

Presented by:
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Airbus status on SBAS EGNOS Service Provision Workshop

29 September 2015 - Copenhagen

Agenda

1. Introduction

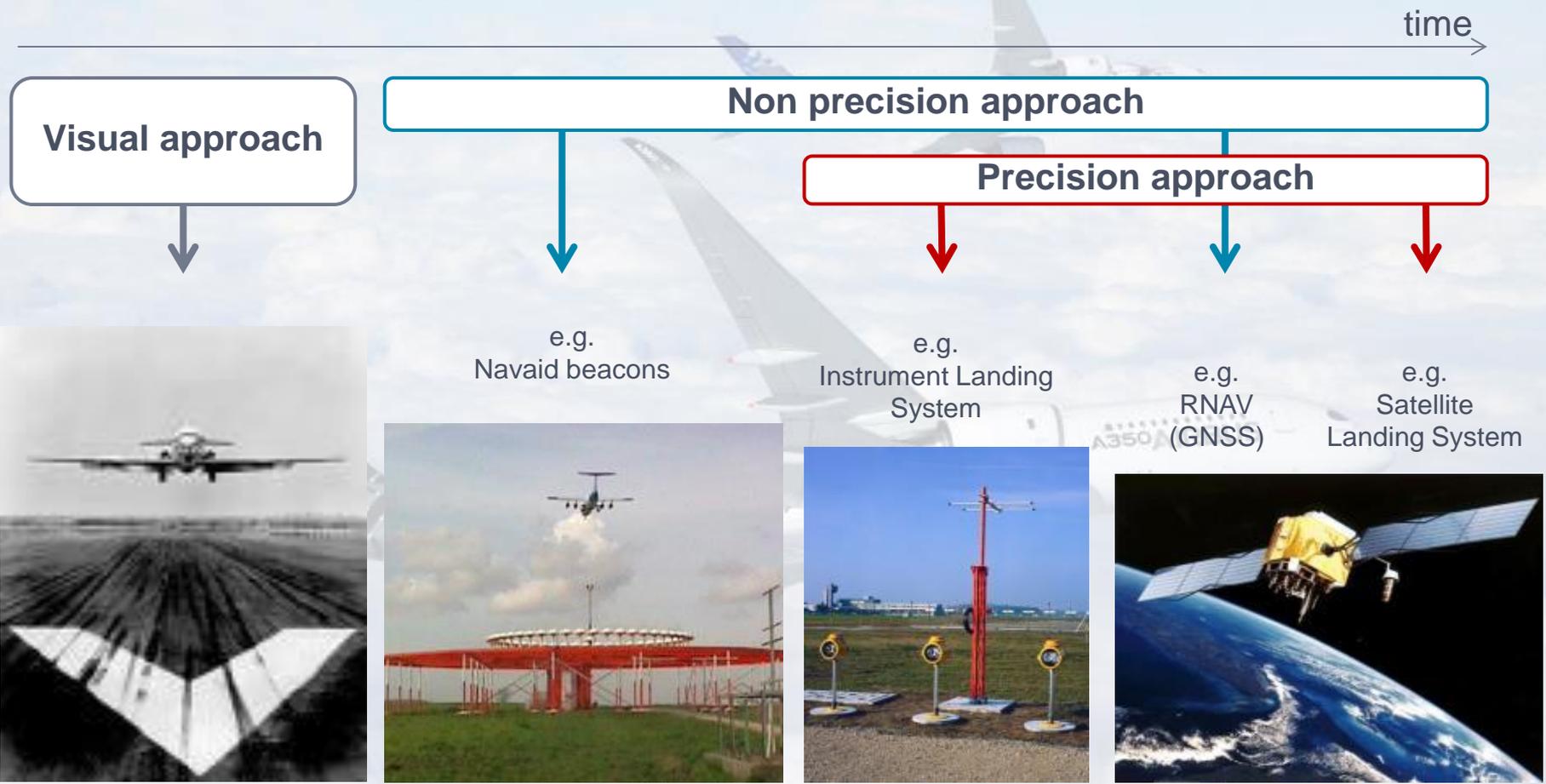
2. SLS on Airbus families

3. Way forward



Introduction

Approach categories and examples



Introduction

Airbus xLS concept

- **ILS is the reference** instrument approach for all pilots
- **xLS concept** provides **ILS look-alike** crew interface
 - MLS and GLS were the first applications of the xLS concept
- Airbus also introduced **FLS** (FMS Landing System) to provides an xLS solution for Non Precision Approaches:
 - Conventional (e.g. VOR, NDB,..)
 - RNAV(GNSS) (RNP APCH)
 - LOC only (or G/S transmitter failed)



