

AIR SPACE AND AIR TRAFFIC MANAGEMENT

**COMMUNICATION, NAVIGATION,
SURVEILLANCE/
AIR TRAFFIC MANAGEMENT (CNS/ATM)**

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ATCOTE, AFA**



INTRODUCTION

- NEED FOR ATS
 - TYPE OF AIR TRAFFIC INVOLVED
 - DENSITY OF AIR TRAFFIC
 - METEOROLOGICAL CONDITIONS
 - FACTORS LIKE OPEN STRETCH OF WATER, MOUNTAINOUS TERRAIN, DESERT AREAS ETC

INTRODUCTION

- AIR SPACE IS FINITE RESOURCE
- OPTIMUM UTILISATION BY STAKE HOLDERS
NECESSIATE PROPER LEGISLATION AND
FRAMEWORK
- OPTIMUM UTILISATION OF AIRSPACE WILL LEAD TO
CO-EXISTENCE OF ALL THE OPERATORS
 - SECURITY VS ECONOMY

REGULATORY AUTHORITIES

•Ministry of Civil Aviation

It is responsible for the formulation of policy for development and regulation of Civil Aviation. Its functions also extend to overseeing airport facilities and carriage of passengers and goods by air.

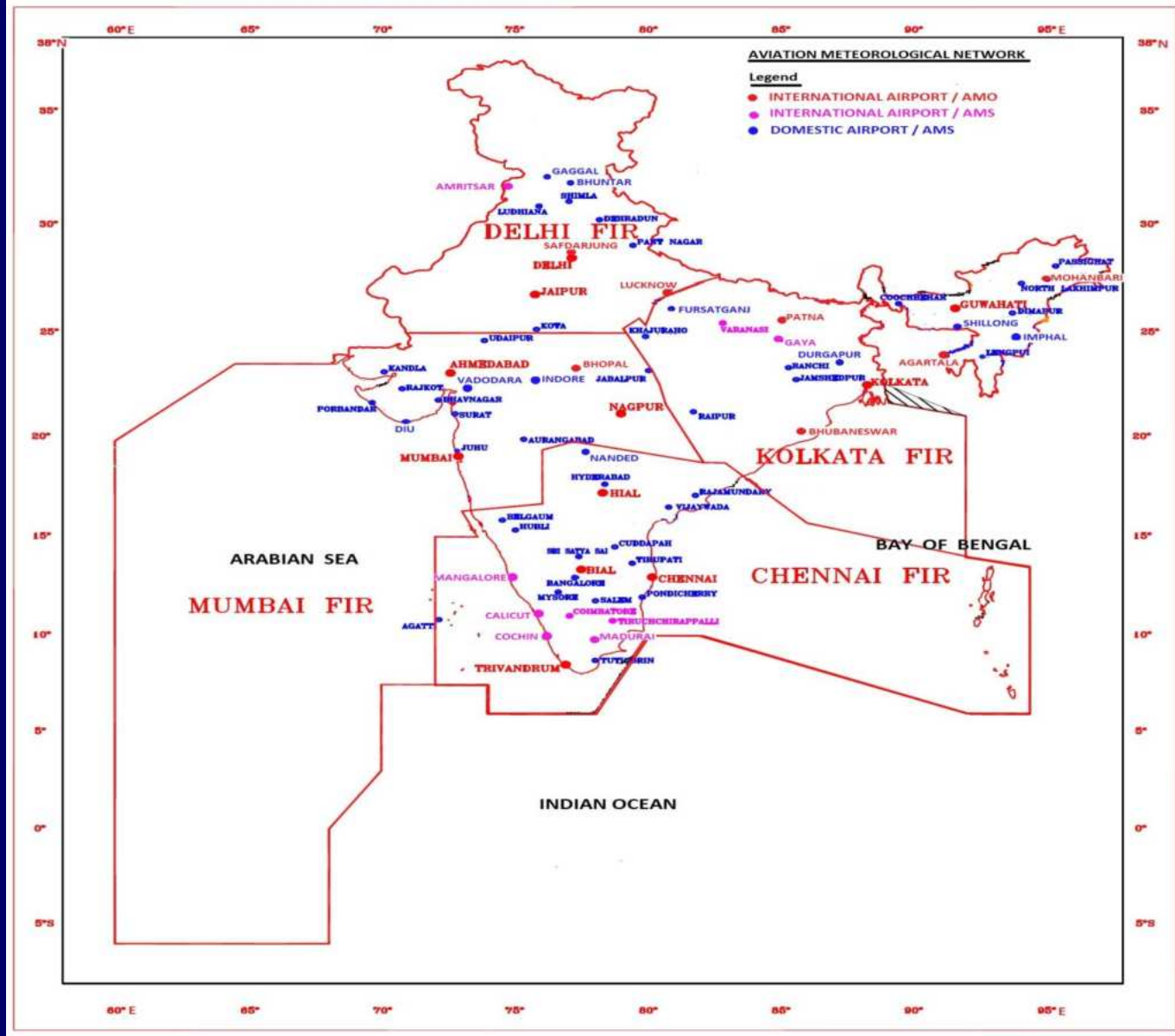
• Other Attached/Autonomous Organizations

- **Directorate General of Civil Aviation (DGCA)** : It promotes safe and efficient Air Transportation through regulation and proactive safety system.
- **Bureau of Civil Aviation Security (BCAS)** : It is the regulatory authority for civil aviation security in India
- **Airport Authority of India (AAI)** : It accelerates the integrated development, expansion and modernization of the operational, terminal and cargo facilities at the airports

SCHEMA

- AIR SPACE ARCHITECTURE
- AIR NAVIGATION
- CNS/ATM
 - CNS/ATM – EVOLUTION
 - CNS/ATM – CURRENT CAPABILITIES
 - CNS/ATM – PBN – RCP/RNP/RSP
- FUTURE CHALLENGES – UAS TRAFFIC
- Q&A

AIR SPACE ARCHITECTURE



AIR SPACE ARCHITECTURE

- FIR – ENCOMPASSING AIR SPACES OF A STATE OR STATES
 - AIRWAY
 - ATS ROUTES
 - CONTROL AREA/ ZONE/ TMA
 - ADVISORY AIRSPACE
 - DANGER AREA/ PROHIBITED AREA
 - RESTRICTED AREA
 - TSA
 - TRA

SEPARATION STANDARDS

- THE RISK OF COLLISION IS A FUNCTION OF NAVIGATION PERFORMANCE, ROUTE CONFIGURATION, TRAFFIC DENSITY, SURVEILLANCE, COMMUNICATION AND AIR TRAFFIC CONTROL (ATC). DETERMINATION OF SEPARATION MINIMA ALLOWS FOR TRADE-OFFS
- VERTICAL SEPARATION
 - RVSM
 - CVSM
- HORIZONTAL SEPARATION
 - LATERAL
 - LONGITUDINAL
- COMPOSITE SEPARATION

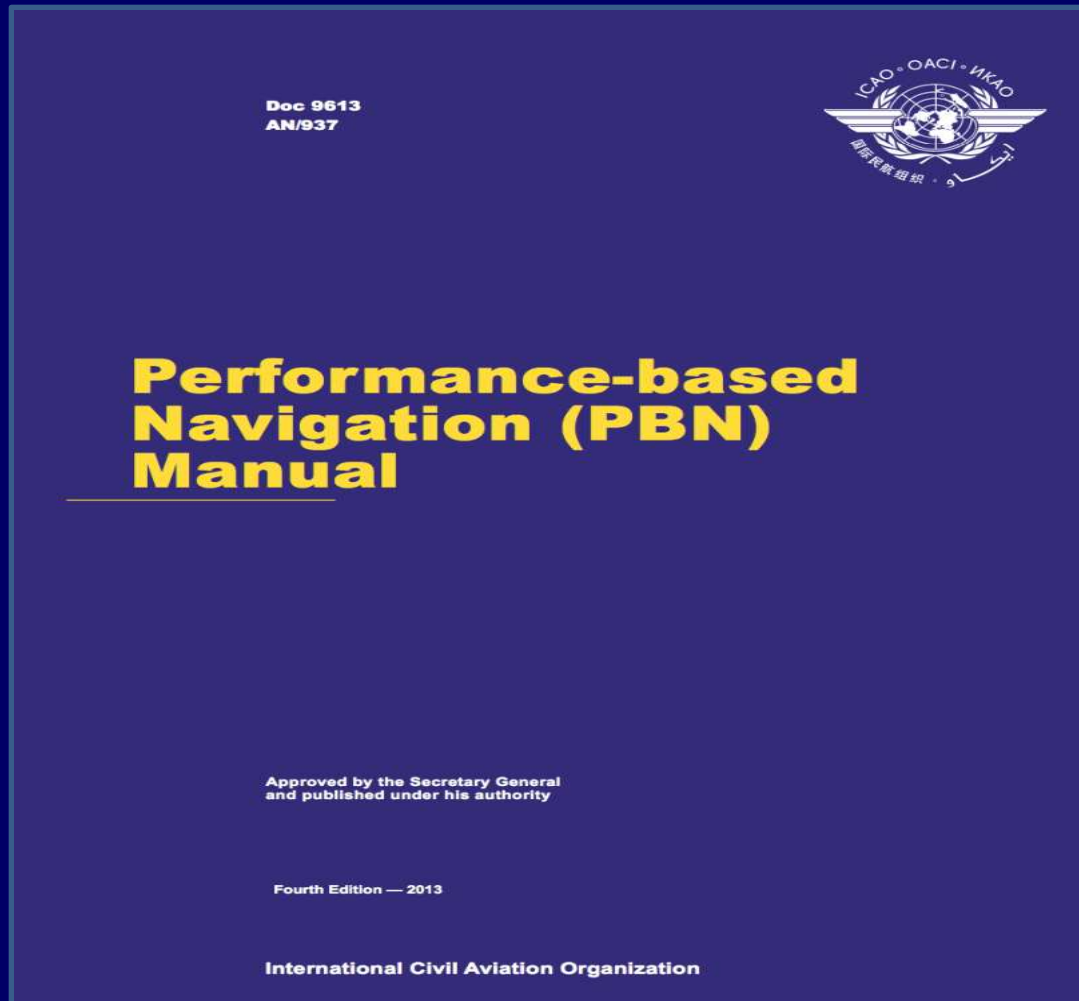
APPLICABILITY

- INTERNATIONAL CIVIL AVIATION REQUIREMENTS
 - UNIFORM APPLICATION OF ICAO- SARPS
 - ANNEX - 2
 - ANNEX - 11
 - DOC – 4444
- REGIONAL SUPPLEMENTARY PROCEDURES
- STATE AIP

LEGAL FRAMEWORK FOR **CNS/ATM**

- REQUIREMENT OF AN INTEGRATED & GLOBALLY HARMONISED ATM SYSTEM WAS FELT
- 2003 – 11TH AIR NAVIGATION CONFERENCE WAS HELD AT ICAO
- ROAD MAP OF ATM KEEPING THE HORIZON BEYOND 2025
- REVISED GLOBAL AIR NAVIGATION PLAN – 2006: INTEGRATED SET OF TOOLS & GUIDANCE MATERIAL
 - GLOBAL ATM OP CONCEPTS
 - ATM SYSTEMS REQUIREMENT
 - PERFORMANCE BASED TRANSITION GUIDELINES TO IMPLEMENT CNS/ATM

