

AIR NAVIGATION PLAN

REGIONAL PERSPECTIVE

Performance Framework Workshop

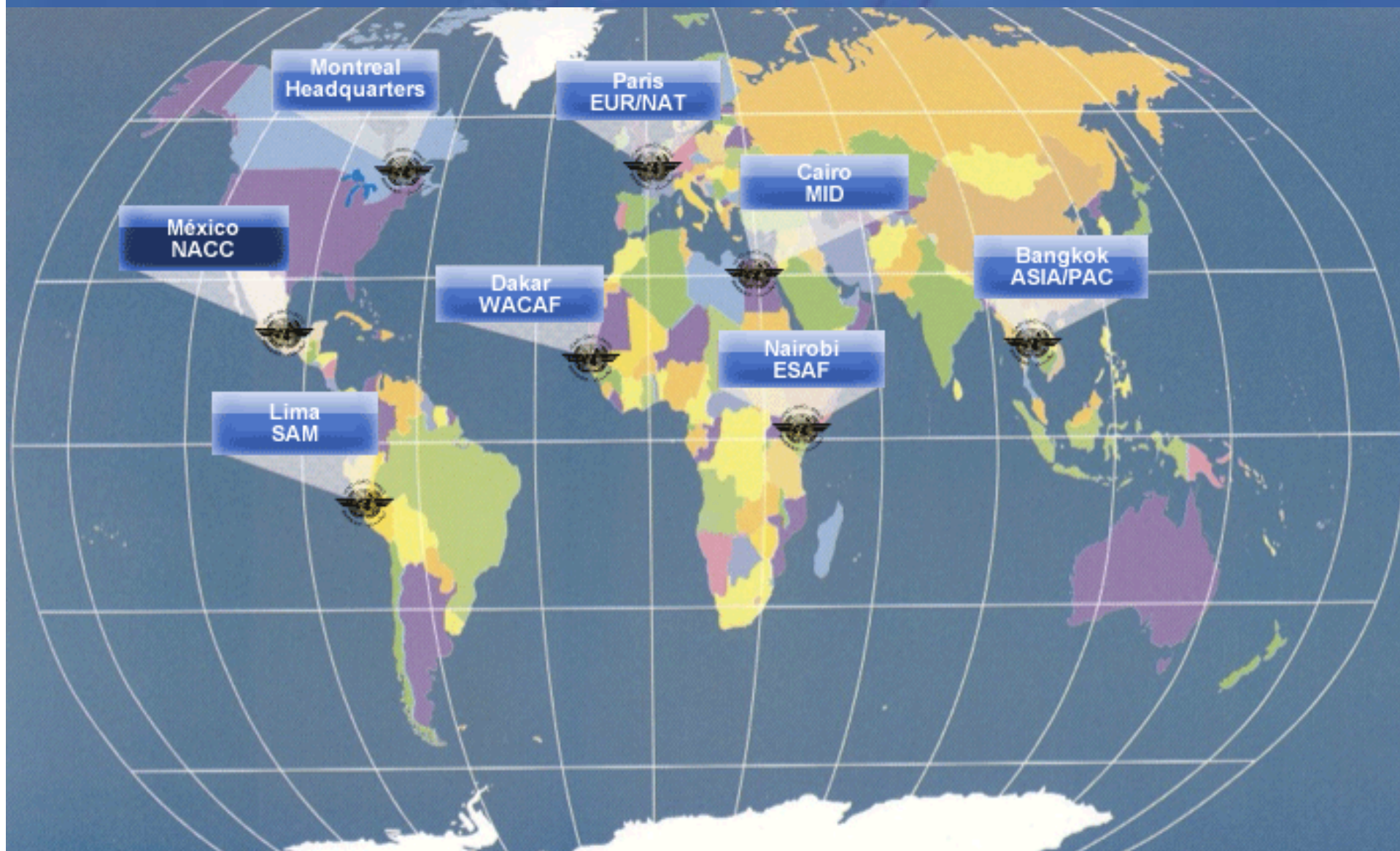
Víctor Hernández – Regional Officer ATM/SAR

ICAO NACC Office

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OBJECTIVE*
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ICAO REGIONAL OFFICES



“Meet the needs of the peoples of the world for safe, regular, efficient and economical air transport (Art. 44, Convention of Chicago)”

- ***Share the Organization’s vision and mission***
- ***Represent ICAO Secretary General to the States to which they are accredited.***
- ***Conduct regional programmes maintaining continuous communication with States and Regional Organizations for the implementation of policies, SARPs and regional air navigation plans.***

Regional Office....

- ✱ Provide assistance with the Universal Safety Oversight Audit Programme (USOAP), including guidance in pre-audit preparation, post-audit direct feedback and commensurate resolution for identified aviation safety deficiencies.

Areas of Expertise in the Regional Office

✱ Air Navigation

- Aerodromes and Ground Aids (AGA)
- Aeronautical Information Management (AIM)
- Air Traffic Management (ATM) –
 - ✱ Search and Rescue (SAR)
- Communications, Navigation and Surveillance (CNS)
- Flight Safety / Safety Oversight / Operations (FS - SO – OPS)

✱ Air Transport

- Aviation Security (AVSEC), Facilitation (FAL)

