User's Guide for

iSX Web Server and
eSX Email Appliance

Revision History

REVISION	RELEASE DATE	SUMMARY
1.0	December 1, 1999	Initial release.
2.0	March 7, 2000	Reformatted for printing.

Contents

Chapter 1
Overview

1.1   Introduction

The Scenix SX communications controller can be used to implement industry-standard web connectivity for cost-constrained and size-constrained embedded control applications such as remote monitoring devices, industrial control systems, and web-enabled appliances. In many cases, a single SX device can handle the web protocol functions, the physical interface layer, and the system control functions of the application.

The Scenix "SX Stack" provides a set of Virtual Peripheral modules to implement a set of standard Internet protocol layers including PPP, TCP/IP, HTTP, STMP, and POP3. The Scenix eSX/iSX demo board, combined with a PC running Windows 95/98, provides a platform for demonstrating and evaluating the SX web server, called "iSX," and SX email appliance capability, called "eSX."

This guide describes how to connect the demo board to the PC, how to configure the various Virtual Peripheral modules on the SX, and how to configure email server software on the PC to demonstrate the email appliance capabilities.

The eSX/iSX evaluation kit consists of:

- SXB-TCP01 demo board

- AC power supply with 120V AC input and 9V/500 mA DC output

- A DB-9 serial interface cable

- A CD-ROM containing the eSX/iSX source code files, support files, and documentation

- The User's Guide for the iSX/eSX demo board

The SX comes pre-programmed with the iSX web server application. To evaluate the iSX web server, you need a PC running Windows 95 or Windows 98. In addition, to download your own web material to the demo board's EEPROM or to do the eSX email tutorial, you need the SX programming tool supplied by the third party tool vendors.

1.2   Demo Board

The Scenix SXB-TCP01 demo board provides the hardware to demonstrate the web server and email capabilities of Scenix SX-Stack software using the SX communications controller as the hardware platform. The board has the following:

- Scenix SX52BD communications controller
- Four-pin header for programming the SX52BD
- Clock circuitry with 2-pin jumper to enable the on-board oscillator
- EEPROM memory chip for storing web content
- Two DB-9 serial port connectors, designated PPP and DEBUG, for Internet access and application debugging
- Seven labeled, color-coded LEDs
- RESET button
- 20-pin header for I/O expansion
- DC power-in plug
- An AC adaptor (120V AC input and 9V/500 mA DC output) is provided with the board, which supplies the required DC power to the board. A DB-9 serial interface cable is also provided for connecting the board to the serial port of the PC. This cable is a "straight-through" (not "null modem") type cable.
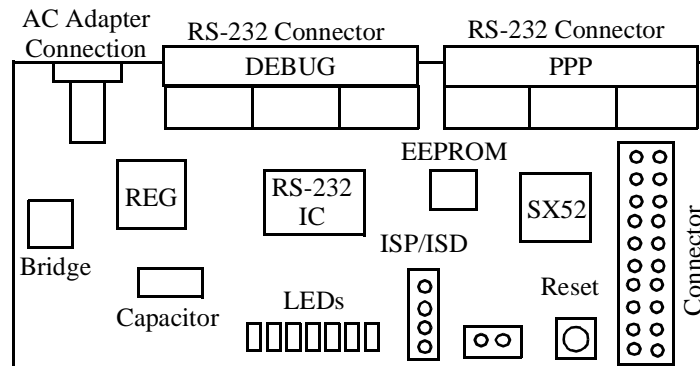
Figure 1-1. iSX/eSX Demo Board

1.3   CD-ROM

The CD-ROM provided with the eSX/iSX evaluation kit contains several directories and files at the top level:

- Documentation directory: contains application notes and other documentation related to SX email and web applications

- eSX Support Files directory: contains files of various types to support the eSX email appliance application

- iSX Support Files directory: contains files of various types to support the iSX web server application

- eSX vx_x_x.src file: the source code file for the eSX email appliance application (x_x_x is the source code version number)

- iSX vx_x_x.src file: the source code file for the iSX web server application

- Version.txt file: an ASCII text file containing the SX- Stack revision information

1.4   Web Server and Email Tutorials

In this user's guide, Section 2 describes the iSX web server tutorial and Section 3 is dedicated for the eSX email appliance. The descriptions in these two sections are independent of each other. If you plan to see both demos, start with the iSX web server because the SX device is pre-programmed with the iSX application code; no programming of the device is necessary to start the demo.

Downloading new web content to the board or doing the eSX email demo requires programming of the SX device on the demo board. A standard four-pin header for programming SX devices is available on the demo board. Be sure to connect the programming plug using the correct orientation, with the signals aligned to the pins as labeled (OSC1, OSC2, VDD, and VSS). If you want to do SX debugging using the programming tool (for example, single-stepping though the code), disable the demo board's on-board oscillator by removing the 2-pin jumper.

The two main source code files on the CD-ROM, called eSX vx_x_x.src and iSX vx_x_x.src, are the source code files for the eSX and iSX applications. The two source code files are identical, except for some statements in the "Options" section of the files. Chapter 4 of this user's guide provides additional information on the source code.

Chapter 2
iSX Web Server

2.1   Introduction

The iSX demo board demonstrates the Scenix TCP/IP stack and HTTP application in a web server environment. The demonstration requires a PC running Windows 95 or Windows 98.

To run the demonstration, you connect the demo board to the PC using the provided serial interface cable. You set up the Windows Dial-Up Networking application to access the demo board as a modem with TCP/IP networking enabled. The demo board does not really operate as a modem, but is programmed to behave like one at its PPP serial port.

After Dial-Up Networking establishes a connection with the demo board, you can start any web browser on the PC, such as Netscape or Internet Explorer, and view the web pages stored on the demo board's EEPROM memory.

The demo board is pre-programmed with the web server application software. If you have not already overwritten the original program on the demo board, you can run this demonstration without programming the SX device.

Later in this section, you will learn how to write your own web content into the EEPROM memory. Doing this requires programming the SX with an EEPROM file transfer program, e2file.exe, and then reprogramming the iSX web server application.

2.2   Establish a TCP/IP Connection

Communication between the iSX demo board and the PC is carried out by Dial-Up Networking. The PC must be configured to communicate with a 19.2K bps modem with TCP/IP networking enabled.

2.2.1   Install the Modem

To install the modem under Windows 95/98:

1. Click Start, Settings, and Control Panel.

2. In the Control Panel, double-click the Modems icon.

3. In the Modems Properties dialog box, click Add.

4. In the initial dialog box of the Install New Modem wizard, click "Other" to enable that option, and then click Next.

5. In the next dialog box, click "Don't detect my modem; I will select it from a list" to enable that option, then click Next.

6. In the next dialog box, under Manufacturers, "Standard Model Types" should be selected. Under Models, select "Standard 19200 bps Modem," then click Next.

