

RN00104

NXP Wireless SoC Features and Release Notes for Linux

Rev. 19.0 — 6 May 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-Wi-Fi-UART-BT-FP99-IW610, SD-Wi-Fi-FP92-88W8801
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.6.12.3_1.0.0.

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
- SD-Wi-Fi-UART-BT-FP99-IW610
- SD-Wi-Fi-FP92-88W8801

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 \(mланutl\)"](#)
- [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 (mланutl)

The mлан utility (mланutl) is not part of the Linux BSP image version v.6.12.3_1.0.0 nor the GitHub source release tag: `1f-6.12.3_1.0.0`.

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.\[6\]](#).
- To get NXP Bluetooth UART driver and bring up the Bluetooth interface, see [ref.\[5\]](#).

2.4 Wi-Fi patch

Intermediate fixes are posted on the website [ref.\[9\]](#). [Figure 1](#) shows an example.

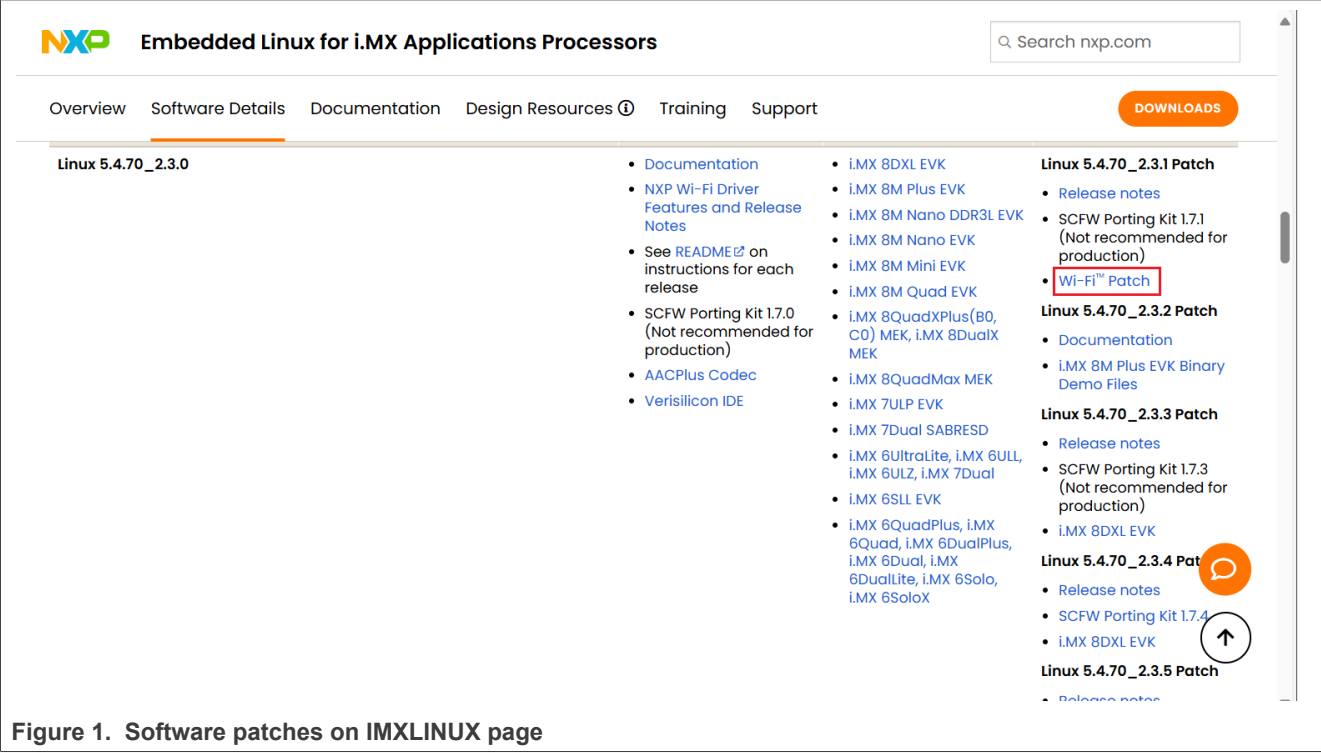


Figure 1. Software patches on IMXLINUX page

3 Feature lists

3.1 Wi-Fi radio

3.1.1 Client mode

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

Features	Sub features	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	88W8801
802.11n High Throughput	2.4 GHz band supported channel bandwidth: 20 MHz	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	N	Y	N
	5 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	Y	N
	5 GHz band supported channel bandwidth: 40 MHz	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
	Data rates up to 72 Mbit/s (MCS 0 to MCS 7)	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	N	Y	N
	Data rates up to 300 Mbit/s (MCS 0 to MCS 15)	Y	Y	Y	N	Y	N	N	N	N
	1 spatial stream (1x1)	Y	Y	Y	Y	Y	Y	Y	Y	Y
	2 spatial stream (2x2)	Y	Y	Y	N	Y	N	N	N	N
	HT protection mechanisms	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Explicit Beamformee	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
	Aggregated MAC Service Data Unit(AMSDU) -4k RX support	Y	Y	Y	Y	Y	Y	Y	Y	Y
	20 MHz/40 MHz coexistence	Y	Y	Y	Y	Y	N	N	N	N
	TX MCS rate adaptation (BGN)	Y	Y	Y	Y	Y	Y	Y	Y	Y
	RX and TX space time block coding for 2x2 (STBC)	N	Y	N	N	Y	N	N	N	N
	RX low-density parity check (LDPC)	Y	Y	Y	Y	Y	Y	N	N	N
	AMSDU over AMPDU support	Y	Y	Y	Y	Y	Y	Y	Y	Y

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

Features	Sub features	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	
802.11ac Very High Throughput	5 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	N	N
	5 GHz band supported channel bandwidth: 40 MHz	Y	Y	Y	Y	Y	Y	N	N	N
	5 GHz band supported channel bandwidth: 80 MHz	Y	Y	Y	Y	Y	Y	N	N	N
	Data rates up to 433.3 Mbit/ s (MCS0 to MCS9)	Y	Y	Y	Y	Y	Y	N	N	N
	Data rates up to 866.7 Mbit/ s (MCS0 to MCS9)	Y	Y	Y	N	Y	N	N	N	N
	Short/Long Guard Interval (400ns/800ns)	Y	Y	Y	Y	Y	Y	Y	N	N
	SU-AMPDU Aggregation	Y	Y	Y	Y	Y	Y	Y	N	N
	MU-MIMO Beamformee (Explicit and Implicit)	Y	Y	Y	Y	Y	Y	Y	N	N
	SU-Beamformee	Y	Y	Y	Y	Y	Y	Y	N	N
	MU-MIMO RX – Wave 2	Y	Y	Y	Y	Y	Y	Y	N	N
	RTS/CTS with BW Signaling	Y	Y	Y	Y	Y	Y	N	N	N
	Operation Mode Notification	Y	Y	Y	Y	Y	Y	Y	N	N
	Backward compatibility with non-VHT devices	Y	Y	Y	Y	Y	Y	Y	N	N
	TX VHT MCS Rate Adaptation	Y	Y	Y	Y	Y	Y	Y	N	N
	LDPC	Y	Y	Y	Y	Y	Y	N	N	N
	256 QAM Modulation – MCS 8 and MCS9	Y	Y	Y	Y	Y	Y	Y	Y	N

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

Features	Sub features	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	
802.11ax High Efficiency	5 GHz band supported channel bandwidth: 20 MHz	Y	N	Y	Y	N	N	Y	N	N
	5 GHz band supported channel bandwidth: 40 MHz	Y	N	Y	Y	N	N	N	N	N
	5 GHz band supported channel bandwidth: 80 MHz	Y	N	Y	Y	N	N	N	N	N
	2.4 GHz band supported channel bandwidth: 20 MHz	Y	N	Y	Y	N	N	Y	N	N
	2.4 GHz band supported channel bandwidth: 40 MHz ^[1]	Y	N	Y	Y	N	N	N	N	N
	Data rates up to 1.2 Gbit/s (MCS 0 to MCS 11) - 2x2	Y	N	Y	N	N	N	N	N	N
	Data rates up to 600 Mbit/s (MCS 0 to MCS 11) - 1x1	Y	N	Y	Y	N	N	Y	N	N
	Operating Mode Indication (OMI) control	Y	N	Y	Y	N	N	N	N	N
	2x/4x HE Long Training Field (LTF)	Y	N	Y	Y	N	N	N	N	N
	Target wake-up Time	Y	N	Y	Y	N	N	Y	N	N
	1024 QAM modulation – MCS10-MCS11	Y ^[2]	N	Y	Y	N	N	N	N	N
	256 QAM modulation – MCS8 and MCS9	Y	N	Y	Y	N	N	Y	N	N
	Spatial reuse	N	N	N	Y	N	N	Y	N	N
	SU beamforming	Y	N	Y	Y	N	N	N	N	N
	UL (TX) and DL (RX) MU-MIMO	Y	N	Y	Y	N	N	Y	N	N
	UL (TX) and DL (RX) OFDMA	Y	N	Y	Y	N	N	Y	N	N
	OFDMA (UL/DL, 484 RU)	Y	N	Y	Y	N	N	N	N	N
	BSS coloring	Y	N	Y	Y	N	N	Y	N	N
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
	802.11a data rates up to 54 Mbit/s	Y	Y	Y	Y	Y	Y	Y	Y	N
	TX rate adaptation (BG)	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Fragmentation/defragmentation	Y	Y	Y	Y	Y	Y	Y	Y	Y
	ERP protection, slot time, preamble	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

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

Features	Sub features	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	88W8801
802.11d 802.11h	802.11d regulatory domain/ operating class/country info	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Per-path regulatory power table ^[1]	N	N	N	Y	N	Y	N	N	N
	802.11h – Dynamic Frequency Selection (DFS)	Y	Y	Y	Y	Y	Y	Y	Y	N
	DFS radar Detection in follower Mode (Follow AP)	Y	Y	Y	Y	Y	Y	Y	Y	N
802.11e QoS	EDCA [Enhanced Distributed Channel Access] / WMM (Wireless Multi-Media)	Y	Y	Y	Y	Y	Y	Y	Y	Y

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

Features	Sub features	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	
802.11i Security	Open source WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y
	WEP-64/128 WPA Supplicant	Y	N	Y	Y	N	N	Y	N	N
	WPA-PSK TKIP WPA Supplicant	Y	N	Y	N	N	N	Y	N	N
	WPA2-PSK AES WPA Supplicant	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
	Wi-Fi Enhanced Open - OWE (Opportunistic Wireless Encryption) WPA Supplicant	Y	N	Y	Y	N	Y	Y	N	N
	802.1x EAP authentication Methods WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y
	WPA2-Enterprise GCMP WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	N	N
	WPA2-Enterprise Mixed Mode WPA Supplicant	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	N	N
	802.11w - PMF (Protected Management Frames) WPA Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y
	WAPI WPA Supplicant	Y	N	Y	Y	N	N	Y	N	N
	Embedded Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y
	STA - WEP-64/128 Embedded Supplicant	Y	N	Y	Y	N	N	Y	N	N
	STA - WPA-PSK TKIP Embedded Supplicant	Y	N	Y	Y	N	N	Y	N	N
	STA - WPA2-PSK AES Embedded Supplicant	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
	STA - WPA3-SAE (Simultaneous authentication of Equals) Embedded Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	N
	STA - 802.11w - PMF (Protected Management Frames) Embedded Supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y
	WPA3 Enterprise	Y	Y	Y	Y	Y	Y	Y	Y	Y

