

Regional Focus



# Recovery goes beyond the visual: Experience remote digital tower and UTM concepts.

Thursday 17 June 2021

08:00 – 10:00 CEST

# Moderator



**Mr. Hai Eng Chiang**  
Director Asia Pacific Affairs

**CANSO**

# Speakers



Matthias Gerlich  
ATM Networks Expert and  
Senior Sales Director ATM Civil  
Frequentis AG



Peter Gridling  
Digital Tower Expert and Vice  
President Sales  
Frequentis DFS Aerosense



Guenter Graf  
Vice President New Business  
Development and Innovation  
Frequentis AG



Roman Stickler  
UTM Expert  
Frequentis AG

# Network solutions for remote towers at very remote locations

# Speakers



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ATM Networks Expert and  
Senior Sales Director ATM Civil  
Frequentis AG



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Digital Tower Expert and Vice  
President Sales  
Frequentis DFS Aerosense

# ATM-grade VSAT Networks - Vitalsphere



VSAT Technology



ATM-grade Performance



Service Monitoring

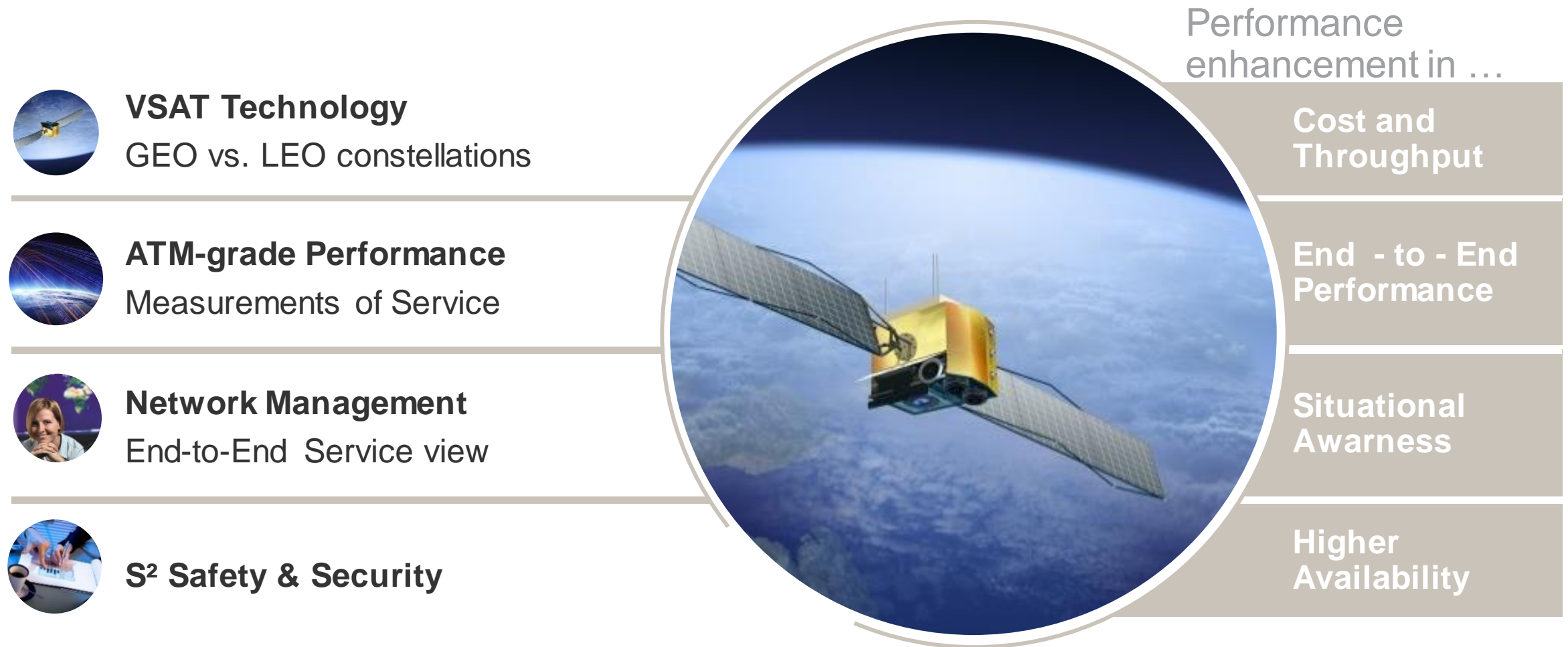


S<sup>2</sup> Safety&Security



# Moving up to the next level of performance, efficiency, safety and security

## ATM-Grade VSAT Networks



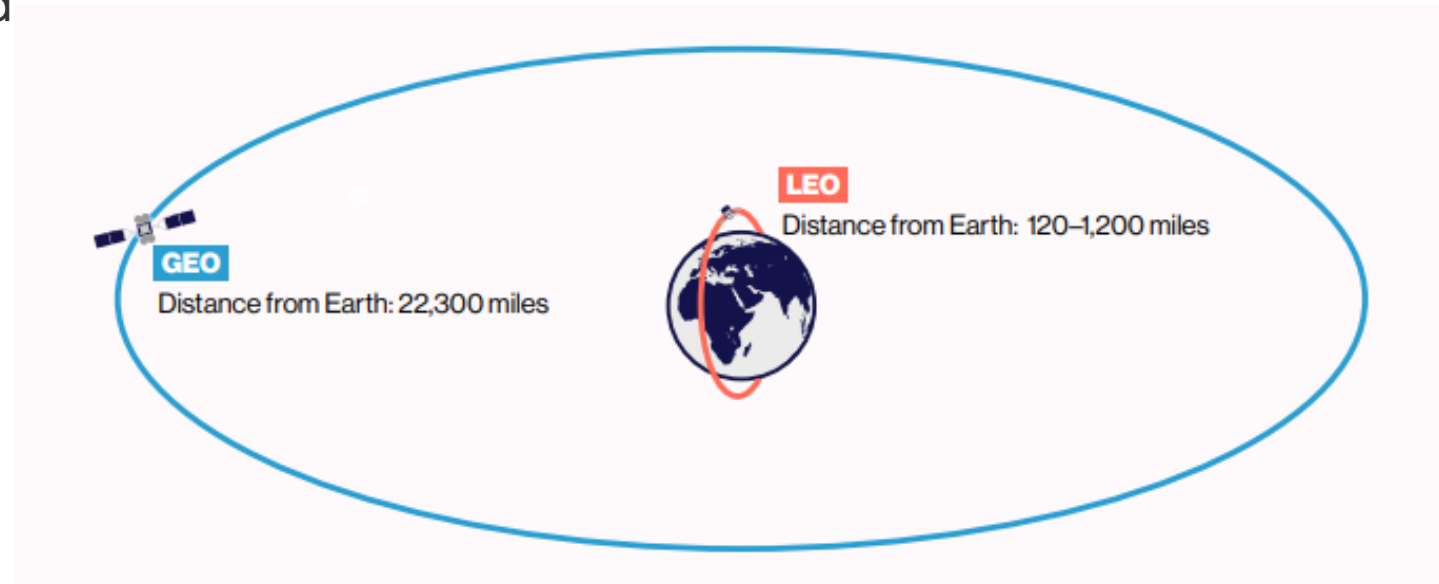
# Main differences between GEO and LEO satellites

## GEO Satellites

- Geostationary Equatorial Orbit
- ~ 36000 km
- Stationary above the same point on earth's surface
- Issues in polar regions (+/- 70 degrees latitude)
- High latency due to huge distance and RTT will be high ~ 500 ms

## LEO Satellites

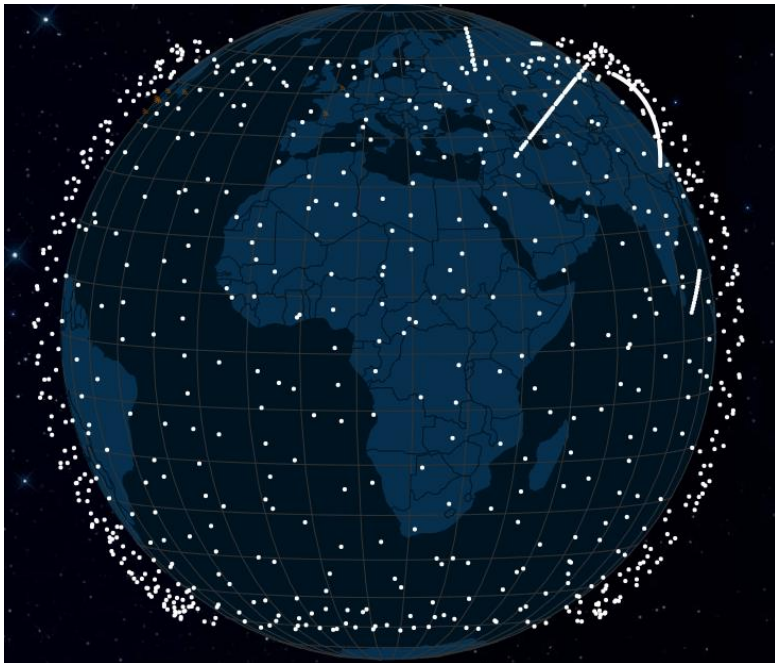
- Low Earth Orbit
- 160 – 2000 km
- Mega constellation for continuous global coverage
- Low latency 20 - 40 ms





