Digi®

Connectware™

Digi PortServer CM

User Manual

90000252_C

Information in this document is subject to change without notice and does not represent a commitment on the part of Digi International.

Digi provides this document “as is,” without warranty of any kind, either expressed or implied, including, but not limited to, the implied warranties of fitness or merchantability for a particular purpose. Digi may make improvements and/or changes in this manual or in the product(s) and/or the program(s) described in this manual at any time.

This product could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes may be incorporated in new editions of the publication.

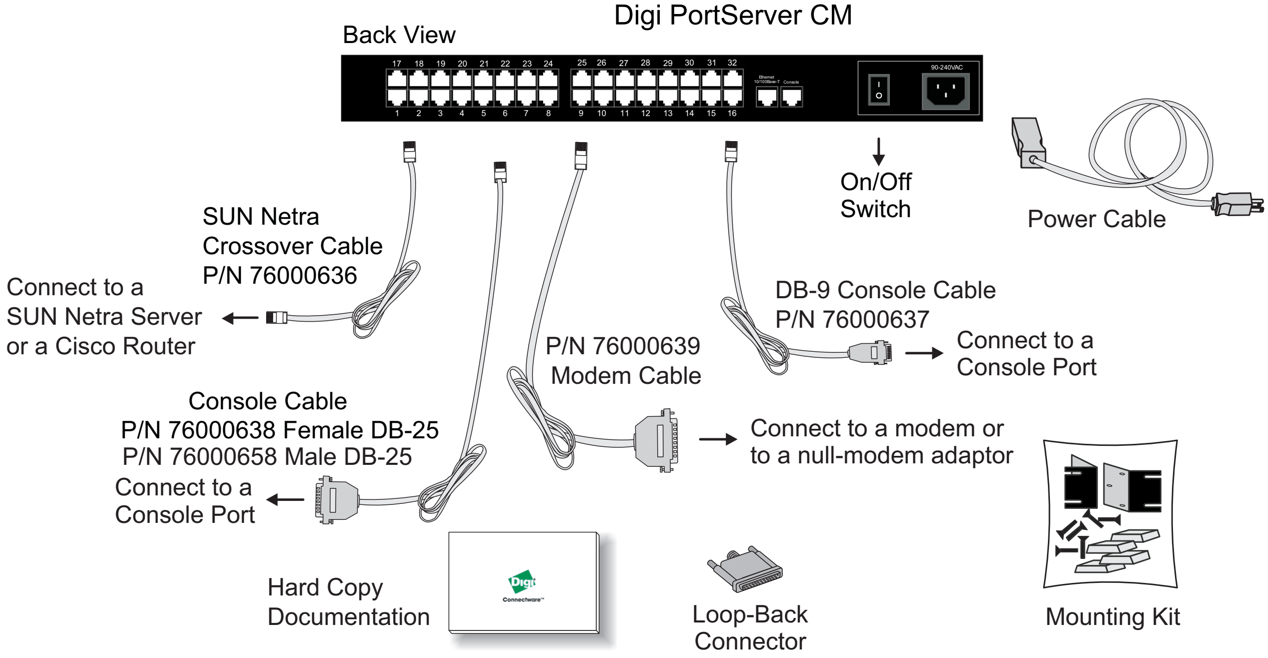
Contents

What Is In the Box

The following figure shows the main unit, accessories included in the package and how cables should be connected. The loop-back connector is provided for convenience in case hardware tests are necessary. An Ethernet cable (not supplied) is required to connect the PortServer CM to the network.

Note: In order to comply with FCC standards, the PortServer CM requires the use of a shielded Category 5 cable connected to the Ethernet Interface

.



Chapter 1 Network Configuration

Introduction to the PortServer CM

The PortServer CM is a Linux-based secure console access server running an embedded version of the Linux operating system. Configuration of the PortServer CM is accomplished by either editing the pslave.conf text file or using the web interface. The pslave.conf file can be edited with a scaled-down vi editor on the PortServer CM or edited on another system. For users more familiar with a graphical interface, the new web interface provides a solution for getting the PortServer CM configured quickly and easily.

The PortServer CM's default IP address is 192.168.160.10 which you can change from either a telnet session or through the web interface. Two other utilities are included to facilitate assigning IP settings to the terminal server and connecting to the network. The Discover utility allows for quick assignment of IP settings using a web-based Java applet and the NetConfig utility uses a command line interface to assign IP settings.

Supported Browsers

The following browsers are supported for use in configuring the PortServer CM through the web interface.

Browser & Version	Java Version
Netscape 7.0 (Linux)	JRE 1.3.1_02 (comes w/ Netscape 7.0)
IE 6.0.26 (Win)	Microsoft (R) VM for Java, 5.0 Release 5.0.0.3802
IE 6.0.26 (Win)	JRE 1.4.1
Netscape 4.78 (Linux)	Java 1.1.5
Netscape 6.2 (Linux)	JRE 1.3.1_02 (comes w/ Netscape 6.2)

Mozilla 1.1 (Linux)	JRE 1.3.1 (comes w/ Mozilla 1.1)

Discover Utility

The Discover utility is a web-based Java applet that allows an administrator to quickly and easily assign IP addresses, the Netmask, and Gateway settings to the PortServer CM from any workstation on the same network as the PortServer CM. The Discover utility sends out a network broadcast and identifies responses from the PortServer CM terminal servers.

The utility is available from the Digi website at http://cm.digi.com. The utility runs locally on the system you are using and no information about your system or network is sent over the Internet.

To use the Discover utility do the following:

1. Open a web browser and enter the following URL in the address bar:

   ```
   http://cm.digi.com
   ```

2. A security warning will be displayed, indicating that the applet is signed and asking if you want to install and run the Discover utility. Choose Yes.
3. Choose Discover to have the Discover utility detect the PortServer CM on your network.

   After completing the search, a new window will open listing the PortServer CM terminal servers found, the firmware versions, and the MAC addresses. If IP, Netmask, and Gateway addresses have been previously defined, these addresses will also be displayed.
4. Locate the MAC address of the PortServer CM you want to configure. The MAC address is listed on a white sticker on the PortServer CM. Choose the Blink LEDs button for a visual verification of the device. The row of serial port LEDs will flash when the Blink LEDs button is selected. Press the button again to stop the flashing LEDs.
5. Select the IP address cell and enter the IP address you wish to assign the PortServer CM. Enter the Netmask and Gateway address settings as needed.
6. Choose Submit to save the new IP settings.
   Choose the Locate button for a visual verification of the device. The row of serial port LEDs will flash when the Locate button is selected. Press the Locate button again to stop the flashing LEDs.

Disable the Discover Utility

The system administrator may desire to disable the Discover utility so users cannot change network configuration parameters. To disable the Discover utility, the administrator needs to modify two files, submit the changes, and save the changes to the flash memory. To disable the Discover utility, use the Web Management Interface and do the following:

1. Log on to the Web Management Interface with administrator rights (root).
2. From the navigation bar, choose Configuration > Edit Text File > and enter `/etc/config_files` in the Filename cell and choose Submit.
3. Scroll to the end of the list and add the following line in the text box: `/etc/inittab` then choose Submit .
4. From the navigation bar, choose Configuration > Edit Text File > enter `/etc/inittab` in the Filename cell and choose Submit.
5. Locate the following line *::once:/bin/xcelld* and replace it with the following line
   # ::once:/bin/xcelld and choose Submit. The # (number symbol) comments the line out.
6. From the navigation bar, choose Administration > Load/Save Configuration > Save to Flash.
7. Reboot the system and the Discover utility will no longer be available.

NetConfig Utility

You can access the NetConfig utility through a telnet session by entering the default IP address, 192.168.160.10 or by connecting a terminal to the PortServer CM's console port. At the logon prompt, enter the username `root` and the password `dbps`. When the command prompt appears, enter `netconfig` to start the utility. Follow the prompts to assign your IP settings.

Note: The Netconfig utility automatically loads upon the first log in.

Console Port Parameters

Connect a personal computer or terminal to the PortServer CM using the console cable. If you are using a personal computer, HyperTerminal can be used in the Windows operating system or Kermit in the UNIX operating system. The terminal parameters should be set as follows:

Serial Speed: 9600 bps

Data Length: 8 bits

Parity: None

Stop Bits: 1 stop bit

Flow Control: Hardware flow control or none

Ansi emulation

Note: If your terminal does not have ansi emulation, select vt100; then, on the CM, log in as root and switch to vt100 by typing "TERM=vt100;export TERM"

When the PortServer CM boots properly, you will see a series of messages displayed as the unit loads each operating system component followed by a logon banner. Log on as *root* and *dbps* as the password. The PortServer CM runs Linux.

Chapter 2 Configuring Serial Ports

Configure Port Settings

You can configure the ports and other settings on the PortServer CM by modifying the pslave.conf file. This chapter lists the parameters that need to be modified to configure the various settings on the PortServer CM. The pslave.conf file is modified by using the *vi editor* built into the PortServer CM. You can also use another text editor on another system to configure the settings on the PortServer CM. The following tables list the parameters and a brief description of the values.

The file */etc/portslave/pslave.conf* is specific to the PortServer CM. There are three basic types of parameters:

- conf.* parameters are global or apply to the Ethernet interface
- all.* parameters are used to set default parameters for all ports
- s#.* parameters change the default port parameters for individual ports.

Note: An all.* parameter can be overridden by an s#.* parameter appearing later in the pslave.conf file (or vice-versa).

Configure Port Settings	
Parameter	**Value**
all.speed	The speed for all ports. An example for this value is: *9600*
all.datasize	The data size for all ports. An example for this value is: *8*
all.stopbits	The number of stop bits for all ports is 1.
all.parity	The parity for all ports is none.
all.dcd	DCD signal (sets the tty parameter CLOCAL). Valid values are 0 or 1. In a socket session, if all.dcd=0, a connection request (telnet or ssh) will be accepted regardless of the DCD signal and the connection and will not be closed if the DCD signal is set to DOWN. In a socket connection, if all.dcd=1 a connection request will be accepted only if the DCD signal is UP and the connection (telnet or ssh) will be closed if the DCD signal is set to DOWN. 0 is the default value.
all.flow	This sets the flow control to hardware, software, or none. An example for this value is: hard
all.socket_port	This defines a reverse telnet port value for the PortServer CM ports. The '+' after the numerical value causes the interfaces to be numbered consecutively. In this example, interface 1 is assigned the port value 7001, interface 2 is assigned the port value 7002, etc. An example for this value is: 7001+

Configure Advanced Port Settings

Use the following table for parameters and values to configure advanced port settings.

Configure Advanced Port Settings	
Parameter	**Value**
all.prompt	This text defines the format of the logon prompt. Expansion characters can be used here. %h login:
all.tx_interval	Valid only for protocols *socket_server*, *socket_ssh,* and *raw_data*. Defines the delay (in milliseconds) of data received through a serial port and transmitted to the Ethernet . If not configured, 100ms is assumed. If set to zero or a value above 1000, no buffering will take place. The default value is 100.
all.idletimeout	Valid only for the protocols *socket_server, socket_ssh, and raw_data.* Specifies how long (in minutes) a connection can remain inactive before it is cut off. If set to zero (the default), the connection will not time out. The default is 0.
all.sttyCmd	Tty settings after a socket connection to that serial port is established. Parameters must be separated by space. The following example sets describe the options: • **-igncr** which tells the terminal not to ignore the carriage-return on input • **-onlcr** do not map newline character to a carriage return/newline character sequence on output • **opost** post-process output, • **-icrnl** do not map carriage-return to a newline character on input all.sttyCmd -igncr -onlcr opost -icrnl Default value is commented.

