



ATM Surveillance

Establishing requirements

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Regional ATM Surveillance (CAR/SAM)

- ✓ Global
- ✓ Regional guidelines;
 - ✓ GREPECAS, RAN/CAR/SAM/3
- ✓ Regional strategy for ATM situational awareness
- ✓ ATM requirements
- ✓ Challenges

ATM surveillance

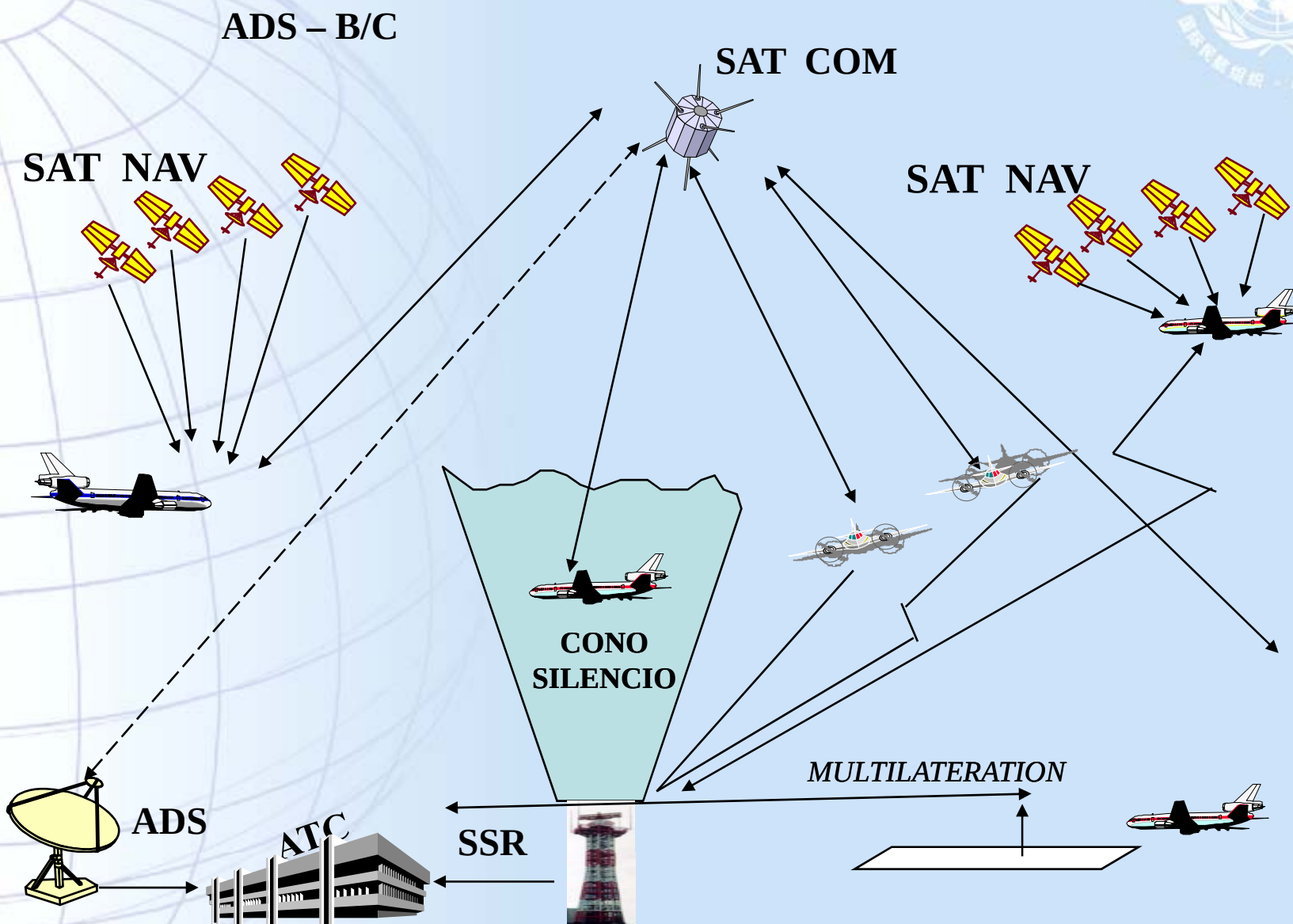


Annex 11 - Doc 4444

✈ **Radar**

✈ **ADS – CPDLC**

✈ *Multilateration*





Implementation of Air Navigation Systems

→ Global ATM Operational Concept
(Doc 9854)



