International Civil Aviation Organization
North American, Central American and Caribbean Office

WORKING PAPER

CAR/DCA/OPSAN — WP/10
24/01/14

Safety and Air Navigation Directors of the CAR Region Meeting (CAR/DCA/OPSAN)
Mexico City, Mexico, 18 to 19 February 2014

Agenda Item 4: Regional Performance Indicators and Metrics for Implementation of Improvements in Safety and Air Navigation
4.7 Communications, Navigation and Surveillance (CNS) Infrastructure as Enablers of Operational Improvements

COMMUNICATIONS, NAVIGATION, SURVEILLANCE (CNS) AND AUTOMATION AS TECHNICAL ENABLERS OF THE NAM/CAR REGIONS PERFORMANCE AND OPERATIONAL IMPROVEMENTS

(Presented by the Secretariat)

EXECUTIVE SUMMARY

This working paper informs on the role performed by CNS, automation elements related to NAM/CAR regional priorities, and operational improvements foreseen by the NAM/CAR Regional Performance Based Air Navigation Implementation Plan (NAM/CAR RPBANIP).

Action:	The suggested action is presented in Section 3
Strategic Objectives:	• Safety • Air Navigation Capacity and Efficiency • Environmental Protection
References:	• Regional Performance-based Air navigation Implementation Plan (NAM/CAR RPBANIP) version 3.0 dated 04 November 2013, version 3.0 • First Eastern Caribbean Civil Aviation Technical Group Meeting (E/CAR/CATG/1), Martinique, French Antilles, 19 to 21 June 2013 • *Global Air Navigation Plan (GANP)*- Doc 9750 • First NAM/CAR Air Navigation Implementation Working Group Meeting (ANI/WG/1), Mexico City, Mexico, 29 July to 1 August 2013

1. Considerations

1.1 The implementation of air navigation Services/ Systems in the NAM/CAR Regions is performance-based as established in the RPBANIP. The CNS related implementation elements are known as the technical enablers of the Air Traffic Management (ATM) operational concept. They are technologies that meet the properties required to implement the element and realistically can become operational during the estimated time frame.

1.2 The fourth edition of the GANP was developed by ICAO to support a globally harmonized incremental air navigation system providing clear guidance on the operational targets and supporting technologies, avionics, procedures, standards and regulatory approvals needed to realize them. This is accomplished through the Aviation System Block Upgrade (ASBU) methodology, which forms the basis of the revised GANP. The ASBU modules are supplemented by CNS, avionics, and information management roadmaps. The CNS roadmaps are located in the **Appendix** to this working paper for reference.

2. Communications, Navigation, Surveillance and Automation elements in the RPBANIP

2.1 Two Regional Performance Objectives (RPOs) in the RPBANIP encompass the CNS and automation elements of air navigation implementation:

- RPO 4. Improve Situational Awareness
- RPO 6. Optimization and Modernization of Communication Infrastructure

2.2 However, other CNS and automated elements are included in the different RPOs considering the development of the appropriate infrastructure and systems for the operational implementation; such are the cases for the *Global Navigation Satellite System (GNSS) Manual - Doc 9849* in support of the Performance-based Navigation (PBN) automation to support the exchange of aeronautical information and meteorological (MET) data.

2.3 Implementation of regional priorities is currently reflected in various regional implementation plans including:

- Aeronautical Message Handling System (AMHS) Implementation Plan
- Air Traffic Services Inter-Facility Data Communication (AIDC) Implementation Plan
- Automatic Dependent Surveillance - Broadcast(ADS-B) Action Plan
- Controller-Pilot Data Link Communication (CPDLC) Action Plan
- MEVA III Network Implementation Plan
- Radar Data Exchange Plans-E/CAR Region and Bilateral Agreements
- E/CAR Aeronautical Fixed Service (AFS) Network Improvement Plan
- Aeronautical Mobile Service (AMS) Communication Improvement Plans

2.4 All plans are available on the ICAO NACC e-documents webpage.

2.5 Similarly, the implementation tasks are being supported and coordinated by the NAM/CAR Air Navigation Implementation Working Group (NAM/CAR ANI/WG) through the GOLD, AIDC, ADS-B and AMHS Task Forces, as well as the sub-regional ad hoc groups like the MEVA Technical Management Group (MEVA TMG), the Eastern Caribbean Network Technical Group (E/CAR/NTG) and specific committees including the CNS Committee in the Eastern Caribbean Civil Aviation Technical Group (E/CAR/CATG). Information on the various implementation groups is available on the group`s respective webpage on the ICAO NACC website.

