



CLEAR CUBE

I/Port User's Guide

ClearCube Technology, Inc.

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Granted patents include: US05926172, US05966056, US05994952, US06012101, US06020839, US06037884, US06038616, US06119146, US06148182, US06167241, US06385666, US06421393, US06426970, US06633934, US06708247, US06735658, and US06886055.

Patents pending include: US S/N 09/755378, US S/N 10/279475, US S/N 10/198719, US S/N 10/198650, US S/N 10/409219, US S/N 09/728667, US S/N 09/728669, US S/N 10/411804, US S/N 10/411908, US S/N 10/458853, US S/N 10/364584, US S/N 10/301536, US S/N 60/411066, US S/N 10/662933, US S/N 10/662889, US S/N 10/662932, US S/N 10/662968, US S/N 10/301563, US S/N 10/662936, US S/N 10/301518, US S/N 10/662955 and US S/N 10/662954.

Inquiries regarding patented technology should be directed to ClearCube Corporate Headquarters.

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How to Use This Guide

This manual provides all the product and installation information needed to set up and run ClearCube Technology's I/Port architecture for managed desktop environments. Familiarize yourself with the ClearCube architecture and product descriptions and read through the entire installation and setup procedures before beginning installation.

If you encounter any problems, contact Technical Support using the contact information provided on the inside front cover of this manual.

FCC Warning

This equipment generates and uses radio frequency energy and, if not installed and used in strict accordance with the instructions in this manual, may cause interference to radio and television reception. Changes or modifications not expressly approved by ClearCube Technology could void the user's authority to operate the equipment under the FCC Rules.

California Proposition 65 Statement



WARNING: ClearCube products contain chemicals, including lead, known to the State of California to cause cancer, birth defects, or other reproductive harm. **Wash hands after handling.**

ClearCube products should be disposed of in accordance with local laws governing computer equipment disposal.

WEEE Information



The products described in this document are subject to regulation under the European Union Directive 2002/96/EC, that mandates separate waste collection, treatment, and recycling of electronic products. This directive is commonly known as WEEE, for Waste from Electrical and Electronic Equipment, and its intent is to promote the safe and sensible disposal of products that have outlived their usefulness

The “crossed-out” trash bin symbol, shown to the left, identifies products that should be recycled, not simply discarded. ClearCube Technology supports the reuse, recycling, recovery, and responsible disposal of all products, not just our systems.

ClearCube Technology is committed to meeting the requirements of the European Union WEEE Directive and is currently developing country-specific implementation plans that comply with the WEEE legislation. The goal of the directive is to reduce the environmental impact due to the disposal of electrical and electronic equipment that has reached the end of its useful service life. This directive goes into enforcement on August 13, 2005.

ClearCube products are sold exclusively to commercial and industrial customers and not to private households. Under the WEEE legislation terms, commercial and industrial customers have the responsibility to ensure that all electrical and electronic equipment is disposed of properly and in accordance with all applicable laws and local regulations. For more information, visit the ClearCube Technology web site at www.clearcube.com, email at recycle@clearcube.com, or call at (866) 652-3400 or +1 (512) 652-3400.

Materials used in this product, if not disposed of properly, could have adverse effects on the environment and human health. Do not dispose of these products in unsorted municipal waste containers. Deliver electronic waste only to an approved recycling, and/or treatment facility. If one is not available, contact ClearCube for assistance.

Warning Regarding Medical and Clinical Use of ClearCube Products

ClearCube products are not designed with components and testing for a level of reliability suitable for use in or in connection with surgical implants or as critical components in any life support systems whose failure to perform can reasonably be expected to cause significant injury to a human. Applications of ClearCube products involving medical or clinical treatment can create a potential for death or bodily injury caused by product failure, or by errors on the part of the user. Because each end-user system environment is customized and differs from ClearCube testing platforms and because a user may use ClearCube products in combination with other products in a manner not evaluated or contemplated by ClearCube, the user is ultimately responsible for verifying and validating the suitability of ClearCube products whenever ClearCube products are incorporated in a system, including, without limitation, the appropriate design, process and safety level of such system or application.

Symbols

Symbols are used on the equipment to convey specific information to the operator and service person. It is important to understand the intended meaning of these symbols. Below are the graphical symbols that are used on ClearCube Technology, Inc. Products and their meaning.



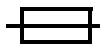
Refer to Manual

Used on the equipment's rating label to direct the operator or service person to the manual for additional information.



Power

Identifies the soft-start switch located on rear of the host or blade, used to power the host on and off.



Fuse

Located on equipment rating label. Symbol is accompanied with the specifications needed for replacement. Only qualified technicians should perform this operation.



Protective Earth Terminal

Identifies the terminal that is used to connect all metal parts of the enclosure through an external conductor to ground for the protection against electrical shock in a fault condition.



Equipment Protection Class II

May be located on the power adapter's rating label. Indicates that equipment is double insulated from hazardous voltages. Not to be confused with "Class 2" that is a US National Electrical Code (NEC) circuit classification.

These same symbols are used within this document where appropriate to indicate situations that merit checking this or another manual, or situations that could result in damage to equipment or physical injury.



CAUTION: A Caution notice in this manual indicates that equipment damage or minor injury may result if proper procedures are not followed.



WARNING – A Warning notice in this manual indicates that catastrophic equipment damage, or serious injury including death may result if proper procedures are not followed.

Safety Guidelines



Before undertaking any troubleshooting or maintenance procedure, read carefully all **WARNING** and **CAUTION** notices. This equipment contains voltage hazardous to human life and is capable of inflicting personal injury.

- **Installations** – ClearCube equipment is required to be installed in accordance with the local electrical codes and may be subject to inspection by the authority having jurisdiction.
- **Chassis Grounding** – ClearCube’s chassis and Fiber Transceiver has been designed with a three-conductor IEC 60320 appliance inlet that – with the proper power cord – connects the building’s external protective earthing conductor to all accessible metal parts of the enclosure. To minimize shock hazard, make sure your electrical power outlet has an appropriate earth safety ground that is connected each time you power on the equipment.

Swedish safety regulations require the following statement:

—Apparaten skall anslutas till jordat uttag när den anslutas till ett nätverk.—

Finnish safety regulations require the following statement:

— Laite on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan.—

- **Power Cord Selection** – ClearCube or ClearCube’s Distributors provides power cords that are specifically designed for use with that particular piece of equipment and are approved for use by the local authority having jurisdiction in the country where the equipment is put into service. Please refer to the installation sections of this manual for specific power cord requirements. For replacement of power cords, refer to *Appendix C – Technical Support*.
- **Power Adapters** – ClearCube or ClearCube’s Distributors provides power adapters that are specifically designed for use with that particular piece of equipment and are approved for use by the local authority having jurisdiction in the country where the equipment is put into service. Please refer to the installation sections of this manual for specific power cord requirements. For replacement of power cords, refer to *Appendix C – Technical Support*.
- **IT Power Systems** – ClearCube equipment has been evaluated and found to be compatible with IT power distribution systems with a phase-to-phase voltage not to exceed 240 V.
- **Live Circuits** – Operating personnel and service personnel must not remove protective covers when operating the ClearCube chassis. Adjustments and service to internal components must be undertaken by qualified service technicians. During any service of this product other than replacing a host, PC blade, or the fan tray, the main connector to the premise wiring must be disconnected. Dangerous voltages may be present under certain conditions. Use extreme caution.
- **Explosive Atmosphere** – Do not operate the chassis in conditions where flammable gases are present. Under such conditions this equipment is unsafe and may ignite the gases or gas fumes.
- **Part Replacement** – Only service equipment with parts that are exact replacements, both electrically and mechanically. Contact ClearCube Technology for replacement part information. Installation of parts that are not direct replacements will void the warranty and may cause harm to personnel operating the chassis. Furthermore, damage or fire may occur if replacement parts are unsuitable.

- **Modification** – Do not modify any part of the I/Port, chassis, host, or PC blade from its original condition. Modifications may result in hazards.



CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Chapter 1. ClearCube I/Port Overview

The ClearCube architecture delivers PC functionality to the desktop from a secure, centralized location. This results in dramatic increases in manageability and security while providing mission-critical reliability, performance, and uptime improvements with lowered costs. Replacing a traditional PC box with a ClearCube C/Port or I/Port in an office or cubicle also saves space, eliminates fan noise and simplifies cabling resulting in a clear cube. The key components of the ClearCube Architecture are:

- **Host or Blade** – a remotely-located computer in a dense form factor.
- **Chassis** – a centralized host or blade housing that provides the power for each host and accepts a wide variety of chassis modules.
- **Chassis Module** – a modular interface card that plugs into a chassis and provides thin client, management, and network connections.
- **Thin Client** – a remote desktop unit (C/Port or I/Port) to which standard peripherals are connected.
- **System Management** – Sentral™ system management software and monitoring hardware that is built into ClearCube blades, ClearCube chassis, and ClearCube I/Ports.

The ClearCube I/Port is a thin client that connects to hosts over a standard Ethernet network. The I/Port delivers video and peripheral signals to a local user from a centralized host using Ethernet protocol, allowing it to work over standard switched networks. Unlike ClearCube C/Ports, I/Ports do not require point-to-point connections to hosts (homerun cabling is not required).

The I/Port enables IT managers use existing IP networks and cabling infrastructure, regardless of the distance between users' desktops and their centralized hosts.

This guide describes the following I/Ports:

- **I8020** – NeoLinux® operating system
- **I8820** – Windows® XPe operating system
- **I8330** – OS-independent
- **I9420** – OS-independent
- **I9440** – OS-independent

[Figure 1](#) on page [2](#) shows the ClearCube family of I/Ports. [Figure 3](#) on page [8](#) shows the connections between I/Ports and host or blades installed in the data center.



Figure 1. ClearCube I/Ports

Thin Clients and Operating Systems

ClearCube I/Ports are available with:

- **Windows XPe operating system**—Windows XPe offers the power of Windows XP in a compact, componentized form.
- **Neoware NeoLinux operating system**—NeoLinux is a tailored version of Linux[®] that is targeted at and optimized for a broad range of information appliances and thin clients. NeoLinux features a secure, read-only file system that enabling applications run on the host, not on the local thin client. Neoware employs a hardened default security profile and a streamlined user security environment.

Both operating systems have the advantage of being remotely manageable using ClearCube Sentral and Neoware ezRemote Manager software.

- **PCoIP[™] processors**—Enable thin clients to deliver a high-end PC experience to multiple monitors over a standard network, without an operating system. PCoIP also transparently redirects USB from the thin client to the host, or computing device. ClearCube I9xx I/Ports use PCoIP processors.

I8820

The I8820 features Windows XPe as the operating system. The small form factor of the I8820 I/Port allows customers to easily mount the I8820 under desks, vertically on walls, or behind a monitor using the optional mounting bracket.

Connecting to hosts using RDP, the I8820 I/Port delivers video and peripheral signals to users using Ethernet, eliminating distance limitations between hosts and users. The I8820 supports ClearCube Sentral, which sets up and dynamically allocates the RDP connections between the I/Ports and hosts. Additionally, Sentral provides sparing and dynamic allocation capabilities for ClearCube I/Ports.

