Renesas Synergy™ Platform

Getting Started with NetX Duo™ Web Server

Introduction

This application note describes how to install, build, and run a simple web server application on a Renesas Synergy™ MCU Group Kits using the Synergy e² studio or IAR Embedded Workbench® for Renesas Synergy™ (IAR EW for Synergy) Integrated Solutions Development Environment (ISDE), the Synergy Software Package (SSP), and the Express Logic NetX Duo™ network stack.

Goals and Objectives

This application note shows how to install, build, and run the example application. The example application supports both IPv4 and IPv6. Using your PC, you can view the web server application running on your board by observing variables being updated in a browser window when you refresh the screen.

The web server displays an IPv6 address at the bottom of the screen. You can ping the IPv6 address from a command window on your PC.

Prerequisites

As the user of this application note, you are assumed to have some experience with the Renesas e² studio ISDE, IAR EW for Synergy, and the Synergy Software Package (SSP). For example, before you perform the procedure in this application note, you should follow the procedure in your board's *Quick Start Guide* to build and run the Blinky project. By doing so, you become familiar with e² studio and the SSP, and ensure that the debug connection to your board is functioning properly.

Required Resources

The example application targets DK-S7G2 and PK-S5D9 Synergy MCU Group devices. To build and run the example application, you need the following:

- One of the following Renesas Synergy boards:
  - DK-S7G2 v2.0 or later
  - SK-S7G2 v2.0 or later
  - PE-HMI1 v2.0
  - PK-S5D9 v1.0 or later.
- A PC with a USB 2.0 port and an Internet connection
- The PC should be running Microsoft® Windows® 7 and have the following Renesas software installed:
  - e² studio ISDE v7.3.0 or later
  - Synergy Software Package (SSP) v1.6.0 or later
  - IAR EW for Synergy v8.23.3 or later
  - SSC v7.3.0 or later

You can download the required Renesas software from the Renesas Synergy Gallery (www.renesas.com/synergy/software).

Time Required

You can install, build, and run the example application in under 30 minutes. The major steps involved require you to:

1. Connect to the target board.
2. Select an IP address for the board.
3. Import, configure, and build the project.
4. Run the NetX Duo web server demonstration.

Contents

1. Connecting to the Board

To configure and connect your target board:

1. Follow the procedure in your target board's *Quick Start Guide* to connect the SEGGER J-Link® debugger from your PC to the JTAG connector on the target board and power-up the board.

Note: On the DK-S7G2 board 2.0 to V3.1, set DIP switch 3 (**ENET1**) on S5 to ON. Use the Main Board Ethernet 1 port only. For other boards, there is no need to have any DIP switch settings.

On the DK-S7G2 v4.1 board, set DIP switch 3 (**ETHERNET1**) on S6 to ON. Use the Board Ethernet 1 port only. For other boards, there is no need to have any DIP switch settings.

2. Connect an Ethernet cable to the target board.
3. Connect the other end of the cable to the PC through a switch, crossover cable, or straight through to the PC using an auto MDI-X capable port.

2. Selecting an IP Address for the Board

Use Figure 1 and Figure 2 to configure the static IP address for the Ethernet port of your PC.

In this example, the IP address for the PC is configured as 192.168.0.200.