7. In the next dialog box, select Communications Port (COM1) as the port, then click Next.

8. After Windows installs the modem, click Finish.

2.2.2   Set the Modem Properties

1. Back in the Modems Properties dialog box, select the new mo-
    dem (Standard 19200 bps Modem) and then click Properties.

2. In the Standard 19200 bps Modem Properties dialog box, under
    the General tab, ensure that Communications Port (COM1) is se-
    lected as the Port. Change the Maximum Speed to 57600. See
    Figure 2-2.
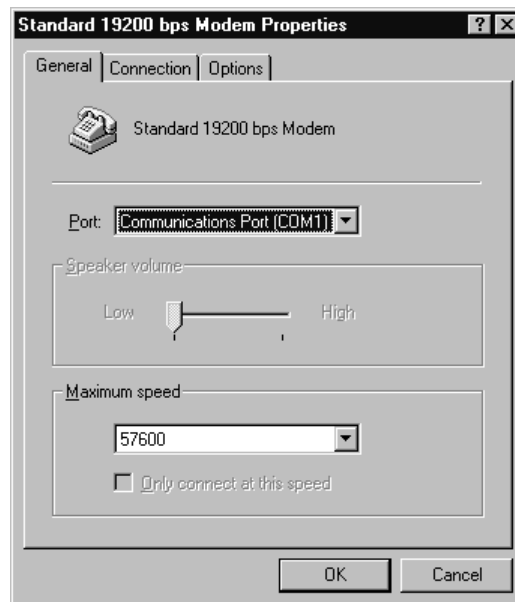
Figure 2-2. Modem Properties Dialog Box

3. Under the Connection tab, ensure that the modem is configured
    for 8 data bits, no parity, and one stop bit. Then click Advanced.

4. In the Advanced Connection Settings dialog box, ensure that the
    "Use flow control" and "Hardware (RTS/CTS)" options are en-
    abled. Then click OK.

5. Under the Connection tab, click Port Settings.

6. In the Port Settings dialog box, ensure that the "Use FIFO Buff-
ers" option is disabled. Then click OK. See Figure 2-3.
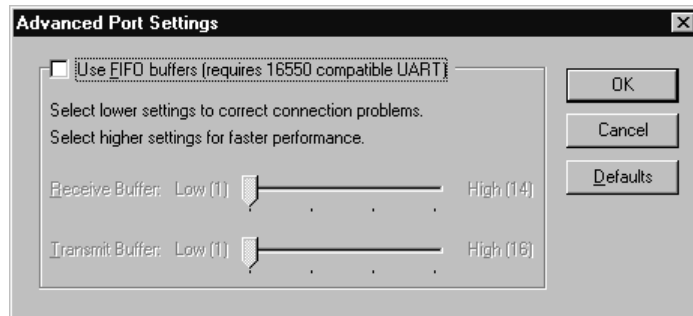
Figure 2-3. Advance Port Settings

7. Click OK to close the Standard 19200 bps Modem Properties di-
alog box and Close to close the Modem Properties dialog box.

2.2.3   Create a Dial-Up Networking Connection

1. Double-click on My Computer, and then on Dial-Up Network-
ing.

2. In the Dial-Up Networking dialog box, double-click the Make
New Connection icon.

3. In the initial dialog box of the Make New Connection wizard,
where it asks you to enter a name for the computer you are dial-
ing, enter "SX TCP IP Demo." Ensure that the selected modem is
"Standard 19200 bps Modem. Then click Next.

4. In the next dialog box, enter any number as the phone number
(for example, just the digit 1 by itself). Then click Next.

5. In the next dialog box, click Finish.

2.2.4   Set the Dial-Up Networking Properties

1. In the Dial-Up Networking dialog box, point to the new SX TCP IP Demo connection icon. Click the right mouse button and select Properties.

2. In the SX TCP IP Demo dialog box, under the General tab, ensure that Standard 19200 bps Modem is selected at the bottom. See Figure 2-4.
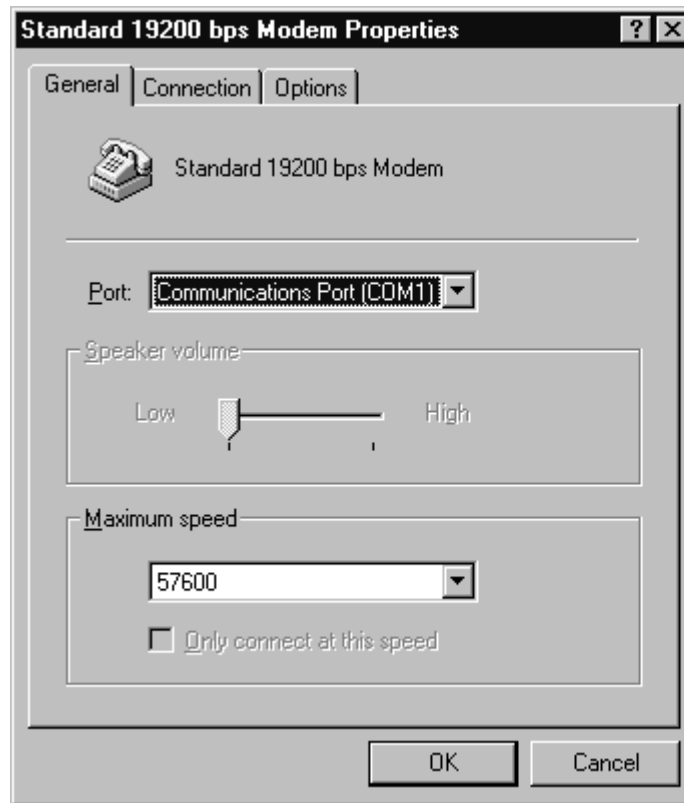
Figure 2-4. Dialog-Up Networking Properties

