TCP Client Socket Application

User guide

Version 0.2

May 2016

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About this Document

This document describes the process of bringing up the RS9113 based module as a standard TCP client socket and sends data to remote TCP server.

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1 Introduction

This project is applicable to all the WiSeConnect variants like WiSeConnect Plus, WiSeMCU and WyzBee. The term WiSeConnect refers to its appropriate variant.

1.1 TCP Protocol Overview

TCP(Transmission control protocol) is a connection-oriented protocol for transferring data reliably in either direction between a pair of users.

When TCP client send data to the server, it requires an acknowledgement in return. If an acknowledgement is not received, TCP automatically retransmit the data and waits for a longer period of time till timeout. After time out socket would be closed.

To open a connection, a message is sent with SYN(synchronize) flag. To close a connection, a message is sent with FIN(finish) flag. Urgent messages may also be sent by selecting the PSH(push) flag as a protocol parameter.

1.2 Application Overview

1.2.1 Overview

The TCP client application demonstrates how to open and use a standard TCP client socket and sends data to TCP server socket.

1.2.2 Sequence of Events

This Application explains user how to:

- Connect the Device to an Access point and get IP address through DHCP
- Open TCP Server socket at Access point using iperf application.
- Open TCP client socket in device and establish TCP connection with TCP server opened in remote peer.
- Send data from WiSeConnect device to remote peer using opened TCP socket.

1.3 Application Setup

The WiSeConnect in its many variants supports SPI and UART interfaces. Depending on the interface used, the required set up is as below:

1.3.1 SPI based Setup Requirements

- Windows PC with CooCox IDE
- Spansion (MB9BF568NBGL) micro controller

Note: If user does not have Spansion (MB9BF568NBGL) host platform, please go through the SPI-Porting guide **\sapis\docs\RS9113-WiSeConnect-SAPI-Porting-Guide-vx.x.pdf** for SAPIs porting to that particular platform.

- WiSeConnect device
- WiFi Access point
- Windows PC2
- TCP server application running in Windows PC2 (This application uses iperf application to open TCP server socket)

1.3.2 UART/USB-CDC based Setup Requirements

- Windows PC with Dev-C++ IDE

- WiSeConnect device
- WiFi Access point
- Windows PC2
- TCP server application running in Windows PC2 (This application uses iperf application to open TCP server socket)

