DISHA -2013
NOV 25-26 2013

CNS- P Initiatives, Communication, Navigation and Surveillance Infrastructure
Developing Tomorrows Aviation system

• Air Traffic growth expands two folds every fifteen years.
• Growth can be double edged sword
• Challenge is how to achieve both safety and operational improvements
  – Globally harmonized
  – Environmentally responsible
  – Cost effective
Developing Tomorrows Aviation system

• Investment certainty is required for
  – Operators
  – Infrastructure providers
  – Equipment manufacturers

• Regulatory processes must be outlined
ICAO has introduced an updated Global Air Navigation Plan (GANP) in the Air Navigation Conference 2012. The GANP describes a rolling 15 year incremental technology up-gradation methodology called as Aviation System Block Upgrades (ASBU). The GANP has been endorsed at the recently held ICAO 38th Assembly.
The Global Air Navigation Plan is an Implementation Framework that...

- Provides consistent information for performance measurement
- Produces the baseline for measurable achievements and implementation of the ICAO ATM Operational Concept
- Automates & integrates Business Plan processes
- Shares common data & processes
The ASBU methodology describes “Modules” achieving well defined and articulated concepts in measurable time frames of Blocks. The Block Upgrades are organized in five-year time increments starting in 2013 and continuing through 2028 and beyond.
ASBU

The implementation process driven by the ASBU module elements will enable all States and stakeholders to realize the goals of global-harmonization, increased capacity, and environmental efficiency in a unified manner. Independent of when and where specific ATM improvement programs are introduced
India is in the process of updating the national Air Navigation Plan in line with the ASBU role out keeping in mind the ICAO strategic objectives of safety, capacity, efficiency and environmental considerations. India is pursuing an aggressive implementation of Block Zero Modules with emphasis on the critical Block-0 elements, to ensure regional and global seamless Air Navigation Services over a crucial airspace connecting three ICAO regions.
ASBUs & Performance Improvements

- ASBUs address 4 key Performance Improvement Areas (PIA):
  - Greener Airports;
  - Globally Interoperable Systems and Data;
  - Optimum Capacity and Flexible Flights;
  - Efficient Flight Path
ASBU – Key PIA

The Four Performance Improvement Areas

- Greener Airports
- Optimum capacity and Flexible Flights
- Efficient flight path
- Globally Interoperable systems

The BLOCKS

- Block 0
- Block 1-2018
- Block 2-2023
- Block 3-2028 +
Improvement Areas, Blocks & Modules

- **Greener Airports**
- **Globally Interoperable Systems and Data**
- **Optimum Capacity and Flexible Flights**
- **Efficient Flight Plan**

**Block 0 (2013)**

**Block 1 (2018)**

**Block 2 (2023)**

**Block 3 (2028 & >)**
Improvements for Phases of Flight

Example: Block 0
CNS Architecture

→ Today
✓ Many CNS Technologies
✓ Many standards
✓ Regional solutions
✓ Regional service variations
Performance Based Air Navigation System
• Integrated CNS
• Global utility
• Global standard
• Uniform levels of service

Today
• Plethora of Disjoint CNS Technologies
• Regional solutions
• Many standards
• Regional service variations

CNS Elements Transition

Synergistic Services

Lower Total Cost to Provide Services

Inherent Redundancy
Key Driver: Co-operation, Collaboration and Co-ordination (Regulators, ANSPs & Airlines)

Common Regulations
- ICAO KPAs & GPIs
- CASAC

Human
- Timely recruitment, training and deployment
- Periodic Skill upgradation
- Technology based skills
- Language proficiency skills

Indian ATM Improvement Strategy

Technology
- Adoption of new Technology
- Integration of Ground and Air segments

ATM Infra
- ATS routes, Upper airspace harmonization
- Civil-Military co-ordination
- COM, NAV, SURV & Automation infras, AIS/AIM
- ATFM, Networked Information Mgmt & Exchange

Procedures
- Performance based applications
- Sharing of expertise and skills
Roadmap to Safety, Efficiency and Capacity Enhancements

Present ATM System
- Voice communication
- Ground based Navigation
- Limited radar Surveillance
- Non-optimum Airspace Structure
- AIS
- ATC

Future ATM System
- Data communication for routine communication
- Satellite based Navigation
- Complete Surveillance Sensors coverage
- Airspace Harmonization
- AIM
- ATM
ANS strategic Plan

Guiding Principles – The Air Navigation Services shall be guided by the following principles

• Enhanced safety
• Increased system capacity
• Optimised use of airport capacity
• Reduced delays
• Reduced flight operating costs
• Reduced fuel consumption and emissions
ANS strategic Plan

• More efficient use of airspace; more flexibility; reduced separations
• More dynamic flight planning; better accommodation of optimum flight profiles
• Reduced controller workload/increased productivity
ANS strategic Plan

- The primary objective of Air Traffic Management would be to develop an ATM system that ensure optimum safety to the aviation industry and provide the airspace users the desired level of operational efficiency to achieve cost effective operations through Gate-to-Gate operational strategy of airlines to ensure Safe, Efficient and cost effective operations, minimise delays and enhance capacity.
ANS strategic Plan

The strategy would consist of the following components –

• Increased utilisation of existing capacity
• Implementation of GAGAN
• Move towards a 4 centre concept for airspace control
ANS strategic Plan

Implementation Requirements

• Identification of potential conflicts and application of solutions for conflict management and enhance safety.

