AzureWave Technologies, Inc.

AW-NM191NF-EVB

IEEE 802.11 1X1 b/g/n Wireless LAN

M.2 1216 LGA module

User Guide

Rev. 02

(For Standard)

Revision History

Version	Revision Date	Description	Initials	Approved
01	2021/01/13	● Initial Version	Renton Tao	N.C. Chen
02	2021/08/09	● Update EVB ● Update format	Renton Tao	N.C. Chen

Contents

1. System Setup

1-1. Hardware Requirements

- AW-NM191NF-EVB (EVB for AW-NM191NF)
- Host system need running the Linux operating system (Ubuntu12.04).
- Windows system for Labtool.
- Vector Signal Analyzer/WLAN analyzer for transmit measurements.
- WLAN signal generator for receiver measurements.
- RF isolation chamber for receive measurements.
- RF attenuators
- RF cable

1-2. Software Requirements

For Linux using SD-WLAN-8801…pxx.tar

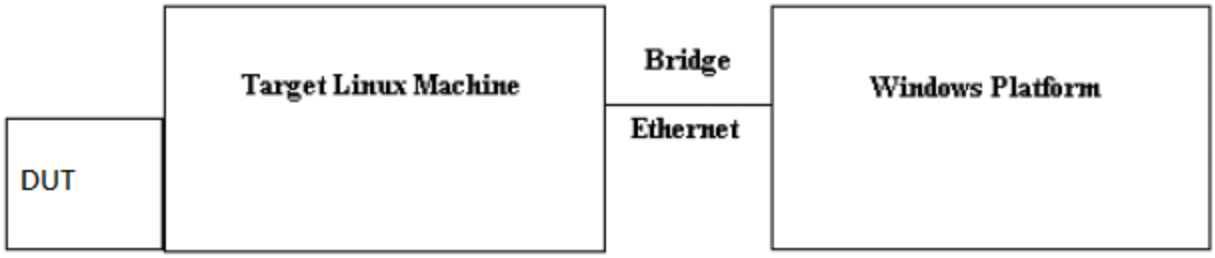
- Download and unzip the driver release package : SD-WLAN-8801…pxx.tar
- Download MFG SW “MFG-W8801-MF-WIFI-BRG-FC13-WIN-X86-2.0.0.92-14.1.36.p59” release package from NXP website and unzip it

For Windows have to run in 32/64bit Windows OS

- Download MFG release package “MFG-W8801-MF-WIFI-BRG-FC13-WIN-X86-2.0.0.92-14.1.36.p59”

1-3. Environment set up and Bridge Mode Tool

The “Manufacturing Bridge” refers to the application that allows a user to send commands between Target platform and Windows 7 platform. The environment enables the user to test performance of the AW-NM191NF.

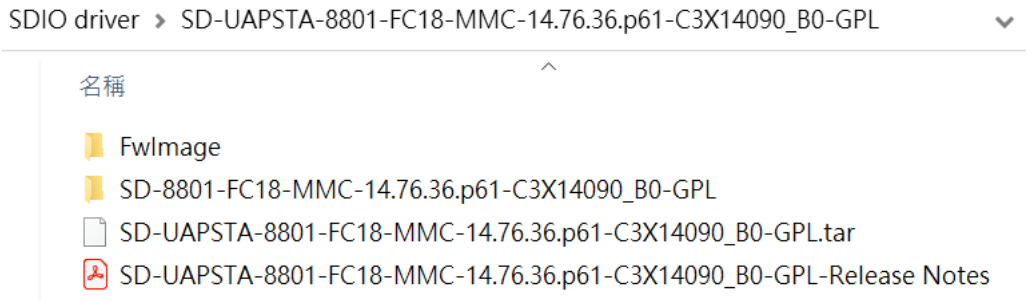


Manufacturing Bridge mode

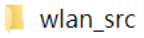
1-3.1 Linux PC set up(Ubuntu 12.04)

(1) Driver Folder Contents

Download the latest driver package release from NXP and unzip it. The driver folder should look similar to the figure shown below. The release contains driver folder and FW image.



After opening above folder, you can see the folders as picture below. The working direction is “wlan_src”.



The user may need to compile the driver per your specific Linux OS and Kernel. This is due to that the driver is dependent on the actual OS and kernel version. This next section will describe the steps needed to be done before you can install the driver and run it.