I8020

The I8020 runs an embedded Linux operating system called NeoLinux. The I8020 features the same form factor as the I8820, allowing the same flexibility in mounting at the user's work space.

Like the I8820, the I8020 eliminates any distance limitations between the host and the user by using RDP. Hosts running Windows XP can work with the NeoLinux-based I8020 without requiring any upgrades. The I8020 also supports Sentral.

I8330

The I8330 connects over Ethernet and does not use RDP as the extension protocol. Because this technology eliminates the need for an operating system on the desktop device, I8330 I/Ports significantly reduce the likelihood of viruses on thin clients.

I9420 and I9440

The I9420 I/Port and the I9440 I/Port use PCoIP processors to deliver simultaneous full screen, full motion video at high resolutions on the following numbers of monitors:

- I9420—One or two monitors when connected to hosts containing V5120 Dual Host video cards
- I9440—One to four monitors when connected to hosts containing V5140 Quad Host video cards

You can specify a different resolution and display orientation (portrait or landscape) for each monitor connected to an I94xx I/Port.

You can deploy I9420 and I9440 I/Ports on:

- Existing Ethernet networks
- Secure point-to-point connections to prevent desktop-display data commingling with other network traffic

I94xx I/Ports do not require unique OS drivers, and support the following standard peripherals:

- Multiple monitors
- Keyboards
- Mouse devices
- Audio devices
- USB peripherals, including isochronous USB devices

Supporting Technology and Software

The following applications work together to enable and enhance I/Port functionality:

- Remote Desktop Protocol (RDP)
- ClearCube Sentral
- Neoware ezRemote Manager
- I83xx Driver and Admin Utility
- PC-over-IP™ (PCoIP) technology

Remote Desktop Protocol

Microsoft Remote Desktop Protocol (RDP) is a presentation protocol that allows the I/Port to communicate with a host. RDP works across any TCP/IP connection, such as a local area network (LAN), wide area network (WAN), or virtual private network (VPN) connection. RDP is the delivery mechanism for video, mouse, keyboard, and USB communications between the I/Port and the host.

When using Remote Desktop Protocol from the I/Port, many of the local I/Port resources are available within the session, for example:

- **Peripheral Redirection** – Peripherals connected to a local I/Port appear as if they are connected to a user's host. RDP supports redirection for devices such as:
 - Human Interface Devices (such as keyboards and pointing devices)
 - TWAIN devices (such as scanners)
 - Local drives (such as mass storage devices)
 - Printers
 - Devices attached the I/Port's local serial port and parallel port

- **Audio** – The audio streams, such as .wav and .mp3 files, play through the I/Port's speaker connection. RDP provides downstream audio only. RDP only supports audio out (i.e., from the host to the I/Port) so speakers connected to an I/Port can play sound generated by the host. However, audio in (i.e., from the I/Port to the host) isn't supported by RDP so audio devices such as microphones cannot transmit back to the host.

ClearCube Sentral

ClearCube Sentral provides IT administrators with a comprehensive set of features and functionality for managing their I/Port environments. Sentral can optimize hardware utilization by dynamically allocating I/Ports to a defined pool of hosts.

Sentral tracks host loading statistics and automatically initiates a connection to the least utilized host when each user logs on. Power users can be mapped to an individual host ensuring maximum performance. Auto discovery of I/Ports and hosts makes it easy to inventory and manage assets. In addition, an update feature makes it easy to update the Sentral Client on each I/Port when new software versions are made available. Finally, Sentral delivers server-level availability to end users by enabling Administrators to easily switch an I/Port user to a spare host should they experience a problem.

Neoware ezRemote Manager Software

Neoware ezRemote Manager is a remote management tool for keeping I/Ports up-to-date and is used as a companion to Sentral. ezRemote Manager is based on a straightforward, easy-to-use interface that allows administrators to remotely push drivers, applications, and security updates via snap-ins, to a single I/Port or an entire enterprise. Snap-ins are deployment packages that can automatically install peripheral drivers or local applications such as VPN clients. ezRM can fully re-image a device in order to deploy a customized image enterprise-wide or for disaster recovery on individual devices. ezRM is also the tool for keeping XPe based units up-to-date with Microsoft security updates.

I83xx Driver and Admin Utility

The I83xx driver and the I83xx admin utility enable support for I83xx-series I/Ports in a Sentral environment and are available on the Sentral installation CD.

Note: The I83xx driver and the I83xx admin utility are required only if you use I83xx I/Ports in your environment. Ensure that you do not install I83xx drivers or admin utility on hosts connected to I94xx I/Ports.

Each blade or virtual machine to which an I8330 connects must have the I83xx driver installed. See *Sentral Administrator's Guide* for more information about the I83xx driver and the I83xx admin utility.

PCoIP

I9420 and I9440 I/Ports use PCoIP technology to deliver high-performance video and audio to users. PCoIP technology consists of dedicated processors on the thin client (I94xx I/Port) and on the host to which the thin client connects. ClearCube hosts can support I94xx I/Ports by using one of the following host-side cards:

- **V5120 Dual Host card**—Contained in specific A-series and R-series PC blades to support I9420 I/Ports
- **V5140 Quad Host card**—Contained in specific A-series PC blades to support I9440 I/Ports

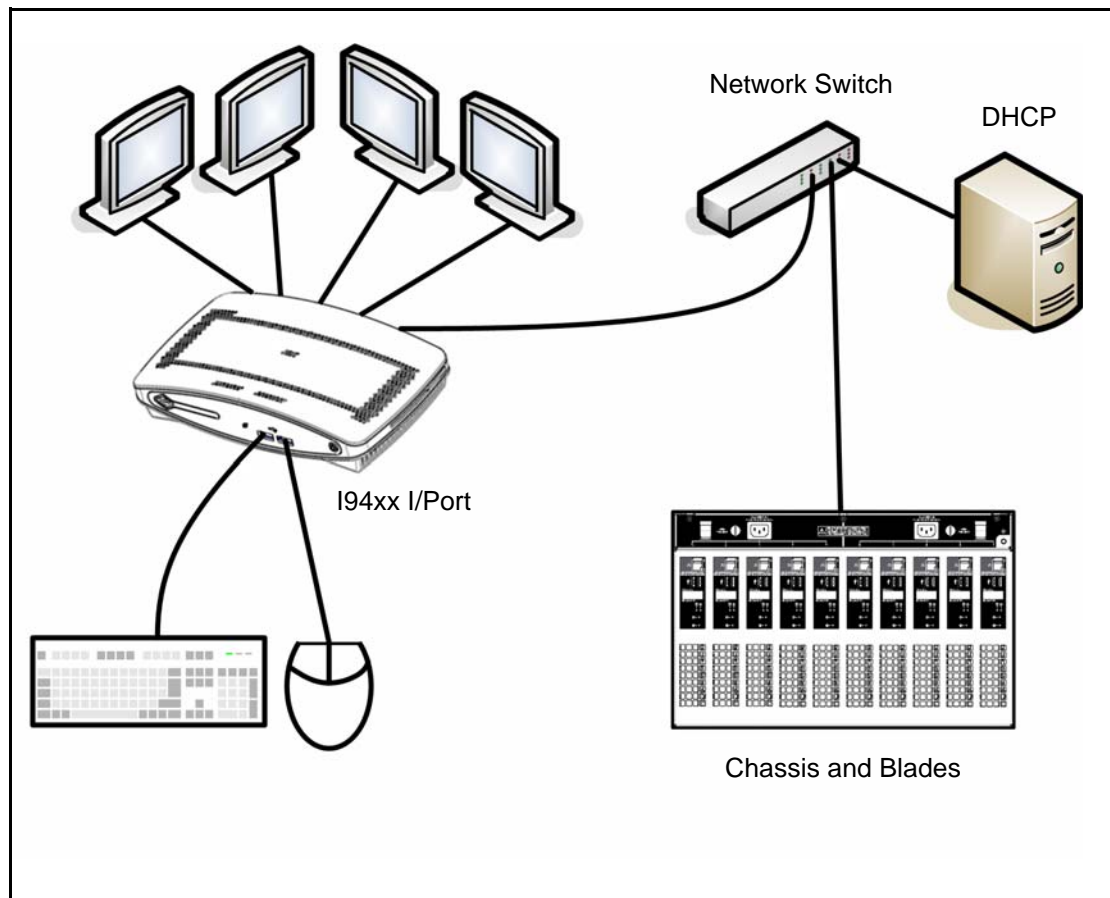


Figure 2. Typical I94xx architecture

Chapter 2. I/Port Installation

Caution Statements

Improper connection, mounting, or use of this product could result in component failure or undesired interference. Read the following caution statements before setting up and operating your I/Port.

Setup

- Do not connect to AC power until all other connections are made, including the power adapter. Connecting or disconnecting components or equipment on the back panel when the I/Port is receiving AC power can cause power surges and damage the device.
- Do not force a connector into its socket. If any undue resistance is encountered, ensure that the connector is correctly oriented to the receptacle.
- Do not attach the I/Port to a telephone jack or other powered network connection. This will permanently damage the I/Port. This damage is not covered under the ClearCube Technology limited warranty.

Orientation and Venting

- Allow sufficient space around the I/Port for ventilation. Do not place the device in any enclosure that restricts airflow around the device. Do not place any objects on the device. Product environmental specifications are listed in [Appendix A. Specifications](#) on page 31.
- The I8020 and I8820 can be mounted horizontally or vertically. An optional mounting bracket is available from ClearCube. Provide adequate clearance around the I/Port for cooling.
- The I8330 can be mounted horizontally or vertically. Provide adequate clearance around the I/Port for cooling.
- Mount I9420 I/Ports and I9440 I/Ports flat (that is, horizontally). A mounting bracket is included with each I9420 and I9440. See "[Using the I94xx Mounting Bracket](#)" on page 12 for instructions about how to mount the bracket and for information about the minimum clearance specifications.

Power Sources

- To ensure regulatory compliance, use only the power supply included in the shipping carton with the I/Port, or a ClearCube-approved equivalent.
- Surge protectors for electrical devices are recommended in areas of frequent lightning. However, when lightning is occurring, your equipment should be properly shut down and unplugged from AC power until the storm has passed.
- Be careful to not interrupt power while the I/Port is receiving a software update.

Cable Requirements

For I/Port installations, you need 16 CAT5 cables per chassis to connect the hosts to your network switch. You will not need to connect any cables to the C/Port connections. With I/Ports, the cables going to the desktop are connected directly to your network switch. [Figure 3](#) on this page provides schematics of the cabling required to connect your R-Series chassis to I/Ports and your Ethernet network.