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

Features	Sub features	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	
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
802.11k	802.11k	Y	Y	Y	Y	Y	Y	Y	Y	N
802.11v	802.11v	Y	Y	Y	Y	Y	Y	Y	Y	N
802.11z	802.11z (Host based TDLS)	Y	Y	Y	Y	Y	Y	N	Y	N
802.11az	New generation Wi-Fi Location	N	N	N	Y	N	N	Y	N	N
802.11mc	Wi-Fi location ^[1]	Y	N	Y	Y	N	N	Y	N	N
FIPS	FIPS support	Y	Y	Y	Y	Y	Y	Y	Y	N
WPS/ WSC2.0 functionality	PIN Config Method - 8 Digit/4 Digit	Y	Y	Y	Y	Y	Y	Y	Y	Y
	PIN Config Method - Static/ Dynamic PIN	Y	Y	Y	Y	Y	Y	Y	Y	Y
	PBC - Virtual Push Button Config Method	Y	Y	Y	Y	Y	Y	Y	Y	Y
	PBC Session Overlap Detection	Y	Y	Y	Y	Y	Y	Y	Y	Y
	STA as Enrollee	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Backward compatibility with WPS1.0 Devices	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Open source WPA supplicant	Y	Y	Y	Y	Y	Y	Y	Y	Y
DPP functionality	Wi-Fi Easy Connect	Y	Y	Y	Y	Y	Y	Y	Y	N
Power-save mode	Deep sleep	Y	Y	Y	Y	Y	Y	Y	Y	Y
	IEEE power save	Y	Y	Y	Y	Y	Y	Y	Y	Y
	U-APSD / WMM power save ^[1]	Y	Y	Y	Y	Y	Y	Y	Y	N

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

Features	Sub features	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	
General features	EU adaptivity support	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Wake on Wireless (WoW) in-band	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Wake on Wireless (WoW) out-of-band	Y	Y	Y	Y	Y	Y	Y	Y	N
	Auto TX ^[1]	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Cloud keep alive (TX and RX) ^[1]	N	N	N	Y	N	N	N	N	N
	MAC Address randomization(in Scan)	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Host-based MLME ^[3]	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
	Extended channel switch announcement (ECSA)	Y	Y	Y	Y	Y	Y	Y	Y	N
	Independent reset (In-band)	Y	Y	Y	Y	Y	Y	Y	Y	N
	Wi-Fi agile multiband	Y	Y	Y	Y	Y	Y	Y	Y	N
	Wireless Apple CarPlay (R5)	Y	N	Y	Y	N	Y	N	N	N
	CSI ^[1]	Y	Y	Y	Y	Y	Y	Y	N	N
	CSI Monitor Mode ^[1]	Y	Y	Y	Y	Y	Y	Y	N	N
	Packet coalescing ^[1]	Y	Y	Y	Y	Y	Y	N	Y	N
	mDNS (Bonjour) offload	N	Y	N	Y	Y	Y	N	Y	N
	mDNS wake on match	Y	Y	Y	Y	Y	Y	N	Y	N
	IPv6 NS offload	N	Y	N	Y	Y	Y	Y	Y	N
	Extended range ^[1]	Y	N	Y	Y	N	N	Y	N	N
	Clock sync ^[1]	Y	Y	Y	Y	Y	N	N	N	N
	DCM	Y	N	Y	Y	N	N	Y	N	N
	UNII_4 Channel Support	Y	N	Y	Y	N	N	Y	N	N
	NAPI Support	Y	Y	Y	Y	Y	Y	Y	Y	N
	Auto reconnect	Y	Y	Y	Y	Y	Y	N	Y	N
	Band steering (AGO + AGO and P2P)	Y	N	Y	N	N	N	N	N	N
	Sniffer mode ^[1]	Y	Y	Y	Y	Y	Y	Y	Y	N
	Wireless Android (auto projection mode)	N	N	N	Y	N	N	N	N	N
	Android automotive OS	Y	N	Y	Y	N	Y	N	N	N
	Specific scan (scancfg)	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Network scan (iwlist scan)	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Cancelable scan	Y	Y	Y	Y	Y	Y	Y	Y	N

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

Features	Sub features	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	88W8801
General features (continued)	Passive to active scan	Y	Y	Y	Y	Y	Y	Y	Y	N
	Software Antenna Diversity ^[1]	N	N	N	Y	N	Y	Y	Y	Y
	EasyMesh ^[1]	Y	N	Y	Y	N	N	N	N	N
	Neighbor aware networking (NAN) ^[1]	N	N	N	Y	N	N	N	N	N
	Vendor specific IE (Custom IE)	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.

3.1.2 AP mode

Feature list for Wi-Fi radio and AP mode

Features	Sub features	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	88W8801
802.11n – High Throughput	2.4 GHz band supported channel bandwidth: 20 MHz	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	N	Y	N
	5 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	Y	N
	5 GHz band supported channel bandwidth: 40 MHz	Y	Y	Y	Y	Y	Y	N	Y	N
	1 spatial stream (1x1)	Y	Y	Y	Y	Y	Y	Y	Y	Y
	2 spatial stream (2x2)	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
	802.11n data rates up to 72 Mbit/s (MCS0 to MCS7)	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	N	Y	N
	802.11n data rates up to 300 Mbit/s (MCS0 to MCS15)	Y	Y	Y	N	Y	N	N	N	N
	TX MCS rate adaptation (BGN)	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
	Aggregated MAC service data unit (AMSDU) - 4k RX support	Y	Y	Y	Y	Y	Y	Y	Y	Y
	HT protection mechanisms	Y	Y	Y	Y	Y	Y	Y	Y	Y
	RX and TX space time block coding (STBC)	Y	Y	Y	N	Y	N	N	N	N
	20/40 MHz coexistence	Y	Y	Y	Y	Y	N	N	N	N
802.11 b/g Features	Explicit beamformer	Y	N	Y	Y	N	N	N	N	N
	RX Low-density parity check (LDPC)	Y	Y	Y	Y	Y	Y	Y	Y	N
	802.11 b/g data rates up to 54 Mbit/s	Y	Y	Y	Y	Y	Y	Y	Y	Y
	TX rate adaptation (BG)	Y	Y	Y	Y	Y	Y	Y	Y	Y
	ERP protection, slot time, preamble	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

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

Features	Sub features	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	88W8801
802.11 ac - Very High Throughput	5 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	N	N
	5 GHz band supported channel bandwidth: 40 MHz	Y	Y	Y	Y	Y	Y	N	N	N
	5 GHz band supported channel bandwidth: 80 MHz	Y	Y	Y	Y	Y	Y	N	N	N
	Short/Long Guard Interval (400ns/800ns)	Y	Y	Y	Y	Y	Y	Y	N	N
	802.11ac data rates up to 433.3 Mbps (MCS 0 to MCS 9) 1SS	Y	Y	Y	Y	Y	Y	Y	N	N
	802.11ac Data rates up to 866.7 Mbps (MCS 0 to MCS 9) 2SS	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	N	N
	RTS/CTS with BW Signaling	Y	Y	Y	Y	Y	Y	Y	N	N
	Backward Compatibility with non-VHT devices	Y	Y	Y	Y	Y	Y	Y	N	N
	TX VHT MCS Rate Adaptation	Y	Y	Y	Y	Y	Y	Y	N	N
	Operation mode notification	Y	Y	Y	Y	Y	Y	Y	N	N
	SU Explicit beamformer	Y	N	Y	N	N	N	N	N	N
	Low-density parity check (LDPC)	Y	Y	Y	Y	Y	Y	N	N	N
802.11 ax – High Efficiency	5 GHz band supported channel bandwidth: 20 MHz	Y	N	Y	Y	N	N	Y	N	N
	5 GHz band supported channel bandwidth: 40 MHz	Y	N	Y	Y	N	N	N	N	N
	5 GHz band supported channel bandwidth: 80 MHz	Y	N	Y	Y	N	N	N	N	N
	Operating Mode Indication (OMI) Control	Y	N	Y	Y	N	N	N	N	N
	2x/4x HE-Long Training Field (LTF)	Y	N	Y	N	N	N	N	N	N
	1024 QAM	Y	N	Y	Y	N	N	N	N	N
	BSS color	Y	N	Y	Y	N	N	Y	N	N
	HE SU beamformer (explicit)	Y	N	Y	N	N	N	N	N	N
802.11d	802.11d - Regulatory Domain/Operating Class/ Country Info	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11h	802.11h - Dynamic Frequency Selection (DFS)	Y	Y	Y	Y	Y	Y	N	Y	N
	Zero Wait DFS	Y	N	Y	N	N	N	N	N	N

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

Features	Sub features	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	
802.11e - QoS	EDCA [Enhanced Distributed Channel Access] / WMM (Wireless Multi-Media)	Y	Y	Y	Y	Y	Y	Y	Y	Y
802.11az	New generation Wi-Fi Location ^[1]	N	N	N	Y	N	N	N	N	N
802.11i - Security	Hostapd support	Y	Y	Y	Y	Y	Y	Y	Y	Y
	WEP-64/128 hostapd	Y	N	Y	Y	N	N	Y	N	N
	WPA-PSK TKIP hostapd	Y	N	Y	N	N	N	Y	N	N
	WPA2-PSK AES hostapd	Y	Y	Y	Y	Y	Y	Y	Y	Y
	WPA+WPA2 PSK Mixed Mode hostapd	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
	802.1x EAP Authentication Methods hostapd	Y	Y	Y	Y	Y	Y	Y	Y	Y
	WPA2-Enterprise Mixed Mode hostapd	Y	Y	Y	Y	Y	Y	Y	Y	Y
	WPA3-Enterprise (Suite-B) National Security Algorithm (CSNA) hostapd	Y	N	Y	Y	N	Y	N	N	N
	802.11w - PMF (Protected Management Frames) Hostpad	Y	Y	Y	Y	Y	Y	Y	Y	Y
	WAPI wpa_supplicant	Y	N	Y	Y	N	N	Y	N	N
	Embedded Authenticator	Y	Y	Y	Y	Y	Y	Y	Y	Y
	WEP-64/128 Embedded Supplicant	Y	N	Y	Y	N	N	Y	N	N
	WPA-PSK TKIP Embedded Supplicant	Y	N	Y	Y	N	N	Y	N	N
	WPA2-PSK AES Embedded Supplicant	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
	WPA3-SAE (Simultaneous Authentication of Equals) Embedded Supplicant	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

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

Features	Sub features	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	88W8801
WPS/ WSC2.0 functionality	PIN Config Method - 8 Digit/4 Digit	Y	Y	Y	Y	Y	Y	Y	Y	Y
	PIN Config Method - Static/ Dynamic PIN	Y	Y	Y	Y	Y	Y	Y	Y	Y
	PBC - Virtual Push Button Config Method	Y	Y	Y	Y	Y	Y	Y	Y	Y
	PBC Session Overlap Detection	Y	Y	Y	Y	Y	Y	Y	Y	Y
	AP Setup Locked State - PIN Method	Y	Y	Y	Y	Y	Y	Y	Y	Y
	MMH as Wireless Registrar	Y	Y	Y	Y	Y	Y	Y	Y	Y
	MMH as Enrollee	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Opensource Hostapd	Y	Y	Y	Y	Y	Y	Y	Y	Y