SAVE SYSTEM UPDATES WITH THE MODIFICATIONS MADE TO THE FILE

Important!

To update the system with the modifications made to the files, do the following:

1.Confirm that all files should be saved to the flash memory are contained in the */etc/config_files* folder.

See the chapter Upgrading and Troubleshooting PortServer CM for a complete list of these files and what programs use which files.

2.Enter the command:

```
saveconf
```

This command reads *the /etc/config_files* file and copies all the files listed in the file */etc/config_files* from the ramdisk to */proc/flash/script*.
The previous contents of the file */proc/flash/script* will be lost.

3.Restart the digi_ras process by entering the command:

```
signal_ras hup
```

The configuration is complete.

Note: The restoreconf does the opposite of *saveconf*, copying the contents of the /proc/flash/script file to the corresponding files in the ramdisk. The files on the ramdisk are overwritten. The restoreconf is run automatically each time the PortServer CM is booted.

Configure Port Monitoring Parameters

Use the following table for parameters and values to configure port monitoring.

Configure Port Monitoring	
Parameter	**Value**
all.sniff_mode	This parameter determines what other users connected to the very same port (see parameter admin_users below) can see of the session of the first connected user (main session): **in** shows data written to the port, **out** shows data received from the port, and **i/o** shows both streams. The second and later sessions are called sniff sessions and this feature may be activated only when the protocol parameter is set to socket_ssh or socket_server. Out is the default setting.
all.admin_users	This parameter determines which users can open a *sniff session*, which is where other users connected to the very same port can see everything that a first user connected is doing. The other users connected to the same port can also cancel and take over the first user’s session . When users want access per port to be controlled by administrators, this parameter is obligatory and authtype must not be **none**. This parameter can determine who can open a sniff session or cancel a previous session. User groups (defined with the parameter conf.group) can be used in combination with user names in the parameter list. An example is peter, john, user_group.
all.multiple_sessions	If all.multiple_sessions is configured as **no**, only two users can connect to the same port simultaneously. If all.multiple_sessions is configured as **yes**, more simultaneous users can sniff the session or have read and/or write permission.

Configure Protocol Settings

Use the following table for parameters and values to configure protocol settings.

Configure Protocol Settings	
Parameter	**Value**
all.protocol	For the console server profile, the possible protocols are socket_server (when telnet is used), socket_ssh (when ssh version one or two is used), raw_data (to exchange data in transparent mode similar to socket_server mode but without telnet negotiation, breaks to serial ports, etc.) Default value is socket_server
all.ipno	This is the default IP address of the PortServer CM's serial ports. The "+" indicates that the first port should be addressed as 192.168.1.101 and the following ports should have consecutive values. Any host can access a port using its IP address as long as a path to the address exists in the host's routing table. Default value is 192.168.1.101+
all.break_sequence	Send Break to the TTY when this string is received (ssh only). Default value is break.

Configure Authentication Settings

The PortServer CM provides several authentication methods. You can set the parameters by editing the pslave.conf file or from the web interface. The following table lists the various parameters used in configuring the authentication settings. Information in the table will be helpful in choosing your authentication method and values.

.

Configure Authentication Settings	
Parameter	**Value**
all.authtype	There are several authentication type options: local (authentication is performed using the /etc/passwd file), radius (authentication is performed using a Radius authentication server), TacacsPlus (authentication is performed using a TacacsPlus authentication server), none, local/radius (authentication is performed locally first, switching to Radius if unsuccessful), radius/local (the opposite of the previous option), RadiusDownLocal (local authentication is tried only when the Radius server is down), local/TacacsPlus (authentication is performed locally first, switching to TacacsPlus if unsuccessful), TacacsPlus/local (the opposite of the previous option), TacacsPlus-DownLocal (local authentication is tried only when the TacacsPlus server is down). Note that this parameter controls the authentication required by the PortServer CM. The authentication required by the device to which the user is connecting is controlled separately. The default is radius.
all.authhost1	This address indicates the location of the Radius/TacacsPlus authentication server and is only necessary if this option is chosen in the previous parameter. A second Radius/TacacsPlus authentication server can be configured with the parameter all.authhost2. An example is 200.200.200.2.
all.accthost1	This address indicates the location of the Radius/TacacsPlus accounting server, which can be used to track how long users are connected after being authorized by the authentication server. Its use is optional. If this parameter is not used, accounting will not be performed. If the same server is used for authentication and accounting, both parameters must be filled with the same address. A second Radius/TacacsPlus accounting server can be configured with the parameter all.accthost2. An example is 200.200.200.2.
all.radtimeout	This is the timeout (in seconds) for a Radius/TacacsPlus authentication query to be answered. The first server (authhost1) is tried "radretries" times, and then the second (authhost2), if configured, is contacted "radretries" times. If the second also fails to respond, Radius/TacacsPlus authentication fails. An example is 3.
all.radretries	Defines the number of times each Radius/TacacsPlus server is tried before another is contacted. The default, if not configured, is 5.

Configure Authentication Settings	
Parameter	**Value**
all.secret	This is the shared secret necessary for communication between the PortServer and the Radius/TacacsPlus servers. An example is Digi.
all.users	Restricts access to ports by user name. Access is restricted only to the users listed. An exclamation mark restricts access to ALL except the users listed. In this example, the users joe, mark and members of user_group cannot access the port. A single comma and spaces/tabs may be used between names. A comma may not appear between the ! and the first user name. The users may be local, Radius or TacacsPlus. User groups (defined with the parameter conf.group) can be used in combination with user names in the parameter list. Notice that these are common users not administrators. An example is joe, mark, user_group.
conf.group	Used to group users to simplify configuration of the parameter all.users later on. This parameter can be used to define more than one group. An example is group_name**:** user1, user2

Configure Port Buffering

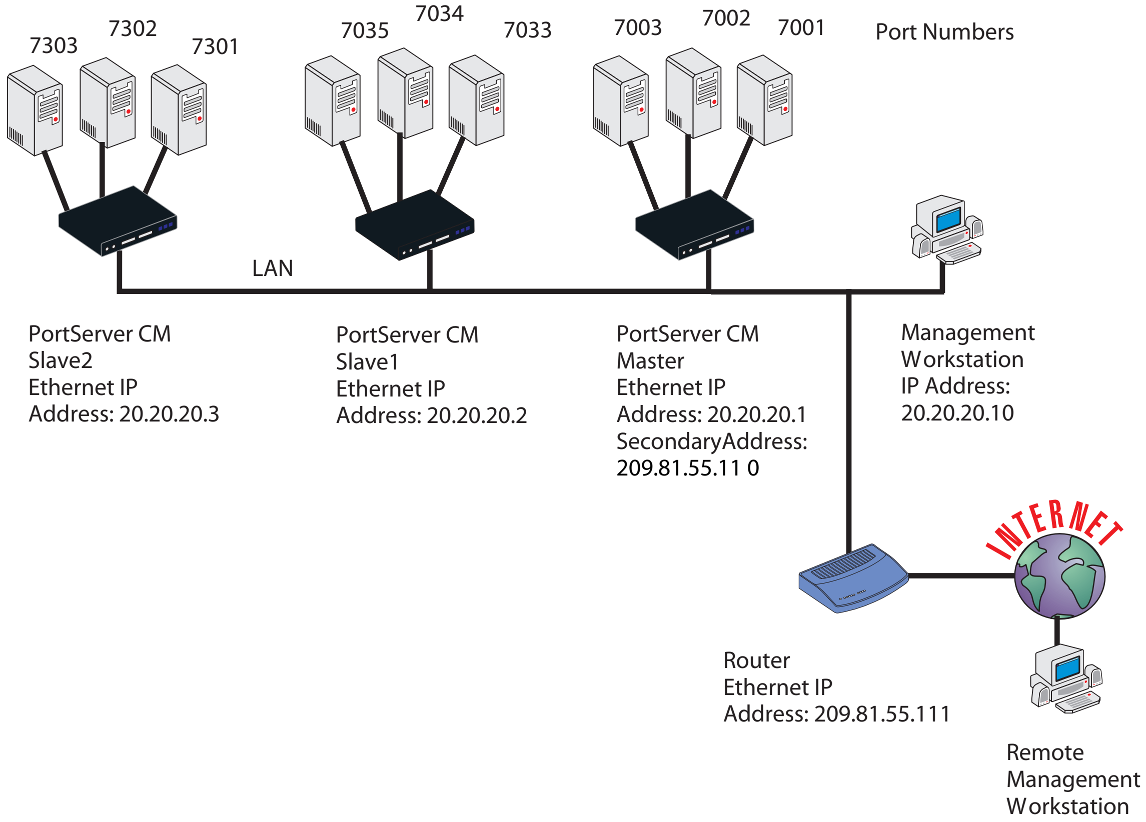
Use the following table for parameters and values to configure port buffering.

Configure Port Buffering	
Parameter	**Value**
s#.serverfarm	Alias name given to the server connected to the serial port. The # sign is the port number. An example is server_connected_serial5
all.data_buffering	A non zero value activates data buffering (local or remote, according to what was configured in the parameter conf.nfs_data_buffering). If local data buffering: • a file is created on the PortServer CM • this parameter means the maximum file size (in bytes) • each time the maximum is reached the oldest 10% of stored data is discarded, releasing space for new data (FIFO system) - circular file If remote data buffering: • a file is created through NFS in a remote server. All data received from the port is captured in this file • this parameter is just a flag to activate (greater than zero) or deactivate data buffering • there's no maximum file size other than the one imposed by the remote server - linear file This file can be viewed using the normal Unix tools (cat, vi, more, etc)**.** The default value is 0.
conf.nfs_data_buffering	Remote Network File System where data captured from the serial port will be written instead of the default directory "/var/run/DB". The directory tree to which the file will be written must be NFS-mounted. If data buffering is turned on for port 1, for example, the data will be stored in the file ttyS1.data (or <serverfarm1>.data if s1.serverfarm was configured) in the directory indicated by this variable (please see also Data Buffering section for more details). The remote host must have NFS installed and the administrator must create, export, and allow reading/writing to this directory. The size of this file is not limited by the value of the parameter s1.data_buffering, though the value cannot be zero since a zero value turns off data buffering. The size of the file is dependent on the NFS server only (hard drive, partition size, etc.). Default value is commented.
conf.facility	This value (0-7) is the local facility sent to the syslog. The file /etc/syslogng/syslog-ng.conf contains a mapping between the facility number and the action. The default value is 7.
all.syslog_buffering	When non zero, the contents of the data buffer are sent to the syslogng every time a quantity of data equal to this parameter is collected. The syslog level for data buffering is hard coded to level 5 (notice) and facility conf.DB_facility. The file /etc/syslog-ng/syslog-ng.conf should be set accordingly for the syslog-ng to take some action The default setting is 0.

