ICAO ASBU Implementation/ CPDLC and AIDC Regional Implementation

Automation System and Integrated Telecommunications for Air
Navigation Services/System-Wide Information Management (SWIM) Workshop
(AUTO/SWIM)
Mexico City, Mexico, 21 to 24 April 2014

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ICAO NACC Office

Agenda

- Air navigation implementation overview
- ASBU implementation
- NAM/CAR Regional Performance Based Air Navigation Implementation Plan (RPBANIP)
- AIDC regional implementation
- CPDLC regional implementation
- NACC/WG/04 Implementation results
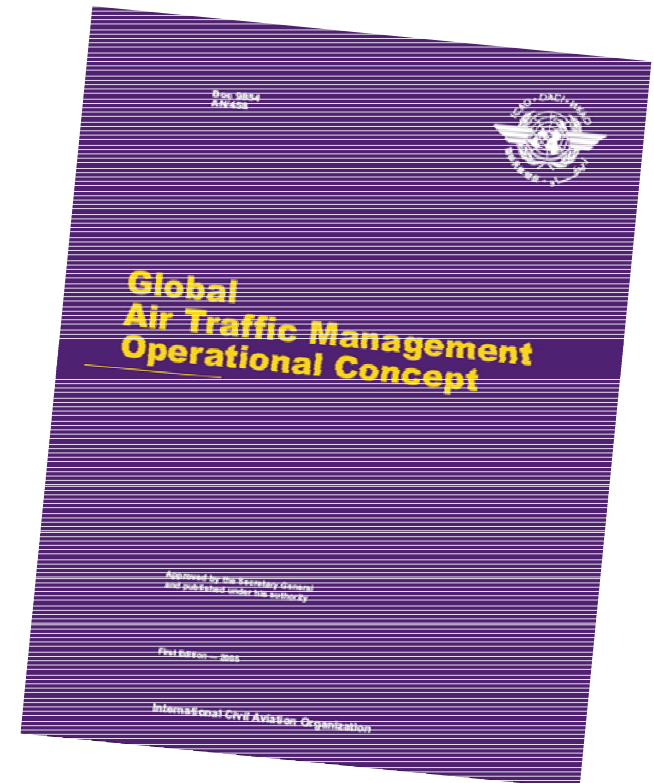
Air Navigation Implementation Overview

Vision

The concepts to implement the safety and capacity/efficiency strategic objectives (Global ATM Operational Concept)

Strategy

Global Air Navigation Plan

Global Aviation Safety Plan

Tactics

Global Performance ASBU approach

Global Safety Initiatives (GSI)

Action

Global and regional work plans (eANP) and action plans (RPBANIP)

Air Navigation Implementation Overview

Global ATM Operational Concept

- The Global Air Traffic Management System Operational Concept;
  - describes how an integrated global air navigation system should operate
  - describes what is envisaged on the basis of services
  - describes how the services form an integrated system
  - utilizes an information rich environment, that solves most problems strategically, through a collaborative process
  - provides States and industry with clearer objectives for the design and implementation of ATM and supporting CNS systems

- ATM user expectations are drivers for change, requiring:
  - Safety case
  - Business case

Technical Enablers
Operational Enablers procedures
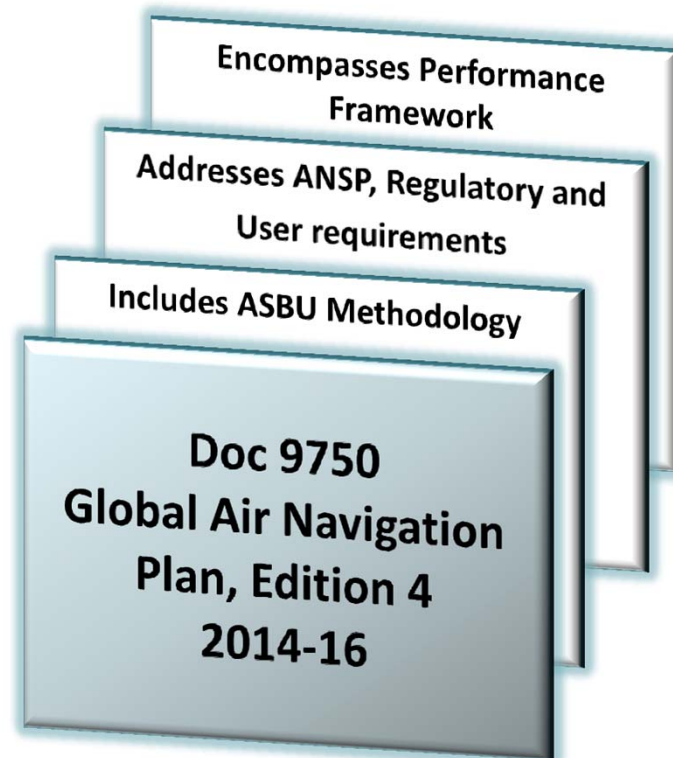**Socio-economic Enablers**

Air Navigation Implementation Overview

**Performance based
Global Air Navigation Systems
(2008)**

**Aviation System Block Upgrade
(ASBU) Methodology
(2012)**

Encompasses Performance Framework

Addresses ANSP, Regulatory and User requirements

Includes ASBU Methodology

Doc 9750
Global Air Navigation
Plan, Edition 4
2014-16

Air navigation implementation overview: ANConf/12 references

Recommendation 1/4 –Architecture

ICAO to develop, for inclusion in the first update of the Global Air Navigation Plan (GANP) after the 38th Session of the ICAO Assembly, a global air traffic management logical architecture representation in support of the GANP and planning work by States and regions; and develop a breakdown of the logical architecture of the ground system to the level needed to best address the global interoperability issues.

Recommendation 1/11 – Automation roadmap

ICAO to develop a global roadmap for the evolution of ground air traffic management automation systems in line with aviation system block upgrade implementation and develop performance-based system requirements for air traffic management automation systems.

Air navigation implementation overview: ANConf/12 references

Recommendations in support of the Global System-wide Information management (SWIM):

- REC 3/1 ICAO ASBU relating to performance improvement through the application of SWIM

- REC 3/2 Development of SWIM Concept

- REC 3/4 States and Industry to support SWIM

- REC 3/8 States actions relating to service improvement through AIM as well as digital ATM information

Recommendation 6/1 – Regional performance framework – planning methodologies and tools

That States and PIRGs:

a) finalize the alignment of regional air navigation plans with the Fourth Edition of the *Global Air Navigation Plan* (Doc 9750, GANP) by May 2014;

b) focus on implementing aviation system block upgrade Block 0 Modules according to their operational needs, recognizing that these modules are ready for deployment;

c) use the eANPs as the primary tool to assist in the implementation of the agreed regional planning framework for air navigation services and facilities;

d) involve **regulatory and industry personnel** during all stages of planning and implementation of aviation system block upgrade modules;

