Airports Authority of India (AAI)

ATM – Meeting the Challenges - Current and Future

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Air traffic management is the dynamic, integrated management of air traffic and airspace safely, economically and efficiently — through the provision of facilities and seamless services in collaboration with all parties.
Growth & Challenges

Growth

- Traffic Growth
- Multiple airspace users
- Conflicting user requirements
- Airspace restrictions

Challenges

- Safety
- Capacity enhancement & minimise delays
- Seamless, cost efficient operations
- User preferred trajectories
- Fuel conservation
- Environmental issues - Noise, Emissions
- Human resource & Training
Interim measures to meet the demand

- Optimum utilisation of available resources
- Implementation of New procedures
- Development of additional ground infrastructure
- Augmentation of CNS/ATM infrastructure
- Augmentation of trained manpower and additional deployment
Traffic Growth – Forecast .....2022-23

- As per the industry estimates
  KPMG’s report, Boeing and Airbus the slower growth in traffic is temporary.
  In the long run the traffic projections are sustainable.
  The forecast growth for India

- A/c Movements
  - Intl: 8% for the year 2008-09 to 2012-13 and 7% for the period 2013-14 to 2022-23
  - Domestic: 3.4% for the period 2008-09 to 2012-13 and 8% for the period from 2013-14 to 2022-23

- Passenger
  - Intl: 10% for the year 2008-09 to 2012-13 and 9% for the period 2013-14 to 2022-23
  - Domestic: 0.3% decline during the period from 2008-09 to 2012-13 and thereafter growth @ 8% for the year 2013-14 to 2017-18 and @10% for the period 2018-19 to 2022-23
ATM Master plan

- Current and forecast traffic growth necessitate a future ATM master plan for India.
- The master plan of India to meet the current and future demand of the industry consistent with Global approach
- The strategy and guiding principles are ICAOs strategic vision for new ATM system that
  - Meets agreed levels of safety
  - Provides for optimum economic operations
  - Environmentally sustainable
  - Meets national security requirements
- Achieves seamlessness through
  - Homogeneous ATM areas and Major Traffic flows
  - Interoperability (common requirements, Standards and procedures) and harmonization (tools and timing)
  - Performance based equipment carriage
Key elements of the Master plan

FIANS (Future Indian Air Navigation System - Master plan)

Infrastructure development (AGA)
- Airport Infrastructure

Technology upgrade (CNS/ATM/MET/AIM)
- ICAO Global Plan Initiatives
- ICAO Regional Impl.Plan

Global Harmonization
Seamless airspace
- ICAO Global Plan
- ICAO Regional plan
- Other Global system initiatives
Collaboration and harmonisation of systems and procedures

**ATM**
- Airspace management
- CNS/ATM infrastructure
- Air traffic services

**Regulator**
- Safety & Ops regulations

**Aerodrome**
- Ground Infrastructure
- RWY / Airside Safety
- All Wx operations
- Ground surveillance

**Airline**
- Flight operations
- Airborne capabilities matching with Ground system
Aerodrome Operations

**Airside management**
- Ground Infrastructure, Capacity vs Demand balancing
- Runway safety programme
- Ground surveillance eqpts
- Runway incursion management
- Bird/wildlife control
- Environmental – Noise/emission
- Online data exchange

**Approach Control**
- Traffic flow management and coo-ordination
- Online exchange of Flight data and clearance co-ordination through ATM system with datalink capabilities

**Aerodrome Control**
- Situational awareness & Conflict management
- Arrival Departure procedures – PBN
- ATM Automation support, controller tools and safety nets
- Datalink (ACARS, VDL-2) capabilities (DATIS, DCL)

**Airline / aircraft operations management**
- Slot conformance & on time ops
- Datalink capabilities with ATM system
- Support for online CDM - Traffic flow management and ops support
- Integration of Airline ops system and Airborne capabilities with ATM ground system
- Integrated planning process to harmonise the ATM system with airborne and airline capabilities

**MET**
- Automatic Current and forecast Wx
- Windshear warnings
- Online data interface with automated ATM system and airline ops control
Optimisation of Terminal Approach control airspace
Application of reduced separation
Capacity enhancement
Enhanced Safety and Operational efficiency

Key enablers
- Radar/ADS-B /multilateration system – multiple overlapping sensors for backup,
- Network interface supporting voice and data
- Communication : VHF, Datalink
- Standard Departure and Arrival routes, Flexible use of airspace, conditional routes
- PBN based procedures : RNP / GBAS based approach / landing procedures at all major airports to provide a back-up
- Flow control tools - Arrival Manager
- ATM Automation interface with ACCs and Tower and MET system
Area / Enroute Control

