

# RN00104

## NXP Wireless SoC Features and Release Notes for Linux

Rev. 12 — 27 March 2024

Release notes

### Document information

Information	Content
Keywords	PCIE-Wi-Fi-UART-BT-FP92-88W9098, PCIE-Wi-Fi-UART-BT-FP92-88W8997, SD-Wi-Fi-UART-BT-FP92-88W9098, SD-Wi-Fi-UART-BT-FP92-88W8997, SD-Wi-Fi-UART-BT-FP92-88W8987, SD-Wi-Fi-UART-BT-FP92-IW416, SD-Wi-Fi-UART-BT-FP99-IW61x, 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 v6.6.3-1.0.0.

### 1.1 Supported SoCs

- PCIE-Wi-Fi-UART-BT-FP92-88W9098
- PCIE-Wi-Fi-UART-BT-FP92-88W8997
- SD-Wi-Fi-UART-BT-FP92-88W9098
- SD-Wi-Fi-UART-BT-FP92-88W8997
- SD-Wi-Fi-UART-BT-FP92-88W8987
- SD-Wi-Fi-UART-BT-FP92-IW416
- SD-Wi-Fi-UART-BT-FP99-IW61x
- SD-Wi-Fi-FP92-88W8801

## 2 Downloading 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 \(mланutl\)"](#)
- [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 (mланutl)

The mланutl is not part of the Linux BSP image version v.6.6.3-1.0.0 nor the GitHub source release tag: `1f-6.6.3-1.0.0`.

The source is available at:

[https://github.com/nxp-imx/mwiflex/tree/1f-5.15.52\\_2.1.0/mxm\\_wiflex/wlan\\_src/mapp/mланutl](https://github.com/nxp-imx/mwiflex/tree/1f-5.15.52_2.1.0/mxm_wiflex/wlan_src/mapp/mланutl)

### 2.3 Wi-Fi driver source and firmware

To download the Wi-Fi driver and wireless firmware releases, refer to the user manual >*How to Download and Build NXP Wi-Fi Drivers* ([Section 7](#)).

**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](https://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:

Embedded Linux for i.MX Applications Processors
Q Search

Overview
Software Details
Design Resources
Support
DOWNLOADS

**Linux 5.4.70\_2.3.0**

- Documentation
- NXP Wi-Fi Driver Features and Release Notes
- See README on instructions for each release.
- SCFW Porting Kit 1.7.0 (Not recommended for production)
- AACPlus Codec
- Versilicon IDE

- i.MX 8DXL EVK
- i.MX 8M Plus EVK
- i.MX 8M Nano DDR3L EVK
- i.MX 8M Nano EVK
- i.MX 8M Mini EVK
- i.MX 8M Quad EVK
- i.MX 8QuadXPlus(B0\_CD) MEK, i.MX 8DualX MEK
- i.MX 8QuadMax MEK
- i.MX 7ULP EVK
- i.MX 7Dual SABRESD
- i.MX 6UltraLite, i.MX 6ULL, i.MX 6ULZ, i.MX 7Dual
- i.MX 6SLL EVK
- i.MX 6QuadPlus, i.MX 6Quad, i.MX 6DualLite, i.MX 6Solo, i.MX 6SoloX

**Linux 5.4.70\_2.3.1 Patch**

- Release notes
- SCFW Porting Kit 1.7.1 (Not recommended for production)
- Wi-Fi™ Patch

**Linux 5.4.70\_2.3.2 Patch**

- Documentation
- i.MX 8M Plus EVK Binary Demo Files

**Linux 5.4.70\_2.3.3 Patch**

- Release notes
- SCFW Porting Kit 1.7.3 (Not recommended for production)
- i.MX 8DXL EVK

**Linux 5.4.70\_2.3.4 Patch**

- Release notes
- SCFW Porting Kit 1.7.4
- i.MX 8DXL EVK

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

### 3 Feature lists

#### 3.1 Wi-Fi radio

##### 3.1.1 Client mode

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

Feature	Sub feature	PCIe-UART		SD-UART					SD
		9098	8997	9098	IW61x	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 <sup>[1]</sup>	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	

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

Feature	Sub feature	PCIe-UART		SD-UART				SD	
		9098	8997	9098	IW61x	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
	256 QAM Modulation – MCS 8 and MCS9	Y	Y	Y	Y	Y	Y	Y	N
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 Time	Y	N	Y	Y	N	N	N	N
	1024 QAM	Y	N	Y	Y	N	N	N	N
	Spatial reuse	N	N	N	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	

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

Feature	Sub feature	PCIe-UART		SD-UART					SD
		9098	8997	9098	IW61x	8997	8987	IW416	8801
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 <sup>[1]</sup>	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
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) <sup>[1]</sup>	Y	Y	Y	Y	Y	N	Y	N
	WPA2 Enterprise Security	Y	Y	Y	Y	Y	Y	Y	Y
	WAPI support <sup>[1]</sup>	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

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

Feature	Sub feature	PCIe-UART		SD-UART					SD
		9098	8997	9098	IW61x	8997	8987	IW416	8801
802.11az	New generation Wi-Fi Location	N	N	N	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
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 <sup>[1]</sup>	Y	Y	Y	Y	Y	Y	Y	N



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

Feature	Sub feature	PCIe-UART		SD-UART					SD
		9098	8997	9098	IW61x	8997	8987	IW416	8801
General Features	EU adaptivity support	Y	Y	Y	Y	Y	Y	Y	Y
	Wake on Wireless (WoW)	Y	Y	Y	Y	Y	Y	Y	Y
	Auto Tx <sup>[1]</sup>	Y	Y	Y	Y	Y	Y	Y	Y
	Cloud keep alive <sup>[1]</sup>	Y	Y	Y	Y	Y	Y	Y	Y
	MAC Address randomization(in Scan)	Y	Y	Y	Y	Y	Y	Y	Y
	Host-based MLME <sup>[2]</sup>	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 <sup>[1]</sup>	Y	Y	Y	Y	Y	Y	N	N
	Packet Coalescing <sup>[1]</sup>	Y	Y	Y	Y	Y	Y	Y	N
	mDNS (Bonjour) Offload	N	Y	N	Y	Y	Y	Y	N
	Mdns wake on match	N	N	N	Y	N	N	N	N
	IPv6 NS Offload	N	Y	N	Y	Y	Y	Y	N
	Extended Range <sup>[1]</sup>	Y	N	Y	Y	N	N	N	N
	Clocksycn <sup>[1]</sup>	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
	Monitor Mode <sup>[1]</sup>	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
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	
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 List	Sub Features List	PCIe-UART		SD-UART					SD
		9098	8997	9098	IW61x	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 <sup>[1]</sup>	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	Y	Y	N	Y	N	N	N	
RX Low Density Parity Check(LDPC)	Y	Y	Y	Y	Y	Y	N	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 List	Sub Features List	PCIe-UART		SD-UART				SD	
		9098	8997	9098	IW61x	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
	Explicit Beamformer	Y	Y	Y	N	Y	N	N	N
	SU-Beamformee	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
802.11 ax – High Efficiency	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
	SU beamforming	N	N	N	Y	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 <sup>[1]</sup>	N	N	N	Y	N	N	N	N

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

Features List	Sub Features List	PCIe-UART		SD-UART					SD
		9098	8997	9098	IW61x	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) <sup>[1]</sup>	Y	Y	Y	Y	Y	N	Y	N
	WAPI support <sup>[1]</sup>	Y	N	Y	Y	N	Y	N	N
802.11mc	Wi-Fi location <sup>[1]</sup>	N	N	N	Y	N	N	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 List	Sub Features List	PCIe-UART		SD-UART					SD
		9098	8997	9098	IW61x	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 <sup>[2]</sup>	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)	N	Y	N	N	Y	Y	Y	Y
	Max supported stations (up to 64 or 16)	Y	N	Y	Y	N	N	N	N
	Independent reset (in-band)	Y	Y	Y	Y	Y	Y	Y	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
	STA Age out Feature for Associated clients	Y	Y	Y	Y	Y	Y	Y	Y
	Extended Range (Partially Advertise) <sup>[1]</sup>	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
Vendor Specific IE (Custom IE)	Y	Y	Y	Y	Y	Y	Y	Y	
Vendor defined txpower 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		SD-UART					SD
			9098	8997	9098	IW61x	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 <sup>[1]</sup>	N	N	N	Y	N	Y	Y	N
	Dynamic Rapid Channel Switch	DRCS <sup>[1]</sup>	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 <sup>[1]</sup>	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	

[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.

### 3.2 Bluetooth

#### 3.2.1 Bluetooth classic

Feature list for Bluetooth radio

Features list	Sub features list	PCIe-UART		SD-UART				
		9098	8997	9098	IW61x	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 <sup>[3]</sup> ) <sup>[1]</sup>	Y	Y	Y	Y	N	Y	Y
	Wake on Bluetooth (chip to host) <sup>[3]</sup>	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
	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	
Bluetooth Packet Type 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



Feature list for Bluetooth radio...continued

Features list	Sub features list	PCIe-UART		SD-UART				
		9098	8997	9098	IW61x	8997	8987	IW416
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 <sup>[3]</sup>	Y	Y	Y	Y	Y	Y	Y
	PAN <sup>[3]</sup>	Y	Y	Y	Y	Y	Y	Y
	PBAP <sup>[3]</sup>	Y	Y	Y	Y	Y	Y	Y
	MAP <sup>[3]</sup>	Y	Y	Y	Y	Y	Y	Y
	A2DP SNK + HFP DEV <sup>[2]</sup>	N	Y	Y	Y	N	N	N
A2DP SRC + HFP GW <sup>[2]</sup>	N	Y	Y	Y	N	N	N	
Bluetooth Dual Profiles Supported <sup>[3]</sup>	Dual A2DP (2 Source)	Y	N	Y	Y	N	Y	N
	DUAL A2DP (1 Source + 1 Sink)	Y	N	Y	N	N	Y	N
	Dual HFP (2 NBS) PCM	Y	N	Y	Y	N	Y	N
	Dual HFP (2 WBS) PCM	N	N	N	Y	N	N	N
	Dual HFP (1 WBS + 1 NBS) PCM	Y	N	Y	Y	N	Y	N
Bluetooth Audio Features	PCM NBS Master/Slave	Y	Y	Y	Y	Y	Y	Y
	PCM WBS Master/Slave	Y	Y	Y	Y	Y	Y	Y
	AAC and LDAC audio codec support	Y	N	Y	Y	N	N	N
RF Test Mode	RF Test Mode functionality	Y	Y	Y	Y	Y	Y	Y

[1] In-band independent reset (IR) can directly work with M.2 based modules on i.MX but OOB IR needs the external uSD muRata adaptor board with M.2 module.

[2] Feature tested using Ubuntu 16 platform, not with i.MX platform.

