



**CTP System**

# **Hardware, Installation, and Software Configuration Guide**

*Release 4.2*

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Part Number: 010344, Revision A00

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*CTP System Hardware, Installation, and Software Configuration Guide*, Release 4.2

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Revision History  
1 November 2006—Revision 1

The information in this document is current as of the date listed in the revision history.

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# Chapter 1

## CTP Overview

The CTP products are designed to create an IP packet flow from a serial data stream or analog voice connection, providing the necessary processing to re-create the serial bit stream or analog signal from an IP packet flow.

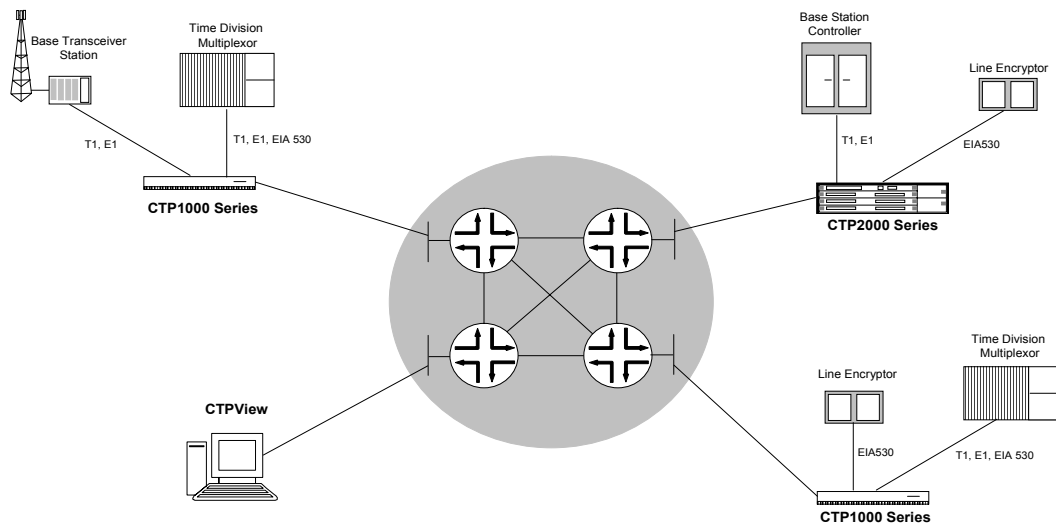
This chapter contains the following sections:

- Overview on page 1
- Packet Processing on page 3
- Clock Options on page 4

### Overview

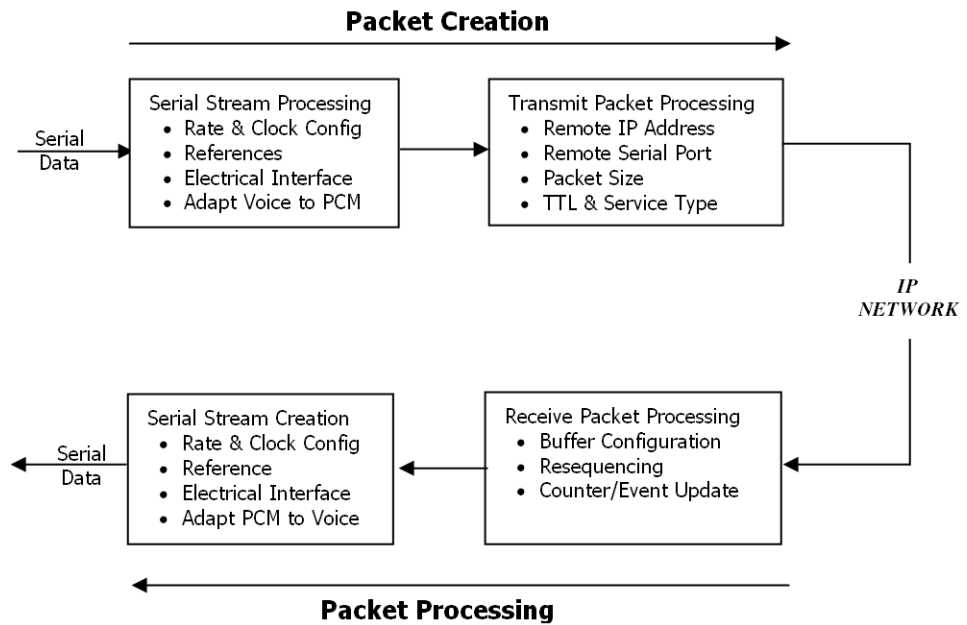
CTP products are designed to accommodate the delay, delay jitter, and packet reordering characteristics of an IP network. Figure 1 shows examples of applications that use CTP products.

**Figure 1: Sample Applications Using CTP Products**



Numerous processes must occur to adapt serial data to and from IP packets. These processes are summarized in Figure 2. You configure the characteristics of the processes by using the CTP menu interface or the CTPView graphical user interface.

**Figure 2: Processes**



Using the menu interface, you can configure the CTP products to accept a serial data stream and create an IP flow that will be transferred across an IP network. The connection provided by the CTP system is a physical layer circuit between the end user equipment.

### **Serial Stream Processing**

For a summary of this process, see Figure 2.

Rate selection and clock configuration allow the serial interface rate to be configured through the software. Rates supported range from less than 300 bps to 12.288 Mbps (in subhertz increments).

You can configure the CTP systems by using the menu interface to provide multiple prioritized node clock references. An external reference input and any of the serial interfaces may be used for the node reference clock. Reference frequencies must be 32 KHz,  $n \times 64$  KHz, or 1544 KHz up to a maximum of 4096 KHz (2048 KHz maximum on the CTP1002).

The electrical characteristics and encoding of the CTP ports are software configurable. The available options are EIA530, EIA530A, RS-232, V.35, analog 4W-TO, conditioned diphase, isochronous, T1, and E1.

An analog voice signal terminated on the 4W-TO interface is converted into a 64-kbps PCM digital bit stream before adaptation to and from an IP flow. The analog interface allows transmit and receive levels to be adjusted.

## Transmit Packet Processing

For a summary of this process, see Figure 2 on page 2.

The CTP is configured with the remote IP address of the CTP where the packets created from the local serial port are to be routed.

The CTP remote port is specified by the IP address and physical port number of the remote unit and port.

The packet size created by the CTP system may be set from 32 to 1456 bytes. As discussed in *Chapter 3, Software Configuration*, larger packet sizes are more bandwidth-efficient but introduce more serialization delay when the packet is created. The menu interface checks to verify that the combination of packet size and data rate does not result in a packet rate exceeding 1200 packets per second.

Time to live (TTL) may be set from 0 to 255 (see Time to Live in *Chapter 3, Software Configuration*). The TTL is the maximum number of hops in the IP network that the packet may travel before it is discarded by the network. You can configure the service type byte (see Service Type in *Chapter 3, Software Configuration*), which some IP networks use to determine the quality of service provided to the IP flow.

## Packet Processing

---

Using the CTP menu interface, you can configure the unit to accept the IP flow and create a serial data stream that meets your application requirements. For a summary of this process, see Figure 2 on page 2.

## Receive Packet Processing

A receive buffer is required to “smooth” the timing jitter of received packets because of the delay variance that is inevitably encountered in the IP network. The configuration allows you to configure both the size of the buffer (in 1-msec increments) and the maximum amount of buffering delay allowed before the buffer will recenter. The size of the buffer configured should be dependent on the performance and characteristics of the IP network.

The CTP system automatically resequences packets when they arrive out of order. If a packet is not received, the CTP system inserts all data in lieu of the packet information so that bit count integrity is maintained.

You can prompt the menu interface to display detailed information about the port status, such as packet counts, late packets, missing packets, and buffer fill.

## Serial Stream Creation

The packet receive process allows the serial data rate to be configured through the software. Rates supported range from less than 300 bps to 12.288 Mbps in subhertz increments as described in *Chapter 3, Software Configuration*. Conditioned diphase and isochronous interfaces operate at rates up to 1.024 Mbps.

## Clock Options

---

The CTP system provides numerous options for physical layer clocking:

- Interface clocking options—As detailed in Clock Configuration in *Chapter 3, Software Configuration*, the CTP system allows complete configuration flexibility of interface clocking. This flexibility includes your ability to specify how clocks are generated (that is, from the node clock, which can be phase locked to an external clock input) and what clocks are used to process the data from the attached device. The CTP system can synthesize over 1.5 billion rates between 1 bps and 12.288 Mbps.
- Asymmetric clocking—As detailed in Custom Clock Options—CLI in *Chapter 3, Software Configuration*, you can configure CTP circuits to synthesize asymmetric rates.
- Reference clock input—The CTP system can phase lock its node clock to an interface clock or external reference input. Up to five prioritized references can be configured. The node provides a reference holdover if all references are lost.
- Plesiochronous operation—Calibrated Clock is a patented CTP feature that allows the one-time calibration of the CTP oscillator to a known reference. Depending on environmental factors, two units calibrated to the same clock will have a clock difference as small as 100 parts per billion. This allows CTP circuits to operate for long periods of time before a buffer recenter occurs.
- Adaptive clocking—Although IP router networks do not transfer physical layer clocking, the CTP adaptive clocking feature, using patented Advanced Time Domain Processing (ATDP), allows the CTP system to recover clocking information from the remote CTP port and adjust the local clock accordingly. ATDP provides rapid convergence to the correct clock, and does not vary due to changes in the average jitter buffer fill. As a result, a CTP circuit will continuously operate without a buffer recenter, even when clock references are not used.



## Chapter 2

# Hardware Configuration and Installation

This chapter describes the CTP hardware configuration and installation. The chapter contains the following sections:

- Overview of Hardware Chassis on page 5
- Chassis Installation on page 18
- Router and Switch Configuration on page 19
- Product Reclamation and Recycling Program on page 20

## Overview of Hardware Chassis

---

The CTP1004 and CTP1012 chassis are an industrial 1-U rack-mount case. The CTP1002 is 1U high and a half-rack wide, and is designed for installation on a tabletop, on a shelf, or in a rack with the supplied rack mount kit. The CTP2008, CTP2024, and CTP2056 are multichassis that are 1U, 2U, and 4U high, respectively.

All of the chassis, except the CTP1002, have multiple cooling fans. Air flow is front to back in the CTP1004 and CTP1012, and side to side in the CTP2008, CTP2024, and CTP2056. The CTP1002 does not use fans. The CTP environmental and power requirements, front and rear subassembly description, chassis subsystems, and indicators and switches are detailed in the following sections.

The CTP1004 and CTP1012 are offered with an optional rubidium atomic clock to provide very accurate circuit clocking without an external reference. The rubidium module is internal to the chassis and does not require hardware configuration. The proper operation of the rubidium module and its clock output can be verified with the CTP menu interface or with the CTPView graphical user interface.

## Environmental and Power Requirements

Table 1 provides a summary of the environmental and power requirements for the CTP products.

**Table 1: CTP Environmental and Power Specifications**

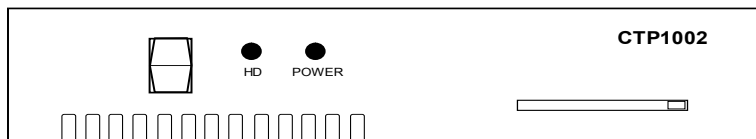
	<b>CTP1002</b>	<b>CTP1004</b>	<b>CTP1012</b>	<b>CTP2008</b>	<b>CTP2024</b>	<b>CTP2056</b>
Power voltage range (VAC)	100-240	100-132 200-240	100-132 100-240	100-240	100-240	100-240
Frequency (Hz)	50-60	50-60	50-60	50-60	50-60	50-60
Nominal current (115V amps)	< 1.0	1.5	1.5	2.0	2.0	2.5
Environmental operating temperature (°C)	0-40	0-40	0-40	0-40	0-40	0-40
Humidity (noncondensing)	5-90 %	5-90 %	5-90 %	5-90 %	5-90 %	5-90 %
Physical width (in.)	8.0	17.25	17.25	17.25	17.25	17.25
Height (in.)	1.75	1.75	1.75	1.75	3.5	1.75
Depth (in.)	12.5	13.9	17.25	11.25	11.25	11.25
Weight (lb.)	6	12	14	16	20	27

### CTP1002 Front Panel

The CTP1002 system has a removable flash drive accessible from the front. You can remove the flash drive by pressing the eject button next to the card. The CTP1002 must be powered off when you insert or remove the flash drive. The CTP1002 front panel (Figure 3) includes:

- Power LED —Illuminated green when power is connected and the front panel power switch is set to ON position.
- HDD LED —Illuminated red when the flash drive is in use.
- Front power switch —Set to ON position when “1” is briefly pressed. Set to OFF when “1” is pressed for 4 or more seconds.
- Removable flash drive.

**Figure 3: CTP1002 Front Panel**



### CTP1002 Rear Panel

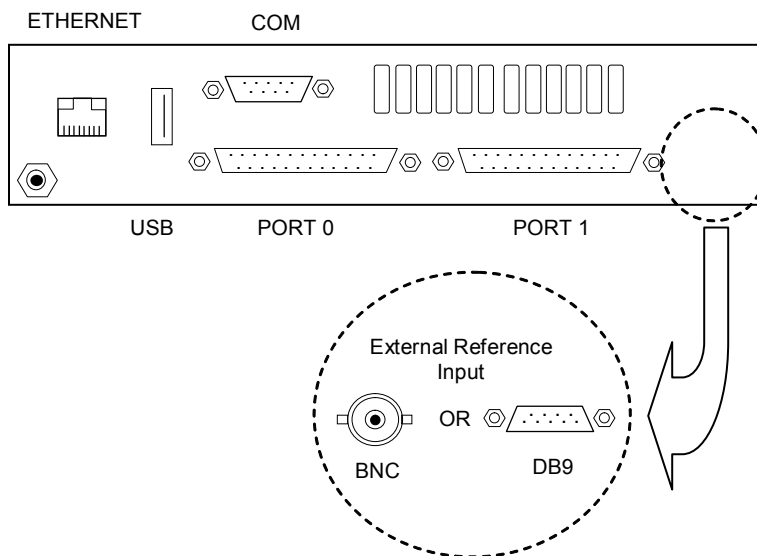
The CTP1002 rear panel (Figure 4) includes:

- Power input from the external 12VDC power supply provided with the unit.
- Port 0 and port 1 DB-25 connectors—DB25 connectors for terminating EIA530, RS-232, V.35, 4WTO, and T1 circuits.
- COM 2 console connection—Provides an asynchronous TTY connection for locally configuring the CTP system.

- Fast Ethernet connector—Provides the 100-Mbps Ethernet connection to the IP network by means of a local Ethernet switch or router.
- USB connector.

The pinout of the DB-25 port connector is the same as provided by the quad cables used on the larger CTP systems. The pinouts for this connector and the console connector are provided in the Cables section of this chapter.

**Figure 4: CTP1002 Rear Panel**



### **CTP1004 and CTP1012 Front Panel**

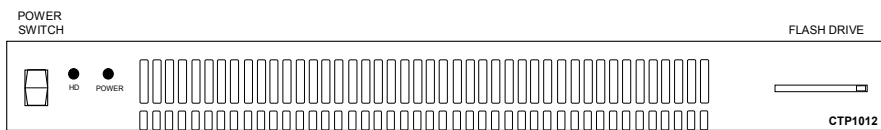
The CTP1004 and CTP1012 systems have a removable flash drive accessible from the front. You can remove the flash drive by pressing the eject button next to the card. The systems must be powered off when you insert or remove the flash drive. The CTP1004 (Figure 5) and CTP1012 (Figure 6) front panels include:

- Power LED —Illuminated green when power is connected and the front panel power switch is set to ON position.
- HDD LED —Illuminated red when the flash drive is in use.
- Front power switch—Set to ON position when the switch is briefly pressed. Set to OFF position when the switch is pressed for 4 or more seconds.
- Removable flash drive.
- USB ports (CTP1004 only).

**Figure 5: CTP1004 Front Panel**



**Figure 6: CTP1012 Front Panel**

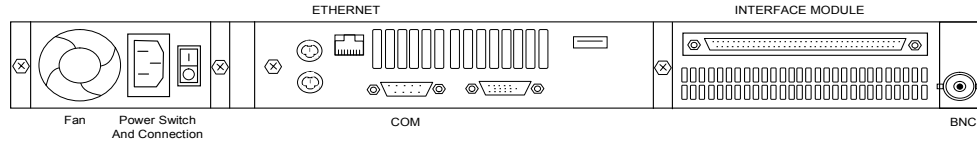


**CTP1004 and CTP1012 Rear Panel**

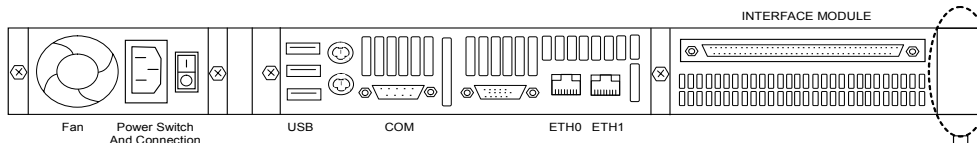
The rear panels of the CTP1004 and CTP1012 are shown in Figure 7 and Figure 8. The standard power cord plugs into the power receptacle. Information about the connectors and cables are provided in the Cables section on page 15. The other connections available on the rear panels include:

- Ethernet connection—Provides the 100-Mbps Ethernet connection to the IP network by means of a local Ethernet switch or router
- Console connection—Provides an asynchronous TTY connection for locally configuring the CTP
- Interface connector—Features a 100-pin connector providing four serial interfaces when used with the CTP quad cable

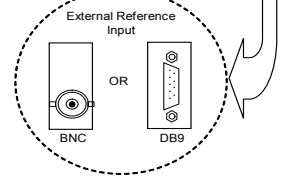
**Figure 7: CTP1004 Rear Panel**



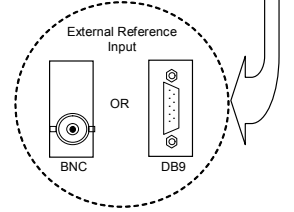
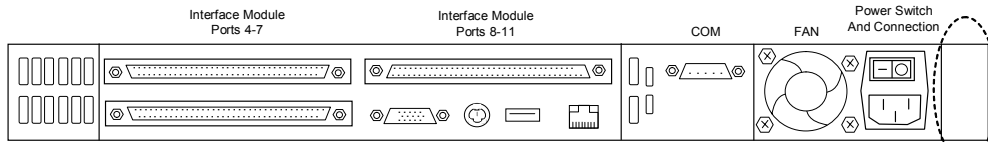
**CTP1004 REAR PANEL – VERSION 1 (EOL)**



**CTP1004 REAR PANEL – VERSION 2**



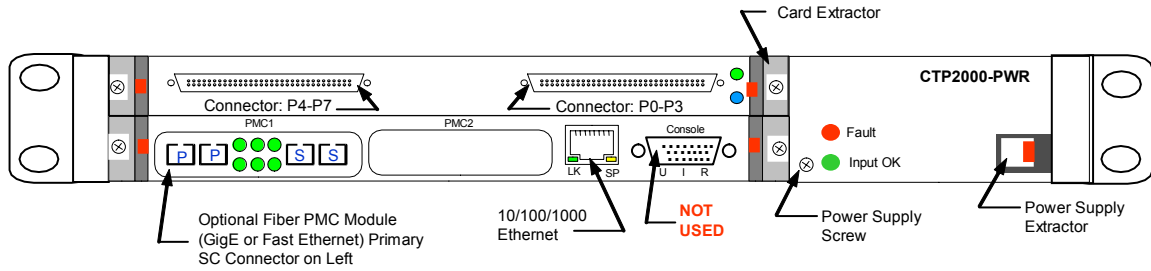
**Figure 8: CTP1012 Rear Panel**



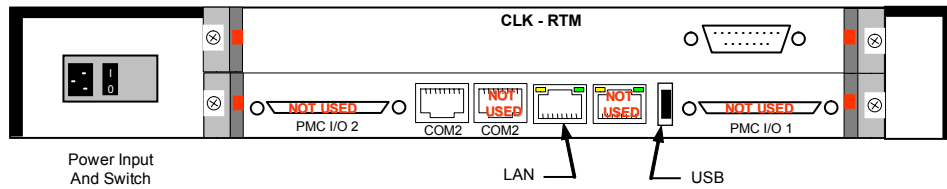
**CTP2008, CTP2024, and CTP2056**

The CTP2008, CTP2024, and CTP2056 have four subsystems: CTP interface modules, power supplies, processor modules (front and rear), and the clock rear transition module (RTM). The CTP2024 and CTP2056 support an optional second power supply for redundancy. The front and rear subsystems are shown in Figure 9, Figure 10, Figure 11, Figure 12, Figure 13, and Figure 14.

**Figure 9: CTP2008 Front Assemblies**



**Figure 10: CTP2008 Rear Assemblies**



**Figure 11: CTP2024 Front Assemblies**

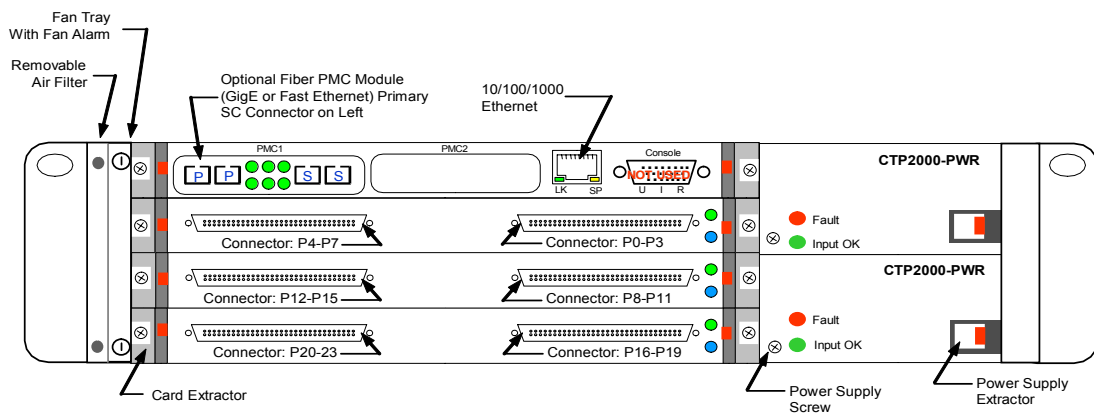


Figure 12: CTP2024 Rear Assemblies

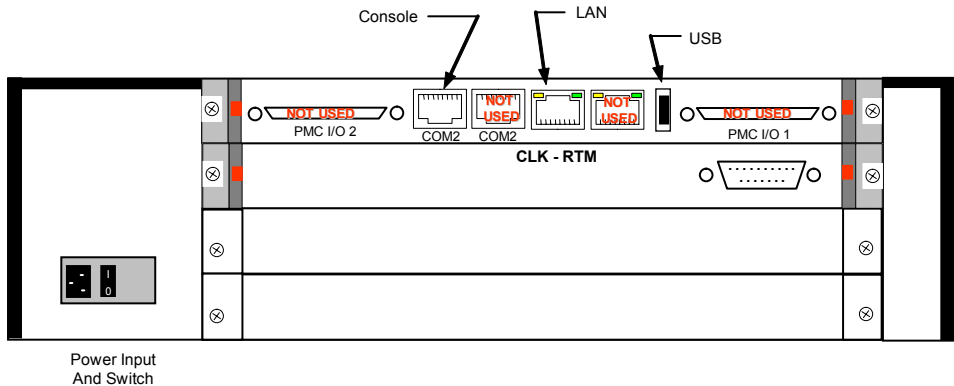
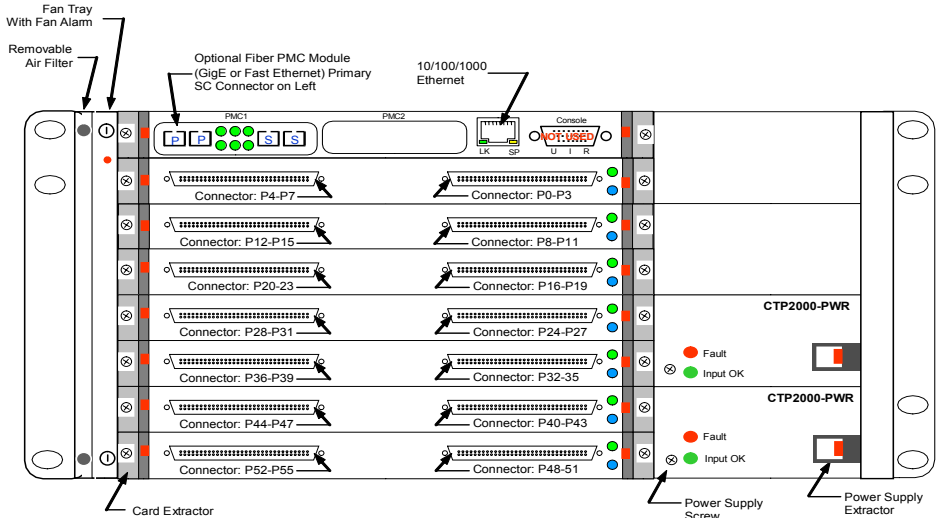
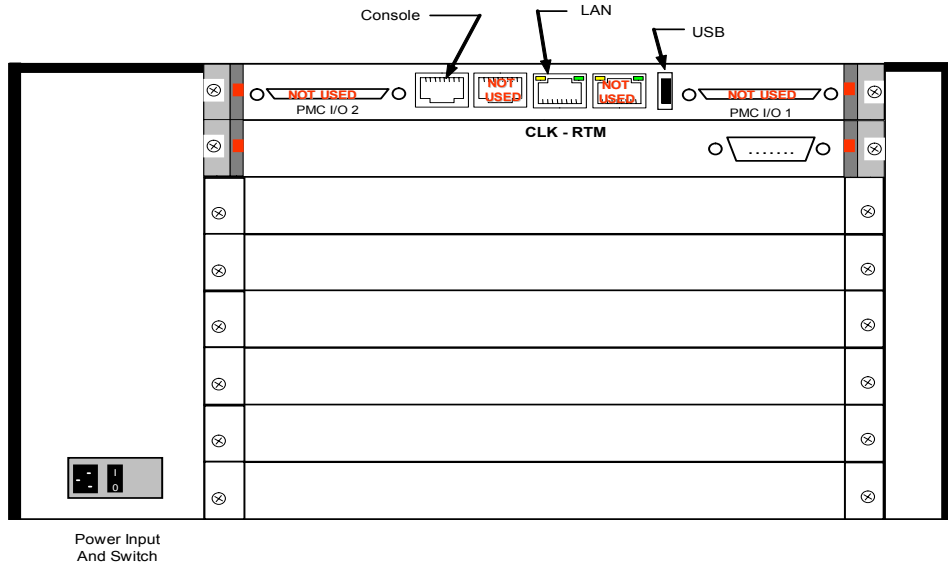


Figure 13: CTP2056 Front Assemblies



**Figure 14: CTP2056 Rear Assemblies**



**CTP2008, CTP2024, and CTP2056 Interface Modules**

The CTP2008, CTP2024, and CTP2056 systems have up to one (1), three (3) and seven (7) interface modules, respectively. The interface modules are interchangeable between the systems.

Part CTP2000-IM-8P provides the standard software-configurable data interfaces, including EIA530, EIA530A, RS-232, and V.35. Part CTP2000-IM-8P-T1 adds the option of a configurable T1/E1 interface in addition to the standard data interfaces. Part CTP2000-IM-8P-V adds the option of a configurable 4WTO interface in addition to the standard data interfaces.

Each interface module provides two 100-pin connectors similar to the connectors provided on the CTP1004 and CTP1012 systems. Each connector provides four ports by means of the quad cable, described in the Cables section. The port numbering is as shown on the preceding figures, with the lowest numbered ports starting at the top right.

You install an interface modules by inserting it into the chassis with the extractors unlocked and pushed outward. The system should be powered off when the module is inserted or removed. When you insert the module into the backplane connector, the extractors are pushed inward; that motion inserts the module into the connectors. Each module has two Phillips head screws, which you use to “lock” the module into the chassis. You must loosen the screws to remove the module; then you push the extractors outward while depressing the red latch.

Each interface module has two LEDs. The bottom LED is purple when the module is functioning, and the top LED states are as follows:

- Yellow—Interface module is offline and not recognized by the system.

This state typically occurs when the system is first turned on and booting.



- Green—Interface module is online and recognized by the system; the interface module clocking is as configured.

The top interface module is used for input clock references, which are distributed to the other modules across the backplane. The LED is green on the top module if no clock reference is defined. The other interface modules should always display the green LED.

- Red—Interface module is online and recognized by the system. It either is not using the clock distributed by the top interface module, or the configured reference(s) are not available to the top module.
- Orange—Interface module is online and recognized by the system. The configured clock is not available, and the system is in a holdover clocking mode.

### Power Supplies

The CTP2008 system has a single power supply, and the CTP2024 and CTP2056 systems have one supply with an option for a second hot-swappable power supply, which provides redundancy. The green LED on the power supply front panel indicates that the input power is OK; a red LED indicates a power supply fault. The power supplies are interchangeable between the systems.

You remove the power supply by first unscrewing the retaining screw in the lower-left corner of the power supply panel. Next, press the red tab on the extractor, and pull the extractor lever outward. You insert a power supply by first sliding the power supply in with the extractor pulled outward. Then push the extractor inward to latch the power supply in place, and tighten the retaining screw at the lower-left corner of the supply.

### Processor Module

You can install the processor module only in the bottom slot of the CTP2008, and only in the upper slot of the CTP2024 and CTP2056. The module provides the IP network connection through the 100/1000-Mbps Ethernet interface (copper) or optional dual 100-Mbps and 1-Gbps fiber interfaces, which are installed in the PMC1 slot. The primary connector is on the left when the PMC1 slot is used. The PMC2 slot is not used.

Remove or install the processor modules (front and rear) only with the unit power turned off. Install the processor module by inserting it into the chassis with the extractors unlocked and pushed outward. When you insert the module into the backplane connector, the extractors are pushed inward to insert the module into the connectors. The module has two screws, which you use to “lock” the processor module into the chassis. You must loosen the screws to remove the module; then push the extractors outward while depressing the red latch.

The processor module provides a front connector for asynchronous console, video, and keyboard connections; you use a special cable that is provided with the system. Never leave the cable installed in the unit when the cable is not in use.

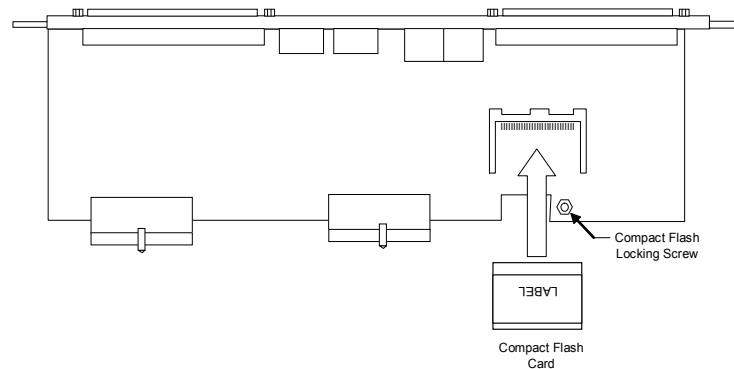
Asynchronous console connections that allow connection to the COM2 port on the rear transition module will be available in a future release. A ferrite core should be connected to any Ethernet cables that is connected to the processor. The recommend ferrite core is the Fair-Rite Products 4611 64281.

The following connectors on the rear transition module are not used: PMC I/O 1, PMC I/O 2, and COM3. Do not connect cables to these connectors. The compact flash card is installed on the processor rear transition module, as shown in Figure 15.

To remove or install the flash card:

1. Power off the unit.
2. Remove the processor rear transition module by unscrewing the retaining screws and pushing the extractors outward with the latching buttons depressed.
3. Remove the flash card–retaining screw and nut. You can then remove or install the flash card in the flash socket.
4. Reinstall the flash card–retaining screw and nut.
5. Reinstall the processor RTM into the chassis, and secure the retaining screws.

**Figure 15: Processor Rear Transition Module and Compact Flash Card**



### Clock RTM Module

The clock rear transition module (RTM) is used to input a reference clock into the CTP2000 system. The module is installed in the rear of the chassis behind the CTP2000 interface modules with ports 0–7. The clock RTM module is the first slot above the processor RTM on the CTP2008 system, and the first slot below the processor RTM on the CTP2024 and CTP2056 systems. The module provides a DB-25 connector, and the differential clock input is provided on pins 24 and 11.