LEGAL FRAMEWORK FOR CNS/ATM



LEGAL FRAMEWORK FOR CNS/ATM

GOVERNMENT OF INDIA
OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION
TECHNICAL CENTRE, OPP. SAFDARJUNG AIRPORT, NEW DELHI - 110003

CIVIL AVIATION REQUIREMENT
SECTION 8 - AIRCRAFT OPERATIONS
SERIES 'S', PART IV
ISSUE I, 4TH SEPTEMBER 2014

EFFECTIVE: FORTHWITH

F. No. AV. 22024/4/2014-FSD

SUBJECT: PERFORMANCE BASED NAVIGATION (PBN)

1. INTRODUCTION

- 1.1 The Performance Based Navigation (PBN) concept specifies system performance requirements in terms of accuracy, integrity, availability, continuity and functionality needed for the proposed operations in the context of a particular Airspace Concept, when supported by the appropriate navigation infrastructure. In that context, the PBN concept represents a shift from sensor-based to performance-based navigation. Performance requirements are identified in navigation specifications which also identify the choice of navigation sensors and equipment that may be used to meet the performance requirements.
- 1.2 This CAR is issued under the provisions of Rule 133A of the Aircraft Rules, 1937 for compliance by the concerned operators prior to operating, through and within the PBN notified airspace. The contents of the CAR are consistent with the provisions of ICAO Annex 6 Operation of Aircraft and ICAO Doc 9613 PBN Manual.

LEGAL FRAMEWORK FOR CNS/ATM

Subject: Aircraft and Operators approval for RNP Authorisation Required Approach (RNP AR APCH) Operations

1. PURPOSE

This operations circular (OC) establishes RNP authorization required approach (RNP AR APCH) requirements for aircraft and operators. An operator may use alternate means of compliance, as far as those means are acceptable for the DGCA. The future tense of the verb or the term "shall" apply to operators who choose to meet the criteria set forth in this OC.

2. RELEVANT REGULATIONS

- (a) Rule 133B Indian Aircraft Rules 1937
- (b) CAR Section 8 Series O Part II Para 7.2.2 – Operation of Commercial Air Transport- Aeroplanes
- (c) CAR Section 8 Series O Part III Para 2.5.2– Operations of General Aviation Aeroplanes
- (b) CAR Section 8 Series S Part IV – Performance Based Navigation

3. RELATED DOCUMENTS

- (a) Annex 2 Rules of the Air
- (b) Annex 6 Operation of aircraft Part I/II
- (c) Annex 10 Aeronautical Telecommunications Volume I

OC NO 01 of 2018
Date: 23rd March 2018

File No AV 22024/02/2018-FS

1. INTRODUCTION

1.2 PBCS is a concept that enables the management of communication and

LEGAL FRAMEWORK FOR CNS/ATM

1.2 PBCS is a concept that enables the management of communication and surveillance capabilities by prescription of Required Communication Performance (RCP) and Required Surveillance Performance (RSP) specifications in Future Air Navigation System (FANS 1/A) data link operations using Controller Pilot Data-link Communications (CPDLC) and Automatic Dependent Surveillance (ADS).

1.3 This OC is based on the ICAO Provisions and amendments to Annexes 4, 6 (Parts I, II, III), 10 (Volumes II, III), 11, 15, PANS-ATM (Doc 4444) and PANS-ABC (Doc 8400) on PBCS, including new Standards and Recommended Practices (SARPs) and related guidance material, Performance-Based Communication and Surveillance (PBCS) Manual (Doc 9869) and Global Operational Data Link (GOLD) Manual (Doc 10037).

1.4 When ATS operation is predicated on communication and surveillance performance, RCP and RSP specifications provide operational requirements and allocations that apply to infrastructure as well as aircraft and operations. For example:

a) RCP 240 includes a four-minute time requirement for a controller capability to intervene with an aircraft. This requirement is specified from when the controller

LEGAL FRAMEWORK FOR CNS/ATM

initiates the communication, to when the controller receives the operational response from the flight crew; and

b) RSP 180 includes an accuracy requirement on the “position at time” based on the prescribed RNP/RNAV specification and $\pm$ one-second accuracy on Coordinated Universal Time (UTC). It also includes a time requirement from when the aircraft is at the compulsory reporting point, to when the report is received by the controlling ATS unit.

Note: RCP 240 and RSP 180 also include requirements associated with continuity, service availability, integrity and functionality.

1.5 The new separation standard is expected to result in reduction in fuel burn and

AIR NAVIGATION

- ACHIEVED THROUGH PLOTTING ON CHART/MAP
- FOLLOWING RHUMB LINE
- ON BOARD NAVIGATOR AIRCREW WAS MANDATORY
- REDUNDANT NAVIGATION TECHNIQUES
 - VISUAL REFERENCE TO LANDMARKS
 - DEAD RECKONING



