≋ ECHELON®

i.LON® 100 e3 User's Guide

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Welcome

This document describes how to configure the *i.*LON 100 *e3* Internet Server, and how to use its applications in control and data networks.

Related Documentation

The documentation for the *i.*LON 100 server is provided as online Adobe Acrobat PDF files and Windows help files. The *i.*LON 100 documentation consists of the following manuals:

- *i.LON 100 e3 Hardware Guide*— Describes how to assemble and wire the *i.*LON 100 server hardware.

- *i.LON 100 e3 Programmer's Reference*—Describes how to configure the *i.*LON 100 using XML files and SOAP calls. This allows you to create your own applications you can use to configure the *i.*LON 100 server.

- *IP-852 Channel User's Guide*—Describes how to configure an IP-852 channel with the Echelon LONWORKS®/IP Configuration Server. You will need this information if you plan to use the *i.*LON 100 server as an IP-852 router.

The following additional documents may be useful if you are using certain features of the i.LON 100. You can download these documents from Echelon's Web site at www.echelon.com.

- *LonMaker® User's Guide*—Describes how to use the LonMaker tool, which can be used to install the *i.*LON 100 server in a LONWORKS network.

- *LNS® Programmer's Guide*—Describes how to write LNS applications that can take advantage of the communication provided by the *i.*LON 100 server.

- *OpenLDV™ Programmer's Guide, xDriver Supplement* — Describes how the xDriver software can be used by an LNS or OpenLDV application to manage communications with multiple LONWORKS networks over a TCP/IP network. The xDriver software is used to communicate with the *i.*LON 100 server when it is functioning as a Remote Network Interface (RNI).

What's Included with the *i.*LON 100 Server

The *i.*LON 100 server includes the following components:

- *i.LON 100 Device*—There are eight models of the *i.*LON 100 Internet Server. There are versions for TP/FT-10 free topology and PL-20 power line; versions with or without a built-in analog modem; and versions with or without IP-852 routing enabled. You can also purchase an IP-852 activation key for i.LON 100 e3 servers that do not already have IP-852 routing enabled. The inputs and outputs of each model are slightly different, as noted in the *i.*LON *100 e3 Hardware Guide*.

- *i.LON 100 Quick Start Guide* — This document describes how to connect the *i.*LON 100 hardware, and how to configure the *i.*LON 100's IP information using the *i.*LON 100 Web pages.

- *i.LON 100 CD* — This CD contains the installation software for the *i.*LON 100 server, as well as the installation software for LNS 3 Service Pack 7, Update 1, and LonMaker 3.1 Service Pack 2, Update 1.

Hardware Requirements

Hardware requirements and recommendations for the computer running the *i.*LON 100 software are listed below:

- Pentium II 600 MHz or faster

- 128-MB RAM minimum

- 70 MB free hard disk space

- CD-ROM drive

- Super VGA (800 × 600) or higher-resolution display with 256 colors

- Mouse or compatible pointing device

Software Requirements

Software requirements for computers running the *i.*LON 100 software are listed below:

- Microsoft® Windows® XP, Windows 2000, or Windows Server 2003. Echelon recommends that you install the latest service pack available from Microsoft for your version of Windows. Screen resolution 1024x768 with large or small fonts; 800x600 with small fonts only.

- LonMaker 3.1, Service Pack 2 or better and/or LNS 3.1, Service Pack 8, Update 1 or better.

- Internet Explorer 6 or higher.

- Terminal emulator, such as Windows HyperTerminal

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*i.*LON 100 *e3* User's Guide

1
Introduction

This chapter provides an introduction to the *i*.LON 100 server and its applications, as well as a roadmap to follow to get started with the *i*.LON 100 server.

Introduction

The *i*.LON 100 *e3* Internet Server is a low-cost, high-performance network interface, controller, router, and Web server that connects LONWORKS, M-Bus, and Modbus devices to corporate IP networks or the Internet. The *i*.LON 100 server features a built-in Web server that allows Web access to all the data managed by the i.LON 100 server, as well as built-in applications for alarming, scheduling, and data logging. Additionally, it includes a Web binder for bridging multiple LONWORKS domains, and it provides a SOAP/XML Web services interface for use by custom Web pages and for integration with enterprise applications. An IP-852 routing option is available, that can be ordered with new units or purchased for e3 units without routing. The *i*.LON server operates on 100 – 240 VAC and can be ordered with an optional built-in 56K V.90 analog modem. Models are available for TP/FT-10 channels and PL-20 channels.

The *i*.LON 100 server also includes built-in I/O for reading pulse meters and digital inputs, and for switching local loads. All data points and built-in I/O is accessible through either the LONWORKS or Web interfaces. The *i*.LON 100 server can be used as a Remote Network Interface (RNI), allowing remote access to the entire LONWORKS network using LNS or OpenLDV based tools, including the LonMaker® Integration Tool. It can also be used with the LonScanner™ Protocol Analyzer to capture, analyze, characterize, and display ANSI/CEA-709.1 network packets either locally or remotely via the Internet.

What's New in *e3*

The *e3* release of the *i*.LON 100 Internet Server includes the following new features:

- The *i*.LON Vision software, which works with Macromedia Contribute 3.1 to allow easy and efficient creation of custom *i*.LON 100 Web pages for creating custom monitoring and control solutions with the i.LON 100 server. You can create custom Web pages to read or write data points or view log files. i.LON Vision is described in Chapter 13, *Creating an i.LON 100 Web Page*.

- A new IP-852 ANSI/CEA-709.1-to-IP routing option that allow you to use the *i*.LON 100 server as a router on an IP-852 channel. The initial steps required to configure the *i*.LON 100 server as an IP-852 router are described in Chapter 12, *Sending ANSI/CEA-709.1 Packets Over IP with the i.LON 100 Server*. The *IP-852 Channel User's Guide* document included with the *i*.LON 100 software provides background information you will need when designing the IP-852 network and using the *i*.LON 100 server as an IP-852 router.

- Web Binder file attachment. You can send a file with a Web connection update. This make it easy to get data logs from an *i*.LON 100 server behind a firewall to a monitoring system outside the firewall. This feature is described in Chapter 10, *Web Binding.*

- Improved alarming and scheduling interfaces. The scheduling and alarming application Web pages have been updated to allow easier, quicker creation of Alarm Generators, Alarm Notifiers, and Event Schedulers. These features are described in Chapter 5, *Alarming*, and Chapter 6, *Scheduling*.

- Data Logger file compression. You can now store the CSV-formatted historical log files generated by the Data Logger application in compressed format, saving flash memory space on the *i*.LON 100 server and reducing connection time when transferring data logs through a dial-up connection. This feature is described in Chapter 7, *Logging Data*.

- Modbus driver interface. You can monitor and control Modbus devices attached to an *i*.LON 100 server. The steps required to configure Modbus server and create Modbus data points to use with the *i*.LON 100 server are described in Chapter 2, *Configuring the i.LON 100 Internet Server*.

- Astronomical Position Sensor. You can calculate the position of the sun based on your location and time-of-day. This is useful for calculating whether it is light or dark outside without using an external light-level sensor. This is used in applications such as street lighting, where lights need to come on at dusk and go off at sunrise. This feature is described in Chapter 2, *Configuring the i.LON 100 Internet Server*.

- Dynamic DNS support. Dynamic DNS allows for an Internet hostname to be assigned to a device with a varying IP address. Because the *i*.LON 100 server can be accessed from a known, non-changing hostname, it is possible for a Web service or user to access the *i*.LON 100 server without needing to track the time-varying IP address. This feature is described in Chapter 2, *Configuring the i.LON 100 Internet Server*.

- Support for LonScanner Protocol Analyzer access. You can use the Echelon's LonScanner Protocol Analyzer to monitor the traffic on the channel connected to the *i*.LON 100 server and diagnose network problems. For more information on using the *i*.LON 100 server with the protocol analyzer, see the *LonScanner Protocol Analyzer User's Guide.*

i.LON 100 Internet Server Applications

The *i*.LON 100 Internet Server provides the following capabilities, in addition to the new features described in the previous section:

- Alarming—The *i*.LON 100 server can trigger alarms based on inputs from the devices it is attached to. In response to an alarm condition, the *i*.LON 100 server can be configured to update any data point including a data point for a network variable in a LONWORKS device, Modbus device, or M-Bus device, or a data point in a Web page; log the conditions to one or more data logs; or send out emails or SOAP messages notifying recipients of the alarms and the conditions that triggered them. Alarms can be configured to shut off automatically when certain conditions are met or they can be configured to require manual clearance via a Web page.

- Data Logging—The *i*.LON 100 server can log any data point including a data point for a network variable in a LONWORKS device, Modbus device, or M-Bus device. These logs can be downloaded using the Internet File Transfer Protocol (FTP), retrieved using a SOAP/XML Web service, or displayed with the *i*.LON 100 Web pages.

- Scheduling—The *i*.LON 100 server can be used to update any data points based on the time-of-day, day-of-week, and date. These schedules can drive

the inputs to any data point including a data point for a network variable in a LONWORKS device, Modbus device, or M-Bus device.

- Digital Input/Output—The *i*.LON 100 server contains 2 built-in digital inputs and 2 built-in digital relay outputs. These can be used to monitor and control simple sensors and actuators.

- Type Translation—The *i*.LON 100 server can translate data from one data type to another. This is useful for integrating disparate devices, including devices on different networks and busses. For example, this can be used to connect an output on an LONWORKS device to an input on a Modbus device— even the data types of the two data points are different.

- Pulse Metering—The *i*.LON 100 server contains two built-in pulse metering inputs. You can configure the *i*.LON 100 server to count pulses or to measure the pulse frequency from pulse output devices.

- Analog Function Processing—The *i*.LON 100 server contains an Analog Function Block application that you can use to perform operations on multiple analog inputs.

- Remote Network Interface—The *i*.LON 100 server can operate as a Remote Network Interface (RNI), allowing you to use it to connect an LNS or OpenLDV application on an IP network to a LONWORKS network.

- Dial-in/Dial-out Support—The *i*.LON 100 server can optionally contain a built-in modem. On these models you can configure the *i*.LON 100 server to dial-out and receive calls using the Internet Point-to-Point (PPP) communications protocol.

i.LON 100 System Limits

The following sections document the limits of the *i*.LON 100 RNI capabilities and of the applications that run on the *i*.LON 100 server.

i.LON 100 RNI Limits

The capabilities of the RNI on the *i*.LON 100 server are largely dependent on the software running on the host computer. When used as an LNS network interface, the *i*.LON 100 server has the following limits. See the *Introduction to LonWorks* document or the *LonMaker User's Guide* for more information about these limits:

- Up to 32768 address table entries.

- Up to 15 simultaneous outgoing transactions.

- Up to 1024 aliases.

- Up to 256 groups, with up to 15 used for incoming messages.

- Up to 4096 dynamic network variables.

- Output messages can be sent to up to 256 different destination addresses within each 24 second interval. Multiple messages can be sent to each of those destination addresses within the interval.

i.LON 100 Application Limits

The *i*.LON 100 application has the following limits:

- Up to 4096 address table entries.

- Up to 32 simultaneous outgoing transactions.

- Up to 1024 aliases.

- The *i*.LON 100 application can support up to 3000 dynamic network variables, but the *i*.LON 100 server will run out of memory before this limit is reached; the practical limit depends on the sizes of the defined dynamic network variables. You can check the available memory on the **System Info** Web page.

Getting Started

When you begin using the *i*.LON 100 server, follow these steps:

1. Install the *i*.LON 100 software and perform the initial setup and configuration tasks described in Chapter 2, *Configuring the i.LON 100 Internet Server.*

2. Start the *i*.LON 100 Web pages, or the *i*.LON 100 Configuration Plug-In. These tasks are described in Chapter 3, *Configuring the i.LON 100 Applications.*

3. Create the data points for the devices you want to use with the *i*.LON 100 server have been created. For more information on data points, see Chapter 4, *Creating Data Points.*

4. Configure the applications you want to use. Chapters 5-12 of this document describe the various applications of the *i*.LON 100 server.

5. Create custom Web pages for monitoring and controlling your devices. You can use i.LON Vision to create custom Web pages as described in Chapter 13, *Creating an i.LON 100 Web Page*.

Table 1.1 describes the remaining chapters of this document in more detail.

Table 1.1 Document Roadmap

Chapter	Description
Chapter 2, *Configuring the i.LON 100 Internet Server*	Describes how to install the *i*.LON 100 software and the initial steps you should take to configure the *i*.LON 100 server before using any of its applications. This chapter also describes how to upgrade an *i*.LON 100 server running on the previous version of the *i*.LON 100 software to *e3.*

Chapter	Description
Chapter 3, *Configuring the i.LON 100 Applications*	Provides an overview of the tools you can use to configure the *i*.LON 100 server: *i*.LON 100 Web pages and the *i*.LON 100 Configuration Plug-In. **You should use the Web pages to configure your *i*.LON 100 server whenever possible.** However, there are some cases where you might need to use the Configuration Plug-In. This chapter describes those situations.
Chapter 4, *Creating Data Points*	This chapter describes how to create data points you can use to monitor and control the devices on your network with the various applications of the *i*.LON 100 server.
Chapter 5, *Alarming*	This chapter describes how to use the *i*.LON 100 alarming applications. This includes the Alarm Generator functional block, which you can use to generate alarms based on monitored conditions, and the Alarm Notifier functional block, which you can use to send emails and update data points based on alarm conditions.
Chapter 6, *Scheduling*	This chapter describes how to use the *i*.LON 100 scheduling applications to create an Event Scheduler. You can use Event Schedulers to schedule daily, weekly and monthly updates to the data points on your network.
Chapter 7, *Logging Data*	This chapter describes how to use the Data Logger application to save network data in logs files, and how to view the logs.
Chapter 8, *Using Pulse Counter Inputs*	This chapter describes how to use the *i*.LON 100 server's Pulse Counter to measure electrical energy, volume, rate or flow, or power.
Chapter 9, *Using Digital Inputs/Digital Outputs*	This chapter describes how to use the *i*.LON 100 server's two digital inputs and two digital outputs
Chapter 10, *Web Binding*	This chapter describes how to create Web connections with the *i*.LON 100 server. Web Binding is a process by which you can connect data points on your *i*.LON 100 server directly to data points on another *i*.LON 100 server or to a third party Web service application or Web server such as Apache® or IIS®, and keep the values of those data points synchronized.
Chapter 11, *Type Translators and Analog Function Blocks*	This chapter describes the Type Translator and Analog Function Block applications. You can configure these applications with the Configuration Plug-In, but not with the *i*.LON 100 Web pages.

Chapter	Description
Chapter 12, *Sending ANSI/CEA-709.1 Packets Over IP with the i.LON 100 Server*	This chapter describes how to configure the *i.*LON 100 server as a remote network interface (RNI), which allows you to use the *i.*LON 100 server as a LONWORKS network interface, and connect to an LNS or OpenLDV application, and how to configure the *i.*LON 100 server as an IP-852 router.
Chapter 13, *Creating an i.LON 100 Web Page*	This chapter describes how to create custom Web pages for the *i.*LON 100 server using *i.*LON Vision and Macromedia Contribute.
Appendix A, *Troubleshooting*	This appendix describes how to diagnose and resolve problems that may occur during the installation and operation of the *i.*LON 100 server.
Appendix B, *Managing the i.LON 100 Server*	This appendix describes how to reboot the *i.*LON 100 server, how to restore the default manufacturer settings to the *i.*LON 100 server, how to view *i.*LON 100 system information, and how to backup and restore the configuration of the *i.*LON 100 server.
Appendix C, *i.LON 100 Console Application*	This chapter describes how to use the *i.*LON 100 server's console application, which you can use to reboot the *i.*LON 100 server and perform other tasks that may be necessary, such as updating the bootrom.
Appendix D, *Web Server Parameters Utility*	This appendix describes how to use the *i.*LON 100 Web Server Parameters utility to add security to your custom Web pages.
Appendix E, *Creating a Web Page Using Web Tags*	This appendix demonstrates how to create Web pages that serve Web page values using web tags. You should use the *i.*LON Vision software to create Web pages for the *i.*LON 100 server, since web tags will not be supported in future releases of the *i.*LON 100.
Appendix F, *i.LON 100 Software License Agreement*	This appendix includes the software license agreement for the i.LON 100 e3 software.
Appendix G, *Software License Transfer Agreement*	This appendix includes an agreement that you can use to transfer an i.LON 100 software license to another organization.

2

Configuring the *i.*LON 100 Internet Server

This chapter describes how to install the *i.*LON 100 *e3* software, and the initial steps you should take to configure the *i.*LON 100 server before using any of its applications. It also describes how to upgrade an *i.*LON 100 server running the Release 1 or *e2* software to use the *e3* software.

Installing the *i*.LON 100 Software

To use the *i*.LON 100 Configuration Plug-in, you must install the *i*.LON 100 software. Follow the steps below to install the *i*.LON 100 software. Note that in order to access the *i*.LON 100 Web pages, you must have Internet Explorer 6 or later.

1. If you are using an LNS application, verify that you have LNS 3 SP 8 Update 1 (or later). If you are using the LonMaker Integration Tool, verify that you have LonMaker 3.1 SP3 Update 2 (or later). These patches are available on the i.LON 100 CD-ROM, in the following locations:

   LNS 3 SP8   `\LNS SP8 xDriver\Lns3sp8_5a.exe`
   LNS 3 SP8 Update 1   `\LNS SP8 xDriver\Lns3sp8u1.exe`
   LonMaker 3.1 SP3   `\LMW 3.1 SP3\lmw313.exe`
   LonMaker 3.1 SP3 Update 1   `\LMW 3.1 SP3\lmw313U1.exe`
   LonMaker 3.1 SP3 Update 2   See step 3.

   These patches must be installed in the order they are listed above.

   If you have a version of the LonMaker tool prior to Release 3.1 you must first update to LonMaker 3.1. This will bring your computer up to the latest revisions of LonMaker and LNS software. The latest service packs for LNS and the LonMaker tool are available at www.echelon.com/downloads. You can also install LonMaker 3.1 Service Pack 3 Update 2 from the main installation window described in step 3 of this procedure.

   You can verify that you have the correct versions of all software installed by clicking on the LonMaker Design Manager's title bar and selecting **About Echelon LonMaker**. This dialog should appear as shown in Figure 2.1.
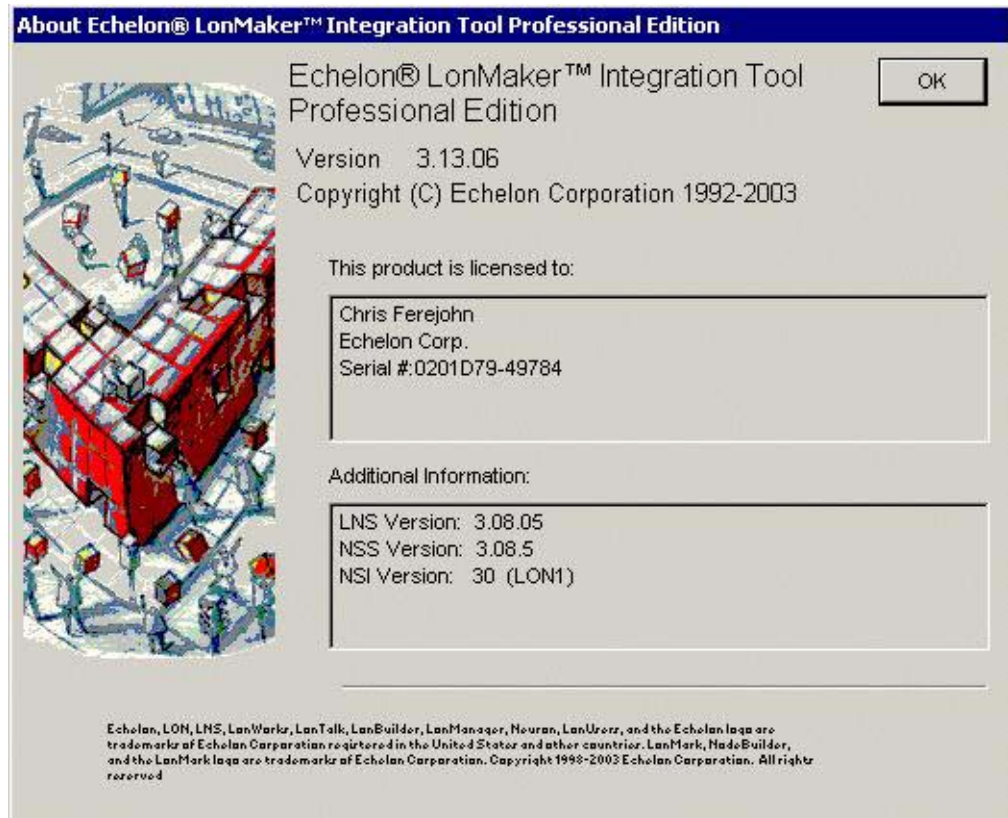
Figure 2.1 LonMaker Network Integration Tool Dialog

2. Verify that you have Internet Explorer 6, SP 1 (or later) installed on your computer. You can install Internet Explorer 6, SP 1 from the main installation window described in steps 3 and 4 of this procedure.

3. Insert the *i*.LON 100 e3 CD. The *i*.LON 100 e3 window should appear. If it does not, open the root directory of the *i*.LON 100 CD and double-click `Setup.exe`.

4. Click **Install Products** to open the Install Products window.

5. To install the *i*.LON 100 software, select **Echelon *i*.LON 100 *e3* Software** and then follow the on-screen installation prompts to install the *i*.LON 100 software.

6. If you plan to use the *i*.LON Vision software to create custom Web pages for your *i*.LON 100 server, you need to have Macromedia Contribute 3.1 installed on your computer. You can select **Macromedia Contribute 3.1 Trial Version** to install a trial version of the software. Then, select **Echelon *i*.LON Vision Software** and follow the instruction prompts to complete the installation. **You must install Macromedia Contribute 3.1 before installing the *i*.LON Vision software.** You can install the *i*.LON Vision software later if you will be acquiring Macromedia Contribute from another source.

Connecting and Configuring the *i*.LON 100 Internet Server

After you install the *i*.LON 100 software on your computer, you will connect to the *i*.LON 100 server and perform some initial configuration tasks. To do so, follow these steps:

1. Assemble the *i*.LON 100 server, as described in the *i.LON e2 Hardware Guide*.

2. If you are upgrading an *i*.LON 100 server running on a previous version of the *i*.LON 100 software, upgrade the *i*.LON 100 server's firmware with the upgrade wizard, as described in the *Upgrading the i.LON 100 Firmware* section on page 49. This will allow you to use the new *e3* Web pages and Plug-In features.

3. If your computer is not on the same subnet as the i.LON 100 server (192.168.1.x be default), then open a Windows command prompt on your computer and issue the following command before accessing the Welcome Web page (change "192.168.1" to the appropriate prefix for your subnet):

   ```
   route add 192.168.1.0 mask 255.255.255.0 %computername%
   ```

4. Open Internet Explorer 6 and enter the address of your i.LON 100 server. By default, this is http://192.168.1.222, but you may have changed that if you are upgrading an existing i.LON 100 server. The *i*.LON 100 Internet Server Welcome Web page appears.

5. Click **Service**. You will be prompted for a user name and password. Enter your user name and password, which by default are `ilon/ilon`. Once you supply this, the Welcome Web page opens.
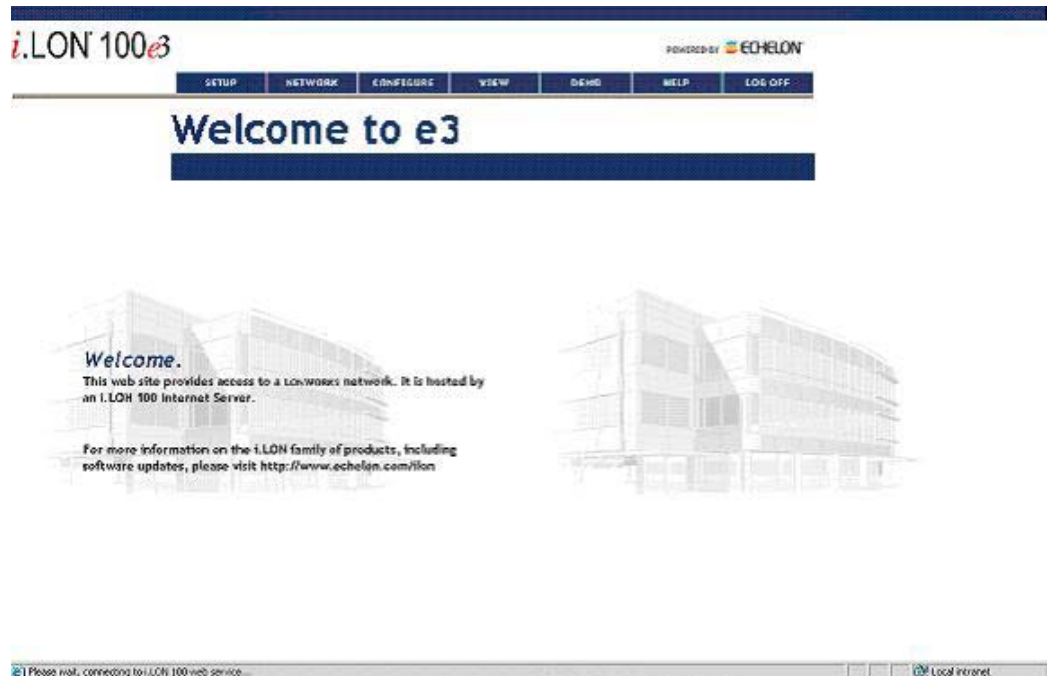
Figure 2.2 *i*.LON 100 Internet Server Welcome Web Page

6. Use the **Network - LAN/WAN** Web page to set up the *i*.LON 100 server's connections, servers, and services. For more information on the **Network - LAN/WAN** Web page, see the *Setting Up Connections, Servers, and Services* section on page 14.

7. If your *i*.LON 100 server is equipped with a modem, configure the modem with the **Configure - Modem** Web page. For more information on the **Configure - Modem** Web page, see the *Configuring Modem Settings* section on page 29.

8. Configure the LONWORKS settings for the *i*.LON 100 server with the **Network - LONWORKS** Web Page. You will need to configure these settings if you plan to use the *i*.LON 100 server as an RNI to connect an LNS or OpenLDV-based application to the LONWORKS network. You can also use this Web page to configure the NVE driver, which manages the NVE (external) data points on the network. NVE data points are data points on other devices on the network. The *i*.LON 100 server can use NVE data points to monitor those devices. For more information on this Web page, see the *Configuring LONWORKS Settings* section on page 33.

9. If you plan to use the *i*.LON 100 server as a router on an IP-852 channel, activate the router option and then configure the *i*.LON 100 server's IP-852 router settings. For more information on this, see the *Configuring IP-852 Router Properties* section on page 38.

10. Configure the *i*.LON 100 server's time settings, as described in the *Configuring Time Settings* section on page 39.

11. Configure the M-Bus and Modbus drivers with the **Network - M-Bus** and **Network - Modbus** Web pages. These tasks are described in detail in the *Configuring the M-Bus Driver* and *Configuring the Modbus Driver* sections later in this chapter.

12. Optionally, perform a security access reset on the *i*.LON 100 server and set the *i*.LON 100 server's security options. For more information, see the *i.LON 100 Server Security* section on page 55.

13. Reboot the *i*.LON 100 server. To do so, point to **Setup**, and then click **Reboot** on the menu to open the **Setup - Reboot** Web page. Click the **Reboot** button to reboot the *i*.LON 100 server. Once the *i*.LON 100 server has been rebooted, the new configuration settings will take effect.

Setting Up Connections, Servers, and Services

You can manage the connections, servers, and services used by the *i*.LON 100 with the **Network - LAN/WAN** Web page. Figure 2.3 shows the Network – LAN/WAN Web page.
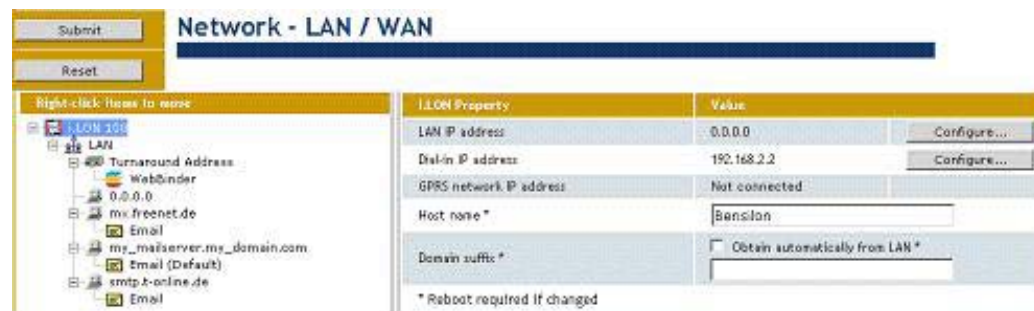
Figure 2.3 LAN/WAN Web Page

The connections tree on the left-hand side of the Web page shows the connections, servers and services that are currently defined on the *i*.LON 100 server. The top level of the tree shows *i*.LON 100 *connections*. These connections define how the *i*.LON 100 server communicates with other devices. The *i*.LON 100 server supports two types of connections:

- LAN Connection – The **LAN** connection corresponds to the *i*.LON 100 server's 10/100-BaseT Ethernet connection. This connection is always the first connection shown in the tree, and may not be removed.

- Dial-up Connections – The *i*.LON 100 server may contain any number of dialup connections below the **LAN** connection. Each dialup connection corresponds to an ISP. By default, the *i*.LON 100 server contains two sample dialup connections: Freenet and T-Online. It is good practice to delete unused connections and services that are provided as examples if they are not being used.

Each connection can have one or more *servers*. By default, the **LAN** connection has a server named **Turnaround Address**. The **Turnaround Address** server refers to the *i*.LON 100 server, and supports only the Web Binder service. For more information on the Web Binder application, see Chapter 10, *Web Binding*.

Each server can have one or more *services* that are available from the server. Each server can support one or more of the following services:

- Email (SMTP) – This service is used to send email from the *i*.LON 100 server.

- Web Binder – This service is used to bind the *i*.LON 100 server to another server.

- LNS Uplink – This service is used to communicate with an LNS Server.

- Time (SNTP) – This service is used to synchronize the time and date of the *i*.LON 100 server with a time server on the network.

- IP-852 – This optional service is used to connect the *i*.LON 100 server to an IP-852 channel.

The following sections describe how to open the LAN/WAN Web page, and begin configuring the connections, servers and services on your *i*.LON 100 server.

Configuring General LAN/WAN Properties

To configure general LAN/WAN properties such as the IP address and host name of the *i*.LON 100, follow these steps:

1. Point your mouse cursor to **Network,** and then select **LAN/WAN** from the drop-down menu. This opens the **Network - LAN/WAN** Web page.
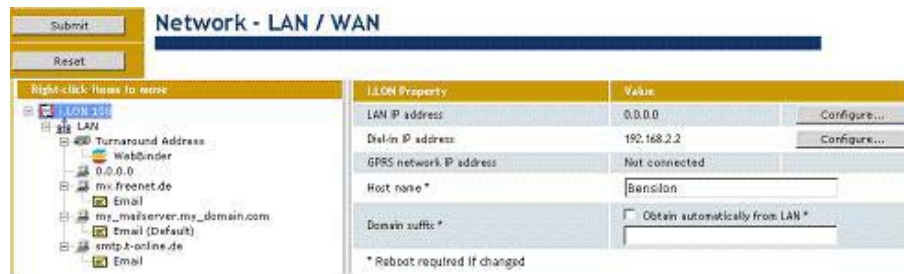
Figure 2.4 Network - LAN/WAN Web Page

2. Make sure the top level of the connections tree is selected, and then configure the properties on the Web page. Note that all fields marked with an asterisk on the Web page require a reboot for the new values to take effect. Table 2.1 describes the properties on the **Network - LAN/WAN** Web page.

Table 2.1 General LAN/WAN Properties

Property	Description
LAN IP Address	Displays the IP address of the *i*.LON 100 server used by the Ethernet LAN connection. Click **Configure** to change this address. See the *Configuring LAN Connection Properties* section below for more information on this.
Dial-in IP Address	Displays the IP address of the *i*.LON 100 server used when the *i*.LON 100 receives a phone call via the internal modem. Click **Configure** to change this address. See the *Configuring LAN Connection Properties* section below for more information on this.

Property	Description
GPRS Network IP Address	Displays the IP address used by the *i.*LON 100 server when it is connected via GPRS modem. If the *i.*LON 100 does not currently have a GPRS connection, this property displays **Not Connected**.
Host Name	Displays the TCP/IP host name of the *i.*LON 100 server. When the *i.*LON 100 server establishes a connection with an LNS Server, it provides its fully qualified host/domain name so the LNS Server knows which LONWORKS database to open.
	By default, the *i.*LON 100 server's host name is `iLON100`. The URL of the *i.*LON 100 server is the host name followed by the DNS suffix. For example, if the host name is **`ilon100Alpha`** and the domain suffix is **`ABCcorp.com`**, the URL would be **`ilon100Alpha.ABCcorp.com`**.
	Set a unique host name if you want to have the DHCP server register the host name with the DNS server, or when you want to manually register with the DNS server administrator.
	Valid characters are numbers, letters, and the hyphen ('-') character. This field has a maximum length of 19 characters. If you change the host name, you must reboot the *i.*LON 100 server for the change to take effect.
Domain Suffix	The IP domain name in which the *i.*LON 100 server's Ethernet Adapter is installed. This value is optional. Valid characters are numbers, letters, and the hyphen ('-') and period ('.') characters. This field has a maximum length of 132 characters.
	If the **Automatically Obtain IP Address** check box is selected on the **Setup - LAN/WAN** Web page (as described in the *Configuring LAN Connection Properties* section below), select the **Obtain Automatically From LAN** check box to obtain the domain suffix from the DHCP server. By default, this value is cleared. If you change this value, you must reboot the *i.*LON 100 server for the change to take effect.

3. When you have finished setting the properties on the LAN/WAN Web page, click **Submit** to save the changes you have made to this Web page. Click **Reset** to leave all fields unchanged.

Configuring LAN Connection Properties

If you are connecting your *i.*LON 100 server directly to a TCP/IP network via the Ethernet port, you must configure the LAN connection properties on the **Setup - LAN/WAN** page. To do so, follow these steps:

1. Point your mouse cursor to **Setup**, and then select **TCP/IP** from the dropdown menu. The **Setup - LAN/WAN** Web page will open with the **LAN** connection selected in the tree, as shown in Figure 2.5.
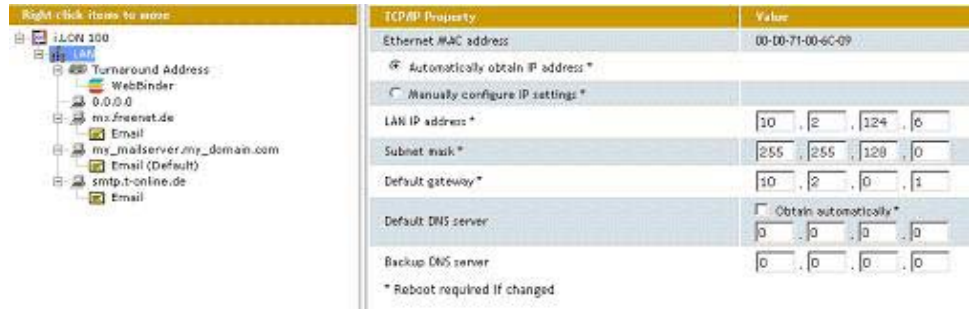
Figure 2.5 Setup – LAN/WAN Web Page

2. Configure the properties on the Web page. Note that all fields marked with an asterisk require a reboot before the new values will take effect. Table 2.2 describes the properties on the Web page.

Table 2.2 LAN/WAN Connection Properties

Property	Description
Automatically Obtain IP Address	Set this option to have the *i*.LON 100 server obtain its IP address, subnet mask, and default gateway from the local network's DHCP server. If this option is set, the user has the option of obtaining the **Domain Suffix** (on the **Network - LAN/WAN** Web page – see the previous section *Configuring General LAN/WAN Properties*) and/or **Default DNS Server** (on this page) automatically by selecting the associated **Obtain Automatically** checkboxes. If you change this value, you must reboot the *i*.LON 100 server for the change to take effect. If the DHCP server cannot be contacted, the IP **Address**, **Subnet Mask**, and **Default Gateway** will be temporarily set to 192.168.1.222, 255.255.255.0, and 192.168.1.222, respectively. As soon as the DHCP server is contacted, the *i*.LON 100 server will reboot itself to take on the new IP address. If you plan to use the *i*.LON 100 server as an IP-852 router, Echelon recommends that you assign the IP address manually to ensure that the *i*.LON 100 server uses a static IP address. See the *DHCP* section in Chapter 4 of the *IP-852 Channel User's Guide* for more information on this.
Manually Configure IP Settings	Set this option when specifying a static IP address, subnet mask, and gateway for the *i*.LON 100 server in **IP Address**, **Subnet Mask**, and **Gateway**. This option is set by default.
LAN IP Address	Static IP address used by the *i*.LON 100 server if the **Manually Configure IP Settings** option is set. If you are using a static IP address, be sure that it is not in a range reserved by a local DHCP server. By default, this value is set to `192.168.1.222`.

Property	Description
Subnet Mask	Subnet mask used by the *i.*LON 100 server if **Manually Configure IP Settings** is set. By default, this value is `255.255.255.0`.
Default Gateway	Gateway used by the *i.*LON 100 server if **Manually Configure IP Settings** is set. By default, this value is `192.168.1.222`.
Default DNS Server **Backup DNS Server**	The primary and secondary DNS servers used to resolve names (*i.e.* LNS Server name, DNS server name, hostname, etc.). Your IT department typically provides this information. If the **Automatically Obtain IP Address** option is set, select the **Obtain Automatically** check box to obtain **Default DNS Server** from the DHCP server. **Backup DNS Server** may only be entered manually. By default, these values are both `0.0.0.0`.

3. Click **Submit** to save the changes you have made. Click **Reset** to leave all fields unchanged. If you changed the IP address of the *i.*LON 100 server, you will have to change your computer's TCP/IP settings to place it on the same subnet if you want to continue to have Web access.

Creating and Configuring a Dial-up Connection

If you will be dialing out from your *i.*LON 100 server to an ISP, you must create a dial-up connection for each number or GPRS service you will connect to. You must also configure the modem you will use, as described in the *Configuring Modem Settings* section on page 29.

The *i.*LON 100 server ships with two sample dial-up connections to SMTP servers (Freenet and T-Online). To create and configure an additional dial-up connection, follow these steps:

1. Open the **Network - LAN/WAN** Web page by pointing your mouse cursor to **Network**, and then selecting **LAN/WAN** from the drop-down menu.

2. Right click *i.***LON 100** at the top level of the connections tree on the **Network - LAN/WAN** Web page, and then select **Add Connection** from the pop-up menu. A new connection will be added to the tree. The right half the **Network - LAN/WAN** Web page shows the dial-up connection properties, as shown in Figure 2.6.

Figure 2.6 Connection Properties

3. Configure the connection properties. Table 2.4 describes these properties.

Table 2.4 Connection Properties

Property	Name
Connection Name	Enter a name for the dial-out profile, such as the name of the ISP. When you click **Submit** to save the connection, this name will appear in the tree on the left side of the LAN/WAN Web page. **Legal Characters:** All ASCII characters except '&', '<', and '>'. **Field Length**: Up to 30 characters
Phone Number	Enter the phone number to call when this dial-out connection is used. By default, this field is blank. **Legal Characters:** Digits and the hyphen character. **Field Length:** Up to 30 characters
GPRS	If you are using a GSM modem, select this check box to use the GPRS protocol to send data instead of an analog phone call. A connection will be established whenever the *i*.LON 100 server attempts to contact a server with the dial-up connection. Once the transaction with the server is complete, the connection will be dropped. See the documentation for your GSM modem for more information about the GPRS protocol. Many GPRS service providers require a phone number which must be dialed when establishing a connection such as ***99***1#**. Consult your ISP for details on configuring the properties of your GPRS connections.

Property	Name
Persistent GPRS	If this check box is selected, the GSM modem will request a network connection as soon as the *i*.LON boots, and keep the connection open as long as the service provider allows it.
User Name	Enter the user name to be used by the *i*.LON 100 server when connecting to an ISP. By default, this field is blank. **Legal Characters:** All ASCII characters except '&', '<', and '>'. **Field Length**: Up to 30 characters.
Password **Re-enter Password**	Enter and re-enter the password to be used by the *i*.LON 100 server when connecting to an ISP. The password will be displayed as all asterisks. By default, this field is blank. **Legal Characters:** All ASCII characters except '&', '<', and '>'. **Field Length**: Up to 30 characters.

4.   Select the **Advanced** checkbox to set additional options required if you want to use a DNS server when dialing out using the dial-out profile. Table 2.5 describes these options.

Table 2.5 Advanced Connection Properties

Property	Description
Remote DNS Server	Enter the IP address of the DNS server to be used when dialing out using this dial-out profile. Select the **Obtain Automatically** check box to obtain the DNS server address from the PPP server when connecting.
Disconnect if Idle For	The idle timeout in seconds. If the connection is idle for this length of time, the call will be ended. By default, this value is 30.0 seconds. Once a PPP connection is established, it will not be released until it has been idle for this amount of time. This means that if data is being constantly sent over a PPP connection, the connection will never be dropped and any data that needs to use a second PPP connection may never be set. **Legal Characters:** Floating point number greater than or equal to 0 and an increment of .1.

Property	Description
PPP Authentication for Outgoing Calls	The PPP (Point-to-Point Protocol) authentication type to be used for outgoing calls. Select **CHAP** to use the Challenge Handshake Authentication Protocol, which is an authentication scheme used by PPP servers to validate the identity of the originator of a connection, upon connection or any time later. Select **PAP** to use the Point-to-Point Access Protocol, which should be used if CHAP is not available, or if the user name and password that the user submitted to PAP must be sent to another program without encryption. Select **Auto** if you want the *i*.LON 100 server to automatically select the authentication type to connect to the ISP.
Use Dynamic DNS Service	Select the **Use Dynamic DNS Service** check box if the DNS server you want to use when dialing out has a dynamic IP address. Then, set the rest of the properties on the Web page. The *i*.LON 100 server only supports www.dyndns.org as a dynamic DNS (DDNS) provider. The DDNS user must setup an account on www.dyndns.org and he must also setup the DDNS host name. For example, consider a case where the *i*.LON 100 should be accessible via host name ilon100example.dyndns.org when a persistent GPRS connection is established. The user needs to use the account with the name "user" and the password "password." In this case, you would perform the following steps: 1. Setup a user account at www.dyndns.org with the user name "user" and password "password." 2. Setup a dynamic DNS entry for host ilon100example.dyndns.org 3. Setup a persistent GPRS connection with this DDNS. 4. Test these settings by opening the following Web page: http://ilon100example.dyndns.org. You should receive the normal iLON100 web pages via GPRS.
Host Name	Enter the host name of the *i*.LON100 server that is registered at www.dyndns.org. You only need to set this field if you are using the dynamic DNS service.
User Name	Enter the user name defined for the DDNS server at www.dyndns.org. By default, this field is blank. You only need to set this field if you are using the dynamic DNS service. **Legal Characters:** All ASCII characters except '&', '<', and '>'. **Field Length**: Up to 30 characters.

Property	Description
Password **Re-enter Password**	Enter and re-enter the password defined for the DDNS Server at www.dyndns.org. The password will be displayed as all asterisks. By default, this field is blank. You only need to set this field if you are using the dynamic DNS service. **Legal Characters:** All ASCII characters except '&', '<', and '>'. **Field Length**: Up to 30 characters.

5. Click **Submit** to save the changes you have made to this Web page. Click **Reset** to leave all fields unchanged.

Creating and Configuring Servers

Each connection can contain one or more servers. A server can provide multiple services including email (SMTP) service, a Web Binder destination, LNS uplink services, time services or IP-852 routing services. By default, the **LAN** connection contains the **Turnaround Address** server with the Web Binder service (to allow the *i*.LON 100 to be bound to itself), and a sample email server called mymailserver.mydomain.com. Each of the sample dial-up connections also contains a sample email server. To create an additional server, follow these steps:

1. Open the **Network - LAN/WAN** page by pointing your mouse cursor to **Network**, and then selecting **LAN/WAN** from the drop-down menu.

2. Right-click the connection you want to add a server to in the connections tree, and then select **Add Server** from the pop-up menu. The right-hand side of the **LAN/WAN** Web page will appear as shown in Figure 2.7.

Figure 2.7 Server Properties

3. Set the **IP or Hostname** property. This is the IP address or the hostname of the server. By default, this value will be 0.0.0.0.

   To access a server via hostname, DNS must be enabled on the *i*.LON 100 server. For more information on this, see the *Configuring LAN Connection Properties* section earlier in this chapter.

4. Click **Submit** to save the new service. It will appear under the specified connection as the IP address or hostname entered in step 3.

5. The **Configured Services** list indicates whether or not email, Web Binder destination, LNS uplink, time, and IP-852 routing services have been configured for the server. See the next section, *Creating and Configuring Services*, for more instructions on how to create and configure services on the new server.

Creating and Configuring Services

Once you have created a server as described in the previous section, you must create one or more services for it. To create a service, follow these steps:

1. Open the **Network - LAN/WAN** page by pointing your mouse cursor to **Network**, and then selecting **LAN/WAN** from the drop-down menu.

2. Right-click the server you want to add a service to, and then select **Add Service** from the short-cut menu. The **Add Service** dialog will open, as shown in Figure 2.8.
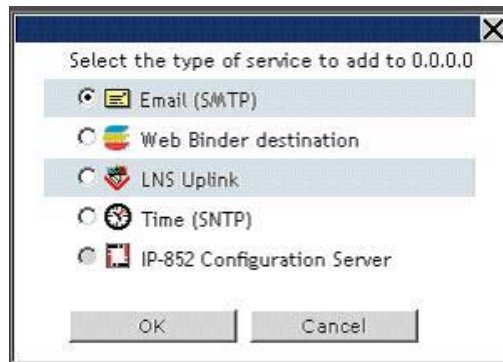
Figure 2.8 Add Service Dialog

3. Select the service you want to add, and then click **OK**. The new service will appear below the selected server, and the right-hand side of the **Network - LAN/WAN** Web page will list a series of properties you can use to configure for the service.

4. Configure the service as described in one of the following sections.

Configuring the Email (SMTP) Service

If you selected the **Email (SMTP)** service, you can send emails through the associated server (note that the server must be an SMTP email server). The right-hand side of the **Network - LAN/WAN** web page will appear as shown in Figure 2.9.

Figure 2.9 Email Service Properties

Configure the properties on the Web page, and then click **Submit** to save the changes. Click **Reset** to leave all fields unchanged.

Table 2.6 describes the email service properties.

Table 2.6 Email Service Properties

Property	Description
Email Server Address	The IP Address of the server the service is being added to.
Email Server Port	The port used by the *i*.LON 100 server to send email. This value is always 25, and may not be changed. Contact your IS department to verify that your firewall will allow you to access the email server on this port.
Use as Default	Set this option to make this the default email service for the *i*.LON 100 server. If this is the first email service created on the *i*.LON 100, this option will be set by default. If another email service is currently designated as the default, the designation will be removed from it when you click **Submit**.
Source Email Address	The string that will appear in the **From** field of emails sent through this service (*e.g.* lonfloor1@echelon.com). By default, this field is blank.
User Name	The user name used to log in to the SMTP server.
Password **Re-enter Password**	The password used to log in the SMTP server.

Configuring the Web Binder Destination Service

Web Binding is a process by which you can connect data points on your *i*.LON 100 server directly to data points on another *i*.LON 100 server, or to a third party Web server such as Apache or IIS, and keep the values of those data points synchronized. If you selected the **Web Binder Destination** service, you can use the associated server as a Web Binder destination. The right-hand side of the **Network - LAN/WAN** web page will appear as shown in the Figure 2.10.

WebBinder Service Property	Value
WebBinder destination address	my_mailserver.my_domain.com
WebBinder destination port	80
SOAP path	/WSDL/iLON100.WSDL
Retry time	120.0 seconds
Format values in SOAP messages using	Data Point Format

Figure 2.10 Web Binder Service Properties

Configure the properties on the Web page, and then click **Submit** to save the changes. Click **Reset** to leave all fields unchanged.

Table 2.7 describes the properties you need to set to configure the Web Binder service. For more information on the Web Binder service, including instructions on how to set up a Web Binder connection, see Chapter 10, *Web Binding*.

Table 2.7 Web Binder Service Properties

Property	Description
Web Binder Destination Address	The IP Address or hostname of the server the service is being added to.
Web Binder Destination Port	The port the server will use to receive Web Binder messages. By default, this value is 80, but it may be changed to any valid port number. Contact your IS department to assure your firewall is configured to allow you to access the server on this port.
SOAP Path	The path to which SOAP messages should be directed on the server. This is typically the location of the WSDL or ASMX file on the destination server where it receives HTTP requests used in a SOAP message transaction. By default, this is `/WSDL/iLON100.WSDL` (the default location of this file on an *i*.LON 100 server).

Property	Description
Retry Time	The *i*.LON 100 server will retry failed Web Binder connection messages every 45 seconds. Use this property to set the amount of time after which the *i*.LON 100 server will stop retrying to send the message.
Format Values in SOAP Messages Using	This determines how the data in the SOAP messages sent to this Web Binder destination will be formatted. Select **Raw Hex** to format the data in raw hexadecimal format. Select **Data Point Formats** to format the data using the format specification assigned to the data point being updated by the SOAP message.

Configuring the LNS Uplink Service

If you selected the **LNS Uplink** service, you can establish an uplink LNS connection with associated server (note that the LNS server must be running at the specified location). The right-hand side of the **Network - LAN/WAN** web page will appear as shown in Figure 2.11.

LNS Uplink Service Property	Value
LNS uplink address	my_mailserver.my_domain.com
LNS uplink port	1628
☑ Use as default	

Figure 2.11 LNS Uplink Service Properties

Configure the properties on the Web page, and then click **Submit** to save the changes. Click **Reset** to leave all fields unchanged.

Table 2.8 describes the properties you need to set to configure the LNS uplink service properties.

Table 2.8 LNS Uplink Service Properties

Property	Description
LNS Uplink Address	The IP Address or hostname of the server the service is being added to.
LNS Uplink Port	The port used by the *i*.LON 100 server to send LNS messages. By default, this value is 1628, but it may be changed to any valid port number. Contact your IS department to assure that your firewall will allow you to access the LNS server on this port.

Property	Description
Use As Default	Set this option to make this the default LNS uplink service for the *i*.LON 100 server. If this is the first LNS uplink service created on the *i*.LON 100 server, this option will be enabled by default. If another LNS uplink service is currently designated as the default, the designation will be removed from it when you click **Submit**.

Configuring the Time Service

If you selected the **Time** service, you can use the associated server as a time server (note that a time server must be running at the specified location). The right-hand side of the **Network - LAN/WAN** web page will appear as shown in Figure 2.12.

Time Service Property	Value
Time server address	my_mailserver.my_domain.com
Time server port	123 (not configurable)
☑ Use as default	

Figure 2.12 Time Service Properties

Configure the properties on the Web page, and then click **Submit** to save the changes. Click **Reset** to leave all fields unchanged.

Table 2.9 describes the time service properties you need to set to configure.

Table 2.9 Time Service Properties

Property	Description
Time Server Address	The IP Address or hostname of the server the service is being added to.
Time Server Port	The port used by the *i*.LON 100 server to receive time data. This value is always 123 and cannot be changed. Contact your IS department to assure that your firewall is configured to allow you to access the time server on this port.

Property	Description
Use As Default	Set this option to make this the default time service for the *i*.LON 100 server. If this is the first time service created on the *i*.LON 100 server, this option will be enabled by default. If another time service is currently designated as the default, the designation will be removed from it when you click **Submit**.

Configuring the IP-852 Configuration Server Service

If you selected the **IP-852 Configuration Server**, you can use the associated server as the Configuration Server for the IP-852 network the *i*.LON 100 server is connected to. The right-hand side of the **LAN/WAN** web page will appear as shown in Figure 2.13.

Figure 2.13 IP-852 Configuration Service Properties

Configure the properties on the Web page, and then click **Submit** to save the changes. Click **Reset** to leave all fields unchanged.

Table 2.10 describes the IP-852 routing properties you need to set to configure. Consult the *IP-852 Channel User's Guide* for further instructions to follow when setting up the Configuration Server.

Table 2.10 IP-852 Routing Properties

Property	Description
IP-852 Configuration Server Address	The IP Address or hostname of the Configuration Server.
IP-852 Configuration Server Port	The port the Configuration Server will use to receive messages from the *i*.LON 100 server.
IP-852 Router Local Port	The port the *i*.LON 100 sever will use to receive messages from the Configuration Server. You must license the *i*.LON 100 server to operate as an IP-852 router before using it on an IP-852 network. For more information on this, see Chapter 12, *Sending ANSI/CEA-709.1 Packets Over IP with the i.LON 100 Server*.

Verifying *i*.LON 100 Connections

The *i*.LON 100 Internet Server includes a Web page that you can use to verify communications between your *i*.LON 100 server and LNS Servers, SMTP Servers, ISPs, other *i*.LON 100 devices, and third party Web servers. To open this Web page, point your mouse cursor to **Setup**, and then select **Verify** from the dropdown menu. The **Setup - Verify** Web page opens.

Figure 2.14 Setup - Verify Web Page

This Web page lists the services that have been configured on the **Network - LAN/WAN** Web page, including tests for the IP-852 router configuration settings and the persistent GPRS settings. By default, the Web page is configured to test all of the services. You can clear a checkbox to prevent verification of a service. To begin testing, click **Start Tests**. Any problems establishing communications with any of the servers will be reported.

When initiating a remote test from this web page, the *i*.LON server will be forced to dial out to each Dial-up connection that contains one or more services. If the *i*.LON server needs to break communication with this PC during that communication, do not attempt a refresh during the process.

Testing of dial-up connections while dialed in to the *i*.LON 100 server will fail, because the Web page will not be able to maintain communication with the *i*.LON 100 after the modem disconnects and dials to another location.

At any time during a test, you can click **Cancel** to clear all ongoing tests.

Configuring Modem Settings

Some *i*.LON 100 server models are equipped with an internal modem. In addition, you can connect an external GSM modem to the Serial port. If you plan to dial-out from the *i*.LON 100 server, you must also create one or more dial-up connections, as described in the *Creating and Configuring a Dial-up Connection* section on page 18. To support dial-in connections, you must set the **Enable Dial-**

in option on the Security Web page, as described in the *i.LON 100 Server Security* section on page 55.

If your *i.*LON 100 server is equipped with a modem or attached to an external modem, you can configure it by pointing your mouse cursor to **Setup,** and then selecting **Modem** from the drop-down menu. The **Setup - Modem** Web page opens.

Figure 2.15 Setup - Modem Web Page

Configure the properties on the Modem Web page, and then click **Submit** to save the changes you have made. Click **Reset** to set all fields on this Web page back to the values they had when the page was opened.

Tables 2.11 and 2.12 describe the properties you can configure on the **Setup - Modem** Web page.

Table 2.11 Modem Properties

Property	Description
Modem	Select the modem that the *i*.LON 100 server will use. Select **Internal Analog** to use the internal modem. Select **External GSM Nokia 30 to 31 Series**, **External GSM Siemens 35 to 45 Series**, or **External GSM Insys GPRS 4.0 to 4.1 Series** to use an external modem connected via the serial port. Note that many GSM service provider contracts do not include provisions for establishing data-only connections. Contact your GSM provider to assure that you have data-only connections activated for your GSM contract.
User Name For Incoming Calls	The user name for incoming calls. This user name must be provided by the caller when attempting to connect to the *i*.LON 100 server via modem. By default, the user name is `ilon`. **Field Length**: Up to 30 characters.
Password For Incoming Calls/Re-enter Password	The password for incoming calls. This password must be provided by the caller when attempting to connect to the *i*.LON 100 server via modem. The password will appear as asterisks when entered. You must reenter the password to assure that you typed it correctly. By default, the password name is `ilon`. **Field Length**: Up to 30 characters.

Select the **Advanced** check box on the Modem Web page to set advanced modem properties. Table 2.12 describes these properties.

Table **2.12** Advanced Modem Properties

Property	Description
Local IP Address For Incoming Calls	Set the IP address that will be assigned to incoming calls by the *i*.LON 100 server. By default, this is `198.162.2.2`.
PPP Authentication	The PPP (Point-to-Point Protocol) authentication type to be used for outgoing calls. Select **CHAP** to use the Challenge Handshake Authentication Protocol, which is an authentication scheme used by PPP servers to validate the identity of the originator of a connection, upon connection or any time later. Select **PAP** to use the Point-to-Point Access Protocol, which should generally used if CHAP is not available, or if the user name and password that the user submitted to PAP must be sent to another program without encryption.
Modem Country/Region	Select the country in which the *i*.LON 100 server is located. The *i*.LON 100 server must be rebooted for changes to this property to take effect. This option is only available if **Modem** is set to **Internal Analog**.
Tone **Pulse**	This option appears only if **Modem** is set to **Internal Analog**. Select **Tone** or **Pulse** to determine whether the *i*.LON 100 server Internet Server's modem will dial using touch-tone or pulse dialing. By default, this is set to **Tone**.
Dialing Prefix	This option appears only if **Modem** is set to **Internal Analog**. If the *i*.LON 100 server is connected to a phone system that requires a code to be dialed to reach an outside line, enter the code here. By default, these fields are blank. **Legal Characters:** Digits only **Field Length:** 30 characters
Delay After Prefix	This option appears only if **Modem** is set to **Internal Analog**. If the **Dialing Prefix** field contains a prefix, enter the delay, in seconds, between the prefix being dialed and the phone number being dialed. The *i*.LON 100 server must rebooted for changes to this property to take effect. By default, this value is `0.0`. **Legal Characters:** Floating point number greater than or equal to 0 and an increment of .1.

Property	Description
Dial Tone Waiting	Select the **Dial Tone Waiting** check box if you want the modem to wait for a dial tone before dialing out.
PIN Number	Set the **PIN Number** that must be send to the external modem to send or receive calls. This option only appears if you are using an external modem. **Field Length**: Up to 30 characters.
Access Point Name (APN)	Set the APN hostname required by most GPRS service providers. This can be a valid IP address or a valid hostname and domain suffix pair. This option only appears if you are using an external modem. **Field Length**: Up to 64 characters.
Quality of Service (QoS)	Set the QoS string required by most GPRS providers. This option only appears if you are using an external modem. **Field Length**: Up to 30 characters.

Configuring LONWORKS Settings

You need to configure the server's LONWORKS settings if you plan to use the *i*.LON 100 Internet Server as a Remote Network Interface or as an IP-852 router, or if you plan to use the NVE driver to create data points on external devices. To do so, click **Network** on the title bar and then select **LONWORKS** from the drop-down menu. The **Network - LONWORKS** Web page opens.

Figure 2.16 Network - LONWORKS Web Page

Configure the properties on the **Network - LONWORKS** Web page, and then click **Submit** to save your changes. Or, click **Reset** to cancel the changes. The properties you can configure are described in the following sections.

Configuring LonTalk Properties

Table 2.13 describes the LonTalk properties you can configure on the LONWORKS Web page.

Table 2.13 LonTalk Properties

Property	Description
Neuron ID: *i*.LON 100 Device	The Neuron ID used by the *i*.LON 100 server. This field is read-only.
Neuron ID: RNI Device	The Neuron ID used by the *i*.LON 100 server when it operates as an RNI. This field is read-only.
Channel Type	The LONWORKS Channel type supported by the *i*.LON 100. This is **TP/FT-10** for FT model *i*.LON 100 servers, and **PL-20N** (or **PL-20C** if CENELEC is enabled) for PL model *i*.LON 100 servers.
Domain/Subnet/Node	If the *i*.LON 100 is configured (i.e. it has been added to an LNS network), this field displays the Domain/Subnet/Node address of the *i*.LON 100. Otherwise, this field will display **Unconfigured**. By default, this field is read-only. Select the **Modify?** check box to make this field writable. Note that modifying the Domain/Subnet/Node address of the *i*.LON 100 server may make it inaccessible by the LNS network.
CENELEC Enable	This option only appears if you have a power-line model *i*.LON 100 server. Set this option to enable CENELEC power-line communication. If you change this value, you will need to close all applications to which the *i*.LON 100 server is connected as an RNI, reboot the *i*.LON 100, and re-establish an RNI connection.

Configuring NVE Driver Properties

The NVE driver properties determine how the *i*.LON 100 server communicates with the network variables associated with NVE (external) data points. NVE data points are data points on other devices on the network. The *i*.LON 100 server can use NVE data points to monitor those devices. See Chapter 4 of this document for more information on NVE data points.

Table 2.14 describes the NVE driver properties you can configure.

Table **2.14** NVE Driver Properties

Property	Description
NVE Transmit Timer	The time, in milliseconds, the *i*.LON 100 server will wait between retry attempts when sending an external data point value. The default value is 96 milliseconds.
NVE Retry Count	The number of times the *i*.LON 100 will attempt to send an external data point value. The default value is 3 retries.
NVE Data Point Max Age	The amount of time, in seconds, before an NVE data point is considered *stale*. If an NVE point receives no updates in this amount of time, the value will be considered invalid. Setting this value to 0 prevents data from becoming stale. The default value for this property is 0.

Configuring LNS Uplink/Downlink Properties

The LNS Uplink/Downlink properties determine how uplink and downlink connections are established with the LNS Server. Table 2.15 describes these properties.

Table 2.15 LNS Uplink/Downlink Properties

Property	Description
Default LNS Server **Backup LNS Server1** **Backup LNS Server2**	The IP addresses or hostnames of the default and backup LNS Servers. When an uplink RNI connection needs to be established, the *i.*LON 100 Internet Server will attempt to establish the RNI connection with the first server on the list. If that server does not respond, it will try the second server, then the third. LNS Servers can be specified by DNS name. If DNS names are used, a DNS server must be listed on the TCP/IP Setup web page. Click **Configure** to configure the default LNS Server. Or, create a server with the LNS Uplink service with the **Network - LAN/WAN** Web page, as described in the *Creating and Configuring Servers* and *Configuring the LNS Uplink Service* sections earlier in this chapter.
Downlink RNI Port	Displays the port on which the *i.*LON 100 listens for downlink requests from the network. Click **Configure** to open the **Setup - Security** Web page and set this value. See the *i.LON 100 Server Security* section on page 55 for more information on this.
Initiate LNS Uplink When IP Address Changes	**This option is not supported for LNS 3, Service Pack 8, Update 1, and earlier.** Select this check box to notify the LNS server when the IP address of the *i.*LON 100 server changes. This may resolve connectivity problems if a non-static IP address is used.
Delay Time Between Two Retries	**This option is not supported for LNS 3, Service Pack 8, Update 1, and earlier.** This option is only available if the **Initiate LNS Uplink When IP Address Changes** check box is selected. If the *i.*LON 100 server attempts to inform the LNS server of an IP address change and is not successful, this is the amount of time it waits before another attempt is made.

Property	Description
Maximum Retry Time	**This option is not supported for LNS 3, Service Pack 8, Update 1, and earlier.** This option is only available if the **Initiate LNS Uplink When IP Address Changes** check box is selected. The amount of time, in minutes, for which the *i*.LON 100 server will attempt to inform the server of an IP address change.
Initiate LNS Uplink When Any Explicit Message is Received	Select this check box to initiate an uplink connection from the *i*.LON 100 server to the LNS Server whenever an explicit message is sent to the host. If this check box is selected, explicit messages for the host will be held until a connection is established. By default, this check box is cleared.
Initiate Only When Explicit Message Code is in Range	Select this check box to initiate an uplink connection from the *i*.LON 100 server to the LNS Server whenever an explicit message with a message code within the specified range is sent to the host. If this check box is selected, explicit messages for the host outside the specified range will be held until a connection is established. By default, this check box is cleared.

Configuring Initiate LNS Uplink Properties

Select these check boxes to determine when the *i*.LON 100 server will attempt to initiate an uplink connection to the LNS Server in response to a network variable message for the host. For example, select the **NVs Using Acked Service** check box to initiate an uplink connection whenever the host receives a network variable message that is sent using the acknowledged messaging service.

If an update is received to establish an uplink connection, the update will be held until a connection is established. By default, all of these check boxes are cleared (i.e. the *i*.LON 100 server will never attempt to establish an uplink connection as a result of a network variable message).

Click **Submit** to save the changes you have made to this Web page. Click **Reset** to set all fields on this Web page back to the values they had when you opened the page.

Configuring IP-852 Router Properties

You can use the *i*.LON 100 server as a router on an IP-852 channel. You first need to license and configure the *i*.LON 100 server for operation as an IP-852 router. For more information on this, and for background information you will need when using the *i*.LON 100 server as an IP-852 router, see Chapter 12, *Sending ANSI/CEA-709.1 Packets Over IP with the i.LON 100 Server*.

Configuring Time Settings and the Astronomic Position Sensor

The *i*.LON 100 server has a real-time clock. The time for this clock can be set manually using the **Setup - Time** Web page, or synchronized to an SNTP time server as described in the *Configuring the Time Service* section on page 27.

To view and set the time with the Time Web page, point to **Setup** and then select **Time** from the dropdown menu. The **Setup - Time** Web page opens, as shown in Figure 2.17.

Figure 2.17 Time Properties

Configure the properties on the **Setup - Time** Web page, and then click **Submit** to save the changes you have made. Click **Reset** to set all fields on this Web page back to the values they had when you opened the page.

Table 2.16 describes the properties on the Time Web page.

Table 2.16 Time Web Page Properties

Property	Description
Default Time Server **Backup Time Server**	These read-only fields display the current time reported by the default and backup SNTP time servers. Click **Configure** to open a popup window that allows you to create a new time server. See the *Creating and Configuring Servers* section on page 23 for more information about servers.
Time of Last SNTP Sync	This read-only field shows when the *i*.LON 100 server last synchronized its clock with the Default Time Server. This varies between 1 to 15 minutes, depending on how far off its time is from the server. As the difference approaches 75 ms or less, the interval will keep increasing until it reaches the maximum of 15 minutes.

Property	Description
Time Zone	Choose the time zone in which the *i*.LON 100 server is located from this drop-down list.
Date and Local Time	These fields display the time and date currently kept by the *i*.LON 100 server's real time clock. This Web page is not updated automatically; and so you may need to refresh the Web page to see the current time. You can modify the time and date manually (you must click **Submit** for the changes to be saved), but if you have configured an SNTP time server, these changes will be overwritten the next time the *i*.LON 100 server synchronizes with the time server.
Enable Astronomic Position Sensor	Select the **Enable Astronomic Position Sensor** check box and then fill in the **Latitude** and **Longitude** properties to set the current position of the *i*.LON 100 server, and enable the astronomic position sensor. The *i*.LON 100 server will then use the NVL_nvoElevation_005 and NVL_nvoAzimuth_005 data points to store the elevation and azimuth that can be used to obtain the position of the sun. For more information on elevation and azimuth, see the next section, *Elevation and Azimuth*.
Latitude **Longitude**	Enter the latitude and longitude of the *i*.LON 100 server's location in degrees, minutes, and seconds (if the first radio button is selected), or in decimal degrees (if the second radio button is selected). When entering the longitude, enter a negative value between 0 and –180 if you are west of the Prime Meridian, or a positive value between 0 and 180 if you are east of the Prime Meridian. When entering the latitude, enter a negative value between 0 and –90 if you are south of the equator, or a positive value between 0 and 90 if you are north of the equator. The latitude and longitude values used by the *i*.LON 100 server conform to WGS84 (World Geodetic System 1984) coordinates. For more information on WGS84, see www.wgs84.com. When you click **Submit** to save these settings, the *i*.LON 100 server will use the NVL_nvoElevation_005 and NVL_nvoAzimuth_005 data points to store the elevation and azimuth that can be used to obtain the position of the sun. For more information on elevation and azimuth, see the next section, *Elevation and Azimuth*. This information can be used for a variety of scheduling applications including street light control, sun shade control, jalousie control, and outdoor lighting control.

Elevation and Azimuth

The *i*.LON 100 server uses the use the NVL_nvoElevation_005 and NVL_nvoAzimuth_005 data points to store the elevation and azimuth that can be used to obtain the position of the sun relative to the location of your *i*.LON 100 server. The elevation is returned as a value between –90 and 90, where a

positive value indicates that the sun is up and a negative value indicates that the sun is down. The azimuth is returned as a value between 0 and 360, where 0 indicates that the sun is directly to the north, 90 indicates that the sun is to the East, 180 indicates that the sun is to the South and 270 indicates the sun is to the West. For example, if the azimuth returns the value 225, then the sun is southwest of your position.

Figure 2.18 shows how these values map to the sun's location. For example, if the azimuth is set to 180 and the elevation is also set to 90, then the sun is to the south of your location, and at its zenith.
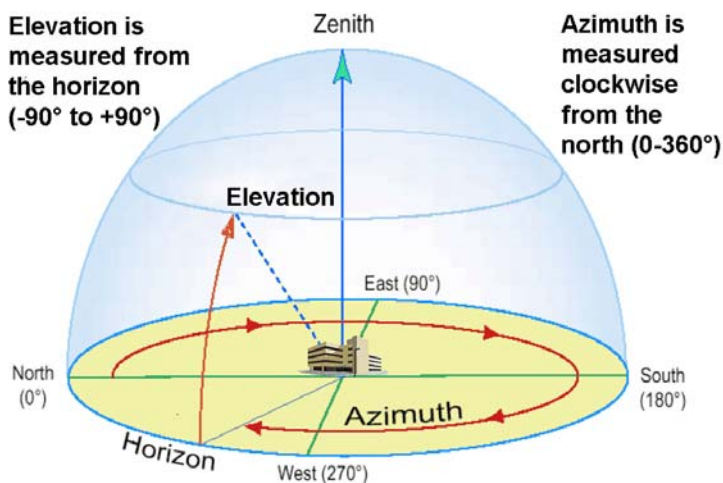
Figure 2.18 Elevation and Azimuth

Configuring the M-Bus Driver

The *i*.LON 100 Internet Server includes an M-Bus driver that is used to communicate with Meter Bus (M-Bus) devices using the M-Bus protocol (EN 1434-3). The *i*.LON 100 will act as the master for the M-Bus. The M-Bus driver conforms to the following serial parameters: 8 data bits, 1 stop bit, even parity, no handshake (RTS / CTS signals not used), and configurable transmission rates of up to 9600 baud.

To configure the M-Bus driver, follow these steps:

1. Install the Meter Bus devices using a Meter Bus specific installation tool. Consult the documentation provided with the Meter Bus devices for more information on this.

2. Map the Meter Bus devices to data points on the *i*.LON 100 server with the **Network M-Bus** Web page. To open this Web page, point your mouse cursor to **Network**, and then select **M-Bus** from the drop-down menu. The **Network M-Bus** Web page opens, as shown in Figure 2.19.

Figure 2.19 Network - M-Bus Web Page

3. Click the **Add** button on the left side of the Web page to add a device to the driver. A new M-Bus device is added to the page, as shown in Figure 2.20.

Figure 2.20 M-Bus Device Properties

4. Configure the M-Bus device by setting the properties shown in Figure 2.20. Table 2.17 describes these properties.

Table 2.17 M-Bus Device Properties

Property	Description
Name	The name of the data point to be associated with the M-Bus device. Once a name has been assigned (i.e. the **Submit** button has been clicked), it cannot be changed. This name can be up to 30 characters long and must begin with "MBS_". The "<", ">", and "&" characters may not be used in this name.
Address	Choose primary (**Pri**) or secondary (**Sec**) addressing mode. An M-Bus device contains both a *primary address* and a *secondary address*. The primary address is assigned by the network management tool used to install the M-Bus device (analogous to a LONWORKS subnet/node address). The secondary address is burned into the device at the factory (analogous to a LONWORKS Neuron ID).
Primary	This field is only active if **Address** is set to **Pri.** Enter the primary address of the M-Bus device. Valid range is 0 to 250.
Secondary	This field is only active if **Address** is set to **Sec**. Enter the secondary address of the M-Bus device. Valid range is 0 to 99,999,999.

Property	Description
Baud Rate	Select the baud rate at which the M-Bus device communicates on the serial port. The default baud rate is 2400 Baud, and this can be reconfigured to any value between 300 and 9600 Baud. See the documentation for your M-Bus device for more information on supported baud rates.
Poll Rate	The device's poll rate, in seconds. The M-Bus device will update the data point on the *i*.LON 100 server at the specified interval. M-Bus devices cannot send event-driven updates, so they must be polled. This value can be set from 0.0 to 6553.4 seconds, with a resolution of .1 seconds. Setting this value to 0.0 will turn off polling. By default, this value is 30 seconds.

See the *Integrating M-Bus Devices With a Type Translator* section on page 151 for an example of using the M-Bus driver with the Type Translator functional block to read and write M-Bus data.

Configuring the Modbus Driver

The *i*.LON 100 Internet Server includes a Modbus driver that allow you to create data points that the *i*.LON 100 applications and Web pages can use to read and write to holding registers on Modbus devices. For background information on the Modbus protocol, see www.modbus.org.

The *i*.LON 100 server can interface with slave Modbus devices on RS-485 and RS-232 channels. The RS-232 channel protocol is the Electronic Industries Association (EIA) standard for the interchange of serial binary data between two devices. The RS-485 channel protocol is data protocol used for transmitting data over longer distances.

The *i*.LON 100 server can use either the RTU (Remote Terminal Unit) or ASCII (American Standard Code for Information Interchange) transmission mode to communicate with the Modbus devices. In ASCII mode, two eight-bit bytes of information are sent as two ASCII characters. The primary advantage of ASCII mode is the flexibility of the timing sequence. Up to a one second interval can occur between character transmissions without causing communication errors. In RTU mode, data is sent as two four-bit, hexadecimal characters, providing for higher throughput than in ASCII mode for the same baud rate.

To configure the Modbus driver, you will first need to define the Modbus devices on your network. Then, you can define the data points you will use to read and write to each device.

You should be aware that you can save a device's settings (including the device's configuration and the data points that have been created for it) into a template, and then create devices based on that template. Those devices will be created with the same configuration and data points as the original device used to create the template. This may be useful if you plan on adding a large number of devices with similar configurations to the Modbus driver. In addition, the *i*.LON 100 server includes several pre-defined templates that you can use. For more

information on this, see the *Adding Modbus Devices from Templates* section on page 49.

Modbus support has been tested with the following devices:

- ABB ACH550*
- Berg UBN 3060*
- Berg UBN 315*
- Cummins MOD-LON
- Dixel XW570K
- Honeywell 7800 series Burner controls with an S7810M Modbus Interface module
- Leibert system 3 AHU with and OpenComms interface module
- Schneider PM500*
- Socomec A40*
- Veris Industries H8035 Modbus Enercept kW/kWh meter
- Wago System 750*
- Yaskawa E7

* indicates that the *i*.LON 100 server includes a template file you can use to add these devices to the *i*.LON 100 server. See the *Adding Modbus Devices from Templates* section for more information.

Due to the many variations of Modbus devices, you should conduct compatibility testing of the Modbus devices that you plan to use with the *i*.LON 100 server prior to using the *i*.LON 100 server with Modbus devices in your production systems.

To configure the Modbus driver and begin creating Modbus data points, follow these steps:

1. Install the Modbus devices using a Modbus specific installation tool. Consult the documentation provided with the Modbus devices for more information on this.

2. Map the Modbus devices to data points on the *i*.LON 100 Internet Server with the **Network - Modbus** Web page. To open this Web page, point your mouse cursor to **Network**, and then select **Modbus** from the drop-down menu. The **Network - Modbus** Web page opens, as shown in Figure 2.21.
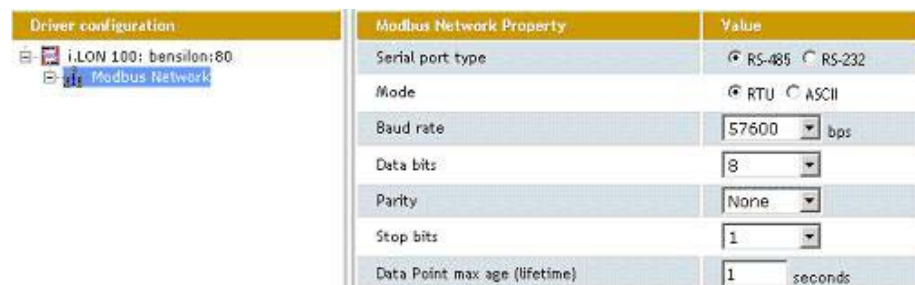
Figure 2.21 Network - Modbus Web Page

3. Initially, the **Driver Configuration** tree on the right side of the Web page only displays the root *i*.LON 100 level and an icon representing the Modbus network.

4. Configure the Modbus network by selecting the **Modbus Network** icon in the Driver Configuration Tree, and then setting the properties on the right side of the Web page. Table 2.18 describes these properties.

Table 2.18 Modbus Network Properties

Property	Description
Serial Port Type	Select **RS-485** if your Modbus devices are installed on an RS-485 channel, or **RS-232** if your devices are installed on an RS-232 channel.
Mode	The transmission mode for the channel containing the Modbus devices. Select either **RTU** or **ASCII.**
Baud Rate	Select the baud rate at which the *i.*LON 100 server will communicate with the Modbus devices on your channel. The default value is 9600 bps. See the documentation for your Modbus devices for more information on the baud rates they support.
Data Bits	The data bit size for messages sent over the Modbus network. A data bit is a group of from 5 to 8 bits that represents a single character of data for transmission over the network. Data bits are preceded by a start bit, and followed by an optional parity bit and one or more stop bits. The default value is 8 bits.
Parity	The parity bit size for messages sent over the Modbus network. A parity bit is an extra bit used to check for errors in groups of data bits transferred between devices. The default parity size is NONE.
Stop Bits	The number of stop bits used on the Modbus network. The default value is 1 stop bit.
Data Point Max Age (Lifetime)	The amount of time, in seconds, before a data point defined on a Modbus device will be considered *stale*. If a Modbus data point receives no updates in this amount of time, the value will be automatically refreshed. Setting the value of this property to 0 will prevent data from becoming automatically refreshed. The default value for this property is 0.

5. Next, add the Modbus devices on your network to the Modbus driver. To do so, right-click the Modbus Network icon and select **Add Device** from the pop-up menu.

An entry for the new device will be added to the Driver Configuration tree, and the right side of the **Network - Modbus** Web page will display a series of properties you can use to configure the new device, as shown in Figure 2.22.
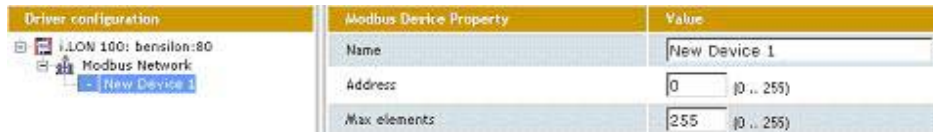
Figure 2.22 Modbus Device Properties

6. Configure the properties on the Web page. Table 2.19 describes the Modbus device properties.

Table 2.19 Modbus Device Properties

Property	Description
Name	The name of the device. Once a name has been assigned (i.e. the **Submit** button has been clicked), it cannot be changed. This name can be up to 30 characters long, and the "<", ">", and "&" characters may not be used in the name.
Address	The logical address of the device on the Modbus network.
Max Elements	The maximum number of data points that can be stored on the device.

7. Repeat steps 5 and 6 until you have added all the devices you plan to use, and then click **Submit** to save the changes.

8. Next, define the data points you will use to read and write to the registers on each of the Modbus devices. To add a data point for a device, right-click the device's icon in the Driver Configuration Tree and then select **Add Point** from the shortcut menu. An entry for the new data point will be added to the Driver Configuration Tree below the selected device, and the right side of the **Network - Modbus** Web page will display a series of properties you can fill in to configure the new data point, as shown in Figure 2.23.

Figure 2.23 Modbus Data Point Properties

9. Configure the properties on the Web page. Table 2.20 describes the Modbus data point properties.

Table 2.20 Modbus Data Point Properties

Property	Description
Name	The name of the data point. Each Modbus data point name must begin with the string **MOD_**. For example, MOD_Device_One or MOD_Device_Two would be valid data point names. Once a name has been assigned (i.e. the **Submit** button has been clicked), it cannot be changed. This name can be up to 30 characters long, and the "<", ">", and "&" characters may not be used in the name.
Description	A description of the data point.
Poll Rate	The device's poll rate, in seconds. The Modbus driver will update the value of the data point on the *i*.LON 100 server at the specified interval. This value can be set from 0.0 to 6553.4 seconds, with a resolution of .1 seconds. Setting this value to 0.0 will turn off polling. By default, this value is 30 seconds.
Modbus Data Access Type	This type of data point being created. Select **Coil**, **Digital Input**, **Input Registers,** or **Hold Registers**, depending on which type of Modbus device you are adding the data point to.
Data Point Value Is	This property indicates whether the value of the data point is read-only, or read-write. This is determined by the Modbus Data Access Type selected.
Length	Enter the length of the data point. Enter the value, and then select either **Bits** or **Bytes** to determine whether the length should be measured in bits or bytes.

Property	Description
Start Address Stop Address	Enter the start address and stop address of the registers that this data point will be used to read or write. If the length property was configured to use bits, you can select the start and stop bits on the Web page. The Modbus driver is configured to ensure that these properties must remain consistent with the Length property, meaning that if the value of the Length property is changed, the values of the Start Address and Stop Address properties will be automatically updated to fit the desired length. Similarly, if the values of the Start Address or Stop Address properties are changed, the value of the Length property will be updated accordingly.
Format Description	The format description the data point will use. Select any of the standard or user-defined format descriptions defined in the resource files on your computer from the dropdown list.
Unit String	Enter a string describing the units the value of the data point is measured in.
Convert to Little Endian	Select this check box to interpret all Modbus data as Little Endian. By default, the Modbus driver follows the Modbus standard and interprets all data as Big Endian, meaning that the highest order byte of data is sent first and all subsequent bytes of data are arranged from highest to lowest order. However, the driver also supports working with data from devices using three other byte ordering schemes to support a diversity of device implementations: Little Endian, Byte Swapped and Word Swapped. Little Endian format is the opposite of Big Endian, meaning that the lowest order byte of data is sent first, and each subsequent byte is arranged from lowest to highest order. Byte Swapped data is first arranged from highest to lowest order, but every pair of bytes in the structure are interchanged. Word swapped data is also arranged from highest to lowest order, but every pair of 16 bit words are swapped. This is best understood by example. Consider a device that uses an unsigned 32 bit integer to report runtime accumulation. In Big Endian format the value of 120,000 hours (0x1D4C0 in hexadecimal format) would be represented as a value of: 00 01 D4 C0 in memory. This requires two adjacent Modbus registers (each holding 16 bits of data). If the device manufacture defines the unit runtime to be at register address 0x8 the Big Endian formatted response to a read function would return data 0x0001 0xD4C0 in that order. But suppose the manufacture states the U32 value is returned in Little Endian format. One interpretation of the value returned to the driver from the read function would be 0xC0D4 0x0100. Alternatively, the manufacture may interpret Little Endian to be the ordering of registers and NOT bytes. In this case, the read function would return 0xD4C0 0x0001 and what the driver needs to do to handle this is to swap the words. A byte swapped format would need to be applied if the device would return a value of 0x0100 0xC0D4. All this complexity is required because the Modbus specification leaves the interpretation of 32 bit integers to the discretion of the implementer.

10. Repeat steps 8 and 9 until you have created all the data points you will

need, and then click **Submit** to save your changes. When you are finished, you can view the new Modbus data points with the **View – Data Points** Web page, and use them with the *i*.LON 100 applications to monitor and control your Modbus devices.

Adding Modbus Devices from Templates

You can save a device's settings (including the device's configuration and the data points that have been created for it) into a template, and then create new devices based on that template. Those devices will be created with the same configuration and data points as the original device used to create the template. This may be useful if you plan on adding a large number of devices with similar configurations to the Modbus driver. In addition, the *i*.LON 100 server includes several pre-defined templates that you can use.

To create a template and add a device that uses the template, follow these steps:

1. Select the device whose settings you want to use as the device template in the Driver Configuration tree, and then click the **Save As Template** button on the **Network – Modbus** Web page.

    If you want to use a template to create multiple devices, hold down the <CTRL> key and then select the devices you want to use, and then click **Save As Template.**

2. This opens the Save as Template dialog. Enter the name you want to use for the template in the Name box, and then click **OK** to save the template.

3. Next, click the **Add From Template** button to add a device with the template. This opens the Add From Template dialog. Select the template you want to use from the drop-down list, and then click **OK**.

    The *i*.LON 100 software includes 4 pre-defined templates you can use, as well: ABB_ACH550, BERG_UBN3060, Socomec Diris40, and Wago_8DI_8DO_4AI_4AO_8DI_8DO. These template files are stored in the `root/config/software/driver/driverMOD` folder on the *i*.LON 100 server. You can also find these files in the `LONWORKS\iLon100\driverSupport\Modbus\templates` folder on any computer running the *i*.LON 100 *e3* software. For descriptions of these files, consult the read-me file in the `iLon100\LonWorks\iLon100\driverSupport\Modbus` directory on the *i*.LON 100 CD.

4. The new device will be added to the Driver Configuration Tree, with its default settings configured to match those of the selected device template. You can now begin using the data points on the device with the rest of the *i*.LON 100 applications, or you can make any desired modifications to the configuration of the device or its data points, as described in the previous section.

Upgrading the *i*.LON 100 Firmware

To use the new *e3* Web pages and Plug-In features, you need to upgrade the *i*.LON 100 firmware with the *i*.LON 100 Configuration Plug-In. If the *i*.LON 100 server you are upgrading has previously been installed in a LONWORKS network with the LonMaker tool, you can proceed to the *Performing the Upgrade* section and begin upgrading the *i*.LON 100 server.

If the *i.*LON 100 server has not been previously installed in a network with the LonMaker tool and you want to perform the upgrade with the Configuration Plug-In, you need to follow these steps before upgrading the *i.*LON 100 server.

1. Make sure that the *i.*LON 100 server has been assigned a routable IP address. This is described in the *Connecting and Configuring the i.LON 100 Internet Server* section on page 12 of this document, as well as in the *i.LON 100 Internet Server Quick Start Guide.*

2. Create a new network with the LonMaker tool, and then add the *i.*LON 100 server to the network. Commission the *i.*LON 100 server with the New Device Wizard, which appears when you add the *i.*LON 100 server to the network. For more information on these tasks, see *Starting the Plug-in* on page 65.

3. Launch the Configuration Plug-In utility and then upgrade the *i.*LON 100 server, as described in the following section, *Performing the Upgrade.*

NOTE: If you do not plan on using the LonMaker tool, you can use FTP to upgrade your *i.*LON 100 server. To do so, FTP the files in the `iLon100\LonWorks\iLon100\images\iLon100 3.00` folder on the *i.*LON 100 CD into the root directory of your *i.*LON 100 server. Then, reboot the *i.*LON 100 server for the changes to take effect. You may want to back up the *i.*LON 100 server before upgrading it in this fashion. For instructions on rebooting the *i.*LON 100 server, and for more information on using FTP with the *i.*LON 100 server, see *Backing Up With FTP* on page 262.

Performing the Upgrade

1. Start the *i.*LON 100 Configuration Plug-In as described in Chapter 4 of this document, and select **Upgrade *i.*LON 100** from the **Tools** menu. The *i.*LON 100 Upgrade Wizard opens.

