



We love to communicate!

LiFi solutions for aeronautical applications

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26.06.2023

aeroLiFi Team and Background



Dr. Markus Werner

Communication technologies

20 years **aviation** experience

Successful founded and sold high tech company



Birger Timm

Medical engineering

10 years **aviation** experience



Günter Boomgaarden

Communication technologies

30 years **aviation** experience

Managing director corporate level

Founders historical company background:



aeroMotivation of aeroLiFi

- Pioneered on-board wireless passenger connectivity since 2002
 - Cellular
 - WiFi
- Extended ambitions to mainly wireless *ConnectedCabin* 2013-2017 (for passengers and on-board systems, incl. IoT)
- Technology scouting for significant improvements in performance of on-board wireless *Inflight Entertainment and Connectivity (IFEC)*



Challenges of radio based data transmission



Congested and crowded areas



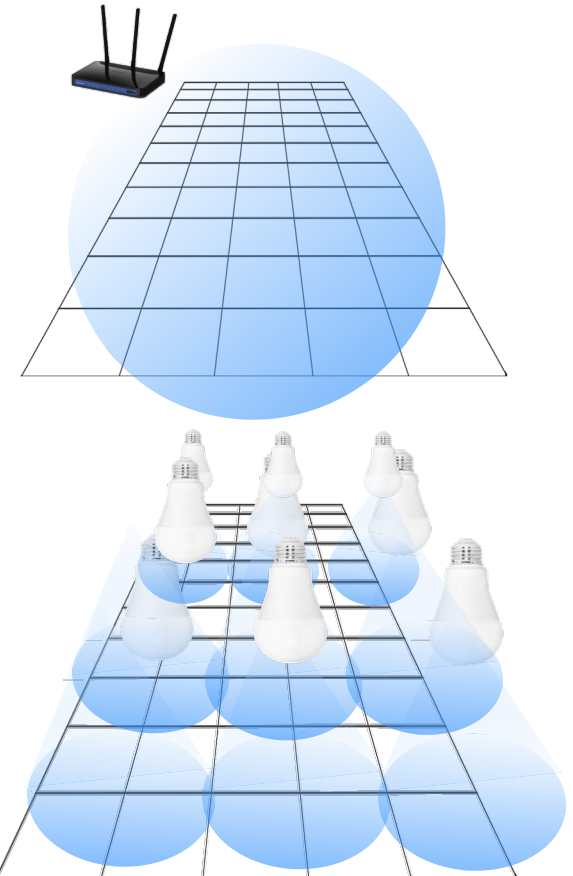
WiFi

- Optimized to cover wide area
- Many devices and parallel networks cause bandwidth decrease

Data Density

LiFi

- Provides “microcells”
- Less devices per cell provide higher bandwidth per device