The xLS concept expands the ILS operational benefits

Introduction

Airbus xLS concept



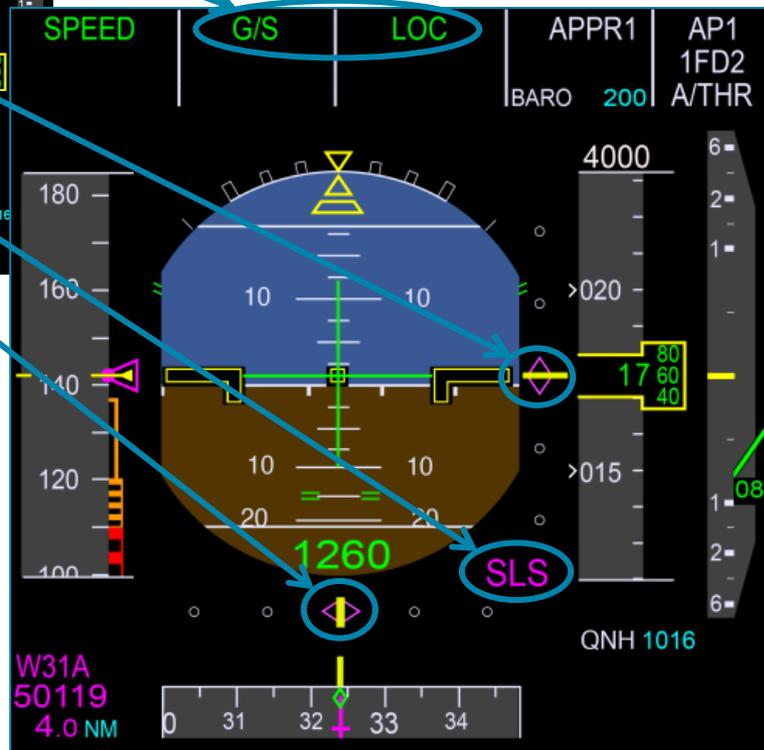
ILS PFD

Introduction

Airbus xLS concept



ILS PFD



SLS PFD

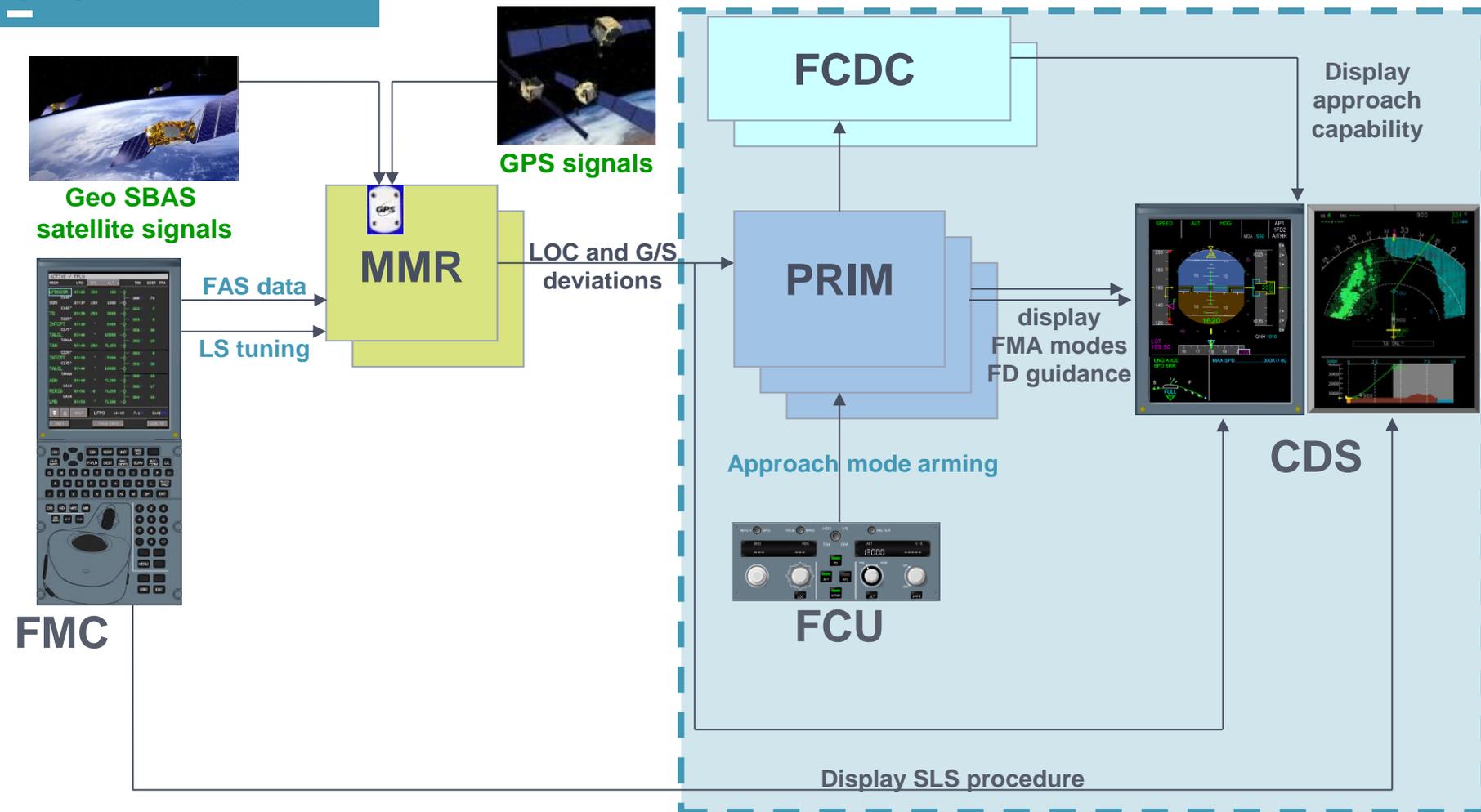
Introduction

Airbus xLS concept

- xLS is based on:
 - Identification of the final approach reference segment (Lateral and Vertical)
 - Computation of LOC and G/S deviations from the reference segment
- Final Approach Segment is equivalent to the ILS beam
- LOC and G/S deviations are used by both pilots and A/C systems in the same way as ILS deviations
 - Pilots get similar interfaces for all xLS functions (e.g. ILS, GLS, FLS...)
- The Multi Mode Receiver (MMR):
 - Manages the radio sensors
 - Computes deviations
 - Ensures interface with display and guidance systems

Introduction

SLS architecture



Introduction

Airbus SLS function

- The new SBAS / LPV approaches are halfway between RNAV(GNSS) and GLS approaches:
 - Technology is very similar to GLS
 - Charting is made through RNAV approaches (with LPV minima)
 - **RNAV/LPV approaches is in line with xLS concept**
- SLS acronym was selected for the A/C function supporting SBAS applications (LPV or LP)