3. Under the Server Types tab, ensure that the type of dial-up server is set to "PPP: Internet, Windows NT Server, Windows 98" (or similar PPP setting under Windows 95). Ensure that all Advanced options are disabled. Under Allowed network protocols, select TCP/IP and ensure that all other network protocols are disabled. See Figure 2-5.
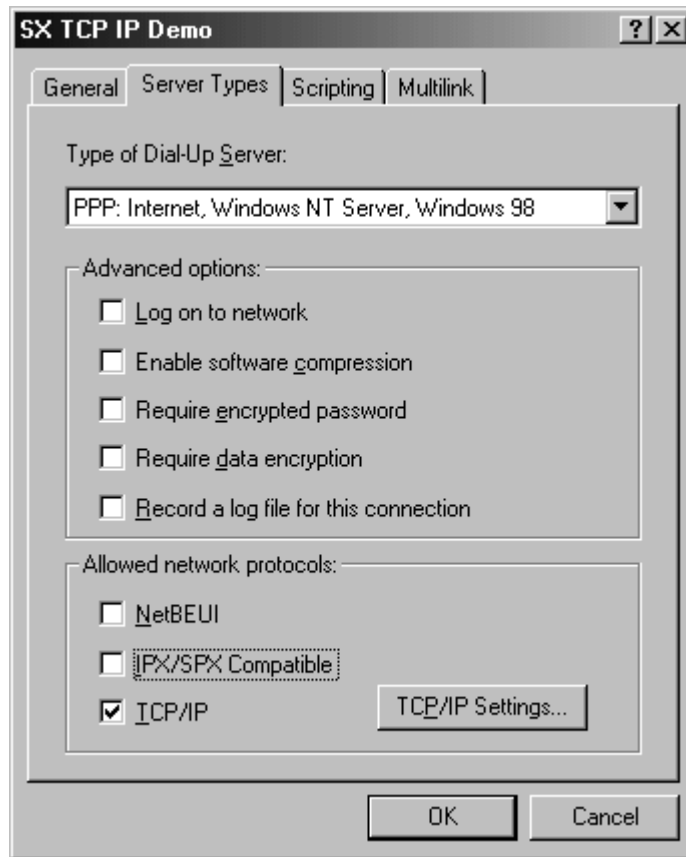
Figure 2-5. Dial-Up Networking Properties - Server Types

4. Under the Server Types tab, click TCP/IP Settings.

5. In the TCP/IP Settings dialog box, click Specify an IP address and type in the following IP address: 192.168.11.2. The "Server assigned name server addresses" option should be enabled. The options "Use IP header compression" and "Use default gateway on remote network" should be disabled. When all options are set correctly, click OK. See Figure 2-6.
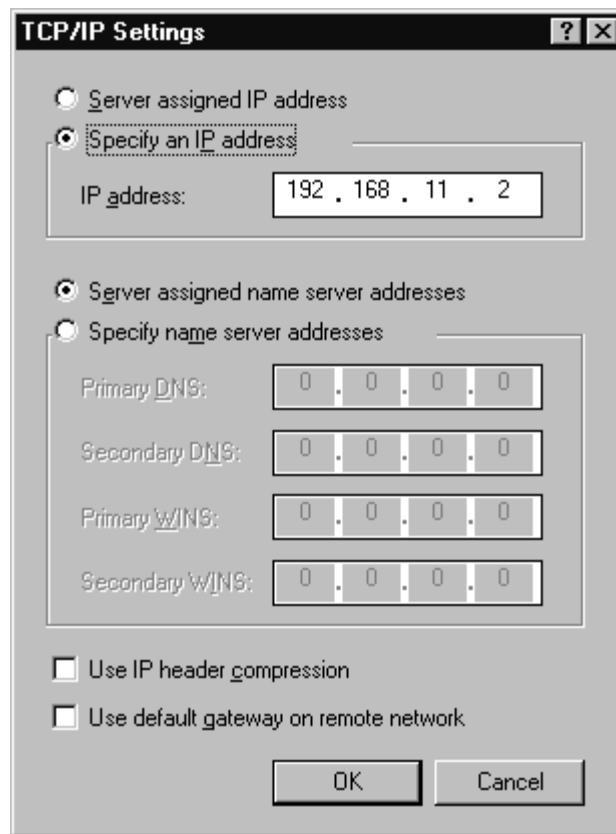
Figure 2-6. TCP IP Settings

6. Under the Scripting tab, ensure that the "Start terminal screen minimized" is enabled.

7. If there is a Multilink tab, ensure that its "Do not use additional devices" option is checked, and click OK.

8. Point to the SX TCP IP Demo icon, click the right mouse button, select Create Shortcut, and answer Yes. A shortcut to the SX TCP IP Demo icon should appear on the Windows desktop.

2.3 Connect the iSX Demo Board

1. Connect one end of the provided DB-9 serial cable to COM1 port of the PC. Connect the other end of the cable to the connector labeled PPP on the demo board.

2. Plug the AC adaptor into a electric outlet. Plug the DC power supply connector into the jack on the demo board. The green LED labeled PWR should light up.

3. Ensure that the 2-pin jumper, J1, is installed on the demo board. This enables the on-board oscillator.

4. Press the RESET button on the demo board.

5. Double-click the Shortcut to SX TCP IP Demo icon. In the Connect To dialog box, click CONNECT and watch the LEDs on the demo board. See Figure 2-7.
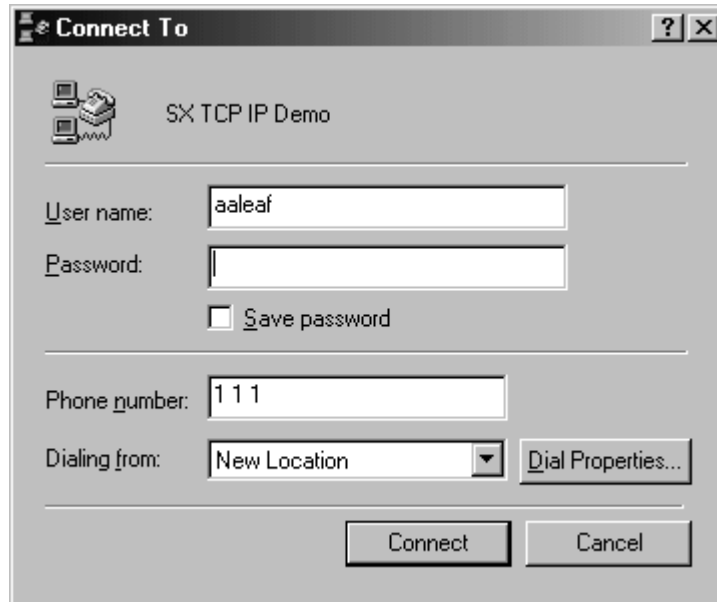
Figure 2-7.   Modem Connection

6. While the connection is being made, the TX and RX LEDs should flash briefly. When the connection is completed, both the PWR and the UP LEDs should be lit. A valid connection is also indicated by a connection icon in the status bar of Windows 95/98.

2.4   View Web Pages from the iSX Web Server

After the TCP/IP connection has been established with the iSX demo board, you can view the demo board's web pages with any standard web browser such as Netscape or Internet Explorer.

1.   Start the web browser under Windows 95/98.

2.   In the "Location" or "Address" field of the web browser, enter the URL of the iSX demo board:

    http://192.168.11.1/index.html

3.   You should see the TX and RX LEDs of the demo board flash while the web page is being accessed. The SX Web Server home page should appear in the browser window.

4.   Click the hyperlinks at the bottom to browse through the web page examples stored on the demo board. If you wish, bookmark the SX Web Server home page so that you can easily gain access to it next time.

5.   To close the connection, double-click the connection icon in the status bar of Windows 95/98. In the Connected To SX TCP IP Demo dialog box, click Disconnect.

2.5   Load New Web Pages into the Demo Board

The iSX Web Server can serve any type of web content, including web pages, graphics, and files. The web content is stored in an EEPROM device on the demo board.

