RN00104

NXP Wireless SoC Features and Release Notes for Linux

Rev. 15.0 — 2 October 2024

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-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 vv6.6.23_2.1.0.

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-FP92-88W8801

2 Downloading the wireless driver/utilities and firmware

For the latest wireless driver/utility and firmware, refer to:

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

2.1 Pre-compiled Wi-Fi driver and firmware

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

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

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

2.2 Wi-Fi utilities (mlanutl)

The mlanutl is not part of the Linux BSP image version v.v6.6.23_2.1.0 nor the GitHub source release tag: `lf-v6.6.23_2.1.0`.

The source is available at:

https://github.com/nxp-imx/mwifiex/tree/lf-5.15.52_2.1.0/mxm_wifiex/wlan_src/mapp/mlanutl

2.3 Wi-Fi driver source and firmware

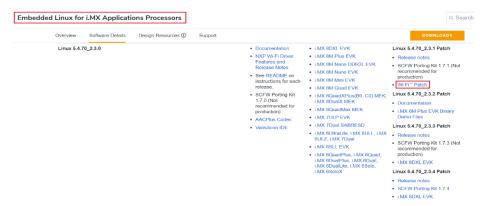To download the Wi-Fi driver and wireless firmware releases, refer to [5].

Note:

- *UART driver source code is open source and part of the Linux kernel source.*
- *UART driver source code used for Bluetooth is NOT part of the release package. To download the code, go to kernel.org.*
- *Refer to the section Bring-up using NXP Bluetooth UART driver in [4].*

2.4 Wi-Fi patch

Intermediate fixes are posted on the website. See the example below:

https://www.nxp.com/design/software/embedded-software/i-mx-software/embedded-linux-for-i-mx-applications-processors:IMXLINUX

Document feedback

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
		9098	8997	9098	IW611/ IW612	8997	8987	IW416	8801
802.11n - High Throughput	2.4 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	Y
	2.4 GHz band supported channel bandwidth: 40 MHz [1]	Y	Y	Y	Y	Y	Y	Y	N
	5 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	N
	5 GHz band supported channel bandwidth: 40 MHz	Y	Y	Y	Y	Y	Y	Y	N
	Short/long guard interval (400 ns/800 ns)	Y	Y	Y	Y	Y	Y	Y	Y
	11n data rates – Up to 72 Mbit/s (MCS 0 to MCS 7)	Y	Y	Y	Y	Y	Y	Y	Y
	11n data rates – Up to 150 Mbit/s (MCS 0 to MCS 7)	Y	Y	Y	Y	Y	Y	Y	N
	11n data rates - Up to 300 Mbit/s (MCS 0 to MCS 15)	Y	Y	Y	N	Y	N	N	N
	1 spatial stream (1x1)	Y	Y	Y	Y	Y	Y	Y	Y
	2 spatial stream (2x2)	Y	Y	Y	N	Y	N	N	N
	HT protection mechanisms	Y	Y	Y	Y	Y	Y	Y	Y
	Explicit Beamformee	Y	Y	Y	Y	Y	N	N	N
	Aggregated MAC Protocol Data Unit(AMPDU) Rx support	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
	20/40 MHz Coexistence	Y	Y	Y	Y	Y	N	N	N
	Tx MCS rate adaptation (BGN)	Y	Y	Y	Y	Y	Y	Y	Y
	RX and TX Space time block coding for 2x2 (STBC)	Y	Y	Y	N	Y	N	N	N
	Rx Low Density Parity Check (LDPC)	Y	Y	Y	Y	Y	Y	N	N
	AMSDU over AMPDU support	Y	Y	Y	Y	Y	Y	Y	Y

RN00104

Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback

5 / 121

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

Features	Sub features	PCIe-UART		SDIO-UART					SDIO
		9098	8997	9098	IW611/ IW612	8997	8987	IW416	8801
802.11 ac - Very High Throughput	5 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	N	N
	5 GHz band supported channel bandwidth: 40 MHz	Y	Y	Y	Y	Y	Y	N	N
	5 GHz band supported channel bandwidth: 80 MHz	Y	Y	Y	Y	Y	Y	N	N
	11ac data rates - Up to 433.3 Mbps (MCS0 to MCS9)	Y	Y	Y	Y	Y	Y	N	N
	11ac Data rates - Up to 866.7 Mbps(MCS0 to MCS9)	Y	Y	Y	N	Y	N	N	N
	Short/Long Guard Interval (400ns/800ns)	Y	Y	Y	Y	Y	Y	N	N
	SU-AMPDU Aggregation	Y	Y	Y	Y	Y	Y	N	N
	MU-MIMO Beamformee (Explicit and Implicit)	Y	Y	Y	Y	Y	Y	N	N
	SU-Beamformee	Y	Y	Y	Y	Y	Y	N	N
	MU-MIMO RX – Wave 2	Y	Y	Y	Y	Y	Y	N	N
	RTS/CTS with BW Signaling	Y	Y	Y	Y	Y	Y	N	N
	Operation Mode Notification	Y	Y	Y	Y	Y	Y	N	N
	Backward Compatibility with non-VHT devices	Y	Y	Y	Y	Y	Y	N	N
	Tx VHT MCS Rate Adaptation	Y	Y	Y	Y	Y	Y	N	N
	LDPC	Y	Y	Y	Y	Y	Y	N	N
	256 QAM Modulation – MCS 8 and MCS9	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
		9098	8997	9098	IW611/ IW612	8997	8987	IW416	8801
802.11 ax – High Efficiency	5 GHz band supported channel bandwidth: 20 MHz	Y	N	Y	Y	N	N	N	N
	5 GHz band supported channel bandwidth: 40 MHz	Y	N	Y	Y	N	N	N	N
	5 GHz band supported channel bandwidth: 80 MHz	Y	N	Y	Y	N	N	N	N
	11ax data rates - Up to 1.2 Gbps (MCS 0 to MCS 11) - 2x2	Y	N	Y	N	N	N	N	N
	11ax data rates - Up to 600 Mbps (MCS 0 to MCS 11) - 1x1	Y	N	Y	Y	N	N	N	N
	Operating Mode Indication(OMI) Control	Y	N	Y	Y	N	N	N	N
	2x/4x HE-Long Training Field(LTF)	Y	N	Y	Y	N	N	N	N
	Target Wake-up Time	Y	N	Y	Y	N	N	N	N
	1024 QAM modulation – MCS10-MCS11	Y	N	Y	Y	N	N	N	N
	256 QAM modulation – MCS8 and MCS9	Y	N	Y	Y	N	N	N	N
	Spatial reuse	Y	N	Y	Y	N	N	N	N
	SU beamforming	N	N	N	Y	N	N	N	N
	UL (Tx) and DL (Rx) MU-MIMO	Y	N	Y	Y	N	N	N	N
	UL (Tx) and DL (Rx) OFDMA	Y	N	Y	Y	N	N	N	N
	OFDMA (UL/DL, 484 RU)	Y	N	Y	Y	N	N	N	N
	BSS coloring	Y	N	Y	Y	N	N	N	N
802.11 a/b/g Features	11b/g data rates - Up to 54 Mbit/s	Y	Y	Y	Y	Y	Y	Y	Y
	11a data rates - Up to 54 Mbit/s	Y	Y	Y	Y	Y	Y	Y	N
	Tx rate adaptation (BG)	Y	Y	Y	Y	Y	Y	Y	Y
	Fragmentation/defragmentation	Y	Y	Y	Y	Y	Y	Y	Y
	ERP protection, slot time, preamble	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
802.11d and 802.11h	802.11d - Regulatory Domain/ Operating Class/Country Info	Y	Y	Y	Y	Y	Y	Y	Y
	Per-path regulatory power table[1]	N	N	N	Y	N	Y	N	N
	802.11h – Dynamic Frequency Selection (DFS)	Y	Y	Y	Y	Y	Y	Y	N
	DFS Radar Detection in Slave Mode (Follow AP)	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

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

Features	Sub features	PCIe-UART		SDIO-UART					SDIO
		9098	8997	9098	IW611/IW612	8997	8987	IW416	8801
802.11i - Security	Open and Shared Authentication	Y	Y	Y	Y	Y	Y	Y	Y
	WPA2-PSK Security (AES-CCMP Encryption)	Y	Y	Y	Y	Y	Y	Y	Y
	WPA + WPA2 mixed mode (AES)	Y	Y	Y	Y	Y	Y	Y	Y
	Opensource WPA supplicant	Y	Y	Y	Y	Y	Y	Y	Y
	Embedded supplicant (WPA3-R1)[1]	Y	Y	Y	Y	Y	Y	Y	Y
	Embedded supplicant (WPA3-R3)[1]	Y	Y	Y	Y	Y	Y	Y	Y
	WPA2 Enterprise Security	Y	Y	Y	Y	Y	Y	Y	Y
	WAPI support[1]	Y	N	Y	Y	N	Y	N	N
	Transient Security Network (TSN)	Y	Y	Y	Y	Y	Y	Y	Y
WPA3 SAE (R3) Security	Simultaneous Authentication of Equals (SAE)	Y	Y	Y	Y	Y	Y	Y	Y
	SAE Connectivity and PMK Caching	Y	Y	Y	Y	Y	Y	Y	Y
	WPA2 Personal Compatibility	Y	Y	Y	Y	Y	Y	Y	Y
	Anti-Clogging	Y	Y	Y	Y	Y	Y	Y	Y
	Wi-Fi Enhanced Open	Y	Y	Y	Y	Y	Y	Y	N
	WPA3 host-based	Y	Y	Y	Y	Y	Y	Y	N
	SAE Finite Cyclic Group - Group-19, Group 20, Group 21	Y	Y	Y	Y	Y	Y	Y	Y
	Reflection Attack	Y	Y	Y	Y	Y	Y	Y	Y
	Suite B - 192-bit Security ECC p384	Y	Y	Y	Y	Y	Y	N	N
	Suite B - 192-bit Security RSA 3K	Y	Y	Y	Y	Y	Y	N	N
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
802.11k	802.11k	Y	Y	Y	Y	Y	Y	Y	N
802.11v	802.11v	Y	Y	Y	Y	Y	Y	Y	N
802.11z	802.11z (Host based TDLS)	Y	Y	Y	Y	Y	Y	Y	N
802.11az	New generation Wi-Fi Location	N	N	N	Y	N	N	N	N
802.11mc	Wi-Fi location[1]	Y	N	Y	Y	N	N	N	N
FIPS	FIPS support	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
	PIN Config Method - Static/Dynamic PIN	Y	Y	Y	Y	Y	Y	Y	Y
	PBC - Virtual Push Button Config Method	Y	Y	Y	Y	Y	Y	Y	Y
	PBC Session Overlap Detection	Y	Y	Y	Y	Y	Y	Y	Y
	STA as Enrollee	Y	Y	Y	Y	Y	Y	Y	Y
	Backward Compatibility with WPS1.0 Devices	Y	Y	Y	Y	Y	Y	Y	Y
	Opensource WPA supplicant	Y	Y	Y	Y	Y	Y	Y	Y
DPP functionality	Wi-Fi Easy Connect	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
		9098	8997	9098	IW611/ IW612	8997	8987	IW416	8801
802.11w - PMF (Protected Management Frames)	PMF require and capable	Y	Y	Y	Y	Y	Y	Y	Y
	Unicast management frames - Encryption/decryption - using CCMP	Y	Y	Y	Y	Y	Y	Y	Y
	Broadcast management frames - Encryption/decryption - using BIP	Y	Y	Y	Y	Y	Y	Y	Y
	SA query request/response	Y	Y	Y	Y	Y	Y	Y	Y
	PMF Support using Opensource WPA	Y	Y	Y	Y	Y	Y	Y	Y
Power save mode	Deep sleep	Y	Y	Y	Y	Y	Y	Y	Y
	IEEE power save	Y	Y	Y	Y	Y	Y	Y	Y
	U-APSD / WMM power save[1]	Y	Y	Y	Y	Y	Y	Y	N
General features	EU adaptivity support	Y	Y	Y	Y	Y	Y	Y	Y
	Wake on Wireless (WoW) in-band	Y	Y	Y	Y	Y	Y	Y	Y
	Wake on Wireless (WoW) out-of-band	Y	N	Y	Y	N	N	N	N
	Auto TX[1]	Y	Y	Y	Y	Y	Y	Y	Y
	Cloud keep alive (TX)[1]	N	N	N	Y	N	N	N	N
	MAC Address randomization(in Scan)	Y	Y	Y	Y	Y	Y	Y	Y
	Host-based MLME [2]	Y	Y	Y	Y	Y	Y	Y	Y
	Driver load time parameters for Manufacturing mode	Y	N	Y	Y	N	N	N	N
	Extended channel switch announcement (ECSA)	Y	Y	Y	Y	Y	Y	Y	N
	Independent reset (In-band)	Y	Y	Y	Y	Y	Y	Y	N
	Wi-Fi agile multiband	Y	Y	Y	Y	Y	Y	Y	N
	Wireless Apple Car Play (R5)	Y	N	Y	Y	N	Y	N	N
	CSI[1]	Y	Y	Y	Y	Y	Y	N	N
	Packet coalescing[1]	Y	Y	Y	Y	Y	Y	Y	N
	mDNS (Bonjour) offload	N	Y	N	Y	Y	Y	Y	N
	mDNS wake on match	Y	Y	Y	Y	Y	Y	Y	N
	IPv6 NS offload	N	Y	N	Y	Y	Y	Y	N
	Extended range [1]	Y	N	Y	Y	N	N	N	N
	Clocksync [1]	Y	Y	Y	Y	Y	N	N	N
	DCM	Y	N	Y	Y	N	N	N	N
	Auto reconnect	Y	Y	Y	Y	Y	Y	Y	N
	Band steering (AGO + AGO and P2P)	Y	N	Y	N	N	N	N	N
	Monitor mode[1]	Y	Y	Y	Y	Y	Y	Y	N
	Wireless Android auto (projection mode)	N	N	N	Y	N	N	N	N
	Android automotive OS	Y	N	Y	Y	N	Y	N	N
	Specific scan (scancfg)	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
		9098	8997	9098	IW611/ IW612	8997	8987	IW416	8801
	Network scan (iwlist scan)	Y	Y	Y	Y	Y	Y	Y	Y
	Cancellable scan	Y	Y	Y	Y	Y	Y	Y	N
	Passive to active scan	Y	Y	Y	Y	Y	Y	Y	N
	EasyMesh[1]	Y	N	Y	Y	N	N	N	N
	Neighbor aware networking (NAN)[1]	N	N	N	Y	N	N	N	N
	Vendor specific IE (Custom IE)	Y	Y	Y	Y	Y	Y	Y	Y

