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Agenda Item 4: Follow-up of the activities of the E/CAR/CATG
4.5 Progress report of the Communications Navigation and Surveillance (CNS) Committee

EASTERN CARIBBEAN AIR NAVIGATION SERVICES, CNS INFRASTRUCTURE, AND ASBU IMPLEMENTATION MATURITY ASSESSMENT

(Presented by Secretariat)

EXECUTIVE SUMMARY	
This Working Paper presents the results of a regional assessment of the implementation status of Air Navigation Services (ANS), Communications, Navigation and Surveillance (CNS) infrastructure, ICAO Basic Building Blocks (BBB), and Aviation System Block Upgrade (ASBU) modules within the Eastern Caribbean (ECAR) States and Territories. The assessment was conducted using information contained in the Eastern Caribbean Aeronautical Information Publication (AIP), ECAR CNS Infrastructure Information, ECAR/CATG technical documentation, and ICAO planning guidance. The evaluation demonstrates that the Region has achieved a strong implementation of the fundamental air navigation capabilities, particularly in Aeronautical Information Management (AIM), Meteorological Services (MET), Communications (COM), and basic Air Traffic Services (ATS). However, significant modernization challenges remain in surveillance, Air Traffic Management (ATM) automation, digital interoperability, and implementation of higher ASBU modules.	
Action:	Suggest actions under item 6.
Strategic Objectives:	• Every Flight is Safe and Secure • Aviation Delivers Seamless, Accessible, and Reliable Mobility for All • No Country Left Behind • The International Civil Aviation Convention and Other Treaties, Laws and Regulations Address All Challenges • The Economic Development of Air Transport Assures the Delivery of Economic Prosperity and Societal Well-Being for All
References:	• ICAO. Doc 9883 – Manual on Global Performance of the Air Navigation System, First Edition (Performance-Based Approach). • Eastern Caribbean Aeronautical Information Publication (AIP), Amendment 29 (AMD 29), Trinidad and Tobago Civil Aviation Authority, including applicable AIRAC Amendments, AIP Supplements, AICs and NOTAM. • CAR Navigation Aids (NAVAID) Inventory (NACC/WG Inventory) • ECAR/CATG-CNS Committee

1. Introduction

1.1 The Eastern Caribbean Region consists of a diverse group of States and Territories that provide air navigation services within geographically dispersed island environments. Despite differences in operational complexity and traffic density, the region has achieved a high degree of harmonization through the publication of a common Eastern Caribbean Aeronautical Information Publication (AIP) and the application of common operational procedures.

1.2 The implementation of the ICAO Global Air Navigation Plan (GANP), the Basic Building Blocks (BBB), and the Aviation System Block Upgrade (ASBU) framework requires continuous assessment of regional capabilities to identify implementation gaps, establish priorities, and support coordinated investment strategies.

1.3 This Working Paper presents a consolidated assessment of the current regional status and identifies actions necessary to continue the modernization of the Eastern Caribbean Air Navigation System.

2. Background

2.1 ICAO has established the BBB as the minimum operational capabilities required to safely provide international air navigation services. These capabilities constitute the foundation upon which ASBU modules are implemented.

The regional assessment incorporated information from:

- Eastern Caribbean AIP and AIP Supplements;
- ECAR CNS Infrastructure Information;
- ECAR/CATG Working Papers;
- Project Priority Area documentation;
- CAR Navigation aid (NAVAID) inventory;
- ICAO GANP and ASBU framework;
- ICAO Doc 9883 (Performance-Based Approach).

2.2 The assessment covered the following States and Territories: Anguilla, Antigua and Barbuda, Barbados, British Virgin Islands, Dominica, Grenada, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines

2.3 Trinidad and Tobago was included as a regional operational reference because of its responsibility for the Piarco flight information region (FIR) and its advanced surveillance capabilities.

3. Analysis

3.1 Regional Air Navigation Services: The assessment demonstrates that all ECAR States provide the essential ICAO air navigation services, including:

- Air Traffic Services (ATS);
- Aeronautical Information Management (AIM);
- Meteorological Services (MET);
- Search and Rescue (SAR);
- Aeronautical Communications;
- Performance-Based Navigation (PBN) procedures.

3.2 The existence of a common regional AIP has significantly improved harmonization and operational consistency across the region. Standardized publication of AIRAC amendments, NOTAM, charts, and operational procedures contributes to a high level of compliance with ICAO Annex 15 and PANS-AIM.

3.3 Communications and Navigation: Communications infrastructure is considered mature throughout the Region. Very High Frequency (VHF) communications, Aeronautical Fixed Telecommunication Network/Aeronautical Message Handling System (AFTN/AMHS) messaging, and ATS ground-to-ground coordination are operational in all participating States. Global navigation satellite system (GNSS) based navigation is widely implemented, complemented by conventional navigation aids (DVOR/DME, NDB, and ILS where operationally required).

3.4 The deployment of CANSNET is expected to significantly enhance resilience, interoperability, and cybersecurity of regional communications.

3.5 Surveillance: Surveillance remains the principal limitation affecting regional ATM modernization.

3.6 The assessment identifies three levels of surveillance capability:

- a) *Full surveillance capability: Barbados and Trinidad and Tobago provide operational radar and/or Multilateration/Automatic dependent surveillance - broadcast (MLAT/ADS-B) surveillance integrated into ATM systems.*
- b) *Partial surveillance capability: Antigua and Barbuda, and Grenada have surveillance infrastructure or ADS-B capabilities available for situational awareness; however, the associated ATM systems are not yet fully commissioned for operational surveillance services.*
- c) *Procedural ATS: The remaining ECAR States continue to rely primarily on procedural control supported by GNSS navigation, flight progress information, and ATS coordination.*

3.7 The assessment highlights that the presence of ADS-B infrastructure should not be interpreted as operational surveillance capability unless the data are integrated into certified ATM systems and used by air traffic controllers for surveillance separation.

3.8 Basic Building Blocks (BBB): The region demonstrates a high level of implementation of the foundational ICAO capabilities:

BBB Area Estimated Implementation

- AIM To be define
- MET To be define
- Communications 85–90%
- ATS To be define
- Navigation 80–85%
- SAR To be define
- Surveillance 35–50%

3.9 Overall BBB implementation is estimated at 82–86%, indicating that the region has successfully established the operational foundation required for future ASBU implementation.

