



Exegin Q52 ZigBee / 802.15.4 Bridge

Installation and Configuration Guide

Version 0.6

Copyright © Exegin Technologies Limited, 2007

All rights reserved.

No patent liability is assumed with respect to the use of the information contained herein. While every precaution has been taken in the preparation of this manual, Exegin Technologies Limited assumes no liability for errors or omissions contained herein or for any damages in connection with the performance or use of this material.

All rights reserved. All other product names are trademarks of their respective manufacturers or providers.

This manual was written, illustrated, and produced using FrameMaker publishing software.

Rev:0.6

Made in Canada.

Exegin Technologies Limited
204 - 2071 Kingsway Avenue
Port Coquitlam, B.C. V3C 6N2
<http://www.exegin.com/>
P/N 79-052-100

Table of Contents

ii	List of Figures	v
i	List of Tables	vi
1	Overview Of The Manual	8
	Contents of the Manual.....	8
	Documentation Conventions	9
2	Introduction to the Q52 ZigBee / 802.15.4 Bridge	10
	What is the Q52?	10
	Physical Features	10
	How Does the Q52 Work?.....	11
	Product Features	11
3	Installing the Q52	12
	Site Requirements.....	12
	Unpacking the Q52	13
	Connecting the Q52 to a Network	13
4	Configuration Tools	17
	Q52 Utilities	17
	TCP/IP Commands	19
5	Configuring the Q52 on Your Network	20
	Required TCP/IP Settings.....	20
	Optional TCP/IP Settings	25
	Troubleshooting Tips.....	27
6	Q52 Zigbee PAN and Bridge Configuration	30
	Required Zigbee Settings.....	30
	Optional Zigbee Settings	32
	Required Bridging Settings	33
	Optional Bridging Settings	34
	Troubleshooting Tips.....	35
7	Using HTML Pages to Configure the Q52	38
	Accessing the Q52 HTML Pages	38
	Q52 Home Page.....	40
	Zigbee Forms.....	42
	Bridge Forms	44
	TCP/IP Forms	46
	Administration Forms.....	49
	Help Page.....	55
8	Reference Information	57
	Q52 Command Line Interface Shell.....	57
	Complete Command Reference.....	59

Q52 Naming Scheme.....	66
User Accounts and Permissions	66
Resetting to Factory Defaults	66
Performing Firmware Upgrades	67
9 Extra Features/Additional Information	68
General Options.....	68
Q52 Security	68
Managing with SNMP	70
10 Q52 Specifications	74
Physical Features	74
Electrical Details.....	75
Radio Frequency Notifications.....	76
Antenna Radiation Pattern.....	78
Q52 LEDs	78
Network Interfaces	79
Software Specifications	79
11 Getting Help	81
Help Methods Available.....	81
Repair Procedure	82
12 Glossary	85

LIST OF FIGURES

Figure 1:	Q52 Bottom View	14
Figure 2:	Q52 Side View	15
Figure 3:	Q52 Top View: LED Status Indicators	16
Figure 4:	Q52 HTML Menu Structure	18
Figure 5:	TCP/IP Settings Form	21
Figure 6:	Gecko Main Screen.....	23
Figure 7:	Zigbee Settings Form	31
Figure 8:	Bridge Settings Form	34
Figure 9:	Zigbee Status Form	36
Figure 10:	Bridge Status Form	37
Figure 11:	Password Dialog for Access to Administration Forms.....	40
Figure 12:	Q52 HTML Menu Structure	41
Figure 13:	Q52 Home Page	41
Figure 14:	Zigbee Settings Form	42
Figure 15:	Zigbee Status Page	44
Figure 16:	Bridge Settings Form	45
Figure 17:	Bridge Status Page	46
Figure 18:	TCP/IP Settings Form	47
Figure 19:	TCP/IP Status Page	49
Figure 20:	System Information Form	50
Figure 21:	Password Form.....	51
Figure 22:	SNTP Settings Form	52
Figure 23:	Firmware Upgrade Form.....	53
Figure 24:	Firmware File Selection Dialog.....	54
Figure 25:	Restart Page.....	55
Figure 26:	Help Page	56
Figure 27:	Power Socket.....	75
Figure 28:	Antenna Radiation Pattern	78
Figure 29:	Sample Commercial Invoice.....	84

LIST OF TABLES

Table 1:	Q52 Packing List.....	13
Table 2:	Q52 Dipswitch Settings	15
Table 3:	Common Commands.....	58
Table 4:	List Command Options	60
Table 5:	Set Command Options	61
Table 6:	Store Command Options	63
Table 7:	Miscellaneous Commands	64
Table 8:	STAT LED Patterns	78
Table 9:	NET LED Patterns	79
Table 10:	UTP (RJ45) Connector Pinout	79

1. Overview Of The Manual

Contents of the Manual

1 OVERVIEW OF THE MANUAL

This manual describes the installation and configuration of the Q52 ZigBee / 802.15.4 Bridge on your network. For the latest information on the Q52, please see the Technical Support section of Exegin's Web site:

<http://www.exegin.com/>

Contents of the Manual

This manual contains the following chapters:

2: Introduction to the Q52 ZigBee / 802.15.4 Bridge. A description of how the Q52 works, and its main features.

3: Installing the Q52. Installing and connecting the Q52 ZigBee / 802.15.4 Bridge to a TCP/IP network.

4: Configuration Tools. Utilities provided with the Q52 ZigBee / 802.15.4 Bridge and some basic TCP/IP commands that you will need to configure the Q52.

5: Configuring the Q52 on Your Network. Describes how to set up the TCP/IP network parameters on the Q52.

6: Q52 Zigbee PAN and Bridge Configuration. Describes how to set up the Zigbee and bridging parameters on the Q52 to establish a Zigbee bridge over your TCP/IP network.

7: Using HTML Pages to Configure the Q52. Descriptions of the Q52 web pages for configuring the Zigbee bridge device and viewing its status.

8: Reference Information. Provides a complete command list and information about using the Q52's command line interface shell. Describes the Q52 naming scheme, how to reset units to factory defaults and how to upgrade the firmware.

9: Extra Features/Additional Information. Topics covered include product architecture, general options, security features, using the FTP daemon to access the Q52, and managing the Q52 with SNMP.

10: Q52 Specifications. Providing hardware and software specifications for the Q52, connector pinouts, LED status indicators and variable definitions.

11: Getting Help. Where to find help and how to return the Q52 for repair.

12: Glossary.

1. Overview Of The Manual

Documentation Conventions

Documentation Conventions

The document conventions used in this manual and the appendices are as follows:

- The Courier font in **boldface** indicates commands that you type.

\$ping ftp.exegin.com

- Regular Courier font indicates displayed results.

ftp.exegin.com is alive

- Example names, numbers, and commands are presented in **bold**.

To create an IP address for the Q52 using the TCP/IP **arp** command, do the following...

- Variable values are shown in *italics*. *Italics* may also be used to add emphasis.

ping ipname

ipname is alive

Please enter the ***ipname*** at the prompt.

Make sure you *first* contact...

2 INTRODUCTION TO THE Q52 ZIGBEE / 802.15.4 BRIDGE

This chapter describes the Q52's architecture and special features. The topics included are:

- [What is the Q52?](#) on page 10
- [Physical Features](#) on page 10
- [How Does the Q52 Work?](#) on page 11
- [Product Features](#) on page 11

What is the Q52?

The Q52 ZigBee / 802.15.4 Bridge allows the connection of disparate Zigbee wireless meshes over a TCP/IP network to form a single PAN (Personal Area Network). Using the Q52, low-latency PANs may be created that span buildings, campuses or continents via local TCP/IP intranets or over the Internet.

Typical applications for the Q52 include: interconnection of out-of-range devices; interconnection of 2.4 GHz and 900 MHz PANs; or extension of a PAN to a central management and control facility.

Physical Features

The key physical components of the Q52 are:

- a 10/100 network interface connector to connect to the network
- Built-in 2.4 GHz and 900 MHz radios for connection to Zigbee PANs, including provision for external radio antennae
- Flash memory to store firmware and user-configurable settings
- High-performance internal 32-bit microprocessor subsystem for speed, efficiency and reliability

For more detailed specifications of the Q52, please see chapter 10, [Q52 Specifications](#).

2. Introduction to the Q52 ZigBee / 802.15.4 Bridge

How Does the Q52 Work?

How Does the Q52 Work?

The Q52 implements the Zigbee Bridge Device Specification as defined by the Zigbee Alliance. This standard specifies a method for bridging Zigbee endpoints over TCP/IP networks, such that remote PANs may be bridged together into a single virtual network with high performance and low latency.

Product Features

The Q52 offers an extensive list of features including:

- internal radio circuitry supporting both 900 MHz and 2.4 GHz PANs simultaneously
- simple and fast configuration of Zigbee, TCP/IP and bridge operating parameters
- built-in HTML forms for easy cross-platform configuration and status monitoring with any web browser
- Gecko, a utility for automated TCP/IP configuration (included on the CD ROM supplied with the Q52 or the latest version online at <http://www.exegin.com/>)
- A detailed and easy-to-use command line interface shell
- TCP/IP configuration through static settings or via DHCP
- configuration security through passwords
- remote management through telnet session and SNMP
- extensive built-in troubleshooting tools
- built-in "**telnet**" and "**ping**" clients
- simple flash memory upgrades over TCP/IP

3 INSTALLING THE Q52

This chapter describes the following:

- *Site Requirements* on page 12
- *Unpacking the Q52* on page 13
- *Connecting the Q52 to a Network* on page 13

Site Requirements

Prepare to install the Q52 in a clean, well-ventilated environment protected from extremes of temperature, humidity, mechanical shock, or vibration. Provide enough space at the front and back of the unit for cable connections.

Depending upon the specific options selected at time of ordering, the Q52 may be powered from a 115 or 230 VAC outlet using the supplied external transformer through a output cord to a barrel-style power connector, or over the Ethernet cable (Power Over Ethernet - POE) from an Ethernet switch providing power as defined in the IEEE standard 802.11af. If using the external AC transformer, prepare to install the Q52 within four meters (13 feet) of a grounded 115 or 230 VAC outlet.

The Q52 must be installed within RF range of the local Zigbee wireless PAN, in order to connect to the PAN and therefore bridge it over the TCP/IP network to the remote PAN. The maximum distance from the Q52 to the nearest Zigbee PAN node will vary depending upon the installation environment and capabilities of the other Zigbee node(s).

The Q52 is an intentional radiator of Radio Frequency (RF) energy. In order to limit RF exposure to personnel in the immediate area, the Q52 should be located and installed such that a separation of at least 20 centimeters is maintained between the Q52's antenna and personnel in the vicinity of the device.

Unpacking the Q52

Upon receiving the Q52, check the packaging for any damage or missing pieces. Immediately report problems to the shipping company or vendor.

Table 1—Q52 Packing List

ZigBee / 802.15.4 Bridge	<ul style="list-style-type: none">• Q52• Power Supply
CD-ROM	<ul style="list-style-type: none">• Q52 Installation and Configuration Guide (PDF format)• Software utilities for the Q52

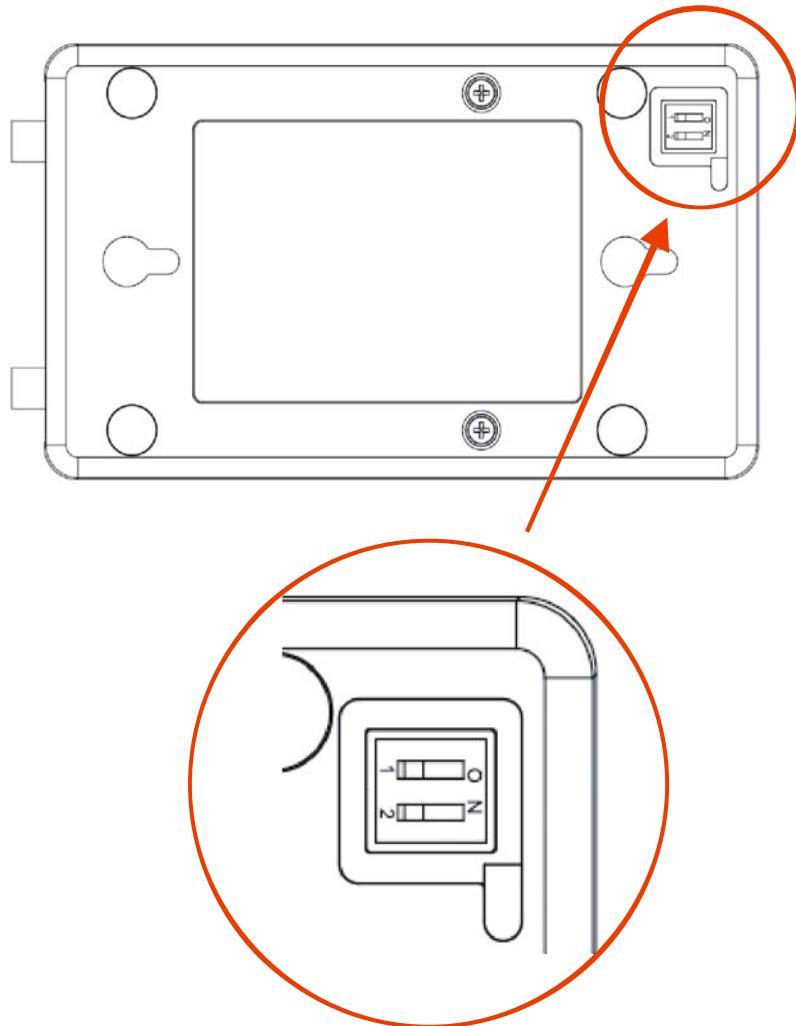
Connecting the Q52 to a Network

There are two dipswitches on the rear surface ([Figure 1](#)) of the Q52. [Table 2](#) on page 15 lists the different modes controlled by dipswitch 1 and 2. Ensure that **dipswitch 1** and **dipswitch 2** are set to the "off" position for normal operations.

3. Installing the Q52

Connecting the Q52 to a Network

Figure 1—Q52 Bottom View



3. Installing the Q52

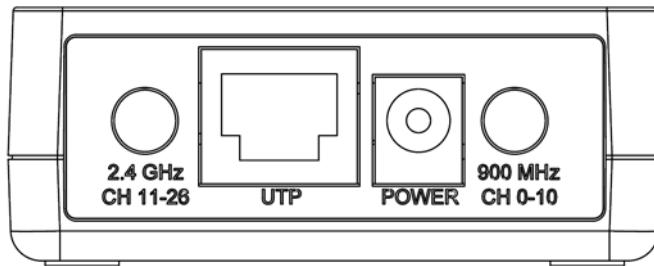
Connecting the Q52 to a Network

Table 2—Q52 Dipswitch Settings

Dipswitch		Comments
1	2	
OFF	OFF	Normal operation. With both dipswitches in the "OFF" position, the unit will boot up using the settings in Flash rather than the default settings. Dipswitch 2 is in the "OFF" position from the factory so that the new settings that you store will be used.
ON	OFF	Factory default settings. With the dipswitches in this configuration, the unit will boot up and all settings stored in Flash will be erased except the Ethernet address and key value.
OFF	ON	Default IP (0.0.0.0). With the dipswitches in this configuration, the unit will boot with factory default settings, but the stored settings in Flash remain intact. This enables you to set an IP Address of your own. Setting dipswitch 2 to "ON" will not clear any settings that you have stored in Flash. It simply boots the unit in a different state with the settings in Flash temporarily ignored.
ON	ON	Factory bootloader mode. Do not use this mode except as directed by Exegin technical support.

Use the RJ45 network connector, located on the side panel of the Q52 (see [Figure 2](#)), for attaching to a 10/100Base-T (UTP) network. Plug a network cable into the network connector. If installing a Q52 without the Power Over Ethernet (POE) option, insert the three-prong power cable of the AC adapter into an AC outlet, and insert the barrel power connectors into the POWER connector on the side panel of the Q52; this will **power on** the device.