29 NAM/FIRs

7 Canada NAM FIRs

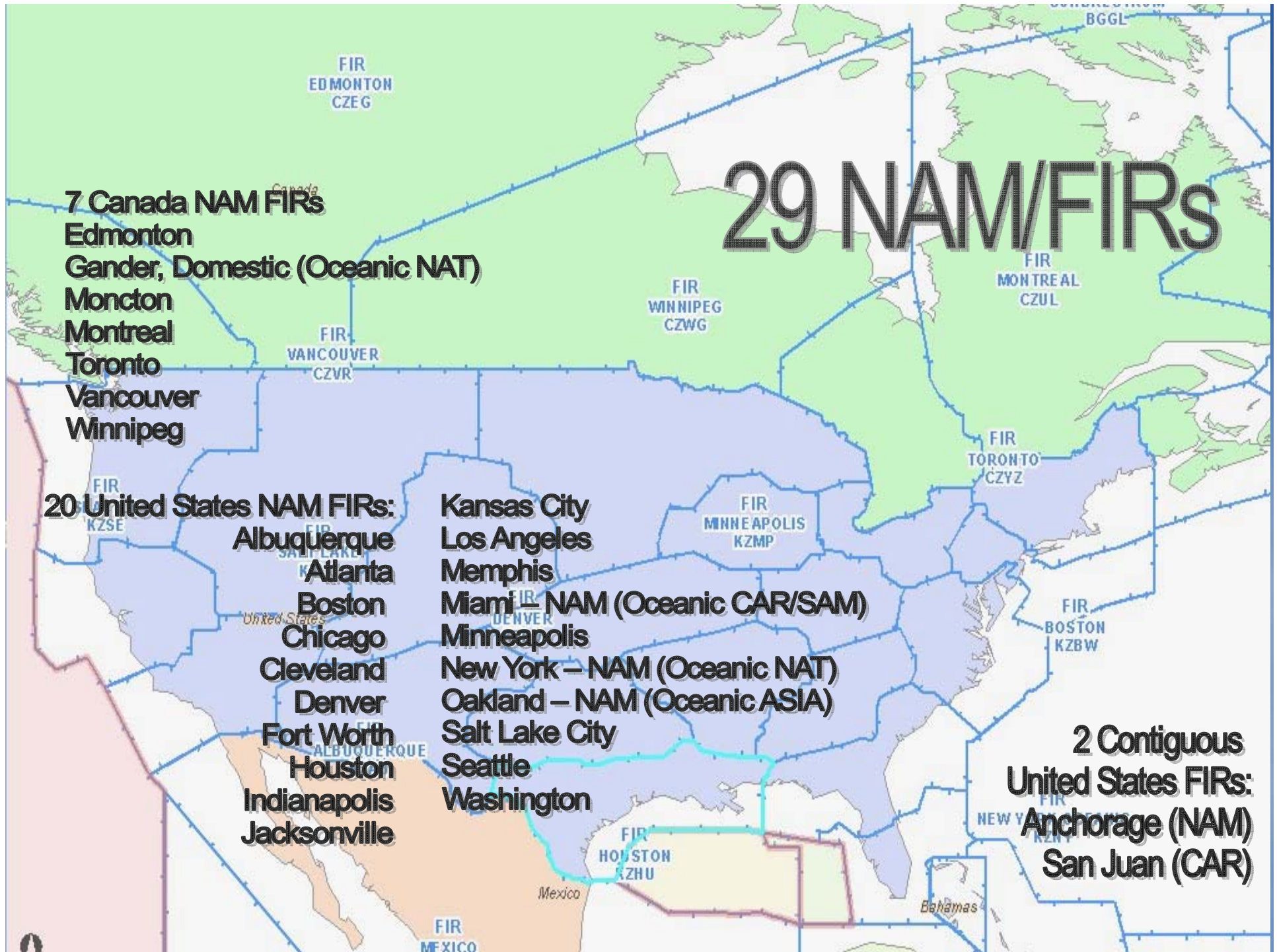
Edmonton
Gander, Domestic (Oceanic NAT)
Moncton
Montreal
Toronto
Vancouver
Winnipeg

20 United States NAM FIRs:

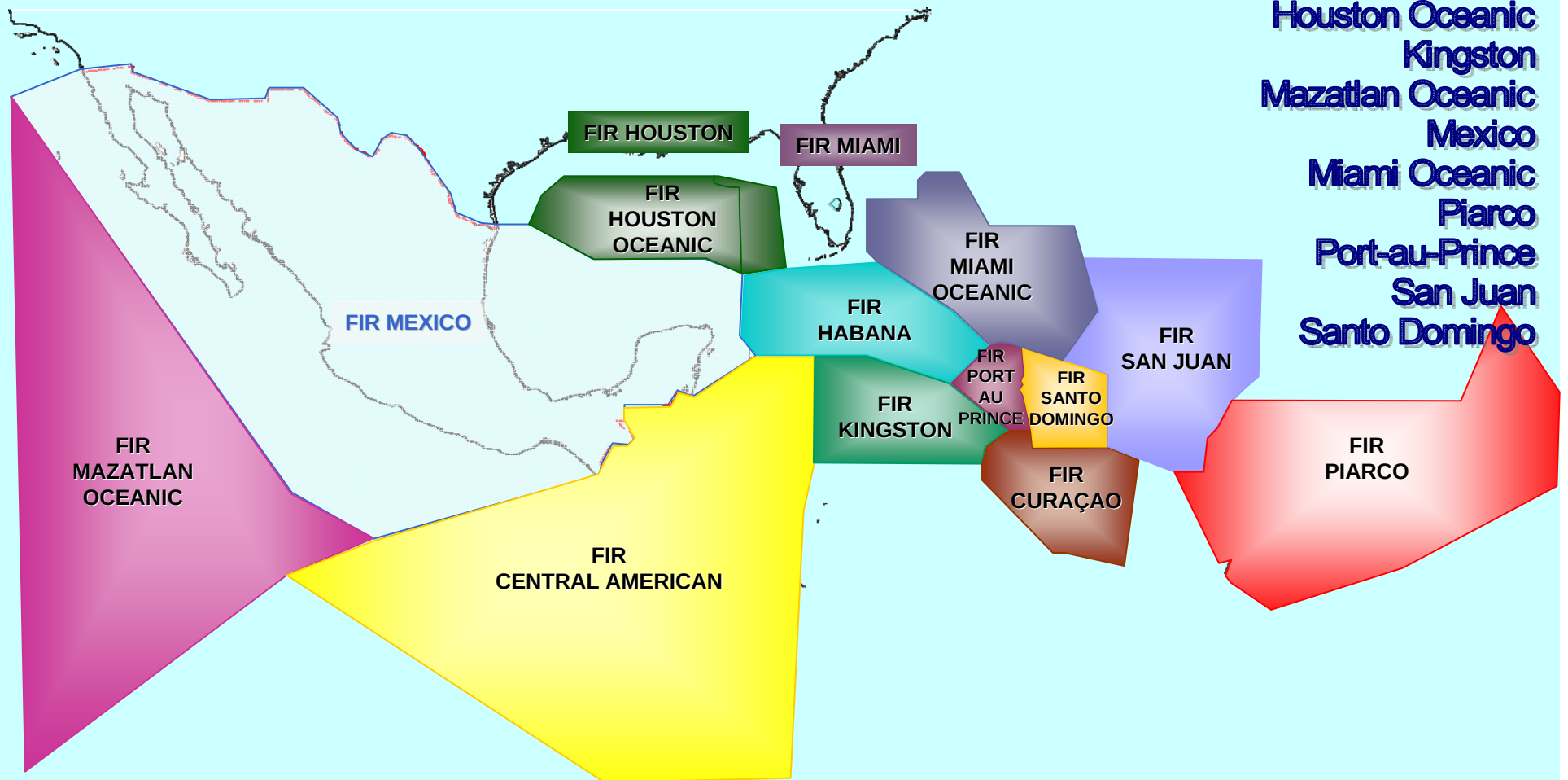
Albuquerque
Atlanta
Boston
Chicago
Cleveland
Denver
Fort Worth
Houston
Indianapolis
Jacksonville

