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RealPort for DG/UX

This section contains instructions for installing, configuring, and uninstalling the DG/UX RealPort driver.

An Introduction to RealPort®

RealPort® software can be installed on one or more host servers to provide local serial port functionality. RealPort can be used to provide standard system TTY interfaces to control baud rate, parity, stop bits, and flow control of local serial ports. Any system utility or user application that works with a locally attached serial port should work with a Digi PortServer port.

Digi's RealPort software works with both the PortServer and PortServer II products. In RealPort documentation, the term PortServer refers to either the PortServer or PortServer II.

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Before Installing RealPort

Read this section before beginning the RealPort driver installation.

- It is important to read any release notes that may be included with the installation media.

- The Digi DG/UX RealPort driver is compatible with DG/UX System Release R4.20 for Intel.

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RealPort Installation Overview

These are the steps necessary for the installation and configuration of RealPort.

1. Read any release notes that may be included with the installation media.

2. Gather information necessary for installation. See Information to Gather.

3. Configure the PortServer for RealPort. See Configuring a PortServer for RealPort.

4. Install the RealPort driver. See the topics under Before Installing and Installation.

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Installing RealPort

Introduction

Use this procedure to Install and configure the DG/UX RealPort device driver from the Digi Realport CD. For instructions on how to install RealPort from a file or diskette, see the release notes or **http://support.digi.com/techsupport/unix/dgux/dguxrp.html**.

Procedure

1. Place the CD in the system CD drive.

2. If it does not already exist, create a **/usr/digi** directory using this command at a root prompt:

   mkdir /usr/digi

   The directory **/usr/digi** MUST be used.

3. Mount the CD drive using the command

   mount -t cdrom [devicename] **/usr/digi**

   where devicename is the name of the CD on your system. A common CD device name is **/dev/pdsk/2**.

4. Change to the **/usr/digi** directory: **cd /usr/digi**

5. If you want to use the X Window System version of the Menu Program, ensure that the X Windows System is running.

6. Enter one of the following at the command prompt:

   unix_xwin (X Windows System version)

   unix_char (Curses version)

   The Access Resource Menu appears.

7. Select the appropriate operating system and **Install Drivers** from the Access Resource menu.

   The installation script runs and installs the RealPort files.

8. Unmount the CD by entering this command at a root prompt:

   umount [devicename]

   Be sure that the CD is not being accessed when this command is entered. This is the case if a prompt has a **pwd** (working directory name) location of **/usr/digi**, or if a window has a working directory of **/usr/digi**.

9. Remove the CD from the CD drive.

10. Configure the RealPorts by editing the file **/etc/realport.conf**.

    If you want to use server-port style short names for RealPort devices (this is suggested, see <u>RealPort Devices</u>), first add the line

    server-port-names on

    Then for each PortServer add a line of the form

    server [server_number] [server_address] [port_count]

    The server_number is an id number specifying the server; normally these begin at 0 and count up for each PortServer. The server_address is the IP address or hostname for the PortServer. Host names for a PortServer can be configured in **sysadm** by choosing **Networking**, **TCP/IP**, **Databases**, **Hosts**, and then **Add**. The port_count is the number of ports on the PortServer, including all ports on extension modules connected to the PortServer.

    Other options to the **server** command and other commands that can be used in the **realport.conf** file are described in the comments at the top of **/etc/realport.conf.proto** and in the release notes.

11. Add an entry in the **/etc/hosts** file for each PortServer. It is important that each PortServer have an entry in the **/etc/hosts** file with an IP address **and** a name.

12. Install the RealPort driver in the kernel by running **/usr/sbin/realport_install**.

    realport_install [system_name]

    The system_name is the name of the kernel where the RealPort driver will be installed; normally this will be **aviion**. The release notes describe other arguments to **realport_install** and other methods of installing the RealPort driver in the kernel.

13. Reboot to start the RealPort driver.

    To reboot use **sysadm** and choose **System**, **Kernel**, and **Reboot**.

14. To add or remove PortServers or to change the RealPort configuration repeat the last three steps above: edit **/etc/realport.conf**, run **realport_install**, and reboot.

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Uninstalling RealPort

Introduction

The Digi device driver software can be removed from the kernel by using the program **/usr/sbin/realport_uninstall**.

Uninstall Procedure

1. Log onto the console as super-user (root), and enter this command:

   realport_uninstall [system_name]

   The system_name is the name of the kernel where the RealPort driver is installed; normally this will be **aviion**. The release notes describe other arguments to **realport_uninstall** and explain in more detail what files are removed or changed.

2. Reboot to start the new kernel without the RealPort driver.

   To reboot use **sysadm** and choose **System**, **Kernel**, and **Reboot**.

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RealPort Devices

The RealPort installation creates two different Unix devices in **/dev** for each port: a standard device and a transparent print device. DG/UX uses long names and short names for each device. The short names for RealPort devices have a DG/UX standard form and an optional alternate form.

Device Name Format

DG/UX standard serial port devices have short names in the form

ttyNN

where NN is a number. The built in serial ports are normally **tty00** and **tty01**; then the RealPort serial ports begin with **tty02** and continue counting up. However, the exact numbering depends on what other standard serial ports devices are configured in the kernel. Transparent print devices do not have short names in this form. DG/UX system administration utilities, like **sysadm**, require names in this form.