3.10 ASBU Implementation: The assessment indicates an overall regional ASBU implementation maturity of approximately 55–60%.

3.11 The strongest implementation areas include:

- B0-APTA (Airport Accessibility and PBN);
- B0-AMET (Meteorological Information);
- B0-DATM (Digital Aeronautical Information).

3.12 The lowest implementation levels are observed in:

- B0-ASUR (Surveillance);
- B0-NOPS (Network Operations);
- B0-ACDM (Airport Collaborative Decision Making);
- B1-SWIM (System Wide Information Management).

3.13 *These limitations are directly associated with the absence of regional surveillance infrastructure, incomplete ATM system commissioning, limited digital interoperability, and the lack of advanced collaborative ATM capabilities.*

3.14 Regional Strengths

The assessment identifies the following regional strengths:

- Harmonized regional AIP.
- Mature AIS/AIM services.
- High-quality MET services.
- Extensive implementation of GNSS/PBN.
- Strong regional cooperation through ECAR/CATG.
- Robust communications infrastructure.
- Existing surveillance expertise in Barbados and Trinidad and Tobago.

3.15 Regional Challenges

The principal challenges include:

- Limited operational surveillance coverage.
- ATM systems awaiting operational commissioning.
- Limited implementation of ATS interfacility data communication (AIDC), SWIM, and Air traffic flow management (ATFM).
- Dependence on procedural ATS.
- Increasing cybersecurity requirements.
- Need for regional spectrum management and protection.
- Limited financial and technical resources for infrastructure modernization.

4. Conclusions

4.1 The assessment concludes that the Eastern Caribbean has established a harmonized air navigation system that fully supports the basic provision of safe international air navigation services. The implementation of the Basic Building Blocks demonstrates that the region has successfully achieved essential operational capabilities necessary to support future modernization.

4.2 Nevertheless, progression toward higher ASBU implementation levels remains constrained by surveillance capability, ATM automation, and digital information management. Several States possess surveillance infrastructure or ATM systems that have not yet been commissioned for operational use, preventing realization of the full benefits of regional investments.

4.3 Regional initiatives such as Caribbean Air Navigation Services Network (CANSNET), ADS-B integration within the Piarco FIR, and modernization of ATS interfacility coordination provide an opportunity to significantly improve regional interoperability, operational efficiency, and safety.

4.4 ***Complete analysis is under the Appendix of this working paper.***

5. Recommendations

- a. Recognize the significant progress achieved by the Eastern Caribbean States in implementing the ICAO Basic Building Blocks.
- b. Acknowledge that surveillance capability remains the principal regional modernization priority.
- c. Encourage States to complete the operational commissioning of installed ATM systems and surveillance infrastructure.
- d. Support the implementation of regional ADS-B integration and surveillance data sharing within the Piarco FIR.
- e. Promote the implementation of AIDC, enhanced Aeronautical message handling system (AMHS) interoperability, and future SWIM capabilities.
- f. Continue supporting the implementation of CANSNET as the regional resilient communications platform.

- g. Strengthen regional coordination on frequency spectrum management and protection.
- h. Encourage periodic regional assessments of BBB and ASBU implementation to monitor progress and support evidence-based investment planning.

6. Suggested Actions by the Meeting

The meeting is invited to:

- a) Review the findings presented in this Working Paper.
- b) Endorse the regional assessment methodology for periodic monitoring of ANS, CNS, BBB, and ASBU implementation.
- c) Request ECAR States to validate the information related to their national CNS infrastructure, ATM systems, and operational capabilities.
- d) Agree to establish a regional implementation monitoring mechanism using BBB and ASBU performance indicators.
- e) Support the development of a regional surveillance implementation strategy that includes ADS-B integration, ATM commissioning, surveillance data sharing, and operational procedures.
- f) Request ICAO NACC, in coordination with ECAR/CATG, to continue monitoring implementation progress and report periodically to NACC/WG and GREPECAS.
- g) Encourage Member States, international organizations, and industry partners to support regional modernization initiatives through coordinated technical cooperation, capacity building, and investment programs aligned with the ICAO GANP and ASBU framework.

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TECHNICAL REPORT

Eastern Caribbean Air Navigation Services, CNS Infrastructure, and ASBU Implementation Maturity Assessment

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1. Introduction and Scope

This report presents a consolidated technical assessment of Air Navigation Services (ANS), Communications, Navigation and Surveillance (CNS) infrastructure, and Aviation System Block Upgrade (ASBU) implementation maturity across the Eastern Caribbean States and Territories.

The assessment is based on the Eastern Caribbean Aeronautical Information Publication (AIP), Amendment 29 (AMD29), its associated AIP Supplements, the ECAR States CNS Infrastructure Information (Appendix I), the ECAR/CATG/9 Working Paper, the Project Priority Area document, the CAR NAVAID list, and ICAO Doc 9883 (Performance-Based Approach).

The Eastern Caribbean AIP is confirmed to be a regional AIP, published by the Trinidad and Tobago Civil Aviation Authority on behalf of:

- Anguilla
- Antigua and Barbuda
- British Virgin Islands
- Dominica
- Grenada
- Montserrat
- Saint Kitts and Nevis
- Saint Lucia
- Saint Vincent and the Grenadines
- Trinidad and Tobago

The AIP is published in accordance with ICAO Annex 15, ICAO Doc 8126 (Aeronautical Information Services Manual), and ICAO Doc 10066 (PANS-AIM).

The purpose of this report is not only to identify the aeronautical services available in each State/Territory, but also to reflect the operational maturity, published ATS capabilities, and recent operational changes documented across the Eastern Caribbean AIP and its supplements, and to integrate additional infrastructure, planning, and priority information from subsequently provided regional documents.

2. Eastern Caribbean Air Navigation Services Overview

The table below summarizes the ATS, CNS, AIM/AIS, MET, and SAR services published for each State/Territory, together with the assessed operational capability and the most recent AIP-published updates.

