



# **Connectivity Client / Connectivity Server**

## **User's Guide**

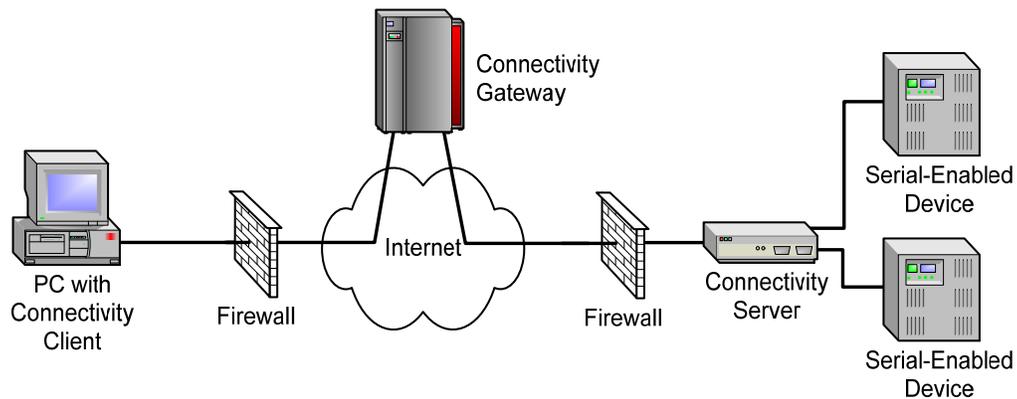
**Version 1.7**

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## Introduction / System Overview

The Traversix Virtual Connectivity Network family consists of the Connectivity Server, the Connectivity Client and the Connectivity Gateway. This system offers the never-before-seen capability of seamlessly connecting multiple serial-enabled devices with existing PC applications. Furthermore, the patent-pending technology allows this connectivity to occur when either or both ends of the connection are behind firewalls.



When placed at a remote facility and attached to serial-enabled equipment, the Connectivity Server provides a rugged, reliable interface. It is self-configuring for most installations, and gives a visible indication once connectivity is achieved, making the installer's job easier.

The Connectivity Client software operates by creating "virtual" serial ports on the user's PC that are indistinguishable from physical serial ports. The Client transmits and receives data to and from the user's existing applications, exchanging this data with the Connectivity Server via the Connectivity Gateway.

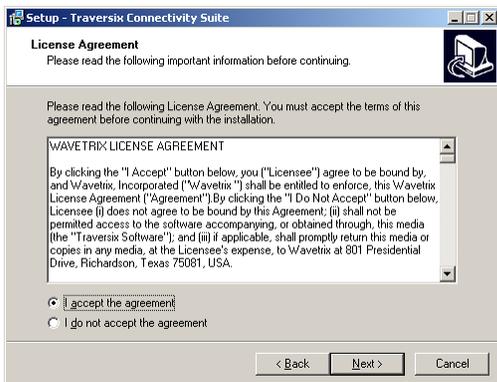
## Software Installation

The Wavetrix Connectivity Suite will operate on any Microsoft Windows 2000™ or Microsoft Windows XP™ PC with an Internet connection. To begin installation of the software, close all unneeded applications, and insert the Traversix Connectivity Suite CD in the CD-ROM drive of your PC. The setup program should start after a few seconds. If “autoplay” is disabled on your PC, you may manually start installation by opening the CD-ROM drive and double-clicking on “setup.exe”.

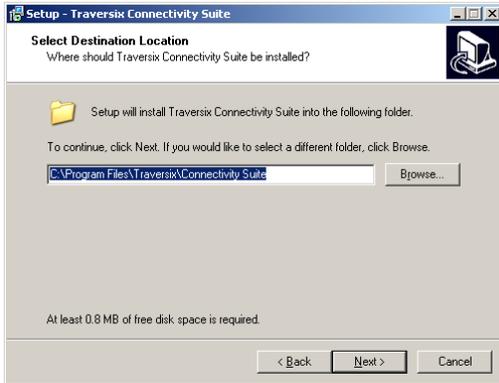
The following screen should appear.



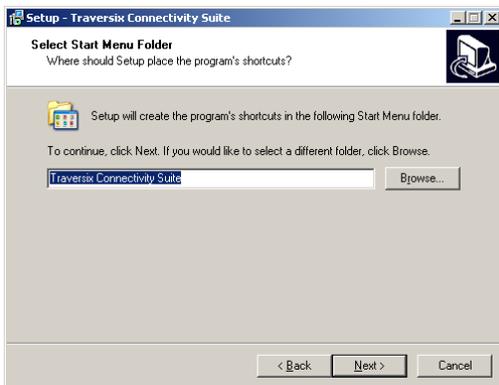
Click **Next** to continue. The following screen should appear.



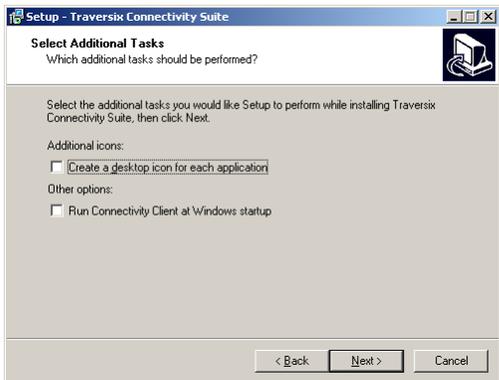
Read the agreement, click “I accept the agreement”, and click **Next** to continue.



