Viasat + Inmarsat Update

ISPACG FIT, 8 April
Port Moresby, Papua New Guinea

Lisa Bee
Director of Air Traffic Services

Viasat

Agenda

- L-band services
- Satellite, fleet arrangement, and coverage
- Network and system
- SB-S Iris operation

Viasat


Viasat
+
inmarsat
a global partner to ANSPs
and airlines

Viasat Aviation Safety Services

Over 30 years providing data link services

Oceanic and remote: FANS 1/A

- CPDLC meeting RCP240
- ADS-C meeting RSP180
- Dual voice

Flight deck IP connectivity

- Real time weather apps, e.g., turbulence avoidance
- SWIM

Domestic: ATS B2 FANS 3/C

- CPDLC meeting RCP130
- ADS-C meeting RSP160
- Dual voice

Ready for 4D TBO

- Extended CPDLC message set for trajectory negotiation
- ADS-C Extended Projected Profile (EPP)
- Enhanced security

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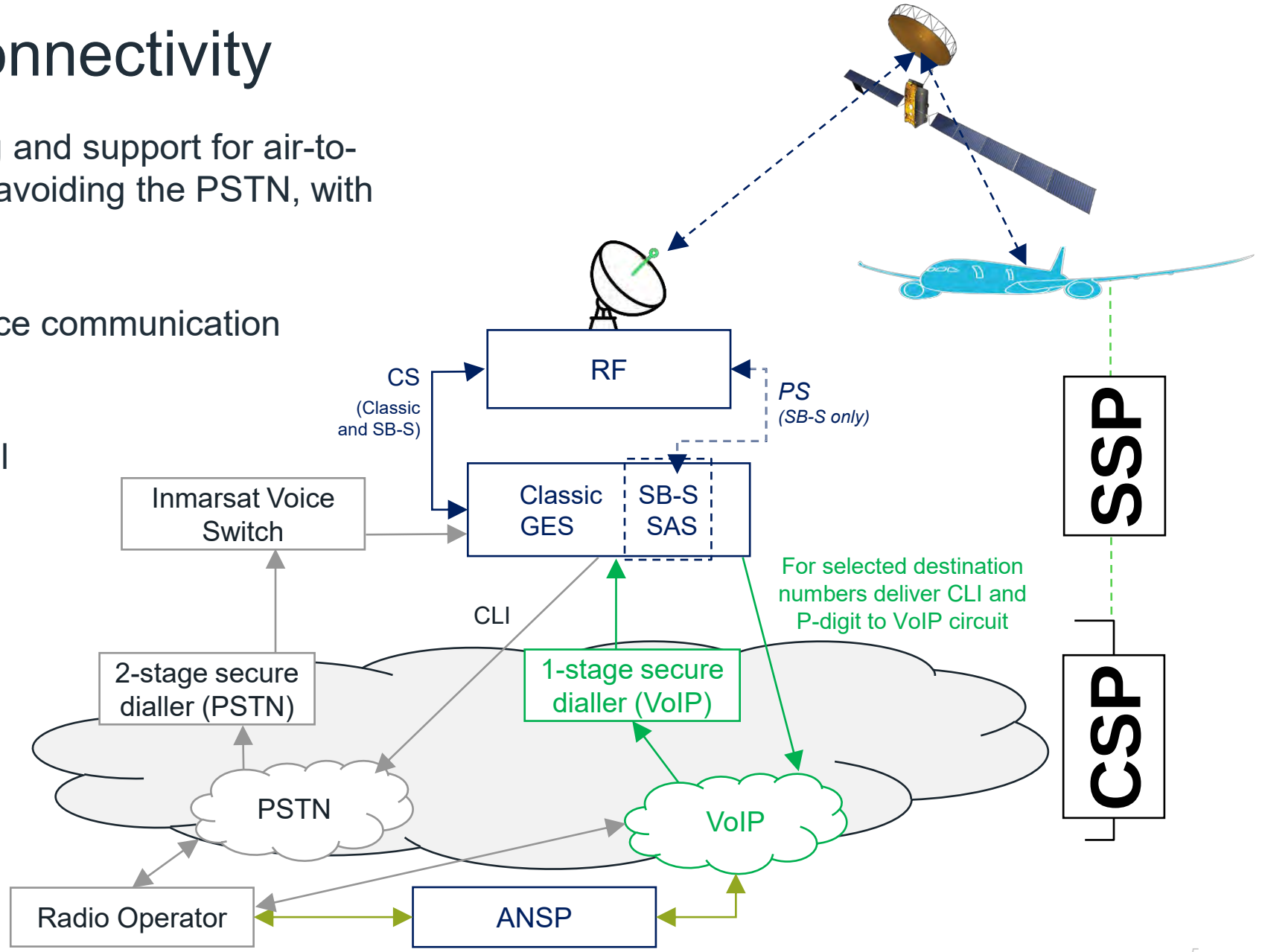
SATVOICE VoIP Connectivity

- 1-stage ground-to-air secure dialling and support for air-to-ground calling on private networks, avoiding the PSTN, with reliable carriage of priority and CLI
- Enabler for direct controller-pilot voice communication
- Implemented by SITA, Collins evaluating service in operational trial
- Aligned with Annex 10, Vol III PfA
- OPDLWG developing new voice RCP for direct controller-pilot comms