2.6 In this regard, the current air navigation targets reflect the regional implementation plan progress and feasibility, as well as agreement by all involved parties to achieve the operational benefits and milestones.

3. Suggested Actions

3.1 The Meeting is invited to:

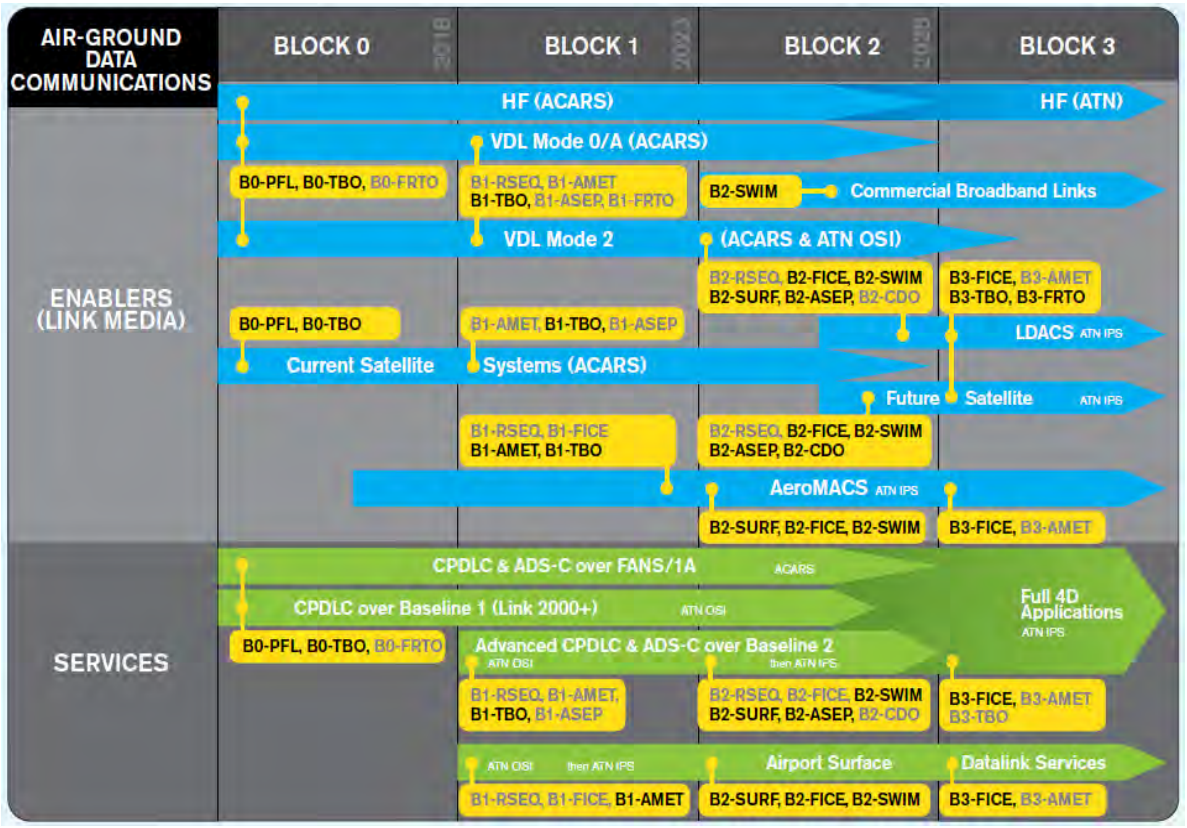
a) take note of CNS and automation elements for air navigation implementation and regional priorities;

