

Renesas Synergy™ Platform

Getting Started with NetX™ Web Server

Introduction

This application note describes how to install, build, and run a simple web server application on a Renesas Synergy™ development board 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™ Network Stack.

Goals and Objectives

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

Prerequisites

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

Required Resources

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

- One of the following Synergy MCU Group boards:
 - DK-S7G2 v2.0 or later
 - SK-S7G2 v2.0 or later
 - PE-HMI1 v2.0
 - PK-S5D9 v1.0 or later.
- USB drive (USB mass storage)
- A PC running Microsoft® Windows® 7, with a USB 2.0 port and connection to the Internet, and the following Renesas software installed:
 - e² studio ISDE v7.3.0 or later
 - 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 key steps require you to:

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

Contents

- 1. Connecting to the Board3
- 2. Selecting an IP Address for the Board3
- 3. Importing, Configuring, and Building the Project6
- 4. Running the Example Application6
- Revision History11

1. Connecting to the Board

To configure and connect your target board:

1. Follow the procedure in the *Quick Start Guide* for your target board to set up the SEGGER J-Link® debugger connection 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.

Note: 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.

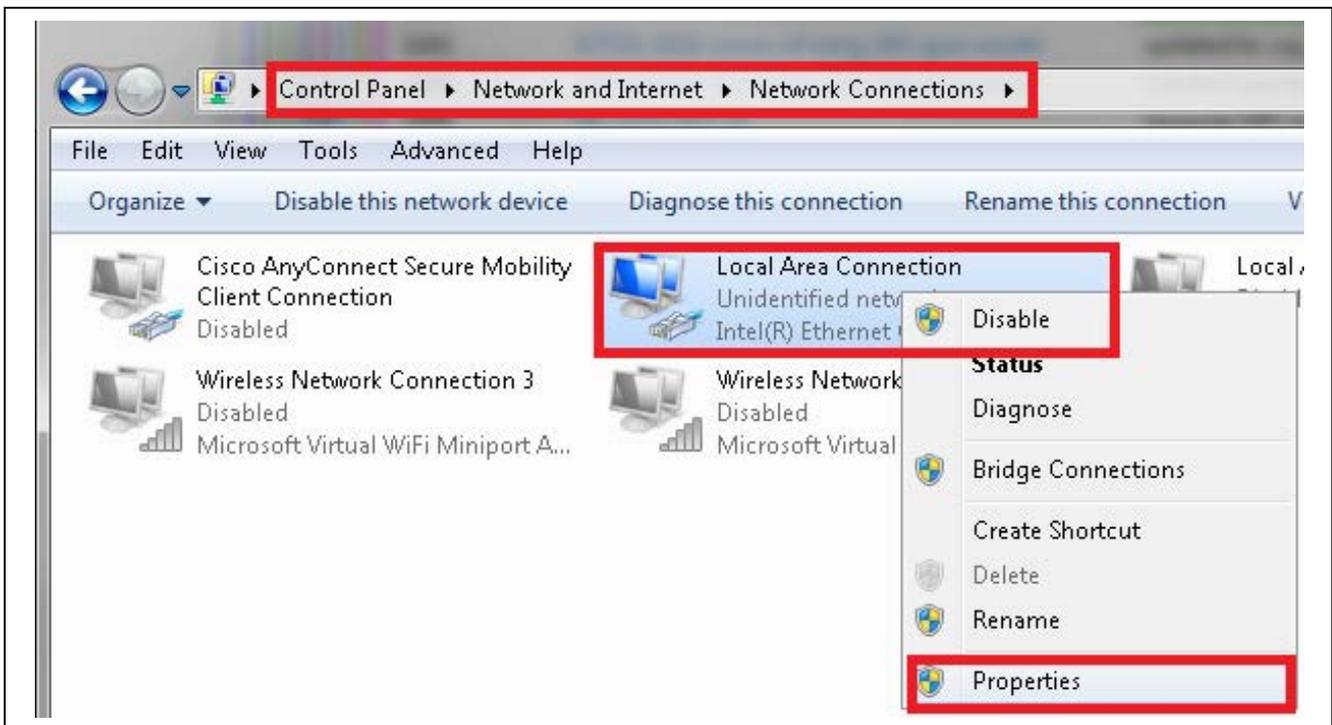


Figure 1. Configure the Ethernet port of your PC to Static IP address to test the board