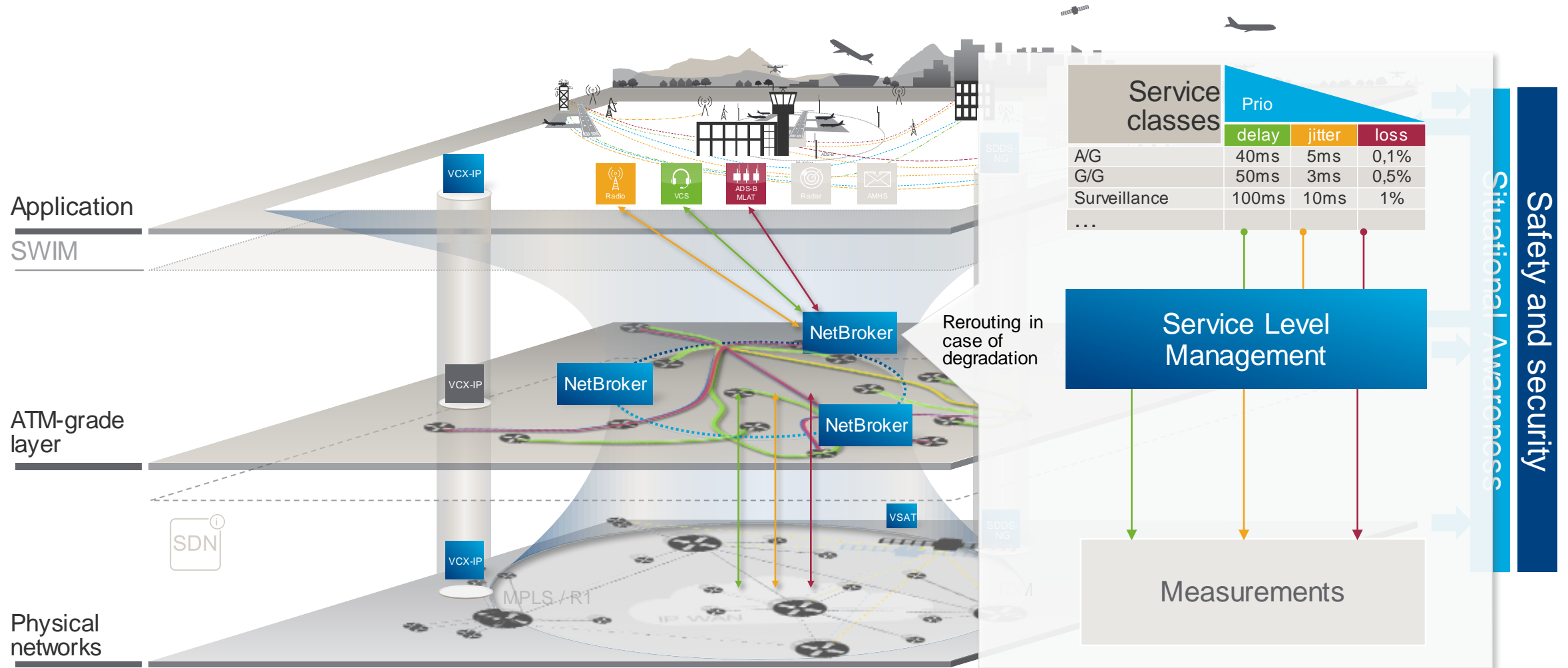
# New Satellite constellation enable RDT deployments

- High speed 50Mb/s – 150 Mb/s
- Lower Cost
- 12000 satellites are already approved for 1<sup>st</sup> stage
- Easy to set-up



# ATM-Grade Intelligence

Brokering network capacity between ATM-specific applications and non-ATM specialised backbone



# Building ATM-grade networks

## Service Classes Example Definition

Class	Example applications	Control based of	Max. Delay / Max. Jitter	Max. Packet Loss / Minimum BER	QoS class / Bandwidth requirements	Other capabilities	allowed MPLS 1	allowed MPLS 2	allowed VSAT
1	A/G, G/G	per call	<50ms <10ms	<0,1% < 1x10 <sup>-7</sup>	EF 100% in each WAN	MOS ED-137 compliance	Yes	Yes	Yes
1	RADAR (RT-Data)	per connection	<150ms <10ms	<0,1% < 1x10 <sup>-7</sup>	High prior AF 100% in each WAN	Admission control Data forking	Yes	Yes	Yes
1	Video	per connection	<50ms <10ms	<0,1% < 1x10 <sup>-7</sup>	High prior AF 100% in each WAN	Admission control	Yes	Yes	Yes
2	AMHS	per class	<100ms	<0,5% < 1x10 <sup>-7</sup>	AF33	Traffic shaping	Yes	Yes	Yes
2	OPMET	per class	<100ms	<0,5% < 1x10 <sup>-7</sup>	AF32	Traffic shaping	Yes	Yes	NO
3	Admin	per class	<50ms <10ms	<0,5% < 1x10 <sup>-7</sup>	AF25	Payload encryption	Yes	NO	NO
4	Best Effort	per class	n/a		BE elastic		Yes	NO	NO

Operational Services

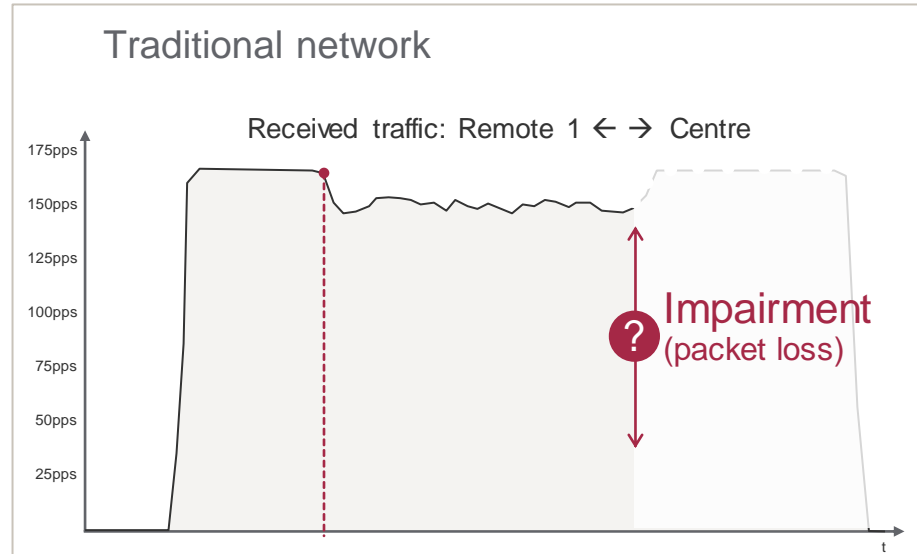
Operational Applications

Privileged Applications

Administrative Applications

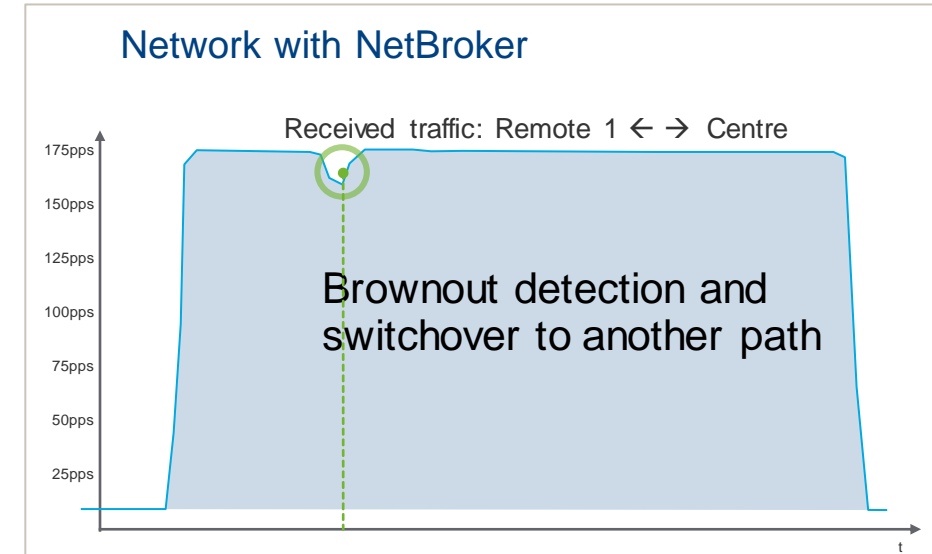
# Building ATM-grade networks

Enhanced network performance with brownout detection and rerouting



Without overlay: Degradation over time

*“Maybe it returns back  
to normal... or not”*



NetBroker senses degradation

- For some apps more critical than for others
- Can act according to app needs

Detecting degradation in quality, traffic re-routing if needed to ensure performance

# Building ATM-grade networks

Taking advantage of converging IP network benefits ...