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

Features	Sub features	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	88W8801
General features	EU adaptivity support	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Automatic channel selection (ACS)	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Host-based MLME ^[2]	Y	Y	Y	Y	Y	Y	Y	Y	Y
	MBSS	Y	Y	Y	Y	Y	Y	Y	N	N
	Extended channel switch announcement (ECSA)	Y	Y	Y	Y	Y	Y	Y	Y	N
	Driver load time parameters for manufacturing mode	Y	N	Y	N	N	N	N	N	N
	Max supported stations	64	8	64	16	8	8	8	8	8
	Independent reset (in-band)	Y	Y	Y	Y	Y	Y	Y	Y	N
	Independent reset (out-of-band)	Y	Y	Y	Y	Y	Y	Y	Y	N
	Hidden SSID (broadcast SSID disabled)	Y	Y	Y	Y	Y	Y	Y	Y	Y
	MAC address filter (allowed/denied list)	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Maximum STA MAC address filtering	64	8	64	16	8	8	8	8	8
	STA age out feature for associated clients	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Extended range (partially advertise) ^[1]	Y	N	Y	Y	N	N	Y	N	N
	Configurable retry limit	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Configurable unicast data rate	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Configurable broadcast/multicast data rate	Y	Y	Y	Y	Y	Y	Y	Y	Y
	uAP events	Y	Y	Y	Y	Y	Y	Y	Y	Y
	DFS radar detection (leader)	Y	Y	Y	Y	Y	Y	Y	Y	Y
	UNII_4 channel support	Y	N	Y	Y	N	N	Y	N	N
	Host sleep (WOW) in band and out-of-band	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
	NAPI support	Y	Y	Y	Y	Y	Y	Y	Y	N
	Vendor specific ie (custom IE)	Y	Y	Y	Y	Y	Y	Y	Y	Y
	EasyMesh ^[1]	Y	N	Y	Y	N	N	N	N	N
	Neighbor aware networking (NAN) ^[1]	Y	N	Y	Y	N	N	Y	N	N
	Vendor defined TX power config (TXpower Config V3)	Y	N	Y	N	N	N	N	N	N

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

[2] Feature is enabled by default in software.

3.1.3 Wi-Fi Direct

Feature list for Wi-Fi Direct/P2P mode

Feature	Sub feature	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	88W8801
P2P basic functionality	WFD Client Mode	Y	Y	Y	Y	Y	Y	Y	Y	Y
	P2P for Miracast	Y	Y	Y	Y	Y	Y	Y	Y	N
	P2P Device Mode	Y	Y	Y	Y	Y	Y	Y	Y	Y

Feature list for Wi-Fi Direct AP-STA mode

Feature	Sub feature	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	88W8801
P2P Basic Functionality	Autonomous GO Mode	Y	Y	Y	Y	Y	Y	Y	Y	Y
	WFD Client Mode	Y	Y	Y	Y	Y	Y	Y	Y	Y
	P2P for Miracast	Y	Y	Y	Y	Y	Y	Y	Y	N
	P2P Device Mode	Y	Y	Y	Y	Y	Y	Y	Y	Y
Simultaneous AP-STA Operation (Same Channel)	AP-STA functionality	Y	Y	Y	Y	Y	Y	Y	Y	Y
Dynamic Rapid Channel Switch	DRCS ^[1]	Y	N	Y	Y	N	N	Y	Y	N
Multiple Wi-Fi MAC	Multiple Wi-Fi MAC	Y	N	Y	N	N	N	N	N	N
RF Test Mode	RF Test Mode functionality	Y	Y	Y	Y	Y	Y	Y	Y	Y
TX power config	TX power config ^[1]	Y	Y	Y	Y	Y	Y	Y	Y	Y
Deep sleep on unload	Deep sleep on unload	N	N	N	Y	N	Y	N	N	N
Auto FW recovery	Auto FW recovery on fatal error	Y	Y	Y	Y	Y	Y	Y	Y	N
Auto ARP and Ping	Auto ARP and Ping support	Y	Y	Y	Y	Y	Y	Y	Y	N
AP – P2P(Client)	DRCS	Y	N	Y	Y	N	Y	Y	Y	N
STA – P2P(GO)	DRCS	Y	N	Y	Y	N	Y	Y	Y	N
AP – P2P(GO)	DRCS	Y	N	Y	Y	N	Y	Y	Y	N
AP-STA-P2P	DRCS	Y	N	Y	Y	N	N	Y	N	N
AP-AP-STA	DRCS	Y	N	Y	Y	N	N	Y	N	N
AP – AP (MBSS)	DRCS	Y	N	Y	Y	N	N	Y	N	N

Feature list for Wi-Fi Direct AP-STA mode...continued

Feature	Sub feature	PCIe-UART		SDIO-UART						SDIO
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416	88W8801
AP – STA	DRCS	Y	N	Y	Y	N	Y	Y	Y	N
DMCS	Dual MAC Connection Services	Y	N	Y	N	N	N	N	N	N
Packet filtering/ Memory Efficient Filtering (MEF)	Packet filtering / Memory Efficient Filtering	Y	Y	Y	Y	Y	Y	Y	Y	Y

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

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			
m1an0	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.

3.2 Bluetooth

3.2.1 Bluetooth classic

Feature list for Bluetooth radio

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

Feature list for Bluetooth radio...continued

Feature	Sub feature	PCIe-UART		SDIO-UART				
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW416
General features (continued)	SCO/eSCO over PCM	Y	Y	Y	Y	Y	Y	Y
	SCO/eSCO over HCI	N	N	N	N	N	N	Y
	Dual SCO/eSCO	Y	N	Y	Y	N	N	N
	APCF feature support	Y	Y	Y	Y	Y	Y	Y
	Train nudging	N	N	N	Y	N	N	N
	Generalized interlaced scan	Y	N	Y	Y	N	N	N
	BR/EDR secure connections	N	N	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
	SCO (HV1, HV3)	Y	Y	Y	Y	Y	Y	Y
	eSCO (EV3, EV4, EV5, 2EV3, 3EV3, 2EV5, 3EV5)	Y	Y	Y	Y	Y	Y	Y
Bluetooth profiles supported	A2DP source/sink	Y	Y	Y	Y	Y	Y	Y
	AVRCP target/controller	Y	Y	Y	Y	Y	Y	Y
	HFP dev	Y	Y	Y	Y	Y	Y	Y
	OPP server/client	Y	Y	Y	Y	Y	Y	Y
	SPP	Y	Y	Y	Y	Y	Y	Y
	HID	Y	Y	Y	Y	Y	Y	Y
	GAP	Y	Y	Y	Y	Y	Y	Y
	HFP AG ^[3]	Y	Y	Y	Y	Y	Y	Y
	PAN server/client ^[3]	Y	Y	Y	Y	Y	Y	Y
	PBAP server/client ^[3]	Y	Y	Y	Y	Y	Y	Y
	MAP server/client ^[3]	Y	Y	Y	Y	Y	Y	Y
	A2DP SNK + HFP DEV ^[2]	Y	N	Y	Y	N	N	N
	A2DP SRC + HFP GW ^[2]	Y	N	Y	Y	N	N	N
Bluetooth dual profiles supported ^[3]	Dual A2DP (two sources)	Y	N	Y	Y	N	Y	N
	Dual A2DP (one source + one sink)	Y	N	Y	N	N	Y	N
	Dual HFP (two NBS) PCM	Y	N	Y	Y	N	Y	N
	Dual HFP (two WBS) PCM	Y	N	Y	Y	N	N	N
	Dual HFP (two WBS + one NBS) PCM	Y	N	Y	Y	N	Y	N
Bluetooth audio features	PCM NBS central/peripheral	Y	Y	Y	Y	Y	Y	Y
	PCM WBS central/peripheral	Y	Y	Y	Y	Y	Y	Y
	AAC and LDAC audio codec support	Y	N	Y	Y	N	N	N
RF test mode	RF test mode functionality	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	Sub features	PCIe-UART		SDIO-UART					
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416
General features	Maximum 16 Bluetooth LE connections(Central role)	Y	Y	Y	Y	Y	Y	Y	Y
	Independent reset (in-band and out-of-band) ^{[2] [1]}	Y	Y	Y	Y	N	Y	Y	Y
	Wake on Bluetooth LE (chip to host) ^[2]	Y	N	Y	Y	N	Y	N	Y
	Deep sleep (NXP UART driver)	Y	Y	Y	Y	Y	Y	N	Y
	Standalone Bluetooth LE AES encryption	Y	N	Y	Y	N	N	N	Y
	Bluetooth classic AES + Bluetooth LE AES encryption	N	N	N	Y	N	N	N	N
Bluetooth profile support	Bluetooth LE GATT	Y	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE HOGP	Y	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE GAP	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
	Low Energy link layer	Y	Y	Y	Y	Y	Y	Y	Y
	Enhancements to HCI for Low Energy	Y	Y	Y	Y	Y	Y	Y	Y
	Low Energy direct test mode	Y	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE - 1Mbit/s support	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
	Bluetooth LE Dual Mode Topology	Y	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE privacy v1.1	Y	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE link layer topology	Y	Y	Y	Y	Y	Y	Y	Y
Bluetooth 4.2 support	Bluetooth LE secure connection	Y	Y	Y	Y	Y	Y	N	Y
	Bluetooth LE link layer privacy v1.2	Y	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE data length extension	Y	Y	Y	Y	Y	Y	Y	Y
	Link layer extended scanner filter policies	Y	Y	Y	Y	Y	Y	Y	Y

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

Features	Sub features	PCIe-UART		SDIO-UART					
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416
Bluetooth 5.0 support	Bluetooth LE 2 Mbps support	Y	Y	Y	Y	Y	Y	Y	Y
	High duty cycle directed advertising	Y	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE multiple advertisement (4, or 5*, or 6**) sets	Y	Y	Y	Y**	Y	Y*	N	N
	Bluetooth LE extended advertisement	Y	N	Y	Y	N	N	Y	Y
	Bluetooth LE channel selection #2	Y	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE long range	Y	N	Y	Y	N	N	Y	Y
	Bluetooth LE periodic advertisement	N	N	N	Y	N	N	Y	Y
Bluetooth 5.2 support	Bluetooth LE power control	N	N	N	Y	N	N	Y	Y
	Isochronous channel ^[3]	N	N	N	Y	N	N	N	N
RF Test Mode	RF Test Mode functionality	Y	Y	Y	Y	Y	Y	N	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).

