Connectware™

User's Guide

Digi One™ IA
Digi One SP

92000326_B

Contents

Chapter 6 Reference

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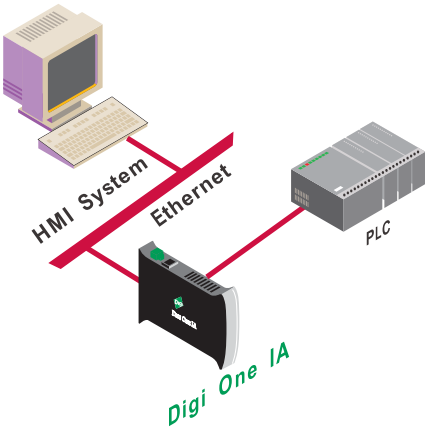
Chapter 1 *Introduction*

In This Chapter

Introducing the Digi One IA

Digi One IA Overview

The Digi One IA device server easily enables any industrial device with a serial port to connect to the Ethernet. These devices include Programmable Logic Controllers, process and quality equipment, motors, drives, bar-code readers, operator displays, and other types of manufacturing equipment.



The Digi One IA delivers cost-effective performance and capability in a rugged DIN Rail mountable enclosure specifically designed for the Industrial Automation market.

Part of Digi's broad device server offering, the Digi One IA delivers standard serial-to-Ethernet connectivity and is ideal for the following applications:

- TCP socket, UDP socket, and UDP multicast. Socket support includes serial tunneling, which requires two device servers, each providing network connectivity for a serial device that would otherwise be limited to communication over a serial cable.
- Com port redirection using Digi's patented RealPort software, which enables applications and serial devices to

communicate over an Ethernet network as though they were communicating in their native serial mode over a cable.

The Digi One IA is easy to install locally or remotely through a variety of IP addressing methods. These include DHCP, ARP-Ping, static IP, and Setup, an application included on the installation CD that automatically detects all Digi One devices on your network.

Digi One IA Key Features

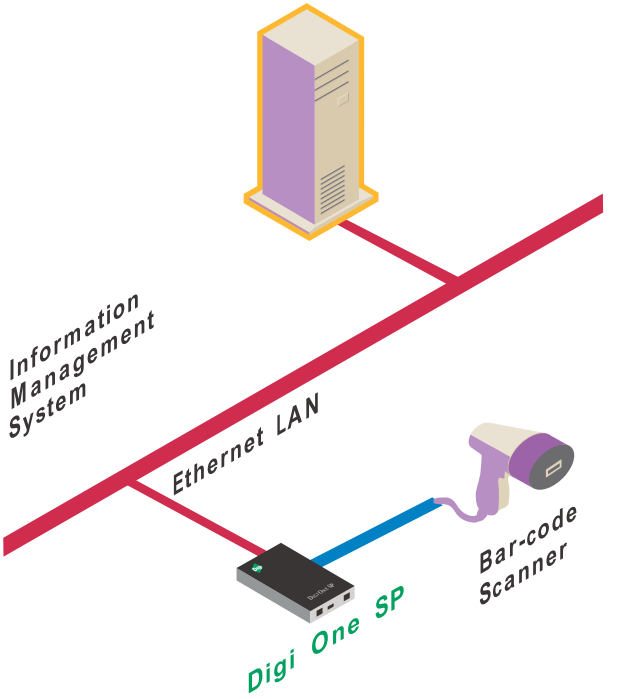
Here are some key Digi One IA features:

- Industrial DIN Rail mounting
- TCP/UDP socket services for broad device connectivity and application use
- Support for RFC 2217
- Com port redirection using RealPort
- DB9M and screw terminals for serial port connection
- Galvanically isolated (from earth ground)
- Class 1, Div2 rated
- Industry leading low latency
- EIA-232/422/485 switch selectable
- Easy configuration through a web interface (HTTP)

Introducing the Digi One SP

Digi One SP Overview

The Digi One SP device server easily allows any device with a serial port to connect to the Ethernet. The compact Digi One SP delivers cost-effective performance and capability in one of the smallest form factors available.



