User Guide


# Digi TS W Family

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9000329_B

# Contents

## Chapter 9 Configuring IP Routing



## Chapter 10 Configuring Security Features

## Setup Overview

This section provides an overview of the setup process.

#### Step A: Plan

Before beginning setup, consider the following:

- How to assign an IP address to the Digi device's Ethernet interface, which can be accomplished in a number of ways. See "Configuring the IP Address" on page 19.
- How to configure serial ports. A key consideration is whether to use RealPort. Other considerations include the type of peripheral that will connect to the port and the peripheral's cabling requirements. See "Setting Up RealPort" on page 23 and the online RealPort driver documentation and Cable Guide, both of which are on the Software and Documentation CD.
- The various ways that your Digi device can be configured. See "About Configuration Methods" on page 11 and "Configuration Prerequisites" on page 12 for more information.

#### Step B: Set Up the Hardware

1. If the Digi device supports multiple serial port interfaces (EIA-232, EIA-422/485), set the interface with the dip switches on the device.
2. Connect the device to power and to the network.
3. Connect peripherals to serial ports. See the Cable Guide on the Software and Documentation CD.

#### Step C: Install and Setup Digi Port Authority-Remote

Digi Port Authority-Remote is a utility that provides one of the ways to configure an IP address and also provides port monitoring. See the *Digi Port Authority-Remote Device Monitor Setup Guide*, which is on the Software and Documentation CD.

#### Step D: Configure an IP Address

There are a number of ways to configure an IP address. See "Configuring the IP Address" on page 19 for more information.

#### Step E: Configure Ports

See the following for more information:

- "Setting Up RealPort" on page 23
- "Configuring the Serial Port Settings with the Web Interface" on page 25
- "Configuring the Serial Port Settings from the Command Line" on page 26

#### Step F: Configure Other Features as Required

See the following for information on setting up other features:

- "Configuring PPP" on page 31
- "Configuring Autoconnection" on page 49
- "Configuring IP Routing" on page 53
- "Configuring Security Features" on page 57
- "Configuring DNS" on page 65

## About Entering Commands on the Command Line

If you use the command line, you will find the commands needed within each chapter. For detail such as syntax, parameters, range, variables, or applications see the Digi One/PortServer TS 2/4 Command Reference found on the Software and Documentation CD.

## Supported Devices

This manual provides information on the following Digi devices:

- Digi One RealPort Wireless
- Digi One TS Wireless
- PortServer TS 2 MEI Wireless
- PortServer TS 4 MEI Wireless

## About This Guide

#### Purpose

This guide provides the following:

- Configuration and administration procedures
- Configuration examples

#### Audience

This manual is intended for the person responsible for configuring and administering device server. It assumes that this person has experience configuring network devices and is familiar with networking concepts.

#### Scope

This manual provides step-by-step instructions for configuring and administering device server's main features. It does not address how to configure every option, provide complete information on commands, or discuss hardware installation. These topics are covered in other documents in the device server library.

## Other Documents in the Library

Here is a list of the other documents in the library:

#### Device Server Quick Start Guide

The guide that comes in the package with the device server covering the first steps necessary to get your device server up and running.

#### Digi One/PortServer TS Command Reference

This online manual, available on the Software and Documentation CD, provides complete information on commands.

#### RealPort Setup Guides

These online manuals provide information on setting up servers for RealPort software.

#### Online Help for the Web UI

This context-sensitive online help provides information on configuration fields used with web browser configuration interface.

## About Configuration Methods

Use this section to learn about configuration methods.

#### Configure the device server with the wizard

Simply follow the prompts and choose your configuration with the wizard. Choose either a Microsoft Windows or Unix platform.

#### Configuring the device server from an Attached Terminal

With this method, you cable a terminal or PC running terminal emulation software to a device server port and then use the command line to enter commands. This method allows you to configure all features. It requires, however, that you and the device server be in the same location. Some users find it advantageous to configure the device server IP address this way and then use one of the other methods for the rest of the configuration.

#### Configuring the device server from a Telnet Session

With this method, you Telnet to the device server and use the command line to complete configuration tasks. The only disadvantage to this method is that you have to configure the device server with an IP address before you can Telnet to it.

#### Configuring the device server from the Web Interface

The great advantage to this method is ease of use. This method requires that you configure the IP address before you can access the configuration from the web interface, however, some features cannot be configured this way.

#### Downloading a Configuration File

With this method, you configure a Digi device and then do the following:

1. Download an existing configuration file to a host system.
2. Edit the file with specific configuration using a text editor.
3. Upload the file to the device server.

This an excellent method for maintaining highly similar configuration files for multiple Digi devices. The disadvantage is that the device server requires some configuration steps, such as the IP address, to be completed before it can be used.

## Configuration Prerequisites

#### Accessing the Command Line from a Locally-Connected Terminal

Use this procedure to access the command line and the configuration from a terminal connected to one of the device server's serial ports.

1. Connect a terminal or PC to a serial port on the device server. For a Windows HyperTerminal connection, use the cable that came in the package.
2. Configure the parameters of the terminal or terminal emulation software to work with the Digi serial port. The default port settings are:
   - VT 100 emulation
   - 9600 baud
   - 8-bit character
   - 1 stop bit
   - No parity
3. Log on as the **`root`** user. The default password is **`dbps`**.

#### Log On as Root from the Command Line

1. At the log on prompt, enter **`root.`**
2. Enter the default password **`dbps`**.

#### Accessing the Command Line from a Telnet Session

Use this procedure to access the command line and the configuration from a Telnet session. This procedure assumes that you have configure the Digi device with an IP address already. See "Configuring the IP Address" on page 19.

1. To Telnet to the device server, enter the following command from a command prompt on another networked device, such as a server:

`telnet` *`ip-address`*

where *ip-address* is the device server's IP address

Example: `telnet 192.3.23.5`

2. Log on as the **`root`** user. The default password is **`dbps`**.

#### Accessing the Configuration from the Web Interface

Use this procedure to access the configuration from the web interface. This procedure assumes that you have configured the Digi device with an IP address already. See "Configuring the IP Address" on page 19.

1. Access the device server from a web browser by specifying the device server's IP address in the URL window.
2. Log on as **`root`**. The default password is **`dbps`**.

## Configuration Considerations

The PortServer TS 4 W works ONLY with the radio provided. You can use the wizard to configure your wireless device available on the Software and Documentation CD. You will need an Ethernet cable and a network PC to configure the wireless device server. After assigning the IP address, access the device from your browser by entering the IP address in the URL address bar.

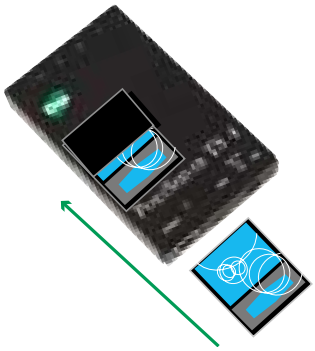
### Install Radio

Place your country sticker on the back of the radio.

Slide radio into slot on top of Wireless device server BEFORE connecting any cables or power supply. Only the radio shipped in the box will function with the unit.

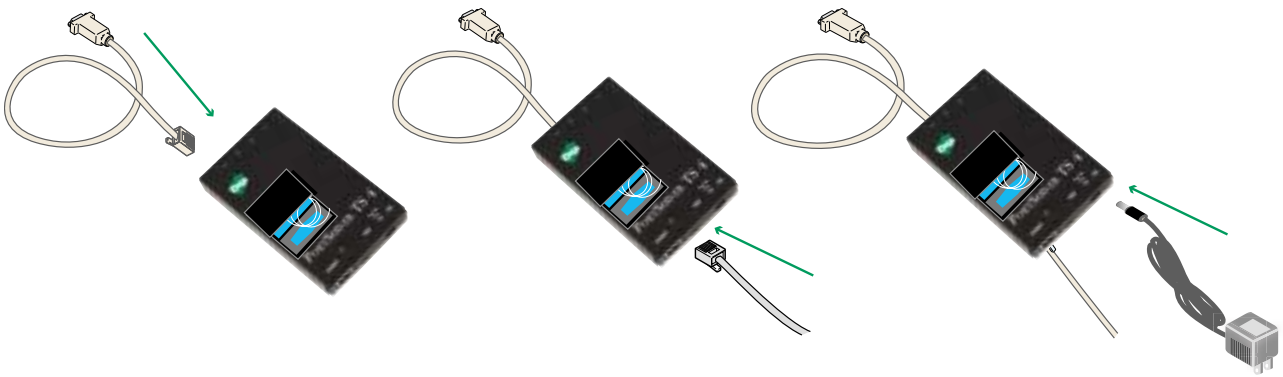
Note: Be sure that the grooves on the side of the radio are fit into the notched edges of the Wireless device server. Gently push radio into slot; fit should be snug.

— **WARNING** - If the power is connected when you plug the radio into the device server, you will be required to reboot. It is not recommended that the radio be removed while the power is connected!



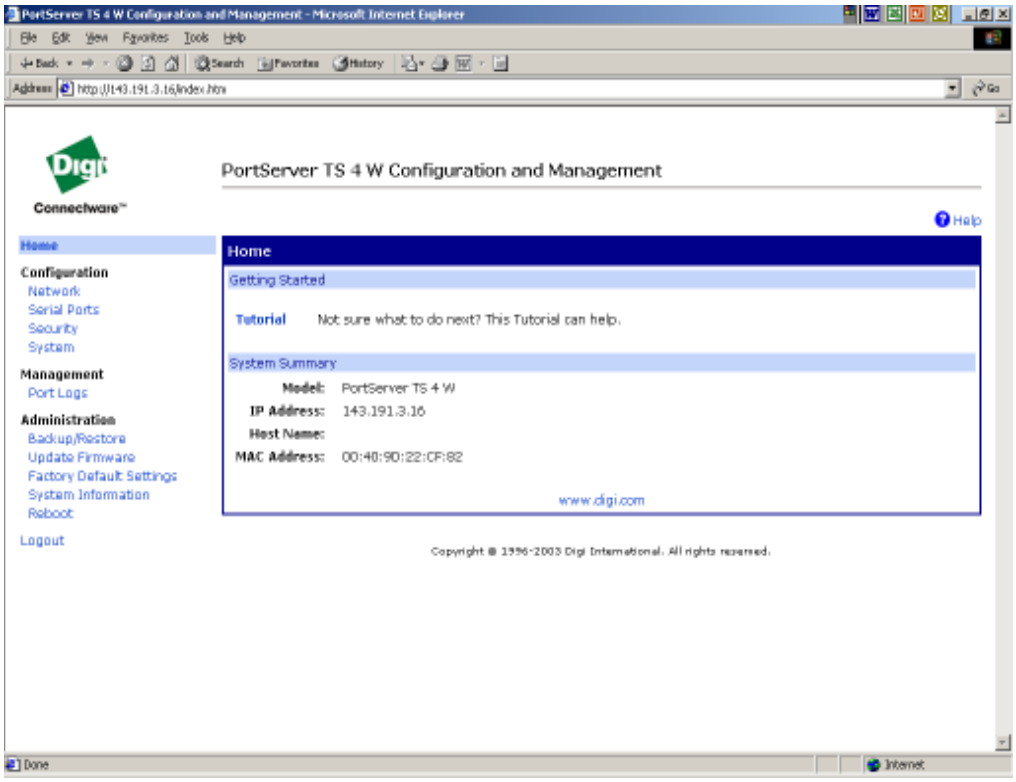
### Using Ethernet

1. Connect serial cable, Ethernet cable, and power supply.

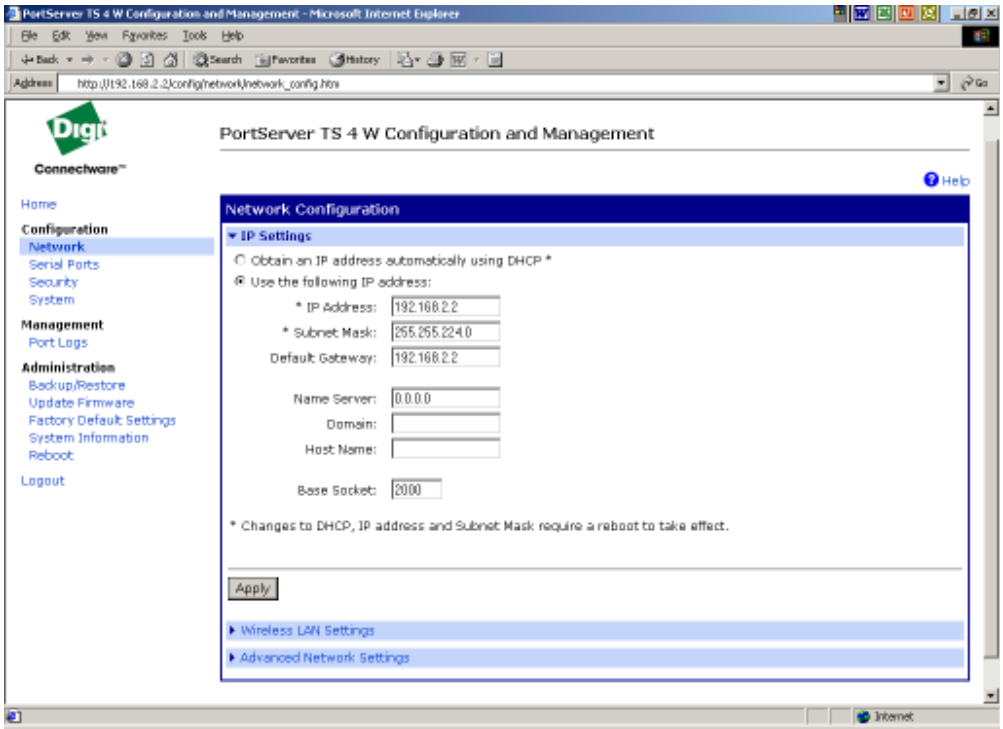


2. Insert CD, the wizard will automatically pop up. Follow wizard either for Microsoft Windows or Unix to configure the device. If you do not want to use the wizard click Cancel and follow the remaining procedure to set up the IP address and configure the device through the web interface.
3. Select **Discover Digi Device (from the CD)**.
4. Select the wireless device and assign the IP address.
5. Click **Set IP**.
6. Enter the IP address, Subnet, and Gateway mask and click **OK**.
7. Select the device and click **Configure** to launch your browser.
8. Enter the username **`root`** and password **`dbps`** and click **OK.**