Figure 2—Q52 Side View

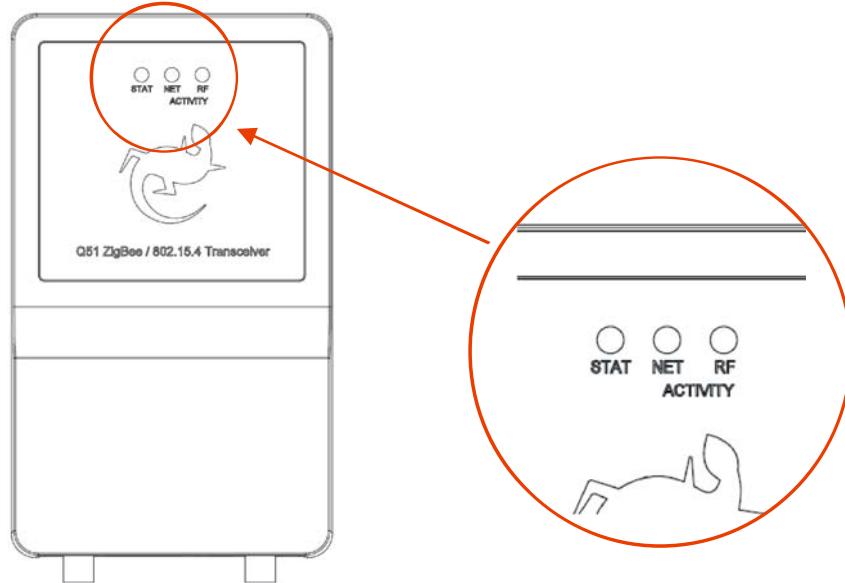


3. Installing the Q52

Connecting the Q52 to a Network

Two LED indicators are used to indicate Ethernet link integrity (see [Figure 2](#)). The green LED at the bottom left of the UTP network connector will be illuminated when a 100 MB/S link is established over the network connection, or extinguished otherwise. The red LED at the bottom right of the UTP network connector will be illuminated when a 10 MB/S link is established over the network connection, or extinguished otherwise.

Figure 3—Q52 Top View: LED Status Indicators



Watch the LED indicators on the top panel as they cycle through the power-on self-test. When the test is complete, the STAT LED will flash once per second or, if there is no IP address configured, twice per second (see [Gecko](#) on page 18 for instruction on how to configure an IP address).

4 CONFIGURATION TOOLS

This chapter briefly describes some of the Q52 utilities provided to help you setup your Q52 ZigBee / 802.15.4 Bridge:

- [HTML forms](#) on page 17
- [Gecko](#) on page 18

In addition, two TCP/IP commands that you will need are briefly described:

- [Telnet](#) on page 19
- [Ping](#) on page 19

Q52 Utilities

HTML forms

The Q52's settings can be configured over TCP/IP using a standard Web browser. The Q52's Web pages provide a user-friendly way to access some of the commands built into the Zigbee bridge device.

To access the Q52's home page, do the following:

1. Ensure that the ZigBee / 802.15.4 Bridge has an IP address and subnet mask so that it is identifiable on your TCP/IP network.
2. Ensure that your network station can successfully "ping" the Q52 over the network.
3. Direct your Web browser to the Uniform Resource Locator (URL):

http://Q52IPaddress

For example: **http://192.168.11.9**

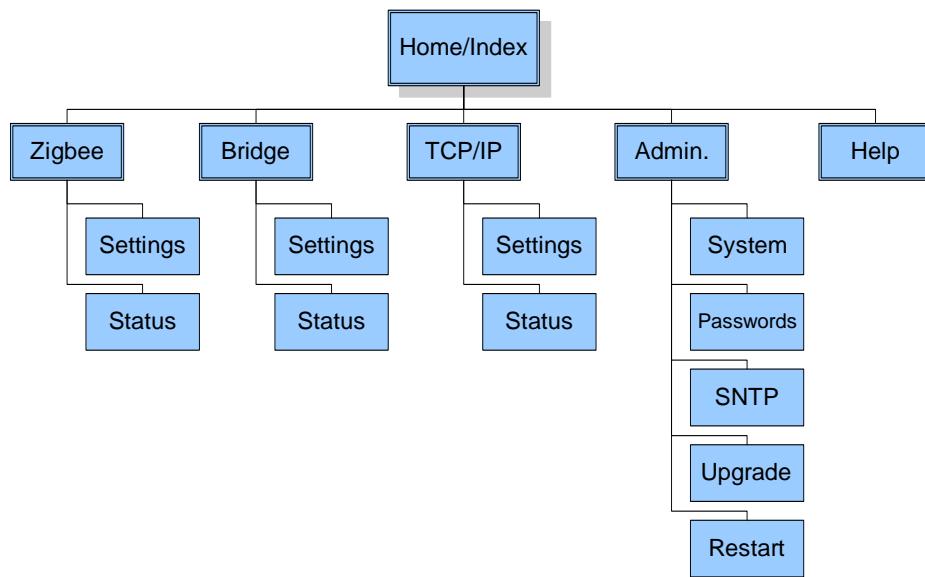
4. When prompted for a User ID and Password, type in "root" for the ID and either press ENTER at the password prompt or, if a password has been set, type the password and then press ENTER.

The Q52's HTML structure is divided into several menus as shown in [Figure 4](#). More detailed information about Q52 web pages is found in chapter 7, [Using HTML Pages to Configure the Q52](#).

4. Configuration Tools

Q52 Utilities

Figure 4—Q52 HTML Menu Structure



Gecko

Gecko is a Windows tool for discovering, monitoring, and configuring Exegin devices on a TCP/IP network. The program is a Java stand alone program.

The Q52 can be configured on a TCP/IP network using Gecko. Two steps are involved:

1. Identify the Q52 on the network using TCP/IP as the underlying protocol
2. Configure the Q52 with its required TCP/IP settings (i.e. IP address and subnet mask).

Additional settings like routing entries can also be configured allowing for communications across subnets. Once Gecko is up and running, select Help Topics from the help menu for more detailed information about Gecko.

The installation procedure for Gecko is described below; [Using Gecko \(Windows\)](#) on page 23 describes how to use Gecko to configure your Q52.

Gecko Environment Requirements

Before installing Gecko, ensure that you have met the following system environment requirements:

- the Java Runtime Environment™ (JRE) from Sun Microsystems. JRE consists of the Java virtual machine, the java platform core classes, and supporting files. The latest supported version of JRE is available at Exegin's website: <http://www.exegin.com/>.
- the TCP/IP protocol installed and configured on your workstation.

4. Configuration Tools

TCP/IP Commands

Installing Gecko in Windows

To install Gecko on a Windows workstation, you will need to:

1. Insert the Q52 CD ROM and bring up the CD directory listing in My Computer or Windows Explorer
2. Double click on *setupex.exe* in the Gecko directory to run the InstallShield Wizard.
3. Answer the prompts throughout the Wizard.

Once the install process is complete, you will be prompted to view the ReadMe file. Select "Yes" to read this and when done, close the file.

Note: The latest version of Gecko is available on Exegin's website:
<http://www.exegin.com/>.

TCP/IP Commands

Telnet

Telnet can be used to access a remote computer on a network. To use this command, you must know the IP address of the Q52 ZigBee / 802.15.4 Bridge. You can start a Telnet session on a UNIX- or Windows-based computer which is connected to the network, to log in to the Q52 command line interface shell to alter and view settings.

Syntax:

```
telnet ipaddress
```

Example:

```
telnet 192.168.11.9
```

This will bring up the Q52 login prompt. Enter "**root**" for the User ID and press either ENTER at the password prompt or, if a password has been set, then type it in and press ENTER.

Ping

You can use the "**ping**" command to check that an assigned IP address (for example, the IP address for the Q52) is active.

Syntax:

```
ping IPaddress
```

For example:

```
ping 192.168.11.9
```

The response will indicate whether the IP address is active or not.

5. Configuring the Q52 on Your Network

Required TCP/IP Settings

5 CONFIGURING THE Q52 ON YOUR NETWORK

This chapter describes how to configure the required and optional TCP/IP settings for the Q52 on your network. The following steps are covered:

- *Required TCP/IP Settings:*
 - *Configuring an initial IP address for the Q52* on page 20
 - *Configure the Q52 IP address and subnet mask* on page 21
- *Optional TCP/IP Settings:*
 - *Communicating across routers* on page 25
 - *Using Host and Domain Names* on page 26
- *Troubleshooting Tips* on page 27.

Once the TCP/IP network port is configured on the Q52, additional configuration is required to connect the Q52 to the local Zigbee Personal Area Network (PAN), and also to bridge that local PAN to another remote PAN over TCP/IP. Please refer to *Q52 Zigbee PAN and Bridge Configuration* on page 30 for details on Zigbee and bridge configuration.

Required TCP/IP Settings

Configuring an initial IP address for the Q52

Since the Q52 has no physical user interface such as a display or keyboard, all operating parameters must be configured by means of a TCP/IP network connection from a separate computer. However, the Q52 must first be assigned an IP address in order to function on a TCP/IP network. This raises the question of how to configure a Q52 when it is first installed on the network fresh from the factory.

As delivered from the factory, the Q52 is configured to request an IP address from a DHCP server when attached to a TCP/IP network. If a DHCP server exists on the network, then the IP address assigned to the Q52 may be determined by querying the DHCP server using its administration interface and locating the IP address of the desired Q52 by matching its Ethernet MAC address. Please refer to the documentation for the particular DHCP server used to determine how this may be done.

As an alternative, Exegin provides a utility program called Gecko which is capable of locating any configured or unconfigured Q52 device attached to the TCP/IP subnet, and assigning an initial IP address to it to facilitate subsequent configuration through a telnet or HTTP connection. Please refer to *Using Gecko (Windows)* on page 23 for details on how to do this.

5. Configuring the Q52 on Your Network

Required TCP/IP Settings

Configure the Q52 IP address and subnet mask

Once the IP address has been created, you can configure the remaining TCP/IP parameters of the Q52 ZigBee / 802.15.4 Bridge using one of the following:

- Q52 HTML forms, [page 21](#)
- the Q52 Gecko utility (Windows only), [page 23](#)
- the TCP/IP **telnet** command, [page 24](#).

Using HTML forms

1. Load the Q52 HTML forms as described in [HTML forms](#) on page 17, then select "Network" from the Main Menu.

Or, go directly to the Network Configuration form by typing the following into your browser:

http://Q52IPaddress/tcpipConf.html

The TCP/IP Settings form is displayed ([Figure 5](#)).

Figure 5—TCP/IP Settings Form

Interface	10/100Mbps Ethernet
Current Settings (Static)	IP Address 172.16.16.1
	Subnet Mask 255.255.0.0
	Default Gateway 172.16.1.254
	DNS Server Address 172.16.1.13
	DNS Domain Suffix microplex.com
TCP Window Size 2 MSS Packets	
Stored Settings	<input type="radio"/> Obtain an IP address automatically
	<input checked="" type="radio"/> Use the following IP address:
	IP Address 172.16.16.1
	Subnet Mask 255.255.0.0
	Default Gateway 172.16.1.254
	DNS Server Address 172.16.1.13
DNS Domain Suffix microplex.com	
TCP Window Size 2 MSS Packets	

Submit **Revert** **Note:** Changes only take effect after restart.

Copyright © 2007 exgin technologies limited. All rights reserved.

5. Configuring the Q52 on Your Network

Required TCP/IP Settings

2. If dynamic addressing is desired, then click on the radio button to the left of the label **Obtain an IP address automatically**, then proceed directly to step 9 below; this will cause the Q52 to request its TCP/IP parameters from a DHCP server over the network.

To specify a static IP address, click on the radio button to the left of the label **Use the following IP address:** and proceed to step 3 below.

3. Enter the IP address in the **IP Address** field.
4. Enter the Q52's subnet mask in the **Subnet Mask** field.
5. [Optional setting] In order to communicate across subnets with the Q52, enter the address of the default gateway in the **Default Gateway** field.
6. [Optional setting] In order to use host and domain names in addition to dotted quad IP addresses, enter the address of the domain name server in the **DNS Server Address** field.
7. [Optional setting] Enter the suffix of the domain name for the Q52 in the **DNS Domain Suffix** field.
8. [Optional setting] To change the TCP window size, select the desired value in the **TCP Window Size** combo box.
9. Click on "Submit" when done.
10. Go to the Reboot page and click on "Reboot" to apply the new settings to your system.

5. Configuring the Q52 on Your Network

Required TCP/IP Settings

Using Gecko (Windows)

Ensure that you have installed Gecko on your Windows PC (see [Installing Gecko in Windows](#) on page 19). To configure the Q52 with its required TCP/IP settings (i.e. IP address and subnet mask), do the following:

1. Select Programs → Exegin → Gecko → Gecko in the Windows Start menu.

The Gecko main screen is displayed, as in [Figure 6](#).

2. Click on "Search..." to open the Discover Devices dialog box.
3. Select "local" and click on "OK".

Or, click on "Add..." to find a device on another subnet.

The main dialog box will now build up a list of Exegin devices. This process may take a minute or two to find the devices on the network.

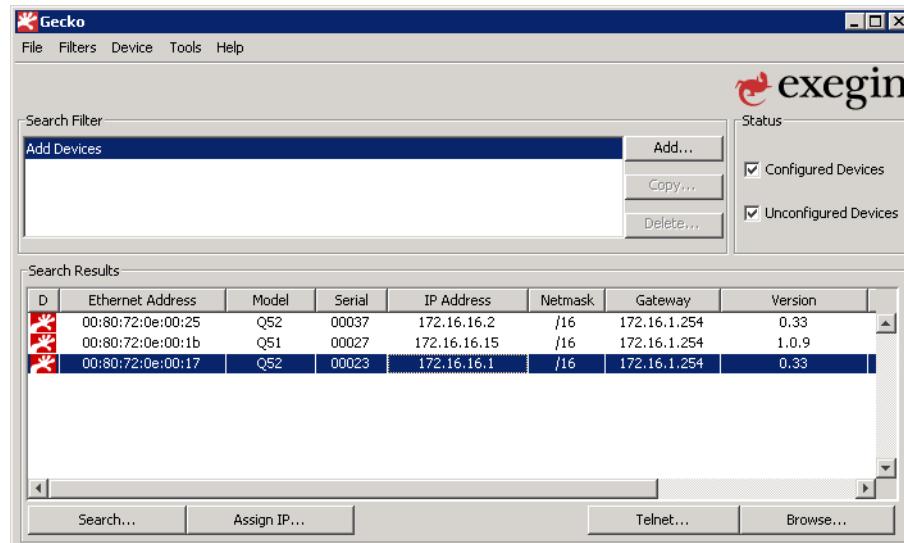
4. Click on "Stop Searching" after the device has been found.
5. Select the Q52's ethernet address from the list box and press "Assign IP...".
6. In the Assign IP dialog box, fill in the IP address and subnet mask for this Q52.

You can also assign a default router/gateway entry in this dialog box to allow your Q52 to communicate across subnets. Please see [Communicating across routers](#) on page 25 for further details.

7. Click "Assign" when done to assign these TCP/IP settings to the Q52. Gecko will then display its progress status in a separate dialog box.

After successfully assigning the settings you will see the Q52 with its new IP address in the device list.

Figure 6—Gecko Main Screen



5. Configuring the Q52 on Your Network

Required TCP/IP Settings

Using Telnet

1. Start a Telnet session with the Q52. Type:

```
telnet Q52IPaddress
```

where **Q52IPaddress** is the IP address of the Q52 unit. This will bring up a login prompt.

2. Enter "**root**" for the User ID and press ENTER at the Password prompt, as by default there is no password set.

The following WARNING message is normal at this point and may be ignored.

```
STORED AND CURRENT VALUES DIFFER
```

You should now see the prompt:

```
Q52IPaddress:root>
```

3. Store the new IP address and netmask in EEPROM so that the setting will remain intact after reboot. To do this, enter:

```
store net addr Q52IPaddress
store net mask Q52netmask
```

where:

Q52netmask is the netmask address for the Q52.

If you would like to communicate with the Q52 from across routers, you will need to make an entry in the "Routing" section. See [Communicating across routers](#) on page 25 for further details.

4. **[Optional, but recommended]** Configure root and guest user passwords with the following commands:

```
set user passwd root newRootPsswd
set user passwd guest newGuestPasswd
```

5. Save these configurations to EEPROM. Enter:

```
save
```

6. Verify the IP address and netmask. Enter:

```
list stored net
```

7. Log out of the telnet session with "**quit**" then reboot the Q52 by powering the unit off and then back on again.

8. Test the equipment and configuration after installation is complete.

```
ping Q52IPaddress
```

An Important Note

Once you have configured the unit using any of the above methods, the STAT LED will flash once per second. This means the Q52 is configured and recognizable on the network.

The STAT LED will flash when the IP Address is configured; it does not mean that the unit is properly configured, only that an IP address has been saved.

5. Configuring the Q52 on Your Network

Optional TCP/IP Settings

Optional TCP/IP Settings

Communicating across routers

Since Windows and UNIX environments depend on TCP/IP to communicate with the Q52, crossing routers can be an issue.

After following one of the Q52 configuration methods described above, you will only be able to communicate with the Zigbee bridge device from the *same* subnet. This means that the Q52 will *not* be able to communicate across a router (i.e., to another subnet).

To allow the Q52 to communicate across a router, it is best to store a default router/gateway within the Zigbee bridge device so that any packets destined for another subnet are forwarded to this router automatically. The router (or series of routers) can then ensure the packets arrive at their final destination on the other subnet.

You can configure a default router/gateway within the Q52 using either the Q52 HTML forms or the TCP/IP **telnet** command.

Using HTML forms

1. Follow the instructions for accessing the Network TCP/IP form ([page 21](#)).
2. Enter the address of the default gateway in the **Default Gateway** field.
3. Click on "Submit" when done.
4. Go to the Reboot page and click on "Reboot" to apply the new settings to your system.