Commercial IP WAN experience



ATM-grade experience

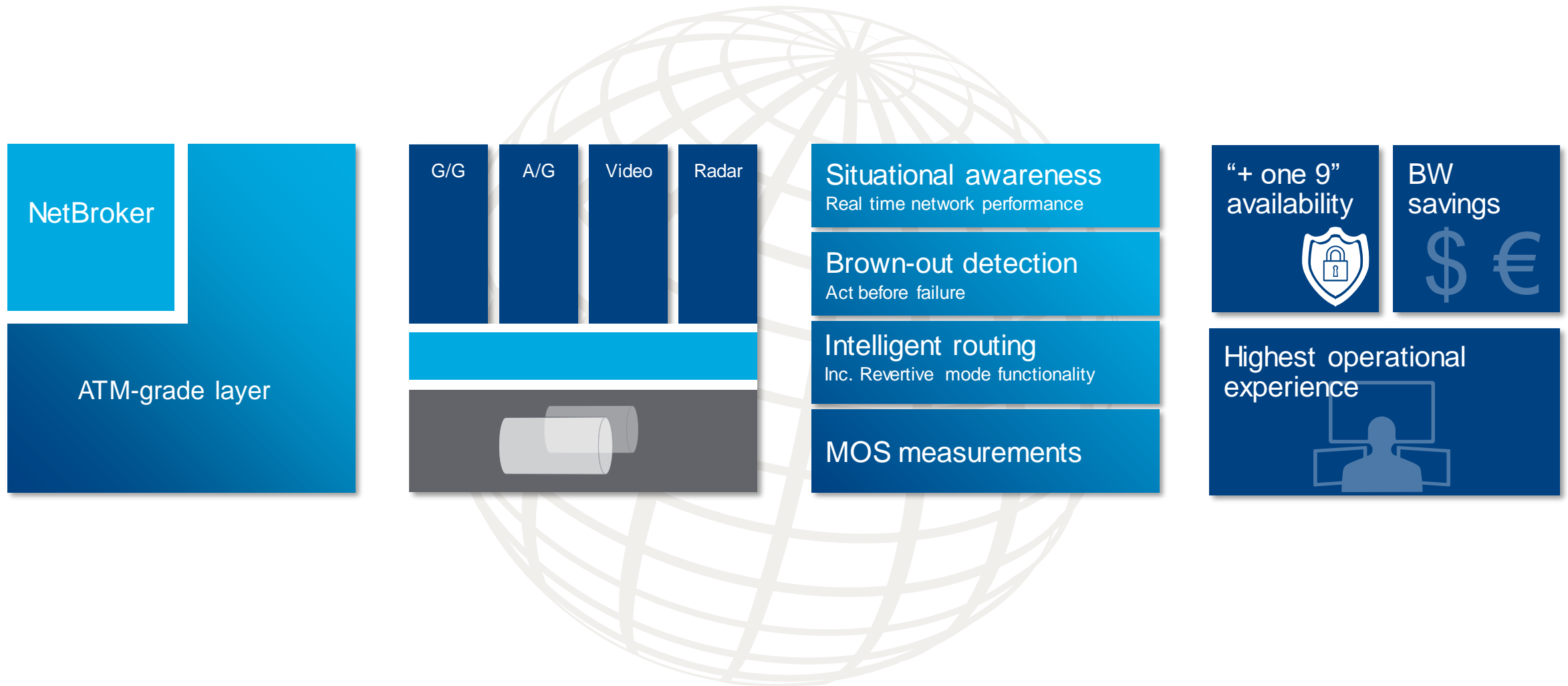


... while avoiding the related downsides for safety-critical applications



# Matching network performance and application needs

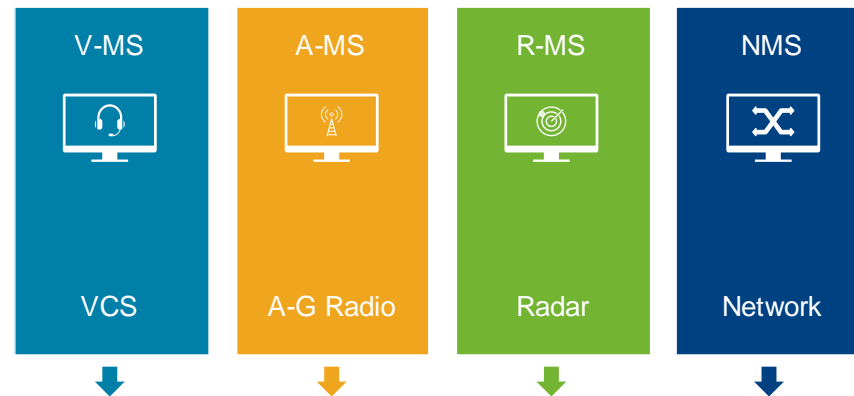
Proactively prevent failure and maximize cross-layer quality of service



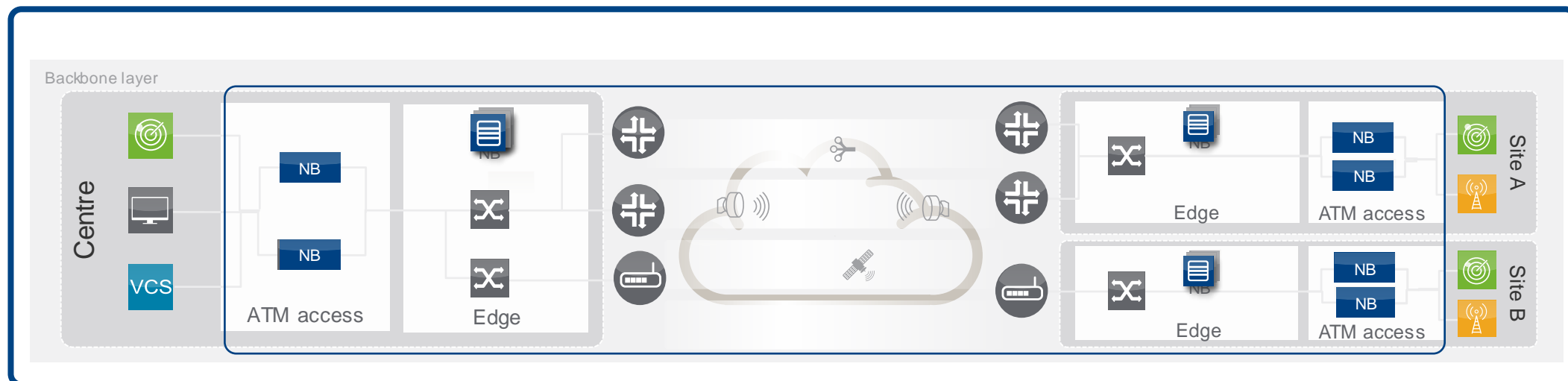
# Situation ANSP operations | Typical monitoring in silos

Monitoring of ATM systems, applications and network in silos is a challenge and safety risk

Management systems



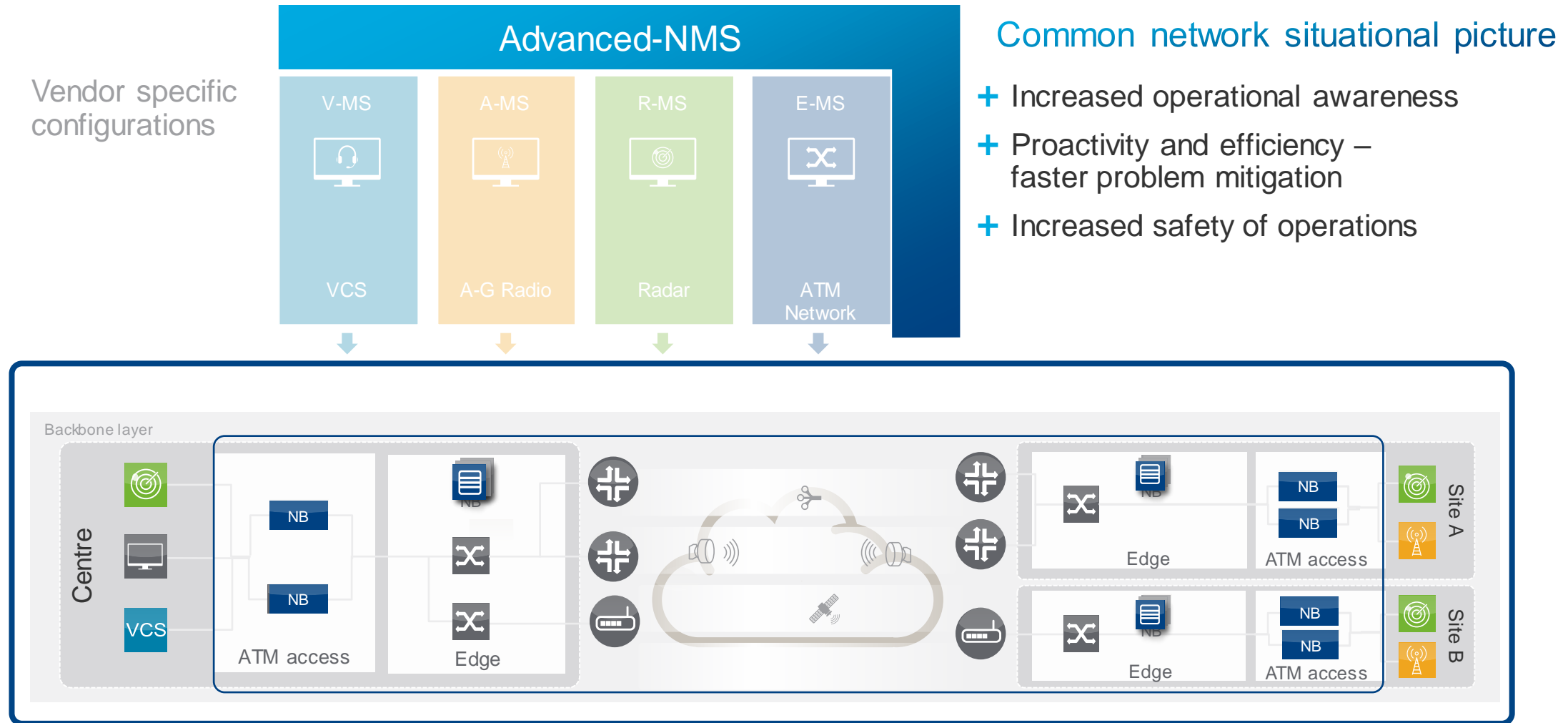
- Complex collaboration between units
- Low situational awareness (device level)
- No ATM specific measurements
- Decreased safety of operations





# Creating a unified network situational awareness

End-to-end network and system management



# End-to-end network management for proactive and efficient ATM operations

## Frequentis Advanced-NMS overview

Operational  
systems  
(North bound)

Ticketing system, email/SMS, 3<sup>rd</sup> party NMS

Advanced-NMS

Core modules



Dashboards, reporting, analytics



Fault  
management



Configuration  
management



Performance  
management



Security  
management



Inventory  
discovery



EoI / vulnerability

I/O

Geo  
resilient  
DB's

Remote modules



Probing



NMS agents



User agents



VSAT quality  
assurance

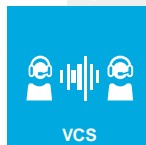
Probes

Measured data

HTTPS access

Bandwidth / QoS

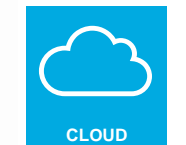
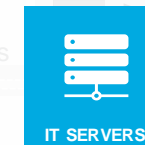
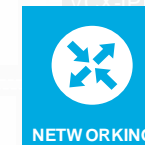
Monitored  
elements  
(South bound)