   Click **Next**. The *i.*LON 100 Upgrade Options window opens, as shown in Figure 2.24.
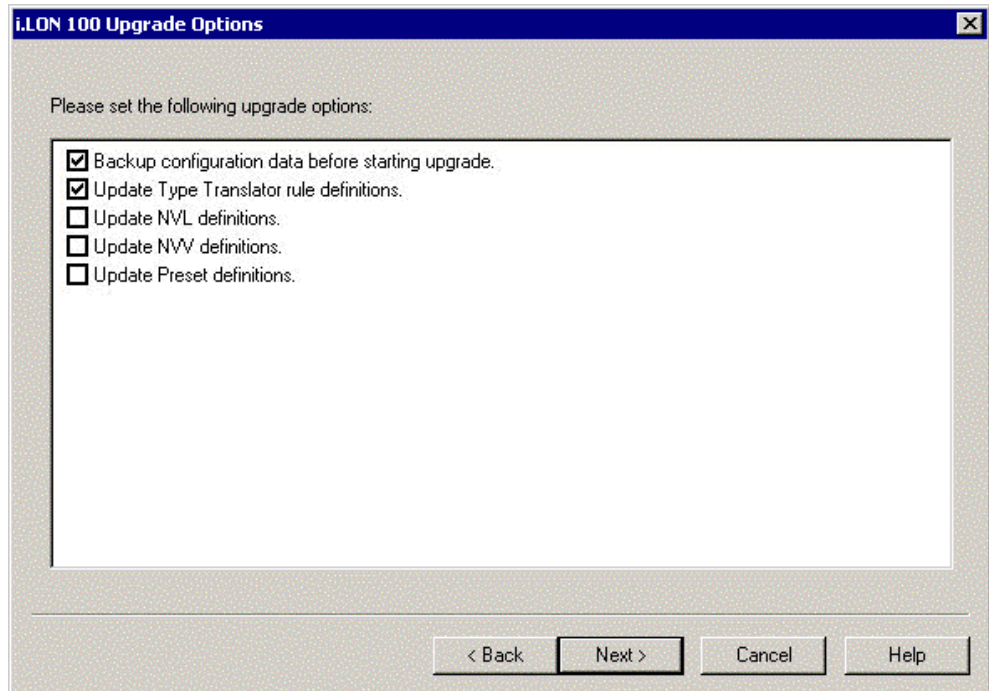
Figure 2.24 *i*.LON 100 Upgrade Options

2. Select the upgrade options you want to use. Table 2.21 describes the options you can choose from.

Table 2.21 Upgrade Options

Option	Description
Backup Configuration Data Before Starting Upgrade	Select this check box to have the *config* and *ltConfig* directories backed up to your computer before the upgrade procedure begins. This allows you to recover your configuration if the upgrade fails. The files will be backed up to the folder selected in the *i*.LON 100 Backup Folder window that opens later in this procedure. This option is set by default.
Update Type Translator Rule Definitions	Select this check box to have the predefined **Type Translator** rules updated. If you made changes to the **Type Translator** rules with the SOAP interface previously, clear this check box to preserve those changes after the upgrade. Any new rules you may have written will be unaffected by the upgrade. This option is set by default.
Update NVL Data Point Definitions	Select this check box to have existing NVL data point definitions updated. This will update the NVL data point location strings to be compatible with the current Web pages. Setting this option will delete any preset values you have created for NVL data points.

Option	Description
Update NVV Data Point Definitions	Set this option to have existing NVV data point definitions updated. This will update the NVV data point location strings to be compatible with the current web pages. Setting this option will delete any preset values you have created for NVV data points.
Update Preset Definitions	Set this option to have the preset definitions for your data points updated. This will update the presets for your data points to be compatible with the current web pages. Setting this option will delete any preset values you have created.

NOTE: If you are upgrading from the *e2* software, the options you will see on this window include the following: **Backup Configuration Data Before Starting Upgrade, Update Type Translator Rule Definitions,** and **Update NVL Definitions**. The first two options are enabled by default.

3. When you have selected the upgrade options, click **Next**. If your *i*.LON 100 server has insufficient disk space to complete the upgrade, the window shown in Figure 2.25 opens. Otherwise, proceed to step 4.
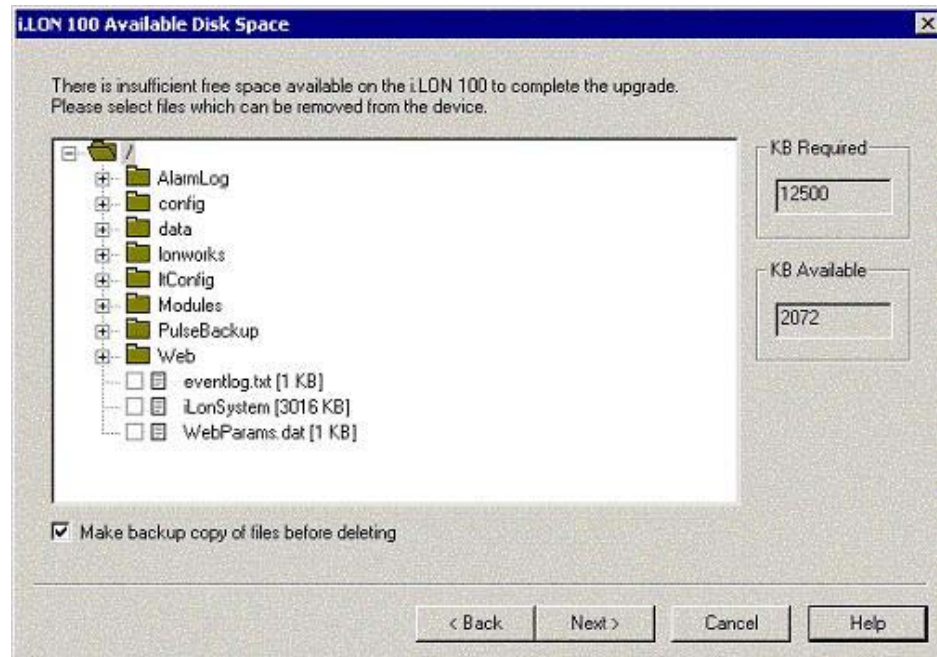
Figure 2.25 *i*.LON 100 Available Disk Space Window

This window displays a tree view of the *i*.LON 100 directory structure. **KB Required** shows how much memory must be free, and **KB Available** shows how much memory is currently available. Browse the *i*.LON 100 directory structure and select files to be deleted until **KB Available** is greater than **KB Required**.

4. Click **Next**. If you selected the **Backup Configuration Data Before Starting Upgrade** check box in the previous step, or selected files to be backed up in the **Available Disk Space** window, the *i*.LON 100 Backup

Folder window opens, as shown in Figure 2.25. If you did not select the **Backup Configuration Data Before Starting Upgrade** check box, proceed to step 5.
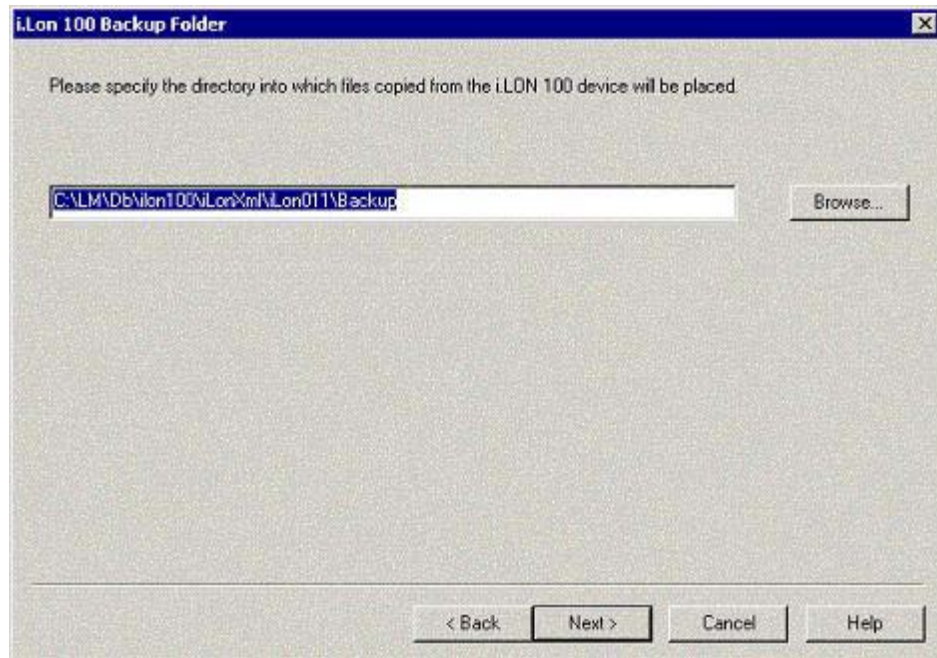
Figure 2.25 *i*.LON 100 Backup Folder

Set the path where the *i*.LON 100 data will be backed up before the upgrade procedure begins.

5. Click **Next**. The *i*.LON 100 Upgrade Status window opens, as shown Figure 2.26.
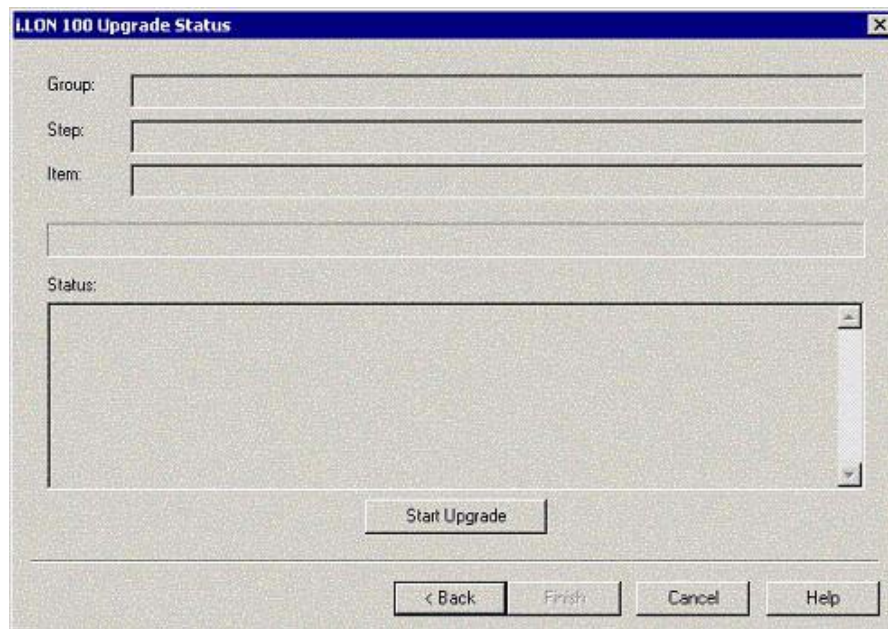
Figure 2.26 *i*.LON 100 Upgrade Status Window

6. Click **Start Upgrade** to begin the upgrade. The FTP dialog opens.

Figure 2.27 FTP Login Dialog

Set the options on the FTP Login dialog. The user name and password default to *iLON.* Leave the FTP Port property blank to use the default FTP port. For the Timeout property, specify the time, in seconds, after which the *i.*LON 100 Configuration Plug-in will stop trying to gain FTP access to the *i.*LON 100 if no connection has been established.

7. Click **OK**. This returns you to the *i.*LON 100 Upgrade Status window, which will show the status of the upgrade. If an error occurs during the upgrade, repeat the upgrade procedure. When prompted, indicate that you wish to **Resume** (as opposed to **Restart**) the upgrade.

8. If you are upgrading from the version 1.0 software, the following dialog opens once the upgrade completes. If you are upgrading from the *e2* software, you will not see this dialog, as the *i.*LON 100 server reboots automatically once the upgrade completes.
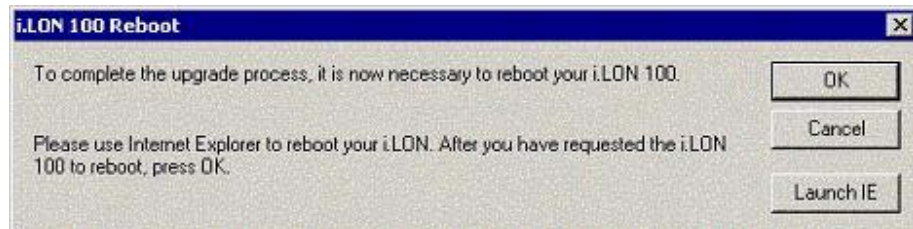
Figure 2.28 *i.*LON 100 Reboot Dialog

Click **Launch IE** to open Internet Explorer with the **Reboot** Web page selected. Once you have rebooted the *i.*LON 100, click **OK** to complete the process.

9. Click **Finish** to close the wizard.

Upgrading the i.*LON 100 Device*

Once you have finished upgrading the *i.*LON 100 firmware, you must upgrade the *i.*LON 100 server in any LNS database it is referenced in. See the documentation for your LNS tool for more information. If you are using the LonMaker tool, follow these steps:

1. In the LonMaker tool, right-click the *i.*LON 100 device shape and select **Replace** from the short-cut menu.

2. When prompted for the device template, select the **v12** version of the *i.*LON 100 template (FTT or PL)

3. When prompted for the Neuron ID, select **Manual Entry**. **T**he default Neuron ID will be the current value and does not need to be changed.

4. Once the upgrade procedure is completed, the LonMaker tool upgrades the *i*.LON 100 device in the LNS database. If you had any connections to the **nvoDeviceAlarm NV** on the **Node Object,** those connections will be removed and have to be recreated.

Converting an e3 Server to Release 1 or e2

You can convert an *i*.LON 100 *e3* server to a Release 1 or *e2* server. You may want to convert to Release 1 or *e2* to maintain compatibility with an existing installation. If you do this, you must use the Release 1 or *e2* documentation since the *i*.LON server will no longer have all the capabilities described in this document. After you do the conversion, you can covert the server back to the *e3* release as described in the previous section.

To convert an *i*.LON 100 *e3* server to Release 1 or *e2*, follow these steps:

1. Backup all files on your *i*.LON 100 server using FTP as described, see *Backing Up With FTP* on page 262.

2. Reformat the *i*.LON 100 flash drive using the console application as described in Appendix C.

3. Assign a routable IP address to your *i*.LON 100 server as described in the Release 1 or e2 user's guide*.*

4. To convert to Release 1, download the Release 1 files from Archived Downloads section at www.echelon.com/downloads. FTP the image files to the root directory of your *i*.LON 100 server.

5. To convert to the e2 release, open the **i.LON 100 Images Folder** in the **Echelon i.LON 100** program folder, navigate up one directory, and then open the **i.LON 100 1.10** folder.

6. FTP all the files and directories in the **i.LON 100 1.10** folder to the root directory of your *i*.LON 100 server.

7. Reboot the *i*.LON 100 server for the changes to take effect.

i.LON 100 Server Security

The *i*.LON 100 Internet Server uses a number of security measures:

- *MD5 Authentication.* When functioning as an RNI, the *i*.LON 100 Internet server uses MD5 authentication for all communication with the LNS Server, requiring a 16-byte authentication key.

- *Basic Authentication*. The *i*.LON 100 Web Server can be configured to use basic authentication to secure the web pages it serves. For more info see Appendix D, *Web Server Parameters Utility*.

- *Security Web Page*. The *i*.LON 100 Security Web page allows you to password protect or disable entirely FTP, Web server, dial-in, and RNI access to the *i*.LON 100 server.

- *Security Access Reset*. A security access reset is required to access the security Web page. A security access reset requires physical access to the *i*.LON 100 server hardware.

Security Access Reset

The Security Web page is only available after performing a security access reset. This Web page allows you to set the user name and password used for FTP access to the *i*.LON 100 server, the MD5 Authentication Key, and allows you to determine what methods may be used to access the *i*.LON 100 server. To ensure maximum security, Echelon recommends disconnecting the computer and *i*.LON 100 server from the local area network before performing a security access reset.

A security access reset of the *i*.LON 100 Internet Server requires physical access to the *i*.LON 100 server hardware. To perform a security access reset, follow these steps:

1. Remove the *i*.LON 100 server from the TCP/IP network and attach it to the computer using an Ethernet cable or a local server hub. This step is optional, but is likely to be necessary since performing a security access reset will temporarily reset the *i*.LON 100 server's IP address to 192.168.1.222.

2. Press and hold the service pin on the *i*.LON 100 server.

3. Reboot the *i*.LON 100 server while still holding down in the service pin. You can reboot the *i*.LON 100 server from the *i*.LON 100 Web pages by pointing your mouse cursor to **Setup** and then selecting **Reboot**, or you can reboot the *i*.LON 100 server manually by pressing the Reset button (just below the **Output** LEDs as described in the *i.LON 100 e3 Hardware Guide*.

4. Continue holding the service pin. In approximately 10 seconds, all the LEDs on the *i*.LON 100 server will illuminate.

5. Approximately 30 seconds from when the reboot began, the service LED will illuminate solid yellow. At this point you can release the service pin.

The *i*.LON 100 server enters security access mode as soon as you complete step 5. When the *i*.LON 100 server is in security access mode, its IP address, subnet mask, and gateway are temporarily changed to `192.168.1.222`, `255.255.255.0`, and `192.168.1.222`, respectively, they are changed back to the values specified on the Setup and Security Web pages once the *i*.LON 100 server exits security access mode (*i.e.* when the *i*.LON 100 server is rebooted). This IP address change could place the *i*.LON 100 server on a subnet that your computer cannot communicate with. In order to communicate with the *i*.LON 100 server after a Security Access Reset, you can either modify your computer's IP configuration to place it on the 192.168.1.* subnet, or enter the following command in the Windows Command Prompt window:

```
route add 192.168.1.0 mask 255.255.255.0 %COMPUTERNAME%
```

This command allows your computer to communicate with the *i*.LON 100 server even when they are not on the same subnet. This command does not persist through computer reboots, but you can add it to the startup script for your computer.

When in security access mode, you can access the Security and Restore Factory Defaults Web pages (as long as the reboot initiated in step 3 of the previous

procedure has completed). The *i*.LON 100 Web server is always enabled in security access mode, regardless of how the Enable Web Server property described in the following section is set.

i.LON 100 Security Web Page

To access the **Setup - Security** Web page, perform a security access reset as described above, and then point your browser to `192.168.1.222`. This opens the main *i*.LON 100 Web page. Point your mouse cursor to the **Setup** menu, and then select **Security** from the drop-down menu. You must wait for the reboot performed in the above procedure to complete before accessing the **Setup - Security** Web page.

Figure 2.29 shows the **Setup - Security** Web page:

Figure 2.29 Setup - Security Web Page

Set the properties on the Web page to configure the *i*.LON 100 server's security settings. Table 2.22 describes these properties. All fields marked with an asterisk require a reboot before the new values take full effect.

Table 2.22 Security Properties

Property	Description
Enable This Page Without Security Access Reset	Select this check box to allow the properties on this page to be modified without a security access reset. Note that this will significantly effect the security of the *i.*LON 100 server.
FTP User name	The FTP user name for the *i.*LON 100 server. This defaults to **ilon**. The user name can be up to 20 characters long and may contain letters, numerals, and the underscore character.
FTP Password Re-enter Password	The FTP password for the *i.*LON 100 server. This defaults to **ilon**. The password will appear as asterisks. The password can be up to 20 characters long and may contain letters, numerals, and the underscore character. Reenter the password in the **Re-enter Password** field.
Enable FTP	Select this check box to allow FTP access to the *i.*LON 100 server. Set the port the *i.*LON 100 server will use for FTP communication in the **Port** column. By default, this option is enabled and the port is set to 21.
Enable Web Server	Select this check box to allow HTTP access to the *i.*LON 100 server. Set the port the *i.*LON 100 will use for HTTP communication in the **Port** column. **If you disable this option, you will not be able to access the *i.*LON 100 Web pages after a reset.** If you need to re-enable HTTP access, you can reset this option by performing a security access reset, as described above. If you change this option, you must reboot the *i.*LON 100 server for this change to take effect. By default, this option is enabled and the port is set to 80.
Enable Downlink RNI Connections	Select this check box to allow the *i.*LON 100 server to be used as a Remote Network Interface (RNI). This will allow you to connect applications running on your PC to an LNS server, as you would with any LONWORKS network interface. For more information on using the *i.*LON 100 server as an RNI, see Chapter 12, *Sending ANSI/CEA-709.1 Packets Over IP with the i.LON 100 Server*
Enable Telnet	Select this check box to allow Telnet access to the *i.*LON 100 console application. The port for Telnet communication is always 23 and may not be changed. This option is disabled by default. For more information on the *i.*LON 100 server console application, see Appendix C, *i.LON 100 Console Application.*
Enable Remote Dial-in	Select this check box to allow an LNS Server to dial-in to the *i.*LON 100 server. See the *Creating and Configuring a Dial-up Connection* section earlier in this chapter for more information. This option is enabled by default.

Property	Description
Enable LonScanner Connections	Select this check box to allow users to connect to the *i*.LON 100 server using Echelon's LonScanner Protocol Analyzer, a utility that can be used to monitor and diagnose network traffic. If you select this option, enter the port number to use to connect to the protocol analyzer in the **Port** column. For more information on the protocol analyzer, see the *LonScanner Protocol Analyzer User's Guide*.
Raw MD5 Authentication Key **Text Secret Phrase**	You can enter either an MD5 authentication key or a text secret phase to be used for authentication when using the *i*.LON 100 server as an RNI. This value must match the value specified in the LONWORKS Interfaces control panel. Changing the key here is generally not necessary, as changing the key in the LONWORKS Interfaces application will normally automatically update the key on the *i*.LON 100 server, as long as the previous key was known by the control panel, or was the default key (all zeros). For more information on using the *i*.LON 100 server as an RNI and on the LONWORKS Interfaces application, see Chapter 12, *Sending ANSI/CEA-709.1 Packets Over IP with the i.LON 100 Server*.
IP-852 Router Raw MD5 Authentication Key	If you are using authentication with the IP-852 router, enter the MD5 authentication key to be used for authentication. This value must match the value specified for the Configuration Server being used on the IP-852 network. For more information on using the *i*.LON 100 server as an IP-852 router, see the *IP-852 Channel User's Guide* document.

Click **Submit** to save the changes you have made to this Web page. Click **Reset** to set all fields on this Web page back to the values they had when you opened the page.

3

Configuring the *i*.LON 100 Applications

This chapter describes how you can configure the *i*.LON 100 applications with either the *i*.LON 100 Web pages or the *i*.LON 100 Configuration Plug-In.

Configuration Plug-In / Web Page Overview

This chapter describes how to access the *i*.LON 100 server with the Configuration Plug-In and the *i*.LON 100 Web pages. You can use either of these tools to configure the *i*.LON 100 server. **Echelon strongly recommends that you use the Web pages to configure your *i*.LON 100 server, as the Configuration Plug-In is to be deprecated in the next release of the *i*.LON 100 server.**

This section lists features that are available with the Configuration Plug-In, but not with the Web pages, and vice versa:

- The *i*.LON 100 Web pages cannot be used to configure the Analog Function Block or the Type Translator functional blocks. These functional blocks are only available when using the Configuration Plug-In. For instructions to follow when configuring these applications with the Configuration Plug-In, see Chapter 11, *Type Translators and Analog Function Blocks*.

- The *i*.LON 100 Web pages cannot be used to create local data points on the *i*.LON 100 server. You can only create local data points on the *i*.LON 100 server with the Configuration Plug-In. For instructions to follow when creating local data points with the Configuration Plug-In, see Chapter 4, *Creating Data Points*.

- The Configuration Plug-in cannot be used to perform Web Binding. This feature is only available with the *i*.LON 100 Web pages, as described in Chapter 10, *Web Binding*.

- The *i*.LON 100 Configuration Plug-in cannot be used to create M-Bus and Modbus data points for the meter bus and Modbus devices on your network. You can use the Web pages for this purpose. These tasks are described in Chapter 2, *Configuring the i.LON 100 Internet Server*.

- The *i*.LON 100 Configuration Plug-in cannot be used to browse data point values. To browse NVL values, you can use the **View – Data Points** Web page described in Chapter 4. You can also use a network variable browser such as the LonMaker browser to browse the values of the corresponding network variables.

- If you are running the *e3* software and use the Web pages to modify an Event Calendar or an Alarm Notifier, those applications will become incompatible with the Configuration Plug-In. You should not use the Configuration Plug-In to modify an Event Calendar or an Alarm Notifier after it has been modified with the Web pages.

You can configure the rest of the applications on the *i*.LON 100 server with either the Configuration Plug-In or the Web pages. This document describes how to use the Web pages. For instructions to follow when using the Configuration Plug-In to configure any of the applications not mentioned in the list above, see the *i*.LON 100 e3 Plug-In Supplement.*

The remainder of this chapter describes how to begin configuring an *i*.LON 100 server with the Web pages, and with the Configuration Plug-In.

Getting Started With the *i*.LON 100 Web Pages

To access the *i*.LON 100 server and begin configuring its applications with the Web pages, follow these steps:

1. Make sure that you have assembled the *i*.LON 100 server as described in the *i*.LON 100 e3 Hardware Guide.*

2. Launch Internet Explorer 6 or later and point it to the IP address of your *i*.LON 100 Server. The *i*.LON 100 Internet Server Welcome Web page appears.

3. Click **Service**. You will be prompted for a user name and password. By default, this is `ilon`/`ilon`. Once you supply this, the Welcome Web page opens.
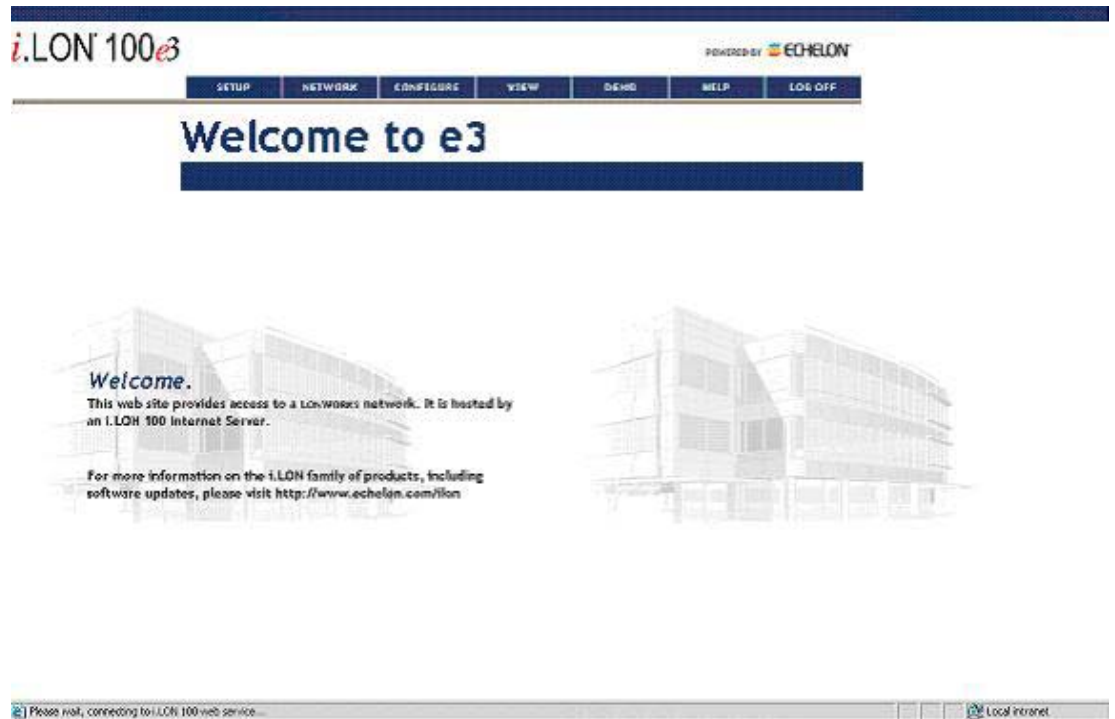
Figure 3.1 *i*.LON 100 Internet Server Main Web Page

4. Perform the initial setup tasks described in Chapter 2 of this document and then begin configuring the *i*.LON 100 server's applications, as described in the remaining chapters of this document.

Getting Started With the Configuration Plug-In

The *i*.LON 100 Configuration Plug-in is an LNS plug-in you can use to create and configure data points on the *i*.LON 100, and to configure the *i*.LON 100 scheduling, alarming, data logging, digital input and output, pulse counting, type translation, and analog function processing applications. You can start the plug-in from any LNS application that supports LNS plug-ins, such as the LonMaker Integration Tool.

This section provides background information you will need when using the Configuration Plug-in, and describes how to begin configuring your *i*.LON 100 server with the Configuration Plug-In. For more extensive details on the Configuration Plug-In, see the *i.LON 100 e3 Plug-In Supplement.*

You can use the Configuration Plug-In with the LonMaker tool or with a non-LonMaker LNS application. These use cases are described below:

- *Using the i.LON 100 with the LonMaker Tool and the Configuration Plug-In.* When using the *i*.LON 100 server with the LonMaker tool, the *i*.LON 100

Configuration Plug-in will be launched when you configure the *i*.LON 100 device shape or any *i*.LON 100 functional block shape. The *i*.LON 100 configuration property will keep track of the functional blocks that have been dropped in the LonMaker drawing, and will only allow you to configure the applications corresponding to those functional blocks that exist in the drawing.

- *Using the i.LON 100 with a non-LonMaker LNS Tool and the Configuration Plug-In.* When using the *i*.LON 100 with an LNS tool other than LonMaker, you can launch the *i*.LON 100 Configuration Plug-in by whatever method plug-ins are launched by that tool. The *i*.LON 100 Configuration Plug-in will list all *i*.LON 100 applications; you are responsible for configuring the correct applications.

To begin using the *i*.LON 100 Configuration Plug-in, follow these steps:

1. Use an LNS installation tool such as the LonMaker tool to add an *i*.LON 100 device to a LONWORKS network and commission it. If you are using the LonMaker tool, see the *Adding an i.LON 100 Shape to a LonMaker Drawing* section below for instructions. If you are using another LNS tool, see the documentation for the tool.

2. Optionally create one or more *i*.LON 100 functional blocks using the LNS installation tool. Typically, you add functional blocks corresponding to the *i*.LON 100 applications you want to use. If you are using the LonMaker tool, see the *Adding i.LON 100 Functional Blocks to a LonMaker Drawing* section below for instructions. If you are using another LNS tool, see the documentation for the tool.

3. Configure the *i*.LON 100 device or the *i*.LON 100 functional blocks. For example, to configure an *i*.LON 100 functional block using the LonMaker tool, right-click the functional block in the LonMaker drawing and then click **Configure** on the shortcut menu. If you are using another LNS tool, see the documentation for the tool. See the *Starting the Plug-in* section below for instructions.

*The i.*LON 100 Shapes Stencil

The **i.LON 100 Shapes** Visio stencil is installed with the *i*.LON 100 software. This stencil contains LonMaker shapes for the *i*.LON 100 device and the *i*.LON 100 functional blocks. This stencil should open automatically when a LonMaker network is opened. If this stencil does not open, follow these steps to open it:

1. In Visio, select the **File** menu, hover your mouse cursor over **Stencils**, and then select **Open Stencil** from the drop-down menu. The **Open Stencil** dialog opens.

2. Browse to LonWorks\LonMaker\Visio.

3. Select the iLON100.vss stencil.

Adding an i.*LON 100 Shape to a LonMaker Drawing*

You can add an *i*.LON 100 server to a LonMaker drawing. This allows you to place the *i*.LON 100 functional blocks in the drawing, and connect the input and output network variables on those functional blocks to other devices in the LONWORKS network. This in turn allows you to use the *i*.LON 100 server's

applications to monitor and control the network. See the *LonMaker User's Guide* for more information about the LonMaker tool.

To add an *i*.LON 100 shape to a LonMaker drawing, follow these steps:

1. Start the LonMaker tool.

2. Open or create a LonMaker network.

3. If this is the first time that you are opening the LonMaker network since installing the *i*.LON 100 software, register the **Echelon *i*.LON 100 Configuration Plug-in** and the **Echelon *i*.LON 100 Web Server Plug-in** in the **Plug-in Registration** window. See the *LonMaker User's Guide* for more information on this.

4. Drag the ***i*.LON 100 FTT** shape (for the free topology model) or ***i*.LON 100 PL** shape (for the power line model) from the *i*.LON 100 Shapes stencil to the LonMaker drawing. The New Device Wizard appears.

5. Step through the New Device Wizard. You can use the New Device Wizard to commission the *i*.LON 100 server. If your *i*.LON 100 server is connected to the network, you can commission it just like any other LONWORKS device. If you create any new network variables on any of the *i*.LON 100 functional blocks, you must commission the *i*.LON 100 device to add the new network variables to the *i*.LON 100 hardware.

> **NOTE:** If you have trouble commissioning the device on a power line channel due to inability to communicate with the device, you should increase the LonMaker **Transmit Timer** to at least 512 ms; to do this, open the **LonMaker** menu, click **Network Properties**, select the **Timing** tab, and then set this property.

Adding i.LON 100 Functional Blocks to a LonMaker Drawing

Once you have added the *i*.LON 100 shape to the LonMaker drawing as described in the previous section, you can add *i*.LON 100 functional blocks. The functional blocks supported by the *i*.LON 100 server are contained in the *i*.LON 100 Shapes stencil. Drag an *i*.LON 100 functional block shape to the LonMaker drawing in order to add it to the network design. See the *LonMaker User's Guide* for more information on adding functional blocks and creating network variable shapes.

Starting the Plug-in

To start the *i*.LON 100 Configuration Plug-in,, follow these steps:

1. Select an *i*.LON 100 device or functional block as required by your LNS installation tool, and then start the plug-in. For example, if you are using the LonMaker tool, select an *i*.LON 100 device or functional block shape, and then click **Configure** on the shortcut menu. The Specify *i*.LON 100 Configuration Data Source dialog appears, as shown in Figure 3.2.
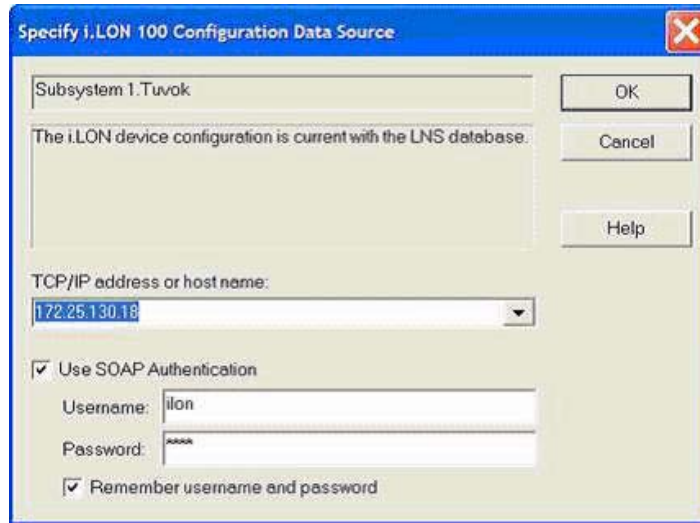
Figure 3.2 Specify *i*.LON 100 Configuration Data Source Dialog

2. Enter the IP address of the *i*.LON 100 server in the TCP/IP Address field.
    If you have configured the *i*.LON 100 server to use a port other than 80,
    you must specify the port with the UP address. For example, to specify
    port 8080 with the IP address shown in Figure 3.2, you would enter
    172.25.130.18:8080.

    Select the **Use SOAP Authentication** check box if you want the SOAP
    messages sent to and from your *i*.LON 100 server to be authenticated.
    The Username and Password both default to *ilon*.

3. Click **OK**.

4. Begin configuring the *i*.LON 100 server, as described in this document
    and in the *i.LON 100 e3 Plug-In Supplement.*

    NOTE: The *i*.LON 100 server must be connected to both the TCP/IP and
    LONWORKS network in order to configure it with the *i*.LON 100
    Configuration Plug-in. The *i*.LON 100 server should always be in sync
    with the LONWORKS application that opens it (*i.e.* in the LonMaker tool,
    you should be connected and OnNet).

    The *i*.LON 100 server must be commissioned and online and the
    LonMaker tool must be attached to the network with the *i*.LON 100 in
    order to use the *i*.LON 100 Configuration Plug-in.

4

Creating Data Points

Data points correspond to network variables on the
LONWORKS devices on your network that you can use to
monitor and control the network with the *i*.LON 100
applications. This chapter describes how to create and
manage data points.

Data Points

The *i*.LON 100 server's functional blocks and supporting applications are structured as shown in Figure 4.1.
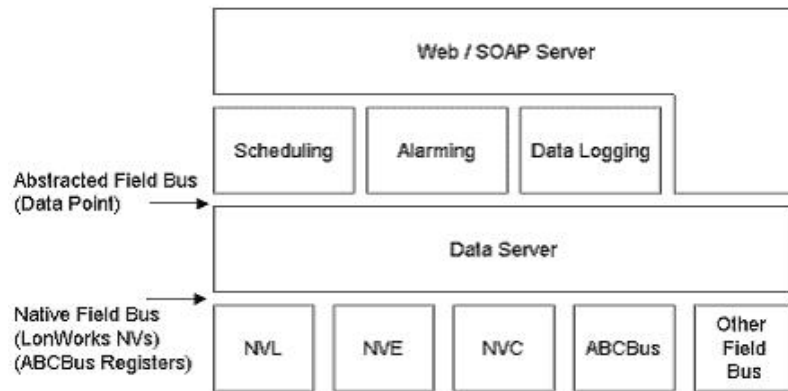
Figure 4.1 *i*.LON 100 Functional Blocks and Applications

Those familiar with other LONWORKS products are accustomed to thinking in terms of network variables. The *i*.LON 100 server works with network variables, and also works with data elements from other field busses. For example, an Event Scheduler can schedule an M-Bus or Modbus register just as easily as it can schedule a LonWorks network variable.

This flexibility uniquely positions the *i*.LON 100 server to integrate legacy devices from other field busses. The integration of other field busses with a LONWORKS network is accomplished by the *i*.LON 100's data server. The data server is a software component that **abstracts** any data element of any bus into a **data point**. The *i*.LON 100's functional blocks (**Scheduler**, **Data Logger**, **Alarm Generator**, etc.) operate on data points – not network variables. Generally speaking you can consider a data point to be the same thing as a network variable because a network variable **is** a LONWORKS data point.

The *i*.LON 100 server can support up to 800 data points.

Data Point Types

The *i*.LON 100 server firmware supports the following data points types: *local data points* (also called NVL data points), *external data points* (also called NVE data points), *constant data points* (also called NVC data points), *Modbus* data points and *Meter Bus data points* (also called M-Bus data points).

Local data points correspond to network variables that are defined locally on the *i*.LON 100 server. This includes any default network variables on an *i*.LON 100 functional block, and any dynamic network variables you might add to an *i*.LON 100 functional block. Local data points must be bound to one or more network variables on other devices in order to send or receive information on the LONWORKS network.

When you create a local network variable on the *i*.LON 100 server with an LNS installation tool, the *i*.LON 100 server will automatically create a local data point for that network variable. You can use any LNS installation tool that has the capability to add dynamic network variables, such as the LonMaker tool, for this purpose. See the *LonMaker User's Guide* for more information on creating dynamic network variables.

External data points correspond to network variables on other LONWORKS devices. For those familiar with the *i*.LON 1000 Web server, these are identical in concept to NVE tags, however the *i*.LON 100 server abstracts the implementation as described above so the syntax for NVEs on the *i*.LON 100 server differs from the syntax used on the *i*.LON 1000 server.

The *i*.LON 100 server's NVE driver keeps an XML file that contains all the information required to read and write external data points. This XML file is updated when you create NVE points using the *i*.LON 100 Configuration Plug-in. You can also write to this XML file manually; see the *i.LON 100 Programmer's Reference* for more information.

Because NVE points are explicitly polled or poked they consume no network variable resources on the referenced devices but often at the expense of increased network traffic. External data points can be created using the *i*.LON 100 Configuration Plug-in.

Constant data points are not associated with a network variable and are used to hold constant values. Constants are useful when making comparisons (for example, testing for alarm conditions) and when you need to supply a static value to some other device on your network. You can change the value of these data points with the SOAP/XML interface, as described in the *i.LON 100 e3 Programmer's Reference*. Local data points can be created using the *i*.LON 100 Configuration Plug-in.

M-Bus data points are used to communicate with Meter Bus (M-Bus) devices using the M-Bus protocol (EN 1434-3). M-Bus devices are connected to the *i*.LON 100 via the Serial Port. For more information on creating M-Bus data points, see Chapter 2 of this document.

Modbus data points are used to communicate with Modbus devices. For more information on creating M-Bus data points, see Chapter 2 of this document.

Data Point Presets

The *i*.LON 100 server allows you to define preset strings representing specific values for each data point. For example you might define a preset named **ON** for an `NVE_lampSw` data point (which is defined as a SNVT_switch) as 100.0 1. You might also define a preset named **ON** for an `NVL_heat_setpoint` data point (which is of type `SNVT_temp_f`) to be 22.

In both cases what you are saying is that you want to turn something on (lights or the heater), but the underlying data type needs to use 100.0 1 for lights, and a floating point value of 22° C for the HVAC system. The data server in the *i*.LON 100 server allows you to abstract the idiosyncrasies of the data types and use a string (ON) that makes sense to you to represent the value. This makes it much easier to work with the data point later. Whenever you want to drive an output network variable to a pre-defined value you set the data point to a pre-defined preset. For example, to turn the lights on at 8:00AM a scheduler block sets the data point `NVL_lampSw` to the ON preset, and the data server automatically translates ON to 100.0 1 as it updates the output network variable.

Another advantage of presets is that you can drive multiple outputs of different type simultaneously. For example, an Event Scheduler can turn a group of points "ON" at 8:00AM, and if you included both the data points discussed above in the scheduled group, the *i*.LON 100 server would send the value 22 on `NVE_heat_setpoint` at 8:00AM and 100.0 1 on `NVL_lampSw` at 8:00AM. This is an extremely powerful feature that allows the *i*.LON 100 server's built-in

applications to work with any kind of data type and field bus. This provides a layer of abstraction in the user interface, so the end user does not need to know about the underlying data structures of the various data points.

Data Points and the *i*.LON 100 Web Pages

As noted previously, you cannot create NVL and NVC data points with the *i*.LON 100 Web pages. However, the *i*.LON 100 Web pages can be used to configure, read and write, and define presets for the data points on the *i*.LON 100 server. These tasks are described in the following sections.

NOTE: You can create M-Bus and Modbus data points with the *i*.LON 100 Web pages, as described in chapter 2, *Configuring the i.LON 100 Internet Server*.

Reading and Writing Data Point Values

You can use the **View – Data Points** Web page to read and write to the values of the data points on your *i*.LON 100 server. To do so, follow these open the *i*.LON 100 server's Web site, point your mouse cursor to the **View** menu, and then select **Data Points** from the drop-down menu. The **View – Data Points** Web page opens.

Figure 4.1 View – Data Points Web Page

To read and write to the value of a data point with the **View – Data Points Web** page, follow these steps:

1. Click a data point in the data point tree to select it. You can select multiple data points by holding down the <Ctrl> or <Shift> keys just like Windows Explorer.

2. Click **Add Points** to display the current value of the selected data point, as well as several other settings, point on the right-hand side of the page. Table 4.1 describes the properties you will see for each data point.

Table 4.1 Data Point Value Properties

Property	Description
Index	The index value assigned to the data point.
Priority	The priority to assign to the data point. This must be a value between 0 (high priority) or 255 (low priority). The priority you assign here must be equal to (or higher than) than the priority used by the last application to write to the data point's value. Similarly, if you successfully update the data point's value, the next application to write to the data point must specify a priority equal to or higher than the priority entered here.
Location	Read-only. The data point's location in the data point tree.
Point	Read-only. The name of the data point.
Value	The current value of the data point.
Unit	Read-only. The units of measurement associated with the data point.
Status	Read-only. The current status of the data point.

3. Click **Submit** to save the changes and write to the value of the data point.

Modifying the Data Point Tree

On the left side of the **Data Point – View** Web page is a tree that contains all the data points on the *i*.LON 100 device. The tree contains the following icons:

Locations (◆) – Locations are analogous to folders in Windows Explorer. Locations can contain data points and other locations. Every location has a '+' symbol next to it that can be clicked to expand the location.

Data points (▰) – Data points are analogous to files in Windows Explorer. Data points correspond directly to data points on the *i*.LON 100 server. Select a data point in the tree to view and modify its configuration.

The following sections describe ways you can modify the data point tree. You can modify the data point tree from the **View – Data Points** Web page, or from the **Configure – Data Points** Web page described later in the chapter.

Create a Location

You can create new locations to organize the data points on the *i*.LON 100 server. Right-click any location in the tree and then select **New Location** from the short-cut menu. A pop-up window will prompt you for the name of the new location. Enter a name and click **OK** to have the new location added beneath the selected one. If a location does not have at least one data point in it, it will be removed when the browser is closed.

Cut/Paste

You can cut and paste individual data points or entire locations. To cut and paste, follow these steps:

1. Click a data point or location to select it. Selecting a location automatically selects all sub-locations and data points for that location. You can click multiple data points and locations to select all of them. To unselect a selected data point or location, click it again.

2. Once you have selected one or more data points and locations, right click one of the selected items and select Cut from the short cut menu. The selected items will become transparent.

3. Right-click a location and select Paste from the drop-down menu. All items selected in step 1 will be moved to the selected location.

Rename

You can rename a location by right-clicking it and selecting **Rename** from the shortcut menu. A pop-up window will prompt you for the new name of the location.

Once you have finished reorganizing the data point tree, click **Submit** to save changes. The modified data point tree will now appear on the **Configure** and **Browse** Web pages.

Configuring Data Points

You can use the *i*.LON 100 Web pages to configure existing data points on the *i*.LON 100.   To configure *i*.LON 100 data points, follow these steps:

1. Point your mouse cursor to the **Configure** menu and then select **Data Points** from the drop down list. The **Configure – Data Points** Web page opens.
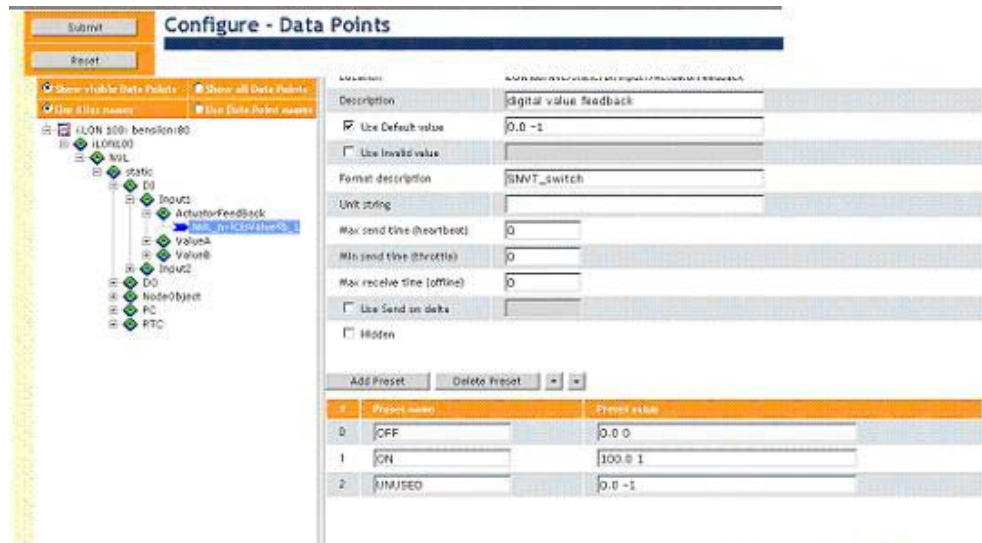
Figure 4.2 Configure – Data Points Web Page

2. Select a data point to view and modify its configuration. You can select multiple data points by holding down the <Ctrl> or <Shift> keys. If multiple data points are selected, any changes made to the data point properties on the right will be made for all selected data points.

NOTE: Click the **Show All Data Points** button to include all data points defined on the *i*.LON 100 server in the data point tree. Click the **Show Visible Data Points** button to include only those data points that are currently being used by an *i*.LON 100 application. Click **Use Data Point Names** or **Use Alias Names** to decide whether you want to view the data points by their names, or by their aliases.

3. Modify the properties on the right-hand side of the page. Table 4.2 describes these properties.

Table 4.2 Data Point Configuration Properties

Property	Description
Description	The description of the selected data point. This field can contain up to 227 characters. This value has no effect on the function of the data point and is used to input description information.
Alias Name	Enter the alias name of the data point. Aliasing allows a network variable to have multiple selector values.
Default Value	The default value for the data point.
Use Default Value	If this check box is selected, the data point will be set to the **Default Value** each time the *i*.LON 100 server is reset. If this check box is not selected, the data point value will be set to 0 and the status will be set to AL_NUL when the *i*.LON 100 server is reset.
Use Invalid Value	Select this check box and enter a value to define the invalid value for the data point. If the data point is updated to this value, its status will be set to AL_INVALID. You could set up an Alarm Notifier to send an alarm notification each time this happens.
Format Description	A description of the format of the data point. By default, this description is taken from the type file that defines the format. For NVL data points, this property is read-only. If you select multiple data points, you cannot modify this property.
Unit String	The units associated with the data point format. By default, this description is taken from the type file that defines the format.
Max Send Time (Heartbeat)	Enter a value, in seconds. This sets maximum time between data point updates from the *i*.LON 100 server. If this amount of time elapses, an update will be sent even if the value has not changed

Property	Description
Min Send Time (Heartbeat)	Enter a value, in seconds. This sets the minimum time between data point updates from the *i*.LON 100 server. Setting this property reduces network traffic by limiting the number of updates that are sent. If the value changes in less than this time, only the first and last updates will be propagated to the network. For example, if this property is set to 5 seconds, and 4 updates occur within a 5 second period, only the first and fourth updates will be propagated to the network.
Max Receive Time (Offline)	Enter a value, in seconds. If this time period expires before the value of a data points is updated, the data point's status will be set to AL_OFFLINE. This property applies to input local data points and all external data points (i.e. all points read by the *i*.LON 100). Set this property to 0 to disable maximum receive time.
Use Send On Delta	Select the **Use Send On Delta** check box to if you want the value of the data point to be sent to all registered applications using it (e.g. Data Logger, Alarm Notifier, Web Binder) each time it is updated.
	When selected, you can set the property to 1 (using the text box to the right of the check-box). If you set the Send on Delta property to 1 for data points using structured types (e.g. SNVT_switch or SNVT_setting) or to a specific value for scalar types, the updated will only be sent to the applications when the value of the data point changes.
	If the Send on Delta property is unchecked, the *i*.LON 100 server will use the defaults for every application. For example, the default for the Web Binder is for updates to be sent only if the value changes. This is to avoid that for example a modem connection will be created on every heartbeat.
	The default for all the other applications is 0, meaning that they will receive every update, regardless of whether the value of the data point changes.
Hidden	Set this option to hide this data point when browsing through *i*.LON 100 data points. You can see hidden data points by selecting the Show All option that appears above the tree view of the *i*.LON 100 data points on the left side of the Web page.

4. Click **Submit** to save changes.

Adding and Removing Presets

You can also create presets for data points with the **Configure – Data Points Web** page. To do so, follow these steps:

1. Click a data point in the data point tree to select it. You cannot create

presets for multiple data points

2. Click the **Add Preset** button on the right side of the Web page. A new preset will appear in the lower right corner of the Web page. Each preset consists of a **Preset Name** and a **Preset Value**.

   In Figure 4.2, three presets exist for the selected data point – **ON**, **OFF**, and **UNUSED**.

3. Enter the name for the new preset in the **Preset Name** box. This is the name by which *i*.LON 100 applications will refer to the new preset.

4. Enter the value that should be applied to the data point when the preset is used in the **Preset Value** box. This value should be a legitimate value for the selected data point.

5. Click **Submit** to save changes.

   To remove a preset later, select it and click **Delete Preset**.

Default presets have been chosen for some network variable types so new data points that use one of these types will automatically have presets defined. For example, a **SNVT_switch** type data point will have presets for **ON (**100.0 1) and **OFF** (0.0 0) by default. These defaults may be changed by modifying the `/root/config/software/dataserver/DPT_Preset.xml` file on the *i*.LON 100 server. See the *i*.LON *100 e3 Programmer's Reference* for instructions to follow when modifying XML files on the *i*.LON 100 server.

Data Points and the *i*.LON 100 Configuration Plug-In

This section describes how to create and configure NVL, NVC and NVE data points with the Configuration Plug-In. You cannot create M-Bus or Modbus data points with the Configuration Plug-In.

Creating and Viewing Local Data Points (NVLs)

When you create a local network variable on the *i*.LON 100 server with an LNS installation tool, the *i*.LON 100 server will automatically create a local data point for that network variable. You can use any LNS installation tool that has the capability to add dynamic network variables, such as the LonMaker tool, for this purpose. See the *LonMaker User's Guide* for more information on creating dynamic network variables.

NOTE: The LonMaker tool maintains private information in the Description property of dynamic network variables. Echelon recommends that you do not modify this property with any tools other than the LonMaker tool or the LonMaker browser.

You can manage all local data points on functional blocks that have been defined on an *i*.LON 100 server using the *i*.LON 100 Configuration Plug-in. To view local data points (NVLs), start the Configuration Plug-in as described in Chapter 3 of this document, and select the **Data Points** tab. The dialog shown in Figure 4.3 opens.
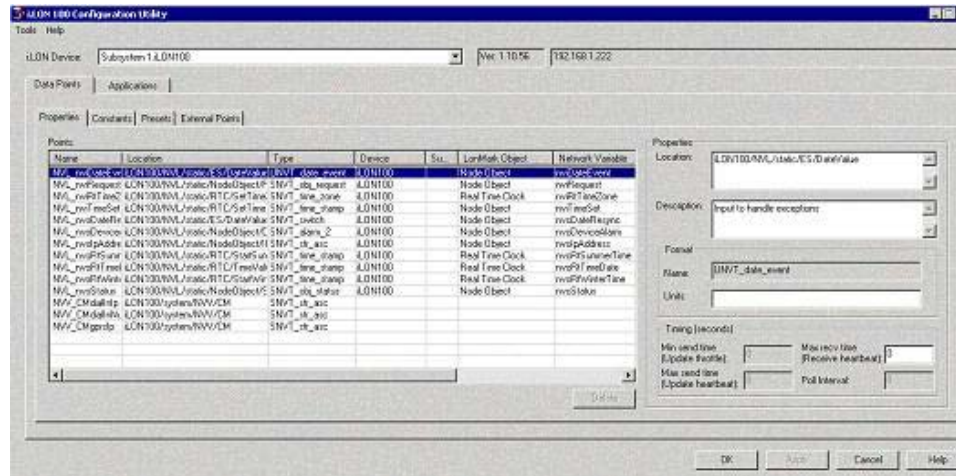
Figure 4.3 Local Data Points

This tab displays all of the data points that exist on defined functional blocks on the *i*.LON 100 server. Local data points are created for all network variables on *i*.LON 100 functional blocks in the LONWORKS network, as well as all network variables on the **Real Time Clock** and **Node Object** functional blocks, which cannot be configured using the *i*.LON 100 Configuration Plug-in. If a dynamic data point is created on an *i*.LON 100 functional block while the *i*.LON 100 Configuration Plug-in is running, an associated NVL data point will be created once a resynchronization is performed. See the *i.LON 100 e3 Plug-In Supplement* section in Chapter 3 for more information on resynchronization with the Plug-In.

You can use the **Delete** button to remove NVL data points that no longer have an associated network variable. This can happen if you remove a network variable from the LONWORKS network and then resynchronize the *i*.LON 100 Configuration Plug-in

The name of a local data point uses the following syntax: **NVL_<network variable programmatic name>**. Using the LonMaker tool, you can find the programmatic name of a network variable by right-clicking the network variable shape, selecting **Properties** from the shortcut menu to open the **Network Variable Properties** dialog, and reading the **Programmatic Name** field of the **Description** tab. The programmatic name may not be the same as the network variable name. See the *Network Variable Programmatic Names* section below for more information.

You can sort the data points on this tab by clicking any of the column headings, just as you would in Windows Explorer. You can resize any of the columns by dragging the edges of the column header.

Network Variable Programmatic Names

The network variable programmatic name is used to determine the name of the associated local data point. All programmatic network variable names on a device must be unique. For the network variables that are included with the *i*.LON 100 server, as well as any network variables that you create on an *i*.LON 100 server with the LonMaker tool, the following rules are used to make the names unique:

- For a static network variable (*i.e.* a network variable included with the *i*.LON 100) on arrays of functional blocks, the programmatic network variable name is:

     <NV name>[<FB array index>]

     <NV name> is the name of the network variable as it appears on the functional block. **<FB array index>** is the index of the functional block within the array.

     For example, the **nviAnEnable** network variable on the **Alarm Notifier[4]** functional block has a programmatic name of **nviAnEnable[4]**. The associated local data point is **NVL_nviAnEnable[4]**.

- For a dynamic network variable (i.e. a network variable that you create), the programmatic network variable name is:

     NVname_FBindex

     NVname is the name of the network variable as it appears on the functional block. **FBindex** is the 3-digit functional block index of the functional block on which the network variable appears. Each functional block on a device has a unique functional block index.

     For example, if you drag an **Alarm Notifier** shape to your LonMaker drawing and associate it with **Alarm Notifier[1]**, an **nviAnAlarm** network variable is dynamically created. This network variable will have a programmatic name of **nviAnAlarm_097**. 097 is the functional block index of **Alarm Notifier[1]** on the *i*.LON 100 device. The associated local data point is **NVL_nviAnAlarm_097**. The network variable label in the LonMaker functional block will be **nviAnAlarm**. By right-clicking a selected network variable shape on a LonMaker Functional block and selecting **Properties**, you can determine the LNS programmatic name of the Network variable, **nviAnAlarm_097**.

Creating and Viewing External Data Points (NVEs)

You can create an external data point using the *i*.LON 100 Configuration Plug-in. An external data point is a data point associated with a network variable on another device on the network. To create an external data point, follow these steps:

1. Start the *i*.LON 100 Configuration Plug-in as described in the *Starting the Plug-in* section on page 65.

2. Select the **Data Points** tab and then the **External Points** tab. The **External Points** tab appears as shown in Figure 4.4.
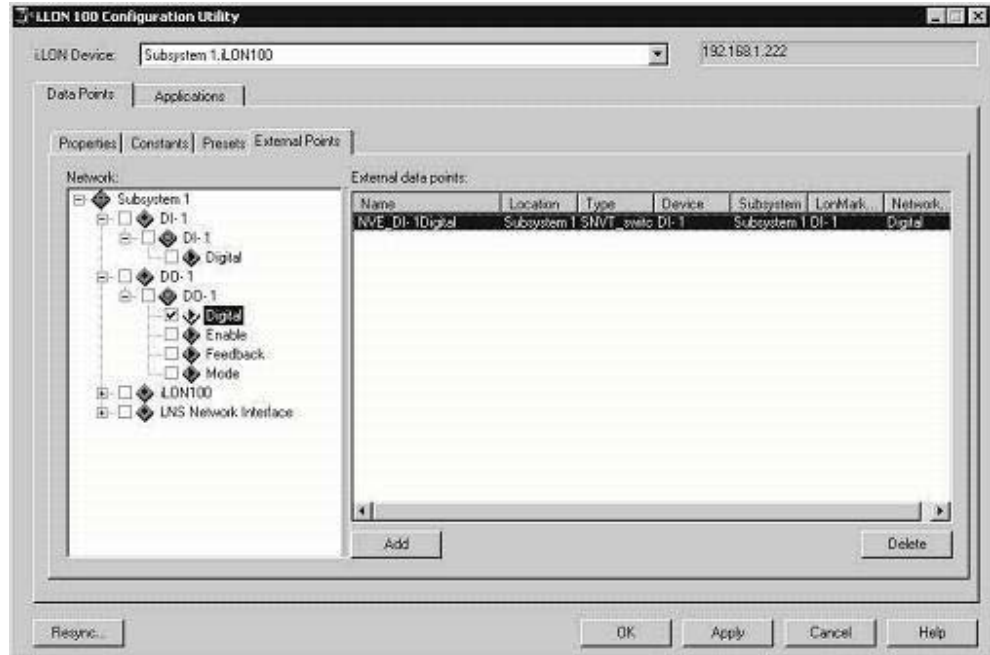
Figure 4.4 External Data Points Tab

3. The Network pane contains a tree listing the devices on the network, and the network variables included on each device. Choose the network variable you want to create external data points for by selecting the appropriate check box. If you select the check box next to a device or functional block, external data points will be created for each network variable on the device or functional block.

4. Click **Add**. The Specify Names for NVE Data Points dialog opens.
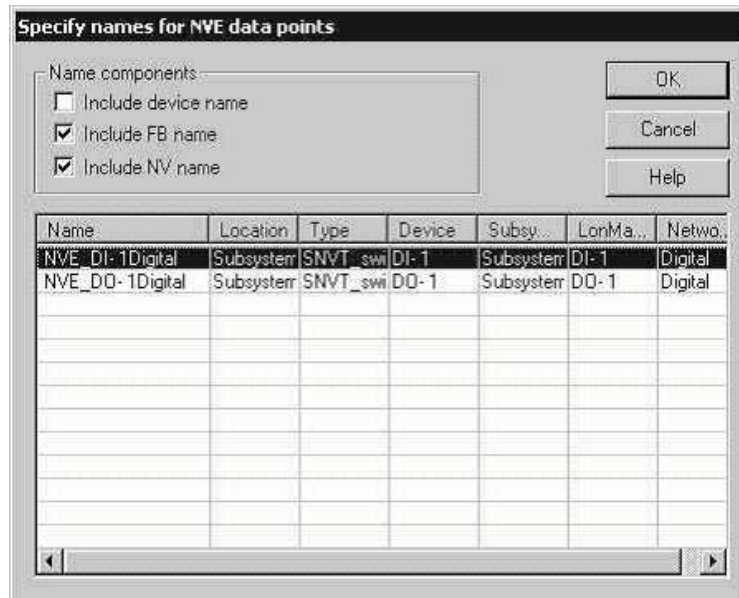
Figure 4.5 Specify Names for NVE Data Points Dialog

5. Use the **Names Components** check boxes to specify how the name(s) for the new data point(s) will be determined. Table 4.3 describes these options.

Table **4.3** Names Components Options

Property	Description
Include Device Name	Select this check box to include the device name in the data point name.
Include FB Name	Select this check box to include the functional block name in the data point name.
Include NV Name	Select this check box to include the network variable name in the data point name.

As you set and clear these options, you will see the resulting name in the **Name** column. The format of the name is:

NVE_[*deviceName*][*fBlockName*][*nvName*][*index*]

An **index** will only be created if the options that you set are not sufficient to create a unique name for the new external data point. For example, an index would be created if you only set **Include NV Name** and you create external data points for two or more identically named network variables on different functional blocks. The name can have a maximum of 25 characters. If it is longer, it will be truncated. You can manually change the name of a data point by double-clicking the name. The name you specify must be unique and start with **NVE_**, any spaces and bracket characters ('[' ']') in the name will be removed, and any hyphens ('-') will be changed to underscores ('_').

6. Click **OK** to create the new external data point(s). These data points will appear in **External Data Points**. They will all appear in the **Properties** tab.

Creating and Viewing Constant Data Points (NVCs)

You can create a constant data point with the *i*.LON 100 Configuration Plug-in. A constant data point always maintains the same value, and is useful when making comparisons—for example, testing for alarm conditions. A constant data point is also useful when you need to supply a static value to some other device on your network. To create a constant data point, follow these steps:

1. Start the *i*.LON 100 Configuration Plug-in as described in the *Getting Started With the Configuration Plug-In* section on page 63.

2. Select the **Data Points** tab, and select then the **Constants** tab. The **Constants** tab opens.
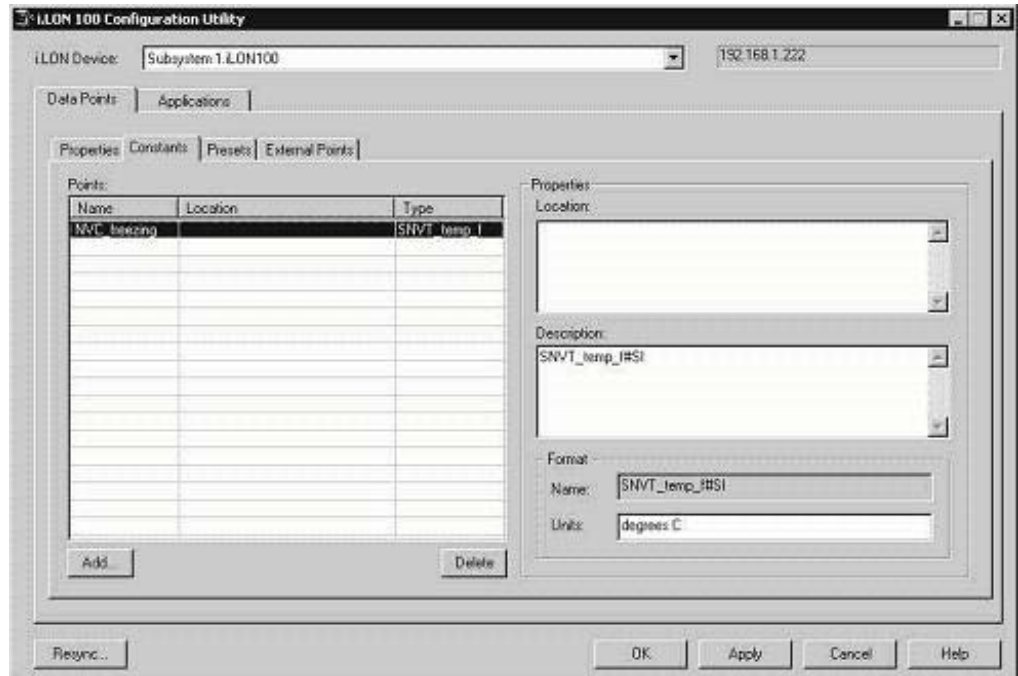
Figure 4.7 Constants Tab

3. Click **Add**. The **Set Data Point Format** dialog opens.
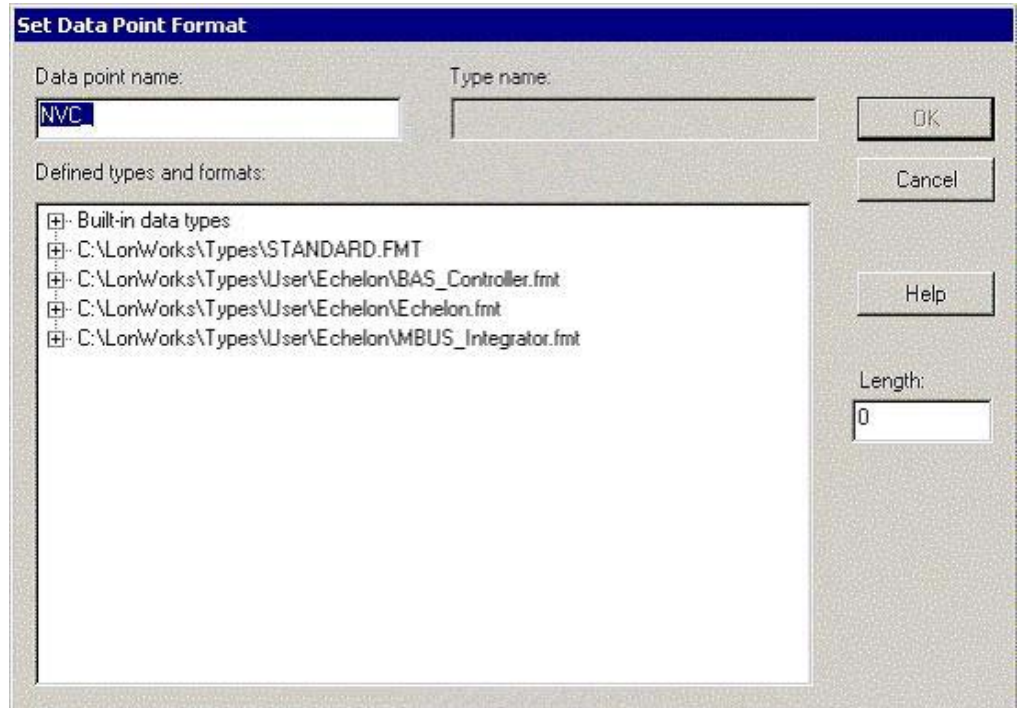
Figure 4.8 Set Data Point Format Dialog

4. Enter a name for the data point in **Data Point Name**. This field contains **NVC_** by default.

5. Select a network variable type and format for this constant. You can choose from any data type that is available in the resource catalog. All available resources are displayed in a tree view. The top level of the tree

shows all available resource files plus the built in data types. Expand the tree to view the resources within a resource file set. The selected resource files must be available on both the computer and on the *i*.LON 100 server. Resource files on the computer are maintained by the resource catalog. Resource files on the *i*.LON 100 server are kept in /root/lonworks/types directory of the *i*.LON 100 server.

6.   Click **OK**. The constant data point will be added to the **Points** list on the left side of the **Constants** tab.

7.   Use the **Data Point Presets** tab to set the default value of this constant, as shown in Figure 4.9. This is the value that the data point will be set to. This step is described in more detail in the next section.
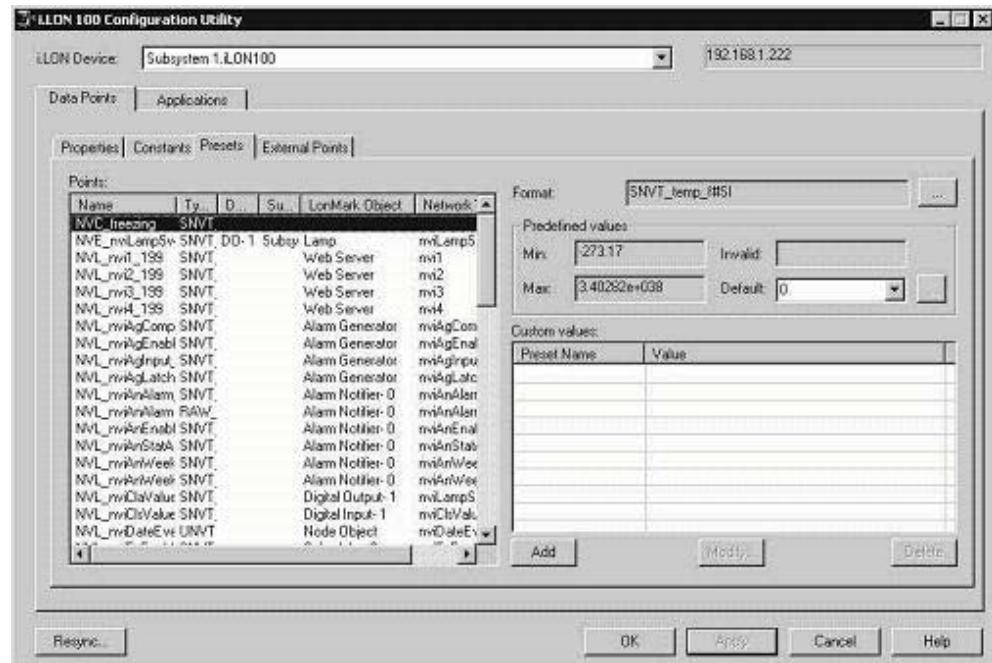
Figure 4.9 Data Point Presets Tab

Creating Data Point Presets

You can create predefined values for local, external, and constant data points with the Configuration Plug-In. To create presets, follow these steps:

1.   Start the *i*.LON 100 Configuration Plug-in as described in Chapter 2 of this document.

2.   Select the **Data Points** tab and then the **Presets** sub. The **Presets** tab is shown in Figure 4.9.

3.   Select a data point from the **Points** list. If the type of the selected data point has a predefined minimum, maximum, or invalid value, these values will appear in the **Min**, **Max**, and **Invalid** fields. See the resource file documentation for the data point type for more information. For standard LONMARK resource files, this information is available at types.lonmark.org. For user resource files, this information is provided by the resource file manufacturer.

You can sort the data points on this tab by clicking any of the column headings, just as you would in Windows Explorer. You can resize any of the columns by dragging the edges of the column header.

4. If multiple formats are available for the data point type, set the format for the point. Click the ⬜ button next to **Format** to open a dialog that allows you to select a format from all available resource files. Changing the type of a data point automatically changes the type of the corresponding network variable.

5. Optionally set a **Default** value. If this is a structure type data point, click the ⬜ button to set each field separately. The **Default** value is used to set the data point value after a reboot or when the *i*.LON 100 server is put into override using a network tool. It cannot be referenced by the other *i*.LON 100 functional blocks like the custom values described below.

    NOTE: If an output data point has no default value (i.e. **Default** is **<none>**), it cannot send a heartbeat.

6. To create additional presets for this data point, click **Add**. The **Specify New Preset Name** dialog appears, as shown in Figure 4.10.

Figure 4.10 Specify New Preset Name

    Enter the name of the new preset and click **OK**. The new preset name appears in the **Custom Values** list. Alternatively, you can double-click a **Custom Values** list entry and type preset names and values directly into the list.

7. Select the new preset name. If this data point is a structure-type data point, you can click **Modify** to set each field of the structure separately. Otherwise, click the **Value** column next to the preset name to enter a value that will correspond to the preset name.

5
Alarming

This chapter describes how to use the *i*.LON 100 alarming applications. This includes the Alarm Generator functional block, which you can use to generate alarms based on monitored conditions, and the Alarm Notifier functional block, which you can use to send emails and update data points based on alarm conditions.

Alarming Overview

The *i*.LON 100 server contains two applications that control alarming—the **Alarm Generator** and the **Alarm Notifier**. The *i*.LON 100 server can use the Alarm Generators to monitor up to 40 data points, and trigger alarms by setting the status of an input data point when specified alarm conditions occur. The Alarm Generator can optionally update a SNVT_alarm and/or SNVT_alarm_2 data point for LONMARK integration with other alarming devices.

The **Alarm Notifier** functional blocks monitor the status of data points, as well as conditions sent via SNVT_alarm and SNVT_alarm_2 data points. Alarm Notifiers can be configured to respond to an alarm by updating one or more data points, sending email messages, and recording the alarm into a log file. A single Alarm Notifier can be configured to monitor multiple inputs.

Alarm Generator

You can create up to 40 Alarm Generators per *i*.LON 100 server. An Alarm Generator generates alarms based on the values of any of the *i*.LON 100 data points. When you create an Alarm Generator, you will specify an *input data point*, and either a *compare data point* (if you want to monitor the value of the input data point against the value of another data point) or a *compare value* (if you want to monitor the value of the input data point against a constant value).

The Alarm Generator compares the values whenever the input data point or the compare data point is updated. You will select the function the Alarm Generator will use to make the comparison. If the result of the comparison is true, an alarm will be generated, and the status of the input data point will be updated to an alarm condition.

For example, you could select Greater Than as the comparison function. In this case, the Alarm Generator would generate an alarm when either data point is updated, and the value of the input data point is greater than the compare value. The Alarm Generator includes the following binary comparison functions: Less Than, Less Than or Equal, Greater Than or Equal, Equal, and Not Equal.

The Alarm Generator also includes an analog comparison function. When you select this comparison function, you will specify four offset limits for the Alarm Generator. The four offset limits allow you to generate alarms based on how much the value of the input data point exceeds, or is exceeded by, the value of the compare data point. The Alarm Generator generates an alarm when either data point is updated and the difference between their values exceeds any of the offset limits.

You will define a hysteresis level for each alarm-offset limit when you use the analog comparison function. After an alarm has been generated based on an offset limit, the value of the input data point must return to the hysteresis level defined for that offset limit before the alarm clears, and before another alarm can be generated based on that limit. As a result, the Alarm Generator will not generate an additional alarm each time the input data point is updated after it reaches an alarm condition, but before it has returned to a normal condition.

All of the comparison functions have additional features that will allow you to throttle alarm generation. You can specify an interval that must elapse between alarm generations for a single data point. You can also define an interval that must elapse after an alarm has returned to normal status before that alarm will

be cleared. These features prevent the Alarm Generator from triggering multiple alarms each time the input data point reaches an alarm condition.

You can optionally select up to two *alarm data points* for each Alarm Generator: one of type SNVT_alarm and one of type SNVT_alarm_2. The status of these data points will be updated to an alarm condition each time the Alarm Generator state changes (i.e. passive to active *or* active to passive).

Alarm Notifier

You can also create up to 40 Alarm Notifiers per *i.*LON 100 server. An Alarm Notifier logs alarm conditions and generates email messages and data point updates each time an alarm condition occurs. You can use an Alarm Notifier to provide notification of alarms generated by any device that produces a SNVT_alarm or SNVT_alarm_2 output, including the *i.*LON 100 server. For example, you can use an Alarm Notifier to provide alarm notification of alarms produced by the Alarm Generators on your *i.*LON 100 server.

You will specify a group of input data points for each Alarm Notifier. The Alarm Notifier will read the status of these data points each time they are updated to determine if the data point's status has been changed to a value that you have defined as an alarm condition. If it has been updated to such a value, an alarm notification will be made.

You can specify one or more output data points for each Alarm Notifier. These data points will be updated each time an alarm notification occurs. You can also specify an email profile for each Alarm Notifier. An email message will be sent to the addresses specified for that email profile each time an alarm notification occurs. You can specify the message text, subject heading, and attachment to be included with each email notification. Email profiles allow you to notify different people when different alarms occur. This is useful if different groups of people need to receive notifications about the various alarm conditions that can occur on your network.

Each Alarm Notifier generates a log file. It will add an entry to this log file each time it causes an alarm notification. You can find these log files in the `/root/AlarmLog` directory of the *i.*LON 100 server. These files are named `histlogX`, where X represents the index number assigned to the Alarm Notifier when it was created. An Alarm Notifier will not generate a log file until it has generated an alarm notification.

The *i.*LON 100 server does not limit how much alarm data can be logged. However, you should maintain at least 1024KB of free disk space on the *i.*LON server. You can view the amount of free disk space using the **Setup - System Info** Web page.

In addition, the Alarm Notifier generates a summary log that summarizes the log entries made by all Alarm Notifiers that were classified as active alarms. This file is called sumlog0, and can also be found in the `/root/AlarmLog` directory of your *i.*LON 100 server.

Alarming with the *i.*LON 100 Web Pages

This section describes how to create and configure Alarm Generators and Alarm Notifiers with the *i.*LON 100 Web pages.

Configuring an Alarm Generator

You can configure an Alarm Generator functional block to generate alarm updates in response to a set of user-defined input conditions. An alarm update does not result in an alarm notification. To provide notifications of an alarm update, you can connect the Alarm Generator's outputs to one or more Alarm Notifiers, as described in the *Providing an Alarm Notification* section on page 91.

To configure an Alarm Generator with the *i*.LON 100 Web pages, follow these steps:

1. Open Internet Explorer 6 or later, point it to the URL of the *i*.LON 100, and log in to the *i*.LON 100 server. This opens the *i*.LON 100 Web page.

2. Point your mouse cursor to **Configure**, and then select **Alarm Generator** from the drop-down menu. The **Configure - Alarm Generator - Main** Web page opens.

3. Click **Add Alarm**. This will activate the fields and properties on the Web page, as shown in Figure 5.1.
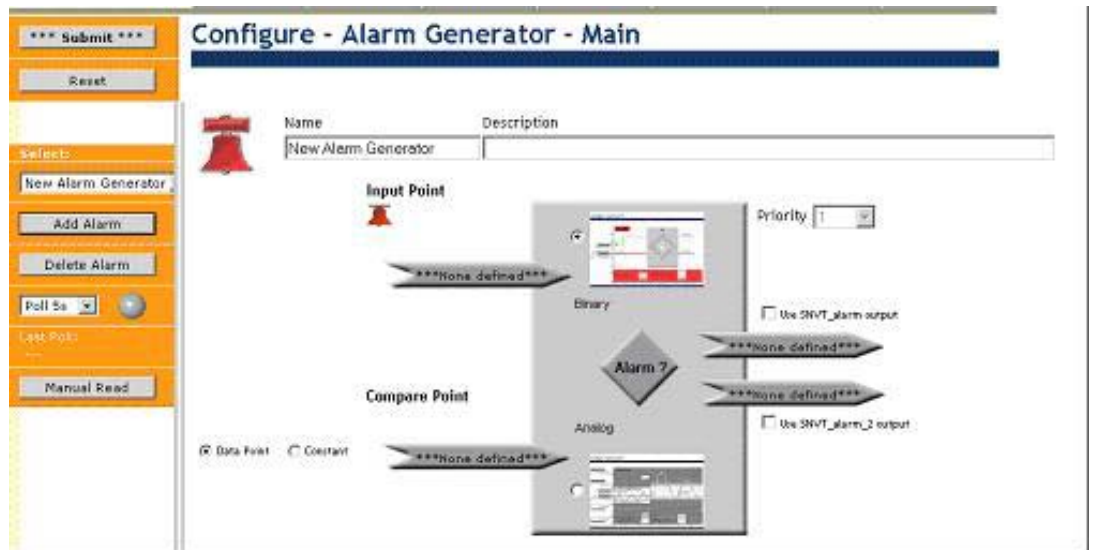
Figure 5.1 Configure - Alarm Generator - Main Web Page

4. Enter the **Name** and optional **Description** of the new **Alarm Generator**.

5. Select an **Input Point** for the new **Alarm Generator**. To do so, click the data point icon (***None defined***) below **Input Point**. A data point tree opens on the left side of the Web page, as shown in Figure 5.2.
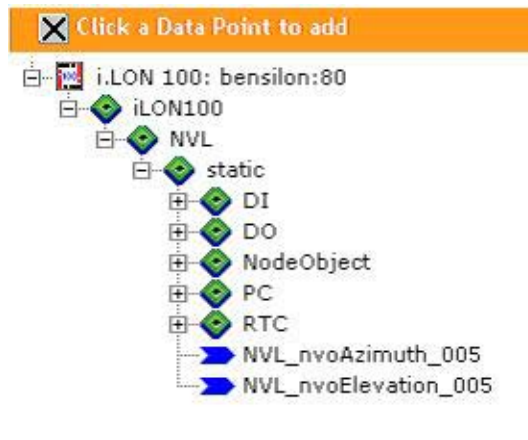
Figure 5.2 Data Point Tree

6. Select the data point you want to use as the **Input Point** by clicking it in the tree. As soon as you select a data point, the data point icon used in step 5 will display the name and type of the data point you have chosen as the input point.

7. Select the **Compare Point** for the Alarm Generator. To do so, click the data point icon (***None defined***) below **Compare Point**, and then select the data point from the tree that appears on the left side of the Web page. The data point you select must use the same type as the **Input Point**. As soon as you select a data point, the **Compare Point** button will display the name and type of the selected data point.

   You can also choose to configure the Alarm Generator so that the value of the **Input Point** will be compared to a constant value, instead of to the value of another data point. To do so, click the **Constant** button to the left of the data point icon, and enter the value you want to use in the box that appears. This is shown in Figure 5.3.
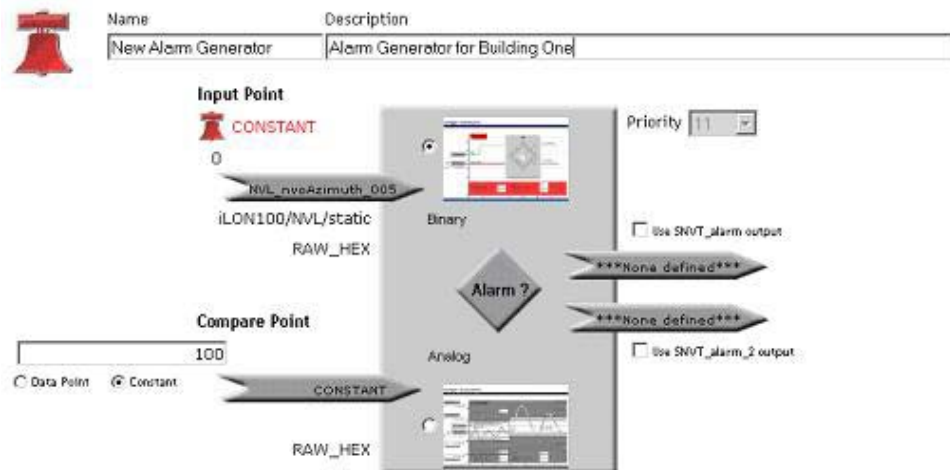
Figure 5.3 Constant Data Point

8. After you have selected an input data point and a compare data point (or a compare value), you can select one or two output data points that will be updated to an alarm condition when an alarm is generated.

   To choose an output data point, select the **Use SNVT_alarm Output** or **Use SNVT_alarm_2 Output** check boxes. After you select either option,

click the associated data point icon and then select a data point on which the output alarm values will be sent from the data point tree. The data points must use the SNVT_alarm or SNVT_alarm_2 types, as appropriate. You will need to create these data points manually, as the *i*.LON 100 server does not contain any SNVT_alarm or SNVT_alarm_2 data points by default. For instructions on creating data points, see Chapter 4, *Creating Data Points*.

NOTE: If you add an Alarm Generator with LonMaker, a SNVT_alarm output data point will be automatically created for use with the Alarm Generator. See the *Adding i.LON 100 Functional Blocks to a LonMaker Drawing* section on page 65 for more information on adding Alarm Generators with LonMaker.

You should be aware that the status of the input data point will also be updated to an alarm condition (AL_ALM_CONDITION) whenever an alarm is generated. Therefore, you can check the status of either an input or an output data point to determine when an alarm has been generated. You could create an Alarm Notifier to send an alarm notification each time either the input or the output data point is updated to an alarm condition, as described in the *Providing an Alarm Notification* section on page 91.

9. The **Priority** field is only enabled if you have selected an output data point. This allows you to set the priority level of the alarm to a value from 0 to 11, with 0 being the highest priority and 11 being the lowest priority. This value will be sent in the priority field of the SNVT_alarm or SNVT_alarm_2 type output data point when an alarm is generated.

10. Select the type of alarm you want to use by clicking either the **Binary** or **Analog** buttons and then clicking **Alarm?**, or by clicking the appropriate icon next to the buttons. If you choose **Binary**, the Web page shown in Figure 5.4 will open.
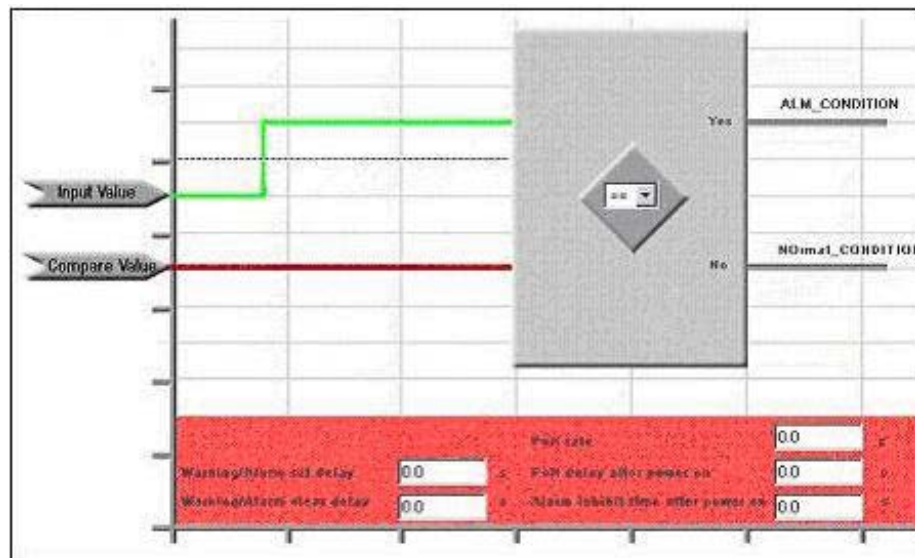
Figure 5.4 Alarm Generator Binary Comparison

Choose the comparison function to be used from the drop-down menu. Available functions are equals (==), is not equal to (=/=), greater than (>), greater than or equal to (>=), less than (<), and less than or equal to (<=).

When the statement *Input Point (comparison) Compare Point* evaluates as true, an alarm will be generated.

For example, if you select the (==) comparison function, an alarm will be generated whenever the value of the input point equals the value of the compare point (or the compare value).

