

NXP-Wireless-Chipset-Release-Notes

PCIE-Wi-Fi-UART-BT-FP92-88W8997

SD-Wi-Fi-UART-BT-FP92-88W8987



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1 About this document

This document contains important information about the supported features, known issues and performance of the Wi-Fi, BT and co-ex with the mentioned release.

This release is a consolidated release for Android 11 2.6.0. Mentioned chipset have been fully tested in Android 11 2.6.0. They have been through automated testing to verify patches that were added after last GA release.



2 Feature List

Table 1: Feature List for available SoCs

Wireless Type	Type	Features List	Sub Features List	PCIe-UART	SD-UART
				8997	8987
Wi-Fi	Client	802.11n - High Throughput	2.4 GHz band operation supported channel bandwidth: 20 MHz	Y	Y
			2.4 GHz band supported channel bandwidths : 40 MHz	Y	Y
			5 GHz band supported channel bandwidths : 20 MHz	Y	Y
			5 GHz band supported channel bandwidths : 40 MHz	Y	Y
			Short/long guard interval (400 ns/800 ns)	Y	Y
			11n data rates – Up to 72 Mbit/s (MCS 0 to MCS 7)	Y	Y
			11n data rates – Up to 150 Mbit/s (MCS 0 to MCS 7)	Y	Y
			11n data rates - Up to 300 Mbit/s (MCS 0 to MCS 15)	Y	N
			1 spatial stream (1x1)	Y	Y
			2 spatial stream (2x2)	Y	N
			HT protection mechanisms	Y	Y
			Explicit Beamformee	Y	N
			Aggregated MAC Protocol Data Unit(AMPDU) Rx support	Y	Y
			Aggregated MAC Service Data Unit(AMSDU) -4k Rx support	Y	Y
			20/40 MHz Coexistence	Y	N
			Tx MCS rate adaptation (BGN)	Y	Y
			RX and TX Space time block coding (STBC)	Y	N
Rx Low Density Parity Check (LDPC)	Y	Y			

Wireless Type	Type	Features List	Sub Features List	PCIe-UART	SD-UART
				8997	8987
Wi-Fi	Client	802.11 ac - Very High Throughput	2.4 GHz band supported channel bandwidths : 20MHz	Y	N
			5 GHz band supported channel bandwidths: 20 MHz	Y	Y
			5 GHz band supported channel bandwidths: 40 MHz	Y	Y
			5 GHz band supported channel bandwidths: 80 MHz	Y	Y
			11ac data rates - Up to 433.3 Mbps (MCS 0 to MCS 9) - 2x2	Y	Y
			11ac Data rates - Up to 866.7 Mbps (MCS 0 to MCS 9)	Y	N
			Short/Long Guard Interval (400ns/800ns)	Y	Y
			SU-AMPDU Aggregation	Y	Y
			MU-MIMO Beamformee (Explicit and Implicit)	Y	Y
			RTS/CTS with BW Signaling	Y	Y
			Operation Mode Notification	Y	Y
			Backward Compatibility with non-VHT devices	Y	Y
			Tx VHT MCS Rate Adaptation	Y	Y
			802.11 ax – High Efficiency	2.4 GHz band supported channel bandwidths : 20MHz	N
		5 GHz band supported channel bandwidths : 20MHz		N	N
		5 GHz band supported channel bandwidths: 40 MHz		N	N
		5 GHz band supported channel bandwidths: 80MHz		N	N
		11ax data rates - Up to 1.2 Gbps (MCS 0 to MCS 11) - 2x2		N	N
		Operating Mode Indication(OMI) Control		N	N
		2x/4x HE-Long Training Field(LTF)		N	N
		UL (Tx) and DL (Rx) OFDMA		N	N