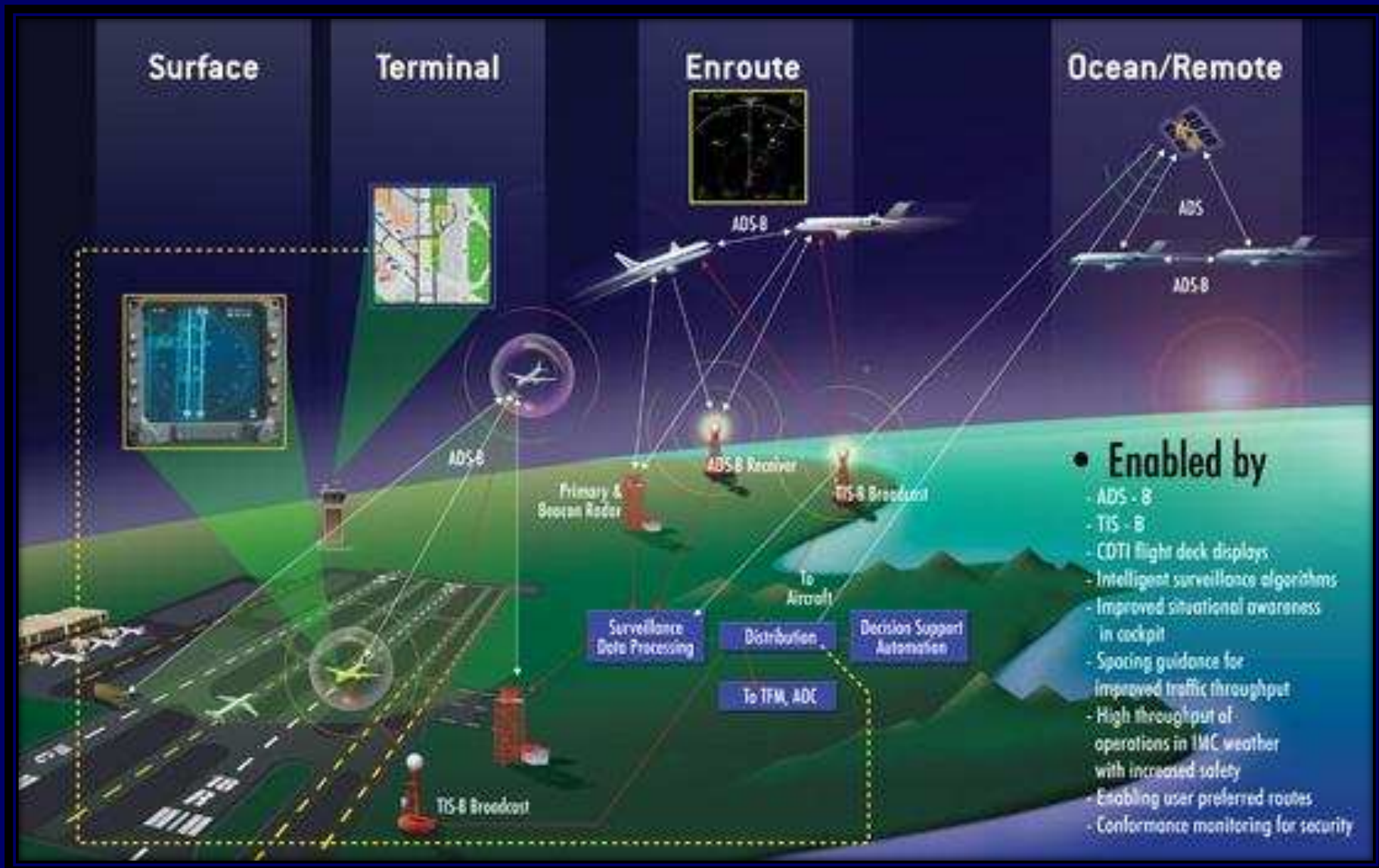
AIR NAVIGATION

- RADIO NAVIGATION
 - LORAN
 - ADF
 - VOR/DME
 - TACAN
 - VORTAC
- INS-GPS/ SATELLITE BASED

AIR NAVIGATION



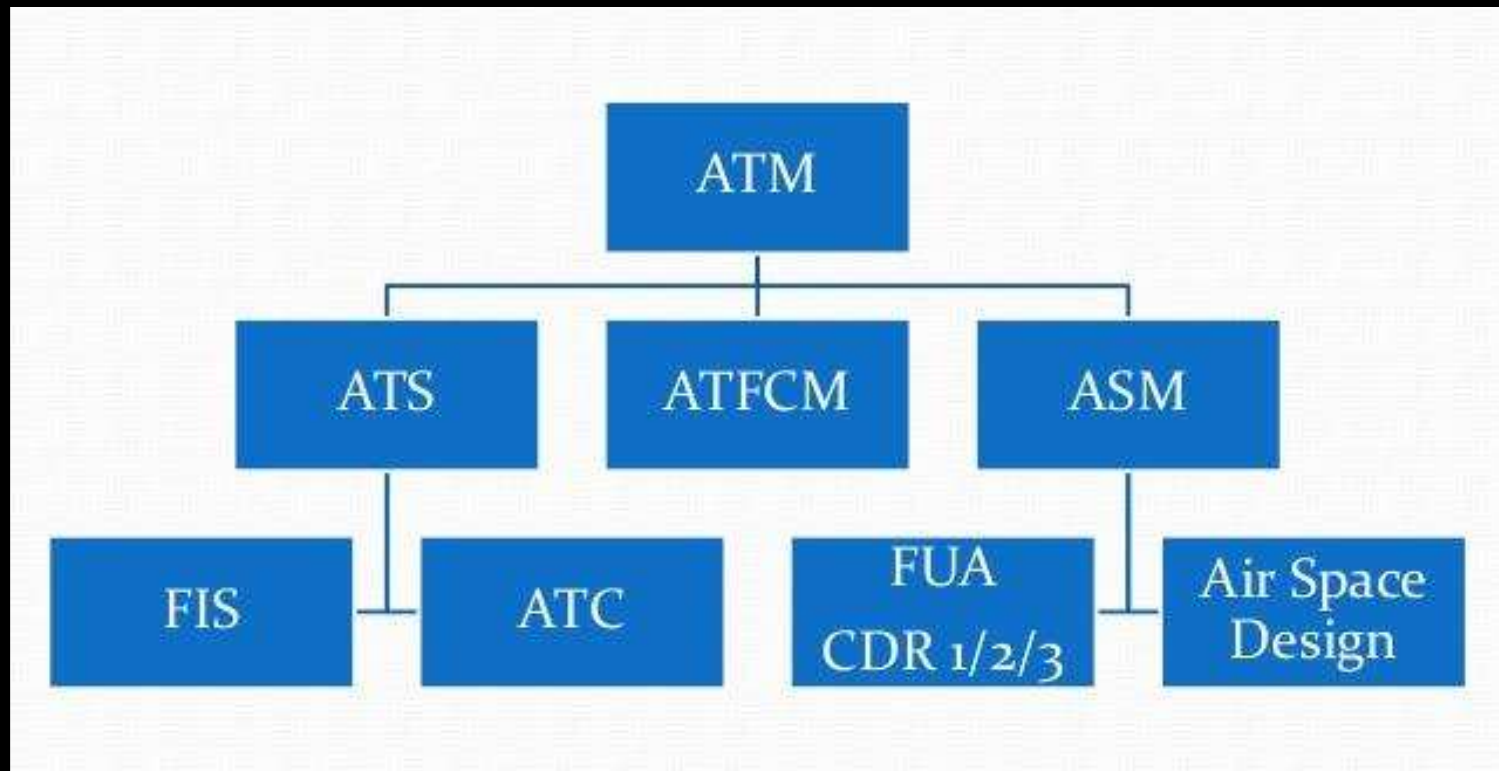
AIR NAVIGATION



AIR NAVIGATION - VISION

- **FREE FLIGHT CONCEPT**

ATM



OBJECTIVES OF CNS/ATM

	<u>ATM</u>	<u>FLIGHT OPS</u>
GENERAL	ENSURE THAT ALL INFO, INCLUDING INFO NEEDED FOR DYNAMIC FLIGHT PLANNING, IS AVAILABLE TO ALL GROUND & A/B SYSTEMS	ENHANCE THE ACCURACY INFO RELATED TO FLT PROGRESS
	ENHANCE FUNCTIONAL INTEGRATION OF GROUND SYSTEMS WITH A/B SYSTEMS AND THE ATM RELATED ASPECTS OF FLT OPS	ENHANCE FUNCTIONAL INTEGRATION OF A/B SYSTEMS & FLT OPS WITH GROUND SYSTEMS
	ENHANCE ACCURACY OF CONFLICT PREDICTION & RESOLUTION & THE PROVISION OF REAL-TIME INFO TO CONTROLLERS AND OPERATORS	ENSURE THE PROVISION OF ACCURATE INFO BETWEEN A/B SYSTEM ELEMENTS & GROUND SYSTEM ELEMENTS NECESSARY FOR DYNAMIC FLT PLANNING

OBJECTIVES OF CNS/ATM

	<u>ATM</u>	<u>FLIGHT OPS</u>
S A F E T Y	ENSURE THE PROVISION OF WELL – ADAPTED AND HARMONISED SAFE PROCEDURES ON A GLOBAL BASIS	IMPROVE PILOT SITUATIONAL AWARENESS
	ENSURE – SEPARATION BETWEEN ACFT - CLEARANCE BETWEEN ACFT & OBSTACLES	ENSURE ADEQUATE CLEARANCE FROM TERRAIN & ENABLE ACFT TO MAINTAIN OWN SEPARATION UNDER SPECIFIC CIRCUMSTANCES
	ENSURE SAFETY LEVELS ARE MAINTAINED AS THE USE OF AUTOMATION INCREASES & RAPID ALERTING SERVICE IS AVAILABLE	ENSURE SAFETY LEVELS ARE MAINTAINED & INTEGRITY OF DATABASE INFORMATION

OBJECTIVES OF CNS/ATM

	<u>ATM</u>	<u>FLIGHT OPS</u>
REGULARITY & EFFICIENCY	PROVIDE FOR THE APPLICATION OF GLOBAL ATM UNDER ALL OP CONDITIONS	ENSURE THAT ACFT CAN OPERATE UNDER ALL WX CONDITIONS
	IMPROVE THE APPLICATION OF TACTICAL ASM THROUGH DYNAMIC USER INVOLVEMENT, LEADING TO MORE EFFICIENT AIRSPACE UTILISATION	PROVIDE FOR THE APPLICATION OF USER PREFERRED FLIGHT PROFILES
	IMPROVE STRATEGIC ASM WHILE INCREASING TACTICAL AIRSPACE FLEXIBILITY	ENSURE THAT THE NECESSARY INFRA IS AVAILABLE TO SUPPORT GATE-TO-GATE OPS IMPROVE USER CAPB TO OPTMISE FLT PLANNING

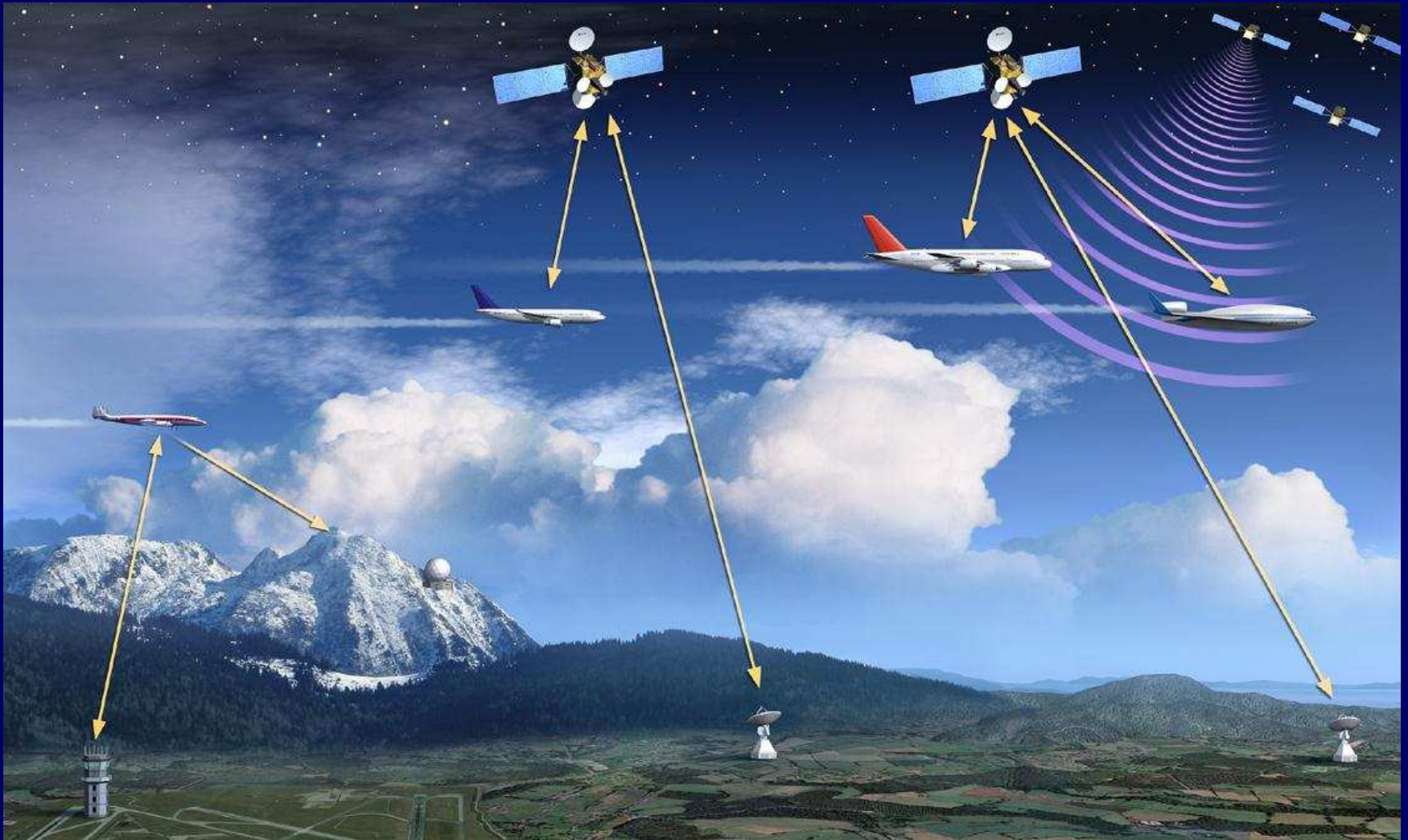
OBJECTIVES OF CNS/ATM

	<u>ATM</u>	<u>FLIGHT OPS</u>
REGULARITY & EFFICIENCY	ENSURE THE PROVISION OF INFO NECESSARY FOR TACTICAL & STRATEGIC ATFM	DYNAMICALLY, ALLOW FLEXIBLE OPS
	ENHANCE OVERALL TACTICAL & STRATEGIC ATFM SO THAT DEMAND DOES NOT EXCEED CAPACITY	MINIMISE ACFT OPERATING COST PENALTIES
	INCREASE AVAILABLE CAPACITY WITHOUT INCREASING CONTROLLER WORKLOAD	MINIMISE DIFFERING EQPT CARRIAGE REQUIREMENTS BETWEEN REGIONS

CNS/ ATM

- FUTURE AIR NAVIGATION SYSTEM COMMITTEE - 1983
- CNS/ATM PLAN ENVISAGED TIME BOUND REPLACEMENT OF THE PRESENT GROUND BASED COMMN, NAVIGATION & SURVEILLANCE SYSTEM WITH MORE EFFECTIVE SATELLITE BASED SYSTEM

CNS/ ATM



CNS/ ATM

- REPLACEMENT OF VOICE COMMN WITH DATA COMMN WHICH WILL PERMIT ACFT FMS TO DIRECTLY COMMUNICATE WITH GROUND BASED ATM COMPUTERS FOR COORDINATION & POSITION REPORTING
- AERONAUTICAL TELECOM NETWORK (ATN) WILL ALLOW FULL INTEROPERABILITY BETWEEN AIR & GROUND SUB SYSTEMS

REQUIREMENTS

- IN ORDER TO GUARANTEE SIGNAL IN SPACE FOR SAFE AND RELIABLE OPERATIONS, FOUR PARAMETERS ARE USED:
 - ACCURACY
 - INTEGRITY
 - AVAILABILITY
 - CONTINUITY



A LITTLE BIT OF VOCABULARY (ANNEX 10)

- ACCURACY :
 - GNSS POSITION ERROR IS THE DIFFERENCE BETWEEN THE **ESTIMATED** POSITION AND THE **ACTUAL** POSITION. FOR AN ESTIMATED POSITION AT A SPECIFIC LOCATION, THE PROBABILITY SHOULD BE AT LEAST **95 PER CENT** THAT THE POSITION ERROR IS WITHIN THE **ACCURACY REQUIREMENT**.
- INTEGRITY :
 - A MEASURE OF THE **TRUST** THAT CAN BE PLACED IN THE CORRECTNESS OF THE INFORMATION SUPPLIED BY THE TOTAL SYSTEM.
 - INCLUDES THE ABILITY OF A SYSTEM TO PROVIDE **TIMELY AND VALID** WARNINGS TO THE USER (**ALERTS**).