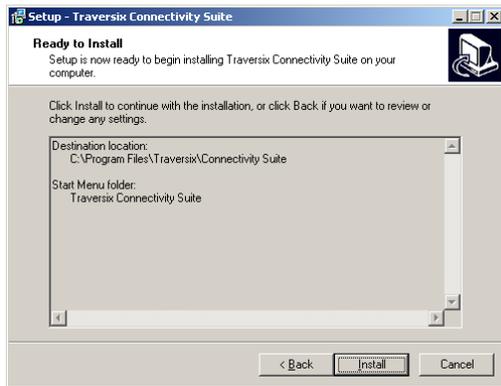
Unless you have severe drive-space limitations on C:, you should accept the default installation location by clicking **Next**. The following screen should appear.



Click **Next** to accept the default location in the Windows Start Menu. The following screen should appear.



If you want desktop icons for the applications in the Connectivity Suite (in addition to the icons to be added to the Start Menu) click the appropriate checkbox. If you want the Connectivity Client to start automatically the next time you log into your PC, click the appropriate checkbox. After making your selections, click **Next**. The following screen should appear.



Click **Install** to begin the installation.

Once the installation is complete, the following screen should appear.



Click **Finish** to exit the installer.

If you wish to use the Connectivity Client immediately after installation, start it by selecting it from the Traversix Connectivity Suite folder in the Windows Start Menu.

## Server Installation

### Installation

Before you begin installation of the Traversix Connectivity Server, take a moment to select a cool, dry location. Next, carefully unpack the Connectivity Server, and familiarize yourself with its connectors and indicators.



All indicators on the unit are labeled as shown above, with the exception of the Ethernet Link and Activity indicators, which are integrated in the RJ-45 Ethernet connector. The Ethernet Link indicator is green, and the Ethernet Activity indicator is amber (yellow). The function of the indicators is described in the table below:

| Indicator                 | Function  |
|---------------------------|---|
| Power                     | Flashes during boot, then remains solid while the unit is in operation.           |
| Online                    | Solid when the unit is online and in communication with the Connectivity Gateway. |
| Ser. 1                    | Flashes to show activity on Serial Port 1. Blinks rapidly when in admin mode.     |
| Ser. 2                    | Flashes to show activity on Serial Port 2.  |
| Ethernet Activity (amber) | Flashes to show activity on the Ethernet port.                                    |
| Ethernet Link (green)     | On solid to indicate Ethernet port is connected to an appropriate hub or switch.  |

The D-sub 9 connectors labeled “Serial 1” and “Serial 2” are RS-232 DTE ports, and should be connected as if they were the serial ports on a typical PC. (i.e., if the device to which you are connecting would require a null-modem cable to connect to a PC, then use a null-modem cable to connect it to the Connectivity Server.) The pin assignments of the two D-sub 9 connectors are given in the following table:

| <b>Pin</b> | <b>Signal Direction</b> | <b>Signal Name / Description</b>                  |
|------------|-------------------------|---|
| 3          | DTE-to-DCE              | Transmitted Data                                  |
| 2          | DCE-to-DTE              | Received Data                                     |
| 7          | DTE-to-DCE              | Request To Send                                   |
| 8          | DCE-to-DTE              | Clear To Send                                     |
| 6          | DCE-to-DTE              | Data Set Ready                                    |
| 5          | N/A                     | Signal Ground                                     |
| 1          | DCE-to-DTE              | Received Line Signal Detector<br>(Carrier Detect) |
| 4          | DTE-to-DCE              | Data Terminal Ready                               |
| 9          | DCE-to-DTE              | Ring Indicator                                    |

Connect the Connectivity Server’s Ethernet port to a hub or switch using a Category 5 Ethernet cable. The Connectivity Server operates at 10 Mbps, but will work equally well with 10 Mbps hubs or with 10/100 auto-sensing switches. Under most circumstances, you should NOT have to use a crossover cable to connect the Connectivity Server to an Ethernet hub or switch.

Connect the supplied 12VDC power adapter to the power (12VDC) jack on the front of the unit. Finger-tighten (but do not over-tighten) the threaded ring on the power connector. This helps to avoid accidental disconnection.

Once power is supplied, the Power indicator on the front of the unit should begin to flash, and then turn solid. Next, the green Ethernet Link light should turn on, and the amber Ethernet Activity light should occasionally flash. Last, the Online indicator should turn on to indicate the Connectivity Server is in communication with the Connectivity Gateway and is ready for use.

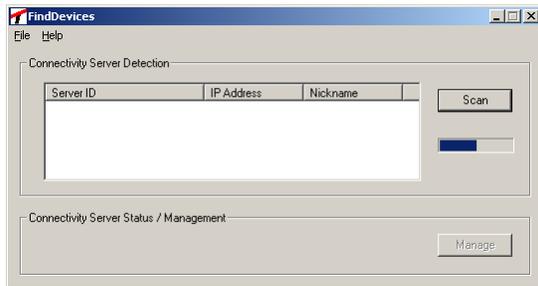
## Advanced Setup

In some installations, additional steps may be required, either due to network topology or other requirements.

