



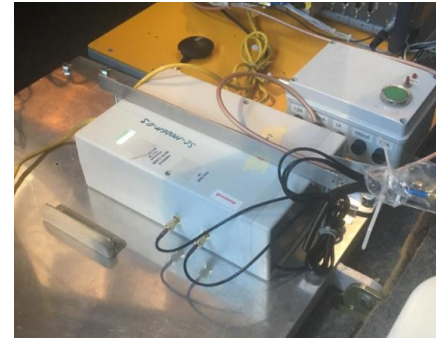
EMPHASIS - EMPowering Heterogenous Aviation through cellular Signals

Petr Cásek



EMPH^{((A))}SIS

EMPowering Heterogenous Aviation through cellular Signals



Exploring affordable CNS functions for low altitude operations of GA and Rotorcraft to increase their operational safety and interoperability → focusing on technical enablers.

Honeywell

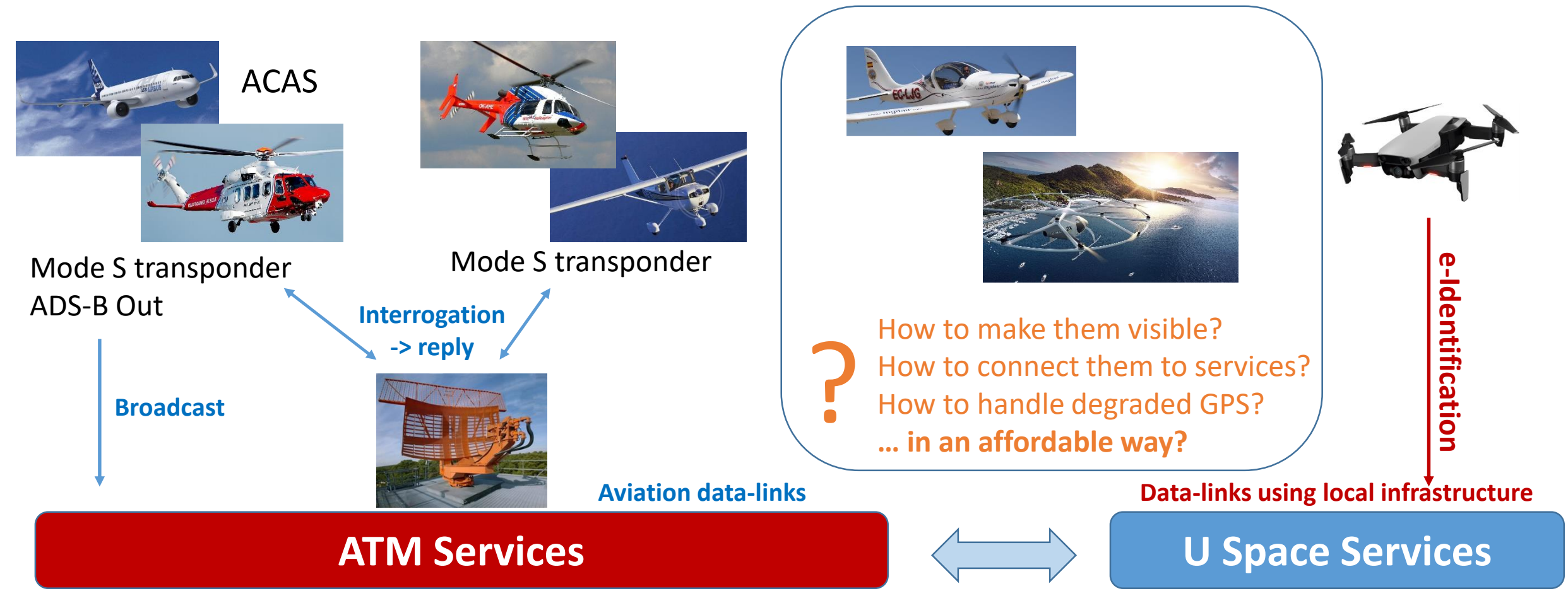
 **AIRBUS**
DEFENCE & SPACE

 Tampere University


evektor



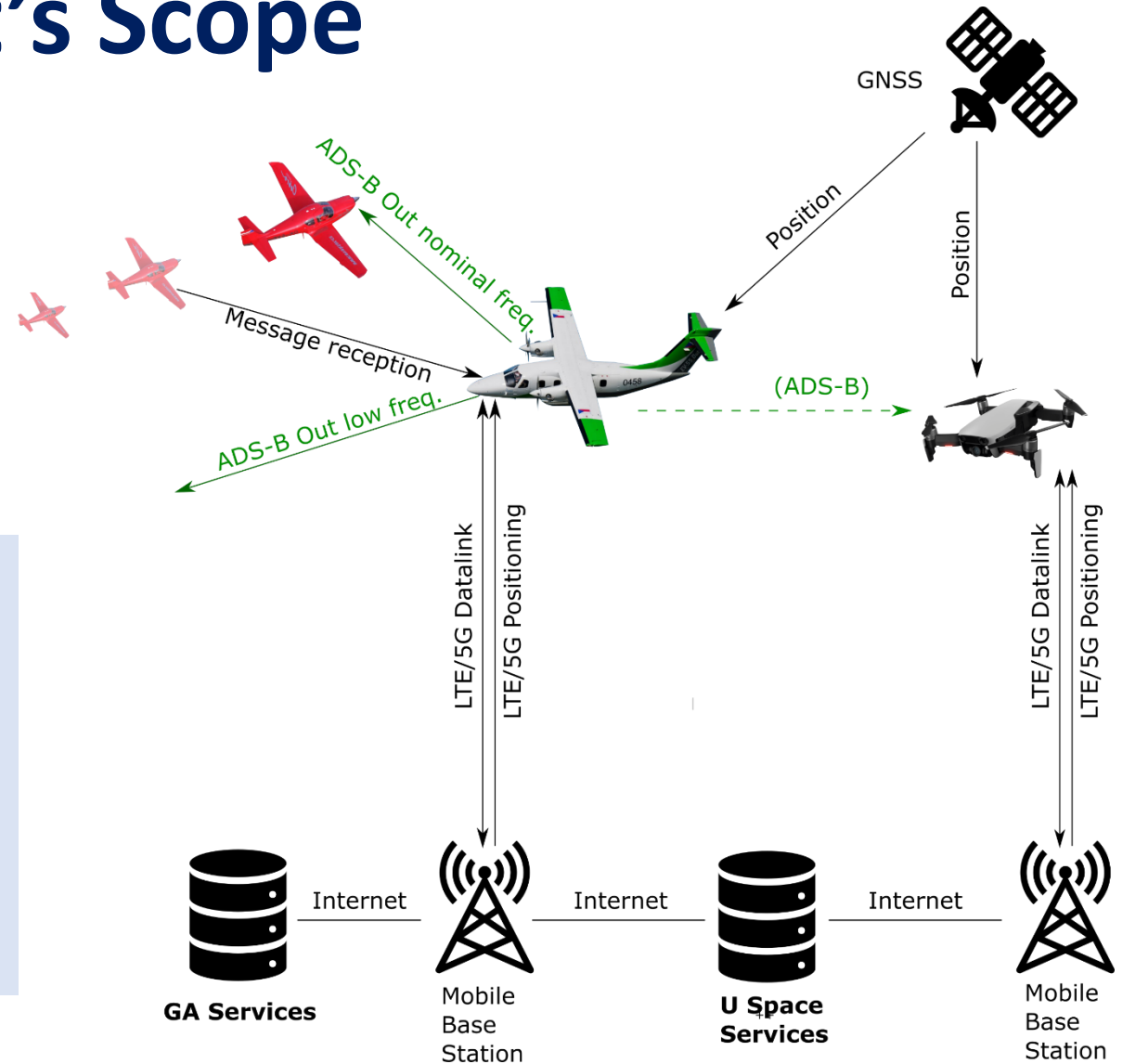
Air Traffic Environment – Surveillance



EMPH^(A)SIS Project's Scope

Exploring affordable CNS functions for low altitude operations of GA and Rotorcraft to increase their operational safety and **interoperability**:

- Use of 4G/5G for positioning
- Use of 4G/5G datalink for GA and U-space services
- Affordable low power ADS-B transceiver
- Alternative certification approaches



Theoretical (simulations)

- Already 4G technology is **technically** capable to address most of communication and positioning needs, BUT requires interference mitigations.
- 5G networks offer further flexibility and possibilities especially when combining mmWave and cmWave channels.

