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Stand 849

The Iris Programme

A partnership to deliver continental satellite communications over Europe, enabling the SESAR Master Plan

Sponsored by ESA and led by Inmarsat

Status: where we are now

AIRBUS

Honeywell

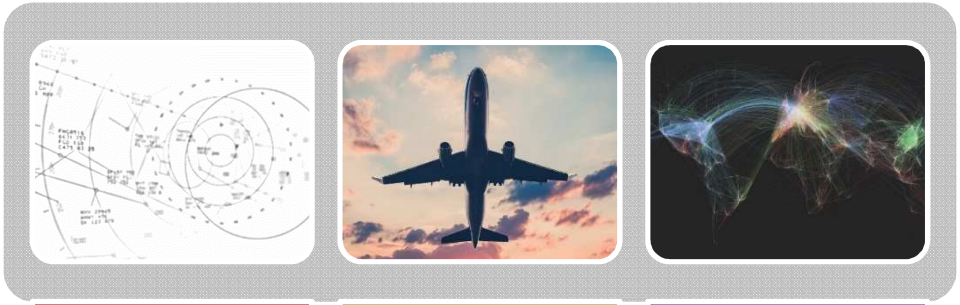
THE POWER OF CONNECTED

- ✓ **Research phase complete**
- ✓ Technology validated
- ✓ Flight campaigns complete
- ✓ Latency requirements met

- ✓ Aircraft avionics being finalised
- ✓ Equipping to begin in 2020

- ✓ **Commercial implementation underway**
- ✓ 20 aircraft to be equipped
- ✓ Major airline, ANSPs engaged
- ✓ Iris Service Provider being organised

Iris benefits: de-risking SESAR deployment in Europe



Performance

Bandwidth

ATN B1+B2 perf. Requirements

Interoperability

Certified service

Security

Operational Benefits

Capacity expansion

Trajectory based Efficiency (4DTRAD)

IP-based AOC services

Sustainable and global

All airspace types

Global coverage

Evolution planned

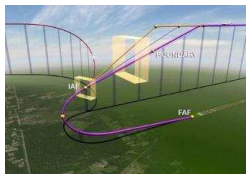
Iris is a ‘must’ for European air transport

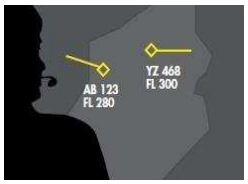
- Can Europe’s ATM afford a new failure of Data Link Services deployment?
- Iris only mature technology to meet the challenge and much more than a complement to VDL2

Early deployment scenario

Transition to satcom will occur inevitably worldwide

- Equipping by 2021 allows a critical mass of aircraft (forward fit) to operate efficient ATC and AOC services and be ready for 4D
- Early transition to satcom will ease frequency congestion, minimise costs for airlines, deploy one system for all services, and align with European centralisation plans for data link