-

VOCABULARY AGAIN.. (ANNEX 10 AGAIN..)

- AVAILABILITY :
 - AVAILABILITY OF GNSS IS CHARACTERISED BY THE PORTION OF TIME THE SYSTEM IS TO BE USED FOR NAVIGATION DURING WHICH RELIABLE NAVIGATION INFORMATION IS PRESENTED TO THE CREW, AUTOPILOT, OR OTHER SYSTEM MANAGING THE FLIGHT OF THE AIRCRAFT.
- CONTINUITY :
 - CONTINUITY OF SERVICE OF A SYSTEM IS THE CAPABILITY OF THE SYSTEM TO PERFORM ITS FUNCTION WITHOUT **UNSCHEDULED** INTERRUPTIONS DURING THE INTENDED OPERATION.

CNS/ ATM - COMMUNICATION

- INCREASED NAVIGATION ACCURACY
 - PILOT IS PRECISELY AWARE ABOUT POSITION AT ALL TIMES
- IF THE SAME DATA IS MADE AVAILABLE TO GROUND CONTROL AGENCIES
 - REDUCE THE LOAD ON EXISTING COMMN SYSTEMS
 - INCREASE THE SURVEILLANCE DATA AND COVERAGE
- COMMUNICATION VEHICLE DELINKED FROM V/UHF COMMN
- 8.33 KHZ SPACING

CNS/ ATM - COMMUNICATION

- THROUGH DATA LINK AN E-MESSAGE SYSTEM DATA AND MESSAGES CAN BE TRANSFERRED DIRECTLY FROM ACFT TO GROUND CONTROL
- DATA LINK CAN BE ACHIEVED THROUGH
 - VHF
 - HF
 - SSR MODE S DATA LINK – SURVEILLANCE + AIR-GROUND DATA LINK
 - SATELLITE
 - AMSS
 - ADS

CNS/ ATM - COMMUNICATION

- DATA LINK SUPPORTS HOSTS OF FUNCTIONS
 - CPDLC
 - AIRLINE OPERATIONAL COMMUNICATION
 - ATC CLEARANCE DELIVERY THROUGH SYSTEM
 - WEATHER INFORMATION

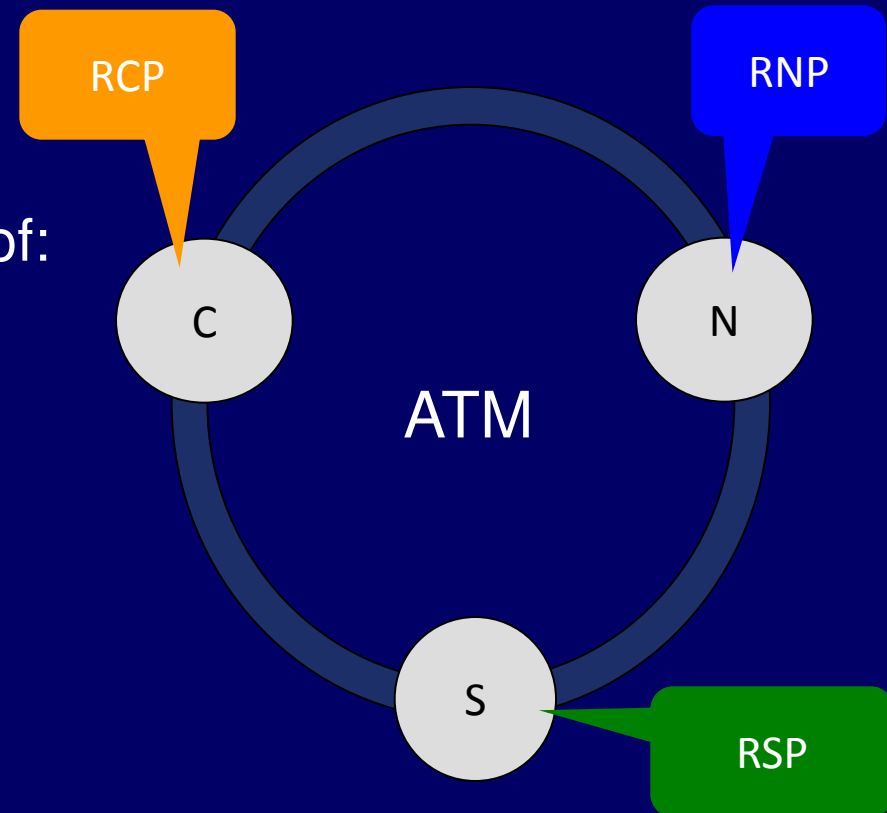
CNS/ ATM - COMMUNICATION

- MAIN FEATURES OF NEW COMN SYSTEM
 - MOST ROUTINE COMN ARE DONE BY DATA INTERCHANGE
 - VOICE COMN ARE MAINLY USED IN NON-ROUTINE & EMERGENCY SIT
 - EMPHASIS ON GLOBAL CONNECTIVITY & OP
 - DEDICATED DIRECT SPEECH CIRCUITS WILL BE REPLACED WITH AERONAUTICAL SWITCHED NETWORKS CAPABLE OF HANDLING BOTH VOICE & DATA
 - SUCH FEATURES ALLOW FOR BETTER USE OF COMN CHANNELS & ENABLE FACILITIES TO BE SHARED AMONG MANY USERS

PERFORMANCE BASED OPS

Balances capability & performance of:

- Communications (RCP)
- Navigation (RNP)
- Surveillance (RSP)
- Air Traffic Management (ATM)



RNP – required navigation performance
RCP – required communication performance
RSP – required surveillance performance

AUTHORISATION

ICAO ANNEX 6, CHAPTER 7

7.1.3 FOR FLIGHTS IN DEFINED PORTIONS OF AIRSPACE OR ON ROUTES WHERE AN RCP TYPE HAS BEEN PRESCRIBED, AN AEROPLANE SHALL, IN ADDITION TO THE REQUIREMENTS SPECIFIED IN 7.1.1:

- (A) BE PROVIDED WITH COMMUNICATION EQUIPMENT WHICH WILL ENABLE IT TO OPERATE IN ACCORDANCE WITH THE PRESCRIBED RCP TYPE(S); AND
- (B) BE AUTHORISED BY THE STATE OF THE OPERATOR FOR OPERATIONS IN SUCH AIRSPACE.

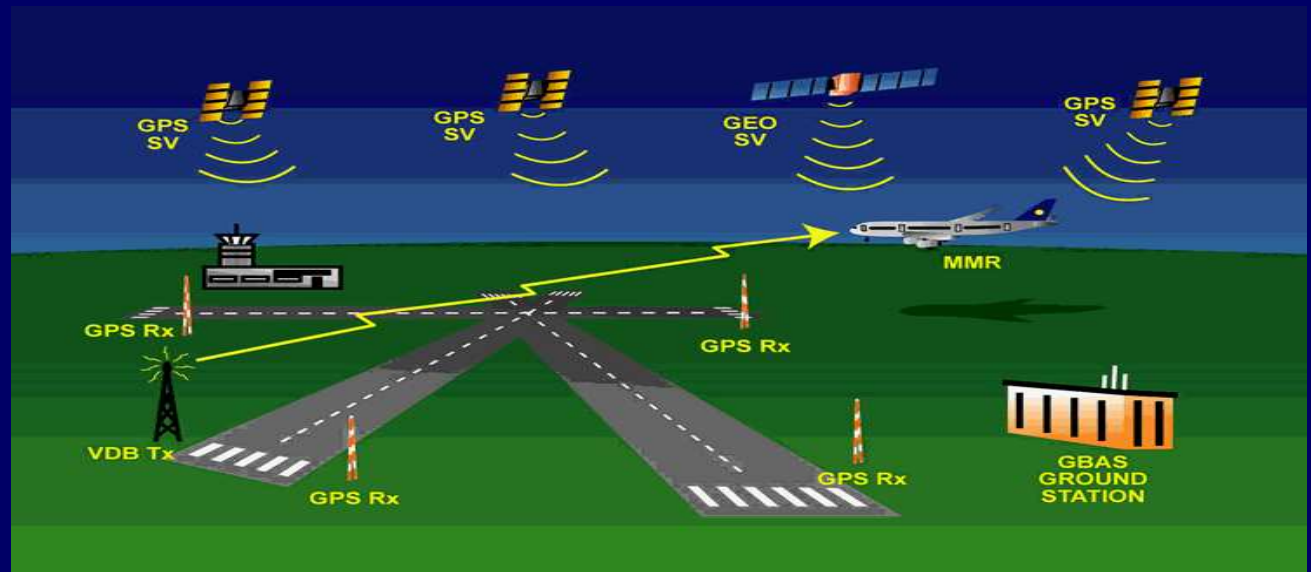
CNS/ ATM - RCP

- A LABEL THAT DEFINES A PERFORMANCE STANDARD FOR OPERATIONAL COMMUNICATION TRANSACTIONS (E.G. RCP 400)
- PROVIDES ALLOCATIONS TO THE AIR TRAFFIC SERVICE PROVIDER (ATSP), COMMUNICATION SERVICE PROVIDER (CSP), AIRCRAFT OPERATOR AND AIRCRAFT SYSTEM
- DENOTES OPERATIONAL VALUES FOR:
 - COMMUNICATION TRANSACTION TIME
 - RCP CONTINUITY
 - RCP AVAILABILITY
 - RCP INTEGRITY