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

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	Sub features	PCIe-UART		SDIO-UART					
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416
Thread Device Roles	Border Router	N	N	N	Y	N	N	Y	N
	Router	N	N	N	Y	N	N	Y	N
	Router Eligible End Device (REED)	N	N	N	Y	N	N	Y	N
	Thread Leader	N	N	N	Y	N	N	Y	N
	Full End Device (FED)	N	N	N	Y	N	N	Y	N
	Minimal End Device (MED)	N	N	N	Y	N	N	Y	N
	Joiner	N	N	N	Y	N	N	Y	N
	Commissioner	N	N	N	Y	N	N	Y	N
Matter	Matter 1.2 with thread support matrix	N	N	N	Y	N	N	Y	N

3.4 Coexistence

3.4.1 Wi-Fi and Bluetooth coexistence

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

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

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

3.4.2 Wi-Fi and Bluetooth/802.15.4 coexistence

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

Features	Sub features	PCIe-UART		SDIO-UART					
		88W9098	88W8997	88W9098	IW611/ IW612	88W8997	88W8987	IW610	IW416
BCA-TDM mode (separate antenna) ^[1]	STA + Bluetooth + 802.15.4 Coex	N	N	N	Y	N	N	N	N
	STA + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	Y	N
	STA + Bluetooth + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	N	N
	AP + Bluetooth + 802.15.4 Coex	N	N	N	Y	N	N	N	N
	AP + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	Y	N
	AP + Bluetooth + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	N	N
	P2P + Bluetooth + 802.15.4 Coex	N	N	N	Y	N	N	N	N
	P2P + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	Y	N
	P2P + Bluetooth + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	N	N
	AP(5GHz) + AP(5GHz) + Bluetooth + 802.15.4 Coex	N	N	N	Y	N	N	N	N
	AP(5GHz) + AP(5GHz) + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	N	N
Security	Secure Boot	N	N	N	Y	N	N	Y	N

[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.

3.5 Zigbee

Table 5. Feature list for Zigbee

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

4 Release notes for the supported SoCs

4.1 PCIe-UART 88W9098

4.1.1 Package information

- BSP version: Linux 6.12.3_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 17.92.1.p149.60
- Driver version: MM6X17505.p14-GPL

4.1.2 Version information

- Wireless SoC: 88W9098
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 17.92.1.p149.60
 - 17 - Major revision
 - 92 - Feature pack
 - 1 - Release version
 - p149.60 - Patch number
- Driver Version: MM6X17505.p14-GPL
 - 6X - Linux 6.x Kernel
 - 17505 - Release version
 - p14 - Patch Number
 - GPL - General Public License V2

4.1.3 Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.12.3
- 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)

4.1.4 Wi-Fi and Bluetooth certification

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

4.1.4.1 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)

4.1.4.2 Bluetooth controller certification

see [ref.\[10\]](#).

4.1.5 Wi-Fi throughput

4.1.5.1 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

4.1.5.2 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	151	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

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	727	754
WPA2-AES	692	684	727	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	233	217	253	232
WPA2-AES	217	213	248	226
WPA3-SAE	221	212	252	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	454	456	493	497
WPA2-AES	434	457	487	498
WPA3-SAE	391	457	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	813	750	891	811
WPA2-AES	808	808	844	837
WPA3-SAE	822	729	896	849

4.1.5.3 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	686	693	724	740

4.1.5.4 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	697	687	722	734

4.1.5.5 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

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	169	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	202	252	247
WPA2-AES	236	229	251	249
WPA3-SAE	236	228	252	251

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	455	448	490	491
WPA2-AES	454	450	487	488
WPA3-SAE	453	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	782	798	903	916
WPA2-AES	779	790	842	908
WPA3-SAE	780	798	840	914

4.1.6 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)

4.1.7 Bug fixes/feature enhancements

4.1.7.1 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	<ul style="list-style-type: none"> • Wake On Wireless Feature

4.1.7.2 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	<ul style="list-style-type: none"> • 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.

4.1.7.3 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	<ul style="list-style-type: none"> • 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.

4.1.7.4 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

4.1.7.5 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	<ul style="list-style-type: none"> • OPP file transfer gets failed while OPP file transfer is ongoing and Wi-Fi traffic initiated with 2.4GHz external AP.

4.1.7.6 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">A2DP audio glitches heard while audio streaming and OPP file transfer to another ref device at the same time

4.1.7.7 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
—	—

4.1.7.8 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
—	—

4.1.7.9 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
—	—

4.1.7.10 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	<ul style="list-style-type: none">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 v6.6.23During 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.

4.1.7.11 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
—	—

4.1.7.12 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	<ul style="list-style-type: none">Fixed kernel panic fatal 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	<ul style="list-style-type: none">In extended Bluetooth LE scanning, an unexpected HCI_LE_Scan_Timeout event is observed.

4.1.8 Known issues

Known issues

Component	Description
Wi-Fi	During the firmware automatic recovery test, kernel crash causing system reboot due to Wi-Fi driver on a specific platform running in DUT STA mode.

4.2 SDIO-UART 88W8997

4.2.1 Package information

- BSP version: Linux 6.12.3_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p149.2
- Driver version: MM6X16505.p14-GPL

4.2.2 Version information

- Wireless SoC: 88W8997
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p149.2
 - 16 - Major revision
 - 92 - Feature pack
 - 21 - Release version
 - p149.2 - Patch number
- Driver Version: MM6X16505.p14-GPL
 - 6X - Linux 6.x Kernel
 - 16505 - Release version
 - p14 - Patch number
 - GPL - General Public License v2

4.2.3 Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: from 2.6.32 to 6.12.3
- 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)

4.2.4 Wi-Fi and Bluetooth certification

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

4.2.4.1 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

4.2.4.2 Bluetooth controller certification

see [ref.\[10\]](#).

4.2.5 Wi-Fi throughput

4.2.5.1 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: Netgear RAX120 (FW-1.0.1.122)
- External Client: NXP IW620 PCIe-UART
- Channel: 6 | 36

4.2.5.2 STA throughput

External AP: Netgear RAX120

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	110	116	120	121
WPA2-AES	106	115	119	120
WPA3-SAE	104	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

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	389	425	431	485
WPA2-AES	393	435	450	488
WPA3-SAE	393	437	449	488

4.2.5.3 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	106	117	117	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	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	356	383	444	435

4.2.5.4 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	111	110	118	122

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	358	419	445	452

4.2.5.5 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	106	111	115	124
WPA2-AES	107	110	115	123
WPA3-SAE	107	109	116	123

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

...continued

Mobile AP Mode Throughput - AC Mode 5 GHz Band 20 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
WPA3-SAE	137	141	146	152

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	356	415	445	458
WPA2-AES	356	406	445	387
WPA3-SAE	356	386	447	431

4.2.6 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)

4.2.7 Bug fixes/feature enhancements

4.2.7.1 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

4.2.7.2 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

4.2.7.3 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

4.2.7.4 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	<ul style="list-style-type: none"> 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.

4.2.7.5 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	<ul style="list-style-type: none"> DUT SPP link gets disconnected with Remote, when DUT creates A2DP SINK profile connection with Remote device.

4.2.7.6 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	<ul style="list-style-type: none"> DUT HFP link gets disconnected with Remote phone, when it starts OPP file transfer to Remote device.
Coex	<ul style="list-style-type: none"> 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.

4.2.7.7 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
—	—

4.2.7.8 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Sometimes, when the DUT is streaming A2DP data to another remote device, the DUT role switch request is failing to the first remote device.

4.2.7.9 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">Wakeup card timeout issue observed when executing iwconfig command during Bluetooth inquiry.

4.2.8 Known issues

Known issues

Component	Description
—	—

4.3 PCIe-UART 88W8997

4.3.1 Package information

- BSP version: Linux 6.12.3_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p149.2
- Driver version: MM6X16505.p14-GPL

4.3.2 Version information

- Wireless SoC: 88W8997
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p149.2
 - 16 - Major revision
 - 92 - Feature pack
 - 21 - Release version
 - p149.2 - Patch number
- Driver Version: MM6X16505.p14-GPL
 - 6X - Linux 6.x Kernel
 - 16505 - Release version
 - p14 - Patch number
 - GPL - General Public License v2

4.3.3 Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.12.3
- 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)

4.3.4 Wi-Fi and Bluetooth certification

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

4.3.4.1 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

4.3.4.2 Bluetooth controller certification

see [ref.\[10\]](#).

4.3.5 Wi-Fi throughput

4.3.5.1 Throughput test setup

- Environment: Shield Room - Over the Air
- External Access Point: Asus RT-AX88U (FW-3.0.0.4.386_49674)
- 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 88W8997 PCIe-UART
- Channel: 6 | 36

4.3.5.2 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	107	117	122	123
WPA2-AES	107	117	122	123
WPA3-SAE	111	122	122	122

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

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	576	684	658	714
WPA2-AES	551	665	661	714
WPA3-SAE	547	664	662	713

4.3.5.3 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	108	109	109	123

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	575	581	660	724

4.3.5.4 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	590	569	662	719

4.3.5.5 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	112	111	114	120
WPA2-AES	113	110	119	120
WPA3-SAE	111	111	114	118

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

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	694	638	734	675
WPA2-AES	664	636	736	673
WPA3-SAE	676	636	736	673

4.3.6 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)

4.3.7 Bug fixes/feature enhancements

4.3.7.1 Firmware version 16.92.10.p208 to 16.92.10.p211

Component	Description
Wi-Fi	<ul style="list-style-type: none"> • Fixed Mobile AP start issue on switching bands
Bluetooth	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Fix Wi-Fi Link loss during UDP Rx + Bluetooth Inquiry and Wi-Fi deauth during Bluetooth HFP coexistence scenarios

4.3.7.2 Firmware version 16.92.10.p211 to 16.92.10.p213

Component	Description
Wi-Fi	<ul style="list-style-type: none"> • Fix for Wi-Fi Fragment and Forge Vulnerabilities ref.[2]
Bluetooth	<ul style="list-style-type: none"> • Fix for ANSSI Vulnerabilities ref.[3]

4.3.7.3 Firmware version 16.92.10.p213 to 16.92.10.p213.2

Component	Description
Wi-Fi	<ul style="list-style-type: none"> • Added support for 40 MHz band in 2.4 GHz BGN mode for AP and STA

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

Component	Description
--	NA

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

Component	Description
--	NA

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

Component	Description
--	NA

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

Component	Description
Bluetooth	<ul style="list-style-type: none"> DUT SPP link gets disconnected with Remote, when DUT creates A2DP SINK profile connection with Remote device.

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

Component	Description
Bluetooth	<ul style="list-style-type: none"> DUT HFP link gets disconnected with Remote phone, when it starts OPP file transfer to Remote device.
Coex	<ul style="list-style-type: none"> 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.

4.3.7.9 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Bluetooth-only firmware initialization is failing when it is downloaded and initialized after Wi-Fi-only firmware initialization.

4.3.7.10 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	<ul style="list-style-type: none"> 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.

4.3.7.11 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">Wakeup card timeout issue observed when executing iwconfig command during Bluetooth inquiry.

4.3.8 Known issues

Known issues

Component	Description
Wi-Fi	<ul style="list-style-type: none">In RF test mode, Firmware command timeout is seen when switching between the enable and disable RF test modes.

4.4 SDIO-UART 88W9098

4.4.1 Package information

- BSP version: Linux 6.12.3_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 17.92.1.p149.60
- Driver version: MM6X17505.p14-GPL

4.4.2 Version information

- Wireless SoC: 88W9098
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 17.92.1.p149.60
 - 17 - Major revision
 - 92 - Feature pack
 - 1 - Release version
 - p149.60 - Patch number
- Driver Version: MM6X17505.p14-GPL
 - 6X - Linux 6.x Kernel
 - 17505 - Release version
 - p14 - Patch number
 - GPL - General Public License v2

4.4.3 Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.12.3
- 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)

4.4.4 Wi-Fi and Bluetooth certification

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

4.4.4.1 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)

4.4.4.2 Bluetooth controller certification

see [ref.\[10\]](#).