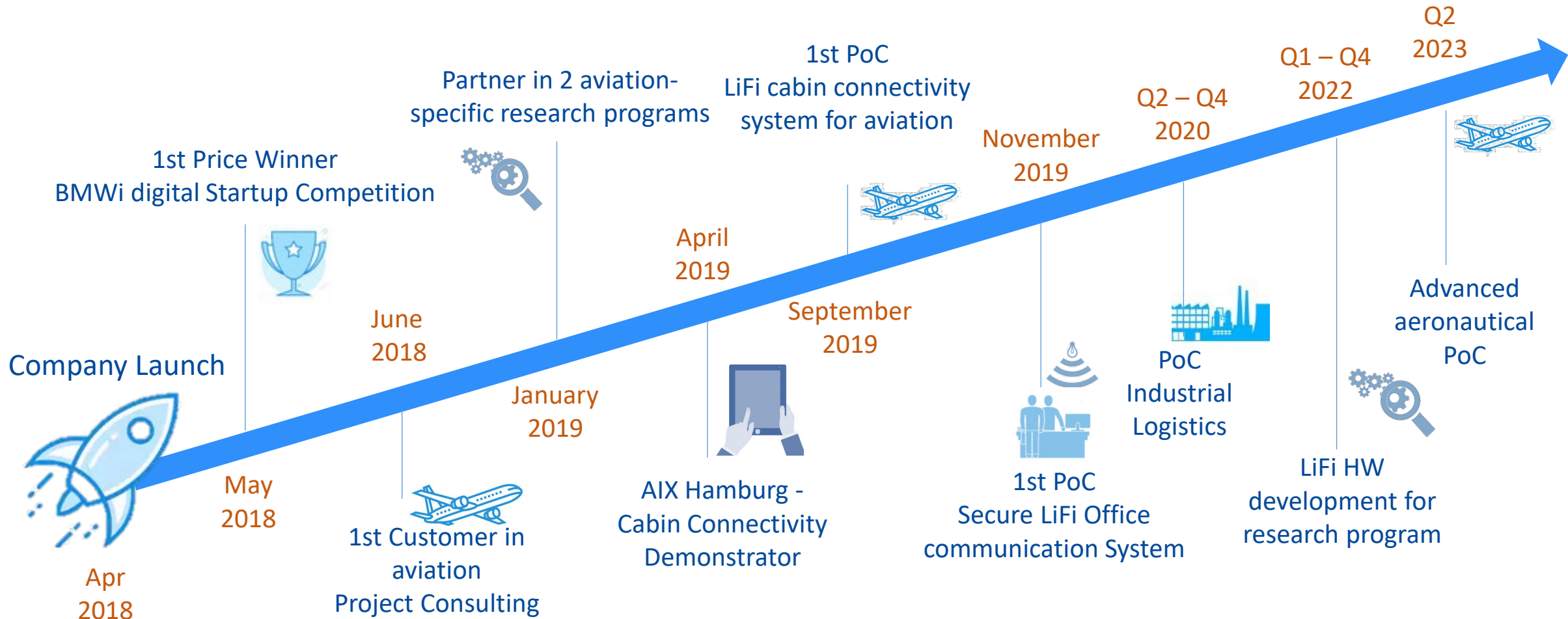


LiFi applications for aviation

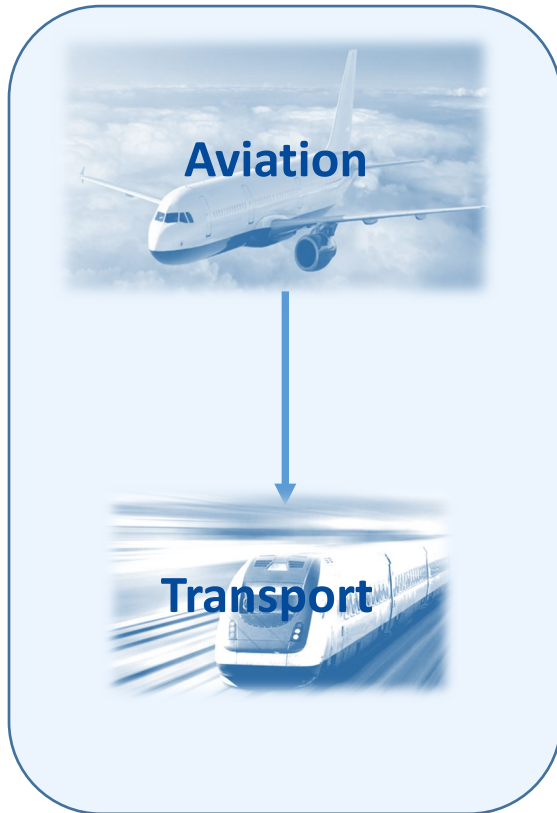
- Passenger entertainment and connectivity
- Crew connectivity
- Seamless wireless connectivity in stations / passenger areas



