TIMING AND FREQUENCY DISTRIBUTION OVER ETHERNET USING WHITE RABBIT

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Most CASPER based instrumentation use a time/frequency distribution system that transmits 1 PPS (one pulse per second timing reference) as well as a reference frequency (10 MHz or an ADC sample clock) to all the digitizers in the instrument, using a bank of dedicated coax or fiber cables. Large correlators can require hundreds to thousands of cables for time and frequency transfer. White Rabbit is open source hardware and software that is used to distribute time and frequency over Gbit/second Ethernet, saving cables and complexity. Each node in a system on requires a single fiber to carry bidirectional data, monitor and control, as well as precision frequency and timing transfer. Each node uses a 1 Gbit/sec bidirectional Ethernet transceiver (one color is used to transmit, another color for receive); White Rabbit can transfer timing to 30 ps RMS accuracy with a central system reference clock (eg: a GPS disciplined hydrogen maser) and can service more than 1000 nodes and cover distances of the order of 10km.