→ Global Planning (Doc 9750)



→ Regional Planning (Doc 8733)
Performance objectives



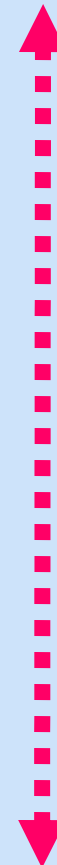
→ National Planning

→ Global
vision

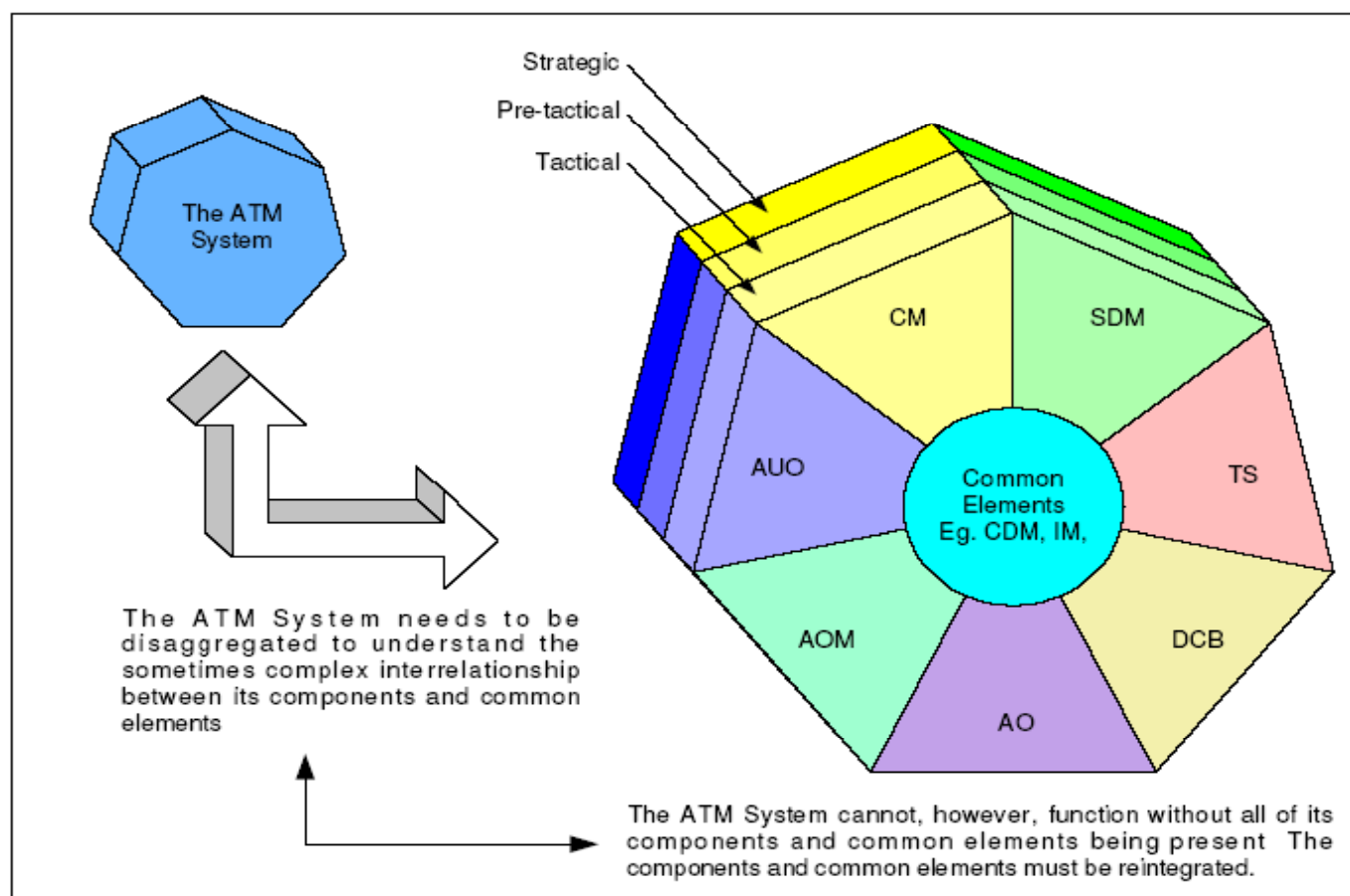
→ Strategic
Planning

→ Regional
action

→ National
action



ATM System (Doc 9854)