Part of Digi's broad device server offering, the Digi One SP delivers standard serial-to-Ethernet connectivity and is ideal for the following applications:

- TCP socket, UDP socket, and UDP multicast. Socket support includes serial tunneling, which requires two device servers, each providing network connectivity for a serial device that would otherwise be limited to communication over a serial cable.

- Com port redirection using Digi's patented RealPort software, which enables applications and serial devices to communicate over an Ethernet network as though they were communicating in their native serial mode over a cable.

The Digi One SP is easy to install locally or remotely through a variety of IP addressing methods. These include DHCP, ARP-Ping, static IP, and Setup, an application on the installation CD that automatically detects all Digi One devices on your network.

Digi One SP Key Features

Here are some key Digi One SP features:

- Easy configuration using the install CD and web interface
- TCP/UDP socket services for broad device connectivity and application use
- Support for RFC 2217
- Com port redirection using Digi's patented RealPort software
- Auto-connect the serial device to networked server using raw, Telnet, Rlogin
- Reverse Telnet for easy access to serial devices from the network
- Switch selectable EIA-232/422/484 for simple interfacing to any type of serial device

Chapter 2 *Configuring the IP Address*

In This Chapter

IP Address Configuration Methods

An IP address can be assigned to the device server using any of the following methods:

- Setup, a Digi application that “discovers” the device and then provides a method for assigning an IP address. See "Configuring the IP Address with Setup" on page 13.
- DHCP. The device server’s default configuration is as a DHCP client. See "Configuring the IP Address with DHCP" on page 14.
- ARP-Ping, which enables IP address assignment by updating the ARP tables on a PC with the device server’s MAC address and then pinging the device server. See "Configuring an IP Address with ARP-Ping" on page 14.
- A web browser. This method works only for changing the IP address of a device server that has already been assigned one. See "Changing an IP Address from a Web Browser" on page 15.

Configuring the IP Address with Setup

This procedure describes how to configure an IP address using Setup, an application you can find on the CD that came in your device server package.

Prerequisites

This procedure assumes the following:

- That the device server is connected to the network and powered up
- That the CD will be used on a Microsoft Windows system

Procedure

1. Record the device server's MAC address.
2. Insert the Digi CD in the CD drive.
3. If the CD does not start automatically, double-click My Computer and then the CD icon.
4. Choose Configure Device.

   The Digi application finds and lists all of the Digi devices on your network.
5. Locate your device server by it's MAC address.
6. Select the device server and then choose Configure.
7. Log into device server with the user name of `root` and the root password. The default root password is `dbps`.
8. To navigate to the network configuration, choose Configure > Network.
9. Use the Network Configuration page to assign the IP address and other network-related values.

Configuring the IP Address with DHCP

Prerequisite

This procedure assumes the following:

- That the device server is configured as a DHCP client. Since this is the default configuration, this will be the case unless the configuration has been changed.
- That the device server is not powered on

Procedure

1. Set up an entry for the device server on a DHCP server. Ensure that this is a permanent entry if you intend to use RealPort.
2. Connect the device server to the network and power it on.

   An IP address is assigned automatically.

Configuring an IP Address with ARP-Ping

Prerequisites

This procedure assumes the following:

- That the device server is connected to the network and powered up
- That you have access to a PC on the same LAN as the device server

Procedure

1. Manually update the PC's ARP (Address Resolution Protocol) table using the device server's MAC address (on the bottom of the unit) and the IP address you want assigned to the device server.

   Here is how this is done on a Microsoft Windows system:

   a. Access the command line.

   b. Issue the following command:

```
arp -s ip-address mac-address
```

Example

arp -s 192.168.2.2 00-40-9D-00-00-00

2. Ping the Digi device using the IP address just assigned.

```
ping 192.168.2.2
```

Note: The ping will probably time out before there is a response from the device server. Wait a few seconds and then ping the device server again, which will respond, indicating that the IP address has been configured.

Changing an IP Address from a Web Browser

Prerequisite

This procedure assumes that the device server already has an IP address and you simply want to change it.

