Wireless Technology for Aircrafts

Opportunities and Challenges

“Fly-by-Wireless” Workshop
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Agenda

• Introduction to EMBRAER

• Wireless Technology for Aircraft – Opportunities and Challenges
Agenda

• Introduction to EMBRAER

• Wireless Technology for Aircraft – Opportunities and Challenges
Highlights

• One of the world’s major commercial aircraft manufacturers
• Significant market share
• Global customer base
• Renowned international partners

• Excellent financial performance
• Brazil’s largest exporter in 1999, 2000 and 2001
• Investment Grade – Moody’s Investor Service and Standard & Poor’s
• A dispersed capital ownership, with no controlling groups
Global Business

Operations in Brazil, United States, Europe and Asia

USA
- Nashville
- Fort Lauderdale

France
- Villepinte

Portugal
- Alverca

Brazil
- Gavião Peixoto
- Botucatu
- São José dos Campos

China
- Beijing
- Harbin

Singapore
Product Portfolio

Commercial Aircraft

Defense Systems

Executive Jet Market
ERJ 145 Family

ERJ 135
37 Seats

ERJ 140
44 Seats

ERJ 145
50 Seats

ERJ 145 XR
50 Seats
(2,000 nm range)
EMBRAER 170/190 Family

EMBRAER 170
70 to 80 Seats – 2,000 nm Range
Certification – 1st Q/2004

EMBRAER 175
78 to 88 Seats – 1,900 nm Range
Certification – 4th Q/2004

EMBRAER 190
98 to 114 Seats – 2,300 nm Range
Certification – 3rd Q/2005

EMBRAER 195
108 to 122 Seats – 2,100 nm Range
Certification – 2nd Q/2006

ESTAS INFORMAÇÕES SÃO DE PROPRIEDADE DA EMBRAER S.A. E NÃO PODEM SER UTILIZADAS OU REPRODUZIDAS SEM AUTORIZAÇÃO ESCRITA DA EMPRESA.
Defense Market Products

Integrated Market Approach

Systems & Services

Training

Intelligence, Surveillance and Reconnaissance

Combat

Transport
Training and Combat

Super Tucano

AMX/ A-1M
Special Mission Aircraft

AIR

GROUND

SEA
Legacy

Versions

Legacy 600

Legacy Shuttle

Transportation of Authorities
Executive Jet Market – New Jets
Lineage 1000 – ‘Ultra-Large’ Business Jet
Agenda

• Introduction to EMBRAER

• Wireless Technology for Aircraft – Opportunities and Challenges
Wires in Aircrafts

• In a general overview Wires are used to:
  • Sending and Receiving
    • Power
    • Data
    • Comand / Control
Wires in Aircrafts

• But Wires adds:
  
  • Weight and Volume: Wire + Connectors + Protections

  • Certification / Maintenance / Troubleshooting issues
## Wireless Opportunities

### Market and Engineering Requirements

<table>
<thead>
<tr>
<th>Item</th>
<th>Market Requirements</th>
<th>Engineering Requirements</th>
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</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
<td>Meet or exceed market requirements</td>
<td>Low weight</td>
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<tr>
<td></td>
<td>- Performance</td>
<td>Low power consumption</td>
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<tr>
<td></td>
<td>- Comfort</td>
<td>Compact installation</td>
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<td>- Safety</td>
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<td></td>
<td>- State of the art</td>
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<tr>
<td><strong>Time to Market</strong></td>
<td>Date of service entry</td>
<td>Short design &amp; development cycles</td>
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<tr>
<td><strong>In-Service Availability</strong></td>
<td>Reliability</td>
<td>Robust design</td>
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<tr>
<td></td>
<td>Maintainability</td>
<td>Maturity at entry into service</td>
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<tr>
<td></td>
<td></td>
<td>Ease troubleshooting and repair</td>
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<tr>
<td><strong>Cost</strong></td>
<td>Low operation cost</td>
<td>Low non-recurring costs</td>
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<td></td>
<td>Low acquisition cost</td>
<td>- Efficient design tools and processes</td>
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<tr>
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<td>- Reduced engineering hours</td>
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<td>- Reduced development tests</td>
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<td>Low recurring costs</td>
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<td></td>
<td>- Simple but efficient solutions</td>
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<td><strong>Environmentally Friendly Solutions</strong></td>
<td>Energy saving</td>
<td>Low fuel &amp; power consumption</td>
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<td></td>
<td>Noise reduction</td>
<td>Efficient insulation</td>
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<td>Low emissions</td>
<td>Active noise reduction systems</td>
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Wireless Opportunities

• Some Aeronautical Trends ...
  • Aircraft Health Monitoring / Aircraft Sensing
  • Advanced Flight Navigation and Control
  • More Electric Aircraft
  • Office in the Sky, Comfort and Entertainment
  • Faster Ground/Flight Testing
Wireless Opportunities

• Some Aeronautical Trends ...(1/5)

  • Aircraft Health Monitoring / Aircraft Sensing
Wireless Opportunities

- Some Aeronautical Trends ... (2/5)
  - Advanced Flight Navigation and Control

Avionics

- Communication Satellites
- Digital High Bandwidth
- Surveillance via ADS-A
- High Bandwidth Digital Data Link
- Voice

Fly Control

- Navigation Satellites
- Surveillance via ADS-B & TCAS
- Precision Navigation via LAAS
- Surface Movement Guidance

Electronics

- Data Center
- Air Traffic Services

4D Navigation
Wireless Opportunities

• Some Aeronautical Trends ... (3/5)
  • More Electric Aircraft

Conventional Non-Propulsive Power

- Mechanical Power
- Pneumatic Power
- Hydraulic Power
- Electric Power

More Electric Non-Propulsive Power

- No Gear Box
- Reduced Engine Bleed
- Local Hydraulic Source
- More Electric Power
Wireless Opportunities

- Some Aeronautical Trends ... (4/5)
  - Office in the Sky, Comfort and Entertainment

Internet access

- Audio/Video on-Demand
- Video Games
- Personal TV
- In-Flight Satellite TV/Radio
- VoIP (Voice over IP)
- Cell phone
- Light
- Power
- Sensors (temperature, smoke, humidity)
Wireless Opportunities

• Some Aeronautical Trends ... (5/5)
  • Faster Ground/Flight Testing
    • Aircraft Ground / Flight Testing Instrumentation is:
      • Complex
      • Time Consuming to Assemble / Disassemble

    a lot of wires!
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• More Sensors
• More Electronics On-Board
• More Sending and Receiving Needs

More WIRES !?
Wireless Opportunities

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More WIRES !?

or Wireless!!
Wireless Challenges

- RF Interference
- Wireless Networks Issues:
  - Security
  - Interferences
- FAA Regulation / Certification
- Others, maybe unknown, right now
Conclusion

- Wireless technology seems to fit well on Aeronautical Trends, Market and Engineering Requirements
  - Wireless technology could enable or speed up the trends making them resulting in a better aircraft
  - Wireless technology could reduce cost while increase passenger satisfaction
- But, as any new technology, before to be applied to aerospace products:
  - Wireless technology has to achieve higher maturity level in order to:
    - Address qualification and certification issues
    - Get reliability from OEM, Suppliers and Regulation Authorities
Thank you!