SD8787 Driver/Firmware Release Note

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November 26, 2013

1. Package Information

- **Version:** **14.66.35.p33-M3X14447_AX-MGPL-(FP66)**

2. Version info

- **SOC Version:** **8787**
- **Firmware version:** **14.66.35.p33**
  - sd8787_uapsta.bin (AX)
  - Following is an explanation of each digit in the versioning scheme designed for the Firmware:
    - **Major Revision** (first number from the left): Tracks the main FW version.
    - **Minor Revision** (second number from the left): Tracks the chip family, firmware branch, custom projects. etc.
    - **Release Number** (third number from the left): this number tracks the incremental changes in the consequent firmware releases given to QA or customers.
    - **Patch Number** (forth number from the left): Customers may want to receive a firmware build based on a previous release plus specific bug fixes, or patches. It is not unusual for customers to request this when they are close to production. The patch number starts at zero (no patch), and increments as we release subsequent builds with more bug fixes.
- **Driver version:** **M3X14426**
  - mlan.ko
  - sd8787.ko
  - Following is an explanation of each digit in the versioning scheme designed for the Driver:
    - **M** : Indicated Marvell OS independent driver
    - **3X** : indicated support for kernel version 3.x
    - **Release Number**: this number tracks the incremental changes in the consequent driver releases given to QA or customers.
    - **Patch Number**: Customers may want to receive a driver build based on a previous release plus specific bug fixes, or patches. It is not unusual for customers to request this when they are close to production. The patch number starts at zero (no patch), and increments as we release subsequent builds with more bug fixes.

3. Host Platform

- PXA 1088 running JB4.3
- Interfaces used
  - WLAN over SDIO
  - BT over SDIO

4. Tested HW

- WLAN SOC/RF chipset: W8787

5. Software features

Access Point Features:

802.11bg Feature:
- Data rate Up to 54Mbps.
- BG rate Adaptation.
- ERP protection, Slot time, Preamble

802.11a Feature (5GHz not validated in current release)

802.11i Security:
- Open and Shared key authentication
- WEP Data Encryption (64/128 bit)
- TKIP and AES-CCMP Encryption.
- WPA-PSK, WPA2-PSK, WPA/WPA2 Mixed Mode Security Methods.
- Group Key Refresh

WAPI Encryption Method

802.11n Features:
- 20/40 MHz Channel Bandwidth Operation.
- 2.4GHz Support.
- 11n Data rates – Up to 150 Mbps is supported (MCS 0 to MCS 7)
- 1 Spatial stream (1x1)
- Short and long Guard Interval Operation.
- AMPDU Tx/Rx support
- AMSDU Rx (only AMSDU 4k) is supported. No AMSDU Tx support.
- Green Field Operation.
- HT Protection Mechanisms.
- RIFS Rx
- 20/40 Coexistence Support.

WMM Support

WMM PS (UAPSD)

WiFi Protected Setup (WPS)
- Micro AP act as internal Registrar.
- PIN and PBC configuration methods.
- Micro AP act as Enrollee – configured using Wireless External Registrar.

Multi-BSS Support
- MAX MMH BSS = 2
- All Security Methods (Independent security configurations on different interfaces).

General:

- MAC address Filter table configuration (allowed list/banned list).
- Hidden SSID/Broadcast SSID Enable-Disable.
- IEEE Power Save for associated STA's
- Association support up to 10 Stations.
- Retry Limit support.
- ACS (Automatic Channel Selection).
- MMH Power Save. (Inactivity Based Powermode)
- Custom IE or Vendor Specific IE.
- RTS/CTS.
- Fragmentation/Defragmentation.
- Broadcast/Multicast.
- STA Ageout feature.
- Host Sleep Feature.
- Auto Deep Sleep.
- Host based Authenticator (Hostapd) Support.
- Configuring MAC Address during Driver load

Wlan Client Features:

802.11 n Features

- 802.11 a/b/g/n
- 1 Spatial stream (1x1)
- 11n Data rates – Up to 150 Mbps is supported (MCS 0 to MCS 7)
- Support for Tx and Rx of AMPDU and AMSDU-4k Packets
- Support for Only Tx of AMSDU-8k Packets
- Green Field Operation
- STBC Rx
- RIFS Rx
- 20/40 MHz channel Bandwidth operation
- Short Guard Interval (400ns / 800ns is supported)

