

MOTIVATIONS FOR IRIS

IRIS TECHNICAL OVERVIEW

IRIS Webinars, 16th February

BUILT TO FLY

inmarsat
AVIATION

Agenda

1. Motivations for Iris
2. Iris Specifics
3. Iris System Architecture and end-to-end concept
4. Performance
5. System maturity overview
6. Benefits for deployment

Context: Why Iris ?

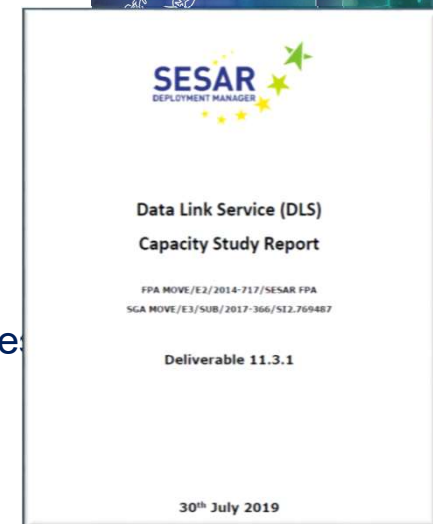


Digital sky: key contributor to “European Green Deal” and “Europe fit for the digital age”

- VDL2 limitations - impact to airlines operations & ATM
- Tomorrow: more demanding and data hungry services: i4D/Full 4D, automation, airlines ops
- Lead time to equip a share of the European fleet with an additional technology
- Coordinated deployment plan: decision needed

ESA-Inmarsat Iris project:

- Designing, developing, validating a service running on Inmarsat’s infrastructure
- Pre-commercial flights
- Certifying a Service Provider against EASA’s requirements for Pan-European service



Iris specifics

1. Technology maturity:

- Inmarsat SB-S service operational
- Commercial avionics products available - ATN/OSI available Q42022
- Operational Iris service (Europe): **ready Q2 2023**

2. Pan European immediate coverage

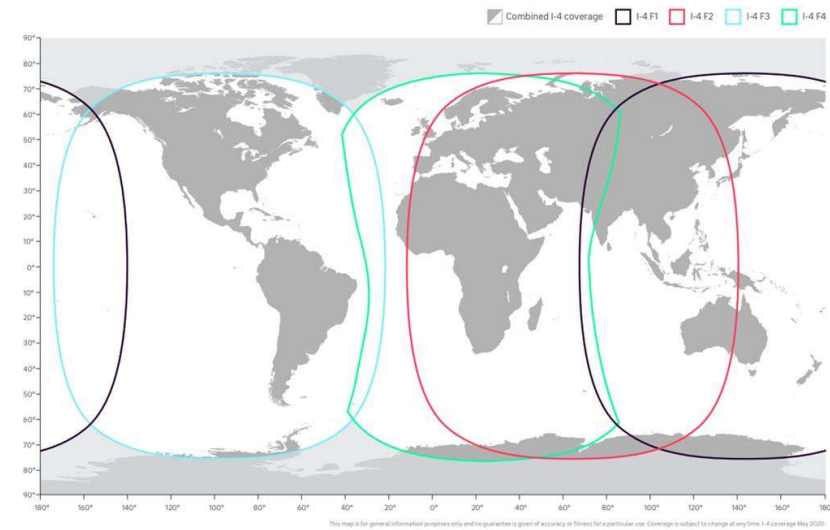
- Service available for entirety of Europe as soon as operational (Extended Service Coverage Area #2)
- No need for ground infrastructure (using the existing ATN backbone)
- “centralised” service distribution per design

