RN00104

NXP Wireless SoC Features and Release Notes for Linux

Rev. 20.0 — 2 July 2025 **Release notes**

Document information

Information	Content
Keywords	PCIE-Wi-Fi-UART-BT-FP92-88W9098, PCIE-Wi-Fi-UART-BT-FP92-88W8997, SD-Wi-Fi-UART-BT-FP92-88W9098, SD-Wi-Fi-UART-BT-FP92-88W8997, SD-Wi-Fi-UART-BT-FP92-88W8987, SD-Wi-Fi-UART-BT-FP92-IW416, SD-Wi-Fi-UART-BT-FP99-IW611, SD-Wi-Fi-UART-BT-FP99-IW612, SD-WLAN-UART-BLE-SPI-OT-Zigbee-IW610, USB-WLAN-USB-BLE-SPI-OT-Zigbee-IW610, PCIE-WLAN-UART-BT-AW693
Abstract	Linux release notes for NXP wireless SoCs

1 About this document

This document includes information about the supported features, driver and firmware release versions, fixed/known issues, and the performance of the Wi-Fi, Bluetooth and coexistence.

The release has been tested for wireless SoCs mentioned in Section 1.1 with Linux BSP version v.6.12.20_2.0.0.

1.1 Supported SoCs

- PCIE-Wi-Fi-UART-BT-FP92-88W9098
- PCIE-Wi-Fi-UART-BT-FP92-88W8997
- SD-Wi-Fi-UART-BT-FP92-88W9098
- SD-Wi-Fi-UART-BT-FP92-88W8997
- SD-Wi-Fi-UART-BT-FP92-88W8987
- SD-Wi-Fi-UART-BT-FP92-IW416
- SD-Wi-Fi-UART-BT-FP99-IW611
- SD-Wi-Fi-UART-BT-FP99-IW612
- USB-WLAN-USB-BLE-FP99-IW610
- PCIE-Wi-Fi-UART-BT-FP99-AW693

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2 Downloading the wireless driver/utilities and firmware

For the latest wireless driver/utility and firmware, see:

- Section "Pre-compiled Wi-Fi driver and firmware"
- Section "Wi-Fi utilities (mlanutl)"
- Section "Wi-Fi/Bluetooth driver source and firmware"
- Section "Wi-Fi patch"

2.1 Pre-compiled Wi-Fi driver and firmware

The Linux BSP image will have wireless firmware and pre-compiled drivers on following paths:

For driver modules: `/lib/modules/<kernel-version>/extra/`

For firmware binary: `/lib/firmware/nxp/`

2.2 Wi-Fi utilities (mlanutl)

The mlan uutility (mlanutl) is not part of the Linux BSP image version v.6.12.20_2.0.0 nor the GitHub source release tag: `lf-6.12.20_2.0.0`.

To get the source, see ref.[4].

2.3 Wi-Fi/Bluetooth driver source and firmware

- To download the Wi-Fi driver and wireless firmware releases, see ref.[7].
- To get NXP Bluetooth UART driver and bring up the Bluetooth interface, see ref.[6].

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2.4 Wi-Fi patch

Intermediate fixes are posted on the website ref.[10]. Figure 1 shows an example.

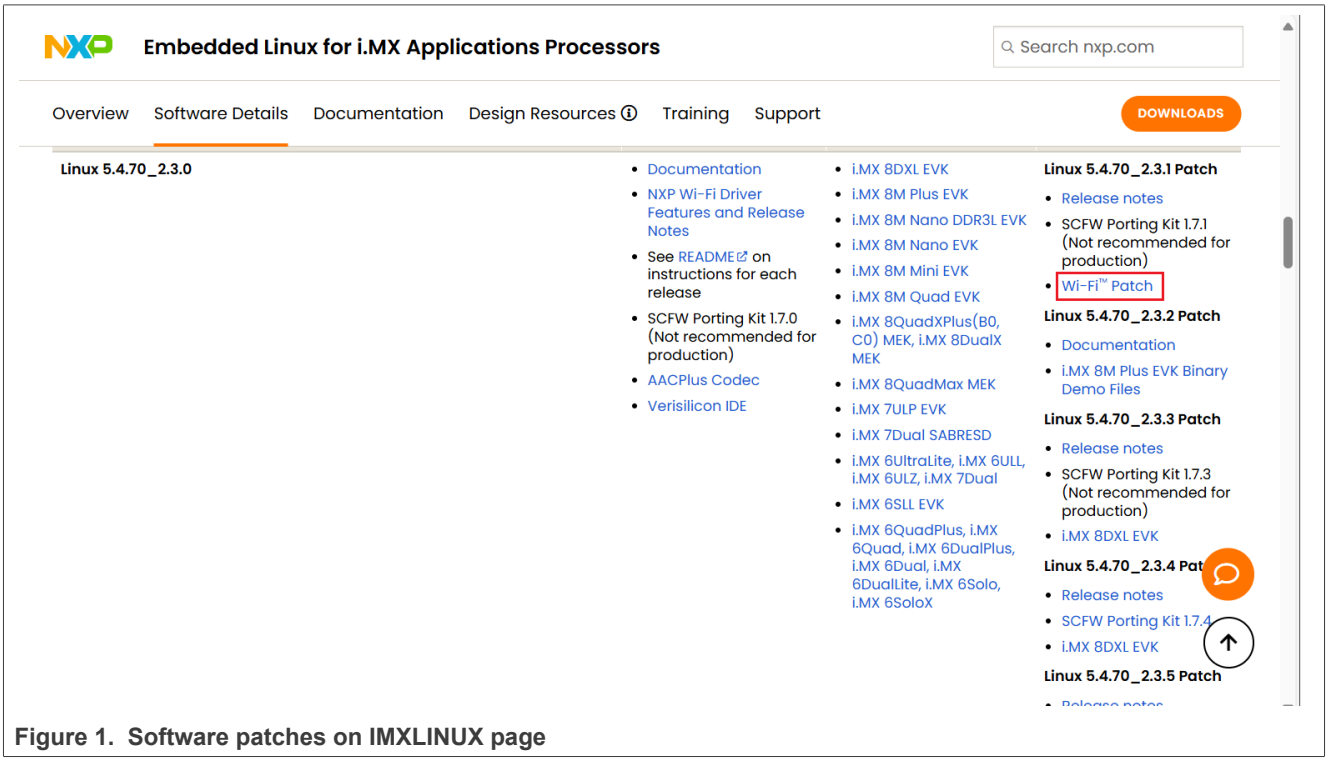

Figure 1. Software patches on IMXLINUX page

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3 Feature lists

- Section 3.1 "Wi-Fi radio"
- Section 3.2 "Bluetooth"
- Section 3.3 "Thread"
- Section 3.4 "Coexistence"
- Section 3.5 "Zigbee"

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3.1 Wi-Fi radio

- Section 3.1.1 "Client mode"
- Section 3.1.2 "AP mode"
- Section 3.1.3 "Wi-Fi Direct "
- Section 3.1.4 "Concurrent dual Wi-Fi (CDW) mode [Dual MAC | Dual Band | Dual Channel] (88W9098)"
- Section 3.1.5 "Known limitations for simultaneous mode operation"

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3.1.1 Client mode

Table 1. Feature list for Wi-Fi radio and client mode

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
802.11n High Throughput										
2.4 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.4 GHz band supported channel bandwidth: 40 MHz [1]	Y	Y	Y	Y	Y	Y	Y	N	Y	N
5 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5 GHz band supported channel bandwidth: 40 MHz	Y	Y	Y	Y	Y	Y	Y	N	Y	N
Short/long guard interval (400 ns/800 ns)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Data rates up to 72 Mbit/s (MCS 0 to MCS 7)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Data rates up to 150 Mbit/s (MCS 0 to MCS 7)	Y	Y	Y	Y	Y	Y	Y	N	Y	N
Data rates up to 300 Mbit/s (MCS 0 to MCS 15)	Y	Y	Y	Y	N	Y	N	N	N	N
1 spatial stream (1x1)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2 spatial stream (2x2)	Y	Y	Y	Y	N	Y	N	N	N	N
HT protection mechanisms	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Explicit Beamformee	Y	Y	Y	Y	Y	Y	N	N	N	N
Aggregated MAC Protocol Data Unit(AMPDU) RX support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Aggregated MAC Service Data Unit(AMSDU) -4k RX support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
20 MHz/40 MHz coexistence	Y	Y	Y	Y	Y	Y	N	N	N	N
TX MCS rate adaptation (BGN)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
RX and TX space time block coding for 2x2 (STBC)	N	Y	N	N	N	Y	N	N	N	N
RX low-density parity check (LDPC)	Y	Y	Y	Y	Y	Y	Y	N	N	N
AMSDU over AMPDU support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11ac Very High Throughput										
5 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
5 GHz band supported channel bandwidth: 40 MHz	Y	Y	Y	Y	Y	Y	Y	N	N	N
5 GHz band supported channel bandwidth: 80 MHz	Y	Y	Y	Y	Y	Y	Y	N	N	N

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Table 1. Feature list for Wi-Fi radio and client mode *...continued*

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
Data rates up to 433.3 Mbit/s (MCS0 to MCS9)	Y	Y	Y	Y	Y	Y	Y	N	N	N
Data rates up to 866.7 Mbit/s (MCS0 to MCS9)	Y	Y	Y	Y	N	Y	N	N	N	N
Short/Long Guard Interval (400ns/800ns)	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
SU-AMPDU Aggregation	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
MU-MIMO Beamformee (Explicit and Implicit)	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
SU-Beamformee	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
MU-MIMO RX – Wave 2	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
RTS/CTS with BW Signaling	Y	Y	Y	Y	Y	Y	Y	N	N	N
Operation Mode Notification	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Backward compatibility with non-VHT devices	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
TX VHT MCS Rate Adaptation	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
LDPC	Y	Y	Y	Y	Y	Y	Y	N	N	N
256 QAM Modulation – MCS 8 and MCS9	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11ax High Efficiency										
5 GHz band supported channel bandwidth: 20 MHz	Y	N	Y	Y	Y	N	N	Y	N	Y
5 GHz band supported channel bandwidth: 40 MHz	Y	N	Y	Y	Y	N	N	N	N	N
5 GHz band supported channel bandwidth: 80 MHz	Y	N	Y	Y	Y	N	N	N	N	N
2.4 GHz band supported channel bandwidth: 20 MHz	Y	N	Y	Y	Y	N	N	Y	N	Y
2.4 GHz band supported channel bandwidth: 40 MHz[1]	Y	N	Y	Y	Y	N	N	N	N	N
Data rates up to 1.2 Gbit/s (MCS 0 to MCS 11) - 2x2	Y	N	Y	Y	N	N	N	N	N	N
Data rates up to 600 Mbit/s (MCS 0 to MCS 11) - 1x1	Y	N	Y	Y	Y	N	N	Y	N	Y
Operating Mode Indication (OMI) control	Y	N	Y	Y	Y	N	N	N	N	N
2x/4x HE Long Training Field (LTF)	Y	N	Y	Y	Y	N	N	N	N	N
Target wake-up Time	Y	N	Y	Y	Y	N	N	Y	N	Y
1024 QAM modulation – MCS10-MCS11	Y[2]	N	Y	Y	Y	N	N	N	N	N
256 QAM modulation – MCS8 and MCS9	Y	N	Y	Y	Y	N	N	Y	N	Y

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Table 1. Feature list for Wi-Fi radio and client mode *...continued*

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
Spatial reuse	N	N	Y	N	Y	N	N	Y	N	Y
SU beamforming	Y	N	Y	Y	Y	N	N	N	N	N
UL (TX) and DL (RX) MU-MIMO	Y	N	Y	Y	Y	N	N	Y	N	Y
UL (TX) and DL (RX) OFDMA	Y	N	Y	Y	Y	N	N	Y	N	Y
OFDMA (UL/DL, 484 RU)	Y	N	Y	Y	Y	N	N	N	N	N
BSS coloring	Y	N	Y	Y	Y	N	N	Y	N	Y
802.11a – 802.11b – 802.11g										
802.11b/g data rates up to 54 Mbit/s	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11a data rates up to 54 Mbit/s	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
TX rate adaptation (BG)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Fragmentation/ defragmentation	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ERP protection, slot time, preamble	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ERP Protection using mac ctrl command (RTS-CTS/ Self-CTS)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11d – 802.11h										
802.11d regulatory domain/ operating class/country info	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Per-path regulatory power table [1]	N	N	N	N	Y	N	Y	N	N	N
802.11h – Dynamic Frequency Selection (DFS)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
DFS radar Detection in follower Mode (Follow AP)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11e QoS										
EDCA [Enhanced Distributed Channel Access] / WMM (Wireless Multi-Media)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11i security										
Open source WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WEP-64/128 | WPA Supplicant	Y	N	Y	Y	Y	N	N	Y	N	Y
WPA-PSK TKIP | WPA Supplicant	Y	N	Y	Y	N	N	N	Y	N	Y
WPA2-PSK AES | WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WPA+WPA2 PSK Mixed Mode | WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

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Table 1. Feature list for Wi-Fi radio and client mode ***...continued***

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
WPA3-SAE (Simultaneous Authentication of Equals) | WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WPA2+WPA3 PSK Mixed Mode (WPA3 Transition Mode) | WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wi-Fi Enhanced Open - OWE (Opportunistic Wireless Encryption) | WPA Supplicant	Y	N	Y	Y	Y	N	Y	Y	N	Y
802.1x EAP authentication Methods | WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WPA2-Enterprise GCMP | WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
WPA2-Enterprise Mixed Mode | WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WPA3-Enterprise (Suite-B) | National Security Algorithm (CSNA) | WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
802.11w - PMF (Protected Management Frames) | WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WAPI | WPA Supplicant	Y	N	Y	Y	Y	N	N	Y	N	Y
Embedded Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STA - WEP-64/128 | Embedded Supplicant	Y	N	Y	Y	Y	N	N	Y	N	Y
STA - WPA-PSK TKIP | Embedded Supplicant	Y	N	Y	Y	Y	N	N	Y	N	Y
STA - WPA2-PSK AES | Embedded Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STA - WPA+WPA2 PSK Mixed Mode | Embedded Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STA - WPA3-SAE (Simultaneous authentication of Equals) | Embedded Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STA - 802.11w - PMF (Protected Management Frames) | Embedded Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WPA3 Enterprise	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11r Fast BSS Transition (FT)										
FT over Air and over DS (Distribution System) [Open, WPA2 security]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11k										
802.11k	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11v										

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Table 1. Feature list for Wi-Fi radio and client mode *...continued*

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
802.11v	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11z										
802.11z (Host based TDLS)	Y	Y	Y	Y	Y	Y	Y	N	Y	N
802.11az										
New generation Wi-Fi Location	N	N	Y	N	Y	N	N	Y	N	Y
802.11mc										
Wi-Fi location[1]	Y	N	Y	Y	Y	N	N	Y	N	Y
FIPS										
FIPS support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
FIPS encryption										
RC4	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
AES_ECB	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
AES_WRAP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
AES_CCM (128 bits)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
AES_CCM (256 bits)	Y	N	Y	Y	Y	N	Y	Y	N	Y
AES_GCM (128, 256 bits)	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
WPS/WSC2.0 functionality										
PIN Config Method - 8 Digit/4 Digit	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PIN Config Method - Static/ Dynamic PIN	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PBC - Virtual Push Button Config Method	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PBC Session Overlap Detection	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STA as Enrollee	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Backward compatibility with WPS1.0 Devices	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Open source WPA supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
DPP functionality										
Wi-Fi Easy Connect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Power save mode										
Deep sleep	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
IEEE power save	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
U-APSD / WMM power save [1]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wi-Fi 6E										
6 GHz in-band association	N	N	Y	N	N	N	N	N	N	N
6 GHz in-band discovery	N	N	Y	N	N	N	N	N	N	N
Out of band discovery	N	N	Y	N	N	N	N	N	N	N

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Table 1. Feature list for Wi-Fi radio and client mode *...continued*

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
General features										
EU adaptivity support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wake on Wireless (WoW) in-band	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wake on Wireless (WoW) out-of-band	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Auto TX[1]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cloud keep alive (TX)[1]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cloud keep alive (TX and RX)[1]	N	N	Y	N	Y	N	N	Y	N	Y
MAC Address randomization(in Scan)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Host-based MLME[3]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Driver load time parameters for manufacturing mode	Y	N	Y	Y	Y	N	N	N	N	N
Extended channel switch announcement (ECSA)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Independent reset (In-band)[4]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wi-Fi agile multiband	Y	N	Y	Y	Y	N	N	Y	N	Y
Wireless Apple CarPlay (R5)	Y	N	Y	Y	Y	N	Y	N	N	N
CSI[1]	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
CSI Monitor Mode [1]	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Packet coalescing [1]	Y	Y	Y	Y	Y	Y	Y	N	Y	N
mDNS (Bonjour) offload	N	Y	Y	N	Y	Y	Y	N	Y	N
mDNS wake on match	Y	Y	Y	Y	Y	Y	Y	N	Y	N
IPv6 NS offload	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Extended range [1]	Y	N	Y	Y	Y	N	N	Y	N	Y
Clock sync [1]	Y	Y	Y	Y	Y	Y	N	N	N	N
DCM	Y	N	Y	Y	Y	N	N	Y	N	Y
UNII_4 Channel Support	Y	N	Y	Y	Y	N	N	Y	N	Y
NAPI Support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Auto reconnect	Y	Y	Y	Y	Y	Y	Y	N	Y	N
Band steering (AGO + AGO and P2P)	Y	N	Y	Y	N	N	N	N	N	N
Sniffer mode [1]	Y	Y	N	Y	Y	Y	Y	Y	Y	Y
Packet transmission with sniffer mode	Y	N	N	Y	Y	N	N	Y	N	Y
Packet injection using scapy tool	Y	N	N	Y	Y	N	N	N	N	N
Wireless Android (auto projection mode)	Y	N	Y	Y	Y	N	N	N	N	N

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Table 1. Feature list for Wi-Fi radio and client mode ***...continued***

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
Android automotive OS	Y	N	Y	Y	Y	N	Y	N	N	N
Specific scan (scancfg)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Network scan (iwlist scan)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Cancel-able scan	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Passive to active scan	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Software Antenna Diversity [1]	N	N	Y	N	Y	N	Y	Y	Y	Y
EasyMesh [1][5]	N	N	Y	N	Y	N	N	N	N	N
Neighbor aware networking (NAN)[1]	N	N	Y	N	Y	N	N	N	N	N
Vendor specific IE (Custom IE)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

[1] Contact your support representative to use this feature.
[2] MCS10 and MCS11 not supported on 88W9098 in 2.4 GHz band.
[3] The feature is enabled by default in software.
[4] To avoid any version mismatch, copy both combo firmware and standalone Wi-Fi firmware to the directory */lib/firmware/nxp/* of the host system.
[5] Feature not supported in this release.

