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M4COM AIR DATA TERMINAL

LinkFinity

Full Duplex IP Stream and Control Data Link

COM
magic *for* components

LinkFinity
Full Duplex IP Stream and Control Data Link
SYSTEM OVERVIEW

GENERAL

The M4Com COFDM Datalink provides a configurable transceiver solution for airborne and ground operations. The intended use is the provision of a configurable broadband down- and uplink, to send and receive video or IP streams and control data. It provides the capabilities to control EO/IR sensor gimbals, radar or other data acquisition sensors with ultra-low latency. It is also capable of encoding and transmission of multiple full-HD video streams in parallel to other sensor data sources with a data rate up to 31 Mbps.

For the most flexible adaptation to customer requirements there are different stackable options like ultra-low delay video-view to sensor-control ("glass-to-glass") or high efficient encoding through low bandwidth.

The internal datalink management provides configurable and automatic settings like "on the fly range versus bandwidth adaption".

The RF frontends contain a Software Defined Radio (SDR) for a frequency change within a defined range by software configuration. The spectral bandwidth occupied is 5 to 8 MHz.

The Transmission range under optimal conditions and dependent on data rate is more than 200 km (108 NM)

APPLICATIONS
- Bi-directional full-duplex broadband multi-channel link
- Bi-directional IP Bridge
- Parallel live streaming of the downlink data from multiple sensors (e.g. video, radar, Mode-S, AIS) or other data sources (e.g. raw data, voice, imagery, video)
- Simultaneous control of sensors via the uplink
- Uni-directional data link
- Software Defined Radio for fine tuning of bandwidth and adjustable centre frequency in 1 kHz steps

FEATURES
- QoS for real-time sensor-control including flow control
- Diversity reception using two antennas
- All modulation parameters configurable

AIR DATA TERMINAL
- Includes broadband RF downlink from 5 to 31 Mbps
- Includes broadband RF uplink from 3 to 31 Mbps
- Highly linear transmit amplifier adjustable from 10 to 40 dBm
- Adjustable downlink frequency in 1 kHz steps
- Different frequency bands as an option
- ASIC-based video encoders (H.264, MPEG-2, MPEG-4)
- Two video input signals
- IP data stream; bandwidth/data rate configurable; symmetrical or asymmetrical
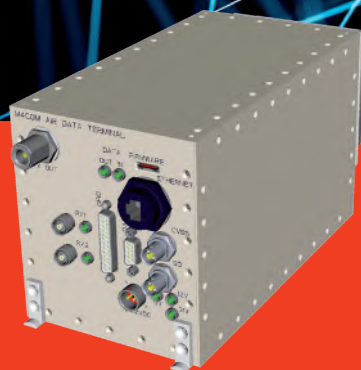
GROUND DATA TERMINAL
- Frequency selection and bands see "Air Data Terminal"
- Test monitor output for video (HDMI)
- Display with resistive touch-operation
- Signal LEDs for essential data link states
- 19" format, 3U

ANTENNA SETUP
- Downlink air: 1x 360° Omni blade antenna
- Uplink air: 2x 360° Omni dipole antenna
- Downlink ground: 8 x 90° Sector antenna
- Uplink ground: 4 x 90° Sector antenna

OPTIONS
- Sensor Control: Ultra-low end-to-end latency
                      Synchronized embedded KLV
                      4 HD ultra-low delay encoding engines
- Low Bandwith: H265 high efficient en-/decoding
- Antenna Setup: Tracking Antenna*
- Range Extension: Relay functionality*

AIR DATA TERMINAL (ADT)

FREQUENCY OPTIONS**

Down Link	Frequencies (MHz)
• S	2.300 - 2.500
• S	3.400 - 3.600*
• C2	5.650 - 5.850*

Up Link	Frequencies (MHz)
• L	430 - 470
• S	2.300 - 2.500*
• S	3.400 - 3.600*
• C2	5.650 - 5.850*

