FAA REPORT

AFC Winter 2014 Meeting

Presented By: Tim Pawlowitz

Date: February 11, 2014

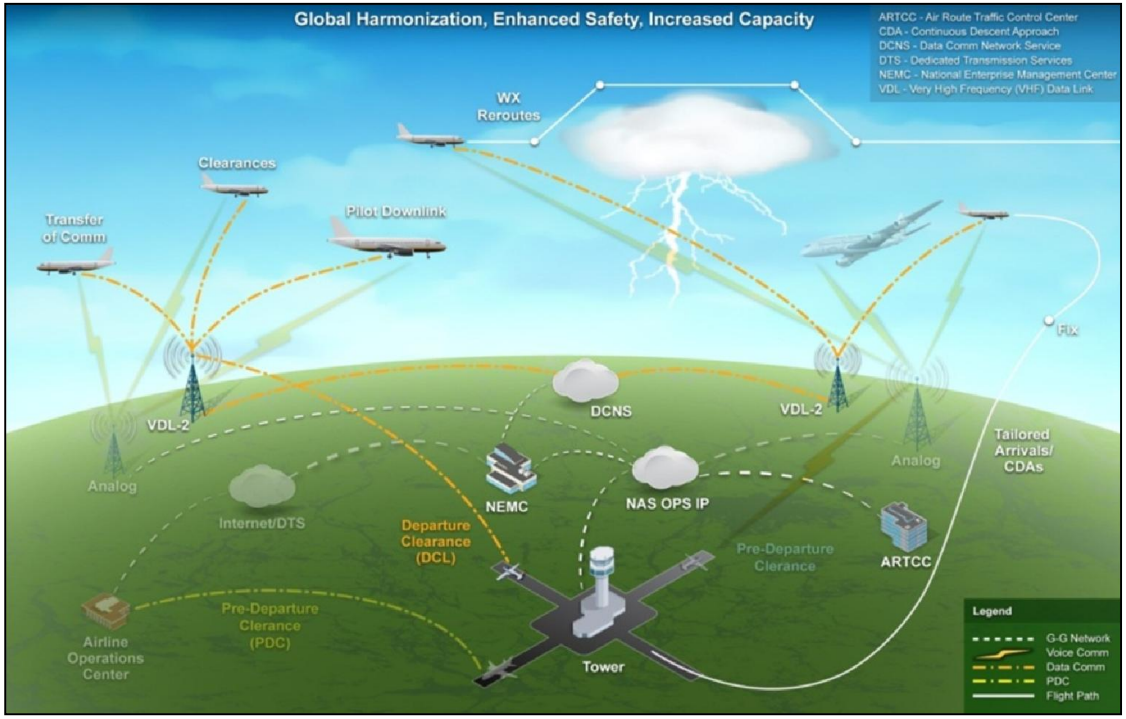
Overview

- Data Comm
- Surveillance Broadcast Service (SBS)
- PED’s
- AeroMACS

Data Comm Program

Data Comm Overview

- **Provides data communications between the cockpit and controllers to supplement voice communications**
  - Air traffic control (ATC) clearances, instructions, traffic flow management, flight crew requests and reports
  - Provides direct link between ground automation and flight deck avionics
- **Transformational program critical to the success of NextGen operations**
  - Provides infrastructure supporting other NextGen programs and operational improvements
  - Enables efficiencies not possible using current voice system



Operational Benefits

- Increased controller productivity leading to increased capacity
- Enables NextGen services (e.g., enhanced re-routes, trajectory operations)
- Reduced communication errors
- Improves controller and pilot efficiency thru automated information exchange
- Reduced impact of ground delay programs, airport reconfigurations, convective weather, congestion, and other causes

