Cortex HDR XXL - High Data rate Receiver

All-in-1-box solution

IN-SNEC® CORTEX Series

The Cortex HDR XXL is the latest COTS very high rate receiver for wideband transmissions in X-band and Ka/Ku-bands. This equipment is today acclaimed worldwide as the most powerful, versatile and reliable digital high rate demodulator, elected by all stake-holders of the Remote Sensing community from payload designers to ground station operators.

The powerful one-board-in-one-chassis architecture empowers the user with a long-term provision for supporting higher bitrates, multiple decoders, dual polarization transmissions and much more, just through simple user-made on-site software upgrades.

The Cortex HDR XXL is the reference equipment for all existing and forthcoming earth observation missions, with direct interface to modern image processing systems thanks to its built-in front-end-processing capabilities allowing Telemetry decoding, sorting, recording and forwarding.

Main Features

- 720MHz and 1.2GHz IF
- Dual 720MHz IF baseline H/W (two independent demodulation units)
- QPSK, 8PSK, 16APSK and 16QAM demodulator & bitsync
- Up to 2Gbps transmission rate
- Digital filtering and signal equalization
- Convolutional and post-processing decoding
- Telemetry data server
  - Very high speed recording
  - Real time output
  - Store and forward
- Built-in constellation viewer & spectrum analyser
- Test modulation capabilities
  - PRN generation
  - Recorded data playback

Main Benefits

- Field-proven truly multimission receiver : risk free solution and lowest implementation losses
- Powerful FPGA design allowing advanced decoders such as LDPC 7/8 and AR4JA, 4D-TCM-8PSK
- Auto-adaptive equalization for complete transmission path optimisation :
  - Onboard OMUX
  - Multipath transmission
  - Ground RF
- "1 box solution" for dual channel demodulation + FEP, drastically minimizing spare sets
- Cortex family product long term commitment: Back-compatible equipment with former versions, allowing swap-and-replace without any M&C or integration cost.
- Easy on-site software upgrades to allow additional missions

ZODIAC DATA SYSTEMS
AEROSAFETY & TECHNOLOGY
Telemetry & Telecommunications

ZODIAC AEROSPACE

Cortex HDR XXL

Technical specifications

IF Input

Dual 720 MHz IF inputs

Input Frequency	2x 720 MHz ±200 MHz 1x 1.2GHz ±320MHz
Carrier acquisition range	±10 kHz to ±1MHz

Demodulation & Bitsync

Supported schemes	BPSK, QPSK, O/S QPSK. A/U QPSK, 8PSK, GMSK, 16APSK,16QAM,32/64APSK
Bit rates	from 500 kbps to 2 Gbps
BER degradation	<1 dB @1Gbps and BER 10^{-6}

Built-in BER measurement tool

Filtering

Static cable equalizer

Academic matched filters (I&D, RR, RRC, GMSK...)

60+ taps programmable matched filter

Auto-adaptive equalizer

Decoding

Convolutional :
- 4D-TCM (2/3 and 2.5/3)
- Viterbi (1/2 and punctured)
- Stacked Viterbi (SNUG)

Post-processing :
- LDPC 7/8 Nasa
- LDPC AR4JA (1/2 & 2/3)
- Reed Solomon (DVB, CCSDS 223, CCSDS 239)

Front End Processor (FEP)

Real time data recording at all supported rates

Internal recording capacity :	1TB (Baseline)
External DAS recording capacity :	3 to 12TB

Programmable framesync & derandomizer

Telemetry CADUs / VCDUs processing

CCSDS AOS paquets / CFDP

Real time data output on TCP-IP (up to 2x 1Gbps)

Differed time data output (store and forward) on TCP-IP

Recorded or external data playback to Data+Clock and test modulator

Test Modulator

IF carrier :	720MHz and 1.2GHz
Built-in noise generator	
Supported schemes :	equal to the demodulator
PCM simulation :	ASCII coded file on hard disk, recorded data playback or PRN generation
PRN patterns :	2^{10}, 2^{11}, 2^{15}, 2^{23}

Miscellaneous

M&C through TCP-IP

Data+Clock as ECL (SMA) or LVDS (RJ45)

Power :	Autorange 90 to 265 VAC (47 to 63 Hz)
Consumption :	1.5A peak, 220V
Rackable chassis	H 4U x W 19" x D 550 mm

FLEXIBLE SOLUTION WITH 1 SINGLE H/W PLATFORM

Examples of configurations

- Multimission Meteorological ground station receiver
  - 1x 150 Mbps with Viterbi and data recording (NPOESS, Feng Yung 3, Metop, Modis...)
- Sentinels and Pleiades class configurations :
  - 2x 360 Mbps 4D-TCM-8PSK demodulators with direct interface to image processor
- Next generation Remote Sensing missions
  - 2x 800 Mbps 16QAM/16APSK demodulators with equalization, RS decoding and data store & forward on TCP-IP
- Ka/Ku-band very high rate data relay and applications
  - 1x 1 Gbps QPSK demodulation with Reed Solomon or LDPC decoding & data recording.
  - 1x 1.5 Gbps 8PSK with LDPC decoding
- Prospective studies
  - 1x 1.5 Gbps 4D-TCM-8PSK with Reed Solomon 239/255 & data recording
  - 1x 2 Gbps 16QAM/16APSK with LPDC 7/8 & data recording

On-the-field supported Missions

Meteorological

NPP, NPOESS, MODIS (Terra Aqua, Aura), Feng Yung 3, GOES-R...

SAR

TerraSAR-X, TanDEM-X, Envisat, Cosmo Sky Med, Radarsat 1 & 2, Risat, SAR-Lupe, Sentinels 1 & 3, ...

Multi purpose

Spot Series, Cartosat / Ressourcesat series, Landsat 7, LDCM, C-BERS

Science

LRO, SDO, GCOM, Gosat, SMOS, JWST, Icesat...

High resolution

Worldview 1& 2, GeoEye 1, Pleiades HR, Eros-B, Quickbird, Ikonos, Kompsat series (2, 3, 5)...

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