[1]   Contact your support representative to use this feature.
[2]   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
		9098	8997	9098	IW611/ IW612	8997	8987	IW416	8801
802.11n – High Throughput	2.4 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	Y
	2.4 GHz band supported channel bandwidth: 40 MHz[1]	Y	Y	Y	Y	Y	Y	Y	N
	5 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y	N
	5 GHz band supported channel bandwidth: 40 MHz	Y	Y	Y	Y	Y	Y	Y	N
	1 spatial stream (1x1)	Y	Y	Y	Y	Y	Y	Y	Y
	2 spatial stream (2x2)	Y	Y	Y	N	Y	N	N	N
	Short/long guard interval (400 ns/800 ns)	Y	Y	Y	Y	Y	Y	Y	Y
	11n data rates – Up to 72 Mbit/s (MCS0 to MCS7)	Y	Y	Y	Y	Y	Y	Y	Y
	11n data rates – Up to 150 Mbit/s (MCS0 to MCS7)	Y	Y	Y	Y	Y	Y	Y	N
	11n data rates - Up to 300 Mbit/s (MCS0 to MCS15)	Y	Y	Y	N	Y	N	N	N
	TX MCS rate adaptation (BGN)	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
	Aggregated MAC service data unit (AMSDU) - 4k RX support	Y	Y	Y	Y	Y	Y	Y	Y
	HT protection mechanisms	Y	Y	Y	Y	Y	Y	Y	Y
	RX and TX space time block coding (STBC)	Y	Y	Y	N	Y	N	N	N
	20/40 MHz coexistence	Y	Y	Y	Y	Y	N	N	N
	Explicit beamformer	Y	N	Y	Y	N	N	N	N
	RX Low-density parity check (LDPC)	Y	Y	Y	Y	Y	Y	Y	N
802.11 b/g Features	11 b/g data rates – Up to 54 Mbit/s	Y	Y	Y	Y	Y	Y	Y	Y
	TX rate adaptation (BG)	Y	Y	Y	Y	Y	Y	Y	Y
	ERP protection, slot time, preamble	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

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

Features	Sub features	PCIe-UART		SDIO-UART					SDIO
		9098	8997	9098	IW611/ IW612	8997	8987	IW416	8801
802.11 ac - Very High Throughput	5 GHz band supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	N	N
	5 GHz band supported channel bandwidth: 40 MHz	Y	Y	Y	Y	Y	Y	N	N
	5 GHz band supported channel bandwidth: 80MHz	Y	Y	Y	Y	Y	Y	N	N
	Short/Long Guard Interval (400ns/800ns)	Y	Y	Y	Y	Y	Y	N	N
	11ac Data rates – Up to 433.3 Mbps (MCS 0 to MCS 9) 1SS	Y	Y	Y	Y	Y	Y	N	N
	11ac Data rates - Up to 866.7 Mbps (MCS 0 to MCS 9) 2SS	Y	Y	Y	N	Y	N	N	N
	Single User- Aggregated MAC Protocol Data Unit (SU-AMPDU) Aggregation	Y	Y	Y	Y	Y	Y	N	N
	RTS/CTS with BW Signaling	Y	Y	Y	Y	Y	Y	N	N
	Backward Compatibility with non-VHT devices	Y	Y	Y	Y	Y	Y	N	N
	TX VHT MCS Rate Adaptation	Y	Y	Y	Y	Y	Y	N	N
	Operation mode notification	Y	Y	Y	Y	Y	Y	N	N
	SU Explicit beamformer	Y	N	Y	N	N	N	N	N
	Low-density parity check (LDPC)	Y	Y	Y	Y	Y	Y	N	N
802.11 ax – High Efficiency	5 GHz band supported channel bandwidth: 20MHz	Y	N	Y	Y	N	N	N	N
	5 GHz band supported channel bandwidth: 40 MHz	Y	N	Y	Y	N	N	N	N
	5 GHz band supported channel bandwidth: 80 MHz	Y	N	Y	Y	N	N	N	N
	Operating Mode Indication (OMI) Control	Y	N	Y	Y	N	N	N	N
	2x/4x HE-Long Training Field (LTF)	Y	N	Y	N	N	N	N	N
	1024 QAM	Y	N	Y	Y	N	N	N	N
	Spatial reuse	N	N	N	Y	N	N	N	N
	BSS color	Y	N	Y	Y	N	N	N	N
	HE SU beamformer (explicit)	Y	N	Y	N	N	N	N	N
802.11d	802.11d - Regulatory Domain/Operating Class/Country Info	Y	Y	Y	Y	Y	Y	Y	Y
802.11h	802.11h - Dynamic Frequency Selection (DFS)	Y	Y	Y	Y	Y	Y	Y	N
	Zero Wait DFS	Y	N	Y	N	N	N	N	N
802.11e -QoS	EDCA [Enhanced Distributed Channel Access] / WMM (Wireless Multi-Media)	Y	Y	Y	Y	Y	Y	Y	Y
802.11az	New generation Wi-Fi Location [1]	N	N	N	Y	N	N	N	N

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

Features	Sub features	PCIe-UART		SDIO-UART					SDIO
		9098	8997	9098	IW611/ IW612	8997	8987	IW416	8801
802.11i - Security	Open security	Y	Y	Y	Y	Y	Y	Y	Y
	WPA2-PSK security (AES-CCMP encryption)	Y	Y	Y	Y	Y	Y	Y	Y
	WPA + WPA2 mixed mode	Y	Y	Y	Y	Y	Y	Y	Y
	Opensource Hostapd	Y	Y	Y	Y	Y	Y	Y	Y
	Embedded authenticator (WPA3-R1) [1]	Y	Y	Y	Y	Y	N	Y	N
	WAPI support[1]	Y	N	Y	Y	N	Y	N	N
WPA3 SAE (R3) security	Simultaneous Authentication of Equals (SAE)	Y	Y	Y	Y	Y	Y	Y	Y
	SAE Connectivity and PMK Caching	Y	Y	Y	Y	Y	Y	Y	Y
	WPA3 host-based	Y	Y	Y	Y	Y	Y	Y	N
	Wi-Fi Enhanced Open	Y	Y	Y	Y	Y	Y	Y	N
	WPA3 Enterprise Suite-B Host supplicant based	Y	Y	Y	Y	Y	Y	N	N
802.11w - Protected management frames (PMF)	PMF require and capable	Y	Y	Y	Y	Y	Y	Y	Y
	Unicast management frames - Encryption/decryption - using CCMP	Y	Y	Y	Y	Y	Y	Y	Y
	Broadcast management frames - Encryption/decryption - using BIP	Y	Y	Y	Y	Y	Y	Y	Y
	SA query request/response	Y	Y	Y	Y	Y	Y	Y	Y
	Support using Hostapd	Y	Y	Y	Y	Y	Y	Y	Y
WPS/WSC2.0 functionality	PIN Config Method - 8 Digit/4 Digit	Y	Y	Y	Y	Y	Y	Y	Y
	PIN Config Method - Static/Dynamic PIN	Y	Y	Y	Y	Y	Y	Y	Y
	PBC - Virtual Push Button Config Method	Y	Y	Y	Y	Y	Y	Y	Y
	PBC Session Overlap Detection	Y	Y	Y	Y	Y	Y	Y	Y
	AP Setup Locked State - PIN Method	Y	Y	Y	Y	Y	Y	Y	Y
	MMH as Wireless Registrar	Y	Y	Y	Y	Y	Y	Y	Y
	MMH as Enrollee	Y	Y	Y	Y	Y	Y	Y	Y
	Opensource Hostapd	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
		9098	8997	9098	IW611/ IW612	8997	8987	IW416	8801
General features	EU adaptivity support	Y	Y	Y	Y	Y	Y	Y	Y
	Automatic channel selection (ACS)	Y	Y	Y	Y	Y	Y	Y	Y
	Host-based MLME[2]	Y	Y	Y	Y	Y	Y	Y	Y
	MBSS	Y	N	Y	Y	N	N	N	N
	Extended channel switch announcement (ECSA)	Y	Y	Y	Y	Y	Y	Y	N
	Driver load time parameters for manufacturing mode	Y	N	Y	N	N	N	N	N
	Max supported stations (up to 8)	64	8	64	16	8	8	8	8
	Independent reset (in-band)	Y	Y	Y	Y	Y	Y	Y	N
	Independent reset (out-of-band)	Y	N	Y	Y	N	N	N	N
	Hidden SSID (broadcast SSID disabled)	Y	Y	Y	Y	Y	Y	Y	Y
	MAC address filter (allowed/denied list)	Y	Y	Y	Y	Y	Y	Y	Y
	Maximum STA MAC address filtering	64	16	64	16	16	16	16	16
	STA age out feature for associated clients	Y	Y	Y	Y	Y	Y	Y	Y
	Extended range (partially advertise)[1]	Y	N	Y	Y	N	N	N	N
	Configurable retry limit	Y	Y	Y	Y	Y	Y	Y	Y
	Configurable unicast data rate	Y	Y	Y	Y	Y	Y	Y	Y
	Configurable broadcast/multicast data rate	Y	Y	Y	Y	Y	Y	Y	Y
	uAP events	Y	Y	Y	Y	Y	Y	Y	Y
	DFS radar detection (leader)	Y	Y	Y	Y	Y	Y	Y	Y
	UNII_4 channel support	N	N	N	Y	N	N	N	N
	Host sleep (W0W) in band and out-of-band	Y	Y	Y	Y	Y	Y	Y	Y
	STA ageout (time out for associated/idle clients)	Y	Y	Y	Y	Y	Y	Y	Y
	NAPI support	Y	N	Y	N	N	N	N	N
	Vendor specific ie (custom IE)	Y	Y	Y	Y	Y	Y	Y	Y
	EasyMesh[1]	Y	N	Y	Y	N	N	N	N
	Neighbor aware networking (NAN)[1]	y	N	y	Y	N	N	N	N
	Vendor defined TX power config (TXpower Config V3)	Y	N	Y	Y	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/P2P, and AP-STA modes