Increased Safety – Reduced Operational Errors

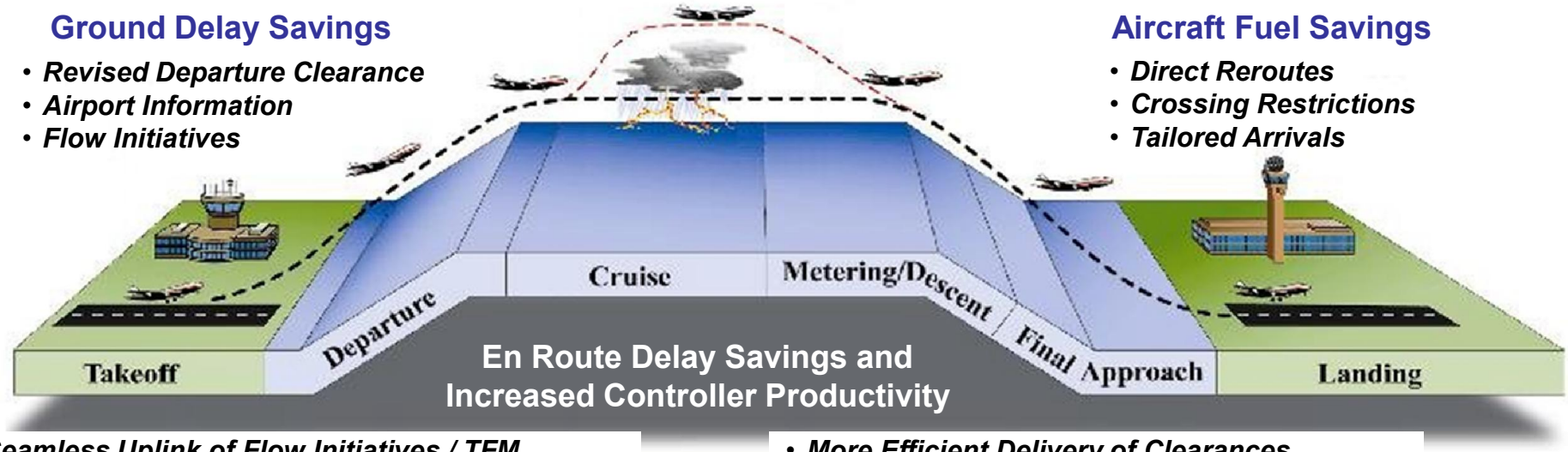
- *Clearer, enduring communications*

Ground Delay Savings

- *Revised Departure Clearance*
- *Airport Information*
- *Flow Initiatives*

Aircraft Fuel Savings

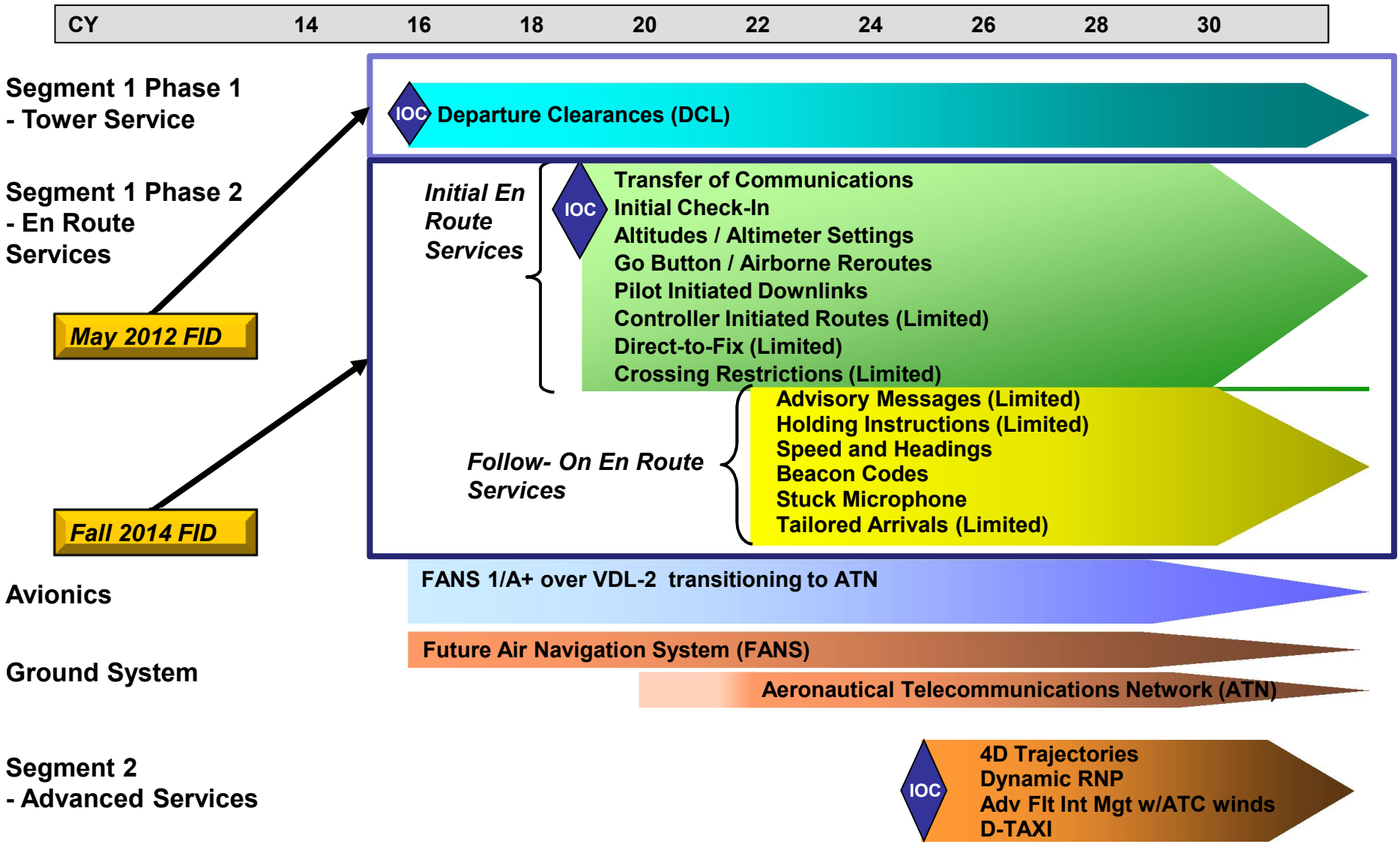
- *Direct Reroutes*
- *Crossing Restrictions*
- *Tailored Arrivals*



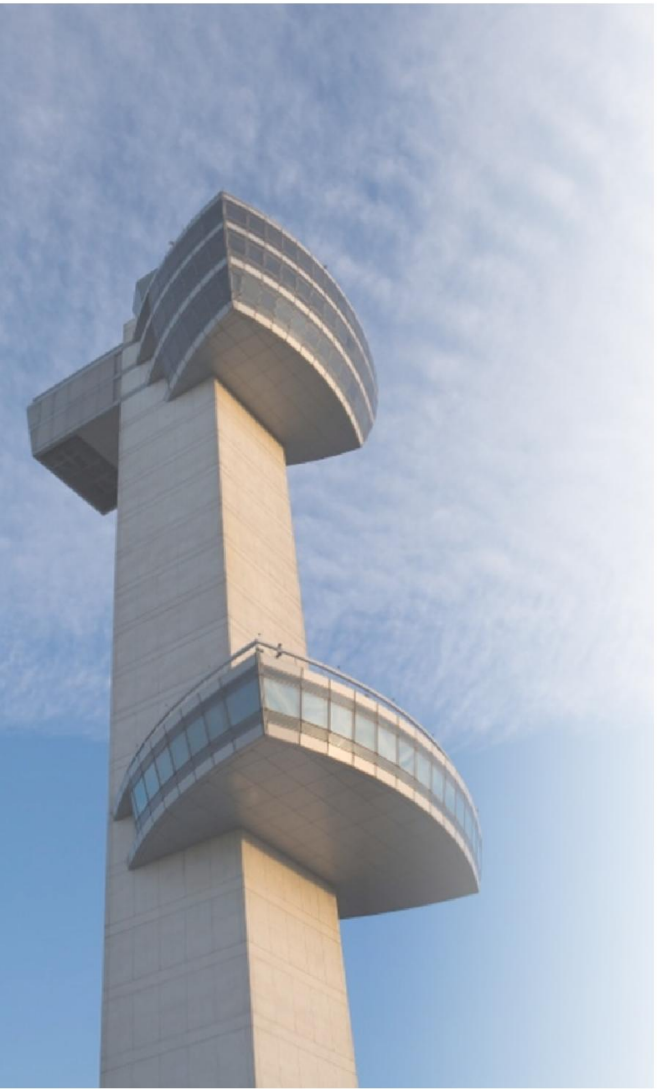
- *Seamless Uplink of Flow Initiatives / TFM Reroutes – "Go" Button*
- *Comm Transfer Workload Reduction*

- *More Efficient Delivery of Clearances*
- *Allows Uplink of More Complex Clearances*
- *En Route Notifications*

Services Strategy



Program Overview – Segment 1 Phase 1



- Tower Data Link Services (TDLS) Departure Clearance (DCL) enhancements
- ERAM contract modification supporting DCL service
- Data Comm Integrated Services (DCIS) contract to provide network services, avionics equipage strategies, and integration support
- Trials at Memphis and Newark

Waterfall Schedule

Key Sites (3 Towers)			
Site Name	Site ID	ARTCC ID	IOC
KS 1: Salt Lake City	SLC	ZLC	Q3 2015
KS 2: Houston Intcl	IAH	ZHU	Q3 2015
KS 3: Houston Hbby	HOU	ZHU	Q3 2015
NAP – NAP Compl	NA	ZLC/ZTL	Q4 2015
IOA Compl			Q4 2015
In-Service Decision			Q4 2015