e) develop action plans to address the identified impediments to air traffic management modernization as part of aviation system block upgrade planning and implementation activities;
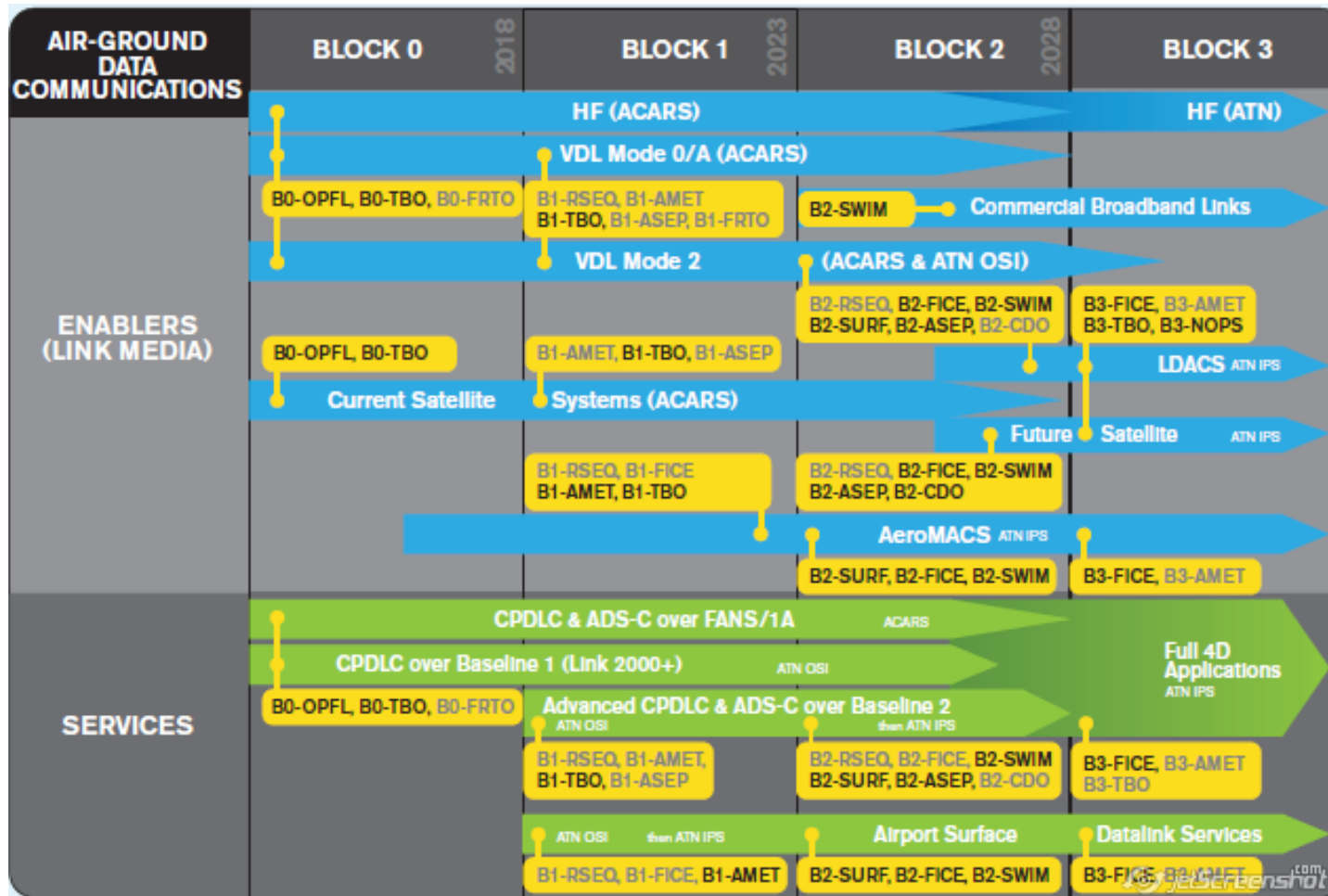
Air navigation implementation overview: Global Air Navigation Plan references

- The management of change pertinent to the block upgrade evolution should include human performance related considerations in the following areas:
  a) Initial training, competence and/or adaptation of new/active operational staff.
  b) New roles and responsibilities and tasks to be defined and implemented.
  c) Social factors and management of the cultural changes linked to increased automation.
- Where automation is to be used, the human-machine interface needs to be considered from both a functional and ergonomic perspective
- the qualification requirements (training/ skills) form an integral part to the implementation of the ASBU modules
- Human performance needs to be embedded both in the planning and design phases of new systems and technologies as well as during implementation.
- Early involvement of operational personnel is also essential.

Air navigation implementation overview: Global Air Navigation Plan references

Air navigation implementation overview: Global Air Navigation Plan references

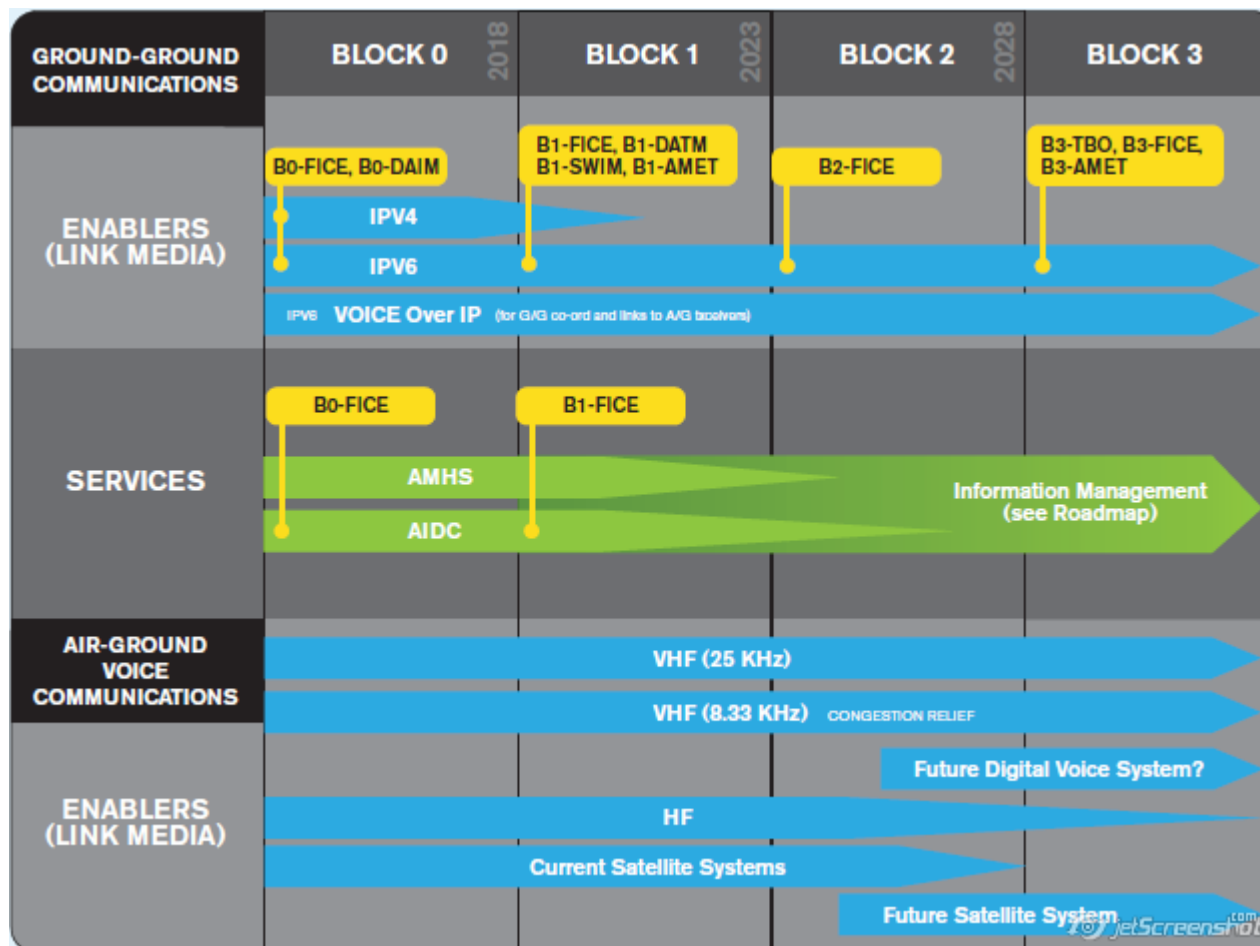**Air navigation implementation overview: Global Air Navigation Plan references**