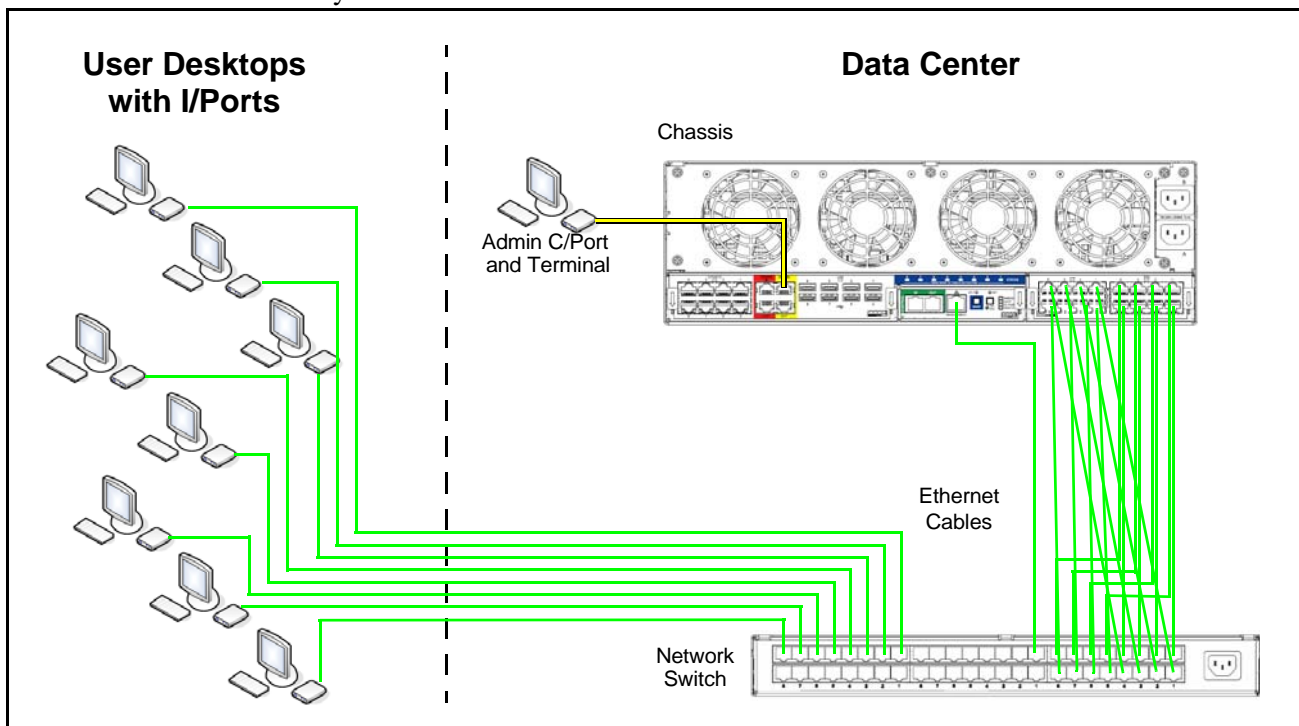


Figure 3. R-Series Chassis Cabling Diagram

The following figure shows a typical cabling configuration to connect I9420 I/Ports and I9440 I/Ports to an A3100 chassis.

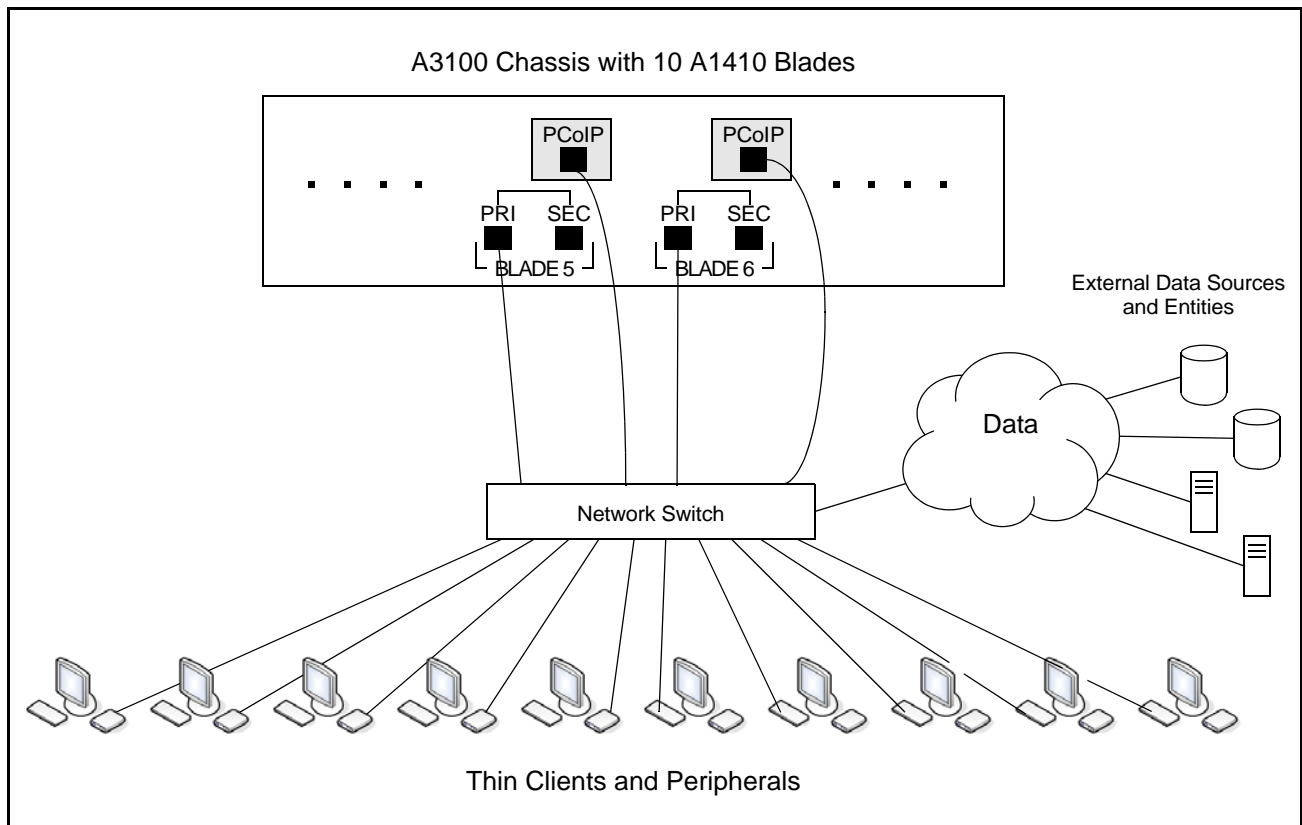


Figure 4. A3100 Chassis Cabling Diagram

Unpacking the I/Port

When unpacking the I/Port, you will find one of each of the following items:

- I/Port unit
- I/Port power supply and power cord (optional for some regions)
- Optional mouse and keyboard (may be shipped separately)
- Mounting bracket and mounting screws are included with I9420

Setting up the I/Port

To set up your I/Port, do the following:

1. Place the I/Port on a desktop or other solid surface.
2. Make connections as appropriate for your I/Port, as shown in one of the following figures:

- I8020 or I8820 I/Port—[Figure 5](#) on this page
- I8330 I/Port—[Figure 6](#) on this page
- I9420 I/Port—[Figure 7](#) on page 11
- I9440 I/Port—[Figure 8](#) on page 11



Do not attach the I/Port to a telephone jack. This will permanently damage the I/Port. This damage is not covered under the ClearCube Technology limited warranty.

