

ANSP International Connectivity and Cybersecurity

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Go Allwhere.

Agenda:

- Nokia Overview
- Nokia in Aviation
- ANSP International Connectivity
- Connecting The Skies
- ANSP Cybersecurity



150 years of reinvention and disciplined execution for successful integration and transformation



Transportations Domains addressed by Nokia



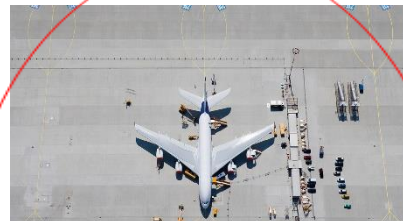
Railways

- Main-Line Rail / Freight Rail
- Urban Rail / Mass Transit
- Rolling Stock Manufacturers



Highways/Road

- Highway / Road Agencies (DOTs)



Aviation

- Airports
- Airlines
- Aircraft Manufacturers
- A2G Service Provider
- Air Navigation SPs



Maritime

- Seaports
- Shipping Companies
- Ship Manufacturers
- Ship-2-Shore Service Provider

End-Customer Type



Logistics

- Freight forwards (B2B)
- Logistic service provider (B2B)
- Trucking, rail, sea and air freight companies (B2B)
- Courier, Express, Parcel companies (B2C)

Nokia Aviation Solutions

ATC

- Ground to Ground Communication
- Managed Services
- Cyber Security

AIRLINES

- Airline: High Speed Internet cabin services
- MRO
 - Remote Table inspection (4G/5G)
 - Hangar LAN (Passive)

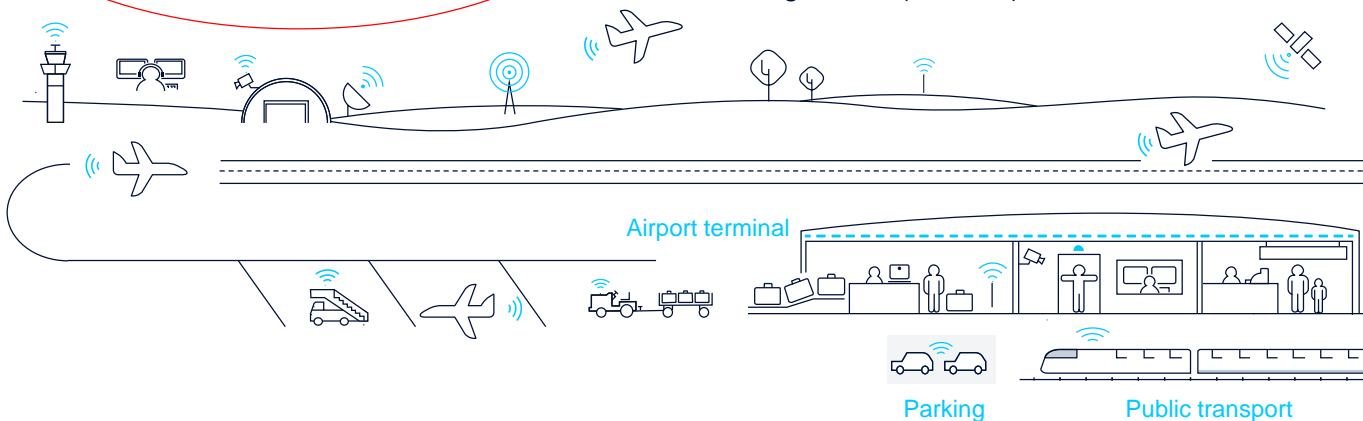
AIRPORTS

Operational Solutions

- Private Wireless:
 - Digitize operations
 - Situational Awareness
- Campus Core/LAN Network
- Cyber Security
- Analytics
 - Automated triage
 - Surveillance
- IoT Solutions
- Cloud Datacenter + SDN DC
- Managed Services