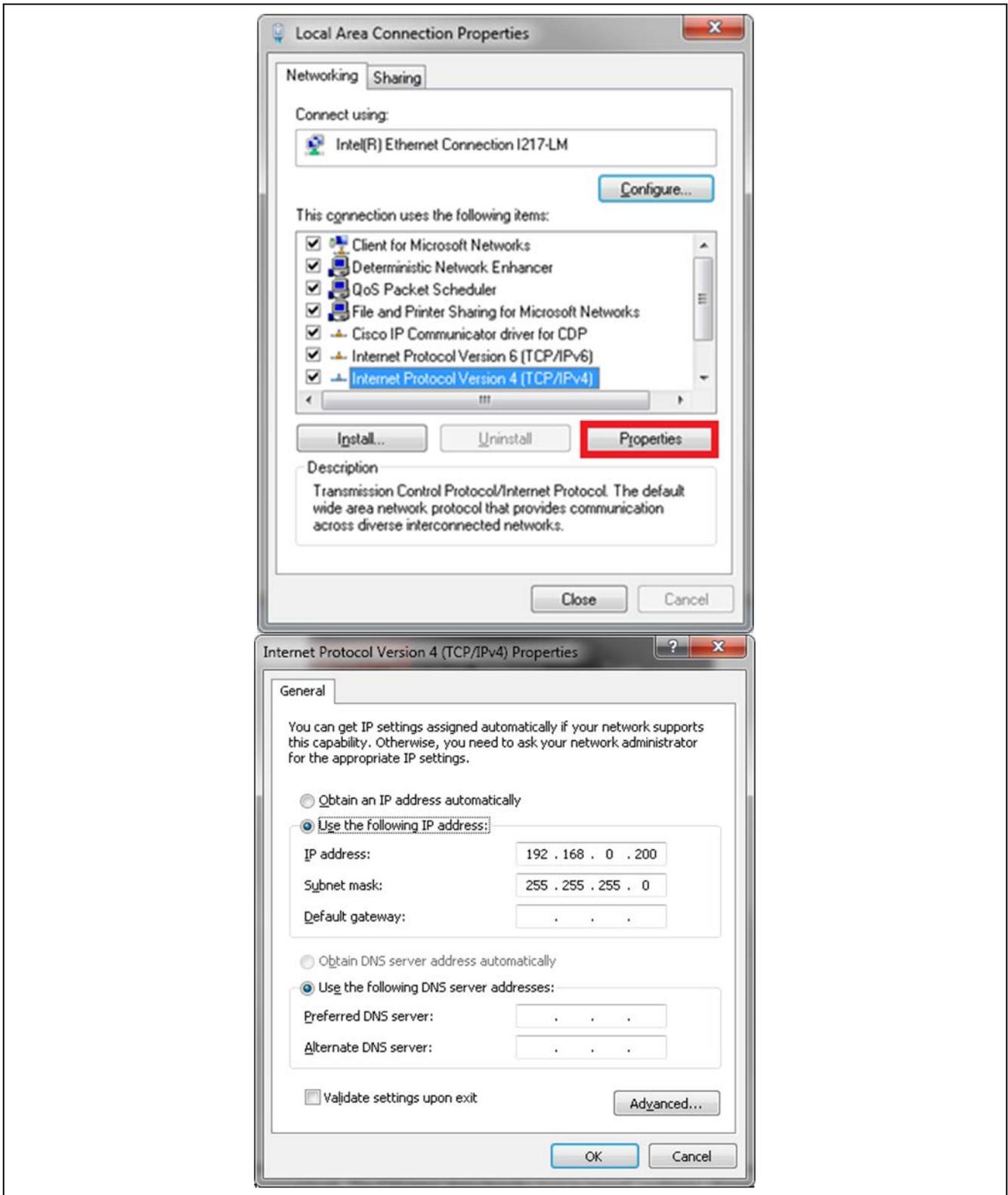


Figure 2. Static IP address for the Ethernet port of the PC

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**.

