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Avionics Support for GBAS and Performance Based Navigation (PBN)

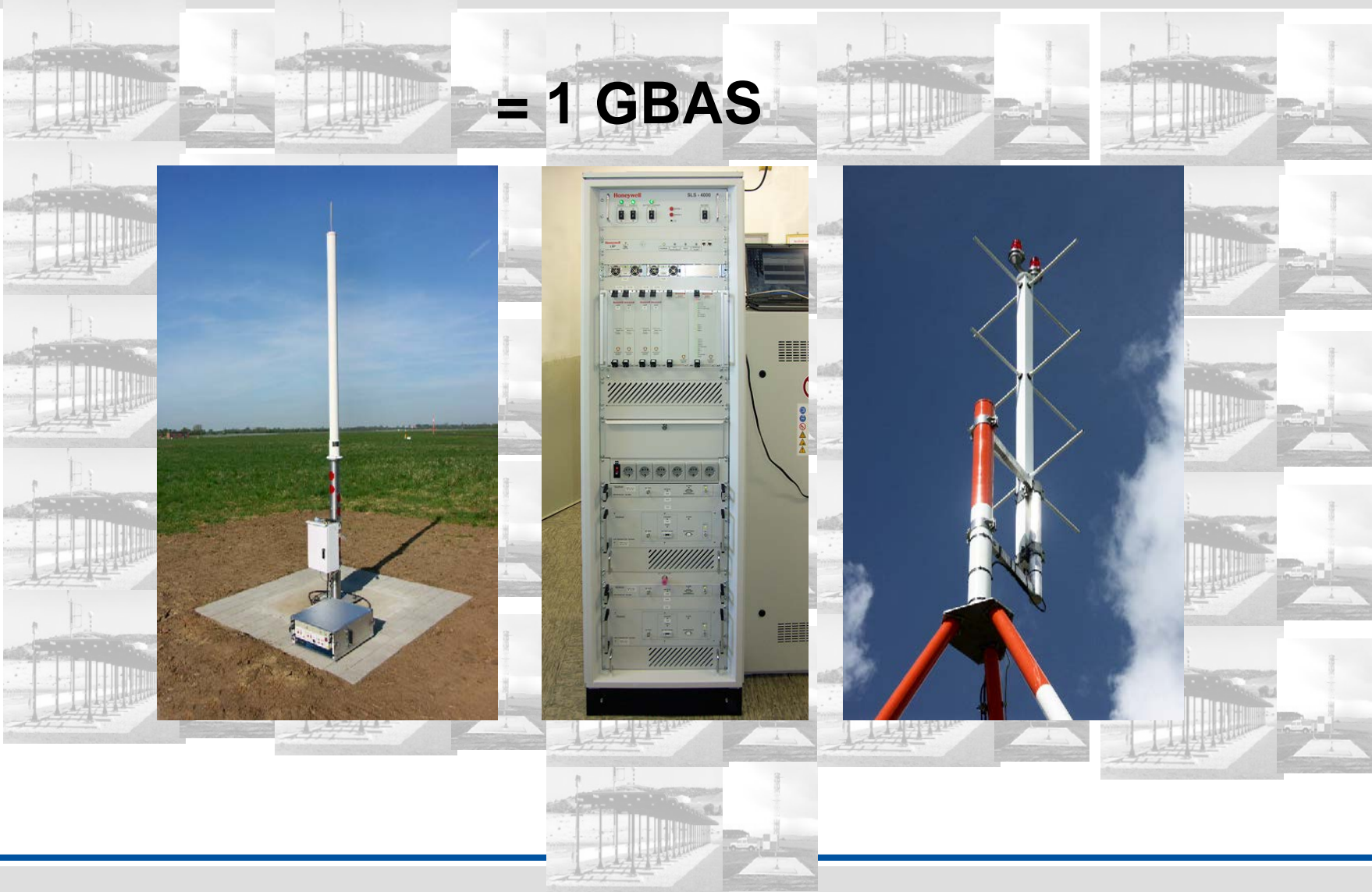
Honeywell

26 ILS Approaches = 26 Localizers and Glide Slopes



26 ILS Approaches = 26 Localizers and Glide Slope

= 1 GBAS

