IPtec Incorporated

TNP-100
IP Multiplexer/De-multiplexer

High Performance, low latency leader.

IPtec specializes in facilitating high performance, low latency services over packet based networks.

IPtec provides reliable, high quality products for low latency, Telemetry (TMoIP), E1/T1 (CESoIP), video and data acquisition services. These products enable transport of high quality telemetry, IRIG, voice (E1/T1), and Video signals over Ethernet, IP-based or MPLS networks.

Standards based Telemetry & IRIG over Packet network

Low latency transmission over IP networks

Four user programmable multi-function IO ports

Enables Multiple TM, TDM, Video & LAN services over IP

Enables Analog & Digital data acquisition services

Superior Flat Line response

Integrated Bit-Sync, BERT, and Monitoring capabilities

Managed via Embedded Web Server and SNMP

Overview

The IPtec TNP-100 IP Multiplexer/De-multiplexer and IP Protocol Adaptor transports serial telemetry and associated IRIG signals between locations linked by commercial IP-based networks with the highest degree of signal integrity. The TNP-100 Flat Line Response (FLR) and adaptive IP packet size technology enables ultra-low latency transmission and superior Time-Data Correlation (TDC), while preserving the original signal integrity. The TNP-100 supports aggregate data rates up to 1 Gbps and performs QoS support enabling IP networks to provide reliable and cost effective data delivery from the source to multiple destinations.

Application

As the proliferation of IP network technology continues from the desktop through the Access network and to the network backbone, it is desired to take advantage of the "port to port" connectivity, low cost, and general availability of these networks to transport legacy "timing sensitive services". These technology advances enable telemetry collection, processing centers, control centers, ground stations, test sites, and payload operations facilities to migrate from expensive dedicated serial interconnections to commercially available IP networks. Multiple telemetry streams often need to be transmitted from one point to another over large distances while maintaining their time-data relationship.

The TNP-100 enables IP networks to perform bi-directional "real-time" transmission of time correlated signals. The TNP-100 performs protocol translation between custom serial signaling used in existing networks, into modern TMoIP telemetry equipment, and the standards-based IP network protocol. The TNP-100 recovers the original serial signaling at the destination with the highest performance possible allowing the TNP-100 to be a drop-in replacement for existing serial transport systems. The TNP-100 offers TMoIP compliant transparent transmission of telemetry and IRIG over IP LAN and WAN networks.

IP Multicast technology enables the TNP-100 to transmit Serial telemetry and IRIG signals between a source (local or remote) and one or more destinations. The TNP-100 innovative adaptive clock recovery and buffer management algorithms are designed to recover PCM telemetry clocking information and maintain specific system latency for the streaming service set by the user, which is independent of the streaming data rate and thus enabling a "Flat-line response" between services over IP network infrastructures.

The TNP-100 even suppresses or removes jitter from the applied telemetry streams before reaching the destination and produces accurate serial output at each destination.

The TNP-100 efficiently performs conversion to and from IP packets, relying on Field-Programmable Gate Array (FPGA) technology running software-defined algorithms to provide speed and configurability. IPtec's software is included allowing dynamic and/or static configuration and monitoring of the distribution network via Graphical User Interfaces or secure SNMP connections.

TNP-100 Telemetry Application

Design

The TNP-100 is a standards compliant network processor enabling transparent, low latency, bidirectional transfer of almost any type of digital and analog signals over Ethernet, IP-enabled, and MPLS networks. The TNP-100 is a single board platform enabling Ethernet (LAN), Circuit Emulation (CESoIP), Video, PCM Telemetry (TMoIP, SCADA), and Analog Data acquisition service solutions. Flexible, multi-function interfaces enable the network processor without physical re-configuration to be used in many different applications, where high performance and ultra-low latency are required. The TNP-100 Flat Line Response System is capable of providing transmission of IRIG timing signals along with the telemetry data and other services and maintains time correlation between the services, while achieving the shortest end to end transmission latency. The TNP-100 single board platform comprises a Host running a real-time Linux operating system, a managed Ethernet Switch with multiple Gb Ethernet ports, and programmable multi-functional I/O interfaces (service ports). The service ports can be configured to operate as inputs or outputs and support most digital and analog electrical signal formats without any hardware changes to the system. The four service port TNP-100 unit is available in a 1RU, ½-width 19" rack space. Two TNP-100 units provide an 8 service port system that fits in a 19" 1RU rack space. Systems with large numbers of services are easily realized by interconnecting multiple TNP-100 units for multiplexing/De-multiplexing (service aggregation) of many streams/services and networking purposes.