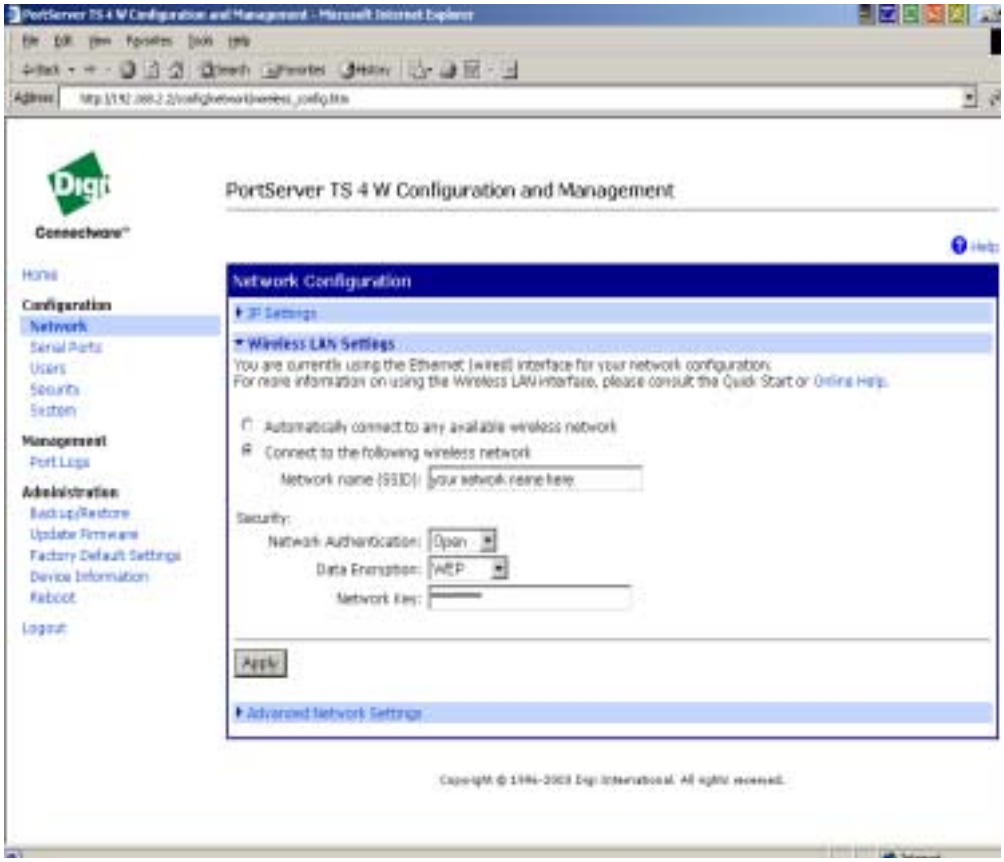
9. Click **Network** from the left navigation bar.



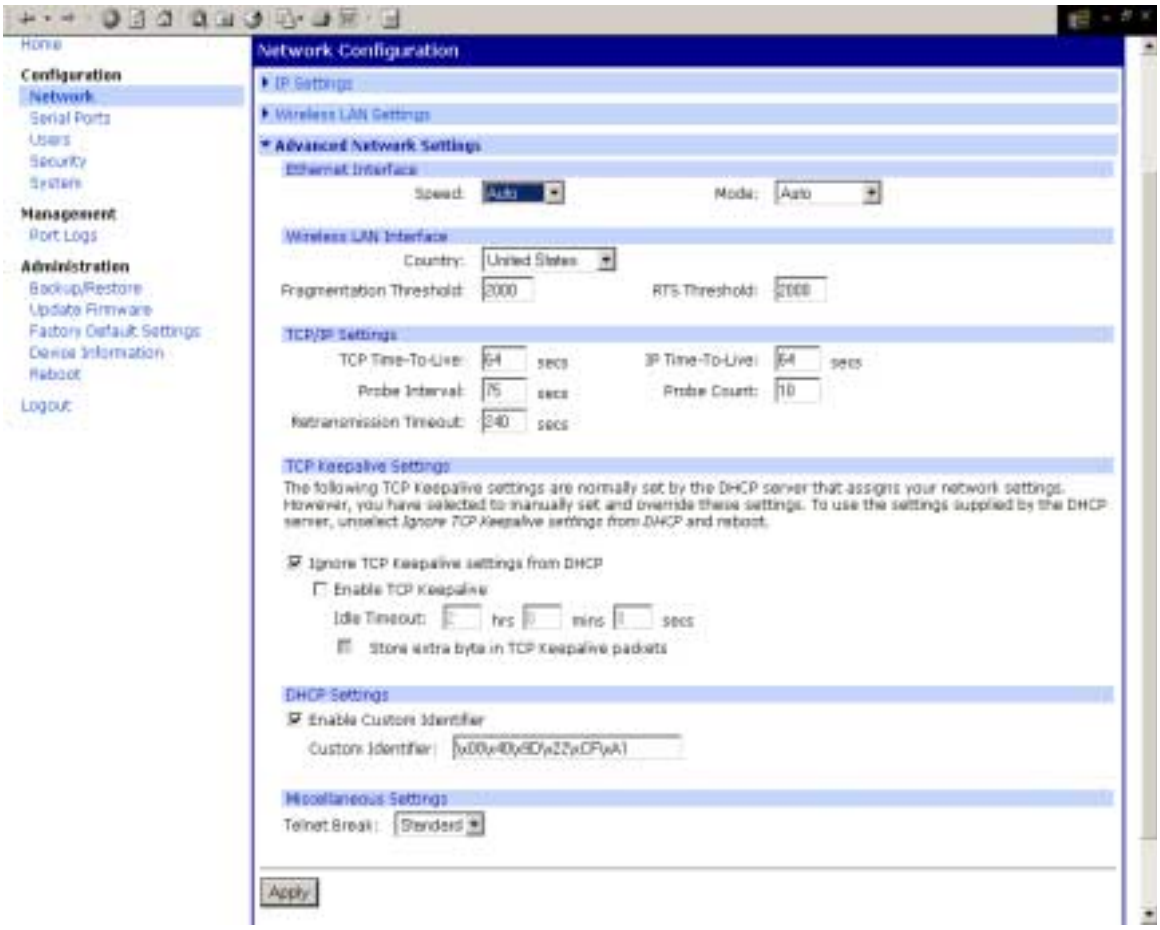

10. Enter parameters, click **Apply** to save then click **Wireless LAN Settings**.



11. Enter the parameters and click **Apply** to save and **Advanced Network Settings** for more settings.



12. Enter parameters, click **Apply** to save.




13. Unplug the Ethernet cable from the device server, disconnect the power, and power the unit up (reboot).

Configuration is complete.

## Options for Configuring the IP Address and Mask

The device server IP address can be configured using the following methods:

- With Digi Port Authority-Remote, a Digi utility on the Software and Documentation CD.
- By updating the ARP table on a server and then pinging the Digi device (called ARP-Ping, see "Configuring the IP Address Using ARP-Ping" on page 20).
- From the command line using the set config command ("Configuring the Ethernet Interface from the Command Line" on page 21.)
- Using a RARP server ("Configuring an IP Address using DHCP and RARP" on page 22.)
- Using a DHCP server ("Configuring an IP Address using DHCP and RARP" on page 22.)

The IP address and mask can also be changed using the web interface. This method, however, does not work for the initial IP address configuration.

#### Device Support: Digi Port Authority-Remote and ARP-Ping for IP Address Configuration

Not all Digi devices can use Digi Port Authority-Remote and ARP-Ping for IP address configuration. To determine if you can use these features, find the hardware label on your Digi device and then use the table below to determine whether this feature is available:

| Device | Part Number | Revision Required |
|---|---|---|
| Digi One IA RealPort | 50000764-01 | F or higher |
| Digi One RealPort | 50000723-01 | J or higher |
| PortServer TS 2 | 50000723-02 | J or higher |
| PortServer TS 4 | 50000723-03 | G or higher |

## Configuring the Ethernet Interface with Digi Port Authority-Remote

Use this section to configure an initial IP address, subnet mask, and default gateway using Digi Port Authority-Remote. This procedure cannot be used to change the IP address, but only to assign the initial IP address. It also cannot be used if a DHCP server is active.

#### Starting Point

This procedure assumes the following:

- That your Digi device supports this feature. See "Device Support: Digi Port Authority-Remote and ARP-Ping for IP Address Configuration" on page 19.
- That your Digi device is connected to the Ethernet network.

- That the Digi device has DHCP client turned on. This is the default setting and it will be on unless it was turned off.
- That you do **not** have a DHCP server to serve IP address. If you do, use the DHCP procedure. See "Configuring an IP Address using DHCP and RARP" on page 22.
- That you have installed Digi Port Authority-Remote version 2.01.11 or later. For information on installing Digi Port Authority-Remote, see the *Digi Port Authority Remote Device Monitor Setup Guide*, which is on the Software and Documentation CD.

**Procedure**

1. Run Digi Port Authority-Remote.
2. If Digi Port Authority-Remote is not set for ADDP, choose ADDP as the Discovery Protocol.
3. Click Discover.

A list of Digi devices appears. Systems with IP addresses of 0.0.0.0 need IP addresses.

4. Select a device from the list and then click Configure.
5. Supply an IP address, subnet mask, and default gateway and then choose OK.

Digi Port Authority-Remote configures the IP address, subnet mask, and default gateway.

## Configuring the IP Address Using ARP-Ping

Use this section to configure an IP address by manually updating a server's ARP table and then pinging the Digi device.

Note: The ARP-Ping command assigns the IP address you designate but also assigns default subnet mask and gateway addresses. It is necessary to change the subnet mask and gateway addresses.

**Starting Point**

This procedure assumes the following:

- That your Digi device supports this feature. See "Device Support: Digi Port Authority-Remote and ARP-Ping for IP Address Configuration" on page 19.
- That your Digi device is connected to the Ethernet network

**Procedure**

1. Record the MAC address of the Digi device. It's on the back of the unit.
2. Access a server on the same subnet as the Digi device.
3. Manually update the server's ARP table using the Digi device's MAC address and the IP address you want assigned to the Digi device. The following is an example of how this is done on a Windows NT 4.0 system:

```
arp -s 143.191.2.1 00-00-9d-22-23-60
```

4. Ping the Digi device using the IP address just assigned. The following is an example:

```
ping 143.191.2.1
```

The ping will probably time out before there is a response from the Digi device.

5. Wait a few seconds and then ping the Digi device again.

The Digi device replies to the ping, indicating that the IP address has been configured.

## Configuring the Ethernet Interface from the Command Line

This section discusses how to use the command line to configure an IP address, mask, and default gateway for the device server's Ethernet interface.

#### Manual Configuration Procedure

1. To ensure that the IP address you configure is permanent, turn DHCP off by entering the following command:

```
set config dhcp=off
```

2. To configure an IP address for the Ethernet interface, enter the following command:

```
set config ip=ip-address
```

where *ip-address* is the IP address for the Ethernet interface

#### Example to Set IP Address

```
set config ip=191.143.2.154
```

3. To configure a subnet mask, enter the following command:

```
set config submask=mask
```

where *mask* is the subnet mask for this subnetwork

#### Example to Set Subnet Mask

```
set config submask=255.255.255.0
```

4. To configure a default gateway, enter the following command:

```
set config gateway=ip-address
```

where *ip-address* is the IP address of the default gateway

#### Example to Set Gateway Mask

```
set config gateway=191.143.2.46
```

5. Reboot the Digi device at the prompt using the following command:

```
boot action=reset
```

#### Manual Configuration Example

In this example set config commands configure the Ethernet interface and the boot command reboot the Digi device, which is required for the address change to take affect.

```
set config ip=192.150.150.10 submask=255.255.255.0 dhcp=off
set config gateway=192.150.150.11
```

```
boot action=reset
```

## Configuring an IP Address using DHCP and RARP

### About DHCP and RARP

When the device server boots, it transmits a DHCP request and a RARP request. This continues until an address is assigned.