Kansas City
Los Angeles
Memphis
Miami – NAM (Oceanic CAR/SAM)
Minneapolis
New York – NAM (Oceanic NAT)
Oakland – NAM (Oceanic ASIA)
Salt Lake City
Seattle
Washington

2 Contiguous
United States FIRs:
Anchorage (NAM)
San Juan (CAR)



12 CAR/FIRs



REGIONAL AIR NAVIGATION PLAN

CAR/SAM ANP, Doc. 8733



- Document approved by the Council and published under the authority of the Secretary General.
- Contains in detail the facilities, services and procedures to be provided by States according to Art. 28 to the Convention of Chicago.
- Formulated by the Regional Air Navigation Meetings (RAN) in two Volumes:
 - VOL I – BASIC ANP
 - Permanent principles within planning horizon
 - AREAS: GEN, BORPC, AOP, AIS/MAP, ATM, CNS, MET, SAR
 - VOL II – FASID
 - Requirements subject to the dynamic of the implementation process
 - AREAS: GEN, AOP, AIS/MAP, ATM, CNS, MET, SAR
- Revised and updated by GREPECAS.
- In current process of integration with the Global Air Navigation Plan (GANP) – eANP
- Fundamental planning document for the implementation of the Global/Regional ATM System

AOP

- **Basic – Required international aerodromes**
- **FASID –AOP Table**

- 1. Aerodromes by State**
- 2. Alternative aerodromes**
- 3. RFF Service**
- 4. ATS Requirements**
- 5. Physical Characteristics**
- 6. Radio-aids**
- 7. Lighting-aids**
- 8. Signals**
- 9. RVR**

CNS

- **BASIC – Planning criteria and regional recommendations for CNS systems (in process of amendment).**
- **FASID – CNS Tables**
 - 1. Aeronautic Fix Service (AFS)**
 - 1.1** Table CNS 1A - AFTN (Doc. 8259)
 - 1.2** Table CNS 1B – Plan ATN (In process of amendment).
 - 1.3** Table CNS 1C – ATS Oral Circuits.
Digital South American Network (REDDIG), MEVA II, COCESNA Network, CAFSAT - cover AFS requisites
 - 2. Aeronautical Mobile Service (AMS (R))**
 - 2.1** Table CNS 2 A (VHF 25 KHz of channels separation, data link requirements (VDL, HF/SSB; Mode S, AMSS, HFDL).
Air-to-Air Channel 123.400 MHz. 136 – 137 MHz separated for VDL air-ground.
 - 2.2** Table CNS 2 B, HF/SSB Communications Service in route. Frequencies families in the bands from 2 to 22 MHz

CNS

➤ FASID – CNS Tables (cont.)

3. **Aeronautical Navigation Radio Service**

3.1 Table CNS 3 – Navigation Radio Aids (in process of amendment)

Radio navigation systems are being examined in order to support the PBN implementation. Current plans for RNAV-5 (continental) RNP10/RNP4 (oceanic) for In-route navigation and RNAV1/RNP1 for Terminal navigation

While GNSS is established and during transition, VOR/DME will be used.

ILS will be retained until its use is operationally and economically acceptable.

4. **Surveillance Service**

4.1 Table CNS 4 – Surveillance Systems (PSR, SSR, ADS-C)

The Regional Strategy is under preparation in the light of new technologies, such as, Multi-lateration and ADS-B,.

Programmes to develop ADS-B regional trials.
Surveillance data exchange.

ATM

- **Basic:** Routes Network - Table ATS 1.
Restructuration of routes network in order to optimize this and to apply PBN concepts
- **FASID:** ATM evolution tables (to be updated by GREPECAS)
SSR codes assignment plan.