## Browser-based Management

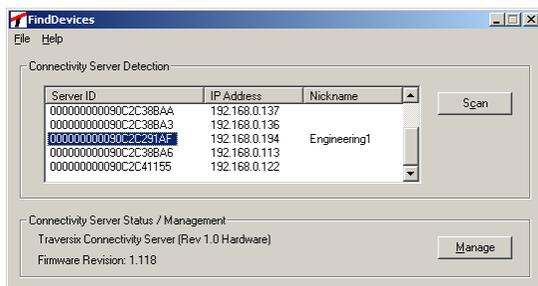
In situations where the Connectivity Server is operating properly on a LAN, and you wish to view status or change a setting, you may do so by using your web browser if your PC is on the same network as the Connectivity Server. To facilitate connection to Connectivity Servers on your local network, the Traversix Connectivity Suite includes the FindDevices Utility, which lists all active Connectivity Servers on your network and allows you to manage them.

From the Windows Start menu, select the FindDevices application in the Traversix Connectivity Suite group. The following screen should appear.



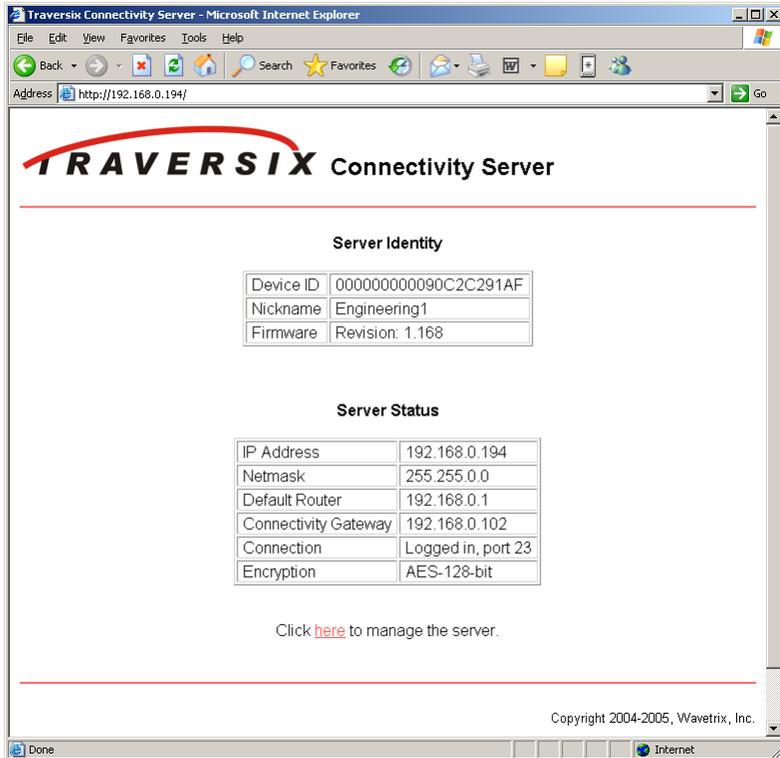
The progress bar indicates that a scan for Connectivity Servers is underway.

Once the scan is complete, the list of devices will appear as shown below.



To view the status of a Connectivity Server, click on it. To re-scan for Connectivity Servers, click the **Scan** button.

To launch a web browser for viewing detailed status and configuration, click the **Manage** button. After a brief pause, your browser will open, and present a screen similar to the one shown in the following picture.

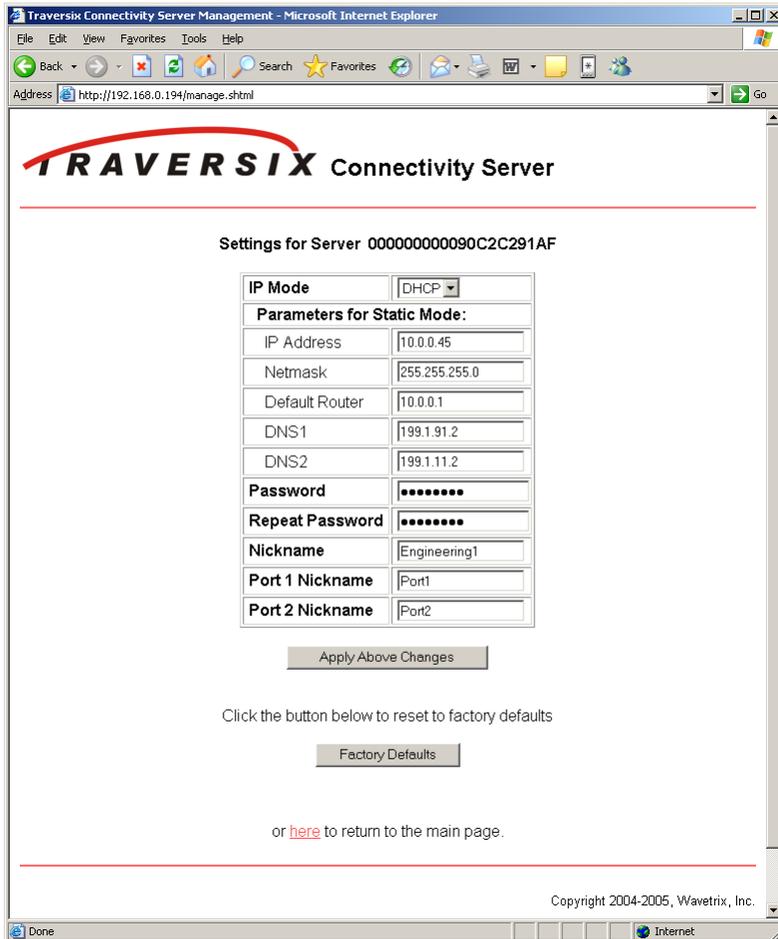


This screen shows the status of the unit, and current settings. If the unit is using DHCP, the IP Address, Netmask, and other network settings displayed on this page are obtained automatically from the DHCP server.