SLS is the last brick of Airbus xLS concept on A350 XWB

Agenda

1. Introduction

2. SLS on Airbus families

3. Way forward



SLS on Airbus families

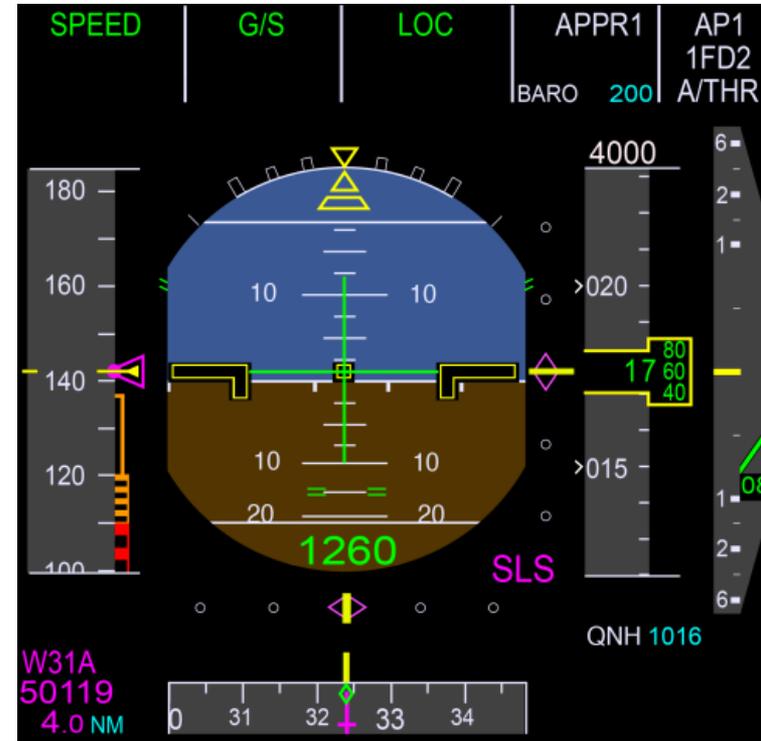
SLS function on Airbus families

A350

SLS function certified since EIS
Selected by 9 customers

A320 / A330

Under feasibility assessment



SLS is part of xLS Airbus concept
and is now in service on A350

SLS on Airbus families

- A350 option status
 - Combined option “SLS and GLS”
 - Certified since Entry-Into-Service
- Recent achievements
 - First A350 deliveries to Qatar Airways and Vietnam airlines
 - High selection rate by A350 customers
 - New customers recently selected option (*Asiana Airlines and Etihad Airways*)



Strong interest of airlines in SLS function

SLS on Airbus families

SLS customers



Agenda

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2. SLS on Airbus families
- 3. Way forward**

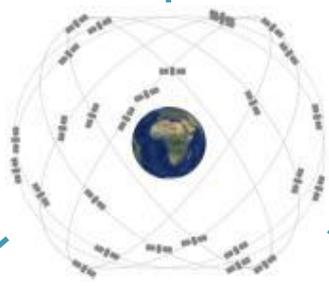


Way forward

GNSS on Airbus aircraft A core function serving CNS



Navigation to increase airport accessibility, provide better efficiency with more direct routes and less fuel consumption



Surveillance to enhance efficiency and provide safety nets: ADS-B, TAWS, BTV, ROPS...