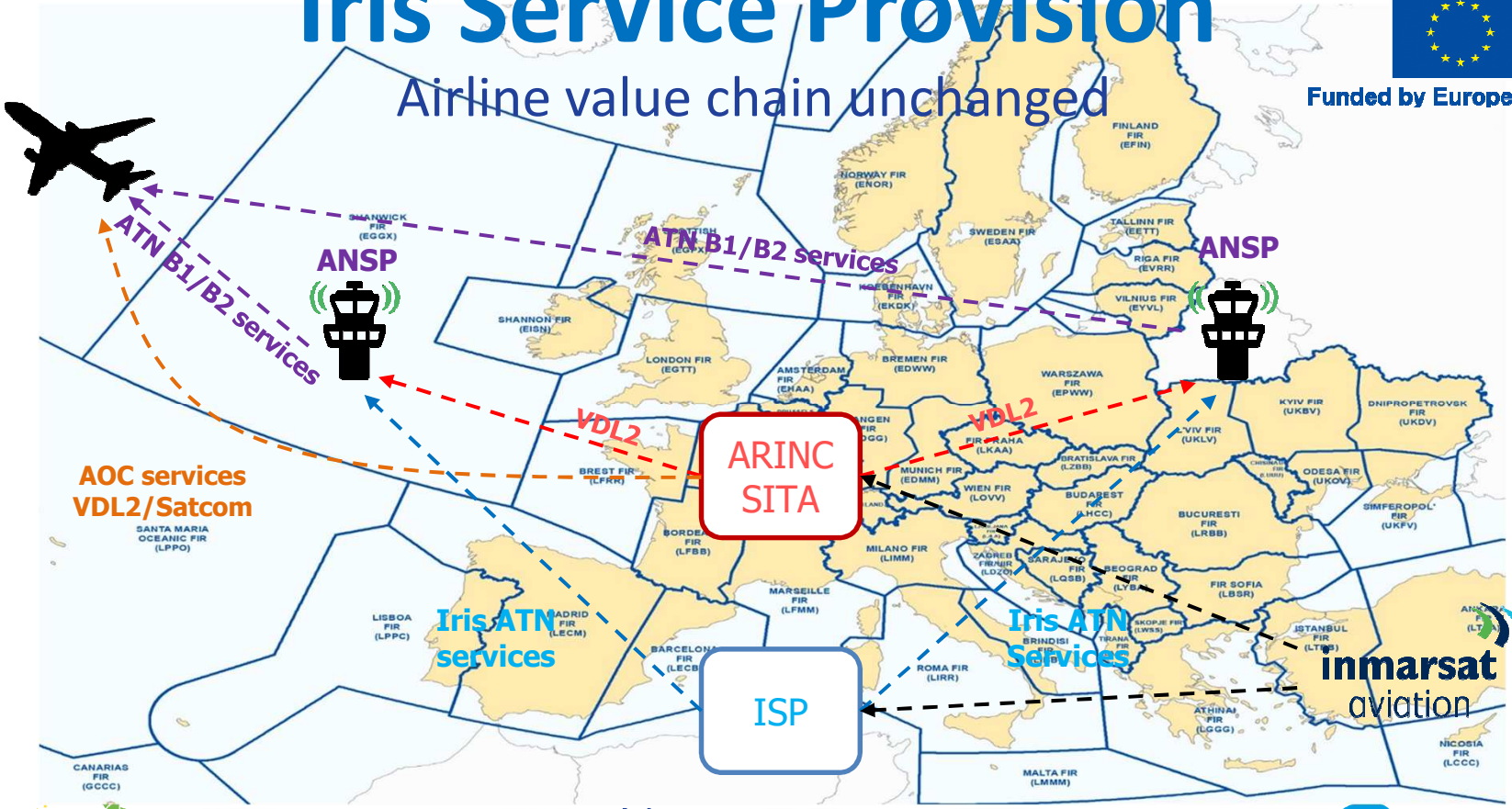




Iris Service Provision

Airline value chain unchanged

Funded by European Union



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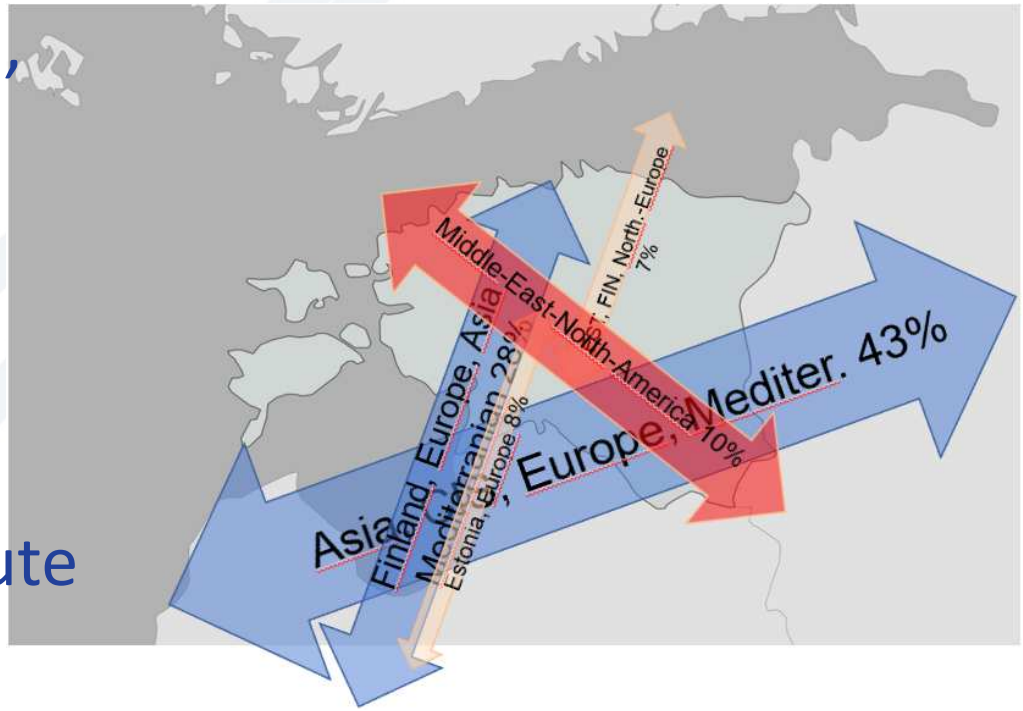
EANS - ESTONIAN ANS PROVIDER

- Provider of ATM, CNS, AIM, MET services
- 2018
  - ~240 000 flights (7.4% growth from 2017)
  - 18,6 min average en-route flight time in Tallinn FIR



ENVIRONMENT

- Thales TopSky ATM system
- ProATN router
- Bought-in service from
  - SITA-On-Air and
  - ARINC

OPERATIONS

- Alternate means of communication for RT
- Initial implementation
  - Standard messages + 2 free text (SQUAWK / STOP SENDING CPDLC REQUESTS)
  - only ACC controllers

EXPERIENCED BENEFITS

- Less congestion in RF
- Shared workload between ATCOs
  - EXEC+PLANNER tasks are overviewed
- Simple squawk change process
- wordless and easy transfer

TIMEFRAME

FEB17
- DLS Implementation project initiation

FEB-JUN17
- Project initiation
- Integra Contract

SEPT17
- Project kick-off

NOV17
- DLS procedures validation

DEC17-JAN18
- LIVE SYSTEM tests
- LIVE Aircraft tests

JAN18
- AIP update

Feb-March 2018
- ATCO training

APR18
- NSA approval

6th April 2018
- SITA-On-Air LIVE

28th June 2018
- ARINC LIVE

EANS webpage:

www.eans.ee

Q / A

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Stand 1231

THE

HONEYWELL

CONNECTED VISION

THE CONNECTED AIRCRAFT

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esa

MARCH 2019

World ATM Congress 2019 (Madrid)

IRIS SATCOM

Satellite Communication System (SATCOM), an alternative to VHF Data Link (VDL Mode 2) to support Controller-Pilot Datalink Communications (CPDLC) and 4D trajectory sharing

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FEATURES & BENEFITS OF IRIS SATCOM AVIONICS

ATC VOICE & DATA

Must-have for efficient use of **oceanic airspace**

Continental ATN datalink as alternative to VHF

Avoid VHF congestion for ACARS and ATN

Enabler for continental **ATM transformation**

CONNECTED OPERATIONS

Native IP applications instead of ACARS

Real time **flight optimization** (weather and traffic avoidance)

Lower cost of apps, IT infrastructure and data

Global connectivity at all phases of flight

CONNECTED MAINTENANCE

Reduces operational disruptions

Reduces maintenance and operations costs

More maintenance data in-flight **at lower costs**

READY FOR FUTURE

Terminals **software upgradeable to IPS**

Global coverage enables **smooth transition** when IPS is deployed

Enables SATCOM as **HF alternative**

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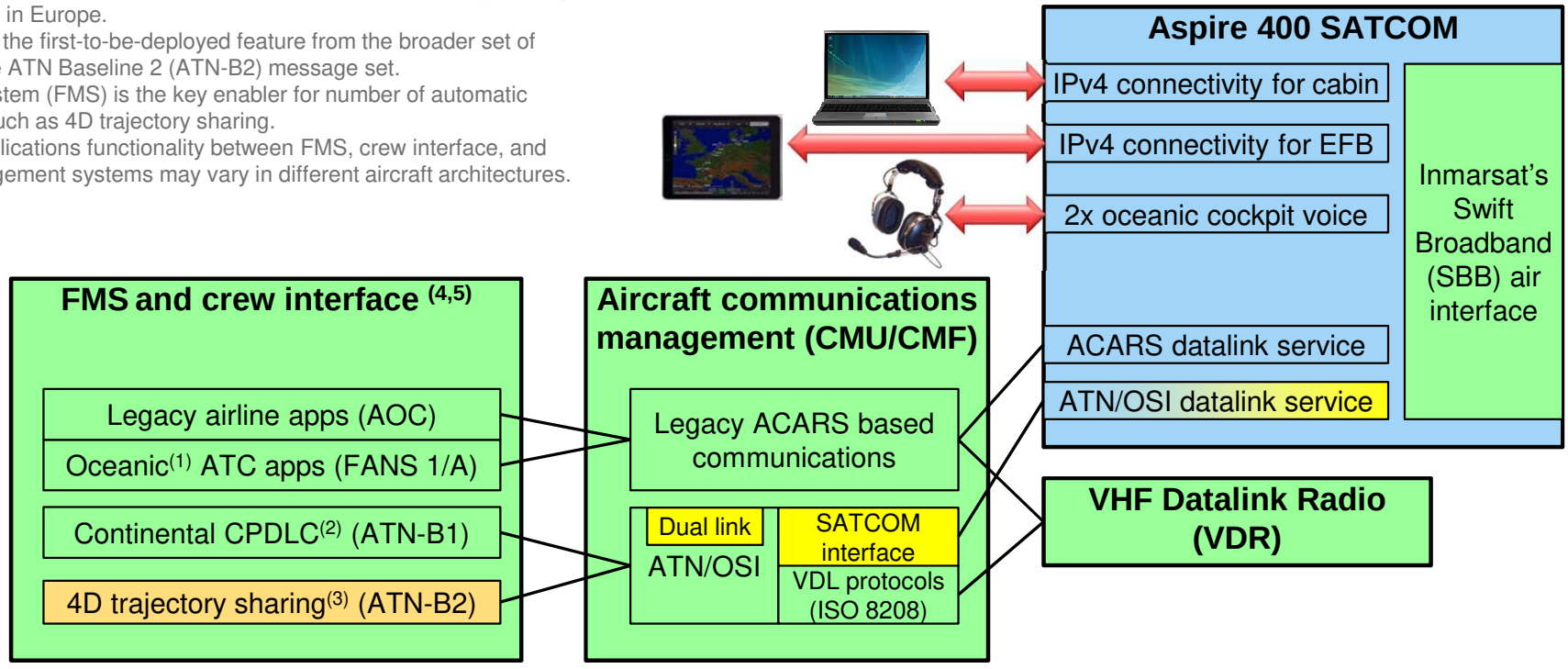
AIRCRAFT IMPACT

