

Hardware Specification	
Configuration	Triple-radio 2x2 802.11n Mesh Node
Design License	Open-source Hardware
Firmware	LibreMesh (based on OpenWrt 15.05.1 Chaos Calmer)
Main chip	MCU: Atheros AR9344 RF: AR9344 + AR9582 + AR9582 GE PHY: TBD
RF	Radio 1: 2.4G 802.11b/g/n + LNA + PA Radio 2: 5G 802.11a/n + LNA + PA Radio 3: 5G 802.11a/n + LNA + PA
Memory	128MB RAM DDR
Flash	32MB Flash
Hardware Watchdog	PIC10F200 available via GPIO
Physical Interface	2 x Gigabit Ethernet RJ-45 1 x USB 2.0 connector (internal, inside enclosure) 1 x XBee expansion socket (for GPS module or 4G module) 1 x serial console pinout 1 x push button (reset) 1 x GPIO pin header 8 x Status LEDs, software controllable through GPIO

Radio Specification			
<b>Radio 1</b>			
Frequency Band	802.11b/g/n		
Supported Data Rate	802.11b: 1, 2, 5.5, 11 Mbps		
	802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps		
	802.11n: 6.5 Mbps - 130 Mbps (20MHz), 13.5 - 300 Mbps (40MHz)		
RF Shield	Included, to block cross-interference with other radios		
Mode	Data Rate	Typical AVG. TX Power	Typical RX Sensitivity
		Per-Chain (dBm)	Per-Chain (dBm)
		Tolerance = +/- 2dB	Tolerance = +/- 2dB
		Measure at board connector	Measure at board connector
802.11b	1 Mbps	23	-95
	11 Mbps	23	-87
802.11g	6 Mbps	23	-88
	54 Mbps	23	-73
802.11n_HT20	MCS 0/8 (BPSK)	23	-88
	MCS 1/9 (QPSK)	23	-85
	MCS 2/10 (QPSK)	23	-83
	MCS 3/11 (16-QAM)	23	-79
	MCS 4/12 (16-QAM)	23	-76
	MCS 5/13 (64-QAM)	23	-72
	MCS 6/14 (64-QAM)	23	-70
	MCS 7/15 (64-QAM)	23	-68
802.11n_HT40	MCS 0/8 (BPSK)	23	-85
	MCS 1/9 (QPSK)	23	-83
	MCS 2/10 (QPSK)	23	-80
	MCS 3/11 (16-QAM)	23	-79
	MCS 4/12 (16-QAM)	23	-74
	MCS 5/13 (64-QAM)	23	-70
	MCS 6/14 (64-QAM)	23	-69
	MCS 7/15 (64-QAM)	23	-68

<b>Radio 2</b>			
Frequency Band	802.11a/n		
Supported Data Rate	802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: 6.5 Mbps - 130 Mbps (20MHz), 13.5 - 300 Mbps (40MHz)		
RF Shield	Included, to block cross-interference with other radios		
Mode	Data Rate	Typical AVG. TX Power	Typical RX Sensitivity
		Per-Chain (dBm)	Per-Chain (dBm)
		Tolerance = +/- 2dB	Tolerance = +/- 2dB
		Measure at board connector	Measure at board connector
802.11a	6 Mbps	19	-88
	54 Mbps	19	-73
802.11n_HT20	MCS 0/8 (BPSK)	19	-88
	MCS 1/9 (QPSK)	19	-85
	MCS 2/10 (QPSK)	19	-83
	MCS 3/11 (16-QAM)	19	-80
	MCS 4/12 (16-QAM)	19	-76
	MCS 5/13 (64-QAM)	19	-72
	MCS 6/14 (64-QAM)	19	-70
	MCS 7/15 (64-QAM)	19	-69
802.11n_HT40	MCS 0/8 (BPSK)	19	-85
	MCS 1/9 (QPSK)	19	-82
	MCS 2/10 (QPSK)	19	-78
	MCS 3/11 (16-QAM)	19	-76
	MCS 4/12 (16-QAM)	19	-73
	MCS 5/13 (64-QAM)	19	-69
	MCS 6/14 (64-QAM)	19	-68
	MCS 7/15 (64-QAM)	19	-67
<b>Radio 3</b>			
Frequency Band	802.11a/n		
Supported Data Rate	802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps 802.11n: 6.5 Mbps - 130 Mbps (20MHz), 13.5 - 300 Mbps (40MHz)		
RF Shield	Included, to block cross-interference with other radios		
Mode	Data Rate	Typical AVG. TX Power	Typical RX Sensitivity
		Per-Chain (dBm)	Per-Chain (dBm)
		Tolerance = +/- 2dB	Tolerance = +/- 2dB
		Measure at board connector	Measure at board connector
802.11a	6 Mbps	19	-88
	54 Mbps	19	-73
802.11n_HT20	MCS 0/8 (BPSK)	19	-88
	MCS 1/9 (QPSK)	19	-85
	MCS 2/10 (QPSK)	19	-83
	MCS 3/11 (16-QAM)	19	-80
	MCS 4/12 (16-QAM)	19	-76
	MCS 5/13 (64-QAM)	19	-72
	MCS 6/14 (64-QAM)	19	-70
	MCS 7/15 (64-QAM)	19	-69
802.11n_HT40	MCS 0/8 (BPSK)	19	-85
	MCS 1/9 (QPSK)	19	-82
	MCS 2/10 (QPSK)	19	-78
	MCS 3/11 (16-QAM)	19	-76
	MCS 4/12 (16-QAM)	19	-73
	MCS 5/13 (64-QAM)	19	-69
	MCS 6/14 (64-QAM)	19	-68
	MCS 7/15 (64-QAM)	19	-67

Antenna	
Connectors	4 x external antenna connectors (RP-SMA female)
Pigtails	4 x pigtails for 5ghz, 80cm long each, RP-SMA male to RP-SMA female connectors
2.4ghz	1 x antenna MIMO 2x2, 14dB gain, integrated inside enclosure
5ghz	2 x antenna MIMO 2x2, 12dB gain, 10x10cm, weatherproof casing, RP-SMA male

Power	
Input	PoE: 12v ~ 24v Passive PoE
	Internal 2-pin header on board for direct power input
PoE passthrough	Software controllable, over 2 <sup>nd</sup> Ethernet port, supporting up to 24W consumption
Consumption	TBD

Environment & Mechanical	
Temperature Range	Operating: 0°C~40°C
	Storage: -40°C to 70°C
Humidity	5%~90% typical
Dimensions	Enclosure: 300 mm x 205 mm x 76 mm
Weight	TBD

Reliability	
ESD	Conductive: 4KV; Air: 8KV
Surge protection	2 x gas discharge arrestors, one at each Ethernet port
MTBF	Over 20000hrs

Compliance Standard	
IC	Canada RF Approval
	Canada RF Report
RCM	AS/NZS 4268
	RCM

Package content	
Contents	1 x Device
Power adapter	None
Enclosure	CPE-75 Weatherproof box with integrated 2.4ghz antenna
Pigtails	4 x pigtails for 5ghz, 80cm long each, RP-SMA male to RP-SMA female connectors
External antennas	2 x antennas 5ghz MIMO 2x2

LED Indicators	
LEDs	1 x Power
	1 x System status
	1 x USB
	3 x WiFi activity (one for each radio)
	2 x Ethernet activity (one for each port)