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3.1.2 AP mode

Feature list for Wi-Fi radio and AP mode

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
802.11n High Throughput										
2.4 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.4 GHz band supported channel bandwidth: 40 MHz[1]	Y	Y	Y	Y	Y	Y	Y	N	Y	N
5 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
5 GHz band supported channel bandwidth: 40 MHz	Y	Y	Y	Y	Y	Y	Y	N	Y	N
1 spatial stream (1x1)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2 spatial stream (2x2)	Y	Y	Y	Y	N	Y	N	N	N	N
Short/long guard interval (400 ns/800 ns)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11n data rates up to 72 Mbit/s (MCS0 to MCS7)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11n data rates up to 150 Mbit/s (MCS0 to MCS7)	Y	Y	Y	Y	Y	Y	Y	N	Y	N
802.11n data rates up to 300 Mbit/s (MCS0 to MCS15)	Y	Y	Y	Y	N	Y	N	N	N	N
TX MCS rate adaptation (BGN)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Aggregated MAC protocol data unit (AMPDU) TX and RX support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Aggregated MAC service data unit (AMSDU) - 4k RX support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
HT protection mechanisms	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
RX and TX space time block coding (STBC)	N	Y	N	N	N	Y	N	N	N	N
20/40 MHz coexistence	Y	Y	Y	Y	Y	Y	N	N	N	N
Explicit beamformer	Y	N	Y	Y	Y	N	N	N	N	N
RX Low-density parity check (LDPC)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11b/g features										
802.11 b/g data rates up to 54 Mbit/s	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
TX rate adaptation (BG)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
ERP protection, slot time, preamble	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Handling of associated STAs with IEEE PS - null data	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11ac Very High Throughput										

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Feature list for Wi-Fi radio and AP mode *...continued*

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
5 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
5 GHz band supported channel bandwidth: 40 MHz	Y	Y	Y	Y	Y	Y	Y	N	N	N
5 GHz band supported channel bandwidth: 80 MHz	Y	Y	Y	Y	Y	Y	Y	N	N	N
Short/Long Guard Interval (400ns/800ns)	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
802.11ac data rates up to 433.3 Mbps (MCS 0 to MCS 9) 1SS	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
802.11ac Data rates up to 866.7 Mbps (MCS 0 to MCS 9) 2SS	Y	Y	Y	Y	N	Y	N	N	N	N
Single User- Aggregated MAC Protocol Data Unit (SU-AMPDU) Aggregation	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
RTS/CTS with BW Signaling	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Backward Compatibility with non-VHT devices	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
TX VHT MCS Rate Adaptation	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Operation mode notification	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
SU Explicit beamformer	Y	N	Y	Y	N	N	N	N	N	N
Low-density parity check (LDPC)	Y	Y	Y	Y	Y	Y	Y	N	N	N
802.11ax High Efficiency										
5 GHz band supported channel bandwidth: 20 MHz	Y	N	Y	Y	Y	N	N	Y	N	Y
5 GHz band supported channel bandwidth: 40 MHz	Y	N	Y	Y	Y	N	N	N	N	N
5 GHz band supported channel bandwidth: 80 MHz	Y	N	Y	Y	Y	N	N	N	N	N
2.4 GHz band supported channel bandwidth: 20 MHz	Y	N	Y	Y	Y	N	N	Y	N	Y
2.4 GHz band supported channel bandwidth: 40 MHz[1]	Y	N	Y	Y	Y	N	N	N	N	N
Operating Mode Indication (OMI) Control	Y	N	Y	Y	Y	N	N	N	N	N
2x/4x HE-Long Training Field (LTF)	Y	N	Y	Y	N	N	N	N	N	N
1024 QAM	Y	N	Y	Y	Y	N	N	N	N	N
BSS color	Y	N	Y	Y	Y	N	N	Y	N	Y
HE SU beamformer (explicit)	Y	N	Y	Y	N	N	N	N	N	N
802.11d										

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Feature list for Wi-Fi radio and AP mode *...continued*

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
802.11d - Regulatory Domain/Operating Class/ Country Info	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11h										
802.11h - Dynamic Frequency Selection (DFS)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Zero Wait DFS	Y	N	N	Y	N	N	N	N	N	N
802.11e QoS										
EDCA [Enhanced Distributed Channel Access] / WMM (Wireless Multi-Media)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11az										
New generation Wi-Fi Location [1]	N	N	Y	N	Y	N	N	N	N	N
802.11i security										
Hostapd support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WEP-64/128 | hostapd	Y	N	Y	Y	Y	N	N	Y	N	Y
WPA-PSK TKIP | hostapd	Y	N	Y	Y	N	N	N	Y	N	Y
WPA2-PSK AES | hostapd	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WPA+WPA2 PSK Mixed Mode | hostapd	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WPA3-SAE (Simultaneous Authentication of Equals) | hostapd	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WPA2+WPA3 PSK Mixed Mode (WPA3 Transition Mode) | hostapd	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wi-Fi Enhanced Open - OWE (Opportunistic Wireless Encryption) | hostapd	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.1x EAP Authentication Methods | hostapd	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WPA2-Enterprise Mixed Mode | hostapd	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WPA3-Enterprise (Suite-B) | National Security Algorithm (CSNA) | hostapd	Y	N	Y	Y	Y	N	Y	N	N	N
802.11w - PMF (Protected Management Frames) Hostpad	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WAPI | wpa_supplicant	Y	N	Y	Y	Y	N	N	Y	N	Y
Embedded Authenticator	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WEP-64/128 | Embedded Supplicant	Y	N	Y	Y	Y	N	N	Y	N	Y
WPA-PSK TKIP | Embedded Supplicant	Y	N	Y	Y	Y	N	N	Y	N	Y

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Feature list for Wi-Fi radio and AP mode *...continued*

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
WPA2-PSK AES | Embedded Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WPA+WPA2 PSK Mixed Mode | Embedded Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WPA3-SAE (Simultaneous Authentication of Equals) | Embedded Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11w - PMF (Protected Management Frames) | Embedded Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WPS/WSC2.0 functionality										
PIN Config Method - 8 Digit/4 Digit	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PIN Config Method - Static/ Dynamic PIN	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PBC - Virtual Push Button Config Method	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
PBC Session Overlap Detection	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
AP Setup Locked State - PIN Method	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
MMH as Wireless Registrar	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
MMH as Enrollee	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Opensource Hostapd	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Wi-Fi 6E features										
BSS establishment	N	N	Y	N	N	N	N	N	N	N
BSS channel signaling	N	N	Y	N	N	N	N	N	N	N
Signaling of capabilities in 6 GHz band	N	N	Y	N	N	N	N	N	N	N
HE beaconing	N	N	Y	N	N	N	N	N	N	N
General features										
EU adaptivity support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Automatic channel selection (ACS)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Host-based MLME[2]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
MBSS	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
Extended channel switch announcement (ECSA)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Driver load time parameters for manufacturing mode	Y	N	Y	Y	N	N	N	N	N	N
Max supported stations	64	8	64	64	16	8	8	8	8	8
Independent reset (in-band)[3]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

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Feature list for Wi-Fi radio and AP mode *...continued*

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
Independent reset (out-of-band)[3]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Hidden SSID (broadcast SSID disabled)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
MAC address filter (allowed/ denied list)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Maximum STA MAC address filtering	64	8	64	64	16	8	8	8	8	8
STA age out feature for associated clients	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Extended range (partially advertise)[1]	Y	N	Y	Y	Y	N	N	Y	N	Y
Configurable retry limit	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Configurable unicast data rate	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Configurable broadcast/ multicast data rate	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
uAP events	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
DFS radar detection (leader)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
UNII_4 channel support	Y	N	Y	Y	Y	N	N	Y	N	Y
Host sleep (W0W) in band and out-of-band	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
STA ageout (time out for associated/idle clients)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
NAPI support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Vendor specific ie (custom IE)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
EasyMesh[1][4]	N	N	N	N	Y	N	N	N	N	N
Neighbor aware networking (NAN)[1]	Y	N	Y	Y	Y	N	N	N	N	N
Vendor defined TX power config (TXpower Config V3)	Y	N	Y	Y	N	N	N	N	N	N

[1] Contact your support representative to use this feature.
[2] Feature is enabled by default in software.
[3] To avoid any version mismatch, copy both combo firmware and standalone Wi-Fi firmware to the directory */lib/firmware/nxp/* of the host system.
[4] Feature not supported in this release.

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3.1.3 Wi-Fi Direct

Feature list for Wi-Fi Direct/P2P mode

Feature	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
P2P basic functionality										
WFD Client Mode	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
P2P for Miracast	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
P2P Device Mode	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

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Feature list for Wi-Fi Direct AP-STA mode

Feature	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
Simultaneous AP-STA operation (same channel)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Multiple Wi-Fi MAC	Y	N	Y	Y	N	N	N	N	N	N
RF Test Mode functionality	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
TX power config[1]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Deep sleep on unload	N	N	N	N	Y	N	Y	N	N	N
Auto FW recovery on fatal error	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
Auto ARP and Ping support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Dual MAC Connection Services (DMCS)	Y	N	Y	Y	N	N	N	N	N	N
Packet filtering / Memory Efficient Filtering (MEF)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
P2P basic functionality										
Autonomous GO mode	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
WFD client mode	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
P2P for Miracast	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
P2P device mode	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
DRCS										
DRCS[1]	Y	N	Y	Y	Y	N	N	Y	Y	Y
AP – P2P(Client)	Y	N	Y	Y	Y	N	Y	Y	Y	Y
STA – P2P(GO)	Y	N	Y	Y	Y	N	Y	Y	Y	Y
AP – P2P(GO)	Y	N	Y	Y	Y	N	Y	Y	Y	Y
AP-STA-P2P	Y	N	Y	Y	Y	N	N	Y	N	Y
AP-AP-STA	Y	N	Y	Y	Y	N	N	Y	N	Y
AP – AP (MBSS)	Y	N	Y	Y	Y	N	N	Y	N	Y
AP – STA	Y	N	Y	Y	Y	N	Y	Y	Y	Y

[1] Contact your support representative to use this feature.

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3.1.4 Concurrent dual Wi-Fi (CDW) mode [Dual MAC | Dual Band | Dual Channel] (88W9098)

Radio-0 always operates in 5 GHz, Radio-1 always operates in 2.4 GHz. One Wi-Fi Interface from MAC-1 operates in Radio-0 and one Wi-Fi interface from MAC-2 operates in Radio-1.

CDW mode use cases

Radio: 0 in 5G			Radio: 1 in 2.4G			
MAC:1			MAC:2			
mlan0	uap0	wfd0	mmlan0	muap0	mwfd0	Use case
—	Yes	—	—	Yes	—	AP + AP CDW Mode
Yes	—	—	Yes	—	—	STA + STA CDW Mode
Yes	—	—	—	Yes	—	AP + STA CDW Mode
—	Yes	—	Yes	—	—	AP + STA CDW Mode

3.1.5 Known limitations for simultaneous mode operation

- uAP/P2P-GO beacons are paused unconditionally whenever STA/P2P-GC performs scan and are resumed automatically once the scan is complete.
- Radio control commands, Antenna configuration commands, 802.11d – Country Info are not unified across two interfaces.
- Custom IE Buffers are shared between two interfaces. IE-Buffer Index used by one interface cannot be used by another interface.
- STA can operate only in Infrastructure mode.

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3.2 Bluetooth

- Section 3.2.1 "Bluetooth classic"
- Section 3.2.2 "Bluetooth LE"

3.2.1 Bluetooth classic

Feature list for Bluetooth radio

Feature	PCIe-UART			SDIO-UART				
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW416
General features								
Bluetooth Class 1.5 and Class 2 support	Y	Y	Y	Y	Y	Y	Y	Y
Scatternet support	Y	Y	Y	Y	Y	Y	Y	Y
Maximum of seven simultaneous ACL connections - Central links	Y	Y	Y	Y	Y	Y	Y	Y
Automatic packet type selection	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth - 2.1 to 5.0 specification support	Y	Y	Y	Y	Y	Y	Y	Y
Low power sniff	Y	Y	Y	Y	Y	Y	Y	Y
Independent reset (in-band and OOB[3]) [1]	Y	Y	Y	Y	Y	N	Y	Y
Wake on Bluetooth (chip to host)[3]	Y	Y	Y	Y	Y	Y	Y	Y
Deep sleep (NXP UART driver)	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth truncated paging	Y	Y	Y	Y	Y	Y	Y	Y
Erroneous data reporting	Y	Y	Y	Y	Y	Y	Y	Y
Encryption pause and resume	Y	Y	Y	Y	Y	Y	Y	Y
Extended inquiry response	Y	Y	Y	Y	Y	Y	Y	Y
Link supervision timeout changed event	Y	Y	Y	Y	Y	Y	Y	Y
Non-automatically flushable packet boundary flag	Y	Y	Y	Y	Y	Y	Y	Y
Sniff sub rating	Y	Y	Y	Y	Y	Y	Y	Y
Enhanced power control	Y	Y	Y	Y	Y	Y	Y	Y
HCI read encryption key size command	Y	Y	Y	Y	Y	Y	Y	Y
Standalone Bluetooth classic AES encryption	Y	N	Y	Y	Y	N	N	Y
Bluetooth classic AES + Bluetooth LE AES encryption	N	N	N	N	Y	N	N	N
Payload – 27bytes to 234 bytes	Y	Y	Y	Y	Y	Y	Y	Y
Enhancements to L2CAP for low energy	Y	Y	Y	Y	Y	Y	Y	Y
PCM loopback mode	Y	N	Y	Y	Y	N	Y	Y
Enhancements to GAP for low energy	Y	Y	Y	Y	Y	Y	Y	Y

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Feature list for Bluetooth radio*...continued*

Feature	PCIe-UART			SDIO-UART				
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW416
SCO/eSCO over PCM	Y	Y	Y	Y	Y	Y	Y	Y
SCO/eSCO over HCI	N	N	N	N	N	N	N	Y
Dual SCO/eSCO	Y	N	Y	Y	Y	N	N	N
APCF feature support	Y	Y	Y	Y	Y	Y	Y	Y
Train nudging	N	N	N	N	Y	N	N	N
Generalized interlaced scan	Y	N	Y	Y	Y	N	N	N
BR/EDR secure connections	N	N	Y	N	Y	N	N	N
Bluetooth packet types supported								
ACL (DM1, DH1, DM3, DH3, DM5, DH5, 2-DH1, 2-DH3, 2-DH5, 3-DH1, 3-DH3, 3-DH5)	Y	Y	Y	Y	Y	Y	Y	Y
SCO (HV1, HV3)	Y	Y	Y	Y	Y	Y	Y	Y
eSCO (EV3, EV4, EV5, 2EV3, 3EV3, 2EV5, 3EV5)	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth profiles supported								
A2DP source/sink	Y	Y	Y	Y	Y	Y	Y	Y
AVRCP target/controller	Y	Y	Y	Y	Y	Y	Y	Y
HFP dev	Y	Y	Y	Y	Y	Y	Y	Y
OPP server/client	Y	Y	Y	Y	Y	Y	Y	Y
SPP	Y	Y	Y	Y	Y	Y	Y	Y
HID	Y	Y	Y	Y	Y	Y	Y	Y
GAP	Y	Y	Y	Y	Y	Y	Y	Y
HFP AG[3]	Y	Y	Y	Y	Y	Y	Y	Y
PAN server/client[3]	Y	Y	Y	Y	Y	Y	Y	Y
PBAP server/client[3]	Y	Y	Y	Y	Y	Y	Y	Y
MAP server/client[3]	Y	Y	Y	Y	Y	Y	Y	Y
A2DP SNK + HFP DEV[2]	Y	N	Y	Y	Y	N	N	N
A2DP SRC + HFP GW[2]	Y	N	Y	Y	Y	N	N	N
Bluetooth dual profiles supported [3]								
Dual A2DP (two sources)	Y	N	Y	Y	Y	N	Y	N
Dual A2DP (one source + one sink)	Y	N	Y	Y	N	N	Y	N
Dual HFP (two NBS) PCM	Y	N	Y	Y	Y	N	Y	N
Dual HFP (two WBS) PCM	Y	N	Y	Y	Y	N	N	N
Dual HFP (two WBS + one NBS) PCM	Y	N	Y	Y	Y	N	Y	N
Bluetooth audio features								
PCM NBS central/peripheral	Y	Y	Y	Y	Y	Y	Y	Y
PCM WBS central/peripheral	Y	Y	Y	Y	Y	Y	Y	Y
AAC and LDAC audio codec support	Y	N	Y	Y	Y	N	N	N

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Feature list for Bluetooth radio*...continued*

Feature	PCIe-UART			SDIO-UART				
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW416
RF test mode								
RF test mode functionality	Y	Y	Y	Y	Y	Y	Y	Y

[1] In-band independent reset (IR) can directly work with M.2 based modules on i.MX but OOB IR needs the external uSD muRata adaptor board with M.2 module.
[2] Feature tested using Ubuntu 16 platform, not with i.MX platform.
[3] Contact your support representative to use this feature.

3.2.2 Bluetooth LE

Table 2. Feature list for Bluetooth LE

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
General features										
Maximum 16 Bluetooth LE connections(Central role)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Independent reset (in-band and out-of-band) [2] [1]	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Wake on Bluetooth LE (chip to host)[2]	Y	N	Y	Y	Y	N	Y	N	Y	N
Deep sleep (NXP UART driver)	Y	Y	Y	Y	Y	Y	Y	N	Y	N
Standalone Bluetooth LE AES encryption	Y	N	Y	Y	Y	N	N	N	Y	N
Bluetooth classic AES + Bluetooth LE AES encryption	N	N	N	N	Y	N	N	N	N	N
Bluetooth profile support										
Bluetooth LE GATT	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth LE HOGP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth LE GAP	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth LE 4.0 support										
Low Energy physical layer	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Low Energy link layer	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Enhancements to HCI for Low Energy	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Low Energy direct test mode	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth LE - 1Mbit/s support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth 4.1 support										
Low duty cycle directed advertising	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth LE Dual Mode Topology	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth LE privacy v1.1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

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Table 2. Feature list for Bluetooth LE*...continued*

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
Bluetooth LE link layer topology	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth 4.2 support										
Bluetooth LE secure connection	Y	Y	Y	Y	Y	Y	Y	N	Y	N
Bluetooth LE link layer privacy v1.2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth LE data length extension	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Link layer extended scanner filter policies	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth 5.0 support										
Bluetooth LE 2 Mbps support	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
High duty cycle directed advertising	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth LE multiple advertisement (4, or 5*, or 6**) sets	Y	Y	Y	Y	Y**	Y	Y*	N	N	N
Bluetooth LE extended advertisement	Y	N	Y	Y	Y	N	N	Y	Y	Y
Bluetooth LE channel selection #2	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth LE long range	Y	N	Y	Y	Y	N	N	Y	Y	Y
Bluetooth LE periodic advertisement	N	N	Y	N	Y	N	N	Y	Y	Y
Bluetooth 5.2 support										
Bluetooth LE power control	N	N	Y	N	Y	N	N	Y	Y	Y
Isochronous channel[3]	N	N	Y	N	Y	N	N	N	N	N
Bluetooth LE audio										
LE Audio Broadcast Audio Source	N	N	Y	N	Y	N	N	N	N	N
LE Audio Broadcast Audio Sink	N	N	Y	N	Y	N	N	N	N	N
LE Audio Broadcast Group Validation	N	N	Y	N	Y	N	N	N	N	N
LE Audio Broadcast Audio Unfamed Mode	N	N	Y	N	Y	N	N	N	N	N
LE Audio Broadcast Audio Sequential Packing	N	N	Y	N	Y	N	N	N	N	N
LE Audio Broadcast Audio Mode-Mono/Stereo	N	N	Y	N	Y	N	N	N	N	N
LE Audio Public Broadcast Audio Source	N	N	Y	N	Y	N	N	N	N	N
LE Audio Unicast Audio Source	N	N	Y	N	Y	N	N	N	N	N

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Table 2. Feature list for Bluetooth LE*...continued*

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
LE Audio Unicast Audio Sink	N	N	Y	N	Y	N	N	N	N	N
LE Audio Unicast Group Validation	N	N	Y	N	Y	N	N	N	N	N
LE Audio Unicast Audio PHY-1M/2M/Coded	N	N	Y	N	Y	N	N	N	N	N
LE Audio Unicast Audio Unfamed Mode	N	N	Y	N	Y	N	N	N	N	N
LE Audio Unicast Audio Sequential Packing	N	N	Y	N	Y	N	N	N	N	N
LE Audio Unicast Audio Mode-Mono/Stereo	N	N	Y	N	Y	N	N	N	N	N
LE Audio Unicast Encrypted Audio	N	N	Y	N	Y	N	N	N	N	N
LE Audio ISO Interval for LE Audio 7.5ms 10ms 20ms 29ms	N	N	Y	N	Y	N	N	N	N	N
LE Audio Unicast Audio Source 2-CIS Stream	N	N	Y	N	Y	N	N	N	N	N
LE Audio Bridging A2DP Sink + Unicast Audio Source	N	N	Y	N	Y	N	N	N	N	N
LE Audio GAF Layers (BAP,CAP, CAS, CSIP, MCP, MCS, MICP, VCP, BASS, CCP)	N	N	Y	N	Y	N	N	N	N	N
RF test mode										
RF Test Mode functionality	Y	Y	Y	Y	Y	Y	Y	N	Y	N

[1] In-band independent reset (IR) can directly work with M.2 based modules on i.MX but OOB IR needs the external uSD muRata adaptor board with M.2 module.
[2] Contact your support representative to use this feature.
[3] The firmware supports Bluetooth LE audio, which is validated using custom host stack (not part of BSP).

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3.3 Thread

Table 3. Feature list for Thread

IW611/IW612 features are tested on the i.MX 8M Mini host platform with NXP reference board.

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
Thread features										
Thread 1.3.0 (OpenThread RCP)	N	N	N	N	Y	N	N	Y	N	Y
Different frame types of IEEE 802.15.4	N	N	N	N	Y	N	N	Y	N	Y
Enhance Ack	N	N	N	N	Y	N	N	Y	N	Y
Network Formation on each channel and stability	N	N	N	N	Y	N	N	Y	N	Y
IEEE 802.15.4-2015 CSL parent functionality	N	N	N	N	Y	N	N	Y	N	Y
UDP and TCP TX and Rx data	N	N	N	N	Y	N	N	Y	N	Y
Support up to 128 attached SED	N	N	N	N	Y	N	N	Y	N	Y
IEEE-802.15.4-2015 MAC & PHY as required by Thread 1.3.0	N	N	N	N	Y	N	N	Y	N	Y
Tools and validation										
Auto DUT (THCI) for test harness	N	N	N	N	Y	N	N	Y	N	Y
RF test mode	N	N	N	N	Y	N	N	Y	N	Y
Other features										
TX overall target power back off control (dB) per step	N	N	N	N	Y	N	N	Y	N	Y
802.15.4 independent reset	N	N	N	N	Y	N	N	Y	N	Y
Secure boot	N	N	N	N	Y	N	N	Y	N	Y
Up to 10 MHz SPI clock speed	N	N	N	N	Y	N	N	Y	N	Y
FW download over UART	N	N	N	N	Y	N	N	Y	N	Y
Spinel over SPI	N	N	N	N	Y	N	N	Y	N	Y
Thread device roles										
Border Router	N	N	N	N	Y	N	N	Y	N	Y
Router	N	N	N	N	Y	N	N	Y	N	Y
Router Eligible End Device (REED)	N	N	N	N	Y	N	N	Y	N	Y
Thread Leader	N	N	N	N	Y	N	N	Y	N	Y
Full End Device (FED)	N	N	N	N	Y	N	N	Y	N	Y
Minimal End Device (MED)	N	N	N	N	Y	N	N	Y	N	Y
Joiner	N	N	N	N	Y	N	N	Y	N	Y
Commissioner	N	N	N	N	Y	N	N	Y	N	Y

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Table 3. Feature list for Thread*...continued*

IW611/IW612 features are tested on the i.MX 8M Mini host platform with NXP reference board.