RF PARAMETERS

- Modulation Formats: COFDM (DVB-T, T2*)
- Carriers: 2k
- Constellation: QPSK, 16 QAM, 64 QAM
- FEC: 1/2, 2/3, 3/4, 5/6, 7/8
- Guard Intervals: 1/32, 1/16, 1/8, 1/4
- Channel Bandwidth: 5 - 8 MHz
- Tuning Step Size: 1 kHz step size
- Uplink Receiver
  - Reception: Spatial diversity with 2x input
  - Sensitivity: -92 dBm

ENVIRONMENTAL

- Operational Temp.:   -20 °C to +55 °C
- Humidity: 0-90% non-condensing
- Altitude: 25.000 ft (7.600 m)
- Sealing: IP54

MECHANICAL

- Dimensions: (W) 124 x (H) 140 x (L) 315 mm
- Weight: 2,98–3,5 kg (Option dependend)
- Connections: Connections front, cooling rear
- Mounting: ATR ½ short tray (ARINC 404)

POWER DISTRIBUTION

- Power in: 12-32 VDC
- Power Consumption: nominal 80 W
- ULD Option: +20 W
- RF Power out
  - Standard: 40 dBm

GENERAL

- Encryption/Decryption: BISS-E, CSA, AES-256*
- Certifications (Option):   RTCA DO-160

USER DATA TRANSPORTATION

- All hardware interfaces: bi-directional / full duplex
- Ethernet Interface: 100 MBit/s (Standard RJ-45 jack)
- Combiport Interface:
  - RS-232   400 kBit/s
  - RS-422   2 Mbit/s
  - RS-485   12 Mbit/s
- Optional Interfaces:
  - 1x RS232   115 kBit/s
  - 1x I²C   300 kBit/s
  - 1x CAN   1 Mbit/s
  - 8x GPIO   3,3 V/6 mA (TTL)
  - 1x USB2.0   480 Mbit/s

EMBEDDED ENCODING

- Hardware Inputs: 2x Video Streams (BNC-f jack)
  1x Audio Stream*
- Digital video formats: 1080p   HD-SDI 30 Hz
  1080i   HD-SDI 60/50 Hz
  720p   SD 60/50/30 Hz
- Analog video formats: 576i Composite PAL (CVBS)
  1080p Component Video (YPbPr)
- Analog audio sampling: 48 kHz Stereo AVC*
- Compression method: MPEG-4 (H.264) or MPEG-2

EMBEDDED COMPUTING

Besides encoding of audio and video streams with embedded metadata, the Air Data Terminal is also capable of interface conversion and/or the manipulation of data. It supports embedding of metadata provided via the serial interface into the Transport Stream. In addition, the embedded computing capability can be used for more sophisticated data handling (e.g. Radar) in parallel or as an alternative to the video streams.

OPTIONS

- Air terminal: Multi Stream Option
  Configurable Interfaces
- Encoding: Ultra low end-to-end latency
  4 HD encoding engines
  Highly efficient encoding
  Synchronized embedded KLV
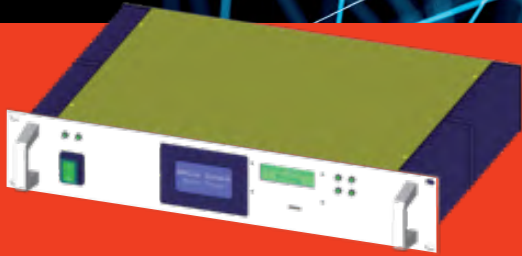
GROUND DATA TERMINAL (GDT)
Full Duplex IP Stream and Control Data Link

RF PARAMETERS
- Modulation Formats: COFDM
- Carriers: 2k
- Constellation: QPSK, 16 QAM, 64 QAM
- FEC: 1/2, 2/3, 3/4, 5/6, 7/8
- Guard Intervals: 1/32, 1/16, 1/8, 1/4
- Channel Bandwidth: 5 - 8 MHz
- Tuning Step Size: 1 kHz step size
- Downlink Receiver
  - Reception: Spatial diversity with 2x - 8x input
  - Sensitivity: -92 dBm

GENERAL
- Encryption/Decryption: BISS-E, CSA, AES-256*
- Certifications (Option):   RTCA DO-160*

