Dedicated Frequency Allocation for Aircraft Onboard Wireless Systems

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Aircraft Wireless systems and applications

Industry consultation

Next Steps
Aerospace Vehicle Systems Institute (AVSI):
- A collaborative group of aerospace industries & government agencies
- Members include companies such as BAE Systems, Boeing, Goodrich, Honeywell, DoD and FAA

AVSI Mission is to:
- Lead & facilitate cooperation between industrial organizations, academic institutions, government agencies
- Dramatically reduce aerospace vehicle systems life-cycle cost and accelerate development of "higher performance, lower cost, more reliable" vehicle systems, architectures, tools and processes
- Improve integration of complex subsystems in aircraft
AVSI is considering the value of obtaining dedicated spectrum for critical & essential wireless airplane systems

Currently evaluating the level of interest in aviation industry for pursuing dedicated spectrum for wireless aircraft systems

Implementation of wireless aircraft systems has been slowed by the lack of internationally harmonized spectrum that is protected from harmful interference from other radio services

This effort may require a change to the International Table of Frequency Allocations and may require WRC action
Why Go “Wireless” for Airplane Systems

- Simplify and Reduce Life-Cycle Cost of Airplane Wiring
  - Ease of installation & maintenance
    - Reduce down time for installation & maintenance cost
    - Improve System Flexibility – re-configurability
  - Weight Reduction Potential
  - Decreased fuel burn
- Increased Reliability
  - Fewer connector pins/failures, cracked insulation, & broken conductors
  - Improved link reliability (mesh networks can provide redundancy and simplified failover capability)
Examples of Aircraft Wireless System in Revenue Service

- TWLU/ Gatelink
- CWLU / Maint. Laptop
- Crew Information Systems
- Internet Connectivity
- Wireless IFE
- Emergency Lighting
- Lighting Control
- Tire Pressure System
- RFID/LRU Part Marking
Today, on-board wireless systems utilize unlicensed bands such as 2.4GHz/ 5GHz (per WRC-03 Resolution 229), but only for applications unrelated to safe flight and landing.

Increasing use of unlicensed bands by consumer devices and airplane systems increases potential for interference.

Unlicensed wireless systems must accept interference from other users as condition of using unlicensed bands e.g.:
- Other airplane wireless systems
- Passenger wireless devices
- Microwave ovens

As a result, only non-essential communication functions are implemented wirelessly today.

Therefore: Higher criticality flight safety-related airplane functions require a protected frequency allocation to ensure deterministic, interference-free communication.
Great benefits are foreseen in developing essential and critical systems that utilize wireless communications technologies.

The Short Range Communications onboard Aircraft (SRCA) systems would be used during all phases of flight: ground, take-off and landing, and at cruise altitudes.

SRCA would require sufficient bandwidth for transporting large amounts of data between stations.

SRCA are expected to operate at a low effective isotropic radiated power (e.i.r.p.).

SRCA operations will be attenuated by the aircraft fuselage.
Examples of candidate critical & essential aircraft wireless applications

- Passenger Address System
- Environmental Control Systems
- Structural Health Systems
- Oxygen System
- Cabin Pressure System
- Fire Detection System
- Wireless Data Buses
- Health Monitoring Systems
Airplanes are truly global products that must comply with international radio regulations and be able to operate across national boundaries.

Obtaining internationally harmonized spectrum allocations can be extremely long-term, high-risk, & costly.

Depending on the application & spectrum it can take around 10 years or more to obtain spectrum allocation and national ratifications.

Approval is also required by ICAO and other aviation authorities in order to provide safety-of-life operations and to certify installations.

Need to start on spectrum allocation process immediately within the ITU to ensure availability in 5-10 years.
Next Steps

- Seek views and support of AVSI members and others in aviation/aerospace industry
- Discuss with ICAO, IATA, and other Regional and national aviation organizations
- Further information will be presented to future WG F meetings to ensure support from aviation bodies
- Determine system requirements and potential candidate frequency bands ranges
- Work with aviation industry worldwide to achieve consensus on future studies in ITU-R and ICAO
- Proposal to arrange a workshop is considered sometime in late 2007 to discuss aircraft dedicated wireless spectrum to enable a collaborative effort among aviation stakeholders worldwide
- Members of WG F to indicate their interest to participate in the Workshop and to receive invitation and information
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