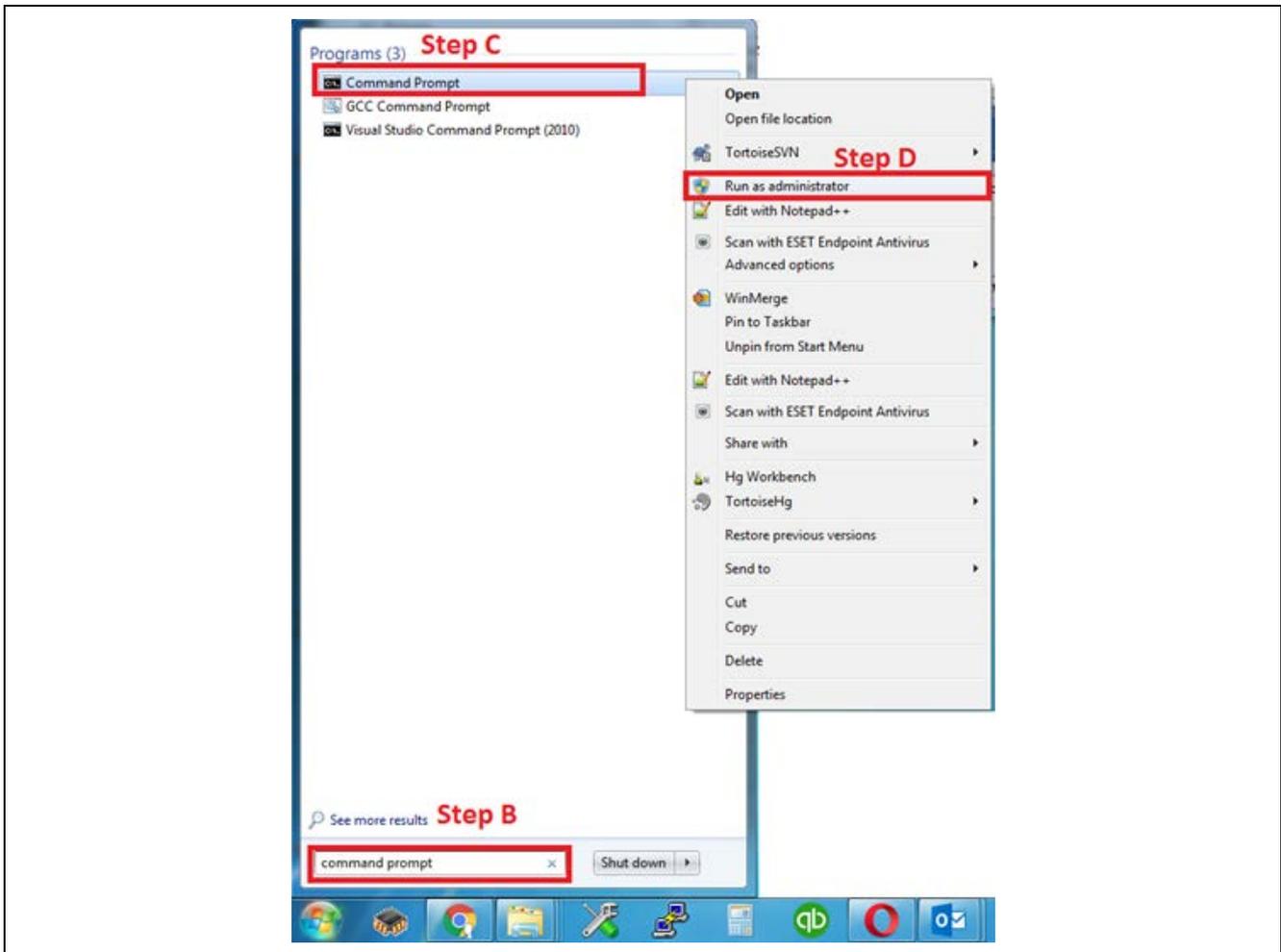


Figure 3. Command Prompt as Administrator

2. In the **Command Prompt** window, enter the command `ipconfig`. You will see a screen like in Figure 4.

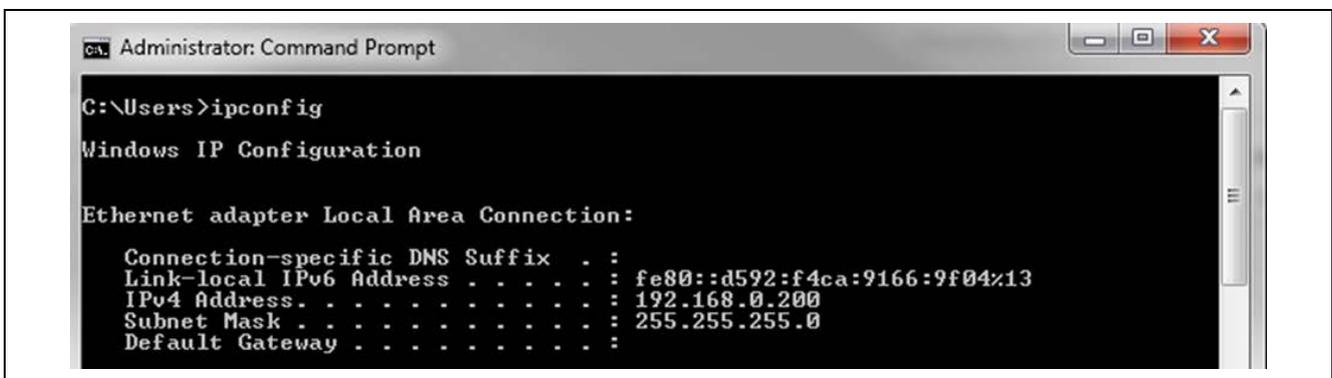


Figure 4. ipconfig results

3. Select an IP address for the board, which is different from the PC and is not being used. In this application, the IP address for the board is chosen as 192.168.0.2.

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 that are appropriate for your network and PC. The following steps describe how to import, configure, change the default IP address in the application to an IP address appropriate for your network, and then build the project:

1. Follow the procedure in the *Renesas Synergy™ Project Import Guide* (r11an0023eu0121_synergy_ssp.pdf) to import the project into the e² studio ISDE. Do not build the project.
2. Open the `configuration.xml` for the project, select the **Threads** tab, and choose **HTTP Server Thread**.
3. Click the `g_ip0`, NetX IP instance, on the **Properties** window, and change the IPv4 address to the one selected in section 2, [step 3](#) (for example, 192.168.0.2).

Note: The IPv4 address may vary depending on your network settings.

4. Follow the procedure in the *Renesas Synergy™ Project Import Guide* to build and debug the project. When prompted to select the debug configuration, select **NETX_Webserver_XX_XXXX Debug** in **Renesas GDB Hardware Debugging**.

4. Running the Example Application

To run the application on your Synergy board, insert the USB drive into the USB connector (USB mass storage) as shown in Figure 5 (DK-S7G2), Figure 6 (PE-HMI1), or Figure 7 (SK-S7G2 or PK-S5D9).