Group A (19 Towers)			
Site Name	Site ID	ARTCC ID	IOC
New Orleans	MSY	ZHU	Q1 2016
Austin	AUS	ZHU	Q1 2016
San Antonio	SAT	ZHU	Q1 2016
Los Angeles	LAX	ZLA	Q1 2016
Las Vegas	LAS	ZLA	Q1 2016
San Diego	SAN	ZLA	Q2 2016
John Wayne	SNA	ZLA	Q2 2016
Bob Hope	BUR	ZLA	Q2 2016
Ontario	ONT	ZLA	Q2 2016
San Francisco	SFO	ZOA	Q2 2016
Oakland	OAK	ZOA	Q2 2016
San Jose	SJC	ZOA	Q3 2016
Sacramento	SMF	ZOA	Q3 2016
Phoenix	PHX	ZAB	Q3 2016
Albuquerque	ABQ	ZAB	Q3 2016
Seattle	SEA	ZSE	Q3 2016
Dallas Love	DAL	ZFW	Q4 2016
Dallas FTW	DFW	ZFW	Q4 2016

Group B (17 Towers)			
Site Name	Site ID	ARTCC ID	IOC
Louisville	SDF	ZID	Q1 2016
Indianapolis	IND	ZID	Q1 2016
Cincinnati	CVG	ZID	Q1 2016
Memphis	MEM	ZME	Q2 2016
Nashville	BNA	ZME	Q2 2016
Denver	DEN	ZDV	Q2 2016
Atlanta	ATL	ZTL	Q2 2016
Charlotte	CLT	ZTL	Q2 2016
Jacksonville	JAX	ZJX	Q2 2016
Orlando	MCO	ZJX	Q3 2016
Miami	MIA	ZMA	Q3 2016
Fort Lauderdale	FLL	ZMA	Q3 2016
Tampa	TPA	ZMA	Q3 2016
Palm Beach	PBI	ZMA	Q3 2016
St Louis	STL	ZKC	Q4 2016
Kansas City	MCI	ZKC	Q4 2016
Minn-St Paul	MSP	ZMP	Q4 2016

Group C (18 Towers)			
Site Name	Site ID	ARTCC ID	IOC
Boston	BOS	ZBW	Q1 2016
Providence	PVD	ZBW	Q1 2016
Bradley	BDL	ZBW	Q1 2016
Newark	EWR	ZNY	Q2 2016
J F Kennedy	JFK	ZNY	Q2 2016
La Guardia	LGA	ZNY	Q2 2016
Philadelphia	PHL	ZNY	Q2 2016
Teterboro	TEB	ZNY	Q2 2016
Westchester	HPN	ZNY	Q2 2016
Detroit	DTW	ZOB	Q3 2016
Cleveland	CLE	ZOB	Q3 2016
Pittsburgh	PIT	ZOB	Q3 2016
Balt/Wash	BWI	ZDC	Q3 2016
Dulles	IAD	ZDC	Q3 2016
Reagan	DCA	ZDC	Q3 2016
Raleigh/Durham	RDU	ZDC	Q4 2016
Chicago Midway	MDW	ZAU	Q4 2016
Chicago O'Hare	ORD	ZAU	Q4 2016

Program Overview – Segment 1 Phase 2

- **ERAM software development for En Route Computer-Human Interface upgrades, lower level requirements completion and software development for design of En Route Controller Pilot Data Link Communications (CPDLC) applications**
- **Software enhancements to the protocol gateway to support the En Route core services of initial check-in and transfer of communications**
- **Integration and testing of core En Route services**
- **Upgrade air/ground network for expanded En Route services**
- **TDLS software enhancements to expand services in Tower**

Planned FID Q4 CY 2014

Data Comm Program Status

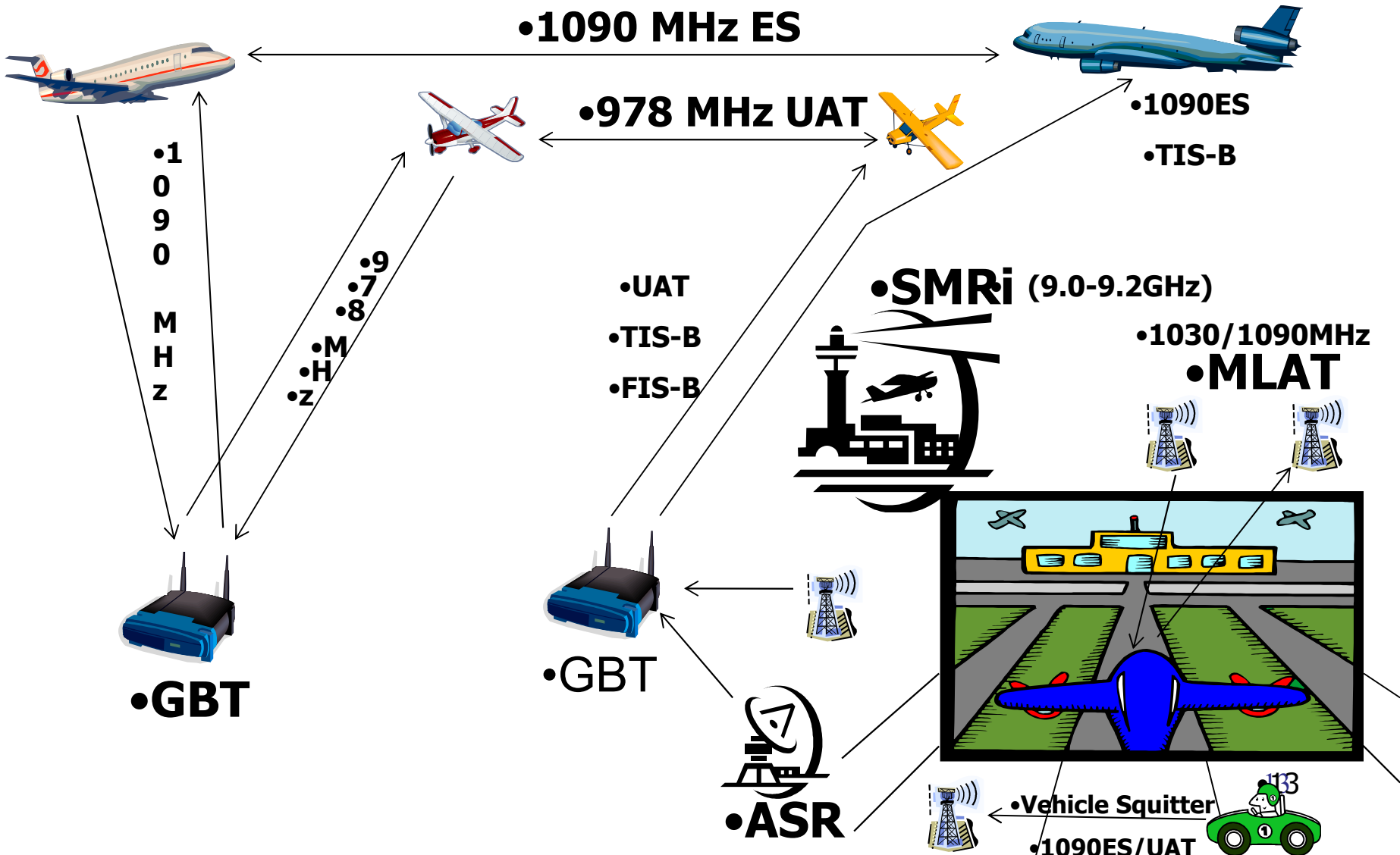
- Data Comm Network Service
  - Harris has been awarded the contract for the DCNS
  - Provides the ground network and data radios necessary to exchange data comm messages with equipped aircraft.
  - Uses the existing ARINC and SITA ACARS networks augmented as necessary
  - Site surveys will be performed to ensure adequate coverage at DCL airports
  - Initially will be drive tests but later based on a model that has been validated by the drive tests
  - Harris will manage the SITA network within CONUS while ARINC will continue to manage their own network
- Site surveys completed at the 3 key sites (SLC, IAH, HOU)
- Surveys have been performed at the test environment location in Atlantic City
- Trials at Newark and Memphis are in progress