The multi-function I/O interfaces supports TTL, ECL, and most other digital electrical signal formats as well as Video and Analog signal formats without any hardware change, significantly improving CapEx and OpEX. The design of the TNP-100 and the IPtec software architecture permits easy tailoring of a standard TNP-100 configuration to meet customer specific requirements.
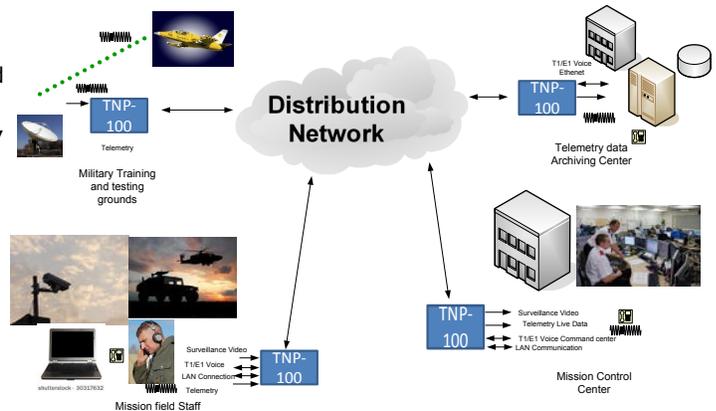
TNP-100 Technical Specification Summary

Multi-Function Interface

Number of user configurable inputs/outputs
4 multi-service ports.

Connector
BNC

Impedance: 75 ohm (Unbalanced)

Telecom
E1,T1 (CESoIP) (PWE3)
Connector: BNC & RJ45 (with optional in-line Balun adaptor)
Impedance: 75 ohm (Unbalanced), 110 ohm (Balanced)

Digital Data Acquisition Format Support (TMoIP)
TTL, ECL, CML & Automatic Threshold detection

Impedance: 50 ohm and 75 ohm
Data Rate: 80b/s to 50Mb/s per port
(Data Rate: 10Mb/s to 600Mb/s for TNP-100-HS)
Bit-Sync: 1000b/s to 22Mb/s (NRZ Data format)

IRIG Timing
Analog format (1, 10 & 100Khz)
Signal Level
Input: 0.2Vpp min. 10Vpp max
Output: 3Vpp (50 ohm), 10Vpp (25 ohm)
Impedance
Input: Hi-Z, 600 ohm and 50 ohm
Output: 25, 50 & 600 ohm

Analog Data Acquisition & Video
Baseband Analog signals
Signal Level: 5Vpp max
Impedance: 50 ohm and 75 ohm
Bandwidth: Up to 10Mhz
Video data rates: 10Mb/s-400Mb/s (user configurable)
Video Processing Latency: 2mS

Signal Processing
Processing Latency <2mS
PDV Compensation: Up to 4S
Packet Size: up to 1463 bytes

Remote Management
Built-in Web-based GUI and SNMPv2 and v3

Ethernet Service Ports & Network Interface
One pluggable SFP module. 1000Base-X
Two RJ45. 10/100/1000Base-T

Maintenance
An onboard BERT (Bit Error Rate Test) generator allows remote testing. Following test patterns are supported:

- Alternating Ones and Zeroes
- Pseudorandom 2^{23-1}
- Pseudorandom 2^{15-1}

Physical Dimensions
1RU, ½-width 19". Two units fit in a 19" 1RU rack space
(H x W x D) 1.77" x 8.50" x 12.00" / 4.5cm x 22,0cm x 30.5cm

Environmental Conditions
Operating Temperature: 0 to 50ºC (32F to 122F)
Storage Temperature: -40 to 70°C (-40F to 158F)
Relative Humidity: 5% to 90% (Non Condensing)

Relevant Publications
FCC CFR47 Part15B Class A
UL/IEC 60950-1, CE Certified
Telemetry over IP (TMoIP), RCC Standard 218-07
IETF-PWE3, SAToIP, CESoIP, G823/G.824, IEEE 808.1D, 1Q, 1P, 1p, 1ag, 3x, 1x, 2, 3ad, 3u, 3z, 3ah, IRIG 106, IRIG A/B/D/H/G

Power
100 – 240V AC (47 – 63Hz) , < 20W