

RN00110

NXP Wireless SoC Features and Release Notes for Android

Rev. 11 — 29 January 2024

[Release notes](#)

Document information

Information	Content
Keywords	PCIe, UART, SDIO, Bluetooth, Bluetooth LE, coexistence, Host platform, release, version, package, certification, Wi-Fi throughput, EU conformance tests, bug fixes, Known issues, feature enhancement, 88W9098, 88W8987, 88W8997, IW416, IW61x
Abstract	Includes information about the supported features, known issues, and performance of the Wi-Fi, Bluetooth and coexistence with the mentioned release.



1 About this document

This document includes information about the supported features, known issues and performance of the Wi-Fi, Bluetooth and coexistence with the mentioned release.

This is a consolidated release that has been tested with Android BSP version 14.0.0_1.0.0, for the wireless devices mentioned in this document.

2 Downloading the wireless driver and firmware

For the latest wireless driver and firmware, refer to the following sections:

2.1 Pre-compiled Wi-Fi driver and firmware

The Android BSP image includes the wireless firmware and pre-compiled driver modules on the following paths:

- Driver modules: `/vendor/lib/modules/`
- Firmware binary: `/vendor/firmware/`

Note: The pre built images in Android release 14.0.0_1.0.0 include the following default wireless firmware based on the i.MX 8M EVK boards. [Table 1](#) lists the possible combinations.

Table 1. Default wireless firmware support

EVK board	Default wireless firmware support
i.MX 8ULP EVK board	IW416
i.MX 8M Nano/Nano UL EVK board	88W8987
i.MX 8M Mini EVK board	88W8987
i.MX 8M Plus EVK board	88W8997 PCIe - UART
i.MX 8M Quad EVK board	88W9098 PCIe - UART
i.MX 8QM/8QXP EVK board	88W9098 PCIe - UART

For non-default firmware, build the BSP image from source. For example, refer to the section *Building the image from source*, and the section *Enabling SDIO on M.2 connection in Android* in [\[2\]](#).

2.2 Wi-Fi driver source and firmware

To download the release for the Wi-Fi driver and wireless firmware, refer to [3].

For example, go to 88W8997 product page on NXP website, and look for the documentation section:

Wi-Fi® + Bluetooth® > 88W8997 > Documentation



Figure 1. Documentation section on product pages

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. Download the code from kernel.org.*

2.3 Wi-Fi patch

Intermediate releases are published on [4].

The screenshot shows the 'Software Details' section of the NXP i.MX Android website. At the top, there's a navigation bar with 'Overview', 'Software Details' (which is underlined), 'Design Resources', and 'Support'. To the right is a search bar and a 'DOWNLOADS' button. Below the navigation, the 'Current Release' section is displayed for 'Android 12.0.0_1.0.0 (Linux 5.10.72 kernel)'. It includes a 'Documentation' section with links to various guides and the 'NXP Wi-Fi Driver Features and Release Notes for Android'. To the right of the documentation are links to 'README' for release instructions, 'Install Source Package', 'Verisilicon IDE', and a list of EVKs: 'i.MX 8M Plus EVK', 'i.MX 8M Mini EVK', 'i.MX 8M Nano EVK', and 'i.MX 8M Quad EVK'. The 'Past Releases' section shows a table with columns for 'Release', 'Build Sources and Documentation', 'Supported Platforms/Demo Images', and a 'Search' field. The first row in the table is for 'Android 11.0.0_2.6.0 (Linux 5.10.72 kernel)'. The 'Supported Platforms/Demo Images' column for this row contains a link to 'Incremental Releases', which is highlighted with a red box. The table also lists 'Documentation' and 'NXP Wi-Fi Driver Features' under the 'Build Sources and Documentation' column, and 'i.MX 8M Plus EVK' and 'i.MX 8M Mini EVK' under the 'Supported Platforms/Demo Images' column.

Release	Build Sources and Documentation	Supported Platforms/Demo Images	Search:
Android 11.0.0_2.6.0 (Linux 5.10.72 kernel)	<ul style="list-style-type: none">DocumentationNXP Wi-Fi Driver Features	<ul style="list-style-type: none">i.MX 8M Plus EVKi.MX 8M Mini EVK	Incremental Releases

Figure 2. Intermediates releases on i.MX Android web page

3 Feature lists

3.1 Wi-Fi radio

3.1.1 Client mode

Table 2. Feature list for Wi-Fi radio and client mode

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	IW61x	8997	8987	IW416
802.11n - High Throughput	2.4 GHz band operation supported channel bandwidth: 20 MHz	Y	Y	Y	Y	Y	Y	Y
	2.4 GHz band supported channel bandwidths: 40 MHz ^[1]	Y	Y	Y	Y	Y	Y	Y
	5 GHz band supported channel bandwidths: 20 MHz	Y	Y	Y	Y	Y	Y	Y
	5 GHz band supported channel bandwidths: 40 MHz	Y	Y	Y	Y	Y	Y	Y
	Short/long guard interval (400 ns/800 ns)	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
	11n data rates – Up to 150 Mbit/s (MCS 0 to MCS 7)	Y	Y	Y	Y	Y	Y	Y
	11n data rates - Up to 300 Mbit/s (MCS 0 to MCS 15)	Y	Y	Y	Y	Y	N	N
	1 spatial stream (1x1)	Y	Y	Y	Y	Y	Y	Y
	2 spatial stream (2x2)	Y	Y	Y	N	Y	N	N
	HT protection mechanisms	Y	Y	Y	Y	Y	Y	Y
	Explicit Beamformee	Y	Y	Y	Y	Y	N	N
	Aggregated MAC Protocol Data Unit(AMPDU) Rx support	Y	Y	Y	Y	Y	Y	Y
	Aggregated MAC Service Data Unit(AMSDU) -4k Rx support	Y	Y	Y	Y	Y	Y	Y
	20/40 MHz Coexistence	Y	Y	Y	Y	Y	N	N
	Tx MCS rate adaptation (BGN)	Y	Y	Y	Y	Y	Y	Y
	RX and TX Space time block coding (STBC)	Y	Y	Y	N	Y	N	N
	Rx Low Density Parity Check (LDPC)	Y	Y	Y	Y	Y	Y	N
	AMSDU over AMPDU support	Y	Y	Y	Y	Y	Y	Y

Table 2. Feature list for Wi-Fi radio and client mode...continued

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	IW61x	8997	8987	IW416
802.11 ac - Very High Throughput	5 GHz band supported channel bandwidths: 20 MHz	Y	Y	Y	Y	Y	Y	N
	5 GHz band supported channel bandwidths: 40 MHz	Y	Y	Y	Y	Y	Y	N
	SU-AMPDU Aggregation	Y	Y	Y	Y	Y	Y	N
	5 GHz band supported channel bandwidths: 80 MHz	Y	Y	Y	Y	Y	Y	N
	11ac data rates - Up to 433.3 Mbps (MCS 0 to MCS 9) -1x1	Y	Y	Y	Y	Y	Y	N
	11ac Data rates - Up to 866.7 Mbps (MCS 0 to MCS 9) -2x2	Y	Y	Y	N	Y	N	N
	Short/Long Guard Interval (400ns/800ns)	Y	Y	Y	Y	Y	Y	N
	MU-MIMO RX – Wave 2	Y	Y	Y	Y	Y	Y	N
	SU-Beamformee	Y	Y	Y	Y	Y	Y	N
	MU-MIMO Beamformee (Explicit and Implicit)	Y	Y	Y	Y	Y	Y	N
	RTS/CTS with BW Signaling	Y	Y	Y	Y	Y	Y	N
	Operation Mode Notification	Y	Y	Y	Y	Y	Y	N
	Backward Compatibility with non-VHT devices	Y	Y	Y	Y	Y	Y	N
	Tx VHT MCS Rate Adaptation	Y	Y	Y	Y	Y	Y	N
	256 QAM Modulation – MCS 8 and MCS9	Y	Y	Y	Y	Y	Y	Y

Table 2. Feature list for Wi-Fi radio and client mode...continued

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	IW61x	8997	8987	IW416
802.11 ax -High Efficiency	5 GHz band supported channel bandwidth: 20MHz	N	Y	Y	Y	N	N	N
	5 GHz band supported channel bandwidth: 40 MHz	N	Y	Y	Y	N	N	N
	5 GHz band supported channel bandwidth: 80MHz	N	Y	Y	Y	N	N	N
	11ax data rates – Up to 1.2 Gbps (MCS 0 to MCS 11) – 2x2	N	Y	Y	N	N	N	N
	Operating Mode Indication(OMI) Control	N	Y	Y	Y	N	N	N
	2x/4x HE-Long Training Field(LTF)	N	Y	Y	Y	N	N	N
	UL (Tx) and DL (Rx) MU-MIMO	N	Y	Y	Y	N	N	N
	UL (Tx) and DL (Rx) OFDMA	N	Y	Y	Y	N	N	N
	1024 QAM	N	Y	Y	Y	N	N	N
	SU beamforming	N	N	N	Y	N	N	N
	TWT	N	Y	Y	Y	N	N	N
	Spatial reuse	N	Y	Y	Y	N	N	N
802.11 a/b/g Features	OFDMA (ul/dl, 484 RU)	N	Y	Y	Y	N	N	N
	BSS coloring	N	Y	Y	Y	N	N	N
	11 b/g data rates – Up to 54 Mbit/s	Y	Y	Y	Y	Y	Y	Y
	11 a data rates – Up to 54 Mbit/s	Y	Y	Y	Y	Y	Y	Y
	Fragmentation/defragmentation	Y	Y	Y	Y	Y	Y	Y
802.11 a/b/g Features	ERP Protection using mac ctrl command (RTS-CTS/Self-CTS)	Y	Y	Y	Y	Y	Y	Y
	ERP protection, slot time, preamble	Y	Y	Y	Y	Y	Y	Y
	Tx rate adaptation (BG)	Y	Y	Y	Y	Y	Y	Y