SAR

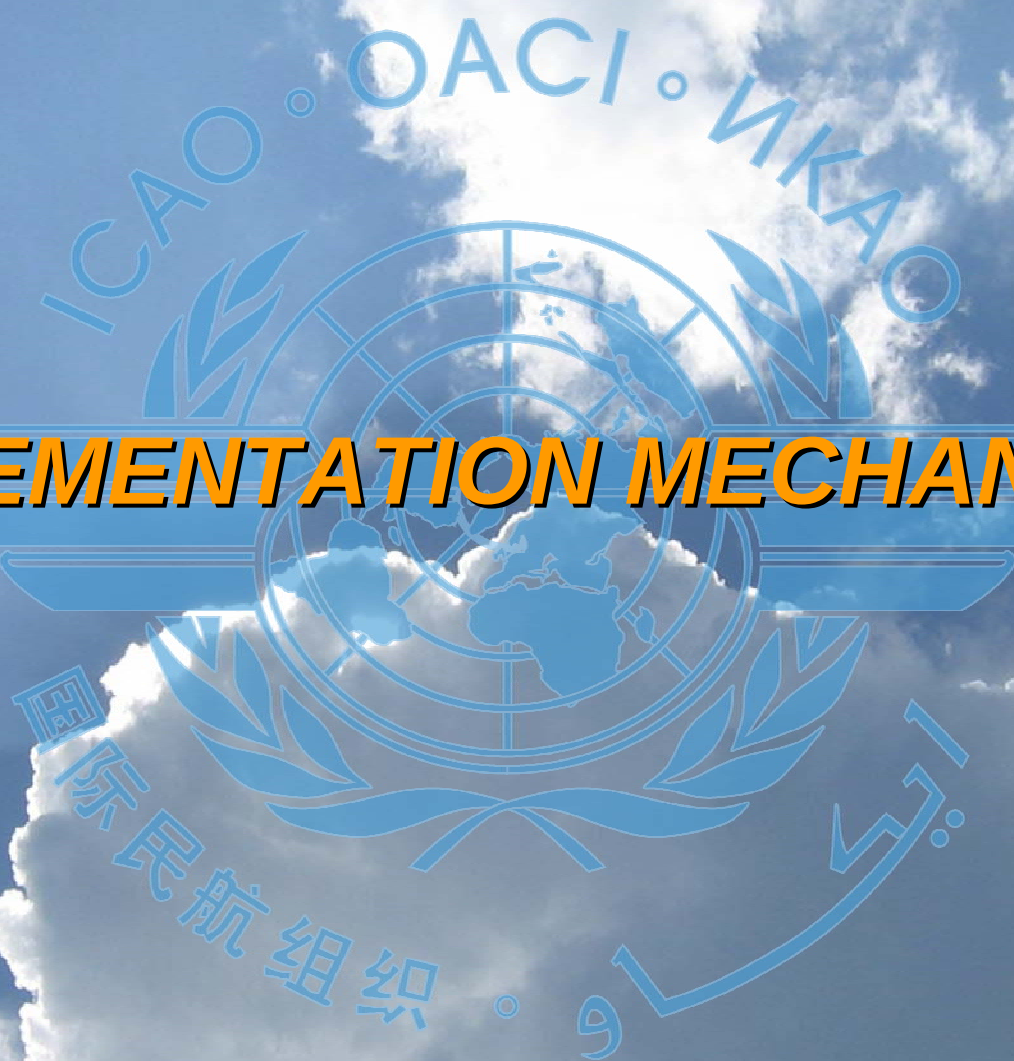
- **Basic:** Plan for the Search and Rescue Regions (SRR)
– SAR Chart
- **FASID:** Search and Rescue facilities

AIS/MAP

- **Basic:** Guidance material and recommendations for AIS/MAP implementation/planning. A concept of an integrated automated AIS system.
- **FASID:** Requisites regarding facilities and services.
 1. Table AIS 1-Aerodrome AIS/MAP Services Organization
 2. Table AIS 2-Services to be provided in aerodromes
 3. Table AIS 3/Chart AIS 1- NOF Requisites
 4. Table AIS 4- Availability of elements of the integrated aeronautical information package in other States
 5. Table AIS 5-Requisites for WGS-84
 6. Table AIS 6-Requisites for aeronautical charts production
 7. Table AIS 7/Chart AIS 2-Responsibilities for the production of sheets of the series of ICAO world aeronautical chart 1:1000000.
 8. Table AIS 8- Requisites of the integrated aeronautical information package

MET

- **Basic:** Basic planning criteria of aeronautical meteorology
- **FASID:** Requisites for facilities and services.
 1. Tables MET 1A/1B, Chart MET1-MET Services required in aerodromes and WMO requisites
 2. Tables MET 2A/2B-OPMET exchange
 3. Table MET3 and Chart MET 2/3- Tropical Cyclones Advisory Centres. Volcanic Ashes Advisory Centres.
 4. Table MET 4
 5. Tables MET5/6, Charts MET 4/5/6- WAFS requirements
 6. Table MET 7- ISCS/1 Users, VSAT equipment and access

The ICAO logo is a circular emblem. It features a central map of the world showing the Eastern Hemisphere, surrounded by a circular border. The border contains the text 'ICAO' at the top, 'OACI' on the right, 'ИКАО' on the left, and '国际民航组织' at the bottom. The logo is rendered in a light blue color, matching the background's sky theme.