Notes:

1) FANS 1/A applications are also used in continental US.
2) ATN-B1 is today's continental Controller-Pilot Datalink Communications (CPDLC) message set mandated in Europe.
3) 4D trajectory sharing is the first-to-be-deployed feature from the broader set of features enabled by the ATN Baseline 2 (ATN-B2) message set.
4) Flight Management System (FMS) is the key enabler for number of automatic datalink applications, such as 4D trajectory sharing.
5) Split of the datalink applications functionality between FMS, crew interface, and communications management systems may vary in different aircraft architectures.



Legend:

Existing product or feature (Honeywell)	New product under development (Honeywell)	New software feature	Optional complementary feature

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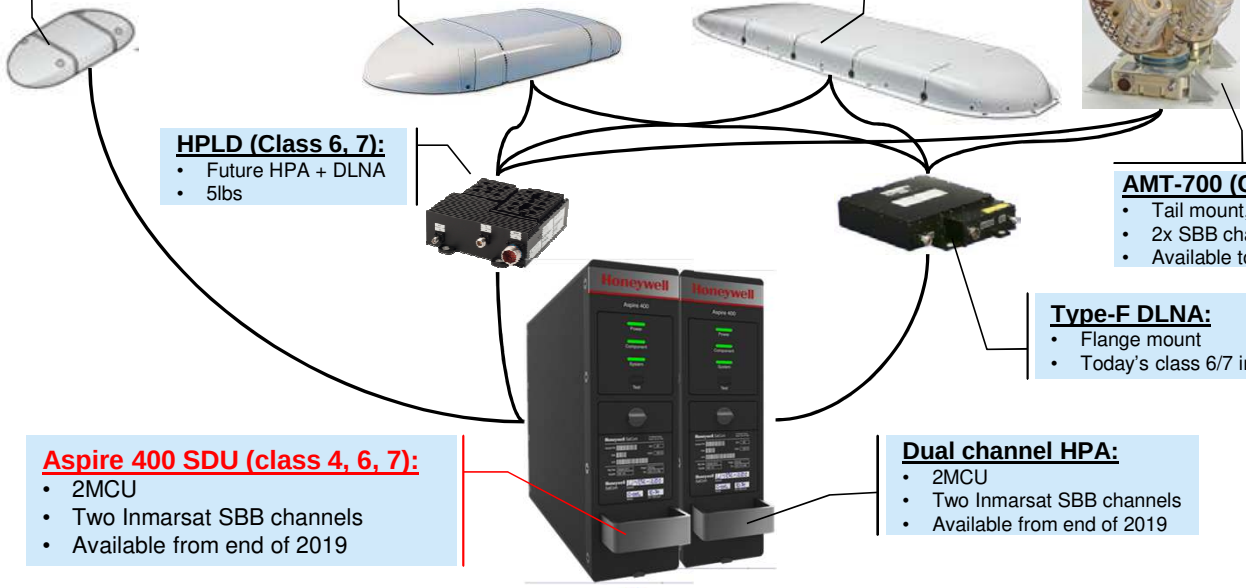
ASPIRE 400 COMPACT SATCOM

ENABLING IRIS

HELGA (Class 4):
- HPA + DLNA + antenna
- 1x SBB channels, 200kbps
- Under development

AMT-1800 (Class 7)
- 18.1" x 7.4" x 2.0"
- 2x SBB channels = 2x 332 kbps
- Available today

AMT-3800 (Class 6)
- 43.0" x 14.3" x 2.5"
- 2x SBB channels = 2x 432 kbps
- Available today



HPLD (Class 6, 7):
- Future HPA + DLNA
- 5lbs

AMT-700 (Class 6):
- Tail mount, 10" x 10" x 9.7"
- 2x SBB channels = 2x 432 kbps
- Available today

Type-F DLNA:
- Flange mount
- Today's class 6/7 installation

Aspire 400 SDU (class 4, 6, 7):
- 2MCU
- Two Inmarsat SBB channels
- Available from end of 2019

Dual channel HPA:
- 2MCU
- Two Inmarsat SBB channels
- Available from end of 2019

The **Aspire 400 compact Satellite Data Unit** (SDU) is Honeywell's new flagship product for L-band SATCOM. It will gradually become available in multiple configurations to fit different user needs.