Table 2. Feature list for Wi-Fi radio and client mode...continued

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	IW61x	8997	8987	IW416
802.11d and 802.11h	802.11d – Regulatory Domain/Operating Class/Country Info	Y	Y	Y	Y	Y	Y	Y
	Per-path regulatory power table ^[1]	N	N	N	Y	N	Y	N
	802.11h – Dynamic Frequency Selection (DFS)	Y	Y	Y	Y	Y	Y	Y
	DFS Radar Detection in Peripheral Mode (Follow AP)	Y	Y	Y	Y	Y	Y	Y
802.11e -QoS	EDCA [Enhanced Distributed Channel Access] / WMM (Wireless Multi-Media)	Y	Y	Y	Y	Y	Y	Y
802.11i -Security	Open and Shared Authentication	Y	Y	Y	Y	Y	Y	Y
	WPA2-PSK Security (AES-CCMP Encryption)	Y	Y	Y	Y	Y	Y	Y
	WPA + WPA2 mixed mode	Y	Y	Y	Y	Y	Y	Y
	Opensource WPA supplicant	Y	Y	Y	Y	Y	Y	Y
	WPA2 Enterprise Security	Y	Y	Y	Y	Y	Y	Y
	Transient Security Network (TSN)	Y	Y	Y	Y	Y	Y	Y
802.11mc	Wi-Fi location ^[1]	N	Y	Y	Y	N	N	N
WPA3 SAE (R3) Security	Simultaneous Authentication of Equals (SAE)	Y	Y	Y	Y	Y	Y	Y
	SAE Connectivity and PMK Caching	Y	Y	Y	Y	Y	Y	Y
	WPA2 Personal Compatibility	Y	Y	Y	Y	Y	Y	Y
	Anti-Clogging	Y	Y	Y	Y	Y	Y	Y
	SAE Finite Cyclic Group – Group-19, Group 20, Goup-21	Y	Y	Y	Y	Y	Y	Y
	Reflection Attack	Y	Y	Y	Y	Y	Y	Y
	Suite B – 192-bit Security ECC p384	Y	Y	Y	Y	Y	Y	N
	Suite B – 192-bit Security RSA 3K	Y	Y	Y	Y	Y	Y	N
	Wi-Fi Enhanced Open	Y	Y	Y	Y	Y	Y	Y
	WPA3 host-based	Y	Y	Y	Y	Y	Y	Y
802.11r - Fast BSS Transition (FT)	FT over Air and over DS (Distribution System) (Open, WPA2-PSK)	Y	Y	Y	Y	Y	Y	Y
802.11k	802.11k	Y	Y	Y	Y	Y	Y	Y

Table 2. Feature list for Wi-Fi radio and client mode...continued

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	IW61x	8997	8987	IW416
802.11v	802.11v	Y	Y	Y	Y	Y	Y	Y
802.11z	802.11z (Host based TDLS)	N	Y	Y	Y	N	Y	N
802.11az	New generation Wi-Fi Location ^[1]	N	N	N	Y	N	N	N
DPP Functionality	Wi-Fi Easy Connect	Y	Y	Y	N	Y	Y	Y
FIPS	FIPS support ^[2]	Y	Y	Y	Y	Y	Y	Y
802.11w - PMF (Protected Management Frames)	PMF require and capable	Y	Y	Y	Y	Y	Y	Y
	Unicast management frames - Encryption/decryption - using CCMP	Y	Y	Y	Y	Y	Y	Y
	Broadcast management frames - Encryption/decryption - using BIP	Y	Y	Y	Y	Y	Y	Y
	SA query request/response	Y	Y	Y	Y	Y	Y	Y
	PMF Support using Opensource WPA	Y	Y	Y	Y	Y	Y	Y
Power Save Mode	Deep sleep	Y	Y	Y	Y	Y	Y	Y
	IEEE power save	Y	Y	Y	Y	Y	Y	Y
	Host Sleep/Wowlan	Y	Y	Y	Y	Y	Y	Y

Table 2. Feature list for Wi-Fi radio and client mode...continued

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	IW61x	8997	8987	IW416
General features	EU adaptivity support	Y	Y	Y	Y	Y	Y	Y
	Wake on Wireless (WoW)	Y	Y	Y	Y	Y	Y	Y
	Auto Tx ^[1]	Y	Y	Y	Y	Y	Y	Y
	MAC Address randomization(in Scan)	Y	Y	Y	Y	Y	Y	Y
	Host based MLME ^[3]	Y	Y	Y	Y	Y	Y	Y
	Extended channel switch announcement (ECSA)	Y	Y	Y	Y	Y	Y	Y
	DCM	N	Y	Y	Y	N	N	N
	Wireless Android Auto ^[2]	N	Y	Y	Y	N	Y	N
	mDNS (Bonjour) Offload	Y	N	N	Y	Y	Y	Y
	Extended Range ^[1]	N	Y	Y	Y	N	N	N
	Clock sync ^[2]	N	Y	Y	Y	N	N	N
	IPv6 offload	Y	N	N	Y	Y	Y	Y
	Wi-Fi Agile Multiband	N	N	N	Y	N	N	Y
	Auto Reconnect	N	N	N	Y	N	N	N
	Independent reset (In-band)	Y	Y	Y	Y	Y	Y	Y
	Cloud keep alive ^[2]	Y	Y	Y	Y	Y	Y	Y
	Specific Scan (scancfg)	Y	Y	Y	Y	Y	Y	Y
	Network Scan (iwlist scan)	Y	Y	Y	Y	Y	Y	Y
802.11n - High Throughput	Cancellable Scan	Y	Y	Y	Y	Y	Y	Y
	Passive to active scan	Y	Y	Y	Y	Y	Y	Y
	Vendor Specific IE (Custom IE)	Y	Y	Y	Y	Y	Y	Y
	CSI ^[1]	Y	Y	Y	Y	Y	N	N
	2.4 GHz band supported channel bandwidths: 20 MHz	Y	Y	Y	Y	Y	Y	Y
	2.4 GHz band supported channel bandwidths: 40 MHz ^[1]	Y	Y	Y	Y	Y	Y	Y
	1 spatial stream (1x1)	Y	Y	Y	Y	Y	Y	Y
	2 spatial stream (2x2)	Y	Y	Y	N	Y	N	N
	Explicit Beamformer	Y	Y	Y	Y	Y	N	N

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

[2] Not Validated using Android BSP. Contact your NXP representative for more details.

[3] Features are enabled by default in the software.

3.1.2 AP mode

Table 3. Feature list for Wi-Fi radio and AP mode

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	IW61x	8997	8987	IW416
802.11n - High Throughput	Short/long guard interval (400 ns/800 ns)	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
	5 GHz band supported channel bandwidths: 20 MHz	Y	Y	Y	Y	Y	Y	Y
	5 GHz band supported channel bandwidths: 40 MHz	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
	11n data rates - Up to 300 Mbit/s (MCS0 to MCS15)	Y	Y	Y	Y	Y	N	N
	Tx MCS rate adaptation (BGN)	Y	Y	Y	Y	Y	Y	Y
	20/40 MHz Coexistence	Y	Y	Y	Y	Y	N	N
	Aggregated MAC Protocol Data Unit(AMPDU) Tx and Rx support	Y	Y	Y	Y	Y	Y	Y
	Aggregated MAC Service Data Unit(AMSDU) - 4k Rx support	Y	Y	Y	Y	Y	Y	Y
	HT protection mechanisms	Y	Y	Y	Y	Y	Y	Y
	RX and TX Space time block coding (STBC)	Y	Y	Y	N	Y	N	N
	RX Low Density Parity Check(LDPC)	Y	Y	Y	Y	Y	Y	N
	HT Duplicate mode (MCS32)	Y	Y	Y	Y	Y	Y	Y
802.11 b/g Features	11 b/g data rates – Up to 54 Mbit/s	Y	Y	Y	Y	Y	Y	Y
	Tx rate adaptation (BG)	Y	Y	Y	Y	Y	Y	Y
	ERP protection, slot time, preamble	Y	Y	Y	Y	Y	Y	Y
	Handling of associated STAs with IEEE PS - null data	Y	Y	Y	Y	Y	Y	Y

Table 3. Feature list for Wi-Fi radio and AP mode...continued

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	IW61x	8997	8987	IW416
802.11 ac - Very High Throughput	5 GHz band supported channel bandwidths: 20 MHz	Y	Y	Y	Y	Y	Y	N
	5 GHz band supported channel bandwidths: 40 MHz	Y	Y	Y	Y	Y	Y	N
	5 GHz band supported channel bandwidths: 80MHz	Y	Y	Y	Y	Y	Y	N
	Short/Long Guard Interval (400ns/800ns)	Y	Y	Y	Y	Y	Y	N
	11ac Data rates – Up to 433.3 Mbps (MCS 0 to MCS 9)	Y	Y	Y	Y	Y	Y	N
	11ac Data rates - Up to 866.7 Mbps (MCS 0 to MCS 9)	Y	Y	Y	Y	Y	N	N
	Single User- Aggregated MAC Protocol Data Unit (SU-AMPDU) Aggregation	Y	Y	Y	Y	Y	Y	N
	RTS/CTS with BW Signaling	Y	Y	Y	Y	Y	Y	N
	Backward Compatibility with non-VHT devices	Y	Y	Y	Y	Y	Y	N
	Tx VHT MCS Rate Adaptation	Y	Y	Y	Y	Y	Y	N
	Operation Mode Notification	Y	Y	Y	Y	Y	Y	N
802.11 ax -High Efficiency	Explicit Beamformer	Y	Y	Y	N	Y	N	N
	SU-Beamformee	Y	Y	Y	Y	Y	Y	N
	256 QAM Modulation - MCS8 and MCS9	Y	Y	Y	Y	Y	Y	Y
	5 GHz band supported channel bandwidth: 20MHz	N	Y	Y	Y	N	N	N
	5 GHz band supported channel bandwidth: 40 MHz	N	Y	Y	Y	N	N	N
	5 GHz band supported channel bandwidth: 80 MHz	N	Y	Y	Y	N	N	N
	Operating Mode Indication(OMI) Control	N	Y	Y	Y	N	N	N
802.11d	2x/4x HE-Long Training Field(LTF)	N	Y	Y	Y	N	N	N
	1024 QAM	N	Y	Y	Y	N	N	N
802.11h	SU beamforming	N	N	N	Y	N	N	N
	802.11d - Regulatory Domain/Operating Class/Country Info	Y	Y	Y	Y	Y	Y	Y
	802.11h – Dynamic Frequency Selection (DFS)	Y	Y	Y	Y	Y	Y	Y
	Zero Wait DFS	N	Y	Y	N	N	N	N
	DFS Radar Detection in Master Mode	Y	Y	Y	Y	Y	Y	Y