To modify the settings, click the “**here**” link. A user-name/password prompt similar to the one shown below will appear.

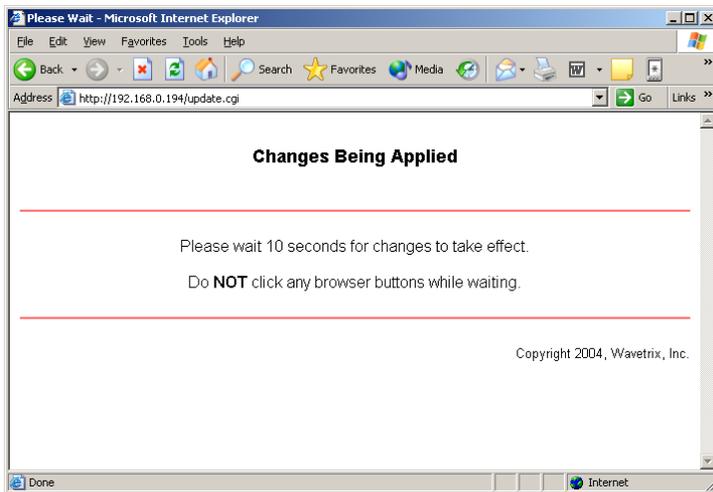


Enter a User name of “localsetup” and the password for your Connectivity Server. (The default password is “password”). Click **OK**, and the following screen will appear.



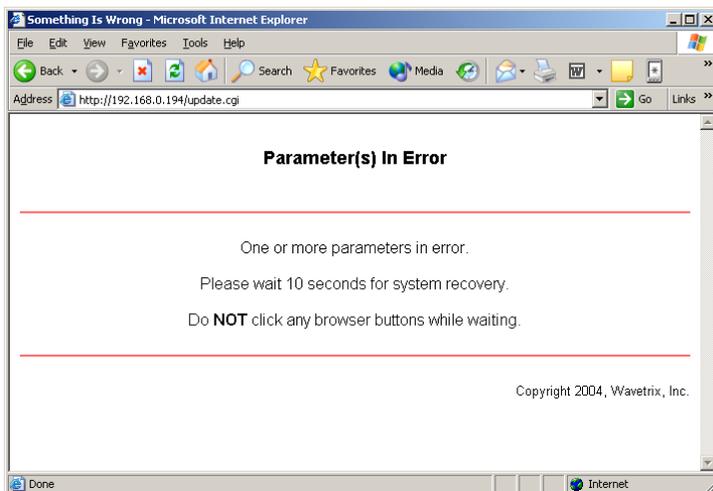
On this screen, you may change any of the values and click **Apply Above Changes** for them to take effect, or you may click **Factory Defaults** to restore factory default settings. Please note that if you enter a new password, it takes effect for both the browser-based interface and the administration mode of Serial Port 1. Also note that the IP Address, Netmask, Router, and DNS settings only have effect if the unit is operating with a static IP address. Be sure to set these parameters correctly and click **Apply Above Changes** before switching the IP Mode to Static. If the unit is using DHCP, it will automatically get the parameters it needs from the DHCP server. The active values are always displayed on the main status page.

When you click a button to apply a change or reset to factory defaults, the following screen will appear.



Do NOT click any other buttons in your browser until the screen disappears. If your browser is unable to locate the Traversix Connectivity Server after the changes are applied, use the FindDevices utility again to locate the device.

If any of the parameters you enter are of the incorrect format, the following screen will appear.



Wait for the Settings screen to re-appear, and re-enter your desired values. Please note that if you set the Connectivity Server to an unreachable IP address, or enter an incorrect netmask or other network settings, you may have to correct the problem by either:

- a) Using the administration mode of Serial Port 1, or
- b) Resetting the unit to factory defaults, using the rear-panel switch.

### Administration Mode on Serial Port 1

In some rare situations, the Connectivity Server will require manual intervention to begin communication. The most notable of these situations is one in which the network to which the Connectivity Server is attached does not have a DHCP server, and the Connectivity Server must be assigned a static IP address.

To manually configure the Connectivity Server, you must use a PC with a communication package such as HyperTerminal™ or Procomm Plus™, and follow the steps below

1. Connect the PC to Serial Port 1 of the Connectivity Server using a *null modem cable* (a special cable in which the transmit and receive lines are crossed).
2. Ensure that the Connectivity Server has power, and orient it so that the LEDs on the front are visible. Gently insert a paperclip straight into the hole in the rear of the cabinet until it reaches a firm obstacle (the reset switch).