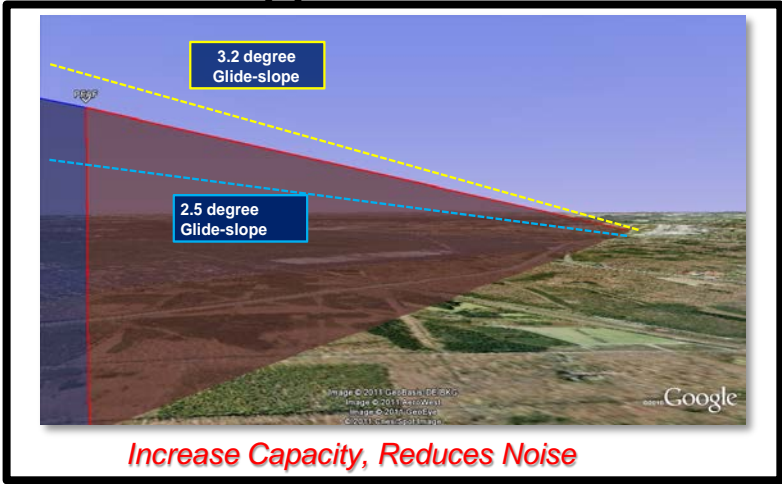


26 ILS Approaches = 26 Localizers and Glide Slope

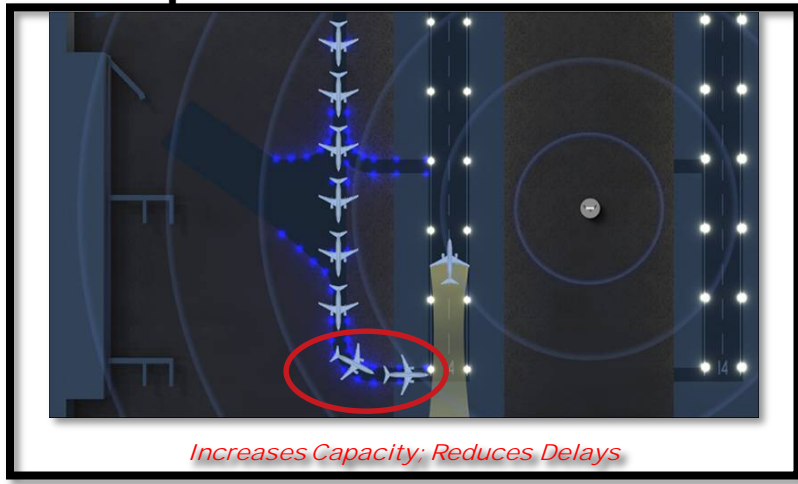


GBAS Benefits for Next Gen ATM

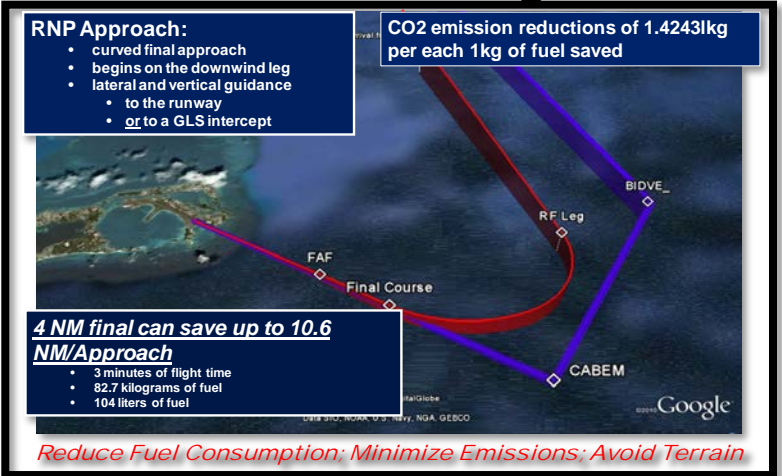
Flexible Approach Geometries



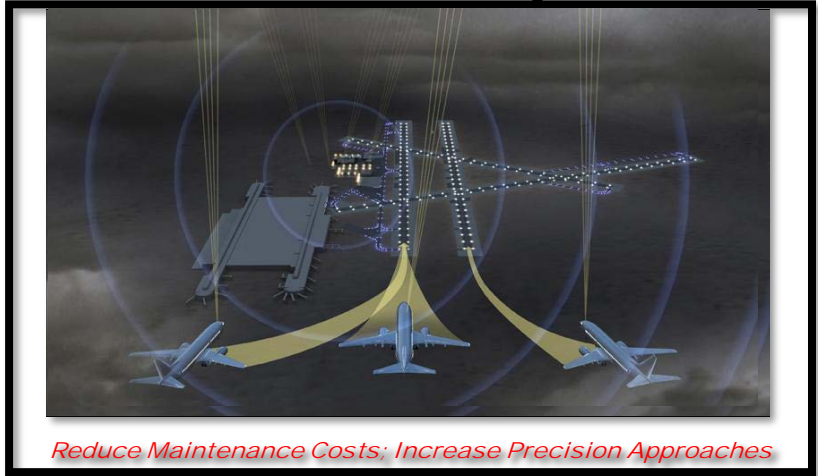
Requires No "Clear Zones"