Feature list for Wi-Fi radio, Wi-Fi Direct/P2P, and AP-STA modes

Mode	Features List	Sub Features List	PCIe-UART		SDIO-UART					SD
			9098	8997	9098	IW611/ IW612	8997	8987	IW416	8801
Wi-Fi Direct/ P2P	P2P Basic Functionality	Autonomous GO Mode	Y	Y	Y	Y	Y	Y	Y	Y
		WFD Client Mode	Y	Y	Y	Y	Y	Y	Y	Y
		P2P for Miracast	Y	Y	Y	Y	Y	Y	Y	N
		P2P Device Mode	Y	Y	Y	Y	Y	Y	Y	Y
AP-STA	Simultaneous AP-STA Operation (Same Channel)	AP-STA functionality	Y	Y	Y	Y	Y	Y	Y	Y
	Software Antenna Diversity	Software Antenna Diversity[1]	N	N	N	Y	N	Y	Y	N
	Dynamic Rapid Channel Switch	DRCS[1]	Y	N	Y	Y	N	N	Y	N
	Multiple Wi-Fi MAC	Multiple Wi-Fi MAC	Y	N	Y	N	N	N	N	N
	RF Test Mode	RF Test Mode functionality	Y	Y	Y	Y	Y	Y	Y	Y
	TX power config	TX power config[1]	Y	Y	Y	Y	Y	Y	Y	Y
	Deep sleep on unload	Deep sleep on unload	N	N	N	Y	N	Y	N	N
	Auto FW recovery	Auto FW recovery on fatal error	Y	Y	Y	Y	Y	Y	Y	N
	Auto ARP and Ping	Auto ARP and Ping support	Y	N	Y	Y	N	Y	N	N
	AP - P2P(Client)	DRCS	Y	N	Y	Y	N	N	Y	N
	STA - P2P(GO)	DRCS	Y	N	Y	Y	N	N	Y	N
	AP – P2P(GO)	DRCS	Y	N	Y	Y	N	N	Y	N
	AP-AP-STA	DRCS	N	N	N	Y	N	N	N	N
	AP – AP (MBSS)	DRCS	Y	N	Y	Y	N	N	N	N
	AP – STA	DRCS	Y	N	Y	Y	N	N	Y	N
	DMCS	Dynamic mode channel selection	Y	N	Y	N	N	N	N	N
	Packet filtering/ Memory Efficient Filtering (MEF)	Packet filtering / Memory Efficient Filtering	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			
mlan0	uap0	wfd0	mmlan0	muap0	mwfd0	Use case
—	Yes	—	—	Yes	—	AP + AP CDW Mode
Yes	—	—	Yes	—	—	STA + STA CDW Mode
Yes	—	—	—	Yes	—	AP + STA CDW Mode
—	Yes	—	Yes	—	—	AP + STA CDW Mode

3.1.5 Known limitations for simultaneous mode operation

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

RN00104
Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback
16 / 121

3.2 Bluetooth

3.2.1 Bluetooth classic

Feature list for Bluetooth radio

Features	Sub features	PCIe-UART		SDIO-UART				
		9098	8997	9098	IW611/ IW612	8997	8987	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	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	N	Y	Y	N	Y	Y
	Deep sleep (NXP UART driver)	Y	N	Y	Y	N	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
	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	N	N	N	Y	N	N	N
	BR/EDR secure connections	N	N	N	Y	N	N	N

Feature list for Bluetooth radio...*continued*

Features	Sub features	PCIe-UART		SDIO-UART				
		9098	8997	9098	IW611/IW612	8997	8987	IW416
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	Y	Y	Y	N	N	N
	A2DP SRC + HFP GW[2]	Y	Y	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	N	N	N	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.

RN00104

Release notes **Rev. 15.0 — 2 October 2024** Document feedback

18 / 121

3.2.2 Bluetooth LE

Table 2. Feature list for Bluetooth LE

Features	Sub features	PCIe-UART		SDIO-UART				
		9098	8997	9098	IW611/ IW612	8997	8987	IW416
General features	Maximum 16 Bluetooth LE connections(Master role)	Y	Y	Y	Y	Y	Y	Y
	Independent reset (in-band and out-of-band) [2] [1]	Y	Y	Y	Y	N	Y	Y
	Wake on Bluetooth LE (chip to host)[2]	Y	N	Y	Y	N	Y	Y
	Deep sleep (NXP UART driver)	Y	N	Y	Y	N	Y	Y
	Standalone Bluetooth LE AES encryption	Y	N	Y	Y	N	N	Y
	Bluetooth classic AES + Bluetooth LE AES encryption	N	N	N	Y	N	N	N
Bluetooth profile support	Bluetooth LE GATT	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE HOGP	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE GAP	Y	Y	Y	Y	Y	Y	Y
Bluetooth LE 4.0 Support	Low Energy physical layer	Y	Y	Y	Y	Y	Y	Y
	Low Energy link layer	Y	Y	Y	Y	Y	Y	Y
	Enhancements to HCI for Low Energy	Y	Y	Y	Y	Y	Y	Y
	Low Energy direct test mode	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE - 1Mbit/s support	Y	Y	Y	Y	Y	Y	Y
Bluetooth 4.1 support	Low duty cycle directed advertising	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE Dual Mode Topology	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE privacy v1.1	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE link layer topology	Y	Y	Y	Y	Y	Y	Y
Bluetooth 4.1 support	Bluetooth LE secure connection	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE link layer privacy v1.2	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE data length extension	Y	Y	Y	Y	Y	Y	Y
	Link layer extended scanner filter policies	Y	Y	Y	Y	Y	Y	Y
Bluetooth 5.0 Support	Bluetooth LE 2 Mbps support	Y	Y	Y	Y	Y	Y	Y
	High duty cycle directed advertising	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE multiple advertisement (4, or 5*, or 6**) Sets	Y	Y	Y	Y**	Y	Y*	N
	Bluetooth LE extended advertisement	N	N	N	Y	N	N	Y
	Bluetooth LE channel selection #2	N	N	N	Y	N	N	Y
	Bluetooth LE long range	N	N	N	Y	N	N	Y
	Bluetooth LE periodic advertisement	N	N	N	Y	N	N	Y
Bluetooth 5.2 Support	Bluetooth LE power control	N	N	N	Y	N	N	N
	Isochronous channel[3]	N	N	N	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] 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				
		9098	8997	9098	IW611/IW612	8997	8987	IW416
Thread Features	Thread 1.3.0 (OpenThread RCP)	N	N	N	Y	N	N	N
	Different frame types of IEEE 802.15.4	N	N	N	Y	N	N	N
	Enhance Ack	N	N	N	Y	N	N	N
	Network Formation on each channel and stability	N	N	N	Y	N	N	N
	IEEE 802.15.4-2015 CSL parent functionality	N	N	N	Y	N	N	N
	UDP and TCP Tx and Rx data	N	N	N	Y	N	N	N
	Support up to 128 attached SED	N	N	N	Y	N	N	N
	IEEE-802.15.4-2015 MAC & PHY as required by Thread 1.3.0	N	N	N	Y	N	N	N
Tools and validation	Auto DUT (THCI) for test harness	N	N	N	Y	N	N	N
	RF test mode	N	N	N	Y	N	N	N
Miscellaneous Features	Tx overall target power back off control (dB) per step	N	N	N	Y	N	N	N
	15.4 Independent Reset	N	N	N	Y	N	N	N
	Secure Boot	N	N	N	Y	N	N	N
	Up to 10 MHz SPI clock speed	N	N	N	Y	N	N	N
	FW Download over UART	N	N	N	Y	N	N	N
	Spinel over SPI	N	N	N	Y	N	N	N
Thread Device Roles	Border Router	N	N	N	Y	N	N	N
	Router	N	N	N	Y	N	N	N
	Router Eligible End Device (REED)	N	N	N	Y	N	N	N
	Thread Leader	N	N	N	Y	N	N	N
	Full End Device (FED)	N	N	N	Y	N	N	N
	Minimal End Device (MED)	N	N	N	Y	N	N	N
	Joiner	N	N	N	Y	N	N	N
	Commissioner	N	N	N	Y	N	N	N
Matter	Matter 1.2 with thread support matrix	N	N	N	Y	N	N	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				
		9098	8997	9098	IW611/ IW612	8997	8987	IW416
BCA-TDM Mode (Shared Antenna)	STA + Bluetooth Coex	N	Y	N	Y	Y	Y	Y
	STA + Bluetooth LE Coex	N	Y	N	Y	Y	Y	Y
	STA + Bluetooth + Bluetooth LE Coex	N	Y	N	Y	Y	Y	Y
	AP + Bluetooth Coex	N	Y	N	Y	Y	Y	Y
	AP + Bluetooth LE Coex	N	Y	N	Y	Y	Y	Y
	AP + Bluetooth + Bluetooth LE Coex	N	Y	N	Y	Y	Y	Y
	P2P + Bluetooth Coex	N	Y	N	Y	Y	Y	Y
	P2P + Bluetooth LE Coex	N	Y	N	Y	Y	Y	Y
	P2P + Bluetooth + Bluetooth LE Coex	N	Y	N	Y	Y	Y	Y
	AP(5GHz) + AP(5GHz) + Bluetooth Coex	N	Y	N	Y	Y	N	N
	AP(5GHz) + AP(5GHz) + Bluetooth LE Coex	N	Y	N	Y	Y	N	N
BCA-TDM Mode (Separate Antenna) [1]	STA + Bluetooth Coex	Y	N	Y	Y	N	N	N
	STA + Bluetooth LE Coex	Y	N	Y	Y	N	N	N
	STA + Bluetooth + Bluetooth LE Coex	Y	N	Y	Y	N	N	N
	AP + Bluetooth Coex	Y	N	Y	Y	N	N	N
	AP + Bluetooth LE Coex	Y	N	Y	Y	N	N	N
	AP + Bluetooth + Bluetooth LE Coex	Y	N	Y	Y	N	N	N
	P2P + Bluetooth Coex	Y	N	Y	Y	N	N	N
	P2P + Bluetooth LE Coex	Y	N	Y	Y	N	N	N
BCA-TDM Mode (Separate Antenna)[1]	P2P + Bluetooth + Bluetooth LE Coex	Y	N	Y	Y	N	N	N
	AP(5GHz) + AP(5GHz) + Bluetooth Coex	Y	N	Y	Y	N	N	N
	AP(5GHz) + AP(5GHz) + Bluetooth LE Coex	Y	N	Y	Y	N	N	N
External coex[1]	External Coex (Hardware interface)	Y	N	Y	Y	N	N	Y

