Future Communications Study (FCS)

Brent Phillips
NAS Technical Engineering
Operations Planning

Jim Eck
ATC Communications Directorate
Technical Operations

August 25, 2004

Phone: 202-385-7188; E-mail: brent.phillips@faa.gov
Agenda

• Study Objective

• Background motivation for Future Communications Study (FCS)

• Study Organizational Structure and Scope

• Technology Assessment and Prescreening

• Schedule
FCS Objective

Objective:

This Study is a coordinated effort between the FAA/NASA and Eurocontrol to progress the identification of a Future Globally Interoperable Communications System to support Air Traffic Management Operations in the time frame of 2020 and beyond.
FCS Background

• Aeronautical air-to-ground voice and data communications capacity for Air Traffic Management (ATM) is reaching saturation
  – Most severe in Europe and parts of the United States
    • 8.33 kHz channel spacing in Europe
    • 25 kHz channel spacing in the US

• 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)

• The FAA and Eurocontrol have started a bi-lateral study of the problem with the support of NASA; study to provide major input to ICAO ACP
FCS Background (cont’d)

- **AMCP/5 (April 1995)**
  - Recommendation 4/2 Future Operational and System Concept Exploration: Explore the likely airspace user needs and the long term system requirements for aeronautical VHF systems in light of ATM operational concept for beyond 2010.

- **AMCP/7 (March 2000)**
  - (Task CNS-9102) Carry out the fact-finding and conduct the necessary studies for the development of datalinks for air traffic services and aeronautical operational Control

- **AMCP WG-C1 (Oct 2000)**
  - Action WGC/1-9: WG-C to develop a report with the objective to recommend a scenario in which a common global interoperable communication infrastructure could be ensured for the future.

- **ANC/11 (Oct 2003)**
  - Recommendation 7/3: In view of anticipated saturation of the VHF band for voice communication, consider transition to spectrally more efficient ICAO systems, and/or make increased use of data communications and investigate multi-mode avionics as a transitional method of achieving interoperability of air/ground communications, where global harmonization has not been achieved.
  - Recommendation 7/4: Investigate new terrestrial and satellite-based technologies, on the basis of their potential for ICAO standardization for aeronautical mobile communications use, taking into account the safety-critical standards of aviation and the associated cost issues.

- **FAA/Eurocontrol Meeting (Oct 2003)**
  - Agreement to undertake a study to investigate future communications needs and technologies.
The Scope of FCS is ATS Communications*

ATS - Air Traffic Services
AOC - Airline Operational Comm’s
AAC - Airline Administrative Comm’s
APC - Airline Passenger Comm’s

*However, the ability of the system to support AOC etc. is a positive collateral benefit in that it addresses the needs of an important stakeholder and supports advanced information sharing (SWIM)

Figure from: The future role of satcom in civil aviation – ATN2002 - Astrium
Technology Assessment Tasks

Task 1

1.1 Documentation Review for Baseline Concepts, Issues, Needs, and Performance Characteristics

1.2 Spectrum Review

Screening Criteria

Government Review and Selection

Key Issues, Needs, Performance Characteristics & Spectrum Availability

Briefing

Task 2

Technology Identification and Recommendations

Down Selected Technologies

Briefing

Task 3

Gov't Review, Criteria Weighting, and Selection

Candidate Analytic Assessment and Development of Requirements for Further Analysis

Recommendations Report/Briefing

Technology Pre-Screening
Elements of the Candidate Technology Pre-Screening

**Input Candidate Technologies**
- Captured Infrastructure (Current/Planned)
  - Avionics
  - Service Provider
  - Airlines
  - Spectrum
- Captured Technology Status
  - Commercial Implementations
  - Demonstrations
  - Prototypes
  - Standards

**Evaluation Criteria**
- Meets Needs?
- Costs/Impacts
- Technology Maturity
- Safety

**Consensus Documentation**
- RTCA
- Eurocontrol
- FAA
- ICAO

**Captured from ACP and other sources**

**Chosen for Further Study with Associated Roadmap**
- Captured Organizational Process Flow and Schedule
- ITU – Spectrum
- ICAO/RTCA
- FAA-Certification
- AEEC

**Output Candidate Technologies**
## Prospective Solution Set

<table>
<thead>
<tr>
<th>From ICAO</th>
<th>From Review of Comm. Services</th>
<th>From RFI</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-VHF</td>
<td>VDL Mode 2</td>
<td>Packet Radio</td>
</tr>
<tr>
<td>ADL</td>
<td>VDL Mode 3</td>
<td>VoIP Using OFDM in MLS Band</td>
</tr>
<tr>
<td>SDLS</td>
<td>VDL Mode 4</td>
<td>Flash OFDM</td>
</tr>
<tr>
<td>Connexion By Boeing</td>
<td>DECT</td>
<td>Safety and Security Enhanced Voice</td>
</tr>
<tr>
<td>Aero B-GAN &amp; Inmarsat Family</td>
<td>TD-SCDMA</td>
<td>VDL Mode 3 + SAIC</td>
</tr>
<tr>
<td>CDMA2000 1xRTT</td>
<td>APCO P-25</td>
<td>Iridium Netted Radios</td>
</tr>
<tr>
<td></td>
<td>TETRA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TETRAPOL</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IRIDIUM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>802.11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SCADA</td>
<td></td>
</tr>
</tbody>
</table>

From RFI

From ICAO

From Review of Comm. Services
<table>
<thead>
<tr>
<th>Task Name</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Comm Operating Concept and Rqmts</td>
<td>5/04</td>
<td>5/04</td>
<td>12/04</td>
</tr>
<tr>
<td>Parse Comm Rqmts (and Environment description) from ICAO &amp; RTCA ATS CONOPS</td>
<td>7/04</td>
<td>9/04</td>
<td>12/04</td>
</tr>
<tr>
<td>Establish Initial Operational Concept, Services, Environment and Requirements</td>
<td>9/04</td>
<td>12/04</td>
<td></td>
</tr>
<tr>
<td>White Paper for ANC WG-C</td>
<td>5/04</td>
<td>12/04</td>
<td></td>
</tr>
<tr>
<td>Deliver Initial Comm Operating Concept and Rqmts</td>
<td>7/04</td>
<td>8/04</td>
<td>11/06</td>
</tr>
<tr>
<td>Finalize Comm Operating Concept and Requirements</td>
<td>12/04</td>
<td>12/04</td>
<td></td>
</tr>
<tr>
<td>Technology Assessment</td>
<td>5/04</td>
<td>6/04</td>
<td>11/06</td>
</tr>
<tr>
<td>Technology Pre-Screening (ITT)</td>
<td></td>
<td>11/04</td>
<td></td>
</tr>
<tr>
<td>Initial Technology Downselect</td>
<td></td>
<td>11/04</td>
<td></td>
</tr>
<tr>
<td>Detailed Alternatives Investigation and Downselect</td>
<td></td>
<td>3/05</td>
<td>3/06</td>
</tr>
<tr>
<td>Technology Simulation</td>
<td></td>
<td>11/05</td>
<td>9/06</td>
</tr>
<tr>
<td>Define Communications Roadmap (Transition)</td>
<td></td>
<td>3/06</td>
<td></td>
</tr>
<tr>
<td>Deliver Communications Study Report</td>
<td></td>
<td>11/06</td>
<td>12/06</td>
</tr>
</tbody>
</table>
Timeline Towards GACS 2020

Global A/G Communications System (GACS Timeline)
* Adopted from ACP WGC7/WP23, Kors van den Boogaaard (IATA)