



| ICAO

CAPACITY & EFFICIENCY

GLOBAL AIR NAVIGATION SURVEILLANCE CONSIDERATION

MAYDA ÁVILA

REGIONAL OFFICER

COMMUNICATION, NAVIGATION AND SURVEILLANCE

**NAM/CAR/SAM AUTOMATIC DEPENDENT SURVEILLANCE – BROADCAST
(ADS-B) IMPLEMENTATION MEETING/WORKSHOP
(ADS-B/IMP)**

(Lima, Peru, 13-16 November 2017)





- ✈ ICAO Strategy
- ✈ Global Air Navigation Plan Overview
- ✈ ASBU implementation overview
- ✈ Surveillance related ASBU modules



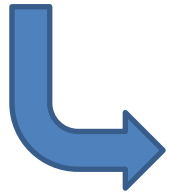


| ICAO

CAPACITY & EFFICIENCY

Global Air Navigation Plan (GANP)

- ICAO's Vision
- Our Mission
- 2017–2019 Strategic Objectives



**Aviation System Block
Upgrades (ASBU),
Modules and Roadmaps**



| ICAO

CAPACITY & EFFICIENCY

2016–2030
Global Air Navigation Plan





| ICAO

CAPACITY & EFFICIENCY

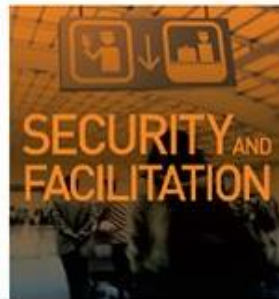
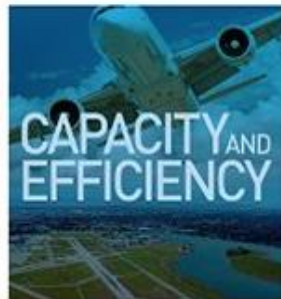
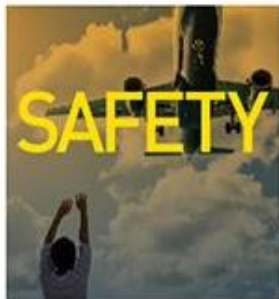
ICAO

✈ **Vision:** Achieve the sustainable growth of the global civil aviation system.

✈ **Mission:** To serve as the global forum of States for international civil aviation. ICAO develops policies and Standards, undertakes compliance audits, performs studies and analyses, provides assistance and builds aviation capacity through many other activities and the cooperation of its Member States and stakeholders.



ICAO STRATEGIC OBJECTIVES



2017–2019 Strategic Objectives

- A. Safety**
Enhance global civil aviation safety.
- B. Air Navigation Capacity and Efficiency**
Increase capacity and improve efficiency of the global civil aviation system.
- C. Security and Facilitation**
Enhance global civil aviation security and facilitation.
- D. Economic Development of Air Transport**
Foster the development of a sound and economically-viable civil aviation system.
- E. Environmental Protection**
Minimize the adverse environmental effects of civil aviation activities.



GANP and ASBU

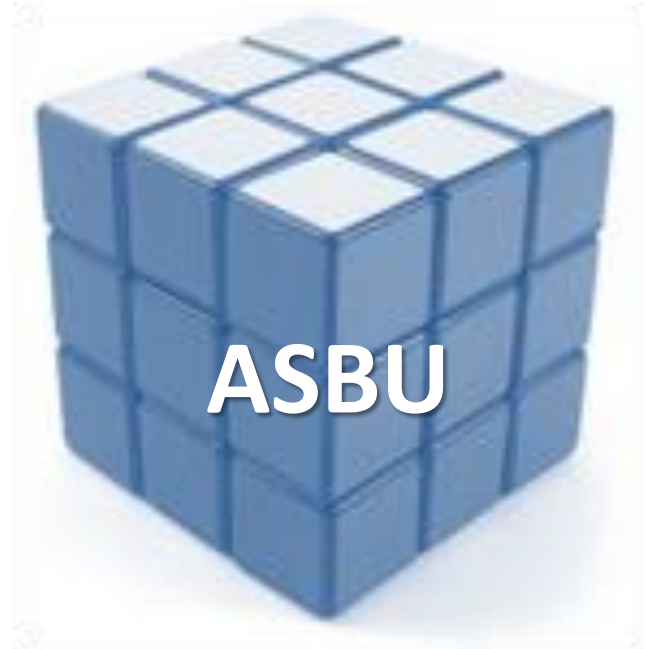


- ✈ The Global Air Navigation Plan's Aviation System Block Upgrades methodology is a programmatic and flexible global systems engineering approach that allows all Member States to advance their Air Navigation capacities based on their specific operational requirements. The Block Upgrades will enable aviation to realize the global harmonization, increased capacity, and improved environmental efficiency that modern air traffic growth now demands in every region around the world.