If you chose **Analog** as the comparison function, the Web page shown in Figure 5.5 opens.
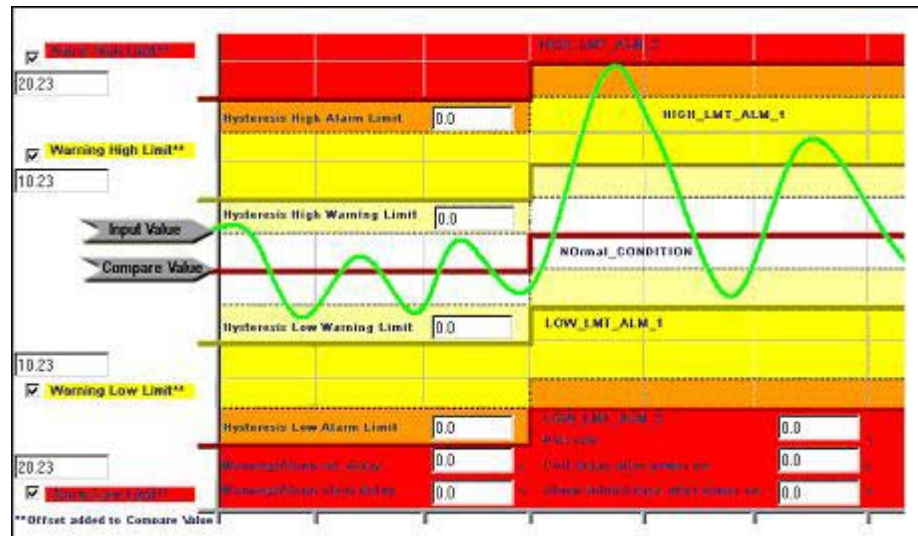
Figure 5.5 Alarm Generator Analog Comparison Window

Set the limits for the Alarm Generator by filling in the properties on the left side of the web page. You can disable any of these limits by clearing the associated check box. Table 5.1 describes the limits you can set:

Table 5.1 Alarm Generator Analog Comparison Limits

Limit	Description
Alarm High Limit	When the **Input Value** exceeds the **Compare Value** by this amount or greater, a HIGH_LMT_ALM_2 alarm condition will be generated. This value must be greater than the **Warning High Limit** value.
Warning High Limit	When the **Input Value** exceeds the **Compare Value** by this amount or greater, a HIGH_LMT_ALM_1 condition will be generated. This value must be less than the **Alarm High Limit** value.
Warning Low Limit	When the **Compare Value** exceeds the **Input Value** by this amount or greater, a LOW_LMT_ALM_1 condition will be generated. This value must be less than the **Alarm Low Limit** value.
Alarm Low Limit	When the **Compare Value** exceeds the **Input Value** by this amount or greater, a LOW_LMT_ALM_2 condition will be generated. This value must be greater than the **Warning Low Limit** value.

For each of the limits described in Table 5.1, you can set an associated hysteresis value. After an alarm has been generated based on one of the

limits defined in Table 5.1, the input values must return to the hysteresis level defined for that limit before the alarm clears, and before another alarm can be generated based on that limit. As a result, the Alarm Generator will not generate an additional alarm each time the input data point is updated after it reaches an alarm condition, but before it has returned to a normal condition.

Table 5.2 lists a series of events showing how this works.

Table 5.2 Hysteresis Levels and Alarm Limits

Event	Input Data Point Status	Comments
Value of input point is normal.	AL_NO_CONDITION	No alarm condition.
Value of input data point goes above the Warning High Limit.	AL_HIGH_LMT_ALM1	Updated to the warning condition.
Value of input data point goes above the Alarm High Limit.	AL_HIGH_LMT_ALM2	Updated to the second, and more severe, alarm condition.
Value of input data point goes below the hysteresis level defined for the Alarm High Limit.	AL_HIGH_LMT_ALM1	Updated back to the Warning High Limit condition, as the data point has not yet reached the hysteresis level for that condition.
Value of input data point goes below the hysteresis level defined for the Warning High Limit.	AL_NO_CONDITION	Updated back to normal status.

11. After you have configured the binary or analog settings described in the previous step, configure the rest of the properties on the Web page (these properties apply to both binary and analog alarms). Table 5.3 describes these properties.

Table 5.3 Binary/Analog Alarm Properties

Property	Description
Warning/Alarm Set Delay	The amount of time, in seconds, an alarm condition must exist for an alarm to be generated.
Warning/Alarm Clear Delay	The amount of time, in seconds, a non-alarm condition must exist for an alarm to be cleared.
Poll Rate	If either the **Input** or **Compare** data points are external data points (NVEs), this option determines how often these data points will be polled, in seconds. If you are using external data points, you must set this option to a non-zero value. A zero value disables polling.
Poll Delay After Power On	If either of the **Input** or **Compare** data points are external data points (NVEs), this option determines how long, in seconds, the **Alarm Generator** will wait to start polling after it has been reset.

Property	Description
Alarm Inhibit Time After Power On	This option determines how long, in seconds, the **Alarm Generator** will wait to start generating alarms after it has been reset.

12. Configure the rate at which the *i*.LON 100 server will poll the value of the input and compare data points using the drop-down list on the left side of the Web page, as shown in Figure 5.6.
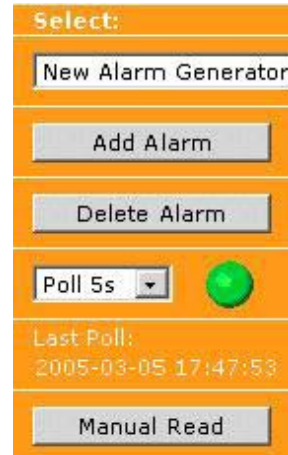
Figure 5.6 Poll Rate

You can click **Manual Read** at any point to force the *i*.LON 100 server to poll the values of the input and compare data points. Otherwise, the data points will be polled at the rate selected here.

13. Click **Submit** to save the new **Alarm Generator**. You can monitor the Alarm Generator by periodically checking the statuses of the output data points, or by setting up an Alarm Notifier to send alarm notifications each time the Alarm Generator generates an alarm. This is described in the next section.

Providing an Alarm Notification

You can create Alarm Notifiers to provide a network or email notification of an alarm condition. The alarm condition can be generated by an Alarm Generator, by any LONWORKS device that produces SNVT_alarm or SNVT_alarm_2 alarm outputs, or it may be generated in response to any data point going offline.

To configure an Alarm Notifier to provide alarm notifications with the *i*.LON 100 Web pages, follow these steps:

1. Open Internet Explorer 6 or later, point it to the URL of the *i*.LON 100, and log in to the *i*.LON 100.

2. If you plan to provide email notifications with the Alarm Notifier, configure the *i*.LON 100 device to send email as described in the *Configuring the Email (SMTP) Service* section on page 23.

3. Point your mouse cursor to **Configure**, and then select **Alarm Notifier** from the drop-down menu. The **Configure – Alarm Notifier – Main** Web page opens, as shown in Figure 5.7.
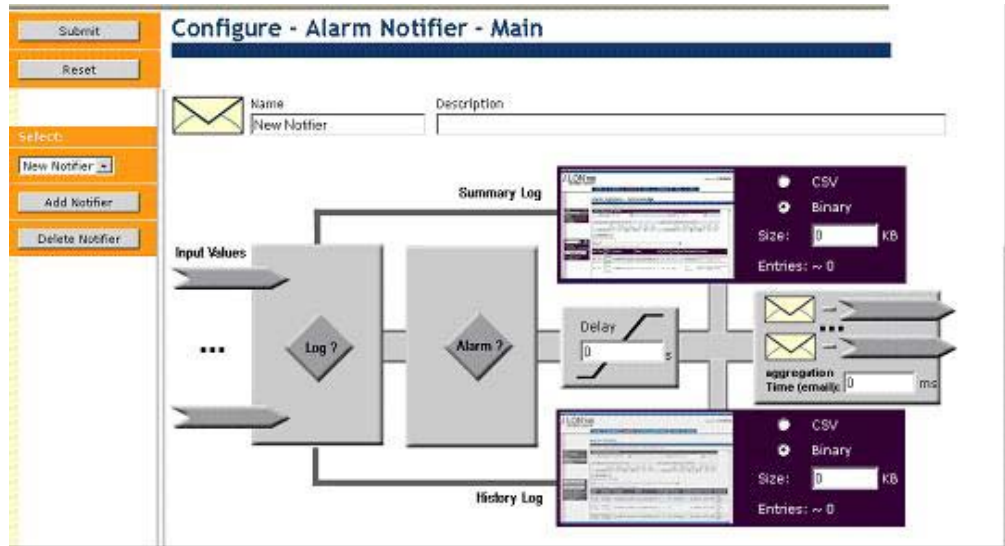
Figure 5.7 Configure – Alarm Notifier – Main Web Page

4. Click **Add Notifier** to create a new Alarm Notifier.

5. Enter a name and description of the Alarm Notifier in the **Name** and **Description** boxes at the top of the Web page.

6. Select the input data points for the Alarm Notifier by clicking either of the two data point icons (⬛⬛⬛⬛), or by clicking **Log?**. The **Configure – Alarm Notifier – Log Data Points** Web page opens, as shown in Figure 5.8.
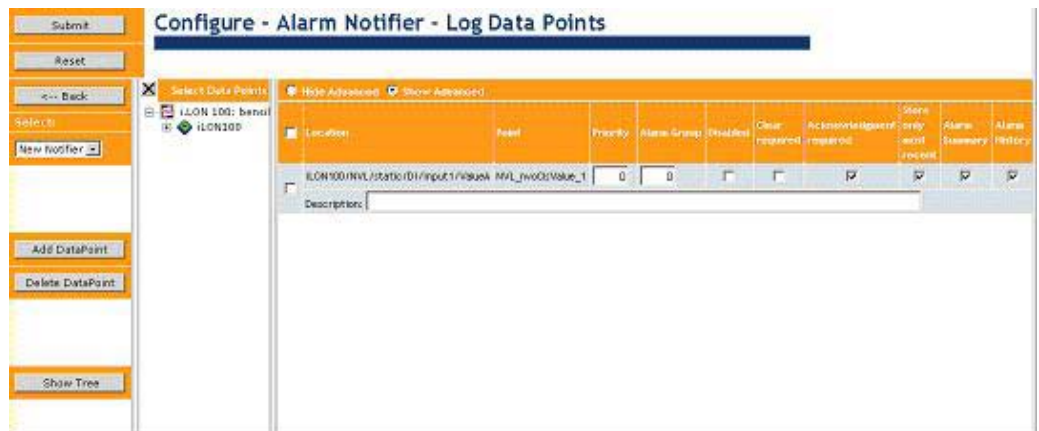
Figure 5.8 Configure – Alarm Notifier – Log Data Points Web Page

7. Select the data point you want to use as the input value from the data point tree, and then click **Add Data Point** to add the data point to the Alarm Notifier. The Alarm Notifier will check the status of the input data point each time they are updated, and send alarm notifications if the statuses are defined as alarm conditions. You could use the input or output data points defined for an Alarm Generator you've created if you want the Alarm Notifier to send alarm notifications each time the Alarm Generator generates an alarm.

    The selected data point will be added to the list on the right side of the Web page, as shown in Figure 5.9.

Figure 5.9 Data Point Properties

8. Configure the data point's properties. Table 5.3 describes these properties. Note that you will need to click the **Show Advanced** button to display all of these properties.

Table 5.3 Data Point Properties

Property	Description
Priority	The priority of the alarm associated with this input. This value can be from 0 (highest priority) to 255 (lowest priority). If alarm conditions are received on more than one input, the alarm with the highest priority will take precedence.
Alarm Group	The alarm group number. This value can be from 1 to 127. A value of 0 indicates the alarm has not been assigned to a group. This has no effect on the function of the alarm, but can be included in emails sent using the Alarm Notifier to provide the recipient with more information, and can be used as a sort field when viewing alarm logs in Excel.
Disabled	Select this check box to disable the input. No alarm notifications will be sent for the data point while it is disabled.
Clear Required	If this check box is selected, alarms received on this input must be manually cleared to end the alarm condition. Alarms can be cleared using the **View - Alarm Summary** Web page, as described later in this chapter. By default, this check box is selected. This may be useful if you may want an alarm to stay active, even when the condition that caused the alarm has been returned to normal. For more information on the **View - Alarm Summary** Web page, see *View - Alarm Summary Web* Page on page 98.
Acknowledgement Required	If this check box is selected, alarms received on this input must be manually acknowledged in order to end the alarm. Alarms can be acknowledged using the **View - Alarm Summary** Web page. By default, this check box is selected. This may be useful if you may want an alarm to stay active, even when the condition that caused the alarm has been returned to normal.
Store Only Most Recent Alarm	If this checkbox is selected, only the most recent alarm for the input will be stored in the Alarm Summary log. All alarms will be stored in the Alarm History log, regardless of whether this check box is selected.

Property	Description
Alarm Summary	If this checkbox is selected, alarms received on this input will be added to the Alarm Summary log (see the **Global** screen for more information). When alarms are added to the alarm summary log, they will appear in the **Alarm Summary** web page. This checkbox is set by default.
Alarm History	If this checkbox is selected, alarms received on this input will be added to the Alarm History log (see the **Global** screen for more information). When alarms are added to the alarm history log, they will appear in the **Alarm History** web page. This checkbox is set by default.
Description	A description of the Alarm Notifier. This field can contain up to 227 characters.

9. Repeat steps 6 and 7 until you have added and configured all the data points you want to use as inputs for the Alarm Notifier, and then click **Submit** to save the changes and return to the **Configure – Alarm Notifier – Main** Web page.

10. After you have chosen the inputs for the Alarm Notifier, configure the alarm conditions the Alarm Notifier will respond to. To do so, click **Alarm?**. The **Configure - Alarm Notifier – Alarm Conditions** Web page opens.
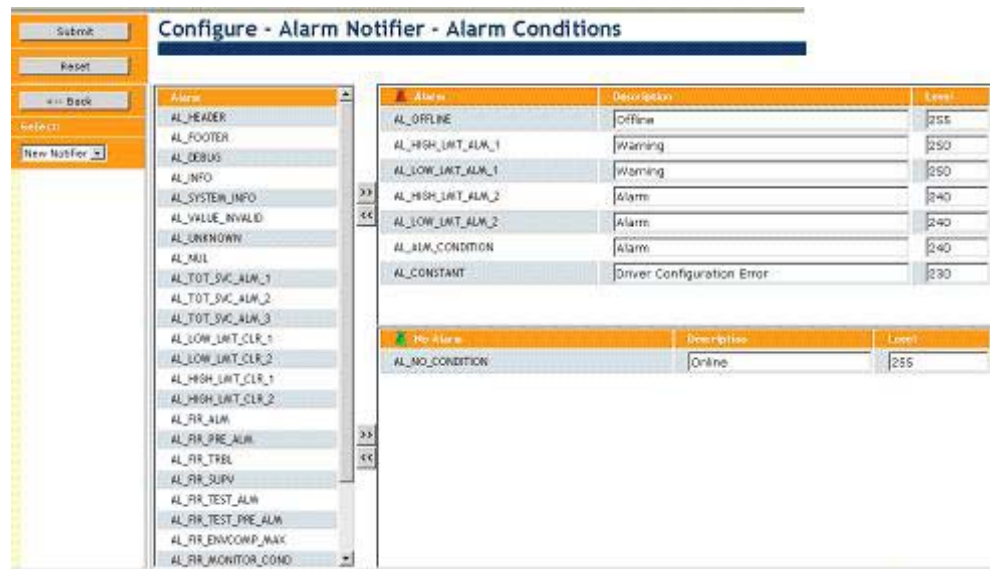
Figure 5.10 Configure - Alarm Notifier – Alarm Conditions Web Page

11. The left side of the Web page lists all of the alarm conditions that the input data points could potentially be set to. You will notice that there are two lists to the right of this – the upper list represents the alarm conditions that have been defined as active alarm conditions for the Alarm Notifier, and the lower list represents alarm conditions that have been defined as passive alarm conditions.

In Figure 5.10, seven alarm conditions have been defined as active alarms. One (the default AL_NO_CONDITION) has been defined as a passive alarm. Note that the active alarm list has a red bell icon and the passive alarm list has a green bell icon. These icons are used on other

Web pages to represent passive and active alarm conditions.

You can move alarm conditions in and out of each list with the 〉〉 and 〈〈 buttons. Use the **Description** property to enter the description that will be stored in the Alarm Summary and Alarm History logs when the alarm condition occurs, and use the **Level** property to set the priority that the alarm condition should be assigned. Later, you will be able to configure the Alarm Notifier to respond to different alarm conditions based on the priority level they have been assigned. In addition, you can click a column heading to sort a list by that heading.

When you have finished configuring the alarm levels, click **Submit** to save your changes, and then return to the **Configure – Alarm Notifier – Main View** Web page.

12. Set the **Delay** property. This property establishes the minimum amount of time that an alarm condition must exist for before the alarm is considered active. Enter a value between 0 and 65536, in seconds.

One case where this could be useful would be a temperature control system that includes some automatic fault correction (i.e. backup heating and cooling systems) that would trigger when the alarm condition was received. An Alarm Notifier with a 5-minute delay time could be used to send an email in case the backups failed to correct the situation.

13. Set the email aggregation time. Valid values for the email aggregation time are 0 to 65536 milliseconds. If multiple emails to the same address are generated within this period of time, they will be merged into a single email. In addition, the email aggregation period resets each time a new alarm occurs.

For example, if you have a number of alarms in a system that trigger when the temperature reaches a certain point, setting an email aggregation time of a minute causes a single email to be sent in the case of a system-wide temperature fluctuation, rather than multiple single emails.
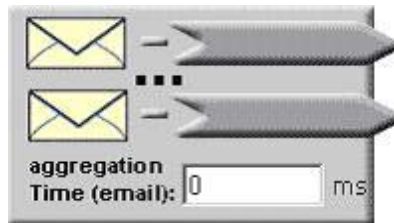
Figure 5.11 Email Aggregation Time and Output Data Point Icons

14. Click the data point icons above the aggregation time box to open the **Configure – Alarm Notifier – Destinations** Web page. You will use this Web page to configure the Alarm Notifier's email profiles and output data points.

Figure 5.12 Configure – Alarm Notifier – Destinations Web Page

15. Each row in the table represents a group of settings that the Alarm Notifier will use when an alarm notification meeting certain criteria is made. These settings are referred to collectively as a *destination*. Each destination includes output data points that will be updated, and email messages that will be sent, whenever the destination is used.

Select **Add Row** to add a destination to the Alarm Notifier. A new row will be added to the Web page. Then, configure each of the properties for the row to configure the alarm destination. Note that each row is divided into two levels – one for active alarms conditions (red bell icon, and one for passive alarm conditions (green bell icon). With this set up, each destination can treat active and passive alarms separately.

Configure the columns of each row, as described below:

- Click the **Enable** column to select a data point that will be used to enable and disable the destination. This opens the data point tree on the left sidebar. You should select SNVT_switch data points to enable the Alarm Notifier. Click a data point in the tree to select it.

  Once you have done so, the destination will be used when the selected data point is set to the **ON** value, and it will not be used when the selected data point is set to the **OFF** value.

  This is an optional part of the Alarm Notifier destination. If you do not select a data point, the destination will always be active.

- Click the **Level Range** columns to set the active and passive alarm level ranges that will cause the destination to be used. Remember that you assigned each alarm condition an alarm level with the **Configure - Alarm Notifier – Alarm Conditions** Web page in steps 9 and 10 of this procedure. These properties determine which alarm levels this particular destination will be used for.

- Click the **Active: Sent…** and **Passive: Sent…** properties to determine how long the Alarm Notifier will wait for an alarm to be cleared before using the destination.

- Click the **Mail To** columns to open the Configure Email dialog shown in Figure 5.13.
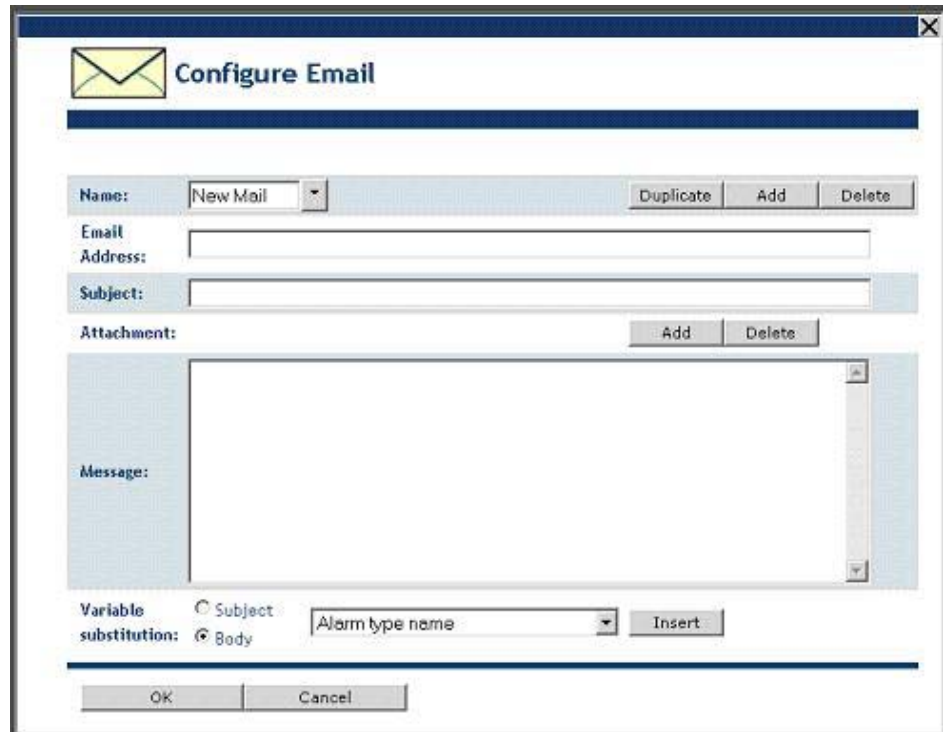
Figure 5.13 Configure Email Dialog

This allows you to specify the address, subject, message and attachment that will be emailed whenever the destination is used. The Configure Email dialog includes a **Variable Substitution** drop-down list, which you can use to insert information from the alarm notification into the email automatically (e.g. the value of the data point that caused the alarm). Consult the online help for more information on these variables. When you have set the fields on the Configure Email dialog, click **OK** to add the email settings to the destination.

You should note that the **Name** drop-down list on the Configure Email dialog lists all of the email profiles that have previously been added to the Alarm Notifier. You can select one from the list if you want to use the same email for multiple alarm destinations, without having to re-enter the same settings.

- Click the **Output** column to select an additional output data point that will be updated to a when the destination is used. This opens the data point tree on the left sidebar. Click a data point in the tree to add it as an output. The data point will be updated to the value specified by the **Value** property as soon as the email for the destination has been sent (or as soon as the alarm occurs, if no email profile has been specified). If you don't want to wait for the email to be sent to update an output data point, you should be sure add the email profile and output data point to separate destinations.

- Click the **Value** column to set the values that the output data point will be updated to when an active or passive alarm condition occurs. When an alarm condition is received, the enabled output data points are set to the active value. When an alarm is cleared, the enabled output data points are set to the passive value.

- You can remove an alarm destination by selecting its check box, and then clicking **Delete Row**.

16. Click **Submit** to save your changes and return to the **Configure - Alarm Notifier – Main** Web page. Then, decide whether the Alarm Notifier's log files should be stored in CSV or binary format using the section shown in Figure 5.14, and then click **Submit**.

Figure 5.14 Log Settings

17. The Alarm Notifier is now fully configured, and will begin logging alarms into the Alarm History and Alarm Summary logs, and sending alarm notifications as it has been configured to.

    For details on how to view the summary and history logs used to record the alarm notifications, and how to acknowledge and clear the alarms that the Alarm Notifier reports, see the next section, *Viewing the Alarm Summary and Alarm History Logs.*

Viewing the Alarm Summary and Alarm History Logs

The *i*.LON 100 Web pages include Web pages you can use to monitor, view, acknowledge, and clear alarms:

View - Alarm Summary   This Web page allows you to see all active alarms, and to acknowledge and clear alarms. By default, this page lists all alarms. You can filter the alarms shown by Alarm Notifier application, data point, and time of alarm.

View - Alarm History   This Web page allows you to display a log of active and cleared alarms. You can filter the alarms shown by functional block, data point, and time of alarm.

View - Alarm Summary Web Page

To open the **View – Alarm Summary** Web page, point your mouse cursor to **View**, and then select **Alarm Summary** from the drop-down menu. Or, click the Alarm Summary icon on the **Configure – Alarm Notifier – Main** Web page. Figure 5.15 shows the **View – Alarm Summary** Web page.
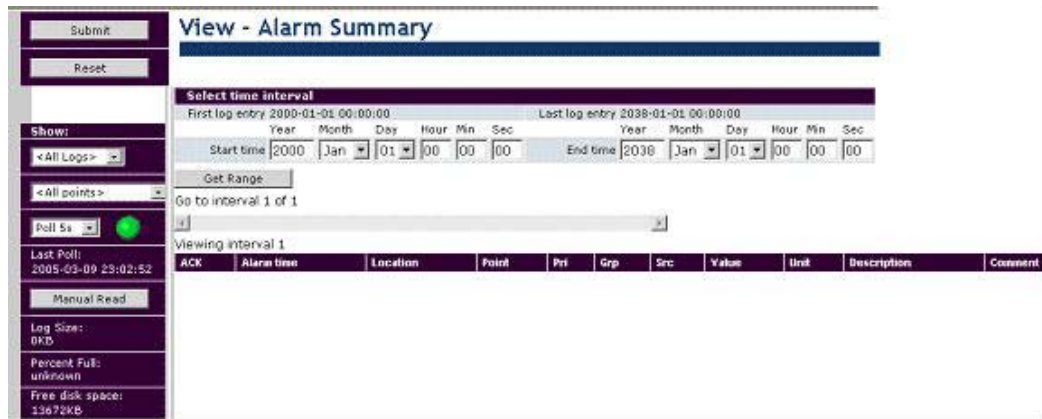
Figure 5.15 View – Alarm Summary Web Page

This web page allows you to acknowledge and clear active alarms. By default, this page will show all current alarms. An alarm is removed from the Summary log when it is cleared, either manually or automatically. If the **Acknowledgement Required** field was checked when the input the caused the alarm was added to the Alarm Notifier, the alarm must be manually acknowledged before the **Alarm Notifier** will stop reporting an alarm condition (even if the reason for the condition has been fixed). If the **Clear Required** field was checked when the input was added, the alarm must be manually cleared using this Web page

To acknowledge an alarm, select the **ACK** check box corresponding to the alarm to be acknowledged, and click **Submit**. To clear an alarm, select the **CLR** check box corresponding to the alarm to be cleared and click **Submit**. You can also add a comment to the log record for an alarm by filling in the **Comment** property and clicking **Submit**.

Some alarms require a clear as well as an acknowledge. Typically, the building supervisor will acknowledge the alarm using this web page once the maintenance company has been notified, and the maintenance company will clear the alarm once the problem has been fixed.

You can filter which alarms are shown using the following fields:

Show   Use the drop-down list to choose the Alarm Notifier and data points you want to view log entries for.

Start Time/End Time   Choose a range of time to view alarms from. The start time is inclusive and the end time is exclusive. For example, if you set a **Start Time** of 10:00 AM and an **End Time** of 1:00 PM, you will get all alarms from 10:00:00 AM to 12:59:59 PM.

Once you have narrowed the range of alarms, click **Get Range** to show the filtered set of alarms. If the unacknowledged alarms take up too much space, they will be broken down into multiple intervals. You can change which interval is shown by using the slide bar to select an interval and clicking **Get Range**.

Table 5.5 describes the information that is shown for each alarm in the Alarm Summary log.

Table 5.5 Alarm Summary Web Page

Property	Description
Alarm Time	The time the alarm condition changed.

Property	Description
Location	The location property of the data point that triggered the alarm. This is the data point specified on the **Inputs** tab of the **Alarm Notifier** application instance.
Point	The name of the data point that triggered the alarm. This is the data point specified on the **Inputs** tab of the **Alarm Notifier** application instance.
Pri	The priority of the alarm, as specified on the **Inputs** tab of the **Alarm Notifier** application instance.
Grp	The alarm group, as specified on the **Inputs** tab of the **Alarm Notifier** application instance.
Src	The LONWORKS source address of the data point that triggered the alarm. If this alarm was triggered by a SNVT_alarm or SNVT_alarm_2 type data point, it will be the source address of the device bound to that point.
Value	The value that triggered the alarm condition change. If this alarm was triggered by a SNVT_alarm type data point, this will be the value of the data point that caused the SNVT_alarm or update to be sent (i.e. the value of the **Input** data point on the **Alarm Generator** application instance). If this alarm was triggered by a SNVT_alarm_2 point, this value will be the **Location** of the alarm (i.e. the **Location** property for **Alarm Generator** application instance. If the data point is set to a preset value, the preset name will be displayed instead of the actual value.
Unit	The units of the value that triggered the alarm condition change. If this alarm was triggered by a SNVT_alarm or SNVT_alarm_2 type data point, this field will be blank.
Description	The description of the alarm type.
Comment	The **Comment** property shows any comments that were added to the alarm when it was acknowledged or cleared with the Summary Web page.

View - Alarm History Web Page

To open the **View – Alarm History** Web page, point your mouse cursor to **View** and select **Alarm History**. Or, click the Alarm History icon on the **Configure – Alarm Notifier – Main** Web page. Figure 5.16 shows the **View – Alarm History** Web page.

Figure 5.16 View – Alarm History Web Page

This Web page allows you to view the alarm history for the Alarm Notifier. By default, this page will show all alarms for a single alarm log. You can determine which alarms are shown using the following fields:

Show

Use the drop-down list to choose the Alarm Notifier and data points you want to view log entries for.

Start Time/End Time

Choose a range of time to view alarms from. The start time is inclusive and the end time is exclusive; i.e. if you set a **Start Time** of 10:00 AM and an **End Time** of 1:00 PM, you will get all

Once you have narrowed the range of alarms, click **Get Range** to show the filtered set of alarms. Click **Delete Entire Log** to delete the log selected in the **Alarm Log** field. Click **Delete Log Interval** to delete the alarms currently displayed (i.e. filtered by point and time). If the logged alarms take up too much space, they will be broken down into multiple intervals. You can change which interval is shown by using the slide bar to select an interval and clicking **Get Range**.

See Table 5.5 in the previous section for descriptions of the properties that are shown for each log. Note that there is an additional property, the **ACK/CLR** property, on the Alarm History Web page. The **ACK/CLR** property indicates whether the alarm has been acknowledged or cleared, as follows:

- **MANUAL_ACK** - The alarm was manually acknowledged.

- **MANUAL_CLEAR** - The alarm was manually cleared.

- **AUTO_CLEAR** - The alarm was cleared when the condition that caused the alarm was removed - no manual clear was required.

- **NACK** - The alarm status before it has been acknowledged or cleared - the initial occurrence of the alarm.

When printing this page, use the landscape format.

6
Scheduling

This chapter describes how to use the *i*.LON 100 scheduling applications to create an Event Scheduler. You can use Event Schedulers to schedule daily, weekly, and monthly updates to the data points on your network.

Scheduling Overview

The *i*.LON 100 contains three types of functional blocks that you can use for scheduling applications — the **Scheduler**, **Calendar**, and **Real Time Clock** functional blocks. The **Scheduler** and **Calendar** functional blocks allow you to define *event schedulers* that specify the *schedule events* for each day over a period of time. Each Event Scheduler consists of a *day-based* schedule and a *date-based* schedule.

Day-based schedules occur every week on a specified day. Each Event Scheduler can contain up to seven day-based schedules (*i.e.* one for each day of the week). You can assign a single day-based schedule to multiple days of the week (*i.e.* you could define one day-based schedule for all weekdays and one for weekends). You can create a *weekly schedule* by assigning a day-based schedule to each day of the week.

Date-based schedules occur on a set of dates defined by an *exception*. Exceptions are ranges of dates such as "January 12th to February 2nd" or "Every other Monday" or "the third Monday of every month." The exceptions defined on the calendar can be used by any number of schedulers.

The **Real Time Clock** functional block maintains the current date and time that is used by the **Scheduler** and **Calendar** functional blocks, and can also provide date and time data to other devices. The *i*.LON 100 server includes one **Real Time Clock**, one **Calendar** functional block, and 40 **Scheduler** functional blocks. In this chapter, these three functional blocks are collectively referred to as the *Event Scheduler* application.

Creating a Schedule

A typical schedule consists of a weekly schedule that defines the daily schedule to be used for each day of the week, and exception schedules that allow alternate daily schedules to become active on certain user-specified dates. The steps involved in creating a schedule are:

1. Plan your schedule. For example, "On weekday mornings at 6:00 AM the heating system should be started and the thermostat set to 65 degrees. At 8:00 AM, the thermostat should be set to 70 degrees." etc. See *Planning Out Your Schedule* for more information.

2. Create a new Event Scheduler.

3. Using the schedule written in step one, decide what data points need to be updated by the scheduler.

4. Define presets for each of the data points that are to be updated by the Event Scheduler. You can also enter the actual values of the data points, but presets are typically easier to use.

5. Define a schedule for each day of the week. Each daily schedule consists of a series of *events*. An *event* consists of a time and a value (i.e. 06:00:Warmup). When an event occurs, the specified data point will be updated to the specified value. Each day of the week can have a different schedule.

6. Define exceptions to the daily schedules created in step 5. Exceptions are date ranges during which the weekly schedule will be overridden. These exceptions can be specific ranges of dates (i.e. "March 27th-April 6th, 2002") or recurring dates that occur in a certain pattern (i.e. "The second

Tuesday of every month" or "Every other Saturday"). For each of these exception schedules, use the **Scheduler** functional block to define the schedule that will be used on that day.

Planning Out Your Schedule

Before implementing a schedule using the **Scheduler** and **Calendar** functional blocks, you should write out the schedule so you have a full understanding of all the schedules and events you will need to create.

Example of Planning Out a Schedule

The following is an example of a simple schedule that might be created to schedule HVAC and lighting controls in a retail store:

- On weekdays, the heat should be set to 60 degrees at 7:00 AM (Warmup), 70 degrees at 9:00 AM (Open), and turned off at 7:00 PM (Closed).
- On weekdays, the lighting should be turned on at 9:00 AM (Open) and turned off at 7:00 PM (Closed).
- On weekends, the heating and lighting should remain off.
- On the first Sunday of each month, for inventory, the heat should be set to 65 degrees at 9:00 AM (OpenInventory) and turned off at 6:00 PM (Closed).
- On the first Sunday of each month, for inventory, the lighting should be turned on at 9:00 AM (OpenInventory) and turned off at 6:00 PM (Closed).
- Every year you will have a winter vacation. In 2003-2004, you would like it to last from December 23rd to January 3rd, but you would like to be able to change the dates of the vacation every year.

Creating an Event Scheduler with the *i*.LON 100 Web Pages

This section describes how to create an Event Scheduler with the *i*.LON 100 Web pages. You can create up to 40 different Event Schedulers on your *i*.LON 100 server, and each Event Scheduler may update multiple data points. That means you could create several Event Schedulers for a single building: one to control lighting, one to control heating, and so on. This flexibility should allow you set up a schedule that accomplishes everything you need, regardless of the diversity of the applications and devices being controlled by the schedule.

1. Open the *i*.LON 100 server Web page. Point your mouse cursor to the **Configure** menu, and then select **Event Scheduler** from the drop-down menu. The **Configure – Event Scheduler – Main** Web page opens.
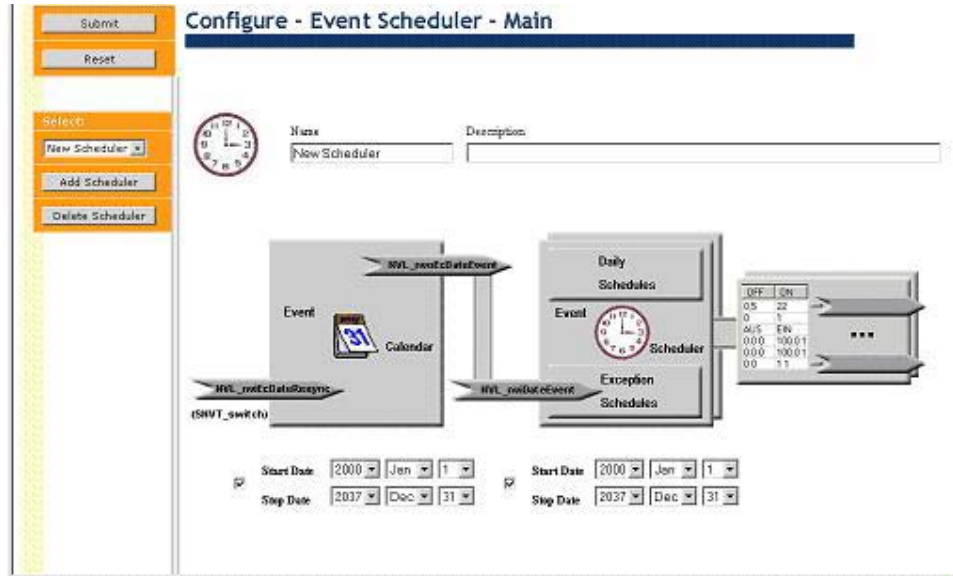
Figure 6.1 Configure – Event Scheduler – Main Web Page

2. Click **Add Scheduler** to create a new **Event Scheduler**.

3. Enter a name and description of the new Event Scheduler.

4. Click **Submit** to save your changes.

Adding Data Points to an Event Scheduler

You can specify the data points to be updated by an Event Scheduler. To do so, follow these steps:

1. Click the data point icon on the far right side of the **Configure – Event Scheduler – Main** Web page. The **Configure – Event Scheduler – Data Points View** Web page opens.
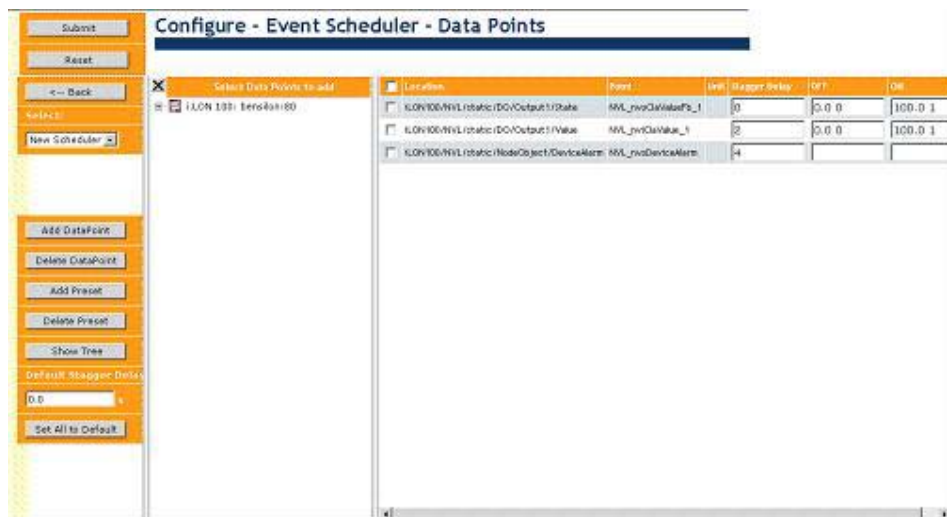
Figure 6.2 Configure – Event Scheduler – Data Points View Web Page

2. Expand the **Select Data Points to Add** tree by clicking it. Then, select the data point, and click **Add Data Point** to add it to the Event Scheduler. Press the CTRL or SHIFT key to select multiple data points at once.

3. If desired, define the presets for each of the data points. You can

optionally use these preset values to determine what value the data points should be updated to at various points in the schedule.

For example, consider a data point used to control a heater. You could define preset values for the different temperatures the heater should be set to. For example, you could create a preset called "COLD" to store the temperature to use for cold days, "WARM" for warmer days, and so on.

Presets are optional. You can also supply a raw value to a data point when you configure an Event Scheduler.

The data points will be added as a list on the right side of the **Configure – Event Scheduler – Data Points View** Web page. The preset values that have been defined for each data point will be shown in the list, on the right side.

Figure 6.3 shows an example where four data points have been added to the Event Scheduler. Two preset values, **ON** and **OFF**, have been defined for the data points. These preset values will not necessarily apply to every data point in the list. In Figure 6.3, the **ON** and **OFF** preset values only apply to the second and fourth data points in the list.

Figure 6.3 Data Points List

You can add values to apply to the preset values that are not currently using the preset value, or modify the values that are currently being applied to each preset, by filling in the boxes and the Web page. You can create additional preset values for the data points by clicking **Add Preset**. You will be prompted to enter the name of the new preset, at which point it will be added to the list. Following that, you can assign values for each of the data points for it. The data points do not have to use the same value for each preset.

You can delete a preset by clicking **Delete Preset** and then selecting the preset you want to delete.

4. Assign the **Stagger Delay** for each data point. This is the amount of time that the Scheduler will wait before updating the specified data point at each schedule interval, in seconds. This allows you to gradually bring a system up or down. For example, consider a schedule that controls the power for 100 stores in a mall. The schedule indicates that power should be turned on at 8:00. However, turning on power for 100 stores at once could cause a power surge. To avoid this, use varying **Stagger Delays** for the different points to bring power up for 1 or 2 stores at a time.

You can create a default **Stagger Delay** and apply that value to all the currently added data points by filling in the **Default Stagger Delay** box and then clicking **Set All to Default.** The delay will be cascaded for each data point. For example, if you set the default stagger delay to 2 seconds, the delay between the first and second updates would be two seconds (so the delay shown for the first data point would be 0 seconds, and the delay shown for the second data point would be 2 seconds). The delay for the third data point to be updated would be 4 seconds, and then a 6 second delay for the fourth data point, and so on. This way, a different data

point is updated every two seconds.

5. Repeat steps 2, 3 and 4 until you have added and configured all the data points you want to update, and then click **Submit** to save the changes. Click **Back** to return to the **Configure – Event Scheduler – Main** Web page.

Setting the Daily Schedule

You can create a daily schedule for each day of the week, and you can share a daily schedule for multiple days of the week. To do so, follow these steps:

1. From the **Configure – Event Scheduler – Main** Web page, click **Daily Schedules**. The **Configure – Event Scheduler – Daily Schedules** Web page opens.
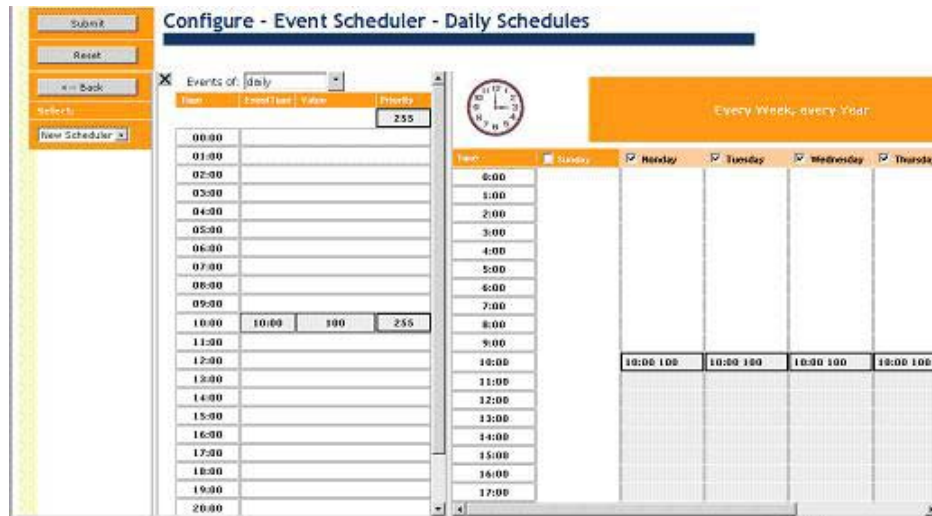
Figure 6.4 Configure – Event Scheduler – Daily Schedules Web Page

2. Use the left pane of the Web page to define the daily schedule. You can use the default settings to create daily schedules that apply to weekdays (Monday through Friday), and weekend schedules that only apply to weekend days (Saturday and Sunday).

   Select **Daily** in the **Events Of** box to create the weekday schedule. Select **Weekend** in the **Events Of** box to create the weekend schedule. You can also click a day to edit in the right pane of the Web page to edit the schedule that the day is a part of (e.g. click any day Monday through Friday to edit the weekday schedule, or click Saturday or Sunday to edit the weekend schedule).

3. To create separate schedules for each day of the week, right-click the calendar on the right side of the Web page and select **Edit Daily Schedules** from the shortcut menu. The dialog shown in Figure 6.5 opens.
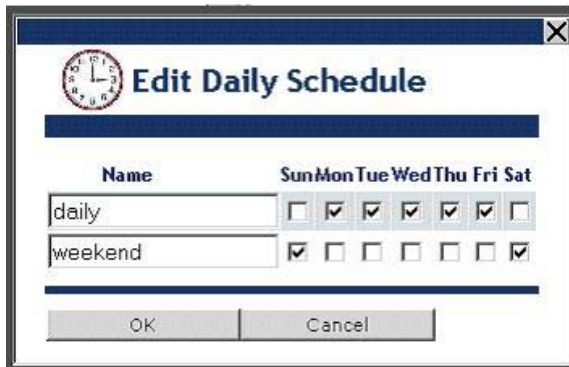
Figure 6.5 Edit Daily Schedule Dialog

Clear the check boxes for the days you want to apply a separate schedule to. For example, clear the Monday check box for the daily schedule to create a separate daily schedule for Monday (it will be added to the list as soon as you clear the check box). Or, you could clear the Sunday check box for the weekend schedule to create a separate daily schedule for Sunday.

You can also select a check box to add that day to an existing schedule. For example, in Figure 6.5, you could select the Monday check box for the weekend schedule. This would remove Monday from the daily schedule, and add it to the weekend schedule.

4. Select a schedule in the **Events Of** box, and then click the area to the right of the time of day for your first schedule event. For example, to schedule an event at 6:00, click the box to the right of 06:00. The area next to the time will expand as shown in Figure 6.6.

Figure 6.6 Setting Up a Schedule Event

5. Click the **Event Time** box to enter the exact time the event could occur. For example, you might want the first event to occur at 6:30 A.M. instead of 6:00 A.M.

6. Click the **Value** box and select the preset to be written by the scheduler at the specified time.

You can also type the data point value to be written by the scheduler at the specified time. If you enter a value instead of a preset, all the data points updated by the Event Scheduler must use the same type.

7. Click the **Priority** box to assign the event a priority. You can enter a value between 0 and 255 here, with 0 being the highest priority and 255 being the lowest priority. If two schedule events conflict, meaning that

one event tries to update a data point that has previously been updated by another schedule event, the event with the higher priority takes precedence.

For example, consider a scenario where an Event Scheduler writes to the value of a data point called NVL_nvoValue, and the last Event Scheduler to write to the value of NVL_nvoValue used priority level 75 when it updated the data point. In that case, the current Event Scheduler must use a priority value between 0 and 75 to successfully write a new value to the data point. If the two Event Schedulers use the same priority, the second one executed will be able to update the value of the data point.

A default priority is calculated automatically by the *i*.LON 100 server when you use the built-in Web pages to configure a schedule. For example, an exception will automatically be set to a higher priority than a daily schedule. As a result, you do not have to modify the priority.

8. Repeat steps 2-7 until you have created all the schedule events you want the Event Scheduler to perform.

9. Click **Submit** to save your changes and then return to the **Configure – Event Scheduler – Main** Web page.

   You can copy the schedule for one day to another day, without having to repeat these steps. To do so, first right-click the day with the schedule to be copied and then select **Copy Schedule** from the shortcut menu. Then, right-click the day you want to copy the schedule to and select **Paste Schedule** from the shortcut menu.

10. Use the **Start Date** and **Stop Date** boxes below the daily schedules to set the start and end dates for the Event Scheduler. To operate permanently, clear the check box next to the **Start Date** and **Stop Date** properties.

11. Click **Submit** to save your changes. This returns you to the **Configure – Event Scheduler – Main** Web page.

   Every time you change the configuration of an Event Scheduler, and every time the *i*.LON 100 server reboots, each Event Scheduler will update all of its data points to the value the updated schedule currently calls for.

   For example, consider a case where an Event Scheduler was configured to set a group of data points to OFF on weekdays, and set it to ON on weekends. If you reconfigure the Event Scheduler to set the data points to OFF on Monday and Tuesday, and ON every day from Wednesday until Sunday, the Event Scheduler will immediately update the data points based on the new schedule. So if the configuration is changed on Wednesday, the data points will be set to ON. If the configuration is changed on Monday or Tuesday, they will be set to OFF.

   When rebooting the *i*.LON 100 server, or when making changes to an Event Scheduler that do not affect the daily schedule, these updates will overwrite any manual updates made to the data points if the manual updates used a lower priority than the Event Scheduler is using.

Adding Exceptions to the Daily Schedule

You can create separate schedules that apply to special dates that you specify. These separate schedules are referred to as *exceptions*. Exceptions have their

own schedules that are completely independent of the daily schedules described in the previous section. You can use these to create schedules for holidays or any other days when the systems you are monitoring or controlling will be shut down or require specific date-related events.

There are two types of exceptions: *one-time exceptions* and *recurring exceptions*. One-time exceptions apply to one specific date only, e.g. April 1st, 2007 or September 16th, 2008. Recurring exceptions apply to specific dates year after year, or to certain days or the week or certain months of the year in a recurring pattern.

For example, you could create a recurring exception that applies to the first ten days of July, every year. Or, you could create a recurring exception that applies to a specific month or day of the week, or you could create a recurring exception that applies to specific days throughout the course of a month (e.g. the third day of the month, or the last day of the month). The Event Scheduler Web pages provide many options for you to choose from when creating such exception schedule.

To create an exception, follow these steps:

1. From the **Configure – Event Scheduler – Main** Web page, click the Exception Schedules icon. This opens the **Configure – Event Scheduler – Exception Schedules** Web page shown in Figure 6.7.

Figure 6.7 Configure – Event Scheduler –Exception Schedules Web Page

2. The **Configure – Event Scheduler – Exception Schedules** Web page shows the schedule you have created in the previous section. Click a day in the calendar to view the event schedule for that day.

    To create a one-time exception schedule for that particular day, right-click that day in the calendar and select **New One-Time Exception**. The dialog shown in Figure 6.8 opens.
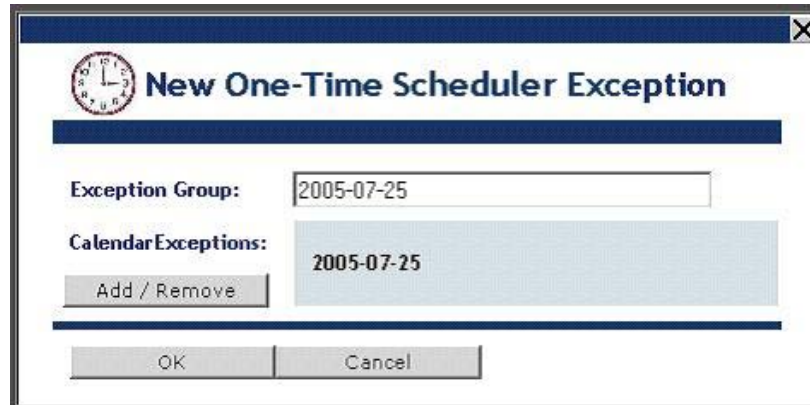
Figure 6.8 New One-Time Scheduler Exception Dialog

Click **OK** on the New One-Time Scheduler Exception dialog, and then configure the events schedule for the one-time exception on the left pane of the Web page. Steps 4-7 of the previous section, *Setting the Daily Schedule*, describe how you can configure the events for the exception schedule. The events schedule for the exception will default to the regularly scheduled events for the day.

3. Step 2 describes how to create a one-time exception, which is an exception that applies to one specific date only, e.g. July 4th, 2006 or November 26th, 2007.

   You can also create recurring exceptions, which are exceptions that apply to a certain date or group of dates year after year, or to certain days of the week or certain months of the year in a regular pattern. For instructions to follow when creating recurring exceptions, see the next section, *Creating Recurring Exceptions.*

4. Repeat steps 2 and 3 until you have added all the one-time and recurring exceptions you want to the Event Scheduler.

5. Click **Submit** to save your changes and return to the **Configure – Event Scheduler – Main** Web page.

Creating Recurring Exceptions

You can create recurring exceptions that apply to specific dates, or to certain days of the week or certain months of the year in a regular pattern. For example, you can create a recurring exception that applies to holidays like the 4th of July and Christmas. Or, you could create a recurring exception that applies to the last day of every other month. Or, you can create a recurring exception that applies to Mondays. Dates selected in recurring exceptions will not be affected by the events configured for the Event Scheduler's daily schedules and one-time exceptions.

To create exception schedules, follow these steps:

1. Open the **Configure – Event Scheduler – Exception Schedules** Web page as described in the previous section.

2. Right-click the calendar on the right pane of the Web page, and select **New Exception** from the shortcut menu. The dialog shown in Figure 6.9 opens.
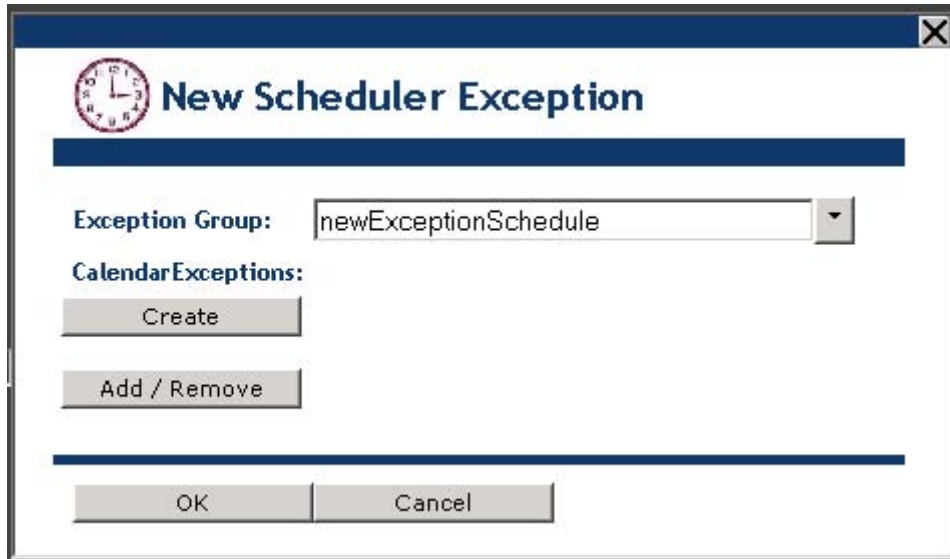
Figure 6.9 New Scheduler Exception Dialog

3. Click **Create** to create a recurring exception. The dialog will expand to appear as shown in Figure 6.10.

   NOTE: You will notice that the New Scheduler Exception Dialog includes an **Add/Remove** button. You can use this to apply exceptions created with the **Configure – Event Scheduler – Event Calend**ar Web page, or exceptions created for use with other Event Schedulers, to the Event Scheduler you are configuring. See the *Using the Configure – Event Scheduler – Calendar Exceptions Web Page* section on page 117 for more information on this.
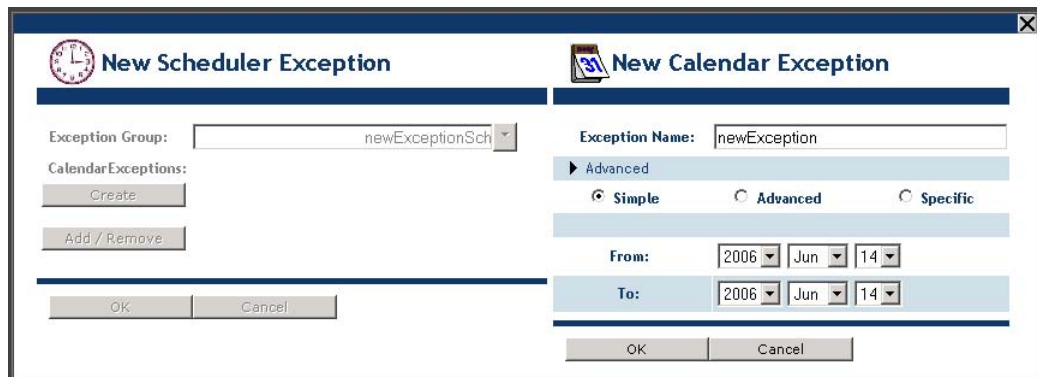
Figure 6.10 New Calendar Exception Dialog

4. Select **Simple, Advanced,** or **Specific** as the exception date. Select **Simple** if you want to create an exception that applies to a specific date or group of dates for one year only. Select **Advanced** if you want to create an exception that applies to a specific date or month or day of the week, year after year. Select **Specific** if you want to create an exception that is more complex than this, such as one that applies to the last day of every month, every third day, the fourth day of each month, and so on. Table 6.2 later in the chapter lists examples demonstrating how you could use each exception type.

5. Configure the rest of the properties on the New Calendar Exception dialog. Table 6.1 describes the rest of the properties on the New

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Calendar Exception dialog.

Table 6.1 New Calendar Dialog Exception Properties

Property	Description
Exception Name	A unique name for this recurring exception.
From **To**	The dates that the recurring exception will be active. If you selected **Simple** as the **Type**, the recurring exceptions will apply to all of these dates. If you selected **Advanced** or **Specific** as the **Type**, the recurring exception will apply to certain dates within this range, depending on how the **Monthly** and **Daily** properties are set. If you selected **Advanced** or **Specific** as the type, you can set the year to ******** if you want to the exception to apply to every year. You can also set the month to ******* if you want the exception to apply to every month of the year, and you can set the day to ****** if you want the exception to apply to every day within each month that the exception is active. For example, if you wanted to create a date range that applied to the first six months of every year, you would set the month for the **From** date to January, and the month for the **To** date to June. You would then set the year to ******** and the days to ******, so that the exception applied to every day between January and June, every year. Table 6.2 provides additional examples you can use to see how this feature could be useful.
Monthly	This property only applies if you selected either **Advanced** or **Specific** as the **Type**. This allows you to select which months the recurring exception should apply to. If you chose to create an **Advanced** exception, you can choose for the exception to apply to every month, every other month, every third month, every fourth month, and so on up to every eleventh month. If you chose to create a **Specific** exception, you can choose for the exception to apply to a specific month (e.g. January or February).
Daily	This property only applies if you selected either **Advanced** or **Specific** as the **Type**. This allows you to select which days of the week the recurring exception should apply to. If you chose to create an **Advanced** exception, you can choose for the exception to apply to every day, every other day, every third day, and so on up to every sixth day. You can also choose a specific day (e.g. Monday or Tuesday) for the exception to apply to. If you chose to create a **Specific** exception, you can chose for the exception to apply to a specific day (e.g. Monday or Tuesday) or you can choose from a variety of settings such as every Monday, every other Monday, the last day of every month, etc.

Table 6.2 describes how you could set the properties on the New Calendar Exception dialog to create a variety of recurring exceptions. Remember that there are many ways to combine the various choices to create

exceptions, and you can combine the settings listed to Table 6.2 to create any number of other recurring exceptions.

Table 6.2 Recurring Exception Examples

Description	Property Settings	Comments
A recurring exception that applies to July 14th-July 25th of the current year.	**Type: Simple** **From:** 2006 / Jul / 14 **To:** 2006 / Jul /25	You can create an exception that applies to a block of dates within a specified year with a **Simple** exception. Configure the **From** and **To** properties to include the dates you want to use.
A recurring exception that applies to the 4th of July, every year.	**Type: Advanced** **From:** ****/ Jul / 4 **To:** **** / Jul / 4 **Monthly:** - - - - - **Daily:** - - - - -	Set the date to July 4th, but make sure to select **** as the year so that the exception will be active every year. Leave the **Monthly** and **Daily** properties blank. You could modify the **From** and **To** dates if you want the exception to apply to a block of dates, year after year.
A recurring exception that applies to the first ten days of every month, every year.	**Type: Advanced** **From:** ****/ *** / 1 **To:** **** / *** / 10 **Monthly:** - - - - - **Daily:** - - - - -	Select *** as the month and **** as the year so that the exception will be active every month of every year. Then, set the day for the **From** and **To** properties to 1 and 10, respectively. Leave the **Monthly** and **Daily** properties blank. This way, the exception will apply to the first ten days of every month of every year.
A recurring exception that applies to Mondays between January and March.	**Type: Advanced** **From:** ****/ Jan / ** **To:** **** / Mar / ** **Monthly:** - - - - - **Daily: Every Monday**	Leave the **Monthly** property blank, and set the **Daily** property to **Every Monday** so that the exception will apply to Mondays only. For the **From** and **To** properties, you should select **** as the year and ** as the day. You should set the months to **Jan** and **Mar**, so that the exception will be active every day of every year, but only between January and March. If you wanted the recurring exception to apply to every Monday all year round, you could change **Jan** and **Mar** to the *** wildcard.
A recurring exception that applies to every fourth month.	**Type: Advanced** **From:** ****/ *** / ** **To:** **** / *** / ** **Monthly: Every Fourth Month** **Daily:** - - - - -	Select **** as the year, *** as the month, and ** as the day for the **From** and **To** properties, so that the exception will be active every day of every year. Leave the **Daily** property blank, and set the **Monthly** property to **Every Fourth Month** so that the exception will apply to every fourth month of every year going forward.

Description	Property Settings	Comments
A recurring exception that applies to every third day, during the first 15 days of each month.	**Type: Specific** **From:** ****/ *** / 1 **To:** **** / *** / 15 **Monthly:** - - - - - **Daily: Every Third Day**	For the **From** and **To** properties, you should select **** as the year and *** as the month, so that the exception applies to every month of every year. You should set the day for the **From** date to **1** and the day for the **To** date to **15**, so that the exception will be active the first 15 days of each of those months. Leave the **Monthly** property blank, and set the **Daily** property to **Every Third Day** so that the exception will apply to every third day of the dates the exception applies to (i.e. the first 15 days of each month).
A recurring exception that applies to the last day of every month after July.	**Type: Specific** **From:** ****/ Jul / ** **To:** **** / Dec / ** **Monthly:** - - - - - **Daily: Last Day of Month**	For the **From** and **To** properties, you should select **** as the year and ** as the day. You should set the month for the **From** date to **Jul** and the month for the **To** date to **Dec**, so that the exception will be active from July to December. Leave the **Monthly** property blank, and set the **Daily** property to **Last Day of Month** so that the exception will apply to the last day of every month that the exception is active (i.e. between July and December every year).
A recurring exception that applies to every other Sunday between April and July.	**Type: Specific** **From:** ****/ Apr / ** **To:** **** / Jul / ** **Monthly:** - - - - - **Daily: Every Second Sunday**	Leave the **Monthly** property blank, and set the **Daily** property to **Every Second Sunday** so that the exception will apply to every other Sunday going forward. For the **From** and **To** properties, you should select **** as the year and ** as the day, and you should set the months to **Apr** and **Jul**, so that the exception will be active every day of every year between April and July. If you wanted the recurring exception to apply to every other Sunday all year round, you could change **Apr** and **Jul** to the *** wildcard.

6. Click **OK** to save the recurring exception you have created. Then, click **OK** again to return to the **Configure – Event Scheduler – Exception Schedules** Web for the Event Scheduler.

7. Configure the events schedule for the days that the recurring exception applies to. To do so, click any of the days included in the recurring schedule in the calendar, and follow steps 4-7 of the *Setting the Daily Schedule* section to create the events schedule for that day. The schedule you create will be applied to all days included in the recurring exception,

not just the one you have currently selected.

8. Click **Submit** to save your changes, and return to the **Configure – Event Scheduler – Main** Web page.

The *i*.LON 100 server will now begin updating your data points at the schedule you have specified. You can go back and edit the configuration of the Event Scheduler at any time. You can create up to 40 Event Schedulers, each with multiple data points.

Using the Configure – Event Scheduler – Calendar Exceptions Web Page

The previous section described how to create one-time and recurring exceptions with the **Configure – Event Scheduler –Exception Schedules** Web page. You can also create exceptions with the **Configure – Event Scheduler – Calendar Exceptions** Web page. The difference between the two Web pages is that the **Configure – Event Scheduler – Calendar Exceptions** Web page shows all the exceptions cr eated for all the Event Schedulers that you have added to the *i*.LON 100 server. In contrast, the **Configure – Event Scheduler – Year View** Web page only shows the exceptions created for the currently selected Event Scheduler.

To use the **Configure – Event Scheduler –Calendar Exceptions** Web page, follow these steps:

1. From the **Configure – Event Scheduler – Main** Web page, click the Event Calendar icon. This opens the **Configure – Event Scheduler – Calendar Exceptions** Web page shown in Figure 6.11.
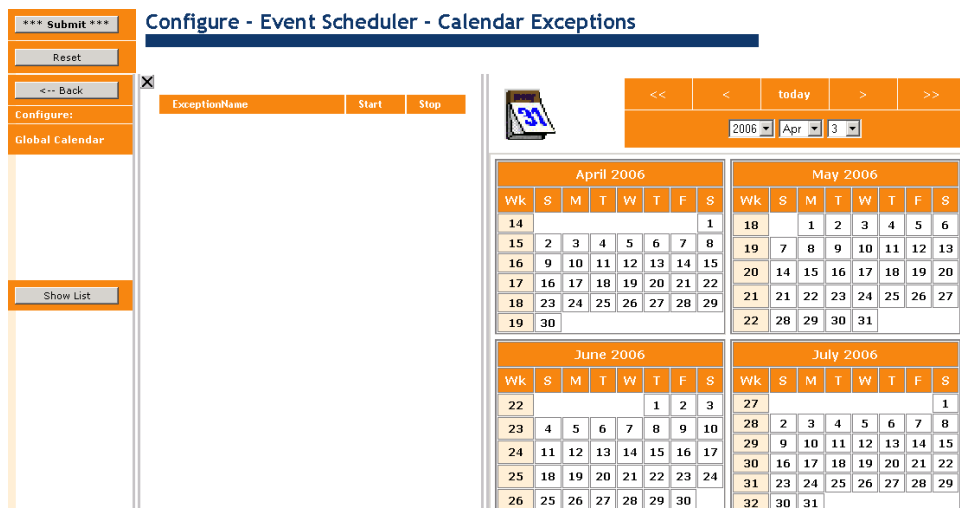
Figure 6.11 Configure – Event Scheduler –Calendar Exceptions Web Page

2. Right-click the calendar in the right pane, and then select **New Exception** or **New One-Time Exception** to create a new exception. Then, follow the steps described previously in this chapter to configure the exception.

3. When you have finished creating exceptions, click **Submit** to return to the **Configure – Event Scheduler – Main** Web page.

4. Click the **Exceptions Schedules** icon to open the **Configure – Event Scheduler – Exception Schedules** Web page.

5. Right-click the calendar in the Web page's right pane and then select

New Exception. This opens the New Scheduler Exception dialog.

Figure 6.12 New Scheduler Exception Dialog

6. Click **Add/Remove**. The dialog will expand, so that the exceptions you
    created with the **Configure – Event Scheduler – Calendar Exceptions**
    Web page are listed.
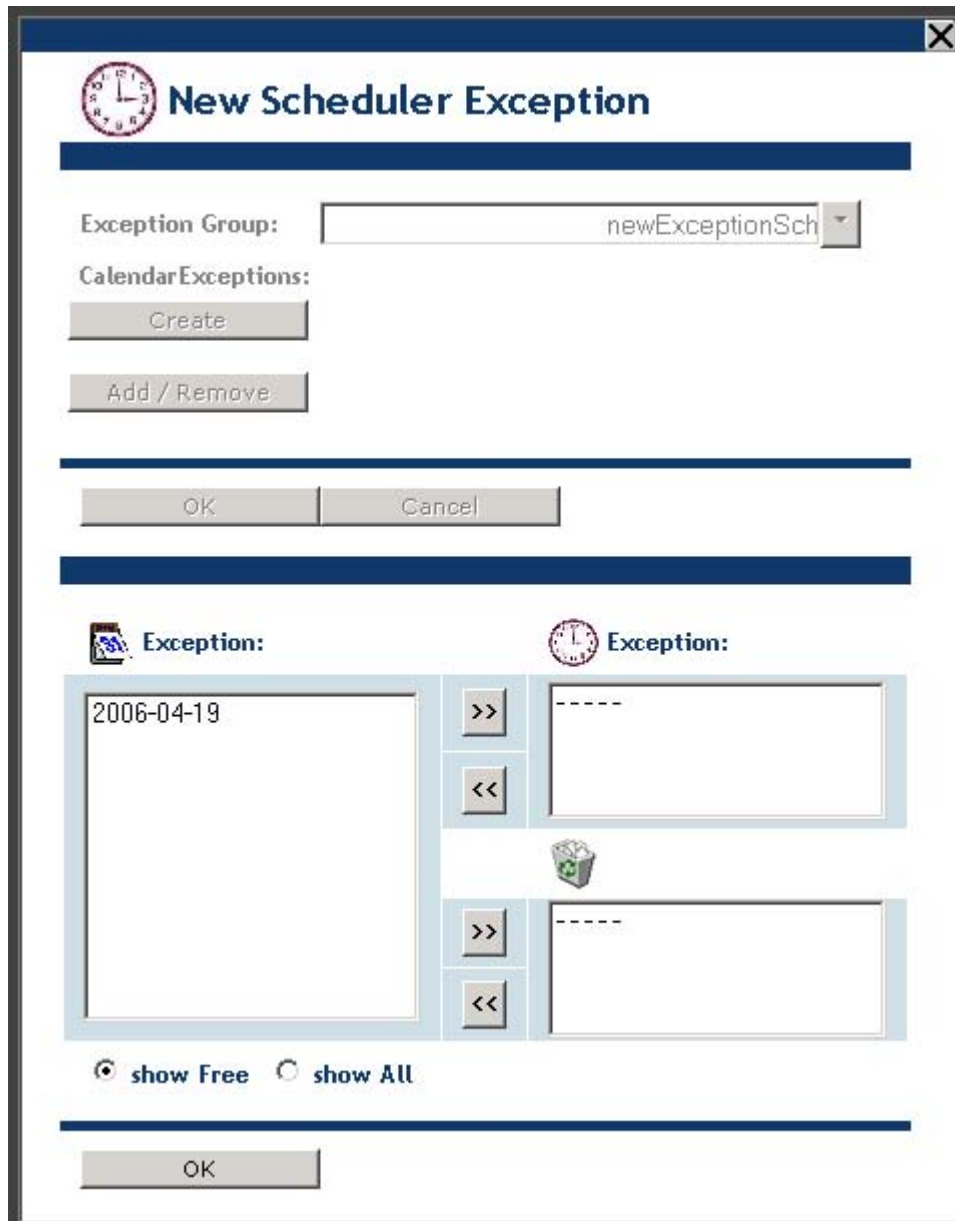
Figure 6.13 New Scheduler Exception Dialog

Click **Show Free** to display the exceptions that have not been added to an Event Scheduler. Click **Show All** to display all the exceptions that have been created, including those that have been created for Event Schedulers other than the one you are currently configuring.

7. Select the exception you want to add by clicking it in the left Exception list, and then click the upper **>>** icon to add it to the Event Scheduler you are currently configuring.

    You can click the lower **>>** icon to delete the exception.

8. Configure the events schedule to apply to each of the exceptions you created in step 2. For instructions to follow when creating the events schedules, see steps 4-7 of the *Setting the Daily Schedule* section previously in this chapter.

9. Click **Submit** to save your changes.

Viewing Event Schedulers

You can view the events and exceptions defined for your Event Schedulers with the **View – Event Schedulers** Web page. To open this Web page, point to the **View** menu, and then click **Event Schedulers** on the menu.

Figure 6.14 View - Data Logs Web Page

Chose an Event Scheduler to display in the **Select** box. The **Events Of** column on the left side of the Web page shows the events scheduled for the currently selected day. You can select a day to be displayed by specifying a date with the boxes next to the clock, or by clicking the day you want to see in the calendar on the right pane of the Web page.

Click the **Events Of** column (or a day in the calendar on the right side) to open the Configure – Event Scheduler Web page and re-configure the events for that day.

7
Logging Data

This chapter describes how to use the *i*.LON 100 Internet Server to save network data into data logs, and how to view the data logs.

Data Logger Overview

The *i*.LON 100 Internet Server can contain up to 10 **Data Loggers**. You can use a Data Logger to record updates to a group of user-specified data points into a *log file*. The log file for each Data Logger is stored in the `/root/data` directory of the *i*.LON 100 server with the file name logX, where X represents the index number assigned to the Data Logger.

You can create two kinds of Data Loggers: *historical Data Loggers*, and *circular Data Loggers*. A historical Data Logger stops recording data point updates when its log file becomes full. A circular Data Logger removes the records for older updates when its log file is full, and new updates occur. A Data Logger can save either type of log file in an ASCII-text (.csv file extension) or binary (.dat file extension) format.

The **e3** version of the *i*.LON 100 also features the ability to save the historical log files as text files in compressed format (.gz file extension) when using the *i*.LON 100 Web pages. A log file that uses the new compressed format can store many more log entries than a log file using the other formats, while conserving the flash memory on the *i*.LON 100. All you need to do is extract the .csv file from the .gz file to view the log.

The Data Logger can record data in two ways: event driven updates and polling. Each data point can have its own set of parameters that determine if the data will be recorded at a specified poll rate (a *poll driven update*) and/or when an update of the data point occurs (an *event driven update*). For event driven updates, you can set the minimum amount of time between updates and the amount of change in the value with the **Min Delta Time** and **Min Delta Change** properties. These filters do not affect data that is recorded at a specified poll rate. When a poll rate is set for a data point in a Data Logger, a value will always be written to the log at that rate.

You can also define a threshold level for each Data Logger. The threshold level represents a percentage. When the Data Logger's log file consumes this percentage of the memory space allocated to it, the Data Logger provides notification that it is time to upload the log and clear out some of the data. The Data Logger makes this notification by updating the Data Logger's alarm data point (called NVL_nvoDlLevAlarm[X], where X represents the index number assigned to the Data Logger) to the status AL_ALM_CONDITION. This feature is useful when working with historical Data Loggers, which are disabled when they become full.

You can access the data in a log file by viewing it in the data logging Web page, by manually opening the log file, or by using a SOAP function. You can clear data from a log by sending an update to the data point NVL_nviDlClear[X], where X represents the index number of the Data Logger to be affected, or by using a SOAP function.

Each log can be up to 1024 KB, and the *i*.LON 100 server can log up to 10 MB of data. You can view the amount of free disk space with the **Setup - System Info** Web page.

Creating a Data Logger with the *i*.LON 100 Web Pages

To create a data logger using the *i*.LON 100 Web pages, follow these steps:

1. Open Internet Explorer 6 or later, point it to the URL of the *i*.LON 100, and log in to the *i*.LON 100. This opens the *i*.LON 100 Web page.

2. Point your mouse cursor to **Configure**, and then select **Data Logger** from the drop-down menu. The **Configure - Data Logger – Main** Web page appears, as shown in Figure 7.1.
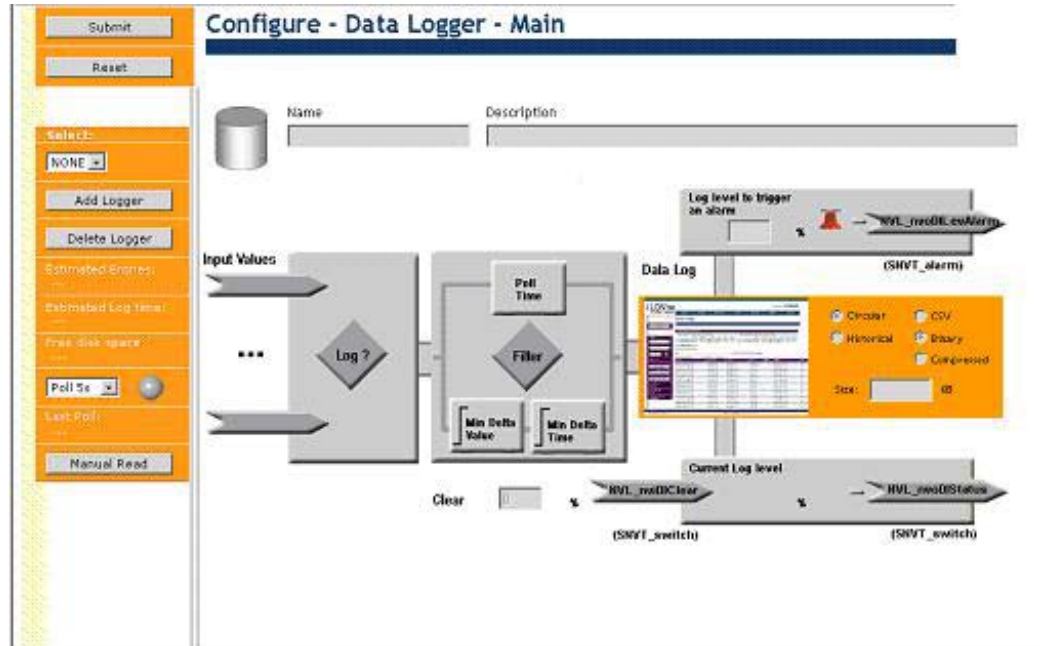
Figure 7.1 Configure – Data Logger – Main Web Page

3. Click the **Add Logger** button to create a new data logger.

4. Configure the properties on the **Configure - Data Logger – Main** Web page. Table 7.1 describes these properties.

Table 7.1 Data Logger Properties

Property	Description
Name	The name of the Data Logger.
Description	An optional description of the Data Logger.
Log Level to Trigger an Alarm	When the data log reaches the specified percent capacity, the nvoDlLevAlarm output network variable on the associated Data Logger functional block will be set to the AL_ALM_CONDITION status.
Circular/Historical	Select either **Historical** or **Circular**. In a historical data log, when the data logger is full, new data will not be logged. In a circular data log, when the data logger is full, the oldest data will be deleted.

Property	Description
CSV/Binary/Compressed	Select either **Binary, CSV,** or **Compressed**. A binary file can only be read by the **View - Data Logger** Web page. A CSV (comma separated value) file is a text file that can be read by any application that can read text files, and can be imported into spreadsheet applications such as Microsoft Excel. The *e3* version of the *i.*LON 100 also features the ability to save the historical log files as text files in compressed format (.gz file extension) when using the *i.*LON 100 Web pages. A log file that uses the new compressed format can store many more log entries than a log file using the other formats, while conserving the flash memory on the *i.*LON 100 server. The name of the log file is `log<n>.dat` (for binary log files), `log<n>.csv` (for comma separated value log files), or `log<n>.csv.gz` (for compressed files), where `<n>` is the index number of the Data Logger functional block. Changing the log file format of an existing log file deletes any existing log file.
Size	The size in KB, of this data log. Each log can be up to 1024 KB, and the *i.*LON 100 server can log up to 10 MB of data. You can view the amount of free disk space with the **Setup - System Info** Web page.
Clear	This field is used to clear the data log. Enter the percentage of the log you wish to clear and click **Submit** to clear out some or all of the data log. This clears the percentage of the total log. For example, if your data log is only 30% full, entering 60.0 will clear your entire log; if your data log is 90% full, entering 60.0 will leave the log 30% full. Entering 100.0 in this field and clicking **Submit** erases all logged data. You cannot clear a data log while the logging is disabled.

5. Once you have created a data logger, you must add one or more points to be logged to it. To add data points to a Data Logger, click the **Log?** or **Filter** diamond on the **Configure - Data Logger – Main** Web page shown in Figure 7.1. The **Configure - Data Logger – Data Points** Web page opens.
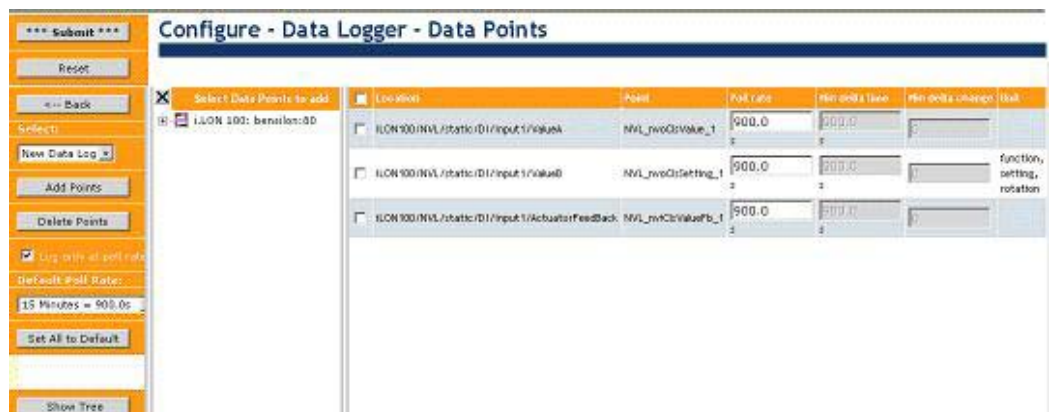
Figure 7.2 Configure - Data Logger – Data Points Web Page

To add a data point to the Data Logger, browse to the data point to be logged with the data point tree on the left side of this Web page, and click **Add Points**. You can select multiple points at once by holding down the

<Ctrl> key and clicking the data points you want to add. Selecting a branch of the tree automatically selects all data points contained by that branch. The points will be added to the list of points on the right hand side of the Web page. In Figure 7.2, three data points have been added to the Data Logger.

6. Configure each of the data points added in step 5 by configuring the properties on the Web page. Table 7.2 describes these properties.

Table 7.2 Data Point Properties

Property	Description
Poll Rate	Enter the poll rate, in seconds. This determines how often the value of the data will be logged. If this value is set to 0, the value will only be logged when it changes. You can set a default poll rate for all data points on this Web page from the **Default Poll Rate** drop-down list on the far left side of the Web page. Click **Set All To Default** to have the poll rates for all data points to be logged set to their default value. Note that if you set the value of this property to 0, the Data Logger will not detect updates to NVE data points that are made with custom SOAP applications, and those updates will not be recorded into the log.
Min Delta Change	Determines how much the data point's value needs to change between log entries. Set this property to 0 to disable logging on value changes. For structure type data points, set the Min Delta Change to any non-zero value to cause any change in value to be logged. This option will be disabled if the **Log Only At Poll Rate** check box in the left sidebar is selected. Disabling this option ensures that the data points will only be logged at their specified poll rates. This option is set by default.
Min Delta Time	Determines the minimum amount of time that must pass between log entries for the data point. The data point will not be logged again within this time, even if the Min Delta Change threshold is passed. This option will be disabled if the **Log Only At Poll Rate** check box is selected in the left sidebar. Enabling this option ensures that the data points will only be logged at their specified poll rates. This option is set by default.
Location	Read-only. The location field of the data point to be logged.
Point	Read-only. The functional name of the data point to be logged.
Unit	Read-only. The units associated with the data point to be logged. This information is derived from the data point's type.

7. To remove points from a Data Logger, check the box next to the points to be removed and click **Delete Points**.

8. Click **Submit** to save your changes. The Data Logger will begin recording updates to the data points you have selected as input to the log files. You can view the log file at any time with the *i.*LON 100 Web pages, as described in the *Viewing Data Logs* section on page 126. Or, you can extract the data logs from the *i.*LON 100 server with FTP as described in the next section, *Extracting Data Logs*.

Extracting Data Logs

You can extract the data logs from the *i.*LON 100 server with FTP or SOAP requests. See the *i.LON 100 e3 Programmer's Reference* for information on using SOAP requests.

To extract a data log with FTP, follow these steps:

1. Open an FTP client, such as Internet Explorer 6.

2. Point the FTP client to the IP address of the *i.*LON 100 server. You must enable FTP access first, as described in the *i.LON 100 Server Security* section on page 55. Once you've connected to the *i.*LON 100 server, you will see the *i.*LON 100 server directory structure.

3. Open the `data` folder. You will see a log file for each data logger that you have created. The log files are named `log<n>.dat` (binary file), `log<n>.csv` (semicolon separated value file) or `log<n>.csv.gz` (compressed file), where <n> is the index of the functional block to which the log applies.

   Copy this log file to your computer using any method available to your FTP client. If you are using a compressed log file, you will need to extract the `.csv` file from the `.gz` file using WinZip or Gnu Zip. Following that, you can view the log file as you would any other `.csv` file.

Viewing Data Logs

You can view data logs using the *i.*LON 100 **View - Data Logs** Web page. To open this Web page, point your mouse cursor to the **View** menu, and then select **Data Logs** from the drop-down menu.

Figure 7.3 View - Data Logs Web Page

Use the **Show** drop-down list to choose the Data Log from which to show data. Choose a single data point to show data for a single point or <All Points>.

Use the **Start Time** and **End Time** fields to choose a range of time to view data from. The start time is inclusive and the end time is exclusive. For example, if you set a **Start Time** of 10:00 AM and an **End Time** of 1:00 PM, you will get all log entries that occurred between 10:00 AM and 12:59:59 PM.

Once you have narrowed the range of data to be displayed, click **Get Range** to show the filtered set of data. If the specified range takes up too much space, it will be broken down into multiple intervals. You can choose which interval is currently displayed by selecting an interval with the slide bar below the **Get Range** button, and then clicking **Get Range**.

Table 7.3 describes the properties that are displayed for each log entry.

Table 7.3 Log Entry Properties

Property	Description
Time	The time at which the data was logged.
Location	The Location property of the logged data point.
Point	The name of the logged data point.
Value	The logged value of the data point.
Unit	The unit associated with the type of the logged data point.
Status	The status of the data point at the time it was logged.
Src	The LONWORKS source address of the logged data point.

Click **Delete Entire Log** to delete the currently selected data log. Click **Delete Log Interval** to delete the currently selected range of data. When using this feature, you should note that the Web page only shows the first 60 entries in the range, but the entire range will be deleted.

When printing this page, use the landscape format.

Using a Data Logger with an Alarm Notifier

You can configure an Alarm Notifier to send an email notification each time one of your log files becomes full. To do so, create an Alarm Notifier as described in Chapter 5, *Alarming*. When doing so, be sure to do the following:

1. Specify the **NVL_nvoDlLevAlarm** data point of the Data Logger as one of the inputs to the Alarm Notifier.

2. Configure the Alarm Notifier to send a notification each time the status of the **NVL_nvoDlLevAlarm** data point is updated to an alarm condition.

3. When you configure the destination for the alarm notifications for the network variable, enter **/data/log/<*n*>.csv** as the attachment, where <*n*> is the index of the **Data Logger** functional block. This way, the Alarm Notifier will email the log file as soon as it becomes full.

8

Using Pulse Counter Inputs

This chapter describes how to use the *i*.LON 100 server's Pulse Counter to measure electrical energy, volume, rate or flow, or power.

Pulse Counter Overview

The *i*.LON 100 server includes two pulse meter inputs. These can be used to connect the *i*.LON 100 server to a any device with a pulse output that does not include a LONWORKS interface. Generally, the hardware input is from some meter that measures energy or the flow of a liquid or gas, and generates a pulse for some predefined unit like kilowatt-hours, liters, or gallons. These pulses are counted and the differential is calculated by the *i*.LON 100 server and stored in output data points. You could link these data points to an Alarm Notifier or a Data Logger to monitor these hardware inputs with the *i*.LON 100 server.

The *i*.LON 100 server contains 2 Pulse Counters – one for each pulse meter input connected to the device.   If you want to change the type of data that is sent by the Pulse Counter to match your application, you must use the *i*.LON 100 Configuration Plug-in to change the output data point types. These types cannot be changed using the Pulse Counter Web pages.