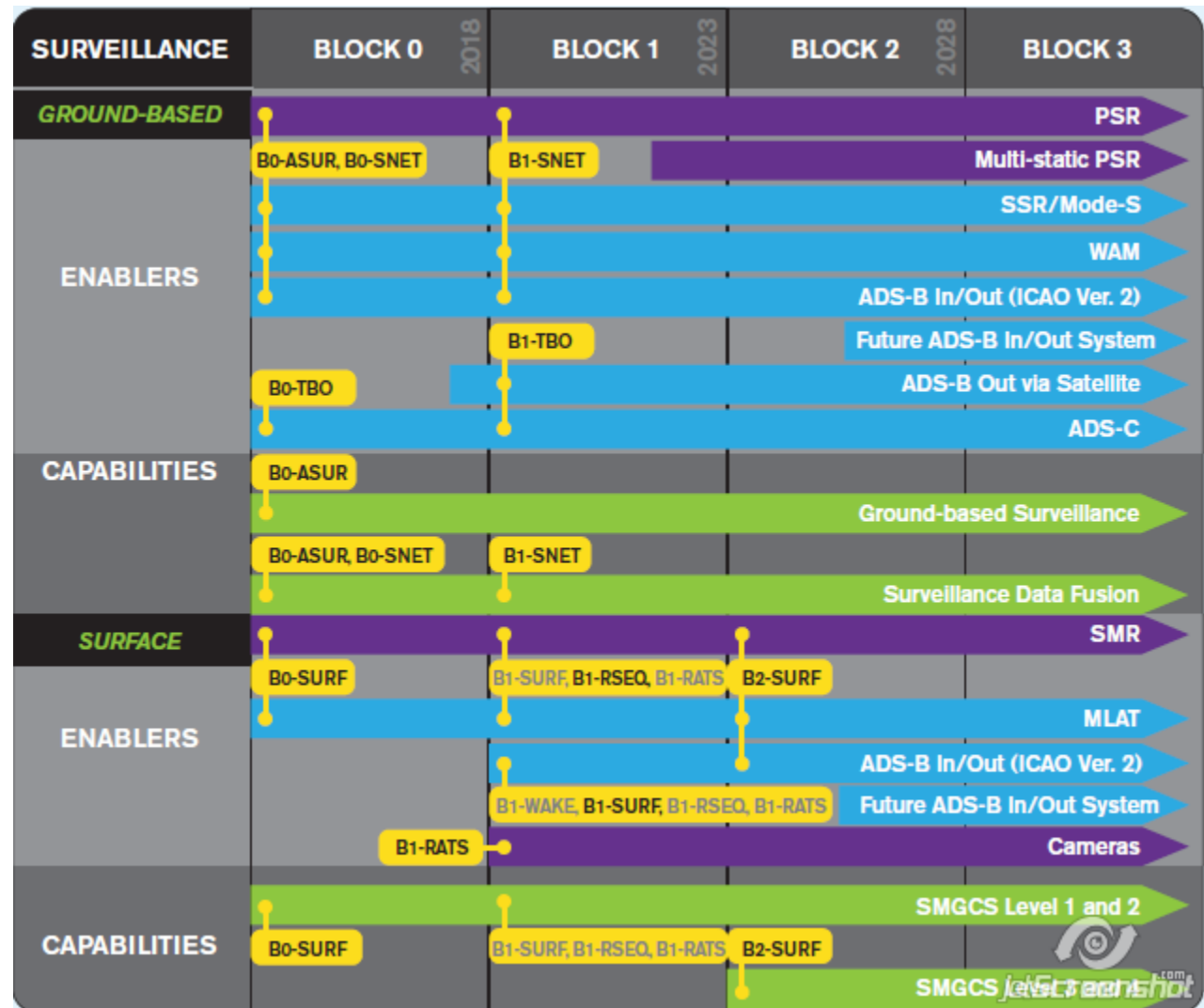# Air navigation implementation overview: Global Air Navigation Plan references
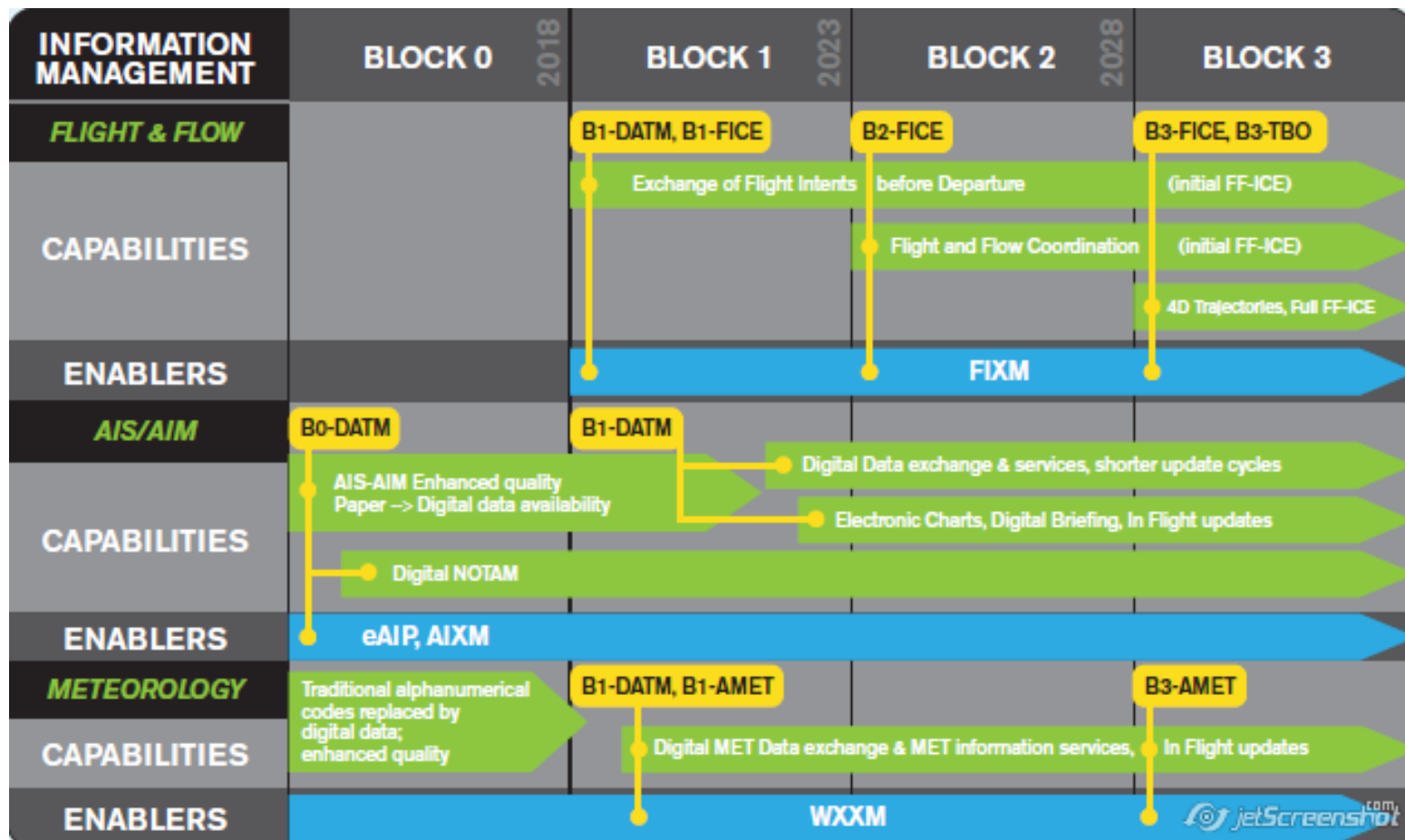
Air navigation implementation overview: Global Air Navigation Plan references

ASBU Implementation

Performance Improvement Areas (PIA)	Block 0 18 Modules (2013)	Block 1 17 Modules (2018)	Block 2 10 Modules (2023)	Block 3 7 Modules (2028 & >)
	B0-15	B1-15	B2-15	B3-15
Airport Operations				
Globally Interoperable Systems and Data				
Optimum Capacity and Flexible Flights				
Efficient Flight Path				