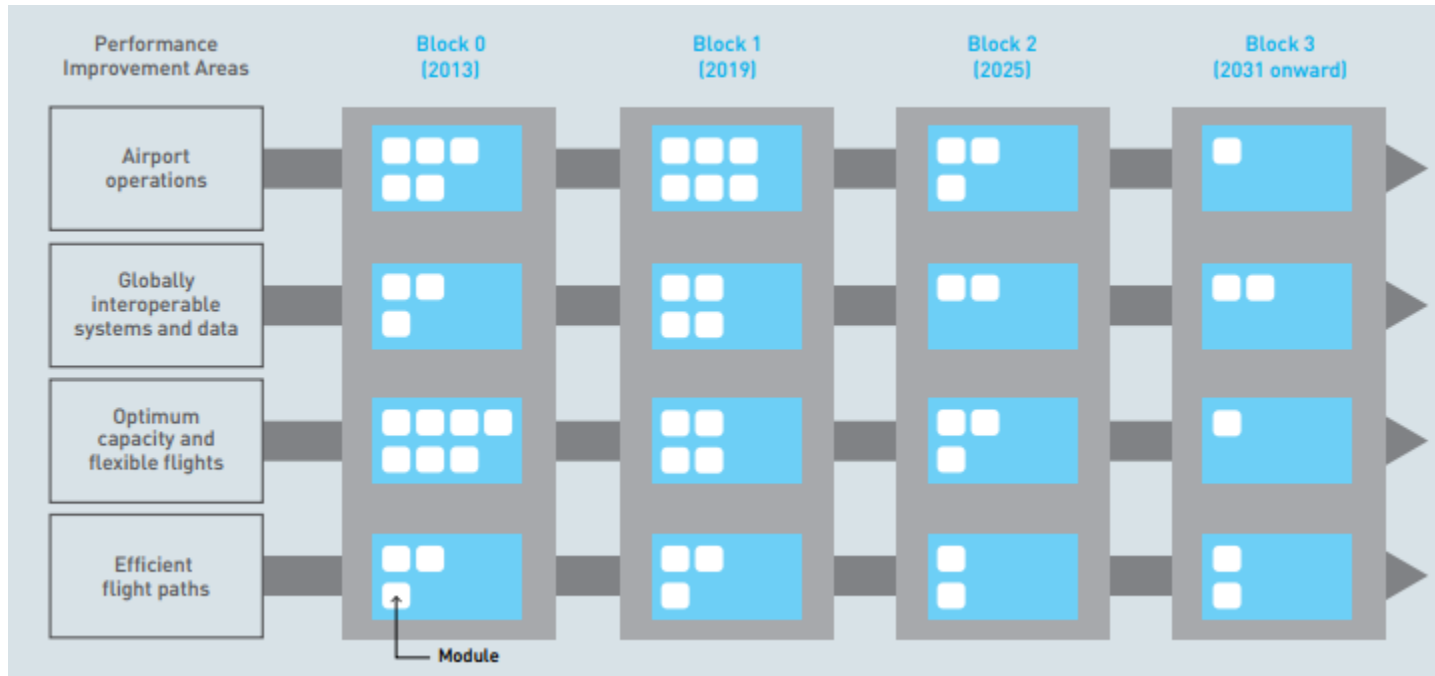
GANP and ASBU

- ✈ The ICAO GANP established internationally agreed phases implementation of the new technologies and capabilities through ASBU.



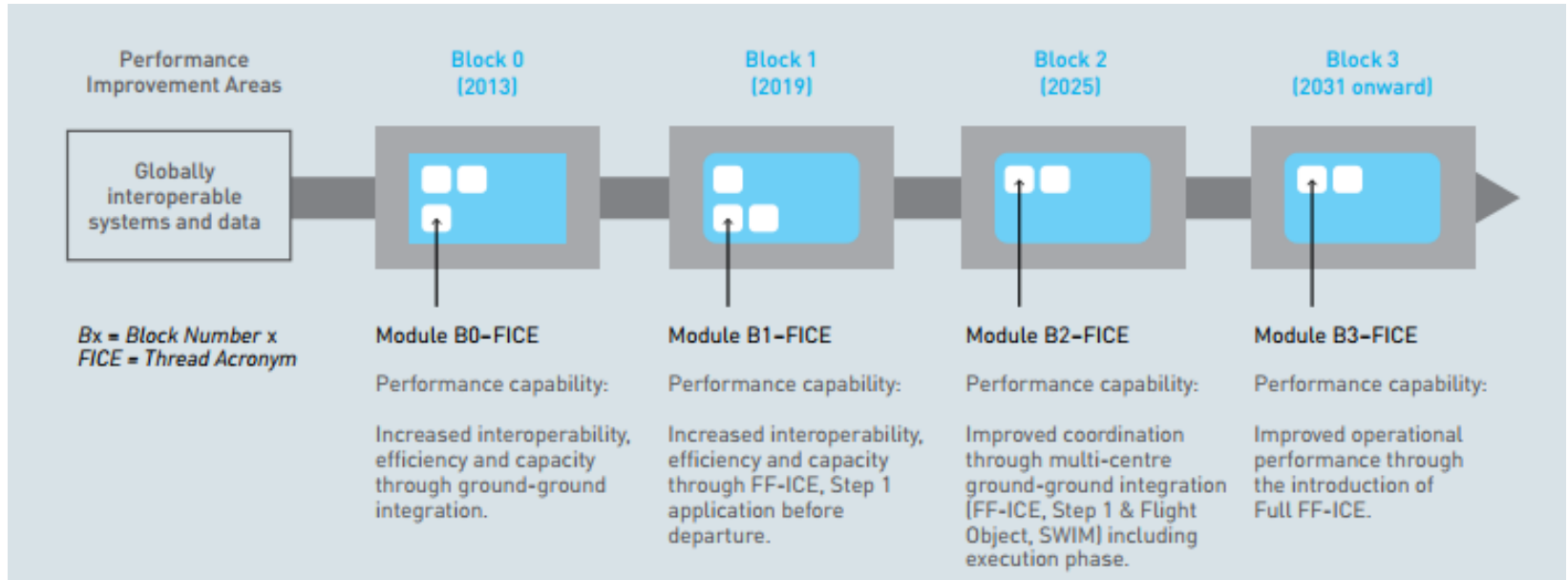


GANP Fifth Edition Aviation System Block Upgrades Methodology





GANP Fifth Edition Aviation System Block Upgrades Methodology





ICAO's 10 Key Air Navigation Policy Principles

1. Commitment to the implementation of ICAO's Strategic Objectives and Key Performance Areas.
2. Aviation safety is the highest priority.
3. Tiered approach to air navigation planning.
4. Global Air Traffic Management Operational Concept (GATMOC)
5. Global air navigation priorities
6. Regional and State air navigation priorities
7. Aviation System Block Upgrades (ASBUs), Modules and Roadmaps
8. Use of ASBU Blocks and Modules
9. Cost-benefit and financial issues
10. Review and evaluation of air navigation planning.



ADS-B and Multilateration

ADS-B

- Advance Surveillance Technology allowing avionics to broadcast ANS aircraft's identification of position, altitude, velocity and other information that depend of the transponder's aircraft type.