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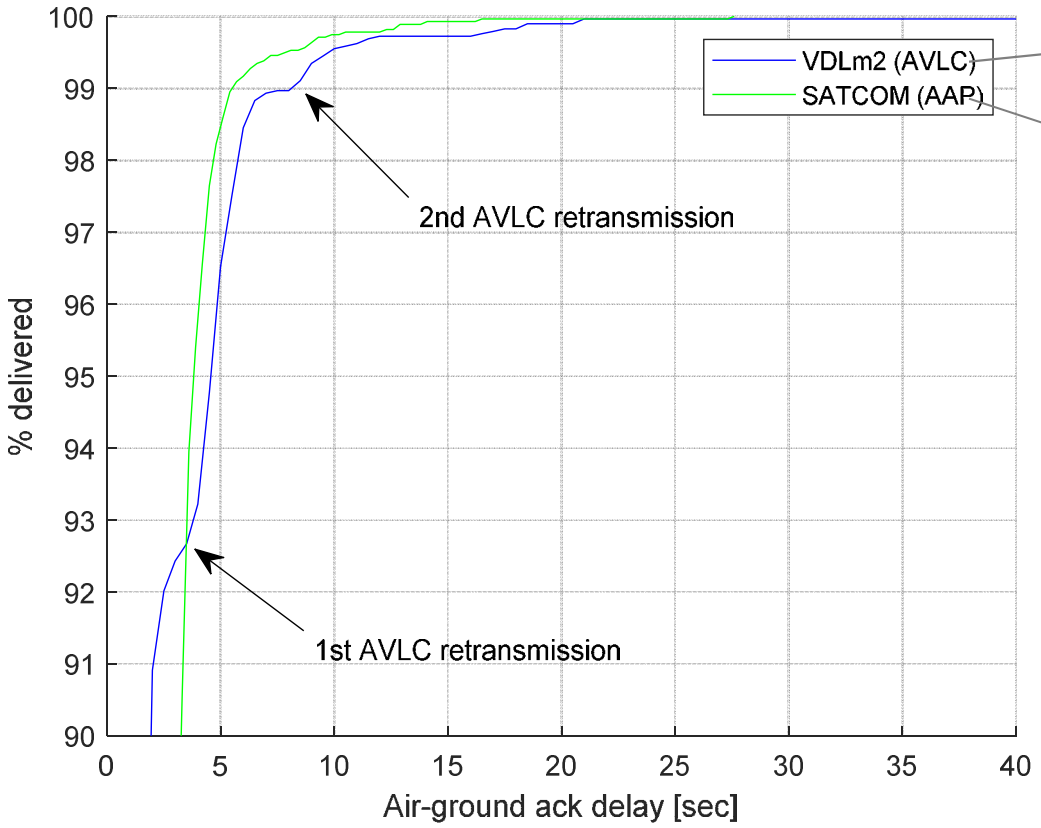
IRIS TECHNOLOGY IS MATURE
WITH PERFORMANCE COMPARABLE TO VDLm2



Round trip latency measured at AVLC layer during 2018 VDLm2 flight campaign

Round trip latency measured at AAP layer (closely equivalent to AVLC) during 2018 Iris Precursor flight trials.

LATENCY

When VDLm2 works, Iris SATCOM has **comparable or better latency where it matters** (95% delivered messages). → SATCOM shall not be thought of as a high latency system, just because satellites are much further away than VDL ground stations.

CAPACITY

ATC data services have highest priority and consume only **a small fraction of the L-band SATCOM capacity**. Contrary to VDLm2 the capacity is thus not expected to be an issue for ATC data over SATCOM, neither today nor in the future.

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STATUS AND PLANS
OPPORTUNITY FOR EARLY ADOPTERS

STANDARDS	EUROCAE/RTCA MOPS and MASPS are in place Interchangeability standards defined by ARINC 781 (ATN not covered).	✓
AVIONICS	**Aspire 400:** prototypes flight-tested in 2018, entry into service in Q1 2020. **CMU/CMF:** capability under development, possible deployment in Q4 2020. **NGFMS:** EPP downlink under development, possible deployment 2020/2021.	✓ 🔧
GROUND	Initial infrastructure deployed and validated during flight trials in 2016 + 2018. Being upgraded to the operational infrastructure – to be completed in 2019. Operational validation starting in 2020 wit **Iris Airline Pilot** program.	✓ 🔧
SERVICE	**ACARS** services available from Q1 2020 with the avionics deployment. **Iris Service Provider** (ISP) responsible for ATN to be in place by end of 2019. ISP certified in early 2021 on the basis of **Iris Airline Pilot** campaign results.	✓ 🔧
INCENTIVES	Equipage and air time for ~20 aircraft funded by **ESA Iris Airline Pilot**. → **Opportunity for airline willing to work with Honeywell, Inmarsat and ESA** ← Follow-on incentives for broader deployment of ATN/SATCOM being negotiated.	!

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Questions?