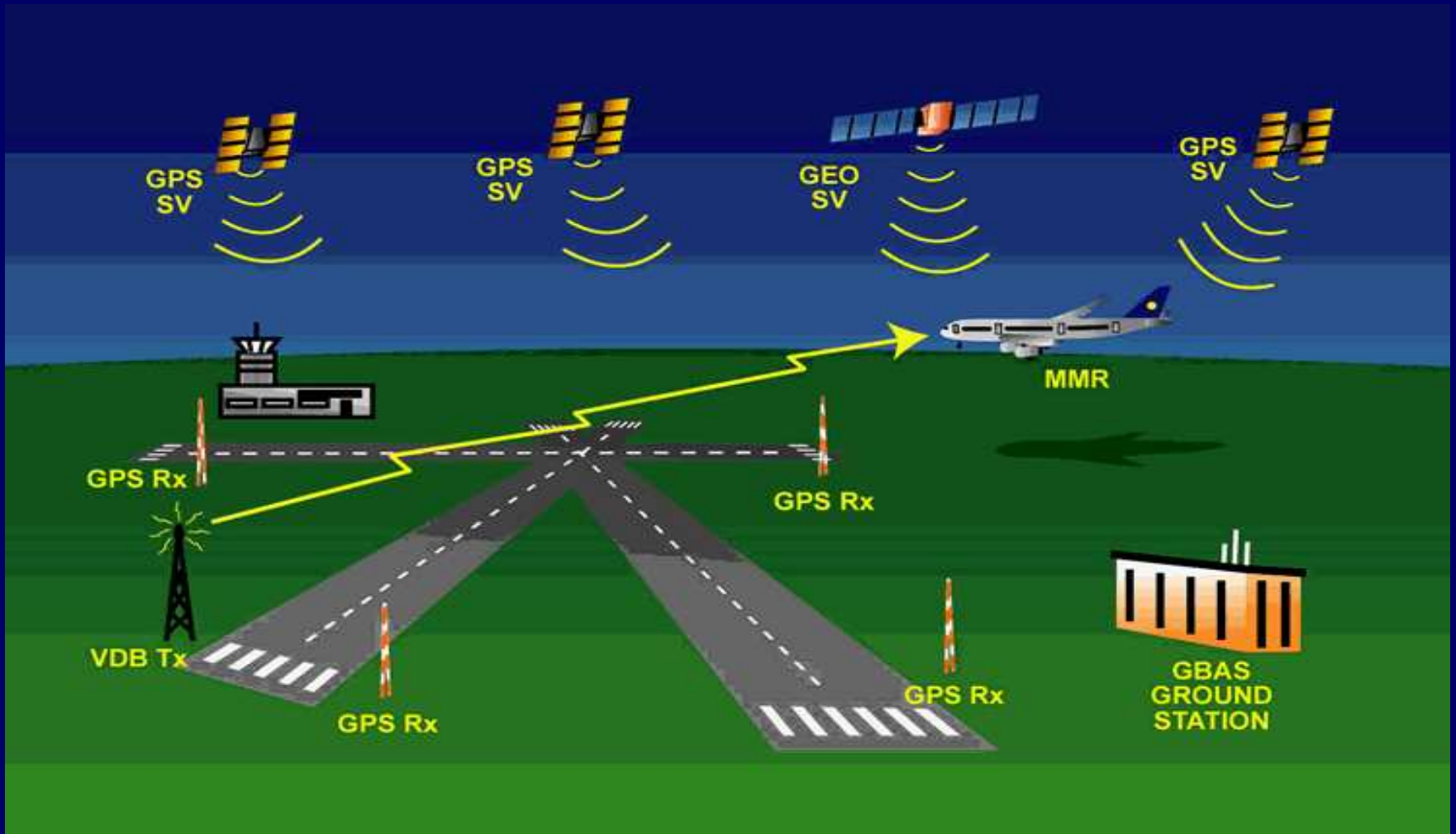
CNS/ ATM - NAVIGATION

- THE SATELLITE BASED NAVIGATION WILL GIVE A GLOBAL ACCURACY WITH AUGMENTATION TECHNIQUES
 - WAAS/MSAS/GAGAN
 - WITH AUGMENTATION TECHNIQUE GPS AIDED APPROACHES ARE UPGRADED TO PRECISION APPROACHES
- 

- SBAS
- GBAS



CNS/ ATM - NAVIGATION

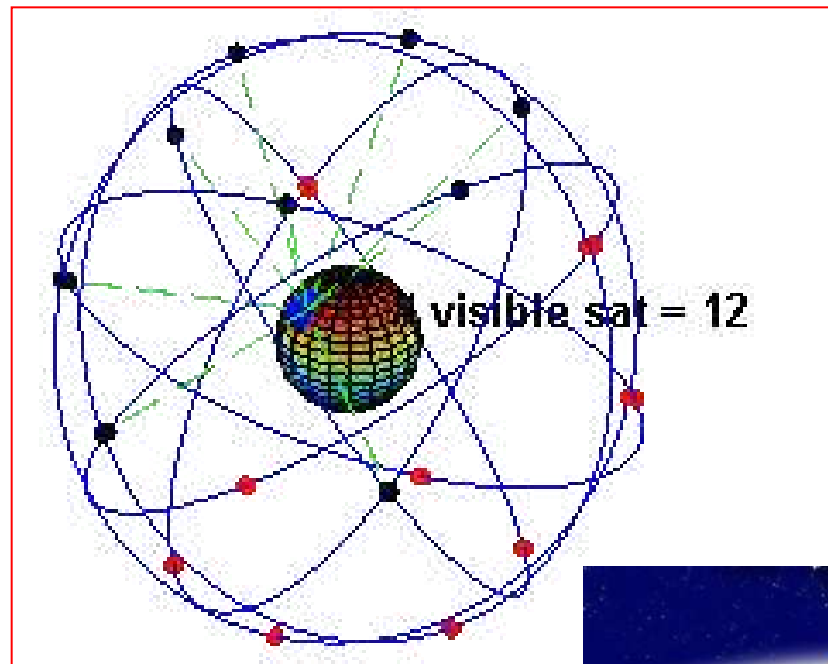


RNAV GNSS: GPS (GLOBAL POSITIONING SYSTEM)

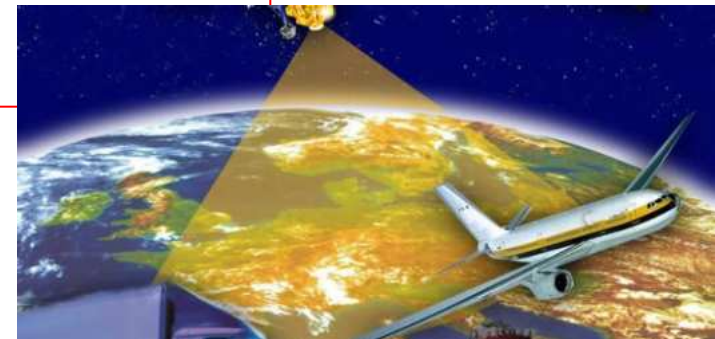


A 24 SATELLITE CONSTELLATION (PRIMARY)