Configure Port Buffering	
Parameter	**Value**
conf.DB_facility	This value (0-7) is the local facility sent to the syslog with the data when syslog_buffering and/or alarm are active. The file /etc/syslog-ng/syslogng.conf contains a mapping between the facility number and the action. The default value is 0.
all.DB_timestamp	A non zero value activates time stamp recording in the data buffering file. This parameter is meaningful only if data buffering option is active. In case time stamp recording is on, input characters will be accumulated until either a CR or LF character is received from the serial port or the size of the accumulated data reaches 256 characters. Then the accumulated data will be recorded in the data buffering file along with the current time. The default is 0.
all.dont_show_DBmenu	When zero, a menu with data buffering options is shown when a nonempty data buffering file is found. When 1, the data buffering menu is not shown. When 2, the data buffering menu is not shown but the data buffering file is shown if not empty. When 3, the data buffering menu is shown but without the **erase** and **show and erase** options. The default is 1.

Cluster PortServer CM Devices

Clustering allows the networking together of PortServer CMs so that one master PortServer CM can be used to access and manage all PortServer CMs on a LAN. The master PortServer CM can manage up to 512 serial ports or have 15 slave PortServer CMs.



Basic Concepts for Clustering Devices

The following information presents an overview of how to setup clustering on a network. The preceding diagram should be used as a reference in configuring the PortServer CM for clustering. The Digi website also contains a sample pslave.conf file to aide the user in the configuration process. To access this document, go to http://support.digi.com/ and select Knowledge Base. Enter the keywords: portserver cm clustering.

You can cluster up to 512 ports or 15 slave devices.

There can be only one master device and it must have two IP addresses. One IP address should be unique to the clustered network using conf.eth_ip and the other should be an IP address for the main network using conf.eth_ip_alias. The subnet masks should also correspond to their IP addresses.
The unique IP settings for the clustered network is designed to protect the slave devices from computers outside the main network gaining access.

Slave units have only one IP address unique to the clustered network. A typical clustered network might have the master device with an IP address of 20.20.20.1 and slave devices numbered sequentially after that IP address, for example 20.20.20.2, 20.20.20.3 and so on. See the preceding diagram.

The master device can use any type of authentication to handle the master and slave ports. Some authentication options are: none, local, and radius.

The master device can use any protocol related to Console Management. Three common protocols are:

socket_server for telnet, socket_ssh for ssh, and socket_raw for raw telnet.

The slave configuration must set all.authtype to none and all.protocol to socket_server. The ports are inaccessible otherwise. The actual serial port configuration for RADIUS, SSH, and other authentication protocols must be in the master configuration file.

The master device's pslave.conf file must list all the slave serial ports using the s# parameters. A PortServer CM 32 master device would have the first 32 ports designated as s1.tty through s32.tty. A second PortServer CM 32, the first slave device, would have ports s33.tty through s64.tty, but these ports need the IP address of their host plus the port numbering scheme that identifies them as using reverse-telnet or some other protocol. The first port on the first slave device would be: s33.tty 20.20.20.2: 7033.
Remember ports 7001 through 7032 are on the master device.

The master device handles the configuration and authentication of all slave and master ports through the master device's pslave.conf file. To set radius authentication on port number 75 of the second slave device, the master device's pslave.conf file would be given the following entry:

```
s75.authtype radius
```

Slaves must follow a unique port numbering scheme so that slaves and masters do not conflict. Each slave device's pslave.conf file must set a unique value for all.socket_port in order that no other slave can access the port. Typically, the first slave device would have all.socket_port 7033+ since the master has 7001+ through 7032+. This value must correspond to the s#.tty parameter in the master's pslave.conf file. If the first slave has all.socket_port 7033+, then s33.tty will be 20.20.20.2:7033 and s64.tty would be 20.20.20.2:7064.

Serial ports can also use a naming scheme called s#.serverfarm where the port is given a custom name string which is used by digi_menu. An example is port s75.tty connected to a Cisco router. The s75.tty port appears on digi_menu as Cisco router allowing the user to more easily identify the port and its purpose.

There are two troubleshooting features that can help determine if the slave devices are connected and the ports are accessible. The ping feature can determine whether the slaves are reachable from the master device and the digi_menu can be used to determine if the ports are connected correctly. For example, to test if the first slave device can be reached by the master device, enter the command: ping 20.20.20.2.

Chapter 3 **Web UI (User Interface)**

Log On

1. Open a browser (Netscape, Internet Explorer, etc.) and enter the URL or IP address of the PortServer CM's Ethernet interface. You may also use a secure socket layer by replacing http: with https: in the web URL address section of your web browser.

   Note: You can find the IP address of the PortServer CM by running the Discover utility. See Chapter 6 to configure new users.

2. Enter **`root`** in the username field and **`dbps`** in the password field to use the Web Configuration Manager. Change the root password as soon as possible: the user database for the Web Configuration Manager is different than the system user database, so the root password can be different.

Change the Password

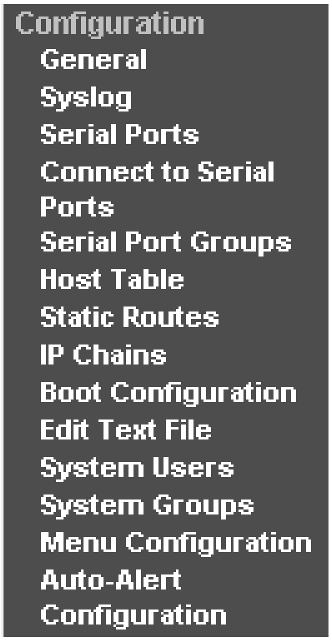
1. Under Web User Management choose Users.
2. Select the radio button for the user root, then select *Change Password*.
3. Enter the new password twice and choose Submit.
4. The next page will require a new logon, enter `root` and the new password.
5. From the Web User Management section, choose Load/Save Configuration > Save > Configuration.
6. Next, go to Administration > Load/Save Configuration > Save to Flash.
7. To log out, choose the *Administration* > *Log out*.

How to restore the default configuration of the Web Management Interface

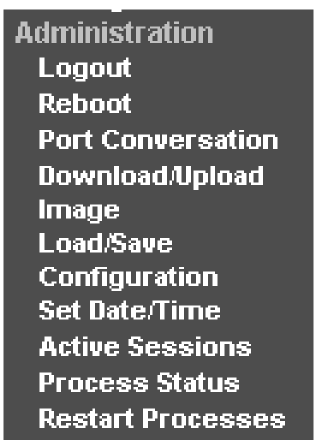
This would be required only when the root password was lost or the configuration file /etc/websum.conf was damaged.

1. Edit the file /etc/config_files from a console or telnet session.
2. Delete the reference to /etc/websum.conf.
3. Save the modified /etc/config_files file.
4. Execute the command saveconf.
5. Reboot the system.
6. Enter into the Web Configuration Manager with the default username and password (root/dbps).
7. Edit the file /etc/config_files and insert the reference to /etc/websum.conf.

Navigate Web Interface (Navigation Bar)

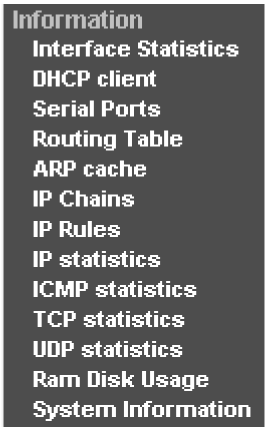


Configuration Section	
Link Name	**Description of Page Contents**
General	Ethernet, DNS, Syslog, Name Service Access, Data Buffering.
Syslog	Displays vi editor for modifying the syslog file
Serial Ports	Configuration for the Portslave package
Connect to Serial Ports	Direct connection to a serial port, ports 1 through 512.
Serial Port Groups	Manages a group of ports
Host Table	Table of hosts in /etc/hosts.
Static Routes	Static routes defined in /etc/network/st_routes.
IP Chains	Static Firewall Chains in /etc/network/ipchains.
Boot Configurations	Configuration of parameters used in the boot process.
Edit Text File	Tool to read and edit a configuration file.
System Users	Management of system users defined in /etc/passwd.
System Groups	Management of system groups defined in /etc/groups.
Menu Configuration	Configuration of parameters for creating menus.
Auto-Alert Configuration	Configuration of parameters for creating auto-alert notifications.



Administrative Section	
Link Name	**Description of Page Contents**
Logout	Exits the Web Manager.
Reboot	Resets the Port Server CM.
Port Conversation	Enables a port conversation through a serial port.
Download/Upload Image	Uses an FTP server to load and save a kernel image.
Load/Save Configuration	Uses flash memory or an FTP server to load or save the CM's configuration
Set Date/Time	Sets the PortServer CM's date and time.
Active Sessions	Shows the active sessions and allows the administrator to kill them.
Process Status	Shows the running processes and allows the adminsitrator to kill them.
Restart Processes	Allows the administrator to start or stop some processes.

Web User Management Section	
Link Name	**Description of Page Contents**
Users	List of users allowed to access the web server.
Groups	List of possible access groups.
Access Limits	List of access limits for specific URL’s.
Load/Save Web Configuration	Load/Save web user configuration in /etc/websum.conf.



Information Section	
Link Name	**Description of Page Contents**
Interface Statistics	Statistics for all active interfaces.
DHCP Client	Host information from the DHCP server
Serial Ports	The status of all serial ports.
Routing Table	The routing table and allows the administrator to add or delete routes.
ARP cache	The ARP cache.
IP Chains	IP Chain Entries.
IP Rules	Firewall, NAT, and IP accounting rules.
IP statistics	IP protocol statistics.
ICMPstatistics	ICMP protocol statistics.
TCP statistics	TCP protocol statistics.
UDPstatistics	UDP protocol statistics.
RAM Disk Usage	The PortServer CM file system.
System Information	Various entries about the PortServer CMl

IN ORDER TO SAVE YOUR CONFIGURATION:

1. In the Administration section of the navigation bar, choose Load/Save Configuration.
2. Choose Save to Flash.
3. In the Administration section of the navigation bar, choose Restart Processes.
4. Choose Stop digi_ras. After a pause, Status field should change from Active to Inactive, and the text on the button should change to Start digi_ras. If it does not, repeat this step.
5. Choose Start digi_ras.

Chapter 4 Menus

Simplify Port Connections with digi_menu

Use the digi_menu script to avoid typing long telnet or ssh commands. The digi_menu script is ready to use immediately and requires no configuration. It presents a short menu with the names of the servers connected to the serial ports of the PortServer CM. The server is selected by its corresponding number. Only ports configured for console access (protocols socket_server or socket_ssh) will be presented.

Enter `digi_menu` with no command line options. This command displays the default menu.

```
Serial Console Server Connection menu
 1 Lucy             2 Snoopy           3 Chris            4 Ringo
 5 ttyS5            6 ttyS6            7 ttyS7            8 ttyS8
Type 'q' to quit, a valid option [1-8], or anything else to refresh:
```

Selecting option 2 will telnet/ssh to the server Snoopy. If a name is present in the serverfarm parameter for a port, that name will appear. Otherwise, ttyS*N* is used where *N* is the port number.

The digi_menu script has the following command line options:

-p: Displays IP Address and TCP port instead of server names:

```
Serial Console Server Connection menu
 1 10.1.2.3 7001       2 10.1.2.3 7002       3 10.1.2.3 7003
 4 10.1.2.3 7004       5 10.1.2.3 7005       6 10.1.2.3 7006
Type 'q' to quit, a valid option [1-8], or anything else to refresh:
```

-i: Displays Local IP assigned to the serial port instead of server names:

```
Serial Console Server Connection menu
 1 192.168.1.101   2 192.168.1.102   3 192.168.1.103   4 192.168.1.104
 5 192.168.1.105   6 192.168.1.106   7 192.168.1.107   8 192.168.1.108
Type 'q' to quit, a valid option [1-8], or anything else to refresh:
```

-u *name*: Username to be used in ssh/telnet command. The default username is the one used to log on to the PortServer CM.