3. Depress and hold the paperclip until the Ser. 1 LED (on the front of the Connectivity Server) begins to flash rapidly. As soon as the LED starts flashing, release the paperclip immediately. (Failure to release the paperclip will result in the Connectivity Server's parameters being reset to factory defaults.)
4. Connect to the unit with HyperTerminal or Procomm Plus, using the null modem cable. Serial port settings should be: 9600, N, 8, 1, no flow control.
5. Once connected, press **Enter**, and a prompt similar to the one below will appear.  
`cmd>`
6. Log into the unit by entering:  
`login password`

## 7. The unit will respond with:

```
Login accepted
cmd>
```

8. For a complete list of commands, enter `help`. Below is a brief summary of commands:

|  |  |
|--|--|
| <code>ipstat</code>                            | Display current IP configuration and statistics  |
| <code>dhcp</code>                              | Configure the Connectivity Server to use DHCP. A DHCP server must be present on the LAN in order for the Connectivity Server to use DHCP. The DHCP server must provide the following: IP address, netmask, default route, and DNS information. If your DHCP server does not provide all four of these items, you must use enter these parameters manually, and then use the <i>static</i> configuration. |
| <code>static</code>                            | Configure the Connectivity Server to use the ip address, netmask, dns, and default router specified by the <i>ip</i> , <i>netmask</i> , <i>dns1</i> , <i>dns2</i> , and <i>router</i> commands. Ensure that you have entered the desired values with those commands BEFORE using the <i>static</i> command.  |
| <code>ip xxx</code>                            | Set the stored IP address of the Connectivity Server to xxx. The stored value takes effect after a reboot, or after the <i>static</i> command. example:<br><code>ip 192.168.0.50</code>  |
| <code>netmask</code>                           | Set the stored netmask of the Connectivity Server. The stored value takes effect after a reboot, or after the <i>static</i> command. Example:<br><code>netmask 255.255.255.0</code>  |
| <code>router</code>                            | Set the stored default router address of the Connectivity Server. The stored value takes effect after a reboot, or after the <i>static</i> command. Example:<br><code>router 192.168.0.1</code>  |
| <code>dns1 xxx</code><br><code>dns2 xxx</code> | Set the stored address of the first / second DNS server to xxx for the Connectivity Server. The stored value takes effect after a reboot, or after the <i>static</i> command. Examples:<br><code>dns1 199.1.11.2</code><br><code>dns2 192.1.91.2</code>  |
| <code>factdef</code>                           | Reset unit to factory defaults.  |
| <code>password xxx</code>                      | Set access password to xxx. Note that this changes the password for both the console interface and the browser-based management interface.   |
| <code>serstat</code>                           | Show serial port statistics  |
| <code>encrypt xxx</code>                       | Set the encryption mode to xxx, where xxx is “NONE”, “AES128”, or “SCRAM”. AES128 (AES 128-bit block mode is the default and is highly recommended). SCRAM enables a slightly-less-secure but faster algorithm. NONE disables all encryption.  |
| <code>nick xxx</code>                          | Set the local nickname of the Connectivity Server to xxx. The nickname is the name by which the Connectivity Server will be known to all users, unless overridden in the user’s profile at the Connectivity Gateway.   |

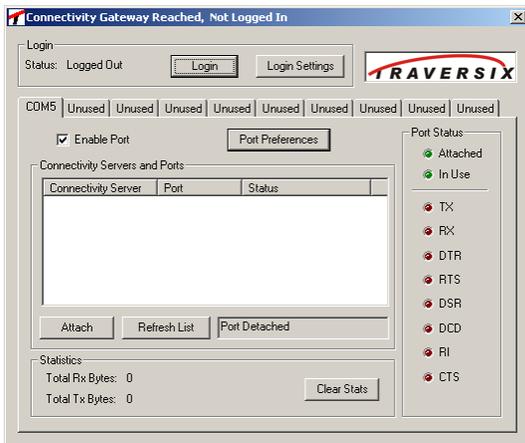
## Client Operation

### Startup

By default, the Connectivity Client will start when you log into your PC. It will appear as an unobtrusive icon in the system tray, as shown below.



To access the Connectivity Client, double-click on the icon, or alternatively, right-click on the icon and select Open Connectivity Client. The following screen should appear.



To log in, click **Login**. The following screen should appear.



Enter your Corporate Account, Username and password.

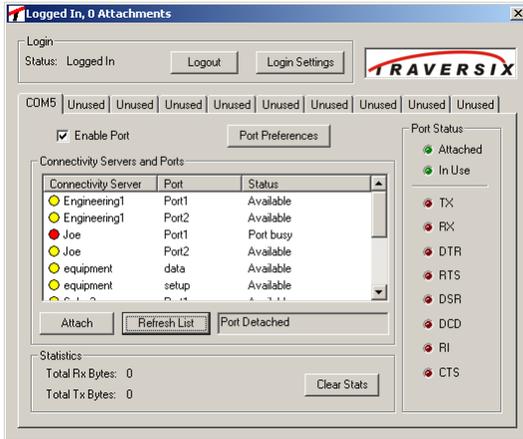


If desired, also check “Remember my username and password”.

Click **Login**. After you are logged in, you may attach a port and use it.

