

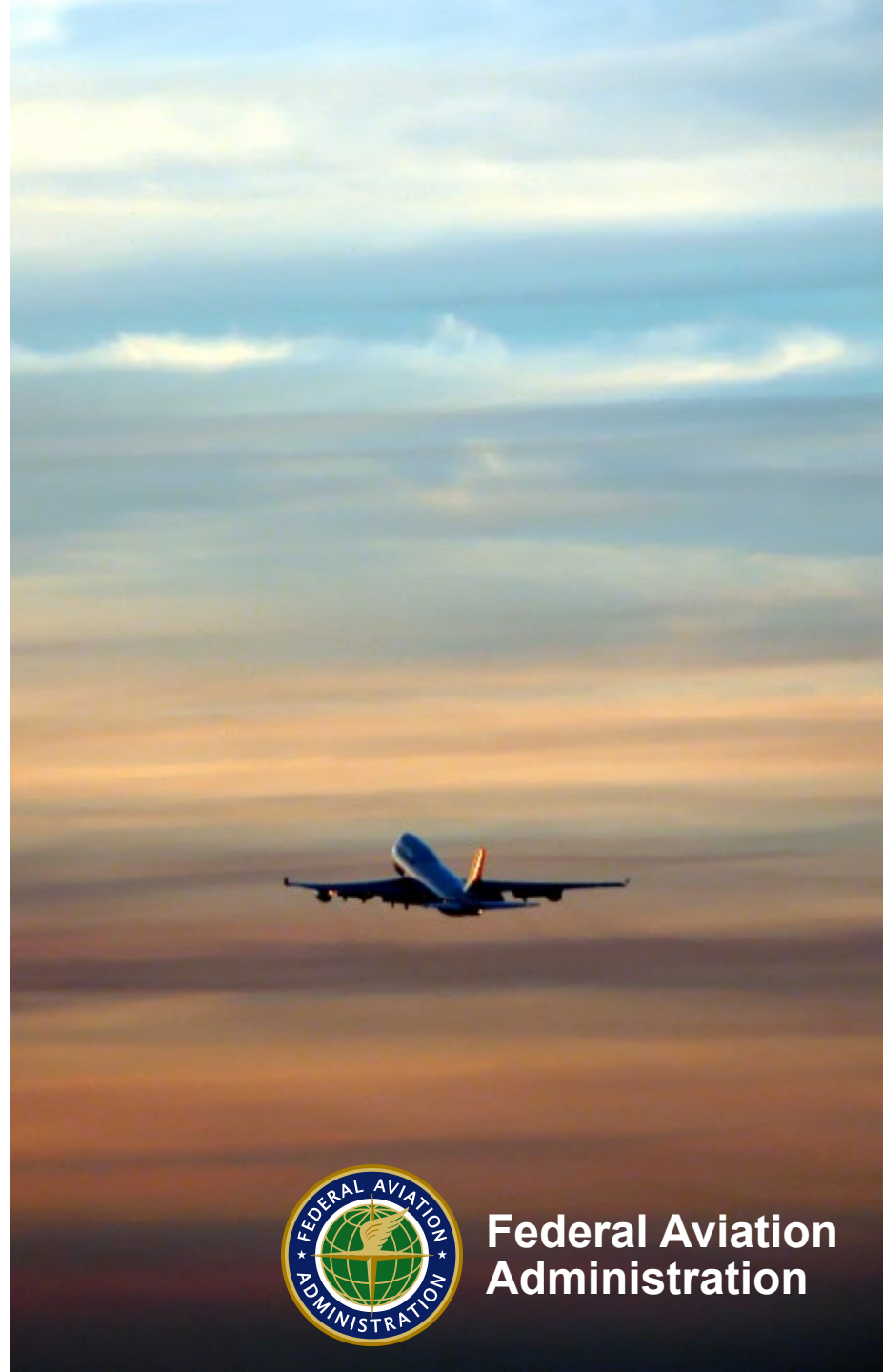
Surveillance & Broadcast Services Advanced Surveillance Enhanced Procedural Separation (SBS ASEPS)

Informal South Pacific ATC Coordinating Group (ISPACG)

Presented to: ISPACG/36
By: FAA Project Management
Organization
Date: August 16-18, 2022