4.4.5 Wi-Fi throughput

4.4.5.1 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

4.4.5.2 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

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	223	224	246	256
WPA2-AES	221	225	245	254
WPA3-SAE	221	225	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	335	360	380
WPA2-AES	311	332	370	381
WPA3-SAE	311	330	368	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	400	408
WPA3-SAE	381	364	412	410

4.4.5.3 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	122	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	388	340	372	394

4.4.5.4 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	119	118	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	388	338	343	372

4.4.5.5 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

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	385	331	373	374
WPA2-AES	384	330	365	375
WPA3-SAE	386	332	365	383

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	239	230	242	251
WPA2-AES	237	231	238	252
WPA3-SAE	237	229	229	250

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	368
WPA3-SAE	366	318	350	370

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	388	348	365	411
WPA2-AES	386	348	346	409
WPA3-SAE	387	350	360	410

4.4.6 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)

4.4.7 Bug fixes/feature enhancements

4.4.7.1 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

4.4.7.2 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

4.4.7.3 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	<ul style="list-style-type: none">• OPP file transfer gets failed while OPP file transfer is ongoing and Wi-Fi traffic initiated with 2.4GHz external AP.

4.4.7.4 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	<ul style="list-style-type: none">• A2DP Audio glitches heard while audio streaming and OPP file transfer to another ref device at the same time.

4.4.7.5 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	<ul style="list-style-type: none">• During the Roaming stress test, a command timeout causing the device Hang/Crash is observed

4.4.7.6 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
—	—

4.4.7.7 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	<ul style="list-style-type: none">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.

4.4.7.8 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
—	—

4.4.7.9 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">In extended Bluetooth LE scanning, an unexpected HCI_LE_Scan_Timeout event is observed.

4.4.8 Known issues

Known issues

Component	Description
Wi-Fi	During the firmware automatic recovery test, kernel crash causing system reboot due to Wi-Fi driver on a specific platform running in DUT STA mode.

4.5 SDIO-UART IW611/IW612

4.5.1 Package information

- BSP version: Linux 6.12.3_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 18.99.3.p23.6
- Driver version: MM6X18505.p14-GPL

4.5.2 Version information

- Wireless SoC: IW611/IW612
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 18.99.3.p23.6
 - 18 - Major revision
 - 99 - Feature pack
 - 3 - Release version
 - p23.6 - Patch number
- Driver Version: MM6X18505.p14-GPL
 - 6X - Linux 6.x Kernel
 - 18505 - Release version
 - p14 - Patch Number
 - GPL - General Public License v2

4.5.3 Software release contents

- 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

4.5.4 Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.12.3
- 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)

4.5.5 Wi-Fi and Bluetooth certification

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

4.5.5.1 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)

4.5.5.2 Bluetooth controller certification

see [ref.\[10\]](#).

4.5.5.3 Thread and Matter certification

- For Thread, see [ref.\[7\]](#).
- For Matter, see [ref.\[8\]](#).

4.5.6 Wi-Fi throughput

4.5.6.1 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

4.5.6.2 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	56	56	62	62
WPA2-AES	55	55	61	62
WPA3-SAE	56	56	62	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	125	117	131	130
WPA2-AES	120	114	128	124
WPA3-SAE	117	124	126	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	59	59	63	63
WPA2-AES	58	56	63	62
WPA3-SAE	58	57	63	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	120	130	130
WPA2-AES	116	119	130	126
WPA3-SAE	118	118	129	128

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	72	72	74	74
WPA2-AES	72	71	73	73
WPA3-SAE	71	72	74	73

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	171	173	179	179
WPA2-AES	170	171	178	173
WPA3-SAE	170	170	179	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	334	358	383	380
WPA2-AES	330	350	382	379
WPA3-SAE	328	352	380	378

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	116	115	124	126
WPA2-AES	115	113	118	124
WPA3-SAE	109	111	120	124

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	116	118	127	126
WPA2-AES	114	117	124	126
WPA3-SAE	118	115	125	124

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	231	231	260	259
WPA2-AES	229	234	252	256
WPA3-SAE	231	228	259	251

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	412	413	457	500
WPA2-AES	405	414	456	496
WPA3-SAE	403	416	453	491

4.5.6.3 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	55	62	62

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	115	114	129	128

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	334	345	379	382

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	395	3988	451	490

4.5.6.4 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	56	62	62

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	116	112	126	130

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	336	340	376	380

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	401	400	453	491

4.5.6.5 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	56	56	62	63
WPA2-AES	57	60	57	57
WPA3-SAE	55	57	64	63

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	117	116	126	128
WPA2-AES	114	114	124	126
WPA3-SAE	115	114	125	125

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	60	60	63	63
WPA2-AES	59	58	63	63
WPA3-SAE	60	60	63	63

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	127	120	132	132
WPA2-AES	125	120	132	131
WPA3-SAE	126	118	130	130

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	71	72	75	75
WPA2-AES	71	72	75	73
WPA3-SAE	71	72	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	179	169	177	180
WPA2-AES	172	164	184	180
WPA3-SAE	178	162	186	174

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	363	346	375	344
WPA2-AES	357	350	374	351
WPA3-SAE	365	346	379	379

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	120	124	129	127
WPA2-AES	119	122	126	126
WPA3-SAE	114	123	125	126

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	121	124	123	129
WPA2-AES	119	116	128	124
WPA3-SAE	121	122	130	129

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	243	234	256	251
WPA2-AES	242	233	256	249
WPA3-SAE	234	230	252	247

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	412	416	454	498
WPA2-AES	407	412	451	492
WPA3-SAE	408	407	450	490

4.5.6.6 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	81	82	84	84
Thread child	80	70	84	84

4.5.7 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)

4.5.8 Bug fixes/feature enhancements

4.5.8.1 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	<ul style="list-style-type: none"> 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.

4.5.8.2 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	<ul style="list-style-type: none"> 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.

4.5.8.3 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	<ul style="list-style-type: none"> 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 deauthentication 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> A2DP Audio Glitches are observed in the presence of Open Thread UDP Tx Traffic, when DUT is configured as Open Thread Leader/Router.

4.5.8.4 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	<ul style="list-style-type: none"> STAUT does not follow the configured wake-up duration.
Wi-Fi, Bluetooth/802.15.4 Open Thread (OT) coexistence (IW612 only)	<ul style="list-style-type: none"> 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.

4.5.8.5 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Authentication failure observed for ACL link, in presence of LE link. In dual HFP configuration, background noise heard on first audio link.
LE Audio	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Zigbee firmware crash observed, after six devices joined to network.
Wi-Fi, Bluetooth and 802.15.4 (Open Thread) coexistence	<ul style="list-style-type: none"> 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.

4.5.8.6 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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.

4.5.8.7 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	<ul style="list-style-type: none">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	<ul style="list-style-type: none">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.

4.5.8.8 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	<ul style="list-style-type: none">In RF test mode, the TX power readback value is not expected in HE 80 MHz MCS11 data rate.In Easymesh test, <code>sys_cfg_channel</code> command error observed during ethernet onboarding with third party AP.In Easymesh test, <code>parse_1905</code> packet error observed during ethernet onboarding with third party AP.
OpenThread (OT)	<ul style="list-style-type: none">When working with OpenThread SPI, bus sharing is not supported with other SPI devices.
Wi-Fi, Bluetooth and 802.15.4 (Open Thread) coexistence	<ul style="list-style-type: none">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.

4.5.9 Known issues

Known issues

Component	Description
Wi-Fi	<ul style="list-style-type: none"> 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 lperf traffic. In firmware automatic recovery test, the firmware download failure is observed in the long run when the DUT operates in AP mode. In RF test mode, the TX power value readback is not expected in HE 80 MHz MCS11 data rate. During the long run Easymesh stress testing, the error <code>Out of memory</code> is observed on Agent3. During Easymesh testing, a 20% ping loss is observed in RX from the 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, <code>Wakeup card timeout(0)!</code> is observed.
Bluetooth	<ul style="list-style-type: none"> 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.
Wi-Fi and Bluetooth coexistence	<ul style="list-style-type: none"> Wi-Fi command timeout is seen when there is A2DP streaming from phone.
Wi-Fi, Bluetooth and 802.15.4 (Open Thread) coexistence	<ul style="list-style-type: none"> 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.

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

4.5.10 Notes

- Bluetooth LE isochronous channel support
 - cis_offset value $\geq 800 \mu\text{s}$ is supported
- Bluetooth LE isochronous channel support on controller are validated using Ethermind stack on RT1170 platform 061718202225.3
- BT-SIG qualification declaration ID: D061718, TCRL Version is TCRL2022-2, Bluetooth specification version is 5.3. see [ref.\[10\]](#).
- 802.15.4 Matter certification for IW612 with Linux certification ID# is CSA22098MAT40098-50. see [ref.\[11\]](#).
- WFA certification for IW612. see :
- This is an experimental software release for LE Audio feature.

4.6 SDIO-UART IW610

4.6.1 Package information

- BSP version: Linux 6.12.3_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 18.99.5.p51
- Driver version: MM6X18505.p14-GPL

4.6.2 Version information

- Wireless SoC: IW610
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 18.99.5.p51
 - 18 - Major revision
 - 99 - Feature pack
 - 5 - Release version
 - p51 - Patch number
- Driver Version: MM6X18505.p14-GPL
 - 6X - Linux 6.x Kernel
 - 18505 - Release version
 - p14 - Patch Number
 - GPL - General Public License v2

4.6.3 Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.12.3
- 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)

4.6.4 Wi-Fi throughput

4.6.4.1 Throughput test setup

- Environment: Shield Room - Over the Air
- Access Point: Netgear-RAX200
- 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

4.6.4.2 STA throughput

External AP: AsusRT-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	54	60	60	62
WPA2-AES	53	59	60	61
WPA3-SAE	51	58	60	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	58	63	64	66
WPA2-AES	54	62	64	65
WPA3-SAE	53	62	64	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	71	76	77	77
WPA2-AES	67	75	77	77
WPA3-SAE	66	75	77	77

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	86	93	94	97
WPA2-AES	86	93	93	96
WPA3-SAE	86	93	94	96

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	91	98	101	102
WPA2-AES	90	98	101	102
WPA3-SAE	89	98	101	102

4.6.4.3 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	58	57	63	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	57	57	62	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	96	91	99	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	94	91	100	99

4.6.4.4 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	58	57	63	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	61	57	63	64

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	96	91	100	97

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	94	94	100	99

4.6.4.5 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	60	56	63	60
WPA2-AES	55	55	63	60
WPA3-SAE	55	55	63	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	58	65	64
WPA2-AES	60	58	65	64
WPA3-SAE	60	58	65	64

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	73	71	78	74
WPA2-AES	70	71	77	74
WPA3-SAE	69	70	77	74

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	98	95
WPA2-AES	92	85	97	94
WPA3-SAE	92	88	97	95

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	96	94	102	100
WPA2-AES	96	93	102	100
WPA3-SAE	96	93	102	100

4.6.4.6 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	83	86	86
Thread child	82	82	86	86

4.6.5 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)

4.6.6 Known issues

Known issues

Component	Description
Wi-Fi	Parallel Independent Reset (Wi-Fi and NB IR issued independently from host) can cause system stuck in stress testing. Robust solution implementation in process.

