

RPAS integration in non segregated airspace: the SESAR approach

System interfaces needed for integration

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- Introduction: the CONOPS
- Scope of RPAS operations
 - System identification and description
 - RPAS classification
- RPAS integration
 - In current ATM
 - In future ATM proposed by SESAR
- Interfaces needed for the integration
- Conclusions



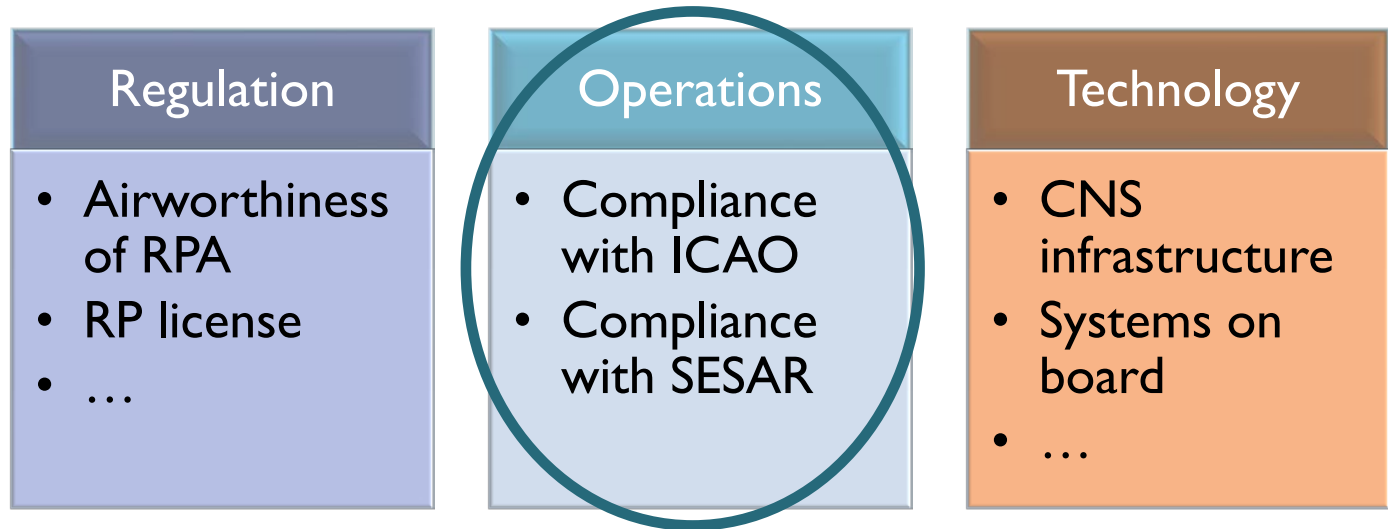
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Introduction: the CONOPS

Current situation of integration



Introduction: the CONOPS

Integration of RPAS in non segregated airspace

- Essential requirements
- Roles and responsibilities
- Interfaces required for the RPAS system