SDM = ATM Service Delivery Management, TS = Traffic Synchronization, DCB = Demand Capacity Balancing, AO = Aerodrome Operations, AOM = Airspace Organization and Management, AUO = Airspace User Operations, CM = Conflict Management, (CDM = Collaborative Decision Making, IM = Information Management)

ATM AUTOMATION PLANNING



- ✈ Identify main traffic flows
- ✈ Identify homogeneous areas
- ✈ Analyze operational ATS scenarios;
- ✈ CNS solutions based in ATM requirements
- ✈ Develop regional strategy for ATM situational awareness, by logical phases

ATM situational awareness, Performance Objective ...



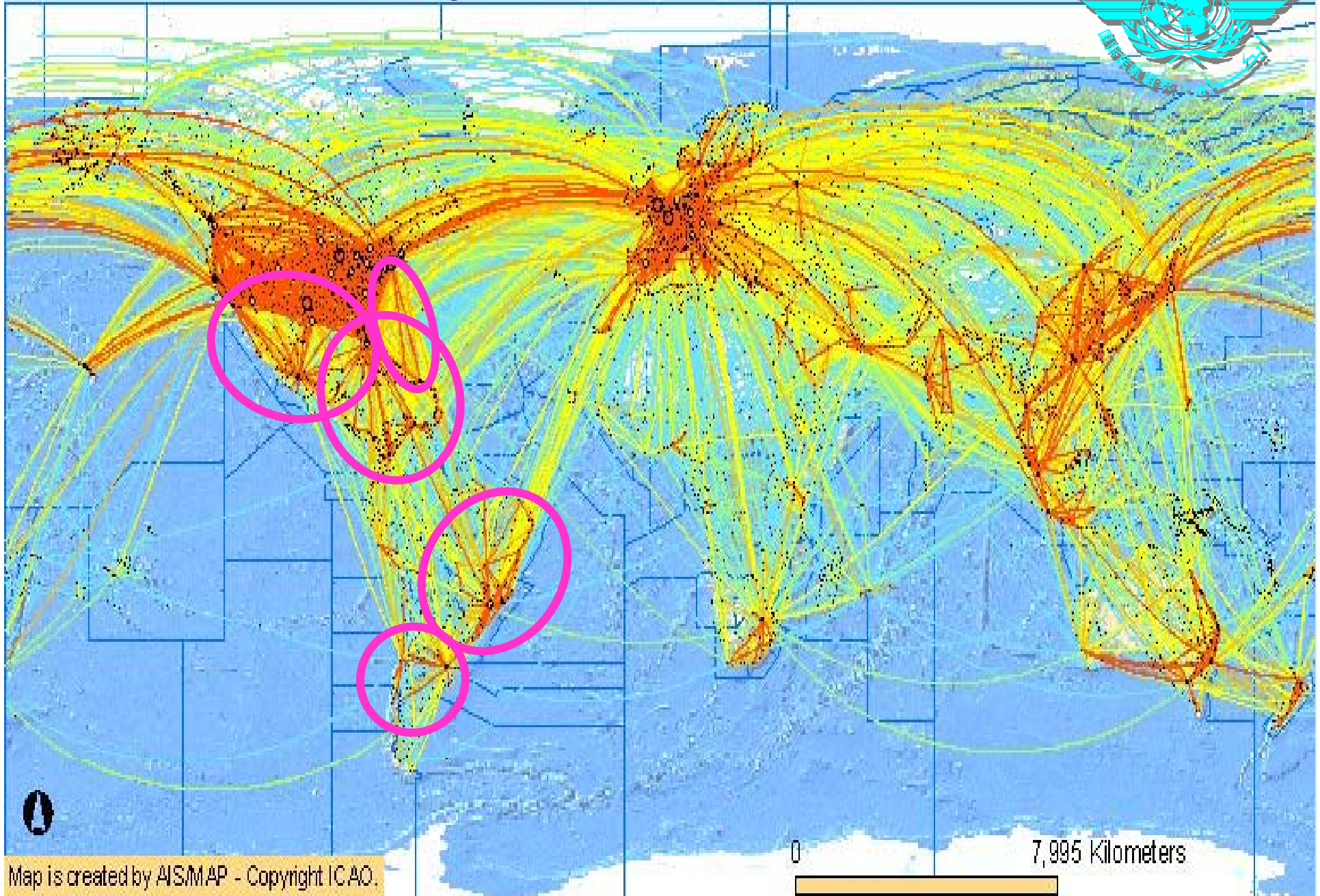
- determine the architecture, characteristics of the operational ATS requirements in the near term as well the future requirements of the ATM community;
- d) analyze current installations and technology, requirements for interoperability, data base, aircraft equipage, software, etc;
- e) Analyze cost - benefit;
- develop guidance material (Interface Control Document /ICD);