Spectrum Requirements

- **For Tower Services (DCL) in the S1P1 timeframe (2015-2024), there are no additional spectrum requirements.**
  - There may be additional spectrum requirements as tower/surface services are added in Segment 2 (e.g. Digital Taxi Instructions).
- **For En Route services in the S1P2 timeframe (2017-2024), it is anticipated that additional spectrum will be required.**
  - Modeling by MITRE has indicated 6-9 additional frequencies.
    - Exact quantity is unknown at this time since there are many unknowns, foremost is the expected amount of equipped aircraft.
- **Harris is in the process of defining the use of simulation to determine spectrum requirements. Expect to have results early this year.**
- **Harris/SITA and ARINC during informal conversation have advised that they don't intend on needing to request additional frequencies from the FAA**
- **The FAA recommends that a priority/preemption scheme be built into the network to prioritize the delivery of messages.**

Surveillance Broadcast Services

Surveillance Broadcast System



Surveillance Broadcast System

- **Aircraft flying in most controlled airspace will be required to be equipped with ADS-B out by 2020.**
- **Traffic Information Service – Broadcast (TIS-B)**
  - Uses data from ground based radars and ADS-B position reports from equipped aircraft
  - Transmits data through ADS-B ground stations to the cockpit of equipped aircraft
  - Improves pilot situational awareness
  - Displays traffic within 15NM and +/- 3,500 feet altitude of the aircraft
- **Flight Information Service – Broadcast (FIS-B)**
  - Available on UAT only
  - Provides 12 products, to include: NOTAMS; significant meteorological info; pilot reports; real time weather; and the status of special use airspace

Service Delivery Points for ATC Separation Services									
	FY10 – FY12	FY13	FY14	FY15	FY16	FY17	FY18	FY19	Operational
En Route	6	4	1 of 14	0	0	0	0	0	11 of 24
Terminal	19	27	5 of 16	5	13	39	28	12	51 of 159
Surface (Advisory)	16	10	3 of 9	2	3	4	0	0	29 of 44
Oceanic	0	0	0	1	1	1	0	0	0 of 3

Rule-Driven ADS-B Out Avionics Equipage 3,244

ATC Spacing Services

Ground-Based Interval Mgmt - Spacing (GIM-S) (En Route only)

2011 - 2014 GIM-S Develop → 2013 - 2014 GIM-S Deploy → 2014 GIM-S Test → 2014 GIM-S IOC → 2020 Avionics Equipage

Flight Deck Based Interval Mgmt– Spacing (FIM-S)

In Trail Procedures (ITP)

Traffic Situation Awareness with Alerts (TSAA)

Pilot Applications

ADS-B In Avionics Equipage 3,102

TIS-B
FIS-B
ADS-R

Pilot Advisory Services					
	FY08 - 12	FY13	FY14	FY15 – FY17	Total
Baseline Radio Station Installations (2008 – 2014)	502	73	30 of 67	0	605 of 642
Service Expansion Radio Station Installations (ASSC and Gulf of Mexico) (2014 – 2017)	--	--	0 of 2	0 of 19	0 of 21
Operational Radio Stations	556				