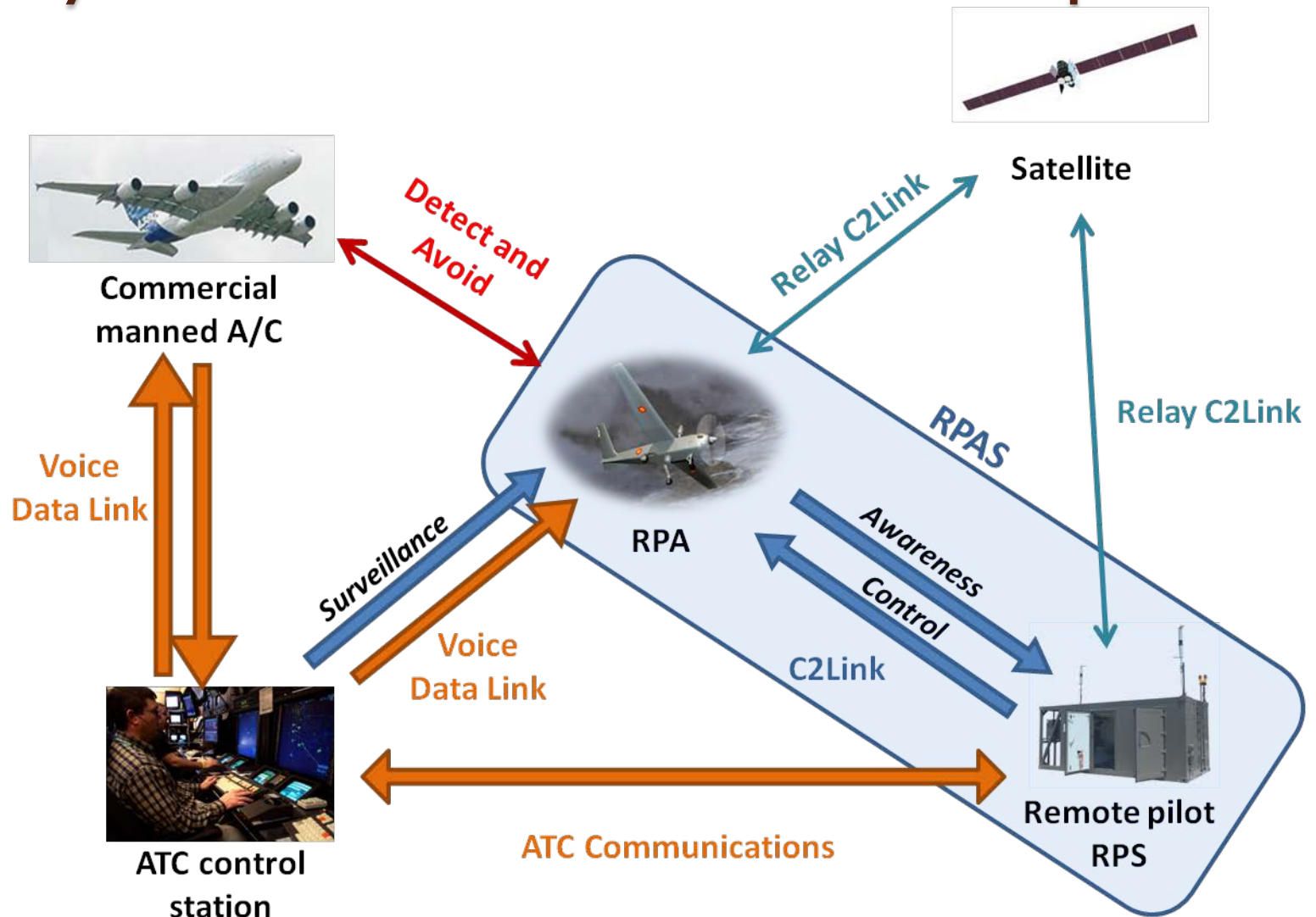


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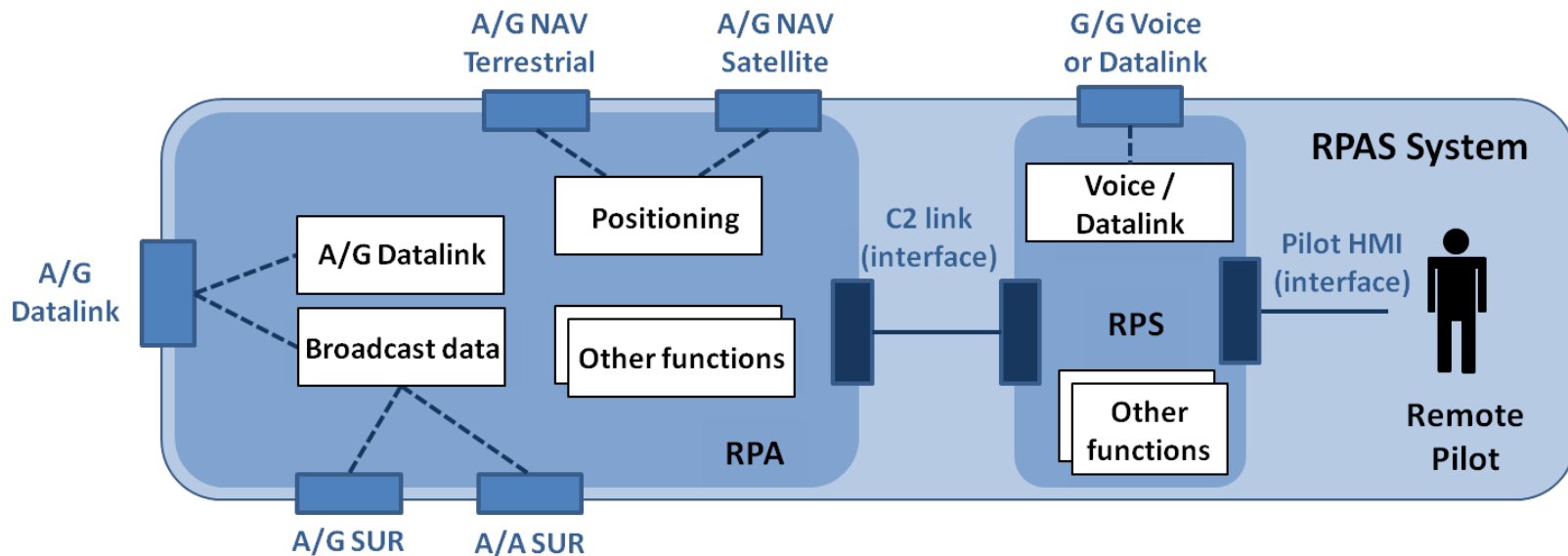
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System identification and description



System identification and description



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RPAS classification

- **By operation**
- **By performance**
- **By category**

OPERATION	
Very low level (VLL) operations. Below the typical IFR and VFR altitudes for manned aviation: i.e. not to exceed 400 ft. (around 122 m) above ground level (AGL).	VLOS – Visual Line of Sight.
	EVLOS – Extended Visual Line of Sight.
	BVLOS – Beyond VLOS.
RPAS operations in VFR or IFR. Above 400 ft. and above minimum flight altitudes.	IFR (or VFR) operations in radio line-of-sight (RLOS) of the RPS in non-segregated airspace.
	IFR (or VFR) operations beyond radio line-of-sight (BRLOS) operations.