ATM ...

- establish bilateral / multilateral agreements;
- training;
- identify long term benefits;
- **develop action plan;** sharing information
(infrastructure, type of system, messages, protocols, coverage, equipment, standards, etc.)

Homogeneous areas and main traffic flows



Map is created by AISMAP - Copyright ICAO.

Positive trends; aircraft movement between 2002 and 2005



CAR Region:

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

SAM Region:

→ Venezuela	4.79%
→ Panama	3.73%
→ Chile	2.59%
→ Bolivia	2.49%
→ Peru	0.85%

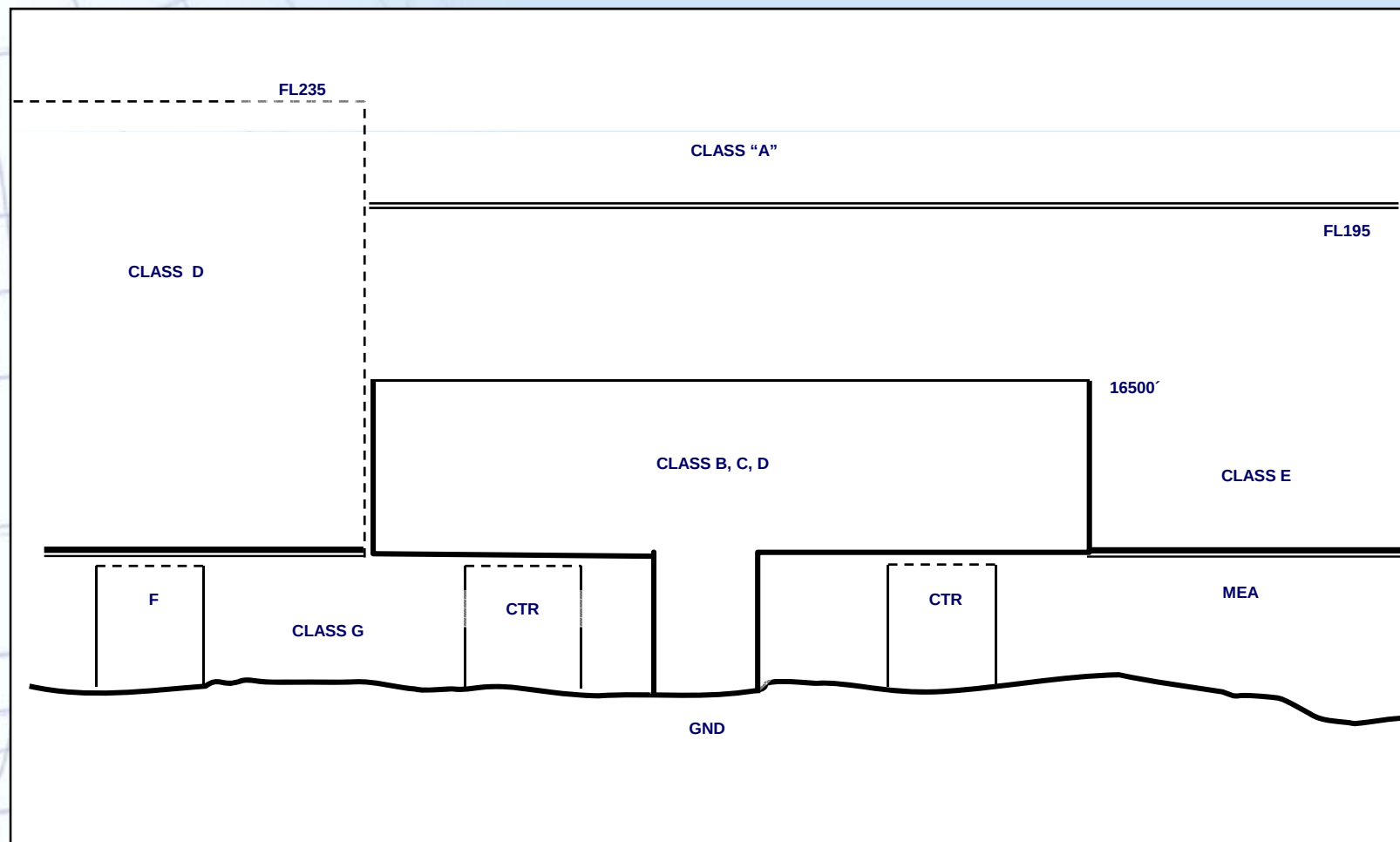
ATS surveillance capabilities



- **Identification**
- **Separation**
- **Navigation guidance**
- **Surveillance**
- **Coordination**
- **Flight plan Inf.**
- **Statistic data**
- **Flight plan processing**
- **Radar data processing**
- **AIDC**
- **CPDLC**
- **Flight Profile (altitude, vertical speed, TAS, predictive vector, turning angle, etc)**