### Procedure

To use RARP or DHCP follow these steps:

1. Set up an entry for an address on a DHCP or RARP server. If you intend to use RealPort, do the following:
   - Reserve a permanent IP address.
   - Record the IP address. You will need it when you configure the RealPort driver.
2. Power on the device server.

The DHCP or RARP server assigns the device server an IP address.

## About RealPort

This section provides a brief introduction to RealPort.

#### What is RealPort?

RealPort is a feature that allows network-based host systems to use the ports of the device server as though they were the host system's own ports, appearing and behaving as local ports to the network-based host.

#### RealPort Advantages

RealPort provides the following advantages:

- It expands the number of ports available to the host system.
- It enables device server ports to be treated as if they were directly connected to the host, which means they use all standard operating system interfaces that control baud rate, parity, stop bits, and flow control.
- It enables host administrators to do most of the required configuration on the host, the system with which the administrator is most familiar.
- It dramatically reduces host CPU overhead because multiple terminal or printer sessions are multiplexed over the same TCP/IP connection.

#### Configuring the RealPort Software

You must install and configure RealPort software on each host that will use RealPort ports. See the RealPort documentation for more information.

1. From the CD, click **Software**. (If the wizard pops up, click **cancel**.)

The files are located in the drivers\windows\win2k\realport folder.

If you use the wizard, follow the steps in the pop-up after selecting the Incoming scenario.

## Options for Configuring the Serial Ports

The device server serial ports can be configured using the following methods:

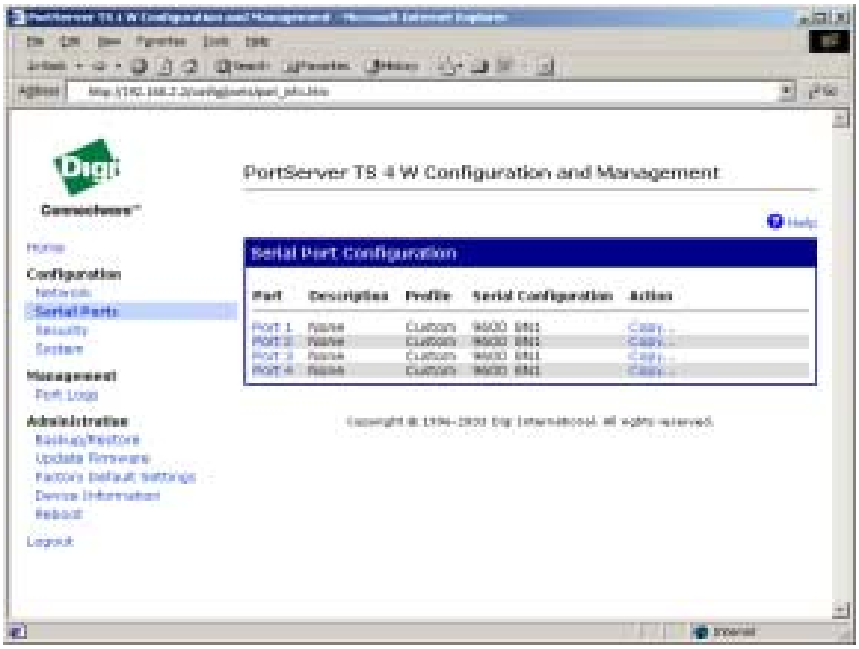
- Through the web interface
- From the command line using the set config command ("Configuring the Serial Port Settings from the Command Line" on page 26.) The serial ports can also be changed using the web interface or command line.

## Configuring the Serial Port Settings with the Web Interface

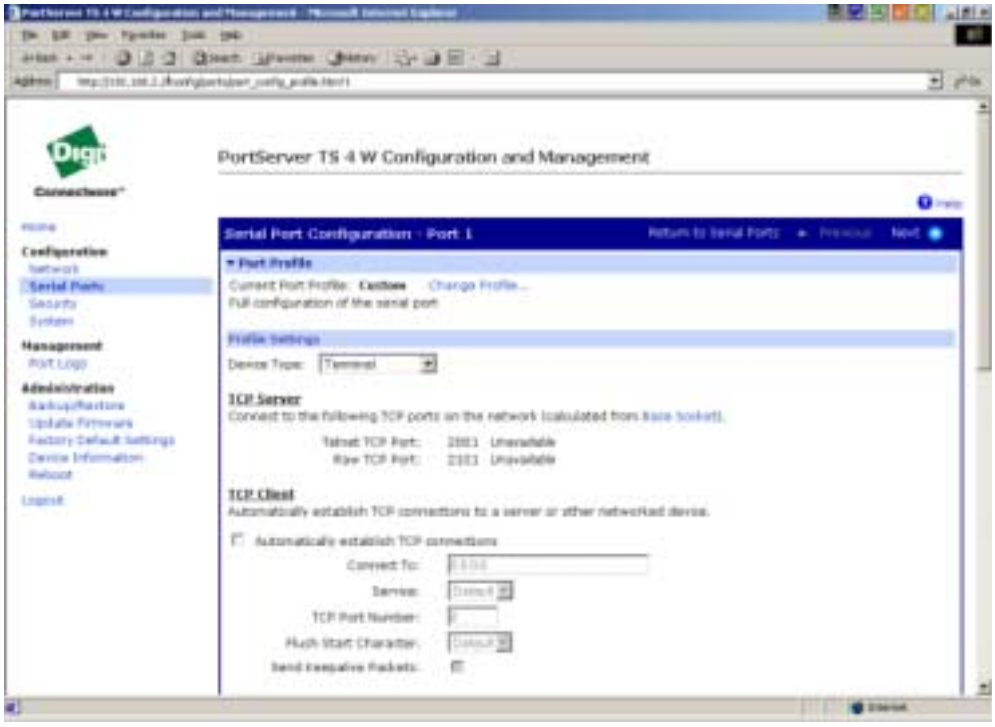
1. Log on to the device by entering the IP address in the URL address bar of your browser.

   Note: This procedure can only be used if an IP address has been set.

2. Enter the username **root** and password **dbps**.
3. Click **Serial Ports** under Configuration.




4. Click the port number that you want to configure.




5. Click **Change Profile** and select a profile based on the device you have connected to your port. Custom will expose all settings.
6. Click **Apply** to save the profile. The interface will determine any additional settings and advise you what tab to click next.
7. A port profile or port options page will come up and ask for additional parameters if needed. Enter the appropriate parameters and click **Apply**.

## Configuring the Serial Port Settings from the Command Line

Use the set ports, set line, and set flow commands from the Digi One/ PortServer TS 2/4 Command Reference to set the serial port settings.

## Configuring Inbound PPP Connections

Use this section to configure simple inbound PPP connections from the command line. For information on fine-tuning PPP connections, see the set user command in the *Digi One/PortServer TS Command Reference*.

Note: CHAP authentication works between two Digi devices. CHAP will be negotiated to PAP for all other connections

#### Procedure for Command Line

1. To configure the port for a modem, enter the following command:

```
set ports range=range dev=device
```

where *range* is the port or ports and *device* is one of the following:

- min for inbound only modem connections
- mio for bidirectional modem connections.

See the set ports command in the *Digi One/PortServer TS Command Reference* for more information.

Example: `set ports range=3 device=min`

2. To configure flow control for the ports, enter the following command:

```
set flow range=range flow-control=scheme
```

where *range* is the port or ports and *flow-control=scheme* is the flow control required for this connection. Typically, for modem connections RTS and CTS are on.

Example: `set flow range=3 ixon=off ixoff=off rts=on cts=on`

See the set flow command in the *Digi One/PortServer TS Command Reference* for more information.

3. To configure the baud rate for this connection, enter the following command:

```
set line range=range baud=bps
```

where *range* is the port or ports to configure and *bps* is the line speed in bits-per-second. Typically, you can set this to 115000 bps for modem connections.

Example: `set line range=3 baud=115000`

4. To create an inbound PPP user, enter the following command:

```
set user name=name protocol=ppp netservice=on
  defaultaccess=netservice
```

where *name* is a name to assign the PPP user

Example:

```
set user name=pppin protocol=ppp netservice=on
  defaultaccess=netservice
```

5. To configure an IP address for the remote PPP user, enter the following command:

```
set user name=name ipaddr=ip-address
```

where

- *name* is the user's name
- *ip-address* is one of the following: (a) A standard IP address in dotted decimal format. (b) 0.0.0.0, which means the remote user will supply the IP address (c) ippool, which means that the user will be assigned an IP address from an IP address pool. See the set ippool command in the *Digi One/PortServer TS Command Reference*.

Example: `set user name=pppin ipaddr=ippool`

6. If you used the IP address pool option in the previous step, specify the following subnetwork mask using the following command: (a mask of 255.255.255.255 is required)

```
set user ipmask=255.255.255.255
```

7. To configure an IP address for the local end of the PPP connection, enter the following command:

```
set user name=name localipaddr=ip-address
```

where *name* is the user's name and *ip-address* is the IP address to assign to the local end of the PPP connection. This address must be unique. That is, no other user can be assigned this address and it cannot be the IP address for the Ethernet interface.

Example: `set user name=pppin localipadr=199.1.1.2`

### Configuring Inbound PPP Connections: Example

This example shows a very simple PPP inbound configuration. Here are some points on this configuration:

- The port is set up for inbound connections (dev=min).
- RTS and CTS are used for flow control.
- The baud rate has been set to 115000 bps.
- The user has been configured to use an IP address pool

```
set ports range=3 device=min
set flow range=3 ixon=off ixoff=off rts=on cts=on
set line range=3 baud=115000
set user name=pppin protocol=ppp netservice=on
  defaultaccess=netservice
set user name=pppin ipaddr=ippool
set user name=pppin localipadr=199.1.1.2
```

## Configuring Outbound PPP Connections: Command Line

This section describes how to configure outbound PPP connections. Use it to configure outbound only connections or to configure the outbound portion of bidirectional connections.

Note: CHAP authentication works between two Digi devices. CHAP will be negotiated to PAP for all other connections

### Procedure

1. To configure the port for a modem, enter the following command:

`set ports range=`*`range`* `dev=`*`device`*

where *range* is the port or ports and *device* is one of the following:

- mout for outbound only modem connections
- mio for bidirectional modem connections.

See the set ports command in the *Digi One/PortServer TS Command Reference* for more information.

Example: `set ports range=3 device=mout`

2. To configure flow control for the ports, enter the following command:

`set flow range=`*`range flow-control=scheme`*

where *range* is the port or ports and *flow-control=scheme* is the flow control required for this connection. Typically, for modem connections RTS and CTS are on.

Example: `set flow range=3 ixon=off ixoff=off rts=on cts=on`

See the set flow command in the *Digi One/PortServer TS Command Reference* for more information.

3. To configure baud rate for this connection to the modem, enter the following command:

`set line range=`*`range`* `baud=`*`bps`*

where *range* is the port or ports to configure and *bps* is the line speed in bits-per-second. Typically, you can set this to 115000 bps for modem connections.

Example: `set line range=3 baud=115000`

4. If you do not want to use the Digi-supplied dialer script (genmdm) and login script (loginscript), which work for most applications, use the set script command to create your own scripts.

See the set script command in the *Digi One/PortServer TS Command Reference* for more information.

5. If you do not want to use the Digi-supplied outbound device (gendialer), which works for most applications, enter the following command:

`set device name=`*`name`* `ports=`*`ports`* `dialer=`*`name`*

where

- name=*name* is the name for this device
- ports=*ports* are the ports to associate with this device
- dialer=*name* is the name of a dialer script, either the Digi-supplied script or a user-created one

6. To create a PPP user, enter the following command:

`set user name=`*`name`* `protocol=ppp`

where *name* is the name of the PPP user

Example: `set user name=pppout protocol=ppp`

7. To configure this user for outbound connections, enter the following command:

```
set user name=name outgoing=on device=device
```

where *device* is either the Digi-supplied device or the outbound device created earlier in this procedure

Example:

```
set user name=pppout outgoing=on device=gendialer
```

8. To configure an IP address for the local end of the PPP connection, enter the following command:

```
set user name=name localipaddr=ip-address
```

where *name* is the user's name and *ip-address* is one of the following:

- 0.0.0.0. , which means that the user will request an IP address from the remote server.
- A specific IP address, which means that the Digi device will attempt to use this IP address. The remote server must agree to this request.

Example: `set user name=pppout localipadr=0.0.0.0`

9. To configure a telephone number to dial to reach the outbound user, enter the following command:

```
set user name=name n1=telephone-number
```

where *name* is the user's name and *telephone-number* is the number to dial to reach the user. You can enter this number as digits only, with dashes (-) separating digits, or with commas.