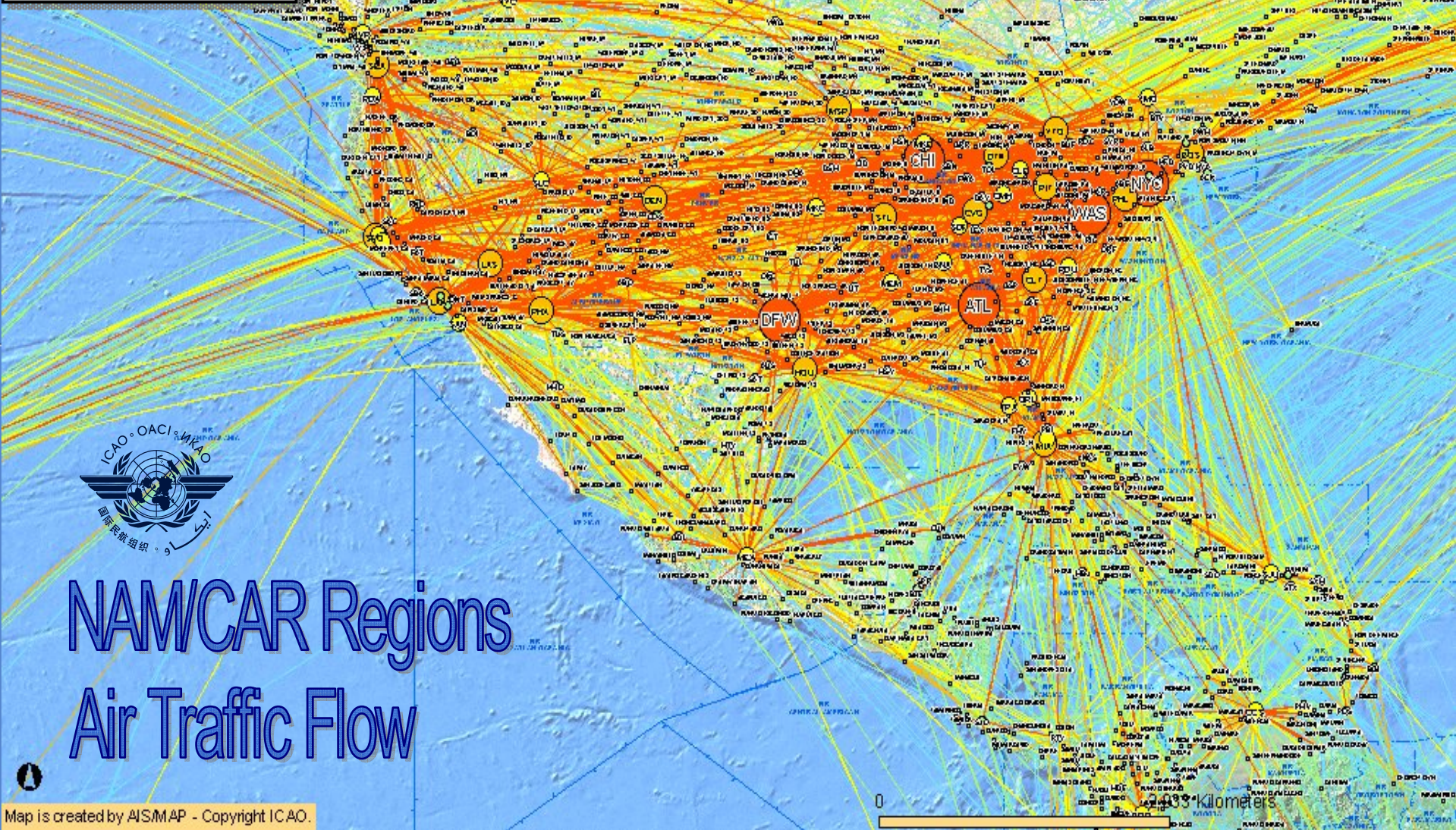
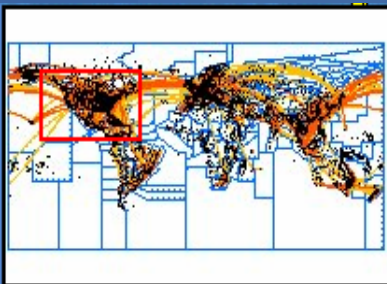
IMPLEMENTATION MECHANISMS

Implementation of Global Air Navigation System



Main Air Traffic Flows





NAM/CAR Regions

Air Traffic Flow

Map is created by AIS/MAP - Copyright ICAO.

Air Traffic - CAR Region

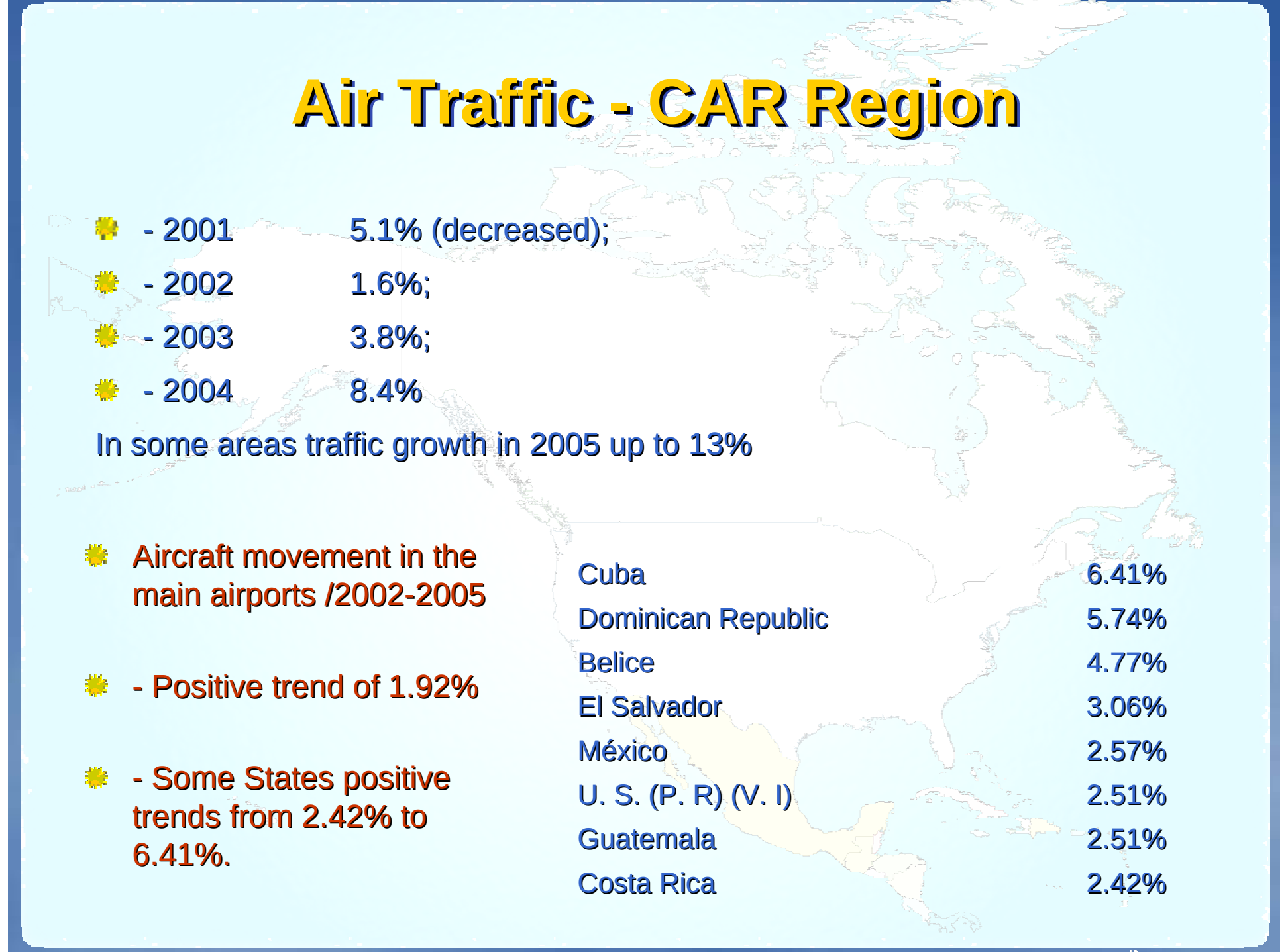
- ✱ - 2001 5.1% (decreased);
- ✱ - 2002 1.6%;
- ✱ - 2003 3.8%;
- ✱ - 2004 8.4%