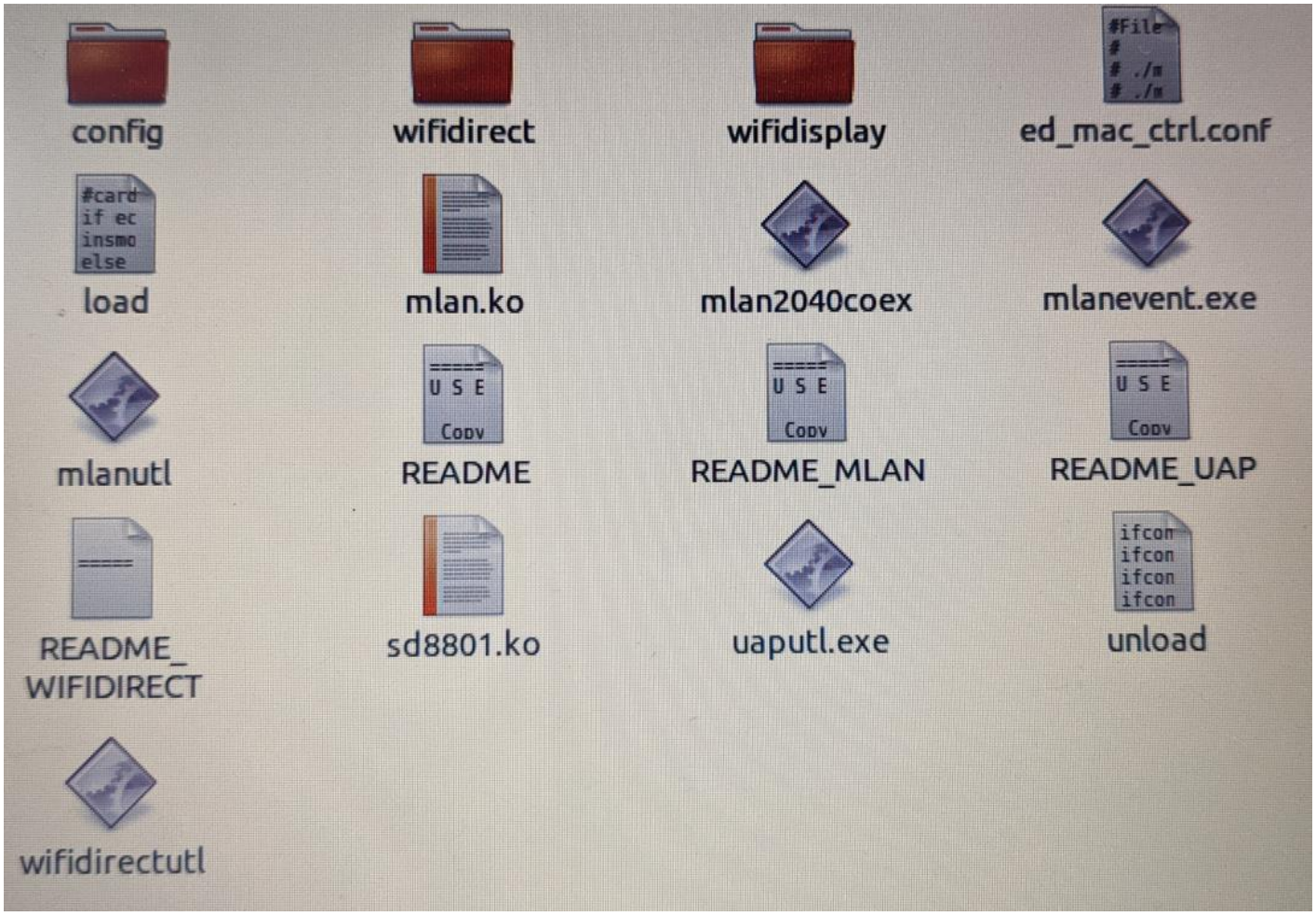
Go to the subdirectory wlan_src

*Make sure to have kernel headers and kernel libs before executing the “make” commands below.

```
make clean
make build
```

After above cmds, you will see the folder as below picture.

The files in folder bin_sd8801 should be as below picture.



