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DHADI
Digital HF Antenna – Horizontal Double Dipole

Main application of the digital horizontal double HF dipole is NVIS (Near-Vertical Incidence Skywave) reception.

DHADI HF Double Horizontal Dipole Head on 6m Mast (prototype)

The picture shows the self-calibrating double HF head preamplifier with rods. A not shown 2-input SYDRE digital receiver is on ground. Each single dipole has its coaxial and control cables. Electronic preamplifiers and coaxial cables are compensated (equalized) after auto-calibration. Each single dipole is channelized and equalized, the time-sampled output data are sent separately through ethernet multicast. If required, the quadrature combination (A+jB or A-jB) for omnidirectionality and/or horizontal circular polarization selection (NVIS) is done numerically at user level. In nominal configuration, channelization provides 2x 1515 consecutive channels of 8 kHz bandwidth complex signals (2x 12.12 MHz total bandwidth), each sampled at 10 kHz. Default usable band is then 1.8-13.9 MHz.

At least 2 fibers are required for use in array configuration (SyncNet & 10G ethernet), 2 more fibers can be used for redundancy. Of course, the antenna can be used alone, without SyncNet (internal OCXO's timebase used then).

Usage for long range communications, for example to enable polarization diversity, is possible through modifications below :
     - signifiant rising of mast height (at least 20 m)
     - replacing half-band 2-channel SYDRE receiver by two 1-channel full-band ones

Features (double dipole head + SYDRE receiver)

- Auto-calibration of analog chain
- Equalized and channelized digital data broadcasted through ethernet 10G optical links 2x1515 channels, 8 kHz-spaced, 10 kHz-sampled (2x 12.12 MHz channelized band)
- Global channelized band positionable with a 1-channel resolution
- Wideband signal reconstruction from adjacent channels can be done on user side through efficient FFT-based preprocessing stage.
- Parametrable packetization (channels number, time samples per packet)
- Low antenna-to-user latency (packetization-dependant) : typically 10…20 ms.
- Relative positioning through GPS antenna
- Power : 48…60VDC, consumption is temperature- dependant : 80..100W

Local head interfaces

- 2x coaxial inputs for calibration signals to SYDRE
- 2x coaxial outputs for preamplified signals to SYDRE
- 2x control I/O to SYDRE
- Optional top GPS active antenna through coaxial connector to SYDRE

Global interfaces

- Fiber connector : 4 monomode fibers G652/G657
  - Double (redundancy) 10G ethernet optical links (1 fiber/link)
  - Two (redundancy) SyncNet ports for synchronization (1 fiber/port)
- Power supply input

Applications of at-the-antenna receiver for HF arrays

- Software-Defined Radio (SDR)
- NVIS
- Polarization diversity (multi-types antennas arrays)