To write your own web content to the EEPROM, you need to run a file transfer program called E2File10.exe on your Windows 95/98 PC, and at the same time, run a program called E2File.src on the demo board's SX device. The program running on the PC transfers the web content from your PC to the demo board, while the program running on the SX device transfers the data to the EEPROM.

Programming the SX with the file transfer program overwrites the existing web server program. After the web content has be written to

the EEPROM, you need to reprogram the web server application into the SX device.

2.5.1   Program the SX with E2File.src

1. In Windows 95/98, starting from My Computer, open the CD-ROM directory window. From there, open the iSX Support Files directory window.

2. Copy the E2File.src program file to a local directory on your hard disk.

3. In the local directory window, point to the source code icon, press the right mouse button, and select properties.

4. In the E2File.src Properties dialog box, toggle off the Read-only attribute option, and then select OK.

    Note: There is a directive called WIN98, which controls the treatment of the TCP/IP stack. If you are using a more recent version of Windows 95, it probably is compatible with the Windows 98 TCP/IP stack. In that case, try leaving the WIN98 directive enabled first. If you encounter problems later, then try commenting out the WIN98 directive.

5. Using your assembler and programming tools, program the SX device on the demo board. This involves connecting the programming tool to the 4-pin header of the demo board. Refer to the documentation provided with the SX programming tool. Check to see that the file is correctly setup for your assembler, and edit if necessary.

6. Leave the SX device in the running state. For example, with the development system running, you can use the Run > Run command, and after the program starts running, you can disconnect the development system hardware from the PC, leaving it attached to the 4-pin header on the demo board. To have the demo board run in stand-alone mode instead, remove the programming connector, ensure that the 2-pin jumper is present, and press the RESET button to start the SX program.

2.5.2   Run the E2File.exe Program Under Windows

1. Put all of the desired web content into a local directory of your PC. This could be just a single web page or many hyperlinked web pages and files. Multiple files may be organized hierarchically under subdirectories. The hierarchy will be preserved when it is transferred to the EEPROM.

2. In the iSX Support Files directory window, find the E2File10.exe program file, and copy that file to a local directory.

3. In the local directory window, double-click on the E2File10.exe program icon. This opens the E2 Send dialog box.

4. In the E2 Send dialog box, set the communications port to Com1 (or whatever port you want to use). See Figure 2-8.
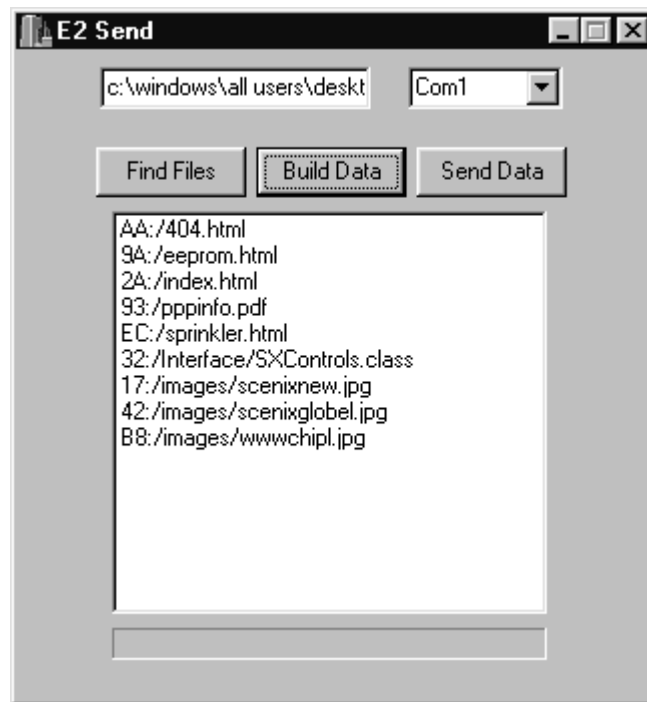
Figure 2-8. E2send Dialog Box

5. Connect the serial cable from the specified port of the PC to the DEBUG port of the demo board.

2.5.3   Transfer the Web Content to the EEPROM

1. In the directory path field of the E2 Send dialog box, enter the full path to the directory containing your web content.

2. Click the Find Files button. All of the files in the specified directory path are listed, including the paths to files in lower-level directories.

3. Click the Build Data button. This builds a data packet that will be sent to the demo board.

4. Click the Send Data button. A popup dialog box reports the size of the target EEPROM (32K bytes).

5. Click OK to start the download process. A new status window appears, with a moving status bar to indicate progress of the download operation.

6. When you see the message "Download Completed," click OK. Disconnect the serial cable from the DEBUG port of the demo board.

2.5.4   Reprogram the Web Server Application

1. From the top-level directory window of the CD-ROM, copy the web server source file, iSX vx_x_x.src, to a local directory.

2. In the local directory window, point to the source code icon, press the right mouse button, and select Properies.

3. In the iSX vx_x_x.src Properties dialog box, toggle off the Read-only attribute option, and then click OK.

4. Check to see that the file is correctly set up for your assembler, and edit it if necessary. A snapshot of the source code is as follows:

```
;
;**************************************************
**************************************************
******************************
;Uncomment one of the following lines to choose the
SX48BD/ES, SX48BD, SX52BD/ES or SX52BD. For ;SX48BD/
ES and SX52BD/ES, uncomment both defines, SX48_52
and SX48_52ES
;**************************************************
*******************************************
SX48_52
SX48_52ES
;**************************************************
*******************************************
;Assembler used
;Oncomment the following line if using Parallax
SXKey assembler. SASM assembler is enabled by
;default
;**************************************************
*******************************************
;SX_Key
;
```

5. Using your assembler and programming tools, program the SX device on the demo board. If the assembler generates an error when the programming cycle is initiated, follow the instructions in the highlighted source area to correct the problem. Leave the SX device in the running state.

6. Connect the serial cable to the PPP port of the demo board.

7. Using the Shortcut to SX TCP IP Demo icon, establish a connection, and then view the new web content using your web browser.

2.5.5   Restore the Original Scenix Web Content

Writing any new web content to the EEPROM erases the previous web content. If you want to restore the original Scenix web pages to the EERPOM, perform the following steps.

1. Reprogram the SX device with the E2File.src program and leave the SX in the running state.

2. Start the E2File10.exe program under Windows 95/98. For the directory path in the E2 Send dialog box, enter the path to the iSX Support Files/html directory on the CD-ROM. Click Find Files and Build.

3. Connect the serial cable to the DEBUG port of the demo board, and then click Send.

4. When the download operation is complete, disconnect the serial cable from the DEBUG port.

5. Reprogram the SX device with the web server program, iSX vx_x_x.src, and verify that you can access the Scenix web content.

2.6   Frequently Asked Questions

Here are some frequently asked questions about the iSX web server application.