[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			
		9098	8997	9098	IW611/IW612	8997	8987	IW416
BCA-TDM Mode (Separate Antenna)[1]	STA + Bluetooth + 802.15.4 Coex	N	N	N	Y	N	N	N
	STA + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	N
	STA + Bluetooth + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	N
	AP + Bluetooth + 802.15.4 Coex	N	N	N	Y	N	N	N
	AP + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	N
	AP + Bluetooth + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	N
	P2P + Bluetooth + 802.15.4 Coex	N	N	N	Y	N	N	N
	P2P + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	N
	P2P + Bluetooth + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	N
	AP(5GHz) + AP(5GHz) + Bluetooth + 802.15.4 Coex	N	N	N	Y	N	N	N
	AP(5GHz) + AP(5GHz) + Bluetooth LE + 802.15.4 Coex	N	N	N	Y	N	N	N
Security	Secure Boot	N	N	N	Y	N	N	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				
		9098	8997	9098	IW611/IW612	8997	8987	IW416
Zigbee features	IEEE 802.15.4 MAC layer	N	N	N	Y	N	N	N
	MAC split protocol over spinel	N	N	N	Y	N	N	N
Zigbee PRO (R23 stack)	NWK layer	N	N	N	Y	N	N	N
	APS layer	N	N	N	Y	N	N	N
	ZDO	N	N	N	Y	N	N	N
	BDB	N	N	N	Y	N	N	N
	SECURITY	N	N	N	Y	N	N	N
	ZCL	N	N	N	Y	N	N	N
Zigbee device role	Coordinator	N	N	N	Y	N	N	N
	Router	N	N	N	Y	N	N	N
	End device	N	N	N	Y	N	N	N
Mesh routing	Mesh routing	N	N	N	Y	N	N	N
General features	Connection of up to 64 end devices (PAN coordinator)	N	N	N	Y	N	N	N
	Connection of up to 64 end devices (PAN router)	N	N	N	Y	N	N	N
	Matter Zigbee bridge example application	N	N	N	Y	N	N	N
	Zigbee OTA server functionality	N	N	N	Y	N	N	N
Green power proxy basic (GPPB)	Green power proxy basic (GPPB)	N	N	N	Y	N	N	N

RN00104

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Release notes **Rev. 15.0 — 2 October 2024** Document feedback

23 / 121

3.6 Dual PAN (coexistence of Thread and Zigbee)

Table 6. Feature list for Thread and Zigbee coexistence

Features	Sub features	PCIe-UART		SDIO-UART				
		9098	8997	9098	IW611/ IW612	8997	8987	IW416
Dual PAN	Coexistence of Thread and Zigbee on the same RF channel	N	N	N	Y	N	N	N
	Thread Leader + Zigbee Coordinator	N	N	N	Y	N	N	N
	Thread Leader + Zigbee Router	N	N	N	Y	N	N	N
	Thread Leader + Zigbee End Device	N	N	N	Y	N	N	N
	Thread Router + Zigbee Coordinator	N	N	N	Y	N	N	N
	Thread Router + Zigbee Router	N	N	N	Y	N	N	N
	Thread Router + Zigbee End Device	N	N	N	Y	N	N	N
	Thread Router Eligible End Device (REED) + Zigbee Coordinator	N	N	N	Y	N	N	N
	Thread Router Eligible End Device (REED) + Zigbee Router	N	N	N	Y	N	N	N
	Thread Router Eligible End Device (REED) + Zigbee End Device	N	N	N	Y	N	N	N
	Thread Full End Device (FED) + Zigbee Coordinator	N	N	N	Y	N	N	N
	Thread Full End Device (FED) + Zigbee Router	N	N	N	Y	N	N	N
	Thread Full End Device (FED) + Zigbee End Device	N	N	N	Y	N	N	N

RN00104

Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback

24 / 121

4 Release notes for the supported SoCs

4.1 PCIe-UART 88W9098

4.1.1 Package information

• BSP version: Linux v6.6.23_2.1.0
• Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 17.92.1.p149.155
• Driver version: MM6X17437.p30-GPL

4.1.2 Version information

• Wireless SoC: 88W9098
• Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 17.92.1.p149.155
  – 17 - Major revision
  – 92 - Feature pack
  – 1 - Release version
  – p149.155 - Patch number
• Driver Version: MM6X17437.p30-GPL
  – 6X - Linux 6.x Kernel
  – 17437 - Release version
  – p30 - 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 6.9.0
• Interface used
  – Wi-Fi over PCIe Interface
  – Bluetooth/Bluetooth LE over UART Interface
• Test Tools
  – iPerf (version 2.0.13)
  – wpa_supplicant (version 2.10)
  – hostapd (version 2.10)

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)

Note:

- *Download Labtool application for RF test mode, refer to the URL: 9098_BridgeLabtool_MFG_FW_p227.*
- *Download Sigma tool, refer to the URL: NXP_WTS&QTT_AGENT Release R2.1.*
- *Download QTT Agent, refer to the URL: NXP_QTT_AGENT_Source-R2.2_Linux*

4.1.4.2 Bluetooth controller certification

Refer to the URL: https://launchstudio.bluetooth.com/ListingDetails/134477

RN00104

Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback

26 / 121

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
  - Driver load parameters:

```
cal_data_cfg=none, cfg80211_wext=0xf, host_mlme=1, amsdu_deaggr=1, net_rx=1,
 tx_skb_clone=1, tx_work=1
```

  - 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	110	120	124	126
WPA2-AES	110	117	124	123
WPA3-SAE	110	119	124	122

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	112	125	128	131
WPA2-AES	111	123	128	126
WPA3-SAE	110	123	129	125

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	196	246	256	263
WPA2-AES	191	247	256	252
WPA3-SAE	192	248	259	253

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	138	150	151	153
WPA2-AES	137	149	151	152
WPA3-SAE	137	149	151	152

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	276	316	355	357
WPA2-AES	277	316	355	344
WPA3-SAE	287	326	354	344

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	569	581	723	751
WPA2-AES	566	568	721	758
WPA3-SAE	566	568	721	759

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	109	120	124	122
WPA2-AES	109	117	123	119
WPA3-SAE	107	119	124	121

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	213	228	252	258
WPA2-AES	210	227	252	249
WPA3-SAE	212	227	254	249

RN00104

Release notes

Rev. 15.0 — 2 October 2024

Document feedback

29 / 121

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	367	414	493	488
WPA2-AES	357	414	491	493
WPA3-SAE	369	415	491	501

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	703	657	931	957
WPA2-AES	699	661	919	957
WPA3-SAE	700	659	919	957

4.1.5.3 P2P-GO throughput

P2P - GO Mode Throughput - BGN Mode | MAC2 | 2.4 GHz Band | 20MHz				
Protocol	**TCP (Mbit/s)**		**UDP (Mbit/s)**	
Direction	**Tx**	**Rx**	**Tx**	**Rx**
WPA2-AES	119	113	124	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	239	236	256	259

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	650	681	720	740

4.1.5.4 P2P-GC throughput

P2P - GC Mode Throughput - BGN Mode | MAC2 | 2.4 GHz Band | 20MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
WPA2-AES	119	113	124	122

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	241	237	256	260

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	666	672	714	740

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	109	110	120	122
WPA2-AES	111	111	118	119
WPA3-SAE	110	112	119	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	120	118	127	129
WPA2-AES	121	119	126	129
WPA3-SAE	122	118	126	127

RN00104

Release notes **Rev. 15.0 — 2 October 2024** Document feedback

31 / 121

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	240	238	252	257
WPA2-AES	243	238	251	258
WPA3-SAE	243	238	252	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	132	140	144
WPA2-AES	140	140	146	140
WPA3-SAE	144	144	146	144

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	320	320	350	355
WPA2-AES	321	319	351	355
WPA3-SAE	322	319	352	355

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	610	635	710	734
WPA2-AES	611	640	710	734
WPA3-SAE	613	636	710	734

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	182	182	189	195
WPA2-AES	182	183	191	195
WPA3-SAE	180	185	192	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	234	228	244	246
WPA2-AES	236	230	245	250
WPA3-SAE	237	228	247	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	446	450	450	460
WPA2-AES	446	451	455	466
WPA3-SAE	445	452	459	462

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	687	858	904	943
WPA2-AES	690	850	904	940
WPA3-SAE	681	850	904	945

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: From 17.92.5.p3 to 17.92.5.p9

Component	Description
Wi-Fi	• Wake On Wireless Feature

4.1.7.2 Firmware version: From 17.92.5.p9 to 17.92.5.p11

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

4.1.7.3 Firmware version: From 17.92.5.p11 to 17.92.1.p116.1

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

4.1.7.4 Firmware version: From 17.92.1.p116.1 to 17.92.1.p136.13

Component	Description
--	NA

4.1.7.5 Firmware version: From 17.92.1.p136.13 to 17.92.1.p136.24

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

4.1.7.6 Firmware version: From 17.92.1.p136.24 to 17.92.1.p136.131

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

4.1.7.7 Firmware version: From 17.92.1.p136.131 to 17.92.1.p136.132

Component	Description
—	—

4.1.7.8 Firmware version: From 17.92.1.p136.132 to 17.92.1.p149.131

Component	Description
—	—

4.1.7.9 Firmware version: From 17.92.1.p149.131 to 17.92.1.p149.43

Component	Description
—	—

4.1.7.10 Firmware version: From 17.92.1.p149.43 to 17.92.1.p149.155

Component	Description
Bluetooth	In legacy remote devices, pairing with PIN code method is failed with LMP/LL timeout.

4.1.8 Known issues

Component	Description
Wi-Fi	• In RF test mode, inconsistent TX-power observed between configured and measured values in tx-continuous carrier suppression (CS) mode. • In RF test mode, EVM value degradations are seen on the DFS channels with Linux BSP v6.6.23. • During the penetration testing of the ECU under test, a buffer overflow vulnerability was found in the Wi-Fi driver.

RN00104

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Release notes **Rev. 15.0 — 2 October 2024** Document feedback

35 / 121

4.2 SDIO-UART 88W8997

4.2.1 Package information

- BSP version: Linux v6.6.23_2.1.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 16.92.21.p137.2
- Driver version: MM6X16437.p30-GPL

4.2.2 Version information

- Wireless SoC: 88W8997
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 16.92.21.p137.2
  - 16 - Major revision
  - 92 - Feature pack
  - 21 - Release version
  - p137.2 - Patch number
- Driver Version: MM6X16437.p30-GPL
  - 6X - Linux 6.x Kernel
  - 16437 - Release version
  - p30 - 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 6.9.0
- Interface used
  - Wi-Fi over SDIO 3.0
  - Bluetooth/Bluetooth LE over UART
- Test Tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.10)
  - hostapd (version 2.10)

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

Note:

- *Download Labtool application for RF test mode, refer to the URL: 88W8997-MANUFACTURING-RELEASE-P208*
- *Download Sigma tool, refer to the URL: NXP_WTS&QTT_AGENT Release R2.1*
- *Download QTT Agent, refer to the URL: NXP_QTT_AGENT_Source-R2.2_Linux*

4.2.4.2 Bluetooth controller certification

Refer to the URL: https://launchstudio.bluetooth.com/ListingDetails/135509

RN00104

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Release notes

Rev. 15.0 — 2 October 2024

Document feedback

37 / 121

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
  - Driver load parameters:

  ```
  cal_data_cfg=none, cfg80211_wext=0xf, host_mlme=1, amsdu_deaggr=1, net_rx=1,
   tx_skb_clone=1, tx_work=1
  ```

  - 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	109	117	120	122
WPA2-AES	105	113	119	114
WPA3-SAE	105	115	119	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 | 20MHz				
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 | 40MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	196	230	222	250
WPA2-AES	196	231	221	250
WPA3-SAE	196	230	221	251

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 20 MHz				
Protocol	**TCP (Mbit/s)**		**UDP (Mbit/s)**	
Direction	**Tx**	**Rx**	**Tx**	**Rx**
Open Security	116	120	125	129
WPA2-AES	116	119	125	129
WPA3-SAE	116	119	124	130

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 40 MHz				
Protocol	**TCP (Mbit/s)**		**UDP (Mbit/s)**	
Direction	**Tx**	**Rx**	**Tx**	**Rx**
Open Security	214	246	238	260
WPA2-AES	214	245	238	260
WPA3-SAE	214	246	238	260

Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 20 MHz				
Protocol	**TCP (Mbit/s)**		**UDP (Mbit/s)**	
Direction	**Tx**	**Rx**	**Tx**	**Rx**
Open Security	137	141	146	152
WPA2-AES	137	141	146	152
WPA3-SAE	137	141	146	152

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

RN00104
Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback
42 / 121

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: From 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: From 16.92.10.p219.3 to 16.92.10.p219.5

Component	Description
--	NA

4.2.7.3 Firmware version: From 16.92.10.p219.5 to 16.92.21.p41

Component	Description
--	NA

4.2.7.4 Firmware version: From 16.92.21.p41 to 16.92.21.p55.3

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

RN00104

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Release notes **Rev. 15.0 — 2 October 2024** Document feedback

43 / 121

4.2.7.5 Firmware version: From 16.92.p55.3 to 16.92.21.p76.2

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

4.2.7.6 Firmware version: From 16.92.21.p76.2 to 16.92.21.p84.4

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

4.2.7.7 Firmware version: From 16.92.21.p84.4 to 16.92.21.p119.3

Component	Description
—	—

4.2.7.8 Firmware version: From 16.92.21.p119.3 to 16.92.21.p137.2

Component	Description
Bluetooth	• Sometimes, when the DUT is streaming A2DP data to another remote device, the DUT role switch request is failing to the first remote device.