**Federal Aviation
Administration**

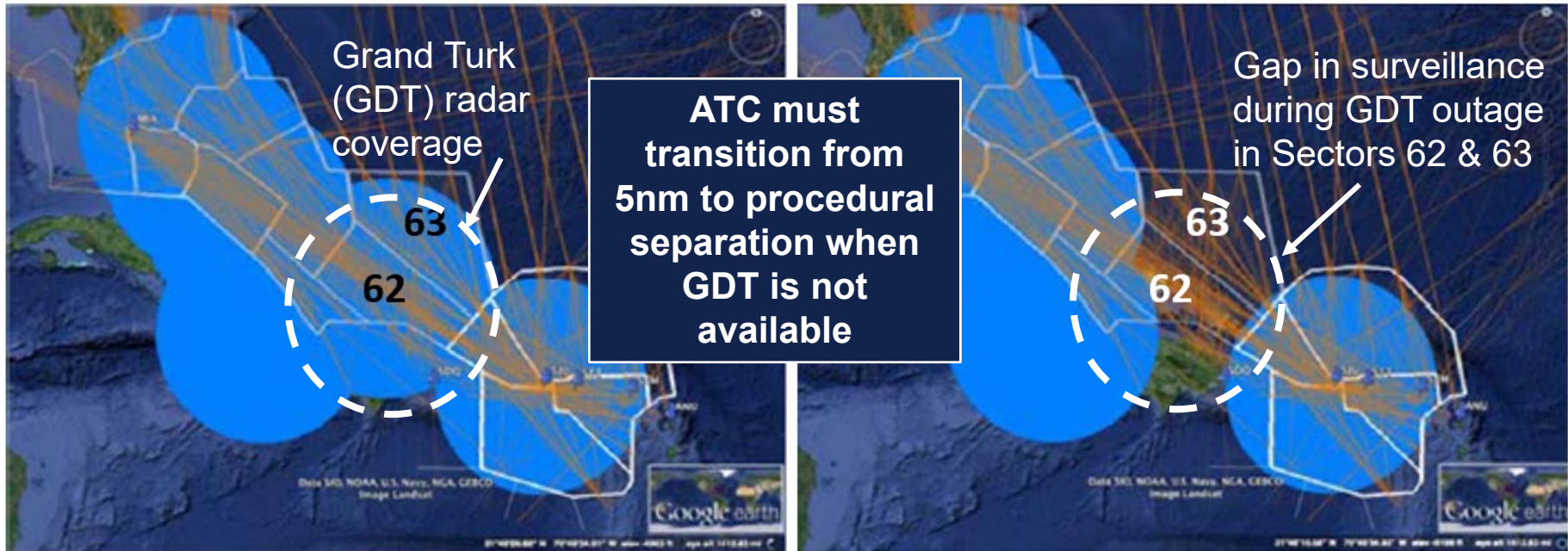


ASEPS Evaluation Scope – 3 SBA Evaluations

Activity	Purpose	Outcome	Status
1. One-year operational assessment in Caribbean	<ul style="list-style-type: none"> Assessed performance and benefits of SBA for 5nm separation 	<ul style="list-style-type: none"> Concluded does not meet requirements for 5nm separation in Caribbean Identified key limitations to using SBA 	COMPLETED: April 2021
2. Evaluation of SBA Data for FAA-wide use	<ul style="list-style-type: none"> Looked at use cases and benefits of SBA data across the entire agency, including five lines of business 	<ul style="list-style-type: none"> Identified agency wide benefits, data requirements, and completed high-level ROM value. Identified SBA data domains for future investment 	COMPLETED: August 2021; Data purchased through February 28, 2022
3. Data evaluation with all three U.S. Oceanic Air Traffic Control Facilities for use on ATOP	<ul style="list-style-type: none"> Explore system performance & identify benefits of new SBA applications in U.S. Oceanic Airspace Work with ICAO to identify requirements 	<ul style="list-style-type: none"> Initial analysis suggests SBA may support reduced oceanic separation in certain airspace, but mitigations will be required 	IN PROGRESS: Progressing towards Investment Analysis Readiness Decision (IARD) in late FY22



Caribbean Evaluation Overview



- **Scope:**
 - Conduct an Operational Evaluation of SBA using En Route Automation Modernization (ERAM) in the Caribbean to assess technical performance and operational benefits of SBA
 - Focused on current operational environment where VHF communication exists
- **Anticipated outcomes:**
 - Measure SBA performance (e.g., latency, update rate, outage duration)
 - Requirements for potential automation changes based on technical performance evaluation
 - Potential opportunities for continued use of SBA in the Caribbean and SBA expansion to other areas