Enables Efficient Flight Path

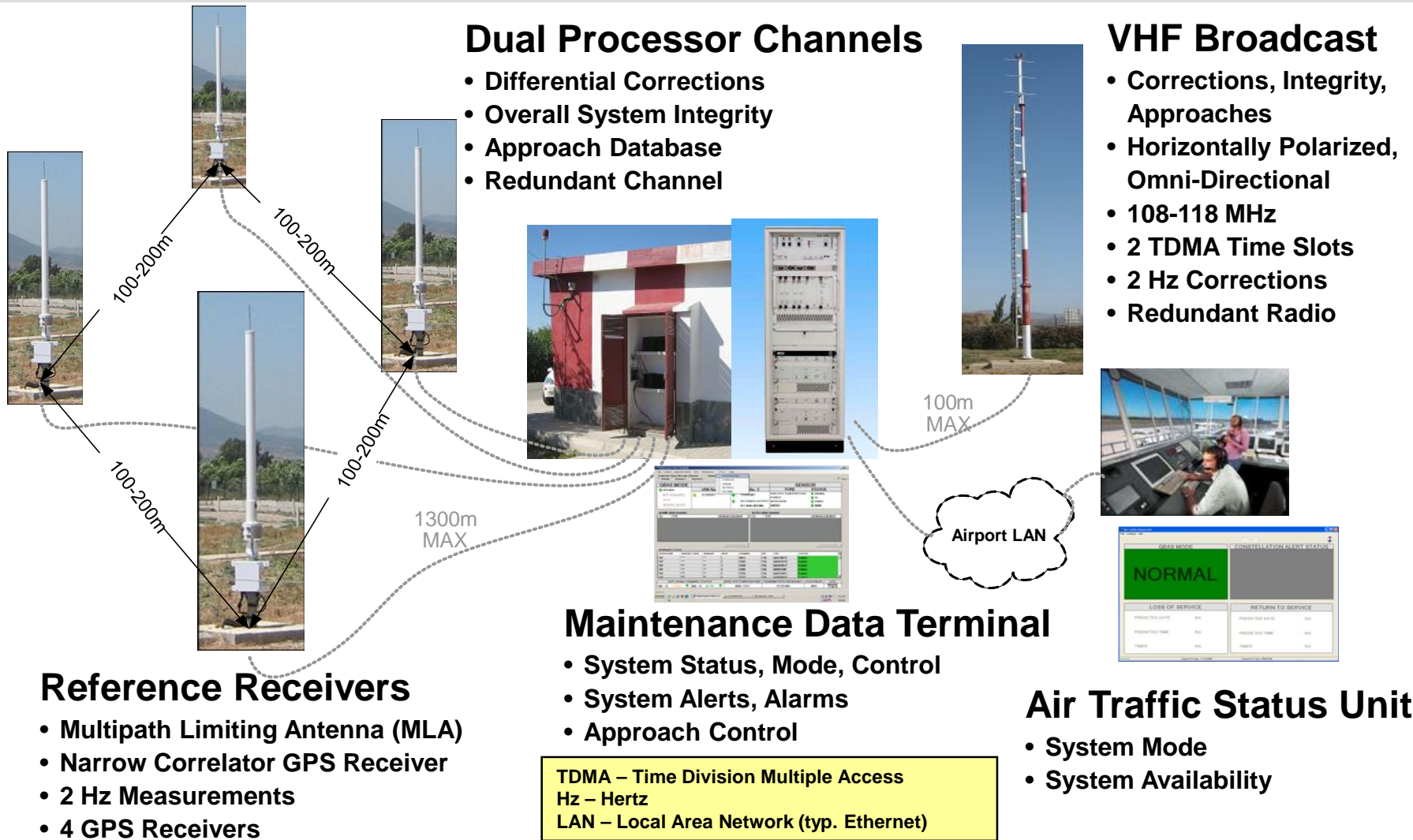


Serves All Runway Ends

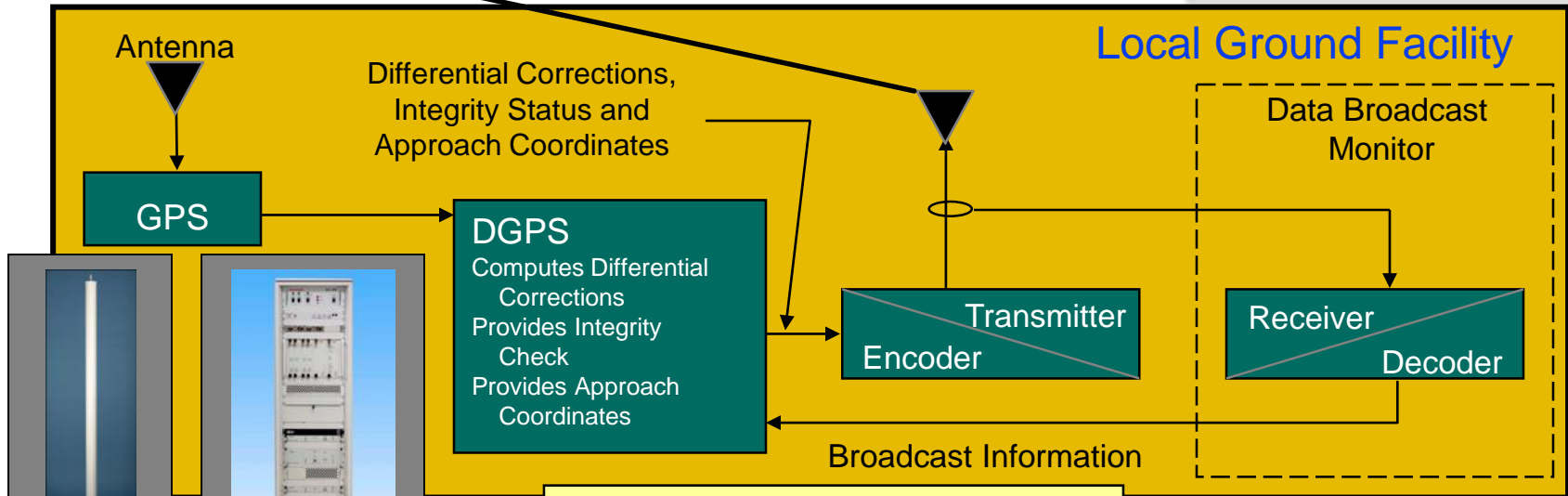
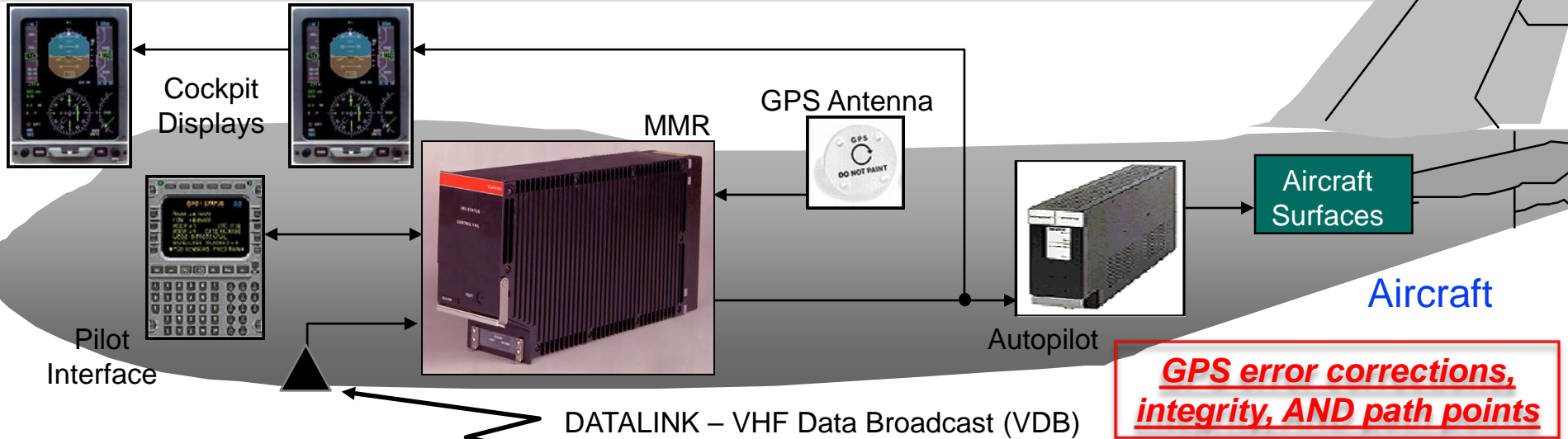