## Cables

The following cables connect to the CTP system:

- Interface module cable—The CTP interface modules provide a 100-pin connector for external serial interfaces connections to the CPT-1004, 1012, 2008, 2024, and 2056 systems. The quad cable ordered separately with the system provides four standard DB-25 connectors, which are labeled P0, P1, P2, and P3. These port numbers correspond to the port-numbering scheme implemented in the software configuration (as detailed in *Chapter 3, Software Configuration*). Use a Revision B or later cable when connecting it to a CTP1012, CTP2008, CTP2024, or CTP2056 system

Table 2, Table 3, Table 4, and Table 5 list the EIA530, RS-232, voice interface, and T1 interface signals.



**CAUTION:** The cable MUST have stress relief before you attach it to the 100-pin connector. Connecting the cable without stress relief will damage either the connector thumbscrews or the interface module.

**Table 2: EIA530 Connector**

Pin	To/From CTP	Description	Circuit
1	–	Shield	
2	To	Transmitted Data—A	BA
3	From	Received Data—A	BB
4	To	Request To Send—A	CA
5	From	Clear To Send—A	CB
6	From	Data Set Ready—A	CC
7	–	Signal Ground	Ground
8	From	Data Carrier Detect—A	CF
9	From	Receive Signal Element Timing—B	DD
10	From	Data Carrier Detect—B	CF
11	To	Transmit Signal Element Timing—B (DTE)	DA
12	From	Transmit Signal Element Timing—B (DCE)	DB
13	From	Clear To Send—B	CB
14	To	Transmitted Data—B	BA
15	From	Transmit Signal Element Timing—A (DCE)	DB
16	From	Received Data—B	BB
17	From	Receive Signal Element Timing—A	DD
18	To	Local Loopback	LL
19	To	Request To Send—B	CA
20	To	Data Terminal Ready—A	CD
21	To	Remote Loopback	RL
22	From	Data Set Ready—B	CC

**Table 2: EIA530 Connector (continued)**

23	To	Data Terminal Ready—B	CD
24	To	Transmit Signal Element timing—A (DTE)	DA
25	–	Test Mode	TM

**Table 3: RS-232 Connector**

Pin	To/From CTP	Description	Circuit
1	–	Shield	
2	To	Transmitted Data—A	BA
3	From	Received Data—A	BB
4	To	Request To Send—A	CA
5	From	Clear To Send—A	CB
6	From	Data Set Ready—A	CC
7	–	Signal Ground	Ground
8	From	Data Carrier Detect—A	CF
15	From	Transmit Signal Element Timing—A (DCE)	DB
17	From	Receive Signal Element Timing—A	DD
20	To	Data Terminal Ready—A	CD
22	From	Data Set Ready—B	CC
24	To	Transmit Signal Element timing—A (DTE)	DA

**Table 4: Voice Interface Signals**

Pin	To/From CTP	Description	Circuit
1	–	Shield	
2	To	Channel 0 Voice RX—A	Channel 0
3	From	Channel 0 Voice TX—A	Channel 0
4	To	Channel 1 Voice Signaling Input A	Channel 1
5	From	Channel 1 Voice Signaling Output A	Channel 1
6	From	Channel 0 Voice Signaling Output A	Channel 0
9	From	Channel 1 Voice TX—A	Channel 1
11	To	Channel 1 Voice RX—B	Channel 1
13	From	Channel 1 Voice Signaling Output—B	Channel 1
14	To	Channel 0 Voice RX—B	Channel 0
16	From	Channel 0 Voice TX—B	Channel 0
17	From	Channel 1 Voice TX—A	Channel 1
19	To	Channel 1 Voice Signaling Input—A	Channel 1
20	To	Channel 0 Voice Signaling Input—A	Channel 0
22	From	Channel 0 Voice Signaling Output—A	Channel 0

**Table 4: Voice Interface Signals (continued)**

23	To	Channel 0 Voice Signaling Input—B	Channel 0
24	To	Channel 1 Voice RX—A	Channel 1

**Table 5: T1 Interface Signals**

Pin	To/From CTP	Description
1	–	Shield
2	To	Transmitted Data—A
3	From	Received Data—A
7	–	Signal Ground
14	To	Transmitted Data—B
16	From	Received Data—B

- Console cable—A console is connected to the CTP1002, CTP1004, and CTP1012 systems with a DB-9 crossover cable. The console connector to the CTP2024 and CTP2056 systems is a standard RJ-45 crossover. The specification for the cable is provided in Table 6. The console arrives preset to the following parameters:
  - Speed: 9600 bps
  - Data bits: 8
  - Stop bits: 1
  - Flow control: Xon/Xoff
  - Parity: none

**Table 6: Console Cable Pinouts**

DB9F_CTP	DB9F_Console
Pin-2 RCV	Pin-3 XMT
Pin-3 XMT	Pin-2 RCV
Pin-4 DTR	Pin-6 DSR
Pin-5 GND	Pin-5 GND
Pin-6 DSR	Pin-4 DTR
Pin-7 RTS	Pin-8 CTS
Pin-8 CTS	Pin-7 RTS
Pin-9 RNG	

- Fast Ethernet cable—The Ethernet connection is a standard RJ-45 connector. Typically, a straight-through cable is used to connect to a switch, and a crossover cable is used to connect to a router.

- Fiber-optic cable—The multimode fiber-optic cable connectors on the CTP1012 (Fast Ethernet), CTP2024 (Fast Ethernet or Gigabit Ethernet), and CTP2056 (Fast Ethernet and Gigabit Ethernet) systems are SC type.

## Chassis Installation

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### Rack Mounting

The CTP1004 and CTP1012 chassis are shipped with preattached brackets. These brackets are used to secure the unit in a rack *only* when the CTP is supported by a shelf. The chassis is shipped with longer side-support brackets, which must be installed when the unit is mounted in a 19-inch rack without a shelf.

The CTP2008, CTP2024 and 2056 models have rack mounts attached to the sides of the chassis. When you install these units in a rack, you must install them with screws in all the bracket holes.

The CTP1002 model can be installed on a shelf, on a table, or in a rack with the supplied rack-mount kit. The rack-mount kit also allows two units to be installed in a 1-U rack space.

When you install the CTP system into a rack, we recommend that two people install it in order to properly support the unit. To rack-mount the CTP unit:

1. Verify that there is adequate space in front of and behind the CTP1004 and CTP1012 systems for airflow. Verify that there is adequate space on the sides of the CTP2008, CTP2024, and CTP2056 systems for adequate airflow.
2. Remove the brackets on the CTP1004 and CTP1012 systems, and install the larger rack-mount brackets if the unit is to be installed in a 19-inch rack without a shelf.
3. Carefully support the CTP unit while it is being mounted in the rack.
4. Make certain that you place screws in all the rack-mount holes and that you securely fasten the screws.
5. Connect a grounding cable to the CTP2000 systems that provide a grounding lug on the rear.

### Power-On Sequence

The first time you power on the system and flash drive, enter the information below on the console connection. You can change this information, if necessary, in the Node Operations menu. (See Node Operations and Maintenance on page 62 in *Chapter 3, Software Configuration*.)

- IP address of the unit
- Unit's hostname

- Subnet mask
- IP gateway address

To power on the CTP system:

1. Be sure that the system is properly installed and that the top cover of a CTP1002, CTP1004, or CTP1012 system is properly secured.
2. On the CTP1004, CTP1012, CTP2024, and CTP2056 systems, set the rear power switch to off. Disconnect the external 12V DC supply from a CTP1002 system.
3. Connect the CTP power cable or external supply to either a 115V AC or 230V AC power source.
4. Set the rear power switch to the ON position, or insert the external 12V DC supply output into the CTP1002 system.
5. Verify that the front panel power status LED is green on the CTP1002, CTP1004, and CTP1012 systems and that the green LED is illuminated on the CTP2024 and CTP2056 processor modules.
6. Verify that the front panel HDD activity LED is flickering red on the CTP1002, CTP1004, and CTP1012 systems.

### **Power-Off Sequence**

As described in *Chapter 3, Software Configuration*, an option is provided in the Node Operations Menu to Power Down the node. Always use this option when maintenance or other activity requires the unit to be powered off.

### **Router and Switch Configuration**

---

The router or switch Fast Ethernet configuration must match the CTP configuration; otherwise a duplex conflict will result. The default configuration for the CTP Fast Ethernet interface is to autonegotiate duplex mode and autospeed. We recommend that you set the switch or router to the same autonegotiation configuration.

If the router or switch is set to full duplex or 100-Mbps speed, or both, then you must set the configuration of the CTP system to the same configuration by using the Node Operations menu (see Node Operations and Maintenance on page 62 in *Chapter 3, Software Configuration*).

You must explicitly disable proprietary router protocols on the interface, such as Cisco Discovery Protocol (use the interface configuration command **NO CDP**). You must also turn off any options to power external voice-over-IP (VoIP) phones through the Ethernet.

## Product Reclamation and Recycling Program

Juniper Networks is committed to environmentally responsible behavior. As part of this commitment, we work to comply with environmental standards such as the European Union's *Waste Electrical and Electronic Equipment* (WEEE) Directive and *Restriction of Hazardous Substances* (RoHS) Directive.

These directives and other similar regulations from countries outside the European Union regulate electronic waste management and the reduction or elimination of specific hazardous materials in electronic products. The WEEE Directive requires electrical and electronics manufacturers to provide mechanisms for the recycling and reuse of their products. The RoHS Directive restricts the use of certain substances that are commonly found in electronic products today. Restricted substances include heavy metals, including lead, and polybrominated materials. The RoHS Directive, with some exemptions, applies to all electrical and electronic equipment.

In accordance with Article 11(2) of Directive 2002/96/EC (WEEE), products put on the market after 13 August 2005 are marked with the following symbol or include it in their documentation: a crossed-out wheeled waste bin with a bar beneath.



Juniper Networks provides recycling support for our equipment worldwide to comply with the WEEE Directive. For recycling information, go to <http://www.juniper.net/environmental>, indicating the type of Juniper Networks equipment that you wish to dispose of and the country where it is currently located, or contact your Juniper Networks account representative.

Products returned through our reclamation process are recycled, recovered, or disposed of in a responsible manner. Our packaging is designed to be recycled and should be handled in accordance with your local recycling policies.



## Chapter 3

# Software Configuration

This chapter provides information about CTP configuration parameters and about configuring the systems with both the command-line interface (CLI) and CTPView. The chapter contains the following sections:

- Overview on page 21
- Port Configuration—Circuit Emulation on page 23
- Port Configuration—Packet-Bearing Serial Interface on page 57
- Node Synchronization on page 60
- Node Operations and Maintenance on page 62

## Overview

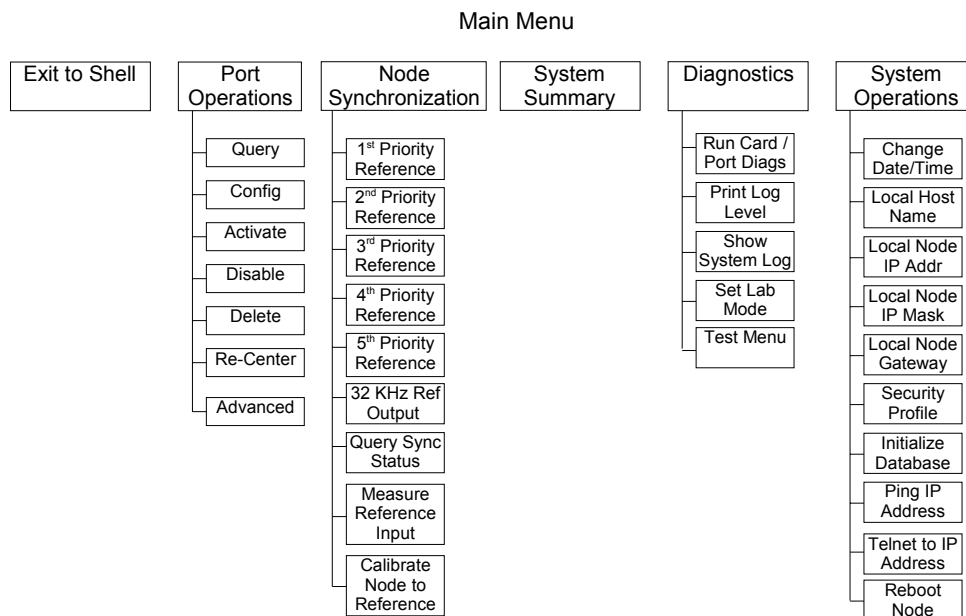
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Figure 16 on page 22 provides the hierarchy of the CLI menu used to configure the CTP system. Each section in this chapter also provides the corresponding CTPView configuration window. The menu options that you use include:

- Port configuration commands—You use these commands to configure port parameters, such as port clock, serial interface rates, interface type, buffering, and distant port IP address.
- Node synchronization commands—You use these commands to configure the clock reference to be used by the CTP system. (See Port Configuration—Packet-Bearing Serial Interface on page 57.)
- Node operation commands—You use these commands infrequently to perform operations such as setting the CTP IP address when the unit is first installed, upgrading the CTP software, and initializing the database. (See Node Operations and Maintenance on page 62.)

Commands that you use to monitor the CTP system, circuits, and the IP network (such as **activate**, **disable**, and **query**) are detailed in *Chapter 4, Software Queries and Operations*.

**Figure 16: CTP Menu Tree**



In the CLI, the default setting for each configuration parameter appears in brackets whenever you are prompted for input. The default setting is implemented when the only input is a return. Whenever you enter an acceptable nondefault setting, that setting becomes the new default for the configuration parameter. When you are configuring the CTP system, any configuration changes take effect immediately and are implemented when you exit the configuration or activate the port.

**Figure 17: CTP Main Menu**

```

=====
CTP Main Menu
=====
Please select a number from the following list:
-----
0) Exit to Shell
1) Port Operations
2) Node Synchronization
3) Node Summary
4) Node Diagnostics
5) Node Operations
----- Your choice [1]: 1

Enter port (0-3) [0]:
    
```

### Port Configuration—Circuit Emulation

You are required to have administrative privileges to modify a port configuration using the CLI. The port must be disabled and will not pass data when you configure it with the CLI. The port is not disabled when you configure it with CTPView, and the configured changes will not take effect until you select the **Submit Changes** button, at which time there will be a momentary interruption in the data flow.

Figure 18 provides a summary of the configuration options available from the Port Operations menu for a circuit emulation port. Figure 19 on page 24 shows the configuration menu provided by CTPView when you select the configuration option in the left pane of the window. Note that when using CTPView, you must be connected to the remote CTP system through the Connection area in the upper left pane. At the bottom of the window you select the port range that is displayed.

**Figure 18: Configuration Options Available from the CLI Config Menu**

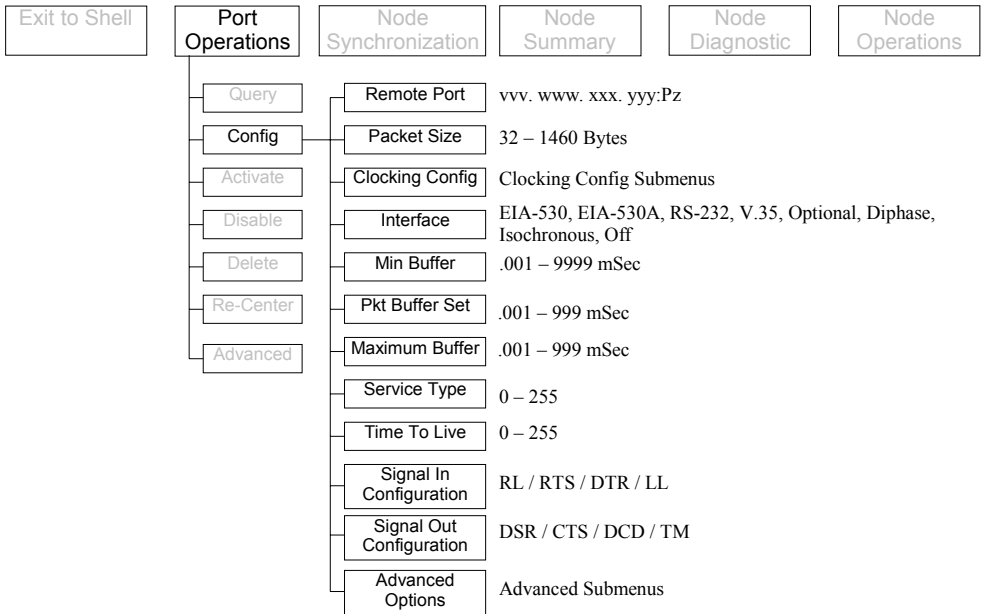


Figure 19: CTPView Port Configuration Menu



When using the CLI, you configure ports by selecting the Config option from the Port Operations submenu to obtain the configuration menu shown in Figure 20. The valid port numbers for different CTP products are as follows:

- CTP1002: P0 and P1
- CTP1004: P0, P1, P2, P3
- CTP1012: P0 though P11
- CTP2008: P0 through P7
- CTP2024: P0 through P23
- CTP2056: P0 through P55

**Figure 20: Selecting Port Configuration—CLI**

```

Please select a number from the following list:
-----
0) Back to Previous Menu
1) Port descriptor text: {user text}
2) Remote Port:         {vvv.www.xxx.yyy:Pz}
3) Interface:           {Submenu - Type, Mode, Encoding}
4) Packet Size:         {32 - 1456 lBytes}
5) Clock Config:        {Submenu - Rate and Config}
6) Min Buffer (ms):      {0.001 - 9999.000}
7) Pkt Buffer Set (ms): {0.001 - 9999.000}
8) Max Buffer (ms):      {0.001 - 9999.000}
9) Service Type:        {0 - 255}
10) Time to Live:       {0 - 255}
11) Signaling In Config: | RL = --- | RTS= --- | DTR=--- | LL = ---|
12) Signaling Out Config: | DSR= --- | CTS= --- | DCD= --- | TM =--- |
13) Advanced Options...
----- Your choice [ ]:

```

### Port Descriptor Text

You can enter a user description of the port. The description is limited to 32 alphanumeric or “-” characters. The port and circuit will function properly regardless of whether a description is entered. The description will be displayed during query and operational commands (described in *Chapter 4, Software Queries and Operations*).

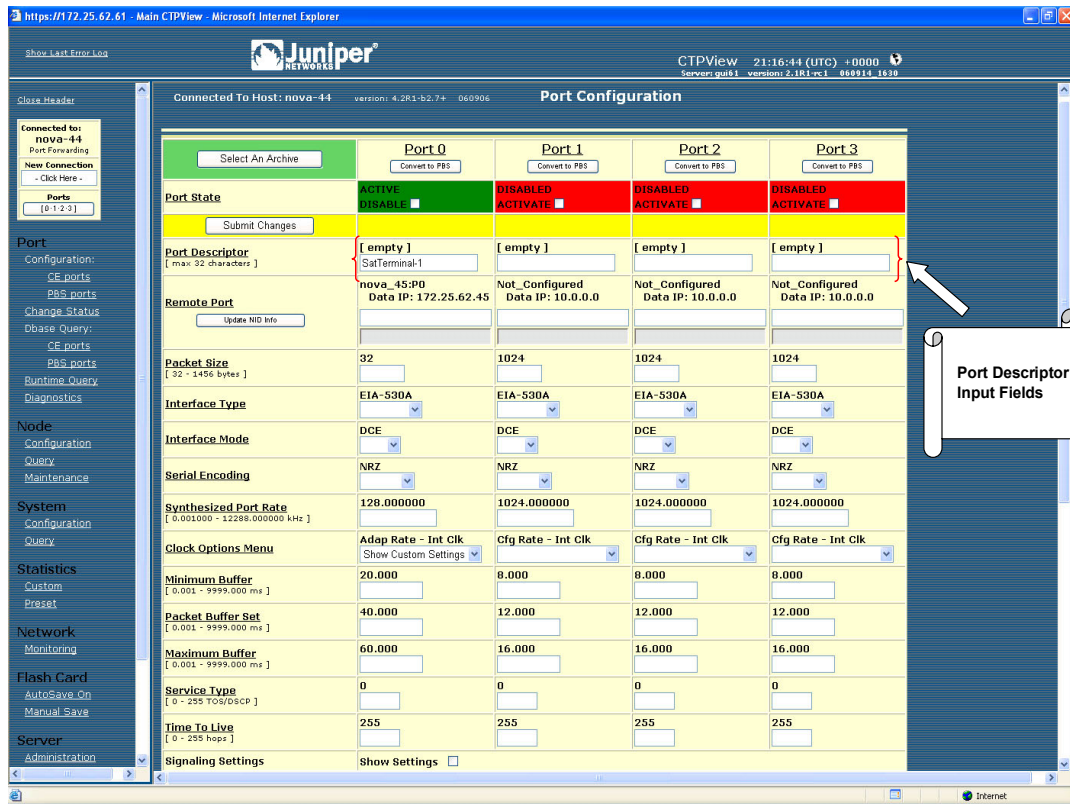
### Configuring the Port Descriptor with the CLI

The current description is shown in the CLI menu. You configure the port description by selecting Option 1 from the Port Configuration menu shown in Figure 20 on page 25. To delete the current description, enter **no description**. Then, when prompted, confirm that the description is to be deleted.

### Configuring the Port Descriptor with CTPView

You configure the description by entering the text into the Port Descriptor field Figure 21 on page 26. The current description is shown above the fields. No description has been entered when (empty) is displayed.

Figure 21: CTPView Port Descriptor Fields



## Remote Port

The Remote Port parameter specifies the CTP port where data from the configured port is to be sent and received (thus establishing a circuit across the IP network). As of Release 4.2, the port being configured and the remote port can be on the same CTP system (referred to as a “hairpin” circuit).

### Configuring the Remote Port with the CLI

You configure the remote port by specifying the CTP IP address and the physical port to be used on that remote system as shown in Figure 22 on page 27. The IP address is specified by its 4 octets, and the port is specified by its physical port number, which is in the range 0–55 depending on the type of CTP system.

**Figure 22: Specifying the Remote Port—CLI**

```

=====
Local CTP Configuration Menu for port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Port descriptor text: {user text}
2) Remote Port:          {vvv.www.xxx.yyy:Pz}
3) Interface:           {Submenu - Type, Mode, Encoding}
4) Packet Size:         {32 - 1456 1Bytes}
5) Clock Config:        {Submenu - Rate and Config}
6) Min Buffer (ms):     {0.001 - 9999.000}
7) Pkt Buffer Set (ms): {0.001 - 9999.000}
8) Max Buffer (ms):     {0.001 - 9999.000}
9) Service Type:       {0 - 255}
10) Time to Live:      {0 - 255}
11) Signaling In Config: | RL = --- | RTS= --- | DTR=--- | LL = ---|
12) Signaling Out Config: | DSR= --- | CTS= --- | DCD= --- | TM =--- |
13) Advanced Options...
----- Your choice [3]: 2

Enter remote node IP address

Enter IP address octet 1 (1-255)[1]: {Input Value}
Enter IP address octet 2 (0-255)[0]: {Input Value}
Enter IP address octet 3 (0-255)[0]: {Input Value}
Enter IP address octet 4 (0-255)[0]: {Input Value}

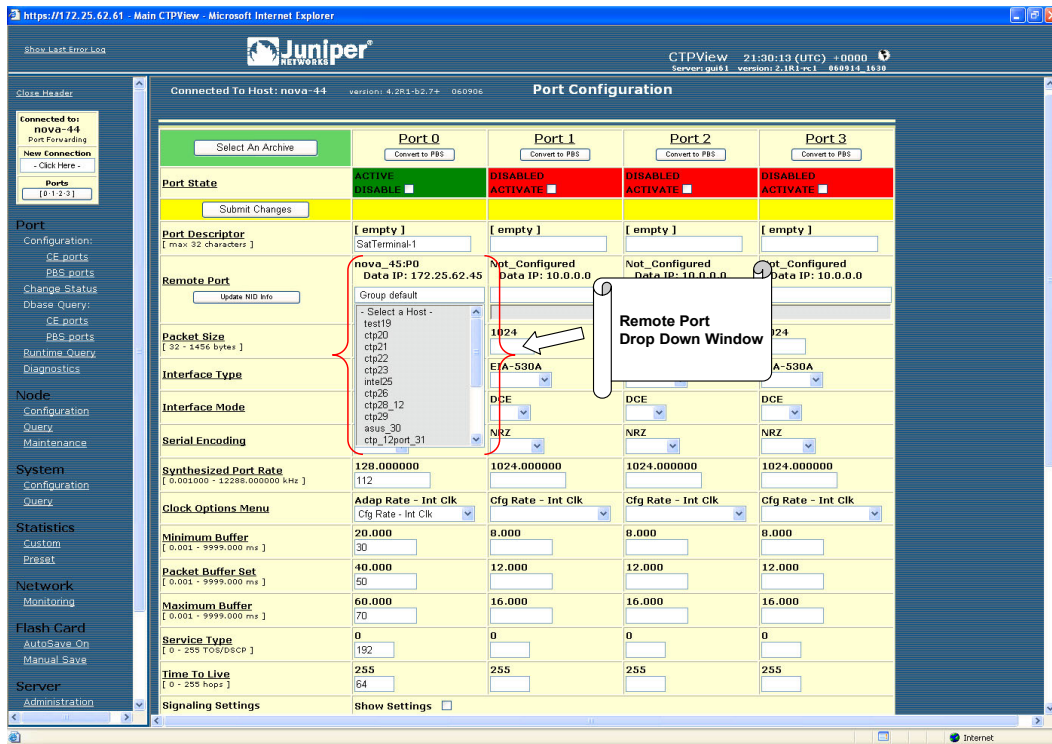
Enter remote port number (0-11)[0]:{Input Value}

```

**Configuring the Remote Port with CTPView**

You are provided with a series of drop-down menus, which allow you to select the group name, CTP name, and port number of a remote CTP system (Figure 23). The Group and CTP names are configured on CTPView when an administrator adds the CTP system to CTPView (see *Chapter 5, Security Profile Menu*).

Figure 23: CTPView Remote Port Drop-Down Menu



## Interface Type

You can configure the interface attributes, including the interface type and the serial encoding. The standard interface types are RS-232, V.35, EIA530, and EIA530A. The 4WTO analog voice or T1/E1 interface types are available when you order the optional hardware and install it on the CTP interface module. The optional interfaces are software configurable, and the system automatically detects when the necessary hardware is installed.

Additional parameters associated with the 4WTO voice interface include the following:

- Dual Channel—Each CTP port with the optional voice daughter card is capable of supporting either one or two voice channels. For one channel, disable the parameter. For two channels, enable the parameter.
- Enabled Channel—If Dual Channel is disabled, then use this parameter to select which channel is enabled. The parameter is not available (N/A) if the Dual Channel parameter is enabled.
- Input level—The input level can be adjusted to a value between 0 and 255. The value of 25 is the default and is the unity value (no attenuation or gain). Setting the value to 0 attenuates the signal 33 % (1.8 dB). Setting the value to 255 amplifies the signal 400 % (6 dB). Intermediate values are derived with linear interpolation. The actual gain depends on the impedance of the attached device.



- Output level—The output level can be adjusted to a value between 0 and 255. The value of 25 is the default and is the unity value (no attenuation or gain). Setting the value to 0 attenuates the signal 33 % (1.8 dB). Setting the value to 255 amplifies the signal 400 % (6 dB). Intermediate values are derived with linear interpolation. The actual gain depends on the impedance of the attached device.
- Talk Squelch—This parameter allows the active squelch circuit to be enabled or disabled.

Additional parameters are associated with the optional T1/E1 interface. When the T1 interface is configured, then you can configure the encoding for either B8ZS or AMI. When the E1 interface is configured, then you can configure the termination to work with either Coax or RJ-48.

### Configuring the Interface Type with the CLI

The interface type is a configuration option available from the Interface Submenu. The configurable interfaces, including the Optional T1/E1 or 4WTO, are provided when you select Option 1 from the submenu (Figure 24). The display shows the current configured interface type in parentheses.

**Figure 24: Selecting the Interface Type—CLI**

```

Please select a number from the following list:
-----
0) Back to Previous Menu
1) Type: {EIA530,EIA530A,RS-232,V.35, Optional: Voice 4W/TO or T1/E1,OFF}
2) Mode: {DCE,DTE, N/A}
3) Encoding: {NRZ, ISOCH, CDI, TRANS, N/A}
----- Your choice [1]: 1

Please select a number from the following list:
-----
0) OFF
1) EIA-530
2) EIA-530A
3) RS-232
4) V.35
5) Optional Interface: Voice 4W/TO
----- Your choice [5]: 5

```

Selecting the 4WTO will bring up additional channel options that you can configure. The submenu for configuring the optional 4WTO interface is shown in Figure 25.



**NOTE:** Selecting the optional voice interface results in the clock rate and clocking configuration being set automatically.

**Figure 25: 4WTO Analog Voice Submenu**

```

Please select a number from the following list:
-----
0) Back to Previous Menu
1) Dual Channel:      {Enable,Disabled}
2) Enabled Channel:  {Chan 0, Chan 1, N/A}
3) Input level:      {0 - 255}
4) Output level:     {0 - 255}
5) Talk Squelch:     {Enable,Disable Active Squelch}
----- Your choice [0]:

```

Selecting the optional T1/E1 interface will bring up additional channel options that you can configure. When you configure the type for T1, then you have an option to set the encoding for B8ZS or AMI (Figure 26).

**Figure 26: Configuring a T1 Interface and Options—CLI**

```

=====
(intel_52 10/09/06 21:28:43 GMT) | Voice T1E1 Config Menu for Port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Type:   T1
2) Option: B8ZS
----- Your choice [2]: 2

Please select a number from the following list:
-----
0) B8ZS
1) AMI
----- Your choice [0]:

```

When you configure the type for E1, then you have the option to select the impedance for a Coax or an RJ-48 termination (Figure 27).

**Figure 27: Configuring an E1 Interface and Options—CLI**

```

=====
(intel_52 10/09/06 21:34:49 GMT) | Voice T1E1 Config Menu for Port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Type:   E1
2) Option: RJ48
----- Your choice [1]: 2

Please select a number from the following list:
-----
0) RJ48
1) COAX
----- Your choice [0]:

```

### Configuring the Interface Type with CTPView

An Interface Type drop-down menu allows you to configure the interface type as shown in Figure 28. The T1/E1 or 4WTO interface supported by optional hardware is displayed when the necessary hardware is installed. The current interface type is shown above the drop-down menu. Figure 29 shows the additional channel options when the 4WTO is selected.