Module
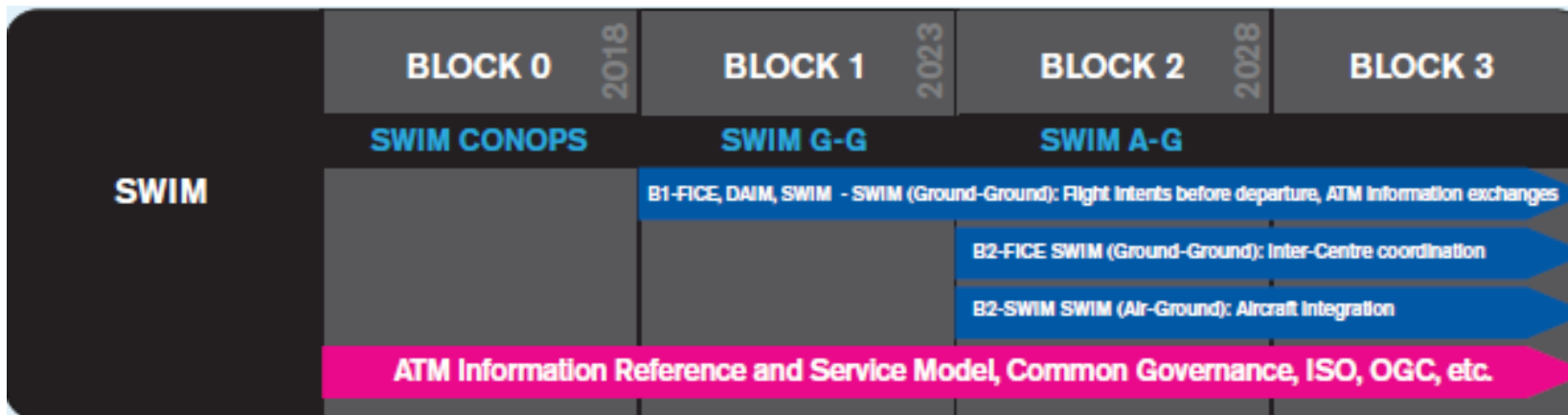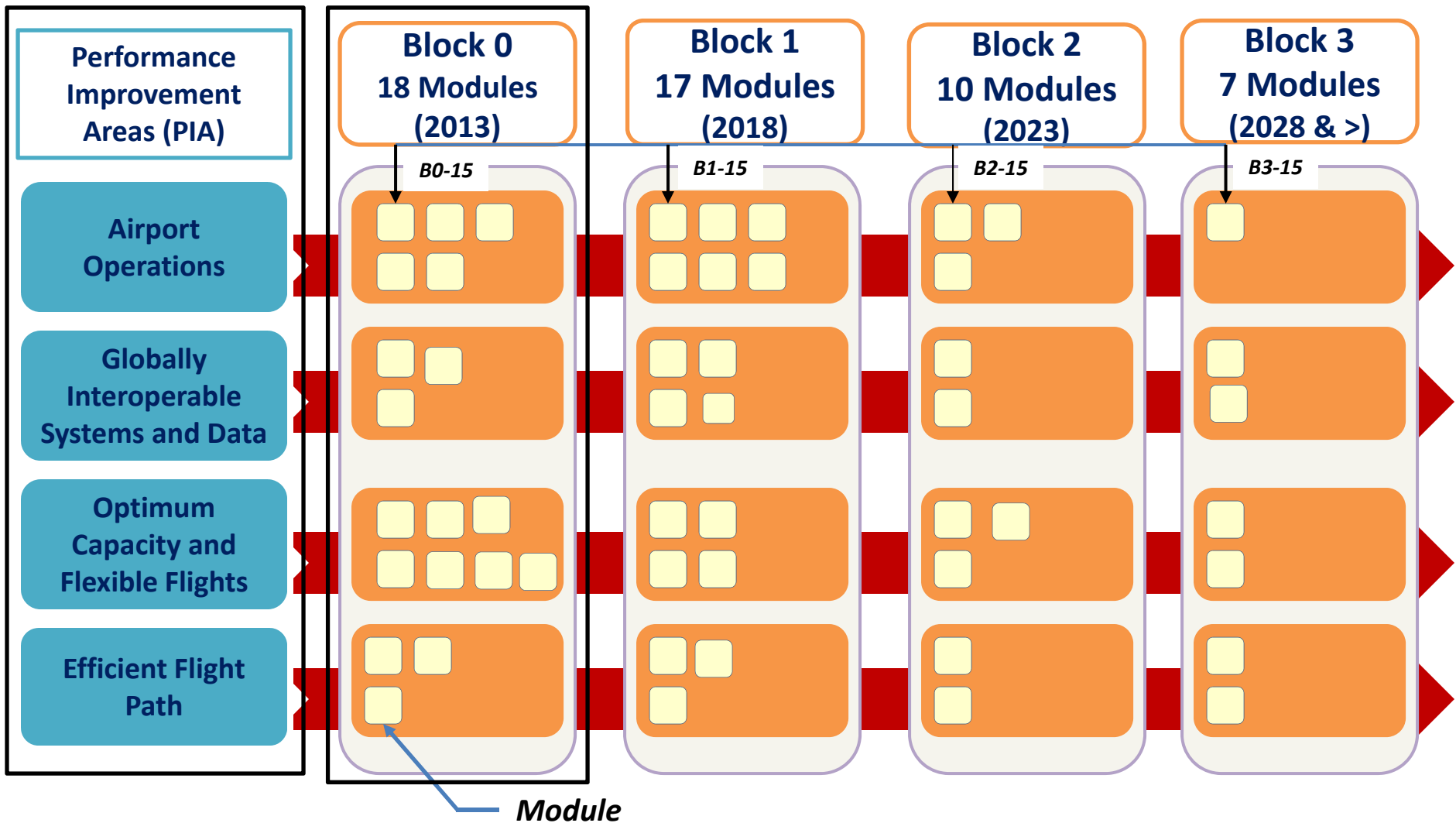
ASBU Implementation - Methodology

Current methodology
- Scope covers only ground equipment for ANSPs
- Planning based on short and medium term
- Implementation process is through GPIs

ASBU methodology
- Scope extends to airspace users and regulators
- Planning based on short, medium and long terms
- Implementation process is through Blocks and corresponding modules

ASBU Advantages
- Takes into account all related issues such as air/ground Systems, air/ground procedures, air/ground regulatory requirements and business case formulation,
- One stop planning at the same time flexible and scalable
- Modules provide a series of measurable, operational performance improvements, which could be introduced as needed

ASBU Implementation - Definition

Each Module is defined as follows:

  – Intended *Operational Improvement*/*Metric* to determine success
  – Necessary *Procedures*/Air and Ground
  – Necessary *Technology*/Air and Ground
  – Positive *Business Case* per Upgrade
  – *Regulatory Approval* Plan/Air and Ground
  – *Well understood* by a Global Demonstration Trial
    • All synchronized to allow initial implementation
    • Won't matter **when or where** implemented

• Each Module is evaluated for its readiness
• If any component is not found to be ready it moves to a future Block for implementation
• Those Modules that are not specifically ready at a Block release are noted as "dates of readiness"
• States choose the modules that are applicable to their national needs and regional priorities

ASBU Implementation: Module Identifiers/ Number

Old ASBU Modules Numbering System	New ASBU Modules Identifiers	
65	APTA	Airport Accessibility
70	WAKE	Wake Turbulence Separation
15	RSEQ	Runway Sequencing
75	SURF	Surface Operations
80	ACDM	Airport Collaborative Decision Making
81	RATS	Remote Air Traffic Services
25	FICE	FF/ICE
30	DAIM	Digital Aeronautical Management
31	SWIM	System Wide Information Management
105	AMET	Advanced Meteorological Information
10	FRTO	Free Route Operations
35	NOPS	Network Operations
84	ASUR	Alternative Surveillance
85	ASEP	Airborne Separation
86	OPFL	Optimum Flight Levels
101	ACAS	Airborne Collision Avoidance Systems
102	SNET	Ground-Based Safety Nets
05	CDO	Continuous Descent Operations
40	TBO	Trajectory-Based Operations
20	CCO	Continuous Climb Operations
90	RPAS	Remotely Piloted Aircraft Systems

ASBU Implementation- Block 0

- Timing/sizing of the block upgrades are in response to
  - need for Mature standards,
  - Integrated air and ground solutions and
  - Establishment of positive business cases
- Block "0" optimizes current onboard equipage and provides baseline
- Modules lacking specific maturity are purposefully placed in later blocks
- Block upgrades respond to issue of non-homogeneous areas

Block 0 will serve as the enabler and foundation for the envisioned future aviation systems.