5. Configuring the Q52 on Your Network

Optional TCP/IP Settings

Using Telnet

1. Telnet to the Zigbee bridge device as described on [page 24](#).

```
telnet Q52ipaddress
```

2. Enter "root" for the User ID and press ENTER at the Password prompt, as by default there is no password set.

The following WARNING message is normal at this point and may be ignored.

```
STORED AND CURRENT VALUES DIFFER
```

You should now see the prompt:

```
Q52IPaddress:root>
```

3. Type "list net" to view the Zigbee bridge device's current settings, then configure the Q52's default router/gateway as follows:

```
store net gateway routerIPaddress
```

4. Logout of the Telnet session with "quit". Then reboot the Q52 by powering the unit off and then on again.

Using Host and Domain Names

The Q52 allows entry of most IP addresses either in 'dotted quad' form or as a symbolic host names. Host names have the advantage that they are easier to remember and are not tied to a specific IP address.

The translation from host name to IP address is performed by a Domain Name Server (DNS). In order to use host names, the IP address for the DNS server as well as the domain name suffix must be specified at configuration time.

Using HTML forms

1. Follow the instructions for accessing the TCP/IP Settings form ([page 21](#)).
2. Enter the IP address of the Domain Name Server in the **DNS Server Address** field. *Note: this address must be entered in dotted quad format.*
3. Enter the suffix of the domain name in the **DNS Domain Suffix** field.
4. Click on "Submit" when done.
5. Go to the Reboot page and click on "Reboot" to apply the new settings to your system.

5. Configuring the Q52 on Your Network

Troubleshooting Tips

Using Telnet

1. Telnet to the Zigbee bridge device as described on [page 24](#).

```
telnet Q52ipaddress
```

2. Enter "root" for the User ID and press ENTER at the Password prompt, as by default there is no password set.

The following WARNING message is normal at this point and may be ignored.

```
STORED AND CURRENT VALUES DIFFER
```

You should now see the prompt:

```
Q52IPaddress:root>
```

3. Type "list net" to view the Zigbee bridge device's current settings, then configure the Q52's Domain Name Server address and Domain Name Suffix as follows:

```
store net dns dnsIPaddress
store net domain domainsuffix
```

4. Logout of the Telnet session with "quit". Then reboot the Q52 by powering the unit off and then on again.

Troubleshooting Tips

Gecko error messages: Q52 will not talk on the network

Unable to assign temporary IP. The address is already in use.

- Ensure that you have assigned an IP address that is not being used by another device.

Unable to assign temporary IP. The device is not responding. The network may be down, or an invalid IP address has been used.

- Ensure that the IP address that you used is valid for your network.

Q52 will not talk on the network

- Have you assigned it a unique and valid IP address which corresponds with the other IP addresses on your network? For example, are you sure no other device is using this IP address, that the subnet mask is the same as other hosts on the network, and that the unique IP address is part of the network specified by the subnet mask specified?
- Are you sure you are trying to talk to the Q52 from a host on the *same subnet*? The Zigbee bridge device can only be seen locally unless you configured a routing entry earlier on.
- Is the STAT LED on the front of the Q52 flashing once per second or is it flashing faster? A slower, once-a-second rate indicates that the Zigbee bridge device is in fact configured with an IP address. A faster rate indicates that the Q52 is unaware of the IP address and you may need to try the configuration process again.

5. Configuring the Q52 on Your Network

Troubleshooting Tips

- Have you confirmed the network connection to the Q52 is working correctly? Trying different network cables and locations will help narrow down the problem.

Cannot ping the Q52

There are a number of possible reasons for this:

- Have you rebooted the Q52? Sometimes this will solve various communication problems.
- Is the network cable securely connected?
- Have you checked your network connection to the Q52? Try it at a new location on your network if possible or swap in another device.
- Have you made an entry in your computer's host table (`/etc/hosts`, **host nis** map, or DNS name table) for the Q52?
- Have you tried to **ping** with the IP address instead of the IP name? This will eliminate any name-lookup issues and focus more on the communications between the Q52 and your host.
- Is it possible that a duplicate IP address has been assigned?
- Did you use the correct netmask for your particular environment?
- Has the Q52 been moved from another network? If so, it will likely need to be reconfigured to integrate with its new location. This includes at minimum a new IP address and netmask. Please see [Resetting to Factory Defaults](#) on page 99 for possible configuration methods.
- Is there a router between the Q52 and your host? If so, a default router or a static route must be configured on the unit so the Q52 knows how to get its response back to the originating host. Please see [Communicating across routers](#) on page 25.
- Do you have a DHCP or BOOTP server running on your network? By default, the Q52 comes with the DHCP and BOOTP request turned *on* so although you may have stored a particular network configuration in the unit's EEPROM, a DHCP or BOOTP server may supply new *network* parameters upon bootup. To turn off DHCP and BOOTP on the unit, please see [Configure the Q52 IP address and subnet mask](#) on page 21.

If none of these help, try the following:

- Reset the unit to default settings. Please see [Resetting to Factory Defaults](#) on page 99. Once the unit is in the default state, use one of the configuration options listed in the "Q52 Configuration" above in the manual to reconfigure it.

Cannot Telnet to the Q52

If you are unable to **ping** the Q52 as well, please see [Cannot ping the Q52](#) on page 28. If it is **telnet** only that you are having problems with, these points should be considered:

- Are you able to **telnet** to another host on your network or **telnet** from another host? If not, look into your host's TELNET configuration.

5. Configuring the Q52 on Your Network

Troubleshooting Tips

- Have you tried rebooting the Q52?
- Are the dipswitches in the "off" position?
- Does the fourth octet of the Q52's given IP address equal 0 or 255? Each of the four octets in the IP address should be between 1 and 254.

HTML configuration forms will not display

- Can you "ping" the Q52 from your Windows station? If not, please see [Cannot ping the Q52](#) on page 28.
- Have you used the correct URL for the Q52's home page? It should be:

http://Q52IPaddress

For example:

http://192.168.11.9

6. Q52 Zigbee PAN and Bridge Configuration

Required Zigbee Settings

6 Q52 ZIGBEE PAN AND BRIDGE CONFIGURATION

This chapter describes how to configure the required and optional Zigbee Personal Area Network (PAN) and bridge settings for the Q52. The following steps are covered:

- *Required Zigbee Settings*
 - *Selecting the RF Channels* on page 30
- *Optional Zigbee Settings*
 - *Setting the PAN Filter* on page 32
 - *Setting Extended Address Filters* on page 33
- *Required Bridging Settings*
 - *Setting the remote bridge host name* on page 33
- *Optional Bridging Settings*
 - *Setting additional remote bridge host names* on page 34
- *Troubleshooting Tips*
 - *Zigbee PAN* on page 35
 - *Zigbee Bridge* on page 36

Required Zigbee Settings

Selecting the RF Channels

The Q52 features two radio circuits, one operating in the 868-928 MHz frequency range and the other operating in the 2.4 GHz frequency range. As shipped from the factory, the Q52 is configured to operate on the lowest channel numbers available in each frequency range:

- In North America, the 900 MHz radio is configured by default to operate on channel 1; in Europe, it is configured to operate on channel 0
- In all markets, the 2.4 GHz radio is configured by default to operate on channel 11.

Note: Channel 0 (868 MHz) is not authorized for operation in North America; similarly, Channels 1 through 10 (902-928 MHz) are not authorized for operation in Europe. For more information, please refer to the appropriate regulatory authority in your market area.

The Q52 must be configured to use the same radio channel(s) as the other nodes in the local Zigbee PAN. This configuration may be performed using HTML forms.

6. Q52 Zigbee PAN and Bridge Configuration

Required Zigbee Settings

Using HTML forms

1. Load the Q52 HTML forms as described in [HTML forms](#) on page 17, then select "Zigbee" from the Main Menu.

Or, go directly to the Zigbee Configuration form by typing the following into your browser:

http://Q52IPaddress/zigbeeConf.html

The Zigbee Settings configuration form is displayed ([Figure 7](#)).

Figure 7—Zigbee Settings Form

2. Select the desired RF Channel for 2.4 GHz operation by clicking on the down-arrow indicator of the combo box for the 2.4 GHz radio.
3. Click on "Submit" when done.
4. Go to the Reboot page and click on "Reboot" to apply the new settings to your system.

6. Q52 Zigbee PAN and Bridge Configuration

Optional Zigbee Settings

Optional Zigbee Settings

Enabling Zigbee Coordinator functionality

By default, the Q52 acts only as a Zigbee Bridge Device (ZBD) to bridge Zigbee network messages over TCP/IP. However, the Q52 is also capable of acting as Zigbee Coordinator for the local Zigbee PAN.

1. Load the Q52 HTML forms as described in [HTML forms](#) on page 17, then select "Zigbee" from the Main Menu.

Or, go directly to the Zigbee Configuration form by typing the following into your browser:

`http://Q52IPaddress/zigbeeConf.html`

The Zigbee Settings configuration form is displayed ([Figure 7](#)).

2. If the Q52 should act as Zigbee PAN Coordinator for the wireless network, enter the desired PAN ID and check the box labelled 'PAN Coordinator'; otherwise leave this box un-checked.
3. Click on "Submit" when done.
4. Go to the Reboot page and click on "Reboot" to apply the new settings to your system.

Setting the PAN Filter

By default, the Q52 will bridge all PAN ID's encountered on the Zigbee network. However, some installations may require filtering of PAN ID's.

Using HTML forms

1. Load the Q52 HTML forms as described in [HTML forms](#) on page 17, then select "Zigbee" from the Main Menu.

Or, go directly to the Zigbee Configuration form by typing the following into your browser:

`http://Q52IPaddress/zigbeeConf.html`

The Zigbee Settings configuration form is displayed ([Figure 7](#)).

2. Enter the desired PAN ID into the **PAN ID Filter** field. The PAN ID is expressed as a four-digit hexadecimal value. To disable PAN ID Filtering (ie: to accept all PAN ID's), enter the value 'ffff' into this field.
3. Click on "Submit" when done.
4. Go to the Reboot page and click on "Reboot" to apply the new settings to your system.

6. Q52 Zigbee PAN and Bridge Configuration

Required Bridging Settings

Setting Extended Address Filters

The Q52 may be optionally configured to respond to specific Zigbee MAC addresses. These addresses are referred to as Extended Address Filters. A maximum of ten Extended Address Filters may be configured.

Using HTML forms

1. Load the Q52 HTML forms as described in [HTML forms](#) on page 17, then select "Zigbee" from the Main Menu.

Or, go directly to the Zigbee Configuration form by typing the following into your browser:

```
http://Q52IPaddress/zigbeeConf.html
```

The Zigbee Settings configuration form is displayed ([Figure 7](#)).

2. Enter the desired Zigbee MAC addresses into the **Extended Address Filter** field. Each address should be entered on its own line, separated by a carriage return from the next. Each MAC address is expressed as a twelve-digit hexadecimal value.
3. To enable extended address filtering, ensure that the 'Extended Address Filter' checkbox is checked.
4. Click on "Submit" when done.
5. Go to the Reboot page and click on "Reboot" to apply the new settings to your system.

Required Bridging Settings

Setting the remote bridge host name

In order to successfully bridge a Zigbee PAN across TCP/IP, at least two Zigbee bridge devices are required. The Q52 ZigBee / 802.15.4 Bridge which is currently being configured requires at least one other Zigbee bridge device available on the TCP/IP network with which it may establish a bridge connection. This configuration may be performed using HTML forms.

Using HTML forms

1. Load the Q52 HTML forms as described in [HTML forms](#) on page 17, then select "Bridge" from the Main Menu.

Or, go directly to the Bridge Configuration form by typing the following into your browser:

```
http://Q52IPaddress/bridgeConf.html
```

The Bridge Settings configuration form is displayed ([Figure 8](#)).

6. Q52 Zigbee PAN and Bridge Configuration

Optional Bridging Settings

Figure 8—Bridge Settings Form

Destination	Hostname 1	Hostname 2	Hostname 3	Hostname 4
1	172.16.16.2			

Submit Revert

Copyright © 2007 exegin technologies limited. All rights reserved.

2. Enter the IP address of the remote zigbee bridge device into the **Hostname 1** field. The IP address may be entered in dotted quad form, or as a host name if the Domain Name Server (DNS) parameters have been configured in the Q52. Please refer to *Optional TCP/IP Settings* on page 25 for details on how to configure the DNS settings.
3. Click on "Submit" when done.

Optional Bridging Settings

Setting additional remote bridge host names

While at least one remote Zigbee bridge device is required for successful bridging operation, the Q52 can support up to four remote Zigbee bridge devices. These additional bridge devices may be configured using HTML forms.

6. Q52 Zigbee PAN and Bridge Configuration

Troubleshooting Tips

Using HTML forms

1. Load the Q52 HTML forms as described in [HTML forms](#) on page 17, then select "Bridge" from the Main Menu.

Or, go directly to the Bridge Configuration form by typing the following into your browser:

`http://Q52IPaddress/bridgeConf.html`

The Bridge Settings configuration form is displayed ([Figure 8](#)).

2. Enter the IP address of up to three additional remote zigbee bridge device into the **Hostname 2**, **Hostname 3** and **Hostname 4** fields. Each IP address may be entered in dotted quad form, or as a host name if the Domain Name Server (DNS) parameters have been configured in the Q52. Please refer to [Optional TCP/IP Settings](#) on page 25 for details on how to configure the DNS settings.
3. Click on "Submit" when done.

Troubleshooting Tips

Zigbee PAN

The Q52 can display a Zigbee Status HTML form which may be very helpful in resolving connection issues with the Zigbee PAN.

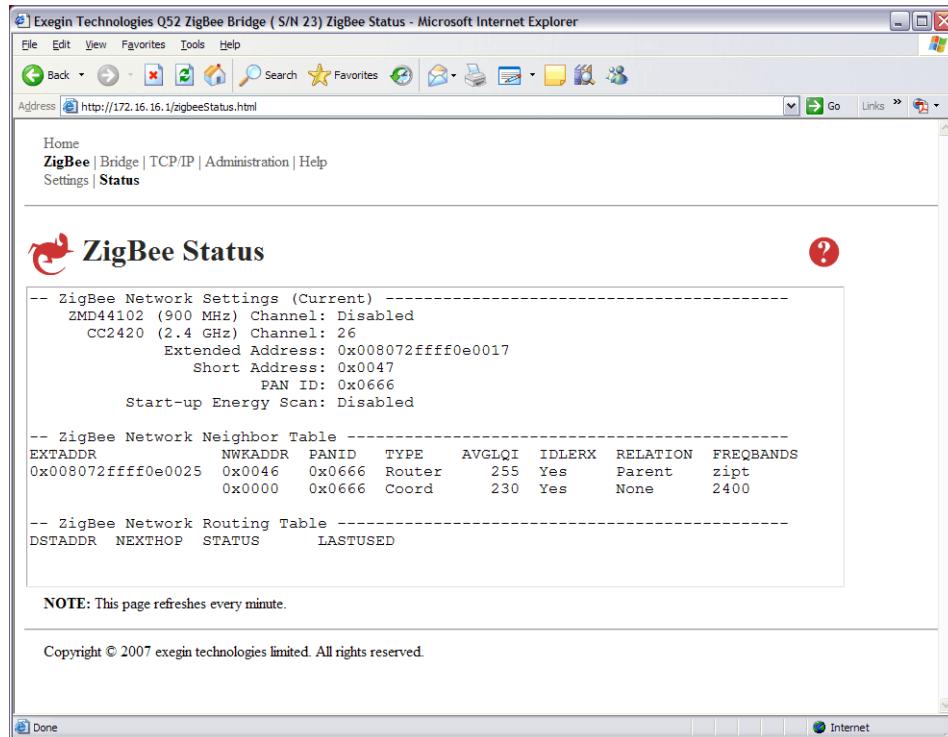
1. Load the Q52 HTML forms as described in [HTML forms](#) on page 17, then select "Zigbee" from the Main Menu. The Zigbee Settings form will be displayed.
2. From the Zigbee Settings form, select "Status".

Or, go directly to the Zigbee Status form by typing the following into your browser:

`http://Q52IPaddress/zigbeestatus.html`

The Zigbee Status form is displayed ([Figure 9](#)).

Figure 9—Zigbee Status Form



Some things to check:

- Do the selected radio channels match the channels in use by the local Zigbee PAN?
- If PAN ID filtering is in use, does the PAN ID filter match the PAN ID used by the local Zigbee coordinator?
- If Extended Address Filters are in use, do the Zigbee MAC addresses match those of the devices to be bridged?

Zigbee Bridge

The Zigbee Bridge Status form is helpful in determining the current state of the Zigbee bridge connection.