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

### 3.2.2 Bluetooth LE

Table 2. Feature list for Bluetooth LE

Features List	Sub Features List	PCIe-UART		SD-UART				
		9098	8997	9098	IW61x	8997	8987	IW416
General Features	Maximum 16 Bluetooth LE connections(Master role)	Y	Y	Y	Y	Y	Y	Y
	Independent reset (in-band and OOB) <sup>[2] [1]</sup>	Y	Y	Y	Y	N	Y	Y
	Wake on Bluetooth LE (chip to host) <sup>[2]</sup>	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 <sup>[3]</sup>	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] Not Validated using Linux BSP. Contact your NXP representative for more details.

### 3.3 Thread

**Table 3. Feature list for Thread**

*IW61x features are tested on the i.MX 8M Mini host platform with NXP reference board.*

Features	Sub features	PCIe-UART		SD-UART				
		9098	8997	9098	IW61x	8997	8987	IW416
Thread Features	Thread 1.2.1 (OpenThread RCP)	N	N	N	Y	N	N	N
	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 & 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	ESMAC	N	N	N	Y	N	N	N
	Auto DUT (THCI) for test harness	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 1.0 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		SD-UART				
		9098	8997	9098	IW61x	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) <sup>[1]</sup>	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
BCA-TDM Mode (Separate Antenna) <sup>[1]</sup>	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	External Coex (Hardware interface) <sup>[1]</sup>	Y	N	Y	N	N	N	Y

[1] IW61x 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

Type	Features List	Sub Features List	PCIe-UART		SD-UART				
			9098	8997	9098	IW61x	8997	8987	IW416
Bluetooth + Wi-Fi + 15.4 Coexistence	BCA-TDM Mode (Separate Antenna) <sup>[1]</sup>	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
Any	Security	Secure Boot	N	N	N	Y	N	N	N

[1] IW61x 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		SD-UART				
		9098	8997	9098	IW61x	8997	8987	IW416
Zigbee Features	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

## 4 Release notes for the supported SoCs

---

### 4.1 PCIe-UART 9098

#### 4.1.1 Package information

- BSP version: Linux 6.6.3-1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 17.92.1.p149.131
- Driver version: MM6X17437.p3-GPL

#### 4.1.2 Version information

- Wireless SoC: 88W9098
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 17.92.1.p149.131
  - 17 - Major revision
  - 92 - Feature pack
  - 1 - Release version
  - p149.131 - Patch number
- Driver Version: MM6X17437.p3-GPL
  - 6X - Linux 6.x Kernel
  - 17437 - Release version
  - p3 - 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 6.6.2
- Interface used
  - Wi-Fi over PCIe Interface
  - Bluetooth/Bluetooth LE over UART Interface
- Test Tools
  - iPerf (version 2.0.13)
  - wpa\_supplicant (version 2.10)
  - 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\\_DUT\\_AGENT\\_Release\\_R2.0](#).
- 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>

#### 4.1.5 Wi-Fi throughput

##### 4.1.5.1 Throughput Test Setup

- Environment: Shield Room - Over the Air
- External Access Point: Asus RT-AX88U (FW-3.0.0.4.386\_49674)
- DUT: Murata 88Q9098 M.2 (Module: LBEE6ZZ1) with MCIMX8M-EVK platform
  - Driver Load Parameters:  
fw\_name=nxp/pcieuart9098\_combo\_v1.bin, 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:** You can add iPerf parameters like TCP window size, parallel streams, etc. to achieve the best throughput. The above-described iPerf parameters are an example.
- External Client: NXP 88W9098 PCIe-UART
- Channel: 6 | 36



4.1.5.2 STA throughput

External Access Point: Asus RT-AX88U

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	115	114	124	125
WPA2-AES	115	121	124	123
WPA3-SAE	109	121	124	123

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	119	125	128	127
WPA2-AES	117	124	128	128
WPA3-SAE	116	124	128	126

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	226	222	252	209
WPA2-AES	226	207	253	215
WPA3-SAE	224	217	252	216

STA Mode Throughput - AC Mode   MAC1   5 GHz Band   20 MHz ( VHT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	143	149	152	152
WPA2-AES	143	148	152	151
WPA3-SAE	143	148	152	151

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	324	333	357	345
WPA2-AES	322	332	356	342
WPA3-SAE	307	319	355	342

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	667	645	736	730
WPA2-AES	691	680	732	740
WPA3-SAE	690	687	732	740

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	178	180	192	186
WPA2-AES	177	179	191	186
WPA3-SAE	177	179	191	187

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	234	239	253	248
WPA2-AES	232	239	253	247
WPA3-SAE	233	238	253	255

STA Mode Throughput - AX Mode   MAC1   5 GHz Band   40 MHz (HE)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	401	402	493	481
WPA2-AES	398	401	492	495
WPA3-SAE	398	402	493	497

STA Mode Throughput - AX Mode   MAC1   5 GHz Band   80 MHz (HE)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	813	798	932	948
WPA2-AES	812	869	919	956
WPA3-SAE	820	877	932	950

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	113	136	127	130

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	237	192	259	262

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	689	688	739	733

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	114	122	127	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	238	197	259	261

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	620	670	735	720

4.1.5.5 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	115	112	123	121
WPA2-AES	116	112	123	122
WPA3-SAE	122	114	121	127

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	118	110	129	128
WPA2-AES	117	112	129	128
WPA3-SAE	117	114	129	128

Mobile AP Mode Throughput - AN Mode   MAC1   5 GHz Band   40 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	244	236	258	261
WPA2-AES	244	240	258	260
WPA3-SAE	245	245	258	260

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	139	127	150	150
WPA2-AES	137	126	150	149
WPA3-SAE	138	127	151	149

Mobile AP Mode Throughput - AC Mode   MAC1   5 GHz Band   40 MHz (VHT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	254	212	354	355
WPA2-AES	253	208	334	354
WPA3-SAE	346	328	353	353

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	670	602	690	720
WPA2-AES	695	690	635	700
WPA3-SAE	698	675	693	728

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	170	180	190
WPA2-AES	176	180	172	188
WPA3-SAE	185	182	193	194

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	224	231	253	238
WPA2-AES	233	222	253	236
WPA3-SAE	240	224	250	244

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	453	470	420	400
WPA2-AES	459	463	420	400
WPA3-SAE	458	464	420	400

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	793	916	949	970
WPA2-AES	703	912	928	988
WPA3-SAE	659	911	927	988

**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 FW version: From 17.92.5.p3 to 17.92.5.p9

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>Wake On Wireless Feature</li> </ul>

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

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

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

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>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.</li> <li>Low UDP Tx (20-25%) throughput observed on HE-80 MHz Band For All Securities.</li> <li>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.</li> <li>P2P GO on/off stress test fails and DUT stops responding after ~1 hour.</li> </ul>

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

Component	Description
--	NA

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

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

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

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>Wake-up card timeout is seen when performing suspend and resume stress test with i.MX 8 host.</li> <li>Command timeout is seen when performing connection and disconnection test in a loop with external AP during addition of block ack requests.</li> </ul>
Bluetooth	<ul style="list-style-type: none"> <li>A2DP audio glitches heard while audio streaming and OPP file transfer to another ref device at the same time</li> </ul>

**4.1.7.7 FW version: From 17.92.1.p136.131 to 17.92.1.p136.132**

Component	Description
—	—

**4.1.7.8 FW version: From 17.92.1.p136.132 to 17.92.1.p149.131**

Component	Description
—	—

**4.1.8 Known issues**

Component	Description
—	—



## 4.2 SD-UART 8997

### 4.2.1 Package information

- BSP version: Linux 6.6.3-1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 16.92.21.p119.2
- Driver version: MM6X16437.p3-GPL

### 4.2.2 Version information

- Wireless SoC: 88W8997
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 16.92.21.p119.2
  - 16 - Major revision
  - 92 - Feature pack
  - 21 - Release version
  - p119.2 - Patch number
- Driver Version: MM6X16437.p3-GPL
  - 6X - Linux 6.x Kernel
  - 16437 - Release version
  - p3 - 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 6.6.2
- Interface used
  - Wi-Fi over SDIO 3.0
  - Bluetooth/Bluetooth LE over UART
- Test Tools
  - iPerf (version 2.0.13)
  - wpa\_supplicant (version 2.10)
  - 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 | 802.11n
- STA | 802.11ac
- STA | PMF
- STA | VU
- STA | FFD
- STA | Security Improvement
- STA | WPA-SAE R3

**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\\_DUT\\_AGENT Release R2.0](#)
- 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>

#### 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:  
fw\_name=nxp/sdiouart8997\_combo\_v4.bin, 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:** You can add iPerf parameters like TCP window size, parallel streams, etc. to achieve the best throughput. The above-described iPerf parameters are an example.
- External Access Point: Asus RT-AX88U (FW-3.0.0.4.386\_49674)
- External Client: NXP IW620 PCIe-UART
- Channel: 6 | 36

4.2.5.2 STA throughput

External AP: Asus RT-AX88U

STA Mode Throughput - BGN Mode   2.4 GHz Band   20 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	110	118	123	123
WPA2-AES	109	116	121	122
WPA3-SAE	108	115	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	119	119	123	126
WPA2-AES	113	119	123	125
WPA3-SAE	113	118	123	125

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	218	228	235	261
WPA2-AES	200	248	235	259
WPA3-SAE	200	248	235	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	144	145	147	153
WPA2-AES	141	144	147	152
WPA3-SAE	142	144	147	152

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	304	337	342	353
WPA2-AES	288	335	342	353
WPA3-SAE	289	336	342	353

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	342	459	480	515
WPA2-AES	341	463	480	515
WPA3-SAE	338	457	480	515

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	111	115	120	123

P2P - GO Mode Throughput - AN Mode   5 GHz Band   40 MHz   2SS				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
WPA2-AES	208	240	237	258

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	353	417	420	493

**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	110	113	119	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	241	244	256	256

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	355	421	423	487

**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	114	119	121	128
WPA2-AES	112	119	122	128
WPA3-SAE	113	119	122	128

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	213	242	232	257
WPA2-AES	207	242	233	256
WPA3-SAE	208	241	234	257

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	117	120	124	128
WPA2-AES	114	119	125	128
WPA3-SAE	114	120	124	128

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	218	242	239	260
WPA2-AES	211	242	238	260
WPA3-SAE	212	242	239	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	140	143	147	153
WPA2-AES	141	142	146	152
WPA3-SAE	140	141	146	151

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	280	329	340	362
WPA2-AES	279	327	340	360
WPA3-SAE	279	328	340	360

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	368	430	400	497
WPA2-AES	368	430	404	502
WPA3-SAE	368	430	404	502

**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 FW 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 FW version: From 16.92.10.p219.3 to 16.92.10.p219.5**

Component	Description
--	NA

**4.2.7.3 FW version: From 16.92.10.p219.5 to 16.92.21.p41**

Component	Description
--	NA

**4.2.7.4 FW version: From 16.92.21.p41 to 16.92.21.p55.3**

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>• P2P-client fails to re-connect to DUT-P2P-GO mode after internal-STA connects to external-AP on different channel.</li> <li>• Internal-STA disconnects from external-AP shortly after starting DUT-P2P-GO mode.</li> <li>• DUT in STA only mode fails to connect with specific hotspot.</li> </ul>