A world of opportunity from connected EFB

- Live weather for turbulence avoidance, avoid harm to passengers, crew and aircraft
- Reduce fuel burn and carbon emissions
- Minimise impact of Irregular Operations
- Enhanced AOC comms – chat apps, IP voice, connected crew apps
- eTechlogs

"Turbulence effects have increased due to climate change"

"Flight Profile Optimization can potentially reduce annual fuel burn by an average of 1% to 3%"

Viasat JEPPESEN A BOEING COMPANY SITA WSI SMARTAVIATION SKYPATH Lufthansa Systems TXT PACE

Satellite update and L-band fleet arrangement

I-6 F1
- I-6 F1 in service over the Indian Ocean
- 70% more power, 50% more capacity per beam

I-4 FA
- I4 Alphasat in service over Europe/Middle East/Africa

I-4 F3
- I4 F3 in service over Americas

I-4 F2
- I4 F2 in service over Asia Pacific

I-3 F5
- I3 F5 in service over Atlantic Ocean

I-4 F1
- Moved to new location for contingency

Three I-8 satellites planned for launch in 2026
- Crucial safety services and added network resilience
- Service life extension beyond 2040

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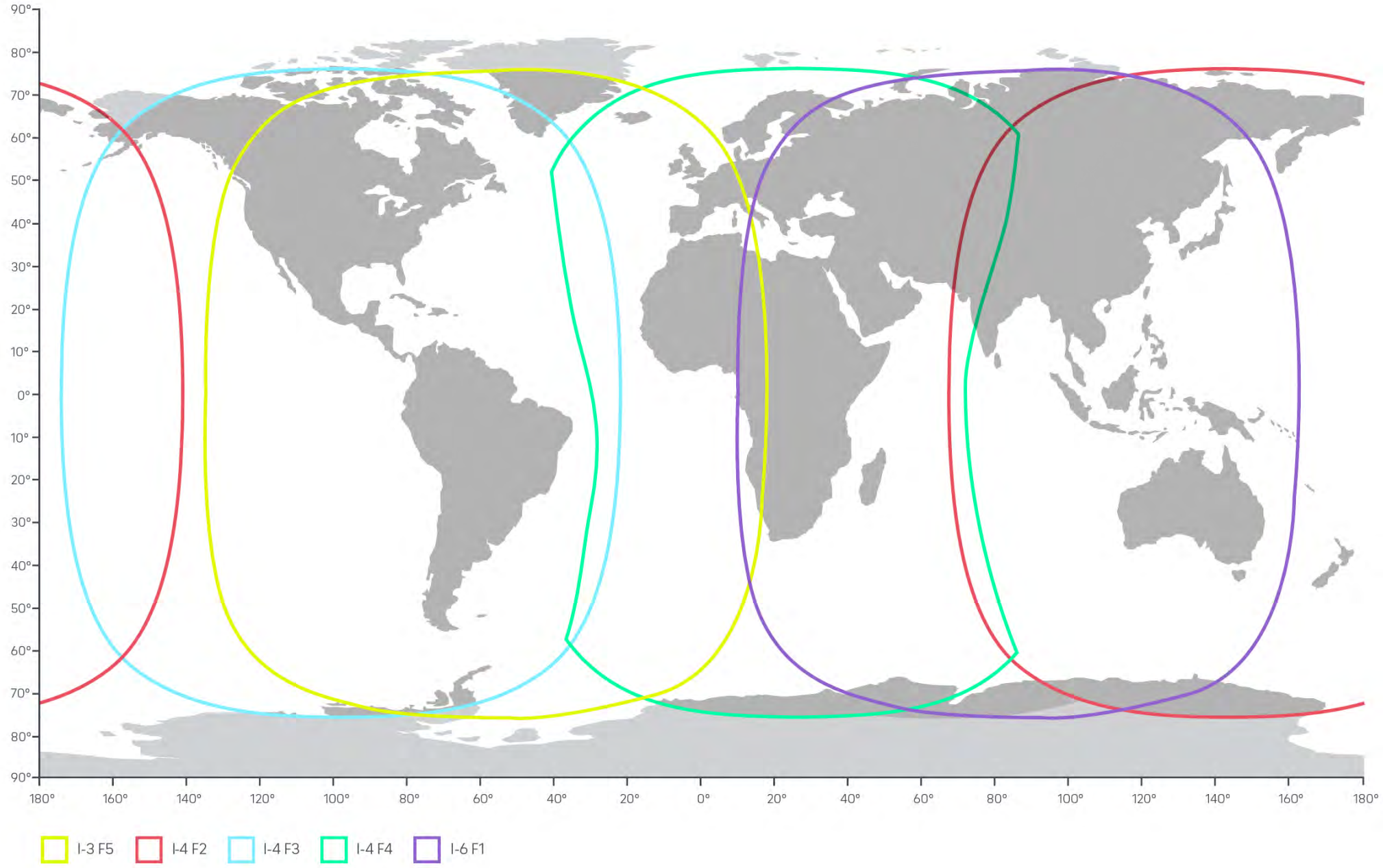
L-band Satellite Coverage