Figure 28: CTPView Interface Type Drop-Down Menu

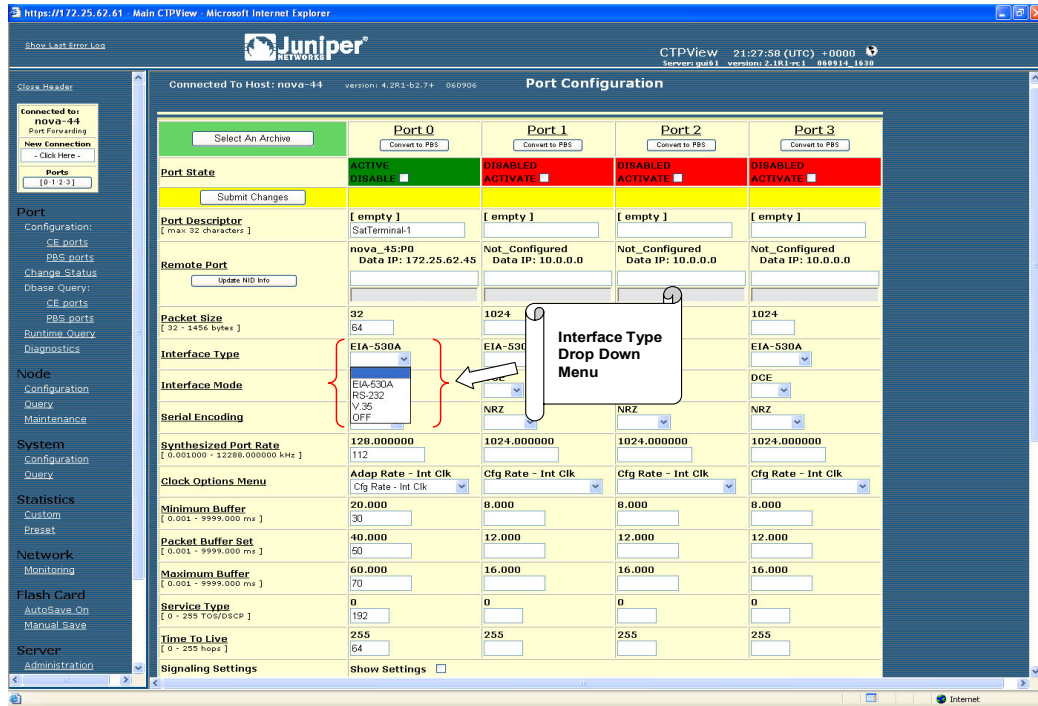
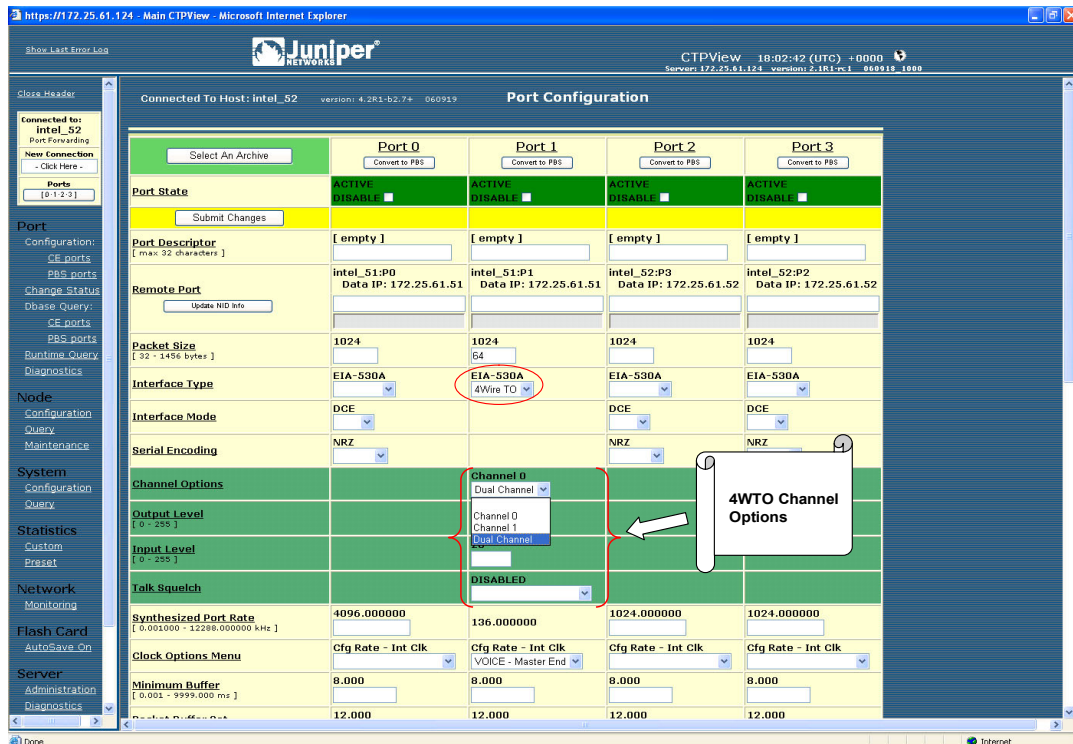


Figure 29: Configuring 4WTO Channel Options with CTPView



## Interface Mode

Configuring the interface mode will be available in a future release. The clocking options menu (see below) allow the interface to be configured for connection to a data terminal equipment (DTE) or data communication equipment (DCE) device.

## Interface Encoding

NRZ is the standard encoding used with the EIA530, V.35, and RS-232 interface types. Note that the encoding options for the T1 interface are B8ZS and AMI; however, these options are configured when the interface type selected is T1. The Interface Encoding is displayed as N/A when the 4WTO, T1, or E1 is configured.

Conditioned diphase, isochronous, and transparent are special encoding schemes. Conditioned diphase encoding recovers and embeds the clock in the data signal. Isochronous encoding does not provide or embed the clock in the data. Asynchronous applications are supported when you configure the encoding to isochronous. The maximum data rate for isochronous and conditioned diphase encoding is 1.024 Mbps.




---

**NOTE:** Transparent encoding, described below, is for unique and nonstandard applications. The encoding scheme can be supported only when you have worked with the Juniper Networks Technical Assistance Center (JTAC) to verify that the application requires this encoding scheme. Special adapters may be required on the cable to properly map the data and clock signals to the connector pins used by the application.

---

Transparent mode is for unique applications, requiring that the data and clock signals be sampled at one end and replicated at the far end. These applications often have clocks that disappear periodically during the circuit operation. The circuit rate should be 32 Kbps or less.

Transparent encoding samples incoming data on four port input leads, transports these signals across the IP network to the remote port, and sends out the signals on four output leads. The signal sampling rate is based on the configured rate of the port. For example, if the port is configured for 128 Kbps, then the four signals are sampled at 128 KHz, which will generate a packet flow through the IP network of 512 Kbps (4 x 128 KHz.). The smallest sampling rate available is 5.3  $\mu$ sec (approximately 192 KHz). To prevent errors, both ends of the transparent circuit must be synchronized with each other. You can achieve synchronization either by locking each CTP node to a common reference or by enabling adaptive clocking on one end of the circuit. The following is the mapping between the input and output signals:

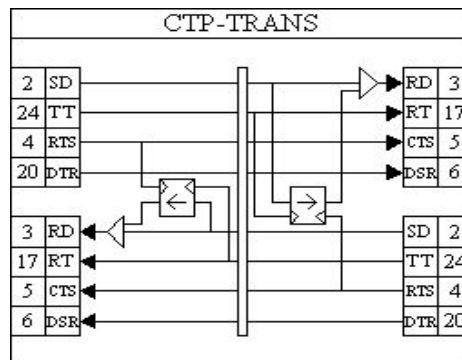
```

Pin 2 -----> Pin 3
Pin 24 -----> Pin 17
Pin 4 -----> Pin 5
Pin 20 -----> Pin 6
Pin 3 -----> Pin 2
Pin 17 -----> Pin 24
Pin 5 -----> Pin 4
Pin 20 -----> Pin 6

```

Transparent encoding provides the option by means of a phase correction FIFO buffer. This FIFO buffer will correct the clock/data phase relationship in which the clock travels in one direction through the network and the data returns in the other direction. The correction is made on the RD output (pin 3) based on the clock input provided on Pin 4. Figure 30 show the data flows and FIFO when transparent encoding is used.

**Figure 30: Transparent (TRANS) Encoding Signal Flow**



### Configuring Encoding with the CLI

The Encoding options are provided in the interface submenu (Figure 31). The menu displays the currently configured encoding. The encoding options available depend on the interface type selected. The encoding option is N/A (not available) when the 4WTO interface type is selected.

**Figure 31: Encoding Submenu**

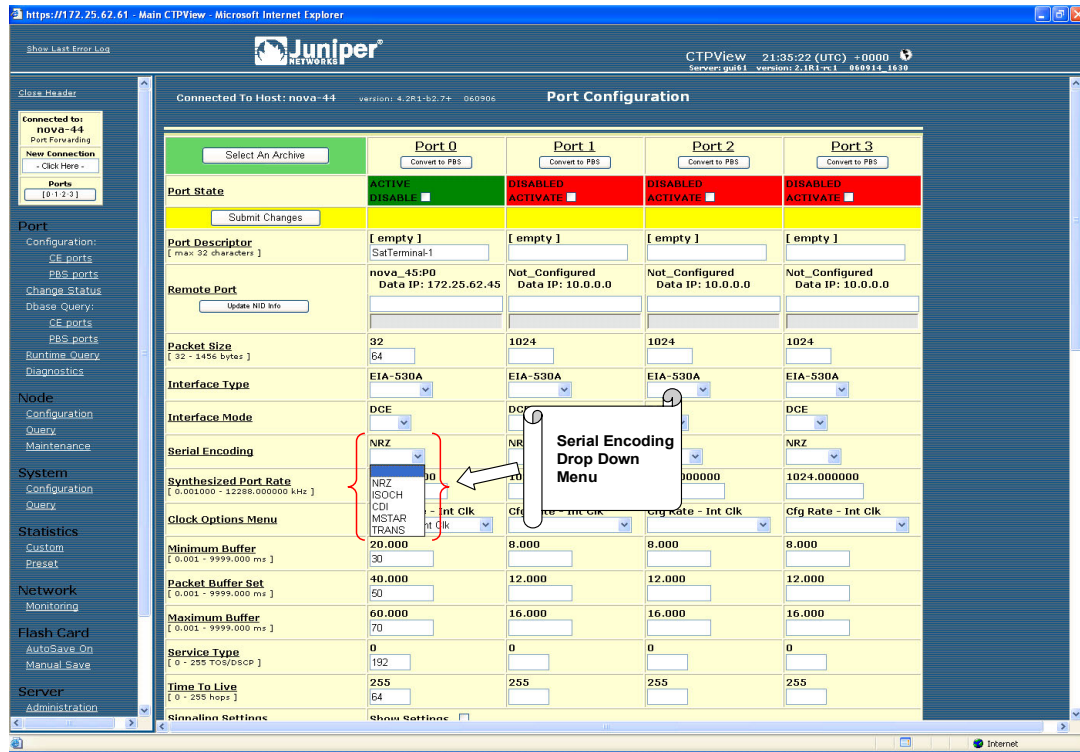
```
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Type:      {EIA530, EIA530A, RS-232, V. 35, T1, E1, Optional, OFF}
2) Mode:      {DCE, DTE, N/A}
3) Encoding:  {NRZ, ISOCH, CDI, TRANS, N/A}
----- Your choice [1]: 3

Please select a number from the following list:
-----
0) NRZ
1) ISOCH
2) CDI
3) MSTAR
4) TRANS
----- Your choice [2]: 1
```

### Configuring Encoding with CTPView

CTPView shows the currently configured encoding and allows you to configure the encoding using a drop-down menu. CTPView automatically displays the available encoding based on the interface selected. Figure 32 provides an example of configuring the encoding with CTPView.

Figure 32: CTPView Encoding Drop-Down Menu



### Packet Size

The Packet Size parameter specifies the IP packet size that will be created from data received at the serial port. Packet size ranges from 32 to 1456 bytes and must be a multiple of 16 bytes. The local and remote port packet size can be set to different values, except when adaptive clocking is configured.

The packet rate is calculated based on the packet size and serial interface rate, and the rate is limited to less than 1200 packets per second. You are prompted to change the rate or packet size if the packet rate exceeds this limit.

### Determining Optimal Packet Size

Determining the optimal packet size for a particular application involves several important considerations, including:

- Performance limitations (if any) of the IP network
- Bandwidth for transporting serial data
- Packet creation delay

The most significant considerations are the serialization (packet creation) delay and the bandwidth required to transport the serial data.

### IP Network Performance

The number of packets created (packet rate) is inversely related to the packet size configured. For example, smaller packets result in a greater packet rate. When you configure the Packet Size parameter, consider the packet-forwarding performance of the attached router and network. Table 7 provides examples of packet rates for various packet sizes and serial interface rates. The CTP system limits the packet rate per interface to 1200 pps and will prompt you if the configuration exceeds this limit.

**Table 7: Packet Rate for Various Packet Size and Serial Interface Rate Settings**

Interface Rate (Kbps)	Packet Rate (Packets per Second)					
	Packet Size (Bytes)					
	128	256	512	768	1024	1400
64	62.5	31.3	15.6	10.4	7.8	5.7
128	125.0	62.5	31.3	20.8	15.6	11.4
256	250.0	125.0	62.5	41.7	31.3	22.9
1024	1000.0	500.0	250.0	166.7	125.0	91.4
1544	1507.8	753.9	377.0	251.3	188.5	137.9
2048	2000.0	1000.0	500.0	333.3	250.0	182.9

### Bandwidth for Transporting Serial Data

It is necessary to add overhead for both the layer 2 encapsulation and the IP header in order to transport packets of data across the IP network. The IP header comprises 20 bytes; and the encapsulation overhead varies based on the method used, but is typically either 6 or 8 bytes on serial links. As a result of this overhead, smaller packets are less efficient and result in the serial data requiring more IP bandwidth. The amount of bandwidth required on the IP network for a serial bit stream may be calculated as follows:

$$\text{IP Bandwidth} = [\text{Packet Size (bytes)} + 20 \text{ (bytes)} + 2 \text{ (bytes)} + \text{Encapsulation Overhead (bytes)}] \times [\text{Packet Rate (pps)}] \times 8$$

### Packet Serialization Delay

Serial data received at the CTP interface must be buffered long enough to allow a packet to be created for transmission across the IP network. The delay to create the packet will increase as either the size of the packet increases or as the rate of the serial interface decreases. Generally, this delay is minimal except when the rate of the serial interface is low and the packet size is large. We recommend that the Packet Size parameter be set to a smaller value when the serial interface operates at lower speeds. Table 8 provides examples of serial interface packet creation delay in milliseconds.

**Table 8: Serial Interface Packet Creation Delay**

Serial Interface Delay (msec)						
	Packet Size bytes)					
Interface Rate (Kbps)	128	256	512	768	1024	1400
64	16.0	32.0	64.0	96.0	128.0	175.0
128	8.0	16.0	32.0	48.0	64.0	87.5
256	4.0	8.0	16.0	24.0	32.0	43.8
1024	1.0	2.0	4.0	6.0	8.0	10.9
1544	0.7	1.3	2.7	4.0	5.3	7.3
2048	0.5	1.0	2.0	3.0	4.0	5.5

### Configuring Packet Size with the CLI

You configure packet size by selecting Option 4 from the Port Configuration menu (Figure 33). The currently configured packet size is the default value.

**Figure 33: Specifying the Packet Size—CLI**

```

=====
Local CTP Configuration Menu for port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Port descriptor text: {user text}
2) Remote Port:          {vvv.www.xxx.yyy:Pz}
3) Interface:           {Submenu - Type, Mode, Encoding}
4) Packet Size:         {32 - 1456 1Bytes}
5) Clock Config:        {Submenu - Rate and Config}
6) Min Buffer (ms):     {0.001 - 9999.000}
7) Pkt Buffer Set (ms): {0.001 - 9999.000}
8) Max Buffer (ms):     {0.001 - 9999.000}
9) Service Type:       {0 - 255}
10) Time to Live:      {0 - 255}
11) Signaling In Config: | RL = --- | RTS= --- | DTR=--- | LL = ---|
12) Signaling Out Config: | DSR= --- | CTS= --- | DCD= --- | TM =--- |
13) Advanced Options...
----- Your choice [3]: 4

Enter packet size in bytes (32-1456) [1024]: {Input Value}

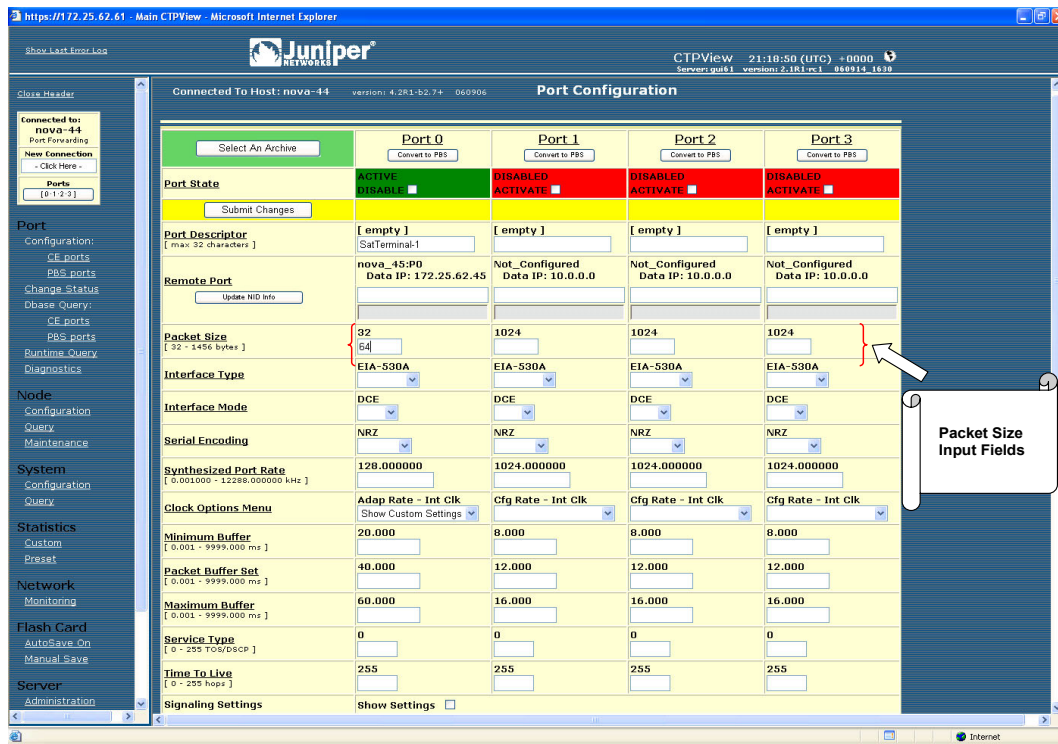
```

### Configuring Packet Size with CTPView

Enter the packet size into the Packet Size field. The value displayed above the window is the value currently configured on the CTP port.



Figure 34: CTPView Packet Size Field



## Clock Configuration

The following is a summary of clocking options with a data interface and NRZ encoding:

- Configured Rate w/o External Tx Clock (TT)—The CTP system expects that the transmit data from the attached DTE will be at the rate specified in the configuration and that the transmit data from the DTE will be sampled at the CTP based on the transmit timing (TT) provided by the CTP system.
- Configured Rate w/ External Tx Clock (TT)—The CTP system expects that the transmit data from the attached DTE will be at the rate specified in the configuration and that the data will be sampled based on the external timing provided by the attached DTE. This option is a common configuration for long cables or high data rates because clock and data signals will travel the same cable length from the DTE and the CTP will sample the data based on the TT input.
- All Clocked w/ External TX Clock (TT)—The clock received from the attached device is received on the external TT clock input and is used for all interface clocks. This option includes transmit and receiving timing and the clock used to clock data out of the receive FIFO buffer toward the IP network.

- Adaptive Rate w/o External Tx Clock (TT)—The CTP system generates the transmit and receive timing based on the clock of the distant CTP system using Advanced Time Domain Processing (ATDP) adaptive clocking. This option allows the clock to rapidly adjust, or adapt, to the remote clock. The circuit will run continuously without buffer overruns or underruns, even when no reference clock is provided to the CTP1004.
- Autobaud Rate w/ External TX Clock (TT)—The CTP system calculates the transmit data rate of the attached DTE by processing the external timing (TT) from the DTE. Autobaud will be supported in a future release.
- The custom clocking options are described in Custom Clock Options—CLI on page 41.

The following are the clocking options when the configured Interface Type is T1 or E1:

- The PBX is looped time. In this configuration, the PBX is returning the clock received from the CTP, or it is returning a clock that is traceable to the same source as the CTP node clock reference. You typically use this configuration when you configure the CTP system with a clock reference input.
- The PBX is the clock source. In this configuration, the PBX is providing the clock and the CTP is returning the same clock to the PBX. You typically use this configuration when the PBX has the more accurate clock source. You can configure the far end of the circuit with adaptive clocking to recover this clock if necessary.
- The PBX is looped time (adaptive). In this configuration, the PBX returns the clock received from the CTP, and the CTP uses the adaptive recovered clock. You typically use this configuration when the CTP does not have a reference input and the PBX typically requires clock from the distant PBX.
- The custom clocking options are described in Custom Clock Options—CLI on page 41.



**NOTE:** The clock configuration is automatically configured when isochronous, conditioned diphase, or transparent encoding is configured. The user should not change the clock configuration when these encoding options have been selected.

---

### Adaptive Clocking Options

There are configurable attributes that affect the Adaptive Clocking algorithm. The attributes are configured only when the clocking configuration specifies adaptive. The default settings are acceptable for the majority of applications. Consider using the assistance of JTAC before changing these parameters since they affect how the clocking and circuit functions. The parameters are as follows:

- AGGR Seconds/Calc—The default is 20. The valid range is 2–60. Sets the time period during initial start of adaptive clocking for identifying packet samples experiencing the least delay through the network. Samples are used in aggressive state calculations.

- MNTN Seconds/Calc—The default is 45. The valid range is 1–60. Sets the time period during normal adaptive clocking for identifying packets experiencing the least delay through the network. Samples are used in maintenance state calculations.
- Slope for MNTN in ppm—The default is 5. The valid range is 1–10. Sets the value for changing that adaptive clocking algorithm from aggressive to maintenance state. Lower values result in longer switchover times with a clock value closer to the distant clock.
- Maintenance Decay in calcs—The default is 3. The valid range is 2–10. Sets how quickly the clocking corrects to buffer set point in maintenance state.
- Max Clock Adjust in ppb—The default is 200. The valid range is 1–1000. Constrains the frequency adjustments to the adaptive clock. This parameter has the effect of capping the frequency acceleration.
- Max Clock Offset in ppm—The default is 200. The valid range is 1–400. Constrains the frequency of the adaptive clock. This parameter has the effect of capping the frequency velocity.
- Max Buffer Error in  $\mu$ sec—The default is 2000. The valid range is 100–5000. Sets the buffer error required to change the adaptive clocking algorithm state from maintenance to aggressive.

### Custom Clocking Options

Custom clocking gives you flexibility in the configuration to provide services such as asymmetric rates. This section provides an overview of the port clocking subsystem and how the custom clocking options can be used.



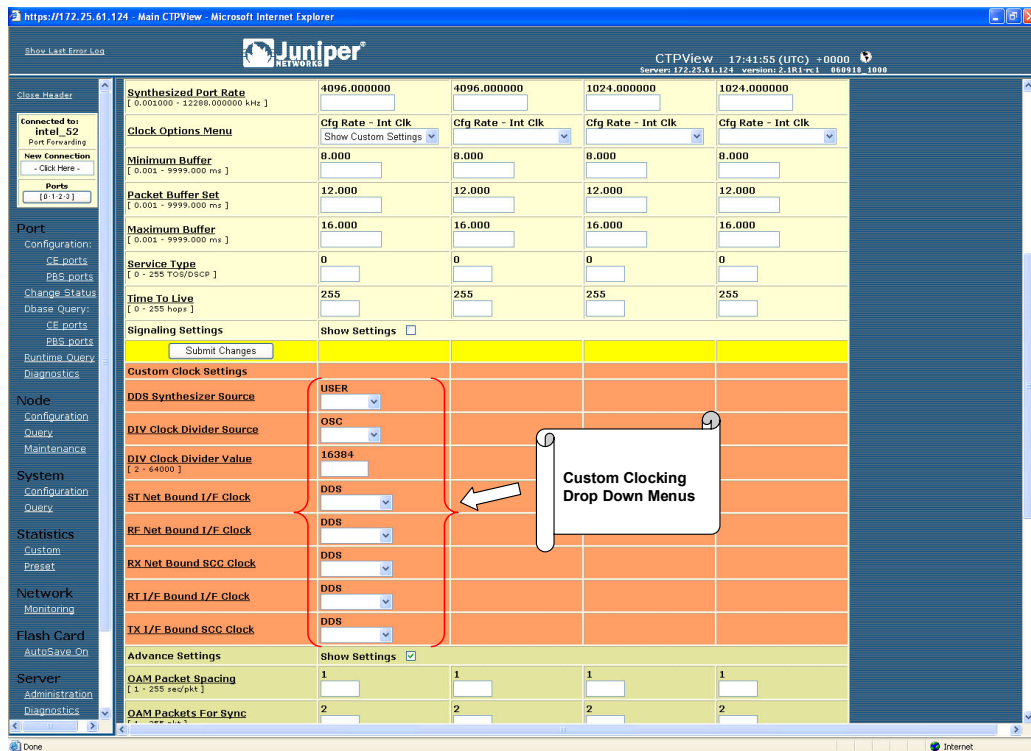
**NOTE:** With the flexibility of custom clocking comes the opportunity to misconfigure the port so that it will not operate according to expectations. Use caution when configuring custom clocking.

Figure 35 on page 40 shows a CTP port with every clock option and a simplified data path (loops and BERT testers are not included). Items in red are configurable parameters specific to port clocking. The major blocks on the diagram are:

- OSC: node clock oscillator—There is one central clock oscillator for every node, and it runs at a nominal rate of 32.768 MHz. This oscillator is part of a phase-locked loop (PLL), which can be locked to the incoming clock on a CTP port or the external reference input.
- DDS: direct digital synthesizer —This is a type of clock generator that is capable of synthesizing a clock at nearly any desired rate. The range of clock output is 1 Hz–12.288 MHz in increments of 1/128 Hz. Because the node OSC provides the reference clock to the DDS, the DDS output will be as accurate as the OSC. The DDS rate is configured in the port clock menu.
- DIV—This is a programmable divider that can divide a clock by an even number between 2 and 16384, inclusive. It may accept as its input clock either the OSC (32.768 MHz) or DDS output clock.

- Packet engine—This block is responsible for conversion of a constant stream of serial data to IP packets and vice versa. In the network-bound direction, incoming serial data is partitioned into packets of data (according to the packet size configured in the Port Configuration menu) and sent into the IP network toward a remote port. In the reverse (interface-bound) direction, IP packets are received from the IP network, stripped of their IP headers, reordered to accommodate packet delay, buffered to accommodate packet delay jitter, and transmitted to the serial interface as a constant stream of data.
- Rx FIFO memory—First-in first-out (FIFO) memory is used to accommodate small amounts of jitter and/or phase shift in the data because of the use of different clocks in the network-bound path (that is, TT [user] clock) or to accommodate the transmit data and transmit clock phase shift experienced on longer cables at higher data rates.

**Figure 35: Custom Clocking Configuration Options**



The standard port timing options described in the previous section are used in most network applications. Based on the option that you select, the settings for the multiplexers and clocking elements on the clock diagram are configured automatically. When you select Custom from the Clock Options menu, the Advanced Clock menu (Figure 37) is presented, allowing you to configure the clocking elements. Numbers in red in Figure 35 correspond to the choices in this menu.

### Configuring Port Clocking with the CLI

The Clock Config submenu is available when you select Option 5 from the Port Configuration menu. The menu shown in Figure 36 allows you to set the serial interface rate and select port clocking options. You do not need to configure port speed and clocking when you select the optional analog 4WTO interface. Selecting this interface causes the port speed and clocking to be automatically configured.

**Figure 36: Port Clock Configuration Menu—CLI**

```

=====
Port Clock Configuration Menu 0
=====
Please select a number from the following list:
-----

0) Back to Previous Menu
1) Port Clock Config:           Configured Rate, NO Ext Tx Clk (TT)
2) Port Speed (KHz):           1024.000000
3) Send User Clock thru Network: NO
----- Your choice [2]:1

=====
Clock Options Menu for Port 0
=====
Please select a number from the following list:
-----

0) Back to Previous Menu
1) Configured Rate w/o External Tx Clock (TT)
2) Configured Rate w/ External Tx Clock (TT)
3) All Clocked w/ External Tx Clock (TT)
4) Adaptive Rate w/o External Tx Clock (TT)
5) Autobaud Rate w/ External Tx Clock (TT)
6) Custom...
7) Set Autobaud/Adaptive Parameters...
----- Your choice [0]:

```

The custom clocking and adaptive parameters are available by when you select select Options 6 and 7, respectively, from the Clock Options menu. Figure 37 shows the Custom Clocking menu (Advanced Clock Options).

**Figure 37: Custom Clock Options—CLI**

```

=====
Advanced Clock Options for Port 0
=====
Please select a number from the following list:
-----

0) Back to Previous Menu
1) DDS Synthesizer Source:     User (OI)
2) DIV (clk divider) Source:   Oscillator
3) DIV (clk divider) Value:    16384
4) ST (net bound i/f) clk sel: DDS (synth)
5) RF (net bound fifo) clk sel: DDS (synth)
6) RX (net bound scc) clk sel: DDS (synth)
7) RT (i/f bound i/f) clk sel: DDS (synth)
8) TX (i/f bound scc) clk sel: DDS (synth)
----- Your choice [0]:

```

The clocking options menu shown in Figure 38 is provided when the interface type is T1 or E1.

**Figure 38: Port Clock Configuration (T1/E1)—CLI**

```

=====
Port Clock Configuration Menu 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Port Clock Config: Configured Rate, NO Ext Tx Clock (TT)
2) Port Speed (KHz): 1024.000000
----- Your choice [2]: 1
=====
Clock Options Menu for Port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) .....
2) PBX is Loop Timed
3) PBX is Clock Source
4) .....
5) PBX is Loop Timed (Adaptive)
6) .....
7) Custom...
8) Set Autobaud/Adaptive Parameters...

----- Your choice [0]:

```

### **Example of an Asymmetric Configuration with the CLI**

The following is a description of an asymmetric circuit configuration with custom clocking. Assume that you want the network-bound direction (toward the remote DTE) to operate at 2.048 MHz and the interface-bound data (toward the local DTE) to operate at 64 KHz. You first configure the DDS for 2048.0 KHz; set the DIV source to DDS; and set the DIV value to 32 (because  $2048/32 = 64$ ). Set the network-bound multiplexers (Options 4, 5, and 6) for DDS, which sets the network-bound data rate to 2.048 Mbps. Set the interface-bound multiplexers (Options 7 and 8) for DIV, which sets the interface-bound data rate to 64 Kbps.

If the cable length of this port is long, it might be desirable to switch multiplexer 4 from DDS to TT, and have the DTE equipment loop the ST clock back to TT so that it travels in phase with the network-bound user data. Figure 39 shows an example of the above configuration.

At the remote CTP asymmetric port, the DDS and DIV settings would be identical, but the clock multiplexer selections would be configured appropriately for the speed of that data direction.

**Figure 39: Example of Asymmetric Configuration**

```

=====
Advanced Clock Options for Port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) DDS Synthesizer Source:      User (OI)
2) DIV (clk divider) Source:   DDS Output
3) DIV (clk divider) Value:   32
4) ST (net bound i/f)  clk sel: DDS (synth)
5) RF (net bound fifo) clk sel: DDS (synth)
6) RX (net bound scc)  clk sel: DDS (synth)
7) RT (i/f bound i/f)  clk sel: DIV (synth)
8) TX (i/f bound scc)  clk sel: DIV (synth)
----- Your choice [6]:
    
```

**Configuring Port Clocking with CTPView**

CTPView provides a drop-down menu of clocking options based on the interface type. Figure 40 shows the drop-down menu when a data interface type is specified with NRZ serial encoding. The clocking options specified are different when the T1/E1 interface type is specified, as shown in Figure 41. Selecting custom and adaptive clocking displays the additional parameters that you can configure. Figure 42 shows a custom clocking example.

