



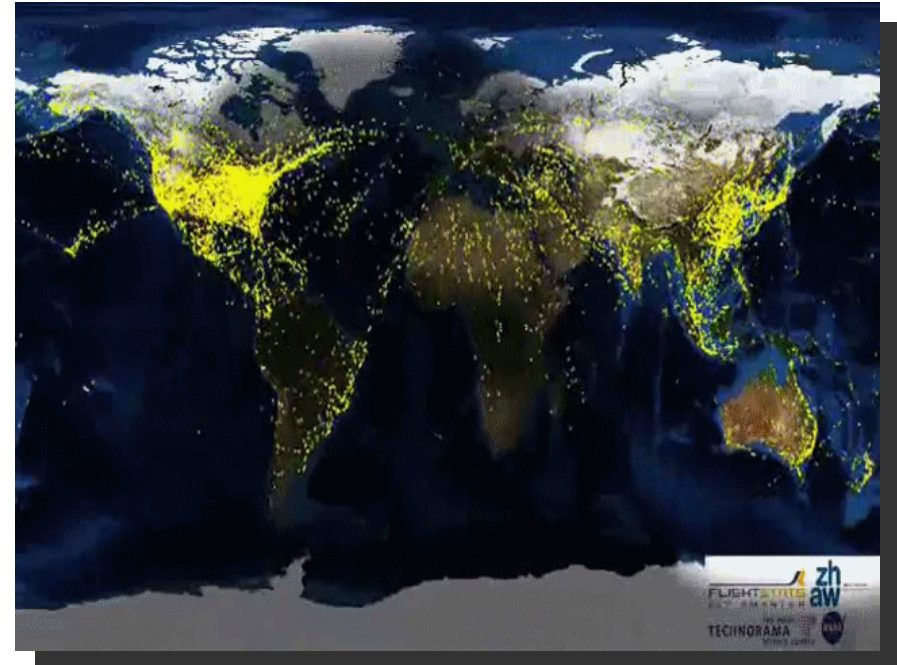
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SEA/BOB ADS-B WG/8 - SP/6