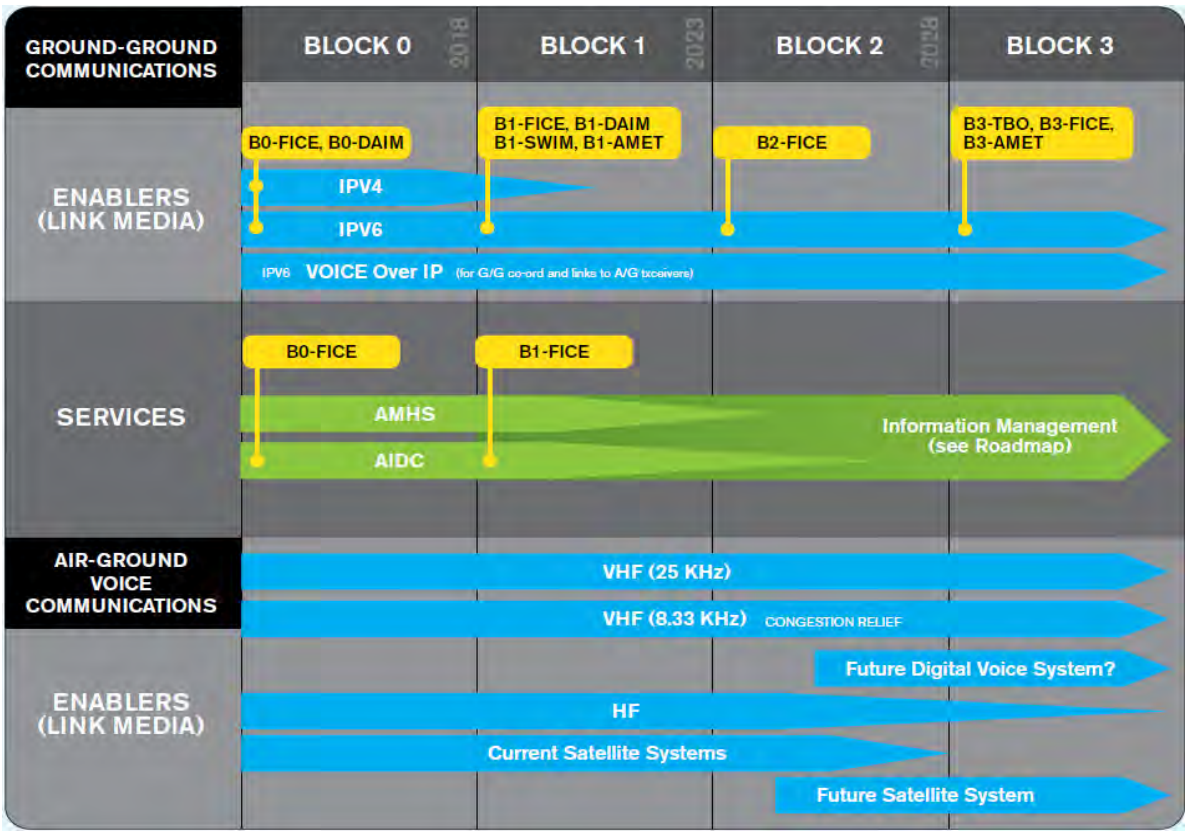
b) urge participation of their experts in the various working groups; and