3. Global footprint

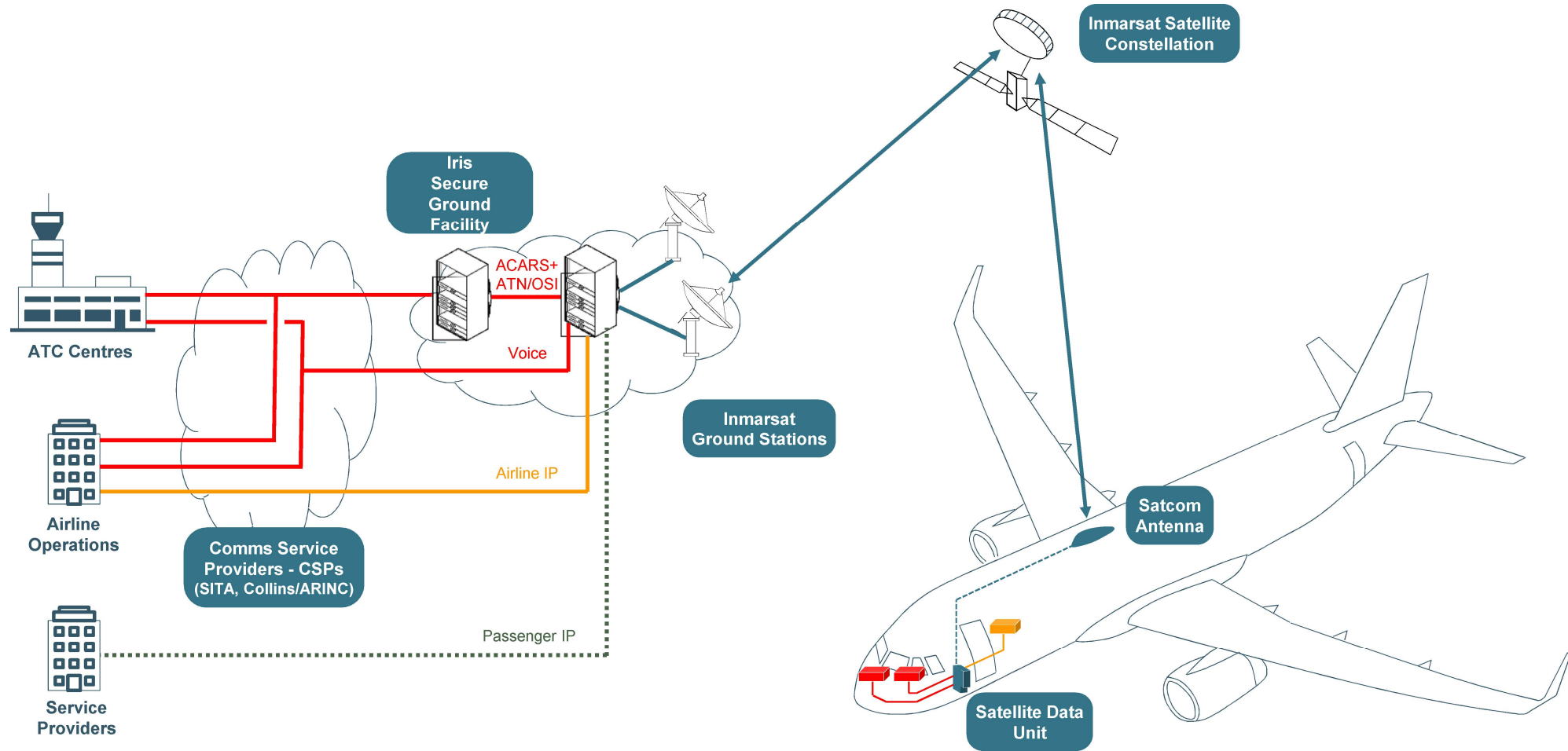
- Global coverage with Inm-4, Alphasat, and I-6 satellites being introduced
- Extension of ATNB1/ATS B2 services to other regions in “Iris Global solution”

