Securaplane Wireless Overview

CANEUS NASA

Fly-by-Wireless ™ Workshop

March 27, 2007

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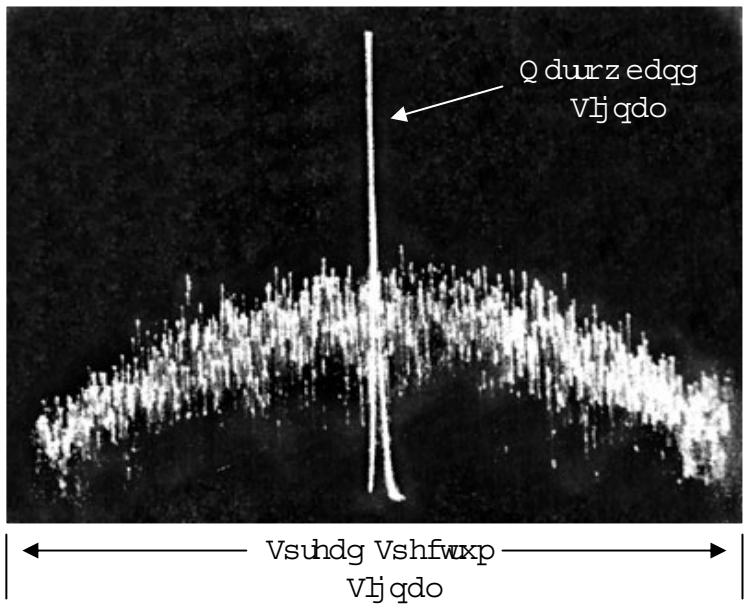
What Benefits Are Derived From Wireless Aircraft Systems?

- **Weight reduction**
- **Installation cost/time reduction**
- **Increases system reliability**
- **Elimination of wiring/wire problems**
- **Flexibility in installation changes**
- **Engine burst survivability**
- **Military battle damage immunity**

Securaplane Wireless Research

Securaplane discovered the phenomenal merits of Spread Spectrum Technology as a part of an 8 year search for a solution to eliminating wiring of its aircraft security products.

What Is Spread Spectrum?



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- **Mature military technology used since 1944**
- **Jam-proof and non-interfering**
- **High reliability - used by the military for telemetry and other critical applications**
- **Signal power spread across large band spectrum**

The Fascinating Origin of Spread Spectrum RF Technology

Hedy Lamarr and her Patent

On August 11, 1942, MGM movie star Hedy Lamarr and musician George Antheil were awarded US Patent Number 2,292,387 for their "Secret Communications System".

Lamarr had told Antheil about her idea for a Secret Communications System that could guide torpedoes to their target without being intercepted by the enemy, by sending messages between transmitter and receiver over multiple radio frequencies in a random pattern. They sent their invention to the recently established National Inventors Council. Rather than develop the patent commercially, they gave it away to the government for the war effort.

In the mid-1980s, the US military declassified spread-spectrum technology, and the commercial sector began to develop it for consumer use.

Securaplane Pioneered Wireless for Essential Aircraft Systems

- **ValueJet crash in May, 1996.**
- **FAA mandates that all airliner cargo bays without smoke detection and fire suppression must have them by March 19, 2001.**
- **Securaplane receives an STC for the 737-300 (SWA) November 20, 1998.**
- **Securaplane receives the Aviation Week and Space Technology "Technology Innovation Award" on November 14, 2000 for our achievement in aviation wireless.**
- **Boeing releases an RFI for a Wireless Emergency Lighting System (WELS) for the new Boeing 787. 14 companies respond.**
- **December 2004 — Boeing awards Securaplane a contract to develop and manufacture the WELS for the 787.**

Securaplane's ST3000 system now flying on over 1500 airplanes

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Plan for World Frequency Compliance