- Addresses ANSP, aircraft and regularity requirements
- Implementation through Block Upgrades (0, 1, 2, and 3) each comprising a number of modules
- Each module is explained in a standardized 4-5 pages template (checklist)
  - provide a series of measurable, operational performance improvements
  - Organized into flexible & scalable building blocks
  - Could be introduced as needed
  - all modules are not required in all airspaces

NAM/CAR Regions adopted 18 Block 0 modules for the 2013-2018 period (RPBANIP)

ICAO | CAPACITY & EFFICIENCY
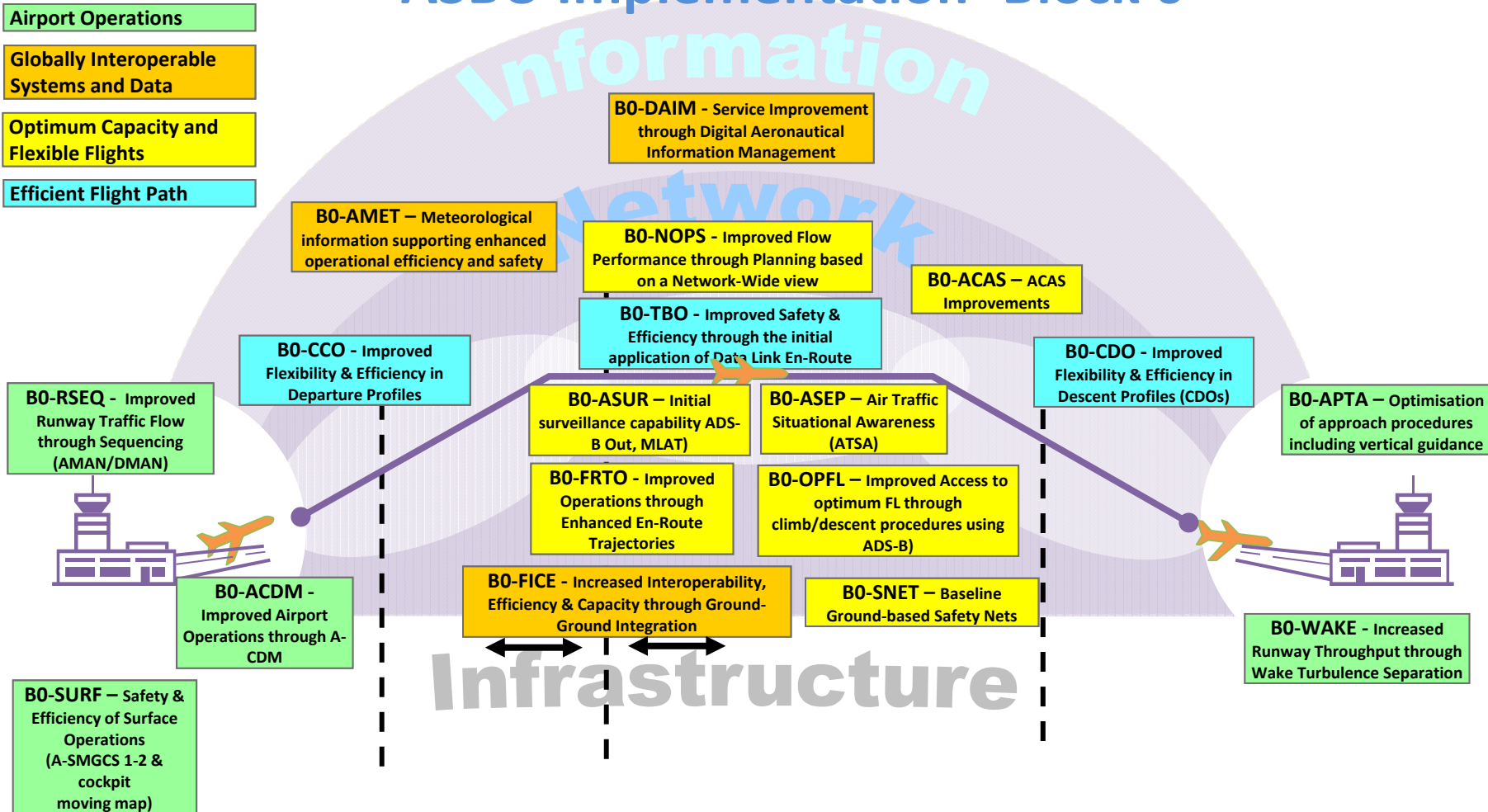
ASBU Implementation- Block 0

Performance Improvement Areas

- Airport Operations
- Globally Interoperable Systems and Data
- Optimum Capacity and Flexible Flights
- Efficient Flight Path

B0-DAIM - Service Improvement through Digital Aeronautical Information Management

B0-AMET – Meteorological information supporting enhanced operational efficiency and safety

B0-NOPS - Improved Flow Performance through Planning based on a Network-Wide view

B0-ACAS – ACAS Improvements

B0-TBO - Improved Safety & Efficiency through the initial application of Data Link En-Route

B0-CCO - Improved Flexibility & Efficiency in Departure Profiles

B0-CDO - Improved Flexibility & Efficiency in Descent Profiles (CDOs)

B0-RSEQ - Improved Runway Traffic Flow through Sequencing (AMAN/DMAN)

B0-ASUR – Initial surveillance capability ADS-B Out, MLAT

B0-ASEP – Air Traffic Situational Awareness (ATSA)

B0-APTA – Optimisation of approach procedures including vertical guidance

B0-FRTO - Improved Operations through Enhanced En-Route Trajectories

B0-OPFL – Improved Access to optimum FL through climb/descent procedures using ADS-B)

B0-ACDM - Improved Airport Operations through A-CDM

B0-FICE - Increased Interoperability, Efficiency & Capacity through Ground-Ground Integration

B0-SNET – Baseline Ground-based Safety Nets

B0-WAKE - Increased Runway Throughput through Wake Turbulence Separation

B0-SURF – Safety & Efficiency of Surface Operations (A-SMGCS 1-2 & cockpit moving map)

Information

Network

Infrastructure

ASBU Implementation- Block 0 - workshop

B0-102 SNET

Increased Effectiveness of Ground-Based Safety Nets.

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).

B0-30 DAIM

Service Improvement through Digital Aeronautical Information Management

Transition from product centric to data centric. Introduction of digital processing and management of information, by the implementation of AIS/AIM making use of AIXM, moving to electronic AIP and better quality and availability of data

B0-40 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.

B0-25 FICE

Increased Interoperability, Efficiency and Capacity through Ground-Ground Integration

Supports the coordination of ground-ground data communication between ATSU based on ATS Inter-facility Data Communication (AIDC) defined by ICO Document 9694

NAM/CAR REGIONAL PERFORMANCE-BASED AIR NAVIGATION IMPLEMENTATION PLAN (RPBANIP)

Harmonized implementation of Air Navigation Services and Systems under a Performance Based Approach.

The States, Air Navigation Implementation Working Group (ANI/WG) and other regional implementation groups follow-up this Plan, and formulate detailed Action Plans

Automation applications are included in most of the RPOs, particularly under RPO No. 4 Situational Awareness, RPO No. 6 Optimization and Modernization of Communication Infrastructure and RPO No. 7 Implementation of AIM respectively.

Version 3.1 of the RPBANIP is ASBU compliant and includes new ICAO ANRFs for monitoring and reporting

Plan Regional NAM/CAR de Implementación de Navegación Aérea Basado en la Performance (RPBANIP)

v3.1 — abril de 2014
Organización de Aviación Civil Internacional

http://www.icao.int/NACC/Pages/namcar-RPBANIP.aspx

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NAM/CAR REGIONAL PERFORMANCE-BASED AIR NAVIGATION IMPLEMENTATION PLAN (NAM/CAR RPBANIP)

ASBU B0-25/FICE: Planning Targets and Implementation Progress	
Elements	Targets and Implementation Progress (Ground and Air)
1. **MEVA III IP Network Implementation**	100% implementation of MEVA III IP Network by MEVA Member States by August 2015
1. **AMHS Implementation**	4 States with Air Traffic Services Message Handling Services (AMHS) interconnected with other AMHS by December 2014
1. **AIDC Implementation ***	50% of FIRs within which all applicable ACCs have implemented at least one interface to use AIDC/OLDI with a neighbouring ACC by December 2016.
1. **ATN Router Structure Implementation**	70% of ATN router structure implemented by June 2016

*: Air Navigation Target in Port of Spain Declaration

NAM/CAR REGIONAL PERFORMANCE-BASED AIR NAVIGATION IMPLEMENTATION PLAN (NAM/CAR RPBANIP)

