• CPDLC Deployment Status
  – CPDLC Mandate
  – ELSA Report
  – SESAR DM Recovery Plan

• Deploying a Data Link System
  – Data Link Components
  – Validating a CPDLC System
  – Monitoring a VDL network
  – Future Data Links

• Summary
EUROPEAN CPDLC MANDATE
• At the Single Sky Committee (SSC) Meeting 55, which took place on 14/15 Jan 2015, the SSC passed a favourable opinion on the proposed amendments to Regulation (EC) 29/2009 (DLS-IR). The regulation 2015/310 which amends Regulation 29/2009 has now been published and is available from the European Commission web site.

• The important date changes to Regulation (EC) 29/2009 in a simplified form are:

  – The amended regulation will be applicable as from 05 Feb 2018
  
  – All ANSPs should be ready by 05 Feb 2018
  
  – All aircraft should be equipped by 05 Feb 2020 (there is no longer a distinction between forward fit and retrofit)
EUROCONTROL Specification on Data Link Services (EUROCONTROL-SPEC-0116) is the primary document.

It complements the Implementing Rule (EC 29/2009).

It applies to all ATN/VDL 2 Data Link Equipment:
- Aircraft communication and display systems, including an ATN Router and an ATN End System
- VDL 2 Airborne Radios
- VDL 2 Ground Radios and Stations
- ATN Air-Ground and Ground-Ground Routers
- ATC Ground Centre communication and display systems, including an ATN End System
- Ground Data Recording equipment

It defines detailed requirements, explanatory materials and conformity assessment materials providing means of compliance (MOC) associated with the DLS implementing rule.
4.1 Constituents of a DLS System

![Diagram of DLS System](https://www.airtel-atn.com)

Figure 1: ATN Data Link System Architecture
The use of VDLM2 air/ground Data Link as an enabler for CPDLC Mandate has encountered implementation issues.
ELSA Findings and recommendations
1. Use of dedicated channel for transmissions at the airport level in service areas with high traffic levels
2. Progressively implement additional VDL2 frequencies
3. Optimise the en-route VGS network coverage
4. Use the CSC as common control channel only
5. Ensure the availability of 5th VDL2 frequency
6. Implement protocol optimisations/fixes
   a) VDL2 AVLC frame size
   b) Unbounded retry in certain VGS
   c) AVCL clear request
   d) Optimise Disconnect Mode management
7. Alternative communication means for AOC, specially at airport level
8. Transition roadmap to VDL2 target technical solution
9. Upgrade avionics to “best in class”
10. Update pilot procedures to avoid unnecessary avionics resets
1. Define and implement an effective Data Link end-to-end system certification process (including both ground and air components) and reference material for the ground network infrastructure (MOPS-like).

Oversight

1. Establish/empower a pan-European air/ground datalink implementing function having appropriate steering responsibilities.
2. Establish/empower a pan-European ATN/VDL2 performance monitoring and spectrum coordination function.
3. Establish/empower a pan-European ATN/VDL2 end-to-end certification and oversight function for validating (ground and airborne) sub-systems acceptability.
What does it mean?

- The ELSA findings and recovery plan are focused on solving the VDLM2 sub-network issues and some of the ground network issues.
- ELSA findings have not reported any major issues with the ANSP CPDLC upgrades/deployments.

Diagram:
- VDL Network
- ATN Network
- ATC Centre
- FDP$S$
- ANSP ATN Router
- AGDLS/DL-FEP/DLS
- ATN A/G Router
- ATN G/G Router
- Airborne Router
- Airborne Router
SESAR Deployment Manager
• Data Link Services Recovery Plan was presented by Sesar DM Nicolas Warinsko – Director Technical Operations

Workshop at WAC 2017 (7-Mar-2017) with SDM, EC, EUROCAE, EASA, SESAR JU

- Datalink is a must!
- DLS recovery plan is being executed now
DEPLOYING A DATA LINK SYSTEM
• Deploying a Data Link requires careful planning for an Air Navigation Service Provider (ANSP):
  
  – the new system components (ATN Routers, DL-FEPs) must be integrated with existing systems;
  
  – ATN Network and VDL stations must be deployed and/or contracts with CSP must be established
  
  – functional, system and interoperability testing must be performed before going live;
  
  – and the Controllers must be trained.

• It requires careful planning and coordination as several actors and systems are involved.
Data Link Components

VDL2 Network

Airborne Router

ATN Network

ATN A/G Router

ATN G/G Router

FDPS

AGDLS/ DL-FEP/DLS

ANSP ATN Router

ATC Centre
Deployment of three components

A. Procurement and/or upgrade ATC Centre for CPDLC/ATN
B. Procurement of AGDLS/DL-FEP and ANSP ATN Router
C. Procurement of ATN Network and VDL M2 Ground Stations
   - Directly
   - Service provided by Communication Service Providers

The procurement and/or deployment of ATC components (ATC Centre, AGDLS) is not dependant of the provision of ATN/VDL network.
DATA LINK EVOLUTION
• VDLM2
  - provides a low-bandwidth air/ground Data Link
  - Aircraft equipage at the moment is VDLM2
  - Mandate requires VDLM2 coverage
  - Shares AOC/ATC traffic in one single channel
  - En-route and airport data in one single channel

• Recovery plan
  - VDL Multi-Frequency with dedicated en-route frequency when required
  - AOC data to other sub-networks

• Other candidates for ATC sub-network
  - Satellite (ESA Iris Precursor, ...)
  - SESAR 2020 is looking at LDACS, AeroMACS and satellite.
Data Link System Architecture
AIRTEL
We are ready to guide ANSPs to meet the CPDLC mandate successfully
• **Products**
  — Operational products
  — Test systems
  — VDL Monitoring systems

• **Adaptable**
  — Each ANSP has specific requirements and Airtel adapts to meet these needs

• **Proven technology**
  — 13 European ANSP use our software
  — Over 2,000 aircraft are equipped by Airtel
  — Integrated with all major system integrators

• **Experience**
  — Working in Data Link since its inception in ATC
  — Key member of ELSA consortium report

• **Ready for the future**
  — Partner in ESA Iris Precursor and Iris Evolution to provide CPDLC ATC using satellite network
  — SESAR 2020 member participating in PJ14 new sub-network and network technologies and future ATN B2 applications
Operational Data Link Products

VDL2 Network

ATN A/G Router

ATN G/G Router

ATC Centre

FDPS

ANSP ATN Router

AGDLS/DL-FEP/DLS

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Ground Validation Suite

- Ground Validation Test Systems provide testing means that require less actors and systems.
- Simulation of up to 1,000 aircraft
- Early detection of interop problems
- Independent Validation
- Easy setup
- No coordination required with CSP or Avionics
- Large emulations
- Testing of valid and invalid scenarios
- Shadowing of operational scenarios
Monitoring VDL Deployments

Airborne Router

VDL2 Network

ATN Network

ATN A/G Router

ATN G/G Router

ANSP ATN Router

AGDLS/DL-FEP/DLS

FDPS

ATC Centre

Mobile Test Platform

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