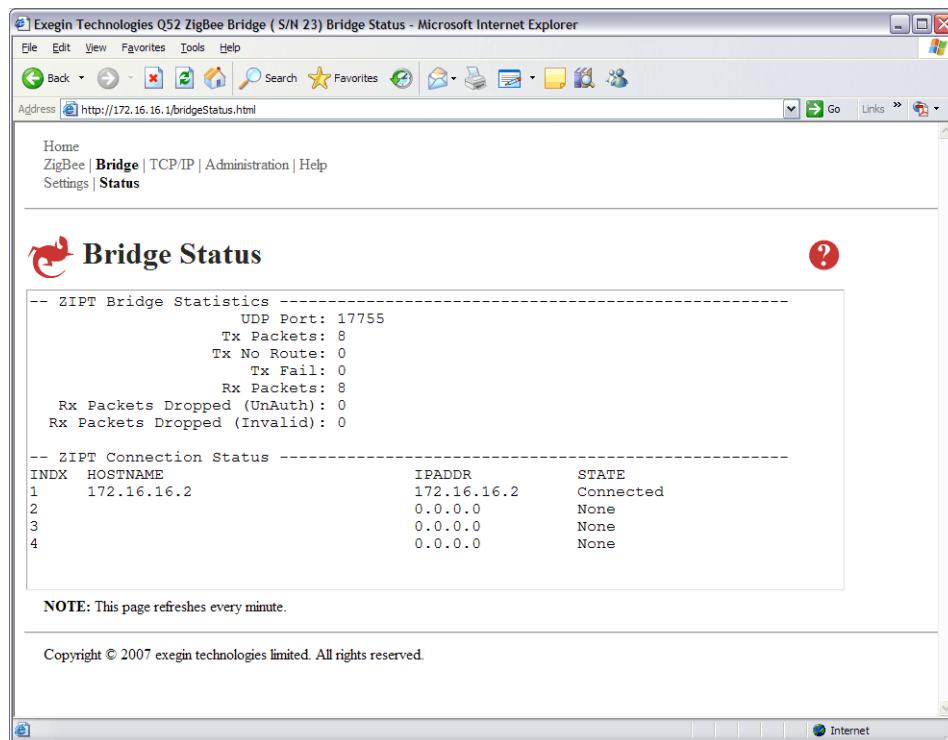
1. Load the Q52 HTML forms as described in [HTML forms](#) on page 17, then select "Bridge" from the Main Menu. The Bridge Settings form will be displayed.
2. From the Bridge Settings form, select "Status".

Or, go directly to the Bridge Status form by typing the following into your browser:

`http://Q52IPaddress/bridgeStatus.html`

The Bridge Status form is displayed ([Figure 10](#)).

Figure 10—Bridge Status Form



Some things to check:

- Is the IP address of the remote bridge device entered correctly?
- If the IP address of the remote bridge device(s) is(are) entered as host names as opposed to a dotted-quad numeric values, have the Domain Name Server (DNS) configuration settings been entered? Please refer to *Optional TCP/IP Settings* on page 25 for details on how to configure the DNS settings.
- Are you able to 'ping' the remote bridge device(s)?

7 USING HTML PAGES TO CONFIGURE THE Q52

This chapter describes the HTML pages provided with the Q52. The Zigbee bridge device settings can be configured and its status observed at any time, by calling up these pages.

The following HTML pages are described here:

- *Accessing the Q52 HTML Pages* on page 38
 - *Password Protection* on page 39
- *Q52 Home Page* on page 40
- *Zigbee Forms*
 - *Zigbee Settings Form* on page 42
 - *Zigbee Status Page* on page 43
- *Bridge Forms*
 - *Bridge Settings Form* on page 44
 - *Bridge Status Page* on page 46
- *TCP/IP Forms*
 - *TCP/IP Settings Form* on page 46
 - *TCP/IP Status Page* on page 48
- *Administration Forms*
 - *System Information Form* on page 49
 - *Password Form* on page 50
 - *SNTP Settings Form* on page 51
 - *Firmware Upgrade Form* on page 52
 - *Restart Page* on page 54
- *Help Page* on page 55

Accessing the Q52 HTML Pages

To access the Q52's HTML pages, do the following:

1. Ensure that the Zigbee bridge device has an IP address and subnet mask so that it is identifiable on your TCP/IP network.

7. Using HTML Pages to Configure the Q52

Accessing the Q52 HTML Pages

2. Ensure that your network station can successfully "ping" the Q52 over the network.
3. Direct your Web browser to the Uniform Resource Locator (URL):

http://Q52IPaddress

For example: **http://192.168.11.9**

4. When prompted for a User ID and Password, type in "**root**" for the ID and press ENTER at the password prompt.

By default, no password is set. However, if a password has been configured, then type it in and then press ENTER.

Each page can be accessed directly by directing your browser to the URL:

http://Q52IPaddress/filename.html

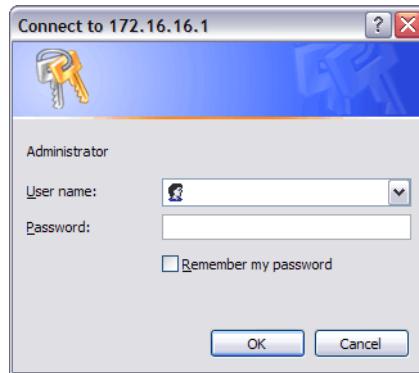
where "**filename**" is one of:

zigbeeConf	Zigbee Settings form
zigbeeStatus	Zigbee Status form
bridgeConf	Bridge Settings form
bridgeStatus	Bridge Status form
tcpipConf	TCP/IP (network) Settings form
tcpipStatus	TCP/IP (network) Status form
adminConf	Administration form
pswdConf	System Password form
sntpConf	SNTP Settings form
upgrade	Firmware Upgrade form
reboot	System Restart page
help	Help page.

Password Protection

Some of the Q52 configuration forms are password-protected. When first accessing these forms, a password dialog will be displayed as shown in [Figure 11](#).

Figure 11—Password Dialog for Access to Administration Forms



By default, the Q52 implements two user names: 'root' and 'guest'. Individual passwords may be set for each user name. As shipped from the factory, the password for both user names is blank. Passwords may be set for each user ID; please refer to [Password Form](#) on page 50 for details on how this is done.

To access a password-protected form, enter the desired user name ('root' or 'guest') and the associated password, then click the 'OK' button at the bottom of the dialog.

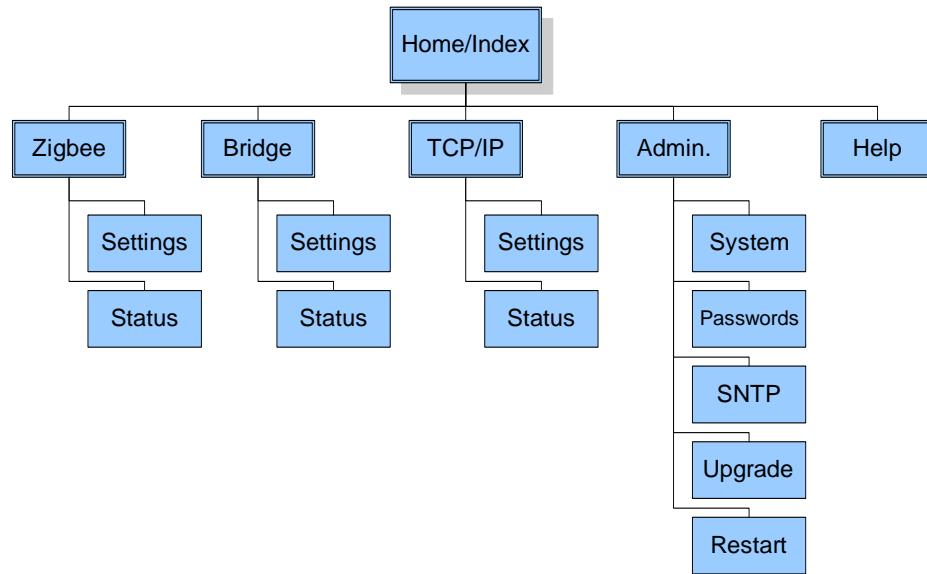
Q52 Home Page

The Home page for the Q52 ZigBee / 802.15.4 Bridge provides a menu of pages (see [Figure 12](#)) that facilitate viewing and changing the status and operating parameters of the Q52. It also provides some basic system information for the Q52, and a link to the Exegin web site.

7. Using HTML Pages to Configure the Q52

Q52 Home Page

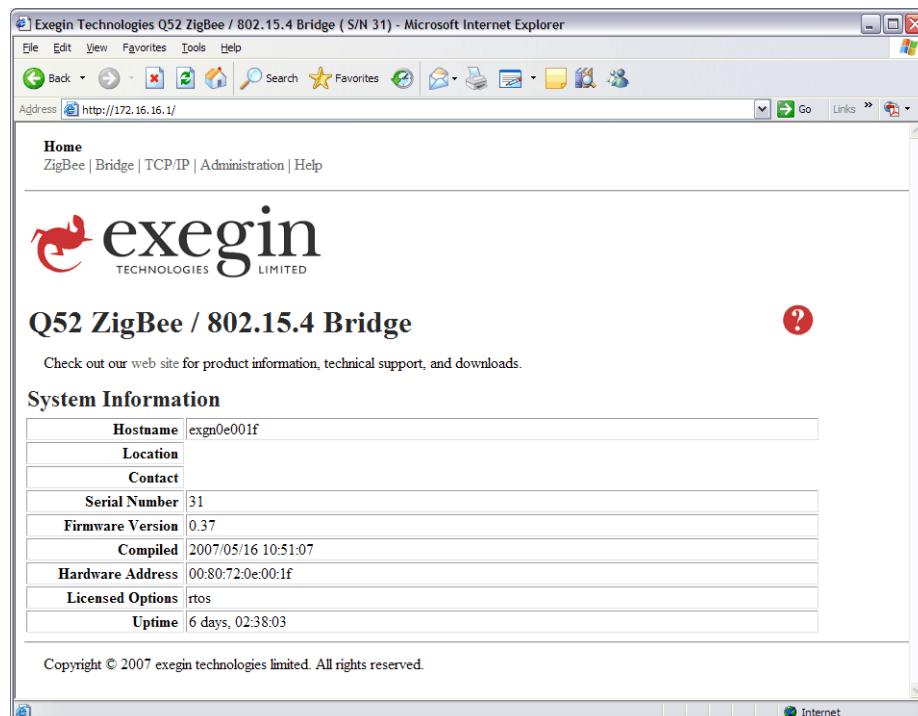
Figure 12—Q52 HTML Menu Structure



System Information

The first three fields of this page, Hostname, Location and Contact, can be changed by going to the Administration page. The other fields are information provided by the Q52 itself.

Figure 13—Q52 Home Page



Zigbee Forms

Zigbee Settings Form

the Zigbee Settings form appears as shown in [Figure 14](#).

Figure 14—Zigbee Settings Form

Radio Channels

The Q52 is capable of operating on one 900 MHz channel and one 2.4 GHz channel simultaneously. A combo box is provided to select the desired channel for the 2.4 GHz radio.

Default: Set to the lowest channel available in the market area into which the product is shipped:

- Channels 0 and 11 (Europe)
- Channels 1 and 11 (North America)

Note: Channel 0 (868 MHz) is not authorized for operation in North America; similarly, Channels 1 through 10 (902-928 MHz) are not authorized for operation in Europe. For more information, please refer to the appropriate regulatory authority in your market area.

7. Using HTML Pages to Configure the Q52

Zigbee Forms

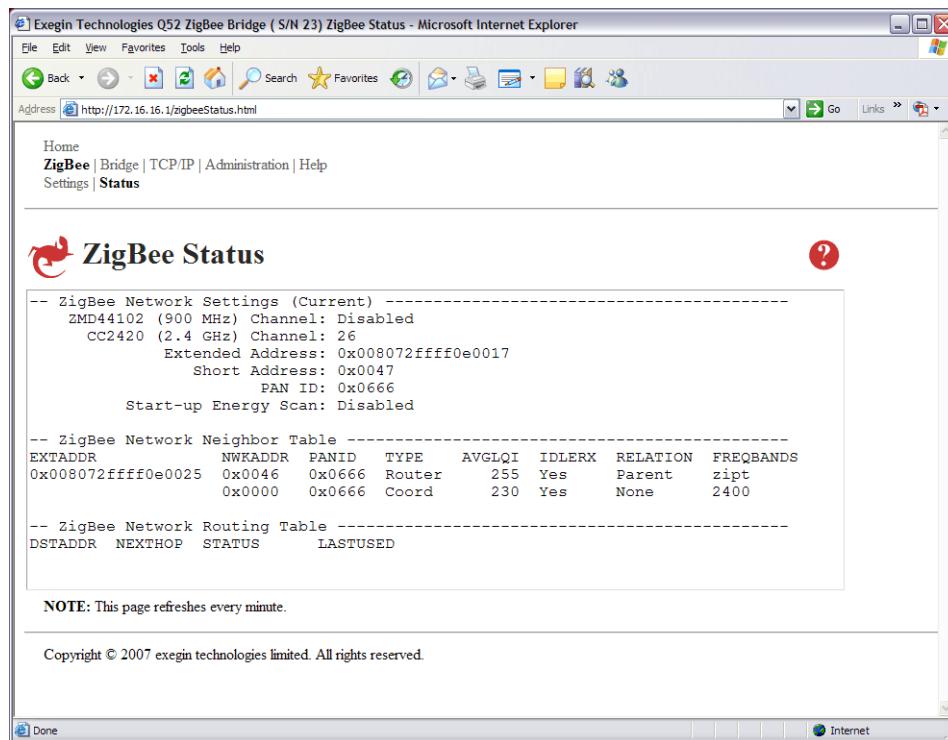
Zigbee Coordinator	By default, the Q52 acts only as a Zigbee Bridge Device (ZBD) to bridge Zigbee network messages over TCP/IP. However, the Q52 is also capable of acting as Zigbee Coordinator for the local Zigbee PAN. A check box is provided to enable the Q52 to act as Zigbee Coordinator for the local PAN. If this functionality is enabled, the local PAN ID must also be set; the 'PAN ID' field is provided for this purpose.
	Default: Zigbee Coordinator functionality is disabled.
PAN ID Filter	The PAN ID Filter field configures the Q52 to bridge only Zigbee messages for a specified PAN ID. To enable PAN ID filtering, enter the desired PAN ID into the PAN ID Filter field. The PAN ID is expressed as a four-digit hexadecimal value. To disable PAN ID Filtering (ie: to accept all PAN ID's), enter the value 'ffff' into this field.
Extended Address Filter	The Q52 may be optionally configured to respond to specific Zigbee MAC addresses. These addresses are referred to as Extended Address Filters. A maximum of ten Extended Address Filters may be configured. To enable Extended Address filters, check the 'Extended Address Filter' checkbox and enter one or more Zigbee MAC addresses into the associated text box. To disable Extended Address filters, un-check the 'Extended Address Filter' checkbox.
Saving Configuration Changes	Any changes on this page will be saved only when the 'Submit' button is clicked. In order for the new values to actually take effect, the Q52 must be re-started. To re-start the Q52, please refer to Restart Page on page 54. To erase all changes, click the 'Revert' button.

Zigbee Status Page

The Zigbee Status page is shown in [Figure 15](#). Use this page to troubleshoot Zigbee-related problems. Network status indicators are recorded in this page; there are no configuration settings. The page refreshes every minute. The Radio status, Zigbee Network Neighbour table, and Zigbee Network Routing table are displayed.

7. Using HTML Pages to Configure the Q52 Bridge Forms

Figure 15—Zigbee Status Page



The screenshot shows a Microsoft Internet Explorer window displaying the 'ZigBee Status' page for an Exgin Technologies Q52 ZigBee Bridge. The page includes a navigation bar with links to Home, ZigBee, Bridge, TCP/IP, Administration, and Help, as well as Settings and Status. The main content area is titled 'ZigBee Status' and contains three sections of network information:

- ZigBee Network Settings (Current) --**

ZMD44102 (900 MHz)	Channel:	Disabled
CC2420 (2.4 GHz)	Channel:	26
Extended Address: 0x008072fffff0e0017		
Short Address: 0x0047		
PAN ID: 0x0666		
Start-up Energy Scan: Disabled		
- ZigBee Network Neighbor Table --**

EXTADDR	NWKADDR	PANID	TYPE	AVGLQI	IDLERX	RELATION	FREQBANDS
0x008072fffff0e0025	0x0046	0x0666	Router	255	Yes	Parent	zipt
	0x0000	0x0666	Coord	230	Yes	None	2400
- ZigBee Network Routing Table --**

DSTADDR	NEXTHOP	STATUS	LASTUSED

At the bottom of the page, a note states: "NOTE: This page refreshes every minute." and a copyright notice: "Copyright © 2007 exgin technologies limited. All rights reserved." The browser status bar shows "Done" and "Internet".