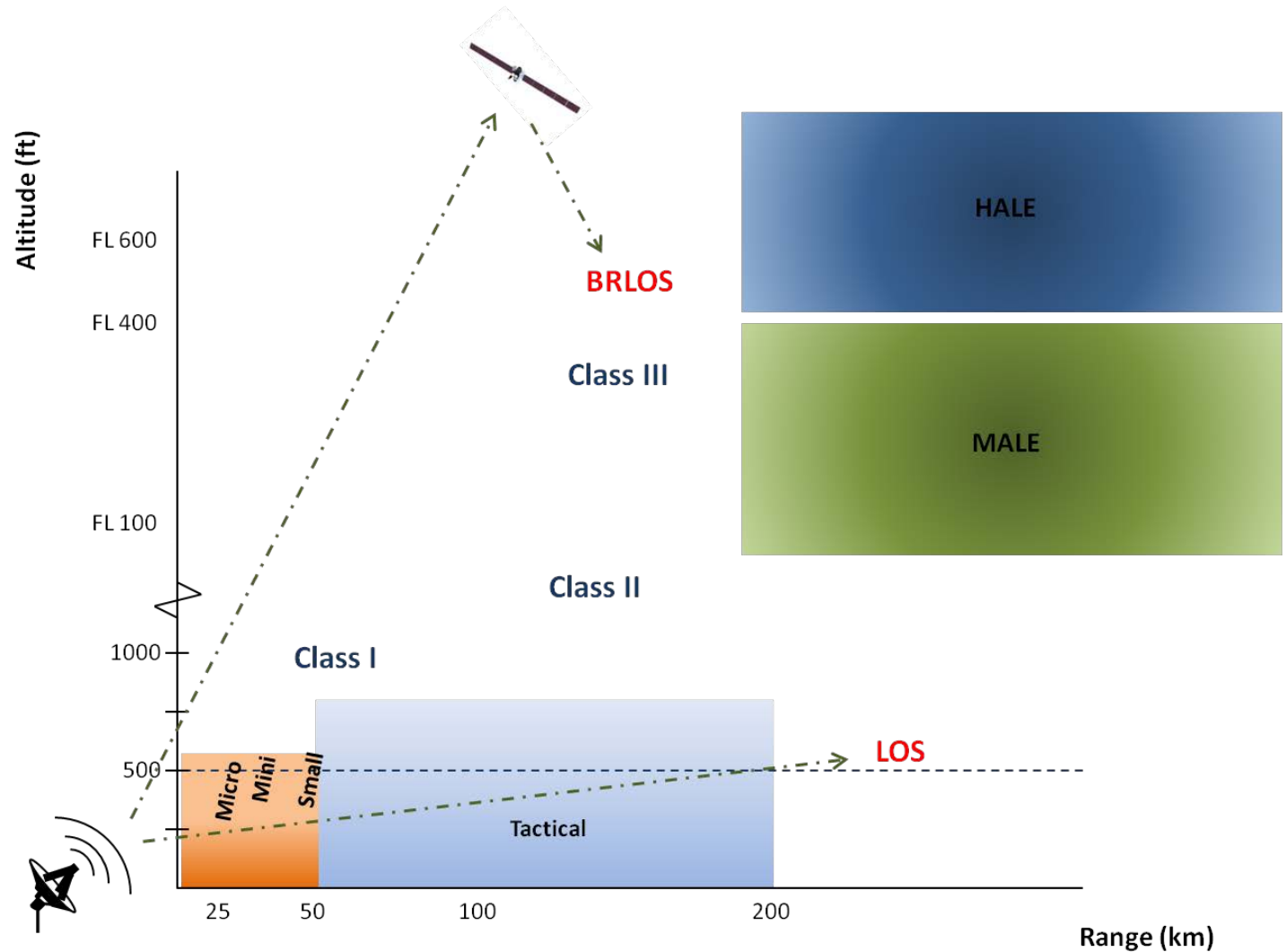
RPAS clas

- **By operation**
- **By performance**
- **By category**

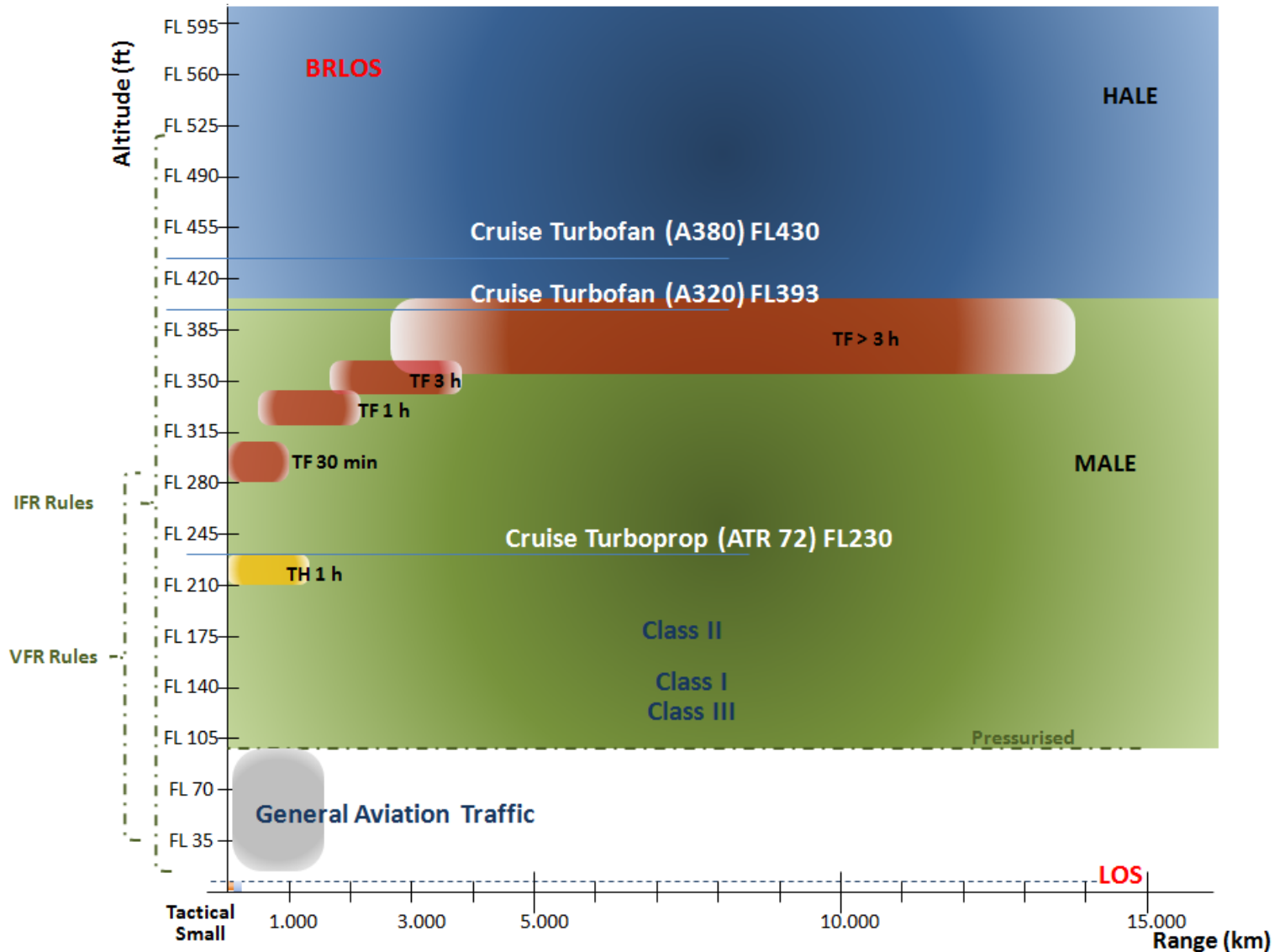
RPAS	Range (km)	Flight Altitude (m)	Endurance (h)	MTOW (kg)
Stratospheric	> 2.000	20.000 – 30.000	48	< 3.000
High altitude and long endurance (HALE)	> 2.000	20.000	48	15.000
Medium altitude and long endurance (MALE)	> 500	14.000	24 - 48	1.500
Low altitude and long endurance (LALE)	> 500	3.000	~ 24	~ 30
Low altitude and deep penetration (LADP)	> 250	50 – 9.000	0,25 - 1	350
Medium range	70 to > 500	8.000	6 to 18	1.250
Short range	10 to 70	3.000	3 to 6	200
Mini	< 10	< 300	< 2	< 30
Micro	< 10	< 250	1	< 1



