

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?
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