# Crestron **C2N-NPA8**
## Network Poll Accelerator

Operations Guide

**CRESTRON**®

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# Contents

# Network Poll Accelerator: C2N-NPA8

## Introduction

### Features and Functions

The Crestron® Network Poll Accelerator (C2N-NPA8) is a device that maintains high data throughput and low data latency via Cresnet® when a large number of Cresnet devices communicate with a single 2-Series control system. When connected to select Crestron 2-Series control systems via a high speed serial or Ethernet connection, the C2N-NPA8 can provide reliable, high-speed communications between the control system and up to 252 Cresnet devices.

*Functional Summary*

- Reliable, high-speed communications between select Crestron 2-Series control systems and up to 252 Cresnet devices
- Eight segments with four mini-Cresnet connectors per segment
- Independently operated segments provide fault tolerance should an individual segment fail
- Communicates with select 2-Series control systems via high-speed serial or 10/100 Base-T Ethernet (refer to "Compatible Control Systems" on page 6 for a list of compatible control systems)
- Console function to configure device settings and monitor diagnostics via DB-9 RS-232 connector
- Each Cresnet ID can be viewed with the Network Analyzer

Placing a large amount of Cresnet devices on a control system can slow down polling time as each Cresnet device is polled sequentially by the control system. By breaking down the Cresnet system into segments, multiple segments can be polled simultaneously by the control system, hence improving response time.

Similarly, high-traffic devices such as touchpanels, camera controls, and other devices require more network bandwidth as they transmit and receive larger amounts of data. By placing these devices on their own segments, other segments can be used for low-traffic devices such as wall keypads allowing Cresnet traffic to flow more efficiently.

The C2N-NPA8 is typically recommended for networks with 20 or more devices (not including button panels). Consult with Crestron's True Blue Support to determine if a C2N-NPA8 would be beneficial to your system.

The C2N-NPA8 is comprised of 32 Cresnet connectors spread over eight segments (NET A – NET H). These segments, along with the Cresnet port on the control system allow the connection of up to 252 Cresnet devices.

The C2N-NPA8 is powered by a 24 VDC signal (from a 2-Series control system or Crestron power supply) applied to the 3-position mini-terminal block connector on either the NET A or NET B segments. Power is provided to the other segments by connecting jumper wires to each segment that requires power. Light Emitting Diodes (LEDs) indicate power and communication activity on each segment.

For detailed information on the C2N-NPA8 input and output ports/connectors, refer to "Physical Description".

## Specifications

Specifications for the C2N-NPA8 are provided below.

*C2N-NPA8 Network Poll Accelerator Specifications*

| SPECIFICATION | DETAILS |
|---|---|
| Power Requirements | 10 Watts (0.42 Amp @ 24VDC)<br>Supplied from control system or Crestron power supply |
| Connectors/Ports<br>  PWR | 8 – 3-position mini-terminal block connector. Provides 24V input (from power supply or powered segment) and 24V output (to segment on C2N-NPA8). One per segment. |
|   NET<br>  LAN<br>  COMPUTER<br>  COM | 32 – Cresnet 4-position mini-terminal block connectors, divided over 8 segments<br>1 – RJ45 10/100 Base-T Ethernet port<br>1 – DB9F PC Interface for console functions<br>1 – DB9F Interface for high-speed serial connection to control system |
| Cresnet Devices Supported | 252[1] |
| Firmware | V3105.CUZ or later |
| Control System Update Files[2,3]<br>      2-Series Control System<br>      MP2/MP2E/MC2E/MC2W | Version C2.V3112.CUZ or later<br>Version MP2.V3112.CUZ or later |
| Environmental Temperature | 41° to 113°F (5° to 45°C) |
| Humidity | 10% to 90% RH (non-condensing) |
| Rack Space | 3 Rack Units when used with optional C2N-RMAK |
| Dimensions & Weight | Height:   5.19 in (13.18 cm)<br>Width:    13.25 in (33.66 cm)<br>Depth:    3.42 in (8.69 cm)<br>Weight:  1.91 lb (0.87 kg) |

1. A control system can address 252 devices (NET IDs 03 to FE).

2. The latest versions can be obtained from the Downloads | Software Updates section of the Crestron website (www.crestron.com). Refer to NOTE below.

3. Crestron 2-Series control systems include the AV2, PAC2, PRO2, and RACK2. For a complete list of compatible control systems, refer to "Compatible Control Systems" on page 6.

**NOTE:** Crestron software and any files on the website are for Authorized Crestron dealers and Crestron Authorized Independent Programmers (CAIP) only. New users may be required to register to obtain access to certain areas of the site (including the FTP site).
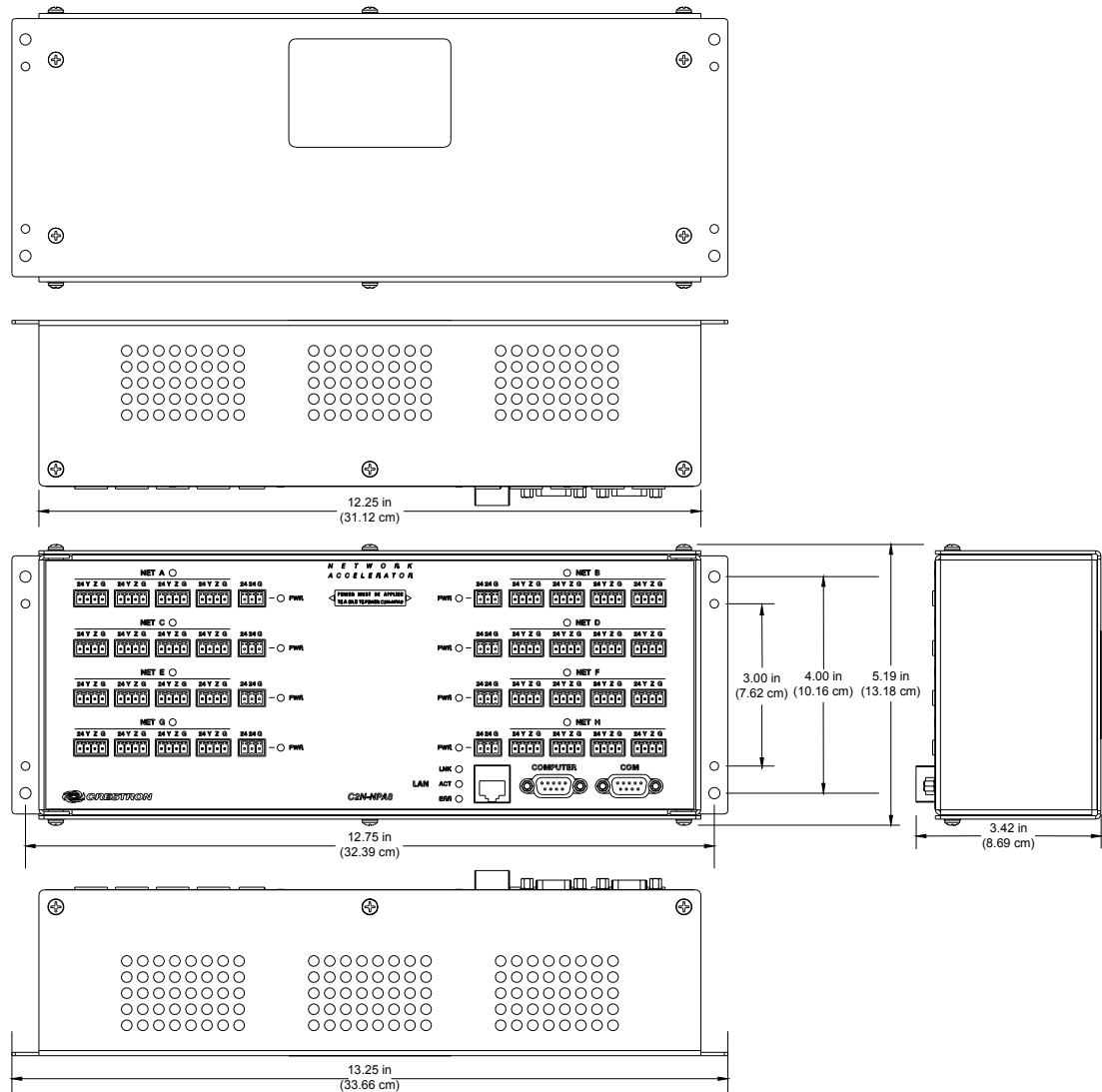
## Physical Description

The C2N-NPA8 Network Poll Accelerator is housed in a black enclosure with labeling on the front panel. Refer to the following illustrations for a detailed view.