Wireless Type	Type	Features List	Sub Features List	PCIe-UART	SD-UART
				8997	8987
Wi-Fi	Client	802.11 a/b/g Features	11 b/g data rates - Up to 54 Mbit/s	Y	Y
			11 a data rates - Up to 54 Mbit/s	Y	Y
			Tx rate adaptation (BG)	Y	Y
			Fragmentation/defragmentation	Y	Y
			ERP protection, slot time, preamble	Y	Y
		802.11d & 802.11h	802.11d - Regulatory Domain/Operating Class/Country Info	Y	Y
			802.11h – Dynamic Frequency Selection (DFS)	Y	Y
			DFS Radar Detection in Slave Mode (Follow AP)	Y	Y
		802.11e - QoS	EDCA [Enhanced Distributed Channel Access] / WMM (Wireless Multi-Media)	Y	Y
		802.11i - Security	Open and Shared Authentication	Y	Y
			WPA2-PSK Security (AES-CCMP Encryption)	Y	Y
			WPA + WPA2 mixed mode	Y	Y
			Opensource WPA supplicant	Y	Y
			WPA2 Enterprise Security	Y	Y
		WPA3 Security	Simultaneous Authentication of Equals (SAE)	Y	Y
			SAE Connectivity and PMK Caching	Y	Y
			WPA2 Personal Compatibility	Y	Y
			Anti-Clogging	Y	Y
			SAE Finite Cyclic Group - Group-19, Group 20, Goup-21, Group-25, Group-26	N	Y
			SAE Finite Cyclic Group - Group-19, Group 20, Goup-21	Y	N
			Reflection Attack	Y	Y
			Commercial National Security Algorithm Suite (CSNA)	Y	Y

Wireless Type	Type	Features List	Sub Features List	PCIe-UART	SD-UART
				8997	8987
Wi-Fi	Client	WPA3 Security	Suite B - 192-bit Security ECC p384	Y	Y
			Suite B - 192-bit Security RSA 3K	Y	Y
		802.11r – Fast BSS Transition (FT)	FT over Air and over DS (Distribution System)	Y	Y
		WPS/WSC2.0 Functionality	PIN Config Method - 8 Digit/4 Digit	Y	Y
			PIN Config Method - Static/Dynamic PIN	Y	Y
			PBC - Virtual Push Button Config Method	Y	Y
			PBC Session Overlap Detection	Y	Y
			STA as Enrollee	Y	Y
			Backward Compatibility with WPS1.0 Devices	Y	Y
			Opensource WPA supplicant	Y	Y
			802.11w - PMF (Protected Management Frames)	PMF require and capable	Y
		Unicast management frames - Encryption/decryption - using CCMP		Y	Y
		Broadcast management frames - Encryption/decryption - using BIP		Y	Y
		SA query request/response		Y	Y
		PMF Support using Opensource WPA		Y	Y
		Power Save Mode	Deep sleep	Y	Y
			IEEE power save	Y	Y
		General Features	Embedded MLME	Y	Y
			EU adaptivity support	Y	Y
			Wake on Wireless (WoW)	Y	Y
			Auto Tx or Keep Alive	Y	Y
			MAC Address randomization(in Scan)	Y	Y
			Host based MLME	Y	Y
			Driver load time parameters for Manufacturing mode	N	N
			Extended channel switch announcement (ECSA)	Y	Y

Wireless Type	Type	Features List	Sub Features List	PCIe-UART	SD-UART
				8997	8987
Wi-Fi	AP	802.11n - High Throughput	2.4 GHz band supported channel bandwidths: 20 MHz	Y	Y
			2.4 GHz band supported channel bandwidths: 40 MHz	Y	Y
			5 GHz band supported channel bandwidths: 20 MHz	Y	Y
			5 GHz band supported channel bandwidths: 40 MHz	Y	Y
			1 spatial stream (1x1)	Y	Y
			2 spatial stream (2x2)	Y	N
			Short/long guard interval (400 ns/800 ns)	Y	Y
			11n data rates – Up to 72 Mbit/s (MCS0 to MCS7)	Y	Y
			11n data rates – Up to 150 Mbit/s (MCS0 to MCS7)	Y	Y
			11n data rates - Up to 300 Mbit/s (MCS0 to MCS15)	Y	N
			Tx MCS rate adaptation (BGN)	Y	Y
			Aggregated MAC Protocol Data Unit(AMPDU) Tx and Rx support	Y	Y
			Aggregated MAC Service Data Unit(AMSDU) - 4k Rx support	Y	Y
			Max client support (up to 8 devices)	Y	Y
			HT protection mechanisms	Y	Y
			RX and TX Space time block coding (STBC)	Y	N
			20/40 MHz Coexistence	Y	N
			Explicit Beamformer	Y	N
			RX Low Density Parity Check(LDPC)	Y	Y
			802.11 b/g Features	11 b/g data rates – Up to 54 Mbit/s	Y
		Tx rate adaptation (BG)		Y	Y
		ERP protection, slot time, preamble		Y	Y
		Handling of associated STAs with IEEE PS - null data		Y	Y