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

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

**4.2.7.6 FW version: From 16.92.21.p76.2 to 16.92.21.p84.4**

Component	Description
Bluetooth	<ul style="list-style-type: none"> <li>DUT HFP link gets disconnected with Remote phone, when it starts OPP file transfer to Remote device.</li> </ul>
Coex	<ul style="list-style-type: none"> <li>DUT A2DP sink audio glitches observed when it starts Wi-Fi data traffic with Station device on BGN 20MHz.</li> <li>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.</li> </ul>

**4.2.7.7 FW version: From 16.92.21.p84.4 to 16.92.21.p119.2**

Component	Description
—	—

**4.2.8 Known issues**

Component	Description
Bluetooth	<ul style="list-style-type: none"> <li>After disconnecting LE link, sometime disconnect complete event is delayed by 30 seconds, so next re-connection possible only after 30 second</li> <li>DUT role switch request is failing sometimes to the first remote device when DUT is streaming A2DP data to another remote device.</li> </ul>



## 4.3 PCIe-UART 8997

### 4.3.1 Package information

- BSP version: Linux 6.6.3-1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 16.92.21.p119.2
- Driver version: MM6X16437.p3-GPL

### 4.3.2 Version information

- Wireless SoC: 88W8997
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 16.92.21.p119.2
  - 16 - Major revision
  - 92 - Feature pack
  - 21 - Release version
  - p119.2 - Patch number
- Driver Version: MM6X16437.p3-GPL
  - 6X - Linux 6.x Kernel
  - 16437 - Release version
  - p3 - 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 6.6.2
- 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 | 802.11n
- STA | 802.11ac
- STA | PMF
- STA | VU
- STA | FFD
- STA | Security Improvement
- STA | WPA-SAE R3

**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\\_DUT\\_AGENT Release R2.0](#)
- 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>

### 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:  
fw\_name=nxp/pcieuart8997\_combo\_v4.bin, 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:** You can add iPerf parameters like TCP window size, parallel streams, etc. to achieve the best throughput. The above-described iPerf parameters are an example.
- External Client: NXP IW620 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	116	120	124	123
WPA2-AES	113	119	123	125
WPA3-SAE	113	119	124	125

STA Mode Throughput - AN Mode   5 GHz Band   20 MHz ( HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	113	125	125	127
WPA2-AES	113	124	125	125
WPA3-SAE	113	124	124	126

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	204	251	237	255
WPA2-AES	204	249	237	253
WPA3-SAE	204	249	237	252

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	134	151	147	154
WPA2-AES	134	150	146	153
WPA3-SAE	133	150	147	153

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	305	334	338	347
WPA2-AES	301	332	339	343
WPA3-SAE	308	315	341	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	656	679	628	759
WPA2-AES	647	680	623	732
WPA3-SAE	651	671	624	732

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	122	120	125	131

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	247	248	237	251

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	645	632	707	730

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	124	118	129	130

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	248	248	258	262

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	634	637	689	743

4.3.5.5 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	111	110	122	128
WPA2-AES	110	109	122	127
WPA3-SAE	110	109	122	127

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	114	112	125	130
WPA2-AES	115	112	125	130
WPA3-SAE	115	112	125	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	206	239	238	259
WPA2-AES	202	249	241	262
WPA3-SAE	210	244	241	262

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	136	130	145	153
WPA2-AES	133	129	145	153
WPA3-SAE	136	128	145	153

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	327	330	337	359
WPA2-AES	325	329	338	356
WPA3-SAE	331	329	338	355

Mobile AP Mode Throughput - AC Mode   5 GHz Band   80 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	694	632	657	753
WPA2-AES	685	630	656	728
WPA3-SAE	683	629	656	731

**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 FW version: From 16.92.10.p208 to 16.92.10.p211

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>Fixed Mobile AP start issue on switching bands</li> </ul>
Bluetooth	<ul style="list-style-type: none"> <li>Fix for Sniff Subrate command processing which resulted in command queue that caused Bluetooth to restart.</li> <li>Fix for ACL link disconnection due to DUT not responding to LMP_switch_req.</li> </ul>
Coex	<ul style="list-style-type: none"> <li>Fix Wi-Fi Link loss during UDP Rx + Bluetooth Inquiry and Wi-Fi deauth during Bluetooth HFP coexistence scenarios</li> </ul>

#### 4.3.7.2 FW version: From 16.92.10.p211 to 16.92.10.p213

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>Fix for Wi-Fi Fragment and Forge Vulnerabilities <a href="#">[2]</a></li> </ul>
Bluetooth	<ul style="list-style-type: none"> <li>Fix for ANSSI Vulnerabilities <a href="#">[3]</a></li> </ul>

#### 4.3.7.3 FW version: From 16.92.10.p213 to 16.92.10.p213.2

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

#### 4.3.7.4 FW version: From 16.92.10.p213.2 to 16.92.10.p213.4

Component	Description
--	NA

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

Component	Description
--	NA

#### 4.3.7.6 FW version: From 16.92.21.p26.1 to 16.92.21.p55.3

Component	Description
--	NA

**4.3.7.7 FW version: From 16.92.21.p55.3 to 16.92.21.p76.2**

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

**4.3.7.8 FW version: From 16.92.21.p76.2 to 16.92.21.p84.4**

Component	Description
Bluetooth	<ul style="list-style-type: none"> <li>DUT HFP link gets disconnected with Remote phone, when it starts OPP file transfer to Remote device.</li> </ul>
Coex	<ul style="list-style-type: none"> <li>DUT A2DP sink audio glitches observed when it starts Wi-Fi data traffic with Station device on BGN 20MHz.</li> <li>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.</li> </ul>

**4.3.7.9 FW version: From 16.92.21.p84.4 to 16.92.21.p119.2**

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>If the DUT is in Tx-mode, a Wakeup-Card timeout is observed causing the device to Hang/Crash.</li> <li>Link Lost observed during roaming even with good RSSI</li> </ul>
Bluetooth	<ul style="list-style-type: none"> <li>Bluetooth-only firmware initialization is failing when it is downloaded and initialized after Wi-Fi-only firmware initialization.</li> </ul>

**4.3.8 Known issues**

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>DUT firmware hang is seen when connected Intel AX210 client sends UDP traffic with power management enabled in noisy environment.</li> </ul>
Bluetooth	<ul style="list-style-type: none"> <li>DUT role switch request is failing sometimes to the first remote device when DUT is streaming A2DP data to another remote device.</li> </ul>



## 4.4 SD-UART 9098

### 4.4.1 Package information

- BSP version: Linux 6.6.3-1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 17.92.1.p149.131
- Driver version: MM6X17437.p3-GPL

### 4.4.2 Version information

- Wireless SoC: 88W9098
- Wi-Fi and Bluetooth/Bluetooth LE firmware version: 17.92.1.p149.131
  - 17 - Major revision
  - 92 - Feature pack
  - 1 - Release version
  - p149.131 - Patch number
- Driver Version: MM6X17437.p3-GPL
  - 6X - Linux 6.x Kernel
  - 17437 - Release version
  - p3 - 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 6.6.2
- Interface used
  - Wi-Fi over SDIO (SDIO 3.0 support, Clock speed: 200 MHz)
  - Bluetooth/Bluetooth LE over UART
- Test Tools
  - iPerf (version 2.0.13)
  - wpa\_supplicant (version 2.10)
  - 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\\_DUT\\_AGENT Release R2.0](#)
- 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\_49674)
- DUT: Murata 88Q9098 M.2 (Module: LBEE5ZZ1XL) with MCIMX8M-EVK platform
  - Driver Load Parameters:  
fw\_name=nxp/sduart9098\_combo\_v1.bin, 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:** You can add iPerf parameters like TCP window size, parallel streams, etc. to achieve the best throughput. The above-described iPerf parameters are an example.
- External Client: NXP 88W9098 PCIe-UART
- Channel: 6 | 36

4.4.5.2 STA throughput

External Access Point: Asus RT-AX88U

STA Mode Throughput - BGN Mode   MAC2   2.4 GHz Band   20 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	118	122	126	128
WPA2-AES	118	121	125	127
WPA3-SAE	117	120	122	126

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	121	120	126	126
WPA2-AES	119	119	125	124
WPA3-SAE	117	120	123	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	240	242	257	258
WPA2-AES	238	245	255	259
WPA3-SAE	230	240	251	260

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	144	148	152	157
WPA2-AES	144	147	151	158
WPA3-SAE	145	148	152	157

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	328	334	354	356
WPA2-AES	329	333	355	357
WPA3-SAE	330	331	356	356

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	378	352	432	417
WPA2-AES	375	351	430	416
WPA3-SAE	373	350	431	410

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	179	181	190	191
WPA2-AES	180	180	187	187
WPA3-SAE	177	176	185	188

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	203	232	240	254
WPA2-AES	204	231	236	251
WPA3-SAE	205	230	242	253

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	355	322	378	383
WPA2-AES	352	321	380	389
WPA3-SAE	350	319	378	380

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	367	314	417	421
WPA2-AES	368	315	421	415
WPA3-SAE	370	318	412	411

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	116	120	125	126

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	248	244	258	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	363	330	390	358

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	115	118	125	119

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	250	244	256	261

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	360	328	388	357

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	118	119	123	129
WPA2-AES	119	118	122	127
WPA3-SAE	119	118	126	126

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	126	122	129	130
WPA2-AES	125	123	128	129
WPA3-SAE	126	121	126	128

Mobile AP Mode Throughput - AN Mode   MAC1   5 GHz Band   40 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	250	246	260	262
WPA2-AES	251	248	259	261
WPA3-SAE	249	247	260	260

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	147	144	151	153
WPA2-AES	146	147	152	154
WPA3-SAE	144	146	150	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	333	313	332	359
WPA2-AES	332	316	336	358
WPA3-SAE	331	314	337	359

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	376	323	384	390
WPA2-AES	376	325	382	391
WPA3-SAE	370	324	380	395

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	184	183	192	195
WPA2-AES	185	184	191	196
WPA3-SAE	183	185	193	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	208	217	250	230
WPA2-AES	212	216	250	232
WPA3-SAE	213	215	250	231

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	311	339	385	378
WPA2-AES	317	340	383	376
WPA3-SAE	320	341	384	373

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	380	365	370	419
WPA2-AES	378	364	370	420
WPA3-SAE	377	366	371	408

