NEXTGEN – Overview

Flightcrew responsibilities: **Aviate**, then **Navigate**, then **Separate** (also known as communicate)

- **Aviate**: fly the airplane (i.e. keep wings level, speed within operating envelope, adjust thrust/pitch/heading/trim, ...) using aircraft systems (e.g. autopilot)
- **Navigate**: coordinate aircraft trajectory in 4-D space over course of earth from origin to destination via published airways and procedures using navigation equipment (on-board (INS, FMS), ground-based (VOR, DME, ILS), space-based (GPS)).
- **Separate**: maintain required separation from other traffic and terrain/obstacles using TCAS, ADS-B/CDTI

Air Traffic Control/Traffic Flow Management responsibilities:
**Communication/Navigation/Surveillance**

- **Surveillance**: track traffic using “radar”
- **Navigation**: flow traffic using airways and procedures (built using ground-based and space-based navigation aids)
- **Communication**: really Separation (communicate with flightcrews to keep traffic separated)

NEXTGEN: There are three ways to increase Airport and Airspace Capacity:

1. Build more runways and make more airspace available
2. Use existing runways and airspace more effectively
   a. Reduce safe distance between aircraft following each other on same track (e.g. airways, approach, departures, ...)
      i. Required Navigation Precision (RNP) - more accurate position estimation
      ii. Automatic-Dependent Surveillance – Broadcast (ADS-B) – provide ATC RNP accurate position information
      iii. Cockpit Display of Traffic (CDTI)
      iv. Digital data communications
   b. Reduce safe distance between aircraft on parallel tracks, crossing tracks
      i. Required Navigation Precision (RNP) - more accurate position estimation
      ii. Automatic-Dependent Surveillance – Broadcast (ADS-B) – provide ATC RNP accurate position information
      iii. Digital data communications
   c. Coordinate flow to eliminate un-used slots (Spacing and Merging, Super-dense Operations)
      i. Digital-Data-communications
ii. 4-D Trajectories

NEXTGEN CHALLENGES:

- Equipage – need majority of aircraft to equip to obtain benefits
  - Best equipped/Best Served vs Equal Access (i.e. first-come/first served)
- Relationship between Enabling Technologies and Concepts-of-Operations
- Sequence of introduction?
  - What order Con-ops (enabling technologies)
- Who should pay for it?
  - If airlines equip on their own, when will service be provided?