State/Territory	ATS Services	CNS Services	AIM/AIS Services	MET	SAR	Operational Capability	Recent AIP Updates
Antigua and Barbuda	ACC, APP, TWR, FIS, Alerting Service	VHF/HF, DVOR/DME, ILS, GNSS, Surveillance support	Complete AIM package (AIP, AIRAC, NOTAM, AIC, PIB, Charts)	✓	✓	Regional ATS Hub serving Eastern Caribbean airspace	Updated Air Navigation Service Charges effective 1 Jan 2026
Dominica	TWR, FIS, Alerting Service	VHF, GNSS (RNAV)	Full AIS	✓	✓	Procedural ATS supporting IFR/VFR traffic	Instrument procedures available through Douglas Charles Airport
Grenada	APP, TWR, FIS	DVOR/DME, ILS, GNSS	Full AIM	✓	✓	International IFR airport with precision approaches	Standard international ATS capability
Saint Kitts (TKPK)	APP, TWR, FIS	DVOR/DME, GNSS	AIM, NOTAM	✓	✓	International airport with Approach Control	Full ATS capability for IFR and VFR traffic
Nevis (TKPN)	AFIS/TWR, FIS	GNSS, VHF	AIM support	✓	✓	Domestic/Regional operations	Ground handling services are now mandatory for all arriving/departing aircraft through approved handling agents
Saint Lucia	APP, TWR, FIS	DVOR/DME, ILS, GNSS	AIM, NOTAM	✓	✓	Dual-airport operation supporting domestic and international traffic	Full IFR capability
Saint Vincent and the Grenadines	APP, TWR, FIS	DVOR/DME, GNSS	AIM	✓	✓	Argyle International Airport plus domestic aerodromes	Mustique Airport ATS hours extended to 1200–SS +20 min; updated aerodrome markings and generator-backed secondary power supply
Anguilla	TWR/FIS	GNSS, VHF	AIM	✓	✓	Procedural ATS	Supports regional operations under the Eastern Caribbean AIP
British Virgin Islands	TWR, APP, FIS	GNSS, RNAV, VHF	AIM	✓	✓	Advanced procedural ATS	New VFR arrival and departure procedures established at Terrance B. Lettsome International Airport, including Visual Reporting Points and RNAV conflict management
Montserrat	AFIS, FIS, Alerting Service	GNSS, VHF	AIM	✓	✓	AFIS operations	Temporary ATS degradation due to the Silver Hills High Site outage, affecting traffic advisories and emergency services
Barbados*	APP, TWR, Radar, FIS	PSR/SSR Radar, ADS-B, DVOR/DME, ILS CAT I, GNSS, AFTN/AMHS	Complete AIM	✓	✓	Independent ANSP with Radar Surveillance	Publishes its own national AIP (not part of the Eastern Caribbean AIP)

* Barbados is included for regional comparison although it is outside the Eastern Caribbean AIP and publishes its own AIP.

2.1 Common Aeronautical Services

AIP establishes that all participating States provide the complete ICAO Aeronautical Information Product suite:

- Aeronautical Information Publication (AIP)
- AIP Amendments
- AIP Supplements
- NOTAM
- Aeronautical Information Circulars (AIC)
- Pre-flight Information Bulletins (PIB)
- AIRAC amendments
- Aeronautical Charts
- Digital eAIP publications

These services comply with ICAO Annex 15, ICAO Doc 8126 (AIS Manual), and ICAO Doc 10066 (PANS-AIM).

2.2 Common Air Navigation Services

The AIP identifies the following common Air Navigation Services (GEN 3):

- Aeronautical Information Services (AIS/AIM)
- Aeronautical Charts
- Air Traffic Services (ATS)
- Aeronautical Communication Services
- Meteorological Services
- Search and Rescue Services (SAR)

2.3 Regional CNS Capabilities

Communications - VHF air-ground communications - HF communications (where applicable) - AFTN/AMHS messaging - ATS inter-centre coordination - Emergency communications

Navigation - GNSS (RNAV) - DVOR/DME - ILS CAT I - NDB (selected aerodromes) - Published instrument approach procedures

Surveillance - Procedural ATS throughout the region - Terminal radar (Barbados) - ADS-B (selected States) - RNAV surveillance procedures - Increasing implementation of Performance-Based Navigation (PBN)

2.4 Operational Maturity Assessment

Capability Level	States
Level 1 – Regional ATS Centres	Antigua & Barbuda, Trinidad & Tobago
Level 2 – International ANSPs	Barbados, Grenada, Saint Lucia, Saint Kitts, Saint Vincent
Level 3 – Regional ATS Providers	Dominica, Anguilla, British Virgin Islands
Level 4 – AFIS/Low-density Operations	Montserrat, Nevis domestic operations

2.5 Evidence of Continuous Modernization

The AIP Supplements demonstrate that the Eastern Caribbean ANSPs actively maintain and improve operational services through continuous publication of changes, including:

- New RNAV routes and waypoints
- Instrument approach procedure updates
- VFR procedure enhancements
- ATS operational hour revisions
- Air Navigation Service charge updates
- Aerodrome operational restrictions
- Ground handling requirements
- Navigation aid outages
- ATS contingency measures
- Aerodrome infrastructure improvements

This assessment highlights the region's commitment to maintaining current aeronautical information and progressively modernizing its air navigation services.

3. Surveillance Capability Assessment

Based on the Eastern Caribbean AIP (AMD29), the published AIP Supplements, and the current operational infrastructure of the Eastern Caribbean States, only a few ANSPs provide surveillance services beyond procedural ATS. Most of the Eastern Caribbean relies on procedural control supported by GNSS navigation and controller position reports, while surveillance coverage is available in selected areas through radar and ADS-B.

State/Territory	Primary Surveillance Radar (PSR)	Secondary Surveillance Radar (SSR/MSSR)	ADS-B	Multilateration (MLAT)	Procedural ATS	Surveillance Capability
Barbados	✓	✓	✓	No	✓	Full Surveillance ATS
Trinidad & Tobago	✓	✓	Limited	No	✓	Full Surveillance ATS
Antigua & Barbuda	Limited*	SSR/Regional	Limited ADS-B	No	✓	Mixed Surveillance
Grenada	No	No	No	No	✓	Procedural ATS
Saint Lucia	No	No	No	No	✓	Procedural ATS
Saint Vincent & the Grenadines	No	No	No	No	✓	Procedural ATS