Procedure

1. Open a web browser and enter the device server's current IP address in the URL window.
2. When the device server prompts you to log in, specify the following:
   - `root` as the user name
   - The root password. The default is `dbps`.
3. Choose Configure > Network to access the Network Configuration page.
4. Enter an IP address (and other network-related parameters) and then choose Submit to save the configuration.

Testing the IP Address Configuration

Use this procedure to test your IP address configuration.

Prerequisite

This procedure assumes that you have configured the device server with an IP address.

Procedure

1. Access the command line of a PC or other networked device.
2. Issue the following command:

   `ping` *`ip-address`*

   where *ip-address* is the address you assigned to the device server.

   Example

   ping 192.168.2.2

   A reply should be returned.

Chapter 3 Setting Up RealPort Com Redirection

In This Chapter

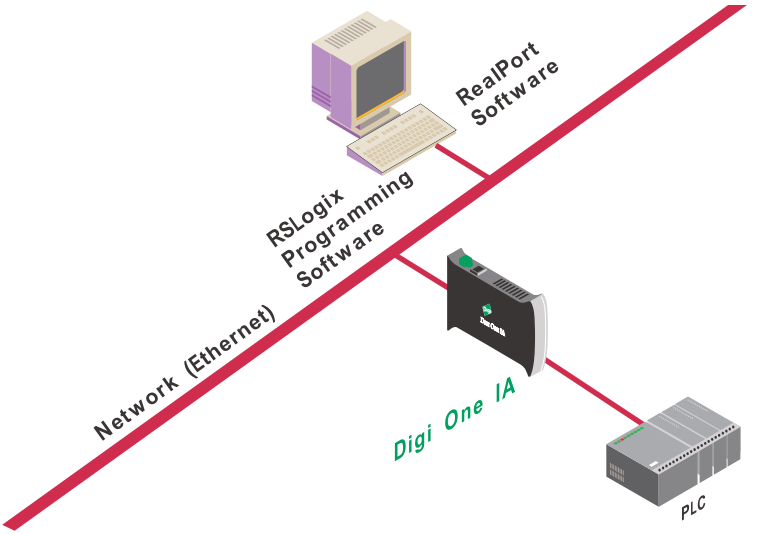
What is RealPort?

With RealPort ®, devices limited to standard serial communication can communicate with the applications that control or monitor them using a TCP/IP network. Many of these devices, including barcode scanners and sensors, don't have an Ethernet port. And even if they did, the applications that run them work on COM1. They know nothing of networking or TCP/IP.

With a Digi device server, you can easily connect your device to the network. The legacy application, however, still knows nothing of Ethernet. That's where RealPort comes in.

Installed on a network-based PC, RealPort emulates a serial port. That is, the application "thinks" it is working with a real serial port, such as COM1. When the application sends data to this serial port, RealPort ships the data across the network to the device server, which in turn routes it to the device connected to its serial port. The network is transparent to both the application and the device.

In the example that follows, the RSLogix software and the PLC communicate as though they were connected with a serial cable.



RealPort Setup Overview

To set up a RealPort configuration, complete the following tasks:

1. Configure the device server's port for RealPort. See "Configuring the Device Server Port for RealPort" on page 19.
2. Install the RealPort software on a network-based PC. See "Installing RealPort on a Windows System" on page 20.

   For UNIX RealPort software and documentation, see the Digi web site (www.digi.com).

Configuring the Device Server Port for RealPort

1. Access the configuration by opening a web browser and entering the device server's IP address in the URL window.
2. Sign on to the device server as the root user (`root`). The default root password is `dbps`.
3. From the main menu, choose Configure > Port.
4. Set the Device type field to Printer.

   Note: No other serial communication settings are required.
5. Choose Submit to commit the configuration.

Installing RealPort on a Windows System

Use this procedure to install RealPort software on Windows NT 4.0, Windows 2000, or Windows XP systems.

1. Place the CD in the CD drive.
2. If the CD menu program does not appear automatically, do the following:
   a. Choose Start > Run.
   b. In the run dialog, browse to the root of the CD and then choose setup.exe.
3. When the menu appears, choose Install RealPort.
4. Follow the on-screen prompts and documentation and use the Windows help to complete setup.

   Note: See the Digi website for UNIX RealPort drivers and documentation.