Does it matter which web browser I use?

The demo should work the same for any web browser, such as Netscape or Internet Explorer.

How is the web content stored in the EEPROM?

The web content is stored as raw data. There is no encryption or encoding. Text is stored as ASCII text and GIF files are stored as binary data.

How much web content can be stored?

The EEPROM on the demo board is 32K bytes. The program uses a 16-bit pointer, which allows a maximum EEPROM size of 64K bytes.

I tried to download 32K bytes of web content and it failed. Why?

There is a certain amount of overhead associated with each downloaded file, so the actual limit is a little bit less than 32K bytes of web content.

What is the IP address of the board?

The IP address is 192.168.11.1. You can change this address by modifying the source code.

The E2 Send dialog box creates a file called test.dat. What is it for?

The test.dat file is generated when you click Build Data. E2 Send (E2File10.exe) sends this file to the demo board and the program running on the SX writes the data to the EEPROM.

I followed all the steps as suggested to launch the web page, but the page does not launch. Why?

Look in the control panel for any WINSOCK software icons and make sure to turn-off (unchecked) any proxy server settings. With improper WINSOCK proxy setting, the explorer will dial out but will not communicate through a COM port when locating a URL.

Chapter 3
eSX Email Appliance

3.1   Introduction

The eSX demo board demonstrates the Scenix email appliance appli-
cation, which allows an SX-equipped device to send and receive
email messages through the Internet. This demonstration requires a
PC running Windows 95 or Windows 98.

To run the demonstration, you connect the demo board to the PC
using the provided serial interface cable. You use the Windows Dial-
Up Networking application to access the demo board as a modem,
with TCP/IP networking enabled.

To test email operation, you set up an SMTP server called EServ
(provided on the CD-ROM) on your PC. With the software and hard-
ware properly configured, you can then send email to and receive
email from the demo board. Sending and receiving are two different
demonstrations.

Figure 3-9 and Figure 3-10 show the two system configurations for these demonstrations.
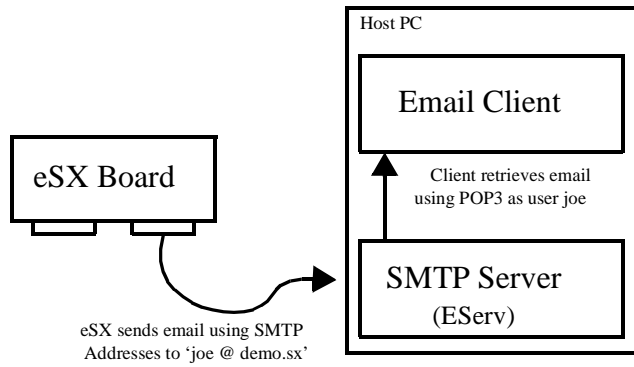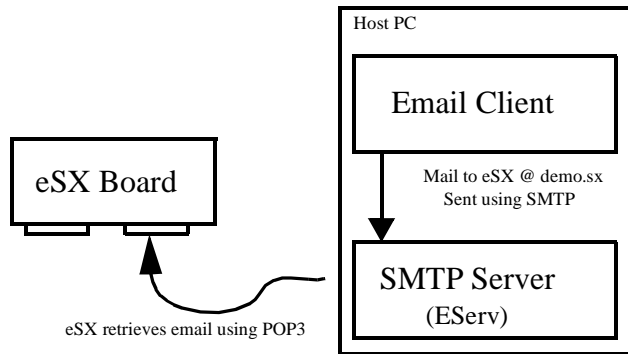

Figure 3-9. Email Data Flow Using POP3

Figure 3-10. Email Data Flow Using SMTP

3.2   Email Principles

Internet email uses two protocols to deliver email to and receive from an email client. These protocols are called the Post Office Protocol (POP) and the Simple Message Transfer Protocol (SMTP). Version 3 of POP, known as POP3, is the current and most widely used version of POP.

An email client is typically a program that sends, receives, and processes email messages for the user. Eudora, Netscape Messenger, and Microsoft Outlook are some examples of email clients. A client uses POP3 to receive email and SMTP to send email.

Any email transaction requires a client and a server. The server is a point of exchange for different email clients. The server is usually located at an Internet Service Provider (ISP). To send email, the client uses SMTP to connect to the ISP's mail server. To receive email, the client uses the POP3 protocol to ask the ISP's mail server if there are any email messages waiting, and to retrieve any such messages.

If a client is sending email to another client connected to the same ISP (for example, between two users within the same company), as soon as the first client sends the message to the server using STMP, the second client can retrieve the message using POP3. Typically, however, the destination address of an email is not on the local server. In that case, a feature called "SMTP relay" is required.

When an SMTP server relays a message, it sends the message to another server on behalf of the requesting client. The SMTP relay feature is often restricted or disabled. Otherwise, it could be used by an outside spammer to send thousands of messages, tying up the server.

Both SMTP and POP3 are client-server, transaction-oriented, text-based protocols. They proceed lock-step, with the client sending requests to the server and modifying its behavior based upon the response codes received from the server.

3.3   Program the eSX SMTP Application

1. From the top-level directory window of the CD-ROM, copy the eSX source file, eSX vx_x_x.src, to a local directory. This source code is set up for the SMTP demo. You will modify it later for the POP3 demo.

2. In the local directory window, point to the source code icon, press the right mouse button, and select Properies.

3. In the eSX vx_x_x.src Properties dialog box, toggle off the Read-only attribute option, and then click OK.

4. Change the name of the file to eSX_SMTP.src.

5. Check the comment lines and code to see whether the file is correctly set up for your assembler, and edit it if necessary.

6. Using your assembler and programming tools, program the SX device on the demo board. Leave the SX device in the running state. If the assembler generates an error when the programming cycle is initiated, follow the instructions in the highlighted source area to correct the problem.

```
;
;**************************************************
**************************************************
*******************************
;Uncomment one of the following lines to choose the
SX48BD/ES, SX48BD, SX52BD/ES or SX52BD. For ;SX48BD/
ES and SX52BD/ES, uncomment both defines, SX48_52 and
SX48_52ES
;**************************************************
********************************************
SX48_52
SX48_52ES
;**************************************************
********************************************
;Assembler used
;Oncomment the following line if using Parallax SXKey
assembler. SASM assembler is enabled by
;default
;**************************************************
********************************************
;SX_Key
;
```

3.4 Establish a Connection to the Demo Board

The basic steps for setting up the interface between the PC and the demo board are the same as for the iSX web server application. If you have not already done so, perform the iSX setup procedures described in Section 2.2.1 through Section 2.2.4:

- Section 2.2.1, Install the Modem

- Section 2.2.2, Set the Modem Properties

- Section 2.2.3, Create a Dial-Up Networking Connection

- Section 2.2.4, Set the Dial-Up Networking Properties

To make the network connection, do the following:

1. Connect the serial cable from the serial port of the PC to the PPP port of the demo board.

2. Double-click the SX TCP IP Demo connection icon.

3. In the Connect To dialog box, click OK and watch the LEDs on the demo board. While the connection is being made, the TX and RX LEDs should flash briefly. When the connection is completed, both the PWR and the UP LEDs should be lit.