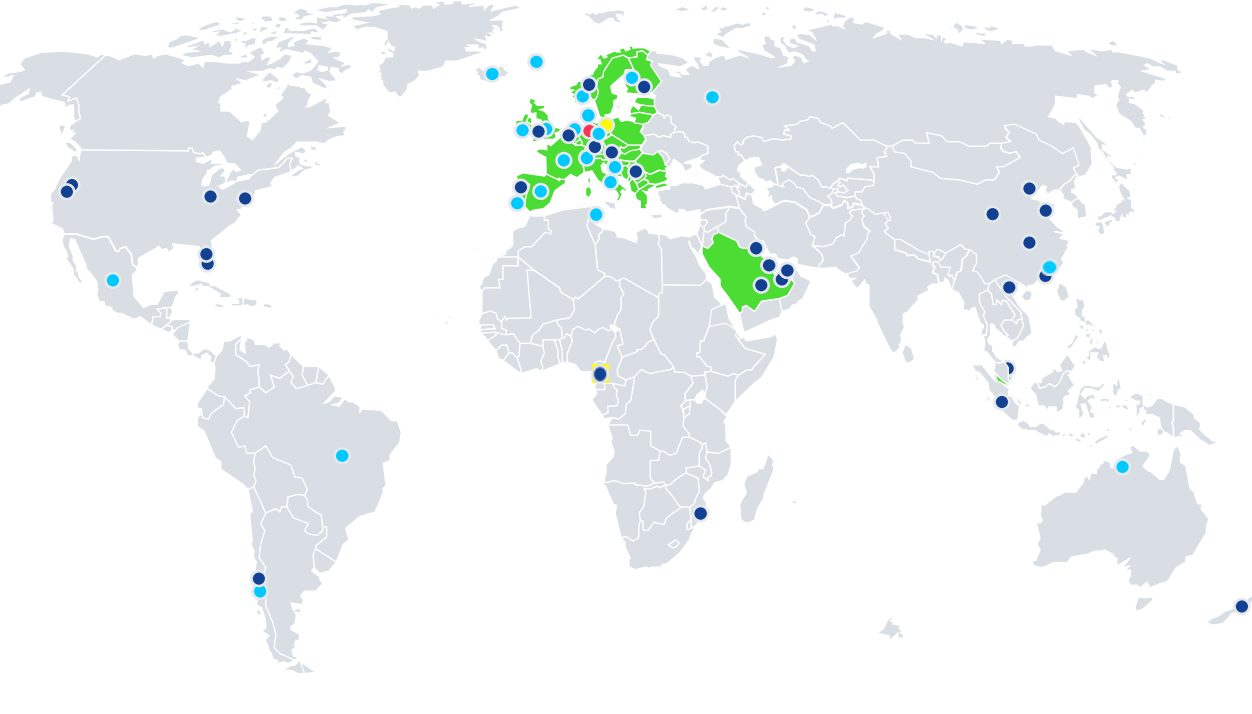
Passenger Solutions

- In Building Wireless Connectivity
 - 2/3/4G DAS
 - 4G/5G Indoor PAX solution



...for safe, on-time and connected journeys

Connected with the Industry



MEMBERSHIPS



AIRPORT

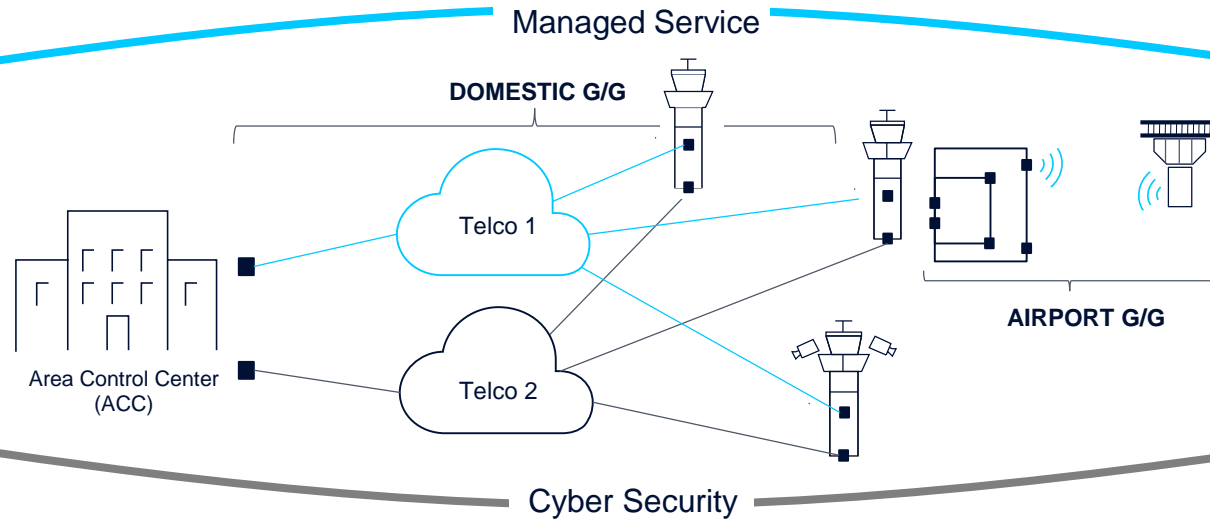
ANSP

MRO

AIRLINE

ANSP High Performance Networking

G/G Network Upgrade without changing the applications



Role of Nokia in ANSP certifications

REGULATORY

WHAT

- Working with **ANSPs** and key **regulatory** organisations globally

HOW

- Developing Standards
- Implementation alignment between ANSPs

WHERE

- Member ICAO CNS
- Member Eurocontrol working group (vote)



SAFETY CASE

- Support ANSPs in developing ATC safety cases and supporting **Safety Case – Part 2/3**

- Design the network to meet safety standards