4. All datalink services in **one airborne terminal**

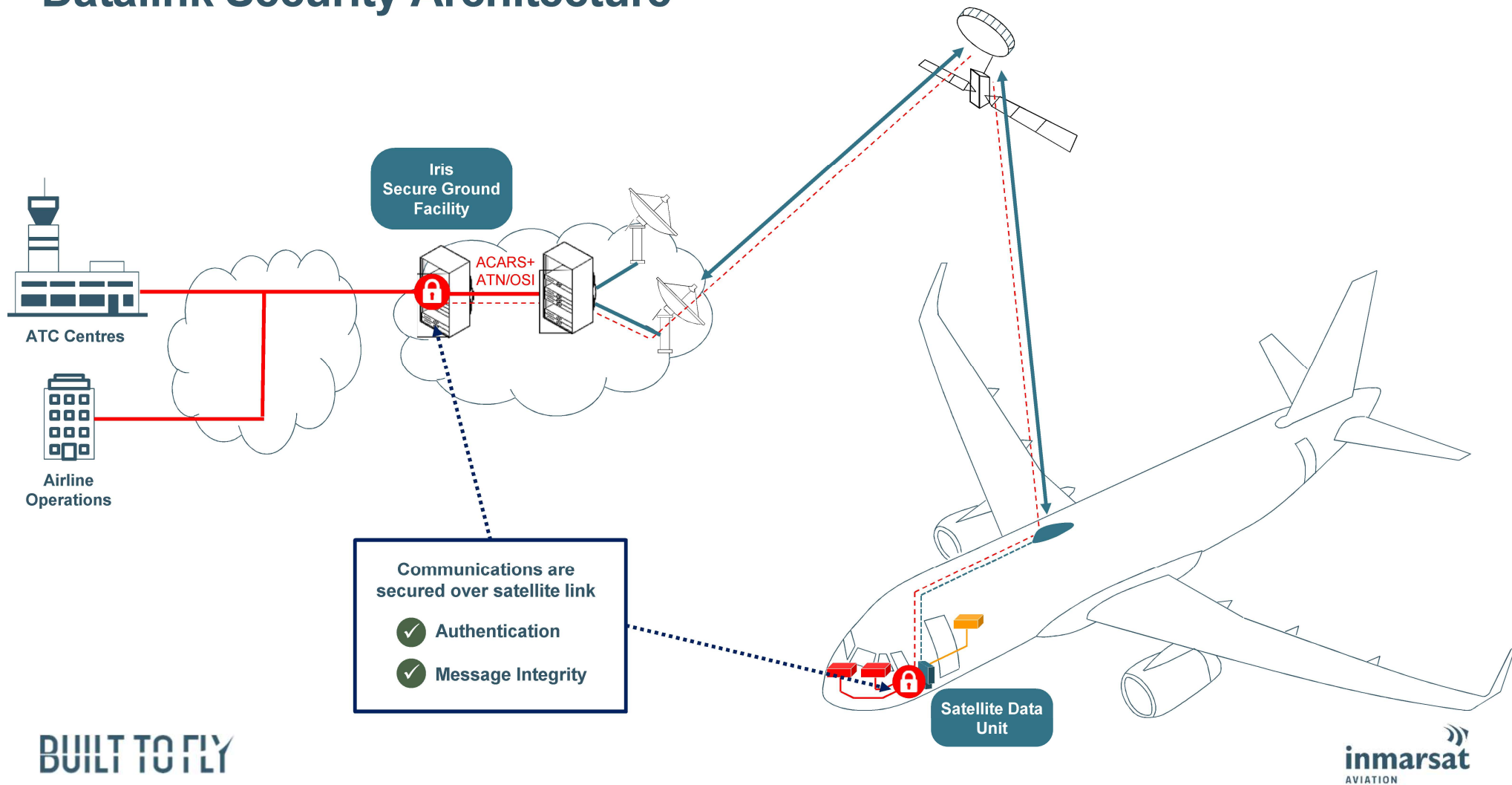
- ATN service and IP pipe for connected EFB
- Legacy services: FANS/ACARS/Voice
- Smooth transition between legacy and new services & interoperability between continental/oceanic airspace



Iris end to end Architecture



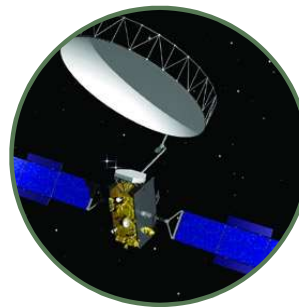
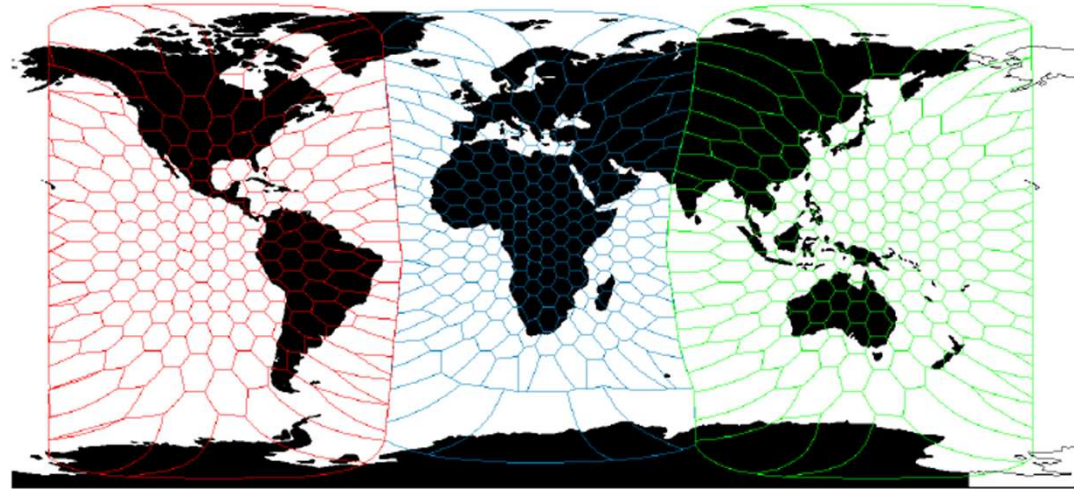
Datalink Security Architecture