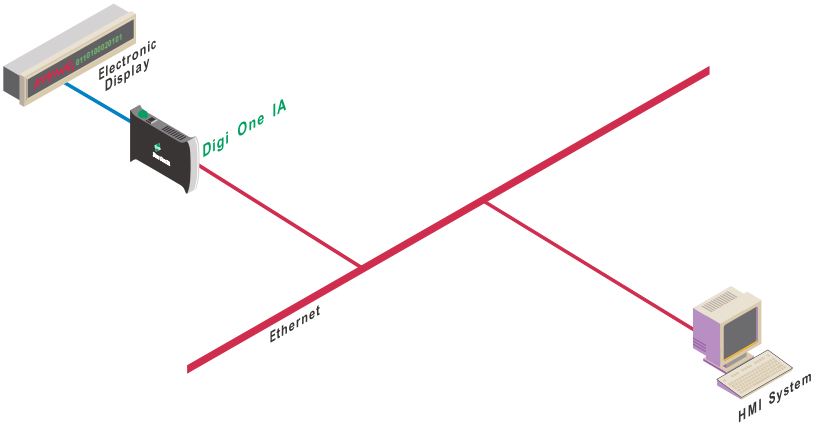
Chapter 4 Configuring Advanced Functions

In This Chapter

Configuring the Digi Device as a Server

Introduction

This section describes how to configure the Digi One IA or Digi One SP as a server, providing TCP or UDP socket service for a serial device connected to the serial port. In this type of configuration, another network device initiates the communications. The Digi device server simply waits for incoming traffic and then passes data to the serial device connected to its port. The following figure illustrates this configuration



RFC 2217 Support

Device servers support RFC 2217, an extension of the Telnet protocol used to access serial devices over the network. RFC 2217 implementations enable applications to set the parameters of remote serial ports (baud rate, flow control etc.), detect line signal changes, as well as receive and transmit data. The configuration information provided in this section applies to device servers functioning as RFC 2217 servers. No additional configuration is required.

About TCP and UDP Port Numbers

Digi device servers use the TCP and UDP port numbering conventions described in the following table:

For this connection type...	Use this Port
Telnet to the serial port	2001 (TCP only)
Raw connection to the serial port	2101(TCP and UDP)

You must ensure that the application or device that initiates communication with the device server uses these ports. If they cannot be configured to use these port, you can change what is known as the “base socket” on the device server, which allows you to use different port numbers to designate a Telnet or raw connection to the serial port. See "Changing the Base Socket: Procedure" on page 23 for more information.

Changing the Base Socket: Procedure

1. Access the configuration by opening a web browser and entering the device server’s IP address in the URL window.
2. Sign on to the device server as the root user (`root`). The default root password is `dbps`.
3. From the main menu, choose Configure > Network.
4. Use the base socket field to change the base socket. Specify a multiple of 100 between 2000 and 9000. Telnet connections will use the base socket value plus one. Raw connections will use the base socket value plus one-hundred one. The following table illustrates how this works:

If the base socket is...	Then Telnet uses...	Then Raw uses ...
3000	3001	3101
4500	4501	4601

If the base socket is...	Then Telnet uses...	Then Raw uses ...
8100	8101	8201

5. Choose Submit to commit the configuration.

Configuring the Device as a Server: Procedure

1. Access the configuration by opening a web browser and entering the device server's IP address in the URL window.
2. Sign on to the device server as the root user (`root`). The default root password is `dbps`.
3. From the main menu, choose Configure > Port.
4. Set the Device type field to Printer.
5. Adjust other settings as required by the peripheral connected to the port. See the online help for information on configuration fields.

   Note: The Terminal type field is ignored in this type of configuration.