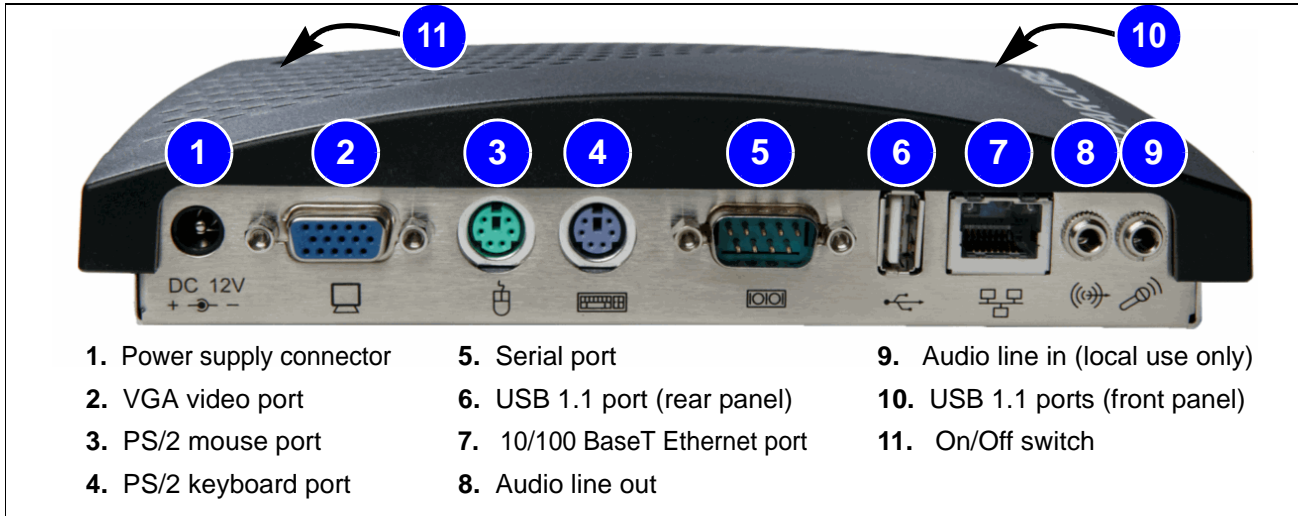


Figure 5. I8020 and I8820 I/Port Connections

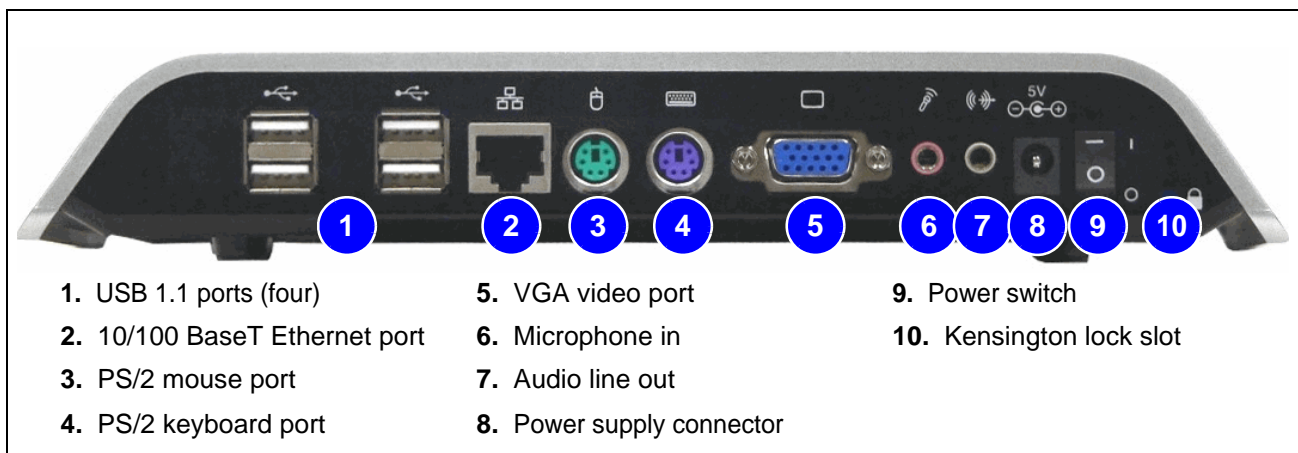


Figure 6. I8330 I/Port Connections

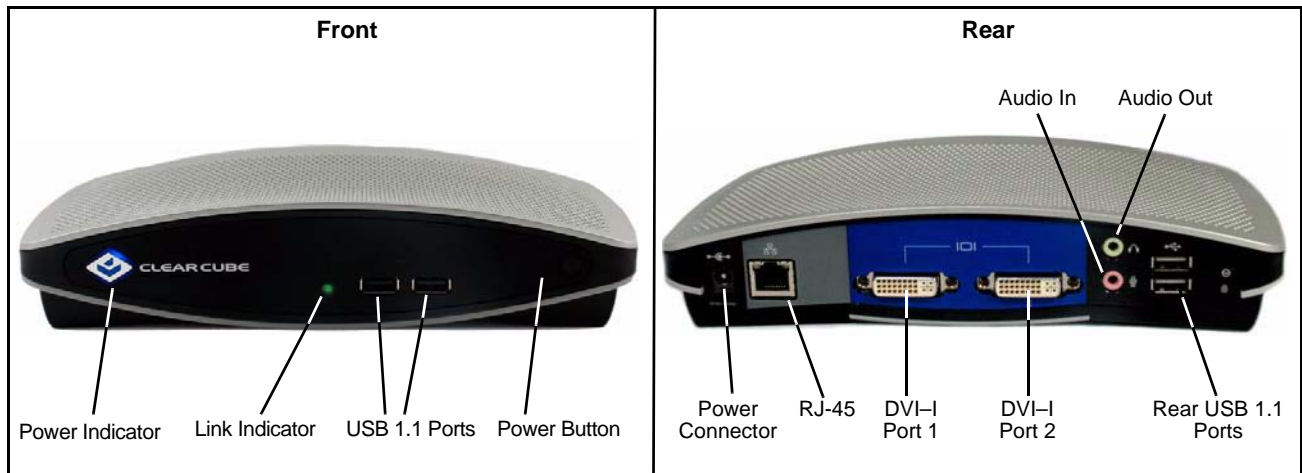


Figure 7. I9420 I/Port Front and Rear

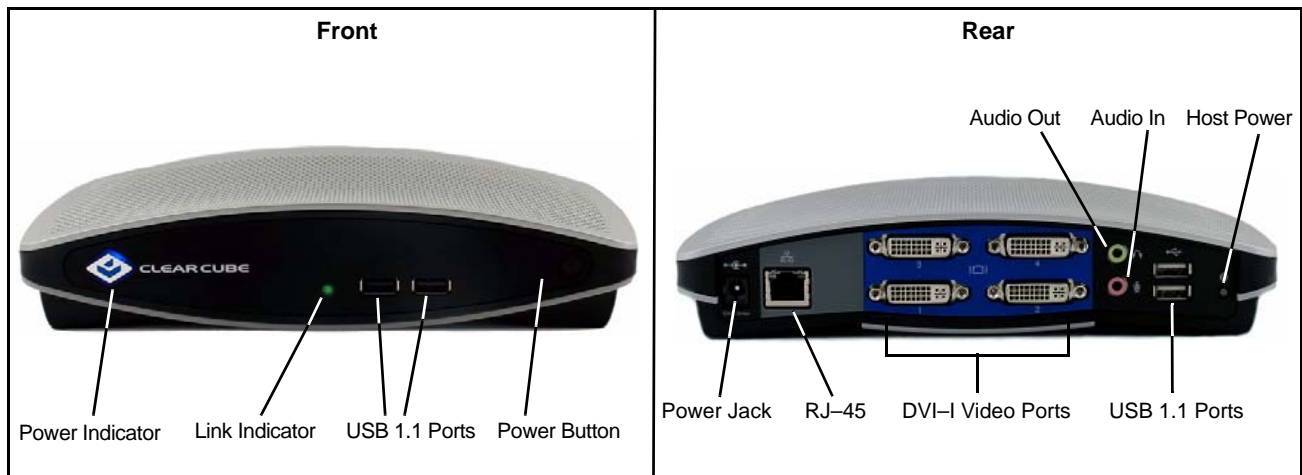


Figure 8. I9440 I/Port Front and Rear

3. Connect the power cord.
4. Press the power push-button on the I/Port to turn power on.
5. Enable any necessary ports on your switches and routers. Sentral uses ports 6502 UDP, 4001 UDP, 9000 TCP and 9000 UDP. RDP uses port 3389 TCP and port 139 UDP. Your individual network may use other ports besides these. For more information about ports you need to open in your environment, see *Sentral Administrator's Guide*.

Note: If using DHCP, verify that name resolution is activated to detect non-Windows-based systems and that the DNS server is registering the I/Port.

6. **For I94xx I/Ports only:** To ensure 100/full-duplex throughput between a V5120 or V5140 card in a blade and an I94xx I/Port, set any network switches connecting the blade and the I/Port to automatic negotiation. Explicitly setting a network switch to 100/full-duplex can cause throughput issues. If there are performance or throughput issues after setting network switches to automatic negotiation, physically disconnect and then reconnect the network cables to the switch.

Using the I94xx Mounting Bracket

Use the I94xx mounting bracket, included with I9420 and I9440 I/Ports, to mount an I94xx I/Port under a desk. Use the following tools to mount the bracket:

- Phillips screwdriver
- Optionally, a drill to drill 3/32-inch pilot holes for the mounting bracket screws.

Note: ClearCube recommends attaching all cables to the I/Port, as described in "[Setting up the I/Port](#)" on page 9, before inserting the I/Port into the bracket.

1. Use the four holes in the top of the bracket as a pattern to mark the surface (for example, the underside of a desk) where you will attach the bracket. Ensure that:
 - There is a minimum of 1 ½ inches of clearance on each side of the I/Port.
 - There is a minimum of ¾-inch clearance above the I/Port.
 - The bracket is inset a minimum of 2 $\frac{3}{8}$ inches from the front of the desk.
2. Optionally, use a drill to make 3/32-inch pilot holes in each of the bracket markings you just made.
3. Use the included wood screws to screw the bracket into the four holes. Ensure that you do not overtighten the screws.
4. Align the grooves on the side of the I/Port with the bracket flanges and gently slide the I/Port into the bracket until it snaps into place.

Note: To prevent overheating, do not stand the I/Port on either of its sides, and do not cover any ventilation holes.

Configuring the Sentral Console for the I/Port Connection

In its default configuration, Sentral automatically detects I/Ports when they are connected to a Sentral-managed network, but some additional configuration is required. To configure the Sentral console for your I/Port connection, do the following:

1. If using I8330 I/Ports, install the I8330 admin utility on the host where Sentral console is installed. The I8330 admin utility is located on the Sentral installation CD.
2. From the Sentral console, run a discovery to discover all thin clients (as described in *Sentral Administrator's Guide*). From the **Setup > Configuration** screen, ensure that the **Discovery Update Config** drop-down menu is set to **True**. This setting pushes out credentials for the Primary and Secondary Sentral servers to I/Ports (however, not to I83xx I/Ports). If Discovery Update Config is set to False, right-click the thin client (I/Port) icon in the Hierarchical view, and select **Configure** to manually specify the Primary and Secondary servers.
3. From Sentral, add the I/Port to a Thin Client Group. See *Sentral Administrator's Guide* for more information about adding thin clients to thin client groups.
4. Allocate the Thin Client Group to a host, a host group, or a virtual machine. From the Sentral main menu, click **Connection Brokering > Allocation**. The Connection Brokering - Mappings screen is displayed.

For more information, see *Sentral Administrator's Guide*.

Enabling RDP on Hosts for I/Port Connections

The Remote Desktop Protocol (RDP) is used to connect your I/Port to a host or blade running Windows XP Professional. The I/Port and host can be located anywhere – across the hall, across town, or across an ocean from each other – provided that you have network access from the I/Port to the host, you have sufficient network bandwidth (> 50 Kbps for each I/Port), and you have the appropriate permissions set up on the host.

Using ClearCube Sentral management software, you can initiate connections from I/Ports to hosts. See *Sentral Administrator's Guide* for installation and configuration details. You can also initiate sessions directly from a I/Port by using the local RDP client connection tool.

To connect to a host from an I/Port, the host must first allow incoming RDP connections. To set up the host for this, you need a C/Port to connect directly to the host.

1. From the host Start Menu, click **Start > Settings > Control Panel > System**.
2. Click the **Remote** tab to open the Remote Desktop (RDP) configuration.
3. Select the **Allow users to remotely connect to this computer** option.
4. Click **OK** to save the configuration.

Note: Remote desktop access is not required for I8330 connections, but may be desirable for administrative purposes.

Configuring the XPe I/Port

The XPe-based I8820 auto-starts to a Windows XPe desktop with a limited set of applications, including the ClearCube Sentral client and the Microsoft Remote Desktop Protocol client. The default XPe user ID and password is `user / clearcube`. The default administrator ID and password is `administrator / clearcube`. For full administrator access on an XPe-based I/Port, hold down the **Shift** key during startup or after logging off from the default login. Access BIOS configuration options by pressing **F2** during start-up.

Whenever you want to make any persistent changes to the I/Port, such as changing user settings or installing new software, you need to disable the I/Port's Write Filter before making the change, and re-enable it after you have committed the change. The Write Filter is a software feature that prevents any inadvertent or undesired writes to the Flash Drive where the I/Port's operating system and other software is stored.

The Write Filter displays an icon in the system tray. When the icon has a red dot, the Write Filter is enabled, stopping you from writing to the Flash. When the icon has a green dot, the Write Filter is disabled and you can go ahead and write to the Flash.

When you push software updates using ezRemote Manager software, the Write Filter is managed automatically. See "[Updating I/Port Software](#)" on page 27 for more information.

To manage the Write Filter manually, you must be logged in as administrator. Double-click on the Write Filter icon in the system tray and select **Disable write filter** to disable the Write

Filter and enable writes to Flash. After you make your changes, double-click on the Write Filter icon in the system tray and select **Commit changes to disk and enable write filter**. Your changes are saved to Flash, the I/Port automatically restarts in 15 seconds, and the Write Filter is re-enabled when the restart is complete.

The Sentral client is provided as the default client on both the XPe- and NeoLinux- based I/Ports. When using your XPe-based I/Port as a client managed by Sentral, do the following from the Sentral Console to begin configuring your I/Port for Sentral:

1. From the Sentral console, run a discovery to discover all thin clients (as described in *Sentral Administrator's Guide*). From the **Setup > Configuration** screen, ensure that the **Discovery Update Config** drop-down menu is set to **True**. This setting pushes out credentials for the Primary and Secondary Sentral servers to the I/Port. If Discovery Update Config is set to False, right-click the thin client (I/Port) in the Hierarchical view, and select **Configure** to manually specify the Primary and Secondary servers.
2. Add the I/Port to a Thin Client Group.
3. Allocate the I/Port or Thin Client Group to a host, a host group, or a virtual machine (VM).

