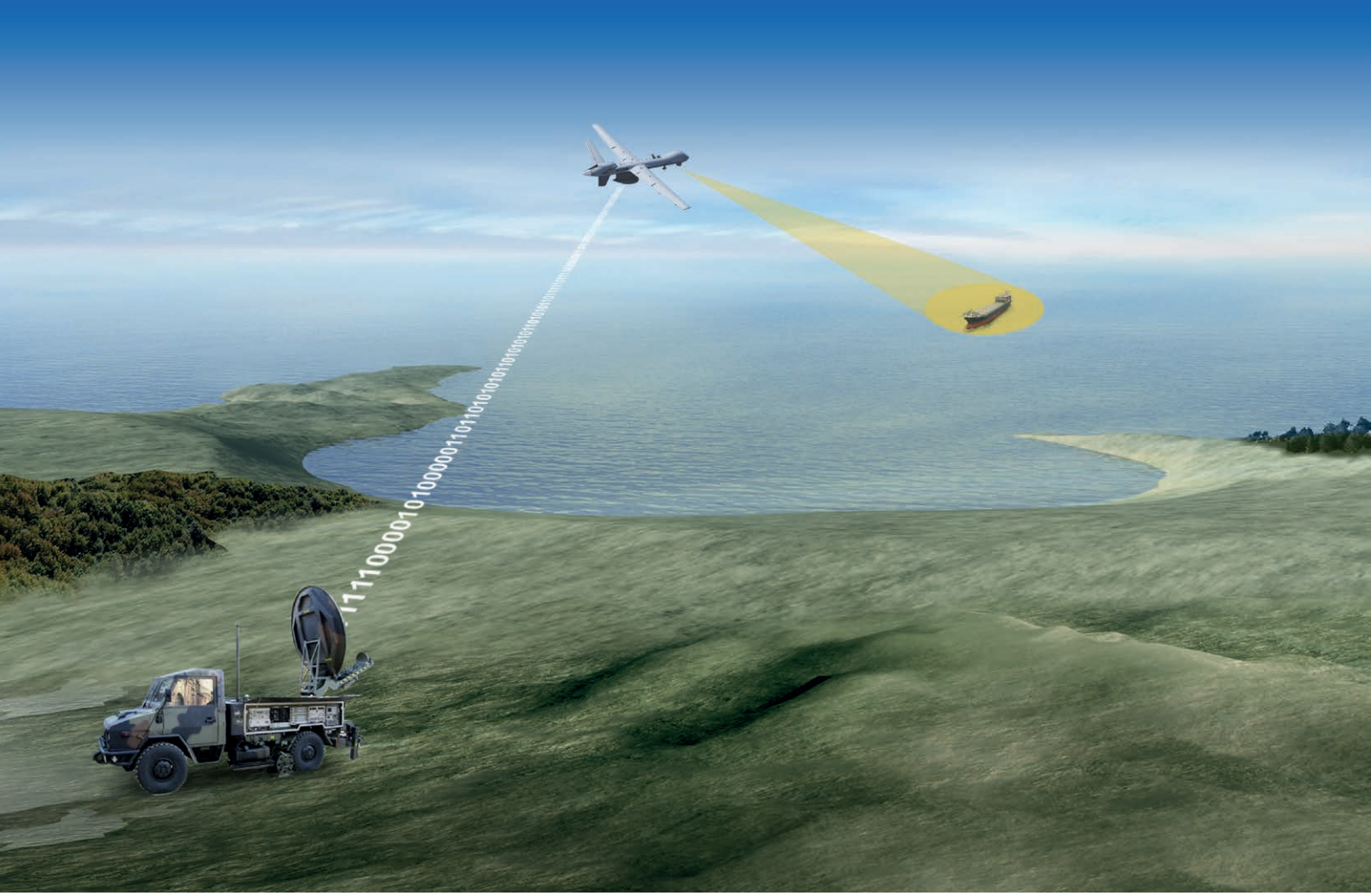
ELECTRONICS DIVISION

WIDE BAND DATA LINK

AIRBORNE AND GROUND DATA TERMINAL SOLUTIONS

LEONARDO



The integration of a Wide Band Data Link (WBDL) in the Airborne System (fixed or rotary wing, manned or unmanned) allows the end user to deal with the emerging requirements about IP data exchange between cooperative forces across Air, Land, Sea and Space domains, under Command and Control Center coordination.