- POSITION COMPUTED IN WGS84
- ACCURACY OF 10 METERS OR BETTER

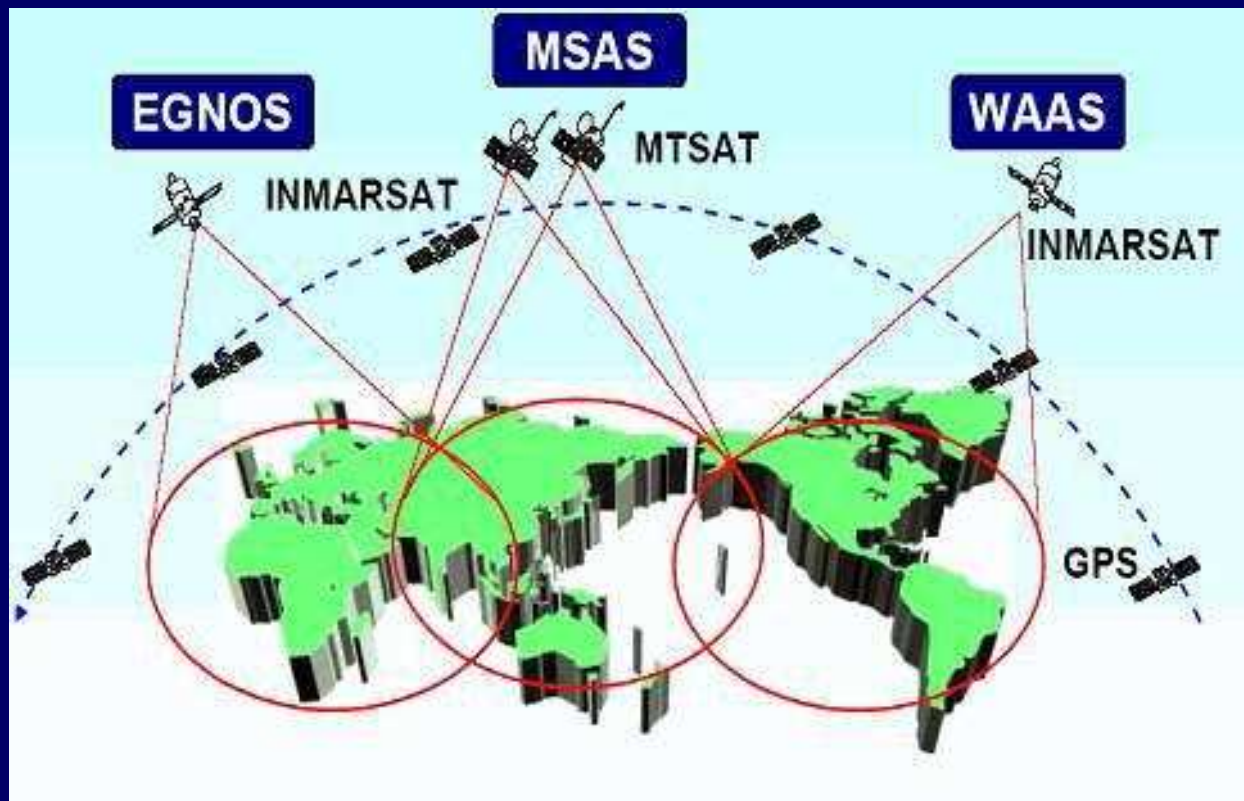


- WORLDWIDE COVERAGE
- DATABASE NAVIGATION

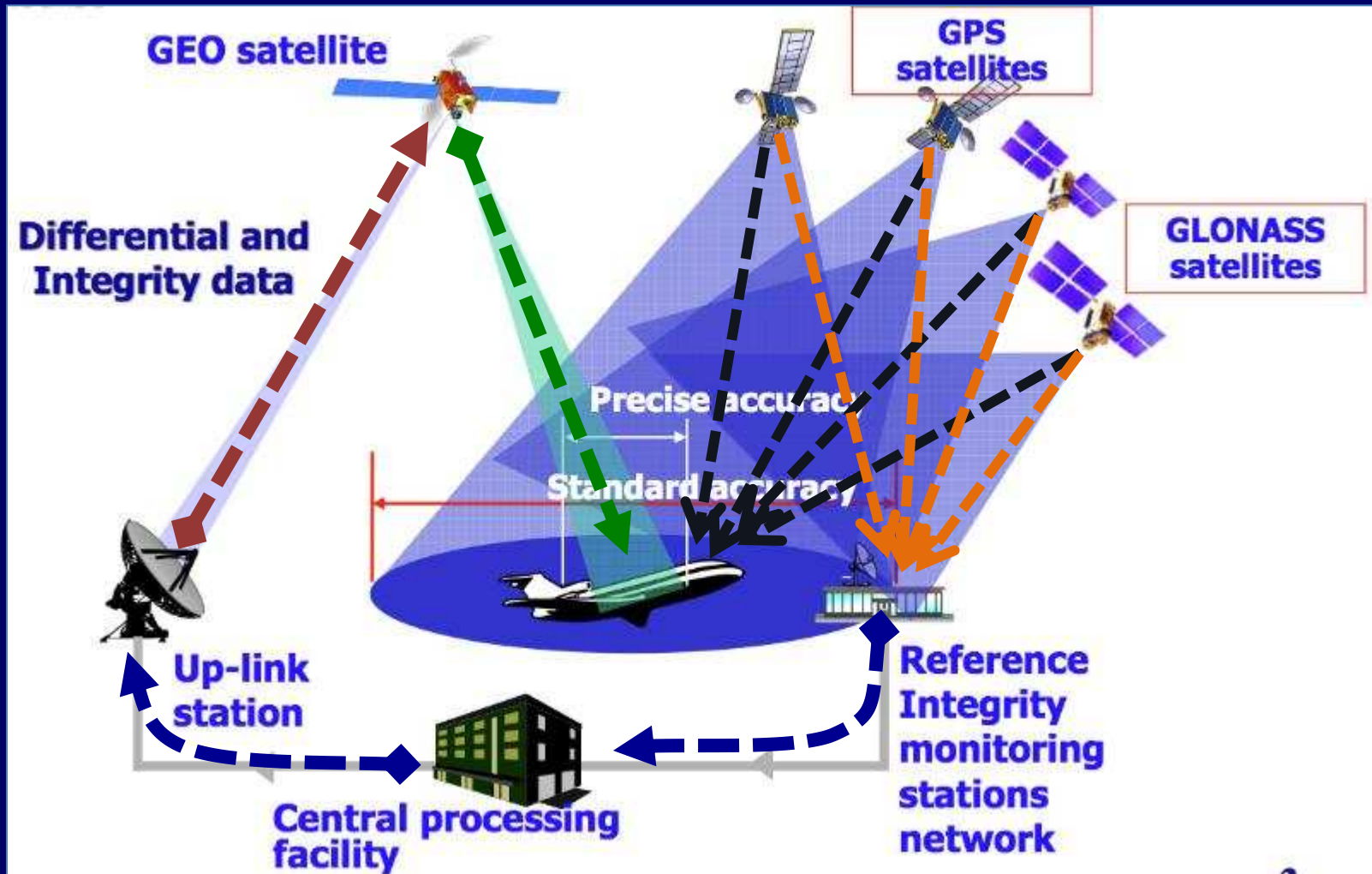


GNSS AUGMENTATIONS

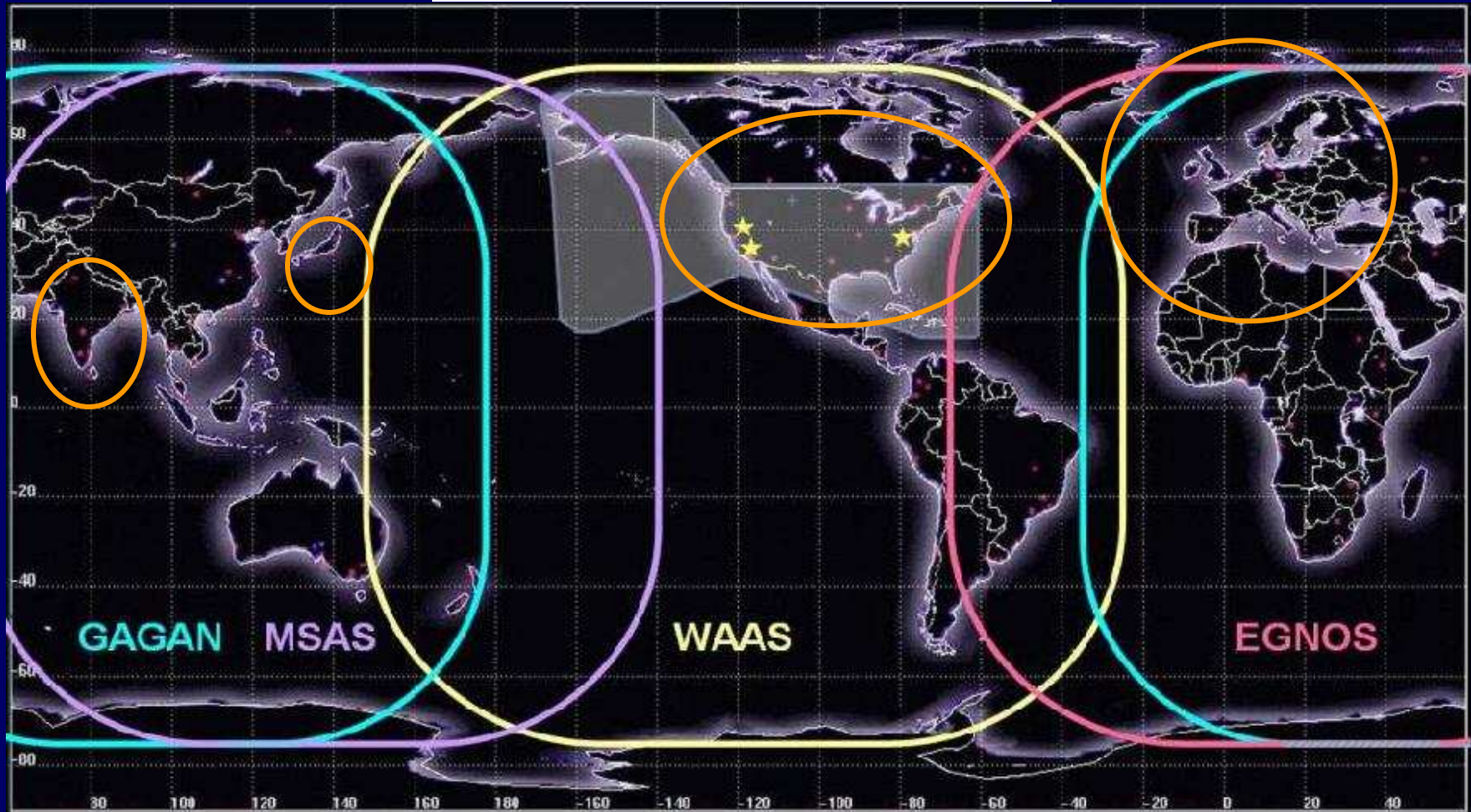
- GNSS AUGMENTATIONS ARE USED TO IMPROVE POSITION ACCURACY
- SATELLITE-BASED AUGMENTATION SYSTEM (**SBAS**), AND GROUND-BASED AUGMENTATION SYSTEM (**GBAS**) BOTH USE KNOWN GROUND POSITIONS TO IMPROVE THE ACCURACY OF THE GNSS SIGNAL



MORE GNSS – SBAS



SBAS GEOS FOOTPRINTS VS SBAS SERVICE VOLUME



 Service Volume

SBAS (GAGAN)

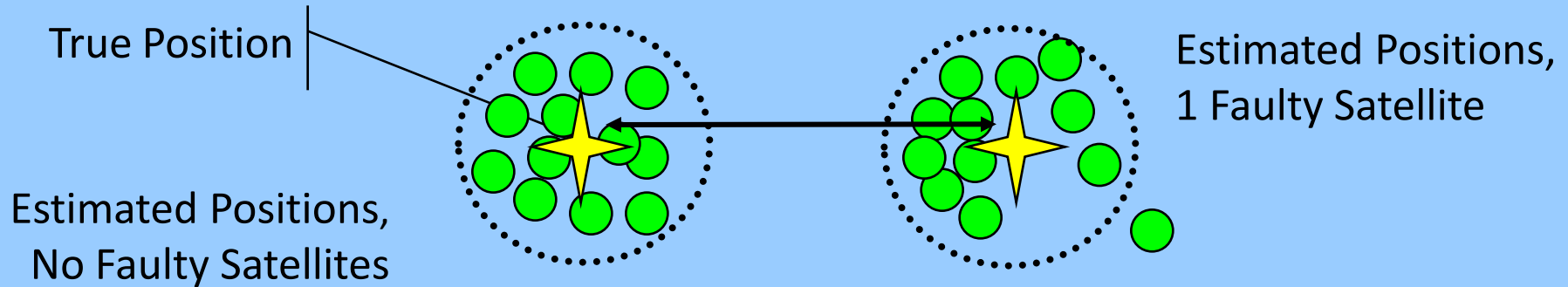
GAGAN:

THE GAGAN SYSTEM CONSISTS OF THE FOLLOWING ELEMENTS FOR THE EFFECTIVE IMPLEMENTATION OF SBAS OVER INDIA.

1. INDIAN REFERENCE STATION (INRES) — AT 15 LOCATIONS ACROSS INDIA
2. INDIAN MASTER CONTROL CENTER (INMCC) — TWO AT BANGALORE
3. INDIAN LAND UPLINK STATION (INLUS) — THREE STATIONS, TWO AT BANGALORE AND ONE AT NEW DELHI
4. GEOSTATIONARY SATELLITES (GSAT8/GSAT10) IN ORBIT AND ONE ON-ORBIT SPARE IS (GSAT-15) LAUNCHED ON NOVEMBER 10, 2015



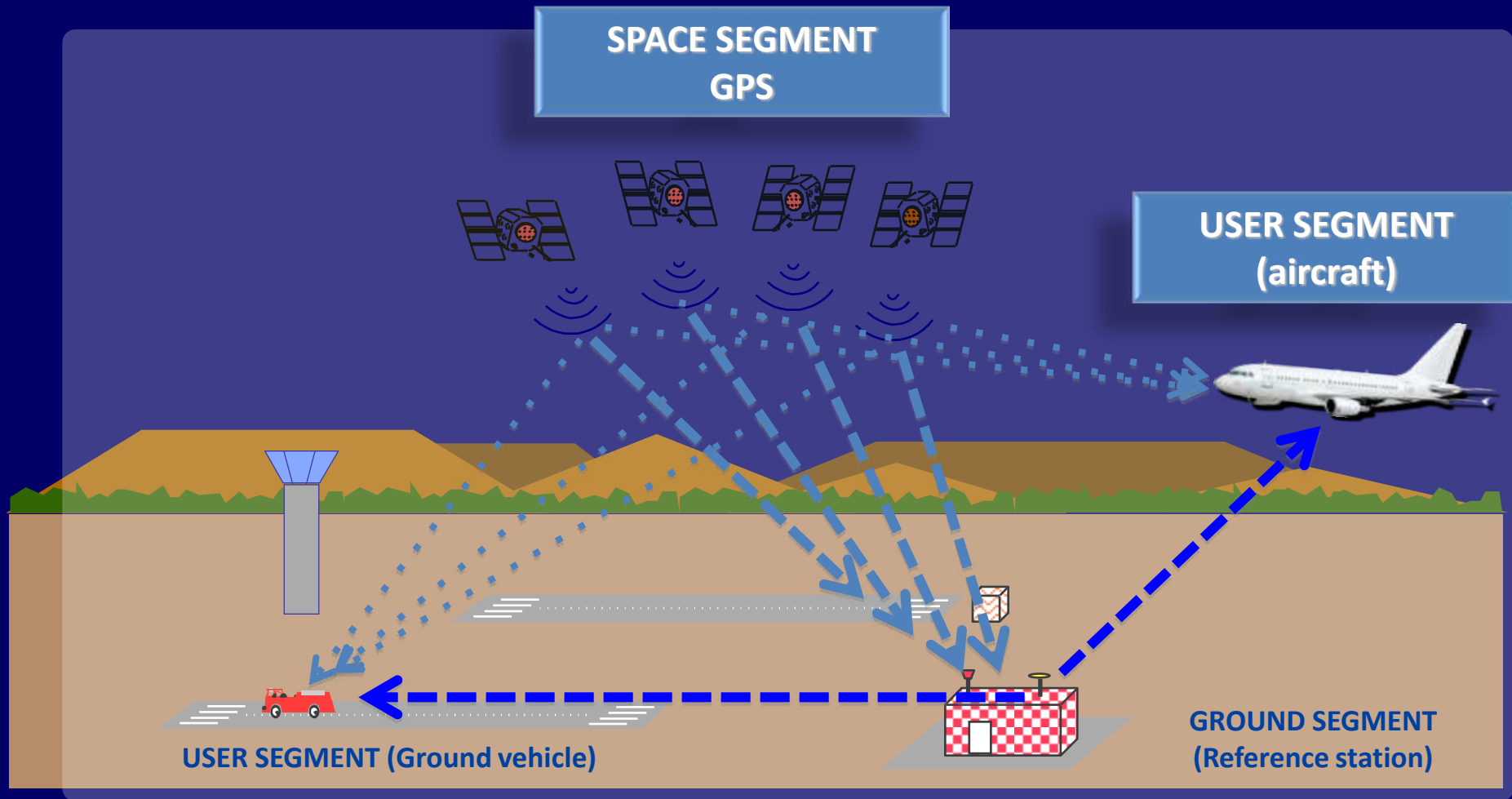
WHAT IS RAIM?