To log in directly to a host from an XPe-based I/Port, double-click the **Thin Client Agent Manager** icon on the thin client desktop and enter login credentials for the I/Port (thin client). Then log into the host using RDP, specifying the domain and host name as follows:

```
domain.com\host_name
```

If you are using an XPe-based I/Port as an unmanaged thin client with Microsoft Remote Desktop Protocol (RDP), double-click the **Remote Desktop Connection** icon on the desktop. Login to your desired host system using that host's fully qualified name. For example:

```
support.clearcube.com
```

You can also use the ezConnect client to set up manual RDP connectivity to hosts. Click **Connections**, select **Add**, and enter the connection information to your host.

If using an XPe-based I/Port as a client managed by ezRemote Manager, see *ezRemote Manager User Manual*:

<http://www.clearcube.com/support/controller/manuals.php>

Download ezRemote Manager from the following URL:

http://www.hp.com/sbso/busproducts_thinclient.html

Optimizing RDP and the I/Port

Under most circumstances, the I/Port itself does not run any applications other than the XPe core operating system, the Sentral client, and RDP. All applications run on the host.

When you use the Sentral client, the interface settings are managed by Sentral automatically. However, if you use RDP as a standalone client, there are several settings that you can adjust

on the I/Port to optimize the user experience. Most of the performance optimization revolves around configuring RDP in the most appropriate fashion, given your infrastructure.

ClearCube recommends using the I/Port primarily on a corporate network (100Mbps or faster) with Sentral. However, you may have users who will use I/Ports for remote applications, such as office access from home, offshore development, etc.

RDP allows several configurable capabilities. Enabling each additional capability requires more bandwidth, thus impacting performance. The ideal I/Port performance optimization process will lead to the best possible experience within any limitations of your operating environment.

[Figure 9](#) on page [15](#) shows the RDP Control Panel, where these adjustments can be made.

Note: Adjustments made to the RDP interface settings do not affect the Sentral client settings.

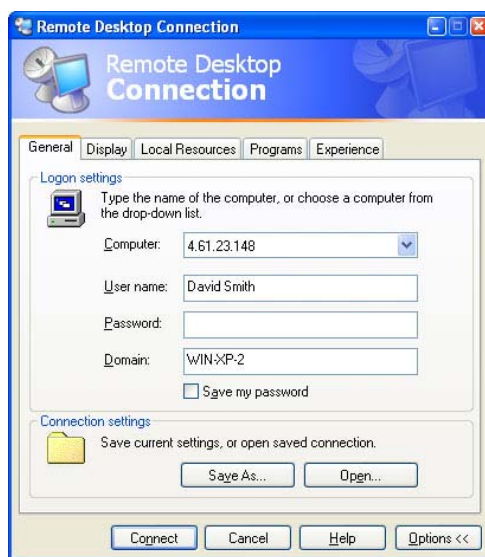


Figure 9. Remote Desktop (RDP) Configuration Window

The following items can be configured prior to initiating an RDP connection:

- **Display: Desktop Size** – Though RDP allows the desktop to be sized so that the RDP connection runs in a window smaller than the local XPe desktop, anything less than full-screen mode is not recommended for I/Port users.
- **Display: Color Depth** – The color depth options range from 256 to True Color. Generally, using only 256 colors negatively impacts the user experience, because most images are grainy and low quality. 16-bit color is normally used.

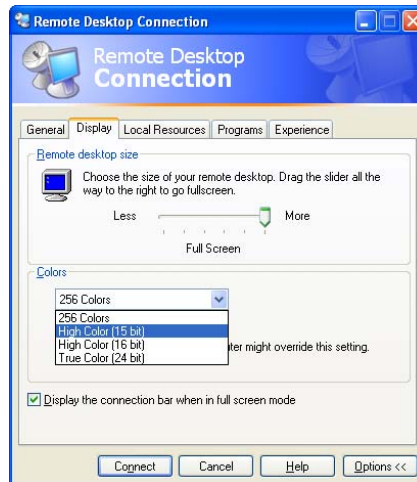


Figure 10. RDP Display Tab

- Local Resources: Sound**—Sound is configurable in three ways. Sound can either be left at the remote computer so it plays at the source (the host). This probably would not be done, since the hosts are in the data center. The other two options are to ignore sound, or to redirect sound to the I/Port. This last option provides the highest quality experience but also requires additional bandwidth. If the user has limited bandwidth and does not require sound, this option can be turned off.

Note: RDP only supports audio out (i.e., from the host to the I/Port) so speakers connected to an I/Port can play sound generated by the host. However, audio in (i.e., from the I/Port to the host) isn't supported by RDP so audio devices such as microphones cannot transmit back to the host.



Figure 11. RDP Local Resources Tab

- Local Resources: Devices** – RDP allows local disk drives, printers, and serial ports to be redirected. Again, these require additional bandwidth. Large quantities of writes and reads from local disks can adversely impact the performance of the RDP session.

If the user does not require printers or serial ports, it is best to disable re-direction to prevent any potential bandwidth loss caused by the host OS carrying out any sort of detection or other processes for these devices.

- **Experience** – Selecting a connection speed causes specific items listed in the connection speed pull-down menu to become checked or unchecked. Generally, the desktop background, especially if it is an image, is a significant source of performance slowdowns. The reason is that every time a window is moved within an RDP session, new parts of the background get exposed and need to be re-transmitted. This is generally a slow and time-consuming process. It is preferred, almost under any bandwidth conditions, to not use a picture background.



Figure 12. RDP Experience Tab

Adding a Printer

Installing a USB-attached local printer on an XPe I/Port requires installation steps both at the I/Port and on the host. You need administrator privileges on both systems.

To perform the tasks at the I/Port, do the following:

1. Disable the Write Filter (see "[Configuring the XPe I/Port](#)" on page 13).
2. Install the printer driver from a USB-attached storage device.
3. Double-click on the Write Filter icon in the system tray and select **Commit changes to disk and disable write filter**. The I/Port reboots automatically.
4. After the I/Port reboots, select **Start > Printers and Faxes** and right-click on the printer that was just installed.
5. Enable sharing according to the printer driver's procedures.
6. Select **Start > Control Panel > Firewall**.
7. Select the **Exceptions** tab.
8. Highlight the **File and Printer Share** service and select Edit.
9. In the **Edit a Service** window, click the checkboxes required to enable the printer. At a minimum, UDP ports 137 and 138, and TCP port 139 must be open.

10. Click **OK** twice to commit the changes and close the Firewall control panel.
11. Double-click on the Write Filter icon in the system tray and select **Commit changes to disk and enable write filter** to reboot the I/Port.

To perform the tasks on the host, do the following:

1. Select **Start > Printers and Faxes > Add a printer**.
2. Select **Network Printer** and use the Add Printer Wizard.
3. When prompted, select **Connect to this printer** and either browse to the printer, or enter `\\iport_name\printer_name` (where *iport_name* is the I/Port and *printer_name* is the printer).
4. Follow the wizard's prompts until the installation is completed.

You do not need to restart the host.

Configuring NeoLinux I/Ports

NeoLinux-based I/Ports autostart the ClearCube I/Port client on bootup. The default Administrator ID / Password is `su / clearcube`. No default user ID or Password is provided. The Write Filter Disable command, which allows writing to flash, is `fsunlock`. The Write Filter Enable command, which prevents writing to flash, is `fslock`.

Enable any necessary ports on your switches and routers. Sentral uses ports 6502 UDP, 4001 UDP, 9000 TCP and 9000 UDP. RDP uses port 3389 TCP and port 139 UDP. Your individual network may use other ports besides these.

Note: If using DHCP, verify that name resolution is activated to detect non-Windows-based systems and that the DNS server is registering the I/Port.

NeoLinux-based I/Ports allow access to BIOS configuration options by pressing **F2** during start-up. Your NeoLinux-based I/Port auto-starts the Sentral client, and you can login to a host from the login screen that is displayed. If you need to log in to the I/Port to change configurations, the default administrator ID and password is `root / clearcube`. No default user ID is configured.

If you are using your NeoLinux-based I/Port as a client managed by Sentral, do the following from the Sentral Console after installing the I/Port at the desktop:

1. At the Sentral console, run Discovery to discover the I/Port. If the **UDP Push Discovery** parameter in the Sentral Console Configuration is set to **True**, credentials for the Primary and Secondary Sentral Servers are pushed out to the I/Port. If the **UDP Push Discovery** parameter is set to **False**, right-click on the I/Port in the Sentral Hierarchical menu, and manually configure the Primary and Secondary Servers.
2. Add the I/Port to an I/Port Group.
3. Allocate the I/Port or Thin Client Group to a host, a Host Group, or a virtual machine (VM).

If you are not using the Sentral client, a native RDP client is also available from the ezConnect interface. To use the ezConnect RDP client, select **Neoware > ezConnect** from the menu bar. The ezConnect client allows viewing and modifying settings on the I/Port such as display settings and network configurations.

The ezConnect client can also be used to set up local or remote connections using X.11 or `tty`. To add a local `tty` connection, do the following:

1. From the Connection window, select **Connect > Add**.
2. In the Add Connection window, choose **Basic Terminal**.
3. Enter a name for the session, specify `localhost` as the Host, and use the default Port 23.
4. Use the default settings, or customize them to your choice.

The `tty` session opens in a `bash` shell, and provides a limited set of Unix tools, including these:

- `ping`
- `passwd`
- `telnet`
- `tar`
- `vim` (an enhanced version of `vi`)

A limited amount of help is available (enter `help`) but `man` pages are not provided.

Configuring the I8330 I/Port

The I8330 I/Port provides a connection to a host without requiring an operating system in the I/Port itself. This architecture provides a variety of benefits, including security and cost savings.

Sentral Configuration

The I8330 I/Port requires Sentral 5.2 or higher. Your Sentral Console must have the I83xx Admin Utility installed on it, and each host to which the I8330 connects must have the I83xx driver installed.

Note: The I83xx Driver requires Windows XP. No other operating systems are supported.

By default, the I8330 is configured to automatically attempt a direct connection to a host with the I83xx driver installed. To change this configuration, press **F10** during startup, or click the **Options** button at the login screen and select **Setup**.

In the **Options** tab of Setup, click the button for Sentral and select **Save**. The I8330 I/Port will restart. If the Sentral network is available, a Sentral login dialog is displayed, and the I8330 is ready for login.

Note: Once this setting has been changed, the I8330 no longer displays the option to enter Setup. If you need to enter Setup, cycle the power on the I8330 and press **F10** when prompted.

The user must be joined to the Windows domain used by your Sentral installation, or must be a local user on the host or virtual machine (VM) to which the user will connect. The user must also be joined to a Sentral User Group, and the target host or VM must be allocated to that User Group. For a successful login, the target host or VM must be discovered in Sentral.

If Sentral is not available, a direct connection login is displayed, with an error message saying the server could not be found. Click through this error to make a direct connection.

For more information, please see the *Sentral Administrator's Guide*.

Direct Connection

By default, the I8330 I/Port is configured to automatically attempt a direct connection to a host. For direct connection, the I8330 requires the I83xx driver installed on each host to which it will connect.

When the I8330 I/Port is first started, a dialog box allowing a direct login is displayed. The login displays a list of the first eight hosts it finds that have the I83xx driver installed. Select a host, and click **Connect**. The user must be joined to the Windows domain used by the host, or must be a local user on the host to which the user will connect.