On the given Host Linux system, the following files have to be transferred & reside on the system.
(Transfer the files over via flash memory or tftp over the host.)
Place the firmware in /lib/firmware/mrvl/
Ex. SDIO8801.bin (for SDIO/SDIO interface)

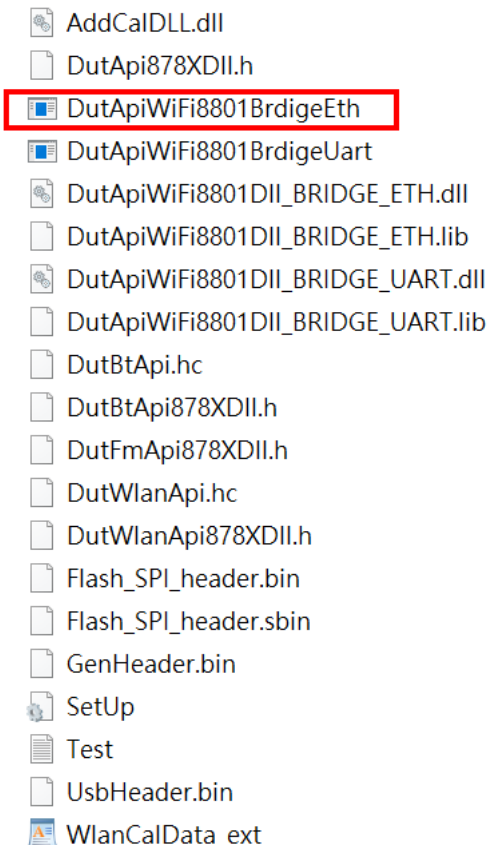
Go up one folder to copy both *.ko files to your directory in where you have the other files in where you want

to run the insmod command.

Here is the sample list of files (as a minimum) at 1 location:
bridge_init.conf
mfgbridge
mlan.ko
sd8801.ko

1-3.2 Windows PC set up

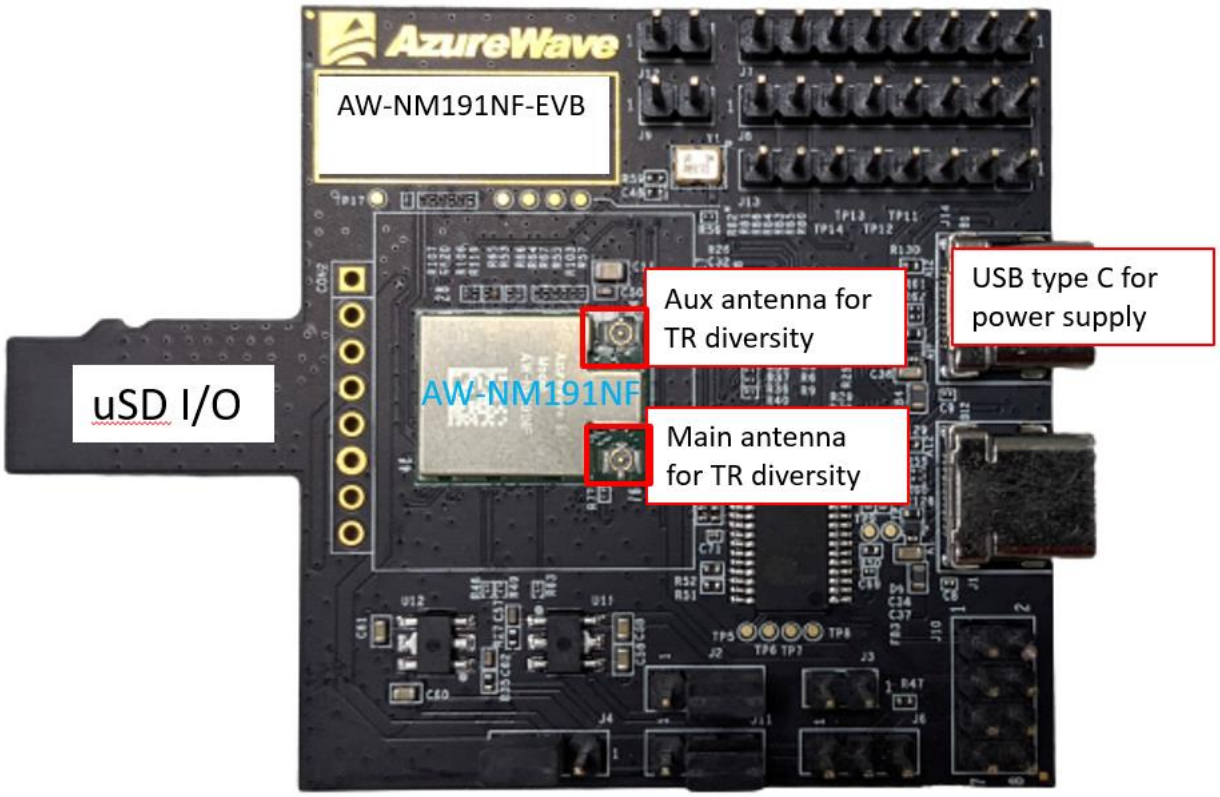
Within the internal folder is the labtool and other folders. For this document's purpose, only the details of the labtool folder will be discussed. The contents of the labtool folder are shown below.