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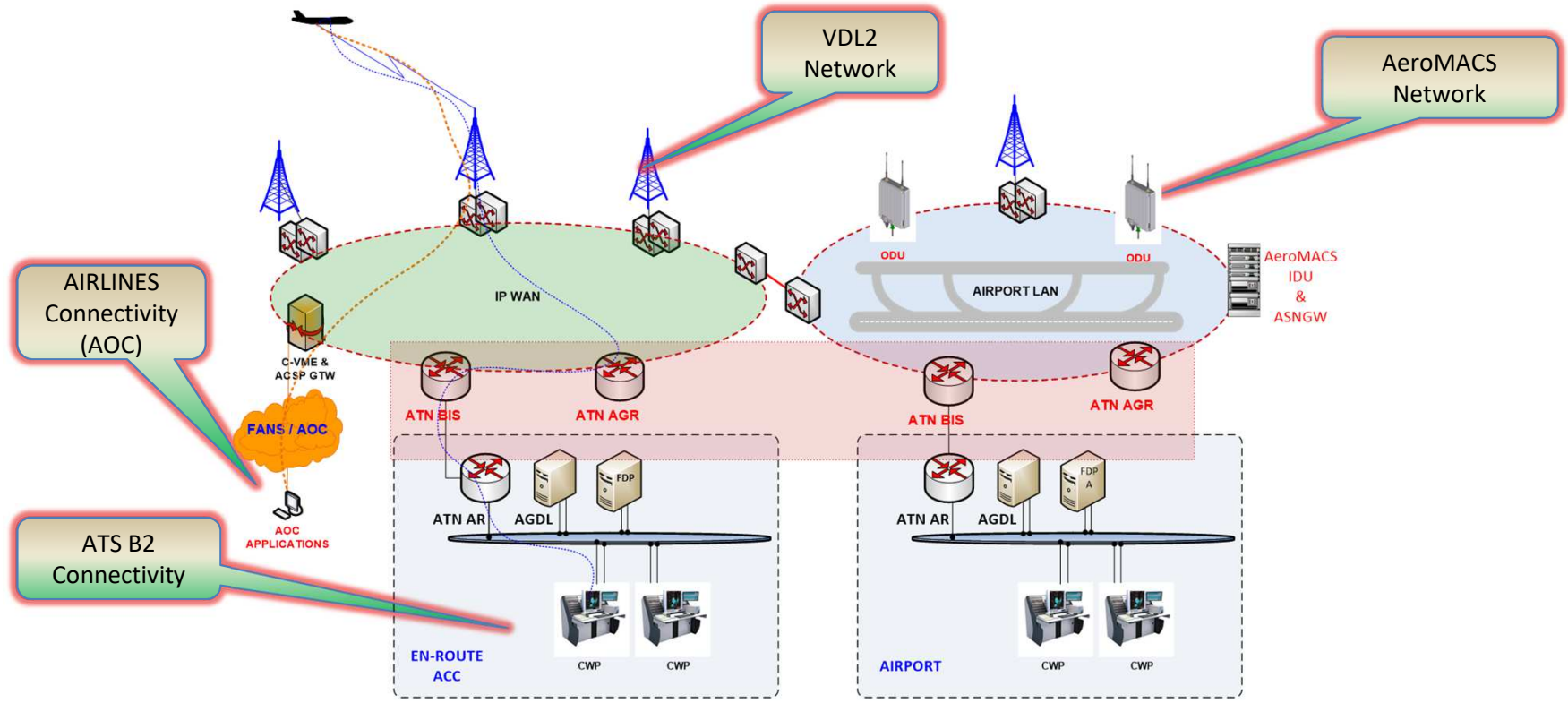
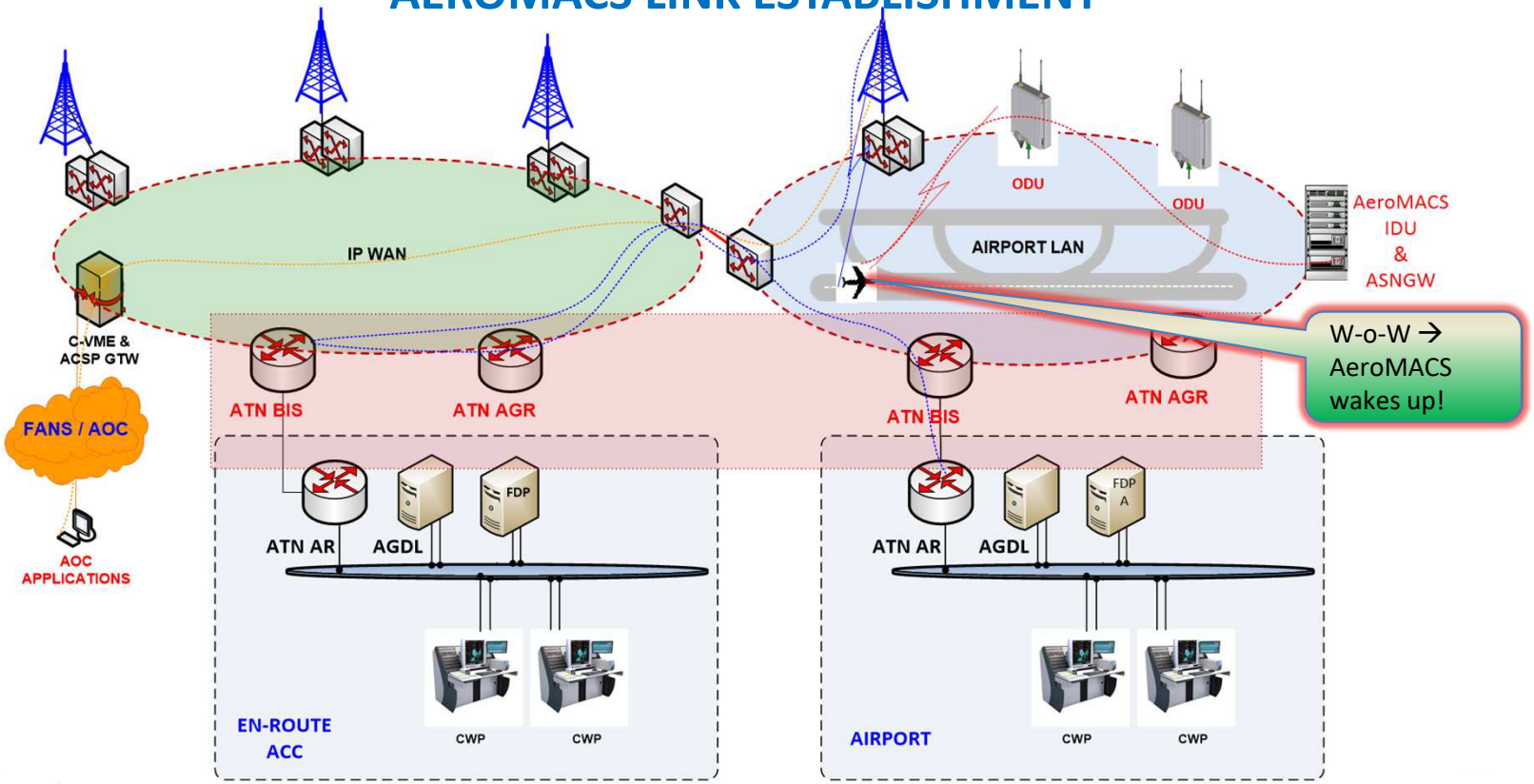
Full Interoperable ENR-GND DataLink Communication ATN/OSI Platform –PJ140206

- Developed and tested within SESAR2020 PJ140206 activities
- PJ140206 Partners
  - AIRTEL ATN / EUROCONTROL / LEONARDO (L)
- PJ140206 Scope
  - To integrate AeroMACS within Multilink ATN-OSI & ATN-IPS, for safety and non-safety applications
- Benefits
  - Increase in performance and safety for ATN B2 services in Airports (DCL & D-TAXI)
  - Data Link resource optimization by dedicating AeroMACS for Airport data link traffic (ATN B2 & ACARS) and VDL2 for ATN B2 En-Route services (CPDLC & ADS-C)
  - Simultaneous usage of AeroMACS infrastructure for IP-based services (SWIM PP)

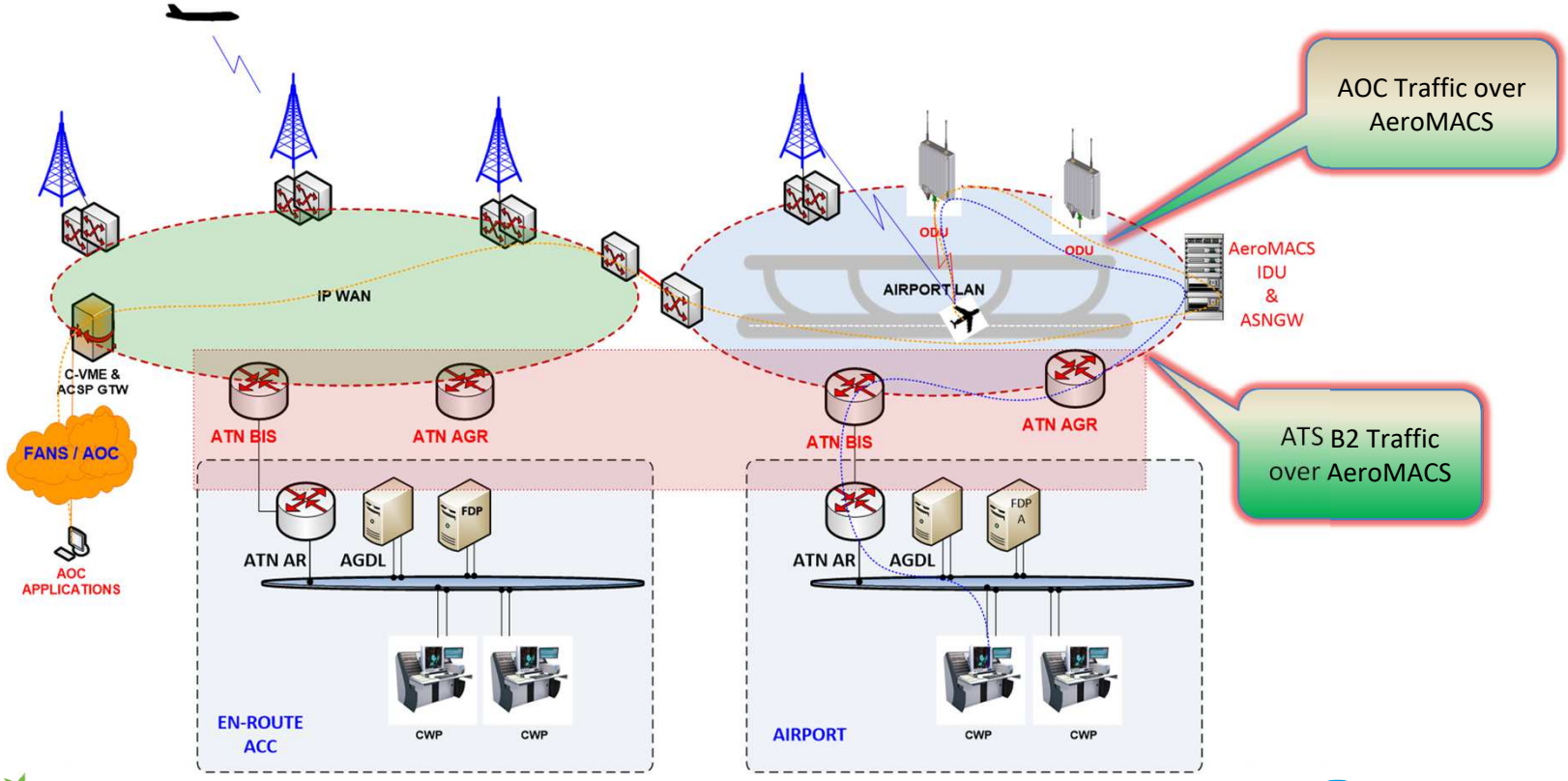
Full Interoperable ENR-GND DataLink Communication ATN/OSI Platform -- EN-ROUTE



