

NextGen – ADS-B ADF Annual Safety Symposium

October 9, 2013

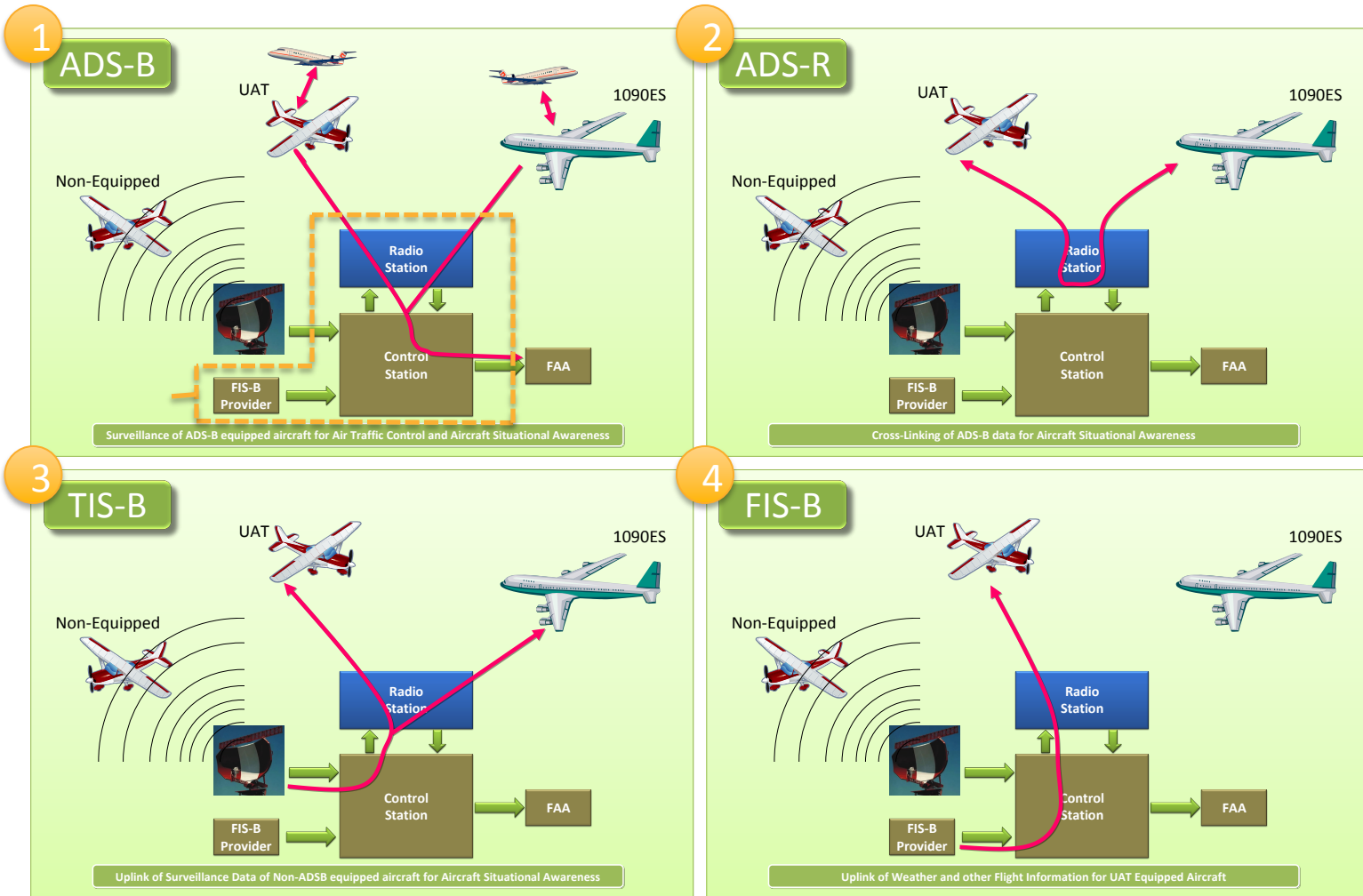
This information is the Proprietary Information of Exelis Inc. and shall not be disclosed or used without the express written consent of Exelis.

Exelis Awarded Contract for ADS-B Ground Infrastructure Deployment – 30 August 2007

- **Cost effective exceptional technical solution**
- **Base contract**
 - CPIF, 3 year period of performance
 - \$207M
 - Design, Development, Key Site Testing, Significant Essential Services Deployment
- **Optional Contract Line Items for nation wide deployment and operations and maintenance of the system through 2025**
 - Deployment capital expense funded by Exelis
 - Nationwide deployment began in early GFY-09 and will be complete by EOY-13