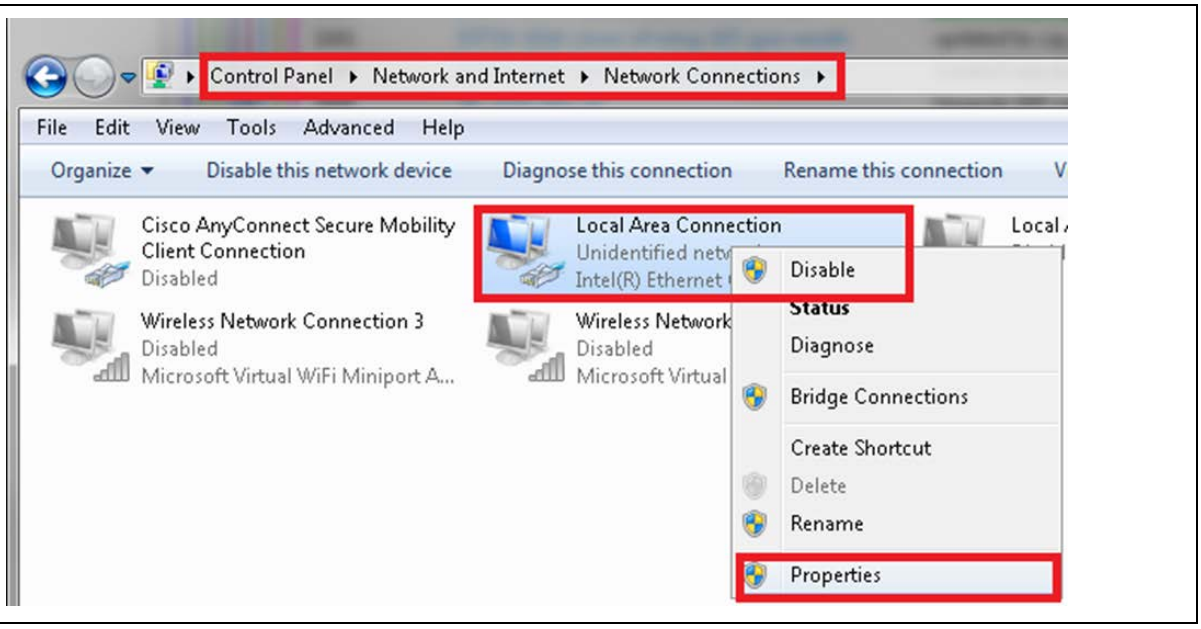

Figure 1. Configuring the PC Ethernet port to static IP address to test the board