ATM access



Edge



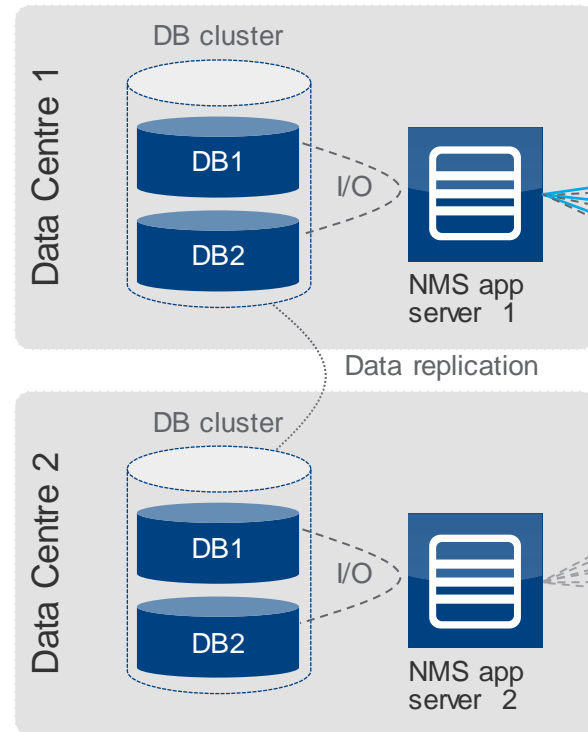
Edge

ATM access

# Advanced-NMS: ATM-grade design

Highest availability – fully resilient

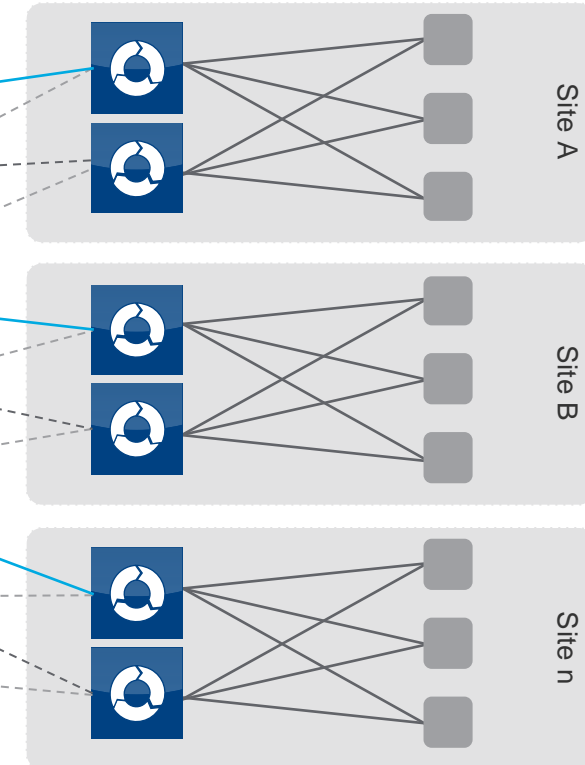
## Data centres



Core APP platform &  
data retention and archive

## Remote agents

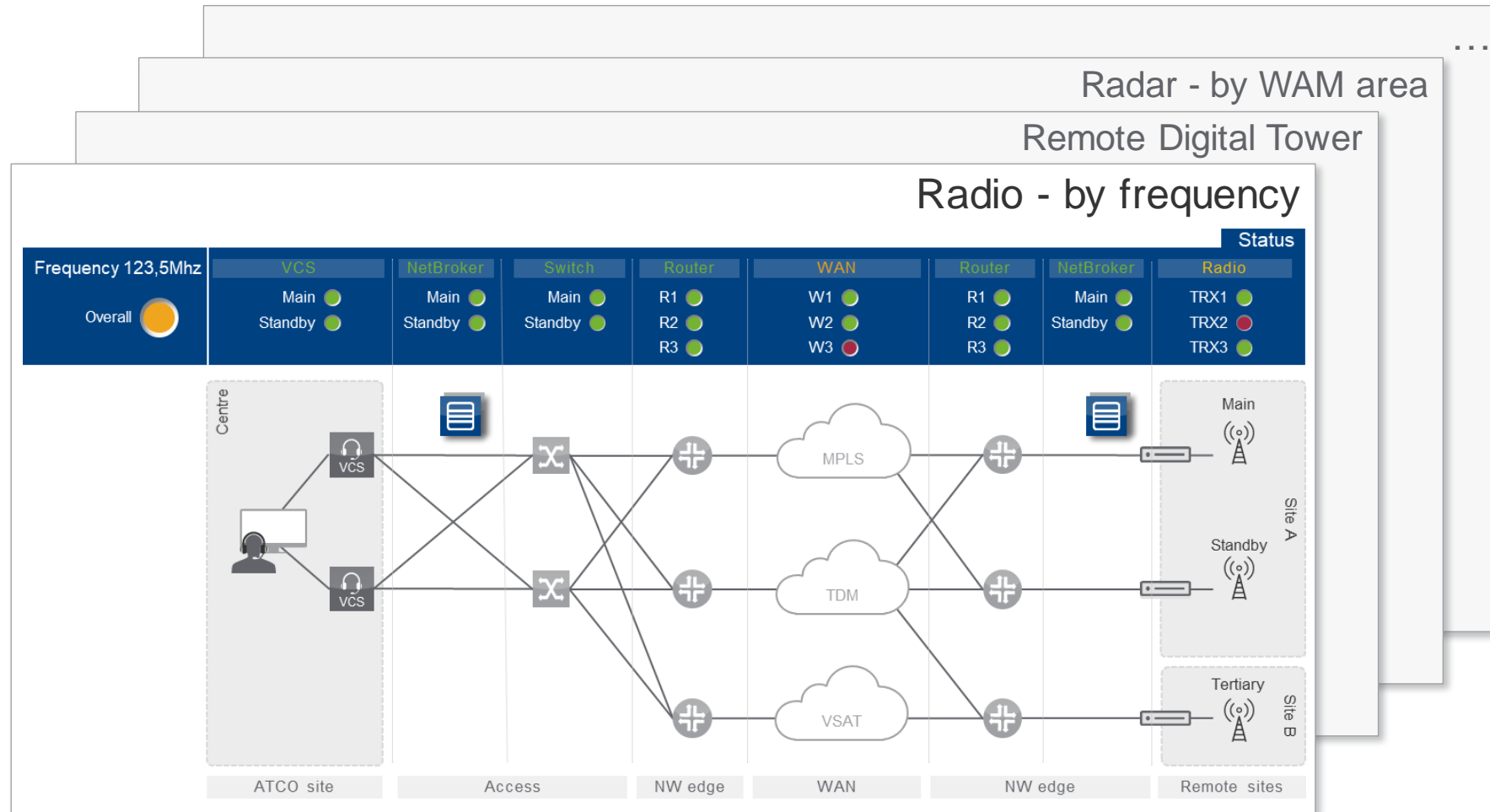
## Monitored elements



Data collection &  
remote processing

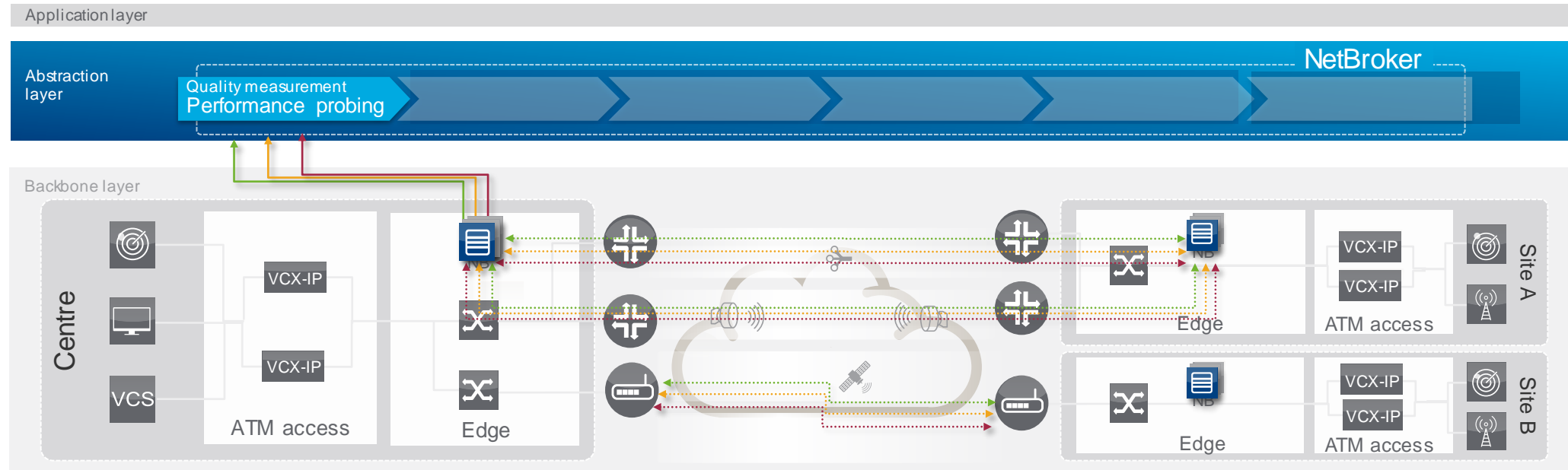
# End-to-end service view: correlating all measured data