Increased Capacity; Reduced Noise; Reduced Track Miles; Reduced Operating Costs

Honeywell SmartPath® GBAS

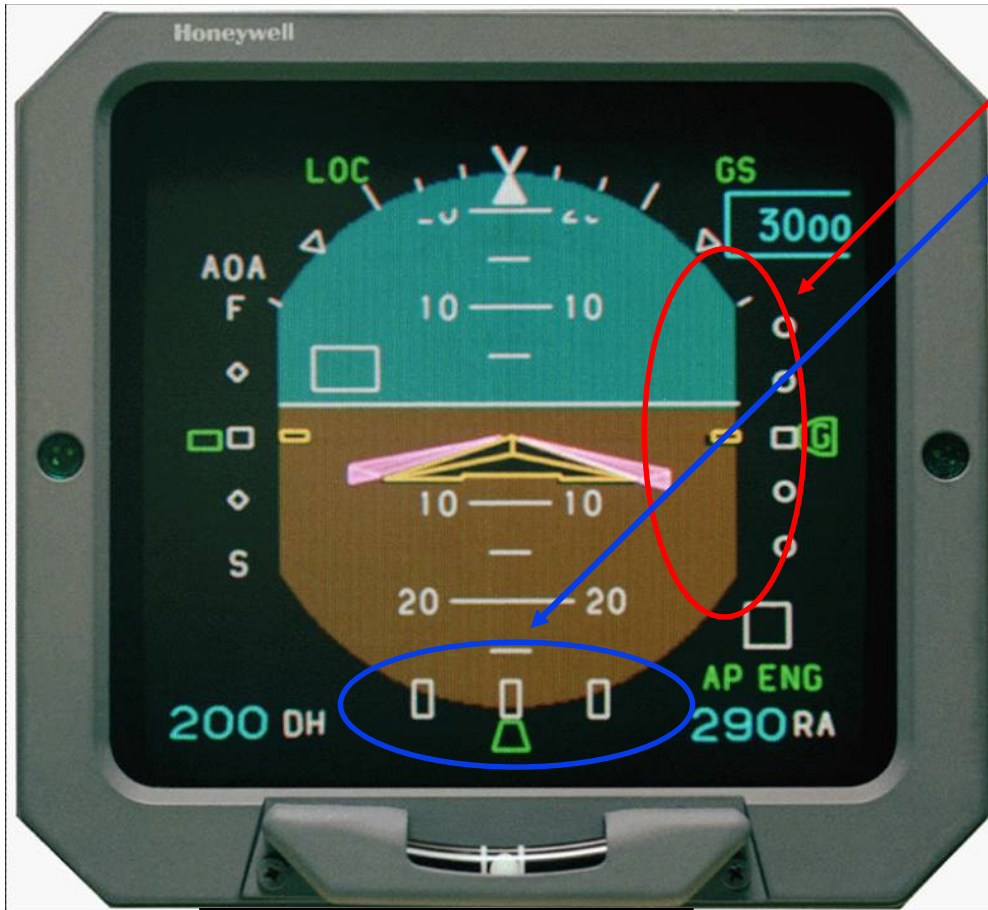


Multi-Mode Receiver Functionality



DGPS – Differential GPS
 MMR – Multi-Mode Receiver (GPS, VDB, ILS, etc)
 VDB – VHF Data Broadcast (Link to aircraft)

GLS Uses Existing Aircraft Architecture



GLS – GNSS Landing System
 ILS – Instrument Landing System

- ILS look alike
 - Glideslope
 - Localizer

737-07-XX

July XX, 2007

GLOBAL POSITIONING LANDING SYSTEM (GLS) PROCEDURES

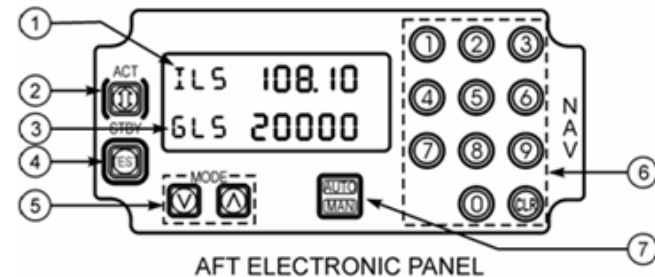
This bulletin describes aircraft systems and procedures for GLS approaches.