Operating Notes

Use the power switch on the back of the I8330 to turn it on and off. The blue **POWER** LED on the front panel indicates that the I8330 has power. The blue **READY** LED indicates that the I8330 is ready to use. The blue **LAN** activity LED on the front panel blinks in response to traffic between the I8330 and the network, but will otherwise remain steadily lit.

Turn the Num Lock function off before connecting to a host. If you notice that the **Num Lock** LED on your keyboard inaccurately displays whether the Num Lock function is set, terminate your host connection and press the **Num Lock** key one or more times until the **Num Lock** LED goes out. Then re-establish a connection to the host.

The configurable I8330 options that can be set in the device include TCP/IP address, monitor resolution, and color depth.

Note: If using DHCP, verify that name resolution is activated to detect non-Windows-based systems and that the DNS server is registering the I/Port. For non-DHCP networks, a static IP address manually assigned to the I8330 should not conflict with an existing address in the network. Enable any necessary ports on your switches and routers.

After powering on the I8330, press F10 to enter the local device setup utility. Verify the following settings:

Table 1. I8330 Setup Tabs

Option	Description
Network Tab	
IP Address	<p>This radio-button menu specifies IP Addressing mode. Choices include:</p> <ul style="list-style-type: none"> • Get Dynamic IP Address • Get Static IP Address <p>The default selection is Get Dynamic IP Address. When Static IP Address mode is chosen, the administrator can specify the IP address and IP Gateway for this I8330 I/Port.</p>
MAC Address	<p>This static field specifies the MAC Address for this I8330 I/Port.</p>
Options Tab	
Connection Mode	<p>This radio-button menu specifies the Connection mode. Choices include:</p> <ul style="list-style-type: none"> • Direct Connection • Sentral <p>The default selection is Direct Connection. When Direct Connection is chosen with Autodetection, the I8330 I/Port lists the first eight hosts it locates that have the I83xx Driver installed, and that are available for a connection. The user can log into one of these hosts if user credentials are available.</p> <p>NOTE: The I8330 discovers hosts non-deterministically. If your network has more than eight hosts with the I83xx Driver installed, the I8330 will not always list the same eight hosts in the login selection dialog box.</p> <p>When Sentral is chosen with Autodetection, the I8330 I/Port searches for a Sentral Console for its login management. If one is found, a Sentral login dialog box is displayed.</p>
Server Connection List	<p>The default selections include:</p> <ul style="list-style-type: none"> • Autodetection • TS 2 • TS 3 <p>The default active connection is Autodetection. This selection's name cannot be edited. The names of the other two choices can be edited. To activate or deactivate a connection, highlight it in the list and click the Enable/Disable button. To edit a connection, highlight it and click the Edit button.</p>
Edit Connection Profile Dialog	
Connection name	<p>This editable field specifies the name of the specified connection.</p>
Autoconnect Enabled	<p>This button allows turning on Autoconnect. The default is Off (unchecked). If Enabled (checked), the I8330 automatically connects to the system whose IP address is entered in the Server Network Address field.</p>
Server Network Address	<p>This editable field specifies the IP address of a host to which the I8330 automatically connects. The I83xx Driver or the I83xx Admin Utility must be installed on this host for a connection to be made. If the I83xx Driver is installed, the connection is a direct connection. If the I83xx Admin Utility is installed, a Sentral login is displayed.</p>
User name	<p>This editable field specifies the user name for this I8330. Entry is optional.</p>

Option	Description
Desktop size	<p>This radio-button menu specifies the Connection mode. Choices include combinations of the following:</p> <ul style="list-style-type: none"> • 640 x 480 – 256 Colors (8-bit) or HI-Color (16-bit) (default) – 60 Hz or 75 Hz vertical sync • 800 x 600 – 256 Colors (8-bit) or HI-Color (16-bit) – 60 Hz or 75 Hz vertical sync • 1024 x 768 – 256 Colors (8-bit) or HI-Color (16-bit) • 1280 x 1024 HI-Color (16-bit), 63 Hz <p>The default selection is 640 x 480 256 Color at 60Hz.</p>
Mode Test	The Mode Test button allows testing a video connection mode before saving it.
Password Tab	
Setup Password	<p>These buttons allow setting a password on the I8330 device setup options. Choices include:</p> <ul style="list-style-type: none"> • Do not use Password • Protect device Setup Options with Password <p>The default selection is Do not use Password.</p>
Update Tab	
Update	Select this button to update the I8330 firmware.
Misc Tab	
TouchScreen options	<p>These buttons allow enabling support for a touchscreen device. Choices include:</p> <ul style="list-style-type: none"> • TouchScreen 3M SC3 Controller support • TouchScreen HT ECS4-1 Controller support <p>The choices refer to the chipset in the touchscreen device. The default selection is TouchScreen 3M SC3 Controller support.</p> <p>NOTE: As of the initial release of the I8330 I/Port, ClearCube has not certified any touchscreen devices for use with the I8330 I/Port. This functionality is unsupported.</p>

Configuring the I9420 I/Port

ClearCube® I9420 I/Ports connect to ClearCube A1410 and R1350 PC blades to provide the following features:

- Support for one or two independently-configurable monitors
- PC-over-IP™ (PCoIP™), delivering PC video and audio over your IP network
- Four USB 1.1 ports
- Audio in and HD audio out

ClearCube A1410 and R1350 PC blades contain V5120 Dual Host cards connected to the blade's PCI Express® connector. V5120 cards and I9420 I/Ports contain PCoIP processors that manage video and audio data. When configuring and working with an I9420 I/Port connected to a blade with a V5120 Dual Host card, remember that:

- There are two PCoIP processors:
 - I9420 I/Port processor

- V5120 Dual Host card processor
- Each PCoIP processor has an IP address, for a total of two IP addresses. Note that the IP addresses of the PCoIP processors are not the same as the host's (that is, the computer's) IP address.

You must provision PCoIP processors on blades and on I9420 I/Ports when deploying I9420s. To provision an I9420, you must:

1. Determine the IP address structure for your environment and determine the IP addresses of the blade, the V5120 Dual Host card, and the I9420 I/Port.
2. Configure the PCoIP processors on the I9420 and on the V5120 card that connects to the thin client.
3. Establish a network connection between the I9420 and the V5120 card in a blade using any of the following options:
 - Direct cable connection or connection through local Ethernet switch
 - DHCP connection
 - ClearCube Sentral

Setting up Connections

The following sections describe how to configure your I9420 I/Port and dual-monitor host (blade). Connect the devices using any of the following methods as appropriate for your environment.

Direct Connection

To perform the following steps, you must have the IP and MAC address of the V5120 Dual Host card in the host to which you are connecting. Default IP and MAC addresses are provided in the following steps.

1. Ensure that you have connected devices as described in "[Setting up the I/Port](#)" on page 9.
2. Connect the chassis and I9420 I/Port.
 - a. Connect one end of a CAT5 or CAT6 Ethernet cable to the appropriate port on your chassis.
 - **R4300 chassis**—Insert the cable in the Secondary Network port.
 - **A3100 chassis**—Insert the cable to the PCoIP port.
 - b. Connect the other end of the cable to the RJ-45 connector on the I9420.
3. Configure the I9420.
 - a. Briefly press and hold the power button on the front of the I9420 to power it on. The I9420 displays a dialog box.
 - b. In the upper-left corner of the screen, click **Options > Configuration** to open the Configuration window. Click **Unlock** on the lower-left portion of the window to display the Unlock dialog box. Click **OK** to unlock the window (you should not need to type a password).
 - c. In the Network tab, ensure that the **Enable DHCP** option is cleared. Specify the following for the I9420 I/Port:

- IP addresses
- Subnet mask
- Gateway

These values can be any value appropriate for your environment.

- d. Click **Apply** and then click **Reset** in the Attention dialog box to reset the I9420.
 - e. In the upper-left corner of the screen, click **Options > Configuration** to open the Configuration window. Click **Unlock** on the lower-left portion of the window to display the Unlock dialog box. Click **OK** to unlock the window (you should not need to type a password).
 - f. From the Session tab, select **IP address** in the Identify Peer by line. Specify the following in the appropriate fields:
 - **Identify Peer by**—The V5120 IP address
 - **Peer MAC Address**—The V5120 MAC addresses (printed on a label on the side of the blade)
 - g. Click **Apply** and then click **OK** to close the Configuration window. You can now continue to provision the V5120 Dual Host card on the blade.
4. Provision the V5120 Dual Host card on the blade.
 - a. Open a Web browser on a computer with a static IP address on the same subnet as the the V5120 Dual Host card you are provisioning.
 - b. In your browser, type the IP address of the V5120 you specified in step [4c](#) to open the PCoIP Web interface.
 - c. From the Log In page, click **Log In** (you should not have to type a password).
 - d. From the Network page, ensure that the **Enable DHCP** option is cleared. Specify the following values for the V5120 card:
 - IP Address
 - Subnet Mask
 - Gateway
 - e. Click **Apply** and then click **Continue**.
 - f. Click **Configuration > Session**. Ensure that the **Accept Any Peer** option is clear. In the **Peer MAC Address** line, type the MAC address of the I9420 I/Port (the MAC address is on a label on the bottom of the I9420).
 - g. Click **Apply** and then click **Continue**.
 - h. Click **Configuration > Monitor Emulation**. Select the monitor emulation option for both monitors (DVI 1 and DVI 2).
 - i. Click **Apply** and then click **Reset**. The V5120 displays a power state message. Click **OK**.
 5. Briefly press and hold the reset button on your blade to reset it. You can now start your I9420 I/Port and click **Connect** to connect to your blade.

DHCP Connection

When connecting a blade and a I9420 on a network with a DHCP server, you can enable both devices to accept a dynamic IP addresses.

Note: Ensure that your chassis and I/Port are connected to a switch on a network with a DHCP server.

1. Ensure that you have connected devices as described in "[Setting up the I/Port](#)" on page 9.
2. Connect the chassis to a network switch.
 - a. Connect one end of a CAT5 or CAT6 Ethernet cable to the appropriate port on your chassis.
 - **R4300 chassis**—Insert the cable in the Secondary Network port.
 - **A3100 chassis**—Insert the cable in the PCoIP port.
 - b. Connect the other end of the cable to a network switch on a known subnet.
3. Connect the I9420 I/Port to a network switch.
 - a. Connect one end of a CAT5 or CAT6 Ethernet cable to the RJ-45 connector on the I9420.
 - b. Connect the other end of the cable to a network switch on the same subnet as the chassis. This switch can be the same switch used in step [Step 2](#).
4. Configure the I9420.
 - a. Briefly press and hold the power button on the front of the I9420 to start it.
 - b. In the upper-left corner of the screen, click **Options > Configuration** to open the Configuration window. From the Network tab, select the **Enable DHCP** option. Click **Apply** and then click **OK**.
 - c. From the **Discovery** tab, select the **Enable Discovery** and **Enable Host Discovery** options. Click **Apply** and then click **OK**.

Your I9420 I/Port is now configured to discover blades automatically.