Table 3. Feature list for Wi-Fi radio and AP mode...continued

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	IW61x	8997	8987	IW416
802.11e -QoS	EDCA [Enhanced Distributed Channel Access] / WMM (Wireless Multi-Media)	Y	Y	Y	Y	Y	Y	Y
802.11i - Security	Open security	Y	Y	Y	Y	Y	Y	Y
	WPA2-PSK security (AES-CCMP encryption)	Y	Y	Y	Y	Y	Y	Y
	WPA + WPA2 mixed mode	Y	Y	Y	Y	Y	Y	Y
	WAPI Support ^[1]	N	N	N	Y	N	N	N
	Opensource Hostapd	Y	Y	Y	Y	Y	Y	Y
	Group Key Refresh (Rekeying GTK)	Y	Y	Y	Y	Y	Y	Y
WPA3 SAE (R3) Security	Simultaneous Authentication of Equals (SAE)	Y	Y	Y	Y	Y	Y	Y
	SAE Connectivity and PMK Caching	Y	Y	Y	Y	Y	Y	Y
	Wi-Fi Enhanced Open	Y	Y	Y	N	Y	Y	N
	WPA3 Enterprise Suite-B Host (host based)	Y	Y	Y	Y	Y	Y	N
802.11w - Protected Management Frames (PMF)	PMF require and capable	Y	Y	Y	Y	Y	Y	Y
	Unicast management frames - Encryption/decryption - using CCMP	Y	Y	Y	Y	Y	Y	Y
	Support using Hostapd	Y	Y	Y	Y	Y	Y	Y
	Broadcast management frames - Encryption/decryption - using BIP	Y	Y	Y	Y	Y	Y	Y
	SA query request/response	Y	Y	Y	Y	Y	Y	Y

Table 3. Feature list for Wi-Fi radio and AP mode...continued

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	IW61x	8997	8987	IW416
General features	EU adaptivity support	Y	Y	Y	Y	Y	Y	Y
	Automatic channel selection (ACS)	Y	Y	Y	Y	Y	Y	Y
	Host-based MLME ^[2]	Y	Y	Y	Y	Y	Y	Y
	Extended channel switch announcement (ECSA)	Y	Y	Y	Y	Y	Y	Y
	Max supported stations (up to 8)	Y	Y	Y	N	Y	Y	Y
	Max supported stations (up to 64)	N	Y	Y	Y	N	N	N
	Independent reset (In-band)	Y	Y	Y	Y	Y	Y	Y
	uAPSD/PPS ^[3]	N	N	N	Y	N	N	N
	Hidden SSID (Broadcast SSID Disabled)	Y	Y	Y	Y	Y	Y	Y
	MAC Address Filter (Allowed/Denied List)	Y	Y	Y	Y	Y	Y	Y
	STA Age out Feature for Associated clients	Y	Y	Y	Y	Y	Y	Y
	Configurable Retry Limit ^[1]	Y	Y	Y	Y	Y	Y	Y
	Configurable Unicast Data Rate ^[1]	Y	Y	Y	Y	Y	Y	Y
	Configurable Broadcast/Multicast Data Rate ^[1]	Y	Y	Y	Y	Y	Y	Y
	uAP Events ^[1]	Y	Y	Y	Y	Y	Y	Y
	Vendor Specific IE (Custom IE) ^[1]	Y	Y	Y	Y	Y	Y	Y
	Vendor defined txpowerConfig(Txpower Config V3)	N	Y	Y	Y	N	N	N

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

[2] Features are enabled by default in the software.

[3] Not Validated using Android BSP. Contact your NXP representative for more details.

3.1.3 Wi-Fi direct/P2P

Table 4. Feature list for Wi-Fi direct/P2P

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	IW61x	8997	8987	IW416
P2P basic functionality	Autonomous GO mode	Y	Y	Y	Y	Y	Y	Y
	WFD client mode	Y	Y	Y	Y	Y	Y	Y
	P2P device mode	Y	Y	Y	Y	Y	Y	Y

3.1.4 AP/STA mode

Table 5. Feature list for Wi-Fi direct/P2P

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	IW61x	8997	8987	IW416
Software antennadiversity	Software antenna diversity ^[1]	N	N	N	Y	N	Y	Y
RF test mode	RF test mode functionality	Y	Y	Y	Y	Y	Y	Y
TX power config	TX power config	Y	Y	Y	Y	Y	Y	Y
Simultaneous AP-STA operation	AP-STA functionality (same channel)	Y	Y	Y	Y	Y	Y	Y
Auto FW recovery	Auto firmware recovery on fatal error	N	Y	Y	N	N	N	Y
Auto ARP and Ping	Auto ARP and ping support	N	N	N	Y	N	Y	N
Secure boot	Secure boot	N	N	N	Y	N	N	N

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

3.2 Bluetooth

3.2.1 Bluetooth classic

Table 6. Feature list for Bluetooth radio

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	8997	8987	IW416	IW61x
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
	Independent reset (In-band & OOB ^{[1][2]})	N	Y	Y	N	Y	N	Y
	Low power sniff	Y	Y	Y	Y	Y	Y	Y
	Bluetooth Truncated Paging	Y	Y	Y	Y	Y	Y	Y
	Erroneous Data Reporting	Y	Y	Y	Y	Y	Y	Y
	Encryption Pause and Resume	Y	Y	Y	Y	Y	Y	Y
	Extended Inquiry Response	Y	Y	Y	Y	Y	Y	Y
	Link Supervision Timeout Changed Event	Y	Y	Y	Y	Y	Y	Y
	Non-Automatically-Flushable Packet Boundary Flag	Y	Y	Y	Y	Y	Y	Y
	Sniff Sub rating	Y	Y	Y	Y	Y	Y	Y
	AES Encryption	N	N	N	N	N	N	Y
	Enhanced Power Control	Y	Y	Y	Y	Y	Y	Y
	HCI Read Encryption Key Size command	Y	Y	Y	Y	Y	Y	Y
	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

Table 6. Feature list for Bluetooth radio...continued

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	8997	8987	IW416	IW61x
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
Bluetooth Profiles Supported	A2DP Source/Sink	Y	Y	Y	Y	Y	Y	Y
	AVRCP Target/Controller	Y	Y	Y	Y	Y	Y	Y
	HFP Gateway	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 Dev ^[1]	Y	Y	Y	Y	Y	Y	Y
	PAN ^[1]	Y	Y	Y	Y	Y	Y	Y
Bluetooth Dual Profiles Supported ^[1]	Dual A2DP (2 Source)	N	Y	Y	N	N	N	N
	Dual A2DP (1 Source + 1 Sink)	N	Y	Y	N	N	N	N
	Dual HFP (1 WBS/1NBS) PCM	N	Y	Y	N	N	N	N
	Dual HFP (2 NBS) PCM	N	Y	Y	N	N	N	N
Bluetooth Audio Features	PCM NBS central/peripheral	Y	Y	Y	Y	Y	Y	Y
	PCM WBS central/peripheral	Y	Y	Y	Y	Y	Y	Y
	AAC and LDAC audio codec support ^[1]	N	Y	Y	N	N	N	N
Generic Features	Maximum 16 Bluetooth LE connections(Central role)	Y	Y	Y	Y	Y	Y	Y

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

[2] 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

Note: Additional Vendor Specific Command is required to support the PCM WBS for IW61x.

3.2.2 Bluetooth LE

Table 7. Feature list for Bluetooth LE radio

Features	Sub features	PCle-UART		SD-UART				
		8997	9098	9098	8997	8987	IW416	IW61x
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
	Low Energy Physical Layer	Y	Y	Y	Y	Y	Y	Y
	Low Energy Link Layer	Y	Y	Y	Y	Y	Y	Y
Bluetooth LE 4.0 Support	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 4.2 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
	Bluetooth LE Multiple Advertisement (4 or 6*) Sets ^[1]	Y	Y	Y	Y	Y	Y	Y*
	Bluetooth LE Extended Advertisement	N	N	N	N	N	Y	Y
	High Duty Cycle Directed Advertising	Y	Y	Y	Y	Y	Y	Y
	Bluetooth LE Long Range ^[1]	N	N	N	N	N	N	Y

Table 7. Feature list for Bluetooth LE radio...*continued*

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	8997	8987	IW416	IW61x
Bluetooth 5.2 Support	Bluetooth LE Power Control ^[1]	N	N	N	N	N	N	Y
	Isochronous Channel ^[1]	N	N	N	N	N	N	Y
BCA-TDM Mode (Shared Antenna)	STA + Bluetooth Coex	Y	N	N	Y	Y	Y	Y
	STA + Bluetooth LE Coex	Y	N	N	Y	Y	Y	Y
	STA + Bluetooth + Bluetooth LE Coex	Y	N	N	Y	Y	Y	Y
	AP + Bluetooth Coex	Y	N	N	Y	Y	Y	Y
	AP + Bluetooth LE Coex	Y	N	N	Y	Y	Y	Y

[1] Not Validated using Android BSP. Contact your NXP representative for more details.