Multilateration

- New technique that provides independent cooperative surveillance that provide services initially on airports and now to wide area (WAM)



ICAO

CAPACITY & EFFICIENCY

ADS-B Benefits





Phased development approach for ICAO

Until 2019

Agreement on a simple set of Key Performance Indicators (KPIs), based on existing best practices in more mature regions that have already published performance information and on ICAO publications; • Initial development of guidance material, illustrating the benefits of a performance-based approach and explaining the data collection, calculation and analysis required for the selected KPIs.

Until 2022

Illustrate links between ASBU Modules and KPIs and exchange of experience and best practices at regional and subregional levels; • Update of performance related ICAO manuals (Doc 9883 and Doc 9161) and development of additional guidance material on data collection, data analysis, etc.; • Define a global performance baseline, based on States' performance monitoring and reporting, against which future progress will be measured.

2022 and beyond

Standardization of performance data and enhanced data exchanges to automate and reduce the cost of performance data collection and processing. This work could benefit from existing work on exchange models.



Global Air Navigation Plan Evolution

- The adjustment of dates for the Blocks is the most visible change (B0 = 2013-2018, B1 = 2019 – 2024, B2 = 2025 – 2030, B3 = 2031 onward). This will allow better synchronization with the ICAO Assembly and the amendment cycles.
- The updates to the ASBU document were provided by the ICAO expert groups that are in charge of developing the associated standards. The order in which the ASBU Modules are presented is now unique in the GANP and follows the one of the ASBU document. Naming convention inconsistencies are corrected.



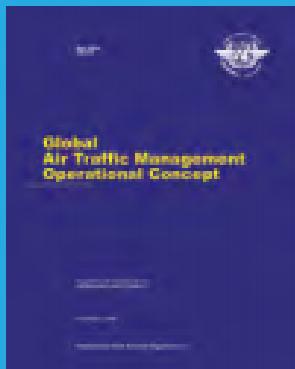


ICAO companion publications supporting the GANP

Global Air Traffic Management Operational Concept (Doc 9854)

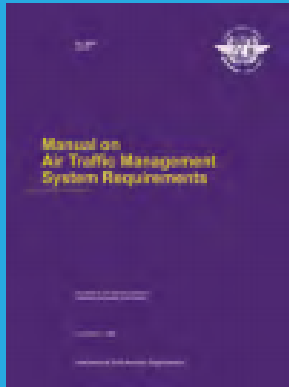
The Global ATM Operational Concept (GATMOC) was published in 2005. It set out the parameters for an integrated, harmonized and globally interoperable ATM system planned up to 2025 and beyond. Doc 9854 can serve to guide the implementation of CNS/ATM technology by providing a description of how the emerging and future ATM system should operate. The GATMOC also introduced some new concepts:

- a. **planning based on ATM system performance;**
- b. **safety management through the system safety approach; and**
- c. **a set of common performance expectations of the ATM community.**





ICAO companion publications supporting the GANP



Manual on Air Traffic Management System Requirements (Doc 9882)

Doc 9882, published in 2008, is used by PIRGs as well as by States as they develop transition strategies and plans. It defines the high-level requirements (i.e. ATM system requirements) to be applied when developing Standards and Recommended Practices (SARPs) to support the GATMOC. This document provides high-level system requirements related to:

- a. system performance-based on ATM community expectations;
- b. information management and services;
- c. system design and engineering; and
- d. ATM concept elements (from the GATMOC).



ICAO companion publications supporting the GANP



Manual on Global Performance of the Air Navigation System (Doc 9883)

This document, published in 2008, is aimed at personnel responsible for designing, implementing and managing performance activities. It achieves two key objectives:

- a. it outlines performance framework and performance-based strategy from the performance concepts provided in the GATMOC; and
- b. it analyses ATM community expectations and categorizes these into key performance areas (KPAs) from which practical metrics and indicators can be developed.

Doc 9883 also provides organizations with the tools to develop an approach to performance management suited to their local conditions.



Block Upgrade Technology Roadmaps

✈ Technology Roadmaps complement the ASBU Modules by providing timelines for the technology that will support the communications, navigation and surveillance (CNS), information management (IM) and avionics requirements of the global air navigation system. These Roadmaps provide guidance for infrastructure planning (and status) by indicating on a per-technology basis, the need for and readiness of:

- existing infrastructure
- ICAO Standards and guidance material
- Demonstrations and validations
- Initial operational capability (IOC) of emerging technologies
- global implementation.



Block 0	2018	Block 1	2024	Block 2	2030	Block 3
	<p>B0-ASUR Initial capability for ground surveillance Ground surveillance supported by ADS-B OUT and/or wide area multilateration systems will improve safety, especially search and rescue and capacity through separation reductions. This capability will be expressed in various ATM services, e.g. traffic information, search and rescue and separation provision.</p>					
	<p>B0-OPFL Improved access to optimum flight levels through climb/descent procedures using ADS-B This module enables an aircraft to reach a more satisfactory flight level for flight efficiency or to avoid turbulence for safety. The main benefit of in-trail procedure (ITP) is fuel/emissions savings and the uplift of greater payloads.</p>					
	<p>B0-ASEP Air traffic situational awareness (ATSAs) Two ATSA (Air Traffic Situational Awareness) applications which will enhance safety and efficiency by providing pilots with the means to enhance traffic situational awareness and achieve quicker visual acquisition of targets:</p> <ul style="list-style-type: none"> • AIRB (basic airborne situational awareness during flight operations); • VSA (visual separation on approach) 	<p>B1-ASEP Increased capacity and efficiency through interval management Interval management improves the management of traffic flows and aircraft spacing. Precise management of intervals between aircraft with common or merging trajectories maximizes airspace throughput while reducing ATC workload along with more efficient aircraft fuel burn.</p>		<p>B2-ASEP Airborne separation (ASEP) Creation of operational benefits through temporary delegation of responsibility to the flight deck for separation provision with suitably equipped designated aircraft, thus reducing the need for conflict resolution clearances while reducing ATC workload and enabling more efficient flight profiles.</p>		
	<p>B0-SURF Safety and efficiency of surface operations (A-SMGCS levels 1-2) and enhanced vision system (EVS) Airport surface surveillance for ANSP.</p>	<p>B1-SURF Enhanced safety and efficiency of surface operations - SURF Airport surface surveillance for ANSP and flight crews, cockpit moving map displays and visual systems for taxi operations.</p>		<p>B2-SURF Optimized surface routing and safety benefits (A-SMGCS levels 3-4 and SVS) and enhanced safety and efficiency of surface operations (SURF-1A) Taxi routing and guidance evolving to trajectory based with ground/cockpit monitoring and data link delivery of clearances and information as well as runway safety alerting logic. Cockpit synthetic vision systems.</p>		