The “Leonardo WBDL Family” has been conceived to comply with the emerging needs of typical mission such as:

- Surveillance, Patrolling (border, ground and maritime)
- Close Air Support, Dissemination
- Intra-Flight Data Link

Specific products respond to the different communication services thereby required:

- Ku-band WBDL-LOS system
- C-band WBDL-LOS system
- Multi-band/multi-purpose WBDL LOS-BLOS system.

Leonardo product portfolio boasts a complete catalogue of Wide Band Data Link (WBDL) systems, including:

- Airborne Data Terminals (ADT)
- Ground Data Terminals (GDT)

Solutions applicable to multiple platforms including fixed-wing aircraft, helicopters and Remotely Piloted Aircraft Systems (RPAS).

The equipment is not subject to ITAR export constraints.

The Wide Band Data Link family named DL2NET (Data Link to NETwork) is based on the following Air Data terminal (ADT) solutions:

DL2NET-10X SINGLE CHANNEL	• **DL2NET-10-C** system for air-to-ground (A/G) operations, based on our off-the-shelf, single-channel Airborne Data Terminal (ADT) and our Ground Data Terminal (GDT) operating in C-band
	• **DL2NET-10-K** system for air-to-ground (A/G) operations, based on our off-the-shelf, single-channel Airborne Data Terminal (ADT) and our Ground Data Terminal (GDT) operating in Ku-band
DL2NET-20X DUAL CHANNEL	• **DL2NET-20-CC** system for air-to-air operations based on our dual dual channel ADT
	• **DL2NET-20-CK** system for air-to-ground operation based on our dual channel ADT
	• **DL2NET-20-LS** system for air-to-ground and Satellite operation (Los/SAT) based on our dual channel ADT

All the solutions provide broadband channels supporting exchange of IP-based digital data streams between the terminals. Transmitted data may include digitised full motion video (FMV), digitised audio, file transfer, etc., independently from the data sources (video/IR sensors, radar, etc.) and source data format.

MAIN CHARACTERISTICS

APPLICABLE STANDARDS

- STANAG 7085 Ed 4 (Waveform specifications)
- STANAG 7085 Ed 5 (STD-CDL and BE-CDL waveform specifications)
- STANAG 4586 Ed. 3
- Proprietary waveform versions for non NATO international market
- MIL-STD-461F
- MIL-STD-704E
- MIL-STD-810G
- RTCA DO-178C
- RTCA DO-254

COMMON CHARACTERISTICS

- Data types
  - IP data over Ethernet (video, SAR, MTI, ESM, audio, NAV, etc.)
  - Low-latency channels for specific purpose (e.g. CNPC)
- Single/dual channel encryption unit, national/NATO/ international versions available
- Both the Forward Link and Return Link are encrypted in “bulk” mode: all data and control messages of the radio protocol are encoded with an algorithm based on AES-256 by an embedded Security module within an integrated secure architecture.
- The system can also operate in un-encrypted “clear” mode.

OPERATIONAL BANDWIDTH: KU (CA. 15 GHZ)

- Typical Data rates
  - downlink: 45 Mb/s
  - uplink: 2 Mb/s

OPERATIONAL BANDWIDTH: C,L,S (CA. 1 TO 6 GHZ)

- Typical Data rates
  - downlink: 10 Mb/s
  - uplink: 2 Mb/s

TYPICAL POINT-TO-POINT RANGE

- Air-to-Ground: 200 km
- Air-to-Air: 30 km

INTERFACES

- 4 lines Gb Ethernet for payload traffic
- 1 line RS-422 Serial I/O for specific purpose
- 1 line ARINC 429 IN for navigation and attitude
- 1 line RS-485 for Security Keys
- Discrete I/O