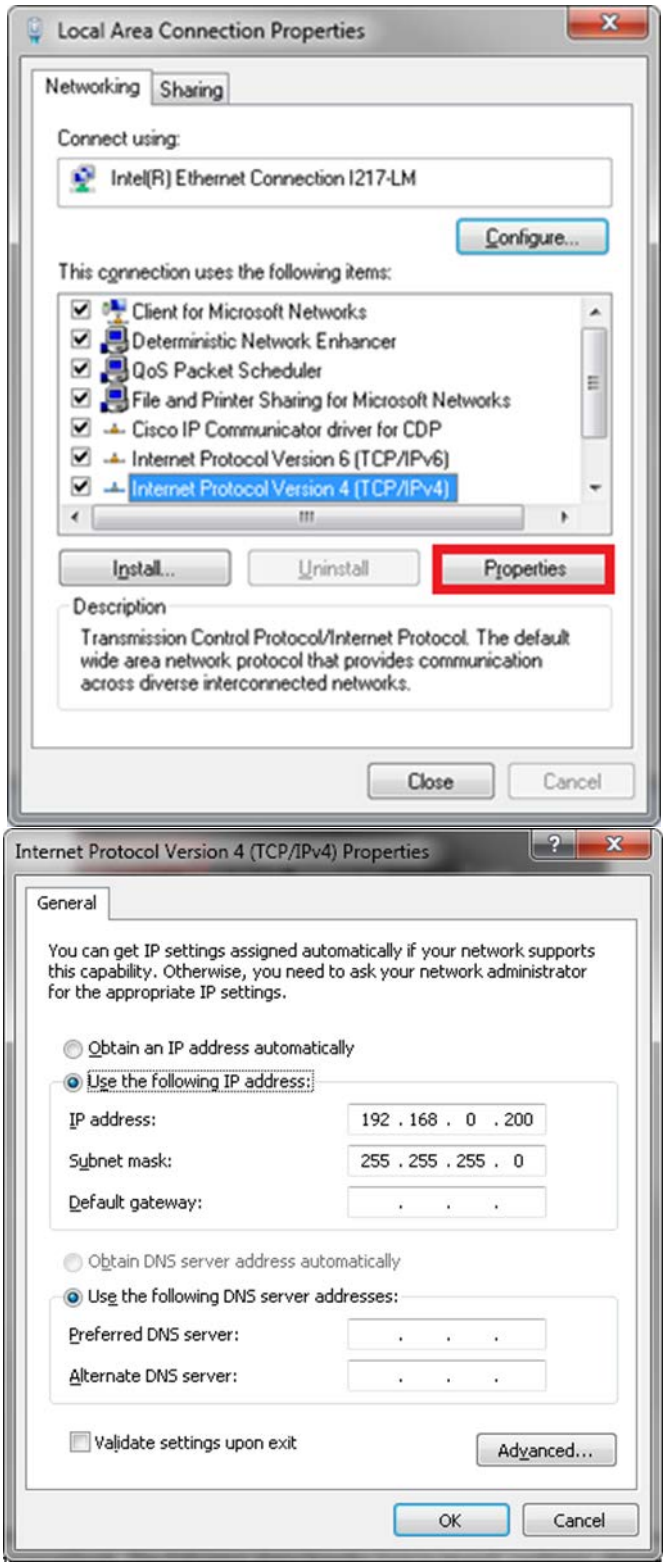

Figure 2. Static IP address for the Ethernet port of the PC

1. Run the command prompt as an administrator:
   A. Click the **Start** icon  .
   B. In the search box, type **command prompt**.
   C. Right click on **Command Prompt**.
   D. Select **Run as Administrator**.
   E. A dialog box appears asking, “Do you want to allow the following program to make changes to your computer?” Click **Yes**.

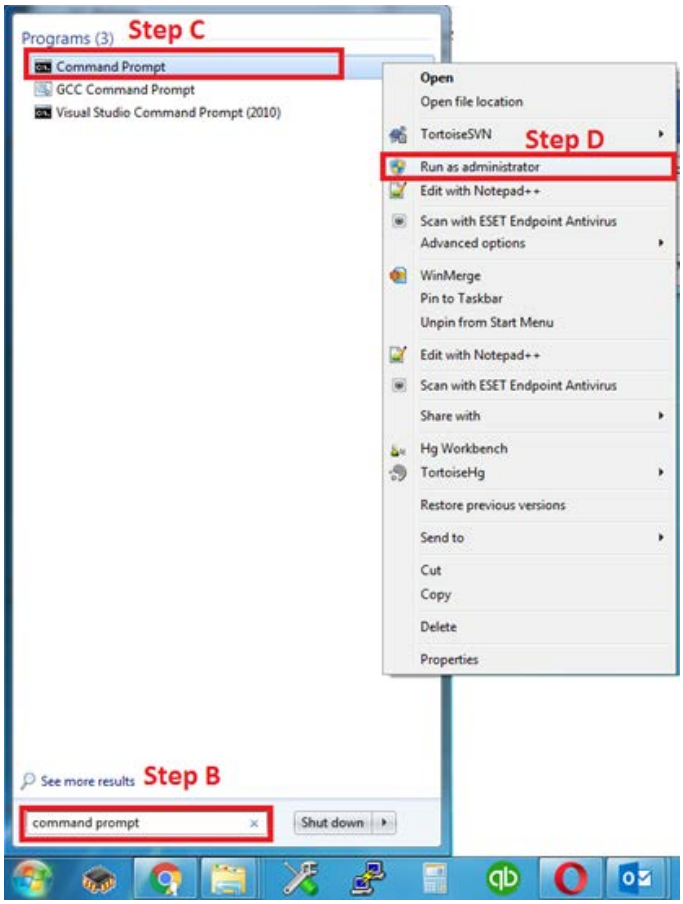

Figure 3. Command prompt as Administrator

2. In the **Command Prompt** window, enter **ipconfig**. Your results should look like the following figure.

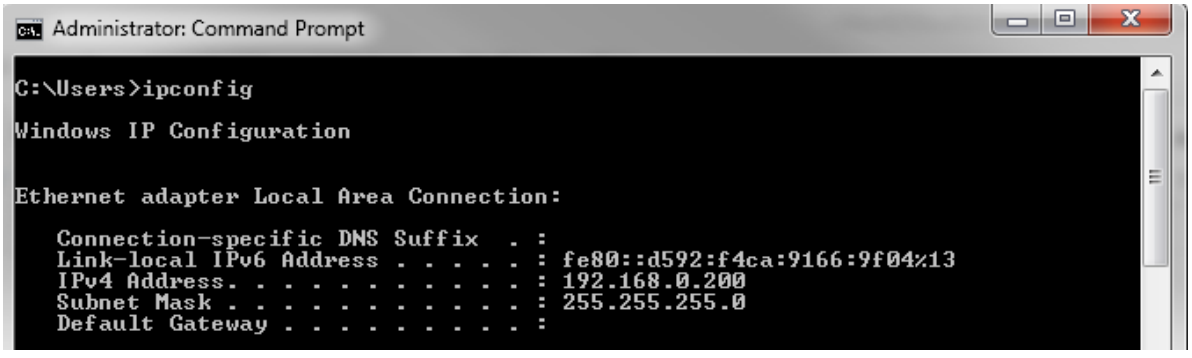

Figure 4. IP Configuration results

3. Select an IP address for the board that is different from the PC’s and is not being used. In this application example, an IP address of 192.168.0.2 was chosen for the board.