4.2.8 Known issues

Component	Description
Wi-Fi	• In RF test mode, the firmware command timeout is seen when stopping the on-going transmit via TX continuous mode. • In RF test mode, the transmission does not happen with TX_frame for 5 GHz VHT 20/40 MCS9 2SS and VHT80 MCS0-9 1SS and 2SS data rates if the 2.4 GHz test started prior to the 5 GHz VHT test.

4.3 PCIe-UART 88W8997

4.3.1 Package information

- BSP version: Linux v6.6.23_2.1.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 16.92.21.p137.2
- Driver version: MM6X16437.p30-GPL

4.3.2 Version information

- Wireless SoC: 88W8997
- Wi-Fi and Bluetooth/Bluetooth LE firmware version: 16.92.21.p137.2
  - 16 - Major revision
  - 92 - Feature pack
  - 21 - Release version
  - p137.2 - Patch number
- Driver Version: MM6X16437.p30-GPL
  - 6X - Linux 6.x Kernel
  - 16437 - Release version
  - p30 - 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 6.9.0
- Interface used
  - Wi-Fi over PCIE
  - Bluetooth/Bluetooth LE over UART
- Test Tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.10)
  - hostapd (version 2.10)

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

Note:

- *Download Labtool application for RF test mode, refer to the URL:* [88W8997-MANUFACTURING-RELEASE-P208](#)
- *Download Sigma tool, refer to the URL:* [NXP_WTS&QTT_AGENT Release R2.1](#)
- *Download QTT Agent, refer to the URL:* [NXP_QTT_AGENT_Source-R2.2_Linux](#)

4.3.4.2 Bluetooth controller certification

Refer to the URL: https://launchstudio.bluetooth.com/ListingDetails/135509

RN00104
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Release notes **Rev. 15.0 — 2 October 2024**
Document feedback
46 / 121

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
  - Driver load parameters:

```
cal_data_cfg=none, cfg80211_wext=0xf, host_mlme=1, amsdu_deaggr=1, net_rx=1,
 tx_skb_clone=1, tx_work=1
```

  - 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	107	117	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

RN00104

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Release notes

Rev. 15.0 — 2 October 2024

Document feedback

48 / 121

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	610	600	700	756
WPA2-AES	615	599	711	732
WPA3-SAE	620	595	700	733

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	111	107	115	116

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	119	107	125	112

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	577	580	660	728

4.3.5.5 Mobile AP throughput

External client: NXP 88W8997 PCIe-UART

Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 20MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open security	115	111	119	120
WPA2-AES	113	110	119	120
WPA3-SAE	111	111	115	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	590	605	652	728
WPA2-AES	580	610	655	728
WPA3-SAE	585	609	655	728

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: From 16.92.10.p208 to 16.92.10.p211

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

4.3.7.2 Firmware version: From 16.92.10.p211 to 16.92.10.p213

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

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

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

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

Component	Description
--	NA

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

Component	Description
--	NA

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

Component	Description
--	NA

RN00104

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Release notes **Rev. 15.0 — 2 October 2024** Document feedback

52 / 121

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

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

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

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

4.3.7.9 Firmware version: From 16.92.21.p84.4 to 16.92.21.p119.3

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

4.3.7.10 Firmware version: From 16.92.21.p119.3 to 16.92.21.p137.2

Component	Description
Bluetooth	• Sometimes, when the DUT is streaming A2DP data to another remote device, the DUT role switch request is failing to the first remote device.

4.3.8 Known issues

Component	Description
Wi-Fi	• DUT firmware hang is seen when connected Intel AX210 client sends UDP traffic with power management enabled in noisy environment. • In RF test mode, the firmware command timeout is seen when stopping the on-going transmit via TX continuous mode. • In DUT-STA 802.11ac 80 MHz mode, the TX ring buffer error "TX Ring full, can't send anymore packets to firmware" was observed from the Wi-Fi driver while running the iPerf test at peak TP in TCP Tx mode for ~1 hour.

4.4 SDIO-UART 88W9098

4.4.1 Package information

- BSP version: Linux v6.6.23_2.1.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 17.92.1.p149.155
- Driver version: MM6X17437.p30-GPL

4.4.2 Version information

- Wireless SoC: 88W9098
- Wi-Fi and Bluetooth/Bluetooth LE firmware version: 17.92.1.p149.155
  - 17 - Major revision
  - 92 - Feature pack
  - 1 - Release version
  - p149.155 - Patch number
- Driver Version: MM6X17437.p30-GPL
  - 6X - Linux 6.x Kernel
  - 17437 - Release version
  - p30 - 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 6.9.0
- 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 2.10)
  - hostapd (version 2.10)

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)

Note:

- *Download Labtool application for RF test mode, refer to the URL: 9098_BridgeLabtool_MFG_FW_p227*
- *Download Sigma tool, refer to the URL: NXP_WTS&QTT_AGENT Release R2.1*
- *Download QTT Agent, refer to the URL: NXP_QTT_AGENT_Source-R2.2_Linux*

4.4.4.2 Bluetooth controller certification

Refer to the URL: https://launchstudio.bluetooth.com/ListingDetails/134477

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
  - **–** Driver load parameters:

```
cal_data_cfg=none, cfg80211_wext=0xf, host_mlme=1, amsdu_deaggr=1, net_rx=1,
 tx_skb_clone=1, tx_work=1
```

  - **–** 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

RN00104

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Release notes

Rev. 15.0 — 2 October 2024

Document feedback

56 / 121

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	291	330	345	346
WPA3-SAE	291	329	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	165	175	190	191
WPA2-AES	166	177	190	191
WPA3-SAE	165	177	190	191

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	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 | 20 MHz (HE)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open security	227	225	248	257
WPA2-AES	225	225	246	256
WPA3-SAE	227	225	246	255

RN00104
Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback
58 / 121

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	382	365	412	403
WPA2-AES	381	364	412	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 | 20MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
WPA2-AES	120	117	125	125

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	243	242	257	260

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	368	363	418

RN00104

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Release notes

Rev. 15.0 — 2 October 2024

Document feedback

59 / 121

4.4.5.4 P2P-GC Throughput

P2P - GC Mode Throughput - BGN Mode | MAC2 | 2.4 GHz Band | 20MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
WPA2-AES	120	117	124	125

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	243	242	257	260

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	350	360	369

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	122	119	127	128
WPA2-AES	120	119	126	128
WPA3-SAE	120	119	126	128

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	125	120	130	130
WPA2-AES	125	120	129	130
WPA3-SAE	125	122	129	130

RN00104
Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback
60 / 121

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	247	245	257	262
WPA2-AES	247	245	258	262
WPA3-SAE	247	245	257	262

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	146	142	152	152
WPA2-AES	146	142	151	152
WPA3-SAE	146	143	152	152

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	321	331	353	359
WPA2-AES	321	330	351	357
WPA3-SAE	320	330	351	357

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	392	343	374	382
WPA2-AES	391	343	366	387
WPA3-SAE	391	343	361	390

RN00104

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Release notes

Rev. 15.0 — 2 October 2024

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Document feedback

61 / 121

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	233	241	253	256
WPA2-AES	231	242	253	254
WPA3-SAE	232	242	253	255

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	341	342	382	372
WPA2-AES	340	342	384	374
WPA3-SAE	332	341	382	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	350	378	380	400
WPA2-AES	360	378	389	401
WPA3-SAE	361	378	389	400

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: From 17.92.1.p98.1 to 17.92.1.p116.1

Component	Description
-	NA

4.4.7.2 Firmware version: From 17.92.1.p116.1 to 17.92.1.p136.13

Component	Description
--	NA

4.4.7.3 Firmware version: From 17.92.1.p136.13 to 17.92.1.p136.24

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

4.4.7.4 Firmware version: From 17.92.1.p136.24 to 17.92.1.p136.131

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

4.4.7.5 Firmware version: From 17.92.1.p136.131 to 17.92.1.p149.131

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

4.4.7.6 Firmware version: From 17.92.1.p149.131 to 17.92.1.p149.43

Component	Description
—	—

4.4.7.7 Firmware version: From 17.92.1.p149.43 to 17.92.1.p149.155

Component	Description
Bluetooth	In legacy remote devices, pairing with PIN code method is failed with LMP/LL timeout.

4.4.8 Known issues

Component	Description
Wi-Fi	• In RF test mode, Inconsistent TX-power observed between configured and measured values in tx-continuous CS(Carrier Suppression) mode. • In RF test mode, EVM value degradations are seen on the DFS channels with Linux BSP v6.6.23

4.5 SDIO-UART IW611/IW612

4.5.1 Package information

- BSP version: Linux v6.6.23_2.1.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 18.99.3.p15.8
- Driver version: MM6X18437.p30-GPL

4.5.2 Version information

- Wireless SoC: IW611/IW612
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 18.99.3.p15.8
  - 18 - Major revision
  - 99 - Feature pack
  - 3 - Release version
  - p15.8 - Patch number
- Driver Version: MM6X18437.p30-GPL
  - 6X - Linux 6.x Kernel
  - 18437 - Release version
  - p30 - 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 7. 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

RN00104

Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback

65 / 121

4.5.4 Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.9.0
- 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 2.10)
  - hostapd (version 2.10)
- OpenThread commit ID details
  - OT host build commit ID: 9681690fab100590566e4937cbf2d072de031ff3(22 Apr 2024)
  - OT FW Lib build commit ID: 0f7e8491e2c2445331d5febcbe3a24c0c1d4e1e3(22 Apr 2024)
  - OTBR build commit ID: 45c847a6b47cef00c9e3d46786127ef87475437d (23 Apr 2024)

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

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)

Note:

- *Download Labtool application for RF test mode, refer to the URL: MFG-AW-IW61X-MF-LABTOOL_Native_BRG-WIN-X86-1.0.0.45.6-18.99.2.p19.13*
- *Download Sigma tool, refer to the URL: NXP_WTS&QTT_AGENT Release R2.1*
- *Download QTT Agent, refer to the URL: NXP_QTT_AGENT_Source-R2.2_Linux*

4.5.5.2 Bluetooth controller certification

Refer to the URL: https://launchstudio.bluetooth.com/ListingDetails/155070

4.5.5.3 Thread and Matter certification

- For Thread, refer to [6].
- For Matter, refer to [7].