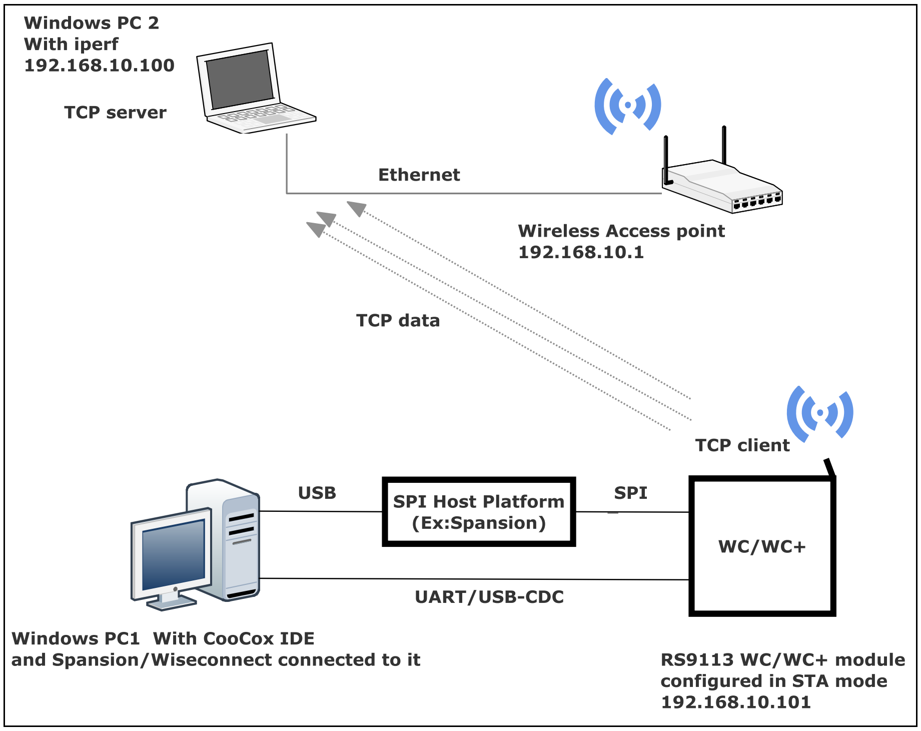


Figure 1: Setup Diagram

2 Configuration and Execution of the Application

The example application is available in the Release at **{Release $}/host/sapis/examples.** These examples will have to be initialized, configured and executed to test the application. The initialization varies based on the interface but configuration and execution are the common.

2.1 Initializing the Application

2.1.1 SPI Interface

If User using SPI interface, Please refer the document ***sapis/platforms/spansion_MB9BF568NBGL/RS9113-WiSeConnect_SAPIS_Spansion_Project_User_guide.pdf*** for opening the ***tcp_client*** example in CooCox IDE.

2.1.2 UART/USB-CDC Interface

If User using UART interface, Please refer the document ***sapis/platforms/ windows_uart/RS9113-WiSeConnect_SAPIS_Windows_Project_UserGuide.pdf*** for opening the ***tcp_client*** example in Dev-C++ IDE

2.2 Configuring the Application

1. Open **`sapis/examples/wlan/tcp_client/rsi_tcp_client.c`** file and update/modify following macros :

`SSID` refers to the name of the Access point.

```
      #define SSID                 “<ap name>”
```

`CHANNEL_NO` refers to the channel in which device should scan. If it is 0, device will scan all channels.

```
      #define CHANNEL_NO         0
```

`SECURITY_TYPE` refers to the type of security. In this application STA supports Open, WPA-PSK, WPA2-PSK securities.

Valid configuration is:

`RSI_OPEN` - For OPEN security mode

`RSI_WPA` - For WPA security mode

`RSI_WPA2` - For WPA2 security mode

```
      #define SECURITY_TYPE          RSI_OPEN
```

`PSK` refers to the secret key if the Access point configured in WPA-PSK/WPA2-PSK security modes.

```
      #define PSK                    “<psk>”
```

`DEVICE_PORT` port refers TCP client port number

```
      #define DEVICE_PORT           5001
```

`SERVER_PORT` port refers remote TCP server port number which is opened in windows PC2.

```
      #define SERVER_PORT           5001
```

SERVER_IP_ADDRESS refers remote peer IP address to connect with TCP server socket.

IP address should be in long format and in little endian byte order.

Example: To configure “192.168.10.100” as IP address, update the macro **DEVICE_IP** as **0x640AA8C0**.

```
      #define SERVER_IP_ADDRESS      0x640AA8C0
```

NUMEBR_OF_PACKETS refers how many packets to send from device to TCP server

```
      #define NUMBER_OF_PACKETS     1000
```

Application memory length which is required by the driver

```
      #define  GLOBAL_BUFF_LEN       8000
```

To configure IP address

DHCP_MODE refers whether IP address configured through DHCP or STATIC

```
      #define DHCP_MODE   1
```

Note: If user wants to configure STA IP address through DHCP then set **DHCP_MODE** to 1 and skip configuring the following **DEVICE_IP, GATEWAY** and **NETMASK** macros.

(Or)

If user wants to configure STA IP address through STATIC then set DHCP_MODE macro to “0” and configure following DEVICE_IP, GATEWAY and NETMASK macros.

IP address to be configured to the device in STA mode should be in long format and in little endian byte order.