In some areas traffic growth in 2005 up to 13%

✱ Aircraft movement in the main airports /2002-2005

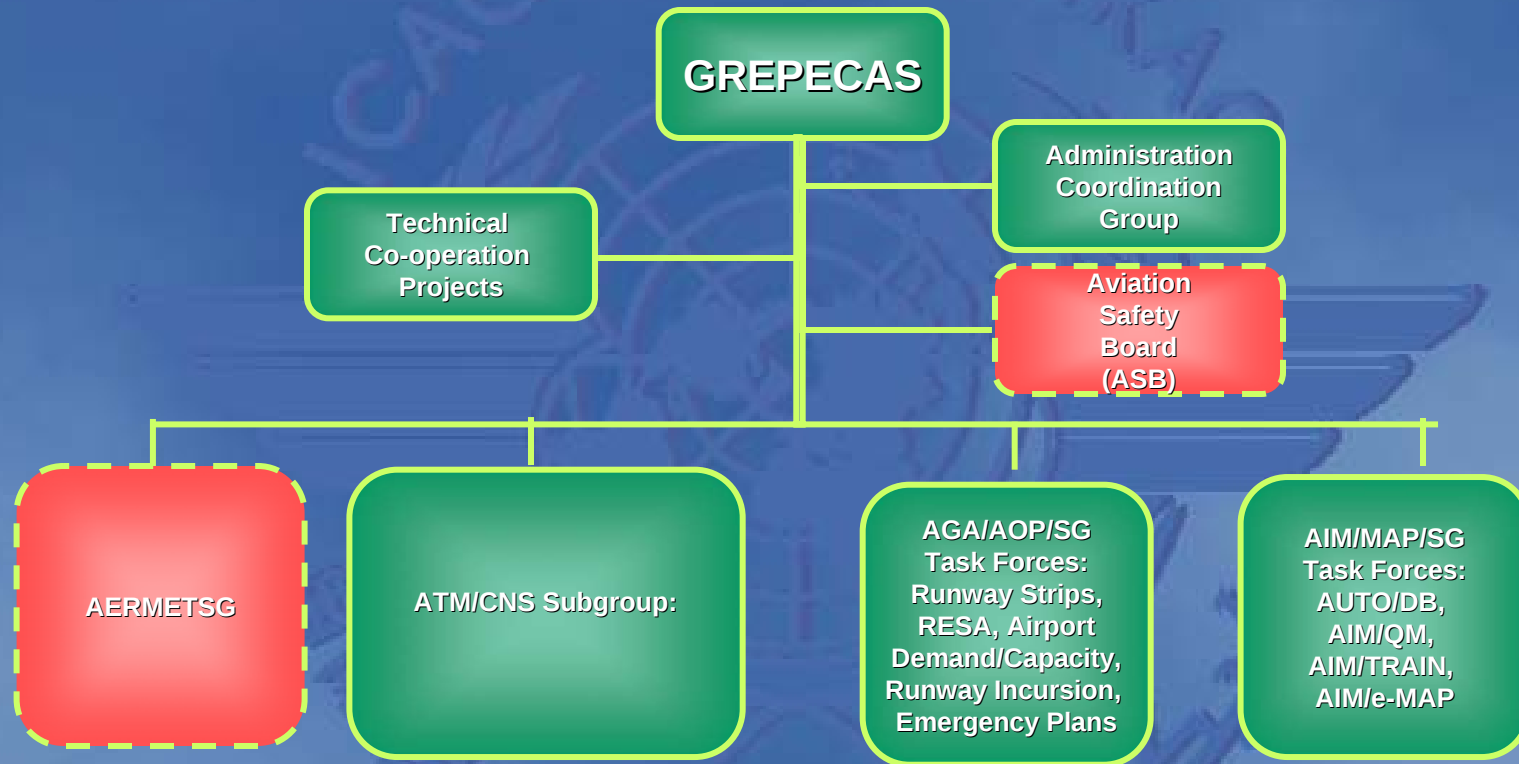
- ✱ - Positive trend of 1.92%

- ✱ - Some States positive trends from 2.42% to 6.41%.