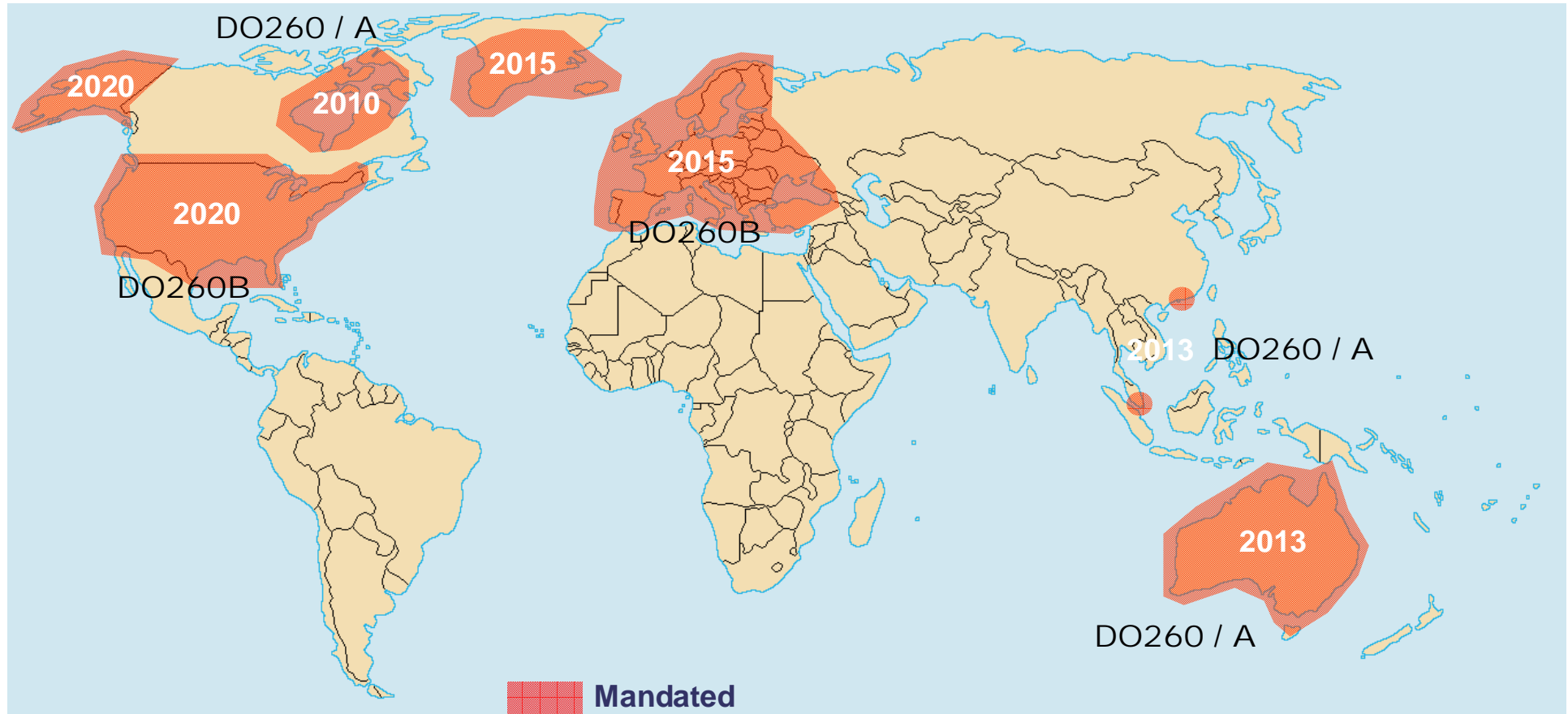
ADS-B and Avionics

8th Meeting of the SE Asia and Bay of Bengal Sub-Regional ADS-B IWG
Yangon December 5th 2012

- ◆ **Mandates, roadmaps, functions**
- ◆ **Available avionic equipment**
 - ADS-B OUT DO-260B (transponders)
 - ADS-B IN (TCAS)
- ◆ **Top level architecture**
- ◆ **Installation and lessons learnt**
- ◆ **Current and future ADS-B avionics deployment**



- Mandates today





ITP
In-Trail
Procedure

Flight Deck Interval Management (FIM)

(Merging and Spacing)



SAMM/SURF
(Surface Area
Movement
Management)



CAVS
(CDTI Assisted Visual
Separation)



- The ARC recommended FAA focus funding on accelerating development of equipment standards, certification guidance, operational approval guidance, ground automation for the applications, and any necessary policy adjustments to enable operational implementation of applications listed below, in priority order

Applications	Target Date
1. CDTI-Assisted Visual Separation (CAVS)	FY 2012
2. Flight-deck-based Interval Management–Spacing (FIM–S)	FY 2015
3. Traffic Situation Awareness with Alerts (TSAA)	FY 2013
4. Oceanic In-Trail Procedures (ITP)	FY 2013
5. CDTI-Enabled Delegated Separation (CEDS) (ending in a visual approach)	FY 2016
6. Ground-based Interval Management–Spacing (GIM–S) with Wake Mitigation	FY 2018
7. Flight-deck-based Interval Management—Defined Interval (FIM–DI)	FY 2019
8. FIM–DI for Closely Spaced Parallel Runway Operations (CSPO)	FY 2017
9. Oceanic Interval Management (IM)	FY 2015
10. Airport Traffic Situation Awareness with Indications and Alerts (SURF–IA) at top 44 airports	FY 2017