Wireless Type	Type	Features List	Sub Features List	PCIe-UART	SD-UART
				8997	8987
Wi-Fi	AP	802.11 ac - Very High Throughput	2.4GHz band supported channel bandwidths: 20MHz	Y	N
			5 GHz band supported channel bandwidths: 20 MHz	Y	Y
			5 GHz band supported channel bandwidths: 40 MHz	Y	Y
			5 GHz band supported channel bandwidths: 80MHz	Y	Y
			Short/Long Guard Interval (400ns/800ns)	Y	Y
			11ac Data rates – Up to 433.3 Mbps (MCS 0 to MCS 9)	Y	Y
			11ac Data rates - Up to 866.7 Mbps (MCS 0 to MCS 9)	Y	N
			Single User- Aggregated MAC Protocol Data Unit (SU-AMPDU) Aggregation	Y	Y
			RTS/CTS with BW Signaling	Y	Y
			Backward Compatibility with non-VHT devices	Y	Y
			Tx VHT MCS Rate Adaptation	Y	Y
			Operation Mode Notification	Y	Y
			Explicit Beamformer	Y	N
		802.11 ax – High Efficiency	2.4 GHz band supported channel bandwidths: 20MHz	N	N
			5 GHz band supported channel bandwidths: 20MHz	N	N
			5 GHz band supported channel bandwidths: 40 MHz	N	N
			5 GHz band supported channel bandwidths: 80 MHz	N	N
			Operating Mode Indication(OMI) Control	N	N
			2x/4x HE-Long Training Field(LTF)	N	N

Wireless Type	Type	Features List	Sub Features List	PCIe-UART	SD-UART
				8997	8987
Wi-Fi	AP	802.11d	802.11d - Regulatory Domain/Operating Class/Country Info	Y	Y
		802.11e -QoS	EDCA [Enhanced Distributed Channel Access] / WMM (Wireless Multi-Media)	Y	Y
		802.11i - Security	Open security	Y	Y
			WPA2-PSK security (AES-CCMP encryption)	Y	Y
			WPA + WPA2 mixed mode	Y	Y
			Opensource Hostapd	Y	Y
		WPA3 Security	Simultaneous Authentication of Equals (SAE)	Y	Y
			SAE Connectivity and PMK Caching	Y	Y
			Anti-Clogging	Y	Y
			SAE Finite Cyclic Group - Group-19, Group 20, Goup-21	Y	Y
			Reflection Attack	Y	Y
			WPA2 Personal Compatibility	Y	Y
			Commercial National Security Algorithm Suite (CSNA)	Y	Y
		802.11w - Protected Management Frames (PMF)	PMF require and capable	Y	Y
			Unicast management frames - Encryption/decryption - using CCMP	Y	Y
			Broadcast management frames - Encryption/decryption - using BIP	Y	Y
			SA query request/response	Y	Y
			Support using Hostapd	Y	Y