4.7 SDIO-UART 88W8987

4.7.1 Package information

- BSP version: Linux 6.12.3_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p149.2
- Driver version: MM6X16505.p14-GPL

4.7.2 Version information

- Wireless SoC: 88W8987
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p149.2
 - 16 - Major revision
 - 92 - Feature pack
 - 21 - Release version
 - p149.2 - Patch number
- Driver Version: MM6X16505.p14-GPL
 - 6X - Linux 6.x Kernel
 - 16505 - Release version
 - p14 - Patch Number
 - GPL - General Public License v2

4.7.3 Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.12.3
- 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)

4.7.4 Wi-Fi and Bluetooth certification

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

4.7.4.1 WFA certifications

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

see [ref.\[1\]](#)

4.7.4.2 Bluetooth controller certification

see [ref.\[10\]](#).

4.7.5 Wi-Fi throughput

4.7.5.1 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 88W8997 PCIe-UART
- Channel: 6 | 36

4.7.5.2 STA throughput

External AP: NXP IW610

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	59	59	62
WPA2-AES	56	59	59	62
WPA3-SAE	55	59	59	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	57	61	61	63
WPA2-AES	57	61	61	63
WPA3-SAE	57	61	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	116	129	123	134
WPA2-AES	115	129	124	134
WPA3-SAE	114	129	124	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	69	71	73	74
WPA2-AES	69	71	73	73
WPA3-SAE	69	71	73	73

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	172	168	177
WPA2-AES	155	172	166	177
WPA3-SAE	155	171	167	177

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	242	358	258	364
WPA2-AES	229	342	244	360
WPA3-SAE	226	343	249	360

4.7.5.3 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	57	60	63

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	220	314	245	386

4.7.5.4 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	56	59	63

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	329	248	386

4.7.5.5 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	55	58	58	63
WPA2-AES	54	58	58	63
WPA3-SAE	54	58	59	63

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	58	60	62
WPA2-AES	58	58	61	63
WPA3-SAE	58	58	61	63

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	126	126	135
WPA2-AES	116	126	124	135
WPA3-SAE	116	127	124	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	69	70	73	74
WPA2-AES	69	69	73	74
WPA3-SAE	69	70	73	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	148	168	161	179
WPA2-AES	146	167	160	179
WPA3-SAE	147	167	160	179

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	242	357	272	390
WPA2-AES	227	317	255	389
WPA3-SAE	226	323	255	388

4.7.6 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)

4.7.7 Bug fixes/feature enhancements

4.7.7.1 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

4.7.7.2 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	<ul style="list-style-type: none"> 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.

4.7.7.3 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	<ul style="list-style-type: none"> During connect/disconnect stress testing, a 4-way Handshake Timeout is observed due to which the Ex-STA cannot connect to the AP.

4.7.7.4 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.

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

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

Component	Description
Wi-Fi	<ul style="list-style-type: none"> 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.

4.7.7.6 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	<ul style="list-style-type: none"> In DUT-AP Mode, the firmware command timeout is observed when sending a large file via SCP along with continuous ping operation.

4.7.8 Known issues

Known issues

Component	Description
—	—

4.8 SDIO-UART IW416

4.8.1 Package information

- BSP version: Linux 6.12.3_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p149.2
- Driver version: MM5X16505.p14-GPL

4.8.2 Version information

- Wireless SoC: IW416
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version 16.92.21.p149.2
 - 16 - Major revision
 - 92 - Feature pack
 - 21 - Release version
 - p149.2 - Patch number
- Driver Version: MM6X16505.p14-GPL
 - 6X - Linux 6.x Kernel
 - 16505 - Release version
 - p14 - Patch Number
 - GPL - General Public License v2

4.8.3 Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.12.3
- 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)

4.8.4 Wi-Fi and Bluetooth certification

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

4.8.4.1 WFA certifications

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

see [ref.\[1\]](#).

4.8.4.2 Bluetooth controller certification

see [ref.\[10\]](#).

4.8.5 Wi-Fi throughput

4.8.5.1 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

4.8.5.2 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	54	54	61	57
WPA2-AES	53	50	60	54
WPA3-SAE	53	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	104	102	124	110
WPA2-AES	101	102	121	105
WPA3-SAE	85	96	120	101

4.8.5.3 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	52

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	104	115	113	130

4.8.5.4 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	49	50	52	56

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	117	119	129

4.8.5.5 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	113	119	122	133
WPA2-AES	109	118	117	133
WPA3-SAE	109	118	117	133

4.8.6 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)

4.8.7 Bug fixes/feature enhancements

4.8.7.1 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	<ul style="list-style-type: none"> • The ACL link with iPhone is disconnected due to error code "REMOTE DEVICE TERMINATED CONNECTION DUE TO LOW RESOURCES."

4.8.7.2 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	<ul style="list-style-type: none"> • Fix Channel Occupancy Time (COT) for HT20/MCS0 within 6 msec.

4.8.7.3 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	<ul style="list-style-type: none"> • 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.

4.8.7.4 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	<ul style="list-style-type: none"> • DUT Bluetooth & BLE TX test mode fails to set the power continuously and there is a difference between configured and measured power.

4.8.7.5 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	<ul style="list-style-type: none"> • DUT HFP link gets disconnected with Remote phone, when it starts OPP file transfer to Remote device.

4.8.7.6 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
—	—

4.8.7.7 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	<ul style="list-style-type: none"> 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.

4.8.7.8 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.

4.8.7.9 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	<ul style="list-style-type: none"> In RF test mode, Firmware command timeout is seen when switching between the enable and disable RF test modes.

4.8.7.10 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	<ul style="list-style-type: none"> 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.

4.8.8 Known issues

Known issues

Component	Description
Wi-Fi	<ul style="list-style-type: none"> When ed-mac is enabled, probe responses are transmitted during interference signal. In DFS test, Radar detection probability is found less than 60% in HT20/40MHz.
Bluetooth	<ul style="list-style-type: none"> Random Bluetooth security link loss in concurrent Bluetooth classic and Bluetooth LE modes with AES

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.

4.9 SDIO 88W8801

4.9.1 Package information

- BSP version: Linux 6.12.3_1.0.0
- Wi-Fi Firmware version 14.92.36.p197
- Driver version: MM6X14505.p14-GPL

4.9.2 Version information

- Wireless SoC: SD8801
- Wi-Fi Firmware Version: 14.92.36.p197
 - 14 - Major revision
 - 92 - Feature pack
 - 36 - Release version
 - p197 - Patch number
- Driver Version: MM6X14505.p14-GPL
 - 6X - Linux 6.x Kernel
 - 14505 - Release version
 - p14 - Patch number
 - GPL - General Public License v2

4.9.3 Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.12.3
- Interface used
 - Wi-Fi over SDIO (SDIO 2.0 support, Clock speed: 50 MHz)
- Test Tools
 - iPerf (version 2.0.13)
 - wpa_supplicant (version 2.11)
 - hostapd (version 2.11)

4.9.4 Wi-Fi certification

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

4.9.4.1 WFA certifications

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

see [ref.\[1\]](#).

4.9.5 Wi-Fi throughput

4.9.5.1 Throughput test setup

- Environment: Shield Room - Over the Air
- Access Point: Asus RT-AX88U (FW-3.0.0.4.386_49674)
- DUT: W8801-Murata M.2 (Module LBWA0ZZ2DS) 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

4.9.5.2 STA throughput

External AP: Asus RT-AX88U

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

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	Rx	TX	Rx
Open Security	38	53	45	57
WPA2-AES	39	54	46	57
WPA3-SAE	38	53	46	58

4.9.5.3 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	42	51	47	52

4.9.5.4 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	40	51	45	57

4.9.5.5 Mobile AP throughput

External client: NXP 88W8997 PCIe-UART

Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 20MHz | 1SS

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	TX	RX	TX	RX
Open Security	41	50	46	58
WPA2-AES	42	50	46	53
WPA3-SAE	41	50	45	54

4.9.6 EU conformance tests

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

4.9.7 Bug fixes/feature enhancements

Bug fixes/feature enhancements

Component	Description
Wi-Fi	Hang/crash with scan command timeout observed in long-run

4.9.8 Known issues

Known issues

Component	Description
—	NA

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 LBES5PL2LL)
8 QM/QXP/DX/DXL	—	NXP 88W8997 (Murata LBEE5XV1YM ^[1]) NXP 88W9098 (Murata LBEE5ZZ1XL ^[1])	—
8 ULP	—	—	NXP IW416 (Murata LBEE5CJ1XK ^[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 LBEE5XV1YM ^[1]) NXP 88Q9098 (Murata LBEE5ZZ1XL ^[1])
8M Quad	—	NXP 88W8997 (Murata LBEE5XV1YM ^[1]) NXP 88Q9098 (Murata LBEE6ZZ-1TA ^[1])	NXP 88W8997 (Murata LBEE5XV1YM ^[1]) NXP IW416 (Murata LBEE5CJ1XK ^[1]) NXP 88W8801 (Murata LBWA0ZZ2DS ^[1]) NXP 88Q9098 (Murata LBEE5ZZ1XL ^[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/ 6SLL/6UL/6ULL/ 6ULZ	—	—	NXP IW416 (Murata LBEE5CJ1XK) ^{[2][1]} NXP 88W8801 (Murata LBWA0ZZ2DS ^{[2][1]}) NXP 88W8987 (Murata LBEE5QD1ZM ^[1])

[1] Module tested with the i.MX EVK.

[2] i.MX6ULL only supports M.2 + M.2-to-uSD adapter

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

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] User manual – UM11483: Getting Started with NXP–based Wireless Modules on i.MX 8M Quad EVK Running Linux OS ([link](#))
- [6] User manual – UM11675: How to Download and Build NXP Wi-Fi Drivers ([link](#))
- [7] Webpage – Thread certified products ([link](#))
- [8] Webpage – Matter – NXP i.MX8M MPU + IW612 Tri–radio ([link](#))
- [9] Webpage – Embedded Linux for i.MX Applications Processors (IMXLINUX) ([link](#))
- [10] Webpage – Bluetooth Launch Studio ([link](#))
- [11] Webpage – Matter certificate for IW612 ([link](#))

9 Revision history

Revision history

Document ID	Date	Change details
RN00104 v.19.0	6 May 2025	Feature list <ul style="list-style-type: none"> Section 3.1.3 "Wi-Fi Direct": updated the definition of DMCS.
RN00104 v.18.0	27 March 2025	Downloading the wireless driver/utilities and firmware <ul style="list-style-type: none"> Section 2.3 "Wi-Fi/Bluetooth driver source and firmware": updated. Release notes for the supported SoCs <ul style="list-style-type: none"> PCIe-UART 88W9098 <ul style="list-style-type: none"> Section 4.1.1 "Package information": updated. Section 4.1.2 "Version information": updated. Section 4.1.3 "Host platform": updated. Section 4.1.5.1 "Throughput test setup": updated. Section 4.1.7.12 "Firmware version 17.92.1.p149.53 to 17.92.1.p149.60": added. Section 4.1.8 "Known issues": updated. SDIO-UART 88W8997 <ul style="list-style-type: none"> Section 4.2.1 "Package information": updated. Section 4.2.2 "Version information": updated. Section 4.2.3 "Host platform": updated. Section 4.2.5.1 "Throughput test setup": updated. Section 4.2.5.2 "STA throughput": updated the numbers in the table <i>BGN Mode 2.4 GHz Band 20 MHz (HT)</i>. Section 4.2.7.9 "Firmware version 16.92.21.p137.4 to 16.92.21.p149.2": added. Section 4.2.8 "Known issues": updated. PCIe-UART 88W8997 <ul style="list-style-type: none"> Section 4.3.1 "Package information": updated. Section 4.3.2 "Version information": updated. Section 4.3.3 "Host platform": updated. Section 4.3.5.1 "Throughput test setup": updated. Section 4.3.5.2 "STA throughput": updated. Section 4.3.5 "Wi-Fi throughput": updated. Section 4.3.7.11 "Firmware version 16.92.21.p137.4 to 16.92.21.p149.2": added. Section 4.3.8 "Known issues": updated. SDIO-UART 88W9098 <ul style="list-style-type: none"> Section 4.4.1 "Package information": updated. Section 4.4.2 "Version information": updated. Section 4.4.3 "Host platform": updated. Section 4.4.5.1 "Throughput test setup": updated. Section 4.4.7.9 "Firmware version 17.92.1.p149.53 to 17.92.1.p149.60": added. Section 4.4.8 "Known issues": updated. <p>Continues</p>

