Exegin Q53 ZigBee / 802.15.4 Gateway

Installation and Configuration Guide

Version 1.2.6

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1 Overview Of The Manual

This manual describes the installation and configuration of the Q53 ZigBee / 802.15.4 Gateway on your network. For the latest information on the Q53, 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 Q53 ZigBee / 802.15.4 Gateway. A description of how the Q53 works, and its main features.

3: Installing the Q53. Installing and connecting the Q53 ZigBee / 802.15.4 Gateway to a TCP/IP network.

4: Configuration Tools. Utilities provided with the Q53 ZigBee / 802.15.4 Gateway and some basic TCP/IP commands that you will need to configure the Q53.

5: Configuring the Q53 on Your Network. Describes how to set up the TCP/IP network parameters on the Q53.

6: Configuring the Q53 Gateway. Describes the services offered by and the configuration of the ZigBee Gateway components of the Q53

7: Q53 Zigbee PAN and Bridge Configuration. Describes how to set up the Zigbee and bridging parameters on the Q53 to establish a Zigbee bridge over your TCP/IP network.

8: Using HTML Pages to Configure the Q53. Descriptions of the Q53 web pages for configuring the Zigbee gateway bridge device and viewing its status.

9: Reference Information. Provides a complete command list and information about using the Q53's command line interface shell. Describes the Q53 naming scheme, how to reset units to factory defaults and how to upgrade the firmware.

10: Extra Features/Additional Information. Topics covered include product architecture, general options, security features, using the FTP daemon to access the Q53.

111: Q53 Specifications. Providing hardware and software specifications for the Q53, connector pinouts, LED status indicators and variable definitions.

12: Getting Help. Where to find help and how to return the Q53 for repair.

13: Glossary.

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 exegin.com
  ```

- Regular Courier font indicates displayed results.

  ```
  exegin.com is alive
  ```

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

  To create an IP address for the Q53 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 Q53 ZigBee / 802.15.4 Gateway

This chapter describes the Q53's architecture and special features. The topics included are:

- *What is the Q53?* on page 9
- *Physical Features* on page 9
- *How Does the Q53 Work?* on page 10
- *Product Features* on page 11

What is the Q53?

The Q53 ZigBee / 802.15.4 Gateway provides computers with a secure TCP/IP network interface to a ZigBee PAN.

Using SOAP or REST, open, well-supported, industry-standard remote procedure call (RPC) protocols.

Physical Features

The key physical components of the Q53 are:

- a 10/100 network interface connector to connect to the network
- 2.4 GHz radio for connection to ZigBee PANs
- Flash memory to store firmware and user-configurable settings
- High-performance 32-bit microprocessor subsystem for speed, efficiency and reliability

For more detailed specifications of the Q53, please see chapter 12, *Q53 Specifications*.

How Does the Q53 Work?

The Q53 implements the ZigBee Gateway specification as defined by the ZigBee Alliance; see www.zigbee.org to obtain a copy. This standard specifies remote procedure call method based on Web services (SOAP and REST) and ASN.1based application level protocols.

Through user created host applications the Q53's SOAP and REST interface can be accessed using the encoding schemes detailed in Gateway Specification. The Q53 does not currently implement the ANS.1 interface.

In the case of SOAP, the message formats are defined through the use of an xml encoded schema and a WSDL which can be found in the ZigBee Gateway specification. The specification also details the format of the RESTful HTTP messages.

Either of these interfaces can be accessed through the use of user created Web Services client applications or third party tools such as eviware's soapUI tool. Exegin provides a sample Microsoft Visual Studio project, on our web site at

http://exegin.com/downloads/Q53_VSC.zip

which implements a number of simple SOAP based interactions with a Q53 gateway.

The Q53 implements the mandatory subset of functions of the Gateway Specification. The Exegin specific schema and WSDL are available in the example Q53_VSC project package.

Note that the contents of this package may change at anytime and that Exegin Technologies makes no warranties regarding the usability or reliability of the contents of the package. The package is simply an example of how one might use a gateway.

Product Features

The Q53 offers an extensive list of features including:

- internal radio circuitry supporting 2.4 GHz PANs
- 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 (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.
- extensive built-in troubleshooting tools
- built-in "**`telnet`**" and "**`ping`**" clients
- simple flash memory upgrades over TCP/IP

3 INSTALLING THE Q53

This chapter describes the following:

- *Site Requirements* on page 12
- *Unpacking the Q53* on page 13
- *Connecting the Q53 to a Network* on page 13

Site Requirements

Prepare to install the Q53 in a clean, well-ventilated environment protected from extremes of temperature, humidity, mechanical shock, or vibration. Provide enough space at the back of the unit for cable connections.

Depending upon the specific options selected at time of ordering, the Q53 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 Q53 within four meters (13 feet) of a grounded 115 or 230 VAC outlet.

The Q53 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 Q53 to the nearest ZigBee PAN node will vary depending upon the installation environment and capabilities of the other ZigBee node(s).

The Q53 is an intentional radiator of Radio Frequency (RF) energy. In order to limit RF exposure to personnel in the immediate area, the Q53 should be located and installed such that a separation of at least 20 centimeters is maintained between the Q53's antenna and personnel in the vicinity of the device.

Note: ESD precautions should be used when attaching or removing the antenna.

Unpacking the Q53

Upon receiving the Q53, check the packaging for any damage or missing pieces. Immediately report problems to the shipping company or vendor.

Table 1—Q53 Packing List

ZigBee / 802.15.4 Gateway	• Q53 • Power Supply
Antenna	• 2.4 GHz Antenna

Connecting the Q53 to a Network

There are two DIP switches on the rear surface (Figure 1) of the Q53. 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. They are in the "**off**" postion when shipped from the factory.

Figure 1—Q53 Bottom View

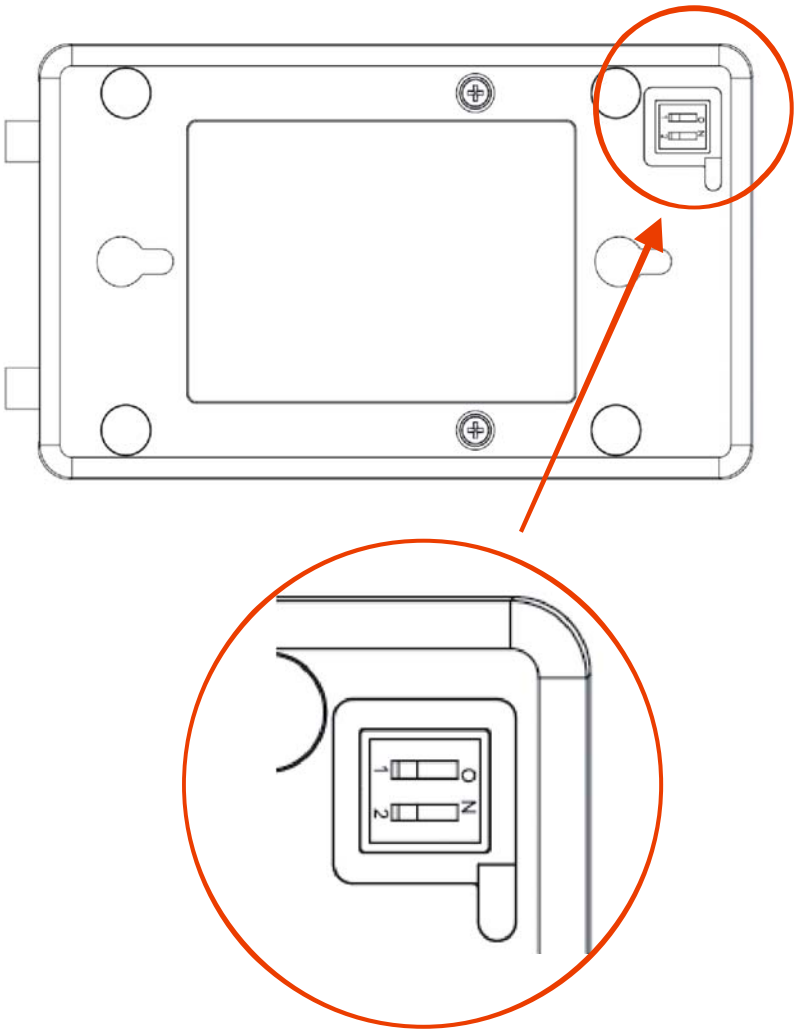
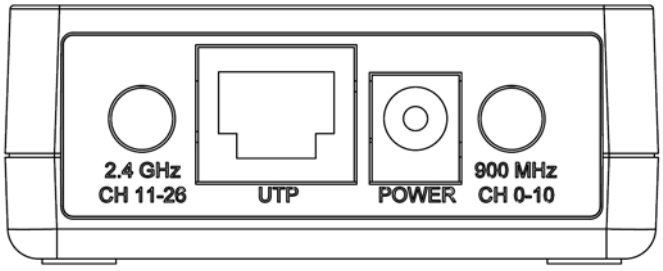


Table 2—Q53 Dipswitch Settings

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.

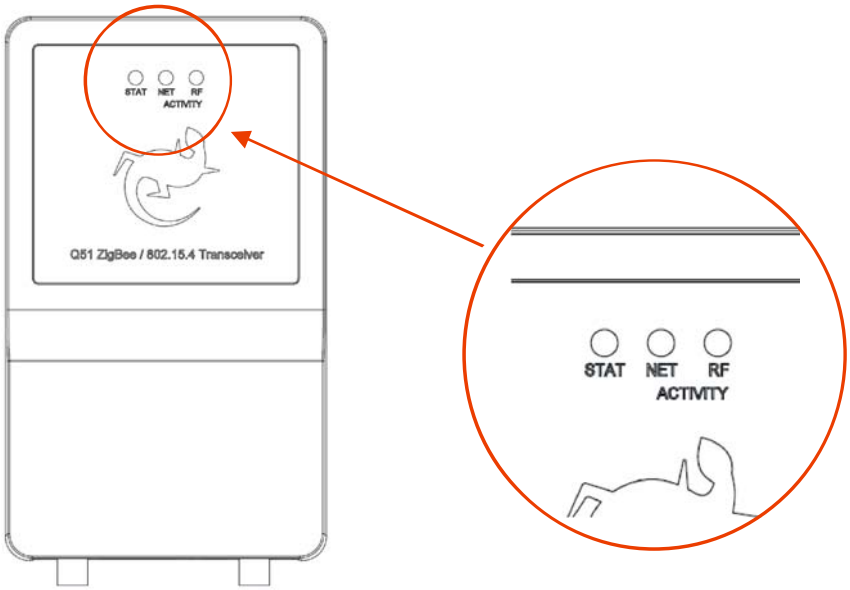
Use the RJ45 network connector, located on the side panel of the Q53 (see Figure 2), for attaching to a 10/100Base-T (UTP) network. Plug a network cable into the network connector. If installing a Q53 without the Power Over Ethernet (POE) option, insert the three-prong power cable of the AC adapter into an AC outlet, and insert the barrel power connectors into the POWER connector on the side panel of the Q53; this will **power on** the device.

Figure 2—Q53 Side View



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—Q53 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 Q53 utilities provided to help you setup your Q53 ZigBee / 802.15.4 Gateway:

- *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

Q53 Utilities

HTML forms

The Q53's settings can be configured over TCP/IP using a standard Web browser. The Q53's Web pages provide a user-friendly way to access some of the commands built into the Zigbee gateway device.

To access the Q53's home page, do the following:

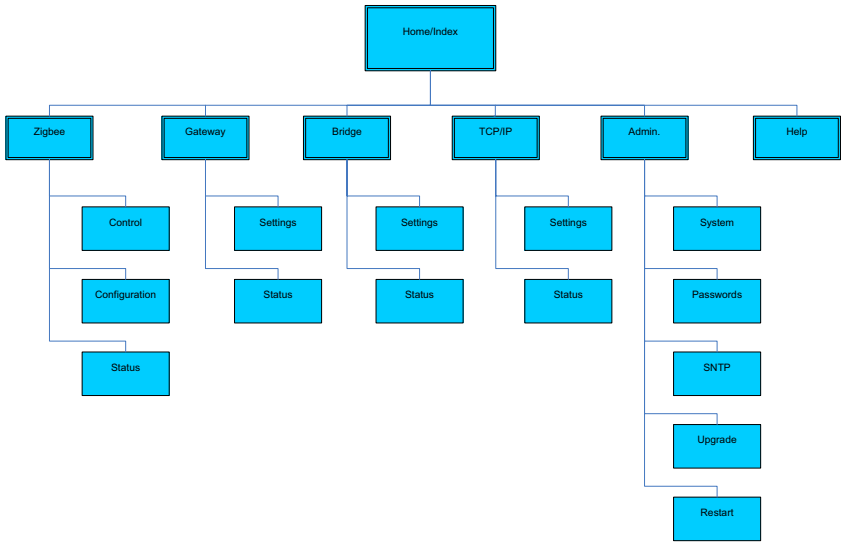
1. Ensure that the ZigBee / 802.15.4 Gateway has an IP address and subnet mask so that it is identifiable on your TCP/IP network.
2. Ensure that your network station can successfully "**`ping`**" the Q53 over the network.
3. Direct your Web browser to the Uniform Resource Locator (URL):

   `http://`*`Q53IPaddress`*

   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 Q53's HTML structure is divided into several menus as shown in Figure 4. More detailed information about Q53 web pages is found in chapter 8, *Using HTML Pages to Configure the Q53*.

Figure 4—Q53 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 Q53 can be configured on a TCP/IP network using Gecko. Two steps are involved:

1. Identify the Q53 on the network using TCP/IP as the underlying protocol
2. Configure the Q53 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 Q53.

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.

Installing Gecko in Windows

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

1. Insert the Q53 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 Q53 ZigBee / 802.15.4 Gateway. You can start a Telnet session on a UNIX- or Windows-based computer which is connected to the network, to log in to the Q53 command line interface shell to alter and view settings.

Syntax:

```
telnet ipaddress
```

Example:

```
telnet 192.168.11.9
```

This will bring up the Q53 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 Q53) 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 Q53 on Your Network

This chapter describes how to configure the required and optional TCP/IP settings for the Q53 on your network. The following steps are covered:

- *Required TCP/IP Settings*:
  - *Configuring an initial IP address for the Q53* on page 20
  - *Configure the Q53 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 Q53, additional configuration is required to connect the Q53 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 *Q53 Zigbee PAN and Bridge Configuration* on page 33 for details on ZigBee and bridge configuration.

Required TCP/IP Settings

Configuring an initial IP address for the Q53

Since the Q53 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 Q53 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 Q53 when it is first installed on the network fresh from the factory.

As delivered from the factory, the Q53 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 Q53 may be determined by querying the DHCP server using its administration interface and locating the IP address of the desired Q53 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 Q53 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.

Configure the Q53 IP address and subnet mask

Once the IP address has been created, you can configure the remaining TCP/IP parameters of the Q53 ZigBee / 802.15.4 Gateway using one of the following:

- Q53 HTML forms, page 21
- the Q53 Gecko utility (Windows only), page 23
- the TCP/IP **telnet** command, page 24.

Using HTML forms

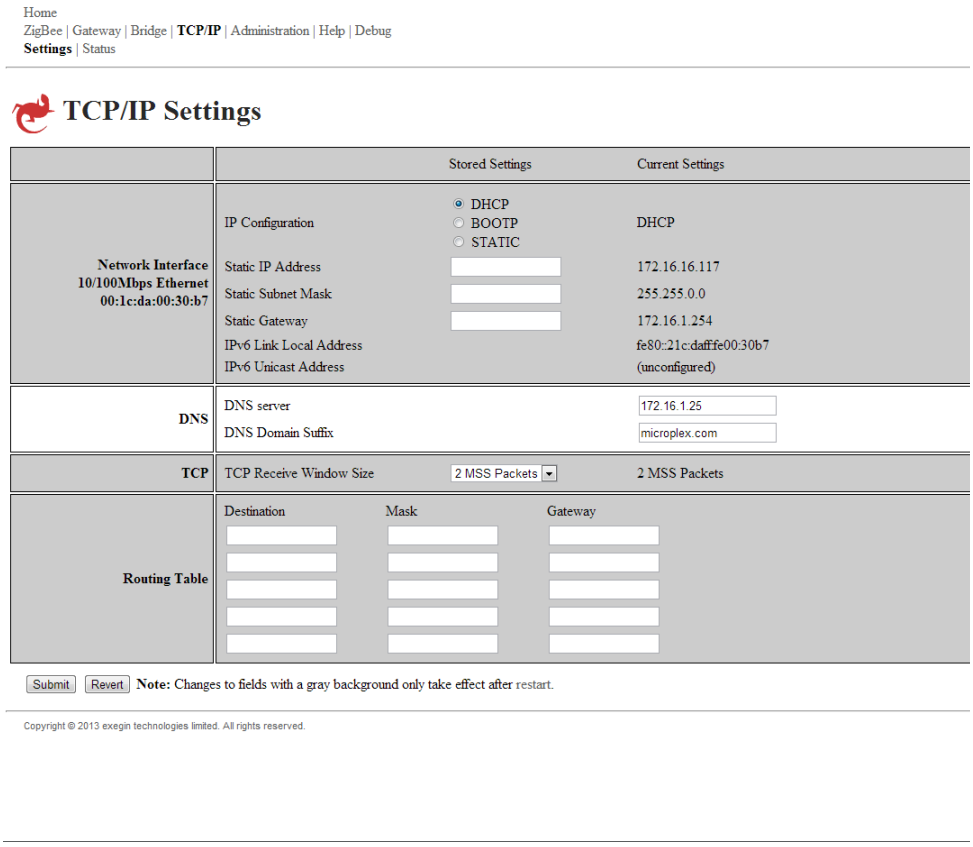
1. Load the Q53 HTML forms as described in *HTML forms* on page 17, then select "Network" from the Main Menu.

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

   `http://Q53IPaddress/tcpipConf.html`

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

Figure 5—TCP/IP Settings Form



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 Q53 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 Q53's subnet mask in the **Subnet Mask** field.
5. [Optional setting] In order to communicate across subnets with the Q53, 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 Q53 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 Restart page and click on "Restart" to apply the new settings to your system.

Using Gecko (Windows)

Ensure that you have installed Gecko on your Windows PC (see *Installing Gecko in Windows* on page 19). To configure the Q53 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.

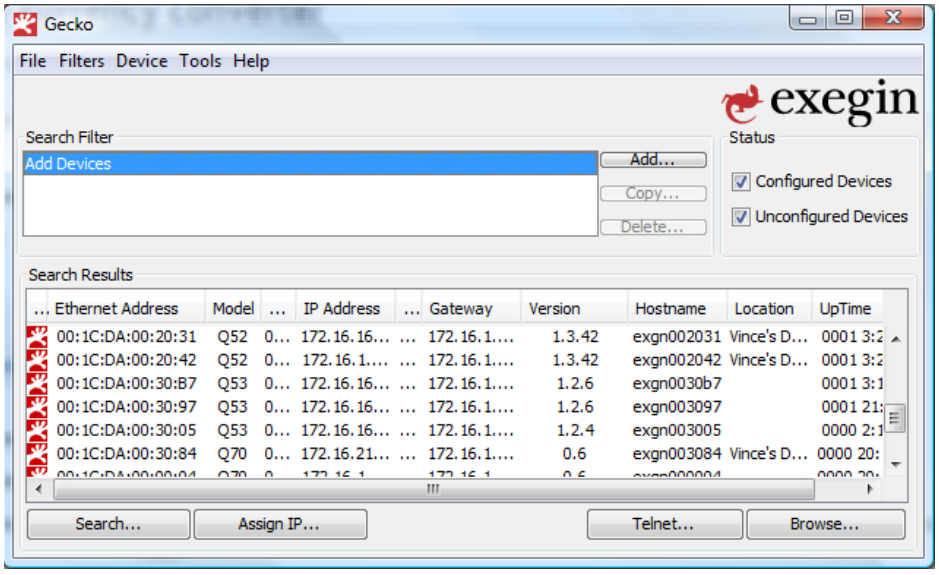
4. Click on "Stop Searching" after the device has been found.
5. Select the Q53's ethernet address from the list box and press "Assign IP…".
6. In the Assign IP dialog box, fill in the IP address and subnet mask for this Q53.

   You can also assign a default router/gateway entry in this dialog box to allow your Q53 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 Q53. Gecko will then display its progress status in a separate dialog box.

After successfully assigning the settings you will see the Q53 with its new IP address in the device list.

Figure 6—Gecko Main Screen



Using Telnet

1. Start a Telnet session with the Q53. Type:

   ```
   telnet Q53IPaddress
   ```

   where ***Q53IPaddress*** is the IP address of the Q53 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:

   ```
   Q53IPaddress:root>
   ```

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

   ```
   store net addr Q53IPaddress
   store net mask Q53netmask
   ```

   where:

   Q53netmask is the netmask address for the Q53.

   If you would like to communicate with the Q53 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 newRootPssswd
   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 restart the Q53 by powering the unit off and then back on again.

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

   ```
   ping Q53IPaddress
   ```

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 Q53 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.

Optional TCP/IP Settings

Communicating across routers

Since Windows and UNIX environments depend on TCP/IP to communicate with the Q53, crossing routers can be an issue.

After following one of the Q53 configuration methods described above, you will only be able to communicate with the Zigbee gateway device from the *same* subnet. This means that the Q53 will *not* be able to communicate across a router (i.e., to another subnet).

To allow the Q53 to communicate across a router, it is best to store a default router/gateway within the Zigbee gateway 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 Q53 using either the Q53 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 Restart page and click on "Restart" to apply the new settings to your system.

Using Telnet

1. Telnet to the Zigbee gateway device as described on page 24.

   ```
   telnet Q53ipaddress
   ```

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:

   ```
   Q53IPaddress:root>
   ```

3. Type "**list net**" to view the Zigbee gateway device's current settings, then configure the Q53's default router/gateway as follows:

   ```
   store net gateway routerIPaddress
   ```

4. Logout of the Telnet session with "**quit**". Then restart the Q53 by powering the unit off and then on again.

Using Host and Domain Names

The Q53 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 Restart page and click on "Restart" to apply the new settings to your system.

Using Telnet

1. Telnet to the Zigbee gateway device as described on page 24.

   ```
   telnet Q53ipaddress
   ```

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:

   ```
   Q53IPaddress:root>
   ```

3. Type "**list net**" to view the Zigbee gateway device's current settings, then configure the Q53'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 restart the Q53 by powering the unit off and then on again.

Troubleshooting Tips

Gecko error messages: Q53 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 use 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.

Q53 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 Q53 from a host on the *same subnet*? The Zigbee gateway device can only be seen locally unless you configured a routing entry earlier on.
- Is the STAT LED on the front of the Q53 flashing once per second or is it flashing faster? A slower, once-a-second rate indicates that the Zigbee gateway device is in fact configured with an IP address. A faster rate indicates that the Q53 is unaware of the IP address and you may need to try the configuration process again.

- Have you confirmed the network connection to the Q53 is working correctly? Trying different network cables and locations will help narrow down the problem.

Cannot ping the Q53

There are a number of possible reasons for this:

- Have you restarted the Q53? Sometimes this will solve various communication problems.
- Is the network cable securely connected?
- Have you checked your network connection to the Q53? 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 Q53?
- 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 Q53 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 Q53 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 70 for possible configuration methods.
- Is there a router between the Q53 and your host? If so, a default router or a static route must be configured on the unit so the Q53 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 Q53 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 Q53 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 70. Once the unit is in the default state, use one of the configuration options listed in the "Q53 Configuration" above in the manual to reconfigure it.

Cannot Telnet to the Q53

If you are unable to **ping** the Q53 as well, please see *Cannot ping the Q53* 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.

- Have you tried restarting the Q53?
- Are the dipswitches in the "off" position?
- Does the fourth octet of the Q53'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 Q53 from your Windows station? If not, please see *Cannot ping the Q53* on page 28.
- Have you used the correct URL for the Q53's home page? It should be:

  `http://`*`Q53IPaddress`*

  For example:

  `http://192.168.11.9`

6 CONFIGURING THE Q53 GATEWAY

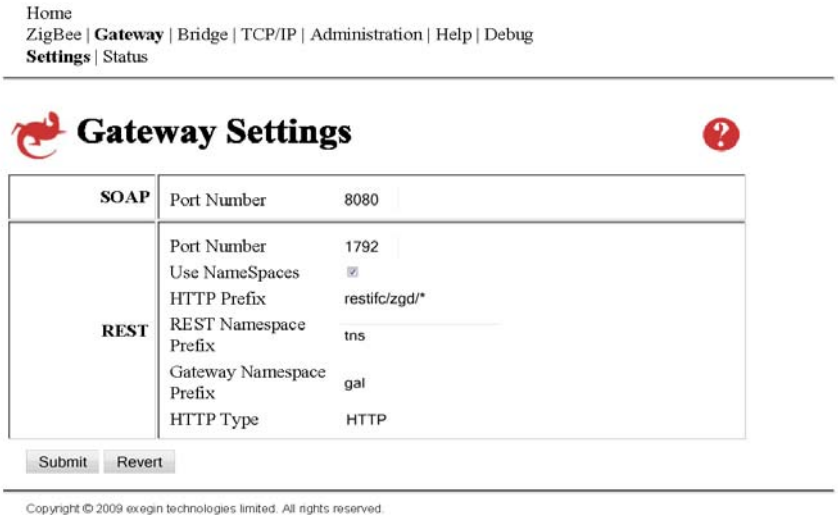
This chapter describes how to configure the required and optional Gateway settings for the Q53 on your network. The following steps are covered:

- *Q53 Gateway Settings* on page 30:.

Once the TCP/IP network port is configured on the Q53, additional configuration is required to connect the Q53 to the local ZigBee Personal Area Network (PAN). Please refer to *Q53 Zigbee PAN and Bridge Configuration* on page 33 for details on ZigBee PAN configuration.

Required Gateway Settings

Figure 7—Q53 Gateway Settings



The Gateway Settings page allows for the configuration of the SOAP and REST interfaces of the gateway.

The SOAP interface configuration admits only one parameter, the TCP/IP port number on which it will receive SOAP request. The default is 8080. This is the port number to which a host application will direct its SOAP requests.

The REST interface configuration allows for a variety of configuration options:

Port Number, like for the SOAP interface this is the TCP/IP port number on which the gateway will receive RESTful requests. This should be different that the SOAP port number. The default is 1792.

