Automatic Dependent Surveillance – Broadcast OUT Implementation Meeting for the NAM/CAR Regions (ADS-B/OUT/M)

21 – 23 August 2019
Ottawa (Canada)

Summary

- Leonardo Overview
- Air Traffic Management Portfolio
- ADS-B Recent Experiences
- Leonardo Road to Aviation System Block Upgrades
- ADS-B Integration in ATM
- Examples of Potential Improvement

Leonardo Overview and ATM Portfolio

Leonardo, a Global Player

Leonardo is a global company in the **Aerospace**, **Defence** and **Security** sectors, with an integrated offer of high-tech and dual-use solutions.

DIVISIONS

- **Helicopters**

- **Aircraft**

- **Aerostructures**

- **Electronics**

- **Cyber Security**

MAIN SUBSIDIARIES AND JOINT VENTURES

- **Leonardo DRS** (100% Leonardo)
- **Telespazio** (67% Leonardo and 33% Thales)
- **Thales Alenia Space** (67% Thales and 33% Leonardo)
- **MBDA** (37.5% BAE Systems, 37.5% Airbus Group, 25% Leonardo)
- **ATR** (50% Leonardo and 50% Airbus Group)
- **Vitrociset** (100%)
- **Selex ES Inc**. (100%)
- **Leonardo Germany GmbH** (100%)

Air Traffic Management Portfolio

Surveillance

A wide range of products covering PSR, MSSR, SMR, ADS-B, Multilateration including transportable solution

Air Traffic Management

Reliable, expandable and integrated command and control with capability of system architecture for state of art systems. Backup, Disaster & Recovery, Simulator and transportable systems complete the offer

Ground to air voice and data multi-mode communication systems, as well as datalink (VDL2 Ground Station) and AeroMACS broadband ground datalink

Communication

Navigation Aids and Weather Radar

Complete line of ground-based radio navigation and landing aids including DVOR, DME, ILS and TACAN. Design, manufacture and installation of weather radar sensors and systems.

Security by design assured on all the products delivered and services for cyber prevention and analysis provided by State-of-art Security Operational Center