Wireless Type	Type	Features List	Sub Features List	PCIe-UART	SD-UART	
				8997	8987	
Wi-Fi	AP	WPS/WSC2.0 Functionality	PIN Config Method - 8 Digit/4 Digit	Y	Y	
			PIN Config Method - Static/Dynamic PIN	Y	Y	
			PBC - Virtual Push Button Config Method	Y	Y	
			PBC Session Overlap Detection	Y	Y	
			AP Setup Locked State - PIN Method	Y	Y	
			MMH as Wireless Registrar	Y	Y	
			MMH as Enrollee	Y	Y	
			OpenSource Hostapd	Y	Y	
			General Features	Embedded MLME	Y	Y
				EU adaptivity support	Y	Y
				Automatic channel selection (ACS)	Y	Y
				Host-based MLME	Y	Y
				Extended channel switch announcement (ECSA)	Y	Y
				Driver load time parameters for Manufacturing mode	N	N
		Max supported stations (up to 64)	N	N		
	Wi-Fi Direct/P2P	P2P Basic Functionality	Autonomous GO Mode	Y	Y	
			WFD Client Mode	Y	Y	
			P2P Device Mod	Y	Y	
AP-STA	Simultaneous AP-STA Operation (Same Channel)	AP-STA functionality	Y	Y		

Wireless Type	Type	Features List	Sub Features List	PCIe-UART	SD-UART
				8997	8987
BT	Bluetooth Classic Features	General Features	BT Class 1.5 and Class 2 support	Y	Y
			Scatternet support	Y	Y
			Maximum of seven simultaneous ACL connections	Y	Y
			Automatic Packet Type Selection	Y	Y
			Bluetooth - 2.1 to 5.0 Specification Support	Y	Y
			Low power sniff	Y	Y
		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
			SCO (HV1, HV3)	Y	Y
			eSCO (EV3, EV4, EV5, 2EV3, 3EV3, 2EV5, 3EV5)	Y	Y
		Bluetooth Profiles Supported	A2DP Source	Y	Y
			AVRCP Target	Y	Y
			HFP Gateway	Y	Y
			OPP Server/Client	Y	Y
			HID	Y	Y
		Bluetooth Audio Features	GAP	Y	Y
	PCM NBS Slave		Y	Y	
	Bluetooth LE Features	Generic Features	PCM WBS Slave	Y	Y
			Maximum 16 Bluetooth LE connections(Master role)	Y	Y
		Bluetooth Profile Support	Bluetooth LE GATT	Y	Y
			Bluetooth LE HOGP	Y	Y
			Bluetooth LE GAP	Y	Y
		Bluetooth LE 4.0 Support	Low Energy Physical Layer	Y	Y
			Low Energy Link Layer	Y	Y
			Enhancements to HCI for Low Energy	Y	Y
			Low Energy Direct Test Mode	Y	Y
	Bluetooth LE - 1Mbit/s support	Y	Y		

Wireless Type	Type	Features List	Sub Features List	PCIe-UART	SD-UART
				8997	8987
BT	Bluetooth LE Features	Bluetooth 4.1 Support	Low duty Cycle Directed Advertising	Y	Y
			Bluetooth LE Dual Mode Topology	Y	Y
			Bluetooth LE Privacy v1.1	Y	Y
			Bluetooth LE Link Layer Topology	Y	Y
		Bluetooth 4.2 Support	Bluetooth LE secure connection	Y	Y
			Bluetooth LE Link Layer Privacy v1.2	Y	Y
			Bluetooth LE Data Length Extension	Y	Y
			Link Layer Extended Scanner Filter Policies	Y	Y
		Bluetooth 5.0 Support	Bluetooth LE 2 Mbps Support	Y	Y
			High Duty Cycle Directed Advertising	Y	Y
Coex	Bluetooth + Wi-Fi Coexistence	Timeshare Co-ex Mode	STA + Bluetooth Coex	Y	Y
			STA + Bluetooth LE Coex	Y	Y
			STA + Bluetooth + Bluetooth LE Coex	Y	Y
			AP + Bluetooth Coex	Y	Y
			AP + Bluetooth LE Coex	Y	Y
			AP + Bluetooth + Bluetooth LE Coex	Y	Y
			P2P + Bluetooth Coex	Y	Y
			P2P + Bluetooth LE Coex	Y	Y
			P2P + Bluetooth + Bluetooth LE Coex	Y	Y
			AP(5GHz) + AP(5GHz) + Bluetooth Coex	Y	N
			AP(5GHz) + AP(5GHz) + Bluetooth LE Coex	Y	N
		Concurrent Dual Wi-Fi Co-ex Mode	uAP + uAP + Bluetooth Coex	N	N
			uAP + uAP + Bluetooth LE Coex	N	N
			uAP + uAP + Bluetooth + Bluetooth LE Coex	N	N
			uAP + STA + Bluetooth Coex	N	N
			uAP + STA + Bluetooth LE Coex	N	N