- **Automated alerts (Emergency, comms failure, HJCK, STCA, MSAW, DAIW)**
- **AIS interface**
- **MET interface**



- define applicable interface data ATS duties;
- determine successive operational applications
- determine ATS requirements /capabilities.



ATM requirements



- a) **Conception**. Response to necessities and expectations, develop framework.
- b) **Specification**. Specify operational requirements
- c) **Design**. Operational architecture to provide service; system interoperability.
- d) **Selection**. Services and technologies for implementation.
- e) **Planning**. Services, installations and capabilities
- f) **Operation**. Operational implementation.

Radar Coverage Data



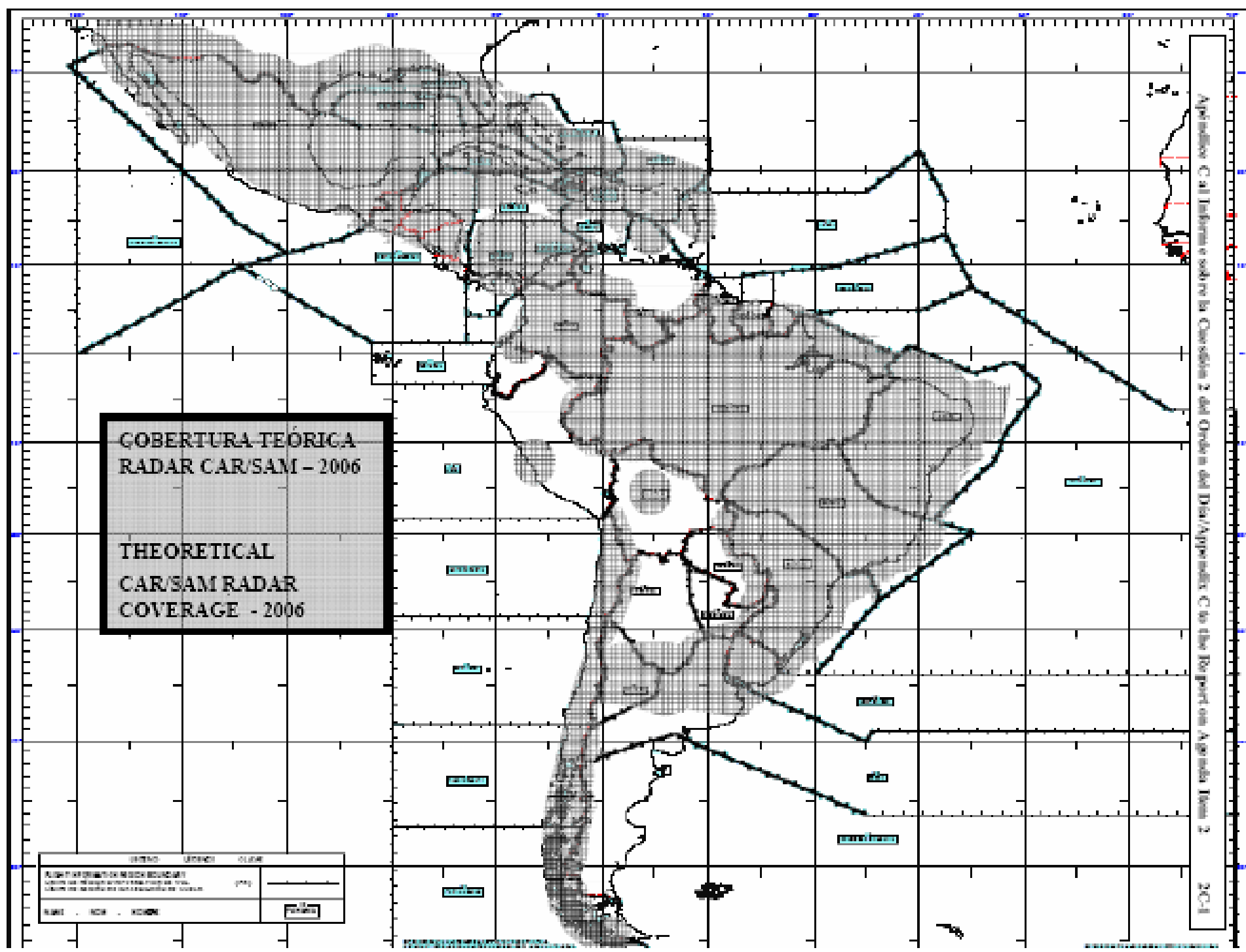
- ✈ The radar coverage depends on certain data.
 - ✓ Radar location (provided by client)
 - ✓ Type of radar (provided by client)
 - ✓ Terrain elevation data