In addition, if you specified **server_port_names on** in the **/etc/realport.conf** file, RealPort standard serial ports have short names in the form

tty-SERVER-PORT

and transparent print devices have short names in the form

tty-SERVER-PORT**p**

where SERVER is the number identifying the server (from the **/etc/realport.conf** file) and PORT is the port number on the PortServer, counting from 0. These names will not work with **sysadm**, but they can be used in other contexts where a Unix character device name is expected.

For example, assuming your DG/UX system has only the two standard built in serial ports in addition to RealPorts, the first port on the first PortServer would be named **/dev/tty02** or **/dev/tty-0-0**, and the corresponding transparent print device would be **/dev/tty-0-0p**. If you had two PortServers, the first with one expansion module for a total of 32 ports, the first port on the second PortServer would be named **/dev/tty34** or **/dev/tty-1-0**.

Each device also has a long name, which is rarely used directly. See the release notes for a description of these names.

Standard Device

Examples: **/dev/tty02** or **/dev/tty-0-0**

The default handshake method is XON/XOFF. Data Carrier Detect must be present to open the device. To allow the device to be used without the Data Carrier Detect signal, use

stty-ncxa **forcedcd /dev/tty**NN

To configure a RealPort to be used as a login port, use **sysadm** and choose **Device**, **Port**, **Terminal**, and then **Add**. To ensure that a login session will be terminated when carrier is dropped, select a modem TTY definition label for the newly added login port, like **M9600**; if a direct connection TTY definition label like **9600** is used, the login session will not be terminated when carrier drops. Complete details on setting up login ports can be found in **Setting Up and Managing Terminals on the DG/UX System** on the DG/UX user documentation CD that came with your system. See also [Configuring a Device for a Terminal](#).

When used with a terminal or other device, it is usually wise to use a modem TTY definition label and to wire the Digi DCD signal to the terminal's DTR (Data Terminal Ready) line. When the terminal is turned off, any associated jobs are killed, and the user is logged out.

Transparent Print Devices

Example: **/dev/tty-0-0p**

The "Transparent Print Devices" (DigiPRINT) can be used with auxiliary printer ports on terminals. Output directed to a transparent print device goes out the auxiliary port of a terminal while the user continues to use the terminal normally.

Setting Device Options with stty-ncxa

With the **stty-ncxa** command, options such as flow control settings, speed, and transparent print settings can be configured for your RealPort tty devices. For detailed information on the **stty-ncxa** command, refer to the DG/UX man pages (**stty-ncxa** is inserted into the man pages when the driver is installed.).

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Configuring a Device for a Terminal

The following procedure will configure a RealPort device for a terminal. For more information on configuring a serial device for a terminal see **Setting Up and Managing Terminals on the DG/UX System** on the user documentation CD that came with your system.

The PortServer and RealPort should be properly installed, configured and functioning before connecting a terminal.

Procedure

1. Connect a proper cable between the port and terminal. Refer to the standard terminal cable shown in [Cabling for Serial Devices](#).

2. Set the port to **dev=prn** on the PortServer by entering this command at a PortServer root prompt:

   set dev port=prn ra=12

   This example sets **dev=prn** for port 12 of a PortServer.

3. If you are using 8-pin RJ-45 cabling from the PortServer to the terminal, set the port to **altpin=on** by entering this command at a PortServer root prompt:

   set port altpin=on ra=12

   This example sets **altpin=on** for port 12 of a PortServer.

4. If you want a loss of carrier to terminate the login session, you should use a modem TTY definition entry in the **/etc/ttydefs** file. These entries begin with the letter "M" followed by the baud rate. For best results with RealPorts this file should be modified from the standard DG/UX distribution.

   As root edit **/etc/ttydefs** and change lines that begin with an "M" by adding **clocal** just before the second ":" in the line and adding **-clocal** just before the third ":". These should be separated by spaces like the other options. For example, here is the "M9600" line after editing.

   M9600: 9600 echo echoe echok kill erase intr hupcl cs8 opost onlcr icrnl cread clocal : 9600 echo echoe echok iexten kill erase intr hupcl icanon cs8 opost icrnl onlcr cread ixon ixoff isig tab3 -clocal ::M9600

5. To enable the terminal port in DG/UX, as root run **sysadm** and select **Device**, **Port**, **Terminal**, and then **Add**. Enter the requested information. Select a modem TTY definition label such as **M9600** if you want a loss of carrier to terminate the login session.

   You should now be able to login over the terminal.

Configuring a Device for a Printer

The following procedure will configure a RealPort device for a printer. For more information on configuring a serial device for a printer see **Installing and Managing Printers on the DG/UX System** on the user documentation CD that came with your system.

The PortServer and RealPort should be properly installed, configured and functioning before proceeding.

Procedure

1. Connect a proper cable between the port and printer. For information on printer cabling, refer to the standard printer cable shown in [Cabling for Serial Devices](#).

2. Set the port to **dev=prn** on the PortServer by entering this command at a PortServer root prompt:

   set dev port=prn ra=12

   This example sets **dev=prn** for port 12 of a PortServer.

3. If you are using 8-pin RJ-45 cabling from the PortServer to the printer, set the port to **altpin=on** by entering this command at a PortServer root prompt:

   set port altpin=on ra=12

   This example sets **altpin=on** for port 12 of a PortServer.