3.3 Coexistence

3.3.1 Wi-Fi and Bluetooth coexistence

Table 8. Feature list for Wi-Fi and Bluetooth coexistence

Features	Sub features	PCIe-UART		SD-UART				
		8997	9098	9098	8997	8987	IW416	IW61x
BCA-TDM Mode (Shared Antenna)	AP + Bluetooth + Bluetooth LE Coex	Y	N	N	Y	Y	Y	Y
	P2P + Bluetooth Coex	Y	N	N	Y	Y	Y	Y
	P2P + Bluetooth LE Coex	Y	N	N	Y	Y	Y	Y
	P2P + Bluetooth + Bluetooth LE Coex	Y	N	N	Y	Y	Y	Y
	AP(5GHz) + AP(5GHz) + Bluetooth Coex	Y	N	N	Y	N	N	Y
	AP(5GHz) + AP(5GHz) + Bluetooth LE Coex	Y	N	N	Y	N	N	Y
BCA-TDM Mode (Separate Antenna)	STA + Bluetooth Coex	N	Y	Y	N	N	N	Y ^[1]
	STA + Bluetooth LE Coex	N	Y	Y	N	N	N	Y ^[1]
	STA + Bluetooth + Bluetooth LE Coex	N	Y	Y	N	N	N	Y ^[1]
	AP + Bluetooth Coex	N	Y	Y	N	N	N	Y ^[1]
	AP + Bluetooth LE Coex	N	Y	Y	N	N	N	Y ^[1]
	AP + Bluetooth + Bluetooth LE Coex	N	Y	Y	N	N	N	Y ^[1]
	P2P + Bluetooth Coex	N	Y	Y	N	N	N	Y ^[1]
	P2P + Bluetooth LE Coex	N	Y	Y	N	N	N	Y ^[1]
	P2P + Bluetooth + Bluetooth LE Coex	N	Y	Y	N	N	N	Y ^[1]
	AP(5GHz) + AP(5GHz) + Bluetooth Coex	N	Y	Y	N	N	N	Y ^[1]
External coex	External Coex (Hardware interface)	N	Y	Y	N	N	Y	N

[1] Features are tested on the i.MX8M Mini Host platform with NXP reference board.

3.3.2 Notes on coexistence

P2P-GO and STA simultaneous mode operations

In this case, P2P-GO and STA modes are active simultaneously where STA has connected to an external AP. If the external-AP switches channel, the P2P-GO stops in case of i.MX Android. The Wi-Fi firmware does not support Dual Channel Radio Concurrency. It means P2P-GO and STA cannot stay on two different channels simultaneously.

In Android, there is only a single wpa_supplicant instance. It would disable the least prioritized interface (P2P) and stop the P2P. In this wpa_supplicant behavior, the firmware does not get a chance to move the P2P-GO to the same channel as STA.

Workaround: The variable num_multichan_concurrent can be assigned value 2 in the function sme_send_authentication of the file "sme.c" [filepath: android_build/external/wpa_supplicant_8/wpa_supplicant/] in wpa_supplicant source.

After this change, supplicant will not stop the P2P-GO and allow the firmware to move P2P-GO on the same channel as STA.

How to apply changes:

In wpa_supplicant source, the function wiphy_info_iface_comb_process at line 195 of file src/drivers/driver_nl80211_capa.c, the num_channels variable should be set to 2.

```
if (combination_has_p2p && combination_has_mgd) {  
    -     unsigned int num_channels =  
    -         nla_get_u32(tb_comb[NL80211_IFACE_COMB_NUM_CHANNELS]);  
    +     unsigned int num_channels = 2;  
}
```

After you have implemented the changes described above, build wpa_supplicant. Now, you can see P2P-GO on the same channel as STA when external-AP switches the channel.

4 Release notes for the supported SoCs

4.1 PCIe-UART 88W8997

4.1.1 Package information

- Android BSP version: 14.0.0_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 16.92.21.p84.4
- Driver version: MM6X16423.p6-GPL

4.1.2 Version information

- Wireless SoC: 88W8997
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 16.92.21.p84.4
 - 16 - Major revision
 - 92 - Feature pack
 - 21 - Release version
 - p84.4 - Patch number
- Driver Version: MM6X16423.p6-GPL
 - 6X - Linux 6.x Kernel
 - 16423 - Release version
 - p6 - Patch number
 - GPL - General Public License v2

4.1.3 Host platform

- MCIMX8M-EVK platform running Android
- Interface used
 - Wi-Fi over PCIE
 - Bluetooth/Bluetooth LE over UART
- Test Tools
 - iperf3
 - wpa_supplicant (version 2.10)
 - hostapd (version 2.10)
 - Wi-Fi Vendor HAL (version M009.014_M009.022_Android_13)

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-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-P207](#)
- Download Sigma tool, refer to the URL: [NXP-WTS-DUT-AGENT-Release-R2-0](#)

4.1.4.2 Bluetooth controller certification

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

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_41700)
- DUT: 88W8997-Murata (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 -il -fm -w 2M
```

TCP client:

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

UDP server:

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

UDP client:

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

Note: You can add iPerf parameters like TCP window size or parallel streams for higher throughput. The above-described iPerf parameters are an example.

- External Client: NXP IW620 PCIe-UART
- Channel: 6 | 36

4.1.5.2 STA throughput

External AP: Asus RT-AX88U

Table 9. 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	110	36	123	38
WPA2-AES	108	34	124	35
WPA3-SAE	108	35	123	35

Table 10. 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	205	77	248	86
WPA2-AES	195	71	249	73
WPA3-SAE	195	81	248	84

Table 11. STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	112	125	123	129
WPA2-AES	112	124	122	129
WPA3-SAE	112	124	123	129

Table 12. STA Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	203	253	235	261
WPA2-AES	202	251	236	260
WPA3-SAE	201	250	235	259

Table 13. STA Mode Throughput - AC Mode | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	133	151	151	156
WPA2-AES	133	151	146	157
WPA3-SAE	134	150	145	157

Table 14. 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	291	340	336	354
WPA2-AES	287	341	336	354
WPA3-SAE	286	342	337	345

Table 15. 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	515	708	451	670
WPA2-AES	510	638	456	675
WPA3-SAE	505	638	455	677

4.1.5.3 P2P-GO throughput

Table 16. 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	112	103	117	116

Table 17. 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	590	585	515	673

4.1.5.4 P2P-GC throughput

Table 18. 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	120	109	124	116

Table 19. 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	585	580	491	589

4.1.5.5 Mobile AP throughput

External client: NXP IW620 PCIe-UART

Table 20. 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	112	119	115	126
WPA2-AES	112	119	116	125
WPA3-SAE	114	120	115	126

Table 21. 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	215	244	234	254
WPA2-AES	214	245	233	254
WPA3-SAE	215	243	233	254

Table 22. 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	121	123	128
WPA2-AES	117	121	124	129
WPA3-SAE	118	122	123	129

Table 23. 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	219	249	237	259
WPA2-AES	217	247	237	258
WPA3-SAE	217	247	236	258

Table 24. 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	139	144	152	152
WPA2-AES	139	143	146	152
WPA3-SAE	140	144	146	152

Table 25. 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	315	322	339	336
WPA2-AES	314	322	338	336
WPA3-SAE	315	321	338	336

Table 26. 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	610	566	547	668
WPA2-AES	600	565	547	654
WPA3-SAE	597	567	546	660

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

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

Table 27.

Component	Description
--	NA

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

Component	Description
—	NA

4.1.7.2 Firmware version: From 16.92.21.p55.3 to 17.92.1.p76.2

Component	Description
Bluetooth	Random mute pattern observed during A2DP_SRC streaming with Ref1 when OPP_TX started with Ref2 Unknown Connection Identifier observed during connection with 2nd LE HID in presence of 1st LE-HID.

4.1.7.3 Firmware version: From 17.92.1.p76.2 to 16.92.21.p84.4

Component	Description
Wi-Fi	Low throughput is observed in VHT80 mode for RX with all security modes.

4.1.8 Known issues

Component	Description
Wi-Fi	DUT firmware hang is seen when connected Intel AX210 client sends UDP traffic with power management enabled in noisy environment.
Bluetooth	After disconnecting LE link, sometime disconnect complete event is delayed by 30 seconds, so next reconnection possible only after 30 second.

4.2 PCIe-UART 88W9098

4.2.1 Package information

- Android BSP version: 14.0.0_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 17.92.1.p136.132
- Driver version: MM6X17423.p6-GPL

4.2.2 Version information

- Wireless SoC: 88W9098
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 17.92.1.p136.132
 - 17 - Major revision
 - 92 - Feature pack
 - 1 - Release version
 - p136.132 - Patch number
- Driver Version: MM6X17423.p6-GPL
 - 6X - Linux 6.x Kernel
 - 17423 - Release version
 - p6 - Patch number
 - GPL - General Public License v2

4.2.3 Host platform

- MCIMX8M-EVK platform running Android
- Interface used
 - Wi-Fi over PCIE
 - Bluetooth/Bluetooth LE over UART
- Test Tools
 - iperf3
 - wpa_supplicant (version 2.10)
 - hostapd (version 2.10)
 - Wi-Fi Vendor HAL (version M009.014_M009.022_Android_13)

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 | 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

Note:

- Download Labtool application for RF test mode, refer to the URL: [9098 Manufacturing FW and Windows Labtool release](#)
- Download Sigma tool, refer to the URL: [NXP-WTS-DUT-AGENT-Release-R2-0](#)

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
- External Access Point: Asus RT-AX88U (FW-3.0.0.4.386_49674)
- DUT: 88W9098-Murata (Module: **LBEE5ZZ1XL**) 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 -il -fm -w 2M
```

TCP client:

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

UDP server:

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

UDP client:

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

Note: You can add iPerf parameters like TCP window size or parallel streams for higher throughput. The above-described iPerf parameters are an example.

