



SX-ULPGN

Quick Start Guide: Renesas Synergy

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Application Note

Introduction



This Quick Start Guide provides an example of the Renesas Synergy Platform connected to a Silex SX-ULPGN-Pmod or SX-ULPGN- EVK evaluation kit. The demonstration covers the SX-ULPGN Wi-Fi Framework Application Programming Interface (API) and it also includes the on-chip software stack API and the Socket API.

Pre-requisites

This QSG expects the user to be familiar with the following topics and concepts:

- Renesas e2 Studio
- Synergy Software Package
- Synergy Wi-Fi Framework / On-Chip Stack / Socket API
- IEEE 802.11 Network
- BSD Socket Programming
- Cygwin GNU/OSS tools for Windows (<https://cygwin.com>)

The user should have a running version of the Renesas e2 Studio and the Synergy Software Package in their Windows development host PC environment.

Requirements

- Windows Development Host PC (Cygwin gcc installed)
- IEEE 802.11b/g/n Access Point (which supports WPA2-PSK authentication and DHCP server)
- Renesas SK-S7G2 Development Board
- SX-ULPGN-Pmod or SX-ULPGN-EVK (with UART Silex AT Command Set firmware v3.1.x)
- Renesas e2 Studio v5.4.0.023
- Synergy Software Package v1.3.2
- SX-ULPGN Wi-Fi Add-On v1.3.2

Hardware Setup

The following steps are required for the hardware setup.

Application Note

1. Set the power supply voltage level. There are two ways of connecting the SX-ULPGN to the SK-S7G2 (see Figure 1 and Figure 2)
 - a. SX-ULPGN-Pmod: Select **3.3V power supply** for SK-S7G2 PMODB by jumping **J15.1** and **J15.2**.
 - b. SX-ULPGN-EVK: Select **5V power supply** for SK-S7G2 PMODB by jumping **J15.2** and **J15.3**.
2. Wiring up the SX-ULPGN to the Renesas development board.
 - a. SX-ULPGN-Pmod: Insert **SX-ULPGN-Pmod** to **PMODB** of SK-S7G2.
 - b. SX-ULPGN-EVK: Connect **SX-ULPGN-EVK** to **PMODB** of SK-S7G2 (see Table 1 below.)

Table 1: SX-ULPGN-EVK to SK-S7G2 Wiring

SK-S7G2 PMODB	SX-ULPGN-EVK
J14.3 (TXDo_B)	JP6.4 (UART1 TXD)
J14.5 (RXDo_B)	JP6.6 (UART1 RXD)
J14.9 (GND)	JP6.2 (GND)
J14.10 (GND)	J4.4 (GND)
J14.11 (PMODB_VCC)	J4.1 (+5.0V power supply)

3. Connect SK-S7G2 **UART console (J9.3 TXD, J9.4 RXD, J7.4 GND)** port to **PC** with USB-UART(TTL) converter.
4. Connect SK-S7G2 **DEBUG_USB(J19)** port to **PC**.
5. Connect the **PC** to the **Access Point** and record IP address of this PC. SK-S7G2/SX-ULPGN will run as TCP client and connect to TCP server running on this PC.