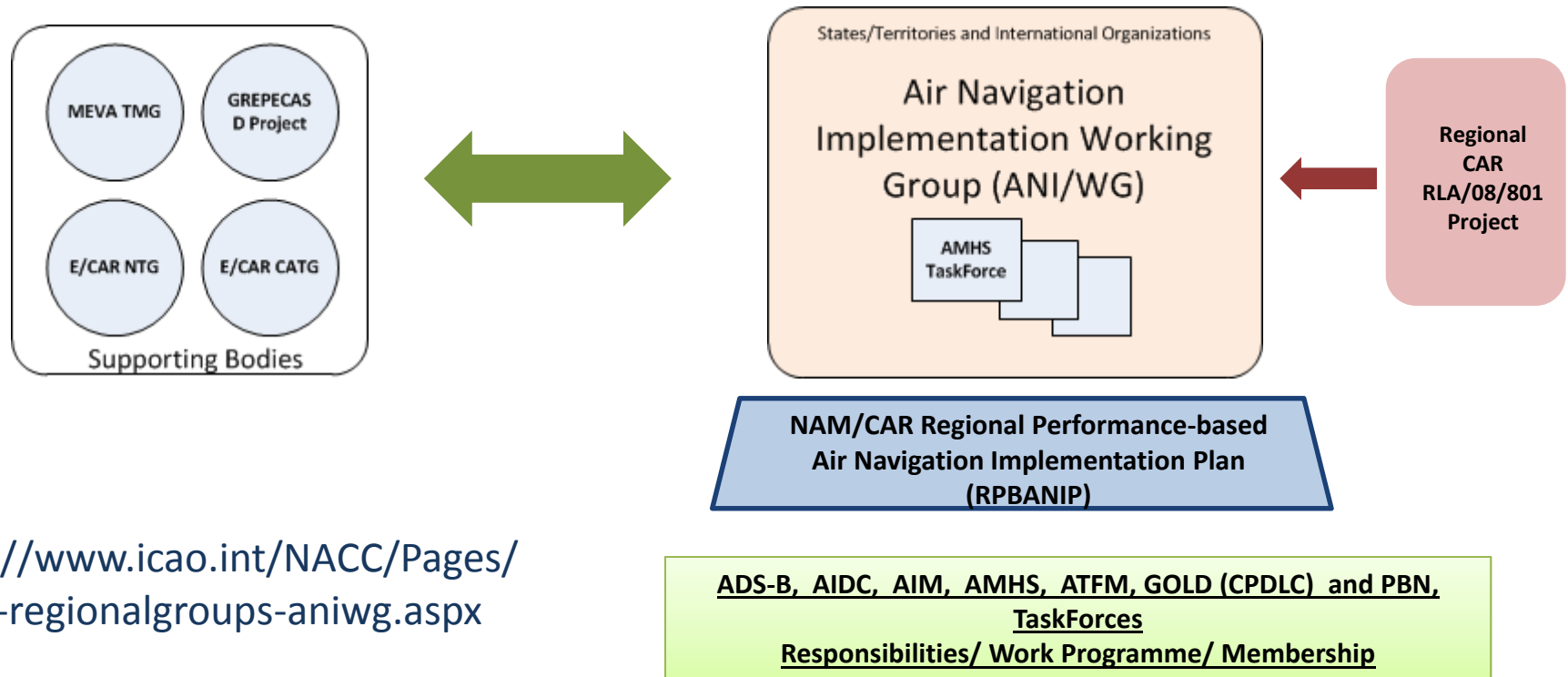| ASBU B0-30/DAIM: Planning Targets and Implementation Progress	
Elements	Targets and Implementation Progress (Ground and Air)
1. **QMS - AIM**	100 % of States QMS Certified by Dec.2016
1. **e.TOD Implementation**	10 % of States e-TOD Implemented by Dec.2018
1. **AIXM 5.1 Implementation**	40 % of States with AIXM 5.1 implemented by Dec.2018
1. **e-AIP Implementation**	45 % of States with e-AIP implemented by Dec.2018
1. **Digital NOTAM**	35 % of States with Digital NOTAM implemented by Dec. 2018

NAM/CAR REGIONAL PERFORMANCE-BASED AIR NAVIGATION IMPLEMENTATION PLAN (NAM/CAR RPBANIP)

ASBU B0-40/TBO: Planning Targets and Implementation Progress	
Elements	Targets and Implementation Progress (Ground and Air)
1. **ADS-C Over Oceanic and Remote Areas**	80% of selected FIRs with ADS-C implemented by December 2016
1. **CPDLC**	80% of selected FIRs with CPDLC implemented by June 2018

NAM/CAR REGIONAL PERFORMANCE-BASED AIR NAVIGATION IMPLEMENTATION PLAN (NAM/CAR RPBANIP)

ASBU B0-102/SNET: Planning Targets and Implementation Progress	
Elements	Targets and Implementation Progress (Ground and Air)
1. **Short Term Conflict Alert Implementation (STCA)**	80% of selected ATS units with ground based safety nets (STCA) implemented by Dec 2015
1. **Area Proximity Warning (APW)/ Minimum Safe Altitude Warning (MSAW)**	70% of selected ATS units with ground based safety nets (APW) implemented / 70% of selected ATS units with ground based safety nets (MSAW) implemented by Dec 2015
1. **Medium Term Conflict Alert (MTCA)**	80% of selected ATS units with ground based safety nets (MTCA) implemented by Dec 2016

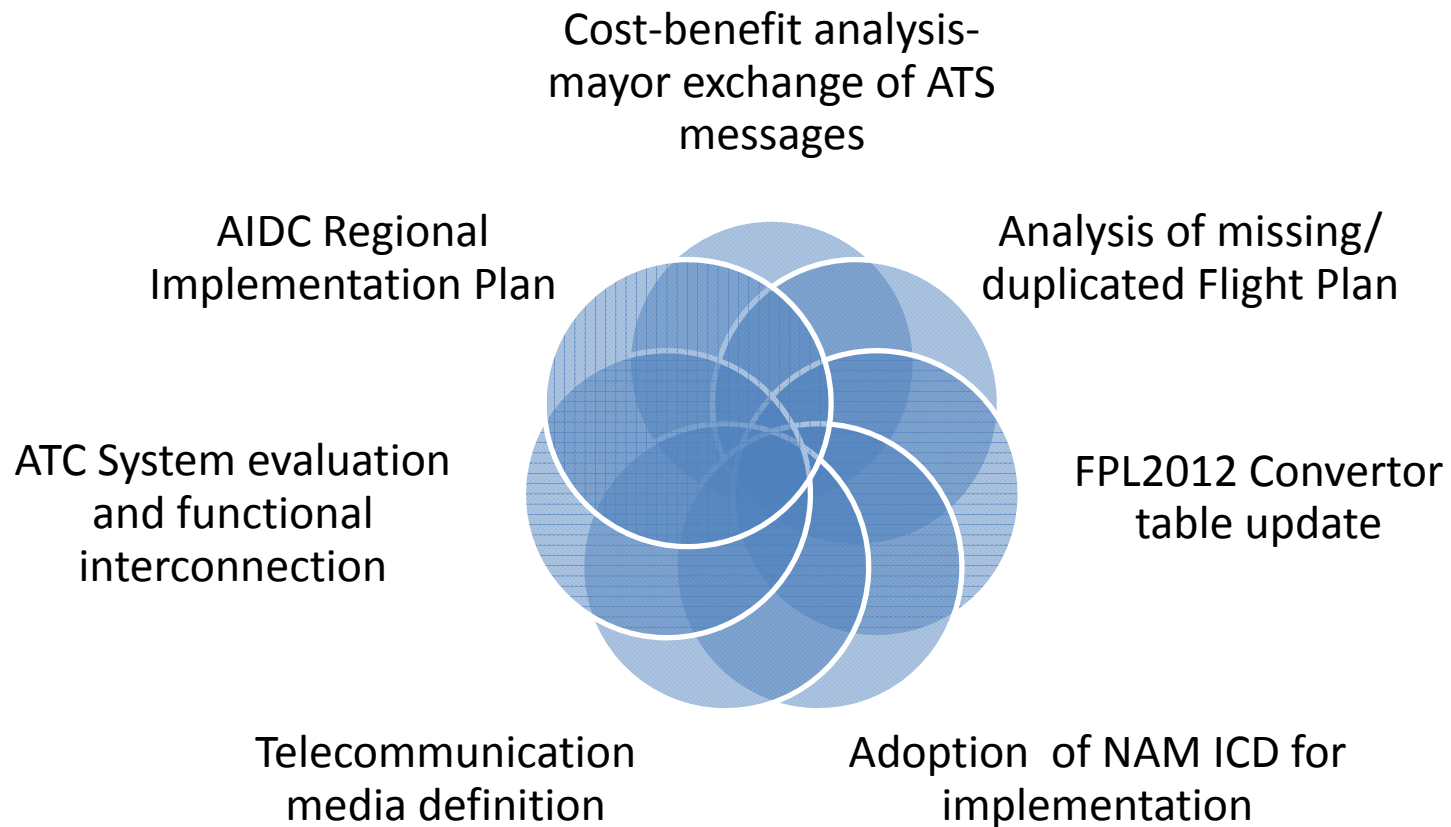# NAM/CAR REGIONAL PERFORMANCE-BASED AIR NAVIGATION IMPLEMENTATION PLAN (RPBANIP)