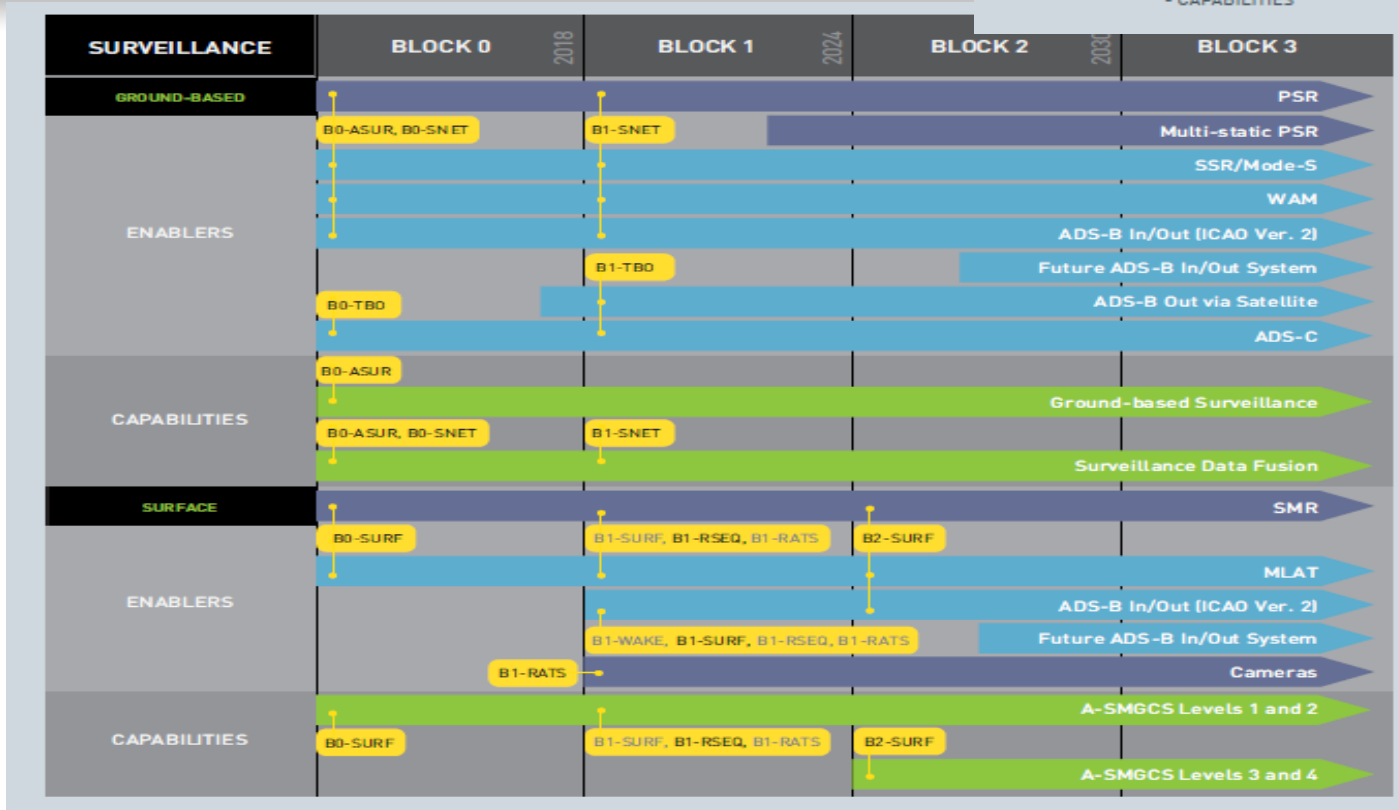
ICAO CAPACITY & EFFICIENCY

Roadmap 5:

DOMAIN: SURVEILLANCE

COMPONENT(S): GROUND-BASED SURVEILLANCE
- ENABLERS
- CAPABILITIES

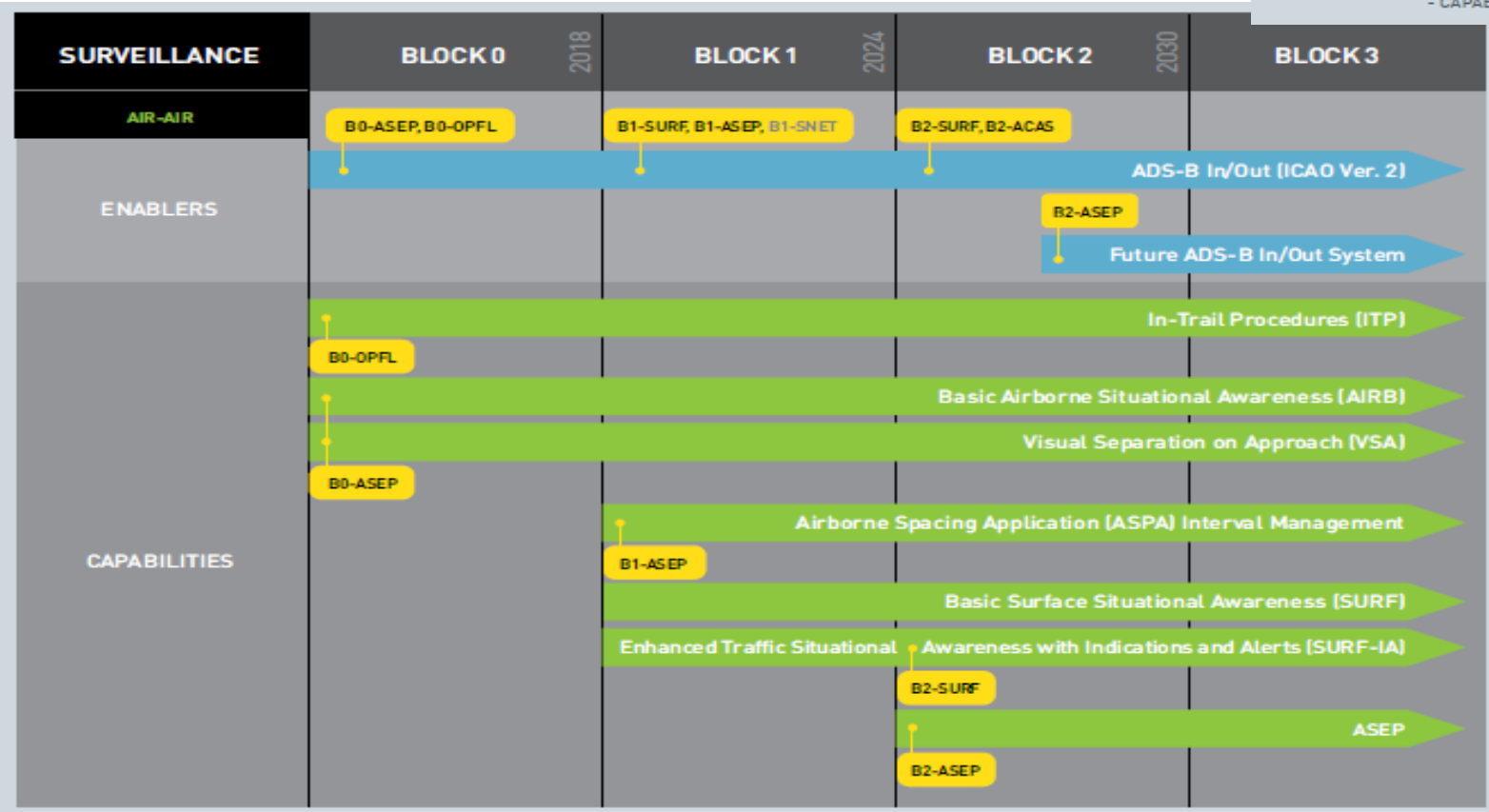
SURFACE SURVEILLANCE
- ENABLERS
- CAPABILITIES





ICAO CAPACITY & EFFICIENCY

Roadmap 6:
 DOMAIN: SURVEILLANCE
 COMPONENT(S): AIR-AIR SURVEILLANCE
 - ENABLERS
 - CAPABILITIES





| ICAO

CAPACITY & EFFICIENCY

BLOCK 0

Block 0 is composed of Modules containing technologies and capabilities which have already been developed and can be implemented today. Based on the milestone framework established under the overall Block Upgrade strategy, ICAO Member States are encouraged to implement those Block 0 Modules applicable to their specific operational needs.





ASBU Modules	ASBU Modules Identifiers
APTA	Airport Accessibility
WAKE	Wake Turbulence Separation
RSEQ	Runway Sequencing
SURF	Surface Operations
ACDM	Airport Collaborative Decision Making
FICE	FF/ICE
DATM	Digital Aeronautical Management
AMET	Advanced Meteorological Information
FRTO	Free Route Operations
NOPS	Network Operations
ASUR	Alternative Surveillance
ASEP	Airborne Separation
OPFL	Optimum Flight Levels
ACAS	Airborne Collision Avoidance Systems
SNET	Ground-Based Safety Nets
CDO	Continuous Descent Operations
TBO	Trajectory-Based Operations
CCO	Continuous Climb Operations

Block 0



ADS-B as key enabler of the ASBU implementation

B0

B0- ASUR

Initial surveillance capability ADS-B Out, MLAT

Ground surveillance supported by ADS-B OUT and/or wide area Multilateration systems will improve safety, especially search and rescue and capacity through separation reductions.

Operating environment/ Phases of flight: All airborne flight phases in continental or subsets of oceanic airspace and on aerodrome surfaces.

Introduces the opportunity to expand ATC radar equivalent service with two new surveillance techniques that can be used, separately or jointly: ADS-B and MLAT. These techniques provide alternatives to classic radar technology at a lower implementation and maintenance cost, thereby allowing to provide surveillance services in areas where they are currently not available for geographical or cost reasons. These techniques also allow, in certain conditions, a reduction of separation minima thereby potentially increasing the ability to accommodate larger volumes of traffic.

Global readiness checklist	Status (ready now or estimated date).
Standards readiness	✓
Avionics availability	✓
Infrastructure availability	✓
Ground automation availability	✓
Procedures available	✓
Operations approvals	✓



ADS-B as key enabler of the ASBU implementation

BO

BO- SURF

Safety and Efficiency of Surface Operations (A-SMGCS Level 1-2)

Airport surface surveillance for ANSP.

Basic A-SMGCS provides surveillance and alerting of movements of both aircraft and vehicles on the aerodrome thus improving runway/aerodrome safety. ADS-B information is used when available (ADS-B APT) and enhanced vision systems (EVS) is used for low visibility operations.

Linkage BO-SURF / BO-ACDM/ BO-RSEQ

A-SMGCS is applicable to any aerodrome and all classes of aircraft/vehicles. Implementation is to be based on requirements stemming from individual aerodrome operational and cost-benefit assessments.