- Provide continuous reports for safety requirements

- Avinor
- Skyguide
- Isavia



ED STANDARDS

- Meeting **ED Standard**



- Nokia supports the WAN requirements to meet W67 ED136, ED 137 (VoIP), ED 138 (latency, jitter, packet loss) and ED 139 standards.
- Nokia ANSP solution is to support data, voice and radar communications services

- Avinor
- Skyguide
- Isavia



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ANSP INTERNATIONAL CONNECTIVITY

Go Allwhere.



ANSP International connectivity

Reducing TDM/E1 dependency

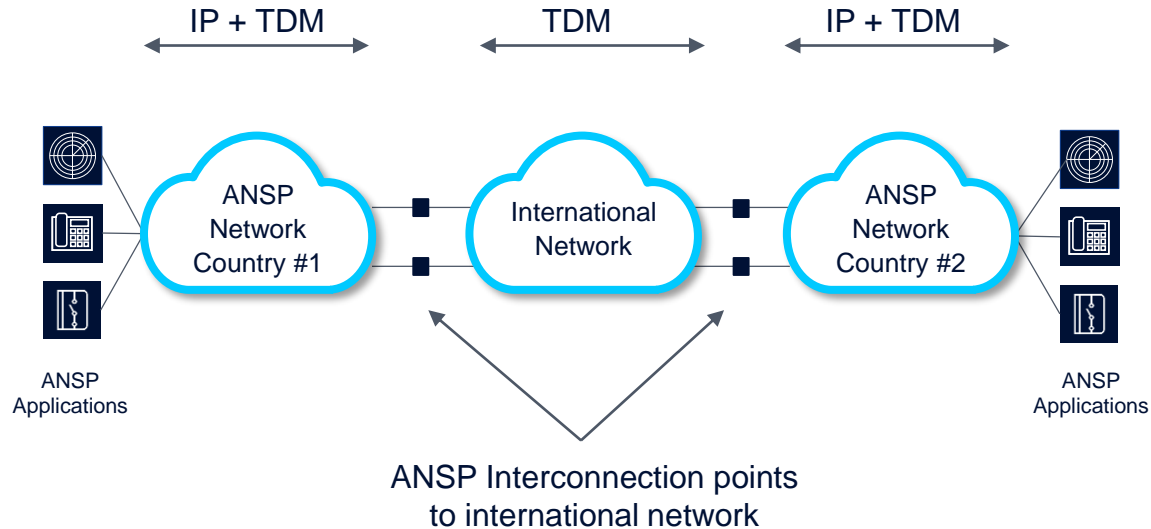
CURRENT REALITY

International ANSP (voice) connectivity continue to rely on TDM services
ANSP's continue to use TDM based applications / connections
Network operators are taking E1 international connections out of service

