Galileo Programme Status Update

UN ICG Workshop on GNSS Applications

12 December 2016, Kathmandu, Nepal
PROGRAMME PRIORITIES

Deploying the infrastructure

Providing services as they come on stream

Establishing Galileo in the market

Preparing for the future
2016 HIGHLIGHTS

• SUCCESSFULLY COMPLETED two GALILEO launches including the recent quad launch on Ariane 5
• Procurement of final GALILEO satellites
• Service OPERATOR Selection
• Galileo Service VALIDATION Campaign + Initial SERVICES
• Set-up and start a Galileo User CONSULTATION FORUM
• Galileo and EGNOS contribution to the SPACE STRATEGY for Europe
• Prepare strategic goals for Galileo 2nd GENERATION
FIRST FOUR SATELLITES (IOV) LAUNCHED IN 2011 AND 2012

SATELLITE 5 & 6 RECOVERED AND ON IMPROVED ORBITS

SATELLITE 7 & 8 LAUNCHED ON 27 MARCH 2015

SATELLITE 9 & 10 LAUNCHED ON 11 SEPTEMBER 2015

SATELLITE 11 & 12 LAUNCHED ON 19 DECEMBER 2015

SATELLITE 13 & 14 LAUNCHED ON 24 MAY 2016

SATELLITES, 15-17 launched November 2016

30 SATELLITES IN ORBIT BY 2020
Galileo Service Provision

• Hand Over of exploitation phase to the European GNSS Agency (GSA)

• On-going selection of the Galileo Service Operator (GSOp)
  ▪ Contract signature before end 2016
  ▪ Handover of operations by mid 2017

• New GNSS Service Center building in Madrid
  ▪ One-stop shop for Galileo customers

• New Galileo Reference Center in Noordwijk
  ▪ Independent monitoring of Galileo performance based on EU Member States infrastructure and competences
Some GSC figures (from 1\textsuperscript{st} Jun 2013 to 15\textsuperscript{st} April 2016):

- More than \textbf{71k visits} from \textbf{181 different countries}!

- \textbf{143 user requests} handled and \textbf{91 advisory notices (NAGU)} published

- \textbf{383 registered users} on the GSC web portal
REGULATED APPLICATIONS

• Digital Tachograph
  – Adopted in March 2016
  – Foresees use of Galileo and EGNOS
  – Same wording as in eCall

• World Wide Radio Navigation System
  – Recognition of Galileo as WWRNS
  – Maritime and Safety Committee – 11-20 May 2016

• Use of Galileo in Critical Infrastructures
  – Under analysis for timing and synchronisation

• Use of EGNOS and Galileo to improve safety and performance in automated driving
Seach and Rescue – Almost There

Galileo fully incorporated into the Cospas-Sarsat Search and Rescue System
EVOLUTIONS - ROADMAP

Consult
- Users
- Industrial Stakeholders
- Member States and Institutional actors

Consolidate
- Mission needs established by EC
- System scenarios established by ESA
- Cost Benefit Analysis conducted by GSA

Decide
- Space Strategy
- Budgetary Authority

Implement
- G2G Design and First launch

TIMEFRAME:
- 2015-2016
- 2016-2017
- FROM 2020
EGNSS in the **SPACE STRATEGY FOR EUROPE**

- The European Commission develops a **Space Strategy** for Europe
- Regarding European GNSS, the main aims are:
  
  - Deliver reliable and state of the art services matching the user needs
  - Ensure long term continuity of EGNOS and Galileo services and plan their evolutions
  - Accompany market uptake
  - Secure European industrial capacity
INTERNATIONAL

- Targeting excellence and compatibility
- Extensive bi-lateral cooperations
- Continuous involvement in multilateral discussions in UN-ICG, ITU, Cospas Sarsat
- Cooperation in international standardisation bodies
- Partnership with other SBAS providers for future multiconstellation solutions
GALILEO INITIAL SERVICES

• Declaration of services will be gradual based on already deployed infrastructure

• Like GPS, Galileo will provide free signals to users – the Open Service

• A Search and Rescue Service, fully incorporated into the international Cospas Sarsat system – to help locate emergency distress beacons

• An encrypted signal for governmental users such as the police, civil protection, customs control – the Public Regulated Service

• Expected performance to be published at the time of declaration. See here: www.gsc-europa.eu

• Galileo already incorporated into many smartphone chipsets, just needs to be activated by the manufacturer/operator

• When? This week! Expected declaration for first Galileo operations – the Initial Services: 15 December 2016
Open Service Navigation
- Good ranging signals (3 m, more than 80% availability)
- Excellent timing performance (30 ns, more than 90%)

Search and Rescue
- Contribution to COSPAS/SARSAT with shorter detection times (10 min) and better localisation accuracy

PRS Access
- Good "ranging" signals
- Manual distribution of keys to PRS participants

Security Monitoring
- Centralisation of system security events in GSMD for analysis and reporting

PERFORMANCE LEVELS
BASED ON AVAILABLE INFRASTRUCTURE IN 2016
EMS R125: Earthquake in Nepal

Event Time (UTC): 2015-04-25 11:45
Event Time (LOC): 2015-04-25 16:45
Event Type: Earthquake
Activation Time (UTC): 2015-04-25 12:20
Reference maps produced: 22
Delineation maps produced: 14
Grading maps produced: 8
Activation Status: Closed
Affected Countries/Territories: Federal Democratic Republic of Nepal
Area Descriptor: Katmandu, Bhidur, Pokhara, Bharatpur
Authorized User: EC Services DG ECHO

Activation Reason:
An earthquake in Nepal with a magnitude of 7.9M, 10km depth occurred with at least one consequent aftershock of 7.1M, 10km depth. The epicenter is located between the capital Kathmandu and the city of Pokhara, and was also felt in northern parts of India. Extensive damage to buildings and injuries have been reported.

Requested Product: Reference and Grading Maps
Example Copernicus image
Earthquake Deformation in Kathmandu
Any Questions?

Biker Dom in Nepal, May 2016
Overflow
Galileo Open Service Signal In Space Interface Control Document (OS SIS ICD)
Version 1.2 to be published end 2015

Galileo NeQuick Ionospheric Model
Version 1.1 published in April 2015

Galileo SIS Operational Status Definition
Version 1.1 published in July 2016

Galileo OS Service Definition Document
First version in 2016 with Initial Service performance
Updated version in 2017-18 with more consolidated FOC performance