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# Software Manual

**Universal QNX4 Device Driver**

**for**

**Digi Intelligent Communications Boards**

**92000127 Rev C**

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# Introduction

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This package includes two separate device drivers named **Dq.ser16** and **Dq.ser32**. For people using 16 bit environments (Such as QNX 4.22) please use **Dq.ser16**. People using 32 bit environments (QNX 4.23 gives its users the option of running 16 bit or 32 bit) should use **Dq.ser32**. This manual is valid for both versions of the driver and uses the term “**Dq.ser**” generically. Please remember to use the appropriate form of the driver (**Dq.ser16** or **Dq.ser32**) when instructed to execute **Dq.ser** by this document.

**Dq.ser** is a device driver that runs under the QNX4 “**Dev**” process, providing the hardware-dependent component for Digi intelligent serial boards (Such as Digi PC/Xi, PC/Xe, PC/Xr, PC/Xem, PCI/Xr, PCI/Xem, COM/Xi, and MC/Xi boards) and cluster controller systems (Such as Digi C/X, and C/X-PCI systems).

Once the **Dq.ser** driver has initialized the hardware and registered itself with **Dev**, new serial device nodes will appear in the **/dev** directory. **Dq.ser** thereafter takes care of having these devices emulate standard serial communications hardware. When the nature of the I/O requests permits it, **Dq.ser** will take full advantage of the on-board buffering and intelligence of the Digi hardware. Advantages include efficient, flow-controlled transmission of large blocks of data; buffered inputs rendering data loss extremely unlikely; and almost no interrupt-time processing that could interfere with other Real Time Critical processes.

# Pre-Installation

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For successful operation of the driver, the user should establish the following things prior to the driver be installed.

- Invoke **Dev** (the device manager provided by QNX), specifying the number of terminal devices (including serial connections) that you expect to be running in the system. When calculating the number of terminal devices to declare, count all serial ports being used (including, but not limited to, ports found on Digi adapters), the number of console windows in use, and an additional terminal device which is taken up by **/dev/null**. If you are still unsure of how many terminal devices will be necessary, we recommend allocating the maximum number allowed which is 128. Once invoked, **Dev** will insure that sufficient space in the **/dev** directory has been reserved for the expected devices (for more details see the section on **Dev** in the QNX Utilities Reference). For example, if 32 serial ports are expected, and 8 console windows are in use, the line in the **sysinit** file might be:

```
Dev -n 41 &
```

This instructs **Dev** reserve space for up to 41 nodes in **/dev**.

- For users of ISA, EISA or Micro Channel adapters, note the settings for I/O port addresses, and shared memory addresses.
- Users of cluster controller systems (such as Digi C/X, and C/X-PCI systems) should note the configuration of the concentrators attached to the cards (how many concentrators are attached to lines 1 and 2; as well as how many ports are on each of those concentrators).

# Installation

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**Important!**

Be sure to read the *Release Notes* that may be included with this software device driver. The *Release Notes* contain information not available at this manual's press time.

**Dq.ser** is a command line invoked device driver, so installation consists of little more than copying the files into a directory on the hard disk drive.

To copy the files, perform the following steps:

To install the driver follow these steps.

1. Log in as super user (root).
2. Place the Digi device driver diskette in Drive A (**/dev/fd0**).
3. Enter: **install**.

The **install** program will extract all files from the Digi diskette and place them in the default Digi directory **/etc/digi**.

## C/X Systems

If you are installing a C/X host adapter, the application `configL` must be run prior to the invoking the driver.

`configL` is an application which obtains configuration information for C/X systems. `configL` requests the following information from the user:

- The number of C/X host adapters in the system.
- The number of concentrators attached to each host adapter's synchronous lines, the number of ports on each concentrator, and the communications modes to be used. When entering the communications modes we strongly recommend accepting the default of 1.2M, but other data rates may be specified by the user. See the tables below:

**Table 1** **EIA-422 Synchronous Modes**

Eight Wire Internal Clock		Eight Wire External Clock		Four Wire Self Clocking	
<i>Mode</i>	<i>Baud Rate</i>	<i>Mode</i>	<i>Baud Rate</i>	<i>Mode</i>	<i>Baud Rate</i>
0	115K	15	2400	1	230K
		16	4800	2	460K
3	2400	17	9600		
4	4800	18	19.2K		
5	9600	19	38.4K		
6	19.2K	20	57.6K		
7	38.4K	21	76.8K		
8	57.6K	22	115K		
9	76.8K	23	230K		
10	115K	24	460K		
11	230K	25	920K		
12	460K	26	1.2M		
13	920K				
14	1.2M	33	14000		

**Table 2**

**EIA-232 Synchronous Modes**

<b>Eight Wire Internal Clock</b>	
<i>Mode</i>	<i>Baud Rate</i>
35	2400
36	4800
37	9600
38	14000
39	19.2K
40	38.4K
41	57.6K
42	64000
43	76.8K

Digi C/X host adapters communicate with attached C/CON-16 and C/CON-8 concentrators via two EIA-422 synchronous channels (newer concentrators and host adapters also support EIA-232 synchronous communication—see your hardware *Installation Guide*). The default operating mode for these channels is 1.2 megabaud, 8-wire, internally clocked (mode 14). This provides the fastest possible communication between the host adapter and locally connected concentrators (in this context, *local* indicates that concentrators are connected directly to the host adapter via a four or eight wire cable; *remote* refers to concentrators that are connected to the host adapter via data communications devices such as modems or DSUs).

Local concentrators always communicate with the host adapter in either an eight wire internally clocked mode or a four wire self clocked mode (in the four wire modes the clock is encoded with the data instead of being carried on separate lines as in the eight wire modes).

Remote concentrators always use an eight wire externally clocked mode (the clock signal is provided by the synchronous modem).

Table 1 shows the EIA-422 synchronous modes supported by **Dq.ser**; Table 2 shows the supported EIA-232 synchronous modes. Note that the external clock baud rates are approximations used to set up time-outs and tuning parameters only. Values do not need to be exact; select the speed closest to the actual speed of your synchronous modem.

# Invoking the Device Driver

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**Dq.ser** is invoked from the command line (or from **sysinit**); all Digi ISA, EISA and Micro Channel boards to be supported by the driver must be described in the command line arguments. After initialization, which will take a few seconds, the device names will appear in **/dev** and are ready for use. See the QNX4 Administrator's Guide for information on enabling ports for logins.

## Command Line Arguments

The standard QNX4 usage utility **use** will give a brief overview of the command line options. The syntax of the command line is:

```
Dq.ser port, mem [cfg] [port, mem [cfg] ...] [options]
```

When invoking the driver for an ISA, EISA, or Micro Channel adapter, *port* and *mem* are mandatory fields which identify the I/O port address and shared memory addresses of the boards. In situations where I/O port and shared memory addresses have been indicated; *cfg*'s presence or lack of presence indicates to the driver what type of board is being initialized. If *port* and *mem* parameters are given but *cfg* is absent, the driver assumes the board is a PC/Xi (EISA or ISA) or a MC/Xi (Micro Channel).

When invoking the driver for a PCI card, only the *options* field is valid. The driver automatically scans for PCI cards and therefore requires no special parameters other than the driver invocation itself.

The formats for *port*, *mem*, *cfg* and *options* are described below:

- port*     Hexadecimal I/O port address of Digi intelligent board. ISA, EISA and Micro Channel boards must have a unique I/O port address, and that address must not be used by any other device in the system.
- mem*     Hexadecimal starting address for shared memory. All Digi adapters (except COM/Xi and Micro Channel adapters) may share the same memory addresses. The designated shared memory must not be used by any other device in the system.

*cfg* Identifies Digi adapter type. If this parameter is absent, the adapter is assumed to be a PC/Xi (on ISA or EISA platforms) or an MC/Xi (on Micro Channel platforms). Values for *cfg* are:

- p** Specifies Xem or Xr adapter.
- e** Specifies an Xe adapter.
- c** Specifies a COM/Xi adapter.
- f** Specifies a C/X host adapter. The application **configL** must be executed prior to using this option.