Example: `set user name=pppout n1=4452624`

### Sample

The following sample shows a very simple outbound PPP configuration. Here are some points on this configuration:

- The port is set up for outbound connections (dev=mout).
- Flow control is set to Hardware.
- Default device and scripts are used

```
set ports range=3 device=mout
set flow range=3 ixon=off ixoff=off rts=on cts=on
set line range=3 baud=115000
set user name=pppout protocol=ppp
set user name=pppout dialout=on outgoing=on device=gendialer
set user name=pppout localipadr=0.0.0.0
set user name=pppout n1=4452624
```

### Filters for PPP Connections

Use the following table for additional configurations.

| set user Field | Description | Example |
|---|---|---|
| pass-packet | Causes a packet to be passed or blocked | Filter causes incoming packets from an IP address to be accepted and packets from all other IP addresses to be blocked |
| keepup | Causes the idletimeout timer to be reset and a connection maintained. | Filter that causes the connection to be maintained as long as there is any packet traffic except RIP packets. |
| bringup | Causes the Digi device to establish a connection. | Filter that causes an outgoing connection to be initiated whenever a packet specifying a particular IP address is handled |
| logpacket | Causes the Digi device to send a message to the log file | Filter that notifies the log anytime an ICMP packet is handled |

## Modem Emulation (Digi One TS and PortServer TS 2/4 MEI only)

Modem emulation enables a system administrator to configure a networked Digi device server to act as a modem. The Digi device server emulates modem responses to a serial device and seamlessly sends and receives data over an Ethernet network instead of a PSTN (Public Switched Telephone Network). The advantage for a user is the ability to retain legacy software applications without modification and use a less expensive Ethernet network in place of public telephone lines.

To use a Digi device server for modem emulation, do the following:

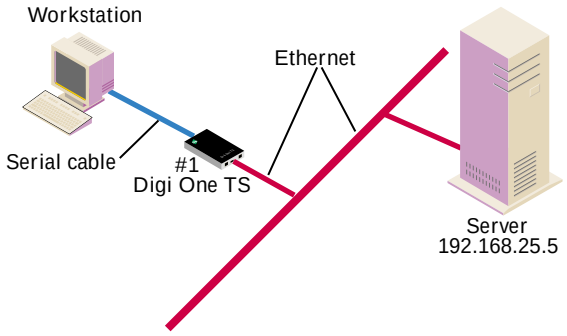
- use a cable with the correct wiring pinouts (see "Modem Emulation Cable Signals" on page 34)
- configure the serial ports and device type with the Web Interface

Note: Before AT commands are accepted, DSR must go high on the Digi device server.

## Common User Scenarios

The Digi device server in modem emulation mode allows for the easy replacement of modems in almost any environment where there is a LAN or WAN.

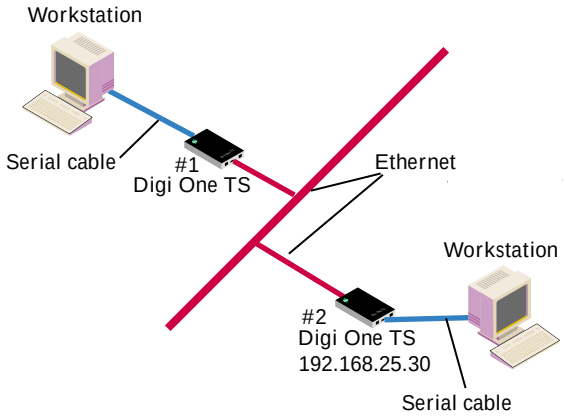
User Scenario-Diagram A




In Diagram A, the Digi One TS replaces a modem connected to a workstation running an application. The Digi One TS allows for the use of software applications without modification by responding to all the AT commands configured in the workstation application. The Digi One TS connects to the IP Address of the server when an `ATDT ipaddress:port` (`ATDT 192.168.25.5:50001`) command is issued. Once the remote device establishes the TCP connection, a CONNECT message is sent to the serial port and only then does the Digi device server switch from AT command mode to data mode. Using the modem escape sequence or dropping DTR on either side terminates the connection. A DISCONNECT message will be sent to the

application if the remote side closes the TCP connection.

User Scenario-Diagram B




In Diagram B, two Digi device servers will replace modems on both sides of the connection. The initiation of the connection occurs with either of the Digi device servers. If both ends are Digi device servers, the TCP listening port number is 50001 for port 1. An example of the connection command is `ATDT 192.168.25.30:50001`. Upon establishing a successful TCP connection, a CONNECT message is sent to the serial port and only then does the Digi device server switch from AT command mode to data mode. After the CONNECT is received, the transmission of data begins. Using the modem escape sequence or dropping DTR on either side terminates the connection.

Modem emulation has the ability to communicate to an infinite number of other devices.

## Modem Emulation Cable Signals

Use the following signal assignments to make a cable connecting the Digi device server to a serial device.

Note: DSR and DTR on the serial device side are connected to the DSR signal of the Digi device server.

| Serial Device | | Digi Device Server |
|---|---|---|
| CTS (in) | ← | RTS (out) |
| RTS (out) | ↔ | CTS (in) |
| DSR (in) | ↔ | DSR (in) |
| DTR (out) | → | |
| DCD (in) | ← | DTR (out) |
| TX (out) | ← | RX (in) |
| RX (in) | → | TX (out) |
| GND | — | GND |

## Originating, Answering, and Disconnecting Calls

In the following table, an application requests a TCP session with the Digi device server. The table displays the responses of the Digi device server and application as they negotiate a TCP connection.

| Application AT Command | Digi Device Server Response | Notes |
|---|---|---|
| AT&F | OK. | AT command request to restore defaults to factory settings-Digi device server responds OK. |
| ATDT *ipaddress:TCPport#* | Receives request to start a TCP session. CONNECT 115200. | Request to start TCP session with IP address and TCP port number of the Digi device server-Digi device server starts a TCP session |
| <P>+++<P> | OK | Escape sequence is sent <P> is Pause in seconds with "+++" being the escape sequence in ASCII characters - Digi device server switches from AT command to data mode |
| ATH | NO CARRIER response sent | Disconnect AT command is sent-Digi device server responds with NO CARRIER |

In the following table, the Digi device server receives a request for a connection.

| AT Command | Digi Device Server Response | Notes |
|---|---|---|
| | RING | The Digi device server sends a Call Notification |
| ATA (or ATS0=n) | CONNECT 115200 | Manual (ATA) or Auto Answer (ATS0=n) response-the Digi device server sends a CONNECT message when the TCP session is started |
| | NO CARRIER | The Digi device server sends a NO CARRIER message when the remote disconnects |

### *Originating Calls*

To send data to a Digi device server, enter the following information for your application replacing the telephone number with the Digi device server's IP address and TCP port number. Enter the following command:

`ATDT` *`ipaddress:tcp_port#`*

an example is `ATDT 146.135.13.5:50001`

### *Answering Calls*

The Digi device server listens on a pre-defined TCP port to receive data. When the Digi device server receives a call notification (RING) through a serial port to begin a TCP connection, it needs to reply with an ATA or a pre-configured Auto-Answer to answer the call.

Note: The TCP ports assigned to the serial ports are as follows:
Serial port 1 listens on TCP port 50001
Serial port 2 listens on TCP port 50002
Serial port 3 listens on TCP port 50003
Serial port 4 listens on TCP port 50004

### *Disconnecting Calls*

The TCP connection disconnects by either dropping the DTR signal on the serial port or sending the escape sequence <P>+++<P> to the Digi device

server. <P> represents a one second pause.

#### Disconnecting Calls-Digi Device Server

The Digi device server sends a NO CARRIER response to the serial port when the network connection is dropped.

## Modem Emulation AT Command Set

<table>
<tr><th>AT<br>Command</th><th>Function</th><th>Result<br>Code</th></tr>
<tr><td>ATA</td><td>Answer command: The Digi Device Server will go off hook and answer a TCP connection request.</td><td></td></tr>
<tr><td>ATD<IP>:<br><TCP<br>PORT></td><td>This command directs the Digi Device Server to go on-line, dial according to the IP address entered as follow 191.1.2.3:12 and attempt to establish a TCP connection. If no dial string is supplied, the Digi Device Server will respond no dial tone.<br>Note: If the ATD command is issued before the S1 register has cleared, the modem will respond with the NO CARRIER result code.<br>Dial Modifiers. The valid dial string parameters are described below. Punctuation characters may be used for clarity with parentheses, hyphen, and spaces being ignored.
<table>
<tr><td>0-9</td><td>DTMF digits 0 to 9.</td></tr>
<tr><td>.</td><td>Dot notation used for IP addresses.<br>IP addresses are written as four numbers separated by periods, where the first number is between 1 and 255 and the other three numbers are between 0 and 255. Retype the IP address in the format xxx.xxx.xxx.xxx .</td></tr>
<tr><td>:</td><td>Colon notation used for the TCP port</td></tr>
<tr><td>L</td><td>Re-dial last number: the modem will re-dial the last valid telephone number. The L must be immediately after the D with all the following characters ignored.</td></tr>
<tr><td>P</td><td>This command is accepted, but not acted on.</td></tr>
<tr><td>T</td><td>This command is accepted, but not acted on.</td></tr>
<tr><td>R</td><td>This command is accepted, but not acted on.</td></tr>
<tr><td>S=n</td><td>Dial the number stored in the directory (n=0 to 3). (See &Z.)</td></tr>
<tr><td>,</td><td>Dial pause: the modem will pause for a time specified by S8 before dialing the digits following “,”.</td></tr>
<tr><td>-</td><td>Ignored: may be used to format the dial string.</td></tr>
<tr><td><space></td><td>Ignored: may be used to format the dial string.</td></tr>
<tr><td><I></td><td>Invalid character: will be ignored.</td></tr>
</table></td><td></td></tr>
<tr><td>ATEn</td><td>Command echo. The Digi Device Server enables or disables the echo of characters to the DTE according to the parameter supplied. The parameter value, if valid, is written to S14 bit 1.<br>E0 : Disables command echo<br>E1 : Enables command echo</td><td>OK n=0 or 1<br>ERROR<br>Otherwise</td></tr>
<tr><td>ATH</td><td>Disconnect (Hang up) command<br>This command initiates a hang up sequence.<br>H0 : Disconnect the TCP session if the modem is currently on line.<br>H1 : If on-hook, the Digi Device Server will go off-hook and enter command mode.</td><td>OK n=0 or 1<br>ERROR<br>Otherwise</td></tr>
</table>

| AT Command | Function | Result Code |
|---|---|---|
| ATIn | Identification command<br>I0 reports product code. Example: Digi Device server<br>I1 reports 255<br>I2 reports “OK”<br>I3 reports “OK”<br>I4 reports DIGI DS_TS<br>I5 reports “OK”<br>I6 reports “OK”<br>I7 reports “OK”<br>I8 reports “ERROR”<br>I9 reports “ERROR” | OK n=0 or 9<br>ERROR<br>Otherwise |
| ATLn | Accepted but ignored. | OK n=0 or 3<br>ERROR<br>Otherwise |
| ATMn | Accepted but ignored. | OK n=0 or 3<br>ERROR<br>Otherwise |
| ATNn | Accepted but ignored. | OK n=0 or 1<br>ERROR<br>Otherwise |
| ATOn | Return to On-Line Data Mode.<br>This command determines how the modem will enter the on-line data mode. If the modem is in the on-line command mode, the modem enters the on-line data mode. If the modem is in the off-line command mode (no connection), ERROR is reported.<br>O0Enters on-line data mode. Handling is determined by the Call Establishment task. Generally, if a connection exists, this command connects the DTE back to the remote modem after an escape (+++).<br>O1Same as above | OKn = 0 or 1 and a connection exists.<br>ERROR<br>Otherwise or if not connected. |
| ATP | Accepted but ignored. | OK |
| ATQn | Quiet Results Codes Control command.<br>The command enables or disables the sending of the result codes to the DTE according to the parameter supplied. The parameter value, if valid, is written to S14 bit 2.<br>Q0 Enables result code to the DTE (Default).<br>Q1 Disables result code to the DTE | OK n=0 or 1<br>ERROR<br>Otherwise |
| ATSn | Read/Write S- Register.<br>n Establishes S-register n as the last register accessed<br>n=v Sets S-Register n to the value v.<br>n? Reports the value of S-Register n. | |
| ATT | Accepted but ignored.. | OK |
| ATVn | Result Code Form. This command selects the sending of short-form or long-form codes to the DTE. The parameter, if valid, is written to S14 bit 3.<br>V0 Enables short-form (terse) result codes. Line feed is not issues before a short-form result.<br>V1 Enables long-form (verbose) results codes (Default). | OK n=0 or 1<br>ERROR<br>Otherwise |
| ATWn | Accepted but ignored. | OK n=0 to 3<br>ERROR<br>Otherwise |