- Subject to change
- Coverage map for illustration purposes only

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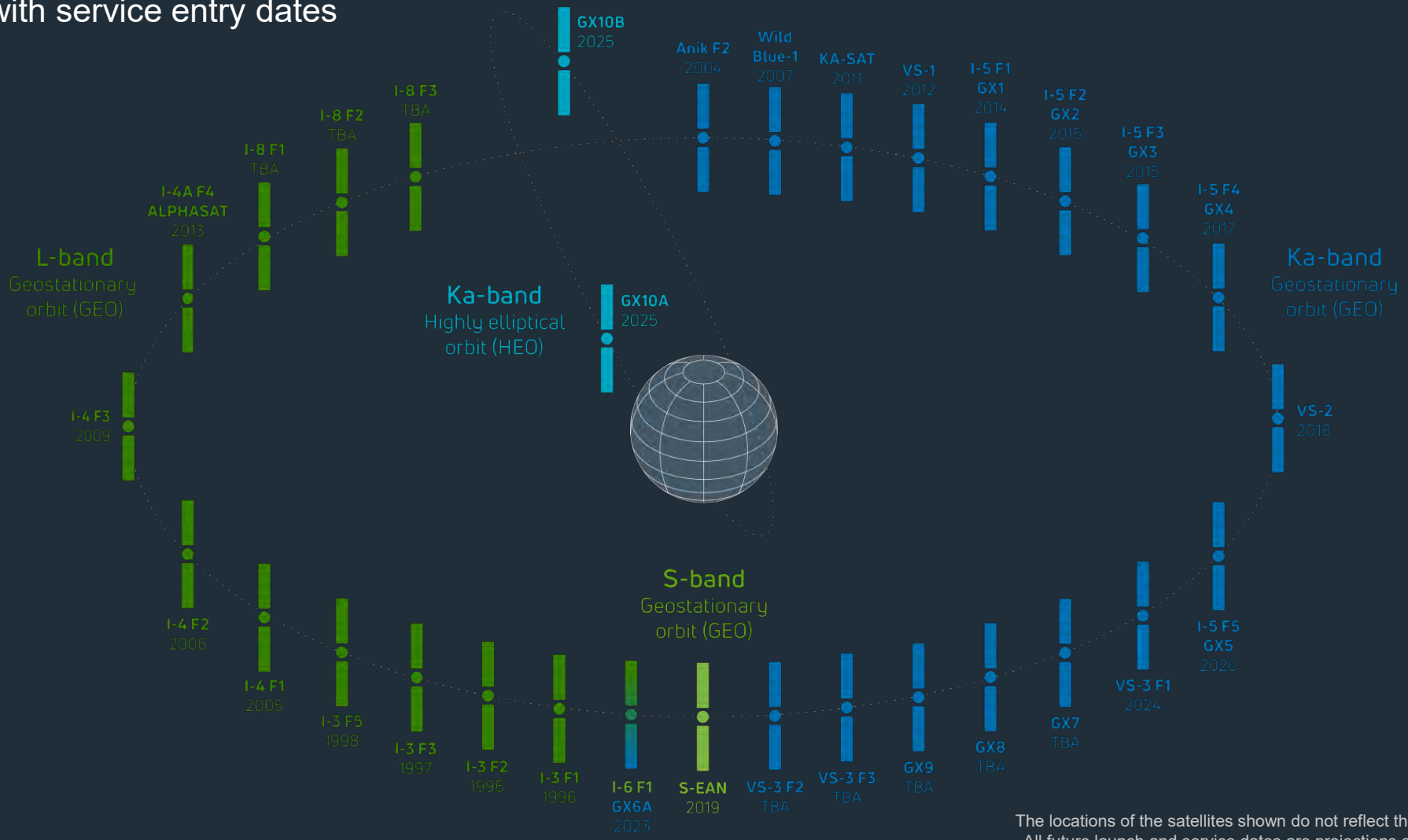
Current and future satellite fleet

Satellites shown with service entry dates



The locations of the satellites shown do not reflect the current actual locations.
All future launch and service dates are projections and are subject to change.
This diagram is for illustrative purposes only.

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SB-S Network Enhancements

- We have recently enhanced our remote database access for our Distribution Partners (DPs), with the ability for DPs to login to a GUI to view detailed logs for Classic Aero, SB-S 1.0, and now SB-S 2.0
  - Enhances DP incident investigation and troubleshooting
- We are building a network of always-on monitoring and test terminals, to specifically monitor SB-S and Iris service availability in each ocean region – the Safety Availability Monitoring System (SAMS)

