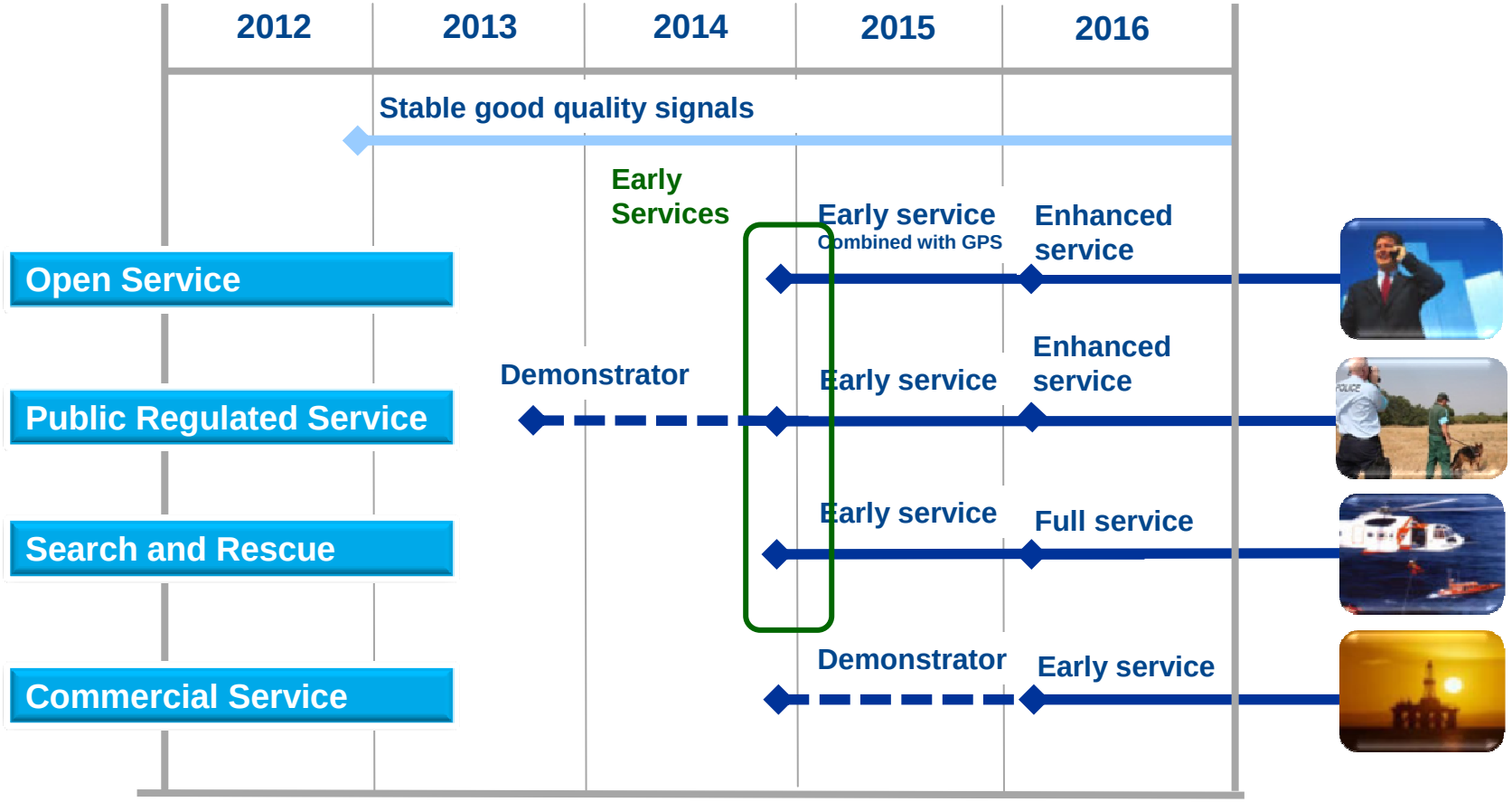
Early Galileo services



Galileo Service Center

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★ **Nucleus**

★ GNSS Service Centre inaugurated in Madrid on 14th May 2013 by Vice-President Tajani

★ GSC provides Galileo System Status and Galileo Helpdesk functionality:
www.gsc-europa.eu