Visualising logical connections and their importance for the service quality



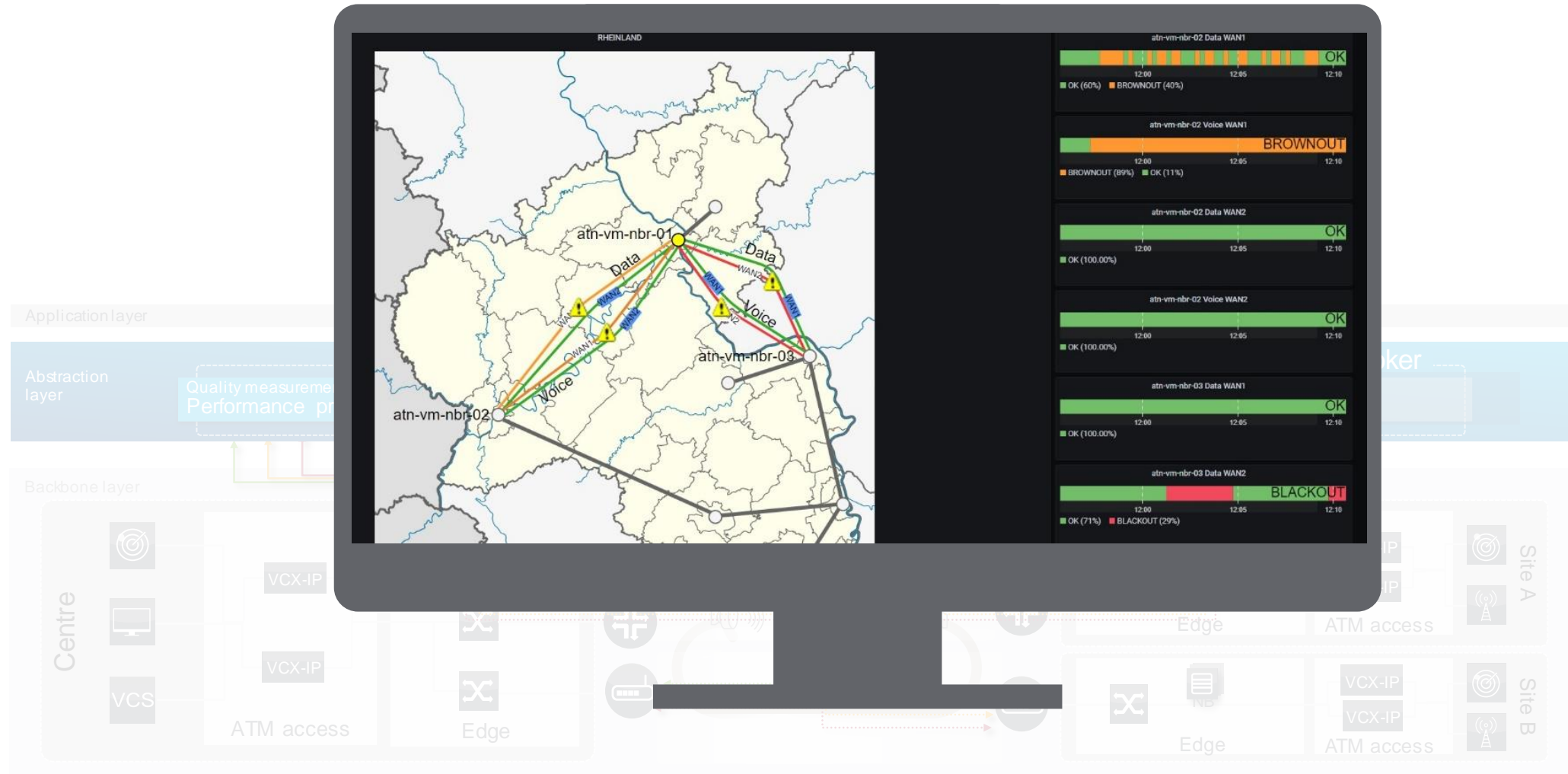
# Advanced quality view leveraging NetBroker

## ED-138 compliancy measurements and reporting



# Advanced quality view leveraging NetBroker

## ED-138 compliancy measurements and reporting



# Unified network situational awareness

Reduce TCO and proactively prevent failures

✓ End to end service view

✓ Increased safety and  
effectivity of operations

✓ ATM-grade design and  
functionalities

✓ Integration and scalability

Highest  
situational  
awareness



Act before  
failure



Reduced  
TCO



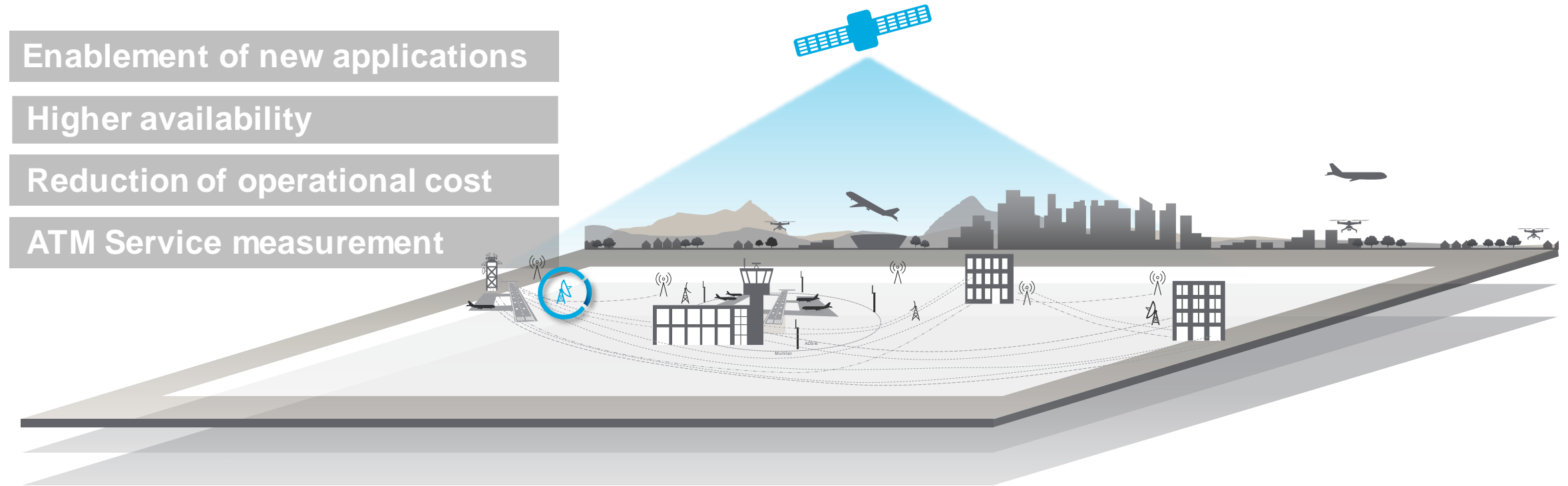
Safe &  
resilient  
solution





# Frequentis VSAT Solutions for better operational performance

## ATM-Grade VSAT Networks



Enablement of new applications

Higher availability

Reduction of operational cost

ATM Service measurement

Link Performance Measurements  
(FEC, Modulation, e.g.)

Performance characteristics  
SLA management per site & per service

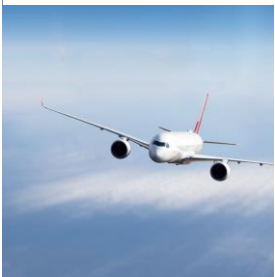
Redundancy and availability  
Brown-out detection

Disaster recovery  
Quick deployment solutions

Service Monitoring  
End-to-End services  
(A/G, G/G, RDT, Surveillance)

# FREQUENTIS

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Combine UTM and ATM for future  
growth and enable professional  
drone services

# Speakers



Guenter Graf

Vice President New Business  
Development and Innovation  
Frequentis AG



Roman Stickler

UTM Expert  
Frequentis AG



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UTM solutions for the digital  
transformation



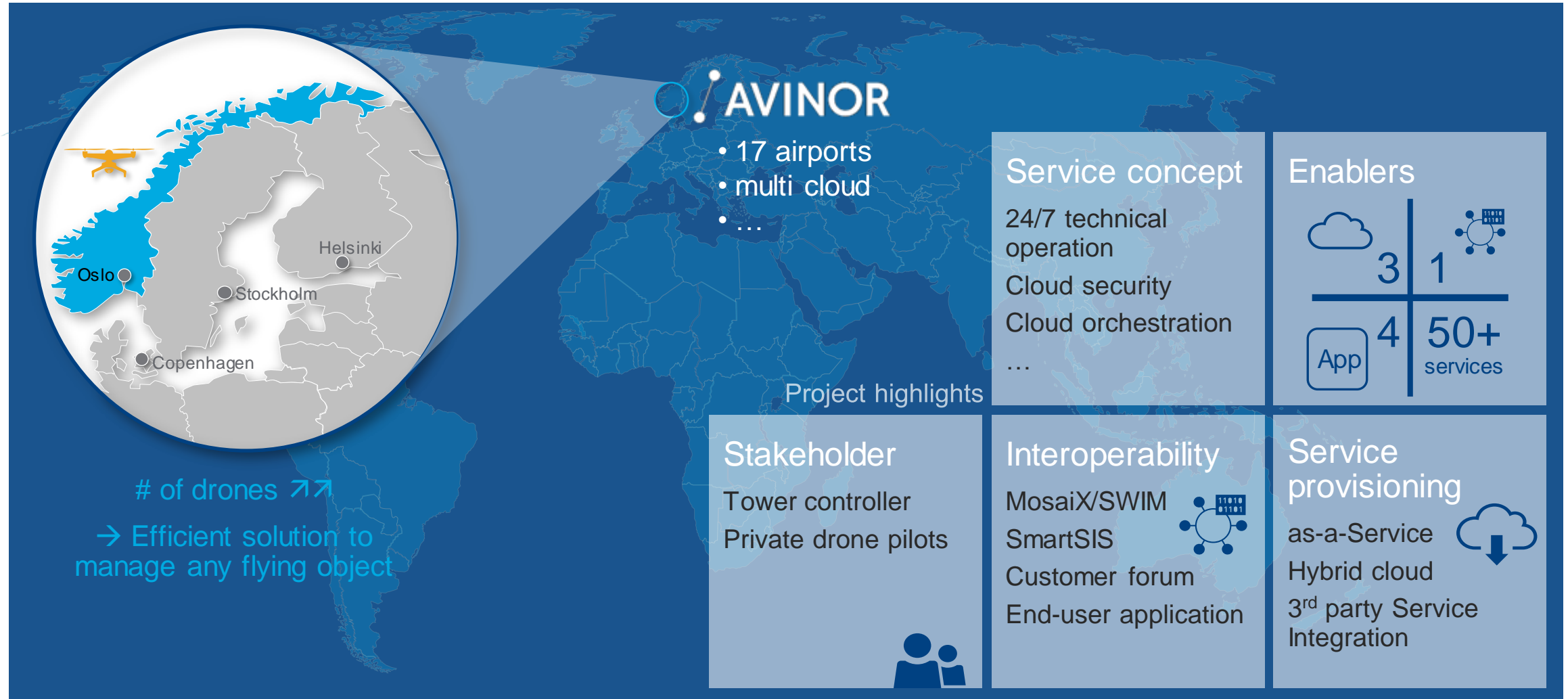
# Agenda

- UTM for Air Traffic Controllers – The Avinor Example
- Regulation – Where does Europe stand?
- Frequentis & Drones – Our Mission
- Drones in Public safety – an important Use-Case