Wireless Type	Type	Features List	Sub Features List	PCIe-UART	SD-UART
				8997	8987
Coex	Bluetooth + Wi-Fi Coexistence	Concurrent Dual Wi-Fi Coex Mode	uAP + STA + Bluetooth + Bluetooth LE Coex	N	N
			STA + STA + Bluetooth Coex	N	N
			STA + STA + Bluetooth LE Coex	N	N
			STA + STA + Bluetooth + Bluetooth LE Coex	N	N

3 Release Notes

3.1 PCIe-UART 8997

3.1.1 Package Information

- Android BSP version : 11.0.0_2.6.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version : 16.92.10.p213.4
- Driver version : MM5X17283.p2-GPL

3.1.2 Version Information

- Wireless SoC : 88W8997
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version : 16.92.10.p213.4
 - 16 - Major revision
 - 92 - Feature pack
 - 10 - Release version
 - p213.4 - Patch number
- Driver Version : MM5X17283.p2-GPL
 - 5X - Linux 5.x Kernel
 - 17283 - Release version
 - p2 - Patch Number
 - GPL - General Public License v2

3.1.3 Host Platform

- MCIMX8M-EVK platform running Linux
- Interface used
 - Wi-Fi over PCIE
 - Bluetooth/Bluetooth LE over UART
- Test Tools
 - iperf (version 2.0.5)

3.1.4 Wi-Fi and Bluetooth Certification

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

3.1.4.1 Wi-Fi Pre-Certifications

- STA | 802.11n
- STA | 802.11ac
- STA | PMF

3.1.4.2 Bluetooth Controller Certification

- Class II - <https://launchstudio.bluetooth.com/ListingDetails/55009>
- Class I - <https://launchstudio.bluetooth.com/ListingDetails/55011>

3.1.5 Wi-Fi Throughput

3.1.5.1 Throughput Test Setup

- Environment: Shield Room - Over the Air
- Access Point: Asus RT-AX88U
- DUT: 88W8997-Azurewave (Module : **AW-CM276MA-PUR M.2 V6**) with MCIMX8M-EVK platform
 - Driver Load Parameters: fw_name=nxp/pcieuart8997_combo_v4.bin, cal_data_cfg=none, cfg80211_wext=0xf, host_mlme=1
- Client: Apple MacBook Air
- Channel: 6 | 36

3.1.5.2 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	117	122	125	122
WPA2-AES	110	118	124	119
WPA3-SAE	111	121	124	120

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	216	242	244	250
WPA2-AES	215	241	247	253
WPA3-SAE	210	242	249	253

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	109	126	116
WPA2-AES	99	103	127	114
WPA3-SAE	110	114	127	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	246	230	256	245
WPA2-AES	246	231	254	244
WPA3-SAE	246	229	251	243

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	137	142	141
WPA2-AES	139	137	142	141
WPA3-SAE	139	137	142	140

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	325	339	354	346
WPA2-AES	316	321	354	341
WPA3-SAE	315	329	354	344

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	679	652	741	734
WPA2-AES	651	673	741	729
WPA3-SAE	661	658	741	729

3.1.5.3 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	114	109	125	125

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	631	605	710	734

3.1.5.4 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	115	111	121	124

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	638	663	719	744

3.1.5.5 Mobile AP Throughput

External client: W8997 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	117	120	124	128
WPA2-AES	111	111	117	121
WPA3-SAE	117	115	114	121