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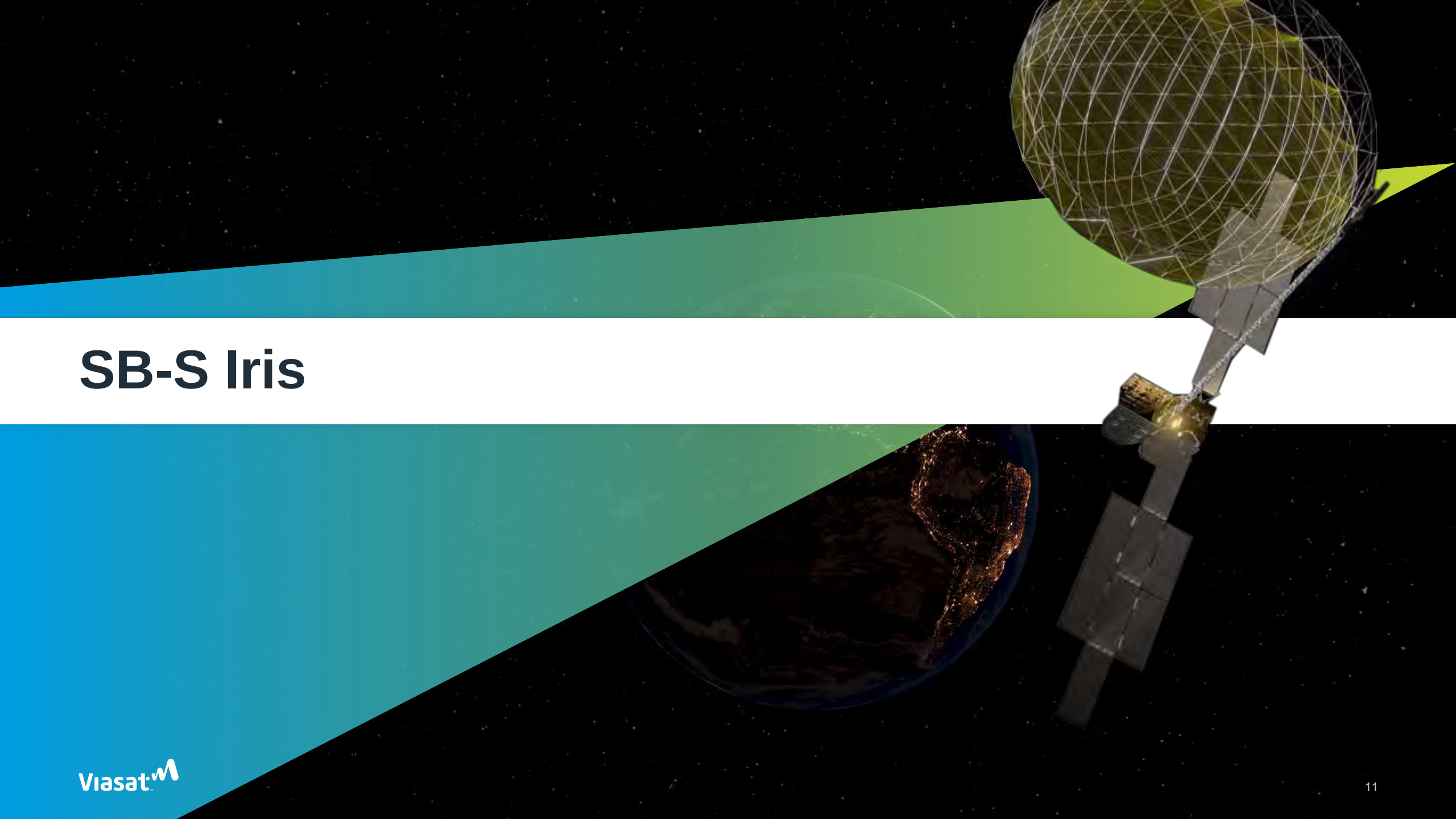
SB-S Iris



The Iris service is built on top of SwiftBroadband-Safety

588

Over 588 SB-S equipped aircraft flying today!

787*
2028

777X
2025

737 NG/MAX
2023

A350
2023

A330
2022

A320/neo
2022

C919
2023

ARJ21
TBC

BOEING AIRBUS COMAC

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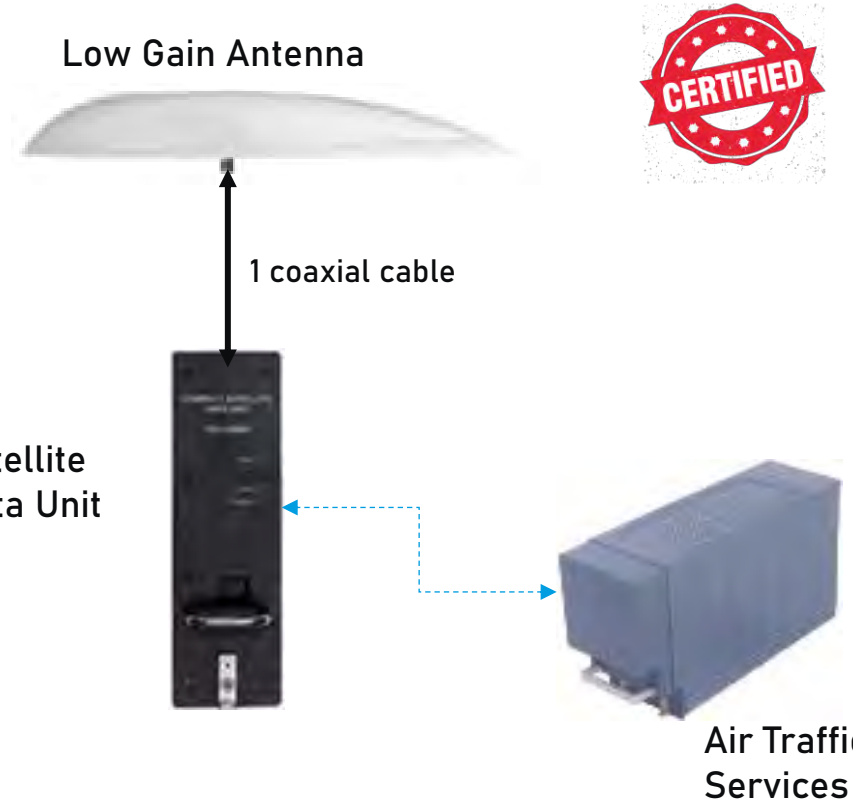
*Availability subject to future plans

SB-S Iris Service

- Iris Service is an ICAO-compliant Aeronautical Mobile Satellite Service (AMSS) for:
  - ATN B1/ATS B2 CM and CPDLC
  - ATS B2 ADS-C
- Meets stringent performance requirements for domestic airspace
- Interoperable between domestic/oceanic airspace

AIRBUS

Light Cockpit Satcom



SB-S Iris Avionics Installation and Hardware

- FANS-C over Satcom
- ATS B2 CPDLC and ADS-C EPP (Extended Projected Profile)
- Software upgrade to ATSU
- ATN/OSI software compatible with ATN network.
  - ATN/IPS available through future software upgrade.

