



Brief Introduction To LDACS

- The Motivation for LDACS

LDACS Webinar 1
April 23, 2021

Presented by Vaughn Maiolla
ICAO CP-DCIWG Secretary





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?

DSB-AM:
Analog Voice



From Voice to Data ... to Internet and SWIM



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)
 - *SWIM = XML-based communications*
 - *Graphics to the cockpit will be a reality.*
 - 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
 - Demand for **spectrum-efficient broadband data link** technology



Motivation

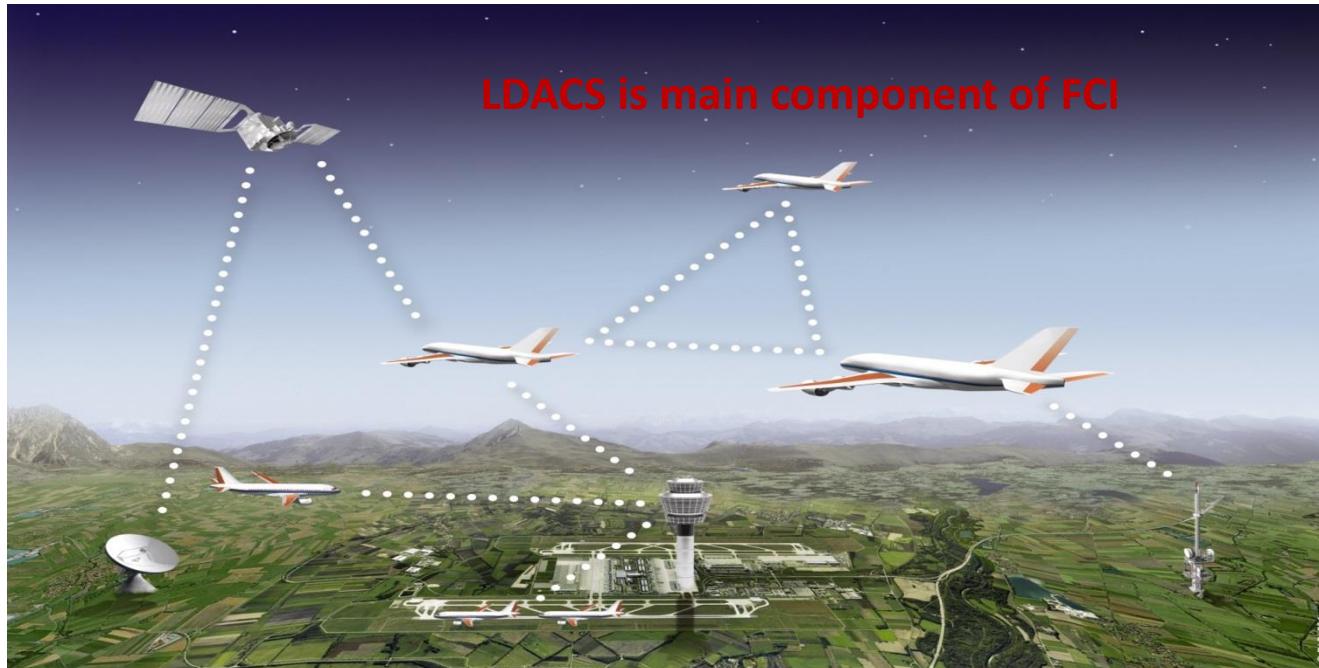
Why do we need LDACS?

- 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





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?

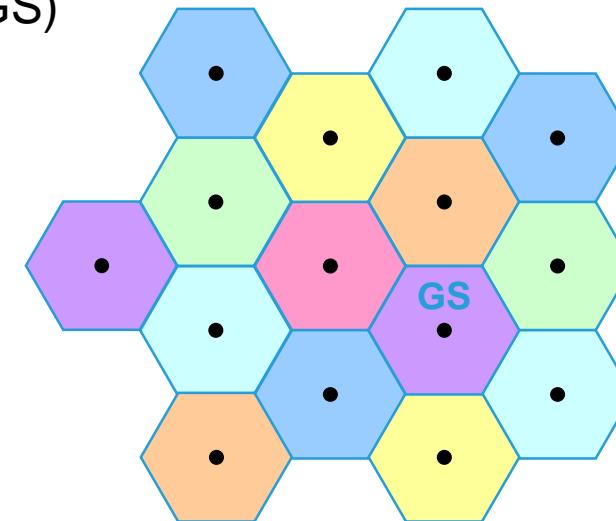
- LDACS foresees quality-of-service
 - Fast access to resources and low delays for application
 - Prioritization of applications
- LDACS is based on Frequency Division Duplex (FDD)
 - Forward link (ground to aircraft) and reverse link (aircraft to ground) use different frequency bands



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



| ICAO

CAPACITY & EFFICIENCY

NO COUNTRY LEFT BEHIND



| ICAO

North American
Central American
and Caribbean
(NACC) Office
Mexico City

South American
(SAM) Office
Lima

ICAO
Headquarters
Montréal

Western and
Central African
(WACAF) Office
Dakar

European and
North Atlantic
(EUR/NAT) Office
Paris

Middle East
(MID) Office
Cairo

Eastern and
Southern African
(ESAF) Office
Nairobi

Asia and Pacific
(APAC) Sub-office
Beijing

Asia and Pacific
(APAC) Office
Bangkok



THANK YOU