ENVIRONMENTAL
- Operational Temp.:   -0 °C to +40 °C
- Humidity: 0-90% non-condensing
- Altitude: 11.000 ft (3.400 m)
- Sealing: IP40

MECHANICAL
- Dimensions: (W) 483 x (H) 89 x (L) 359 mm
- Weight: 7 kg
- Connections: Connections rearside
- User Interface: frontside
- Cooling: rearside
- Mounting: 19 inch Rack IEC60297
- Height :   2U (3U*)

POWER DISTRIBUTION
- Power in: 100-240 VAC; 50/60 Hz 150 W
- RF output power: 40 dBm

USER DATA TRANSPORTATION
- All hardware interfaces: bi-directional / full duplex
- Ethernet Interface: 100 MBit/s (Standard RJ-45 jack)
- Multiport Interface:
  - RS-232   400 kBit/s
  - RS-422   12 Mbit/s
  - RS-485   12 Mbit/s

- Optional Interfaces:
  - 1x   RS232   115 kBit/s
  - 1x   I²C   300 kBit/s
  - 1x   CAN   1 Mbit/s
  - 8x   GPIO   3.3 V/6 mA (TTL)
  - 1x   USB2.0   480 Mbit/s

EMBEDDED DECODING
- Video output interface: Standard HDMI
- Audio output: Stereo*
- De-compression method: MPEG-4 (H.264) or MPEG-2

EMBEDDED COMPUTING
The Ground Data Terminal provides the encoded audio and video streams. In addition, it acts as the counterpart to the ADT providing interface conversion and/or manipulation of data. Typical applications are to pass hand controller commands to a Gimbal or to extract data elements from different input sources and recombine these to a new output stream. The concept of internal data channelization in combination with a single board computer provides most flexible data handling. The cycle time for customizations is very low because it can be done by a simple exchange of an SD-card.

OPTIONS
- Ground Terminal: Multi Stream Option
  Configurable Interfaces
- Decoding: Up to 4 ultra low latency HD decoding engines
 Synchronized embedded KLV
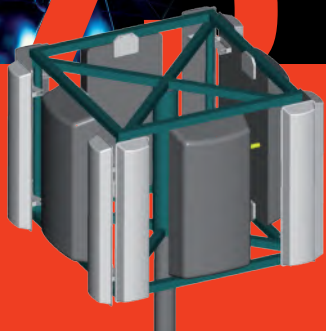
AIR AND GROUND ANTENNA SETS

AIRBORNE ANTENNAS

- Downlink: 1x omnidirectional blade
- Dimensions: 76 x 14 x 30 mm
- Weight: 1 x 40 g

- Uplink: 2x omnidirectional dipole
- Dimensions: Ø 14 x 310 mm
- Weight: 2 x 88 g

- Temperature : -50 °C to +85 °C
  withstand extreme shock
  & vibration
- Max. Airspeed: <= 60 m/s
- Max. Altitude: <= 100.000 ft (30.000 m)