Cyber ATM

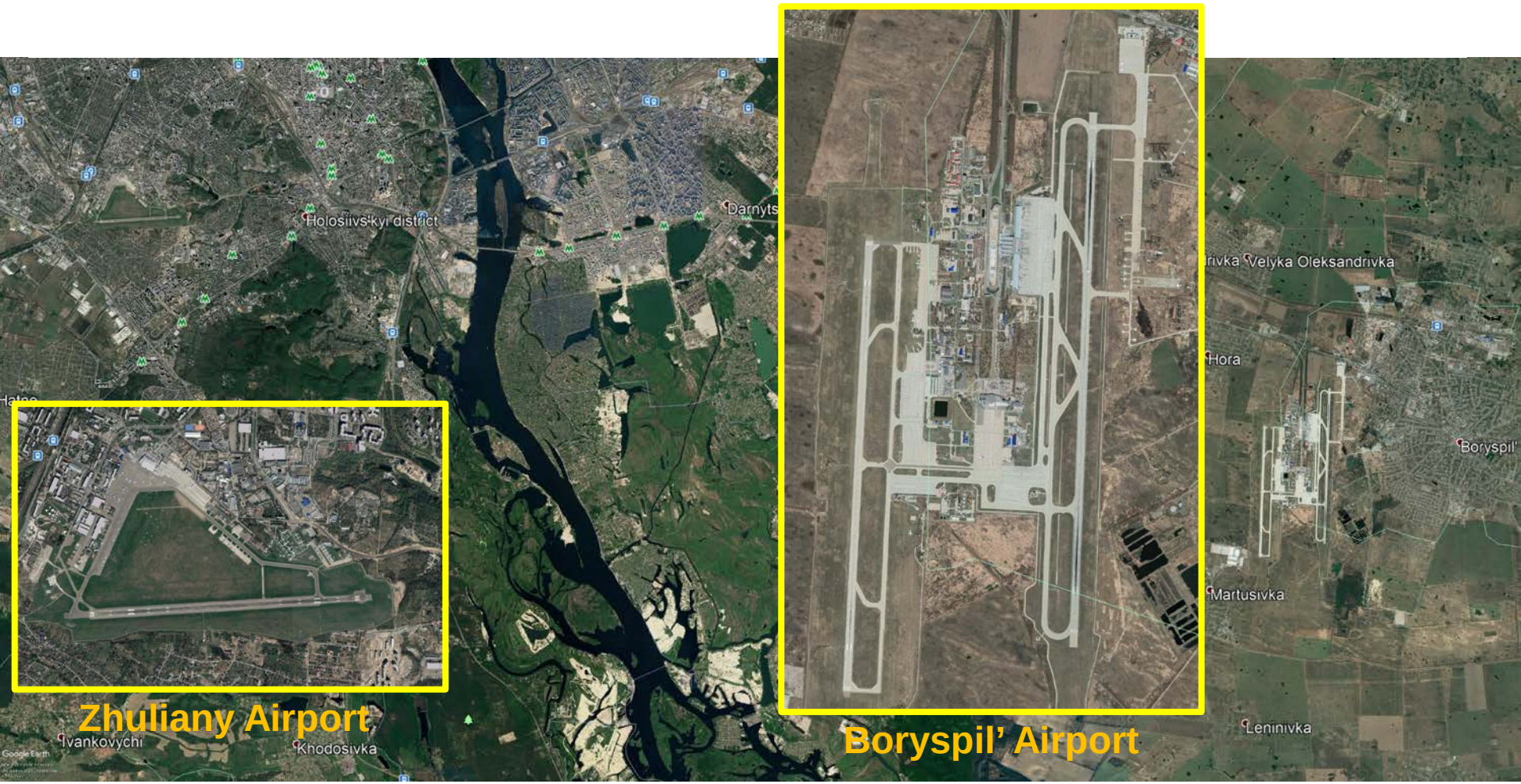
UTM

Unmanned Traffic Management for surveillance of U-Space with new technology and traffic management concept