NAM/CAR Implementation supporting and implementing Bodies

MEVA TMG

GREPECAS D Project

E/CAR NTG

E/CAR CATG

Supporting Bodies

States/Territories and International Organizations

Air Navigation Implementation Working Group (ANI/WG)

AMHS TaskForce

Regional CAR RLA/08/801 Project

NAM/CAR Regional Performance-based Air Navigation Implementation Plan (RPBANIP)

ADS-B, AIDC, AIM, AMHS, ATFM, GOLD (CPDLC) and PBN, TaskForces
Responsibilities/ Work Programme/ Membership

http://www.icao.int/NACC/Pages/
nacc-regionalgroups-aniwg.aspx

AIDC REGIONAL IMPLEMENTATION

Cost-benefit analysis-
mayor exchange of ATS
messages

AIDC Regional
Implementation Plan

Analysis of missing/
duplicated Flight Plan

ATC System evaluation
and functional
interconnection

FPL2012 Convertor
table update

Telecommunication
media definition

Adoption of NAM ICD for
implementation

AIDC REGIONAL IMPLEMENTATION
CAR/SAM ANP Table CNS 1Bb – ATN Ground- Ground Applications Plan

- Due to the implementation of the New Flight plan format, several States have speed up the implementation of their ATS Automation Systems

- With the recognition of the operation benefits achieved through the implementation of CPL-LAM functionalities, more States are requiring the AIDC implementation

- The modernization of regional telecommunication networks are facilitating the implementation of ATN applications

AMHS Implementation Plan

AIDC Implementation Plan
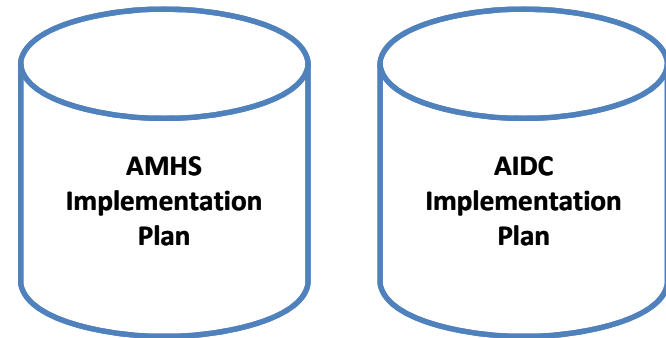
Revision of CNS 1Bb Table by States

AIDC REGIONAL IMPLEMENTATION: FPL2012
Converter Status Table

FOLLOW-UP: 25 MARCH 2014

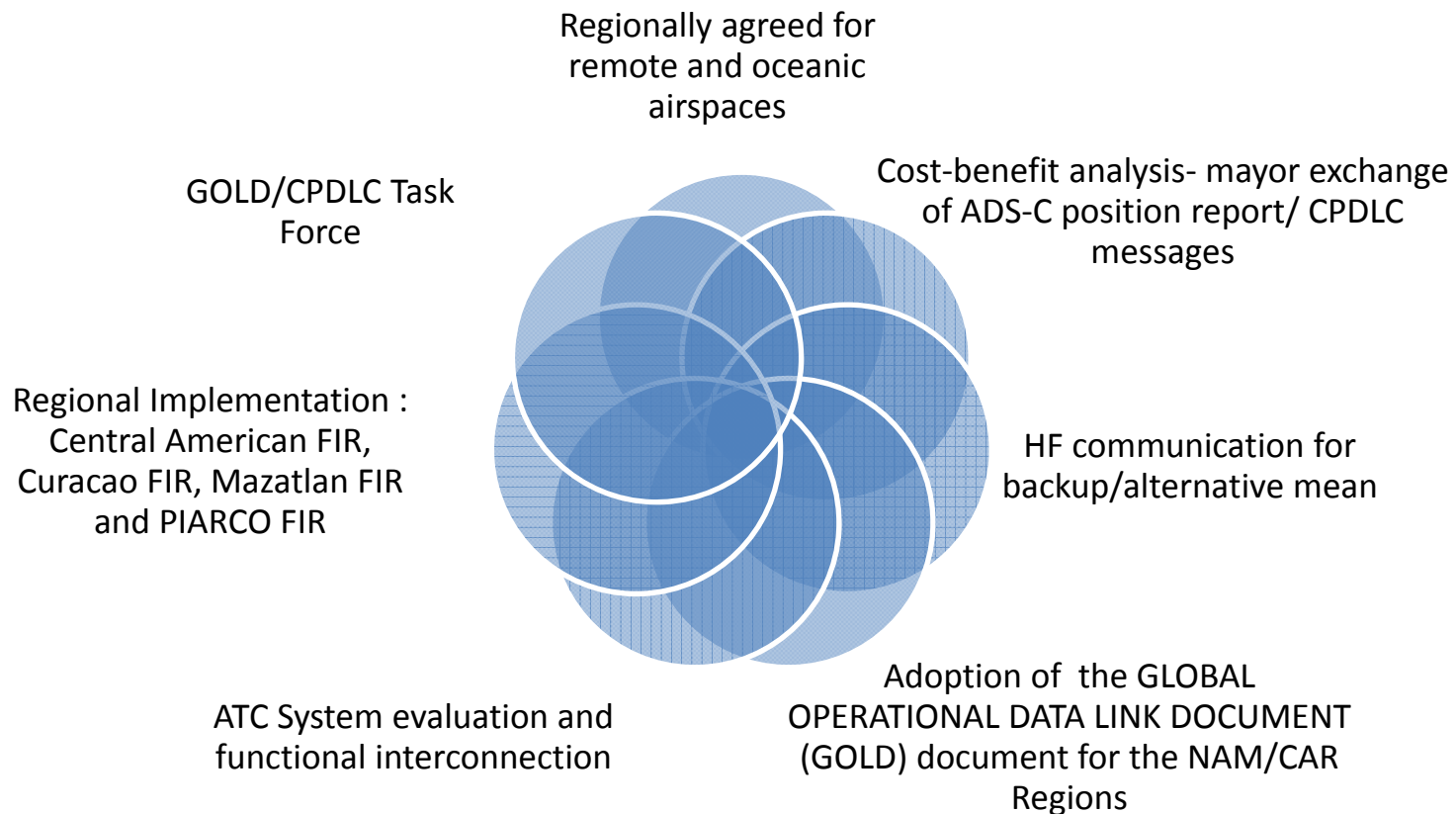| Date	Solution	
	AFTN Terminal –FPL	ATC Automated System - FDP
Anguilla	Implemented	Manual
Antigua and Barbuda	Implemented	Manual
Aruba	Implemented	Implemented
Bahamas	AMHS (FPL2012) terminals implementation date to be defined (TBD)	Full upgrade planned (converter is use)
Barbados	Implemented	Implemented
Belize	Implemented	Full upgrade planned (converter is use)
Bermuda	Implemented	Manual
British Virgin Islands	Implemented	Manual
Canada	Implemented	Implemented
Cayman Islands	Implemented	Implemented
COCESNA	Implemented	Full upgrade planned (2014). Currently converter is use
Costa Rica	Implemented	Full upgrade planned (converter is use)
Cuba	Implemented	Implemented