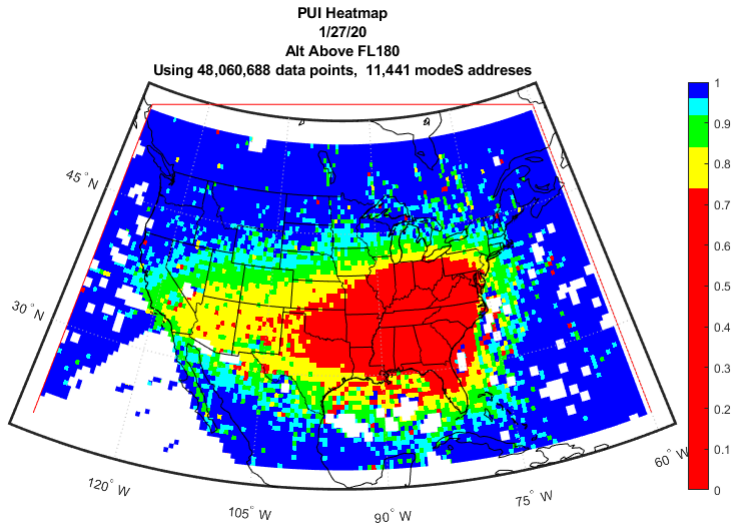


Caribbean Evaluation: Summary of Outcomes

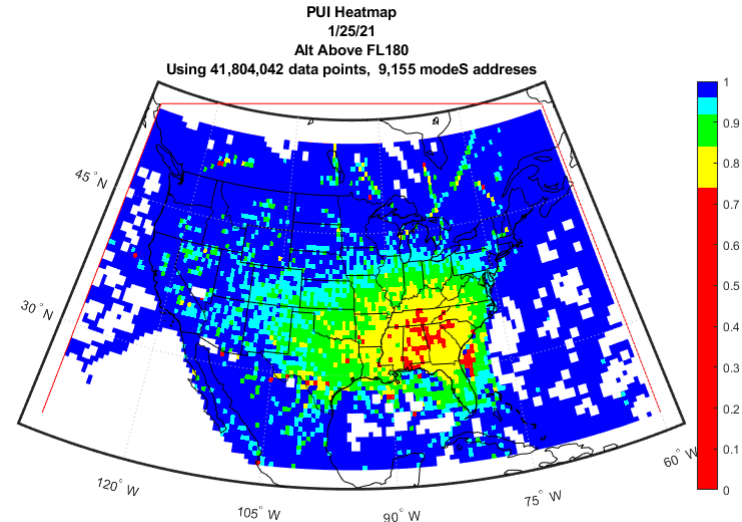
- In April 2021, the FAA completed a successful first look at SBA in the Caribbean
- Based on performance limitations the FAA was not able to bring the service operational. However, this effort yielded valuable information about SBA performance in a complex airspace faced with:
 - High traffic volume
 - Varying levels of equipage
- **ADS-B Equipage Constraints:**
 - SBA works only with 1090ES equipped aircraft and does not detect 40,736 Universal Access Transceiver (UAT)-equipped aircraft currently registered to operate within U.S. airspace
 - Bottom-mounted antenna placement on aircraft further degrades SBA detection capabilities for 1090ES equipped aircraft
- **Additional factors that limited SBA performance:**
 - Spectrum congestion
 - Single satellite coverage at lower latitudes
 - Low power top antenna
 - Unknown transponder performance issues that are more pronounced due to radio frequency characteristics (i.e., link margin)