State/Territory	Primary Surveillance Radar (PSR)	Secondary Surveillance Radar (SSR/MSSR)	ADS-B	Multilateration (MLAT)	Procedural ATS	Surveillance Capability
Saint Kitts & Nevis	No	No	No	No	✓	Procedural ATS
Dominica	No	No	No	No	✓	Procedural ATS
British Virgin Islands	No	No	No	No	✓	Procedural ATS
Anguilla	No	No	No	No	✓	Procedural ATS
Montserrat	No	No	No	No	✓	Procedural/AFIS

* *Antigua benefits from surveillance data available within portions of the Eastern Caribbean ATS environment but does not operate a comprehensive national radar network comparable to Barbados or Trinidad & Tobago.*

3.1 ANSPs with Complete Surveillance Capability

Barbados: is the most advanced surveillance provider in the Eastern Caribbean. Through the Air Navigation Services Department at Grantley Adams International Airport, it provides:

- Primary Surveillance Radar (PSR)
- Secondary Surveillance Radar (SSR/Mode S)
- ADS-B surveillance
- Radar vectoring
- Radar approach services
- Surveillance support for approach and terminal operations
- Integrated surveillance displays
- Flight data processing

Barbados is the only Eastern Caribbean State routinely providing radar-based ATS comparable to larger ANSPs in the ICAO NACC Region.

Trinidad and Tobago: Although not an ECCAA Member State, Trinidad and Tobago is part of the Eastern Caribbean AIP and operates the Piarco FIR, one of the largest FIRs in the Caribbean.

Capabilities include:

- PSR
- SSR
- Oceanic surveillance support
- Integrated ATM system
- ADS-B implementation in selected sectors
- RNAV surveillance procedures
- Surveillance support for continental and oceanic sectors

The AIP also documents continuous modernization of RNAV routes, ATS sectors, and surveillance-related procedures.

Antigua and Barbuda: is operationally important because it manages ATS services for portions of the Eastern Caribbean.

Capabilities include:

- Surveillance support for terminal operations
- ADS-B implementation in selected locations
- Integration with neighboring surveillance systems
- Procedural ATS for en-route operations

However, Antigua is not currently published as operating a complete radar surveillance system equivalent to Barbados or Trinidad & Tobago.

States Operating Primarily Procedural ATS: The following States provide safe ATS without radar surveillance by relying on:

- GNSS (RNAV)
- Published instrument procedures
- Controller position reports
- Flight progress strips/electronic flight data
- Inter-unit coordination
- Flight Information Service

These States include: Anguilla, British Virgin Islands, Dominica, Grenada, Montserrat, Saint Lucia, Saint Vincent and the Grenadines, Saint Kitts and Nevis.

3.2 ADS-B Implementation Status

State	ADS-B Status
Barbados	Operational
Trinidad & Tobago	Operational (selected sectors)
Antigua & Barbuda	Limited/partial implementation
Remaining Eastern Caribbean States	No published operational ADS-B surveillance for ATS (procedural services remain the primary method)

3.3 Regional ICAO NACC Perspective

From a CNS planning perspective, the Eastern Caribbean can be categorized into three surveillance capability groups:

Level	States	Capability
Level 1 – Full Surveillance ANSP	Barbados, Trinidad & Tobago	PSR, SSR, ADS-B, radar vectoring, integrated surveillance
Level 2 – Partial Surveillance	Antigua & Barbuda	Limited surveillance support with regional integration and selected ADS-B capabilities
Level 3 – Procedural ATS	Grenada, Dominica, Saint Lucia, Saint Vincent and the Grenadines, Saint Kitts and Nevis, Anguilla, British Virgin Islands, Montserrat	Procedural control supported by GNSS and ATS coordination

3.4 Recommendation for ICAO NACC

For regional CNS modernization and projects such as ADS-B integration, CANSNET, SWIM, and surveillance interoperability, Barbados, Trinidad & Tobago, and Antigua & Barbuda should be considered the principal surveillance-capable ANSPs. Their existing infrastructure and operational experience make them well positioned to serve as regional leaders and support neighboring States that currently depend on procedural ATS.



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EASTERN CARIBBEAN REGION – SURVEILLANCE STATUS BY STATE/TERRITORY

Infrastructure, Operational Use and Terminal Surveillance Coverage

ICAO NACC

Regional Office

STATE / TERRITORY	1. SURVEILLANCE INFRASTRUCTURE (INSTALLED)					2. ATM INTEGRATION STATUS			3. OPERATIONAL SURVEILLANCE SERVICES		4. TERMINAL SURVEILLANCE COVERAGE		OVERALL SURVEILLANCE MATURITY LEVEL (ICAO SCALE)
	Primary Radar (PSR)	Secondary Radar (SSR)	ADS-B Ground Receivers	ADS-B Space-Based	MLAT (WAM)	Data Received	Integrated to ATM System	System Commissioned & Validated	En-route Surveillance Provided	Terminal Area Surveillance Provided (TMA/CTR)	Airport(s) with Surveillance Coverage	Minimum Radar Coverage	
 Anguilla	—	—	✗	✓	—	✗	✗	✗	✗	✗	—	—	 1 – INITIAL
 Antigua & Barbuda	✓	✓	○	✓	—	○	○	✗	✗	✗	—	60 – 100 NM	 2 – BASIC
 Barbados	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	BGI	> 100 NM	 4 – MANAGED
 British Virgin Islands	✗	✗	✗	✓	—	✗	✗	✗	✗	✗	—	—	 1 – INITIAL
 Dominica	—	—	✗	✓	—	✗	✗	✗	✗	✗	—	—	 1 – INITIAL
 Grenada	—	—	○	✓	—	○	○	✗	✗	✗	—	< 60 NM	 2 – BASIC
 Montserrat	—	—	✗	✓	—	✗	✗	✗	✗	✗	—	—	 1 – INITIAL
 Saint Kitts & Nevis	—	—	✗	✓	—	✗	✗	✗	✗	✗	—	< 60 NM	 1 – INITIAL
 Saint Lucia	—	—	○	✓	—	○	○	✗	✗	✗	—	60 – 100 NM	 2 – BASIC
 Saint Vincent & the Grenadines	—	—	✗	✓	—	✗	✗	✗	✗	✗	—	—	 1 – INITIAL
 Trinidad & Tobago	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	POS, TAB	> 200 NM (Regional)	 5 – OPTIMIZED

