

# Safe communications for existing and new airspace users (FACT Project)

Geneva, 9<sup>th</sup> March 2023

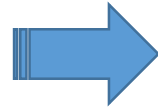
Petr Cásek, Honeywell

# SESAR 2020 SHOWCASE

# Cellular Networks and Aerial Operations

## Motivation

- Reuse of existing infrastructure
- Affordable hardware



## Two conceptual solutions

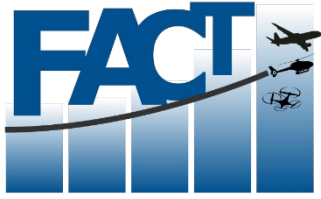
- Using public 4G/5G network (wide deployment)
- Building dedicated 5G network (selected areas)



SESAR2020 FACT Project targeted both solutions in the context of mixed traffic (GA, rotorcraft, drones) at low altitude airspace, covering:

- ✓ Analysis of the overall operational context of airspace with low altitude mixed air traffic
- ✓ Technical evaluation of 4G/5G performance (datalink, positioning) in the context of selected CNS functions (position reporting, traffic broadcast, alerting, instructions).
- ✓ Demonstration of operational benefits of the explored CNS enhancements for general aviation (GA) pilots, remote pilots of drones, and air traffic control (ATC).





# Future All aviation CNS Technology

SESAR2020 ER project (July 2020 – December 2022)