Application Note

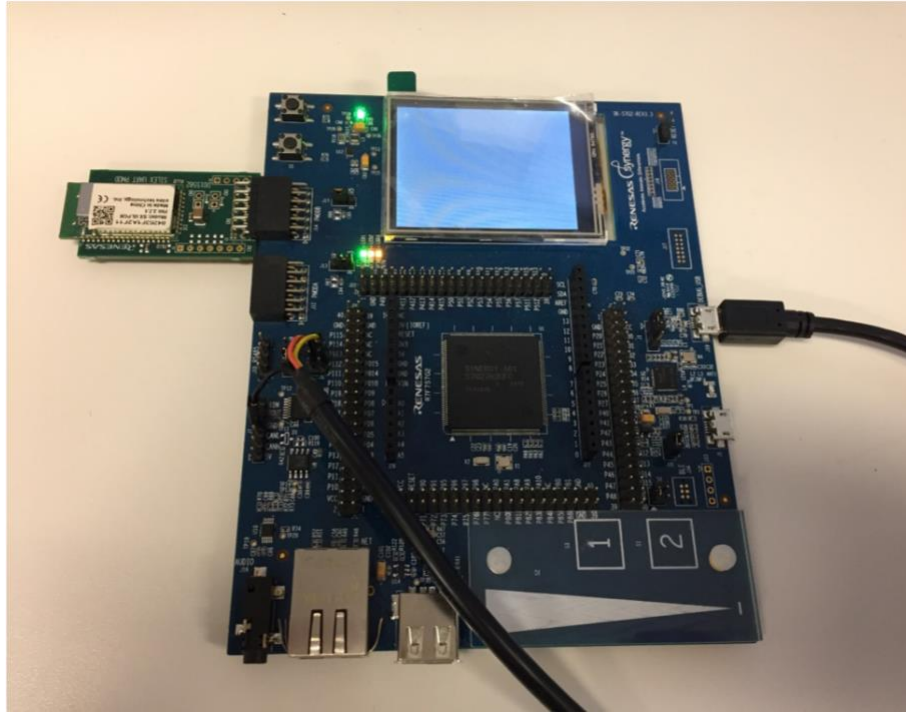


Figure 1: SX-ULPGN-Pmod

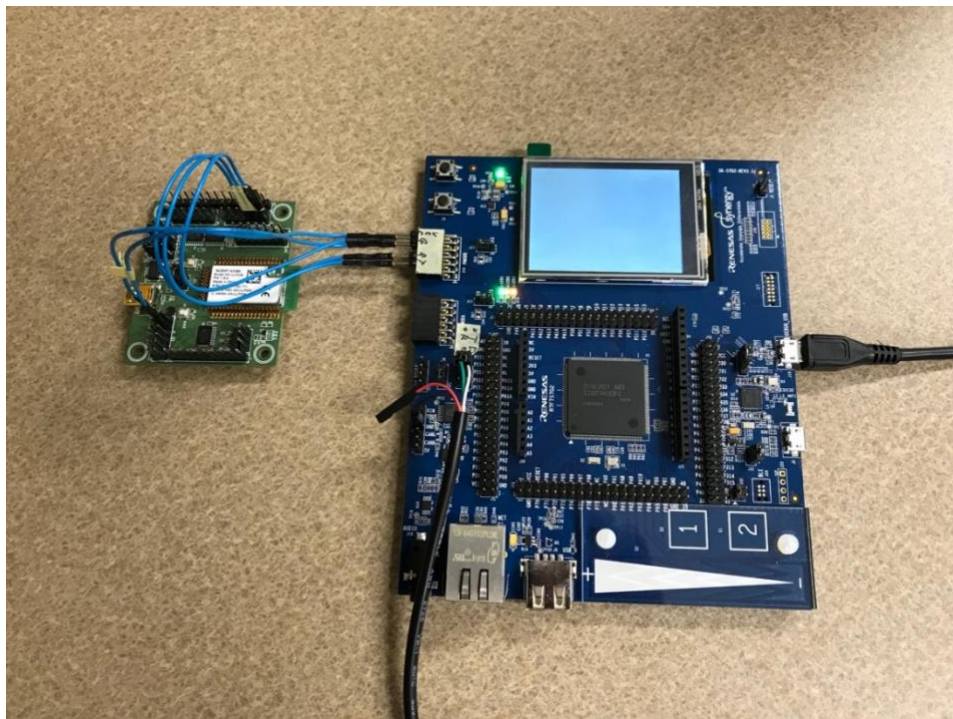