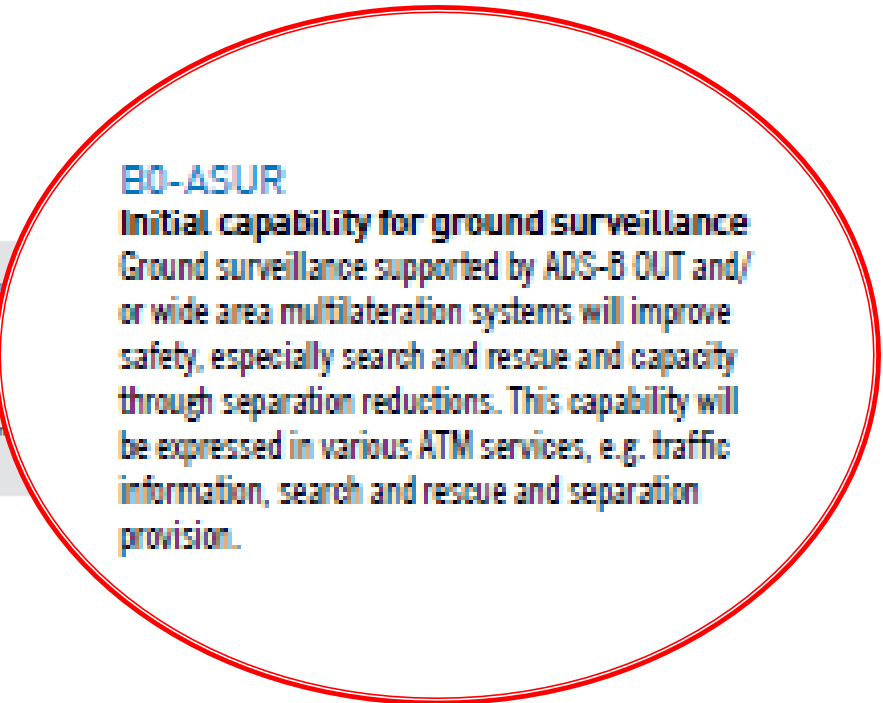
ADS B APT, when applied is an element of A-SMGCS, is designed to be applied at aerodromes with medium traffic complexity, having up to two active runways at a time and the runway width of minimum 45 m.

Global readiness checklist	Status (indicate ready with a tick or input date)
Standards readiness	✓
Avionics availability	✓
Infrastructure availability	✓
Ground automation availability	✓
Procedures available	✓
Operations approvals	✓



Performance Improvement Area 3: Optimum capacity and flexible flights – through global collaborative ATM

Block 0	Block 1	Block 2	Block 3
<p>B0-FRTO Improved operations through enhanced en-route trajectories To allow the use of airspace which would otherwise be segregated (i.e. special use airspace) along with flexible routing adjusted for specific traffic patterns. This will allow greater routing possibilities, reducing potential congestion on trunk routes and busy crossing points, resulting in reduced flight length and fuel burn.</p>	<p>B1-FRTO Improved operations through optimized ATS routing Introduction of free routing in defined airspace, where the flight plan is not defined as segments of a published route network or track system to facilitate adherence to the user-preferred profile.</p>		
<p>B0-NOPS Improved flow performance through planning based on a network-wide view Collaborative ATM measure to regulate peak flows involving departure slots, managed rate of entry into a given piece of airspace for traffic along a certain axis, requested time at a way-point or an FIR/sector boundary along the flight, use of miles-in-trail to smooth flows along a certain traffic axis and re-routing of traffic to avoid saturated areas.</p>	<p>B1-NOPS Enhanced flow performance through network operational planning ATM techniques that integrate the management of airspace, traffic flows including initial user driven prioritization processes for collaboratively defining ATM solutions based on commercial/operational priorities.</p>	<p>B2-NOPS Enhanced flow performance through network operational planning ATM techniques that integrate the management of airspace, traffic flows including initial user driven prioritization processes for collaboratively defining ATM solutions based on commercial/operational priorities.</p>	<p>B3-NOPS Enhanced flow performance through network operational planning ATM techniques that integrate the management of airspace, traffic flows including initial user driven prioritization processes for collaboratively defining ATM solutions based on commercial/operational priorities.</p>
<p>B0-ASUR Initial capability for ground surveillance Ground surveillance supported by ADS-B OUT and/or wide area multilateration systems will improve safety, especially search and rescue and capacity through separation reductions. This capability will be expressed in various ATM services, e.g. traffic information, search and rescue and separation provision.</p>			



B0-ASUR
Initial capability for ground surveillance
Ground surveillance supported by ADS-B OUT and/or wide area multilateration systems will improve safety, especially search and rescue and capacity through separation reductions. This capability will be expressed in various ATM services, e.g. traffic information, search and rescue and separation provision.

B0-ASUR: Initial capability for ground surveillance

- ✈ To provide initial capability for lower cost ground surveillance supported by new technologies such as ADS-B OUT and wide area multilateration (MLAT) systems
- ✈ This capability is characterized by being dependent/cooperative (ADS-B OUT) and independent/cooperative (MLAT). The overall performance of ADS-B is affected by avionics performance and compliant equipage rate.

Benefits

Capacity:

Improved coverage, capacity, velocity vector performance and accuracy can improve ATC performance in both radar and non-radar environments.

Efficiency:

Availability of optimum flight levels and priority to the equipped aircraft and operators.

Safety: Reduction of the number of major incidents. Support to search and rescue.



ADS-B as key enabler of the ASBU implementation

B0

B0: OPFL

Improved access to Optimum Flight Levels through Climb/Descent Procedures using ADS-B

Enables an aircraft to reach a more satisfactory flight level for flight efficiency or to avoid turbulence for safety. The use of In Trail Procedure (ITP) facilitates en-route climb or descent to enable better use of optimal flight levels in environments where a lack of ATC surveillance and/or the large separation minima currently implemented is a limiting factor. The main benefit of ITP is fuel/emissions savings and the uplift of greater payloads.

This can be applied to routes in procedural airspaces.

The introduction of ITP and ADS-B based separation minima enable aircraft to climb or descend through the altitude of other aircraft when the requirements for procedural separation cannot be met.

ITP also provides safety benefits by providing a tool to manage contingency scenarios such as climbing or descend out of turbulence and potentially avoiding adverse meteorological conditions. Once the procedure has been field proven, it will also allow for a reduction in the contingency fuel carriage requirement.

Global readiness checklist	Status (ready now or estimated date).
Standards readiness	✓
Avionics availability	✓
Infrastructure availability	✓
Ground automation availability	✓
Procedures available	✓
Operations approvals	✓



Performance Improvement Area 3: Optimum capacity and flexible flights – through global collaborative ATM

Block 0

B0-ASEP

Air traffic situational awareness (ATSA)

Two ATSA (Air Traffic Situational Awareness) applications which will enhance safety and efficiency by providing pilots with the means to enhance traffic situational awareness and achieve quicker visual acquisition of targets:

- AIRB (basic airborne situational awareness during flight operations);
- VSA (visual separation on approach).