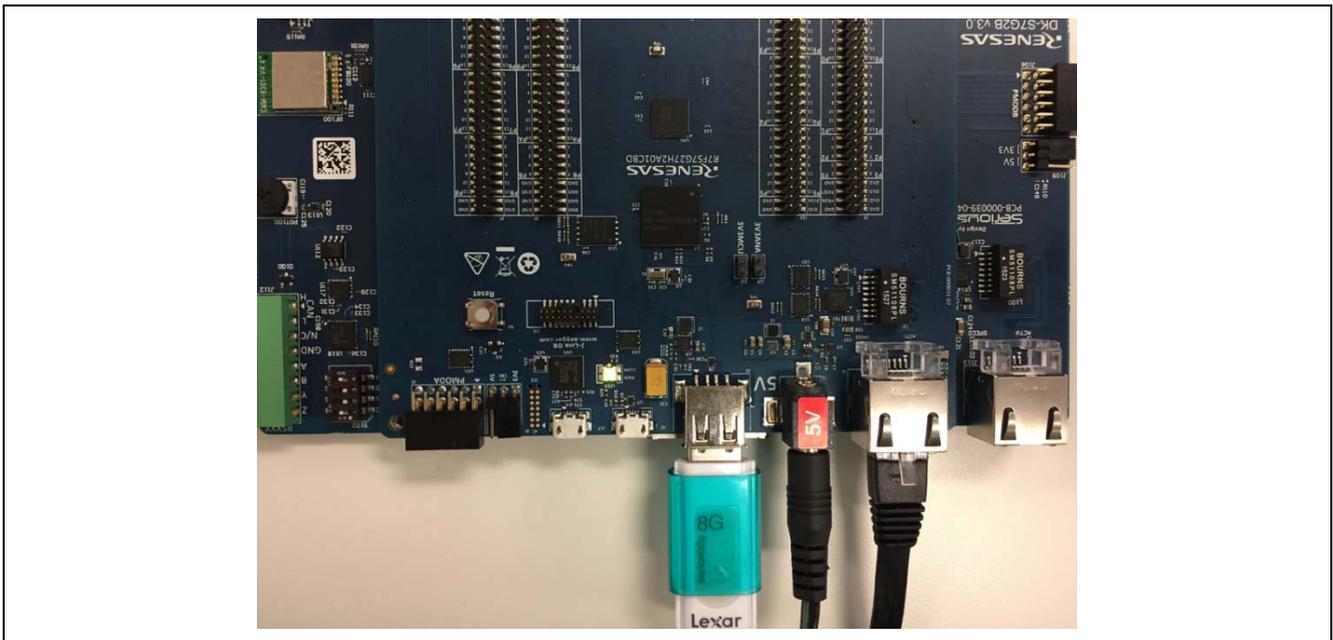


Figure 5. USB Drive and Ethernet Connection for DK-S7G2 Synergy MCU board

Note: On the DK-S7G2 board, 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.