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
  – Driver load parameters:

```
cal_data_cfg=none, cfg80211_wext=0xf, host_mlme=1, amsdu_deaggr=1, net_rx=1,
 tx_skb_clone=1, tx_work=1
```

  – 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	58	59	63	62
WPA2-AES	57	58	62	61
WPA3-SAE	56	58	62	60

STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open security	61	60	65	63
WPA2-AES	60	59	65	63
WPA3-SAE	60	59	65	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	125	124	134	132
WPA2-AES	124	123	134	131
WPA3-SAE	124	123	134	131

STA Mode Throughput - AC Mode | 5 GHz Band | 20 MHz (VHT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open security	72	75	77	78
WPA2-AES	72	74	77	77
WPA3-SAE	72	74	77	77

Document feedback

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	169	174	181	181
WPA2-AES	167	172	180	180
WPA3-SAE	167	172	179	180

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	328	364	378	391
WPA2-AES	325	364	376	389
WPA3-SAE	325	364	376	389

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	110	110	119	120
WPA2-AES	108	108	118	116
WPA3-SAE	109	103	119	118

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	120	119	127	128
WPA2-AES	119	120	126	127
WPA3-SAE	119	120	126	127

RN00104
Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback
69 / 121

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	229	233	254	259
WPA2-AES	228	231	254	257
WPA3-SAE	228	230	254	257

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	418	466	505
WPA2-AES	410	416	465	505
WPA3-SAE	410	412	466	507

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	58	57	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	119	124	128	132

P2P - GO Mode Throughput - AC Mode | 5 GHz Band | 80 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
WPA2-AES	351	348	376	380

RN00104

Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback

70 / 121

P2P - GO Mode Throughput - AX Mode | 5 GHz Band | 80 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
WPA2-AES	400	404	455	473

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	58	57	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	118	122	129	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	349	344	375	379

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	401	449	478

RN00104
Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback
71 / 121

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	60	55	62	60
WPA2-AES	60	55	62	60
WPA3-SAE	60	55	62	60

Mobile AP Mode Throughput - AN Mode| 5 GHz Band | 20 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open security	61	57	64	62
WPA2-AES	62	58	64	62
WPA3-SAE	62	58	64	62

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	129	125	128	132
WPA2-AES	124	125	133	133
WPA3-SAE	129	125	133	133

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	75	71	77	76
WPA2-AES	75	71	77	76
WPA3-SAE	75	70	77	76

RN00104

Release notes

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Rev. 15.0 — 2 October 2024

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	174	166	180	177
WPA2-AES	173	166	179	176
WPA3-SAE	170	167	179	177

Mobile AP Mode Throughput - AC Mode| 5 GHz Band | 80 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open security	356	346	375	382
WPA2-AES	355	345	373	377
WPA3-SAE	356	345	373	377

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	111	112	119	119
WPA2-AES	109	110	118	118
WPA3-SAE	109	110	119	118

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	122	118	127	127
WPA2-AES	122	116	127	126
WPA3-SAE	122	117	126	126

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	237	230	254	254
WPA2-AES	237	229	253	253
WPA3-SAE	236	230	253	245

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	416	415	460	507
WPA2-AES	410	412	455	506
WPA3-SAE	408	410	456	506

RN00104

Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback

74 / 121

4.5.6.6 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
ThreadLeader	81	81	85	85
ThreadChild	81	81	84	85

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)

RN00104
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Document feedback
75 / 121

4.5.8 Bug fixes/feature enhancements

4.5.8.1 Firmware version: From 18.99.1.p154.40 to 18.99.2.p19.15

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

4.5.8.2 Firmware version: From 18.99.2.p19.15 to 18.99.2.p66.10

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

4.5.8.3 Firmware version: From 18.18.99.2.p66.10 to 18.99.2.p66.17

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

4.5.8.4 Firmware version: From 18.99.2.p66.17 to 18.99.3.p10.1

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

4.5.8.5 Firmware Version: From 18.99.3.p10.1 to 18.99.3.p15.8

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

4.5.9 Known issues

Component	Description
Wi-Fi	• Firmware auto recovery failures seen during long run stress test in DUT-AP mode. • In the DRCS test, DUT AP sent fewer beacons resulting ext. STA disconnections when DUT-STA already performing scan operation. • Wi-Fi firmware automatic recovery failures are seen during stress test in DUT-AP mode running Iperf traffic. • In the DRCS test, Firmware scan command timeout is observed when DUT-STA tries to connect with ext.AP using the wrong password and a Mobile tries to associate with DUT AP. • In the DRCS test, Connection failures are seen when a Mobile tries to associate with DUT AP and DUT-STA tries to connect with ext.AP using the wrong password. • During Tx power and regulatory test, kernel warning observed when tx-power values are not same for 20, 40 &80MHz bonded channels.
Bluetooth	• While two Bluetooth ACL links are connected, HFP call is ongoing in one of the two connections,and the DUT starts scanning, disconnection with the second ACL link occurs. • Randomly DUT hang has been observed while connected with the peer device on BT/BLE link for long duration.
Wi-Fi, Bluetoothand 802.15.4 (Open Thread) Coex	• Wi-Fithroughput in presence of OT peak throughput is under optimization • HighOT Ping loss is observed in the presence of WLAN traffic and A2DP streaming in the closed environment, OT-UDP traffic cannot initiate in the presence of A2DP+WLAN traffic. • Audio cuts observed while running the DUT STA coex RVR test. • In LNT Network of 50 nodes, segmentation fault error occurred, and app crashed in a running node, while Node considered to be run for more than ~24 hours. • In LNT Network of 10 nodes when high traffic is running on each node, ZC and ZR got terminated because of MAC split errors.

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

- OTBR functionality
  - The current software release version 18.99.3.p10.1 is compatible with Linux 6.6.23 BSP planned to be available in the middle of July 2024. The current release does work on the older BSP version due to dependencies on the Linux 6.6.23 BSP.
- Additional changes in OpenThread are required to enable vendor specific Spinel properties
  - Patch files are located in OT-Tools_LNX_6_6_23-IMX8/otpatches-052-0f7e849
- Use vendor specific command to update SPI CLK to 10 MHz
  - ot-ctl spifreq 10000000
  - Refer to the *ReadME_SPI10MHz.txt* for more details.
- Vendor specific commands for independent reset and TX power limit were added to OTBR.
- To recover OT daemon hang, restart the OT daemon
- Bluetooth LE isochronous channel support
  - cis_offset value ≥ 800 µs is supported
- Bluetooth LE isochronous channel support on controller are validated using Ethermind stack on RT1170 platform
- 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
  - BT-SIG qualification: link
- 802.15.4 Matter certification for IW612 with Linux certification ID# is CSA22098MAT40098-50
  - Matter certificate: link
- WFA certification for IW612: link
- This is an experimental software release for following features:
  - LE Audio

4.6 SDIO-UART 88W8987

4.6.1 Package information

- BSP version: Linux v6.6.23_2.1.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 16.92.21.p137.2
- Driver version: MM6X16437.p30-GPL

4.6.2 Version information

- Wireless SoC: 88W8987
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 16.92.21.p137.2
  - 16 - Major revision
  - 92 - Feature pack
  - 21 - Release version
  - p137.2 - Patch number
- Driver Version: MM6X16437.p30-GPL
  - 6X - Linux 6.x Kernel
  - 16437 - Release version
  - p30 - 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 6.9.0
- 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 2.10)
  - hostapd (version 2.10)

4.6.4 Wi-Fi and Bluetooth certification

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

4.6.4.1 WFA certifications

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

Refer to [1].

Note:

- *Download Labtool application for RF test mode, refer to the URL: MFG-W8987-MF-WIFI-BT-BRG-FC-VS2013-1.1.0.191-16.80.205.p211*
- *Download Sigma tool, refer to the URL: NXP_WTS&QTT_AGENT Release R2.1*
- *Download QTT Agent, refer to the URL: NXP_QTT_AGENT_Source-R2.2_Linux*

4.6.4.2 Bluetooth controller certification

Refer to the URL: https://launchstudio.bluetooth.com/ListingDetails/115533

RN00104

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Release notes **Rev. 15.0 — 2 October 2024** Document feedback

81 / 121

4.6.5 Wi-Fi throughput

4.6.5.1 Throughput test setup

- Environment: Shield Room - Over the Air
- Access Point: NXP IW620
- DUT: 88W8987-Murata M.2 (Module: LBEE5QD1ZM) with MCIMX8M-EVK platform
  - **Driver load parameters:**

```
cal_data_cfg=none, cfg80211_wext=0xf, host_mlme=1, amsdu_deaggr=1, net_rx=1,
 tx_skb_clone=1, tx_work=1
```

  - 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

4.6.5.2 STA throughput

External AP: NXP IW620

STA Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open security	56	57	58	60
WPA2-AES	57	58	58	60
WPA3-SAE	56	57	58	60

STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open security	59	61	61	63
WPA2-AES	58	61	61	63
WPA3-SAE	58	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	130	125	134
WPA2-AES	114	130	124	134
WPA3-SAE	114	130	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	72	73	74
WPA2-AES	70	72	73	74
WPA3-SAE	69	72	73	74

RN00104

Release notes **Rev. 15.0 — 2 October 2024** Document feedback

83 / 121

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	148	173	164	178
WPA2-AES	147	172	163	178
WPA3-SAE	147	172	163	178

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	219	360	262	388
WPA2-AES	206	346	241	385
WPA3-SAE	206	344	240	385

4.6.5.3 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	53	57	58	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	115	126	122	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	310	237	385

4.6.5.4 P2P-GC throughput

P2P - GC Mode Throughput - BGN Mode | 2.4 GHz Band | 20MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
WPA2-AES	55	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	122	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	232	320	240	385

4.6.5.5 Mobile AP throughput

External client: NXP 88W8997 PCIe-UART

Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 20MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open security	52	56	57	60
WPA2-AES	53	56	57	61
WPA3-SAE	53	56	56	61

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 20 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open security	58	59	61	64
WPA2-AES	58	59	61	64
WPA3-SAE	58	59	61	64

Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 40 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open security	117	127	124	135
WPA2-AES	115	126	123	135
WPA3-SAE	115	127	121	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	70	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	147	168	155	179
WPA2-AES	146	167	156	179
WPA3-SAE	146	168	156	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	241	348	259	388
WPA2-AES	226	314	245	386
WPA3-SAE	226	315	245	385

4.6.6 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)

RN00104

Release notes **Rev. 15.0 — 2 October 2024** Document feedback
86 / 121

4.6.7 Bug fixes/feature enhancements

4.6.7.1 Firmware version: From 16.92.10.p208 to 16.92.10.p210

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

4.6.7.2 Firmware version: From 16.92.10.p210 to 16.92.10.p210.1

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

4.6.7.3 Firmware version: From 16.92.10.p210.1 to 16.92.21.p11.1

Component	Description
-	NA

4.6.7.4 Firmware version: From 16.92.21.p11.1 to 16.92.21.p26

Component	Description
Bluetooth	• When host read batch scan parameters then DUT gets unresponsive.

4.6.7.5 Firmware version: From 16.92.21.p26 to 16.92.21.p41.3

Component	Description
-	NA

4.6.7.6 Firmware version: From 16.92.21.p41.3 to 16.92.21.p41.4

Component	Description
Bluetooth	• DUT as peripheral and DUT as central starts connection for LE link simultaneously, if link with DUT as peripheral gets connected before link with DUT as central then link with DUT as central gets disconnected.

RN00104

Release notes

Rev. 15.0 — 2 October 2024

Document feedback

87 / 121

4.6.7.7 Firmware version: From 16.92.21.p41.4 to 16.92.21.p69.3

Component	Description
Bluetooth	• DUT pairing with LE HoGP remote device fails with authentication failure error. • DUT is connected for OPP profile with remote device and when transfer file to remote device then Bluetooth link gets disconnected. • When Bluetooth A2DP streaming is ongoing with first remote device then DUT failed for encryption with another LE remote device. • When DUT connected for HFP call and perform stress test for Bluetooth link connect disconnect then DUT firmware becomes unresponsive.
Coex	• Sometimes in dual A2DP mode, glitches are observed and Wi-Fi Rx throughput drops.

4.6.7.8 Firmware version: From 16.92.21.p69.3 to 16.92.21.p76.2

Component	Description
Wi-Fi	• The current consumption is higher than expected on chipset when loading the Wi-Fi only firmware.
Bluetooth	• When DUT A2DP streaming is ongoing and another LE device is connected with DUT and DUT is performing LE scan makes DUT firmware in bad condition for stress test.
Coex	• LE peripheral pairing gets failed with Mobile device when Wi-Fi is enabled on a single antenna device.