3.5   Check the Demo Board Interface

To check the eSX program on the demo board, you will use the "ping" command under MS-DOS. The ping command is a request for an echo from a specified host in the network. If the serial cable is connected correctly and the eSX program is running on the demo board, you should get a response from the board.

1. Under Windows 95/98, open an MS-DOS window (click Start, Programs, and MS-DOS Prompt).

2. In the MS-DOS window, enter the following command:

    ```
    ping 192.168.11.1
    ```

3. Check the response. You should see a message like the following:

    ```
     Pinging 192.168.11.1 with 32 bytes of data:

     Reply from 192.168.11.1: bytes=32 time=56ms
    TTL=15
     Reply from 192.168.11.1: bytes=32 time=56ms
    TTL=15
     Reply from 192.168.11.1: bytes=32 time=51ms
    TTL=15
     Reply from 192.168.11.1: bytes=32 time=51ms
    TTL=15
    ```

3.6   Install an SMTP Server on the PC

In order to demonstrate the ability of the eSX email appliance to send an email message, you need to find a way to route the email message from the demo board through the host PC used for demonstration, and from there to the final destination. Similarly, to demonstrate the ability of eSX to receive an email message, you need to find a way to connect the demo board to an SMTP server, so that the board can retrieve a message that has been sent to the board.

There are several ways that you could route email messages sent by the eSX email appliance:

1.   Have the host PC perform packet forwarding to an SMTP server somewhere else in the network (such as a connected ISP).

2.   Install an SMTP server on the PC itself, and have this local server relay the message to the destination address somewhere else in the network.

3.   Install an SMTP server on the PC itself, and have a local email client on the PC retrieve the message.

Method number 1 is the most likely method to be used in a real application. However, it requires an operating system that supports IP packet forwarding, and needs a system administrator to modify the network routing tables.

For this demonstration, we will use method number 3 because it does not require an external network connection. The network in this case consists of just the eSX demo board and applications running under Windows 95/98. To use this method, you need to install an SMTP server on the PC. A server application called EServ, version 2.5, is provided on the CD-ROM for this purpose.

Note: If you would like to obtain the latest version of EServ, you can download it from the web site "http://www.eserv.ru/". The EServ software is available on a "free trial" basis. Using the software beyond a 30-day evaluation period requires a payment to the software provider, E-Type Co.

3.6.1   Install and Run EServ on the PC

1. In Windows 95/98, open the CD-ROM directory window. From there, open the eSX Support Files directory window.

2. Double-click the Eserv250.exe icon. This starts the installation process.

3. Read the License Agreement and then click Yes. Read the "readme" file and then click OK. Click OK to accept the default destination directory, c:\eserv2. Installation should then proceed to completion.

4. Click Start, Programs, Eserv2, Run Eserv2 Server. This opens the Eserv/2.50 application window. See Figure 3-11.

Figure 3-11. EServ Application Window

Eserv is now running and can process email messages. Unlike some SMTP servers that are invoked automatically upon start-up of the computer, Eserv only operates when you explicitly run the program.

3.6.2   Configure Eserv for the eSX Demo

In order to send and receive email locally, you need to create a local domain and a local user to communicate with the demo board. You will create a new email address, joe@demo.sx, where "joe" is the user name and "demo.sx" is the local domain name. The user password will also be "joe".

To allow the demo board to send email messages that are handled by the local server, you will create a user "eSX" and an email address eSX@demo.sx. The user password will also be "eSX".

1. The left side of the Eserv window has a list of purple books. Double-click MailServer, SMTPserver, and LocalDomains. The right side of the window lists the local domains that have been defined. See Figure 3-12.
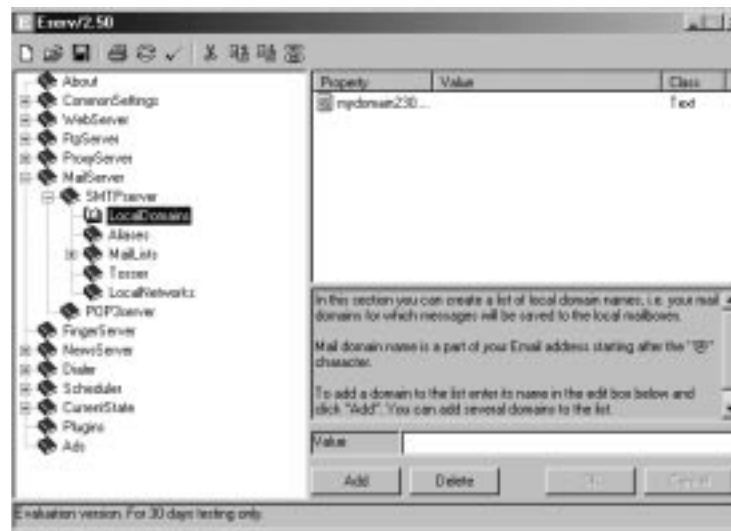
Figure 3-12. Eserv Application Window - Local Domains

2. In the Value field, enter the new domain name, demo.sx. Click Add to add this domain to the list.

Figure 3-13. Eserv Application Window - New Domain Name

3. On the left side of the Eserv window, double-click Common Settings and Users. The list of users currently supported is shown below Users.