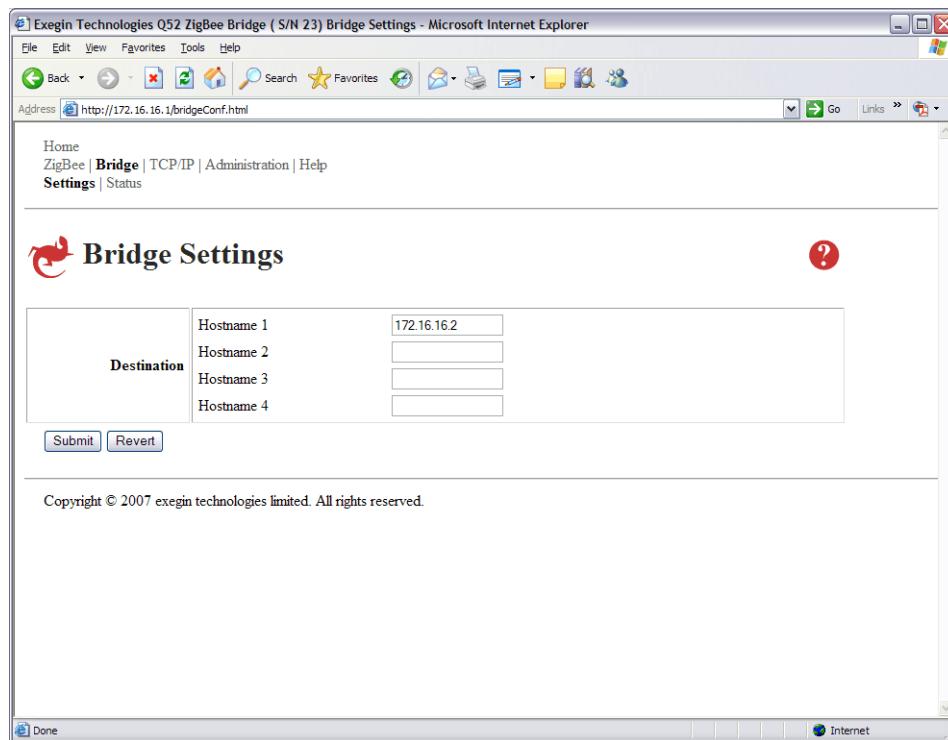
Bridge Forms

Bridge Settings Form

The Bridge Settings form is shown in [Figure 16](#).

7. Using HTML Pages to Configure the Q52 Bridge Forms

Figure 16—Bridge Settings Form



The screenshot shows a Microsoft Internet Explorer window with the title "Exgin Technologies Q52 ZigBee Bridge (S/N 23) Bridge Settings - Microsoft Internet Explorer". The address bar shows "http://172.16.16.1/bridgeConf.html". The page content is titled "Bridge Settings". It contains a table with four rows, each labeled "Hostname 1" through "Hostname 4". The "Hostname 1" row has a value of "172.16.16.2" in the input field. Below the table are "Submit" and "Revert" buttons. At the bottom of the page, a copyright notice reads "Copyright © 2007 exgin technologies limited. All rights reserved.".

The Bridge Settings form allows specification of up to four remote Zigbee bridge devices. The Q52 will attempt to connect to all specified bridge devices to bridge Zigbee messages to and from the local PAN.

Remote Zigbee bridge devices are specified by IP address. At least one device should be specified in order to bridge Zigbee message over the TCP/IP network.

IP addresses may be specified in dotted quad format, for example:

172.16.16.1

Alternatively, host names may be used to specify the IP address of each bridge device. The Q52 requires access to a Domain Name Server (DNS) in order for host names to work. Please refer to [DNS Server Address](#) on page 48 for more details on configuring the DNS server address.

Hostname 1 At a minimum, the IP address one remote Zigbee bridge device should be entered into the **Hostname 1** field.

Default: Unconfigured (blank) IP address.

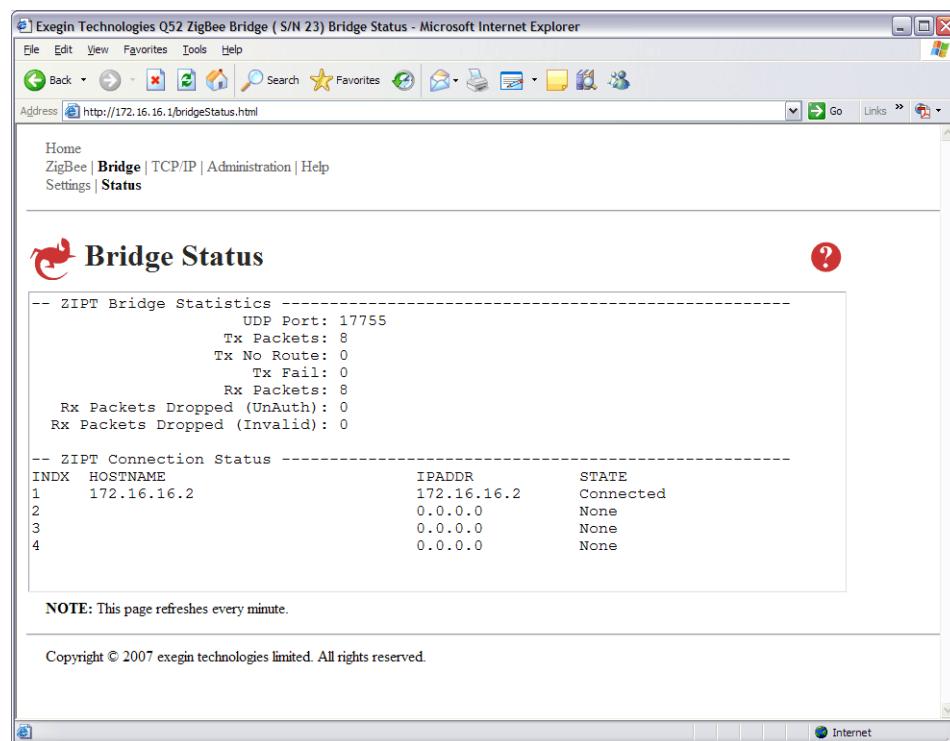
Hostname 2 The IP addresses of up to three additional Zigbee bridge devices may be specified, using the **Hostname 2** through **Hostname 4** fields respectively.
Hostname 3
Hostname 4

Default: Unconfigured (blank) IP address.

Bridge Status Page

The Bridge Status page is shown in [Figure 17](#). Use this page to troubleshoot bridge-related problems. Only bridge status indicators are recorded in this page; there are no configuration settings. The page refreshes every minute. The packet statistics are displayed for each bridge connection.

Figure 17—Bridge Status Page



TCP/IP Forms

TCP/IP Settings Form

The TCP/IP Settings form appears as is shown in [Figure 18](#).

Figure 18—TCP/IP Settings Form

Interface	10/100Mbps Ethernet	
Current Settings (Static)	IP Address: 172.16.16.1	
	Subnet Mask: 255.255.0.0	
	Default Gateway: 172.16.1.254	
	DNS Server Address: 172.16.1.13	
	DNS Domain Suffix: microplex.com	
TCP Window Size: 2 MSS Packets		
Stored Settings	<input type="radio"/> Obtain an IP address automatically <input checked="" type="radio"/> Use the following IP address: IP Address: 172.16.16.1 Subnet Mask: 255.255.0.0 Default Gateway: 172.16.1.254 DNS Server Address: 172.16.1.13 DNS Domain Suffix: microplex.com	
	TCP Window Size: 2 MSS Packets	
	<input type="button" value="Submit"/> <input type="button" value="Revert"/> Note: Changes only take effect after restart.	
	Copyright © 2007 exegin technologies limited. All rights reserved.	
	<input type="button" value="Done"/> <input type="button" value="Internet"/>	

**Static vs
Dynamic
Addressing**

The Q52 may be set up to automatically request its TCP/IP parameters over the network from a DHCP (Dynamic Host Configuration Protocol) server. To enable this feature, click on the radio button labelled 'Obtain an IP address automatically'. When this feature is enabled, the DHCP server will provide all TCP/IP configuration data; in this case, none of the other fields on the TCP/IP Settings form need to be filled in.

If static addressing is desired, then click on the radio button labelled 'Use the following IP address'. For static addressing, the IP address and Subnet mask are required to be entered. All other parameters are optional, depending upon your installation requirements.

Default: Unconfigured (blank) IP address and subnet mask; dynamic addressing enabled.

**Default
Gateway**

If static addressing is used, and the Q52 will be required to communicate to a different subnet, then the IP address of a default gateway is required in order to route traffic from the Q52 to devices on remote subnets. You can leave this field blank if you are not communicating across a router (from one network to another). In most other situations, you simply enter your router's IP address in the Default Gateway field.

Default: Unconfigured (blank).

7. Using HTML Pages to Configure the Q52

TCP/IP Forms

DNS Server Address	Enter the IP address of the local domain name service (DNS) host in this field. This allows the Zigbee bridge device to automatically resolve hostnames (e.g. host.domain.com) to IP addresses (e.g. 192.168.0.42).
	<i>Default:</i> Unconfigured (blank).
DNS Domain Suffix	Enter the domain name suffix which will be appended to the host name of the Q52 to form a complete fully-qualified host name. For example, if the fully-qualified host name of a particular Q52 is host.domain.com, then the string 'host' would be the device's host name and 'domain.com' would be the DNS Domain Suffix.
	<i>Default:</i> Unconfigured (blank).
TCP Window Size	To change the TCP window size, select the desired value in the TCP Window Size combo box.
	<i>Default:</i> 2 MSS packets.

TCP/IP Status Page

The TCP/IP Status page is shown in [Figure 19](#). Use this page to troubleshoot network-related problems. Network status indicators are recorded in this page; there are no configuration settings. The page refreshes every minute. The TCP, UDP and DHCP connection information is displayed.

7. Using HTML Pages to Configure the Q52

Administration Forms

Figure 19—TCP/IP Status Page

The screenshot shows a Microsoft Internet Explorer window with the title bar 'Exegin Technologies Q52 ZigBee Bridge (S/N 23) TCP/IP Status - Microsoft Internet Explorer'. The address bar shows 'http://172.16.16.1/tcpipStatus.html'. The page content is titled 'TCP/IP Status' and includes a 'TCP Connections' section with detailed counters for incoming and outgoing TCP traffic, and a table of TCP and UDP sockets with their respective ports, protocols, remote hosts, and states.

SD	PORT	PROTOCOL	RMT HOST	STATE
5	23	Telnet	(N/A)	LISTEN
6	60000	SockTestD	(N/A)	LISTEN
7	80	HTTP	(N/A)	LISTEN
10	80	HTTP	172.16.1.66	ESTABLISHED
11	80	HTTP	172.16.1.66	ESTABLISHED
12	23	Telnet	172.16.1.66	ESTABLISHED
14	80	HTTP	172.16.2.4	ESTABLISHED

SD	PORT	PROTOCOL	RMT HOST	STATE
3	123	SNTP	(N/A)	LISTEN
4	9	MDMP	(N/A)	LISTEN
8	17755	ZIPT	(N/A)	LISTEN
9	68	DHCP	(N/A)	LISTEN

Administration Forms

Several forms are available for administering basic system settings, such as host name, passwords, and firmware upgrades.

System Information Form

The System Information form is shown in [Figure 20](#). It facilitates administration of general device-related settings.

Figure 20—System Information Form

Hostname, Location, Contact Free format fields for user. A host name for the Zigbee bridge device, its location and contact information for support can be entered in these fields and they will appear on the Q52 home page.

Default: Unconfigured (blank).

Password Form

The Password administration form is shown in [Figure 21](#).

Figure 21—Password Form

The screenshot shows a Microsoft Internet Explorer window with the title bar 'Exegin Technologies Q52 ZigBee Bridge (S/N 23) Passwords - Microsoft Internet Explorer'. The address bar shows the URL 'http://172.16.16.1/pswdConf.html'. The page content is titled 'Passwords'. It contains two sets of password change fields: 'Root Password' and 'Guest Password'. Each set has 'Old:' (text input), 'New:' (text input), and 'Confirm:' (text input) fields. Below the fields are 'Submit' and 'Revert' buttons, and a note: 'Note: Reauthorization may be necessary after changing a password.' At the bottom, it says 'Copyright © 2007 exegin technologies limited. All rights reserved.'

All settings are protected by a password so that only authorized users can make changes. When you try to open any configuration page, you will be asked for a user name and password. At the prompt, you will need to enter `root` (unless you have another user configured with root privileges) followed by the associated password. If there is no password, leave the field blank and press ENTER.

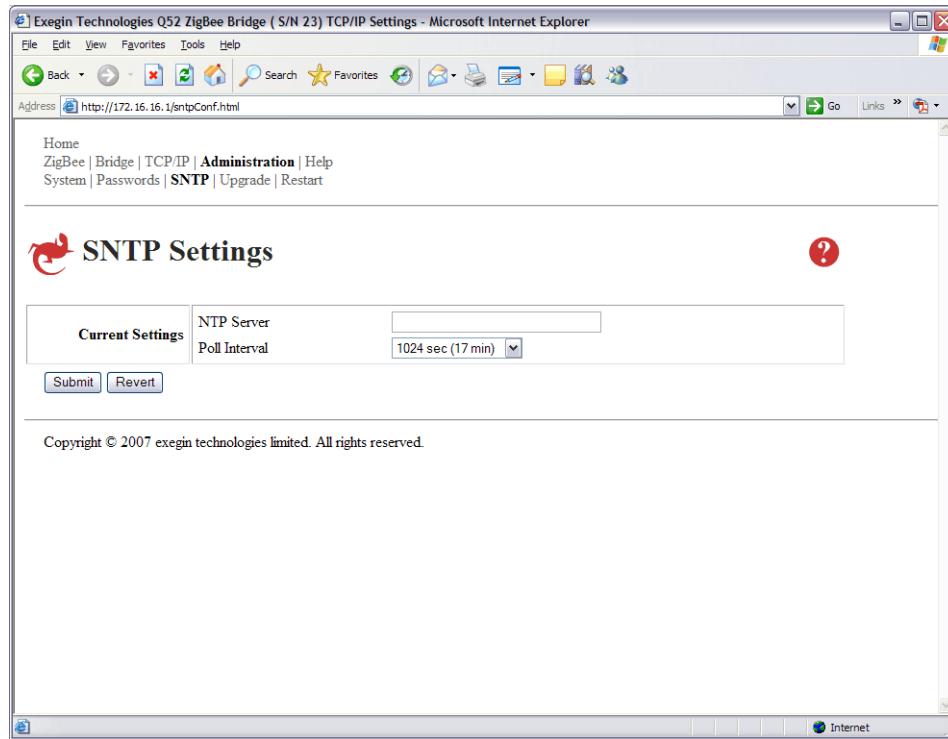
Settings can only be altered by a user with root privileges; guest users can only view settings. Both types of users can be assigned passwords. To change a password, type the old password in the "Old" field. Then type the new password twice: once in the "New" field and once in the "Confirm" field.

Default: Blank passwords for root and guest users.

SNTP Settings Form

the SNTP Settings Form (Figure 22) facilitates configuration of the Simple Network Time Protocol (SNTP) client in the Q52. SNTP is used by the Q52 to synchronize its local time-of-day clock with that of a central server.

Figure 22—SNTP Settings Form



NTP Server The NTP Server field specifies the IP address of the NTP server from which the Q52 will obtain time of day information. The IP address may be specified in dotted quad numeric form. Alternatively, if a Domain Name Service (DNS) server have been configured, the server's host name may be entered. Please refer to [Using Host and Domain Names](#) on page 26 for details on setting up the DNS server.

Default: Unconfigured (blank).

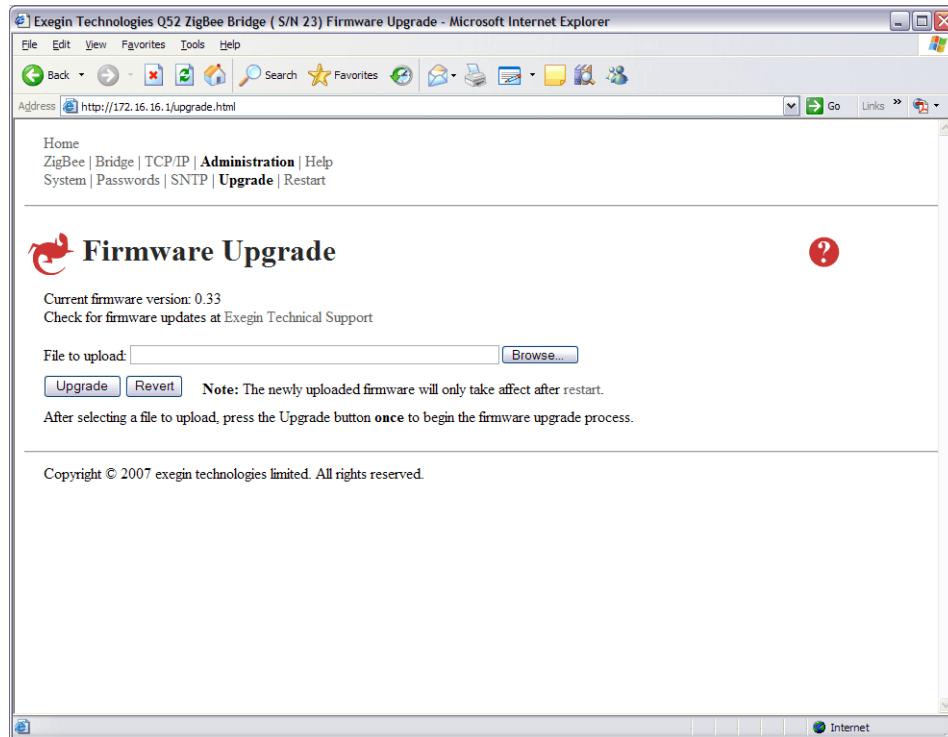
Poll Interval The Poll Interval combo box facilitates selection of the desired NTP polling interval. A range of values between 1 and 17 minutes may be selected.