RPAS classifications



RPAS classifications

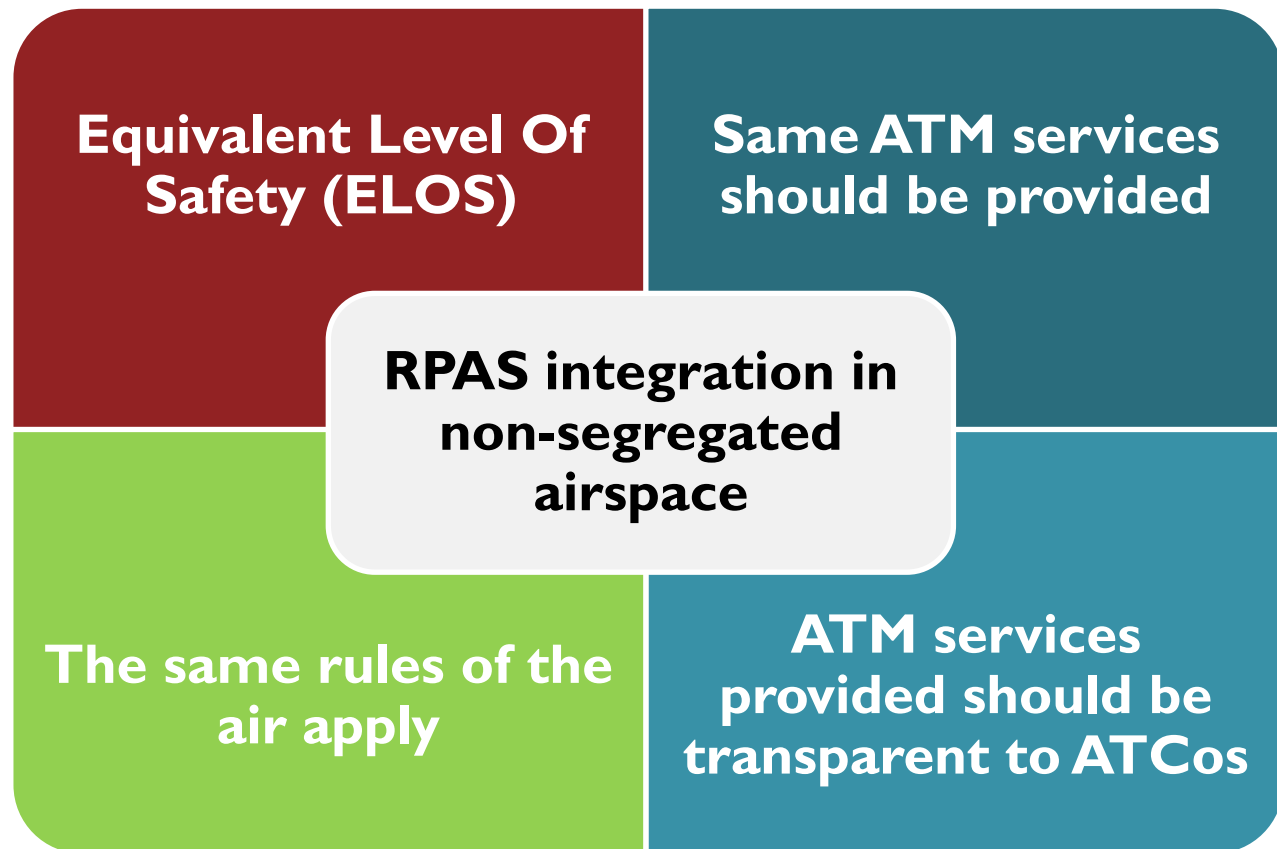


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RPAS integration: requirements



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RPAS integration in current ATM

ATM integration

The integration of RPAS **shall not imply a significant impact on the current users** of the airspace (provision of Air Traffic Services to the RPAS should be transparent to ATC controllers).

RPAS shall be able to **comply with air traffic control rules and procedures** so that ATM/ATC procedures mirror those applicable to manned aircraft).

RPAS shall comply with the **capability requirements applicable to the airspace within which they are intended to operate** (Managed or Unmanaged Airspace).

Aircraft performance and communications with the Air Traffic Service provider must be **continuously monitored by the Remote Pilot**.



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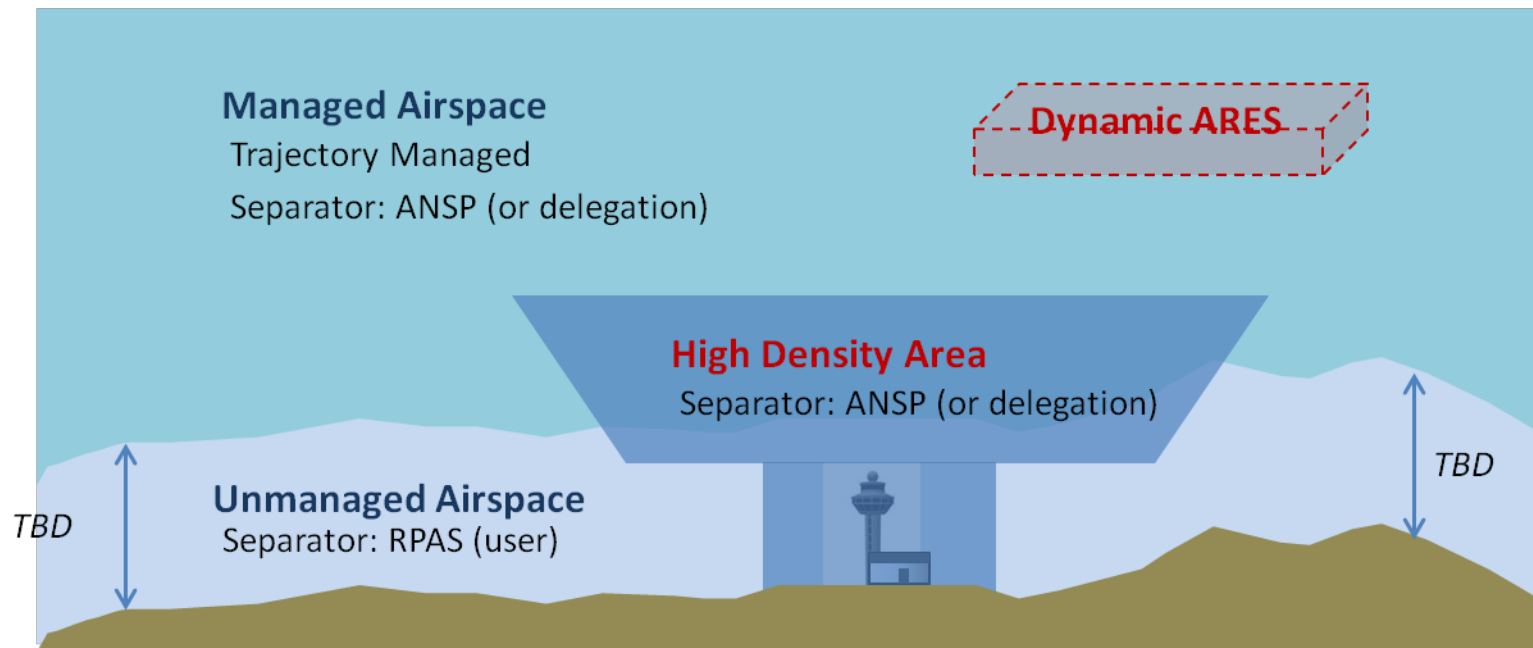
Operational functions and requirements of SESAR