*C2N-NPA8 Physical View*
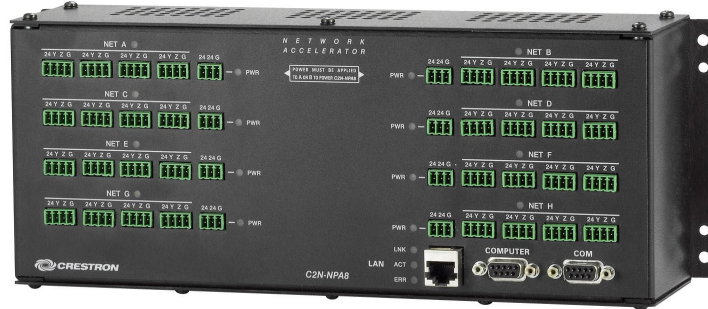


*C2N-NPA8 Physical Views*

### *Ports/Connectors*

The ports/connectors on the top panel of the C2N-NPA8 are described in the following paragraphs.

**NOTE:** Interface connectors for the PWR and NET ports are provided with the C2N-NPA8.
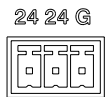
### NET A - H

These eight segments provide 32 standard (24 Y Z G) Cresnet connectors (in groups of four) for Cresnet device connections. Each group of four supports 32 electrical Cresnet connections.

**NOTE:** Although there are eight segments with four connectors each, a control system can only address 252 devices (03 through FE).

### POWER

These connectors (quantity eight) are used to supply 24VDC power to each segment as well as providing a jumping point for powering another segment on the C2N-NPA8. To power the C2N-NPA8, 24VDC power must be supplied to a Cresnet connector or the power connector on NET A or NET B. For more details, refer to "Power Connections" on page 12.

**CAUTION:** Use only Crestron power supplies for Crestron equipment. Failure to do so could cause equipment damage or void the Crestron warranty.

### LAN

An 8-position RJ45 port is used for an Ethernet connection to a control system with Ethernet capabilities. Refer to the following table for the Ethernet connector signals and use an appropriate cable (not supplied). For information on connecting the LAN port to a control system, refer to "Configuring for TCP/IP Communications" on page 15.

**NOTE:** Only one C2N-NPA8 can be connected to a control system.

*LAN Connector Specifications*

| TYPE | PIN | SIGNALS |
|------|-----|---------|
| 8-Position RJ45 | 1 | TD+ |
| | 2 | TD- |
| | 3 | RD+ |
| | 4 | Connected to pin 5 |
| | 5 | Connected to pin 4 |
| | 6 | RD- |
| | 7 | Connected to pin 8 |
| | 8 | Connected to pin7 |

**NOTE:** To determine which is pin 1 on the cable, hold the cable so that the end of the eight pin modular jack is facing away from you, with the clip down and copper side up. Pin 1 is on the far left.
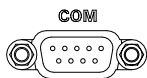
**COMPUTER**

## *COMPUTER*

This DB9 (female) connector is used for console purposes. The C2N-NPA8's Ethernet configuration settings and diagnostics can be accessed through this port. The port is modem compatible. The modem and/or PC program cable are not included. Supports baud rate of up to 115 Kb. Use with a standard DB9 straight through cable (Crestron cable number CNSP-587 or equivalent). Refer to the following table for the cable pinouts. For information on establishing serial communications with the C2N-NPA8, refer to "Establish a Serial Connection" on page 14.

*Standard DB9 Pin Assignments*

| PIN # | ABBREVIATION | DESCRIPTION |
|-------|--------------|-------------|
| 1 | N/A | Not Connected |
| 2 | RD | Receive Data |
| 3 | TD | Transmit Data |
| 4 | N/A | Not Connected |
| 5 | SG | Signal Ground |
| 6 | N/A | Not Connected |
| 7 | RTS | Request To Send |
| 8 | CTS | Clear To Send |
| 9 | N/A | Not Connected |

Male DB9 Connector
1 2 3 4 5
6 7 8 9

Female DB9 Connector
5 4 3 2 1
9 8 7 6

**NOTE:** DTR, pin 4 and DSR, pin 6 are not normally used.

**COM**

## *COM*

This DB9 (female) bi-directional serial port is used for high-speed serial communication between a control system and the C2N-NPA8. Use with a DB9 straight through cable (Crestron cable number CNSP-587 or equivalent).

**NOTE:** Crestron has successfully tested 50-foot serial cable runs without loss of signal quality. Cable runs in excess of 50 feet **may** be subject to signal degradation or errors as cable length increases.

**NOTE:** Only one C2N-NPA8 can be connected to a control system.

### *Indicators*

The C2N-NPA8 indicators are described in the following paragraphs.

## *NET A - H*

The eight **NET (A-H)** activity LEDs illuminate when a device on the respective segment transmits and/or receives data.

## *PWR (Power)*

This LED illuminates when a segment is connected to and receives 24 VDC power from an external power pack or a Crestron control system.

## *LNK*

This LED illuminates when there is a connection to the LAN port.

### ACT

This LED illuminates when there is communication (activity) at the LAN port with an Ethernet network.

### ERR

This LED illuminates when an error condition is detected. This may be the result of hardware or software failure, or a programming error. To determine the actual error condition, examine the message available through the Viewport menu **Functions | 2-Series | Error Log | Show Error Log.** Refer to the note on page 22 for a definition of Viewport.

## Compatible Control Systems

The C2N-NPA8 is compatible with several Crestron 2-series control systems. However, not all of the 2-series products are compatible with the C2N-NPA8. The following table lists 2-series control systems (that are currently available as of this writing) that are compatible with the C2N-NPA8 as well as the communication methods that can be used.

*Processor Compatibility*

| PROCESSOR | SERIAL | ETHERNET |
|-----------|--------|----------|
| AV2 | YES[1] | YES[4] |
| C2N-DVP4DI | NO | YES |
| CNX-DVP4 | NO | YES |
| CP2 | YES[3] | NO |
| CP2E | YES[3] | YES |
| MC2E | YES[3] | YES |
| MC2W | YES[3] | NO |
| MP2 | YES[3] | NO |
| MP2E | YES[3] | YES |
| PAC2 | NO | YES[4] |
| PRO2 | YES[1] | YES[4] |
| QM-RMC | NO | NO |
| QM-RMCRX | NO | NO |
| RACK2 | NO | YES[4] |

1. COM ports C through F are poll accelerator-ready

2. COM ports A through C are poll accelerator-ready

3. COM ports A and B are poll accelerator-ready

4. Requires installation of C2ENET-1 or C2ENET-2 Ethernet card.

**NOTE:** Control systems cannot use a plug in serial card (i.e. a C2COM-3) to communicate with the C2N-NPA8.

## Industry Compliance

As of the date of manufacture, the C2N-NPA8 has been tested and found to comply with specifications for CE marking and standards per EMC and Radiocommunications Compliance Labelling (N11785).

**NOTE:** This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.

- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

- Consult the dealer or an experienced radio/TV technician for help.

# Setup

## Network Wiring

**CAUTION:** Use only Crestron power supplies for Crestron equipment. Failure to do so could cause equipment damage or void the Crestron warranty.

**CAUTION:** Provide sufficient power to the system. Insufficient power can lead to unpredictable results or damage to the equipment. Please use the Crestron Power Calculator (http://www.crestron.com/ dealer-tech_resources/power_calculator.asp) to help calculate how much power is needed for the system.

**CAUTION:** Possible equipment damage if miswired.

**NOTE:** When installing network wiring, refer to the latest revision of the wiring diagram(s) appropriate to your specific system configuration, available from the

Downloads | Product Manuals | Wiring Diagrams section of the Crestron website (www.crestron.com).

**NOTE:**  Do not power up system until all wiring is verified. Care should be taken to ensure data (Y, Z) and power (24, G) connections are not crossed.

**NOTE:**  All network wiring must consist of two twisted-pairs. One twisted pair is the +24V conductor and the GND conductor and the other twisted pair is the Y conductor and the Z conductor.

When calculating the wire gauge for a particular network run, the length of the run and the power factor of each network unit to be connected must be taken into consideration. If network units are to be daisy-chained on the run, the power factor of each network unit to be daisy-chained must be added together to determine the power factor of the entire chain. The length of the run in feet and the power factor of the run should be used in the following resistance equation to calculate the value on the right side of the equation.

*Resistance Equation*

$$R \ <\ \frac{40,000}{L \times PF}$$

Where: R = Resistance (refer to table below).
L = Length of run (or chain) in feet.
PF = Power factor of entire run (or chain).

The required wire gauge should be chosen such that the resistance value is less than the value calculated in the resistance equation. Refer to the following table.