CHECKS THE INTEGRITY OF THE POSITION FIX:

- INCLUDES LOCAL ERRORS, SUCH AS INTERFERENCE
- BASED ON THE CONSISTENCY OF MEASUREMENTS

GBAS ARCHITECTURE



PBN

KEY COMPONENTS OF *PBN*

Area
Navigation
(RNAV)

Required Navigation
Performance
(RNP)

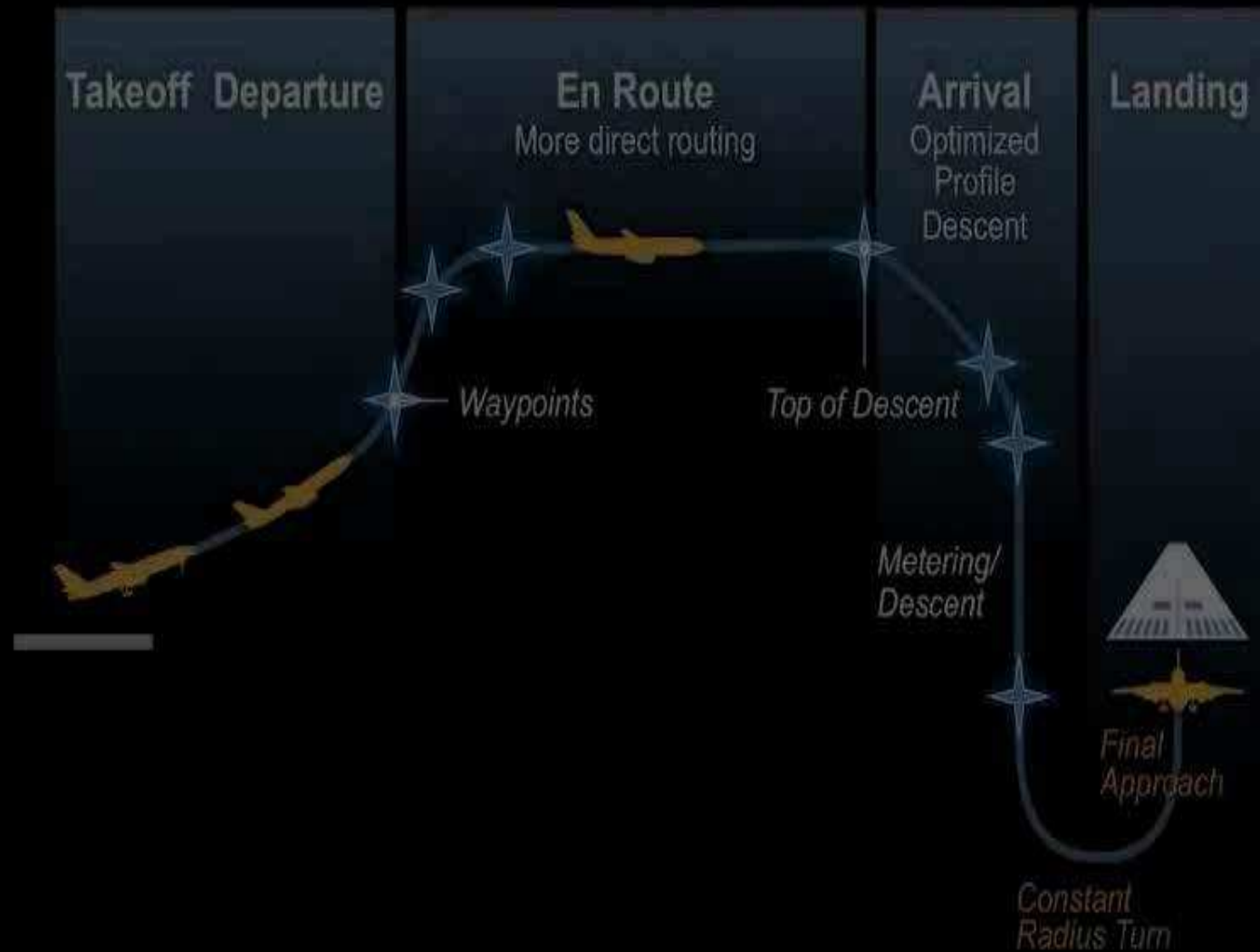
RNAV Area navigation on any desired flight path within the coverage of station-referenced navigation aids or within limits of the capability of self-contained aids or a combination of these

RNP Navigation specification based on area navigation that includes the requirement of on board performance monitoring and alerting

PBN concept represents a shift from Sensor based to
Performance –based Navigation

RNAV and RNP Implementation

Applicable in all Phases of Flight



PRE-REQUISITES FOR PBN

Aircraft Position

Flight Management System (FMS)

Standard NAV Performance



RNAV SENSORS

Self-contained

INS/IRS

Can navigate using onboard systems without reliance on ground based nav aids

Sensors for Area Navigation (RNAV)

Ground based

DME-DME

Positioning by using two or more DME stations

VOR-DME

Position by using a fix formed by VOR radial and DME distance

Space based

GNSS

3D position using minimum of 4 satellites

FLIGHT MANAGEMENT SYSTEM (FMS)



Master Control Panel



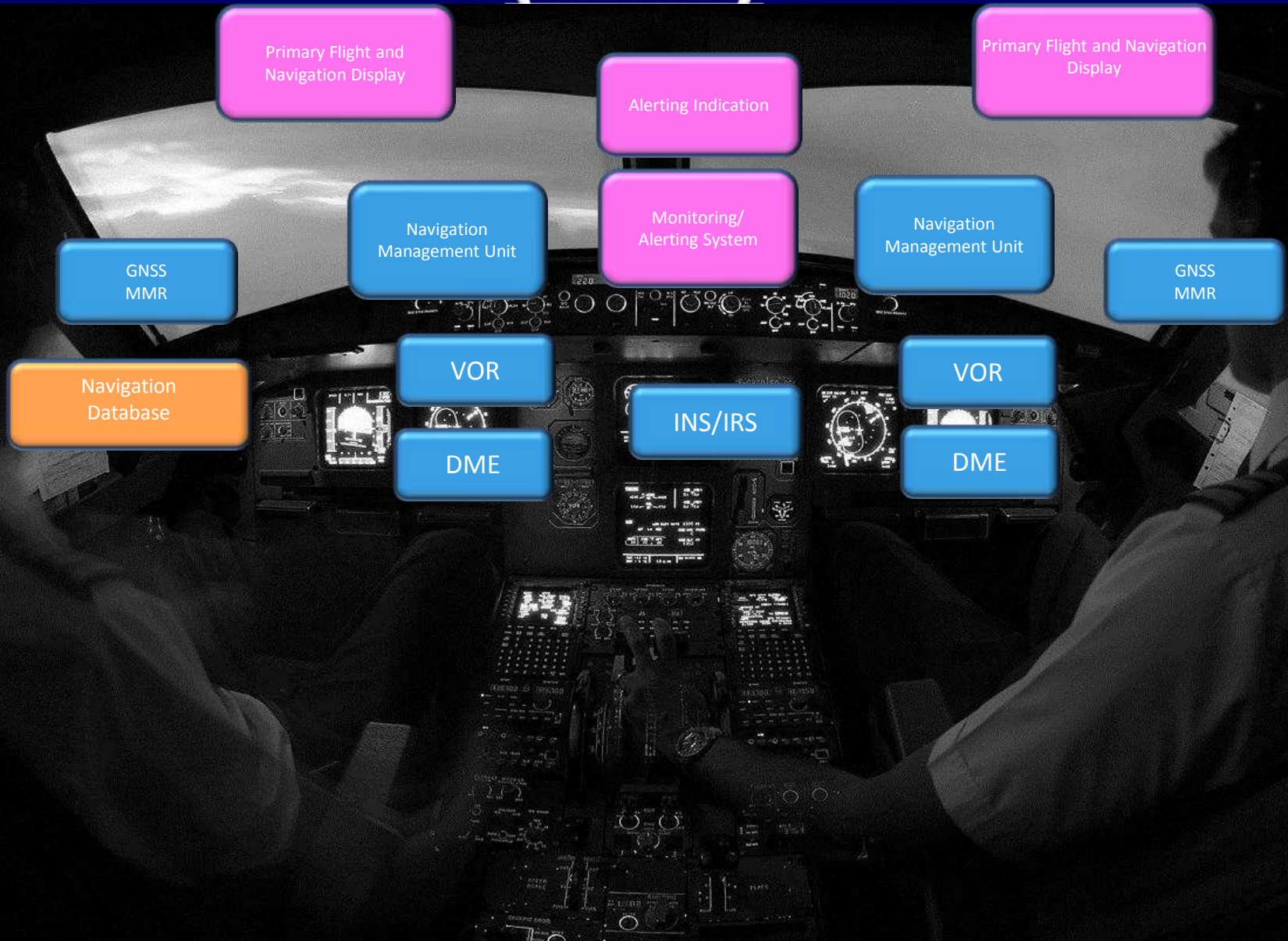
Moving Map Display

**FMS comprises of
several systems and
interfaces**



Control Display Unit

FLIGHT MANAGEMENT SYSTEM (FMS)



PERFORMANCE LEVEL REQUIREMENTS

Performance Based Navigation (PBN)

RNAV

(Onboard Performance Monitoring not required)