- External Client: NXP 88W9098 PCIe-UART
- Channel: 6 | 36

4.2.5.2 STA throughput

External AP: Netgear RAX200

Table 28. 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	108	104	116	115
WPA2-AES	107	105	116	114
WPA3-SAE	107	89	116	93

Table 29. STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	120	122	132	129
WPA2-AES	132	122	126	130
WPA3-SAE	120	121	126	128

Table 30. STA Mode Throughput - AN Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	159	187	189	189
WPA2-AES	149	188	184	186
WPA3-SAE	146	186	186	172

Table 31. 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	121	123	132	131
WPA2-AES	121	122	127	129
WPA3-SAE	121	122	127	131

Table 32. 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	279	264	284	254
WPA2-AES	275	267	284	279
WPA3-SAE	277	266	278	286

Table 33. 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	481	468	333	399
WPA2-AES	468	345	345	427
WPA3-SAE	475	354	346	429

Table 34. 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	167	154	177	172
WPA2-AES	166	154	177	174
WPA3-SAE	167	154	177	172

Table 35. 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	199	184	209	209
WPA2-AES	190	184	207	208
WPA3-SAE	221	205	241	242

Table 36. 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	349	323	337	330
WPA2-AES	354	354	332	355
WPA3-SAE	353	339	332	363

Table 37. 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	535	479	343	331
WPA2-AES	516	386	342	384
WPA3-SAE	534	477	338	406

4.2.5.3 P2P-GO throughput

Table 38. 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	115	112	118	121

Table 39. 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	231	231	250	241

Table 40. 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	350	258	389	356

4.2.5.4 P2P-GC throughput

Table 41. 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	109	110	115	119

Table 42. 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	229	230	249	242

Table 43. 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	369	307	420	342

4.2.5.5 Mobile AP throughput

External client: NXP 88W9098 PCIe-UART

Table 44. 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	116	110	118	110
WPA2-AES	122	119	122	124
WPA3-SAE	112	112	117	102

Table 45. 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	125	122	127	128
WPA2-AES	117	122	127	128
WPA3-SAE	125	121	127	128

Table 46. 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	252	245	252	258
WPA2-AES	248	244	251	257
WPA3-SAE	251	244	255	258

Table 47. 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	144	156	152
WPA2-AES	147	144	150	152
WPA3-SAE	148	144	150	152

Table 48. 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	347	317	351	335
WPA2-AES	346	317	347	334
WPA3-SAE	344	329	345	344

Table 49. 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	636	369	467	397
WPA2-AES	601	379	457	385
WPA3-SAE	634	368	456	388

Table 50. 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	138	138	142	146
WPA2-AES	137	136	143	145
WPA3-SAE	136	136	142	144

Table 51. 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	143	145	156	150
WPA2-AES	143	142	155	150
WPA3-SAE	144	141	152	151

Table 52. 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	294	269	304	286
WPA2-AES	293	273	301	286
WPA3-SAE	304	269	304	286

Table 53. 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	583	376	497	421
WPA2-AES	582	370	473	421
WPA3-SAE	581	370	462	426

4.2.6 EU conformance tests

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

4.2.7 Bug fixes/feature enhancements

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

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

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

Component	Description
Wi-Fi	Wake-up card timeout is seen when performing suspend & resume stress test with iMX8 host.

4.2.7.3 FW version: 17.92.1.p136.131 to 17.92.1.p136.132

Component	Description
—	—

4.2.8 Known issues

Component	Description
Bluetooth	When Bluetooth firmware is downloaded on in band reset, after that sometimes FW fails to respond to HCI reset and not able to bring up Bluetooth interface. A2DP Audio glitches heard while audio streaming and OPP file transfer to another ref device at the same time.

4.3 SD-UART 88W8987

4.3.1 Package information

- Android BSP version: 14.0.0_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 16.92.21.p99.2
- Driver version: MM6X16423.p6-GPL

4.3.2 Version information

- Wireless SoC: 88W8987
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 16.92.21.p99.2
 - 16 - Major revision
 - 92 - Feature pack
 - 21 - Release version
 - p99.2 - Patch number
- Driver Version: MM6X16423.p6-GPL
 - 6X - Linux 6.x Kernel
 - 16423 - Release version
 - p6 - Patch number
 - GPL - General Public License v2

4.3.3 Host platform

- MCIMX8QM-EVK platform running Android
- Interface used
 - Wi-Fi over SDIO (SDIO 3.0 support, Clock speed: 200 MHz)
 - Bluetooth/Bluetooth LE over UART
- Test Tools
 - iperf3
 - wpa_supplicant (version 2.10)
 - hostapd (version 2.10)
 - Wi-Fi Vendor HAL (version M009.014_M009.022_Android_13)

4.3.4 Wi-Fi and Bluetooth certification

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

4.3.4.1 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](#)
- Download Sigma tool, refer to the URL: [NXP-WTS-DUT-AGENT-Release-R2-0](#)

4.3.4.2 Bluetooth controller certification

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

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_41700)
- DUT: 88W8987-Murata (**Module: LBEE5QD1ZM**) with MCIMX8M-EVK platform
 - Driver load parameters:

```
fw_name=nxp/sdiouuart8987_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 -il -fm -w 2M
```

TCP client:

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

UDP server:

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

UDP client:

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

Note: You can add iPerf parameters like TCP window size or parallel streams for higher throughput. The above-described iPerf parameters are an example.

- External Client: NXP 88W8987 SD-UART
- Channel: 6 | 36

4.3.5.2 STA throughput

External AP: Asus RT-AX88U

Table 54. 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	50	50	55
WPA2-AES	49	50	53	54
WPA3-SAE	50	51	52	54

Table 55. STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	54	58	62	61
WPA2-AES	54	57	62	61
WPA3-SAE	54	57	62	61

Table 56. 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	106	124	114
WPA2-AES	107	108	122	115
WPA3-SAE	107	106	122	112

Table 57. 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	65	71	75	75
WPA2-AES	64	70	72	74
WPA3-SAE	64	70	72	74

Table 58. 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	142	146	167	163
WPA2-AES	139	148	165	155
WPA3-SAE	142	148	166	154

Table 59. STA Mode Throughput - AC Mode | 5 GHz Band | 80 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	219	325	255	358
WPA2-AES	196	307	239	352
WPA3-SAE	194	300	239	350

4.3.5.3 P2P-GO throughput

Table 60. 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	51	52	59	52

Table 61. 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	209	295	232	326

4.3.5.4 P2P-GC throughput

Table 62. P2P - GC Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
WPA2-AES	56	54	61	60

Table 63. 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	171	274	231	308

4.3.5.5 Mobile AP throughput

External client: NXP 88W8987 SD-UART

Table 64. Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	55	51	60	63
WPA2-AES	53	52	58	57
WPA3-SAE	52	49	59	61

Table 65. 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	56	58	65
WPA2-AES	53	52	63	61
WPA3-SAE	58	56	60	65

Table 66. 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	122	122	133
WPA2-AES	116	111	124	125
WPA3-SAE	114	105	124	132

Table 67. Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	70	58	76	52
WPA2-AES	69	65	69	62
WPA3-SAE	69	65	68	58

Table 68. Mobile AP Mode Throughput - AC Mode | 5 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	147	143	161	147
WPA2-AES	146	165	160	162
WPA3-SAE	147	147	160	174

Table 69. 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	234	317	265	355
WPA2-AES	222	293	255	345
WPA3-SAE	225	316	254	358

4.3.6 EU conformance tests

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

4.3.7 Bug fixes/feature enhancements

4.3.7.1 Firmware version: From 16.92.10.p208 to 16.92.21.p11.1

Component	Description
Bluetooth	Fix for disconnect complete event getting delayed by 30 seconds, so next re-connection was possible only after 30 second

4.3.7.2 Firmware version: From 16.92.10.p11.1 to 16.92.21.p41.3

Component	Description
—	NA

4.3.7.3 Firmware version: From 16.92.10.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.

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

Component	Description
Bluetooth	DUT pairing with LE HoGP remote device fails with authentication failure error. When DUT connected for HFP call and perform stress test for Bluetooth link connect disconnect then DUT firmware becomes unresponsive
Coex	Sometimes in dual A2DP mode, glitches are observed and Wi-Fi Rx throughput drops.

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

Component	Description
Bluetooth	When DUT A2DP streaming is ongoing and another LE device is connected with DUT and DUT is performing LE scan makes DUT firmware in bad condition for stress test. DUT is connected for OPP profile with remote device and when transfer file to remote device then Bluetooth link gets disconnected.
Coex	LE peripheral pairing gets failed with Mobile device when Wi-Fi is enabled on a single antenna device.

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

Component	Description
—	NA

4.3.7.7 Firmware version: From 16.92.21.p76.5 to 16.92.21.p99.2

Component	Description
Bluetooth	When Bluetooth A2DP streaming is ongoing with first remote device then DUT failed for encryption with another LE remote device.

4.3.8 Known issues

Component	Description
Bluetooth	After disconnecting LE link, sometime disconnect complete event is delayed by 30 seconds, so next reconnection possible only after 30 second During parallel firmware load, Bluetooth firmware fails to load if Wi-Fi firmware is loaded first, the firmware load sequence should be Bluetooth firmware followed by Wi-Fi firmware. Coex cannot be well supported if dual-A2DP feature with TBS is used.

4.4 SD-UART IW416

4.4.1 Package information

- Android BSP version: 14.0.0_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 16.92.21.p84.128
- Driver version: MM5X16423.p6-GPL

4.4.2 Version information

- Wireless SoC: IW416
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 16.92.21.p84.128
 - 16 - Major revision
 - 92 - Feature pack
 - 21 - Release version
 - p84.128 - Patch number
- Driver Version: MM5X16423.p6-GPL
 - 5X - Linux 5.x Kernel
 - 16423 - Release version
 - p6 - Patch number
 - GPL - General Public License v2

4.4.3 Host platform

- MCIMX8QM-EVK platform running Android
- Interface used
 - Wi-Fi over SDIO (SDIO 3.0 support, Clock speed: 200 MHz)
 - Bluetooth/Bluetooth LE over UART
- Test Tools
 - iperf3
 - wpa_supplicant (version 2.10)
 - hostapd (version 2.10)
 - Wi-Fi Vendor HAL (version M009.014_M009.022_Android_13)

4.4.4 Wi-Fi and Bluetooth certification

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

4.4.4.1 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-W8978-MF-WIFI-BT-BRG-FC-VS2013](#)
- Download Sigma tool, refer to the URL: [NXP-WTS-DUT-AGENT-Release-R2-0](#)

4.4.4.2 Bluetooth controller certification

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

4.4.5 Wi-Fi throughput

4.4.5.1 Throughput test setup

- Environment: Shield Room - Over the Air
- Access Point: Asus RT-AX88U (FW-3.0.0.4.386_41700)
- DUT: IW416-Murata (**Module: LBEE5CJ1XK**) with MCIMX8M-EVK platform
 - Driver load parameters:

```
fw_name=nxp/sdiouuartiw416_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 -il -fm -w 2M
```

TCP client:

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

UDP server:

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

UDP client:

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

Note: You can add iPerf parameters like TCP window size or parallel streams for higher throughput. The above-described iPerf parameters are an example.