-h: lists script options

Assigning Names to Ports

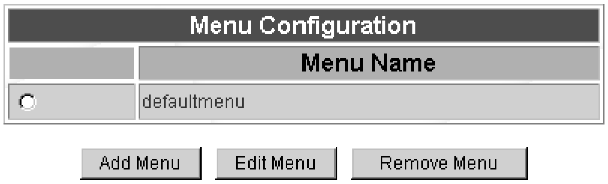
Ports may be assigned names to identify their destination or purpose. The names will appear in menus instead of the generic ttyS*N* names. Use the following procedure to name ports.
Open a web browser and access the Web Management Interface by entering the name or IP address of the PortServer CM in the address bar.

1. Log on as root.
2. In the Configuration section of the navigation bar, choose Serial Ports.
3. From the Logical Ports drop down box, choose the port you wish to name, then choose Submit.
4. Enter the new name in the Server Farm parameter field (near the bottom of the page in the SSH section) and choose Submit.
5. Repeat steps 4 and 5 for each port you wish to name.
6. In the Administration section of the navigation bar, choose Load/Save Configuration.
7. Choose Save to Flash.
8. In the Administration section of the navigation bar, choose Restart Processes.
9. Choose Stop digi_ras. After a pause, Status field should change from Active to Inactive and the text on the button should change to Start digi_ras. If it does not, repeat this step.
10. Choose Start digi_ras.

Create Menus Through the Web Interface

To create menus and submenus using the web interface, do the following:

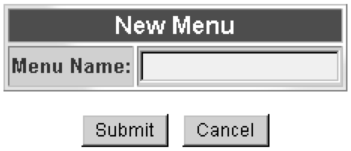
1. Choose Menu Configuration from the Configuration section of the web interface menu.
2. Choose Add Menu under the Menu Configuration section.
   .



Menu Configuration

	Menu Name
○	defaultmenu

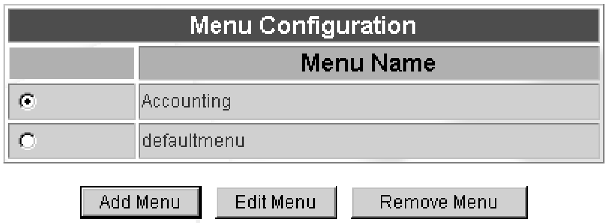
3. Enter a name for the new menu in the Menu Name box and choose Submit.



New Menu

Menu Name:

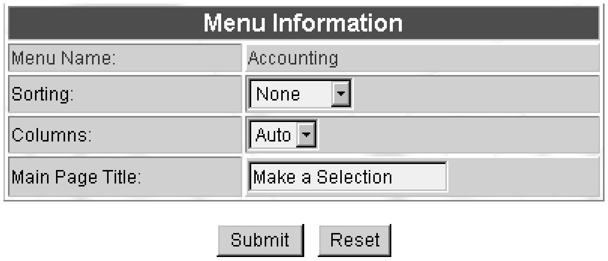
4. Check the radio button next to the newly created menu on the Menu Configuration page and choose Edit Menu.



Menu Configuration

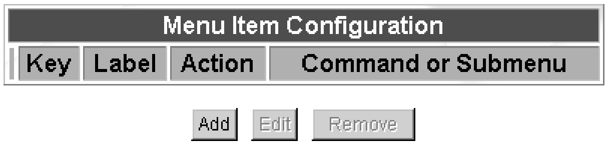
	Menu Name
●	Accounting
○	defaultmenu

5. Enter the information requested under Menu Information. To add menu items, choose Add from Menu Item Configuration. A menu item configuration page is displayed.



Menu Information

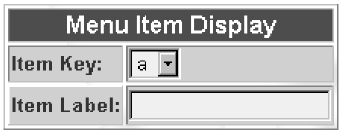
Menu Name:	Accounting
Sorting:	None
Columns:	Auto
Main Page Title:	Make a Selection



Menu Item Configuration

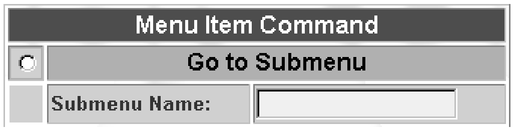
Key	Label	Action	Command or Submenu

6. Enter a name in the Item Label box from the Menu Item Display section and choose a key for the menu item. The drop down key menu lists all letters of the alphabet followed by numbers 1 through 9.



Menu Item Display

Item Key:	a
Item Label:	



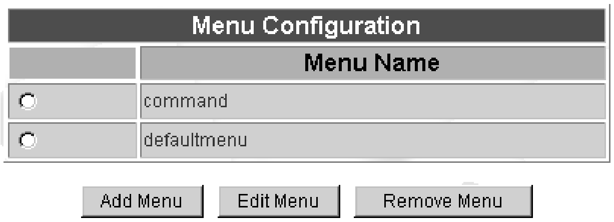
Menu Item Command

○	Go to Submenu
	Submenu Name:

7. Choose the Go to Submenu option from the Menu Item Command section (see preceding screenshot.) This links the Menu Item to another submenu. Choose Submit to save the configuration.

Create Submenus

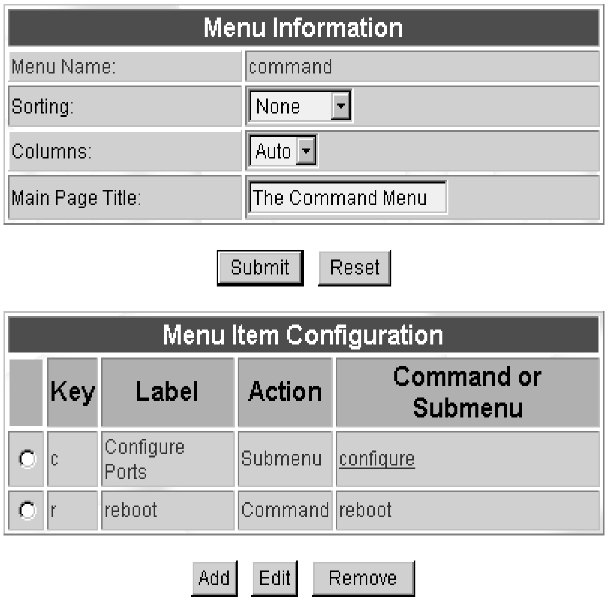
1. Check the radio button for the menu you want to modify by adding a submenu.
   Menu information for the selected menu is displayed.



Menu Configuration

	Menu Name
○	command
○	defaultmenu

2. Enter the requested information in the Menu Information section and choose Add in the Menu Item Configuration section to create a submenu.
   The example below is for a menu titled The Command Menu. The Command Menu already has one submenu and one command listed in the Menu Item Configuration column. The **configure** submenu is hyperlinked indicating it can be edited and more submenus added if necessary. The reboot command is a Command, not a Submenu and can not be edited. It is not hyperlinked.



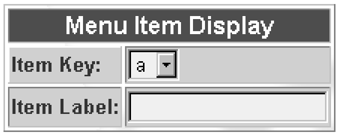
Menu Information

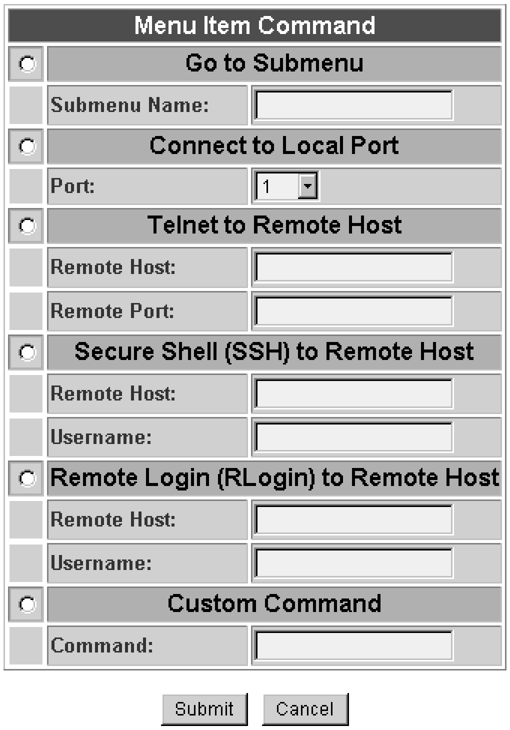
Menu Name:	command
Sorting:	None
Columns:	Auto
Main Page Title:	The Command Menu

Menu Item Configuration

	Key	Label	Action	Command or Submenu
○	c	Configure Ports	Submenu	configure
○	r	reboot	Command	reboot

3. Enter a name in the Item Label box from the Menu Item Display section and choose a key for the menu item. The drop down key menu lists all letters of the alphabet followed by numbers 1 through 9.





4. Choose the Go to Submenu option from the Menu Item Command section (see preceding screenshot.) This links the Menu Item to a new submenu. Choose Submit to save the configuration.

The Connect Command Through the Command Line Interface

This command connects a user directly to a port. To connect directly to a port, enter the following command:

```
connect port#
```

An example is, connect 15. Additional information on the connect command can be found by entering:

```
connect -h
```

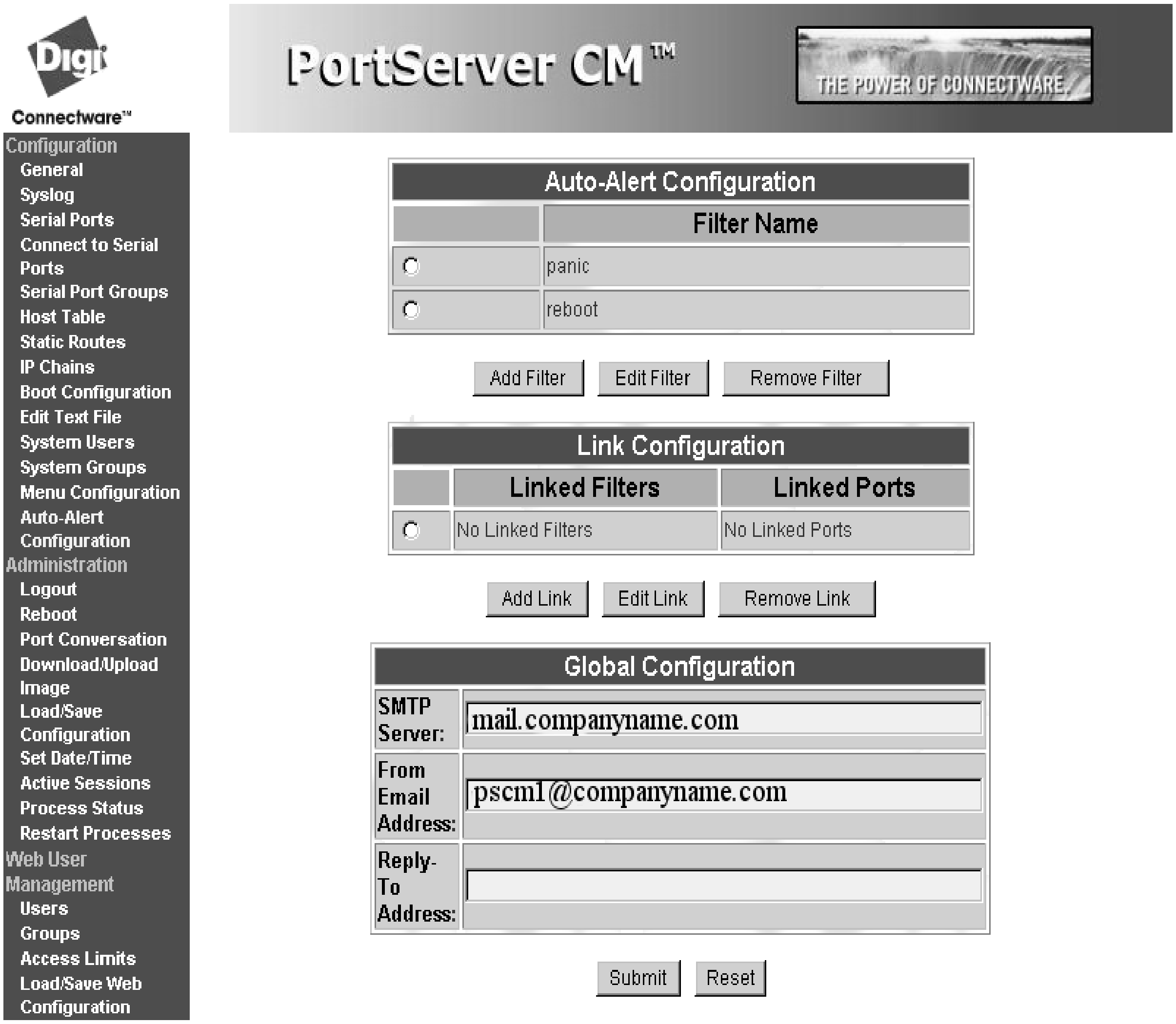
Chapter 5 Creating Auto-Alerts and Notifications