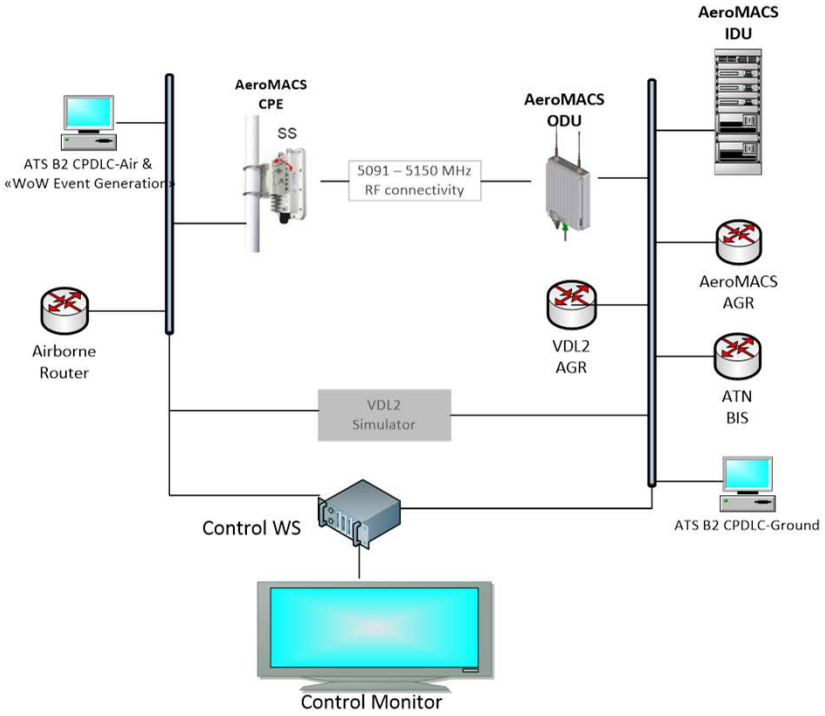
Full Interoperable ENR-GND DataLink Communication ATN/OSI Platform – AEROMACS LINK ESTABLISHMENT



Full Interoperable ENR-GND DataLink Communication ATN/OSI Platform – AIRPORT SURFACE



Full Interoperable ENR-GND DataLink Communication ATN/OSI Platform --Demo



- Seamless ATN-OSI connectivity through VDL2 – AeroMACS technology integration for gate-to-gate operation
- Selection between AeroMACS and VDL2 through “Weight-on-Wheels event generation”
- Aircraft and ground communications operation is managed through the Control WS and monitor

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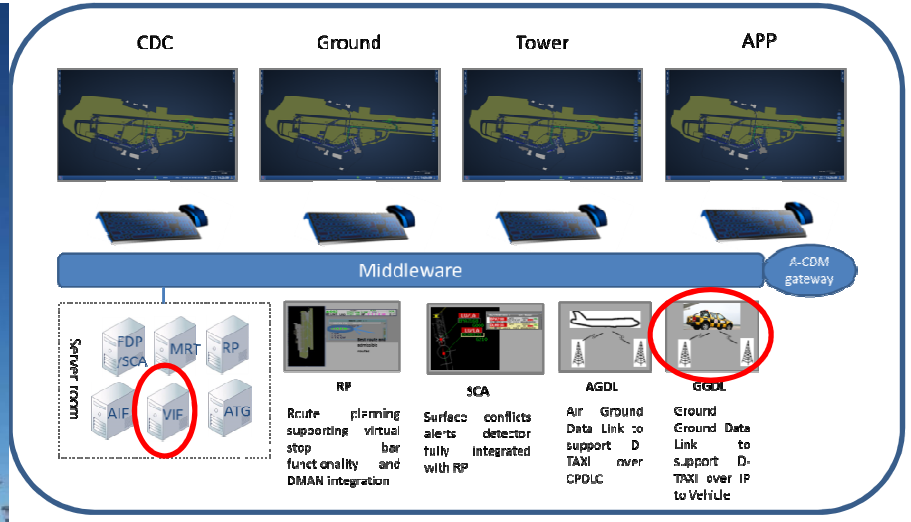
Improvement on airport routing and communication with vehicle via datalink based on Internet protocol (IP)–PJ03a

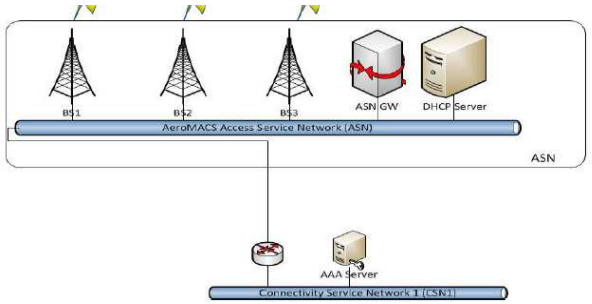
- Developed, tested and validated within SESAR2020 PJ03a-01 solution
- **PJ03a-01 Partners**
  - LEONARDO and BULATSA (Bulgarian ANSP)
- **PJ03a-01 Scope**
  - Among all solution objectives, one of this was to validate the Vehicle data link communication based on IP network
- **Benefits**
  - Reduce the ATCO workload in terms of voice communication, especially in high traffic density
  - Reduce misunderstanding in clearance and route to be followed
  - Increase vehicle drivers situation awareness