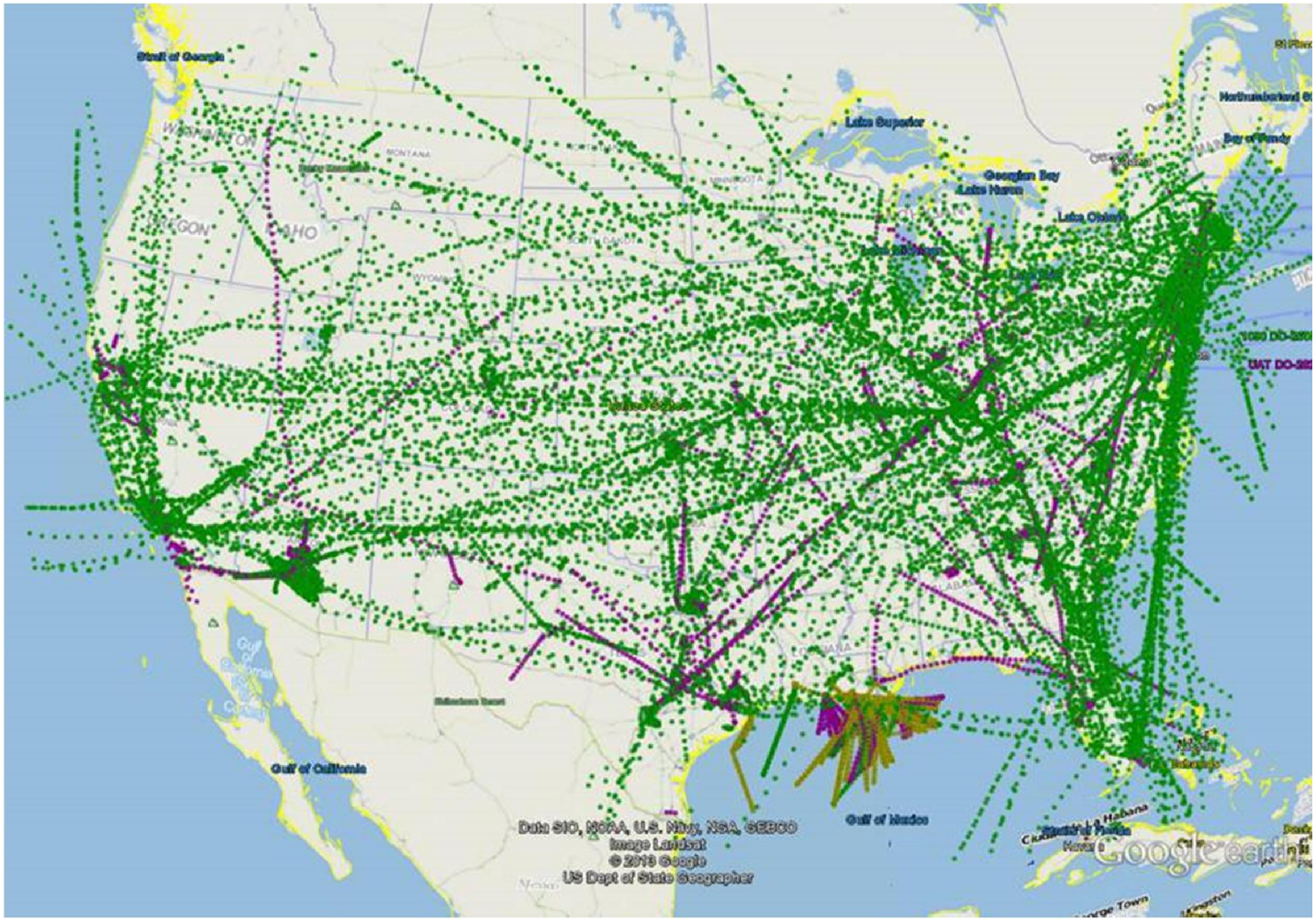
In Process

Complete

As of 2-4-2014

ADS-B 24 Hour Snap Shot (January 30, 2014)

Coverage extends out 300nmi over Atlantic and 250nmi over Pacific.



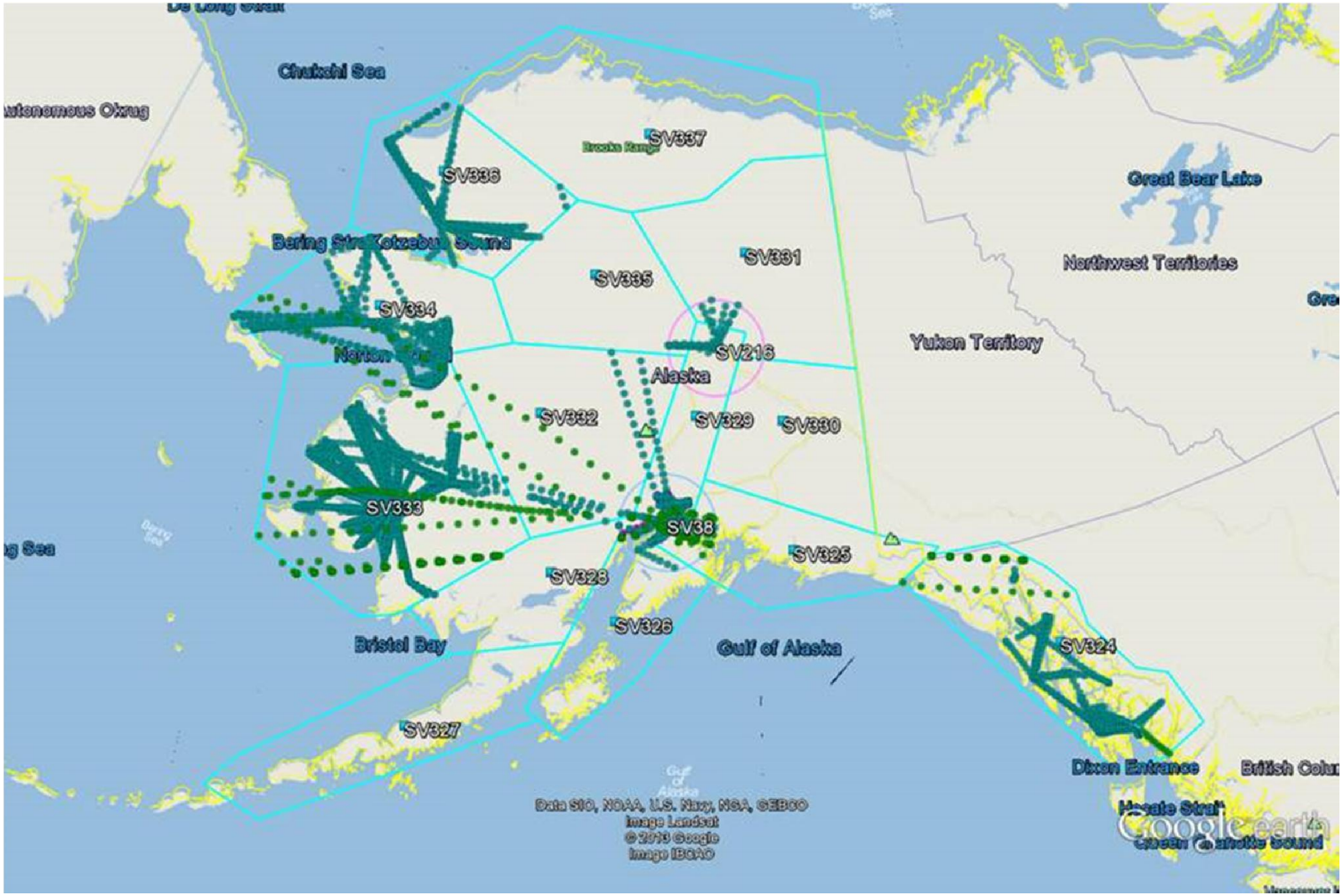
624 total aircraft

594 version 2 (460 260B, 118 UAT, 16 Dual Out)

30 version 1 1090ES helicopters from approved list

Alaska ADS-B: 24 Hour Snapshot (January 30, 2014)

http://youtu.be/seY8JQcHDlU



111 total aircraft

22 version 2 (18 260B, 4 UAT, 0 Dual Out)

89 version 1 UATs

Portable Electronic Devices (PED's)

PED's Aviation Rulemaking Committee (ARC)

- **Aug 2012, FAA published a Notice of Policy, Request for Comments on the rules governing the passenger use of PED's on aircraft.**
- **Jan 2013, PED'S ARC established to review/address comments.**
  - ARC was an FAA/Industry collaboration that made recommendations to the FAA
- **Oct 2013, ARC provided a 222 page report and concluded it's work.**

ARC Report

- **Report provides 29 recommendations for PEDS, does not cover voice communications.**
- **The gist of the report provides recommendations that:**
  - New aircraft be PEDS certified
  - A path be provided for existing aircraft to certify that they meet RTCA DO-307
  - Recommends that AC 91-21.1B be updated to provide a process by which operators can use PED's
- **I do not know at this time what formal actions the FAA is taking in response to the ARC's recommendations.**