**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 FW version: From 17.92.1.p98.1 to 17.92.1.p116.1**

Component	Description
-	NA

**4.4.7.2 FW version: From 17.92.1.p116.1 to 17.92.1.p136.13**

Component	Description
--	NA

**4.4.7.3 FW version: From 17.92.1.p136.13 to 17.92.1.p136.24**

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

**4.4.7.4 FW version: From 17.92.1.p136.24 to 17.92.1.p136.131**

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

**4.4.7.5 FW version: From 17.92.1.p136.131 to 17.92.1.p149.131**

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

**4.4.8 Known issues**

Component	Description
—	—

**4.5 SD-UART IW61x**

**4.5.1 Package information**

- BSP version: Linux 6.6.3-1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 18.99.2.p66.17
- Driver version: MM6X18437.p3-GPL

**4.5.2 Version information**

- Wireless SoC: IW61x
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 18.99.2.p66.17
  - 18 - Major revision
  - 99 - Feature pack
  - 2 - Release version
  - p66.17 - Patch number
- Driver Version: MM6X18437.p3-GPL
  - 6X - Linux 6.x Kernel
  - 18437 - Release version
  - p3 - Patch Number
  - GPL - General Public License v2

**4.5.3 Software release contents**

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

**Table 6. IW61x software release content**

Firmware	IW61x A1 with secure boot enabled
<b>Combo firmware</b>	sduart_nw61x_v1.bin.se
<b>Wi-Fi only</b>	sd_w61x_v1.bin.se
<b>Bluetooth and 802.15.4 only</b>	uartspi_n61x_v1.bin.se

#### 4.5.4 Host platform

- MCIMX8M-EVK platform running Linux
- Supported Linux kernel versions: From 2.6.32 to 6.6.2
- Interface used
  - Wi-Fi over SDIO (SDIO 3.0 support, Clock speed: 200 MHz)
  - Bluetooth/Bluetooth LE over UART
- Test Tools
  - iPerf (version 2.0.13)
  - wpa\_supplicant (version 2.10)
  - hostapd (version 2.10)
- Openthread commit ID details
  - OT host build commit ID: 98e644d538ff2c57e96c54bdd6e13df31c7d19ba (2022 Dec 11)
  - OT FW Lib build commit ID: 98e644d538ff2c57e96c54bdd6e13df31c7d19ba (From: 2022Dec11th).
  - OTBR build commit ID: 6dc3d2f640292820e6377a2500f0c375f447d207 (2022 Dec 12)

#### 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\\_DUT\\_AGENT Release R2.0](#)
- 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>

#### 4.5.6 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:  
fw\_name=nxp/sduart\_nw61x\_v1.bin.se, 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:** You can add iPerf parameters like TCP window size, parallel streams, etc. to achieve the best throughput. 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	58	61	60
WPA2-AES	56	57	61	60
WPA3-SAE	56	57	61	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	60	62	64	65
WPA2-AES	59	61	64	64
WPA3-SAE	59	61	64	64

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	120	130	133	135
WPA2-AES	120	128	133	131
WPA3-SAE	120	129	132	131

STA Mode Throughput - AC Mode   5 GHz Band   20 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	72	74	78	78
WPA2-AES	71	74	78	77
WPA3-SAE	72	74	78	77

STA Mode Throughput - AC Mode   5 GHz Band   40 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	168	173	182	180
WPA2-AES	166	172	180	179
WPA3-SAE	166	171	181	178

STA Mode Throughput - AC Mode   5 GHz Band   80 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	334	359	379	376
WPA2-AES	332	358	378	374
WPA3-SAE	331	359	377	382

STA Mode Throughput - AX Mode   2.4 GHz Band   20 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	114	119	125	124
WPA2-AES	112	117	120	123
WPA3-SAE	114	116	124	124

STA Mode Throughput - AX Mode   5 GHz Band   20 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	119	120	129	128
WPA2-AES	119	119	129	128
WPA3-SAE	118	120	129	127

STA Mode Throughput - AX Mode   5 GHz Band   40 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	230	232	257	256
WPA2-AES	228	231	255	255
WPA3-SAE	229	231	255	255

STA Mode Throughput - AX Mode   5 GHz Band   80 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	373	416	457	485
WPA2-AES	370	416	462	492
WPA3-SAE	370	415	460	489

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	57	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	116	117	132	133

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	340	345	380	383

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	57	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	114	116	132	132

P2P - GC Mode Throughput - AC Mode   5 GHz Band   80 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
WPA2-AES	342	341	381	378

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	56	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	62	58	64	62
WPA2-AES	61	58	62	61
WPA3-SAE	62	57	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	133	133
WPA2-AES	129	125	133	132
WPA3-SAE	129	124	133	132

Mobile AP Mode Throughput - AC Mode  5 GHz Band   20 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	75	69	77	73
WPA2-AES	74	68	77	72
WPA3-SAE	74	66	77	73

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	175	167	181	178
WPA2-AES	174	166	181	178
WPA3-SAE	174	166	181	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	362	346	378	348
WPA2-AES	361	346	376	348
WPA3-SAE	361	347	376	380

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	116	121	126	127
WPA2-AES	115	118	125	127
WPA3-SAE	114	119	125	127

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	123	119	128	126
WPA2-AES	122	117	128	126
WPA3-SAE	122	118	128	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	240	235	254	252
WPA2-AES	239	234	253	251
WPA3-SAE	238	225	253	250

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	407	413	454	494
WPA2-AES	406	410	473	498
WPA3-SAE	406	409	472	495

**4.5.6.6 Open Thread throughput test**

- Environment: closed
- DUT: Murata M.2 module LBES5PL2EL with MCIMX8M-EVK 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)	
	Tx	Rx	Tx	Rx
Thread Leader	81	81	86	86
Thread Child	81	82	86	86

**4.5.7 Bug fixes/feature enhancements**

**4.5.7.1 FW version: From 18.99.1.p154.40 to 18.99.2.p19.15**

Component	Description
Coex	<ul style="list-style-type: none"> <li>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.</li> </ul>

**4.5.7.2 FW Version: From 18.99.2.p19.15 to 18.99.2.p66.10**

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>Wake-up card timeout is observe when DUT AP changes the channels during TWT execution.</li> <li>DUT-STA does not stop sending the periodic null frames after executing TWT Teardown.</li> </ul>

**4.5.7.3 FW version: From 18.18.99.2.p66.10 to 18.99.2.p66.17**

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>DUT-AP keeps sending RTS to client device which is turned off till age-out timer expires.</li> <li>Firmware fatal automatic recovery failed in long run stress testing.</li> <li>DUT wakeup interval found unexpected for successive wakeups in TWT session of specific Service period which can be more than 10mins.</li> <li>DUT station stuck observed after sending the deauthentication due to unspecified reason in a disconnected state.</li> <li>Scan commda timeout is seen when performed scan while doing Auto-Tx in HE 80MHz mode</li> </ul>
Bluetooth	<ul style="list-style-type: none"> <li>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)</li> <li>Link Stability in presence of multiple Bluetooth links under optimization</li> <li>In long run with Bluetooth Scatternet along with eSCO link established scenario, random DUT hang is observed</li> </ul>
Coex	<ul style="list-style-type: none"> <li>A2DP Audio Glitches are observed in the presence of Open Thread UDP Tx Traffic, when DUT is configured as Open Thread Leader/Router.</li> </ul>

**4.5.8 EU conformance tests**

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

#### 4.5.9 Known issues

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>In DUT STA mode, scan command timeout was observed during WPA3-FT PSK RSSI based roaming test on long run.</li> <li>STAUT does not follow the configured wake-up duration.</li> </ul>
Bluetooth	<ul style="list-style-type: none"> <li>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.</li> </ul>
Coex	<ul style="list-style-type: none"> <li>Low COEX Throughput values observed on dual-radio and tri-radio cases with OT-Tx power 20 dBm</li> </ul>
Wi-Fi, Bluetooth and 802.15.4 (Open Thread) Coex	<ul style="list-style-type: none"> <li>Wi-Fi throughput in presence of OT peak throughput is under optimization</li> <li>High OT 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.</li> <li>High OT ping loss(&gt;90%) observed in the presence of WLAN traffic and A2DP streaming.</li> <li>High OT-UDP-RX throughput drop observed in the presence of A2DP streaming on high antenna isolation.</li> <li>Low COEX throughput values observed in dual-radio and tri-radio cases with 20 dbm OT-Tx power.</li> </ul>

**Note:** Before loading Bluetooth-only firmware, the Wi-Fi SDIO driver and firmware loading must be required with the calibration data file.

#### 4.5.10 Notes

- Additional changes in OpenThread are required to enable vendor specific Spinel properties
  - Patch files are located in OT-Tools\_LNX\_6\_1\_55-IMX8/otpatches--046-0f7e849
- Use vendor specific command to update SPI CLK to 10 MHz
  - `ot-ctl spifreq 10000000`
  - Refer to `ReadME_SPI10MHz.txt` for more details
- Additional changes in Linux Kernel are required to enable the OTBR (OpenThread Border Router) device role
  - `OT-Tools_LNX_6_1_55-IMX8/imx-linux-otbr-047-111623-0f7e849/` directory s `IMx8mm_BSP_6_1_1_OTBR_enablement`, Debian packages, Patch files and steps to run OTBR
  - The existing OT-Tools are compatible with Linux 6\_1\_1 BSP, And updated OT-Tools with Linux 6\_6\_3 will be available in End of March 2024 timeframe.
  - After applying the patches compile the Kernel and then compile Wi-Fi driver
- 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  $\geq 800 \mu\text{s}$  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 SD-UART 8987

### 4.6.1 Package information

- BSP version: Linux 6.6.3-1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 16.92.21.p119.2
- Driver version: MM6X16437.p3-GPL

### 4.6.2 Version information

- Wireless SoC: 88W8987
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 16.92.21.p119.2
  - 16 - Major revision
  - 92 - Feature pack
  - 21 - Release version
  - p119.2 - Patch number
- Driver Version: MM6X16437.p3-GPL
  - 6X - Linux 6.x Kernel
  - 16437 - Release version
  - p3 - 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 6.6.2
- Interface used
  - Wi-Fi over SDIO (SDIO 3.0 support, Clock speed: 200 MHz)
  - Bluetooth/Bluetooth LE over UART
- Test Tools
  - iPerf (version 2.0.13)
  - wpa\_supplicant (version 2.10)
  - 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\\_DUT\\_AGENT Release R2.0](#)
- 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>

#### 4.6.5 Wi-Fi throughput

##### 4.6.5.1 Throughput test setup

- Environment: Shield Room - Over the Air
- Access Point: Asus RT-AX88U (FW-3.0.0.4.386\_49674)
- DUT: 88W8987-Murata M.2 (Module: LBEE5QD1ZM) with MCIMX8M-EVK platform
  - Driver Load Parameters:  
fw\_name=nxp/sdiouart8987\_combo\_v0.bin, 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:** You can add iPerf parameters like TCP window size, parallel streams, etc. to achieve the best throughput. 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: Asus RT-AX88U

STA Mode Throughput - BGN Mode   2.4 GHz Band   20 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	57	59	60	62
WPA2-AES	57	59	60	62
WPA3-SAE	57	59	60	62

STA Mode Throughput - AN Mode   5 GHz Band   20 MHz ( HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	57	61	61	63
WPA2-AES	57	61	61	63
WPA3-SAE	57	61	61	63