Use NameSpaces: a check box that enables, if checked, the use of the Namespaces defined below. If unchecked the namespace will not be used.

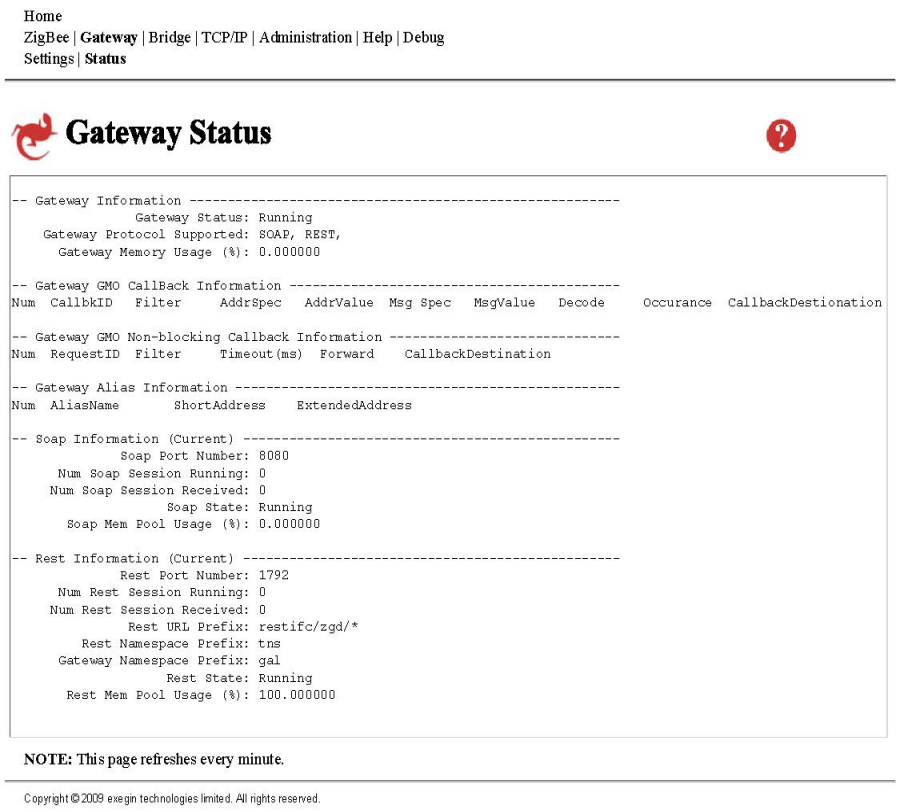
- HTTP Prefix: The prefix that will be prepended to all incoming RESTful URL requests. The default is “restifc/zgd/*”
- REST Namespace Prefix: The namespace to be used for the REST requests. The default is “tns”
- Gateway Namespace Prefix: The namespace to be used for the gateway ga.l

HTTP type: This field allows the gateway REST interface to be configured to use either HTTP or HTTPs.

Gateway Status Page

The Gateway Status page is shown in the figure below. The page provides for the reporting of the status of the gateway device.

Figure 8—Gateway Status Screen



The page provide information regarding the:

- Gateway Status (running or not)
- Gateway Protocol Supported (SOAP and/or REST)
- Gateway Memory Usage (%) (overall memory usage on the device)
- GAteway GMO CallBack Information (details of Callback filters defined)
- Gateway GMO Non-blocking Callback Information
- Gateway Alias Information (details of Alias devices defined)
- Soap Information (Current)
- Rest Information (Current)

7 Q53 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 Q53. The following steps are covered:

- *Required ZigBee Settings*
  - *Selecting the RF Channels* on page 33
- *ZigBee Configuration Settings*
  - *Using HTML forms* on page 38
  - *Setting Extended PAN ID* on page 38
- *Required ZigBee Settings*
  - *Setting the remote bridge host name* on page 39
- *Setting additional remote bridge host names*
  - *Setting additional remote bridge host names* on page 40
- *Troubleshooting Tips*
  - *ZigBee PAN* on page 40
  - *ZigBee Bridge* on page 41

Required ZigBee Settings

Selecting the RF Channels

As shipped from the factory the Q53 is configured to operate on channel 11 for the 2.4 GHz radio.

The Q53 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.

Using HTML forms

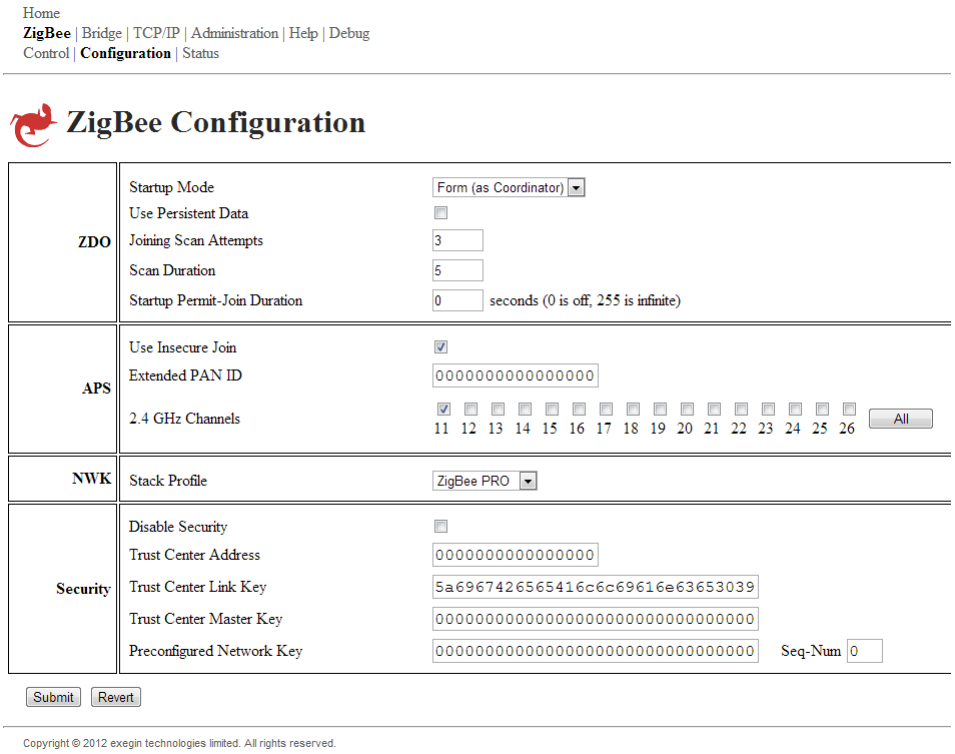
1. Load the Q53 HTML forms as described in *HTML forms* on page 17, then select "ZigBee" from the Main Menu and than click on "Configuration".

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

   `http://Q53IPaddress/zigbeeConf.html`

   The ZigBee Configuration form is displayed (Figure 9).

Figure 9—ZigBee Configuration Form

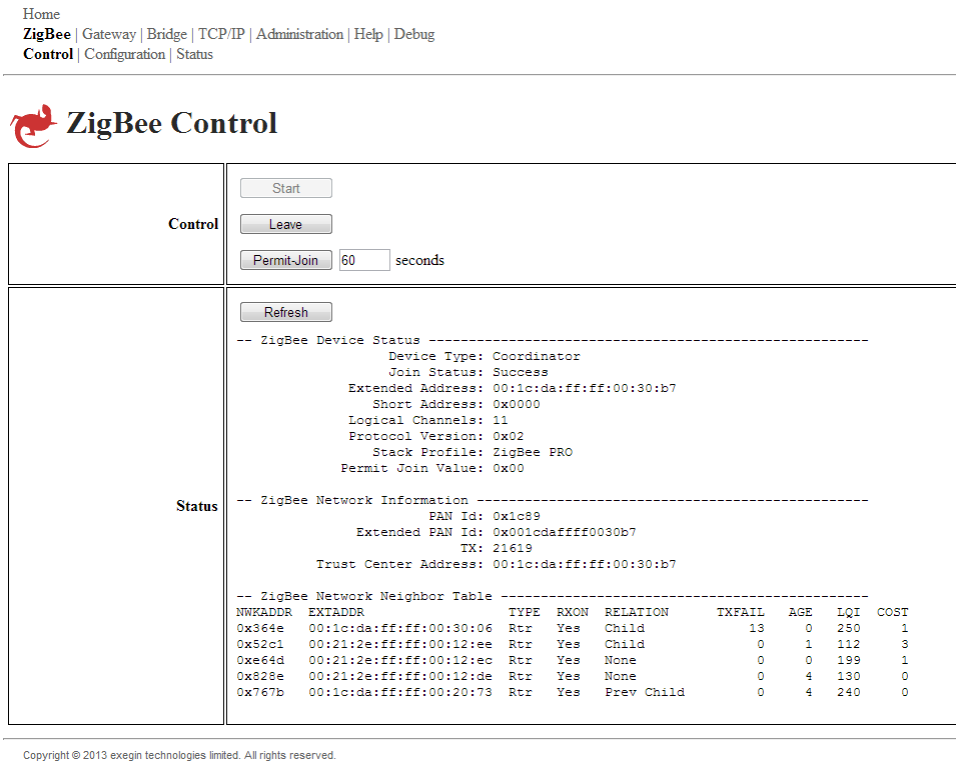


Next click on the "Control" link below ZigBee: The start button forces the Gateway to join or form a network.
Or, go directly to the ZigBee Configuration form by typing the following into your browser:

`http://Q53IPaddress/zigbeeBasic.html`

The ZigBee Control form is displayed (Figure 10).

Figure 10—ZigBee Control Form



2. Control Start;
   Forces the Gateway device to join or form the specific network.

3. Control Leave:
   Forces the Gateway device to leave the network
   Click on "Leave" to leave the network.

4. Control Permit-Join:
   ZigBee networks have a notion of a period of time during which a coordinator allows devices to join its network. The Permit-Join button put the gateway into an open state of 60 seconds (configurable on the Advanced page). During this period child devices should be able to join the network being formed by the gateway coordinator.

5. Click on "Permit-Join" to enable child devices to join the network.

6. Status Refresh
   Displays information regarding the gateway device and its local network.

7. Click on "Refresh" to get immediate status information on the gateway and its local network.

ZigBee Configuration Settings

ZigBee Settings

By default, the Q53 acts only as a ZigBee Bridge Device (ZBD) to bridge ZigBee network messages over TCP/IP. However, the Q53 is also capable of acting as ZigBee Coordinator for the local ZigBee PAN.

Configuration Management: Allows named gateway configurations to be stored on the Q53 and retrieved by name.

Selected Configuration: Allows the selected/current configuration to be displayed and modified.

ZDO: ZDO specific parameters are set here, including:

Startup Mode: The device will join a PAN as a Router or form the PAN as a ZigBee coordinator

Use Persistent Data: *The ZigBee specification indicated that the following information should be preserved across resets in order to maintain an operating network:*

- The device's PAN Id and Extended PAN Id.
- The device's 16-bit network address.
- The 63-bit IEEE address and 16-bit network address of each associated end device child and if nwkAddrAlloc is equal to 0 then also each associated router child.
- For end devices, the 16-bit network address of the parent device.
- The stack profile in use.
- The device depth.

The use of the non-volatile data at any time on a gateway is determined by the "Use Persistent Data" check box.

Scan Attempts: Integar value representing the number of scan attempts to make before the device decides which ZigBee coordinator or router to associate with. This attribute has default value of 5 and valid values of between 1 and 255.

Scan Duration:
Permit-Join Duration: The period of which the coordinator will allow nodes to join.

APS:

Use Insecure Join:

This flag indicates whether the device should assume on startup that it must become a ZigBee coordinator

If the network rejoin attempt fails, and Use Insecure Join is selected, then the device will use the Channel Mask. If extended PANID has a non-zero value, then the device should join only the specified network and the procedure should fail if that network is found to be inaccessible. If extended PANID is equal to 0x0000000000000000, then the device should join the best available network.

Extended PAN Id:

This is the extended PANID of the network to which the device is joined or in the case of a coordinator the network that it will form. If it has a value of 0x0000000000000000, then the device is not connected to a network.

2.4 GHz Channels:

This is the mask containing allowable channels on which the device may attempt to form or join a network at startup time.

NWK:

Stack Profile: The device will use one of the following: ZigBee Home, ZigBee PRO or Ember.

Security:

Disable Security: Turning off all security features.

Trust Center Address:

The IEEE address of the Trust Center.

Trust Center Link Key:

This is a key that is shared exclusively between two, and only two, peer application-layer entities within a PAN.

Trust Center Master Key:

This is a shared key used during the execution of a symmetric-key key establishment protocol. The master key is the basis for long-term security between the two devices, and may be used to generate link keys.

Preconfigured Network Key:

This is the key used by a ZigBee device to secure outgoing NWK frames and that is available for use to process incoming NWK frames.

1. Load the Q53 HTML forms as described in *HTML forms* on page 17, then select "ZigBee" from the Main Menu and than "Configuration".

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

   `http://Q53IPaddress/zigbeeConf.html`

   The ZigBee Settings configuration form is displayed (Figure 9).

2. If the Q53 should act as ZigBee PAN Coordinator for the wireless network, click on the "Startup Mode" drop down box labelled ’Form (as Coordinator)’; otherwise leave it as ’Join (as Router)’.
3. Click on "Submit" when done.
4. Go to the Control page and click on "Start" for the new settings to join or form a PAN.

Using HTML forms

Setting Extended PAN ID

The Q53 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 Q53 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://Q53IPaddress/zigbeeConf.html`

   The ZigBee Settings configuration form is displayed (Figure 9).

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 Control page and click on "Start" for the new settings to join or form a PAN.

Optional 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 Q53 ZigBee / 802.15.4 Gateway which is currently being configured requires at least one other Zigbee gateway 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

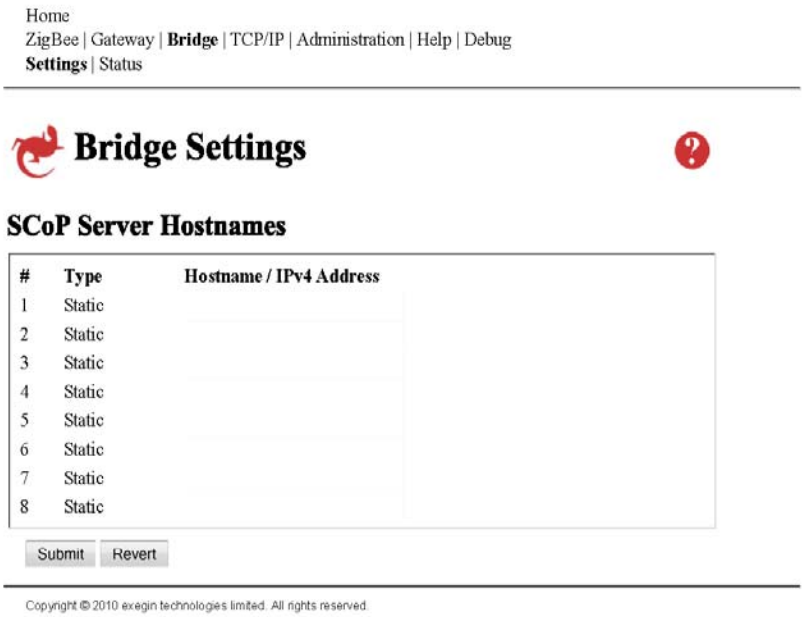
1. Load the Q53 HTML forms as described in *HTML forms* on page 17, then select "Bridge" from the Main Menu.

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

   `http://Q53IPaddress/bridgeConf.html`

   The Bridge Settings configuration form is displayed (Figure 11).

Figure 11—Bridge Settings Form



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 Q53. 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.

Setting additional remote bridge host names

While at least one remote ZigBee bridge device is required for successful bridging operation, the Q53 can support up to eight remote ZigBee bridge devices. These additional bridge devices may be configured using HTML forms.

Using HTML forms

1. Load the Q53 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://Q53IPaddress/bridgeConf.html`

The Bridge Settings configuration form is displayed (Figure 11).

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 Q53. 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 Q53 can display a ZigBee Status HTML form which may be very helpful in resolving connection issues with the ZigBee PAN.

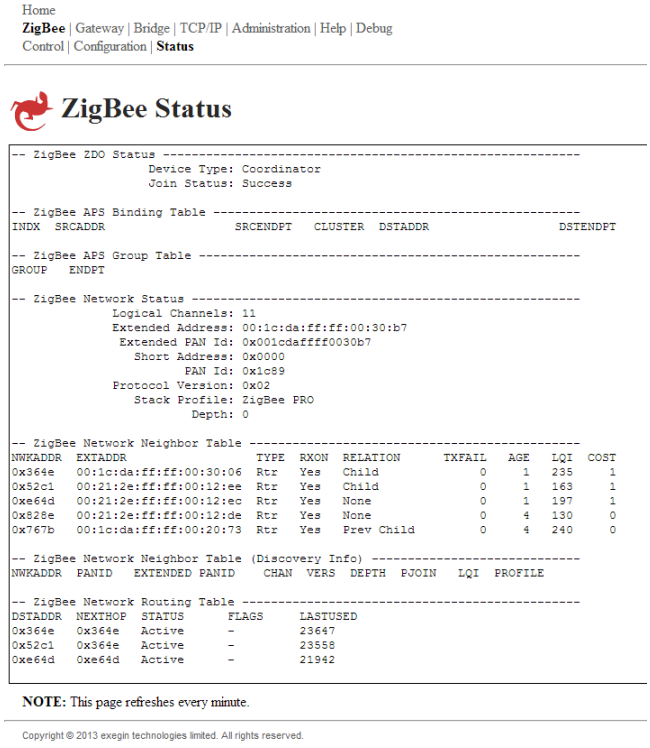
1. Load the Q53 HTML forms as described in *HTML forms* on page 17, then select "ZigBee" from the Main Menu. The ZigBee Settings form will be displayed.
2. From the ZigBee Settings form, select "Status".

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

   `http://Q53IPaddress/zigbeeStatus.html`

The ZigBee Status form is displayed (Figure 12).

Figure 12—ZigBee Status Form



Home
ZigBee | Gateway | Bridge | TCP/IP | Administration | Help | Debug
Control | Configuration | **Status**

ZigBee Status