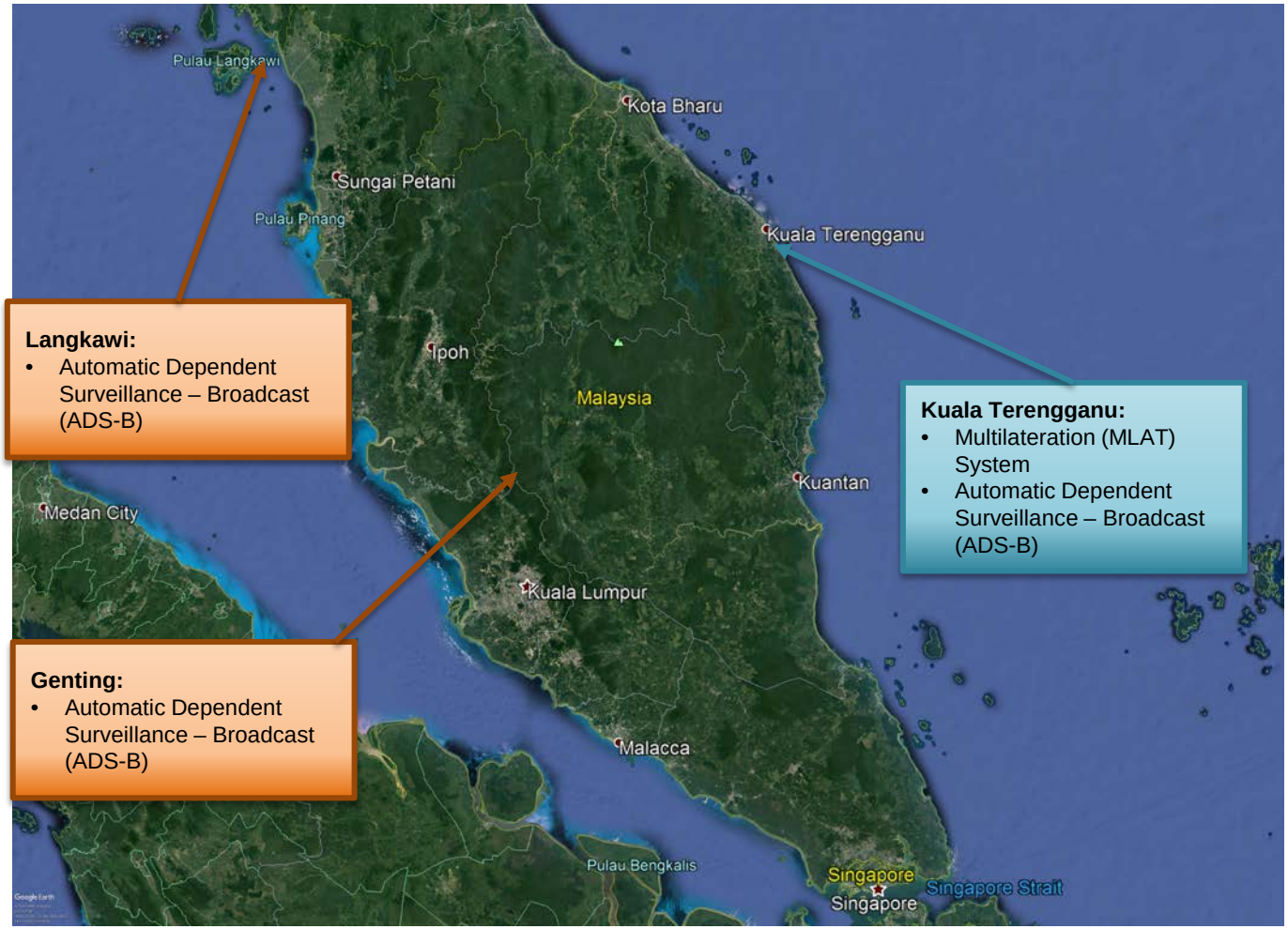
ADS-B Recent Experiences

Ukraine Kyiv Boryspil' and Zhuliany Airports

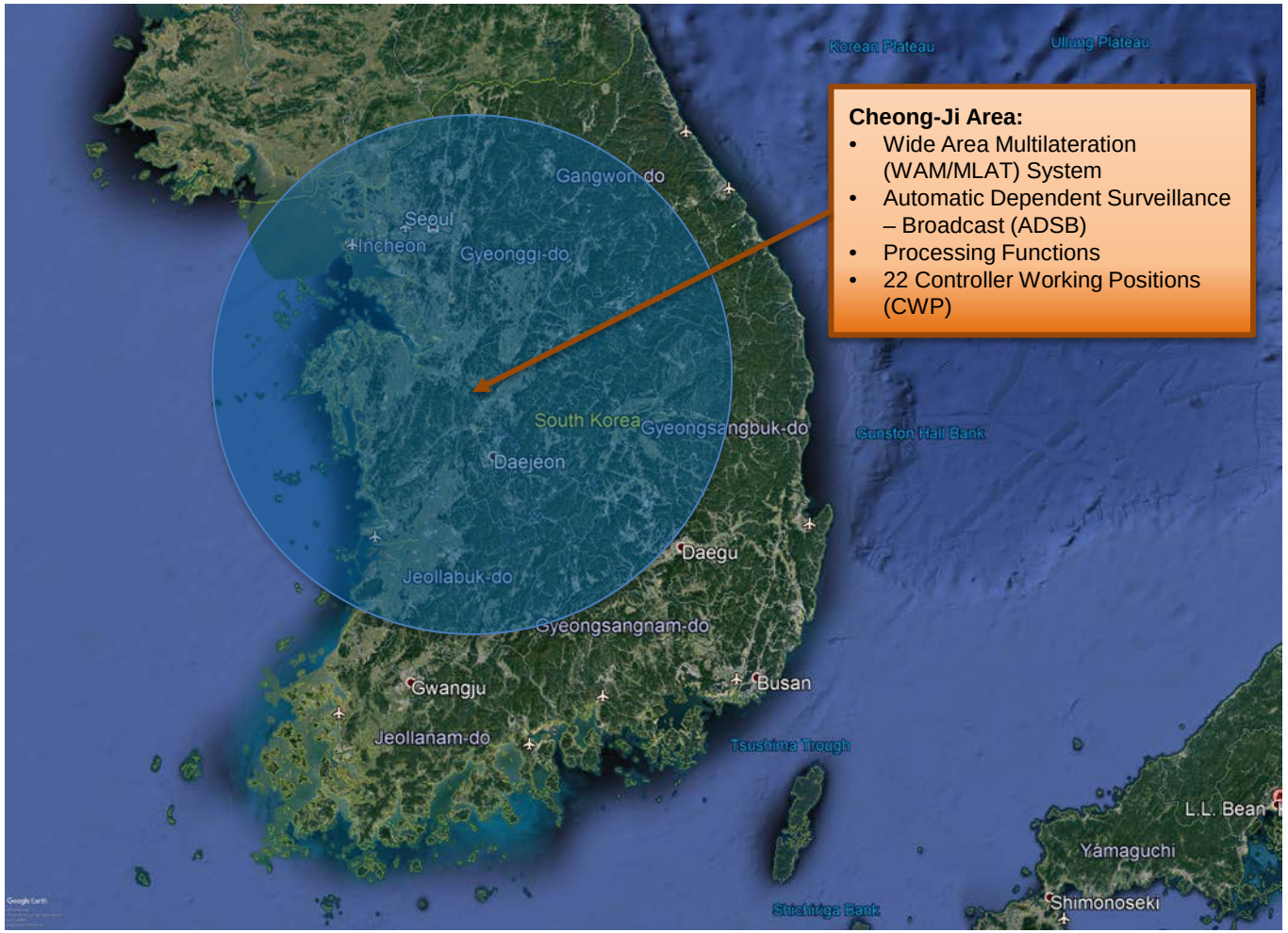
Zhuliany is currently under upgrade to extend MLAT coverage up to 100NM