Example: To configure “192.168.10.10” as IP address, update the macro **DEVICE_IP** as **0x0A0AA8C0**.

```
      #define  DEVICE_IP           0X0A0AA8C0
```

IP address of the gateway should also be in long format and in little endian byte order

Example: To configure “192.168.10.1” as Gateway, update the macro GATEWAY as **0x010AA8C0**

```
      #define  GATEWAY             0x010AA8C0
```

IP address of the network mask should also be in long format and in little endian byte order

Example: To configure “255.255.255.0” as network mask, update the macro **NETMASK** as **0x00FFFFFF**

```
      #define   NETMASK            0x00FFFFFF
```

2. Open ***sapis/include/rsi_wlan_config.h*** file and update/modify following macros :

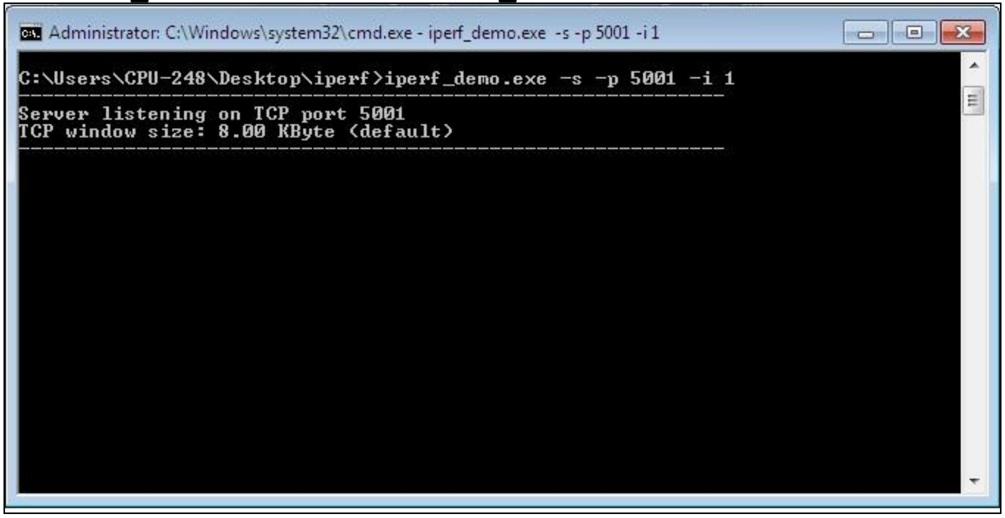
```
#define  CONCURRENT_MODE             RSI_DISABLE
#define  RSI_FEATURE_BIT_MAP         FEAT_SECURITY_OPEN
#define  RSI_TCP_IP_BYPASS           RSI_DISABLE
#define  RSI_TCP_IP_FEATURE_BIT_MAP  TCP_IP_FEAT_DHCPV4_CLIENT
 #define  RSI_CUSTOM_FEATURE_BIT_MAP  0
```

```
#define  RSI_BAND                          RSI_BAND_2P4GHZ
```

2.3 Executing the Application

1. Configure the Access point in OPEN/WPA-PSK/WPA2-PSK mode to connect WiSeConnect device in STA mode.
2. Open TCP server application using iperf application in Windows PC2 which is connected to Access point through LAN.

```
iperf_demo.exe -s -p <SERVER_PORT> -i 1
```



Administrator: C:\Windows\system32\cmd.exe - iperf_demo.exe -s -p 5001 -i 1

```
C:\Users\CPU-248\Desktop\iperf>iperf_demo.exe -s -p 5001 -i 1
------------------------------------------------------------
Server listening on TCP port 5001
TCP window size: 8.00 KByte (default)
------------------------------------------------------------
```