- External Client: NXP IW620 PCIe-UART
- Channel: 6 | 36

4.4.5.2 STA throughput

External AP: Asus RT-AX88U

Table 70. 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	55	55	62	62
WPA2-AES	51	55	62	62
WPA3-SAE	51	53	62	61

Table 71. 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	98	113	127	128
WPA2-AES	86	102	119	101
WPA3-SAE	86	102	119	101

Table 72. STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	54	57	62	63
WPA2-AES	54	57	62	62
WPA3-SAE	53	57	62	61

Table 73. STA Mode Throughput - AN Mode | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	98	120	124	129
WPA2-AES	84	103	120	104
WPA3-SAE	85	103	120	104

4.4.5.3 P2P-GO throughput

Table 74. P2P - GO Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
WPA2-AES	58	56	62	62

Table 75. 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	109	122	117	130

4.4.5.4 P2P-GC throughput

Table 76. 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	60	55	63	62

Table 77. 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	108	120	123

4.4.5.5 Mobile AP throughput

External client: NXP IW620 PCIe-UART

Table 78. Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	55	54	59	60
WPA2-AES	55	54	59	61
WPA3-SAE	55	54	60	61

Table 79. 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	97	120	102
WPA2-AES	107	86	117	92
WPA3-SAE	108	83	117	89

Table 80. 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	56	62	62
WPA2-AES	58	56	62	62
WPA3-SAE	58	56	62	62

Table 81. 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	116	116	126	125
WPA2-AES	111	97	122	105
WPA3-SAE	112	97	122	106

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 v2.2.2 (for 5 GHz)

4.4.7 Bug fixes/feature enhancements

4.4.7.1 Firmware version: from 16.92.21.p11.2 to 16.92.21.p41.1

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

4.4.7.2 Firmware version: from 16.92.21.p41.1 to 16.92.21.p55.3

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

4.4.7.3 Firmware version: from 16.92.21.p55.3 to 16.92.21.p76.3

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

4.4.7.4 Firmware version: from 16.92.21.p76.3 to 16.92.21.p84.3

Component	Description
Bluetooth	The ACL link with iPhone is disconnected due to error code "REMOTE DEVICE TERMINATED CONNECTION DUE TO LOW RESOURCES" Random Bluetooth security link loss in concurrent Bluetooth classic and Bluetooth LE modes with AES DUT HFP link gets disconnected with Remote phone, when it starts OPP file transfer to Remote device.

4.4.7.5 FW version: from 16.92.21.p84.3 to 16.92.21.p84.128

Component	Description
—	—

4.4.8 Known issues

Component	Description
Wi-Fi	When ed-mac is enabled, probe responses are transmitted during interference signal.
Bluetooth	After disconnecting LE link, sometime disconnect complete event is delayed by 30 seconds, so next re-connection possible only after 30 second When Bluetooth A2DP streaming is ongoing with first remote device then DUT shows low transmit throughput with second remote device.

4.5 SD-UART 88W8997

4.5.1 Package information

- Android BSP version: 14.0.0_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 16.92.21.p84.4
- Driver version: MM6X17423.p6-GPL

4.5.2 Version information

- Wireless SoC: 88W8997
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 16.92.21.p84.4
 - 16 - Major revision
 - 92 - Feature pack
 - 21 - Release version
 - p84.4 - Patch number
- Driver Version: MM6X17423.p6-GPL
 - 6X - Linux 6.x Kernel
 - 17423 - Release version
 - p6 - Patch number
 - GPL - General Public License v2

4.5.3 Host platform

- MCIMX8M-EVK platform running Android
- Interface used
 - Wi-Fi over SDIO 3.0
 - Bluetooth/Bluetooth LE over UART
- Test Tools
 - iperf3
 - wpa_supplicant (version 2.10)
 - hostapd (version 2.10)
 - Wi-Fi Vendor HAL (version M009.014_M009.022_Android_13)

4.5.4 Wi-Fi and Bluetooth certification

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

4.5.4.1 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-P207](#)
- Download Sigma tool, refer to the URL: [NXP-WTS-DUT-AGENT-Release-R2-0](#)

4.5.4.2 Bluetooth controller certification

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

4.5.5 Wi-Fi throughput

4.5.5.1 Throughput test setup

- Environment: Shield Room - Over the Air
- DUT: 88W8997-Murata (Module: **LBEE5XV1YM**) with MCIMX8M-EVK platform
 - Driver load parameters:

fw_name=nxp/sdiouuart8997_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 or parallel streams for higher throughput. The above-described iPerf parameters are an example.

- External Access Point: Asus RT-AX88U (FW-3.0.0.4.386_41700)
- External Client: NXP IW620 PCIe-UART
- Channel: 6 | 36

4.5.5.2 STA throughput

External AP: Asus RT-AX88U

Table 82. 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	113	122	123	128
WPA2-AES	109	120	124	126
WPA3-SAE	108	121	124	126

Table 83. STA Mode Throughput - AN Mode | 5 GHz Band | 20 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	112	126	123	131
WPA2-AES	110	124	123	129
WPA3-SAE	110	125	123	129

Table 84. 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	252	235	258
WPA2-AES	199	251	235	255
WPA3-SAE	189	251	234	254

Table 85. STA Mode Throughput - AC Mode | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	133	152	151	158
WPA2-AES	133	151	145	157
WPA3-SAE	132	151	145	157

Table 86. 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	255	334	336	336
WPA2-AES	255	334	336	332
WPA3-SAE	253	332	335	332

Table 87. 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	310	407	460	380
WPA2-AES	308	406	455	366
WPA3-SAE	310	405	456	370

4.5.5.3 P2P-GO throughput

Table 88. 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	111	119	120	125

Table 89. 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	214	246	238	257

Table 90. 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	306	384	451	382

4.5.5.4 P2P-GC throughput

Table 91. 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	112	117	116	124

Table 92. 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	214	246	234	257

Table 93. 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	311	383	455	388

4.5.5.5 Mobile AP throughput

External Client: NXP IW620 PCIe-UART

Table 94. 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	109	110	118	119
WPA2-AES	108	111	118	119
WPA3-SAE	108	109	118	118

Table 95. Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	210	239	228	247
WPA2-AES	209	237	228	248
WPA3-SAE	210	238	227	247

Table 96. 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	118	120	123	128
WPA2-AES	115	121	123	128
WPA3-SAE	116	121	123	128

Table 97. 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	219	248	237	258
WPA2-AES	215	247	236	257
WPA3-SAE	215	248	236	257

Table 98. 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	138	144	151	151
WPA2-AES	138	144	146	152
WPA3-SAE	138	144	146	152

Table 99. 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	272	319	337	328
WPA2-AES	271	318	337	326
WPA3-SAE	271	318	337	326

Table 100. 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	311	401	450	402
WPA2-AES	310	401	452	403
WPA3-SAE	310	402	452	403

4.5.6 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)

4.5.7 Bug fixes/feature enhancements

4.5.7.1 Firmware version: from 16.92.10.p218 to 16.92.10.p219.3

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

4.5.7.2 Firmware version: from 16.92.10.p219.3 to 16.92.21.p219.5

Component	Description
—	NA

4.5.7.3 Firmware version: from 16.92.10.p219.5 to 16.92.21.p41

Component	Description
—	NA

4.5.7.4 Firmware version: from 16.92.21.p41 to 16.92.21.p55.3

Component	Description
Wi-Fi	Added support for 40 MHz band in 2.4 GHz BGN mode for AP and STA P2P-client fails to re-connect to DUT-P2P-GO mode after internal-STA connects to external-AP on different channel. Internal-STA disconnects from external-AP shortly after starting DUT-P2P-GO mode. DUT in STA only mode fails to connect with specific hotspot.

4.5.7.5 Firmware version: from 16.92.21.p55.3 to 16.92.21.p76.2

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

4.5.7.6 Firmware version: from 16.92.21.p76.2 to 16.92.21.p84.4

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

4.5.8 Known issues

Component	Description
Bluetooth	After disconnecting LE link, sometime disconnect complete event is delayed by 30 seconds, so next re-connection possible only after 30 second

4.6 SD-UART 88W9098

4.6.1 Package information

- Android BSP version: 14.0.0_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 17.92.1.p136.132
- Driver version: MM6X17423.p6-GPL

4.6.2 Version information

- Wireless SoC: 88W9098
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 17.92.21.p136.132
 - 17 - Major revision
 - 92 - Feature pack
 - 21 - Release version
 - p136.132 - Patch number
- Driver Version: MM6X17423.p6-GPL
 - 6X - Linux 6.x Kernel
 - 17423 - Release version
 - p6 - Patch number
 - GPL - General Public License v2

4.6.3 Host platform

- MCIMX8M-EVK platform running Android
- Interface used
 - Wi-Fi over SDIO 3.0
 - Bluetooth/Bluetooth LE over UART
- Test Tools
 - iperf3
 - wpa_supplicant (version 2.10)
 - hostapd (version 2.10)
 - Wi-Fi Vendor HAL (version M009.014_M009.022_Android_13)

4.6.4 Wi-Fi and Bluetooth certification

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

4.6.4.1 Wi-Fi pre-certifications

- 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

Note:

- Download Labtool application for RF test mode, refer to the URL: [9098 Manufacturing FW and Windows Labtool release](#)
- Download Sigma tool, refer to the URL: [NXP-WTS-DUT-AGENT-Release-R2-0](#)