4. From a root prompt run **sysadm** and choose **Device**, **Printer**, **Devices**, and then **Add**. Enter the requested information when prompted. For connection type choose **Local /dev/tty, /dev/lp, or /dev/parallel**. Normally you can answer **yes** to "Quick Add using default values?"; if the default values are not appropriate you can later choose **Modify** to change the defaults, including stty settings. For device, enter **/dev/tty**NN for for a printer directly connected to a PortServer serial port, or enter **/dev/tty**-N-Mp for a printer connected to a terminal on port **tty**-N-M. (Replace NN, N and M with the appropriate numbers.)

5. When you have completed the **Add** process, the printer should be ready for use. To print a file, use the command

   lp -d [printer_name] [file_to_print]

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Configuring a Device for a Modem

This procedure will configure a RealPort device for a Dial-in/Dial-out modem connection. Configuring a device for a modem requires familiarity with both the operating system and the modem being used. While the following procedure is sufficient for most cases, it may be necessary to take additional steps to properly configure your modem or to set up the operating system for a specific application. For more information on configuring a serial device for a modem see **Managing Modems and UUCP on the DG/UX System** and **Setting Up and Managing Terminals on the DG/UX System** on the user documentation CD that came with your system.

The PortServer and RealPort should be properly installed, configured and functioning before proceeding.

The instructions here assume, as an example, that you are configuring a dial-in and dial-out modem on port 16 of the first PortServer, which corresponds to device **/dev/tty17**.

Procedure

1. Connect a proper cable between the port and modem. For information on modem cabling, refer to the standard modem cable shown in [Cabling for Serial Devices](#)**.**

2. Power the modem on.

3. Set the port to **dev=prn** on the PortServer by entering this command at a PortServer root prompt:

   set dev port=prn ra=16

   This example sets **dev=prn** for port 16 of a PortServer.

4. If you are using 8-pin RJ-45 cabling from the PortServer to the terminal, set the port to **altpin=on** by entering this command at a PortServer root prompt:

   set port altpin=on ra=16

   This example sets **altpin=on** for port 16 of a PortServer.

5. You must be logged in as root to perform the following steps.

6. Run **sysadm** and choose **Networking**, **UUCP**, **Devices**, and then **Add**. When prompted enter the TTY number; for **/dev/tty17** this would be **17**. When prompted for the "Local modem type?" enter **direct**. When prompted enter a modem speed, for example **9600**.

7. Edit the file **/etc/uucp/Devices**. At the end of the file you should find the Direct line for the device you just added. Modify this line by adding a "**,M**" at the end of the second field, which will be the device name. In our example the line will look like this after editing:

   Direct tty17,M - 9600 direct

8. Change the ownership of the device to **uucp** with the **chown** command:

   chown uucp /dev/tty17

9. You should now be able to connect to the modem and enter modem commands. The following is an example. Commands to be entered are in bold text. Modem responses are in regulat text:

   1. Enable forcedcd on the device.

      # **stty-ncxa forcedcd /dev/tty17**

   2. Connect to the modem with the **cu** command.

      # **cu -l tty17**
      Connected

      If you do not get the "Connected" message, check the UUCP device configuration above.

   3. Test the connectivity with the **at** command.

      at
      OK

      If you do not see **at** or "OK", check the modem: power it down and back up, try modem commands **ate1**, **atq0**, and **atq2**, or see your modem manual for other suggestions.

   4. Set the modem to answer after the first ring with this command:

      ats0=1

   5. Train the modem to the port speed with this command:

      at&w

   6. Enter any other desired **at** commands.

   7. Disconnect from the modem by entering a tilde-period:

      ~.

      Disconnected
      #

10. **IMPORTANT:** Restore the **-forcedcd** setting with the **stty-ncxa** command:

    # **stty-ncxa -forcedcd /dev/tty17**

11. Edit the file **/etc/ttydefs**. On each line that begins with an "M" add **clocal** just before the second ":" in the line and add **-clocal** just before the third ":". These should be separated

by spaces like the other options. For example, here is the "M9600" line after editing.

M9600: 9600 echo echoe echok kill ^u erase ^? intr ^c hupcl cs8 opost onlcr icrnl cread clocal : 9600 echo echoe echok iexten kill ^u erase ^? intr ^c hupcl icanon cs8 opost icrnl onlcr cread ixon ixoff isig tab3 -clocal ::M9600

12. To configure dial-in logins on the modem port, you must have a port monitor running. You can use an existing port monitor or add a new one. This example assumes that you will add a new one.

    Run **sysadm** and choose **Device**, **Port**, **Port Monitor**, and then **Add**. Use the defaults (just press enter) for all the prompts except "Port monitor tag" where you will enter a name for the port monitor. In our example we will use **modem** for the name.

    When this is completed the port monitor should be added to the system.

13. Now we must add the port service for this port. In **sysadm** go to **Device**, **Port**, **Port Service**, and then choose **Add**. You will be prompted for several responses; in most cases you can accept the default by pressing enter, except for the following.

    For "Controlling port monitor", enter the name of the port monitor, **modem**.

    For "Port service tag", enter the device name, **tty17**.