The *options* field lets you to change some of the default configuration settings:

- b** *baud rate* Set initial baud rate for all ports. Default: 9600 bps.
- n** *name* Prefix for port names. Default: **dtty**
- d** *data path* Location of driver data files. Default: **/etc/digi**
- p** Disable automatic scanning for Digi PCI cards.
- v** Verbose. Full banner including copyright, board names and settings will be output upon initialization of the driver. Default: non-verbose (silent).
- a** Select ALTPIN configuration for all channels. ALTPIN switches the Data Set Ready (DSR) and Data Carrier Detect (DCD) signals so that DCD is available on pin 1 of 8-pin RJ-45 connectors (normally a 10-pin RJ-45 connector is required to support DCD). Default: ALTPIN *not* selected.

**Note:**

Multiple *options* must be separated by a space, and each option must begin with a dash (-); thus, to select ALTPIN and Verbose, use **-a -v**, *not* **-av**.

# Command Line Examples

## Multi Channel Adapters

**Dq.ser 300,d0000**

Board is at I/O port 0x300, shared memory starting at 0x000D0000. If installed in an ISA system, a PC/Xi board is expected. If installed in a Micro Channel system, an MC/Xi board is expected. All other settings are left at default values. Devices will be named `/dev/dty1`, `/dev/dty2`, etc.

**Dq.ser -p 324,d0000,p -b 1200 -n digi**

Specifies an Xem or Xr adapter at I/O port 0x324, shared memory location 0x000D0000 and instructs the driver to disable the scan normally done for Digi PCI devices. Set initial baud rate for all ports to 1200 baud. Devices will be named `/dev/digi1`, `/dev/digi2`, etc.

**Dq.ser 320,d8000,c 300,e80000 -v -d /dfiles**

COM/Xi board at I/O port 0x320, shared memory starting at 0x000D8000, and a PC/Xi board at I/O port 0x300, shared memory starting at 0x00E80000. All driver related data files are expected to be in directory `/dfiles` instead of `/etc/digi`. Full banner including copyright, board names and settings will be output upon initialization of the driver (verbose).

**Dq.ser -v**

Instructs the driver to scan for and boot any Digi PCI adapters found in the system. If the `-p` configuration is given, `port`, `mem` and `cfg` must also be given as applicable.

## **C/X System**

**Dq.ser 1005,d8000,f -v**

C/X EISA host adapter at I/O port (slot address) 1005, shared memory starting at 0xd8000, with verbose option turned on. The C/X configuration will be read from a data file generated by **configL**. **configL** *must* be run first.

**Dq.ser -v**

Instructs the driver to scan for and boot any Digi PCI adapters found in the system. The C/X configuration will be read from a data file generated by **configL**. **configL** *must* be run first.

# Error Messages

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## **Failed to RESET the I/O PORT**

I/O port address may be set incorrectly or conflict with another board. Verify setting, or try another address.

## **Failed to STAT BIOS file Failed to read from BIOS file Failed to find DIGIPATH directory**

Improper installation. Driver and/or data files not found in expected directory. Default DIGIPATH directory is `/etc/digi`. All files must be loaded from the distribution diskette to this directory. If a different directory is used, it must be specified with the `-d` option in the `Dq.ser` command line.

## **Failed to allocate CardBase Memory Selector**

System call to map physical memory has failed. Too many processes in the system may be competing for memory handles. The QNX kernel may need to be reconfigured to permit more memory selectors.

## **Failed to BOOT the BIOS**

BIOS on Digi adapter will not respond to commands from the driver. Usually means that the driver cannot reliably read/write to the dual ported RAM. This could be due to a cache conflict (if the board is addressed above 1 meg) or a conflict with another device's memory. It could also mean that the wrong address was given in the `Dq.ser` command line.

## **Failed to BOOT the uploaded FEPOS**

Card type specification may be incorrect. Could also indicate an incorrect memory address specification or a dual ported memory conflict.

## **Failed to read Initialization Information**

Shared memory conflict. Try a different address.

## **Failed to set up Event Queue**

System resources exhausted.

# Digi Support Services

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## The Digi Bulletin Board System

Digi provides an electronic bulletin board service (BBS) for our customers. This bulletin board provides general and technical information about Digi's products.

The Digi BBS allows users to download software drivers as soon as they become available. There is also a feature to allow users with problems or questions about Digi products to leave messages to Digi Technical Support.

Using the Digi BBS is easy. Simply dial **(612) 912-4800**. In Europe, dial **+49 221 9205211**; in Asia, dial **+65 735 2460**.