• ATM system to support user preferred trajectories to save flying time and fuel, enhancing capacity.
ANS strategic Plan

• Central Air-traffic Flow Management Unit to be established to optimize airspace / airport capacity with demand.
• Implementation of Performance Based Navigation (PBN) based procedures for Approach and Landing at all airports.
ANS strategic Plan

- Reduction of separation standards for capacity enhancement.
- Measures to control / minimize the impact due to aviation emission and noise on environment.
- CNS/ATM infrastructure to be developed
ANS strategic Plan

- Covering high density areas by multiple radar
- ADS-B / Multi-latration to supplement enroute MSSRs for any other areas.
ANS strategic Plan

Challenges and Constraints to be addressed

- Need to create consensus with multiple stakeholders for the effective deployment of a flexible air space management system
- Shortage of trained officers
- Aviation Meteorology operates as a separate department; leading to several coordination issues
- Significant changes required to existing technology
CNS-P Dte

• CNS-Planning directorate has the responsibility of creating and modernizing Air Navigation Services infrastructure to support safe Air Navigation in Indian Airspace.

• The department is also involved in planning, procurement and implementation of various elements of the satellite based CNS/ATM systems.

• This directorate is responsible for introduction of new systems and equipments in the field of CNS, ATC Automation, Training Simulators, Test Equipment’s and security equipment’s.
CNS-P Dte

- Installation, testing of above mentioned equipment’s and handing over of these equipment’s for commissioning after flight calibration wherever required.
- Co ordinate with DGCA for obtaining concurrence for commissioning of various CNS facilities and implement CAR prescribed by DGCA.
- Implement safety standards and procedures as prescribed by Aviation Safety directorate.
The department has a dedicated team of officers who are constantly probing into the new areas of development in the field of Communication, Navigation and Surveillance, new standards being laid down by the ICAO for implementation and new systems introduced in other countries to make Air Navigation Services safer and more efficient.
CNS-P Projects

• In order to meet the above objectives, CNS-P Dte has taken up a number of CNS/ATM projects/initiatives for enhancement/up gradation of Infrastructure & Air Navigation services for improving supply, efficiency and capacity of Airports/Airspaces by:

• Executing projects under R F D (Results-Framework Document) for Ministry of Civil Aviation (2012-2013)

• Executing Current Projects for Enhancements

• Planning for future Projects as per Corporate Plans.
### Results-Framework Document 2012-13 for MoCA-Project status

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>1</td>
<td>S/I/T/C of Monopulse Secondary Surveillance Radar (MSSR) at Chennai, Bellary, Vizag, Kolkata(Badu), Bhopal, Porbandar, Jharsuguda, Katihar and Udaipur.</td>
<td>Installed at all sites</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Installation of Non Radar, Procedural, Air Traffic Control Simulator at Civil Aviation Training College Allahabad and Gondia</td>
<td>Installation complete</td>
<td></td>
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<tr>
<td>3</td>
<td>S/I/T/C OF ASR/MSSR (i)Replacement at Trivandrum and Ahmedabad (ii)Backup at Delhi &amp; Mumbai (iii)Separate ASR and MSSR at Chennai, Kolkata (iv) New additions at Amritsar &amp; Cochin - All for improving surveillance capability and operational efficiency leading to decongestion of air space and minimising delays to aircrafts.</td>
<td>Installation under progress</td>
<td></td>
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<tr>
<td></td>
<td>Documentation for certification of GAGAN (GPS Aided Geo Augmented Navigation System)</td>
<td>Certification process in progress by DGCA</td>
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<td>4</td>
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<tr>
<td>5</td>
<td>Installation of ATS data link network at 06 out of 14 civil international airports for improved operational efficiency for exchange of operational clearances between pilots &amp; air traffic controller..</td>
<td>SAT completed at all the sites.</td>
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<tr>
<td>6</td>
<td>Radar Integration, complete Very High Frequency (VHF) coverage &amp; implementation of integrated air traffic services automation system in Delhi &amp; Mumbai FIR in order to improve operational efficiency in terms of fuel/time/flying distance.</td>
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<td></td>
<td>Description</td>
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<tr>
<td>6</td>
<td>Radar Integration, complete Very High Frequency (VHF) coverage &amp; implementation of integrated air traffic services automation system in Delhi &amp; Mumbai FIR in order to improve operational efficiency in terms of fuel/time/flying distance.</td>
<td>under progress</td>
<td></td>
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<tr>
<td>7</td>
<td>Radar Integration, complete Very High Frequency (VHF) coverage &amp; implementation of integrated Air Traffic Services automation system and restructuring of Upper Air space in Kolkata in order to improve operational efficiency in terms of fuel/time/flying distance.</td>
<td>Under progress</td>
<td></td>
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<tr>
<td>8</td>
<td>Implementation of Performance based navigation based RNAV 5 route pairs between Delhi &amp; Mumbai, Delhi &amp; Kolkata, Delhi &amp; Ahmadabad, Kolkata &amp; Chennai, Chennai &amp; Mumbai, Bangalore &amp; Delhi, Chennai &amp; BIAL and Chennai &amp; HIAL airports for improving safety, efficiency and capacity of air space</td>
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<tr>
<td>9</td>
<td>Implementation of Performance based navigation RNAV-1 procedures for Guwahati, Mangalore and Nagpur airports for improving safety, efficiency and capacity of air space</td>
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</table>
# Results-Framework Document 2012-13 for MoCA

