

UM11560

WFA Certification for NXP-based Wireless Modules on i.MX 8M Quad EVK Running Linux OS

Rev. 10.0 — 3 July 2025

User manual

Document information

Information	Content
Keywords	Wi-Fi Alliance (WFA), certification, NXP-based wireless modules, i.MX 8M Quad EVK
Abstract	Provides the step-by-step procedure of WFA certification for NXP-based wireless modules on i.MX 8M Quad EVK running Linux OS.



1 About this document

1.1 Purpose and scope

This document describes the test setup and procedure used for WFA certification of Wi-Fi features like 802.11ax, 802.11ac, 802.11n, protected management frames (PMF), WPA3, and security vulnerability detection of NXP-based wireless devices. This document applies to NXP-based wireless modules connected to i.MX 8M Quad EVK running Linux OS, and configured as a station (STA). The instructions apply to other similar platforms and wireless devices.

The users should be familiar with [ref.\[1\]](#) and [ref.\[2\]](#).

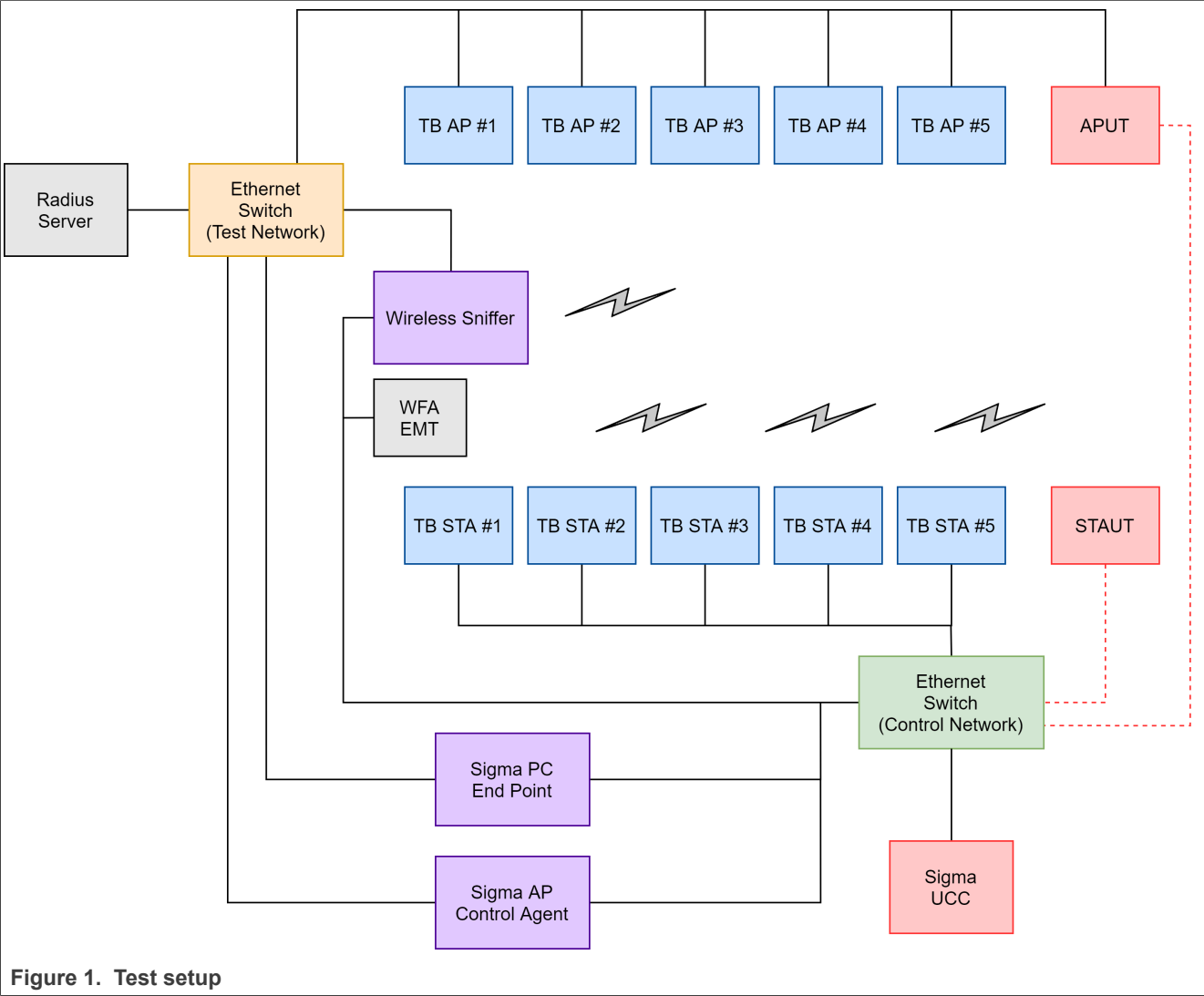
1.2 Considerations

The readers should have some knowledge of Wi-Fi terminologies and certification.

The document is based on the latest version of WFA test plan.

2 Test setup

Figure 1 illustrates the test setup.



3 WFA certification test procedure

This section shows the sequence of operations to run in order to test the Wi-Fi features.

3.1 Set up the serial console

Set up the test. See [Section 2](#).

Follow these steps to setup the serial console and access the i.MX 8M Quad device terminal:

- Open the serial console and login into the device

```
ubuntu@ubuntu-desktop:/# sudo minicom -s -D /dev/ttyUSBx
```

- `ttyUSB0` or `ttyUSB1` are the serial devices. The minicom setup configuration is given below:

```
A - Serial Device      : /dev/ttyUSBx
E - Bps/Par/Bits       : 115200 8N1
F - Hardware Flow Control : No
G - Software Flow Control : No
```

Note: The baud rate is set to 115200 in the given minicom setup configuration.

- Save and exit.

3.2 Copy the required files

- Connect the device to the control network