**Figure 40: CTPView Clock Configuration Drop-Down Menu**





Figure 41: CTPView T1 and E1 Clocking Drop-Down Menu

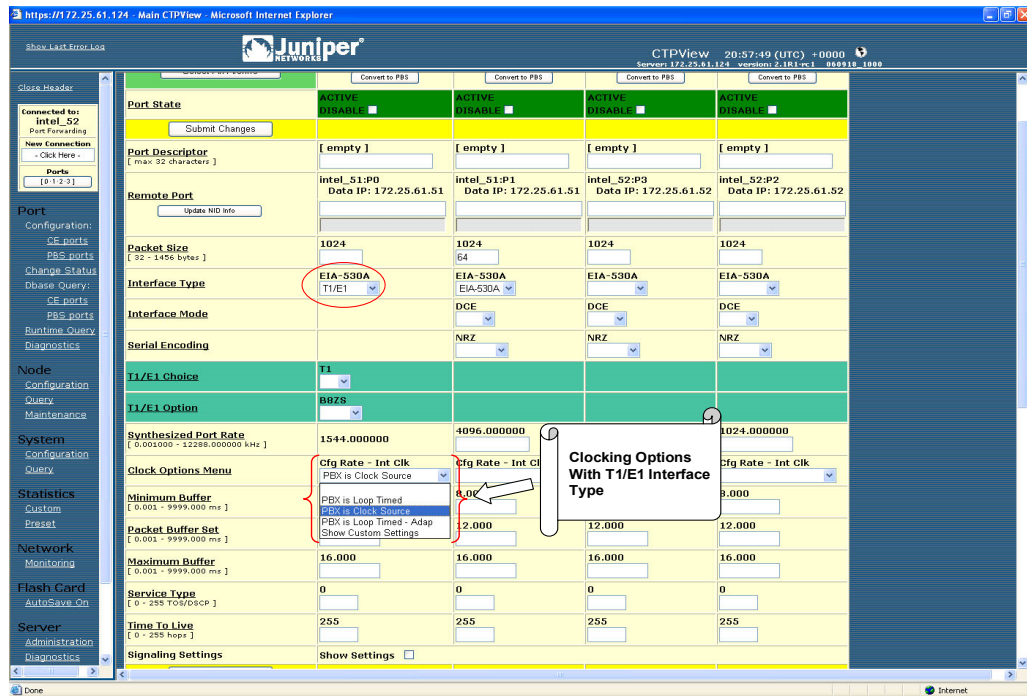
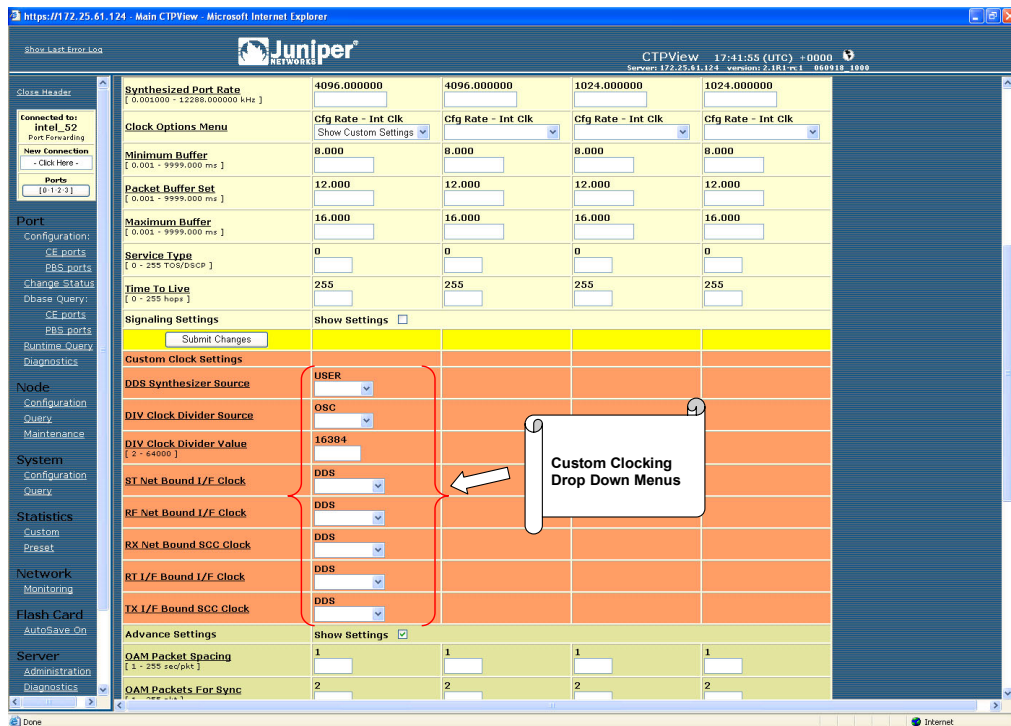


Figure 42: CTPView Custom Clocking Drop-Down Menus and Input Fields





## Port Speed

The port speed is specified in Kbps ranging from 0.001000 to 12288.000000; however, the CTP1002 is limited to a port speed of 2048.000000. The aggregate port rate (sum of the rates of all ports) of the CTP1012 cannot exceed 49.152 Mbps, and the aggregate port rate of the CTP2008, CTP2024, and CTP2056 cannot exceed 114.688 Mbps. The clock rate of ports using either conditioned diphase and isochronous encoding is limited to 1024 Kbps.

The CTP system is capable of accurately synthesizing frequencies with a granularity of 0.0078125 Hz or less. If the selected frequency cannot be synthesized, the CTP system calculates the closest available rate within 0.0078125 Hz and allows you the option of using the calculated frequency.

### Configuring the Port Speed with the CLI

You configure the port speed by selecting Option 2 from the Port Clock Configuration submenu (Figure 43).

**Figure 43: Specifying Port Speed—CLI**

```

=====
Port Clock Configuration Menu 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Port Clock Config: Configured Rate, NO Ext Tx Clock (TT)
2) Port Speed (KHz): 1024.000000
3) Send User Clock thru Network: NO
----- Your choice [1]: 2

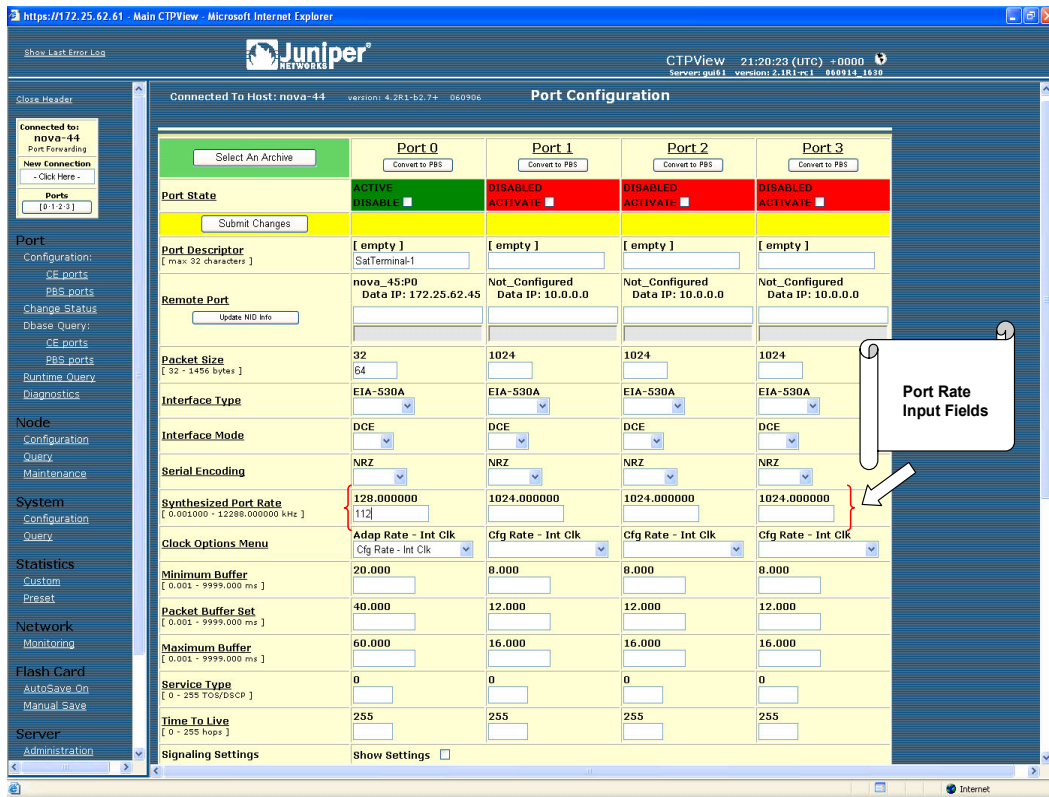
Enter Synthesized port rate (kHz)
(0.001000 - 12288.000000) [1024.000000]:

```

### Configuring the Port Speed with CTPView

You configure the port speed by specifying the rate in the Synthesized Port Rate field (Figure 44).

Figure 44: CTPView Port Rate Fields



## Buffer Settings

Packets received from the IP network must be buffered to accommodate variances in the packet arrival rates (referred to as delay variance or delay jitter) and the resequencing of out-of-order IP packets. Making the buffer larger ensures that greater amounts of delay variance may be accommodated; however, it also increases the overall delay encountered by the serial data. We recommend that you set the buffer as small as possible without introducing unacceptable error rates and port starvation restarts due to missed packets caused by delay jitter. You can use the query commands and CTPView Runtime Query and Jitter graphs, as detailed in *Chapter 4, Software Queries and Operations*, to determine how well the serial circuit is performing, and you can make adjustments to the buffering based on actual performance.

The default settings are acceptable for local IP-switched connections, but are normally increased for routed IP connections.



**NOTE:** Set the buffer parameters based on the expected packet delay variance (jitter). Do not set them based on the overall packet delay through the network. For example, if a CTP circuit transits a satellite circuit with 260 msec of delay and the packets experience 20 msec of jitter, then you would configure the Packet Buffer Set parameter to a value slightly greater than 20 msec (such as 30 msec).

### Minimum Buffer

The Min Buffer parameter ensures that the buffer does not become too small because of timing variances between the local and remote serial interfaces. The minimum buffer size is specified in milliseconds and defines the minimum average buffer size before the buffer is recentered.

Periodic buffer recenters are not expected. If you notice recenters, we recommend that you verify the reference to the CTP (if used) or that you configure one port with adaptive clocking. It should also be noted that the entire buffer is available for accommodating and smoothing packet delay jitter, regardless of the Minimum buffer setting. The minimum buffer setting is set to a value greater than the expected jitter and less than the packet buffer setting.

### Packet Buffer

You set the buffer size by using the Pkt Buffer Set parameter. The buffer size is set to this value when the circuit enters a Running State. The Pkt Buffer Set value must be large enough to accommodate the anticipated packet delay jitter. Pkt Buffer Set must be set to a value greater than the Min Buffer parameter and less than the Max Buffer parameter.

### Maximum Buffer

You configure the Max Buffer parameter to ensure that the buffer does not become too large due to timing variances between the local and remote serial interfaces. The buffer is recentered to the Pkt Buffer Set value if the buffer size exceeds the Max Buffer value.

Periodic buffer recenters are not expected. If you notice recenters, we recommend that you verify the reference to the CTP (if used) or that you configure one port with adaptive clocking.

### Configuring the Buffer Settings with the CLI

You configure the Min Buffer, Pkt Buffer Set, and Max Buffer parameters by selecting Options 6, 7, or 8 from the Port Config menu (Figure 45). The current settings for the buffer are displayed and are the defaults.

**Figure 45: Setting Minimum Buffering—CLI**

```

=====
Config Menu for port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Port descriptor text: {user text}
2) Remote Port:          {vvv.www.xxx.yyy:Pz}
3) Interface:           {Submenu - Type, Mode, Encoding}
4) Packet Size:         {32 - 1456 1Bytes}
5) Clock Config:        {Submenu - Rate and Config}
6) Min Buffer (ms):      {0.001 - 9999.000}
7) Pkt Buffer Set (ms):  {0.001 - 9999.000}
8) Max Buffer (ms):      {0.001 - 9999.000}
9) Service Type:        {0 - 255}
10) Time to Live:       {0 - 255}

```

```

11) Signaling In Config: | RL = --- | RTS= --- | DTR=--- | LL = ---|
12) Signaling Out Config: | DSR= --- | CTS= --- | DCD= --- | TM =--- |
13) Advanced Options...
----- Your choice [3]: 6

Enter minimum buffer fill (in ms) (0.001 - 9999.000)[8.000]:
    
```

### Configuring the Buffer Settings with CTPView

You configure the Min Buffer, Pkt Buffer Set, and Max Buffer parameters by entering the data into the appropriate field (Figure 46).

Figure 46: CTPView Receive Buffer Fields



### Service Type

You can configure the ToS byte in the IP header. The ToS setting is specific to the port being configured, and the value is set in the IP packets transmitted from the CTP system into the IP network. The ToS setting does not need to be the same value on the local and remote ports.

Because you can configure the entire byte, the options are 0–255. Packet classification in IP networks is frequently based on the Differentiated Services code point (DSCP) as specified in the ToS byte. Table 9 shows the service type settings for all DSCP classes.

**Table 9: DSCP Classes and Service Type**

Class	DSCP Setting	TOS Setting
CS7	56	224
CS6	48	192
EF	46	184
CS5	40	160
AF43	38	152
AF42	36	144
AF41	34	136
CS4	32	128
AF33	30	120
AF32	28	112
AF31	26	104
CS3	24	96
AF23	22	88
AF22	20	80
AF21	18	72
CS2	16	64
AF13	13	52
AF12	12	48
AF11	10	40
CS1	8	32

### Configuring the Service Type with the CLI

You configure the Service Type parameters by selecting Option 9 from the Port Config menu (Figure 47).

**Figure 47: Service Type Settings—CLI**

```

=====
Config Menu for port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Port descriptor text: {user text}
2) Remote Port:          {vvv.www.xxx.yyy:Pz}
3) Interface:           {Submenu - Type, Mode, Encoding}
4) Packet Size:         {32 - 1456 lBytes}
5) Clock Config:        {Submenu - Rate and Config}
6) Min Buffer (ms):      {0.001 - 9999.000}
7) Pkt Buffer Set (ms): {0.001 - 9999.000}
8) Max Buffer (ms):      {0.001 - 9999.000}
9) Service Type:        {0 - 255}
10) Time to Live:       {0 - 255}

```

```

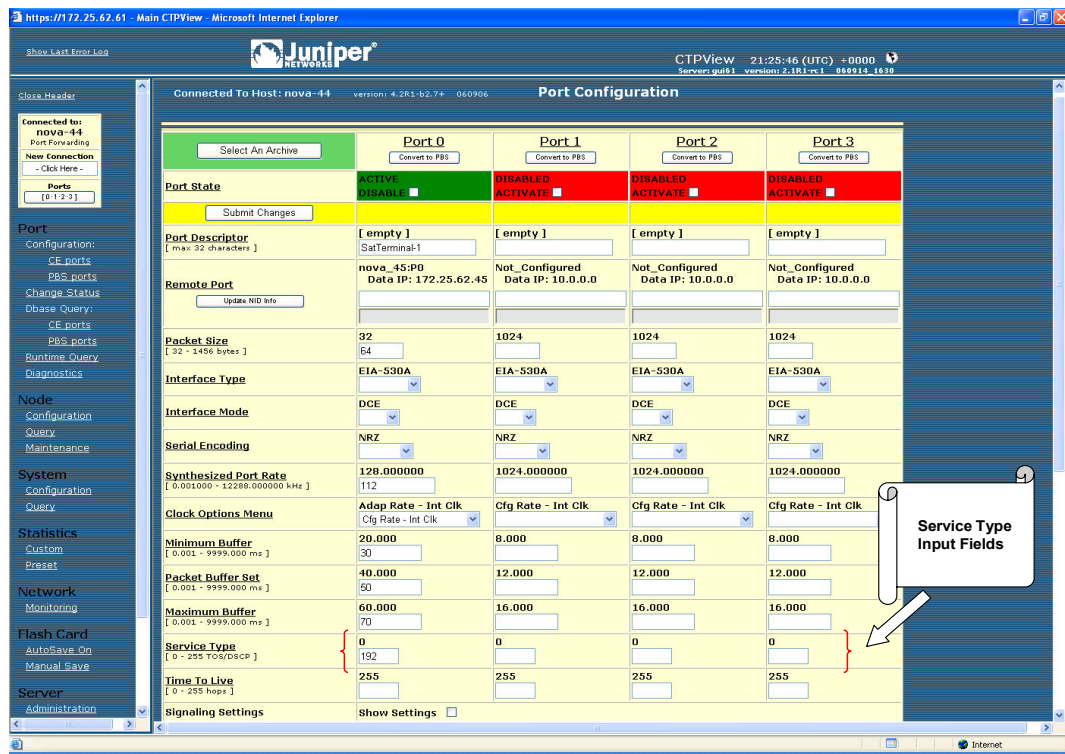
11) Signaling In Config: | RL = --- | RTS= --- | DTR=--- | LL = ---|
12) Signaling Out Config: | DSR= --- | CTS= --- | DCD= --- | TM =--- |
13) Advanced Options...
----- Your choice [8]: 9

Enter Time to Live (0-255) [255]:
    
```

### Configuring the Service Type with CTPView

You configure the Service Type parameters by entering the data into the appropriate field (Figure 48).

**Figure 48: CTPView Service Type Fields**



### Time to Live

You can configure the IP packet time to live (TTL). The acceptable values range from 0 to 255; the default is 255. The TTL value specifies the maximum number of router hops that a packet can traverse, and the value is set in the IP packets transmitted from the CTP system into the IP network. Note that the IP network does not alter or optimize the packet routing based on the TTL setting, and the setting does not need to be the same value on the local and remote ports.

### Configuring Time to Live with the CLI

You configure the TTL setting by selecting Option 10 from the Port Config Menu (Figure 49). The current settings for TTL are displayed and are the defaults.

Figure 49: Configuring Time to Live—CLI

```

=====
Config Menu for port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Port descriptor text: {user text}
2) Remote Port:          {vvv.www.xxx.yyy:Pz}
3) Interface:           {Submenu - Type, Mode, Encoding}
4) Packet Size:         {32 - 1456 1Bytes}
5) Clock Config:        {Submenu - Rate and Config}
6) Min Buffer (ms):      {0.001 - 9999.000}
7) Pkt Buffer Set (ms): {0.001 - 9999.000}
8) Max Buffer (ms):      {0.001 - 9999.000}
9) Service Type:        {0 - 255}
10) Time to Live:       {0 - 255}
11) Signaling In Config: | RL = --- | RTS= --- | DTR=--- | LL = ---|
12) Signaling Out Config: | DSR= --- | CTS= --- | DCD= --- | TM =--- |
13) Advanced Options...
----- Your choice [8]: 10

Enter Time to Live (0-255) [255]:

```

### Configuring the Time to Live with CTPView

You configure the TTL setting by entering the data into the appropriate field (Figure 50).

Figure 50: CTPView Time to Live Field

The screenshot shows the Juniper CTPView Port Configuration interface. The interface is divided into several sections: a left-hand navigation menu, a top status bar, and a main configuration table. The main configuration table is titled 'Port Configuration' and is organized into columns for Port 0, Port 1, Port 2, and Port 3. Each column contains various configuration parameters for that port. The 'Time to Live' field is highlighted in red in the Port 0 column, and a callout box with an arrow points to it, labeled 'Time To Live Input Fields'. The 'Time to Live' field is currently set to 255. Other fields include Port State, Port Descriptor, Remote Port, Packet Size, Interface Type, Interface Mode, Serial Encoding, Synthesized Port Rate, Clock Options Menu, Minimum Buffer, Packet Buffer Set, Maximum Buffer, Service Type, and Signaling Settings.

	Port 0	Port 1	Port 2	Port 3
Port State	ACTIVE DISABLE <input type="checkbox"/>	DISABLED ACTIVATE <input type="checkbox"/>	DISABLED ACTIVATE <input type="checkbox"/>	DISABLED ACTIVATE <input type="checkbox"/>
Port Descriptor	[ empty ] [ max: 32 characters ]	[ empty ]	[ empty ]	[ empty ]
Remote Port	nova_45:P0 Data IP: 172.25.62.45	Not_Configured Data IP: 10.0.0.0	Not_Configured Data IP: 10.0.0.0	Not_Configured Data IP: 10.0.0.0
Packet Size	32 [ 32 - 1456 bytes ]	1024	1024	1024
Interface Type	EIA-530A	EIA-530A	EIA-530A	EIA-530A
Interface Mode	DCE	DCE	DCE	DCE
Serial Encoding	NRZ	NRZ	NRZ	NRZ
Synthesized Port Rate	128.000000 [ 0.001000 - 12288.000000 kHz ]	1024.000000	1024.000000	1024.000000
Clock Options Menu	Adop Rate - Int Clk Cfg Rate - Int Clk	Cfg Rate - Int Clk	Cfg Rate - Int Clk	Cfg Rate - Int Clk
Minimum Buffer	20.000 [ 0.001 - 9999.000 ms ]	8.000	8.000	8.000
Packet Buffer Set	40.000 [ 0.001 - 9999.000 ms ]	12.000	12.000	12.000
Maximum Buffer	60.000 [ 0.001 - 9999.000 ms ]	16.000	16.000	16.000
Service Type	0 [ 0 - 255 TOS/DSCP ]	0	0	0
Time To Live	255 [ 0 - 255 hops ]	255	255	255
Signaling Settings	Show Settings <input type="checkbox"/>			

## Signaling Configurations

The input signals (RL, RTS, DTR, LL) can be either unused (ignored) or used to create a demand circuit. When configured for demand, the packets created from the circuit are transferred across the IP network only when the signal lead is in the specified state for the circuit to be a Demand Call – Active. When two or more leads are configured for demand, all the configured leads must be in the state Demand Call – Active for the circuit to transfer packets across the IP network.

The port output signals (DSR, CTS, DCD, TM) can be set to a fixed value (high or low), or they can be set to inband so that the output signal state is based on the state of an input signal at the remote CTP port. The remote input signals that can be mapped to the output signals include RL, RTS, DTR, and LL.

The input state of each signal lead is encoding once in every transmitted IP packet. Thus the granularity of the transitions (frequency of changes) that can be transferred across the network is equal to the packet rate of the circuit.

### Configuring Signals with the CLI

The menus shown in Figure 51 and Figure 52 are provided when you select either Option 11 (Signaling In Config) or Option 12 (Signaling Out Config). Both menus allow you to configure the input signals used for establishing a demand circuit and the output signals based on the remote port input.

**Figure 51: Input Signaling Configuration for Demand Circuits—CLI**

```

=====
Signaling Menu for Port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) DSR (output): Fixed - Low
2) CTS (output): Fixed - Low
3) DCD (output): Fixed - Low
4) TM (output): Fixed - High
5) RL (input): Unused
6) RTS (input): Unused
7) DTR (input): Demand Call - Active High
8) LL (input): Unused
----- Your choice [2]: 7

Enter input signal function:
Please select a number from the following list:
-----
0) Unused
1) Demand Call
----- Your choice [1]:
(NOTE: 0=Space=On, 1=Mark=Off )
Enter input signal value to initiate call (0-1)[1]:

```



**Figure 52: Output Signaling Configuration—CLI**

```

=====
Signaling Menu for Port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) DSR (output): Fixed - Low
2) CTS (output): Fixed - Low
3) DCD (output): Fixed - Low
4) TM (output): Fixed - High
5) RL (input): Unused
6) RTS (input): Unused
7) DTR (input): Demand Call - Active High
8) LL (input): Unused
----- Your choice [1]: 2

Enter output signal function:
Please select a number from the following list:
-----
0) Fixed
1) In-Band
----- Your choice [0]: 1

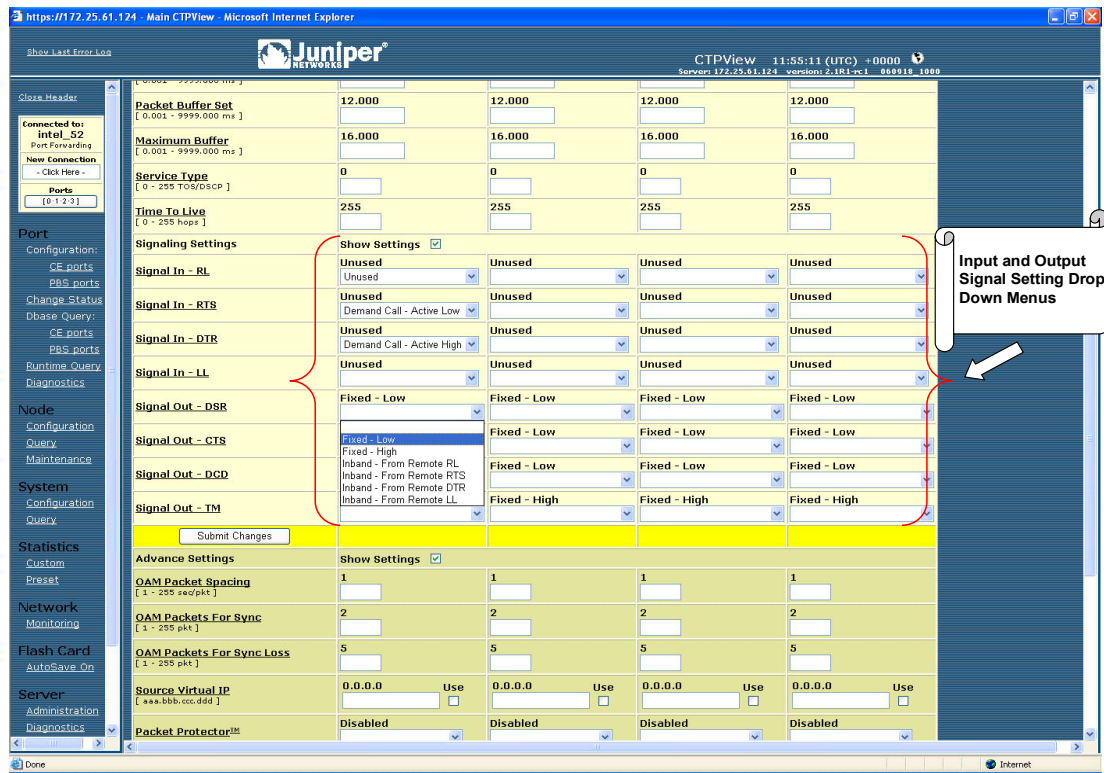
Choose remote port signal source:
Please select a number from the following list:
-----
0) RL
1) RTS
2) DTR
3) LL
----- Your choice [0]: 0

```

**Configuring the Signals with CTPView**

The signaling configuration drop-down menus are displayed when you select the Show Settings check box for the Signaling Settings parameters. As shown in Figure 53, the drop-down menus provide the valid options for configuring both the output signals and the input signals used for demand calls.

Figure 53: CTPView Signaling Configuration Drop-Down Menus



## Advanced Options

The default Advanced Option settings are acceptable for the majority of circuits and applications. The advanced options allow the user to configure nonstandard attributes that may be required by some applications. The following is a summary of Advance Option parameters:

- OAM Configuration—The CTP system uses periodic UDP OAM packets to determine the connectivity between the two CTP systems that are providing the circuit’s ports. These parameters allow you to configure the OAM packet rate: the number of consecutive OAM packets that must be received before the circuit will change to IN-SYNC, and the number of consecutive OAM packets that must be missed before the circuit state is changed to NO-SYNC.
- Virtual IP address—This parameter allows you to use and configure an IP address for the circuit’s data and OAM flow that is *different* from the IP address of the CTP system. This virtual IP address is used in the IP packet’s Origination Address field, and the distant CTP system must be configured with the virtual IP address of the port. The Virtual IP address must be within the range of acceptable subnet addresses specified on the Ethernet interface.

- **Packet Protector**—In a network where significant IP packet loss is expected, you can configure this option to send and/or receive cloned (duplicated) packets. When configured to receive cloned packets, the CTP system automatically uses the cloned packet when the original packet is dropped by the IP network. The system ignores the cloned packet when both the original and cloned packets are received.

The following are the configuration options for the Packet Protector feature:

- 0—Disable packet protector
  - 1—Send cloned packets to NET
  - 2—Expect cloned packets from NET
  - 3—Send and expect cloned packets
- **Missing pkt fill pattern**—When an IP packet is dropped, the CTP system automatically inserts data into the circuit bit stream in lieu of the actual data. The number of bits inserted is equal to the number of bits in the missed packet. This data insertion method prevents a loss of bit count integrity to attached circuit devices and encryptors. This parameter allows you to configure the fill-pattern byte to a value other than ff. You enter the number as two hexadecimal digits. Note that the input does not require the 0x characters.
  - **Consecutive pkts loss to starve**—Specifies how many consecutive circuit packets must be dropped by the IP network for the CTP circuit state to process the loss as a starvation and to recenter the buffer. The circuit state will also change from RUNNING to IN-SYNC, depending on the duration of the loss. This parameter allows you to change the number of consecutive lost packets required for a starvation from the default value of 5 to a value between 1 and 64.

We recommend that you set the parameter to a larger value when the IP network uses packet-encrypting devices. These devices will cause momentary interruption in packet flows when encryption keys are periodically updated.

- **In sequence pkts after starve**—After a starvation, the CTP circuit must begin receiving circuit packets before the port recovers from the packet starvation and resets the jitter buffer. The circuit state may also change from IN-SYNC to RUNNING. This parameter allows you to change the number of required in-sequence packets received by the CTP system from the default of 15 to a value between 1 and 64.
- **Y cable redundancy**—Set to YES when the CTP1004 or CTP1012 system is configured with a redundant Y cable.

### Configuring Advanced Options with the CLI

Figure 54 shows the Advanced Options submenu provided when you select it from the Port Config menu. Parameters 11 through 14 are automatically configured by the CTP system. Do not change these values without consulting JTAC.

**Figure 54: Advanced Options Menu**

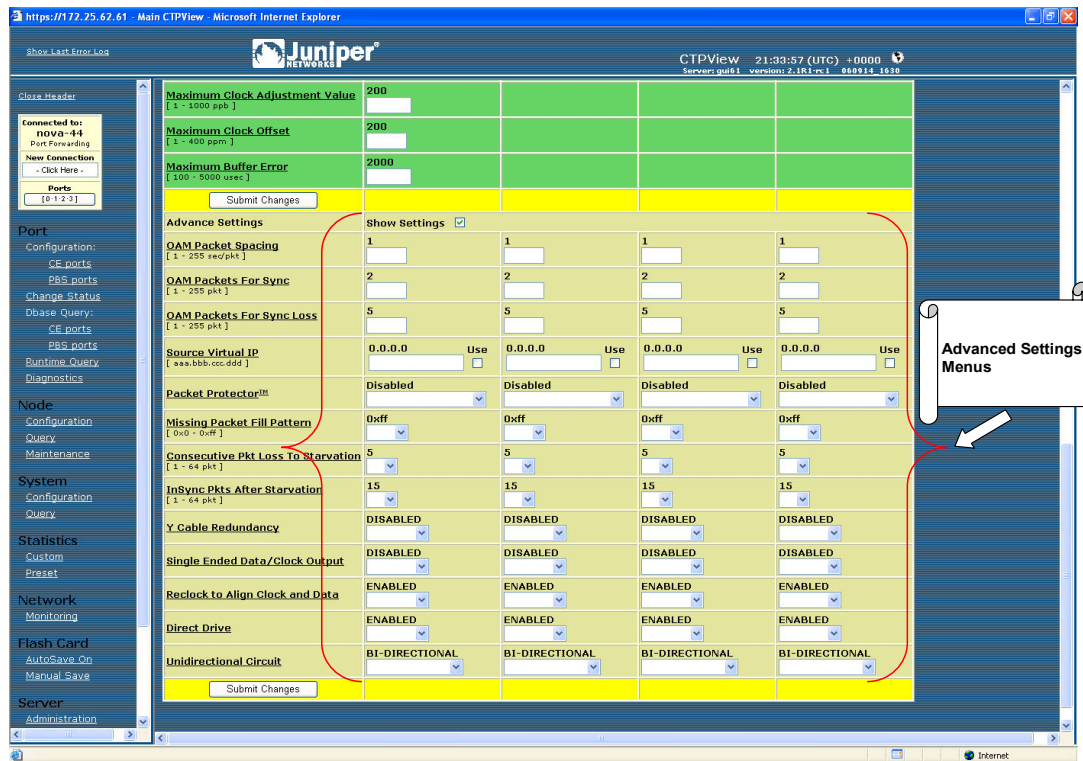
```

Please select a number from the following list:
-----
0) Back to Previous Menu
1) OAM Chan Rate (sec/pkt):          1
2) OAM pkts for Sync:                2
3) OAM pkts for Sync Loss:          5
4) Use virtual ip for port           NO
5) Virtual ip for port:              0.0.0.0
6) Packet Protector(tm)              Disabled
7) Missing pkt fill pattern:         0xff
8) Consecutive pkts loss to starve:  5
9) In sequence pkts after starve:   15
10) Y cable redundancy:              NO
11) Single ended data/clock outputs: NO
12) Reclock RD to align RD/RT:       YES
13) Send pkts to stack:              NO
14) Unidirectional circuit:         No
----- Your choice [1]:
Parameters 1 through 3
    
```

**Configuring Advanced Options with CTPView**

The advanced option (Advance Settings) drop-down menus and input fields are displayed when you select the Show Settings check box for the Advanced Settings parameters (Figure 55).

**Figure 55: CTPView Advanced Settings Drop-Down Menus and Input Fields**



## Port Configuration—Packet-Bearing Serial Interface

You are required to have administrative privileges to modify a port configuration. You are not permitted to configure the port if you have only user privileges. The port is disabled and will not pass data when you configure it with the CLI. The port is not disabled when you configure it with CTPView, and the configured changes will not take effect until you click the **Submit Changes** button, at which time there will be a momentary interruption in the data flow.

Configuring a packet-bearing serial (PBS) interface allows you to connect a CTP1000 to an IP network through a serial interface. The feature is currently available on the CTP1000 products and will be supported on the CTP2000 with a future software release. A port configured as a PBS interface uses static routes and does not participate in any routed protocol sessions, such as OSPF and RIP.

A port must be configured as either a circuit emulation (CE) port or PBS interface. The default is the CE port. You can change the port between CE and PBS modes in the Node Operations menu. Changing the type of port, which is typically done only during the initial installation, requires the system to automatically reboot. The following are the ports that can be configured for PBS port operation:

- CTP1002—P0 and P1
- CTP1004—P0 and P1
- CTP1012—P0, P1, P4, P5, P8, and P9

Figure 56 shows the menu that you use to change the port to PBS operation with the CLI. This submenu is available from the Node Operations menu.