| AT Command | Function | Result Code |
|---|---|---|
| ATXn | Accepted but ignored. | OK n=0 to 3<br>ERROR Otherwise |
| ATYn | Accepted but ignored. | OK n=0 or 1<br>ERROR Otherwise |
| ATZn | Accepted but ignored. (Soft Reset and restore Profile). | OK n=0 or 1<br>ERROR Otherwise |
| AT&Cn | DCD Option. The Digi Device Server controls the DCD output in accordance with the parameter supplied. The parameter value, if valid is written to S21 bit 5.<br>&C0 DCD remains ON at all times.<br>&C1 DCD follows the state of the connection | OK n=0 or 1<br>ERROR Otherwise |
| AT&Dn | DTR Option. This command interprets the ON to OFF transition of the DTR signal from the DTE in accordance with the parameter supplied. The parameter value, if valid, is written to S21 bits 3 and 4. Also see S25.<br>&D0 -DTR is ignored (assumed ON). Allows operation with DTEs which do not provide DSR.<br>&D1DTR drop is interpreted by the modem as if the asynchronous escape sequence had been entered. The modem returns to asynchronous command state without disconnecting.<br>&D2DTR drop causes the modem to hang up. Auto-answer is inhibited. (Default.)<br>&D3DTR drop causes the modem to perform a soft reset as if the Z command were received. The &Y setting determines which profile is loaded. | OK n=0 to 3<br>ERROR Otherwise |
| AT&Fn | Restore Factory Configuration (Profile)<br>The Device Server loads the factory default configuration (profile). The factory defaults are identified for each command and in the S-Register descriptions. A configuration (profile) consists of a subset of S-Registers.<br>&F0Restore factory configuration 0.<br>&F1Restore factory configuration 1. | OK n=0 or 1<br>ERROR Otherwise |
| AT&Jn | Accepted but ignored. | OK n=0 or 1<br>ERROR Otherwise |
| AT&Gn | Accepted but ignored. | OK n=0 or 1<br>ERROR Otherwise |
| AT&Jn | Accepted but ignored. | OK n=0 or 1<br>ERROR Otherwise |
| AT&Kn | Flow control. This command defines the DTE/DCE flow control mechanism. The parameter value, if valid, is written to S39 bits 0, 1, and 2.<br>&K0 Disables flow control<br>&K3 Enables RTS/CTS flow control (Default)<br>&K4 Enables XON/XOFF flow control<br>&K5 Enables transparent XON/XOFF flow control<br>&K6 Enables both RTS/CTS and XON/XOFF flow control. | OK n=0,3,4,5,or 6<br>ERROR Otherwise |
| AT&Ln | Accepted but ignored. | OK n=0, 1, 2<br>ERROR Otherwise |

| AT Command | Function | Result Code |
|---|---|---|
| AT&Mn | Accepted but ignored. | OK n=0, 1, 2<br>ERROR Otherwise |
| AT&Pn | Accepted but ignored. | OK n=0, 1, 2<br>ERROR Otherwise |
| AT&Qn | Accepted but ignored. | OK n=0 to 8<br>ERROR Otherwise |
| AT&Rn | RTS/CTS Option<br>This selects how the Digi Device Server controls CTS. CTS is modified if hardware flow control is selected (see &K command). The parameter value, if valid, is written to S21 bit2.<br>&R0CTS reflects the ability of the modem to transmit data. For example, CTS will drop during retrains. In sync mode, CTS tracks the state of RTS; the RTS-to-CTS delay is defined by S26. In async mode, CTS is normally ON and will turn OFF only if required by flow control.<br>&R1CTS forced on (default). In sync mode, CTS is always ON (RTS transitions are ignored). tracks the state of RTS. In async mode, CTS is normally ON and will turn OFF only if required by flow control.<br>&R2CTS follows RTS. | OK n=0 or 1<br>ERROR Otherwise |
| AT&Sn | DSR Override<br>This command selects how the modem will control DSR. The parameter value, if valid, is written to S21 bit 6.<br>&S0DSR will remain ON at all times. (Default.)<br>&S1DSR will become active after answer tone has been detected and inactive after the carrier has been lost. | OK n=0 or 1<br>ERROR Otherwise |
| AT&Tn | Accepted but ignored. | OK n= 0<br>ERROR Otherwise |
| AT&V | Display Current Configuration and Stored Profiles<br>**There is no NVRAM support currently.** | OK |
| AT&Vn | Accepted but ignored. | OK n=0 to 5<br>ERROR Otherwise |
| AT&V6 | Display current IP settings of the Device Server | OK |
| AT&Wn | Accepted but ignored. | OK n=0 or 1<br>ERROR Otherwise |
| AT&Xn | Accepted but ignored. | OK n=0 or 1<br>ERROR Otherwise |
| AT&Yn | Accepted but ignored. | OK n=0 or 1<br>ERROR Otherwise |
| AT&Zn | &Zn=x - Store Telephone Number.<br>Currently not supported | OK n=0 or 3<br>ERROR Otherwise |
| AT\An | Accepted but ignored. | OK n=0 to 3<br>ERROR Otherwise |

| AT Command | Function | Result Code |
|---|---|---|
| AT\Gn | Accepted but ignored. | OK n=0 or 1<br>ERROR Otherwise |
| AT\Kn | Accepted but ignored. | OK n=0 to 5<br>ERROR Otherwise |
| AT\Nn | Operating Mode<br>This command controls the preferred error correcting mode to be negotiated in a subsequent data connection.<br>\N0 Selects normal speed buffered mode<br>\N1 Serial interface selected - Selects direct mode<br>\N2 Accepted but ignored.<br>\N3 Accepted but ignored.<br>\N4 Accepted but ignored.<br>\N5 Accepted but ignored. | OK n=0 to 5<br>ERROR Otherwise |
| AT\Vn | Accepted but ignored. | OK n=0 or 1<br>ERROR Otherwise |
| AT+MS | Accepted but ignored. | OK |
| AT+MI | Accepted but ignored. | OK |
| AT%Cn | Accepted but ignored. | OK n=0 to 3<br>ERROR Otherwise |

## S-Registers

| Register | Function | Range | Units | Saved | Default |
|---|---|---|---|---|---|
| S0 | Rings to Auto-Answer<br>Sets the number of rings required before the Digi Device Server automatically answers a call. Setting this register to Zero disables auto-answer mode. | 0-255 | Rings | * | 0 |
| S1 | Ring Counter<br>S1 is incremented each time the modem detects a ring signal on the telephone line. S1 is cleared if no rings occur over an eight second interval. | 0-255 | Rings | | 0 |
| S2 | Escape Character<br>S2 holds the decimal value of the ASCII character used as the escape character. The default value corresponds to an ASCII '+'. A value over 127 disables the escape process, i.e., no escape character will be recognized. | 0-255 | ASCII | * | 43 |
| S3 | Carriage Return Character<br>Sets the command line and result code terminator character. Pertains to asynchronous operation only. | 0-127 | ASCII | | 13 |
| S4 | Line Feed Character<br>Sets the character recognized as a line feed. Pertains to asynchronous operation only. The Line Feed control character is output after the Carriage Return control character if verbose result codes are used. | 0-127 | ASCII | | 10 |
| S5 | Backspace Character<br>Sets the character recognized as a backspace. Pertains to asynchronous operation only. The modem will not recognize the Backspace character if it is set to a value that is greater than 32 ASCII. This character can be used to edit a command line. When the echo command is enabled, the modem echoes back to the local DTE the Backspace character, an ASCII space character and a second Backspace character; this means a total of three characters are transmitted each time the modem processes the Backspace character. | 0-32 | ASCII | | 8 |
| S6 | Accepted but ignored. | 2-255 | s | * | 2 |
| S7 | Accepted but ignored. | 1-255 | s | * | 50 |
| S8 | Accepted but ignored. | 0-255 | s | * | 2 |
| S9 | Accepted but ignored. | 1-255 | 0.1 s | * | 6 |
| S10 | Accepted but ignored. | 1-255 | 0.1 s | * | 14 |
| S11 | Accepted but ignored. | 50-255 | 0.001 s | * | 95 |
| S12 | Escape Prompt Delay<br>Defines the maximum period, in fiftieths of a second, allowed between receipt of the last character of the three escape character sequence from the DTE and sending of the OK result code to the DTE. If any characters are detected during this time, the OK will not be sent. Note that sending of the OK result code does not affect entry into command mode. | 0-255 | 0.02 s | * | 50 |

| Register | Function | Range | Units | Saved | Default |
|---|---|---|---|---|---|
| S13 | Reserved | - | - | | - |
| S14 | General Bit Mapped Options Status<br>Indicates the status of command options.<br>Default:138 (8Ah) (10001010b)<br>Bit 0This bit is ignored.<br>Bit 1Command echo (En)<br>0 =Disabled (E0)<br>1 =Enabled (E1) (Default.)<br>Bit 2Quiet mode (Qn)<br>0 =Send result codes (Q0) (Default.)<br>1 =Do not send result codes (Q1)<br>Bit 3Result codes (Vn)<br>0 =Numeric (V0)<br>1 =Verbose (V1) (Default.)<br>Bit 4Reserved<br>Bit 5Tone (T)/Pulse (P)<br>0 =Tone (T) (Default.)<br>1 =Pulse (P)<br>Bit 6Reserved<br>Bit 7Originate/Answer<br>0 =Answer<br>1 =Originate (Default.) | | | * | 138<br>(8Ah) |
| S15 | Reserved | - | - | | - |
| S16 | Accepted but ignored. | - | - | | 0 |
| S17 | Reserved | - | | - | - |
| S18 | Accepted but ignored. | 0-255 | s | * | 0 |
| S19 | Accepted but ignored. | - | - | | 0 |
| S20 | Accepted but ignored. | 0-255 | - | * | 0 |

| Register | Function | Range | Units | Saved | Default |
|---|---|---|---|---|---|
| S21 | General Bit Mapped Options Status<br>Indicates the status of command options.<br>Default:52 (34h) (00110100b)<br>Bit 0Set by &Jn command but ignored otherwise.<br>0 =&J0 (Default.)<br>1 =&J1<br>Bit 1Reserved<br>Bit 2CTS behavior (&Rn)<br>0 =CTS tracks RTS (&R0)<br>1 =CTS always on (&R1) (Default.)<br>Bits 3-4DTR behavior (&Dn)<br>0 =&D0 selected<br>1 =&D1 selected<br>2 =&D2 selected (Default.)<br>3 =&D3 selected<br>Bit 5RLSD (DCD) behavior (&Cn)<br>0 =&C0 selected<br>1 =&C1 selected (Default.)<br>Bit 6DSR behavior (&Sn)<br>0 =&S0 selected (Default.)<br>1 =&S1 selected<br>Bit 7Long space disconnect (Yn)<br>0 =Y0 (Default.)<br>1 =Y1 | - | - | * | 52 (34h) |
| S22 | Accepted but ignored. | - | - | * | 117 (75h) |

| Register | Function | Range | Units | Saved | Default |
|---|---|---|---|---|---|
| S23 | General Bit Mapped Options Status<br>Indicates the status of command options.<br>Default:62 (3Dh) (00111110b)<br>Bit 0Grant RDL<br>0 =RDL not allowed (&T5) (Default.)<br>1 =RDL allowed (&T4)<br>Bits 1-3DTE Rate<br>0 =0 - 300 bps<br>1 =600 bps<br>2 =1200 bps<br>3 =2400 bps<br>4 =4800 bps<br>5 =9600 bps<br>6 =19200 bps<br>7 =38400 bps or higher (Default.)<br>Bits 4-5Assumed DTE parity<br>0 =even<br>1 =not used<br>2 =odd<br>3 =none (Default.)<br>Bits 6-7not action applied | | | * | 62 (3Dh) |
| S24 | Accepted but ignored. | 0-255 | s | * | 0 |
| S25 | Delay to DTR Off<br>Sets the length of time that the modem will ignore DTR for taking the action specified by &Dn. Its units are seconds for synchronous modes and one hundredths of a second for other modes | 0-255 | s or 0.01 s | | 5 |
| S26 | RTS-to-CTS Delay<br>Sets the time delay, in hundredths of a second, before the modem turns CTS ON after detecting an OFF-to-ON transition on RTS when &R0 is commanded. Pertains to synchronous operation only. | 0-255 | 0.01 s | | 1 |
| S27 | General Bit Mapped Options Status | - | - | * | 73 (49h) |
| S28 | Accepted but ignored. | - | - | * | 0 |
| S29 | Accepted but ignored. | 0-255 | 10 ms | | 70 |
| S30 | Accepted but ignored. | 0-255 | 10 s | | 0 |
| S31 | Accepted but ignored. | - | - | * | 194 (C2h) |
| S32 | XON Character | 0-255 | ASCII | | 17 (11h) |
| S33 | XOFF Character | 0-255 | ASCII | | 19 (13h) |
| S34 | S35 Reserved | - | - | | - |
| S36 | Accepted but ignored. | - | - | * | 7 |

| Register | Function | Range | Units | Saved | Default |
|---|---|---|---|---|---|
| S37 | General Bit Mapped Options Status<br>Telnet support for modem emulation.<br>Default:0<br>Bit 0-1 Send TCP transmit data timer<br>0 = 100ms<br>1 = 200 ms<br>2 = 300 ms<br>3 = 500 ms<br>Bits 2-3 Service TCP transmit data watermark<br>0 = 256<br>1 = 512<br>2 =768<br>3 =1024<br>Bits 4-5 Service TCP receive data watermark<br>0 = 256<br>1 = 512<br>2 =768<br>3 =1024<br>Bits 6-7 Telnet support (RFC 2217)<br>0 = Disabled<br>1 = Receive Telnet support enabled<br>2 = Transmit Telnet support enabled<br>3 = Receive and Transmit Telnet support enabled | - | - | * | 0 |
| S38 | Accepted but ignored. | 0-255 | s | | 20 |
| S39 | Flow Control Bit Mapped Options Status<br>Default:3 (00000011b)<br>Bits 0-2Status of command options<br>0 =No flow control<br>3 =RTS/CTS (&K3) (Default.)<br>4 =XON/XOFF (&K4)<br>5 =Transparent XON (&K5)<br>6 =Both methods (&K6)<br>Bits 3-7Reserved | - | - | * | 3 |
| S40 | Accepted but ignored. | - | - | * | 104 (68h) |
| S41 | Accepted but ignored. | - | - | * | 195 (C3h) |
| S42 - S45 | Reserved | - | - | | - |
| S46 | Accepted but ignored. | - | - | * | 138 |
| S48 | Accepted but ignored. | - | - | * | 7 |
| S82 | Accepted but ignored. | - | - | | 128(40h) |
| S86 | Accepted but ignored. | 0-255 | - | | - |

| Register | Function | Range | Units | Saved | Default |
|---|---|---|---|---|---|
| S91 | Accepted but ignored. | 0-15 | dBm | | 10 (Country dependent) |
| S92 | Accepted but ignored. | 0-15 | dBm | | 10 (Country dependent) |
| S95 | Accepted but ignored. | - | - | * | 0 |
| * Register value may be stored in one of two user profiles with the &W command. | | | | | |