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
Matter										
Matter 1.2 with thread support matrix	N	N	N	N	Y	N	N	Y	N	Y

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3.4 Coexistence

3.4.1 Wi-Fi and Bluetooth coexistence

Table 4. Feature list for Wi-Fi and Bluetooth coexistence

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
BCA-TDM mode (shared antenna)										
STA + Bluetooth Coex	N	Y	N	N	Y	Y	Y	N	Y	N
STA + Bluetooth LE Coex	N	Y	N	N	Y	Y	Y	Y	Y	Y
STA + Bluetooth + Bluetooth LE Coex	N	Y	N	N	Y	Y	Y	N	Y	N
AP + Bluetooth Coex	N	Y	N	N	Y	Y	Y	N	Y	N
AP + Bluetooth LE Coex	N	Y	N	N	Y	Y	Y	Y	Y	Y
AP + Bluetooth + Bluetooth LE Coex	N	Y	N	N	Y	Y	Y	N	Y	N
P2P + Bluetooth Coex	N	Y	N	N	Y	Y	Y	N	Y	N
P2P + Bluetooth LE Coex	N	Y	N	N	Y	Y	Y	Y	Y	Y
P2P + Bluetooth + Bluetooth LE Coex	N	Y	N	N	Y	Y	Y	N	Y	N
AP(5GHz) + AP(5GHz) + Bluetooth Coex	Y	N	Y	Y	N	N	N	N	N	N
AP(5GHz) + AP(5GHz) + Bluetooth LE Coex	Y	N	Y	Y	N	N	N	N	N	N
BCA-TDM mode (separate antenna)[1]										
STA + Bluetooth Coex	Y	N	Y	Y	Y	N	N	N	N	N
STA + Bluetooth LE Coex	Y	N	Y	Y	Y	N	N	Y	N	Y
STA + Bluetooth + Bluetooth LE Coex	Y	N	Y	Y	Y	N	N	N	N	N
AP + Bluetooth Coex	Y	N	Y	Y	Y	N	N	N	N	N
AP + Bluetooth LE Coex	Y	N	Y	Y	Y	N	N	N	N	N
AP + Bluetooth + Bluetooth LE Coex	Y	N	Y	Y	Y	N	N	N	N	N
P2P + Bluetooth Coex	Y	N	Y	Y	Y	N	N	N	N	N
P2P + Bluetooth LE Coex	Y	N	Y	Y	Y	N	N	Y	N	Y
P2P + Bluetooth + Bluetooth LE Coex	Y	N	Y	Y	Y	N	N	N	N	N
AP(5GHz) + AP(5GHz) + Bluetooth Coex	Y	N	Y	Y	N	N	N	N	N	N
AP(5GHz) + AP(5GHz) + Bluetooth LE Coex	Y	N	Y	Y	N	N	N	N	N	N
External coexistence[1]										
External Coex (hardware interface)	Y	N	Y	Y	Y	N	N	N	N	N

[1] IW611/IW612 chipset features are tested on the i.MX 8M Mini host platform with NXP reference board.

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3.4.2 Wi-Fi and Bluetooth/802.15.4 coexistence

Feature list for Wi-Fi and Bluetooth/802.15.4 radio coexistence

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
BCA-TDM mode (separate antenna)[1]										
STA + Bluetooth + 802.15.4 Coex	N	N	N	N	Y	N	N	N	N	N
STA + Bluetooth LE + 802.15.4 Coex	N	N	N	N	Y	N	N	Y	N	Y
STA + Bluetooth + Bluetooth LE + 802.15.4 Coex	N	N	N	N	Y	N	N	N	N	N
AP + Bluetooth + 802.15.4 Coex	N	N	N	N	Y	N	N	N	N	N
AP + Bluetooth LE + 802.15.4 Coex	N	N	N	N	Y	N	N	Y	N	Y
AP + Bluetooth + Bluetooth LE + 802.15.4 Coex	N	N	N	N	Y	N	N	N	N	N
P2P + Bluetooth + 802.15.4 Coex	N	N	N	N	Y	N	N	N	N	N
P2P + Bluetooth LE + 802.15.4 Coex	N	N	N	N	Y	N	N	Y	N	Y
P2P + Bluetooth + Bluetooth LE + 802.15.4 Coex	N	N	N	N	Y	N	N	N	N	N
Security										
Secure Boot	N	N	Y	N	Y	N	N	Y	N	Y

[1] IW611/IW612 chipset features are tested on the i.MX 8M Mini host platform with NXP reference board.

Note: *When the dual A2DP (A2DP SRC+SRC & SRC+SNK) feature is enabled on firmware using vendor-specific commands then it will affect the Wi-Fi throughput until it gets disabled.*

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3.5 Zigbee

Table 5. Feature list for Zigbee

Features	PCIe-UART			SDIO-UART						USB
	88W9098	88W8997	AW693	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	IW610
Zigbee features										
IEEE 802.15.4 MAC layer	N	N	N	N	Y	N	N	Y	N	Y
MAC split protocol over spinel	N	N	N	N	Y	N	N	Y	N	Y
Zigbee PRO (R23 stack)										
NWK layer	N	N	N	N	Y	N	N	Y	N	Y
APS layer	N	N	N	N	Y	N	N	Y	N	Y
ZDO	N	N	N	N	Y	N	N	Y	N	Y
BDB	N	N	N	N	Y	N	N	Y	N	Y
SECURITY	N	N	N	N	Y	N	N	Y	N	Y
ZCL	N	N	N	N	Y	N	N	Y	N	Y
Zigbee device role										
Coordinator	N	N	N	N	Y	N	N	Y	N	Y
Router	N	N	N	N	Y	N	N	Y	N	Y
End device	N	N	N	N	Y	N	N	Y	N	Y
Mesh routing										
Mesh routing	N	N	N	N	Y	N	N	Y	N	Y
General features										
Connection of up to 64 end devices (PAN coordinator)	N	N	N	N	Y	N	N	Y	N	Y
Connection of up to 64 end devices (PAN router)	N	N	N	N	Y	N	N	Y	N	Y
Matter Zigbee bridge example application	N	N	N	N	Y	N	N	N	N	N
Zigbee OTA server functionality	N	N	N	N	Y	N	N	Y	N	Y
Green power proxy basic (GPPB)										
Green power proxy basic (GPPB)	N	N	N	N	Y	N	N	Y	N	Y

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4 Release notes for the supported SoCs

- Section 4.1 "PCIe-UART 88W9098"
- Section 4.2 "PCIe-UART 88W8997"
- Section 4.3 "PCIe-UART AW693"
- Section 4.4 "SDIO-UART 88W8997"
- Section 4.5 "SDIO-UART 88W9098"
- Section 4.6 "SDIO-UART IW611/IW612"
- Section 4.7 "SDIO-UART IW610"
- Section 4.8 "USB-USB-SPI IW610"
- Section 4.9 "SDIO-UART 88W8987"
- Section 4.10 "SDIO-UART IW416"

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4.1 PCIe-UART 88W9098

Package information

- BSP version: Linux 6.12.20_2.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 17.92.1.p149.70
- Driver version: MM6X17537.p9-GPL

Version information

- Wireless SoC: 88W9098
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 17.92.1.p149.70
  - 17 - Major revision
  - 92 - Feature pack
  - 1 - Release version
  - p149.70 - Patch number
- Driver Version: MM6X17537.p9-GPL
  - 6X - Linux 6.x Kernel
  - 17537 - Release version
  - p9 - Patch number
  - GPL - General Public License V2

Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.14.2
- Interface used
  - Wi-Fi over PCIe Interface
  - Bluetooth/Bluetooth LE over UART Interface
- Test Tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.11)
  - hostapd (version 2.11)

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4.1.1 Wi-Fi and Bluetooth certification

The Wi-Fi and Bluetooth certification is obtained with the following combinations.

4.1.1.1 Wi-Fi pre-certification

- STA | WiFi6 11ax
- STA | Wi-Fi CERTIFIED ac
- STA | Wi-Fi CERTIFIED n
- STA | PMF
- STA | VU
- STA | FFD
- STA | Security Improvement
- STA | WPA-SAE R3
- STA | Agile Multiband (MBO)

4.1.1.2 Bluetooth controller certification

see ref.[11].

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4.1.2 Wi-Fi throughput

4.1.2.1 Throughput test setup

- Environment: Shield Room - Over the Air
- External Access Point: Netgear RAX120 (FW-1.0.1.122)
- DUT: Murata 88Q9098 M.2 (Module: LBEE6ZZ1) with MCIMX8M-EVK platform
  - iPerf commands:
    - TCP server

```
# iperf -s -i1 -fm -w 2M
```

    - TCP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -P5
```

    - UDP server

```
# iperf -s -u -i1 -fm -w 2M
```

    - UDP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -b 800 -P5
```

    Note: *For optimized throughput, add iPerf parameters such as TCP window size and parallel streams. The above-described iPerf parameters are an example.*
- External Client: NXP IW620 PCIe-UART
- Channel: 6 | 36

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4.1.2.2 STA throughput

External Access Point: Netgear RAX120

STA Mode Throughput - BGN Mode | MAC2 | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	116	113	124	114
WPA2-AES	112	117	124	123
WPA3-SAE	112	102	124	109

STA Mode Throughput - AN Mode | MAC1 | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	116	107	128	111
WPA2-AES	115	105	128	105
WPA3-SAE	115	103	128	105

STA Mode Throughput - AN Mode | MAC1 | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	218	190	257	199
WPA2-AES	212	119	257	123
WPA3-SAE	192	187	187	206

STA Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	143	148	151	157
WPA2-AES	142	149	151	156
WPA3-SAE	142	149	150	156

STA Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 40 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	330	335	357	355
WPA2-AES	326	332	355	350
WPA3-SAE	328	336	355	353

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STA Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 80 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	697	686	722	754
WPA2-AES	692	683	720	747
WPA3-SAE	691	685	723	749

STA Mode Throughput - AX Mode | MAC2 | 2.4 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	152	156	166	165
WPA2-AES	147	145	163	163
WPA3-SAE	150	138	165	152

STA Mode Throughput - AX Mode | MAC1 | 5 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	231	217	249	232
WPA2-AES	221	213	248	226
WPA3-SAE	221	212	250	228

STA Mode Throughput - AX Mode | MAC1 | 5 GHz Band | 40 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	450	450	490	491
WPA2-AES	429	455	490	495
WPA3-SAE	400	455	490	496

STA Mode Throughput - AX Mode | MAC1 | 5 GHz Band | 80 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	800	766	850	809
WPA2-AES	802	796	840	820
WPA3-SAE	801	740	859	830

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4.1.2.3 P2P-GO throughput

P2P - GO Mode Throughput - BGN Mode | MAC2 | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	117	112	121	117

P2P - GO Mode Throughput - AN Mode | MAC1 | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	247	243	257	258

P2P - GO Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	685	690	716	730

4.1.2.4 P2P-GC throughput

P2P - GC Mode Throughput - BGN Mode | MAC2 | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	112	113	118	116

P2P - GC Mode Throughput - AN Mode | MAC1 | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	245	246	257	256

P2P - GC Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	687	687	722	729

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4.1.2.5 Mobile AP throughput

External client: NXP IW620 PCIe-UART

Mobile AP Mode Throughput - BGN Mode| MAC2 | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	114	110	118	114
WPA2-AES	116	115	120	116
WPA3-SAE	116	103	119	111

Mobile AP Mode Throughput - AN Mode | MAC1 | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	124	120	128	128
WPA2-AES	124	120	128	128
WPA3-SAE	124	120	128	128

Mobile AP Mode Throughput - AN Mode | MAC1 | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	248	242	257	259
WPA2-AES	247	242	257	259
WPA3-SAE	247	243	257	258

Mobile AP Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	145	141	150	150
WPA2-AES	145	140	150	150
WPA3-SAE	145	141	150	149

Mobile AP Mode Throughput - AC Mode| MAC1 | 5 GHz Band | 40 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	341	325	354	355
WPA2-AES	339	323	352	352
WPA3-SAE	339	325	352	352

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Mobile AP Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 80 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	685	653	719	738
WPA2-AES	681	653	713	735
WPA3-SAE	682	653	716	735

Mobile AP Mode Throughput - AX Mode | MAC2 | 2.4 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	169	180	189	182
WPA2-AES	170	183	179	181
WPA3-SAE	165	185	178	195

Mobile AP Mode Throughput - AX Mode | MAC1 | 5 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	235	208	252	247
WPA2-AES	236	231	249	249
WPA3-SAE	238	228	252	246

Mobile AP Mode Throughput - AX Mode | MAC1 | 5 GHz Band | 40 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	440	448	488	491
WPA2-AES	454	445	487	485
WPA3-SAE	451	450	488	487

Mobile AP Mode Throughput - AX Mode | MAC1 | 5 GHz Band | 80 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	776	790	895	900
WPA2-AES	778	777	850	901
WPA3-SAE	780	780	840	902

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4.1.3 EU conformance tests

- EU Adaptivity test - EN 300 328 v2.1.1 (for 2.4 GHz)
- EU Adaptivity test - EN 301 893 v2.1.1 (for 5 GHz)

4.1.4 Bug fixes/feature enhancements

4.1.4.1 Firmware version 17.92.5.p3 to 17.92.5.p9

Firmware version 17.92.5.p3 to 17.92.5.p9

Component	Description
Wi-Fi	• Wake On Wireless Feature

4.1.4.2 Firmware version 17.92.5.p9 to 17.92.5.p11

Firmware version 17.92.5.p9 to 17.92.5.p11

Component	Description
Wi-Fi	• In RF Test Mode Tx tests, the device is unable to transmit Tx Frame and Tx Continuous Wave modes. Manufacturing software can be used for validation.

4.1.4.3 Firmware version 17.92.5.p11 to 17.92.1.p116.1

Firmware version 17.92.5.p11 to 17.92.1.p116.1

Component	Description
Wi-Fi	• Low TCP/UDP Tx (by ~80%) and TCP/UDP Rx (by ~70%) throughput is observed for Internal STA mode on MAC2 interface in BGN20 mode with Netgear R6200 AP. • Low UDP Tx (20-25%) throughput observed on HE-80 MHz Band For All Securities. • Internal-AP mode the data-rate drops to 0 Mbps and does not recover when TCP Bidirectional test is run in HE80/WPA2 mode after ~2 hours. • P2P GO on/off stress test fails and DUT stops responding after ~1 hour.

4.1.4.4 Firmware version 17.92.1.p116.1 to 17.92.1.p136.13

Firmware version 17.92.1.p116.1 to 17.92.1.p136.13

Component	Description
—	NA

4.1.4.5 Firmware version 17.92.1.p136.13 to 17.92.1.p136.24

Firmware version 17.92.1.p136.13 to 17.92.1.p136.24

Component	Description
Coex	• OPP file transfer gets failed while OPP file transfer is ongoing and Wi-Fi traffic initiated with 2.4GHz external AP.

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4.1.4.6 Firmware version 17.92.1.p136.24 to 17.92.1.p136.131

Firmware version 17.92.1.p136.24 to 17.92.1.p136.131

Component	Description
Wi-Fi	• Wake-up card timeout is seen when performing suspend and resume stress test with i.MX 8 host. • Command timeout is seen when performing connection and disconnection test in a loop with external AP during addition of block ack requests.
Bluetooth	• A2DP audio glitches heard while audio streaming and OPP file transfer to another ref device at the same time

4.1.4.7 Firmware version 17.92.1.p136.131 to 17.92.1.p136.132

Firmware version 17.92.1.p136.131 to 17.92.1.p136.132

Component	Description
—	—

4.1.4.8 Firmware version 17.92.1.p136.132 to 17.92.1.p149.131

Firmware version 17.92.1.p136.132 to 17.92.1.p149.131

Component	Description
—	—

4.1.4.9 Firmware version 17.92.1.p149.131 to 17.92.1.p149.43

Firmware version 17.92.1.p149.131 to 17.92.1.p149.43

Component	Description
—	—

4.1.4.10 Firmware version 17.92.1.p149.43 to 17.92.1.p149.157

Firmware version 17.92.1.p149.43 to 17.92.1.p149.157

Component	Description
Wi-Fi	• In RF test mode, inconsistent TX-power observed between configured and measured values in txcontinuous carrier suppression (CS) mode. • In RF test mode, EVM value degradations are seen on the DFS channels with Linux BSP v6.6.23 • During the penetration testing of the ECU under test, a buffer overflow vulnerability was found in the Wi-Fi driver.
Bluetooth	In legacy remote devices, pairing with PIN code method is failed with LMP/LL timeout.

4.1.4.11 Firmware version 17.92.1.p149.157 to 17.92.1.p149.53

Firmware version 17.92.1.p149.157 to 17.92.1.p149.53

Component	Description
—	—

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4.1.4.12 Firmware version 17.92.1.p149.53 to 17.92.1.p149.60

Firmware version 17.92.1.p149.53 to 17.92.1.p149.60

Component	Description
Wi-Fi	• Fixed kernel panic fetal error due to connecting the DUT STA to a long SSID Ex-AP. • In DUT STA mode, a wake-up card timeout is observed when Ex-AP is momentarily offline and when there is a connection times out. • In DUT STA mode, the firmware command 0xd0 timeout is observed in a stress testing with good RSSI AP connection.
Bluetooth	• In extended Bluetooth LE scanning, an unexpected HCI_LE_Scan_Timeout event is observed.

4.1.4.13 Firmware version 17.92.1.p149.60 to 17.92.1.p149.64

Firmware version 17.92.1.p149.60 to 17.92.1.p149.64

Component	Description
Wi-Fi	• During firmware automatic recovery test, kernel crash causing system reboot due to Wi-Fi driver on a specific platform running in DUT STA mode. • Readback of "txratecfg" command not showing expected output. • In DUT STA mode, the Reassociation response from the External Access Point was dropped after the acknowledgement was sent. Resulted in another Reassociation request, ultimately leading to Deauthentication from the External Access Point. • Firmware crash occurrence in the 2.4 GHz band during a roaming stress test scenario.

4.1.4.14 Firmware version 17.92.1.p149.64 to 17.92.1.p149.70

Firmware version 17.92.1.p149.60 to 17.92.1.p149.64

Component	Description
Wi-Fi	• Firmware command timeout error [0xb] observed during long-term stress testing of legacy roaming. • Firmware command timeout error [0x107] observed during long-term stress testing of legacy roaming. • TX timeout error observed during long-term stress testing of legacy roaming. • Firmware crash observed in the long run test when AP is enabled and STA is connected to ext. AP. • Linux kernel panic with Netlink hung task observed randomly while booting and shutting down host system.
Bluetooth	• During firmware initialization, the process fails if any pulse is observed on the UART TX line. • After braktooth attack of duplicated encapsulated payload, DUT not able to start the Page and Inquiry scan.

4.1.5 Known issues

Known issues

Component	Description
Wi-Fi	EasyMesh is disabled in the current release.

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4.2 PCIe-UART 88W8997

Package information

- BSP version: Linux 6.12.20_2.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p151.4
- Driver version: MM6X16537.p9-GPL

Version information

- Wireless SoC: 88W8997
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p151.4
  - 16 - Major revision
  - 92 - Feature pack
  - 21 - Release version
  - p151.4 - Patch number
- Driver Version: MM6X16537.p9-GPL
  - 6X - Linux 6.x Kernel
  - 16537 - Release version
  - p9 - Patch number
  - GPL - General Public License v2

Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.14.2
- Interface used
  - Wi-Fi over PCIE
  - Bluetooth/Bluetooth LE over UART
- Test Tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.11)
  - hostapd (version 2.11)

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4.2.1 Wi-Fi and Bluetooth certification

The Wi-Fi and Bluetooth certification is obtained with the following combinations.

4.2.1.1 Wi-Fi pre-certifications

- STA – AP | 802.11n
- STA – AP | 802.11ac
- STA – AP | PMF
- STA | VU
- STA – AP | FFD
- STA | Security Improvement
- STA – AP | WPA-SAE R3
- STA – AP | QTT

4.2.1.2 Bluetooth controller certification

see ref.[11].