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	235	235	246	252
WPA2-AES	237	234	247	254
WPA3-SAE	236	234	242	251

Mobile AP Mode Throughput - AN Mode 5 GHz Band 20 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	119	115	126	121
WPA2-AES	120	115	126	127
WPA3-SAE	120	116	126	125

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	244	240	256	254
WPA2-AES	245	241	256	255
WPA3-SAE	244	240	257	256

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	144	140	146	148
WPA2-AES	143	141	148	148
WPA3-SAE	144	135	148	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	328	308	343	331
WPA2-AES	324	308	343	331
WPA3-SAE	328	308	343	331

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	696	674	736	734
WPA2-AES	662	642	736	734
WPA3-SAE	654	641	736	734

3.1.6 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)

3.1.7 Bug Fixes/Feature Enhancements

Component	Description
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3.1.8 Known Issues

Component	Description
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3.2 SD-UART 8987

3.2.1 Package Information

- Android BSP version : 11.0.0_2.6.0
- Wi-Fi and Bluetooth/Bluetooth LE Firmware version : 16.92.21.p11.1
- Driver version : MM5X17283.p2-GPL

3.2.2 Version Information

- Wireless SoC: 88W8987
- Wi-Fi and Bluetooth/Bluetooth LE Firmware Version : 16.92.21.p11.1
 - 16 - Major revision
 - 92 - Feature pack
 - 21 - Release version
 - p11.1 - Patch number
- Driver Version : MM5X17283.p2-GPL
 - 5X - Linux 5.x Kernel
 - 17283 - Release version
 - p2 - Patch Number
 - GPL - General Public License v2

3.2.3 Host Platform

- MCIMX8M-EVK platform running Linux
- Interface used
 - Wi-Fi over SDIO (SDIO 3.0 support, Clock speed : 200 MHz)
 - Bluetooth/Bluetooth LE over UART

Test Tools

- iperf (version 2.0.5)

3.2.4 Wi-Fi and Bluetooth Certification

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

3.2.4.1 WFA Certifications

- STA | 802.11n
- STA | 802.11ac
- STA | PMF

Refer to AN12976 – *Wi-Fi Alliance Derivative Certification* available on NXP website.

3.2.4.2 Bluetooth Controller Certification

- Class II - <https://launchstudio.bluetooth.com/ListingDetails/11394>
- Class -I - <https://launchstudio.bluetooth.com/ListingDetails/24794>

3.2.5 Wi-Fi Throughput

3.2.5.1 Throughput Test Setup

- Environment: Shield Room - Over the Air
- Access Point: Linksys WRT1900AC and Netgear RAX120
- DUT: 88W8987-Azurewave (**Module : AW-CM358MA**) with MCIMX8M-EVK platform
 - Driver Load Parameters: fw_name=nxp/sdiouart8987_combo_v0.bin, cal_data_cfg=none, cfg80211_wext=0xf, host_mlme=1
- Client: Apple MacBook Air
- Channel: 6 | 36

3.2.5.2 STA Throughput

External AP: Linksys WRT1900AC and Netgear RAX120

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	65	72	69	75
WPA2-AES	66	71	71	75
WPA3-SAE	66	70	68	77

STA Mode Throughput - AN Mode 5 GHz Band 20 MHz (HT)				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	50	50	57	50
WPA2-AES	50	50	57	50
WPA3-SAE	52	60	61	61

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	156	141	172	135
WPA2-AES	153	151	166	169
WPA3-SAE	151	146	171	151

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	67	76	73	78
WPA2-AES	69	73	74	80
WPA3-SAE	70	73	74	80

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	155	144	170	160
WPA2-AES	152	139	168	138
WPA3-SAE	150	143	168	163

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	259	312	307	349
WPA2-AES	242	313	286	346
WPA3-SAE	239	296	327	327