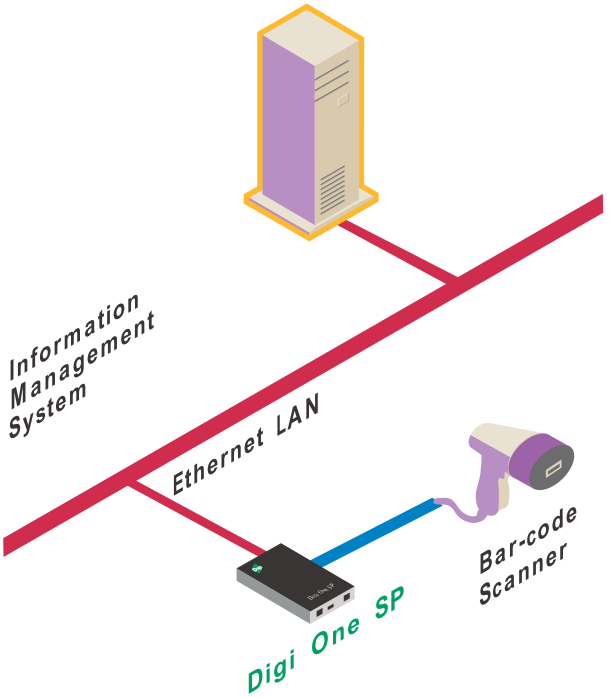
6. Choose Submit to commit the configuration.

Autoconnecting to a Network Host (TCP)

Introduction

This section describes how to configure the device server to initiate an autoconnection to a host on the network. In this type of configuration, the device server initiates TCP connections to applications running on servers or serial devices connected to server serial ports (sometimes called TCP socket service).

The following figure provides an example of a Digi One SP configured for autoconnection. This connection can be configured to be always up or to be triggered whenever the scanner sends data to the serial port.



Autoconnecting to a Network Host: Procedure

1. Access the configuration by opening a web browser and entering the device server's IP address in the URL window.
2. Sign on to the device server as the root user (`root`). The default root password is `dbps`.
3. From the main menu, choose Configure > Port.
4. On the Port Configuration page, do the following:
   - Set the Device type according to the event you want to open the connection. See the following table for more information.

To trigger a connection when...	Set the Device type to...
The port receives data	Terminal
When the DCD signal is raised	Modem in *

   * To configure the port to behave as though DCD were always on, which will keep the connection up all the time, use the Force DCD option on the Advanced Configuration page.

   - Adjust serial settings as required by the peripheral connected to the port. See the online help for information on configuration fields.

   Note: The Terminal type field is used only when you configure a terminal. In all other cases, this field is ignored.
5. When the port settings are correct, choose Submit to commit the configuration.
6. Choose Advanced to access the Advanced configuration page.
7. On the Advanced Configuration page, do the following:
   - Check Enable AutoConnect.

- Provide the IP address of the server or other device to which the connection should be made.
- Specify the TCP port number for connections. The port number depends on the conventions used on the remote server or device. The following table provides common TCP port numbering conventions. However, the remote device may not use these conventions:

Connection Type	Common TCP Port
Telnet	23
Rlogin	513
Reverse Telnet to the port of a Digi device server	2001
Raw connection to the port of a Digi device server	2101

- Specify a service to use for the connection.
- Specify other options as required. Use the online help for information on configuration fields. One option, Force DCD should be specified only in the following circumstances: (1) You want the connection up all the time. (2) The Device type specified on the Port Configuration page is Modem in.

8. When you complete configuration changes, choose Submit to commit the configuration.

Autoconnecting to a Network Host (UDP)

Introduction

This section describes how to configure the device server to initiate an “autoconnection” to one or more hosts on the network. In this type of configuration, the device server initiates UDP communications to applications running on servers or serial devices connected to server serial ports (sometimes called UDP socket service).

This configuration provides multicasting capability. That is, multiple devices can be identified as destinations for a single communication.

Autoconnecting to Network Hosts: Procedure

1. Access the configuration by opening a web browser and entering the device server’s IP address in the URL window.
2. Sign on to the device server as the root user (`root`). The default root password is `dbps`.
3. From the main menu, choose Configure > Port.
4. On the Port Configuration page, do the following:
   - Set the Device type to Printer.
   - Adjust serial settings as required by the peripheral connected to the port. See the online help for information on configuration fields.