STA Mode Throughput - AN Mode   5 GHz Band   40 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	113	130	125	134
WPA2-AES	112	130	124	134
WPA3-SAE	112	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	68	72	74	74
WPA2-AES	68	72	73	74
WPA3-SAE	68	72	74	74

STA Mode Throughput - AC Mode   5 GHz Band   40 MHz (VHT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	148	173	168	178
WPA2-AES	147	173	167	178
WPA3-SAE	147	172	167	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	222	359	264	383
WPA2-AES	208	344	249	385
WPA3-SAE	208	346	248	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	57	59	60	65

P2P - GO Mode Throughput - AN Mode   5 GHz Band   40 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
WPA2-AES	116	127	124	135

P2P - GO Mode Throughput - AC Mode   5 GHz Band   80 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
WPA2-AES	222	305	240	386

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	58	58	61	64

P2P - GC Mode Throughput - AN Mode   5 GHz Band   40 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
WPA2-AES	116	127	124	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	235	313	248	388

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	56	58	60	62
WPA2-AES	56	58	59	63
WPA3-SAE	56	58	60	63

Mobile AP Mode Throughput - AN Mode   5 GHz Band   20 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	58	59	61	63
WPA2-AES	57	59	61	63
WPA3-SAE	57	59	61	63

Mobile AP Mode Throughput - AN Mode   5 GHz Band   40 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	117	127	125	135
WPA2-AES	116	127	124	135
WPA3-SAE	116	126	124	135

Mobile AP Mode Throughput - AC Mode   5 GHz Band   20 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	69	70	74	74
WPA2-AES	69	70	74	74
WPA3-SAE	69	70	74	75

Mobile AP Mode Throughput - AC Mode   5 GHz Band   40 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	148	169	161	180
WPA2-AES	146	169	160	180
WPA3-SAE	146	169	160	180

Mobile AP Mode Throughput - AC Mode   5 GHz Band   80 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	240	348	262	384
WPA2-AES	228	305	245	387
WPA3-SAE	229	307	246	386

**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)

#### 4.6.7 Bug fixes/feature enhancements

##### 4.6.7.1 FW 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 FW 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 FW version: From 16.92.10.p210.1 to 16.92.21.p11.1

Component	Description
-	NA

##### 4.6.7.4 FW 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 FW version: From 16.92.21.p26 to 16.92.21.p41.3

Component	Description
-	NA

##### 4.6.7.6 FW 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.

**4.6.7.7 FW version: From 16.92.21.p41.4 to 16.92.21.p69.3**

Component	Description
Bluetooth	<ul style="list-style-type: none"> <li>DUT pairing with LE HoGP remote device fails with authentication failure error.</li> <li>DUT is connected for OPP profile with remote device and when transfer file to remote device then Bluetooth link gets disconnected.</li> <li>When Bluetooth A2DP streaming is ongoing with first remote device then DUT failed for encryption with another LE remote device.</li> <li>When DUT connected for HFP call and perform stress test for Bluetooth link connect disconnect then DUT firmware becomes unresponsive.</li> </ul>
Coex	<ul style="list-style-type: none"> <li>Sometimes in dual A2DP mode, glitches are observed and Wi-Fi Rx throughput drops.</li> </ul>

**4.6.7.8 FW version: From 16.92.21.p69.3 to 16.92.21.p76.2**

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>The current consumption is higher than expected on chipset when loading the Wi-Fi only firmware.</li> </ul>
Bluetooth	<ul style="list-style-type: none"> <li>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.</li> </ul>
Coex	<ul style="list-style-type: none"> <li>LE peripheral pairing gets failed with Mobile device when Wi-Fi is enabled on a single antenna device.</li> </ul>

**4.6.7.9 FW version: From 16.92.21.p76.2 to 16.92.21.p76.5**

Component	Description
-	NA

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

Component	Description
Coex	<ul style="list-style-type: none"> <li>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.</li> </ul>

**4.6.7.11 FW version: From 16.92.p99.2 to 16.92.2 p119.2**

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

**4.6.8 Known issues**

Component	Description
—	—

## 4.7 SD-UART IW416

### 4.7.1 Package information

- BSP version: Linux 6.6.3-1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 16.92.21.p119.2
- Driver version: MM5X16437.p3-GPL

### 4.7.2 Version information

- Wireless SoC: IW416
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 16.92.21.p119.2
  - 16 - Major revision
  - 92 - Feature pack
  - 21 - Release version
  - p119.2 - Patch number
- Driver Version: MM6X16437.p3-GPL
  - 6X - Linux 6.x Kernel
  - 16437 - Release version
  - p3 - 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 6.6.2
- Interface used
  - Wi-Fi over SDIO (SDIO 3.0 support, Clock speed: 200 MHz)
  - Bluetooth/Bluetooth LE over UART
- Test Tools
  - iPerf (version 2.0.13)
  - wpa\_supplicant (version 2.10)
  - 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\\_DUT\\_AGENT Release R2.0](#)
- 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>

#### 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\_49674)
- DUT: IW416-Murata (Module: LBEE5CJ1XK) with MCIMX8M-EVK platform
  - Driver Load Parameters:  
fw\_name=nxp/sdiouartiw416\_combo\_v0.bin, 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:** You can add iPerf parameters like TCP window size, parallel streams, etc. to achieve the best throughput. The above-described iPerf parameters are an example.
- External Client: NXP IW620 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	50	51	59	60
WPA2-AES	51	50	59	62
WPA3-SAE	51	51	59	61

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	110	116	118	120
WPA2-AES	110	115	116	120
WPA3-SAE	109	115	116	118

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	51	56	61	60
WPA2-AES	52	55	61	61
WPA3-SAE	51	54	61	60

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	109	121	124	128
WPA2-AES	110	119	123	127
WPA3-SAE	108	120	123	126

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	53	54	58	55

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	102	114	114	126

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	58	54	60	58

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	104	112	120	124

4.7.5.5 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	54	52	57	58
WPA2-AES	55	51	58	54
WPA3-SAE	55	52	58	56

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	110	111	112	120
WPA2-AES	108	112	112	118
WPA3-SAE	108	114	114	118

Mobile AP Mode Throughput - AN Mode   5 GHz Band   20 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	58	55	62	50
WPA2-AES	57	54	61	59
WPA3-SAE	57	54	61	49

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	115	112	124	118
WPA2-AES	110	110	121	118
WPA3-SAE	108	114	120	120

**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 FW version: From 16.92.10.p233.2 to 16.92.21.p11.2**

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

**4.7.7.2 FW version: From 16.92.21.p11.2 to 16.92.21.p41.1**

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

**4.7.7.3 FW version: From 16.92.21.p41.1 to 16.92.21.p55.3**

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>• Once DUT PAN profile gets disconnection with remote device, then DUT reconnection fails for successive connection trials.</li> <li>• DUT Bluetooth Classic &amp; BLE RX test mode fails to receive the packets and host is failing to derive the various parameters.</li> </ul>

**4.7.7.4 FW version: From 16.92.21.p55.3 to 16.92.21.p76.3**

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

**4.7.7.5 FW version: From 16.92.21.p76.3 to 16.92.21.p84.3**

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

**4.7.7.6 From 16.92.21.p84.3 to 16.92.21.p84.128**

Component	Description
—	—

#### 4.7.7.7 FW version: From 16.92.21.p84.3 to 16.92.2.p119.2

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>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.</li> <li>With DRCS enabled, when STA is connected to the EX-AP P2P data pause/stuck is observed.</li> <li>When connecting STA to Ex-AP in AP provisioning case, due to association status mismatch failures are observed in STA connection.</li> </ul>

#### 4.7.8 Known issues

Component	Description
Wi-Fi	<ul style="list-style-type: none"> <li>When ed-mac is enabled, probe responses are transmitted during interference signal.</li> </ul>
Bluetooth	<ul style="list-style-type: none"> <li>Random Bluetooth security link loss in concurrent Bluetooth classic and Bluetooth LE modes with AES</li> <li>When Bluetooth A2DP streaming is ongoing with first remote device then DUT shows low transmit throughput with second remote device.</li> </ul>

**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 SD 8801

### 4.8.1 Package information

- BSP version: Linux 6.1.55-2.2.0
- Wi-Fi Firmware version: 14.92.36.p188
- Driver version: MM6X14437.p3-GPL

### 4.8.2 Version information

- Wireless SoC: SD8801
- Wi-Fi Firmware Version: 14.92.36.p188
  - 14 - Major revision
  - 92 - Feature pack
  - 36 - Release version
  - p188 - Patch number
- Driver Version: MM6X14437.p3-GPL
  - 6X - Linux 6.x Kernel
  - 14437 - Release version
  - p3 - 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 6.6.2
- 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\\_DUT\\_AGENT Release R2.0](#)
- 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:  
fw\_name=nxp/sd8801\_uapsta.bin 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:** You can add iPerf parameters like TCP window size, parallel streams, etc. to achieve the best throughput. 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)



#### 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

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

Table 7. 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 <sup>[1]</sup> ) NXP 88W9098 (Murata LBEE5ZZ1XL <sup>[1]</sup> )	-
8 ULP	-	-	NXP IW416 (Murata LBEE5CJ1 XK <sup>[1]</sup> )
8M Nano	NXP 88W8987 (AzureWave AW-CM358 SM/MA <sup>[1]</sup> )	-	NXP 88W8987 (Murata M.2 LBEE5QD1ZM)
8M Mini	NXP 88W8987 (AzureWave AW-CM358 SM/MA <sup>[1]</sup> )	-	NXP 88W8987 (Murata M.2 LBEE5QD1ZM)
8M Plus	-	NXP 88W8997 (AzureWave AW-CM276 SM/MA <sup>[1]</sup> ) NXP 88Q9098 (Murata LBEE6ZZ-1TA <sup>[1]</sup> )	NXP 88W8997 (Murata LBEE5 XV1YM <sup>[1]</sup> ) NXP 88Q9098 (Murata LBEE5 ZZ1XL <sup>[1]</sup> )
8M Quad	-	NXP 88W8997 (Murata LBEE5XV1YM <sup>[1]</sup> ) NXP 88Q9098 (Murata LBEE6ZZ-1TA <sup>[1]</sup> )	NXP 88W8997 (Murata LBEE5 XV1YM <sup>[1]</sup> ) NXP IW416 (Murata LBEE5CJ1 XK <sup>[1]</sup> ) NXP 88W8801 (Murata LBWA0 ZZ2DS <sup>[1]</sup> ) NXP 88Q9098 (Murata LBEE5 ZZ1XL <sup>[1]</sup> )
7ULP	-	-	NXP 88W8987(Azurewave AW-CM358-SM/MA <sup>[1]</sup> )(WLAN only)
7D	-	-	NXP 88W8987(Azurewave AW-CM358-SM/MA <sup>[1]</sup> )(WLAN only)
6Q/6DL/6QP/6SX/ 6 SLL/6UL/6ULL/ 6ULZ	-	-	NXP IW416 (Murata LBEE5CJ1 XK) <sup>[2][1]</sup> #NXP 88W8801 (Murata LBWA0 ZZ2DS <sup>[2][1]</sup> ) NXP 88W8987(Murata LBEE5 QD1ZM <sup>[1]</sup> )

[1] Tested modules with mentioned i.MX EVK.