3. Importing, Configuring, and Building the Project

Before you can run the example application, you must change the default IP addresses for the application in the ISDE configurator to IP addresses appropriate for your network and PC. The following steps describe how to import, configure, and change the default IP address in the application to an IP address appropriate for your network, and then build the project:

1. Follow the application note, *Renesas Synergy™ Project Import Guide* (r11an0023eu0121_synergy_ssp.pdf), to import the project into e^2 studio ISDE that was included in this package. Do not build the project yet.
2. Open the configuration.xml for the project.
3. Select the **Threads Tab** and choose **HTTP Server Thread**.
4. Click the **g_ip0, NetX Duo IP** instance in the Properties window and change the IPv4 address to the one you selected in section 2, step 3.
   The example uses 192.168.0.2 as the address, but the IPv4 address may vary based on your network settings.
5. Keep the IPv6 address setting and use it as the default selection.
6. Follow the procedures in the *Renesas Synergy™ Project Import Guide* to build and debug the project.
7. When prompted to select the debug configuration, select NetX_Duo_WebServer_XX_XXXX Debug (under Renesas GDB Hardware Debugging).

4. Running the Example Application

To run the application on the Synergy board, insert the USB Drive into the USB connector (USB Mass storage) for your board using Figure 5 (DK-S7G2), Figure 6 (PE-HMI1), or Figure 7 (SK-S7G2 and PK-S5D9), as applicable.

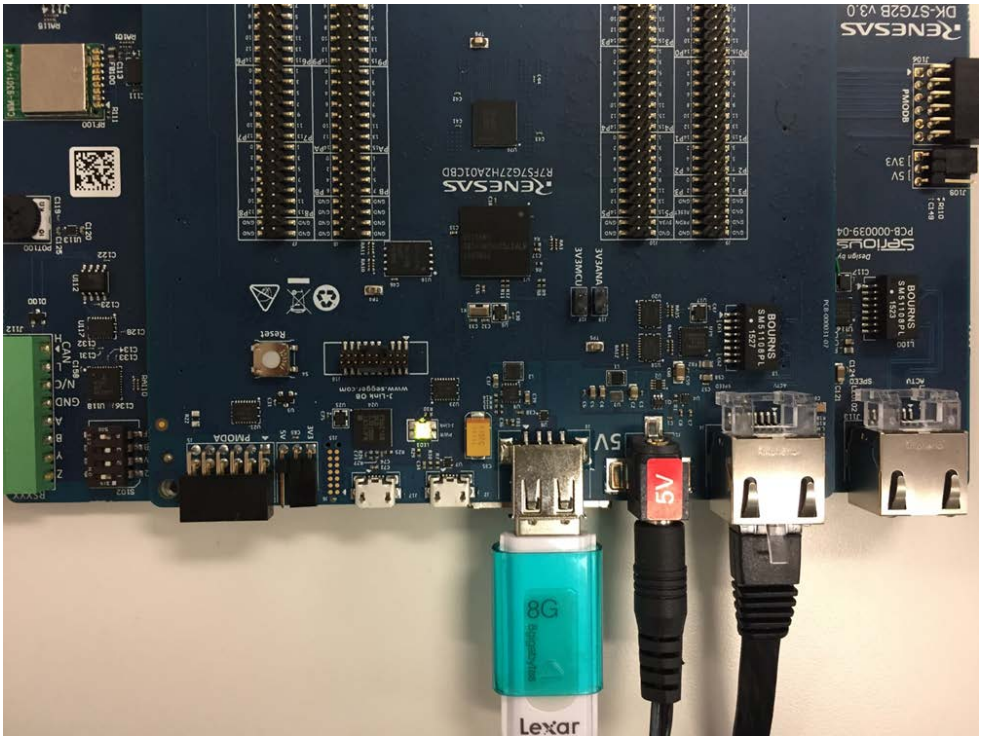

Figure 5. USB drive and Ethernet connection for DK-S7G2 board

Note: For the DK-S7G2 board, set the DIPSW S5 **ENET1** switch to **ON** and use the **Main Board Ethernet 1** port only. For other boards, no DIP switch settings are needed.