The initial aircraft to obtain this system will be the Continental Micronesia 737-800's. Installation will commence at the end of June, with flight procedures to begin in the fall timeframe.

The aircraft will have the following physical differences on the flight deck:

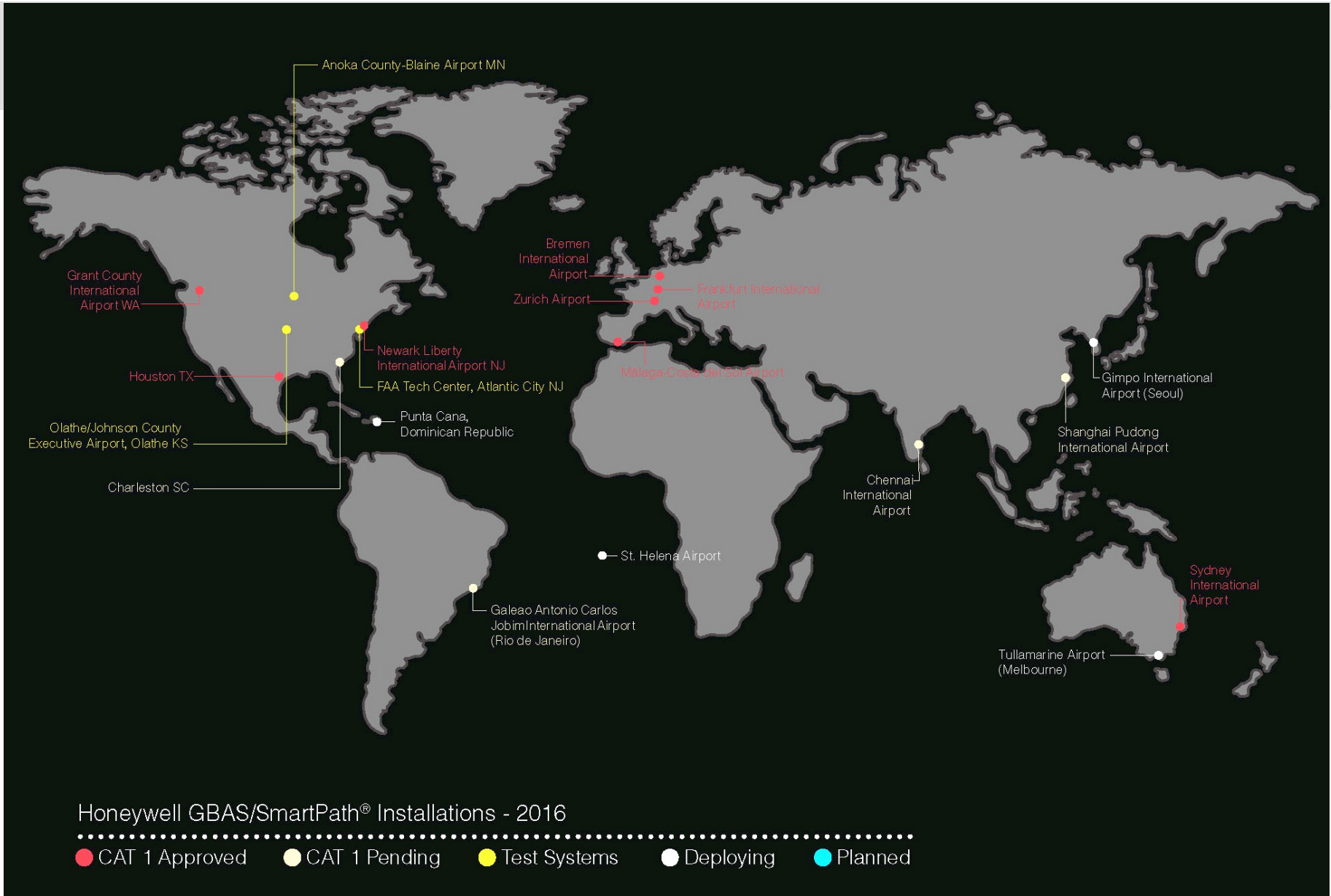
1. Multi-Mode Navigation Control Panel. This is visually identical to the panel currently installed in the 500's. The difference is the ability to select GLS frequencies.

Multi – Mode Navigation Control (If Installed)



7370-11005

- Active (ACT) Mode and Frequency Indicator
 Indicates the active mode and frequency.
- ▶ Transfer Switch