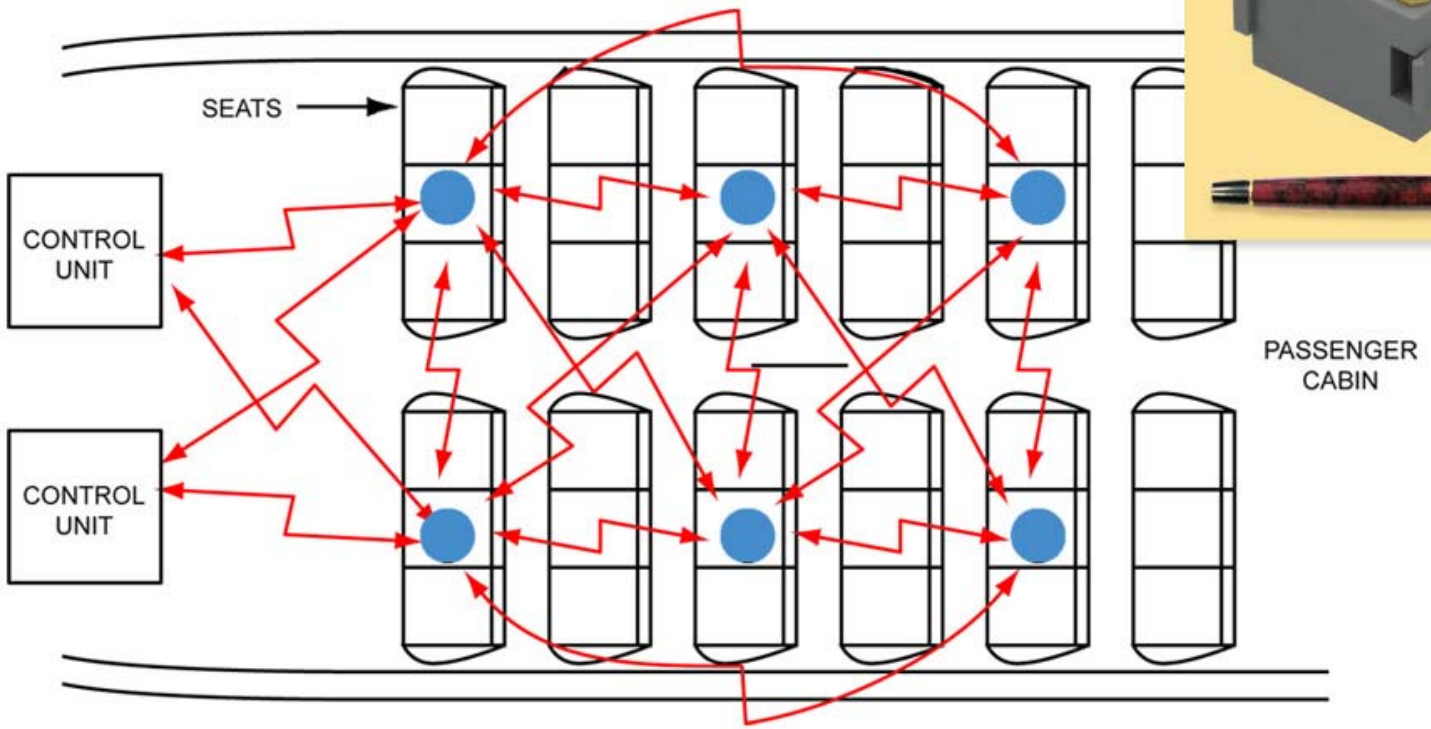
- **The IEEE organization and the International Telecommunications Union (ITU) have been working the issue for the past 3-4 years.**
- **All of the first world countries have approved the 2.4 GHz ISM band**
- **Some countries limit output power to less than 100 mw; i.e. 10 mw outdoors in France**
- **Boeing/FCC leading the effort for world wide acceptance**