Create Auto-Alerts

Auto-Alerts can be configured from the web interface. Creating an Auto-Alert is a three step process of creating a filter, linking the filter to specified ports, and adding a notification feature. To create an Auto-Alert, do the following:

1. On the web interface main page under the Configuration menu, choose Auto-Alert Configuration.
2. Choose Add Filter > assign the filter a name > Submit.
3. Check the radio button next to the filter you just created and choose Edit Filter.
4. Enter the parameters for the filter > Submit.
5. Under the Link Configuration menu choose Add Link, then the ports you want to filter. Choose Submit.
   You must check the radio button before selecting an individual port or port range. All Ports is selected by checking the radio button only.
6. To add a notification, select Add Notification and choose either email address or SNMP Trap by selecting the appropriate radio button and entering the required information. Choose Submit.
7. To save the configuration to flash memory, under the Administration menu choose Load/Save Configuration > Save to Flash.
   The configuration is saved. To start the auto-alert processes immediately, you must reboot the PortServer CM.

.



Auto-Alert Configuration

	Filter Name
○	panic
○	reboot

Link Configuration

	Linked Filters	Linked Ports
○	No Linked Filters	No Linked Ports

Global Configuration

SMTP Server:	mail.companyname.com
From Email Address:	pscm1@companyname.com
Reply-To Address:	

Screenshot of the Auto-Alert Configuration page

Syslog-ng

Syslog-ng is an advanced syslog configuration feature which enables the user to define specific source information to be read or filtered such as, files, remote syslogd clients, or local messages. Syslog-ng uses filters defined by the user to search for syslog level, syslog facility, string matching, or program generation. When the filters detect pertinent information, they send the filtered information to a defined destination such as a file, program, or a remote syslogd server.

The Syslog configuration is stored in the /etc/syslog-ng/syslog-ng.conf file and automatically starts when the PortServer CM is booted. Changes to the configuration result in the syslog-ng process needing to re-read the configuration. The user must enter the following command to prompt the syslog-ng process to re-read the configuration files.

```
$ killall -HUP syslog-ng
```

Global Options

The PortServer CM syslog configuration supports several options that control how the syslog-ng process behaves. To specify an option in the syslog configuration file (/etc/syslog-ng/syslog-ng.conf) use the following syntax:

options { ***option_name(option_parameter)****;* ***option_name(option_parameter)****; … };*

The following ***option_name*** and ***option_parameter*** options may be used:

time_reopen(n): The time to wait before a dead connection is re-established.

time_reap(n): The time to wait before an idle destination file is closed.

sync_freq(n): The number of lines buffered before written to file. The file is synchronized when this number of messages has been written to it.

mark_freq(n): The number of seconds between two MARKS lines.

log_fifo_size(n): The number of lines fitting to the output queue.

chain_hostname(yes/no): Enable/disable the chained hostname format.

long_hostname(yes/no): Enable/disable the chained hostname format.

use_time_recvd(yes/no): Use the time a message is received instead of the one specified in the message.

use_dns(yes/no): Enable/disable DNS usage. Syslog blocks on DNS queries, therefore enabling DNS may lead to a Denial of Service (DoS) attack.

gc_idle_threshold(n): Sets the threshold value for the garbage collector when Syslog is idle. Garbage collection phase starts when the number of allocated objects reaches this number. [Default: 100]

gc_busy_threshold(n): Sets the threshold value for the garbage collected when Syslog is busy. Garbage collection phase starts when the number of allocated objects reaches this number. [Default: 100]

create_dirs(yes/no): Enable/disable creating non-existing directories.

owner(username): Set the owner of any created files to the one specified. [Default: root]

group(groupname): Set the group of any created files to the one specified. [Default: root]

perm(mask): Set the permission mask of the created file to the one specified. [Default: 0600]

Source Definition

Source definitions define from where Syslog reads information. Multiple source definitions may be defined with each using a variety of source drivers as explained below. To define a source in the syslog configuration file, /etc/syslog-ng/syslog-ng.conf, use the following syntax:

*source <**identifier**> { **source_driver**([**source_params**]); **source_driver**([…]); … };*

The ***identifier*** must be a uniquely defined name for this source. No two source definitions may share the same identifier.

The following ***source_driver*** and ***source_params*** definitions may be used:

internal():

Description**:** Messages generated internally in syslog-ng.
Parameters: None
Options:None

*unix_stream(**filename** [**options**])*:
*unix_dgram(**filename** [**options**])*:

Description: Syslog opens an AF_UNIX socket on the specified filename and begins listening on the interface and socket for messages.

Parameters:

filename: The name of the file to open an AF_UNIX socket

Options:

owner(name): The owner of the file to specify
group(name): The group of the file to specify
perm(mask): The permission mask of the file to specify
keep-alive(yes/no): Enables/disables whether to keep connections opened when syslog-ng is restarted. This can only be specified with *unix_stream*. [Default: yes]
max-connections(n): The limit on the number of simultaneously opened connections. This can only be specified with *unix_stream*. [Default: 10]

Examples:

The following example receives messages from local syslogd clients:
source sysl { unix_stream("/dev/log"); };

*tcp([**options**]):*
*udp([**options**]):*

Description: Syslog opens listening connections on the TCP or UDP interfaces and begins listening for messages. These definitions do not require source parameters since by default they bind to 0.0.0.0:514 in order that syslog-ng listens on all available interfaces on the remote syslog port.

Parameters: None

Options:

ip(<ip-address>): Bind to the IP address identified. [Default: 0.0.0.0]
port(<port-number>): Bind to and listen on the TCP or UDP port. [Default: 514]
max-connections(n): The limit on the number of simultaneously opened connections. [Default: 10]

Examples:

The following example listens for syslog messages from a syslog client at 10.0.0.1:
source s_udp { udp(ip(10.0.0.1); port(514);); };

*file(**filename**):*

Description: Syslog opens the specified file and begins reading messages.

Parameters:

filename: The name of the file to read messages.

Examples:

The following example will receive messages from the Linux kernel:
source s_kernel { file("/proc/kmsg"); };

Filter Definitions

Filter definitions define how Syslog handles information in order to know when to send source definitions to destination definitions. Multiple filter definitions may be defined each using a variety of filter expressions as explained below. To define a filter in the syslog configuration file /etc/syslog-ng/syslog-ng.conf use the following syntax:

*filter <**identifier**> { **filter_expression(filter_parameter)** };*

The ***identifier*** must be a uniquely defined name for this filter. No two filter definitions may share the same identifier.

The following ***filter_expression*** and ***filter_params*** definitions may be used:

*facility(**facility_code**):*

Description: Selects messages based on their facility codes.

Parameters:

facility_code: The facility code for the syslog message. The following facility codes may be used:
info: Information messages
daemon: Server messages
kern: Kernel messages
auth: Authentication messages
authpriv:Private authentication events using data with privileged or sensitive information
news: News messages
mail: Mail messages
local[0-7]: Local user-defined message

Examples: The following examples explain various ways to use facility:
filter f_daemon { facility(daemon); };
filter f_kern { facility(kern); };
filter f_debug { not facility(auth, authpriv, news, mail); };
*filter f_syslog_buf { facility(local**[0+<conf.DB_facility>]**); };*

*level(**level_code**):*
*priority(**priority_code**):*

Description: Selects messages based on their priorities.

Parameters:

priority_code: The priority code for the syslog message. The following priority codes may be used:
info: Informations
warn: Warnings
emerg: Emergencies

Examples: The following examples explain various ways to use priorities:
filter f_messages { level(info..warn); };
filter f_emergency { level(emerg); };

*program(**program_name**):*

Description: Selects messages based on the program that generated it.

Parameters:

program_name:The name of the program to match.

Examples: The following examples explain various ways to use the programs.
filter f_sshd_debug {not program("sshd") or not level(debug); };

*host(**host_name**):*

Description: Selects messages based on the hostname field of the log message.

Parameters:

host_name: The hostname to match

*match(**string**):*

Description: Selects messages based on a string in the log message

Parameters:

string: The string to match in the message

Examples:

The following examples explain how to match a string "named":
filter f_named { match("named"); };

Destination Definitions

Destination definitions define where Syslog sends information that it receives. Multiple destination definitions may be defined with each using a variety of destination drivers as explained below. To define a destination in the syslog configuration file /etc/syslog-ng/syslog-ng.conf use the following syntax:

*destination <**identifier**> { **destination_driver**([**destination_param**]); **destination_driver**([…]); … };*

The ***identifier*** must be a uniquely defined name for this destination. No two destination definitions may share the same identifier.

The following ***destination_driver*** and ***destination_params*** definitions may be used:

*unix_stream(**filename**)*:
*unix_dgram(**filename**)*:

Description: Syslog sends a message on the specified AF_UNIX socket.

Parameters:

filename: The name of the file shere Unix datagram or Unix socket messages are sent.

*tcp(“**ip-address” [options**]):*
*udp(“**ip-address” [options**]):*

Description: Syslog sends messages to the specified remote host which are typically remote syslog servers.

Parameters:

ip-address: The IP-Address of the remote host where messages are sent.

Options:

port(<port-number>):Where the TCP or UDP port are connected. [Default: 514]

Examples:

The following example sends the messages to the syslogd server located at 10.0.0.1
destination d_udp { udp(“10.0.0.1” port(514)); };

*file(**filename [options**]):*

Description: Syslog sends received messages out to the specified file. This is one of the most important destination drivers and includes several advanced configurations. The destination filename may include macros that get expanded when the message is written. This allows the filename to be dependent on the type of message.