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4.2.2 Wi-Fi throughput

4.2.2.1 Throughput test setup

- Environment: Shield Room - Over the Air
- External Access Point: NXP 88W9098 PCIe-UART
- DUT: 88W8997- Murata M.2 (Module: LBEE5XV1YM) with MCIMX8M-EVK platform
  - iPerf commands:
    - TCP server

```
# iperf -s -i1 -fm -w 2M
```

    - TCP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -P5
```

    - UDP server

```
# iperf -s -u -i1 -fm -w 2M
```

    - UDP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -b 800 -P5
```

    Note: *For optimized throughput, add iPerf parameters such as TCP window size and parallel streams. The above-described iPerf parameters are an example.*
- External Client: NXP 88W9098 PCIe-UART
- Channel: 6 | 36

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4.2.2.2 STA throughput

External AP: NXP 88W9098 PCIe-UART

STA Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	109	109	118	120
WPA2-AES	109	116	118	119
WPA3-SAE	110	116	120	121

STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	114	125	128	130
WPA2-AES	112	122	128	129
WPA3-SAE	111	123	128	129

STA Mode Throughput - AN Mode | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	216	248	252	260
WPA2-AES	205	248	253	260
WPA3-SAE	206	249	254	260

STA Mode Throughput - AC Mode | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	139	145	150	155
WPA2-AES	140	145	150	156
WPA3-SAE	138	147	150	156

STA Mode Throughput - AC Mode | 5 GHz Band | 40 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	300	321	341	353
WPA2-AES	299	323	345	353
WPA3-SAE	300	324	340	354

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STA Mode Throughput - AC Mode | 5 GHz Band | 80 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	579	695	659	735
WPA2-AES	567	670	661	714
WPA3-SAE	547	664	662	713

4.2.2.3 P2P-GO throughput

P2P - GO Mode Throughput - BGN Mode | 2.4 GHz Band | 20MHz | 1SS

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	109	115	116	124

P2P - GO Mode Throughput - AN Mode | 5 GHz Band | 40 MHz | 2SS

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	217	238	233	259

P2P - GO Mode Throughput - AC Mode | 5 GHz Band | 80 MHz | 2SS

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	582	673	655	721

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4.2.2.4 P2P-GC throughput

P2P - GC Mode Throughput - BGN Mode | 2.4 GHz Band | 20MHz | 1SS

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	107	117	114	124

P2P - GC Mode Throughput - AN Mode | 5 GHz Band | 40 MHz | 2SS

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	202	237	237	256

P2P - GC Mode Throughput - AC Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	581	672	658	728

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4.2.2.5 Mobile AP throughput

External client: NXP 88W9098 PCIe-UART

Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	111	112	115	123
WPA2-AES	110	112	118	123
WPA3-SAE	110	112	114	123

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	121	117	127	128
WPA2-AES	121	117	127	128
WPA3-SAE	120	116	124	126

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	240	238	254	259
WPA2-AES	241	238	254	259
WPA3-SAE	244	239	250	260

Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	143	140	149	151
WPA2-AES	137	139	144	151
WPA3-SAE	138	138	145	150

Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	307	302	338	345
WPA2-AES	310	305	340	345
WPA3-SAE	311	306	341	345

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Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	686	678	727	735
WPA2-AES	669	673	725	729
WPA3-SAE	670	670	727	727

4.2.3 EU conformance tests

- EU Adaptivity test - EN 300 328 v2.1.1 (for 2.4 GHz)
- EU Adaptivity test - EN 301 893 v2.1.1 (for 5 GHz)

4.2.4 Bug fixes/feature enhancements

4.2.4.1 Firmware version 16.92.10.p208 to 16.92.10.p211

Component	Description
Wi-Fi	• Fixed Mobile AP start issue on switching bands
Bluetooth	• Fix for Sniff Subrate command processing which resulted in command queue that caused Bluetooth to restart. • Fix for ACL link disconnection due to DUT not responding to LMP_switch_req.
Coex	• Fix Wi-Fi Link loss during UDP Rx + Bluetooth Inquiry and Wi-Fi deauth during Bluetooth HFP coexistence scenarios

4.2.4.2 Firmware version 16.92.10.p211 to 16.92.10.p213

Component	Description
Wi-Fi	• Fix for Wi-Fi Fragment and Forge Vulnerabilitiesref.[2]
Bluetooth	• Fix for ANSSI Vulnerabilities ref.[3]

4.2.4.3 Firmware version 16.92.10.p213 to 16.92.10.p213.2

Component	Description
Wi-Fi	• Added support for 40 MHz band in 2.4 GHz BGN mode for AP and STA

4.2.4.4 Firmware version 16.92.10.p213.2 to 16.92.10.p213.4

Component	Description
--	NA

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4.2.4.5 Firmware version 16.92.10.p213.4 to 16.92.21.p26.1

Component	Description
--	NA

4.2.4.6 Firmware version 16.92.21.p26.1 to 16.92.21.p55.3

Component	Description
--	NA

4.2.4.7 Firmware version 16.92.21.p55.3 to 16.92.21.p76.2

Component	Description
Bluetooth	• DUT SPP link gets disconnected with Remote, when DUT creates A2DP SINK profile connection with Remote device.

4.2.4.8 Firmware version 16.92.21.p76.2 to 16.92.21.p84.4

Component	Description
Bluetooth	• DUT HFP link gets disconnected with Remote phone, when it starts OPP file transfer to Remote device.
Coex	• DUT A2DP sink audio glitches observed when it starts Wi-Fi data traffic with Station device on BGN 20MHz. • DUT is not able to connect with Bluetooth device and not able to sustain LE connection, when it starts receiving the Wi-Fi data traffic with Station/Access Point on BGN 20MHz.

4.2.4.9 Firmware version 16.92.21.p84.4 to 16.92.21.p119.3

Firmware version 16.92.21.p84.4 to 16.92.21.p119.3

Component	Description
Wi-Fi	• If the DUT is in Tx-mode, a Wakeup-Card timeout is observed causing the device to Hang/Crash. • Link Lost observed during roaming even with good RSSI
Bluetooth	• Bluetooth-only firmware initialization is failing when it is downloaded and initialized after Wi-Fi-only firmware initialization.

4.2.4.10 Firmware version 16.92.21.p119.3 to 16.92.21.p137.4

Firmware version 16.92.21.p119.3 to 16.92.21.p137.4

Component	Description
Bluetooth	• Sometimes, when the DUT is streaming A2DP data to another remote device, the DUT role switch request is failing to the first remote device. • In RF test mode, Firmware command timeout seen when stopping the on-going transmit via tx continuous mode.

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4.2.4.11 Firmware version 16.92.21.p137.4 to 16.92.21.p149.2

Firmware version 16.92.21.p137.4 to 16.92.21.p149.2

Component	Description
Wi-Fi	• During the roaming test with Meraki APs, the DUT STA explicitly sends a deauthentication frame to the previous AP to clean the STA list cache of the AP. • In RF test mode, the transmission does not happen with tx_frame for 5 GHz VHT 20 MHZ/40 MHZ MCS9 2SS and VHT80 MCS0 and MCS9 1SS and 2SS data rates if the 2.4 GHz test started before the 5 GHz VHT test. • In DUT STA mode, the SCHED_SCAN_RESULTS are not updated to wpa_supplicant layer during suspend and resume stress testing.
Coexistence	• Wakeup card timeout issue observed when executing `iwconfig` command during Bluetooth inquiry.

4.2.4.12 Firmware version 16.92.21.p149.2 to 16.92.21.p149.4

Firmware version 16.92.21.p149.2 to 16.92.21.p149.4

Component	Description
Wi-Fi	• Roaming test enhancements have been implemented through the blocking of scans during the authentication process. • During suspend/resume stress testing, the DUT in station (STA) mode encountered a connection issue following the completion of the wakeup process. • In DUT STA mode, the Reassociation response from the External Access Point was dropped after the acknowledgement was sent, which resulted in another Reassociation request, ultimately leading to Deauthentication from the External Access Point. • Implemented changes to handle received frames with retry bit set from AP having same sequence number in the roaming scenario.
Bluetooth	• When the device connects with some headsets, some audio distortion is observed on downlink.

4.2.4.13 Firmware version 16.92.21.p149.4 to 16.92.21.p151.4

Firmware version 16.92.21.p149.4 to 16.92.21.p151.4

Component	Description
Wi-Fi	• In the roaming test, the DUT failed to connect back to the previous AP due to association failure. • Failure to set the MAC address with an init config file.

4.2.5 Known issues

Known issues

Component	Description
—	—

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4.3 PCIe-UART AW693

Package information

- BSP version: Linux 6.12.20_2.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 18.99.2.p145.34
- Driver version: MM6X18537.p9-GPL

Version information

- Wireless SoC: AW693
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 18.99.2.p145.34
  - 18 - Major revision
  - 99 - Feature pack
  - 2 - Release version
  - p145.34 - Patch number
- Driver Version: MM6X18537.p9-GPL
  - 6X - Linux 6.x Kernel
  - 18537 - Release version
  - p9 - Patch number
  - GPL - General Public License V2

Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.14.2
- Interface used
  - Wi-Fi over PCIe Interface
  - Bluetooth/Bluetooth LE over UART Interface
- Test Tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.11)
  - hostapd (version 2.11)

4.3.1 Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.14.2
- Interface used
  - Wi-Fi over PCIe Interface
  - Bluetooth/Bluetooth LE over UART Interface
- Test Tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.11)
  - hostapd (version 2.11)

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4.3.2 Wi-Fi and Bluetooth certification

The Wi-Fi and Bluetooth certification is obtained with the following combinations.

4.3.2.1 Wi-Fi pre-certification

- STA – uAP | WiFi 6E
- STA – uAP | WiFi 6 802.11ax
- STA – uAP | Wi-Fi CERTIFIED ac
- STA – uAP | Wi-Fi CERTIFIED n
- STA – uAP | PMF
- STA | VU
- STA – uAP | Security improvement
- STA – uAP | WPA-SAE R3
- STA – uAP | WPS2.0
- STA | Enterprise Suite B
- STA | Agile Multiband (MBO)
- P2P

4.3.2.2 Bluetooth controller certification

See ref.[13].

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4.3.3 Wi-Fi throughput

4.3.3.1 Throughput test setup

- Environment: Shield Room - Over the Air
- External Access Point: Netgear RAXE500
- DUT: u-blox JODY-W683 with MCIMX8M-EVK platform
  - iPerf commands:
    - TCP server

```
# iperf -s -i1 -fm -w 2M
```

    - TCP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -P5
```

    - UDP server

```
# iperf -s -u -i1 -fm -w 2M
```

    - UDP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -b 800 -P5
```

    Note: *For optimized throughput, add iPerf parameters such as TCP window size and parallel streams. The above-described iPerf parameters are an example.*
- External Client: NXP AW693 PCIe-UART
- Channel: 6 | 36

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4.3.3.2 STA throughput

External Access Point: Netgear RAXE500

STA Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	116	120	124	127
WPA2-AES	116	119	124	124
WPA3-SAE	116	119	124	125

STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	119	124	128	128
WPA2-AES	119	122	128	130
WPA3-SAE	119	123	128	130

STA Mode Throughput - AN Mode | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	230	251	254	265
WPA2-AES	229	250	254	262
WPA3-SAE	230	249	254	262

STA Mode Throughput - AC Mode | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	148	148	156	156
WPA2-AES	147	148	156	158
WPA3-SAE	147	149	156	158

STA Mode Throughput - AC Mode | 5 GHz Band | 40 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	336	341	356	360
WPA2-AES	333	338	355	353
WPA3-SAE	334	340	355	358

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STA Mode Throughput - AC Mode | 5 GHz Band | 80 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	723	705	756	764
WPA2-AES	719	698	752	761
WPA3-SAE	721	702	752	761

STA Mode Throughput - AX Mode | 2.4 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	233	229	249	236
WPA2-AES	229	230	247	234
WPA3-SAE	232	231	249	242

STA Mode Throughput - AX Mode | 5 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	237	244	256	262
WPA2-AES	237	238	257	260
WPA3-SAE	237	242	256	261

STA Mode Throughput - AX Mode | 5 GHz Band | 40 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	475	471	504	504
WPA2-AES	473	468	502	508
WPA3-SAE	473	470	502	508

STA Mode Throughput - AX Mode | 5 GHz Band | 80 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	938	921	956	953
WPA2-AES	937	922	955	953
WPA3-SAE	938	921	955	953

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STA Mode Throughput - AX Mode | 6 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA3-SAE	238	240	257	260
WPA3-OWE	237	243	257	260

STA Mode Throughput - AX Mode | 6 GHz Band | 40 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA3-SAE	473	471	502	509
WPA3-OWE	473	469	502	493

STA Mode Throughput - AX Mode | 6 GHz Band | 80 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA3-SAE	935	924	956	952
WPA3-OWE	237	243	257	260

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4.3.3.3 P2P-GO throughput

P2P - GO Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	125	120	129	128

P2P - GO Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	249	249	254	257

P2P - GO Mode Throughput - AC Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	671	701	727	744

P2P - GO Mode Throughput - AX Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	919	916	996	997

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4.3.3.4 P2P-GC throughput

P2P - GC Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	124	125	125	127

P2P - GC Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	249	250	255	260

P2P - GC Mode Throughput - AC Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	674	711	734	742

P2P - GC Mode Throughput - AX Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	921	932	997	989

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4.3.3.5 Mobile AP throughput

External client: NXP AW693 PCIe-UART

Mobile AP Mode Throughput - BGN Mode| 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	**TX**	**RX**	**TX**	**RX**
Open security	120	123	124	124
WPA2-AES	113	123	120	127
WPA3-SAE	122	123	120	127

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	**TX**	**RX**	**TX**	**RX**
Open security	124	125	130	130
WPA2-AES	124	126	126	128
WPA3-SAE	124	125	126	130

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	**TX**	**RX**	**TX**	**RX**
Open security	249	249	255	257
WPA2-AES	249	250	255	257
WPA3-SAE	249	250	255	257

Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	**TX**	**RX**	**TX**	**RX**
Open security	150	151	151	156
WPA2-AES	150	151	152	155
WPA3-SAE	150	151	152	155

Mobile AP Mode Throughput - AC Mode| 5 GHz Band | 40 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	**TX**	**RX**	**TX**	**RX**
Open security	342	340	347	353
WPA2-AES	340	339	346	351
WPA3-SAE	340	338	356	357

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Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 80 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	672	701	756	740
WPA2-AES	668	700	740	735
WPA3-SAE	673	701	740	718

Mobile AP Mode Throughput - AX Mode | 2.4 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	225	235	239	249
WPA2-AES	225	234	240	247
WPA3-SAE	225	235	239	251

Mobile AP Mode Throughput - AX Mode | 5 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	246	248	252	255
WPA2-AES	246	247	252	253
WPA3-SAE	246	245	252	256

Mobile AP Mode Throughput - AX Mode | 5 GHz Band | 40 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	475	469	501	490
WPA2-AES	474	466	496	489
WPA3-SAE	473	470	497	492

Mobile AP Mode Throughput - AX Mode | 5 GHz Band | 80 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	924	928	981	987
WPA2-AES	923	925	977	981
WPA3-SAE	922	920	997	970

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Mobile AP Mode Throughput - AX Mode | 6 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA3-SAE	244	244	250	254
WPA3-OWE	243	246	250	252

Mobile AP Mode Throughput - AX Mode | 6 GHz Band | 40 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA3-SAE	466	476	495	495
WPA3-OWE	466	471	494	494

Mobile AP Mode Throughput - AX Mode | 6 GHz Band | 80 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA3-SAE	878	935	979	988
WPA3-OWE	904	925	982	983

4.3.4 EU conformance tests

- EU Adaptivity test – EN 300 328 v2.1.1 (for 2.4 GHz)
- EU Adaptivity test – EN 301 893 v2.1.1 (for 5 GHz)
- EU Adaptivity test – ETSI EN 303 687 V1.1.1 for 6 GHz

4.3.5 Known issues

Known issues

Component	Description
—	—

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4.4 SDIO-UART 88W8997

Package information

- BSP version: Linux 6.12.20_2.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p151.4
- Driver version: MM6X16537.p9-GPL

Version information

- Wireless SoC: 88W8997
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p151.4
  - 16 - Major revision
  - 92 - Feature pack
  - 21 - Release version
  - p151.4 - Patch number
- Driver Version: MM6X16537.p9-GPL
  - 6X - Linux 6.x Kernel
  - 16537 - Release version
  - p9 - Patch number
  - GPL - General Public License v2

Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: from 2.6.32 to 6.14.2
- Interface used
  - Wi-Fi over SDIO 3.0
  - Bluetooth/Bluetooth LE over UART
- Test Tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.11)
  - hostapd (version 2.11)

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4.4.1 Wi-Fi and Bluetooth certification

The Wi-Fi and Bluetooth certification is obtained with the following combinations.

4.4.1.1 Wi-Fi pre-certifications

- STA – AP | 802.11n
- STA – AP | 802.11ac
- STA – AP | PMF
- STA | VU
- STA – AP | FFD
- STA | Security Improvement
- STA – AP | WPA-SAE R3
- STA – AP | QTT

4.4.1.2 Bluetooth controller certification

see ref.[11].

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4.4.2 Wi-Fi throughput

4.4.2.1 Throughput test setup

- Environment: Shield Room - Over the Air
- DUT: 88W8997-Murata M.2 (Module: LBEE5XV1YM) with MCIMX8M-EVK platform
  - iPerf commands:
    - TCP server

```
# iperf -s -i1 -fm -w 2M
```

    - TCP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -P5
```

    - UDP server

```
# iperf -s -u -i1 -fm -w 2M
```

    - UDP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -b 800 -P5
```

    Note: *For optimized throughput, add iPerf parameters such as TCP window size and parallel streams. The above-described iPerf parameters are an example.*
- External Access Point: NXP 88W9098 PCIe-UART
- External Client: NXP 88W9098 PCIe-UART
- Channel: 6 | 36

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4.4.2.2 STA throughput

External AP: NXP 88W9098 PCIe-UART

STA Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	111	116	120	121
WPA2-AES	106	115	119	120
WPA3-SAE	111	114	117	120

STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	112	126	125	131
WPA2-AES	112	124	125	129
WPA3-SAE	112	124	125	129

STA Mode Throughput - AN Mode | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	202	252	238	262
WPA2-AES	202	249	238	259
WPA3-SAE	202	249	238	259

STA Mode Throughput - AC Mode | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	133	152	147	158
WPA2-AES	133	151	147	157
WPA3-SAE	133	151	147	157

STA Mode Throughput - AC Mode | 5 GHz Band | 40 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	286	336	330	355
WPA2-AES	277	333	323	353
WPA3-SAE	281	336	324	354

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STA Mode Throughput - AC Mode | 5 GHz Band | 80 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	404	427	474	484
WPA2-AES	394	425	466	485
WPA3-SAE	399	425	468	485

4.4.2.3 P2P-GO throughput

P2P - GO Mode Throughput - BGN Mode | 2.4 GHz Band | 20MHz | 1SS

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	113	121	121	129

P2P - GO Mode Throughput - AN Mode | 5 GHz Band | 40 MHz | 2SS

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	213	244	237	259

P2P - GO Mode Throughput - AC Mode | 5 GHz Band | 80 MHz | 2SS

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	409	416	466	488

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4.4.2.4 P2P-GC throughput

P2P - GC Mode Throughput - BGN Mode | 2.4 GHz Band | 20MHz | 1SS

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	112	121	121	125

P2P - GC Mode Throughput - AN Mode | 5 GHz Band | 40 MHz | 2SS

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	209	246	237	257

P2P - GC Mode Throughput - AC Mode | 5 GHz Band | 80 MHz | 2SS

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	401	427	460	486

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4.4.2.5 Mobile AP throughput

External Client: NXP 88W9098 PCIe-UART

Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	112	115	120	125
WPA2-AES	112	114	120	125
WPA3-SAE	112	115	120	125

Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	196	230	222	250
WPA2-AES	196	231	221	250
WPA3-SAE	196	230	221	251

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	116	120	125	129
WPA2-AES	116	119	125	129
WPA3-SAE	116	119	124	130

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	214	246	238	260
WPA2-AES	214	245	238	260
WPA3-SAE	214	246	238	260

Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	137	141	146	152
WPA2-AES	137	141	146	152
WPA3-SAE	137	141	146	152

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Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	298	327	338	359
WPA2-AES	296	324	338	356
WPA3-SAE	296	323	338	356

Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	380	421	458	486
WPA2-AES	383	421	463	485
WPA3-SAE	388	420	459	486

4.4.3 EU conformance tests

- EU Adaptivity test - EN 300 328 v2.1.1 (for 2.4 GHz)
- EU Adaptivity test - EN 301 893 v2.1.1 (for 5 GHz)

4.4.4 Bug fixes/feature enhancements

4.4.4.1 Firmware version 16.92.10.p218 to 16.92.10.p219.3

Firmware version 16.92.10.p218 to 16.92.10.p219.3

Component	Description
Wi-Fi	• Added support for 40 MHz band in 2.4 GHz BGN mode for AP and STA

4.4.4.2 Firmware version 16.92.10.p219.3 to 16.92.10.p219.5

Firmware version 16.92.10.p219.3 to 16.92.10.p219.5

Component	Description
—	NA

4.4.4.3 Firmware version 16.92.10.p219.5 to 16.92.21.p41

Firmware version 16.92.10.p219.5 to 16.92.21.p41

Component	Description
—	NA

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4.4.4.4 Firmware version 16.92.21.p41 to 16.92.21.p55.3

Firmware version 16.92.21.p41 to 16.92.21.p55.3

Component	Description
Wi-Fi	• P2P-client fails to re-connect to DUT-P2P-GO mode after internal-STA connects to external-AP on different channel. • Internal-STA disconnects from external-AP shortly after starting DUT-P2P-GO mode. • DUT in STA only mode fails to connect with specific hotspot.

