

LDACS AIRCRAFT DEPLOYMENT

AVIONIC MANUFACTURER VIEW
















Thomas Boegl
Director of Technology and Studies
1st of July 2021

ROHDE & SCHWARZ

Make ideas real



BASIC STRATEGY FOR THE ROLL OUT OF LDACS

	VDL M2	LDACS Technology	LDACS Rollout Strategy
Applications, Services			
Service Provider, Infrastructure			
Users, Customer Base			
Payment Models			
over the Air Bandwidth			

Enhance a well established System (VDL Mode 2) with significantly more RF bandwidth (LDACS)

- ▶ The idea is to use LDACS just as an enhancement for the Air Bandwidth of VDL Mode 2 Systems
- ▶ It was described first in 2016 by Rohde & Schwarz and is applied by the LDACS / VDL community

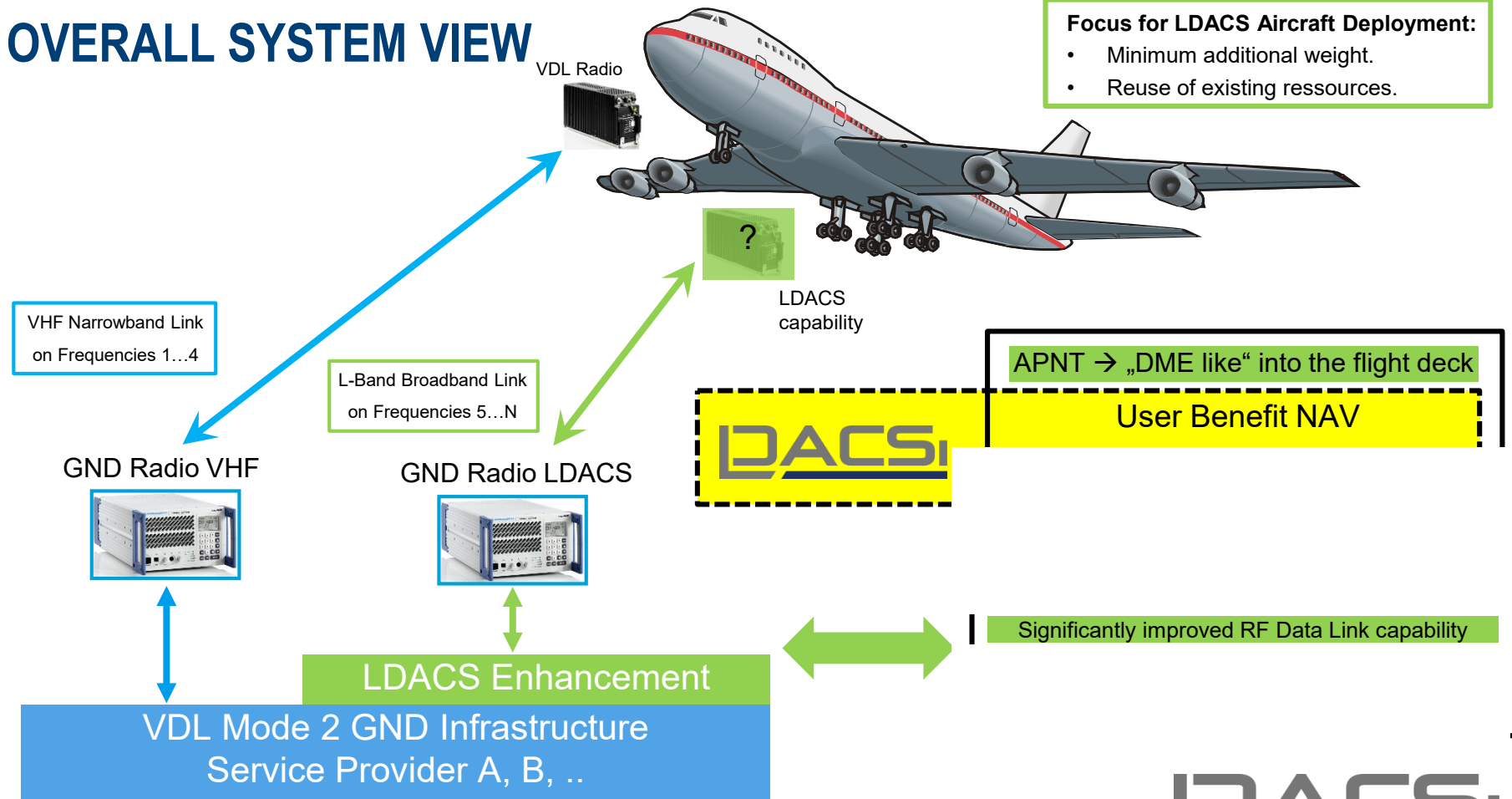
ENHANCING VDL MODE 2 WITH LDACS

- ▶ VDL Mode 2 has already made some steps as a basis to increase the system bandwidth over the air.
- ▶ VDL Mode 2 has started to use more than one frequency to get rid of short term capacity problems.
- ▶ This means that VDL mode 2 will be able to search and select more than one channel and is on the way to become a cell based system.

- ▶ This capability is not linked to particular frequency band or channel.
 - Frequencies 1 – 4 will be VHF as planned for VDL (as it is)
 - Frequencies 5 – N can be within other frequency bands e.g. L – BAND
 - With this approach VDL Mode 2 can operate any frequency which is scanned by a receiver and which can be addressed with a transmitter.

- ▶ This is the basis to enhance a VDL Mode 2 system with an additional LDACS data link.
- ▶ For the protocol LDACS is just a new broadband mode for the RF Link. (simplified)