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Iris – airspace modernization program

What is it?

- ESA backed air traffic modernization program enabled by ATS B2 satcom in multilink with VDL
- Embraced by Airbus and tightly integrated into cockpit
- Delivers technology and performance needed to increase airspace capacity and flight efficiency and to achieve goals for CO_2 reduction
- Increases datalink capacity by offloading enroute traffic from VDL to satcom to address issue of VDL reaching max capacity in congested domestic airspace

Benefits

- Increased ATM capacity with optimized flight routing
- Minimized delays from lack of ATC capacity
- Reduced environmental impact of air travel

EU Mandate: ATS B2, ADS-C EPP effective 31st December 2027

COMMISSION IMPLEMENTING REGULATION (EU) 2021/116

of 1 February 2021

Extract

System requirements

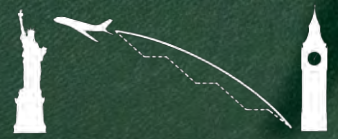
(a) Aircraft must be equipped with the capability to automatically down-link trajectory information using ADS-C EPP as part of the ATS B2 services. The trajectory data automatically down-linked from the airborne system must update the ATM system in accordance with the terms of the contract.

(b) Data link communications ground systems must support ADS-C (downlink of aircraft trajectory using EPP) as part of the ATS B2 services while keeping compatibility with controller – pilot data link communications ('CPDLC') services as required by Commission Regulation (EC) No 29/2009 (1), including provision of service to flights equipped only with the Aeronautical Telecommunication Network Baseline 1 ('ATN-B1').

Enables 4D Trajectory-Based Operations

Direct Routes

Optimum Flight Levels



Continuous Climbs

Continuous Descents

Queue Management

Speed Control

Iris pre-commercial flights are supported by 19 ANSPs

Iris Service is currently fully operational and provided by ESSP who is certified and overseen by EASA since July 2023

19 ANSPs have contracted Iris Service

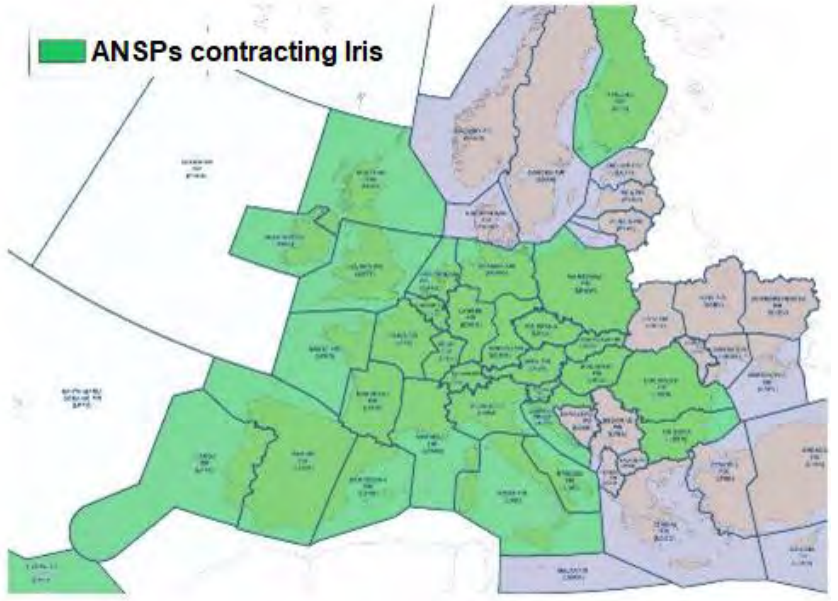
Full specification of Iris Service is provided in the Iris Service Definition Document published at [ESSP website]

EASA
European Union Aviation Safety Agency

LIST OF APPROVED ATM/ANS ORGANISATIONS UNDER THE OVERSIGHT OF EASA

CERTIFICATE REFERENCE	ORGANISATION NAME	COUNTRY	SCOPE	ISSUE DATE	STATUS
EASA.AOA.PAN.038	European Satellite Service Provider (ESSP SAS)	France	Aeronautical Mobile Satellite Service (AMSS)	20/07/2023	Valid

List of Approved ATM-ANS Organisations (public pdf at EASA website)



ANS CR
AIRNAV IRELAND
AUSTROCONTROL
BULATSA
CROATIACONTROL
DFS
DSNA
NAV PORTUGAL
ECTL/MUAC
ENAIRE
ENAV
FINTRAFFIC ANS
HUNGAROCONTROL
LPS SR
NATS
PANSA
ROMATSA
SLOVENIACONTROL
SKYGUIDE