4.4.4.5 Firmware version 16.92.p55.3 to 16.92.21.p76.2

Firmware version 16.92.p55.3 to 16.92.21.p76.2

Component	Description
Bluetooth	• DUT SPP link gets disconnected with Remote, when DUT creates A2DP SINK profile connection with Remote device.

4.4.4.6 Firmware version 16.92.21.p76.2 to 16.92.21.p84.4

Firmware version 16.92.21.p76.2 to 16.92.21.p84.4

Component	Description
Bluetooth	• DUT HFP link gets disconnected with Remote phone, when it starts OPP file transfer to Remote device.
Coex	• DUT A2DP sink audio glitches observed when it starts Wi-Fi data traffic with Station device on BGN 20MHz. • DUT is not able to connect with Bluetooth device and not able to sustain LE connection, when it starts receiving the Wi-Fi data traffic with Station/Access Point on BGN 20MHz.

4.4.4.7 Firmware version 16.92.21.p84.4 to 16.92.21.p119.3

Firmware version 16.92.21.p84.4 to 16.92.21.p119.3

Component	Description
—	—

4.4.4.8 Firmware version 16.92.21.p119.3 to 16.92.21.p137.4

Firmware version 16.92.21.p119.3 to 16.92.21.p137.4

Component	Description
Wi-Fi	• In RF test mode, Firmware command timeout seen when stopping the on-going transmit via tx continuous mode. • In RF test mode, Firmware command timeout is seen when switching between the enable and disable RF test modes.
Bluetooth	• Sometimes, when the DUT is streaming A2DP data to another remote device, the DUT role switch request is failing to the first remote device.

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4.4.4.9 Firmware version 16.92.21.p137.4 to 16.92.21.p149.2

Firmware version 16.92.21.p137.4 to 16.92.21.p149.2

Component	Description
Wi-Fi	• During the roaming test with Meraki APs, the DUT STA explicitly sends a deauthentication frame to the previous AP to clean the STA list cache of the AP. • In RF test mode, the transmission does not happen with tx_frame for 5 GHz VHT 20 MHZ/40 MHZ MCS9 2SS and VHT80 MCS0 and MCS9 1SS and 2SS data rates if the 2.4 GHz test started before the 5 GHz VHT test. • In DUT STA mode, the SCHED_SCAN_RESULTS are not updated to wpa_supplicant layer during suspend and resume stress testing.
Coexistence	• Wakeup card timeout issue observed when executing `iwconfig` command during Bluetooth inquiry.

4.4.4.10 Firmware version 16.92.21.p149.2 to 16.92.21.p149.4

Firmware version 16.92.21.p149.2 to 16.92.21.p149.4

Component	Description
Wi-Fi	• Roaming test enhancements have been implemented through the blocking of scans during the authentication process. • During suspend/resume stress testing, the DUT in station (STA) mode encountered a connection issue following the completion of the wakeup process. • In DUT STA mode, the Reassociation response from the External Access Point was dropped after the acknowledgement was sent, which resulted in another Reassociation request, ultimately leading to Deauthentication from the External Access Point. • Implemented changes to handle received frames with retry bit set from AP having same sequence number in the roaming scenario.
Bluetooth	• When device connects with some headsets, audio distortion observed on downlink.

4.4.4.11 Firmware version 16.92.21.p149.4 to 16.92.21.p151.4

Firmware version 16.92.21.p149.4 to 16.92.21.p151.4

Component	Description
Wi-Fi	• In the roaming test, the DUT failed to connect back to the previous AP due to association failure. • Fails to set the MAC address with an *init confi*g file.

4.4.5 Known issues

Known issues

Component	Description
—	—

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4.5 SDIO-UART 88W9098

Package information

- BSP version: Linux 6.12.20_2.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 17.92.1.p149.70
- Driver version: MM6X17537.p9-GPL

Version information

- Wireless SoC: 88W9098
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 17.92.1.p149.70
  - 17 - Major revision
  - 92 - Feature pack
  - 1 - Release version
  - p149.70 - Patch number
- Driver Version: MM6X17537.p9-GPL
  - 6X - Linux 6.x Kernel
  - 17537 - Release version
  - p9 - Patch number
  - GPL - General Public License v2

Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.14.2
- Interface used
  - Wi-Fi over SDIO (SDIO 3.0 support, Clock speed: 200 MHz)
  - Bluetooth/Bluetooth LE over UART
- Test Tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.11)
  - hostapd (version 2.11)

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4.5.1 Wi-Fi and Bluetooth certification

The Wi-Fi and Bluetooth certification is obtained with the following combinations.

4.5.1.1 Wi-Fi pre-certification

- STA | WiFi6 11ax
- STA | Wi-Fi CERTIFIED ac
- STA | Wi-Fi CERTIFIED n
- STA | PMF
- STA | VU
- STA | FFD
- STA | Security Improvement
- STA | WPA-SAE R3
- STA | Agile Multiband (MBO)

4.5.1.2 Bluetooth controller certification

see ref.[11].

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4.5.2 Wi-Fi throughput

4.5.2.1 Throughput test setup

- Environment: Shield Room - Over the Air
- External Access Point: Asus RT-AX88U (FW-3.0.0.4.386.41700)
- DUT: Murata 88Q9098 M.2 (Module: LBEE5ZZ1XL) with MCIMX8M-EVK platform
  - iPerf commands:
    - TCP server

```
# iperf -s -i1 -fm -w 2M
```

    - TCP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -P5
```

    - UDP server

```
# iperf -s -u -i1 -fm -w 2M
```

    - UDP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -b 800 -P5
```

    Note: *For optimized throughput, add iPerf parameters such as TCP window size and parallel streams. The above-described iPerf parameters are an example.*
- External Client: NXP 88W9098 PCIe-UART
- Channel: 6 | 36

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4.5.2.2 STA throughput

External Access Point: Asus RT-AX88U

STA Mode Throughput - BGN Mode | MAC2 | 2.4 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	114	120	124	122
WPA2-AES	112	116	122	121
WPA3-SAE	110	117	121	120

STA Mode Throughput - AN Mode | MAC1 | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	117	124	128	130
WPA2-AES	118	124	127	127
WPA3-SAE	117	123	126	128

STA Mode Throughput - AN Mode | MAC1 | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	215	248	255	254
WPA2-AES	216	247	255	254
WPA3-SAE	217	248	255	254

STA Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	141	150	151	154
WPA2-AES	140	149	151	155
WPA3-SAE	139	148	149	155

STA Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 40 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	292	332	346	345
WPA2-AES	287	327	345	346
WPA3-SAE	285	325	342	345

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STA Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 80 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	381	370	411	414
WPA2-AES	379	370	421	414
WPA3-SAE	378	370	415	407

STA Mode Throughput - AX Mode | MAC2 | 2.4 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	165	175	190	191
WPA2-AES	166	177	190	191
WPA3-SAE	165	177	190	191

STA Mode Throughput - AX Mode | MAC1 | 5 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	219	225	246	256
WPA2-AES	220	222	245	254
WPA3-SAE	221	221	245	255

STA Mode Throughput - AX Mode | MAC1 | 5 GHz Band | 40 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	300	330	358	380
WPA2-AES	301	330	359	381
WPA3-SAE	299	329	362	381

STA Mode Throughput - AX Mode | MAC1 | 5 GHz Band | 80 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	380	370	412	403
WPA2-AES	381	369	397	408
WPA3-SAE	375	366	400	410

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4.5.2.3 P2P-GO throughput

P2P - GO Mode Throughput - BGN Mode | MAC2 | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	118	114	120	122

P2P - GO Mode Throughput - AN Mode | MAC1 | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	246	241	257	258

P2P - GO Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	379	337	367	386

4.5.2.4 P2P-GC Throughput

P2P - GC Mode Throughput - BGN Mode | MAC2 | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	111	114	122	123

P2P - GC Mode Throughput - AN Mode | MAC1 | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	245	243	256	257

P2P - GC Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	380	338	339	372

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4.5.2.5 Mobile AP Throughput

External client: NXP 88W9098 PCIe-UART

Mobile AP Mode Throughput - BGN Mode| MAC2 | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	117	113	121	120
WPA2-AES	118	114	120	119
WPA3-SAE	116	113	120	119

Mobile AP Mode Throughput - AN Mode | MAC1 | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	124	119	128	129
WPA2-AES	124	118	128	128
WPA3-SAE	123	120	128	128

Mobile AP Mode Throughput - AN Mode | MAC1 | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	246	238	257	259
WPA2-AES	247	240	258	258
WPA3-SAE	246	239	256	259

Mobile AP Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	145	141	150	150
WPA2-AES	146	140	150	149
WPA3-SAE	144	140	149	150

Mobile AP Mode Throughput - AC Mode| MAC1 | 5 GHz Band | 40 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	329	315	346	354
WPA2-AES	327	216	244	352
WPA3-SAE	327	315	344	352

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Mobile AP Mode Throughput - AC Mode | MAC1 | 5 GHz Band | 80 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	378	329	368	378
WPA2-AES	379	330	363	376
WPA3-SAE	371	332	361	380

Mobile AP Mode Throughput - AX Mode | MAC2 | 2.4 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	165	165	180	180
WPA2-AES	168	166	175	185
WPA3-SAE	169	167	176	178

Mobile AP Mode Throughput - AX Mode | MAC1 | 5 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	241	230	237	239
WPA2-AES	231	231	238	243
WPA3-SAE	232	229	229	245

Mobile AP Mode Throughput - AX Mode | MAC1 | 5 GHz Band | 40 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	366	324	358	369
WPA2-AES	366	321	347	360
WPA3-SAE	359	318	339	359

Mobile AP Mode Throughput - AX Mode | MAC1 | 5 GHz Band | 80 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	390	340	365	390
WPA2-AES	378	348	346	409
WPA3-SAE	387	350	360	390

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4.5.3 EU conformance tests

- EU Adaptivity test - EN 300 328 v2.1.1 (for 2.4 GHz)
- EU Adaptivity test - EN 301 893 v2.1.1 (for 5 GHz)

4.5.4 Bug fixes/feature enhancements

4.5.4.1 Firmware version 17.92.1.p98.1 to 17.92.1.p116.1

Firmware version 17.92.1.p98.1 to 17.92.1.p116.1

Component	Description
—	NA

4.5.4.2 Firmware version 17.92.1.p116.1 to 17.92.1.p136.13

Firmware version 17.92.1.p116.1 to 17.92.1.p136.13

Component	Description
—	NA

4.5.4.3 Firmware version 17.92.1.p136.13 to 17.92.1.p136.24

Firmware version 17.92.1.p136.13 to 17.92.1.p136.24

Component	Description
Coex	• OPP file transfer gets failed while OPP file transfer is ongoing and Wi-Fi traffic initiated with 2.4GHz external AP.

4.5.4.4 Firmware version 17.92.1.p136.24 to 17.92.1.p136.131

Firmware version 17.92.1.p136.24 to 17.92.1.p136.131

Component	Description
Bluetooth	• A2DP Audio glitches heard while audio streaming and OPP file transfer to another ref device at the same time.

4.5.4.5 Firmware version 17.92.1.p136.131 to 17.92.1.p149.131

Firmware version 17.92.1.p136.131 to 17.92.1.p149.131

Component	Description
Wi-Fi	• During the Roaming stress test, a command timeout causing the device Hang/Crash is observed

4.5.4.6 Firmware version 17.92.1.p149.131 to 17.92.1.p149.43

Firmware version 17.92.1.p149.131 to 17.92.1.p149.43

Component	Description
—	—

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4.5.4.7 Firmware version 17.92.1.p149.43 to 17.92.1.p149.157

Firmware version 17.92.1.p149.43 to 17.92.1.p149.157

Component	Description
Wi-Fi	• In RF test mode, Inconsistent TX-power observed between configured and measured values in txcontinuous Carrier Suppression (CS) mode. • In RF test mode, EVM value degradations are seen on the DFS channels with Linux BSP v6.6.23
Bluetooth	In legacy remote devices, pairing with PIN code method is failed with LMP/LL timeout.

4.5.4.8 Firmware version 17.92.1.p149.157 to 17.92.1.p149.53

Firmware version 17.92.1.p149.157 to 17.92.1.p149.53

Component	Description
—	—

4.5.4.9 Firmware version 17.92.1.p149.53 to 17.92.1.p149.60

Firmware version 17.92.1.p149.53 to 17.92.1.p149.60

Component	Description
Wi-Fi	• Fixed kernel panic fetal error due to connecting the DUT STA to a long SSID Ex-AP. • In DUT STA mode, a wake-up card timeout is observed when Ex-AP is momentarily offline and when there is a connection times out. • In DUT STA mode, the firmware command 0xd0 timeout is observed in a stress testing with good RSSI AP connection.
Bluetooth	• In extended Bluetooth LE scanning, an unexpected HCI_LE_Scan_Timeout event is observed.

4.5.4.10 Firmware version 17.92.1.p149.60 to 17.92.1.p149.64

Firmware version 17.92.1.p149.60 to 17.92.1.p149.64

Component	Description
Wi-Fi	• During firmware automatic recovery test, kernel crash causing system reboot due to Wi-Fi driver on a specific platform running in DUT STA mode. • Readback of `txratecfg` command not showing expected output. • In DUT STA mode, the Reassociation response from the External Access Point was dropped after the acknowledgement was sent, which resulted in another Reassociation request, ultimately leading to Deauthentication from the External Access Point. • Firmware crash occurrence in the 2.4 GHz band during roaming stress test scenario.

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4.5.4.11 Firmware version 17.92.1.p149.64 to 17.92.1.p149.70

Firmware version 17.92.1.p149.64 to 17.92.1.p149.70

Component	Description
Wi-Fi	• Firmware command timeout error [0xb] observed during long-term stress testing of legacy roaming. • Firmware command timeout error [0x107] observed during long-term stress testing of legacy roaming. • TX timeout error observed during long-term stress testing of legacy roaming. • Firmware crash observed in the long run test when AP is enabled and STA is connected to ext. AP. • Linux kernel panic with Netlink hung task observed randomly while booting and shutting down host system.
Bluetooth	• During firmware initialization, the process fails if any pulse is observed on the UART TX line. • After braktooth attack of duplicated encapsulated payload, DUT not able to start the Page and Inquiry scan.

4.5.5 Known issues

Known issues

Component	Description
Wi-Fi	EasyMesh is disabled in the current release.

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4.6 SDIO-UART IW611/IW612

Package information

- BSP version: Linux 6.12.20_2.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 18.99.3.p25.7
- Driver version: MM6X18537.p9-GPL

Version information

- Wireless SoC: IW611/IW612
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 18.99.3.p25.7
  - 18 - Major revision
  - 99 - Feature pack
  - 3 - Release version
  - p25.7 - Patch number
- Driver Version: MM6X18537.p9-GPL
  - 6X - Linux 6.x Kernel
  - 18537 - Release version
  - p9 - Patch number
  - GPL - General Public License v2

software release content

- Firmware binaries
- RF test mode is enabled in the production Firmware. A separate firmware binary is not required to execute RF test mode commands.

Table 6. IW611/IW612 software release content

Firmware	IW611/IW612 A1 with secure boot enabled
Combo firmware	sduart_nw61x_v1.bin.se
Wi-Fi only	sd_w61x_v1.bin.se
Bluetooth and 802.15.4 only	uartspi_n61x_v1.bin.se

Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.14.2
- Interface used
  - Wi-Fi over SDIO (SDIO 3.0 support, Clock speed: 200 MHz)
  - Bluetooth/Bluetooth LE over UART
  - 802.15.4 over SPI interface
- Test tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.11)
  - hostapd (version 2.11)

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4.6.1 Wi-Fi and Bluetooth certification

The Wi-Fi and Bluetooth certification is obtained with the following combinations.

4.6.1.1 Wi-Fi pre-certification

- STA | WiFi6 11ax
- STA | Wi-Fi CERTIFIED ac
- STA | Wi-Fi CERTIFIED n
- STA | PMF
- STA | VU
- STA | FFD
- STA | Security Improvement
- STA | WPA-SAE R3
- STA | Agile Multiband (MBO)

4.6.1.2 Bluetooth controller certification

see ref.[11].

4.6.1.3 Thread and Matter certification

- For Thread, see ref.[8].
- For Matter, see ref.[9].

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4.6.2 Wi-Fi throughput

4.6.2.1 Throughput test setup

- Environment: Shield Room - Over the Air
- External Access Point: Asus RT-AX88U (FW-3.0.0.4.386_49674)
- DUT: Murata M.2 Module LBES5PL2EL with MCIMX8M-EVK platform
  - iPerf commands:
    - TCP server

```
# iperf -s -i1 -fm -w 2M
```

    - TCP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -P5
```

    - UDP server

```
# iperf -s -u -i1 -fm -w 2M
```

    - UDP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -b 800 -P5
```

    Note: *For optimized throughput, add iPerf parameters such as TCP window size and parallel streams. The above-described iPerf parameters are an example.*
- External Client: NXP IW620 PCIe-UART
- Channel: 6 | 36

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4.6.2.2 STA throughput

External Access Point: Asus RT-AX88U

STA Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	57	59	63	63
WPA2-AES	57	57	63	63
WPA3-SAE	56	58	63	62

STA Mode Throughput - BGN Mode | 2.4 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	114	118	128	128
WPA2-AES	113	122	125	127
WPA3-SAE	117	118	128	124

STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	58	57	62	66
WPA2-AES	59	59	65	63
WPA3-SAE	58	60	62	62

STA Mode Throughput - AN Mode | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	119	126	129	132
WPA2-AES	118	124	130	131
WPA3-SAE	115	123	132	131

STA Mode Throughput - AC Mode | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	71	76	78	80
WPA2-AES	69	76	75	79
WPA3-SAE	72	74	78	78

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STA Mode Throughput - AC Mode | 5 GHz Band | 40 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	161	171	176	176
WPA2-AES	159	163	177	178
WPA3-SAE	161	168	180	179

STA Mode Throughput - AC Mode | 5 GHz Band | 80 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	325	369	375	391
WPA2-AES	325	363	376	385
WPA3-SAE	328	366	378	388

STA Mode Throughput - AX Mode | 2.4 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	115	113	118	129
WPA2-AES	115	110	117	124
WPA3-SAE	113	117	118	119

STA Mode Throughput - AX Mode | 2.4 GHz Band | 40 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	209	229	240	252
WPA2-AES	210	232	239	251
WPA3-SAE	194	233	235	248

STA Mode Throughput - AX Mode | 5 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	115	112	127	129
WPA2-AES	114	111	127	127
WPA3-SAE	115	112	121	124

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STA Mode Throughput - AX Mode | 5 GHz Band | 40 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	218	220	244	250
WPA2-AES	218	216	243	243
WPA3-SAE	219	219	247	242

STA Mode Throughput - AX Mode | 5 GHz Band | 80 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	405	418	461	502
WPA2-AES	397	418	461	500
WPA3-SAE	400	412	455	497

4.6.2.3 P2P-GO throughput

P2P - GO Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	55	55	60	61

P2P - GO Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	118	126	128	132

P2P - GO Mode Throughput - AC Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	336	369	385	378

P2P - GO Mode Throughput - AX Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	400	418	449	476

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4.6.2.4 P2P-GC Throughput

P2P - GC Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	53	55	60	60

P2P - GC Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	118	125	128	132

P2P - GC Mode Throughput - AC Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	332	365	380	381

P2P - GC Mode Throughput - AX Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	398	412	452	470

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4.6.2.5 Mobile AP Throughput

External client: NXP IW620 PCIe-UART

Mobile AP Mode Throughput - BGN Mode| 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Opensecurity	62	59	64	62
WPA2-AES	62	55	64	61
WPA3-SAE	57	55	61	61

Mobile AP Mode Throughput - BGN Mode| 2.4 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	118	119	126	129
WPA2-AES	118	120	122	128
WPA3-SAE	120	119	122	126

Mobile AP Mode Throughput - AN Mode| 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	63	59	61	61
WPA2-AES	61	60	62	61
WPA3-SAE	62	55	63	64

Mobile AP Mode Throughput - AN Mode| 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	120	126	131	131
WPA2-AES	123	123	129	134
WPA3-SAE	121	126	130	132

Mobile AP Mode Throughput - AC Mode| 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	70	71	75	76
WPA2-AES	74	70	79	77
WPA3-SAE	74	68	74	76

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Mobile AP Mode Throughput - AC Mode| 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	169	163	177	175
WPA2-AES	168	167	173	177
WPA3-SAE	167	167	176	177

Mobile AP Mode Throughput - AC Mode| 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	348	352	382	390
WPA2-AES	348	350	382	388
WPA3-SAE	350	348	378	386

Mobile AP Mode Throughput - AX Mode| 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	115	112	119	125
WPA2-AES	114	113	122	124
WPA3-SAE	111	115	123	123

Mobile AP Mode Throughput - AX Mode| 2.4 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	212	208	233	234
WPA2-AES	205	207	231	232
WPA3-SAE	210	202	232	235

Mobile AP Mode Throughput - AX Mode| 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	120	119	128	126
WPA2-AES	115	116	125	126
WPA3-SAE	116	116	121	128

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Mobile AP Mode Throughput - AX Mode| 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	**TX**	**RX**	**TX**	**RX**
Open security	223	217	242	246
WPA2-AES	225	212	242	242
WPA3-SAE	223	215	245	242

Mobile AP Mode Throughput - AX Mode| 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	**TX**	**RX**	**TX**	**RX**
Open security	402	406	452	498
WPA2-AES	398	403	449	482
WPA3-SAE	390	399	445	499

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4.6.2.6 OpenThread throughput test

- Environment: closed
- DUT: NXP reference board with 8MMINILPD4-EVKB platform
- Clock rate: 10 MHz
- DUT TX Power: 0 dBm
- OTREF TX Power: 20 dBm

Thread mode throughput

Role	TCP (Kbit/s)		UDP (Kbit/s)	
Direction	**TX**	**RX**	**TX**	**RX**
Thread leader	82	81	90	90
Thread child	82	81	90	90

4.6.3 EU conformance tests

- EU Adaptivity test - EN 300 328 v2.2.2 (for 2.4 GHz)
- EU Adaptivity test - EN 301 893 v2.1.1 (for 5 GHz)

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4.6.4 Bug fixes/feature enhancements

4.6.4.1 Firmware version 18.99.1.p154.40 to 18.99.2.p19.15

Firmware version 18.99.1.p154.40 to 18.99.2.p19.15

Component	Description
Coex	• Audio glitches observed on DUT as Master A2DP Source/Sink streaming with remote device when DUT Wi-Fi station is connected with external AP on 2.4 GHz.