## Result Codes

| Short | Long Form | | Short | Long Form | | Short | Long Form |
|---|---|---|---|---|---|---|---|
| 0 | OK | | 13 | CONNECT 7200 | | 84 | CONNECT 33600 |
| 1 | CONNECT | | 14 | CONNECT 12000 | | 91 | CONNECT 31200 |
| 2 | RING | | 15 | CONNECT 14400 | | 165 | CONNECT 32000 |
| 3 | NO CARRIER | | 16 | CONNECT 19200 | | 166 | CONNECT 34000 |
| 4 | ERROR | | 17 | CONNECT 38400 | | 167 | CONNECT 36000 |
| 5 | CONNECT 1200 | | 18 | CONNECT 57600 | | 168 | CONNECT 38000 |
| 6 | NO DIALTONE | | 19 | CONNECT 115200 | | 169 | CONNECT 40000 |
| 7 | BUSY | | 20 | CONNECT 230400 | | 170 | CONNECT 42000 |
| 8 | NO ANSWER | | 59 | CONNECT 16800 | | 171 | CONNECT 44000 |
| 9 | CONNECT 0600 | | 61 | CONNECT 21600 | | 172 | CONNECT 46000 |
| 10 | CONNECT 2400 | | 62 | CONNECT 24000 | | 173 | CONNECT 48000 |
| 11 | CONNECT 4800 | | 63 | CONNECT 26400 | | 174 | CONNECT 50000 |
| 12 | CONNECT 9600 | | 64 | CONNECT 28800 | | | |

## About Autoconnection

The autoconnection feature allows you to configure a user to access the device server and then be automatically connected to a host on the LAN. You can implement autoconnection in the following ways:

- By port where all port users are automatically connected to the same host. The device server is completely transparent to them.
- By user where a user is required to log on and may be required to supply a password, but once the user is authenticated, an automatic connection to a host is made.

## Configuring a Port for Autoconnection: Web Interface

This section describes how to configure a port for autoconnection from the web interface.

1. Access the web interface by entering the device server IP address in a browser's URL window.
2. Log on to the device server as **`root`**. The default password is **`dbps.`**
3. Select **Serial Ports** under Configuration.
4. Click **Change Profile** under Port Profile.
5. Click the profile based on the device connected to your port.Use the online help for more information.

   Note: TCP Sockets is the Autoconnection profile.

6. To return to the main Ports menu, choose Ports from the Menu again.

## Commands for Configuring Autoconnection by Port or by User

See the complete list of commands in the *Digi One/PortServer TS Command Reference*. The commands needed for autoconnection either by port or by user will be under the following commands in the Command Reference on your Software and Documentation CD.

- set ports
- set user

## Configuring a User for Autoconnection: Web Interface

1. Access the web interface by entering the device server IP address in a browser's URL window.
2. Log on to the device server as **`root`**. The default password is **`dbps`**.
3. Click **Users** from the menu.
4. Choose **New User**.
5. Enter a username and then click **Next.**
6. Select the "Terminal/Terminal Emulation" user profile and click **Next**

7. Check Automatically connect to a ... Be sure to specify the following:
   - Hostname or IP address that will be the destination
   - Service
   - Destination TCP port number, which determines the type of connection for this user (such as 23 for Telnet)
8. Click **Next** and Verify the settings.
9. Click **Finish** to save settings.

## Configuring TCP Socket Communication

TCP socket communication enables serial devices to communicate with each other over an Ethernet network as though they were connected by a serial cable.

This section describes how to use the web interface to configure this Digi device for the following:

- Inbound connections, that is, connections that are initiated by the device on the other side of the network
- Outbound connection, that is, connections that are initiated by the device connected to the serial port

#### Procedure for Configuring Inbound and Outbound Socket Communication

1. Access the web interface by entering the device server IP address in a browser's URL window.
2. Log on to the device server as **`root`**. The default password is **`dbps`**.
3. Click **Serial Ports**.
4. Click the port number you wish to configure.
5. Click **Change Profile.**
6. Select TCP Sockets and click **Apply.**
7. Enter the parameters for the appropriate connection. Use the context sensitive Help for additional information.

## Configuring UDP Multicast

The Digi One and PortServer TS devices are devices capable of UDP multicast. UDP multicast is used to send serial data over an Ethernet cable to one or many hosts at the same time. UDP is a connectionless protocol, meaning UDP does not need a protocol, but is sending data without any form of acknowledgement or error correction. Up to 64 devices can receive a UDP multicast at one time. Both the transmitting and receiving devices must be configured properly for UDP multicast to work.

This section describes how to use the web interface to configure this Digi device for the following:

- Inbound connections, that is, connections that are initiated by the device on the other side of the network
- Outbound connection, that is, connections that are initiated by the device connected to the serial port

**Procedure for Configuring Inbound or Outbound Socket Communication**

1. Access the web interface by entering the device server IP address in a browser's URL window.
2. Log on to the Digi One/PortServer TS as **root**. The default password is **dbps**.
3. Click **Serial Ports**.
4. Click the port number you want to configure.
5. Click **Change Profile** and select **UDP Socket**

   Note: The serial parameters for two connecting devices must match meaning if one device is set for 9600 bps, the other device must be set for the same rate.

6. Fill in the requested information and click **Apply** to save the settings.
7. Repeat these steps until you have added the necessary destinations. Use the context sensitive Help for additional information.

## Configuring Static Routes

This section describes how to configure device server for static routes.

#### Related Information

See the set route command in the *Digi One/PortServer TS Command Reference*.

#### Procedure

To configure a static route over a PPP link, enter the following command:

```
set route net=addr mask=mask metric=hops wanname=interface
  gateway=gateway
```

where

- *addr* is either the IP address of a system to be reached over this route or the network address of the subnet that is to be reached on this route
- *mask* is the mask to use for interpreting the IP address.
- *metric* is the number of hop to the destination
- *interface* is either `ether` if this route is over the Ethernet interface or the name of a user if the route is over a PPP link
- *gateway* is the IP address of the device that is the next hop to the destination

#### Example: Route Using the Ethernet Interface

In this example, a route to a subnet is created over the Ethernet interface. Key features include the following:

- The address on the net field is a subnetwork address, not the IP address of a specific device
- The wannane=ether, indicating that this route is over the Ethernet interface
- The metric field indicates that packets to this subnet will pass through two routers
- The gateway field indicates that all packets using this route are to be forwarded to the device at IP address 191.21.21.2.

```
set route net=199.21.33.0 mask=255.255.255.0 metric=2
  wannname=ether gateway=199.21.21.2
```

#### Example: Route Using a PPP Link

In this example, a route to a subnet is created over a PPP interface. Key features include the following:

- The address on the net field is IP address of a specific device, not a subnetwork address
- The WAN name is the name of a PPP user.

- The metric field indicates that packets to this subnet will pass through two routers
- The gateway field indicates that all packets using this route are to be forwarded to the device at IP address 191.21.21.2.

```
set route net=199.21.33.44 mask=255.255.255.255 metric=2
  wannname=ppp1 gateway=199.21.21.2
```

## Configuring Dynamic Routes Using RIP

This section describes how to configure the device server for dynamic routing.

#### Related Information

See the set forwarding command in the *Digi One/PortServer TS Command Reference*.

#### Starting Point

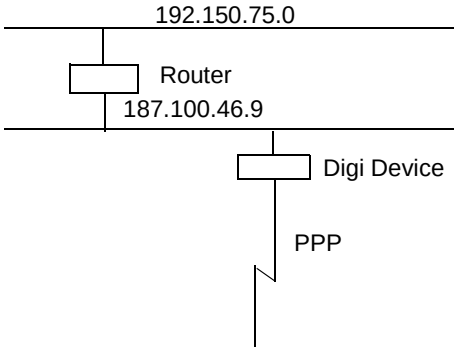
This procedure assumes that you have signed on as root and have or will configure modems, modem scripts, devices, and filters for routes that use serial lines.

#### Procedure

1. Configure the links over which routed packets and RIP updates will be sent.
   - To enable routing over the LAN to which device server is attached, no routing-specific configuration is required.
   - To enable routing over PPP links be sure to use the netrouting field on the set user command to configure how device server handles RIP updates. You can configure the link so that device server does any of the following with RIP updates:
     - Both sends and receives them (netrouting=both)
     - Sends them only (netrouting=send)
     - Receives them only (netrouting=receive)
     - Neither sends nor receives them (netrouting=off)
2. Configure the device server for dynamic routing with a set forwarding command that specifies state=active.

#### Example: Dynamic Routes

In this example, which shows only those commands and command fields pertinent to routing, device server is configured for dynamic routing using RIP. But to prevent RIP updates from being sent across the PPP link, the set user command that defines the link specifies netrouting=off.




```
set forwarding state=active poisonreverse=on splithorizon=on
set user name=link1...netrouting=off
```

## Configuring Proxy ARP

This section describes how to configure device server for Proxy ARP.

#### Related Information

See the set forwarding command in the *Digi One/PortServer TS Command Reference*.

#### Starting Point

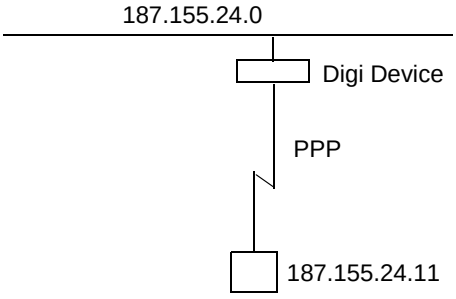
This procedure assumes that you have signed on as root and have or will configure modems, modem scripts, devices, and filters for routes that use serial lines.

#### Procedure

1. Configure the links over which packets will be routed using a set user command. This command must specify (on the ipaddr field) a specific IP address for the remote system using the Proxy ARP service.
2. Configure device server for Proxy ARP by supplying a set forwarding command that specifies the following:
   - state=passive
   - proxyarp=on

#### Example

In this example, device server provides Proxy ARP services to a remote host.




```
set user name=link1...ipaddr=187.155.24.11
set forwarding state=passive proxyarp=on
```

## Controlling Access to the Configuration

Controlling access of device server restricts access to the configuration by defining the following types of users:

- The root user, who has unlimited access to device server commands. He or she can view any configuration table and change any configuration parameter. The root is identified by the user name **`root`** and must supply a password to be authenticated. The default root password is **`dbps`**. You should change this password immediately.
- Regular users, who have much more restricted access to device server commands. Regular users can view some configuration tables and can change some configuration parameters related to their own sessions and passwords. See the *Digi One/PortServer TS Command Reference* for information on the limitations placed on regular users for each command.

## Controlling Access to Inbound Ports

This section describes methods of controlling access to inbound serial ports. An inbound port is one defined on the `dev` field of the set ports command for one of the following device types:

- term (used to define terminal connections)
- min (used to define incoming modem connections)
- mio (used to define bi-directional modem connections)
- hdial, hio (used to define computer connections)

### Default Access Restrictions

The default configuration for inbound ports is that a login and password are required to access them.

### Options for Removing Access Restriction

The login and password requirement for inbound ports can be changed by configuring

- The port so that it does not require a login and password. In this case, no one is required to supply a login or password.
- Specific users so that they do not require a password. In this case, some users do not supply passwords and others are required.

### Procedure for Changing a Port's Access Requirements

To configure a port so that no one has to login or specify a password, supply a set logins command that specifies the following:

`set logins range=`*`range`* `login=off passwd=off`

**Example:**

```
set logins range=1-2 login=off passwd=off
```

#### Procedure for Changing a User's Access Requirements

To configure a user so that he or she does not have to specify a password when accessing an inbound port, supply a set user command that specifies the following:

```
set user name=name password=off
```

where *name* is a name to identify the user

**Example:**

```
set user name=user1 password=off
```

## Controlling Access to Outbound Ports

This section describes methods for controlling access to outbound serial ports. An outbound port is one defined on the dev field of the set ports command for one of the following device types:

- prn (used to define printer connections)
- mout (used to define outbound modem connections
- mio (used to define bi-directional modem connections)
- host (used to define host connections)
- ia

#### Default Access

The default for outbound ports is unlimited access.

#### Restricting Access to Outbound Ports

Use the set auth command to restrict access to outbound ports. See the description of the set auth command in the *Digi One/PortServer TS Command Reference* for more information.

#### CHAP Authentication for PPP Users

CHAP authentication can be used to restrict PPP user access to outbound ports. For more information on CHAP configuration, see the set user command in the device server *Command Reference*.