Practical (measurements)

- Current network optimized to terrestrial users – outages due to interference and handovers in higher altitudes.
- Only limited set of 4G standard features really deployed (varying by region&operator) – driven by business.

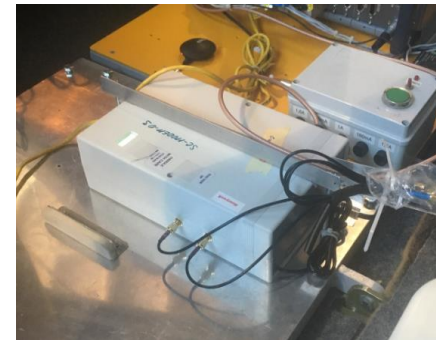


Main limitations for aerial use of 4G/5G are **not technical but business driven** and are common for 4G and 5G: operators deploy only a subset of capabilities for which they see sufficient value.

NEXT STEPS: Intensive coordination with network providers to work jointly on business case.

Low power ADS-B (1090 MHz) concept was proposed & validated:

- Performance requirements driven by air-to-air safety applications
- Simulations performed to verify impact on spectrum (dense environment)
- Experimental prototype developed and flight tested on Evektor aircraft
- Possibilities of alternative certification means explored to further improve affordability



The proposed and evaluated low-cost low-power ADS-B concept seem to answer well airborne surveillance needs of heterogenous traffic in low airspace.

NEXT STEPS: Further discussions with EASA, EUROCAE and Eurocontrol to mature the concept.