FAA-Approved Version 2 ADS-B Out Avionics as of 14-Aug-2012

Manufacturer	Model #	Aircraft	Approval Date	AML Approved
ITT Exelis / FreeFlight	FDL-978-TXG	VEHICLE	May 2012	Massport
ACSS	XS-950	B767	STC Jan 2012	Yes
ACSS	XS-950	B747	STC Jan 2012	Yes
Trig-Avionics	TT-31	Mooney M20C	STC May 2012	No
Trig-Avionics	TT-21/TT-22	N/A	N/A	No
FreeFlight	FDL-978-TX	Agusta Westland 139	STC Jun 2012	No
Honeywell	XS-852	N/A	N/A	No
ACSS	XS-950	A320	STC Jul 2012	No
ACSS	XS-950	A330	STC Aug 2012	No

Note: "N/A" indicates equipment has received TSOA, but has not received any other certification



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FAA-Approved Version 2 ADS-B In Avionics as of 14-Aug-2012

Manufacturer	Model #	Aircraft	STC Date	AML Approved
Honeywell	TPA-100B	B747-400	June 2011	No
Honeywell	TPA-100B	A330/340	Dec 2011*	Yes via Production
Honeywell	TPA-100B	A318/319/320/321	Feb 2012*	Yes via Production
ACSS	T3CAS	A330/340	Dec 2011*	Yes via Production
ACSS	T3CAS	A318/319/320/321	Feb 2012*	Yes via Production
ACSS	TCAS3000SP	B767-300	May 2012	No
ACSS	TCAS3000SP	A330	Q1 2013	US Airways
TBD	TBD	Various	TBD 2015	Various (approximately 400 aircraft in Alaska)

* Airbus ATSAW (with and without ITP) received EASA approval in May 2011 as TC amendment; all A330/340s produced since Jan 2011 are capable, all A320s produced since mid-2011 are capable