Inmarsat Infrastructure and Broadband Global Area Network (BGAN)

Space Infrastructure

- Alphasat, I4-F3 and I4-F1
- Two satellites cover Europe.
- Alphasat is the primary European satellite, covers the “Iris area” with approximately 16 beams.
- Capacity is dynamically allocated to beams in response to traffic demand, with multiple 200 kHz channels being assigned to each beam to support traffic.
- BGAN carriers are QPSK or 16-QAM modulated and use adaptive coding
- I6 satellite will gradually replace I4 (1st I6 launched in December)



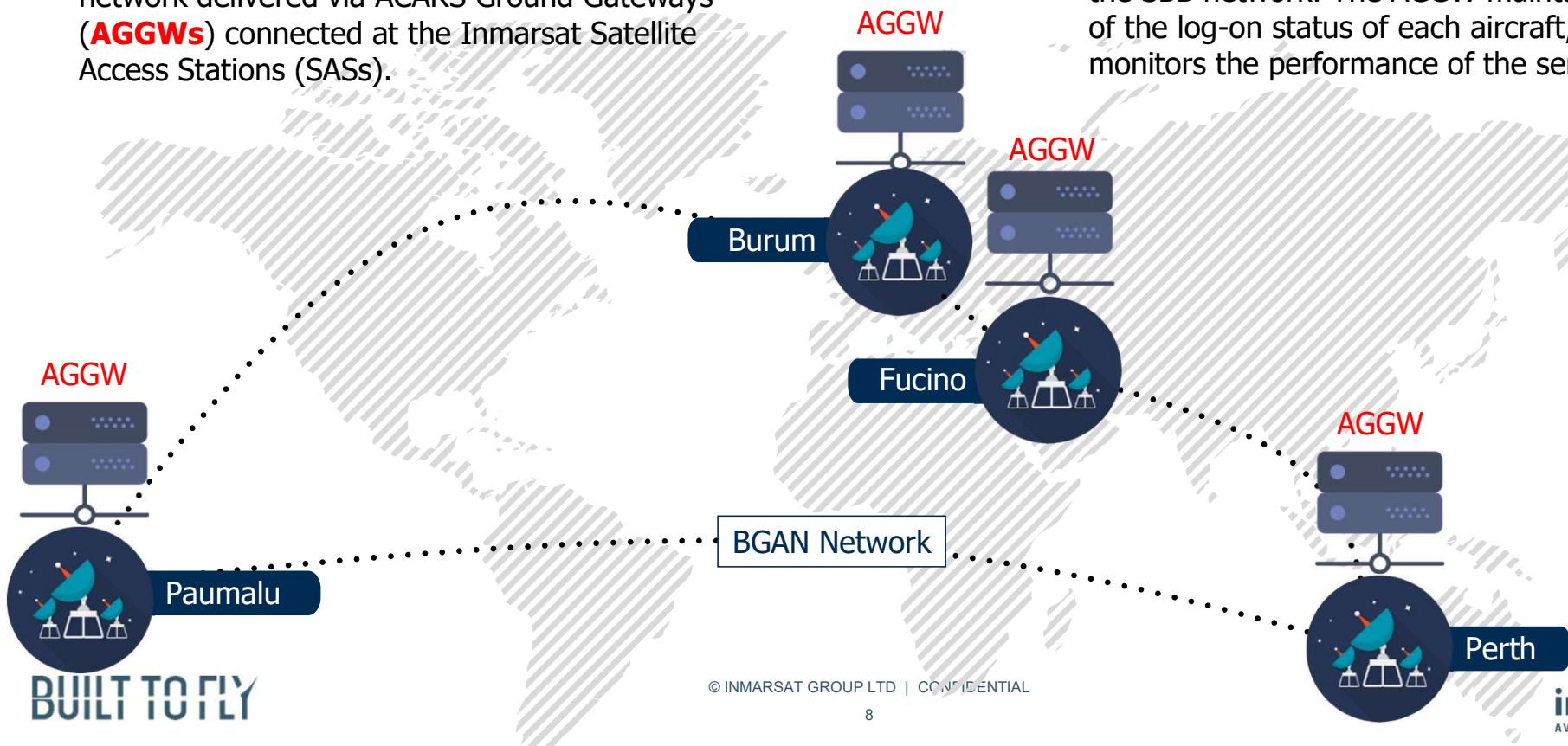
Alphasat + I4; I6 satellite launched end 2021