Cuba	6.41%
Dominican Republic	5.74%
Belize	4.77%
El Salvador	3.06%
México	2.57%
U. S. (P. R) (V. I)	2.51%
Guatemala	2.51%
Costa Rica	2.42%

GREPECAS Structure



Work Programme

- ✿ **GREPECAS + E/CAR + C/CAR + DGCA CAP + CAR + NACC**
- ✿ **Missions to States/Territories/International Organizations**
- ✿ **Meetings, seminars, workshops, courses**
- ✿ **Coordination with States/Territories/International Organizations**
- ✿ **Technical advice and assistance**
- ✿ **Audit follow-up visits (USOAP and USAP)**

REGIONAL AIR NAVIGATION SYSTEM

1. THE CURRENT SYSTEM

Conventional systems

AFTN, ATS SPEECH circuits,
VOR/DME/ILS/NDB, SSR

mainly manual procedures are apply

Low degree of automation

CNS/ATM systems in development (data link, GPS
procedures, development of RNAV, RVSM, RNP10 routes)

2. THE FUTURE COMPREHENSIVE SYSTEM

Progressive use of the GANP GPIs towards a
performance standards based system, in accordance with
the ATM operational concept

3. IMPLEMENTATION HORIZON

25 years starting in 2000

Seamless ATM System - Performance Objectives NAM/CAR/SAM Regions

✱ Optimize ATS route structure in en-route airspace

✱ Implement RNP approaches

- ✱ GPI 4 Alignment of upper airspace classifications
- ✱ GPI 5 RNP and RNAV implementation (RNAV 5)
- ✱ GPI 7 Dynamic and flexible ATS route management
- ✱ GPI 8 collaborative airspace design and management
- ✱ GPI 10 terminal area design and management
- ✱ GPI 11 RNP and RNAV SIDs and STARs
- ✱ GPI 12 FMS based arrival procedures

✱ Improve demand and capacity balancing

- ✱ GPI 6 Air traffic flow management

✱ Enhance civil/military coordination and cooperation

- ✱ GPI 1 Flexible use of airspace

✱ Align upper airspace classification

- ✱ GPI 4 align upper airspace classification

✱ Improve ATM situational awareness

OPTIMIZE THE ATS ROUTE STRUCTURE EN-ROUTE AIRSPACE

Benefits

Environment	•reductions in fuel consumption;
Efficiency	•ability of aircraft to conduct flight more closely to preferred trajectories;
	•increase in airspace capacity; •facilitate the utilization of advanced technologies (e.g., FMS based arrivals) and ATC decision support tools (e.g., metering and sequencing), thereby increasing efficiency.

Strategy (2008 - 2015)

TASK	DESCRIPTION	START-END	RESPON- SIBLE	STATUS
AOM	Develop regional action plan			
	Develop Airspace Concept based in CAR /SAM PBN Roadmap, in order to design and implement a trunk route network, connecting major city pairs in the upper airspace and for transit to/from aerodromes, on the basis of PBN and, in particular, RNAV/5, taking into account interregional harmonization			
	Develop performance measurement plan			
	Formulate safety plan			
	Establish collaborative decision making (CDM) process			
	Publish national regulations for aircraft and operators approval using PBN manual as guidance material			
	Identify training needs and develop corresponding guidelines			
	Implementation of ATS routes enroute		States	
	Monitor implementation progress in accordance with CAR/SAM PBN implementation roadmap and State implementation plan			
References	GPI/5: performance-based navigation, GPI/7: dynamic and flexible ATS route management, GPI/8: collaborative airspace design and management, GPI/10: terminal area design and management, GPI/11: RNP and RNAV SIDs and STARs and GPI/12: FMS-based arrival procedures			

IMPLEMENT RNP APPROACHES

Benefits

Efficiency	•Improvements in capacity and efficiency at aerodromes.
Safety	•Improvements in safety at aerodromes.

Strategy (2008-2015)

TASK	DESCRIPTION	START-END	RESPON-SIBLE	STATUS
AOM	Develop State PBN implementation plan.			
	Develop Airspace Concept based in CAR /SAM PBN Roadmap, in order to design and implement RNP APCH with Baro-VNAV in accordance with assembly resolution A36-23, and RNP AR APCH where beneficial			
	Develop performance measurement plan			
	Formulate safety plan			
	Establish collaborative decision making (CDM) process			
	Publish national regulations for aircraft and operators approval using PBN manual as guidance material.			
	Identify training needs and develop corresponding guidelines			
	Implementation of APV procedures	-2016	State	
	Formulate system performance monitoring plan		State	
	Monitor implementation progress in accordance with CAR/SAM PBN implementation roadmap and State implementation plan			
References	GPI/5: performance-based navigation, GPI/7: dynamic and flexible ATS route management, GPI/8: collaborative airspace design and management, GPI/10: terminal area design and management, GPI/11: RNP and RNAV-SIDs and STARs and GPI/12: FMS-based arrival procedures			

ALIGN UPPER AIRSPACE CLASSIFICATION

Benefits

Efficiency	•better utilization of data link communication;
	•optimize use of flight plan data processing systems;
	•enhance airspace management coordination, message exchange capabilities and utilization of flexible and dynamic airspace management techniques;
	•harmonization of interregional coordination processes;
Continuity	•improvement of airspace interoperability and seamlessness; and
	•ensure the provision of positive air traffic control services to all aircraft operations.

Strategy (Target: 2008)

TASK	DESCRIPTION	START-END	STATUS
AOM	Develop a regional implementation strategy and work programme for the implementation of ICAO Annex 11 airspace Class A above FL 195.		
	Identify key stakeholders, ATCOs, pilots, and relevant international organisations for coordination and cooperation on changes for new airspace organization, using a CDM process.		
	Develop new national airspace organization in accordance with ICAO provisions, as needed.		
	Coordinate changes for regional and national documents; ▪Doc 8733, CAR/SAM ANP; ▪AIP; and, ▪ATS letters of agreement.		
	Carry out improvements in ground systems to support new airspace organization configurations, as necessary.		
	Publish national regulatory material for implementation of new rules and procedures to reflect airspace organizational changes.		
	Train ATCOs and pilots in new procedures, including all civil and military airspace users, as required;		
	Monitor implementation progress.		
References	GPI/4: align upper airspace classification.		

