



# **Dedicated Frequency Allocation for Aircraft Onboard Wireless Systems**

**ICAO ACP WG-F Meeting  
Nairobi, September 2007**

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# Dedicated Frequency Spectrum for Wireless Systems On-board Aircraft



- **Aerospace Vehicle Systems Institute (AVSI)**
- **Aircraft Wireless systems and applications**
- **Industry consultation**
- **Next Steps**

# AVSI Overview



- ***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 Current Activity



- **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



## Emergency Lighting



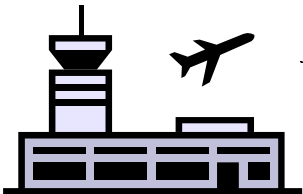
## Internet Connectivity



## Wireless IFE



## TWLU/ Gatelink

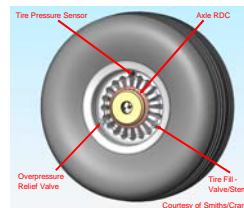


## CWLU / Maint. Laptop



## Crew Information Systems

## Tire Pressure System



## Lighting Control



## RFID/LRU Part Marking



# Why is “Dedicated Spectrum” Needed?



- 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.***

# Short Range Communications onboard Aircraft (SRCA)



- **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**

# Spectrum Allocation is a Long-Term Process



- 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

## For Further Information:



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