Default: 1024 Sec (17 minutes).

Firmware Upgrade Form

The Firmware Upgrade Form (Figure 23) facilitates uploading of new firmware to the Q52.

Figure 23—Firmware Upgrade Form



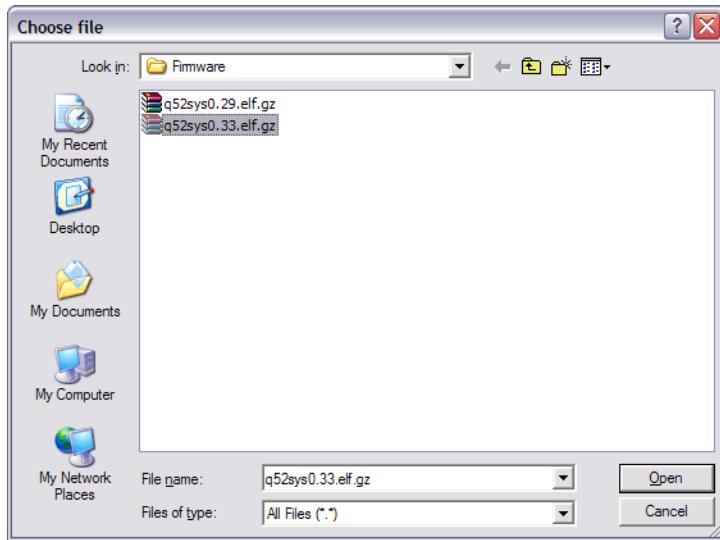
The firmware upgrade procedure uploads a new firmware image from your workstation into the flash memory of the Q52. This firmware image file must have been previously obtained from Exegin technical support personnel or downloaded directly from Exegin's web site:

<http://www.exegin.com/>

Please refer to [Contacting Exegin](#) on page 81 for more details on how to contact Exegin technical support.

File to Upload Enter the location of the new firmware file on your computer's hard drive. The full path to the file must be entered. Alternatively, clicking the 'Browse...' button will open a file selection dialog (Figure 24) which will allow you to navigate your computer's hard drive and select the firmware file interactively.

Figure 24—Firmware File Selection Dialog



Upgrade

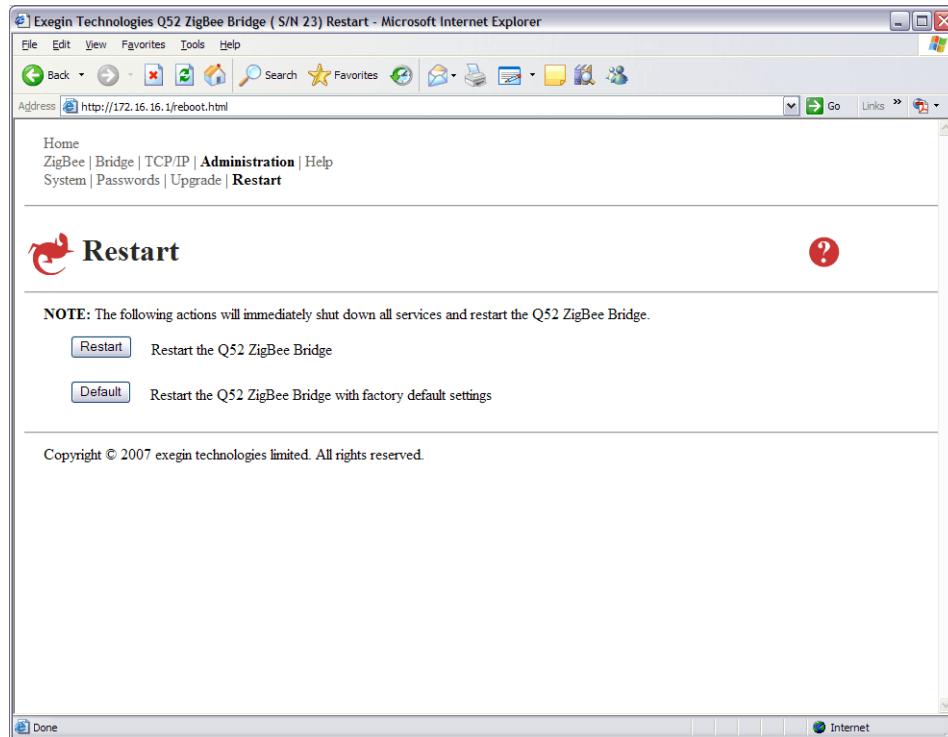
Once the file location has been specified, clicking the 'Upgrade' button will cause the selected firmware file to be uploaded to the Q52.

Restart Page

The Restart page (Figure 25) allows you to reboot the Zigbee bridge device with one of two options.

7. Using HTML Pages to Configure the Q52 Help Page

Figure 25—Restart Page



Restart Reboot the Zigbee bridge device with any new settings that have been configured or changed in these forms.

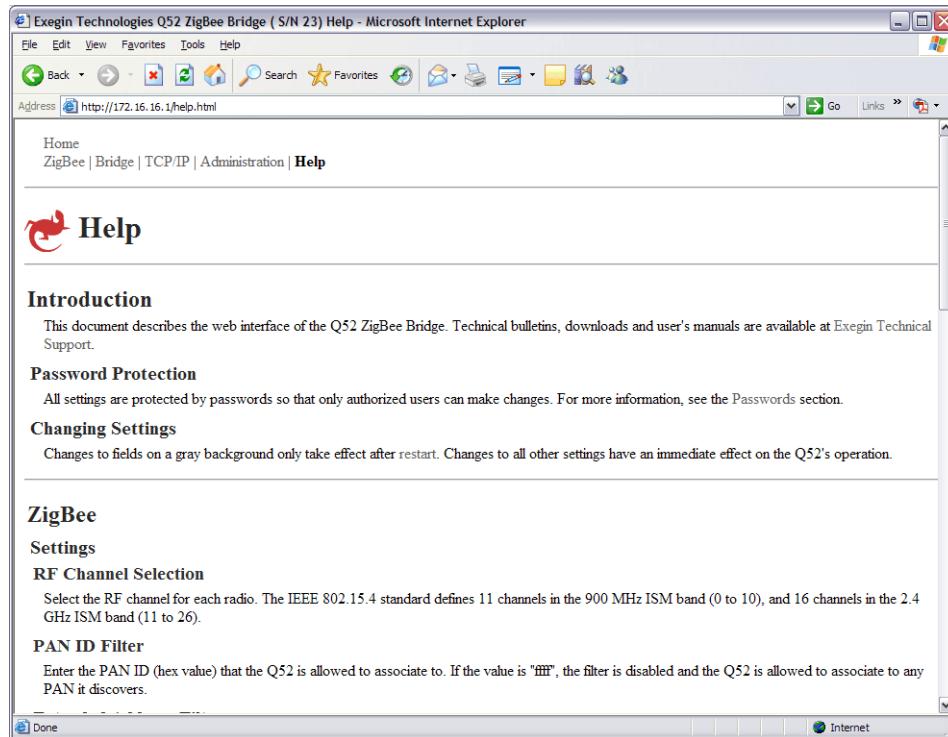
Default Reboot the Zigbee bridge device with the factory default settings.

Help Page

Selecting "Help" from the main menu opens the Help information page (see [Figure 26](#)) with all of the Help information available for these forms. This page can also be opened at the appropriate location by clicking on the Help (question mark) icon at the top of each HTML form or page.

7. Using HTML Pages to Configure the Q52 Help Page

Figure 26—Help Page



8 REFERENCE INFORMATION

This chapter describes some of the most common features of the Q52 including:

- *Q52 Command Line Interface Shell* on page 57: a description of the built-in command line interface shell, along with a table of the most common commands
- *Complete Command Reference* on page 59: syntax and descriptions of all commands available in the command line interface shell
- *Q52 Naming Scheme* on page 66: important predefined names
- *User Accounts and Permissions* on page 66: logging in as a "root" or "guest" user
- *Resetting to Factory Defaults* on page 66: how to reset the unit to factory default settings
- *Performing Firmware Upgrades* on page 67: a complete overview of the Flash upgrade procedure.

Q52 Command Line Interface Shell

Within the Q52, the command line interface shell is built into the firmware. It allows you to manipulate objects such as destinations, models, and I/O ports and also provides some monitoring and troubleshooting capabilities.

Command Line Interface access methods

Access the command line interface shell using these methods:

HTML Forms

When you configure a setting using the built-in HTML configuration forms, shell commands are actually executed remotely on the Q52.

Telnet Session

Opening a Telnet session with the Q52 allows you to log into the device and access the command line interface shell. (e.g. "`telnet 192.168.11.9`")

8. Reference Information

Q52 Command Line Interface Shell

Main command prefixes

The four main command prefixes within the command line interface shell are:

- store** change settings stored in Flash. When the "store" prefix is used, the Q52 must be rebooted to apply the changes to the system. Since "store" affects Flash settings only, the Zigbee bridge device must reset and read the new settings now in Flash.
- set** change current/working settings in memory. When the "set" prefix is used, a "save" command must be executed as well so that the new settings are retained after power cycles. Since "set" only affects the settings in memory, they will be lost after a power cycle unless they are saved into Flash ROM.
- list** view current/working settings in memory.

Command shell prompt

When the command shell is accessed through a Telnet session, a prompt is displayed after login to indicate that it is ready to accept a command from the user. The Telnet prompt is formatted **ipaddress:userid>** where *IPaddress* is the IP address of the Q52 and *userid* is the user ID of the currently logged-in user. For example,

192.168.11.32:root>

where **192.168.11.32** is the Q52's IP address and the user is **root**.

Getting command help

The Q52's command line interface shell provides several on-line help tools. These include:

- "?" Command** Typing "?" once logged in to the command line interface shell will produce a full listing of all commands available.
- Command Prefixes** Typing in the beginning of a command will produce an error message showing the correct syntax. For example, typing in "store **tcpip**" will produce a list of all commands that start with this prefix.

Common command shell commands

The command line interface shell consists of more than 50 commands. [Table 3](#) outlines some of the more common commands. For a complete command reference, please refer to [Complete Command Reference](#) on page 59.

Table 3—Common Commands

Command Syntax	Description
store net addr IPaddress	Store the IP address for the Q52.

8. Reference Information

Complete Command Reference

Table 3—Common Commands

Command Syntax	Description
store net mask <i>netmask</i>	Store the subnet mask for the Q52.
store net gateway <i>routerIPaddress</i>	Store a default router/gateway for the Q52 to forward remote packets to.
store net opts [[-]dhcp]	Enable or disable DHCP requests for IP addresses.
list net	List the current TCP/IP network settings.
list sysinfo	List current system information for the Q52.
save	Save all current settings to Flash.
reset	Reset the Q52.
ping <i>IPaddress</i>	"ping" another TCP/IP host on the network.
quit	"Quit" out of the command line interface shell.

Complete Command Reference

This section outlines the entire Q52 command set including the command syntax, a description, and in most cases, an example for each command listed. These commands are available in the command line interface shell. See *Q52 Command Line Interface Shell* on page 57 for information on accessing these commands

- *List commands* on page 60
- *Set commands* on page 61
- *Store commands* on page 63
- *Miscellaneous commands* on page 64.

8. Reference Information

Complete Command Reference

List commands

These commands list the *current* or *working* settings for a particular section within the command line interface shell. To view stored settings in Flash memory, you'll need to add "**stored**" to the beginning of any of the following commands. For example, "**list net**" shows you the current network settings but "**list stored net**" shows you the settings sitting in Flash. Normally these should match. You may also type "**list default**" to view the factory default settings.

Table 4—List Command Options

Command Syntax	Description
list all	List all current settings.
list diff	List the differences between the current settings and the stored settings in Flash. Normally, you want these values to match, so issue a " save " command followed by a " restart ".
list date	List the current time and date on the Q52.
list dhcp	Display the current status of the DHCP client in the Q52. Data includes the client state, server IP address, and the length of the current lease.
list [default stored] ifc	Display the module's physical network interface properties. There is one interface parameter (mode) which denotes the operating mode of the network interface's physical layer: mode auto - the Q52 will automatically negotiate link speed and duplex with the link peer. mode 10half - the network interface is forced to 10 MB/Sec, half duplex mode. mode 10full - the network interface is forced to 10 MB/Sec, full duplex mode. mode 100half - the network interface is forced to 100 MB/Sec, half duplex mode. mode 100full - the network interface is forced to 100 MB/Sec, full duplex mode.
list [default stored] key	List the license details and license key number.
list [default stored] net	List all current TCP/IP network settings (e.g. IP address and subnet mask).

8. Reference Information

Complete Command Reference

Table 4—List Command Options

Command Syntax	Description
<code>list [default stored] radio</code>	Lists the version, model number, RF channel and receiver state for each Zigbee radio in the Q52.
<code>list [default stored] snmp</code>	List SNMP configuration.
<code>list [default stored] sysinfo</code>	List the current Q52 system information (e.g. contact name and protocol stacks enabled).
<code>list [default stored] user</code>	List the current user definitions (e.g. user names and types).
<code>list uptime</code>	List the time the unit has been powered up since the last power cycle. (e.g. "Uptime: 12 days, 22:50:23").
<code>list [default stored] zbmac</code>	List all current Zigbee settings (e.g. RF channel selections, PAN ID filter and Extended Address Filters).
<code>list zbnwk</code>	Displays the current Zigbee network status, including the MAC address, PAN ID, Network Neighbour Table and Network Routing Table.
<code>list zbnwktest</code>	Displays whether the Zigbee network test is currently running, along with the test results.
<code>list zipt</code>	Displays the host names of the remote Zigbee bridge devices, as well as the UDP port number used to transport Zigbee messages over the IP network.

Set commands

These commands alter the current or working settings in memory only. They will be lost if the Q52 is turned off then on. To ensure this does not happen, be sure to issue a "**save**" command so the current settings get written to Flash.

Table 5—Set Command Options

Command Syntax	Description
<code>set sysinfo contact contactname</code>	<p>Set a person or department to contact in case of Zigbee bridge device trouble.</p> <p>For example:</p> <pre>set sysinfo contact Christopher_Owen</pre>

8. Reference Information

Complete Command Reference

Table 5—Set Command Options

Command Syntax	Description
set sysinfo label <i>newname</i>	Set a descriptive name defined by <i>newname</i> for the Q52 for identification purposes. This is not used in the operation of the Zigbee bridge device in any way. For example: set sysinfo name salesprinter
set sysinfo label <i>newname</i>	Set a descriptive name defined by <i>newname</i> for the Q52 for identification purposes. This is not used in the operation of the Zigbee bridge device in any way. For example: set sysinfo name salesprinter
set sysinfo from default	Set all sysinfo settings back to factory defaults.
set user passwd <i>username password</i>	Assign a <i>password</i> to a defined user on the Q52. This <i>password</i> must be less than eleven characters. The <i>username</i> must be either root or guest . If the new password is not entered, the user's old password will be cleared. For example: set user passwd root mplex1 If you forget the root password, you can set the dipswitches to restore settings to factory defaults. See <i>Resetting to Factory Defaults</i> on page 66.
set user from default	Set all user settings back to factory defaults.
set user from stored	Set all current user settings to the stored values in Flash.

8. Reference Information

Complete Command Reference

Store commands

These commands change the settings stored in Flash (permanent memory) and do *not* affect the current or working settings in memory. A power cycle is needed before the stored settings become current.