B0-OPFL

Improved access to optimum flight levels through climb/descent procedures using ADS-B

This module enables an aircraft to reach a more satisfactory flight level for flight efficiency or to avoid turbulence for safety. The main benefit of in-trail procedure (ITP) is fuel/emissions savings and the uplift of greater payloads.

B0-ACAS

ACAS improvements

To provide short-term improvements to existing airborne collision avoidance systems (ACAS) to reduce nuisance alerts while maintaining existing levels of safety. This will reduce trajectory perturbation and increase safety in cases where there is a breakdown of separation.

Block 1

B1-ASEP

Increased capacity and efficiency through interval management

Interval management improves the management of traffic flows and aircraft spacing. Precise management of intervals between aircraft with common or merging trajectories maximizes airspace throughput while reducing ATC workload along with more efficient aircraft fuel burn.

Block 2

B2-ASEP

Airborne separation (ASEP)

Creation of operational benefits through temporary delegation of responsibility to the flight deck for separation provision with suitably equipped designated aircraft, thus reducing the need for conflict resolution clearances while reducing workload and enabling more efficient flight.

B2-ACAS

New collision avoidance system

Implementation of Airborne Collision Avoidance System (ACAS) adapted to trajectory-based operations with improved surveillance function supported by ADS-B aimed at reducing nuisance alerts and deviations. The new system will enable more efficient operations and procedures while complying with safety regulations.

Block 3

B0-OPFL

Improved access to optimum flight levels through climb/descent procedures using ADS-B

This module enables an aircraft to reach a more satisfactory flight level for flight efficiency or to avoid turbulence for safety. The main benefit of in-trail procedure (ITP) is fuel/emissions savings and the uplift of greater payloads.



B0-OPFL : Improved access to optimum flight levels through climb/descent procedures using ADS-B

To enable aircraft to reach a more satisfactory flight level for flight efficiency or to avoid turbulence for safety. The main benefit of in-trail procedure (ITP) is fuel/emissions savings and the uplift of greater payloads.

This can be applied to routes in procedural airspaces.

Benefits

Capacity:

Improvement in capacity on a given air route.

Efficiency:

Increased efficiency on oceanic and potentially continental en-route.

Safety:

A reduction of possible injuries for cabin crew and passengers by providing a tool to manage contingency scenarios.

Environment:

Reduced emissions.



ADS-B as key enabler of the ASBU implementation

B0

B0– SNET

Increased Effectiveness of Ground-based Safety Nets

Provides improvements to the effectiveness of the ground-based safety nets assisting the Air Traffic Controller and generating, in a timely manner, alerts of an increased risk to flight safety (such as short terms conflict alert, area proximity warning and minimum safe altitude warning).

Monitors flights to provide timely alerts to air traffic controllers of potential risks to flight safety. Alerts from short-term conflict alert (STCA), area proximity warnings (APW) and minimum safe altitude warnings (MSAW) are proposed. Ground-based safety nets make an essential contribution to safety and remain required as long as the operational concept remains human centred.

This module corresponds to a baseline version of the safety nets as already implemented or being implemented in many areas.

The ground-based safety nets are providing alerts to the controller but no solution. The controller is expected to immediately assess the situation and if necessary take appropriate action.

Global readiness checklist	Status (ready now or estimated date).	
	Standards readiness	Not applicable
	Avionics availability	√
	Infrastructure availability	√
	Ground automation availability	√
	Procedures available	√
	Operations approvals	√



B0- TBO

Improved Safety and Efficiency through the initial application of En-Route Data Link

To implement an initial set of data link applications for surveillance and communications in ATC, supporting flexible routing, reduced separation and improved safety.

Linkage with B0/FICE

Requires good synchronization of airborne and ground deployment to generate significant benefits, in particular to those equipped. Benefits increase with the proportion of equipped aircraft.

For ground systems, the necessary technology includes the ability to manage ADS-C contract, process and display the ADS-C position messages. CPDLC messages need to be processed and displayed to the relevant ATC unit. Enhanced surveillance through multi-sensor data fusion facilitates transition to/from radar environment.

Global readiness checklist	Status (ready now or estimated date)
Standards readiness	✓
Avionics availability	✓
Ground systems availability	✓
Procedures available	✓
Operations approvals	✓



BLOCK 1

The Modules comprising Block 1, which are intended to be available beginning in 2019, satisfy one of the following criteria:

- The operational improvement represents a well understood concept that has yet to be trialed;
- The operational improvement has been trialed successfully in a simulated environment;
- The operational improvement has been trialed successfully in a controlled operational environment; and
- The operational improvement is approved and ready for roll-out.



B1-ASEP : Increased capacity and efficiency through interval management

Benefits

- ✈ Interval management improves the organization of traffic flows and aircraft spacing. Precise management of intervals between aircraft with common or merging trajectories, maximize airspace throughput while reducing ATC workload along with more efficient aircraft fuel burn reducing environmental impact.
- ✈ Applicability: En-route and terminal areas.

Capacity:

Consistent, low variance spacing between paired aircraft (e.g. at the entry to an arrival procedure and on final approach).

Efficiency:

Early speed advisories provided by the IM system reduce controller interaction and remove the requirement for later path-lengthening.

Safety:

Reduced ATC instructions and workload per aircraft without unacceptable increase in flight crew workload.

Environment:

All efficiency benefits have an impact of reduced emissions and noise (reduced noise contours), resulting in beneficial impact on the environment.



B1-SURF: Enhanced safety and efficiency of surface operations-SURF

Benefits

- ✈ To provide enhancements for surface situational awareness, including both cockpit and ground elements, in the interest of runway and taxiway safety, and surface movement efficiency. Cockpit improvements including the use of surface moving maps with traffic information (SURF) for flight crew traffic situational awareness on the taxiways and on the runway.
- ✈ Applicability: SURF has been designed to be applicable to larger aerodromes (ICAO codes 3 and 4) and all classes of aircraft.