Figure 2: SX-ULPGN-EVK

Application Note

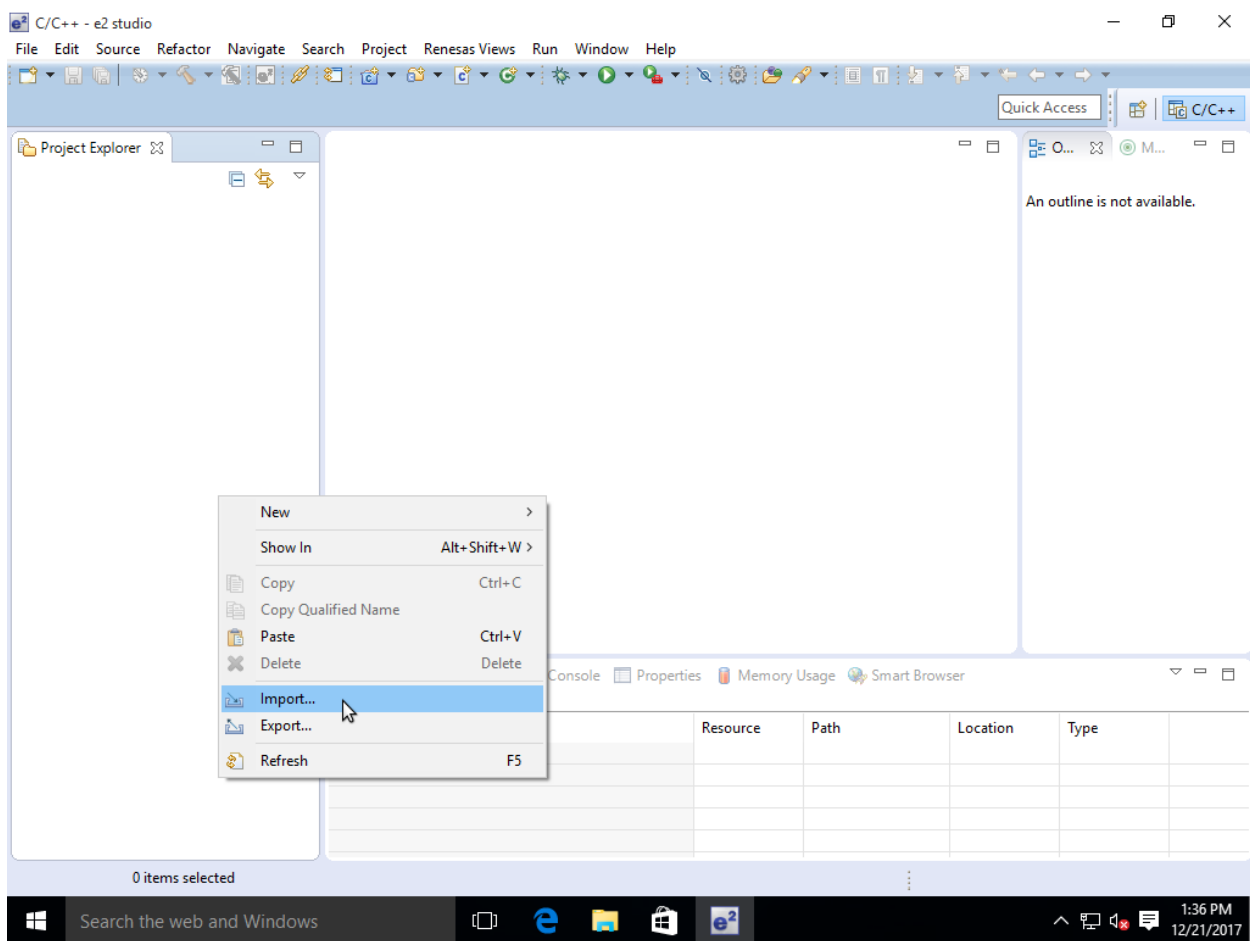
Installation and Importing for e2 Studio