```
-- ZigBee ZDO Status ---------------------------------------------------------
                  Device Type: Coordinator
                  Join Status: Success

-- ZigBee APS Binding Table --------------------------------------------------
INDX  SRCADDR                 SRCENDPT   CLUSTER  DSTADDR                 DSTENDPT

-- ZigBee APS Group Table ----------------------------------------------------
GROUP   ENDPT

-- ZigBee Network Status -----------------------------------------------------
             Logical Channels: 11
             Extended Address: 00:1c:da:ff:ff:00:30:b7
              Extended PAN Id: 0x001cdafffff0030b7
                 Short Address: 0x0000
                       PAN Id: 0x1c89
             Protocol Version: 0x02
                Stack Profile: ZigBee PRO
                        Depth: 0

-- ZigBee Network Neighbor Table ---------------------------------------------
NWKADDR  EXTADDR                  TYPE  RXON  RELATION      TXFAIL   AGE   LQI  COST
0x364e   00:1c:da:ff:ff:00:30:06  Rtr   Yes   Child              0     1   235     1
0x52c1   00:21:2e:ff:ff:00:12:ee  Rtr   Yes   Child              0     1   163     1
0xe64d   00:21:2e:ff:ff:00:12:ec  Rtr   Yes   None               0     1   197     1
0x828e   00:21:2e:ff:ff:00:12:de  Rtr   Yes   None               0     4   130     0
0x767b   00:1c:da:ff:ff:00:20:73  Rtr   Yes   Prev Child         0     4   240     0

-- ZigBee Network Neighbor Table (Discovery Info) ----------------------------
NWKADDR  PANID   EXTENDED PANID    CHAN  VERS  DEPTH  PJOIN   LQI  PROFILE