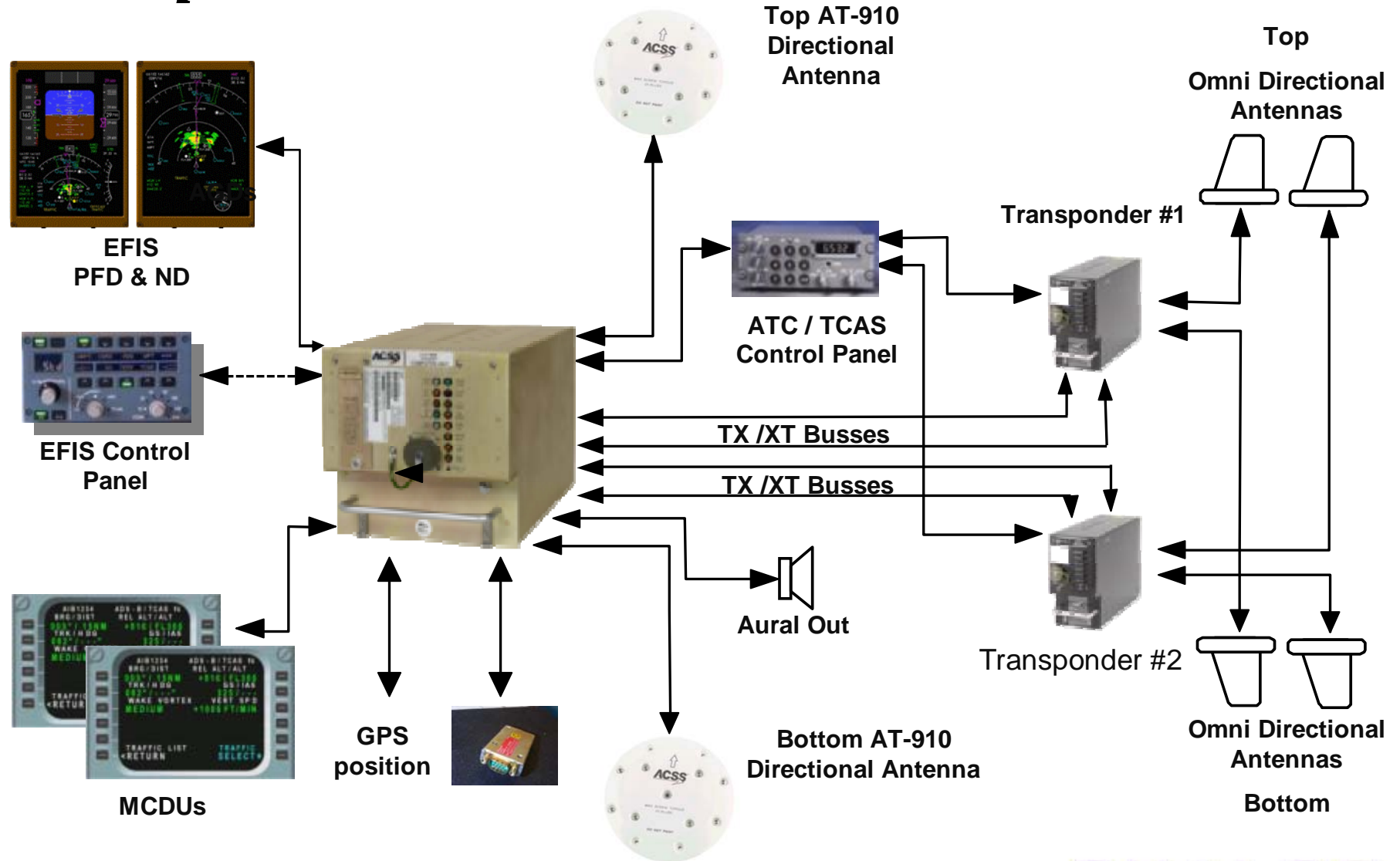


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Top level Architecture - FFOV



Installing TCAS w/ ADS-B Out:

- Replace Existing TCAS II with ACSS TCAS 3000SP, OR T3CAS
 - NO WIRING CHANGES
- Replace Existing Top and Bottom TCAS Antennas with ACSS Directional Antennas.
 - Mounting Structures are Identical
 - Coax cabling remains unchanged
- Replace Existing Transponder to DO-260B ADS-B Out
 - **WIRING IMPACT (SAME FOR ALL VENDORS):**
 - 13 (worst case) strobing pins (DO-260B) – 6- nch runs to wire cap, standard parts.
 - 2 twisted shielded pair (GPS) – may already be provisioned
 - No transponder antenna change