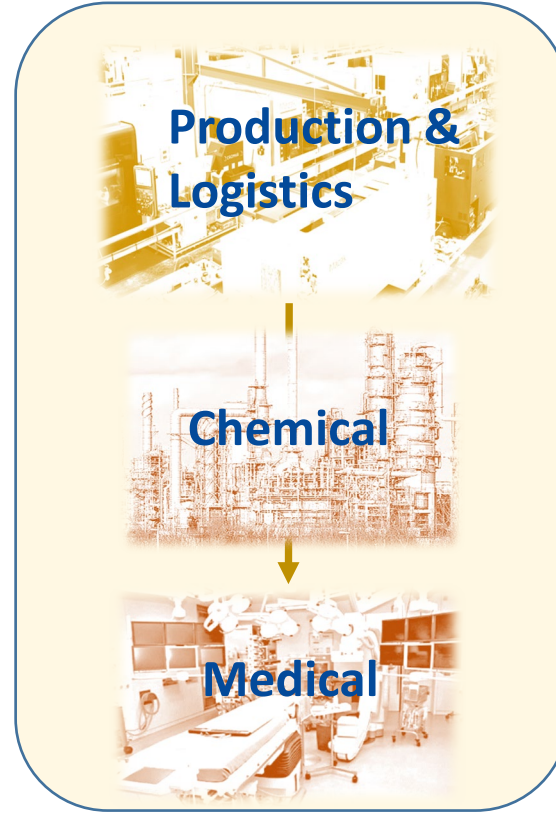
Development of aeroLiFi



Markets and main LiFi benefits



Data Density



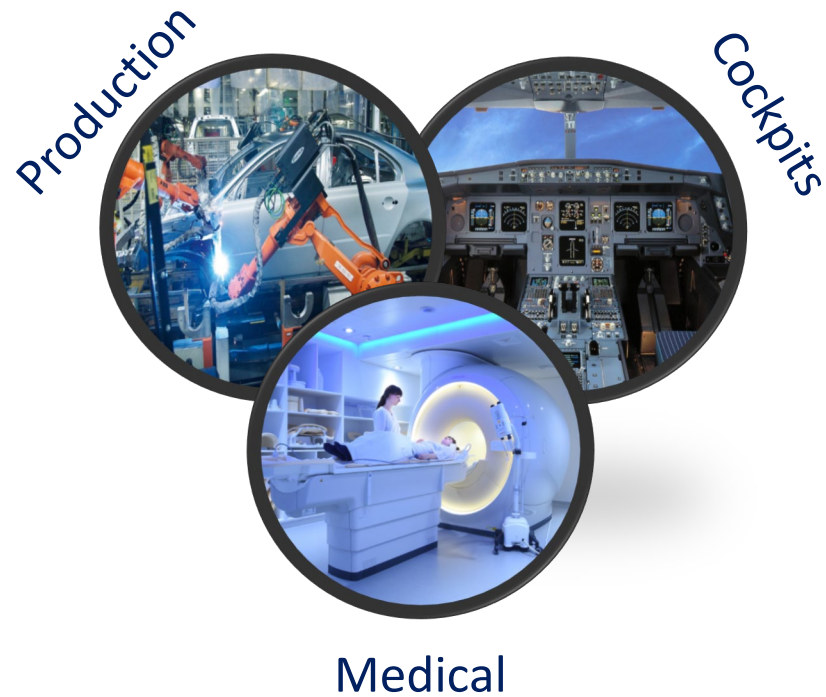
RF - Robustness



Geo Fencing / Security

Challenges of radio based data transmission

RF-disturbed and -sensitive environments



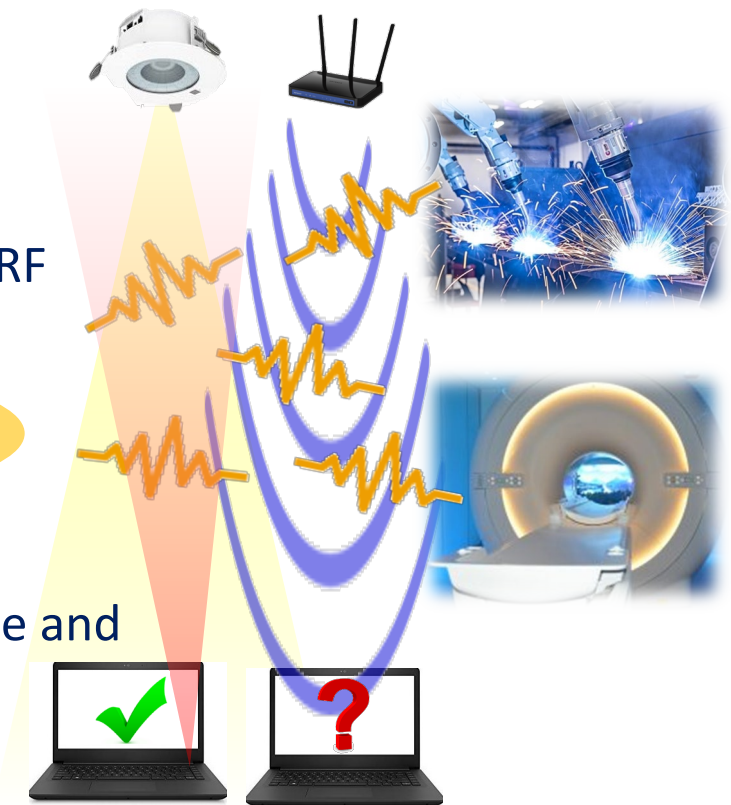
WiFi

- Can be disturbed by external RF sources
- Can be intentionally disabled by induced RF noise