    For "Path name of terminal device", enter the full path of the device, **/dev/tty17**.

    For "TTY Definition Label", enter a modem definition label such as **M9600**.

    For the "Bidirectional?" enter **yes** if you want to use the modem for dial-out or to connect to the modem with **cu** to send modem commands.

    When this is completed the port service for this port should be added to the system.

    You can change any port service settings later with **sysadm** by choosing **Modify** in the Port Service menu.

14. If you want hardware flow control on the port, this can be configured in the **/etc/ttydefs** file for dial-in, or with **stty-ncxa** for dial-in or dial-out. For example,

    stty-ncxa rtspace ctspace /dev/tty17

15. The port is now configured for dial-in and, if you answered **yes** to "Bidirectional?" in the port service configuration, for dial-out use.

    To dial-out you will need to first run **stty-ncxa** to set **forcedcd** to connect to the modem:

    stty-ncxa forcedcd /dev/tty17

    When you are done with dial-out, you must reset **-forcedcd**:

    stty-ncxa -forcedcd /dev/tty17

    If you forget to reset **-forcedcd**, logins will not be terminated when the modem drops carrier.

About Transparent Printing

Most terminals have an auxiliary port that can be connected to a serial printer. When this port is configured as a **transparent printer** port, print jobs may be run simultaneously with normal terminal operation.

Data bound for the printer is preceded by a terminal escape sequence which turns on transparent printing, and followed by a sequence which turns transparent printing off.

Transparent printer devices are created in **/dev** and, after configuration, are accessed in the same manner as a printer on a regular serial port. Data sent to a transparent printer device is automatically "wrapped" in the transparent print on/off command strings for the specified printer.

Transparent Printer Configuration

The Digi device driver uses six parameters to configure transparent printing. These options are set by the **stty-ncxa** command, and are described below.

maxcps n Limits the maximum printer port character-per-second data rate. **n** should be set to the minimum character rate the printer can sustain in typical use.

maxchar n Limits the number of characters queued to the printer ahead of terminal output. Lower numbers increase system overhead, higher numbers result in keystroke echo delays. A value of 50 is generally a good compromise at 9600 baud.

bufsize n This parameter should be set to a value just below the printer's buffer size. After a period of inactivity, the driver will burst up to this many characters to the printer to fill the print buffer before slowing to the **maxcps** rate.

onstr "s" Defines the terminal escape sequence to direct subsequent data to the transparent printer.

s is a string of ascii characters, enclosed in quotes, that command the terminal to enter transparent printing mode. An arbitrary octal character **xxx** may be given as **\xxx**.

For example, the sequence "<Esc>[5i" would be entered as: **"\033[5i"**.

offstr "s" Defines the terminal escape sequence to stop directing data to the printer.

s is a string of ascii characters, enclosed in quotes, that command the terminal to enter transparent printing mode. An arbitrary octal character **xxx** may be given as **\xxx**.

For example, the sequence "<Esc>[4i" would be entered as: **"\033[4i"**.

term t Sets the transparent printer on/off strings to values found in the internal default table. Internal defaults are used for the following terminal types: **adm31**, **ansi**, **dg200**, **dg210**, **hz1500**, **mc5**, **vt100**, **vt220**, **vt320**, **vt420**, **wang2x36**, **wyse30**, **wyse50**, **wyse60** or **wyse75**. If the terminal type is not found in the internal default table, then **stty-ncxa** reads the **terminfo** entry for the terminal type and sets the transparent print on/off strings to the values given by the **mc5/mc4** attributes found there.

Setup Examples for Transparent Printing

Use the **stty-ncxa** program to set up your terminal for transparent printing.

The value for **term** sets the transparent printer on/off strings to values found in the internal default table. Internal defaults are used for the following terminal types: **adm31**, **ansi**, **dg200**, **dg210**, **hz1500**, **mc5**, **vt100**, **vt220**, **vt320**, **vt420**, **wang2x36**, **wyse30**, **wyse50**, **wyse60** or **wyse75**. If the terminal type is not found in the internal default table, then **stty-ncxa** reads the **terminfo** entry for the terminal type and sets the transparent print on/off strings to the values given by the **mc5/mc4** attributes found there.

Note: The **the term** option for the command **stty-ncxa** has no relation to the the value **TERM**.

Example 1:

The following command configures the transparent print options for a DEC VT100 terminal connected to **/dev/tty-0-0** (note that the printer will be called **/dev/tty-0-0p**). **maxcps**, **maxchar** and **bufsize** are left to defaults. Enter:

sttn-ncxa term vt100 /dev/tty-0-0

Example 2:

The following example uses **onstr** and **offstr** arguments (this sets the terminal to use ANSI Standard). Again **maxcps**, **maxchar**, and **bufsize** are defaults. Enter (on a single command line):

sttn-ncxa onstr "\033[5i" offstr "\033[4i" /dev/tty-0-0

Example 3:

This example command sets the transparent print option for a WYSE30 terminal, with maxcps of 75, a **maxchar** of 100, and a printer buffer size, **bufsize**, of 1000. Enter (on a single command line):

sttn-ncxa term wyse30 maxcps 75 maxchar 100 bufsize 1000 /dev/tty-0-0

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Cabling for Serial Devices

For specific cable information, select a topic below.