MIGRATION TO INT'L IP

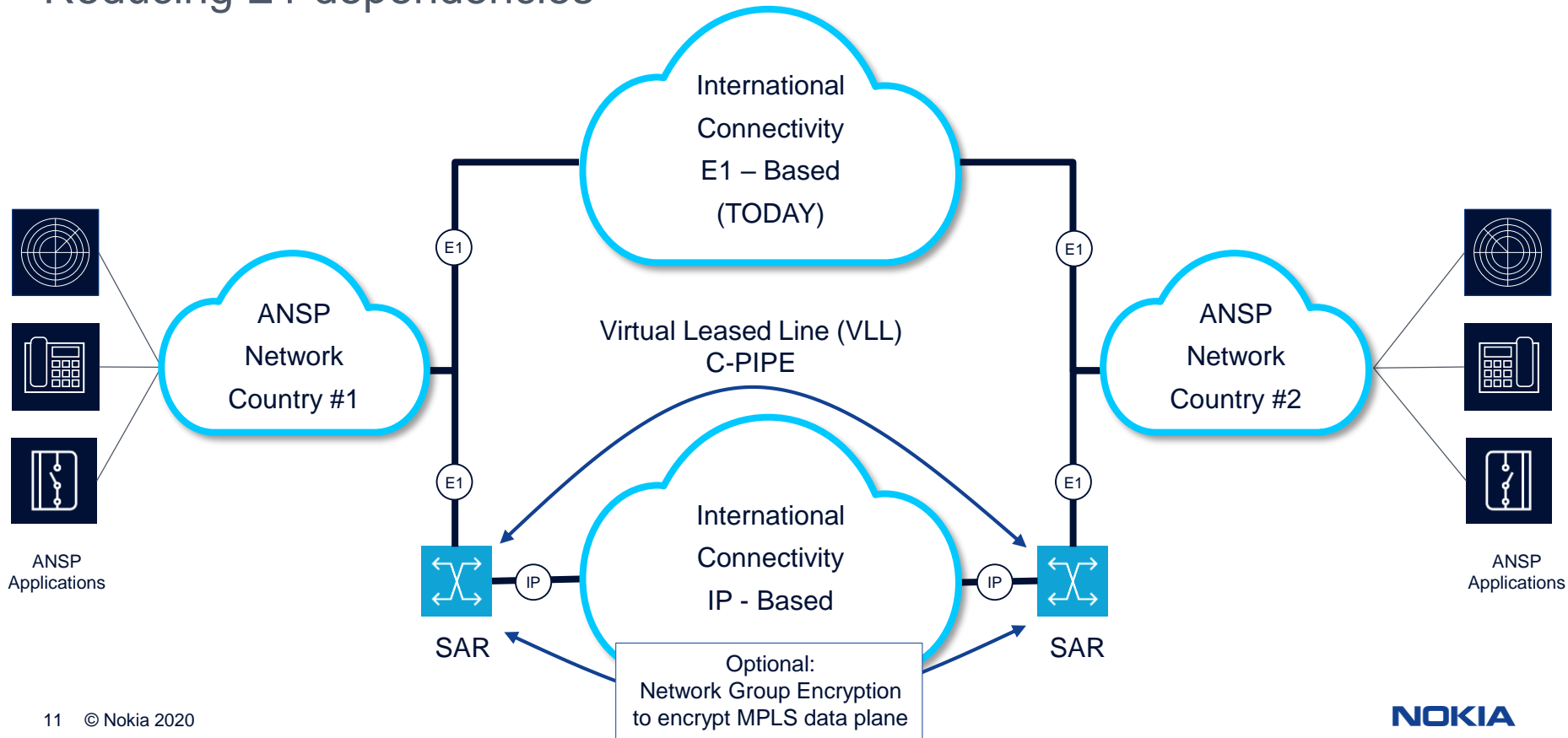
Continue to use ANSP E1 application
Strategy: limit migration to interconnection point:
domestic – international

INDICATIVE ANSP INTERNATIONAL CONNECTIVITY



ANSP International connectivity

Reducing E1 dependencies



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Connecting the skies

A blue sky with white clouds and a white contrail from an airplane streaking across the frame.