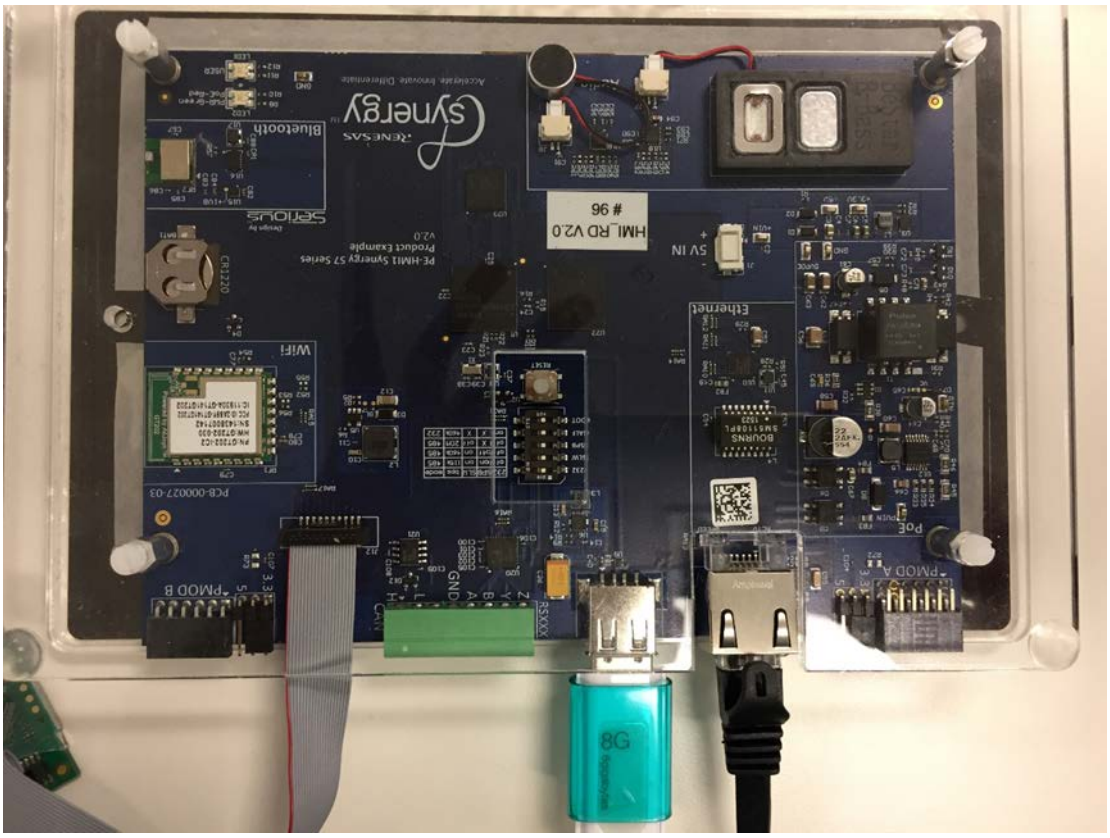

Figure 6. USB and Ethernet connection for the PE-HMI1 board

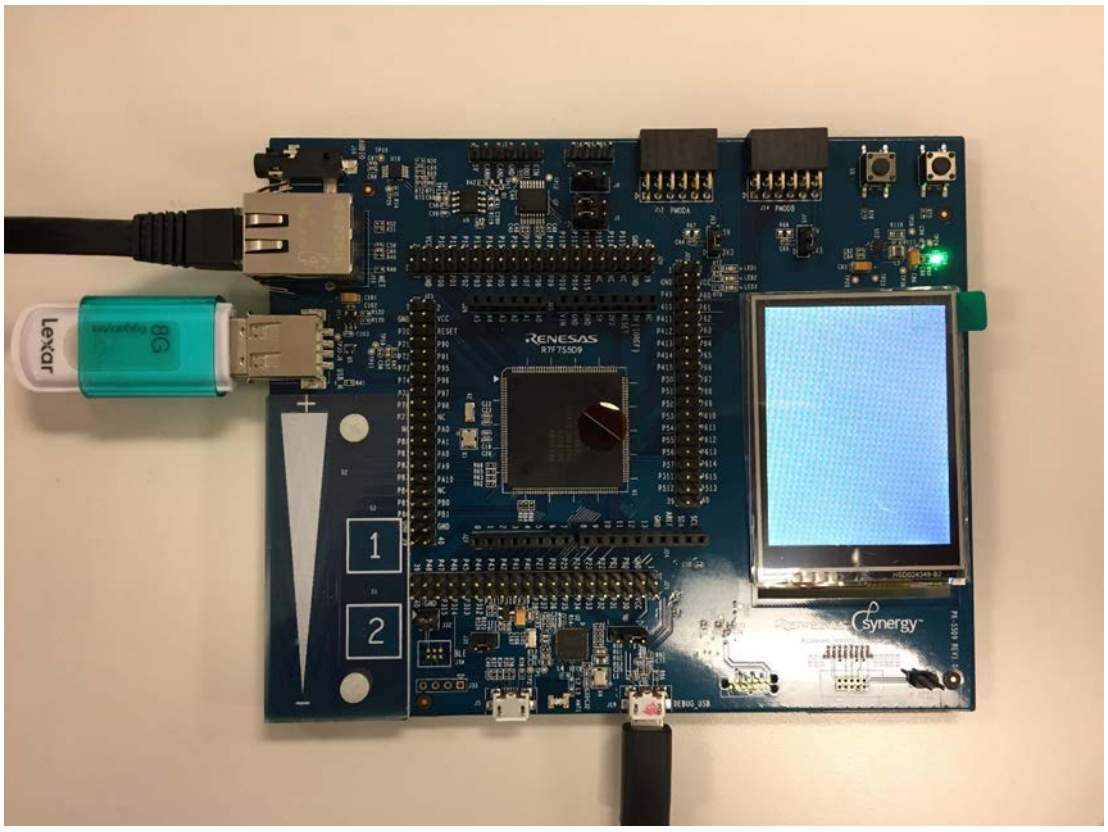

Figure 7. USB and Ethernet connection for the SK-S7G2 and PK-S5D9 board

If you properly configured, built, and have the application running, you should see the orange light constantly illuminated on the board near the Ethernet connector. A flashing green light on this connector indicates data traffic. The following figure shows the orange and green Ethernet status LEDs on a DK-S7G2 MCU board. The other kits operate the same way.

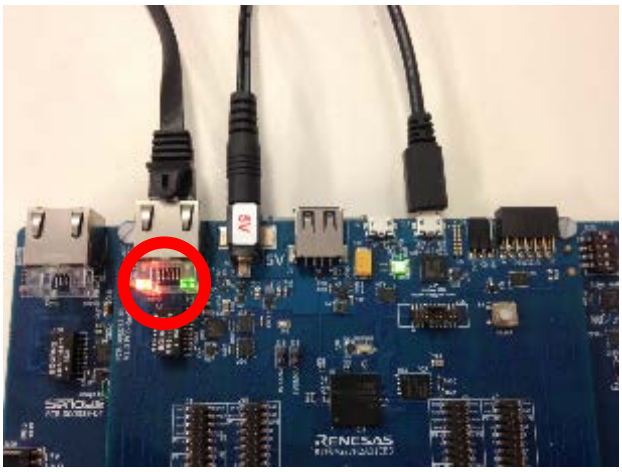

Figure 8. Orange and green Ethernet status LEDs

To exercise the example web server application:

1. In a command prompt window on your PC, enter the `ping` command with the IP address that you specified for the board previously (such as 192.168.0.2). In the following example, the ping result for the board address is shown. If the connectivity and configurations are working properly, you will see ping results.

```
C:\Users>ping 192.168.0.2

Pinging 192.168.0.2 with 32 bytes of data:
Reply from 192.168.0.2: bytes=32 time=1ms TTL=128
Reply from 192.168.0.2: bytes=32 time<1ms TTL=128
Reply from 192.168.0.2: bytes=32 time=1ms TTL=128
Reply from 192.168.0.2: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\Users>_
```

Figure 9. Ping results

2. In a web browser, enter the IP address used with the ping command from the previous step in the text field where you normally place a URL, like www.google.com. You should see the following window.