[2] M.2 + M.2-to-usd adapter (only imx6ull support)

## 6 Acronyms and abbreviations

Table 8. 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

## 7 References

---

### Application notes

- [1] AN12976 - Wi-Fi Alliance Derivative Certification ([link](#))

### 7.2 Engineering bulletins (EB)

- [2] EB - NXP Security Advisory - Wi-Fi Vulnerability - USIRP02-2020 ([link](#))  
[3] EB - NXP Security Advisory - Bluetooth Vulnerability - ANSSI ([link](#))

### User manuals

- [4] UM11483 - Getting Started with NXP-based Wireless Modules on i.MX 8M Quad EVK Running Linux OS ([link](#))

## 8 Revision history

### Revision history

Document ID	Date	Change details
RN00104 v.12	27 March 2024	<ul style="list-style-type: none"> <li>• <a href="#">Section 1 "About this document"</a>: updated the release version.</li> <li>• <a href="#">Section 2.2 "Wi-Fi utilities (mланutl)"</a>: updated the release version.</li> <li>• Feature list                             <ul style="list-style-type: none"> <li>– <a href="#">Section 3.1.1 "Client mode"</a>: updated.</li> <li>– <a href="#">Section 3.1.2 "AP mode"</a>: update.</li> <li>– <a href="#">Section 3.1.3 "Wi-Fi Direct/P2P, and AP-STA modes"</a>: updated.</li> <li>– <a href="#">Section 3.2.1 "Bluetooth classic"</a>: updated.</li> <li>– <a href="#">Section 3.2.2 "Bluetooth LE"</a>: updated.</li> <li>– <a href="#">Section 3.3 "Thread"</a>: updated.</li> <li>– <a href="#">Section 3.5 "Zigbee"</a>: added.</li> </ul> </li> <li>• PCIe-UART 88W9098                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.1.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.1.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.1.3 "Host platform"</a>: updated.</li> <li>– <a href="#">Section 4.1.4.1 "Wi-Fi pre-certification"</a>: updated.</li> <li>– <a href="#">Section 4.1.5 "Wi-Fi throughput"</a>: updated.</li> <li>– <a href="#">Section 4.1.7.8 "FW version: From 17.92.1.p136.132 to 17.92.1.p149.131"</a>: added.</li> <li>– <a href="#">Section 4.1.8 "Known issues"</a>: updated.</li> </ul> </li> <li>• SD-UART 88W8997                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.2.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.2.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.2.3 "Host platform"</a>: updated.</li> <li>– <a href="#">Section 4.2.4.1 "Wi-Fi pre-certifications"</a>: updated.</li> <li>– <a href="#">Section 4.2.5 "Wi-Fi throughput"</a>: updated.</li> <li>– <a href="#">Section 4.2.7.7 "FW version: From 16.92.21.p84.4 to 16.92.21.p119.2"</a>: added.</li> </ul> </li> <li>• PCIe-UART 88W8997                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.3.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.3.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.3.3 "Host platform"</a>: updated.</li> <li>– <a href="#">Section 4.3.4.1 "Wi-Fi pre-certifications"</a>: updated.</li> <li>– <a href="#">Section 4.3.5 "Wi-Fi throughput"</a>: updated.</li> <li>– <a href="#">Section 4.3.7.9 "FW version: From 16.92.21.p84.4 to 16.92.21.p119.2"</a>: added.</li> <li>– <a href="#">Section 4.3.8 "Known issues"</a>: updated.</li> </ul> </li> <li>• SD-UART 88W9098                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.4.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.4.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.4.3 "Host platform"</a>: updated.</li> <li>– <a href="#">Section 4.4.4.1 "Wi-Fi pre-certification"</a>: updated.</li> <li>– <a href="#">Section 4.4.5 "Wi-Fi throughput"</a>: updated.</li> <li>– <a href="#">Section 4.4.7.5 "FW version: From 17.92.1.p136.131 to 17.92.1.p149.131"</a>: updated.</li> <li>– <a href="#">Section 4.4.8 "Known issues"</a>: updated.</li> </ul> </li> </ul> <p style="text-align: center;">—————Continues—————</p>

Revision history...continued

Document ID	Date	Change details
RN00104 v.12	27 March 2024	<p style="text-align: center;">————— <i>Continued</i> —————</p> <ul style="list-style-type: none"> <li>• SD-UART IW61x                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.5 "SD-UART IW61x"</a>: replaced IW612 with IW61x.</li> <li>– <a href="#">Section 4.5.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.5.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.5.3 "Software release contents"</a>: added.</li> <li>– <a href="#">Section 4.5.4 "Host platform"</a>: updated.</li> <li>– <a href="#">Section 4.5.5.1 "Wi-Fi pre-certification"</a>: updated.</li> <li>– <a href="#">Section 4.5.6 "Wi-Fi throughput"</a>: updated.</li> <li>– <a href="#">Section 4.5.7.3 "FW version: From 18.18.99.2.p66.10 to 18.99.2.p66.17"</a>: added.</li> <li>– <a href="#">Section 4.5.9 "Known issues"</a>: updated.</li> <li>– <a href="#">Section 4.5.10 "Notes"</a>: added.</li> </ul> </li> <li>• SD-UART 88W8987                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.6.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.6.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.6.3 "Host platform"</a>: updated.</li> <li>– <a href="#">Section 4.6.4.1 "WFA certifications"</a>: updated.</li> <li>– <a href="#">Section 4.6.5 "Wi-Fi throughput"</a>: updated.</li> <li>– <a href="#">Section 4.6.7.11 "FW version: From 16.92.p99.2 to 16.92.2.p119.2"</a>: added.</li> <li>– <a href="#">Section 4.6.8 "Known issues"</a>: updated.</li> </ul> </li> <li>• SD-UART IW416                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.7.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.7.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.7.3 "Host platform"</a>: updated.</li> <li>– <a href="#">Section 4.7.4.1 "WFA certifications"</a>: updated.</li> <li>– <a href="#">Section 4.7.5 "Wi-Fi throughput"</a>: updated.</li> <li>– <a href="#">Section 4.7.7.7 "FW version: From 16.92.21.p84.3 to 16.92.2.p119.2"</a>: updated.</li> <li>– <a href="#">Section 4.7.8 "Known issues"</a>: updated.</li> </ul> </li> <li>• SD 88W8801                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.8.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.8.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.8.3 "Host platform"</a>: updated.</li> <li>– <a href="#">Section 4.8.4.1 "WFA certifications"</a>: updated.</li> <li>– <a href="#">Section 4.8.7 "Bug fixes/feature enhancements"</a>: updated.</li> </ul> </li> </ul>

Revision history...continued

Document ID	Date	Change details
RN00104 v.11	13 December 2023	<ul style="list-style-type: none"> <li>• <a href="#">Section 1 "About this document"</a>: updated.</li> <li>• <a href="#">Section 1.1 "Supported SoCs"</a>: replaced IW612 with IW61x.</li> <li>• <a href="#">Section 2.2 "Wi-Fi utilities (mланutl)"</a>: updated.</li> <li>• Feature list                             <ul style="list-style-type: none"> <li>– <a href="#">Section 3.1.1 "Client mode"</a>: updated.</li> <li>– <a href="#">Section 3.1.2 "AP mode"</a>: updated.</li> <li>– <a href="#">Section 3.1.3 "Wi-Fi Direct/P2P, and AP-STA modes"</a>: updated.</li> <li>– <a href="#">Section 3.2.1 "Bluetooth classic"</a>: updated.</li> <li>– <a href="#">Section 3.2.2 "Bluetooth LE"</a>: updated.</li> <li>– <a href="#">Section 3.3 "Thread"</a>: updated.</li> </ul> </li> <li>• PCIe-UART 88W9098                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.1.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.1.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.1.3 "Host platform"</a>: updated.</li> <li>– <a href="#">Section 4.1.7.7 "FW version: From 17.92.1.p136.131 to 17.92.1.p136.132"</a>: added.</li> </ul> </li> <li>• SD-UART 88W8997                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.2.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.2.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.2.3 "Host platform"</a>: updated.</li> </ul> </li> <li>• PCIe-UART 88W8997                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.3.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.3.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.3.3 "Host platform"</a>: updated.</li> </ul> </li> <li>• SD-UART 88W9098                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.4.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.4.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.4.3 "Host platform"</a>: updated.</li> <li>– <a href="#">Section 4.4.8 "Known issues"</a>: updated.</li> <li>– <a href="#">Section 4.4.7.5 "FW version: From 17.92.1.p136.131 to 17.92.1.p149.131"</a>: added.</li> </ul> </li> <li>• SD-UART IW61x                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.5 "SD-UART IW61x"</a>: replaced IW612 with IW61x.</li> <li>– <a href="#">Section 4.5.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.5.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.5.4 "Host platform"</a>: updated.</li> <li>– <a href="#">Section 4.5.6.2 "STA throughput"</a>: updated.</li> <li>– <a href="#">Section 4.5.6.4 "P2P-GC Throughput"</a>: updated.</li> <li>– <a href="#">Section 4.5.6.5 "Mobile AP Throughput"</a>: updated.</li> <li>– <a href="#">Section 4.5.6.6 "Open Thread throughput test"</a>: added.</li> <li>– <a href="#">Section 4.5.7.1 "FW version: From 18.99.1.p154.40 to 18.99.2.p19.15"</a>: updated.</li> <li>– <a href="#">Section 4.5.7.2 "FW Version: From 18.99.2.p19.15 to 18.99.2.p66.10"</a>: added.</li> <li>– <a href="#">Section 4.5.9 "Known issues"</a>: updated.</li> </ul> </li> </ul> <p style="text-align: center;">—Continues—</p>