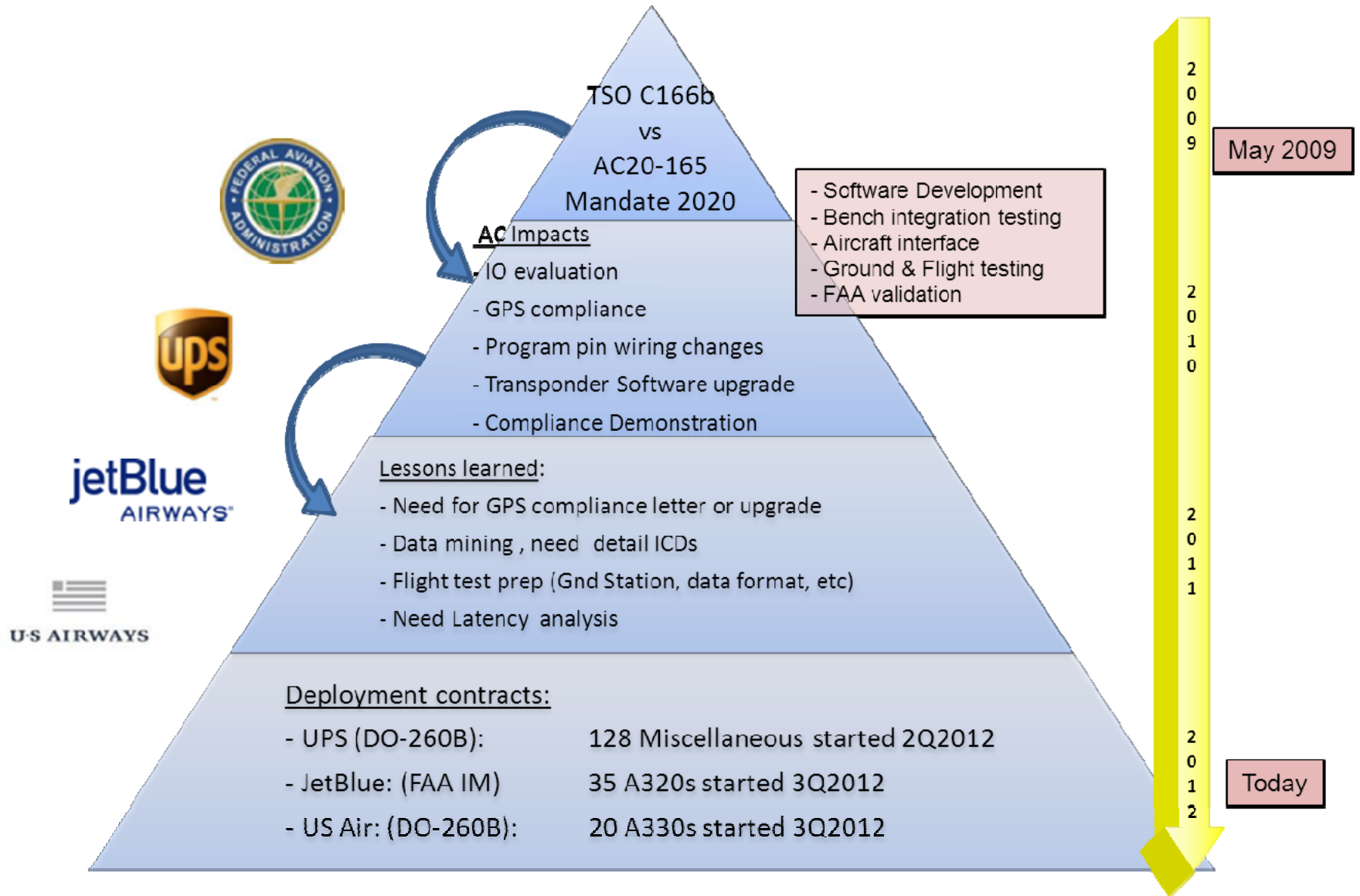
Tasks (TCAS/Mode S only)	ManHours
Gain access	2.0
Wiring modifications	20.0
Equipment Replacement	3.0
Tests	3.0
Close-up	2.0
TOTAL MANHOURS	30.0