**Figure 56: Configuring a Port for PBS Operation—CLI**

```
=====
(ctp_44 09/26/06 11:16:45 GMT) | Configure Ports for PBS Operation
=====

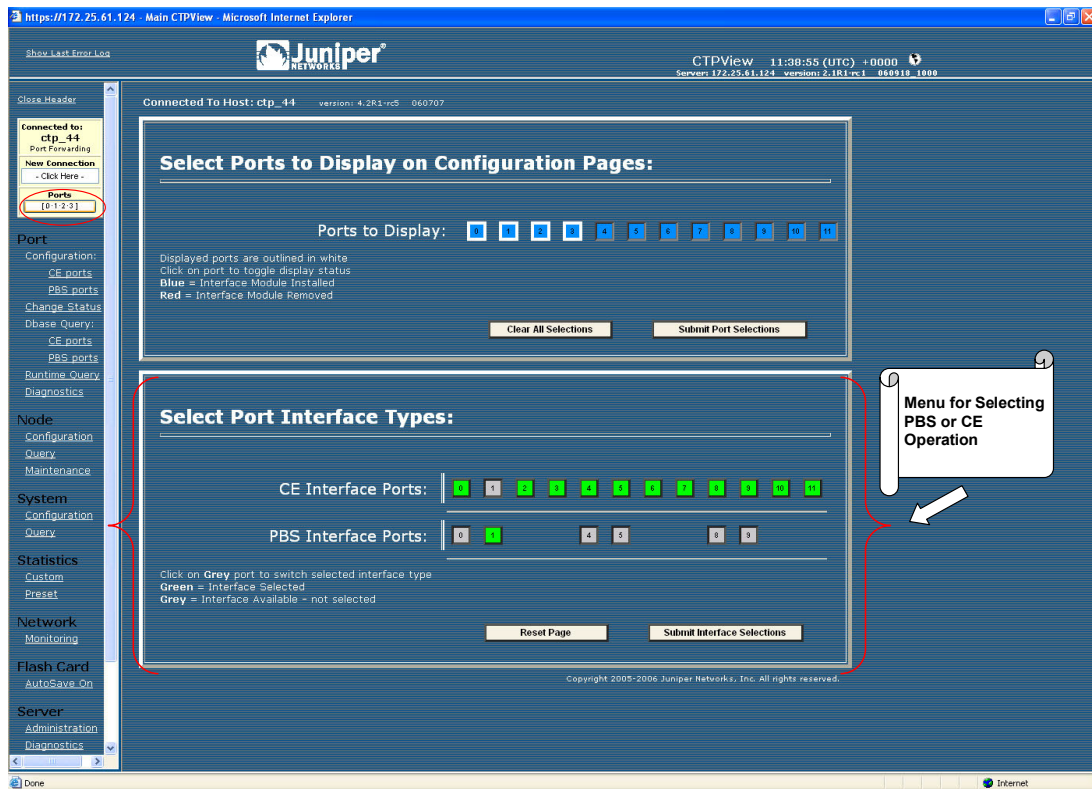
PBS operation is limited to the following ports:

Port 0 configured for PBS operation: no
Port 1 configured for PBS operation: yes
Port 4 configured for PBS operation: no
Port 5 configured for PBS operation: no
Port 8 configured for PBS operation: no
Port 9 configured for PBS operation: no

Please input a port to configure, <rtm> to exit: 0
Configure port 1 for PBS operation? n[y]:
```

You can change the ports between PBS and CE modes with CTPView. The window shown in Figure 57 is provided when you select Ports from the Connect window or when you select the Convert to CE/Convert to PBS check box in the configuration window. You select the CE and PBS mode by using the buttons provided.

Figure 57: Specifying PBS and CE Port Types with CTPView



### Packet-Bearing Serial Interface Parameters

The following is a summary of the parameters used to configure a packet-bearing serial interface.

- **Encapsulation**—PPP and HDLC encapsulation are supported by PBS interfaces. Select the encapsulation from the CLI or from the CTPView drop-down menu.
- **Local and remote IP address**—The PBS interface requires that the IP address of the local and remote IP interfaces be specified. Both addresses must be on the same network.
- **Clock configuration**—The clock configuration submenu lets you configure port speed and clock configuration. The clocking options include configured rate with and without external TT, all clocked by external TT, and custom clocking. The custom configuration is as detailed in Port Configuration—Circuit Emulation on page 23.

CTPView allows you to configure the rate using an input field and specify the clocking from a pull down menu of valid options.

- **MTU**—The MTU can be configured to a value up to 1500 bytes. MTU fragmentation is not supported.

- **Interface**—The Interface is configurable to be either EIA530, EIA530A, RS232, V.35 or T1/E1 (optional when hardware is installed). The encoding is limited to NRZ.
- **Static routes**—Up to three static routes that use the PBS interface can be configured and active. The static routes cannot conflict with the static routes configured on any other PBS Interfaces.

### Configuring the Packet-Bearing Serial Interface with the CLI

Figure 58 shows the CLI menu for configuring the PBS Interface. The parameters are as described in Packet-Bearing Serial Interface Parameters on page 58.

Figure 59 shows the submenu that you use to configure the static route.

**Figure 58: Configuring the PBS Interface—CLI**

```

=====
(ctp_44 09/26/06 13:54:27 GMT) | Config Menu for PBS Port 1
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Port descriptor text:   {Text}
2) Encapsulation:         {PPP,HDLC}
3) Local ip of p2p link:  {www.xxx.yyy.zzz IP address}
4) Remote ip of p2p link: {www.xxx.yyy.zzz IP address}
5) Clock Config:          {Rate/ Clock Configuration}
6) MTU:                    {0 - 1500}
7) Interface:              {Interface / Encoding}
8) First static route:    {Disabled or IP Address / Subnet Mask}
9) Second static route:   {Disabled or IP Address / Subnet Mask}
10) Third static route:   {Disabled or IP Address / Subnet Mask}
11) Advanced Options...
-----
Your choice [6]: 8

```

**Figure 59: Submenu for Configuring a Static Route**

```

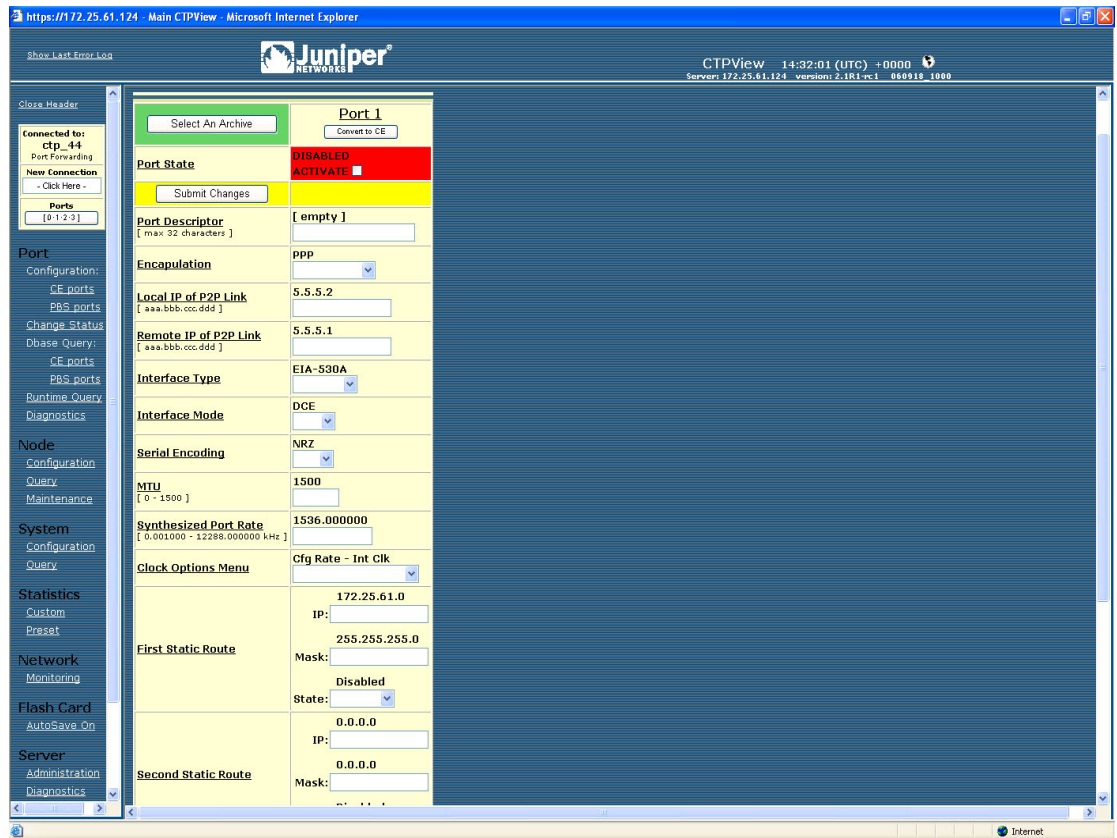
=====
(ctp_44 09/26/06 13:56:26 GMT) | Route Configuration Menu for Port 1
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Enable this route: NO
2) Network:              172.25.61.0
3) Netmask:               255.255.255.0
-----
Your choice [0]:

```

## Configuring the Packet-Bearing Serial Interface with CTPView

Figure 60 shows CTPView display for configuring the PBS interface and static routes. The parameters are as described Packet-Bearing Serial Interface Parameters on page 58. Figure 59 shows the CLI submenu that you use to configure the static route.

**Figure 60: Configuring a PBS Interface with CTPView**



## Node Synchronization

The CTP products can use an external clock as a reference input to the system. The reference can be input on a port or on the external reference input. You can configure and prioritize up to five references depending on the CTP model. The system will automatically use the highest priority reference available, and will switch to a holdover mode if all the references are lost. The following ports can be used for reference inputs:

- CTP1002: P0–P1
- CPT1004: P0–P3
- CTP1012: P0–P3
- CTP2008, CTP20024, CTP2056: P0–P8



The CTP2000 external reference input is provide by the CLK-RTM module through a DB-25 connector. The CTP1000 external input is provided on either a rear BNC or D-B9 connector depending on the chassis revision (see *Chapter 2, Hardware Configuration and Installation*). The input is differential with one of the two differential leads input on the BNC outer ring. This outer ring is isolated from the chassis ground. More information about the external clock inputs is available in Chapter.

### Configuring References

You can define multiple clocks as references, each with a priority, to ensure that a reference with lower priority is available if the primary clock reference fails. The reference inputs to the CTP system must be 32 Kbps, an  $n \times 64$  Kbps (up to 4096), or 1.544 Mbps. The CTP system provides a reference holdover with an accuracy of approximately 100 parts per billion if the reference is lost and no backup is defined or available.

Figure 61 shows the Node Synchronization menu. When you select the reference, you may either disable it or specify both the reference input (port number or external) and frequency. Figure 62 shows the CTPView configuration window.

**Figure 61: Node Synchronization Options Menu—CLI**

```

=====
CTP Main Menu
=====
Please select a number from the following list:
-----
0) Exit to Shell
1) Port Operations
2) Node Synchronization
3) Node Summary
4) Node Diagnostics
5) Node Operations
6) Save Database to Flash
----- Your choice [1]: 2

=====
Node Synchronization Options Menu
=====

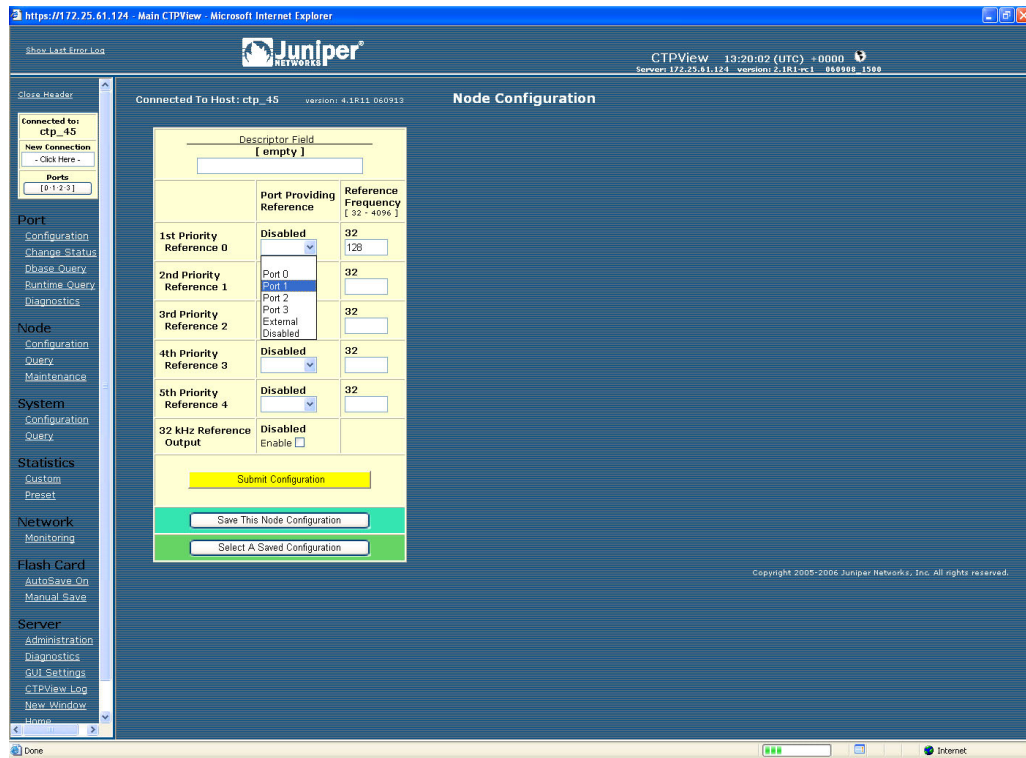
Please select a number from the following list:
-----
0) Back to Previous Menu
1) 1st Priority, Reference 0: Disabled
2) 2nd Priority, Reference 1: Disabled
3) 3rd Priority, Reference 2: Disabled
4) 4th Priority, Reference 3: Disabled
5) 5th Priority, Reference 4: Disabled
6) 32 kHz Ref Output:           {Yes or No}
7) Query Node Sync Status
8) Measure Ref Inputs
9) Calibrate Node to Current Reference
----- Your choice [7]: 1

Enter port providing reference (4=External,5=Disabled) (0-5) [0]: 2

Enter Reference Frequency (in Khz) (128-8192) [128]: {Input Value}

```

Figure 62: Node Configuration Window with CTPView



### 32-KHz Reference Output

You can use the external reference interface to send out a 32-KHz differential signal by setting the 32 KHz Ref Output value to Yes. Note that the BNC connector on the CTP1000 is isolated from the chassis, and the differential signal is sent out on both the center pin and outer BNC ring.

### Calibrate Node to Current Reference

When the CTP system is configured to accept a reference and the reference is present, you can calibrate the system to the reference input by selecting Option 9. The calibrated value is stored in EEPROM, and the system uses this value to calibrate the internal oscillator when no reference is present. The calibrated clock accuracy is approximately 100 ppb.

## Node Operations and Maintenance

Figure 63 shows the Node Operations menu. If you change the name, IP address, network mask gateway, or Ethernet configuration of the unit, the system reboots. Before you are allowed to change these node settings, the CTP system asks for confirmation that rebooting is desired. If not confirmed, you will return to the main menu without the system's rebooting.

**Figure 63: Node Operations Menu—CLI**

```

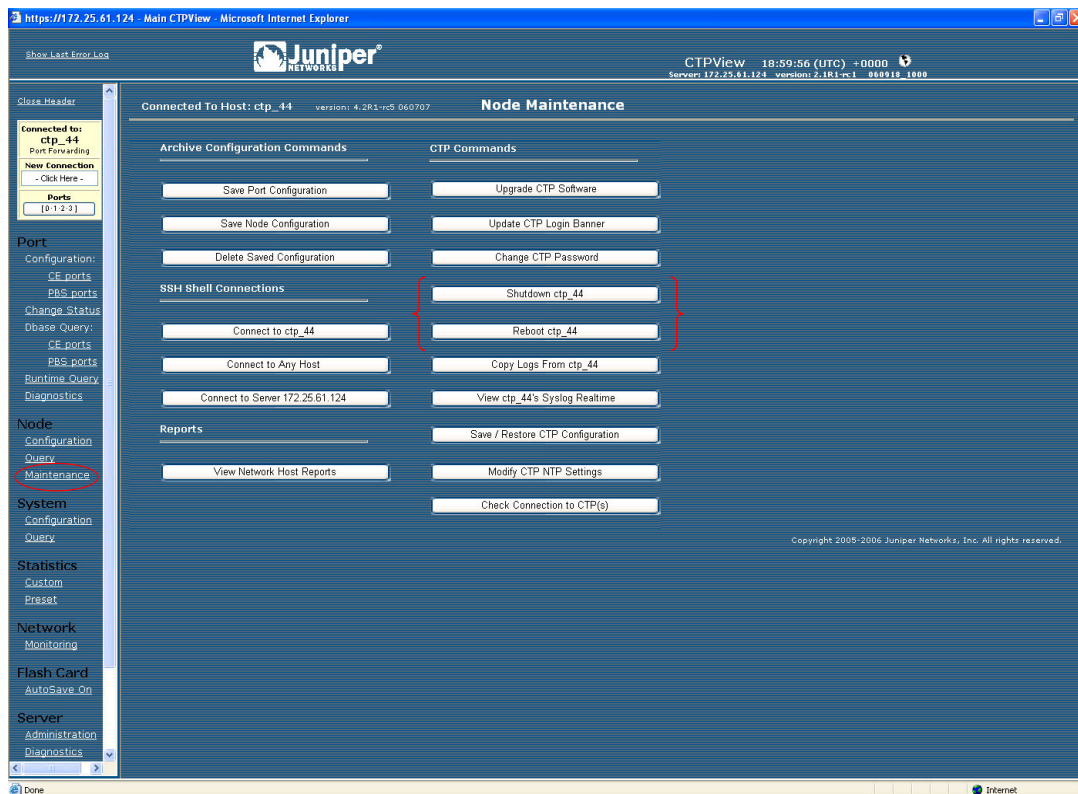
=====
(lab_12pt 11/16/04 13:28:23 GMT) | Node Operations Menu
=====

Please select a number from the following list:
-----

0) Back to Previous Menu
1) Change Node Date/Time
2) Display network settings:
3) Configure network settings:
4) Initialize Database
5) Ping IP address
6) Traceroute IP address
7) ssh to another host
8) System descriptor field:
9) Reboot Node
10) Powerdown Node
11) Display ethernet media:
12) Config ethernet media:
13) Set your password
14) System port speed range: 0 kHz - 12288 kHz
15) Config security profile
----- Your choice [0]:

```

You can also perform some functions that are available in the Node Operations menu from the CTPView Node Maintenance window (Figure 64).

**Figure 64: CTPView Node Maintenance Window**

## **Node Operations and Maintenance Parameters**

The following sections describe the node operations and maintenance parameters that you can configure or execute.

### **Change Node Date/Time**

With this selection you can change the date and times on the node.

### **Display Network Settings**

This parameter displays the status of the Ethernet interface that is connected to the CTP system. The information includes interface IP address, default gateway, receive and transmit packet counts, errors, dropped packets, overruns, and frame errors.

### **Configure Network Settings**

This parameter allows you to configure the hostname and IP address, subnet mask, and gateway of the Ethernet interface. You can also configure the secondary network management Ethernet interface on the CTP2000 series.

### **Initialize Database**

This parameter clears nonvolatile configuration of the local CTP system. It returns all node settings to their factory defaults and leaves all ports in the disabled state.

### **Ping IP address**

This parameter allows you to ping an IP address and reports the whether the ping is successful.

### **Traceroute IP Address**

This parameter allows you to enter an IP address and get a traceroute to that address.

### **SSH to Another Host**

This parameter allows you to enter an IP address of a host; the system establishes an SSH session with that host. You must know the login and password to the remote host. You can also use the CTPView Node Maintenance window (Figure 64) to establish an SSH session to a host.

### **System Descriptor Field**

This parameter allows you to enter a system descriptor that will be displayed in the top banner of each menu.

### **Reboot Node**

This parameter allows you to reboot the CTP system. You can also use the CTPView Node Maintenance window (Figure 64) to reboot the CTP system.

### Powerdown Node

This parameter allows you to gracefully power down the system. You can also use the CTPView Node Maintenance window (Figure 64) to power down the system.



**CAUTION:** Always use the powerdown option provided in the node operations menu when maintenance or other activity requires a system powerdown.

---

### Display Ethernet Media

This parameter displays the supported link modes (speed and duplex) and the configuration of the Ethernet media.

### Configure Ethernet Media

You can configure the CTP Ethernet media to autonegotiate the duplex mode and speed, to set the duplex to either half or full, and to set the speed to either 100 or 10 Mbps. If you answer No to Enable Autonegotiate, you will receive prompts for the Ethernet speed and duplex settings. If you answer No to Setup Ethernet for 100 Mbps, the speed will be set to 10 Mbps. If you answer No to Setup Ethernet full duplex, the configuration will be half duplex.

The Ethernet configurations of the CTP must match the configuration of the connected router or switch. Mismatched configurations, such as setting the CTP system to autonegotiate and the router to full duplex, will result in a misconfiguration and dropped packets. You must disable Cisco Discovery Protocol on the Fast Ethernet port connected to the CTP system.

### Set Your Password

You can log in to the system to change your password. The password must meet the criteria established in the Configuration Security Profile menu, and you must have the current password to make any changes.

### System Port Speed Range

The parameter sets one of two valid port speed ranges for the CTP1000 series. The first range allows ports to run at rates from 1 bps through 8 Mbps. The second range allows ports to run at rates from 4 Kbps to 12.288 Mbps. There is only one port speed range for the CTP2000 series, which is 0 KHz to 12288 kHz.

### Config Security Profile

The Config Security Profile menu is covered in *Chapter 5, Security Profile Menu*. The administrator must have the root password to gain access to the menu.



## Chapter 4

# Software Queries and Operations

The CTP command-line interface (CLI) and CTPView provide extensive capabilities that allow you to diagnose problems and assess the performance of both circuits and the IP network. The CLI and CTPView also provide tools to assist with the diagnosis of problems. These diagnostic tools include integral bit error rate tests (BERTs), circuit loops, IP pings, IP traceroutes, packet delay jitter, and dropped packet plots.

The chapter contains the following sections:

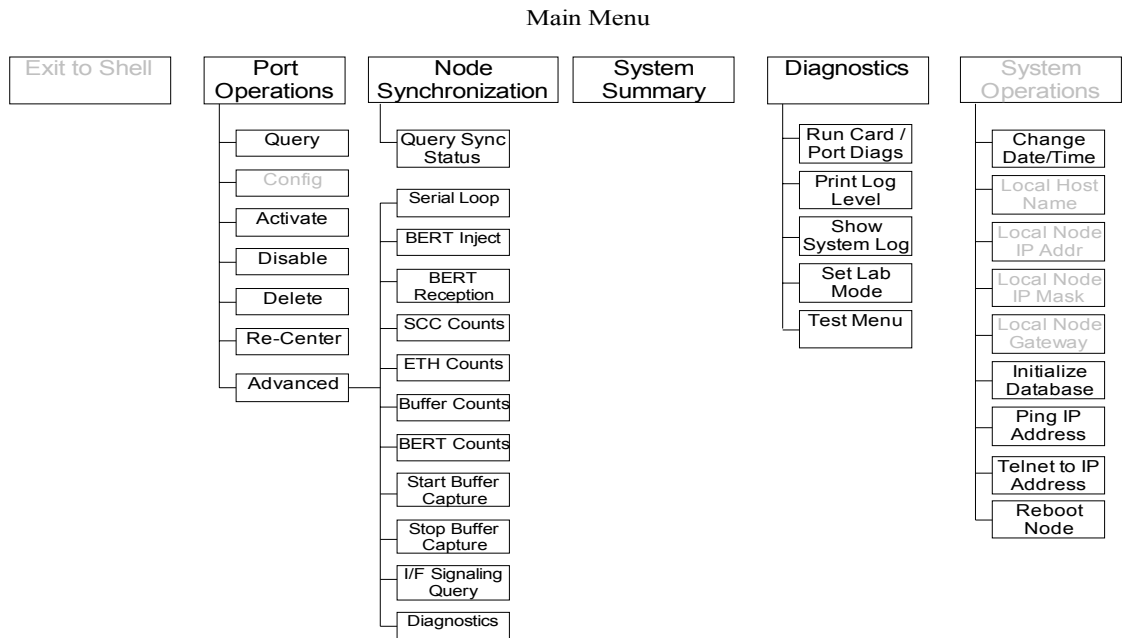
- Overview on page 67
- Port Queries and Operations on page 68
- Node Summary on page 86
- Node Diagnostics on page 88
- Node Synchronization on page 90

### Overview

---

The CTP menu interface provides a set of menu-driven operational commands. You can use these commands to determine the status of the node or ports and to perform operations such as looping ports or saving the database. Figure 65 shows the Main menu interface with Software Queries and Operations highlighted.

**Figure 65: Software Queries and Operations Menu Tree**



You can find software queries and operations under the Port Operations, Node Summary, and Node Diagnostics menus. The Port Operations CLI menu is shown in Figure 66 on page 70.

## Port Queries and Operations

Port queries and advanced operations are available from the CLI or from CTPView. Both provide information on the port configuration, database state, runtime state, and performance when running. The following summarizes the type of information provided by the CLI and CTPView displays:

- Remote Port —Remote port to which the queried port is connected. The variable *vvv.www.xxx.yyy* specifies the IP address of the remote CTP, and *z* specifies the port number (0-4).
- Port Database State—Specifies whether the port is active or disabled in the database. Ports disabled in the database will not connect to the remote port or pass serial data.
- Port Runtime State —Indicates whether the active local CTP port is communicating with the remote node, as follows:
  - N/A—Not applicable; is displayed when the port database state is disabled.
  - No Sync—Indicates that the local CTP system is not able to communicate with the remote CTP system.
  - In Sync—Indicates that the local CTP system is communicating properly with the remote system, but data is not flowing to the interface.



- Running—Indicates that the local CTP system is communicating and is synchronized with the remote CTP system. The circuit is established between the ports.
- Cfg Fail—Indicates that the database configuration for the port cannot be supported. You will not typically encounter this state. If you do, delete and reinstall the port.
- MisCfg —Indicates that a misconfiguration between the local and remote ports prevents bringing up the circuit. Examples of misconfigurations are incorrectly configured IP addresses or ports, and mismatched speeds.
- Too Slow—Encountered on a port when the port clock configured is TT ALL and either no clock is provided by the external device or the rate is different from the configured rate.
- Net Bound Data Info—Indicates the packet size created for transfer, the short-term average number of packets per second being sent out to the remote port, and the approximate data rate of information being received at the serial interface and sent into the IP network to the remote port.
  - Pkt Size—Size of packets created for transfer across the network. You can modify the packet size by using the **Packet Size Configuration** command (Port Operations > Config > Parameter 4).
  - Pkt/sec—Short-term average number of packets per second being sent to the remote port.
  - Data Rate—*Approximate* data rate in bits per second of information being received at the serial interface and sent into the IP network to the remote port. The data rate is calculated based on packets per second and packet size, and should be approximately the same as the configured port speed or the expected rate from the data terminal equipment (DTE) when autobaud is configured.
- I/F Bound Data Info—Indicates the following information:
  - Pkt Size—Size of packets received from the IP network destined for the queried port. You can modify the packet size.
  - Pkt/sec—Short-term average number of packets per second being received from the IP network.
  - Data Rate—Displays in bits per second the approximate data rate of information being received from the IP network and sent to the queried serial port. The data rate is calculated based on packets per second and packet size, and should be approximately the same as the configured remote port speed or the expected rate from the remote DTE when autobaud is configured.
  - Late Pkts —Counter of packets that arrives too late to be sent to the serial interface. You may need to increase the buffer size if the late packet count continually increments.

- Missing Packets—Counter of packets destined for the serial interface that were not available at the time when that data was needed. This unavailability may be due to a dropped packet in the IP network or to a packet that arrived too late at the CTP unit to be processed out the serial interface. Both dropped and late packets cause the missing packet counter to increment.
- Buffer Recenter Count—Count of buffer recenters since the last time statistics were cleared. Recenters are due to either buffer underflow (buffer depleted) or the buffer exceeding the maximum delay configured for the port.
- Buffer Underflow Count—Number of times the buffer reached the minimum set threshold.
- Buffer Overflow Count —Number of times the buffer reached the maximum set threshold.
- Buffer Fill—Amount of data (in milliseconds) currently held in the buffer.
- Buffer Starvation Count—Indicates an exceeded threshold. The CTP system is designed to tolerate strings of consecutive missing packets without the loss of bit count integrity. The number of packets is configurable; the default is five (5). Exceeding this threshold is called a “starvation,” and a counter is incremented each time this event occurs.

### Port Query with the CLI

The Query operation provides both the database configuration and current state of the port (Figure 66). When you perform the query, the menu interface provides the option to clear the statistics (counters).

**Figure 66: Port Query and Results**

```

=====
Operations Menu for port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Query
2) Config
3) Activate
4) Disable
5) Delete
6) Recenter
7) Advanced...
----- Your choice [2]: 1

Detail query display for port 0
=====
Remote Port:                vvv.www.xxx.yyy:Pz
Port Database State:        DISABLED, ACTIVE
Port Runtime State:         N/A,No Sync,In Sync,Running,Cfg
Fail,MisCfg,Too Slow
Permanent/Demand:          Permanent or Demand
----- Net Bound Data Info -----
Pkt Size:                   Configured Packet Size
Pkt/sec:                     Approximate Packet Rate

```

```

Data Rate (Approx bps):          Calculated Rate
----- I/F Bound Data Info -----
Pkt Size:                        Packet Size from Remote
Pkt/sec:                          Approximate Packet Rate From Remote
Data Rate (Approx bps):          Approximate Date Rate
Late/Missing Pkts:                Late Packets/Missing Packets Since Last
Clear
Buffer Recntr/Underflow/Overflow: Recenter/Underflow/Overflow Since Last
Clear
Buffer Fill (in Msec):           0.000
Buffer Starvation Count:         0

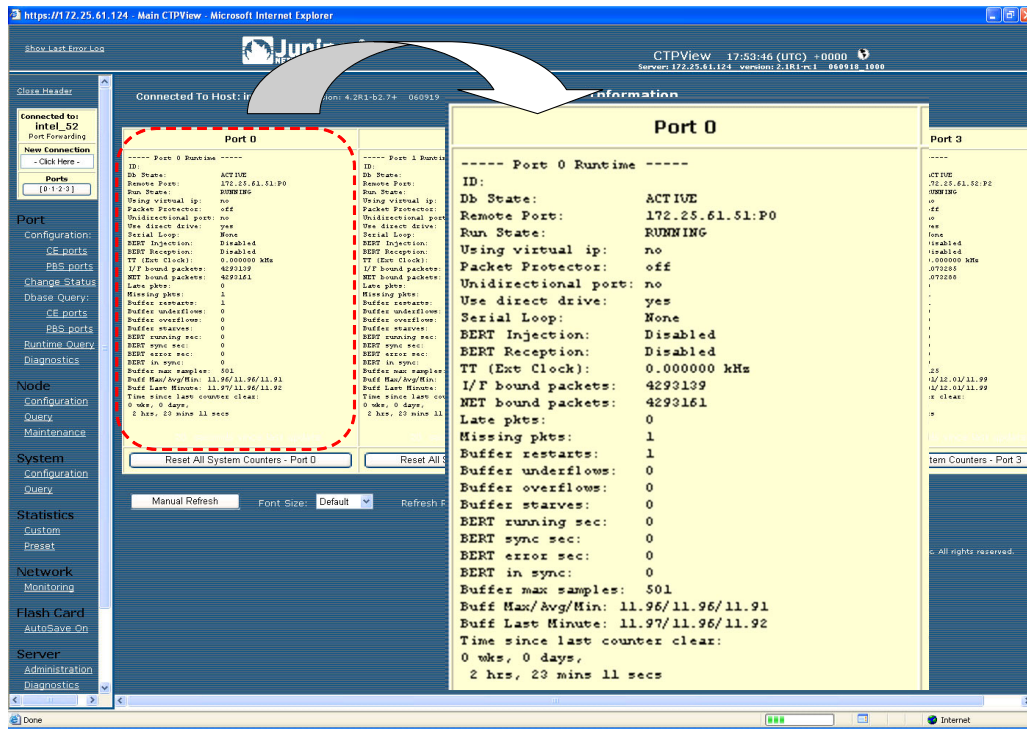
Clear Port 0 Stats?  y[n]:

```

### **Port Query with CTPView**

A superset of Port Query attributes is described at the beginning of the Port Queries and Operations section on page 68. The CTPView Port Runtime option provides the status of the port (Figure 67). Additional information provided by the Runtime query includes the status of internal BERTs and port loops. The display will periodically be updated at the rate specified in the drop-down menu. The Reset ALL System Counters button at the bottom of the display resets the counters.