## Controlling Access to the Command Line

This section describes how to restrict access to the device server command line.

#### Autoconnection

The autoconnection feature allows you to configure a user to access the device server but then be automatically connected to a host on the LAN.

You can implement autoconnection in the following ways:

- By port where all port users are automatically connected to the same host. The device server is completely transparent to them.

- By user where a user is required to login and may be required to supply a password, but once the user is authenticated, an automatic connection to a host is made.

For information on configuring autoconnection, see "Configuring Autoconnection" on page 49.

#### Method 2: Menus

Menus select destination systems without having to access the device server command line. For information on configuring menus, see the description of the set menu command in the *Digi One/PortServer TS Command Reference*.

## Issuing User Passwords

This section discusses how to issue user passwords.

#### Related Information

See the newpass and set user commands in the *Digi One/PortServer TS Command Reference*.

#### Starting Point

This procedure assumes that you have signed on as root and already configured the user to whom you will be issuing a password.

The Advanced tab under User allows you to set Escape characters for Connect, Telnet, Rlogin, and Kill as well as an SSH Public Key. Click **Apply** to save the settings.

#### Procedure

1. Issue a newpass command that identifies the user (on the name field) to whom this password will be issued.
2. When the system prompts you for a new password, type in the password and then press Enter.
3. When the system prompts you to enter the new password again, type it in and then press Enter.

## Configuring SSH Version 2 for Secure Communication

This section discusses how to configure a user for SSH version 2 encryption.

This feature is only available for the following devices.

| Device | Required Hardware | Required Firmware |
|---|---|---|
| Digi One TS | 50000771-01A or higher | 82000747a or higher |
| PortServer TS 2 MEI | 50000771-02A or higher | |
| PortServer TS 4 MEI & Wireless | 50000771-03A or higher | |

#### Password Protection

To configure simple password authentication for an SSH user, no SSH-specific configuration is required. Simply configure a user by entering the following commands:

```
set user name=name password=on
newpass name=name
```

where *name* is a user name

Example:

```
set user name=ssh-user1
newpass name=ssh-user1
```

#### Using a Public Key

To enable public key authentication and to associate a public key with a user, enter the following command:

```
set user name=name loadkey=host:key
```

where

- *name* is the name of a user
- *host* is either an IP address or DNS name of a host running TFTP that holds
- *key* is the name of a file that contains the DSA public key. If your host's implementation requires a complete path to the file, specify the path here as well.

Example:

```
set user name=secure loadkey=143.191.2.34:ssh-file
```

#### Making Reverse SSH Connections to Ports

The convention used to identify a port for a reverse SSH connection to a Digi device is to use 2500 + the port number. See the examples that follow for more information.

***Example: Reverse SSH Connection to Port 1***

```
ssh 192.1.2.3 2501
```

***Example: Reverse SSH Connection to Port 4***

```
ssh 192.1.2.3 2504
```

## Controlling Access to Services

This section describes how to disable services, such as Telnet and Rlogin, for inbound users, which means that they cannot access the Digi device using those services. This feature allows you to turn off individual services or to specify a security level, which means that all services not included in that level are turned off.

#### Services that Can Be Turned Off

The following services can be turned off.

- HTTP

- RealPort
- Reverse TCP
- Reverse Telnet
- Remote login
- Remote shell
- SNMP
- SSH
- Telnet

#### Service Levels

These are the secure access levels:

- Secure, which means that SSH is the only service available to inbound users
- High, which means that SSH, HTTP, SNMP, and RealPort services are available to inbound users
- Normal, which means all services are available
- Custom, which means you can select services to turn off.

The default service level is normal, which means that all services are available.

#### Procedure

Use this topic for information on using the web interface to turn services off.

1. Access the device server from a web browser by entering the Digi device's IP address in the URL window.
2. Log on as **`root`**. The default password is **`dbps`**.
3. Click **Security** under Configuration.
4. Select the **Secure Access** tab and select the security level you want or choose **Custom** to select the specific services you want to turn off. Use the context sensitive help for information on configuration fields.

# Chapter 13 Configuring the Digi Device for IA (Industrial Automation)

## Configuring Modbus

Modbus is a protocol that defines how devices in an industrial automation (IA) environment communicate. It specifies that a controlling unit, called a master, manages one or more units, called slaves. The protocol specifies that only the master may initiate communication. Slaves may only respond.

The protocol defines the structure of Modbus messages, determines how the master requests information from the slave or specifies an action for the slave to take, defines how the slave is to respond, specifies addressing conventions, and deals with many of the other details required for communication to occur. Modbus defines two encoding schemes, Modbus ASCII and Modbus RTU. Each Modbus device uses one or the other.

Designed to function over a serial communication cable, Modbus has been extended in recent years to function over an Ethernet network using Modbus/TCP, which defines a method of encapsulating Modbus ASCII or Modbus RTU messages in IP packets for transport over the network.

The extermely flexible Digi implementation includes support for Modbus ASCII, Modbus RTU, Modbus/TCP, and two other methods of transport over a network, TCP socket and UDP socket communication. The implementation enables multiple network-based masters to concurrently initiate communication with serial-based slaves using any of the supported network protocols.

### Modbus Configuration Procedure

Use the setia command from the  See the *Digi One/PortServer TS Command Reference* for information.

- Configure the serial port for the serial communication parameters (baud rate, data bits, parity and stop bits) required by the connected IA device.
- Choose Modbus ASCII or Modbus RTU as the serial port protocol, depending on the requirements of the IA device connected to the port.
- If you configure the port for a slave, you do not have to configure a network-based master. Communication with the master just works. (If the master is connected to a serial port, it must be configured, however.)
- If you configure a port for a master and the slaves are located on the network, TCP sockets, UDP sockets, and Modbus/TCP are all supported. Use the protocol required by the master.

## Configuring the User-Defined Protocol

Digi One\PortServer TS 2/4 MEI devices support what Digi calls the “user-defined” protocol, which is any IA serial-port protocol with the following attributes:

- All message packets are bounded by fixed header and trailer strings.
- Each protocol request is followed by a single response.

#### Modbus Configuration Procedure

Use the setia command from the  See the *Digi One/PortServer TS Command Reference* for information.

- Configure the serial port for serial communication parameters (baud rate, data bits, parity and stop bits) required by the connected IA device.
- Choose User-defined as the serial-port protocol.
- If you configure the port for a slave, you do not have to configure a network-based master. Communication with the master just works. (If the master is connected to a serial port, it must be configured, however.)
- If you configure a port for a master and the slaves are located on the network, TCP sockets and UDP sockets are supported options.

## About the Domain Name System

This section discusses key concepts of the domain name system.

#### Purpose of DNS

The domain name system maps domain names to information associated with these names, such as IP addresses.

#### DNS Components

DNS components include:

- A distributed database consisting of domain names and associated information
- A hierarchical system of domain name servers that maintain the database and use it to respond to requests for information about a particular domain name, such as its IP address
- Domain name resolvers that
  - Accept requests from users
  - Satisfy information requests by building and submitting properly formulated queries to one or more name servers or by retrieving information from a local host file
  - Return information to users
  - Cache information for future use

#### Types of Name Servers

There are two types of name servers in the domain name system:

- Local servers maintain information for resources within a local zone. It is up to individual network administrators to determine the scope of a local zone.
- Root servers maintain information in higher-level domains than do local servers.

Typically, when a user requires information about a domain name, the resolver queries a local server. If local servers cannot provide the information, root servers are queried next.

#### Naming Conventions

Each node in the domain name system has a globally unique domain name that consists of its own name, which is called a label, and the labels of all superior nodes.

#### DNS Name Example

Here is an example of a domain name. Note that labels are separated by periods:

```
mn07.amalgamated.com
```

In this example, mn07 is part of the higher-level domain called

amalgamated.com.

## Configuration Procedures

#### Procedure for Using a Name Server

To configure a DNS server, enter the following command:

`set config domain=`*`domain`* `myname=`*`name`* `dns=`*`ip-address`*

where

- *domain* is the domain in which the device server will reside
- *name* is a DNS name for device server
- *ip-address* is the IP address of a name server

Example:

```
set config domain=digi.com myname=poe dns=204.221.1.4
```

#### Procedure for Using a Host File

Use this section to configure the host table, which maps IP addresses to host names.

Enter the following command

`set host name=`*`name`* `ip=`*`ip-address`*

where

- *name* is the name the host
- *ip-address* is the IP address of the host

#### Example

In this example, three IP address-to-name mappings are configured

```
set host name=poe ip=204.221.110.200
set host name=gary ip=204.221.110.202
set host name=toni ip=204.221.110.203
```

## About SNMP and the Device Server Agent

This section introduces SNMP and network management in TCP/IP networks and it describes the device server agent. It discusses the following:

- Network management components
- SNMP agent
- SNMP traps
- MIB support of the device server agent
- Support traps of the device server agent

#### Network Management Components

The TCP/IP network management architecture contains the following components:

- Managed nodes such as host systems, routers, terminal and communications servers (such as device server) and other network devices
- One or more network managers (also called network management stations), which are the points from which the network is managed
- Agents that reside on managed nodes and retrieve management information and communicate this information to network managers
- The network management protocol, SNMP, which governs the exchange of information between the nodes and stations
- Management information, which is the database of information about managed objects. This database is called the management information base (MIB).

#### SNMP Management Agent

Each managed node contains at least one agent—a component that responds to requests from the network manager—that retrieves network management information from its node and notifies the manager when significant events occur.

#### SNMP Traps

A mechanism defined by SNMP is called a trap, which is a report or “alarm” from a managed node to an SNMP manager that a significant event has occurred.

#### MIB Support

The agent supports the following MIBs:

- Read-write for MIB II (RFC 1213), which is an Internet-standard MIB, consisting of managed objects from the systems, interfaces, IP, ICMP, TCP, UDP, transmission, and SNMP group

- Read-write for the character-stream devices using SMIv2 MIB (RFC 1658)
- Read-write for the RS-232-like hardware devices MIB (RFC 1659)
- Read-write for the device server IP Network Control Protocol of the Point-to-Point Protocol MIB (RFC 1473)

#### Message Support

The SNMP agent supports the Set, Get, GetNext, and Trap messages as defined in RFC 1157. These messages are used as follows:

- Set, which means set the value of a specific object from one of the supported MIBs
- Get, which means retrieve the value of a specific object form one of the supported MIBs
- GetNext, which means retrieve the value of the next object in the MIB
- Trap, which means send traps to the manager when a particular type of significant event occurs

#### Supported Traps

The agent can send traps when any of the following occur:

- Cold starts (device server initializes)
- Authentication failures
- Login attempts

### Configuration Procedure: Web Interface

1. Access the web interface by entering the device server IP address in a browser's URL window.
2. Log on to the device server as **`root`**.

   Note: The default password is **`dbps`**, which should be changed. See the newpass command in the *Digi One/PortServer TS Command Reference* for information on changing passwords.

3. Click **SNMP** under System from the menu.
4. Fill in the configuration fields and click **Apply** to save settings.

## About Configuring Users

Although it is not required, the device server is often configured to accommodate the requirements of particular users. Typical configurable user attributes include the following:

- Whether the user is required to supply a password
- Autoconnection attributes, such as the system to which the user should be automatically connected at login
- The interface the device presents the user, such as a menu or command line
- Whether the user has access to outbound ports

Note: For information on configuring PPP users, see "Configuring PPP" on page 27.

### Configuration Methods

You can configure users in the following ways:

- With the web interface.
- With the set user command. See the set user command in the *Digi One/PortServer TS Command Reference*.

## Common User Features

This section discusses common user-related features. For a complete list, see the set user command in the *Digi One/PortServer TS Command Reference*.

| Feature | Description | set user Field |
|---|---|---|
| autoconnect | Automatically connects the user to the host specified on the autohost field using the service (TCP port) defined on the autoport or autoservice fields.<br>Autoconnection can also be implemented by port instead of by user.<br>This feature is configurable from the web interface. | autoconnect<br>autohost<br>autoport<br>autoservice |
| Default access type | Defines the type of access the user is restricted to. Menu, command line, autoconnect, and outgoing and netservice are the types.<br>This feature is configurable from the web interface. | defaultaccess |
| Menu access | Defines the menu that is to be presented to a user with menu access.<br>This feature is configurable from the web interface. | menu |
| Port access | Defines the number of outbound ports a user connected over the LAN can access at one time.<br>This feature is not configurable from the web interface. | maxsessions |
| PPP | Defines PPP-related parameters for the user. | There are too many fields to list here. See the set user command for more information. |
| Routing updates | Defines whether RIP routing updates are forwarded over the link to this user. | netrouting |

## Configuring a User: Web Interface

Use this section to configure users with from the web interface.

1. Access the web interface by entering the device server IP address in a browser's URL window.
2. Log on to the device server as **`root`**. The default password is **`dbps`**.
3. Click **Users** under Configuration.
4. Click **New User**.
5. Enter the user name and password (password is optional).
6. Select the profile for user.
7. Enter appropriate parameters, click **Next**, and verify settings.

   Note: If the user profile is Custom there are no parmeters to set. Click Finish if user name is correct.