*Wire Gauge Values*

| RESISTANCE (R) | WIRE GAUGE |
|:---:|:---:|
| 4 | 16 |
| 6 | 18 |
| 10 | 20 |
| 15 | 22 |
| 13 | Doubled CAT5 |
| 8.7 | Tripled CAT5 |

**NOTE:**  When daisy-chaining Cresnet units, strip the ends of the wires carefully to avoid nicking the conductors. Twist together the ends of the wires that share a pin on the network connector, and tin the twisted connection. Apply solder only to the ends of the twisted wires. Avoid tinning too far up the wires or the end becomes brittle. Insert the tinned connection into the Cresnet connector and tighten the retaining screw. Repeat the procedure for the other three conductors.

## Mounting Options

### *Rack Mounting*

There is a rack mount kit for the C2N-NPA8 known as C2N-RMAK. For installation instructions, refer to the latest version of the Installation Guide (Doc. 6131) which is available from the Crestron website (www.crestron.com).

### *CAEN Enclosure Mounting*

The C2N-NPA8 can also be installed in a Crestron Automation Enclosure (CAEN). To install the C2N-NPA8 in a CAEN enclosure, the CAEN Mounting Kit (CAEN-

MK) must be used. For installation instructions, refer to the latest version of the Installation Guide (Doc. 6130) which is available from the Crestron website (www.crestron.com).

## Hardware Hookup

Refer to the following hookup diagram and, aside from attaching power last, complete the connections in any order. Refer to "Network Wiring" on page 7 when making network connections.

**NOTE:**  To prevent overheating, do not operate this product in an area that exceeds the environmental temperature range listed in the table of specifications. Consideration must be given if installed in a closed or multi-unit rack assembly since the operating ambient temperature of the rack environment may be greater than the room ambient. Contact with thermal insulating materials should be avoided on all sides of the unit.

**NOTE:**  The maximum continuous current from equipment under any external load conditions shall not exceed a current limit that is suitable for the minimum wire gauge used in interconnecting cables. The ratings on the connecting unit's supply input should be considered to prevent overloading the wiring.

*Hookup Connections for the C2N-NPA8*
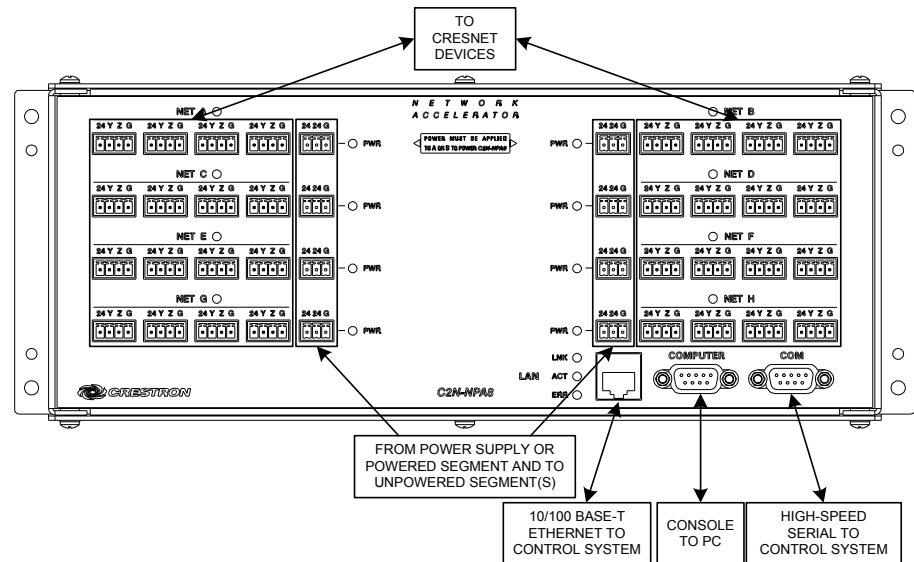


**NOTE:**  For the C2N-NPA8 to function, power must be applied to a power or Cresnet connector on either NET A or NET B. The C2N-NPA8 will not function if 24VDC power is not applied to either NET A or NET B's power connectors.

### *Cresnet Connections*

There are eight independent segments (labeled A through H), each with four Cresnet connectors wired in parallel. Each segment has a dedicated driver/receiver for Cresnet communication. The eight **NET (A-H)** activity LEDs illuminate when a device on the respective segment transmits data.

Segments that are not in use or have devices that are not polled by a Crestron SIMPL Windows program are logically 'disconnected' from the other segments in operation. The LEDs for these segments are not illuminated.

To properly configure a network using a C2N-NPA8, the network traffic should be balanced across the eight legs of the C2N-NPA8.

**NOTE:** The tips described below can be used as a starting point for balancing the network traffic on most networks. Contact Crestron's True Blue Technical Support to determine the best configuration for your network.

### Configuration Tips

- Place **ALL** Cresnet devices on the segments of the poll accelerator and nothing on the control system's Cresnet bus.

- Group all devices by device type and assign consecutive Cresnet ID numbers.

- Place devices on sequential segments of the poll accelerator in order of Cresnet ID number (i.e. ID 03 on segment A, ID 04 on segment B, etc.) Since the Cresnet network is polled by the control system in numeric order, the control system will talk to different segments, allowing each segment to process commands that overlap, instead of having to wait for the completion of one command before going on to the next command.

### Example

The following example is provided to show how a large amount of network devices may be connected to the C2N-NPA8 for optimum performance.

A system has the following network devices:

- Five TPS-3000L touchpanels. The touchpanels have been assigned with Cresnet ID numbers 03 through 07.

- Five CT-1000 touchpanels. The touchpanels have been assigned with Cresnet ID numbers 08 through 0C.

- Five TPS-4500 touchpanels. The touchpanels have been assigned with Cresnet ID numbers 0D through 11.

- Two C2N-IIF intercom interfaces. The interfaces have been assigned with Cresnet ID numbers 12 and 13.

- Three C2N-TXM satellite radio tuners. The tuners have been assigned Cresnet ID number 14 through 16.

Using the configuration tips, connect the network devices as shown in the following diagram.