Uses Broadband Global Area Network (B-GAN)

Iris building on BGAN

FANS and AOC ACARS messages over the BGAN network delivered via ACARS Ground Gateways (**AGGWs**) connected at the Inmarsat Satellite Access Stations (SASs).

The AGGW connects the aircraft ACARS box to the SBB network. The AGGW maintains a record of the log-on status of each aircraft, and monitors the performance of the service.

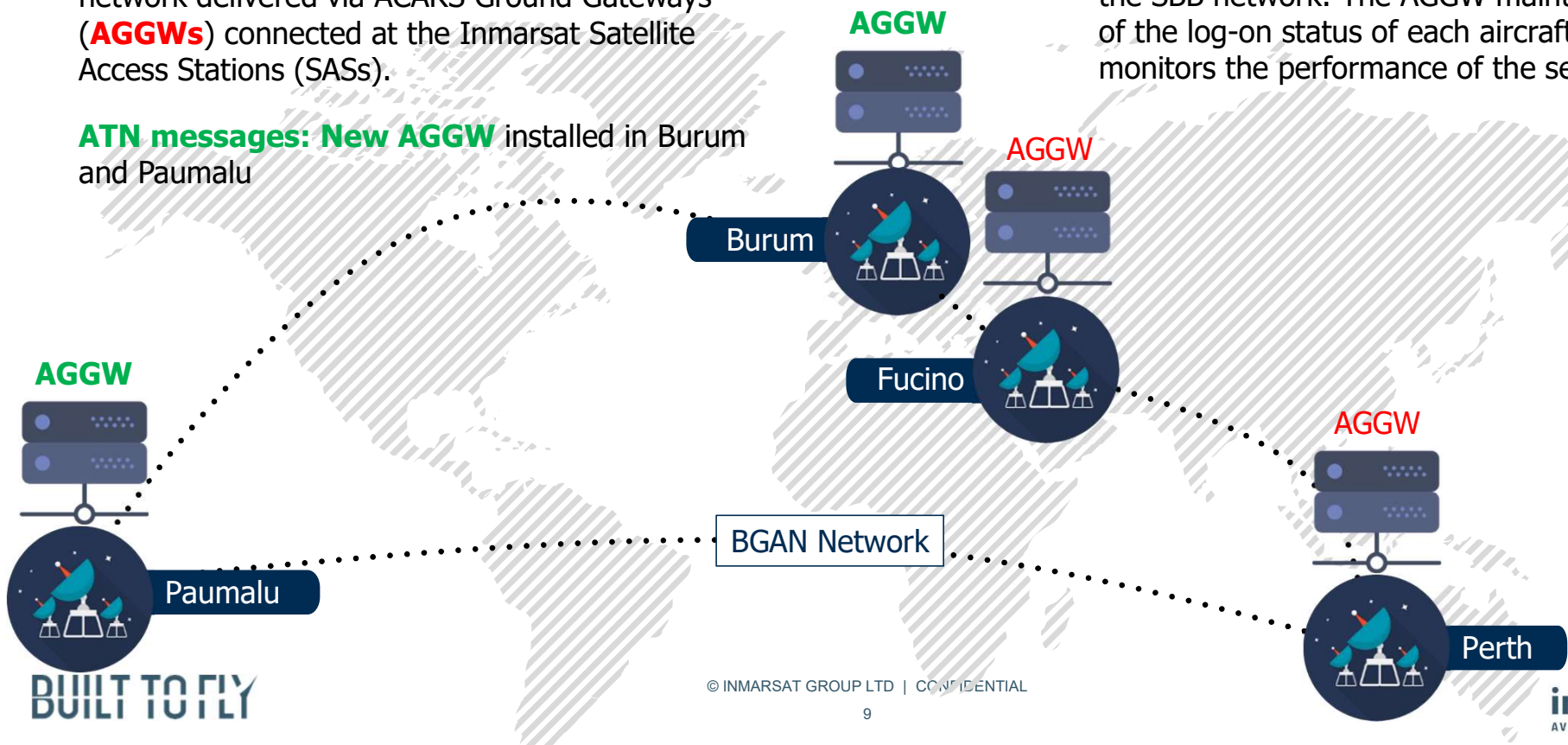


Iris building on BGAN

FANS and AOC ACARS messages over the BGAN network delivered via ACARS Ground Gateways (**AGGWs**) connected at the Inmarsat Satellite Access Stations (SASs).

ATN messages: New **AGGW** installed in Burum and Paumalu

The AGGW connects the aircraft ACARS box to the SBB network. The AGGW maintains a record of the log-on status of each aircraft, and monitors the performance of the service.



Performance: demonstrated compliance

Performance framework:

- RCP130 (CPDLC) and RSP160 (ADS-C)

Latency performance measures – OK

- Several flight trials starting in 2018; SESAR 1 trials; Honeywell flight campaign Q3-Q4 2021
- More to come with final Airbus campaign

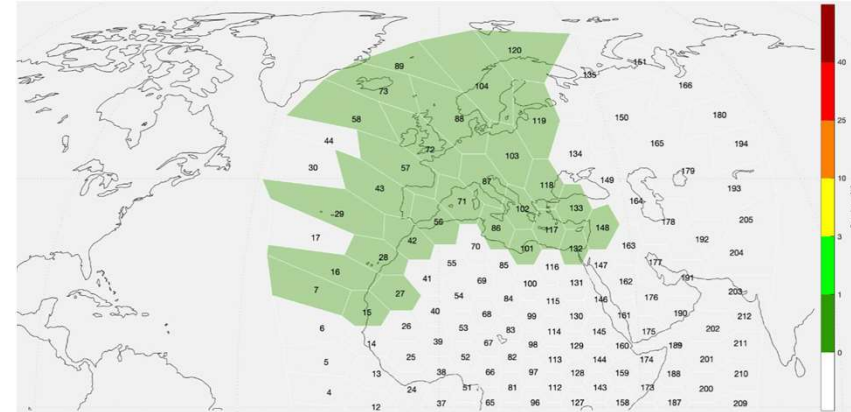
Capacity

- Capacity simulation done by Iris partners (TAS-I / USBG):
 - Objectives: to demonstrate that the Iris network can manage the ATC and AOC traffic that could be expected in various scenarios of VDL2 saturation
 - Results: more than enough capacity until 2040 to support the Iris traffic for all considered scenarios with 100% spectrum margin.
- I6 satellite will gradually replace I4 (1st I6 launched in December)
- Orchestra/ELERA project to complement the space segment in the future