4. In the Value field, enter the first new user name, joe. Click Add to add this user to the list of supported users.

5. On the left side of the Eserv window, click joe.

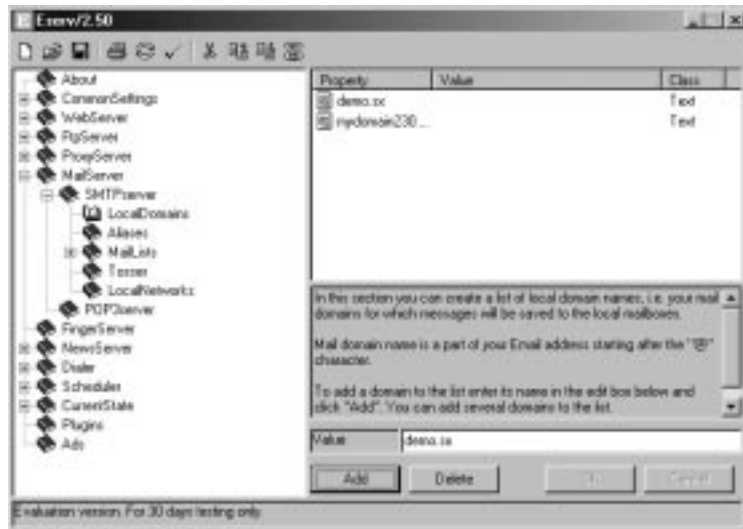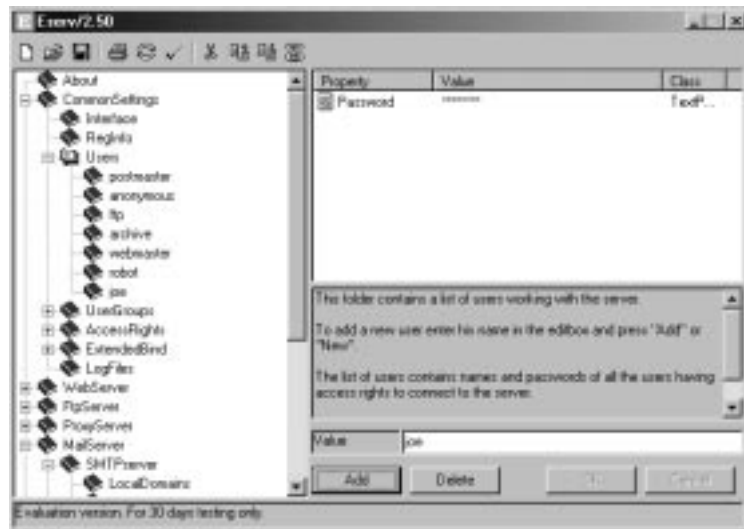Figure 3-14. Eserv Application Window - Adding User

6. On the right side of the Eserv Window, double-click Password. In the Password field at the bottom, enter "joe" (which is displayed as three asterisks) and then click OK.
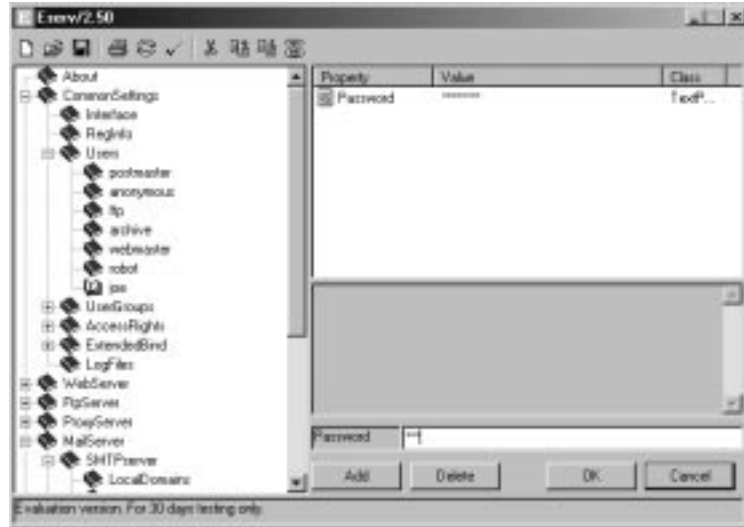
Figure 3-15. Eserv Application - Entering Password

7. Repeat steps 3 through 6 to create a user called "eSX" with a password "eSX".

For the eSX email appliance demonstration, it is not necessary for Eserv to gain access to the Internet. However, if you want Eserv to be able to send email to and receive email from any address throughout the Internet, you can tell Eserv how to gain access to the SMTP server and POP3 server of the ISP that you normally use for Internet access. For more information on this topic, double-click Scheduler, Tasks, and SMTPSEND or POP3RECV.

3.7 Configure the Email Client Software

For the eSX demonstration, you need to configure your email client (such as Eudora or Netscape Messenger) to use Eserv rather than your usual SMTP server. The exact procedure for doing this depends on your email client. For specific commands, see the documentation or on-line help for your email client.

This is the general procedure:

1. To avoid changing your existing email setup, create a new email user account. For example, for Eudora, create new shortcut to the Eudora executable, open the Properties dialog box for the short-cut, and add a second directory path to the Target field.

2. Execute the email client's setup command (such as Tools > Options or Edit > Preferences) and set the options as follows:

   – User name = joe

   – Password = joe

   – Return address = joe@demo.sx

   – POP account = joe@localhost

   – POP (incoming mail) server = localhost

   – SMTP (outgoing mail) server = localhost

   (The sever name is literally the string "localhost".)

3.8   eSX Sending An Email Message

The eSX STMP application sends an email message each time you ping the demo board. The content of the message is "hard-wired" in the eSX source code.

1. In the MS-DOS window, enter the following command:

    ```
    ping -n 1 192.168.11.1
    ```

    The TX and RX lights on the demo board flash for about a second. Also, the "LED" light turns on during this time to show that a TCP connection is open.

2. Go the email client program and check your email. You should get an incoming email message like the following:

    ```
    From: SX
    To: Joe
    Subject: Warning!

    Over-temperature condition in router.
    ```

If you did not receive this email message, check to see whether the message is waiting in Eserv to be retrieved. In that case, there is some kind of setup problem between Eserv and your email client. To check for messages waiting in Eserv, look for any files in the following directory:

```
c:\eserv2\mail\in
```

If there is no file in that directory, it indicates some kind of setup problem between Eserv and the demo board.

3.9   Perform the POP3 Demonstration

To perform the eSX POP3 demonstration, you need to modify the eSX source code and reprogram the SX on the demo board to receive (rather than send) email messages.

After you reprogram the SX, you will send a message to the demo board at its email address, eSX@demo.sx. This message will go to the Eserv SMTP server, where it will wait to be retrieved by the demo board.

The eSX POP3 application checks for and retrieves its email whenever a new PPP connection is made (in other words, when you first connect to the board by using the SX TCP IP Demo icon).

To prove that it really received the email message, the POP3 application transmits the received message out through the board's DEBUG serial port. To see this transmission, you need another serial cable (not provided) and an available serial port on the host PC or another PC.

3.9.1   Program the eSX POP3 Application

1. In the local directory window containing your source code, copy the eSX_SMTP.src file to a new file.

2. Change the name of the new file to eSX_POP3.src.

3. Make the following changes to the Options section of the source code and save the edited file:

    Enable (un-comment) the DEBUG option.

    Disable (comment out) the SMTPDEMO option.

    Enable (un-comment) the POP3DEMO option.

4. Using your assembler and programming tools, program the SX device on the demo board. Leave the SX device in the running state.

3.9.2 Send Email Messages to the Demo Board

1. Using your "joe" email client, send an email message to the demo board. The address of the demo board is eSX@demo.sx. Use any text you want for the subject and body of the message. You can send more than one email message if you wish.

2. The email message should be waiting in Eserv. To confirm this, look at the contents of the following file:

   c:\eserv2\mail\in\eSX

   The file is in ASCII format.

3. Connect the serial cable from the serial port of the PC to the PPP port of the demo board.

4. Double-click the SX TCP IP Demo connection icon, and in the Connect To dialog box, click OK. Watch the LEDs on the demo board. The demo board should retrieve its email from the Eserv server.