Requirements and General Information

- [General Cable Requirements](#)
- [Environmental Requirements](#)
- [Grounding Requirements](#)
- [Data Rate vs. Cable Length](#)
- [Transmission Errors](#)

Pin Assignments

- [Digi RJ-45 Connector Pin Assignments](#)
- [Digi DB-25 Connector Pin Assignments](#)
- [RJ Plug Pinout Relationships](#)
- [Digi RJ-45 to DB-25 Cable Adapters](#)

Terminal/Printer Cable Pinout Diagrams

- [RJ-45/RJ11 Software (XON/XOFF) Flow Control](#)
- [DB-25 Software (XON/XOFF) Flow Control](#)
- [DB-25 Hardware (DTR or Ready/Busy) Flow Control](#)
- [RJ-45 Hardware (DTR or Ready/Busy) Flow Control](#)

Modem Cable Pinout Diagrams

- [RJ-45 8-pin Altpin Cable](#)
- [RJ-45 10-pin Cable](#)
- [DB-25 Cable](#)

Troubleshooting RealPort

This section contains several troubleshooting procedures. Follow the procedure below that most closely addresses your problem.

- One or several RealPort ports do not function at all.

  Follow the procedure **Port Does not Function**.

- One or several RealPort ports do not function correctly.

  Follow the procedure **Port Does not Function Correctly**.

- All RealPort ports do not function. The PortServer boots to AC.

  Follow the procedure **Ports Do not Function - PortServer Boots to AC**.

- All RealPort ports do not function. The PortServer does not show AC on the front panel LED display or fails to show AC after a reboot.

  Follow the procedure **PortServer Fails to Boot to AC**.

Printable Documentation

[92000368.pdf](#) - Digi RealPort for DG/UX **Documentation**

The link above is to a printable PDF version of this documentation. To read and print this PDF file, you must have a recent version of the Adobe Reader on your system.

Adobe PDF Readers for many operating systems are available from ftp://ftp.digi.com:/pub/mirrors/ftp.adobe.com/acrobatreaders or [http://www.adobe.com.](http://www.adobe.com)

Information to Gather

Get this information before installing RealPort:

- Determine the name and/or IP address to assign each unconfigured PortServer

- Determine the IP address of each RealPort host

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Configuring a PortServer for RealPort

Follow this procedure to configure a PortServer to use RealPort.

1. Access a root prompt on the PortServer using one of the two following methods:

   Method 1 - Unconfigured PortServer:

   Use these steps to access a root prompt on an unconfigured PortServer.

   1. **Telnet** can be used to login as root on an unconfigured PortServer if **RARP** or **bootp** are correctly configured. For more information on **RARP** and **bootp**, refer to the PortServer II Configuration and Administration Guide or the PortServer User's Guide and Reference Manual.

   2. Attach a terminal to port 1 of the PortServer and configure the terminal for VT-100 emulation, 9600 baud, 8 data bits, 1 stop bit, and no parity.

   3. Turn on the PortServer and press **Return** or **Enter**.

   4. At the login prompt, enter: **root**

   5. At the **passwd** prompt, enter: **dbps** (this the default root password)

   Method 2 - Previously-configured PortServer:

   Use this method to access a root prompt on a previously-configured PortServer.

   Login to the PortServer as root directly from an attached terminal or by using **telnet**.

   Note: If a port is configured to bypass the PortServer login, you cannot directly log into the PortServer from that port. Use another port that does not bypass the PortServer login or use **telnet** to login to the PortServer.

2. Set the PortServer's IP address with this command:

   set config ip=[ipaddress]

   where **[ipaddress]** is the IP address the PortServer will use.

3. Set any other relevant PortServer **set config** parameters such as **nameserver**, **gateway**, etc. Refer to the PortServer II Configuration and Administration Guide or the PortServer User's Guide and Reference Manual for details on initial PortServer configuration.

4. Check the RealPort TCP port value with this command:

   set config

   The default value is 771. If it is some other number, change it to 771 with this command:

   set config realport=771

5. Configure the PortServer ports using RealPort to **prn** by using a **set ports** command. The following example configures ports 2-16 of a PortServer for RealPort:

    set ports range=2-16 dev=prn

6. If 8-pin RJ-45 cables are used on the PortServer, the **altpin** option should be enabled. The following example enables altpin on ports 2-16 of a PortServer:

    set flow range=2-16 altpin=on

7. Verify the PortServer configuration can be confirmed with these commands:

    set config
    set ports range=2-16
    set flow range=2-16

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Cable Requirements

EIA-232 serial interface cables should be shielded, low capacitance cables, ideally designed specifically for serial data transmission.

EIA-422 interface cables should be shielded twisted-pair cables. Each signal requires two leads (one twisted pair of wires) to complete a balanced voltage digital circuit. The shield should be connected to the Chassis Ground of the devices at both ends of the interface cable.

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Environmental Requirements

While good shielding provides reasonable protection against "noise" (Electro-Magnetic Interference, or EMI), cables should still be routed away from noise sources wherever possible. Avoid laying cables in close proximity to transformers, generators, motors, fluorescent lights, etc.

Grounding Requirements

EIA-232 interface cables should have the shield grounded at both ends of the cable. Chassis Ground--available on the shell of Digi's DB-25 connectors, and pin 4 of our 10-pin RJ-45 connector, is ideal for this purpose.