*Configuration Example*
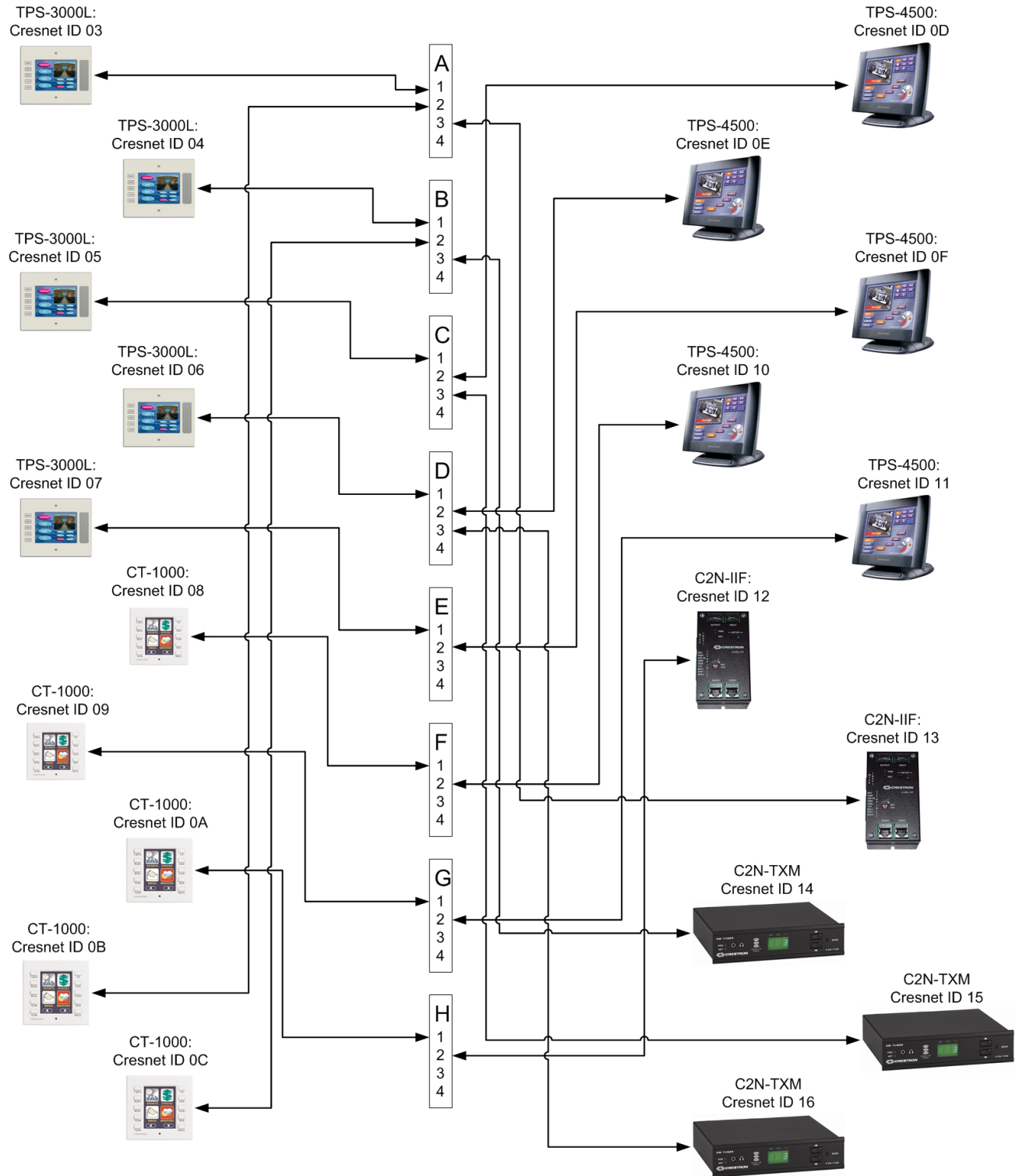


**NOTE:** 24 VDC power must be supplied to the C2N-NPA8 by the PWR connector on segment A or B. The control system must communicate with the poll accelerator via serial or Ethernet communications.
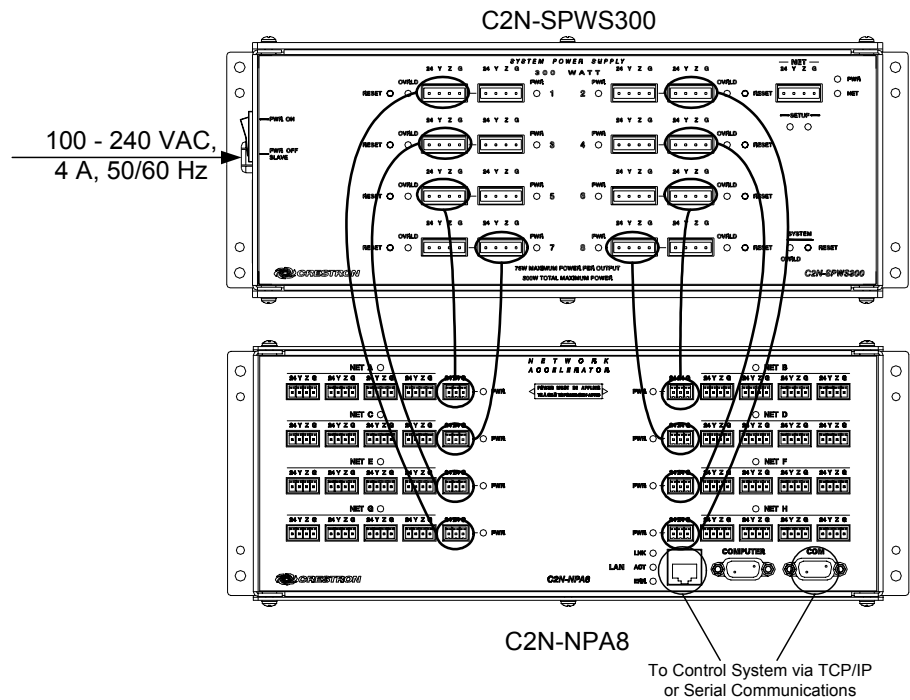
## *Power Connections*

To provide power to the C2N-NPA8, connect 24VDC power from either a Crestron power supply or a 2-Series control system to a PWR port or a Cresnet connector on either segment A or B.

When applying power, the same considerations used in any Cresnet configuration (with regard to a device's power factor and required power supply for proper distribution of power), should be applied when connecting a C2N-NPA8. Refer to "Network Wiring" on page 7 for more information.

The C2N-NPA8 can be powered with the C2N-SPWS300 External 300 Watt Power Supply. This power supply features eight power outputs, which can be used to control power to each of the eight segments on the C2N-NPA8. By wiring each power segment from the C2N-SPWS300 to a segment on the C2N-NPA8 (as shown in the following diagram), each segment on the C2N-NPA8 can be activated or deactivated by controlling the C2N-SPWS300 through additional programming in the control system program.

**NOTE:** If the C2N-SPWS300 is being used to power each segment on the C2N-NPA8, power must always be applied to segment A or segment B on the C2N-NPA8 for activation.

*Wiring Power Connectors on C2N-NPA8 with C2N-SPWS300 Power Supply*



Alternatively, a single power source (such as Crestron's CNPWS-75) can be used to provide power to the C2N-NPA8. Additional segments on the C2N-NPA8 may be powered by connecting a jumper wire from a powered segment's PWR port to an unpowered segment's PWR port as shown in the following diagram.

*Wiring Power Connectors on C2N-NPA8 with CNPWS-75 Power Supply*
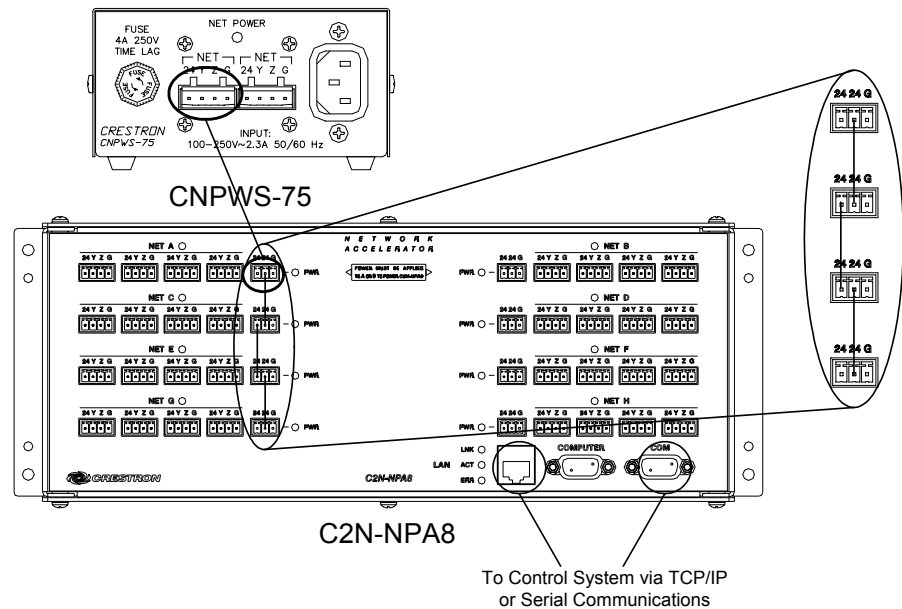


CNPWS-75

C2N-NPA8

To Control System via TCP/IP
or Serial Communications

**CAUTION:** Use only Crestron power supplies for Crestron equipment. Failure to
do so could cause equipment damage or void the Crestron warranty.

**NOTE:** If a Cresnet device connected to a powered segment has its own power
source, remove the 24V line from the Cresnet connector on the C2N-NPA8.
Although equipment damage is unlikely, Crestron does not recommend applying two
power sources to the same segment.

### *Communication Connections*

When using a PC for console operations on the C2N-NPA8, refer to "Establish a
Serial Connection" on page 14.

The C2N-NPA8 can also be connected to compatible control systems that are
equipped with an Ethernet port. Refer to "TCP/IP Communications Between a
Control System and the C2N-NPA8" on page 14.

**NOTE:** For a list of control systems that are compatible with the C2N-NPA8, refer
to "Compatible Control Systems" on page 6.

## C2N-NPA8-Control System Communications

The C2N-NPA8 can communicate with a control system over serial or TCP/IP
communication. Only one method of communication can be used.

### *Serial Communications Between a Control System and the C2N-NPA8*

If a direct connection from a PC to the C2N-NPA8 is required for uploading
firmware or performing diagnostics, follow the steps described in "Establish a Serial
Connection" on page 14. If the C2N-NPA8 firmware is to be upgraded through a
connection to a control system, refer to "Uploading and Upgrading" on page 22.

If using a serial connection for communications between the control system and the C2N-NPA8, connect a straight through serial cable (Crestron cable number CNSP-587 or equivalent) from a compatible COM port on the control system to the COM port on the C2N-NPA8. All serial communication parameters between the control system and the C2N-NPA8 are automatically configured by the program stored on the control system.

### *TCP/IP Communications Between a Control System and the C2N-NPA8*

If the control system is to communicate with the C2N-NPA8 over TCP/IP, a serial connection must first be established to configure the C2N-NPA8 TCP/IP settings.