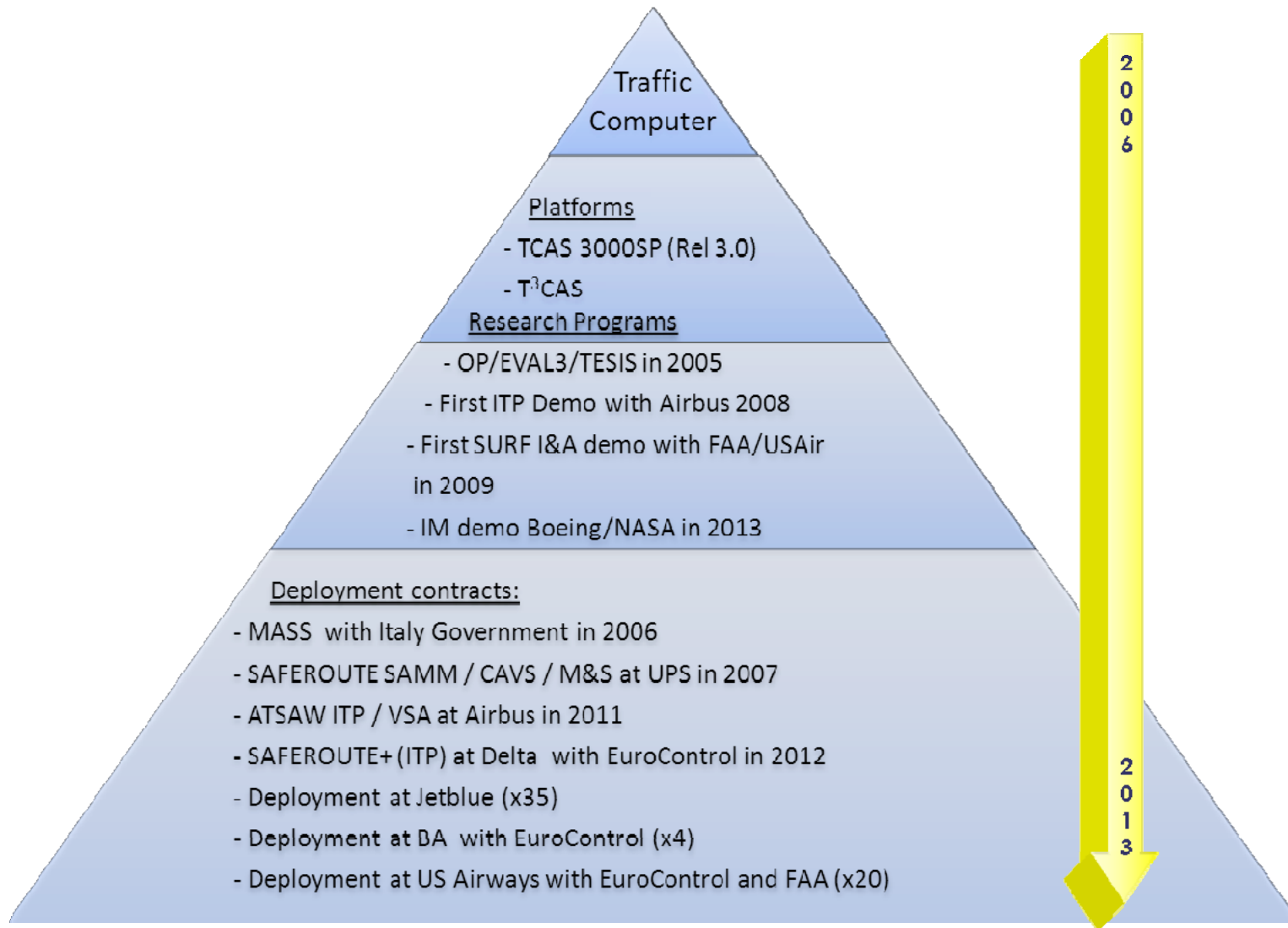
Installing TCAS (EFB excluded) w/ ADS-B In:

- Replace Existing TCAS II with ACSS TCAS 3000SP, OR T3CAS
 - Connect Sub-Systems for required ADS-B IN I/O
 - 3-4 Misc singles depending on current installation (ppin, parity, mag/true)
 - 2 twisted shielded pair (GPS)
 - ADC, MCP/FCC and FMS Interface – single twisted shielded pair each
 - EFB Interface – 4 twisted shielded pair (EFB Installation is not included in this estimate)
- APM Installation
 - 7 single wires
- AGD Installation (if required)
 - 2 twisted shielded pair, 9 single wires (Power, discretes, etc.)
- Antenna and Transponder installation same as ADS-B Out scope

Tasks (TCAS ADS-B IN /Mode S)	ManHours
Gain access (varies based on extent of rack removal required)	2.0 to 20.0
Wiring modifications	80.0
Equipment Replacement	3.0
Tests (varies based on level of disturbed systems)	4.0 to 40.0
Close-up	2.0
TOTAL MANHOURS	91.0 to 145.0

Work Breakdown from representative Engineering Order







MCDU based (Airbus)

EFB Class III



Integrated
EFB Class III

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EFB Class III



Integrated (OANS)

EFB Class III on B777



Integrated on A380



JetBlue:

- ◆ DO-260B: Certified & installation in progress (22/35)
- ◆ IM,CAVS,SAMM: 1Q 2014

Delta:

- ◆ ITP: Installation completed + ops approval obtained

US Airways:

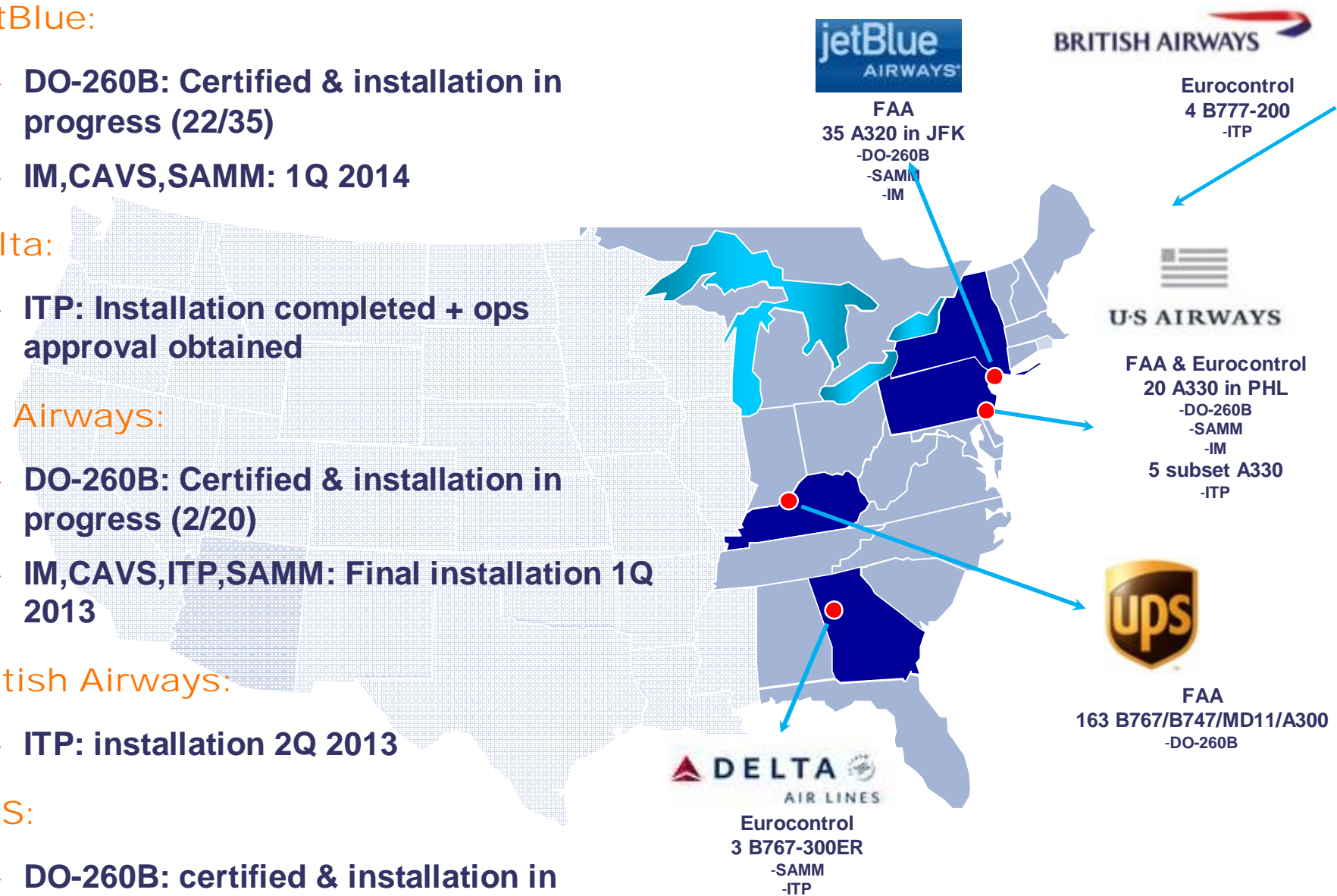
- ◆ DO-260B: Certified & installation in progress (2/20)
- ◆ IM,CAVS,ITP,SAMM: Final installation 1Q 2013