5. Provision the V5120 Dual Host card on the blade.
 - a. From the I9420 desktop, click the **Connect** button to display the Discovered Hosts dialog box. Record the IP address and MAC address of the blade's V5120 Dual Host card, or host, and then click **Cancel** to close the dialog box.
 - b. Open a Web browser on a computer with DHCP enabled, connected to the same switch as the V5120 Dual Host card you are provisioning. To open the PCoIP Web interface on the V5120, type the IP address that you recorded in the previous step in the browser.
 - c. From the Tera1202 PCoIP Processor menu, click **Configuration > Monitor Emulation**. Select the monitor emulation option for both monitors (DVI 1 and DVI 2).
 - d. Click **Apply** and then click **Continue**.
 - e. Click **Configuration > Discovery** and select the **Enable Discovery** option.
 - f. Click **Apply** to save your changes and a success message is displayed. Click **Reset** and then click **OK** to reset your blade and apply your changes.
 - g. Close the browser.
6. Return to the I9420 I/Port and click **Connect** to display the Discovered Hosts dialog box.
7. Click **OK** to connect your configured I9420 I/Port and blade.

Sentral Connection

When you use Sentral to manage I9420 I/Ports and hosts, Sentral sets IP addresses and session controls according to device MAC addresses and the assignments that the administrator specifies. See *Sentral Administrator's Guide* for information about using Sentral to manage hosts and thin clients.

I9420 I/Port Display Resolution and Bandwidth Requirements

The following table describes dual display resolutions for various display resolutions. Bandwidth values are provided in megabits per second (Mbps).

Table 2. I9420 Dual Display Resolution and Bandwidth Requirements

Display Resolution	1280 x 768	1280 x 1024	1680 x 1050	1600 x 1200
Typical Bandwidth Allocation	10Mbps	16Mbps	22Mbps	24Mbps
Extreme Bandwidth Allocation	—	—	44Mbps	48Mbps
Note: If the bandwidth is limited the compression algorithms will compensate for the available bandwidth. This will cause some loss of the texture detailing in the video.				

Deploying I9440 I/Ports

You can use Sentral to manage the I9440 I/Ports in your environment. The following instructions assume that Sentral is already deployed and configured appropriately for your environment. For more information about installing, configuring, and using Sentral to manage the hosts and thin clients in your environment, see *Sentral Administrator's Guide*.

To deploy I9440 I/Ports in your environment, perform the following steps.

1. Unpack the I9440 I/Port and all components from the shipping container, as described in "[Unpacking the I/Port](#)" on page 9.
2. Connect all cables and power as described in "[Setting up the I/Port](#)" on page 9.
3. Ensure that the I9440 is connected to your Sentral network, as shown in "[Cable Requirements](#)" on page 8.
4. From Sentral, run a discovery to discover the I9440. See *Sentral Administrator's Guide* for information about how to run a discovery.
5. From Sentral, allocate the I9440s that you discovered to hosts, to users, or to both. See *Sentral Administrator's Guide* for information about how to allocate I/Ports (thin clients).

From the I9440 screen, the I9440 user can now click **Connect** and enter their Windows username and password to connect to the host or host group to which they are allocated.

Updating I/Port Software

The XPe I8820 and the NeoLinux I8020 I/Ports use ezRemote Manager for software updates. Software updates are sent, or pushed, to the I/Ports in a package called a snap-in. Custom system images can also be pushed out to I/Ports.

These brief procedures describe how to update or re-image XPe- and NeoLinux- based I/Ports. The *ezRemote Manager User Manual* provides complete details on pushing software updates or re-imaging the I/Port. The *ezRemote Manager User Manual* can be downloaded at <http://www.neoware.com/support/documentation/archive.html>.

To push a snap-in:

1. In ezRemote Manager, select **Neoware Appliances** in the left pane.
2. From the **Actions** menu, select **Assets**.
3. In the window that is displayed, click the **Password** button and enter the password for the I/Ports to be updated.
4. Highlight the I/Ports to receive the snap-in.
5. Select the **Snapin Manager** icon (the icon with the red check mark).
6. Browse for the snap-in and click **OK**.

To re-image:

1. In ezRemote Manager, select **Neoware Appliances** in the left pane.
2. From the **Actions** menu, select **Assets**.
3. In the window that is displayed, click the **Password** button and enter the password for the I/Ports to be updated.
4. Highlight the I/Ports to receive the image.
5. Select the **Software Update Manager** icon (the icon with the floppy disk).
6. Browse for the image file and click **OK**.

Note: ezRemote Manager is not supported on ClearCube model I8800 or I8010 I/Ports.

Best Practices for I/Ports

Follow the recommendations in this section for best I/Port performance.

RDP-Based I/Ports

As previously noted, RDP is a limited-bandwidth connection when compared to 100baseT Ethernet. In addition, Ethernet bandwidth can be constrained by network activity anywhere between each end of a connection.

I/O-intensive applications between the host and the I/Port can significantly affect performance. ClearCube offers these recommendations:

- **Do not use I/Ports for writing to CDs or DVDs.** Mass-storage devices such as CD burners and DVD burners rely on a predictable and relatively constant data transfer rate from the source to the burner. Although modern burners have large write buffers, the likelihood of a buffer underrun is high, and increases both with recording speed and with file size. If the user must write files from a host to CD or DVD, use the USB 2.0 connector on the front of the ClearCube PC blade.
- **Do not use I/Ports to transfer extremely large files.** Although the I/Port provides robust file transfer capabilities, the limited bandwidth inherent in RDP can cause these file transfers take an exceedingly long time. If the user must write extremely large files to a blade or to the network, use the USB 2.0 connector on the front of the ClearCube PC blade.
- **Do not write large files directly to I/Ports.** The RAM disk on the XPe I/Port is limited to 16 MB, and is reserved as a temporary space for updating software on the I/Port. Attempts to write a file larger than 16 MB to the RAM disk will fail. Attempts to write a series of files with a sum file size greater than 16 MB will eventually fail when the 16 MB limit is exceeded.

Individual files with a file size greater than 56 MB cannot be written through the I/Port to an attached USB peripheral storage device. This is by design, and represents a security feature that limits moving large files such as software. Folders containing multiple files, with a total size greater than 56 MB can be written through, as long as the 56 MB limit is not exceeded.

The Flash disk in the I/Port is write-protected by the Enhanced Write Filter. Writes to the C:\ drive, including temporary files, are written to an area in RAM that is separate from the RAM disk and is shared by the operating system. When the sum of the files and the operating system's RAM requirement exceeds the total amount of available RAM, the I/Port will suffer a system error. This can be cleared by rebooting the I/Port. However, data in RAM cannot be recovered.

- **For normal usage, leave the Write Filter turned on.** This prevents persistent writes to the Flash disk and helps keep the device secure. Since applications are actually run on the host in an I/Port environment, there is no need for the user to write data to the local I/Port.
- **Upstream audio is not supported by RDP.** Microphones can only be used as local devices on the I/Port, and not as I/O devices to send content to the blade. This is a limitation of RDP.
- **Lengthy RDP sessions may result in slower throughput.** If the connection through RDP appears to have slowed down significantly, close the RDP session and restart the I/Port.
- **Test your USB peripherals before putting them into a production environment.** I/Ports are USB 1.1 or USB 2.0 compliant, depending on model number. I/Port peripherals, including USB devices, rely on redirection by RDP to work properly. RDP can only redirect the following devices: mass storage, printers, serial ports and smart card readers. ClearCube Technology maintains a list of peripherals (including USB devices) that are fully tested and certified for use with ClearCube-supplied thin clients, including I/Ports. This list is kept up-to-date and is available on the ClearCube Support Web site at <http://support.clearcube.com/> as *Technical Bulletin TB0109, Certified Peripherals for C/Ports and I/Ports*. Because of the wide range of peripherals available, ClearCube is

unable to test all devices. If your peripheral is not on this list, contact your Account Executive to ask about ClearCube certification services.

- **Limit the number of USB peripherals connected to your I/Port.** When connecting more USB devices to an I/Port than there are available ports (three ports on the I8020/I8820), you need a USB hub. You should select a powered USB hub to reduce the likelihood of drawing too much power from the I/Port's USB port(s). ClearCube has observed unpredictable results when simultaneously attaching more than six USB devices to an I/Port. USB devices with motors, such as CD-ROM or DVD drives, are the devices most likely to exceed power ratings.
- **Occasionally, USB devices fail to enumerate correctly when inserted or removed.** When inserting a device that supports RDP redirection into a peripheral port on the I/Port, it should enumerate (display as a device on the host desktop). Allow a few seconds for this to occur. If the device does not enumerate, try refreshing the desktop or the folder window. This usually resolves the problem. If this does not work, check the system tray for the device and eject it (if displayed), unplug the device, and then reattach it. Sometimes this problem is caused by a USB device overloading the power rating for the I/Port's USB hub. Using an externally powered USB hub will reduce this problem.

When removing a USB device, always eject it from the system tray and wait for confirmation before physically unplugging it. If the device's icon persists on the desktop after it has been physically removed, refresh the window or desktop. A reboot of the I/Port may be required.

I8330 I/Ports

Because the I8330 I/Port requires a connection to be established via the I83xx Admin Utility or I83xx Driver, certain limitations apply on the usage of I8330s as connection devices.

- **Do not use an I8330 I/Port for administration duties.** Use a C/Port or an RDP-connected device (such as an I8820 I/Port or a traditional PC) for host administration.

The I83xx driver software is supported only on Windows XP. Support on other operating systems is not available, so the I8330 cannot be used to administrate a virtual machine (VM) host.

- **Do not install the I83xx Driver on a system that also has the I83xx Admin Utility installed.** These two applications are incompatible, and using them on the same system will cause unexpected results.
- **Do not hot-plug PS/2 devices on an I8330 I/Port.** On the I8330, PS/2 devices (keyboard or mouse) are not hot-pluggable. You must turn off the I8330 before attaching or detaching PS/2 devices.
- **Disconnect USB devices using the “Safely Remove Hardware” icon in the system tray.** If USB devices are incorrectly disconnected, the USB chain is forced to re-enumerate completely. This can cause a delay for the user, and will disrupt any on-going USB communications (such as printer spooling or file transfer).
- **USB devices are not available on the I8330 I/Port until a host connection is established.** Some USB keyboards and mice will function properly when connected using a USB-to-PS/2 adapter.

- **The I8330 implements USB 1.1.** Read and write performance are specified at 300KB/s read and 200KB/s write.
- **The I8330 does not support remote power on/off or reset functionality.**
- **The I8330 is not capable of running a VPN client locally (on the I8330 device).** A VPN connection is possible only if another device (e.g., a router) to which the I8330 is connected includes a VPN client and can, therefore, make the VPN connection.

I94xx I/Ports

To ensure 100/full-duplex throughput between a V51xx card in a blade and an I94xx I/Port, set any network switches connecting the blade and the I/Port to automatic negotiation. Explicitly setting a network switch to 100/full-duplex can cause throughput issues. If there are performance or throughput issues after setting network switches to automatic negotiation, physically disconnect and then reconnect the network cables to the switch.