Installation

1. Run SX-ULPGN Wi-Fi Add-On installer (wifi-addon-installer.exe).
2. Accept the license agreement and follow the installer instructions.

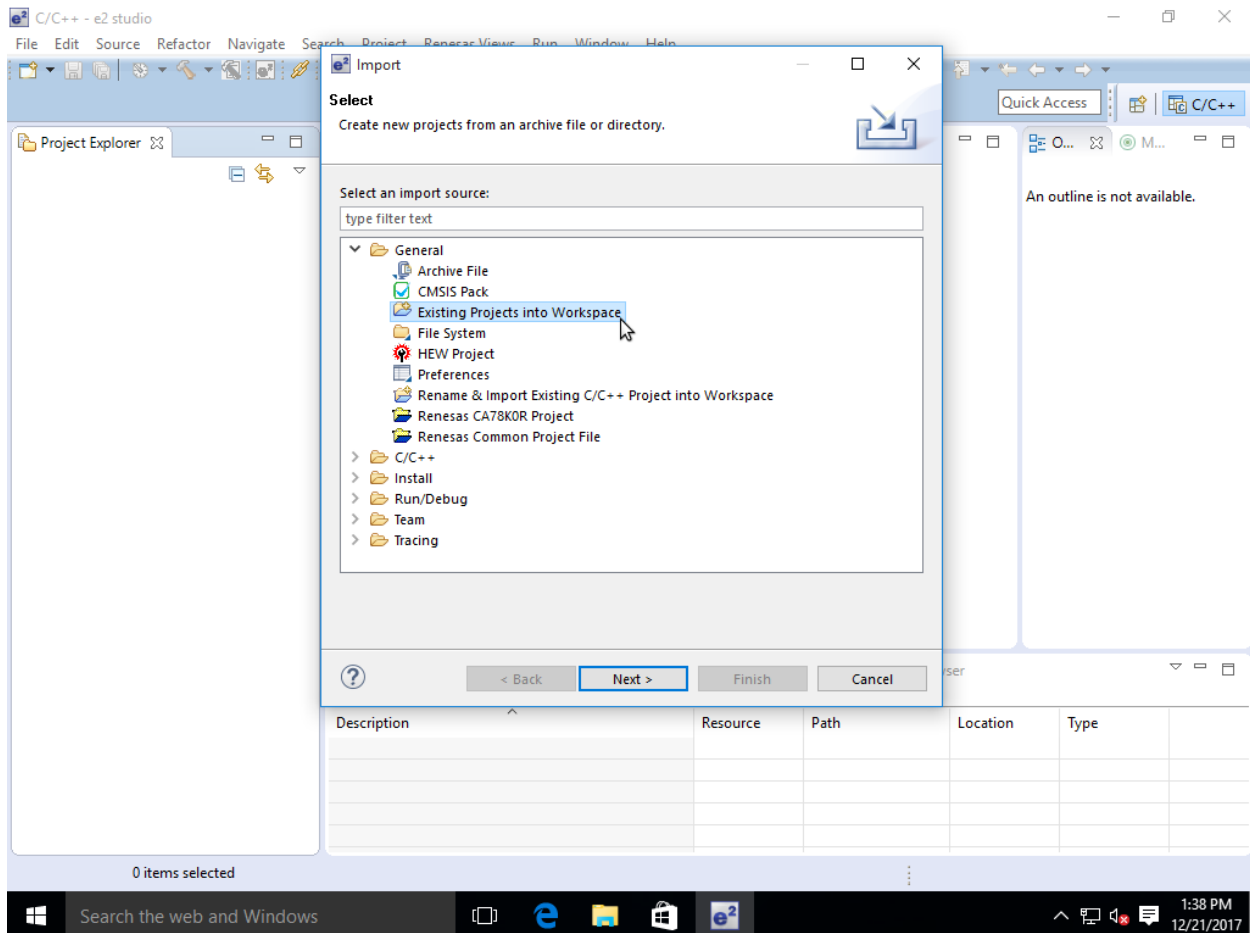
Importing/Creating the Project

1. Start e2 Studio.
2. Right click on Project Explorer view and select **Import**.



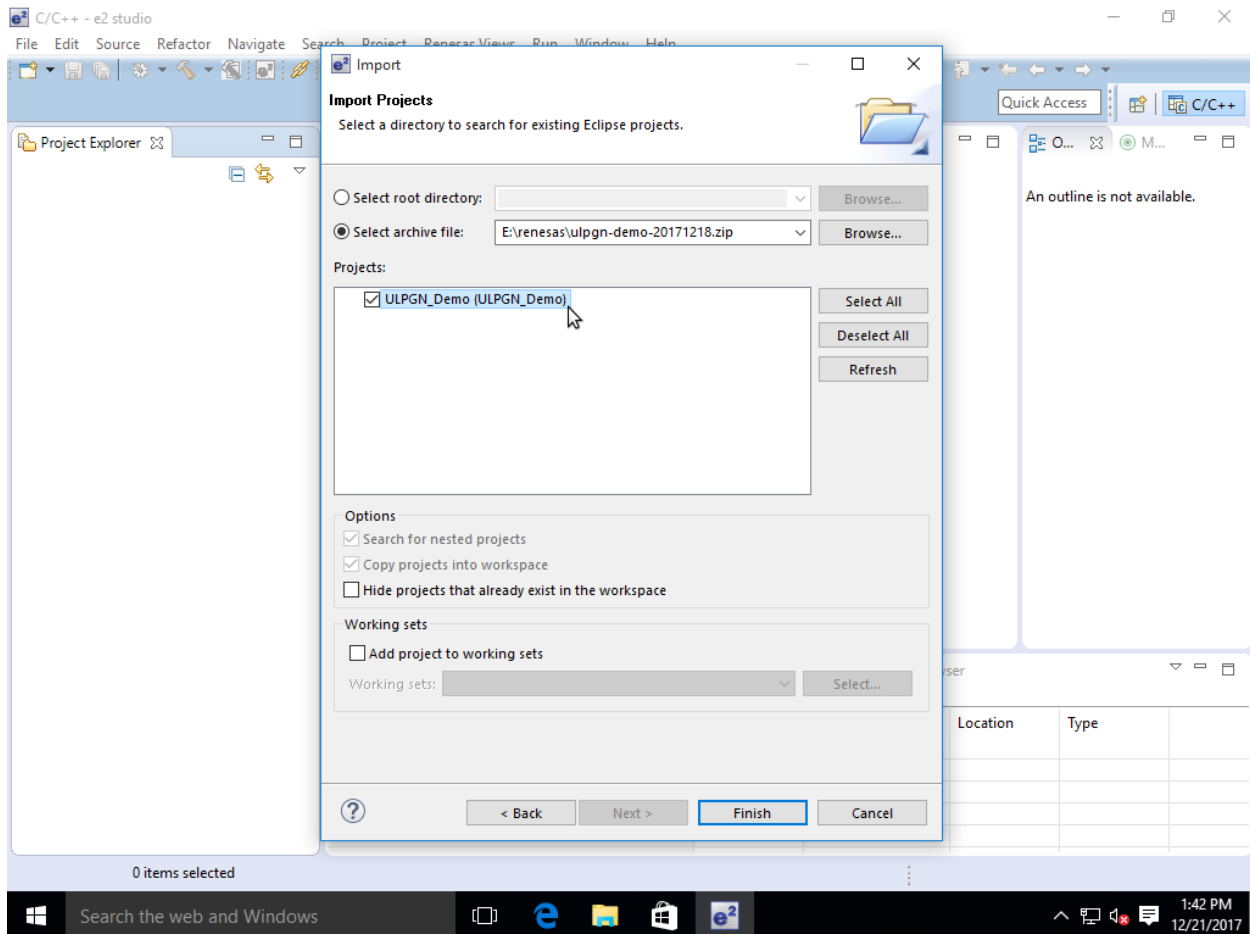
Application Note

3. In the Select dialog, select **General > Existing Project into Workspace** and click **Next**.



Application Note

4. In the **Import Projects** dialog, chose the **Select Archive file** and set full path to **ulpgn-demo-20171218.zip**.
5. Confirm that the **ULPGN_Demo** project is checked in **Projects** list and click **Finish**.