Project Coordinator: Honeywell



*Airspace Users*



*Universities*

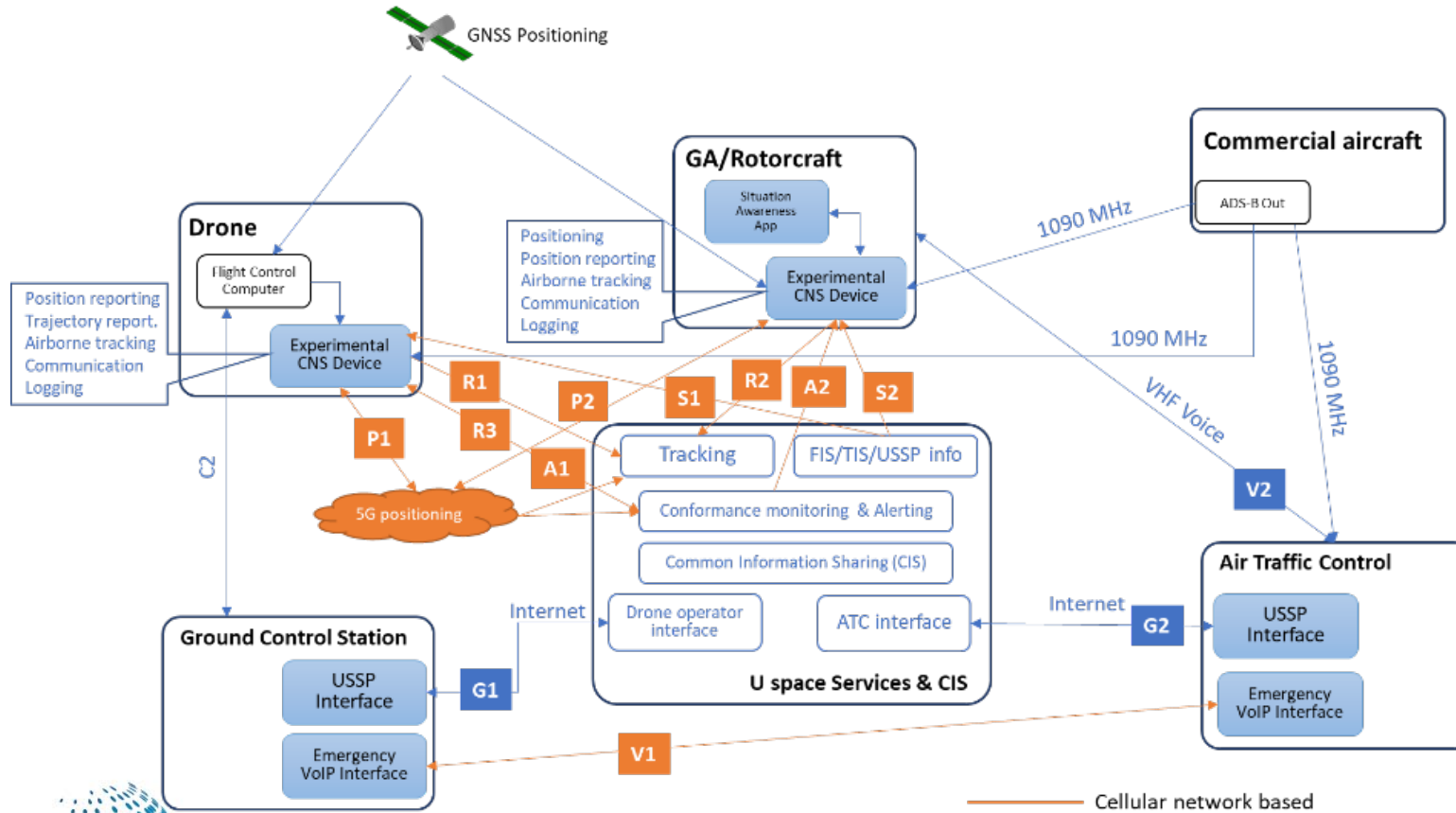


*Industry*



#SESARShowcase

#EuropeForAviation



## Services Implemented over 4G/5G (supported by experimental CIS):

- Position reporting by GA, rotorcraft and drones
- TIS/FIS services
- Conformance alerting and emergency request to land for drones
- VoIP between ATC and remote pilots



## Operational Demo in July 2022



### Implementation

- Experimental CNS devices installed on:
  - ✓ 2 drones
  - ✓ Sikorsky S76 heli
  - ✓ Cessna 172
- Ground server collecting & tracking traffic information, and providing TIS and FIS (geofence, alerts) services to vehicles, ATC and remote pilots.



### Human Machine Interfaces

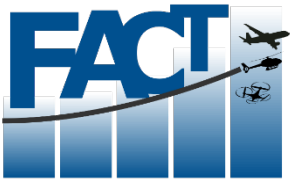
- Situation awareness app (traffic and alerts, geofence zones) in GA and rotorcraft cockpit.
- Dedicated adaptations of ATC and remote pilot's working positions (situation awareness)



## Technical Evaluations (2021 – 2022)

- End-to-end communication performance related to:
  - ✓ Traffic surveillance through regular position reporting over cellular network
  - ✓ FIS/TIS services provided over cellular network
  - ✓ Ground alerting service to relevant vehicles
- Evaluation of possible improvements of link availability
- Possible impact of network load on quality of service
- Positioning capabilities in current 4G/5G networks





# Conclusions & Recommendations



## Usability of public LTE/5G network for air traffic applications

- Current public 4G/5G links (without additional means/modifications) not acceptable for safety critical applications
- Typically meaningful for VLL (interferences at higher altitudes) but depends on local network configuration
- Proposed tools to mitigate impact of varying COM performance (mainly availability) include:
  - Classification of network coverage (different altitudes) for each U-space airspace
  - Network monitoring (& alerting) service
- Many operations/applications will require complementing this link with other communication means
- 5G offers benefits over LTE but LTE performance sufficient for tested applications.

## Possible deployment of dedicated 5G network for air traffic

- Potential solution even for safety critical applications
  - Could be also used for precise positioning
  - Key pre-requisite is a sufficiently strong business case (currently missing)
- Probably only local deployment for areas with high CNS requirements and business potential
- Coordinated approach of aeronautical community with regulators and EU recommended to address business and spectrum aspects.

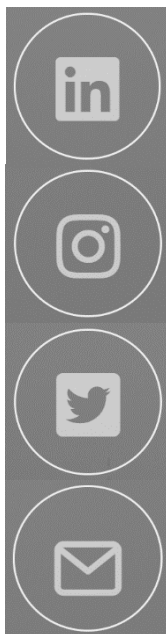




# Learn More ....



Project's web site: <https://fact.itu.edu.tr>



<https://www.linkedin.com/in/fact-project-669774245/>

[https://www.instagram.com/fact\\_sesar/](https://www.instagram.com/fact_sesar/)

[https://twitter.com/fact\\_sju](https://twitter.com/fact_sju)

[fact@itu.edu.tr](mailto:fact@itu.edu.tr)

Project Coordinator: [petr.casek@honeywell.com](mailto:petr.casek@honeywell.com)