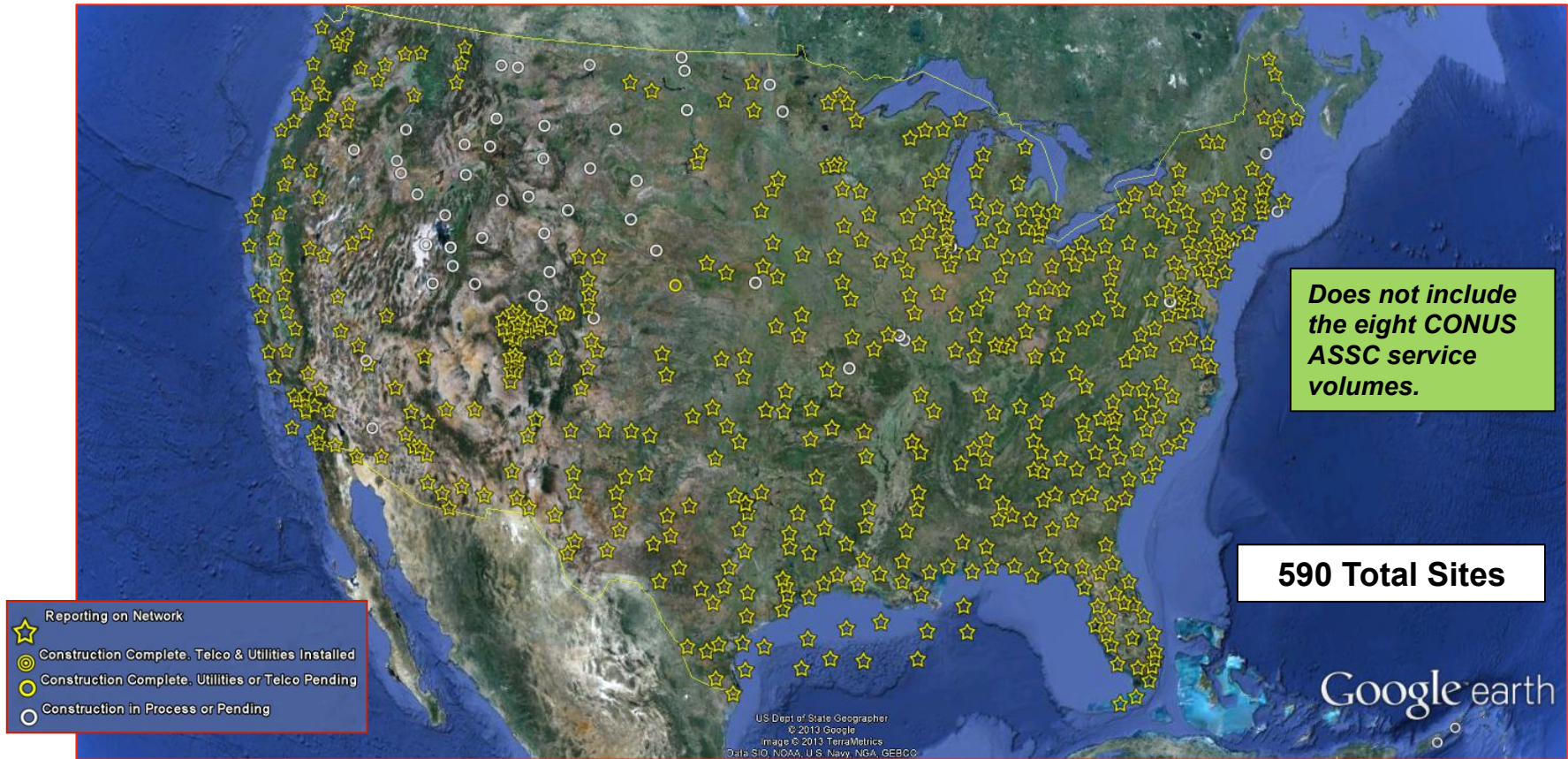
ADS-B Data Services

ADS-B Infrastructure provides: 1) Delivery of ADS-B messages from aircraft to ATC facilities (includes aircraft ID, position, and intent), 2) Delivery of ADS-B messages between aircraft, 3) Delivery of Radar data from FAA to aircraft, 4) Delivery of Aeronautical data (e.g NOTAMS, Special Use Airspace, etc) to Aircraft