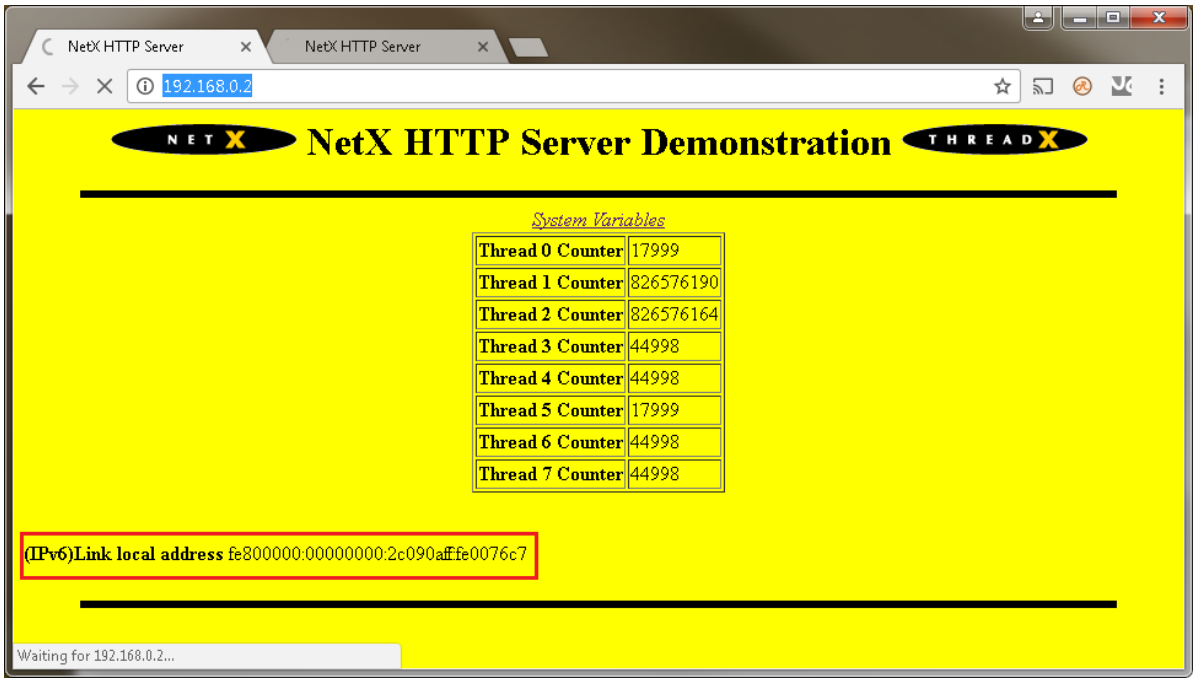

Figure 10. HTTP web page

3. The local IPv6 address of the board is displayed on the bottom of the webpage. In this example, the number is fe800000:00000000:2c090aff:fe0076c7. Return to the command prompt and execute the ping command with the IPv6 address. In this example, the command would be `ping fe80::2c09:aff:fe00:76c7`.

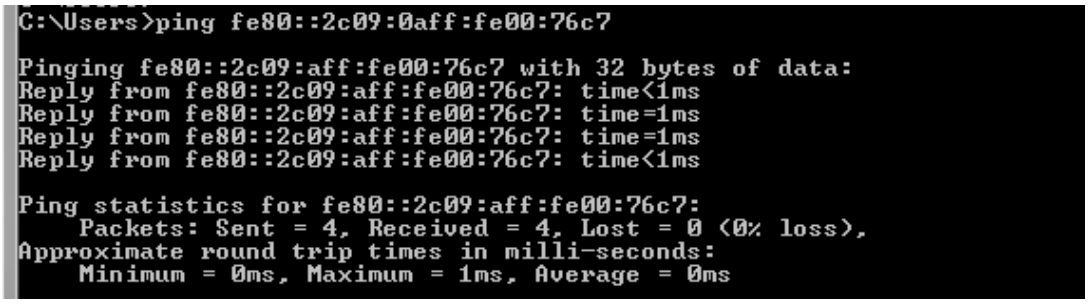

Figure 11. Pinging the board's IPv6 address

4. To load the web page using the IPv6 address, enter it in the address bar with the format `[fe80::2c09:aff:fe00:76c7]`, including the brackets.