8. Click **Finish** to save settings.

   Note: To edit a user go to the Users page and click on the user name you wish to edit, enter the parameters and click **Apply**.

The Advanced tab under User allows you to set Escape characters for Connect, Telnet, Rlogin, and Kill as well as an SSH Public Key. Click **Apply** to save the settings.

## Commands for Configuring a User

Use the commands listed below as well as find specific examples and complete parameters from the *Digi One/PortServer TS Command Reference*.

- set user (name=)
- newpass to assign a password
- default access=menu to configure a user for a menu
- autoconnect to automatically connect a user
- remove to remove a user from the user table

## Upgrading the Firmware

This section describes how to upgrade the firmware, which can be done from the web interface using HTTP or FTP.

#### HTTP or TFTP Upgrade Procedure

If your hardware is okay, make sure you are running the latest firmware version available. Check the Digi Support site for the latest firmware and/or POST updates for your device:

http://ftp.digi.com/support/firmware

1. Download a copy of the firmware file.
2. Access the Digi device server's web interface by entering the Digi device server's IP address in a browser's URL window and log on (User Name **`root`**, Password **`dbps`**).
3. Choose **Update Firmware** under Administration from the main menu.
4. Browse to the location on your system where the firmware has been saved, select the correct file, and click **Update**.
5. Reboot the device when prompted.
6. Access the Digi device server's web interface and verify on the Information Page that the Firmware version has been successfully updated.

**Do not leave your browser until you are prompted to reboot.**

#### Command Line

If you want to use the command line to upgrade firmware, use the boot command. See the *Digi One/PortServer TS Command Reference* for more information.

## Copying the Configuration to and from a Remote Host

This section discusses copying the configuration to a remote host and from a remote host, which means you can configure the Digi device remotely by entering commands in a text file and then copying the file to the Digi device.

#### When To Use Remote Configuration

Typically, you use remote configuration when you have several device servers with similar configurations and want to keep a master configuration on a remote host, from which you can easily create variations for downloading to individual device servers.

#### Rules for Editing a Configuration file

Here are some rules for editing a configuration file on a remote host:

- Edit the file with any text editor.
- Each line of the file must start with a set command, such as set user or set line. In other words, do not let commands wrap to the next line if your editor supports this function.

#### HTTP Procedure

1. Access the web interface by entering the device server IP address in a browser's URL window.
2. Log on to the device server as **root**. The default password is **dbps**.
3. From the main menu, choose Admin > HTTP CpConf.
4. To copy a file from the host you are on do the following:
   - Choose Browse, select the file, and then choose Submit.
   - Follow the prompts to complete this procedure.
5. To copy a file to a remote host, do the following:
   - Right click on the Download current config link.
   - Choose Save Target as
   - Specify a file name and then choose Save.
6. Follow the prompts to complete this task.

#### TFTP Procedure

1. Ensure that TFTP is running on the remote host.
2. Access the web interface by entering the device server IP address in a browser's URL window.
3. Log on to the device server as **root**. The default password is **dbps**.
4. From the main menu, choose Admin > TFTP CpConf.
5. Choose either Copy configuration to a TFTP server or Copy configuration from a TFTP server.
6. Specify an IP address and a file name and then choose Submit.
7. Follow the prompts to complete this task.

#### Command Line

If you want to use the command line to copy the configuration to and from a remote host, use the cpconf command. See the *Digi One/PortServer TS Command Reference* for more information.

### Resetting Device Server Configuration to Defaults

Use this topic to reset the device server configuration to defaults.

Note: This procedure causes the device server to lose all configuration changes. If you have a complex configuration, contact Digi before performing for information on saving your configuration. See "Reference and Certifications" on page 79 for information.

#### Procedure

1. Use a pen, the point of a paper clip, or some other device to press the recessed button on the front panel.
2. While holding down the button, power on the device server.
3. When the 1-5-1 LED pattern is displayed, release the button.

The device boots up.

## Commands for Resetting the Configuration to Defaults

Use the revert command to reset the configuration to factory defaults or the latest version stored in NVRAM. See the *Digi One/PortServer TS Command Reference* for complete information.

Note: You can also use the range field on this command to define a range of ports with the serial, port, line, flow, keys, and login options.

# *Chapter 18* Configuring Power Over the Serial Ports

## Serial Power Feature

The Serial Power feature available for the Digi One TS, PortServer TS 2 MEI, and PortServer TS 4 MEI allows the Digi device to power a serial device (power out) or use a serial device to power the Digi device (power in). The advantage of this feature is to eliminate an external power supply.

Power out is available on all ports through Ring Indicator (RI) or Data Terminal Ready (DTR). Power in is available only through RI and **only** on port one (1). The Serial Power feature is active on a specific port when that port is configured for RS 232 operation.

- The power out budget equals one (1) watt (the total amount of power available). The available power can be divided in any combination between the ports but the following rules must be observed:
  - RI = 5 volts @ up to 200 mA (max)
  - DTR = 9 volts @ up to 100 mA (max)
  - You may use DTR or RI as the source of power (power out) on any port but you may not use both DTR and RI on the same port.
- Pinout information
  - RI is pin 1
  - DTR is pin 9
- RI signaling is lost when the pin is used for power

## Configuring RI Power

### RI Power In

Ring Indicator (RI) power in accepts power into the Digi device server **only** on port one. Power in is available using the RI pin. The Digi device requires power in the range of 9-30 VDC @ 525mA (max). Ports 2, 3, and 4 can still supply power to a serial device through the RI or DTR pins for each port. When using power in through the RI, the external power supplies (both powered Ethernet and the barrel connector power supply) are inoperative. Altpin will not work for RI power in.

1. Open the device unit enclosure and move the black jumper to the following settings:
   P-6 jumper on pins 1 and 2

Note: When the jumper is placed correctly for power in, the jumper will set on the pins closest to the edge of the board. The left arrow indicates the open pin and the right arrow is pointing to the jumper.

2. Close the device unit enclosure.

**RI Power Out**

Ring Indicator (RI) power out is available on all ports. The total power budget for this feature is one (1) watt not to exceed 5 volts @ up to 200mA on any single port. The following procedure assumes the unit will only be used for RI power out.

1. Set the port DIP switches to the following places: switch 1 and 3 are up and 2 and 4 are down (see "Serial Power Table" on page 77 for illustration).
2. Enable the RI power through the web interface.
3. Connect power supply with the barrel-connector power supply provided with the device or use powered Ethernet.

Note: If the unit will be used with RI power in (port 1 only), set the jumper to the following setting:
P-6 jumper on pins 1and 2
and do not use an external power source. Port 1 cannot be used for both power in and power out.

## Configuring DTR Power

**Power Out**

Data Terminal Ready (DTR) power out is the factory default on the Digi device server. Total power budget for this feature is one watt not to exceed 9 volts @ up to 100mA to any single port.

1. Set the port DIP switches to EIA 232 (switch 1 is up, 2,3, and 4 are down) to enable DTR power.
2. Open the port and set DTR high.

Note Here are the pins to verify the jumper position. The **default** position has the jumper on the two pins furthest from the edge. DO NOT MOVE THE JUMPER FROM THE DEFAULT UNLESS USING RI POWER IN.


If you are having trouble with your unit after using the Power over port feature, you may have tripped the circuit breaker in the unit. You can identify this by the RI or DTR signal indicators found in the System Information under Administration on the main menu in the web interface. Click the port number using serial power. (Remember serial power out is unavailable if the MEI settings are not 232.)

Under serial power will be a message if the breaker is tripped. Follow the

instructions to reset.

From the command line use the two examples below for additional information.

```
display circuitbreaker
```

Display the status of the circuit breaker

```
set configuration circuitbreaker=reset
```

Reset the circuit breaker

Note: set configuration print will also give the status of the circuitbreaker state.

## Serial Power Table

Use this table for summary information for a serial power setup.

| Quick Summary Table for Setup of Serial Power | DTR Power | RI Power | |
|---|---|---|---|
| | OUT | OUT | IN |
| Switch Settings |   |   | |
| DTR setting | DTR ON | DTR OFF | DTR OFF |
| Ports Allowed | 1, 2, 3, 4 | 1*, 2, 3, 4 *unless port 1 is used for power in | 1 |
| Jumper Pin Settings | P-6 jumper on pins 2 & 3 (Factory Default) | P-6 jumper on pins 2 & 3 (Factory Default) | P-6 jumper on pins 1 & 2 |
| Power Budget | 9v @ up to 100mA one watt | 5v @ up to 200 mA one watt | 9 -30 v @ up to 525mA (max) |

## Interpreting the LEDs

**LEDs**

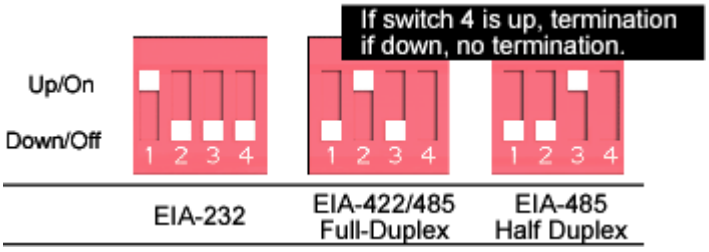
| LED | Color | State | Indicates |
|---|---|---|---|
| Power | Green (labeled PWR) | On | Power detected |
| | | Steady blinking | Waiting for an IP address |
| | | Blinking 1-1-1 | Starting the EOS |
| | | Blinking 1-3-1 | Starting the TFTP process |
| | | Blinking 1-5-1 | Configuration returned to factory defaults |
| | | Off | No power detected |
| Radio Signal Strength | Yellow | Varying brightness | Signal strength relates to brightness or dimness of the light |
| Status (Link) | Green | On | Physical network detected |
| | | Off | No physical network detected |
| ACT | Yellow | On | Bad initialization |
| | | Off | Ready |
| | | Blinking | Network activity |

**LED Diagnostics**

| LED Activity | Indication |
|---|---|
| 1-1-1 pattern | Starting the EOS. |
| 1-3-1 pattern | TFTP boot process started. |
| 1-5-1 pattern | Tells you that configuration has been return to the factory configuration. See "Managing the OS and Configuration" on page 71. |
| 9-1-1 pattern | Contact Tech Support for help.<br>1-952-912-3444 or outside the U.S. (+011) 952-912-3444 |
| Steady blinking | Device seeking an IP address from DHCP server. |
| Solid | On Digi One RealPort and PortServer TS 2/4 devices, this means the boot completed sucessfully. |

### Device Server EIA 232/422/485 Switch Settings

| Function | Switch Settings | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| EIA-232 | Up | Down | Down | Down |
| EIA-422/485 Full-duplex | Down | Up | Down | If up, termination. If down, no termination |
| EIA-485 half-duplex | Down | Down | Up | |




### RJ-45 Pinouts

| RJ-45 Pin | EIA-232 | EIA-422/485 Full-Duplex | EIA-485 Half-Duplex |
|---|---|---|---|
| 1 | RI | TxD- | TxD- |
| 2 | DSR | RxD- | RxD- |
| 3 | RTS | RTS+ | NA |
| 4 | GND | GND | GND |
| 5 | TxD | TxD+ | TxD+ |
| 6 | RxD | RxD+ | RxD+ |
| 7 | SG | SG | SG |
| 8 | CTS | CTS+ | NA |
| 9 | DTR | RTS- | NA |
| 10 | DCD | CTS- | NA |

**WARNING:** To prevent electric shock, do not remove the cover of this module while unit is powered up. There are no user-serviceable parts inside. Refer servicing to qualified personnel.

**CAUTION:** This unit has two power inputs. For total isolation from electrical shock and energy hazard, disconnect both power inputs. The device is intended to be mounted in an indoor only type system.

### Standard Models Specifications

| Power Requirements (Standard Models) | |
|---|---|
| 2-contact barrel connector  | +9 to +30 VDC 525 mA (max) external power supply |
| **Environmental** | |
| Ambient temperature | 0 to 50° Celsius<br>32 to 131° Fahrenheit |
| Relative humidity | 5% to 90% non-condensing |
| Altitude | 0 to 12,000 feet<br>0 to 3,658 meters |
| **Mechanical** | |
| Length | 13.33 centimeters<br>5.25 inches |
| Width | 8.25 centimeters<br>3.25 inches |
| Height | 3.842 centimeters<br>1.306 inches |
| Weight | .227 Kilos<br>8 ounces |

## Certifications

### FCC Part 15 Class A

#### Radio Frequency Interference (RFI) (FCC 15.105)

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

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

#### Labeling Requirements (FCC 15.19)

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

#### Modifications (FCC 15.21)

Changes or modifications to this equipment not expressly approved by Digi may void the user's authority to operate this equipment.

#### Cables (FCC 15.27)

Shielded cables *must* be used to remain within the Class A limitations.

| Product Certifications | |
|---|---|
| **Emission** | • EN55022:1994<br>• CISPR 22:1993<br>• AS/NZS 3548<br>• VCCI<br>• FCC P15 Subpart B<br>• EN61000-3,2:2000<br>• EN61000-3-3:1995 |
| **Immunity** | • EN55024:1998 |
| **Safety** | • UL60950-1<br>• CSA 22.2 No. 60950-1-03<br>• IEC60950<br>• EN60950 |

#### ICES 003 Class B

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n'emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class B prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

## Digi Contact Information

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