Radio Station Locations - CONUS

535 Sites Reporting on Network : 537 Sites Constructed : 53 Sites in Planning or Construction

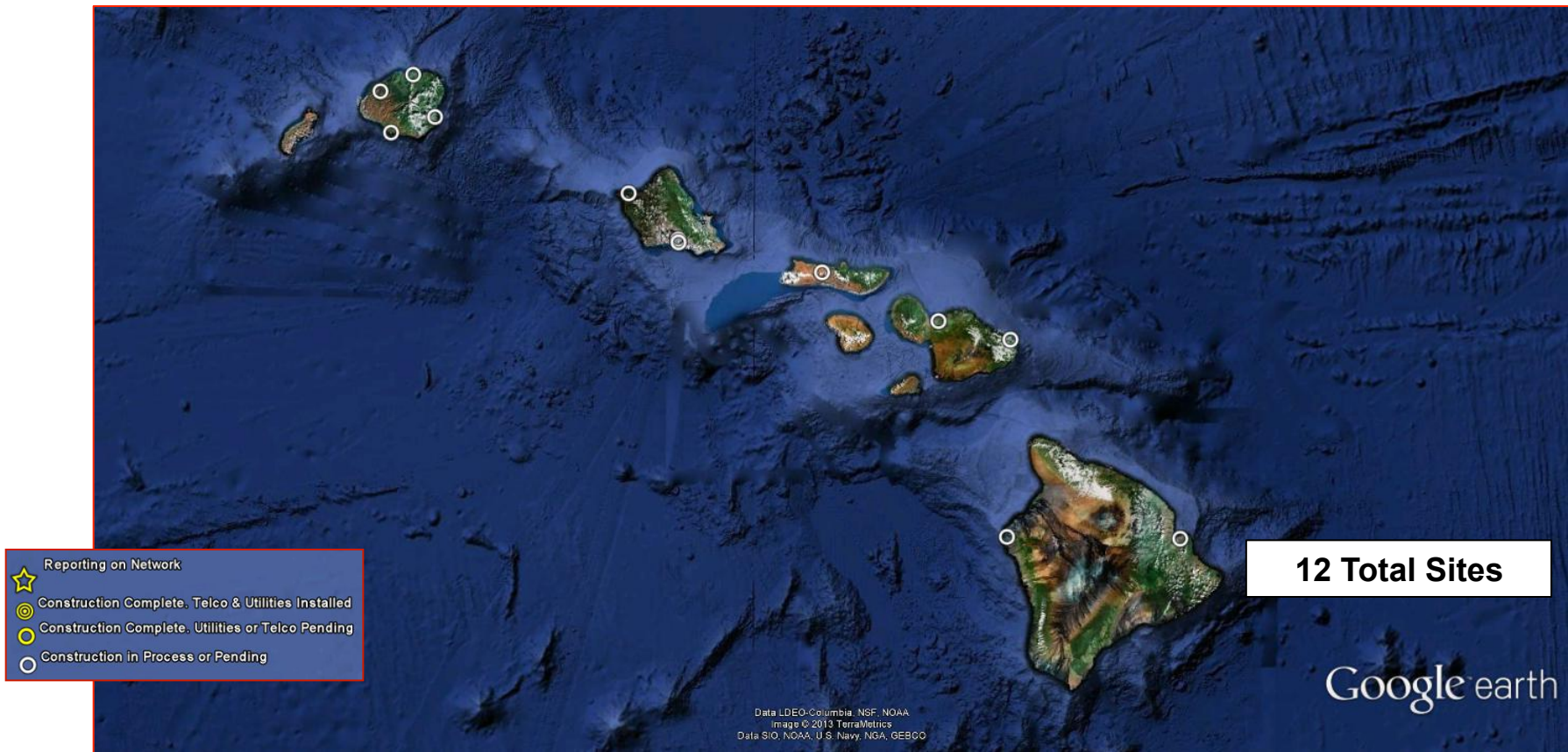


Radio Station Locations - Alaska

33 Sites Reporting on Network : 33 Sites Constructed : 8 Sites in Planning or Construction



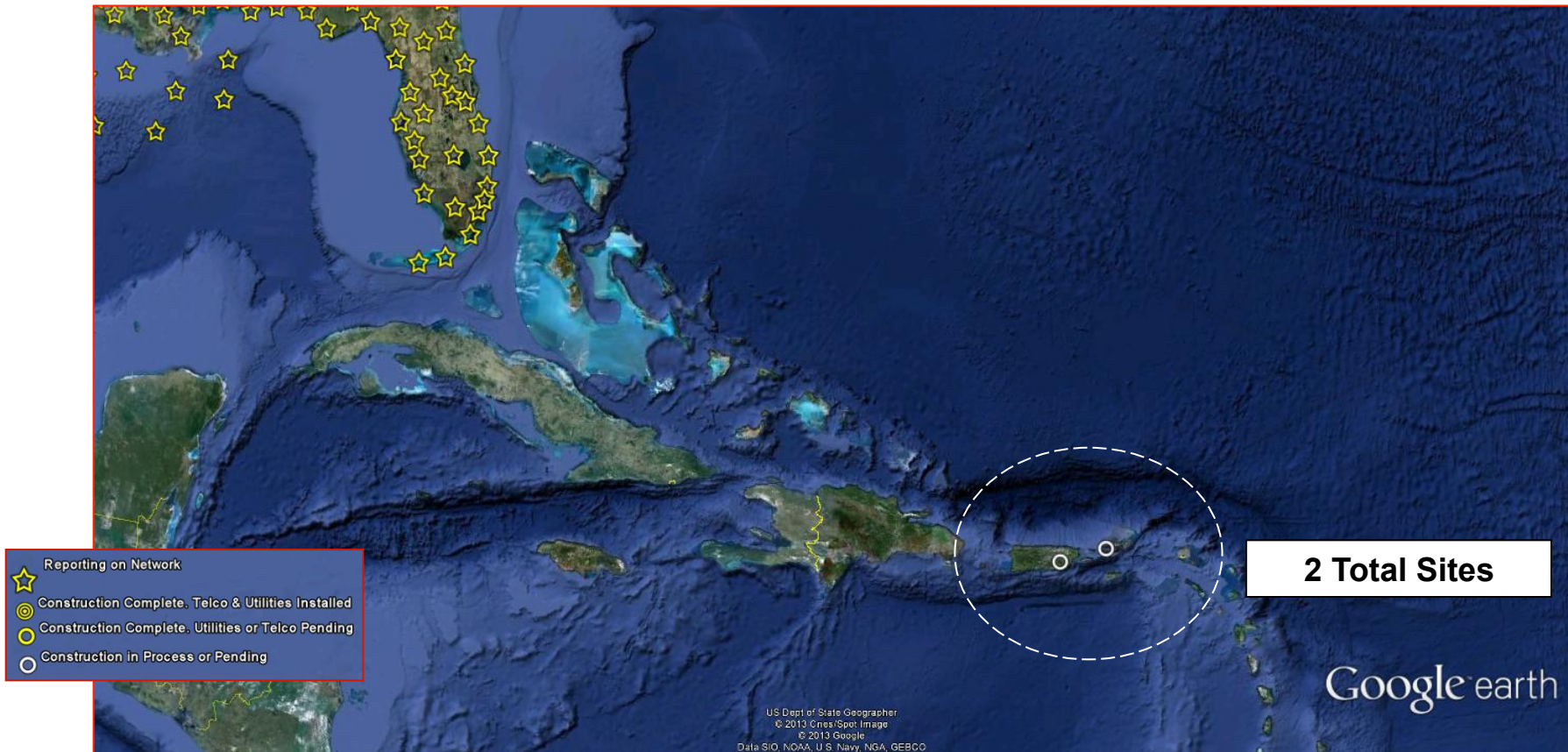
Radio Station Locations - Hawaii



Radio Station Locations - Guam / Saipan

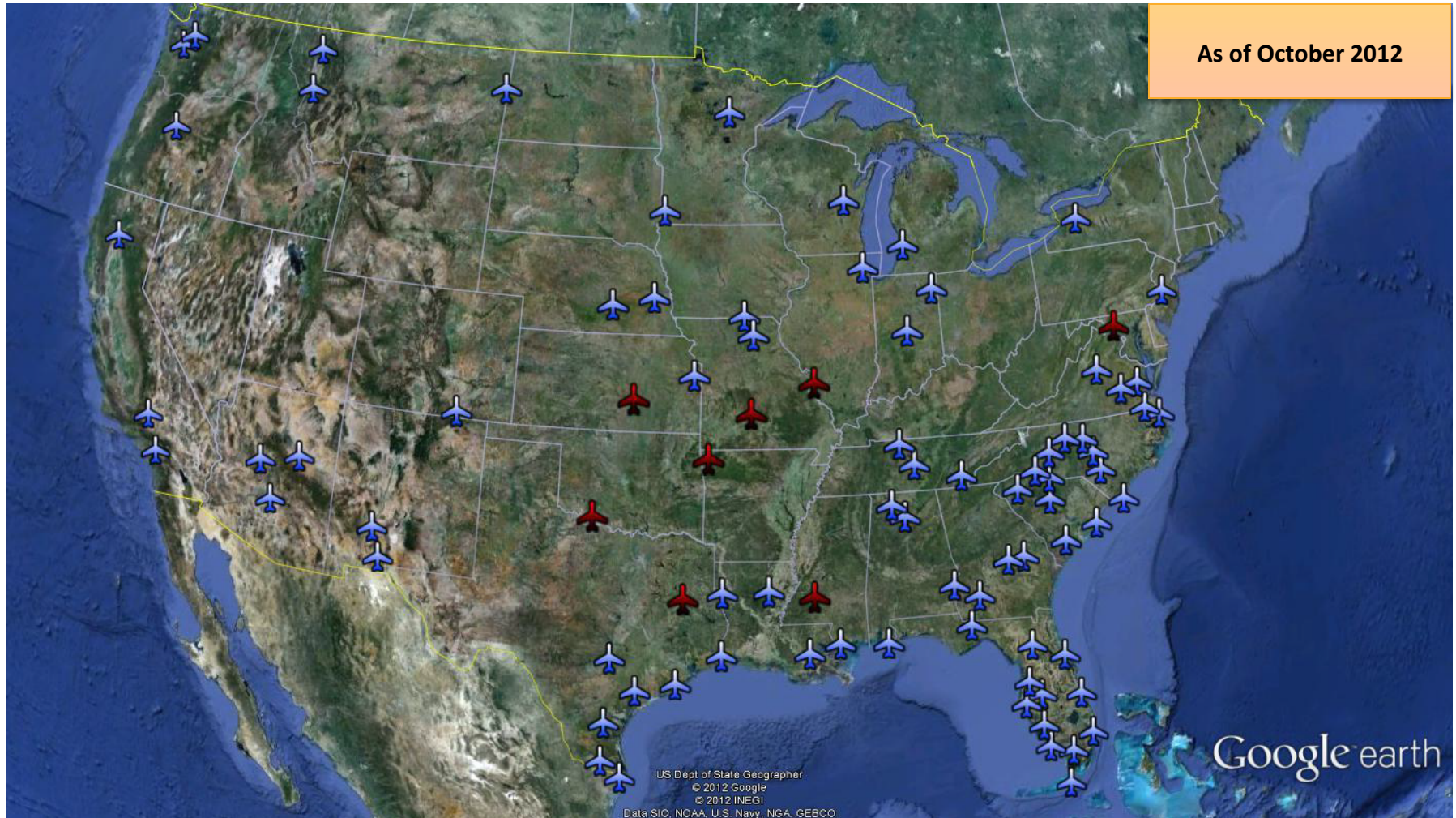


Radio Station Locations - San Juan / St. Thomas



GA Airport Siting

87 General Aviation Airport ADS-B Sites (79 Operational, 8 in process)



Typical Co-Location



Typical Airport Site



Oil Platform Installation – ATP Innovator



ADS-B Radios



Airport Surface Radio



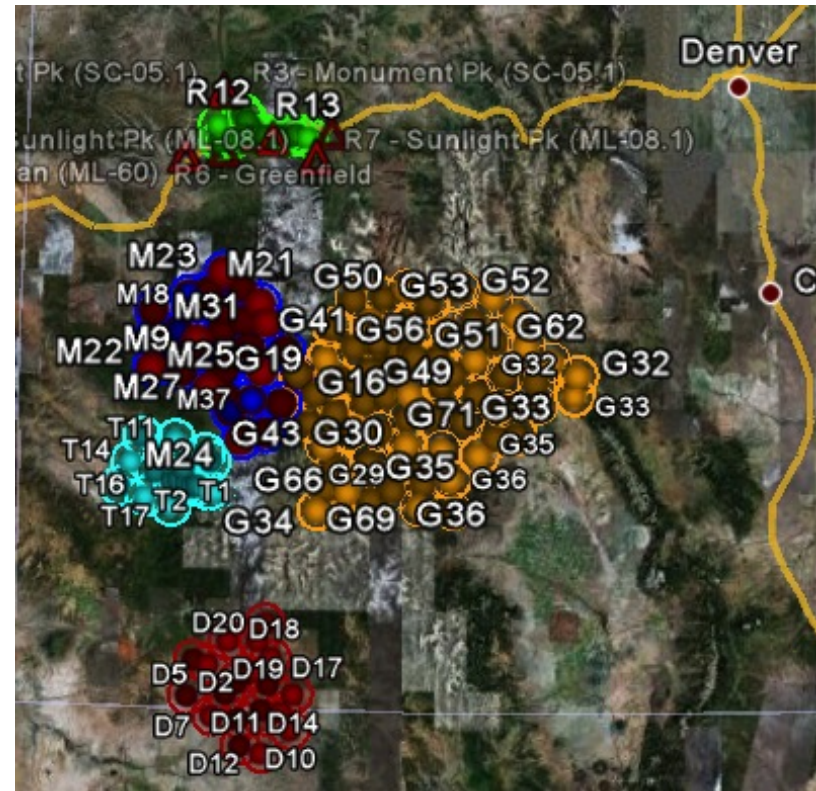
Radio Enclosure



1090 and UAT Antennas

Exelis Added Wide Area Multilateration to the Network

- **FAA has worked with the State of Colorado and Exelis to develop and test a fifth service, WAM, which is deployed in Colorado**
 - Montrose was the Key Site
