



The FAA/NextGen perspective

LDACS Awareness Campaign
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11th Air Navigation Position

- Aeronautical air-to-ground VHF channel capacity for Air Traffic Management (ATM) is reaching saturation
 - Most severe in Europe and parts of the United States
- Various proposals to address this problem have been offered and approved independently; none has achieved global endorsement
- ICAO is seeking a common, global solution through the Aeronautical Communications Panel (ACP)



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AIR TRAFFIC ORGANIZATION



FAA/EUROCONTROL Joint Future Communications Study

CCOM
FAA/EUROCONTROL
Coordination Committee



The FAA and EUROCONTROL initiated a bi-lateral study of the problem support of NASA to provide major input to ICAO ACP in its search for a solution



QinetiQ

Objectives:

- Identification of requirements and operating concepts
- Investigation into new mobile communication technology
- Investigation of a flexible avionics architecture



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➤ Development of a Future Communications Roadmap

- Creation of industry buy-in
- Improvements to maximise utilisation of current spectrum

* Federal Aviation Administration/EUROCONTROL, Cooperative Research and Development Action Plan 17:
Future Communications Study (AP 17-04)

Technology Identification

- In order to identify all technologies that may be applicable to aeronautical communications, a multi-pronged approach was used for technology identification:
 1. A survey of widely used and successful commercial and military technologies was conducted to identify technologies that offered potential value to A/G communications
 2. NASA released two Requests for Information soliciting technology candidate inputs from industry
 3. Eurocontrol received input from European manufacturers
 4. Technology candidates previously identified by the ICAO ACP WG-C were included in this study
- In all, over 50 technology candidates were identified in this process



Technologies Considered

Technology Family	Candidates
Cellular Telephony Derivatives	[US:TDMA (IS-136), CDMA (IS-95A), CDMAone (IS-95B), CDMA2000 1xRTT, W-CDMA, TD-CDMA, CDMA2000 3x, CDMA2000 1xEV, GSM/GPRS/EDGE, TD-SCDMA, DECT] [European: UMTS FDD, UMTS TDD]
IEEE 802 Wireless Derivatives	IEEE 802.11, IEEE 802.15, IEEE 802.16, IEEE 802.20, ETSI HIPERLAN, ETSI HIPERMAN
Public Safety and Specialized Mobile Radio	APCO P25 Phase 1, APCO P25 Phase 2, TETRA Release 1, TETRAPOL, IDRA, IDEN, EDACS, APCO P34, TETRA Release 2 (TAPS), TETRA Release 2 (TEDS), Project MESA
Satellite and Other Over Horizon Communication	SDLS, Connexion by Boeing, Swift Broadband (Aero B-GAN), Iridium, GlobalStar, Thuraya, Integrated Global Surveillance and Guidance System (IGSAGS), HF Data Link
Custom Narrowband VHF Solutions	VDL Mode 2, VDL Mode 3, VDL Mode 3 w/SAIC, VDL Mode E, VDL Mode 4, E-TDMA
Custom Broadband	ADL, Flash-OFDM, UAT, Mode-S, B-VHF (MC-CDMA)
Military	Link 16, SINCGARS, EPLRS, HAVEQUICK, JTRS
Other	APC Phone (Airphone, AirCell, SkyWay)

Criteria Detail

	Candidate Evaluation	Sub-Item	Sub-Elements
1	Meets Voice Needs	A. Functional Requirements: Supported Voice Services	1. Pilot-Controller Talk Group 2. Pilot-Controller Selective Addressing 3. Direct Pilot-Pilot 4. Broadcast capability
		B. Capacity Requirements	1. Capacity provided 3. Number of users supported
		C. Performance Requirements for Pilot Controller Voice Services	1. Aircraft Mobility Management 2. End-to-end Latency
2	Meets Basic Data Link Needs	A. Functional Requirements: Supported Data Services	1. A/G, G/A Addressed Data Transport 2. G/A Basic Data Transport
		B. Capacity Requirements	1. Aggregate Data Rate 2. Number of Users
		C. Performance Requirements for Data Transport	1. Uplink/Downlink Priority Levels/QoS 2. End-to-end latency
3	Meets Expanded Data Link Needs Including Air-to-Air requirements	A. Functional Requirements: Supported Data Services	1. ADS-B 2. Pilot-Pilot Data Transport
		B. Capacity Requirements	1. Aggregate data rate
		C. Performance Requirements	1. None beyond basic data

Common Technology Screening Results

NASA – ITT	Common Recommendations		Eurocontrol
Continental	• P-34 • Broadband-VHF • Wideband CDMA • Enhanced TDMA • L-band Datalink [(x)DL3]	• P-34 • Broadband-VHF • Wideband CDMA • Enhanced TDMA • L-band Datalink [(x)DL3] • Custom Satellite	Continental • [(x)DL4]
Oceanic	• Custom Satellite • INMARSAT • Swift Broadband	• INMARSAT • Swift Broadband	Oceanic
Airport	• IEEE 802.16	• IEEE 802.16	Airport