Revision history...continued

Document ID	Date	Change details
RN00104 v.11	13 December 2023	<p>———— <i>Continued</i> ————</p> <ul style="list-style-type: none"> <li>• SD-UART 88W8987                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.6.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.6.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.6.3 "Host platform"</a>: updated.</li> </ul> </li> <li>• SD-UART IW416                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.7.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.7.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.7.3 "Host platform"</a>: updated.</li> </ul> </li> <li>• SD 88W8801                             <ul style="list-style-type: none"> <li>– <a href="#">Section 4.8.1 "Package information"</a>: updated.</li> <li>– <a href="#">Section 4.8.2 "Version information"</a>: updated.</li> <li>– <a href="#">Section 4.8.3 "Host platform"</a>: updated.</li> <li>– <a href="#">Section 4.7.7.6 "From 16.92.21.p84.3 to 16.92.21.p84.128"</a>: added.</li> </ul> </li> <li>• <a href="#">Section 7 "References"</a>: updated.</li> </ul>
RN00104 v.10	18 October 2023	<p>Updated:</p> <ul style="list-style-type: none"> <li>• Updated the document title.</li> <li>• <a href="#">Section 4.4.5.2 "STA throughput"</a>: updated.</li> <li>• <a href="#">Section 4.4.5.3 "P2P-GO throughput"</a>: updated.</li> <li>• <a href="#">Section 4.4.5.4 "P2P-GC Throughput"</a>: updated.</li> <li>• <a href="#">Section 4.4.5.5 "Mobile AP Throughput"</a>: updated.</li> <li>• <a href="#">Section 4.4.7.4 "FW version: From 17.92.1.p136.24 to 17.92.1.p136.131"</a>: updated.</li> <li>• <a href="#">Section 4.4.8 "Known issues"</a>: updated.</li> </ul>
RN00104 v. 9	4 October 2023	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Section 3 "Feature lists"</a></li> <li>• <a href="#">Section 4.1 "PCIe-UART 9098"</a></li> <li>• <a href="#">Section 4.2 "SD-UART 8997"</a></li> <li>• <a href="#">Section 4.3 "PCIe-UART 8997"</a></li> <li>• <a href="#">Section 4.4 "SD-UART 9098"</a></li> <li>• <a href="#">Section 4.5 "SD-UART IW61x"</a></li> <li>• <a href="#">Section 4.6 "SD-UART 8987"</a></li> <li>• <a href="#">Section 4.7 "SD-UART IW416"</a></li> <li>• <a href="#">Section 4.8 "SD 8801"</a></li> </ul>
RN00104 v. 8	29 June 2023	<p>Updated:</p> <ul style="list-style-type: none"> <li>• <a href="#">Section 3 "Feature lists"</a></li> <li>• <a href="#">Section 4.1 "PCIe-UART 9098"</a></li> <li>• <a href="#">Section 4.2 "SD-UART 8997"</a></li> <li>• <a href="#">Section 4.3 "PCIe-UART 8997"</a></li> <li>• <a href="#">Section 4.4 "SD-UART 9098"</a></li> <li>• <a href="#">Section 4.5 "SD-UART IW61x"</a></li> <li>• <a href="#">Section 4.6 "SD-UART 8987"</a></li> <li>• <a href="#">Section 4.7 "SD-UART IW416"</a></li> <li>• <a href="#">Section 4.8 "SD 8801"</a></li> </ul>



Revision history...continued

Document ID	Date	Change details
RN00104 v. 7	29 March 2023	Updated: <ul style="list-style-type: none"> <li>• <a href="#">Section 3 "Feature lists"</a></li> <li>• <a href="#">Section 4.1 "PCIe-UART 9098"</a></li> <li>• <a href="#">Section 4.2 "SD-UART 8997"</a></li> <li>• <a href="#">Section 4.3 "PCIe-UART 8997"</a></li> <li>• <a href="#">Section 4.4 "SD-UART 9098"</a></li> <li>• <a href="#">Section 4.5 "SD-UART IW61x"</a></li> <li>• <a href="#">Section 4.6 "SD-UART 8987"</a></li> <li>• <a href="#">Section 4.7 "SD-UART IW416"</a></li> <li>• <a href="#">Section 4.8 "SD 8801"</a></li> <li>• <a href="#">Section 5 "i.MX platforms on-board chips and external wireless solutions"</a></li> </ul>
RN00104 v. 6	16 December 2022	Updated: <ul style="list-style-type: none"> <li>• <a href="#">Section 3 "Feature lists"</a></li> <li>• <a href="#">Section 4.1 "PCIe-UART 9098"</a></li> <li>• <a href="#">Section 4.2 "SD-UART 8997"</a></li> <li>• <a href="#">Section 4.3 "PCIe-UART 8997"</a></li> <li>• <a href="#">Section 4.4 "SD-UART 9098"</a></li> <li>• <a href="#">Section 4.6 "SD-UART 8987"</a></li> <li>• <a href="#">Section 4.7 "SD-UART IW416"</a></li> <li>• <a href="#">Section 4.8 "SD 8801"</a></li> <li>• <a href="#">Section 5 "i.MX platforms on-board chips and external wireless solutions"</a></li> <li>• <a href="#">Section 6 "Acronyms and abbreviations"</a></li> </ul>
RN00104 v. 5	27 September 2022	Updated: <ul style="list-style-type: none"> <li>• <a href="#">Section 3 "Feature lists"</a></li> <li>• <a href="#">Section 4.1 "PCIe-UART 9098"</a></li> <li>• <a href="#">Section 4.2 "SD-UART 8997"</a></li> <li>• <a href="#">Section 4.3 "PCIe-UART 8997"</a></li> <li>• <a href="#">Section 4.4 "SD-UART 9098"</a></li> <li>• <a href="#">Section 4.4.8 "Known issues"</a></li> <li>• <a href="#">Section 4.7 "SD-UART IW416"</a></li> <li>• <a href="#">Section 4.8 "SD 8801"</a></li> <li>• <a href="#">Section 6 "Acronyms and abbreviations"</a></li> </ul>
RN00104 v. 4	28 June 2022	Updated: <ul style="list-style-type: none"> <li>• <a href="#">Section 3 "Feature lists"</a></li> <li>• <a href="#">Section 4.1 "PCIe-UART 9098"</a></li> <li>• <a href="#">Section 4.2 "SD-UART 8997"</a></li> <li>• <a href="#">Section 4.3 "PCIe-UART 8997"</a></li> <li>• <a href="#">Section 4.4 "SD-UART 9098"</a></li> <li>• <a href="#">Section 4.4.8 "Known issues"</a></li> <li>• <a href="#">Section 4.7 "SD-UART IW416"</a></li> <li>• <a href="#">Section 4.8 "SD 8801"</a></li> <li>• <a href="#">Section 6 "Acronyms and abbreviations"</a></li> </ul>

## Revision history...continued

Document ID	Date	Change details
RN00104 v. 3	24 March 2022	<ul style="list-style-type: none"><li>Added SD-UART 88W9098</li></ul> Updated: <ul style="list-style-type: none"><li><a href="#">Section 4.1.4 "Wi-Fi and Bluetooth certification"</a></li><li><a href="#">Section 4.3.4 "Wi-Fi and Bluetooth certification"</a></li><li><a href="#">Section 4.4.4 "Wi-Fi and Bluetooth certification"</a></li><li><a href="#">Section 4.6.4 "Wi-Fi and Bluetooth certification"</a></li><li><a href="#">Section 4.7.4 "Wi-Fi and Bluetooth certification"</a></li><li><a href="#">Section 4.8.4 "Wi-Fi certification"</a></li></ul> <ul style="list-style-type: none"><li>Bluetooth certification links</li></ul>
RN00104 v. 2	24 January 2022	<ul style="list-style-type: none"><li>Added the link for the WPA3-R3 support.</li><li><a href="#">Section 4.8.1 "Package information"</a>: updated.</li><li><a href="#">Section 4.8.2 "Version information"</a>: updated.&gt;</li></ul>
RN00104 v.1	14 December 2021	Initial release

## Legal information

### Definitions

**Draft** — A draft status on a document indicates that the content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included in a draft version of a document and shall have no liability for the consequences of use of such information.

### Disclaimers

**Limited warranty and liability** — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of NXP Semiconductors.

**Right to make changes** — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

**Suitability for use** — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

**Applications** — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

**Terms and conditions of commercial sale** — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at <https://www.nxp.com/profile/terms>, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

**Export control** — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

**Suitability for use in non-automotive qualified products** — Unless this document expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

**Translations** — A non-English (translated) version of a document, including the legal information in that document, is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

**Security** — Customer understands that all NXP products may be subject to unidentified vulnerabilities or may support established security standards or specifications with known limitations. Customer is responsible for the design and operation of its applications and products throughout their lifecycles to reduce the effect of these vulnerabilities on customer's applications and products. Customer's responsibility also extends to other open and/or proprietary technologies supported by NXP products for use in customer's applications. NXP accepts no liability for any vulnerability. Customer should regularly check security updates from NXP and follow up appropriately. Customer shall select products with security features that best meet rules, regulations, and standards of the intended application and make the ultimate design decisions regarding its products and is solely responsible for compliance with all legal, regulatory, and security related requirements concerning its products, regardless of any information or support that may be provided by NXP.

NXP has a Product Security Incident Response Team (PSIRT) (reachable at [PSIRT@nxp.com](mailto:PSIRT@nxp.com)) that manages the investigation, reporting, and solution release to security vulnerabilities of NXP products.

**NXP B.V.** — NXP B.V. is not an operating company and it does not distribute or sell products.

### Trademarks

Notice: All referenced brands, product names, service names, and trademarks are the property of their respective owners.

**NXP** — wordmark and logo are trademarks of NXP B.V.

**Bluetooth** — the Bluetooth wordmark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by NXP Semiconductors is under license.