European Aviation Network

LTE air-to-ground

Commercial network details

- First Europe-wide integrated LTE network with 300 base stations
- Increased bandwidth for fastest broadband access via smallest on-board antennas even in high-density flight areas
- Partners: DTAG, Thales & Inmarsat



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THALES



World's first and only home-like Internet experience on board based on an LTE connection to the aircraft and Wi-Fi inside the cabin

Results

- Unmatched in-flight connectivity for 30 countries
- German Innovation Award
- First customer:
British Airways launched passenger Wi-Fi services in Nov. 2018, set to disrupt the market

Aviation community benefits

ANSP



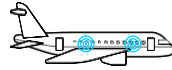
A step into the future

A state-of-the-art technology to enable SWIM

Improved communication even at lower altitude and all kinds of Aircraft

No compromise on safety

Airlines



Efficient, affordable & cost benefit from connected operations

Easy & economical installation on any aircraft

Differentiating passenger experience and new revenues

Passengers



Affordable home-like Internet experience

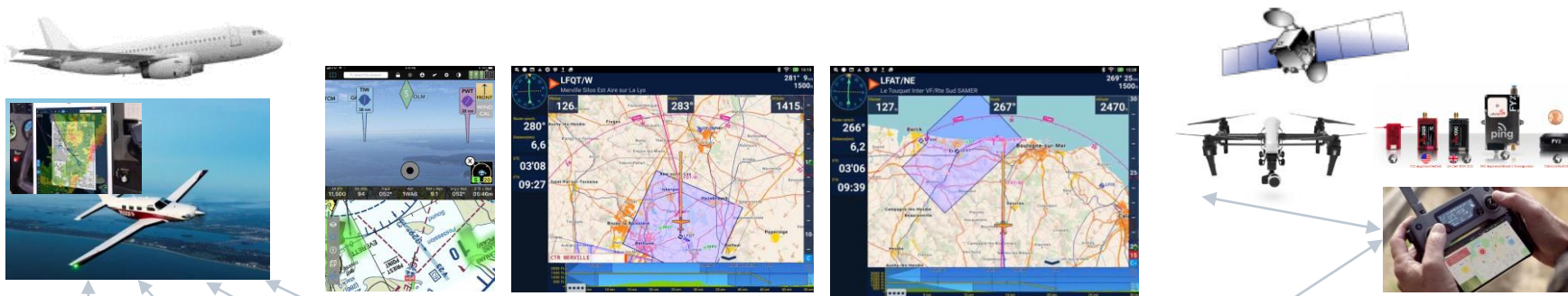
Personalized entertainment

Enhanced productivity

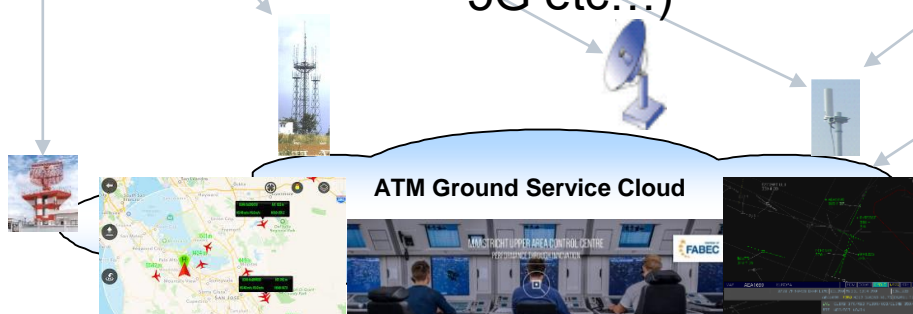
Focused on secure, efficient and lower cost of ownership for the Aviation community



Future All Aviation CNS Technology (FACT)



Evaluate new Technologies (4G, 5G etc...)



- 6 Partners:
 - HONEYWELL International (leader), ESKISEHIR TEKNIK UNIVERSITESI, NOKIA, ISTANBUL TEKNIK UNIVERSITESI, AOPA GERMANY, EUROCONTROL
- Project selected by the SESAR-JU for exploratory research.
- Targeting light aviation and drones requirements/commercial aviation
- 2 years project, starting in July 2020.
- Experiment at ESKISEHIR international Airport.