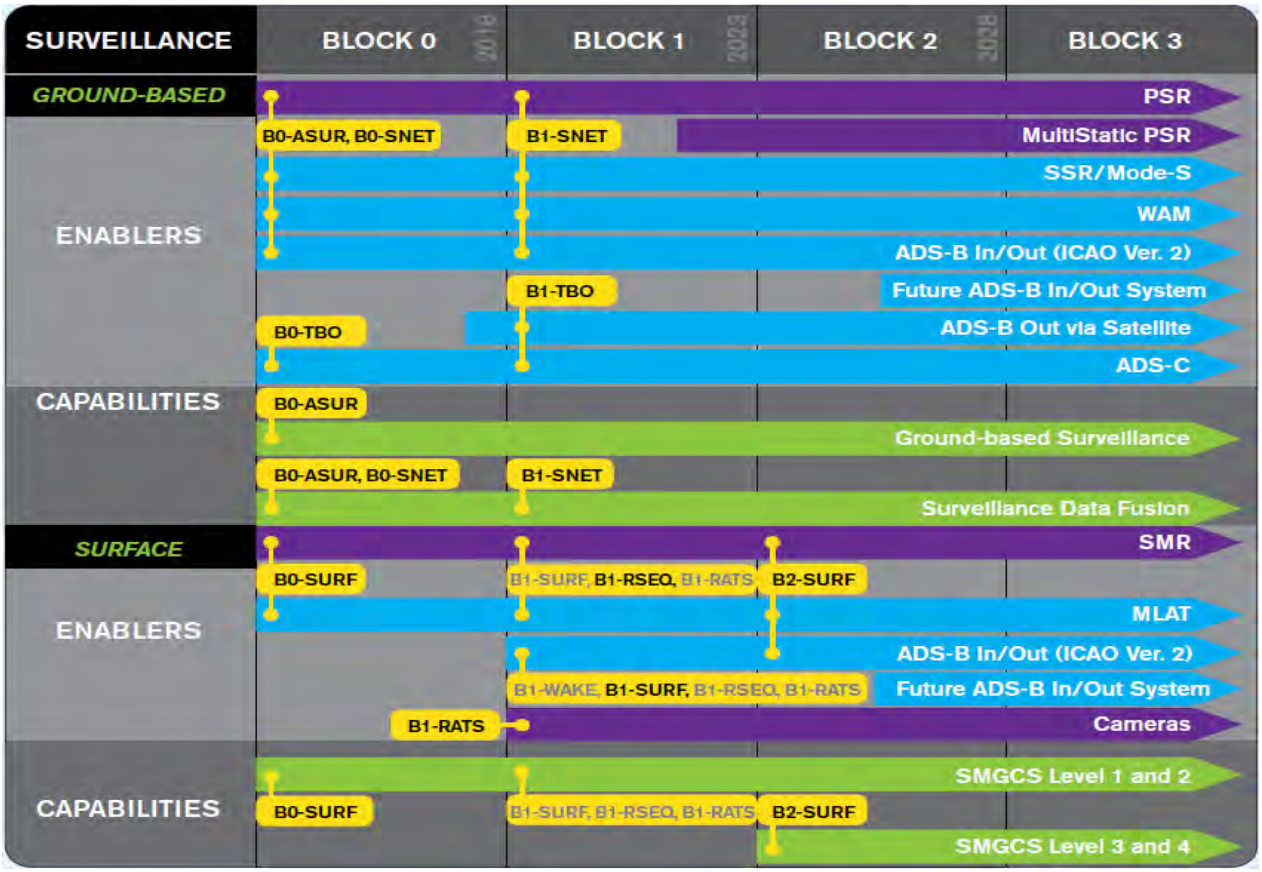
c) recommend any other action as deemed necessary.