AIDC REGIONAL IMPLEMENTATION: Regional Plan

| State	1. Does your current Flight Data Processing System (FDP) have the capacity to process CPL-LAM messages? (Y/N) If not, when will your FDP have this capacity? Indicate date If yes, please indicate FDP model, manufacturer and any relevant equipment information to identify the system.	2. Indicate with what adjacent FIR/ATS Unit is the CPL-LAM implementation required:	3. Please indicate intended date for CPL-LAM testing and implementation:	4. Please provide Point of Contact for further CPL-LAM coordination (name, title, e-mail, phone number)	5. If CPL-LAM has been implemented, please provide bilateral agreement(s) for its operation, if applicable (for example ICD document)	6. CPL-LAM messages are transmitted through AFTN circuits, what is the current AFTN circuit speed and, if any, upgrade for CPL-LAM implementation:	7. Provide comment or concerns for CPL-LAM implementation
Cuba	yes - Oracle Version 9 modified by LITA-CUBA	FIR Miami	With Miami was started in 15 December 2011. Merida started in 9 March 2012.	Manuel Vega Rodríguez, Operations Management Havana ACC (537) 649-7281 manuelvega@aeronav.ecasa.avianet.cu, Víctor Manuel Machado Sánchez, Operation Management Havana ACC (537)-649-7281, email: victormachado@aeronav.ecasa.avianet.cu	NAM-ICD Version D	19200 BPS	We received many mistakes from the users in the FPL, in almost all fields. We have detected changes in the FPL forwarded by ACC´s or ANSP offices related to FPL´s presented by operators
		FIR Merida					
		FIR Kingston	TBD				
		FIR CENAMER	Segundo semestre del 2014				
		FIR Haiti	TBD				
Dominican Republic	Yes - For mid 2013 yes- TopSky-ATC, Thales ATM	KZMA/Miami ARTCC	Q2 - Ready to test	Julio Cesar Mejia A. Enc. ATM, jmejia@idac.gov.do, 809 274-4322. Ext. 2103 + Fernando Casso,fcasso@idac.gov.do	NAM-ICD Versión D	AMHS: 64 Kbps	
		TJZS/San Juan CERAP	Q2 - Ready to test				
		TNCF/Curazao ACC	Q2 - Ready to test				
		MTEG/Port au Prince ACC	TBD				
Mexico	Yes- FDP=EUROCAT-X.V3 Model, Producer= THALES ATM, INFO= Four Control Centres, all Mexico covered	Central America (COCESNA/CENAMER)	Mexico FDP system available	Ing. Jose de Jesus Jimenez Director de Sistemas Digitales SENEAM/SCT/MÉXICO xxxxx@sct.gob.mx 55 57 86 55 32	NAM-ICD Versión D	19200 bps	Mexico already counts with the implementation of CPL/LAM information exchange between: MZT ≤ ≥ LAX, MZT ≤ ≥ ABQ, MTY ≤ ≥ABQ, MTY ≤ ≥HOU, MID ≤ > HOU, MID < > HAB

CPDLC REGIONAL IMPLEMENTATION

Regionally agreed for remote and oceanic airspaces

GOLD/CPDLC Task Force

Cost-benefit analysis- mayor exchange of ADS-C position report/ CPDLC messages

Regional Implementation : Central American FIR, Curacao FIR, Mazatlan FIR and PIARCO FIR

HF communication for backup/alternative mean

ATC System evaluation and functional interconnection

Adoption of the GLOBAL OPERATIONAL DATA LINK DOCUMENT (GOLD) document for the NAM/CAR Regions

NACC/WG/04 IMPLEMENTATION RESULTS

- AIDC harmonization effort being conducted by the ICAO Inter-Regional AIDC Task Force (IRAIDCTF) for consolidating the Interface Control Documents (ICD) of the North Atlantic and Asia/Pacific Regions.

- United States' lessons learned, operational benefits and the current status on Automated Data Exchange

- COCESNA´s progress on the implementation of AIDC and OLDI in CENAMER ACC and the Area Control Centres adjacent to the Central American FIR

Emerging NAM Interfaces
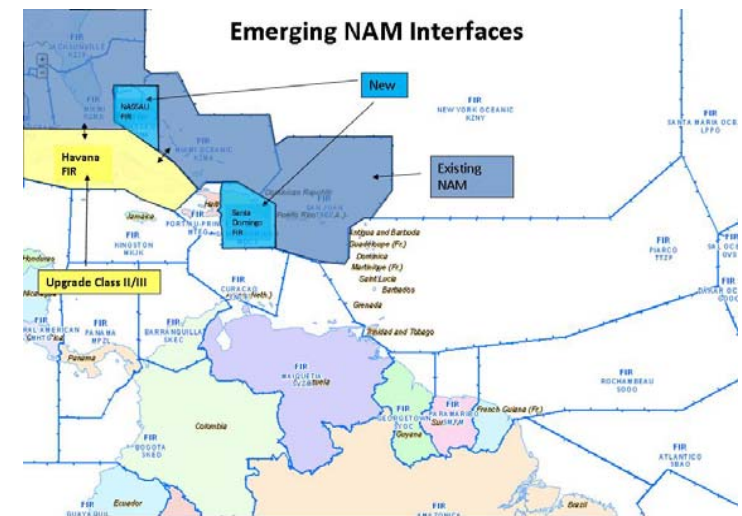
NACC/WG/04 IMPLEMENTATION RESULTS

- Analysis carried out by the AIDC Task Force, on the issue of missing, duplication and errors of flight plans

- Creation of a FPL monitoring group

- Filing of alternate aerodrome in FPL discussion

CONCLUSION
NACC/WG/4/9   ADOPTION OF NAM INTERFACE CONTROL DOCUMENT (ICD)

That the NAM ICD be adopted as the preferred ICD in the CAR region, not precluding the use of other ICDs under circumstances favourable to the latter.

NACC/WG/04 IMPLEMENTATION RESULTS

- COCESNA CPDLC/ADS-C current activities in the Pacific sector of the Central American FIR (CENAMER) and the trials being conducted until the second quarter 2014

- Canada´s experience in CPDLC/ADS-C implementation in the NAT Region

- Curacao joined the work of the GOLD TF for studying the implementation of CPDLC/ADS-C in the north western part of the Curacao FIR

- No operational obstacles to the use of the GOLD Document was identified
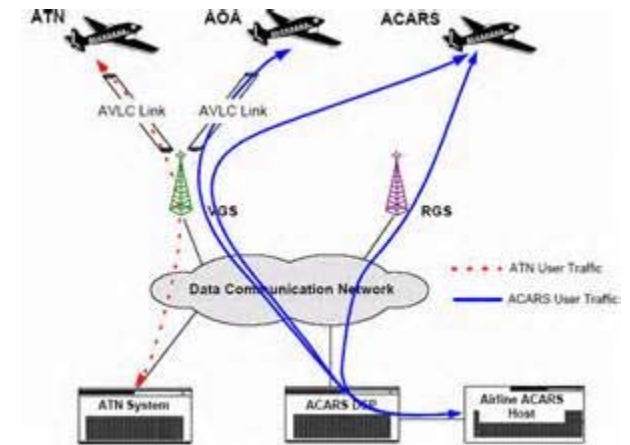
CONCLUSION
NACC/WG/4/11   ADOPTION OF THE GOLD DOCUMENT VERSION 2 FOR DATALINK APPLICATIONS IN THE NAM/ CAR REGIONS

That, in order to promote and facilitate the implementation of data link applications in the NAM and CAR Regions, that the States and Territories of the NAM/CAR Regions adopt the GOLD Document version 2, as the guidance material and reference document for the implementation of data link applications.

NACC/WG/04 IMPLEMENTATION RESULTS

CONCLUSION

NACC/WG/4/6   REPORTING ON THE PROGRESS ACHIEVED IN THE IMPLEMENTATION OF THE AERONAUTICAL INFORMATION EXCHANGE MODEL (AIXM)

That States and International Organizations adopt the AIXM 5.1 information exchange model and report progress

CONCLUSION

NACC/WG/4/7   AIM ACTION PLANS FOR THE AIS TO AIM TRANSITION

That CAR States that have not yet done so develop/update and execute the Action Plans for the transition from AIS to AIM taking into consideration the latest AIM developments, and the AIM TF work until AIM is completed according the AIM RPO of the RPBANIP