4.6.4.2 Bluetooth controller certification

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

4.6.5 Wi-Fi throughput

4.6.5.1 Throughput test setup

- Environment: Shield Room - Over the Air
- DUT: 88W9098-Murata (Module: **LBEE5ZZ1XL**) with MCIMX8M-EVK platform
 - Driver load parameters:

```
fw_name=nxp/sdiouuart9098_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 or parallel streams for higher 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 88W9098 SD-UART
- Channel: 6 | 36

4.6.5.2 STA throughput

External AP: Netgear RAX200

Table 101. 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	113	110	123	114
WPA2-AES	101	109	117	117
WPA3-SAE	102	108	119	112

Table 102. 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	116	113	125	123
WPA2-AES	111	111	124	121
WPA3-SAE	111	112	124	123

Table 103. STA Mode Throughput - AN Mode | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	216	219	215	249
WPA2-AES	196	221	215	247
WPA3-SAE	208	226	216	241

Table 104. 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	137	138	146	150
WPA2-AES	132	137	145	149
WPA3-SAE	132	137	145	149

Table 105. 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	250.0	231.0	254.0	249.0
WPA2-AES	247.0	214.0	252.0	245.0
WPA3-SAE	254.0	226.0	252.0	242.0

Table 106. 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	313	233	276	282
WPA2-AES	312	214	276	235
WPA3-SAE	315	216	275	280

Table 107. 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	169	154	174	182
WPA2-AES	166	153	173	181
WPA3-SAE	165	153	173	180

Table 108. 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	210	221	232	234
WPA2-AES	211	223	230	237
WPA3-SAE	212	218	228	240

Table 109. 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	269	298	375	321
WPA2-AES	241	303	374	314
WPA3-SAE	257	301	367	317

Table 110. 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	315	275	431	296
WPA2-AES	309	271	428	303
WPA3-SAE	279	272	429	297

4.6.5.3 P2P-GO throughput

Table 111. 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	113	118	124	126

Table 112. 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	232	225	249	242

Table 113. 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	305	305	379	376

4.6.5.4 P2P-GC throughput

Table 114. 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	112	119	123	121

Table 115. 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	230	231	251	249

Table 116. 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	307	318	389	354

4.6.5.5 Mobile AP throughput

External Client: NXP 88W9098 SD-UART

Table 117. 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	119	114	121	120
WPA2-AES	115	113	117	122
WPA3-SAE	115	114	121	121

Table 118. Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	231	218	240	240
WPA2-AES	230	226	242	243
WPA3-SAE	230	219	241	240

Table 119. 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	123	119	126	125
WPA2-AES	121	119	125	125
WPA3-SAE	120	119	125	125

Table 120. 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	245	231	253	254
WPA2-AES	240	237	251	254
WPA3-SAE	238	227	250	254

Table 121. 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	148	144	156	150
WPA2-AES	145	140	148	149
WPA3-SAE	147	141	149	152

Table 122. 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	263	283	349	324
WPA2-AES	257	275	349	326
WPA3-SAE	267	270	350	344

Table 123. 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	333	289	426	367
WPA2-AES	342	295	425	376
WPA3-SAE	334	301	424	378

Table 124. 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	136	132	140	133
WPA2-AES	132	133	141	135
WPA3-SAE	134	131	139	136

Table 125. 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	143	140	150	147
WPA2-AES	142	140	150	147
WPA3-SAE	142	139	149	147

Table 126. 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	110	254	309	292
WPA2-AES	109	256	308	284
WPA3-SAE	125	252	302	299

Table 127. Mobile AP Mode Throughput - AX Mode | MAC1 | 5 GHz Band | 80 MHz (HE)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
	Tx	Rx	Tx	Rx
Direction	Tx	Rx	Tx	Rx
Open Security	108	313	424	351
WPA2-AES	109	312	421	394
WPA3-SAE	108	310	418	367

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 v2.1.1 (for 5 GHz)

4.6.7 Bug fixes/feature enhancements

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

Component	Description
—	NA

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

Component	Description
—	NA

4.6.7.3 FW version: from 17.92.1.p136.131 to 17.92.1.p136.132

Component	Description
—	—

4.6.8 Known issues

Component	Description
Wi-Fi	Low throughput is observed in VHT/HE mode.
Bluetooth	When Bluetooth firmware is downloaded on in band reset, after that sometimes FW fails to respond to HCI reset and not able to bring up Bluetooth interface.

4.7 SD-UART IW61x

4.7.1 Package information

- Android BSP version: 14.0.0_1.0.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version: 18.99.2.p66.10
- Driver version: MM6X18423.p6-GPL

4.7.2 Version information

- Wireless SoC: IW61x
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version: 18.99.2.p66.10
 - 18 - Major revision
 - 99 - Feature pack
 - 2 - Release version
 - p66.10 - Patch number
- Driver Version: MM6X18423.p6-GPL
 - 6X - Linux 6.x Kernel
 - 18423 - Release version
 - p6 - Patch number
 - GPL - General Public License v2

4.7.3 Host platform

- MCIMX8M-EVK platform running Android
- Interface used
 - Wi-Fi over SDIO 3.0
 - Bluetooth/Bluetooth LE over UART
- Test Tools
 - iperf3
 - wpa_supplicant (version 2.10)
 - hostapd (version 2.10)
 - Wi-Fi Vendor HAL (version M009.014_M009.022_Android_13)

4.7.4 Wi-Fi and Bluetooth certification

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

4.7.4.1 Wi-Fi pre-certifications

- 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

Note:

- Download Labtool application for RF test mode, refer to the URL: [MFG-AW-IW61X-MF-BRG-U16-WIN-X86-1.0.39.1-18.80.1.p154.38](https://www.nxp.com/lgnd/sw-dk/wireless/RF-Test-Mode-LabTool)
- Download Sigma tool, refer to the URL: [NXP-WTS-DUT-AGENT-Release-R2-0](https://www.nxp.com/lgnd/sw-dk/wireless/Sigma-Tool)

4.7.4.2 Bluetooth controller certification

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

4.7.5 Wi-Fi throughput

4.7.5.1 Throughput test setup

- Environment: Shield Room - Over the Air
- 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 or parallel streams for higher 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

4.7.5.2 STA throughput

External AP: Asus RT-AX88U

Table 128. 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	61	62	63
WPA2-AES	57	53	62	55
WPA3-SAE	57	60	62	62

Table 129. 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	63	65
WPA2-AES	58	61	63	64
WPA3-SAE	59	61	63	64

Table 130. STA Mode Throughput - AN Mode | 5 GHz Band | 40 MHz (HT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	121	126	129	130
WPA2-AES	120	127	131	132
WPA3-SAE	122	125	134	132

Table 131. STA Mode Throughput - AC Mode | 5 GHz Band | 20 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	72	75	76	78
WPA2-AES	75	77	79	70
WPA3-SAE	74	77	78	80

Table 132. STA Mode Throughput - AC Mode | 5 GHz Band | 40 MHz (VHT)

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	169	169	181	172
WPA2-AES	169	165	181	173
WPA3-SAE	158	165	181	171

Table 133. 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	332	316	372	367
WPA2-AES	331	316	369	369
WPA3-SAE	329	329	370	371

Table 134. 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	115	115	120	124
WPA2-AES	115	116	121	124
WPA3-SAE	116	116	122	124

Table 135. 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	119	118	126	127
WPA2-AES	117	118	126	128
WPA3-SAE	120	119	124	127

Table 136. 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	223	220	250	240
WPA2-AES	223	214	253	239
WPA3-SAE	220	213	251	238

Table 137. 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	355	340	440	445
WPA2-AES	354	370	435	428
WPA3-SAE	361	407	447	468

4.7.5.3 P2P-GO throughput

Table 138. 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	52	52	56	59

Table 139. 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	130	128	130	132

Table 140. 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	335	323	372	367

4.7.5.4 P2P-GC throughput

Table 141. 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	51	49	57	55

Table 142. 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	131	129	129	133

Table 143. 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	335	323	372	367

4.7.5.5 Mobile AP throughput

External Client: NXP IW620 PCIe-UART

Table 144. 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	60	57	60	62
WPA2-AES	61	57	63	61
WPA3-SAE	58	57	55	61

Table 145. Mobile AP Mode Throughput - BGN Mode | 2.4 GHz Band | 40 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	123	122	124	129
WPA2-AES	127	124	128	126
WPA3-SAE	126	123	124	129

Table 146. Mobile AP Mode Throughput - AN Mode | 5 GHz Band | 20 MHz

Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	60	55	61	62
WPA2-AES	59	57	58	63
WPA3-SAE	62	56	64	63

Table 147. 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	125	126	130	131
WPA2-AES	128	127	132	132
WPA3-SAE	124	124	126	131

Table 148. 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	84	75	83	82
WPA2-AES	73	72	77	74
WPA3-SAE	79	76	80	79

Table 149. 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	180	163	181	170
WPA2-AES	178	164	179	172
WPA3-SAE	179	162	175	173

Table 150. 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	333	321	374	353
WPA2-AES	338	323	371	354
WPA3-SAE	337	322	371	354

Table 151. 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	111	92	122	99
WPA2-AES	97	95	93	101
WPA3-SAE	96	94	98	102

Table 152. 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	73	67	76	77
WPA2-AES	74	68	76	77
WPA3-SAE	74	67	76	77