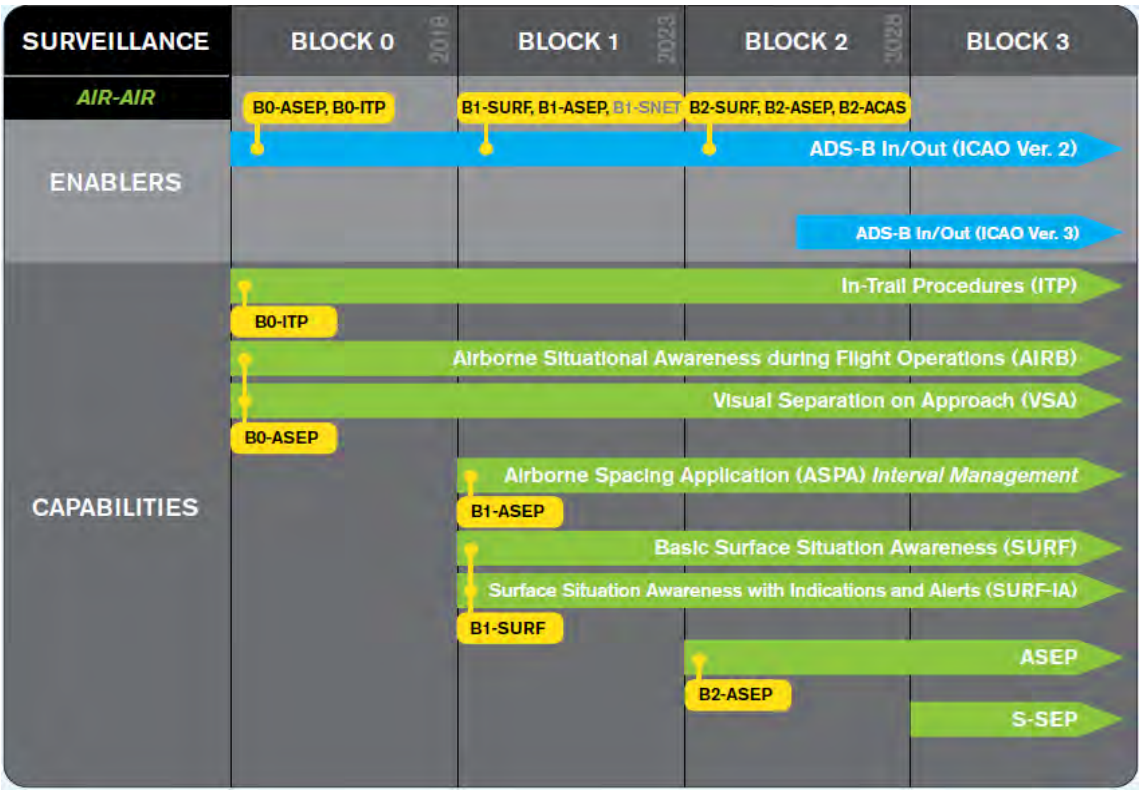
— — — — — — — — — — —

APPENDIX / APÉNDICE
CNS Roadmaps / Hojas de Ruta CNS

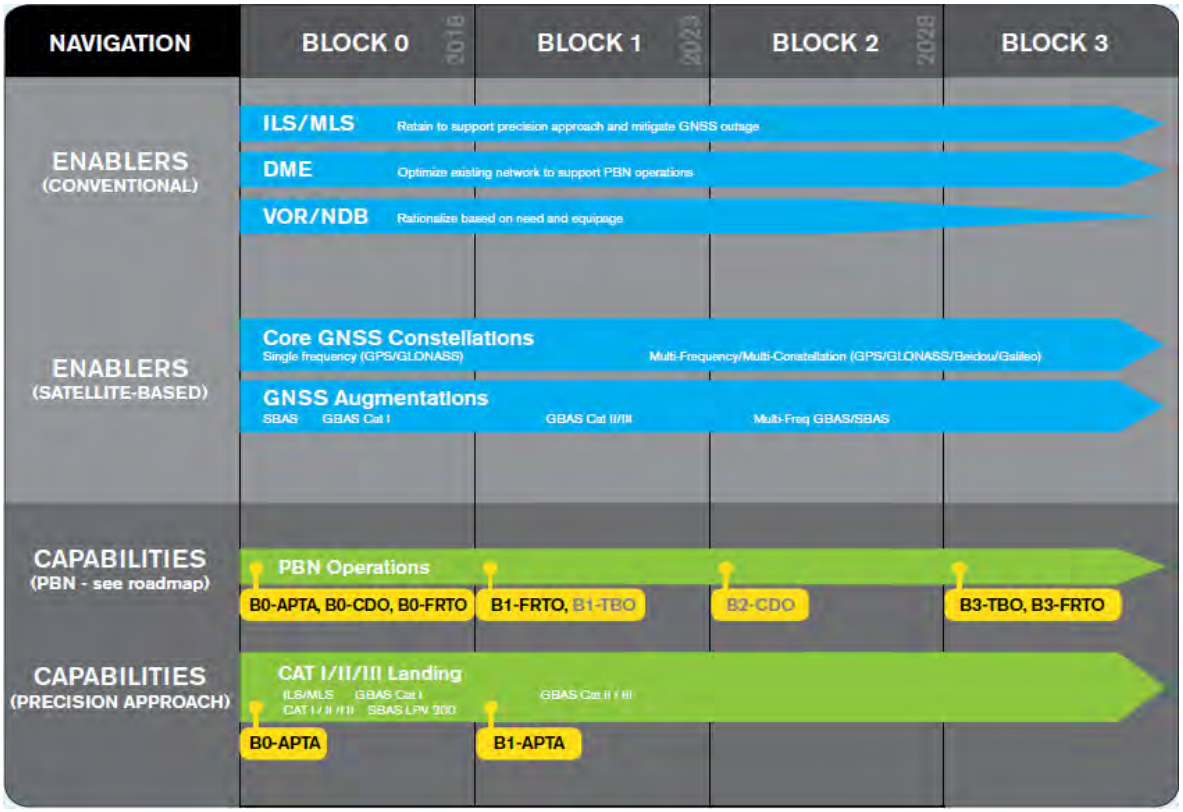



GROUND-GROUND COMMUNICATIONS
BLOCK 0
2013
BLOCK 1
2018
BLOCK 2
2028
BLOCK 3
ENABLERS (LINK MEDIA)
B0-FICE, B0-DAIM
B1-FICE, B1-DAIM
B1-SWIM, B1-AMET
B2-FICE
B3-TBO, B3-FICE,
B3-AMET
IPV4
IPV6
IPV6 VOICE Over IP (for G/G co-ord and links to A/G txceivers)
SERVICES
B0-FICE
B1-FICE
AMHS
AIDC
Information Management
(see Roadmap)
AIR-GROUND VOICE COMMUNICATIONS
VHF (25 KHz)
VHF (8.33 KHz) CONGESTION RELIEF
ENABLERS (LINK MEDIA)
Future Digital Voice System?
HF
Current Satellite Systems
Future Satellite System


SURVEILLANCE
BLOCK 0
2018
BLOCK 1
2023
BLOCK 2
2028
BLOCK 3
GROUND-BASED
ENABLERS
CAPABILITIES
SURFACE
ENABLERS
CAPABILITIES
PSR
MultiStatic PSR
SSR/Mode-S
WAM
ADS-B In/Out (ICAO Ver. 2)
Future ADS-B In/Out System
ADS-B Out via Satellite
ADS-C
Ground-based Surveillance
Surveillance Data Fusion
SMR
MLAT
ADS-B In/Out (ICAO Ver. 2)
Future ADS-B In/Out System
Cameras
SMGCS Level 1 and 2
SMGCS Level 3 and 4
B0-ASUR, B0-SNET
B1-SNET
B1-TBO
B0-TBO
B0-ASUR
B0-ASUR, B0-SNET
B1-SNET
B0-SURF
B1-SURF, B1-RSEQ, B1-RATS
B2-SURF
B1-WAKE, B1-SURF, B1-RSEQ, B1-RATS
B1-RATS
B0-SURF
B1-SURF, B1-RSEQ, B1-RATS
B2-SURF