OVERALL SYSTEM VIEW

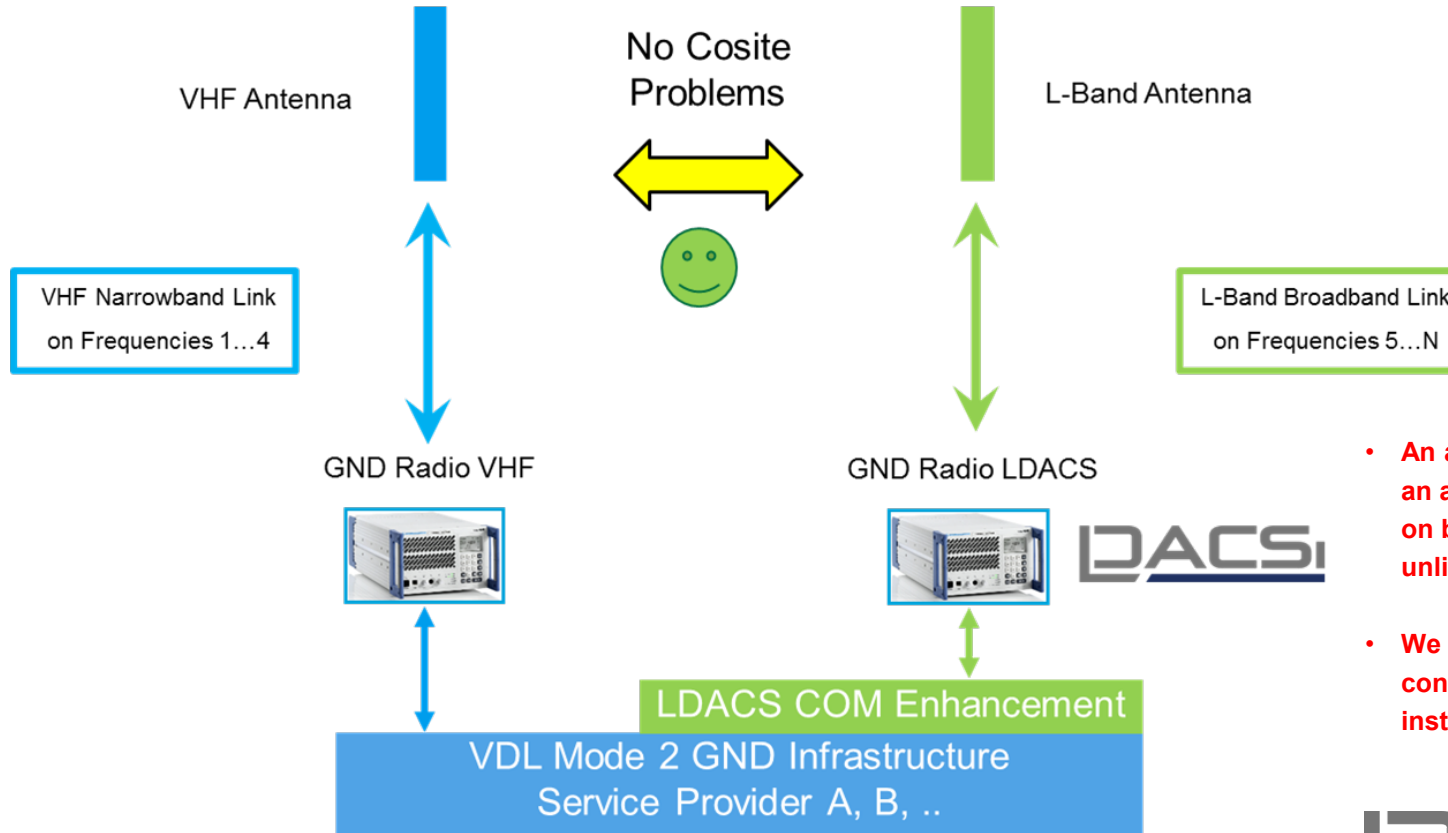


Focus for LDACS Aircraft Deployment:

- Minimum additional weight.
- Reuse of existing resources.



ENHANCEMENT OF VDL MODE 2 GND SYSTEMS



- An additional radio plus an additional antenna on board of an aircraft is unlikely to happen!
- We need an alternative concept for airborne installations!