Table 6—Store Command Options

Command Syntax	Description
store ifc from default	Set all network settings back to factory defaults.
store ifc from current	Store all current network settings to Flash so they are retained after a power cycle. This ensures all current settings match what is stored in Flash.
store ifc mode [auto 10half 10full 100half 100full]	Set the line speed for the UTP Ethernet interface.
store net addr <i>IPaddress</i>	Store a static IP address for the Q52. For example: store net addr 192.168.11.9
store net dns <i>domainName</i>	Store the IP address of the Domain Name Server (DNS) for the Q52. For example: store net dns 192.168.1.254
store net domain <i>domainName</i>	Store the domain name suffix for the Q52. For example: store net domain microplex.com
store net from default	Set all TCP/IP network settings back to factory defaults.
store net from current	Store all current TCP/IP network settings to Flash so they are retained after a power cycle. This ensures all current settings match what's stored in Flash.
store net gateway <i>routerIPaddress</i>	Store a default router/gateway defined by <i>routerIPaddress</i> so the Q52 knows where to direct packets destined for another subnet. For example: store net gateway 192.168.11.1 1

8. Reference Information

Complete Command Reference

Table 6—Store Command Options

Command Syntax	Description
store net mask netmask	Store the subnet mask for the Q52. For example: store tcip 1 mask 255.255.255.0
store net opts[[-]dhcp]	Enable or disable the automatic DHCP requests for IP addresses upon bootup. Prefix the 'DHCP' option with a dash ('-') to disable the option; otherwise it is enabled. For example: store tcip 1 opts -dhcp
store net rxbuf packets	Determine the receive window size for the Q52. Usually the <i>packets</i> value ranges from 2-8 with the lower number allowing for more simultaneous TCP connections with the Zigbee bridge device. For example: store net rxbuf 2
store zbnwk opts [-]edscan	Enable/disable power-up energy scan on the Zigbee radios.
store zbmac freqband [[-]868] [[-]915] [[-]2400]	Sets the frequency band for each Zigbee radio.
store zipt port portnumber	Sets the UDP port number to be used for bridging Zigbee traffic over the IP network. The default port number is 17755.

Miscellaneous commands

These commands do not fall under any specific section of the command line interface shell but they are used quite frequently.

Table 7—Miscellaneous Commands

Command Syntax	Description
close <sd> all	Close the network connection defined by the socket descriptor. Socket descriptors can be obtained using the netstat command. If the argument all is entered, then all active network connections will be terminated, including the telnet session in which the command was entered.

8. Reference Information

Complete Command Reference

Table 7—Miscellaneous Commands

Command Syntax	Description
load [default]	Load the settings stored in Flash and use them as the current or working settings. If default is specified as well, factory settings will be loaded. Use this after power failure to restore settings saved in Flash.
netstat	Display current network status, including TCP packet statistics and the current state of each TCP and UDP socket in the system.
ping [-s] hostIPAddress [datasize [packetnumber]]	<p>"ping" another TCP/IP host, specified by <i>hostIPAddress</i>, on the network. <i>datasize</i> is the datagram packet size which defaults to 64 bytes if no size is included in the syntax and <i>packetnumber</i> is the number of requests to be sent.</p> <p>To use a host or IP name instead of the address, you must have set the DNS server on the Q52. Use the command "set sysinfo dns..." to do this.</p> <p>For example:</p> <pre>ping 192.168.11.30</pre>
quit	Close the telnet command session.
restart	Perform a warm boot or hardware reset simulating a power-on reset. This will restore current settings to those stored in Flash as the Flash settings will be read and loaded into memory upon bootup.
save [default]	Save the current settings to Flash so they are remembered after power cycles. Sysinfo, destination, model, logpath, variable, user, and I/O port settings will be saved. If default is specified as well, factory settings will be saved to Flash overwriting any new settings you have configured. Resetting the unit is not required.

Q52 Naming Scheme

The Q52 always follows this naming scheme:

exgnxxxx A default name of 'exgn' is followed by "xxxxx", the serial number found on the bottom of the Zigbee bridge device. For example: exgn00091

User Accounts and Permissions

When you log into the Q52, you either log in as a **guest** or as a **root** user. The commands you will be able to utilize on the print server depend on which login name you use. By default, there is one **root** user and one **guest** user; users can then be added to this with either permission level.

Users with **root** permission can execute all commands: users with **guest** permission can not do any configuration and can only execute commands that display settings on the Q52. However, they can use **ping** and **telnet** as well.

Use *list [default/stored] user* on page 61 to look at current user definitions. Use *set user passwd username password* on page 62 to see how the **root** user can change these settings.

Resetting to Factory Defaults

Sometimes it is beneficial to return the Q52 to its factory default state. For example, if you are having problems communicating with the Zigbee bridge device over the network, you may want to put it back to a default state and reconfigure the network settings.

To reset to factory defaults:

1. Move dipswitch 1 to the "**off**" position and dipswitch 2 to the "**on**" position as described in *Table 2, Q52 Dipswitch Settings*, on page 15. This is the Factory Settings mode
2. Reboot the unit by cycling the power off, then on.

You now have the Q52 booted into a default state, meaning its current/working settings are those stored at the factory. All settings configured and stored in Flash are ignored while the dipswitches are in the "Factory Settings" position.

At this point, you can use shell commands on the Q52 to configure certain settings. Here are some common examples of steps taken when the device is in a default state:

8. Reference Information

Performing Firmware Upgrades

1. Forgotten Password

If you have forgotten a password set on the Q52, you can reset the user settings using these commands:

```
set user from default  
save
```

2. Restore All Settings in Flash to Defaults

Since this default state is temporary and you may want to make sure *all* settings sitting in Flash are back to their factory default values, you will need to use these commands:

```
save default  
store tcPIP from default
```

or set dipswitch 1=on and 2=off. See [Table 2, Q52 Dipswitch Settings](#), on page 15.

3. Set dipswitches for normal operation.

Set dipswitch 1=off and 2=off. See [Table 2, Q52 Dipswitch Settings](#), on page 15.

Performing Firmware Upgrades

Since the Q52's firmware is stored in Flash ROM, upgrading is easy. Using a computer with a web browser on a TCP/IP network, the Zigbee bridge device can be upgraded to a newer firmware version without needing new hardware. Please refer to [Firmware Upgrade Form](#) on page 52 for step-by-step instructions on how to load new firmware into the Q52.

Firmware File

The latest firmware file is always available at Exegin's FTP site ("[ftp.exegin.com](ftp://ftp.exegin.com)") and web site ("<http://www.exegin.com/>"), or it can be ordered through Exegin Technical Support. Please see [Help Methods Available](#) on page 81 for further information.

9 EXTRA FEATURES/ADDITIONAL INFORMATION

This chapter provides information about additional features available with the Q52.

- [General Options](#) on page 68: miscellaneous Zigbee bridge device options
- [Q52 Security](#) on page 68: how to use the Q52's built-in security features as well as taking advantage of your Network's security features.
- [Managing with SNMP](#) on page 70, including creating custom MIBs.

General Options

Manipulating the Q52's UTP Interface

You have some control over the UTP interface and its properties on the Q52.

By default, the UTP interface is set to automatically negotiate the communications speed and duplex settings with its link peer. You can change this to force the Q52 to use a specific speed and duplex setting.

To see the current UTP interface settings for the UTP network interface, please see *list ifc* in [Table 4](#) on page 60. To manipulate the UTP interface, please see *store ifc* in [Table 6](#) on page 63.

Remotely Managing the Q52

In a TCP/IP environment, various methods are available for remotely monitoring the Print Server. These include using:

- the built-in **HTML** forms,
- a **Telnet** session,
- **SNMP** management.

Q52 Security

This touches upon the most popular built-in security feature - permission levels and passwords. Setting passwords and assigning a permission level to users makes it difficult for unauthorized users to gain access to the Q52's command set and manipulate the settings.

9. Extra Features/Additional Information

Q52 Security

However, the Zigbee bridge device also uses TCP access lists to restrict host connections with the device and allows scrambling/descrambling of print jobs.

Users and Passwords

The Q52 supports two users:

- root** Access to everything within the Zigbee bridge device including all configurable settings.
- guest** Ability to list settings but not configure them.

For each user, a password can be set. However, you would normally only set a password for the root user to protect the Q52's configuration. Guest users cannot alter the Zigbee bridge device's configuration in any way.

To configure the root password on your Q52, you will need to:

HTML Method

1. Load a Web browser on a network station that can communicate with the Zigbee bridge device over TCP/IP.
2. Direct your Web browser to URL "<http://Q52IPaddress/pswdConf.html>" (e.g. "<http://192.168.11.9/pswdConf.html>").
Note: If prompted for a "User ID" and password first, type in "**root**" for the ID and press ENTER at the password prompt as there is no password by default.
3. Click within the "Old" field beside the "Root Password" heading and enter the existing root password. By default, there is no root password; in this case, this step can be skipped.
4. Within the "Root Password" section, click within the "New" field and enter the new root password.
5. Within the "Root Password" section, click within the "Confirm" field and enter the new root password again. Remember this the password is case sensitive.
6. Click on the "Submit" button when done.
7. Go to the Reboot page and click on "Reboot" to apply the new settings to your system.

Manual(Telnet) Method

1. Start a Telnet session with the Q52. Type:

```
telnet Q52IPaddress
```

2. Login to the Q52 through a command line shell session as a root user.

Note: If prompted for a "User ID" and password first, type in "**root**" for the ID and press ENTER at the password prompt since there's no password by default.

3. At the command shell prompt, follow this syntax:

```
set user passwd username password
```

For example, to set the root password to "mplex1" type:

9. Extra Features/Additional Information

Managing with SNMP

```
set user passwd root mplex1
save
```

From this point on, anytime you log in to the Q52 as "**root**", you will need to specify this password or else your login attempt will fail.

Note: This process can be repeated to clear or change the password. An alternate method to clear the password has the following syntax:

```
set user from default
save
```

SNMP Security

SNMP does not include any formal type of security definition. However, security can be accomplished using *communities*. A *community* is a string that is sent with every SNMP request and is used to define a certain view of the MIB. By doing this, you can control what parts of the MIB are accessed by an SNMP manager.

To access the Q52's custom MIB, the public *community* string can be used to read any variables that have access. To restrict **write** access, there is an additional security step, involving defining a user named **snmp** on the Q52 with **root** privileges. The password defined for this **snmp** user will then be used as the *community* string which allows **write** access.

Note: If no **snmp** user is defined with **root** privileges, no **write** requests will be accepted by the Q52.

Managing with SNMP

SNMP (Simple Network Management Protocol) is a protocol for internetwork management services. This protocol provides a means for computers (or *agents*) to be managed remotely by *managers*. The level of management depends on the manager and agent. The level of management ranges from providing information such as statistics to providing full management capabilities.

MIB (Management Information Base) files are a description of managed objects available in an agent. MIB files provide the data for the manager so they can remotely manage the agent. A MIB file is simply a formal description of the way an agent can be accessed using SNMP and what functions can be managed.

The Q52 is a fully manageable SNMP agent that supports MIB-II, custom MIBs and traps.

9. Extra Features/Additional Information

Managing with SNMP

MIB II Support

The Q52 is MIB II compliant allowing SNMP managers to monitor protocol, network, and routing statistics.

Custom MIBs and Traps

The Q52 provides a custom MIB definition file which consists of 150 variables and three traps. This MIB file allows you to monitor and configure the Zigbee bridge device directly. In fact, the MIB file represents all of the possible configuration options such as destination settings, network configurations, print queue status, loading of defaults, etc.

The Q52's custom MIB definition file is included on the CD ROM supplied with the Q52. This file can also be downloaded from the Exegin FTP site:

ftp.exegin.com

or can be accessed via the Exegin Web site:

http://www.exegin.com/

Custom MIB Variables

The variables found within the custom MIB definition file describe all information that can be possibly be accessed on the Q52 by an SNMP manager. These variables can be divided into two groups: system variables and product variables.

System Variables

The first grouping of variables contain general information about the Zigbee bridge device such as firmware version, serial number, etc. In addition to these, it includes a trap table which defines what SNMP managers will receive by the traps generated on the Q52. The trap table can have up to ten entries, but only the first entry is saved to flash memory.

Product Variables

The second grouping of variables contains information defining all of the remaining functionality of the Zigbee bridge device. The product variables are divided into:

config group	Includes all configuration components such as models, destinations, logpaths, and users.
status group	Includes all dynamic monitoring components such as print queues, user logins, and RPRINTER configurations.
command group	Includes the save, load, and reset commands.

Note: These variables can have read, write, or read-write permissions. Along with these permissions there are other elements that can limit the write access to these variables. Please see *SNMP Security* on page 70 and *Users and Passwords* on page 69 for more information.

Custom MIB Traps

A trap is an event generated by an agent to indicate a significant event to the manager. By default, the Q52 will generate three traps:

coldstart	A generic trap generated every time the Q52 is powered on or reset
authenticationFailure	A generic trap generated whenever a disallowed access is attempted
lpqIOSTatusChanged	The only custom trap. This trap is generated whenever the I/O port's status changes.

Compiling and Monitoring the Custom MIB

For read-only SNMP functionality, please follow the steps below:

1. Copy the Q52 MIB definition file (**Q52mib.txt**) from the CD ROM supplied with the Q52. This file can also be downloaded from the Microplex FTP site (<ftp://exegin.com>) or can be accessed via the Microplex Web site (<http://www.exegin.com/>).
2. Compile this MIB description file to work with your SNMP manager.
3. Using your SNMP manager, view the particular MIB variables that you wish to monitor.

Notes: If you are using SunNet Manager, you will need to download a special MIB file (**Q52mib.txt.SNM**) from the Exegin FTP site. This file can also be accessed via the Exegin Web site.

If you are using Castle Rock Computing's *SNMPc* package, you will need to rename the MIB variable *UInteger32* to another name such as *U32*.

Writing to the Custom MIB

The following example explains how to use the custom MIB variables to set the Q52's parameters. For example, to turn on bb mode and onlcr on the Q52's prn port, please follow the steps below:

Note: This example assumes that the snmp password has been defined as *custommib*, that the Q52's ipname is *spike*, and that the SNMP manager is the Tricklets package.

Issue the following configuration commands using the snmp user's password as the community string.

```
echo "m307IfPrnbbM[1.2]=2" | snmp-set spike custommib
echo "m307IfOnlcr[1.2]=2" | snmp-set spike custommib
```

Configuring the Q52 to Send Traps to an SNMP Manager

The Q52 continuously generates traps but unless the trap table is filled in, no SNMP manager will receive this information. To set the Q52 to send traps to a particular SNMP manager, please follow the steps below:

Note: This example assumes that the snmp password has been defined as *custommib*, that the Q52's ipname is *spike*, and that the SNMP manager is the Tricklets package.

1. Set up an **snmp** user with **root** privileges on the Q52. Please see [Compiling and Monitoring the Custom MIB](#) on page 72 for details.
2. Set the following Q52 trap variables using your SNMP manager. The actual syntax of the commands will depend on the particular SNMP manager you are using.

```
echo "trapCommunity[1]=\"building-A\"" | snmp-set spike  
custommib
```

where **building-A** is the string that you want the Q52 to send with the trap information. This community string has a 14 character maximum.

```
echo "trapDest[1]=192.168.11.11" | snmp-set spike  
custommib
```

where **192.168.11.11** is the IP address of your SNMP manager.

Note: To disable the entry in the trap table, set the IP address to 0.0.0.0

The Q52 will now send trap information with the community string *building-A* to the SNMP manager with the IP address *192.168.11.11*. For more information on these trap variables, please see their description in the custom MIB definition file.

Note: The trap table can hold up to ten entries but only the first entry is stored in Flash memory. If you turn the unit off, you will lose the additional entries.

10. Q52 Specifications

Physical Features

10 Q52 SPECIFICATIONS

Hardware and software specifications are described in this chapter.

Hardware specifications are covered in the following sections:

- [Physical Features](#) on page 74
- [Electrical Details](#) on page 75
- [Q52 LEDs](#) on page 78
- [Network Interfaces](#) on page 79

[Software Specifications](#) are covered in the following sections:

- [Standards supported](#) on page 79
- [TCP port numbers used on the Q52](#) on page 80
- [UDP port numbers used on the Q52](#) on page 80
- [Error conditions](#) on page 80
- [Internal errors such as bus errors, address errors or illegal instructions force the Q52 into this non-operational mode.](#) on page 80.

Physical Features

Dimensions

Metric Width: 65 mm
 Height: 23.5 mm
 Length: 111 mm

Imperial Width: 2.55"
 Height: 1.925"
 Length: 4.4"

Weight: 80g or 3 oz (Device); 175g or 6 oz (external transformer)

Environmental details

Operating: 0° C to 50° C
Storage: -40° C to 85° C

95% maximum humidity, non-condensing.

10. Q52 Specifications

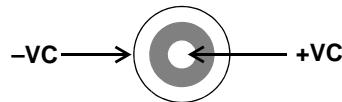
Electrical Details

Electrical Details

Power socket

Figure 27 shows the power socket on the Q52 side panel.

Figure 27—Power Socket



Power supply options External transformer available in 120V/60Hz or 220-240V/50Hz.

Power supply requirements	Typical	120VAC +/- 10% 35mA, 60Hz 240VAC +/- 10% 18mA, 50/60Hz
	Maximum	120VAC +/- 10% 40mA, 60Hz 240VAC +/- 10% 20mA, 50/60Hz

DC power requirements	Voltage	4.5-6.0 VDC regulated
	Current, Typical	300 mA
	Current, Maximum	330 mA

DC Power consumption	Typical	1.8 W
	Maximum	2.0 W

IEEE 802.3.af Power over Ethernet Class 1 device, 1.2W typical

FCC Part 15

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, 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 to correct the interference by one or more of the following measures:

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

10. Q52 Specifications

Radio Frequency Notifications

- 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.