- RPAS should be able to **interact** and communicate **with the rest of ATM users** and managers using SWIM.
- RPAS should be able to **participate in the trajectories management process** defined by SESAR



SESAR Operational context

The rules and requirements for operation are set in the SESAR ATM context. The airspace which is not segregated is divided into **managed (MAS)** and **unmanaged (UMAS)** airspace.



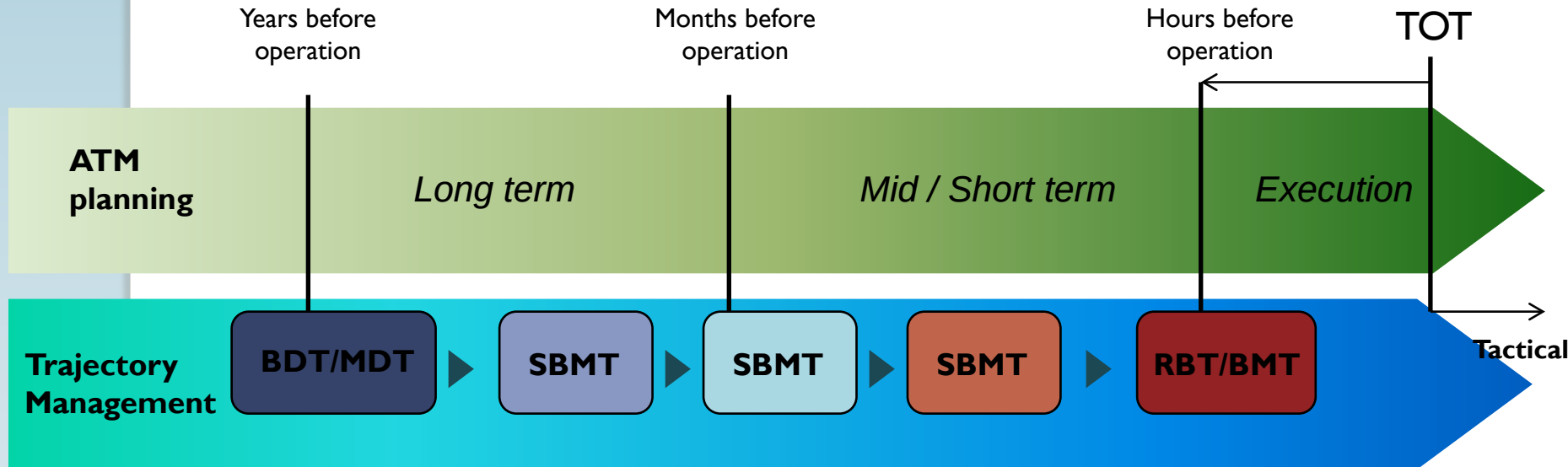
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Interfaces needed for the integration