# First ATM/UTM integration system in the EU for Avinor

Leveraging the advantages of as-a-Service delivery







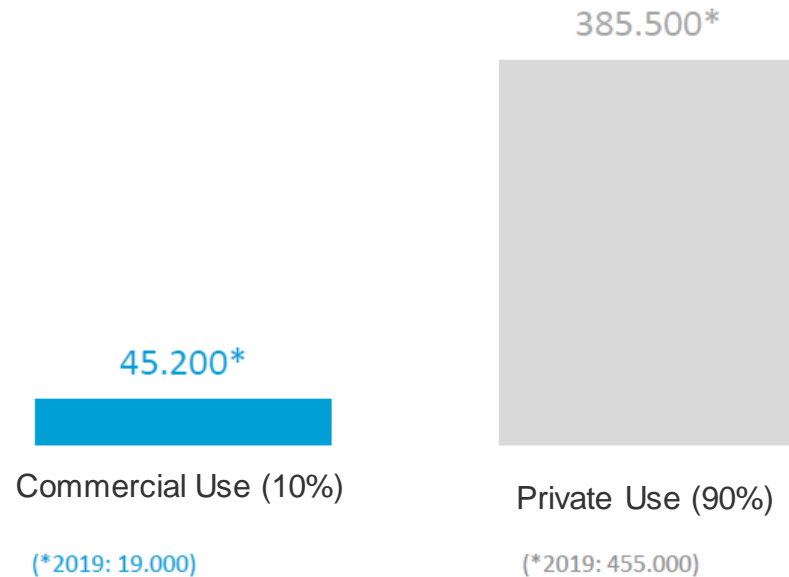
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Regulation – Where does Europe stand?

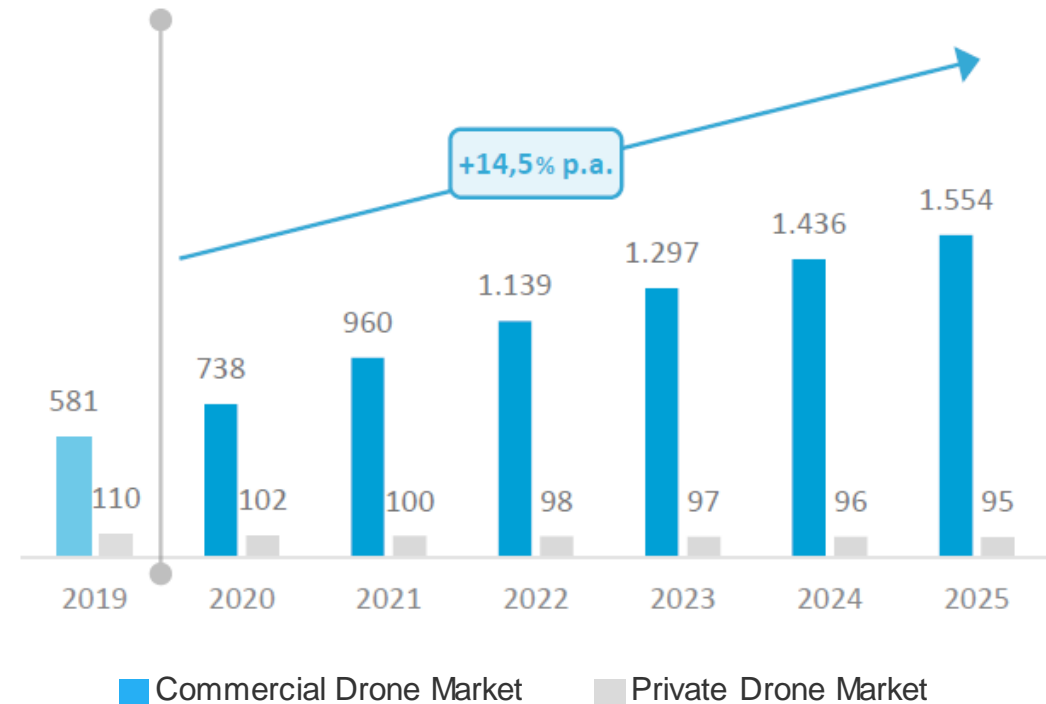
# Market Development

- Based on Germany

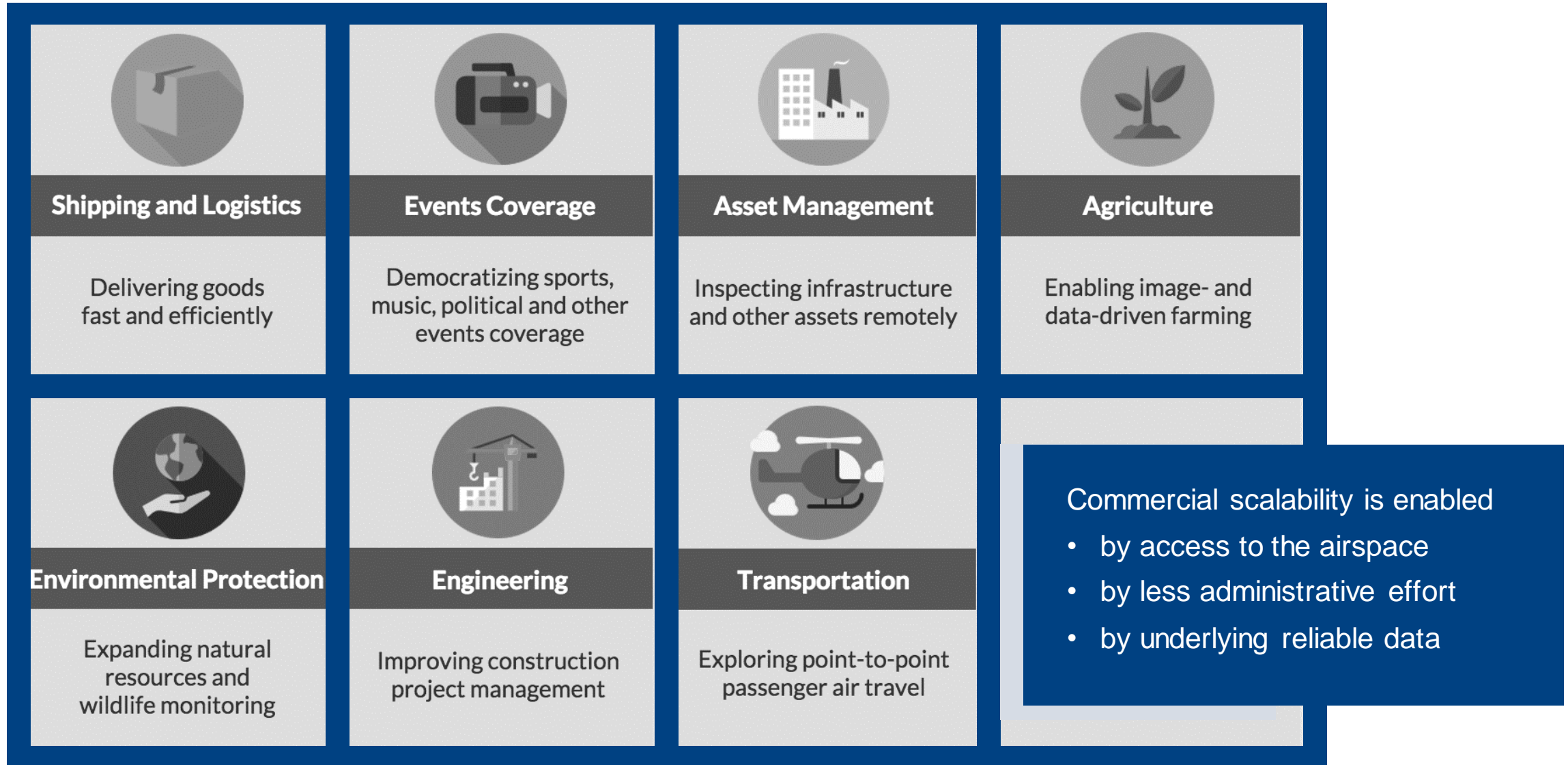
## 430.700 Drones in Germany



## Growth Forecast until 2025 (in MEUR)



# Commercial Demand



# Requirements and expectations to be met

## Legal framework (EASA)



Reliable and safe provision of

- Services and
- Information

## Commercial Demand



Commercial scalability is enabled

- by access to the airspace
- by less administrative effort
- by underlying reliable data

## Other authorities



- Law enforcement
- cUAS
- Fire Service
- SAR



# FRQ supports U-space regulation & specific operations

## U-space regulation

### Network Identification

Who is where (US: RemoteID)

### Geo-Awareness

Conditions/Constraints/Zones

### Flight Authorisation

From service provider to oper.

### Traffic Information

Air situat. provided to operator

### Weather Information

Optional, incl. QNH

### Conformance Monit.

Optional, make operator aware



..in an integrated approach.