Security

- Open and Shared key authentication
- WEP data encryption (64/128 bit)
- WPA-PSK and WPA2-PSK
- 802.1x Authentication methods
- Embedded Supplicant

Power Save Modes

- IEEE PS
- PPS
- UAPSD

WMM

WAPI

WPS (PIN and PBC methods)

802.11d

General

- Auto Deep Sleep
- Host Sleep
- Background Scan
- Auto Tx
- ARP Filter
- MEF
- WoW
- Inactivity time out
- Set user Scan
- Subscriber Event
- Vendor specific IE
- Extended Scan

Simultaneous AP-STA Operation:

- AP-STA functionality.
- Independent security configurations on different interfaces.
- Enhanced Power Save (AP-STA simultaneous power save)

WiFi Direct/P2P Features:

- Autonomous Group Owner (GO) Mode.
- P2P Client Mode.
- Non P2P Client Association with GO.
- P2P client association with WLAN AP.
- P2P Client Powersave.
- P2P Client WMM PS (UAPSD).
- GO WMM PS for associated P2P Clients.
- GO IEEE PS for associated P2P Clients.
- 8 Client Support.
- Provision Discovery

FM Features:

Worldwide FM band—76–108 MHz
Full Rx operation with reference clock, as well as 32.768 kHz external sleep clock
Configurable Channel spacing/frequency step size (50 kHz steps)
Dynamic switching between FM audio and Bluetooth audio
FM control using standard SDIO interface (shared with Bluetooth) using vendor specific Commands

FM Rx feature specifics:

Fully customizable RDS data reporting
Volume control, channel seek, channel up/down and preset functionality
Automatic RX channels search
Alternate Frequency Jump Capable
Audio Silence Detection – Soft Mute, Mono/Stereo Blending

Bluetooth

- BT 3.0
- Adaptive Frequency Hopping (AFH)
- Channel Quality Driven Data Rate (CQDDR)
- Enhanced Bluetooth Transmit Power Control
- Support for class 1.5 operation

- BT over SDIO
- Multi slot ACL with eSCO
- Low Power Page/Inquiry Scan
- UCD

6. WLAN Throughput

2.4 GHz Performance | BGN Mixed, Rate Auto | AMPDU								
Guard Interval: Long Guard								
CBW	**20**				**40**			
	TCP		**UDP**		**TCP**		**UDP**	
	Tx	**Rx**	**Tx**	**Rx**	**Tx**	**Rx**	**Tx**	**Rx**
OPEN	36.2	41.5	53.6	52.5	50	70.7	85.1	90.4
WPA2	36.8	41.1	53.3	52.5	50.1	70.8	82.6	88.3
Guard Interval: Short GI								
CBW	**20**				**40**			
	TCP		**UDP**		**TCP**		**UDP**	
	Tx	Rx	Tx	Rx	Tx	Rx	Tx	Rx
OPEN	40.7	41	59	57.9	52	66.9	84.7	77.5
WPA2	39.4	40.2	58.6	57.8	52.1	62.7	83.3	87.6

5 GHz Performance | BGN Mixed, Rate Auto | AMPDU								
Guard Interval: Long Guard								
CBW	**20**				**40**			
	TCP		**UDP**		**TCP**		**UDP**	
	Tx	**Rx**	**Tx**	**Rx**	**Tx**	**Rx**	**Tx**	**Rx**
OPEN	31.6	25.9	54.5	51.7	45.9	52.1	91.3	95.6
WPA2	34.4	25.8	54.3	51.6	39.8	49.1	87.8	95.6
Guard Interval: Short GI								
CBW	**20**				**40**			
	TCP		**UDP**		**TCP**		**UDP**	
	Tx	**Rx**	**Tx**	**Rx**	**Tx**	**Rx**	**Tx**	**Rx**
OPEN	38.6	28.6	59.5	54.9	51.7	56.2	92.2	95.5
WPA2	37.6	27.2	59.1	54.4	45.8	50.8	89.6	92.5