4.6.4.2 Firmware version 18.99.2.p19.15 to 18.99.2.p66.10

Firmware version 18.99.2.p19.15 to 18.99.2.p66.10

Component	Description
Wi-Fi	• Wake-up card timeout is observe when DUT AP changes the channels during TWT execution. • DUT-STA does not stop sending the periodic null frames after executing TWT Teardown.

4.6.4.3 Firmware version 18.18.99.2.p66.10 to 18.99.2.p66.17

Firmware version 18.18.99.2.p66.10 to 18.99.2.p66.17

Component	Description
Wi-Fi	• DUT-AP keeps sending RTS to client device which is turned off till age-out timer expires. • Firmware fatal automatic recovery failed in long run stress testing. • DUT wakeup interval found unexpected for successive wakeups in TWT session of specific Service period which can be more than 10mins. • DUT station stuck observed after sending the deuathication due to unspecified reason in a disconnected state. • Scan commda timeout is seen when performed scan while doing Auto-Tx in HE 80MHz mode
Bluetooth	• When A2DP steaming is initiated during an ongoing HFP call, A2DP link lose observed due to LMP response timeout (Frequency of occurrence 4/5 times) • Link Stability in presence of multiple Bluetooth links under optimization • In long run with Bluetooth Scatternet along with eSCO link established scenario, random DUT hang is observed
Coex	• A2DP Audio Glitches are observed in the presence of Open Thread UDP Tx Traffic, when DUT is configured as Open Thread Leader/Router.

4.6.4.4 Firmware version 18.99.2.p66.17 to 18.99.3.p10.1

Firmware version 18.99.2.p66.17 to 18.99.3.p10.1

Component	Description
Wi-Fi	• STAUT does not follow the configured wake-up duration.
Wi-Fi, Bluetooth/802.15.4 Open Thread (OT) coexistence (IW612 only)	• High OT ping loss(>90%) observed in the presence of Wi-Fi traffic and A2DP streaming. • High OT-UDP-RX throughput drop observed in the presence of A2DP streaming on high antenna isolation. • Low COEX throughput values observed in dual-radio and tri-radio cases with 20 dbm OT-TX power.

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4.6.4.5 Firmware version 18.99.3.p10.1 to 18.99.3.p15.8

Firmware version 18.99.3.p10.1 to 18.99.3.p15.8

Component	Description
Wi-Fi	• In DUT STA mode, a scan command timeout was observed during WPA3-FT PSK RSSI based roaming test on long run. • In roaming test using wpa_cli between multiple APs, the firmware is unstable when the RSSI of the AP is very low.
Bluetooth	• Authentication failure observed for ACL link, in presence of LE link. • In dual HFP configuration, background noise heard on first audio link.
LE Audio	• In stress testing of 2-CIS, collision of ISO packet & ATT data affects ISO anchor point scheduling. • DUT is generating BIG sync lost event randomly after some inactivity. • Second CIS establishment always fails when creating 2 CIS over one ACL with interleaved packing. • Sometimes the connection timeout for CIS establishment event is observed on second/third CIS link while creating all 4/2 CIS together.
Zigbee	• Zigbee firmware crash observed, after six devices joined to network.
Wi-Fi, Bluetooth and 802.15.4 (Open Thread) coexistence	• Randomly audio glitch observed, in the presence of Wi-Fi + Open thread UDP-TX traffic. • Wi-Fi throughput goes 60% down when DUT working as slave role is connected to mobile phone.

4.6.4.6 Firmware version 18.99.3.p15.8 to 18.99.3.p15.13

Firmware version 18.99.3.p15.8 to 18.99.3.p15.13

Component	Description
Wi-Fi	• In the DRCS test, the firmware scan command timeout is observed when the DUT-STA tries to connect with an external AP using the wrong password, and a mobile tries to associate with the DUT AP. • In the DRCS test, connection failures are seen when a mobile tries to associate with the DUT AP, and the DUT-STA tries to connect with an external AP using the wrong password. • During TX power and regulatory test, kernel warning observed when `tx-power` values are not the same for 20 MHz, 40 MHz, and 80 MHz bonded channels.
Bluetooth	• Randomly, the DUT hang has been observed while connected with the peer device on Bluetooth/ Bluetooth LE link for a long duration.
Wi-Fi, Bluetooth and 802.15.4 (Open Thread) coexistence	• In an LNT network of 50 nodes running for more than 24 hours, a segmentation fault error and app crash can occur. • In an LNT Network of 10 nodes, when high traffic is running on each node, ZC and ZR got terminated because of MAC split errors.

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4.6.4.7 Firmware version 18.99.3.p15.13 to 18.99.3.p21.15

Firmware version 18.99.3.p15.13 to 18.99.3.p21.15

Component	Description
Wi-Fi	• In the DRCS test, DUT AP sent fewer beacons resulting ext. STA disconnections when DUT-STA already performing scan operation.
Wi-Fi, Bluetooth and 802.15.4 (Open Thread) coexistence	• Audio cuts observed when running the DUT STA coexistence RVR test. • Firmware dump observed when the DUT STA is connected with an external AP and tries to connect a Bluetooth device.

4.6.4.8 Firmware version 18.99.3.p21.15 to 18.99.3.p23.6

Firmware version 18.99.3.p15.13 to 18.99.3.p21.15

Component	Description
Wi-Fi	• In RF test mode, the TX power readback value is not expected in HE 80 MHz MCS11 data rate. • In Easymesh test, `sys_cfg_channel` command error observed during ethernet onboarding with third party AP. • In Easymesh test, `parse_1905` packet error observed during ethernet onboarding with third party AP.
OpenThread (OT)	• When working with OpenThread SPI, bus sharing is not supported with other SPI devices.
Wi-Fi, Bluetooth and 802.15.4 (Open Thread) coexistence	• High OT Ping loss is observed in the presence of Wi-Fi traffic and A2DP streaming in the closed environment. OT-UDP traffic cannot initiate in the presence of A2DP+Wi-Fi traffic. • Wi-Fi throughput degraded by 35% when LE audio stream 1-BIS is running in the background. • The DUT fails to start the mobile hotspot when Bluetooth and OT traffic is ongoing.

4.6.4.9 Firmware version 18.99.3.p23.6 to 18.99.3.p23.20

Firmware version 18.99.3.p23.6 to 18.99.3.p23.20

Component	Description
Wi-Fi	• Firmware auto recovery failures seen during long run stress test in DUT-AP mode. • Wi-Fi firmware automatic recovery failures are seen during stress test in DUT-AP mode running Iperf traffic. • In Firmware automatic recovery test, firmware download fail observed on long run while DUT operating in AP mode. • In long run Easymesh stress testing, error “Out of memory” is observed on Agent3. • In Easymesh testing, a 20% ping loss observed in RX from Controller to a random Agent. • In Easymesh, Topology Notification Messages are not sent properly when clients are getting connected and disconnected to MAUT (MultiAP agent under test). • During suspend/resume stress test, "Wakeup card timeout(0)!" was observed. • Enhancement: TSMC/UMC dual foundry support per FPCN 202405001F01 including golden calibration support for parts from TSMC/UMC foundries.
Wi-Fi and Bluetooth coexistence	• Wi-Fi command timeout is seen when there is A2DP streaming from phone.

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4.6.4.10 Firmware version 18.99.3.p23.20 to 18.99.3.p25.7

Firmware version 18.99.3.p23.20 to 18.99.3.p25.7

Component	Description
Wi-Fi	• Low throughput is observed when EDMAC is enabled with JP country code and DUT connected to NEC Aterm WG1200HP2 AP. • Kernel warning fixes for cfg80211_calculate_bitrate+0x210 invalid rate. • In DUT STA mode, Incorrect RSSI is reported to the wpa_supplicant when ext AP keeps changing RSSI values. • The scan interval does not transition back to the long interval even after the RSSI exceeds the configured threshold. • Firmware hang issue observed when STAUT tries to connect ex-AP with the wrong password.
Bluetooth	• When 251 bytes of data set as extended advertisement data, over the air data length is set as 242 bytes.

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4.6.5 Known issues

Known issues

Component	Description
Wi-Fi	• In automatic firmware recovery, random kernel crash is observed during stress test.
Bluetooth	• Link loss is happening on Ref1 headphone (A2DP sink) device streaming A2DP audio, in the presence of Ref2 mobile (HFP AG) device running HFP call. • A2DP audio glitches heard on Ref1 headphone (A2DP sink) device in the presence of HFP call ongoing on ref2 headphone (HFP Dev) device. • A2DP glitches are observed when the DUT is an A2DP source device with peripheral role and in the presence of Bluetooth inquiry in background. • During dual HFP (DUT connected with two reference headphone devices (HFP Dev)), when the active call is terminated on any of the slots, or when an active call is set in Privacy mode, some audio distortion is observed in that disconnected slot. • The firmware fails to assign connection handles during BIG (Broadcast Isochronous Group) creation.
Wi-Fi and Bluetooth coexistence	• Wi-Fi command timeout is seen when there is A2DP streaming from phone.
Wi-Fi, Bluetooth and 802.15.4 (Open Thread) coexistence	• Wi-Fi throughput in presence of OT peak throughput is under optimization • Wi-Fi scan timeout is observed in the presence of OT-daemon running in the background. • Wi-Fi command timeout has been observed following the initiation of the OT-daemon, specifically when the CPU2 power save disable command is not utilized and a calibration file is loaded.

Note:

1. *Before loading Bluetooth-only firmware, the Wi-Fi SDIO driver and firmware loading must be required with the calibration data file.*
2. *Bluetooth LE Audio features are in phase 1 where only two simultaneous CIS/BIS streams are validated. This feature is validated with i.MX RTOS and not using Linux BSP. Contact your NXP representative for more details*

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4.6.6 Notes

- Bluetooth LE isochronous channel support
  - cis_offset value ≥ 800 µs is supported
- Bluetooth LE isochronous channel support on controller are validated using Ethermind stack on RT1170 platform 061718202225.3
- BT-SIG qualification declaration details:
  - FC controller cert. full listing:
    DN#: Q347382
    TCRL version: TCRL2025-1
    Core Spec version: 5.4
    Link: see ref.[15]
  - FC Controller cert. subset listing (without LE Power Class 1):
    Subset DN#: Q360748
    TCRL Version: TCRL2025-1
    Core Spec version: 5.4
    Link: see ref.[16]
- 802.15.4 Matter certification for IW612 with Linux certification ID# is CSA22098MAT40098-50. see ref.[12].
- WFA certification for IW612. see :
- This is an experimental software release for LE Audio feature.

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4.7 SDIO-UART IW610

Package information

- BSP version: Linux 6.12.20_2.0.0
- Wi-Fi and Bluetooth LE Firmware version 18.99.5.p61
- Driver version: MM6X18537.p9-GPL

Version information

- Wireless SoC: IW610
- Wi-Fi and Bluetooth LE Firmware version 18.99.5.p61
  - 18 - Major revision
  - 99 - Feature pack
  - 5 - Release version
  - p61 - Patch number
- Driver Version: MM6X18537.p9-GPL
  - 6X - Linux 6.x Kernel
  - 18537 - Release version
  - p9 - Patch number
  - GPL - General Public License v2

Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.14.2
- Interface used
  - Wi-Fi over SDIO (SDIO 3.0 support, Clock speed: 200 MHz)
  - Bluetooth LE over UART
  - 802.15.4 over SPI interface
- Test tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.11)
  - hostapd (version 2.11)

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4.7.1 Wi-Fi throughput

4.7.1.1 Throughput test setup

- Environment: Shield Room - Over the Air
- External access point: Asus RT-AX88U
- DUT: IW610-Murata M.2 module: LBES0ZZ2LL with MCIMX8M-EVK platform
  - iPerf commands:
    - TCP server

```
# iperf -s -i1 -fm -w 2M
```

    - TCP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -P5
```

    - UDP server

```
# iperf -s -u -i1 -fm -w 2M
```

    - UDP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -b 800 -P5
```

    Note: *For optimized throughput, add iPerf parameters such as TCP window size and parallel streams. The above-described iPerf parameters are an example.*
- External Client: NXP IW620 PCIe-UART
- Channel: 6 | 36

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4.7.1.2 STA throughput

External AP: Asus RT-AX88U

STA Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	55	60	62	61
WPA2-AES	55	60	62	61
WPA3-SAE	55	60	62	62

STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	56	63	63	66
WPA2-AES	56	62	63	63
WPA3-SAE	56	62	63	63

STA Mode Throughput - AC Mode | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	70	75	75	76
WPA2-AES	70	75	75	78
WPA3-SAE	70	75	75	76

STA Mode Throughput - AX Mode | 2.5 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	88	95	94	97
WPA2-AES	85	95	94	96
WPA3-SAE	85	95	94	99

STA Mode Throughput - AX Mode | 5 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	92	99	101	100
WPA2-AES	89	99	101	100
WPA3-SAE	89	98	100	103

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4.7.1.3 P2P-GO throughput

P2P - GO Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	57	56	62	62

P2P - GO Mode Throughput - BGN Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	61	58	63	63

P2P - GO Mode Throughput - HE Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	92	90	97	95

P2P - GO Mode Throughput - HE Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	96	93	100	99

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4.7.1.4 P2P-GC throughput

P2P - GC Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	56	55	61	62

P2P - GC Mode Throughput - BGN Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	58	58	63	63

P2P - GC Mode Throughput - HE Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	93	89	98	96

P2P - GC Mode Throughput - HE Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	96	93	100	100

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4.7.1.5 Mobile AP throughput

External client: NXP IW620 PCIe-UART

Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	58	55	60	60
WPA2-AES	55	54	60	60
WPA3-SAE	55	55	60	60

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	58	55	60	60
WPA2-AES	55	54	60	60
WPA3-SAE	55	55	60	60

Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	72	70	75	73
WPA2-AES	69	70	75	73
WPA3-SAE	69	70	75	73

Mobile AP Mode Throughput - AX Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	92	89	96	94
WPA2-AES	92	89	96	94
WPA3-SAE	92	88	96	93

Mobile AP Mode Throughput - AX Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	97	92	101	99
WPA2-AES	97	92	101	99
WPA3-SAE	97	92	101	99

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4.7.1.6 Open Thread throughput test

- Environment: closed
- DUT: NXP reference board with 8MMINILPD4-EVKB platform
- Clock rate: 10 MHz
- DUT TX Power: 0 dBm
- OTREF TX Power: 20 dBm

Thread mode throughput

Role	TCP (Kbit/s)		UDP (Kbit/s)	
Direction	**TX**	**RX**	**TX**	**RX**
Thread leader	83	82	92	91
Thread child	84	81	92	92

4.7.2 EU conformance tests

- EU Adaptivity test - EN 300 328 v2.1.1 (for 2.4 GHz)
- EU Adaptivity test - EN 301 893 v2.2.2 (for 5 GHz)

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4.7.3 Bug fixes/feature enhancements

4.7.3.1 Firmware version 18.99.5.p43 to 18.99.5.p51

Firmware version 18.99.5.p43 to 18.99.5.p51

Component	Description
Wi-Fi	• Firmware wakeup card timeout observed during stress testing of firmware independent reset in DUT STA connected state. Bluetooth LE • While connecting 10 BLE devices with connection interval of 30-50ms connections are not stable.

4.7.3.2 Firmware version 18.99.5.p51 to 18.99.5.p56

Firmware version 18.99.5.p51 to 18.99.5.p56

Component	Description
Wi-Fi	• In TX power feature, the readback of the RU TX Power command output is not anticipated for negative set TX-power values. • Firmware command timeout during roaming between two APs in stress test.
Bluetooth LE	• Baud rate mismatch seen with the calibration data when using the read calibration data command.

4.7.3.3 Firmware version 18.99.5.p56 to 18.25.5.p61

Firmware version 18.99.5.p56 to 18.25.5.p61

Component	Description
Wi-Fi	• Observed high OT-Ping loss and 0kbps throughput on OT traffic when the uAP traffic is started. • Parallel independent reset (IR) (Wi-Fi and NB IR issued independently from host) can cause system stuck in stress testing. Robust solution implementation in process.

4.7.4 Known issues

Known issues

Component	Description
—	—

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4.8 USB-USB-SPI IW610

Package information

- BSP version: Linux 6.12.20_2.0.0
- Wi-Fi and Bluetooth LE Firmware version 18.99.5.p61
- Driver version: MM6X18537.p9-GPL

Version information

- Wireless SoC: IW610
- Wi-Fi and Bluetooth LE Firmware version 18.99.5.p61
  - 18 - Major revision
  - 99 - Feature pack
  - 5 - Release version
  - p61 - Patch number
- Driver Version: MM6X18537.p9-GPL
  - 6X - Linux 6.x Kernel
  - 18537 - Release version
  - p9 - Patch number
  - GPL - General Public License v2

Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.14.2
- Interface used
  - Wi-Fi over SDIO (SDIO 3.0 support, Clock speed: 200 MHz)
  - Bluetooth LE over UART
  - 802.15.4 over SPI interface
- Test tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.11)
  - hostapd (version 2.11)

Note: *Download Labtool application for RF test mode ref.[5].*

4.8.1 Bluetooth controller certification

See ref.[14].

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4.8.2 Wi-Fi throughput

4.8.2.1 Throughput test setup

- Environment: Shield room – Over the air
- External access point: Asus RT AX88U
- DUT: IW610-Murata M.2 module LBES0ZZ2LL with i.MX 91 EVK platform
  - iPerf commands:
    - TCP server

```
# iperf -s -i1 -fm -w 2M
```

    - TCP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -P5
```

    - UDP server

```
# iperf -s -u -i1 -fm -w 2M
```

    - UDP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -b 800 -P5
```

    Note: *For optimized throughput, add iPerf parameters such as TCP window size and parallel streams. The above-described iPerf parameters are an example.*
- External Client: NXP IW620 PCIe-UART
- Channel: 6 | 36

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4.8.2.2 STA throughput

External AP: Asus RT-AX88U

STA Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	56	57	62	61
WPA2-AES	55	60	62	60
WPA3-SAE	55	60	62	60

STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	56	63	63	64
WPA2-AES	55	62	63	65
WPA3-SAE	55	62	63	65

STA Mode Throughput - AC Mode | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	69	75	75	76
WPA2-AES	69	75	75	76
WPA3-SAE	70	75	75	76

STA Mode Throughput - AX Mode | 2.5 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	87	87	98	96
WPA2-AES	84	85	97	96
WPA3-SAE	84	93	97	98

STA Mode Throughput - AX Mode | 5 GHz Band | 20 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	90	99	101	103
WPA2-AES	88	99	101	102
WPA3-SAE	87	99	101	103

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4.8.2.3 P2P-GO throughput

P2P - GO Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	57	55	61	61

P2P - GO Mode Throughput - BGN Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	59	57	61	62

P2P - GO Mode Throughput - HE Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	94	90	96	97

P2P - GO Mode Throughput - HE Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	95	93	101	99

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4.8.2.4 P2P-GC throughput

P2P - GC Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	56	55	61	61

P2P - GC Mode Throughput - BGN Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	58	56	63	63

P2P - GC Mode Throughput - HE Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	93	91	98	96

P2P - GC Mode Throughput - HE Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	96	93	100	101

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4.8.2.5 Mobile AP throughput

External client: NXP IW620 PCIe-UART

Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	58	55	61	60
WPA2-AES	55	55	61	60
WPA3-SAE	56	54	61	60

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	61	57	63	63
WPA2-AES	58	58	63	63
WPA3-SAE	58	57	63	63

Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	72	70	75	74
WPA2-AES	69	70	75	73
WPA3-SAE	69	70	75	73

Mobile AP Mode Throughput - AX Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	92	89	96	94
WPA2-AES	92	89	96	94
WPA3-SAE	92	89	96	94

Mobile AP Mode Throughput - AX Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	97	93	101	99
WPA2-AES	97	93	101	99
WPA3-SAE	97	93	101	99

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4.8.2.6 Open Thread throughput test

- Environment: closed
- DUT: NXP reference board with 8MMINILPD4-EVKB platform
- Clock rate: 10 MHz
- DUT TX Power: 0 dBm
- OTREF TX Power: 13 dBm

Thread mode throughput

Role	TCP (Kbit/s)		UDP (Kbit/s)	
Direction	**TX**	**RX**	**TX**	**RX**
Thread leader	83	83	86	86
Thread child	82	82	86	86

4.8.3 EU conformance tests

- EU Adaptivity test – EN 300328 v2.2.2 (for 2.4 GHz)
- EU Adaptivity test – EN 301893 v2.1.1 (for 5 GHz)

4.8.4 Known issues

Known issues

Component	Description
—	—

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4.9 SDIO-UART 88W8987

Package information

- BSP version: Linux 6.12.20_2.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p151.4
- Driver version: MM6X16537.p9-GPL

Version information

- Wireless SoC: 88W8987
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p151.4
  - 16 - Major revision
  - 92 - Feature pack
  - 21 - Release version
  - p151.4 - Patch number
- Driver Version: MM6X16537.p9-GPL
  - 6X - Linux 6.x Kernel
  - 16537 - Release version
  - p9 - Patch number
  - GPL - General Public License v2

Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.14.2
- Interface used
  - Wi-Fi over SDIO (SDIO 3.0 support, Clock speed: 200 MHz)
  - Bluetooth/Bluetooth LE over UART
- Test Tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.11)
  - hostapd (version 2.11)

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4.9.1 Wi-Fi and Bluetooth certification

The Wi-Fi and Bluetooth certification is obtained with the following combinations.