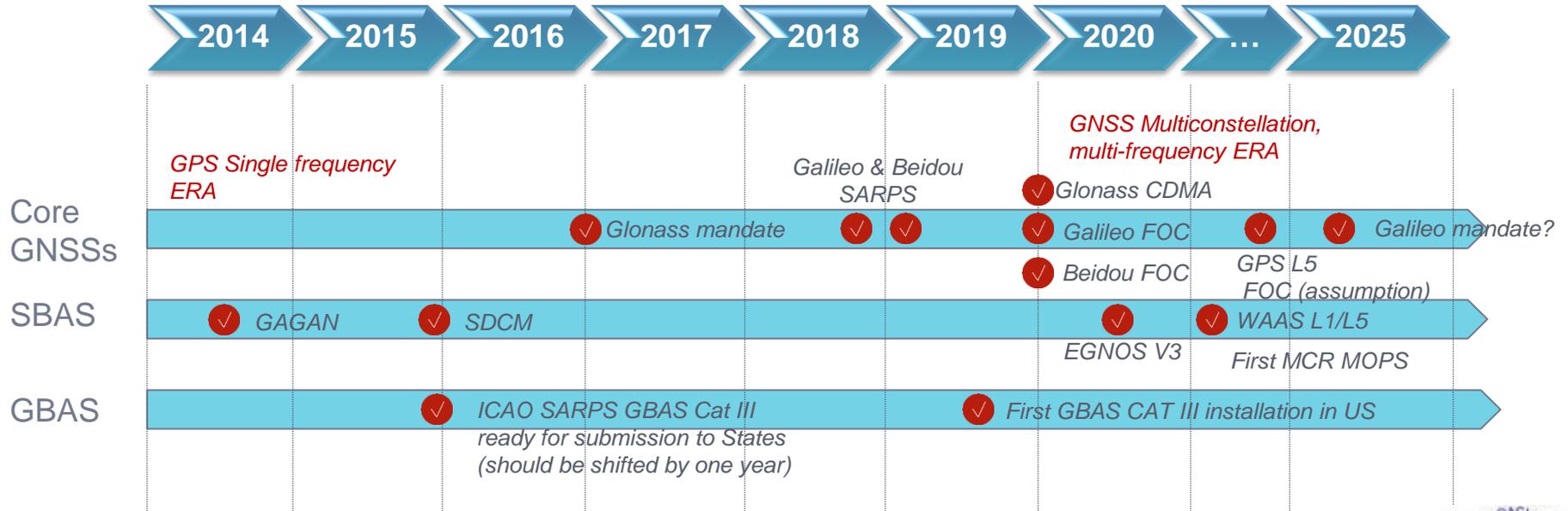


Communication to provide enhanced passenger's comfort: SATCOM, IFE



Way forward

GNSS roadmap overview



New core GNSS constellations, SBAS and GBAS under development:

- Multi-GNSS Receiver ICAO standards not mature: key missing inputs from GNSSs constellations providers to build airborne receiver standards
- New GNSSs Operational requirements not yet identified => ConOps
- Two to four GNSS core constellations in future MMRs not before 2025

➤ **R&T focus on preparing and feeding standardization, and identify Multi-GNSSs incremental operational benefits and technical requirements**



Way forward

Multi Constellation / Dual Frequency

Airbus supports standardization for DF/MC SBAS MOPS by 2021/2022

- Prototyping and flight tests of DF/MC SBAS receiver opportunity
- Identification of Multi-GNSSs incremental operational benefits
- Identification of technical requirements:
 - L1/L5 CDMA, Mandates management, receiver logics, A-RAIM opportunity, resilience
- Airbus does not forecast to certify DF/MC SBAS Receiver before 2025

Way forward

Autoland with SLS

Airbus develops a SBAS error model to support CAT I autoland

- Thesis co-funded by ENAC, ESA and Airbus with support from EGNOS and WAAS
- Study of Cat II feasibility
- Results expected mid 2017, standardization to follow supporting future certification at next opportunity

Way forward

Airbus expectations

LPV 200 with EGNOS to enhance operational benefits

LPV approaches can provide benefits:

- To airports currently not having precision approach
- To main runways as a backup of ILS
- To alternate airports in case of diversion
- **Lower minima can provide operational improvement for airlines**

Way forward

Airbus expectations

LPV 200 with EGNOS to enhance operational benefits

More LPVs to raise airlines interest

Number of airports with LPV
(with runway > 2000m):

- 300 in USA
- 60 in Europe and increasing!



Way forward

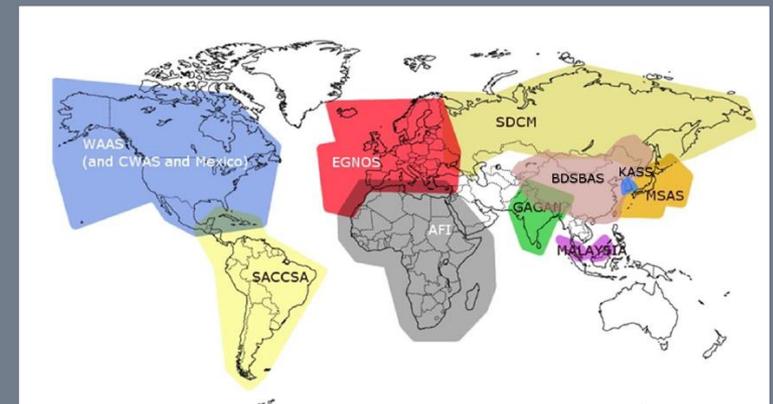
Airbus expectations

LPV 200 with EGNOS to enhance operational benefits

More LPVs to raise airlines interest

Additional SBAS constellations

Actual and potential SBAS constellations



Way forward

Airbus expectations

LPV 200 with EGNOS to enhance operational benefits

More LPVs to raise airlines interest

Additional SBAS constellations



LPV expansion will increase airlines interest



Thank you for your attention!