SBA Challenges: Spectrum Congestion



SBA PUI 8 sec for 1/27/20

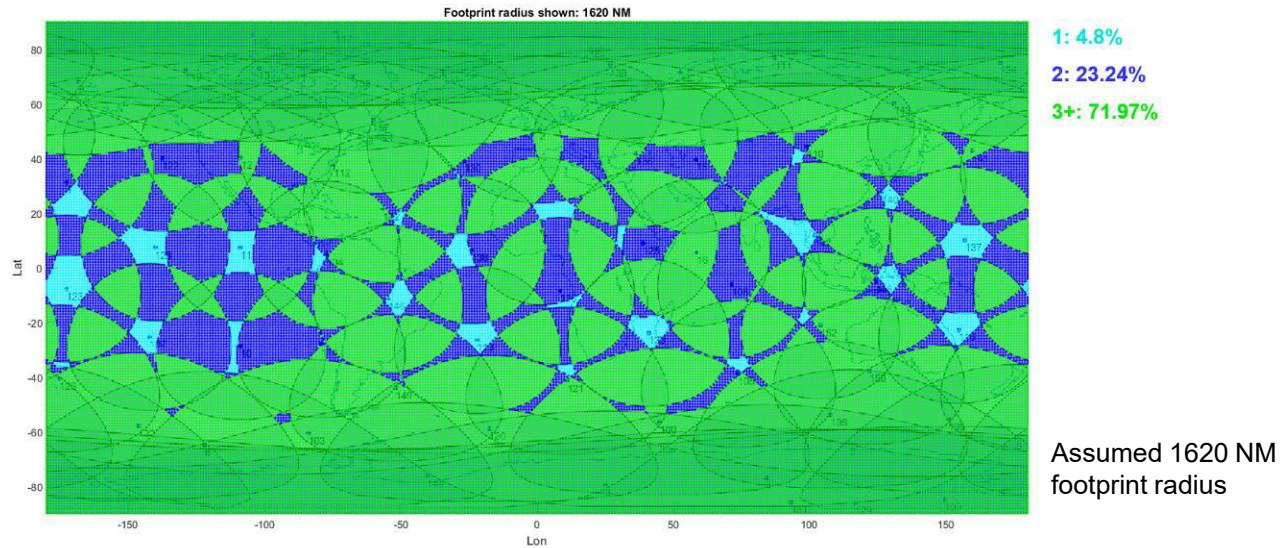


SBA PUI 8 sec for 1/25/21

- **Spectrum congestion adversely affects SBA reception**
- **Caused by dense 1090MHz broadcasts**
 - ADS-B, replies to radar interrogations and TCAS/ACAS-X
- **Spectrum congestion worst in areas of high traffic combined with dense radars**
 - Affects SBA performance in oceanic areas near to congested areas (e.g., Caribbean and Western New York Oceanic (WATRS) regions)



SBA Challenges: Single Satellite Coverage



- Areas of single satellite coverage may contribute to poor update performance in combination with spectrum congestion or aircraft avionics deficiencies
- Multiple satellites in view provide more reception opportunities
- Higher latitudes provide more footprint overlap



Oceanic Evaluation: Summary of Outcomes

- **Different update requirement but see similar factors that impact performance**
- **Although performance is better in Oceanic Airspace, mitigations would be required:**
 - Implementation of an exclusion list
 - Continuous airspace monitoring
 - Used in combination with additional surveillance sources in certain airspace



SBA Performance for Oceanic Service Volumes

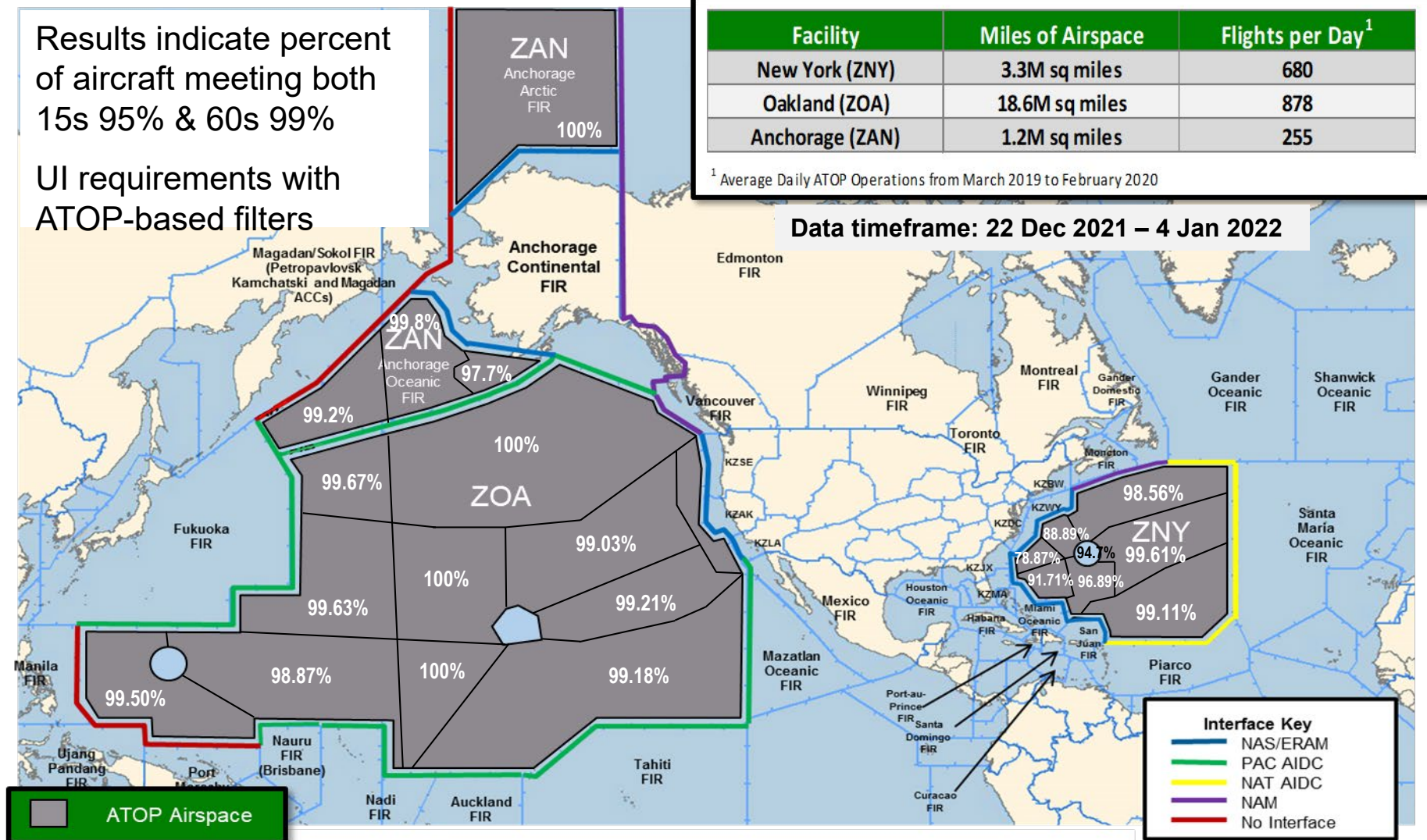
Results indicate percent of aircraft meeting both 15s 95% & 60s 99%

