CNS / ATM

- Introduction to CNS / Atm:

*** Back Ground.**

*** Short Comings of Conventional Systems.**

*** Current Navigation Capability.**

*** A Brief Look at CNS / Atm.**

*** Global Planning and Regional Planning Process.**

*** ICAO Policies on CNS / Atm.**

- Cns System -- Communication:

*** Introduction.**

*** Telecommunications in ATC.**

*** Essential tools for controller**

- **Radar display**
- **Radio**
- **Telephone**

*** AIR – Ground Communication:**

*** ATC Communications**

*** Operational Requirements**

*** HF – Voice Communication**

*** VHF – Voice Communication**

*** UHF – Voice Communication**

*** Satellite Voice Communication**

*** Data Communication to Replace Voice Communication.**

*** Ground / Ground Voice Communications:**

*** Types of links (Radio, Telephone)**

*** Availability**

*** Signaling.**

*** Ground / Ground Data Communications**

*** Used for many purpose.**

*** Flight data transmission**

*** AFTN, OLDI.**

*** ATFM.**

*** AIS.**

*** Communication emerging Technologies:**

*** Data – Link needed by ATC.**

*** Data – Link needed by Airlines.**

*** ICAO initiative for Telecommunications**

*** The Connected mode.**

*** A cars Data – Link.**

*** AMSS**

*** VHF Digital link (VDL Mode 2)**

*** Mode – S (secondary surveillance Radar)**

*** Mode – S Data Link**

*** Other Air – Ground data Links.**

- Cns System – Navigation:

*** Aeronautical Navigation Overview.**

*** ICAO & Aeronautical Organization**

*** Navigation Overview**

*** Navigation Parameters**

*** Navigation Systems.**

*** Airspaces**

*** Phases of Fly.**

*** En – Route Requirements**

*** RNP.**

*** ICAO Requirements Approach & landing.**

*** Conventional Ground Based NAV. Systems.**

*** En – Route:**

*** OMEGA.** *** LORAN - C.**

*** VOR.** *** NDB.**

*** DME.** *** ILS.**

*** MLS.**

*** Technical Overview of Systems.**

*** GNSS:**

*** The GNSS Concept.**

*** Operational Requirements for Navigation**

*** GPS – How it works?**

*** Satellite Ranging**

*** Measuring Distance from a satellite**

*** Perfect timing**

*** Effects of Atmosphere and Ionosphere.**

*** Differential GPS.**

*** GPS Benefits.**

*** Status of GLONASS**

*** SBAS**

*** GBAS**

*** New GNSS elements and future trends.**

*** EGNOS architecture**

*** EGNOS Planning**

*** GALILEO – Services**

*** GALILEO – Planning**

*** G. R. A. S.**

*** A/C multi – mode Receiver.**

*** WAAS**

*** LAAS**

*** On Board Increments (RAIM, AAIM Function)**

*** Users Receivers**

*** RVSM.**

3- RNP Criteria:

*** Defining RNP Air Space.**

*** Applying RNP in an Air Space.**

*** Relation of R N P to Separation Minima.**

*** Rnp Types : (1, 4 , 12 . 6 , 20) .**

*** Air Space Requirements.**

*** RNP Route:**

*** Fixed R N P Route.**

*** Contingency R N P Route.**

*** Random R N P Route.**

*** RNP Co - Ordinate System.**

*** Atc Procedures in R N P Air Space:**

*** Normal Procedures.**

*** Special Procedures.**

*** Procedures for Transit between Different Types of R N P Air Space.**

*** Rnp Concept for Approach, Landing and Departure Operations.**

*** RNP Operations:**

*** Atc for RNP Air Space.**

*** Atc For Parallel Offset.**

*** Flight Plan Requirement.**

*** Procedures in Event of Equipment Failure.**