GROUNDSIDE ANTENNA HEAD

- Dimensions: approx. 1,5 m x 1,5 m x 1,5 m
- Weight: approx. <= 100 kg
- Mounting: Pipe: Ø 200 mm x 1000 mm
- Downlink: 8 x 90° Sector Antenna
- Uplink: 4 x 90° Sector Antenna
- Coverage: 360° hemispherical coverage
  including diversity reception
  and electronic antenna switching
- Maintenance: None (no moving parts)
- Temperature: -25 °C to +50 °C
  remains operational under icy
  conditions
- Sealing: IP66
- Max. wind velocity: 200 km/h
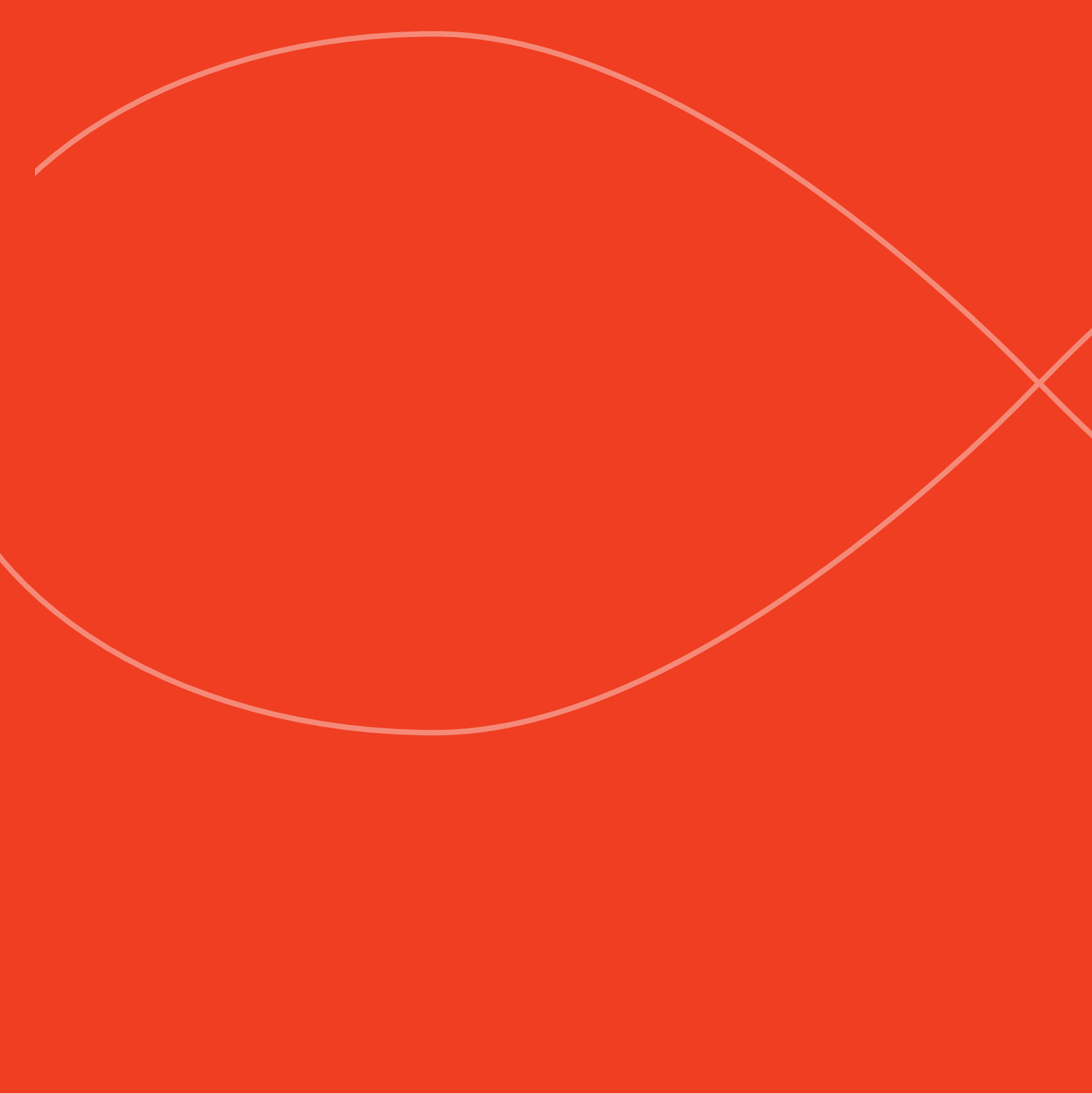- Wind load @ 150 km/h: < 2.600 N

Typical Airborne Antennas
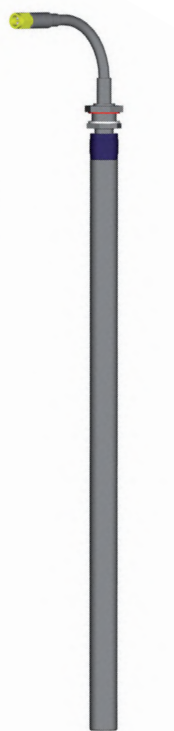
Groundside Antenna

*   Feature under development
** Frequencies (dependent on power
    amplifier and antenna configuration)