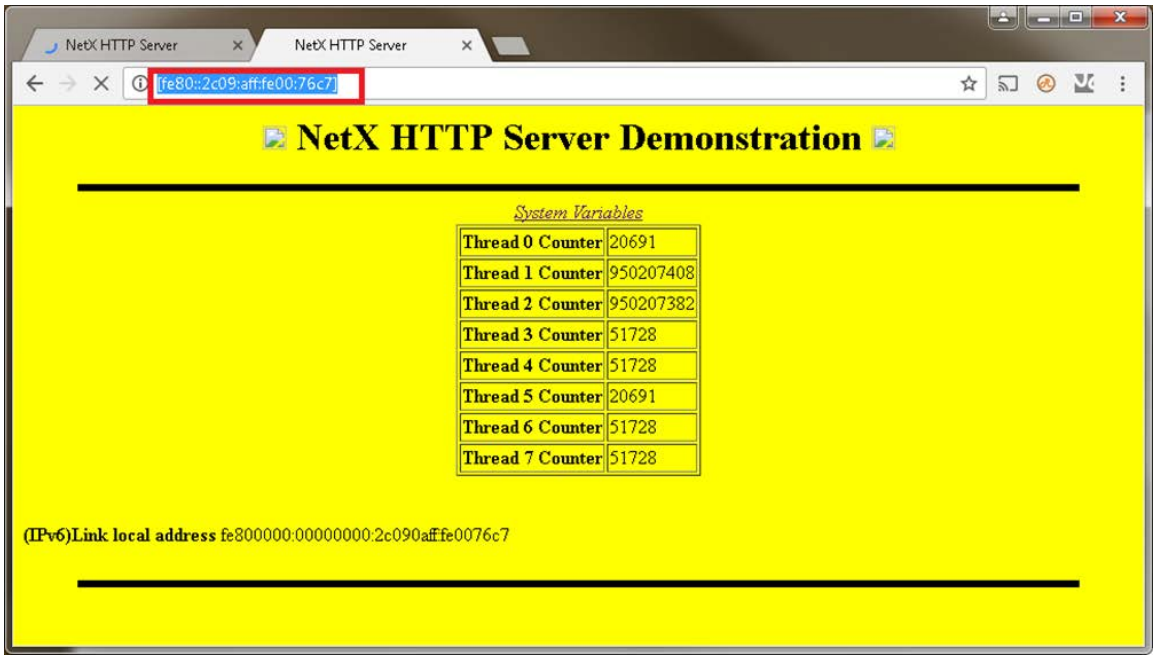

Figure 12. Hosted web page using IPv6 address

Note: The example application supports only IPv6 link local addresses. If you need an IPv6 address outside of your local network, you must add the processing to set the address for the application

5. Click the **Terminate** button to close the debugger.

5. Next Steps

After you run the example application, you can learn more about how the application works and the API calls involved, by examining the application source code.

You can also download additional Synergy example applications from the following URL: www.renesas.com/synergy/applicationprojects

Website and Support

Visit the following vanity URLs to learn about key elements of the Synergy Platform, download components and related documentation, and get support.

Synergy Software	www.renesas.com/synergy/software
Synergy Software Package	www.renesas.com/synergy/ssp
Software add-ons	www.renesas.com/synergy/addons
Software glossary	www.renesas.com/synergy/softwareglossary
Development tools	www.renesas.com/synergy/tools
Synergy Hardware	www.renesas.com/synergy/hardware
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MCU glossary	www.renesas.com/synergy/mcuglossary
Parametric search	www.renesas.com/synergy/parametric
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Partner projects	www.renesas.com/synergy/partnerprojects
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Forums	www.renesas.com/synergy/forum
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Videos	www.renesas.com/synergy/videos
Chat and web ticket	www.renesas.com/synergy/resourcelibrary

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	May.12.16	—	Initial version
1.01	Oct.21.16	—	Minor format changes
1.02	Feb.28.17	—	Updated for SSP 1.2.0
1.03	Aug.28.17	—	Updated to SSP 1.3.0
1.04	Sep.27.17	1	Required resources of SSP version changed
1.05	Feb.27.18	—	Updated for SSP v1.4.0
1.06	Apr.09.18	9	Fixed link in Next Steps
1.07	Sep.06.18	—	Updated for SSP v1.5.0
1.08	Mar.15.19	—	Updated to SSP 1.6.0

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