3.2.5.3 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	56	68	57	55

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	212	271	225	340

3.2.5.4 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	47	67	56	57

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	227	302	253	349

3.2.5.5 Mobile AP Throughput

External client: Apple MacBook Air

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	55	51	57	54
WPA2-AES	55	52	57	54
WPA3-SAE	54	53	58	53

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	55	56	61	58
WPA2-AES	57	57	59	61
WPA3-SAE	56	56	61	60

Mobile AP Mode Throughput - AN Mode 5 GHz Band 40 MHz				
Protocol	TCP (Mbit/s)		UDP (Mbit/s)	
Direction	Tx	Rx	Tx	Rx
Open Security	113	118	125	125
WPA2-AES	113	117	121	121
WPA3-SAE	75	116	89	124

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	68	68	65	65
WPA2-AES	65	67	65	65
WPA3-SAE	66	67	65	64

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	152	159	161	172
WPA2-AES	144	157	166	171
WPA3-SAE	153	160	166	172

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	247	316	280	346
WPA2-AES	233	320	261	343
WPA3-SAE	234	316	261	348

3.2.6 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)

3.2.7 Bug Fixes/Feature Enhancements

3.2.7.1 FW Version : From 16.92.10.p208 to 16.92.21.p11.1

Component	Description
Bluetooth	<ul style="list-style-type: none">• Fix for disconnect complete event getting delayed by 30 seconds, so next re-connection was possible only after 30 second

3.2.8 Known Issues

Component	Description
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4 Getting Latest Wireless Driver and Firmware Fixes

For latest Wireless driver and firmware fixes, please refer Incremental Releases section of each release as shown in below figure.

https://www.nxp.com/design/software/embedded-software/i-mx-software/android-os-for-i-mx-applications-processors:IMXANDROID?tab=In-Depth_Tab

The screenshot shows the NXP website interface for 'Android OS for i.MX Applications Processors'. The navigation bar includes 'PRODUCTS', 'APPLICATIONS', 'DESIGN', 'SUPPORT', and 'COMPANY'. A search bar is present on the right. The 'RELEASES' tab is active in the sub-navigation. The main content area is titled 'Android Current Release' and features a table with three columns: 'Release and Documentation', 'Build Sources', and 'Supported Platforms/Demo Images'. The table lists 'Android 11.0.0_2.4.0 (Linux 5.10.52 kernel)' with links to documentation, build sources, and supported platforms like IMX 8M Plus EVK, IMX 8M Mini EVK, IMX 8M Nano EVK, and IMX 8M Quad EVK.

Android Past Releases

The screenshot shows the 'Android Past Releases' section. It includes a 'Show 10 entries' dropdown and a search bar. The table below has three columns: 'Release', 'Build Sources and Documentation', and 'Supported Platforms/Demo Images'. A red box highlights the 'Incremental Releases' link in the table header, with a red arrow pointing to it. The table lists 'Android 11.0.0_2.2.0 (Linux 5.10.35 kernel)' with links to documentation and build sources, and supported platforms like IMX 8M Plus EVK and IMX 8M Mini EVK.

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

Below tables list the on-board chips for i.MX platforms and external wireless solutions available.

Table 2: 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 (tested with AzureWave AW-CM276 SM/MA)	-
8 ULP	-	-	NXP IW416 (tested with Murata LBEE5CJ1XK)
8M Nano	NXP 88W8987 (tested with AzureWave AW-CM358 SM/MA)	-	-
8M Mini	NXP 88W8987 (tested with AzureWave AW-CM358 SM/MA)	-	-
8M Plus	-	NXP 88W8997 (tested with AzureWave AW-CM276 SM/MA)	-
8M Quad	-	NXP 88W8997 (tested with AzureWave AW-CM276 SM/MA)	-

6 Acronyms & Abbreviations

Acronyms	Definitions
A2DP	Advanced audio distribution profile
AP	Access Point
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
WEP	Wired Equivalent Private
WFD	Wi-Fi Direct
WPA	Wi-Fi protected access
WPS	Wi-Fi Protected Setup
WSC	Wi-Fi Simple Configuration

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