Using the Pulse Counter with the *i*.LON 100 Web Pages

To use the Pulse Counter application with the *i*.LON 100 Web pages, follow these steps:

1. Open the *i*.LON 100 Web pages, point your mouse cursor to **Configure** and then select **Pulse Counter** from the drop-down menu. The Configure – Pulse Counter Web page opens, as shown in Figure 8.1.
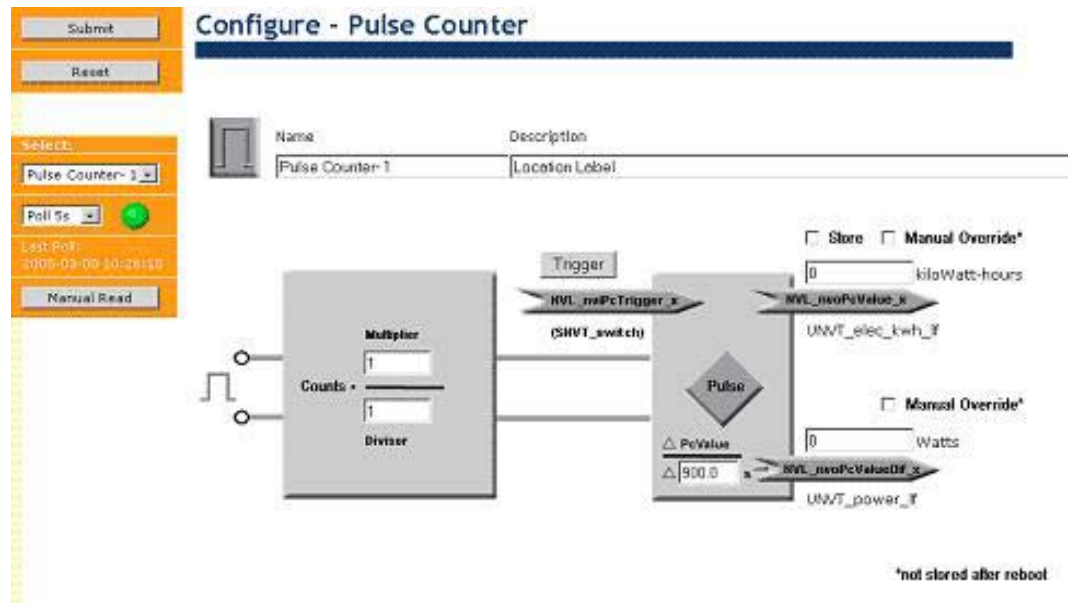
Figure 8.1 Configure – Pulse Counter Web Page

2. You will notice three data point icons on the Web page. These are the input and output data points for the Pulse Counter application. Table 8.1 describes these data points.

Table 8.1 Pulse Counter Inputs and Outputs

Name	Description
NVL_NvoPcValue	This output data point sends the cumulative pulse count data (*i.e.* the total number of pulse counts received). This value will be calculated every time a pulse is received, but the value will not be sent to the network until the **Time Interval** (see below) expires or the value of the **NVL_nviPcTrigger** data point changes from **Off** to **On**, polling this network variable at any time will return the most current value.
NVL_NvoPcValueDif	This output data point sends the pulse rate.
NVL_NviPcTrigger	This SNVT_switch input data point is used to synchronize the **nvoPcValueDif** network variable. When the value of the data point changes from **Off** to **On**, the **nvoPcValue** and **nvoPcValueDif** values will be calculated and sent to the network and a new time interval is started.

3. Select **Pulse Counter - 1** or **Pulse Counter - 2** from the **Select** drop-down list on the left side of the Web page to determine which **Pulse Counter** you will use.

   Pulse Counter - 1 applies to the pulse meter device connected to the Meter 1 screw terminals, and **Pulse Counter - 2** applies to the pulse meter device connected to the Meter 2 screw terminals. Consult the *i*.LON 100 *e3 Hardware Guide* for more information on the screw terminals.

4. Configure the properties on the Configure – Pulse Counter Web page. Table 8.2 describes these properties.

Table 8.2 Pulse Counter Properties

Property	Description
Name	The name of the **Pulse Counter**.
Description	An optional description of the **Pulse Counter**.
Multiplier/Divisor	These fields allow you to input a multiplier and divisor to convert the units per pulse. For example, if your power meter sends 1 pulse every 10 watt hours, set the Multiplier to 10 and the Divisor to 1 to translate the data to watts/hour.
Time Interval	This field appears below **PcValue** next to the **NVL_nvoPcValueDif_x** data point shape. Set the interval that will be used as the divisor for the **NVL_nvoPcValueDif_x** value. This value also determines how often the output data point values are updated.
Trigger	Click this button to start a new time interval. This resynchronizes the pulse counter.

Property	Description
Manual Override	You can set manual override values for the **NVL_nvoPcValue_x** and **NVL_nvoPcValueDif_x** output data points used by the **Pulse Counter** application instances. Enter the override value to use in the box below the **Manual Override** check box. The override value must be properly formatted (or use a defined preset) for the data point type. Then, enable the override value for a data point by selecting the **Manual Override** check box. The *i*.LON 100 server will then send the override value regardless of hardware input.
Store	To set the **NVL_nvoPcValue_x** data point to a specified starting value, set this option, enter the value in the **Manual Override** field, and then click **Submit**. The **NVL_nvoPcValue_x** data point will be set to this value and the Store option will be automatically unchecked. This overwrites the metering values previously reported for the device by the Pulse Counter application.

5. After changing any of these options, it is recommended that you resynchronize the *i*.LON 100 server with the LNS database at the next opportunity.

9

Using Digital Inputs/Digital Outputs

This chapter describes how to use the *i*.LON 100 Internet Server's two digital inputs and two digital outputs.

Overview

The *i*.LON 100 device includes two digital inputs. These can be used to connect the *i*.LON 100 device to a digital device that does not include a LONWORKS interface, such as a switch or pushbutton. The *i*.LON *100 Internet Server Hardware Guide* describes how to connect the digital inputs to digital devices.

The *i*.LON 100 device includes two dry-contact relay outputs. These can be used to connect the *i*.LON 100 device to a digital device that does not include a LONWORKS interface such as a drive contactor or alarm bell. The *i*.LON 100 device contains two Digital Output application instances.

Using Digital Inputs With the *i*.LON 100 Web Pages

To use digital input with the *i*.LON 100 Web pages, follow these steps:

1. Choose one of the two digital inputs. Connect one side of the input to the 12V output and the other side to ground that runs through a switch or dry-contact relay. See the *i*.LON *100 e3 Hardware Guide* for more information on the output. If the contact is open, the digital input will register OFF and if the contact is closed, the digital input will register ON.

2. On the *i*.LON 100 Web pages, point your mouse cursor to **Configure** and then select **Digital Input** from the drop-down menu. The **Configure – Digital Input** Web page opens.
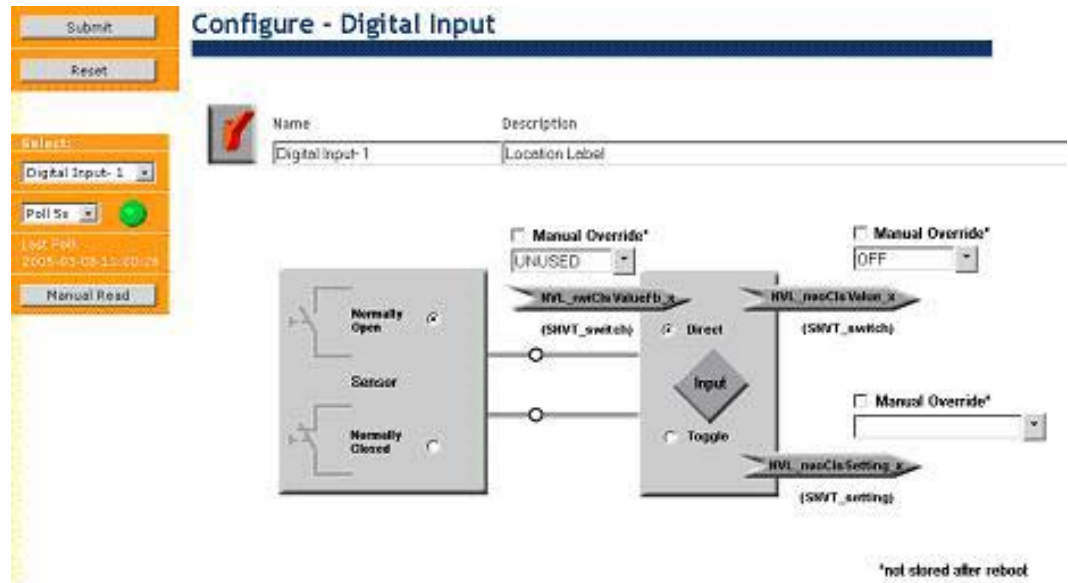
Figure 9.1 Configure – Digital Input Web Page

3. Select **Digital Input - 1** or **Digital Input - 2** from the **Select** drop-down menu on the left side of the Web page to determine which **Digital Input** you want to configure. **Digital Input – 1** applies to the digital device connected to the Input 1 screw terminals, and **Digital Input - 2** applies to the digital device connected to the Input 2 screw terminals. Consult the

i.LON 100 *e3 Hardware Guide* for more information on the screw terminals.

4. Configure the properties on the Configure – Digital Input Web page. Table 9.1 describes these properties.

<div align="center">Table 9.1 Digital Input Properties</div>

Property	Description
Normally Open **Normally Closed**	Select **Normally Open** to have the Digital Input application send an Off value when the hardware input is open. Select **Normally Closed** to have the Digital Input application send an Off value when the hardware input is closed.
Direct **Toggle**	Select **Direct** to have the **Digital Input** application send the current state of the hardware input. Select **Toggle** to have the Digital Input application toggle its output each time the hardware input changes from Off to On.
Manual Override	You can set manual override values for each of the three data points used by a **Digital Input** application instance (**NVL_nviClsValueFb_x**, **NVL_nvoClsValue_x**, and **NVL_nvoClsSetting_x**). Enable the override value for a data point by checking the **Manual Override** option. For **NVL_nviClsValueFb_x**, the *i*.LON 100 server will use the override value as an input and ignore other updates to this data point; for the two output data points, the *i*.LON 100 will send the override values regardless of the state of the hardware input. The override value must be properly formatted (or use a defined preset) for the data point type (SNVT_setting for **NVL_nvoClsSetting_x**, SNVT_switch for the other two data points).

5. Click **Submit** to save the settings.

Using a Digital Output With the *i*.LON 100 Web Pages

To use a digital output with the *i*.LON 100 Web pages, follow these steps:

1. Connect the one of the two relay outputs to a digital input.

2. On the *i*.LON 100 Web pages, hover your mouse cursor over **Configure** and select **Digital Output**. The **Configure – Digital Output** Web page opens:
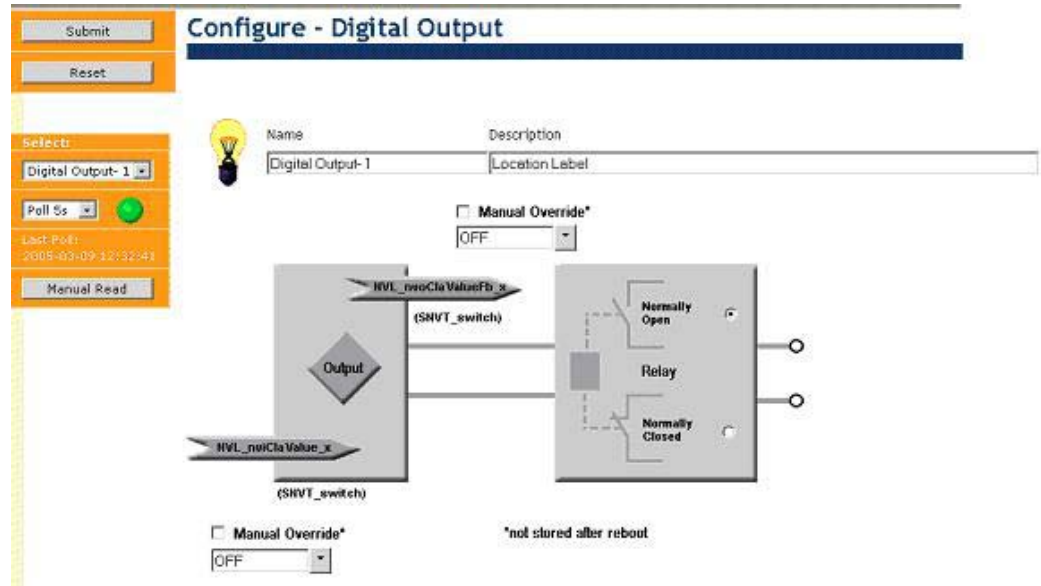
Figure 9.2 Configure – Digital Output Web Page

3. Select **Digital Output - 1** or **Digital Output - 2** from the **Select** drop-down menu on the left side of the Web page to determine which **Digital Output** you want to configure.

    Digital Output – 1 applies to the digital device connected to the Output 1 screw terminals, and **Digital Output - 2** applies to the digital device connected to the Output 2 screw terminals. Consult the *i*.LON 100 *e3 Hardware Guide* for more information on the screw terminals.

Table 9.2 Digital Output Properties

Property	Description
Normally Open **Normally Closed**	Select **Normally Open** to have the **Digital Output** application switch the hardware output off when the Off value is received. Select **Normally Closed** to have the **Digital Output** application switch the hardware input on when an Off value is received.
Manual Override	You can set manual override values for each of the two data points used by a **Digital Output** application instance (**NVL_nviClaValue_x**, and **NVL_nvoClaValueFb_x**). Enable the override value for each data point by selecting the applicable Manual Override check box. For **NVL_nviClaValue_x**, the *i*.LON 100 will use the override value as an input and ignore other updates to this data point; for **NVL_nvoClaValueFb_x**, the *i*.LON 100 will send the override value regardless of the state of the hardware input. The override value must be properly formatted (or use a defined preset) for the data point type (SNVT_switch).

After changing any of these options, it is recommended that you resynchronize the *i*.LON 100 to the LNS database at the next opportunity.

4. Click **Submit** to save the settings.

10
Web Binding

This chapter describes how to create Web connections with the *i.*LON 100 server. Web Binding is a process by which you can connect data points on your *i.*LON 100 server directly to data points on another *i.*LON 100 server, Web services application, or to a third party Web server such as Apache® or IIS®, and keep the values of those data points synchronized.

Using Web Connections

You can use the Web Binder application to create Web connections that allow direct data exchange over a TCP/IP network between two *i*.LON 100 servers, or between an *i*.LON 100 server and any Web server that can communicate via SOAP messaging, such as Apache or IIS.

Web connections are independent of LONWORKS domain boundaries. No connection with an LNS Server is required to create a Web connection, and *i*.LON 100 servers connected via Web connections do not need to be in the same LNS database. Web connections do not tightly constrain the types of the data points involved in a connection, which enables simple translation of data sent over scalar to scalar connections. For example, even though the underlying data types of **SNVT_temp_f** and **SNVT_temp_p** may be different, Web connections allow data points of these types to be connected and carries out the conversion automatically. In addition, you can connect structured types such as **SNVT_lev_disc** and **SNVT_switch** by using Presets to map values such as **ST_ON** and **100.0 1** both to a preset value of **ON**. See Chapter 4, *Creating Data Points*, for more information on data point presets.

Each time you create a Web connection on an *i*.LON 100 server, you will specify a data point on the *i*.LON 100 server as the *input data point* (or you could specify an input data point field). You will also specify an IP address, port number, and output data point (or an output data point field). The IP address represents the IP address of the server at the other end of the connection - the *destination server* in this chapter. The port number specifies the incoming port to which data sent to the destination server must be transmitted. If the target device is an *i*.LON 100 server, the output data point must exist on that *i*.LON 100. If the target device is not an *i*.LON 100, the output data point is an optional part of the connection.

Once the Web connection has been created, a request message will be sent to the destination server each time the value of the input data point is updated. The request message will contain the updated value of the input data point, and will update the output data point to match that value. Using these connections, you can cause data points on one *i*.LON 100 network to match the values of data points on another network. This may be very useful when setting up large monitoring applications.

As of the *e3* release of the *i*.LON 100 server, you can attach files stored on your *i*.LON 100 server to the request message. You can send a data log, an alarm log, an event scheduler log, or any user-specified file stored on the *i*.LON 100 server. This make it easy to get data logs from an i.LON 100 behind a firewall to a monitoring system outside the firewall. File attachment is not support for Web connections between two *i*.LON 100 servers.

If the target device is a Web service application, the target application can use the data to monitor data point values from the i.LON 100 server.

Creating a Web connection from an *i*.LON 100 server running the *e3* or *e2* software to an *i*.LON 100 server running the Release 1 software is not supported. However, Web connections between *i*.LON 100 servers running the *e2* and *e3* software are supported. If an *i*.LON 100 server running the *e3* software sends a Web connection update to an *i*.LON 100 server running the *e2* software, the message will initially fail, as the namespace used for Web connection messages from *i*.LON 100 *e3* servers is not compatible with the *e2* software. The *i*.LON 100 *e3* server will then receive a fault message signifying that it should re-send the message to the target host using an *e2* message format, so that the target *i*.LON

100 *e2* server can receive the message successfully. All subsequent Web connection messages to that particular *i*.LON 100 server will then be sent using the *e2* message format, until the *i*.LON 100 server is rebooted. After the reboot, the *i*.LON *e3* 100 server will begin sending all Web connection messages using the e3 message format, but will revert to the *e2* message format for Web connections to *i*.LON 100 *e2* servers following the procedure described in this section.

Configuring Internet Explorer for Web Binding

When connecting two devices using a Web connection, you may find it convenient to see the data points on both devices at once. Internet Explorer security settings may prevent viewing of data from multiple servers simultaneously, even though you may be able to reach that server in a separate browser instance. To enable the viewing of multiple *i*.LON data point trees in a single instance of Internet Explorer, follow these steps:

1. Start Internet Explorer.
2. From the **Tools** menu, select **Internet Options**. The **Internet Options** dialog opens.
3. Select the **Security** tab.
4. Under **Select a Web Content Zone to Specify Its Security Settings**, select **Trusted Sites**, and then click **Sites**. The **Trusted Sites** dialog opens.
5. Clear the **Require Server Verification (https:) For All Sites In This Zone** option.
6. Enter the IP address (or host name + domain suffix if using DNS) for an *i*.LON 100 that you plan to connect using Web binding using the format http://123.123.123.123 (or http://ilon-host-name.mydomain.com), and then click **Add**. Repeat this step for every *i*.LON 100 you will connect using Web binding.
7. Click **OK** in all open dialogs, close all instances of Internet Explorer, and then start a new Internet Explorer session to enable the new settings.

Creating a Web Connection

To connect data points on an *i*.LON 100 to data points on one or more other servers with a Web connection, follow these steps:

8. Open Internet Explorer and point it to your *i*.LON 100.
9. Point to **Configure**, and then click **Web Binder** on the menu. The Web page shown in Figure 10.1 opens:

Figure 10.1 Configure – Web Binder Web Page

The data points on your *i*.LON 100 server appear on the left side of this page under **Select a Source Data Point**. Data points for any destination servers appear on the right side of this page under **Select Destination Data Points**. The next step of this procedure describes how to add destination servers to the list.

10. Add the servers to connect to with the Web Binder application. You can do so by clicking **Add Destination**. The dialog shown in Figure 10.2 opens.

Figure 10.2 New Sever Properties Web Page

Configure the properties on the New Server Properties Web page, and then click **OK** to add the destination server. Table 10.1 describes the properties you need to configure.

Table 10.1 New Server Properties

Property	Description
IP or Hostname	The IP Address or hostname of the destination server.

Property	Description
Port	The port the destination server will use to receive messages from the Web Binder application. By default, this value is 80, but it may be changed to any valid port number. Contact your IS department to assure you're your firewall is configured to allow you to access the server on this port.
SOAP Path	The path to which SOAP messages should be directed on the server. This is typically the location of the WSDL or ASMX file on the destination server where it receives HTTP requests used in a SOAP message transaction. By default, this is `/WSDL/iLON100.WSDL` (the default location of this file on an *i*.LON 100 server).
Retry Time	The *i*.LON 100 server will retry failed Web connection messages every 45 seconds. Use this property to set the amount of time after which the *i*.LON 100 server will stop retrying to send the message.
Connect Via	Determines how your *i*.LON 100 server should connect to the destination server from the dropdown list.

NOTE: You can also create Web Binder destination servers with the connections pane on the **Network – LAN/WAN** Web page. For more information on the **Network – LAN/WAN** Web page task, see *Configuring the Web Binder Destination Service* on page 25.

11. The **Select a Source Data Point** pane lists the data points that have been defined on your *i*.LON 100 server. Select the data point you want to use as the input data point.

12. The **Select Destination Data Points** pane contains entries for the data points on the server you added in step 1 (or for any server that was previously added for use with the Web Server application). Select one or more data points to use as target data points. Hold down the <CTRL> key if you want to select multiple target data points on the same destination server. If the *i*.LON 100 server cannot reach a data point on the destination server, you can create a new data point by clicking *****Target Data Point*****.

13. You can optionally attach a file on your *i*.LON 100 server to the request messages sent over the Web connection. You can send a data log, an alarm log, an event scheduler log, or any user-defined file stored on the *i*.LON 100 server. You cannot attach files to Web connection updates between two *i*.LON 100 servers.

To add an attachment, click **Add Attachment**. The dialog shown in Figure 10.4 opens.
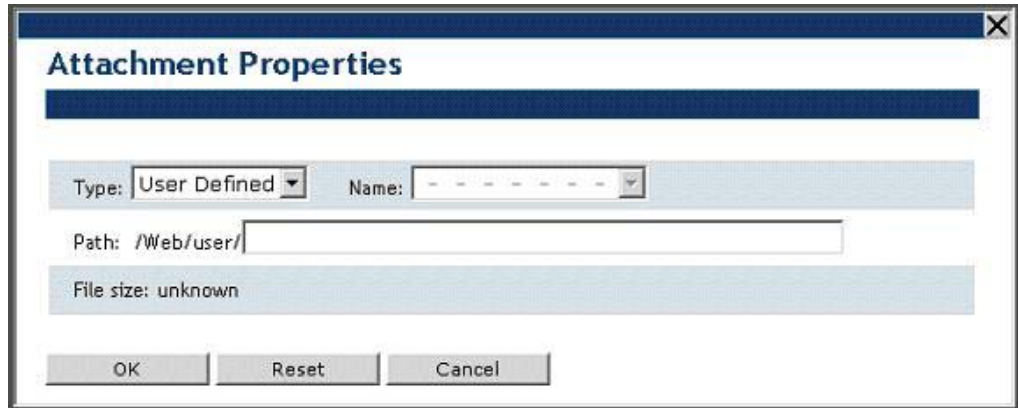
Figure 10.4 Attachment Properties Web Page

Configure the properties on the Attach Properties Web page, and then click **OK** to add the attachment to the messages sent to the destination server. Table 10.2 describes the properties you need to configure.

Table 10.2 Attachment Properties

Property	Description
Type	The type of the file. Select **User Defined, Alarm Log, Data Log,** or **Event Log**. If you select **User Defined**, you can attach any file stored in the `/Web/user` directory of your *i.*LON 100 server to messages sent to the destination server. This includes files in the subdirectories of the `user` directory. If you select **Alarm Log**, **Data Log**, or **Event Log**, you can select any of the alarm logs, data logs, or event scheduler log files stored on your *i.*LON 100 server to the connection.
Name	This property only applies if you selected **Alarm Log, Data Log,** or **Event Log** as the **Type**. The list will include all the log files of the selected application. Select the one you want to attach to the messages sent to the destination server from the list.
Path	This property only applies if you selected **User Defined** as the **Type**. Enter the name (and the rest of the path, if necessary) of the file you want to attach.
File Size	This read-only property displays the size of the file being attached. If you specified a file the *i.*LON 100 server could not find, an error message will be displayed here.

For information you will find useful when retrieving the file attachment from the Web Binder message, see *Retrieving File Attachments* on page 143.

14. Once you have selected a source data point and one or more destination data points, click the **Add Binding** button on the left sidebar. The new Web connection appears at the bottom of the window, as shown in Figure 10.5.
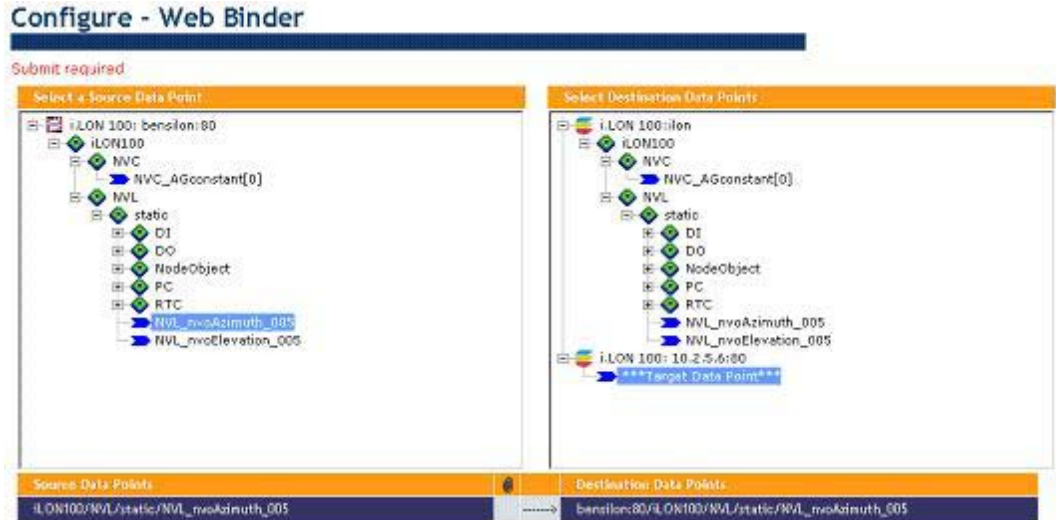
Figure 10.5 Web Binder connection Added

15. Repeat steps 3-7 to add more connections, as desired. Then, click **Submit** to save the new Web connection(s).

16. Once you have created a Web connection(s), click **Validate** to validate that the Web connection(s) has been created successfully. The **Web Binder Validation Report** window opens. This window shows all web bindings on the *i*.LON 100 device. The report shows a **Status** for each connection. If there is some reason that the connection is invalid (e.g. can't find the IP address, format mismatch, etc), the reason will be shown here.

To delete Web connections from the table, select one or more connections from the list at the bottom of the Web page and then click **Delete Bindings**. You can also add (or remove) an attachment from a Web Binder connection by selecting the connection in the list, and clicking **Add Attachment.**

> **NOTE:** Once a dial-up connection is established, it will not be released until its **Disconnect If Idle For** time is reached. This means that if data is being constantly sent over a dial-up connection, the connection will never be dropped and any data that needs to use a second dial-up connection may never be set.
>
> If multiple source data points of Web connections use different dial-up connections, you must ensure that the source data points are not updated so frequently that the first PPP connection is never dropped. If data is being sent over a dial-up connection at a faster rate than the timeout for the connection, the connection will never be dropped, and a new connection can never be made. This can result in a situation in which the *i*.LON 100 server will be unable to update a Web connection over a second dial-up connection. See the *Creating and Configuring a Dial-up Connection* section on page 18 for more information on dial-up connections.

Retrieving File Attachments

The Web Binder follows the Direct Internet Message Encapsulation (DIME) protocol specification when sending file attachments. The DIME protocol specification is supported by Microsoft IIS with .NET V1.1 and WSE (Web Services Enhancements) 2.0. DIME is a binary message format that can be used to encapsulate one or more application-defined payloads of arbitrary type and

size into a single message construct. Each payload is described by a type, a length, and an optional identifier. Both URIs and MIME media type constructs are supported as type identifiers. The payload length is an integer indicating the number of octets of the payload. The optional payload identifier is a URI enabling cross-referencing between payloads. DIME payloads may include nested DIME messages or chains of linked chunks of unknown length at the time the data is generated. DIME is strictly a message format: it provides no concept of a connection or of a logical circuit, nor does it address head-of-line problems.

For more details on the DIME protocol specification, including information you will need when extracting file attachments from your Web connection, consult the following Web site:

www.gotdotnet.com/team/xml_wsspecs/dime/draft-nielsen-dime-01.txt

11

Type Translators and Analog Function Blocks

This chapter describes how to use the Analog Functional Block and Type Translator functional blocks. When reading this chapter, you should be aware that these functional blocks are not available via the *i.*LON 100 Web pages. You can only use these applications with the Configuration Plug-In.

Type Translator

The *i*.LON 100 includes 40 Type Translator functional blocks. A type translator allows you to translate data from one network variable type to another. You can use *scalar-based translation* and *rule-based translation*. Scalar-based translation allows you to translate one floating point or integer network variable to another floating point or integer network variable. Rule-based translation uses one of the Type Translators rules to translate from one network variable type to another. The Type Translator ships with a number of pre-defined rules and you can create custom rules using the *i*.LON 100 Configuration Plug-in as described in the *Creating a Custom Type Translator Rule* section later in this chapter. Rule-based translation can involve translating a single input into many outputs or vice versa.

The Type Translator functional block initially has no network variables. You will dynamically add input and output network variables of the appropriate types for the translation you want to implement.

Using the Type Translator Functional Block

To use a type translator, follow these steps:

1. Open an existing LonMaker network or create a new LonMaker network as described in the *LonMaker User's Guide*.

2. Use an existing *i*.LON 100 device in the LonMaker network, or create and commission a new *i*.LON 100 device.

3. Drag a Type Translator functional block shape from the *i*.LON 100 stencil to the LonMaker drawing.

4. Use the LonMaker New Functional Block wizard to associate the Type Translator functional block shape with any of the available Type Translator functional blocks on the *i*.LON 100.

5. Optionally add dynamic network variables to the Type Translator functional block as described in the *Creating and Viewing Local Data Points (NVLs)* in Chapter 4 of this document. These network variables can be used as local data points.

6. Right-click the Type Translator functional block and select **Configure** from the short-cut menu. The *i*.LON 100 Configuration Plug-in opens and prompts you for the IP address of the *i*.LON 100 hardware.

7. Enter the IP address of the *i*.LON 100 and then click **OK**. The *i*.LON 100 Configuration Plug-in options with the **Type Translator** tab selected, as shown in Figure 11.1.
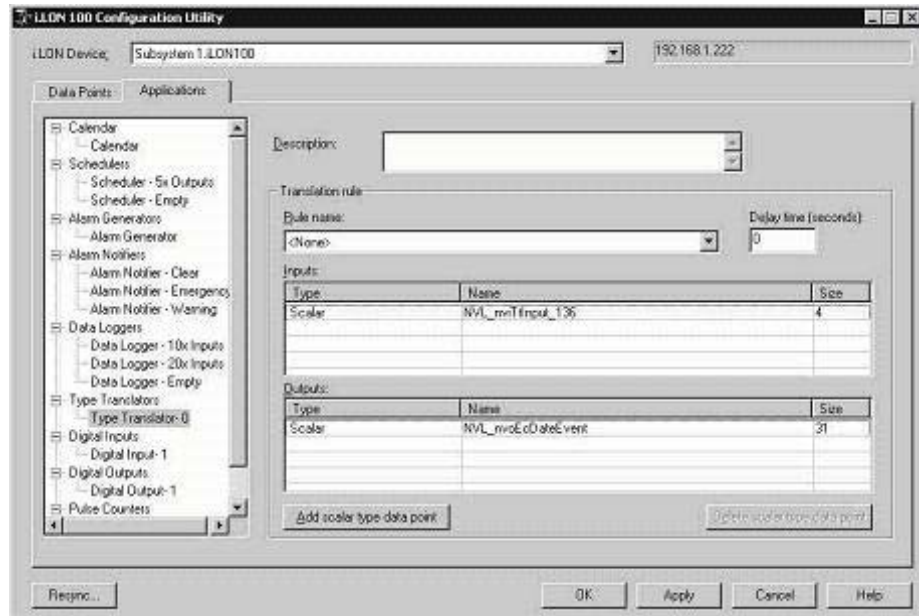
Figure 11.1 Type Translator Tab

8. To create a scalar-based translation, select **<None>** from **Rule Name**, and then click **Add Scalar Type Data Point** to add a scalar point to the **Input** and **Output** lists. You can add as many input/output pairs as required. In each case, the input is translated to the corresponding output.

    To create a rule-based translation, select the translation rule you want to use from **Rule Name**. The **Input** and **Output** lists will be filled in according to the rule you select. For example, if you select the **16xSNVT_switch_TO_SNVT_state** rule, the **Input** list will display 16 **SNVT_switch** type inputs, and the **Output** list will display one **SNVT_state** type output.

    Set the **Delay Time** property to specify the time period the Type Translator wait after the input data point has been updated before a translation is performed. Enter a value in seconds. You might consider setting this property to a value greater than 0 if you have multiple inputs. That way, translations may only occur after most or all of the input data points have been updated. The translation will reflect any additional data point updates that occur during the delay interval (meaning that if an input is updated a second time before the delay interval expires, the delay will not be reset, but the second update value will be the one translated).

    Click **Help** for a complete list and description of all rules provided with the *i*.LON 100 Configuration Plug-In, and for descriptions of the rest of the fields on this tab. For information on creating a custom rule, see *Creating a Custom Type Translator Rule*, later in this chapter.

9. Select a data point of the appropriate type for each entry in the **Input** and **Output** lists. To do this, click the **Name** column next to the entry to see a shortcut menu of all data points of the appropriate type.

10. Click **OK** or **Apply** to save changes.

Creating a Custom Type Translator Rule

You can use the *i*.LON 100 Configuration Software to create custom type translator rules. You can use custom rules to translate data from any number of input network variables to any number of output network variables. To create a custom rule you will define the inputs and outputs of the rule, and create one or more cases that define how the rule will behave with various inputs. To create a custom rule, follow these steps:

1. In the **Applications** tab of the *i*.LON 100 Configuration Software, select **Type Translator Rules** from the Applications list.

2. Right click **Type Translator Rules** in the Applications list and select **Add** from the shortcut menu. The **Add Application** dialog appears. Enter the name of the new rule in **Application Name** and click **OK**. The new rule appears on the Applications list.

3. Select the new application to open the dialog shown in Figure 11.2.
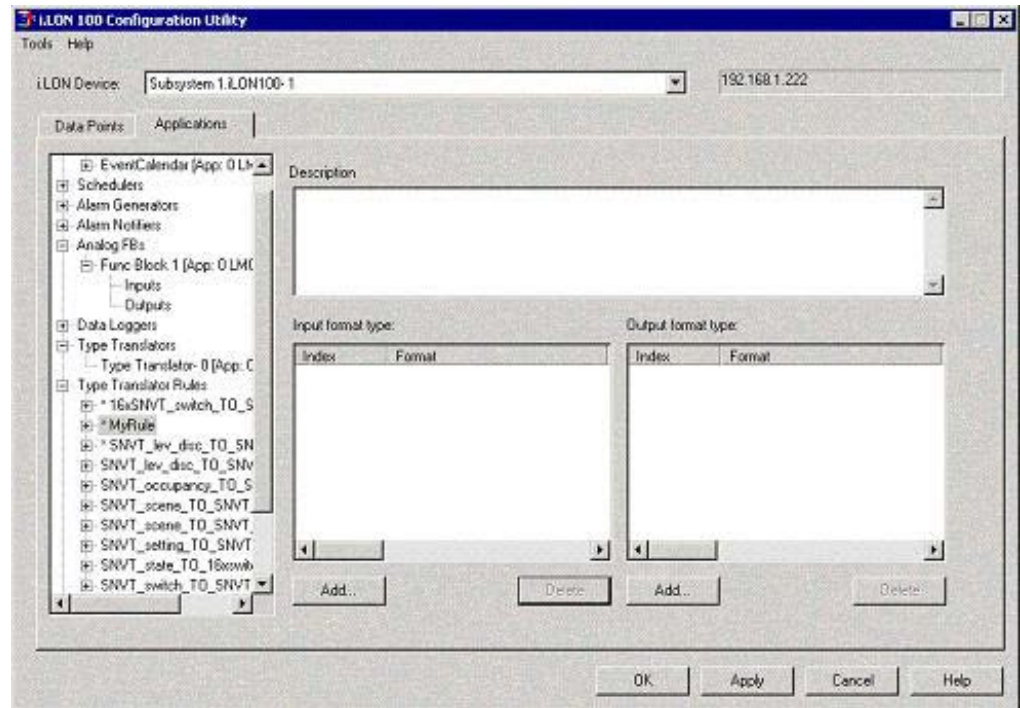
Figure 11.2 New Application Dialog

4. Click the **Add** button under **Input Format Type**. The **Set Data Point Format** dialog appears, as shown in Figure 11.3.
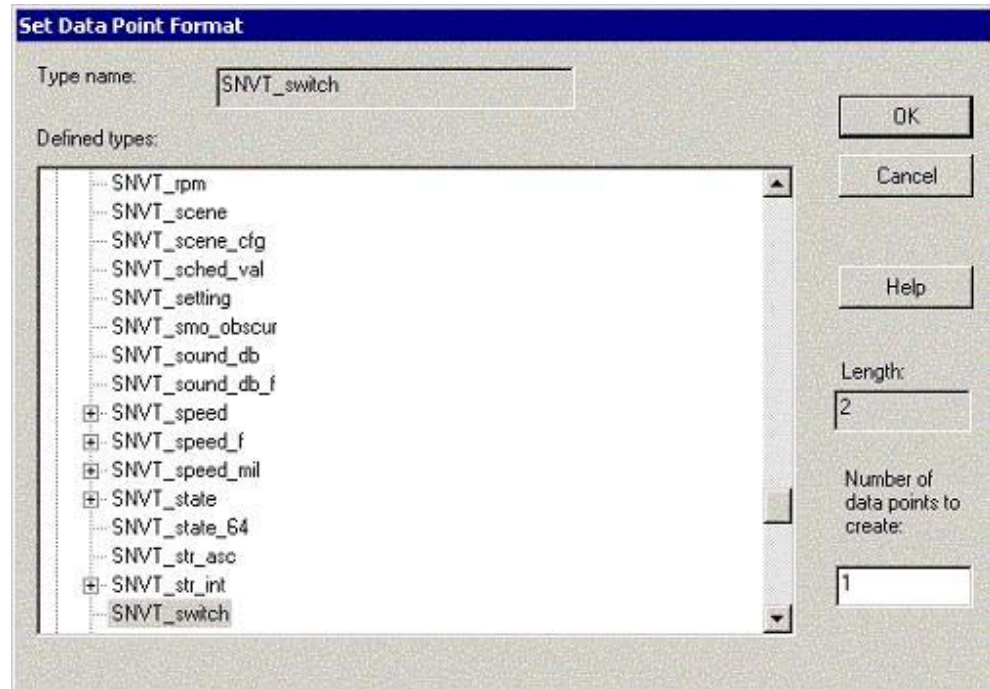
Figure 11.3 Set Data Point Format Dialog

Select a data type that will be used as an input for this rule. If this rule
will accept multiple inputs of this type, set **Number of Data Points to
Create** appropriately.

5. Click **OK**. The data point or data points specified will appear in the **Input
    Format Type** list.

6. To add more input data points, click **Add** and repeat step 4.

7. Add one or more output data points using the **Add** button under the
    Output Format Type list, using the same method described in steps 4-6
    for input data points.

8. Once you have defined all the inputs and outputs, expand the new rule
    the Applications list and then click **Cases**. The **Cases** dialog opens.
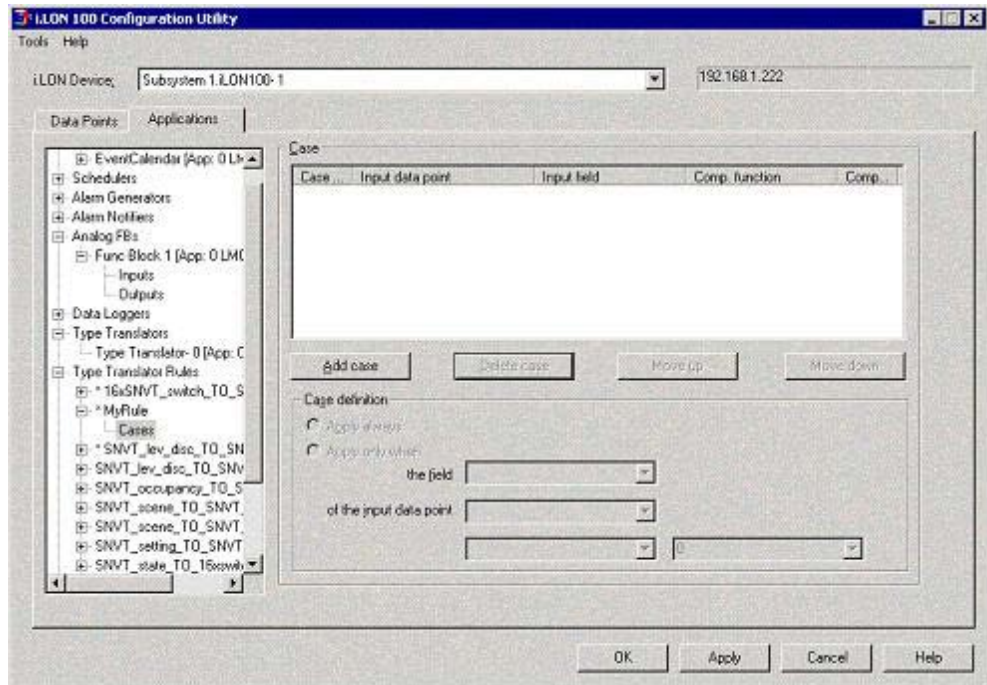
Figure 11.4 Cases Dialog

9. Expand the **Cases** item under your translation rule in the Applications
    list. Select one of the cases you created. The **Rules** dialog opens.
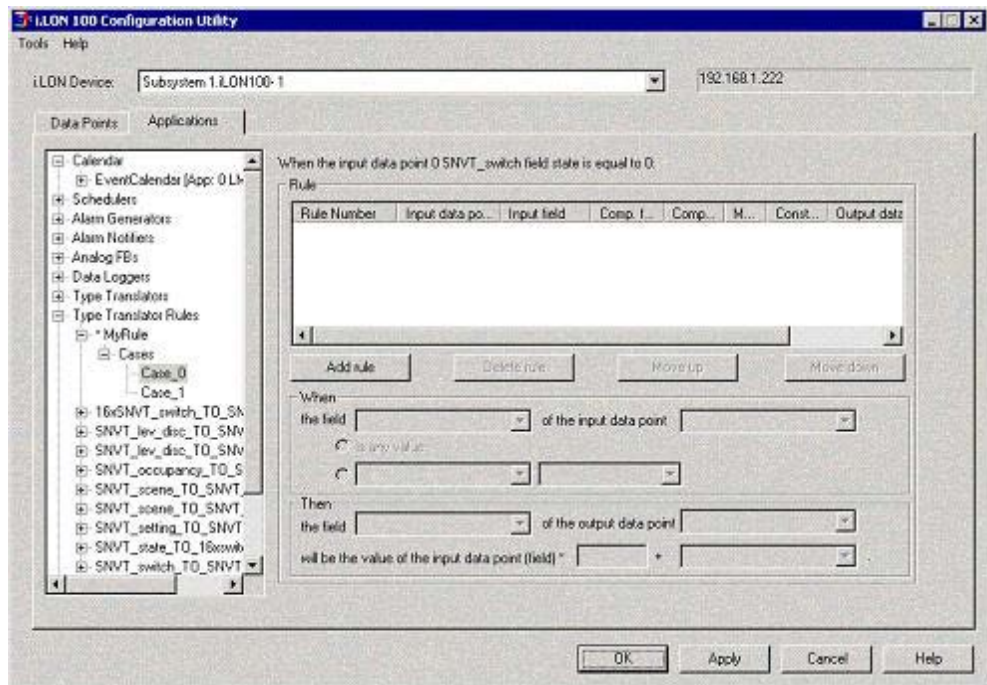
Figure 11.5 Rules Dialog

10. Click the **Add Rule** button to create a new rule for this case. Click **Help**
    for more information on defining rules.

11. Define rules for all defined cases. The *i*.LON 100 Configuration Plug-In
    does not do any verification of your cases and rules; you must make sure

what you have defined makes sense. Once you are finished, click **Apply**.
The new rule will now appear in **Rule Name** in the **Type Translator**
dialog.

Integrating M-Bus Devices With a Type Translator

This tutorial describes how to expose the data from a generic M-Bus device as a
network variable on a LONWORKS network. The techniques covered in this
tutorial may be applied to any M-Bus device that you want to integrate with your
i.LON 100 server. Before starting this tutorial, you should already have installed
an M-Bus device, as described in Chapter 2 of this document. You should also
create a LonMaker drawing that includes the *i*.LON 100 which contains the M-
Bus data point. If you would like more information about the specific device used
in this tutorial, you may download the data sheet of the Scampy water meter
from the Hydrometer GmbH web site.

Step 1: View the Data Point properties

Once you have added an M-Bus data point to the *i*.LON 100 using the built-in M-
Bus Web page, you can examine the properties of the data point using the
Network – M-Bus Web page described in the *Configuring the M-Bus Driver*
section on page 41.

All M-Bus data points defined on the *i*.LON 100 server are listed on the Web
page. The *i*.LON 100 M-Bus driver represents each device using a single data
point that exposes all data from the device as an array. In this example, the
Format Description of the selected data point is UCPT_MBS8. This means that
the data point is an array with 8 elements. The **Unit String** property tells you
the unit for each of these values in order. In this example, the first element in
the array is a measurement of volume with the unit m^3, the second element is a
time stamp, and so on. The M-Bus driver discovers the type and unit information
when the M-Bus device is configured with the M-Bus Web page. The unit and
type information will not be set if the *i*.LON 100 cannot communicate with the M-
Bus device.

The formats used by the M-Bus driver are described in the MBUS_Integrator
resource file set which is installed by the *i*.LON 100 Software CD. These files
may be viewed with the LonMark Resource Editor, also included on the *i*.LON
100 Software CD.

Step 2: Evaluating the device specification

Though the type and unit information can be easily read from the device, many
M-Bus devices could have complex data structures. It is often the case that you
will have to read the device specification to determine how each piece of data
should be interpreted.

In the device specification for an M-Bus device, there is usually a section on the
M-Bus protocol. Find the description of the data being returned by the device on
the REQ_UD2 M-BUS command. This command could also be called the
standard telegram or the *response RSP_UP*. Once you have found this section in
the documentation, you can map the entries in the **Unit String** one by one to the
values in the vendor specification.

This example shows a structure with the following elements:

value[0] m^3: This value reflects the current meter reading (total amount of
water)

value[1] Datetime: The current date and time stored in the M-Bus device

value[2] m³: The meter reading at the last reference day. *Reference days* are configured by the installation tool for the device and define a fixed date or recurring pattern when data will be recorded.

value[3] Date: The last reference day. *Reference days* are configured by the installation tool for the device and define a fixed date or recurring pattern when data will be recorded.

value[4] Date: The next reference day

value[5] l/h: The current flow of water

value[6] m³: The meter reading at the end of the month

value[7] Date: The date of last months reading

Step 3: Modifying the M-Bus Type Translator Rules

Once you have read the data sheet for your device and determined what each element in your M-Bus data point structure means, you can use an *i.*LON 100 **Type Translator** functional block to extract each item and map it to a network variable on the LonWorks network.

The *i.*LON 100 ships with three generic Type Translator Rules for water, power, and thermal measurement which can be used as a starting point when integrating your own M-Bus devices. These rules are named **MBS_HYDROMETER_SCAMPY_1**, **MBS_EMH_EIZ_EDWS_7390** and **MBS_ACTARIS_CF50** respectively. The names of these rules are composed of the manufacturer and model number of actual devices for which these were designed. You can find the XML files defining these rules in the `root/config/software/translatorRules` folder on the *i.*LON 100 server, or in the `LONWORKS\iLon100\driverSupport\M-Bus\translatorRules` on any computer running the *e3* software. Other rule examples can be found on the *i.*LON 100 CD in the **Unsupported** folder.

You can view these built-in rules by opening the *i.*LON 100 Configuration Plug-in for an existing *i.*LON 100 and browsing to **Type Translator Rules** in the Applications pane as shown in Figure 11.6.
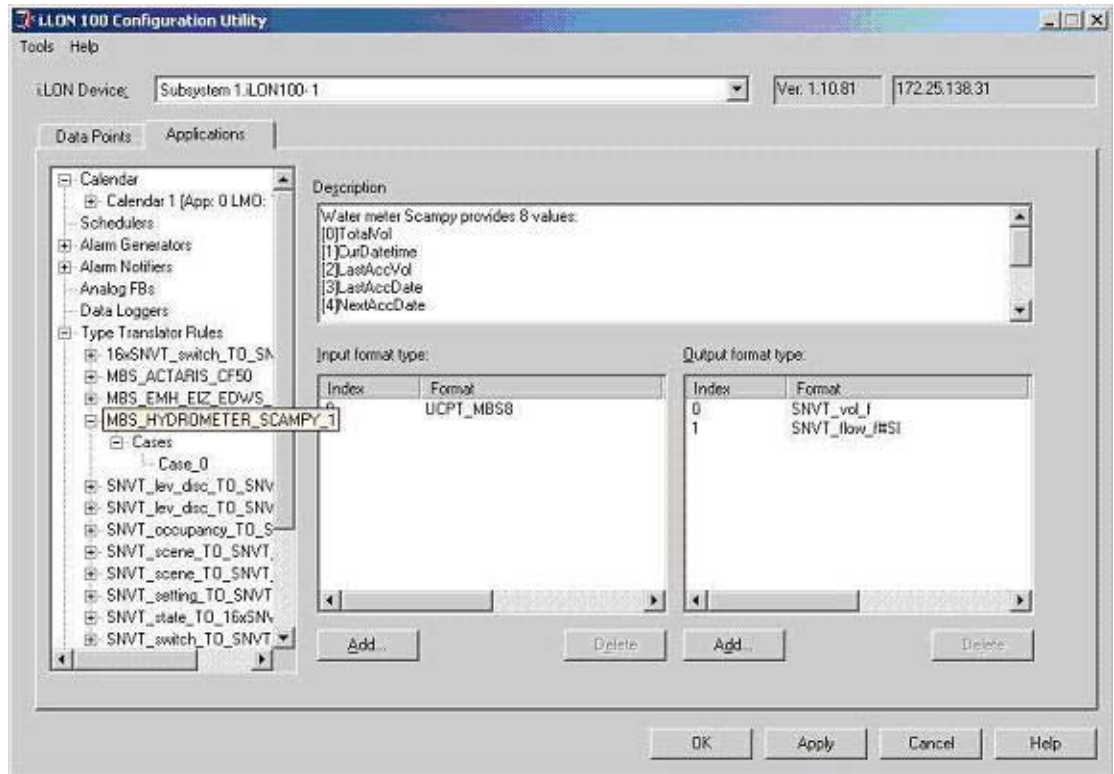
Figure 11.6 Application Pane

To integrate your device, you will either create a new Type Translator rule or duplicate one of the existing M-Bus rules. In the **MBS_HYDROMETER_SCAMPY_1** rule, there is one input and two outputs. If the input data point for your device is not **UCPT_MBUS8**, add an input with the correct type to match your device. The M-Bus type definitions are stored in the MBUS_Integrator resource file set which by default is installed to $LonWorks$\Types\User\Echelon\MBUS_Integrator.fmt as shown in Figure 11.7.
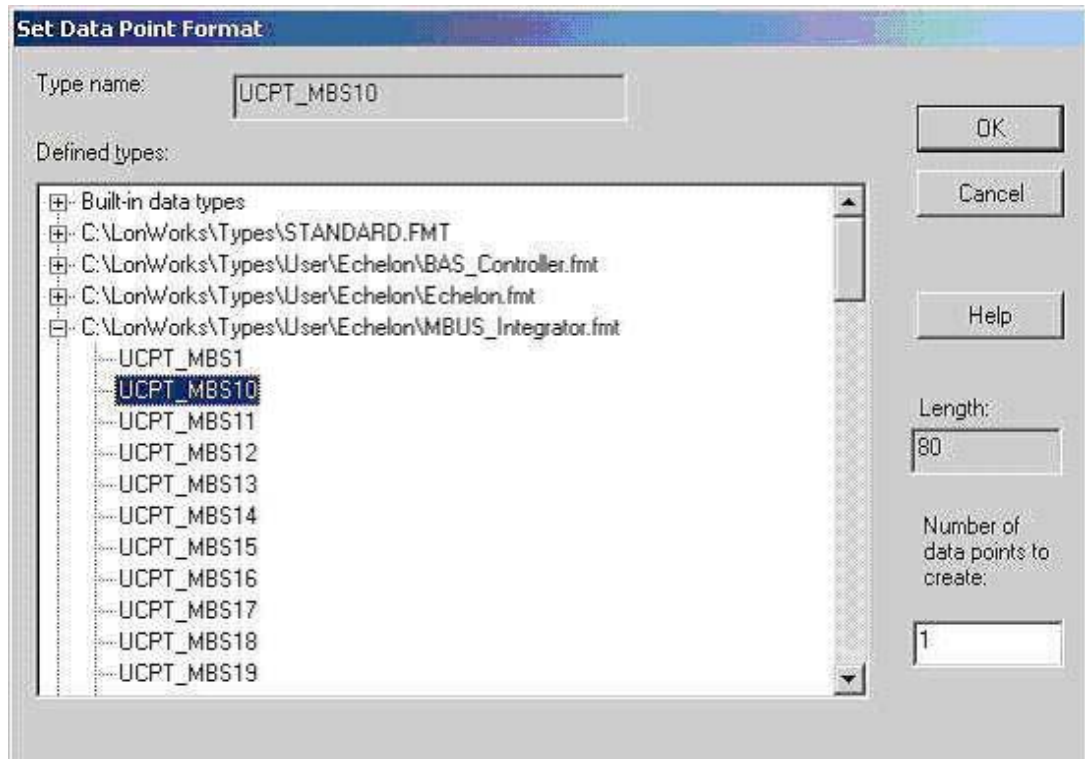
Figure 11.7 Set Data Point Format Dialog

This rule maps **value[0]** to an output network variable with the type **SNVT_vol_f** and **value[5]** to an output network variable with the type **SNVT_flow_f#SI.** You can use the *i*.LON 100 Configuration Plug-in to add more outputs to the rule if you would like to expose other data from the M-Bus device. For each output, add a rule that maps a data field from the M-Bus device to a SNVT. For example, to add a new output to expose the monthly reading from the M-Bus device sent on field 6, create the rule as shown in Figure 11.8.
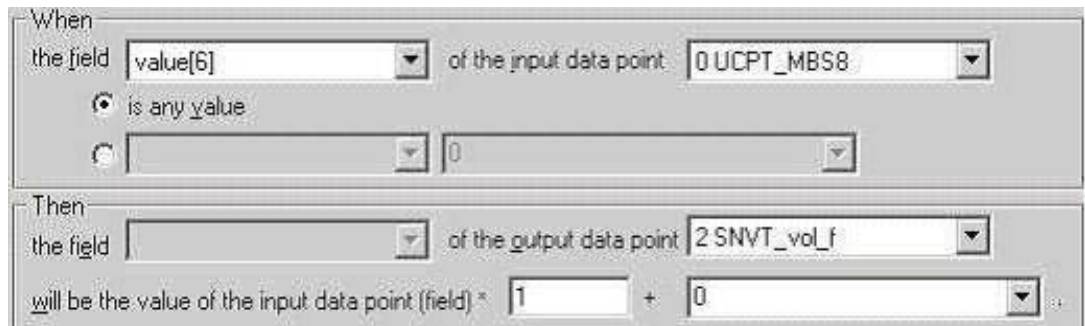
Figure 11.8 Type Translator Rule

Step 4: Using the M-Bus Type Translator Shapes in LonMaker

There are predefined master **Type Translator** shapes in the *i*.LON 100 Stencil for three types of M-Bus devices: Water, Energy and Heating. These shapes contain an output network variable for each output defined in the **Type Translator** rules. Add the appropriate shape to your LonMaker drawing, right-click on it, and then

select **Configure** from the short-cut menu to open the *i*.LON 100 Configuration Plug-in with the **Type Translator** configuration window selected.

To use your new rule, choose it from the list. The two predefined outputs will be selected by default. To select the input data points, click **Name** under the **Inputs** list and select the data point from the drop down list that appears as shown in Figure 11.9.
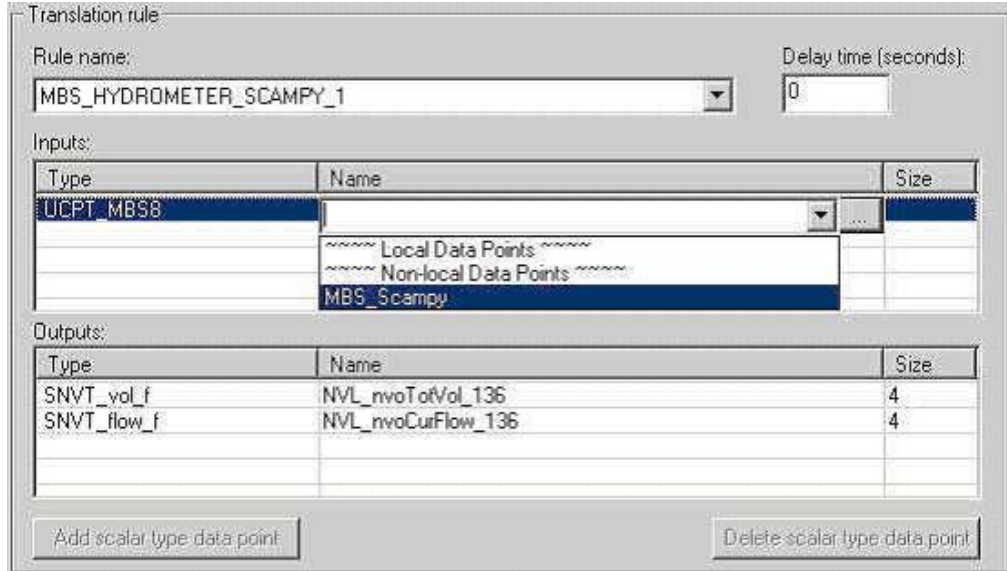
Figure 11.9 Translation Rule

The **Name** drop-down list includes only data points of the appropriate type. If the *i*.LON 100 cannot communicate with the M-Bus device, it may not have set the data point type; in this case, your data point will not show up in this list.

To add new output network variables to the M-Bus functional block using the LonMaker tool, drag an **Output Network Variable** shape from the *i*.LON 100 Shapes 1.1 stencil to the functional block (see the LonMaker documentation for more information. When creating network variables in LonMaker, you must have another network variable with the same type to act as a template. In the example above, the new output had the same type as the first output. In most cases, this process is simplified if you install the LONWORKS devices that will be integrated before creating the output network variables.

NOTE: The M-Bus driver represents all scalar values as double precision floating-point numbers (8 bytes). The use of 4 byte floating-point types such as **SNVT_vol_f** may exhibit a loss of precision when values become very large. The **Pulse Counter** output network variable **nvoPcValue_1** is 8 bytes and may be used as a template to create output network variables with double precision floating point types, such as those found in the **BAS_Controller** resource file set of the *i*.LON 100 (**UNVT_double_float**, **UNVT_elec_kwh_lf**, and **UNVT_power_lf**).

Analog Function Block

The *i*.LON 100 device includes twenty analog function blocks. You can use these functional blocks to perform statistical, arithmetic, or logical operations on data points. The *i*.LON 100 device contains 20 Analog Function Block functional blocks. The Analog Function Blocks include the following input and output network variables shown in Figure 11.10.

Figure 11.10 Analog Function Block Network Variables

These network variables are described below:

- **nvoAfbDropOut** is a SNVT_count type output network variable provides a count of data points that are currently offline.

- **nvoAfbOutput** is a dynamic, changeable type output network variable is used to send the output of the Analog Function Block. By default, the type is set to SNVT_temp_f. The type must be set to a scalar type or to SNVT_switch.

- **nviAfbInputA** and **nviAfbInputB** are changeable-type input network variables that provide input values to the analog function block. The analog function block can be configured to operate on these values or to compare one of them to the **nviAfbCompare** network variable value. The comparison function can be configured as described in the *Comparing Data Points* section later.

- **nviAfbCompare** is a dynamic changeable-type input network variable provides a value to be compared to the **nviAfbInput** network variable value. This network variable must have the same type as the **nviAfbInput** network variable. The input and compare network variables must be scalar types.

Using the Analog Function Block

To use the analog function block, follow these steps:

1. Open an existing LonMaker network or create a new LonMaker network as described in the *LonMaker User's Guide*.

2. Use an existing *i*.LON 100 device in the LonMaker network, or create and commission a new *i*.LON 100 device.

3. Drag an Analog Function Block functional block shape from the *i*.LON 100 stencil to the LonMaker drawing. The LonMaker New Functional Block wizard appears.

4. Select one of the 20 available Analog Function Blocks in **Functional Block – Name**.

    Click **OK**. The Analog Function Block functional block shape appears.

5. Right-click the new Analog Function Block functional block and select **Configure** from the shortcut menu. The *i*.LON 100 Configuration Plug-in opens and prompts you for the IP address of the *i*.LON 100 server.

6. Enter the IP address of the *i*.LON 100 server and then click **OK**. The Analog Function Block dialog opens, as shown in Figure 11.11.

i.LON 100 *e3* User's Guide
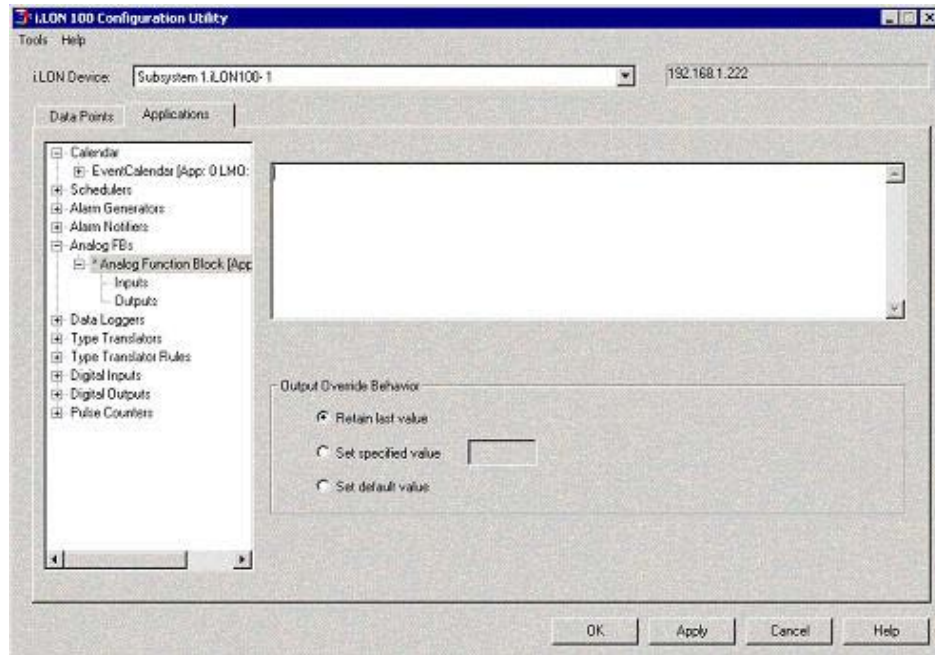
Figure 11.11 Analog Function Block Dialog

7. Configure the fields on the Analog Function Block dialog. Table 11.1 describes these fields.

Table 11.1 Analog Function Block Dialog Properties

Property	Description
Description	Enter a description of the analog function block.
Output Override Behavior	Determines the behavior of output data points on the analog function block functional block when it is put into override. Select **Retain Last Value** for the output data points to continue to send their most recent value before the functional block was put into override. Select **Set Specified Value** and enter a value for the output data points to send the specified value when the functional block is in override. You must ensure that the given value is valid. Select **Set Default Value** for the output data points to send their default value when the functional block is in override.

8. See one of the following sections corresponding to what function you want the analog function block to perform (click **Help** for more information about any options that are not discussed below):

Adding, Averaging, or Selecting the Minimum or Maximum of Two or More Values

To perform an arithmetic or statistical operation on two or more values using the analog function block, follow these steps:

1. Click **Inputs** under the analog function block on the Applications list. The **Inputs** dialog opens, as shown in Figure 11.12.
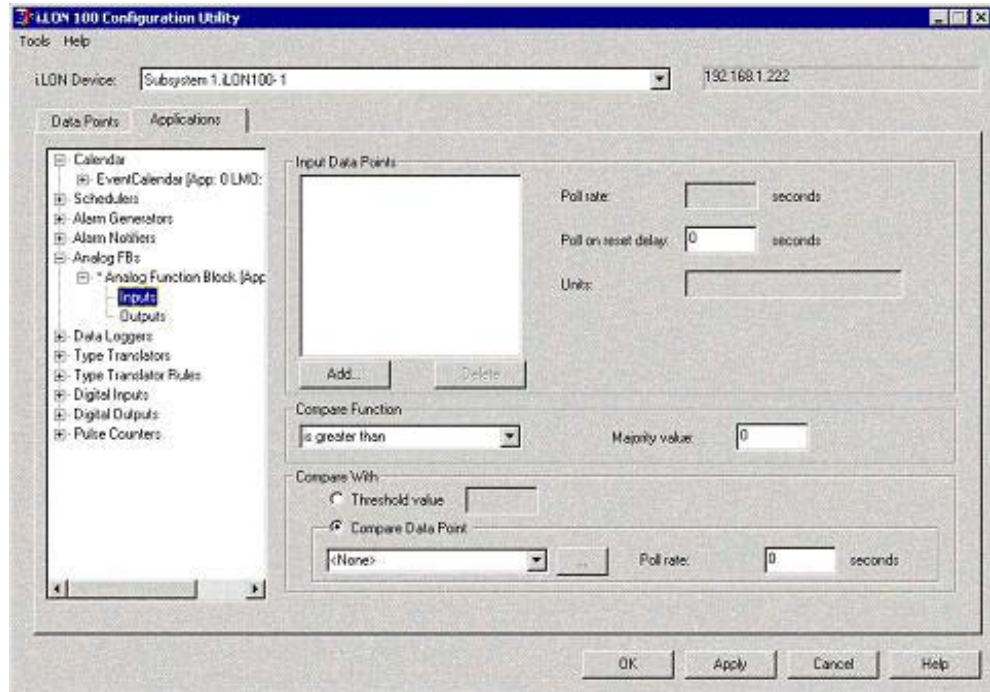
Figure 11.12 Inputs Dialog

2. By default, the **nviAfbInputA** and **nviAfbInputB** data points will appear in the **Input Data Points** list. Click **Add** to add additional data points to the list with the **Add Data Points** dialog. All data points must be scalar types. Data points of different types will yield unpredictable results due to differing scaling factors.

3. Click **Outputs** under the analog function block on the Applications list. The **Outputs** dialog opens, as shown in Figure 11.13.
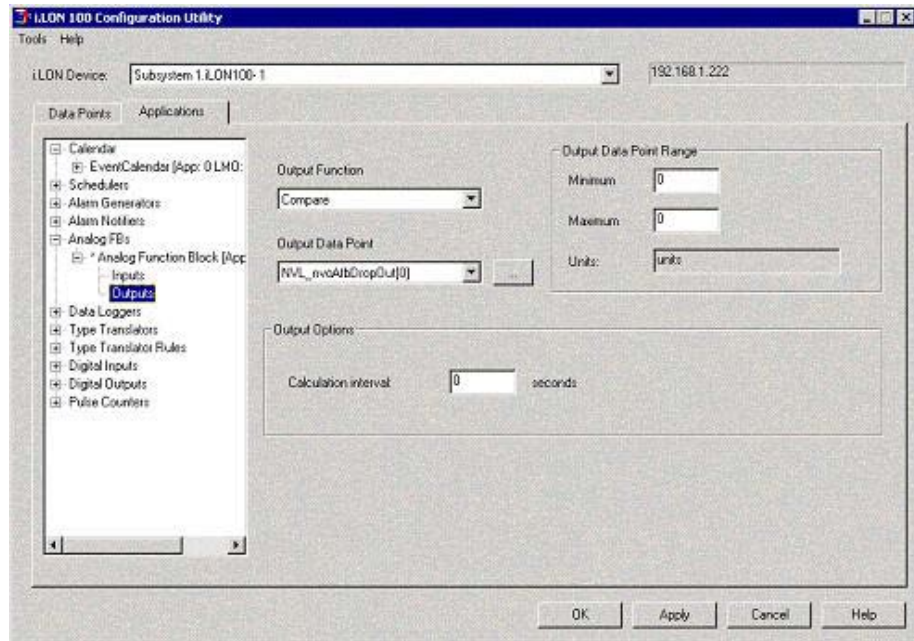
Figure 11.13 Outputs Dialog

4. Set the **Output Data Point** property to select the output data point - the data point to be used to output the selected function of the input data points. This data point must be of the same type as all the input data points.

5. Set the **Output Function** property to one of the values described in Table 11.2.

Table 11.2 Output Function Property

Property	Description
Sum	The **Output Data Point** will send the sum of all **Input Data Points** specified in the **Inputs** dialog.
Average	The **Output Data Point** will send the average of all **Input Data Points** specified in the **Inputs** dialog (i.e. the sum divided by the number of points).
Minimum	The **Output Data Point** will send the smallest of all **Input Data Points** specified in the **Inputs** dialog.
Maximum	The **Output Data Point** will send the largest of all **Input Data Points** specified in the **Inputs** dialog.

6. Set the **Minimum** and **Maximum** properties to limit the range of values that can be sent on the **Output Data Point**. If the value exceeds one of these values, the minimum or maximum will be sent instead.

7. Click **OK** or **Apply** to save your changes.

Comparing Data Points

The analog function block can be used to compare an input data point to either another data point or a static value and send a true or false result depending on the results of the comparison. If you use multiple input data points, you can specify a percentage of them that must satisfy the comparison in order for the analog function block or output a TRUE value. To compare data points, follow these steps:

1. Click **Inputs** under the analog function block on the Applications list. The **Inputs** dialog opens, as shown in Figure 11.14.
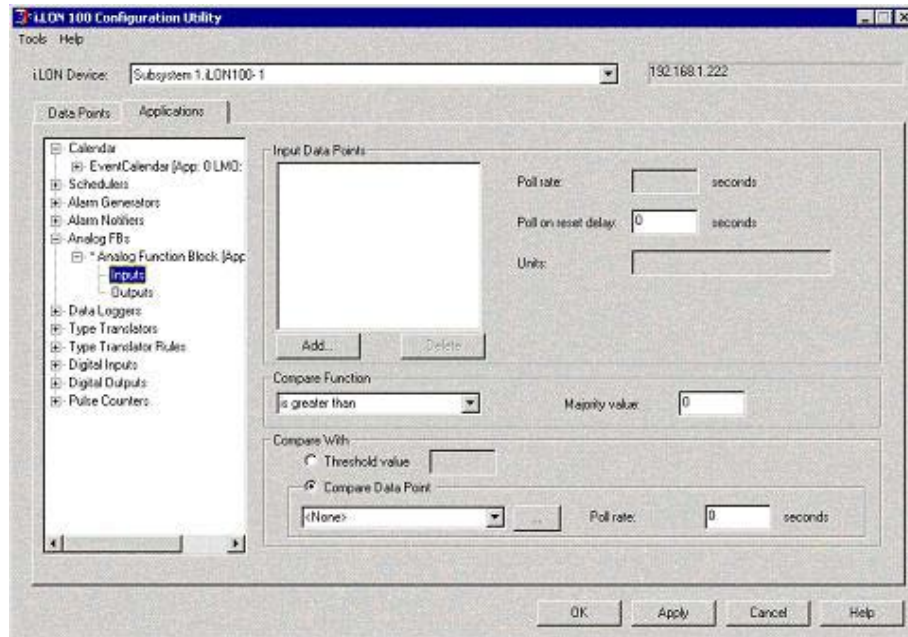
Figure 11.14 Applications List

2. By default, the **nviAfbInput** data point will appear in the **Input Data Points** list. Click **Add** to add additional input data points with the **Add Data Points** dialog.

3. Set the **Compare Function** property to determine how the input data points will be compared to the compare data point or the threshold value. Click **Help** for a description of the comparison functions.

4. Set the **Compare With property** to determine what value will be compared against the input data points. Select **Threshold Value** to enter a static value to be used for comparison. Select **Compare Data Point** to compare the input data points to another data point value. By default, this is set to the **nviAfbCompare** data point, but you can select any data point that matches the type of the input data points.

5. If you are comparing multiple data points, set the **Majority Value** property to the percentage of data points that must satisfy the comparison in order for the analog function block to output a TRUE value.

6. Click **Outputs** under the analog function block on the Applications list. The **Outputs** dialog opens, as shown in Figure 11.15.
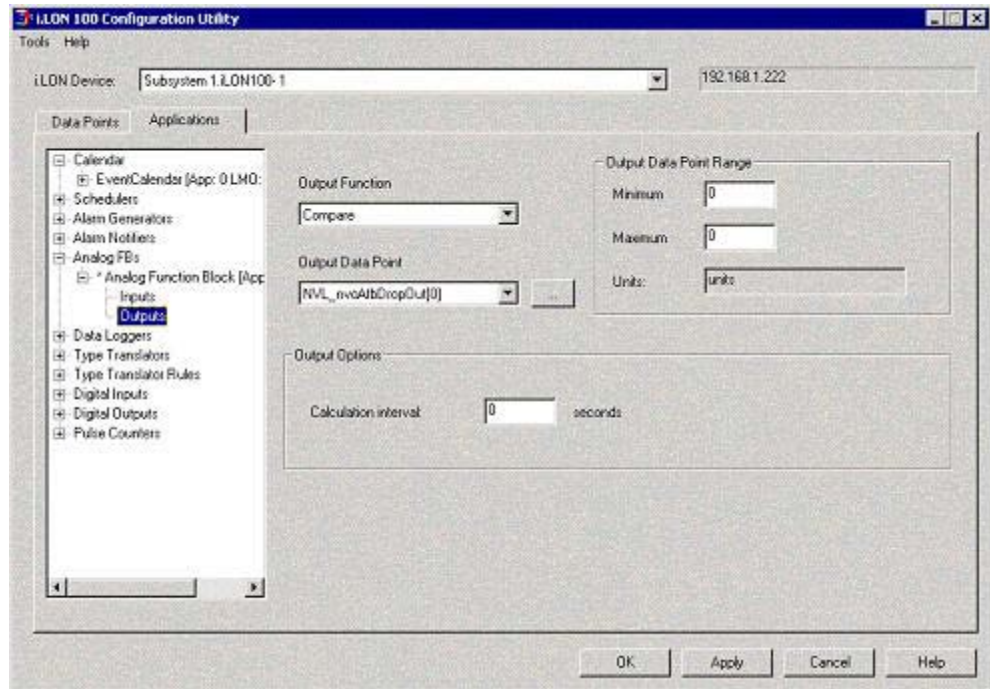
Figure 11.15 Outputs Dialog

7. Set the **Output Function** properties to one of the values described in Table 11.3.

Table 11.3 Output Function Property

Property	Description
Compare	The **Output Data Point** will send a true value if the comparison specified in the **Inputs** tab evaluates as true. If there are multiple input data points, the **Majority Value** property will be used to determine what percentage of input data points must satisfy the condition for the **Output Data Point** to send a true value.
AND	If all the **Input Data Points** evaluate as true, the **Output Data Point** will send a true value.
OR	If any of the **Input Data Points** evaluate as true, the **Output Data Point** will send a true value.

8. Set **Output Data Point** to the data point to be used to output the TRUE or FALSE value. This data point must be of the SNVT_Switch type.

12

Sending ANSI/CEA-709.1 Packets Over IP with the *i.*LON 100 Server

This chapter describes how configure the *i.*LON 100 server to operate as a Remote Network Interface (RNI) or as an IP-852 router.

Overview

The *i*.LON 100 server can be used as a Remote Network Interface (RNI). This allows you to use the *i*.LON 100 server to connect LNS and OpenLDV-based applications to the LONWORKS network via a TCP/IP connection. This way, you do not need to use a local LONWORKS interface (*i.e.* PCLTA-20, PCC-10, etc) installed on the computer running the application to make the connection.

When operating as an RNI, the *i*.LON 100 server is connected to the computer running the LNS or OpenLDV-based application (and the rest of the LONWORKS network) via a TCP/IP connection, as shown in Figure 12.1. In Figure 12.1, the *i*.LON 100 server is being used to monitor the devices installed in a building.
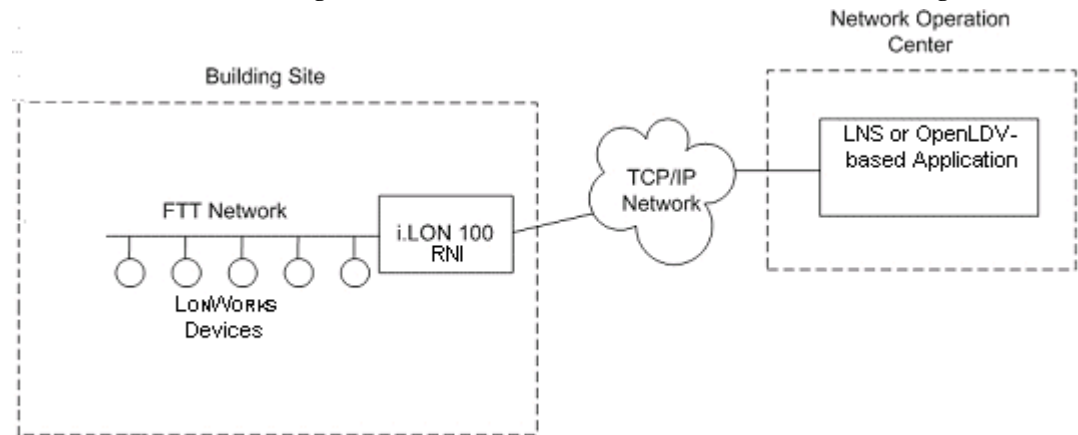
Figure 12.1 *i*.LON 100 Server Operating as RNI

To use the *i*.LON 100 server as an RNI, you must configure the RNI settings for the *i*.LON 100 server on the computer running the LNS or OpenLDV-based application with the LONWORKS Interfaces application. Once you have done this, the *i*.LON 100 device will appear in the list of available network interfaces you can use with your LNS and OpenLDV-based applications.

NOTE: In some cases, you may have multiple *i*.LON 100 servers configured as RNIs, all connected to the same channel. This is a valid configuration. However, if your LNS or OpenLDV-based application uses the RNI on any of those *i*.LON 100 servers to connect to the channel, the application cannot commission any of the other *i*.LON 100 servers that are also configured to operate as an RNIs. This is because if the *i*.LON 100 server being commissioned would be assigned the same network address as the *i*.LON 100 server used to access the channel. To avoid this, you should either program your application to assign the *i*.LON 100 server being commissioned a different network address, or you should disable the RNI on the *i*.LON 100 server being commissioned. You can disable the RNI with the **Setup – Security** Web page, as described in the *i.LON 100 Security Web Page* section on page 55.

As of the *e3* release, the functionality of the *i*.LON 100 server on TCP/IP networks has been expanded to allow you to use the *i*.LON 100 server as a router on IP-852 channels. An IP-852 channel uses the IP addresses on a shared IP network to form a "virtual wire" connecting the devices. IP-852 devices and PCs running LNS (version 3.01 or better) use this virtual wire in the same way they use traditional dedicated twisted pair wiring.

The concept of an IP-852 channel is similar to a Virtual Private Network (VPN). Each IP-852 device in the system is aware of its peers and each IP-852 device keeps peer information in its routing tables so it can forward LONWORKS packets

to the correct IP address. Figure 12.2 shows a typical IP-852 channel configuration.
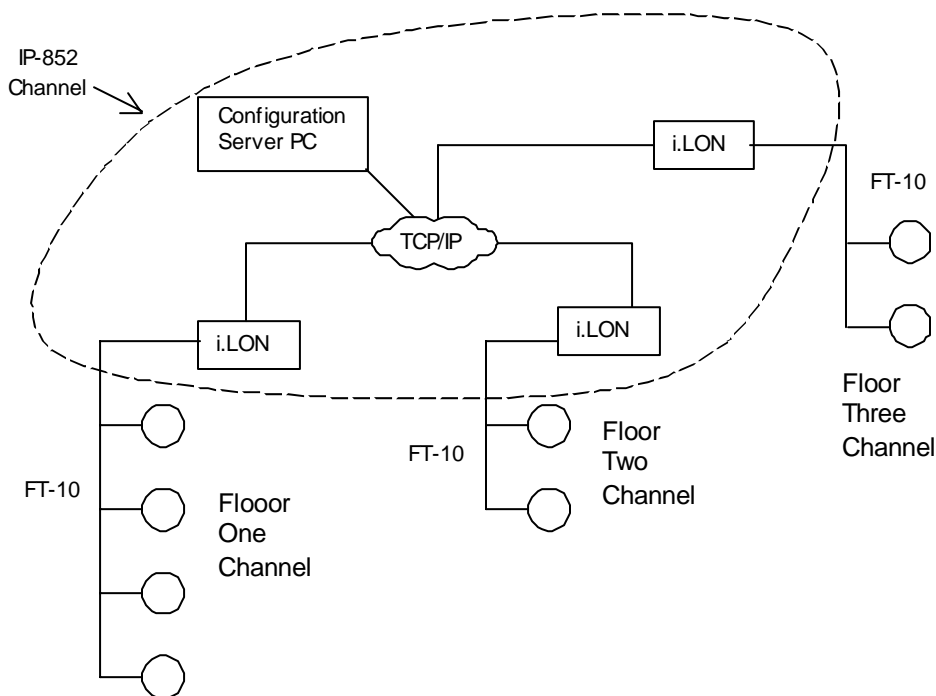
Figure 12.2. An IP-852 Channel

Figure 12.2 shows an example network in which 3 *i*.LON 100 servers are used to create an IP-852 channel connecting three TP/FT-10 channels, each of which connects the devices installed on a different floor in a building. The circled portion of the diagram represents the IP-852 channel – the virtual, IP-based connection between the three *i*.LON 100 servers. As a result of this connection, a single application can communicate with the devices all three of the TP/FT-10 channels connected to each of the three *i*.LON 100 servers via the TCP/IP connection, and monitor and control the entire building.

Figure 12.2 shows a Configuration Server inside the IP-852 channel. The Configuration Server stores the configuration of the IP-852 channel, including the IP addresses of all the devices and routers installed on the channel. You will initially configure the IP-852 channel with the Configuration Server, and the Configuration Server must be running anytime you change the configurations of the devices on the IP-852 channel. You can run the Configuration Server on any PC with access to the IP network containing the IP-852 channel. The software required to run the Configuration Server is included with the *e3* software. For more information on the Configuration Server, see the *IP-852 Channel User's Guide.*

A complete installation may contain many IP-852 devices and PCs – all sharing an IP-852 channel. Because the IP-852 channel can exist on any IP network, a system may now span the entire globe as easily as it once spanned a single building, as shown in Figure 12.3.
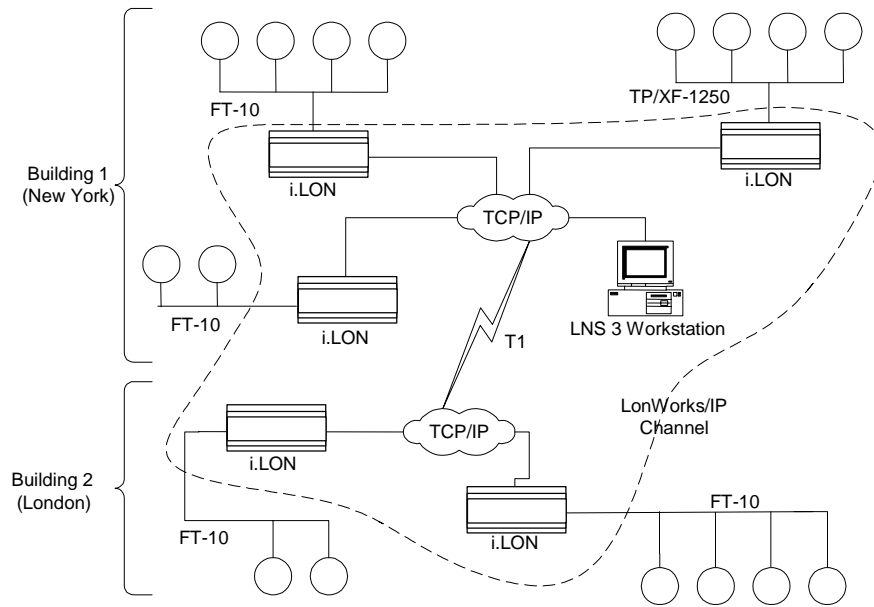
Figure 12.3 Large LONWORKS Network using an IP-852 Channel

And so as of *e3,* you have two choices when using the *i*.LON 100 server to connect devices on a TCP/IP network. You could use the *i*.LON 100 server as an RNI, meaning that you use it as a network interface to establish a point-to-point connection between an LNS or OpenLDV-based application and the LONWORKS channel your *i*.LON 100 server is connected to. This is simpler than configuring the *i*.LON 100 server to operate on an IP-852 channel, and you should consider using this approach if you are only using a single *i*.LON 100 server on one channel in your network.

You could also use it as an IP-852 router, and use it to connect multiple TP/FT-10 or PL-20 channels via TCP/IP so that a single application could connect to the devices on each channel. You should use the IP-852 feature if you have multiple *i*.LON 100 servers on multiple channels, and want to connect them. This may be especially useful if each *i*.LON 100 server needs to connect to the same LNS Server and database.

You should be aware that the *i*.LON 100 server's capabilities are not restricted when using either function. All the other application features of the *i*.LON 100 server are available when it is operating as an RNI or as an IP-852 router.

In addition, you could use a given *i*.LON 100 server as an RNI and as an IP-852 router simultaneously. For example, consider a building with multiple floors, where the devices in the rooms on each floor are connected by an FT-10 channel, and each floor has an *i*.LON 100 server installed to manage those devices. You could create an IP-852 channel to connect all three floors and control them with a central application. This would be the best way to perform control of the building over a long period of time.

However, you may need another entry point into the network at some point, to perform maintenance on a single part of the building. In this case, you could configure the *i*.LON 100 server on the floor you want to access as an RNI, and access the floor that way. This would allow you to avoid having to re-configure the IP-852 channel with the Configuration Server, which may be desirable if you do not plan on making the new entry point a long term part of the network.

Figure 12.4 demonstrates this. You will recall the IP-852 channel shown in Figure 12.2, in which the IP-852 channel connected three *i*.LON 100 servers,

each used to monitor a floor of a building. Figure 12.4 shows an update to this configuration. In Figure 12.4, the *i*.LON 100 server for Floor Three has been configured to operate as an RNI, so that an application can connect to the devices on Floor Three without having to re-configure the IP-852 channel with the Configuration Server. **And so the *i*.LON 100 server for Floor Three is involved in two separate TCP/IP connections: the IP-852 connection with the other *i*.LON 100 servers, and the RNI connection with the application for Floor Three.** In this way, an LNS or OpenLDV-based application can access the devices on Floor Three via the RNI connection, without requiring modifications to the configuration of the IP-852 channel.
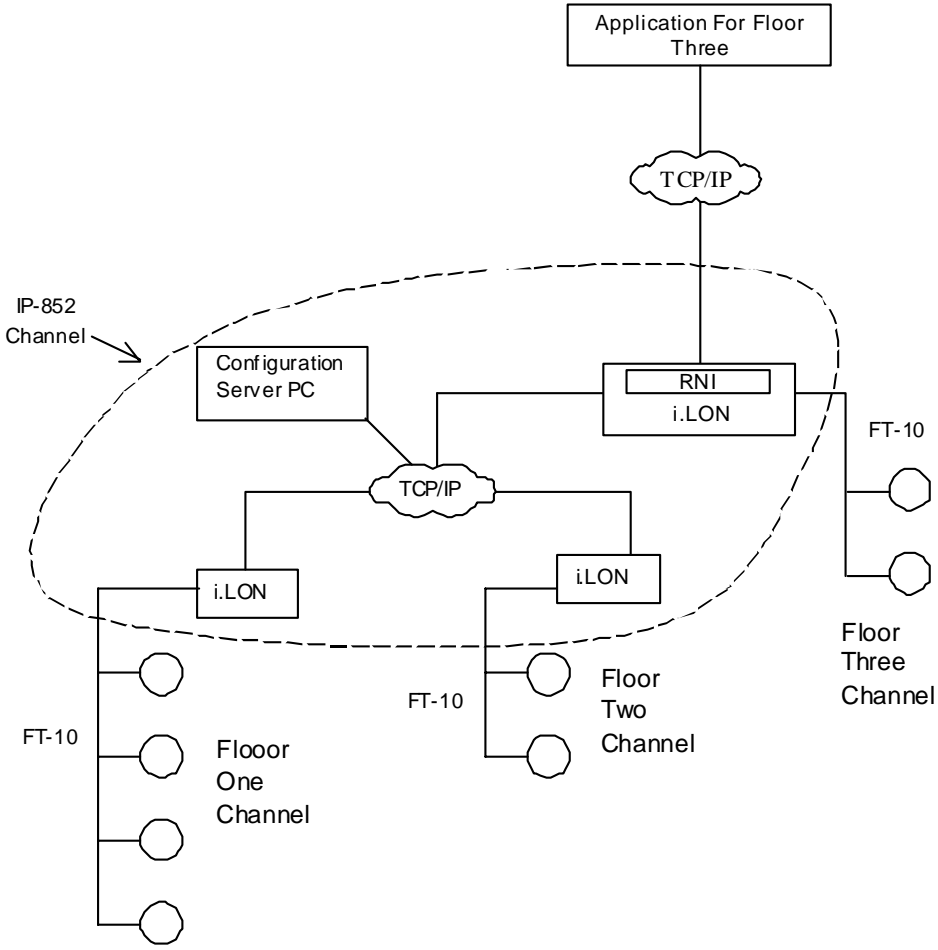
Figure 12.4 RNI and IP-852 Router

The remainder of this chapter describes how to configure the *i*.LON 100 server as an RNI, and how to activate and configure the *i*.LON 100 server as an IP-852 router. The *IP-852 Channel User's Guide* included with the *i*.LON 100 documentation contains background information you will need when setting up your IP-852 channel.