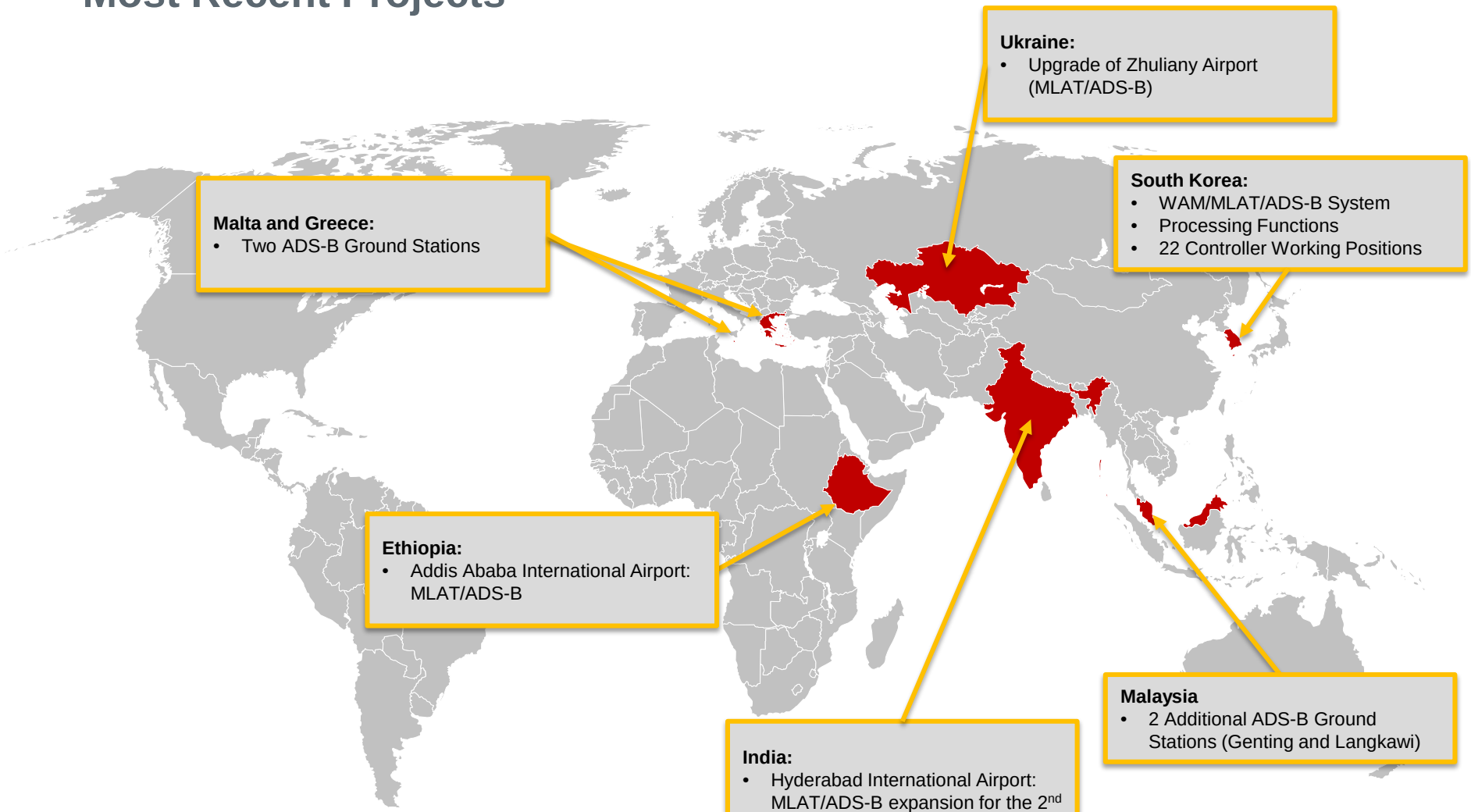
Malaysia – New Kuala Lumpur ATC Centre



South Korea – Cheong-Ju Area WAM/MLAT/ADS-B

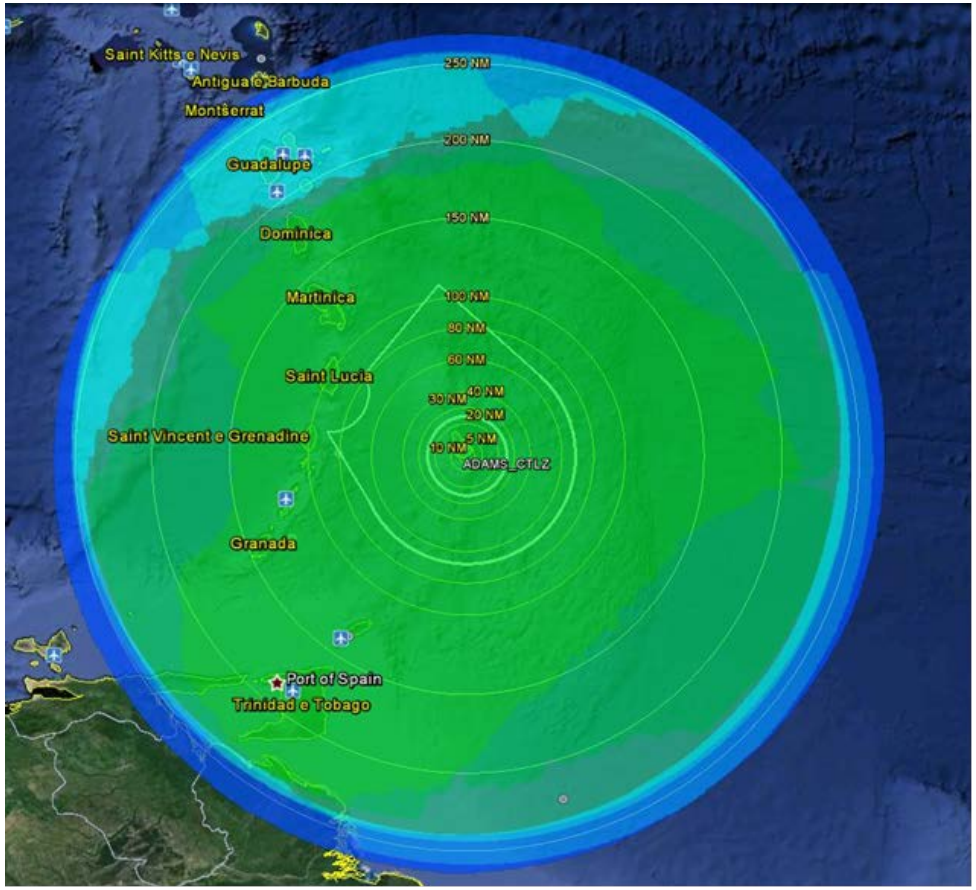


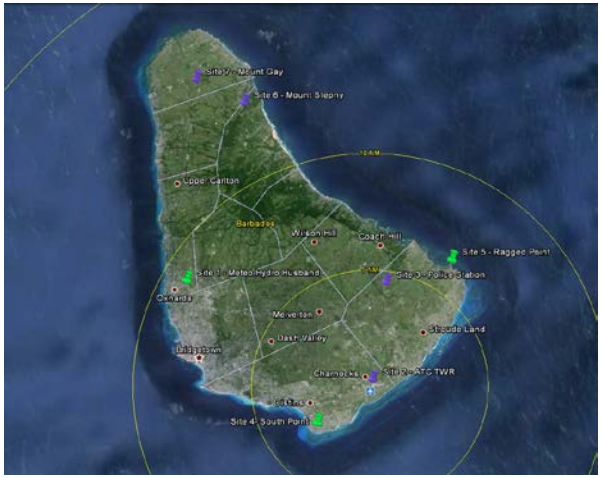
Most Recent Projects



Barbados ATM /WAM / MLAT ADS-B System

- Site Acceptance Tests October-November 2018
- Operational Transition: June 2019





Leonardo Road to Aviation System Block Upgrades

LeadInSky System

Anticipating the Future Standards – ICAO ASBU

Leonardo fulfilled Block 0 Modules providing technologies and functionalities which are already implemented, deployed and in operation.

Leonardo is evolving LeadInSky components in order to deploy all the Modules of Block 1 ICAO roadmap while some of them are already in operation.

Within R&D programmes (e.g. SESAR 2020, GAMMA) Leonardo is validating the technical solutions to support the Operational Concepts of Block 2/3 Modules.

LeadInSky System

Anticipating the Future Standards – ICAO ASBU

Performance Improvement Area 1: Airport Operations

		STATUS
B0	***B0-SURF*: Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)**	**In Operation**
	B0-RSEQ: Improved Traffic Flow through Sequencing (AMAN/DMAN)	In Operation
	B0-ACDM: Improved Airport Operations through Airport-CDM	In Operation
B1	***B1-SURF*: Enhanced Safety and Efficiency of Surface Operations - SURF, SURF IA and Enhanced Vision Systems (EVS)**	**In Progress**
	B1-RSEQ: Improved Airport Operations through Departure, Surface and Arrival Management	In Progress

LeadInSky System

Anticipating the Future Standards – ICAO ASBU

Performance Improvement Area 2: Globally Interoperable Systems and Data

		STATUS
B0	*B0-FICE: Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration*	In Operation
	B0-AMET: Meteorological information supporting enhanced operational efficiency and safety	In Operation
	B0-DATM: Service Improvement through Digital Aeronautical Information Management	In Operation
B1	*B1-FICE: Increased Interoperability, Efficiency and Capacity though FF-ICE, Step 1 application before Departure*	In Progress
	B1-AMET: Enhanced Operational Decisions through Integrated Meteorological Information (Planning and Near-term Service)	In Progress
	B1-DATM: Service Improvement through Integration of all Digital ATM Information	In Progress
	B1-SWIM: Performance Improvement through the application of System-Wide Information Management (SWIM)	In Progress

