Brief Introduction To LDACS
- The Motivation for LDACS

LDACS Webinar 1
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Briefing Outline:

- The motivation for LDACS
  - Why do we need it and why is it the solution

- Brief Description of LDACS
  - Basic and extended functionality
Motivation
Why do we need LDACS?

From Voice to Data ... to Internet and SWIM

DSB-AM: Analog Voice

VDL Mode 2: Kind of SMS

LDACS: Full Connectivity

Migration towards Broadband Data Link
Motivation

Why do we need LDACS?

- **ATM modernization** and paradigm change
  - Trajectory-based operations
  - From voice to data, aircraft integration into SWIM (full connectivity)
    - \textit{SWIM = XML-based communications}
    - \textit{Graphics to the cockpit will be a reality.}
    \rightarrow Demand for **broadband data link** technology

- **Air-traffic increase** and scarce frequency spectrum
  - From analog voice to digital data link technology
  - Future proof, scalable data link technology to avoid shortcomings
  \rightarrow Demand for **spectrum-efficient broadband data link** technology
Motivation

Why do we need LDACS?

- **Security issues**
  - More automation, less human-in-the-loop: higher demand for security
  - Security creates an additional data burden
  → Demand for broadband data link technology

- **Future Communications Infrastructure (FCI)**
  - Several data links required to cover all airspaces and operations
  → LDACS is main component of FCI

- *In addition, LDACS is multi-functional!*
Motivation
The Future Communications Infrastructure

LDACS is main component of FCI
Brief Description of LDACS

What is LDACS?

- L-band Digital Aeronautical Communications System (LDACS) is the future data link for terrestrial-based aeronautical communications

- LDACS is a broadband system based on Orthogonal Frequency-Division Multiplexing (OFDM) like current/future mobile radio standards

- LDACS applies state-of-the-art, highly efficient transmission concepts like
  - Advanced coding and adaptive coding and modulation
  - Advanced receiver design for interference robustness
Brief Description of LDACS
What is LDACS?

- LDACS foresees quality-of-service
  - Fast access to resources and low delays for application
  - Prioritization of applications

- LDACS is based on Frequency Division Duplex (FDD)
  - Forward link (ground to aircraft) and reverse link (aircraft to ground) use different frequency bands
Brief Description of LDACS

What is LDACS?

- **LDACS** uses a **cellular** structure with **centralized communication** via a ground station (GS)
  - Bandwidth can be re-used.
  - The system is scaleable

- **LDACS** supports **seamless handover**
  - No R/T workload!
LDACS Basic Functionality

Which communications problems will it solve?

- LDACS covers all kinds of **ATM communications** (ATC, AOC, AAC)

- LDACS resolves current data **capacity** shortage

- LDACS can be seen as **broadband complement** to VDL Mode 2
  - Additional broadband communications channel
  - Avionics should contain VDL Mode 2 and LDACS in a single box
  - LDACS can be used where ground infrastructure is in place
LDACS Basic Functionality
Which communications problems will it solve?

- **LDACS** enables broadband applications
  - 4D trajectories,
  - Weather maps,
  - SWIM integration, ...

- **LDACS** enables secured communications
  - Covers required data overhead for secured communications
LDACS Extended Functionality

Is there Additional Value?

- **LDACS contains** ranging/navigation functionality
  - Ranging to 4 ground stations allows position determination (like GPS)
  - Combination of **LDACS** ranging and additional sensors (e.g. baro, INS) enables modular navigation approach
  - Well suited for Alternative Positioning Navigation and Timing (APNT)

- **LDACS as** data link for GBAS
  - Supplement/Replace VDB with LDACS
  - Data broadcast with more capacity and less latency

- **We did say multi-functional!**
LDACS Extended Functionality
Is there Additional Value?

- **LDACS** is extendable and **future proof**
  - Due to underlying modulation (OFDM)

- **LDACS** can be scaled-up towards higher bandwidth without changing system characteristics

- **LDACS** can easily be extended towards higher capacity
THANK YOU