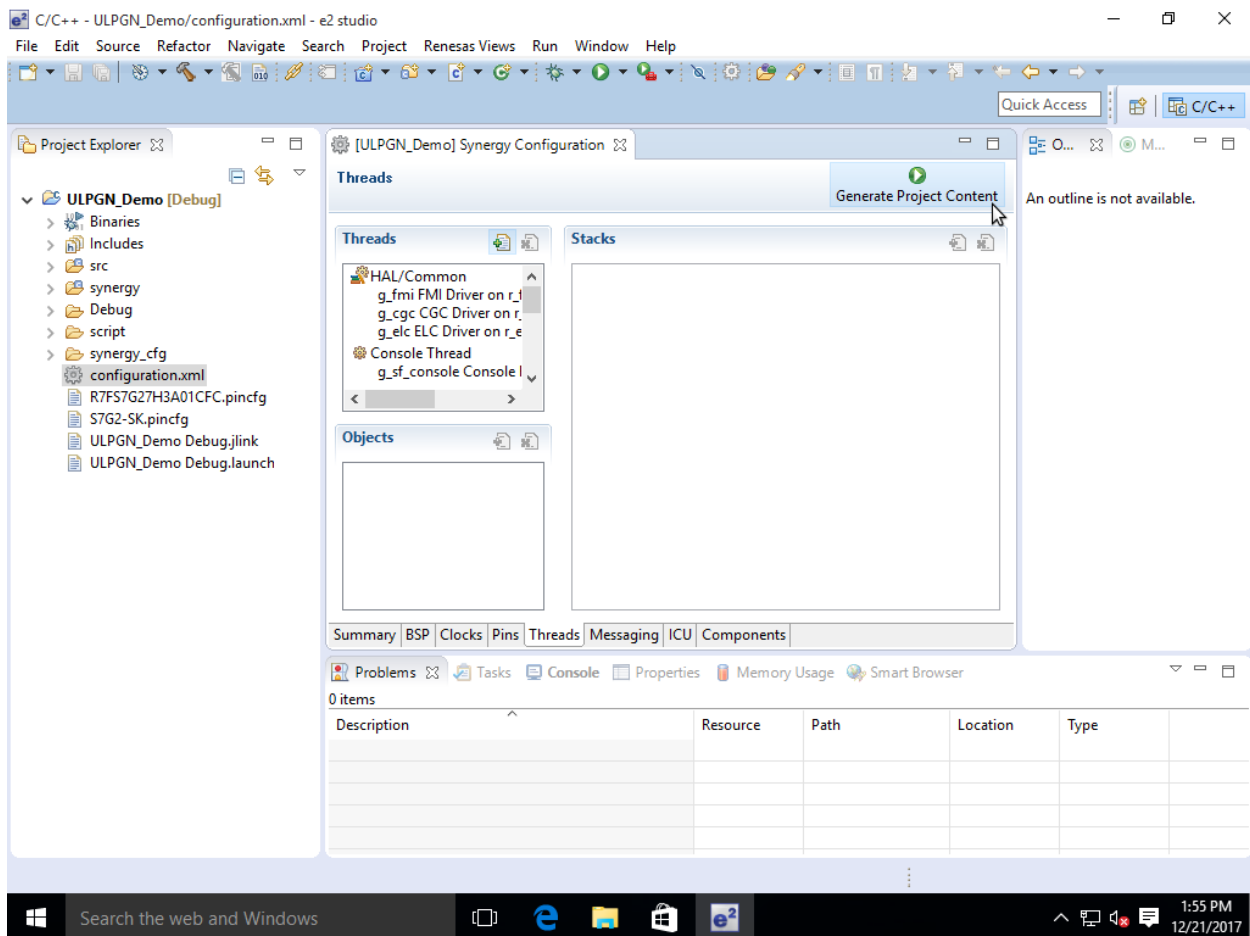
Application Note

Configuring the Project

The project is pre-configured to use SCIo in Asynchronous UART mode and has two threads to manage the Wi-Fi driver and user interface.

Generating the Project Files

Open **configuration.xml** of ULPGN_Demo project and click **Generate Project Content** in **Synergy Configuration** view.



Note: You can safely ignore all **Warnings** in **Problems** view at this stage (if any).