4.9.1.1 WFA certifications

- STA | 802.11n
- STA | 802.11ac
- STA | PMF
- STA | FFD
- STA | Security Improvement
- STA | WPA3-R3
- STA | VU

see ref.[1]

4.9.1.2 Bluetooth controller certification

see ref.[11].

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4.9.2 Wi-Fi throughput

4.9.2.1 Throughput test setup

- Environment: Shield Room - Over the Air
- Access Point: NXP IW620
- DUT: 88W8987-Murata M.2 module: LBEE5QD1ZM with MCIMX8M-EVK platform
  - iPerf commands:
    - TCP server

```
# iperf -s -i1 -fm -w 2M
```

    - TCP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -P5
```

    - UDP server

```
# iperf -s -u -i1 -fm -w 2M
```

    - UDP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -b 800 -P5
```

    Note: *For optimized throughput, add iPerf parameters such as TCP window size and parallel streams. The above-described iPerf parameters are an example.*
- External Client: NXP IW620 PCIe-UART
- Channel: 6 | 36

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4.9.2.2 STA throughput

External AP: NXP IW620

STA Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	55	59	58	60
WPA2-AES	56	58	58	60
WPA3-SAE	55	59	58	60

STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	56	62	61	63
WPA2-AES	57	62	61	63
WPA3-SAE	57	62	61	63

STA Mode Throughput - AN Mode | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	117	131	126	134
WPA2-AES	116	130	125	134
WPA3-SAE	115	131	125	134

STA Mode Throughput - AC Mode | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	68	72	73	75
WPA2-AES	68	72	73	74
WPA3-SAE	68	72	73	74

STA Mode Throughput - AC Mode | 5 GHz Band | 40 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	156	168	168	174
WPA2-AES	155	168	166	174
WPA3-SAE	153	168	166	174

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STA Mode Throughput - AC Mode | 5 GHz Band | 80 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	247	345	267	361
WPA2-AES	231	339	250	359
WPA3-SAE	232	340	250	360

4.9.2.3 P2P-GO throughput

P2P - GO Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	56	56	61	61

P2P - GO Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	116	126	124	135

P2P - GO Mode Throughput - AC Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	217	313	243	382

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4.9.2.4 P2P-GC throughput

P2P - GC Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	57	54	61	60

P2P - GC Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	115	126	123	135

P2P - GC Mode Throughput - AC Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	231	316	254	381

4.9.2.5 Mobile AP throughput

External client: NXP IW620 PCIe-UART

Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	54	56	58	61
WPA2-AES	55	56	58	61
WPA3-SAE	54	56	58	61

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	58	59	61	64
WPA2-AES	57	59	61	64
WPA3-SAE	58	59	61	64

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Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	117	127	126	135
WPA2-AES	117	126	125	135
WPA3-SAE	116	126	125	135

Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	70	70	74	75
WPA2-AES	70	68	74	74
WPA3-SAE	70	70	74	74

Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	149	168	162	180
WPA2-AES	147	169	161	180
WPA3-SAE	147	168	161	180

Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 80 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	241	350	269	390
WPA2-AES	226	320	254	386
WPA3-SAE	226	323	254	386

4.9.3 EU conformance tests

- EU Adaptivity test - EN 300 328 v2.1.1 (for 2.4 GHz)
- EU Adaptivity test - EN 301 893 v2.2.2 (for 5 GHz)

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4.9.4 Bug fixes/feature enhancements

4.9.4.1 Firmware version 16.92.21.p76.2 to 16.92.21.p76.5

Firmware version 16.92.21.p76.2 to 16.92.21.p76.5

Component	Description
—	NA

4.9.4.2 Firmware version 16.92.p99.2 to 16.92.2. p119.3

Firmware version 16.92.p99.2 to 16.92.2.p119.3

Component	Description
Wi-Fi	• During connect/disconnect stress testing, a 4-way Handshake Timeout is observed due to which the Ex-STA cannot connect to the AP.

4.9.4.3 Firmware version 16.92.2.p119.3 to 16.92.21.p137.4

Firmware version 16.92.2.p119.3 to 16.92.21.p137.4

Component	Description
Wi-Fi	In RF test mode, TX power values are not updating after configured values in continuous wave transmit mode.

4.9.4.4 Firmware version 16.92.21p137.4 to 16.92.21.p142.3

Firmware version 16.92.21.p137.4 to 16.92.21.p142.3

Component	Description
Wi-Fi	• In RF test mode, TX power values are not updating after configured values in continuous wave transmit mode. • In RF test mode, firmware command timeout is seen when switching between the enable and disable RF test modes.

4.9.4.5 Firmware version 16.92.21.p142.3 to 16.92.21.p149.2

Firmware version 16.92.21.p142.3 to 16.92.21.p149.2

Component	Description
Wi-Fi	• In DUT-AP Mode, the firmware command timeout is observed when sending a large file via SCP along with continuous ping operation.

4.9.4.6 Firmware version 16.92.21.p149.2 to 16.92.21.p149.4

Firmware version 16.92.21.p149.2 to 16.92.21.p149.4

Component	Description
Wi-Fi	• Roaming test enhancements have been implemented through the blocking of scans during the authentication process. • During suspend/resume stress testing, the DUT in station (STA) mode encountered a connection issue following the completion of the wakeup process. • In DUT STA mode, the Reassociation response from the External Access Point was dropped after the acknowledgement was sent, which resulted in another Reassociation request, ultimately leading to Deauthentication from the External Access Point.

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Firmware version 16.92.21.p149.2 to 16.92.21.p149.4*...continued*

Component	Description
	• Implemented changes to handle received frames with retry bit set from AP having same sequence number in the roaming scenario.
Bluetooth	When the device connects with some headsets, some audio distortion is observed on downlink.

4.9.4.7 Firmware version 16.92.21.p149.4 to 16.92.21.p151.4

Firmware version 16.92.21.p149.2 to 16.92.21.p149.4

Component	Description
Wi-Fi	• In the roaming test, the DUT failed to connect back to the previous AP due to association failure. • In P2P mode, Connection failure is observed when the device is in the listen state. • Fail to set MAC address with an init config file.

4.9.5 Known issues

Known issues

Component	Description
Wi-Fi	• TX data path stuck seen for 1 second in PMF enabled case when DELBA command is received.

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4.10 SDIO-UART IW416

Package information

- BSP version: Linux 6.12.20_2.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p151.4
- Driver version: MM5X16537.p9-GPL

Version information

- Wireless SoC: IW416
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p151.4
  - 16 - Major revision
  - 92 - Feature pack
  - 21 - Release version
  - p151.4 - Patch number
- Driver Version: MM6X16537.p9-GPL
  - 6X - Linux 6.x Kernel
  - 16537 - Release version
  - p9 - Patch number
  - GPL - General Public License v2

Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.14.2
- Interface used
  - Wi-Fi over SDIO (SDIO 3.0 support, Clock speed: 200 MHz)
  - Bluetooth/Bluetooth LE over UART
- Test Tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.11)
  - hostapd (version 2.11)

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4.10.1 Wi-Fi and Bluetooth certification

The Wi-Fi and Bluetooth certification is obtained with the following combinations.

4.10.1.1 WFA certifications

- STA | 802.11n
- STA | PMF
- STA | FFD
- STA | Security Improvement
- STA | WPA3-R3
- STA | VU

see ref.[1].

4.10.1.2 Bluetooth controller certification

see ref.[11].

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4.10.2 Wi-Fi throughput

4.10.2.1 Throughput test setup

- Environment: Shield Room - Over the Air
- Access Point: Asus RT-AX88U (FW-3.0.0.4.386_41700)
- DUT: IW416-Murata (Module: LBEE5CJ1XK) with MCIMX8M-EVK platform
  - iPerf commands:
    - TCP server

```
# iperf -s -i1 -fm -w 2M
```

    - TCP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -P5
```

    - UDP server