Parameters:

filename:	The name of the file to write to. Since the state of this file must be tracked by syslog-ng, it consumes some memory for each file. Therefore, if no new messages are written to a file within 60 seconds (controlled by the *time_reap* global option), the file is closed and the state is freed. The following macros may be used:
$HOST:	The name of the source from where the message originated.
$FACILITY:	The name of the facility with which the message was tagged.
$PRIORITY:	The priority of the message.
$LEVEL:	Same as $PRIORITY.
$PROGRAM:	The name of the program that sent the message.
$YEAR:	Year the message was sent.
$MONTH:	Month the message was sent.
$DAY:	Day the message was sent.
$HOUR:	Hour the message was sent.
$MIN:	Minute the message was sent.
$SEC:	Second the message was sent.
$TAG:	Equal to $FACILITY/$LEVEL.
$FULLHOST:	The name of the source host and source driver: <source-driver>@<hostname>.

$MSG/$MESSAGE: The message that was received.
$FULLDATE: The date the message was sent.

Options:

log_fifo_size(n): The number of entries in the output file.
sync_freq(n): The file is synchronized when this number of messages is written to it.
encrypt(yes/no): Encrypt the resulting file.
compress(yes/no): Compress the resulting file with zlib.
owner(name): The owner of the file.
group(name): The group of the file.
perm(mask): The permission mask of the file.

Examples:

The following example sends a message to the console:
destination d_console { file("/dev/ttyS0"); };
The following example writes the message a system file:
destination d_message { file("/var/log/messages"); };

*usertty (**username**)*:

Description: Syslog sends the message to the terminals of the logged-in user

Parameters:

username: The message is sent to each terminal to which the user is logged.

Examples:

*program (**program_name program_arguments**)*:

Description: Syslog does a fork() and then executes the given program with the specified arguments sending the message to the stdin of the program.

Parameters:

program_name: The name of the program.
program_arguments: The arguments to send to the program.

Examples:

The following example sends the message to all root-logged in sessions:
destination d_userroot { usertty("root"); };

Connecting Definitions

After source, filter, and destination definitions have been defined, they must be connected together in order that Syslog knows which sources to read from, which filters to filter them on, and which destinations to send them to. Multiple syslog connections may be defined with each using any variety of previous definitions. To define a syslog connection in the syslog configuration file, /etc/syslog-ng/syslog-ng.conf, use the following syntax:

*log { source(**source_definition_id**); source(**source_definition_id**); …*
*filter(**filter_definition_id**); filter(**filter_definition_id**); …*

*destination(**destination_definition_id**); destination(**destination_definition_id**); ...};*

The ***source_defintion_id***, ***filter_definition_id***, and ***destination_defintion_id*** must refer to a previous defined identifier. See the previous sections on how to define a source definition, filter definition, and destination definition.

Examples:

The following example sends all messages received from local syslog clients to the console:

```
log { source(sysl); destination(d_console); };
```

The following example sends only those messages with **alert** level that are received from local syslog clients and sends them to the logged in root user:

```
log { source(sysl); filter(f_alert); destination(d_userroot); };
```

The following example writes all messages with facility levels **info**, **notice**, or **warning** that are received from local and remote syslog clients. The messages are written to the */var/log/messages* file:

```
log { source(sysl); source(s_udp); filter(f_messages); destination(d_messages); };
```

The following example sends all messages with a **kernel** facility that are received from local and remote syslog clients and sends them to a remote syslogd server:

```
log { source(sysl); source(s_udp); filter(f_kern); destination(d_udp); };
```

User Scenarios

Below are some common user scenarios and how to set up the necessary configuration on the PortServer CM. These examples may be used directly or as a template for a more advanced configuration. Please refer to previous sections for information on how to define the configuration.

Syslog Buffering

Syslog buffering is used in order to send port-generated messages and system messages to a remote syslog server.

The following configuration is required in “/etc/portslave/pslave.conf” in order to make the configuration work.

```
# Data Buffering Facility
conf.DB_facility 1
all.syslog_buffering100
```

The following configuration is required in the Syslog Configuration file /etc/syslog-ng/syslog-ng.conf.

```
Local Syslog Clients
source src { unix_stream(“/dev/log”); } ;
# Filter Expressions(local1 matches the conf.DB_facility value)
# If you change conf.DB_facility, make sure to change localN so that N matches
filter f_buffering (facility(local) and level(notice); };
# Remote Syslog Server Destinations
destination d_buffering { udp(“10.0.0.1”); } ;

# Send only Syslog_buffering messages to remote server
log { source(src); filter(f_buffering); destination(d_buffering); } ;
```

Multiple Syslog Server

Multiple syslog servers allow you to send various messages to various syslog servers. You can send all the messages to all the servers or you can send certain messages to only certain servers giving you the greatest flexibility.

The following configuration is required in “/etc/portslave/pslave.conf” in order to make the configuration work.

```
# Facility
conf.facility
```

The following configuration is required in the Syslog Configuration file “ /etc/syslog-ng/syslog-ng.conf”.

```
Local Syslog Clients
source src { unix_stream(“/dev/log”); };

# Remote Server 1 at IP=10.0.0.1 Port=Default
destination d_udp1 { udp(“10.0.0.1”); } ;

# Remote Server2 at IP=10.0.0.2 Port=1999
destination d_udp2 { udp(“10.0.0.2” port(1999)); };

# Filter Messages from Facility Local1 and Level Info to Warning
# If conf.facility in pslave.conf changes, then local1 must change to
# localN where N matches the value of conf.facility
filter f_local1 {facility(local1) and level1(info..warn) };

# Filter Messages from facilitylocal1 and Level Err to Alert
# If conf.facility in pslave.conf changes, then local1 must change to
#localN where N matches the value of conf.facility
filter f_critic { facility(f_local1) and level (err..alert) } ;

# Send Info, Notice, and Warning Messages to Remote Server 1
log { source(src); filter(f_local); destination( d_udp1); } ;

# Send Error, Critical, and Alert Messages to Remote Server 2
log {source(src), filter(f critic), destination(d_udp2); } ;
```

Chapter 6 System Administration

Users and Passwords

A username and password are necessary to log in to the PortServer CM. The user “root” is predefined, with a password “dbps”. A new password should be configured as soon as possible to avoid unauthorized access. Enter the command:

```
passwd
```

to create a password for the root user.

To create a regular user (without root privileges), use the commands:

```
adduser user_name
```

```
passwd user_password
```

To log out enter `logout` at the command prompt.

Shadow Password

The PortServer CM uses a Shadow Passwords feature for increased security. Typically, Linux passwords are stored in the /etc/passwd file allowing unauthorized users easy access to a computer system’s or the network’s user passwords. The shadow password feature encrypts or encodes the passwords and stores them in a root-only accessible file named /etc/shadow.

NTP Client Functionality

In order for the PortServer CM to work as a NTP (Network Timer Protocol) client, the IP address and either hostname or domain name of the NTP server must be set in the file /etc/hosts. To edit the file, use vi editor and from the command line enter `vi /etc/hosts`.

Once in the file, add the following syntax `ipaddress_NTPserver ntphost.`
An example is: 199.26.5.33 ntphost. Save the file and exit the vi editor.

Next, enter `vi /etc/timezone` at the command line. Depress the “i” key to enter insert mode and enter the appropriate Greenwich Standard Time difference. For the Central Time Zone of the United Stated, the entry would be: `GST+6`. France, which is an hour earlier than GST would enter: `GST-1`. Save the file and exit the vi editor. Lastly, enter `saveconf` from the command line to save the changes to flash memory.

Packet Filtering Using ipchains

The PortServer CM uses the Linux utility ipchains to filter IP packets entering, leaving and passing through its interfaces. An ipchains tutorial is beyond the scope of this manual. For more information on ipchains, see the ipchains man page (not included with the PortServer CM).

The syntax of the ipchains command is:

ipchains - command chain [-s source] [-d destination] [-p protocol] [-j target] [-i interface]

where **command** is one of the following:

A - Add a condition or rule to the end of the chain. Note that the order in which a condition appears in a chain can modify its application and the first rule added to a chain is processed first, etc.

D - Delete a condition from the chain. The condition must match exactly with the command’s arguments to be deleted.

R- Replace a condition in the chain.

I - Insert a condition in a specified location in the chain.

L - List all conditions in the chain.

F - Flush (remove) all conditions in the chain.

N - Create a new chain.

X - Deletes a user-created chain

P - Policy applied for default handling

chain is one of the following:

input - filters incoming packets

output - filters outgoing packets

forward - filters packets which are not created by the PortServer CM and are not destined to the PortServer CM

user_created_chain - a previously defined (or in the process of being defined) chain created using the N command described above.

The output chain controls which packets are sent. A packet can be accepted by the input chain, but then rejected by the output chain. Likewise, the forward chain controls which packets will be routed. The input chain controls incoming packet filtering. The packet is either destined for the router or for another computer. In the latter case, the packet is processed by the forward chain. Packets that pass through the forward chain will then be processed by the output chain.

source and **destination** have the following format:

[!] address[/ mask] [!][port[:port]]

! : reverses the definition, resulting in the opposite.

address: host or network IP

port: defines a specific port

port:port: defines a range of ports

If a source or destination is not specified then 0.0.0.0/0 is used.

protocol is one of the following: tcp, udp, icmp, all or a protocol number (see the file /etc/protocols for a list).

target is one of the following:

ACCEPT

DENY

the name of another chain

interface is:

eth0 (the Ethernet interface is the only option on the PortServer CM) Lists do not need to be associated to an interface, so this option may be omitted.

To save changes made using the ipchains command, execute fwset. This command will save the filter configuration in the file /etc/network/firewall and then save the file in flash memory.

To delete the changes made (before fwset is executed) execute fwset restore to return to the lists previously saved in /etc/network/firewall. Only the lists previously saved using fwset will then be defined. This command is executed at boot to invoke the last configuration saved.
Another option is to edit the file /etc/network/firewall (or another file) directly, following the syntax defined in the file itself. If the file is edited in this way, the command fwset cannot be used to save and restore the configuration.

Use:

`ipchains-save > file_name` to save the lists in file_name

`updatefiles file_name` to save file_name to flash memory

`ipchains-restore < file_name` to restore the lists to the configuration in file_name

An example of the use of ipchains for a console access server

If the administrator wishes to restrict access to the consoles connected to the PortServer CM to a user on the workstation with IP address 200.200.200.4, a filter can be set up as shown below.

ipchains -P input ACCEPT

ipchains -P output ACCEPT

ipchains -P forward ACCEPT

ipchains -A input -p tcp -s ! 200.200.200.4 -d 0.0.0.0/0 23 -j DENY

ipchains -A input -p tcp -s ! 200.200.200.4 -d 200.200.200.1 7001:7032 -j DENY
ipchains -A input -p tcp -s ! 200.200.200.4 -d 0.0.0.0/0 22 -j DENY

Chapter 7 Hardware Specifications

The RS-232 Standard

RS-232C, EIA RS-232, or simply RS-232 refer to a standard defined by the Electronic Industries Association in 1969 for serial communication. RS-232 was defined to connect Data Terminal Equipment, (DTE, usually a computer or terminal) to Data Communication Equipment (DCE, usually a modem):

DTE —> RS-232 —> DCE —> communication line –> DCE —> RS-232 –> DTE

RS-232 is now mostly being used to connect DTE devices directly (without modems or communication lines in between). While that was not the original intention, it is possible with some wiring tricks. The relevant signals (or wires) in a RS-232 cable, from the standpoint of the computer (DTE) are:

- Receive Data (RxD) and Transmit Data (TxD) – The actual data signals
- Signal Ground (Gnd) - Electrical reference for both ends
- Data Terminal Ready (DTR) - Indicates that the computer (DTE) is active Data
- Set Ready (DSR) - Indicates that the modem (DCE) is active.
- Data Carrier Ready (DCD) - Indicates that the connection over the communication line is active
- CTS (Clear to Send, an input) – Flow control for data flowing from DTE to DCE
- RTS (Request to Send, an output) – Flow control for data flowing from DCE to DTE

Not all signals are necessary for every application, so the RS-232 cable may not need all 7 wires.The RS-232 interface defines communication parameters such as parity, number of bits per character, number of stop-bits and the baud rate. Both sides must be configured with the same parameters. That is the first thing to verify if you think you have the correct cable and things still do not work. The most common configuration is 8N1 (8 bits of data per character, no parity bit included with the data, 1 stop-bit to indicate the end of a character). The baud rate in a RS-232 line translates directly into the data speed in bits per second (bps). Usual transmission speeds range between 9600 bps and 19200bps (used in most automation and console applications) to 115,200 bps (used by the fastest modems).