The Labtool executable is labeled (DutApiWiFi8801BrdigeEth.exe)

2- WLAN/Bluetooth RF Test

2-1. Setup RF Test



*Please confirm that Computer's WiFi and BT had closed

1 The bridge PC have to run in Linux OS Ubuntu 12.04

2 Prepare AW-NM191-EVB, insert DUT.

2.1 VBAT supply
For SDIO supply VBAT, please connect J2(1-2).

2.2 VDDIO supply
For 3.3V supply VDDIO, please connect J4(2-3)
For 1.8V supply VDDIO, please connect J4(1-2)

2.3 VIO_SD supply
For 3.3V supply VIO_SD, please connect J11(2-3)
For 1.8V supply VIO_SD, please connect J11(1-2)

3 Open terminal, press command: $**sudo su**

4 To bring up DUT:
modprobe cfg80211
insmod mlan.ko
insmod sd8801.ko mfg_mode=1 fw_name=mrvl/SDIO8801.bin

5 Open bridge for labtool
./mfgbridge -B

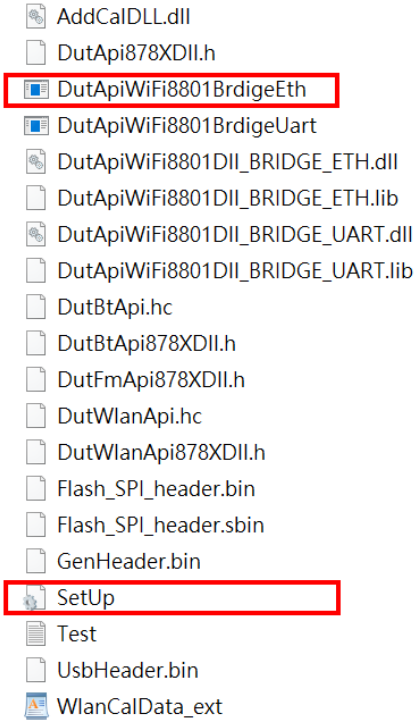
6 To confirm success to bring up WiFi, please key "ifconfig mlan0"

2-3. Setup for RF Tx/Rx Performance Test

The host PC have to run in Windows OS

Download MFG release package “MFG-W8801-MF-WIFI-BRG-FC13-WIN-X86-2.0.0.92-14.1.36.p59” from NXP extranet website and unzip it.

Copy the “labtool” folder to the host PC .The Labtool folder content are shown in below.



Open the “SetUp.ini” file using a text editor such as Notepad. Edit the “SetUp.ini” file as shown below. The parameter “DutIpAddress” will be the IP address of DUT. The parameter “HostIPAddress” will be the IP address of the Windows host PC.

[DutIp]
DutIpAddress = 192.168.0.10
HostIpAddress = 192.168.0.58

In the “SetUp.ini” file, the parameter “NO_EEPROM” is used for specifying the calibration data storage option. The default value is “2” (OTP support). For general RF evaluation and test, the user needs to set the parameter as “1” which is file option to use calibration data from external file. If the calibration data is already stored in on-chip OTP memory then the default value of ‘2” can be used.