Viasat

Operational flights with easyJet

OELSO

GUZLT

GUZLS

OELSR

- 1 aircraft — January 2024
- 2 more aircraft — February 2024
- 4th aircraft — December 2024
- Number of Iris flights thru 28 February: 5,538

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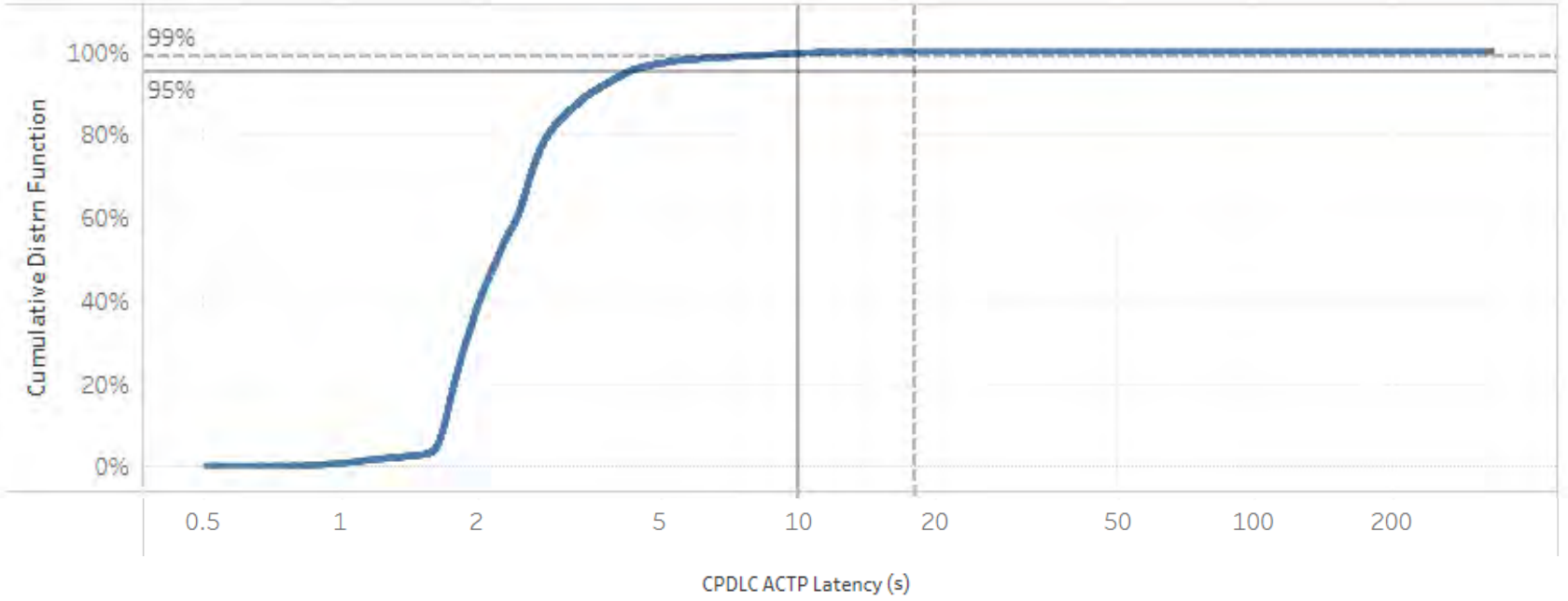
CPDLC Air-Ground Latency

- Excellent performance seen for in-service period
- Tableau chart shows satcom data latency on 1 year of Iris flights for February 2024 to January 2025
- 95th percentile at **4.25** seconds for **2-way** satcom air-ground data transfer
- Measurement points: Timestamps at the satellite terminal (SDU) and at the Viasat data link gateway (GDGW) – ground-ground latency not included
- ESSP provides monthly end-to-end Iris performance: https://satcom-dls-support.essp-sas.eu/

ATN/OSI CPDLC Latency (Aircraft Iris Satcom terminal to Satcom Ground Gateway)