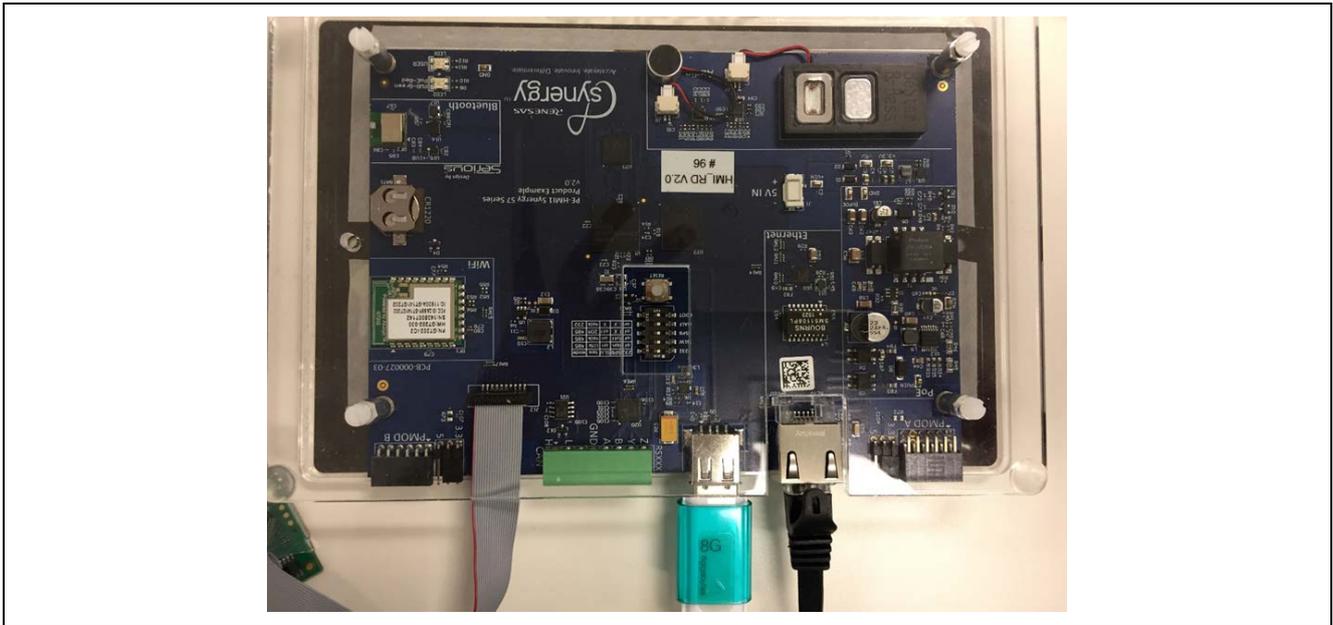


Figure 6. USB and Ethernet connection for the PE-HMI1 board

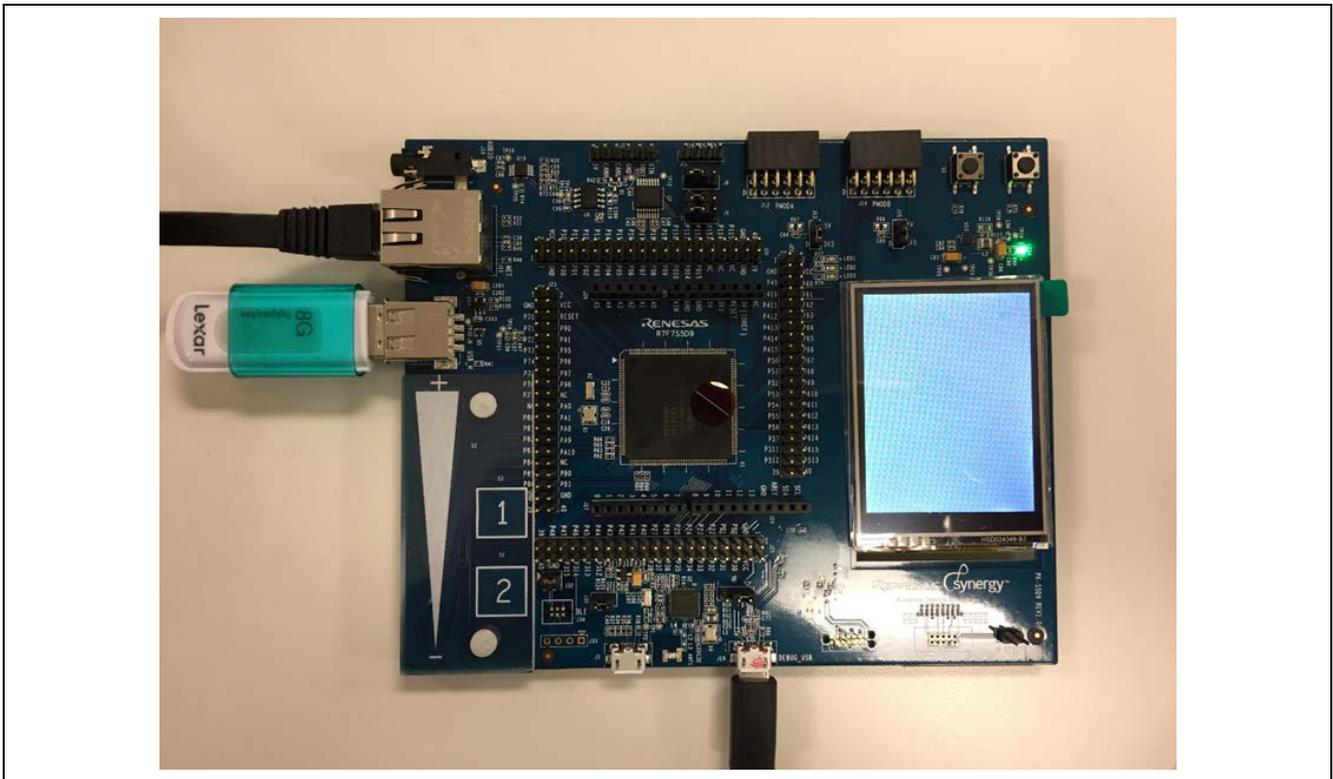


Figure 7. USB and Ethernet connection for the SK-S7G2 and PK-S5D9 boards

If you have properly configured, built, and ran the application, you should see the orange light constantly illuminated on the board near the Ethernet connector. A flashing green light on the same connector indicates data traffic. Figure 8 shows the orange and green Ethernet status LEDs on the DK-S7G2 board. The other kits function the same way.