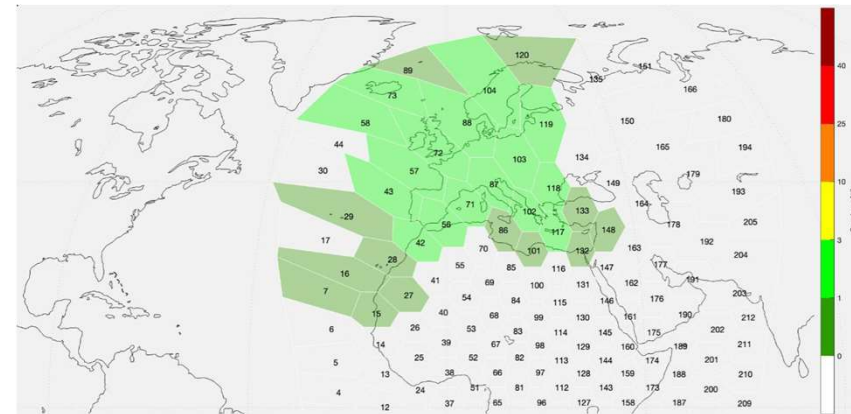
Availability: generally exceeds 99.9%

Security : uniquely protected by IPSec layer

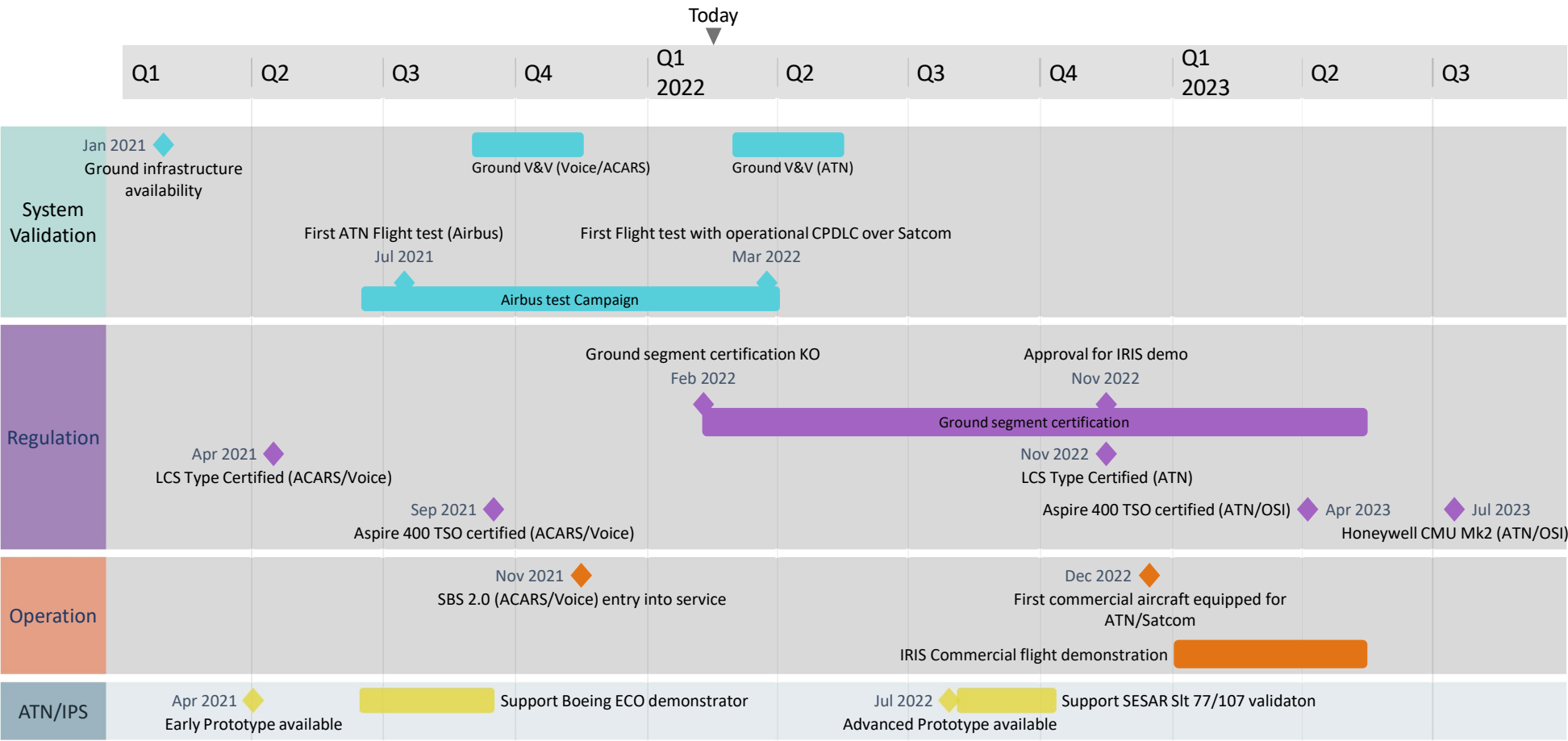