The recommended modem communications parameters are 8 bits, no parity and one stop bit (**8 N 1**). Other settings may also work.

Download protocols include Zmodem, Xmodem, Ymodem, Kermit and others.

## Internet FTP Server

Digi has set up an Anonymous FTP server for those with access to the Internet network. The address is **ftp.dgii.com**. Log in as **anonymous**, and enter your E-mail address when asked for a password. Drivers and installation tips are located in the **/drivers** directory. A text file, **download.doc**, gives information on uncompressing the files after downloading. Tip: Be sure to enter **"bin"** before downloading, to ensure binary transfer of files.

## World Wide Web Server

Product information, manuals, new product announcements, programs, application stories and more can be obtained through the World Wide Web. Our address is **http://www.dgii.com**.

## DigiFACTs FaxBack Server

Manuals and technical information can also be obtained by FAX. To use the FaxBack server, simply call (612) 912-4990 on a touch tone phone.

## Information About Your System

Serial number of your Digi product: \_\_\_\_\_

Make, model and clock speed of your computer: \_\_\_\_\_

\_\_\_\_\_

How much RAM does your computer have? \_\_\_\_\_

**Hard disk  
controller:**

Type: \_\_\_\_\_ Memory addressed at: \_\_\_\_\_

I/O port used: \_\_\_\_\_ IRQ: \_\_\_\_\_

**LAN card:** Type: \_\_\_\_\_ Memory addressed at: \_\_\_\_\_

I/O port used: \_\_\_\_\_ IRQ: \_\_\_\_\_

**Other:** Type: \_\_\_\_\_ Memory addressed at: \_\_\_\_\_

I/O port used: \_\_\_\_\_ IRQ: \_\_\_\_\_

**Operating system:** \_\_\_\_\_ Version: \_\_\_\_\_

**Digi device driver version:** \_\_\_\_\_

## Technical Support

At Digi, we are proud of our products, and support them. Our dealers and distributors are fully trained on our product line, so that they can help you on a technical level should assistance be needed.

Your first level of support is your Digi dealer, the place where you purchased your Digi product. Your dealer has the training to help you with any installation questions or difficulties you might have.

If you still experience difficulties (after contacting your first level of support), Digi has a staff of Technical Support Specialists that can assist you. They can be reached at **(612) 912-3456**. In Europe, call **+49 221 920520**, and in Asia, call **+65 732 1318**. FAX numbers are: (612) 912-4958 (USA), +49 221 9205210 (Europe) and +65 732 1312 (Asia).

When you call Digi Technical Support, please call from a position where you can operate your system. Also, please fill out the form on the preceding page before calling, so your Technical Support representative can have a clear picture of your system and any potential conflicts between devices.

Digi Technical Support can also be reached via Internet E-mail. Please send correspondences to **support@dgii.com**, and include your voice and FAX phone numbers.

## Customer Service

Digi also has a staff of Customer Service representatives to help you with software and documentation update requests, as well as Returned Merchandise Authorizations (RMAs) in case you need to return your Digi product for repair (see page 18). They may be reached at **(612) 912-3456**. Digi Customer Service may be contacted by FAX at (612) 912-4959.

Digi Customer Service can also be reached via Internet E-mail. Please send correspondences to **cust\_serv@dgii.com**, and include your voice and FAX phone numbers.

## Return Procedures

All Digi products have a five-year parts and labor warranty, and we are ultimately responsible for any defective parts, according to the limits specified in the warranty. However, many of the reported problems are due to factors other than defects in the product itself. To save you time and possibly additional cost, Digi asks that you *first* try to resolve any difficulties by contacting our Technical Support representatives at **(612) 912-3456**.

### **Important!**

*Be sure to have the serial number of your Digi product at hand before calling Technical Support.*

Returns should be directed to the dealer or distributor from whom you purchased the product. If you need to return your Digi product for repair, it is first necessary to obtain an RMA (Returned Merchandise Authorization) number from Digi, by speaking to a Digi Customer Service representative. Authorized returns should be shipped to Digi International, 10000 West 76th Street, Eden Prairie, MN 55344. The RMA number should appear on the shipping carton, on or near the address label.

### **Note:**

*Products received without an RMA number clearly marked on the outside of the package will be returned, unopened, to the sender*