## Specific Operations

### Registration

Interface

### SORA

Information

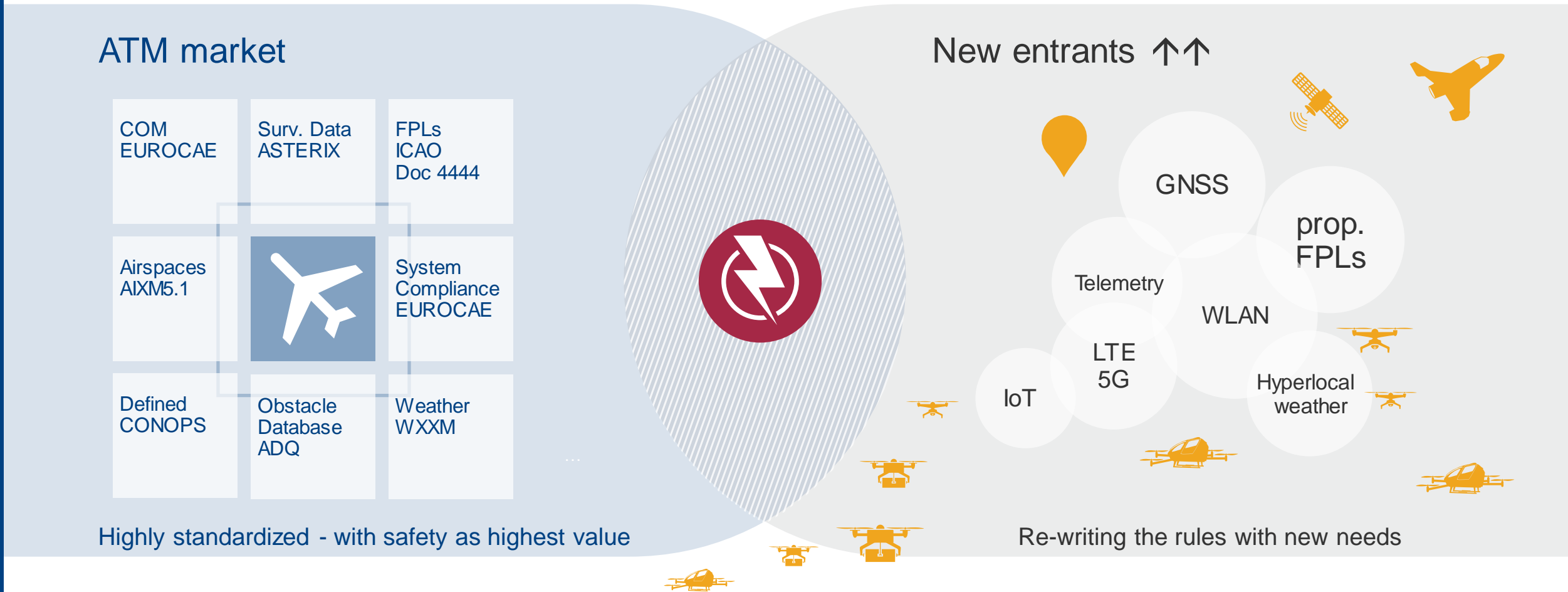


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## Frequentis & Drones – Our Mission

# Uniting the things that fly

- How to ensure safe UAV operation in shared airspace





# Uniting the things that fly

- Seamless information exchange between all stakeholders



# Integration of UTM and ATM systems: inter-agency UTM solution

Demonstrating the fitness of a digital data exchange platform for cross-border drone operations



Part of the European U-Space initiative



Large scale demonstration



Common operational picture - enabling Joint Operations / authority collaboration



Urban drone fleet ops in controlled airspace ...



... with Police intervention



...with search and rescue forces and general air traffic



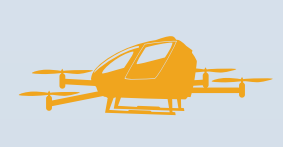
...with border guards over Gulf of Finland



... for inspection flights



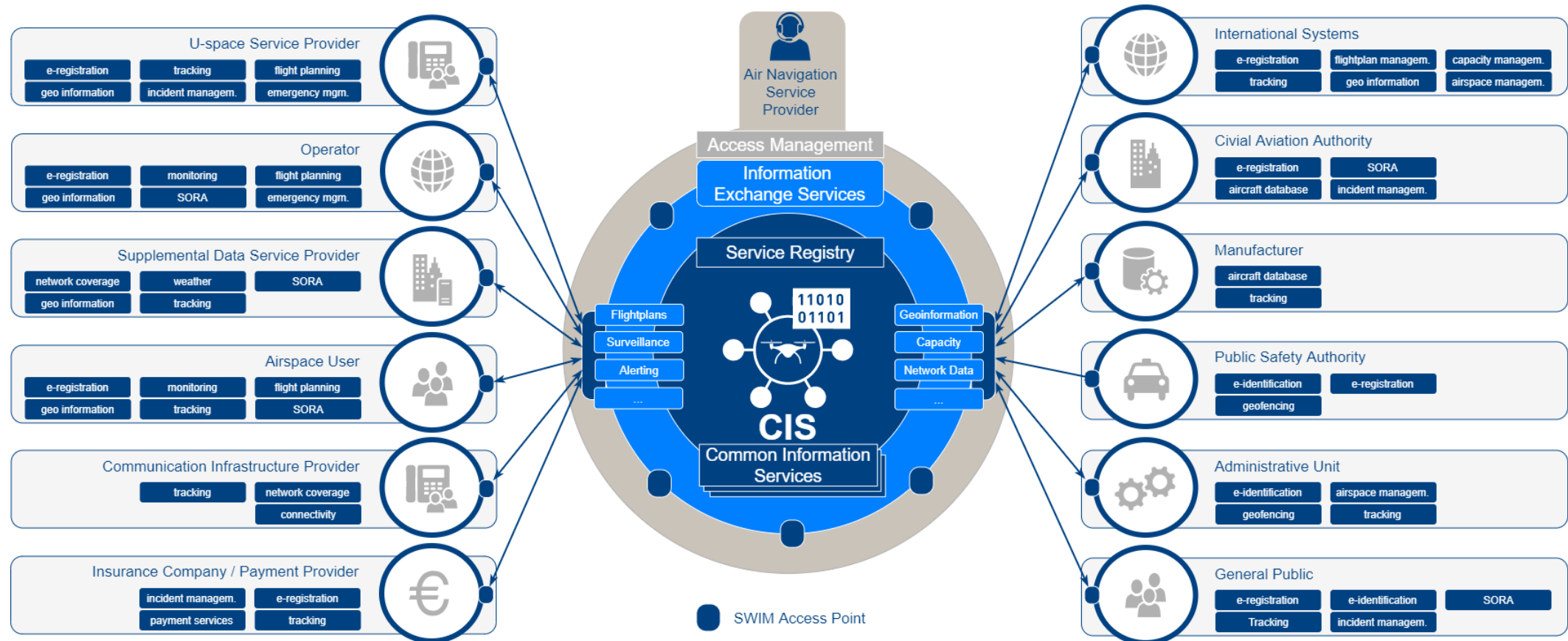
...with international parcel delivery



... with Drone taxi shuttle

# Utilizing existing infrastructure components to bridge UTM and ATM

- Interoperability and standardization are key enabler to build the

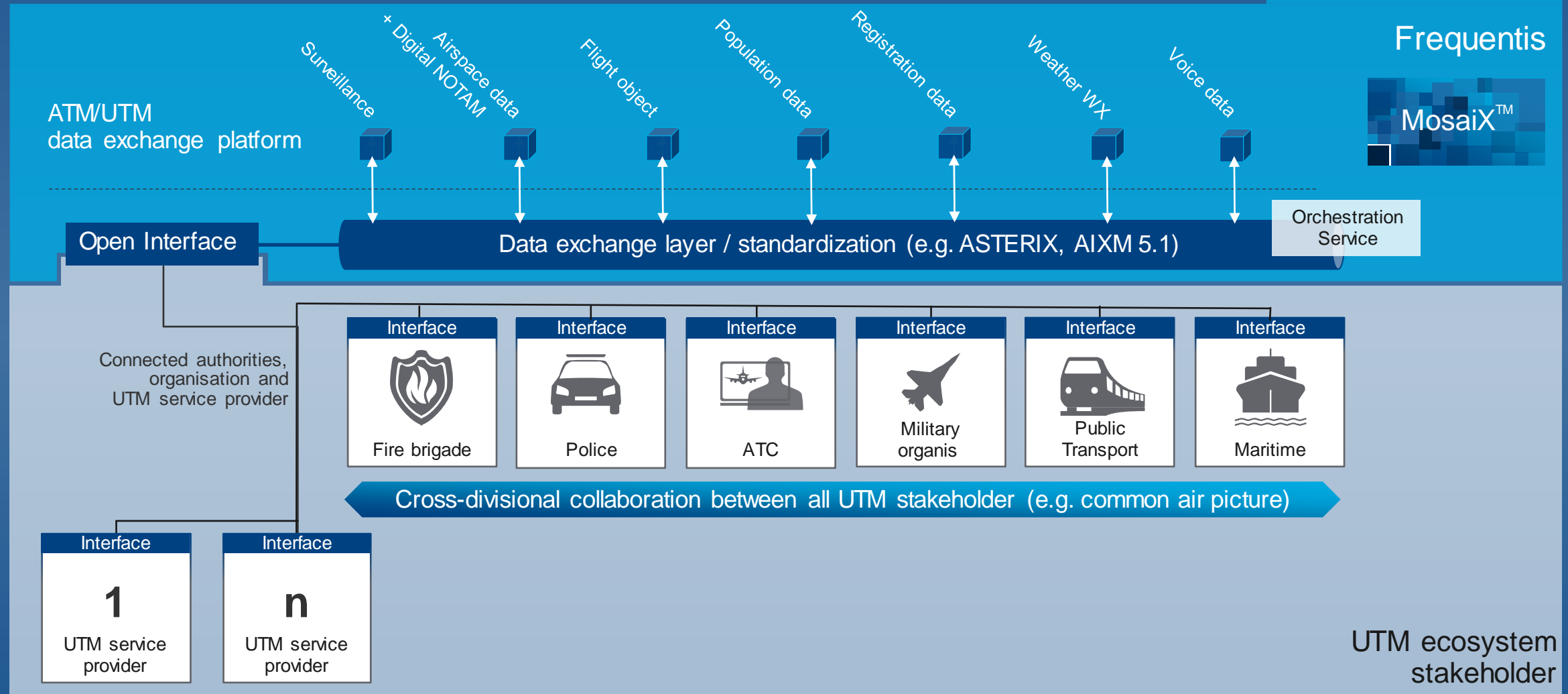


High Level design and architecture

# UTM / ATM data exchange platform (MosaiX)

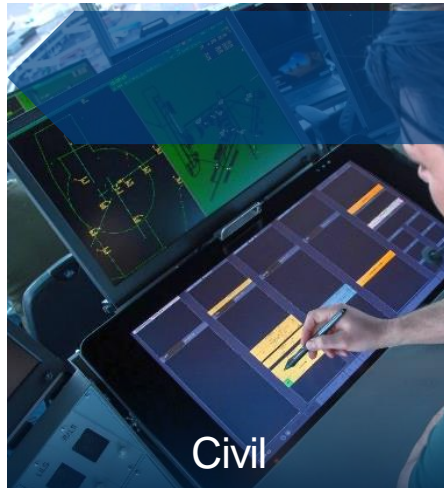
## Future proven and fully expandable system design