## Attaching a Port

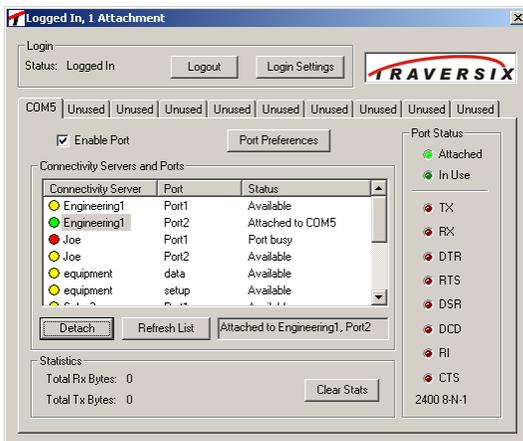
After login, the client will display a list of Connectivity Servers and ports. Scroll down the list, select the Connectivity Server and Port that you wish to use, and click **Attach Port**.



Once the port is attached, the display will indicate the attachment was successful with a green icon in the system tray, as shown below.



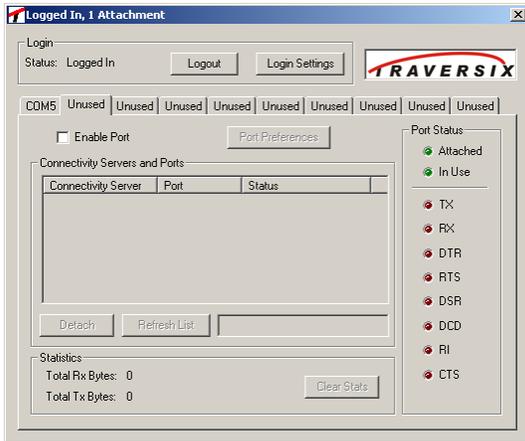
Also, the application displays a green icon for the selected Connectivity Server and port in the Connectivity Client application window, as shown below.



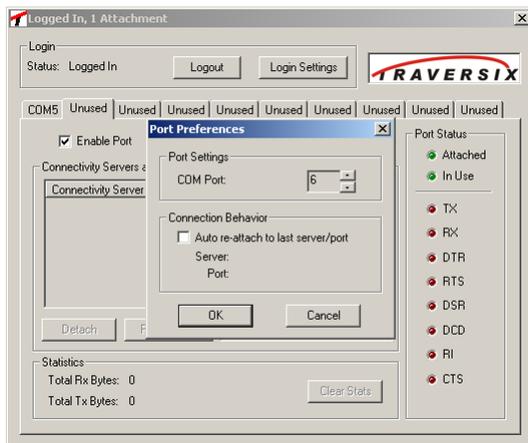
You may then start using your communication application to operate the remote device. Once your application opens the port, the “In Use” indicator will light, and the other indicators (TX, RX, etc.) will show the port status.

## Adding More Ports

To add more virtual ports, click any of the “Unused” tabs. The following screen will appear:

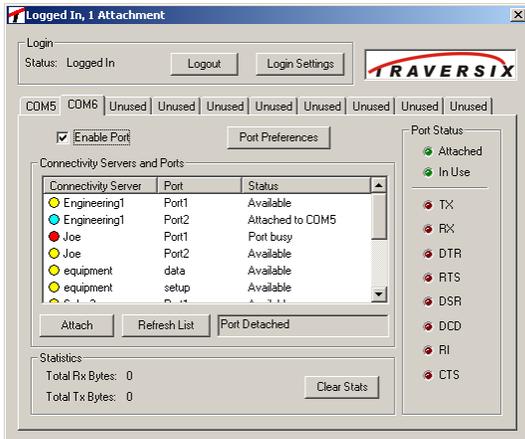


Click the “Enable Port” checkbox, and the Port Preferences dialog will appear, as shown below.



Select the COM port number, and click **OK**. This will return you to the attachment list for the new COM port.

Note that the Connectivity Server (and port) that you attached on the initial screen is also shown, but is marked with a special color. You may select any of the other available ports for attachment to this port.



## Preferences

You may configure the Connectivity Client to remember your username and password and even to log in to the Connectivity Gateway automatically. To change these settings, click **Preferences**. The dialog shown below will appear.

You may also adjust login preferences by clicking the **Login Settings** button. This gives you access to the following configuration items:



The **Change Password at Gateway** button will only work if you have logged in successfully.

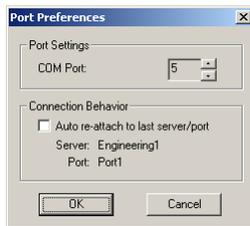
If you are logged in, you may change your Connectivity Gateway password by entering your old password and your new password twice as prompted by the window shown below.



After you have entered the old and new passwords, click **OK** to attempt the password change. Another window will pop up after a few seconds to notify you of the password change status. Click **OK** to return to the Preferences window.

Once back in the Preferences window, continue to modify preferences as desired. Click **OK** when complete.

You may also adjust the preferences for each port by clicking **Port Preferences**.



These settings apply only to the currently-displayed port. You may change the COM Port number only if the port is not currently in use by an application.