- ✈ Coverage: one based on the client-specified location (theory) and one adjusted coverage based on the best judgement of where a radar is placed (real)

COBERTURA TEÓRICA
RADAR CAR/SAM - 2006

THEORETICAL
CAR/SAM RADAR
COVERAGE - 2006

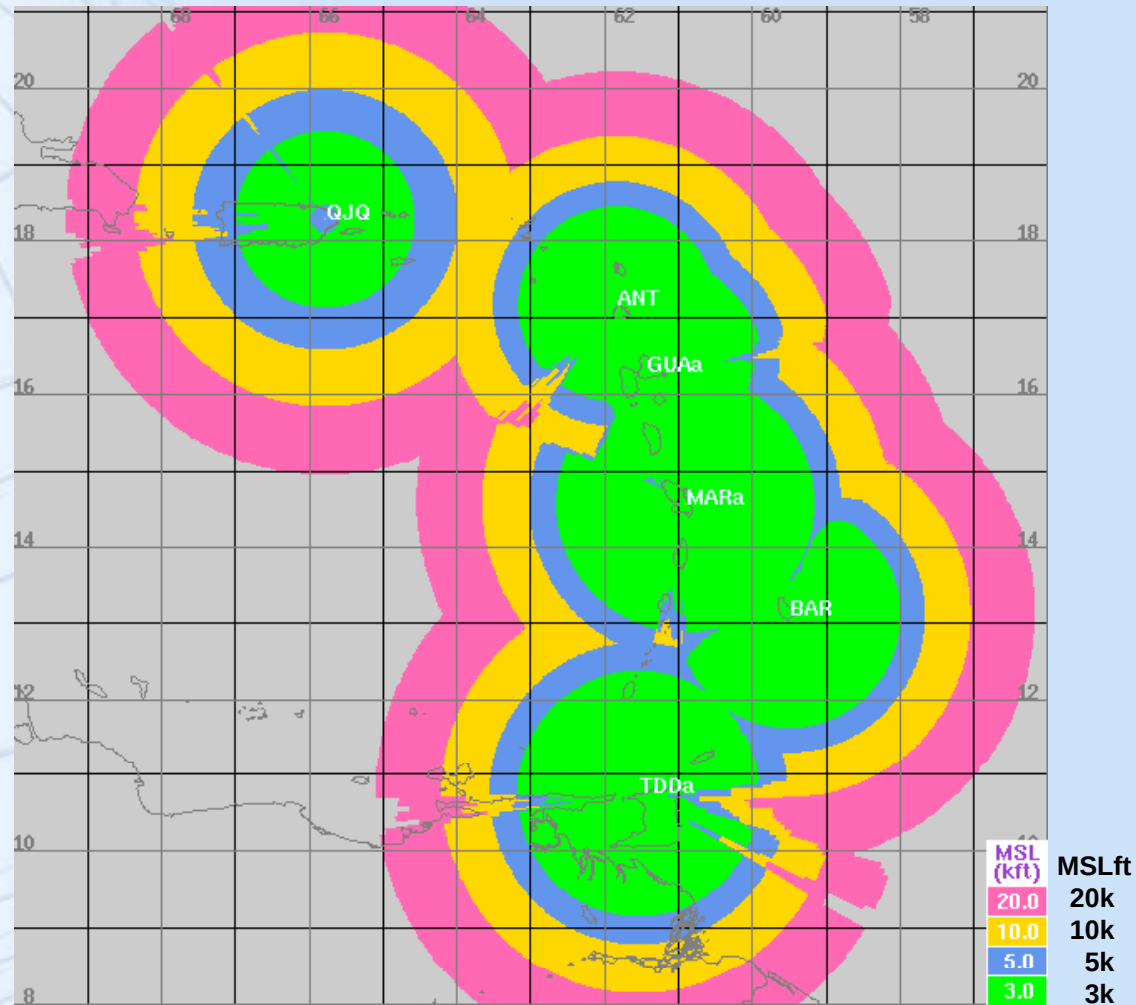
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Composite Line-of-Sight Coverage Estimate for East Caribbean Radars (Adjusted Locations)