GLS option on Airbus fleet

GLS option status

A320 family

GLS CAT I with Autoland certified
Selected by 18 customers

A330

GLS CAT I with Autoland certified
Selected by 6 customers

A350

GLS CAT I with Autoland certified
Selected by 10 customers

A380

GLS CAT I with Autoland certified
Selected by 9 customers



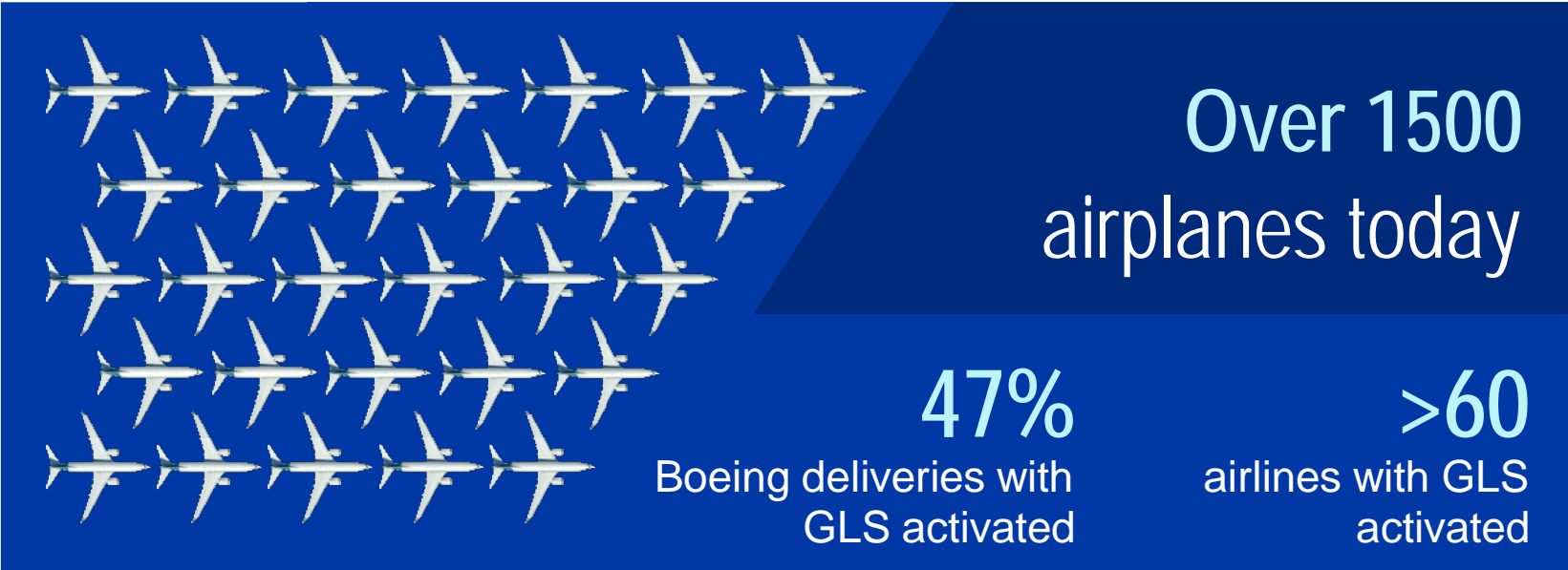
GLS CAT I certified on all linefit Airbus

Boeing GLS CAT I Availability

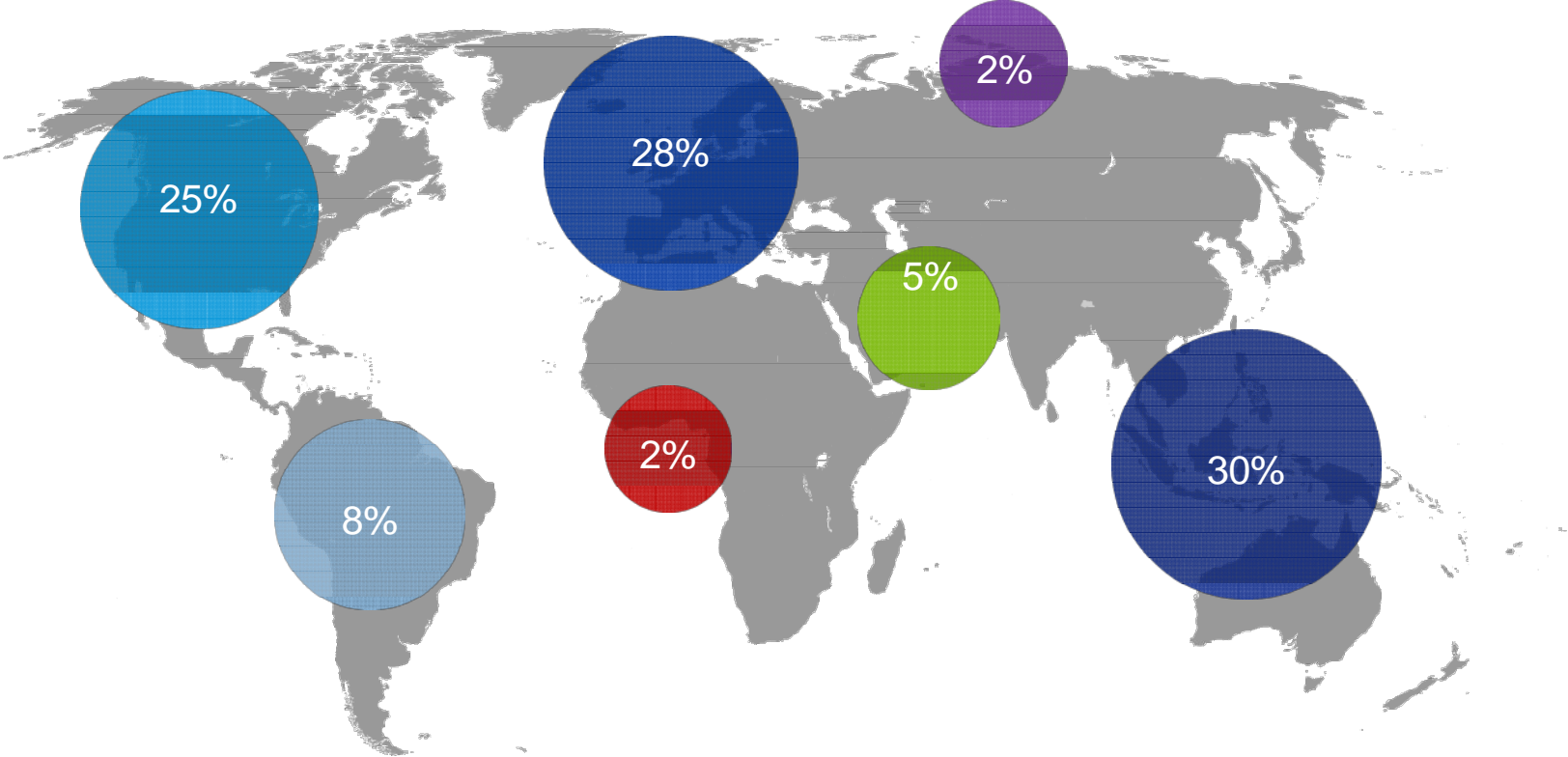


Cost effective retrofit options for out of production airplanes are being explored