FCC Notice of Proposed Rulemaking (NPRM)

FCC NPRM, WT Docket No. 13-301, Released December 13, 2013

To quote what the NPRM is seeking comment on:

"Specifically, we propose to:

(1) Remove existing, narrow restrictions on airborne use of mobile devices in the 800 MHz cellular and Specialized Mobile Radio (SMR) bands, replacing them with a more comprehensive framework encompassing access to mobile communications services in all mobile wireless bands;

(2) Harmonize regulations governing the operation of mobile devices on airborne aircraft across all commercial mobile spectrum bands;

(3) Add the authority to provide mobile communications services on airborne aircraft across all commercial mobile spectrum bands to existing Part 87 aircraft station licenses;

FCC NPRM

Continuation of quote from what the NPRM proposes:

(4) Allow mobile communications services on airborne aircraft only if managed by an Airborne Access System certified by the FAA, which would control the emissions of onboard PEDs by requiring them to remain at or near their lowest transmitting power level;

(5) Limit authorization for mobile communications services to aircraft travelling at altitudes of more than 3,048 meters (approximately 10,000 feet) above the ground;

(6) We also seek comment on alternative authorization frameworks, the potential impact of these proposals on public safety and national security, and issues related to the use of voice services onboard aircraft.”

FCC NPRM

Additional language in the FCC NPRM:

"Our proposal is focused on data services, but it is technology-neutral; we do not propose to limit the use of mobile communications services on airborne aircraft to non-voice applications. Deployment of such services, including etiquette and other rules, would be at the discretion of individual airlines, within the context of any rules or guidelines established by the FAA or DoT."

- While the ARC report was limited to non-voice applications, the FCC NPRM was not.
- As far as I know, the FAA does not intend to respond with comments to the NPRM.

Spectrum Support of PED's Testing

- **Trying to get a better understanding of the spectrum requirements for testing/certifying aircraft to allow the use PED's**
  - Starting to get frequency coordination requests from airlines to test aircraft on airports
    - They're asking to operate across entire bands of aeronautical spectrum
    - In some cases, analysis shows potential for RFI
  - Would like to limit testing in the aeronautical bands to spot frequencies, or to be able to exclude certain frequencies from testing
    - The amount of flexibility on the amount of spectrum support that the FAA can provide is location dependent

Spectrum Support of PED's Testing

- **FCC is suppose to be issuing a Public Notice sometime soon (if they haven't already) providing guidance on obtaining experimental authorizations for testing PED compatibility with aircraft.**
- **The FAA Spectrum Office is awaiting more information before adopting a formal position.**
  - As a minimum, the FAA support for the use of PED's will on an air frame-by-air frame basis for each carrier

AeroMACS

Spectrum Allocation

- **At WRC-07, the U.S. supported and the Conference approved an allocation of the band 5091-5150 MHz to the AM(R)S for airport surface applications, *inter alia*, thus the footnote 5.444B was added to the ITU-R Radio Regulations. Conditions for use were contained in Resolution 748 (WRC-07)(Rev. WRC-12) and referenced in RR5.444B.**
- **NTIA incorporated into the U.S. table of allocations a federal allocation for AM(R)S and associated fixed services.**
- **FCC has not yet incorporated a non-federal allocation.**

Spectrum Allocation

- **NTIA has proposed footnote 5.444B from the Radio Regulations of the ITU-R be adopted and adapted as a US footnote, but it will not implement the footnote until the FCC adopts it. The footnote allocates the band 5091-5150 MHz to the AM(R)S. NTIA has sent a letter to the FCC for rulemaking.**
- **Additionally, NTIA has sent a separate letter to the FCC for inclusion of an FS allocation in the band 5091-5150 MHz.**
  - The FCC has not yet established an allocation for AeroMACS.
- **Once an allocation for non-federal use of 5091-5150 MHz for AM(R)S and FS is complete, industry will need to initiate a rulemaking to update Part 87 so manufacturers have something to certify AeroMACS equipment against.**
- **Non-federal users can influence the FCC through the FCC rulemaking process to help ensure the success of AeroMACS.**

FAA Use of AeroMACS

- **AeroMACS supports safety and regularity of flight in the Aeronautical Mobile (Route) Service and Fixed Service.**
  - AM(R)S: Critical data links between base station and mobile stations (e.g., aircraft)
  - FS: Critical data links between base and stationary stations (e.g. ASR, ASDE, Glide Slope, etc.)
- **The FAA obtained NTIA Stage 4 (Operational) certification for AeroMACS on March 11, 2013.**
  - The certification is to operate equipment that meets the 802.16-2009 specification in the band 5091-5150 MHz in the US&P

FAA Use of AeroMACS

- **Locations that have frequency assignments to support AeroMACS:**
  - San Francisco, CA
  - Denver, CO
  - Daytona Beach, MD
  - Honolulu, Hi
  - Chicago O'Hare, IL
  - Baltimore, MD
  - Detroit, MI
  - Minneapolis, MN
  - Charlotte, NC
  - FAA Tech Center, NJ
  - Syracuse, NY
  - Philadelphia, PA
  - Memphis, TN
  - Houston International, TX
- **Additional locations are anticipated.**
- **FAA working on an acquisition strategy (e.g., FAA owned/maintained, service provider, etc), due circa early/mid CY 2014.**

Frequency Assignments for AeroMACS

- **Need to ensure Globalstar compatibility by spreading individual airport assignments across the band.**
  - MITRE first modeled the aggregate impact of AeroMACS on Globalstar by simulating the use of AeroMACS at all U.S. towered airports.
  - MITRE then modeled the aggregate impact of AeroMACS on Globalstar by simulating the use of AeroMACS at over 6,000 airports worldwide.
    - The power limits for AeroMACS are based on MITRE's modeling
    - Results of MITRE studies showed that the impact of AeroMACS on the noise floor of Globalstar was less than the maximum allowed increase of 2%
    - A proposal to allow a maximum increase in the noise floor of 5% will be presented at the next WRC
  - NASA is expected to take over the modeling of any future assessments of the aggregate impact of AeroMACS on Globalstar
- **FAA plans to act as band coordinator for AeroMACS just as we do for all frequency assignment applications that request to operate in the Aeronautical Assignment Group (AAG) frequency bands.**

AeroMACS Channel Plan

- **The channel plan for AeroMACS has been defined by RTCA and draft ICAO SARPs.**
- **AeroMACS has a necessary bandwidth of 5 MHz and it is capable of tuning in 5 MHz increments. The channel widths need to be 5 MHz. Therefore, the band 5091-5150 MHz can support 11 channels (5095-5145 MHz) in 5 MHz increments.**
- **The FAA will go through the IRAC process to get the channel plan added in the NTIA Manual of Regulations and Procedures for Federal Radio Frequency Management.**
- **Once the channel plan is added to the NTIA Manual, the FAA will work with NTIA to have the FCC adopt the same channel plan for the non-federal users.**