## Troubleshooting

### Simple Troubleshooting Procedures

| Symptom   | Possible Cause(s)  | Possible Resolution(s) / Next Steps   |
|---|--|---|
| Power light not illuminated                                   | Power adapter not plugged into wall outlet or power adapter's plug not firmly inserted into Connectivity Server.                         | Check outlet where power adapter is plugged in.<br><br>Re-seat power plug   |
| Ethernet Link LED not illuminated                             | Ethernet cable not plugged in, or wrong type.<br><br>Hub/switch port not active.   | Ensure Ethernet cable is plugged in on both ends.<br>Test the port on the hub or switch with another device and/or cable.<br>If necessary, try a crossover cable.                                 |
| Online LED not illuminated (but Ethernet Link LED is)         | DHCP server not present on LAN.<br><br>Unusual firewall configuration preventing Connectivity Server from reaching Connectivity Gateway. | Connect PC to LAN, test connectivity to Connectivity Gateway with ConnectionTest utility.<br><br>Verify that Connectivity Server can be administered using FindDevices utility and a web browser. |
| Forgot local administration password for Connectivity Server  |  | Reset Connectivity Server to factory defaults.<br>(Factory default password is "password".)   |
| Connectivity Client not able to log into Connectivity Gateway | Poor connectivity between local network and Connectivity Gateway<br><br>Incorrect username / password                                    | Test connectivity to Connectivity Gateway with ConnectionTest utility.  |

***Resetting the Server to Factory Default Settings***

If it becomes necessary to reset the Connectivity Server to factory default settings, perform the following steps:

1. Ensure that the Connectivity Server has power, and orient it so that the LEDs on the front are visible.
2. Gently insert a paperclip straight into the hole in the rear of the cabinet until it reaches the hidden switch, as shown in the picture below.



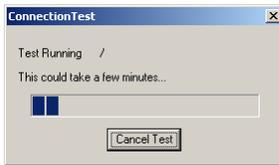
3. Depress and hold the switch with the paperclip. Continue holding the switch until the Power LED blinks off and back on. (Note that the Ser. 1 LED will also flash rapidly and then stop during this time.)

## ConnectionTest Utility

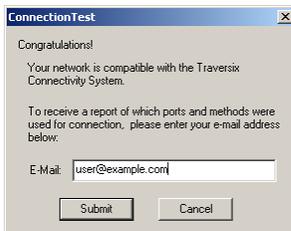
If you are unsure as to whether or not your PC can communicate with the Connectivity Gateway, you can use the ConnectionTest utility as a troubleshooting aid. Start the utility from the Traversix Connectivity Suite group in the Windows Start menu. The screen below will appear.



Press the Begin Test button to start the test and the following status screen will appear.



If your network is compatible with the Traversix Connectivity System, you will see the following screen. If you would like to know which ports and connection methods were used in this test, enter your e-mail address in the space provided. A Traversix customer service representative will send you a detailed test report.



If all connection attempts fail, you will see the following:



If the failure continues, contact Traversix customer service or your local network administrator.

## Glossary

Here are some common computing, connector, cable, and wiring terms.

**Adapter Card** - An electronics board installed in a PC, which provides a network interface to and from that computer. A network interface card (NIC) is a type of adapter card.

**Bandwidth** - The amount of information or data that can be sent over the Internet during a given period of time. Bandwidth is usually stated in bits per second (bps), kilobits per second (kbps) or megabits per second (Mbps).

**bps** - bits per second - A measure of bandwidth capacity or transmission speed.

**Bridge** - A data communications device that connects two or more networks and forwards packets between them. Ethernet bridges read and filter packets and frames by MAC address, do not require IP addresses, and will pass broadcast traffic.

**Broadband** - A transmission medium or channel that has a wider bandwidth than one voice channel (with a carrier wave of a certain modulated frequency). It allows multiple services like voice, data, video, etc. to transit over the network. The term "broadband" also is used to generically refer to a class of consumer networking services such as DSL (ADSL), cable modem, etc., that provide higher bandwidth than a 56kbps dialup connection.

**Crossover Cable** (Usually referring to Ethernet) - A cable that crosses the transmit and receive pins appropriately so that two devices can communicate directly without the use of a hub, or similar intermediate device.

**DHCP** – Dynamic Host Control Protocol - A mechanism by which IP addresses and other parameters are assigned automatically to computers and other equipment on a LAN. For network devices to use DHCP, there must be one special device, called a DHCP server present.

**Ethernet** - A popular type of local area network (LAN) developed by Xerox in 1976 and common in many of today's office networks. Two popular Ethernet configurations are 10Base-T (carrying 10 megabits per second) and 100Base-T (at 100Mbps). Ethernet networks are often connected by twisted-pair cabling, but can also be connected by coaxial and fiber-optic cables.

**Firewall** - A set of related programs, usually operated on a network gateway server that protect the resources of a private network from users from other networks. (The term also implies the security policy that is used with the programs.) An enterprise with an intranet that allows its workers access to the wider Internet installs a firewall to prevent outsiders from accessing its own private data resources and for controlling what outside resources its own users can access. More recently, a number of “software firewall” products have become available for use on individual PCs, rather than on the network gateway.

**Full-Duplex** - A physical medium in which data can travel in both directions at the same time, using 100% of available bandwidth in the communication channel.

**Half-Duplex** - A physical medium in which data travels in one direction, or the other at any given time, using 50% of the theoretical bandwidth of the communication channel.

**Hub** - A wiring connection device that accepts cables from PCs, servers, etc. The hub retransmits signals received from one device to all other devices connected to the hub. If more ports are needed than are present on a single hub, multiple hubs can be cascaded together. Ethernet hubs usually require the use of a crossover cable or a special uplink or ‘MDI’ port for cascading.