 - Telluride, Gunnison and Durango complete the CO WAM installations
- **Future provision of WAM service to additional service volumes to be accommodate through extendable WAM design**



ADS-B Business Plan for Commercializing Data

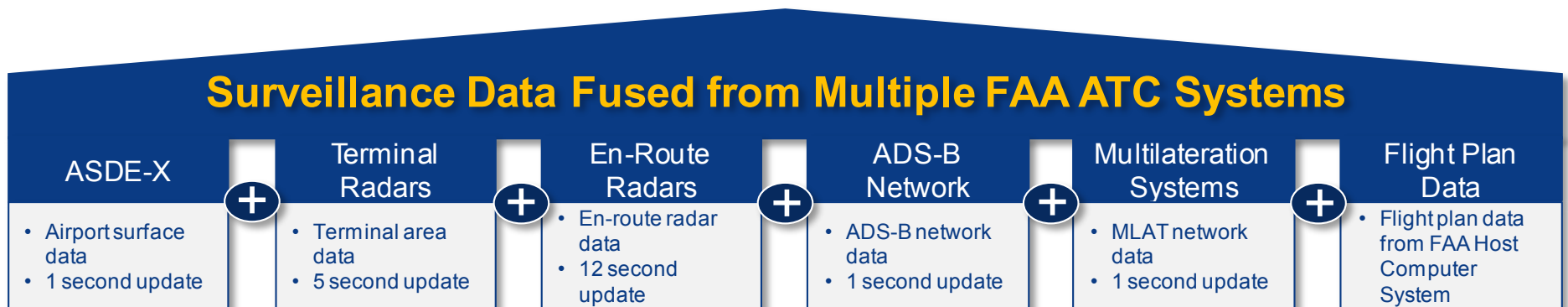
- **As a part of our ADS-B proposal we were required to submit a business plan which discussed how we would:**
 - Reduce service costs
 - Reduce FAA costs
 - Reduce avionics costs
 - Increase user benefits
- **Recognizing that we would have a comprehensive set of NAS surveillance data in our network we proposed to commercialize the data and share sales with the FAA**
- **Established data commercialization infrastructure**
 - Effort undertaken at Exelis expense
 - Provides surveillance of ASD-B and non-ADS-B equipped aircraft for aircraft situational awareness (ADS-B and TIS-B services)

Nationwide Exelis NextGen Surveillance Data

All 35 ASDE-X Airports Integrated into NextGen Data Feed
ASSC airports (such as SFO) will be included as they come on line