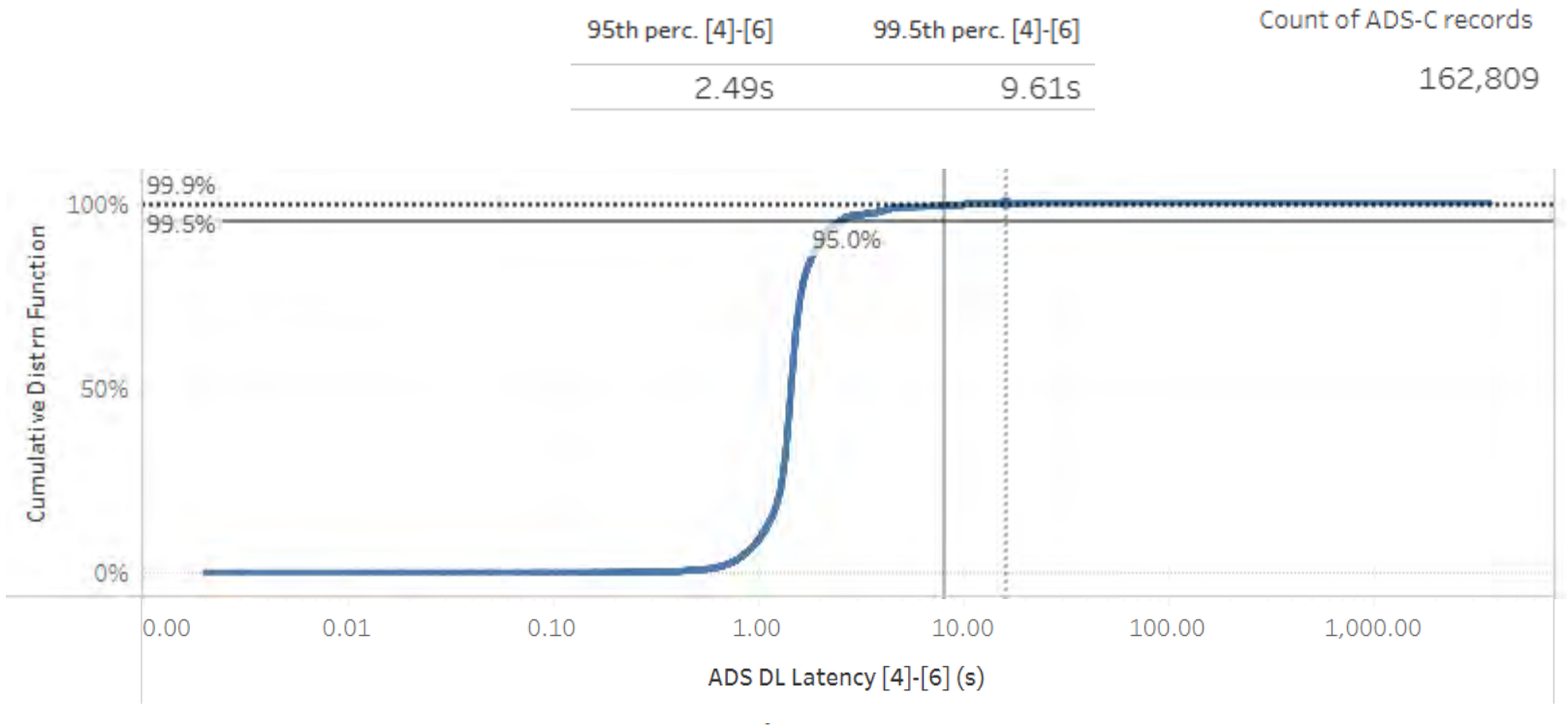
95th perc. ([5]-[1])+([4]-[6])	99th perc. ([5]-[1])+([4]-[6])	Number of CPDLC records (SL1)
4.25s	8.17s	12,061



ADS-C Air-Ground Latency

- Excellent performance seen for in-service period
- Tableau chart shows satcom data latency on 1 year of Iris flights for February 2024 to January 2025
- 95th percentile at **2.49** seconds for **1-way** satcom air-ground data transfer
- Measurement points: Timestamps at the satellite terminal (SDU) and at the Viasat data link gateway (GDGW) – ground-ground latency not included
- ESSP provides monthly end-to-end Iris performance: https://satcom-dls-support.essp-sas.eu/

ATN/OSI ADS-C Latency (Aircraft Iris Satcom terminal to Satcom Ground Gateway)



Benefits of Connected Airline Operations

MUAC's overview on ATS-B2 benefits

EUROCONTROL

Airborne side ADS-C + CPDLC

Airlines

- Optimized climb and descend profiles
- Optimized routes, less miles flown
- Fuel saving + Reduced CO_2 emissions → greener flights
- Future(possibly): less regulations through a more optimized network (use of EPP ETA, runway occupancy parameter, etc.)
- Already available in MUAC's airspace

Pilots

- Link of the ATSU to FMS for easier handling of messages (CPDLCv2)
- Less radio usage for routine information requested by controllers
- Reduced Flight crew workload

	ATN STD	UM	AVG(s)	PC50(s)	PC70(s)	PC95(s)	COUNT
PROCEED DIRECT TO X	B1	74	12,401	10	13	26	519548
PROCEED DIRECT TO X	B2	74R	10,5784	9	11	22	20206
CLEARED TO X VIA Y	B1	79	21,7196	16	23	55	5128
CLEARED TO X VIA Y	B2	79R	18,25	14	19	41	188

Response times to PROCEED DCT and CLEARED TO [...] VIA [...] CPDLC uplinks in B1/B2 airframes in 2022 at MUAC.
Note: Measured as time from uplink to WILCO sending time; there are more contributing factors.

ATS B2 capabilities (provided by SBS + FANS C):

- Extended CPDLC message set for trajectory negotiation
- ADS-C Extended Projected Profile (EPP)