- Give the control network IP to the wired interface
- Use `SCP` to copy `NXP_WTS_AGENT_IMX_bin` repository to i.MX 8M Quad EVK board.

The command on Linux host is as follows:

```
# scp -r <absolute_path>/NXP_WTS_AGENT_IMX_bin root@192.168.X.X:/home/root/
```

Where 192.168.X.X is the board IP which you set in the previous step.

- Set the permission to the files within `NXP_WTS_AGENT_IMX_bin` repository copied to i.MX 8M Quad EVK board using the command:

```
chmod 777 * -Rf
```

- Copy the driver file set `[bin_wlan/*]` to `NXP_WTS_AGENT_IMX_bin` repository
- Copy the firmware file set `[FW_Image/*]` to `/lib/firmware/nxp/` repository of i.MX 8M Quad EVK board

3.3 Cross compilation of WTS DUT agent

This section shows how to cross compile the certification agent for Linux Yocto.

- For how to set up the toolchain, refer to the section *i.MX 8M evaluation platform with Yocto* in [ref.\[3\]](#).
- Extract the content of the zip file.

```
ubuntu@ubuntu-desktop:/# unzip NXP_WTS_QTT_AGENT_R2_1.zip
```

- Source the toolchain.

```
ubuntu@ubuntu-desktop:/# source /opt/fsl-imx-wayland/5.10-hardknott/environment-setup-cortexa53-crypto-poky-linux
```

- Go to WTS-R-2.1 directory.

```
ubuntu@ubuntu-desktop:/# cd WTS-R-2.1/
```

- Extract the content of the zip file.

```
ubuntu@ubuntu-desktop:/# unzip NXP_WTS_AGENT_SRC_R2.1.zip
```

- Open *Makefile.inc* file and disable static compile.

```
ubuntu@ubuntu-desktop:/# gedit Makefile.inc  
#CC = gcc
```

- Compile the source code.

```
ubuntu@ubuntu-desktop:/# make
```

At the end of the compilation, the directory *NXP_WTS_AGENT_IMX_bin* is created at the current path. The files in *NXP_WTS_AGENT_IMX_bin* directory are used on the target android platform.

3.4 Load the driver

Use the `cd` command to go to `NXP_WTS_AGENT_IMX_bin` repository where the driver files are located on i.MX board.

Note: By default the turbo mode is enabled in the firmware. But turbo mode must be disabled for all the certification programs because turbo mode requires to update wmm parameters as per the specification. See [Section 3.4.1](#).

