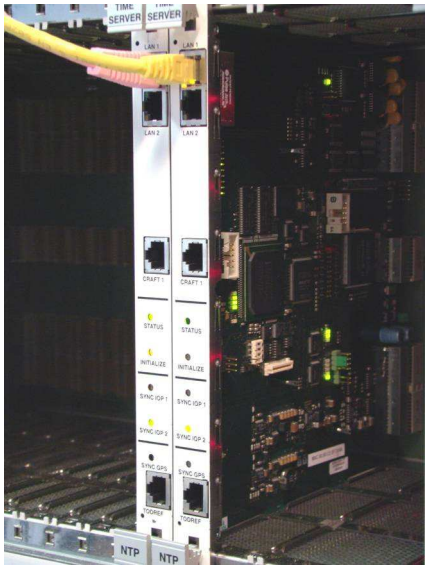
US5G-US5Ge NTP Server Card

Hardware assisted high performance NTP card for US5G and US5Ge products



Solution Overview:

Currently, BITS (Building Integrated Timing Supply) equipments are used to deliver high availability precision frequency references to network elements. Now, GPS receivers are often associated to BITS as complementary frequency references. Hearts of the BITS, synchronization units like US5G or US5Ge have to complete frequency reference features with accurate network timing capabilities. Network timing references are used for date and time distribution through IP networks to Clients like PC's, billing machines and others.

This HW assisted NTP card is directly connected to the US5G backplane. High quality local oscillators (Rubidium or low aging quartz) available into IOP redundant modules are used as the system clock of the NTP card, maintaining a very high stability and low jitter reference for the NTP server reference clock.

The card works as a server stratum level 1 when PPS and UTC time reference are available. The US5Ge unit is able to retrieve PPS reference signals (driven by the IOP GPS sources) through its backplane. The US5G unit is also able to handle PPS reference signals through its ToD interface and complementary UNISYNC PRS unit.
In case of PPS unavailability, the NTP card works as a lower level stratum server connected to NTP network servers.

Card Installation:

The NTP card plugs into output slots of the US5G-US5Ge shelves. There is no limitation to the number of NTP cards. Moreover, the cards plugged into US5Ge main shelf have direct access to the GPS interface, which directly drives the NTP PPS driver.

Card overview:

The card is based on a powerful CPU with dedicated 10/100 Mbits/s Ethernet LAN controller and a large FPGA device for direct NTP packet time stamping, which is done at the physical interface level. NTP system clock is derived from the US5G-US5Ge local clocks (Rubidium or OCXO quartz). UTC time and PPS synchronization are routed to IOP1, IOP2 through backplane. Two LAN interfaces (10/100baseT) are available on the front of the card for the US5Ge or at the rear face for the US5G. Craft port is also available for local NTP supervisory. TOD interface with accurate PPS reference can be directly connected to UNISYNC TOD port.
Front LED's are used to monitor NTP card activity. NTP card(s) provisioning and monitoring are under control of the US5G-US5Ge COM management card and thus separated from the NTP dedicated LAN Ethernet interfaces.

Card features:

- NTP client/server implementation based on NTPd reference platform (rel.:4.2.4)
- SNTP / NTP stratum 1 (1PPS & UTC reference)
- NTP stratum 2 or higher (remote server UTC reference)
- Two 10/100Mbits/s LAN interfaces with independent MAC processor for high throughput
- Hardware assistance for sub micro sec time stamping
- High stability local clock (IOP oscillator)
- Management by COM card (separated from NTP traffic)
- Craft port for local NTP monitoring and administration
- Front LED's for direct alarm and activity monitoring
- TOD interface with serial data stream (NTP clock driver type 4) and PPS

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Card specifications:

Protocols:

NTPv2 (RFC 1119), NTPv3 (RFC 1305), NTPv4 (draft), IPv4

SNTPv4 (RFC 4330)

MD5 Authentication (RFC 1321)

Telnet (RFC 854)

NTP server performance:

Clock accuracy: 10 10exp-9 sec

Clock stability: Rub.= 2 10exp-10/year
(IOP main clock) Qz = 3 10exp-8/year

Stratum 1: PPS + UTC ref. driver from GPS on IOP's (redundant GPS receiver).

Time accuracy (< 100 request per sec):
HW time stamping assistance = 150 ns

Time accuracy (up to 500 requests per sec):
HW time stamping assistance =150 ns

Stratum 2: NTP client and connection to remote server (stratum1).

Transaction rate: 500 requests/sec per interface

Environment:

RoHS compliant

Physical:

US5G output card form factor

US5G: 1 card for 2 output slots, 1 rear face interface accessory
US5Ge: 1 card per output slot (front face interface)

Management:

NTP card: Local craft + Telnet
Menu oriented console user interface

US5G COM card: TL1 + SNMP

Interfaces:

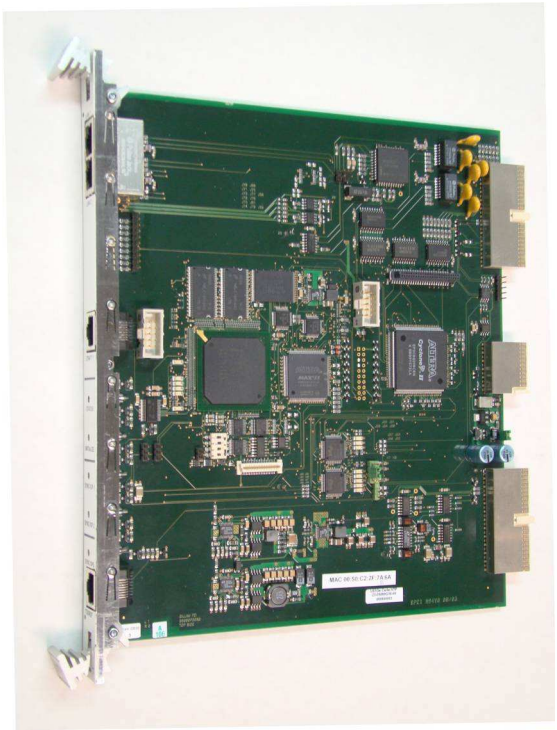
Two RJ45 10/100 baseT LAN, independent traffic channel (Enquiry/response on same interface)

One RJ45 local craft

One RJ45 ToD (NTP clock driver type 4) with PPS signalling

US5Ge view:

Card view:



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