Cable Length

The total capacitance of a cable affects the integrity of transmitted data. As a rule of thumb, the total capacitance of a cable (including the connectors) should not exceed 2500 pF. Serial interface cable is usually rated in Pico Farads per foot. Therefore, if a cable has a capacitance of 50 pF/ft, and the connectors are 100 pF each, the maximum recommended cable length is 46 feet. If the cable is rated at 12.5 pF/ft, the maximum recommended cable length is 184 feet, and 5 pF/ft cable can be run up to 460 feet. In situations where low-capacitance cable (e.g. Category 5) is unavailable, or very long cable runs are required, “short-haul” modems, available from suppliers such as Black Box, can be used to increase the effective range of the RS-232 interface. Short-haul modems are similar to standard modems, except that they are connected directly to each other via a cable instead of going through a telephone circuit.

Connectors

The connector traditionally used with RS-232 is the 25-pin D-shaped connector (DB-25). Most analog modems and most older computers and serial equipment use this connector. The RS-232 interface on DB-25 connector always uses the same standard pin assignment. The 9-pin D-shaped connector (DB-9) saves some space and is also used for RS-232. Most new PC COM ports and serial equipment (specially when compact size is important) uses this connector. RS-232 interfaces on DB-9 connectors always use the same standard pin assignment. The telephone-type modular RJ-45 plug and jack are very compact, inexpensive and compatible with the phone and Ethernet wiring systems present in most buildings and data centers. Most networking equipment and new servers use RJ-45 connectors for serial communication. Unfortunately, there is no standard RS-232 pin assignment for RJ-45 connectors. Every equipment vendor has its pin assignment. Most connectors have two versions. The ones with pins are “male” and the ones with holes are “female”.

RS-232 Signal	Name/Function (Input/Output)	DB-25 pins (Standard)	DB-9 pins (Standard)	RJ-45 pins (PortServer CM)
Chassis	Safety Ground	1	Shell	Shell
TxD	Transmit Data (O)	2	3	3
RxD	Receive Data (I)	3	2	6
DTR	Data Terminal Ready (O)	20	4	2
DSR	Data Set Ready (I)	6	6	8
DCD	Data Carrier Detect (I)	8	1	7
RTS	Request To Send (O)	4	7	1
CTS	Clear To Send (I)	5	8	5

Straight-Through vs. Crossover Cables

The RS-232 interface was originally intended to connect a DTE (computer, printer and other serial devices) to a DCE (modem) using a straight-through cable (all signals on one side connecting to the corresponding signals on the other side one-to-one). We can use RS-232 to connect two DTEs as is the case in most modern applications.

A crossover (also known as a null-modem) cable is used to connect two DTEs directly, without modems or communication lines in between. They data signals between the two sides are transmitted and received and there are many variations on how the other control signals are wired. A “complete” crossover cable would connect TxD with RxD, DTR with DCD/DSR, and RTS with CTS on both sides. A “simplified” crossover cable would cross TxD and RxD and locally short-circuit DTR with DCD/DSR and RTS with CTS.

Choose Correct Cable

First, look up the proper cable for your application in the table below. Next, purchase standard off-the-shelf cables from a computer store or cable vendor. For custom cables, refer to the cable diagrams to build your own cables or order them from Digi or a cable vendor.

To Connect To	Use Cable	Part Number
DCE DB-25 Female (standard) • Analog Modems • ISDN Terminal Adapters	Cable 1 – RJ-45 to DB-25 M straight-through (Custom). This custom cable can be ordered from Digi or other cable vendors. A sample is included with the product (“straight-through”).	76000639
DTE DB-25 Male or Female (standard) • Serial Terminals • Old PC COM ports • Most serial printers • Some Console Ports • Most automation devices	Cable 2 – RJ-45 to DB-25 F crossover (custom). This custom cable can be ordered from Digi or other cable vendors. A sample is included with the products (“Console”).	76000638 (female) 76000658 (male)
DTE DB-9 Male (standard) • Newer PC COM ports • Most Mice and pointing Devices • Some automation devices	Cable 3 – RJ-45 to DB-9 F crossover (custom). This custom cable can be ordered from Digi or other cable vendors. A sample is included with the products (console).	76000637
DTE RJ-45 Netra (custom) • Sun Netra Console Ports • Cisco Console Ports	Cable 4- RJ-45 to RJ-45 crossover (custom) This custom cable can be ordered from Digi or cable vendors using the provided wiring diagram.	76000636

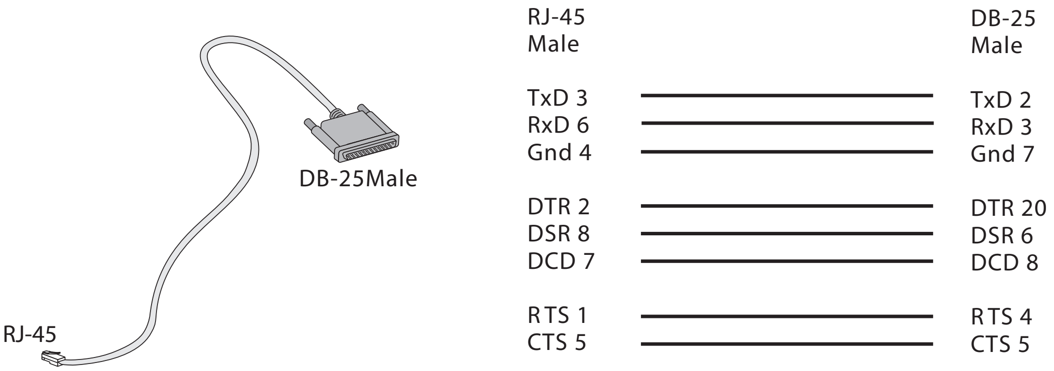
Cable Diagrams

Before using the following cable diagrams refer to the tables above to select the correct cable for your application. Sometimes, crossover cables are wired slightly differently depending on the application. A “complete” crossover cable would connect the TxD with RxD, DTR with DCD/DSR, and RTS with CTS across both sides. A “simplified” crossover cable would cross TxD and RxD and locally short-circuit DTR with DCD/DSR and RTS with CTS.

Most of the diagrams in this document show the “complete” version of the crossover cables, with support for modem control signals and hardware flow control. Applications that do not require such features have just to configure NO hardware flow control and NO DCD detection on their side. Both ends should have the same configuration for better use of the complete version of the cables.

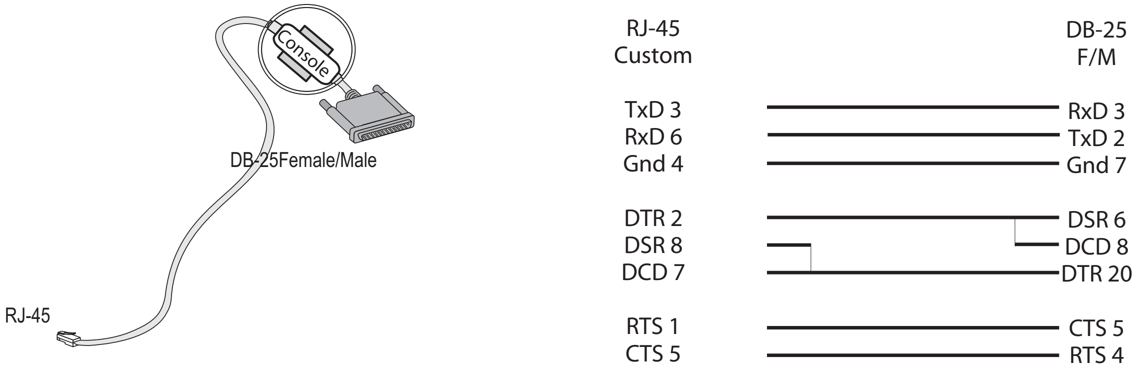
Digi CM RJ-45 to DB-25 Male, Straight Through

Application: It connects Digi CM products (serial ports) to modems and other DCE RS-232 devices.
.



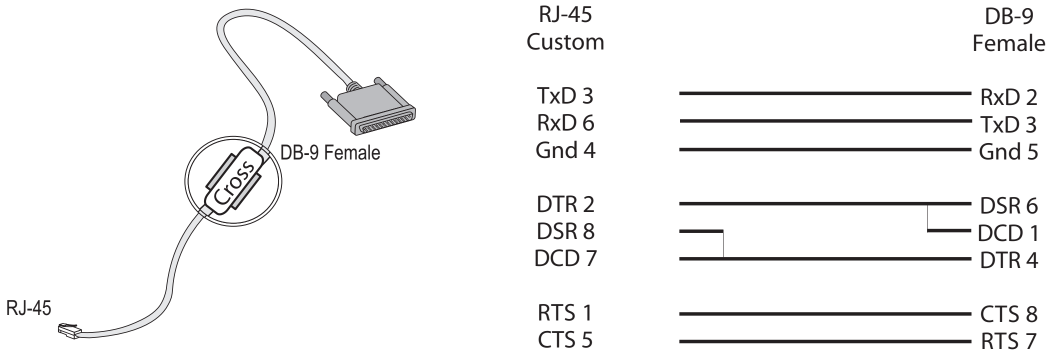
Digi CM RJ-45 to DB-25 Female, Crossover (P/N 76000638 and P/N 76000658)

Application: It connects the PortServer CM (serial ports) to console ports, terminals, printers, and other DTE RS-232 devices.