RF - Robustness

LiFi

- Is immune to RF noise and disturbance
- Uses only light for transmission



Challenges of radio based data transmission

RF-disturbed and -sensitive environments

Production



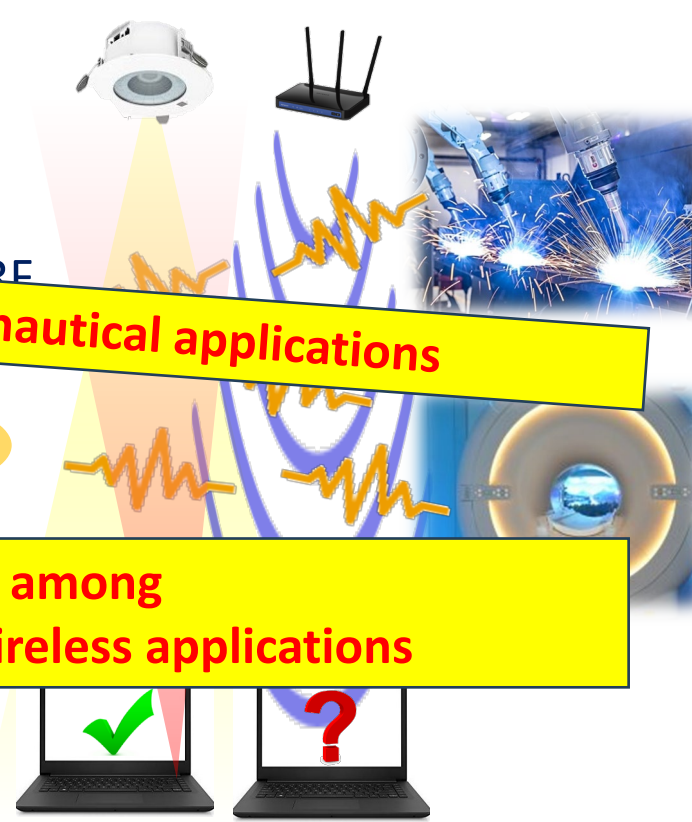
Cockpits



Medical

WiFi

- Can be disturbed by external RF sources
- Can be intentionally



LiFi relevance for aeronautical applications

RF - Robustness

Less disturbance among various cabin and cockpit wireless applications

- Uses only light for transmission

Challenges of radio based data transmission

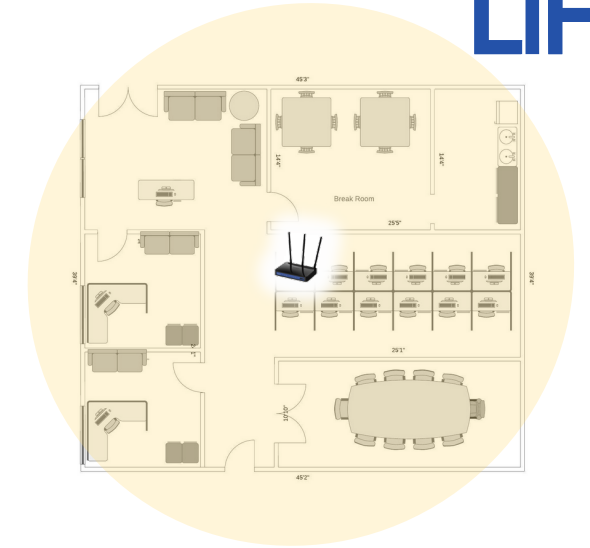


security-critical and private environments



WiFi

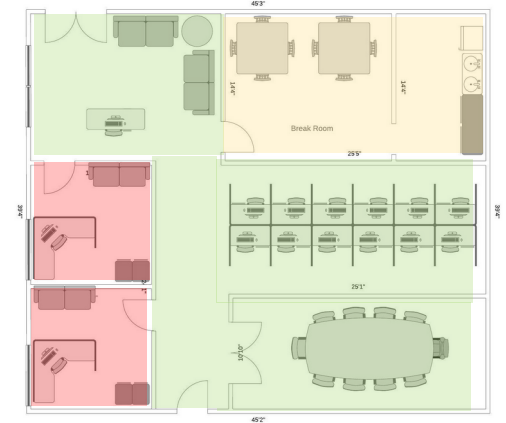
- Passes walls
- Accessible to unintended users outside target areas
- Difficult to limit to certain areas



Geo Fencing/Security

LiFi

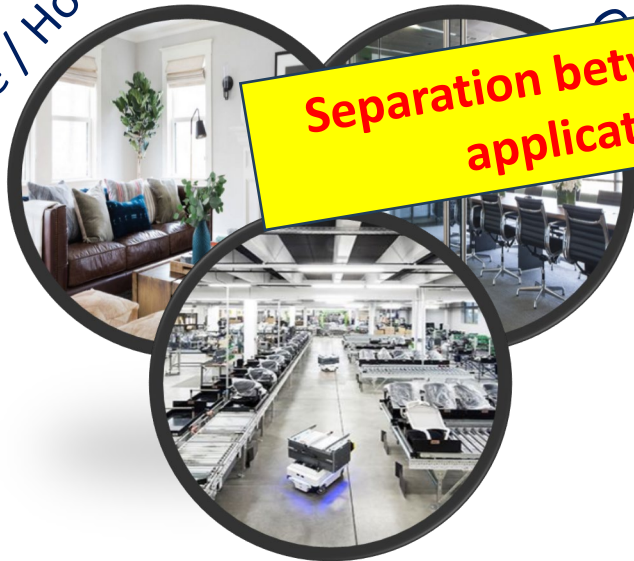
- Provides local cells
- Signal shielded by walls (and windows)
- Different security levels can be realized in different rooms