Appendix A. Specifications

Table 3. I8020 I/Port Specifications	
Input/Output	<ul style="list-style-type: none"> • 3 USB 1.1 ports (2 on front, 1 on rear) • PS/2 Keyboard & Mouse • VGA (DB-15 connector) • Audio In/Out • Serial Port (DB-9) • 10/100BaseT Ethernet (RJ-45)
Video	1600 x 1200; 24-bit color; 85 Hz max
Operating System	NeoLinux
Power Adapter	Input 100–240 VAC, 50–60 Hz
Size	1.7 inches (H) x 7.6 inches (W) x 6.2 inches (D) (4.3cm x 19.4cm x 15.7cm)
Weight	Shipping Weight: 3 lbs. (1.4 kg)
Environmental	Operating 5–35° Celsius (C), 10%–90% humidity, non-condensing Shipping/Transit -40–70° C, 10%–95% humidity, non-condensing (in sealed manufacturer's packaging) Extended storage -10–50° C, 10%–95% humidity, non-condensing (in sealed manufacturer's packaging)

Table 4. I8820 I/Port Specifications	
Input/Output	<ul style="list-style-type: none"> • 3 USB 1.1 ports (2 on front, 1 on rear) • PS/2 Keyboard & Mouse • VGA (DB-15 connector) • Audio In/Out • Serial Port (DB-9) • 10/100BaseT Ethernet (RJ-45)
Video	1600 x 1200; 16-bit color; 85 Hz max 1280 x 1024; 24-bit color; 85 Hz max
Operating System	Windows XPe
Power Adapter	Input 100–240 VAC, 50–60 Hz
Size	1.7 inches (H) x 7.6 inches (W) x 6.2 inches (D) (4.3cm x 19.4cm x 15.7cm)
Weight	Shipping Weight: 3 lbs. (1.4 kg)
Environmental	Operating 5–35° Celsius (C), 10%–90% humidity, non-condensing Shipping/Transit -40–70° C, 10%–95% humidity, non-condensing (in sealed manufacturer's packaging) Extended storage -10–50° C, 10%–95% humidity, non-condensing (in sealed manufacturer's packaging)

Table 5. I8330 I/Port Specifications

Input/Output	<ul style="list-style-type: none"> • 4 USB 1.1 ports • PS/2 Keyboard & Mouse • VGA (DB-15 connector) 	<ul style="list-style-type: none"> • Microphone In • Audio Out • 10/100BaseT Ethernet (RJ-45)
Video	800 x 600; 8- and 16-bit color; 60 / 75 Hz 1024 x 768; 8- and 16-bit color; 60 / 75 Hz	1280 x 1024; 8- and 16-bit color; 63 Hz
Operating System	None	
Power Adapter	Input 100–240 VAC, 50–60 Hz	
Size	1.57 inches (H) x 9.5 inches (W) x 5.2 inches (D) (40cm x 242cm x 132cm)	
Weight	Shipping Weight: 2.14 lbs. (970 g)	
Environmental	Operating 5–35° Celsius (C), 10%–90% humidity, non-condensing Shipping/Transit -40–70° C, 10%–95% humidity, non-condensing (in sealed manufacturer's packaging) Extended storage -10–50° C, 10%–95% humidity, non-condensing (in sealed manufacturer's packaging)	

Table 6. I9420 I/Port Specifications

Input/Output	<ul style="list-style-type: none"> • 4 USB 1.1 ports • 2 DVI digital video ports (standard DVI-I) 	<ul style="list-style-type: none"> • Microphone In • HD audio Out • 10/100 RJ-45 Ethernet
Video	Up to 1600 x 1200; 32-bit color depth; 60 Hz	
Operating System	None	
Power Adapter	Input 100–240 VAC, 50–60 Hz; output 12 VAC, 5 amps	
Size	2.5 inches (H) x 9.5 inches (W) x 5.2 inches (D)	
Weight	Shipping Weight: Approximately 3 pounds (1.4kg)	
Environmental	Operating 5–35° Celsius (C), 10%–90% humidity, non-condensing Shipping/Transit -40–70° C, 10%–95% humidity, non-condensing (in sealed manufacturer's packaging) Extended storage -10–50° C, 10%–95% humidity, non-condensing (in sealed manufacturer's packaging)	

Table 7. I9440 I/Port Specifications

Input/ Output	<ul style="list-style-type: none">• 4 USB 1.1 ports• 4 DVI digital video ports (standard DVI-I)• Microphone In• HD audio Out• 10/100 RJ-45 Ethernet
Video	Up to 1600 x 1200; 32-bit color depth; 60 Hz
Operating System	None
Power Adapter	Input 100–240 VAC, 50–60 Hz; output 12 VAC, 5 amps
Size	2.5 inches (H) x 9.5 inches (W) x 5.2 inches (D)
Shipping Weight	Approximately 3 pounds (1.4kg)
Environmental	Operating 0–35° Celsius (C), 10%–90% humidity, non-condensing Shipping/Transit -40–70° C, 10%–95% humidity, non-condensing (in sealed manufacturer's packaging) Extended storage -10–50° C, 10%–95% humidity, non-condensing (in sealed manufacturer's packaging)

Appendix B. Troubleshooting

This appendix provides troubleshooting information for the I9420 I/Port.

The I9420 I/Port is connected to a 100/full-duplex switch but performance is poor and throughput is not full-duplex.

To ensure 100/full-duplex throughput between a V5120 card in a blade and an I9420 I/Port, set any network switches connecting the blade and the I/Port to automatic negotiation. Explicitly setting a network switch to 100/full-duplex can cause throughput issues. If there are performance or throughput issues after setting network switches to automatic negotiation, physically disconnect and then reconnect the network cables to the switch.

The I9420 I/Port does not connect to a blade when I disable DHCP or change the IP address of the I/Port's V5120 Dual Hostcard.

The I9420 and the V5120 Dual Host card that it contains have DHCP connection mode enabled by default. If a DHCP address is not granted within 20 seconds of starting the I/Port, each device defaults to the following static IP addresses:

- **I9420**—192.168.1.100
- **V5120**—192.168.1.101

Each device has a Web page interface that you can use to:

- Enable and disable DHCP connection mode.
- Specify static IP addresses for the subnet and default gateway.

If you disable the I/Port's DHCP setting, the I/Port cannot connect to a blade if the I/Port's static IP address and default gateway are on different subnets.

Resolution

If the devices are on a known subnet, you can discover a specific device to display the device's IP and MAC address.

To prevent this issue:

- Avoid disabling the I/Port's DHCP setting.
- If you specify a static IP address for the V5120, ensure that you record it.
- Ensure that the I/Port's IP address and default gateway are on the same subnet.

My I9420 I/Port does not recognize my keyboard, my mouse, or both. When I start the I/Port the Add New Hardware wizard starts and I cannot dismiss the wizard.

The Realtek® HDAudio driver must be installed on a blade to use the I9420 or C7420. If the driver is not installed it can cause the Add New Hardware Wizard to start before the USB driver is installed. In this case there is no keyboard or mouse support and you cannot dismiss the wizard.

Resolution

Include the Realtek HDAudio driver in any image that you install on your blade.

If you encounter this scenario:

- Connect a PS/2 keyboard or mouse to the USB port on the blade to dismiss the wizard.
- Install an image with the HDAudio driver on the blade.

When I connect one monitor to video port 1 of an I9420 I/Port or a C7420 C/Port in direct connect mode, video is not displayed after I configure the I/Port.

If you connect a single monitor to video port 1 of an I9420 I/Port or a C7420 C/Port, and the I/Port is connected to a blade with the G0530005 XP SP2 factory image, video is not displayed through port 1 after you configure the I/Port.

Resolution

After configuring the I/Port, connect the monitor to port 2. Video is displayed through video port 2 after a connection is established.

I cannot use the remote power button to start a blade or shut down a blade.



The remote power button is located on the right side of the rear of the blade. The I9420 remote power button does not start or shut down the blade, or when I try to connect to a blade I receive a System Busy! message.

Resolution

Ensure that there are not any V5120, I9420, or C7420 configuration Web pages open when you use the remote power button to start, power cycle, or shut down a I9420 I/Port. If V5120 configuration Web pages are open when you press the remote power button, they can interfere with the session between the blade and I9420 and produce unsupported behavior.

The A1410 blade does not support standby state. Briefly press the remote power (less than four seconds) to perform a graceful shutdown, or soft power off.

I9420 does not support the hard reset option, or Hard-Power off (pressing and holding the remote client power button for more than four seconds). In the V5120 configuration Web page, click **Permissions** and then click **Power**. Ensure that Soft-Power off is selected. No other option is supported.

The I9420 displays an Error: Value must be 0-FF or an Invalid Peer MAC Address error message.

After configuring the I9420, the I/Port displays error messages about MAC addresses.

Resolution

You have changed the Connection Type to RDP, which is unsupported. From the V5120 configuration Web page, click Permissions and then click Sessions. Select PcoIP in the **Session Type** drop-down menu.

The mass storage lockout (MSL) jumper in the blade does not prevent mass storage devices from operating on the I9420.

The MSL feature is not implemented in December 2007 release.

Resolution

Use the Permissions tab on the I9420 and C7420 to enable MSL. From the V5120 configuration Web page, click Permissions and then click USB.

The default I/Port behavior is to permit all USB mass storage devices. You can add mass storage devices to a list of prohibited devices can be added by class, vendor, or specific ID. You can specify a password to access these screens.

If mass storage lockout (MSL) is enabled on a I9420 or C7420 I/Port in a Sentral environment and I insert a USB device in the I/Port, an empty, gray dialog box is displayed.

You can enable mass storage lockout through a blade's V5120 configuration Web page. When you insert a USB device in the I/Port and the I/Port is in a direct connect mode, a gray dialog box is displayed that says USB device is not authorized.

If the I/Port is in a Sentral environment and MSL is enabled, the dialog box displayed when you insert a USB device does not contain any text.

Resolution

Remove the USB device to dismiss the dialog box.

***I cannot connect a I/Port to a blade using RDP, or I receive an Alert :
Session timeout! message.***

I9420 I/Ports use PCoIP technology to deliver video, USB, and audio data. These user ports do not currently support RDP.

Resolution

From the I/Port V5120 configuration Web page, click **Configuration > Session** and ensure that you select PCoIP in the **Session Type** drop-down menu.

Appendix C. Technical Support

In the event any problems arise with your ClearCube hardware or software, we recommend that you first check the support Web site for any relevant technical bulletins and updates for your specific product(s) before calling your authorized reseller or the ClearCube Technical Support Department. If your system is being serviced by a local service partner for ClearCube (such as an authorized reseller), please refer to the contact information provided by the service partner or refer to the ClearCube Web site for partner contact information. For direct access to ClearCube technical support use the contact information below.

support@clearcube.com	Email address to ClearCube Technical Support
support.clearcube.com	ClearCube Support Web site
support.clearcube.com/rma	Link to service part replacement form on the Web
+1-866-652-3400	ClearCube Technical Support in the US
+1-512-652-3400	ClearCube Technical Support from outside US

If you are instructed to return any hardware, you must obtain a Return Merchandise Authorization (RMA) number from ClearCube and clearly mark the RMA number on the outside of all shipments to ensure proper and prompt handling. Please do not return any equipment without the appropriate ClearCube packaging materials. If you no longer have ClearCube boxes, please contact us for replacement boxes.



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