MUAC = Maastricht Upper Area Control Centre

Operational in Europe, available globally

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Iris Global

Launched June 2022

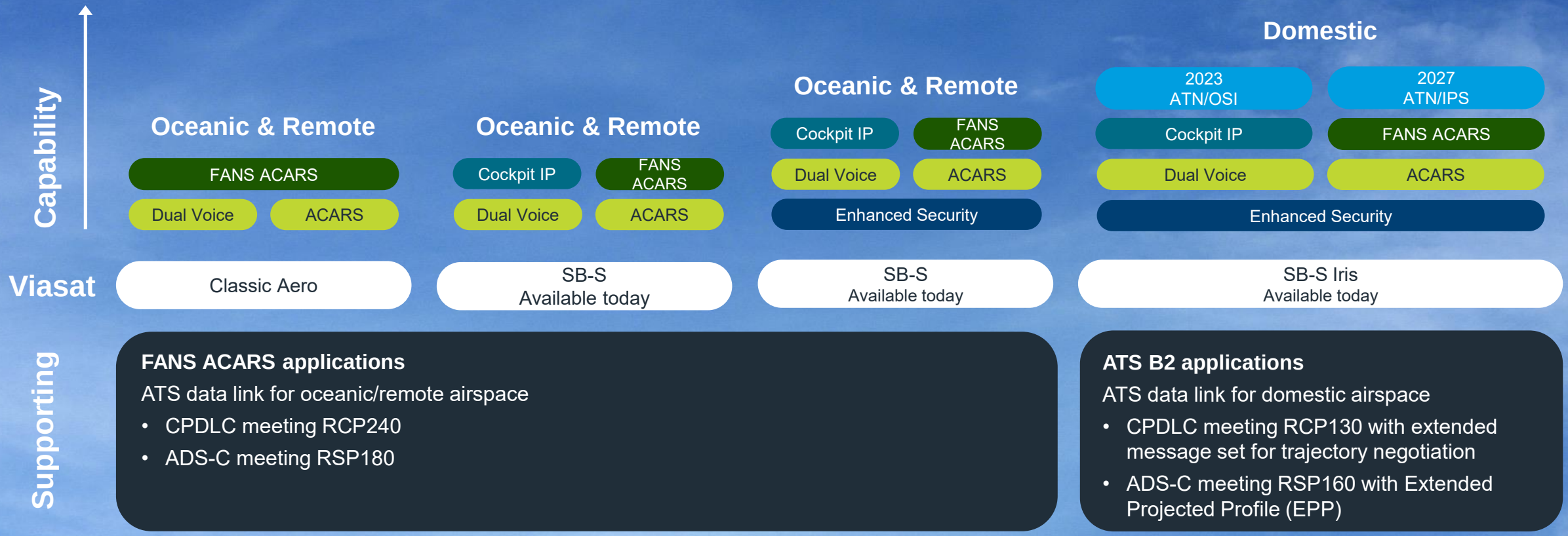
Iris Global (Phase 3), ESA project

- International development & demonstrations for Iris-based services work package
- Opportunity for key Aviation/ATM stakeholders to benefit from funding for Iris demonstrations
- Opportunity to be a pioneer/early adopter of Iris in the region
- Future-proof for global ATC and AOC services, as part of fleet renewal

Trajectory-based operations

- Several ANSPs in APAC have already demonstrated the use of TBO via EFB
- Opportunity to test/develop a prototype of the ATS B2 service over satcom
- Trajectory-based demonstrations between regions (mixed environment)
- Demonstrate the use of the IP connectivity for advanced SWIM-based AOC services

A data link ready for the future



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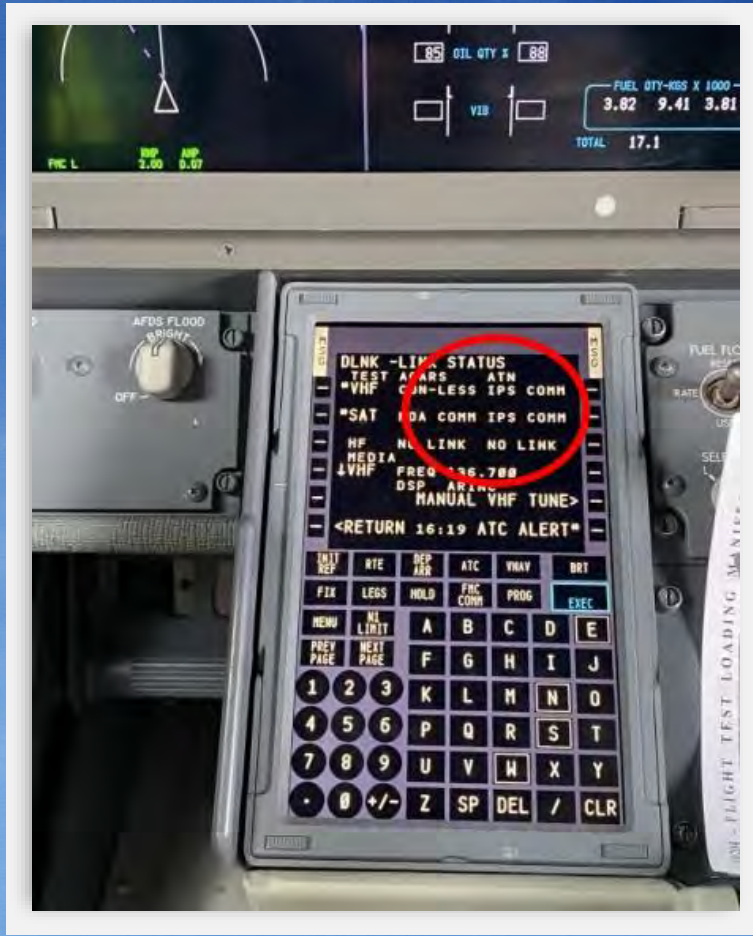
Robust Roadmap to support ATN/IPS standard

- We are building an ATN/OSI and ATN/IPS gateway that allows all aircraft, to transition seamlessly no matter which standard they operate on
- Boeing ecoDemonstrator flight in 2021
- OSI<>IPS interoperability trials 2024/2025




Questions?
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