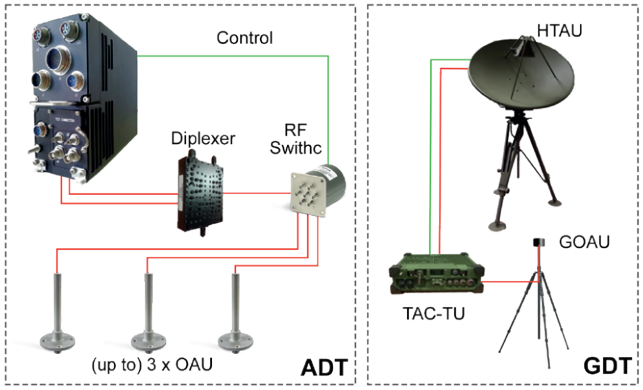
DL2NET-10X - SINGLE CHANNEL

DL2NET-10-C

The DL2NET-10C is a Wide Band Data Link (WBDL) operating in Line Of Sight (LOS) C-Band composed of:

- One Airborne Data Terminal (ADT)
- One Ground Data Terminals (GDT).

Depending from airborne antenna configuration, the DL2NET-10-C can support full-duplex, point-to-point connections and/or simplex, broadcast connections.



ADT MAIN CHARACTERISTICS

- Target applications: fixed/rotary wing A/C, small and tactical RPAs
- Operational bandwidth:
  - C-band (RL: 4.4-4.9 GHz, FL: 5.25-5.85 GHz)
- Waveform: proprietary
- Data rates:
  - Return Link (RL): up to 44.73, 10.71, 2 Mb/s
  - Forward Link (FL): 200 kb/s, 2 Mb/s (both with DSSS)
- Operational ranges
  - 200 km @ 10.71 Mb/s RL, 0.2 Mb/s FL
  - 200 NM @ 2 Mb/s RL, 0.2 Mb/s FL
- Security: AES-256 embedded encryption Unit

GDT MAIN CHARACTERISTICS

- Auto track capability (telemetry based);
- Omni aux antenna for short-range tracking.

TECHNICAL CHARACTERISTICS

AIRBORNE DATA TERMINAL

- Size:
  - ADT-TU: 3/8 ATR Short i.a.w. ARINC 404-A, reduced depth 266 mm
  - RF Diplexer: less than 100 x 80 x 30 mm
  - RF Switch: less than 40 mm x 110 mm height including connectors
  - Omni antenna (OAU): less than Ø 15 mm x 140 mm height (without connector). Antenna size and type to be confirmed i.a.w. custom-specified installation constraints.
  - Fan Tray (optional): less than 180 x 480 x 101 mm, to be confirmed i.a.w. custom-specific platform and installation
- Weight: less than 8 Kg (excluding fan tray)
- Power: less than 150 W @ 28 VDC i.a.w. RTCA DO-160G
- Environmental and EMI/EMC qualification: i.a.w. RTCA DO-160G

GROUND DATA TERMINAL

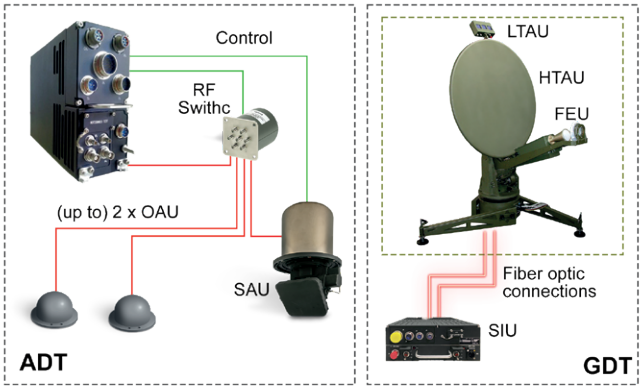
- Size:
  - TAC-TU: Rack 19” 3U (mm 450 x 400 x 135) (WxLxH)
  - Antenna assembly envelope: less than Ø 1 m x 2 m Height
  - Antenna dish Ø: 1 m
- Weight: less than 60 Kg
- Power: less than 500 W @ 28 VDC and 220 VAC, 50/60 Hz
- Environmental, EMI/EMC qualification: i.a.w. AECTP-300/400/500 (similar to MIL-STD-810G)