Wireless Programs

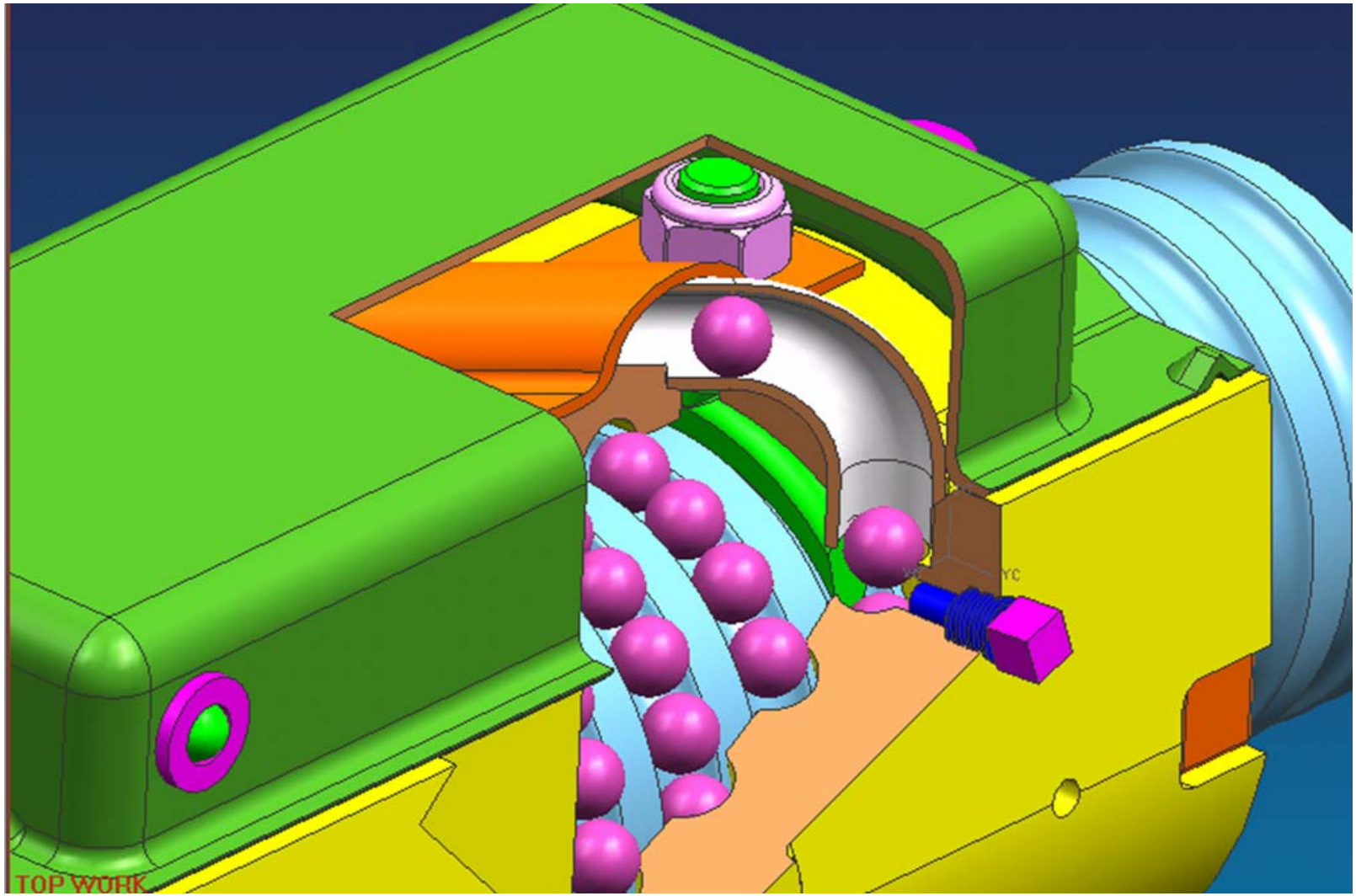
- Commercial OEMs
  - Wireless Emergency Lighting and expansion to other systems
  - Flap Ball Screw Condition Monitoring
- Business Jet OEMs
  - Joint development of “Wireless Aircraft” flight test program
  - Fly-By-Wireless ™ flight test program
  - Composite wing structural monitoring program
  - Lavatory leak detection system
  - Aircraft health monitoring
- Military
  - Fire protection for the Air Refueling Pod
- Joint Ventures
  - Joint development of wireless sensor line
  - Tire pressure and brake temperature
  - Wireless cabin lighting
- Tier One Suppliers
  - Engine and APU health monitoring

Boeing 787 Wireless Emergency Lighting

SecuraNet Mesh Network



Ball Screw Wireless Condition Monitoring



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Design Concept

- **Configuration**
  - Stationary Drive Unit: Communicates with the airplane and the moving sensor.
  - Moving Ball Nut Sensor: Counts ball bearings in 8 separate paths and transmits back to the fixed unit
- **Non-contact power and data transmission**
  - No battery – power is electro-magnetically coupled
- **750 rpm maximum screw speed**
- **190 Hz maximum ball bearing frequency**

Wireless Research and Development

- **Modularize WELS hardware and software architecture to easily adapt to other wireless applications**
- **SecuraNet ™ FAA acceptance for critical applications**
- **Further development of remote power source**
- **Parasitic power source development**
- **Expand band-width**
- **Enhance data compression algorithms**
- **Develop ASIC wireless chip-set**

Key 3 Year Actions

- **2007**
  - **Expand facilities to support growth -- June**
  - **Market research for acceptance of wireless data bus -- Sep**
  - **Complete WELS development -- Nov**
  - **Complete development of wireless data bus -- Dec**
- **2008**
  - **Release WELS to Production and support as necessary**
  - **ASIC chip set development**
  - **Deliver hardware for first new wireless data bus and complete flight test**
  - **Begin certification effort**
- **2009**
  - **Complete wireless data bus certification**

Summary

- **Wireless will continue to expand to more applications**
- **Fly-by-wireless will become a reality in the near future**
- **Emerging power technologies will advance wireless operations**
- **Wireless permits extended range through weight reduction**
- **Wireless reduces installation cycle time**
- **Wireless reduces maintenance**