LEGEND – STATUS

✓ Available / Operational

○ Installed / Partial / Under Implementation

✗ Not Available / Not Operational

— Not Applicable / No Service

1. SURVEILLANCE INFRASTRUCTURE

PSR: Primary Surveillance Radar

SSR: Secondary Surveillance Radar

ADS-B Ground: Ground-based ADS-B receivers

ADS-B Space-Based: Satellite-based ADS-B services

MLAT (WAM): Multilateration systems

2. ATM INTEGRATION STATUS

✓ Data Received: Surveillance data received by ATM system

○ Integrated to ATM: Data integrated for situational awareness

✗ Commissioned & Validated: System operationally approved

3. OPERATIONAL SURVEILLANCE SERVICES

✓ En-route Surveillance: Provided on ATS routes

✓ Terminal Surveillance: Provided in TMA/CTR (for separation services)

✗ If not provided, ATS is procedural

4. TERMINAL SURVEILLANCE COVERAGE

< 60 NM
Limited coverage (approach / aerodrome control)

60 – 100 NM
Partial coverage (en-route / terminal)

> 100 NM
Full en-route / upper airspace coverage

> 200 NM
Extended oceanic / FIR-wide coverage

OVERALL MATURITY LEVEL (ICAO SCALE)

1 INITIAL
No capability or very limited

2 BASIC
Basic capability with limitations

3 DEFINED
Capability implemented for routine ops

4 MANAGED
Performance monitored & system managed

5 OPTIMIZED
Fully integrated, reliable, performance optimized

Notes: Information based on AIPs, ANSP reports, ECAR/CATG documents and ICAO sources up to May 2025. Coverage areas are approximate.

4. ASBU Implementation Maturity Assessment

Based on the Eastern Caribbean AIPs, the published CNS/ATM capabilities, ICAO GANP (Edition 2025–2028), and the Basic Building Block (BBB) framework, this section presents an expert assessment of the ASBU implementation maturity for the Eastern Caribbean States. Since no State has officially published its ASBU implementation status, this evaluation is based on the operational capabilities documented in the AIPs and their alignment with ICAO ASBU modules.

The assessment covers: Antigua and Barbuda, Anguilla, British Virgin Islands, Dominica, Grenada, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Barbados (included for regional comparison), and Trinidad and Tobago (regional reference).

The BBB framework provides the operational baseline against which ASBU improvements are implemented.

4.1 Overall Regional ASBU Maturity

ASBU Performance Area	Regional Implementation	Maturity
Airport Operations	80%	High
Globally Interoperable Systems	75%	Medium-High
Optimum Capacity & Flexible Flights	65%	Medium
Efficient Flight Paths	90%	High
Flow Management	40%	Low
Collaborative Decision Making	20%	Very Low
Information Management (SWIM)	15%	Very Low
CNS Infrastructure	80%	High
Surveillance	50%	Medium
Digital ATM	20%	Very Low

Estimated Regional ASBU Implementation: ~60–65%

4.2 ASBU Module Assessment

B0-APTA – Optimization of Airport Accessibility

Objective: Improve airport accessibility through instrument procedures and PBN. Status: Implemented in almost every international airport (✓ RNAV approaches, ✓ ILS, ✓ PBN procedures, ✓ IFR operations).

State	Status
Antigua	Implemented
Barbados	Implemented
Grenada	Implemented
Saint Lucia	Implemented
Saint Vincent	Implemented
Saint Kitts	Implemented
Dominica	Implemented

Implementation: 95%

B0-CCO – Continuous Climb Operations

Implemented operationally through published SID procedures but not formally managed as a regional performance programme. Implementation: 70%

B0-CDO – Continuous Descent Operations

Most airports publish optimized RNAV arrivals. Large airports support ILS, RNAV, and STARs. Implementation: 70%

B0-FRTO – Free Route through Optimized Routing

The Eastern Caribbean already has relatively direct routing because of the oceanic environment, small FIRs, and limited route constraints. Implementation: 75%

B0-AMET – Meteorological Information

One of the strongest modules. Implemented: ✓ METAR, ✓ TAF, ✓ SIGMET, ✓ Tropical Cyclone Advisories, ✓ WAFS, ✓ Volcanic Ash. Implementation: 95%

B0-DATM – Digital Aeronautical Information

Implemented: ✓ AIP, ✓ AIRAC, ✓ NOTAM, ✓ Charts. Still missing: AIXM, SWIM, Digital AIM. Implementation: 75%

B0-FICE – Interfacility Information Exchange

Implemented through: ✓ AFTN, ✓ AMHS, ✓ Voice coordination. Partial: OLDI, AIDC, Digital coordination. Implementation: 60%

B0-NOPS – Network Operations

Limited. Few States have airspace management, network management, or regional optimization. Implementation: 45%

B0-ASUR – Surveillance

Largest regional gap. Only Barbados and Trinidad operate complete surveillance. Antigua has partial ADS-B. Others rely on procedural ATS. Implementation: 50%

B0-SNET – Safety Nets

Implemented (✓ MSAW, ✓ APW, ✓ Short-term conflict alerts) where radar exists; otherwise procedural separation. Implementation: 60%

B0-RSEQ – Arrival Management

Only partially implemented. No AMAN. Limited sequencing. Implementation: 35%

B0-ACDM – Airport Collaborative Decision Making

Not operational. Implementation: 10%

B1-Modules

Most B1 modules are in planning or have limited implementation.

Module	Status
B1-DATM	Planning
B1-SWIM	Not implemented
B1-FICE	Limited
B1-ASUR	Partial
B1-FRTO	Partial
B1-CDO	Partial
B1-RSEQ	Not implemented
B1-ACDM	Not implemented

Average: 30%

B2-Modules

Only isolated initiatives (e.g., ADS-B, CANSNET, Cybersecurity). Implementation: 15%

B3-Modules

Not yet implemented. Implementation: <5%

4.3 State ASBU Maturity

State	ASBU Maturity
Barbados	80%
Trinidad & Tobago	82%
Antigua	72%
Grenada	65%
Saint Lucia	65%
Saint Vincent	62%
Saint Kitts	60%
Dominica	58%
British Virgin Islands	55%
Anguilla	55%
Montserrat	50%

4.4 Regional Strengths

- Widespread implementation of Performance-Based Navigation (PBN) and RNAV procedures (B0-APTA)
- Strong meteorological services supporting aviation operations (B0-AMET)
- Harmonized Aeronautical Information Management (B0-DATM), supported by a common regional AIP and AIRAC cycle
- Mature communications infrastructure based on AFTN/AMHS, with modernization through CANSNET expected to enhance interoperability (B0-FICE)
- Consistent provision of basic ATS, MET, AIS, and SAR services, establishing a solid BBB foundation