<table>
<thead>
<tr>
<th></th>
<th>Implementation of RNP approaches at HIAL, BIAL &amp; Ahmadabad</th>
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<thead>
<tr>
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<th>Implementation of Central Air Traffic Flow Management</th>
<th>Under progress</th>
<th>PDC: Two years</th>
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<thead>
<tr>
<th></th>
<th>Implementation of ADS-B at 14 Airports</th>
<th>Certification process in progress by DGCA</th>
<th>PDC: 3 months</th>
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<tr>
<td>12</td>
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<tr>
<td>No.</td>
<td>Project Description</td>
<td>Status</td>
<td>PDC Duration</td>
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<td>13</td>
<td>Implementation of Ground Based Augmentation system (GBAS) thru USACP programme</td>
<td>FAT Completed.</td>
<td>PDC ONE Year</td>
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<tr>
<td>14</td>
<td>CNS-ATM trans-installation at New Control Tower Mumbai (under construction by MIAL)</td>
<td>Installation Completed</td>
<td>PDC: Two months</td>
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<tr>
<td>15</td>
<td>Installation of New CNS-ATM facilities at IGI Airport, New Delhi for the New Control Tower and Technical Block under construction by DIAL</td>
<td>Under progress</td>
<td>PDC: Two years</td>
</tr>
</tbody>
</table>
# Results-Framework Document 2012-13 for MoCA

<table>
<thead>
<tr>
<th></th>
<th>Implementation Details</th>
<th>Status</th>
<th>PDC Duration</th>
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<tbody>
<tr>
<td>16</td>
<td>Implementation of Automatic Message Handling System (AMHS) at Delhi, Chennai, Kolkata airports</td>
<td>Under progress</td>
<td>PDC Two years</td>
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<tr>
<td>17</td>
<td>Implementation of advanced surface movement guidance and control system (ASMGCS) at Amritsar, Lucknow, Jaipur, Ahmedabad and Guwahati airports for enhancing surveillance, safety, efficiency and capacity of ground operations.</td>
<td>Procurement under process</td>
<td>PDC One year</td>
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<tr>
<td>18</td>
<td>Implementation of 3 NM Radar Separation within Approach jurisdiction of BIAL, HIAL Airports</td>
<td>under progress</td>
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## Current Projects

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<tr>
<td>1</td>
<td>IATS (04 No.)</td>
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<tr>
<td>2</td>
<td>(upgradation of Delhi &amp; Mumbai AT3 systems): Following Radars to be integrated. Delhi: Amritsar, Bhopal, Jaipur, Varanasi, Udaipur, Lucknow, Delhi Mumbai: Mumbai, Porbandar, Jaipur, Varanasi, Udaipur, Lucknow,</td>
<td>Under Progress</td>
<td>PDC: Three Months</td>
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# Current Projects

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<thead>
<tr>
<th></th>
<th>ADS - B (7 No.):</th>
<th>Installation completed</th>
<th>DGCA Certification In Process</th>
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<tr>
<td>3</td>
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<tr>
<td></td>
<td>ASR / MSSR (06 )</td>
<td>Procurement in progress</td>
<td>PDC Two years</td>
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<td>4</td>
<td></td>
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<td></td>
<td>A – SMGCS(UPGRADATION) Delhi</td>
<td>In progress</td>
<td>PDC one Year</td>
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<tr>
<td>6</td>
<td>VHF Tx / Rx (427 No.):</td>
<td>Procurement in progress</td>
<td>PDC One year</td>
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<tr>
<td>7</td>
<td>DVTR (41 No.):</td>
<td>Completed</td>
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<tr>
<td>8</td>
<td>VCCS (Delhi &amp; Kolkata):</td>
<td>Procurement in progress</td>
<td>PDC : One Year</td>
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</tbody>
</table>
## Current Projects