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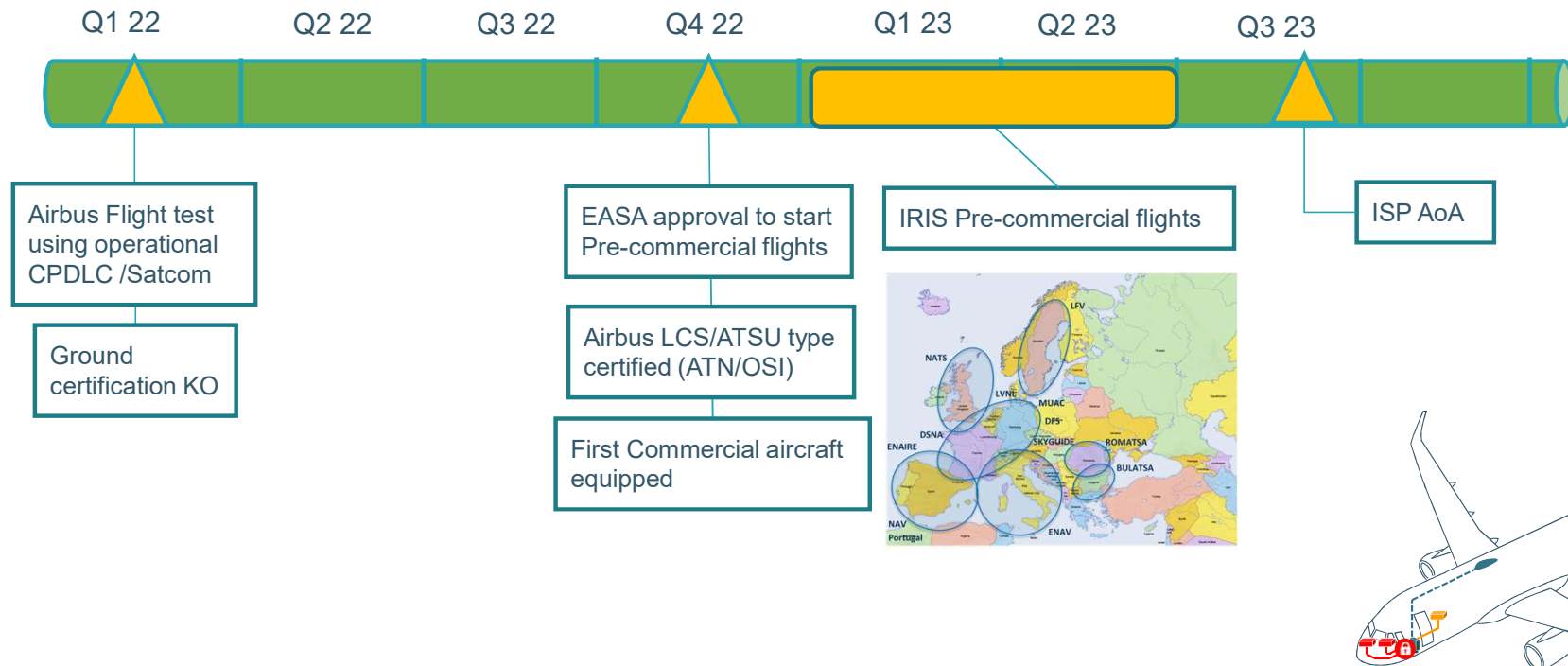
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IRIS Deployment Timeline