RNAV 10

Oceanic

**RNAV 5
RNAV 1**

Enroute

SID/STAR

RNP

(Onboard Performance Monitoring required)

RNP 4

Oceanic

**RNP 1
RNP 2
A-RNP
RNP APCH
RNP AR
RNP 0.3**

Enroute

SID/STAR

RNP APCH

CNS/ ATM - SURVEILLANCE

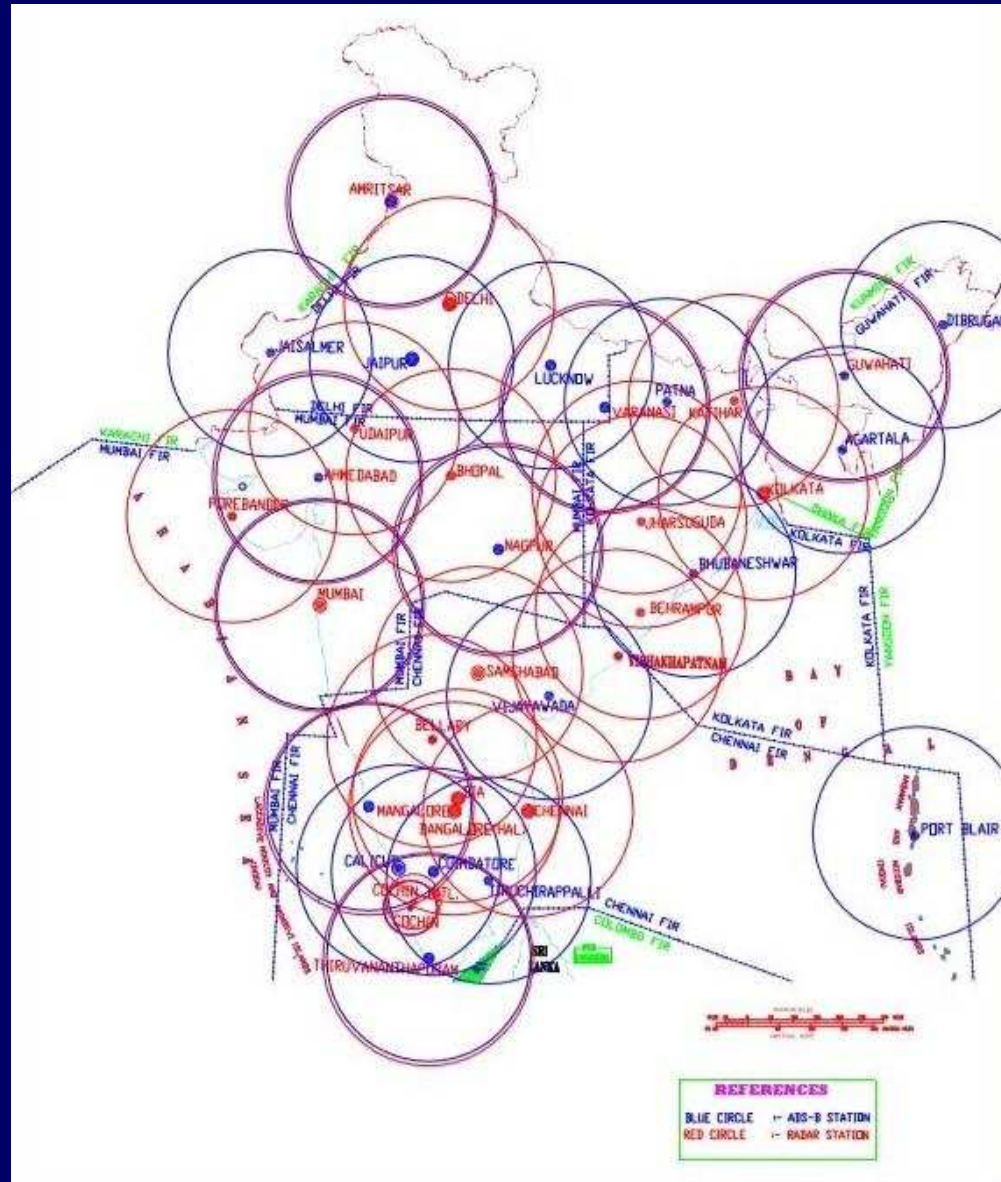
- PSR
- SSR
- ADS – B
 - POSITION SUPPLIED BY ON-BOARD NAV EQUIPT
 - MESSAGE TIME STAMP WITHIN 1 SEC UTC
 - AIR-GROUND DATA LINK
 - GROUND INFRA PROVING INFO TO ATC
 - APPROPRIATE ATS PROCEDURES

CNS/ ATM - SURVEILLANCE

- DATA LINK ALSO SUPPORTS DOWN-LINKING OF POSITION DATA AND PRESENTING THE SAME ON GROUND SYSTEMS
 - AUTOMATIC DEPENDENT SURVEILLANCE
- INTEGRATION OF SENSORS
- NETWORKED RADARS FOR WIDE AREA COVERAGE SURVEILLANCE
 - AUTOTRACK II/ III

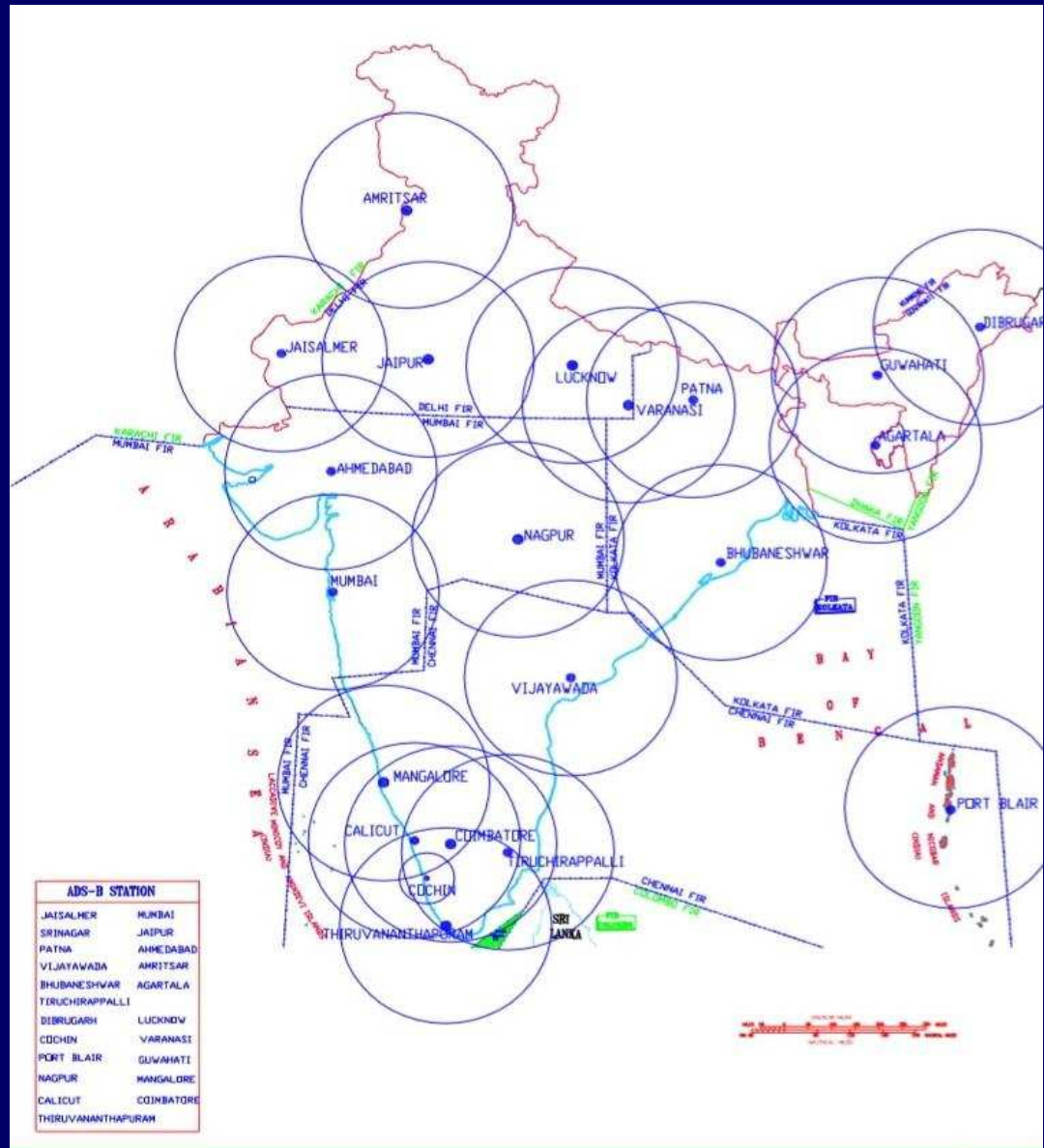
CNS/ ATM - SURVEILLANCE

SURVEILLANCE
COVERAGE WITHIN
INDIAN FIR



CNS/ ATM - SURVEILLANCE

ADS B COVERAGE WITHIN INDIAN FIR



REQUIRED SURVEILLANCE

PERFORMANCE - RSP

- Defines high-level surveillance system performance requirements.
- Operationally derived and not based on any specific techniques, technologies and/or architecture.
- Includes both ground and airborne systems.
- Supports a particular ATM application (e.g. reduced separation)

RCP / RSP IS NOT THE SAME AS RNP

Some similarity, but...

Item	RNP	RCP / RSP
Specifications	EXCLUSIVE TO AIRCRAFT AND OPERATOR	END-TO-END SYSTEM REQUIREMENTS
Monitoring and alerting	REAL TIME MONITORING AND ALERTING	REAL-TIME MONITORING AND ALERTING POST-IMPLEMENTATION MONITORING (STATISTICAL) AND CORRECTIVE ACTION
	AIRCRAFT AND OPERATOR	SHARED BETWEEN AIRCRAFT AND ATSP / ATSU

CNS/ATM

- ICAO IS ASSISTING STATES TO ENHANCE THEIR KNOWLEDGE & COMPREHENSION OF TECHNICAL, ORGANISATIONAL, ECONOMIC & SAFETY ISSUES RELATED TO PBN
- PBN PROVIDES FOR
 - MORE DIRECT & PRECISE FLIGHT ROUTES/PATHS
 - INCREASED SAFETY
 - REDUCED FUEL BURN & LESS CARBON PRINT
 - EFFICIENT TRAFFIC FLOW
 - REDUCED ATC COMMUNICATION

FUTURE – CHALLENGES & WAY AHEAD (CNS/ATM)

- UAS TRAFFIC MANAGEMENT
- ECONOMY VS SECURITY
- EFFICACY OF FREE FLIGHT CONCEPT

FUTURE – CHALLENGES & WAY AHEAD (CNS/ATM)

- DRONEPORTS
- BVLOS OPS
- ABV 120 M/400 FT OPS
- DRONE CORRIDORS
- PPP
- LOCAL CIVIL POLICE
- TRAINING RESPONSIBILITY WITH IAF

QUESTIONS?