4.6.7.9 Firmware version: From 16.92.21.p76.2 to 16.92.21.p76.5

Component	Description
-	NA

4.6.7.10 Firmware version: From 18.99.1.p154.40 to 18.99.2.p19.15

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

4.6.7.11 Firmware version: From 16.92.p99.2 to 16.92.2 p119.3

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

4.6.7.12 Firmware version: From 16.92.2 p119.3 to 16.92.21.p137.2

Component	Description
—	—

4.6.8 Known issues

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

4.7 SDIO-UART IW416

4.7.1 Package information

- BSP version: Linux v6.6.23_2.1.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 16.92.21.p137.2
- Driver version: MM5X16437.p30-GPL

4.7.2 Version information

- Wireless SoC: IW416
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 16.92.21.p137.2
  - 16 - Major revision
  - 92 - Feature pack
  - 21 - Release version
  - p137.2 - Patch number
- Driver Version: MM6X16437.p30-GPL
  - 6X - Linux 6.x Kernel
  - 16437 - Release version
  - p30 - 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 6.9.0
- 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 2.10)
  - hostapd (version 2.10)

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

Refer to [1].

Note:

- *Download Labtool application for RF test mode, refer to the URL: MFG-IW416-MF-WIFI-BT-BRG-FC-VS2013-1.0.0.15.0-16.80.21.p72*
- *Download Sigma tool, refer to the URL: NXP_WTS&QTT_AGENT Release R2.1*
- *Download QTT Agent, refer to the URL: NXP_QTT_AGENT_Source-R2.2_Linux*

4.7.4.2 Bluetooth controller certification

Refer to the URL: https://launchstudio.bluetooth.com/ListingDetails/108035

RN00104

Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback

91 / 121

4.7.5 Wi-Fi throughput

4.7.5.1 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
  – Driver load parameters:

```
cal_data_cfg=none, cfg80211_wext=0xf, host_mlme=1, amsdu_deaggr=1, net_rx=1,
 tx_skb_clone=1, tx_work=1
```

  – 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: 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	45	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	81	90	108	91
WPA2-AES	76	88	110	97
WPA3-SAE	77	88	108	92

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	53	54	60	57
WPA2-AES	52	52	60	56
WPA3-SAE	51	48	59	54

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	98	115	121	129
WPA2-AES	84	92	117	101
WPA3-SAE	83	93	115	102

4.7.5.3 P2P-GO throughput

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

4.7.5.4 P2P-GC throughput

P2P - GC Mode Throughput - BGN Mode | 2.4 GHz Band | 20MHz				
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	110	118	120	130

RN00104

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Release notes **Rev. 15.0 — 2 October 2024** Document feedback

94 / 121

4.7.5.5 Mobile AP throughput

External client: NXP 88W8997 PCIe-UART

Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 20MHz				
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 | 40MHz				
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

4.7.6 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: From 16.92.10.p233.2 to 16.92.21.p11.2

Component	Description
Bluetooth	• The ACL link with iPhone is disconnected due to error code "REMOTE DEVICE TERMINATED CONNECTION DUE TO LOW RESOURCES.

4.7.7.2 Firmware version: From 16.92.21.p11.2 to 16.92.21.p41.1

Component	Description
Wi-Fi	• Fix Channel Occupancy Time (COT) for HT20/MCS0 within 6 msec.

4.7.7.3 Firmware version: From 16.92.21.p41.1 to 16.92.21.p55.3

Component	Description
Wi-Fi	• Once DUT PAN profile gets disconnection with remote device, then DUT reconnection fails for successive connection trials. • DUT Bluetooth Classic & BLE RX test mode fails to receive the packets and host is failing to derive the various parameters.

4.7.7.4 Firmware version: From 16.92.21.p55.3 to 16.92.21.p76.3

Component	Description
Bluetooth	• DUT Bluetooth & BLE TX test mode fails to set the power continuously and there is a difference between configured and measured power.

4.7.7.5 Firmware version: From 16.92.21.p76.3 to 16.92.21.p84.3

Component	Description
Bluetooth	• DUT HFP link gets disconnected with Remote phone, when it starts OPP file transfer to Remote device.

4.7.7.6 Firmware version: From 16.92.21.p84.3 to 16.92.21.p84.128

Component	Description
—	—

RN00104

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Release notes

Rev. 15.0 — 2 October 2024

Document feedback

96 / 121

4.7.7.7 Firmware version: From 16.92.21.p84.3 to 16.92.2.p119.11

Component	Description
Wi-Fi	• For the DRCS with P2P GO provisioning use-case, a Scan timeout is observed when STA is connected to EX-AP and Ex-Client is connected to GO. • With DRCS enabled, when STA is connected to the EX-AP P2P data pause/stuck is observed. • When connecting STA to Ex-AP in AP provisioning case, due to association status mismatch failures are observed in STA connection.

4.7.7.8 Firmware version: From 16.92.2.p119.11 to 16.92.21.p137.2

Component	Description
—	—

4.7.8 Known issues

Component	Description
Wi-Fi	• When ed-mac is enabled, probe responses are transmitted during interference signal. • In RF test mode, TX power values are not updating after configured values in continuous wave transmit mode.
Bluetooth	• Random Bluetooth security link loss in concurrent Bluetooth classic and Bluetooth LE modes with AES • When Bluetooth A2DP streaming is ongoing with first remote device then DUT shows low transmit throughput with second remote device.

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.*

4.8 SDIO 88W8801

4.8.1 Package information

- BSP version: Linux v6.6.23_2.1.0
- Wi-Fi Firmware version: 14.92.36.p192
- Driver version: MM6X14437.p30-GPL

4.8.2 Version information

- Wireless SoC: SD8801
- Wi-Fi Firmware Version: 14.92.36.p192
  - 14 - Major revision
  - 92 - Feature pack
  - 36 - Release version
  - p192 - Patch number
- Driver Version: MM6X14437.p30-GPL
  - 6X - Linux 6.x Kernel
  - 14437 - Release version
  - p30 - 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 6.9.0
- Interface used
  - Wi-Fi over SDIO (SDIO 2.0 support, Clock speed: 50 MHz)
- Test Tools
  - iPerf (version 2.0.13)
  - wpa_supplicant (version 2.10)
  - hostapd (version 2.10)

4.8.4 Wi-Fi certification

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

4.8.4.1 WFA certifications

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

Refer to [1].

Note:

• *Download Labtool application for RF test mode, refer to the URL: MFG-W8801- MF-WIFI- BRG-FC13- WIN-X86*
• *Download Sigma tool, refer to the URL: NXP_WTS&QTT_AGENT Release R2.1*
• *Download QTT Agent, refer to the URL: NXP_QTT_AGENT_Source-R2.2_Linux*

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_49674)
• DUT: W8801-Murata M.2 (Module LBWA0ZZ2DS) with MCIMX8M-EVK platform
  – Driver load parameters:

```
cal_data_cfg=none cfg80211_wext=0xf host_mlme=1, amsdu_deaggr=1, net_rx=1,
 tx_skb_clone=1, tx_work=1
```

  – 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

4.8.5.2 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	40	55	46	59
WPA2-AES	42	55	45	59
WPA3-SAE	42	55	47	60

4.8.5.3 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	40	55	44	60

4.8.5.4 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	42	55	49	60

4.8.5.5 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	42	52	44	58
WPA2-AES	40	55	43	60
WPA3-SAE	42	53	47	60

4.8.6 EU conformance tests

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

RN00104

Release notes **Rev. 15.0 — 2 October 2024** Document feedback

100 / 121

4.8.7 Bug fixes/feature enhancements

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

4.8.8 Known issues

Component	Description
--	NA

RN00104

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Release notes **Rev. 15.0 — 2 October 2024** Document feedback

101 / 121

5   i.MX platforms on-board chips and external wireless solutions

Table 8. On-board chips and external support for Bluetooth and Wi-Fi support

SoC	On-board chip	PCIe M.2 card	uSD card or SDIO M.2 card
8 QM/QXP/DX/DXL	-	NXP 88W8997 (Murata LBEE5XV1YM[1]) NXP 88W9098 (Murata LBEE5ZZ1XL[1])	-
8 ULP	-	-	NXP IW416 (Murata LBEE5CJ1 XK[1])
8M Nano	NXP 88W8987 (AzureWave AW-CM358 SM/MA[1])	-	NXP 88W8987 (Murata M.2 LBEE5QD1ZM)
8M Mini	NXP 88W8987 (AzureWave AW-CM358 SM/MA[1])	-	NXP 88W8987 (Murata M.2 LBEE5QD1ZM)
8M Plus	-	NXP 88W8997 (AzureWave AW-CM276 SM/MA[1]) NXP 88Q9098 (Murata LBEE6ZZ-1TA[1])	NXP 88W8997 (Murata LBEE5 XV1YM[1]) NXP 88Q9098 (Murata LBEE5 ZZ1XL[1])
8M Quad	-	NXP 88W8997 (Murata LBEE5XV1YM[1]) NXP 88Q9098 (Murata LBEE6ZZ-1TA[1])	NXP 88W8997 (Murata LBEE5 XV1YM[1]) NXP IW416 (Murata LBEE5CJ1 XK[1]) NXP 88W8801 (Murata LBWA0 ZZ2DS[1]) NXP 88Q9098 (Murata LBEE5 ZZ1XL[1])
7ULP	-	-	NXP 88W8987(Azurewave AW-CM358-SM/MA[1])(WLAN only)
7D	-	-	NXP 88W8987(Azurewave AW-CM358-SM/MA[1])(WLAN only)
6Q/6DL/6QP/6SX/ 6 SLL/6UL/6ULL/ 6ULZ	-	-	NXP IW416 (Murata LBEE5CJ1 XK)[2][1] #NXP 88W8801 (Murata LBWA0 ZZ2DS[2][1]) NXP 88W8987(Murata LBEE5 QD1ZM[1])

[1]   Tested modules with mentioned i.MX EVK.
[2]   M.2 + M.2-to-usd adapter (only imx6ull support)

6 Note about the source code in the document

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7 Acronyms and abbreviations

Table 9. List of acronyms and abbreviations

Acronym	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

RN00104

Release notes

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Rev. 15.0 — 2 October 2024

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Document feedback
104 / 121

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]   User manual – UM11483 – Getting Started with NXP–based Wireless Modules on i.MX 8M Quad EVK Running Linux OS (link)

[5]   User manual – UM11675 – How to Download and Build NXP Wi–Fi Drivers (link)

[6]   Web page – Thread certified products (link)

[7]   Web page – Matter – NXP i.MX8M MPU + IW612 Tri–radio (link)

9 Revision history

Revision history

Document ID	Date	Change details
RN00104 v.15.0	02 October 2024	• Section 4 "Release notes for the supported SoCs": updated MM6X17437 driver patch version to p30. • Removed the section *Software release content*.

RN00104 v.14.0	25 September 2024	• Section 1 "About this document": updated the release version.
		• Section 2.2 "Wi-Fi utilities (mlanutl)": updated the release version.
		• Feature list
		  – Section 3.1.1 "Client mode ": updated.
		  – Section 3.1.2 "AP mode": updated.
		  – Section 3.1.3 "Wi-Fi Direct/P2P, and AP-STA modes": updated.
		  – Section 3.2.1 "Bluetooth classic": updated.
		  – Section 3.5 "Zigbee": updated.
		• PCIe-UART 88W9098
		  – 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: From 17.92.1.p149.43 to 17.92.1.p149.155": added.
		  – Section 4.1.8 "Known issues": updated.
		• SDIO-UART 88W8997
		  – 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: From 16.92.21.p119.3 to 16.92.21.p137.2": added.
		  – Section 4.2.8 "Known issues": updated.
		• PCIe-UART 88W8997
		  – 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: From 16.92.21.p119.3 to 16.92.21.p137.2": added.
		  – Section 4.3.8 "Known issues": updated.
		——— continues ———

Revision history...*continued*

Document ID	Date	Change details

RN00104 v.14.0	25 September 2024	————— continued —————
		• SDIO-UART 88W9098
		  – 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: From 17.92.1.p149.43 to 17.92.1.p149.155": added.
		  – Section 4.4.8 "Known issues": updated.
		• SDIO-UART IW611/IW612
		  – 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: From 18.99.3.p10.1 to 18.99.3.p15.8": added.
		  – Section 4.5.9 "Known issues": updated.
		• SDIO-UART 88W8987
		  – Section 4.6.1 "Package information": updated.
		  – Section 4.6.2 "Version information": updated.
		  – Section 4.6.3 "Host platform": updated.
		  – Section 4.6.4.1 "WFA certifications": updated.
		  – Section 4.6.5 "Wi-Fi throughput": updated.
		  – Section 4.6.7.12 "Firmware version: From 16.92.2 p119.3 to 16.92.21.p137.2": added.
		  – Section 4.6.8 "Known issues": updated.
		• SDIO-UART IW416
		  – 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 4.7.7.8 "Firmware version: From 16.92.2.p119.11 to 16.92.21.p137.2": added.
		  – Section 4.7.8 "Known issues": updated.
		• SDIO 88W8801
		  – Section 4.8.1 "Package information": updated.
		  – Section 4.8.2 "Version information": updated.
		  – Section 4.8.3 "Host platform": updated.