Challenges of radio based data transmission

security-critical and private environments

Home / Hotel

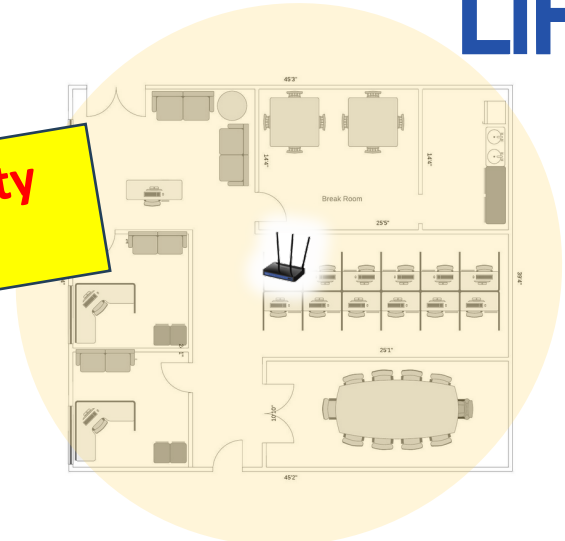


Logistics / Production

Separation between different on-board wireless connectivity applications with different DAL (security) levels

WiFi

- Passes walls
- Access to limit to certain areas



Geo Fencing/Security

LiFi

- Provides local cells
- Signal shielded by walls (and windows)
- Different security levels can be realized in different rooms



Recent LiFi System



- Full infrared (uplink and downlink) access points
 - Up to 150-200 Mbps data rate
 - G.hn compatible
 - IEEE 802.11bb on roadmap
- System scalable to customer and use case needs
- End device connection via USB dongle
- Used for various use case PoCs incl. in particular aeronautical

Innovation Projects

- **aero5FIVE**
aeronautical 5G Communication for Flexible Integrated and Versatile Aircraft Cabin Applications based on a Bavarian Excellence Cluster
- **UltraLight**
Ultra-schnelle, -effiziente und sichere aeronautische Kabinenkommunikation auf Basis von lichtbasierter Informationsübertragung (LiFi)
- **6G-life**
Various involvements, incl. joint LiFi/WiFi VR solution and demo with Cadami



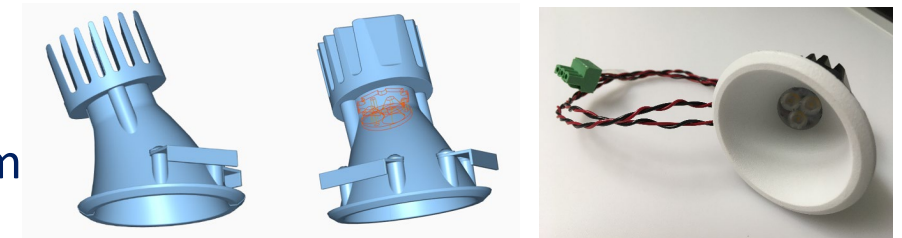
<https://www.youtube.com/watch?v=IP1oY7lwxt8>

Aeronautical Deployment: Challenges



- Challenges

- DO-160 Hardware/environmental qualification
- DO-178 Software certification
- Cabin/cockpit integration challenges
 - form factor and power
 - implications and dependencies with various system tier 1 suppliers/OEMs



- Integration of LiFi transceivers with embedded screens *and/or* support of BYOD (passenger-owned) devices

Aeronautical Deployment: Opportunities



- Opportunities
 - Support massive boost in IFEC connectivity (*"Netflix on board"*)
 - (Distributed) content distribution and collection
→ tight integration of complementary WiFi/5G/6G/LiFi (!)



- Secure applications in cockpit and cabin (crew, airline operations)
- LiFi gatelink for ultra-fast content from/to aircraft at gate
- LiFi for on-board IoT systems?

Impressions from recent PoC Demonstrator at Aeronautical Exhibition AIX Hamburg, June 2023



Thank you



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