Run the shell script `load.sh` to install the driver located in `NXP_WTS_AGENT_IMX_bin` repository.

```
./load.sh
```

Note: The shell script changes with the device and respective features being tested. Refer to the program specific data for the script to use.

Check the version of the build with the following command:

```
./mланutl wlan0 version
```

3.4.1 Disable Turbo mode

- Edit `turbo_mode.conf` configuration file to change the value for turbo mode enablement.

```
#File : turbo_mode.conf
## WMM turbo mode config command
turbo_mode_set={
    CmdCode=0x0016 # do NOT change this line
    Action:2=1     # 1 - SET
    OID:2=0x27     # OID_WMM_TURBO_MODE
    Size:2=128
    Value:128=5    # 1 -- Enable turbo_mode_1; 2 -- Enable turbo_mode_2; otherwise,
    disable turbo_mode
}
```

- Use `mланutl` utility to update the settings for turbo mode

Command syntax:

```
./mланutl <wireless interface> hostcmd <conf file name> <config structure name>
```

Command example:

```
root@imx8mnevk:~# ./mланutl wlan0 hostcmd config/turbo_mode.conf turbo_mode_set
```

Command output example:

```
HOSTCMD_RESP: CmdCode=0x16, Size=0x8e, SeqNum=0x26, Result=0000
payload: len=134
01 00 27 00 80 00 05 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00
```

3.5 Start Sigma

Sigma automation test suite formerly named Wi-Fi Test Suite (WTS) is an automation frame work provided by Wi-Fi Alliance. All the test bed devices including Access Points, test bed STAs, Sniffers and Traffic generator are controlled through the Unified CAPI (Control API) Console (UCC). The CA and DUT control agents (wfa_ca and wfa_dut) are components of the automation test suite.

3.5.1 Start Sigma for the DUT agent (wfa_dut)

- Open an ssh terminal to access the i.MX 8M Quad EVK board
- Go to `NXP_WTS_AGENT_IMX_bin` repository where you have copied `wfa_dut` and `wfa_ca` agents earlier
- Get the DUT agent version

```
wfa_dut -v (version)
```

- Run the command to start `wfa_dut` DUT agent:

Syntax: `./wfa_dut <interface> <dut_port> <program_index>`

Table 1. Command parameters

Parameter	Description
interface	Interface name
dut_port	Port number for the DUT
program_index	Program index value. See Table 2 .

Note: Refer to the program index table to parse the program index of the certification program to execute.

Example

`./wfa_dut lo 8000 3` // starts VHT-STAUT program for DUT port number 8000 and lo interface

[Table 2](#) lists the program index values.

Table 2. WTS program index values

Program index	WTS program
1	HE-STAUT
2	HE-APUT-HOSTAPD
3	VHT-STAUT
4	VHT-STAUT-MWIFIEX
5	VHT-APUT-UAPUTL
6	VHT-APUT-HOSTAPD
7	11N-STAUT
8	11N-STAUT-MWIFIEX
9	11N-APUT-UAPUTL
10	11N-APUT-HOSTAPD
11	PMF-STAUT
12	PMF-STAUT-MWIFIEX
13	PMF-APUT-UAPUTL
14	PMF-APUT-HOSTAPD
15	WPA3-STAUT
16	WPA3-APUT-HOSTAPD
17	WMM-PS-STAUT
18	WMM-PS-APUT
19	WMM-PS-APUT-HOSTAPD
20	P2P-MWU
21	P2P-WS
22	MBO-STAUT
23	FFD-VU-APUT-UAPUTL
24	FFD-VU-APUT-HOSTAPD
25	FFD-VU-STAUT
26	HS2-R1
27	HS2-R2
28	V-E-STAUT
29	TDLS

3.5.2 Start Sigma for the CA control agent (*wfa_ca*)

- Open another ssh terminal
- Go to *NXP_WTS_AGENT_IMX_bin* repository where you have copied *wfa_ca* component files earlier
- Run the command to start *wfa_ca* CA agent:

Syntax: `./wfa_ca.sh <control interface>`

Table 3. Command parameters

Parameter	Description
control interface	Network control interface name

Example

`./ca.sh eth0 //` starts the control agent for eth0

4 Certification program execution

This section shows how to execute the certification programs for the set of Wi-Fi features.

