AeroMACS Briefing / Update

European activities

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Agenda

- Why AeroMACS for aviation?
- Stakeholders
- Current Status
- Next Steps
Agenda

- Why AeroMACS for aviation?
  - History – Background
  - Importance of AeroMACS for aviation
  - Alternatives

- Stakeholders

- Current Status

- Next Steps
Future COM Infrastructure: FCI - Multilink

Existing Systems (Voice/VDL2)

Multilink Concept

Airport surface: AeroMACS

General terrestrial: LDACS

Satellite: Oceanic + Continental
AeroMACS and aviation

- High capacity, modern data link (4G) for communications in the airport surface (vehicles and aircraft on ground, as well as fixed coms)

- Part of the wider future aviation communication infrastructure (FCI)

- Operation in regulated spectrum (5GHz) offering protection from interference (for safety and regularity of flight communications)
  - ITU allocation maintains aeronautical usage for 5 GHz band

- Supports ATM, AOC and Airport communications using single technology, and creates synergies between Airports, Airlines and ANSPs business models
ICAO COM Roadmap: GANP includes AeroMACS
Are there alternatives to AeroMACS for aviation?

- For AOC and/or airport authority communications: Various commercial systems (proprietary, etc.)

- For ATC: VDL2 (with the caveat of potential performance issues)
  - EASA data link report recommends consideration of AeroMACS

- For ATM, AOC and airport authority communications all together: no other option is currently standardised or globally agreed

- What about LTE?
  - Question (is there a case to revert to LTE?) raised in the past
    - SJU COM study (2010/2011) confirmed choice of AeroMACS
    - Aviation cycles are very different from commercial telcom
      - By the time we could reach with LTE the same maturity/consensus as with AeroMACS, new 5G and maybe 6G options would be available to consider beyond LTE.
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AeroMACS: 3 key Stakeholders/Users

- High performance airport surface datalink
- Gate Operations
- Data collection & sharing
- ATC
- Video Surveillance
- Airlines
- Service vehicles
- ATN/IPS Ground Infrastructure (SWIM backbone)
AeroMACS: 3 key Stakeholders/Users

- Airlines
- ANSPs
- Airports
AeroMACS: 3 key Stakeholders/Users

- Airlines
- ANSPs
- Airports
- Airport and AOC
- COMs
- ATM

Data collection & sharing

Gate Q

ATC

Video Surveillance

Service vehicles

Ground Infrastructure (backbone)
AeroMACS implementation perspectives

- Airports (only)
- Airports and Airlines
- Airports, Airlines and ANSPs
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- Why AeroMACS

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AeroMACS: Summary of status

- Standards are available and planned:
  - Profile (EUROCAE/RTCA/WiMAX Forum)
  - MOPS (EUROCAE/RTCA) and MASPS (EUROCAE)
  - SARPS and Technical Manual (ICAO)
  - Avionics/ARINC spec (AEEC)

- Extensive testing in Europe, US and Japan
  - Europe: Two SESAR1 projects with two independent prototype developments (SELEX and Thales) supporting testing and validation
    - Testing and evaluation in labs, airport and aircraft integration (SESAR1)
  - Europe: Additional testing, trials and/or demos are expected in future (SESAR 2020)

- Implementations are already being pursued (in US starting from ground/airport side)
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Next Steps - Europe

Technical work is sufficiently advanced/mature but business case considerations in Europe are at starting point.

- Support completion of pending technical work
- Support users (Airports, Airlines, ANSPs) with information to consider synergies, business case and implementation
- SESAR2020 activities for AeroMACS are expected covering further testing, network aspects, business case
Q?

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Back Up slides
What are the AeroMACS benefits?

- Provides higher throughput for airport surface communications
- Provides relief to the congested VHF spectrum in airports;
- Supports worldwide interoperability and integration of critical coms for ANSPs, AUs and Airports
- Reduces overall costs (via synergies of sharing infrastructure);
- Offers increased security capabilities
- Helps to reduce airport congestion and delays and to enhance situational awareness in the airport surface
AeroMACS: Data Rates and Modulation Schemes

<table>
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<tr>
<th>MCS</th>
<th>DL Data rate [Mb/s]</th>
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<tr>
<td>64QAM 5/6</td>
<td>9.2</td>
</tr>
<tr>
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<tr>
<td>QPSK 1/2</td>
<td>1.8</td>
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BS = base station

$d_1 =$ distance from BS to the edge of the coverage area
AeroMACS Activities in Europe: An overview

- SESAR Programme (SESAR 1): 2 AeroMACS projects
  - P15.2.7: System aspects and ground component
  - P9.16: Airborne integration
- EU SANDRA project
- EUROCAE WG82: MOPS, MASPS and Profile

What type of activities:
- Prototype developments
- Testing and Trials
- Analysis and investigations
- Aircraft integration
- Support to standardization and International Coordination

Who has been involved so far:

SJU, ANSPs (DSNA, AENA, DFS), Airbus, Selex, Thales, INDRA, NATMIG, SITA, DLR, Airtel, University of Salzburg, EUROCONTROL, …