-- ZigBee Network Routing Table ----------------------------------------------
DSTADDR  NEXTHOP  STATUS      FLAGS     LASTUSED
0x364e   0x364e   Active      -         23647
0x52c1   0x364e   Active      -         23558
0xe64d   0xe64d   Active      -         21942
```

NOTE: This page refreshes every minute.

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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 Q53 HTML forms as described in *HTML forms* on page 17, then select "Bridge" from the Main Menu. The Bridge Settings form will be displayed.

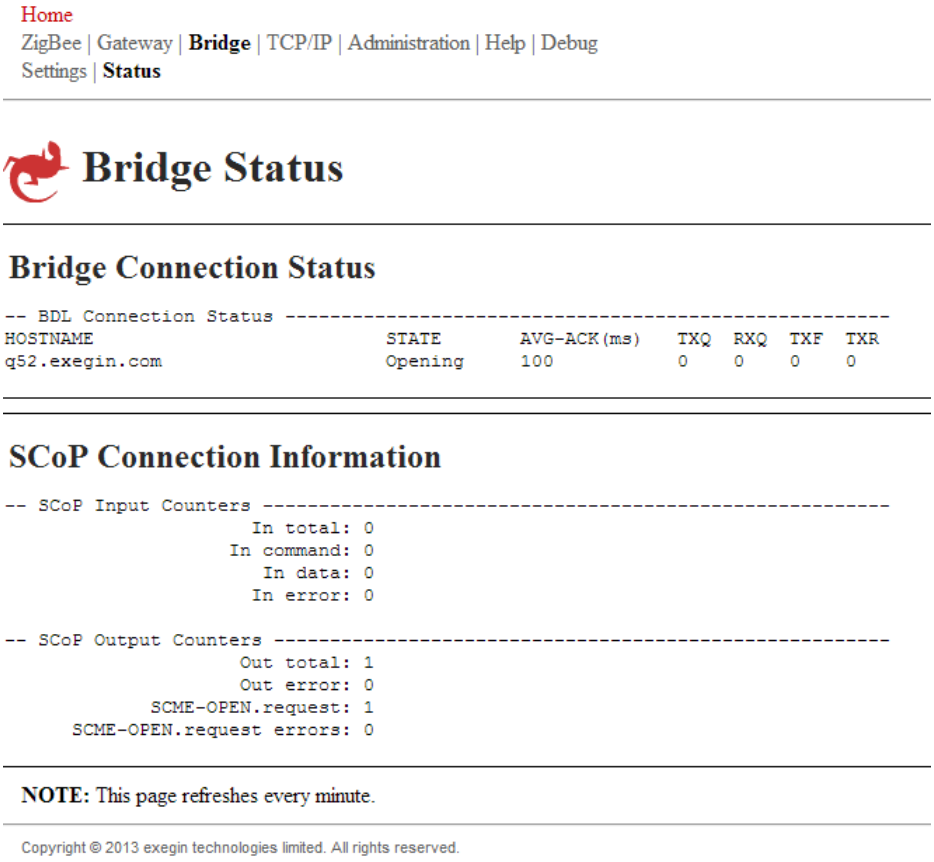
2. From the Bridge Settings form, select "Status".

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

   `http://Q53IPaddress/bridgeStatus.html`

The Bridge Status form is displayed (Figure 13).

Figure 13—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)?

8 Using HTML Pages to Configure the Q53

This chapter describes the HTML pages provided with the Q53. The Zigbee gateway 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 Q53 HTML Pages* on page 43
  - *Password Protection* on page 44
- *Q53 Home Page* on page 45
- *ZigBee Forms*
  - *ZigBee Control Form* on page 47
  - *ZigBee Configuration Form* on page 47
  - *ZigBee Status Page* on page 48
- *Bridge Forms*
  - *Bridge Settings Form* on page 49
  - *Bridge Status Page* on page 51
- *TCP/IP Forms*
  - *TCP/IP Settings Form* on page 51
  - *TCP/IP Status Page* on page 53
- *Administration Forms*
  - *System Information Form* on page 54
  - *Password Form* on page 55
  - *SNTP Settings Form* on page 56
  - *Firmware Upgrade Form* on page 57
  - *Restart Page* on page 59
- *Help Page* on page 60

Accessing the Q53 HTML Pages

To access the Q53's HTML pages, do the following:

1. Ensure that the Zigbee gateway device 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 Q53 over the network.
3. Direct your Web browser to the Uniform Resource Locator (URL):

   http://*Q53IPaddress*

   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://*Q53IPaddress*/*filename*.html

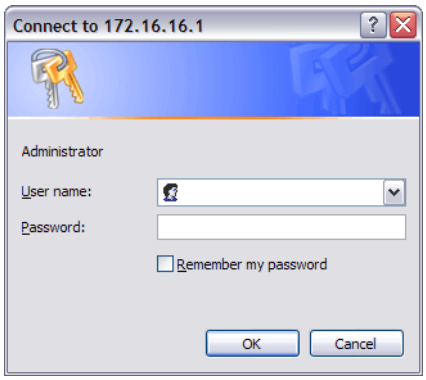
where "***filename***" is one of:

zigbeeBasic	Zigbee Control form
zigbeeConf	ZigBee Settings form
zigbeeStatus	ZigBee Status form
gatewayConf	Gateway Settings form
gatewayStatus	Gateway 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
restart	System Restart page
help	Help page.

Password Protection

The Q53 configuration forms are password-protected. When first accessing these forms, a password dialog will be displayed as shown in Figure 14.

Figure 14—Password Dialog for Access to Administration Forms



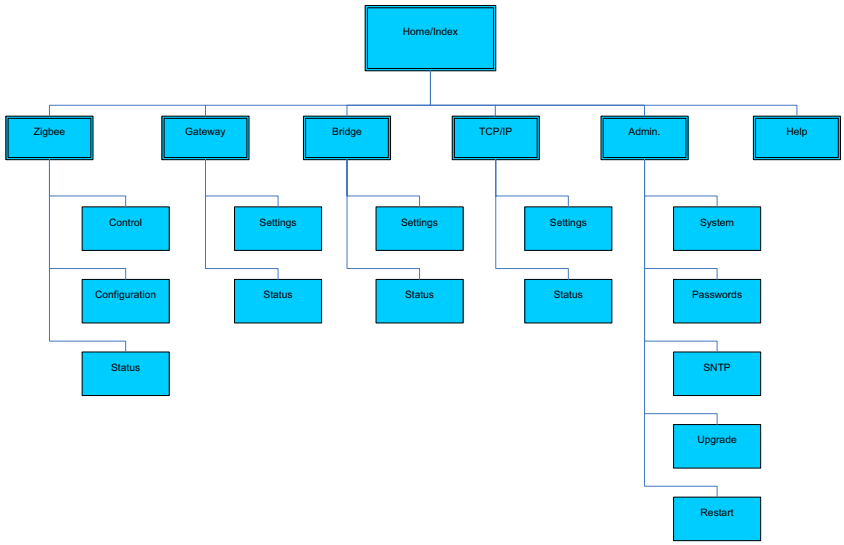
By default, the Q53 implements two user names: ’root’ and ’guest’. Individual passwords may be set for each user name. As shipped from the factory, the password for both user names is blank. Passwords may be set for each user ID; please refer to *Password Form* on page 55 for details on how this is done.

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.

Q53 Home Page

The Home page for the Q53 ZigBee / 802.15.4 Gateway Bridge provides a menu of pages (see Figure 15) that facilitate viewing and changing the status and operating parameters of the Q53. It also provides some basic system information for the Q53, and a link to the Exegin web site.

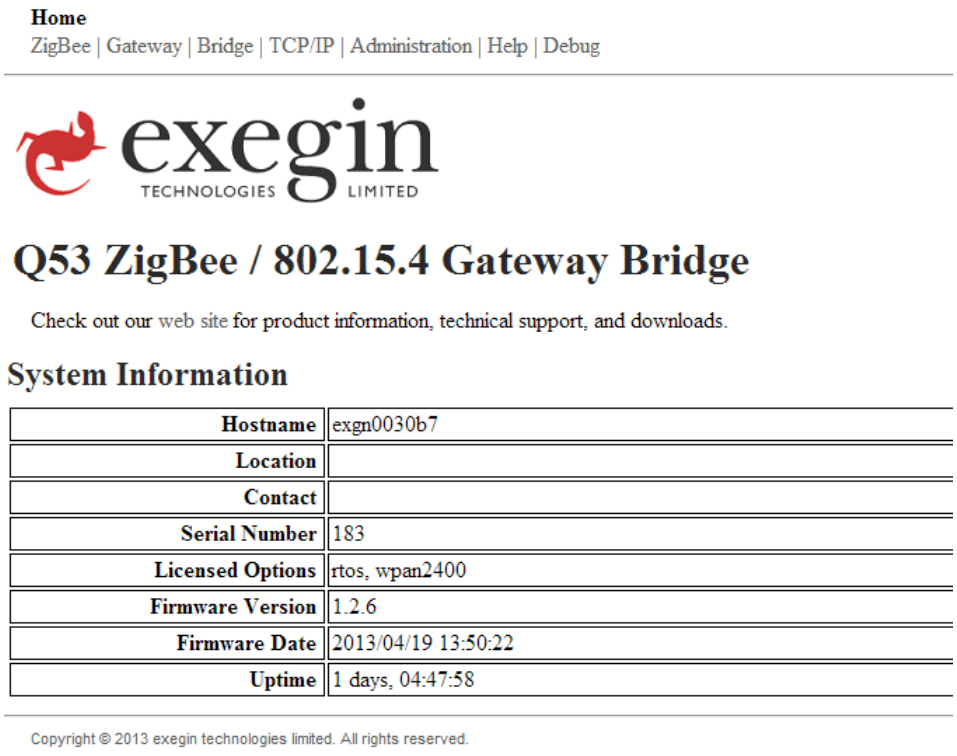
Figure 15—Q53 HTML Menu Structure



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 Q53 itself.

Figure 16—Q53 Home Page

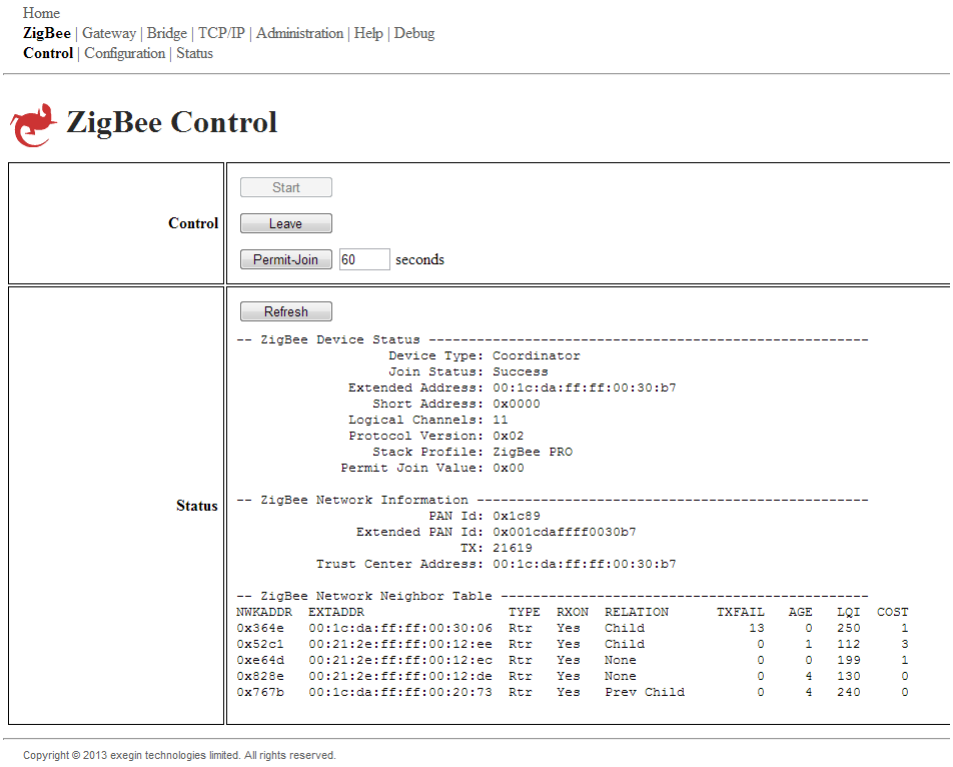


ZigBee Forms

ZigBee Control Form

the ZigBee Control form appears as shown in Figure 17.

Figure 17—Zigbee Control Form



Control

Start: Forces the Gateway device to join or form the specific network.

Leave: Forces the Gateway device to leave the network.

Permit-Join: ZigBee networks have a notion of a period of time during which a coordinator allows devices to join its network. The Permit-Join button put the gateway into an open state of 60 seconds (configurable on the Advanced page). During this period child devices should be able to join the network being formed by the gateway coordinator.

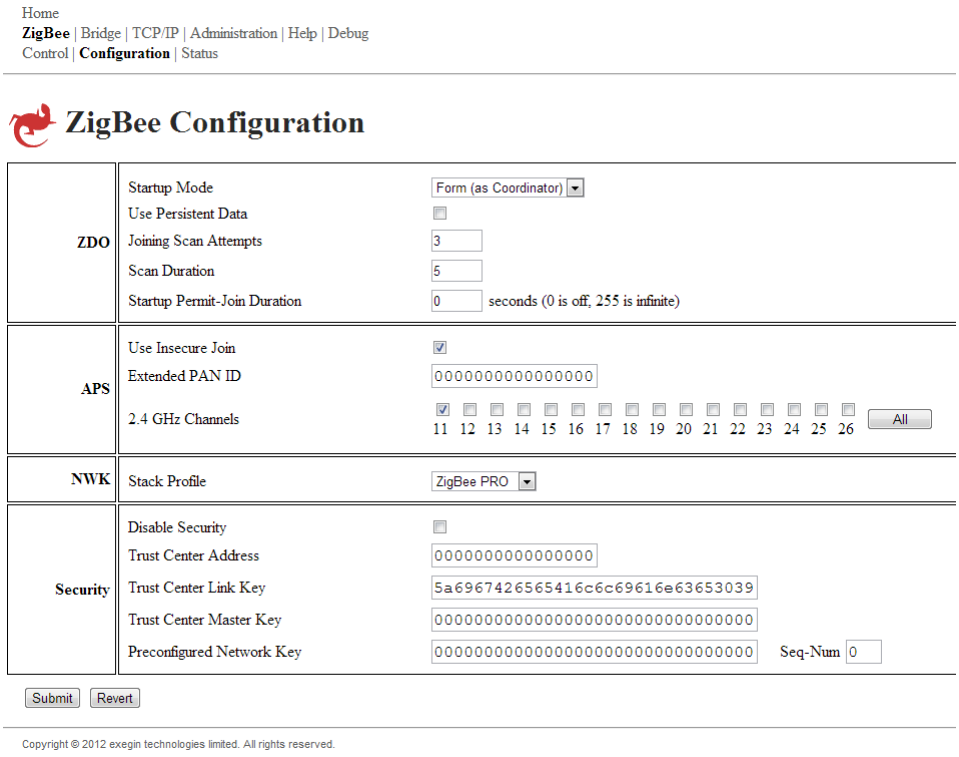
Status

Refresh: Displays information regarding the gateway device and its local network.

ZigBee Configuration Form

the ZigBee Settings form appears as shown in Figure 18.

Figure 18—ZigBee Configuration Form



Radio Channels

Radio buttons are provided to select the desired channel for the 2.4 GHz radio.

Default: No channels selected.

ZigBee Coordinator

By default, the Q53 acts only as a ZigBee Bridge Device (ZBD) to bridge ZigBee network messages over TCP/IP. However, the Q53 is also capable of acting as ZigBee Coordinator for the local ZigBee PAN. A check box is provided to enable the Q53 to act as ZigBee Coordinator for the local PAN. If this functionality is selected.

Default: ZigBee Router functionality is selected.

Saving Configuration Changes

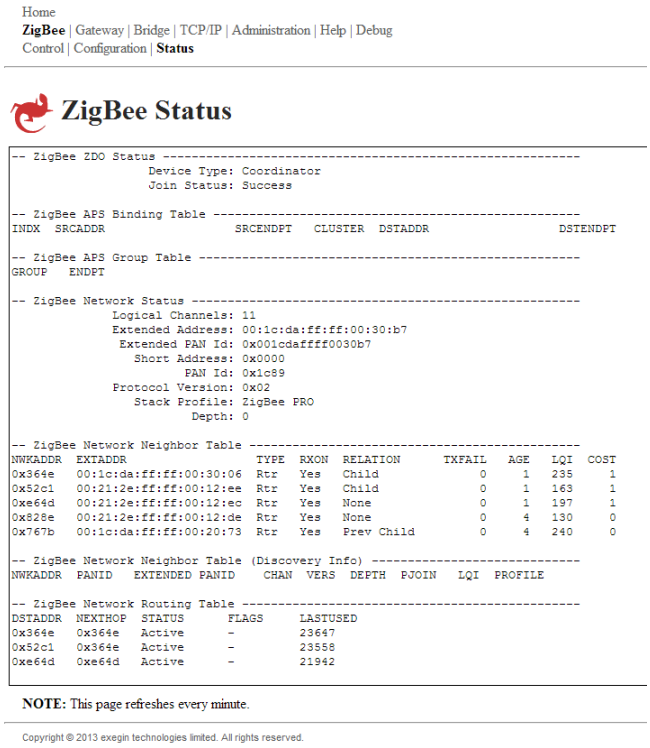
Any changes on this page will be saved only when the 'Submit' button is clicked. In order for the new values to actually take effect, the Q53 must be re-started.

To erase all changes, click the 'Revert' button.

ZigBee Status Page

The ZigBee Status page is shown in Figure 19. 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 Neightbour table, and ZigBee Network Routing table are displayed.

Figure 19—ZigBee Status Page

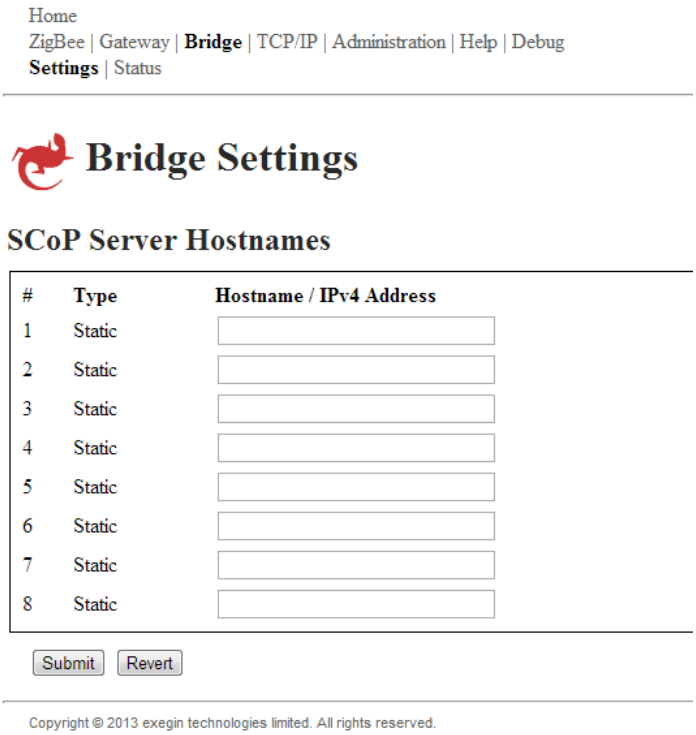


Bridge Forms

Bridge Settings Form

The Bridge Settings form is shown in Figure 20.

Figure 20—Bridge Settings Form



The Bridge Settings form allows specification of up to four remote ZigBee bridge devices. The Q53 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 Q53 requires access to a Domain Name Server (DNS) in order for host names to work. Please refer to *DNS Server Address* on page 53 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
Hostname 3
Hostname 4

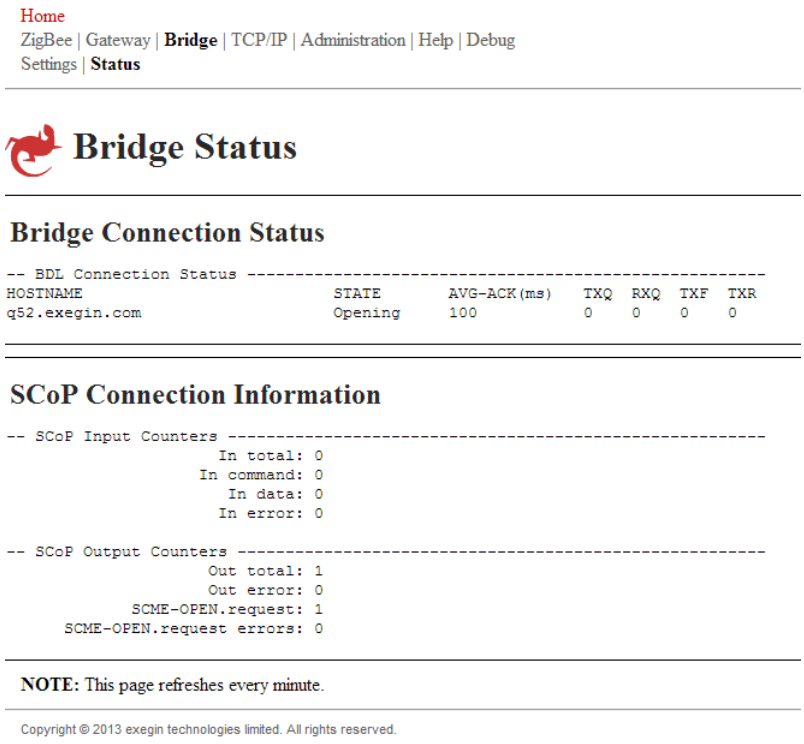
The IP addresses of up to three additional ZigBee bridge devices may be specified, using the **Hostname 2** through **Hostname 4** fields respectively.

Default: Unconfigured (blank) IP address.

Bridge Status Page

The Bridge Status page is shown in Figure 21. 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 21—Bridge Status Page

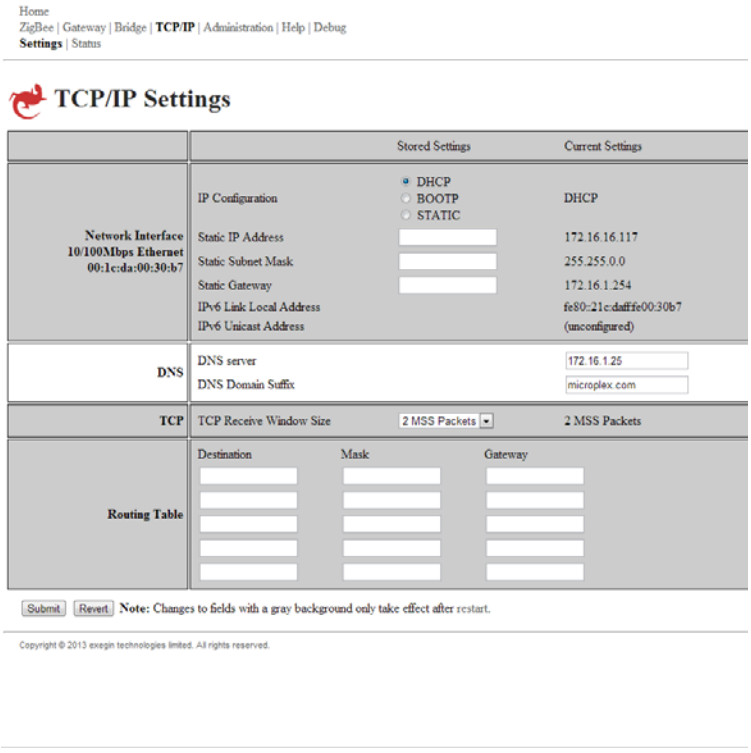


TCP/IP Forms

TCP/IP Settings Form

The TCP/IP Settings form appears as is shown in Figure 22.

Figure 22—TCP/IP Settings Form



Static vs Dynamic Addressing

The Q53 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 Q53 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 Q53 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).

DNS Server Address

Enter the IP address of the local domain name service (DNS) host in this field. This allows the Zigbee gateway device to automatically resolve hostnames (e.g. host.domain.com) to IP addresses (e.g. 192.168.0.42).

Default: Unconfigured (blank).

DNS Domain Suffix

Enter the domain name suffix which will be appended to the host name of the Q53 to form a complete fully-qualified host name. For example, if the fully-qualified host name of a particular Q53 is host.domain.com, then the string 'host' would be the device's host name and 'domain.com' would be the DNS Domain Suffix.