4.5 Regional Gaps

- Surveillance (B0-ASUR): Most States rely on procedural ATS due to limited radar and ADS-B coverage
- Airport Collaborative Decision Making (B0-ACDM): No structured implementation across the region
- Flow Management (B0-NOPS): Limited ATFM capabilities and regional network management
- Digital Information Management (B1-SWIM): No regional SWIM infrastructure or System Wide Information Management services
- Advanced Interfacility Coordination: Limited implementation of AIDC/OLDI and digital ATS coordination
- Higher ASBU Blocks (B2/B3): Emerging technologies such as trajectory-based operations, virtual centres, integrated ATM information management, and advanced decision support remain largely unimplemented

4.6 Recommended Regional ASBU Roadmap (2026–2035)

Phase	Priority Modules
2026–2028	B0-ASUR, B0-FICE, B0-DATM, B0-NOPS
2028–2031	B1-SWIM, B1-FICE, B1-ASUR, B1-CDO
2031–2035	B2-TBO, B2-SWIM, Digital Tower concepts (where appropriate), Regional Decision Support, Advanced Collaborative ATM

4.7 Section Conclusion

The Eastern Caribbean has achieved a good implementation of the foundational (Block 0) ASBU modules, particularly in airport accessibility, meteorological services, aeronautical information management, and basic CNS infrastructure. These capabilities are underpinned by a harmonized regulatory framework and standardized regional procedures. However, implementation declines significantly beyond Block 0. The region's principal constraints are surveillance, air traffic flow management, collaborative decision making, and digital information management (SWIM), which limit progression toward the higher ASBU blocks.

Overall, the region demonstrates an estimated 60–65% ASBU implementation maturity, reflecting a good operational foundation with clear priorities for modernization through initiatives such as regional ADS-B deployment, AIDC, SWIM, and advanced ATM interoperability.

5. Updated Assessment Incorporating Additional Regional Documents

The following consolidated assessment updates the ECAR States ANS/CNS, BBB, and ASBU implementation level, incorporating the ECAR CNS Infrastructure Appendix, the ECAR/CATG/9 Working Paper, the Project Priority Area document, and the CAR NAVAID list.

5.1 Updated ECAR CNS Infrastructure Status

State/Territory	Surveillance / ASUR-B0/1	ADS-B	Radar/Secondary Data	ATM System	NAVAIDs	GNSS	Overall CNS Level
Anguilla	Not implemented	0	0	0	0	Yes	Low
Antigua and Barbuda	ADS-B used for situational awareness	Partial	Radar system OFF	ATM installed, not implemented/commissioned	DVOR/DME	Yes	Medium
Barbados	MLAT system	0	Secondary data available	Yes (1)	DVOR/DME; possible future ILS	Yes	High
Dominica	Not implemented	0	0	0	NDB/DME at Douglas-Charles	Yes	Medium-Low
Grenada	ADS-B capability used for situational awareness	Partial	Not commissioned	ATM installed, not implemented/commissioned	NDB/DME; possible ILS/DVOR/DME or GNSS option under CATCOP	Yes	Medium
Montserrat	Not implemented	0	0	0	0	0	Very Low
Saint Kitts and Nevis	Not implemented	0	0	0	NDB/DME	Yes	Medium-Low
Nevis	Not implemented	0	0	0	0	Yes	Low
Saint Lucia – Hewanorra	Not implemented	0	0	ATM purchased/installed	DVOR/DME; possible future ILS or GNSS option under CATCOP	Yes	Medium
Saint Lucia – George F.L. Charles	Not implemented	0	0	Shared ATM system planned	NDB	Yes	Medium-Low
Saint Vincent and the Grenadines	Not implemented	0	0	0	DVOR/DME, NDB	Yes	Medium
Trinidad and Tobago	ASUR implementation ongoing	Yes	Yes	Yes	ILS, DVOR/DME, NDB	Yes	Very High
Guadeloupe	Not indicated	0	Yes	0	DVOR/DME, ILS	Yes	High
Martinique	Not indicated	0	Yes	Yes	DVOR/DME, ILS	Yes	High

The ECAR/CATG/9 paper confirms that the ECAR infrastructure review covers surveillance, communications, and navigation systems supporting ATS within the Piarco FIR, and that Antigua, Grenada, and Montserrat had projects completed but pending commissioning.

5.2 Updated BBB Implementation Level

BBB Area	Updated ECAR Level	Assessment
Meteorological Services	90–95%	Strong regional implementation; services generally available through national MET providers and regional coordination
AIS/AIM	95–100%	Very strong due to common Eastern Caribbean AIP, NOTAM, supplements, amendments and charts
SAR	85–90%	Basic SAR and alerting are available, but regional exercises and interoperability should be strengthened
ATM / ATS	80–85%	Core ATS exists, but several States remain procedural and some ATM systems are not commissioned
Communications	85–90%	Operational VHF/ground-ground communications exist; modernization through CANSNET remains important
Navigation	80–85%	GNSS is widely available; conventional NAVAIDs vary by State
Surveillance	35–50%	Main regional weakness; limited ADS-B/radar/MLAT operational use

Updated overall BBB maturity: approximately 82–86%.

5.3 Updated ASBU Implementation Level

ASBU Module	Updated ECAR Status	Implementation Level
B0-APTA – Airport Accessibility / PBN	RNAV/GNSS broadly available; conventional aids vary	High, 80–90%
B0-AMET – Meteorological Information	MET, TAF, METAR, SIGMET coordination generally available	Very High, 90–95%
B0-DATM – Digital Aeronautical Information	AIP, NOTAM, AIP SUP and charts available; full digital AIM/AIXM not mature	Medium-High, 70–80%
B0-FICE – Interfacility Coordination	Voice/AFTN/AMHS coordination exists; AIDC/OLDI not broadly implemented	Medium, 50–60%
B0-ASUR – Surveillance	Barbados MLAT, Trinidad radar/ADS-B, Antigua/Grenada ADS-B situational awareness; most States procedural	Low-Medium, 35–50%
B0-SNET – Safety Nets	Available only where ATM/surveillance systems support them	Low-Medium, 40–50%
B0-NOPS / ATFM	Limited regional ATFM/network operations	Low, 30–40%
B0-ACDM	No structured airport CDM implementation identified	Very Low, 10–20%
B1-SWIM / Digital Integration	Not implemented regionally	Very Low, 10–15%

Updated regional ASBU maturity: approximately 55–60%.