   Note: The Terminal type field is used only when the Device type is Terminal. In all other cases, this field is ignored.
5. When the port settings are correct, choose Submit to commit the configuration.
6. Choose Advanced, which brings up the Advanced Configuration page, and then UDP serial, which brings up the UDP Serial Configuration page.
7. Use the UDP Serial Configuration page to set up UDP

communication on the port. Here is some information on this page:

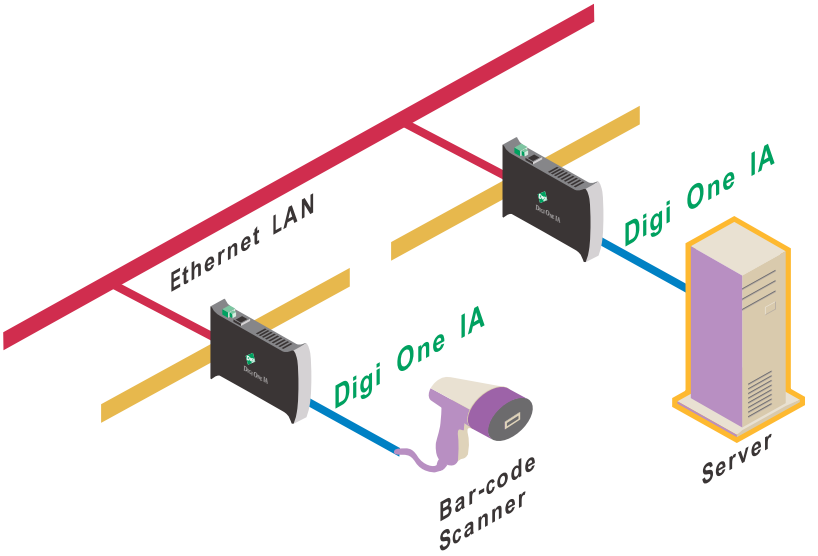
- Use this page to define the event or timing that triggers a UDP communication and the destinations for this communication.
- Use the online help for information on specific configuration fields.
- Choose Submit to commit the configuration.

Configuring a Serial Tunnel

Introduction

A serial tunnel is a network connection between two serial devices, each of which is connected to the serial port of a Digi device server. The serial devices “think” they are communicating with each other across a serial cable using serial communication techniques. Neither is aware of the intervening network.

The following figure illustrates this configuration.



Configuring a Serial Tunnel: Procedure

1. Set up one of the device servers as a TCP server. See "Configuring the Digi Device as a Server" on page 22 for information.
2. Set up the other device server to autoconnect to the first device server. The details for this configuration can be found in "Autoconnecting to a Network Host (TCP)" on page 25. Here are a few additional tips:
   - Specify one of the following as the Device type:
     — Modem in if you want to initiate a connection when DCD goes high
     — Terminal if you want to initiate the connection when DTR goes high
   - Specify the first device server's IP address as the destination of the autoconnection.
   - Specify one of the following destination TCP ports:
     — 2101 for raw connections
     — 2001 for Telnet connections
   - Turn Force DCD on.
   - Ignore the Terminal type and Binary mode fields.

Chapter 5 *Administration*

In This Chapter

Changing the Root Password

For security reason you will want to change the root password immediately. This procedure shows you how.

Prerequisite

This procedure assumes that you are the root user and that you know the current root password.

Procedure

1. Open a web browser and enter the device server's IP address in the URL window.
2. When the device server prompts you to log in, enter the following:
   - `root` as the user name
   - The root password. The default is `dbps`.
3. Choose Admin > Password from the main menu.
4. Fill in the New Password and Confirm Password fields and then choose Submit.

Upgrading Firmware

This procedure shows you how to download firmware using either HTTP or TFTP.

Note: HTTP, which simply requires a web browser, is the preferred method, and Digi recommends it. TFTP, however, is often used in UNIX environments, so TFTP is supported as well.

Prerequisite

This procedure assumes that:

- You have already downloaded the firmware file from the Digi web site
- TFTP is running (if you are using the TFTP option)

Procedure

1. Open a web browser and enter the device server's IP address in the URL window.
2. When the device server prompts you to log in, enter the following:
   - `root` as the user name
   - The root password. The default is `dbps`.
3. Choose Admin > Upgrade from the main menu.
4. Follow the prompts.

