



AIR SPACE AND AIR TRAFFIC MANAGEMENT

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OBJECTIVES OF AIR TRAFFIC SERVICES

The objectives of the air traffic services are:

- prevent collisions between aircraft;
- prevent collisions between aircraft on the manoeuvring area and obstructions on that area;
- expedite and maintain an orderly flow of air traffic;
- provide advice and information useful for the safe and efficient conduct of flights;
- notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.



CAPACITY, THROUGHPUT, EFFICIENCY

- System capacity is used to denote the theoretical maximum flow rate supported by the separation standard.
- Throughput is the rate of flow that is realized in operation, which is never more than the system capacity, and often considerably less due to the need to accommodate operational uncertainty and disturbances without compromising safety.
- Efficiency is a measure of how close the real operation is to achieving ideal flight, which is influenced partly by the balance between capacity and demand, and partly by airspace restrictions such as special use airspace.



SOME TERMINOLOGIES

AIRPORT DESIGN

- Runway(S)
- Taxiway(S)
- APRONS
- NAV AIDS
- ANCILLARY INSTALLATIONS



VARIABLES IN FLOW PLANNING

- Weather
- GHS
- Equipment Status



NATIONAL FLOW MANAGEMENT

- Planning for Operator Efficiency and Overload Protection
- Time Horizons and Coordination
- Information Flow
- Collaborative Decision Making by Agents:
 - Airlines/dispatch
 - AOC/ Local despatch
 - Pilot



AIR TRAFFIC MANAGEMENT: CONFLICT SITUATION

- Sector Controller
- Pilot
- Equipment
 - On board
 - On ground



COLLABORATIVE DECISION MAKING IN FLOW MGT

- Users manage response to delay, after an overall delay allocation from central flow. This involves the user allocating arrival/departure time to individual aircraft in their fleet, or opting to re-route around congestion areas.
- Central flow management will continue to act as an arbitrator to allocate resources fairly, and to help users expedite their flight planning.



FLOW MANAGEMENT

- Human Factors in Airspace and Airways
 - Human Factors Support For Implementation, Education, And Training
 - Designing To Support Human Performance Across The Entire Range Of System Operating Conditions
 - Human Factors Issues Affecting Tactical Control
 - Using Structure To Maximize Throughput
 - Sharing Responsibility



DECISION SUPPORT SYSTEMS

- Over reliance on Tech
- Situational Awareness
- Function of Time and Confidence
- New entrants more dependent
- Unaware of outcome without that support



USE OF STRUCTURES TO MAXIMISE THROUGHPUT

- The structure can be predetermined and accessible to the pilots for planning; e.g., Airways, SID's, STAR's, or
- It can be predetermined but not available to the pilots; e.g., letters of agreement between air traffic control facilities on the use of flight levels or routes, or
- It can consist of predetermined actions based on group or individual experience and not published anywhere, and can be as extreme as stopping all departures from a particular airport if a sector becomes dangerously overloaded.



SHARING RESPONSIBILITY

- Between Controller and Pilot: VMC
- Between different ATS Units
- Conflict Resolution in Low Traffic



TECHNOLOGY

- **Available and Emerging Technology**
 - System Performance: Reduced Sep Min
 - Air Navigation: Differs in each stage(RNP, ANP)
 - Communication Systems: Function of Controller Pilot Com Needs(RCP, ICP and ACP)
 - Surveillance Systems and Performance



COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

➤ Meaning and Background

- Historical Development
- Shortcomings of the Earlier System



COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

➤ **CNS Systems: An Overview**

- Objectives
- Brief Look at the Existing System
- Benefits of the New System
- Organizational and Financial Issues
- Assistance Requirements and Technical Cooperation



COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

- **ICAO's Planning Structure for the CNS/ATM System**
 - Regional Planning Process
 - National Planning Process
 - CNS/ATM Partners and Tools
 - Relevant ICAO Policies on CNS/ATM
 - ICAO's Role and Responsibility



COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

➤ Global Planning Methodology

- Homogeneous ATM Areas and Major Traffic Flows
- Planning Methodology
- Operational Analysis



COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

➤ Communication Systems

- Air-Ground Communication
- Ground-Ground Communication
- Aeronautical Telecommunication Network (ATN)
- Future Trends
- Required Communication Performance (RCP)
- General Transition Issues



COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

➤ Navigation Systems

- Required Navigation Performance (RNP)
- Global Navigation Satellite System (GNSS)
- Avionics
- WGS-84 Coordinate System And Aeronautical Databases
- Evolutionary Simulation to understand complexity
- Systems To Support Approach, Landing And Departure Operations
- General Transition Issues



COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

➤ Surveillance Systems

- Current Surveillance Systems
- Functional Description
- Technical Options Overview
- ATM Requirements For Surveillance
- Airborne Collision Avoidance System (ACAS)
- Required Surveillance Performance (RSP)
- Future Trends
- General Transition Issues



COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

➤ Meteorology

- Meteorological Support To International Civil Aviation
- Meteorological Systems To Support Global CNS/ATM
- Meteorological Systems To Support The Transition To The New Global CNS/ATM Systems
- Planning And Implementation Of Meteorological Systems



COMMUNICATIONS, NAVIGATION, SURVEILLANCE/ AIR TRAFFIC MANAGEMENT (CNS/ATM)

➤ **Aeronautical Information Services**

- AIS and Map Support To International Civil Aviation
- AIS and Map Services To Support Global CNS/ATM Systems
- AIS/Map Systems & New Global CNS/ATM Systems



ICAO AND AIR SPACE AND AIR TRAFFIC MANAGEMENT

- **ICAO Institutional and Regulatory Framework**
 - Institutional Framework
 - Article 3 of the Convention
 - Assembly Resolutions
 - Existing Regulatory Framework



ICAO AND AIR SPACE AND AIR TRAFFIC MANAGEMENT

➤ Civil and Military Inter-operability

- Introduction
- Regulation And Standardization
- Operational And Technical Interoperability
- Strategic and/or Political Interoperability



ICAO AND AIR SPACE AND AIR TRAFFIC MANAGEMENT

- **Air Space Organization and Management**
 - General Principles
 - The Flexible Use of Airspace Concept
 - FUA Principles
 - Flexible and Adaptable Airspace Structures and Procedures



ICAO AND AIR SPACE AND AIR TRAFFIC MANAGEMENT

- **ATM Security and ATM in crisis situation**
 - ATM Security
 - ATM In Crisis Situation



ICAO AND AIR SPACE AND AIR TRAFFIC MANAGEMENT

- Civil/Military Collaboration — A New Global Challenge
- Legal Issues Concerning Communication/Navigation and Surveillance Systems
 - Introduction
 - Fundamental Principles Of The GNSS Legal Framework
 - Other Legal Issues



AIR TRAFFIC MANAGEMENT IN INDIA

- Introduction and Historical Evolution
 - An Overview of Air Transport Management in India
 - Airport as Growth Engine
 - Airport as Revenue Generator
 - Identified Challenges
 - Compacting Strategies



AIR TRAFFIC MANAGEMENT IN INDIA

- Institutional and Organizational Framework to regulate Air Space and Air Traffic Management in India
 - Directorate General Of Civil Aviation
 - Stakeholders Involved In Air Space And Air Traffic Management In India
 - Role Of Airports Authority Of India In Air Space And Air Traffic Management



SPACE AND AIR TRAFFIC MANAGEMENT IN INDIA

➤ Role of Air Traffic Controllers in India

- Meaning Of Air Traffic Control
- Roles And Responsibilities Of Air Traffic Controllers
- Categories of Air Traffic Controllers



SPACE AND AIR TRAFFIC MANAGEMENT IN INDIA

➤ The Future of Air Space and Air Traffic Management in India

- Introduction
- Satellite-Based Navigation System Is The Flagship Project
- Flexible Use Of India's Airspace Will Deliver Significant Efficiencies
- A National High Level Airspace Policy Board
- Air Traffic Controllers Employed By Region
- Growth Challenges Call For A New Governance Structure For The ANSP



Feel free to share your query/ suggestion
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Thank You