EIA-422 interface cables must provide a ground path between the devices to be connected. This insures the integrity of data transfers and control signals. This should be connected to the Chassis Ground of each device. Digi recommends using the cable shield for this purpose.

Data Rate Information

The maximum date rate which may be used for EIA-232 connections is primarily determined by the quality and length of the interconnecting cable. The quality of the cable (for transmission purposes) is generally determined by the capacitance per foot rating of the cable.

The Data Rate vs. Cable Length table gives the recommended maximum cable length for a given baud rate. Longer cables may be implemented at the user's discretion.

Data Rate vs. Cable Length

Baud Rate	Max Cable Length
57,600 or less	100 feet
115,200	80 feet
230,400	40 feet
460,800	20 feet
921,600	10 feet

The table assumes the following:

1. The maximum length is the amount of cable which may be connected to a Digi supplied interconnect device such as Quad or Octa cables and boxes.
2. Maximum length is based on a cable rated at:
   12.3 pF/foot, conductor to conductor
   22.4 pF/foot conductor to shield

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Transmission Errors

If transmission errors occur, attempt the following to determine the cause of the problem:

1. Reduce the baud rate.

2. Reduce the cable length.

3. Use a cable with a lower capacitance per foot rating.

In situations where low-capacitance cable 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 EIA-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.

Note: Use only externally-powered short-haul modems with Digi products.

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Digi RJ-45 Connector Pin Assignments

Signal	Description	DTE Use	Pin #
RI	Ring Indicator	Input	1
DSR (DCD*)	Data Set Ready (Data Carrier Detect*)	Input	2
RTS	Request to Send	Output	3
GND	Chassis Ground	N/A	4
TxD	Transmitted Data	Output	5
RxD	Received Data	Input	6
SG	Signal Ground	reference	7
CTS	Clear to Send	Input	8
DTR	Data Terminal Ready	Output	9
DCD (DSR*)	Data Carrier Detect (Data Set Ready*)	Input	10

*When ALTPIN is in effect.

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Digi DB-25 Connector Pin Assignments

Signal	Description	DTE Use	Pin #
GND	Chassis Ground	N/A	Shell
TxD	Transmitted Data	Output	2
RxD	Received Data	Input	3
RTS	Request to Send	Output	4
CTS	Clear to Send	Input	5
DSR	Data Set Ready	Input	6
SG	Signal Ground	reference	7
DCD	Data Carrier Detect	Input	8
DTR	Data Terminal Ready	Output	20
RI	Ring Indicator	Input	22

Relationship of Different RJ Plugs to Digi RJ-45 10-Pin Jack

RJ-11 4-Pin	RJ-11 6-Pin	RJ-45 8-Pin	RJ-45 10-Pin	Signal Name	Digi 10-Pin
			1	RI	1
		1	2	DSR (DCD*)	2
	1	2	3	RTS	3
1	2	3	4	GND	4
2	3	4	5	TxD	5
3	4	5	6	RxD	6
4	5	6	7	SG	7
	6	7	8	CTS	8
		8	9	DTR	9
			10	DCD (DSR*)	10

*When ALTPIN is in effect.

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Digi RJ-45 to DB-25 Cable Adapters

RJ-45 to DB-25 cable adapters can be purchased from Digi. These adapters consist of a full 10-pin RJ-45 plug connected via a two- or four-foot cable to a DTE-configured DB-25 plug.

The pin configuration of the DB-25 connector on the RJ-45 to DB-25 cable adapter is identical to that of the DB-25 connectors on the standard Digi fan-out cable, and provides full modem control.

Part numbers for RJ-45 to DB-25 Cable Adapters:

Cable RJ45 to DB25 Male 24"	76000129
Cable RJ45 to DB25 Male 48"	76000195

RJ-45 / RJ-11 Software Handshaking (XON/XOFF)

Simple Terminal/Printer Cable (RJ-11)

RJ-11 (Digi End)			DB-25 Male (Peripheral)	
Signal	Pin		Pin	Signal
TxD	2	connected to	3	RxD
RxD	3	connected to	2	TxD
SG	4	connected to	7	SG
GND	1	connected (via shield) to	1 (or shell)	GND

This cable is a three-wire null modem cable. Transmitted Data on one end of the cable is connected to Received Data at the other end, and vice versa.

The RJ-45 8-pin connector uses the same wiring with the center pins only--pins 3, 4, 5, and 6. See **Relationship of Different RJ Plugs to Digi RJ-45 10-Pin Jack** for a comparison of different RJ connector types.

The male DB-25 end can be plugged directly into most serial terminals and printers without any adapters. The RJ-11 plug fits into the center of the RJ-45 jack.

In most cases, serial terminals and printers need only a three-wire connection. All Digi device driver software supports XON/XOFF (software) handshaking, so the only signal lines necessary are Transmitted Data (TxD), Received Data (RxD) and Signal Ground (SG).

DB-25 Software Handshaking (XON/XOFF)

Simple Terminal/Printer Cable

DB-25 Female (Digi End)			DB-25 Male (Peripheral)	
Signal	Pin		Pin	Signal
TxD	2	connected to	3	RxD
RxD	3	connected to	2	TxD
SG	7	connected to	7	SG
GND	1 (or shell)	connected (via shield) to	1 (or shell)	GND

This cable is a three-wire null modem cable. Transmitted Data on one end of the cable is connected to Received Data at the other end, and vice versa.