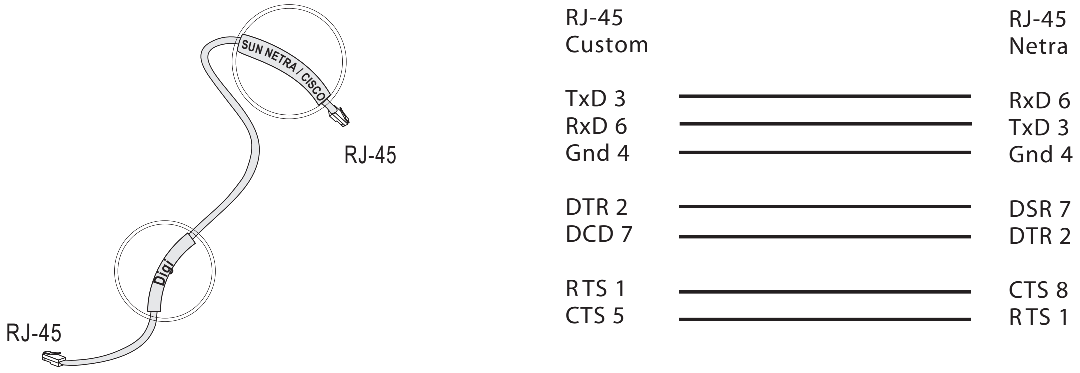
Digi CM RJ-45 to DB-9 Female, Crossover (P/N 76000637)

Application: It connects Digi CM products (serial ports) to console ports, terminals, printers, and other DTE RS-232 devices.



Digi CM RJ-45 to Netra RJ-45, Crossover (P/N 76000636)

Usually used in console management applications to connect Digi CM products to a Sun Netra server or to a Cisco product.



LED Information

The Digi PortServer CM has a frontal array of multiple LEDs. Below is a brief explanation of what each LED represents.

Note: All 32 serial port Ready LEDs will flash when the Discover utility Locate box is selected.

LED Title	Definition
Collision	Indicates a collision on the Ethernet bus. Infrequent flashing is normal, frequent flashing indicates a saturated Ethernet bus.
Link	This LED should be on continually indicating the unit is properly terminated on the network.
CPU	This LED blinks at a rate of one second on/one second off.
100BT	This light is on if the Ethernet link is connected to other 100Base-T equipment and is working at 100 Mbps. If not, the LED will be off.
RX	Indicates the unit is receiving data. This light should be blinking continually.
TX	Indicates the unit is transmitting data.
Serial Port LEDs	
Ready	Indicates a connection to the port has been made.
RX	Indicates the unit is receiving data.
TX	Indicates the unit is transmitting data.

Working Inside the PortServer CM

NOTICE: Do not attempt to service the PortServer CM yourself, except following the instructions from Digi Technical Support personnel. In such a case, first perform the following actions:

- Turn off the PortServer CM.
- Ground yourself by touching an unpainted metal surface at the back of the equipment before touching anything inside your equipment.

Replacing the Battery

A coin-cell battery maintains date and time information. If you have to repeatedly reset time and date information after turning on your PortServer CM, replace the battery.

CAUTION: A new battery can explode if it is incorrectly installed. Replace the 3 Volt CR2032 battery only with the same or equivalent type recommended by the battery manufacturer. Discard used batteries according to the battery manufacturer’s instructions.

Safety Instructions

CAUTION: Do not operate your PortServer CM with the cover removed.

- In order to avoid shorting out your PortServer CM when disconnecting the network cable, first unplug the cable from the equipment and then from the network jack. When reconnecting a network cable to the equipment, first plug the cable into the network jack, and then into the equipment.
- To help prevent electric shock, plug the PortServer CM into properly grounded power source. The cable is equipped with 3-prong plug to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from the cable. If you have to use an extension cable, use a 3-wire cable with properly grounded plugs.
- To help protect the PortServer CM from transients in electrical power, use a surge suppressor, line conditioner, or uninterruptible power supply.
- Be sure that nothing rests on the PortServer CMs cables and that the cables are not located where they can be stepped on or tripped over.
- Do not spill food or liquids on your PortServer CM. If it gets wet, contact Digi Technical Support.
- Do not push any objects into the openings of your PortServer CM. Doing so can cause fire or electric shock by shorting out interior components.

Keep your PortServer CM away from heat sources. Also, do not block cooling vents.

Chapter 8 Upgrading and Troubleshooting

Upgrading the Linux Kernel

The files added by Digi to the standard Linux files are in the /proc/flash directory. They are:

- boot_ori - original boot code
- boot_alt - alternate boot code
- syslog - event logs (not used by Linux)
- config - configuration parameters, only the boot parameters are used by the boot code
- zImage - Linux kernel image
- script - file where all PortServer CM configuration information is stored

To upgrade the Linux kernel provided in the PortServer CM, ftp the new zImage file on top of the zImage file in the /proc/flash directory.

```
[root@portserver_cm /root]# cd /proc/flash
[root@portserver_cm flash]# ftp [ftp server name]
[root@portserver_cm flash]# cd [directory containing zImage file]
[root@portserver_cm flash]# bin (change to binary mode)
[root@portserver_cm flash]# get zImage
```

Reboot to activate the new Linux kernel. This can be confirmed by entering the following command at the command prompt:

```
cat /proc/version
```

the Linux kernel version is displayed.

Troubleshooting the PortServer CM

If the PortServer CM booted properly, the interfaces can be verified using ifconfig and ping. If ping does not work, check the routing table using the command route. Of course, all this should be tried after checking that the cables are connected correctly.

As mentioned earlier, the file /etc/config_files contains a list of files acted upon by saveconf and restoreconf. If a file is missing, it will not be loaded onto the ramdisk on boot. The following table lists files that should be included in the /etc/config_files file and which programs use each.

File	Program
/etc/securetty	telnet, login, su
/etc/issue	getty
/etc/getty_ttyS0	login (via console)
/etc/hostname	tcp
/etc/hosts	tcp
/etc/host.conf	tcp
/etc/nsswitch.conf	dns
/etc/resolv.conf	dns
/etc/config_files	saveconf
/etc/passwd	login, passwd, adduser...
/etc/group	login, passwd, adduser...
/etc/ssh/ssh_host_key.pub	sshd
/etc/ssh/sshd_config	sshd
/etc/ssh/ssh_config	ssh client
/etc/ssh/ssh_host_key	sshd (ssh1)
/etc/ssh/ssh_host_key.pub	sshd (ssh1)
/etc/ssh/ssh_host_dsa_key	sshd (ssh2)
/etc/ssh/ssh_host_dsa_key.pub	sshd (ssh2)
/etc/snmp/snmpd.conf	snmpd
/etc/portslave/pslave.conf	digi_ras, portslave, CM configuration information
/etc/network/ifcfg_eth0	ifconfig eth0, digi_ras, rc.sysconf
/etc/network/ifcfg*	ifconfig, digi_ras, rc.sysinit
/etc/network/ifcfg_lo	ifconfig lo, digi_ras, rc.sysinit
/var/run/radsession.id	radinit, radius authentication process
/home	adduser, passwd
/etc/network/st_routes	ifconfig, digi_ras, rc.sysconf

If any of the files listed in /etc/config_files is modified, the PortServer CM administrator must execute the command saveconf before rebooting the PortServer CM or the changes will be lost. If a file is created (or a file name altered), its name must be added to this file before executing saveconf and reboot.

Single User Mode

The PortServer CM has a single user mode when:

- After the name or password of the user with root privileges is lost or forgotten
- After an upgrade or downgrade leaves the PortServer CM unstable
- After a configuration change leaves the PortServer CM inoperative or unstable

Type the word `single` (with a blank space before the word) during boot using a console connection. This cannot be done using a telnet or other remote connection. The initial output of the boot process is shown below.

```
Entry Point = 0x00002120

loaded at: 00002120 0000D370

relocated to: 00300020 0030B270

board data at: 003052C8 0030537C

relocated to: 002FF120 002FF1D4

zImage at: 00008100 0006827E

relocated to: 00DB7000 00E1717E

initrd at: 0006827E 0024F814

relocated to: 00E18000 00FFF596

avail ram: 0030B270 00E18000

Linux/PPC load: root=/dev/ram
```

After displaying “Linux/PPC load: root=/dev/ram”, the PortServer CM waits approximately 10 seconds for user input. This is where the user should type “single”. When the boot process is complete, the Linux prompt will appear on the console:

```
[root@(none) /]#
```

If the password or username was forgotten, execute the following commands:

```
passwd

saveconf

reboot
```

For configuration problems, the user has two options:

Edit the file(s) causing the problem with vi, then execute the commands:

```
saveconf
reboot
```

Reset the configuration by executing the commands:

```
echo 0 > /proc/flash/script
reboot
```

If the problem is due to an upgrade or downgrade, a second downgrade or upgrade will be necessary to reverse the process. First, the network must be initialized in order to reach a ftp server. Execute the following script, replacing the parameters with values appropriate for your system. If your ftp server is on the same network as the CM, the gw and mask parameters are optional.

```
config_eth0 ip 200.200.200.1 mask 255.255.255.0 gw 200.200.200.5
```

At this point, the DNS configuration (in the file /etc/resolv.conf) should be checked. Then, download the kernel image using the ftp command.

Hardware Test

A hardware test called *digitest* is included with the PortServer CM firmware. It is a menu-driven program, run by entering `digitest` at the command prompt. The various options are described below.

Note: The PortServer CM should not be tested while in use as the test will deactivate all ports. You must also turn off port buffering before running digitest and restart port buffering after completing the test.

Port Test

Either a cross cable or a loop-back connector is necessary for this test. The pinout diagrams are supplied in the chapter on hardware. Connect the loop-back connector to the modem cable and then connect the modem cable to the port to be tested (or connect a cross cable between two ports to be tested). When *digitest* senses the presence of the cable or connector, the test will be automatically run and the result shown on the screen.

Each line of data correponds to a port in test. The last 4 columns (DATA, CTS, DCD, and DSR) indicate errors. The values in these columns should be zero. The figure below is an example of the output screen.

Packets				**Errors**				
From	To	Sent	Received	Passes	Data	CTS	DCD	DSR
2	2	35	35	35	0	0	0	0
4	5	35	35	35	0	0	0	0
5	4	35	35	35	0	0	0	0

When this test is run with a cable or connector without the DSR signal (see the pinout diagram in Appendix B for the cable or connector being used), errors will appear in the DSR column. This does not indicate a problem with the port. In the example above, **digitest** perceived that a loop-back connector was attached to port 2 and that a cross cable was used to connect ports 4 and 5.

Port Conversation

This test sends and receives data on the selected port. One way to run this test is to place a loop-back connector on the port to be tested and begin. Enter the number of the port and a baud rate (9600 is a typical value). Type some letters, and if the letters appear on the screen, the port is working. If the letters do not appear on the screen, the port is not functioning correctly.

A second method that can be used to test the port is to connect it to a modem with a straight cable. Begin the test and type “at”. The modem should respond with “OK”, which will appear on the screen. Other commands can be sent to the modem or to any other serial device.

Test Signals Manually

This test confirms that signals are being sent and received on the selected port. Neither the loop-back connector nor the cross cable are necessary. Enter the number of the port to be tested and begin the test.

State	**DTR**	**DCD**	**DSR**	**RTS**	**CTS**
On	X			X	
Off	↓	X	X	↓	X

First, press Ctrl-D to see the X in the DTR column move position, then press Ctrl-R to see the X in the RTS column change position. If each of the Xs moves in response to its command, the signals are being sent.

Another method to test the signals is to use a loop-back connector. Enter the number of the port with the loopback connector and start the test. In this case, when Ctrl-D is typed, the Xs in the first three columns will move as shown in the followng table.

State	Dtr	DCD	DSR	RTS	CTS
On	X	X	X	X	
Off	↓	↓	↓		X

This is because the test is receiving the DTR signal sent through the DCD and DSR channels. When Ctrl-R is typed, the Xs in the RTS and CTS columns should move together. If the Xs change position as described, the signals are being sent and received correctly.