### *Establish a Serial Connection*

Connect the COMPUTER port on the C2N-NPA8 to one of the COM ports (usually COM 1) on the PC. Use a straight through serial cable (Crestron cable number CNSP-587 or equivalent) with a DB9 male connector on one end and a DB9 female connector on the other. Most commercially available cables are acceptable. Refer to "COMPUTER" on page 5 for pinout details.

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**NOTE:** For laptops and other PCs without a built-in RS-232 port, Crestron recommends the use of PCMCIA cards, rather than USB-to-serial adapters. If a USB-to-serial adapter must be used, Crestron has tested the following devices with good results:

> I/O Gear GUC232A
> Keyspan USA-19QW (Discontinued)

Results may vary depending on the computer being used. Other models, even from the same manufacturer, may not yield the same results.

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Open the Crestron Viewport and click **Setup | Communication Settings** to display the "Port Settings" window. Then click **RS-232** as the connection type.

The PC communication settings specified here should match the protocol that the C2N-NPA8 uses. The settings are as follows:

- Port = COM 1 through COM 8. Select the correct COM port on the PC.

- Baud rate = 115200 (You can set the PC and the control system to a different baud rate, by using the **Functions | Set Baud Rate** command.

- Parity = None.

- Number of data bits = 8.

- Number of stop bits = 1.

- Hardware handshaking (RTS/CTS) enabled.

- Software handshaking (XON/XOFF) not enabled.

*"Port Settings" Window: Settings for RS-232 Communication with the C2N-NPA8*



To verify communication, click **Diagnostics | Establish Communications (Find Rack)**. This should display a window that gives the COM port and baud rate.

## Configuring for TCP/IP Communications

Once communications have been established between the PC and the C2N-NPA8, perform the following procedure to configure the C2N-NPA8 for TCP/IP communications.

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**NOTE:** The terms used in the following steps are explained in detail in the Crestron e-Control Reference Guide (Doc. 6052). The latest version is available as a PDF on the Crestron website (www.crestron.com).

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1. From the Viewport menu, click **Functions | Set Control System IP Information**.

2. Enter the IP address, IP Mask, Router IP address, Hostname, and Domain name in the applicable fields and click **OK**.

3. After saving the IP address, an entry must be added to the C2N-NPA8 IP table to enable communications between the control system and the C2N-NPA8. To add an IP table entry, click **Functions | Setup IP Table.** The following illustration shows a sample IP table for a C2N-NPA8 that will communicate via Ethernet to a 2-Series control system at IP address 192.168.125.165.

*C2N-NPA8 IP Table*



4. Click **Add** and enter the IP ID and IP address/Hostname of the control system in the relevant fields. *Set as Master* must be checked to indicate that the C2N-NPA8 is controlled by the device using the IP address. Select *Connect Using TCP* and click **OK.**

**NOTE:** The "IP Table Setup" window allows more than one entry to be entered in the C2N-NPA8's IP table. However, the poll accelerator will only read the first entry. All other entries will be ignored.

5. Click **Send** to send the IP table to the C2N-NPA8. If an entry does not already exist, add a corresponding entry for the C2N-NPA8 in the control system's IP table.

6. Create an entry in the control system's IP table listing the IP address of the C2N-NPA8.

**NOTE:** Port number 41791 must be accessible to the control system for communication with the C2N-NPA8.

**NOTE:** If a control system program uses a TCP/IP Client symbol or TCP/IP Server symbol, port number 41791 cannot be specified for either symbol if a C2N-NPA8 is in the control system program.

**NOTE:** The default port number assigned by Viewport should not be changed when configuring the IP tables on the control system and the C2N-NPA8.

**NOTE:** If an IP table is defined in the C2N-NPA8, then serial communication between the C2N-NPA8 and a control system is disabled. To enable high-speed serial communications, remove the IP table entry from the C2N-NPA8's IP table. TCP/IP communications between the C2N-NPA8 and the control system will be disabled while serial communication will be enabled.

Once the IP settings have been defined in the IP tables of the C2N-NPA8 and the control system, the C2N-NPA8 can communicate with the control system using a TCP/IP connection.

*Connecting the C2N-NPA8 to the Control System via Ethernet*

To enable TCP/IP communication, use CAT5 straight through cables with 8-pin RJ45 connectors to connect the LAN port on the C2N-NPA8 and the LAN port on the control system to an Ethernet hub. Alternatively, you can use a CAT5 crossover cable to connect the LAN port on the control system directly to the LAN port on the C2N-NPA8 without using a hub. The following figure illustrates pinouts for straight through and crossover RJ45 cables. Pins 4, 5, 7, and 8 are not used.

*RJ45 Pinouts*
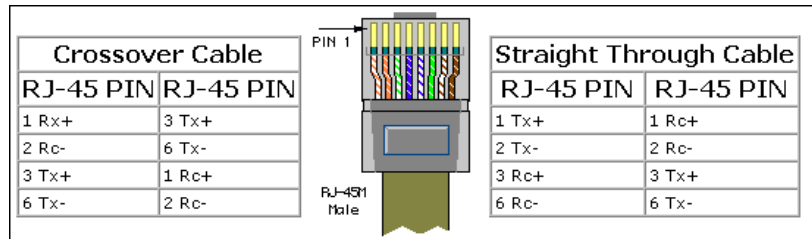


Once the cable connections are made, verify communications by opening the Crestron Viewport and clicking **Setup | Communication Settings** on the menu to display the "Port Settings" window. Select **TCP/IP** as the connection type and enter the IP address of the C2N-NPA8. Click **OK** to connect to the C2N-NPA8 over TCP/IP.

*"Port Settings" Window*
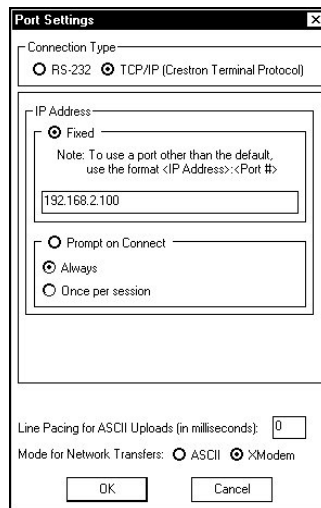


To verify communication, click **Diagnostics | Establish Communications (Find Rack).** This should display a window that gives the IP address and port number.

If communications cannot be established between the C2N-NPA8 and a control system, refer to "Troubleshooting Communications" on page 28.

# System Monitoring/Diagnostics with the C2N-NPA8

A C2N-NPA8 in a Cresnet system provides improved troubleshooting abilities for monitoring Cresnet devices. A common problem in building a system is the use of devices with identical Cresnet IDs. In a system without a C2N-NPA8, Cresnet IDs that are duplicated are not reported by the system when using the **REPORTCRESNET** command in Viewport. A system with a C2N-NPA8 recognizes the existence of a duplicated Cresnet ID if the devices are on different

legs of the C2N-NPA8. If the duplicated IDs are on the same leg, the Cresnet ID will not be displayed when using the **REPORTCRESNET** command in Viewport. The **REPORTCRESNET** command lists each Cresnet ID in the system along with identifying the C2N-NPA8 segment where the device is located. Devices that are connected to the control system's Cresnet connector (not on the C2N-NPA8) are listed without identifying a segment. The illustration below shows a REPORTCRESNET report indicating where devices are located on the C2N-NPA8.

*REPORTCRESNET with C2N-NPA8*



The C2N-NPA8 console can be accessed through the Viewport utility to perform diagnostics. At the control system prompt, type **PASSTHRU NPA**. For a list of available commands, type **HELP ALL**.

For further diagnostics, the Network Analyzer tool that is built into SIMPL Windows can be used to analyze the signal quality of each Cresnet ID in a system. For more information on how to use the network analyzer, refer to the SIMPL Windows help file and use the index to search for "Network Analyzer".

## Adding a C2N-NPA8 Without a Program

If a control system has been rebooted and it does not have a program that contains a C2N-NPA8, it must be told via console command that a C2N-NPA8 is present. If using serial communications, open Viewport (while connected to a control system) and type:

        **NPA ADD PORT Y**

Where "Y" is the letter designating the serial port on the control system For example, NPA ADD PORT C installs the C2N-NPA8 on port C of a control system). If using TCP/IP communications, type:

        **NPA ADD IPID 0xYY**

Where "YY" is the IP ID in the control system's IP table when using TCP/IP communications. For example, NPA ADD IPID 0x03 installs the C2N-NPA8 at IP ID 03.

---

**NOTE:** The C2N-NPA8 must be defined in the control system's IP table and the control system must be listed in the C2N-NPA8's IP table before using the **NPA ADD IPID** command.