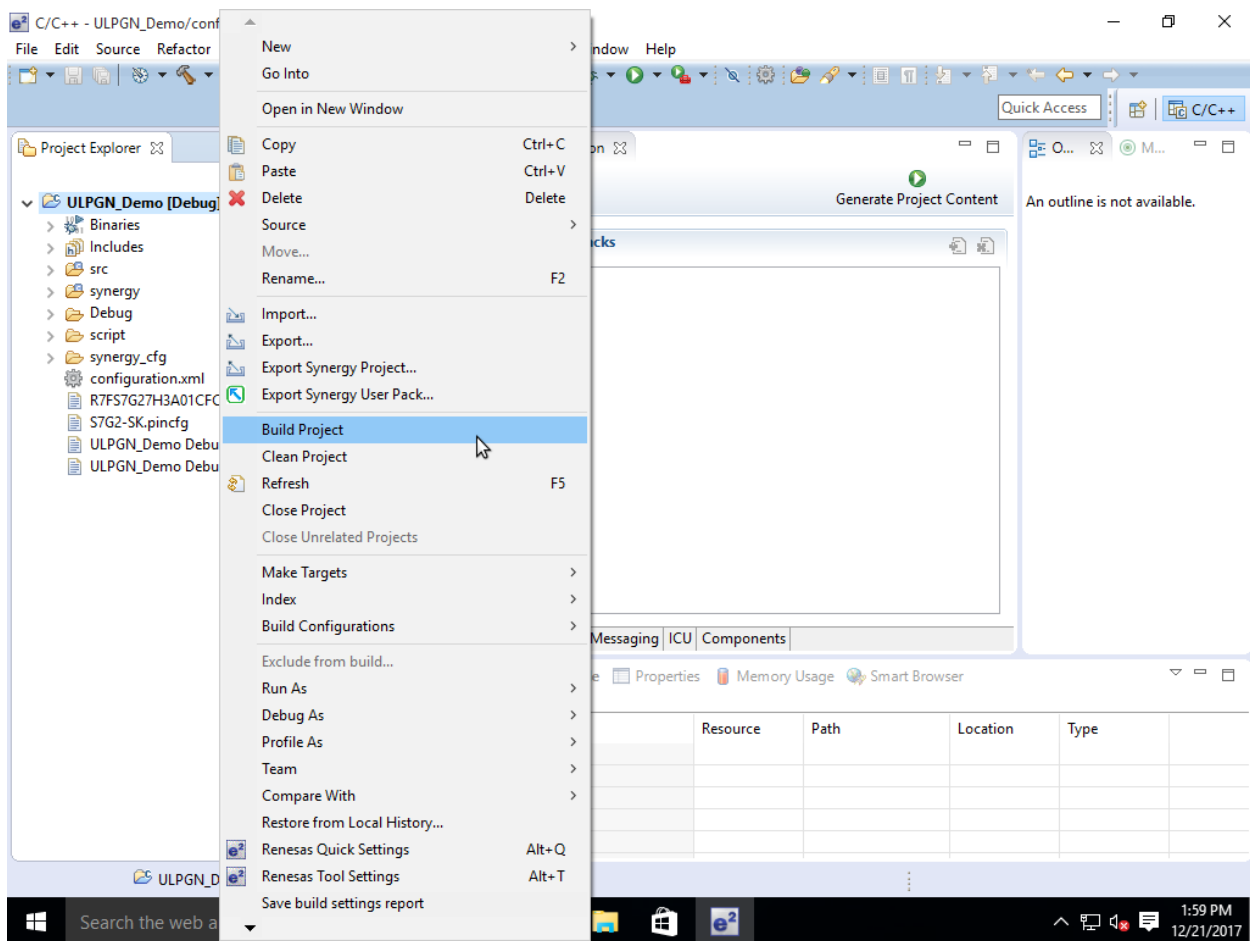
Application Note

Set PC (Server) IP address

Open `src/console_threado_entry.c` and edit the `SERVER_IP_ADDRESS` macro to set IP address of PC obtained in Hardware Setup (Default: 192.168.1.2.)