British Airways:

- ◆ ITP: installation 2Q 2013

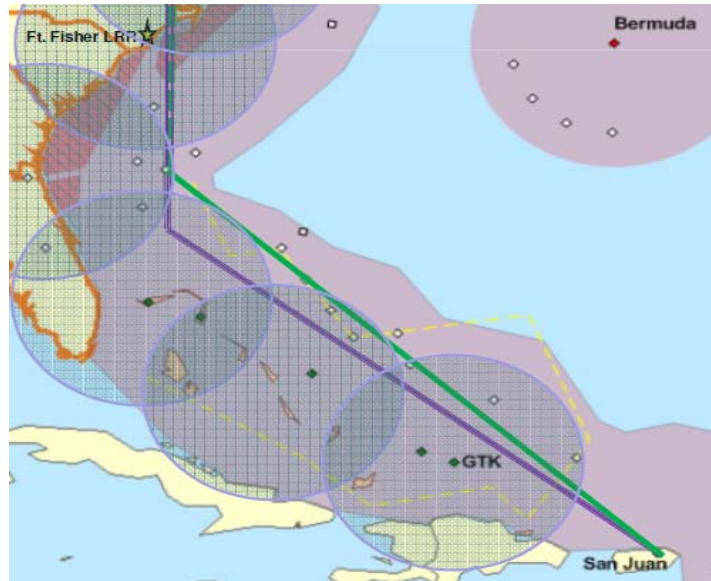
UPS:

- ◆ DO-260B: certified & installation in progress (30/163)

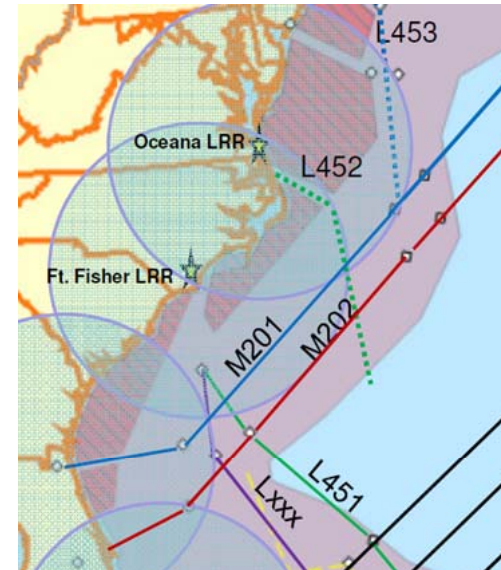


- ◆ Fuel Savings
- ◆ Lower maintenance costs
- ◆ Better dispatch capability for irregular operations

Example of preferred routing



- Create New Routes to decrease flight plan distance to/from Caribbean Destinations (Purple is existing routing)

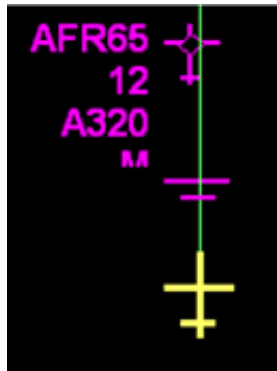


- Opening of alternate ADS-B Routes along congested Eastern Seaboard

Result: Surveillance Redundancy, Continuity of Operations, \$\$ Savings.

Best Equipped = Best Served

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- ◆ First Airborne Separation Assistance System test flight on Nov 27th 2012 with Airbus A320 test aircraft MSN1 and a commercial Air France flight.
- ◆ 2 functions successfully tested: remain behind and Merge then remain behind.
- ◆ Next two functions (Vector then merge and follow route then merge) to be tested in flight Oct/Nov 2013.



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Breakthrough Trials in ADS-B



Inspire a rethink of how airlines and ATC operate with ADS-B.

Pilot project to deploy ADS-B (IN) on a real scenario, based on Thales TCAS (Traffic Collision Avoidance System), let's conceptualise never before capabilities to spearhead your country's aviation industry.



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THANK YOU

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