UI requirements with ATOP-based filters

Facility	Miles of Airspace	Flights per Day ¹
New York (ZNY)	3.3M sq miles	680
Oakland (ZOA)	18.6M sq miles	878
Anchorage (ZAN)	1.2M sq miles	255

¹ Average Daily ATOP Operations from March 2019 to February 2020

Data timeframe: 22 Dec 2021 – 4 Jan 2022



Data timeframe: 28 May 2021 – 27 June 2021



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ICAO and Other ANSPs

- **ASEPS Program Office met with ICAO SASP on Sept 20th, 2021:**
 - Discussed the FAA's interpretation of requirements and observations of SBA performance
 - Reviewed ANSPs' performance and experience with SBA for air traffic control
 - Participating ANSPs: NavCanada, NATS UK, Isavia, and CAA Singapore
- **Key Take-Aways:**
 - Most ANSPs are using more stringent SBA performance requirements than the FAA for Oceanic reduced separation
 - ANSPs are seeing similar performance limitations in airspace impacted by spectrum congestion
 - Most ANSPs accept SBA performance limitations and add requirements to accommodate non-performing aircraft impacts on their operations:
 - Exclusion list to remove aircraft
 - Use SBA for reduced separation only with other surveillance
 - Rules for requiring aircraft with antenna pointed upward



Next Steps

- **Complete Oceanic data analysis and document findings**
- **Continue industry coordination**
 - Partnering with Airlines for America (A4A) to review non-performing aircraft after meeting in July 2022
 - Will meet with ICAO virtually in early Summer and in-person early Fall
- **Continue to develop artifacts for FAA investment decision points**
 - IARD planned for September 2022 (key decision point for continuing to bring SBA forward)



Backup



Potential Investment of SBA – Three Domains




Archived Data

- Data used in post-event
- Highest Resolution
- Global dataset
- Examples include:
 - Safety Analysis
 - Accident Investigation
 - Environmental Analysis
 - Shortfall Analysis
 - Concept and Tools Development



Real-Time Non-Separation Data

- Data live streamed into Air Traffic Management Systems or tools
- Highest Resolution
- Global dataset
- Examples include:
 - Search and Rescue
 - ATOP Failure Mode for Situational Awareness
 - Space Launch Monitoring
 - Accident Investigation



Real-Time Separation Data

- Data fed to an Automation System
- Highest Resolution and Availability
- U.S. Oceanic dataset
- Examples Include:
 - Applications of reduced oceanic separation



