User Manual

Model: WP838I, WP838I-BT

1. Product Description

This document describes LITE-ON generic product requirement of 802.11 a/b/g/n/ac dual band (2.4GHz and 5GHz) concurrent dual radios 3×3:3 indoor AP, which Lite-On product model is WP838I.

The WP838I structure as SOC QCA9550+1×miniPCIe radio card (Lite-On WM863). One radio offers 802.11n 450Mbps and another radio offers 802.11ac 1.3Gbps. See Figure-01

In mounting scenario, the WP838I can be deployed as wall mount and ceiling mount.

Via one Giga-bit Ethernet port, the WP838I can connect to the backbone network through Giga-bit Ethernet interface. Besides, the WP838I also provides 802.3af/at PoE PD which is able to be powered by PoE switch remotely. The WP838I also supports DC12V power source option for the environment where PoE is not available.

The WP838I equips six internal antennas.

1.1 Product Deliverables

- WP838I AP and its embedded software
- Mounting kits (ceiling tie rail adapters for 15mm, 24mm and 38mm)
- User Documentation (one leaflet or booklet)
  - Getting Started Guide
  - Warranty/SLA (TBD on website only)
  - Registration card (TBD on website only)
  - Regulatory flyer

2. Hardware requirements

2.1 Main chipset

- **CPU:** QCA 9550 SOC;
- **PCIe:**
  - 1× WM863 card (built-in QCA9890, work@4.9GHz~5.85GHz), see Figure-02;

  (Note: WM863 can deploy QCA9890 or QCA9880)
- **GE. PHY:** QCA8334
- **PoE:** TBD;
- **Flash:**

- SPI NOR 32M Bytes

❖ **DDR2:** 128MBytes

2.2 Enclosure and Mechanical

The dimension for the WP838I is as below:

❖ PCB Dimension (L x W x D): 156×138.5*(Note: this is the target dimension, will be inplemented at next stage)*

❖ ME Dimension (L x W x D): 177 × 155 × 42*(Note: this is the target dimension, will be inplemented at next stage)*

❖ Default 3× RJ45 connectors

- ✓ 1× 10/100/1000Mbps Full/Half Duplex Ethernet;
- ✓ 1× 10/100/1000Mbps Full/Half Duplex with POE;
- ✓ 1× RS232 console in RJ45 connector

❖ Default 5×LEDs

❖ Default One USB 2.0 port;

❖ 12V DC input;

❖ Factory default reset; *(Note: can be removed according to customer's demand)*

❖ Plastic bottom case for thermal radiating

Figure-03 Reference for ID design

(Note: It is required that bottom cover contains cable concealment and the place to integrate

the mounting ceiling tie rail, which is suitable for 15mm, 24mm and 38mm)

2.3 Mounting

❖ Standard

Recessed ceiling-tile rail mounting adapter to comply with 15mm, 24mm, and 38mm rails

❖ Optional mounting kit

Wall-mount bracket for offset wall mounting, providing spacing between wall and unit

2.4 Antenna and Wireless

The WP838I shall deliver 3×3:3 wireless connections on both 2.4~2.4835GHz and 5.15~5.85GHz.

- Frequency: 2.4~2.4835GHz and 5.15~5.85GHz;
- The peak antenna gain*(Note: measured including the AP, not antenna in free space)*
  - 4 dBi±1 dB@ 2.4GHz --internal
  - 4.5 dBi±1 dB@ 5GHz—internal
- V.S.W.R
  - ≤2.0 @ 2.4~2.4835GHz;
  - ≤ 2.0@ 4.9~5.85GHz;
- Polarization: Linear;
- Return Loss: ≥10dB;
- Efficiency
  - Single band
    - ✓ ≧50%@ 2.4GHz --internal
    - ✓ ≧50%@ 5GHz—internal
- RF cable insertion loss between module and antenna
  - ≤ 0.5dB@2.4~2.4835GHz;
  - ≤ 1dB@4.9~5.85GHz;

2.5 Ethernet port

The WP838I provides:

❖ 1×10/100/1000 BASE-T Ethernet (RJ-45), this is also a PoE PD port;

❖ 1×10/100/1000 BASE-T Ethernet (RJ-45); *(Note: This port can be easily removed if customer ask for)*

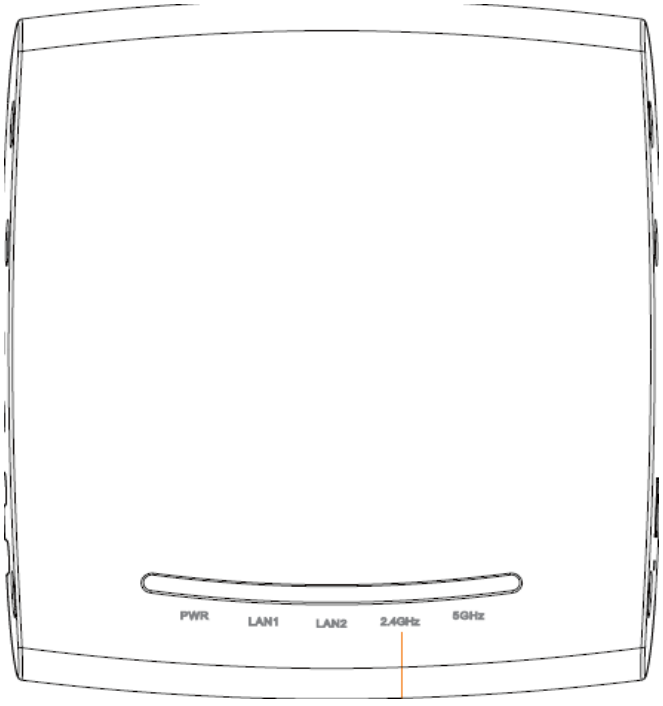
2.6 LED Indicator Function Definition:

The LED shall be enabled and disabled by software. Please see the table below for detailed definition.

Table-01 WP838I 5×LEDs (Default)

WP838I LED Description		
Power	Yellow	On: CPU or System Failed
		Blinking: System Initial or reset (Software self-testing and loading)
	Green	On: Power On and ready for operation
		Off: Power Off
LAN1	Yellow	On: Good Link on 100Mbps
		Blinking: receiving/transmitting data at 100Mbps from LAN Port
	Green	On: Good link on 1000Mbps
		Blinking: receiving/transmitting data at 1000Mbps from LAN port
		Off: No Link
LAN2	Yellow	On: Good Link on 100Mbps
		Blinking: receiving/transmitting data at 100Mbps from LAN Port
	Green	On: Good link on 1000Mbps
		Blinking: receiving/transmitting data at 1000Mbps from LAN port
		Off: No Link
2.4GHz	Green	On: Good link at 2.4GHz
		Off: No data transfer
		Blinking: receiving/transmitting data from wireless LAN
5GHz	Green	On: Good link at 5GHz
		Off: No data transfer
		Blinking: receiving/transmitting data from wireless LAN

The below shows the silk printing for LED



2.7 Power Supply

The WP838I shall be powered by:

- External power supply :12V DC, 2A(finalized by RD)
- Power Over Ethernet (PoE 802.3 af/at)

When multiple power sources are present, the WP838I power supply follows the priority: 12V DC>PoE 802.3 af/at

2.8 Factory Default Reset

The WP838I shall support an external factory default reset mechanism

3. Software Requirement

Basically WP838I is supposed to support the below specific software requirements. Most likely customer will install owned SW rather than Lite-On' SW, so that we only develop some necessary SW features so that we can present performance in demo show and also for certification.