---

For more information on console commands, refer to the latest version of the 2-Series Console Commands Reference Guide (Doc. 6002), available from the Downloads | Product Manuals section of the Crestron website (www.crestron.com).

# Programming Software

**Have a question or comment about Crestron software?**

Answers to frequently asked questions (FAQs) can be viewed in the Online Help
section of the Crestron website (www.crestron.com). To post your own question or
view questions you have submitted to Crestron's True Blue Support, log in at
http://support.crestron.com. First-time users will need to establish a user account.

## Earliest Version Software Requirements for the PC

**NOTE:**  Crestron recommends that you use the latest software to take advantage of
the most recently released features. The latest software is available from the
Downloads | Software Updates section of the Crestron website (www.crestron.com).

The following are the earliest useable software version requirements for the PC:

- SIMPL Windows version 2.04.14 or later with Library Update 232 or later.
  Requires SIMPL+ Cross Compiler version 1.1.

- Crestron Database version 16.0.0 or later.

**NOTE:**  The following assumes that the reader has knowledge of SIMPL Windows.
If not, refer to the extensive help information provided with the software.

**NOTE:**  The following are acceptable file extensions for programs that include a
C2N-NPA8, developed for specific control system types:

.smw  *projectname*.smw (source file)
.spz  *projectname*.spz (compiled file for 2-series)
.usp  *projectname*.usp (source code module for SIMPL+)
.ush  *projectname*.ush (compiled SIMPL+ file)
.umc  *projectname*.umc (user macro)

**NOTE:**  In the following, the PRO2 control system is used.

SIMPL Windows is Crestron's primary software for programming Crestron control
systems. It provides a well-designed graphical environment with a number of
workspaces (i.e., windows) in which a programmer can select, configure, program,
test, and monitor a Crestron control system. SIMPL Windows offers drag and drop
functionality in a familiar Windows® environment.

This section explains how to create a SIMPL Windows program that includes the
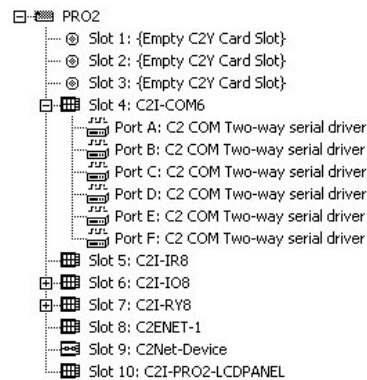C2N-NPA8.

Configuration Manager is where programmers "build" a Crestron control system by
selecting hardware from the *Device Library*. In Configuration Manager, drag the
PRO2 from the Control Systems folder of the *Device Library* and drop it in the upper
pane of the *System Views*. The PRO2 with its associated communication ports is
displayed in the *System Views* upper pane.

*PRO2 System View with C2ENET-1 Installed*
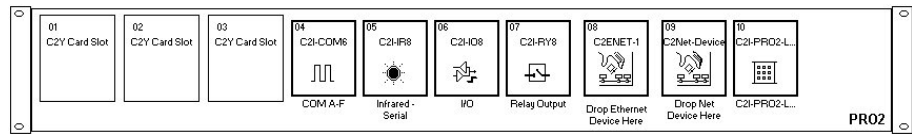


The *System Views* lower pane displays the PRO2 system tree. This tree can be expanded to display and configure the communications ports.

*Expanded PRO2 (with C2ENET-1 Installed) System Tree*



When a C2N-NPA8 is added to a system in Configuration Manager, the *Cresnet Units* icon in System Views changes as shown in the following diagram to indicate that a C2N-NPA8 is present.

*"Cresnet Units" Icon Indicating a C2N-NPA8 is Installed*



Adding a C2N-NPA8 to a 2-series control system is as easy as dragging and dropping the device into the appropriate device slot in the 2-Series system tree.

# Serial Connection Between the Control System and C2N-NPA8

If the C2N-NPA8 is to be connected to a control system via serial communications, perform the following:

In Configuration Manager, drag the C2N-NPA8 from the *Serial Drivers (General)* folder of the *Device Library* and drop it onto a compatible serial port of the control system. Click **Yes** when prompted (refer to the following diagram) to replace the serial driver for that port. SIMPL Windows displays the C2N-NPA8 in the target serial port.

*Configuration Manager Prompt*
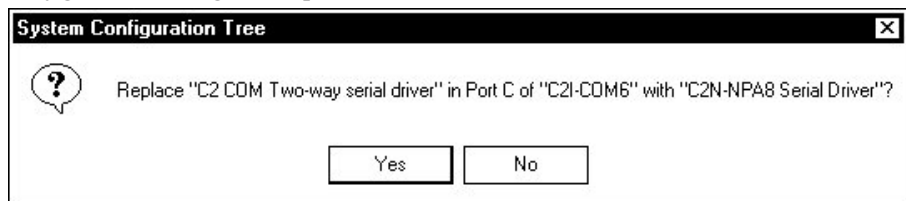
**NOTE:** For a list of control systems that can communicate with the C2N-NPA8, refer to "Compatible Control Systems" on page 6. Review the notes to determine which serial ports on a control system can be used with the C2N-NPA8 if using serial communications.

## Ethernet Connection Between the Control System and C2N-NPA8

If the C2N-NPA8 is to be connected to a control system via Ethernet, perform the following:

In Configuration Manager, drag the C2N-NPA8 from the *Ethernet Control Modules | Ethernet Modules (Crestron)* folder of the *Device Library* and drop it onto the C2ENET-1 slot of the control system. SIMPL Windows displays the C2N-NPA8 in the C2ENET-1 slot of the control system.

**NOTE:** Ethernet devices can only be added to Ethernet-equipped control systems. For a list of control systems that can communicate with the C2N-NPA8, refer to "Compatible Control Systems" on page 6.

**NOTE:** An IP table entry for the control system must exist on the C2N-NPA8's IP table. Refer to "Configuring for TCP/IP Communications" on page 15 for more information.

*Setting the IP Information in Device Settings*

Double-click the C2N-NPA8 icon to open the "Device Settings" window. This window displays the C2N-NPA8 device information. Select the *IP Net Address* tab to change the IP ID and other IP information as shown in the following figure.

*"Device Settings" Window for the C2N-NPA8*



Any information entered in this window is used to create the control system's default IP table.

**NOTE:** The control system's IP table must list the C2N-NPA8's IP address. This can be done using the Device Settings window or through Viewport.

**NOTE:** SIMPL Windows automatically chooses the IP ID values of devices added to a program. Always ensure that the hardware and software settings of the IP ID match. For IP ID hardware settings details, refer to "Configuring for TCP/IP Communications" on page 15.

# Uploading and Upgrading

Assuming a PC is properly connected to the entire system, Crestron programming software allows the programmer to upload programs and projects after their development to the system and network devices. However, there are times when the files for the program and projects are compiled and not uploaded. Instead, compiled files may be distributed from programmers to installers, from Crestron to dealers, etc. Even firmware upgrades are available from the Crestron website as new features are developed after product releases. In those instances, one has the option to upload via the programming software or to upload and upgrade via the Crestron Viewport.

**NOTE:** The Crestron Viewport is available as a pull-down command from SIMPL Windows and VT Pro-e (**Tools | Viewport**) or as a standalone utility. The Viewport utility accomplishes multiple system tasks, primarily via an RS-232 or TCP/IP connection between the control system and a PC. It is used to observe system processes, upload new operating systems and firmware, change system and network parameters, and communicate with network device consoles and touchpanels, among many other tasks. Viewport can also function as a terminal emulator for generic file transfer. All of these functions are accessed through the commands and options in the Viewport menus. Therefore, for its effectiveness as a support and diagnostic tool, the Crestron Viewport may be preferred over development tools when uploading programs and projects.

The following sections define how one would upload a SIMPL Windows program containing a C2N-NPA8 or upgrade the firmware of the C2N-NPA8. However, before attempting to upload or upgrade, it is necessary to establish communications with the control system.

## Communication Settings

**NOTE:** For laptops and other PCs without a built-in RS-232 port, Crestron recommends the use of PCMCIA cards, rather than USB-to-serial adapters. If a USB-to-serial adapter must be used, Crestron has tested the following devices with good results:

> I/O Gear GUC232A
> Keyspan USA-19QW (Discontinued)

Results may vary depending on the computer being used. Other models, even from the same manufacturer, may not yield the same results.

The procedure in this section provides details for RS-232 communication between the PC and the control system. If TCP/IP communication is preferred, consult the latest version of the Crestron e-Control Reference Guide (Doc. 6052) or the respective Operations Guide for the control system. These documents are available from the Downloads | Product Manuals section of the Crestron website (www.crestron.com). Refer to the figure on the next page for a typical connection diagram when uploading files.