- Flight preparation

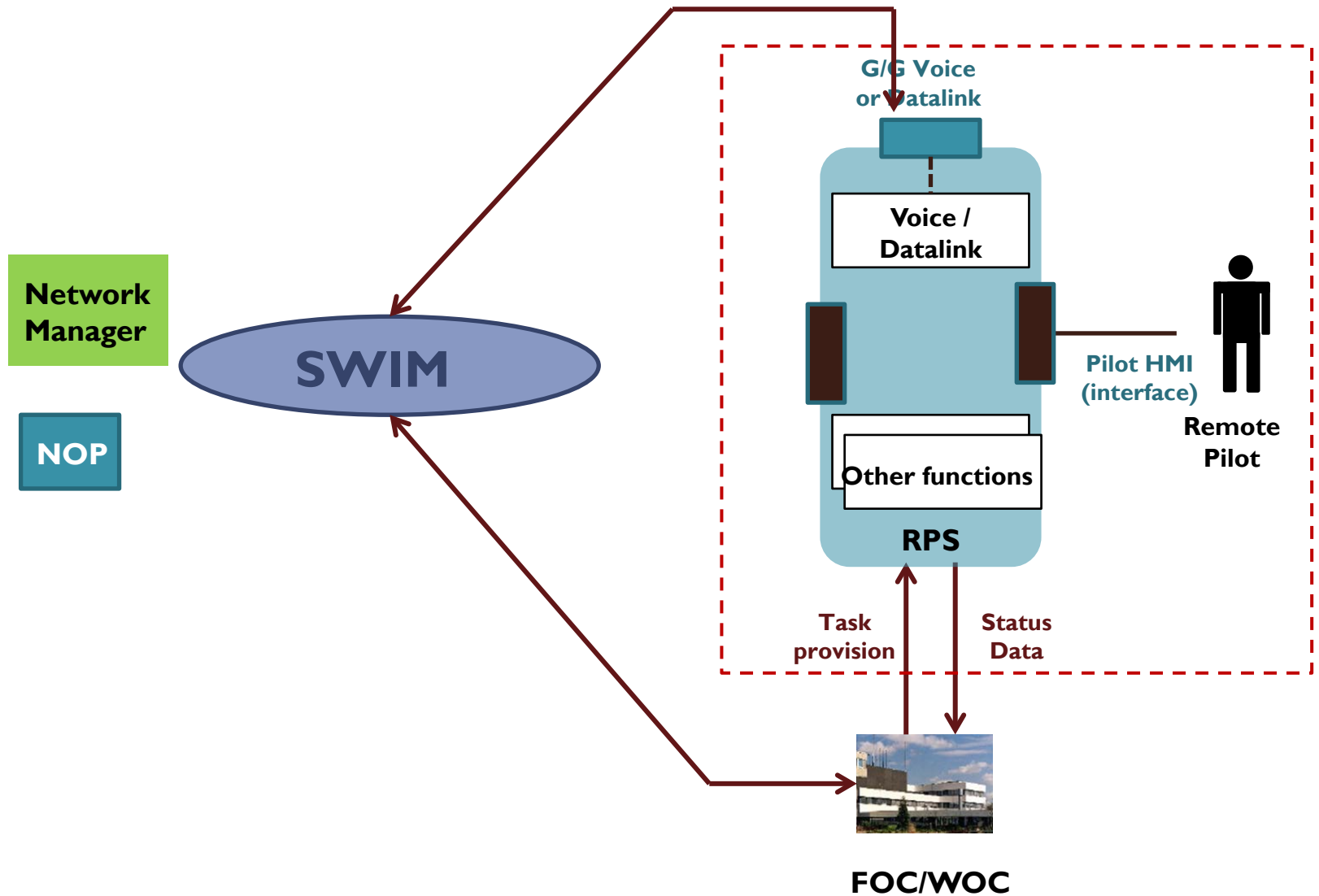


Interfaces needed for the integration

- Preparation phase - RPS or the FOC/WOC :
 - Capability of access and sharing data through SWIM
 - Fill the required information for the trajectory management (requested by NM)
 - Monitor the SBMT and management of modifications (in the NOP).
 - Final RBT/RMT should be processed and uploaded to the RPS before the flight