Figure 67: CTPView Port Runtime Information Window



## Technical Notes—Port Operations

### Missing Packets and Late Packets

Each time a packet is missed, the data fill pattern specified in the advanced port options is substituted for data in the missed packet. The substitution maintains the bit count integrity of the data sent to the DTE or encryptor, but results in what appears to be a burst of errors with a duration equal to the size of the packet. Both the missing packet count and late packet count are incremented if the packet is received too late to be processed out the serial interface.

Packets may infrequently arrive late because of momentary congestion and delay in the IP network. If the rate of late packets is too great, consider increasing the port buffer size to accommodate the delay jitter being experienced. You can modify the port buffer size in the Port Configuration menu of the CLI or the Configuration window of CTPView.

### Buffer Recenter Count

Under normal operations, the buffer recenter count should not be incrementing. If the count is incrementing, examine both the clocking configuration and references being used by the CTP system. For example, if the distant port and local port are configured with slightly different rates, buffer recenters will result. If the accuracy or stability of the references is inaccurate, recenters may also occur.

## Port Database States

A port's database state can be set to Active or Disabled, or the port can be deleted. Deleting the port disables it and returns the port configuration to default values the next time it is configured. As shown in Figure 68, the commands to activate, disable or delete the port are provided in Port Operations menu. You will be prompted to confirm your command before it will take effect.

A port is disabled when the port is being configured using CLI. Only the port being configured is affected, and other ports will continue operating as configured. When you select Config from the menu, you will be prompted to confirm that the port can be disabled.

**Figure 68: Activating Port Command**

```

=====
Operations Menu for port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Query
2) Config
3) Activate
4) Disable
5) Delete
6) Recenter
7) Advanced...
----- Your choice [7]: 3

*** You asked to bring the port up. Are you sure? y[n]:

```

You can activate or disable the port by using either of two CTPView windows. The Port Configuration window allows you to change the state by checking the appropriate box near the top of the display (Figure 69). You can also open the Change Port Status window (Figure 70). This window allows you to change the state of the port from active to disabled or disabled to active, to delete the port, and to recenter the buffer.

Figure 69: CTPView Port Configuration Window to Activate and Disable the Port

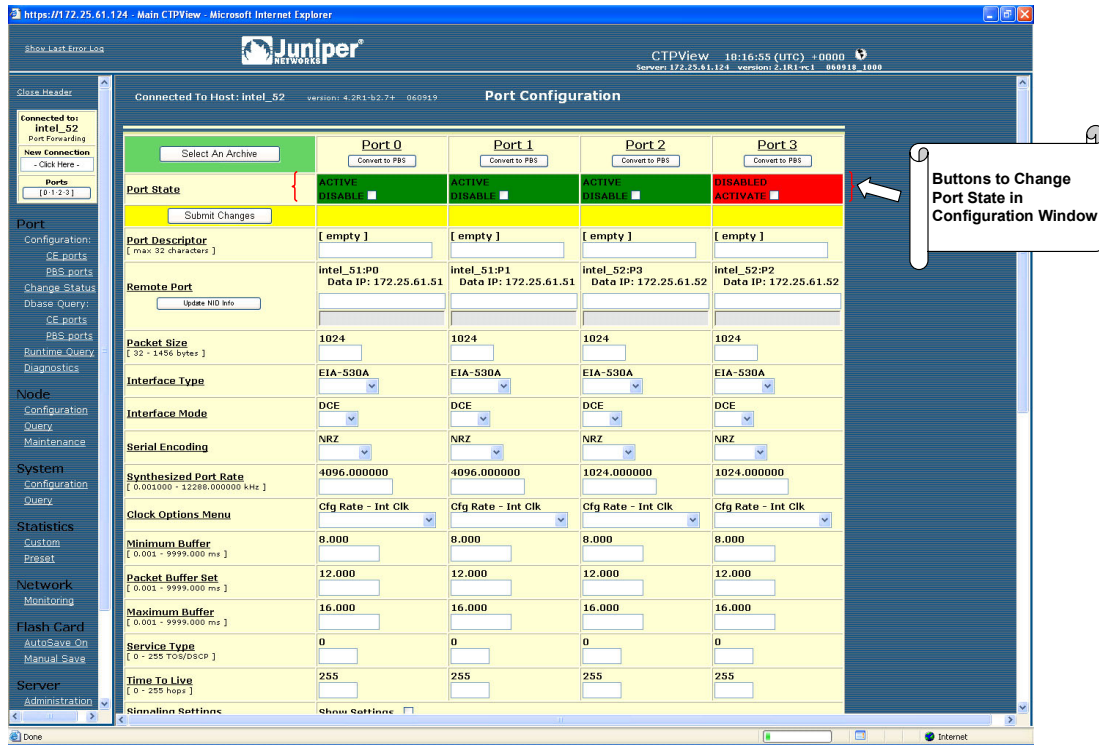
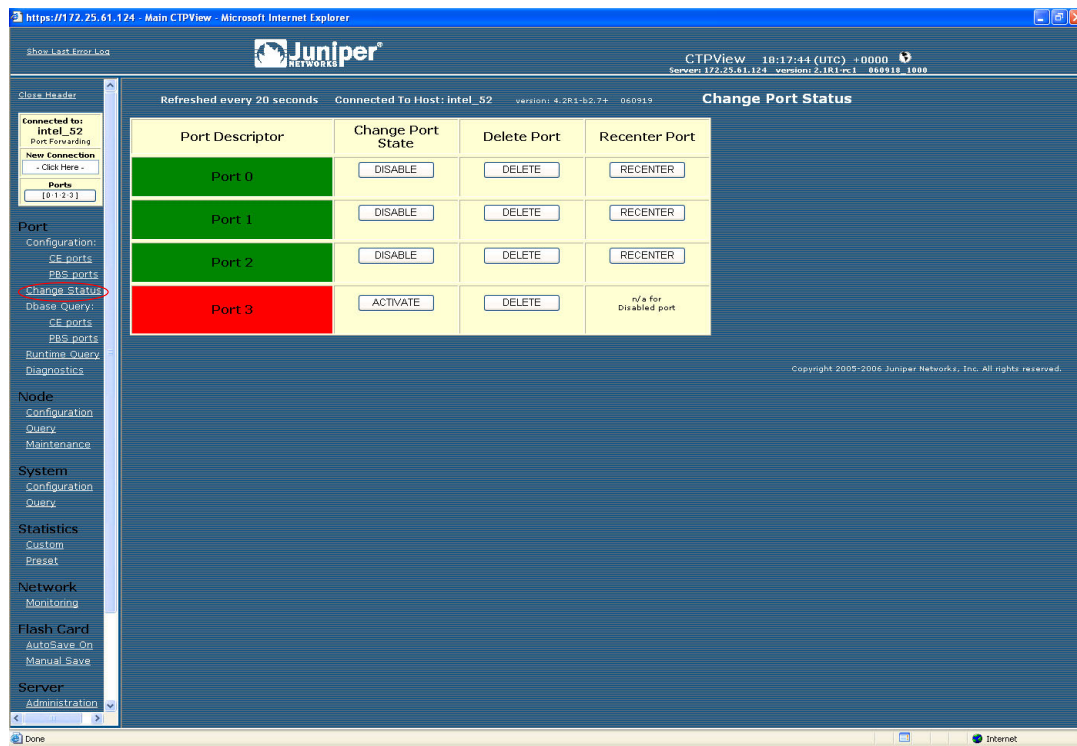


Figure 70: CTPView Change Port Status Window



## Port Recenter

Use the Recenter operation to reset the buffer to the Pkt Buffer Set size specified in the port configuration. Recentering the buffer results in a one-time loss of bit count integrity and synchronization for the attached DTE. Figure 71 shows the Port Recenter option from the CLI. You can also recenter the port from the Change Port Status window on CTPView (Figure 70).

Figure 71: Port Recentering

```

=====
Operations Menu for port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Query
2) Config
3) Activate
4) Disable
5) Delete
6) Recenter
7) Advanced...
----- Your choice [5]: 6

*** This will cause a port data interruption. Are you sure? y[n]:

```

## Advanced Query Menu

You access the the Advanced Query menu from the CLI Port Operations menu by selecting Advanced (Figure 72).

**Figure 72: Advanced Query Menu**

```

=====
Operations Menu for Port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Query
2) Config
3) Activate
4) Disable
5) Delete
6) Recenter
7) Advanced...

----- Your choice [7]: 7

=====
Advanced Query Menu for Port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Serial Loop:      None
2) BERT Injection:  Disabled
3) BERT Reception:  Disabled
4) BERT Pattern:    2^15-1
5) BERT Error Inject
6) BERT Counts
7) SCC Counts
8) Buffer Counts
9) Clear All Counts
10) I/F Signaling Query
11) Modify Runtime Configuration
12) Diagnostics...

----- Your choice [8]:

```

### Serial Loops

The Serial Loop parameter provides the option for enabling loops toward the interface (DTE device) or toward the “NET” (IP network) in the direction of the remote port (Figure 73). The following loop options are available:

- Disabled—If a loop is currently active on the port, the Disabled setting will remove the loop.
- To NET—Data arriving from the IP network destined for the serial interface is looped back to the IP network and remote port. The data is still transmitted from the IP network to the serial interface, but the data from the serial interface to the IP network and remote port is blocked.
- To I/F—Data arriving from the serial interface that is destined for the IP network is looped back to the serial interface. The data is still transmitted from the serial interface to the IP network, but the data from the IP network to the serial interface is blocked.



Figure 73: CTP Serial Loops

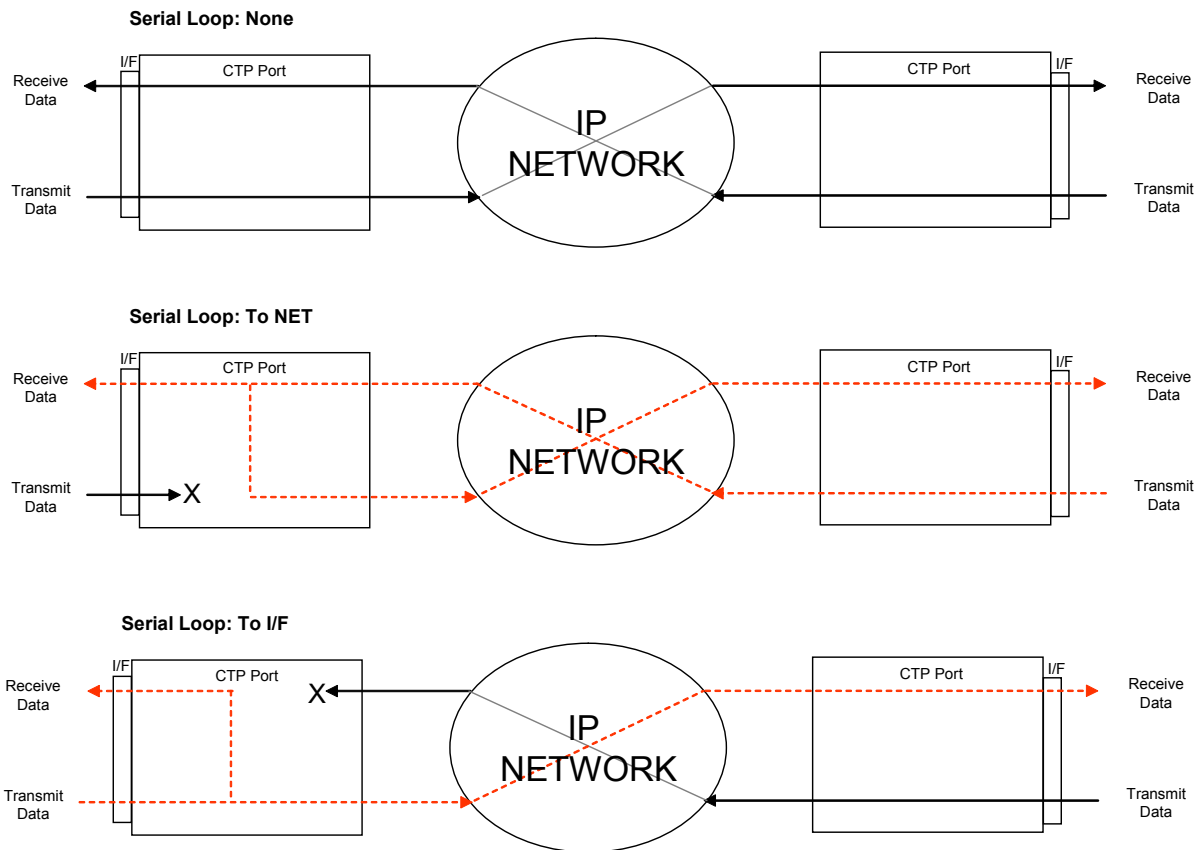


Figure 74 shows the CLI Advanced Query menu that you use for setting the loops.

Figure 74: Serial Loop Menu

```

=====
Advanced Query Menu for Port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Serial Loop:    None
2) BERT Injection: Disabled
3) BERT Reception: Disabled
4) BERT Pattern:  2^15-1
5) BERT Error Inject
6) BERT Counts
7) SCC Counts
8) Buffer Counts
9) Clear All Counts
10) I/F Signaling Query
11) Modify Runtime Configuration
12) Diagnostics...
----- Your choice [8]:1

```

Enter Loop Function

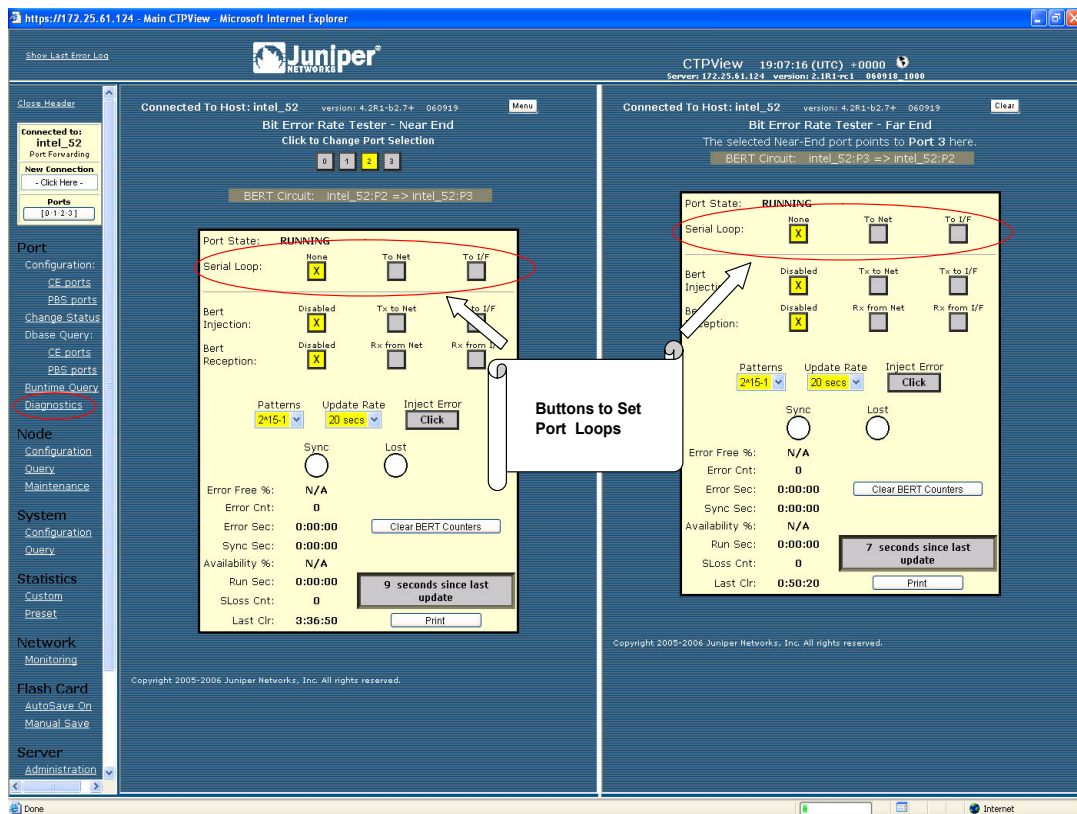
Please select a number from the following list:

- ```

-----
0) None
1) To NET
2) To I/F
----- Your choice [0]:
    
```

You can also configure serial loops by using the the Bit Error Rate Tester menu, which is located in the Port Diagnostics window (displayed when you select Port > Diagnostics in the left pane of the CTPView window). The remote port is automatically displayed when you select the local port (Figure 75).

**Figure 75: CTPView Bit Error Rate Tester Window—Serial Loop Buttons**

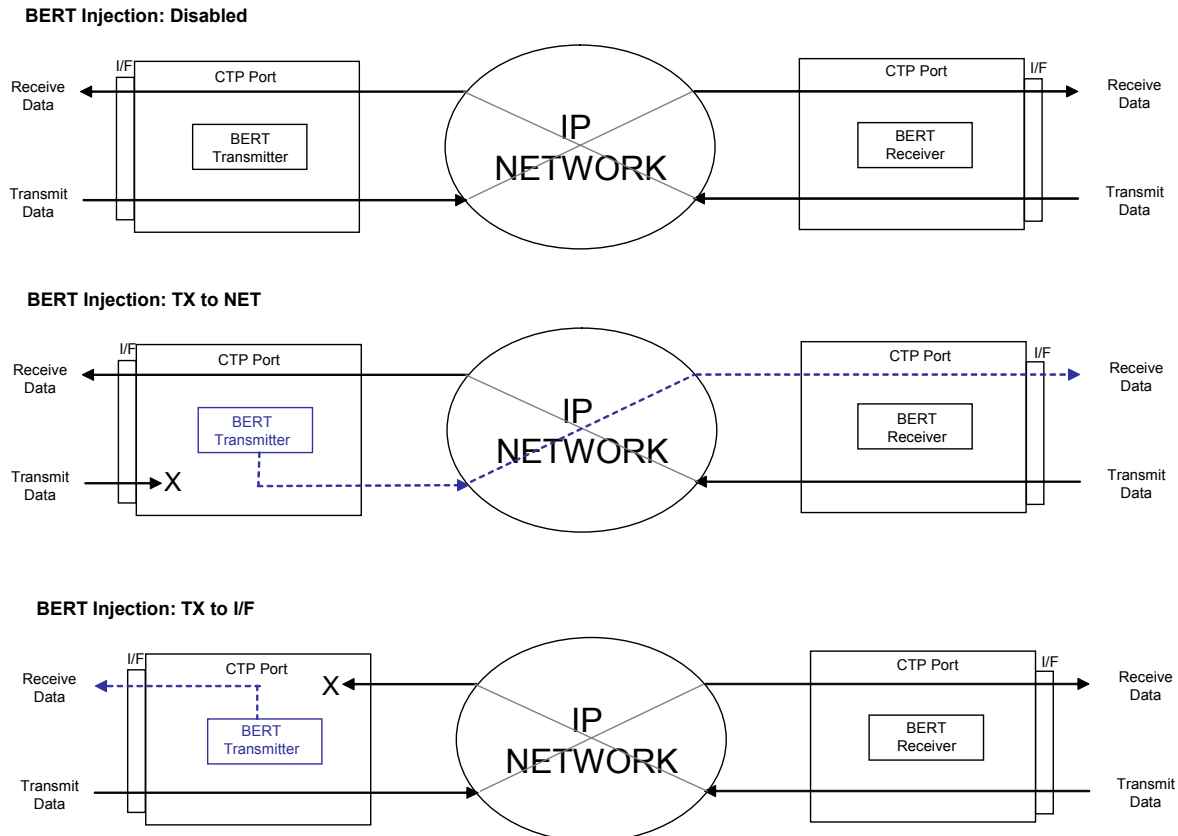


### BERT Testing

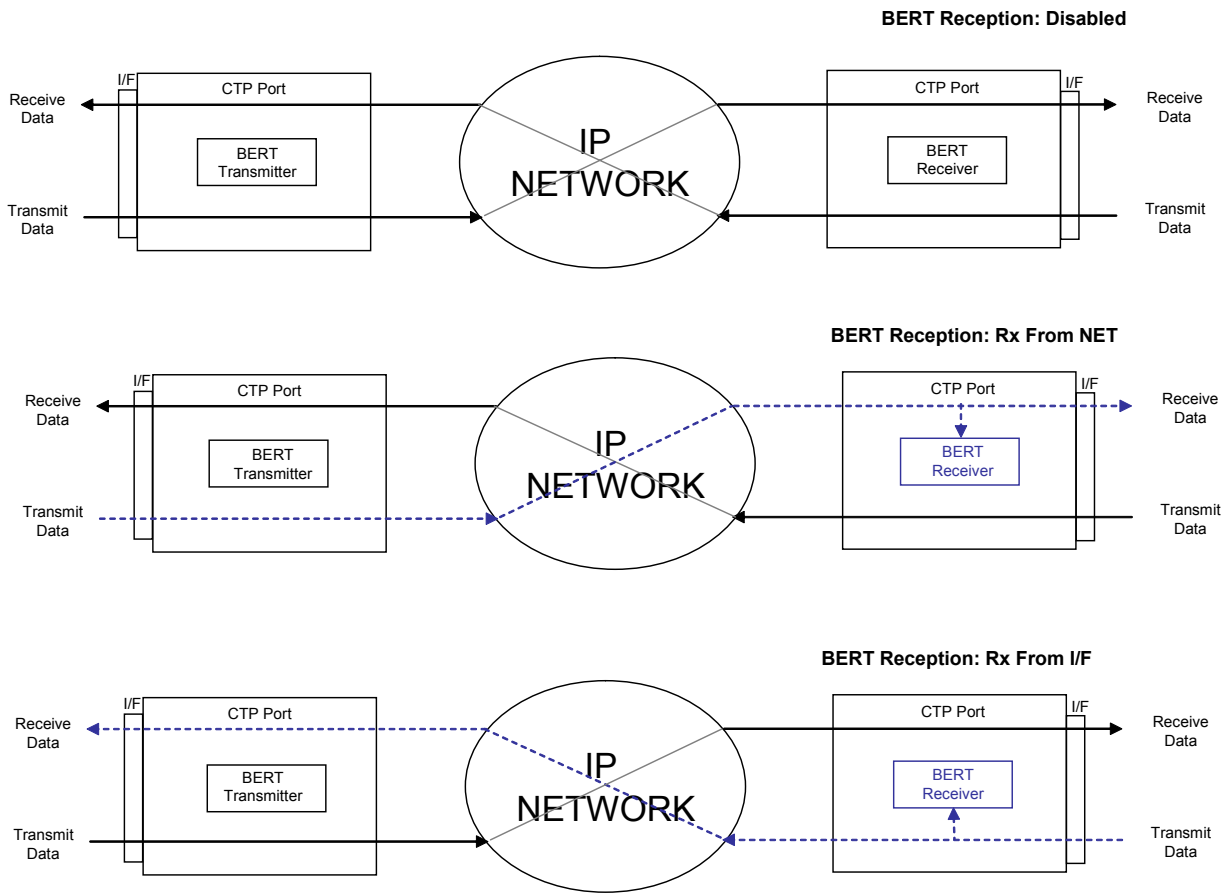
Each port provides a dedicated BERT transmitter and receiver, which are capable of transmitting and receiving a pseudorandom sequence of data by means of a user-specified pattern. The data sequence may be injected toward the serial interface or the IP network, and replaces the user data with the BERT pattern in the selected direction (Figure 76). The BERT receiver does not disrupt the existing data flow in either direction (Figure 77).

You can select the type of BERT pattern. The BERT patterns are compatible with the Firebird 6000, with the exception of pattern 2<sup>31</sup>-1, which is not a Firebird option. You must configure the same pattern on both ports when performing a bidirectional end-to-end BERT. The available patterns include MARK, ALT, 511m 2047, 2<sup>15</sup>-1, 2<sup>20</sup>-1, 2<sup>23</sup>-1, 2<sup>29</sup>-1, and 2<sup>31</sup>-1.

**Figure 76: BERT Injection**



**Figure 77: BERT Reception**



In the CLI menu, use Options 2, 3, and 4 to configure the BERT transmitter, receiver, and pattern (Figure 78). Option 5 injects an error in the pattern to verify that an end-to-end BERT has been established. Option 6 provides the BERT counts (Figure 79).

**Figure 78: Example of Configuring the BERT Transmitter**

```

Please select a number from the following list:
-----
0) Back to Previous Menu
1) Serial Loop:      None
2) BERT Injection:  Disabled
3) BERT Reception:  Disabled
4) BERT Pattern:    2^15-1
5) BERT Error Inject
6) BERT Counts
7) SCC Counts
8) Buffer Counts
9) Clear All Counts
10) I/F Signaling Query
11) Modify Runtime Configuration
12) Diagnostics...
----- Your choice [8]: 2
    
```

```

Enter Tx BERT Function

Please select a number from the following list:
-----
0) Disabled
1) Tx to NET
2) Tx to I/F
----- Your choice [0]: 1

```

**Figure 79: BERT Counts**

```

=====
Advanced Query Menu for Port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Serial Loop:          None
2) BERT Injection:      Disabled
3) BERT Reception:     Disabled
4) BERT Pattern:        2^15-1
5) BERT Error Inject
6) BERT Counts
7) SCC Counts
8) Buffer Counts
9) Clear All Counts
10) I/F Signaling Query
11) Modify Runtime Configuration
12) Diagnostics...

----- Your choice [2]: 6

BERT query display for port 0
=====
BERT Running time: Sync Seconds:      0
Errored Seconds:      0
Error Count:          0
Sync Loss Count:      0
Currently in SYNC: NO

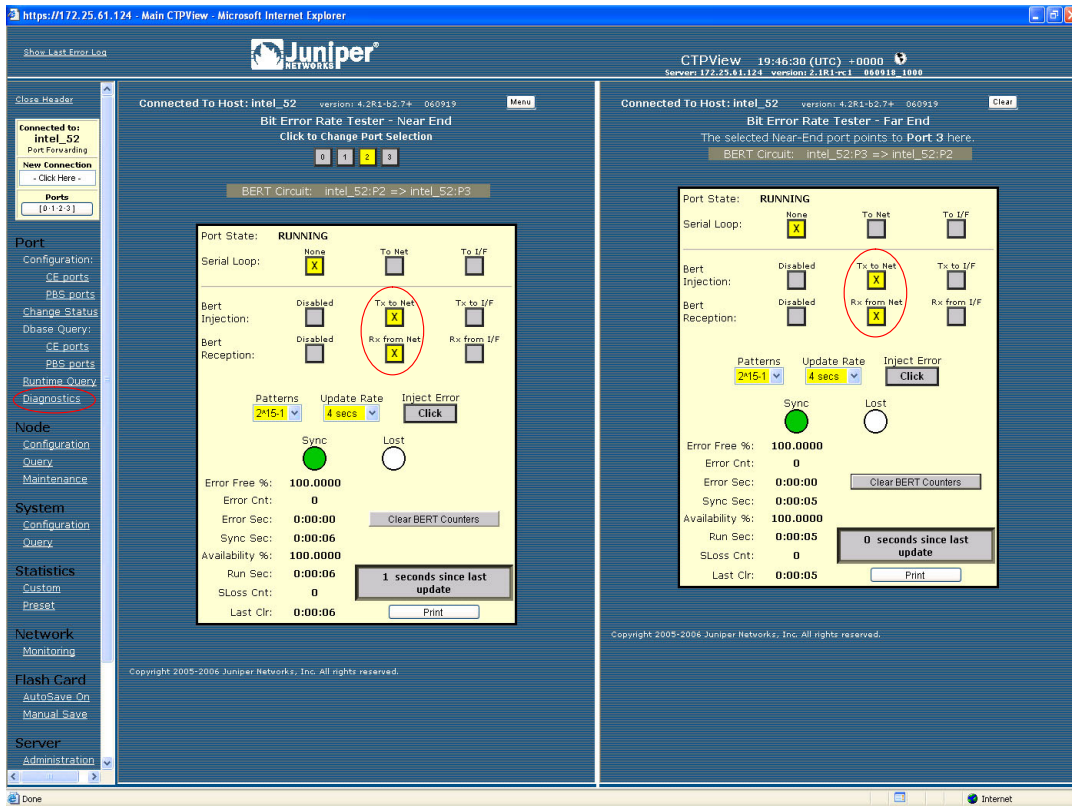
Time since last counter clear: 0 wks, 0 days, 1 hrs, 34 mins 20 secs

Clear Port 0 BERT Stats? y[n]:

```

Figure 80 shows the BERT pane, which is displayed when you selected Port > Diagnostics in the left pane of the CTPView window. The remote port is automatically displayed when you select the local port. You can use this window to specify whether the BERT transmitter and receiver will be directed toward the network (NET) or serial interface (I/F). You choose the pattern by using the drop-down menu. CTPView checks the status of the BERT at the rate specified in the Update Rate drop-down menu and updates the synchronization status and counter accordingly.

Figure 80: CTPView BERT Tester Window



### SCC Counts

The Serial Communications Controller (SCC) counts (Figure 81) are counters related to packet creation and reception. Many of these counters also appear in the Port Query menu. All the SCC counts increment until you clear them.

The SCC counts, which you access from the CLI Port Operations > Advanced menu, are:

- Pkts to NET—Number of packets that have been sent to the IP network.
- Pkts to NET ints—Packets-to-NET interrupts; corresponds to the number of packets destined for the IP network that have been processed by the software driver.
- Pkts to I/F—Number of packets that have been sent to the serial interface.
- Pkts to I/F ints—Packets-to-interface interrupts; corresponds to the number of packets destined for the serial interface that have been processed by the software driver.

- Pkts to I/F missing—Packets to interface missing; packets destined for the serial interface that were not available at the time when that data was needed. Unavailability may be caused by a dropped packet in the IP network or a delayed packet considered late by the CTP system, according to the current buffer settings and state.
- Pkts to I/F late—Packets to interface late; number of packets destined for the serial interface that were not available at the time when that data was needed. Unavailability may be caused by a dropped packet in the IP network or a by a packet delayed too long, according to the current buffer settings and state.
- Pkts to I/F recenter cnt—Packets to interface recenter count; number of buffer recenters since the last time statistics were cleared. Recenters are due to either buffer underflow (buffer depleted) or the buffer exceeding the maximum delay configured for the port.
- Pkts to I/F underflow cnt—Packets to underflow count; number of times the minimum threshold was reached since the counter was last reset.
- Pkts to I/F overflow cnt—Packets to overflow count; number of times the maximum threshold was reached since the counter was last reset.
- Pkts to I/F starve cnt—Packets to interface starvation count. When a fixed consecutive number of packets are missing from the IP network, the CTP receive processor detects this as a starvation condition. During this state, the buffer is recentered. Starvation can occur because of a failure in the IP network or because of a cabling or Ethernet interface problem.
- Clear Port Stats—Responding affirmatively to this option will clear all the SCC counts listed in this menu.

**Figure 81: SCC Counts Output**

```

=====
Advanced Query Menu for Port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
  1) Serial Loop:          None
  2) BERT Injection:      Disabled
  3) BERT Reception:      Disabled
  4) BERT Pattern:        2^15-1
  5) BERT Error Inject
  6) BERT Counts
  7) SCC Counts
  8) Buffer Counts
  9) Clear All Counts
 10) I/F Signaling Query
 11) Modify Runtime Configuration
 12) Diagnostics...
----- Your choice [3]: 7

```

```

Advanced Packet query display for port 0
=====
Pkts to NET:                                0
Pkts to NET ints:                           0
-----
Pkts to I/F:                                0
Pkts to I/F ints:                           0
Pkts to I/F missing:                        0
Pkts to I/F late:                           0
Pkts to I/F recenter cnt:                   0
Pkts to I/F underflow cnt:                  0
Pkts to I/F overflow cnt:                   0
Pkts to I/F starve cnt:                     0

Clear Port 0 Stats? y[n]:

```

### Buffer Counts

The CTP system monitors packet delay. The time is measured from when a packet arrives from the Ethernet interface to when it is completely transmitted out the serial interface. This interval represents an instantaneous measure of the buffer fill. Short-term changes in the value of this measured delay correspond to the packet delay jitter in the network. These values are stored in an array where the average may be calculated over a large number of samples.