Stakeholder centric view



# UAS utilisation in safety-critical environments

## Air Traffic Management



Air navigation service providers  
Aeronautical data service providers  
Flight information service providers  
Airports  
Unmanned traffic service providers  
Space agencies



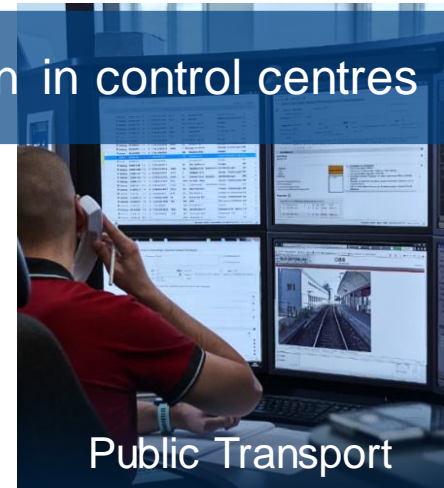
Air force  
Army  
Navy  
Homeland security  
Joint forces

## Drone Management and/or administration in control centres

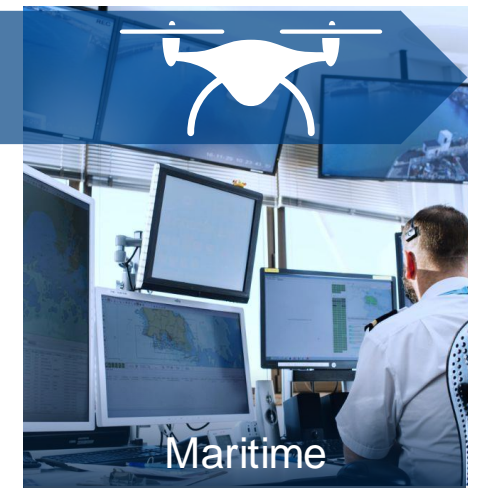


Police forces  
Fire services  
Emergency and medical services  
Critical infrastructure for industries

## Public Safety and Transport



Heavy rail  
Urban rail



Coast guard / navy  
Offshore  
Port authorities  
Search and rescue












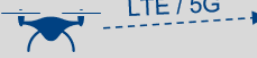
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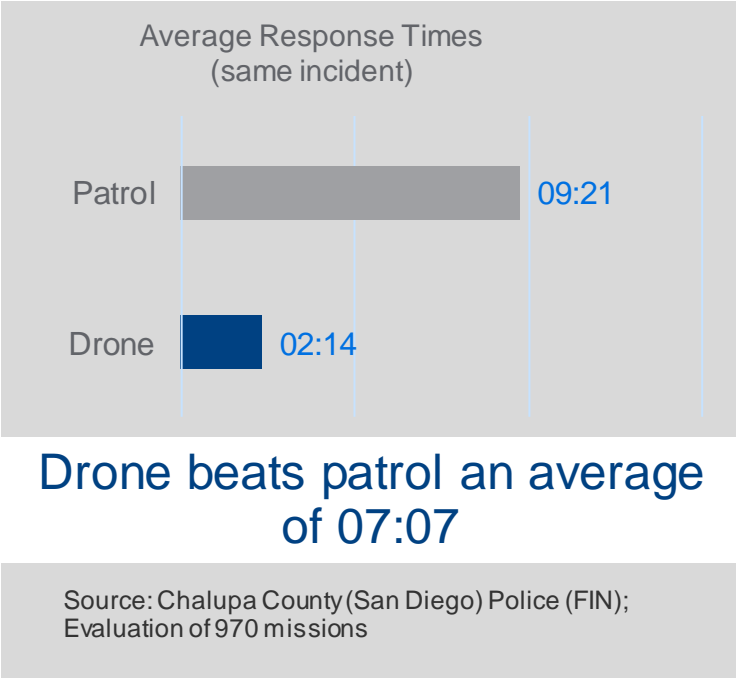
## Drones in Public Safety

Example

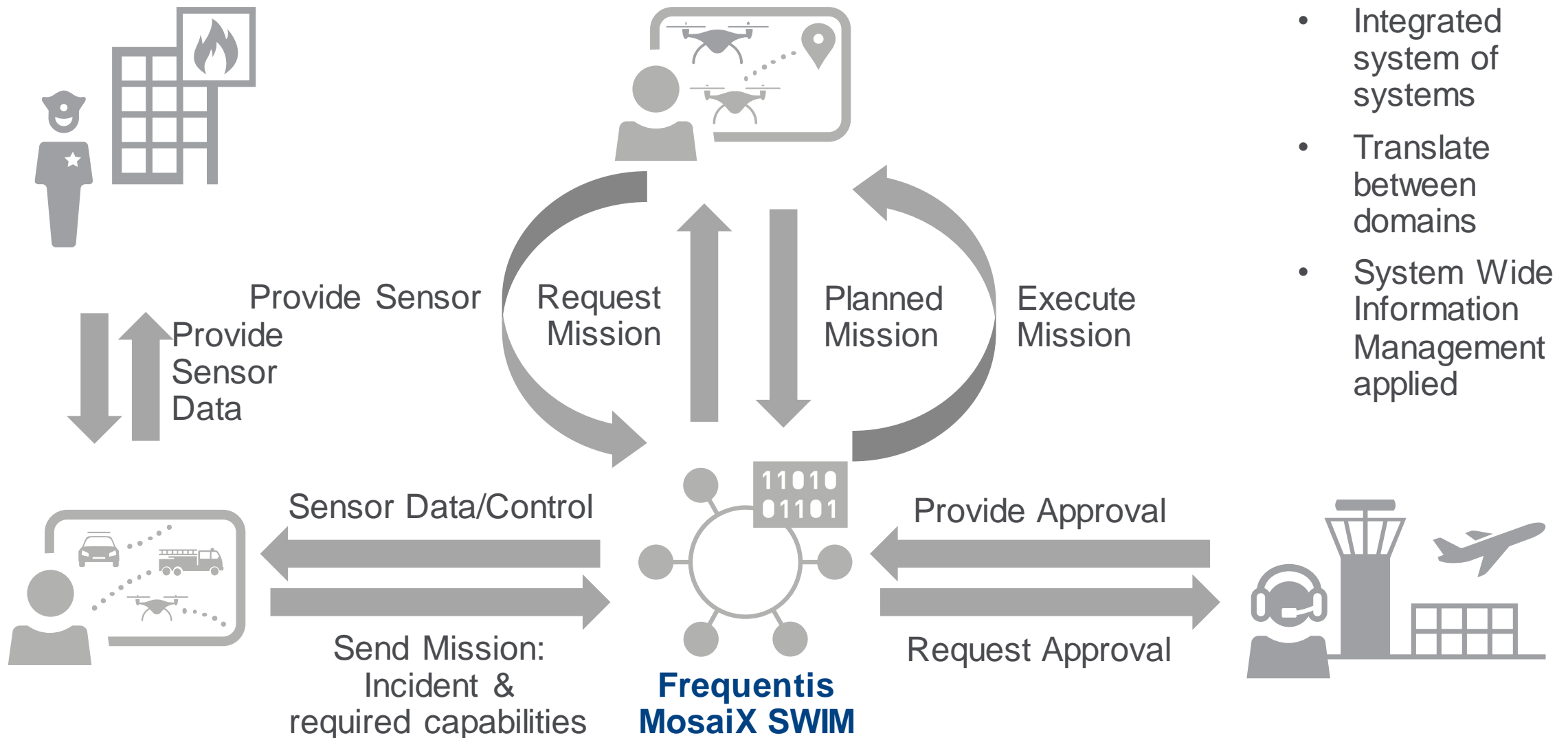
# Drones in Public Safety

- Now and tomorrow

	Now			
Alarm	Arrive on scene	deploy manually	Manual, handheld flight	Information availability for
			 (customer example)	
			 LTE / 5G	
Alarm	Automated drone flight	Not applicable	Remotely supervised or controlled	first responders, supervisors and managers
	Tomorrow			



## Current work - Integrated UAS Control & UTM in a public safety control center



# Summary

## Enabling to fly

Providing the complete ecosystem

### Any aircraft

UTM integrated into ATM

### Any airspace

U – Space Airspace  
Controlled-, uncontrolled  
Airspace

### Any time

### Any user

ATCO, Aircraft Pilot  
Drone Pilot, Commercial  
Operator, Law enforcement

### Any deployment

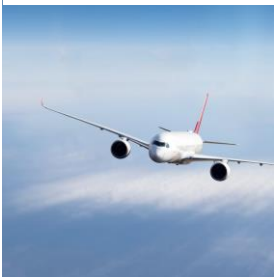
Cloud based SaaS  
On premises

- Worldwide growth in the UTM sector
- Book your demonstration now!



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# Questions and Answers

# Speakers



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