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<thead>
<tr>
<th></th>
<th>Project Description</th>
<th>Status</th>
<th>Duration</th>
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<tbody>
<tr>
<td>9</td>
<td>Frangible Shelters (12 No.):</td>
<td>COMPLETED</td>
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<tr>
<td>10</td>
<td>ILS (04 No.):</td>
<td>Procurement in progress</td>
<td>PDC One Year</td>
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<td></td>
<td>DME – LP (04 No.):</td>
<td>Procurement in progress</td>
<td>PDC One Year</td>
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<tr>
<td>11</td>
<td>DVOR (14 No.):</td>
<td>Procurement in progress</td>
<td>PDC One Year</td>
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</table>
## Current Projects

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<tr>
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<th>Current Projects</th>
<th>Procurement under progress</th>
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## AAI Future Plans

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Planning stage</th>
<th>PDC Two Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The MODE-S DATA Link will permit pilot and air traffic controller access benefits, to the database at the ground and in the aircraft respectively. This will be initially used for high-density aircraft routes.</td>
<td>Planning stage</td>
<td>PDC Two Year</td>
</tr>
<tr>
<td>2</td>
<td>MODE-S data communication would also be available on high density routes at an incremental cost to MODE-S surveillance facility being provided on MSSRs by AAI.</td>
<td>Planning stage</td>
<td>PDC Two Year</td>
</tr>
</tbody>
</table>
## AAI Future Plans

<table>
<thead>
<tr>
<th></th>
<th>Integration of the air-ground segment to the ATN including aircraft avionics would take some more time and the developments in this area are to be closely monitored by AAI.</th>
<th>Planning stage</th>
<th>PDC THREE Year</th>
</tr>
</thead>
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<tr>
<td>3</td>
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<tr>
<td>4</td>
<td>There will be progressive introduction of Area Navigation (RNAV) capability in compliance with the Required Navigation with the Required Navigation Performance (RNP) criteria.</td>
<td>Planning stage</td>
<td>PDC Three Years</td>
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</tr>
</tbody>
</table>
# AAI Future Plans

<table>
<thead>
<tr>
<th></th>
<th>Development of HF data link and its standardization by ICAO has opened up avenues for its use as the primary means of Communication between ground stations and aircraft in the oceanic air space.</th>
<th>Planning Stage</th>
<th>PDC Three years</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Implementation of VHF Data link with automated ATC Supporting Controller Pilot Data Link Communication (CPDLC) will be the primary means of air-ground communication</td>
<td>Planning Stage</td>
<td>PDC Three years</td>
</tr>
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<td>6</td>
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</table>
## AAI Future Plans

<table>
<thead>
<tr>
<th>7</th>
<th>Implementation of a national network of VHF data link ground stations meeting the requirements of the ICAO standards for the VHF Digital link (VDL) Mode-2.</th>
<th>Planning Stage</th>
<th>PDC FIVE YEARS</th>
</tr>
</thead>
</table>

**AERONAUTICAL TELECOMMUNICATION NETWORK (ATN)**

ATN would provide for interchange of digital data between a wide variety of end systems, applications and end users. 

| 8 | Planning stage | PDC FIVE YEARS |
CNS-P Major initiatives

GAGAN- GPS Aided Geo Augmentation Navigation

• GAGAN has entered The Final Operations Phase

• The first milestone is to deliver an RNP 0.1 capability provided over the Indian FIR as specified in the ICAO specification.

• The second milestone is to deliver APV1 service as specified in the ICAO specification over 90% of the Indian land mass.

• The certified GAGAN system will be available by ------
GAGAN- Indian SBAS
Benefits of GAGAN

GAGAN Foot Print

Gains

• GAGAN is being developed to meet the ICAO GNSS SARPs and it will be interoperable with WAAS, EGNOS, and MSAS.
• GAGAN SBAS will be a significant addition to navigation capabilities in the entire South-East ASIA
• Will lead to greater Regional cooperation (interoperability, increased service areas)
Central -ATFM

- Demand and Capacity balancing through CDM to enhance the traffic flow at six major airports
- 1st phase of C-ATFM will be completed in 2014
- Strategic, Pre-Tactical and Tactical ATFM and CDM capabilities at six major airports in phase 1.
- Subsequently ATFM will be extended to other airports
- In Phase 2 regional ATFM integration with the Indian C-ATFM envisaged
THANK YOU