**Range
Limits
(nmi)**
ANT = 200
BAR = 200
GUAa = 250
MARa = 250
QJQ = 215
TDDa = 256



Adjusted site locations: MITRE 2000

REGIONAL STRATEGY



PHASE	Capabilities
Phase I	- Flight data processing System (FDPS) CPL, FLP, RPL
Phase II	- ATS Radar Data Processing System /RDPS, ADS; monoradar; multiradar; Radar data sharing.
Phase III	- Digital automated communications (Automated traffic hand off, AIDC/ CPDLC, etc).
Phase IV	- CDM implementation for AOM [Airspace Organization and Management], CM [conflict management], DCB [Demand/Capacity Balancing], AO [Aerodrome Operation], TS [Traffic Synchronization], AUO [Airspace User Operation], ASDM [ATM Service Demand Management], AIS, MET, Statistics, etc.

CAR/SAM Interface Control Document (ICD)



Based on ICAO 4444, and NAM ICD developed between Canada, Mexico and United States

- Outlines current and medium term guidelines for harmonized development of automation systems
- It is designed as a living document that may be updated to reflect the needs of the Regions

Supports:

- Automated flight plan exchange
- Automated hand-offs
- Provide efficiencies to be achieved between ATS facilities



ICD Features

- ✓ ICD defines the message formats for the interfaces between automated systems to be used by ATS facilities, communications requirements, interface protocols
- ✓ The phased functionality of the core messages include :
 - Passing/ receiving active ICAO flight plan and logical acceptance or rejection messages
 - Passing/receiving change, modify and cancellation messages needed for full automated exchange of flight plans
 - Messages needed to support automated handoff and point out capabilities
 - More comprehensive description of aircraft equipment to support automation and decision making (RVSM, RNP, preferred routes, etc.)
 - Defines type of flight, e.g., (GA, military, commercial, etc.)
 - Provides airframe-unique 24-bit address (CPDLC/ADS)



ICD ...

- ➔ Strategies may need to be modified due to schedule, resource or funding changes
- ➔ Issue coordination during development can result in fewer problems in implementation
- ➔ Implementation
 - ✓ Airspace and parameter adaptation
 - ✓ Letters of Agreement address operational changes needed
 - ✓ Requires training/education process ATS users/providers
 - ✓ Requires closer adherence to proper use of fields in flight plans



Operational Benefits

- ✓ Looks for seamless cross border operations between ATS facilities
- ✓ Reduces controller manual coordination
 - Less phone time = more time separating aircraft
 - Provides direct benefit to ACCs; reduces ATS workload
- ✓ Increased Safety
 - Coordination more reliable with standard terms in standard formats without risk of language misunderstandings
 - Flight data automation will reduce manual coordination and allow automation benefits associated with AOM

ATM Challenges

- ➔ Action plan
- ➔ Bilateral – multilateral agreements
- ➔ Sharing information – collaborative decision making; low cost, high benefit for the ATM community
- ➔ Seamless sky- flexible, dynamic airspace organization and management