4.1 11AX/6E certification program

11AX/6E certification program is used to test the compliance of 802.11ax/6E Wi-Fi feature.

- Use the `cd` command to go to `NXP_WTS_AGENT_IMX_bin` directory where the driver files are located. See [Section 3.2](#).
- Run the shell script to load the driver

```
./load.sh
```

- Start Sigma for the DUT agent

```
./wfa_dut lo 8000 1
```

- Start Sigma for the CA agent

```
./ca.sh eth0
```

4.2 11AC certification program

11AC certification program is used to test the compliance of 802.11ac Wi-Fi feature.

- Use the `cd` command to go to `NXP_WTS_AGENT_IMX_bin` repository where the driver files are located. See [Section 3.2](#).
- Run the shell script `./load.sh` to load the driver

```
./load.sh
```

- Start Sigma for the DUT agent

```
./wfa_dut lo 8000 3
```

- Start Sigma for the CA agent

```
./ca.sh eth0
```

4.3 11N certification program

11N certification program is used to test the compliance of 802.11n Wi-Fi feature

- Use the `cd` command to go to `NXP_WTS_AGENT_IMX_bin` repository where the driver files are located. See [Section 3.2](#).
- Run the shell script `./load.sh` to load the driver

```
./load.sh
```

- Start Sigma for the DUT agent

```
./wfa_dut lo 8000 7
```

- Start Sigma for the CA agent

```
./ca.sh eth0
```

Note: The following commands need to be executed manually before running the test cases N-5.2.2 and N-5.2.48.

4.4 WPA3 certification program

WPA3 pre-cert program is used to test the compliance of WPA3 Wi-Fi feature

- Use the `cd` command to go to `NXP_WTS_AGENT_IMX_bin` repository where the driver files are located. See [Section 3.2](#).
- Run the shell script `./load.sh` to load the driver

```
./load.sh
```

- Start Sigma for the DUT agent

```
./wfa_dut lo 8000 15
```

- Start Sigma for the CA agent

```
./ca.sh eth0
```

4.5 PMF certification program

PMF certification program is used to test the compliance of PMF Wi-Fi feature

4.5.1 Test with WTS tool

- Use the `cd` command to go to `NXP_WTS_AGENT_IMX_bin` repository where the driver files are located. See [Section 3.2 "Copy the required files"](#).
- Run the shell script `./load.sh` to load the driver

```
./load.sh
```

- Start Sigma for the DUT agent

```
./wfa_dut lo 8000 11
```

- Start Sigma for the CA agent

```
./ca.sh eth0
```

4.5.2 Test with Quicktrack tool

- Download `NXP_WTS_QTT_AGENT_R2_1` source code from [ref.\[4\]](#).
- Unzip the downloaded source code and navigate to QTT-R-2.1 source code.
- Cross-compile the `NXP_Linux_QTT_ControlApp_R2.1` for your platform.
- Copy the cross-compiled app binary on your platform.
- Copy the downloaded source code to `/home/root` directory on the i.MX 8M platform
- Create `wpa_supPLICANT` directory in `etc` directory

```
mkdir /etc/wpa_supPLICANT
```

- Copy `wpa_supPLICANT` binary in `/etc/wpa_supPLICANT/` directory

```
cp /usr/sbin/wpa_supPLICANT /etc/wpa_supPLICANT/
```

- Start the agent

```
./app -p 9004
```

- Assign the IP address to i.MX 8M platform as per the QTT configuration.

4.6 SVD (VU) certification program

SVD (VU) certification program is used to test the compliance of security vulnerability detection Wi-Fi feature.

Follow the steps below to test with Quicktrack tool.

- Download NXP_WTS_QTT_AGENT_R2_1 source code from [ref.\[4\]](#).
- Unzip the downloaded source code and navigate to QTT-R-2.1 source code.
- Cross-compile the NXP_Linux_QTT_ControlApp_R2.1 for your platform.
- Copy the cross-compiled app binary on your platform.
- Create *wpa_suppllicant* directory in *etc* directory

```
mkdir /etc/wpa_suppllicant
```

- Copy *wpa_suppllicant* binary in */etc/wpa_suppllicant/* directory

```
cp /usr/sbin/wpa_suppllicant /etc/wpa_suppllicant/
```

- Start the agent

```
./app -p 9004
```

- Assign the IP address to i.MX 8M platform as per the QTT configuration.