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ANSP CYBERSECURITY

Go Allwhere.



One common ATM goal

The goal for global aviation is to become a “system of systems”, with all relevant air traffic information shared seamlessly to support collaborative decision-making.



While there are clear benefits to this approach,
it makes ATM increasingly vulnerable to cyber attack.

Cyber Security Governance in Aviation

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Involvement(*)



ICAO Working Group on Threat and Risk
ICAO Working Group on Training



ECAC study group on cyberthreats to civil aviation



CANSO Working Group

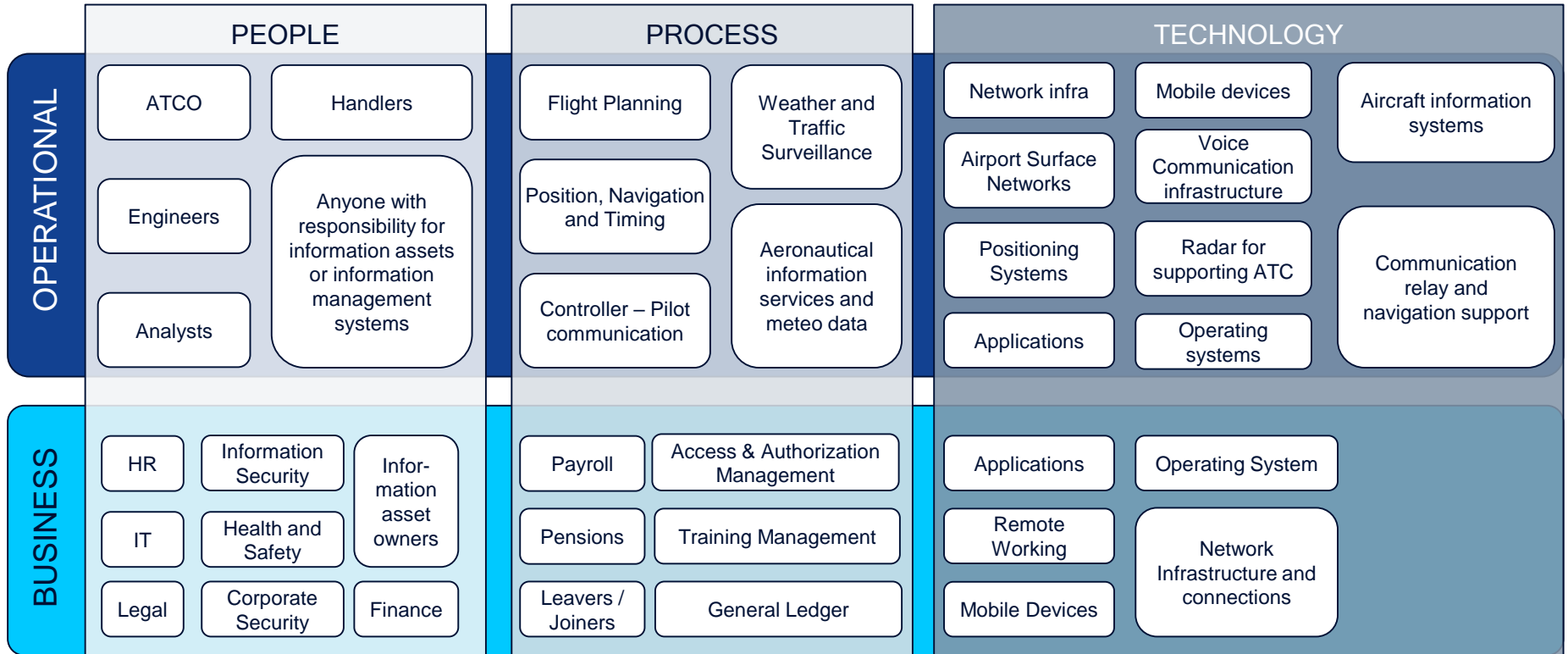


National CAA groups
National initiatives

(*) Participation in working groups, develop regulations, procedures, etc.

ANSP Cyber Asset Model

A multi-dimensional challenge



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