LeadInSky System

Anticipating the Future Standards – ICAO ASBU

Performance Improvement Area 3: Optimum Capacity and Flexible Flights

		STATUS
B0	***B0-ASUR*: Initial Capability for Ground Surveillance**	**In Operation**
	***B0-SNET*: Increased Effectiveness of Ground-based Safety Nets**	**In Operation**
	B0-FRTO: Improved Operations through Enhanced En-Route Trajectories	In Operation
B1	***B1-SNET*: Ground-based Safety Nets on Approach**	**In Operation**
	B1-FRTO: Improved Operations through Optimized ATS Routing	In Operation
	B1-ASEP: Increased Capacity and Efficiency through Interval Management	Completed

LeadInSky System

Anticipating the Future Standards – ICAO ASBU

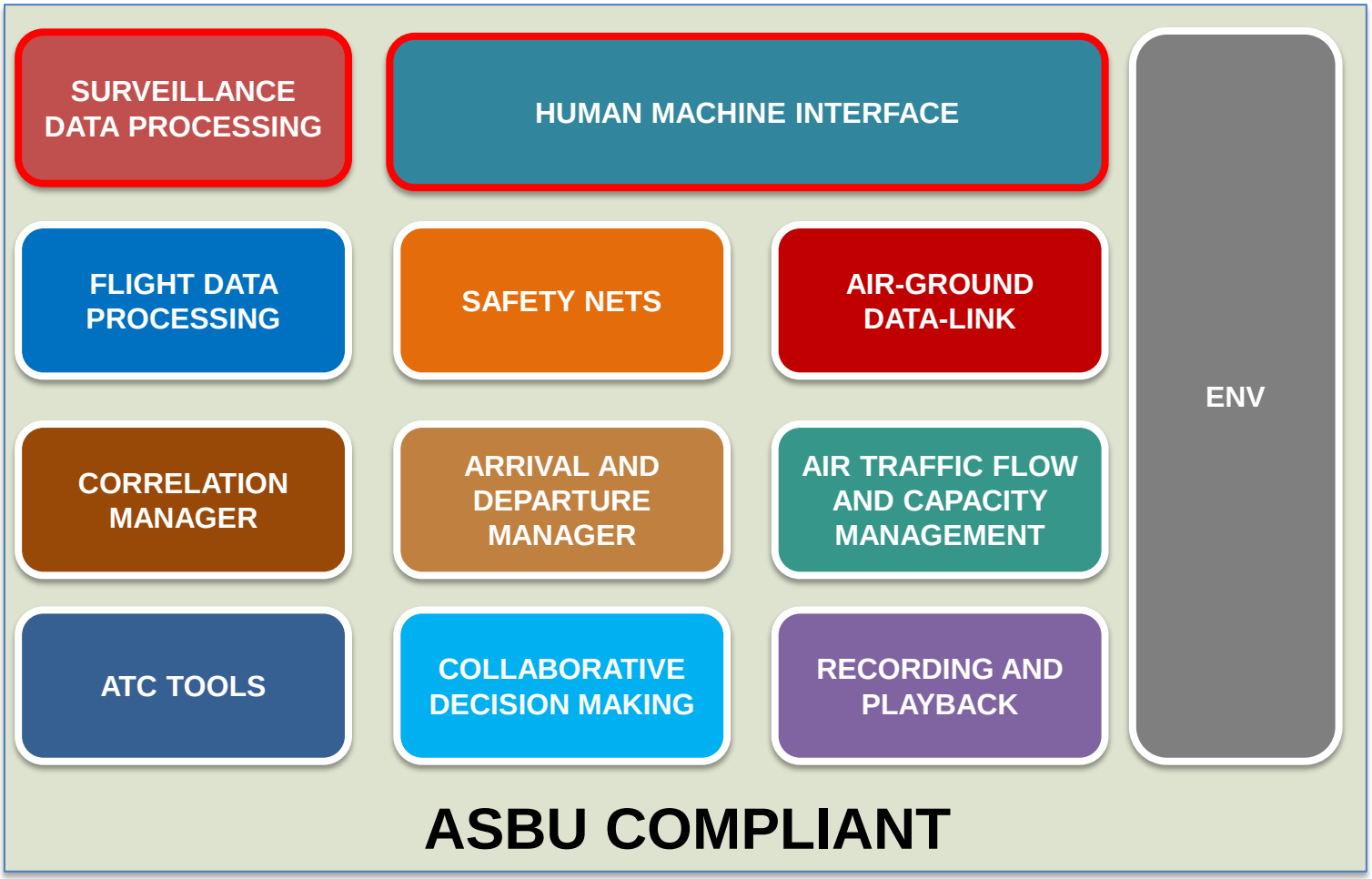
Performance Improvement Area 4: Efficient Flight Paths

		STATUS
B0	*B0-TBO: Improved Safety and Efficiency through the initial application of Data Link En-Route*	In Operation
	B0-CDO: Improved Flexibility and Efficiency in Descent Profiles (CDO)	In Operation
	B0-CCO: Improved Flexibility and Efficiency in Departure Profiles - Continuous Climb Operations (CCO)	In Operation
B1	*B1-TBO: Improved Traffic Synchronization and Initial Trajectory-Based Operation*	In Progress
	B1-CDO: Improved Flexibility and Efficiency in Descent Profiles (CDOs) using VNAV	In Progress