5.4 Key Updated Finding

The ECAR region has a BBB baseline in AIS/AIM, MET, ATS, GNSS, and conventional navigation, but ASBU implementation is constrained by limited operational surveillance, incomplete ATM commissioning, and limited digital interoperability.

The Project Priority Area document identifies two priority regional needs: frequency spectrum management and surveillance data integration using ADS-B/radar sources into the Piarco ADS-B/ATM environment for situational awareness and coverage within the Piarco FIR.

5.5 Updated Priority Actions

Priority	Action
1	Complete ADS-B integration in the Piarco FIR and provide ECAR States with access to surveillance data for situational awareness
2	Commission pending ATM systems in Antigua, Grenada and Saint Lucia
3	Define operational procedures for the use of ADS-B/radar/MLAT data in ECAR TMAs
4	Strengthen CANSNET as the resilient IP platform for surveillance, AMHS/AFTN, voice and future SWIM services
5	Validate and protect aeronautical frequencies using the Frequency Finder Tool
6	Develop regional AIDC/AMHS modernization to improve ATS coordination
7	Prioritize GNSS/PBN continuity where conventional NAVAIDs are limited or absent

5.6 Section Conclusion

The updated ECAR assessment shows that the region is BBB-compliant at a high level, but still at a medium ASBU implementation level. The most urgent modernization gap is surveillance, followed by ATM system commissioning, digital coordination, frequency protection, and regional data sharing.

6. Comprehensive Updated Assessment (All Sources Combined)

This final consolidated assessment combines:

- Eastern Caribbean AIP
- ECAR States CNS Infrastructure Information (Appendix I)
- ECAR/CATG/9 Working Paper
- Project Priority Areas
- ICAO Doc 9883 (Performance-Based Approach)

These sources provide information not available in the AIPs alone, particularly regarding actual CNS implementation status, planned projects, ATM modernization, and regional priorities, enabling an assessment of not only the services currently provided but also the operational capability and maturity of each ECAR State.

6.1 Updated Eastern Caribbean Air Navigation Services Assessment

State	ATS	COM	NAV	SUR	AIM	MET	SAR	Overall ANS Maturity
Antigua & Barbuda	★★★★★	★★★★★	★★★★☆	★★★☆☆	★★★★★	★★★★★	★★★★★	High
Barbados	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★	Very High
Dominica	★★★★☆	★★★★☆	★★★★☆	★★☆☆☆	★★★★★	★★★★★	★★★★☆	Medium
Grenada	★★★★☆	★★★★☆	★★★★☆	★★★☆☆	★★★★★	★★★★★	★★★★☆	Medium-High
Saint Kitts & Nevis	★★★★☆	★★★★☆	★★★★☆	★★☆☆☆	★★★★★	★★★★★	★★★★☆	Medium
Saint Lucia	★★★★☆	★★★★☆	★★★★☆	★★★☆☆	★★★★★	★★★★★	★★★★☆	Medium-High
Saint Vincent	★★★★☆	★★★★☆	★★★★☆	★★☆☆☆	★★★★★	★★★★★	★★★★☆	Medium
Anguilla	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆	★★★★★	★★★★☆	★★★★☆	Low-Medium
British Virgin Islands	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆	★★★★★	★★★★☆	★★★★☆	Medium
Montserrat	★★☆☆☆	★★☆☆☆	★★☆☆☆	☆☆☆☆☆	★★★★★	★★★★☆	★★★★☆	Low

6.2 Communications

Overall implementation is mature. The region provides:

- VHF communications
- Ground-to-ground ATS communications
- AFTN/AMHS
- Emergency communications

The next regional modernization step is updating the current ECAR communication network.

Implementation level: ≈90%

6.3 Navigation

Most States provide GNSS, PBN, RNAV, and conventional NAVAIDs.

Current infrastructure:

State	Published Navigation Infrastructure
Antigua	DVOR/DME
Barbados	DVOR/DME (future ILS planned)
Dominica	NDB/DME
Grenada	NDB/DME with future DVOR/DME or ILS through CATCOP
Saint Lucia	DVOR/DME, future ILS
Saint Vincent	DVOR/DME + NDB
Saint Kitts	NDB/DME
Trinidad	ILS + DVOR/DME + NDB

GNSS is available in almost every State.

Implementation: ≈85%

6.4 Surveillance

This is the principal regional gap. Updated status:

State	Operational Capability
Barbados	MLAT operational
Trinidad	Radar + ADS-B implementation underway
Antigua	ADS-B for situational awareness; radar exists but is not operational; ATM system installed but not commissioned
Grenada	ATM supports ADS-B for situational awareness; commissioning pending
Saint Lucia	ATM system purchased and installed but not operational
Remaining ECAR States	Procedural ATS

This represents a major improvement over previous years, but operational commissioning remains incomplete.

Implementation: ≈45%

6.5 ATM Systems

State	ATM Status
Barbados	Operational
Trinidad	Operational
Antigua	Installed; pending implementation
Grenada	Installed; pending implementation
Saint Lucia	Installed; pending operational use
Others	Procedural ATS

The ECAR/CATG paper notes that Antigua, Grenada, and Montserrat projects were completed and awaiting commissioning, while future upgrades are expected through World Bank initiatives.

The following data is provided by the AIP of the different States must have to be confirmed by each State and by the information of the different ECAR/CATG Committee.

6.6 AIS / AIM

This remains one of the strongest areas. All ECAR States provide: AIP, NOTAM, AIRAC, Charts, AIP Supplements, AIC, PIB.

6.7 MET

All international airports provide: METAR, TAF, SIGMET, Briefing services.

6.8 SAR

All States provide: Alerting Service, SAR coordination, RCC interfaces.