DL2NET-10-K

The DL2NET-10K is a Wide Band Data Link (WBDL) operating in Line Of Sight (LOS) Ku-Band composed of:

- One Airborne Data Terminal (ADT).
- One Ground Data Terminals (GDT).

Depending from airborne antenna configuration, the DL2NET-10-K LOS Ku-band system can support full-duplex, point-to-point connections and/or simplex, broadcast connections.



ADT MAIN CHARACTERISTICS

- Operational bandwidth: Ku (ca.15 GHz)
- Waveform:
  - NATO version: i.a.w. STANAG7085 Ed. 4
  - Export/non-NATO version with proprietary waveform
- Data rates:
  - Return link (RL): 44.73, 10.71 Mb/s
  - Forward link (FL): 200 kb/s, 2 Mb/s (both with Direct Sequence Signal Spreading)
- Point-to-point range (including fade margin):
  - 200 km @ 44.73 Mbps RL
  - 200 NM @ 10.71 Mbps RL
- Security: AES-256 embedded encryption (NATO or Export)

GDT MAIN CHARACTERISTICS

- Auto track capability (monopulse and/or telemetry-based)
- LTAU auxiliary antenna for tracking at short range
- GDT SIU remotised up to 1.5 km through optical fibers

TECHNICAL CHARACTERISTICS

AIRBORNE DATA TERMINAL

- Size:
  - ADT-TU: 3/8 ATR Short i.a.w. ARINC 404-A with reduced depth 265.5 mm.
  - RF Switch: less than Ø 80 mm x H 80 mm w/o connectors.
  - OAU: less than Ø 110 mm x H 58 mm.
  - SAU: less than Ø 210 mm x H 210 mm outside of the fuselage.
- Weight:
  - ADT-TU: less than 6 kg.
  - RF Switch: less than 0.5 kg.
  - OAU: less than 0.3 kg.
  - SAU: less than 6.5 kg.
- Power:
  - ADT-TU: less than 150 W @ 28 VDC
  - SAU: less than 70 W average, 150 W warmup @ 28 VDC

GROUND DATA TERMINAL

- Size:
  - SIU: less than Width 300 mm, Length 460 mm and Height 120 mm.
  - GCT: various configurations available depending from deployability requirement,
  - Antenna dish less than Ø 1.2 m.
  - LTAU panel: less than Width 200 x Length 100 x Height 100 mm
- Weight:
  - SIU: less than 10 kg.
  - GCT: various configurations available depending from deployability requirement
  - Optical Fiber: depending on length.
- Power:
  - SIU: less than 130 W @ 120 - 230 VAC, 50 / 60 Hz.
  - GCT: less than 2 kW @ 120 - 230 VAC, 50 / 60 Hz.