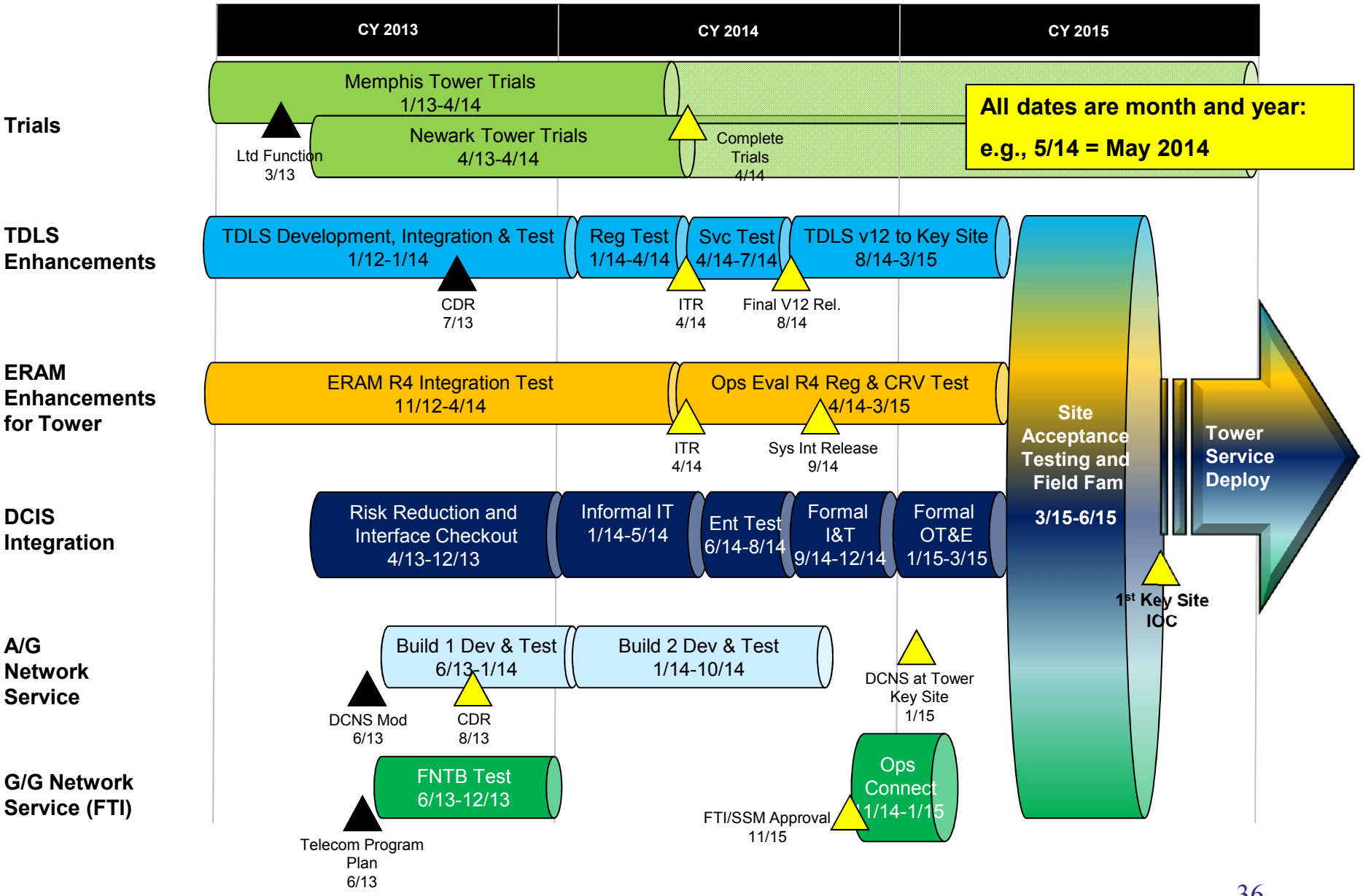
Use of AeroMACS

- **We expect that all of AeroMACS channels will be available for reuse at airports that are in close proximity to each other (to be confirmed via testing).**
- **It is anticipated that with coordination, on airport AeroMACS operations could have multiple networks (e.g., ATS and AOC).**
- **Once FCC completes their rulemaking, it is possible that an airport could have a government system, a commercial system, or combined system.**
  - Key to the latter is whether FAA security will allow the system to carry both kinds of traffic (most economical and spectrum efficient approach).
  - Decision is TBD and part of the FAA acquisition strategy decision.