The male DB-25 end can be plugged directly into most serial terminals and printers without any adapters. The female DB-25 end plugs directly into one of the DB-25 connectors on the fan out cable or connector box assembly.

In most cases, serial terminals and printers need only a three-wire connection. Digi device driver software supports XON/XOFF (software) handshaking, so the only signal lines necessary are Transmitted Data (TxD), Received Data (RxD), and Signal Ground (SG).

DB-25 Hardware Handshaking (Ready/Busy)

Terminal/Printer Cable with DTR Handshaking

DB-25 Female (Digi End)			DB-25 Male (Peripheral)	
Signal	Pin		Pin	Signal
TxD	2	connected to	3	RxD
RxD	3	connected to	2	TxD
CTS	5	connected to	20	DTR
SG	7	connected to	7	SG
GND	1 (or shell)	connected (via shield) to	1 (or shell)	GND
		jumpered	4 & 5	RTS & CTS

This cable is valid with any Digi DB-25 serial port including Concentrator ports, PORTS/Xem Modules, ClassicBoards, and Xe, Xr, PC/X adapters.

Most terminals and printers use Data Terminal Ready (DTR) for Ready/Busy hardware handshaking. The cable shown supports this method.

Some Okidata printers use a control signal on pin 11, called Supervisory Send Data (SSD) instead of DTR. In this case, simply connect CTS on the female DB-25 side to pin 11 of the male DB-25, instead of pin 20.

Other printer manufacturers may use different methods of flow control. Consult your printer's documentation for specific wiring requirements.

RJ-45 Hardware Handshaking (Ready/Busy)

Terminal/Printer Cable with DTR Handshaking

RJ-45 (Digi End)			DB-25 Male (Peripheral)	
Signal	Pin		Pin	Signal
TxD	4	connected to	3	RxD
RxD	5	connected to	2	TxD
CTS	7	connected to	20	DTR
SG	6	connected to	7	SG
GND	3	connected (via shield) to	1 (or shell)	GND
		jumpered	4 & 5	RTS & CTS

Most terminals and printers use Data Terminal Ready (DTR) for Ready/Busy hardware handshaking. This cable supports that method.

Some Okidata printers use a control signal on pin 11, called Supervisory Send Data (SSD) instead of DTR. In this case, simply connect CTS on the RJ-45 side to pin 11 of the DB-25, instead of pin 20.

Other printer manufacturers may use different methods of flow control. Consult your printer's documentation for specific wiring requirements.

RJ-45 8-Pin to Modem (ALTPIN option)

10-pin RJ-45 plugs may be difficult to obtain in the retail market; therefore, most Digi device driver software incorporates an optional feature called ALTPIN, which swaps the logical functions of DSR (Data Set Ready) with DCD (Data Carrier Detect).

When ALTPIN is enabled, DCD becomes available on pin 1 of an 8-pin RJ-45 connector (equivalent to pin 2 of a 10-pin connector).

8-Wire Modem Cable for use with ALTPIN Configuration

| RJ-45 (Digi End) | | | DB-25 Male (Modem End) | |
Signal	Pin		Pin	Signal
DCD	1	connected to	6	DCD
RTS	2	connected to	4	RTS
GND	3	connected (via shield) to	1 (or shell)	GND
TxD	4	connected to	3	RxD
RxD	5	connected to	2	TxD
SG	6	connected to	7	SG
CTS	7	connected to	5	CTS
DTR	8	connected to	20	DTR

If you wish to build an 8-wire modem cable for a Digi RJ-45 port, use an 8-pin RJ-45 plug wired as shown in the diagram.

ALTPIN is not supported under Windows NT when the ports are to be used with the Remote Access Service (RAS) or any application that requires RI, DCD, and DSR. Use the full 10 wire modem cable in these cases.

RJ-45 10-Pin to Modem

The simplest way to connect a modem to an adapter with RJ-45 connectors is to use **Digi RJ-45 to DB-25 Cable Adapters**. These adapters use 10-pin RJ-45 plugs, and therefore provide full modem support (Ring Indicator and Data Carrier Detect are only available on 10-pin RJ-45 connectors).

RJ-45 to DB-25 Modem Cable (10 Wire)

RJ-45 (Digi End)			DB-25 Male (Modem End)	
Signal	Pin		Pin	Signal
RI	1	connected to	22	RI
DSR	2	connected to	8	DSR
RTS	3	connected to	4	RTS
GND	4	connected (via shield) to	1 (or shell)	GND
TxD	5	connected to	3	RxD
RxD	6	connected to	2	TxD
SG	7	connected to	7	SG
CTS	8	connected to	5	CTS
DTR	9	connected to	20	DTR
DCD	10	connected to	6	DCD

Follow this chart when building your own modem cable.

DB-25 to Modem

To connect a DB-25 equipped asynchronous adapter to a modem, use a standard "straight-through" cable. A straight-through cable has a DB-25 female connector at the Digi end, and a DB-25 male connector at the modem end. All 25 pins are connected, 1 to 1, 2 to 2, 3 to 3, etc. Use shielded cable, and connect pin 1 of each connector to the cable shield.