PJ03a-01 Platform for Vehicle communication



-Emulated for V2 (Wave 1)
-Real scenario for V3 (Wave 2)

AeroMACS NETWORK



Vehicle equipped with AeroMACS CPE

Vehicle messages

- Messages CPDLC-like based

Downlink messages

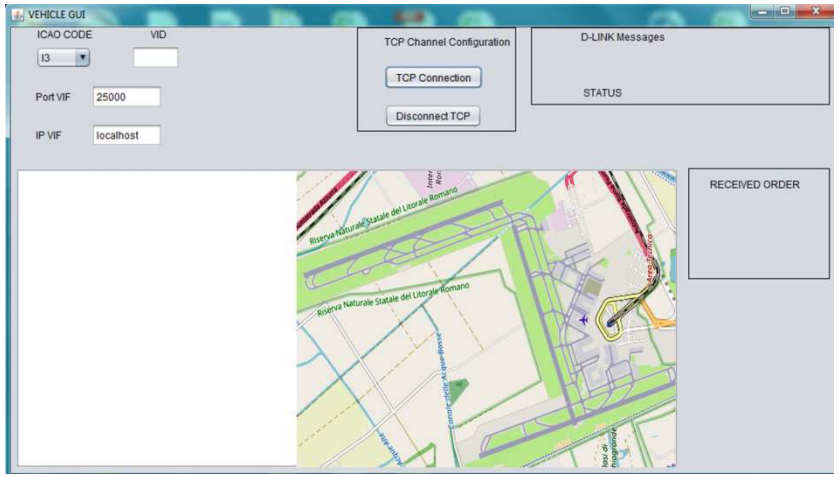
Msg ID	Message element	Message intent/usage
DM0	**WILCO**	Indication that the instruction will be complied.
DM1	**UNABLE**	Indication that the instruction cannot be complied.
DM2	**STANDBY**	Indication that the message will be responded to shortly.
DM139	**REQUEST TOW**	Request to TOW

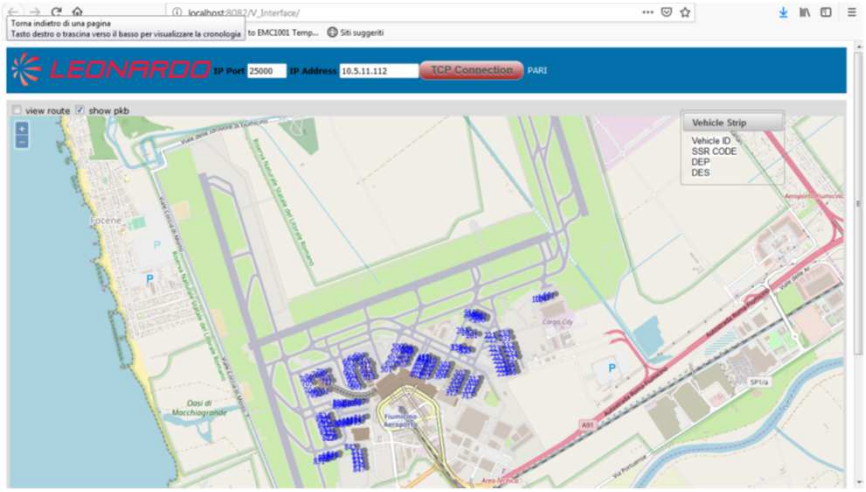
Uplink messages

Msg ID	Message element	Message intent/usage
UM0	**UNABLE**	Indication that the instruction cannot be complied.
UM1	**STANDBY**	Indication that the message will be responded to shortly.
UM311	**HOLD POSITION**	Instruction to hold the current position
UM421	**PROCEED TO [Ground location]**	Request for permission to proceed, for example to enter or cross a runway
UM420	**TOW TO STAND [PKB] VIA TWY [TaxiRoute]**	Instruction to tow to the specified location; may include a hold short position

Vehicle HMI

- Two type of HMI: i) standalone and ii) web-based
  - Textual and graphical information (e.g. route, taxi limit, and clearances) displaying
  - Sound at Instructions/Clearance receiving





Looking ahead to Wave2

- Real scenario involving vehicles moving on airport equipped with AeroMACS CPE
- AeroMACS network covering airport layout
- Request messages from vehicles drivers to ATCOs
- Surround traffic (improving situation awareness) and alerts integrated on vehicles HMI

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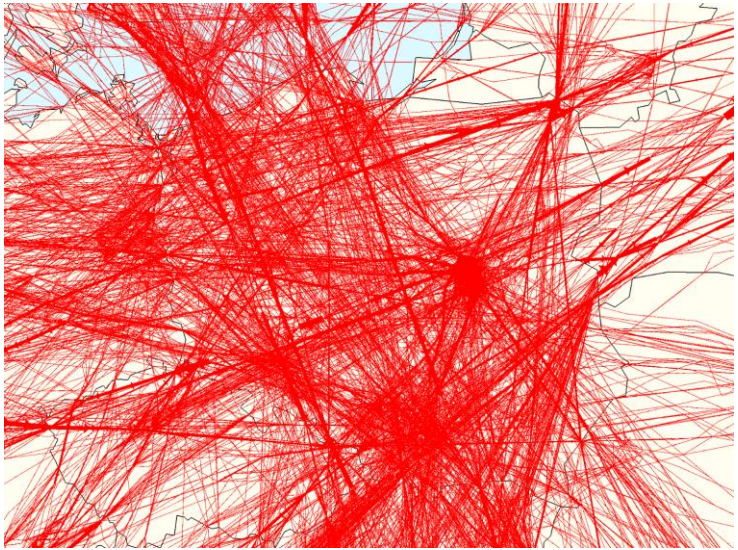
IMPLEMENTATION OF DATA-LINK SERVICES FOR THE ATM IN WARSZAWA FIR

SESAR WALKING TOURS – DATA COMMUNICATIONS

Rafał Cichocki
Polish Air Navigation Services Agency

Why do we need data link?