Using the *i*.LON 100 Server as an RNI

As described in the previous section, you can use the *i*.LON 100 server as an RNI, meaning that you use it as a network interface to establish a point-to-point connection between your computer and an LNS 3.0 or LNS Turbo Edition Server.

For either the LNS 3.0 Server or the LNS Turbo Edition Server, you need to install OpenLDV 2.1 on your computer to create the connection. If you are using an LNS 3.0 Server, you will also need to upgrade the server to LNS 3.08 by installing LNS 3.0 Service Pack 8. LNS 3.0 Service Pack 8 and OpenLDV 2.1 are available on Echelon's Web site at http://www.echelon.com/downloads.

Using the LONWORKS Interfaces Application

Use the LONWORKS Interfaces application in the Windows Control Panel to create LONWORKS interface names for each of your *i*.LON 100 Internet Servers. A separate entry is required for each *i*.LON 100 server you plan to use as an RNI and connect to the LNS Server

If you are managing a large application on a single LNS Server computer, and will be using many *i*.LON 100 servers (*i.e.* more than 50), you should consider creating an external lookup extension to keep track of each *i*.LON 100 server See the *OpenLDV Programmer's Guide, xDriver Supplement* for more information on this.

To use the LONWORKS Interfaces application, follow these steps:

1. Open the Windows Control Panel and double-click the LONWORKS Interfaces icon (⬡). This opens the LONWORKS Interfaces application's RNI tab.
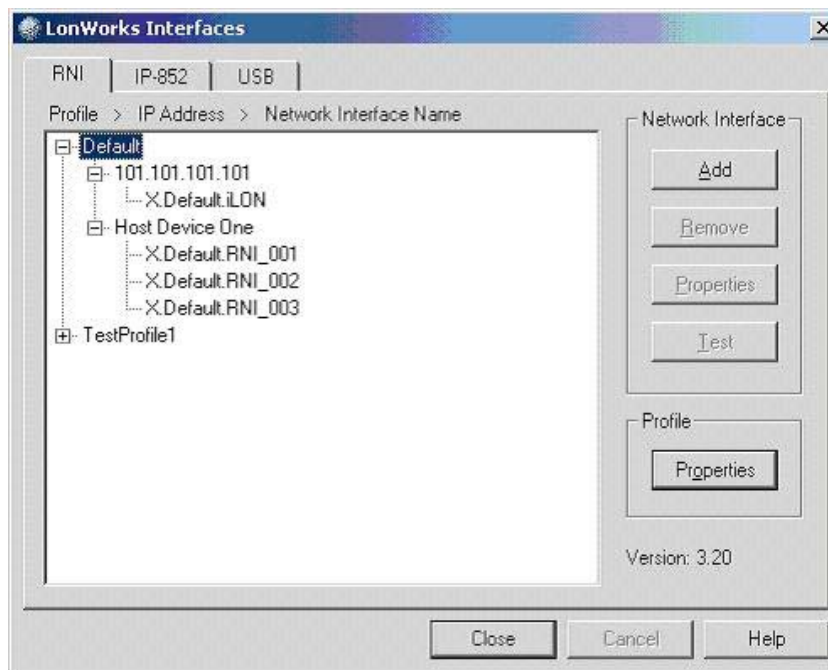
Figure 12.5 RNI Tab

The Default xDriver Profile, and all the other xDriver Profiles that are using the default xDriver Lookup Extension Component, are listed in the Profile list on the left side of RNI tab. An xDriver Profile is a set of configuration properties that determines how xDriver will handle connections to the devices using that Profile. When you configure an *i*.LON 100 server as an RNI, you must choose the xDriver Profile that the device will use.

Default represents the Default xDriver Profile. Most users use the

Default Profile. This is the set of configuration parameters that determines how the default xDriver will manage connections to your *i*.LON 100 server, and how it will respond if those connections are terminated as a result of some unexpected communication failure.

You can click a Profile name in the list to see a list of devices that are using that Profile. When you do so, you will notice that there are two levels of sub-trees below the Profile. The first sub-tree level is the IP Address list. This lists the devices that are using the Profile. The devices are listed by their hostnames or IP addresses, depending on how you configure them. In Figure 12.2, there are two devices using the Default Profile: one is identified by its hostname, "Host Device One," and the other is identified by its IP address, "101.101.101.101."

The next sub-tree level is the Network Interface Name list. This lists the RNI definitions that have been created for each device. In Figure 12.2, there are three RNI definitions for the device called Host Device One, and one for the device using IP address 101.101.101.101.

2. To configure your *i*.LON 100 server as an RNI, select the Default Profile and then click **Add**. This starts the Add Network Interface Wizard, which you can use to enter the information xDriver will require to connect to the device.

   NOTE: You must be logged in as an Administrative user to configure your *i*.LON 100 server as an RNI if you are using Windows 2000 Windows or Windows XP.

Figure 12.6 Add Network Interface – Name Dialog

3. Enter a name for the *i*.LON 100 RNI. This will be used as a lookup key to access the proper registry entry each time xDriver initiates a connection to this RNI. **Each RNI must have a unique name.**

   Click **Next**. This opens the tab shown in Figure 12.7.

Figure 12.7 Add Network Interface Wizard – Type Dialog

4. Select **Other** and then click next. This opens the tab shown in Figure 12.8.

Figure 12.8 Add Network Interface Wizard – IP Address Dialog

5. Click **Use Static IP Address** and enter the IP address in the box to manually enter the *i*.LON 100 server's IP address. You must enter an IP address in the form x.x.x.x, where x is an integer in the range 0-255.You should use this option if your RNI's hostname is not configured in any name servers (e.g. DNS servers, HOSTS file).

    Click **Use Hostname** and enter the *i*.LON 100 server's hostname to resolve the device's IP address from its hostname.

6. When you have entered the IP address or hostname, click **Finish**. This returns you to the RNI tab shown in Figure 12.2. The *i*.LON 100 server's RNI configuration will be listed on the tab. To continue configuring the RNI, select it on the RNI tab and click **Properties**. This opens the dialog shown in Figure 12.9.
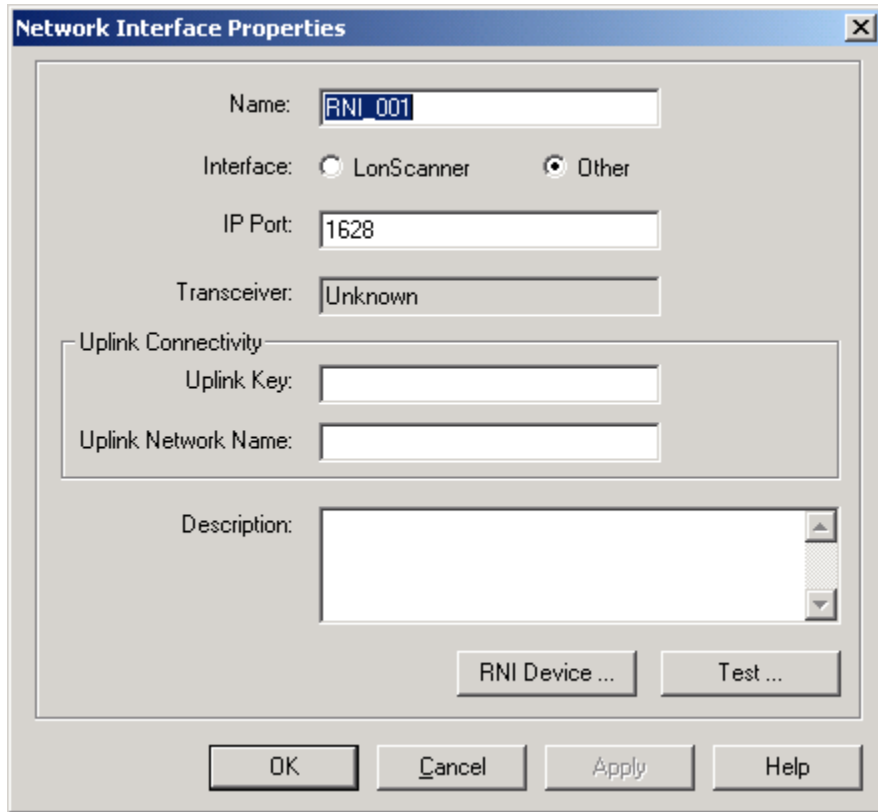
Figure 12.9 Network Interface Properties Dialog

7. Configure the fields on the Network Interface Properties dialog, and click **OK** to save your changes and return to the RNI tab. Or, click **Apply** to save your changes and keep the Network Interface Properties dialog open. Make sure that the **IP Port** property is set to match the port you want the *i*.LON 100 server to use to listen for messages from the LNS server. Consult the online help for descriptions of the fields on the Network Interface Properties dialog.

   You can also click **RNI Device** to configure the address and authentication settings for the device the RNI was created on. This opens the Host Device Properties - LAN/WAN tab. Or, click **Test** to test the LNS Server's ability to communicate with the device. This opens the Diagnostics dialog. Consult the online help for descriptions of these dialogs.

8. The *i*.LON 100 server is now configured an RNI. You can use it to connect applications running on your PC to an LNS server, just as you would with any other LONWORKS network interface. The name to use for the RNI is **x.Default.[Name]**, where **[Name]** represents the name entered in step 3.

   NOTE: Before using the *i*.LON 100 server as an RNI, you need to enable it for RNI connections. To do so, open the **Setup - Security** Web page, select the **Enable Downlink RNI Connections** check box, and then reboot the *i*.LON 100 server. See the *i.LON 100 Server Security* section on page 55 for more information on these tasks.

Switching Between the i.*LON 100 RNI and a Standard* L*ON*W*ORKS Network Interface*

If you are using the *i.*LON 100 server as an RNI and wish to switch to a different L*ON*W*ORKS* network interface (*e.g.* a PCLTA-20, PCLTA-10, or PCC-10), but you want to leave the *i.*LON 100 server attached to the network, you must disable the RNI application on the *i.*LON 100 server before opening the network with the new network interface. You can disable RNI in either of the following ways:

- Perform a security access reset, open the **Setup - Security** Web page, clear the **Enable Downlink RNI Connections** check box, and then reboot the *i.*LON 100 server. See the *i.LON 100 Server Security* section on page 55 for more information on these tasks.

- Enter the following command using the console application:

```
deactivate 4
```

4 is the index of the RNI application. You can obtain the index with the console application's `listapp` command. Confirm that you want to disable the RNI application. Disabling the RNI application may cause the *i.*LON 100 server to reboot. See Appendix C for more information about the console application.

If you want to use the RNI capability of the *i.*LON 100 server at a later time, you must remember to re-enable RNI, either by setting the **Enable RNI** option on the **Security** Web page or by entering `activate 4` in the console application.

If you are using a different L*ON*W*ORKS* network interface and you wish to switch to using the *i.*LON 100 server's RNI capability, you must physically remove the old network interface from the network.

Using the *i.*LON 100 Server as an IP-852 Router

To use the *i.*LON 100 server as an IP-852 router, follow these steps:

1. Activate and configure the *i.*LON 100 server for operation as an IP-852 router. For instructions on this task, see the following section, *Activating and Configuring the IP-852 Router*.

2. If you are not using the standard port for the IP-852 channel, add the Configuration Server to the list of servers associated with the *i.*LON 100 server. For more information on this, see *Configuring the IP-852 Configuration Server Service* on page 28.

3. Add the *i.*LON 100 server to an IP-852 channel with the Configuration Server. For more information on this, see the *IP-852 Channel User's Guide.*

Activating and Configuring the IP-852 Router

You can activate the IP-852 routing option an i.LON 100 e3 server. The IP-852 routing option is included with some models of the i.LON 100 e3 server, and can be purchased for i.LON 100 e3 server without IP-852 routing. To activate the *i.*LON 100 server to operate as an IP-852 router, follow these steps:

1. Open the *i.*LON 100 Web pages, point to **Network**, and then click L*ON*W*ORKS* on the menu. The **Network -** L*ON*W*ORKS* Web page opens.

Figure 12.10 Network - LONWORKS Web Page

2. Click any of the **Not Licensed** links in the Router Properties area of the Web page. This opens the Activate IP-852 Routing dialog. Follow the instructions on the dialog to obtain your license.
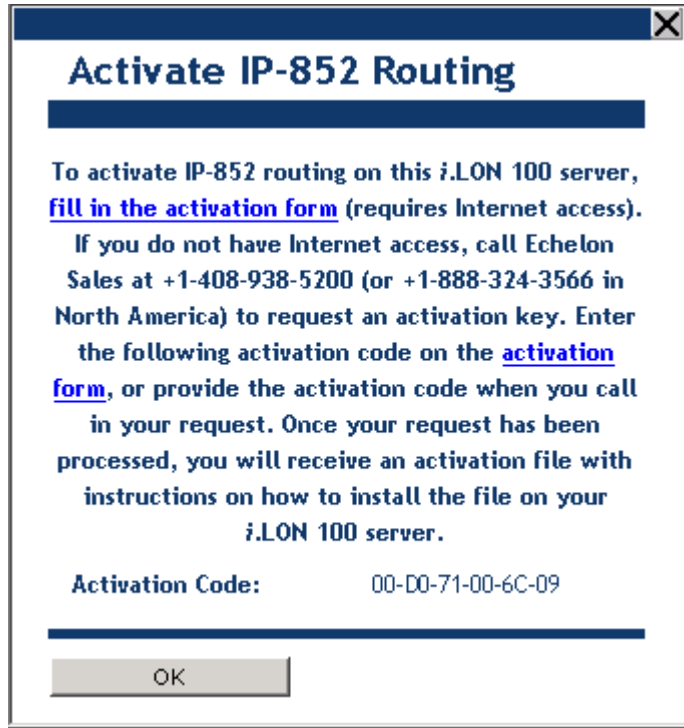
Figure 12.11 Activate IP-852 Routing Dialog

NOTE: Your *i*.LON 100 server will use a different activation code than the one shown in Figure 12.11.

3. If you do not have a network manager such as an LNS server managing the LonWorks network with the i.LON 100 server, click the **Self Install Router** button on the **Network - LONWORKS** Web Page to install and commission the *i*.LON 100 server as an IP-852 router

13

Creating an *i.*LON 100 Web Page

This chapter describes how you can use *i.*LON Vision to create custom Web pages to read and write to data points on your *i.*LON 100 server.

Introduction

This chapter describes how to use *i*.LON Vision to create custom Web pages to read and write data points on your *i*.LON 100 server. The *i*.LON Vision software requires Macromedia Contribute, and a trial version of Macromedia Contribute is included with the *i*.LON 100 software, so you can try *i*.LON Vision before licensing the Contribute software. With *i*.LON Vision and Contribute, you can create custom *i*.LON 100 Web pages without any knowledge of JavaScript or HTML, and without a background in Web programming.

i.LON Vision adds *i.LON Vision objects* to Contribute that make it easy for you to design custom *i*.LON 100 Web pages. These objects include a combo box, radio button, image swapper, text box, and menu items you can use to read and write values to data points on your *i*.LON 100 server.

The following section, *Creating a Simple Web Page*, is a tutorial that describes how to create a simple Web page to read and write to the value of a single data point. This demonstrates how you could create a Web page to enable or disable the first Digital Output on the *i*.LON 100 server by writing to the NVL_nviClaValue_1 data point.

Echelon's Web site contains an instructional video you may find useful when creating a simple Web page like this one. You can find this online at:

www.echelon.com/developers/ilon100/ilonhowto/video100.htm

The tutorial in this chapter, and the online video, demonstrate simple ways to use the *i*.LON Vision software, and are excellent ways to get started with *i*.LON Vision. However, they only expose a small portion of the functionality provided by *i*.LON Vision. Your Web design may be far more complex than the Web page created in the tutorial or in the video. For example, you may require multiple Web pages that are linked via a menu or a navigation tree, and you may want to use a different mechanism to display or change the value of your data points. *i*.LON Vision provides all of this functionality, as well as many other features that are not described in the tutorial that you may find useful. For details on all of this, see *Advanced Web Page Creation* on page 189.

Creating a Simple Web Page

This section describes how to create a simple Web page you can use to control the first Digital Output on the *i*.LON 100 server by writing to the **NVL_nviClaValue_1** data point. The Web page will include a switch icon a user can click to enable or disable the Digital Output, as well as a lamp icon that will indicate whether or not the Digital Output is enabled.

To create this Web page, follow these steps:

1. Start Macromedia Contribute, and click **Create Connection**. The Contribute Website Connection Wizard starts. Click **Next** on the first window. The Website Home Page window opens.
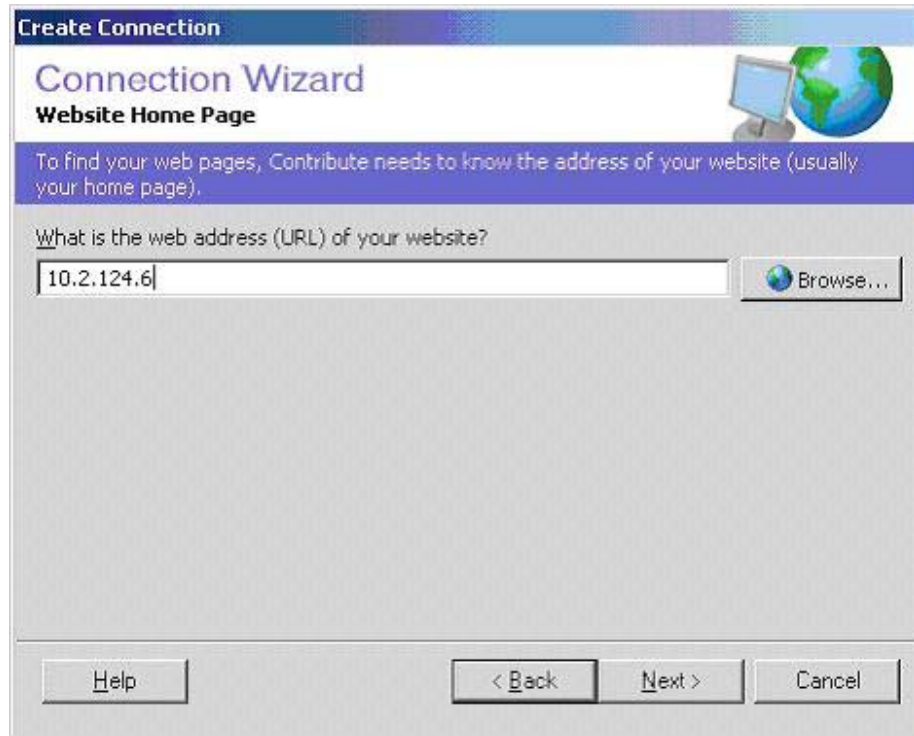
Figure 13.1 Website Home Page Window

2. Enter the IP address or hostname of the *i*.LON 100 server you want to connect to, and then click **Next**. The Connection Information window opens.

   NOTE: You must enter an IPv4 address for the Contribute software to connect to the *i*.LON 100 server. See the *Configuring LAN Connection Properties* section on page 16 for instructions to follow when determining the *i*.LON 100 server's IPv4 network address.
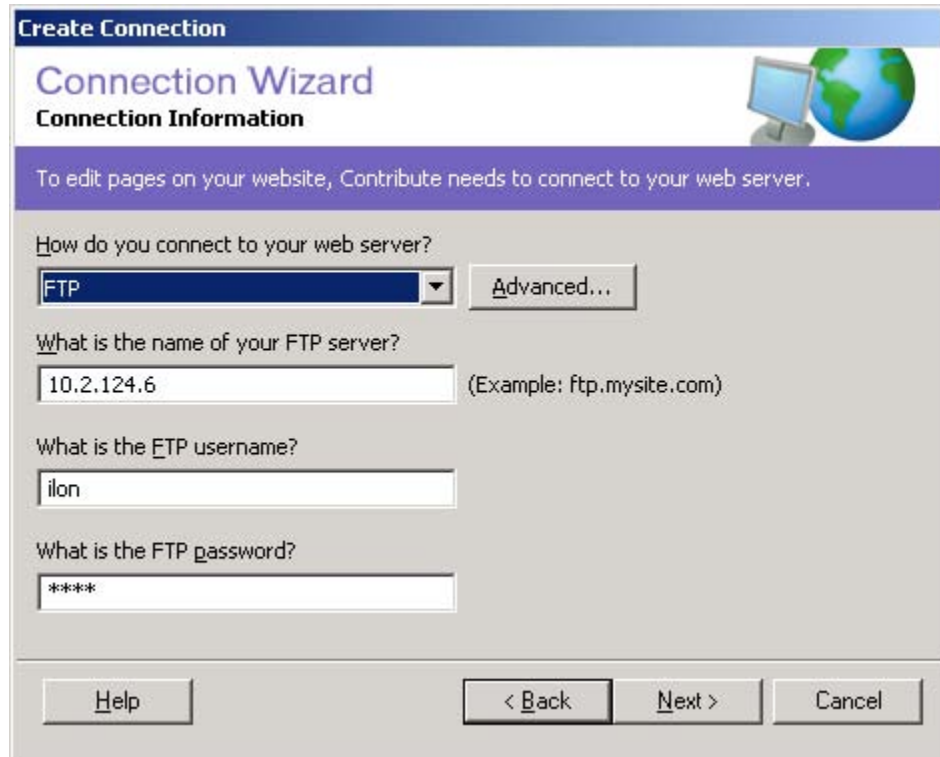
Figure 13.2 Connection Information Window

3. Select **FTP** from the **How Do You Connect To Your Web Server** box.

4. Enter the IP address or hostname of the *i*.LON 100 server as the name of the FTP server, and enter the user name and password for your *i*.LON 100 server for the other boxes. The default user name and password are "ilon", but you may have changed that.

   When entering the IP address, do not include the http:// prefix.

5. Click **Advanced.** The Advanced Connection Settings dialog opens.
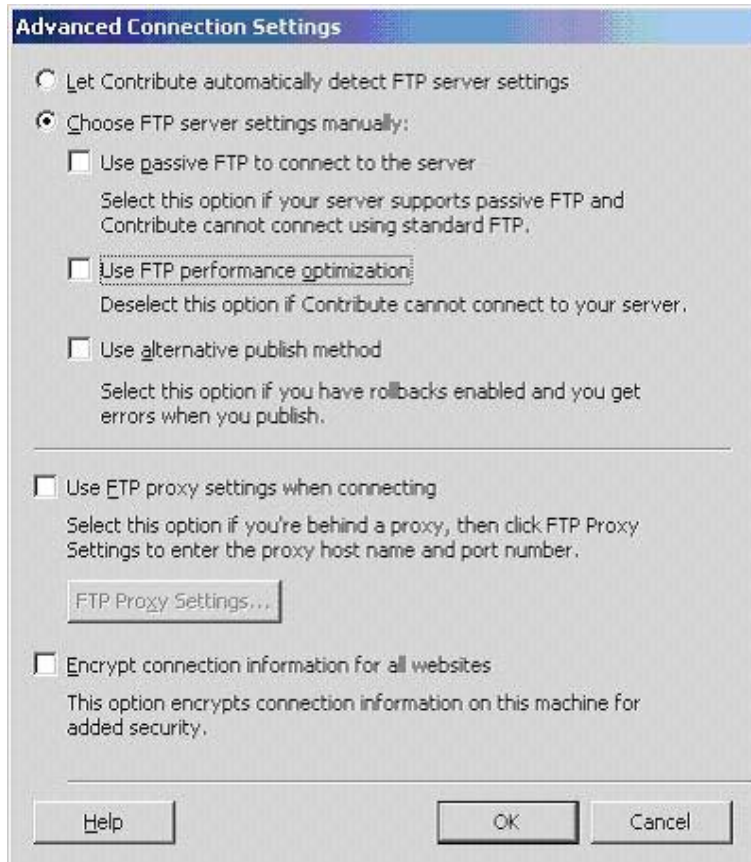
Figure 13.3 Advanced Connection Settings Dialog

Configure the properties on the Advanced Connection Settings dialog as shown in Figure 13.3, and then click **OK**. Make sure that the **Use FTP Performance Optimization** check box is cleared before doing so.

This returns you to the Connection Information window. Click **Next** to continue. The User Information Window opens.

6. Enter your name and e-mail address on the User Information window, and then click **Next**. The Summary window opens, indicating that the connection is complete.

7. Click **Done** to exit the wizard. This returns you to the main Contribute window. The Login page for your *i*.LON 100 server will be displayed.

8. Click the **New Page** button on the Contribute toolbar. The window shown in Figure 13.4 opens.
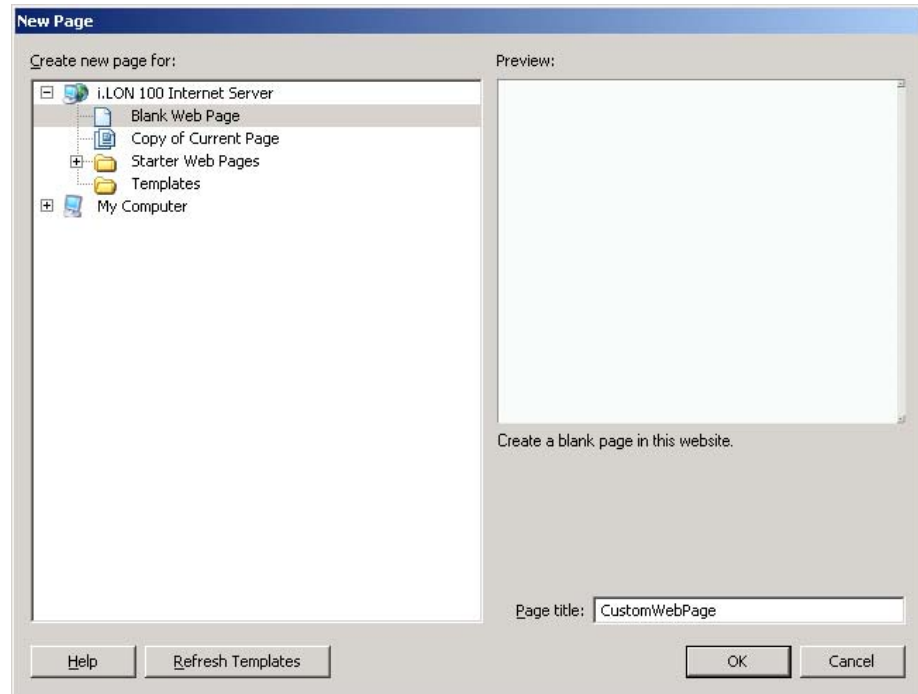
Figure 13.4 New Page Dialog

9. Select **Blank Web Page** as the page type, enter the name
   CustomWebPage in the Page Title box, and then click **OK**. The window
   shown in Figure 13.5 opens.

Figure 13.5 CustomWebPage.htm Web Page Window

10. Click **Publish**. A window opens, advising you that visitors to the Web site
    will not be able to view the page unless you link to it from another page.
    Click **Yes** to continue. The window shown in Figure 13.6 opens.

Figure 13.6 Publish New Page Window

Click **Choose Folder** to create the directory for your custom area of the *i*.LON 100 server's Web site.   You must create the new folder in the `/user` directory of your *i*.LON 100 server. The window shown in Figure 13.7 opens.
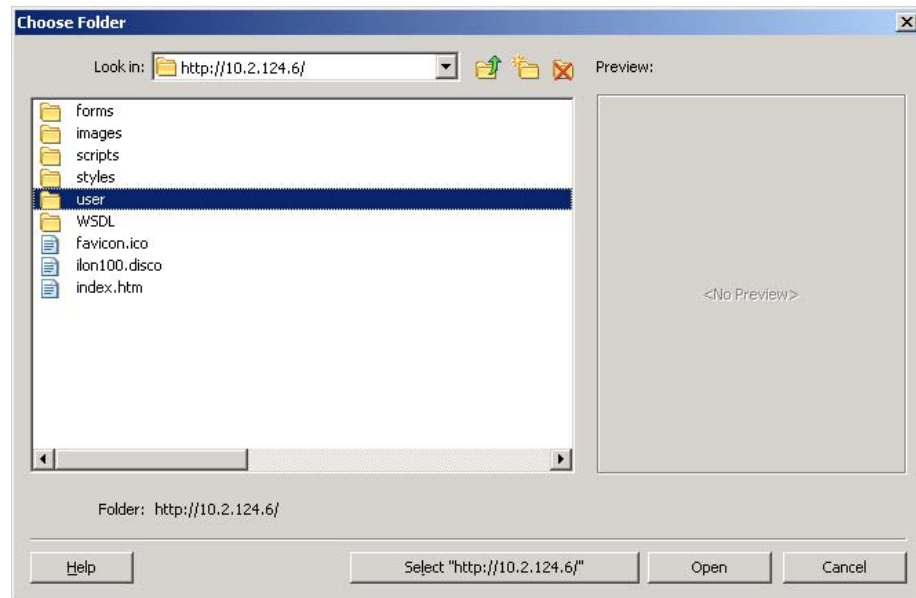
Figure 13.7 Choose Folder Window

11. Open the `User` directory, and then click the new folder icon ( ) to create the directory for your custom Web site. Enter the name of the folder on the New Folder dialog that opens, and click **OK**. This returns you to the Choose Folder window. **The new folder you create must be in the `User` directory in order for the Web page to function properly.**

12. Click **Select** to select the new folder and return to the Publish New Page window. Click **Publish** to publish the Web page.

13. Click **Edit Page** to begin editing the Web page. Now that you have published the Web page, you will be able to add *i*.LON Vision objects to it.

14. Click the *i*.**LON** button ( ) on the Contribute toolbar, and then select **Image Swapper**. The dialog shown in Figure 13.7 opens.
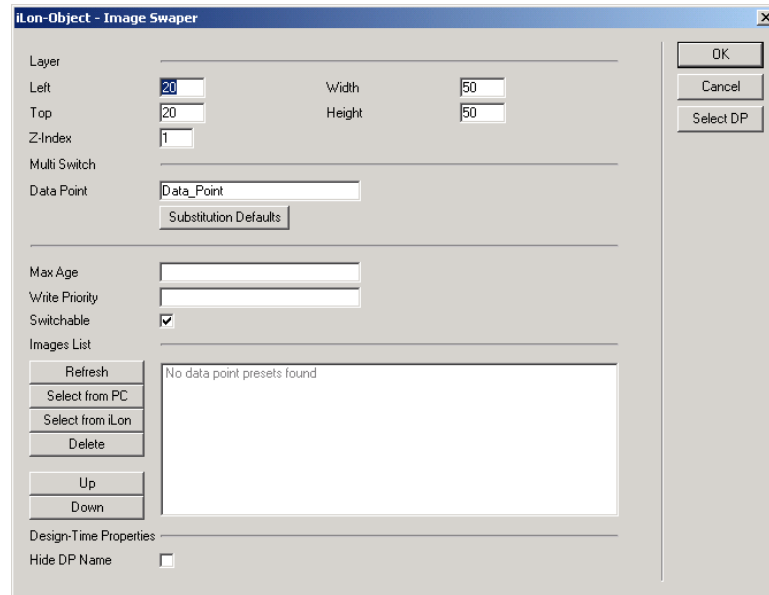
Figure 13.7 Image Swapper Dialog

15. Make sure that the Switchable check box is selected, and then click **Select DP**. This opens the Data Points dialog shown in Figure 13.8. If the iLON Information dialog opens first, then enter the *i*.LON 100 server's IP address and click **OK**.
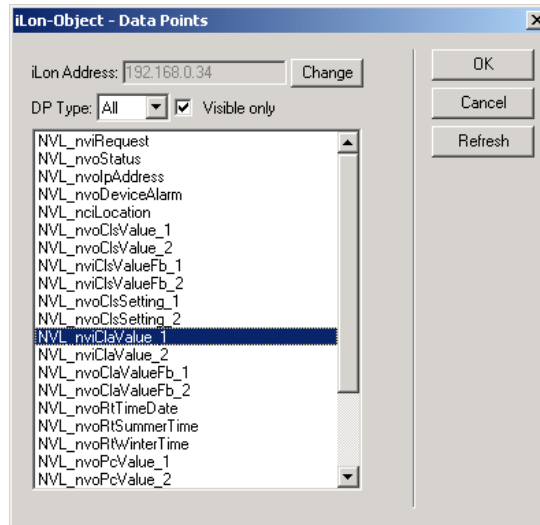
Figure 13.8 Data Points Dialog

Select **NVL_nviClaValue_1** on the Data Points dialog, and then click **OK**. This returns you to the Image Swapper dialog shown in Figure 13.7.

You can use the **NVL_nviClaValue_1** data point to enable or disable the Digital Output. When the **NVL_nviClaValue_1** data point is set to ON, the first Digital Output on the *i*.LON 100 server will be enabled. When the data point is set to OFF, the Digital Output will be disabled.

16. In the Images list in the lower part of the Image Swapper dialog, select

OFF and then click **Select From PC**. Browse to the **iLonVision\graphics\switch** directory in your LONWORKS folder, choose a graphic of a switch in the OFF position, and then click **Select**.

This graphic will be displayed on the Web page when the data point is set to OFF, and the Digital Output is disabled. Because you selected the **Switchable** check box, a user will be able to click the graphic to enable the Digital Output from the Web page.

17. Select **ON** from the Images list, and click **Select from PC** again. Browse to the **iLonVision\graphics\switch** directory in your LONWORKS folder, choose a graphic of a switch in the ON position, and then click **Select**.

    This graphic will be displayed on the Web page when the data point is set to ON, and the Digital Output is enabled. Because you selected the **Switchable** check box, a user will be able to click the graphic to disable the Digital Output from the Web page.

18. Click **OK**. This returns you to the main Contribute window. The image you selected will appear in the upper left hand corner of the window.
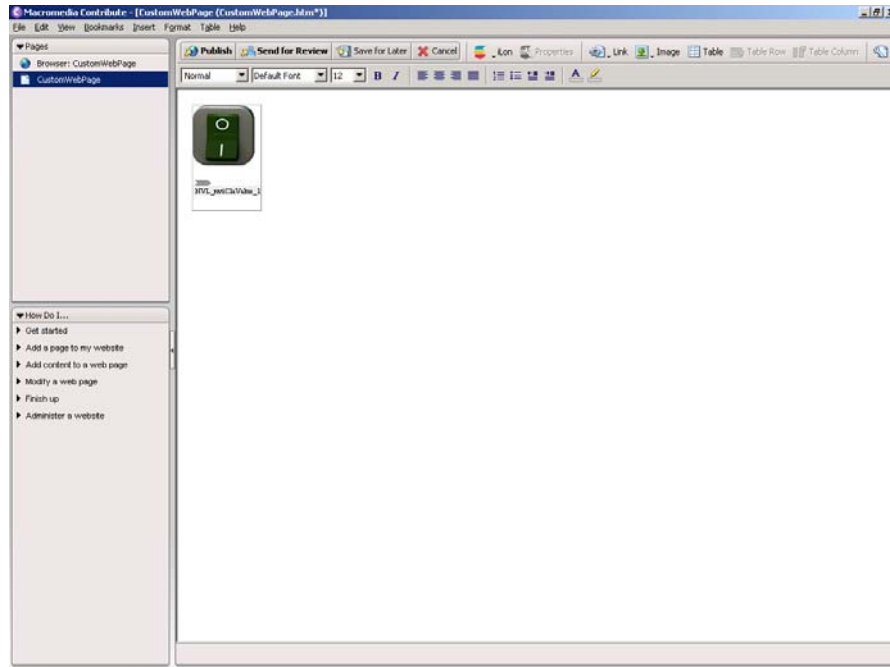
Figure 13.9 Main Contribute Window

19. Select the image and drag it to the middle of the window. When you select the image, make sure to click the frame containing the switch, and not the switch itself.

20. Next, add a lamp graphic to display the current status of the *i*.LON 100 Digital Output. To do so, repeat steps 13-19 to add another image swapper to the Web page. This time, select **NVL_nvoClaValueFB_1** as the data point, make sure the **Switchable** check box is cleared, and use the lamp graphics in the **iLonVision\graphics\lamp** directory in your LONWORKS folder for the ON and OFF presets.

    These graphics will be used to indicate the current status of the Digital Output. The graphic selected for the OFF preset will be displayed when the Digital Output is disabled, and the graphic selected for the ON preset will be displayed when the Digital Output is enabled. Because the

Switchable check box was cleared, clicking either graphic will not have an effect.

21. Move the lamp image so that it is next to the switch image, and then click **Publish** to publish the Web page to the *i*.LON 100 server.

22. Next, create the **Start.htm** file. **This step is required to add the *i*.LON Vision framework to the custom Web page you are creating. If you do not create the Start.htm file, your Web page will not function properly.**

Click the **New Page** button on the Contribute toolbar to open the New Page window. Select **Blank Web Page** as the page type, enter **Start** in the Page Title box, and then click **OK**. The window shown in Figure 13.10 opens.
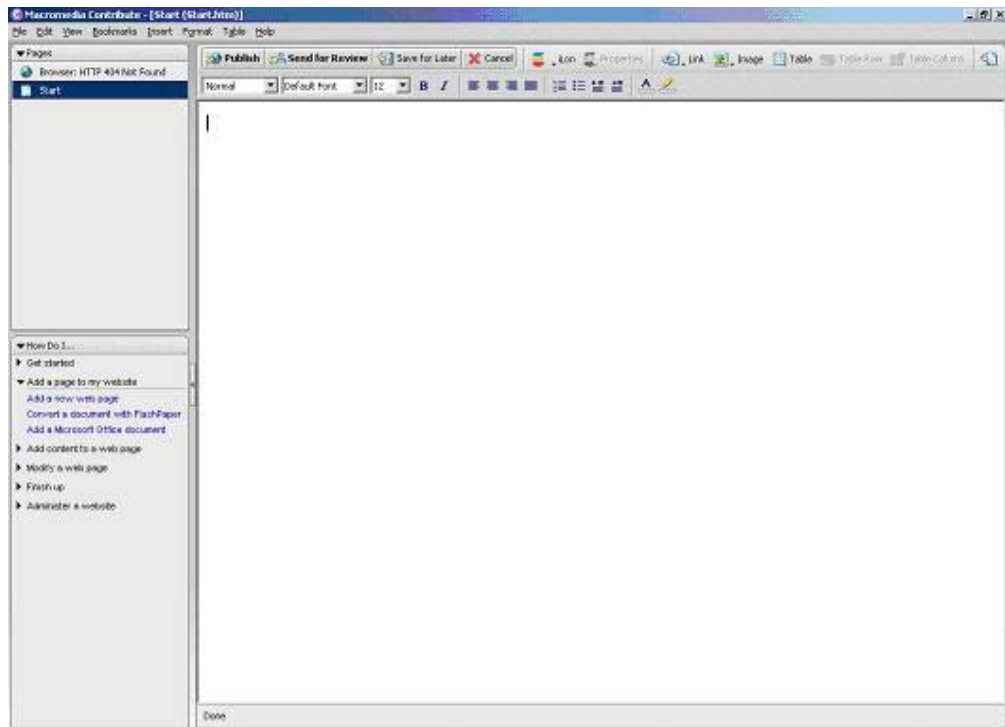
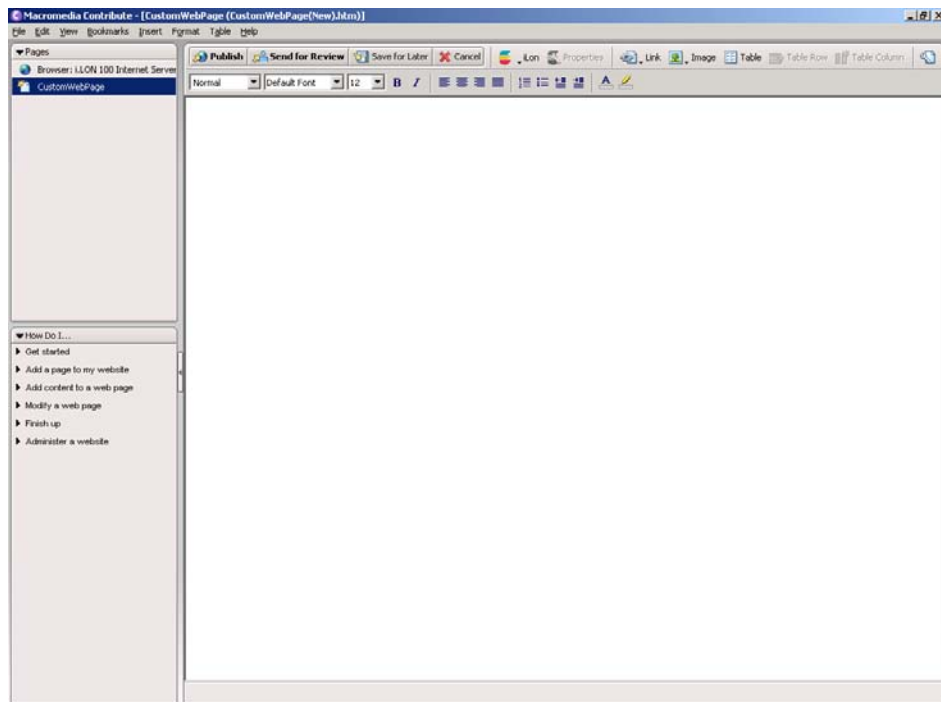Figure 13.10 Start.htm Web Page Window

23. You must publish the Web page before adding the *i*.LON Vision framework to it.

To do so, click **Publish**. A window opens, advising you that visitors to the Web site will not be able to view the page unless you link to it from another page. Click **Yes** to continue. The window shown in Figure 13.11 opens.
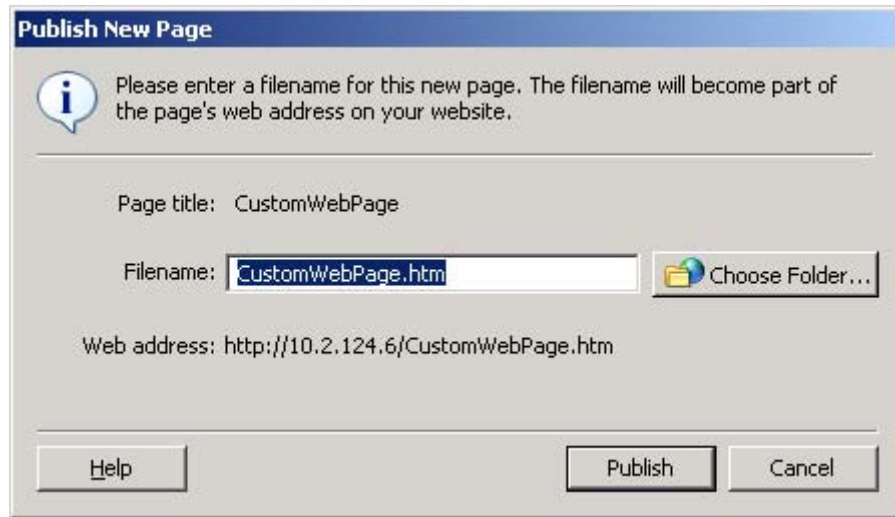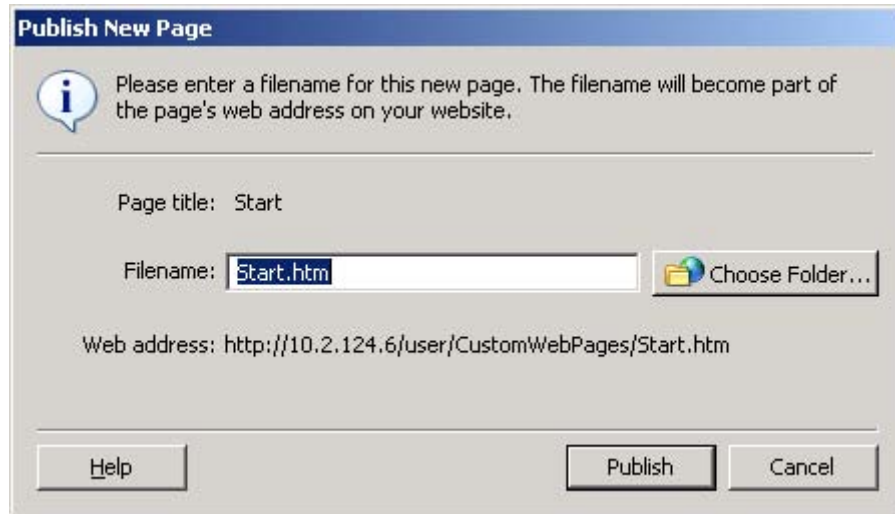
Figure 13.11 Publish New Page Window

Make sure the file name is set to **Start.htm**, and then click **Choose Folder** to select the folder the Web page will be stored in. **This must be the same folder that you created in steps 10 and 11 to store the CustomWebPage.htm file.**

24. Click **Select** to select the new folder. This returns you to the Publish New Page window. Click **Publish** to publish the Web page. A window opens informing you that the page has been published.

25. Click **Edit Page** to begin editing the page.

26. Add the Frameset Properties object to your **Start.htm** page. To do so, click the *i*.LON button (⬤ ·ᶦᴸᵒⁿ) on the toolbar at the top of the window, and then select **Frameset Properties**. The Frameset Properties dialog opens.
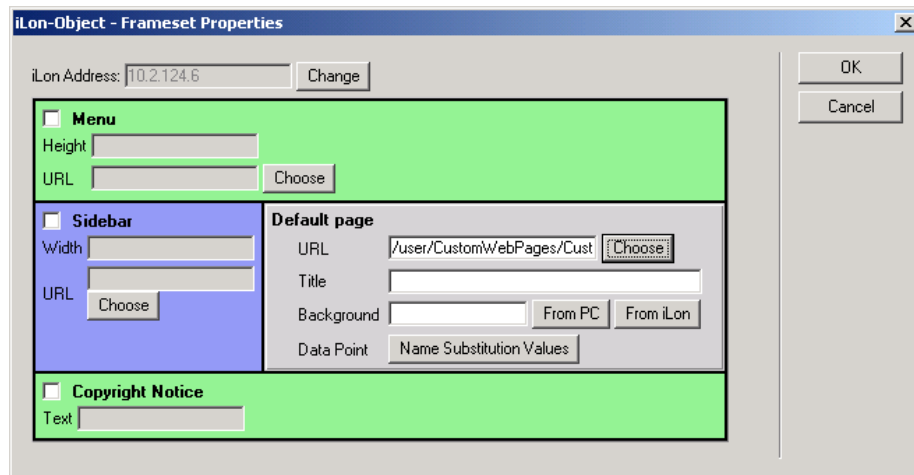
Figure 13.12 Frameset Properties Dialog

27. Clear the **Menu**, **Sidebar**, and **Copyright Notice** check boxes.

28. Click **Choose** in the **Default Page** area to open the **Insert Link** dialog.
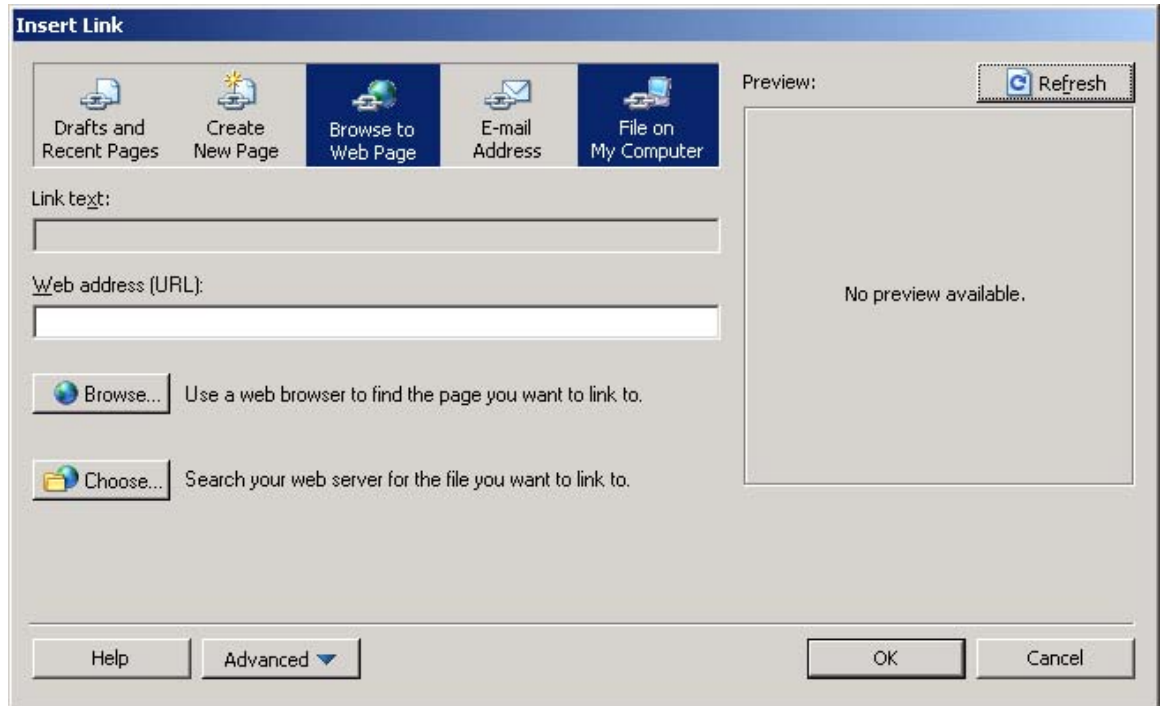
Figure 13.13 Insert Link Dialog

29. Click **Choose** to open the Choose File on Website dialog. Browse to the **CustomWebPage.htm** file you created previously, and then click **OK** to return to the Insert Link dialog. Then, click **OK** again to return to the Frameset Properties dialog. Click **OK** one more time to return to the main Contribute window. The Frameset Properties object will now appear on the window.

30. Click **Publish** to publish the updated Web page to your *i*.LON 100 server.

31. Click the **Choose** button on the Contribute toolbar to open the Choose File on Website dialog. Go to the root directory of the *i*.LON 100 server, select **Index.htm** and then click **OK**. You should now see the Login page for your *i*.LON 100 server in the main Contribute window.
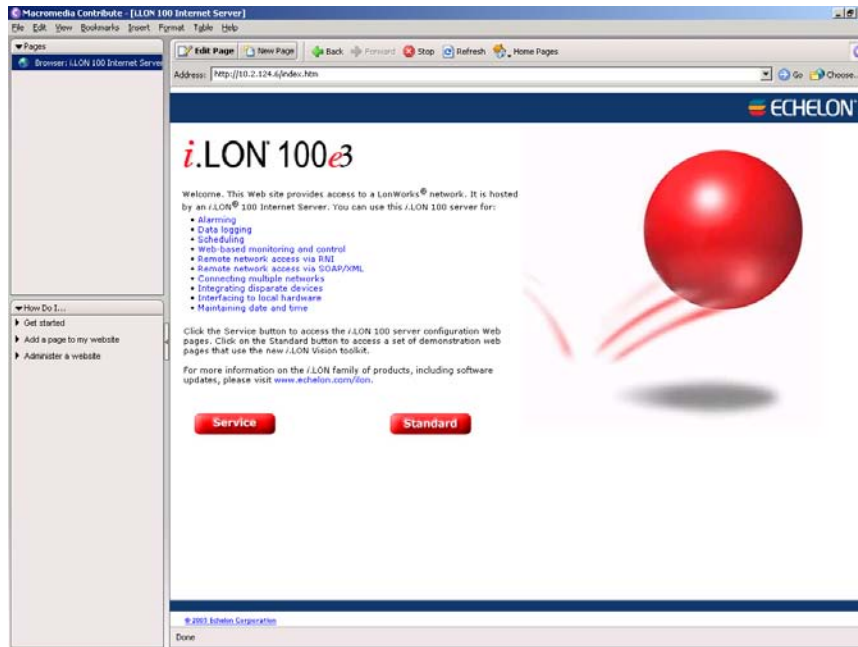
Figure 13.14 Main Contribute Window

32. Click the **Edit Page** button on the Contribute toolbar.

33. For this tutorial, you will modify the **Standard** button to link to your custom Web page. Right-click the **Standard** button, and then select **Link Properties** to open the Insert Link dialog.

34. Click **Choose** to open the Choose File on Web Site directory. Browse to directory you created in steps 10 and 11 to store your custom Web pages, and select the **Index.htm** file. **This file was created automatically when you created the Start.htm file. You must link to this page for the user to access your custom Web page.**

35. Click to return to the Insert Link dialog, and then click **OK** again.

36. Click **Publish** in the Contribute toolbar. Any user logged onto the *i.*LON 100 server's Web site will now be directed to your custom Web page when he clicks the **Standard** button.

When the user clicks the switch icon to enable and disable the Digital Output, the lamp icon will turn on and off to indicate the Digital Output's state. In addition, the **Output 0** LED on the *i*.LON 100 server will turn on and off, depending on whether the Digital Output is enabled or disabled.
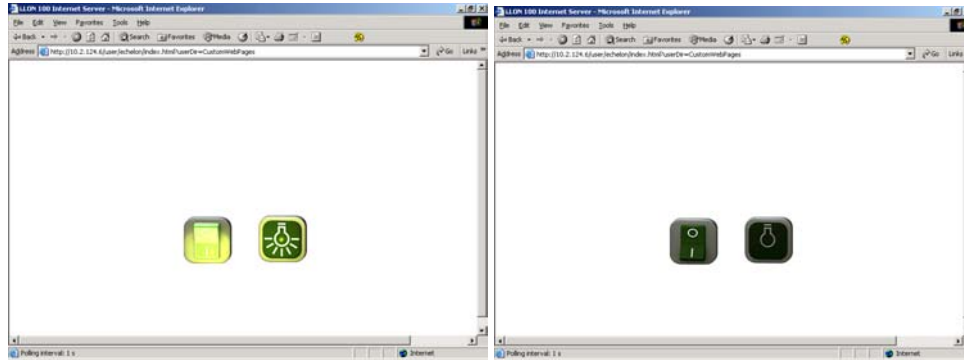
Figure 13.15 Completed Web Pages – ON and OFF

Advanced Web Page Creation

The previous section described how to create a simple Web that contained one image swapper you could use to read and write to the value of a single data point, and another image swapper to display the current value of the data point.

Your Web design may require more complex functionality, such as multiple Web pages that are linked via a menu or navigation sidebar. In addition, the *i*.LON Vision toolkit contains many other objects you can use to read and write to the values of your data points. For example, you could create a drop-down list containing the values a user could assign to a data point, or a text area where a user could enter the value to assign to a data point. The remainder of this chapter describes how you can create Web page(s) with *i*.LON Vision that take advantage of all of these features. When doing so, you will follow these steps:

1. Install Macromedia Contribute 3.0 or 3.1 and the Echelon *i*.LON Vision software on your computer, as described in Chapter 2.

2. Create a connection to your *i*.LON 100 server. For more information on this task, see *Step One: Create a Connection to the i.LON 100 Server* on page 192.

3. Create the *i*.LON Vision framework. **There are several steps to this process, the first of which is to create the Start.htm file and add the *i*.LON Frameset Properties object to it. Without the Frameset Properties object, the Web pages you create will not function properly.** For more information on this task, see *Step Two: Create a User Directory and the Start.htm File* on page 195.

4. Modify the *i*.LON 100 server's Login Web page to link to your custom Web pages. For more information on this task, see *Step Three: Customize the Login Web Page* on page 199.

5. Use the *i*.LON Vision toolkit to create your custom Web pages. For more information on this task, see *Step Four: Create Custom i.LON 100 Web Page* on page 202.

6. Select a default Web page. This is the Web page that will be opened when a user accesses your custom Web pages from the Login page. For more information on this task, see *Step Five: Defining the Default Page for Your Web Site* on page 229.

7. Optional. Create the menu for your Web pages. For more information on this task, see the *Step Six: Creating a Menu For Your Web Pages* section on page 231.

8. Optional. Create the sidebar for your Web pages. For more information on this task, see the *Step Seven: Creating a Sidebar For Your Web Pages* section on page 236.

Before you begin creating a more complex Web page, you should become familiar with the *i*.LON Vision framework. This is described in the next section.

Introduction to the i.*LON Vision Framework*

The *i*.LON Vision framework applied to each Web page you create is based on a frameset that supports a menu bar across the top, a navigation tree in the left sidebar, and a visualization area to the right. The visualization area is where the different Web pages you create will be displayed. The menu bar and navigation

bar are optional, and can be omitted for a simple interface. However, you will probably find it beneficial to use them to browse between the custom Web pages you create.

You will create this framework when you add an *i*.LON Frameset Properties object to the Start.htm file. You must create the Start.htm file, and add the Frameset Properties object to it in order to successfully create custom Web pages with *i*.LON Vision. Without the *i*.LON Frameset Properties object, your custom Web pages will not function properly. This mandatory task is the first step you will perform after connecting to the *i*.LON 100 server with *i*.LON Vision. It is described in the *Step Two: Create a User Directory and the Start.htm File* **section on page 195.**

Once you have created the **Start.htm** file and added the Frameset Properties object to it, you can customize the menu bar and navigation tree areas that the *i*.LON Vision framework includes by creating two files called **Menu.htm** and **Sidebar.htm**. *i*.LON Vision includes several features you can use to make the creation of these files simple and efficient.

Finally, you can create any number of custom Web pages. The layout you create (i.e. the navigation tree and menu bar) when you set up the **Start.htm**, **Menu.htm**, and **Sidebar.htm** files will be automatically applied to each of these Web pages, so that you do not have to configure a separate menu and navigation tree for each Web page you create. These tasks are described later in the chapter.

Figure 13.16 shows how the **Start.htm**, **Menu.htm**, and **Sidebar.htm** files combine to form the *i*.LON Vision framework, and how they will be applied to the custom Web pages you create.
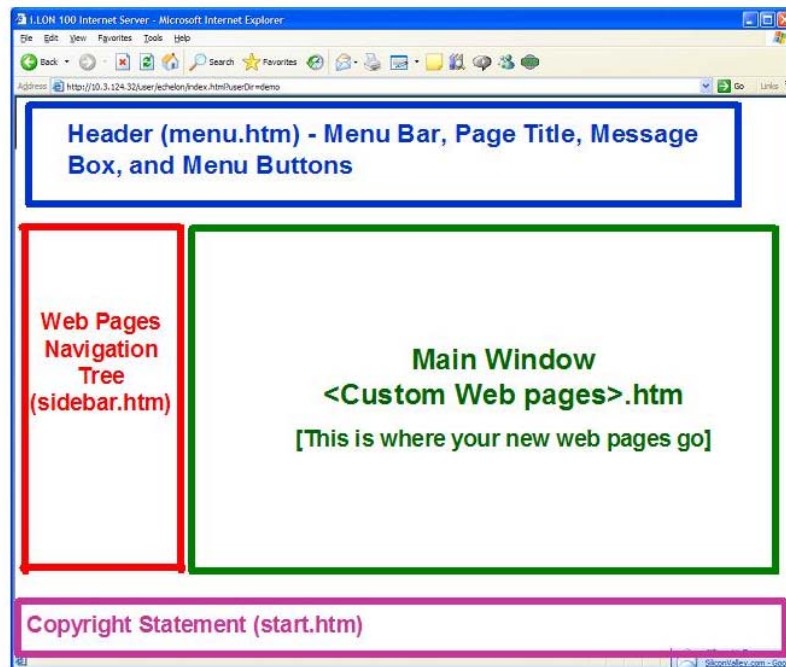
Figure 13.16 *i*.LON Vision Framework

As you can see, the **Menu.htm** file determines how the menu bar at the top of each Web page will appear. The **Sidebar.htm** file determines how the left sidebar will appear. The **Start.htm** file determines how these objects (the menu bar and the left sidebar) will be sized and positioned, and also allows you to create a

copyright statement that you can display at the bottom of your custom Web pages.

The "Main Window" area of the framework represents the area where the custom Web pages you create will be displayed. Each of these Web pages will include the same menu, sidebar and copyright statement that are defined in the **Start.htm**, **Menu.htm**, and **Sidebar.htm** files.

i.LON 100 Demo Web Pages

You may find it useful to view the Demo Web pages included with the *i*.LON 100 server. This will help you understand the framework you will be using to create your own Web pages. To view the Demo Web pages, follow these steps:

1. From the Welcome page of the *i*.LON 100 server's Web site, click the **Standard** button to enter the Demo area of the Web site.

2. Click **Configuration** in the Navigation tree to load the **Options - Configuration** Web page. Press the **Add Config** button to configure the Demo area and to create the data points referenced in the Demo pages.
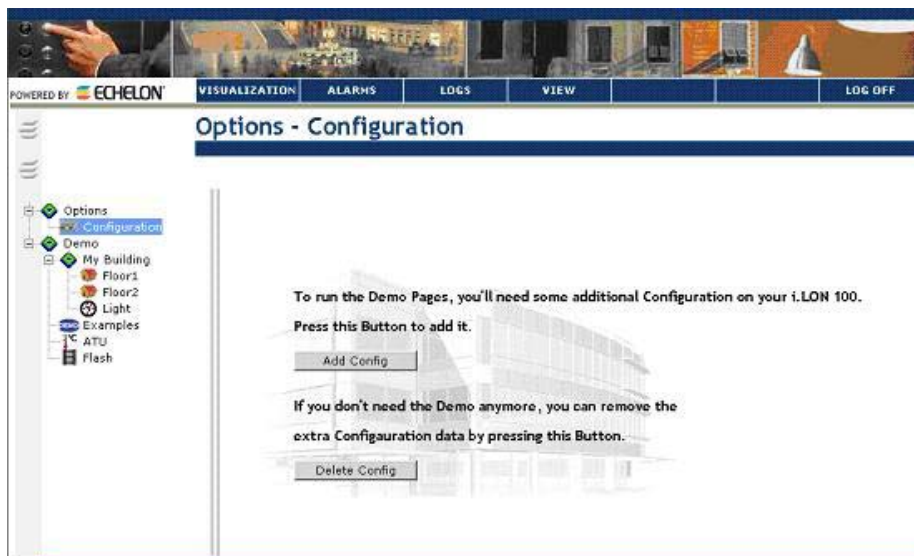
Figure 13.17 Options – Configuration Web Page

3. Once you have pressed **Add Config**, you can use the navigation tree in the left sidebar, and the menus in the menu bar, to view the data points you have referenced and browse the Demo area of the Web site.

    When browsing the Demo area, you should keep in mind that it uses the same framework that *i*.LON Vision uses. You will be able to create a navigation tree similar to the one shown in Figure 13.17 by editing the **Sidebar.htm** file. You will be able to create a menu similar to the one shown in Figure 13.17 by editing the **Menu.htm** file. Remember that this framework is provided by the *i*.LON Frameset Properties object, which you must add to the **Start.htm** file before creating your custom Web pages.

    Figure 13.18 shows the Demo Web pages again, with the functionality provided by the **Start.htm**, **Menu.htm**, and **Sidebar.htm** files highlighted.
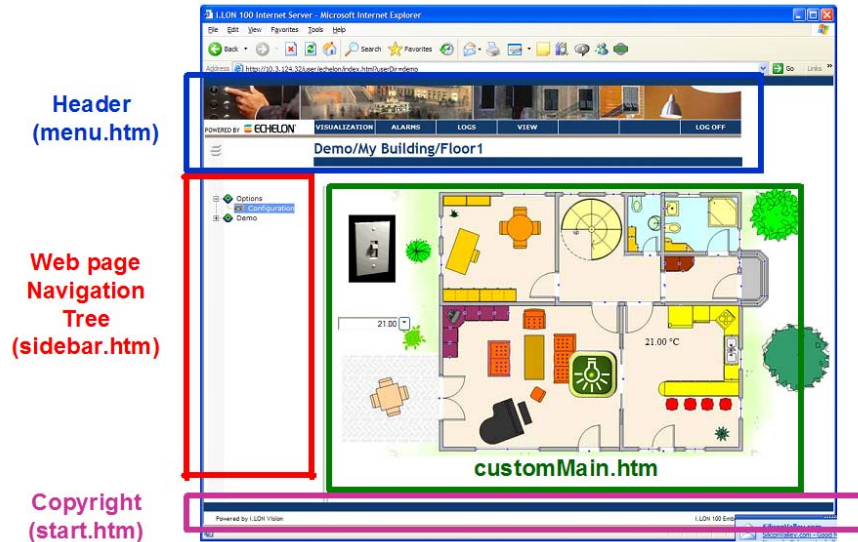
Figure 13.18 Demo Web Pages

Step One: Create a Connection to the i.*LON 100 Server*

Before you create your custom Web pages, you need to create a connection to the *i*.LON 100 server with *i*.LON Vision. To create a connection, follow these steps:

1. Start Macromedia Contribute, and select **My Connections** from the **Edit** menu. The window shown in Figure 13.19 opens.
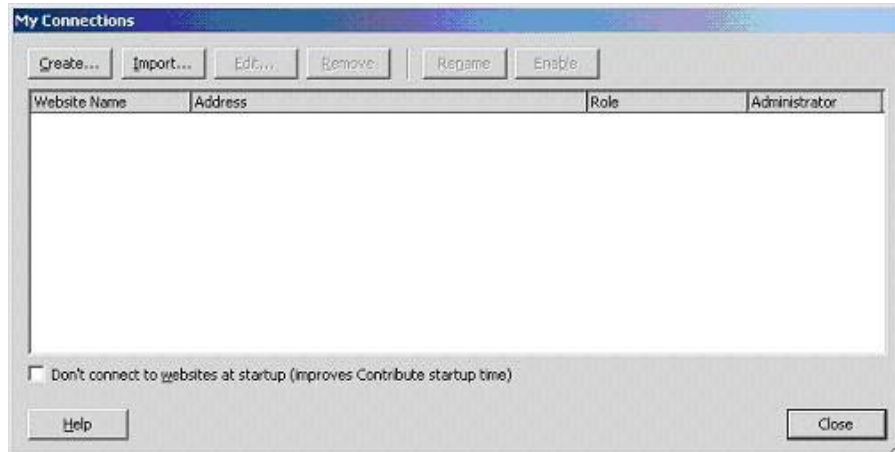
Figure 13.19 My Connections Window

2. Click **Create** to add a new connection. The Contribute Website Connection Wizard starts. Click **Next** on the first window. The Website Home Page window opens.

Figure 13.20 Website Home Page Window

3. Enter the IP address or hostname of the *i*.LON 100 server you want to connect to, and then click **Next**. The Connection Information window opens.

   NOTE: You must enter an IPv4 address for the Contribute software to connect to the *i*.LON 100 server. See the *Configuring LAN Connection Properties* section on page 16 for instructions to follow when determining the *i*.LON 100 server's IPv4 network address.

Figure 13.21 Connection Information Window

4. Select **FTP** from the **How Do You Connect To Your Web Server** box.

5. Enter the name of the FTP server, the FTP user name, and the FTP password required to connect to the *i*.LON 100 server. Enter the IP address or hostname of the *i*.LON 100 server as the name of the FTP server, and enter the user name and password for your *i*.LON 100 server for the other fields. The default user name and password are "ilon", but you may have changed that.

   When entering the IP address, do not include the http:// prefix.

6. Click **Advanced.** The Advanced Connection Settings dialog opens.
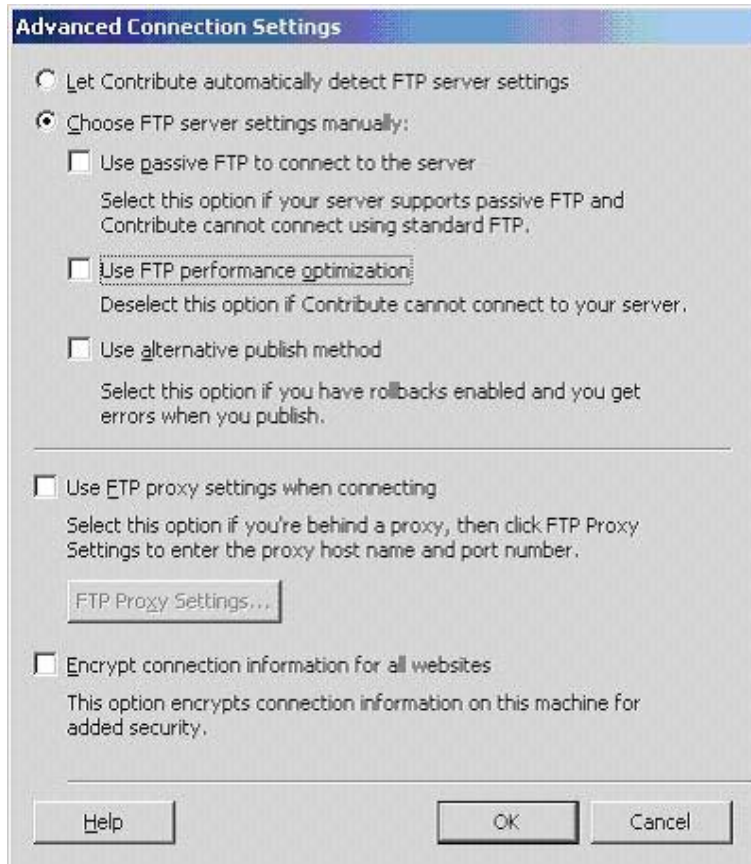
Figure 13.22 Advanced Connection Settings Dialog

Configure the properties on the Advanced Connection Settings dialog as shown in Figure 13.22, and then click **OK**. Make sure that the **Use FTP Performance Optimization** check box is cleared before doing so.

This returns you to the Connection Information window. Click **Next** to continue. The User Information Window opens.

7. Enter your name and e-mail address on the User Information window, and then click **Next**. The Summary window opens, indicating that the connection is complete.

8. Click **Done** to exit the wizard. You can now proceed to the second part of the procedure, which is to create the **Start.htm** file.

Step Two: Create a User Directory and the Start.htm File

The next step to perform when using *i*.LON Vision is to create a new directory for your custom Web pages, create the **Start.htm** file, and then add the Frameset Properties object to the **Start.htm** file. To do so, follow these steps

1. Click the **New Page** button on the Contribute toolbar. The window shown in Figure 13.23 opens.
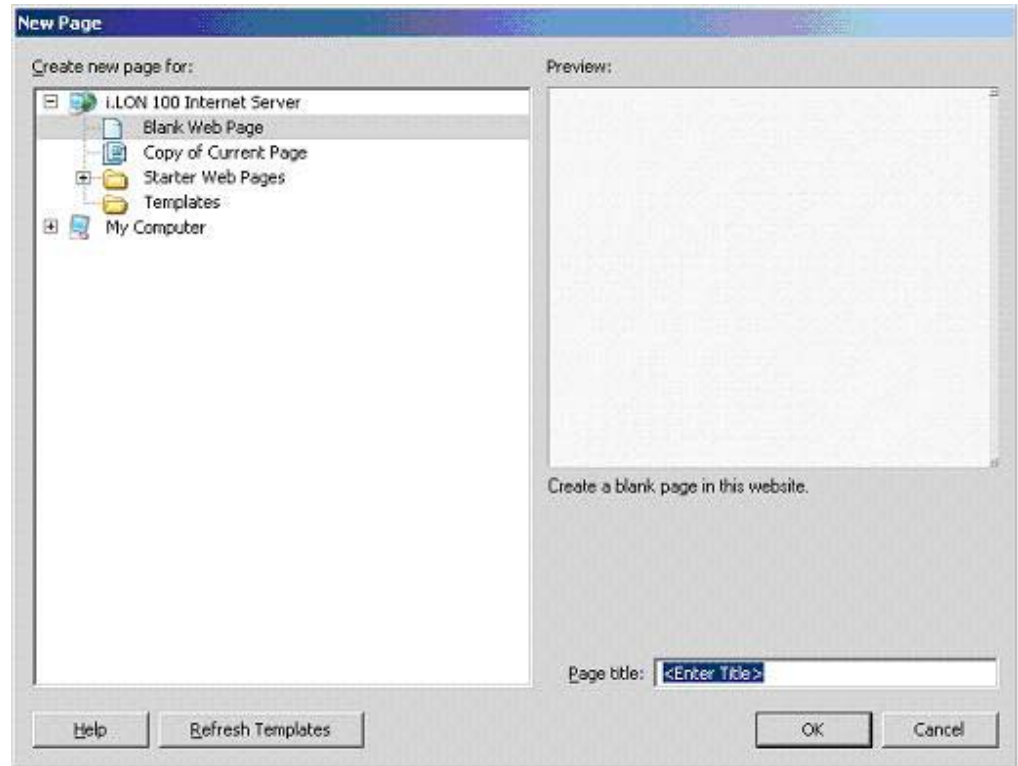
Figure 13.23 New Page Dialog

2. Select **Blank Web Page** as the page type, enter **Start** in the Page Title box, and then click **OK**. The window shown in Figure 13.24 opens.
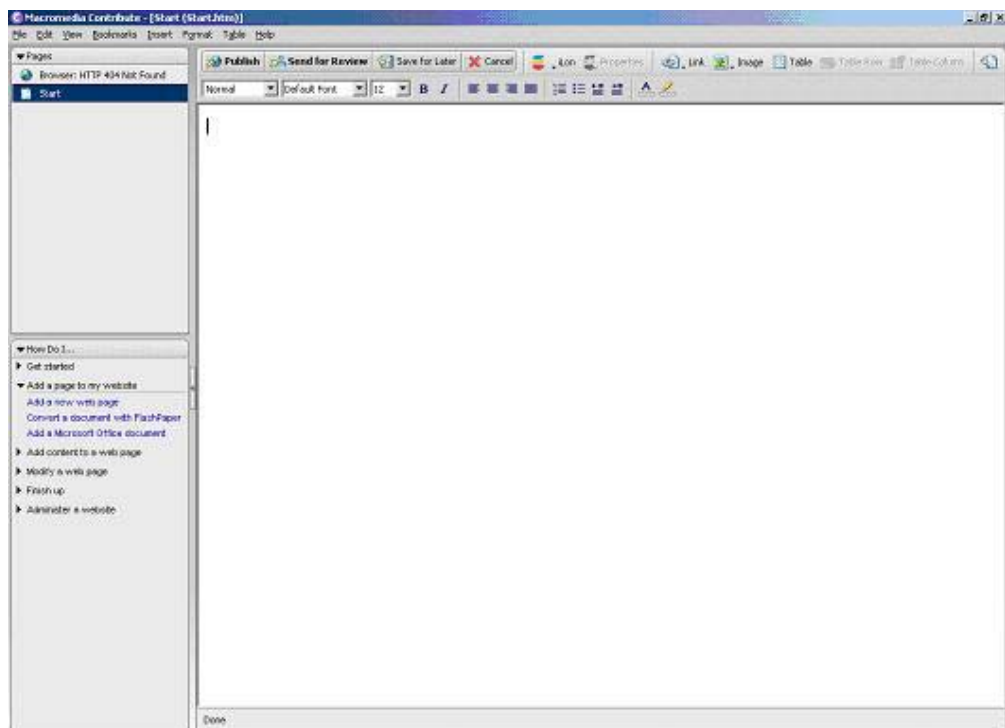
Figure 13.24 Start.htm Web Page Window

3. You must publish the page before adding the Frameset Properties object

to it. Click **Publish.** A window opens, advising you that visitors to the Web site will not be able to view the page unless you link to it from another page. Click **Yes** to continue. The window shown in Figure 13.25 opens.
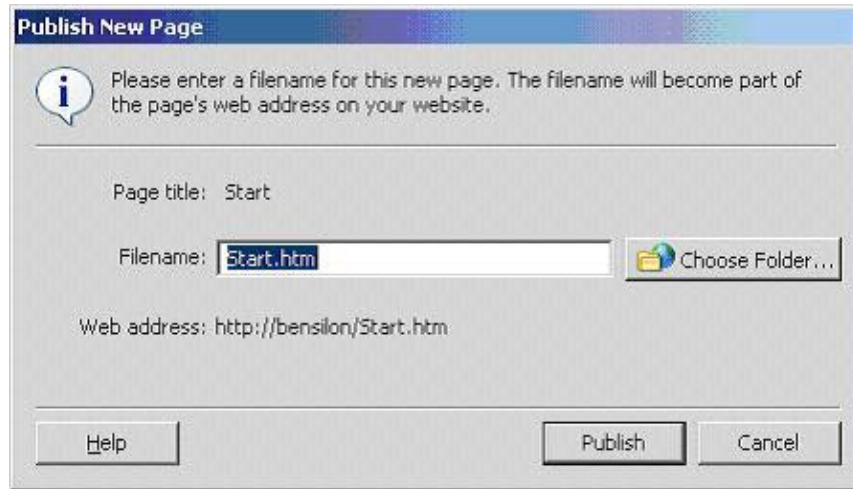
Figure 13.25 Publish New Page Window

Make sure the file name is set to **Start.htm**, and then click **Choose Folder** to create the directory for your custom area of the *i*.LON 100 server's Web site.   You must create the new folder in the `/user` directory of your *i*.LON 100 server, and you must name this page **Start.htm**. The window shown in Figure 13.26 opens.
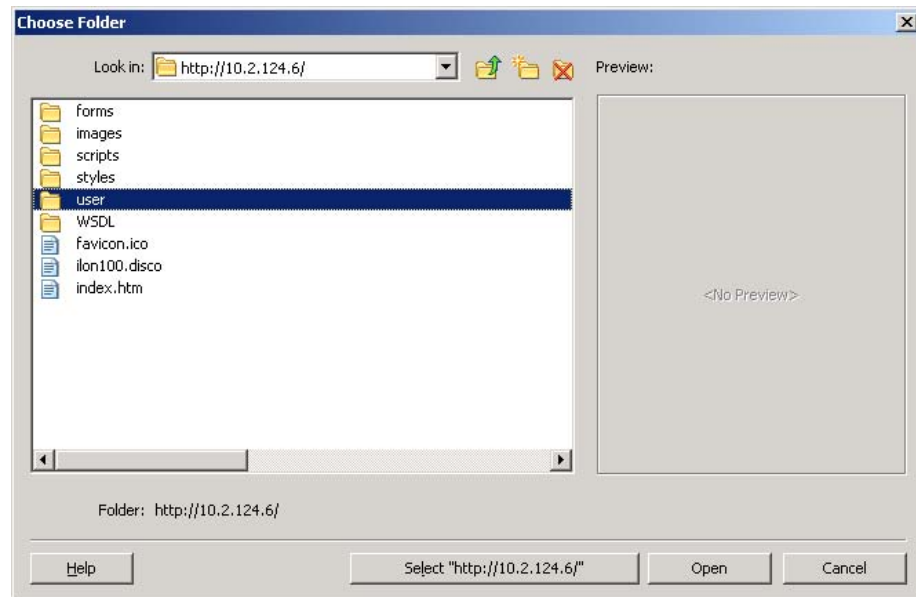
Figure 13.26 Choose Folder Window

4. Open the `User` directory highlighted in Figure 13.26, and then click the new folder icon ( ) to create the directory for your custom Web site. Enter the name of the folder on the New Folder dialog that opens, and click **OK**. This returns you to the Choose Folder window. **Remember that the new folder you create must be in the `User` directory in order for the Web page to function properly.**

5. Click **Select** to select the new folder. This returns you to the Publish New Page window. Click **Publish** to publish the Web page. A window opens informing you that the page has been published, and you will return to the window shown in Figure 13.24.

6. Click **Edit Page**.

7. Add the Frameset Properties object to your **Start.htm** page. To do so, click the *i*.LON button ( ) on the toolbar at the top of the window, and then select **Frameset Properties**. The Frameset Properties dialog opens.
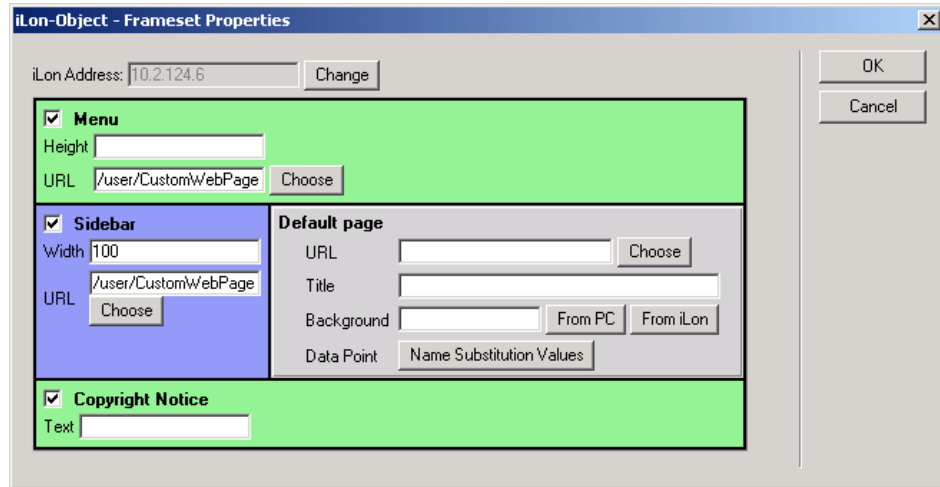
Figure 13.27 Frameset Properties Dialog

8. Configure the properties on the dialog, and then click **OK** to save your changes. Table 13.1 describes these properties.

Table 13.1 Frameset Properties

Property	Description
Menu	Configures how the menu bar for your custom Web pages will be formatted. Clear the **Menu** check box if you do not want to have a menu bar.
	The height will be calculated automatically. To set the height manually, enter a new value here. You do not need to modify the **URL** property.
	If you select the Menu check box, you will need to set up the rest of the menu later. Otherwise, your Web pages may not function properly. For more information on this, see *Step Six: Creating a Menu For Your Web Pages* on page 231.
Sidebar	Configures how the sidebar (i.e. the area containing the navigation tree) for your custom Web pages will be formatted. Clear the **Sidebar** check box if you do not want the main page to contain a sidebar.
	The width will be calculated automatically. To set the width manually, enter a new value here. You do not need to modify the **URL** property.
	If you select the Sidebar check box, you will need to set up the rest of the sidebar later. Otherwise, your Web pages may not function properly. For more information on this, see *Step Seven: Creating a Sidebar For Your Web Pages* on page 236.

Property	Description
Copyright Notice	Leave the **Copyright Notice** check box selected if you want to display a copyright notice at the bottom of your Web pages. Clear the **Copyright Notice** check box if you want to remove the copyright notice from the main page. If you select the **Copyright Notice** check box, enter the text that you want to be displayed as the copyright notice in the **Text** box.
Default Page	Selects the default Web page that will open when a user logs into your custom Web site. You will select the default Web page later, after you have created your custom Web pages. This step is described in more detail in the *Step Five: Defining the Default Page for Your Web Site* section on page 223.

Click **OK** to return to the main Contribute window. The Frameset Properties object will now appear in the window.
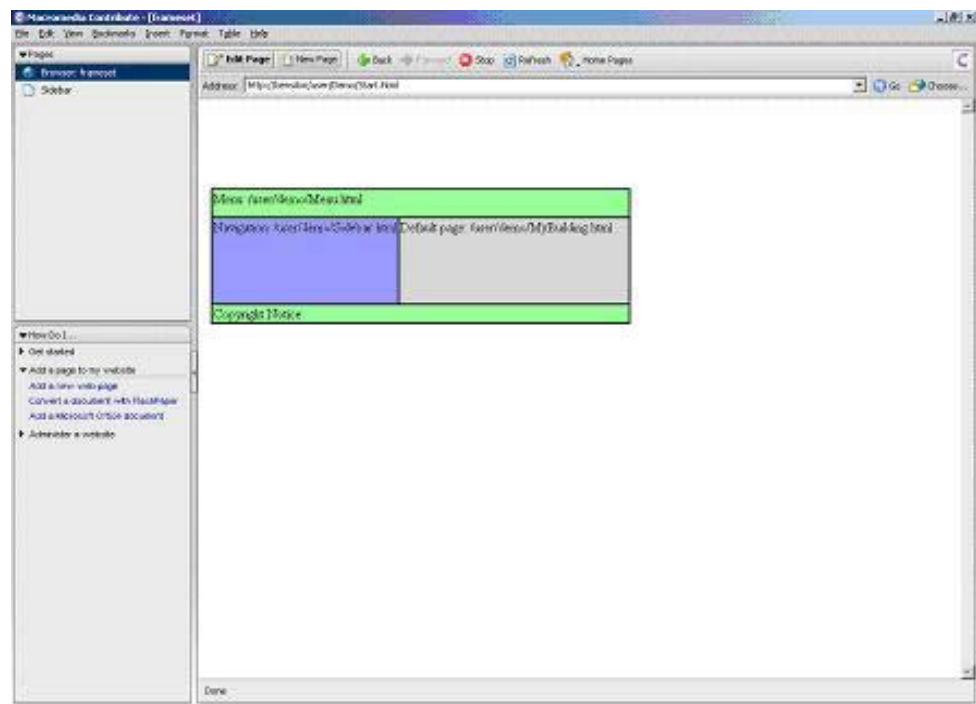
Figure 13.28 Start.htm Page

9. Click **Publish** to publish the updated Web page to your *i*.LON 100 server. Click **Choose** and browse to your custom directory. You will see that an addition file, **Index.htm**, has been added to your new directory. **You will use the Index.htm file to link to your custom Web pages from the Login Web page, as described in the next section.**

Step Three: Customize the Login Web Page

The next step to perform is to modify the *i*.LON 100 server's existing login Web page to link to the custom area of the *i*.LON 100 Web site, i.e. the area that will store your custom Web pages. For example, you could modify the existing **Standard** button to link to the custom Web pages, or you could add a new link to the Web page.

To edit the Login page to link to your custom Web pages, follow these steps:

1. Start Macromedia Contribute, and then click **i.LON 100 Internet Server** under **Begin Editing My Websites** (or, enter the IP address of your *i*.LON 100 server in the address bar if you are already running Macromedia Contribute).

   This opens the Macromedia Contribute opening window, which should be similar to Figure 13.29.
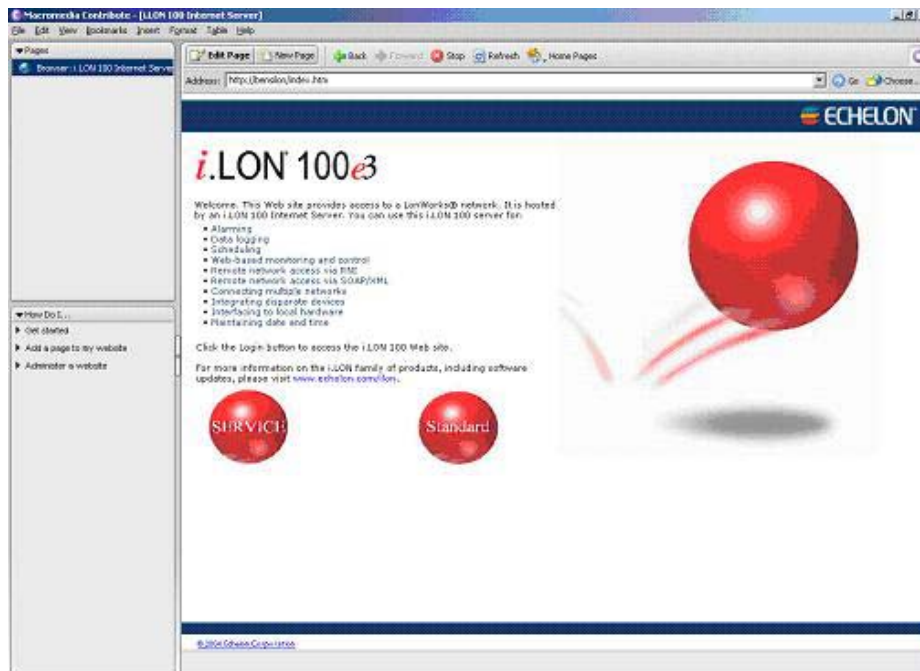
Figure 13.29 Macromedia Contribute Window

2. Click **Edit Page**.

3. The **Service** button links to the main *i*.LON 100 Web page that you use to configure the *i*.LON 100 server and its applications. The **Standard** button links to the *i*.LON 100 Demo Web pages.