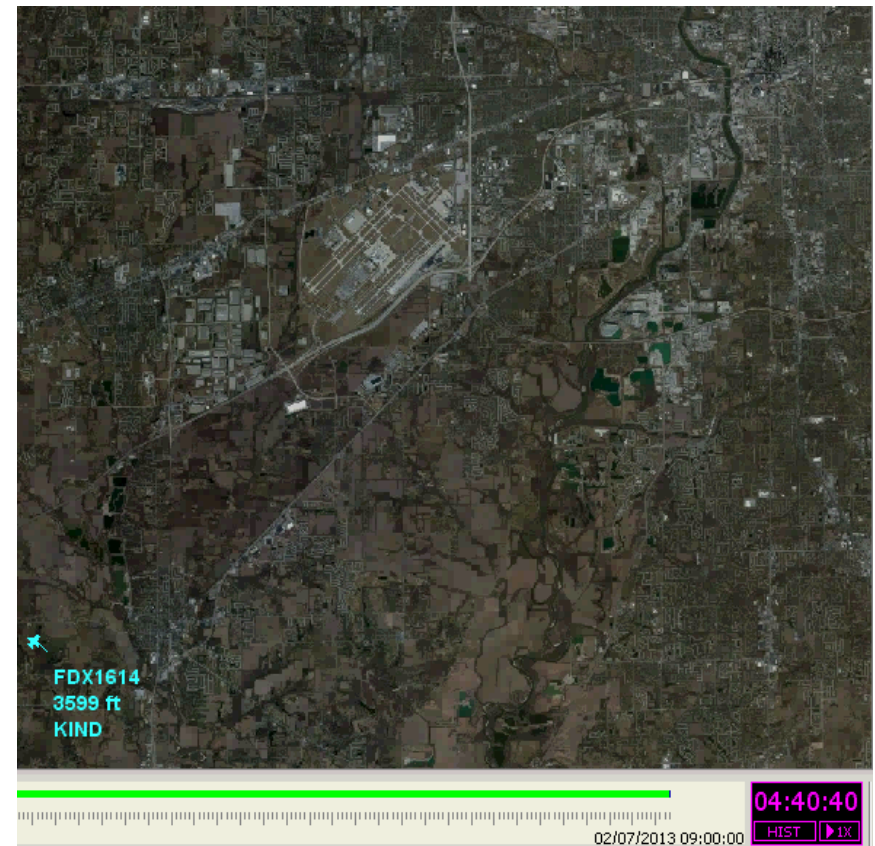
ASDI	ATL	DFW	IAH	MEM	PHX
	BDL	DTW	JFK	MIA	SAN
	BOS	EWR	LAS	MKE	SDF
	BWI	FLL	LAX	MSP	SEA
	CLT	HNL	LGA	ORD	SLC
	DCA	HOU	MCO	PHL	SNA
	DEN	IAD	MDW	PVD	STL

Flight Plan
 One Area
 Canadian
 de
 Area
 Gate
 ain
 onwide



Complete US Coverage With NextGen Surveillance

- ADS-B equipped Aircraft can be seen on US airports without Advanced Surface Movement Guidance and Control Systems (A-SMGCS)
- Surveillance for all RTCA DO260, DO260A and DO260B equipped aircraft
- FAA only sees surveillance on RTCA DO260B equipage