*Typical Connection Diagram when Uploading*
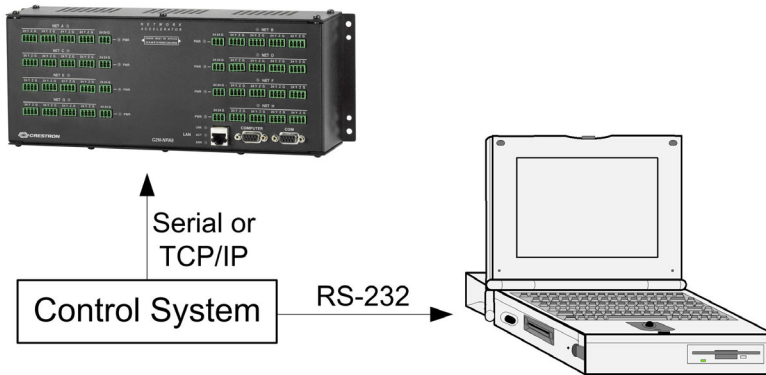


1.  Open the Crestron Viewport.
    Either launch the stand-alone version of Viewport or start SIMPL
    Windows and from the menu bar, select **Tools | Viewport**.

2.  Refer to the following figure after this step. From the Viewport menu,
    select **Setup | Communications settings** (alternatively, press **Alt+D**)
    to open the "Port Settings" window.

*Setup | Communications Settings Command*
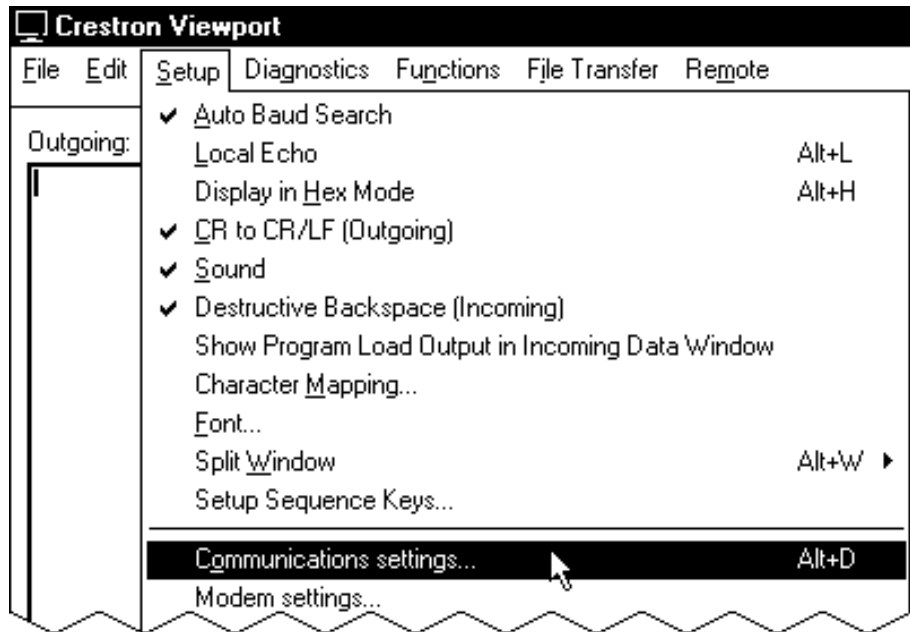


3.  Select **RS-232** as the connection type. Verify that an available COM
    port (COM 1 is shown after this step) is selected, and that all
    communication parameters and necessary options from the "Port
    Settings" window are selected as shown after this step. Click the **OK**
    button to save the settings and close the window.

*"Port Settings" Window*



NOTE: The parameters shown in the illustration above are the port settings for a 2-Series control system. Consult the Operations Guide for the control system being used for exact parameter selection.

If using a TCP/IP connection, select **TCP/IP (Crestron Terminal Protocol)** and enter the IP information for the control system. Click the **OK** button to save the settings and close the window.

4. To verify communication, select **Diagnostics | Establish Communications (Find Rack)**. This should display a window that gives the COM port and baud rate. If communication cannot be established, refer to the "Troubleshooting Communications" section in the respective Operations Guide for the control system.

## Uploading a SIMPL Windows Program

*A control system source file has the extension .smw. A compiled SIMPL Windows file has the extension .spz for a 2-Series control system.*

Once communication with the control system has been established, a SIMPL Windows program containing a C2N-NPA8 can be uploaded to the control system using SIMPL Windows or the Crestron Viewport.

### Upload via SIMPL Windows

1. Start SIMPL Windows.

2. Select **File | Open** to view the "Open" window, navigate to the SIMPL Window file (.smw), and click **Open**.

3. Select **Project | Transfer Program**.

### Upload via Crestron Viewport

1. Verify that the procedure for "Communication Settings" that begins on page 22 has been performed.

2. As shown after this step, select **File Transfer | Send Program** (alternatively, press **Alt+P**) from the Viewport menu.

*File Transfer | Send Program Command*
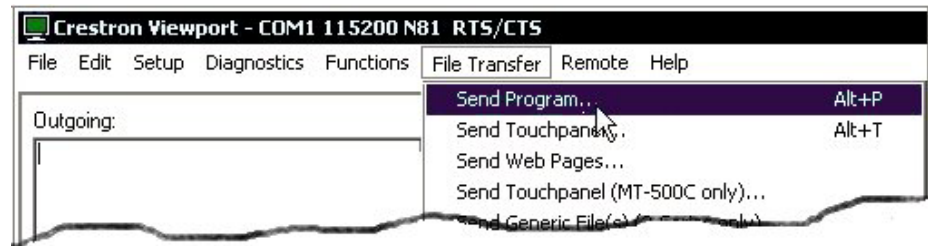


3.  The "Send Program" window appears, as shown after this step. Click
    **Browse**, locate the compiled file (.spz for PRO2) and click **Open**. This
    will display the program's header information and enable one or both of
    the *What to Send* check boxes. If the program does not contain any
    SIMPL+ modules, only the *SIMPL Program* check box will be enabled.
    If it does contain SIMPL+ modules, then the *SIMPL+ Program(s)*
    check box will also be enabled. Select one or both check boxes and
    then click **Send Program** to begin the transfer.

**NOTE:**  Refer to the respective Operations Guide for the control system for details
about the other fields shown on the "Send Program" window.

*"Send Program" Window*
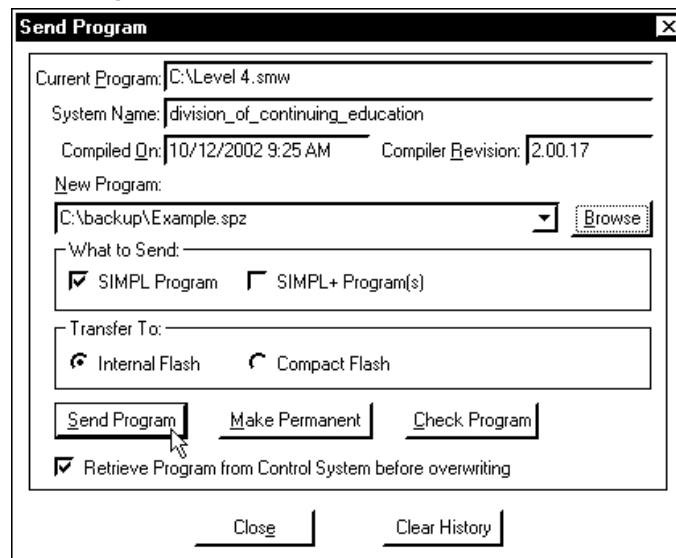


4.  To verify that the program has been transferred successfully, select
    **Diagnostics** | **Report Program Information**. This should display a
    window that provides details about the current program loaded into the
    control system.

## Updating the Operating System

The operating system files for the C2N-NPA8 have a .cuz extension. You can obtain .cuz updates (when available) from the software downloads area of the Crestron website. To download an update, click the .cuz file and choose the **Save to Disk** option, then specify the directory where the update will be stored.

**NOTE**:  In some cases Microsoft's Internet Explorer may append a .zip extension to a downloaded .cuz file. For example, a file called "c2n-npa8.v3105.cuz" may appear as "c2n-npa8.v3105.cuz.zip." If this happens, rename the file, removing the .zip extension.

**NOTE**:  Even though the C2N-NPA8 uses a .CUZ file, it cannot be loaded with a SIMPL Windows or SIMPL+® program

To upload the new .cuz to the C2N-NPA8:

1. Open Viewport and connect to the C2N-NPA8 over a serial (from the COM port on the PC to the COMPUTER port on C2N-NPA8) or TCP/IP connection as described in "Communication Settings" on page 22.