Figure 82 shows the Buffer Counts menu, which provides the following counts:

- Sample Buffer Size—Total number of samples in the array used for averaging.
- Valid Buffer Samples—Number of currently valid samples in the array.
- Total Samples—Number of packets measured since the last time the count was cleared.
- Smallest Sample—Within the total number of samples, the smallest sample measured (in milliseconds).
- Average Sample—Within the valid array samples, the average buffer fill (in milliseconds).
- Largest Sample—Within the total number of samples, the largest sample measured (in milliseconds).
- Largest Buffer Jitter—Difference between the largest sample and the smallest sample measured. This corresponds to system packet delay jitter.

The buffer counts are also provided in CTPView port runtime query (Figure 67 on page 72). One line in the query provides the current measurements for the maximum, minimum, and average buffer, and a second line provides the data for the preceding minute.



**Figure 82: Buffer Counts Command**

```

=====
Advanced Query Menu for Port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Serial Loop:          None
2) BERT Injection:      Disabled
3) BERT Reception:     Disabled
4) BERT Pattern:       2^15-1
5) BERT Error Inject
6) BERT Counts
7) SCC Counts
8) Buffer Counts
9) Clear All Counts
10) I/F Signaling Query
11) Modify Runtime Configuration
12) Diagnostics...
----- Your choice [5]: 9

Advanced Buffer query display for port 0
=====
Sample Buffer Size:      2048
Valid Buffer Samples:    0
Total Samples:          0
-----
Smallest Sample:        0.000 ms
Average Sample:         0.000 ms
Largest Sample:         0.000 ms
Largest Buffer Jitter:  0.000 ms

Reset Buffer Monitor? y[n]:

```

**Clear All Counts**

Select this option to clear all the counts on all the ports.

**I/F Signaling Query**

Select this option to record the state of the signaling leads.

**Modify Runtime Configuration**

Selecting this option allows you to modify parameters that affect adaptive clocking, signal output, interface mode, and buffer configurations without your having to disable the port. The changes are valid only while the port is active and are not stored in the database. We recommend that you do not make port changes with this option except in a lab or test environment.

**Diagnostics**

You can perform diagnostic tests on a port by using the Diagnostics menu, which you access from the CLI Port Operations > Advanced menu. Running the diagnostics on a port will automatically test the port with the integral BERT. The port will not transfer user data during the test.

Figure 83 shows the CLI Diagnostics menu. The system reports results as pass or fail. A failed test indicates possible faulty hardware. Tests include:

- Test Port Data Path (towards NET fast and slow)—Data path test toward the IP network.
- Test Port Data Path (towards I/F)—Data path test toward the serial interface.
- Test Port Signaling—Tests the signaling leads on the serial interface.

**Figure 83: Diagnostics Command**

```

=====
Advanced Query Menu for Port 0
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
  1) Serial Loop:          None
  2) BERT Injection:      Disabled
  3) BERT Reception:     Disabled
  4) BERT Pattern:       2^15-1
  5) BERT Error Inject
  6) BERT Counts
  7) SCC Counts
  8) Buffer Counts
  9) Clear All Counts
 10) I/F Signaling Query
 11) Modify Runtime Configuration
 12) Diagnostics...
----- Your choice [8]: 12

=====
Diagnostics Menu for Port 0
=====
Please select a number from the following list:
-----
 0) Back to Previous Menu
 1) Test Port Data Path (towards NET fast)
 2) Test Port Data Path (towards NET Slow)
 3) Test Port Data Path (towards I/F)
 4) Test Port Signalling
----- Your choice [2]:

```

## Node Summary

Figure 84 shows a sample CLI Node Summary menu. The node summary provides CTP port system information for all ports on a single screen.

**Figure 84: Node Summary Sample Menu**

```

=====
CTP Main Menu
=====
Please select a number from the following list:
-----
0) Exit to Shell
1) Port Operations
2) Node Synchronization
3) Node Summary

```

```

4) Node Diagnostics
5) Node Operations
----- Your choice [1]: 3

Port Config and Status Summary:

Port          RemPort  DbState  RunState NtSz  IfSz      PortRate  ReCtr
=====
0             6.6.6.2:P0  ACTIVE  RUNNING  32   32      38.400000  0
1             6.6.6.2:P1  ACTIVE  RUNNING  64   64     136.000000  0
2             10.0.0.0:P0  ACTIVE   NoSYNC 1024  N/A      0.103996   0
3             10.0.0.0:P0  ACTIVE   NoSYNC 1024  N/A      64.000000  0
=====

```

The menu provides the following summary information:

- **RemPort**—Remote port to which the local port is connected. The variable *www.www.xxx.yyy* specifies the IP address of the remote CTP system, and *z* defines the port number (0-55). You can change the remote port by using the **Port Configuration** command (Port Operations > Configuration > Parameter 1).
- **DbState**—Database state and whether the port is active or disabled in the database. Ports disabled in the database will not connect to the remote port or pass serial data.
- **Run\_State**—Remote node synchronization state; indicates whether the local CTP port is communicating and synchronized with the remote node. Status is defined as NoSYNC, ToSYNC, InSYNC, or RUNNING.
  - **NoSYNC**—Indicates that the local CTP system is not able to communicate with the remote CTP system.
  - **InSYNC**—Indicates that the local CTP system is communicating properly with the remote unit, but data is not flowing to the interface.
  - **RUNNING**—Indicates that the local CTP system is communicating and synchronized with the remote CTP system and that the circuit is established.
  - **MisCfg**—Indicates that there is a misconfiguration between the local and remote ports that prevent bringing up the circuit. Examples of misconfigurations are incorrectly configured IP addresses or ports, and mismatched speeds.
  - **N/A**—Not applicable; displayed when the port database state is disabled.
  - **Cfg Fail**—Indicates that the database configuration for the port cannot be supported. You will not typically encounter this state. If you do, delete and reinstall the port.
  - **Too Slow**—Encountered on a port when the port clock configured is TT ALL and either no clock is provided by the external device or the rate is different from the configured rate.
- **NtSz**—Network-bound data packet size. You can modify the packet size by using the **Packet Size Configuration** command.

- IfSz—Interface-bound data packet size. You can modify the packet size only at the remote CTP system.
- PortRate—User-specified port speed in kilohertz. (For further details, see Port Speed on page 45 in *Chapter 3, Software Configuration*.)
- ReCtr—Number of times the buffer has been recentered to the size specified in the port configuration.

## Node Diagnostics

---

By using the Node Diagnostics menu, which you access from the CTP Main menu by selecting Parameter 4, you can troubleshoot suspected problems with the CTP hardware or software configuration.

### Run Diags on Card/Ports

This parameter runs data path tests on each port (Figure 85) using the built-in BERT testers. The test will loop back data at both the serial and packet interfaces on all ports. In addition, the system tests signaling loopback on the serial interface. Ports will be disabled for the duration of the tests and then reactivated after the diagnostic is complete. The system reports results as pass or fail. A failed test may indicate a hardware problem.

**Figure 85: Run Diagnostics on Card/Ports**

```

=====
Diagnostics Menu
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Run Diags on Card/Ports
2) Set Log Print Level:   EVE
3) Show Node Log
4) Set Lab Mode:         Disable
----- Your choice [0]: 1

***
*** This will cause a port data interruption
***

Are you sure? y[n]: y

PLL Lock Test...           Passed
External Reference Test... Passed
Port 0 Net-Bound Data Test... Passed
Port 0 I/F-Bound Data Test... Passed
Port 0 I/F Signaling Test... Passed
Port 1 Net-Bound Data Test... Passed
Port 1 I/F-Bound Data Test... Passed
Port 1 I/F Signaling Test... Passed
Port 2 Net-Bound Data Test... Passed
Port 2 I/F-Bound Data Test... Passed
Port 2 I/F Signaling Test... Passed
Port 3 Net-Bound Data Test... Passed
Port 3 I/F-Bound Data Test... Passed
Port 3 I/F Signaling Test... Passed

```

## Set Log Print Level

By selecting Set Log Print Level, you can set the level of stored node event messages that the CTP system logs. Figure 86 shows the Set Log Print Level menu. The settings range from most detailed (Level 1: debug) to least detailed (Level 8: fatal alarm):

- DBG—debug
- GEN—general
- FNC—function entry
- EVE—event
- TMP—temporary; not a user setting; for system development only
- MIN—minor alarm
- MAJ—major alarm
- FAT—fatal alarm

**Figure 86: Set Log Print Level Menu**

```

=====
Diagnostics Menu
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) Run Diags on Card/Ports
2) Set Log Print Level:   EVE
3) Show Node Log
4) Set Lab Mode:         Disable
----- Your choice [0]:2

Please select a number from the following list:
-----
0) OFF
1) DBG
2) GEN
3) FNC
4) EVE
5) TMP
6) MIN
7) MAJ
8) FAT
----- Your choice [4]:

```

## Show Node Log

By selecting Show Node Log, you can review stored node event messages that the CTP system logs. The node prompts you to specify the number of most recent events to be reviewed and the number of events to be presented per page.

## Set Lab Mode

Set Lab Mode is not a user parameter; this parameter is for system development use only.

## Node Synchronization

---

### Query Sync Status

Figure 87 shows the Node Synchronization menu provided by the CLI, and Figure 88 shows the Node Synchronization Query window provided by CTPView. The Query Node Sync Status option (Option 7 on the CLI menu) provides details of the current state of the node synchronization:

- PLL Monitor Runtime—Time (in seconds) that the phase lock loop (PLL) has been monitored since the last restart of the CTP or reconfiguration of the CTP reference.
- PLL Locked—Indicates whether the PLL is currently locked to a valid reference (YES) or whether no reference is available (NO).
- PLL Loss Seconds—Indicates the number of seconds during the PLL monitor runtime that the PLL has not been locked.
- Reference in Use:
  - Fixed/Calibrated—The CTP unit is not locked to a reference and has loaded and used the calibrated value (provides improved clock accuracy). Setting a calibrated value is discussed in *Chapter 3, Software Configuration*.
  - Center—The CTP unit is not locked to a reference, and the clock is based on the natural frequency of the internal oscillator.
  - Ref (0–4)—The CTP unit is currently using a reference defined in the configuration.
  - Holdover—The CTP unit acquired a valid reference that was subsequently lost. The clock is adjusted to the reference frequency before its loss, and is held at this adjusted frequency until the reference is restored.
- Reference Info:
  - Valid—Indicates whether the reference is valid for the configuration (Yes) or invalid (No)
  - PPM—Measured difference in parts per million from the current state of the clock and the reference.
  - Count—Progress (1–5) of the system’s assessment of the reference before its use.

- Holdover Info:
  - Valid—Indicates whether the reference is valid for holdover use.
  - Value—Numerical value between 1 and 4096 used to profile the reference for holdover if the reference is lost.
  - Count—Progress (1–5) of the system’s assessment of the reference before determining the holdover value.

**Figure 87: Node Synchronization Status Menu**

```

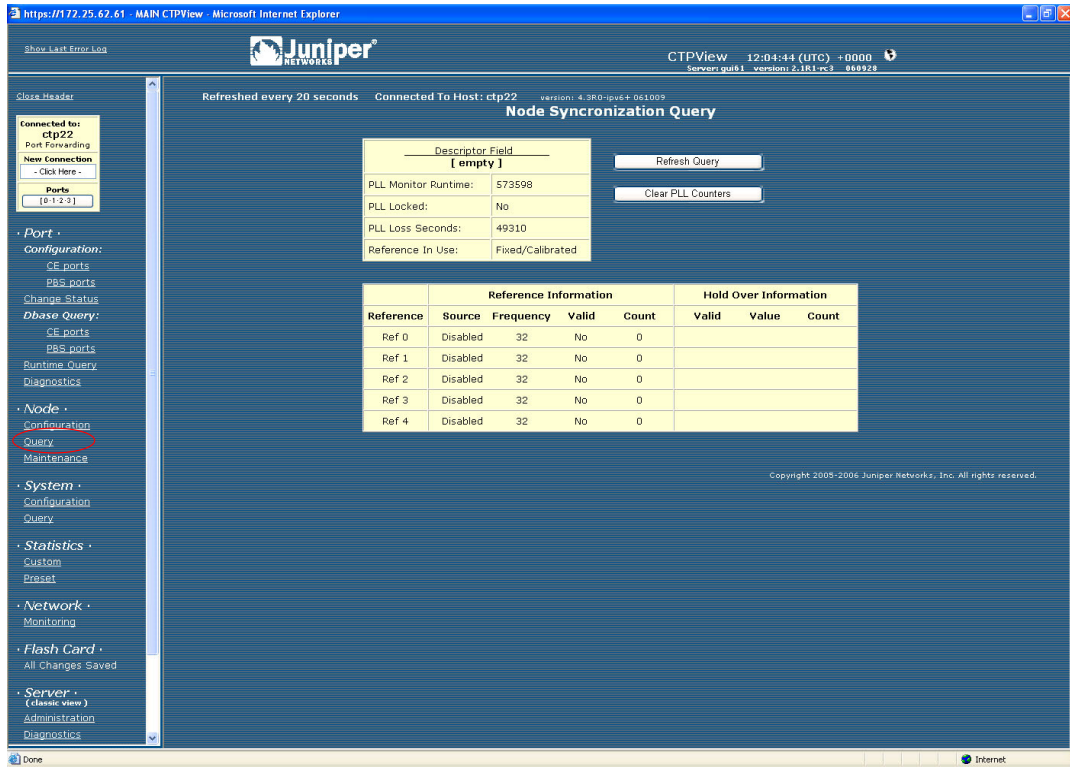
=====
Node Synchronization Menu
=====
Please select a number from the following list:
-----
0) Back to Previous Menu
1) 1st Priority, Reference 0: Disabled
2) 2nd Priority, Reference 1: Disabled
3) 3rd Priority, Reference 2: Disabled
4) 4th Priority, Reference 3: Disabled
5) 5th Priority, Reference 4: Disabled
6) 32 kHz Ref Output:          NO
7) Query Node Sync Status
8) Measure Ref Inputs
9) Calibrate Node to Current Reference
----- Your choice [2]: 7

Node Synchronization Info
=====
PLL Monitor Runtime: 1056
PLL Locked:          NO
PLL Loss Seconds:   1056
Reference in use:    Fixed/Calibrated
+-----+-----+
| Reference Info | HoldOver Info |
+-----+-----+
Ref | Valid   PPM Count | Valid Value Count |
====|=====|=====|=====|
0:  |-----|-----|-----|
1:  |-----|-----|-----|
2:  |-----|-----|-----|
3:  |-----|-----|-----|
4:  |-----|-----|-----|

Clear Counters? y[n]:

```

Figure 88: CTPView Node Synchronization Query Window





## Chapter 5

# Security Profile Menu

This chapter describes security profile options available on CTP systems through the command-line interface (CLI). The chapter contains the following sections:

- Overview on page 93
- User Management on page 94
- Password Management on page 95
- Secure Log Management on page 96
- Login Banner on page 97

## Overview

---

The Security Profile menu is available from the Node Operations menu to administrators who have the root password. The Security Profile menu provides the following functions:

- User management
  - Adding or deleting user and administrator profiles
  - Displaying user and administrator profiles
- Password management
  - Displaying and managing password expirations
  - Displaying and managing password requirements
- Secure log management
  - Scanning and viewing the secure log
  - Following log entries
  - Copying logs to a remote host
  - Configuring and showing remote logging options

## User Management

User management functions are provided by Option 1 from the Security Profile's Main menu (Figure 89). The submenu allows the security administrator access to the following functions:

- Users and administrators logged in to the CTP—Users are able to execute menu commands to query the status of the ports and clocking. Administrators can configure the CTP system, configure loops and BERTs, and query the status of the ports and clocking.
- User and administrator accounts currently configured.
- Option to add or delete user accounts.

**Figure 89: User Administration Menu**

```

*****
****          Security Profile Menu V 1.0          ****
****   Host lab_top: Mon Apr 11 14:56:20 2005
****   User root logged in from 10.0.1.27 as ctp_cmd
****   ****   ****       All actions are logged       ****   ****   ****
*****

Main Configuration Menu

Please choose a menu item from the following list:
0) Exit Security Profile Menu
1) User Management
2) Password Management
3) Secure Log Management
4) Change login banner

Please input your choice [1]:

*****
****          Profile Menu V 1.0          ****
****   Host lab_top: Mon Apr 11 14:56:42 2005
****   User root logged in from 10.0.1.27 as ctp_cmd
****   ****   ****       All actions are logged       ****   ****   ****
*****

User Management Menu

Please choose a menu item from the following list:
0) Return to main menu
1) List users currently logged on
2) List user & admin accounts
3) Add user or admin accounts
4) Delete user or admin account

Please input your choice [1]:
    
```

## Password Management

Password management functions are provided by Option 2 from the Security Profile's Main menu (see Figure 89). The submenu (Figure 90) provides a list of password management functions.

**Figure 90: Password Management Menu**

```
*****
****          Security Profile Menu V 1.0          ****
**** Host lab_top: Mon Apr 11 15:08:40 2005
**** User root logged in from 10.0.1.27 as ctp_cmd
**** **** **** All actions are logged **** **** ****
*****
```

### Password Management Menu

Please choose a menu item from the following list:

- 0) Return to main menu
- 1) List user & admin accounts
- 2) Display password expiration details
- 3) Manage password expiration details
- 4) Show password requirements
- 5) Manage password requirements

When you select Option 2, you see the password expiration details for a user, including the life of the password, days before expiration before a warning is provided, maximum number of inactive days after expiration when the password can be changed, and the password expiration and inactivity dates. Figure 91 shows an example of the display of password expiration details.

**Figure 91: Display of Expiration Details**

```
Displaying the password aging setting for a user.
Input the username to query, hit return to exit: jim1
Minimum:      10
Maximum:     90
Warning:      3
Inactive:     45
Last Change:      Mar 31, 2005
Password Expires: Jun 29, 2005
Password Inactive: Aug 13, 2005
Account Expires:  Jun 29, 2005
```

When you select Option 3 from the Password Management menu, you can configure the password expiration details of a specific user:

- Maximum number of days a password will remain valid (5 to 9999 days)
- Minimum number of days between password changes (0 to 90 days)
- Days before expiration that an expiration warning is provided (0 to 80 days)
- Number of days after expiration that the user account is locked out (0 to 100 days)

When you select Options 4 and 5 from the Password Management menu, you can view and configure password requirements. The configurable password requirements are as follows:

- Password length (0 to 20 characters)—No restriction is enforced if you enter 0.
- Minimum number of lowercase characters (0 to 6)—No restriction is enforced if you enter 0.
- Minimum number of uppercase characters (0 to 5)—No restriction is enforced if you enter 0.
- Minimum number of numerals (0 to 4)—No restriction is enforced if you enter 0.
- Minimum number of other characters (nonalphanumeric; 0 to 3)—No restriction is enforced if you enter 0.

## Secure Log Management

---

The secure log provides an audit trail of user and administrator activity on the CTP system. Figure 92 shows the Secure Log Management submenu, which you access from the CLI Security Profile menu > Option 3. You can view the log by selecting Option 1—Scan/view log entries. Use the Page Up and Page Down keys to move through the log; press q to exit the log view. You can view the secure log in real time when you select Option 2—Follow log entries. Enter ^c to terminate the real-time view and return to the submenu.

Options 3 and 4 allow you to copy the secure logs to a remote host or to configure a host for remote logging. Option 5 shows the remote logging configuration.

**Figure 92: Secure Log Management Submenu**

```
Please choose a menu item from the following list:
```

- 0) Return to main menu
- 1) Scan/view log entries
- 2) Follow log entries
- 3) Copy logs to remote host
- 4) Configure remote logging options
- 5) Show remote logging configuration

```
Please input your choice [1]:
```

## Login Banner

---

You can configure the login banner by selecting Option 4—Change login banner—which you access from the CLI Security Profile menu > Option 4. The banner can have multiple lines, up to 80 characters. The input is complete when you enter a blank line. Figure 93 shows an example of changing the login banner.

**Figure 93: Login Banner**

```
Main Configuration Menu

Please choose a menu item from the following list:
0) Exit to shell
1) User Management
2) Password Management
3) Secure Log Management
4) Change login banner

Please input your choice [1]: 4
In order to input a banner message to be displayed to users before they
log in, you will be asked to input alphanumeric text at the keyboard.

Would you like to continue? [n] y
Input your text, 80 characters to a line. Enter a blank line when you are
finished.
CTP Security Banner
Lab Test Unit
```



## Chapter 6

# CTPView Server Management, Network Monitoring, and Network Performance Reporting

This chapter provides information about the administration of the CTPView server, and about using the CTPView to monitor, manage, and maintain CTP systems, and to produce reports on IP network performance.

This chapter contains the following sections:

- Overview on page 99
- CTPView Server Administration on page 100
- Node Maintenance Functions on page 106
- Network Monitoring on page 114
- Statistics and IP Performance Reports on page 116

## Overview

---

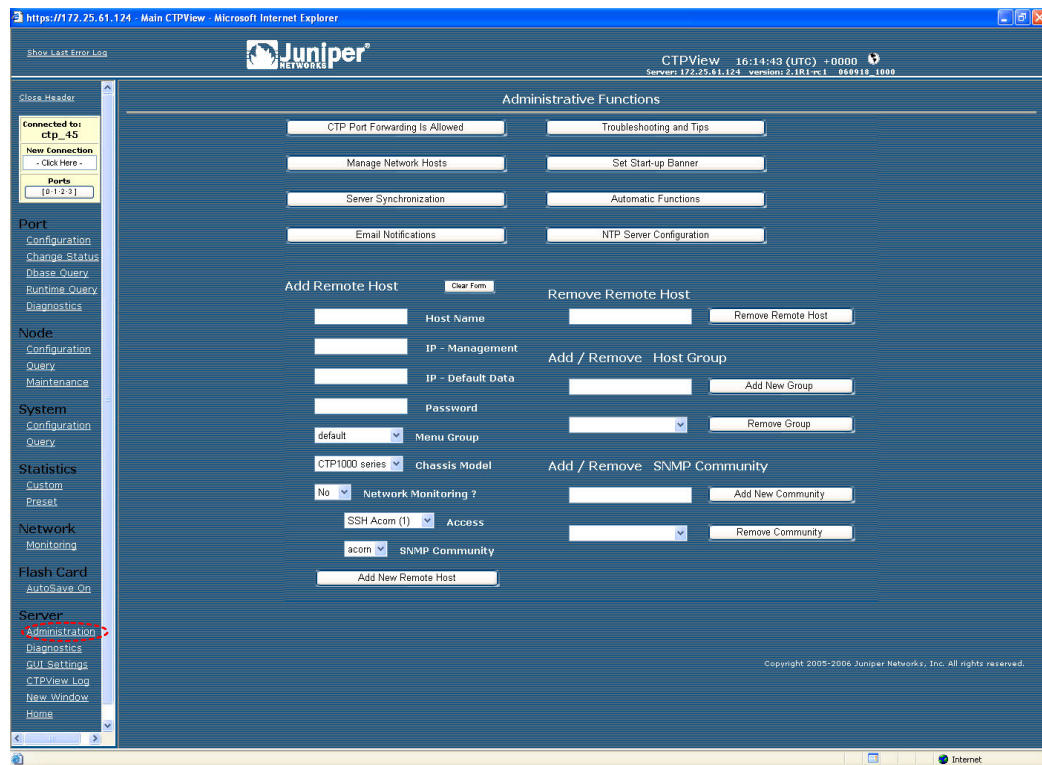
The following information is covered in this chapter:

- CTPview server administration—Adding, deleting and managing groups and CTP hosts, configuring e-mail notifications, synchronizing multiple CTPView servers, and configuring automatic functions.
- Node maintenance functions—Saving CTP port and node configurations to be used as templates for other port and node configurations, creating reports on port provisioning, managing the upgrade and distribution of CTP software, saving CTP backup configurations and restoring a configuration to a CTP.
- Network monitoring—Monitoring the reachability of CTP hosts and the status of ports.
- Statistic and IP performance reports—Creating plots of IP performance and port buffers including buffer states, IP delay jitter, round trip delay and missing IP packets.

## CTPView Server Administration

Figure 94 shows the CTPView Administrative Functions window. This window allows you to add and delete CTP hosts and groups, manage and update the configuration of existing CTP hosts, configure e-mail notifications, configure automatic functions, and synchronize CTPView servers. Information about using these functions is provided in this section.

**Figure 94: CTPView Administrative Functions Window**



### Adding and Deleting CTP Hosts and Groups

CTPView allows you to create groups that multiple CTP hosts are then logically associated with. The host groups allow easier connection and monitoring of CTP systems, especially as networks become large and complex. Group names can have 3 to 20 characters that include letters, numbers, hyphens and underscores. The groups and names are created based on your requirements, and are often based on geography or application type. If you do not define a group, then the CTP hosts are placed in the Default group.

The “Connected to” area in the upper left pane provides a good example of how host groups are used. The available groups are first displayed in the window, and then the CTP hosts within the group are displayed after the group is selected. This process makes connecting to a CTP easier compared with a connect window that lists every CTP host in a large network.



Figure 94 on page 100 shows the area that you use to add a host group and the area that you use to delete a selected group.



**NOTE:** Deleting a group will delete all the CTP hosts within the group. Use the Network Hosts window to move CTP hosts to other groups before the group is deleted.

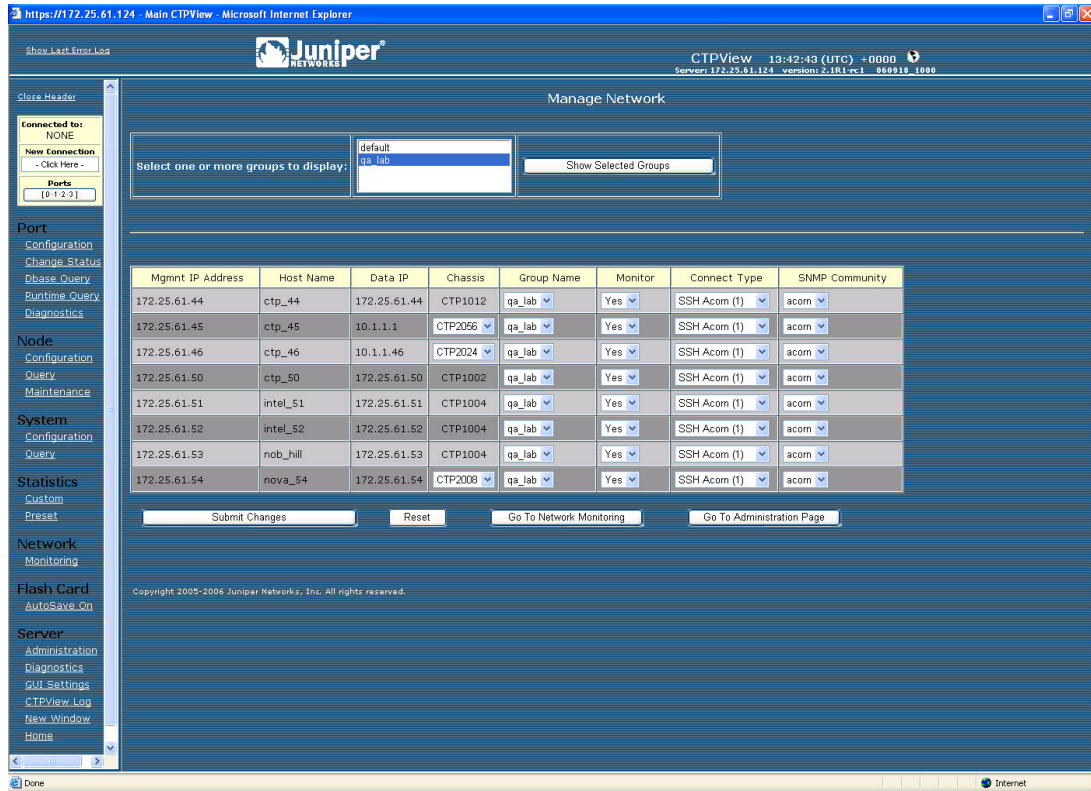
---

You add CTP systems to CTPView using the Add Remote Host field and drop-down menus (Figure 94 on page 100). To successfully add a CTP host, fill in the following fields, or select the appropriate parameter from the drop-down menus:

- Host Name—A unique name for the CTP host.
- IP-Management, IP-Default Data—IP addresses used for CTPView management connection and circuit data flow.
- Password—Password on the CTP host that CTPView will use when accessing the system.
- Menu Group—The group that the CTP host is be logically associated with. The available group names are displayed, and Default is used when no groups have been defined.
- Chassis Model— CTPView will determine the type of CTP1000 system. You must specify the type of CTP2000 system when applicable (CTP2008, CTP2024, and CTP2056).
- Network Monitoring—CTPView is capable of monitoring remote CTP hosts (see Network Monitoring on page 114). The drop-down list provides the option of including or excluding the CTP host for monitoring.
- Access—When selected for monitoring, CTPView must periodically access the CTP host. The type of access can be either SSH or SNMP, as specified in this drop-down menu.
- SNMP Community—Defines the SNMP community of the CTP host.

### **Managing CTP Network Hosts**

The Manage Network window, which you access by clicking Manage Network Hosts in the Administration Functions window, allows you to change the configuration of an existing host (Figure 95). After selecting the appropriate group, you are able to change the type of CTP system, group association, monitoring, monitoring connection type, and SNMP community of any CTP host within the selected group. The changes do not take effect until you click the **Submit** button.

**Figure 95: Managing Network Hosts with CTPView**

## Configuring E-Mail Notifications

You may want to create e-mail notifications based on specific server and network problems identified by CTPView. As shown in Figure 96, you can create a list of specific e-mail addresses to be notified based on the type of problem. The problems that can initiate an e-mail notification are specified in the following CTPView areas (Figure 96):

- CTP host Unreachable
- CTP has become Check Host
- CTP Port has become Active-Down
- CTP Port has become Assessing
- CTP Port has become Active-Up:
- CTP Port has become Disabled

**Figure 96: Configuring E-Mail Notifications with CTPView**

## Synchronizing CTP Servers

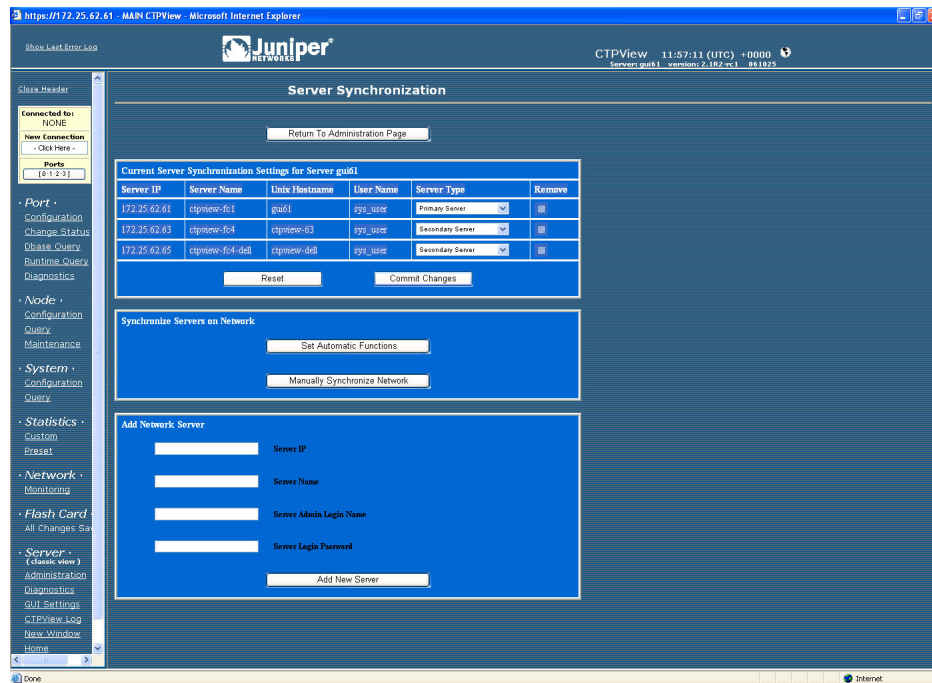
Many networks use multiple CTPView servers, and it is helpful when changes on one CTPView server designated as the primary server are automatically distributed to other CTPView servers in the network. Synchronization eliminates the need to make repetitive entries on multiple systems.