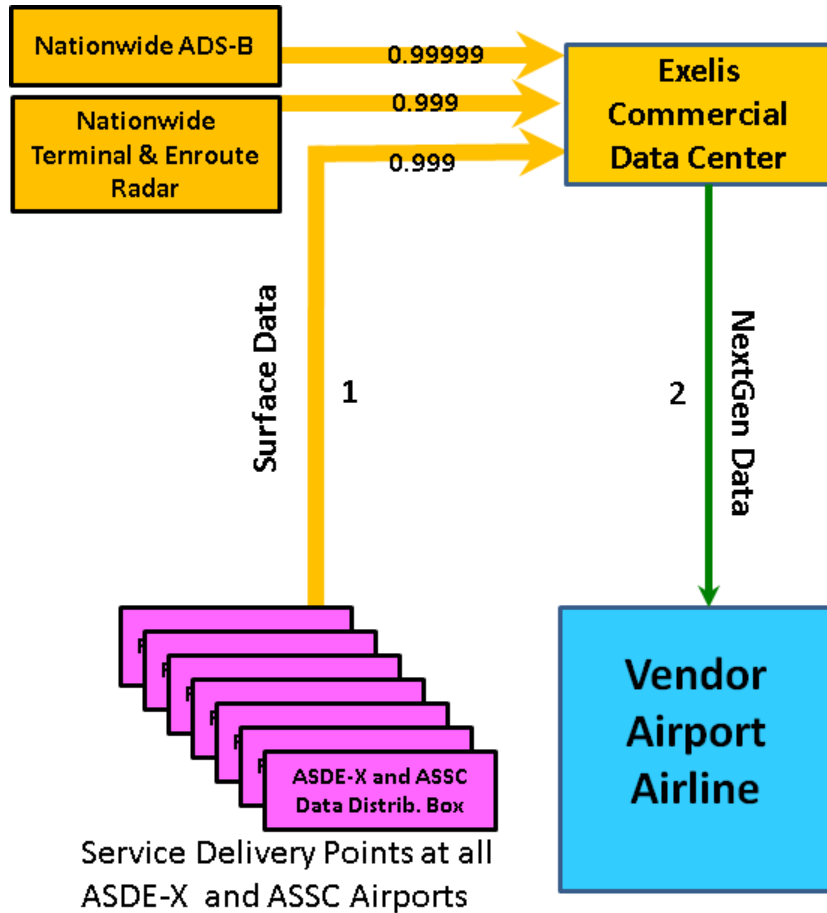


SFO ADS-B Coverage

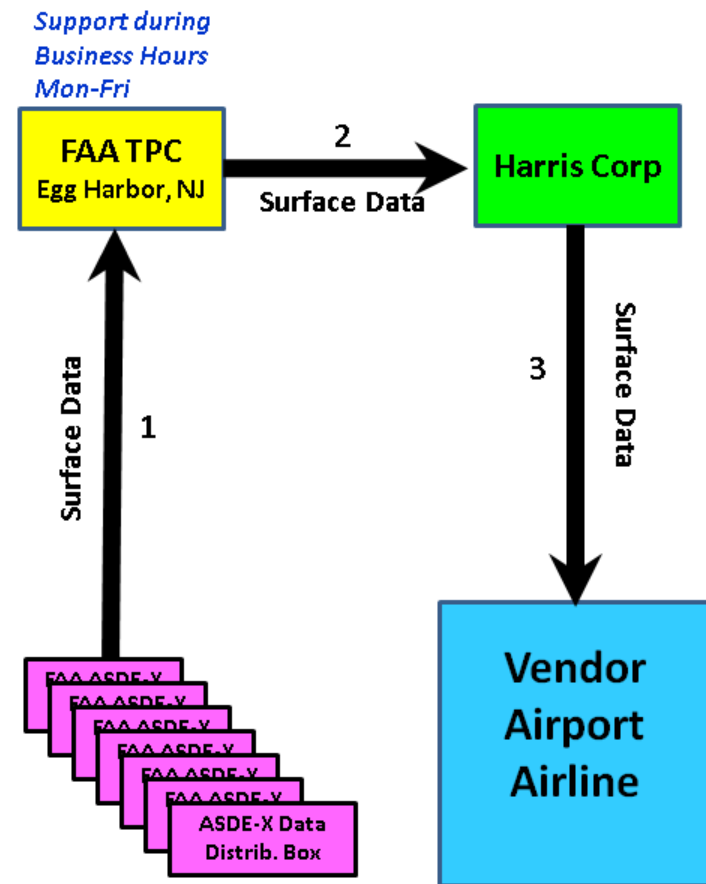


NextGen vs. SWIM

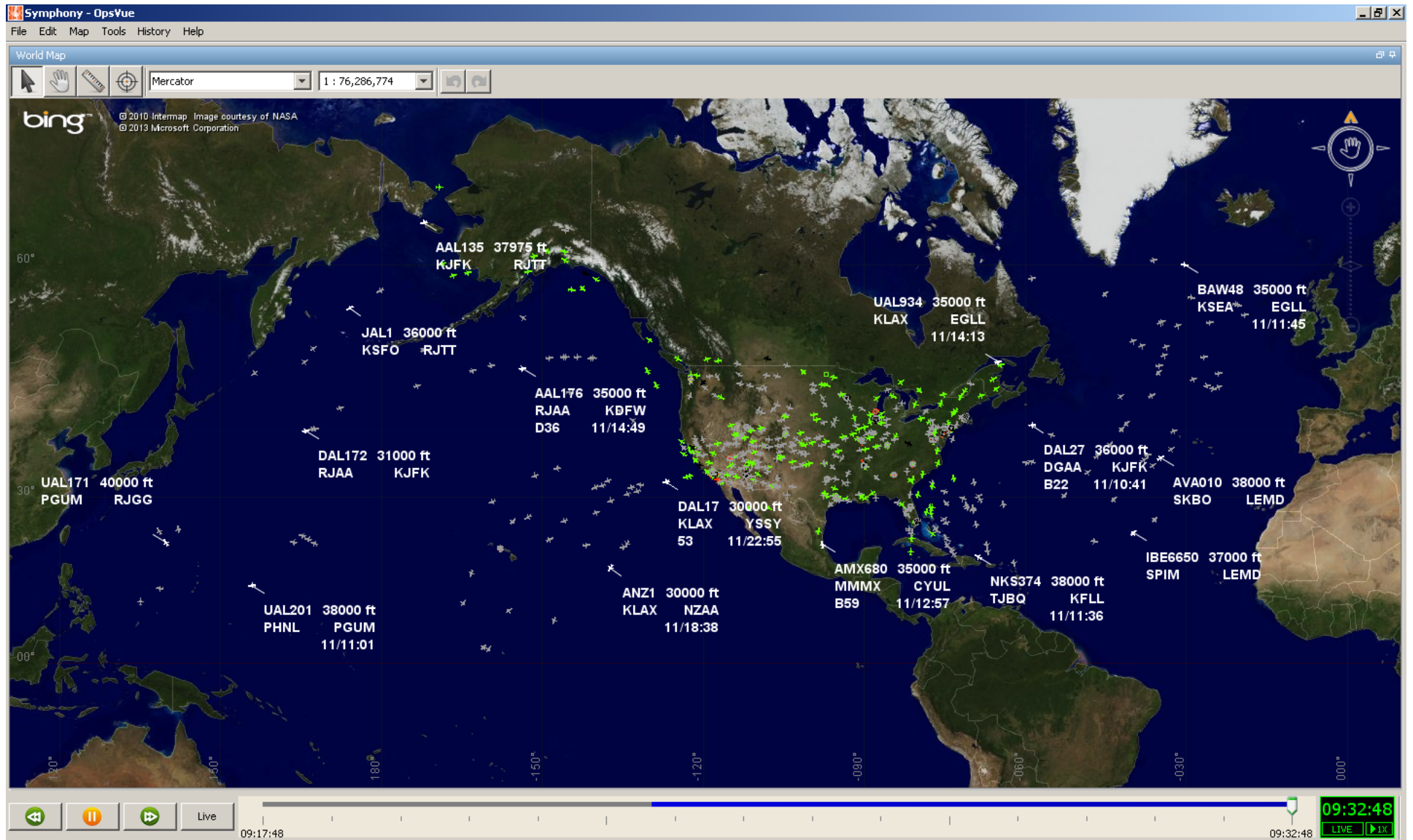
Exelis Direct Data Access



Data Access Through NESG (SWIM)



Complete Situational Awareness In the Air



Complete Situational Awareness On the Ground

Symphony - OpsVue

File Edit Map Tools Reports Help

Flight Data (Layer-Filtering 'Selected Fil...') Total Count: 317

Drag columns here to group

ACID	Tail N...	Origin	Destin...	...
UAL693	N423UA	KLGA	KORD	00:18
UAL131	N37408	KIAH	CYYC	00:14
UAL898	N218UA	ZBAA	KIAD	00:11
UAL1662	N79402	KIAH	KORD	00:10
UAL925	N795UA	EGLL	KIAD	00:10
UAL438	N529UA	KLAX	KORD	00:09
UAL990T	N548UA	KORD	KIAD	00:08
UAL26	N17122	KEWR	EGBB	00:08
UAL324	N564UA	KMCO	KEWR	00:08
UAL774	N808UA	KORD	KRIC	00:06
UAL1539	N37413	KBOS	KIAD	00:06
UAL334	M521UA	KIAH	KLAX	00:05
UAL817	N817UA	KJAX	KORD	00:05
UAL120	N67134	KEWR	LEBL	00:04
UAL1461	N79521	KIAH	MSLP	00:04
UAL871	N427UA	KORD	KSAN	00:04
UAL1022	N78438	KEWR	KIAH	00:04
UAL1502	N42706	KIND	KIAH	00:03
UAL1462	N73259	KEWR	KSFO	00:03
UAL278	N848UA	KORD	KMDT	00:03
UAL942	N654UA	KORD	LFPG	00:02
UAL779	N481UA	KLGA	KDEN	00:01
UAL776	N519UA	KDEN	KLGA	00:01
UAL482	N851UA	KCLE	KEWR	00:01
UAL4	N37018	KIAH	EGLL	00:01
UAL134	N76054	KEWR	L5ZH	00:01
UAL1600	N18119	KEWR	KLAX	----
UAL1460	N36272	KIAD	KSFO	----
UAL1117	KSFO	KEWR	----	----
UAL237	N560UA	KJFK	KSFO	----
UAL47	EDDF	KIAH	----	----
UAL952	N505UA	KLAX	KJFK	----
UAL1587	N37255	KIAD	KSEA	----
UAL1222	N76505	KEWR	KLAS	----
UAL1485	N38424	KBOS	KDEN	----
UAL15	N76065	KEWR	PHNL	----
UAL1005	N38443	KIAH	KSFO	----
UAL765	N563UA	KEWR	KDEN	----
UAL442	N440UA	KMCO	KDEN	----
UAL1597	N76515	KORD	KSFO	----
UAL1182	N27213	KEWR	KLAS	----
UAL1114	N76503	KSAN	KEWR	----
UAL762	KSFO	KCLE	----	----
UAL499	N534UA	KIAH	KSEA	----
UAL1200	N33284	KEWR	KSAN	----
UAL1604	N39415	KPHL	KSFO	----
UAL1001	N57857	KLAX	KEWR	----
UAL332	N566UA	KLAS	KEWR	----
UAL1544	N87531	KSFO	KORD	----
UAL404	N835UA	KEWR	KSEA	----
UAL653	N833UA	KLAX	KIAD	----