Port Does not Function

This procedure is intended to be a general guideline for troubleshooting a RealPort port that is not functioning. Steps may be skipped, added, modified , or rearranged based on a particular problem. Exit this procedure if one of these steps solves the port problem.

If all RealPort ports are not functioning, use the procedure Ports Do not Function - PortServer Boots to AC or PortServer Fails to Boot to AC.

Procedure

1. Power-cycle the device attached to the port.

2. Reboot the PortServer if possible.

   All PortServer ports will be unavailable while the PortServer reboots and the daemon reestablishes a connection.

3. Use the PortServer front panel LED display to inspect the EIA-232 signals on the port with the problem. Make a note of the active signals. Refer to the PortServer II Hardware Installation Guide or the PortServer User's Guide and Reference Manual for detailed information on the LED display.

4. Check for flow control issues. See Flow Control.

5. Check for DCD issues. See DCD Checklist.

6. Make sure the correct cable is being used. See Cabling for Serial Devices.

7. Check the port configuration on the PortServer. See PortServer Port Configuration.

8. Run a loopback test with a loopback plug installed on the port. See Loopback Port Test.

9. If possible, configure the device on another port.

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Port Does not Function Correctly

This procedure is intended to be a general guideline for troubleshooting a port that is functioning but not correctly. Steps may be skipped, added, modified , or rearranged based on a particular problem. Exit the procedure if one of the steps corrects the port problem.

Procedure

1. Power-cycle the device attached to the port.

2. Reboot the PortServer if possible.

   PortServer RealPort users will lose their connections while the PortServer reboots and the daemon establishes a connection.

3. Check the port settings in the operating system's port configuration utility, the settings on the device attached to the port, and the settings in any software application being run on the port. Make sure the baud rate, data bits, stop bits and parity match. Make sure flow control settings match. Check other applicable settings.

4. Use the PortServer front panel LED display to inspect the EIA-232 signals on the port when the problem occurs. Make a note of the active signals. Determine which signals change from active to inactive or vice-versa when the problem occurs. Refer to the PortServer II Configuration and Administration Guide or the PortServer User's Guide and Reference Manual for details on the PortServer LED display.

5. Check for DCD issues if the problem is that the port occasionally stops functioning. See [Data Carrier Detect Issues](#).

6. Check for cable issues.   See [Cabling for Serial Devices](#).

7. Run a loopback test with a loopback plug installed on the port. See [Loopback Port Test](#).

8. If possible, configure the device on another port.

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Ports Do not Function - PortServer Boots to AC

This procedure is intended to be a general guideline to follow when all RealPort ports are not functioning. Steps may be skipped, added, modified , or rearranged based on a particular problem.

Procedure

1. Wait five minutes and then check the PortServer and the devices. The PortServer may have lost it's network connection. It is designed to automatically reconnect after losing the network connection.

2. Make sure the network and power cables attached to the PortServer are securely connected.

3. Log in to the PortServer as root from an attached terminal or by using telnet.

   If you cannot access the PortServer with a terminal or telnet, reboot the unit by turning the power switch off, waiting a few seconds, and then turning it back on.

4. Reboot the PortServer with this command:

   boot action=reset

   After rebooting, if the PortServer fails to show **AC** on the front panel LED display, follow the procedure [PortServer Fails to Boot to AC](#) until the PortServer displays **AC**. Refer to the PortServer II Configuration and Administration Guide or the PortServer User's Guide and Reference Manual for an explanation of PortServer LED error codes.

5. Check the status of the RealPort daemon. See [Checking the RealPort Daemon Status](#).

6. Verify the network connection. See [Checking the Network Connection](#).

7. Check the network configuration on the PortServer. See [PortServer Network Configuration](#).

8. If the operating system is AIX, verify the PortServer **sa**. See [Verifying the RealPort sa](#).

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PortServer Fails to Boot to AC

This procedure is intended to be a general guideline to follow when all RealPort ports are not functioning and the PortServer does not show **AC** on the front panel LED display. Steps may be skipped, added, modified , or rearranged based on a particular problem.

Procedure

1. Wait five minutes and then check the PortServer and the devices. The PortServer may have not been able to establish a network connection.

2. Log in to the PortServer as root from an attached terminal or by using **telnet**.

   If the PortServer cannot be accessed with a terminal or telnet, reboot the unit by turning the power switch off, waiting a few seconds, and then turning the power back on.

3. Reboot the PortServer with this command:

   boot action=reset

4. Check the status of the PortServer front panel LED display. The PortServer should display "**AC**" after rebooting. PortServers configured to boot from a boot file or image on a host may take several minutes to completely boot.

Result	Action
If the PortServer shows **AC**.	Proceed to Step 5.
If the PortServer does not show **AC** and is configured for **tftp** booting	Troubleshoot **tftp**. See Troubleshooting TFTP. Remote booting may be bypassed by pressing and releasing the two arrows on the front of the PortServer during a remote boot.
If the PortServer does not show **AC** and is **not** configured for **tftp** booting	Call Digi Technical Support for Assistance. Refer to the *PortServer II Configuration and Administration Guide* or the *PortServer User's Guide and Reference Manual* for additional LED information.

5. Continue to the procedure Ports Do not Function - PortServer Boots to AC.

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