DACSI

DACSI

AIRCRAFTS ARE VERY SPECIAL

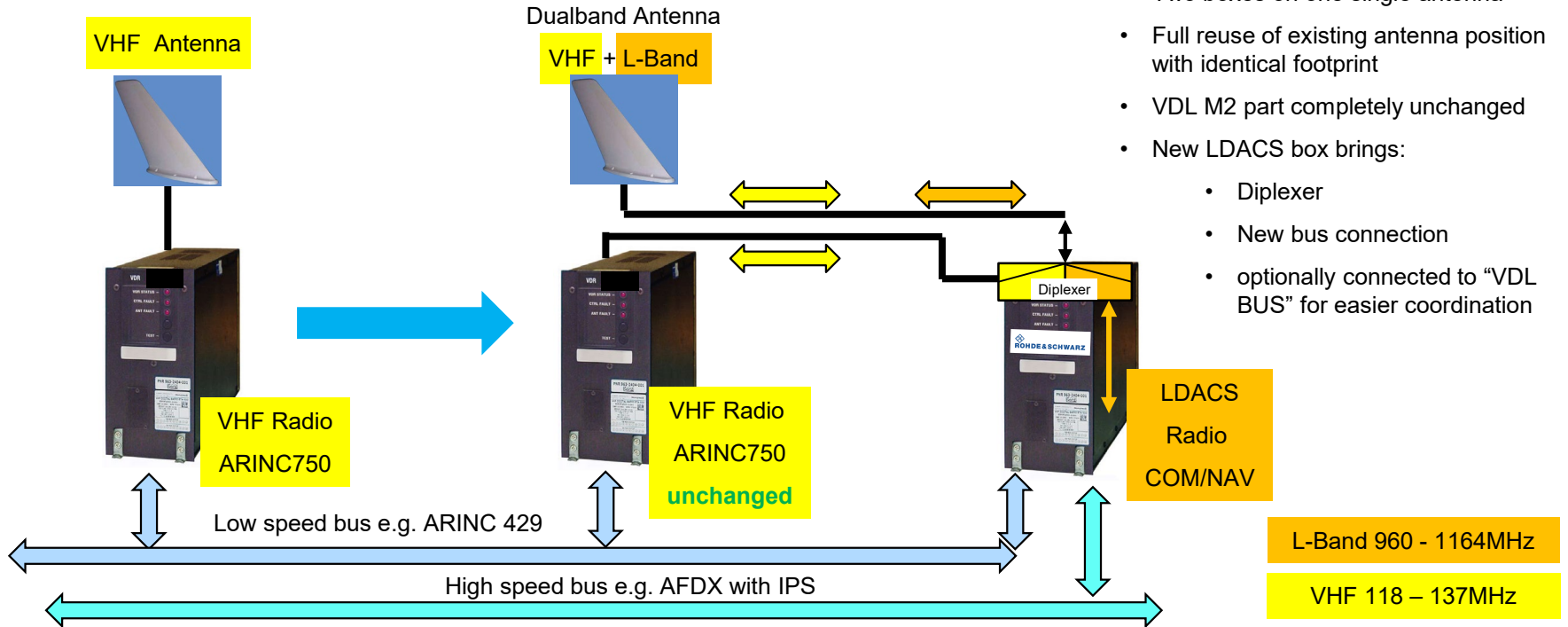
- ▶ Aircraft manufacturer react very differently when they get an info how more bandwidth can be achieved:
 - GREAT, but do not touch the avionics bay!
 - GREAT, but do not touch the antenna layout → No additional antenna please!
 - GREAT, but do not touch the flight deck.