Column Filter Mode: AND Column(s) Filtered

NAS Wide Selected Flight | ExecVue Dashboard

EWR

IAH

ORD

19:11:18

19:26:18 LIVE

Complete Situational Awareness Airport Status

Flight Data (Layer-Filtering 'NAS Wide') | Total Count: 294

ACID	Tail N...	Origin	Destin...
UAL1723	N75851	KDEN	KIAD	00:19	
UAL1443	N24224	KLAX	KIAD	00:19	
UAL627	N848UA	KEWR	KORD	00:18	
UAL381	N556UA	KLAX	KIAH	00:14	
UAL85	N78004	LLBG	KEWR	00:12	
UAL941	N769UA	EDDF	KORD	00:09	
UAL1462	N77261	MVNN	KEWR	00:09	
UAL260	N597UA	KSEA	KIAD	00:06	
UAL259	N843UA	KEWR	KBOS	00:03	
UAL864	N568UA	KSFO	KPHL	00:03	
UAL1180	N77871	KIAH	KLAX	00:02	
UAL235	N589UA	KIAH	KDEN	00:02	
UAL508	N514UA	KORD	KSEA	00:02	
UAL78	N78017	RJAA	KEWR	00:01	
UAL324	N564UA	KDEN	KMCO	00:01	
UAL1206	N32404	KDEN	KIAD	00:01	
UAL84	N77022	KEWR	LLBG	00:01	
UAL528	N545UA	KLAX	KBOS	00:00	
UAL495	N412UA	KDEN	KFLL	00:00	
UAL278	N651UA	KIAH	KORD	00:00	
UAL432	N829UA	KORD	KCLT	---	
UAL1684	N14242	KFLL	KCLE	---	
UAL1608	N62631	KIAH	KORD	---	
UAL1600	N18119	KEWR	KLAX	---	
UAL1238	N34460	KIAH	KFLL	---	
UAL788		KSFO	KBOS	---	
UAL1215	N14250	KORD	KSFO	---	
UAL1460	N36272	KIAD	KSFO	---	
UAL1678	N16217	KLAX	KSFO	---	
UAL1265	N14704	KPHX	KEWR	---	
UAL474	N483UA	KORD	KPWD	---	
UAL241	N448UA	KORD	KSEA	---	
UAL1117		KSFO	KEWR	---	
UAL779	N481UA	KLGA	KDEN	---	
UAL500	N460UA	KSAN	KIAH	---	
UAL755	N585UA	KLAX	KORD	---	
UAL552		KSFO	KPHL	---	
UAL237	N560UA	KJFK	KSFO	---	
UAL483	N7933B	KSFO	KIAH	---	
UAL1677	N37419	KORD	KTPA	---	
UAL1270	N76517	KEWR	KMCO	---	
UAL1074	N38459	KORD	KSFO	---	
UAL1411		KIAH	KBWI	---	
UAL744		KIAH	KCLE	---	
UAL1737	N76062	KEWR	KIAH	---	
UAL1531	N73259	KORD	KEWR	---	
UAL1087	N75428	KIAH	KPHL	---	
UAL47		EDDF	KIAH	---	
UAL1227	N38257	KEWR	KPHX	---	
UAL891	N782UA	KLAX	RJAA	---	
UAL1695	N66057	KEWR	KIAH	---	

Column Filter Mode: AND Column(s) Filtered

ExecVue Dashboard | Airport (IATA): **ORD** | Update | ORD | EWR | IAH

Status ORD | Last update on 2012-12-06 16:21:04

Chicago O'Hare International

Status
Delay: **None**

Weather
Condition: Overcast
Credit: NOAA's National Weather Service
Updated: 2:51 PM Local
Wind: Southwest at 9.2mph

METAR ORD | Last update on 2012-12-06 16:22:06

Conditions at 2012-12-06 20:51:00 UTC
Temperature: 45°F
Dewpoint: 34°F
Relative Humidity: 66%
Baro Pressure: 29.93 Inches Hg
Wind Speed: 8 KTS
Wind Direction: 220 degrees
Airport Visibility: 10 or more miles
Ceiling: 25000 feet AGL
Weather Source: METAR

TAF ORD | Last update on 2012-12-06 16:21:18

Condition	Forecast
Forecast period	2012-12-06 20:00:00 TO 2012-12-08 00:00:00 UTC
Forecast Status	Routine
Wind Direction	190 degrees
Wind Speed	10 KTS
Cloud Ceiling	10000 feet AGL
Sky condition	Overcast at 10000 feet

Surface Ops ORD | Last update on 2012-12-06 16:25:17

Surface Ops ORD 16:25:17 Ops:12

Arrivals ORD | Last update on 2012-12-06 16:21:37

ACID	Origin	Gate	Terminal	ETA
ASQ5911	KPIA			06/15:38
UAL941	EDDF			06/16:14
ETD151	OMAA			06/16:18
SKW5532	KDTW			06/16:19
ASQ5853	KATL			06/16:19
UAL949	EGLL			06/16:21
UAL278	KIAH			06/16:24
EGF4117	KPIT			06/16:25
EGF4289	KCLE			06/16:25
EIN125	EIDW			06/16:25
UAL1	KSRQ			06/16:26
DAL1493	KDTW			06/16:27