6.9 Updated BBB Evaluation

BBB	Implementation
MET	To define
AIM	To define
SAR	To define
ATS	To define
COM	90%
NAV	85%
SUR	45%

6.10 SWOT Analysis (ICAO Doc 9883 Methodology)

Applying the performance-based approach described in ICAO Doc 9883, which recommends identifying strengths, weaknesses, opportunities, and threats before defining improvement objectives, the ECAR region can be characterized as follows:

Strengths - Harmonized Eastern Caribbean AIP - High maturity in AIS/AIM and MET - GNSS implemented throughout the region - Strong regional coordination through ECAR/CATG - Good communications infrastructure - Barbados and Trinidad provide advanced surveillance capabilities

Weaknesses - Surveillance coverage remains limited across most ECAR States - Several ATM systems are installed but not yet commissioned - Limited implementation of AIDC, SWIM and ATFM - Dependence on procedural ATS in many FIR sectors

Opportunities - Completion of ADS-B integration across the Piarco FIR - Operational commissioning of ATM systems in Antigua, Grenada and Saint Lucia - Expansion of CANSNET to improve resilient IP communications - Implementation of World Bank CATCOP projects - Regional surveillance data sharing

Threats - Delays in commissioning new CNS infrastructure - Aging conventional navigation aids - Frequency spectrum congestion - Limited financial and technical resources - Increased cybersecurity risks as ATM systems become more interconnected

6.12 Regional Priority Projects under CNS area

The ECAR Project Priority Area identifies two strategic modernization initiatives:

1. Frequency Spectrum Management

- Regional use of the Aeronautical Frequency Finder Tool
- Protection of existing and future aeronautical frequencies
- Frequency planning for UAS and RPAS operations

2. Surveillance Data Integration

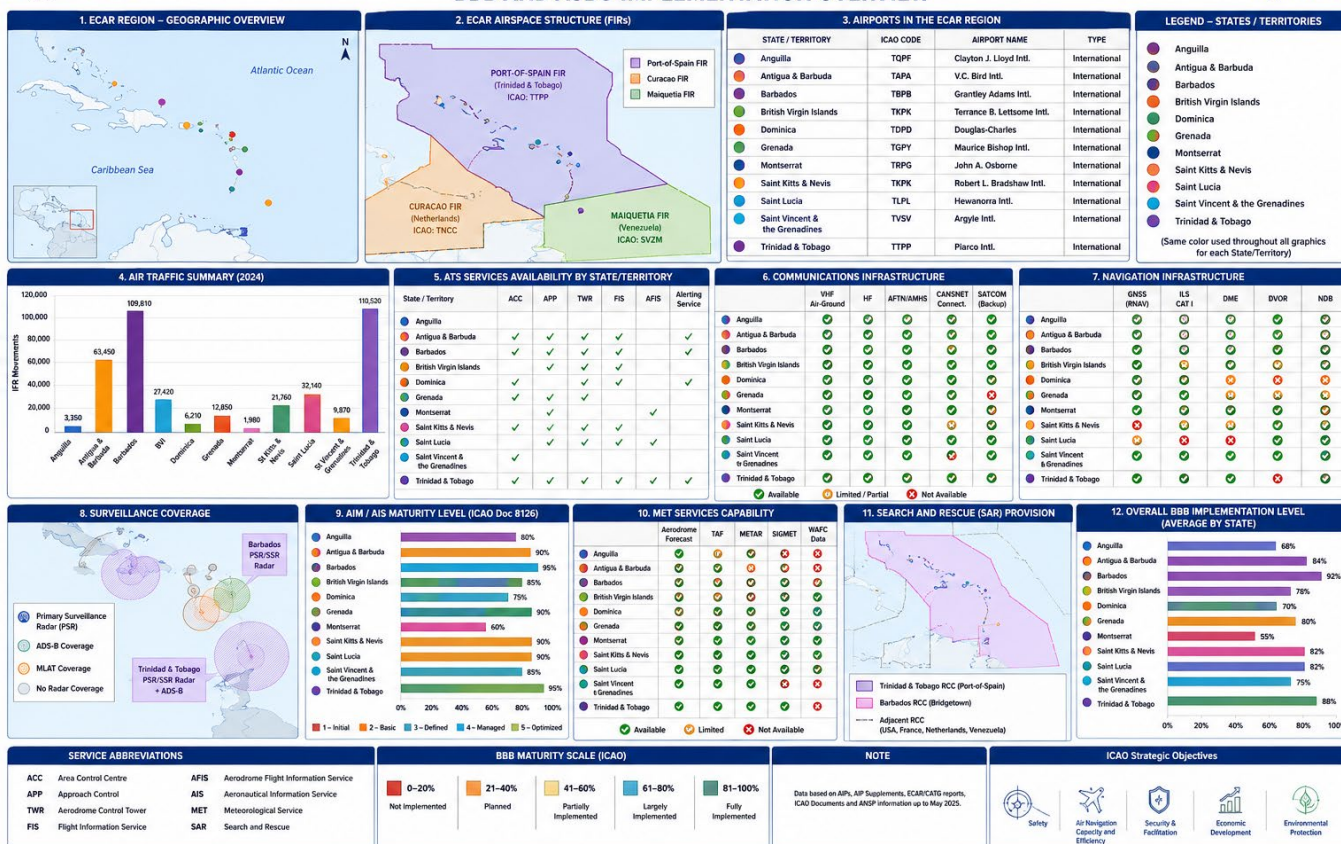
- Complete ADS-B implementation throughout the Piarco FIR
- Integrate ADS-B and radar feeds into the Piarco ATM system
- Provide surveillance displays to ECAR States for situational awareness
- Train ATC personnel in surveillance operations
- Achieve surveillance coverage across the Piarco FIR

7. Overall Conclusion

The updated assessment indicates that the Eastern Caribbean has well-established foundational air navigation services, with good performance in AIS/AIM, Meteorological Services, Communications, and Navigation, resulting in a high Basic Building Block maturity (approximately 84–87%). However, the transition toward advanced ASBU capabilities remain constrained by surveillance and ATM modernization, as several States still rely on procedural ATS and have ATM systems or ADS-B capabilities that are installed but not yet operational.

The most significant opportunity for the region is the commissioning and integration of surveillance infrastructure, supported by new communication network, ANS projects, and regional ADS-B data sharing, which would substantially improve interoperability, safety, and operational efficiency.

EASTERN CARIBBEAN REGION – AIR NAVIGATION SERVICES, CNS INFRASTRUCTURE, BBB AND ASBU IMPLEMENTATION OVERVIEW



— END —