Building the Project

1. Right click on the **ULPGN_Demo** project in **Project Explorer** view, then point and click on **Build Project**.

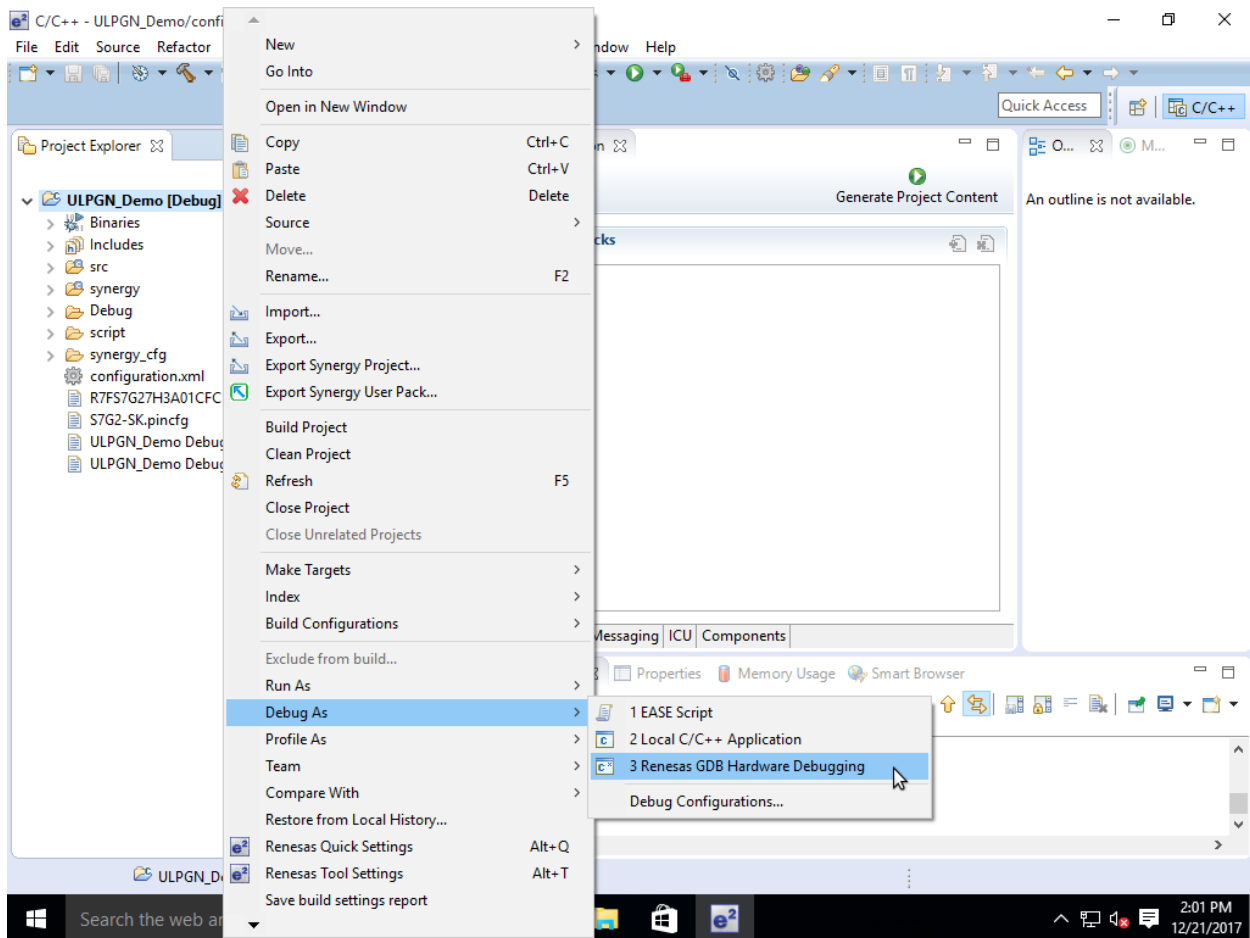


2. Wait until build is finished.

Application Note

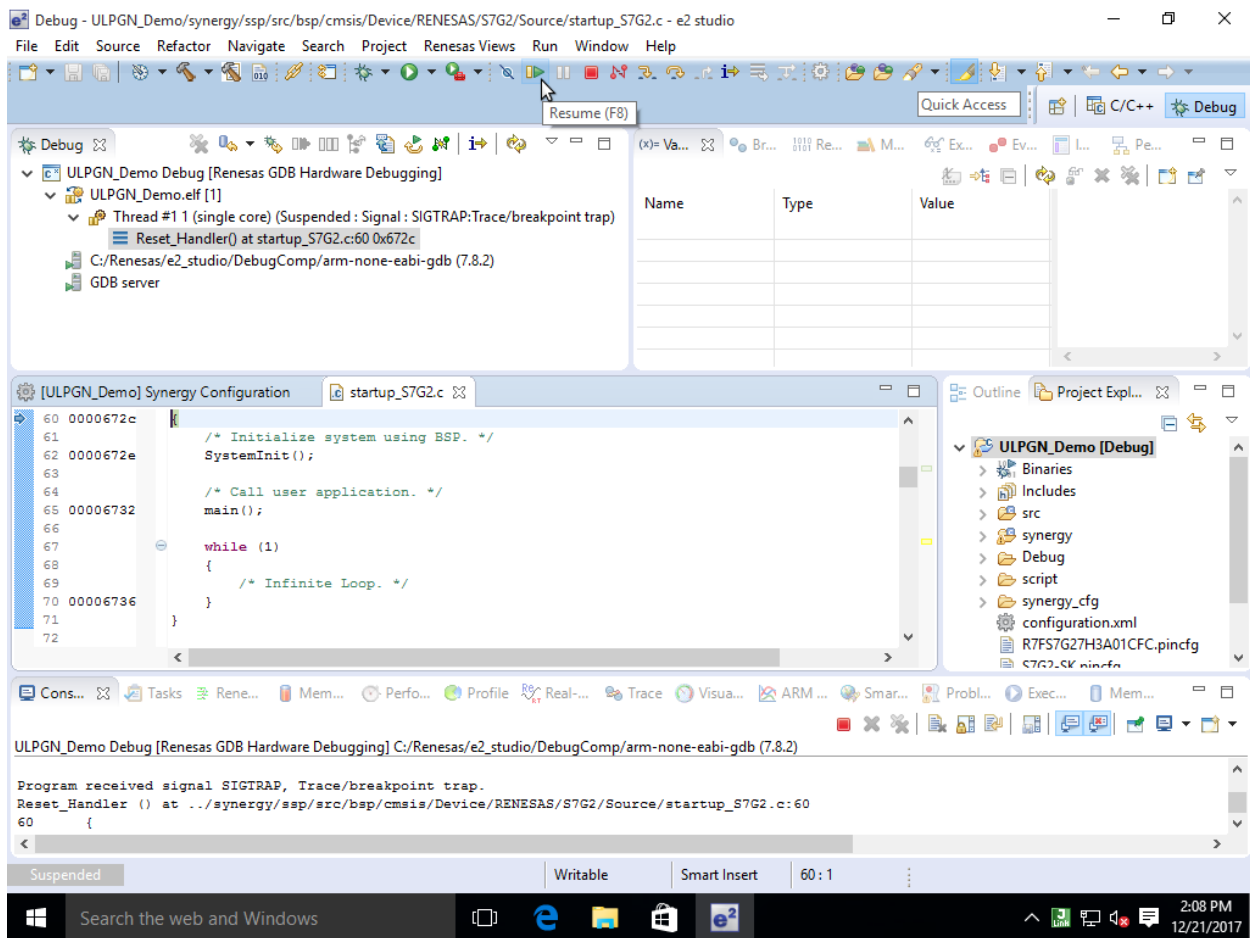
Running the Application

1. Right click on the **ULPGN_Demo** project in the **Project Explorer** view, then point and click on **Debug As > Renesas GDB Hardware Debugging**.



Application Note

2. In the **Debug** perspective, click **Resume** twice.



3. Start the **serial console emulator** on the PC and connect to the SK-S7G2 **UART console** (Baudrate:115200bps, Data:8bit, Parity:none, Stop:1bit, no flow control.)

Application Note

4. On the serial console emulator, hit the **Enter** key and view the application menu:

```
*****
*           Synergy Developer Example applications           *
*                   Version 1.0.0                           *
*                   Hit ? to show command list               *
*****
synergy>?
  synergy Help Menu
  help : Prints the help information for Developer Example
  sf_wifi_unit_test : WiFi Unit Test Cases
```

5. Select **sf_wifi_unit_test** to open Wi-Fi Unit Test Cases

```
synergy>sf_wifi_unit_test
sf_wifi_unit_test>?
  sf_wifi_unit_test Help Menu
  ~ : Back to root menu
  ^ : Up one menu level
  def_prov_config: Configure Default Provisioning Parameter
  test_407 : Initialize WiFi Driver
  test_411 : AP Provisioning
  test_415 : Station mode Provisioning
  test_416 : Reading Provisioning configuration.
  test_421 : Scanning Access Point.
  test_423 : Get WiFi module information.
  test_426 : WiFi module de-init.
  test_427 : Socket Interface using UDP.
  test_430 : Socket Interface using TCP.
```

6. Set ESSID and passphrase of WPA2-PSK authentication (Example: SSID=tndlink-a, Passphrase=1234567890).

```
sf_wifi_unit_test>def_prov_config ssid tndlink-a key 1234567890
Mode: CLIENT