2. Select **File Transfer** | **Update Control System** or press **ALT + O**.

3. Browse to the .cuz file and click **Open** to start the transfer.

4. After the transfer is complete, the C2N-NPA8 will automatically reboot. To confirm the transfer, click **Diagnostics | Check Ops Version**. The Viewport console should display the new .cuz version number.

# Problem Solving

Problems may occur with the 2-Series automation control system itself or there may be serial communication difficulties with other devices connected to the control system. The next two sections address possible problem solving tools or procedures for each situation.

## Troubleshooting the C2N-NPA8

The following table provides corrective action for possible trouble situations. If further assistance is required, please contact a Crestron customer service representative.

*C2N-NPA8 Troubleshooting*

| TROUBLE | POSSIBLE CAUSE(S) | CORRECTIVE ACTION |
|---------|-------------------|-------------------|
| Unexpected response from control system. | Network devices are not communicating to the control system. | From the Viewport, poll the network (F4) to verify communication. |
| Intermittent communication with Cresnet device. | Possible wiring fault. | Use Network Analyzer to check connection with Cresnet device. |
| PWR LED does not illuminate. | Segment is not receiving power. | Verify that 24V power is applied to either segment A or B of the C2N-NPA8. Verify that the segment is connected to a powered segment. |
| ERR LED illuminates. | Hardware failure, software failure, or programming error. | Verify that the hardware configuration matches software configuration. Poll the network (F4) from the Viewport; check error log for SIMPL, SIMPL+ program reload errors. |
| C2N-NPA8 does not communicate with control system. | Used wrong serial port. | Verify that a Poll-Accelerator-compatible port is used if using serial communications (refer to chart on page 6 for details). |
| | Serial cable miswired. | Verify that serial cable is wired correctly if using serial communications. |
| | Serial cable pins do not make proper contact with DB9 socket. | Remove the two standoffs on either side of the DB9 socket. |
| | Incorrect IP information. | Verify correct IP information on control system and C2N-NPA8. |
| | Incorrect Network Cable. | Use cable with pinouts described in "Serial Communications Between a Control System and the C2N-NPA8" on page 13 or Connecting the C2N-NPA8 to the Control System via Ethernet" on page17. |
| System does not function. | Incorrect power supply. | Use power from a Crestron power source. |
| | Various. | Refer to the "Troubleshooting Non-Functioning Units" procedure following this table. |

### *Troubleshooting Communications*

Use the following checklist if communications cannot be established with the C2N-NPA8.

1. Verify that you are using the correct cables. As described previously, an RS-232 connection requires a straight-through serial cable. That is, pin 1 on one end is connected to pin 1 on the other end. Pin 2 connects to pin 2, etc. With a TCP/IP connection, you must use a CAT5 cable with 8-pin RJ45 connectors.

2. With a serial connection, verify that the correct COM port on the PC has been selected. Some computers have more than one COM port; some may be internal (e.g., for a modem). Consult the manufacturer's documentation for further information about the COM ports on your PC.

3. Check the **ERR** LED indicator on the C2N-NPA8. If this LED is illuminated before a program is loaded, examine the error log through the Viewport menu **Functions | 2-Series | Error Log | Show Error Log**.

4. Correct any problems indicated by the error log, i.e. connect cables, verify Ethernet parameters, reconfigure Cresnet IDs to eliminate duplicates, etc.

5. Clear the error log. If the **ERR** LED illuminates again, unplug the unit and reapply power after a few seconds. If the LED illuminates again, or if communication still cannot be established, contact Crestron customer service.

### *Troubleshooting Non-Functioning Units*

If after reviewing the troubleshooting chart on page 27, the C2N-NPA8 is still not functioning, reinstall the operating system file by performing the following procedure.

1. Connect a DB9 straight through RS-232 cable between the C2N-NPA8 and a PC. Refer to "Establish a Serial Connection" on page 14 for more information.

2. Open Viewport and select **Setup | Communication Settings** to open the "Port Settings" window.

3. In the window, select **RS-232** (Connection Type), **57600** (Baud Rate), **N** (Parity), **8** (Data Bits) and **1** (Stop Bits) and click **OK**.

4. Power down the C2N-NPA8.

5. While powering up the C2N-NPA8, press and hold **ALT** + **K** on the keyboard until the following text (or similar) appears in Viewport:

```
System Monitor [v1.001 (0001)]
12-19-01 16:25:23 32 MB RAM, 4MB FLASH

CS>
```

**NOTE:** After this, you can increase the baud rate to 115200 (for faster communication) by pressing F8 on the keyboard and then selecting 115200 from the "Set Baud Rate" window.

6.  Press **ALT** + **O** (not zero) on the keyboard. The "Open" window appears.

7.  Find and select the correct CSU file (**\*.CSU**, extracted from the .CUZ file using WinZip or other ZIP file extraction tool) and click **Open**.

**NOTE:** System Monitor cannot be used to upload a .CUZ file. Only the .CSU file can be used.

Once "Completed Successfully" appears in Viewport, type **quit** at the Viewport prompt and press Enter.

### Network Analyzer

To assist with troubleshooting, the unit contains Crestron's patent-pending network analyzer to continuously monitor the integrity of the Cresnet network for wiring faults and marginal system performance or other network errors. For more information on how to use the network analyzer, refer to the SIMPL Windows help file and use the index to search for "Network Analyzer".

**NOTE:** The Network Analyzer can be used when directly connected to the C2N-NPA8 or when connected to Cresnet via a control system.

**NOTE:** The C2N-NPA8's network analyzer will monitor the devices connected in the network, not the segments of the C2N-NPA8.

## Further Inquiries

If, after reviewing this Operations Guide for the C2N-NPA8, you cannot locate specific information or have questions, please take advantage of Crestron's award winning customer service team in your area. Dial one of the following numbers.

- In the US and Canada, call Crestron's corporate headquarters at 1-888-CRESTRON [1-888-273-7876].

- In Europe, call Crestron International at +32-15-50-99-50.

- In Asia, call Crestron Asia at +852-2341-2016.

- In Latin America, call Crestron Latin America at +5255-5093-2160.

- In Australia and New Zealand, call Crestron Pacific at +613-9480-2999.

You can also log onto the online help section of the Crestron website (www.crestron.com) to ask questions about Crestron products. First-time users will need to establish a user account to fully benefit from all available features.

## Future Updates

As Crestron improves functions, adds new features, and extends the capabilities of the C2N-NPA8, additional information may be made available as manual updates. These updates are solely electronic and serve as intermediary supplements prior to the release of a complete technical documentation revision.

Check the Crestron website (www.crestron.com) periodically for manual update availability and its relevance. Updates are available from the Downloads | Product Manuals section and are identified as an "Addendum" in the Download column.

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# Return and Warranty Policies

## Merchandise Returns / Repair Service

1. No merchandise may be returned for credit, exchange, or service without prior authorization from CRESTRON. To obtain warranty service for CRESTRON products, contact the factory and request an RMA (Return Merchandise Authorization) number. Enclose a note specifying the nature of the problem, name and phone number of contact person, RMA number, and return address.

2. Products may be returned for credit, exchange, or service with a CRESTRON Return Merchandise Authorization (RMA) number. Authorized returns must be shipped freight prepaid to CRESTRON, 6 Volvo Drive, Rockleigh, N.J. or its authorized subsidiaries, with RMA number clearly marked on the outside of all cartons. Shipments arriving freight collect or without an RMA number shall be subject to refusal. CRESTRON reserves the right in its sole and absolute discretion to charge a 15% restocking fee, plus shipping costs, on any products returned with an RMA.

3. Return freight charges following repair of items under warranty shall be paid by CRESTRON, shipping by standard ground carrier. In the event repairs are found to be non-warranty, return freight costs shall be paid by the purchaser.

## CRESTRON Limited Warranty

CRESTRON ELECTRONICS, Inc. warrants its products to be free from manufacturing defects in materials and workmanship under normal use for a period of three (3) years from the date of purchase from CRESTRON, with the following exceptions: disk drives and any other moving or rotating mechanical parts, pan/tilt heads and power supplies are covered for a period of one (1) year; touchscreen display and overlay components are covered for 90 days; batteries and incandescent lamps are not covered.

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CRESTRON shall not be liable to honor the terms of this warranty if the product has been used in any application other than that for which it was intended, or if it has been subjected to misuse, accidental damage, modification, or improper installation procedures. Furthermore, this warranty does not cover any product that has had the serial number altered, defaced, or removed.

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