**Kbps** - Kilobits per second - A measure of bandwidth capacity or transmission speed. A kilobit is 1000 bits.

**LAN** – Local Area Network – A network segment in which all nodes are in reasonably close proximity (topologically), and can communicate directly with each other without requiring a router.

**MAC Address** - Media Access Control Address - A unique 32-bit number (usually expressed in hex) assigned to a device to identify it on the network. MAC addresses are 6 bytes long; the first three bytes are unique to each manufacturer, the last three are a sequential number. Every network device in the world should have a unique MAC address.

**Mbps** – Megabits per second (Millions of bits per second) - A measure of bandwidth capacity or transmission speed.

**NAT** - Network Address Translation - Provides a pseudo-dynamic connection with the Internet in a private IP space, by allowing a LAN to operate using "private" unroutable addresses, and exposing a small number of routable addresses on the external interface of a firewall.

**NIC** - Network Interface Card - The circuit board or other form of computer hardware that serves as the interface between a computer and the communications network. Types of NICs include Ethernet, Arcnet, token ring, etc.

**Node** - A device on a network, other than a hub. (i.e., PC, router, bridge, sniffer, printer, etc.)

**Patch Cable** - A short length of network cable used to connect two devices together.

**RJ-11** - The most common type of consumer telephone connector, a 6-pin male modular jack (or plug) that connects to a female jack on a wall (or an RJ-11 adapter). RJ-11 jacks are usually only wired for four pins and only two of them (usually the red and the green wires) are used for the telephone signal. The second pair can be used to carry a second telephone line or even to run low-wattage electronics, such as lights on phones. "RJ" stands for Registered Jack. The numbers that follow RJ (RJ-45, RJ-61X, etc.) are designations assigned by the FCC

**RJ-45** - A type of connector, similar to RJ-11, only wider, with 8 conductors, rather than 6. RJ-45 connectors are used for a variety of purposes including networking and telephony. Most Ethernet devices use RJ-45 connectors.

**Router** - A device that connects multiple computer networks by reading the IP address information on all data packets. The packet information is read, and the packets are then forwarded to the appropriate end station. Routers provide more functionality than bridges, which operate at the MAC address level. Routers may be used to connect LANs to LANs or LANs to WANs.

**RS-232** - An industry standard for serial interfaces, commonly used on computers for communication with modems and other serial peripheral devices.

**Serial** – A data transmission scheme in which data is transferred one bit at a time. In a parallel connection (such as a parallel printer), data is sent in groups of bits over multiple wires.

**Store-and-forward** - A type of communication system in which messages are received at an intermediate routing point in a network, recorded (i.e. stored), and then transmitted (i.e. forwarded) to another routing point, or their final destination, at a later time. This allows messages to be sent to machines that may be offline or transferred over a network at off-peak hours when rates and/or traffic are lower. Most e-mail traffic is handled in store-and-forward systems. The Traversix Virtual Connectivity Network streams data in real-time, as opposed to storing and forwarding messages.

**Switch (Ethernet)** – An Ethernet Switch is device which allows for a large network to maintain an effective data throughput by segmenting it into multiple parts, then passing traffic only to the segment that contains the destination host, thus reducing traffic on the other segments. Both hubs and switches are used for Ethernet connection.

**UART** - "Universal Asynchronous Receiver/Transmitter" - A chip that performs the conversion from serial data (transmitted and received by a serial port) to parallel form, which is used internally by a computer. The UART is a common source of bottlenecks in a computer/modem relationship. Newer computers use a 16550 UART with a buffer of 16-bits or more to help keep pace with today's faster modems and other peripherals.

## Specifications

### Connectivity Server

|                        |  |
|------------------------|--|
| Serial Ports           | 2 RS-232 ports (9-pin D-sub, male, DTE)  |
| Serial Interface Rates | 300 bps – 115,200 bps  |
| Flow Control           | RTS / CTS<br>DTR / DSR-CD<br>XON / XOFF<br>None  |
| Setup                  | Browser-based configuration utility in unit<br>Also offers command-line interface on serial port 1 (when in administration mode) |
| Administration         | Browser-based central administration via Connectivity Gateway  |
| Encryption             | AES 128-bit  |
| LED Indicators         | Power<br>Online<br>Serial 1 (Activity)<br>Serial 2 (Activity)<br>Ethernet Link<br>Ethernet Activity                              |
| Ethernet Interface     | RJ-45 connector<br>10 Mbps, half- or full-duplex   |
| Dimensions             | 5.3" wide<br>3.9" deep<br>1.4" high  |
| Operating Temperature  | -40°C to +70°C   |
| Power                  | 12 VDC, 150 ma, AC adapter included.   |
| Regulation Compliance  | FCC Part 15  |

## **Connectivity Client Software**

### Specifications

|                    |   |
|--------------------|---|
| <b>Encryption</b>  | AES 128-bit   |
| <b>Diagnostics</b> | Connection status<br>Transfer statistics<br>On-screen display of all serial control signals |

### Requirements

|                                |  |
|--------------------------------|--|
| <b>Operating System</b>        | Microsoft Windows 2000<br>Microsoft Windows XP   |
| <b>Memory Recommendation</b>   | 128MB  |
| <b>Additional Requirements</b> | CD-ROM drive required for installation<br>Internet connection required, broadband connection recommended |

## **Notices and Contact Information**

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