5 Abbreviations

Table 4. Abbreviations

Abbreviation	Description
AP	Access point
CA	Control agent
CAPI	Control API
DHCP	Dynamic host configuration procedure
DUT	Device under test
PMF	Protected management frames
QTT	Quick track tool
SAE	Simultaneous authentication of equals
STA	Station
STAUT	Station under test
SVD	Security vulnerability detection
UCC	Unified control API (CAPI) console
WFA	Wi-Fi Alliance
WTS	Wi-Fi Test Suite

6 References

- [1] Reference manual – RM00297: Linux Software Reference Manual for NXP Wireless Connectivity ([link](#))
- [2] User manual – UM11483: Getting Started with NXP-based Wireless Modules on i.MX 8M Quad EVK Running Linux OS ([link](#))
- [3] User manual – UM11675: How to Download and Build NXP Wi-Fi Drivers ([link](#))
- [4] Software – NXP_WTS_QTT_AGENT_R2_1 source code on NXP website ([link](#))

7 Contact information

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9 Revision history

Revision history

Document ID	Date	Description
UM11560 v.10	3 July 2025	<ul style="list-style-type: none"> Section 4.5.2 "Test with Quicktrack tool": updated. Section 4.6 "SVD (VU) certification program": updated. Section 6 "References": updated.
UM11560 v.9.0	25 September 2024	<ul style="list-style-type: none"> Section 3.3 "Cross compilation of WTS DUT agent": updated. Section 4.1 "11AX/6E certification program": renamed 802.11ax as 802.11ax/6E, renamed 11AX as 11AX/6E, and renamed the shell script as load.sh. Section 4.2 "11AC certification program": renamed the shell script as load.sh. Section 4.3 "11N certification program": renamed the shell script as load.sh.
UM11560 v.8.0	26 June 2023	<ul style="list-style-type: none"> Section 6 "References": added UM11675 Section 3.1 "Set up the serial console": added a note Overall document: changed the directory name <i>NXP_WTS_AGENT_U16_bin</i> to <i>NXP_WTS_AGENT_IMX_bin</i> Section 3.3 "Cross compilation of WTS DUT agent": added the section Section 3.4 "Load the driver": updated the first note Section 3.4.1 "Disable Turbo mode": updated Section 3.5.1 "Start Sigma for the DUT agent (wfa_dut)": updated the information about the DUT version Section 4.3 "11N certification program": removed the content after the note Section 8 "Note about the source code in the document": added the section
UM11560 v.7.0	20230330	<ul style="list-style-type: none"> Section 3.4 "Load the driver": updated the note Section 3.5.1 "Start Sigma for the DUT agent (wfa_dut)": added a note after the table
UM11560 v.6.0	15 December 2022	<ul style="list-style-type: none"> Section 3.5.1 "Start Sigma for the DUT agent (wfa_dut)": updated the example
UM11560 v.5.0	29 September 2022	<ul style="list-style-type: none"> Section 4.2 "11AC certification program": changed the program index to 3 Section 4.3 "11N certification program": changed the program index to 7 Section 4.4 "WPA3 certification program": changed the program index to 15 Section 4.5.1 "Test with WTS tool": changed the program index to 11
UM11560 v.4.0	29 March 2022	<ul style="list-style-type: none"> Section 3.5.1 "Start Sigma for the DUT agent (wfa_dut)": updated Table 2 "WTS program index values" Section 4.5 "PMF certification program": moved the content to Section 4.5.1 "Test with WTS tool" Section 4.5.2 "Test with Quicktrack tool": added Section 4.6 "SVD (VU) certification program": updated Section 5 "Abbreviations": added QTT
UM11560 v.3.0	14 December 2021	<ul style="list-style-type: none"> Extended the scope to NXP-based wireless modules Section 1.1 "Purpose and scope": updated Section 6 "References": updated the links to the documents on NXP website Section 1.2 "Considerations": added the last sentence
UM11560 v.2.0	21 September 2021	<ul style="list-style-type: none"> Table 2 "WTS program index values": updated Section 4.1 "11AX/6E certification program": added
UM11560 v.1.0	22 February 2021	Initial version

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