Upgrading POST Code

This procedure shows you how to upgrade POST code using HTTP or TFTP. Typically, POST upgrades are not required and should only be done if the firmware release notes indicate that this step is required.

Note: HTTP, which simply requires a web browser, is the preferred method, and Digi recommends it. TFTP, however, is often used in UNIX environments, so TFTP is supported as well.

Prerequisite

This procedure assumes that:

- You have already downloaded the firmware file from the Digi web site
- TFTP is running (if you are using the TFTP option)

Procedure

1. Open a web browser and enter the device server's IP address in the URL window.
2. When the device server prompts you to log in, enter the following:
   - `root` as the user name
   - The root password. The default is `dbps`.
3. Choose Admin > Upgrade from the main menu.
4. Follow the prompts.

Resetting the Configuration to Defaults

Introduction

The two procedures in this section reset the configuration to defaults. The first procedure resets the configuration from a web browser. If you can access the device server from a web browser, this is the best way to reset the configuration because you can also back up the configuration, which provides a means for restoring it after you have worked through configuration issues. See "Copying the Configuration to and from a Server" on page 39 for more information.

The second procedure resets the configuration using the reset button on the device server. Use this method if you cannot access the device from a web browser.

Resetting the Configuration from a Browser

1. Open a web browser and enter the device server's IP address in the URL window.
2. When the device server prompts you to log in, enter the following:
   - `root` as the user name
   - The root password. The default is `dbps`.
3. Choose Admin > Reset Config from the main menu.
4. Follow the prompts to complete this procedure.

Resetting the Configuration Using the Reset Button

1. Power off the device server by unplugging the power.
2. Use a pen, the point of a paper clip, or some other pointed object to press and hold down the reset button. The following figures help you locate the reset button. The first shows a Digi One IA. The second a Digi One SP.

3. While holding the reset button, turn the power back on.
4. Hold the button for 20 seconds and then release it.

   The default configuration is restored.

Copying the Configuration to and from a Server

This procedure shows you how to copy the configuration to a server and to download a configuration from a server using either HTTP or TFTP.

Prerequisite

If you intend to use TFTP, ensure that the TFTP program is running on a server before you begin this procedure.

Procedure

1. Open a web browser and enter the device server's IP address in the URL window.
2. When the device server prompts you to log in, enter the following:
   - `root` as the user name
   - The root password. The default is `dbps`.
3. Choose Admin > Copy Configuration from the main menu.
4. Follow the prompts to complete the procedure.

Viewing Port Statistics and Settings

Introduction

Use this procedure to view port statistics and configuration settings.

Procedure

1. Open a web browser and enter the device server's IP address in the URL window.
2. When the device server prompts you to log in, enter the following:
   - `root` as the user name
   - The root password. The default is `dbps`.
3. Choose Report > Port from the main menu.

Viewing Network Statistics

Introduction

Use this procedure to view network statistics.

Procedure

1. Open a web browser and enter the device server's IP address in the URL window.
2. When the device server prompts you to log in, enter the following:
   - `root` as the user name
   - The root password. The default is `dbps`.
3. Choose Report > Network from the main menu.

Chapter 6 Reference

In This Chapter

Digi One IA LEDs

LED	Color	State	Indicates
Power	Red	On	Power detected
		off	No power detected
Link	Red	On	No network detected
		Off	Network detected
TX/RX	Green	On	Network traffic
		Off	No network traffic
Diag	Red	Blinking 1-1-1	Starting the EOS
		Blinking 1-3-1	Starting the TFTP process
		Blinking 1-5-1	Configuration returned to factory defaults
		Steady blinking	Device seeking an IP address from a DHCP server
Tx/Rx	Green	On	Serial port activity
		Off	No serial port activity
RTS	Green	On	RTS is on
		Off	RTS is off
CTS	Green	On	CTS is on
		Off	CTS is off
DTR	Green	On	DTR is on
		Off	DTR is off
DSR	Green	On	CSR is on
		Off	CSR is off
DCD	Green	On	DCD is on
		Off	DCD is off

Digi One IA Specifications

Attribute	Value
Main Power Connector	9-30 VDC, screw connector
Ambient Temperature	0 to 60 Degrees C
Relative humidity	5 to 90% non-condensing
Length	4.7 in (12 cm)
Width	0.9 in (2.3 cm)
Depth	4 in (10.1 cm)

FCC Class A Statement: Digi One IA

These devices comply with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) These devices may not cause harmful interference, and (2) These devices must accept any interference received, including interference that may cause harmful operation.