- Limitations of air-ground voice communication
- High traffic growth
- **SESAR Vision** – 4D trajectory management

SESAR DEPLOYMENT MANAGER

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Data Link in PANSA

Infrastructure

- VDL Mode 2 coverage
- Multi-frequency

Air Traffic Management System

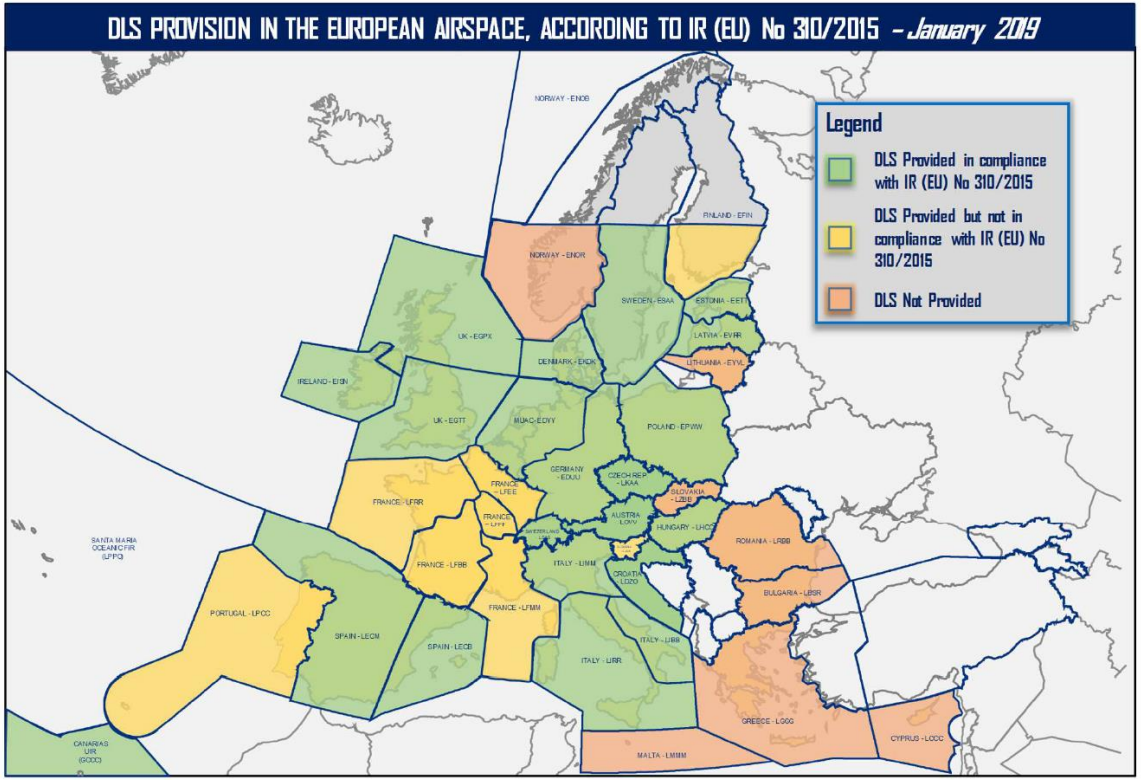
- System integration and user interface
- Testing - laboratory test, air-ground tests

ATCO/pilots and procedures

- Concept of operations
- Simulator training and familiarization

1st data link application **- CPDLC** - Controller-Pilot Data Link Communication

Source: SDM Report on the DLS Implementation status in Europe



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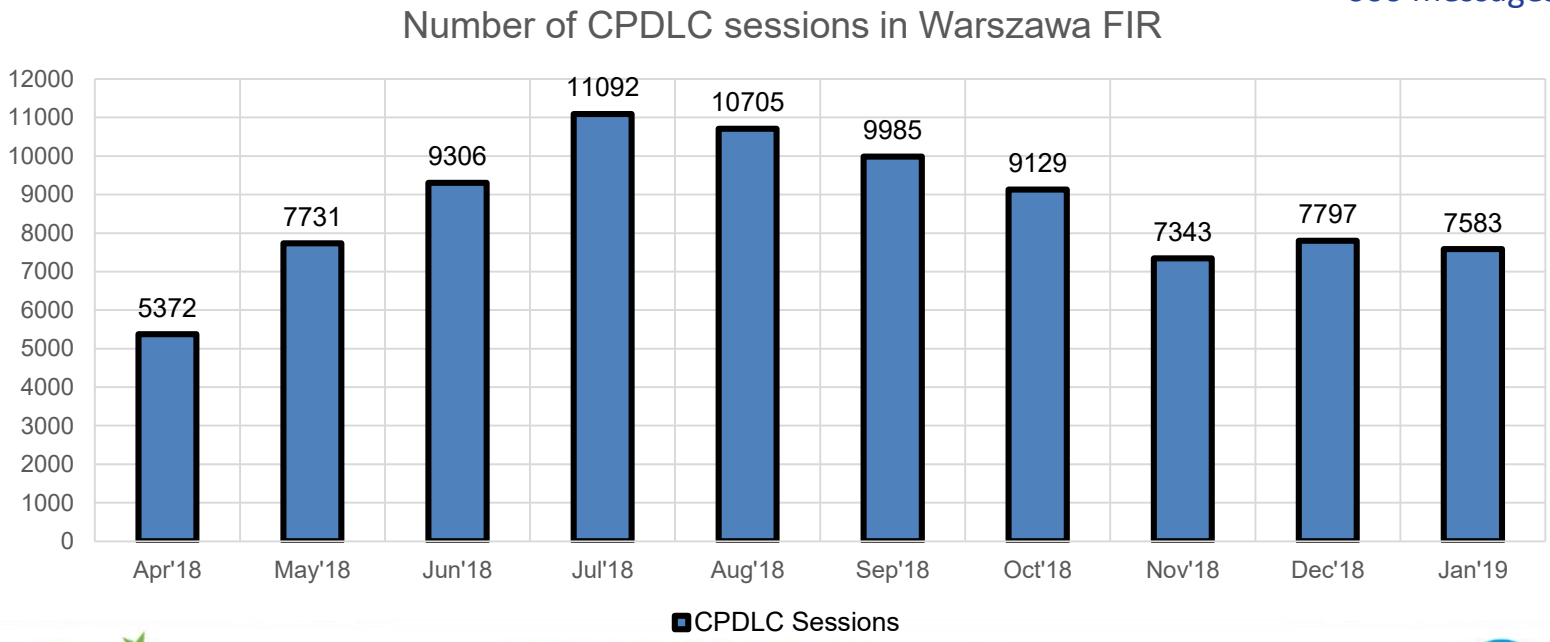
Data Link Usage

Over **16 000** messages a month
~600 messages a day



Data Link Usage

- Top 3 messages **from controllers**:
  - CONTACT [unitname] [frequency]
  - PROCEED DIRECT TO [position]
  - SQUAWK [code]
- Top 3 messages **from pilots**:
  - REQUEST [Flight Level]
  - REQUEST DIRECT TO [position]
  - REQUEST CLIMB TO [Flight Level]
- Average round trip delay: **3 sec**
- **Provider Aborts** are still main issue but situation is getting better

PANSA Experience

- Aircraft operators early involvement and encouraging is a must.
  - **30 %** of flights is CPDLC capable (based on flight plan data)
  - … but **only 13 % really use CPDLC**
  - However the situation is getting better and **more flights use CPDLC!**
- Legacy communication protocols/technology are still present
- User perspective - **data link works and helps a lot!**

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FUTURE

Data Link is **KEY ENABLER** for **future ATM concepts**

Thank you for participating in SESAR walking tours

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with our experts at stand **no.239**
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