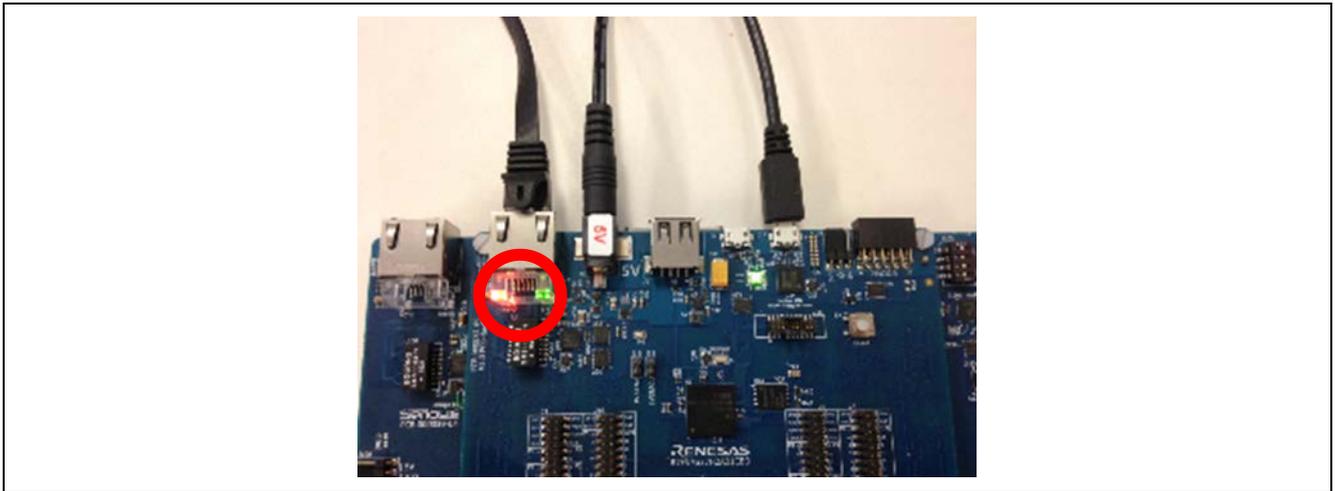


Figure 8. Orange and Green Ethernet Status LEDs

To run 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 (for example, 192.168.0.2). In the following example, the ping result for the board address is shown in Figure 9. If the connectivity and configurations are properly set up, you will see the ping working.

```
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

- In a web browser, enter the IP address that you used with the ping command in the previous step in the text field where you normally type a URL, such as www.google.com. You should see the view in Figure 10.

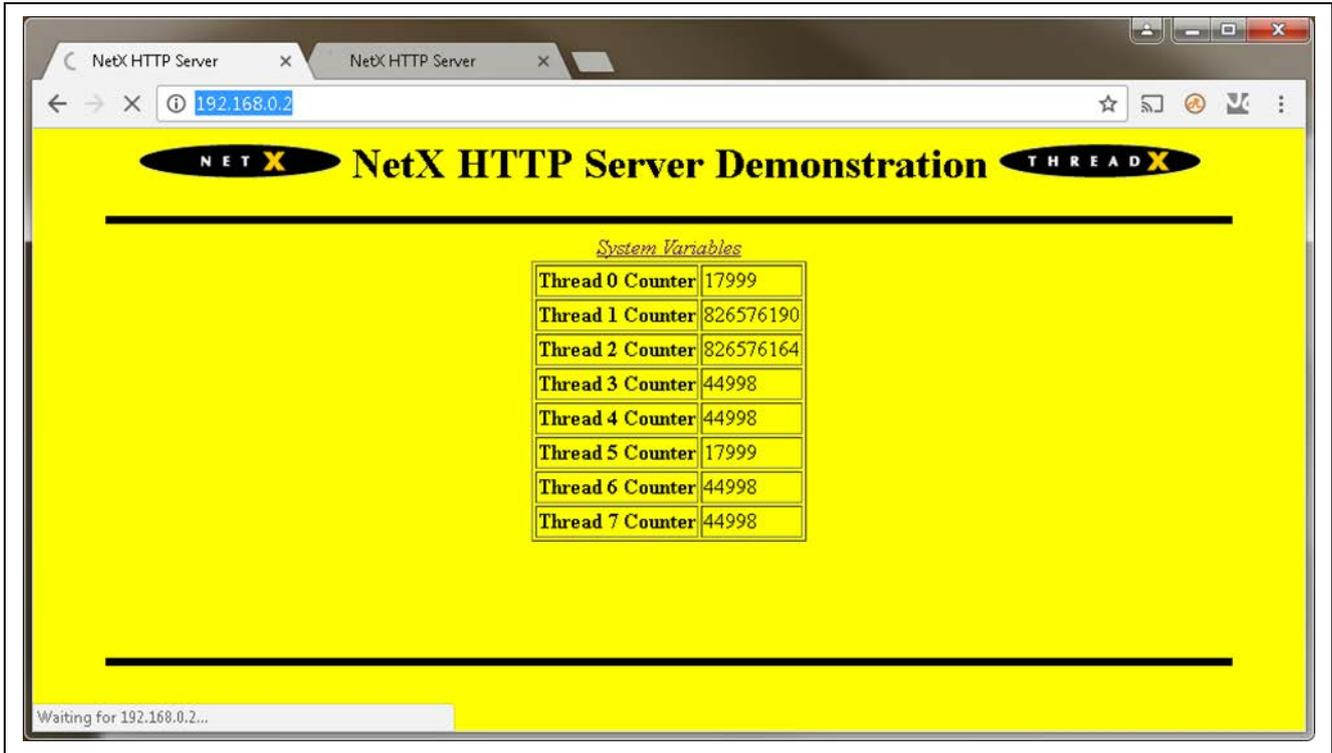


Figure 10. HTTP Webpage

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

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
Microcontrollers	www.renesas.com/synergy/mcus
MCU glossary	www.renesas.com/synergy/mcuglossary
Parametric search	www.renesas.com/synergy/parametric
Kits	www.renesas.com/synergy/kits
Synergy Solutions Gallery	www.renesas.com/synergy/solutionsgallery
Partner projects	www.renesas.com/synergy/partnerprojects
Application projects	www.renesas.com/synergy/applicationprojects
Self-service support resources:	
Documentation	www.renesas.com/synergy/docs
Knowledgebase	www.renesas.com/synergy/knowledgebase
Forums	www.renesas.com/synergy/forum
Training	www.renesas.com/synergy/training
Videos	www.renesas.com/synergy/videos