Digi One IA Emissions

- FCC Part 15 Subpart B, Class A
- EN 55022, Class A: 1998
- ICES-003, Class A
- VCCI, V-3/99.05
- AS/NZS5 3548

Digi One IA Immunity

- EN 55024:1998
- EN61000-6-2:1999

Digi One IA Safety

- UL 60950 3rd Ed.
- EN 60950 (European Union)
- CSA C22.2, No. 60950 3rd Ed. (Canada)

Digi One SP LEDs

LED	Color	State	Indicates
Power	Red (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
Link	Green	On	Physical network detected
		Off	No physical network detected
ACT	Yellow	On	Bad initialization
		Off	Ready

Digi One SP Specifications

Attribute	Value
Main Power Connector	9-30 VDC, barrel connector
Ambient Temperature	10 to 45 Degrees C
Relative humidity	5 to 90% non-condensing
Length	3.7 in. (9.4 cm)
Width	1.72 in. (4.3 cm)
Depth	0.93 in. (2.3 cm)

FCC Class A Statement: Digi One SP

These devices comply with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) These devices may not cause harmful interference, and (2) These devices must accept any interference received, including interference that may cause harmful operation.

Digi One SP Emissions

- FCC Part 15 Subpart B, Class A
- EN 55022, Class A: 1998
- ICES-003, Class A
- VCCI, V-3/99.05
- AS/NZS5 3548

Digi One SP Immunity

- EN 55024:1998
- EN61000-6-2:1999

Digi One SP Safety

- UL 60950 3rd Ed.
- EN 60950 (European Union)
- CSA C22.2, No. 60950 3rd Ed. (Canada)

Device Server MEI 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	

DB9 Pinouts

DB9 Pin	EIA-232	EIA-422/485 Full-Duplex	EIA-485 Half-Duplex
1	DCD	CTS-	Not used
2	RxD	RxD+	RxD+
3	TxD	TxD+	TxD+
4	DTR	RTS-	Not used
5	GND	GND	GND
6	DSR	RxD-	RxD-
7	RTS	RTS+	Not used
8	CTS	CTS+	Not used
9	NA	TxD-	TxD-

Important Safety Information

To avoid contact with electrical current:

Never install electrical wiring during an electrical storm.

To reduce the risk of fire, use only 26 AWG or larger telecommunication line cord.

Never install telephone jacks in wet locations unless that jack is specifically designed for wet locations.

Use caution when installing or modifying telephone lines.

Use a screwdriver and other tools with insulated handles.

You and those around you should wear safety glasses or goggles.

Do not place telephone wiring or connections in any conduit, outlet or junction box containing electrical wiring.

WARNING

Do not work on your telephone wiring if you wear a pacemaker. Telephone lines carry electrical current.

Installation of inside wire may bring you close to electrical wire, conduit, terminals and other electrical facilities. Extreme caution must be used to avoid electrical shock from such facilities. You must avoid contact with all such facilities.

Telephone wiring must be at least 6 feet from bare power wiring or lightning rods and associated wires, and at least 6 inches from other wire (antenna wires, doorbell wires, wires from transformers to neon signs), steam or hot water pipes, and heating ducts.

Before working with existing inside wiring, check all electrical outlets for a square telephone dial light transformer and unplug it from the electrical outlet. Failure to unplug all telephone transformers can cause electrical shock.

Do not place a jack where it would allow a person to use the

telephone while in a bathtub, shower, swimming pool, or similar hazardous location. Protectors and grounding wire placed by the service provider must not be connected to, removed, or modified by the customer.

Do not touch uninsulated telephone wiring if lightning is likely!

External Wiring
Any *external* communications wiring you may install needs to be constructed to all relevant electrical codes. In the United States this is the National Electrical Code Article 800. Contact a licensed electrician for details.

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