Interfaces needed



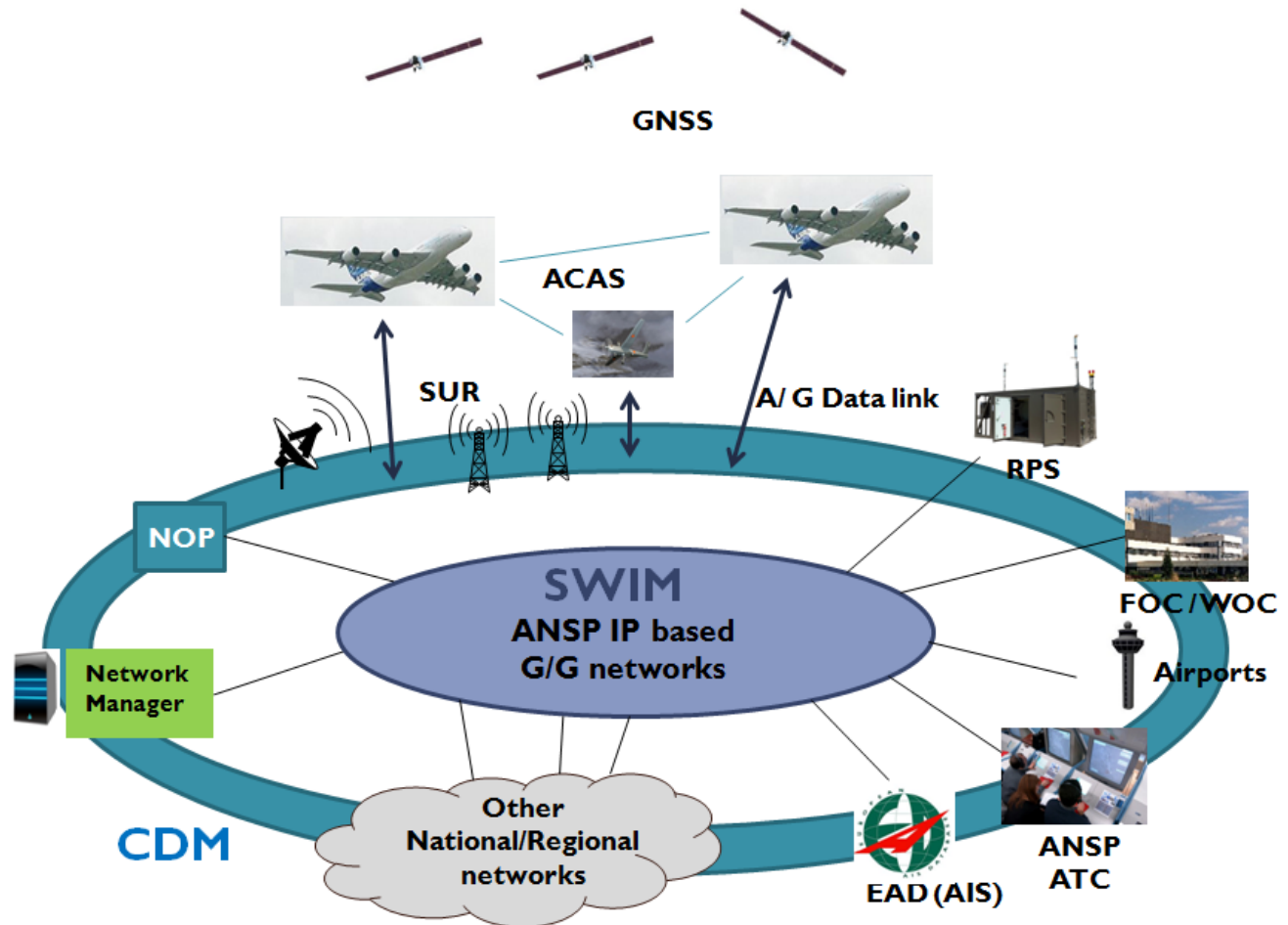
Interfaces needed for the integration

- Execution phase – RPS
 - Access to last approved RBT/RMT (through NOP)
 - Communications between RPS and ATC unit responsible for the area of operation or procedure
 - RPA communicate its position to the ATC unit (SUR)
 - RPS should be able to monitor real time modifications to the RBMT and accept/request alternatives.
 - Communicate contingency procedures if needed.



Interfaces needed for the integration

- Flight execution



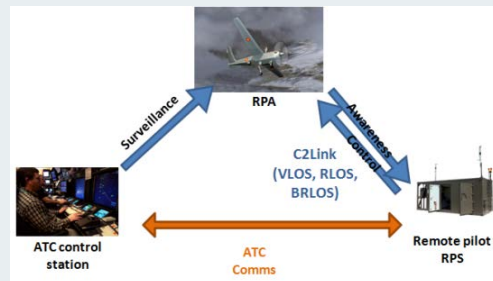
Interfaces needed for the integration

RPAS Communications with ATC

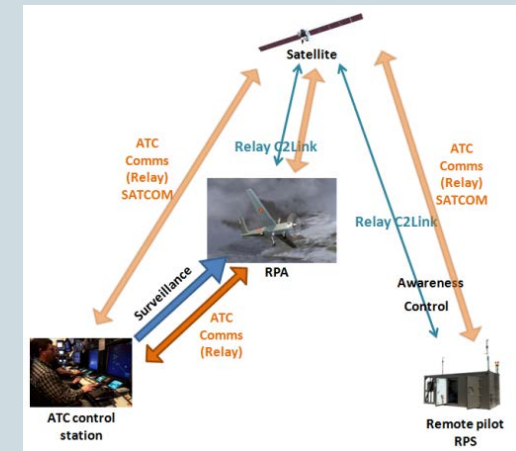
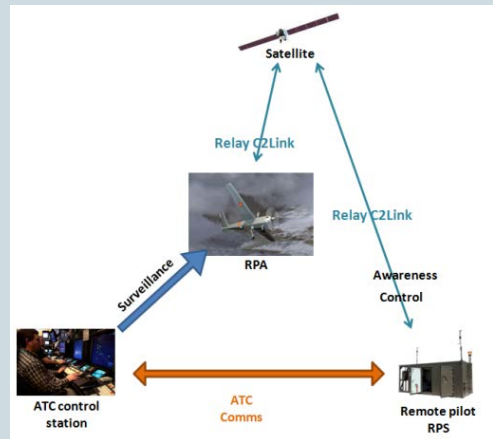
RPS – ATC Direct Link

RPS – ATC using RPA as relay

RPA in RLOS



RPA in BRLOS



Operation
distance
between
RPS and
RPA

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Conclusions

- RPAS integration would be achieved when three main challenges are solved: compliance with regulation; adaptation to operations and; technical solutions.
- Requirements for future integration in **Managed Airspace** have been proposed. This involves the **inclusion for RPAS of interfaces similar to those of manned aircraft**.
- Requirements for integration in **Unmanaged Airspace** involve that the RP assumes the **responsibility of separation** using available surveillance (SUR) information and technical assistance in the form of a DAA system.
- In special circumstances (such as loss of link) a **robust DAA** system onboard the RPA is required as well as **communication to other users**.





Thank you!