IRIS towards pre-commercial flights



Benefits of Iris deployment

- **Ready for deployment – anticipate VDL2 degradation**
 - Early deployment by 2023 can be managed using the natural fleet renewal process
 - Opportunity of a Pan-European approach for ANSPs: seamless service
 - Value-added services for airlines operations- IP connected EFB
 - Enabling ATM modernisation (i4D/Full 4D, automation) with benefits to airspace users ($\approx 10\%$ fuel/CO2 savings)
 - Benefits of datalink are significant:
 - +10% Airspace capacity.
 - Lack of capacity $\approx 1\text{B€}$ /year from 2030 onwards (Eurocontrol biz case)
- **Mitigating operational risks to airlines/ANSPs:**
 - Satcom has been used successfully for more than 20 years in the oceanic regions
 - Global standard / solution
 - No ground deployment (low complexity)
 - Certification started – Initial multilink concept will be demonstrated
- **Global service:**
 - Opportunity and plans to enlarge the service coverage area to adjacent / new regions



Iris contribution to ATM Long term Benefits



MORE CAPACITY



FUEL SAVINGS



CO₂ EMISSIONS



DELAYS



BETTER SERVICE
REDUCED COST



ROUTE
OPTIMISATION



AIRSPACE MANAGEMENT



SAFETY



ENHANCED SECURITY



AIRCRAFT HEALTH
MONITORING



MAINTENANCE



REAL TIME
OPTIMISED
INVENTORY

BUILT TO FLY