- ▶ Therefore some ideas have been created how to install LDACS within aircrafts.
 1. Two separated boxes
 2. A new dual – band box replacing the existing VDL radio
 - The currently discussed ideas have all shown advantages but also some disadvantages

- ▶ The next slide shows a new idea combining the advantages of both approaches and leaving the disadvantages behind.

ENHANCEMENT OF VDL MODE 2 AIRBORNE SYSTEMS

NEW IDEA DERIVED FROM PREVIOUS DISCUSSIONS



New idea:

- Two boxes on one single antenna
- Full reuse of existing antenna position with identical footprint
- VDL M2 part completely unchanged
- New LDACS box brings:
 - Diplexer
 - New bus connection
 - optionally connected to “VDL BUS” for easier coordination

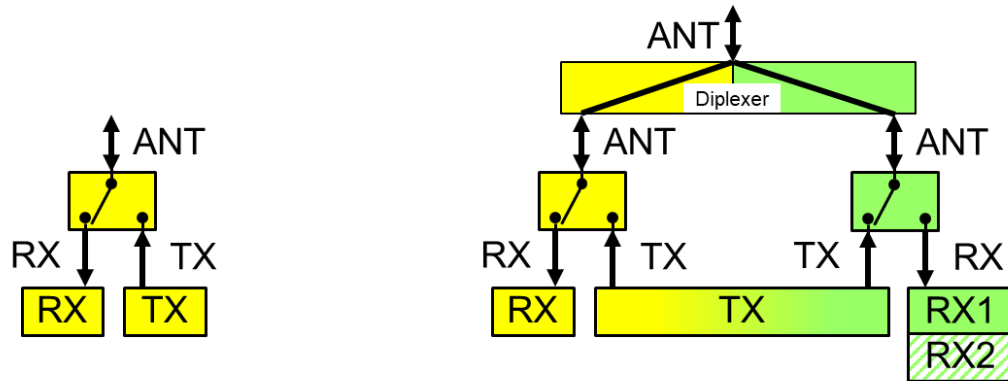
LDACS DEPLOYMENT IDEA FOR AIRCRAFTS

1. The VHF VDL Radio remains unchanged including the connected bus plus protocols.
2. The VHF Antenna is replaced by a dual - band antenna with the same footprint.
3. A new LDACS radio gets a new place within the avionics bay.
4. The antenna cable is feed first to the LDACS box and from there back to the VHF radio.
 - The LDACS radio incorporates a diplexer.
5. The LDACS radio is connected to a high speed bus to allow to use the full bandwidth of LDACS + IPS.
6. The LDACS radio may be connected to the “old bus” as well to allow an easier coordination between the new and “old” equipment.
7. VDL Mode 2 can use VHF and LBAND simultaneously in parallel and full independent.
 - New protocols ensure that the L-Band is used whenever available.
8. This will lead to a long term relaxation of the VHF band.

That's it!

Many thanks for your attention!

ENHANCEMENT OF VDL MODE 2 AIRBORNE SYSTEMS



VHF 118 – 137MHz

L-Band 960 - 1164MHz