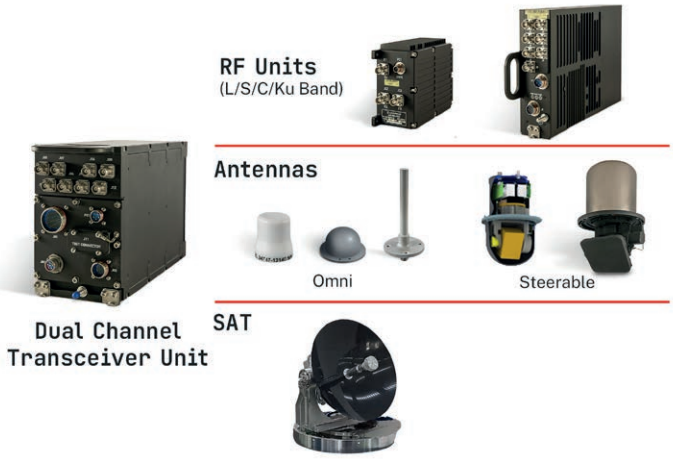
DL2NET-20X - DUAL CHANNEL

The DL2NET-20X is a dual channel fully configurable Wide Band Data Link product targeted to integration on all Air Force assets, including Helicopters, manned and unmanned fixed wing aircraft and Fighters.
Further to the common long range air-ground Line of Sight function, the evolutionary functions of Airborne Relay Terminal (ART) include support to ISR/ISTAR missions, Close Air Support, Intra Flight Wideband Link (IFWL), Embedded Training Data Links, Air-to-Air Relay, MUM-T, Wide Band Satellite data links.

Thanks to its flexibility and long term sustainable life cycle, Leonardo proposes the ART system, the latest and most advanced member of the Leonardo Wide Band Data Link product family, as the reference equipment for RPAS, manned fixed wing aircraft and for all Air Force asset upgrades of the future.

DL2NET-20X features two complete configurable WBDL terminals in a modular architecture with flexible functional configurations, upgradable software suites, state of the art electronics and performance. It includes advanced embedded COMSEC, TRANSEC and Cyber Security / Cyber Resilience features, as well as flexible Networking and Routing functionalities for future-ready integration in Network Enabled Communication architectures.

At the same time DL2NET-20X fully inherits the expertise accrued by Leonardo in system optimization, experimental flight campaigns, operational assessment and advanced



equipment engineering during 10 years of experience in Wide Band Data Links applications.

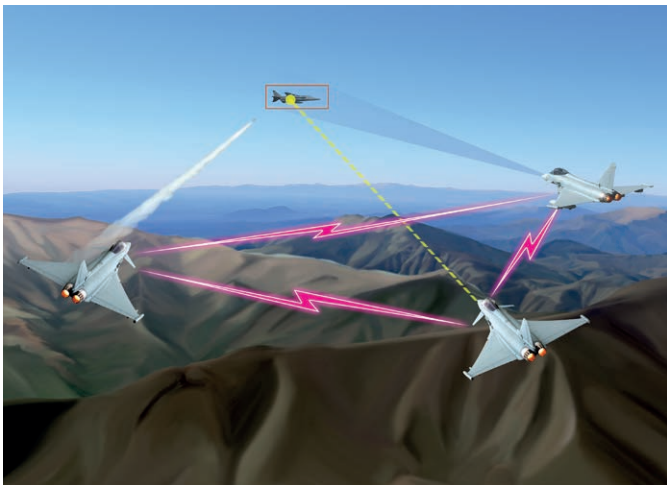
DL2NET-20X implements:

- A Dual Channel Transceiver Unit (DCTU) includes I/O, digital processing, Security and low power modulation in a wide range of frequency bands:
  0.9 – 6 GHz and 15 GHz.
- A catalogue of Radio Frequency Units (RFU) implement specific transmit and receive amplifiers and RF diplexers/ filters for the required operating bands, that range from L, S, C, Ku for LoS to the Ka band
  (20 – 30 GHz) for Satellite.
- Omni and directional tracking antennas complete the easily configurable suite of available LRUs.