5. Check the Eserv "in" directory. Now that the email has been re-trieved, Eserv has renamed the old eSX file to $eSX, and it has created a new empty eSX file. This indicates that there is no email left for the demo board to retrieve.

6. Double-click the SX TCP IP Demo icon, and in the Connected To SX TCP IP Demo dialog box, click Disconnect.

7. Back in your "joe" email client, send a very long email message to the demo board (for example, by attaching a big file).

8. Reconnect to the demo board. Watch the TX and RX lights flash for a long time as the board retrieves the long email.

3.9.3   Read the Received Email at the DEBUG Port

As the demo board retrieves an email message, it retransmits the message out through its DEBUG serial port. If you would like to see this, do the following:

1. Obtain another male-female DB-9 straight-through serial inter-face cable.

2. Connect an available serial port of a PC to the DEBUG port of the demo board.

3. On the PC, start a terminal application such as HyperTerminal (Start, Programs, Accessories, HyperTerminal). Configure the application to use the connected serial port. Set the port charac-teristics to 57600 baud, 8 data bits, no parity, 1 stop bit, and no handshaking or flow control. Then make the connection.

4. Run the POP3 demonstration just described. You should see the text of the email appear in the terminal window as it is being re-ceived by the demo board.

3.10   Frequently Asked Questions

Here are some frequently asked questions about the eSX email application.

In the SMTP demo, the demo board sent back multiple email messages in response to one ping. Why?

You did not to use the "-n 1" option in the ping command, which specifies one echo request. By default, the ping command issues four echo requests. The eSX application starts transmitting an email in response to the first ping. If the second ping arrives while the first ping is being processed, the demo board aborts the first email message and starts another. However, if there is enough time between each ping, you can get up to four email messages in response to one ping command.

How do I change the user password in Eserv?

To change the user password for user "joe," go to the Eserv window, click CommonSettings, Users, and joe. Double-click Password, enter the new password into the Password field, and click OK. Remember to change the password in your email client as well.

To change the user password for user "eSX" (the demo board), use the same procedure. However, you must also change the password definition in the SX source code file and reprogram the SX device. Look in the source code for the "_POP3PASS" definition.

I got the message "Cannot bind socket to port 110" message. What does this mean?

You should have only one email server on the PC. This message appears when you already have an SMTP server installed and running on your PC. Perhaps you have accidentally installed Eserv twice.

Does Eserv support multiple accounts?

Yes. In fact, you need to set up two accounts to support the SMTP demo (username: joe) and for the POP3 demo (username: eSX).

I got an "SMTP send" message for the status of Eserv. What does this mean?

*** I never saw this message, even when I tried to make it appear. Where and when does it appear? ***

It means that there is an email message waiting in Eserv to be relayed to another server. It is caused by a request to send email to a non-local domain. Perhaps you have not yet added "demo.sx" as a local domain in Eserv.

Is it possible to have both the SMTP and POP3 demos run at the same time on the SX?

Yes, but the source code needs to be changed first. When there is enough customer demand, an improved version of the source code will be provided to support both protocols simultaneously. Contact Scenix for further information.

Chapter 4
eSX/iSX Source Code

4.1   Introduction

The two main source code files on the CD-ROM, called eSX vx_x_x.src and iSX vx_x_x.src, are the source code files for the eSX and iSX applications. The two files are identical except for some statements in the "Options" section of the files. These statements determine which sections of the source code file get assembled.

To be specific, the eSX demo uses UDPDEMO and SMTPDEMO define statements, and the iSX demo uses HTTPDEMO and JAVA-DEMO define statements. The eSX vx_x_x.src file is designed to support the SMTP demo. It must be modified slightly to support the POP3 demo.

You can experiment with the eSX and iSX applications by modifying the source code and reprogramming the SX device on the demo board. The comment lines in the source code provide information on how the code operates.

4.2 "Options" Section

The "Options" section near the beginning of the source code file lets you easily control several program options. The code contains many "conditional assembly" instructions that determine whether certain sections of code are used or not used, depending on the option settings.

The eSX can be configured to either send email with SMTP or to receive email with POP3. In the current version of the source code, these options are mutually exclusive, so either the POP3 options or the SMTP options should be enabled, but not both.

Here are brief descriptions of the options in the "Options" section.

- DEBUG – Enable this option to generate debugging messages. At many points in the program, the application sends debugging messages to the DEBUG serial port. If this option is disabled, no such messages will be generated and the overall code length will be smaller.

- WIN32 – Enable this option if the host PC is running Windows (95, 98, or NT). Windows Dial-up Networking needs to think that it is communicating with a modem. When this option is set, code is included which responds to some of the AT command set, making the PC think that it is dialing a modem. If this option is not enabled, then PPP negotiation can start immediately. This is appropriate under UNIX operating systems, or if a real modem is being used as the physical interface.

- WIN98 – Enable this option if the host PC is running Windows 98 or a later version of Windows 95. It controls the operation of the TCP/IP stack. Later versions of Windows 95 operate like Windows 98 in this respect.

- UDP – Enable this option to include the UDP protocol in the stack.

- TCP – Enable this option to include the TCP protocol in the stack.

- HTTPDEMO – Enable this option to include the HTTP protocol. Using this option requires TCP.

- JAVADEMO – Enable this option to include code for the Java demonstration program. Using this option requires HTTPDEMO, TCP, and UDP.

- SMTPDEMO – Enable this option to include code for SMTP. Using this option requires TCP.

- ADCDEMO – Enable this option to include code for the Analog-to-Digital conversion daughter board that plugs into the demo board. The ADC demonstration uses sigma-delta ADC to measure the value of an external potentiometer. When that value crosses a threshold, the application transmits an email message.Using this option requires SMTPDEMO and TCP. For more information, contact Scenix.

- POP3DEMO – Enable this option to include the POP3 protocol. Using this option requires TCP.

- POP3DEBUG – Enable this option to include debugging code for the POP3 protocol. Using this option requires POP3DEMO and TCP.

- UDPDEMO – Enable this option to include the UDP code described in Scenix Application Note AN23 (available in the Documentation folder on the CD-ROM). This option cannot be used with JAVADEMO.

4.3   SMTP Configuration

For the SMTP application, you can specify the email address to which the eSX application sends email messages. This address can be a real email address if you will be connecting to a network, or a dummy address such as joe@demo.sx (which is the default) if you will be using the host PC in stand-alone mode. The recipient address is on a line that starts with "_SMTPRCPT".

4.4   POP3 Configuration

For the POP3 application, you can specify the IP address of the POP3 server from which email will be retrieved, and the user name and password of the demo board.

The POP3 server address is set by the POP3Address constants. If EServ is the POP3 server being used, the four constants should be left at their default settings (192.168.11.2).

The POP3 user name and password for the demo board are set by the _POP3USER and _POP3PASS constants. By default, they are both set to the string "eSX".