

High Precision, Low investment



EGNOS for aviation

- EGNOS for aviation: what, how?
- EGNOS and Galileo status in Europe



EGNOS Benefits in Final Approach...

- Avg NPA in USA: 450ft; LPV: 200ft
- Benefits:
 - Reduction in DDC of 48%¹
 - Reduction of CFIT of 75%²
 - Reduction in ground infrastructure cost
- Costs
 - Cost of a procedure = yearly ILS maintenance
 - Cost of receiver

 Eurocontrol estimate; DDC –Delays, diversions and cancellations; 2. Airlines/ANSP estimate; CFIT – Controlled fligth into terrain

3

...close to €2,4 billion



EGNOS: comparable to ILS cat1

even more than BaroVNAV¹

Geneva – LSGG05					
	MET estimated OCH (ft)				
Approach Type	CAT A	CAT B	CAT C	CAT D	
ILS CAT I	223	233	243	253	
SBAS APVI	263	273	282	292	
SBAS APVII	240	250	259	269	
APV BaroVNAV	407				
LNAV			137		

1 RNAV Approach benefits analysis, Eurocontrol, 2009 EGN () S

APV SBAS = LPV = EGNOS = mandated by ICAO

The International Civil Aviation organisation (ICAO) calls for APV to be implemented on all instrument runways, by 2016 with intermediate milestones: 30 per cent by 2010, 70 per cent by 2014.

April 2009 industry declaration calling upon:

"All leaders of the civil aviation community, to fully support implementation of Performance Based Navigation (PBN) into the air navigation system according to the ICAO provisions and established timetable."

French ANSP declares:

- SBAS APV on all IFR runways by 2016
- ILS Cat I proposed to be progressively replaced by APVs from 2015 on DSNA managed airfields, phased out by 2020

UK ANSP declares:

- Today 133 NPA supported by VORs
- Tomorrow: rationalisation of 28 VOR facilities between 2011- 2017.

Italian ANSP declares

EGNOS suitable for 70% of runways

PLUS: en route, airport ops,...



The more efficient green GPS guided procedure compared to the conventional red track currently used most often at Sydney.



A "Follow Me" vehicle is tracked using EGNOS during a demonstration at Casablanca's airport. © Ahmed ElAmin



Speakers at the METIS event at Casablanca's airport watch a demonstration of EGNOS in action. © Ahmed ElAmin

Courtesy of Waypoints, ICAO PBN publication, Q1 2010

SatNav: soon in all aircraft



GPS augmentation system: EGNOS



'It's there, use it'



EGNOS in Europe – Status

European Commission Vice-President Tajani,

Oct 1, 2009, declaration of Open service availability:

"Both the Open Service and the Safety-of-Life Service are provided free of charge, and the European Union is committed to supporting EGNOS for the long term, even after Galileo has become operational. This includes extending its geographical scope within the coverage of the three satellites involved."



EGNOS in Europe – services

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)	Service available since October 2009	20+ years
Safety of Life Service	Same accuracy as Open Service. SoL service levels compliant to ICAO SARPS definition for APV1	Service to be made available by end 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; Official service to be made available in 2011	20+ years

SIS.....Signal in Space

Safety of Life

SARPS.....Standards and Recommended Practices

EGNOS in Europe – coverage



Fully independent Satnav: Galileo



Navigation solutions powered by Europe

GN 🏵 S 🚽



Galileo Implementation Plan

Full Operational Capability All services, 30 satellites

2017/2018



Initial Operational Capability Early Services for OS, SAR, PRS 18 satellites 2014/2015



In-Orbit Validation 4 IOV satellites plus ground segment

2011

In order for Galileo to be recognized by the downstream market as the second satellite navigation system of choice it is key to deliver early services as soon as 2014/2015.



Galileo System Testbed v2 2 initial test satellites 2005

GALILEO

GIOVE





Validation of critical algorithms

Galileo - services

Galileo will be offering five services.

	Open Service	Free to air, mass market, simple positioning		
	Commercial Service	Encrypted, high accuracy, added-value service	nin -	
	Safety of Life Service	Adds integrity to Open Service	-	
	Public Regulated Service	Encrypted, robust, continuous availability		
	Search and Rescue Service	Near real-time, precise, return link		
NØ				15

Galileo – test satellites

The two Galileo test satellites have secured the frequencies and tested critical technology in space.

- Giove-A
 - Launched on 28 December 2005
 - Securing of Galileo frequencies
 - In-orbit technology test bed



- Giove-B
 - Launched on 27 April 2008
 - First Passive Hydrogen Maser atomic clock ever flown in space
 - Implementation of CBOC signal



Galileo – public benefits

- The public benefits to the 27 EU Member States from satellite-based navigation are estimated to be over €800 billion during the period 2010-2027. This value does not include some of the major potential benefits, such as employment growth and saved lives, which were estimated on a non-monetary basis.
- Meanwhile, the public benefits derived from Galileo are forecast at €58 billion in the 2010-2027 period. The benefits include reduced travel time and fuel consumption, and public expenditures savings due to a reduction in road accidents and injuries, for example.



These public benefits are expected to grow rapidly. The road segment has the potential to reap the largest public benefits from Galileo, accounting for more than 70% of the estimated total. The benefits derive mainly from a reduction in travel time (a result of better navigation), the availability of more devices, better congestion management and the development of intelligent services.

In agriculture, the use of more accurate positioning technologies enabled by Galileo will allow rationalisation and increased efficiency in the use of fertilisers and pesticides. In aviation, the integrity information provided by Galileo and EGNOS will increase flight safety and reduce fuel consumption.

Thank you...