- Reorganisation of enroute airspace structure
  - Multiple sectors, dynamic Consolidation/Deconsolidation
  - Flexible use of airspace, Upper area harmonisation
  - Integration of Airborne and Ground system capabilities
  - Radar / ADS-B/Multilateration based surveillance – Departure to Destination;
  - Entry to Exit
    - ATC procedures – PBN, RNAV/RNP
    - Reduced separation minima
    - Flexible routings, Helicopter procedures
    - Datalink applications AIDC, CPDLC (Mode-S, VDL-2, FANS-1A)
    - ATFM
Area / Enroute Control

- **Key Enablers**

  - **CNS Infrastructure**:
    - Seamless, overlapping (Radar, ADS-B, Multilateration) Surveillance and VHF cover
    - Controller –Pilot Datalink (FANS-1, VDL-2, Mode –S), AIDC
    - PBN based RNAV/RNP routes, GAGAN (SBAS) based procedures

  - **ATM Automation**: Data processing system, Controller tools, Safety alerts, Flow management tools, System interface with APP, Towers, MET system, ATFM

  - **Amalgamation of existing 11 ACCs into 4 ACCs initially and ultimately into 2 ACCs** with Seamless ATC procedures and Separation
VHF(voice) – air-ground: at all operational airports

VHF -RCAG at 18 sites

CPDLC (FANS-1A) – at Mumbai, Kolkata, Chennai, Delhi

HF-RT(voice) - Delhi, Mumbai, Kolkata and Chennai FIRs

DATIS(voice) : 29

ATS Message Handling System (AMHS) at Mumbai to handle ground –ground global network of Aeronautical Telecommunication Network (ATN)

- Transition from Voice Communication to Data Communication. (Air-Ground, DATIS, AIDC, Clearance Delivery)
- Aeronautical Mobile Satellite system (AMSS). Implementation of Air-Ground network of ATN for voice communication
- voice to be retained as a back-up when complete data communication is used.

Future/Transition

DSCN-Dedicated Satellite Comm.Network Impl. in phases from Dec 2008

5 more VHF- RCAGs- PDC/ Dec 2009

16 more DATIS – Datalink and Networking of DATIS PDC/Dec 2009-Mar 2010
ILS: 54 at 44 airports

DVOR: 86

DME: 88

NDB: 55 (being phased out)

PBN: Delhi, Mumbai, Ahmedabad

13 at 13 airports (10 as new facility)

PDC: Dec 09

8 DVOR as new facility. PDC: Dec 09

8 DME as new Facility. PDC: Dec 09

Satellite based Navigation:

GBAS: PDC - Dec 10

GAGAN: PDC – June 2013

- Satellite based navigation system complimented with Flight Management Systems. (GNSS, PBN - RNAV/RNP)

- The ground based navigation equipments like NDB, VOR/DME and ILS to be retained as a back-up for some time before being phased out.

- GAGAN (GPS aided Geo augmented Navigation) to play an extremely important part in the future navigation systems.
- Radars would continue to be primary surveillance equipment in high density traffic and terminal approach areas.

- The upcoming technologies in surveillance - ADS-B and wide area multilateration would be used in combination to provide extended surveillance.
Integrated Automation system with Data processing system, controller tools, Safety alerts etc available at 4 centres Mumbai, Delhi, Bangalore & Hyderabad.

Limited level of Automation (RDPS&FDPS only) available at 8 other centres

Integrated Automation system for Chennai & Kolkata: PDC: Mar 10
other 6 centres: PDC: Dec 09

Tower Automation system – 32 towers
PDC: Dec 10

Central ATFM system PDC: Dec 11

- Networking of radars and ATM systems / facilities
- Amalgamation of 11 ACC centres into 4 centres initially and subsequently 2 centres
- Integration of Ground based ATM /MET system and Airborne avionics and airline ground system
- All core functions and the support systems of ATM would be networked and configured as System Wide Information Management (SWIM)
Central Air Traffic Flow Management system

Airports

Central ATF M

Constraints

AIS/MET/Wx DATA

Airspace Data

Air Traffic Control

Aircraft Operators

FPL/RPL

Slots

Re-routing

FPL/Track data

Slots
CONCLUSION

- The objective of FIANS (Future Indian Air Navigation System)
  - Safe, efficient, cost effective and environmental friendly Air traffic management to meet user expectations
- Strategy to Achieve
  - Working together: Airport operator, Airline operators, Airspace users and ATS providers, Industry partners, Technology solution providers.
- Strategic Approach
  - Collaborative and co-ordinated Global approach to ensure harmonisation and adoption of the technological solutions that would be cost effective and uniform for application.