   You can create a link to the **Index.htm** page created in the previous section to allow users to access your custom Web pages from either of these links. Echelon recommends that you do not change the **Service** button, as this would remove the link to the service Web pages.

   Right-click either button, and then select **Link Properties** to change either of the existing links. This opens the Insert Link dialog shown in Figure 13.30.
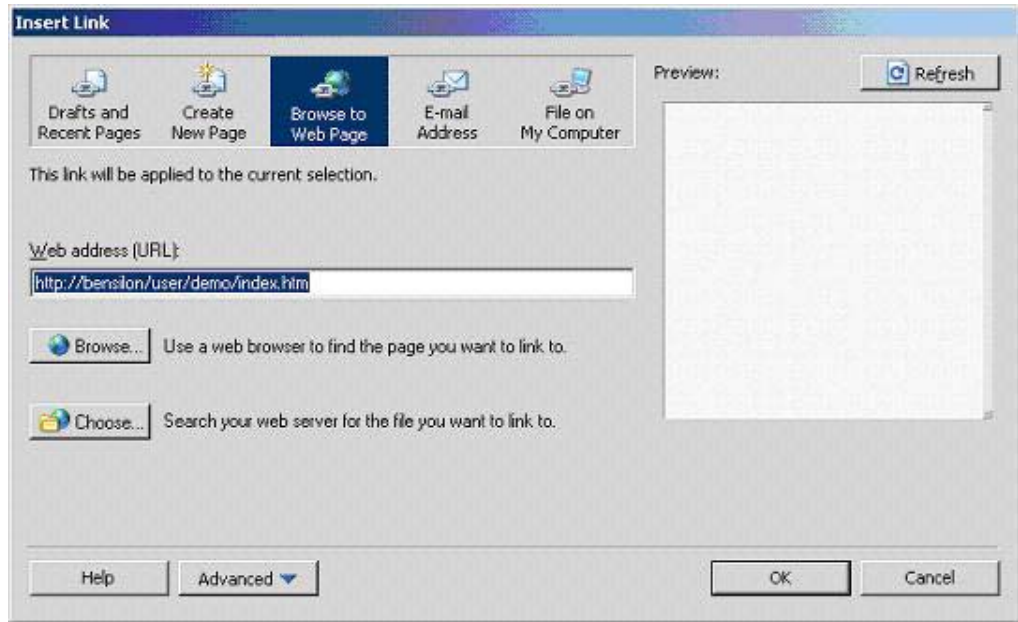
Figure 13.30 Insert Link Dialog

Click **Choose**. This opens the Choose File from Web Site dialog. Browse to the **Index.htm** file that you created in the previous section, and then click **OK** to create the link. **You must create a link to the Index.htm page in order for a user to access your custom Web pages from this link. The Index.htm page links directly to the framework provided by the Start.htm file, which will in turn host the custom Web pages. Figure 13.31 demonstrates this.**
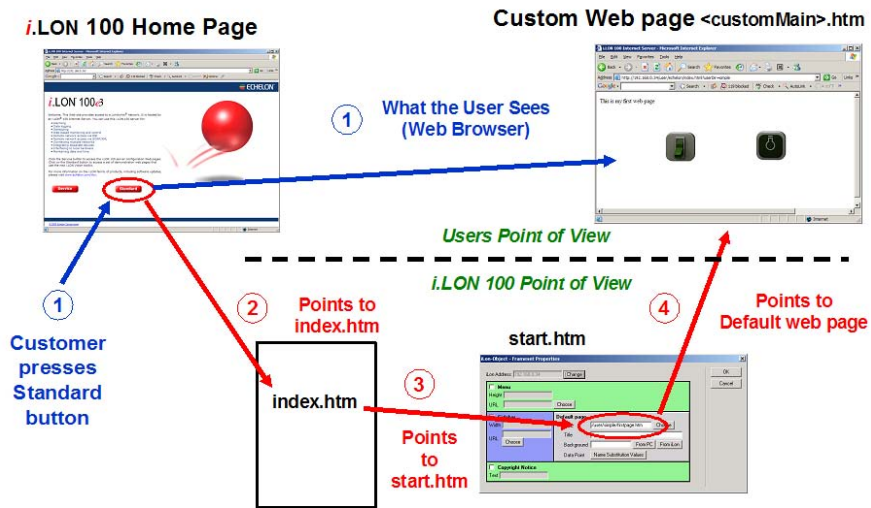
Figure 13.31 Index.htm Page

You may not want to modify the **Standard** or **Service** buttons to link to your custom Web pages. You could add a new object to the Web page by selecting **Image** from the Contribute **Insert** menu, and then use that object to link to the custom Web pages (in the same manner as you would have used the **Service** or **Standard** buttons). For guidelines you may need when using Contribute images, including instructions on how to re-

position Contribute images on the Web page, see *Contribute Image Menu Graphics* on page 228.

4. Modify the rest of the Login page as your Web user interface requires.

5. When you have finished modifying the Login page, click **Publish** to make your changes to the *i.*LON 100 Web site, or click **Send for Review** to send a draft of the Web page out for review.

6. The link you have created will now link to your custom directory. It will display a blank Web page until you have selected a default Web page. This step is described in the *Step Five: Defining the Default Page for Your Web Site* section on page 223.

   The next section, *Step Four: Create Custom i.LON 100 Web Page* describes how to create custom Web pages from scratch. Once you have created your custom Web pages, you can choose one to serve as the default Web page.

Step Four: Create Custom i.LON 100 Web Pages

You can create a custom Web page to display data point values you want a user to have access to, or to allow a user to write to the values of certain data points. For example, you can create a Web page that shows the statistics on the different floors of a building, including the current temperature, lighting conditions, etc.

To create a custom Web page, follow these steps. **Remember that you must create the Start.htm file and add the Frameset Properties object to it before performing these tasks, as described previously in this chapter.**

1. Click the **New Page** button on the Contribute toolbar. The window shown in Figure 13.32 opens.
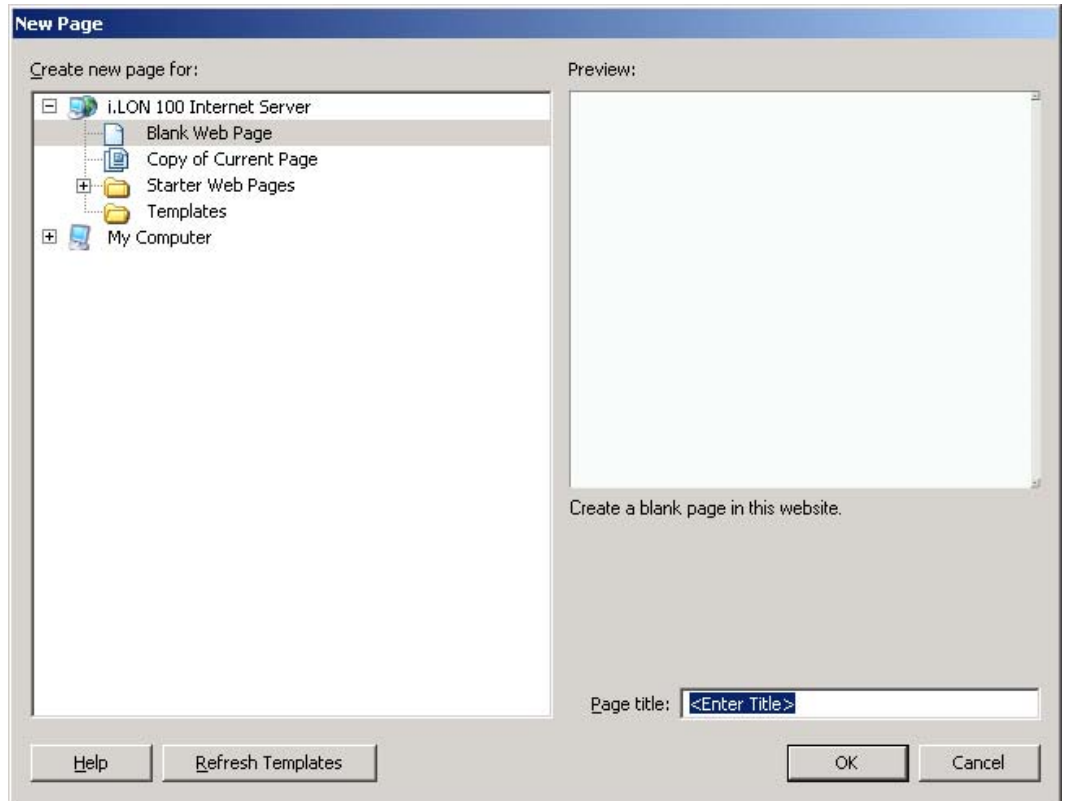
Figure 13.32 New Page Dialog

2. Select **Blank Web Page** as the page type, enter a name for the page in the Page Title box, and then click **OK**. The window shown in Figure 13.33 opens.
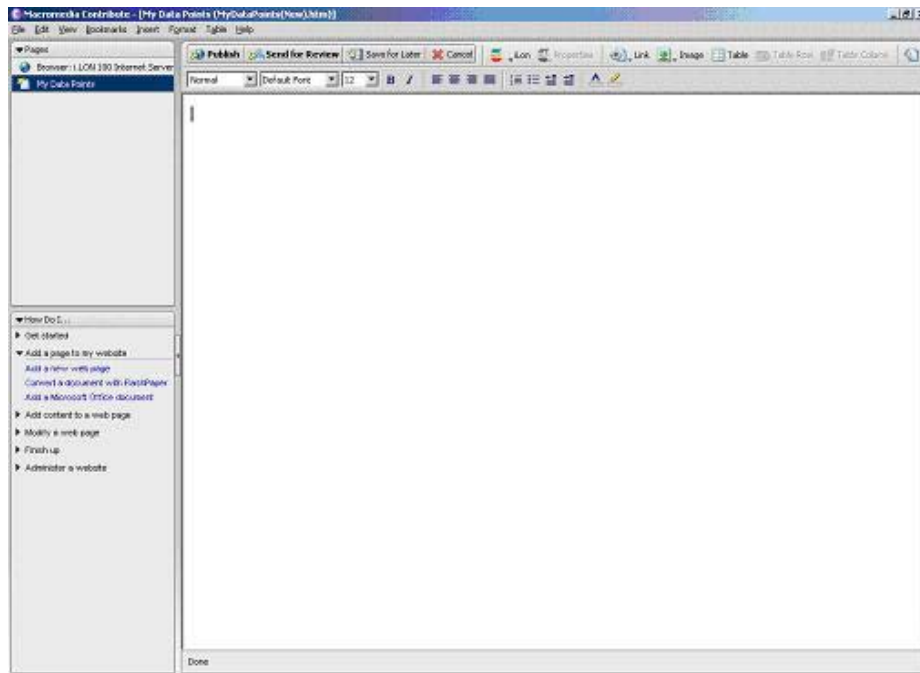
Figure 13.33 Blank Web Page Window

3. Click the ***i*.LON** button ( ) to access the *i*.LON Vision toolkit, and

begin adding the *i*.LON Vision objects you want to use to the Web page. Most of these objects provide a way to read or write the data points on the *i*.LON 100 server. The following section, *Using i.LON Vision Objects*, provides more details on the *i*.LON Vision objects you can use on your custom Web pages.

4. Make any other changes you have planned for your Web page. For example, you could use **Image** button to insert and image from your PC onto the Web page, or you could use the **Table** button to insert a table.

5. When you are finished, click **Publish** to publish your changes to the Web site. **Be sure to publish the Web page to the same user directory you used for the Start.htm file.**

6. Repeat this procedure to create as many custom Web pages as you like. Following this, you can choose which page you want to serve as the default Web page that will open when a user accesses your custom Web site, as described in the *Step Five: Defining the Default Page for Your Web Site* section on page 229.

Using i.LON Vision Objects

Most of the *i*.LON Vision objects listed when you click the **i.LON** button provide you with a means to read or write the value of a data point on your *i*.LON 100 server. When you add the *i*.LON Vision object to the Web page, you will select a data point to be associated with the object. Users will then be able to use the object to read or write the value of the selected data point. For example, you can use the Show Value object to display the value of a data point on the Web page. This section describes how to add each of the *i*.LON Vision objects to a Web page.

Not all *i*.LON Vision objects are used to read and write data point values. Table 13.2 lists and describes these exceptions. The sections following Table 13.2 describe the objects you can use to read and write data point values.

<div align="center">**Table 13.2** Toolkit Objects</div>

i.LON Object	Description
Frameset Properties	Adds a standard frameset to the Web page. You can only use this object on the **Start.htm** page, as described in the *Step Two: Create a User Directory and the Start.htm File* section earlier in the chapter.
Menu Bar **Menu Buttons** **Page Title** **Message Box**	You can only use these objects when you configure your menu with the **Menu.htm** page, as described in the *Step Six: Creating a Menu For Your Web Pages* section on page 231. You can use the **Menu Bar** object to configure the menu that will be applied to all of your Web pages. You can use the **Menu Buttons** object when linking to a standard Web page that configures an Alarm Generator or another *i*.LON application with your menu. The Menu Buttons object adds **Submit** and **Reset** buttons that a user can click to save any changes to the Web page. The Menu Buttons object has no effect and is not displayed for standard Web pages that do not use a **Submit** button. The *Step Six: Creating a Menu For Your Web Pages* section provides more details on when you should use the Menu Buttons object. You can use the **Page Title** object to position where the title bar on each of your custom Web pages will be positioned. Similarly, you can use the **Message Box** object to determine where any error messages regarding the current state of the Web page will be displayed. If you do not add this object to the Web page, all error messages will be displayed in the Web browser's status field. See the *Step Six: Creating a Menu For Your Web Pages* section on page 231 for more information on these objects.
Navigation Tree	Adds a navigation pane to the Web page. You can only use this object on the **Sidebar.htm** page. This is described in the *Step Seven: Creating a Sidebar For Your Web Pages* section on page 236.
Layer	Use the Layer object to add a layer to the Web page. You can add an object or a group of objects to a layer, and the layer will server as an anchor you can use to move them around the Web page. All other *i*.LON objects include their own layer. See Table 13.4 for descriptions of the properties you need to configure when adding a Layer to your Web page. You could use a Layer object to re-position a Contribute graphic image or some other non-*i*.LON object on the Web page, as described in the *Copying and Pasting i.LON Vision Objects* section on page 227.

i.LON Object	Description
Background Image	Adds a static image to the Web page. This opens the Choose Image on Website dialog, which allows you to browse the contents of the Web site and choose an image to insert on the Web page.
	This is more efficient than placing an image directly with the **Image** button on the Contribute toolbar, because the image will be replaced dynamically when you access the page.
	NOTE: When using background images for a Web page that includes a table, Internet Explorer 6 may appear to render multiple copies of the page when you click a menu bar link to open the page multiple times in succession. Resizing the browser window will reflow the page to get the results you expect. You could avoid this problem by using a table that includes the image in one of its cells, or by adding a layer (with the *i*.LON Vision toolkit) to the Web page and inserting the image object inside the layer.
Link	Adds a link to another Web page. You can link to another custom Web page, a Help page, or to a Web page that allows you to read the data that a Data Logger, Event Scheduler, or Alarm Generator has recorded. **See Table 13.7 later in the chapter for descriptions of the different types of links you can add.**

The remainder of this section lists and describes the *i*.LON Vision objects you can use to read and write to the data points on your *i*.LON 100 server. Table 13.3 provides a brief introduction to these objects.

The right column shows how each object will appear on your published Web page, when the object is being used to read or write a SNVT_switch data point. You should be aware the each object will appear slightly different when you are editing the Web page. For example, the data point name will be displayed below the object when you edit the Web page, but not after the Web page has been published.

<div align="center">

Table 13.3 *i*.LON Vision Objects for Data Points

</div>

i.LON Vision Object Name	Description	Will Appear On Your Web Page Like……
Textarea	Adds a text box to the Web page that you can use to display or change the value of a data point. For more information, see *Textarea* on page 208.	0.0 0
Show Value	Displays a data point value on a Web page. For more information, see *Show Value* on page 212.	OFF
Textfield	Adds a text box to a Web page that you can use to write to a data point. For more information, see *Textfield* on page 213.	0.0 0

i.LON Vision Object Name	Description	Will Appear On Your Web Page Like……
Select Box	Adds a drop-down list to the Web page that you can use to select a value for a data point. The drop-down list will include the preset values for the data point. For more information, see *Select Box* on page 214.	
Combo Box	Adds a drop-down list to the Web page that you can use to select a value for a data point, just like the Select Box object. The drop-down list will include the preset values for the data point. This is similar to the Select Box object; however, a user can also manually enter a new value for the data point with the Combo Box object. For more information, see *Combo Box* on page 215.	
Image Swapper	Adds a dynamic image representing the value of a data point to the Web page. When you add the object to the Web page, you will select a data point whose value is to be represented by the object. You will then specify multiple images, each of which applies to one of the data point's preset values. When the data point is set to one of the preset values, the image selected for that value will be displayed on the Web page. For more information, see *Image Swapper* on page 216.	Varies, depending on the images you select when adding the object to your Web page.
Radio Buttons	Adds radio buttons to the Web page a user can select to assign the data point a value. For more information, see *Radio Buttons* on page 219.	
Check Box	Adds a check box to the Web page a user can select or clear to assign a data point an **ON** or **OFF** value, or between any other two preset values you specify. For more information, see *Check Box* on page 220.	
Reset Priority	If a data point is locked because its value was manually overridden by an application using a higher priority than yours, this object can be used to reset the priority, so that you can access the data point. For more information, see *Reset Priority* on page 221.	

You should also be aware that the current status and priority setting of the data point that an *i*.LON object represents will be indicated by icons appearing on the left side of the object on the Web page. You may find the status icons useful when creating Web pages for alarming, or when creating Web pages that will update the values of your data points. For more information on these icons, see *Data Point Status and Priority Icons* on page 223.

The sections following the *Data Point Status and Priority Icons* section provide additional details you may find useful when adding *i*.LON Vision objects to a

Web page, such as how to copy and paste *i*.LON Vision objects, and how to add non-*i*.LON Vision objects to a Web page.

Textarea

You can use the **Text Area** object to add a text box to the Web page that can be used to display the values that have been recently assigned to a data point. You can optionally configure the text area to allow a user to write to the data point by typing a new value in the text area.

To add the **Text Area** object to a Web page, follow these steps:

1. Open a draft of a Web page, click the ***i*.LON** button, and then select **Textarea**. An icon is inserted on the Web page where the text area will be displayed, and the dialog shown in Figure 13.34 opens.
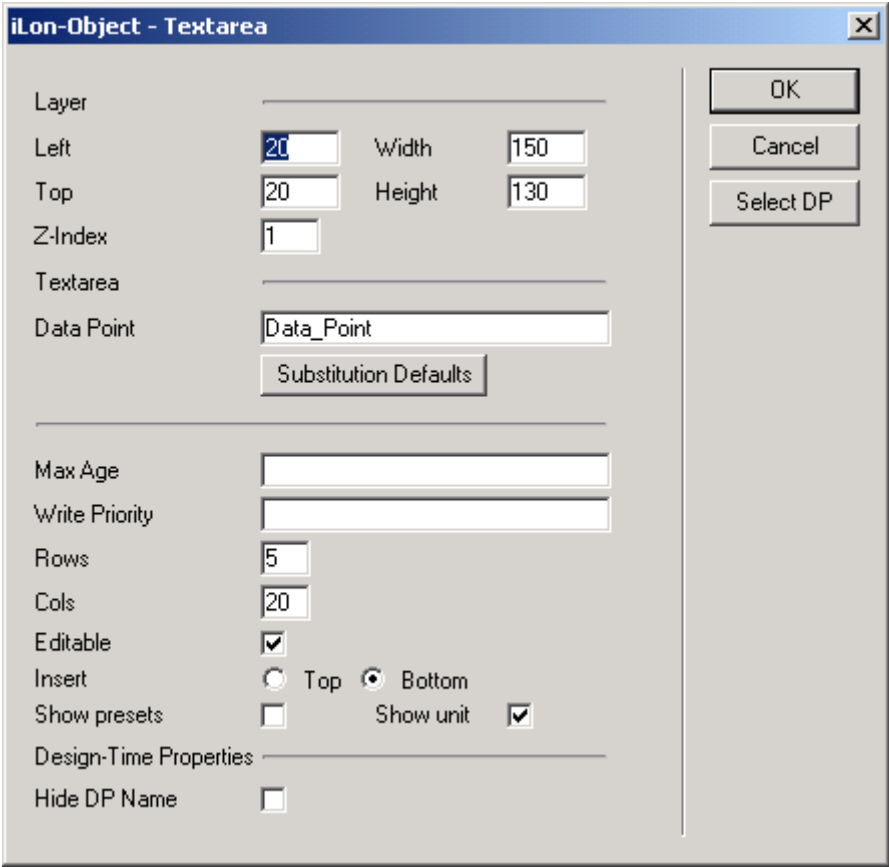
Figure 13.34 Text Area Dialog

2. Click **Select DP.** The dialog shown in Figure 13.35 opens.
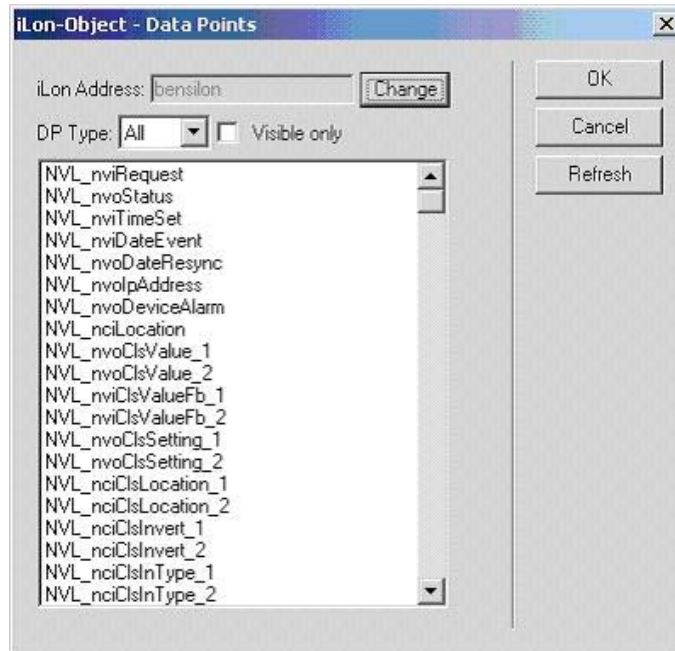
Figure 13.35 Data Points Dialog

3. Select a data point type in the **DP Type** box to view data points of a certain type (such as **NVC** or **NVL**). Leave the **DP Type** property set to **All** to view all data points. Select the **Visible Only** check box to only view data points that are currently being used by an *i*.LON 100 application.

4. Select the data point whose value you want to display from the list, and then click **OK**. This returns you to the **Text Area** dialog.

5. You will notice that the **Text Area** dialog includes a **Substitution Defaults** button. You can use this dialog to configure placeholder labels and substitution strings for the object. You can create placeholder labels (for example: "{xxx}") by changing the names of the data point referenced on this dialog to include substitution areas in the form {xxx}, where xxx represents a portion of the data point name that will be replaced with a user-specified substitution string each time the Web page containing the object is opened.

The substitution string will identify a specific data point that the object should display a value for. Each placeholder label requires a default replacement string. When you create a link to a Web page, you will specify the substitution string to use when that link is opened. As a result, the object could display information for different data points, depending on how the Web page was accessed.

You could use this feature to design a single Web page that will display information for several different groups of data points, as opposed to creating a separate Web page for each group, as long as the data point names used a common naming convention. For an extensive overview of this procedure, see *Tutorial: Using Data Point Substitution Tags* on page 238.

To create the placeholders for this object, and to specify the default substitution string for the object, click **Substitution Defaults**. This opens the dialog shown in Figure 13.36.

If you do not want to use substitution defaults, you can proceed to step 7.
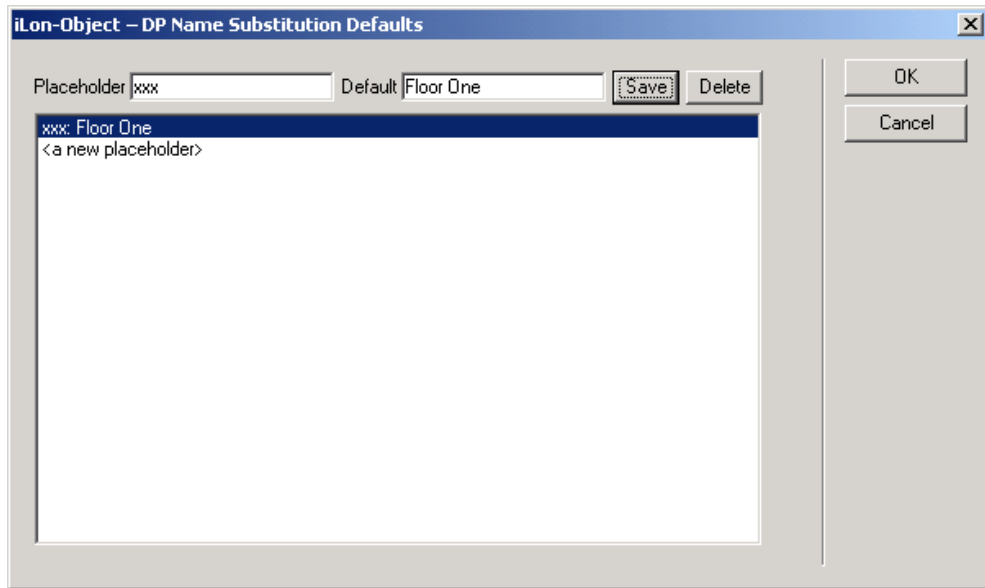
Figure 13.36 DP Name Substitution Defaults Dialog

6. Enter the part of the data point name that should serve as the placeholder in the **Placeholder** box, and enter the default substitution string you want to use in the **Default** box. Click **Save**. Click **<a new placeholder>** to specify substitutions for more placeholders, or click **OK** to return to Text Area dialog.

7. Configure the rest of the properties on the Text Area dialog. These properties determine how the value of the data point you have selected will be displayed in the text area. Table 13.4 describes these properties.

Table 13.4 *i*.LON Vision Data Point Properties

Property	Description
Layer Properties	Enter the Layer properties to determine the size and location of the object. The **Left** and **Top** properties determine the distance from the upper-left corner of the Web page, in pixels. The **Width** and the **Height** properties determine the size of the object, in pixels. The **Z-Index** property determines the object's background depth compared to objects it overlaps with, with 1 being in the back and higher values being in front. When positioning the object, remember that the Web page may also contain a menu bar, page title, and sidebar, depending on how you configured the **Start.htm** page. In this case, you should make sure that the object will not overlap the areas where the menu, page title, and sidebar will be placed.
Max Age	Enter a value in seconds in the **Max Age** box. This determines how long the *i*.LON 100 server will cache the value of this data point without refreshing the value on the Web page. Set this to 0 (the default value) to use the default value for the specific variable type. For NVE data points, you can change the default by setting the NVE Data Point Max Age property on the **Network – LONWORKS** Web page. For other variable types, it can only be changed with the SOAP/XML interface.
Write Priority	Enter the priority you want to use when updating the value of the data point with the *i*.LON Vision object in the **Write Priority** box. Enter a value between 0 and 255, where 0 represents the highest priority and 255 represents the lowest priority. The Web page must specify a priority that is higher than or equal to the last application to update the data point in order to successfully update its value.
Rows	Enter the number of rows you want in the text area. Each row will display the value of the data point after a recent update. For example, if you enter 5, the text area would display the last five values assigned to the data point would be displayed.
Cols	Enter the number of characters that should be displayed in each row. You should enter enough characters to fit the values that may be assigned to the data point. If you do not enter enough characters, the text area will include a scroll bar the user can use to see the whole value.
Editable	Select this check box if you want users to be able to edit the value of the data point with the text area. To do so, they will need to change the most recent value displayed in the text area, and then click outside the text area.
Insert	Select either **Top** or **Bottom** to determine whether the most recent update to a data point will be displayed at the top of the text area, or at the bottom.

Property	Description
Show Presets	Select the **Show Presets** check box to show the data point's preset value strings on the Web page. Or, clear the check box to display the raw value assigned to the data point on the Web page.
Show Unit	Select the **Show Unit** check box to show units associated with the data point.
Hide DP Name	Select the **Hide DP Name** check box to suppress the data point name in Contribute's editor view. This may be useful if you are creating complex layouts where data point names interfere with the page layout in the editor view.

8. Click **OK** to save the changes and add the value to the Web page. After you publish the Web page and browse to it, the text area will be displayed on the Web page wherever you placed the object.

Show Value

You can use the Show Value object to display a data point value on a Web page. You can use the Show Value tool object to create a simple monitoring application. For example, you could use it to monitor a building with multiple floors. You can create a Web page containing a table, with a row for each floor on the building. In each row, you can display the values of the data points used to monitor the conditions on that floor, including the temperature, occupancy state, and any other settings you want shown on the Web page.

To use the Show Value object, follow these steps:

1. Open a draft of a Web page, click the *i*.**LON** button, and then select **Show Value**. An icon is inserted on the Web page where the value will be displayed, and the dialog shown in Figure 13.37 opens.


Figure 13.37 Show Value Dialog

2. Click **Select DP** to open the data point selection dialog, and then select the data point whose value you want to display. Following that, you can optionally specify substitution defaults to use when displaying the value by clicking **Substitution Defaults**. For more information on these tasks, see steps 2-6 of the *Textarea* section on page 208.

3. When you have selected a data point and returned to the **Show Value** dialog, configure the Layer, Max Age, Show Presets, Show Unit, and Hide DP Name properties. These properties determine where the *i*.LON Vision object will be positioned on the Web page, and how the value of the data point will be displayed. See Table 13.4 in the *Textarea* section on page 208 for descriptions of each property.

4. Click **OK** to save the changes and add the value to the Web page. After you publish the Web page and browse to it, the text field point will be displayed on the Web page.

Textfield

You can use the Textfield object to add a text box to a Web page that can be used to write to a data point. To add this to a Web page, follow these steps:

1. Open a draft of a Web page, click the *i*.LON button, and then select **Textfield**. An icon is inserted on the Web page where the text field will be displayed, and the dialog shown in Figure 13.38 opens.
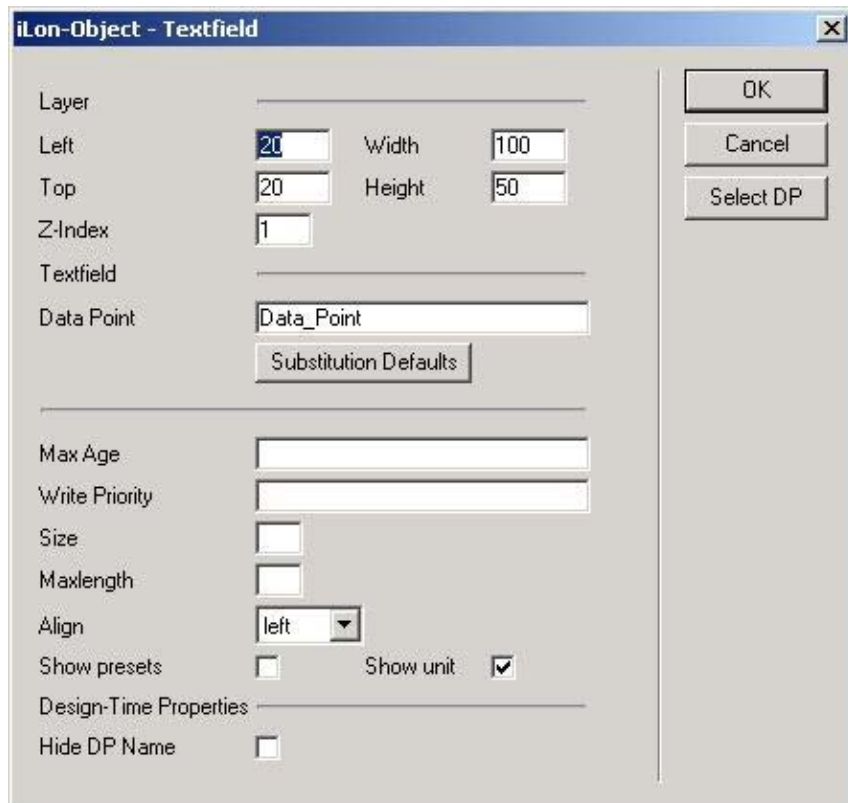
Figure 13.38 Textfield Dialog

2. Click **Select DP** to open the data point selection dialog, and then select the data point whose value you want to display. Following that, you can optionally specify substitution defaults to use when displaying the value by clicking **Substitution Defaults**. For more information on these tasks,

see steps 2-6 of the *Textarea* section on page 208.

3. When you have selected a data point and returned to the **Textfield** dialog, configure the Layer, Max Age, Write Priority, Show Presets, Show Unit, and Hide DP Name properties. These properties determine where the *i*.LON Vision object will be positioned on the Web page, and how the value of the data point will be displayed. See Table 13.4 in the *Textarea* section on page 208 for descriptions of each property.

4. Configure the **Size, Maxlength,** and **Align** properties to specify how the value will be formatted and displayed on the Web page. Table 13.5 describes these properties:

Table 13.5 Textfield Properties

Property	Description
Size	Enter the size of the text field, in pixels.
Maxlength	Enter the maximum number of characters the text field can display. You should make sure this is large enough to display the values that could be assigned to the data point you have selected.
Align	Select **Left** or **Right** to determine how the value of the data point will be aligned in the text field.

5. Click **OK** to save the changes and add the value to the Web page. After you publish the Web page and browse to it, the text field will be displayed on the Web page wherever you placed the object.

Select Box

You can use the **Select Box** object to add a select box to the Web page that can be used to select a value for a data point. The select box will list the preset values for the data point – you simply need to select the preset you want to assign the data point from the list to write that value to the data point. To add the **Select Box** object to your Web page, follow these steps:

1. Open a draft of a Web page, click the *i*.LON button, and then select **Select Box**. An icon is inserted on the Web page where the select box will be displayed, and the dialog shown in Figure 13.39 opens.

Figure 13.39 Select Box Dialog

2. Click **Select DP** to open the data point selection dialog, and then select the data point whose value you want to write to with the check box. Be sure to select a data point that has preset values. Following that, you can optionally specify substitution defaults to use by clicking **Substitution Defaults**. For more information on these tasks, see steps 2-6 of the *Textarea* section on page 208.

3. When you have selected a data point and returned to the **Select Box** dialog, configure the Layer, Max Age, Write Priority, and Hide DP Name properties. See Table 13.4 in the *Textarea* section on page 208 for descriptions of each property.

4. Configure the Size property to determine the size of the select box. Enter a value in pixels.

5. Click **OK** to save the changes and add the value to the Web page. After you publish the Web page and browse to it, the value of the data point will be displayed on the Web page wherever you placed the object.

Combo Box

You can use the **Combo Box** object to add a combo box to a Web page that can be used to select a new value for a data point. The combo box will list all the preset values defined for the data point, and the user can select one of the presets to assign the data point the value associated with the preset. This is similar to the **Select Box** object described in the previous section. However, with the **Combo Box**, the user can also manually enter a value in the combo box to write to the data point's value. To add the **Combo Box** object to a Web page, follow these steps:

1. Open a draft of a Web page, click the *i*.LON button, and then select **Combo Box**. An icon is inserted on the Web page where the combo box will be displayed, and the dialog shown in Figure 13.40 opens.
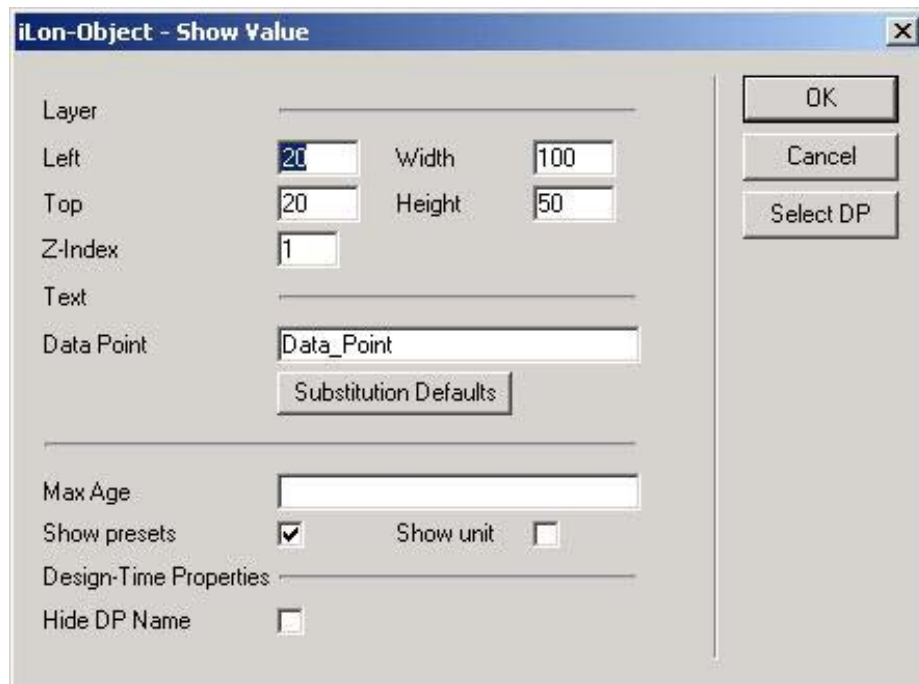
Figure 13.40 Combo Box Dialog

2. Click **Select DP** to open the data point selection dialog, and then select the data point whose value you want to display. Be sure to select a data point that has preset values. Following that, you can optionally specify substitution defaults to use when displaying the value by clicking **Substitution Defaults**. For more information on these tasks, see steps 2-6 of the *Textarea* section on page 208.

3. When you have selected a data point and returned to the **Combo Box** dialog, configure the Layer, Max Age, Write Priority, Show Presets, Show Unit, and Hide DP Name properties. These properties determine where the *i*.LON Vision object will be positioned on the Web page, and how the value of the data point will be displayed. See Table 13.4 in the *Textarea* section on page 208 for descriptions of each property.

4. Configure the Size property to determine the size of the combo box. Enter a value, in pixels.

5. Click **OK** to save the changes and add the value to the Web page. After you publish the Web page and browse to it, the value of the data point will be displayed on the Web page wherever you placed the object.

Image Swapper

You can use the **Image Swapper** object to add a dynamic image representing the value of a data point to the Web page. When you add the object to the Web page, you will select a data point whose value is to be represented by the object. You will then specify multiple images, each of which applies to one of the data point's preset values. When the data point is set to that value, that image will be displayed on the Web page. You can optionally configure the **Image Swapper** object so that a user can click the image on the Web page to assign the data point a new value.

To add the **Image Swapper** object to a Web page, follow these steps:

1. Open a draft of a Web page, click the *i*LON button, and then select **Image Swapper**. An icon is inserted on the Web page where the images will be displayed, and the dialog shown in Figure 13.41 opens.

Figure 13.41 Image Swapper Dialog

2. Configure the Layer properties to determine where the images will be placed on the Web page. See Table 13.4 in the *Textarea* section on page 208 for descriptions of the Layer properties.

3. Click **Select DP** to open the data point selection dialog, and then select the data point whose value you want to display. Be sure to select a data point that has preset values defined. Following that, you can optionally specify substitution defaults to use when displaying the value by clicking **Substitution Defaults**. For more information on these tasks, see steps 2-6 of the *Textarea* section on page 208.

4. When you have selected a data point and returned to the **Image Swapper** dialog, the preset values defined for the data point will be listed in the Images List at the bottom of the dialog, as shown in Figure 13.42.
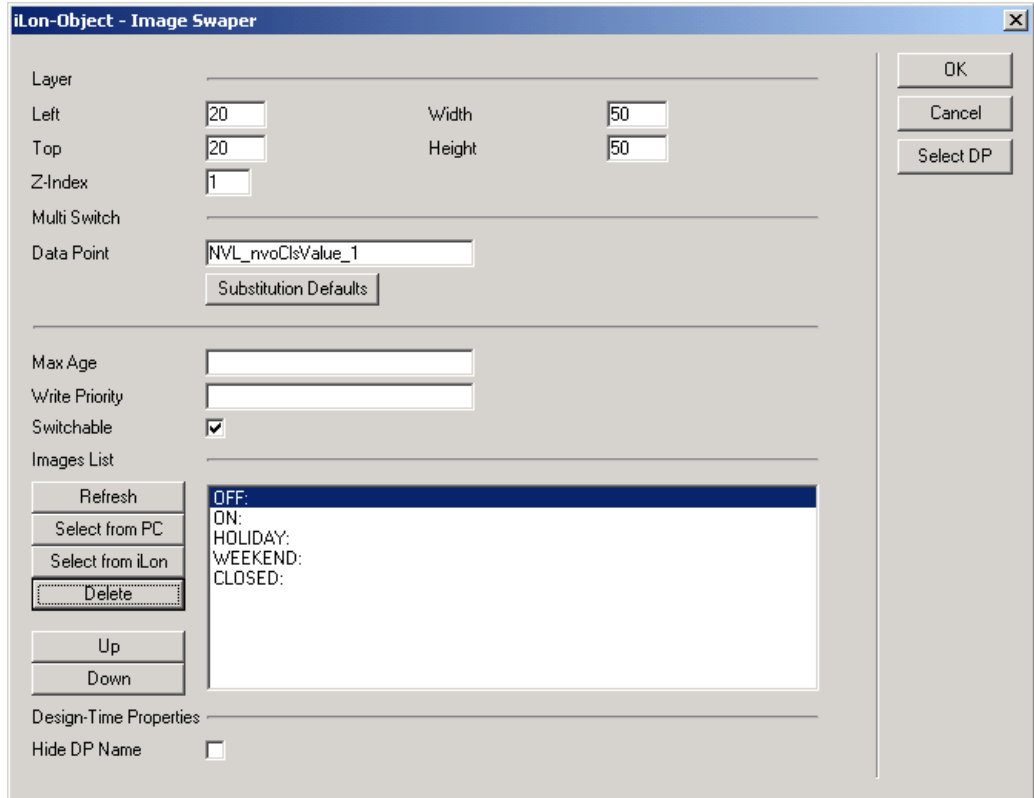
Figure 13.42 Data Point Presets

5. Specify the image you want to display for each preset. To do so, select the preset in the list, and then click **Select from PC** to choose an image that is stored on your computer, or click **Select from iLON** to choose an image that is stored on your *i*.LON 100 server. Either choice opens a dialog you can use to browse the contents of your computer (or your *i*.LON 100 server) and select an image.

   NOTE: The **Images** folder in the root directory of the *i*.LON 100 server contains many images you could use, as does the **iLonVision\graphics** directory in the LONWORKS folder on the PC running the *i*.LON Vision software.

   If you have selected an image for a preset and decide you want to change it, or that you do not want an image to be displayed for that preset, select the preset in the list and click **Delete**. This does not delete the preset – it only disassociates the image you previously selected from the preset. You can then click **Select from PC** or **Select from iLON** to associate a new image with the preset.

   You can click **Refresh** to refresh the list of presets that are displayed at any time.

6. You can optionally configure the **Image Swapper** object so that a user can click the image on the Web page to change the data point's value. To enable this feature, select the **Switchable** check box, and then specify the priority that should be used when changing the data point's value with the image swapper by setting the Write Priority property. See Table 13.4 in the *Textarea* section on page 208 for a description of the Write Priority property.

The value the data point will be updated to when the image is clicked depends on the order that the presets are listed in on the Image Swapper dialog. *i*.LON Vision will proceed through the list from top to bottom each time the image is clicked.

For example, consider the image swapper created in Figure 13.42. If the data point is set to OFF and a user clicks the image, it will be set to ON, the next value in the list. If the user clicks it again, it will be set to HOLIDAY. If the user clicks it again, it will be set to WEKEND, and then CLOSED, and so on. When it reaches the bottom of the list, *i*.LON Vision will start over from the top.

You can select a preset in the list and click either **Up** or **Down** to change the order of the presets.

7. Configure the Max Age and Hide DP Name properties to determine how often *i*.LON Vision will poll the *i*.LON 100 server for an updated value, and whether or not the data point's name will be displayed with the image. See Table 13.4 in the *Textarea* section on page 208 for more information on these properties.

8. Click **OK** to save the changes and add the value to the Web page. After you publish the Web page and browse to it, the value of the data point will be displayed on the Web page wherever you placed the object.

Radio Buttons

You can use the **Radio Buttons** object to add radio buttons to the Web page that a user can use to assign a value to a data point. Once this object is added to a Web page, the user will see a radio button for each preset value defined for the data point. The user will be able to select a radio button to assign the data point that value.

To add the **Radio Buttons** object to a Web page, follow these steps:

1. Open a draft of a Web page, click the *i*.LON button, and then select **Radio Buttons**. An icon is inserted on the Web page where the radio buttons will be displayed, and the dialog shown in Figure 13.43 opens.
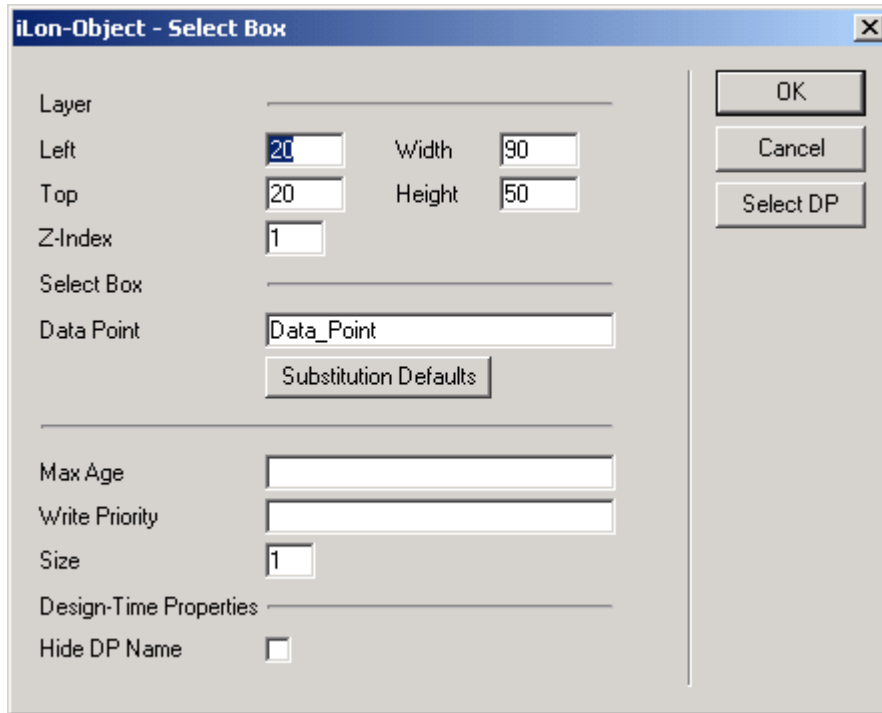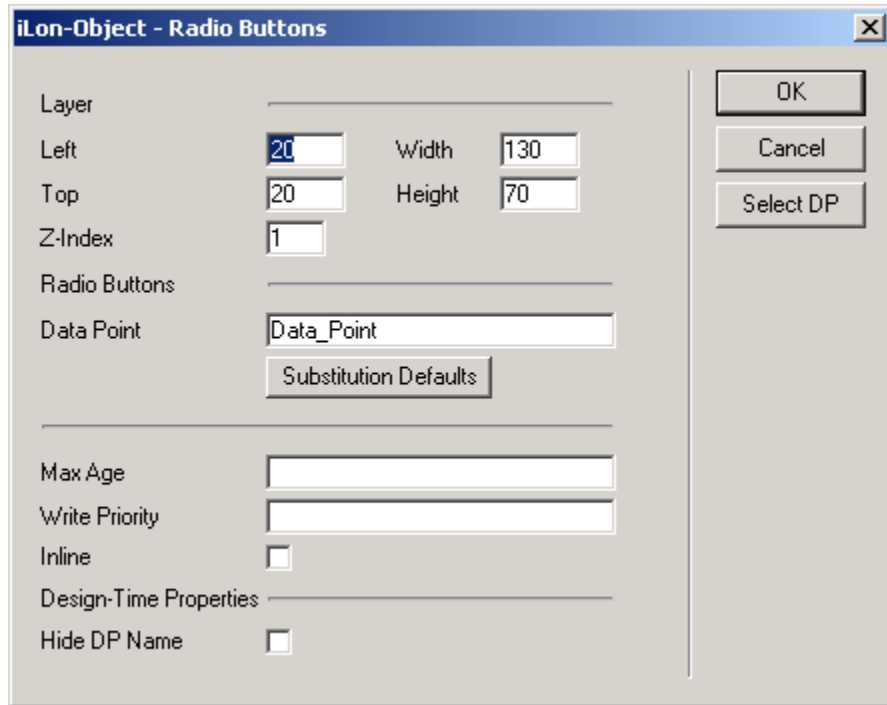
Figure 13.43 Radio Buttons Dialog

2. Click **Select DP** to open the data point selection dialog, and then select the data point whose value you want to update with the radio buttons. Be sure to select a data point that has preset values. Following that, you can optionally specify substitution defaults to use when displaying the value by clicking **Substitution Defaults**. For more information on these tasks, see steps 2-6 of the *Textarea* section on page 208.

3. When you have selected a data point and returned to the Radio Buttons dialog, configure the Layer, Max Age, Write Priority, and Hide DP Name properties. See Table 13.4 in the *Textarea* section on page 208 for descriptions of each property.

4. Select the Inline check box if you want the radio buttons to be displayed horizontally, side-by-side. Leave the Inline check box cleared if you want the radio buttons to be displayed one on top of the next.

5. Click **OK** to save the changes and add the value to the Web page. After you publish the Web page and browse to it, the value of the data point will be displayed on the Web page wherever you placed the object.

Check Box

Use the **Check Box** object to add a check box to the Web page a user can select or clear to assign a data point an **ON** or **OFF** value (or switch between any other two preset values you specify). To add the **Check Box** object to your Web page, follow these steps:

1. Open a draft of a Web page, click the *i*.LON button, and then select **Check Box**. An icon is inserted on the Web page where the check box will be displayed, and the dialog shown in Figure 13.44 opens.
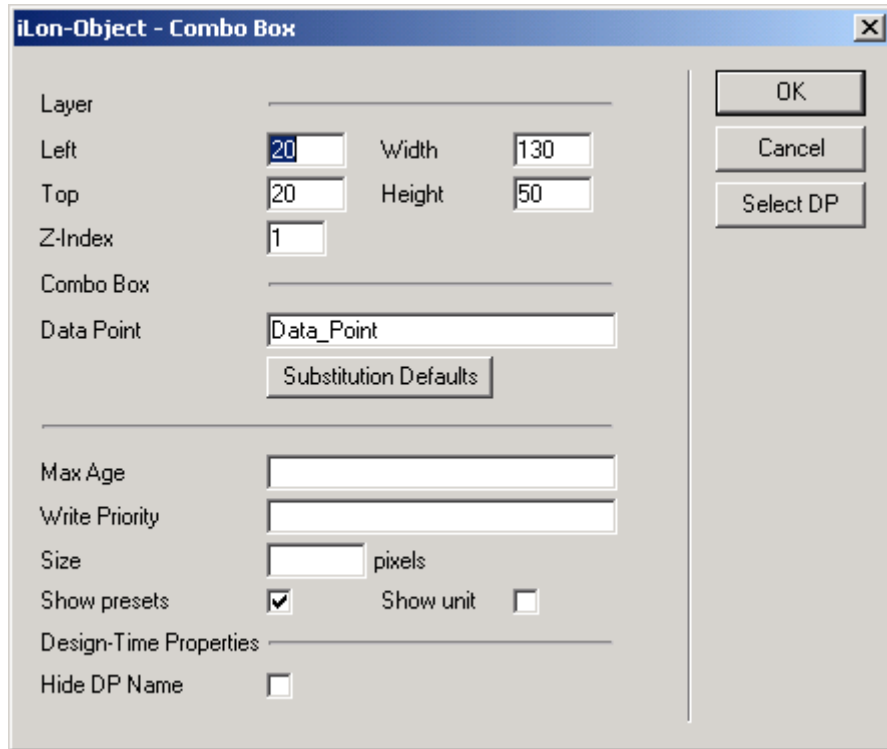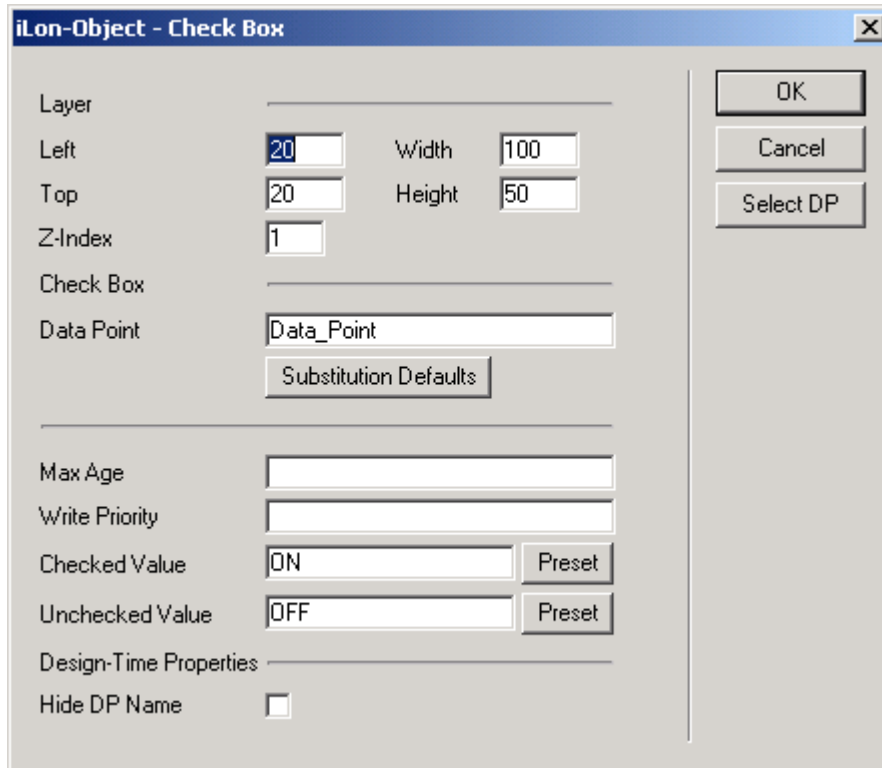
Figure 13.44 Check Box Dialog

2. Click **Select DP** to open the data point selection dialog, and then select the data point whose value you want to set with the check box. Be sure to select a data point that has preset values defined. Following that, you can optionally specify substitution defaults to use by clicking **Substitution Defaults**. For more information on these tasks, see steps 2-6 of the *Textarea* section on page 208.

3. When you have selected a data point and returned to the **Check Box** dialog, configure the Layer, Max Age, Write Priority, and Hide DP Name properties. See Table 13.4 in the *Textarea* section on page 208 for descriptions of each property.

4. Use the **Checked Value** and **Unchecked Value** fields to determine the values that will be assigned to the data point when a user selects or clears the check box. By default, the data point will be assigned the value **ON** when the check box is selected (**Checked Value**), and **OFF** when the check box is not selected (**Unchecked Value**).

   To change these settings, click the appropriate **Preset** button. This opens the Data Point Presets dialog, which lists all of the preset values that have been created for the data point. Select one from the list, and click **OK** to use that preset value. This returns you to the **Check Box** dialog.

5. Click **OK** to save the changes and add the value to the Web page. After you publish the Web page and browse to it, the value of the data point will be displayed on the Web page wherever you placed the object.

Reset Priority

If a data point is locked because its value was manually overridden by an application using a higher priority than yours, you can use the **Reset Priority**

object to reset the data point's priority, so that you can access the data point. To add the **Reset Priority** object to your Web page, follow these steps:

1. Open a draft of a Web page, click the *i*.LON button, and then select **Reset Priority**. An icon is inserted on the Web page where the check box will be displayed, and the dialog shown in Figure 13.45 opens.
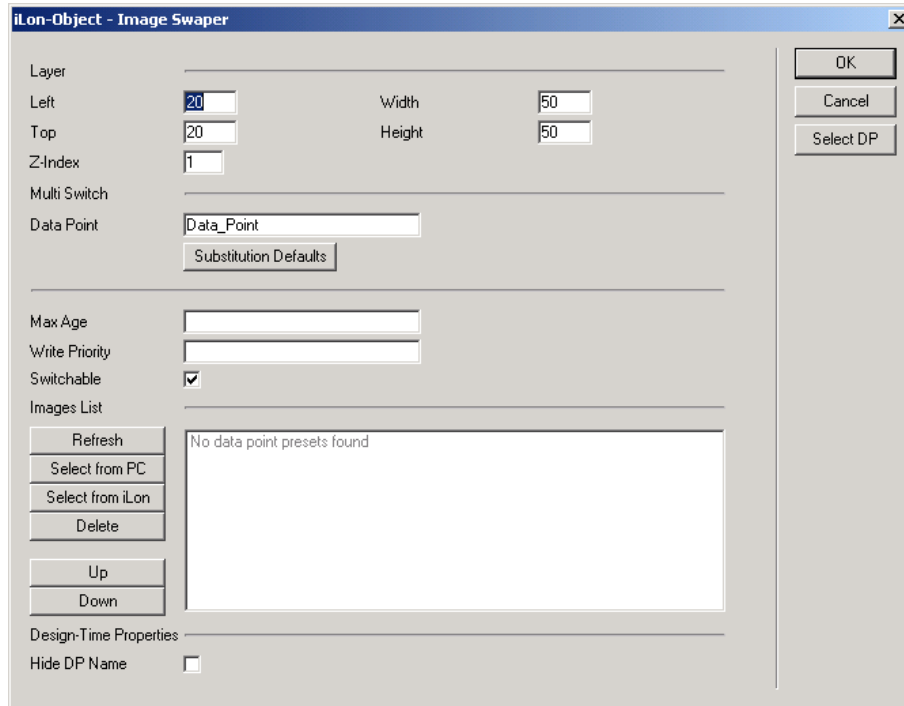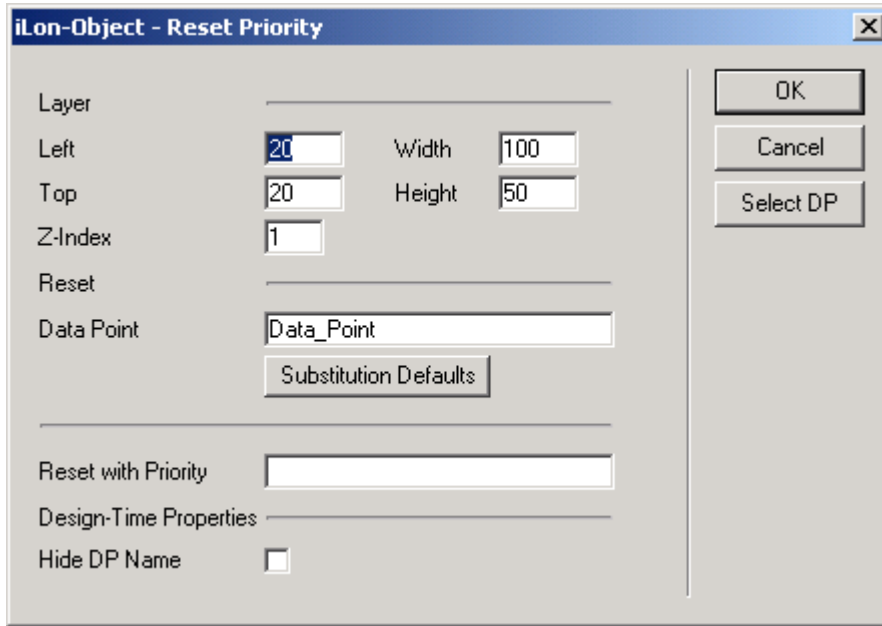

Figure 13.45 Reset Priority Dialog

2. Click **Select DP** to open the data point selection dialog, and then select the data point you want to reset with the check box. Following that, you can optionally specify substitution defaults to use by clicking **Substitution Defaults**. For more information on these tasks, see steps 2-6 of the *Textarea* section on page 208.

3. When you have selected a data point and returned to the **Reset Priority** dialog, configure the Layer and Hide DP Name properties. See Table 13.4 in the *Textarea* section on page 208 for descriptions of each property.

4. Specify the priority level the Web page will use when resetting the data point. Enter a value between 0 (high) and 255 (low). This must be a priority level that is higher than or equal to the priority level used by the last application to write to the data point to successfully reset the data point.

5. Click **OK** to save the changes and add the object to the Web page. This object is displayed as a check box with the label **Manual Override**. The check box is automatically selected when the data point is manually overridden by any instance. Clearing the check box resets the priority and returns control to the instance with the highest priority. For this to happen, the value of the **Reset With Priority** field must be greater than the priority used to manually override the value in the first place.

   For more details on how to use priority with your Web pages, see the next section, *Data Point Status and Priority Icons* on page 223.

Data Point Status and Priority Icons

Most of the *i*.LON objects described in the previous section display some sort of information about a data point you have specified, such as the value. You should be aware that the status and priority level of the data point each *i*.LON object represents will be indicated by icons appearing on the left side of the object on the Web page.

Table 13.6 describes these icons. The remainder of this section provides more details on how you can use the icons with your custom Web pages.

Table 13.6 Data Point Status and Priority Icons

Symbol	Status	Explanation
	Configuration Bug	Error in the definition of the data point name. For example, the data point may not exist.
	Offline	The data point is offline. This could occur if a heartbeat has been defined for the data point in question, or a data point write message failed.
	Warning	The data point is in warning status. This could occur if an Alarm Generator has been created to monitor the data point.
	Alarm	The data point is in an alarm condition. This could occur if an Alarm Generator has been created to monitor the data point.
	Manual Override	The user has manually overridden the data point and is blocking other applications from accessing it. In order to return access to the data point to instances with lower priority, the user has to click the green hand.
	Manual Locked	The data point has been manually overridden by another application with a higher priority than that defined for this object. A user with priority that is equal to or higher than the priority that was used to override the data point has to reset the priority before values can be written to that data point again.

Status Icons

The Offline, Warning and Alarm icons are used to indicate the current status of the data point. The Offline icon indicates that the *i*.LON 100 server is having problems communicating with the data point. This could happen if the *i*.LON 100 server failed to read or write the value of the data point, or if a heartbeat was defined for the respective data point, and the heartbeat period elapsed before the value of the data point was reported over the network. If a Web connection defined on the *i*.LON 100 server fails, the source data point is set to offline.

The Warning and Alarm conditions only appear if an Alarm Generator has been created to monitor the respective data point. If a data point is in a warning condition or an alarm condition, its status will be displayed as a yellow or a red bell. You can define the conditions that cause your data points to be updated to

warning or alarm conditions when you create your Alarm Generators, as described in Chapter 5, *Alarming.*

It is not necessary to define a SNVT_alarm or SNVT_alarm_2 output data point for each Alarm Generator in order for these icons to work. If an alarm is triggered, the Alarm Generator automatically sets the status of the input data point to the respective alarm condition, and this status will be displayed on the Web pages via the Warning and Alarm icons.

Priority Icons

Every application that writes to a data point on an *i*.LON 100 server must specify a priority value between 0 (highest priority) and 255 (default, lowest priority). This priority determines whether the application will be able to write to the data point. If the write operation has an equal or higher priority value than the priority value currently assigned to the data point, then the value of the data point will be updated successfully.

The priority currently assigned to the data point is the priority that was used the last time the data point was updated. Therefore, when you successfully update a data point value, you also update the priority assigned to the data point. In *i*.LON Vision, this is indicated when the Manual Override icon appears next to the respective *i*.LON Vision object. As soon as the Manual Override icon appears, no application with a lower priority setting than that used by your Web page will be permitted to write to the value of the data point. An *i*.LON Vision Web page using a lower priority would display the Manual Locked icon to indicate that it cannot currently write to the value of the data point.

In order to return write access to applications using lower priority, a user on a Web page that is using a priority level equal to or higher than the last application to write to the data point has to click on the green hand in the Manual Override icon. Alternatively, you can use the Reset Priority *i*.LON Vision object to provide users on another Web page with a way to reset the data point's priority. In either case, the *i*.LON 100 server will contact all applications that have registered with the data point in question (e.g. Event Schedulers), and the data point's priority level will be restored to the lowest level, when it is reset.

The concept of priorities exists only on the *i*.LON 100 server. Modbus, LONWORKS and M-Bus devices do not recognize priority levels. If you need to implement priorities for an external device, the different applications have to converge on a single data point on the *i*.LON 100 server which is bound to the external device.

Figure 13.46 demonstrates the use of priority with *i*.LON Vision. Imagine a conference room where someone in the room is using a Web interface to control the lighting (first row in Figure 13.46). A caretaker, who is responsible for all the conference rooms in the building, is using a different Web interface where the lighting for all the conference rooms in the building can be controlled centrally (second row in Figure 13.46). A technician, who needs to be sure that nobody accidentally switches on the electricity while he or she is at work, is using his own high-priority Web interface. The sequence of priority level changes that could occur are depicted and described in Figure 13.46.

At first, all pages have access to the data point, as shown in the left column of Figure 13.46. If the technician issues a high-priority (230) write operation to turn the lighting in a room off, the data point is manually overridden, and the caretaker and the conference room user will no longer have access to the lighting (middle column in Figure 13.46). The conference room user and caretaker will be informed of the fact that they can no longer adjust the lighting by the red hand in

the Manual Locked icon besides their now disabled control object on the Web page. This exclusion of low priority users in turn is signified to the technician by the green hand in the Manual Override icon on his Web page. The technician can release the data point to low level control by clicking on the green hand. After this, the other users can write to the data point, as shown in the right column of Figure 13.46.
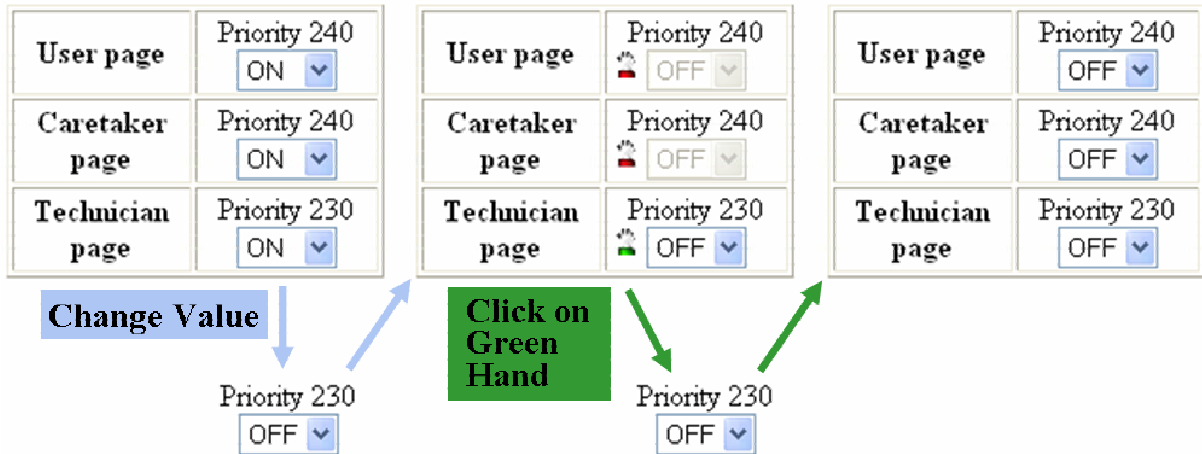
Figure 13.46 Priority Settings

When To Use Priority Levels

This section describes two scenarios involving *i*.LON Vision Web pages. The first is an example where it is not necessary to use priority levels. The second is an example where the manual override feature would be useful.

Scenario 1: No Priority Settings

In this scenario, an Event Scheduler controls a light in a garden. There is also a hardware switch outside the house connected to the digital input of an *i*.LON 100 server, and a Web page switch that can also be used to control the light.
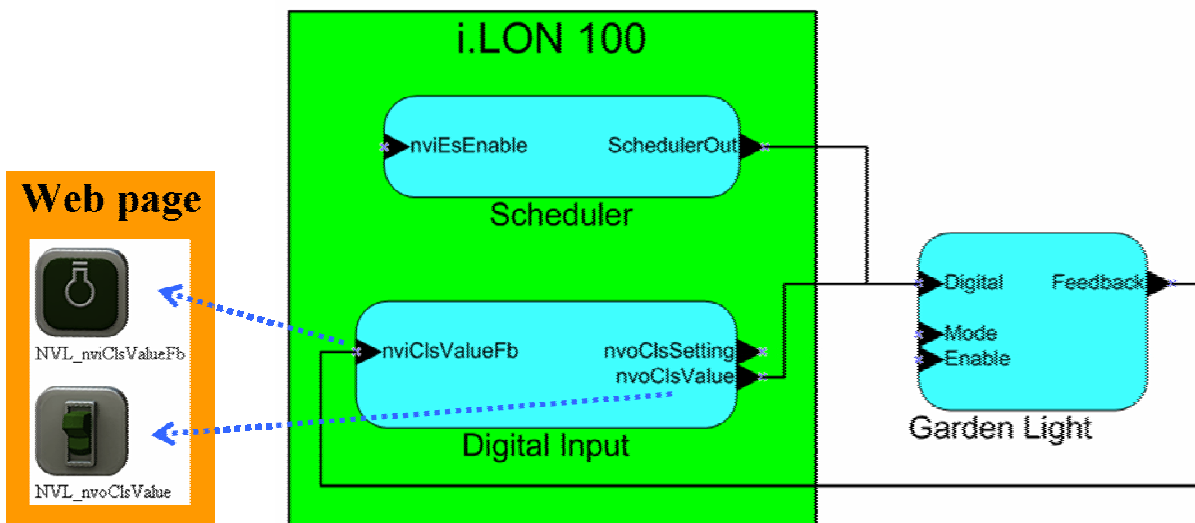
Figure 13.47 Example Scenario 1

This scenario does not require priorities. If a simple Event Scheduler is employed with only one priority level and no schedule exceptions, all entities should have direct fan-in connections to the destination device, or they should converge at the same network variable that is bound to the light being controlled. If a more complex Event Scheduler is employed that uses different priorities, it should use a private network variable to control the light. Since priorities are not implemented in the external device, a fan-in connection from different network variables ensures that user requests are not blocked by high priority scheduler requests. The different entities have equal access to the light, and can all update the data point at any time.

Use Case 2: Manual Override

In the scenario described in the previous section, you want to add a Web page switch that can override the hardware switch. If you turn on the light via that switch, the light will stay on no matter how many people press the hardware switch, or the lower priority Web page switch.

In this scenario, you could use priorities. The additional Web page switch could have an identical user interface to the one introduced in the previous section, but will be assigned a higher priority. As soon as you toggle the high-priority switch and turn the light on, the Manual Override icon will appear on the Web page. A green hand will be displayed beside the icon, and the lower priority switch and the hardware switch will be disabled until someone using the higher-priority Web page clicks on the green hand. An Event Scheduler could still overwrite the high priority switch if it uses different data points to access the switch, as shown in Figure 13.48
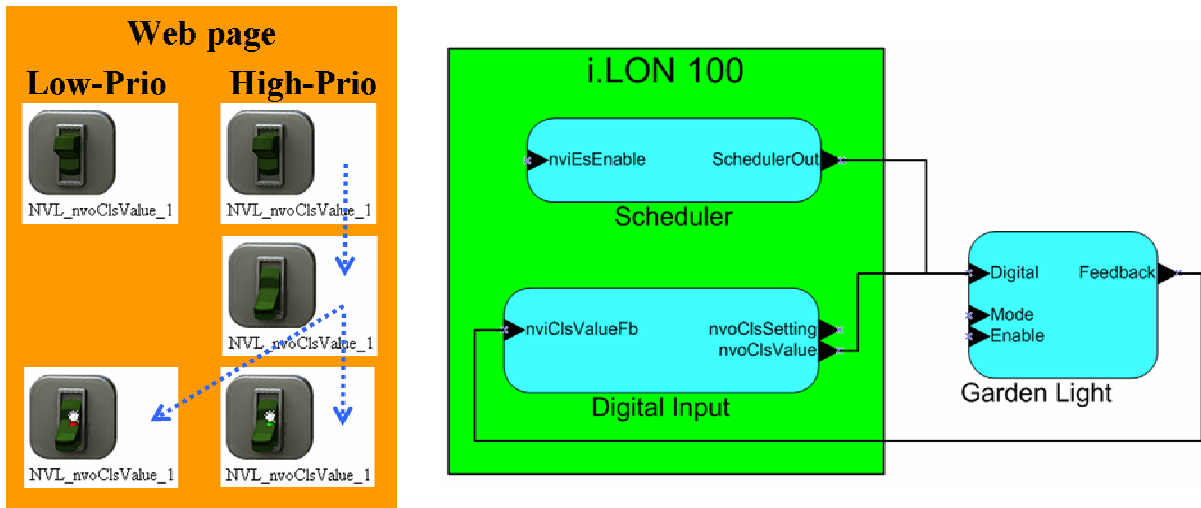
Figure 13.48 Manual Override Scenario

If you want the Event Scheduler to be subordinate to the high-priority switch as well, they have to use the same data point to access the switch, as shown in Figure 13.49. This is also true for external input devices. If an external hardware switch is to be integrated into the given setup, it has to be connected to the shared data point on the *i*.LON 100 server for priorities to take effect. If it is directly connected to the garden light, it can toggle the light regardless of prior high-priority overrides.
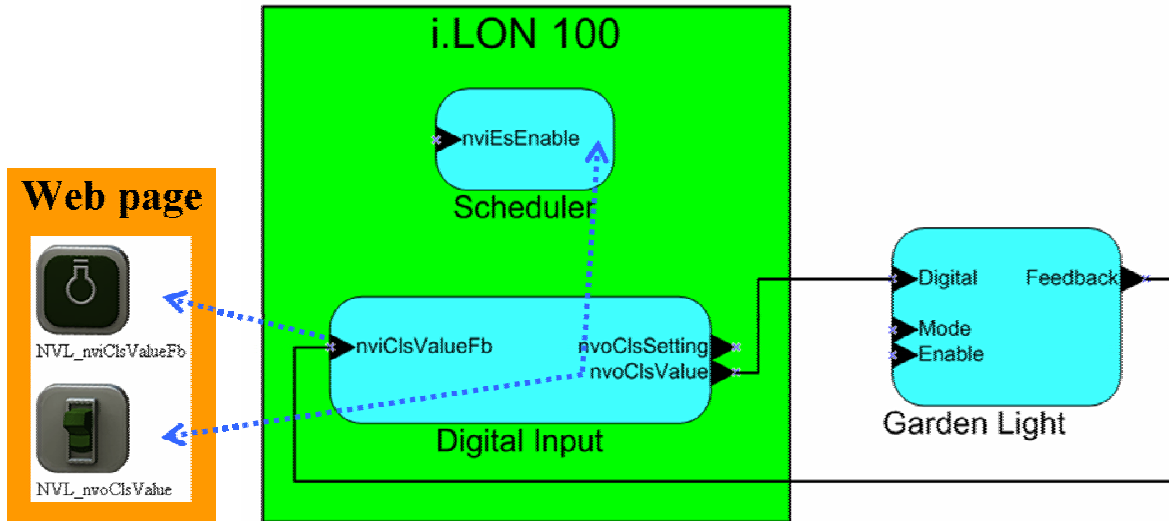
Figure 13.49 Manual Override

Copying and Pasting i.LON Vision Objects

Your Web page design may include several instances of the same object. It may be simpler to copy and paste the objects that appear more than once, as opposed to re-inserting all of them one at a time. With the cut-and-paste sequences described in this section, you can detach a layer or object from its current layer and attach it to another layer. You may also find these techniques useful when moving objects on your Web page.
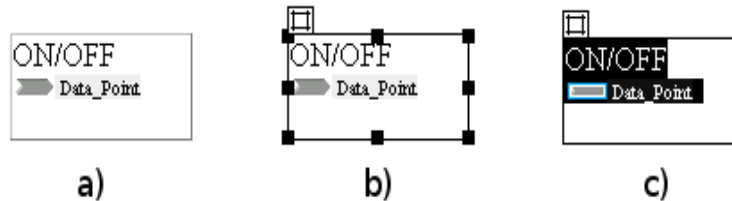
Figure 13.50 *i*.LON Vision Layers

When copying and pasting *i*.LON Vision objects and layers as described in the following sections, you need to make sure you have the correct object or layer selected on the Web page. Figure 13.50 demonstrates the different selection states of a Show Value object. In state **a)** nothing is selected. In state **b)**, the frame is selected. In state **c)**, the object is selected.

Copying and Pasting Layers

To cut or copy a layer and paste it (and the objects it contains) into another part of the Web page, follow these steps:

1. Select the frame of the object you want to change.
2. Press Ctrl-X to cut the object, or Ctrl-C to copy it.
3. Select the frame you want the object to be attached to (or the main page) and press Ctrl-V.

If you cut the layer from its original position, you should be aware that the pasted layer retains the relative coordinates it was assigned before, but they now refer to the upper left corner of the new layer it has been added to. If the

coordinates of the pasted object are outside the editor window when they are computed, you will not be able to see the object. To resolve this, either you undo the change and displace the object to a different position before you cut and paste the object, or displace the new frame until you can see the object.

If you copy the layer from its original position, the created object may appear to be invisible because it has the same coordinates as the source object. This means that the new (pasted) layer is directly on top of or under the original layer. Displacing the object on top separates both objects. Select and move the original layer and now you will see the pasted layer.

NOTE: After attaching multiple *i*.LON Vision objects with their accompanying layers to a new layer and bringing that layer to the background, the subordinate elements are still in the foreground. To compensate for this, you have to adjust the Z-Index of every layer separately. You can move and resize the object after adding it to a Web page by clicking it so that the layer object around it is selected. You can then move or re-size the object.

Copying and Pasting Objects

In rare cases the layers accompanying every inserted *i*.LON Vision object can be obstructive, e.g. if you want to arrange multiple objects in a table. You can embed i.LON Vision objects directly into a table and remove the accompanying layer afterwards by following the procedure below.

1. Select the object you want to copy.
2. Press Ctrl-X.
3. Select the cell of the table you want to insert the object in.
4. Press Ctrl-V.
5. Select the layer of the object which was left behind.
6. Press Ctrl-X.

Contribute Image Menu Graphics

The Contribute **Image** Menu allows you to place graphic objects on your web pages. These are not *i*.LON Vision objects. When you add these images to your Web page, they will always be added to the Web page's main layer. In most cases, you will want to move the graphics somewhere else on your page. To move these objects, you need to add an *i*.LON Vision Layer object, and then cut and paste the graphics to this new layer. To do so, follow these steps:

1. Add a graphic to your Web page with the **Image** menu.
2. Click a blank place on the main Web page.
3. Add a Layer *i*.LON Vision object to your web page.
4. Resize the Layer object to make it smaller, and move it somewhere else on the page.
5. Cut the graphic by selecting it and pressing CTL-X, and then copy it to the new layer by selecting the layer and pressing CTL-V.

Step Five: Defining the Default Page for Your Web Site

Once you have created your custom Web pages, you should choose the default page for your Web site. You can do so by modifying the **Start.htm** page. To do so, follow these steps:

1. Start Macromedia Contribute, and then click *i*.**LON 100 Internet Server** under **Begin Editing My Websites** (or enter the *i*.LON 100 server's IP address in the Address bar if you are already running Macromedia Contribute). This opens the connection to the *i*.LON 100 server.

2. Click **Choose**. This opens the **Choose File on Website** dialog.
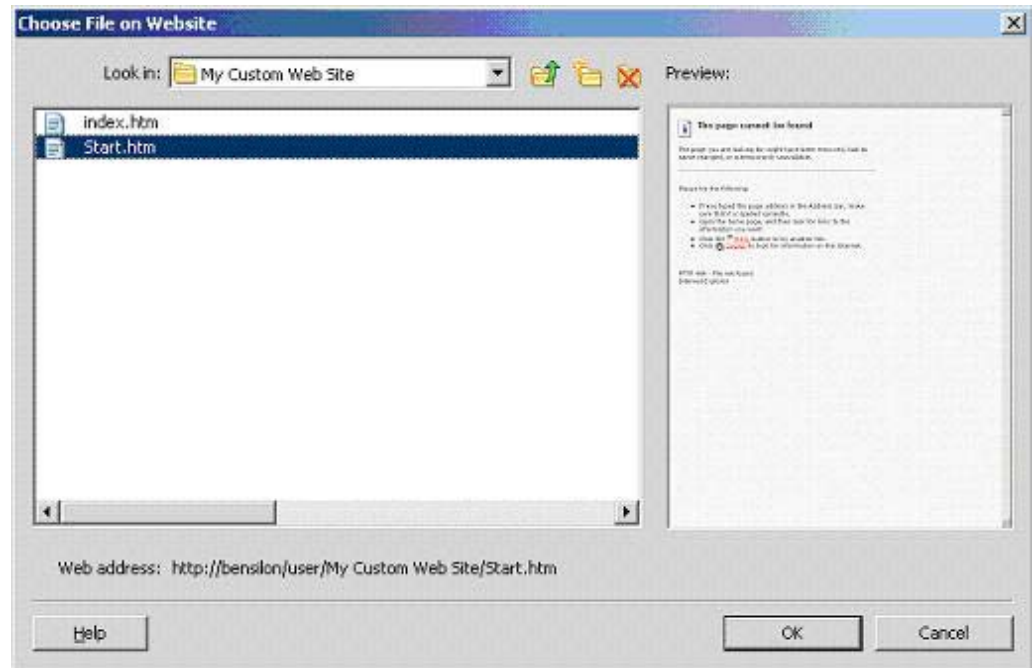
Figure 13.51 Choose File on Website Dialog

Browse to the directory you created for your custom Web pages, select **Start.htm**, and then click **OK** to open the **Start.htm** page shown in Figure 13.52.
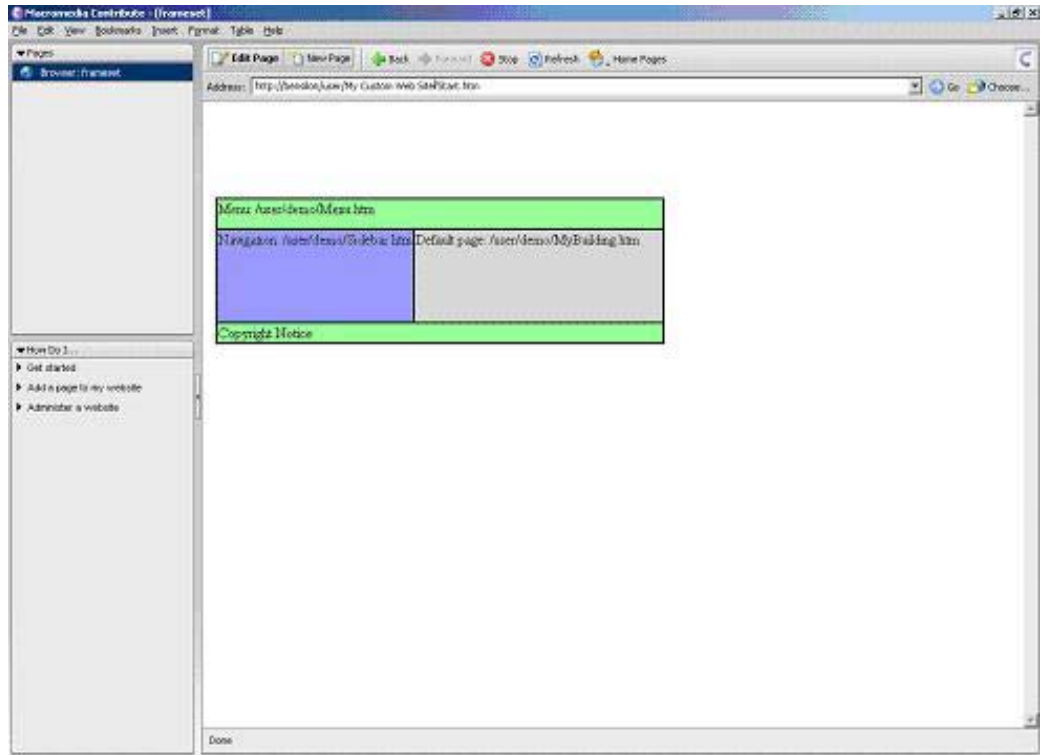
Figure 13.52 Start.htm Page

3. Click **Edit Page** to begin editing the **Start.htm** page. Then, select the Frameset Properties object, and click **Properties**. This opens the dialog shown in Figure 13.53.
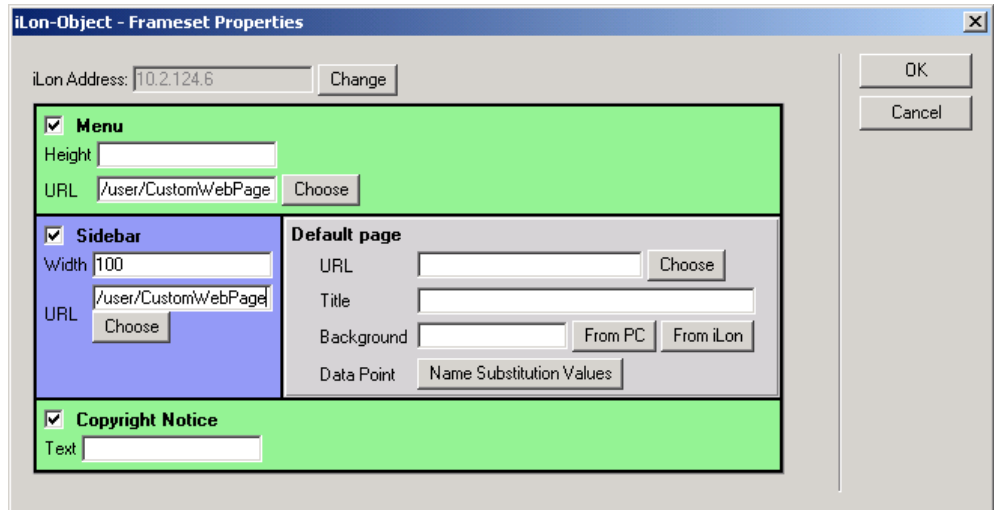
Figure 13.53 Frameset Properties Dialog

4. Click the **Choose** button in the **Default Page** area to select the Web page that will open when a user logs into the Demo area. Browse to the Web page in your directory that you want to use as the default page, and then click **OK**.

   Configure the rest of the fields in the **Default Page** area to specify how the default Web page will be opened:

   - **Title**. The name of the Web page.

- **Background**. Select **From PC** or **From iLON** to select the background image that will be applied to the Web page.

- **Name Substitution Values**. You can optionally specify the substitution defaults to use when displaying data point values on the default Web page by clicking **Name Substitution Values**. See the section on *i*.LON Vision objects for more information on substitution defaults.

5. Click **Publish** to publish your change to the *i*.LON 100 server. Users will now be directed to this page when they enter the custom area of your Web site.

6. Next, you can optionally add a menu and sidebar to your Web pages, as described in the following sections.

Step Six: Creating a Menu For Your Web Pages

You can use the **Menu.htm** page to set up a menu for the custom area of your *i*.LON 100 Web site that is similar to the menu used in the standard and Demo *i*.LON 100 Web pages.

Remember that in order for you to create the menu successfully, you must select the **Menu** check box on the Frameset Properties dialog from the **Start.htm** page, as described in the *Step Two: Create a User Directory and the Start.htm File* section on page 195.

To create a menu, follow these steps:

1. Create a **Menu.htm** page in your custom directory. Follow the same procedure used to create the **Start.htm** page (described in the *Step Two: Create a User Directory and the Start.htm File* section on page 195) to do so. Name the page **Menu**, and name the file **Menu.htm**, and be sure to save the file in the same directory as the **Start.htm** file.

2. After you've created and published the Menu.htm file, click **Choose** to open the **Choose File on Website** dialog shown in Figure 13.51.