SURVEILLANCE
BLOCK 0
2018
BLOCK 1
2023
BLOCK 2
2028
BLOCK 3
AIR-AIR
ENABLERS
CAPABILITIES
B0-ASEP, B0-ITP
B1-SURF, B1-ASEP, B1-SNET
B2-SURF, B2-ASEP, B2-ACAS
ADS-B In/Out (ICAO Ver. 2)
ADS-B In/Out (ICAO Ver. 3)
In-Trail Procedures (ITP)
B0-ITP
Airborne Situational Awareness during Flight Operations (AIRB)
Visual Separation on Approach (VSA)
B0-ASEP
Airborne Spacing Application (ASPA) Interval Management
B1-ASEP
Basic Surface Situation Awareness (SURF)
Surface Situation Awareness with Indications and Alerts (SURF-IA)
B1-SURF
ASEP
B2-ASEP
S-SEP

— A4 —


NAVIGATION
BLOCK 0
2018
BLOCK 1
2023
BLOCK 2
2028
BLOCK 3
ENABLERS
(CONVENTIONAL)
ILS/MLS
Retain to support precision approach and mitigate GNSS outage
DME
Optimize existing network to support PBN operations
VOR/NDB
Rationalize based on need and equipage
ENABLERS
(SATELLITE-BASED)
Core GNSS Constellations
Single frequency (GPS/GLONASS)
Multi-Frequency/Multi-Constellation (GPS/GLONASS/Beidou/Galileo)
GNSS Augmentations
SBAS
GBAS Cat I
GBAS Cat II/III
Multi-Freq GBAS/SBAS
CAPABILITIES
(PBN - see roadmap)
PBN Operations
B0-APTA, B0-CDO, B0-FRTO
B1-FRTO, B1-TBO
B2-CDO
B3-TBO, B3-FRTO
CAPABILITIES
(PRECISION APPROACH)
CAT I/II/III Landing
ILS/MLS
GBAS Cat I
CAT I / II / III
SBAS LPV 200
GBAS Cat II / III
B0-APTA
B1-APTA

— END —