Default: Unconfigured (blank).

TCP Window Size

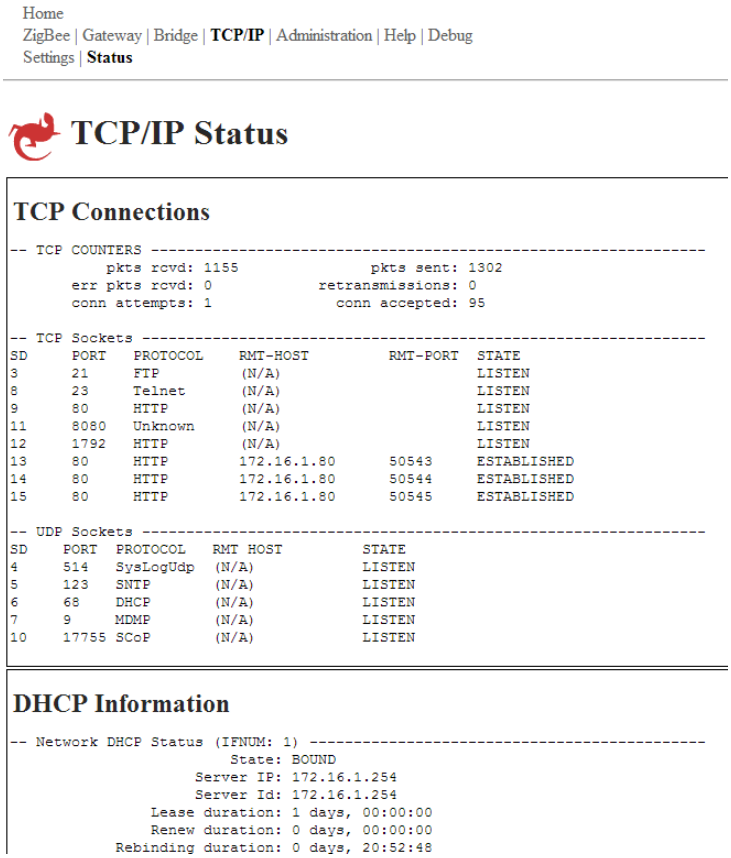
To change the TCP window size, select the desired value in the **TCP Window Size** combo box.

Default: 2 MSS packets.

TCP/IP Status Page

The TCP/IP Status page is shown in Figure 23. 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.

Figure 23—TCP/IP Status Page



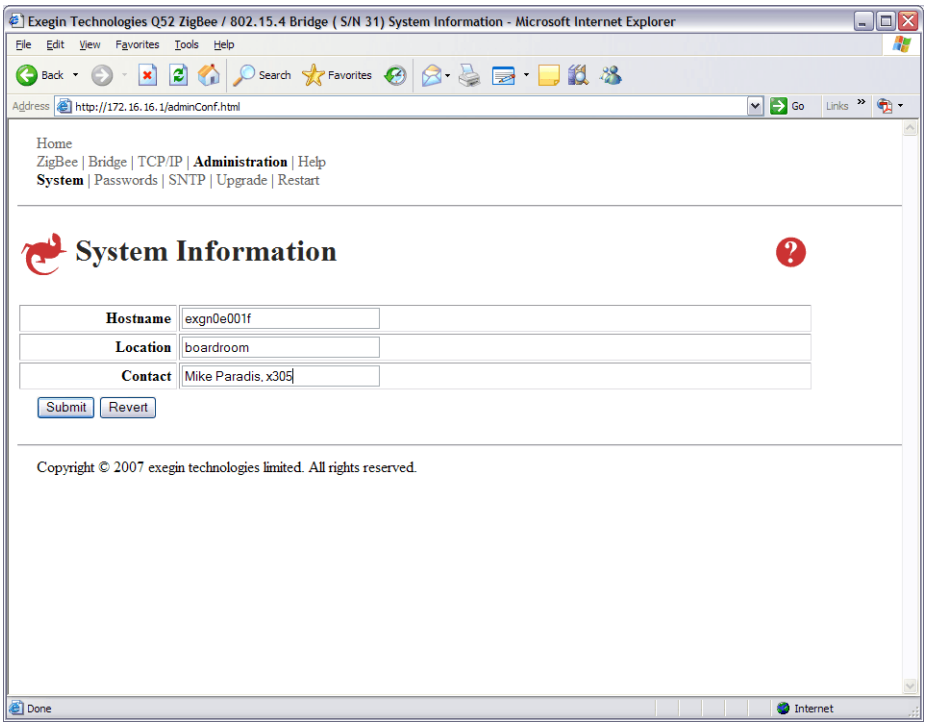
Administration Forms

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 24. It facilitates administration of general device-related settings.

Figure 24—System Information Form



Hostname, Location, Contact

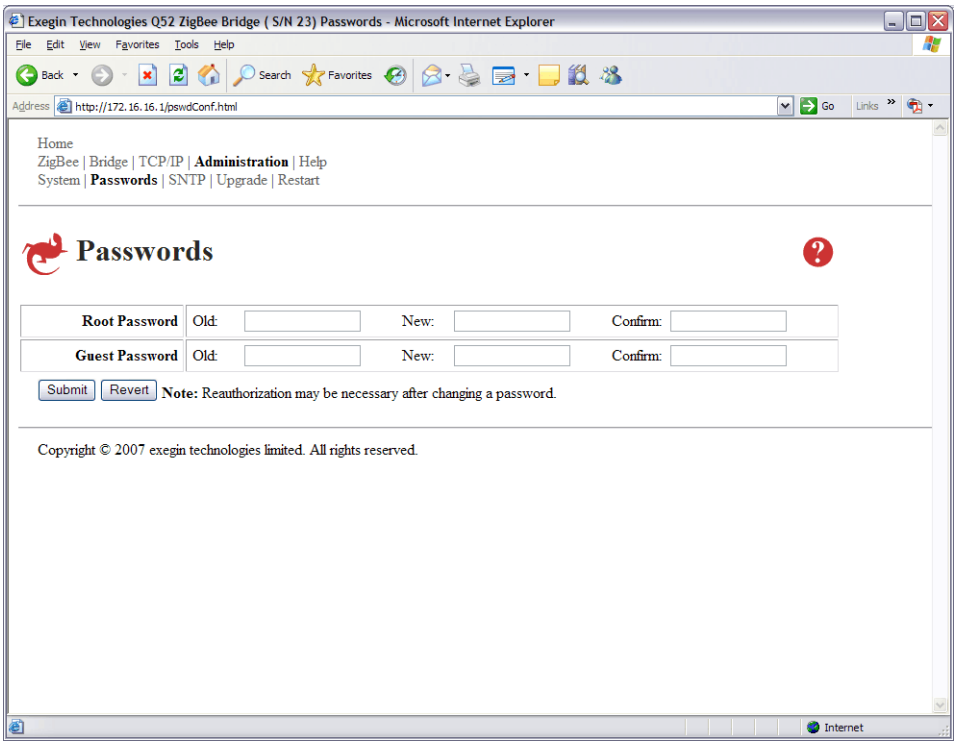
Free format fields for user. A host namefor the Zigbee gateway device, its location and contact information for support can be entered in these fields and they will appear on the Q53 home page.

Default: Unconfigured (blank).

Password Form

The Password administration form is shown in Figure 25.

Figure 25—Password Form



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.

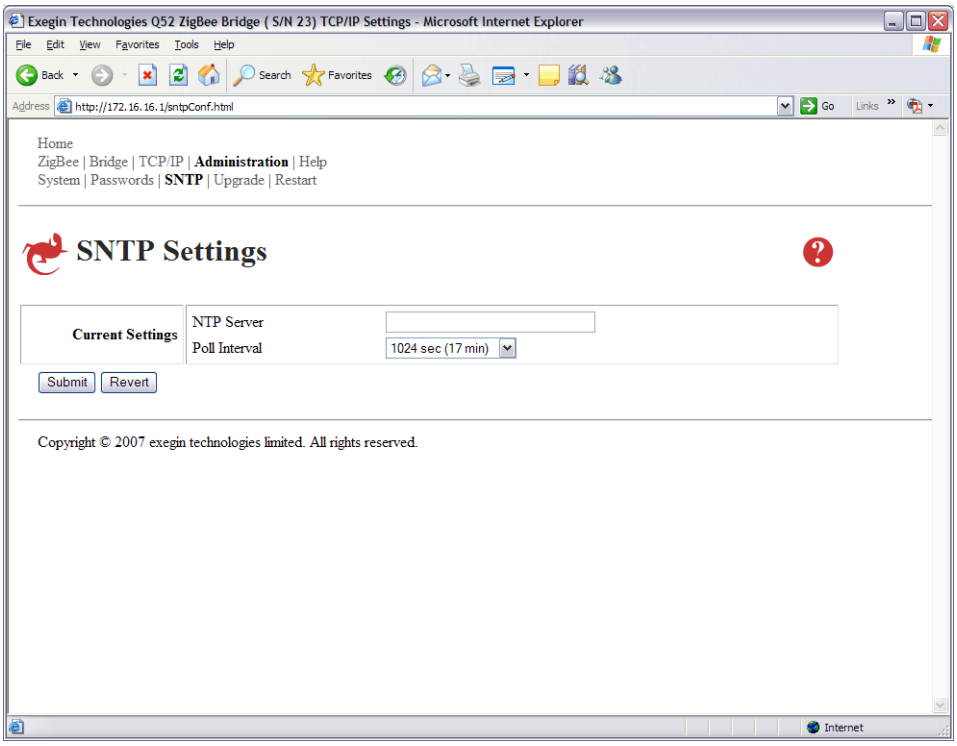
Settings can only be altered by a user with root privileges; guest users can only view settings. Both types of users can be assigned passwords. To change a password, type the old password in the "Old" field. Then type the new password twice: once in the "New" field and once in the "Confirm" field.

Default: Blank passwords for root and guest users.

SNTP Settings Form

the SNTP Settings Form (Figure 26) facilitates configuration of the Simple Network Time Protocol (SNTP) client in the Q53. SNTP is used by the Q53 to synchronize its local time-of-day clock with that of a central server.

Figure 26—SNTP Settings Form



NTP Server

The NTP Server field specifies the IP address of the NTP server from which the Q53 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

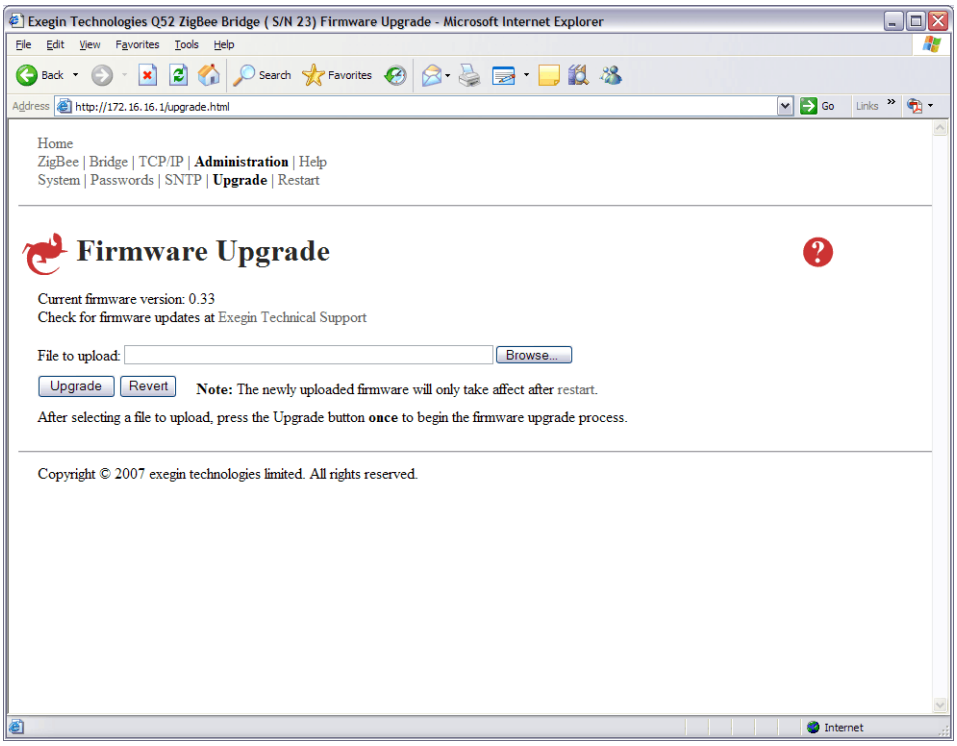
The Poll Interval combo box facilitates selection of the desired NTP polling interval. A range of values between 1 and 17 minutes may be selected.

Default: 1024 Sec (17 minutes).

Firmware Upgrade Form

The Firmware Upgrade Form (Figure 27) facilitates uploading of new firmware to the Q53.

Figure 27—Firmware Upgrade Form



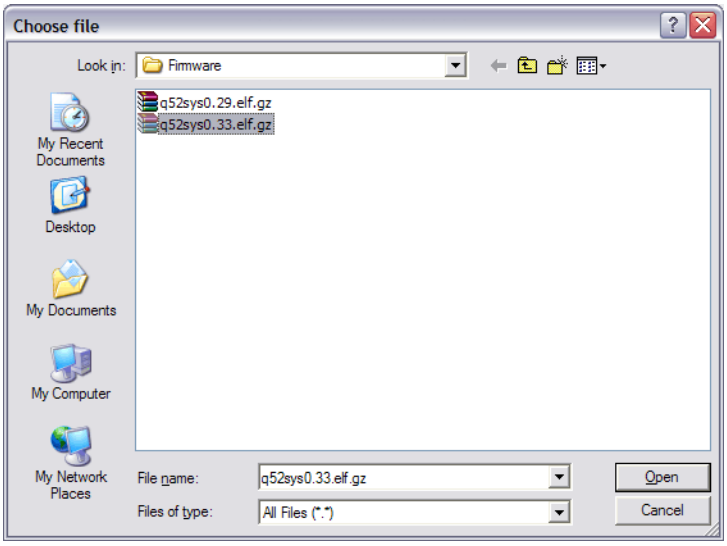
The firmware upgrade procedure uploads a new firmware image from your workstation into the flash memory of the Q53. This firmware image file must have been previously obtained from Exegin technical support personnel or downloaded directly from Exegin's web site:

`http://www.exegin.com/`

Please refer to *Contacting Exegin* on page 84 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 the 'Browse...' button will open a file selection dialog (Figure 28) which will allow you to navigate your computer's hard drive and select the firmware file interactively.

Figure 28—Firmware File Selection Dialog

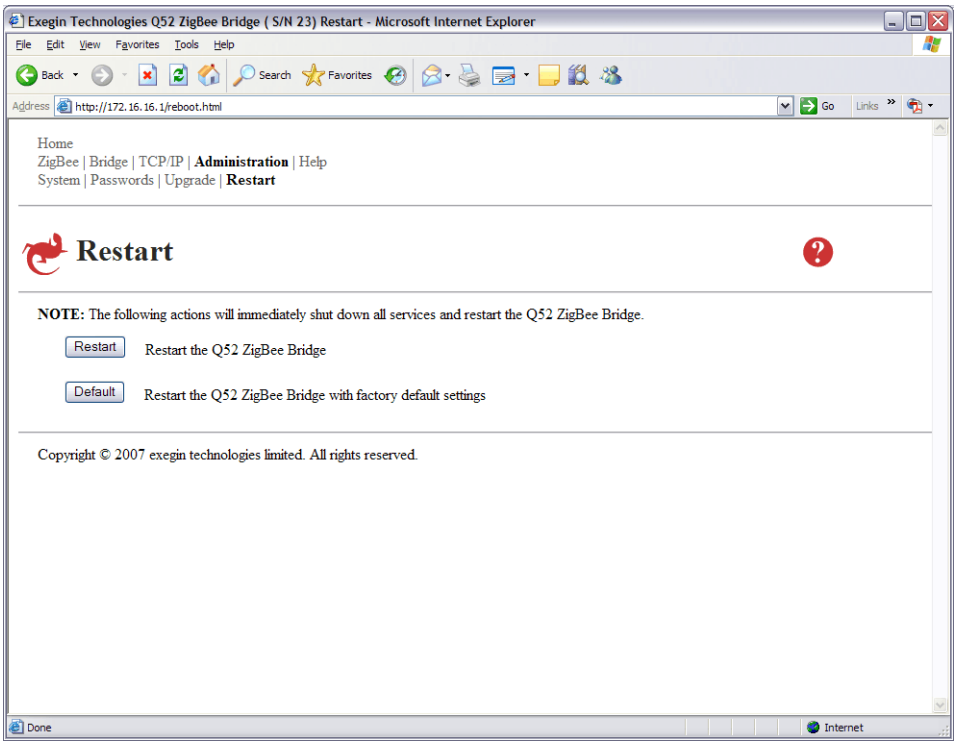


Upgrade Once the file location has been specified, clicking the ’Upgrade’ button will cause the selected firmware file to be uploaded to the Q53.

Restart Page

The Restart page (Figure 29) allows you to restart the Zigbee gateway device with one of two options.

Figure 29—Restart Page



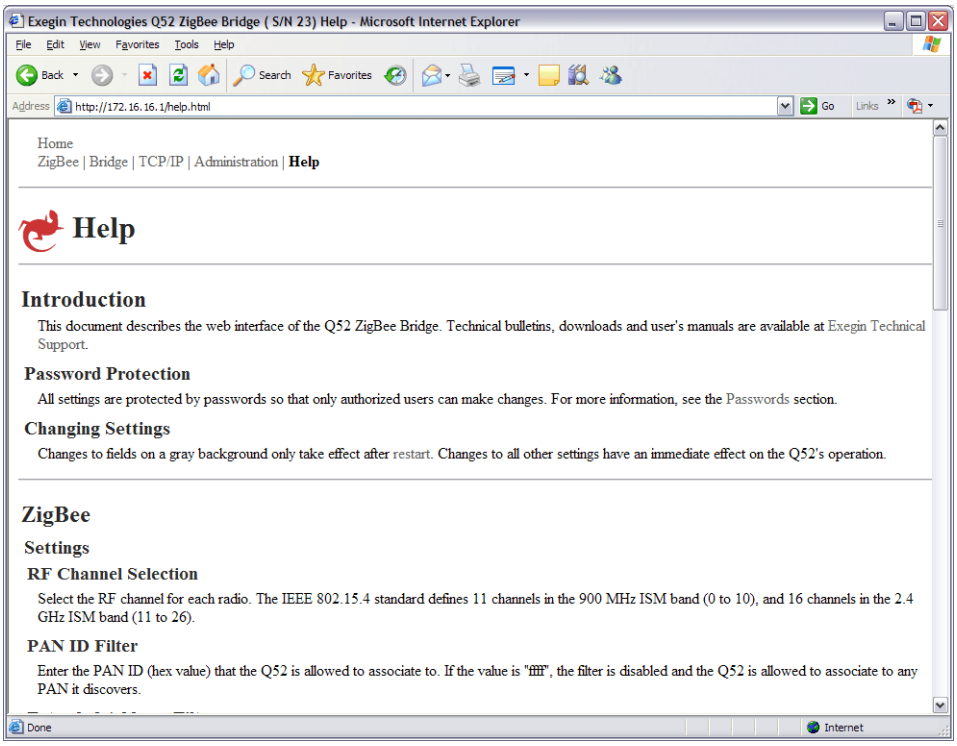
Restart Restart the Zigbee gateway device with any new settings that have been configured or changed in these forms.

Default Restart the Zigbee gateway device with the factory default settings.

Help Page

Selecting "Help" from the main menu opens the Help information page (see Figure 30) 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.

Figure 30—Help Page



9 REFERENCE INFORMATION

This chapter describes some of the most common features of the Q53 including:

- *Q53 Command Line Interface Shell* on page 62: a description of the built-in command line interface shell, along with a table of the most common commands
- *Complete Command Reference* on page 64: syntax and descriptions of all commands available in the command line interface shell
- *Q53 Naming Scheme* on page 70: important predefined names
- *User Accounts and Permissions* on page 70: logging in as a "root" or "guest" user
- *Resetting to Factory Defaults* on page 70: how to reset the unit to factory default settings
- *Performing Firmware Upgrades* on page 71: a complete overview of the Flash upgrade procedure.

Q53 Command Line Interface Shell

Within the Q53, the command line interface shell is built into the firmware. It allows you to manipulate objects such as sntp, and sysinfo 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 Q53.
Telnet Session	Opening a Telnet session with the Q53 allows you to log into the device and access the command line interface shell. (e.g. "**`telnet 192.168.11.9`**")

Main command prefixes

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

`store` change settings stored in Flash. When the "**`store`**" prefix is used, the Q53 must be restarted to apply the changes to the system. Since "**`store`**" affects Flash settings only, the Zigbee gateway 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 Q53 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 Q53's IP address and the user is **root**.

Getting command help

The Q53'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 64.

Table 3—Common Commands

Command Syntax	Description
`store net addr` ***`IPaddress`***	Store the IP address for the Q53.

Table 3—Common Commands

Command Syntax	Description
store net mask *netmask*	Store the subnet mask for the Q53.
store net gateway *routerIPaddress*	Store a default router/gateway for the Q53 to forward remote packets to.
store net ipconfig bootp	Disable DHCP requests for IP addresses and enables bootp
list net	List the current TCP/IP network settings.
list sysinfo	List current system information for the Q53.
save	Save all current settings to Flash.
reset	Reset the Q53.
ping *IPaddress*	"**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 Q53 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 *Q53 Command Line Interface Shell* on page 62 for information on accessing these commands

- *List commands* on page 65
- *Set commands* on page 66
- *Store commands* on page 67
- *Miscellaneous commands* on page 68.

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 all**" to view the factory default settings.

Table 4—List Command Options

Command Syntax	Description
list all	List all current settings.
list bdl	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.
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 Q53.
list dhcp	Display the current status of the DHCP client in the Q53. 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.
list 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).
list sysinfo	List the current Q53 system information (e.g. contact name and protocol stacks enabled).
list user	List the current user definitions (e.g. user names and types).
list uptime	List the time the unit has been powered up since the last power cycle. (e.g. "Uptime: 12 days, 22:50:23").
list zigbee	List all current ZigBee settings (e.g. RF channel selections, PAN ID filter and Extended Address Filters).