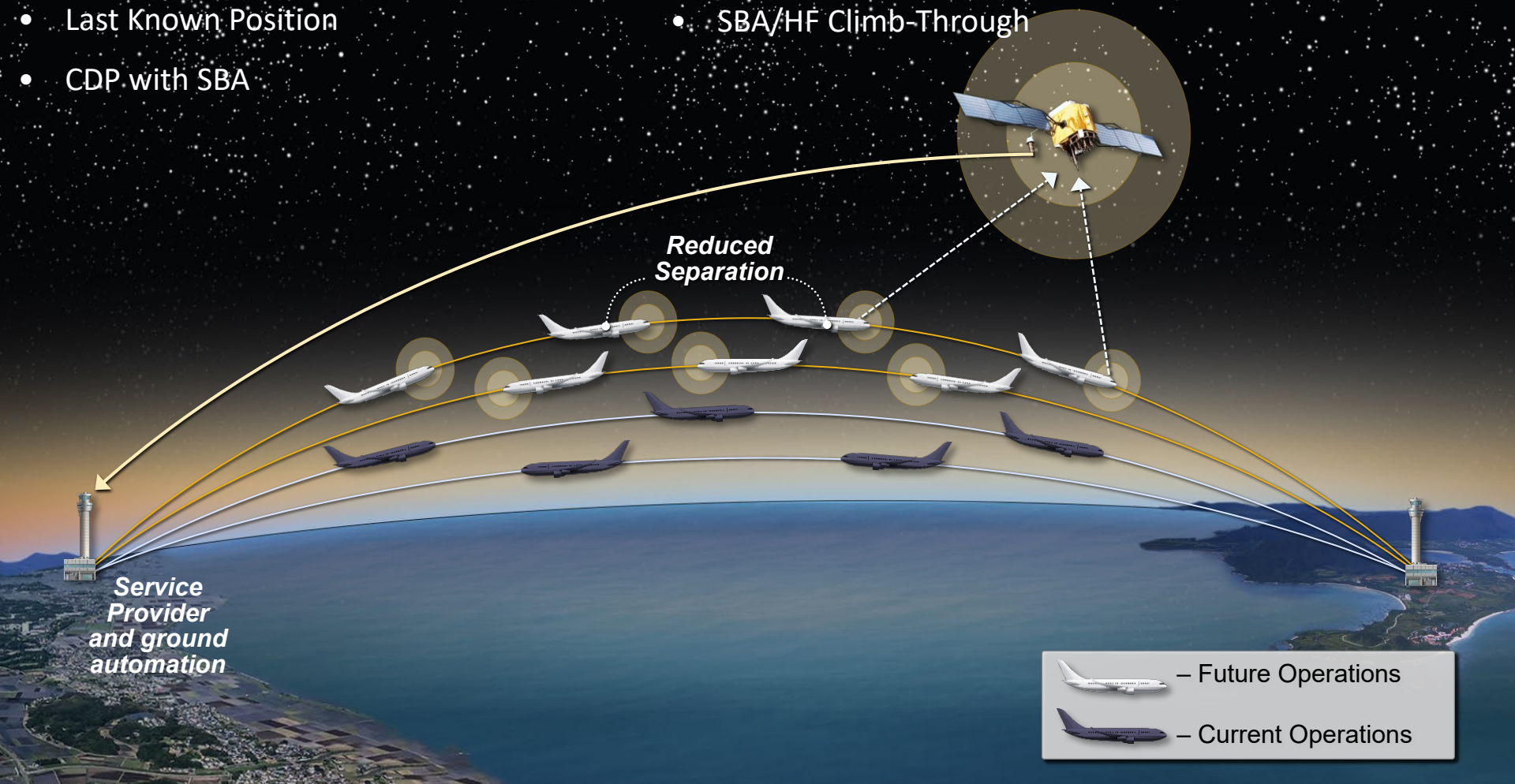
Description and Scope of SBA Domain Initiatives

	Archived Data	Real-Time Non-Separation Data	Real-Time Separation Data
Current Operation	Limited or no analysis due to surveillance gaps	Limited situational awareness	Current oceanic separations
New Operation	More complete or new analyses	Enhanced situational awareness	Reduced oceanic separations
Implementation Timeframe	Once contract and data interface are in place	Once contract and data interface are in place	ATOP implementation in 2026 to 2028
Delivery Method	GovCloud (federal government cloud service)	Vendor tool or Service Delivery Point on Operational Network	Service Delivery Point on Operational Network



SBA Oceanic Applications for Use on ATOP

- 19NM Lateral & 17nm/14nm Longitudinal
- ADS-B Selected Altitude
- Last Known Position
- CDP with SBA
- SBA/HF Separation Standard
- SBA/HF Reduced Crossing
- SBA/HF Climb-Through



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