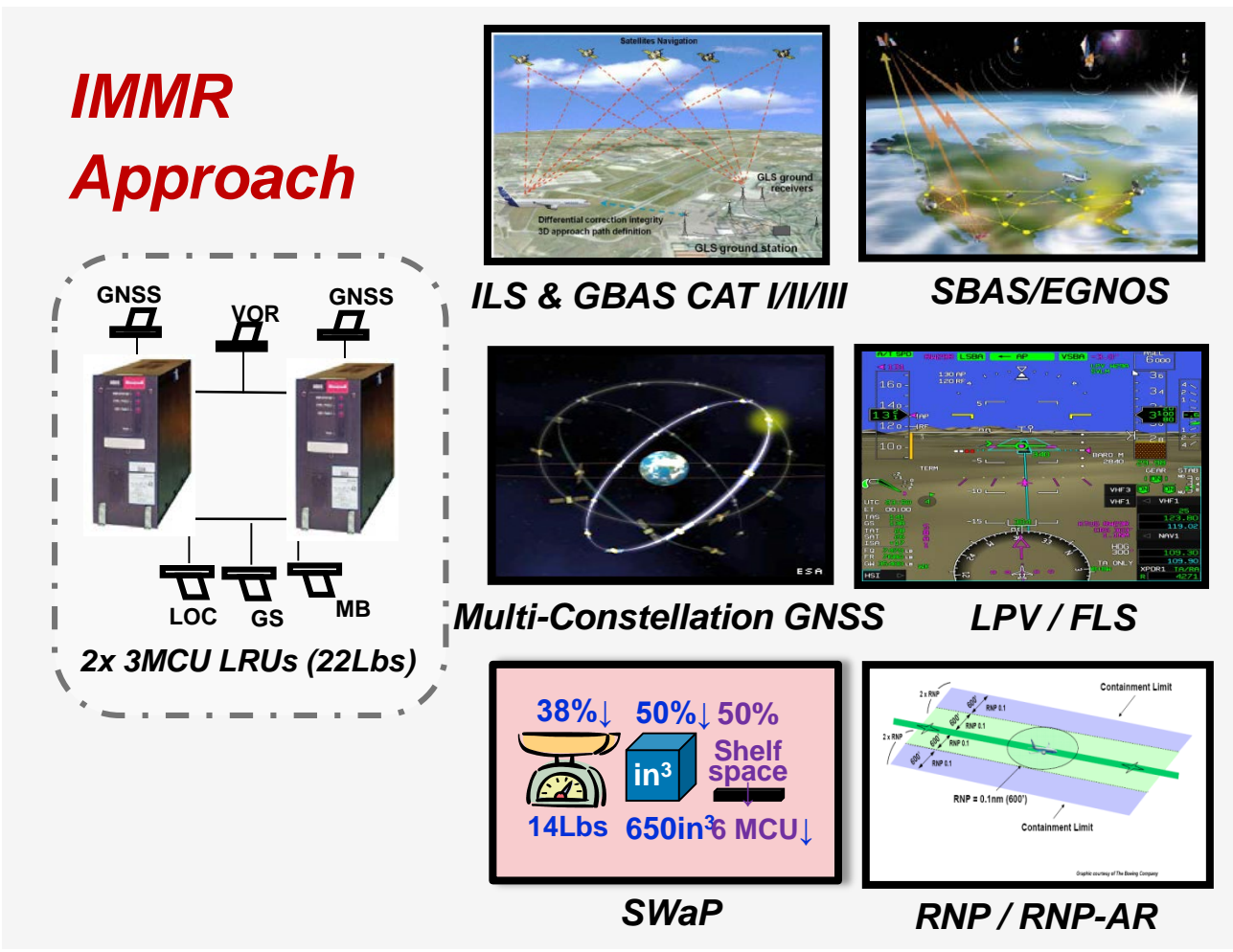
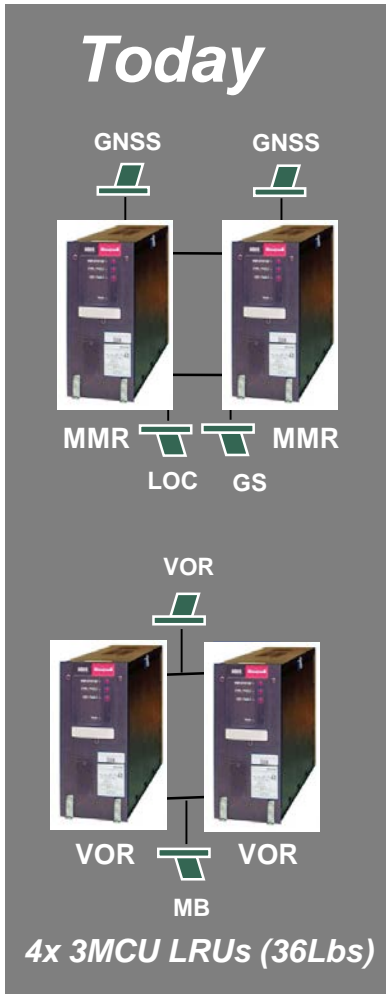
Boeing Fleet GLS Activation Growing