3. Browse to your custom directory, select **Menu.htm**, and then click **OK** to open the **Menu.htm** page.

4. Click **Edit Page**. This opens another page you can use to begin editing the **Menu.htm** file.

5. Click the *i*.**LON** button and then select **Menu Edit**.

6. Click the menu object and then click **Properties** to begin configuring the menu. The dialog shown in Figure 13.54 opens.
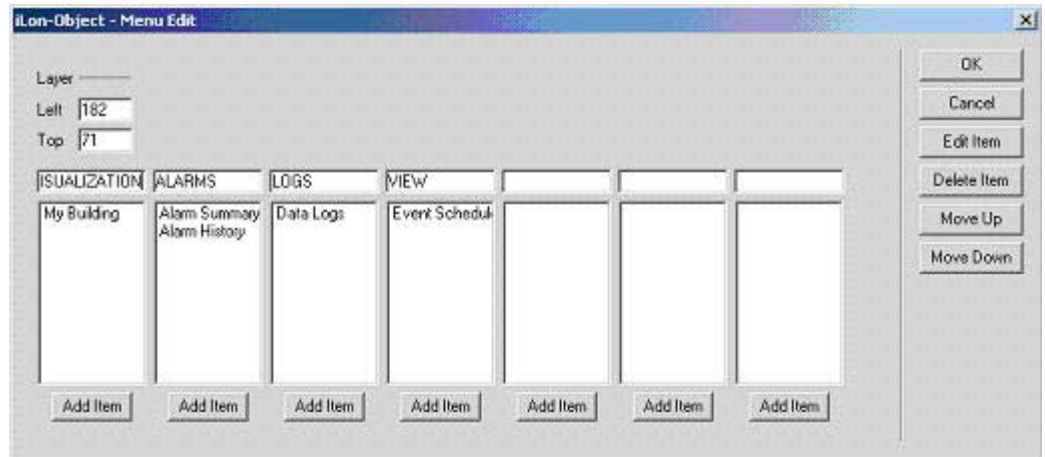
Figure 13.54 Menu Edit Dialog

7. You can perform the following tasks from the Menu Edit dialog. These tasks are described in more detail in the following section, *Using the Menu Edit Dialog.*

- To change the name of one of the existing menu headings, edit the text.

- To add a new menu heading, fill in a blank column heading on the right of the dialog.

- To remove an option from a menu heading, select it in the list and click **Delete Item**.

- To add an option to a menu heading, click the **Add Item** button below the heading. Then, select the new item in the list and click **Edit Item** to configure how the option will work (i.e. the name of the option and what page it will link to).

8. Click **OK** to save your changes and return to the **Menu.htm** file.

9. Add the **Page Title** object to the Web page to determine where the title bar will be displayed on each of your custom Web pages. You should consider adding this directly above the **Menu Bar** object, so that it does not overlap the other *i*.LON Vision objects you insert on a Web page. If you do not add this object to the **Menu.htm** file, none of your custom Web pages will include a title bar.

By default, the name assigned to the **.htm** file when a custom Web page was created will be displayed in the title bar. You can specify an alternate title for a custom Web page when you create a link to it in the menu or the sidebar, as described later in the chapter.

NOTE: You can set the title to assign to the default Web page for your custom site by filling in the **Title** field in the **Default Page** area on the Frameset Properties dialog when you add the Frameset Properties object to the **Start.htm** file. See the previous section, *Step Five: Defining the Default Page for Your Web Site*, for more information on this.

10. Add the **Message Box** object to the Web page to determine where any error messages regarding the current state of the Web page will be displayed. If you do not add this object to the Web page, all error messages will be displayed in the Web browser's status field.

11. Click **Publish** to publish your changes to the Web site.

Using the Menu Edit Dialog

This section describes how to use the Menu Edit dialog. To create a new set of menus, follow these steps:

1. Fill in the menu names. The dialog shown in Figure 13.54 includes four menus - **Visualization**, **Alarms**, **Logs**, and **View**. You can optionally change or remove these names by changing them on the dialog. You can enter names for new menus in the blank menu heading boxes on the right.

   In Figure 13.55, two new menus called **My Data Points** and **Building One Alarms** have been added to the dialog. The **View** menu has been re-named to **Building One Schedule**.
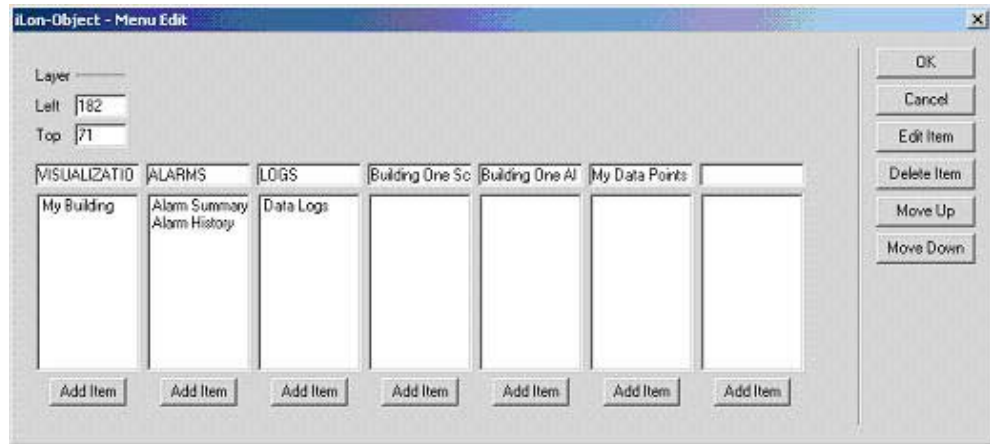
Figure 13.55 Menu Edit Dialog – New Menu Headings

2. Add the options you want to appear in each menu by clicking the **Add Item** button below the applicable menu heading. Each time you click **Add Item**, a **New Item** entry will be added to the menu. In Figure 13.56 below, three items have been added to the menu headings created in step 1, and one item has been added to the visualization menu.
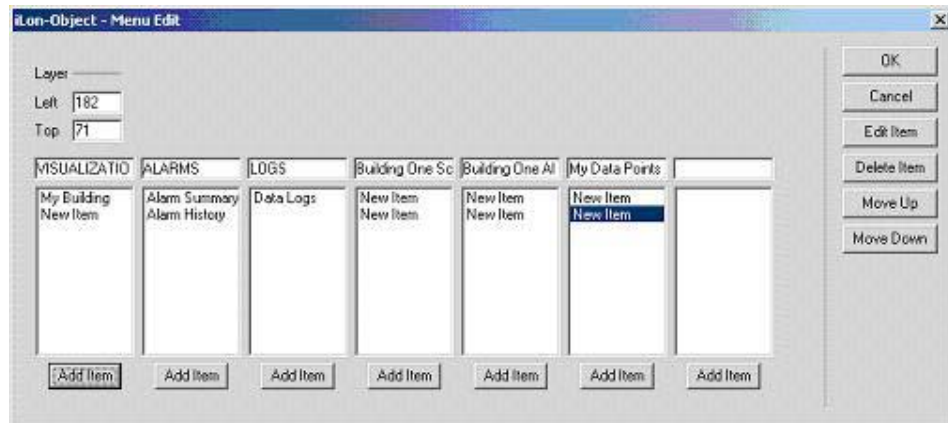
Figure 13.56 Menu Edit Dialog – New Menu Options

3. For each of the new menu options you added in step 2, select the name you want to use for the menu option and the Web page you want the menu option to access. To do so, select the menu option you want to configure and then click **Edit Item**. The dialog shown in Figure 13.57 opens.
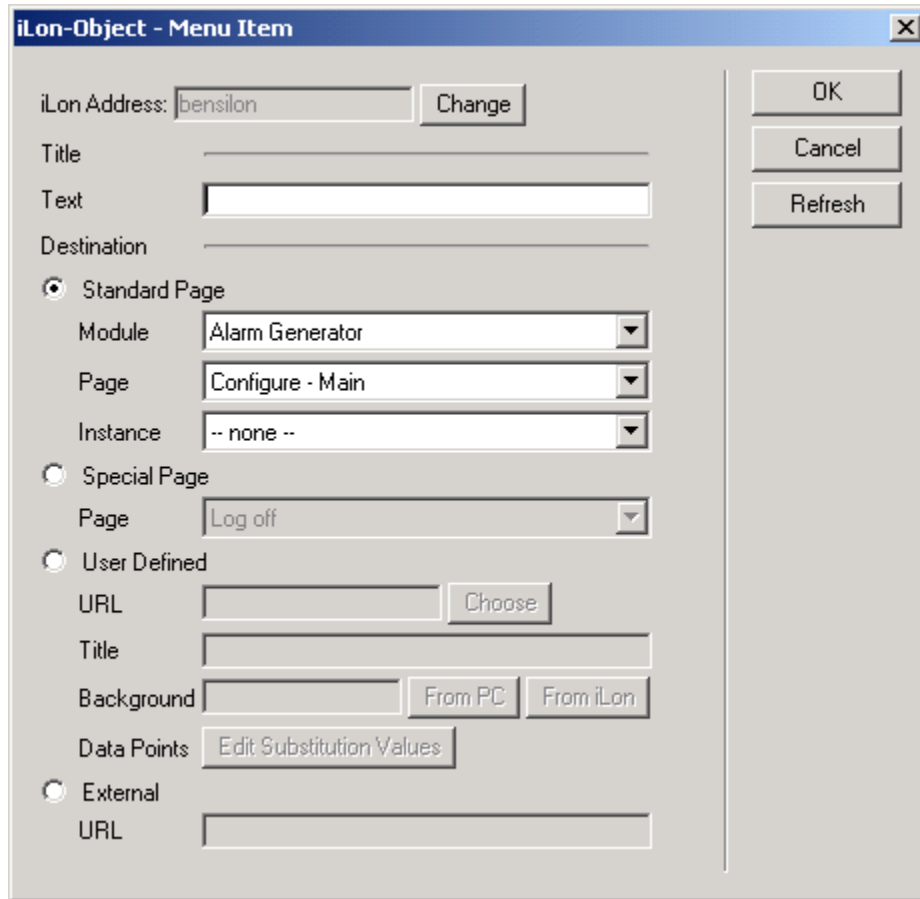
Figure 13.57 Menu Item Dialog – Editing Menu Options

Enter the name of the menu option (i.e. what the user will see in the menu) in the **Text** box. Then, select the menu option's destination (i.e. what the menu option will link to) by clicking any of the four buttons on the dialog and then configuring the applicable settings. Table 13.7 describes these settings.

Table 13.7 Menu Item Properties

Property	Description
Standard Page	Links to a Web page that will allow the user to read the data that has been recorded by a Data Logger, Event Scheduler or Alarm Notifier, or to write to the configuration of the Data Loggers, Event Schedulers and Alarm Notifiers that have been added to the network. Select **Alarm**, **Data Logs**, or **Event Scheduler** in the **Module** box to determine what sort of log file the user will have access to. Then, select what page they will see (e.g. Alarm Summary or Alarm History) in the **Page** box. Select the application instance you want them to see in the **Instance** box. For example, to create a Web page that would allow the user to see the Alarm Summary log for an Alarm Notifier called **"Building One Room Three,"** select **Alarm** as the **Module**, **Summary View** as the **Page**, and then **Building One Room Three** as the **Instance**. **If you create a Web page with one of these links, you will need to insert an *i*.LON Menu Buttons object to the Web page to add a Submit button you can use to save any changes made with that Web page.** By default, this option is selected, and is configured to link to the **Configure – Alarm Generator** Web page.
Special Page	Links to either the **Log off** page or a **Help** page.
User Defined	Links to one of the Web pages you have created. Select this option and then click **Choose** to open the Insert Link dialog, which you can use to browse the Web pages on your *i*.LON 100 server and select one. You can click **Drafts and Recent Pages** on the Insert Link Dialog to see a list of the Web pages you have recently created. Some of the Web pages you reference may contain placeholders in its data point names of the form {xxx}, where xxx represents three letters that help identify the data point and its purpose. For example, the data points associated with devices on the second floor of a building could use the following naming convention: NVL_Property_{zzz}. You could replace the placeholder with the value "2" (or any string, for that matter) to indicate that the *i*.LON objects on this page referring to the data point NVL_Property_{zzz} actually refer to the data point NVL_Property_2 when the page is viewed using this link. To replace the placeholder with a string, click **Edit Substitution Values**. This opens the **Data Point Name Substitution Values** dialog. For more information on this, see the *Tutorial: Using Data Point Substitution Tags* section on page 206. **NOTE:** The dialog includes a **Title** field in the **User Defined Area**. This determines the name that will be displayed in the title bar when a user accesses the selected Web page via this link. By default, the name assigned to the **.htm** file when the Web page was created will be displayed in the title bar. **You must add the Page Title object to the Menu.htm file in order for the title bar to be displayed on your custom Web pages.**

Property	Description
External	Link to an external Web site. Enter the Web site's IP address in the **External** box. If you want the IP address to be displayed in the menu, you should also enter it in the **Text** box.

4. Repeat step 3 until you have set up all of the menu options you want to use. You can select a menu item in the list and click **Move Up** or **Move Down** to change the order the items in each menu are listed. When you are finished, click **OK** to save your changes and return to the Menu.htm page. Click **Publish** to update your custom Web pages with the new menu.

Step Seven: Creating a Sidebar For Your Web Pages

You can use the **Sidebar.htm** page to set up the left sidebar for your custom Web pages. The sidebar for the Demo area of the *i*.LON 100 Web site includes a navigation bar that you can use to browse Web pages for the various floors and rooms on a building, as shown in Figure 13.58.
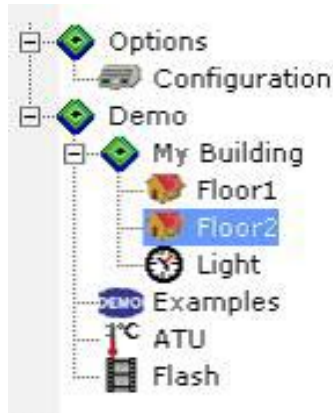
Figure 13.58 Demo Navigation Tree

You can use the sidebar to navigate through the Web pages in the Demo area. You can easily create a navigation tree for your custom Web pages. To do so, follow these steps:

1. Create the **Sidebar.htm** page in your custom directory. Follow the same procedure used to create the **Start.htm** page (described in the *Step Two: Create a User Directory and the Start.htm File* section on page 195) to do so. Name the page **Sidebar** and name the file **Sidebar.htm**, and be sure to save the file in the same directory as the **Start.htm** file.

    NOTE: Remember that in order for you to create the navigation tree successfully, you must select the **Sidebar** check box on the Frameset Properties dialog from the **Start.htm** page, as described in the *Step Two: Create a User Directory and the Start.htm File* section on page 195.

2. Click **Choose** to open the **Choose File on Website** dialog shown in Figure 13.51.

3. Browse to your custom directory, select **Sidebar.htm**, and then click **OK** to open the **Sidebar.htm** page.

4. Click **Edit Page**. This opens another page you can use to begin editing the **Sidebar.htm** page.

5. Click the *i*.LON button, and then select **Navigation Tree**. The dialog shown in Figure 13.59 opens.
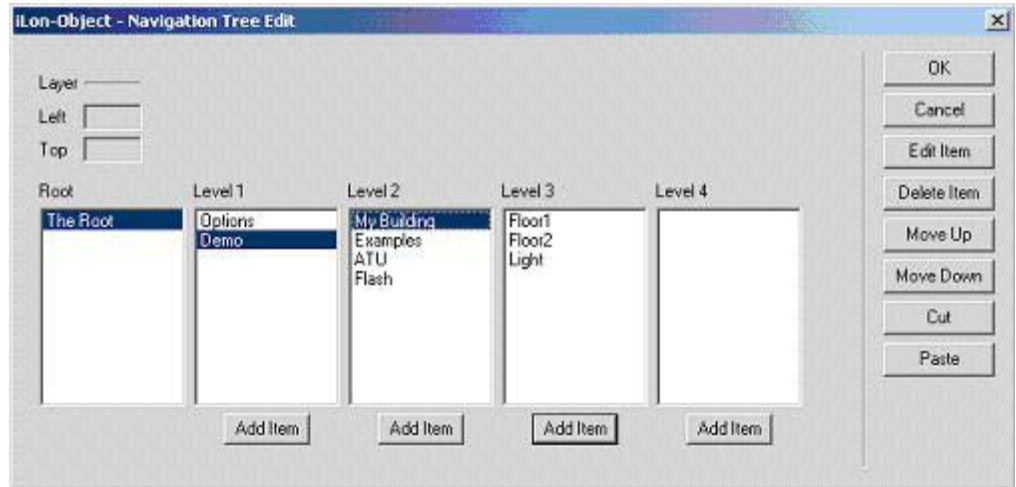
6. The dialog in Figure 13.59 shows how you would configure the navigation tree shown in Figure 13.58. The **Level 1** column shows the two main levels in the tree – **Options** and **Demo**. The **Level Two** column shows the next level down the tree, for the node currently selected in the **Level One** column. The **Level Three** column shows the next level down the tree, for the node selected in the **Level Two** column. The **Level Four** column shows the next level down the tree, for the node selected in the **Level Three** column.

For example, because **Demo** is selected in the **Level 1** column, the **Level 2** column displays the items that are immediately below **Demo** in the tree. And because **My Building** is selected in the Level 2 column, the **Level 3** column displays the items that are immediately below it in the tree.

You can add items to each list by clicking the **Add Item** button below the level you want to add an item to, selecting the new entry in the list, and then clicking the **Edit Item** button to open the Navigation Link dialog, which you can use to assign the new link a destination. The Navigation Link dialog works exactly like the one on the Menu Edit dialog, which is described in the *Using the Menu Edit Dialog* section on page 236.

In addition, you can select an icon in the list and use the **Move Up** and **Move Down** buttons to change the order in which the nodes in a given level are shown.

8. When you are finished, click **OK** to save your changes and return to the **Sidebar.htm** page. Click **Publish** to update your custom Web pages with the new sidebar.

Tutorial: Using Data Point Substitution Tags

Substitution tags and placeholder labels provide a way to re-use a single Web page to target repeated instances of data points in a system that uses a common naming convention for its data points. For example, you might want to create a series of Web pages to control several floors in a building. If each floor uses a similar set of data points and those data points follow a common naming convention, you could create a single Web page that could be applied to each separate floor by using substitution tags. You could use the placeholders and substitution tags so that each time the Web page was accessed, information for the data points on a different floor would be displayed, depending on how the Web page was accessed (i.e. which menu option was selected, or which part of the navigation tree was clicked).

To use substitution tags, you will need placeholder labels in your data point names. You can create placeholder labels by changing references to existing data points to include substitution areas in the form {xxx}, where {xxx} represents a portion of the data point's name that is subject to replacement, when you add *i*.LON Vision objects to your custom Web pages. The placeholder {xxx} can be replaced with a substitution string of any length (for example, "7" or "seven").

When you create links to a Web page that uses placeholders, you will be able to specify what string (i.e. what substitution tag) the placeholder will be replaced with when the Web page is opened via that particular link. For example, consider a system that includes 40 VAV controllers. The naming convention used by the LonMaker tool to label the device names is driven by the original engineering drawings for the mechanical system. The VAV devices are all named **VAV_f_n**, where **f** is the floor number and **n** is the VAV box number for the controller. The data points on the *i*.LON 100 server for each device are named based on the device name. Table 13.8 lists the data points were created for VAV box 1-1, which are used in a simple Web page to represent the points on a VAV controller.

Table 13.8 Data Point Names

Point	Description
NVE_V1_1_spacetemp	Zone temp
NVE_V1_1_effectiveSP	Effective set point
NVE_V1_1_boxFlow	Measured box flow
NVE_V1_1_flowSp	Flow Set point
NVE_V1_1_Occupancy	Occupancy State

When designing a Web page that will use placeholder labels and substitution tags, the data point names to use when adding *i*.LON Vision objects to the Web page would be NVE_V{xxx}_spacetemp, NVE_V{xxx}_effectiveSP, and so on. You could then create a menu or navigation tree linking to a Web page allowing access to the data points for the various devices, with each menu option using a different value for {xxx}, so that it would link to the data points for a different device.

To design a Web page to use substitution tags, you will need to follow the steps listed below. These tasks are described in more detail in the following sections.

1. Create a network with LonMaker, and add all the devices and Function

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Blocks.

2. Design what your Web pages will look like. Remember that you only need to create one instance of the Web page, although you will be able to use the Web page to access different groups of data points.

3. Add NVE data points for all the network variables you plan to reference from your Web page with the *i*.LON 100 Configuration Plug-In.

4. Using Contribute, create a Web page and add *i*.LON Vision objects to the Web page, using network variable placeholders {xxx} when adding objects for the data points you plan to reference.

5. Add links to the Web page to the menu bar (**Menu.htm** file) and navigation tree (**Sidebar.htm**).   Make sure to add the substitution naming information to the Web page when you create the link, so that the link will open a Web page displaying the proper set of data points.

The remainder of this section describes these steps in more detail, using a Web site for a 4-room building in which each room has one switch and one lamp as an example. The Web site uses two LonPoint DIO-10s (2 inputs and 2 outputs for each device) to control all four rooms. Each DIO-10 will support two rooms (one input and one output per room). The data points used to control the switches and lamps will use placeholders, so that their network variable and data point names will use the following format: "switch_room_{xxx}" and "lamp_room_{xxx}." The switch can be controlled with either the DIO-10 input function block, or the custom Web page.

To implement this design, follow these steps:

1. Create your network with LonMaker, making sure to add all the required devices and function blocks. In this example, you would create a LonMaker drawing, and add an *i*.LON 100 device and two DIO-10 devices. You will use one input and one output from each DIO-10 to represent a light switch and a lamp. You would also add 4 input function blocks (name them **Switch 1**…**Switch 4**) and 4 output functions (name them **Lamp 1**…**Lamp 4**) for the DIO-10s. Connect the output for the Digital Input/counter function block to the input for the Digital Output function block for each input/output pair (or room). Figure 13.60 shows how your network would appear in LonMaker.
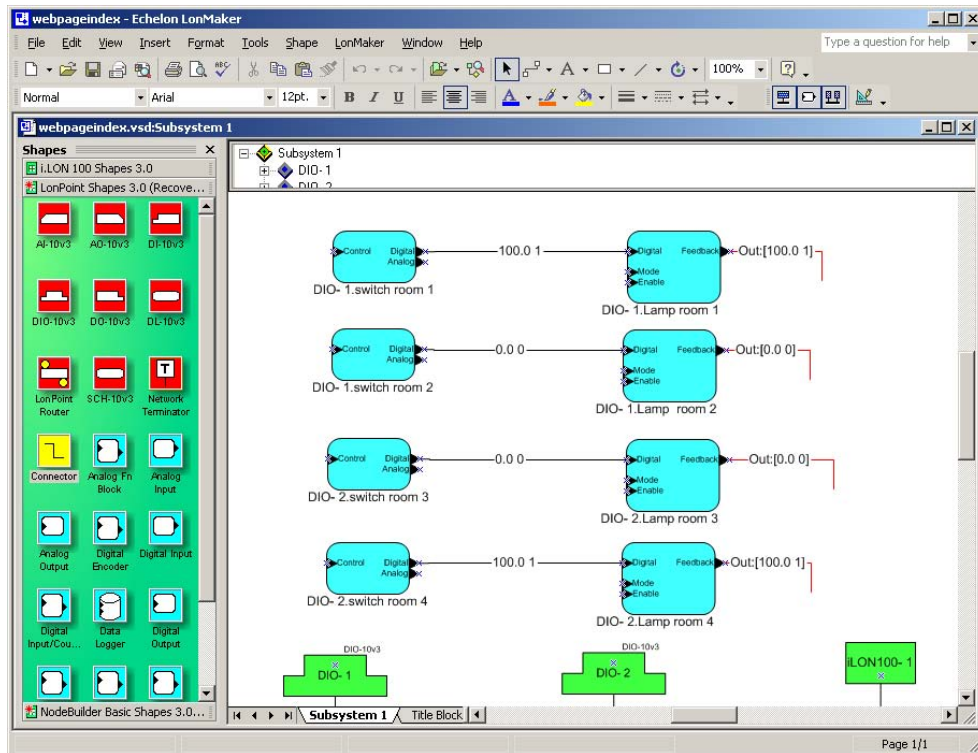
Figure 13.60 Example Network

2. Determine what your Web page will look like, and create them as described previously in this chapter. In this example, you will use the digital input network variables from the DIO-10 digital output function block to represent the switch control and the lamp state.
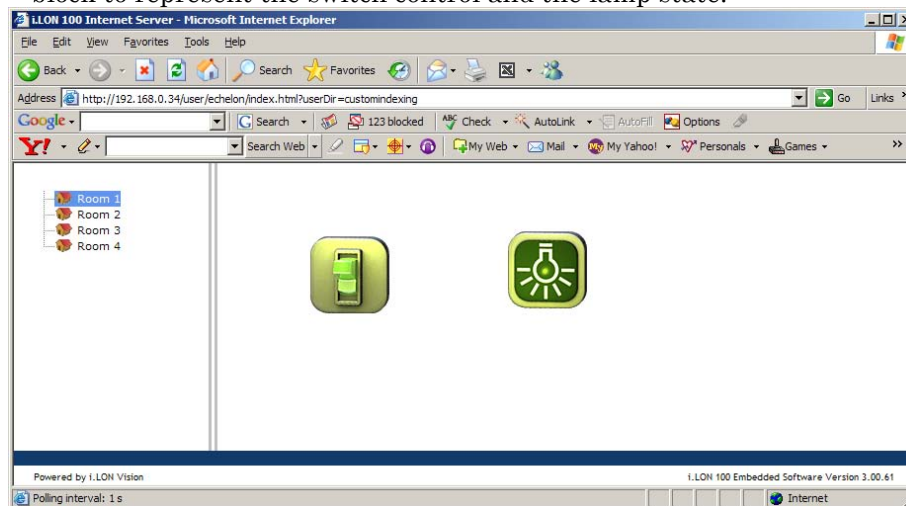
Figure 13.61 Example Web Page

To show both the switch and lamp, you could use the input for the DIO-10 digital output function block for the switch, and the feedback output for the same function block for the lamp. The switch indicates the state of the input to the lamp, and the feedback indicates the actual status of the lamp.

When you change the switch from the Web page, you will see an immediate change of the switch in the Web page (for example,

lighted/unlighted and up/down). If you change the digital input using another function (for example, a manual switch) you will see the change in the switch image swapper within the defined poll rate (defaults is 120 seconds). The output (feedback output) will change after it is polled (the default poll rate is 120 seconds).

The recommended way to reduce this latency is to set the **Max Age** property when you create the respective data point. This way, only the data points that are actually viewed at the moment are polled at a higher rate. Alternatively, you could reduce the NVE poll rate. The latency problem does not occur for NVL data points with a binding from the external devices, since they push the value into the *i*.LON 100 server as soon as any changes occur.

The problem with a global decrease of the NVE poll rate (as opposed to setting the Max Age property) is that you need to use a small delay between polls to reduce delays between changing the switch and seeing the output changing, but this causes a lot of overhead for the *i*.LON 100 server. Typically, you never want to use 1 second polling, the minimum should be at least 20 seconds for most applications (each poll is a minimum of two packets, for an FT-10 Channel sustained packet rate is about 150 packets/sec). As an example, Alarm Generators poll data points about every five seconds, by default. Binding, on the other hand, to the i.LON 100 are usually used for Alarms or for NV information that needs to be updated immediately.

3. Add NVE or NVL data points for all the network variables created in steps 1 and 2 with the *i*.LON 100 Configuration Plug-In. When you create these data points, make sure they map to the network variables you want them associated with, and make sure they follow a naming convention you can use placeholders with.

In this example, you need to create four input and four output NVE data points. Name the inputs **switch_room_1**, **switch_room_2, switch_room_3** and **switch_room_4**. For the first DIO-10, add NVE data points for switch_room_1 and switch_room_2 with digital inputs one and two of the DIO-10 digital output function block. For the second DIO-10, add NVE data points for switch_room_3 and switch_room_4 using inputs one and two for the DIO-10 Digital Output function block. Do the same for the DIO-10 Digital Output FB Feedback output using lamps_room_1 thru lamps_room_4.

See Chapter 4, *Creating Data Points*, for more details on how to create data points with the Configuration Plug-In and the with the *i*.LON 100 Web pages.
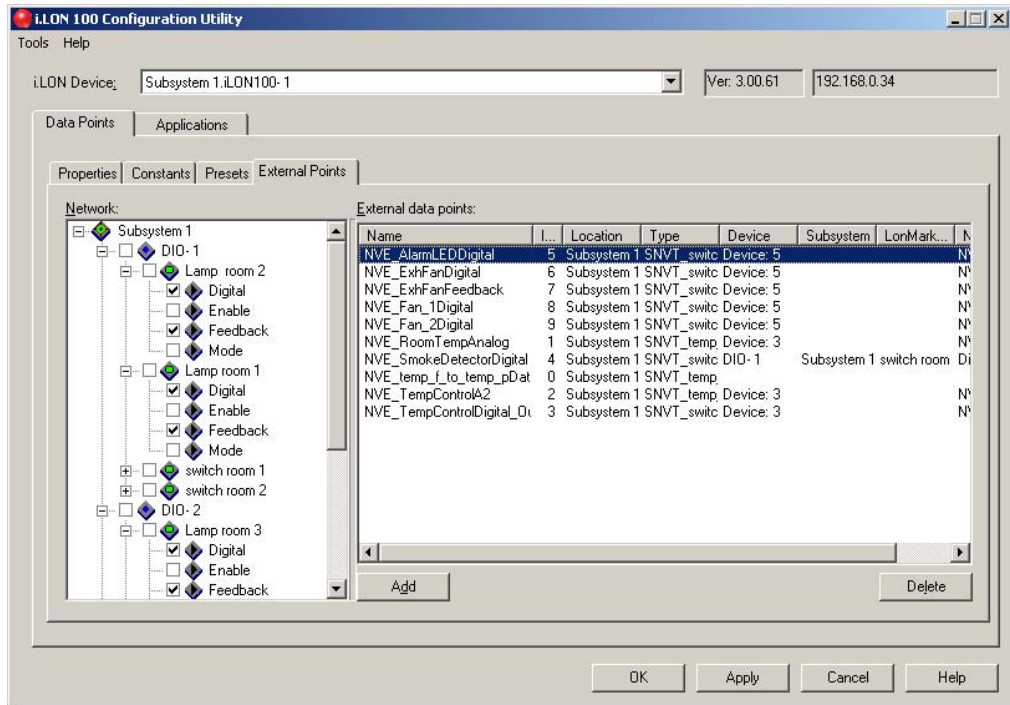
Figure 13.62 *i.*LON 100 Configuration Plug-In Data Points Tab

4. Start Contribute, create a new Web page and add any necessary *i.*LON Vision objects, as described previously in this chapter. In this example, you should add an *i.*LON Vision image swapper object to the Web page for the switch device.
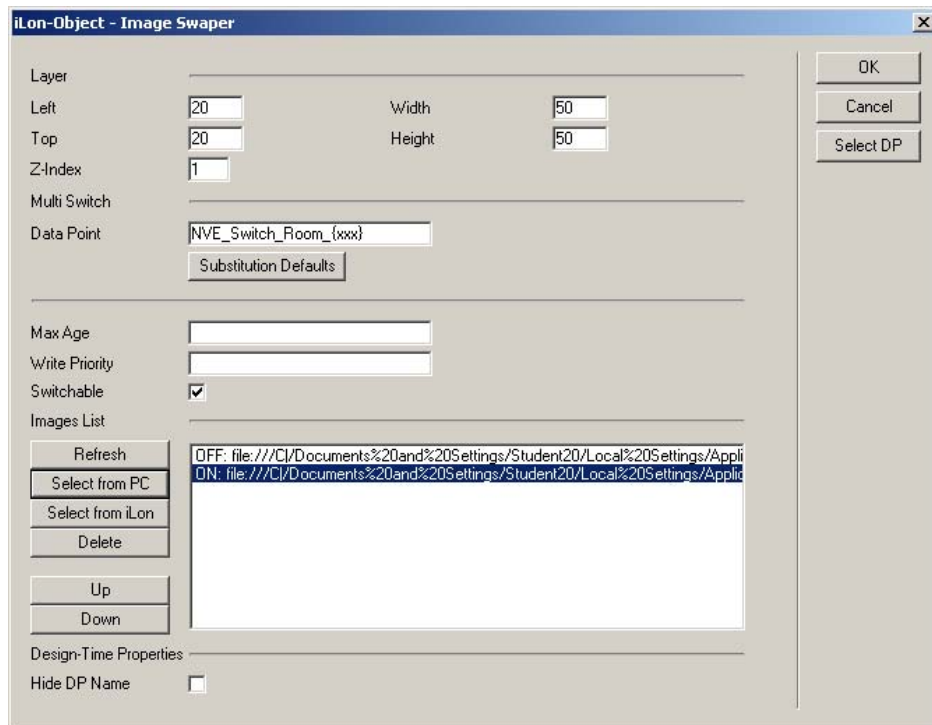
Figure 13.63 Image Swapper Dialog

5. When you add the object to the Web page, you will click the **Select DP** to

select the data point you want the object to reference. For this example, you should select **NVE_Switch_Room_1**. You will need to add a placeholder to the data point name, so that you can use substitution strings. To do so, replace "1" with" {xxx}"to change the name to **NVE_Switch_Room_{xxx}** in the **Data Point** box on the Image Swapper dialog, as shown in Figure 13.63.

6. Click **Substitution Defaults** to specify the default substitution string for the placeholder. This opens the DP Name Substitution Defaults dialog. Click "xxx" in the middle pane, and then enter **1** in the **Default** box, as shown in Figure 13.63. Click **Save**, and then click **OK**.

   As a result of this, the object will reference the NVE_Switch_Room_1 data point when the Web page is opened by default. However, when you create links to the Web page, you can specify another substitution value, so that the Image Swapper will reference another data point when the Web page is accessed via that link.
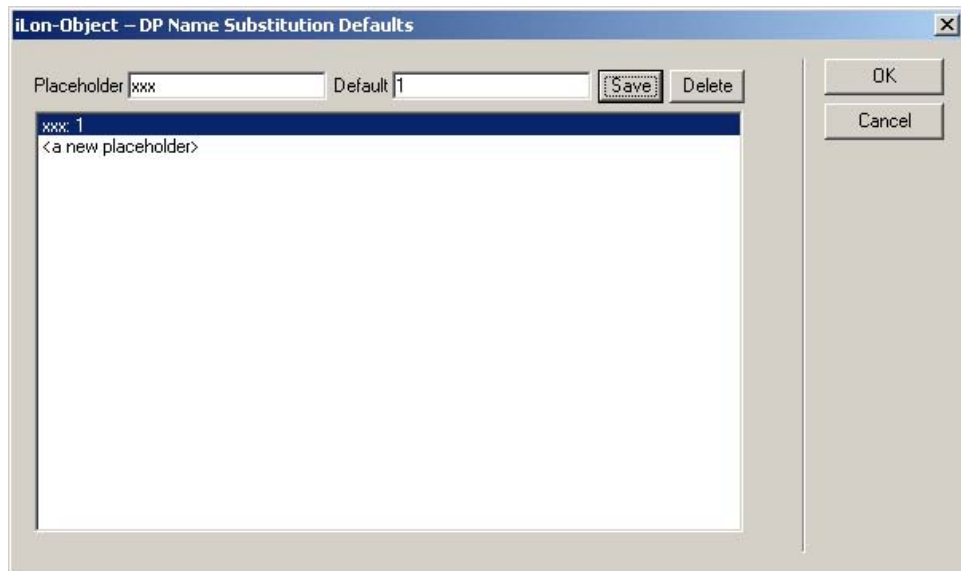
Figure 13.64 Substitution Defaults Dialog

7. Add the preset graphics. For this example, you could use a switch and lamp from the `\iLonVision\graphics` directory in the LONWORKS folder on the computer running the *i*.LON Vision software. You can add a new image swapper object for the lamp using **"NVE_Lamp_Room_{xxx}"** for the data point name with placeholder, and configure the object just as you configured the switch in steps 4, 5 and 6.
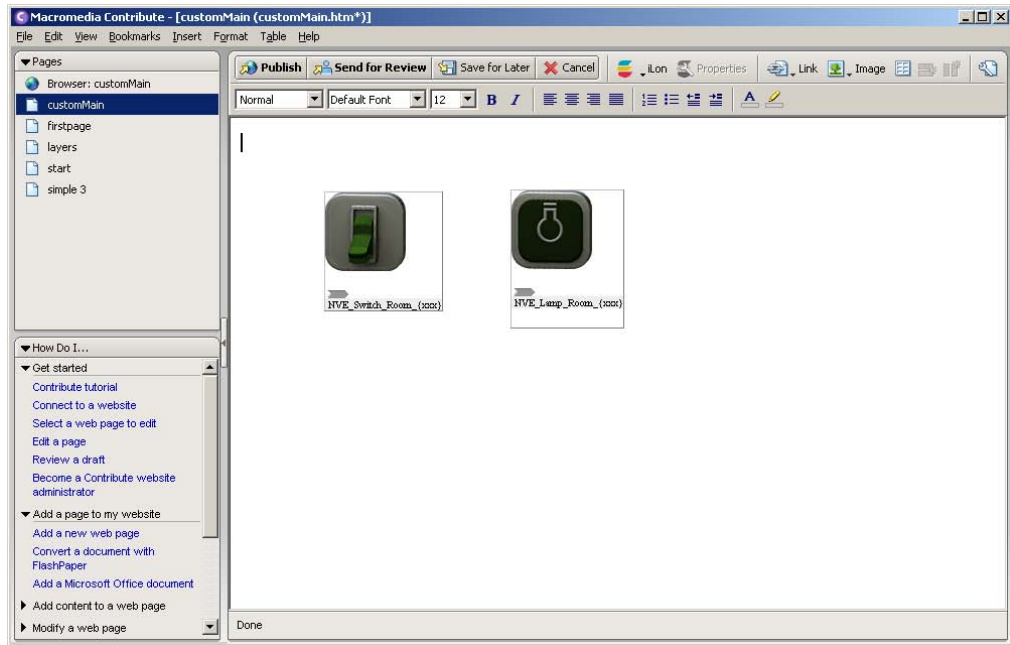
Figure 13.65 Preset Graphics

8. Add a link to the Web page link to the menu bar (**Menu.htm**) and the Navigation Tree (**Sidebar.htm**). When you create the link, you will specify the substitution value that will be used for the placeholder when the Web page is opened via that link, as described below. This process is the same for both the menu bar and the navigation tree.

In this example, you could modify the navigation tree defined by the **Sidebar.htm** file to navigate between the Web pages for each room. Add four items to the Navigation Tree Edit dialog, one for each room, as shown in Figure 13.66.
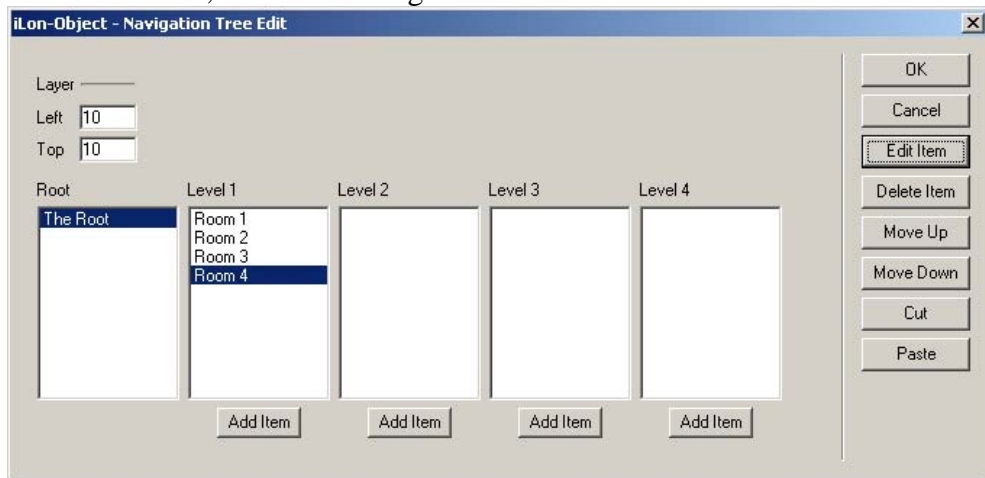
Figure 13.66 Navigation Tree Edit Dialog

9. To make sure that a new menu option links to the proper Web page, select it in the **Navigation Tree Edit** dialog and then click **Edit Item**. This opens the Navigation Link dialog.
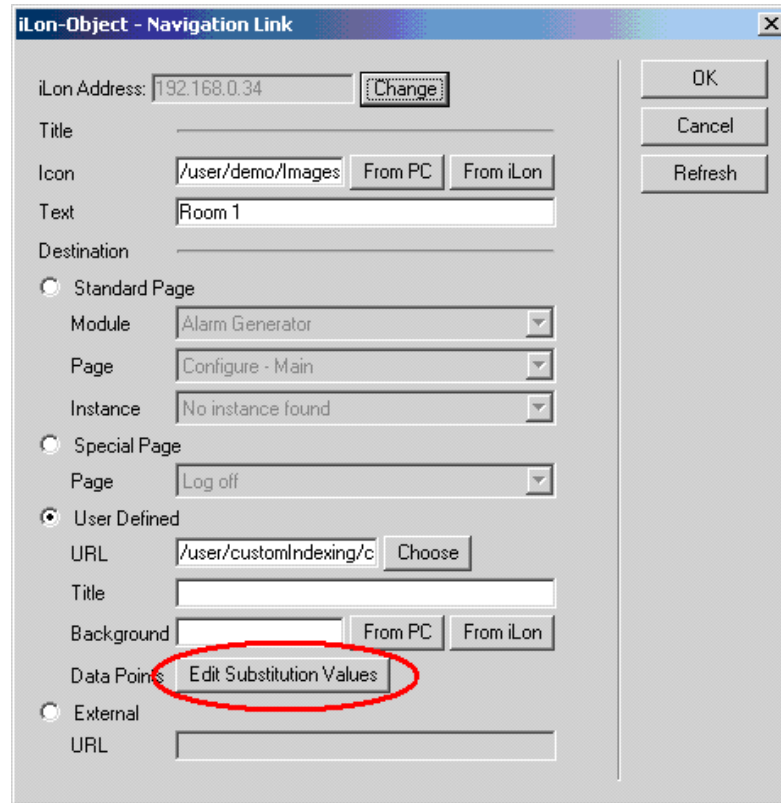
Figure 13.67 Navigation Link Dialog

10. Change the placeholder in the data point names by clicking **Edit Substitution Values**. This opens the Data Point Name Substitution Values dialog.
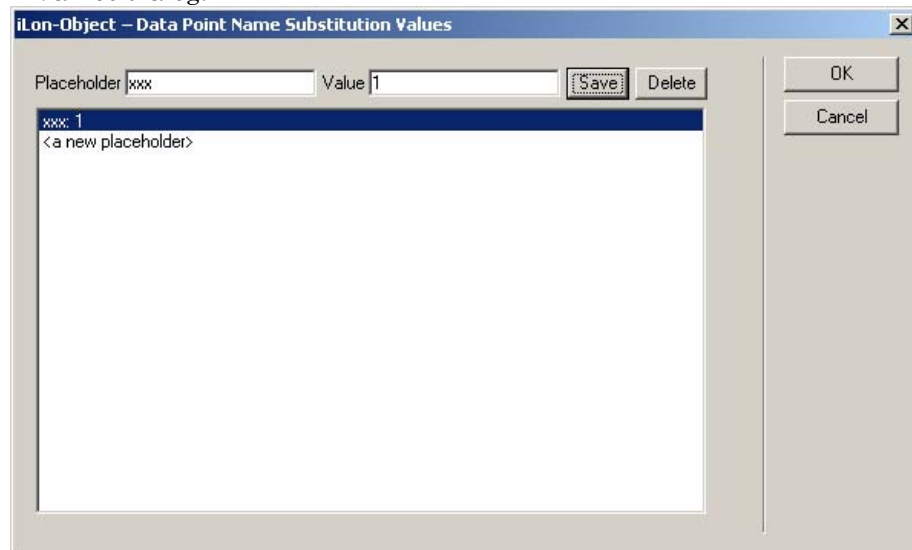
Figure 13.67 Data Point Name Substitution Values

11. Select the **xxx** placeholder in the middle pane, and then type the substitution string you want to use in the **Value** box. For the example, you would enter 1 to reference the data points for the lamp and switch in the first room from that instance of the Web page, or 2 to reference the data point for the lamp in the second room, and so on. Click **Save** and

then click **OK** to save your changes.

When you use the various options on the menu, the Web page that opens each time will appear to be identical. However, the data points each Web page references are not the same. In this fashion, you can re-use a single Web page for multiple rooms or floors, instead of having to create the same Web page over and over again.

Adding Security to Your Custom Web Pages

You can use the *i*.LON 100 Web Server Parameters utility to create security settings that will requires users to provide a user name and password each time they access the files stored in the custom directory you created for your custom Web pages. For more information on the Web Server Parameters utility, see Appendix D, *Web Server Parameters Utility*.

Customizing the Demo Area

This chapter has described how to create a Web site completely from scratch. You may find that the Demo area of the *i*.LON 100 Web site contains much of the functionality you want to use. You could use the techniques described in this chapter to modify the Demo area to suit your needs. The Demo area is based on the same framework and the same set of files (**Start.htm, Menu.htm** and **Sidebar.htm**) that you would use to create your custom Web pages.

To modify the Demo area, click **Choose**, open the User/Demo folder on the *i*.LON 100 Web site, and begin working with these files. You may find it useful to look at these files even if you do not plan on modifying the Demo area.

Using i.LON Vision While Offline

You can create new Web pages and edit existing pages while you are not connected to the *i*.LON 100 server, and then publish them to the *i*.LON 100 server's Web page the next time you connect to it.

The *i*.LON Vision objects will not have access to the names and preset values of the data points on your *i*.LON 100 server while operating in offline. However, you can still layout all your Web pages while offline, reconnect to the *i*.LON 100 server and use the toolkit to add any data point links once you are reconnected, and then publish the Web pages to the *i*.LON 100 Web site.

To do so, follow these steps:

1. Start Macromedia Contribute, and then select **Work Offline** from the **File** menu.

2. From the **File** menu, select **Open** and browse to the project folder for your *i*.LON 100 Web site. Your project folders are stored in the `Documents and Settings/User/Local Settings/Application Data/Macromedia/Contribute 3/Sites` directory of your computer, as shown in Figure 13.69.

   Alternatively, you can create a new page by selecting **New Page** from the **File** menu.
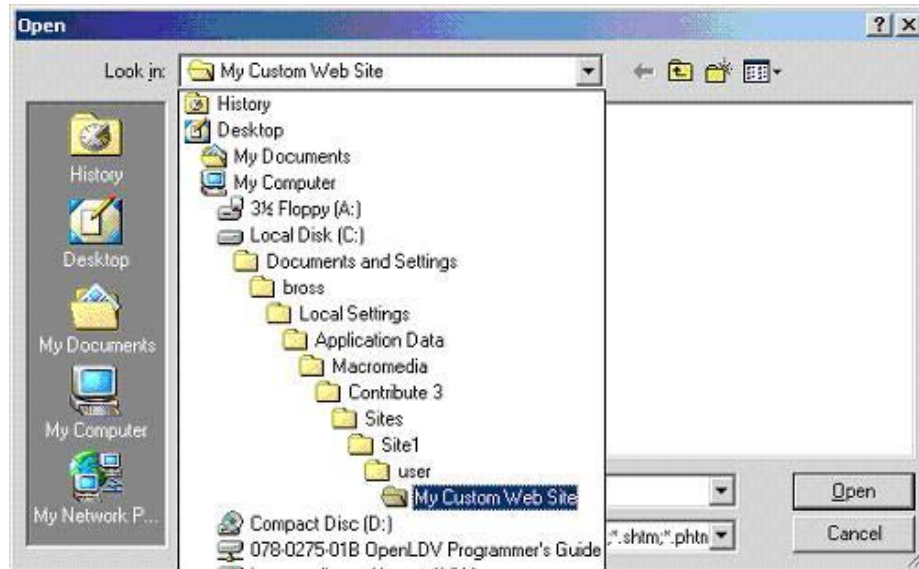
Figure 13.69 Open File Window

3. Edit the Web page you have opened (or created) as described in the previous sections of this chapter. Although the *i*.LON Vision objects are available in offline mode, you will not have access to the names and preset values of the data points on your *i*.LON 100 server while operating in offline mode (i.e. the **Select DP** feature is not available).

If you know the names of the data points you plan to reference, you could enter them manually while offline. Otherwise, you will need to add the data point links when online. However, you can still lay out the majority of the Web site while offline, as you have access to the **Menu.htm** and **Sidebar.htm** pages, as well as any new or existing Web pages you want to add to the site.

4. When you are finished working offline, click **Work Online** to connect to the *i*.LON 100 server. When the connection has been made, you can access the *i*.LON Vision objects and add the data point links you need.

5. When you are ready, open each of the pages you created in steps 3 and 4 and click **Publish** to publish them to the Web site. The custom area of your *i*.LON 100 Web site will be updated with the new pages.

Troubleshooting Web Page Designs

This section describes some of the problems that you could encounter when creating your custom Web pages.

1. **I modified my Web page, but I don't see the changes when I open it with my Web browser.** This could be due to cached pages being displayed by Internet Explorer. To correct this with Internet Explorer, select **Internet Options** from Internet Explorer's **Tools** menu. The Internet Options window appears. Click the **Delete Files** buttons. Then, click the refresh button on the Internet Explorer tool bar to refresh the screen.

2. **I get an *ERROR: JavaScript support is disabled* message when I try to edit some of my Web pages with Contribute.** This is expected. When editing Web pages with Contribute, the JavaScript support is automatically disabled. The Web page will work properly when accessed with a web browser.

3. **I linked all of my Web pages from the standard *i*.LON 100 Web site, but I can't get to my custom Web pages.** To avoid this, make sure the link to your custom Web page site links to the **Index.htm** file, and not to any of your custom Web pages.

4. **I created a Start.htm file, but I cannot add the Frameset Properties object to it.** You need to publish the Start.htm file before editing it and adding the Frameset Properties object.

5. **I tried to edit my previously saved web page in Contribute, but got the error message shown in Figure 13.70**. Make sure that the Contribute Address field points to the Web page, and is not an **Index.htm** address. If you accessed your Web pages by pressing the Standard button on the main *i*.LON 100 Web page, then the next page displayed is not your custom Web page, but rather a link.

   For example, if you use customMain.htm and it is in the directory "customWeb," the following address will give you this error:

   http://192.168.0.34/user/echelon/index.html?userDir=customWeb

   The correct address should look more like:
   http://192.168.0.34/user/simple/<customMain>.htm

Figure 13.70 Contribute Error

6. **After I've accessed my custom Web pages, I cannot use Internet Explorer's Back button to go back to the main *i*.LON 100 web page.** You can get back to the main page by using the **Back** button pull down and selecting *i*.LON 100 Internet Server from the list. You can avoid this problem completely by using a Frameset Properties object on the main Web page, or by have your custom Web page start in a new Web browser window.

7. **I do not see anything on my first custom Web page.** Look at the Frameset Properties object on the **Start.htm** file, and make sure that you have selected a default Web page.

8. **I copied my custom Web page directory into a new directory with FTP but I cannot see any of my new changes.** You copied the files but all the links are for the old directory. You need to change any link that that has your custom web page directory included in the path (for example, the Default URL in the **Start.htm** frameset object). Also, check your Sidebar.htm and Menu.htm links.

9. **I added a Contribute toolbar Image Menu Graphics to my web page but I cannot move it around.** This image is not an *i*.LON Vision object, so it was added to the web page main layer. You need to move the image from the main layer to an *i*.LON Vision layer object. You can do this by adding an *i*.LON Vision Layer object, selecting the image and cutting it (CTL-X), and then selecting the new Layer and pasting the image (CTL-V). See the *Contribute Image Menu Graphics* section on page 228 for further details on this.

Using Other Tools To Build *i*.LON 100 Web Pages

Several alternate tools are available to create *i*.LON 100 Web pages, although the Contribute software is the recommended method. These tools include:

- Macromedia Dreamweaver with *i*.LON Vision. You can use Macromedia Dreamweaver together with *i*.LON Vision. To do so, create your initial Web pages with Contribute as described in this chapter. You can then edit an *i*.LON Vision page in Dreamweaver by opening the page in Contribute, clicking the **File** menu, pointing to **Actions**, and then clicking **Edit Page Source in External Application** (or press Ctrl+Shift+E).

- You can create Web pages that serve Web page values using Web tags. Web tags will not be supported in future releases of the *i*.LON 100. For more information on Web tags, see Appendix E, *Creating a Web Page Using Web Tags*.

*i.*LON 100 *e3* User's Guide

Appendix A

Troubleshooting

This appendix describes how to diagnose and resolve
common problems that may occur when using the *i*.LON 100
server.

Troubleshooting

I can access my *i*.LON 100 Web pages but some content seems to be missing.

- The *i*.LON 100 has been designed to work with Microsoft Internet Explorer 6.0 or later. Some pages will not display correctly on other browsers or prior versions of IE.

I defined a dynamic network variable in the LonMaker tool, but I can't reference it in my Web page. What is wrong?

- The *i*.LON 100 will append a number to any network variable you defined in LonMaker. This allows network variable names to remain unique even if two functional blocks have an input named nviMyInput. You can see what number is appended by looking at the data server tab on the *i*.LON 100 plug-in.

The *i*.LON 100 exhibits problems due to a low-memory condition. This could be indicated by one or more of the following: "out-of-memory" messages, slow network access, application performance problems, or even an unexpected reboot.

- Reduce the number of Alarm Notifiers and/or the size limit of the alarm Summary Logs (which are kept in RAM).
- Reduce the number of Web clients that are simultaneously accessing the *i*.LON 100.
- If you are making calls to the SOAP interface on the *i*.LON 100, refer to the *i*.LON 100 Internet Server Programmer's Guide* for specific recommendations on limiting SOAP messages.

I have created NVE style points and although I can see them in the plug-in and reference them using the SOAP/XML interface I can not reference them using Web tags.

- *i*.LON 100 Web tags do not allow NVE tag names with spaces. Be sure your tag names do not have spaces. Note that the SOAP/XML server and the plug-in do allow spaces under some conditions, but the best practice is never to include spaces in NVE names.

I defined a dynamic network variable in the LonMaker tool, but I can't reference it in my Web page. What is wrong?

- The *i*.LON 100 will append a number to any network variable you defined in LonMaker. This allows network variable names to remain unique even if two functional blocks have an input named nviMyInput. You can see what number is appended by looking at the data server tab on the *i*.LON 100 plug-in

When I run the *i*.LON 100 Configuration Plug-in I get an error stating that I could not communicate with the *i*.LON 100

- Verify that the WSDL file is not password protected. Protection is defined in the **webparams.dat** file located at the root of the *i*.LON 100's flash disk.
- Verify that the IP communication path to the *i*.LON 100 is intact. (Try pinging the *i*.LON 100)

I have created NVE style points and although I can see them in the plug-in and reference them using the SOAP/XML interface I can not reference them within my Web pages.

- The *i*.LON 100 Web server does not allow NVE tag names with spaces. Be sure your tag names do not have spaces. The SOAP/XML server and the

plug-in do allow spaces under some conditions, but the best practice is never to include spaces in NVE names.

I can't make my *i*.LON 100 send an email message. What am I doing wrong?

- Emails are sent as a result of alarm conditions. Verify that the alarm condition actually triggers and that the email *should* be sent.

After changing the type of a data point using Configuration Plug-in or the LonMaker browser, the data point starts showing incorrect data.

- The LNS Data Server may be using old format data. Close and restart all LNS applications.

Anytime I reboot or power down and up when using RNI loose connection in LonMaker and have to un-attach and reattach.

- This is a known bug that will be addressed in a future release. The current work around is to close and then re-open the system.

My Service LED is blinking, what does this mean?

- The Service LED blinks when the *i*.LON 100 device is uncommissioned. When the *i*.LON 100 is added to a network and commissioned, the Service LED will turn off.

When updating the *i*.LON 100, I get an error that the update completed successfully, but the device has not been updated successfully yet. What is wrong?

- This error occurs when you attempt to update the *i*.LON 100 device while monitoring many of its network variables with a very short poll time. Try turning off monitoring or increasing the poll time.

I can't open the network using a non-*i*.LON 100 network interface. What is wrong?

- If you were using the *i*.LON 100 as an RNI, then you switched to another network interface, you need to disable RNI on the *i*.LON 100 in order to open the network. This can be done using the console application or the Security Web page.

I can't open the network using the *i*.LON 100 as an RNI. What is wrong?

- Can you access the *i*.LON 100 via HTTP (*i.e.* the *i*.LON 100 Web pages)? If not, then you may not be in TCP/IP communication with the *i*.LON 100. Check the connection. If using static IP addresses, make sure that your computer is on the same subnet as the *i*.LON 100. If using DHCP, consult your network administrator.

- If you are can see the *i*.LON 100 Web pages, but still cannot open the network via RNI, check the following:
  - Ensure that RNI is enabled on the *i*.LON 100. This can be done on the Security Web page or using the console application.
  - Ensure that you have created an RNI entry for the *i*.LON server with the LONWORKS Interfaces application that has the correct IP address/hostname, port and MD5 Authentication Key

The *i*.LON 100 gets a duplicate IP address assigned from a DHCP server, and either boots using its default IP address (*i.e.* 192.168.1.222), or boots using the duplicate IP address.

- If the *i*.LON 100 device boots using its default IP address when it has obtained an address via DHCP, it is probably because the DHCP server assigned an address already in use by another machine on the network. This may happen if the other machine is disconnected from the network long

enough for its DHCP lease to expire, yet continues using that address after reconnecting to the network. Make sure all other machines on the network using DHCP have valid leases. If the *i*.LON 100 detects this condition, it will boot using its default IP address (typically 192.168.1.222), and will continue attempting to contact a DHCP server. Once it can contact a DHCP server, the *i*.LON 100 will reboot to obtain a new IP address.

- The *i*.LON 100 may not initially detect the above condition, in which case it will boot using the duplicate IP address. At some point the *i*.LON 100 may discover that the address is a duplicate, but will continue using it. Make sure all machines on the network using DHCP have valid leases. Reboot the *i*.LON to obtain another address, if necessary, or use a statically configured address.

Appendix B

Managing the *i*.LON 100 Server

This appendix describes how to reboot the *i*.LON 100 server, how to restore the default manufacturer settings to the *i*.LON 100 server, how to view *i*.LON 100 system information, and how to backup and restore the configuration of the *i*.LON 100 server.

Rebooting the *i*.LON 100 Server

You can reboot the *i*.LON 100 server using the *i*.LON 100 Web pages by pointing your mouse cursor to the **Setup** menu and then selecting **Reboot** from the drop-down list. Click the **Reboot** button to begin the reboot. A Web page will open informing you that the *i*.LON 100 server is rebooting. A reboot takes approximately 2 minutes. While the reboot is happening, the LEDs on the *i*.LON 100 server will flash. Once the reboot is complete, the green Power/Wink LED will stay on solidly. Once the reboot is completed, the Welcome Web page will open.

If DHCP is enabled, this page may not redirect the Web browser to the **Welcome** page properly, because the new address from the DHCP server is unknown. If this is the case, issue the **show all** command from the console application, or ask your network administrator to determine the new IP address of the *i*.LON 100 server. See Appendix C for more information on the console application.

If your DHCP server has the capability to dynamically propagate newly assigned device IP address and target name to the DNS server (as is the case with the WIN2K DHCP server), you should be able to connect to the *i*.LON 100 server after reset using its fully qualified hostname.

When the *i*.LON 100 server is rebooted, it executes its shutdown and startup scripts. Modifying these scripts is not supported.

Restoring Factory Defaults to the *i*.LON 100 Server

You can use the **Clean Up** Web page to restore the *i*.LON 100 to its manufacturer defaults. This will remove all configuration to the *i*.LON 100 and its applications. To use the **Clean Up** Web page, follow these steps:

1. Perform a security access reset as described in the *Security Access Reset* section on page 56.

2. Point your mouse curse to the **Setup** menu, and select **Clean Up** from the drop-down menu. This opens the **Setup – Clean Up** Web page.

3. Click **Clean Up** to restore the *i*.LON 100 server to its default factory settings. This button will only be active if the *i*.LON 100 is in security access mode. This will restore the *i*.LON 100 server to the configuration listed in Table B.1.

Table B.1 Default Factory Configuration

Property	Setting
FTP user name:	ilon
FTP password:	ilon
Automatically obtain IP address:	False
IP address:	192.168.1.222
Subnet mask:	255.255.255.0
Gateway:	192.168.1.222
Web server port:	80

Property	Setting
Hostname:	`iLON100`
Domain suffix:	`[blank]`
DNS servers:	`0.0.0.0`
SNTP servers:	`0.0.0.0`
Time zone:	`(GMT-08:00) Pacific Time (US & Canada); Tijuana`
LNS Servers:	`0.0.0.0:1628`
Incoming RNI port:	`1628`
LonTalk address:	`Unconfigured`
Email server:	`0.0.0.0`
Source email address:	`[blank]`
CENELEC enabled:	`False (Power line model only)`

All XML configuration files, as well as the contents of the `/root/PulseBackup` (pulse count data), `/root/AlarmLog` (alarm log data), and `/root/data` (data log data) directories, will be backed up to `/root/config/software.bak`.

This will restore the IP address back to `192.168.1.222`, and you will need to place your computer on that subnet or use the route command as described in the *Connecting and Configuring the i.LON 100 Internet Server* section in Chapter 2 to communicate with the *i*.LON 100 server after the reboot is complete.

Viewing *i*.LON 100 System Information

To view *i*.LON 100 system information, point your mouse cursor to the **Setup** menu and the select **System Info** from the drop-down list. The **Setup – System Info** Web page opens.

Figure B.1 Setup – System Info Web Page

Click **Reset** to reload the entire page. Click **Refresh Values** to refresh the data displayed on the page. Click **Clear Statistics** to clear the LonTalk and IP-side statistics currently displayed at the bottom of the Web page from memory and begin calculating them again.

The following sections describe the information that is displayed on the **Setup – System Info** Web page.

i.LON 100 Model Information

This section of the Web page displays *i*.LON 100 model information. This information may be requested by Echelon support when diagnosing a problem with the *i*.LON 100. Table B.2 describes the information displayed on this part of the Web page.

Table B.2 Model Information

Property	Setting
Model Number	The model number of the *i*.LON 100 server.
Channel Type	The channel type the *i*.LON 100 server is connected to. Either TP/FT-10 or PL-22.
Modem Installed	Indicates whether the *i*.LON 100 server has an internal modem.

Property	Setting
CPU Speed	The CPU speed for the *i*.LON 100 server.
Firmware Version	The firmware version of the *i*.LON 100 server.
Bootrom Version	The bootrom version of the *i*.LON 100 server.

i.LON 100 Flash Information

This section of the Web page shows information on flash memory usage. The *i*.LON 100 server uses flash memory to store data associated with its applications, such as the log files generated by the Data Loggers and Alarm Notifiers that you have created. To the *i*.LON 100 applications, this non-volatile memory appears as a logical 32 MB disk drive (also called a "flash disk"). The flash disk is extremely reliable and should last a long time, but it has some limitations that may affect the lifetime and runtime configuration of the *i*.LON 100.

The flash memory is physically composed of 2048 blocks of 16 KB each (these are not the same as disk blocks/sectors, which are much smaller). 2000 of these blocks are mapped to the logical disk drive, 2 are required for overhead, and the remaining ones (up to 46) are spares.

Once a flash block has been written to, it must be completely erased before it can be written to again. As the *i*.LON 100 applications write data to the logical flash disk, physical flash blocks are erased as needed to allow data to be stored. Each flash block can be erased a limited number of times before it fails, and flash manufacturers specify a minimum expected value for this limit. When a flash block fails, it is permanently marked as failed and no longer used by the *i*.LON 100 server. The spare flash blocks allow for a limited number of block failures to occur without affecting the reliability of the flash disk.

The amount of time it takes for the flash blocks on the *i*.LON 100 server to reach their erase limit depends on how much and how often data is written to the flash disk. Writes to the logical flash disk cause erases of physical flash blocks, but there is no simple formula to precisely describe this relationship. The flash erase rates reported by the *i*.LON 100 server apply to the entire flash memory, not to individual flash blocks. The *i*.LON 100 server contains a sophisticated flash file system that distributes flash erases across all available blocks, in order to optimize the flash life. Over time, the actual number of erases of each block will remain approximately equal, thus maximizing the lifespan of all flash blocks. According to the flash manufacturers' rated limits, all flash blocks should last at least 10 years if the total block erase rate averages no more than 39 erases per minute for that entire time. Exceeding this limit may cause the flash disk to wear out sooner.

You should note that the block erase limit specified by the flash manufacturers is very conservative. Empirical testing of at least some flash parts indicates that a typical limit under normal conditions may be at least 10 times longer, which translates to a much longer life for the *i*.LON 100 flash disk, and/or erase rates much greater than 39 erases per minute. Informally, flash manufacturers will confirm these findings, but they cannot be guaranteed. Use this information with caution, depending on how conservative you wish to be. You may also trade off expected lifespan for increased erase rates.

The configuration of your *i*.LON 100 server may have a significant impact on the number of flash erases per minute. Because of this, it is important that you

monitor both the rate at which you are erasing the flash blocks on your *i*.LON 100 server, and how many spare disk blocks are available. You can do so using the information on this Web page. If the number of spare block falls below the recommended minimum, you should consider replacing the *i*.LON 100 server.

The rate of flash block erases is a difficult number to report. Short-term increases or decreases in this value are not meaningful to the lifespan of the flash. Only long-term, sustained rates are truly significant. However, if you are trying to adjust your data logging to see what affect this has on the erase rate, a long-term number is not very helpful. To accommodate these different needs, this Web page reports four different values for the flash block erase rate.

The most important is computed using a two-day moving average, which will reflect only sustained erase rates. However, this average is slow to respond to changes in the rate, and it may take up to five days before the value fully reflects a sustained change in the erase rate. The three minute and one hour values provide more immediate feedback by using shorter time windows, but they may show jumps in their values due to short-term activity (for example, transferring a file via FTP to the *i*.LON 100 server). The final value is the rate since the last reboot, which may respond to rate changes even slower than the two-day average, but provides a very long-term view.

Table B.3 describes the information displayed on this part of the Web page.

Table B.3 Flash Information

Property	Description
Flash Disk Activity: Moving Average	The long term moving average of the number of flash block erases/minute. This value is calculated using a two-day sliding window. When this value exceeds the recommended limit of 39 erases/minute, the value will be shown in red and a warning message will be displayed at the top of the Web page.
Flash Disk Activity: Last 3 Minutes	The number of flash disk erases/minute over the last 3 minutes.
Flash Disk Activity: Last Hour	The number of flash disk erases/minute over the last 1 hour.
Flash Disk Activity: Since Startup (<Time Since Startup>)	The number of flash disk erases/minute since the *i*.LON 100 server was last rebooted.

Property	Description
Spare Flash Blocks	The number of available spare flash blocks remaining out of the 46 total. Initially, the *i*.LON 100 server contains up to 46 spare flash blocks that can be used to accommodate block failures. However, it is normal for a small number of flash blocks to initially be marked as failed by the flash manufacturer, and additional blocks may fail after extended use, so the number of available spare blocks on your *i*.LON 100 may vary.
	This does not adversely affect the normal operation of the flash disk, as long as some spares are available. When the number of spare flash blocks falls below the recommended limit of eight blocks, this value will be shown in red and a warning message will be displayed at the top of the Web page. If a flash block on the *i*.LON 100 server fails and there are no spare blocks remaining, the flash disk may become unreliable. The *i*.LON 100 server should be replaced before this happens.
Free Disk Space / Total Disk Space	The current available disk space and the total possible disk space in the *i*.LON 100 server, in kilobytes. If you go below the recommended limit of 1024KB of free disk space, this value will appear in red and a warning message will appear at the top of the web page.
Free Memory (RAM)	The current available RAM on the *i*.LON 100 server. The *i*.LON 100 server has 32 MB of RAM. If the *i*.LON 100 server runs out of available RAM, it will reboot. If this value is close to 0, you should close some of the *i*.LON 100 applications.
Data Point Message Failures: Last 2 minutes	The number of data point message failures per minute over the last 2 minutes. Data point message failures occur when the *i*.LON 100 server cannot handle all updates to its data points. This problem can be caused by high network traffic, misconfigured applications, or overactive remote applications attempting read or write to *i*.LON 100 data points.
Data Point Message Failures: Last 10 Minutes	The number of data point message failures per minute over the last 10 minutes.
Data Point Message Failures: Last 1 Day	The number of data point message failures per minute over the last day.

Backing Up and Restoring the *i*.LON 100 Server

You can backup the configuration of an *i*.LON 100 device using the *i*.LON 100 Configuration Plug-in or using FTP. This section describes how to do so.

Backing Up With FTP

To backup the configuration of an *i*.LON 100 device using FTP, use an FTP application to copy the entire contents of the *i*.LON 100's root directory to a folder on your computer.

If you are using the LonMaker tool, you may want to use the *i*.LON 100 folder within the LonMaker drawing folder on your computer as the backup folder. This way, when you back up the LonMaker database, you can set **Backup All Files in Drawing Directory** to backup the *i*.LON 100 configuration along with the rest of the LonMaker network.

Backing Up With the Configuration Plug-In

To backup the *i*.LON 100 with the Configuration Plug-in, follow these steps:

1. Click the **Tools** menu and select **Backup *i*.LON 100**. The Backup *i*.LON 100 Files window opens.
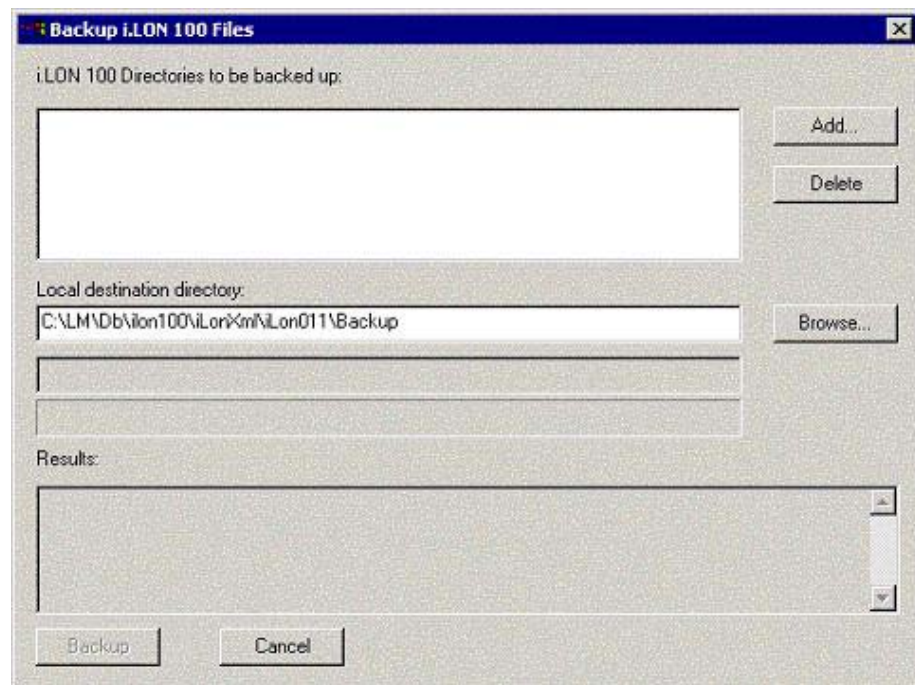
Figure B.2 Backup *i*.LON 100 Files Window

2. Click **Browse** to select a location on your computer to which the files will be backed up. By default, files are backed up in `<LNS Database path>\iLonXml\iLon011\Backup`.

3. Click **Add** to select which files on the *i*.LON 100 will be backed up. If this is the first time the *i*.LON 100 Configuration Plug-in has attempted to access the *i*.LON 100 via FTP, the FTP Login dialog opens.
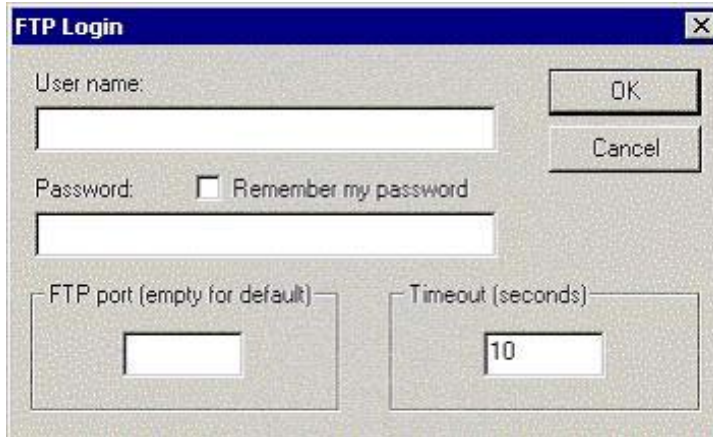
Figure B.3 FTP Login Dialog

Enter the user name and password for the *i*.LON 100 server. Then, set the **FTP Port** property to specify the port used to FTP files to and from the *i*.LON 100. Leave this field blank to use the default FTP port. Set the **Timeout** property to specify the timeout period for the connection (i.e. how long the Plug-In will try to make the connection).

Click **OK** when you are ready.

4. The *i*.LON 100 FTP dialog opens.
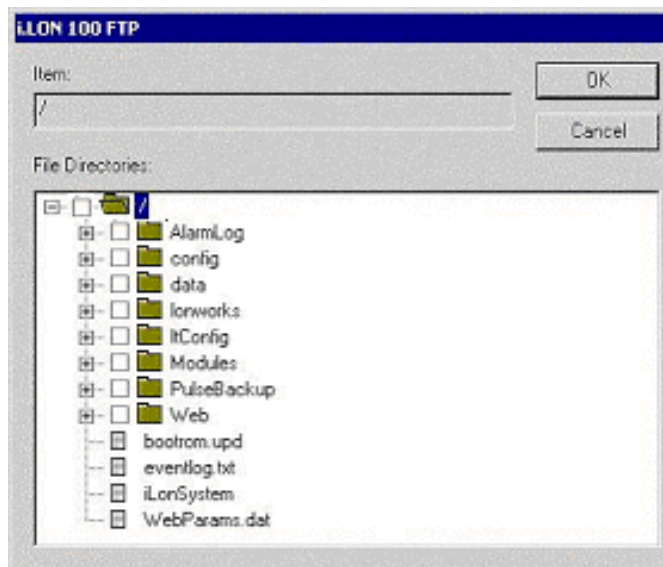
Figure B.4 *i*.LON 100 FTP Dialog

Use this dialog to select the directories that will be backed up. All subdirectories within the directory will be backed up as well. Once you have finished selecting files and directories to backup, click **OK**.

5. Click **Backup**. The *i*.LON 100 will FTP the files to the selected location on your computer. The status of the backup procedure will be displayed in **Results**. Click **Cancel** to cancel the backup procedure.

Restoring or Duplicating an i.LON 100 Server

You can restore the configuration of an *i*.LON 100 device from an *i*.LON 100 backup directory. To restore an *i*.LON 100 backup directory, follow these steps:

1. Determine the location of the directory to which the *i*.LON 100 configuration was backed up.

2. Format the *i*.LON 100 using the **format** command in the console application as described in Appendix C of this document.

3. Copy the contents of the *i*.LON 100 backup folder to the *i*.LON 100's root directory using an FTP application.

4. Reset the *i*.LON 100 server.

You can follow this procedure with a new *i*.LON 100 server to create an *i*.LON 100 server with identical configuration to the *i*.LON 100 server you used to create the backup folder . You can also FTP files directly from one *i*.LON 100 server to another to duplicate the configuration of an *i*.LON 100 server.

When you install the *i*.LON 100 software, the default *i*.LON 100 server's configuration is stored in the `LONWORKS\iLon100\Images\iLON100 3.00` directory on your computer. To restore an *i*.LON 100 server to its factory default condition, use an FTP application to remove all files on the *i*.LON 100 server and then copy the contents of this directory into it.

Replacing an i.LON 100 Server

To replace an *i*.LON 100 device, follow these steps:

1. If you are running LonMaker or another LNS-based application and have the network containing the *i*.LON 100 device open, close it.

2. Reboot the old *i*.LON 100 server with the console application, as described in Appendix C. When the console application displays `Press the '!' key to stop auto-boot`, press '!'.

3. Backup the entire directory structure of the old *i*.LON 100 server to be replaced onto a folder on a computer using an FTP application.

4. Remove the old *i*.LON 100 device from the LONWORKS network.

5. Attach the new *i*.LON 100 device to the LONWORKS network.

6. Format the new *i*.LON 100 server and restore the directory structure backed up in step 3.

7. Reboot the new *i*.LON 100 server.

8. Assure that the new *i*.LON 100 server has the same IP address, subnet mask, and gateway as the old *i*.LON 100 server. If you are using the *i*.LON 100 server's RNI capability, you must also assure that the new *i*.LON 100 server has the same MD5 authentication key as the old *i*.LON 100 server. If the new *i*.LON 100 is initially configured to use the default key (all zeros), this will occur automatically when connecting to the RNI.

9. Re-open the network.

10. Perform a replace operation. Using the LonMaker tool, right-click the *i*.LON 100 device shape and select **Replace** from the shortcut menu.

Follow the replace procedure as described in the *LonMaker User's Guide*. Use the configuration property values from the old device. When prompted, press the

service pin on the new *i.*LON 100 device. The new *i.*LON 100 device will now function exactly as the old one did.

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Appendix C

i.LON 100 Console Application

This appendix describes how to use the *i*.LON 100 server's console application.

Using the Console Application

You can use the *i*.LON 100 server's console application to configure and troubleshoot the *i*.LON 100. To access the console application, you must connect a female-to-female DB-9 null modem crossover cable from the **Console** hardware output to a COM port on your computer. Then use a terminal emulator, such as Windows HyperTerminal, to communicate on the specified serial port. Set the communications parameters on the terminal emulator to 9600-8-N-1 and turn flow control off.

Consult the *i*.LON 100 *e3 Hardware Guide* for more information on the Console hardware output.

Console Command List

Once you have accessed the *i*.LON 100 console application, you can issue commands. You must reboot the *i*.LON 100 server (either through the console application or the Web page) for any changes to take effect. Table C.1. lists the commands you can use with the *i*.LON 100 console application.

Table C.1 Console Command List

Command	Description
activateapp *index/name*	The *i*.LON 100 server uses a multitasking operating system that can simultaneously run multiple processes. This command allows you to selectively activate or deactivate processes.
archive *name*	Create a compressed tar archive of a directory or file on the *i*.LON 100 server and stores its contents in a Gnu Zip file. The directory remains unchanged by this command. For example, if you ran the command **archive data**, the *i*.LON 100 server would create a file called **data.tar.gz** that contains the entire **data** directory. The directory or file to be archived must be located in the current working directory.
	This command is CPU intensive and may cause a delayed response to requests (e.g. SOAP requests) that are sent while the *i*.LON 100 server is processing the command.
	The contents of this file can be extracted with the **extract** command.
authkey *key*	Sets the 16-byte MD5 authentication key.
cd [*directory*]	Changes to the specified directory. If no argument is provided, displays current directory.

Command	Description
compress *name*	Compresses a text file, specified by its file name, into Gnu Zip format (.gz file extension). A new file is created by this command, and the original file remains uncompressed. The file to be compressed must be located in the current working directory. If you ran the command **Compress exceptionlog1.txt**, then a compressed version of the **exceptionlog1.txt** file named **exceptionlog1.txt.gz** would be created. This command is CPU intensive and may cause a delayed response to requests (e.g. SOAP requests) that are sent while the *i*.LON 100 server is processing the command.
copy *file1 file2*	Copies *file1* to *file2*.
createapp *name*	Creates an application instance, specified by name, and returns the index assigned to the application. The application is automatically activated upon creation. Generally, you will not need to use this comment.
cenelec *on/off*	Power line model only. Puts the *i*.LON 100 server in CENELEC mode (for communicating on European C-band power line networks). If you change this value, you will need to close all applications to which the *i*.LON 100 is connected as an RNI, reboot the *i*.LON 100, and re-establish an RNI connection.
date *mm/dd/yyyy*	Sets the date. This is not allowed if the *i*.LON 100 server is synched to an SNTP server.
deactivateapp *index/name*	Deactivates an application instance, specified by index or name. See **listapp** for supported names. This command does not delete the instance of the application; it deactivates the application. Primarily used for troubleshooting.
decompress *file*	Decompresses a file created in Gnu Zip format (.gz file extension) into a normal text file. A new file is created by this command, and the original file remains uncompressed. The directory or file to be decompressed must be located in the current working directory. If you ran the command **Compress exceptionlog1.txt.gz**, then a decompressed version of the **exceptionlog1.txt.gz** file named **exceptionlog1.txt** would be created. This command is CPU intensive and may cause a delayed response to requests (e.g SOAP requests) that are sent while the *i*.LON 100 server is processing the command.
delete *file*	Deletes *file*.
demo *A/B*	Reserved for future use.
dhcp *on/off*	Turns DHCP on and off. If DHCP is on, the *i*.LON 100 DHCP client gets its IP address, gateway, subnet mask, primary DNS server (if used), and DNS domain from a DHCP server.

Command	Description
dialuptrace [*level*]	Sets the dialup trace level. You may be asked to perform a dialup trace by Echelon support personnel to assist them in diagnosing problems with your *i*.LON 100 server. The higher the trace level, the more information will be displayed by the console application. Available dialup trace levels are: *0 or OFF* – Turns off dialup tracing. *1 or LOW* – Turns on dialup tracing for MAJOR_EVENT, MINOR_EVENT, and STATE_TRANSITION. *2 or MEDIUM* – Turns on dialup tracing for the above plus MODEM_RESPONSE. *3 or HIGH* - Turns on dialup tracing for the above plus PPP_DEBUG. Use the dialup trace command with no arguments to see the current dialup trace level.
dir [*directory*]	Lists directory contents. If no directory is specified, lists the contents of the current directory.
Disable *service*	Disables a service. Available services are: **Ftp** – FTP access **Web** – HTTP access **Dial-in** – Dial-in access **DnsServerViaDhcp** – Obtaining DNS server from DHCP. **DnsDomainViaDhcp** – Obtaining DNS suffix via DHCP. **Secureaccess** – Disables security access mode temporarily, until the next time the *i*.LON 100 server is rebooted. You can also re-enable security access mode with the **enable** command after running this command. **Secureaccess always** – Disables security access mode persistently, even through reboots of the *i*.LON 100 server. You can re-enable security access mode with the **enable** command after running this command.
dnsdomain *domain*	Sets the DNS domain name. This command is valid only when DHCP is turned off, or **Obtaining DNS Suffix From DHCP** is disabled while DHCP is enabled (see the **enable** and **disable** commands for more information).
dnsprimary *address*	Sets the IP address of the primary DNS server. This command is valid only when DHCP is turned off or **Obtaining DNS Suffix From DHCP** is disabled while DHCP is enabled (see the **enable** and **disable** commands for more information).
dnssecondary *address*	Sets the IP address of the secondary DNS server. This will only be used if the primary DNS server can not be contacted.
dump ip852config	Copies the IP-852 configuration to the `/root/ltconfig/xmldump/LTIP_config.xml` file.

Command	Description
enable *service*	Enables a service. Available services are: **Ftp** – FTP access **Web** – HTTP access **Dial-in** – Dial-in access **DnsServerViaDhcp** – Obtaining DNS Server from DHCP. **DnsDomainViaDhcp** – Obtaining DNS suffix via DHCP. **SecureAccess** – Enables security access mode temporarily, until the next time the *i*.LON 100 server is rebooted. You can also disable security access mode with the **disable** command after running this command. **SecureAccess always** – Enables security access mode persistently. This is the default setting. You can disable security access mode with the **disable** command.
eventlog *on/off*	Turns the console event log on and off. The event log is kept in `eventlog.txt` in the root directory of the *i*.LON 100 server.
extract *name*	Extracts the contents of a directory or file created with the **compress** command. The directory or file to be extracted must have the extension **.tar**.gz, and must be located in the current working directory. The archive will be extracted into the current directory. This command is CPU intensive and may cause a delayed response to requests (e.g SOAP requests) that are sent while the *i*.LON 100 server is processing the command.
factorydefault	Resets the *i*.LON 100 server to its factory defaults. Files added by the user outside of the `/root/software` directory (*i.e.* Web pages) are not affected. **Echelon recommends that you run this command from the *i*.LON 100 bootrom console. See the** *Interrupting the Boot Process* **section later in this appendix for more information.**
ftppassword *password*	Sets the FTP password to *password*; anonymous FTP is not allowed. By default, the FTP password is *ilon*. If the **Global password** on the Security Web page is changed, the FTP password will be changed to the same value.
ftpuser *name*	Sets the FTP username to *name*. By default, the FTP username is *ilon*. If the **Global username** on the Security Web page is changed, the FTP username will be changed to the same value.
format	Formats the *i*.LON 100 server's flash disk. This command deletes all files, including the *i*.LON 100 server's system image file. After using this command, you must upload a new software image to the *i*.LON 100 server. **Echelon recommends that you run this command from the *i*.LON 100 bootrom console. See the** *Interrupting the Boot Process* **later in this appendix for more information.**

Command	Description
gateway *address*	Modifies the gateway address. Enter `0.0.0.0` to specify no gateway. For example, gateway `10.1.10.1`. This command is valid only if DHCP is turned off.
help	Displays a listing of the typically used commands. `Help all` displays a complete command list.
history [*size*]	If you do not specify the *size* parameter, this command displays a history of console commands issued since the last reboot. You can specify a size from 10 to 100 to determine how far back the command history is kept.
hostname *name*	Modifies the host name. For example, `hostname ilon100`.
install *idx*/*name* [*dmn*]*sn nd*	Installs a LONWORKS domain/subnet/node address for the application specified by *idx*. This command is provided for backward compatibility to add an *i*.LON 100 server to a pre-installed network. **Echelon does not recommend or support using this command**. The *i*.LON 100 server should be installed using a standard network installation tool such as the LonMaker tool.
ip852port *portnumber*	Sets the local IP port for the IP-852 router.
ipaddress *address*	Modifies the IP address. For example, `ipaddress 101.253.100`. This command is valid only when DHCP is turned off.
listapp	Lists the current application instances.
logout	Terminates a Telnet session
ltipport	Reserved for future use.
mkdir *directory*	Makes a directory.
nataddress *address*	Sets the external NAT address to be used when the *i*.LON 100 server is used as an IP-852 router and is installed behind a NAT firewall.
ping *hostaddr*	Tests communications to another IP host.
reboot	Reboots the *i*.LON 100 server. If the *i*.LON 100 server is currently being used as an RNI, the networks for which it is acting as an interface must be closed and re-opened.
removeapp *index*/*name*	Deletes an existing application instance, specified by index or name. The user does generally not use this command.
rename *file1 file2*	Renames *file1* to *file2*.
servicepin *index*	Sends a service pin message for the application specified by *index*. See **listapp** for supported indexes.