Revision history...*continued*

Document ID	Date	Change details

RN00104 v.13.0	26 June 2024	• Section 1 "About this document": updated the release version.
		• Section 1.1 "Supported SoCs": updated for IW611 and IW612.
		• Section 2.2 "Wi-Fi utilities (mlanutl)": updated the release version.
		• Section *Software release content*: added.
		• Feature list
		  – Section 3.1.1 "Client mode ": updated.
		  – Section 3.1.2 "AP mode": updated.
		  – Section 3.1.3 "Wi-Fi Direct/P2P, and AP-STA modes": updated.
		  – Section 3.2.1 "Bluetooth classic": updated.
		  – Section 3.3 "Thread": updated.
		  – Section 3.5 "Zigbee": added.
		  – Section 3.6 "Dual PAN (coexistence of Thread and Zigbee)": added.
		• PCIe-UART 88W9098
		  – 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 4.1.7.9 "Firmware version: From 17.92.1.p149.131 to 17.92.1.p149.43": added.
		• SDIO-UART 88W8997
		  – 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.
		• PCIe-UART 88W8997
		  – 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.
		• SDIO-UART 88W9098
		  – 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 4.4.7.6 "Firmware version: From 17.92.1.p149.131 to 17.92.1.p149.43": added.
		——————*Continues*——————

Revision history...*continued*

Document ID	Date	Change details

RN00104 v.13.0	26 June 2024	——— *Continued* ———
		• SDIO-UART IW611/IW612
		  – 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: From 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
		  – Section 4.6.1 "Package information": updated.
		  – Section 4.6.2 "Version information": updated.
		  – Section 4.6.3 "Host platform": updated.
		• SDIO-UART IW416
		  – 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 4.7.5.5 "Mobile AP throughput ": updated.
		• SD 88W8801
		  – Section 4.8.1 "Package information": updated.
		  – Section 4.8.2 "Version information": updated.
		  – Section 4.8.3 "Host platform": updated.
		• Section 8 "References": updated.

Revision history...*continued*

Document ID	Date	Change details

RN00104 v.12.0	27 March 2024	• [Section 1 "About this document"](#): updated the release version.
		• [Section 2.2 "Wi-Fi utilities (mlanutl)"](#): updated the release version.
		• Feature list
		  – [Section 3.1.1 "Client mode "](#): updated.
		  – [Section 3.1.2 "AP mode"](#): update.
		  – [Section 3.1.3 "Wi-Fi Direct/P2P, and AP-STA modes"](#): updated.
		  – [Section 3.2.1 "Bluetooth classic"](#): updated.
		  – [Section 3.2.2 "Bluetooth LE"](#): updated.
		  – [Section 3.3 "Thread"](#): updated.
		  – [Section 3.5 "Zigbee"](#): added.
		• PCIe-UART 88W9098
		  – [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 4.1.7.8 "Firmware version: From 17.92.1.p136.132 to 17.92.1.p149.131"](#): added.
		  – [Section 4.1.8 "Known issues"](#): updated.
		• SDIO-UART 88W8997
		  – [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 4.2.7.7 "Firmware version: From 16.92.21.p84.4 to 16.92.21.p119.3"](#): added.
		• PCIe-UART 88W8997
		  – [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 4.3.7.9 "Firmware version: From 16.92.21.p84.4 to 16.92.21.p119.3"](#): added.
		  – [Section 4.3.8 "Known issues"](#): updated.
		• SDIO-UART 88W9098
		  – [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 4.4.7.5 "Firmware version: From 17.92.1.p136.131 to 17.92.1.p149.131"](#): updated.
		  – [Section 4.4.8 "Known issues"](#): updated.
		————*Continues*————

RN00104

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Release notes

Rev. 15.0 — 2 October 2024

Document feedback

110 / 121

Revision history...*continued*

Document ID	Date	Change details

RN00104 v.12,0	27 March 2024	———— *Continued* ————
		
		• SDIO-UART IW61x
		  – 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: From 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
		  – Section 4.6.1 "Package information": updated.
		  – Section 4.6.2 "Version information": updated.
		  – Section 4.6.3 "Host platform": updated.
		  – Section 4.6.4.1 "WFA certifications": updated.
		  – Section 4.6.5 "Wi-Fi throughput": updated.
		  – Section 4.6.7.11 "Firmware version: From 16.92.p99.2 to 16.92.2 p119.3": added.
		  – Section 4.6.8 "Known issues": updated.
		• SDIO-UART IW416
		  – 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 4.7.7.7 "Firmware version: From 16.92.21.p84.3 to 16.92.2.p119.11": updated.
		  – Section 4.7.8 "Known issues": updated.
		• SD 88W8801
		  – 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 4.8.7 "Bug fixes/feature enhancements": updated.

RN00104

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Release notes

Rev. 15.0 — 2 October 2024

Document feedback

111 / 121

Revision history...*continued*

Document ID	Date	Change details

RN00104 v.11.0	13 December 2023	• Section 1 "About this document": updated.
		• Section 1.1 "Supported SoCs": replaced IW612 with IW61x.
		• Section 2.2 "Wi-Fi utilities (mlanutl)": updated.
		• Feature list
		  – Section 3.1.1 "Client mode ": updated.
		  – Section 3.1.2 "AP mode": updated.
		  – Section 3.1.3 "Wi-Fi Direct/P2P, and AP-STA modes": updated.
		  – Section 3.2.1 "Bluetooth classic": updated.
		  – Section 3.2.2 "Bluetooth LE": updated.
		  – Section 3.3 "Thread": updated.
		• PCIe-UART 88W9098
		  – Section 4.1.1 "Package information": updated.
		  – Section 4.1.2 "Version information": updated.
		  – Section 4.1.3 "Host platform": updated.
		  – Section 4.1.7.7 "Firmware version: From 17.92.1.p136.131 to 17.92.1.p136.132": added.
		• SDIO-UART 88W8997
		  – Section 4.2.1 "Package information": updated.
		  – Section 4.2.2 "Version information": updated.
		  – Section 4.2.3 "Host platform": updated.
		• PCIe-UART 88W8997
		  – Section 4.3.1 "Package information": updated.
		  – Section 4.3.2 "Version information": updated.
		  – Section 4.3.3 "Host platform": updated.
		• SDIO-UART 88W9098
		  – Section 4.4.1 "Package information": updated.
		  – Section 4.4.2 "Version information": updated.
		  – Section 4.4.3 "Host platform": updated.
		  – Section 4.4.8 "Known issues": updated.
		  – Section 4.4.7.5 "Firmware version: From 17.92.1.p136.131 to 17.92.1.p149.131": added.
		• SDIO-UART IW61x
		  – 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 4.5.4 "Host platform": updated.
		  – Section 4.5.6.2 "STA throughput": updated.
		  – Section 4.5.6.4 "P2P-GC Throughput": updated.
		  – Section 4.5.6.5 "Mobile AP Throughput": updated.
		  – Section 4.5.6.6 "Open Thread throughput test": added.
		  – Section 4.5.8.1 "Firmware version: From 18.99.1.p154.40 to 18.99.2.p19.15": updated.
		  – Section 4.5.8.2 "Firmware version: From 18.99.2.p19.15 to 18.99.2.p66.10": added.
		  – Section 4.5.9 "Known issues": updated.
		————*Continues*————

RN00104

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Release notes

Rev. 15.0 — 2 October 2024

Document feedback

112 / 121

Revision history...*continued*

Document ID	Date	Change details

RN00104 v.11.0	13 December 2023	———— *Continued* ————
		• SDIO-UART 88W8987
		  – Section 4.6.1 "Package information": updated.
		  – Section 4.6.2 "Version information": updated.
		  – Section 4.6.3 "Host platform": updated.
		• SDIO-UART IW416
		  – Section 4.7.1 "Package information": updated.
		  – Section 4.7.2 "Version information": updated.
		  – Section 4.7.3 "Host platform": updated.
		• SD 88W8801
		  – Section 4.8.1 "Package information": updated.
		  – Section 4.8.2 "Version information": updated.
		  – Section 4.8.3 "Host platform": updated.
		  – Section 4.7.7.6 "Firmware version: From 16.92.21.p84.3 to 16.92.21.p84.128": added.
		• Section 8 "References": updated.

RN00104 v.10.0	18 October 2023	Updated: • Updated the document title. • Section 4.4.5.2 "STA throughput": updated. • Section 4.4.5.3 "P2P-GO throughput": updated. • Section 4.4.5.4 "P2P-GC Throughput": updated. • Section 4.4.5.5 "Mobile AP Throughput": updated. • Section 4.4.7.4 "Firmware version: From 17.92.1.p136.24 to 17.92.1.p136.131": updated. • Section 4.4.8 "Known issues": updated.
RN00104 v. 9.0	4 October 2023	Updated: • 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 4.6 "SDIO-UART 88W8987" • Section 4.7 "SDIO-UART IW416" • Section 4.8 "SDIO 88W8801"
RN00104 v. 8.0	29 June 2023	Updated: • 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 4.6 "SDIO-UART 88W8987" • Section 4.7 "SDIO-UART IW416" • Section 4.8 "SDIO 88W8801"

RN00104

Release notes

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Rev. 15.0 — 2 October 2024

Revision history...*continued*

Document ID	Date	Change details
RN00104 v. 7.0	29 March 2023	Updated: • 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 4.6 "SDIO-UART 88W8987" • Section 4.7 "SDIO-UART IW416" • Section 4.8 "SDIO 88W8801" • Section 5 "i.MX platforms on-board chips and external wireless solutions"
RN00104 v. 6.0	16 December 2022	Updated: • 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 4.6 "SDIO-UART 88W8987" • Section 4.7 "SDIO-UART IW416" • Section 4.8 "SDIO 88W8801" • Section 5 "i.MX platforms on-board chips and external wireless solutions" • Section 7 "Acronyms and abbreviations"
RN00104 v. 5.0	27 September 2022	Updated: • 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 4.7 "SDIO-UART IW416" • Section 4.8 "SDIO 88W8801" • Section 7 "Acronyms and abbreviations"
RN00104 v. 4.0	28 June 2022	Updated: • 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 4.7 "SDIO-UART IW416" • Section 4.8 "SDIO 88W8801" • Section 7 "Acronyms and abbreviations"

Revision history...*continued*

Document ID	Date	Change details
RN00104 v. 3.0	24 March 2022	• Added SDIO-UART 88W9098 Updated: • 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 4.6.4 "Wi-Fi and Bluetooth certification" • Section 4.7.4 "Wi-Fi and Bluetooth certification" • Section 4.8.4 "Wi-Fi certification" • Bluetooth certification links
RN00104 v. 2.0	24 January 2022	• Added the link for the WPA3-R3 support. • Section 4.8.1 "Package information": updated. • Section 4.8.2 "Version information": updated.>
RN00104 v.1.0	14 December 2021	Initial release

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RN00104

Release notes

Rev. 15.0 — 2 October 2024

Document feedback

116 / 121

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Release notes

Rev. 15.0 — 2 October 2024

Document feedback

117 / 121

Tables

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Release notes

Rev. 15.0 — 2 October 2024

Document feedback

118 / 121

Contents

RN00104

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Release notes

Rev. 15.0 — 2 October 2024

Document feedback

119 / 121

RN00104

Release notes

Rev. 15.0 — 2 October 2024

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120 / 121