TECHNICAL CHARACTERISTICS

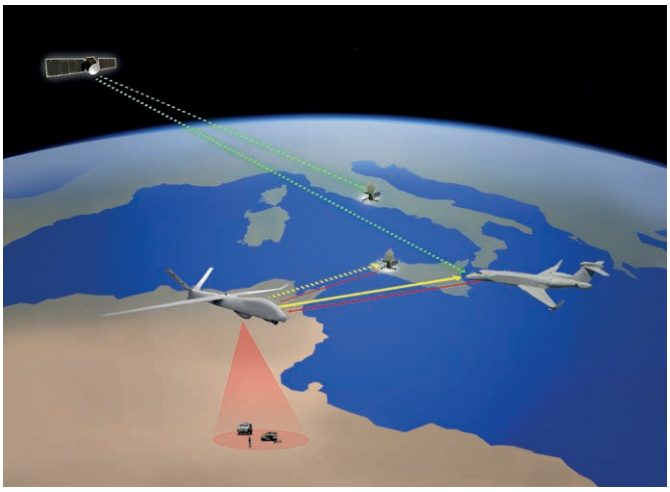
AIRBORNE RELAY TERMINAL SYSTEM

- DCTU:
  - Size: 1/2 ATR Short i.a.w. ARINC 404-A, reduced depth
  - Weight: 10 Kg (excluding fan trays)
  - Power: less than 150 W @ 28 VDC i.a.w. RTCA DO-160G
  - Environmental and EMI/EMC qualification: i.a.w. RTCA DO-160G ›
- RFU (L/S/K/Ku Band):
  - Size : 1/4 ATR Short i.a.w. ARINC 404-A, reduced depth
  - Weight: 4Kg
  - Power: 100W
- RFU (C Band):
  - Size : 120x62x170mm
  - Weight: 1,5Kg
  - Power: 25W
- Fan Trays for DCTU and RFUs optional depending on specific platform and installation requirements
- Omnidirectional antenna (OAU):
  - less than Ø 15 mm x 140 mm height (without connector). Antenna size and type to be confirmed i.a.w. custom/specified installation constraints.
- LOS Steerable Antenna (typical):
  - Size: Ø 177 x h 173 mm
  - Weight 6,5 Kg
  - Power 40W
- SAT Antenna (typical):
  - Size: Ø 340 x h 336 mm
  - Weight 15 Kg (including Block Up Converter)
  - Power 380W



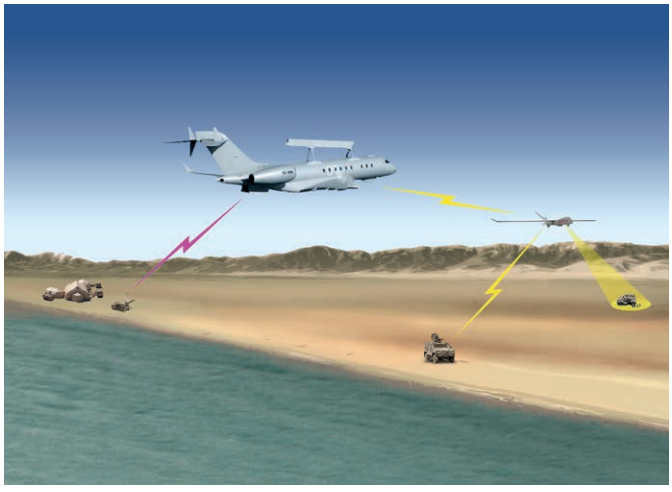
DL2NET-20-CC

Operational coordination and data exchange by means of WBDL LOS operating in C Band for Intraflight scenario.
The DCTU is integrated by two Radio Frequency Units (RFU) and two Omnidirectional antennas.
Typical configuration for Fighter cooperative missions Cross-cueing -Common tactical situation Intra-flight communications.



DL2NET-20-LS

Mission Data Relay in mixed LOS/SATCOM scenario (C-Band and Ka-Band respectively).
The DCTU is integrated by one Radio Frequency Unit (RFU) and one Satellite antenna which integrates the Block Up Converter.
Typical configuration for Surveillance Mission (e.g. ASW, ISR/ISTAR) data and image dissemination.



DL2NET-20-CK

Control and Mission Data Relay over LOS/LOS connections (e.g. C and Ku band) for MUM-T and ISR Data dissemination.
The DCTU is integrated by two Radio Frequency Units (RFU) operating in the specified Band (L/S/C/K) and antennas selected i.a.w. operating frequency, installation constraints and expected system performances.
Typical configuration for ISR/ISTAR data and image dissemination and MUM-T applications.

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