



# Air ground datalink implementation issues and lessons learned

European experience stemming from Link 2000+  
Programme

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We All Have  
*ISSUES*

# Datalink Implementation in Europe: Issues

Lack of planning information

Deadlines not being met

Long lead times for fixes

What's installed on the aircraft?

Lack of data from aircraft

**ANSPs and many AU's not ready on time**

Performance monitoring with a shared frequency

Problems only found in live environment

Ambiguity in standards

Competitors need to cooperate

Frequency Congestion

**Provider Aborts**

Testing against a moving baseline

Last mover advantage

# Datalink Issues

Technical Issues

Organisational Issues

Scheduling Issues

# Technical Issues

## Technical Problems and lack of validation of technical solutions

- Provider Aborts
- Congestion of VDL channel
- Various system issues (avionics, network and ground system)

## Difficulty in testing

- Many problems not found until in the live environment
- Difficult to obtain data from aircraft in service
- Moving baseline in service... difficult to isolate improvements
- Need to know aircraft avionics configuration to test in-service performance

## Some ambiguity in standards

- Complex standards, many levels, many options, some aspects deliberately left unspecified
- Different system behaviours (different interpretations / implementations)
- Incomplete / lack of end-to-end validation of standards

# Organisational issues

## Lack of overall system authority / integrator

- No testing oversight / control / plan
- Disjointed decisions / no decision

## Competitors need to cooperate

- Sharing data can be difficult
- May have conflicting interests
- Difficult to monitor individual ACSP performance with shared frequency

# Scheduling Issues

## Late implementation by many ANSPs and airspace users

- Many ANSPs failed to meet their obligations under the regulation (e.g. unrealistic reporting / plans)
- Airspace users were also late in equipping their aircraft

## Avionics

- Most deployed avionics are not mature
- Long lead times to develop and deploy updates

## Motivation to implement

- Lack of commitment to implement, despite Regulation
- Limited perceived operational/performance benefits
- Perceived last mover advantage (some AOs are apparently waiting)





## Lessons learned... from Sept 2012

Synchronized commitment & investment are essential  
ANSPs & Airspace users  
Different needs, expectations & ROI

Bring together OPS, Tech, Safety & Finance from the start

Get the regulation & standards on the table  
Publicise, reach business aviation etc.  
Stability – make up your mind and stick to it.

Some stakeholders will wait until the last moment  
Benefit driven – YES but ...  
Money and legal power needed

## Lessons learnt

- Regulation alone doesn't make it happen – it needs to be enforced and managed
- Regulation driven implementation leads to a culture of achieving the dates/obligations of the regulation rather than admitting the system isn't ready
- Regulation should be accompanied by incentives (positive and negative)
- Shouldn't grant exemptions too widely or too quickly – can stifle the market for third party solutions.
- Once the deadline is missed it's difficult to get it back on track – AOs reluctant to invest further until system is proven to work.
- System integration not good enough – no clear owner/authority of the system overall – need of end-to-end validation .
- Testing approach has not been good enough to identify problems early.
- ACSP performance is critical and difficult to manage - lack of competition doesn't help.
- Certification of avionics does not mean they will perform well in service.

## Lessons learnt... on a more positive note

- The certainty of the regulation did stimulate avionics manufacturers to commit to full scale development / manufacturing
- Pioneer phase was successful... many participants and identified problems early



- PA: Combination of different factors:
  - Use of a single frequency for Common Signaling Channel (CSC) and data.
  - Concurrency of AOC and ATN traffics over this single frequency channel.
  - The VGS networks are mainly driven by AOC needs, leading to a saturated and non optimised VGS network or en-route (over FL 285) purposes.
  - The resulting RF complex environment (where there are many VGSs in view) introduces some unexpected demands on the VGS handover logic at airborne level.
  - Increase of the Radio Frequency congestion leading to delays in data transmissions or disconnections.
- Recommended:
  - Action on the ground infrastructure
  - Assessment of the RF and Management of the hot spots
  - AOC versus ATN traffic and A/G CMM services: Distributed or Centralised
  - Avionics / Ground end systems (incl. Multi-frequency)
  - ACSP performance monitoring
  - CM/CPDLC interop. Robustness testing
  - Perform further investigations (Cf. SJU/ELSA study)
- Hence European Commission amended the regulation (cf. 2015/310) that “suspend” the timing and tasked SJU that initiated the ELSA study.



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## The “VDL2 capacity study“ (Completed)

Objective: Identification of the **limits of the operational performance of VDL2** in terms of the VHF channel physical limitations and its operational usage for ATS purposes.

Timeline: June 2014- July 2015 (completed - <http://www.sesarju.eu/newsroom/all-news/sesar-study-confirms-need-for-next-generation-datalink-technology>)

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## The ELSA study: (Ongoing)

Objectives:

**Collection and analysis of data** from avionics and ground-systems to **identify the issues** affecting the end-to-end performance of the VDL2 Datalink;

Modelling and analysis of the **options for multi-frequency VDL2** deployment, in particular the options for channel use, frequency assignment, network topology and network management;

**VDL2 protocol optimization** in support of both ATN and AOC communications (through RF Level Modelling and Testing)

Timeline: Feb 2015- Jun2016

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## SESAR2020 VLD on VDL2

Objectives:

Build confidence on the solution developed by ELSA

Timeline: Q3/Q4 2016→ TBD

## Next

- Datalink deployment shall continue.
- Technical problems shall be fixed
- New legal framework?
- Next steps addressed by the European Commission

# Questions?