7. MMH Throughput

2.4 GHz Performance | BGN Mixed, Rate Auto | AMPDU				
Guard Interval: Long Guard				
CBW	20			
	TCP		UDP	
	Tx	Rx	Tx	Rx
OPEN	30.50	38.10	50.00	51.50
WPA	21.10	21.90	27.50	27.60
WPA2	32.10	37.90	49.50	51.50

8. Bug Fixes

Area	Description
STA	wifi on off kernel panic
	Fixed kernel panic issue in a specific scenario for Portable Hotspot mode
	Tuned internal register to improve target WiFi Tx power consistence.
MMH	Fix mlan0 disconnect from AP after stop uap by hostapd
BT	Fix BT driver download FW issue
	When BT Scanning, uAP can't be scanned
P2P	P2P scan auto stops
	Wifi Disconnection during P2P connection

9. Simultaneous AP-STA Limitations

- The uAP BSS will adopt to the same channel as of Ex-AP
- The uAP BSS will be stopped and started automatically, whenever In-STA (re)associates to Ex-AP
- Scan on In-STA stops the uAP BSS; It will be restarted again automatically
- WMM Tx queues are shared between MMH and In-STA interfaces
- TX power settings, Radio control commands, Antenna config commands, wireless slot, preamble, and ERP protection settings are not unified across MMH and In-STA interfaces.
- Custom IE Buffers are shared between two interfaces (uap0 and mlan0). IE_Buffer Index used by one interface cannot be used by other interface.
- Notes:
    - Ex-AP - External AP (AP to which mlan0 interface is associated)

- In-STA - Internal Station (mlan0 interface)
- Ex-STA - External Stations associates to MMH.
- uAP - Micro AP/ MMH – (Marvell Mobile Hotspot)

10. Multi-BSS (MBSS) Limitations

- In MBSS scenario (uap0+uap1) interfaces has below limitations.
  - Channel Settings, TX power settings, 802.11d settings will be used as same across two interfaces;
  - Custom IE Buffers are shared between two interfaces. IE_Buffer Index used by one interface cannot be used by other interface.
  - MMH Powermode is not supported in MBSS scenario, i.e. when both interfaces(uap0+uap1) are active.

11. WiFi Direct (P2P) Limitations

- STA IBSS is not simultaneously supported with MMH or P2P_GO.
- Use Case 8 (Simultaneous STA-P2P_CLIENT. STA supports IBSS role) not supported.
- P2P GO Powersave is not supported currently.
- Device configuration 'wdf_config' is required before starting P2P.
- GET command 'wfd_mode' will show operating modes only i.e. DEVICE / GO / CLIENT

12. Simultaneous Use cases

Use cases
Use Case 1: STA-only mode. Supports both Infra and Ad-hoc
Use Case 2: MMH-only mode
Use Case 3: AP-STA simultaneous support. STA does not support IBSS role
Use Case 4: MMH-only mode with MBSS support (up to 2 BSSs)
Use Case 5: AP (MBSS)-STA simultaneous support. STA does not support IBSS role. MBSS = 2 BSSs
Use Case 6: P2P only mode. Both GO and Client are supported
Use Case 7: Simultaneous STA-P2P_GO. STA does not support IBSS role
Use Case 8: Simultaneous STA-P2P_CLIENT. STA supports IBSS role - Not Supported
Use Case 9: Simultaneous MMH (single BSS)-P2P_GO. STA not supported

Use Case 10: Simultaneous MMH (single BSS)-P2P_client. STA not supported
Use Case 11: Simultaneous STA-MMH (single BSS)-P2P_GO. STA does not support IBSS role
Use Case 12: Simultaneous STA-MMH (Single BSS)-P2P_Client. STA does not support IBSS role
Use Case 13: Simultaneous MMH (2 BSSs)-P2P_GO. STA is not supported
Use Case 14: Simultaneous MMH (2 BSSs)-P2P_Client. STA is not supported
Use Case 15: Simultaneous STA-MMH (2 BSSs)-P2P_GO. STA does not support IBSS role
Use Case 16: Simultaneous STA-MMH (2 BSSs)-P2P_Client. STA does not support IBSS role