```
# iperf -s -u -i1 -fm -w 2M
```

    - UDP client

```
# iperf -c <ip_address> -i1 -fm -w 2M -t60 -b 800 -P5
```

    Note: *For optimized throughput, add iPerf parameters such as TCP window size and parallel streams. The above-described iPerf parameters are an example.*
- External Client: NXP 88W8997 PCIe-UART
- Channel: 6 | 36

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4.10.2.2 STA throughput

External AP: Asus RT-AX88U

STA Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	51	44	55	44
WPA2-AES	43	55	56	60
WPA3-SAE	44	50	55	54

STA Mode Throughput - BGN Mode | 2.4 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	97	92	115	98
WPA2-AES	91	88	112	94
WPA3-SAE	91	88	113	96

STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	50	53	60	57
WPA2-AES	51	52	60	54
WPA3-SAE	50	51	60	53

STA Mode Throughput - AN Mode | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	100	100	118	110
WPA2-AES	101	101	121	105
WPA3-SAE	96	96	117	101

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4.10.2.3 P2P-GO throughput

P2P - GO Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	46	50	51	51

P2P - GO Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	105	115	113	130

4.10.2.4 P2P-GC throughput

P2P - GC Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	45	47	48	52

P2P - GC Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA2-AES	109	111	112	129

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4.10.2.5 Mobile AP throughput

External client: NXP 88W8997 PCIe-UART

Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	41	38	43	39
WPA2-AES	40	37	42	37
WPA3-SAE	41	36	42	36

Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	70	111	76	124
WPA2-AES	70	111	74	126
WPA3-SAE	70	111	75	126

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	57	49	60	51
WPA2-AES	56	56	60	59
WPA3-SAE	56	56	60	59

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open security	107	107	118	130
WPA2-AES	107	107	117	130
WPA3-SAE	109	105	117	131

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4.10.3 EU conformance tests

- EU Adaptivity test - EN 300 328 v2.1.1 (for 2.4 GHz)
- EU Adaptivity test - EN 301 893 v2.2.2 (for 5 GHz)

4.10.4 Bug fixes/feature enhancements

4.10.4.1 Firmware version 16.92.10.p233.2 to 16.92.21.p11.2

Firmware version 16.92.10.p233.2 to 16.92.21.p11.2

Component	Description
Bluetooth	• The ACL link with iPhone is disconnected due to error code “REMOTE DEVICE TERMINATED CON NECTION DUE TO LOW RESOURCES.

4.10.4.2 Firmware version 16.92.21.p11.2 to 16.92.21.p41.1

Firmware version 16.92.21.p11.2 to 16.92.21.p41.1

Component	Description
Wi-Fi	• Fix Channel Occupancy Time (COT) for HT20/MCS0 within 6 msec.

4.10.4.3 Firmware version 16.92.21.p41.1 to 16.92.21.p55.3

Firmware version 16.92.21.p41.1 to 16.92.21.p55.3

Component	Description
Wi-Fi	• Once DUT PAN profile gets disconnection with remote device, then DUT reconnection fails for successive connection trials. • DUT Bluetooth Classic & BLE RX test mode fails to receive the packets and host is failing to derive the various parameters.

4.10.4.4 Firmware version 16.92.21.p55.3 to 16.92.21.p76.3

Firmware version 16.92.21.p55.3 to 16.92.21.p76.3

Component	Description
Bluetooth	• DUT Bluetooth & BLE TX test mode fails to set the power continuously and there is a difference between configured and measured power.

4.10.4.5 Firmware version 16.92.21.p76.3 to 16.92.21.p84.3

Firmware version 16.92.21.p76.3 to 16.92.21.p84.3

Component	Description
Bluetooth	• DUT HFP link gets disconnected with Remote phone, when it starts OPP file transfer to Remote device.

4.10.4.6 Firmware version 16.92.21.p84.3 to 16.92.21.p84.128

Firmware version 16.92.21.p84.3 to 16.92.21.p84.128

Component	Description
—	—

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4.10.4.7 Firmware version 16.92.21.p84.3 to 16.92.2.p119.11

Firmware version 16.92.21.p84.3 to 16.92.2.p119.11

Component	Description
Wi-Fi	• For the DRCS with P2P GO provisioning use-case, a Scan timeout is observed when STA is connected to EX-AP and Ex-Client is connected to GO. • With DRCS enabled, when STA is connected to the EX-AP P2P data pause/stuck is observed. • When connecting STA to Ex-AP in AP provisioning case, due to association status mismatch failures are observed in STA connection.

4.10.4.8 Firmware version 16.92.2.p119.11 to 16.92.21.p137.4

Firmware version 16.92.2.p119.11 to 16.92.21.p137.4

Component	Description
Wi-Fi	In RF test mode, Tx power values are not updating after configured values in continuous wave transmit mode.

4.10.4.9 Firmware version 16.92.2.p137.4 to 16.92.21.p142.3

Firmware version 16.92.2.p137.4 to 16.92.21.p142.3

Component	Description
Wi-Fi	• In RF test mode, Firmware command timeout is seen when switching between the enable and disable RF test modes.

4.10.4.10 Firmware version 16.92.21.p142.3 to 16.92.21.p149.2

Firmware version 16.92.21.p142.3 to 16.92.21.p149.2

Component	Description
Wi-Fi	• Incorrect wake-up reason is observed during the validation of the wake on Wi-Fi feature. • The firmware host command 0x112 and IOCTL failures are observed in dmesg when starting AP mode.

4.10.4.11 Firmware version 16.92.21.p149.2 to 16.92.21.p149.4

Firmware version 16.92.21.p149.2 to 16.92.21.p149.4

Component	Description
Wi-Fi	• Added handling to read interrupt status register based on the device sleep state machine. • Roaming test enhancements have been implemented through the blocking of scans during the authentication process. • During suspend/resume stress testing, the DUT in station (STA) mode encountered a connection issue following the completion of the wakeup process. • In DUT STA mode, the Reassociation response from the External Access Point was dropped after the acknowledgement was sent, which resulted in another Reassociation request, ultimately leading to Deauthentication from the External Access Point. • Implemented changes to handle received frames with retry bit set from AP having same sequence number in the roaming scenario • STAUT switches to 5GHz channel after ECSA from AP even if 5GHz channels are disabled on STAUT.
Bluetooth	• When the device connects with some headsets, some audio distortion is observed on downlink.

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4.10.4.12 Firmware version 16.92.21.p149.4 to 16.92.21.p151.4

Firmware version 16.92.21.p149.4 to 16.92.21.p151.4

Component	Description
Wi-Fi	• In the roaming test, the DUT failed to connect back to the previous AP due to association failure. • In DFS test, Radar detection probability is found less than 60% in HT20/40 MHz. • Failure to set the MAC address with an init config file.

4.10.5 Known issues

Known issues

Component	Description
Wi-Fi	• When ed-mac is enabled, probe responses are transmitted during interference signal.

Note: *Bluetooth HFP operations only works on IW416 1XK RevA modules by default, and does not work on earlier IW416 revPA2 modules from current release onwards. Contact NXP support team for more information.*

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5 i.MX platforms, on-board SoCs, and external wireless solutions

Table 7. On-board and external wireless SoC support for Bluetooth and Wi-Fi on different i.MX EVKs

i.MX EVK	On-board SoC	PCIe M.2 card	uSD card or SDIO M.2 card
i.MX 93	—	—	NXP IW612 (Murata BES5PL2EL)
i.MX91	—	—	NXP IW610 (Murata LBES5PL2 LL)
8 QM/QXP/DX/DXL	—	NXP 88W8997 (Murata LBEE5XV1YM[1]) NXP 88W9098 (Murata LBEE5ZZ1XL[1])	—
8 ULP	—	—	NXP IW416 (Murata LBEE5CJ1 XK[1])
8M Nano	NXP 88W8987 (AzureWave AW-CM358 SM/MA[1])	—	NXP 88W8987 (Murata M.2 LBEE5QD1ZM)
8M Mini	NXP 88W8987 (AzureWave AW-CM358 SM/MA[1])	—	NXP 88W8987 (Murata M.2 LBEE5QD1ZM)
8M Plus	—	NXP 88W8997 (AzureWave AW-CM276 SM/MA[1]) NXP 88Q9098 (Murata LBEE6ZZ-1TA[1])	NXP 88W8997 (Murata LBEE5 XV1YM[1]) NXP 88Q9098 (Murata LBEE5 ZZ1XL[1])
8M Quad	—	NXP 88W8997 (Murata LBEE5XV1YM[1]) NXP 88Q9098 (Murata LBEE6ZZ-1TA[1])	NXP 88W8997 (Murata LBEE5 XV1YM[1]) NXP IW416 (Murata LBEE5CJ1 XK[1]) NXP 88W8801 (Murata LBWA0 ZZ2DS[1]) NXP 88Q9098 (Murata LBEE5 ZZ1XL[1])
7ULP	—	—	NXP 88W8987(Azurewave AW-CM358-SM/MA[1])(WLAN only)
7D	—	—	NXP 88W8987(Azurewave AW-CM358-SM/MA[1])(WLAN only)
6Q/6DL/6QP/6SX/ 6 SLL/6UL/6ULL/ 6ULZ	—	—	NXP IW416 (Murata LBEE5CJ1 XK)[2][1] NXP 88W8801 (Murata LBWA0 ZZ2DS[2][1]) NXP 88W8987(Murata LBEE5 QD1ZM[1])

[1] Module tested with the i.MX EVK.
[2] i.MX6ULL only supports M.2 + M.2-to-uSD adapter

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6 Note about the source code in the document

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7 Abbreviations

Table 8. Abbreviations

Abbreviation	Definition
A2DP	Advanced audio distribution profile
AP	Access point
BCA-TDM	Bluetooth coexistence arbiter - Time division multiplexing
BW	Bandwidth
CCMP	Counter mode CBC-MAC protocol
CTS	clear to send
DCM	Dual carrier modulation
DRCS	Dynamic rapid channel switching
ERP	Extended rate physical
GATT	Generic attribute profile
HFP	Hands free profile
HID	Human interface device
HT	High throughput
MCS	Modulation and coding scheme
MLME	Mac layer management entity
RTS	Request To Send
SAE	Simultaneous authentication of equals
STA	Station
VHT	Very high throughput
WFD	Wi-Fi direct
WPA	Wi-Fi protected access
WPS	Wi-Fi protected setup
WSC	Wi-Fi simple configuration

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8 References

[1] Application note – AN12976: Wi-Fi Alliance Derivative Certification (link)
[2] Engineering bulletins (EB) – NXP Security Advisory – Wi-Fi Vulnerability – USIRP02–2020 (link)
[3] Engineering bulletins (EB) – NXP Security Advisory – Bluetooth Vulnerability – ANSSI (link)
[4] GitHub – mlan utility (link)
[5] Software – IW610 manufacturing firmware release (link)
[6] User manual – UM11483: Getting Started with NXP–based Wireless Modules on i.MX 8M Quad EVK Running Linux OS (link)
[7] User manual – UM11675: How to Download and Build NXP Wi-Fi Drivers (link)
[8] Webpage – Thread certified products (link)
[9] Webpage – Matter – NXP i.MX8M MPU + IW612 Tri–radio (link)
[10] Webpage – Embedded Linux for i.MX Applications Processors (IMXLINUX) (link)
[11] Webpage – Bluetooth Launch Studio (link)
[12] Webpage – Matter certificate for IW612 (link)
[13] Webpage – Qualification workspace – Qualified product details – AW693 (link)
[14] Webpage – Qualification workspace – Qualified product details – IW610 (link)
[15] Webpage – FC controller certificate for IW612 (link)
[16] Webpage – FC controller certificate (sub-set) (link)

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9 Revision history

Revision history

Document ID	Date	Change details
RN00104 v.20.0	2 July 2025	**About this document** • Section 1 "About this document": updated the Linux BSP version and list of supported SoCs. **Feature list** • Section 3.1 "Wi-Fi radio": – Removed SDIO 88W8801 – Added PCIe-UART AW693 – Added USB-USB IW610 – Added some features. • Section 3.2 "Bluetooth" – Added PCIe-UART AW693 – Added USB-USB IW610 – Added Bluetooh LE audio features. • Section 3.3 "Thread" – Added PCIe-UART AW693 – Added USB-USB IW610 • Section 3.4 "Coexistence" – Added PCIe-UART AW693 – Added USB-USB IW610 • Section 3.5 "Zigbee" – Added PCIe-UART AW693 – Added USB-USB IW610 • Section 3.5 "Zigbee" – Added PCIe-UART AW693 – Added USB-USB IW610 **Release notes for the supported SoCs** • Section 4.1 "PCIe-UART 88W9098": updated. • Section 4.2 "PCIe-UART 88W8997": updated. • Section 4.3 "PCIe-UART AW693": added. • Section 4.4 "SDIO-UART 88W8997": updated. • Section 4.5 "SDIO-UART 88W9098": updated. • Section 4.6 "SDIO-UART IW611/IW612": updated. • Section 4.7 "SDIO-UART IW610": updated. • Section 4.8 "USB-USB-SPI IW610": added. • Section 4.9 "SDIO-UART 88W8987": updated. • Section 4.10 "SDIO-UART IW416": updated. • Section *SDIO 88W8801*: removed.
RN00104 v.19.0	6 May 2025	**Feature list** • Section 3.1.3 "Wi-Fi Direct ": updated the definition of DMCS.

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Revision history...*continued*

Document ID	Date	Change details
RN00104 v.18.0	27 March 2025	**Downloading the wireless driver/utilities and firmware** • Section 2.3 "Wi-Fi/Bluetooth driver source and firmware": updated. **Release notes for the supported SoCs** • PCIe-UART 88W9098 – Section 4.1.2.1 "Throughput test setup": updated. – Section 4.1.4.12 "Firmware version 17.92.1.p149.53 to 17.92.1.p149.60": added. – Section 4.1.5 "Known issues": updated. • SDIO-UART 88W8997 – *Release information*: updated. – Section 4.4.2.1 "Throughput test setup": updated. – Section 4.4.2.2 "STA throughput": updated the numbers in the table *BGN Mode | 2.4 GHz Band | 20 MHz (HT)*. – Section 4.4.4.9 "Firmware version 16.92.21.p137.4 to 16.92.21.p149.2": added. – Section 4.4.5 "Known issues": updated. • PCIe-UART 88W8997 – *Release information*: updated. – Section 4.2.2.1 "Throughput test setup": updated. – Section 4.2.2.2 "STA throughput": updated. – Section 4.2.2 "Wi-Fi throughput": updated. – Section 4.2.4.11 "Firmware version 16.92.21.p137.4 to 16.92.21.p149.2": added. – Section 4.2.5 "Known issues": updated. – SDIO-UART 88W9098 – *Release information*: updated. – Section 4.5.2.1 "Throughput test setup": updated. – Section 4.5.4.9 "Firmware version 17.92.1.p149.53 to 17.92.1.p149.60 ": added. – Section 4.5.5 "Known issues": updated. ———— *Continues* ————

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Revision history...*continued*

Document ID	Date	Change details
RN00104 v.18.0	27 March 2025	——————— *Continued* ——————— • SDIO-UART IW611/IW612 – *Release information*: updated. – Section 4.6.2.1 "Throughput test setup": updated. – Section 4.6.2 "Wi-Fi throughput": throughput numbers updated. – Section 4.6.4.7 "Firmware version 18.99.3.p15.13 to 18.99.3.p21.15": updated. – Section 4.6.4.8 "Firmware version 18.99.3.p21.15 to 18.99.3.p23.6": added. – Section 4.6.5 "Known issues": updated. • SDIO-UART IW610 – *Release information*: updated. – *Wi-Fi and Bluetooth certification*: removed the section. – Section 4.7.1.1 "Throughput test setup": updated. – Section 4.7.1 "Wi-Fi throughput": throughput numbers updated. • SDIO-UART 88W8987 – *Release information*: updated. – Section 4.9.2.1 "Throughput test setup": updated. – Section 4.9.2 "Wi-Fi throughput": throughput numbers updated. – Section 4.9.4.5 "Firmware version 16.92.21.p142.3 to 16.92.21.p149.2": added. • SDIO-UART IW416 – *Release information*: updated. – Section 4.10.2.1 "Throughput test setup": updated. – Section 4.10.4.10 "Firmware version 16.92.21.p142.3 to 16.92.21.p149.2 ": added. • Section *SDIO 88W8801*: updated **i.MX platform on-board devices and external wireless solutions** • Section 5 "i.MX platforms, on-board SoCs, and external wireless solutions": added i.MX 91 and i.MX 93. **References** • Section 8 "References": updated.

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Revision history...*continued*

Document ID	Date	Change details
RN00104 v.17.0	10 March 2025	**Feature lists** • Section 3.1.1 "Client mode": updated. • Section 3.1.2 "AP mode": updated. • Section 3.2.2 "Bluetooth LE": updated. **SDIO-UART IW611/IW612** • Section 4.6.4.6 "Firmware version 18.99.3.p15.8 to 18.99.3.p15.13": added. • Section 4.6.4.7 "Firmware version 18.99.3.p15.13 to 18.99.3.p21.15": updated. • Section 4.6.5 "Known issues": updated. **SDIO-UART IW416** • Section 4.10.4.9 "Firmware version 16.92.2.p137.4 to 16.92.21.p142.3": updated.

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Revision history...*continued*

Document ID	Date	Change details
RN00104 v.16.0	27 February 2025	• Section 1.1 "Supported SoCs": added IW610. • Section 1 "About this document": updated the release version. • Section 2.2 "Wi-Fi utilities (mlanutl)": updated the release version. • Feature list – Section 3.1.1 "Client mode": updated. – Section 3.1.2 "AP mode": updated. – Section 3.1.3 "Wi-Fi Direct ": updated. – Section 3.2.1 "Bluetooth classic": updated. – Section 3.2.2 "Bluetooth LE": updated. – Section 3.3 "Thread": updated. – Section 3.4.1 "Wi-Fi and Bluetooth coexistence": updated. – Section 3.4.2 "Wi-Fi and Bluetooth/802.15.4 coexistence": updated. – Section 3.5 "Zigbee": updated. – Dual PAN (Coexistence of Thread and Zigbee): removed • PCIe-UART 88W9098 – *Release information*: updated. – Section 4.1.1.1 "Wi-Fi pre-certification ": updated. – Section 4.1.2 "Wi-Fi throughput": updated. – Firmware version 17.92.1.p149.43 to 17.92.1.p149.155 removed. – Section 4.1.4.10 "Firmware version 17.92.1.p149.43 to 17.92.1.p149.157": added. – Section 4.1.4.11 "Firmware version 17.92.1.p149.157 to 17.92.1.p149.53": added. – Section 4.1.5 "Known issues": updated. • SDIO-UART 88W8997 – *Release information*: updated. – Section 4.4.1.1 "Wi-Fi pre-certifications": updated. – Firmware version 16.92.21.p119.3 to 16.92.21.p137.2: removed. – Section 4.4.4.8 "Firmware version 16.92.21.p119.3 to 16.92.21.p137.4": added. – Section 4.4.5 "Known issues": updated. • PCIe-UART 88W8997 – *Release information*: updated. – Section 4.2.1.1 "Wi-Fi pre-certifications ": updated. – Section 4.2.2 "Wi-Fi throughput": updated. – Firmware version 16.92.21.p119.3 to 16.92.21.p137.2: removed. – Section 4.2.4.10 "Firmware version 16.92.21.p119.3 to 16.92.21.p137.4": added. – Section 4.2.5 "Known issues": updated. ———— *Continues* ————

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Revision history...*continued*

Document ID	Date	Change details
RN00104 v.16.0	27 February 2025	———— *Continued* ———— • SDIO-UART 88W9098 – *Release information*: updated. – Section 4.5.1 "Wi-Fi and Bluetooth certification": updated. – Section 4.5.2 "Wi-Fi throughput": updated. – Firmware version 17.92.1.p149.43 to 17.92.1.p149.155: removed. – Section 4.5.4.7 "Firmware version 17.92.1.p149.43 to 17.92.1.p149.157": added. – Section 4.5.4.8 "Firmware version 17.92.1.p149.157 to 17.92.1.p149.53": added. – Section 4.5.5 "Known issues": updated. • SDIO-UART IW611/IW612 – *Release information*: updated. – Section 4.6.1.1 "Wi-Fi pre-certification": updated. – Section 4.6.2 "Wi-Fi throughput": updated. – Section 4.6.4.7 "Firmware version 18.99.3.p15.13 to 18.99.3.p21.15": added. – Section 4.6.5 "Known issues": updated. – Section 4.6.6 "Notes ": updated • Section 4.7 "SDIO-UART IW610": added • SDIO-UART 88W8987 – *Release information*: updated. – Section 4.9.1 "Wi-Fi and Bluetooth certification": updated. – Section 4.9.2 "Wi-Fi throughput": updated. – Firmware version 16.92.2 p119.3 to 16.92.21.p137.2: removed – Section 4.9.4.3 "Firmware version 16.92.2.p119.3 to 16.92.21.p137.4": added. – Section 4.9.4.4 "Firmware version 16.92.21p137.4 to 16.92.21.p142.3": added. • SDIO-UART IW416 – *Release information*: updated. – Section 4.10.1 "Wi-Fi and Bluetooth certification": updated. – Section 4.10.2 "Wi-Fi throughput": updated. – Firmware version 16.92.2.p119.11 to 16.92.21.p137.2: removed. – Section 4.10.4.8 "Firmware version 16.92.2.p119.11 to 16.92.21.p137.4": added. – Section 4.10.4.9 "Firmware version 16.92.2.p137.4 to 16.92.21.p142.3": added. – Section 4.10.5 "Known issues": updated. ———— *Continues* ————

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Revision history...*continued*

Document ID	Date	Change details
RN00104 v.16.0	27 February 2025	———— *Continued* ———— • Section *SDIO 88W8801*: updated • Section 8 "References": updated.
RN00104 v.15.0	2 October 2024	• Section 4 "Release notes for the supported SoCs": updated MM6X17437 driver patch version to p30. • Removed the section *Software release content*.
RN00104 v.14.0	25 September 2024	• Section 1 "About this document": updated the release version. • Section 2.2 "Wi-Fi utilities (mlanutl)": updated the release version. • Feature list – Section 3.1.1 "Client mode": updated. – Section 3.1.2 "AP mode": updated. – Section 3.1.3 "Wi-Fi Direct ": updated. – Section 3.2.1 "Bluetooth classic": updated. – Section 3.5 "Zigbee": updated. • PCIe-UART 88W9098 – *Release information*: updated. – Section 4.1.1.1 "Wi-Fi pre-certification ": updated. – Section 4.1.2 "Wi-Fi throughput": updated. – Section 4.1.4.10 "Firmware version 17.92.1.p149.43 to 17.92.1.p149.157": added. – Section 4.1.5 "Known issues": updated. • SDIO-UART 88W8997 – *Release information*: updated. – Section 4.4.1.1 "Wi-Fi pre-certifications": updated. – Section 4.4.2 "Wi-Fi throughput": updated. – Section 4.4.4.8 "Firmware version 16.92.21.p119.3 to 16.92.21.p137.4": added. – Section 4.4.5 "Known issues": updated. • PCIe-UART 88W8997 – *Release information*: updated. – Section 4.2.1.1 "Wi-Fi pre-certifications ": updated. – Section 4.2.2 "Wi-Fi throughput": updated. – Section 4.2.4.10 "Firmware version 16.92.21.p119.3 to 16.92.21.p137.4": added. – Section 4.2.5 "Known issues": updated. ———— continues ————

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Document ID	Date	Change details
RN00104 v.14.0	25 September 2024	———— continued ———— • SDIO-UART 88W9098 – *Release information*: updated. – Section 4.5.1.1 "Wi-Fi pre-certification": updated – Section 4.5.2 "Wi-Fi throughput": updated. – Section 4.5.4.7 "Firmware version 17.92.1.p149.43 to 17.92.1.p149.157": added. – Section 4.5.5 "Known issues": updated. • SDIO-UART IW611/IW612 – Section 4.6 "SDIO-UART IW611/IW612": replaced IW612 with IW61x. – *Release information*: updated. – Section 4.6.1.1 "Wi-Fi pre-certification": updated. – Section 4.6.2 "Wi-Fi throughput": updated. – Section 4.6.4.5 "Firmware version 18.99.3.p10.1 to 18.99.3.p15.8": added. – Section 4.6.5 "Known issues": updated. • SDIO-UART 88W8987 – *Release information*: updated. – Section 4.9.1.1 "WFA certifications": updated. – Section 4.9.2 "Wi-Fi throughput": updated. – Section 4.9.4.3 "Firmware version 16.92.2.p119.3 to 16.92.21.p137.4": added. – Section 4.9.5 "Known issues": updated. • SDIO-UART IW416 – *Release information*: updated. – Section 4.10.1.1 "WFA certifications": updated. – Section 4.10.2 "Wi-Fi throughput": updated. – Section 4.10.4.8 "Firmware version 16.92.2.p119.11 to 16.92.21.p137.4": added. – Section 4.10.5 "Known issues": updated. • Section *SDIO 88W8801*: updated.

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Document ID	Date	Change details
RN00104 v.13.0	26 June 2024	• Section 1 "About this document": updated the release version. • Section 1.1 "Supported SoCs": updated for IW611 and IW612. • Section 2.2 "Wi-Fi utilities (mlanutl)": updated the release version. • Section *Software release content*: added. • Feature list – Section 3.1.1 "Client mode": updated. – Section 3.1.2 "AP mode": updated. – Section 3.1.3 "Wi-Fi Direct ": updated. – Section 3.2.1 "Bluetooth classic": updated. – Section 3.3 "Thread": updated. – Section 3.5 "Zigbee": added. • PCIe-UART 88W9098 – *Release information*: updated. – Section 4.1.1.1 "Wi-Fi pre-certification ": updated. – Section 4.1.2 "Wi-Fi throughput": updated. – Section 4.1.4.9 "Firmware version 17.92.1.p149.131 to 17.92.1.p149.43": added. • SDIO-UART 88W8997 – *Release information*: updated. – Section 4.4.1.1 "Wi-Fi pre-certifications": updated. – Section 4.4.2 "Wi-Fi throughput": updated. • PCIe-UART 88W8997 – *Release information*: updated. – Section 4.2.1.1 "Wi-Fi pre-certifications ": updated. – Section 4.2.2 "Wi-Fi throughput": updated. • SDIO-UART 88W9098 – *Release information*: updated.. – Section 4.5.1.1 "Wi-Fi pre-certification": updated – Section 4.5.2 "Wi-Fi throughput": updated. – Section 4.5.4.6 "Firmware version 17.92.1.p149.131 to 17.92.1.p149.43": added. ————*Continues* ————

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Revision history...*continued*

Document ID	Date	Change details
RN00104 v.13.0	26 June 2024	———— *Continued* ———— • SDIO-UART IW611/IW612 – Section 4.6 "SDIO-UART IW611/IW612": replaced IW612 with IW61x. – *Release information*: updated. – Section 4.6.1.1 "Wi-Fi pre-certification": updated. – Section 4.6.1.3 "Thread and Matter certification": added. – Section 4.6.2 "Wi-Fi throughput": updated. – Section 4.6.4.4 "Firmware version 18.99.2.p66.17 to 18.99.3.p10.1": added. – Section 4.6.5 "Known issues": updated. – Section 4.6.6 "Notes ": updated. • SDIO-UART 88W8987 *Release information*: updated. • SDIO-UART IW416 – *Release information*: updated. – Section 4.10.1.1 "WFA certifications": updated. – Section 4.10.2.5 "Mobile AP throughput ": updated. • Section *SDIO 88W8801*: updated • Section 8 "References": updated.

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Revision history...*continued*

Document ID	Date	Change details
RN00104 v.12.0	27 March 2024	• Section 1 "About this document": updated the release version. • Section 2.2 "Wi-Fi utilities (mlanutl)": updated the release version. • Feature list – Section 3.1.1 "Client mode": updated. – Section 3.1.2 "AP mode": update. – Section 3.1.3 "Wi-Fi Direct ": updated. – Section 3.2.1 "Bluetooth classic": updated. – Section 3.2.2 "Bluetooth LE": updated. – Section 3.3 "Thread": updated. – Section 3.5 "Zigbee": added. • PCIe-UART 88W9098 – *Release information*: updated. – Section 4.1.1.1 "Wi-Fi pre-certification ": updated. – Section 4.1.2 "Wi-Fi throughput": updated. – Section 4.1.4.8 "Firmware version 17.92.1.p136.132 to 17.92.1.p149.131": added. – Section 4.1.5 "Known issues": updated. • SDIO-UART 88W8997 – *Release information*: updated. – Section 4.4.1.1 "Wi-Fi pre-certifications": updated. – Section 4.4.2 "Wi-Fi throughput": updated. – Section 4.4.4.7 "Firmware version 16.92.21.p84.4 to 16.92.21.p119.3": added. • PCIe-UART 88W8997 – *Release information*: updated. – Section 4.2.1.1 "Wi-Fi pre-certifications ": updated. – Section 4.2.2 "Wi-Fi throughput": updated. – Section 4.2.4.9 "Firmware version 16.92.21.p84.4 to 16.92.21.p119.3": added. – Section 4.2.5 "Known issues": updated. • SDIO-UART 88W9098 – *Release information*: updated. – Section 4.5.1.1 "Wi-Fi pre-certification": updated – Section 4.5.2 "Wi-Fi throughput": updated. – Section 4.5.4.5 "Firmware version 17.92.1.p136.131 to 17.92.1.p149.131": updated. – Section 4.5.5 "Known issues": updated. ————*Continues* ————

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Revision history...*continued*

Document ID	Date	Change details
RN00104 v.12,0	27 March 2024	———— *Continued* ———— • SDIO-UART IW61x – Section 4.6 "SDIO-UART IW611/IW612": replaced IW612 with IW61x. – *Release information*: updated. – Section 4.6.1.1 "Wi-Fi pre-certification": updated. – Section 4.6.2 "Wi-Fi throughput": updated. – Section 4.6.4.3 "Firmware version 18.18.99.2.p66.10 to 18.99.2.p66.17": added. – Section 4.6.5 "Known issues": updated. – Section 4.6.6 "Notes ": added. • SDIO-UART 88W8987 – *Release information*: updated. – Section 4.9.1.1 "WFA certifications": updated. – Section 4.9.2 "Wi-Fi throughput": updated. – Section 4.9.4.2 "Firmware version 16.92.p99.2 to 16.92.2. p119.3": added. – Section 4.9.5 "Known issues": updated. • SDIO-UART IW416 – *Release information*: updated. – Section 4.10.1.1 "WFA certifications": updated. – Section 4.10.2 "Wi-Fi throughput": updated. – Section 4.10.4.7 "Firmware version 16.92.21.p84.3 to 16.92.2.p119.11": updated. – Section 4.10.5 "Known issues": updated. • Section *SDIO 88W8801*: updated

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Revision history...*continued*

Document ID	Date	Change details
RN00104 v.11.0	13 December 2023	• Section 1 "About this document": updated. • Section 1.1 "Supported SoCs": replaced IW612 with IW61x. • Section 2.2 "Wi-Fi utilities (mlanutl)": updated. • Feature list – Section 3.1.1 "Client mode": updated. – Section 3.1.2 "AP mode": updated. – Section 3.1.3 "Wi-Fi Direct ": updated. – Section 3.2.1 "Bluetooth classic": updated. – Section 3.2.2 "Bluetooth LE": updated. – Section 3.3 "Thread": updated. • PCIe-UART 88W9098 – *Release information*: updated. – Section 4.1.4.7 "Firmware version 17.92.1.p136.131 to 17.92.1.p136.132": added. • SDIO-UART 88W8997 – *Release information*: updated. • PCIe-UART 88W8997 – *Release information*: updated. • SDIO-UART 88W9098 – *Release information*: updated. – Section 4.5.5 "Known issues": updated. – Section 4.5.4.5 "Firmware version 17.92.1.p136.131 to 17.92.1.p149.131": added. • SDIO-UART IW61x – Section 4.6 "SDIO-UART IW611/IW612": replaced IW612 with IW61x. – *Release information*: updated. – Section 4.6.2.2 "STA throughput": updated. – Section 4.6.2.4 "P2P-GC Throughput": updated. – Section 4.6.2.5 "Mobile AP Throughput": updated. – Section 4.6.2.6 "OpenThread throughput test": added. – Section 4.6.4.1 "Firmware version 18.99.1.p154.40 to 18.99.2.p19.15": updated. – Section 4.6.4.2 "Firmware version 18.99.2.p19.15 to 18.99.2.p66.10": added. – Section 4.6.5 "Known issues": updated. ————*Continues* ————

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Revision history...*continued*

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