Efficiency:

Reduced taxi times.

Safety:

Reduced risk of collisions.





BLOCK 2

The Modules comprising Block 2 are intended to be available in 2025 and must satisfy one of the following criteria:

- represent a natural progression from the preceding Module in Block 1; and
- support the requirements of the operating environment in 2025.





B2-SURF: Optimized surface routing and safety benefits (A-SMGCS levels 3-4 and SVS) and enhanced safety and efficiency of surface operations (SURF-IA)

- ✈ To improve efficiency and reduce the environmental impact of surface operations, even during periods of low visibility.
- ✈ Queuing for departure runways is reduced to the minimum necessary to optimize runway use and taxi times are also reduced.
- ✈ Operations will be improved so that low visibility conditions have only a minor effect on surface movement.
- ✈ This module also provides runway safety alerting logic (SURF-IA).

Applicability

Most applicable to large aerodromes with high demand, as the Upgrades address issues surrounding queuing and management and complex aerodrome operations. For SURF-IA, applicable to ICAO codes 3 and 4 aerodromes and all classes of aircraft; cockpit capabilities work independently of ground infrastructure.



B2-ACAS: New collision avoidance system

- ✈ Implementation of the airborne collision avoidance system (ACAS) adapted to trajectory-based operations with improved surveillance function supported by ADS-B and adaptive collision avoidance logic aiming at reducing nuisance alerts and minimizing deviations.
- ✈ The implementation of a new airborne collision warning system will enable more efficient operations and airspace procedures while complying with safety regulations.
- ✈ The reduction of “nuisance alerts” will lead to a reduction in pilot and controller workload as personnel will spend less time responding to “nuisance alerts”. This will result in a reduction in the probability of a near mid-air collision.

Applicability

Safety and operational benefits increase with the proportion of equipped aircraft. The safety case needs to be carefully done.



B2-RPAS: Remotely piloted aircraft (RPA) integration in traffic

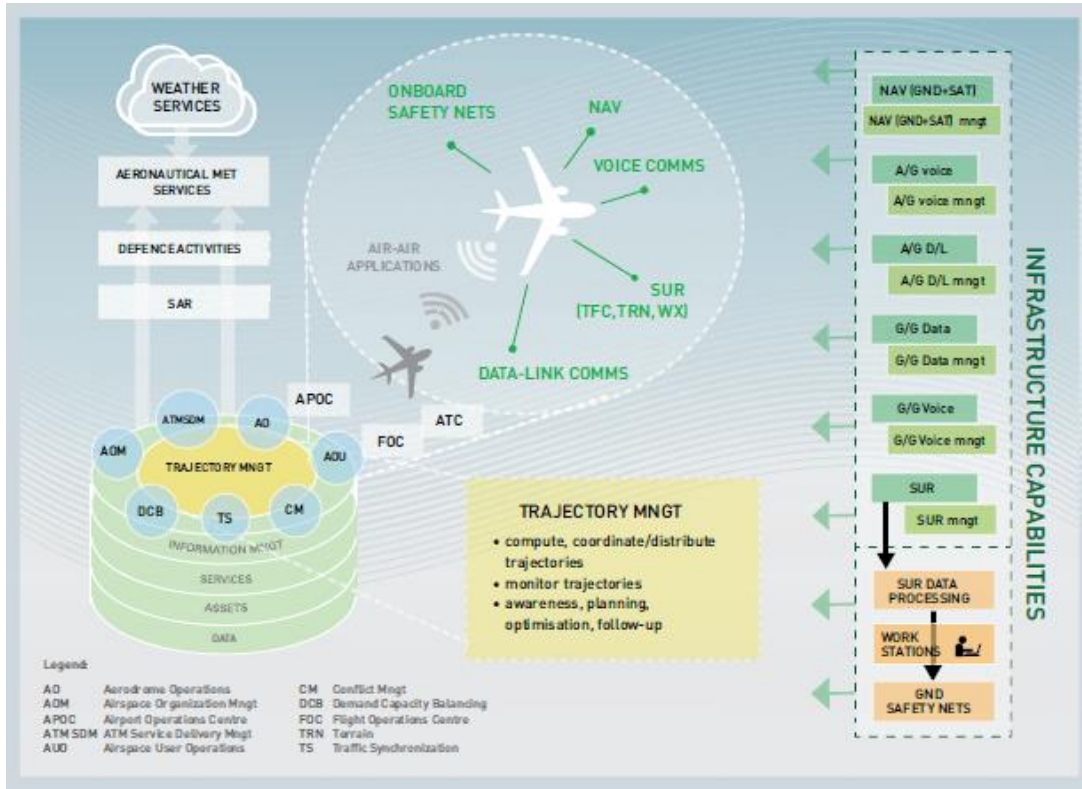
- ✈ Continuing to improve the remotely piloted aircraft (RPA) access to non-segregated airspace; continuing to improve the remotely piloted aircraft system (RPAS) approval/certification process; continuing to define and refine the RPAS operational procedures; continuing to refine communication performance requirements; standardizing the lost command and control (C2) link procedures and agreeing on a unique squawk code for lost C2 link; and working on detect and avoid technologies, to include automatic dependent surveillance – broadcast (ADS-B) and algorithm development to integrate RPA into the airspace.

Applicability

Applies to all RPA operating in non-segregated airspace and at aerodromes. Requires good synchronization of airborne and ground deployment to generate significant benefits, in particular to those able to meet minimum certification and equipment requirements.



INFRASTRUCTURE CAPABILITIES





ICAO

CAPACITY & EFFICIENCY



ICAO

North American
Central American
and Caribbean
(NACC) Office
Mexico City

South American
(SAM) Office
Lima

ICAO
Headquarters
Montréal

Western and
Central African
(WACAF) Office
Dakar

European and
North Atlantic
(EUR/NAT) Office
Paris

Middle East
(MID) Office
Cairo

Eastern and
Southern African
(ESAF) Office
Nairobi

Asia and Pacific
(APAC) Sub-office
Beijing

Asia and Pacific
(APAC) Office
Bangkok



THANK YOU