ADS-B Data Integration in ATM

LeadInSky ATM System

State-of-the-Art ATC Applications – Impact of New Surveillance Source



ADS-B Integration in ATM: a Long Experience

- Two shadow-mode ATC centers (Rome, Padua) with live traffic and flight plan data and data link ATS applications (ADS-B, TIS-B, CPDLC)
- Three STDMA/VDL Mode 4 ground stations (Rome, Padua, Brindisi)
- Three equipped aircrafts (3 Alitalia MD-80)

FARAWAY

Fusion of **A**DS and **Ra**dar Data Through a Two **Way** Data-Link

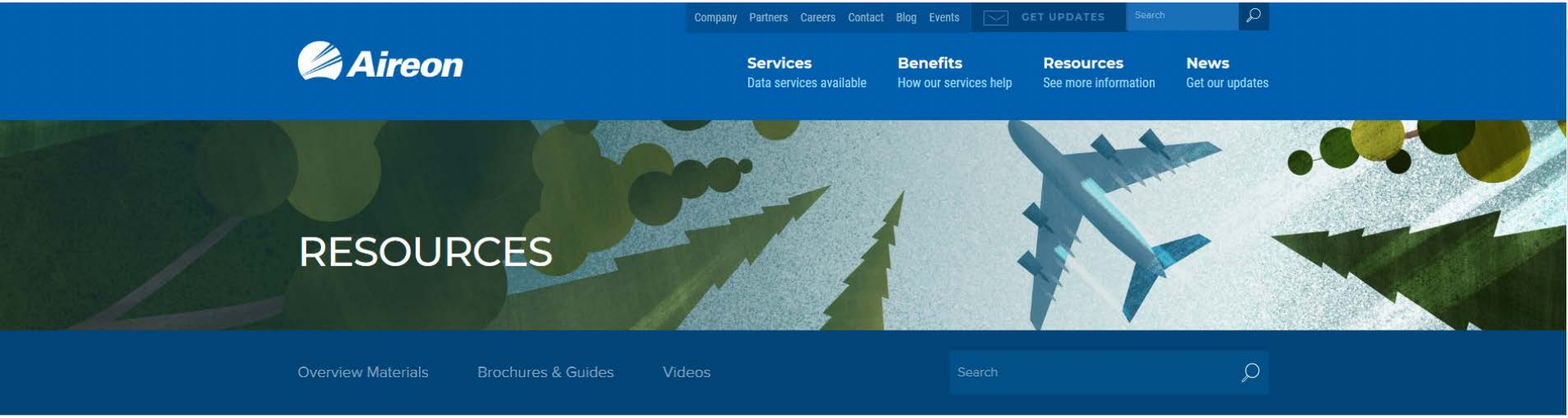
1997

1090 ADS-B, MLAT, WAM

2019

SPACE BASED ADS-B

Space Based ADS-B



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It's Just ADS-B

Aireon's space-based global surveillance system is just Automatic Dependent Surveillance-Broadcast (ADS-B) on a satellite. Instead of utilizing traditional radio receiver towers on the ground, Aireon has redesigned them into flexible and highly effective space-grade receivers on Iridium's second generation satellite constellation, Iridium NEXT. This allows for 100 percent global surveillance using the same ADS-B signal that aircraft already transmit.

What is ADS-B?

Related Articles

Technical Specifications

Space-based ADS-B provides unparalleled global surveillance coverage to receive and process ADS-B signals broadcast from aircraft equipped with 1090 MHz ADS-B transponders, which operate on the same frequency as traditional Mode A/C/S transponders, including DO-260, DO-260A and DO-260B (Link Versions 0, 1 and 2, respectively), as well as DO-

LeadInSky ATM System

State-of-the-Art ATC Applications – Space Based ADS-B Data Integration

- LeadInSky merges data from a variety of sources to display air traffic during all flight phases.
- Integrating Space Based Automatic Dependent Surveillance - Broadcast (ADS-B) feed will provide air navigation providers (ANSPs) with precise aircraft positions in remote and oceanic airspace, supporting dynamic routing to optimize flights.
- MoU between Leonardo and Aireon signed in September 2018
- Simulation with Aireon data has been presented at World ATM Congress 2019 in Madrid