[DutInitSet]
0 - EEPROM support
1 - NO_EEPROM support 2 - OTP support NO_EEPROM=1
NoEepromBtFlexFileName = WlanCalData_ext.conf
NoEepromWlanFlexFileName = WlanCalData_ext.conf

Make sure that the Bridge application is running prior to starting Labtool application. To start the Labtool application, double click on “DutApiWiFi8801BrdigeEth.exe” for WiFi Performance Test

3- Labtool command guide

3-1 Generate 802.11 b/g/n Packet commands

a. Tx on CH 6 at 10 dBm with a CCK-11Mbps data rate in 20 MHz BW mode on path A

```
25                      // Stop Tx
10 1 1                  // Set Path A Only
22 6 10 0               // Set to CH 6 at 10 dBm Output Power with CCK/BPSK Data Rate
25 1 4              // Tx at 11 Mbps
```

---

b. Tx on CH 6 at 10 dBm with a CCK-11Mbps data rate in 20 MHz BW mode on path B

```
25                      // Stop Tx
10 2 2                  // Set Path B Only
22 6 10 0               // Set to CH 6 at 10 dBm Output Power with CCK/BPSK Data Rate
25 1 4                  // Tx at 11 Mbps
```

---

c. Tx on CH 6 at 10 dBm with a OFDM-54Mbps data rate in 20 MHz BW mode on path B

```
25                      // Stop Tx
10 2 2                  // Set Path B Only
22 6 10 1               // Set to CH 6 at 10 dBm Output Power with OFDM(n mode or g mode) Data Rate
25 1 13                // Tx at 54 Mbps
```

---

d. Tx on CH 6 at 10 dBm with a MCS7 data rate in 20 MHz BW mode on path B

```
25                      // Stop Tx
10 2 2                  // Set Path B Only
22 6 10 1               // Set to CH 6 at 10 dBm Output Power with OFDM(n mode or g mode) Data Rate
25 1 22                // Tx at MCS7
```

3-2 Data rate set up

B mode & G mode:

1Mbps	2Mbps	5.5Mbps	11Mbps	6Mbps	9Mbps	12Mbps	18Mbps
1	2	3	4	6	7	8	9
24Mbps	36Mbps	48Mbps	54Mbps				
10	11	12	13				

N mode:

MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
15	16	17	18	19	20	21	22

After you type above command, you can measure the 802.11a/b/g/n/ac packet by your RF test instrument (exp: Agilent 4010, IQview…).

3-3 Generate 802.11 b/g/n continuous symbol Commands

a. Cont. Tx on CH 6 at 8 dBm with a MCS7 Data rate in 20 MHz BW Mode on Path A

```
17                  // Stop Cont. Tx
25                  // Stop Tx
10 1 1              // Set Path A
22 6 8 1            // Set to CH 6 at 8 dBm Output Power with OFDM Data Rate on Path A
25 1 22             // Tx at MCS 7
25                  // Stop Tx
17 1 22             // Cont. Tx at MCS7
17                  // Stop Cont. Tx
```

3-4 Test RX sensitivity Commands

a. Rx on CH 7 in 20 MHz BW Mode on both Path A

```
25                  // Stop Tx
10 1 1              // Set to Path A
12 7                // Set to CH 100
31                  // Clear all the received packets
32                  // Get Rx Packet Count and then clear the Rx packet counter
```

3-5 Others Commands

(1) **Command 45→** Check the MAC
(2) **Command 99→** Quit the test mode/ Quit the MFG tool

4- Setup Throughput Test

START MEASURING WLAN THROUGHPUT

The throughput measurement shows the performance of the TCP/IP layer over the wireless link. To achieve the best results, run the measurement test in a clean environment with as little interference as possible. The test can be run with the adapter connected to either an Infrastructure network (see Fig. 1) or an ad hoc network (see Fig. 2). An AP that is known to be in good working order should be used for the infrastructure mode test.