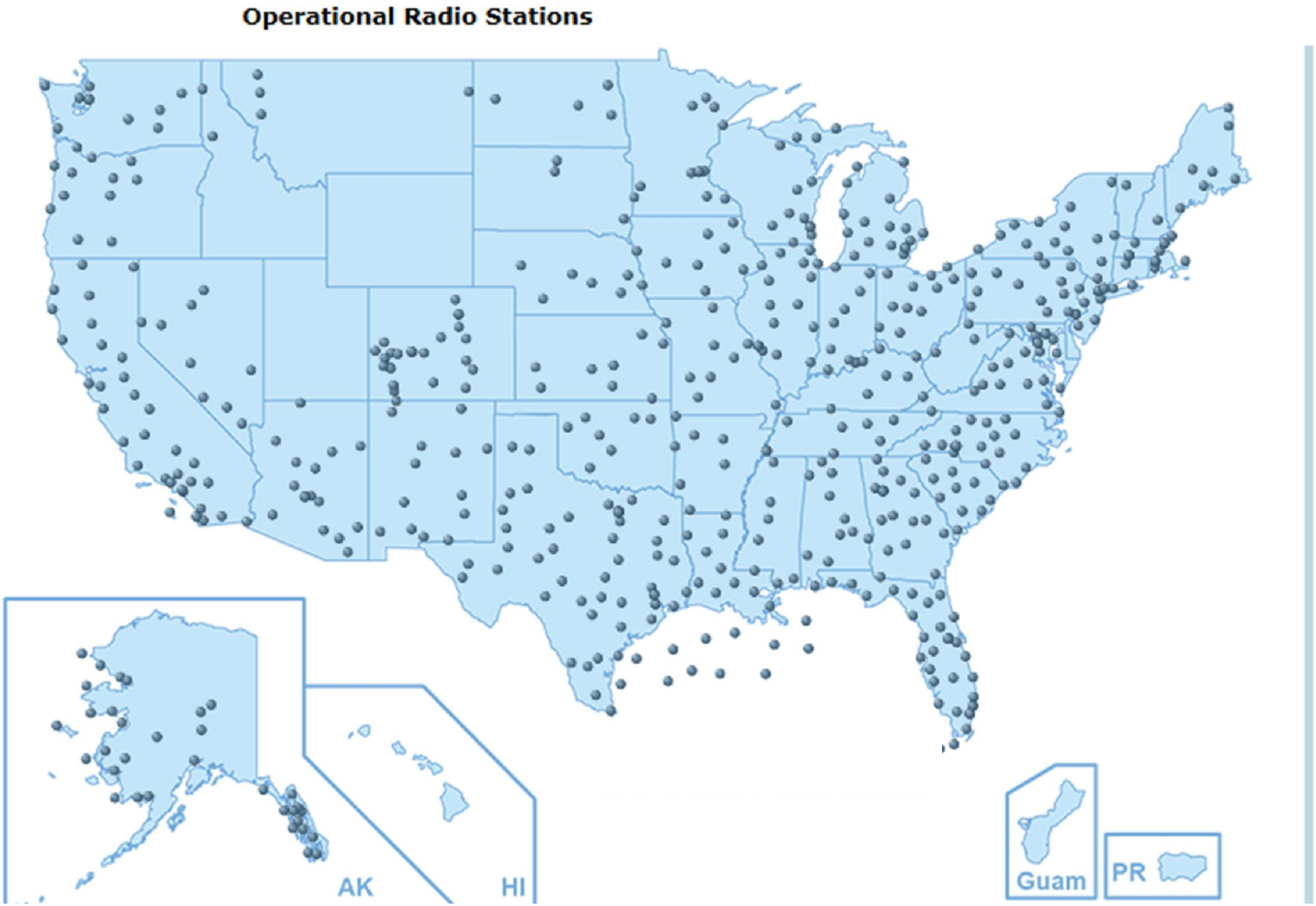
- ***www.ato.faa.gov***

Backup Slides

Data Comm: S1P1 Activities – Challenge Schedule



ADS-B: Operational Ground Radio Stations as of Feb, 2014



ADS-B: FAA Air Transport Avionics Upgrades

jetBlue
HAPPY JETTING

- ADS-B Out
- Aircraft: 35 A320
- STC approved July 2012
- **All 35 modifications complete**

UNITED

- ADS-B Out and In
- Aircraft: 12 747
- STC approved June 2011
- **12 ADS-B In equipped**

BOEING
Rockwell Collins
UNITED

- ADS-B Out
- Aircraft: 110 737NG
- Boeing Service Bulletin 01 delivered May 2013 and Rockwell Collins Black Label Equivalent delivered December 2013
- United retrofit begins June 2014
- Upgrades to DO-260B complete by December 2017

- ADS-B Out
- Aircraft: 164
  - 13 B747
  - 59 B767
  - 52 A300
  - 38 MD11
  - 2 B757
- STC for 767, 747/767 AML, MD11/A300 AML approved (December 2011, January 2012, and February 2013 respectively)
- **145 installs complete to date**
- Upgrades complete by June 2014

U·S AIRWAYS

- ADS-B Out and In
- Aircraft: 20 A330-300/200
- STC for ADS-B Out approved August 2012; STC for Merging & Spacing approved January 2013
- **16 ADS-B Out and 13 In installs complete**
- Upgrades (Out and In) complete by March 2014

ADS-B: FAA General Aviation / Rotorcraft Avionics Upgrades

- ADS-B Out and In [Multi-function Display (MFD) and Portable Electronic Device (PED)]
- Aircraft: 2 Bell 206 helicopters
- STC issued January 2014
- Upgrades complete by February 2014

- ADS-B Out
- Aircraft: 54 helicopters
  - **9 AW-139 Chevron: Completed February 2013**
  - 47 PHI: Upgrades complete by 2015
- STC for AW-139 282B issued June 2012
- STC for S-92 260B expected May 2014
- STC for S-76 260B expected June 2014
- Upgrades complete by 2016

- ADS-B Out
- Aircraft: 1 Cessna 150
- AML STC for Cessna 150/172/182 issued December 2012
- **Upgrade completed December 2012**

- ADS-B Out
- Aircraft: 400 legacy Capstone aircraft
- Contract awarded to FreeFlight Systems on April 30, 2013
- AML STC for fixed wing expected February 2014 and AML STC to include AS-350 and Bell 412 expected March 2014
- Upgrades complete by February 2015

ADS-B: Available Version 2 Avionics

Manufacturer	ADS-B Model Number	Position Solutions
ACSS	XS-950	RCI GLU 920, RCI GLU-925, Thales TLS8755-01-0101A/0102B
Honeywell	XS-852	CMC CMA-4024-1 SBAS
Trig-Avionics	TT-31	FreeFlight WAAS 1201, Accord Technology NexNav™ Mini GPS unit
FreeFlight	FDL-978-TX	FreeFlight WAAS 1201
Garmin	GDL-88 GTX-23 GTX-33x w/ES GTX-330x, GTX-3000 (all require appropriate S/W rev)	Garmin GTN 625/635/650, GTN 725/750, GPS 400W, GNC 420W/420AW, GNS 430W/430AW, GPS 500W/530W (w/ or w/o TAWS) (all require appropriate S/W rev)
Honeywell	MRC XPDR w/ADS-B Out	CMC CMA-3024 SBAS GNSSU MK II and CMA-4024 SBAS GNSSU
Honeywell	XS-858B Transponder, P/N 7517402-970	Honeywell GPS module (made by CMC) P/N 245-604067-100
Honeywell	ISP-80A.1	Honeywell ADIRU Part#'s HG2030BE02, BE03 or BE04
Trig-Avionics	TT-22	FreeFlight WAAS 1201
FreeFlight	FDL-978-XVR	FreeFlight WAAS 1201 (integrated in box with XVR)
NavWorx	ADS600-B	Accord Technology NexNav™ Mini GPS unit
Rockwell Collins	TDR-94D-550	Universal UNS-1Fw

AeroMACS: Spectrum Allocation

- **Note that the ITU did not include an allocation for the FS, but there is precedent for RLAN systems using fixed applications in mobile services. NTIA added FS to simplify assignments.**
- **NTIA authorized the FS operations on a primary basis in accordance with the proposed changes to the National Table of Frequency Allocations which limits the system to:**
  - Those operating in conjunction with the stations in the AM(R)S allocation IAW Footnote RR 5444B
  - The international aeronautical standards [ICAO], that limits use to surface applications at airports. The requirements on and protection of the FS shall be the same as for the AM(R)S operating IAW ITU Resolution 748 (Rev. WRC-12)
- **All practical steps are also required to be taken to protect the radio astronomy service from harmful interference in the band 5000-5250 MHz.**