Command	Description
show [*all/ hwInfo*]	This displays configuration information about the *i*.LON 100 server. For example, show might display: ``` Software Version: 2.00-0024 IP Address: 10.1.253.201 Subnet Mask: 255.0.0.0 Host Name: echeloni100 Gateway: 0.0.0.0 SNTP Server: 0.0.0.0 DHCP: off MAC Address: 00-D0-71-00-4A-04 Time: MON SEP 13 08:30:02 2001 UTC Time: MON SEP 13 06:30:02 2001 Startup script: /root/config/startup.scr Timezone: MET:60:1:5.1.3.2:5.1.10.4 ``` Show all displays all parameters. Show hwinfo displays hardware properties.
shutdown	Closes all applications on the *i*.LON 100 server. A reboot is required to restore operation of all modules.
sntpaddress *address*	Modifies the address of the SNTP server. If you have a backup SNTP server, you can enter **sntpaddress *address1 address2*.**
sntpinterval *value*	Sets the SNTP update interval in seconds. Set the value to 0 for automatic (adaptive), or to -1 to disable SNTP updates.
Sntplog *on/off*	Enables or disables SNTP logging. The SNTP log file is named `sntp.log` and is located in the root directory of the *i*.LON 100 server. The time logged in the SNTP log file is in universal coordinated time (UTC). The maximum size of the SNTP log file is 50 Kbytes. When the file exceeds 50 Kbytes, logging is automatically disabled. Use this command to diagnose time synchronization problems.
staticroute *add/delete/show*	Use these commands to add, delete or show manual static IP routing entries. This command accepts both IPv4 and IPv6 addresses.
subnetmask *address*	Modifies the subnet mask. For example, `subnetmask 255.255.255.0`. This command is valid only when DHCP is turned off.
time *hh:mm:ss*	Sets the time. This is not allowed if the *i*.LON 100 server is synched to an SNTP server.
timezone *zone*	Sets the time zone with the following format: *nameOfZone*:*timeInMinutes*FromUTC:*dstUsed*:*daylightStart*:*daylightEnd* where *dstUsed* is 0 or 1, and daylight savings start/end times are in the form *rank*.*day*.*month*.*hour*. For example, 1.1.4.2 is the first Sunday in April at 02:00. Rank is a number from 1 to 5 with 5 meaning the last instance in the month. Days are numbered 1 to 7 starting with Sunday. Months are numbered 1 to 12, starting with January.

Command	Description
trace *level* [*stamp*]	Sets the tracing level; 0 = None; 1 = Urgent tracing only (default); 2 = Verbose tracing (for debugging only, not recommended). Set the optional *stamp* parameter to True to enable time stamping.
type *file*	Types the contents of *file*.
unconfigapp *index/name*	Unconfigures the specified application (removes the LonTalk addresses).
update *bootrom* [*file*]	Updates the bootrom of the *i*.LON 100 server. By default, this command will look for the `bootrom.upd` file in the /root directory of the *i*.LON 100 server. **Echelon recommends that you run this command from the *i*.LON 100 bootrom console. See the following section, *Interrupting the Boot Process*, for more information.**

Interrupting the Boot Process

The *i*.LON 100 server undergoes an extensive boot process upon power-up, and when reset by the reset button or a reboot command issued in the Configuration Server or console application. During the boot process, the *i*.LON 100 server's disk structure is automatically checked to ensure that any structural errors on the disk are repaired (similar to running a check-disk command in DOS), and a message is displayed on the screen if any corrections are made to the disk. (Additional information about the corrections is written to the event log file.) The boot process then loads the *i*.LON 100 server's system image. Successful completion is indicated when the *i*.LON 100 server displays its normal command-line prompt.

If the *i*.LON 100 server repeatedly fails to boot up, you are unable to FTP files to it, or you suspect the image is corrupted, you may interrupt the boot process and troubleshoot the *i*.LON 100 server. To interrupt and bypass the boot process, press the exclamation point (!) key when the "Press the '!' key to stop auto-boot…" message appears on the console. This message displays for approximately 4 seconds at the beginning of the boot process (following self-test and memory initialization). If the auto-boot is interrupted, the boot image is then loaded from ROM, and the *i*.LON 100 server enters the bootrom state.

The Bootrom State

When the boot process is interrupted or fails (e.g. if the iLonSystem image is corrupt or not available, perhaps due to a power cycle during image download), the *i*.LON 100 server loads its system image from ROM and starts a console application similar to that run by the normal iLonSystem image. This state, called the bootrom state, is indicated by a command-line prompt prefixed with [Bootrom]. If caused by a boot failure, you may need to reload or upgrade the *i*.LON 100 server software to restore proper operation.

While in the bootrom state, only a subset of the normal console commands are available. The *i*.LON 100 server provides the minimal functionality required to troubleshoot and recover its system image. The FTP server runs, and the console provides commands needed to recover the image. However, application

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commands such as listapp and createapp are not available and certain attributes are not displayed.

Updating the Bootrom

Echelon may provide updates to the *i*.LON 100 server bootrom. The bootrom can be updated using the console application. The bootrom that ships in the *i*.LON 100 will be installed to `<LonWorks>\iLON100\Images\BootROM\iLON100 3.00\bootrom.upd`. To update the bootrom, follow these steps":

1. Reboot the *i*.LON 100 server using the console. When the console reads "`Press the '!' key to stop auto-boot`", press '!'. The *i*.LON 100 server will reboot to the bootrom state, halting all applications.

2. FTP the `bootrom.upd` file into your *i*.LON100 /root directory and update the bootrom by executing the **update bootrom** command. If the bootrom file name is different than the default (`bootrom.upd`), specify the actual file name as an additional parameter.

3. When the update completes, it will automatically reboot your *i*.LON100 system.

See Appendix B, *Managing the i.LON 100 Server*, information on updating other *i*.LON firmware.

NOTE: Do not interrupt the bootrom update process. Doing so will render the *i*.LON 100 server unable to boot. If this happens, you will need to ship your *i*.LON 100 server back to Echelon to be repaired.

Appendix D

Web Server Parameters Utility

This chapter describes how to use the *i.*LON 100 Web Server Parameters utility to restrict the viewing and modification of custom *i.*LON 100 Web pages.

Overview of *i*.LON 100 User Web Page Security

You can configure the *i*.LON 100 Web server to use basic authentication for request messages sent to the *i*.LON 100 server, meaning that each Web client that attempts to access a realm defined on the *i*.LON 100 web server must authenticate itself with the user name and password defined for the *i*.LON 100 server. You can define realms, as well as the user names and passwords required to access each realm, with the *i*.LON 100 Web Server Parameters Utility, as described in this appendix. For more information on basic authentication, see the following Web site:

www.faqs.org/rfcs/rfc2617.HTML

You can also restrict access to files in the *i*.LON 100 server's `/root/Web` directory to provide Web page security. You may secure the access by user name/password, source IP address, or by the location of the resource (URL). You will define Web page security using the *i*.LON Web Server Parameters utility. This utility is included with the *i*.LON 100 software and is accessible from the *i*.LON 100 program folder by clicking **START > PROGRAMS > Echelon *i*.LON 100 > *i*.LON 100 Web Server Security and Parameters**. The *i*.LON Web Server Parameters utility creates a `WebParams.dat` file that you must transfer to the *i*.LON 100's root directory. (`/root/WebParams.dat`) with FTP.

The *i*.LON 100 server parses the `WebParams.dat` file on startup to establish Web page restrictions. The `WebParams.dat` file is stored as plain text with no encryption or password protection. This means that *i*.LON 100 security is protected from inspection by FTP security (user name and password) only. Be sure to set proper user names and passwords for FTP access to prevent the WebParams.dat file from being viewed, as described in the *i.LON 100 Server Security* section on page 55. Also, be sure to secure the computer that you use to create the `WebParams.dat` file.

The *i*.LON 100 server's factory default `WebParams.dat` file allows access to all files found under `/root/Web` from any location by any user. To modify the existing *i*.LON 100 Web security you have to create a new `WebParams.dat` file, or modify the existing one. After modifying the `WebParams.dat` file, transfer the updated file using an FTP application to the *i*.LON 100 server, and then reboot the *i*.LON 100 server for the new security settings to take effect.

To change the security settings on an *i*.LON 100 server, follow these steps:

1. Use FTP to download the existing `WebParams.dat` file from the `/root` directory of the *i*.LON 100 server.

2. Start the *i*.LON Web Server Parameter utility, and open `WebParams.dat` (**File** > **Open** command).

3. Make the required security changes and save the `WebParams.dat` file using the **File** > **Save** command. The changes you will need to make are described in the next section, *Setting Access Restrictions*.

4. Use FTP to upload the `WebParams.dat` file to the *i*.LON 100 server's `/root` directory.

5. Reboot the *i*.LON 100 server to activate the security changes.

Setting Access Restrictions

Security realms are used to define the *i*.LON 100 server's security access restrictions. A *realm* is defined to be the combination of URL (folder in *i*.LON 100 server), group (users group name), and location (IP address range from where the URL may be accessed). The realm defines which files (URL) can be accessed by which users (group) and from which IP addresses (location).
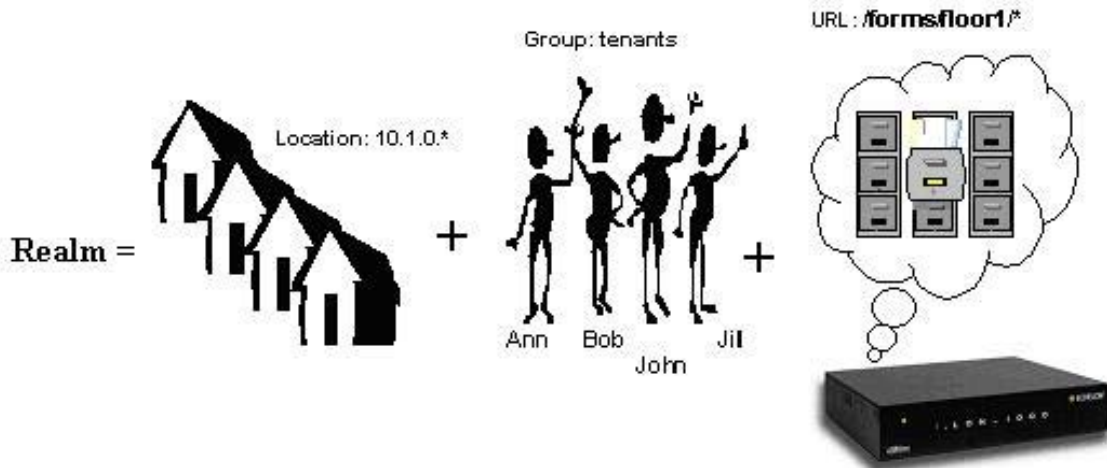
Figure D.1 *i*.LON 100 Server Security Realm

URLs are defined with the assumption that you are starting from the root of the Web site, and not the *i*.LON 100 server. For example, to restrict access to http://building10/forms/floor3/ the URL must be defined as "/forms/floor3/*". The wildcard is required in order to place this setting across the entire directory. To restrict access to the whole site you need to use the URL "/*." Figure D.2 shows examples of URLs (**the leading "/" is required syntax**).

URL: **/***   URL: **/forms/***   URL: **/forms/floor3/***
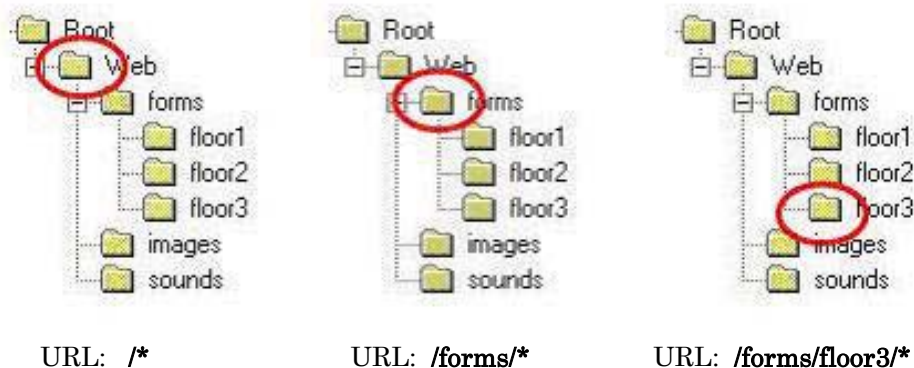
Figure D.2 Example URLs

Users and Groups

Each person who will be given access (*i.e.* a user name and password) to the *i*.LON 100 server is called a *user*. Users are organized into groups. All users in a given group will have identical access. A group must contain one or more users. A group can contain a maximum of 16 users. This limit is not enforced by the Web Server Parameter utility. If you add more than 16 users to a group, the *i*.LON server will ignore all users after the 16th. If each user must have different access rights, you must define a group for each user.

In order to define a group you must first define a list of users and passwords. For example:

```
Ann : boxcar
Bob : trumpet
John : foxtrot
Jill : mustang
superuser : sfs43fs6f
```

Users should be grouped together based on the *i*.LON 100 Web folders that they are going to access. For example, if Ann, Bob, Jill and John live in the same building, you could group them by floor. Ann, Bob, and Jill have apartments on the second floor, Bob also happens to have a workshop on the first floor. Finally, John has an apartment on the third floor. The property management company maintains the Web site. Their Web master has the access name superuser. Table D.1 shows which users are to have access to which folders:

<div align="center">Table D.1 Example i.LON 100 Web Page Security Chart</div>

	floor 1	floor2	floor3
Ann		X	
Bob	x	X	
Jill		X	
John			x
Superuser	x	X	x

The *i*.LON security mechanism allows each user to be a member of one group only. Thus, the 4 groups will need to be created: one for access to floor 1 and floor 2 for Bob, one for access to floor 2 for Ann and Jill, one for access to floor 3 for John, and for access to all floors for superuser.

To set up the users and groups described above, follow these steps:

1. Setup user names and passwords with the **Users** tab of the *i*.LON Web Server Parameters utility.
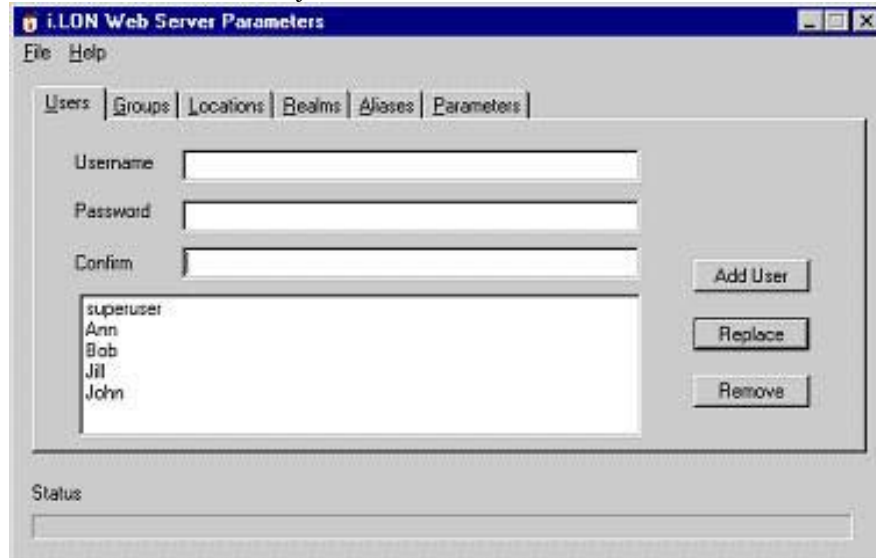
<div align="center">Figure D.3 Web Server Parameters Utility – Users Tab</div>

2. Once all the user names and passwords have been entered, create the necessary groups with the Groups tab.
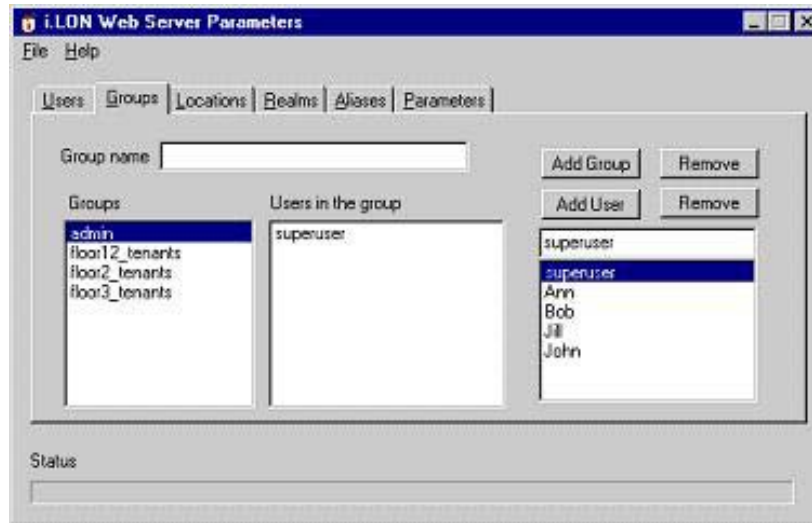
Figure D.4 Web Server Parameters Utility – Groups Tab

3. Finally, add users to specific groups by selecting the group and then clicking the **Add User** button for each user you want to add to the group.

NOTE: If you create 16 or more groups of users, you may need to change some of the parameters as described in the *Parameters* section later in this chapter.

Locations

Locations are defined as ranges of IP addresses from which a particular group of users can access a particular folder. "*" is used as a wildcard. Table D.2 lists some example location settings.

Table D.2 Example Location Settings

Location Name	IP Address Range	Comments
All	*.*.*.*	Any IP address
Tenants	10.1.0.*	Any host with IP in the range 10.1.0.1 – 10.1.0.254 Note that 10.1.0.0 is a network address and 10.1.0.255 is a broadcast address, hence they are not included
Topgun	10.1.0.10	IP address of the host used by superuser (property manager) to update Web pages

Use the *i.LON Web Server Parameters* utility's **Locations** tab to define these locations, as shown in Figure D.5.
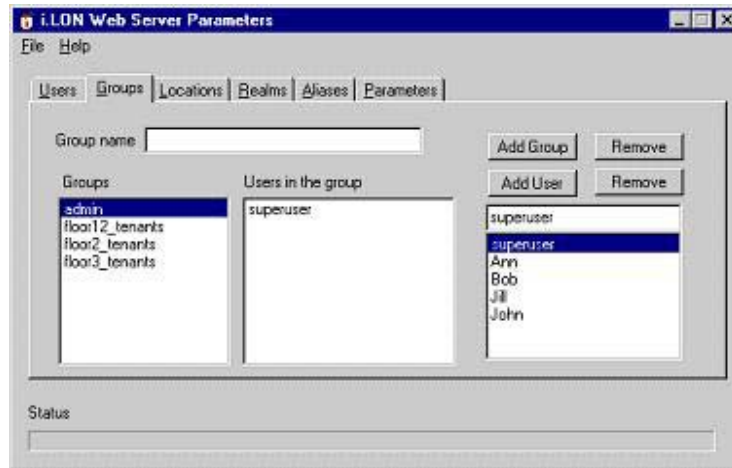
Figure D.5 Web Server Parameters – Locations Tab

If you declare a location "A" that happens to be a subset of another location "B," it is assumed that "A" is not included in the access rights of users in location "B." For example:

```
topgun: 10.1.0.10
tenants: 10.1.*.*
all: *.*.*.*
```

This declaration actually means that `tenants` is the whole range 10.1.*.* with the exception of 10.1.0.10. Similarly, `all` excludes 10.1.*.*.

Realms

Realms define the folders the various groups and locations are allowed to access. Each realm is defined using the format `URL:GROUP:LOCATION`, where users from the specified `GROUP` and `LOCATION` are given access to the specified `URL`. These values can be selected in the Realms tab of the *i*.LON Web Server Parameters utility.

For example, consider an *i*.LON 100 Web site that allows users to monitor occupancy information, temperature, and light level on the floor on which they live. This is a three-story building so we have floors 1, 2, and 3, with corresponding Web pages stored in folders under /forms: /forms/floor1, /forms/floor2, and /forms/floor3. There are five users that can access this site: superuser, Ann, Bob, Jill, and John. They belong to the following groups: tenants_floor12, tenants_floor2, tenants_floor3, and admin as described above.

Tenants are allowed to access Web pages of their floor only, but can login from any local host. Local hosts may have any IP address in the network 10.1.0.0 / 24 (*i.e.* 10.1.0.1 – 10.1.0.254). There is one "superuser" that designs Web pages, and has unlimited access to the Web site; for security reasons he or she will access the site from one host only, with IP address 10.1.0.10; the Web site should be restricted to any other users.

Based on this description, the **Realms** tab should appear as shown in Figure D.6.
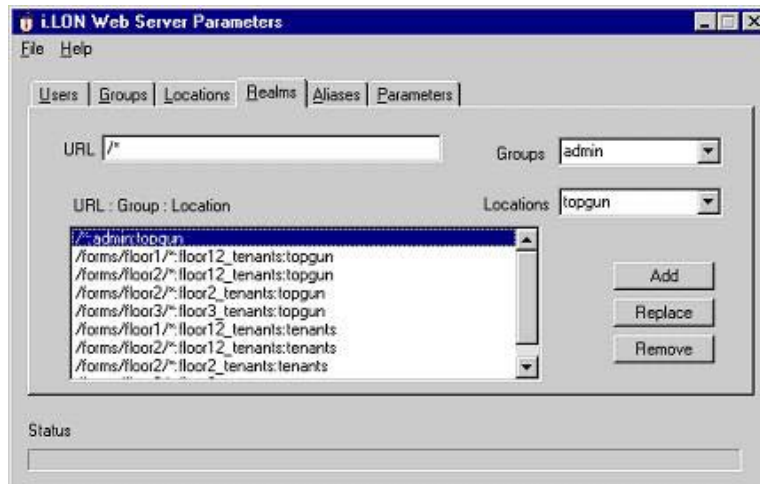
Figure D.6 Web Server Parameters Utility – Realms Tab

Aliases

Aliases allow redirecting URLs to other URLs in the web server directory structure. You can use aliases to create cross-references, or to define realms for Web page security.

The syntax for an alias is: `URL:Path`. The following example redirects a request made with the URL element **/forms/DIRA/Nvpage.HTML** and converts it to **/secureforms/Nvpage.htm**redirects all URLs ending in a slash to the index.htm file in the same path.

/forms/DIRA/*:/secureforms/*

Tip: Use the asterisk (*) as a wildcard in both the URL string and alias string. It must occur only once in the URL string and once in the alias string.

To create an alias:

1. Open the *i*.LON Web Server Parameters utility and then select the **Aliases** tab.

2. In **URL**, enter the URL that identifies the path to the web pages for which you wish to define an alias.

3. In **Path**, enter the path to which you wish to redirect.

4. Click **Add**.

5. Your new alias definition appears in the window.

Parameters

The **Parameters** tab appears as shown in Figure D.7.
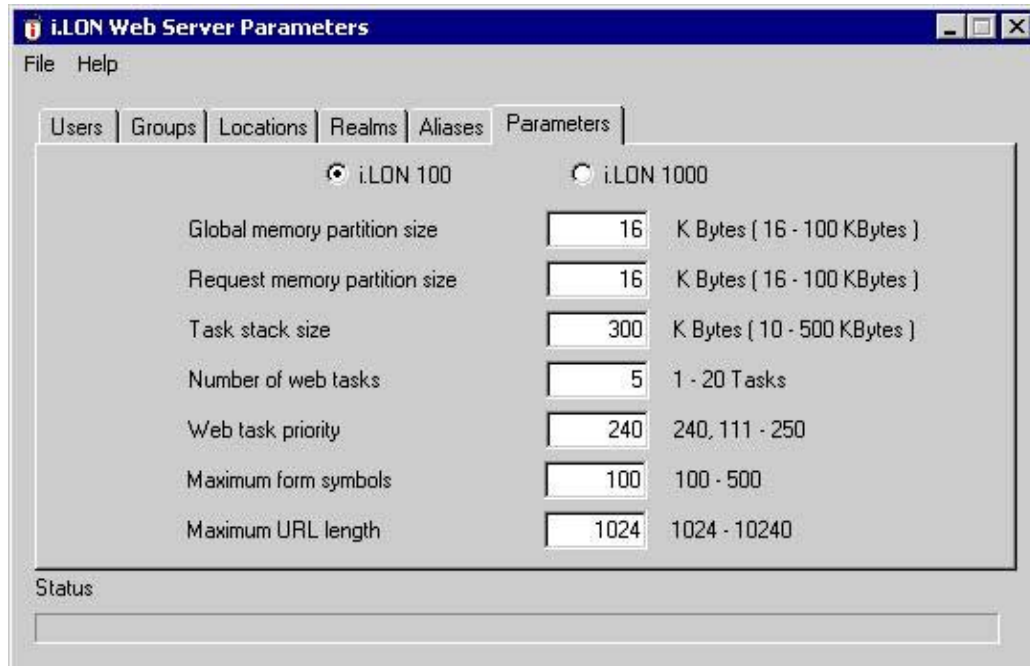
Figure D.7 Web Server Utility – Parameters Tab

Typically, you will not change any of the values in this tab. However, if you create 16 or more groups of users and you have trouble accessing the *i.*LON 100 server, the following changes are recommended:

Global memory partition size   80KB

Request memory partition size   80KB

Maximum form symbols   200

Maximum URL length   2048

Sample WebParams.dat file

The following WebParams.dat file was generated according to the scenario discussed above.

```
iLonSecurity 1.2
GlobalMemoryBytes:16384
RequestMemoryBytes:16384
TaskStackBytes:10240
NumTasks:1
TaskPriority:240
MaxSymbols:100
(Users)
admin:superuser:sfs43fs6t
floor12_tenants:Bob:trumpet
floor2_tenants:Ann:boxcar
floor2_tenants:Jill:mustang
floor3_tenants:John:foxtrot
(Locations)
all:*.*.*.*
tenants:10.1.*.*
topgun:10.1.0.10
(Realms)
/*:admin:topgun
```

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```
/forms/floor1/*:floor12_tenants:topgun
/forms/floor2/*:floor12_tenants:topgun
/forms/floor2/*:floor2_tenants:topgun
/forms/floor3/*:floor3_tenants:topgun
/forms/floor1/*:floor12_tenants:tenants
/forms/floor2/*:floor12_tenants:tenants
/forms/floor2/*:floor2_tenants:tenants
/forms/floor3/*:floor3_tenants:tenants
```

Appendix E

Creating a Web Page Using Web Tags

This appendix demonstrates how to create Web pages that serve data using web tags. The Contribute method described in Chapter 13 is the recommended way to create Web pages for the *i.*LON 100 server, as web tags will not be supported in future releases of the *i.*LON 100.

Overview of Creating *i*.LON 100 Web Pages Using Web Tags

The *i*.LON 100 server's embedded Web server application and the *i*.LON 100 server's embedded data server application work together to serve Web pages that reference network variables to a standard Web browser.

The *i*.LON 100 server's data server provides an anchor point to which both input and output network variables can be bound. Additionally, it knows how to pass the current value of network variables to the Web server, and how to accept data from the Web server to propagate to its output network variables.

Prior to serving a Web page to a browser, the Web server parses the page searching for a special HTML tag indicating a network variable reference. The Web server substitutes the current value of a network variable for this tag when returning information to the browser. Thus, any network variable defined on the *i*.LON 100 server can be referenced in a Web page just by incorporating the correct HTML tags.

Web pages may be constructed with any off-the-shelf HTML editor.

Using the *i*.LON 100 Server's Web Server

You can create HTML files for the *i*.LON 100 Web server with any standard text or HTML editor. The *i*.LON 100 Web server supports standard HTML for defining the structure and format of your Web page, as well as the `<ILONWEB>` HTML tag for retrieving dynamic data elements and processing HTML forms. The `<ILONWEB>` tag is an extended HTML tag designed to provide access to the *i*.LON 100 server's system and network variable data through a Web browser such as Internet Explorer 6 or better.

HTML files reside in a special directory on the *i*.LON 100 server's flash disk. Other related files such as graphics and Java applets may also be stored on the flash disk. Approximately 14MB of space is available for user files on the *i*.LON 100 server's flash disk. Files are read and written to the *i*.LON 100 server's flash disk using standard FTP over the IP connection.

An *i*.LON 100 server hosted Web page can expose any of the data points on the *i*.LON 100 server. See Chapter 4 for more information about data points. The following tutorial demonstrates how to read and write data points on the *i*.LON 100 server.

Required Hardware

You will need an *i*.LON 100 Internet Server with a TP/FT-10 channel for this tutorial.

Required Software

You will need the following software for this tutorial:

- LonMaker Integration Tool Release 3.1, Service Pack 2 (or higher) with the LonMaker Basic Shapes Stencil and the *i*.LON 100 Shapes Stencil.
- A standard FTP client application such as Internet Explorer.
- Microsoft Internet Explorer 6.0 or higher

Creating The LonMaker Network

This section describes how to create a simple LonMaker network using LonPoint devices and how to create a Web page through which that network can be monitored and controlled using an *i*.LON 100 server. Please refer to the LonMaker and LonPoint documentation for more information on performing the various LonMaker tasks described in this tutorial.

1. Set the *i*.LON 100 server's IP address, subnet mask, gateway, FTP user name, and FTP password using the *i*.LON 100 Web pages as described in *i.LON 100 User's Guide: Installing, Connecting, and Configuring the i.LON 100*

2. Create and open a new network using the LonMaker tool. This tutorial requires you to be attached to the network.

3. Drag an *i*.LON 100 device shape from the *i*.LON 100 Shapes stencil and name it "*i*.LON 100." Create and commission the *i*.LON 100 device.

4. Drag a **Alarm Generator** shape from the *i*.LON 100 stencil to the drawing. Associate it with the **Alarm Generator[0]** functional block on the *i*.LON 100 server.

Creating Web Pages

To create a simple Web page that will monitor and control the **nviAgCompare** input network variable and the **nvoAnAlmFlg** output network variable on the **Alarm Generator** functional block, follow these steps:

1. Use a text or HTML editor to input the following HTML code:

```
<HTML>
<head>
<title>Alarm Generator Status</title>
</head>
Setpoint = <iLonWeb FUNC=ShowValue
SYMBOL=NVL_nvoAgAlarmFlag[0]></iLonWeb><p>

</HTML>
```

The *i*.LON 100 server's built-in Web server understands the meaning of the special `<iLonWeb>` HTML tag. When the server returns a page to a requesting browser, the ***server*** parses the page and substitutes the <u>current value</u> of the network variable for the `<iLonWeb>` tag. (Those of you familiar with ASP or other server side substitution technologies will recognize this technique.)

This Web page displays the current value of **nvoAgCompare**.

2. Save the HTML text above as `inputs.htm`.

3. Upload `inputs.htm` to the *i*.LON 100 server's flash disk using a standard FTP program such as Internet Explorer 6 or later.

All Web pages must be in the directory named `Web` or in a subfolder of `Web`. Any page that references network variables must be placed in the `/root/Web/forms` directory or a subdirectory below `/forms`. Do not

place non-HTML files in the /forms directory; you may create other directories under /Web to store graphics and other content.

4. To retrieve the Web page enter
   http://24.1.7.251/forms/inputs.htm (where 24.1.7.151 is the *i*.LON 100 server's IP address) in the browser's URL window. You do not need to include the Web directory in the URL. Web is the implied root for all HTTP requests. The Web page displays as shown in Figure E.1.

Figure E.1 Web Page Displaying nvoAgAlarmFlag

Notice that the *i*.LON 100 server's Web server converts the network variable values to strings. The browser "sees" only text.

5. Open a new file using a standard text or HTML editor and enter the following HTML code:
```
<HTML>
<head>
<title>Output Test</title>
</head>
<form action="outputs.htm" method="get">
<iLonWeb_url>
<iLonWeb func=TextField type=text
symbol=NVL_nviAgCompare_056 size="20"></iLonWeb>
<p>
<input type="submit" value="Update Alarm Setpoint">
</form>
```

```
</HTML>
```

This HTML allows the output network variables defined on the *i*.LON 100 server's Web Server functional block to be controlled from a Web page. Since the NVL_nvoAgCompare data point controls the setpoint for the Alarm Generator, this will allow you to change the setpoint from the Web page. This code is described in detail in *How the HTML Code Works*, below.

6. Save this code as a file named `outputs.htm`. (The file name is important since the code references the file name in the *action* attribute of each form.) Using an FTP program, transfer the file to the *i*.LON 100 server's `Web/forms` directory, as you did for `inputs.htm`.

7. Enter `http://24.1.7.251/forms/outputs.htm` (where `24.1.7.251` is the *i*.LON's IP address) in the browser URL window to display the Web page shown in Figure E.2.
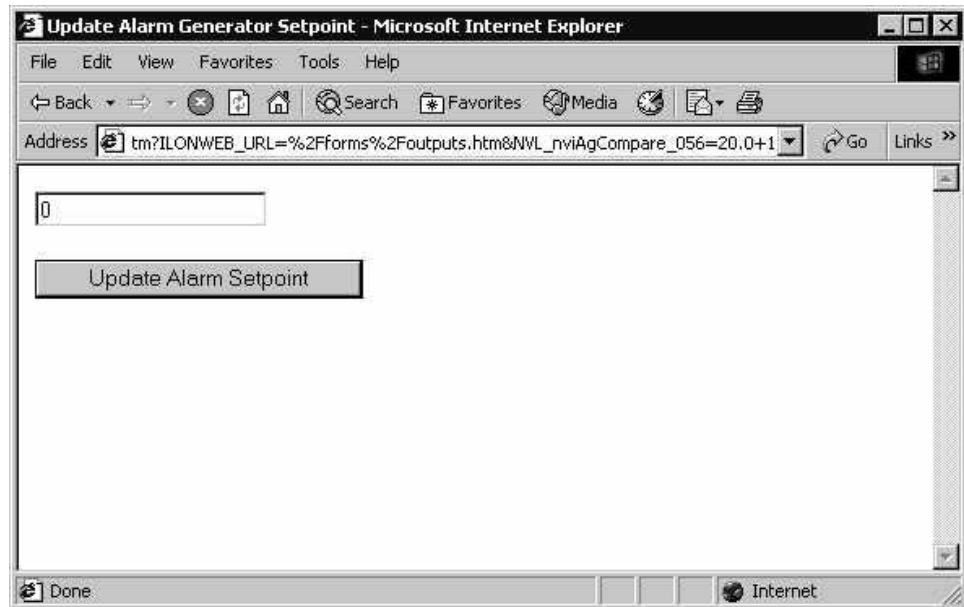
Figure E.2 Web Page Displaying Output Network Variable

Enter 10 in the text box and click **Update Alarm Setpoint**. The NVL_nviAgCompare_056 data point is updated; this in turn updates the `nviAgCompare` network variable on the Alarm Generator functional block.

How the HTML Code Works

Let's examine how this process works. Most Web servers have the ability to call utility programs through a CGI gateway. These utility programs usually do something simple like create a GIF image of a stock chart based on stock symbol provided by the user. Usually, the user types a stock symbol into a text box. When the user clicks the **Create a Chart** button, the stock symbol is passed to the chart-making program as a parameter. The chart-making program makes the chart, saves it as a .GIF file, and tells the server that it has completed its task. The server then serves a page back to the browser, referencing the newly created GIF file.

Updating an output date point uses a similar mechanism. When you click the
Update Alarm Setpoint button, you are submitting the content of the text box
(really the entire form) to the *i*.LON 100 server's Web server. The server passes
the form on to the form-processing engine through an internal *i*.LON 100 server
interface that is similar to CG*I*. The engine looks for the data point associated
with the text box, and then passes the value in the text box along with the data
point name to the *i*.LON 100 server's data server. The data server then
propagates value to the network variable associated with the data point.

```
<form action="outputs.htm" method="get">
```

This tag indicates the beginning of an HTML form. Forms may contain several
elements. For example, this form contains a textbox, and a submit button.

All forms have an *action* attribute. This attribute indicates which page will be
served next (after submittal). The *method* attribute indicates that the form-
processing engine should get all the values in the current form as a QueryString
when the submit button is pressed. The "post" method is not supported.

```
<iLonWeb_url>
```

The `<iLonWeb_url>` tag allows the *i*.LON 100 server to implement the
necessary security to prevent access to network variables on Web pages that are
outside of a user's access range. See the *i.LON 100 Server Security* section in
Chapter 2 for more information on setting up *i*.LON 100 server Web page
security.

```
<iLonWeb func=TextField type=text symbol=NVL_nviAgCompare_056
size="20"></iLonWeb>
```

Creates an element in a form that is associated with a local data point. In this
case the element is a textbox and the data point is `NVL_nviAgCompare_056`.

```
<input type="submit" value="Update Alarm Setpoint">
```

Standard HTML submit button. Every form must have some mechanism that
indicates the user has finished filling out the information in the textbox(s) and it
is time to send the information to the Web server. The most common method for
doing this is to use a submit button. The Web browser recognizes that when a
submit button click event occurs, it is time to send the form to the Web server
(the *i*.LON 100 server in our case) to process the form.

```
</form>
```

Indicates the end of an HTML form.

When the *i*.LON 100's Web server serves `outputs.htm` the above HTML code is
translated to look like the following:

```
<form action="outputs.htm" method="get">
<INPUT TYPE=HIDDEN NAME=iLonWeb_URL VALUE=/forms/outputs.htm>
<INPUT TYPE=text NAME=NVL_nviAgCompare_056 VALUE="0"
MAXLENGTH=31 SIZE="20" >
<p>
<input type="submit" value="Update Alarm Setpoint">
</form>
```

You can see the effect of the translation by viewing the source code in the browser. Notice that <iLonWeb_url> has been translated to <INPUT TYPE=HIDDEN NAME=iLonWeb_URL VALUE=/forms/outputs.htm>. The form-processing engine decides which network variables to update based on the hidden field. The form-processing engine will update all the network variables on the page listed in the *value* attribute of this hidden field. Because all data points are sent to the engine when the form is processed, it generally makes sense to have only one form per Web page.

Using The Web Server Functional Block

The *i*.LON 100 server contains a Web Server functional block. You can create dynamic network variables on this functional block and connect them to network variables on other devices in order to monitor and control these devices using the *i*.LON 100 server. However, the data points that you display in your Web pages are not limited to the dynamic network variables on these blocks. Any data point on the *i*.LON 100 may be referenced via an <ILONWEB> HTML tag. These blocks are provided to help you organize data points in your LonMaker drawing that are controlled solely via the Web. The following tutorial demonstrates how to create a simple LonMaker network and monitor and control two LonPoint devices using this method.

Required Hardware

You will need the following hardware for this tutorial:
- One *i*.LON 100 Internet Server (with A TP/FT-10 channel)
- One LonPoint DI-10 Digital Interface Module
- One LonPoint DO-10 Digital Output Interface Module

Required Software

You will need the following software for this tutorial:
- LonMaker Integration Tool version 3.1, service pack 2 (or higher) with the LonMaker Basic Shapes Stencil, the LonPoint Shapes Stencil, and the *i*.LON 100 Shapes Stencil.
- A standard FTP client application such as Internet Explorer.
- Microsoft Internet Explorer 6.0 or higher

Setting Up The Hardware

Physically attach the DI-10, DO-10, *i*.LON 100 server, and computer running the LonMaker tool to the TP/FT-10 channel. You can use the *i*.LON 100 server as an RNI (see Chapter 5) or use another LONWORKS interface such as a PCLTA-20 or PCC-10. Attach the *i*.LON 100 server to the 10BaseT network.

Creating the LonMaker Network

This section describes how to create a simple LonMaker network using LonPoint devices and how to create a Web page through which that network can be monitored and controlled using an *i*.LON 100 server. Refer to the LonMaker and LonPoint documentation for more information on performing the various LonMaker tasks described in this tutorial.

1. Set the *i.*LON 100 server's IP address, subnet mask, gateway, FTP user name, and FTP password using the *i.*LON 100 Web pages as described in the *i.LON 100 User's Guide: Installing, Connecting, and Configuring the i.LON 100*.

2. Create and open a new network using the LonMaker tool. This tutorial requires you to be attached to the network.

3. Drag a DI-10 device shape and a DO-10 device shape from the LonPoint Shapes stencil onto the LonMaker drawing and commission them. Set their state to OnLine.

4. Drag an *i.*LON 100 device shape from the *i.*LON 100 Shapes stencil and name it "*i.*LON 100". Create and commission the *i.*LON 100 device.

5. From the LonPoint stencil, drag four "Digital Input" functional blocks to the LonMaker drawing. Associate one with each input on the DI-10 device.

6. From the LonPoint stencil, drag four "Digital Output" functional blocks to the LonMaker drawing. Associate one with each output on the DO-10 device.

7. Select each LonPoint functional block, right-click it, and then select **Configure** from the shortcut menu. Disable heartbeats in both the input and output functional blocks as shown in the following figures. If you leave heartbeats on, it will be much more difficult to determine if the Web pages that you create later in this tutorial work as intended.
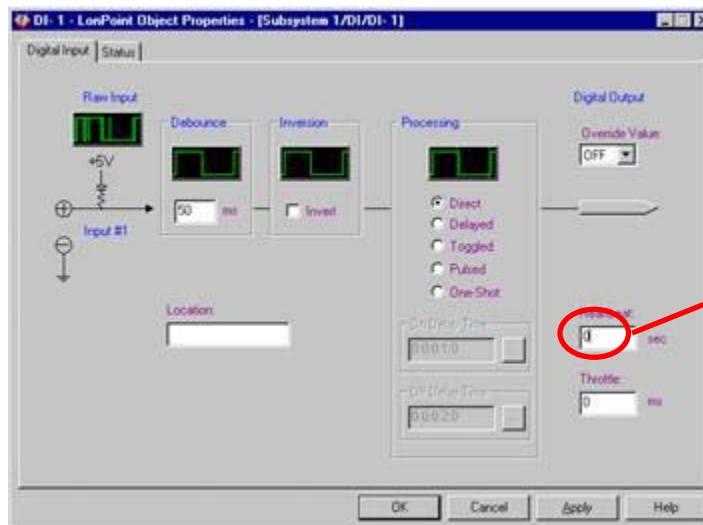
Set this value to zero for all **Digital Input** functional blocks.

Figure E.3 Disable Digital Input Functional Block Heartbeat
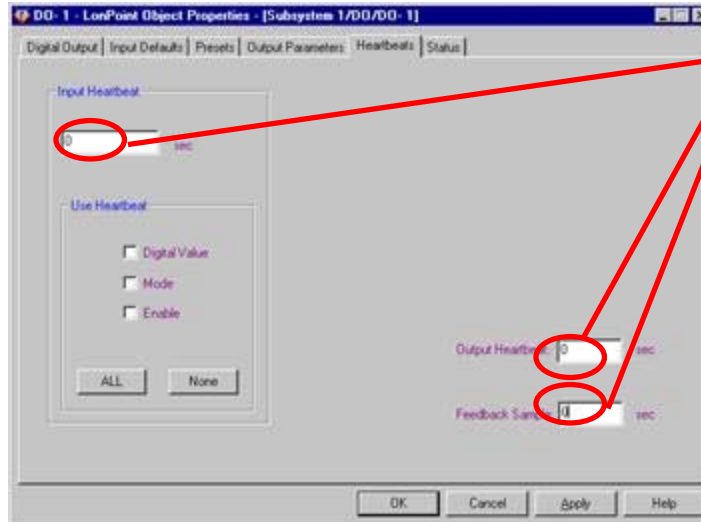
Set these values to zero for each **Digital Output** functional block.

Figure E.4 Disable Digital Output Functional Block Heartbeat

8. Drag a **Web Server** shape from the *i*.LON 100 stencil to the LonMaker drawing. Associate the functional block with the Web Server[0] functional block and name the functional block **Web Server**.

9. Dynamically create four input network variables on the **Web Server** functional block. Use the **Digital** output network variables on the DI-10 functional blocks as a basis for these network variables. Name these network variables `nvi1`, `nvi2`, `nvi3`, and `nvi4`.

10. Dynamically create four output network variables on the **Web Server** functional block. Use the **Digital** input network variables on the DO-10 functional blocks as a basis for these network variables. Name these network variables `nvo1`, `nvo2`, `nvo3`, and `nvo4`.

11. Connect the **Digital Input** functional blocks to the **Web Server** inputs, and the **Digital Output** functional blocks to the **Web Server** outputs, as shown in Figure E.5.
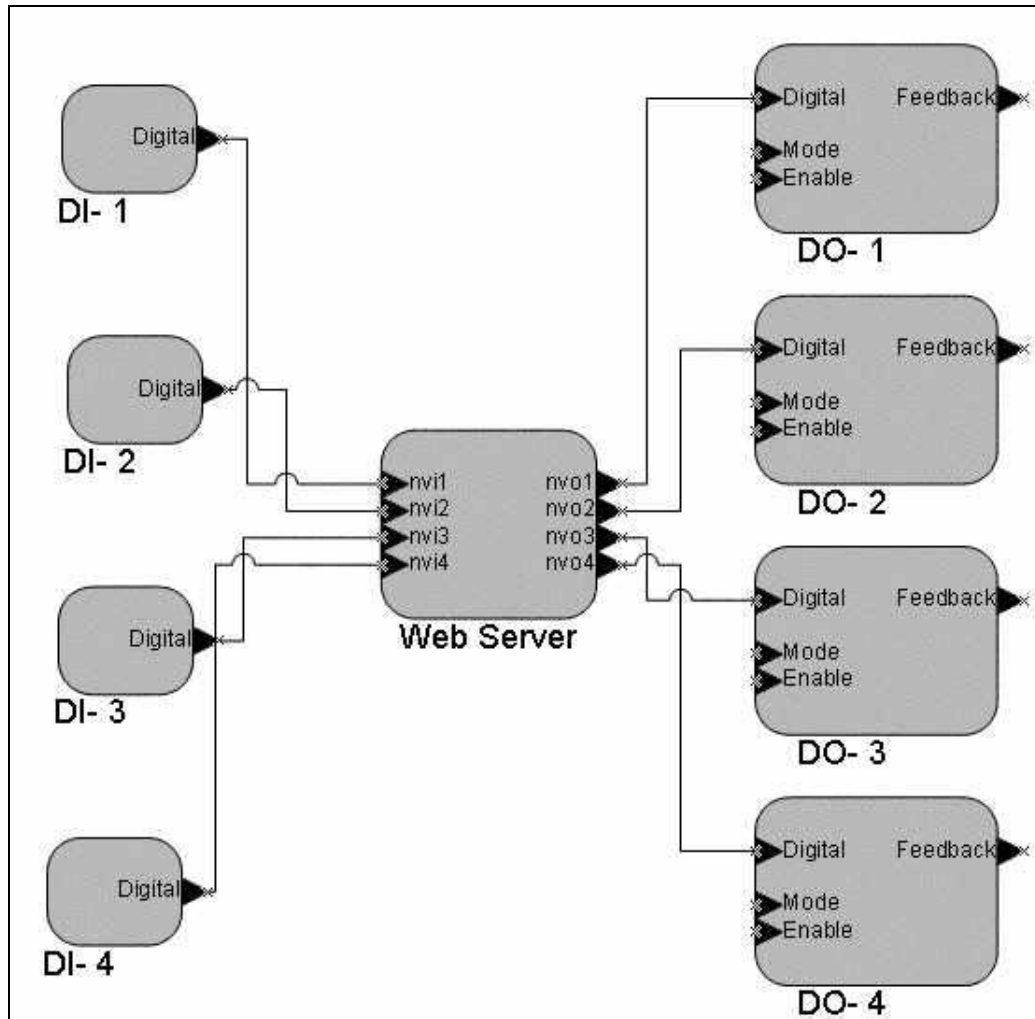
Figure E.5 Digital Input / Digital Output Functional Blocks

The Web Server functional block that you created can be used to monitor and control the network variables on the DI-10 and DO-10 devices through a Web browser. Next, you will write some HTML code and make references to the network variables on an *i*.LON 100 server's **Web Server** functional block.

Creating Web Pages

To create a simple Web page that will monitor and control the values of the network variables connected to the Web Server functional block (see *Creating the LonMaker Network*, earlier in this chapter), follow these steps:

1. Use a text or HTML editor to input the following HTML code:

    ```
    <HTML>
    <head>
    <title>Display Digital Sensors (inputs)</title>
    </head>
    nvi1 = <iLonWeb FUNC=ShowValue
    SYMBOL=NVL_nvi1_199></iLonWeb><p>
    nvi2 = <iLonWeb FUNC=ShowValue SYMBOL=NVL_
    nvi2_199></iLonWeb><p>
    ```

```
nvi3 = <iLonWeb FUNC=ShowValue SYMBOL=NVL_
nvi3_199></iLonWeb><p>
```

```
nvi4 = <iLonWeb FUNC=ShowValue SYMBOL=NVL_
nvi1_199></iLonWeb><p>
```

```
</HTML>
```

2. Save the HTML text above as `inputs.htm`.

3. Upload `inputs.htm` to the *i.*LON 100 server's flash disk using a standard FTP program such as Internet Explorer 6 or later.

4. To retrieve the Web page enter `http://24.1.7.251/forms/inputs.htm` (where 24.1.7.151 is the *i.*LON 100 server's IP address) in the browser's URL window. You do not need to include the `Web` directory in the URL. `Web` is the implied root for all HTTP requests.

   Assume that switches 1 and 2 are Off, and switches 3 and 4 are On. The HTML code entered in Step 1 generates the Web page shown in Figure E.6.
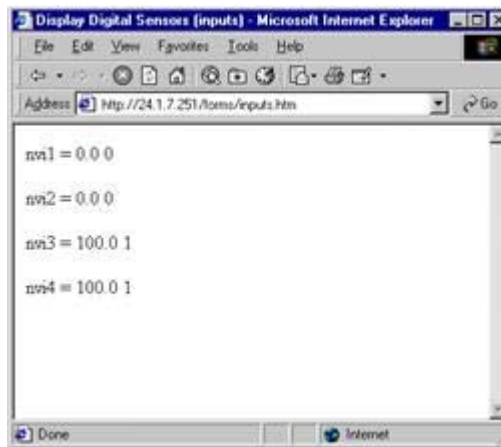
Figure E.6 Web Page Displaying Input Network Variable Values

   The *i.*LON 100's Web server converts the network variable values to strings. The browser receives only text.

5. Open a new file using a standard text or HTML editor and enter the following HTML code:

```
<HTML>
<head>
<title>Output Test</title>
</head>
<form action="outputs.htm" method="get">
<iLonWeb_url>
<iLonWeb func=TextField type=text symbol=NVL_nvo1_199
size="20"></iLonWeb>
<p>
<input type="submit" value="Update nvo1">
</form>
```

```
</HTML>
```

This HTML allows the output network variables defined on the *i*.LON 100's Web Server functional block to be controlled from a Web page. Since these network variables are connected to the Digital input network variables of the DO-10 device, this will allow you to change the output of the DO device from the Web page.

6. Save this code as a file named `outputs.htm`. (The file name is important since the code references the file name in the *action* attribute of each form.) Using an FTP program, transfer the file to the *i*.LON 100 server's `Web/forms` directory, as you did for `inputs.htm`.

7. Enter `http://24.1.7.251/forms/outputs.htm` (where `24.1.7.251` is the *i*.LON's IP address) in the browser URL window to display the Web page shown in Figure E.7.
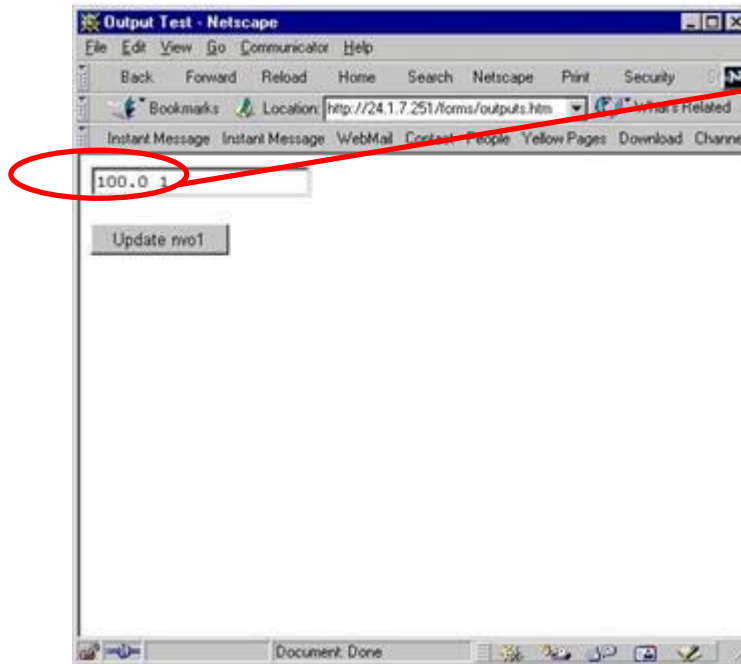
Manually enter "100.0 1" (the SNVT_switch value for ON) in the text box and click the **Update nvo1** button. This causes the *i*.LON to propagate its network variables.

Figure E.7 Web Page Displaying Output Network Variable

Enter 100.0 1 in the text box and click **Update nvo1**. The `NVL_nvo1_199` data point is updated; this in turn updates the `nvo1` network variable on the Web Server functional block.

`<iLonWeb>` Web Tag Format

The `<iLonWeb>` tag identifies variables, include files, and form elements used by the *i*.LON 100 Web server. The general syntax of the `<iLonWeb>` tag is:

<iLonWeb FUNC=*function* SYMBOL={NVL_|NVE_|ILON_|} *symbolname* >
</iLonWeb>

The content of the Web tag is defined by the *function* specified within the `<iLonWeb>` tag statement. Depending on the function, the Web tag can simply

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display a network variable value, or it can accept user input from a Web page displayed in a browser and change the value of a network variable. The appropriate network variable or internal *i.*LON 100 server system variable is specified within the `<iLonWeb>` tag using the SYMBOL attribute. The remaining attributes further qualify the behavior of the function, such as formatting the output or displaying a specific field within a network variable. These are described in further detail in this chapter.

While the *i.*LON 100 Web server parses and replaces the Web tags in its HTML files according to their function, it ignores all text between the <iLonWeb.> and </iLonWeb> tags. In contrast, a standard browser reading the same HTML file will ignore the Web tags and process the text between the tags. This feature can be useful when prototyping *i.*LON 100 Web pages in standard HTML editors. See *Working with Forms* later in this chapter for an example.

FUNC Attribute

Func=ShowValue

The ShowValue function displays the value of the variable identified with the SYMBOL attribute. The syntax of the ShowValue function is the following:

<iLonWeb FUNC=ShowValue SYMBOL=*symbolname*> </iLonWeb>

The following example shows the HTML required to display the current value of an input network variable named **localDigitalIn1** using the default text formatting. The network variable name is prefixed with "NVL_" indicating it is a local network variable. The *i.*LON 100's Web server uses the first few characters of the symbol name parameter to determine how the symbol is to be acquired. See the *Web Tag Symbol Names* section for more detail on symbol prefixes.

```
<HTML>
<body>
LocalDigitalIn1=<iLonWeb FUNC=ShowValue
SYMBOL=NVL_localDigitalIn1_199></iLonWeb>
</body>
</HTML>
```

FUNC=Include

The Include function allows you to include the contents of files. This function reads the contents of the file identified with the FILE attribute. The FILE attribute must specify the include path beginning with "/forms/". The include file can also contain `<iLonWeb>` tags. The syntax of the Include function is the following:

<iLonWeb FUNC=Include FILE=*incpath*> </iLonWeb>

The following example shows the Include function used in HTML to include the file called **localConfig.htm**.

```
<HTML>
<body bgcolor="#CCCCFF">
```

```
<iLonWeb func=Include FILE=/forms/localConfig.htm></iLonWeb>
</body>
</HTML>
```

FUNC=CreateSymbol

The CreateSymbol function creates a global variable on the Web server. You can use global variables for a number of tasks including passing the variable to another form, modifying its value, or using it to set up a counter. CreateSymbol is often used to pass variables between forms to use with Java scripts. The syntax of the CreateSymbol function is the following:

<iLonWeb FUNC=CreateSymbol SYMBOL=*User Symbol* VALUE=*user defined*> </iLonWeb>

User Symbol may be any name not starting with symbol prefixes used in the *Web Tag Symbol Names* section.

The following HTML example creates and tests a user-defined symbol called **sValue**. The CreateSymbol function is used to create the symbol, and the ShowValue function is used to display the value assigned to the symbol when it was created.

```
<HTML>
<body bgcolor="#CCCCFF">
<iLonWeb func=CreateSymbol symbol=sValue value="This is a
Test"></iLonWeb>
<p>ShowValue of sValue is <iLonWeb func=ShowValue
symbol=sValue></iLonWeb>
</body>
</HTML>
```

Form element functions include CheckBox, RadioButton, TextField, and TextArea. You can change the value of the symbol with the TextField function. See the *Working with Forms* section on page 309 for more information on these functions.

SYMBOL Attribute

The *i*.LON 100's Web server uses Web tag symbol names to identify and retrieve different types of *i*.LON 100 system data and network variable data that can be displayed in Web pages. Web tag symbol names have prefixes that determine their type as described in Table E.1.

Table **E.1** Web Tag SYMBOL Name Prefixes

Web Tag Symbol Name Prefix	Description
NVE_, NVL_, NVC	Data point type. NVE_ refers to external data points associated with network variables on remote devices that are polled by the *i*.LON 100 server. NVL_ refers to local data points associated with network variables local to the *i*.LON 100 Web server. NVC_ refers to constant data points created on the *i*.LON 100 server. See Chapter 4 of this document for more information about data points.
ILON_	Refer to system variables generated inside the *i*.LON 100 system software. These values cannot be changed through HTML forms; you can change the values through the *i*.LON 100 console application or the Configuration Web pages, depending on the symbol.
User Defined	Other prefixes that can be used as local Web tag symbols in forms once created with the CreateSymbol tag.

Data Point Symbols (NVL_, NVE_, and NVC_ Prefixes)

You can use three types of data point references in *i*.LON 100 Web server Web pages: local data point references, external data point references, and constant data point references.

Local data point references cause the *i*.LON 100 to return the value of the network variable associated with the local data point (assuming that something is bound to the local network variable) and allow event-driven updates to be reported on Web pages. Reading and writing of local data points is accomplished through the use of the NVL_ symbol, described below.

You can create external data points with the *i*.LON 100 Configuration Plug-in. The network variable associated with an external data point is not located on the *i*.LON 100 server, but exists elsewhere in the LONWORKS network. You have read-only access to external data points associated with output network variables and read-write access to external data points associated with input network variables. Reading and writing of external network variables is accomplished through the use of the NVE_ symbol, described below.

You can create constant data points with the *i*.LON 100 Configuration Plug-in. A constant data point is not associated with a network variable but with a fixed value contained in the *i*.LON 100. You have read-write access to constant data points. Reading and writing of constant data points is accomplished through the use of the NVC_ symbol, described below.

Local Data Point Symbols (NVL_ Prefix)

In general, it is best to use local data points as much as possible for reduced network traffic and simplified maintenance. For example, if an output network variable is bound to the *i*.LON 100 server, the *i*.LON 100 server will get value updates for the remote output whenever its value changes. The Web server can query the value of the local data point without producing any LONWORKS network traffic. If the same network variable is monitored through an external data point (NVE_), a value query message will be sent by the data server on a

regular interval. See Chapter 4 of this document for more information on data points.

Local data point symbol names are prefixed with NVL_ when specified in the `<iLonWeb>` tag. For example:

`<iLonWeb Func=ShowValue SYMBOL=NVL_nvitemp_199> </iLonWeb>`

Since the network variable is defined locally, the Web server is aware of its type, size, and format. The syntax for a local network variable reference is the following:

NVL_*nvProgrammaticName*

The *nvProgrammaticName* is the programmatic name of the network variable on the *i*.LON 100 server.

For example, the action of the following ShowValue function will display the contents of the **DigitalOut** local network variable.

`<iLonWeb FUNC=ShowValue SYMBOL=NVL_DigitalOut_199> </iLonWeb>`

External Data Point Symbols (NVE_ Prefix)

While it is normally advantageous to use local data points, there are several cases where this method does not work:

- Your network tool does not know how to create dynamic network variables.
- Your system is pre-installed, or self-installed and thus has no network tool.
- Your system is installed on the zero-length domain.
- You can create dynamic network variables, but you need so many that you run out of address table entries.

In these cases, you need to poll the network variables on the network without binding them to network variables on the *i*.LON 100 server. Because the network variable is not local to the *i*.LON 100 server, the external data point must be explicitly created. You can create external data points for any network variables in the network by creating an XML NVE driver file; this can be done using the *i*.LON 100 Configuration Plug-in as described in Chapter 4 of this document, or manually as described in the *i*.LON 100 Programmer's Reference. This approach has the following disadvantages:

- You must manually assign addresses for the external data points.
- You must manually update the addresses if they change for any reason, such as a change in your network configuration.

External data point symbol names are prefixed with NVE_ when specified in the **`<iLonWeb>`** tag. For example:

`<iLonWeb Func=ShowValue SYMBOL=NVE_nviSwitch> </iLonWeb>`

The *i*.LON 100 data server will look up the name of the external data point in the NVE driver file and serve the appropriate value to the Web server.

When an external data point is created, its name appears in the **External Points** tab of the *i*.LON 100 Configuration Plug-in. This name must be used when specifying the external data point in the **`<iLonWeb>`** tag. External data point names are always prefixed with `NVE_`.

Constant Data Point Symbols (NVC_ Prefix)

Constant data point symbol names are prefixed with NVC_ when specified in the **`<iLonWeb>`** tag. For example:

`<iLonWeb Func=ShowValue SYMBOL=NVC_myConstant> </iLonWeb>`

The *i*.LON 100 data server will look up the name of the constant data point in the NVC driver file and serve the appropriate value to the Web server.

When a constant data point is created, its name appears in the **Constants** tab of the *i*.LON 100 Configuration Plug-in. This name must be used when specifying the constant data point in the **<iLonWeb>** tag. Constant data point names are always prefixed with NVC_.

System Symbols (ILON_ Prefix)

System symbol names are specified in the <iLonWeb> tag with the SYMBOL= attribute to display *i*.LON 100 server information. System symbol names are prefixed with "ILON_."

The system symbols in Table E.2 are used with the ShowValue tag to display information from the *i*.LON 100 server.

Table E.2 System Symbol Names (ILON_ Sys) Used With ShowValue

Web Tag Symbol	Description
iLon_Sys_IpAddress	The IP address of the *i*.LON 100 server, *e.g.* 10.1.253.101.
iLon_Sys_IpMask	The IP subnet mask of the *i*.LON 100 server, *e.g.* 255.255.255.0.
iLon_Sys_IpName	The hostname name of the *i*.LON 100 server, *e.g.* iLonDataSvr01
iLon_Sys_Gateway	The IP address of the gateway device, *e.g.* 10.1.253.1
iLon_Sys_DhcpEnabled	1 if DHCP is enabled, 0 [zero] if not enabled.
iLon_Sys_CurrentIpAddress	The current IP address. If you change the IP address, the change will not take place until the *i*.LON 100 server is reset.
iLon_Sys_CurrentIpMask	The current IP subnet mask. If you change the subnet mask, the change will not take place until the *i*.LON 100 server is reset.
iLon_Sys_CurrentGateway	The IP address of the current gateway device. If you change the gateway, the change will not take place until the *i*.LON 100 server is reset.
iLon_Sys_MacAddress	The Ethernet MAC address of the *i*.LON 100 server, *e.g.* 00-23-34-45-56-AB
iLon_Sys_DNSServer1	The IP address of the first DNS Server.
iLon_Sys_DNSServer2	The IP address of the second DNS Server.
iLon_Sys_IpDomain	The domain name for the DNS server.
iLon_Sys_LtUids	The Neuron IDs available in the *i*.LON 100 server for LONWORKS applications.
iLon_Sys_LtXcvrId	The LONWORKS transceiver ID of the attached transceiver.
iLon_Sys_HttpPort	The IP port used by the LONWORKS IP communications software. Normally 1628.

Web Tag Symbol	Description
iLon_Sys_ConfigServer	The IP address and port of the Configuration Server, if any. The port follows the address after a colon, *e.g.* 10.1.253.34:1629
iLon_Sys_TimeServer1	The IP address and port of the first time server, *e.g.* 10.1.0.1:123
iLon_Sys_TimeServer2	The IP address and port of the second time server, *e.g.* 10.1.0.1:123
iLon_Sys_TimeSynched	1 for synchronized with a server, 0 for not synchronized.
iLon_Sys_TimeLastSynched	The time in Unix format at which the time was last synchronized with a time server.
iLon_Sys_Date	The date in Unix format of the local date on the *i*.LON 100 server.
iLon_Sys_Time	The time in Unix format of the local time on the *i*.LON 100 server.
iLon_Sys_TimeZone	The time zone settings for the *i*.LON 100 server. This includes both the offset from universal coordinated time (UTC) and the settings for daylight savings time.
iLon_Sys_LONWORKS_Addr	The domain/subnet/node address of the *i*.LON 100 server in the LONWORKS network.
iLon_Sys_FtpUsername	The FTP username for the *i*.LON 100 server.
iLon_Sys_FtpPassword	The FTP password for the *i*.LON 100 server.
iLon_Sys_AutoAnswer	1 if dial-in to the *i*.LON 100 server is enabled. 0 if it is not.
iLon_Sys_TelnetEnable	1 if telnet access to the *i*.LON 100 server console application is enabled; 0 if it is not.
iLon_Sys_FtpEnable	1 if FTP access to the *i*.LON 100 server is enabled; 0 if it is not.
iLon_Sys_RniEnable	1 if RNI access to the *i*.LON 100 server is enabled; 0 if it is not.
iLon_Sys_SOAPEnable	1 if SOAP access to the *i*.LON 100 server is enabled; 0 if it is not.
iLon_Sys_AuthKeyRaw	The raw 16 byte MD5 authentication key.
iLon_Sys_AuthKeyHashed	The hashed 16 byte MD5 authentication key.
iLon_Sys_LtUids	The Neuron ID of the *i*.LON 100 server.
iLon_Sys_CENELECEnable	1 if the CENELEC protocol is enabled on the *i*.LON; 0 if it is not.
iLon_Sys_LnsServer1	The IP address/host name and port of the primary LNS Server (*i.e.* 128.45.5.2:2020 or myilon.abccorp.com:2020).

Web Tag Symbol	Description
iLon_Sys_LnsServer2	The IP address/host name and port of the secondary LNS Server.
iLon_Sys_LnsServer3	The IP address/host name and port of the tertiary LNS Server.
iLon_Sys_RNIPort	The port on which the *i*.LON 100 server listens for RNI connections.
iLon_Sys_RniMaxIdleTime	The maximum idle time before the *i*.LON 100 server terminates an idle RNI connection.
iLon_Sys_MailServer	The IP address/host name and port of the SMTP mail server used to send Alarm Notifier emails.
iLon_Sys_MailLogin	The login in name required by the SMTP mail server.
iLon_Sys_MailPassword	The password required by the SMTP mail server.
iLon_Sys_MailOriginator	The email address that will be seen in the **From** field of emails sent by the *i*.LON 100 server.
iLon_Sys_FreeDiskSpace	The amount of free disk space on the *i*.LON 100 server.
iLon_Sys_DataLogFull	The percentage of the data logging space on the *i*.LON 100 server that is currently full.
iLon_Sys_TraceFile	The name of the console application trace file.
iLon_Sys_NumNVs	The number of network variables on the *i*.LON 100 server.
iLon_Sys_PhoneNumbers	The phone number of the *i*.LON 100 server.
iLon_Sys_UplinkNVUpdate	1 to initiate an uplink connection on any network variable update; 0 to not do so.
iLon_Sys_UplinkExpMsg	1 to initiate an uplink connection on any explicit message update; 0 to not do so.
iLon_Sys_UplinkExplicitCode	1 to initiate an uplink connection on any explicit message update with an explicit message code in the range defined by iLon_Sys_UplinkExplicitCodeVal; 0 to not do so.
iLon_Sys_UplinkExplicitCodeVal	The range of explicit message codes to be used if iLon_Sys_UplinkExplicitCode is set. The format for this range is *xx-yy* where *xx* and *yy* are integers between 00 and 79 and *xx* is less than *yy*.
iLon_Sys_DnsServerViaDhcpEnabled	1 to get the primary DNS server via DHCP; 0 to not do so. Does not get the secondary DNS server.
iLon_Sys_DnsDomainViaDhcpEnabled	1 to get the DNS domain suffix via DHCP; 0 to not do so.
iLon_Sys_RemoteRebootEnable	1 to allow the *i*.LON 100 to be rebooted remotely; 0 to forbid remote reboots. This value can only be changed in security access mode.

Web Tag Symbol	Description
iLon_Sys_SecureAccessAlways	1 to allow properties that normally can only to be changed in security access mode to be changed at any time; 0 to have security access mode function normally. This value can only be changed when in security access mode. That setting this value to 1 makes the *i*LON 100 less secure.

Two types of memory for processing Web requests are pre-allocated when the Web server starts: **global memory**, which is used by all the Web tasks, and **per-request** memory, which is used by a particular Web task for the duration for one request. The symbols in the following table allow a page to obtain memory information. For example, in the CreateSymbol function, some of the parameters and security information use the global partition while the request partition is used by the current request only. The global symbols can be placed in any pages after the pages that perform CreateSymbol are used. The request symbols should be placed at the end of pages that process the most complex requests. All of the following symbol values are expressed in bytes.

Table E.3 System Symbol Names (ILON_ Prefix) Used to Obtain Memory Information

Web Tag Symbol	Description
ILon_Mem_RequestPartTotal	Total memory allocated to process requests.
ILon_Mem_RequestPartFree	Free memory in a request partition.
ILon_Mem_RequestPartLargest	Largest free block in a request partition.
ILon_Mem_RequestPartUsed	Used memory in a request partition.
ILon_Mem_GlobalPartTotal	Total global memory allocated.
ILon_Mem_GlobalPartFree	Free memory in a global partition.
ILon_Mem_GlobalPartLargest	Largest free block in the global partition.
ILon_Mem_GlobalPartUsed	Used memory in a global request partition.

Web Tag Attributes

When a network variable is specified with the NVL_ or NVE_ symbol in the SYMBOL= attribute of the `<iLonWeb>` tag, four optional attributes may be used to further define how a network variable is displayed or changed.

FIELD:

FORMAT:

PROPAGATE:

WAIT:

The attributes may be used in any combination within a single `<iLonWeb>` tag with the exception of **WAIT:**. **WAIT:** must be used in conjunction with **PROPAGATE:**. The colon (:) is required as part of the syntax. If Web tag attributes are used, use the exclamation point (!) to delimit the attributes. For example:

```
<iLonWeb FUNC=TextField
SYMBOL=NVL_DigitalOut!FIELD:value!PROPAGATE:TRUE> </iLonWeb>
```

The Web tag in the example above will display the contents of the field called **value** contained in the local network variable, **Digital_Out**. The value will be displayed as a read-write value in a text field. If the form containing this text field is submitted, the new value will be propagated onto the network immediately.

FIELD:

Network variables may contain fields that vary according to the network variable type. The contents of these fields can be displayed and changed by specifying the field name with the **FIELD:** attribute.

For example, the SNVT_switch type contains two fields: **value** and **state**. To display the contents of the **value** field in the local network variable **DigitalOut**, use the following tag.

```
<iLonWeb FUNC=ShowValue SYMBOL=NVL_DigitalOut!FIELD:value>
</iLonWeb>
```

Important! The default value of the **PROPAGATE:** attribute is False when operating on a network variable field. For further information, see *PROPAGATE:*.

FORMAT:

You may assign a format to a network variable to control how the data is displayed and changed in your Web page. Specify the format of the network variable using the **FORMAT** attribute.

Network variable formats can come from the following three places:

Standard Resource File Set

This is a set of files that describes the data structures within standard network variable types (SNVTs) and standard configuration property types (SCPTs) and also describes the formats to be used for display of SNVT and SCPT data. On the *i*.LON 100, these files may be found in the `/root/lonworks/types` directory, and are named `STANDARD.ENU`, `STANDARD.TYP`, `STANDARD.FMT`, and `STANDARD.FPT`.

The default format for a SNVT is its native format, as described in the `STANDARD.FMT` text file within the resource file set. To assign a different SNVT or SCPT format, or to assign a SNVT or SCPT format to a user network variable type, explicitly assign the format type. For example:

```
FORMAT:SNVT_switch
```

User Resource File Sets

These are sets of files created by device manufacturers to describe manufacturer-defined user network variable types (UNVTs) and user configuration property types (UCPTs). Using the same mechanisms as the standard resource file set, they describe how to format data from a particular manufacturer's device. On the *i*.LON 100, all resource files will be found in the `/root/lonworks/types` directory.

UNVT and UCPT formats can be specified using the format name of the form:

`[`**`#`**`progamID`**`[`**`selector`**`].]`*`formatName`*

The program ID is optional; if it is not supplied, the Program ID of the *i.*LON 100 server will be used. In this syntax, the **bold** "**#**", "**[**", "**]**" and "**.**" characters are literal characters. The program ID is represented as a hex byte string (in the "RAW_HEX_PACKED" format described below). The selector is a one-digit string from 0 to 6, and the format name syntax is similar to that used for SNVT and SCPT types, except that the type name starts with "UNVT" or "UCPT" instead of "SNVT" or "SCPT". For example:

`FORMAT:#8011223344556677[1].UNVT_switch`

Built-in Formats

The underlying formatting engine provides built-in formats, including **RAW**, **RAW_HEX**, **RAW_HEX_PACKED**, **FLOAT_TEXT**, **STRING**, and **UNIT_TEXT**. All of these formats display the network variable data byte-by-byte, in the same order that the bytes arrive on the network (the Neuron Chip has big endian byte ordering, the opposite of the Pentium's little endian ordering, and network variable data must be in big endian order on the LONWORKS network). The **RAW** format displays the data as decimal byte values, with each byte separated by a space. The **RAW_HEX** format displays the data as hexadecimal byte values, with each byte separated by a space. The **RAW_HEX_PACKED** format displays each byte as a two-digit hex value, with no spaces in between the byte values.

The **RAW_HEX_PACKED** format is the default format for UNVT network variables that do not specify a format.

PROPAGATE:

The **PROPAGATE:** attribute allows you to specify whether a value should be transmitted across the network immediately, or buffered. For example:

```
<iLonWeb FUNC=TextField
SYMBOL=NVL_DigitalOut_199!FIELD:value!PROPAGATE:TRUE></iLonWeb
>
```

The **PROPAGATE:** attribute defaults to TRUE when a tag references a complete network variable, and FALSE when a tag references a network variable field. Network variable fields may not be manipulated individually over the LONWORKS network—the entire network variable value can be changed, but not one field at a time. These default settings are designed to assure that updates are consistently delivered for the specified network variable. In addition, it is typically more efficient to update several fields and propagate the network variable once, instead of causing propagation for each field update.

If your HTML form sets a network variable value field-by-field, set the **PROPAGATE:** attribute to False for all of the network variable field tags in the form except the last one. The last **PROPAGATE:** attribute of TRUE will cause the network variable value to be propagated over the network. If you set

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PROPAGATE: to True for each field, some fields may contain indeterminate values in the network variable update, which should not be propagated.

WAIT:

The **WAIT:** attribute allows you to specify whether to wait for the acknowledgement of a write command. Using the wait feature, you may test whether a local output network variable's update is acknowledged by the remote inputs. The test will only be valid if the local output network variable is connected to one or more remote network variables by the acknowledged address services. If the connection is made by an unacknowledged message service, the test will always return a positive response, even if the network variable update did not reach its target.

To perform the test, follow these steps:

1. Set the **WAIT:** attribute to TRUE by adding `!WAIT=TRUE` to the Web tag responsible for writing the network variable. This causes the data server to wait for an acknowledgement (ACK) or failure from the network variable update before returning from processing that field.

2. Modify the Web page so it reads back the results of the acknowledgement. Following the update tag, place a **ShowValue** tag for the same network variable and specify a field name of "$ErrStatus" (`!FIELD:$ErrStatus`). This field returns the value of the network variable's error status.

If all of the expected acknowledgments were received, the returned error string will be empty. If any acknowledgements failed, the string "No acknowledgement from remote network variable" will be returned. Since an empty error string will be returned on success, you can always display the error string, perhaps in a color indicating that an error condition exists.

Working with Forms

Forms are used in Web pages to get information from end users. HTML form elements allow you to present and collect that information by using input objects such as text boxes and check boxes. **Only one form is recommended for each page.** See *Form Element Functions* later in this manual for further information.

A function within the *i*.LON 100 Web tag, called a *form element function*, invokes a routine that performs a specific task. The form element function acts upon the network variable that you specify in the **SYMBOL=** attribute. Other attributes may further qualify what the function does, such as formatting the output or displaying a specific field within a network variable.

The following Web tag uses the **Check Box** function and assigns a value of 1 to the state field of the DigitalOut network variable when the user selects this checkbox in a Web page.

```
<iLonWeb FUNC=CheckBox SYMBOL=
NVL_DigitalOut_199!FIELD:state></iLonWeb>
```

Opening a Form

To include a form in a Web page, start with a HTML document then insert the appropriate `<iLonWeb>` tags to build your form. The first step in building a form is to use a form element function to open a form.

\<FORM ACTION=filename.htm METHOD=GET\>\<iLonWeb_URL\>\</FORM\>

Table E.4 Form Element Function Description

Web Tag Element	Description
\<FORM \>	This tag is standard HTML and signals the start of a form.
ACTION=	This attribute is standard HTML and identifies what happens to the data when the form is submitted for processing.
METHOD=	This attribute defines the method used to send data to the server. GET is the supported method and sends data to the server by appending the data to the URL itself after a question mark (?) separator. POST is *not* supported.
\<iLonWeb_URL\>	This tag is required between the \<FORM\> and \</FORM\> tags. This tag implements a security feature by creating a hidden field that is the URL of the page containing the form. The form processor checks the URL to ensure the users are accessing only the variables that they are authorized to access.
\</FORM\>	This tag signifies the end of the form.

NOTE: While it is recommended that you use only one form per page, the *i*.LON 100 Web server will support multiple forms on the same page on the condition that each read-write network variable defined on the page is defined on one form only. This prevents unintentional updating of network variables.

Submit or Reset a Form

Once information has been entered into a form, the form must be submitted to the server. This is accomplished using the Submit function. Alternatively, a form that has not already been submitted can be restored to its original values using the Reset function. These two functions, Submit and Reset, are standard HTML form elements that control forms in Web pages. For information on their use and syntax, consult an HTML reference.

When used in conjunction with the *i*.LON 100 Web tags, the Submit function creates a button that, when clicked, informs the *i*.LON 100 Web server to update those read/write data points whose values are displayed on forms in the page. The Reset function creates a button that resets any form element to its original value, or, if a submit button was clicked, to its most recently submitted value. For example:

```
<INPUT type="submit" value="Write NV">
<INPUT type="reset" value="Reset modifications">
```

Important! Clicking the submit button causes all forms on a page to submit their data to the server, even if no change has been made to a form. While the *i*.LON 100 Web server will support multiple forms per page, provided each form

references a unique data point, it is recommended that only one form be used per page, to avoid the unintentional updating of unchanged data points.

Refresh a Form

After submitting a value to update a data point, the URL is appended with the submitted value in the browser's address window. If you subsequently use the Web browser's Refresh button to try to obtain the current value of the data point, the value appended to the URL is written to the data point instead. Instead of using the Web browser's Reload or Refresh button, create your own Refresh button to obtain the current value of a data point that is defined in your Web page. This function will get the latest value of the network variable and display it when the Web page is reloaded. For example:

```
<INPUT type="button" value="Refresh"
onClick="window.location.assign(window.location.pathname)">
```

When you click a Refresh button in a form to reload a Web page, the browser might load the Web page from cache memory. That cached Web page could contain old data point values. To force the browser to load a new page, add the following Meta Web tag in the <head> tag of the Web page.

```
<head>
<META HTTP-EQUIV="Expires" CONTENT="Tue, 25 Apr 1995 09:30:00
-0700">
</head>
```

As an alternative to using the Refresh button, create a link to the current Web page:

```
<a href="iLonTest1.htm"><b>Refresh</b></a>
```

Form Element Functions

This section describes the form element functions supported by the *i*.LON 100 Web server. The following table lists the *i*.LON 100 Web server form element functions and their actions. Unlike most HTML elements, the *i*.LON 100 Web tag functions are case sensitive.

Table E.5 Form Element Functions

Function	Action on the Specified Network Variable
CheckBox	A value of 1 is selected for the specified data point when the user sets the check box, a value of 0 is written if the checkbox is clear.
Hidden	Hides the text field that contains the value of the specified data point.
RadioButton	The value assigned to a radio button is selected for the specified data point when the user clicks it.
TextField	Displays the value of the specified data point with access to modify it.

CheckBox

A *check box* is an object that presents the user with a choice to set or clear an option. The CheckBox tag creates a checkbox in your Web page form and sends a value of 1 to the form processor when the user sets the checkbox and submits the

form for processing. The form processor will set a value of 0 for a cleared checkbox.

The Web tag example below creates a check box object in a Web page form. The table that follows describes each Web tag element.

```
<iLonWeb FUNC=CheckBox SYMBOL=NVL_nvoCbx1_199></iLonWeb>
```

Table E.6 Check Box Elements

Web Tag Element	Description
`<iLonWeb>`	The *i*.LON 100 tag.
`FUNC=CheckBox`	Specifies the CheckBox function and causes a checkbox to be created in the form.
`SYMBOL=NVL_nvoCbx1_199`	Specifies that the local data point called `NVL_nvoCbx1_199` is the symbol to which a value is written when the user selects the checkbox in the form.
`</iLonWeb>`	The ending *i*.LON 100 tag.

Hidden

The Hidden function allows you to include text in your Web page without displaying it on the browser window. This function is useful when you want to make network variable values available to a program, like JavaScript, but not for users to see or edit. For example, the following Web tag hides the value of the NVL_nvoDigital data point on the Web page.

```
<iLonWeb FUNC=Hidden SYMBOL=NVL_nvoDigital></iLonWeb>
```

Table E.7 Hidden Elements

Web Tag Element	Description
`<iLonWeb>`	The *i*.LON 100 tag.
`FUNC=Hidden`	Hides the text field that contains the value of the specified data point.
`SYMBOL= NVL_nvoDigital`	Specifies the local data point named `NVL_nvoDigital` on the Web page.
`</iLonWeb>`	The ending *i*.LON 100 tag.

RadioButton

Radio buttons are objects that present the user with a series of items and allow the user to choose one item from the series. A value is assigned to each radio button defined in the tag, and when the user selects a radio button, the corresponding value is sent to the form processor.

The following Web tag example creates a series of radio button objects in a Web page form. The table that follows describes each Web tag element.

```
<iLonWeb FUNC=RadioButton SYMBOL=NVL_nvoRb1_199 VALUE="1"
Checked></iLonWeb>
<iLonWeb FUNC=RadioButton SYMBOL=NVL_nvoRb1_199 VALUE="2">
</iLonWeb>
<iLonWeb FUNC=RadioButton SYMBOL=NVL_nvoRb1_199
VALUE="3"></iLonWeb>
```

Table E.8 Radio Button Web Tag Elements

Web Tag Element	Description
`<iLonWeb>`	The *i*.LON 100 tag.
`FUNC=RadioButton`	Specifies the radio button function and causes a radio button object to be displayed in the form.
`SYMBOL=NVL_nvoRb1`	Specifies that the local data point called `NVL_nvoRb1` be written to when the form is processed.
`VALUE="1"`	Specifies the data point update value assigned to the radio button.
`Checked`	Indicates that this radio button is selected by default.
`</iLonWeb>`	The ending *i*.LON 100 tag.

TextField

A text box allows the user to insert a relatively small amount of text information into a form. Use this tag when you want to modify a network variable value.

The text box example and description below creates a text box that is 20 characters wide and allows the user to update a local data point named **NVL-nvoDigital1**.

```
<iLonWeb FUNC=TextField TYPE=text SYMBOL=NVL_nvoDigital1
SIZE=20 MAXLENGTH=58></iLonWeb>
```

Table E.9 TextField Web Tag Elements

Web Tag Element	Description
`<iLonWeb>`	The *i*.LON 100 tag.
`FUNC=TextField`	Specifies the text field function. Causes a text box to be displayed in the Web form.
`TYPE={text|password}`	The **Text** type specifies the input will appear as text. The **password** type specifies that input will appear as asterisks in the text box.
`SYMBOL=NVL_nvoDigital1`	Specifies that the local data point called `NVL_nvoDigital1` be written to when the form is processed.

`SIZE=20`	Indicates that the width of the text box is 20 characters.
`MAXLENGTH=58`	Indicates that the field is 58 characters long. If `SIZE` is less than `MAXLENGTH`, the input text will scroll within the text box displayed in the browser.
`</iLonWeb>`	The ending tag

Appendix F

i.LON 100 Software License Agreement

When installing the *i*.LON 100 software, you must agree to the terms of the software license agreement detailed in this appendix.

i.LON 100 Internet Server Software License Agreement

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- "*i*.LON Utilities" means the *i*.LON Internet Server computer software utilities listed in the UTILITIES.TXT file, and associated media, printed materials, and online or electronic documentation, including without limitation any and all executable files, add-ons, stencils, templates, *i*.LON Vision shapes, SmartShapes® symbols, filters, tutorials, help files, Web pages and other files, that accompany such software or are in the accompanying documentation;
- "*i*.LON Server" means the *i*.LON 1000 Internet Server, the *i*.LON 100 Internet Server, or the *i*.LON 600 LonWorks/IP Server as the case may be;
- "*i*.LON System Image" means the *i*.LON Server firmware preloaded on the device or listed in the SYSTEM.TXT file, and associated media, printed materials, and online or electronic documentation, including without limitation any and all executable files, tutorials, help files, web pages and other files, that accompany such software or are in the accompanying documentation;
- "709.1" means the ANSI/CEA-709.1 Control Networking Protocol, also known as the EN14908 protocol. Echelon's implementation of this protocol is known as the LonTalk protocol.
- "IP-852 Channel" means a collection of devices that communicate using the ANSI/CEA-852 protocol;.
- "Configure" means to provide a valid 709.1 Domain, Subnet, and Node address, as well as valid Group, Network Variable Selector, and Message Tag values, and device state information as defined by the 709.1 Protocol to the *i*.LON Server, and to set configuration properties on an *i*.LON Server using the SOAP protocol.

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(b) copy the *i*.LON Utilities as reasonably necessary for such permitted internal use and for backup or archival purposes consistent with your archive procedures, provided that you reproduce, unaltered, all proprietary notices on or in such copies;
(c) make one (1) copy the *i*.LON System Image for the purpose of loading it into an *i*.LON Server in order to replace or update the *i*.LON System Image on the *i*.LON Server and one (1) copy for backup or archival purposes consistent with your archive procedures, provided that you reproduce, unaltered, all proprietary notices on or in such copies; and
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LANGUAGE

The parties hereto confirm that it is their wish that this Agreement, as well as other documents relating hereto, have been and shall be written in the English language only. Les parties aux présentes confirment leur volonté que cette convention de même que tous les documents y compris tout avis qui s'y rattache, soient rédigés en langue anglaise.

GENERAL

This Agreement shall not be governed by the 1980 U.N. Convention on Contracts for the International Sale of Goods; rather, this Agreement shall be governed by the laws of the State of California, including its Uniform Commercial Code, without reference to conflicts of laws principles. This Agreement is the entire agreement between us and supersedes any other communications or advertising with respect to the Licensed Software and accompanying documentation. If any provision of this Agreement is held invalid or

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Appendix G

Software License Transfer Agreement

This appendix provides a copy of the Software License
Transfer Agreement.

Software License Transfer Agreement

THIS SOFTWARE LICENSE TRANSFER AGREEMENT is entered into as of _____ _____ [insert date], by and between_____ [insert company name of original purchaser] ("Assignor") and_____ [insert name of company purchasing the software] ("Assignee") for the _____ [insert name of software product being transferred] ("Software").

1.   Software License Agreement. Reference is made to the Software License Agreement(s) that Assignor entered into when Assignor purchased the Software ("Software License Agreement"), pursuant to which Echelon Corporation ("Echelon") granted Assignor a non-exclusive license to use the Software.

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3.   Transfer Restriction. Assignee acknowledges that Assignee shall have no right whatsoever to transfer, sell, or otherwise grant any rights to the Software or to assign any of its rights or obligations hereunder or under the Software License Agreement, and any such purported assignment or transfer shall be void.

4.   General. This Agreement shall be governed by the laws of the State of California without reference to conflict of laws principles. Echelon shall be deemed a third party beneficiary of this Agreement. Neither party shall have the right to modify or assign this Agreement without the prior written consent of Echelon.

IN WITNESS WHEREOF, the parties have executed this Software License Transfer Agreement as of the date first written above.

"ASSIGNOR":_____   "ASSIGNEE": _____

_____   Company Name   Company Name
Signed By: _____   Signed By: _____

(Print Name)   (Print Name)
Title: _____   Title: _____
Address:_____   Address:_____
City,State/Province, Country, Postal Code   City,State/Province, Country, Postal Code
Telephone: _____   Telephone: _____
 (Fax or email address)   (Fax or email address)
Date: _____   Date: _____

For a copy of the appropriate Software License Agreement, call Echelon Corporation at +1-408-938-5200.