Chat and web ticket	www.renesas.com/synergy/resourcelibrary

Revision History

Rev.	Date	Description	
		Page	Summary
1.0	Nov.12.15	—	Initial version
1.01	Jan.08.16	—	Updated to remove template references
		—	Updated board connection section for multiple boards
1.02	Jan.22.16	—	Editorial updates. Fixed some IP documentation Issues in the app note.
		—	In code: <ul style="list-style-type: none"> - Fixed Include Issue - Optimization -02 - No Yellow/Red in configuration - High Drive - One Debug session
1.03	Feb.12.16	—	QSPI support added to code samples.
		—	Editorial update. Fixed IP address from 192.168.0180 to 192.168.1.180.
1.04	Jun.17.16	—	Specified SSP V1.0.0.
1.05	Oct.25.16	—	Minor formatting changes
1.06	Feb.28.17	—	Updated for SSP 1.2.0
1.07	Sep.27.17	—	Updated to SSP 1.3.0
		1	Required resources of SSP version changed
1.08	Feb.27.18	—	Updated for SSP 1.4.0
1.09	Sep.06.18	—	Updated for SSP 1.5.0
1.10	Mar.15.19	—	Updated for SSP 1.6.0

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.
 - "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.
 - "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.

Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user's manual or other Renesas Electronics document.
6. When using Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.

(Note1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

(Rev.4.0-1 November 2017)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/.