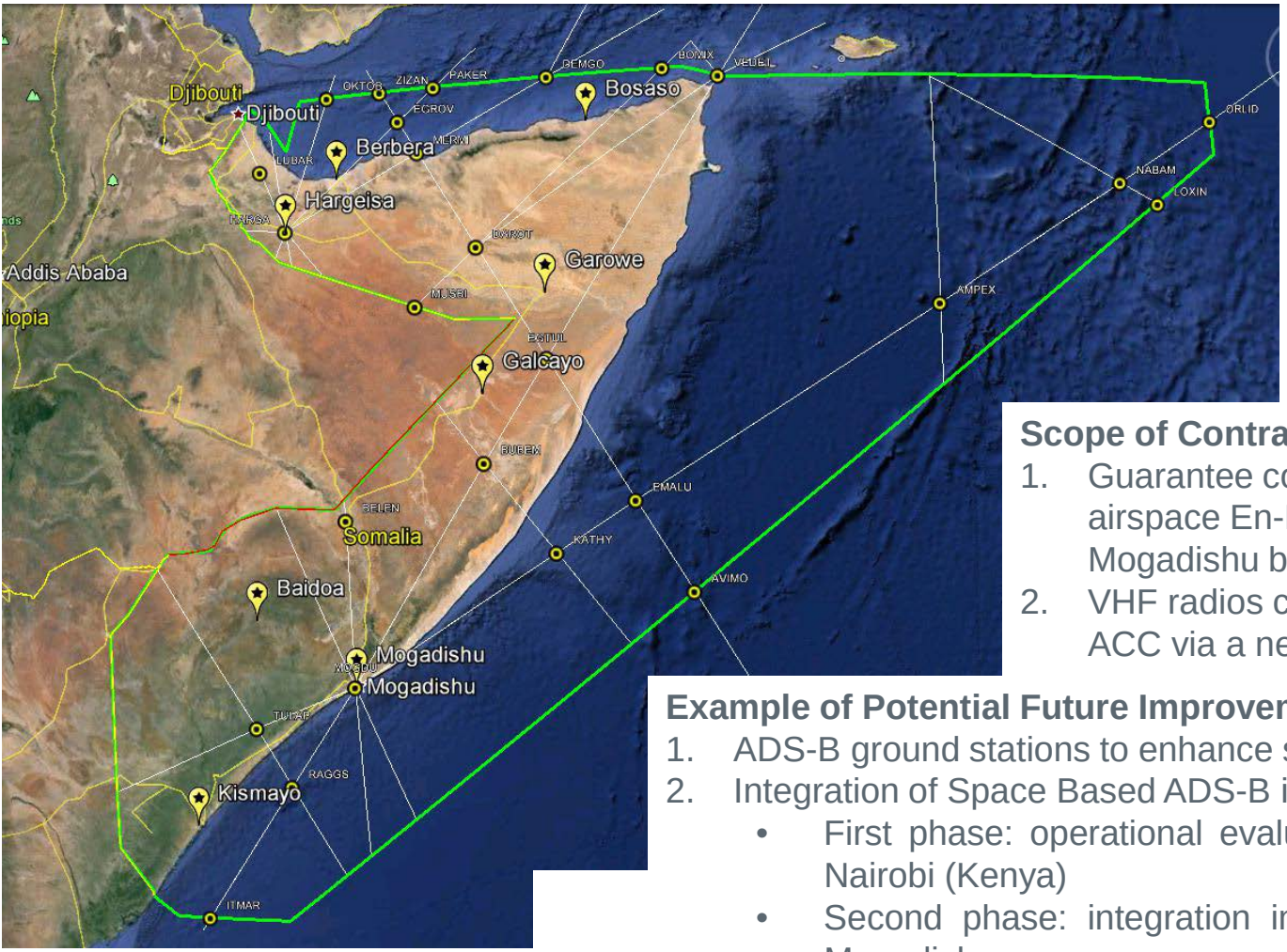
Examples of Potential Future Improvement

LeadInSky ATM System

Potential Benefits of Space Based ADS-B Data Integration with Leonardo for the CAR Region

- LeadInSky platform will be installed in Piarco ACC within 2019
- Trinidad combined Multiradar data flow provides interoperability for regional (Radar) data sharing by providing a source for distribution over the Eastern Caribbean Multi-Protocol Label Switch (MPLS) Network
- The data sharing, tailored to the operational need of the Eastern Caribbean Radar Data Sharing Group, bring to the following benefits: *heterogeneous surveillance data integration*, resilience against failures, well-proven solution, ready to be expanded
- **The Integration of Space Based ADS-B would improve the coverage of the Surveillance service in Piarco ACC and the Eastern Caribbean MPLS Network Users could benefit of this improvement**

Somalia Project (ICAO – TCB Contract)



Scope of Contract:

1. Guarantee coverage for the oceanic airspace En-Route operations around Mogadishu by ADS-C and CPDLC
2. VHF radios connected with Mogadishu ACC via a new VSAT network

Example of Potential Future Improvement:

1. ADS-B ground stations to enhance surveillance coverage
2. Integration of Space Based ADS-B in the Mogadishu ACC
   - First phase: operational evaluation with a test-bed in Nairobi (Kenya)
   - Second phase: integration in the operational site in Mogadishu

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THANK **YOU**
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