Distribution of Boeing GLS Equipped Customers



Integrated Multi-Mode Receiver (IMMR)



New Navigation Receiver for Future Needs

SmartPath Certification Baseline, Growth

- **SmartPath Cat I System Design and Operational Approvals**

- FAA (US): September 2009
- BAF (Germany): November 2011
- Other approvals: Spain, Australia, Switzerland
- **In revenue passenger service now**



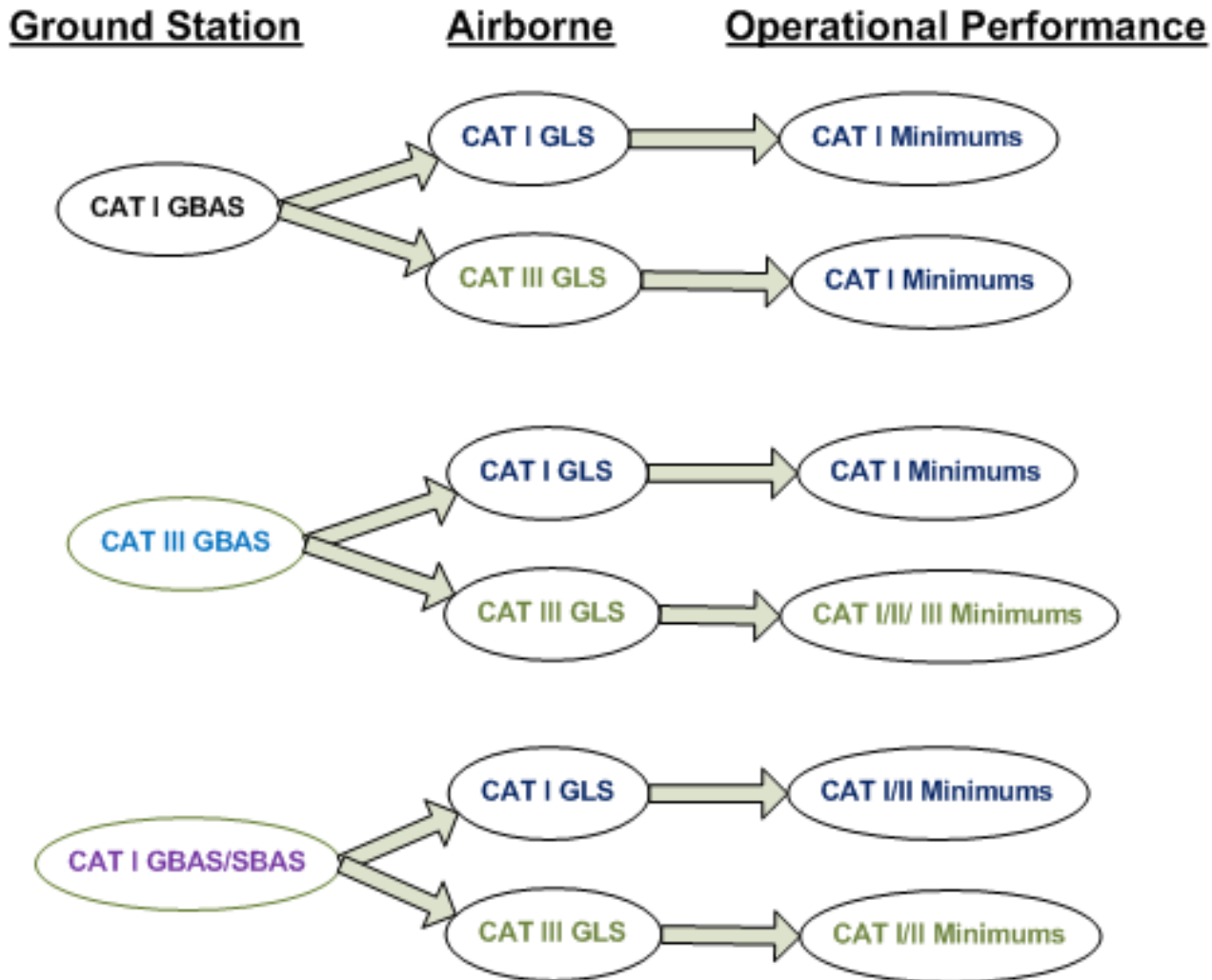
- **Block II software/SBAS**

- SBAS network provides iono status: benign iono en parameter changes
- Approved by FAA September 2015
- **Cat II on Cat I ground station**
 - **No new avionics required**
- Autoland capability
- 48 approaches/ground station
- Ionospheric mitigations

SmartPath Certification Baseline, Growth

- **Cat III development and validation underway**
 - **Cat I station is upgradeable to Cat III**
 - **Cat III GBAS works with Cat I and Cat II/III GLS avionics**
 - FAA Cat III ground station/avionics contracts to Honeywell: 2010
 - Prototype ground station/avionics based on SLS-4000 and INR
 - Flight testing and additional development: 2012-2016
 - FAA testing 2012
 - SESAR flight tests 2013-2016
 - Boeing ecoDemonstrator Cat III autolands 2014
 - Certification: 2018
 - FAA/Honeywell approval project underway
 - **Forecasted to be operationally available: 2019**

SmartPath Certification Baseline, Growth



Regulator



Airlines

Lowers operational cost, and increases schedule reliability



ANSP

Enhances safety, environmental impacts, ATM modernization



Airports

Improves capacity, lowers cost, future proof to CAT III

Value is shared across all stakeholders

***Stakeholder Involvement Throughout the Whole Project =
Successful Implementation***



Thank You!

Honeywell