Security: WPA2
Encryption: AUTO
SSID: tndlink-a
Key: 1234567890
SSP_SUCCESS
```

The application acquires an IP address by DHCP and tries to establish a TCP connection with the TCP server running on 192.168.1.2 (i.e. PC) at TCP port 2000.

7. On the PC, open Cygwin bash console, then build and start tcpserver with port number 2000:

```
$ gcc -Wall -o tcpserver tcpserver.c
$ ./tcpserver 2000
```

Application Note

Note: Windows Firewall can possibly block the connection to the TCP sever. Disable Windows Firewall if you experience connection problems.

8. On the serial console emulator, run **test_430** and confirm the test case ends in SSP_SUCCESS.

```
sf_wifi_unit_test>test_430
```

```
Sending Data: testing  
Received TCP response  
SSP_SUCCESS
```

Installation and Importing for IAR Workbench

This application does not support IAR Workbench.

Application Note

About Silex Technology America, Inc.

Silex Technology builds on more than 40 years of hardware and software connectivity know-how and IP, custom design development experience, and in-house manufacturing capabilities, bringing value to customers with a foundation of technical expertise. With relentless attention to quality, exclusive access to Qualcomm Atheros expertise, and strategic partnerships with leading semiconductor providers, Silex Technology is the global leader in reliable Wi-Fi connectivity for products ranging from a medical device to a document imaging product to a video or digital display. With Silex Technology, customers get a single vendor that provides hardware and software support from design through manufacturing for successful product after successful product. For more information, please visit www.silexamerica.com.

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Revision History

Revision	Date	By	Notes
A	2/12/2018	T. Nakase	Initial release.
B	2/14/2018	K. Sugawara	Listed SX-ULPGN-Pmod first; Minor Marketing Edits