★ Users will be informed regularly of the Galileo constellation status

★ **First NAGU issued through the Galileo Service Centre on 3rd July 2013**

NOTICE ADVISORY TO GALILEO USERS (NAGU) 2013002

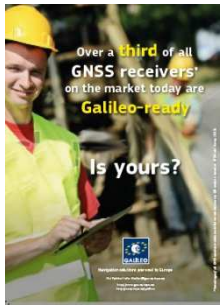
DATE GENERATED (UTC): 2013-07-03 9:40
NAGU TYPE: AVAILABLE
NAGU NUMBER: 2013002
NAGU SUBJECT: AVAILABLE
NAGU REFERENCED TO: 2013001
START DATE EVENT (UTC): 2013-07-01 10:25
END DATE EVENT (UTC): N/A
SATELLITE AFFECTED: GSAT0104
SPACE VEHICLE ID: 20
SIGNAL(S) AFFECTED: ALL
EVENT DESCRIPTION: GALILEO SATELLITE GSAT0104 (ALL SIGNALS) IS AVAILABLE SINCE 2013-07-01 BEGINNING 10:25 UTC.

★ Full NAGU format standards under preparation. Expected to be issued by End 2014

Galileo CS Demonstrator

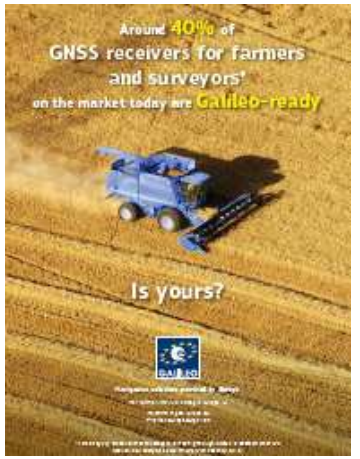
★Objectives:

- ★ Contribute to the Galileo Early Services declaration with a CS Early Proof-Of-Concept
- ★ Phase 1: Initial offline testing of authentication schemes (from Oct. 2014)
- ★ Phase 2: Demonstration of CS Signal-In-Space with connection to Galileo (from mid-end 2015), incl. real-time SIS tests with GSC and External CS Providers
- ★ Support other CS aspects: receiver development, CS service provision concept



★Planning:

- ★ Procurement of infrastructure On-going
- ★ Call for Interest to Commercial Service providers to be organized by the GNSS Agency



Galileo Search And Rescue

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- The first 2 SAR Repeaters are now used for Cospas-Sarsat MEOSAR testing (Demonstration and Evaluation Phase)
- MEOLUT Hosting Services under preparation
- SAR Operations Definition under preparation by SGDSP
- SAR Service Center proposal evaluation on-going
- 2 Service Milestones:
  - End of 2014 - SAR/Galileo Early Service: will provide detection and localization data to Cospas-Sarsat Mission Control Centres
  - Beginning of 2016 - SAR/Galileo FOC Service: will provide a Return Link Function (distress reception acknowledgment to the distress beacon)

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International cooperation is crucial for the development of European GNSS

- **Objectives of international cooperation**
  - Cooperation towards compatibility and interoperability with other GNSS providers
  - Fostering uptake of EGNOS and Galileo worldwide
  - Cooperation towards multi-constellation service provision
- **Implementation**
  - Conclusion of GNSS cooperation agreements
  - Participation in international fora such as ICG

Securing the long term

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2013 has been instrumental in shaping and securing the long term programme structure

★New Regulations adopted for the European GNSS Programmes and for the GNSS Agency

★Funding secured for EGNOS and Galileo for the new financial framework 2014-2020

★Exploitation tasks conducted by the GNSS Agency under delegation

★System design and development tasks conducted by the European Space Agency under delegation

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In 2014, Galileo will be facing the challenges of the early phase of service delivery…

- ★Gradual service introduction approach
- ★Strong interaction with users
- ★Need to run early services with continued infrastructure deployment

…and

- ★Conduct a service validation campaign
- ★Finalize definition of Commercial Service
- ★Develop a long term evolution plan for Galileo


Thank you!
GALILEO
EGNOS
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http://ec.europa.eu/galileo