Set commands

These commands alter the current or working settings in memory only. They will be lost if the Q53 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
set sysinfo hostname *hostname*	Set a hostname for use with DDNS. For example: **set sysinfo hostname Q53Plan2**
set sysinfo contact *contactname*	Set a person or department to contact in case of Zigbee gateway bridge device trouble. For example: **set sysinfo contact HelpDeskx255**
set sysinfo location *newname*	Set a descriptive name defined by ***newname*** for the Q53 for identification purposes. This is not used in the operation of the Zigbee gateway bridge device in any way. For example: **set sysinfo name southwall_level2**
set sysinfo from default	Set all sysinfo settings back to factory defaults.
set user passwd *username password*	Assign a ***password*** to a defined user on the Q53. This ***password*** must be less than eleven characters. The ***username*** 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 dipswitchs to restore settings to factory defaults. See *Resetting to Factory Defaults* on page 70.
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.

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 net addr *IPaddress*	Store a static IP address for the Q53. For example: **store net addr 192.168.11.9**
store net dns *domainName*	Store the IP address of the Domain Name Server (DNS) for the Q53. For example: **store net dns 192.168.1.254**
store net domain *domainName*	Store the domain name suffix for the Q53. 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 ipconfig dhcp|bootp|static	Change the way the IP address is assigned upon bootup. Default is DHCP. Enter the command for alternative configuration option; otherwise it is enabled. For example: **store ipconfig static**
store net route add default *routerIPaddress*	Store a default router/gateway defined by ***routerIPaddress*** so the Q53 knows where to direct packets destined for another subnet. For example: **store net route add default 192.168.11.1 1**

Table 6—Store Command Options

Command Syntax	Description
store net mask *netmask*	Store the subnet mask for the Q53. For example: **store net mask 255.255.255.0**
store net rxwin *packets*	Determine the receive window size for the Q53. Usually the ***packets*** value ranges from 2-8 with the lower number allowing for more simultaneous TCP connections with the Zigbee gateway bridge device. For example: **store net rxwin 2**

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.
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.

Table 7—Miscellaneous Commands

Command Syntax	Description
ping [-s] ***hostIPaddress*** **[datasize [packetnumber]]**	"**ping**" another TCP/IP host, specified by *hostIPaddress*, on the network. *datasize* is the datagram packet size which defaults to 64 bytes if no size is included in the syntax and *packetnumber* is the number of requests to be sent. To use a host or IP name instead of the address, you must have set the DNS server on the Q53. Use the command "**set sysinfo dns...**" to do this. For example: **ping 192.168.11.30**
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, user, and sntp 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.

Q53 Naming Scheme

The Q53 always follows this naming scheme:

exgnxxxxx	A default name of ‘exgn’ is followed by "*xxxxx*", the serial number found on the bottom of the Zigbee gateway bridge device. For example: exgn00091

User Accounts and Permissions

When you log into the Q53, 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 Q53. However, they can use **ping** and **telnet** as well.

Use *list user* on page 65 to look at current user definitions. Use *set user passwd* `username password` on page 66 to see how the **root** user can change these settings.

Resetting to Factory Defaults

Sometimes it is beneficial to return the Q53 to its factory default state. For example, if you are having problems communicating with the Zigbee gateway 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, *Q53 Dipswitch Settings*, on page 15. This is the Factory Settings mode
2. Restart the unit by cycling the power off, then on.

You now have the Q53 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 Q53 to configure certain settings. Here are some common examples of steps taken when the device is in a default state:

1. **Forgotten Password**

   If you have forgotten a password set on the Q53, 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, *Q53 Dipswitch Settings*, on page 15.

3. **Set dipswitches for normal operation.**

   Set dipswitch 1=off and 2=off. See Table 2, *Q53 Dipswitch Settings*, on page 15.

Performing Firmware Upgrades

Since the Q53's firmware is stored in Flash ROM, upgrading is easy. Using a computer with a web browser on a TCP/IP network, the Zigbee gateway bridge device can be upgraded to a newer firmware version without needing new hardware. Please refer to *Firmware Upgrade Form* on page 57 for step-by-step instructions on how to load new firmware into the Q53.

Firmware File

The latest firmware file is always available at Exegin's web site, "**`http://www.exegin.com/`**" or it can be ordered through Exegin Technical Support. Please see *Help Methods Available* on page 84 for further information.

10 Extra Features/Additional Information

This chapter provides information about additional features available with the Q53.

- *General Options* on page 72: miscellaneous Zigbee gateway device options
- *Q53 Security* on page 72: how to use the Q53's built-in security features as well as taking advantage of your Network's security features.

General Options

Manipulating the Q53's UTP Interface

You have some control over the UTP interface and its properties on the Q53.

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 Q53 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 65. To manipulate the UTP interface, please see *store ifc* in Table 6 on page 67.

Remotely Managing the Q53

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,

Q53 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 Q53's command set and manipulate the settings.

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

Users and Passwords

The Q53 supports two users:

root Access to everything within the Zigbee gateway 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 Q53's configuration. Guest users cannot alter the Zigbee gateway device's configuration in any way.

To configure the root password on your Q53, you will need to:

HTML Method

1. Load a Web browser on a network station that can communicate with the Zigbee gateway device over TCP/IP.
2. Direct your Web browser to URL "***`http://Q53IPaddress/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 Restart page and click on "Restart" to apply the new settings to your system.

Manual (Telnet) Method

1. Start a Telnet session with the Q53. Type:

   `telnet` ***`Q53IPaddress`***
2. Login to the Q53 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:

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

From this point on, anytime you log in to the Q53 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
```