CE Mark conformity declaration

The Q52 fulfills the requirements for radiated emissions according to limit B of EN55022/1987 and the requirements for immunity according to EN50082-1/1992 residential, commercial, and light industry.

Radio Frequency Notifications

FCC Notifications

RF Radiation The Q52 is an intentional radiator of Radio Frequency (RF) energy. In order to limit RF exposure to personnel in the immediate area, the Q52 should be located and installed such that a separation of at least 20 centimeters is maintained between the Q52's antenna and personnel in the vicinity of the device.

Modification warning Caution: changes or modifications to this equipment, not expressly approved by Exegin Technologies Limited could void the user's authority to operate the equipment.

Industry Canada Notifications

This Class B digital apparatus complies with Canadian ICES-003. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Approved Antenna To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

This device has been designed to operate with the antennas listed below, and having a maximum gain of 3 dB. Antennas not included in this list or having a gain greater than 3 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

- Antenna Factor Corp: Part no ANT-2.4-CW-RCL

10. Q52 Specifications

Radio Frequency Notifications

EU Notifications

Exegin Technologies Limited declares that this product conforms to the specifications listed in this manual, following the provisions of the European R&TTE directive 1999/5/EC:

Exegin Technologies Limited vakuuttaa täten että dieses produkt tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien näiden direktiivien muiden ehtojen mukainen.

Exegin Technologies Limited déclare que le produit est conforme aux conditions essentielles et aux dispositions relatives à la directive 1999/5/EC.

- EN 301 489-1, 301 489-17 General EMC requirements for Radio equipment.
- EN 609 50 Safety
- EN 300-328-1, EN 300-328-2 Technical requirements for Radio equipment.

CAUTION—This equipment is intended to be used in all EU and EFTA countries. Outdoor use may be restricted to certain frequencies and/or may require a license for operation. Contact local Authority for procedure to follow.

Note: Combinations of power levels and antennas resulting in a radiated power level of above 100 mW equivalent isotropic radiated power (EIRP) are considered as not compliant with the above mentioned directive and are not allowed for use within the European community and countries that have adopted the European R&TTE directive 1999/5/EC. For more details on legal combinations of power levels and antennas, contact Exegin Technologies Limited

Do not use this product near water, for example, in a wet basement or near a swimming pool.

Avoid using this product during an electrical storm. There may be a remote risk of electric shock from lightning.

Belgique

Dans le cas d'une utilisation privée, à l'extérieur d'un bâtiment, au-dessus d'un espace public, aucun enregistrement n'est nécessaire pour une distance de moins de 300m. Pour une distance supérieure à 300m un enregistrement auprès de l'IBPT est requise. Pour une utilisation publique à l'extérieur de bâtiments, une licence de l'IBPT est requise. Pour les enregistrements et licences, veuillez contacter l'IBPT.

France

2.4 GHz Bande : les canaux 10, 11, 12, 13 (2457, 2462, 2467, et 2472 MHz respectivement) sont complètement libres d'utilisation en France (en utilisation intérieur). Pour ce qui est des autres canaux, ils peuvent être soumis à autorisation selon le département. L'utilisation en extérieur est soumis à autorisation préalable et très restreint. Vous pouvez contacter l'Autorité de Régulation des Télécommunications (<http://www.art-telecom.fr>) pour de plus amples renseignements.

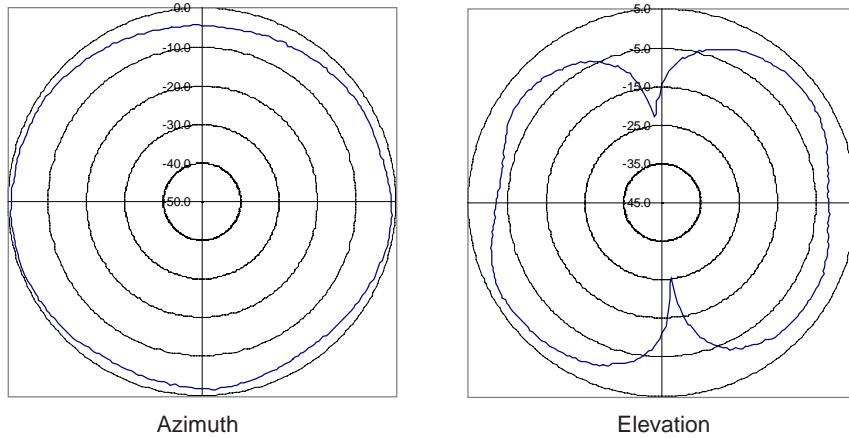
10. Q52 Specifications

Antenna Radiation Pattern

Antenna Radiation Pattern

Figure 28 shows the radiation pattern of the standard antenna supplied with the Q52.

Figure 28—Antenna Radiation Pattern



Q52 LEDs

STAT	System Status
NET	Data to Ethernet
RF	Data to Zigbee PAN

Run and auto-reset mode

Run Mode is the normal operating state of the Q52. Auto-reset mode is entered when the watchdog timer is triggered and the Zigbee bridge device has reset itself. The STAT LED flashes differently depending on whether the device's IP address is configured.

Table 8—STAT LED Patterns

FLASH RATE	INDICATES
Green, on once per second (i.e., more off than on)	Normal Mode, IP address configured
Green, on twice per second	IP address not configured
Amber, off once per second (i.e., more on than off)	Download (MOS)
Amber, off twice per second	Download (MOS), no IP address configured
Red, off twice per second	System error

10. Q52 Specifications

Network Interfaces

Table 9—NET LED Patterns

FLASH RATE	INDICATES
On	Network link present
Off	Network link not present
Blinking, off 1/3 second	Network link present and transmitting; flashes off 1/3 second each time a packet is transmitted

Network Interfaces

The Q52 network interfaces provide compatibility with TCP/ICMP/IP and 802.3 Ethernet protocols with an IEEE 802.3 10/100Base-T UTP Ethernet female RJ45 connector.

Network Connector Pinouts

[Table 10](#) shows the pinout for the UTP (RJ45) connector.

Table 10—UTP (RJ45) Connector Pinout

Pin	Signal	Source	Pin	Signal	Source
1	TX_D1+	Q52	5	BI-D3-	Q52
2	TX_D1-	Q52	6	RX_D2-	Network
3	RX_D2+	Network	7	BI_D4+	Network
4	BI-D3+	Q52	8	BI_D4-	Network

Software Specifications

Standards supported

ARC	Ethernet Address Control Protocol
ARP	Address Resolution Protocol
DHCP	Dynamic Host Configuration Protocol
ICMP	Internet Control Message Protocol
IP	Internet Protocol
SNMP	Simple Network Management Protocol
TCP	Transmission Control Protocol
TELNET	Telnet Protocol
UDP	User Datagram Protocol

TCP port numbers used on the Q52

23	TCP Protocol for TELNETD port
8200	Exegin Communications Protocol Port for Gecko

UDP port numbers used on the Q52

161	UDP port for SNMP
514	SYSLOG client support
68	DHCP client port
17755	ZIPT Zigbee Bridge Device Protocol

Error conditions

Firmware panic	Unrecoverable errors detected by the Q52 firmware force it into panic mode. Manually reset the Q52 to resume normal operation.
Watchdog halt	The watchdog timer is a hardware device that resets the system if not serviced regularly by the CPU. Its purpose is to prevent the CPU from entering an infinite loop because of a hardware or firmware problem. After a watchdog interrupt, some diagnostic information is saved for debugging and the device resumes operation in Auto-reset Mode. The Q52 will auto-reset up to 16 times before entering non-operational Watchdog Halt.
Spurious halt	Unsupported interrupts force the Q52 into this non-operational mode and typically indicate a hardware problem.
Hardware exception	Internal errors such as bus errors, address errors or illegal instructions force the Q52 into this non-operational mode.

11 GETTING HELP

This chapter identifies other sources of Help for installing and configuring your Q52 ZigBee / 802.15.4 Bridge and defines the repair procedure.

Help Methods Available

"Troubleshooting Tips" sections

Troubleshooting tips are listed at the end of each network configuration chapter. These are the most commonly asked relevant questions. There are additional troubleshooting tips in the appendices as well.

Web site

Exegin's Web site, <http://www.exegin.com/>, contains information about the company and its products. You will find a link to the Technical Support page that contains the "Support Shack", a central location for technical bulletins and firmware and software histories and files.

FTP site

Exegin's FTP site, "[ftp.exegin.com](ftp://ftp.exegin.com)" contains firmware and software for the Q52. Once logged in anonymously, you will need to change to the Q52 directory. Here, you will find several subdirectories pointing to software, firmware, documentation, and miscellaneous files.

Contacting Exegin

If you need technical assistance from Exegin, please have this information on hand:

- Q52 serial number found on the bottom of the Zigbee bridge device.
- Description of your network environment and peripherals attached.
- Description of the problem.

Contact options

Email "support@exegin.com"

Fax to "Support" at **+1 604 468-2445**

Call **+1 604 468-3639** and select Technical Support from the list of options (#3)

Note: Email queries will have the fastest response time.

Repair Procedure

Warranty description

Exegin Systems Ltd. warrants this product to be free from defects in workmanship and material for **one (1) year** from the time of the original purchase date.

During this period, Exegin will repair or replace a defective product with a new or rebuilt product at no extra charge except as stipulated below.

At no time shall Exegin's liability exceed the replacement cost of the subject item.

All expressed and implied warranties for this product including all warranties of Merchantability, Suitability, and Fitness for a particular application are limited to **one (1) year** from the time of the original purchase date. In no event shall Exegin be liable for Loss of Use, Loss of Profits or Revenues, or other Indirect, Incidental, or Consequential Damages. This warranty *does not imply the right to loaner or replacement units during the time required to perform repairs.*

This warranty *does not* cover any losses or damage caused by:

- shipping,
- improper installation, use, or maintenance,
- unauthorized repair, modification, alteration, or replacement of components,
- excessive environmental conditions including electrical power surges, temperature, humidity, or any other irregularities,
- negligence or abuse.

Returning for repair

To obtain service under this warranty, you must *first* contact Exegin's Technical Support department to rule out configuration errors. A Support Technician will ensure the problem is related to the hardware. If so, a Return Merchandise Authorization (RMA) number will be given to you by the technician. The defective product should then be returned to Exegin for repair.

Please use the following guidelines when shipping goods back for warranty claim:

- Package the product securely, in original packaging if possible, to prevent damage during shipping.
- Indicate the RMA number clearly on the address label of the shipping carton.

11. Getting Help

Repair Procedure

- Include a copy of the invoice/receipt.
- You may use any courier company. However, we recommend using Federal Express due to its lower charges for customs.

Note: Under a normal warranty repair, Exegin will only pay for the shipping charges to return the Q52 to you.

If you ship from a country other than Canada, type (on any paper) a commercial invoice containing the following information:

- your address
- Exegin's address (as "consignee")
- country of origin of the product (i.e. Canada)
- number of packages in the shipment
- description of the product
- quantity
- total value of shipment (i.e. your total purchase price)
- reason for return (e.g. warranty repair)
- a declaration.

Canada Customs requires that this invoice accompany the returned product. For an example, refer to [Figure 29](#).

Download a copy from the website:

<http://www.exegin.com/support/docs/ComInvoice.html>

Figure 29—Sample Commercial Invoice

<p>COMMERCIAL INVOICE from Leslie Smith ABC Corporation 1234 Western Parkway Anycity, NC USA, 27511</p>																	
<p>DATE OF EXPORT: 22/02/96</p>																	
<p>AIR WAYBILL NO: 123-12341234</p>																	
<p>CONSIGNEE: Exegin Systems Ltd. 204 - 2071 Kingsway Avenue Port Coquitlam, B.C. V3C 6N2, Canada</p>																	
<p>IMPORTER (if other than consignee) same as consignee</p>																	
<p>COUNTRY OF ORIGIN: Canada</p>																	
<table><thead><tr><th># OF</th><th>PKGS</th><th>DESCRIPTION</th><th>TOTAL</th></tr><tr><th></th><th></th><th></th><th>QTY</th><th>VALUE</th></tr></thead><tbody><tr><td>1</td><td></td><td>Ethernet Zigbee bridge device 1</td><td>100.00</td><td></td></tr></tbody></table>				# OF	PKGS	DESCRIPTION	TOTAL				QTY	VALUE	1		Ethernet Zigbee bridge device 1	100.00	
# OF	PKGS	DESCRIPTION	TOTAL														
			QTY	VALUE													
1		Ethernet Zigbee bridge device 1	100.00														
<p>REASON FOR RETURN: warranty repair</p>																	
<p>I declare all information contained in this invoice to be true and correct.</p>																	
<hr/> <p>_____ Leslie Smith 24/03/2002</p>																	
SIGNATURE	NAME	DATE															

12 GLOSSARY

ARP	<i>Address Resolution Protocol.</i> Associates a selected IP address with a network device's Ethernet address.
BPS	Bits per second.
Daemon	A continuously running process that handles system-wide functions such as print spooling.
Default router	A network device that allows communication to and from external subnets by forwarding any IP packets accordingly.
Destination	Logical print queue on the Q52 to which hosts send their print jobs. There are four destinations on the Q52: d1prn, d2prn, d3prn, and d4prn.
DHCP	<i>Dynamic Host Configuration Protocol.</i> Allows a network device to discover its IP address dynamically upon bootup.
DNS	Domain Name Server. Host providing responses to queries for a given host name's IP address.
EEPROM	<i>Electrically-Erasable, Programmable Read-Only Memory.</i> Preserves data after power is removed. Also known as Flash memory.
Factory defaults	Zigbee bridge device settings shipped with the Q52.
Flash	Permanent memory in the EEPROM. Stores firmware code and configurable settings. Allows for upgrades without replacing hardware inside the Q52.
FTP	<i>File Transfer Protocol.</i> Used for transferring files from one TCP/IP host to another and used in the upgrade process.
Gecko	TCP/IP configuration utility provided with the Q52 ZigBee / 802.15.4 Bridge.
HTML	<i>HyperText Markup Language.</i> Format used for documents viewable on the World Wide Web.
HTTP	<i>HyperText Transport Protocol.</i> Protocol used for the delivery of web pages.
IEEE	<i>Institute of Electrical and Electronics Engineers.</i>
Ifnum	<i>Interface Number.</i> Represents the network interface. This will be "1" for an Ethernet network.
Interface script	UNIX host filter file that processes the print job before it is sent over the network to the Q52.
I/O port	Port for attaching peripherals to. The Q52 provides one: PRN.
MIB	Management Information Base. A set of variables (a database) managed by an SNMP manager application.

Model	Defines how a print job should be processed (e.g. banner pages added or ASCII to PostScript conversion) as it passes through the Q52. One model is associated with every destination.
Netmask	see <i>subnet mask</i> .
PAN	<i>Personal Area Network</i> . A wireless network made up of Zigbee wireless devices communicating under control of a Zigbee Coordinator device.
PDF	<i>Portable Document Format</i> . Encodes different types of documents enabling them to be read across multiple platforms.
Ping	A program used to test reachability of destinations by sending them an ICMP echo request and waiting for a reply. It is a standard command to test a TCP/IP connection. (e.g. " <code>ping 192.168.11.9</code> ")
RAM	<i>Random Access Memory</i> . Volatile memory within the Q52 that contains current/working settings. Settings are lost once the power is removed.
RARP	<i>Reverse Address Resolution Protocol</i> . Allows a network device to discover its IP address dynamically upon bootup. The IP address does not need to be stored within the device permanently.
RF	<i>Radio Frequency</i> . A radio signal that propagates through the environment via electromagnetic radiation.
Router	A device that forwards IP packets to their destination. Also called a gateway. See <i>Default Router</i> .
Serial number	Number found on the bottom of the Q52. Each Q52 is assigned a unique serial number.
SNMP	<i>Simple Network Management Protocol</i> . A standard protocol used to monitor network devices called "SNMP agents".
Socket	TCP connection between two hosts consisting of a source and destination TCP port number at each end.
Subnet mask	A binary value used to divide IP networks into smaller subnetworks or subnets. This mask is used to help determine whether IP packets need to be forwarded on to other subnets.
Tar	UNIX command for archiving data onto a permanent storage medium.
TCP/IP	<i>Transmission Control Protocol/Internet Protocol</i> . Suite of protocols that act as the base protocol for the Internet.
TCP port	A logical connection point in the software of a TCP host or device. When two IP devices talk, they establish a socket which consists of a source and destination TCP port number on both ends.
Telnet	Command and protocol to establish a terminal connection between two hosts on an IP network.

12. Glossary

Zigbee	A set of electrical and protocol standards defining a means by which low-cost control devices may communicate over low-power wireless links within a building. Defined and maintained by the Zigbee Alliance. More information may be obtained from the Alliance's web site: http://www.zigbee.org/
---------------	--