Performance measurement

NAM/CAR RVSM
IMPLEMENTATION
20 JANUARY 2005

➤ **C: Environment
Protection**

➤ **D-Efficiency**

✱ CAR: Expected savings approximately US\$ 400 million in a 15-year period for international flights alone

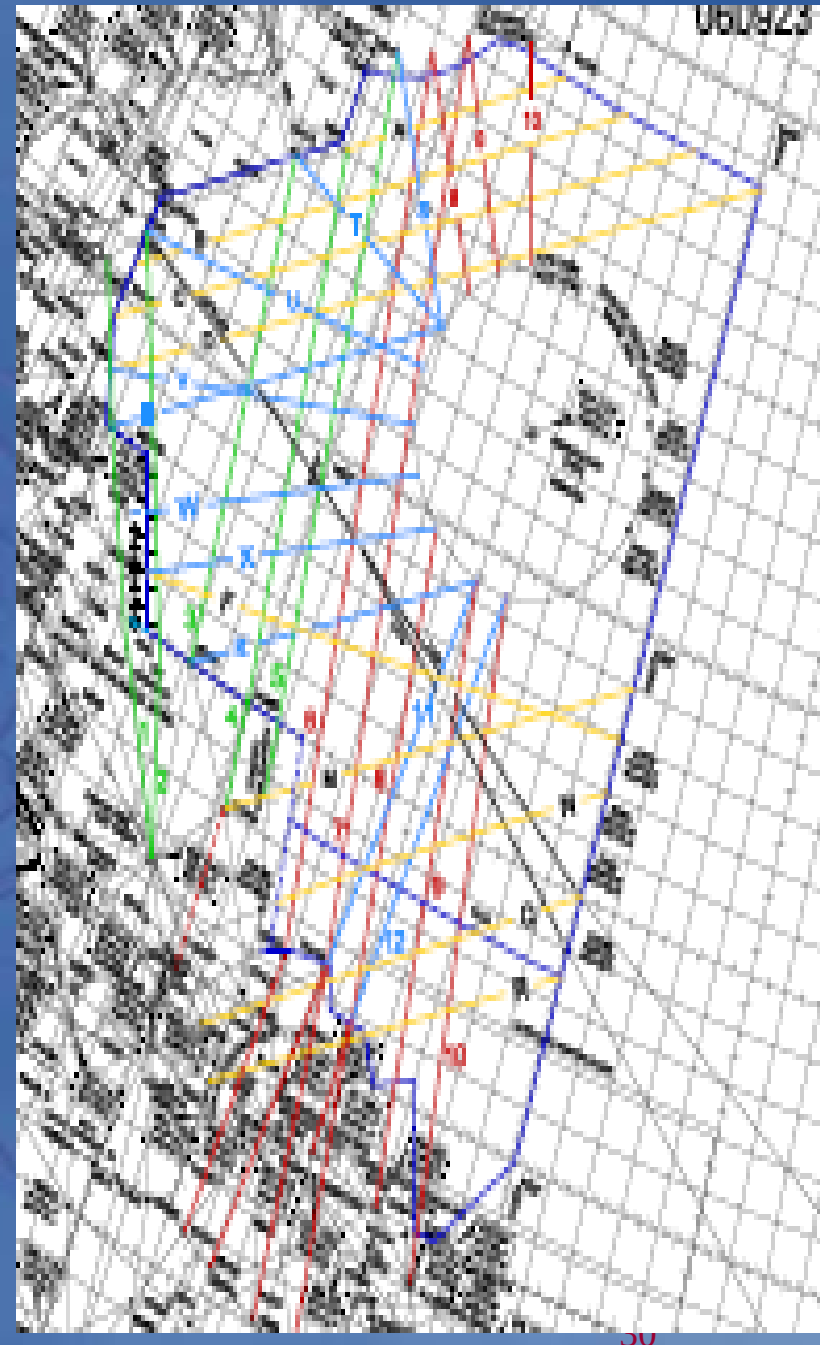
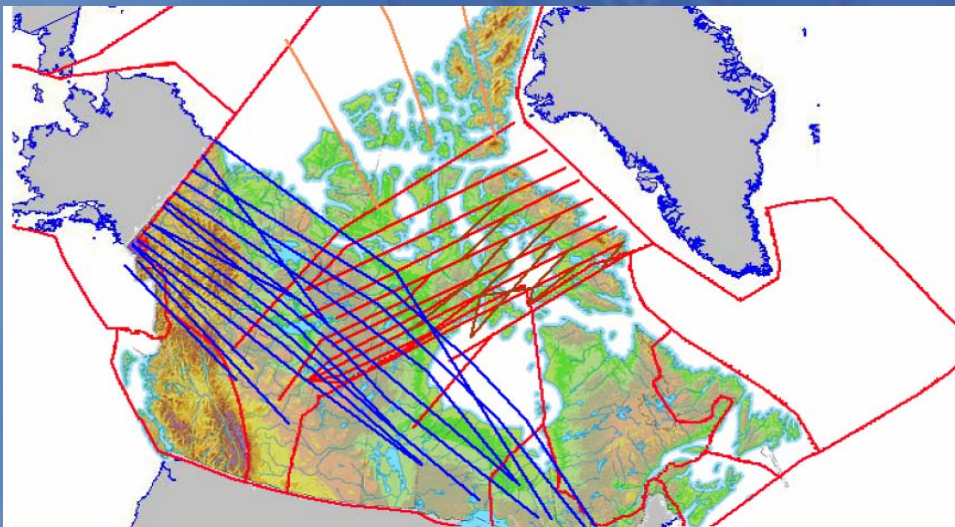
✱ NAM: fuel saving benefits would be US\$5.3 billion approximately for the same period

✱ Reduction of gas emissions

Performance measurement

PBN Implementation

- ☀ WATRS (25) = 40 % +Capacity
- ☀ Polar Routes (5) = TBD



CONCLUSIONS

- **NAM/CAR/SAM Regions move ahead towards Global ATM**
- **CAR/SAR Air Navigation Plan is continuously being reviewed by GREPECAS in correspondence to ICAO guidelines regarding transition towards Global/Regional ATM system.**
- **GREPECAS is progressively re-shaped to develop its work based on a performance approach (PBA).**
- **In NAM/CAR/SAM Regions, significant CNS/ATM improvement has been made, and GANP initiatives have been identified, in order to continue progressing towards the global ATM system.**
- **ICAO Regional Offices have an implementation programme, with technical cooperation tools established for advising States in matters of CNS/ATM implementation towards global ATM system.**



Thank you!