A good example of the information that is distributed when you synchronize CTP servers is changes to the groups and CTP hosts. Note that changes to the actual CTP configuration, such as configuring a port, do not require synchronization between the CTPView servers, because CTPView obtains the current configuration directly from the CTP system each time it connects to the unit.

The synchronizing function can also transfer CTP statistical data collected by the primary CTPView server to secondary CTPView servers. The overall network bandwidth used to collect the statistics from each CTP system is reduced when the information is collected only by the primary CTPView server, as compared with having every CTPView server collect the data.

Figure 97 shows the Server Synchronization window used on the primary CTPView server to add servers that will use the synchronizing process. After you have added the server, you select the primary and secondary CTPView servers and commit the change. You can then manually synchronize the CTPView servers, or you can schedule synchronization as an automatic function (see Configuring Automatic Functions on page 104).

Figure 97: Synchronizing CTP Servers with CTPView



## Configuring Automatic Functions

Actions that should periodically occur are configured in the CTPView Automatic Functions window (Figure 98). This window specifies the following actions:

- Verify Email Notification Script Is Running—A software script runs in the background to create the emails used for notifications. This automatic function verifies that the scrip is running, and restarts the script if necessary.
- Gather Remote Host Statistical Data—This function retrieves the data used to create the plots of IP Buffer Usage, Delay Jitter, Round Trip Delay, and Missing Packets.
- Synchronize Secondary Servers—This function copies information from the Primary Server to each Secondary Server. The information includes ssh keys, archived port configurations, email notifications, port forwarding settings, trigger point for hard drive warning usage level, and CTP identification information (IP address, host name, group name).

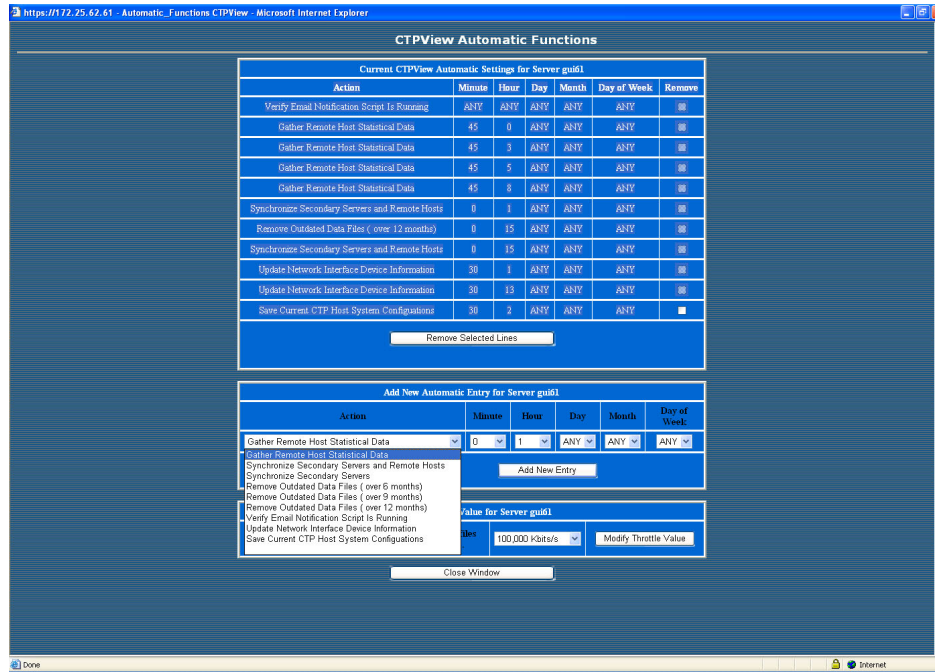
- Synchronize Secondary Servers and Remote Hosts—This function copies information from the Primary to each Secondary Server and CTP Host. The information transferred to the Secondary Servers include ssh keys, archived port configurations, email notifications, port forwarding settings, trigger point for hard drive warning usage level, CTP identification information (IP address, host name, group name) and CTP statistical data. The function copied from the Primary server to CTP Hosts include each Secondary Servers ssh key.
- Remove Outdated Data Files (over 6, 9 or 12 months)—CTPView removes older files (typically CTP Host Statistical data) based on the age of the data. The age criteria can be set to 6, 9 or 12 months. It is recommended that this automatic function be configured to insure that the file system does not become filled.
- Update Network Interface Device Information—CTPView collects network interface device information. Use this automatic function if you configure virtual IP addresses using the CLI or if you use multiple CTPView servers to configure CTP hosts and virtual IP addresses.
- Save Current CTP Host System Configuration—CTPView saves every CTP host configuration at the specified time interval. CTPView will save the 10 most recent configurations.

In the CTPView Automatic Functions window (Figure 98), you select the action in the area titled Add New Automatic Entry for Server *serverName*, and you specify when the action should take place. For example, the action being added in Figure 98 would occur every day at 01:00.

It may be necessary for an action to occur multiple times in a day. To add this configuration, you can add multiple entries for the same action and specify a different time for each entry. In the example shown in Figure 98, the Gather Remote Host Statistical Data action is to occur four times every day—at 00:45, 03:45, 05:45 and 8:45.

You can limit the bandwidth used to copy and retrieve information from the CTP hosts by using the Modify Throttle Value for Server *serverName* area in the CTPView Automatic Functions window. Throttling the bandwidth is typically not necessary and may be required only when the local LAN segment experiences significant load and bandwidth limitations.

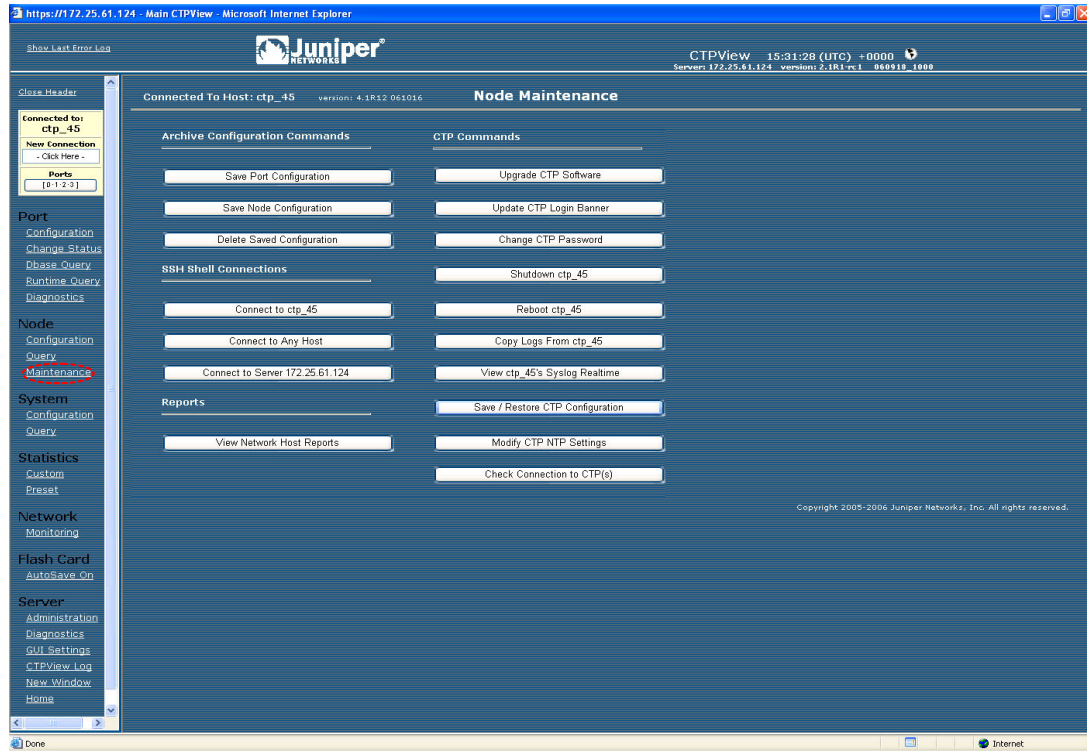
Figure 98: Configuring Automatic Functions with CTPView



## Node Maintenance Functions

The Node Maintenance window (Figure 99) allows you to perform functions such as distributing and updating CTP software, saving port and node configurations, saving and restoring CTP databases, and creating reports that detail the provisioning of ports. Other functions provided are similar to those in the Node Operations command-line interface (CLI) menu, which includes opening SSH connections, shutting down and rebooting systems, and modifying banners.

Figure 99: CTPView Node Maintenance Window

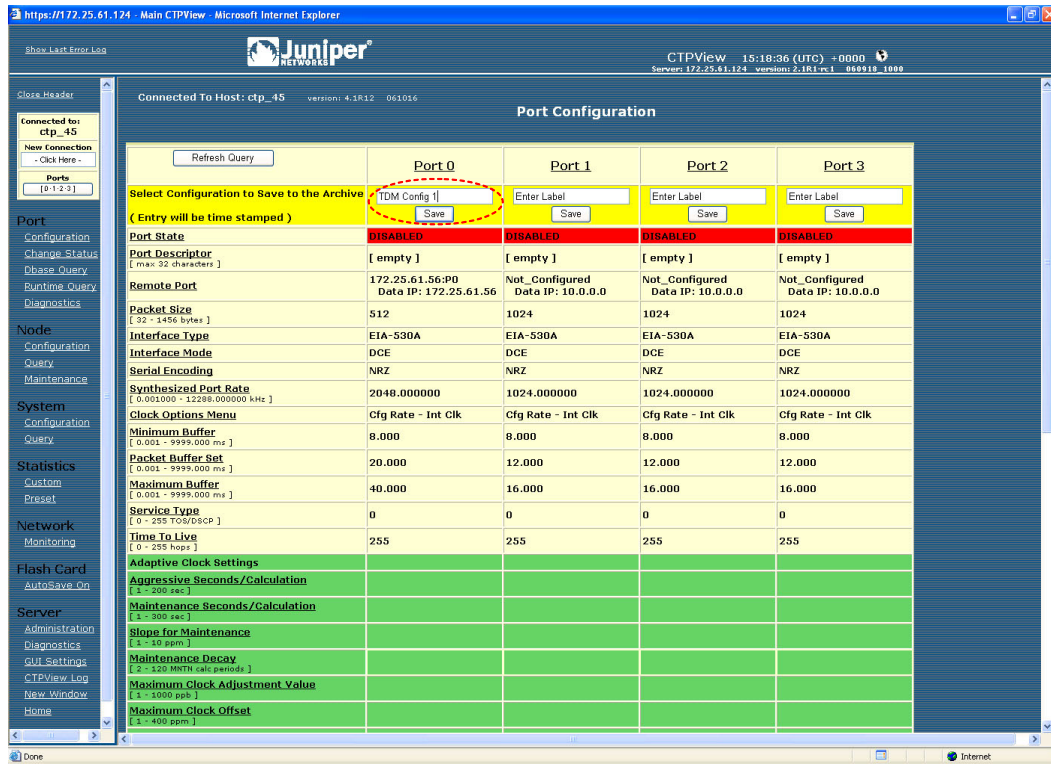


### Saving Port, Node, and CTP Configurations

CTPView allows you to save a port configuration using your naming convention. The saved port configuration can be applied as a template to other ports when you are configuring them. Reusing the configuration eliminates repetitive entries for common configurations. The saved configuration includes all the port attributes except the remote host and port.

Figure 100 shows the window for saving a port configuration. You enter a name above the port whose configuration you want to save, and then you click the **Save** button.

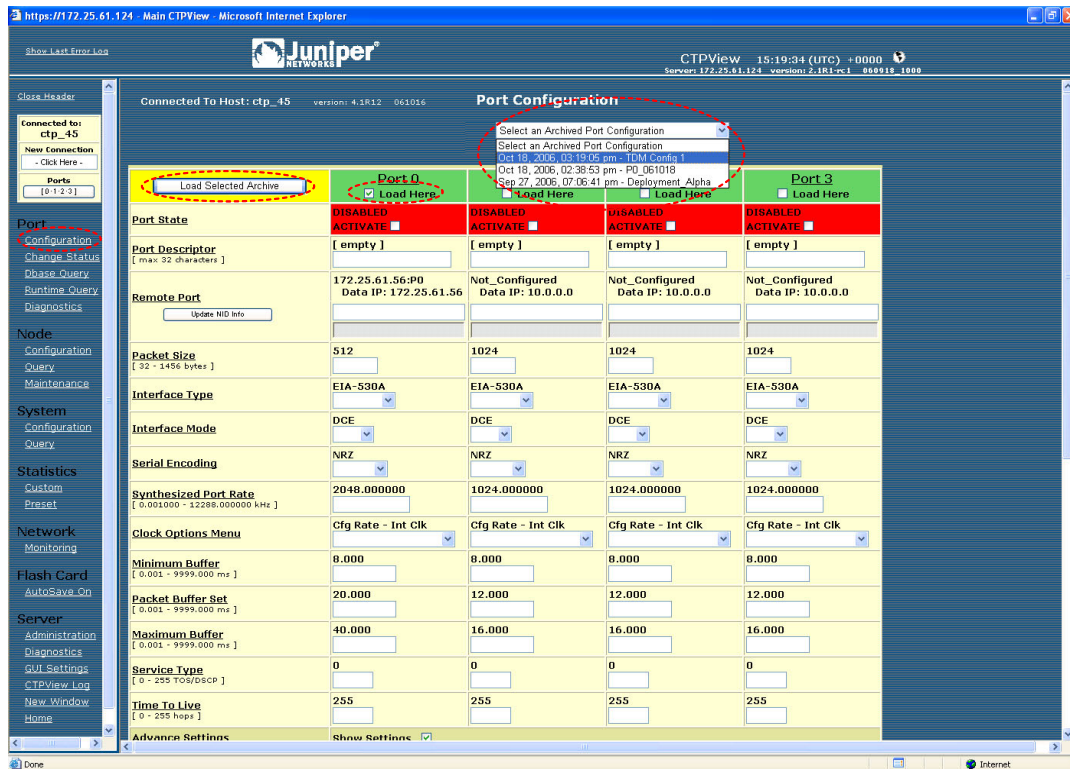
**Figure 100: Saving a Port Configuration with CTPView**





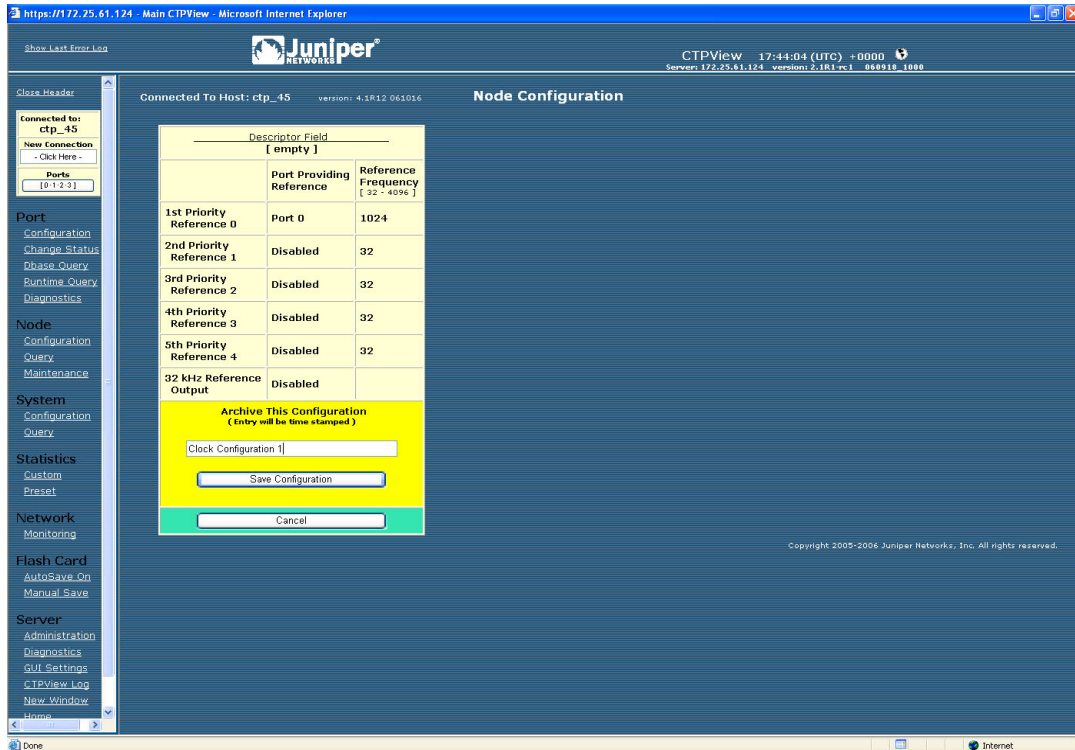
You can apply a saved port configuration to another port by using the Port Configuration window (Figure 101). First, select the saved port configuration from the Archived Port Configuration drop-down menu, and then click the **Load Here** button on the appropriate port(s). The configuration is loaded when you click the **Load Selected Archive** button. The changes do not take effect on the CTP system until you click the **Submit** button.

**Figure 101: Applying a Save Port Configuration with CTPView**



You access the Node Configuration window (Figure 102) by selecting Save Node Configuration in the Node Maintenance window (Figure 99 on page 107). This window allows you to save the clock configuration for the CTP system as a template, which you can then apply to other node configurations.

**Figure 102: Saving a Node Configuration with CTPView**

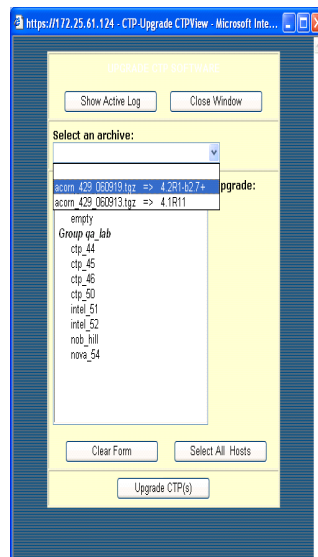




## Updating CTP Software

You can use CTPView to manage the distribution and installation of CTP operating systems archives. The software update window (Figure 104), which you access from the Node Maintenance window (Figure 99 on page 107), allows you to select from the available archives provided and then to select the CTP system(s) to be updated. You can select all the CTP systems, or you can specify a system by pressing the Ctrl key when you select each system. CTPView updates the target CTP systems sequentially, and provides a window with the status of the upgrade process.

**Figure 104: CTPView Software Update Window**



## Maintenance Reports

Node maintenance reports detail how ports are provisioned on one or more CTP systems. You can format reports for printing and sort the columns.

The Channelization Report provides a summary of all the ports and includes the source IP address, remote IP address and port, interface type, and port speed. The CCSD report includes only ports that are configured, and the Non-Configured Port Report shows ports that are in the default configuration. Figure 105 shows an example of the Channelization Report.

**Figure 105: Node Maintenance Report**

The screenshot displays the Juniper CTPView Network Reports interface. The main content area is titled "Channelization Report" and includes a table of port configurations. The interface also features a sidebar with navigation options and a top navigation bar with the Juniper logo and system information.

**Channelization Report Table:**

| Source IP Address | Source Host Name | Source Port Number | Destination IP Address | Destination Host Name | Destination Port Number | Source Interface Type | Source Port Speed | Source Port Descriptor | Last Update           |
|-------------------|------------------|--------------------|------------------------|-----------------------|-------------------------|-----------------------|-------------------|------------------------|-----------------------|
| 172.25.61.52      | intel_52         | 0                  | 172.25.61.51           | intel_51              | 0                       | EIA50A                | 4096              |                        | 02:31:03 Oct 18, 2006 |
| 172.25.61.52      | intel_52         | 1                  | 172.25.61.51           | intel_51              | 1                       | EIA50A                | 4096              |                        | 02:31:03 Oct 18, 2006 |
| 172.25.61.52      | intel_52         | 2                  | 172.25.61.52           | intel_52              | 3                       | EIA50A                | 1024              |                        | 02:31:03 Oct 18, 2006 |
| 172.25.61.52      | intel_52         | 3                  | 172.25.61.52           | intel_52              | 2                       | EIA50A                | 1024              |                        | 02:31:03 Oct 18, 2006 |

## Network Monitoring

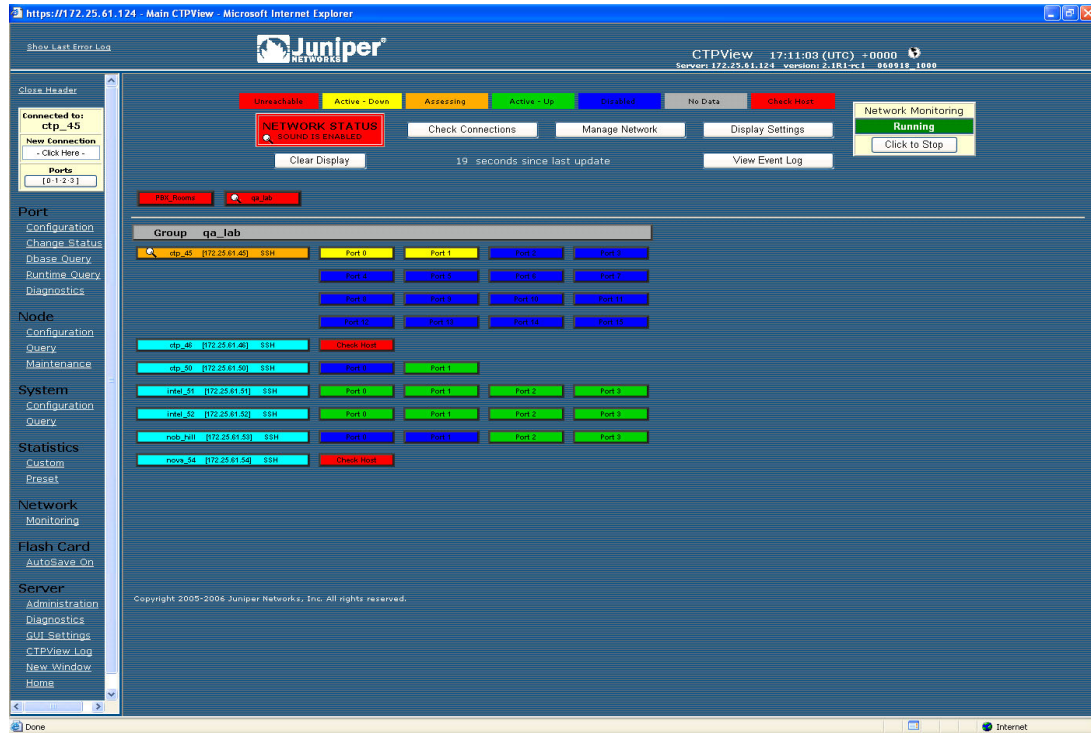
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When Network Monitoring is in the Running state, CTPView periodically checks the reachability of CTP hosts if the host is configured with network monitoring enabled. If the host is reachable, CTPView obtains the status of the CTP host ports. Selecting Network Monitoring the left CTPView pane opens the network monitoring window, which provides a summary of both the CTP host reachability and the port status. The highest alarm level on a CTP percolates up to the Group icon.

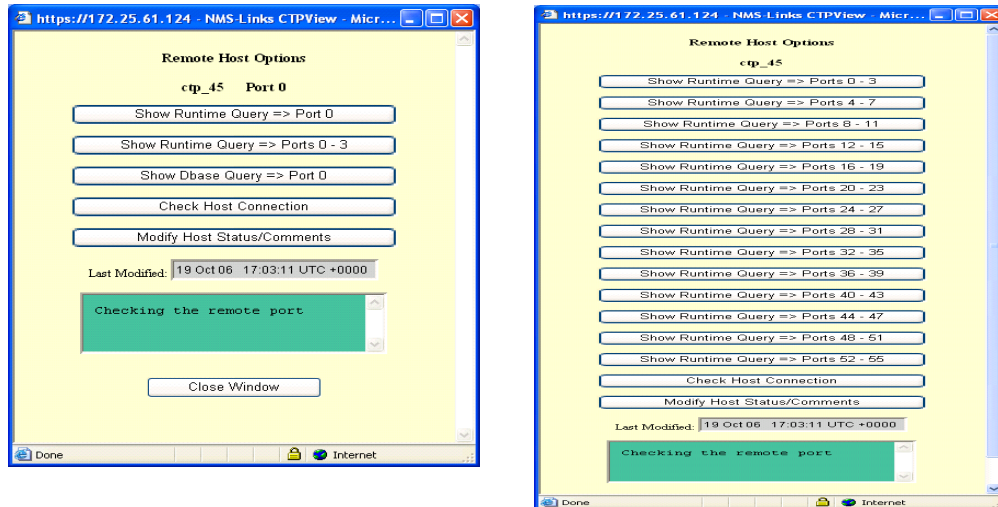
Figure 106 provides an example of a network monitor window. When you select a group, the window displays all CTP hosts within the group. The status or alarm associated with each CTP host and port is displayed:

- Unreachable (Alarm)—The CTPView server cannot reach the CTP host. This alarm could be due to a IP network problem, a site problem (such as a power outage), or a CTP equipment or configuration issue.
- Active-Down (Alarm)—The port on the CTP system is configured as active, but the port state is Down (that is, no circuit is established to the port).
- Assessing (Alarm)—The problem is being assessed, and a user has placed the CTP host into an Assessing state, as described below.
- Active-Up (Status)—The port is configured as active, and the port state is Up (that is, a circuit is established to the port).
- Disabled (Status)—The circuit is configured as disabled.
- No Data (Status)—No data could be obtained from the CTP host, a status that requires further investigation
- Check Host (Alarm)—The CTP host is reachable across the network, but CTPView is unable to communicate with the system and obtain the status of the ports.

Figure 106: Network Monitoring Window



Additional information and functions are available, as shown in Figure 107. You access them by clicking a CTP host or port. The functions available include quick access to the runtime and database queries (see *Chapter 4, Software Queries and Operations*). You can also create and modify comments about the problem, and change the alarm level to Assessing by clicking the **Modify Host Status/Comments** button.

**Figure 107: Additional Functions Accessed from the CTPView Network Monitoring Window**

Remote Host Options when Port is Selected

Remote Host Options when Node is Selected

## Statistics and IP Performance Reports

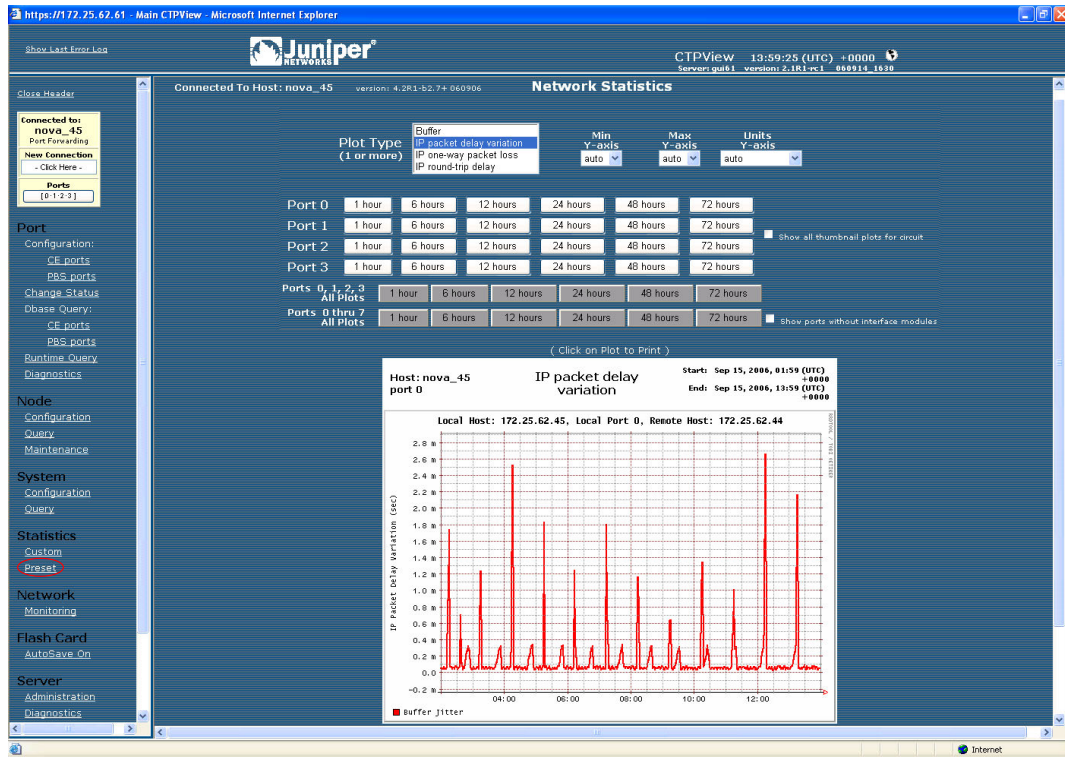
CTPView periodically retrieves IP performance information from each CTP system. The data retrieved includes 1-minute observations of the maximum, minimum, and average buffer state; calculated IP packet delay variance (jitter); round-trip delay; and missing packet counts. CTPView allows you to review this data using either preset or custom plots.

Preset plots are provided for the currently connected CTP system. The time periods displayed include the preceding 1, 6, 12, 24, 48, or 72 hours. The plot's y axis will be automatically scaled unless you specify the axis units with the minimum and maximum value in the three drop-down menus provided. You can make plots for a single port, for the four ports currently selected, or for all the ports on the CTP system. You can select and expand thumbnail plots.



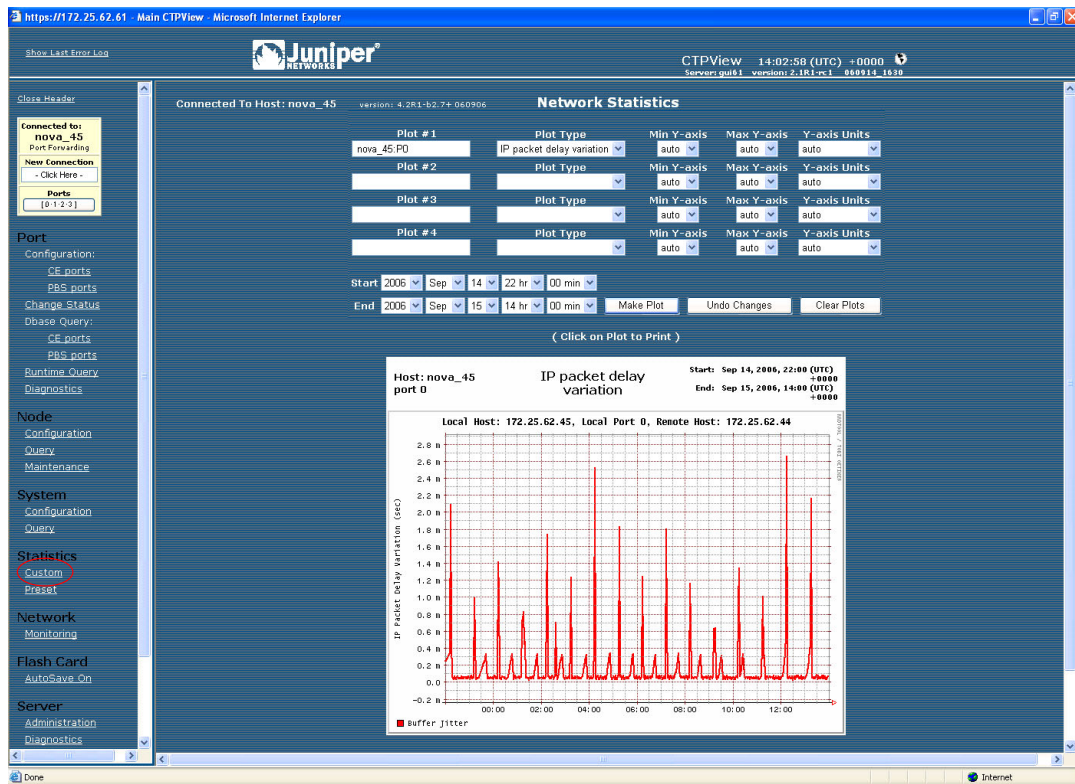
Figure 108 is an example of a preset report showing packet delay variance received at a port over a 12-hour period.

**Figure 108: Viewing a Preset Statistics Report with CTPView**



Custom statistics plots allow you to display graphs from one or more CTP systems during any period of time when CTPView has retrieved data from the system(s). The plot's y axis is automatically scaled unless you specify the axis units with the minimum and maximum value in the drop-down menus provided. You can create up to four plots by specifying the CTP system and port, report type, and the start and finish time of the plot. Figure 109 shows an example of a custom plot.

**Figure 109: Viewing a Custom Statistics Report with CTPView**



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