Table-02 WP838I SW platform

Boot loader:	u-boot
System	Linux, kernel version 2.6 according to QCA LSDK
Wireless driver	Atheros 10.1.389 or upper version

Table-03 WP838I Demo software features

Wireless	Wireless mode	11b/g 11a 11b/g/n 11a/n/ac
	Operation mode	Access point mode
	Bandwidth	20MHz 40MHz 80MHz 20/40/80MHz dynamic
	Aggregation in 11n mode	A-MPDU, A-MSDU
	Multi-BSSID	Support 4 virtual AP for each radio Support SSID hiding
	Power save	UAPSD in 11n mode
	QoS	IQUE (Atheros proprietary QoS extensions) EDCA WMM
	Other parameter configurable via Web UI	Transmit power Beacon interval DTIM 802.11d A-MPDU aggregation length
Security	Authentication	WPA/WPA2 Personal (PSK) Enterprise (802.1x): PEAP, TTLS, TLS
	Encryption	AES
Certification	Wi-Fi	
	DFS	ETSI FCC
	SRRC	

Management	Management interface	HTTP , Telnet (CLI), Serial console
	Network setting	IPv4 static IP & DHCP client
	Wireless ACL	Based on MAC address

4. Performance Requirement

4.1 Transmite power (Single chain)

The below TX table reference the spec & test results of QCA9550 and WM863. Then we set them to be target spec.

Table-04 WP838I TX capability @ 5 GHz (WM863_QCA9890)

Transmitter	Target Power(dBm)
802.11a	
6M	18
36M	18
48M	18
54M	17
802.11n HT20	
MCS 0,1,2,3,4,8,9,10,11,12,16,17,18,19,20	18
MCS 5,13,21	18
MCS 6,14,22	18
MCS 7,15,23	17
802.11n HT40	
MCS 0,1,2,3,4,8,9,10,11,12,16,17,18,19,20	18
MCS 5,13,21	18
MCS 6,14,22	18
MCS 7,15,23	17
802.11ac 256QAM VHT80	
3/4 Code Rate	15
5/6 Code Rate	14

Table-05 WP838I TX capability @ 2.4 GHz (QCA9550)

Legacy Mode	2.4 GHz (dBm)
6Mbps	20
54Mbps	18
HT20	
MCS 0/8/16	20
MCS 7/15	18
MCS 23	17

HT40	
MCS 0/8/16	20
MCS 7/15	17
MCS 23	16

4.2 Rx Sensitivity (Single chain)

Table-06 WP838I Rx capability @ 5GHz (WM863)

	Receiver	Sensitivity (dBm)	IEEE SPEC
802.11a	6M	-92	-82
	36M	-79	-70
	48M	-76	-66
	54M	-74	-65
802.11n HT20	MCS 0,8,16	-92	-82
	MCS 5,13,21	-75	-66
	MCS 6,14,22	-73	-65
	MCS 7,15,23	-72	-64
802.11n HT40	MCS 0,8,16	-88	-79
	MCS 5,13,21	-71	-63
	MCS 6,14,22	-70	-62
	MCS 7,15,23	-69	-61
802.11ac	HT20 MCS8 @ 3/4 Code Rate	-67	-59
	HT20 MCS9 @ 5/6 Code Rate	-65	-57
	HT40 MCS8 @ 3/4 Code Rate	-64	-56
	HT40 MCS9 @ 5/6 Code Rate	-62	-54
	HT80 MCS8 @ 3/4 Code Rate	-61	-53
	HT80 MCS9 @ 5/6 Code Rate	-59	-51

Table-07 WP838I Rx capability @ 2.4GHz (QCA9550)

Legacy Mode	2.4 GHz (dBm)
1Mbps	-97
6Mbps	-93
11Mbps	-89
54Mbps	-76
HT-20	
MCS 0	-93
MCS 7	-72

MCS 15	-72
HT-40	
MCS 0	-89
MCS 7	-69
MCS 15	-69

5. Environmental

- Operating:
  - Temp: 0° C to +50° C (+32° F to +122° F)
  - Humidity: 5 to 95% non-condensing
- Storage and Transportation Temperature Range:
  - Temp: -40° C to +70° C (-40° F to +158° F)

FCC Statement:

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For product available in the USA/Canada market, only channel 1~11 can be operated. Selection of other channels is not possible.

This device is restricted for indoor use.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.