Departures ORD | Last update on 2012-12-06 16:22:07

ACID	Destination	Gate	Terminal	ETD
ETD151	KORD			06/01:57
UAL836	KORD			06/04:26
UAL850	KORD			06/04:57
AAL288	KORD			06/05:10
LOT1	KORD			06/05:48
UAL941	KORD			06/06:58
SWR84T	KORD			06/07:34
UAL949	KORD			06/07:45
EIN125	KORD			06/08:21
AAL47	KORD			06/08:36
AAL1372	KORD			06/13:32
UAL843	KORD			06/13:40
AAL892	KORD			06/13:54
UAL1715	KORD			06/13:55
AAL1214	KORD			06/13:56

NOTAMS ORD | Type here to filter NOTAMS. To activate this query control,

ID	Report
02/224	TWY ZC SOUTH OF TWY N CLSD. 14 FEB 23:04 2012 U...
03/295	TWY N CLSD BTN TWY ZH AND TWY ZJ. 21 MAR 03:37 ...
05/455	TWY ZY BTN TWY N AND TWY PP CLSD. 23 MAY 16:02 ...
09/296	TWY D8 CLSD. 15 SEP 19:28 2012 UNTIL 23 OCT 22:0...
09/579	TWY ZJ BTN TWY N AND RWY 10/28 CLSD LGTD AND B...
10/088	TWY ZH BTN RWY 10/28 AND SOUTH CENTRAL CARGO...
10/139	TWY N CLSD BTN TWY T AND TWY ZJ. 06 OCT 19:43 2...
10/488	TWY Q IRREGULAR SURFACE BTN TWY 2F AND SOUTH...
11/087	OBST ANTENNA 715 (64 AGL) 1.41 SW LGTS U/S. 04 N...
11/358	OBST CRANE 761 (100 AGL) 0.95 SSW FLAGGED/LGTD ...
11/390	OBST CRANE 830 (190 AGL) 2.17 E FLAGGED/LGTD 12...

TaxiTimers ORD | Last update on 2012-12-06 16:22:31

ACID	Tail Number	Taxi Time
TCF3469	N639RW	00:14
EGF4281	N812AE	00:09
UAL941	N769UA	00:09

TWY N CLSD BTN TWY ZH AND TWY ZJ. 21 MAR 03:37 ...

16:10:17 | 16:25:17 | LIVE

Partnership Between the FAA, Massport and Exelis provides Enhanced Airport Surface Operations Management

- **Three way partnership established to achieve certified ADS-B vehicle units (VMATs) and integration with the surface management product (Symphony® MobileVue™)**
- **Partnership outcome**
 - **Certified ADS-B UAT based vehicle units, with deployment of 37 units**
 - **Symphony® OpsVue™ installed at Boston Logan**
 - **Development and deployment of Symphony MobileVue application in use at Boston Logan**
- **Projected completed in November 2011**
 - **Massport to expand number of VMATs to 70**
 - **Massport increased MobileVue licenses to 15**
 - **Improved safety and common situational awareness across all stakeholders**

Exelis Surface Vehicle Transponders (VMATs)

ADS-B Out Squitter Units for Airport Surface Vehicles in the Movement Area

- Incidents and accidents involving aircraft and vehicles at airports occur in periods of reduced visibility, resulting in a loss of situational awareness for ATC and flight crews.
- FAA AC 150/5220-26 for ADS-B Out Squitter Units for Airport Surface Vehicles in the Movement Area
 - Equipping surface vehicles provides ATC, airports and aircraft operators shared situational awareness of the complete surface picture
 - MobileVue app enables complete surface situational awareness for use in all surface vehicles (including ARFF)
 - At ASDE-X airports information is fed into the TIS-B service.



Symphony® MobileVue™ Real Time Display

- Tablet-based situational awareness display
- Easily mounts within vehicles to show “ownership”, transponder equipped vehicles on the airfield, and aircraft to a 30 mile range
- Accessible via a Web-Browser and compatible with multiple systems (Apple iOS, Google Android and Windows)
- MobileVue display configurable to show only the data needed



Symphony® MobileVue™ Real Time Display

- Simple, familiar hardware and display interface
- Supports zoom, pan and centering operations
- User configurable information display
- Displays aircraft taxi-times for DOT compliance monitoring
- User selectable background maps and colors
- Low bandwidth requirements enable the use of existing Wi-Fi, 3G and 4G wireless communications

EXELIS

Logout Options Help About

Details Tools Replay

Properties

Flight ID: EGF3248
 Tail Number: N844AE
 Flight Type: Departure
 AC Type: E135
 ICAO: KORD
 Airline: EGF
 Status: IFR
 ADS Code: 11243194
 STAR:

Airport

Origin: KORD
 Departure Gate: KLE5
 Destination: KLE5
 Arrival Gate: A4
 Runway:
 Departure Fix: CMSKY

Position

Speed: 12 mph
 Altitude: 672 ft
 Heading: 106 deg
 Latitude: 41.97189 dd
 Longitude: -87.88048 dd
 Beacon Code: 2266
 Surveillance Type: Dual-Equipped

Times

ETA: 10/03/2013 6:26:00 PM
 ETO: 10/03/2013 6:06:00 PM
 Actual Out: 10/03/2013 5:56:00 PM
 Actual On:
 Taxi Time: 14 min

Zoom To Follow

Flight ID	Tail Number	Origin	Destination	Tail Size	Departure Fix
ASQ4385	N14902	KORD	KSOF	29	HMOBLE
UAL1127	N34455	KBOS	KORD	24	HYLND
UAL793	N404UA	KORD	KLAX	23	IOW
DAL1908	N944DL	KORD	KDTW	18	PETTY
DAL1877	N930DL	KORD	KATL	18	BACEN
AAL288	N12552	KORD		17	
AAL1531	N932AN	KORD	KSAN	16	IOW
EGF3062	N828AE	KORD	KCVG	16	EARND

American flight EGF3248

Flight ID: EGF3248
 Tail Number: N844AE
 Origin: KORD
 Destination: KLE5
 Tail Time: 14
 Speed: 12

United flight UAL332

Flight ID: UAL332
 Tail Number: N833UA
 Origin: KSMF
 Destination: KORD
 AC Type: A319
 ETA: 10/03/2013 9:14:00 PM
 Altitude: 35000
 Speed: 515
 Arrival Gate: 813

Exelis Contact Information

Chris Zanardi

Director of Sales and Marketing
Commercial Aviation Solutions
Civil & Aerospace
Exelis Inc.

12930 Worldgate Drive
Herndon, VA 20170

703.668.6572 - Office

703.300.4523 - Mobile

Christopher.Zanardi@exelisinc.com

www.exelisinc.com