Figure 1: FAA/NASA and EUROCONTROL shortlists of candidate technologies - September 2006

****B-VHF was further developed into B-AMC****



FCS Technology Recommendation

Position:

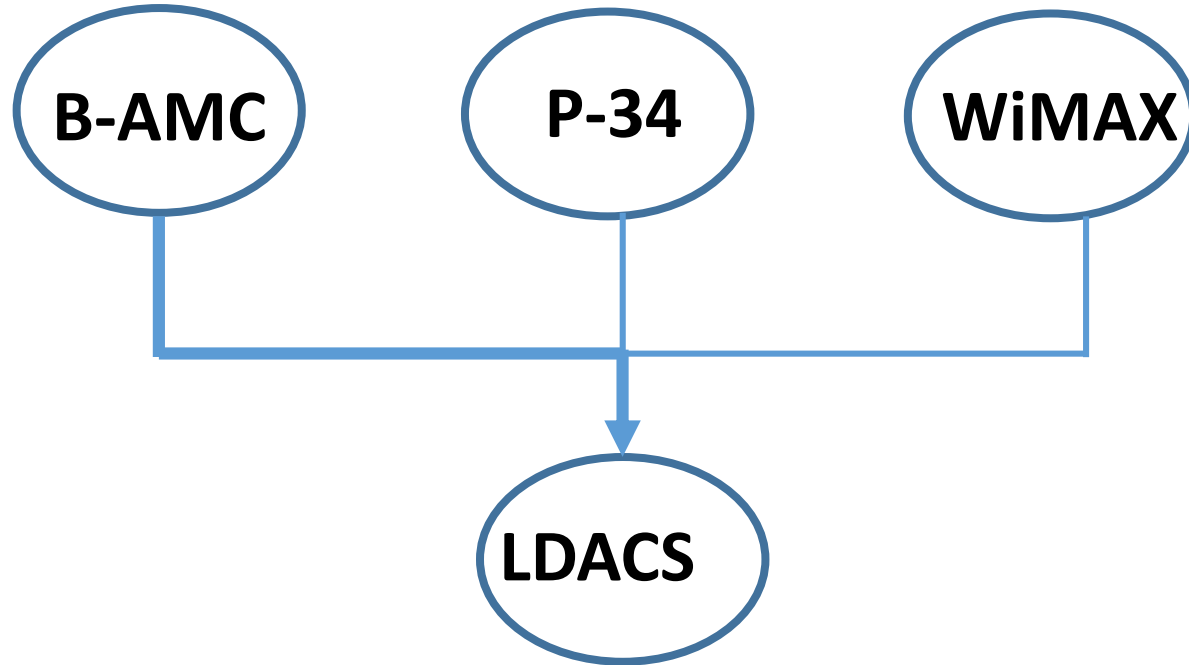
- Support B-AMC (Broadband Aeronautical Mobile Communications) as the basis of a single terrestrial L-Band Digital Aeronautical Communications System (L-DACS) technology with the adoption of strong attributes of other leading candidate technologies primarily including TIA-902/P-34.

Rationale:

- It is in the Best Interest of Aviation: The FCS has as one of its main objectives the identification of a solution which can support global harmonization. Based on FCS technology assessments, B-AMC is one of only four candidates expected to be capable of meeting the future requirements with some modifications.
- It is a Politically Acceptable Solution: LDACS is designed and funded by a European consortium and recognized as technically acceptable by the U.S.
- Eurocontrol has the More Urgent Need: Europe has an immediate need from a spectrum perspective to define and deploy a new system. The U.S. has no immediate need until all other alternative VHF band solutions have been exhausted.



LDACS1 System



2007 World Radiocommunications Conference Decision

- The WRC-07 also approved adding an AMRS Allocation for 960 – 1164 MHz to the International Table of Frequency Allocations.
 - Co-allocation on a non-interfering basis with Aeronautical radio navigation systems (ARNS) in the same band, primarily DME.
 - Proposed band for L-band Digital Aeronautical Communications System (LDACS) for terrestrial enroute communications as part of the future communications infrastructure.

Conclusion

- The FAA participated in the Technology Down-Selection process which resulted in the identification of two leading candidates for the final LDACS solution. B-AMC was selected over P34 because:
 - it appeared to meet the necessary performance requirements with limited modifications.
 - The U.S. did not foresee need for a new L-band system at the time and therefore did not commit to fund additional development work
- The FAA's further involvement was limited to review and comment on the following documentation including the LDACS Transition Assessment, LDACS ConOps Validation, LDACS Architecture Validation, LDACS Interference Assessment, System Specification Development and the L-band Capacity Assessment.
- Given a determination of no near or mid-term needs - the FAA has not participated in any further Standards development or Validation.
- The FAA's current infrastructure is provided to the FAA as an acquired service and the FAA does not plan to own and operate a terrestrial ATC Communications System in the future.
- The FAA position is that when and if additional service is needed it will consider the use of LDACS along with potentially other Commercially available systems.