**i.MX** — is a trademark of NXP B.V.

Contents

<b>1</b>	<b>About this document</b> .....	<b>2</b>	4.1.7.8	FW version: From 17.92.1.p136.132 to 17.92.1.p149.131 .....	32
1.1	Supported SoCs .....	2	4.1.8	Known issues .....	32
<b>2</b>	<b>Downloading wireless driver/utilities and firmware</b> .....	<b>3</b>	4.2	SD-UART 8997 .....	33
2.1	Pre-compiled Wi-Fi driver and firmware .....	3	4.2.1	Package information .....	33
2.2	Wi-Fi utilities (mланutl) .....	3	4.2.2	Version information .....	33
2.3	Wi-Fi driver source and firmware .....	3	4.2.3	Host platform .....	33
2.4	Wi-Fi patch .....	4	4.2.4	Wi-Fi and Bluetooth certification .....	34
<b>3</b>	<b>Feature lists</b> .....	<b>5</b>	4.2.4.1	Wi-Fi pre-certifications .....	34
3.1	Wi-Fi radio .....	5	4.2.4.2	Bluetooth controller certification .....	34
3.1.1	Client mode .....	5	4.2.5	Wi-Fi throughput .....	34
3.1.2	AP mode .....	10	4.2.5.1	Throughput test setup .....	34
3.1.3	Wi-Fi Direct/P2P, and AP-STA modes .....	14	4.2.5.2	STA throughput .....	35
3.1.4	Concurrent dual Wi-Fi (CDW) mode [Dual MAC   Dual Band   Dual Channel] (88W9098) .....	15	4.2.5.3	P2P-GO throughput .....	36
3.1.5	Known limitations for simultaneous mode operation .....	15	4.2.5.4	P2P-GC throughput .....	37
3.2	Bluetooth .....	16	4.2.5.5	Mobile AP throughput .....	37
3.2.1	Bluetooth classic .....	16	4.2.6	EU conformance tests .....	39
3.2.2	Bluetooth LE .....	18	4.2.7	Bug fixes/feature enhancements .....	39
3.3	Thread .....	19	4.2.7.1	FW version: From 16.92.10.p218 to 16.92.10.p219.3 .....	39
3.4	Coexistence .....	20	4.2.7.2	FW version: From 16.92.10.p219.3 to 16.92.10.p219.5 .....	39
3.4.1	Wi-Fi and Bluetooth coexistence .....	20	4.2.7.3	FW version: From 16.92.10.p219.5 to 16.92.21.p41 .....	39
3.4.2	Wi-Fi and Bluetooth/802.15.4 coexistence .....	21	4.2.7.4	FW version: From 16.92.21.p41 to 16.92.21.p55.3 .....	39
3.5	Zigbee .....	22	4.2.7.5	FW version: From 16.92.p55.3 to 16.92.21.p76.2 .....	40
<b>4</b>	<b>Release notes for the supported SoCs</b> .....	<b>23</b>	4.2.7.6	FW version: From 16.92.21.p76.2 to 16.92.21.p84.4 .....	40
4.1	PCIe-UART 9098 .....	23	4.2.7.7	FW version: From 16.92.21.p84.4 to 16.92.21.p119.2 .....	40
4.1.1	Package information .....	23	4.2.8	Known issues .....	40
4.1.2	Version information .....	23	4.3	PCIe-UART 8997 .....	41
4.1.3	Host platform .....	23	4.3.1	Package information .....	41
4.1.4	Wi-Fi and Bluetooth certification .....	24	4.3.2	Version information .....	41
4.1.4.1	Wi-Fi pre-certification .....	24	4.3.3	Host platform .....	41
4.1.4.2	Bluetooth controller certification .....	24	4.3.4	Wi-Fi and Bluetooth certification .....	42
4.1.5	Wi-Fi throughput .....	24	4.3.4.1	Wi-Fi pre-certifications .....	42
4.1.5.1	Throughput Test Setup .....	24	4.3.4.2	Bluetooth controller certification .....	42
4.1.5.2	STA throughput .....	25	4.3.5	Wi-Fi throughput .....	42
4.1.5.3	P2P-GO throughput .....	27	4.3.5.1	Throughput test setup .....	42
4.1.5.4	P2P-GC throughput .....	28	4.3.5.2	STA throughput .....	43
4.1.5.5	Mobile AP throughput .....	28	4.3.5.3	P2P-GO throughput .....	44
4.1.6	EU conformance tests .....	30	4.3.5.4	P2P-GC throughput .....	45
4.1.7	Bug fixes/feature enhancements .....	31	4.3.5.5	Mobile AP throughput .....	45
4.1.7.1	FW version: From 17.92.5.p3 to 17.92.5.p9 .....	31	4.3.6	EU conformance tests .....	46
4.1.7.2	FW version: From 17.92.5.p9 to 17.92.5.p11 .....	31	4.3.7	Bug fixes/feature enhancements .....	47
4.1.7.3	FW version: From 17.92.5.p11 to 17.92.1.p116.1 .....	31	4.3.7.1	FW version: From 16.92.10.p208 to 16.92.10.p211 .....	47
4.1.7.4	FW version: From 17.92.1.p116.1 to 17.92.1.p136.13 .....	31	4.3.7.2	FW version: From 16.92.10.p211 to 16.92.10.p213 .....	47
4.1.7.5	FW version: From 17.92.1.p136.13 to 17.92.1.p136.24 .....	31	4.3.7.3	FW version: From 16.92.10.p213 to 16.92.10.p213.2 .....	47
4.1.7.6	FW version: From 17.92.1.p136.24 to 17.92.1.p136.131 .....	31	4.3.7.4	FW version: From 16.92.10.p213.2 to 16.92.10.p213.4 .....	47
4.1.7.7	FW version: From 17.92.1.p136.131 to 17.92.1.p136.132 .....	32			

4.3.7.5	FW version: From 16.92.10.p213.4 to 16.92.21.p26.1	47	4.5.8	EU conformance tests	68
4.3.7.6	FW version: From 16.92.21.p26.1 to 16.92.21.p55.3	47	4.5.9	Known issues	69
4.3.7.7	FW version: From 16.92.21.p55.3 to 16.92.21.p76.2	48	4.5.10	Notes	70
4.3.7.8	FW version: From 16.92.21.p76.2 to 16.92.21.p84.4	48	4.6	SD-UART 8987	71
4.3.7.9	FW version: From 16.92.21.p84.4 to 16.92.21.p119.2	48	4.6.1	Package information	71
4.3.8	Known issues	48	4.6.2	Version information	71
4.4	SD-UART 9098	49	4.6.3	Host platform	71
4.4.1	Package information	49	4.6.4	Wi-Fi and Bluetooth certification	72
4.4.2	Version information	49	4.6.4.1	WFA certifications	72
4.4.3	Host platform	49	4.6.4.2	Bluetooth controller certification	72
4.4.4	Wi-Fi and Bluetooth certification	50	4.6.5	Wi-Fi throughput	72
4.4.4.1	Wi-Fi pre-certification	50	4.6.5.1	Throughput test setup	72
4.4.4.2	Bluetooth controller certification	50	4.6.5.2	STA throughput	73
4.4.5	Wi-Fi throughput	50	4.6.5.3	P2P-GO throughput	74
4.4.5.1	Throughput test setup	50	4.6.5.4	P2P-GC throughput	75
4.4.5.2	STA throughput	51	4.6.5.5	Mobile AP throughput	75
4.4.5.3	P2P-GO throughput	53	4.6.6	EU conformance tests	76
4.4.5.4	P2P-GC Throughput	54	4.6.7	Bug fixes/feature enhancements	77
4.4.5.5	Mobile AP Throughput	54	4.6.7.1	FW version: From 16.92.10.p208 to 16.92.10.p210	77
4.4.6	EU conformance tests	56	4.6.7.2	FW version: From 16.92.10.p210 to 16.92.10.p210.1	77
4.4.7	Bug fixes/feature enhancements	57	4.6.7.3	FW version: From 16.92.10.p210.1 to 16.92.21.p11.1	77
4.4.7.1	FW version: From 17.92.1.p98.1 to 17.92.1.p116.1	57	4.6.7.4	FW version: From 16.92.21.p11.1 to 16.92.21.p26	77
4.4.7.2	FW version: From 17.92.1.p116.1 to 17.92.1.p136.13	57	4.6.7.5	FW version: From 16.92.21.p26 to 16.92.21.p41.3	77
4.4.7.3	FW version: From 17.92.1.p136.13 to 17.92.1.p136.24	57	4.6.7.6	FW version: From 16.92.21.p41.3 to 16.92.21.p41.4	77
4.4.7.4	FW version: From 17.92.1.p136.24 to 17.92.1.p136.131	57	4.6.7.7	FW version: From 16.92.21.p41.4 to 16.92.21.p69.3	78
4.4.7.5	FW version: From 17.92.1.p136.131 to 17.92.1.p149.131	57	4.6.7.8	FW version: From 16.92.21.p69.3 to 16.92.21.p76.2	78
4.4.8	Known issues	57	4.6.7.9	FW version: From 16.92.21.p76.2 to 16.92.21.p76.5	78
4.5	SD-UART IW61x	58	4.6.7.10	FW version: From 18.99.1.p154.40 to 18.99.2.p19.15	78
4.5.1	Package information	58	4.6.7.11	FW version: From 16.92.p99.2 to 16.92.2 p119.2	78
4.5.2	Version information	58	4.6.8	Known issues	78
4.5.3	Software release contents	58	4.7	SD-UART IW416	79
4.5.4	Host platform	59	4.7.1	Package information	79
4.5.5	Wi-Fi and Bluetooth certification	59	4.7.2	Version information	79
4.5.5.1	Wi-Fi pre-certification	59	4.7.3	Host platform	79
4.5.5.2	Bluetooth controller certification	59	4.7.4	Wi-Fi and Bluetooth certification	80
4.5.6	Wi-Fi throughput	59	4.7.4.1	WFA certifications	80
4.5.6.1	Throughput test setup	59	4.7.4.2	Bluetooth controller certification	80
4.5.6.2	STA throughput	61	4.7.5	Wi-Fi throughput	80
4.5.6.3	P2P-GO throughput	63	4.7.5.1	Throughput test setup	80
4.5.6.4	P2P-GC Throughput	64	4.7.5.2	STA throughput	81
4.5.6.5	Mobile AP Throughput	64	4.7.5.3	P2P-GO throughput	82
4.5.6.6	Open Thread throughput test	67	4.7.5.4	P2P-GC throughput	82
4.5.7	Bug fixes/feature enhancements	68	4.7.5.5	Mobile AP throughput	83
4.5.7.1	FW version: From 18.99.1.p154.40 to 18.99.2.p19.15	68	4.7.6	EU conformance tests	84
4.5.7.2	FW Version: From 18.99.2.p19.15 to 18.99.2.p66.10	68	4.7.7	Bug fixes/feature enhancements	84
4.5.7.3	FW version: From 18.18.99.2.p66.10 to 18.99.2.p66.17	68	4.7.7.1	FW version: From 16.92.10.p233.2 to 16.92.21.p11.2	84

4.7.7.2	FW version: From 16.92.21.p11.2 to 16.92.21.p41.1 .....	84
4.7.7.3	FW version: From 16.92.21.p41.1 to 16.92.21.p55.3 .....	84
4.7.7.4	FW version: From 16.92.21.p55.3 to 16.92.21.p76.3 .....	84
4.7.7.5	FW version: From 16.92.21.p76.3 to 16.92.21.p84.3 .....	84
4.7.7.6	From 16.92.21.p84.3 to 16.92.21.p84.128 .....	84
4.7.7.7	FW version: From 16.92.21.p84.3 to 16.92.2.p119.2 .....	85
4.7.8	Known issues .....	85
4.8	SD 8801 .....	86
4.8.1	Package information .....	86
4.8.2	Version information .....	86
4.8.3	Host platform .....	86
4.8.4	Wi-Fi certification .....	87
4.8.4.1	WFA certifications .....	87
4.8.5	Wi-Fi throughput .....	87
4.8.5.1	Throughput test setup .....	87
4.8.5.2	STA throughput .....	88
4.8.5.3	P2P-GO throughput .....	88
4.8.5.4	P2P-GC throughput .....	88
4.8.5.5	Mobile AP throughput .....	88
4.8.6	EU conformance tests .....	88
4.8.7	Bug fixes/feature enhancements .....	89
4.8.8	Known issues .....	89
<b>5</b>	<b>i.MX platforms on-board chips and external wireless solutions .....</b>	<b>90</b>
<b>6</b>	<b>Acronyms and abbreviations .....</b>	<b>91</b>
<b>7</b>	<b>References .....</b>	<b>92</b>
7.2	Engineering bulletins (EB) .....	92
<b>8</b>	<b>Revision history .....</b>	<b>93</b>
	<b>Legal information .....</b>	<b>99</b>

---

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

---