Revision history...continued

Document ID	Date	Change details
RN00104 v.18.0	27 March 2025	<p>————— <i>Continued</i> —————</p> <ul style="list-style-type: none"> • SDIO-UART IW611/IW612 <ul style="list-style-type: none"> – Section 4.5.1 "Package information": updated. – Section 4.5.2 "Version information": updated. – Section 4.5.3 "Software release contents": added. – Section 4.5.4 "Host platform": updated. – Section 4.5.6.1 "Throughput test setup": updated. – Section 4.5.6 "Wi-Fi throughput": throughput numbers updated. – Section 4.5.8.7 "Firmware version 18.99.3.p15.13 to 18.99.3.p21.15": updated. – Section 4.5.8.8 "Firmware version 18.99.3.p21.15 to 18.99.3.p23.6": added. – Section 4.5.9 "Known issues": updated. • SDIO-UART IW610 <ul style="list-style-type: none"> – Section 4.6.1 "Package information": updated. – Section 4.6.2 "Version information": updated. – Section 4.6.3 "Host platform": updated. – <i>Wi-Fi and Bluetooth certification</i>: removed the section. – Section 4.6.4.1 "Throughput test setup": updated. – Section 4.6.4 "Wi-Fi throughput": throughput numbers updated. • SDIO-UART 88W8987 <ul style="list-style-type: none"> – Section 4.7.1 "Package information": updated. – Section 4.7.2 "Version information": updated. – Section 4.7.3 "Host platform": updated. – Section 4.7.5.1 "Throughput test setup": updated. – Section 4.7.5 "Wi-Fi throughput": throughput numbers updated. – Section 4.7.7.6 "Firmware version 16.92.21.p142.3 to 16.92.21.p149.2": added. • SDIO-UART IW416 <ul style="list-style-type: none"> – Section 4.8.1 "Package information": updated. – Section 4.8.2 "Version information": updated. – Section 4.8.3 "Host platform": updated. – Section 4.8.5.1 "Throughput test setup": updated. – Section 4.8.7.10 "Firmware version 16.92.21.p142.3 to 16.92.21.p149.2": added. • SDIO 88W8801 <ul style="list-style-type: none"> – Section 4.9.1 "Package information": updated. – Section 4.9.2 "Version information": updated. – Section 4.9.3 "Host platform": updated. – Section 4.9.5.1 "Throughput test setup": updated. – Section 4.9.5 "Wi-Fi throughput": throughput numbers updated. <p>i.MX platform on-board devices and external wireless solutions</p> <ul style="list-style-type: none"> • Section 5 "i.MX platforms, on-board SoCs, and external wireless solutions": added i.MX 91 and i.MX 93. <p>References</p> <ul style="list-style-type: none"> • Section 8 "References": updated.

Revision history...continued

Document ID	Date	Change details
RN00104 v.17.0	10 March 2025	<p>Feature lists</p> <ul style="list-style-type: none">• Section 3.1.1 "Client mode": updated.• Section 3.1.2 "AP mode": updated.• Section 3.2.2 "Bluetooth LE": updated. <p>SDIO-UART IW611/IW612</p> <ul style="list-style-type: none">• Section 4.5.8.6 "Firmware version 18.99.3.p15.8 to 18.99.3.p15.13": added.• Section 4.5.8.7 "Firmware version 18.99.3.p15.13 to 18.99.3.p21.15": updated.• Section 4.5.9 "Known issues": updated. <p>SDIO-UART IW416</p> <ul style="list-style-type: none">• Section 4.8.7.9 "Firmware version 16.92.2.p137.4 to 16.92.21.p142.3": updated.

Revision history...continued

Document ID	Date	Change details
RN00104 v.16.0	27 February 2025	<ul style="list-style-type: none">• Section 1.1 "Supported SoCs": added IW610.• Section 1 "About this document": updated the release version.• Section 2.2 "Wi-Fi utilities (mlanutil)": updated the release version.• Feature list<ul style="list-style-type: none">– 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<ul style="list-style-type: none">– Section 4.1.1 "Package information": updated.– Section 4.1.2 "Version information": updated.– Section 4.1.3 "Host platform": updated.– Section 4.1.4.1 "Wi-Fi pre-certification ": updated.– Section 4.1.5 "Wi-Fi throughput": updated.– Firmware version 17.92.1.p149.43 to 17.92.1.p149.155 removed.– Section 4.1.7.10 "Firmware version 17.92.1.p149.43 to 17.92.1.p149.157": added.– Section 4.1.7.11 "Firmware version 17.92.1.p149.157 to 17.92.1.p149.53": added.– Section 4.1.8 "Known issues": updated.• SDIO-UART 88W8997<ul style="list-style-type: none">– Section 4.2.1 "Package information": updated.– Section 4.2.2 "Version information": updated.– Section 4.2.3 "Host platform": updated.– Section 4.2.4.1 "Wi-Fi pre-certifications": updated.– Firmware version 16.92.21.p119.3 to 16.92.21.p137.2: removed.– Section 4.2.7.8 "Firmware version 16.92.21.p119.3 to 16.92.21.p137.4": added.– Section 4.2.8 "Known issues": updated.• PCIe-UART 88W8997<ul style="list-style-type: none">– Section 4.3.1 "Package information": updated.– Section 4.3.2 "Version information": updated.– Section 4.3.3 "Host platform": updated.– Section 4.3.4.1 "Wi-Fi pre-certifications ": updated.– Section 4.3.5 "Wi-Fi throughput": updated.– Firmware version 16.92.21.p119.3 to 16.92.21.p137.2: removed.– Section 4.3.7.10 "Firmware version 16.92.21.p119.3 to 16.92.21.p137.4": added.– Section 4.3.8 "Known issues": updated. <p>Continues</p>

Revision history...continued

Document ID	Date	Change details
RN00104 v.16.0	27 February 2025	<div>Continued</div> <ul style="list-style-type: none">SDIO-UART 88W9098<ul style="list-style-type: none">Section 4.4.1 "Package information": updated.Section 4.4.2 "Version information": updated.Section 4.4.3 "Host platform": updated.Section 4.4.4 "Wi-Fi and Bluetooth certification": updated.Section 4.4.5 "Wi-Fi throughput": updated.Firmware version 17.92.1.p149.43 to 17.92.1.p149.155: removed.Section 4.4.7.7 "Firmware version 17.92.1.p149.43 to 17.92.1.p149.157": added.Section 4.4.7.8 "Firmware version 17.92.1.p149.157 to 17.92.1.p149.53": added.Section 4.4.8 "Known issues": updated.SDIO-UART IW611/IW612<ul style="list-style-type: none">Section 4.5.1 "Package information": updated.Section 4.5.2 "Version information": updated.Section 4.5.3 "Software release contents": added.Section 4.5.4 "Host platform": updated.Section 4.5.5.1 "Wi-Fi pre-certification": updated.Section 4.5.6 "Wi-Fi throughput": updated.Section 4.5.8.7 "Firmware version 18.99.3.p15.13 to 18.99.3.p21.15": added.Section 4.5.9 "Known issues": updated.Section 4.5.10 "Notes ": updatedSection 4.6 "SDIO-UART IW610": addedSDIO-UART 88W8987<ul style="list-style-type: none">Section 4.7.1 "Package information": updated.Section 4.7.2 "Version information": updated.Section 4.7.3 "Host platform": updated.Section 4.7.4 "Wi-Fi and Bluetooth certification": updated.Section 4.7.5 "Wi-Fi throughput": updated.Firmware version 16.92.2 p119.3 to 16.92.21.p137.2: removedSection 4.7.7.4 "Firmware version 16.92.2.p119.3 to 16.92.21.p137.4": added.Section 4.7.7.5 "Firmware version 16.92.21p137.4 to 16.92.21.p142.3": added.SDIO-UART IW416<ul style="list-style-type: none">Section 4.8.1 "Package information": updated.Section 4.8.2 "Version information": updated.Section 4.8.3 "Host platform": updated.Section 4.8.4 "Wi-Fi and Bluetooth certification": updated.Section 4.8.5 "Wi-Fi throughput": updated.Firmware version 16.92.2.p119.11 to 16.92.21.p137.2: removed.Section 4.8.7.8 "Firmware version 16.92.2.p119.11 to 16.92.21.p137.4": added.Section 4.8.7.9 "Firmware version 16.92.2.p137.4 to 16.92.21.p142.3": added.Section 4.8.8 "Known issues": updated. <div>Continues</div>

Revision history...continued

Document ID	Date	Change details
RN00104 v.16.0	27 February 2025	<p>————— <i>Continued</i> —————</p> <ul style="list-style-type: none"> • SDIO 88W8801 <ul style="list-style-type: none"> – Section 4.9.1 "Package information": updated. – Section 4.9.2 "Version information": updated. – Section 4.9.3 "Host platform": updated. – Section 4.9.4.1 "WFA certifications ": updated. – Section 4.9.5 "Wi-Fi throughput": updated. • Section 8 "References": updated.
RN00104 v.15.0	2 October 2024	<ul style="list-style-type: none"> • Section 4 "Release notes for the supported SoCs": updated MM6X17437 driver patch version to p30. • Removed the section <i>Software release content</i>.
RN00104 v.14.0	25 September 2024	<ul style="list-style-type: none"> • Section 1 "About this document": updated the release version. • Section 2.2 "Wi-Fi utilities (mланutl)": updated the release version. • Feature list <ul style="list-style-type: none"> – 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 <ul style="list-style-type: none"> – Section 4.1.1 "Package information": updated. – Section 4.1.2 "Version information": updated. – Section 4.1.3 "Host platform": updated. – Section 4.1.4.1 "Wi-Fi pre-certification ": updated. – Section 4.1.5 "Wi-Fi throughput": updated. – Section 4.1.7.10 "Firmware version 17.92.1.p149.43 to 17.92.1.p149.157": added. – Section 4.1.8 "Known issues": updated. • SDIO-UART 88W8997 <ul style="list-style-type: none"> – Section 4.2.1 "Package information": updated. – Section 4.2.2 "Version information": updated. – Section 4.2.3 "Host platform": updated. – Section 4.2.4.1 "Wi-Fi pre-certifications": updated. – Section 4.2.5 "Wi-Fi throughput": updated. – Section 4.2.7.8 "Firmware version 16.92.21.p119.3 to 16.92.21.p137.4": added. – Section 4.2.8 "Known issues": updated. • PCIe-UART 88W8997 <ul style="list-style-type: none"> – Section 4.3.1 "Package information": updated. – Section 4.3.2 "Version information": updated. – Section 4.3.3 "Host platform": updated. – Section 4.3.4.1 "Wi-Fi pre-certifications ": updated. – Section 4.3.5 "Wi-Fi throughput": updated. – Section 4.3.7.10 "Firmware version 16.92.21.p119.3 to 16.92.21.p137.4": added. – Section 4.3.8 "Known issues": updated. <p>————— continues —————</p>