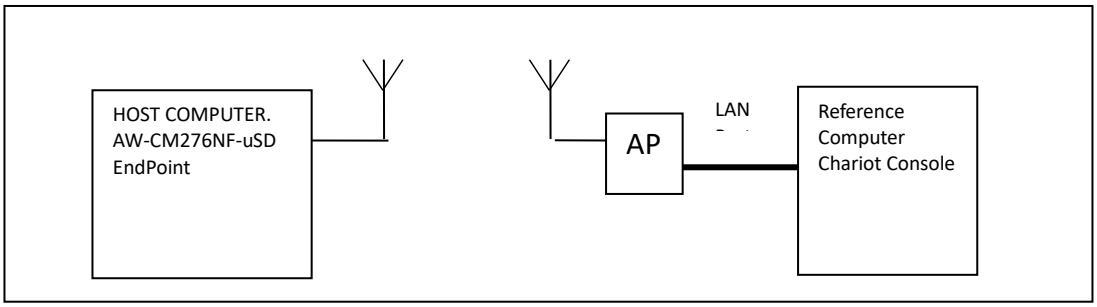


FIG. 1

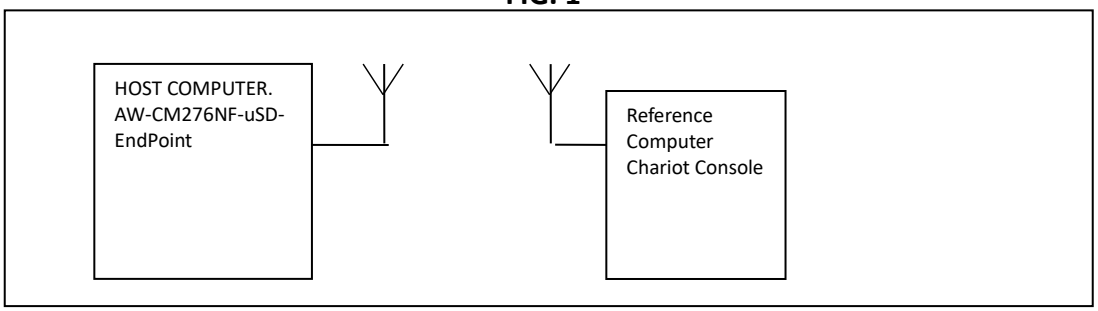


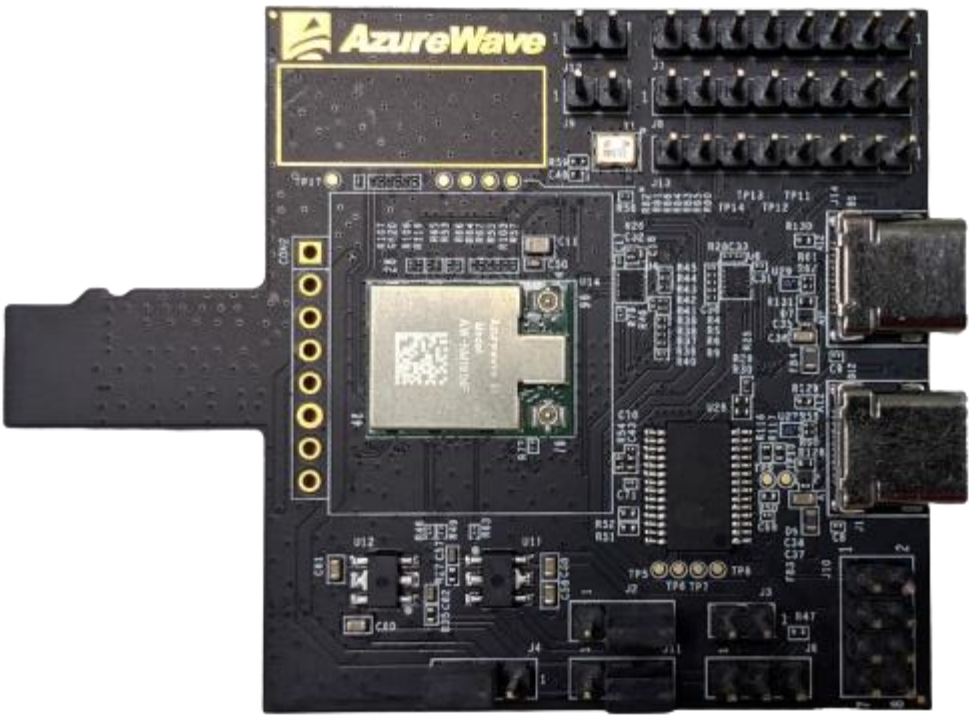
FIG. 2

MEASURING THROUGHPUT USING NETIQ CHARIOT

Test Procedure

1. Bring up the AW-NM191NF-EVB demo boar with the IP address set as 192.168.1.110.
2. Connect the reference computer with Chariot Console, which is assigned an IP address of 192.168.1.100, to the LAN port of the AP
3. Verify that communication exists between the reference computer and the AW-NM191NF-EVB demo board by pinging **192.168.1.100** from the AW-NM191NF-EVB host console.
4. Set up Chariot.
   a. On the host computer, activate EndPoint:
   b. Using Chariot Console on the reference computer, create two pair groups (192.168.1.100 and 192.168.1.110) using the Chariot Throughput.scr script. Run the throughput test for a specified period of time and observe the results.

5- EVB Attachment



Top View