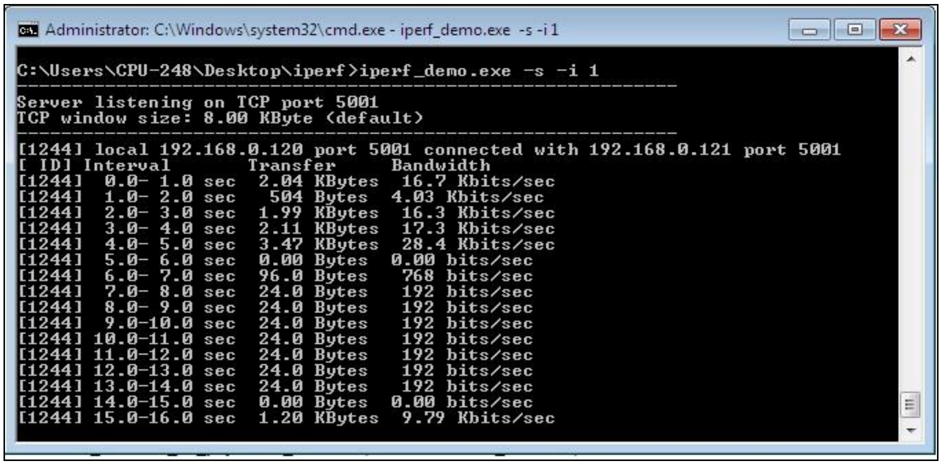
3. **SPI Interface**

If User using SPI interface, Please refer the document ***sapis/platforms/spansion_MB9BF568NBGL/RS9113-WiSeConnect_SAPIS_Spansion_Project_User_guide.pdf*** for executing the ***tcp_client*** example in CooCox IDE.

4. **UART/USB-CDC Interface**

If User using UART interface, Please refer the document ***sapis/platforms/ windows_uart/RS9113-WiSeConnect_SAPIS_Windows_Project_UserGuide.pdf*** for executing the ***tcp_client*** example in Dev-C++ IDE

5. After program gets executed, WiSeConnect Device would scan and connect to Access point and get IP.
6. After successful connection, WiSeConenct STA connects to TCP server socket opened on Windows PC2 using TCP client socket and sends configured `NUMBER_OF_PACKETS` to remote TCP server. Please find below image for reception of TCP data on TCP server,



Administrator: C:\Windows\system32\cmd.exe - iperf_demo.exe -s -i 1

```
C:\Users\CPU-248\Desktop\iperf>iperf_demo.exe -s -i 1
------------------------------------------------------------
Server listening on TCP port 5001
TCP window size: 8.00 KByte (default)
------------------------------------------------------------
[1244] local 192.168.0.120 port 5001 connected with 192.168.0.121 port 5001
[ ID] Interval       Transfer     Bandwidth
[1244]  0.0- 1.0 sec  2.04 KBytes  16.7 Kbits/sec
[1244]  1.0- 2.0 sec   504 Bytes  4.03 Kbits/sec
[1244]  2.0- 3.0 sec  1.99 KBytes  16.3 Kbits/sec
[1244]  3.0- 4.0 sec  2.11 KBytes  17.3 Kbits/sec
[1244]  4.0- 5.0 sec  3.47 KBytes  28.4 Kbits/sec
[1244]  5.0- 6.0 sec  0.00 Bytes  0.00 bits/sec
[1244]  6.0- 7.0 sec  96.0 Bytes   768 bits/sec
[1244]  7.0- 8.0 sec  24.0 Bytes   192 bits/sec
[1244]  8.0- 9.0 sec  24.0 Bytes   192 bits/sec
[1244]  9.0-10.0 sec  24.0 Bytes   192 bits/sec
[1244] 10.0-11.0 sec  24.0 Bytes   192 bits/sec
[1244] 11.0-12.0 sec  24.0 Bytes   192 bits/sec
[1244] 12.0-13.0 sec  24.0 Bytes   192 bits/sec
[1244] 13.0-14.0 sec  24.0 Bytes   192 bits/sec
[1244] 14.0-15.0 sec  0.00 Bytes  0.00 bits/sec
[1244] 15.0-16.0 sec  1.20 KBytes  9.79 Kbits/sec
```