Revision history...continued

Document ID	Date	Change details
RN00104 v.14.0	25 September 2024	<div>———— continued ————</div> <ul style="list-style-type: none">• SDIO-UART 88W9098<ul style="list-style-type: none">– Section 4.4.1 "Package information": updated.– Section 4.4.2 "Version information": updated.– Section 4.4.3 "Host platform": updated.– Section 4.4.4.1 "Wi-Fi pre-certification": updated.– Section 4.4.5 "Wi-Fi throughput": updated.– Section 4.4.7.7 "Firmware version 17.92.1.p149.43 to 17.92.1.p149.157": added.– Section 4.4.8 "Known issues": updated.• SDIO-UART IW611/IW612<ul style="list-style-type: none">– Section 4.5 "SDIO-UART IW611/IW612": replaced IW612 with IW61x.– Section 4.5.1 "Package information": updated.– Section 4.5.2 "Version information": updated.– Section 4.5.3 "Software release contents": added.– Section 4.5.4 "Host platform": updated.– Section 4.5.5.1 "Wi-Fi pre-certification": updated.– Section 4.5.6 "Wi-Fi throughput": updated.– Section 4.5.8.5 "Firmware version 18.99.3.p10.1 to 18.99.3.p15.8": added.– Section 4.5.9 "Known issues": updated.• SDIO-UART 88W8987<ul style="list-style-type: none">– Section 4.7.1 "Package information": updated.– Section 4.7.2 "Version information": updated.– Section 4.7.3 "Host platform": updated.– Section 4.7.4.1 "WFA certifications": updated.– Section 4.7.5 "Wi-Fi throughput": updated.– Section 4.7.7.4 "Firmware version 16.92.2.p119.3 to 16.92.21.p137.4": added.– Section 4.7.8 "Known issues": updated.• SDIO-UART IW416<ul style="list-style-type: none">– Section 4.8.1 "Package information": updated.– Section 4.8.2 "Version information": updated.– Section 4.8.3 "Host platform": updated.– Section 4.8.4.1 "WFA certifications": updated.– Section 4.8.5 "Wi-Fi throughput": updated.– Section 4.8.7.8 "Firmware version 16.92.2.p119.11 to 16.92.21.p137.4": added.– Section 4.8.8 "Known issues": updated.• SDIO 88W8801<ul style="list-style-type: none">– Section 4.9.1 "Package information": updated.– Section 4.9.2 "Version information": updated.– Section 4.9.3 "Host platform": updated.

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RN00104 v.13.0	26 June 2024	<div><div>Continued</div><ul style="list-style-type: none">SDIO-UART IW611/IW612<ul style="list-style-type: none">Section 4.5 "SDIO-UART IW611/IW612": replaced IW612 with IW61x.Section 4.5.1 "Package information": updated.Section 4.5.2 "Version information": updated.Section 4.5.3 "Software release contents": added.Section 4.5.4 "Host platform": updated.Section 4.5.5.1 "Wi-Fi pre-certification": updated.Section 4.5.5.3 "Thread and Matter certification": added.Section 4.5.6 "Wi-Fi throughput": updated.Section 4.5.8.4 "Firmware version 18.99.2.p66.17 to 18.99.3.p10.1": added.Section 4.5.9 "Known issues": updated.Section 4.5.10 "Notes ": updated.SDIO-UART 88W8987<ul style="list-style-type: none">Section 4.7.1 "Package information": updated.Section 4.7.2 "Version information": updated.Section 4.7.3 "Host platform": updated.SDIO-UART IW416<ul style="list-style-type: none">Section 4.8.1 "Package information": updated.Section 4.8.2 "Version information": updated.Section 4.8.3 "Host platform": updated.Section 4.8.4.1 "WFA certifications": updated.Section 4.8.5.5 "Mobile AP throughput ": updated.SD 88W8801<ul style="list-style-type: none">Section 4.9.1 "Package information": updated.Section 4.9.2 "Version information": updated.Section 4.9.3 "Host platform": updated.Section 8 "References": updated.</div>

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RN00104 v.12.0	27 March 2024	<div><div>Continued</div><ul style="list-style-type: none">SDIO-UART IW61x<ul style="list-style-type: none">Section 4.5 "SDIO-UART IW611/IW612": replaced IW612 with IW61x.Section 4.5.1 "Package information": updated.Section 4.5.2 "Version information": updated.Section 4.5.3 "Software release contents": added.Section 4.5.4 "Host platform": updated.Section 4.5.5.1 "Wi-Fi pre-certification": updated.Section 4.5.6 "Wi-Fi throughput": updated.Section 4.5.8.3 "Firmware version 18.18.99.2.p66.10 to 18.99.2.p66.17": added.Section 4.5.9 "Known issues": updated.Section 4.5.10 "Notes ": added.SDIO-UART 88W8987<ul style="list-style-type: none">Section 4.7.1 "Package information": updated.Section 4.7.2 "Version information": updated.Section 4.7.3 "Host platform": updated.Section 4.7.4.1 "WFA certifications": updated.Section 4.7.5 "Wi-Fi throughput": updated.Section 4.7.7.3 "Firmware version 16.92.p99.2 to 16.92.2.p119.3": added.Section 4.7.8 "Known issues": updated.SDIO-UART IW416<ul style="list-style-type: none">Section 4.8.1 "Package information": updated.Section 4.8.2 "Version information": updated.Section 4.8.3 "Host platform": updated.Section 4.8.4.1 "WFA certifications": updated.Section 4.8.5 "Wi-Fi throughput": updated.Section 4.8.7.7 "Firmware version 16.92.21.p84.3 to 16.92.2.p119.11": updated.Section 4.8.8 "Known issues": updated.SD 88W8801<ul style="list-style-type: none">Section 4.9.1 "Package information": updated.Section 4.9.2 "Version information": updated.Section 4.9.3 "Host platform": updated.Section 4.9.4.1 "WFA certifications ": updated.Section 4.9.7 "Bug fixes/feature enhancements": updated.</div>

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RN00104 v.11.0	13 December 2023	<p>———— <i>Continued</i> ————</p> <ul style="list-style-type: none"> • SDIO-UART 88W8987 <ul style="list-style-type: none"> – Section 4.7.1 "Package information": updated. – Section 4.7.2 "Version information": updated. – Section 4.7.3 "Host platform": updated. • SDIO-UART IW416 <ul style="list-style-type: none"> – Section 4.8.1 "Package information": updated. – Section 4.8.2 "Version information": updated. – Section 4.8.3 "Host platform": updated. • SD 88W8801 <ul style="list-style-type: none"> – Section 4.9.1 "Package information": updated. – Section 4.9.2 "Version information": updated. – Section 4.9.3 "Host platform": updated. – Section 4.8.7.6 "Firmware version 16.92.21.p84.3 to 16.92.21.p84.128": added. • Section 8 "References": updated.
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RN00104 v. 9.0	4 October 2023	<p>Updated:</p> <ul style="list-style-type: none"> • Section 3 "Feature lists" • Section 4.1 "PCIe-UART 88W9098" • Section 4.2 "SDIO-UART 88W8997" • Section 4.3 "PCIe-UART 88W8997" • Section 4.4 "SDIO-UART 88W9098" • Section 4.5 "SDIO-UART IW611/IW612" • Section 4.7 "SDIO-UART 88W8987" • Section 4.8 "SDIO-UART IW416" • Section 4.9 "SDIO 88W8801"
RN00104 v. 8.0	29 June 2023	<p>Updated:</p> <ul style="list-style-type: none"> • Section 3 "Feature lists" • Section 4.1 "PCIe-UART 88W9098" • Section 4.2 "SDIO-UART 88W8997" • Section 4.3 "PCIe-UART 88W8997" • Section 4.4 "SDIO-UART 88W9098" • Section 4.5 "SDIO-UART IW611/IW612" • Section 4.7 "SDIO-UART 88W8987" • Section 4.8 "SDIO-UART IW416" • Section 4.9 "SDIO 88W8801"

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Document ID	Date	Change details
RN00104 v. 7.0	29 March 2023	Updated: <ul style="list-style-type: none"> • Section 3 "Feature lists" • Section 4.1 "PCIe-UART 88W9098" • Section 4.2 "SDIO-UART 88W8997" • Section 4.3 "PCIe-UART 88W8997" • Section 4.4 "SDIO-UART 88W9098" • Section 4.5 "SDIO-UART IW611/IW612" • Section 4.7 "SDIO-UART 88W8987" • Section 4.8 "SDIO-UART IW416" • Section 4.9 "SDIO 88W8801" • Section 5 "i.MX platforms, on-board SoCs, and external wireless solutions"
RN00104 v. 6.0	16 December 2022	Updated: <ul style="list-style-type: none"> • Section 3 "Feature lists" • Section 4.1 "PCIe-UART 88W9098" • Section 4.2 "SDIO-UART 88W8997" • Section 4.3 "PCIe-UART 88W8997" • Section 4.4 "SDIO-UART 88W9098" • Section 4.7 "SDIO-UART 88W8987" • Section 4.8 "SDIO-UART IW416" • Section 4.9 "SDIO 88W8801" • Section 5 "i.MX platforms, on-board SoCs, and external wireless solutions" • Section 7 "Abbreviations"
RN00104 v. 5.0	27 September 2022	Updated: <ul style="list-style-type: none"> • Section 3 "Feature lists" • Section 4.1 "PCIe-UART 88W9098" • Section 4.2 "SDIO-UART 88W8997" • Section 4.3 "PCIe-UART 88W8997" • Section 4.4 "SDIO-UART 88W9098" • Section 4.4.8 "Known issues" • Section 4.8 "SDIO-UART IW416" • Section 4.9 "SDIO 88W8801" • Section 7 "Abbreviations"
RN00104 v. 4.0	28 June 2022	Updated: <ul style="list-style-type: none"> • Section 3 "Feature lists" • Section 4.1 "PCIe-UART 88W9098" • Section 4.2 "SDIO-UART 88W8997" • Section 4.3 "PCIe-UART 88W8997" • Section 4.4 "SDIO-UART 88W9098" • Section 4.4.8 "Known issues" • Section 4.8 "SDIO-UART IW416" • Section 4.9 "SDIO 88W8801" • Section 7 "Abbreviations"

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Document ID	Date	Change details
RN00104 v. 3.0	24 March 2022	<ul style="list-style-type: none">Added SDIO-UART 88W9098 Updated: <ul style="list-style-type: none">Section 4.1.4 "Wi-Fi and Bluetooth certification"Section 4.3.4 "Wi-Fi and Bluetooth certification"Section 4.4.4 "Wi-Fi and Bluetooth certification"Section 4.7.4 "Wi-Fi and Bluetooth certification"Section 4.8.4 "Wi-Fi and Bluetooth certification"Section 4.9.4 "Wi-Fi certification" <ul style="list-style-type: none">Bluetooth certification links
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RN00104 v.1.0	14 December 2021	Initial release

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