Table 153. 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	148	143	153	149
WPA2-AES	147	143	152	150
WPA3-SAE	148	143	152	150

Table 154. 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	300	285	315	312
WPA2-AES	305	280	317	310
WPA3-SAE	303	281	317	318

4.7.6 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)

4.7.7 Bug fixes/feature enhancements

4.7.7.1 FW version: from 18.99.2.p19.15 to 18.99.2.p66.10

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

4.7.8 Known issues

Component	Description
Wi-Fi	<ul style="list-style-type: none"> • The DUT-AP keeps sending RTS to the external device—in switched off state—until the age-out timer expires. • Firmware fatal automatic recovery failed in long run stress testing.
Bluetooth	<ul style="list-style-type: none"> • When A2DP steaming is initiated during an ongoing HFP call, A2DP link loss is observed due to LMP response timeout (frequency of occurrence 4/5 times). • Link instability in presence of multiple Bluetooth links under optimization. • When Bluetooth Scatternet and eSCO link run for a long time, the DUT may hang.

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

[Table 155](#) lists the on-board chips for i.MX platforms and external wireless solutions available.

Table 155. 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 (AzureWave AW-CM276 SM/MA ^[1]) NXP 88W8997 (Murata LBEE5XV1YM ^[1])	-
8 ULP	-	-	NXP IW416 (Murata LBEE5CJ1XK ^[1])
8M Nano	NXP 88W8987 (AzureWave AW-CM358 SM/MA ^[1])	-	NXP 88W8987 (Murata M.2 LBEE5QD1ZM)
i.MX 8M Mini	NXP 88W8987 (AzureWave AW-CM358 SM/MA ^[1])	-	NXP 88W8987 (Murata M.2 LBEE5QD1ZM)
8M Plus	-	NXP 88W8997 (AzureWave AW-CM276 SM/MA ^[1])	-
i.MX 8M Quad	-	NXP 88W8997 (AzureWave AW-CM276 SM/MA ^[1]) NXP 88W8997 (Murata LBEE5XV1YM ^[1])	-

[1] Modules tested with the mentioned i.MX EVK

6 Acronyms and abbreviations

Table 156. Acronyms and abbreviations

Acronyms	Definitions
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
ERP	Extended rate physical
GATT	Generic attribute profile
HFP	Hands free profile
HID	Human interface device
HT	High throughput
MCS	Modulation and coding scheme
MLME	Mac layer management entity
RTS	Request to send
SAE	Simultaneous authentication of equals
STA	Station
VHT	Very high throughput
WFD	Wi-Fi direct
WPA	Wi-Fi protected access
WPS	Wi-Fi protected setup
WSC	Wi-Fi simple configuration

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8 References

Application notes

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

User manuals

- [2] UM11558 - Getting Started with NXP-based Wireless Modules on i.MX 8M Quad EVK Running Android 13 OS ([link](#))
- [3] UM11675 - How to Download and Build NXP Wi-Fi Drivers ([link](#))

Web pages

- [4] Android OS for i.MX Applications Processors ([link](#))

9 Revision history

Revision history

Document ID	Date	Description
RN00110 v.11	29 January 2024	<ul style="list-style-type: none">• Updated the release version to 14.0.0_1.0.0.
RN00110 v.10	13 December 2023	<ul style="list-style-type: none">• Replaced IW612 with IW61x.• Section 1 "About this document": updated.• Section 2.1 "Pre-compiled Wi-Fi driver and firmware": updated.• Feature lists<ul style="list-style-type: none">- Section 3.1.1 "Client mode": updated.- Section 3.1.2 "AP mode": updated.- Section 3.2.1 "Bluetooth classic": updated.- Section 3.2.2 "Bluetooth LE": updated.• PCIe-UART 88W8997<ul style="list-style-type: none">- Section 4.1.1 "Package information": updated.- Section 4.1.2 "Version information": updated.- Section 4.1.3 "Host platform": updated.• PCIe-UART 88W9098<ul style="list-style-type: none">- Section 4.2.1 "Package information": updated.- Section 4.2.2 "Version information": updated.- Section 4.2.3 "Host platform": updated.- Section 4.2.7.3 "FW version: 17.92.1.p136.131 to 17.92.1.p136.132": added.• SD-UART 88W8987<ul style="list-style-type: none">- Section 4.3.1 "Package information": updated.- Section 4.3.2 "Version information": updated.- Section 4.3.3 "Host platform": updated.• SD-UART IW416<ul style="list-style-type: none">- Section 4.4.1 "Package information": updated.- Section 4.4.2 "Version information": updated.- Section 4.4.3 "Host platform": updated.- Section 4.4.7.5 "FW version: from 16.92.21.p84.3 to 16.92.21.p84.128": added.• SD-UART 88W8997<ul style="list-style-type: none">- Section 4.5.1 "Package information": updated.- Section 4.5.2 "Version information": updated.- Section 4.5.3 "Host platform": updated.• SD-UART 88W9098<ul style="list-style-type: none">- Section 4.6.1 "Package information": updated.- Section 4.6.2 "Version information": updated.- Section 4.6.3 "Host platform": updated.- Section 4.6.7.3 "FW version: from 17.92.1.p136.131 to 17.92.1.p136.132": added. <p>———— Continues ————</p>

Revision history...continued

Document ID	Date	Description
RN00110 v.10	13 December 2023	<p>————— <i>Continued</i> —————</p> <ul style="list-style-type: none"> • SD-UART IW61x <ul style="list-style-type: none"> – Section 4.7.1 "Package information": updated. – Section 4.7.2 "Version information": updated. – Section 4.7.3 "Host platform": updated. – Section 4.7.5.2 "STA throughput": updated. – Section 4.7.5.3 "P2P-GO throughput": updated. – Section 4.7.5.4 "P2P-GC throughput": updated. – Section 4.7.5.5 "Mobile AP throughput": updated. – Section 4.7.7 "Bug fixes/feature enhancements": added. – Section 4.7.8 "Known issues": updated. • Section 8 "References": updated.
RN00110 v.9	23 October 2023	<ul style="list-style-type: none"> • Section 4.1 "PCIe-UART 88W8997": updated the patch number for the driver in sections <i>Package information</i> and <i>Version information</i>. • Section 4.2 "PCIe-UART 88W9098": <ul style="list-style-type: none"> – Updated the patch number for the driver in sections <i>Package information</i> and <i>Version information</i>. – Created a separate table for AN mode 5 GHz band 40 MHz in Section 4.2.5.2 "STA throughput": • Section 4.3 "SD-UART 88W8987": updated the patch number for the driver in sections <i>Package information</i> and <i>Version information</i>. • Section 4.4 "SD-UART IW416": updated the patch number for the driver in sections <i>Package information</i> and <i>Version information</i>. • Section 4.5 "SD-UART 88W8997": updated the patch number for the driver in sections <i>Package information</i> and <i>Version information</i>. • Section 4.6 "SD-UART 88W9098": updated the patch number for the driver in sections <i>Package information</i> and <i>Version information</i>. • Section 4.7 "SD-UART IW61x": updated the firmware version, and the patch version for the driver in sections <i>Package information</i> and <i>Version information</i>.
RN00110 v.8	12 October 2023	<p>Updated:</p> <ul style="list-style-type: none"> • Section 1 "About this document" • Section 2 "Downloading the wireless driver and firmware" • Section 3 "Feature lists" • Section 4.1.1 "Package information" • Section 4.2.1 "Package information" • Section 4.2.5 "Wi-Fi throughput" • Section 4.2.7.2 "Firmware version: 17.92.1.p136.24 to 17.92.1.p136.131" • Section 4.2.8 "Known issues" • Section 4.3.1 "Package information" • Section 4.3.5 "Wi-Fi throughput" • Section 4.3.7.7 "Firmware version: From 16.92.21.p76.5 to 16.92.21.p99.2" • Section 4.3.8 "Known issues" • Section 4.4.1 "Package information" • Section 4.5.1 "Package information" • Section 4.6.1 "Package information" • Section 4.6.5.1 "Throughput test setup" • Section 4.7.1 "Package information" <p>Added:</p> <ul style="list-style-type: none"> • Section 7 "Note about the source code in the document"

Revision history...continued

Document ID	Date	Description
RN00110 v.7	10 July 2023	<p>Updated:</p> <ul style="list-style-type: none"> • Section 1 "About this document" • Section 2.1 "Pre-compiled Wi-Fi driver and firmware" • Section 3 "Feature lists" • Section 4.1 "PCIe-UART 88W8997" • Section 4.2.1 "Package information" • Section 4.2.4.1 "Wi-Fi pre-certifications" • Section 4.3 "SD-UART 88W8987" • Section 4.4 "SD-UART IW416" • Section 4.5 "SD-UART 88W8997" • Section 4.6.1 "Package information" • Section 4.6.4.1 "Wi-Fi pre-certifications" • Section 4.7.1 "Package information" • Section 4.7.4.1 "Wi-Fi pre-certifications"
RN00110 v.6	07 Apr 2023	<p>Updated:</p> <ul style="list-style-type: none"> • Section 2 "Downloading the wireless driver and firmware" • Section 3 "Feature lists" • Section 4.1 "PCIe-UART 88W8997" • Section 4.2 "PCIe-UART 88W9098" • Section 4.3 "SD-UART 88W8987" • Section 4.4 "SD-UART IW416" • Section 4.5 "SD-UART 88W8997" • Section 4.6 "SD-UART 88W9098" <p>Added:</p> <ul style="list-style-type: none"> • Section 4.7 "SD-UART IW61x"
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RN00110 v.4	17 October 2022	<p>Updated:</p> <ul style="list-style-type: none"> • Section 2 "Downloading the wireless driver and firmware" • Section 3 "Feature lists" • Section 4.1 "PCIe-UART 88W8997" • Section 4.4 "SD-UART IW416" • Section 5 "i.MX platforms on-board chips and external wireless solutions" • Section 6 "Acronyms and abbreviations" <p>Added:</p> <ul style="list-style-type: none"> • Section 4.4 "SD-UART IW416"

Revision history...continued

Document ID	Date	Description
RN00110 v.3	24 July 2022	<p>Updated:</p> <ul style="list-style-type: none">• Section 4.1.1 "Package information"• Section 4.1.2 "Version information"• Section 4.1.4 "Wi-Fi and Bluetooth certification"• Section 4.3.1 "Package information"• Section 4.3.2 "Version information"• Section 4.3.4 "Wi-Fi and Bluetooth certification"• Section 4.3.5 "Wi-Fi throughput" <p>Added:</p> <ul style="list-style-type: none">• Section 4.4 "SD-UART IW416"
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RN00110 v.1	4 January 2022	<ul style="list-style-type: none">• Initial release

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