11 Q53 REGULATORY INFORMATION

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.
- 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.

Radio Frequency Notifications

FCC Notifications

RF Radiation

The Q53 is an intentional radiator of Radio Frequency (RF) energy. In order to limit RF exposure to personnel in the immediate area, the Q53 should be located and installed such that a separation of at least 20 centimeters is maintained between the Q53'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.

- Pulse Electronics Corporation: Part no. W1030
- Phoenix Contact: Part no 2885867

CE Mark Conformity

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 60950 Safety
- EN 300 328 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: ESD precautions should be used when attaching or removing the antenna.

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.

Canada Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

France 2.4 GHz Bande : les canaux 10, 11, 12, 13 (2457, 2462, 2467, et 2472 MHz respectivement) sont complétement libres d'utilisation en France (en utilisation intérieur). Pour ce qui est des autres canaux, ils peuvent être soumis à autorisation selon le department. 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.

Figure 31—Q53 Declaration of Conformity

Declaration of Conformity

We, Exegin Technologies Limited, Manufacturer / Importer, 401 – 2071 Kingsway Avenue, Port Coquitlam, BC, V3C 6N2, Canada

hereby declare that under sole responsibility the following equipment:

- Q51 ZigBee 802.15.4 Transceiver
- Q52 ZigBee Bridge Device
- Q53 ZigBee Gateway Device

is in conformity with the provisions of the following EC Directives, including all amendments, and with national legislation implementing these directives:

European Council Directive 1999/5/EC

and that the following harmonized standards have been applied:

RF: EN 300 328 v1.7.1 (2006-10)

EMC: EN 301 489-01 v1.8.1 (2008-04)

EN 301 489-17 v2.1.1 (2009-05)

Electrical Safety: EN 60950-1:2006

Full name and identification of the person empowered to sign on behalf of the manufacturer:

Name	Title
Fred Fierling	Director

Signature	Date	Place
	2009/10/20	Port Coquitlam

401 - 2071 kingsway avenue | port coquitlam | bc | canada | v3c 6n2 | t +1.604.468.2552 | f +1.604.468.2445 | www.exegin.com

12 Q53 SPECIFICATIONS

Hardware and software specifications are described in this chapter.

Hardware specifications are covered in the following sections:

- *Physical Features* on page 79
- *Electrical Details* on page 80
- *Q53 LEDs* on page 81
- *Network Interfaces* on page 82

Software Specifications are covered in the following sections:

- *Standards supported* on page 83
- *TCP port numbers used on the Q53* on page 83
- *UDP port numbers used on the Q53* on page 83
- *Error conditions* on page 83
- *Internal errors such as bus errors, address errors or illegal instructions force the Q53 into this non-operational mode.* on page 83.

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

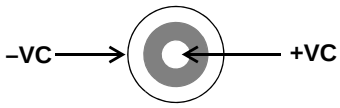
95% maximum humidity, non-condensing.

Electrical Details

Power socket

Figure 32 shows the power socket on the Q53 side panel.

Figure 32—Power Socket

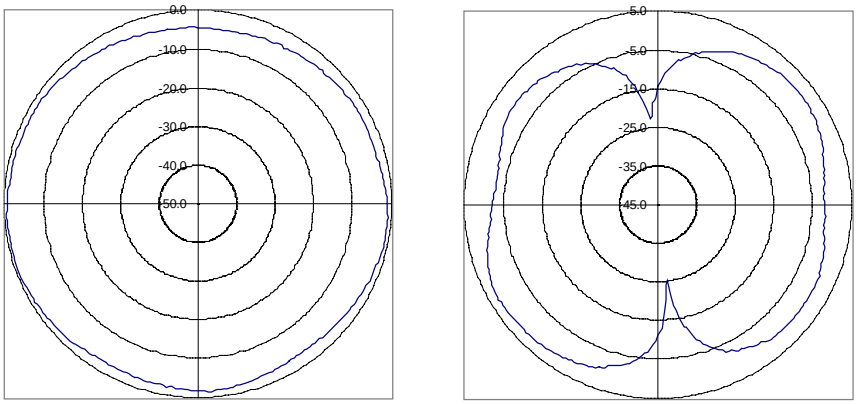


Power supply options	External transformer available in 120V/60Hz or 220-240V/50Hz.	
Power supply requirements	Typical	120VAC +/- 10% 35mA, 60Hz 240VAC +/- 10% 18mA, 50/60Hz
	Maximum	120VAC +/- 10% 40mA, 60Hz 240VAC +/- 10% 20mA, 50/60Hz
DC power requirements	Voltage	4.5-6.0 VDC regulated
	Current, Typical	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	

Antenna Radiation Pattern

Figure 33 shows the radiation pattern of the standard antenna supplied with the Q53.

Figure 33—Antenna Radiation Pattern



Azimuth Elevation

Q53 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 Q53. Auto-reset mode is entered when the watchdog timer is triggered and the Zigbee gateway 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

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

Table 10—RF 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 Q53 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 11 shows the pinout for the UTP (RJ45) connector.

Table 11—UTP (RJ45) Connector Pinout

Pin	Signal	Source	Pin	Signal	Source
1	TX_D1+	Q53	5	BI-D3-	Q53
2	TX_D1-	Q53	6	RX_D2-	Network
3	RX_D2+	Network	7	BI_D4+	Network
4	BI-D3+	Q53	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
TCP	Transmission Control Protocol
TELNET	Telnet Protocol
UDP	User Datagram Protocol

TCP port numbers used on the Q53

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

UDP port numbers used on the Q53

514	SYSLOG client support
68	DHCP client port
17755	SCoP ZigBee Bridge Device Protocol

Error conditions

Firmware panic Unrecoverable errors detected by the Q53 firmware force it into panic mode. Manually reset the Q53 to resume normal operation.

Watchdog halt The watchdog timer is a hardware device that resets the system if not serviced regularly by the CPU. It's 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 Q53 will auto-reset up to 16 times before entering non-operational Watchdog Halt.

Spurious halt Unsupported interrupts force the Q53 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 Q53 into this non-operational mode.

13 GETTING HELP

This chapter identifies other sources of Help for installing and configuring your Q53 ZigBee / 802.15.4 Gateway 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 Support page that contains the technical bulletins and firmware and software histories and files.

Contacting Exegin

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

- Q53 serial number found on the bottom of the Zigbee gateway device.
- Description of your network environment and peripherals attached.
- Description of the problem.

Contact options

Email "**support@exegin.com**"

Call **+1 604 468-2552 x637**.

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.
- 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 Q53 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 34:

Figure 34—Sample Commercial Invoice

COMMERCIAL INVOICE from
Leslie Smith
ABC Corporation
1234 Western Parkway
Anycity, NC
USA, 27511

DATE OF EXPORT: 22/02/96

AIR WAYBILL NO: 123-12341234

CONSIGNEE:
Exegin Systems Ltd.
401- 2071 Kingsway Avenue
Port Coquitlam, B.C.
V3C 6N2, Canada

IMPORTER (if other than consignee)
same as consignee

COUNTRY OF ORIGIN: Canada

# OF PKGS	**DESCRIPTION**	**QTY**	**TOTAL VALUE**
1	Ethernet Zigbee gateway device	1	100.00

REASON FOR RETURN: warranty repair

I declare all information contained in this invoice to be true and correct.

_____ Leslie Smith 24/03/2002

SIGNATURE **NAME** **DATE**

14 GLOSSARY

ARP	*Address Resolution Protocol.* 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.
DHCP	*Dynamic Host Configuration Protocol.* 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	*Electronically-Erasable, Programmable Read-Only Memory.* Preserves data after power is removed. Also known as Flash memory.
Factory defaults	Zigbee gateway device settings shipped with the Q53.
Flash	Permanent memory in the EEPROM. Stores firmware code and configurable settings. Allows for upgrades without replacing hardware inside the Q53.
FTP	*File Transfer Protocol.* 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 Q53 ZigBee / 802.15.4 Gateway Bridge.
HTML	*HyperText Markup Language*. Format used for documents viewable on the World Wide Web.
HTTP	*HyperText Transport Protocol.* Protocol used for the delivery of web pages.
IEEE	*Institute of Electrical and Electronics Engineers.*
Ifnum	*Interface Number.* Represents the network interface. This will be "1" for an Ethernet network.
Netmask	see *subnet mask.*
PAN	*Personal Area Network*. A wireless network made up of ZigBee wireless devices communicating under control of a ZigBee Coordinator device.
PDF	*Portable Document Format.* 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. "**`ping 192.168.11.9`**")
RAM	*Random Access Memory.* Volatile memory within the Q53 that contains current/working settings. Settings are lost once the power is removed.
RARP	*Reverse Address Resolution Protocol.* 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	*Radio Frequency.* 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 *Default Router.*
Serial number	Number found on the bottom of the Q53. Each Q53 is assigned a unique serial number.
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	*Transmission Control Protocol/Internet Protocol.* 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.
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/*