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					
Radio 1					
Frequency Band	802.11b/g/n	802.11b/g/n			
Supported Data Rate	802.11b: 1, 2, 5.5, 11 M	802.11b: 1, 2, 5.5, 11 Mbps			
	802.11g: 6, 9, 12, 18, 2	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	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		

Radio 2						
Frequency Band	802.11a/n	802.11a/n				
Supported Data Rate	802.11a: 6, 9, 12, 18, 2	4, 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			
902 11n HT40	MCS 0/8 (BPSK)	19	-85			
802.11n_HT40			-82			
	MCS 1/9 (QPSK)	19				
	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			
Radio 3						
Frequency Band		802.11a/n				
Supported Data Rate		802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps				
Capported Data Nate						
	802.11n: 6.5 Mbps - 13	0 Mbps (20MHz), 13.5 - 300 Mbp	s (40MHz)			
RF Shield	802.11n: 6.5 Mbps - 13 Included, to block cross	O Mbps (20MHz), 13.5 - 300 Mbp -interference with other radios				
RF Shield	802.11n: 6.5 Mbps - 13	0 Mbps (20MHz), 13.5 - 300 Mbp interference with other radios Typical AVG. TX Power	Typical RX Sensitivity			
RF Shield	802.11n: 6.5 Mbps - 13 Included, to block cross	0 Mbps (20MHz), 13.5 - 300 Mbp i-interference with other radios Typical AVG. TX Power Per-Chain (dBm)	Typical RX Sensitivity Per-Chain (dBm)			
RF Shield	802.11n: 6.5 Mbps - 13 Included, to block cross	0 Mbps (20MHz), 13.5 - 300 Mbp -interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB			
RF Shield Mode	802.11n: 6.5 Mbps - 13 Included, to block cross	0 Mbps (20MHz), 13.5 - 300 Mbp i-interference with other radios Typical AVG. TX Power Per-Chain (dBm)	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector			
RF Shield Mode	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate 6 Mbps	O Mbps (20MHz), 13.5 - 300 Mbps-interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88			
RF Shield Mode 802.11a	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps	O Mbps (20MHz), 13.5 - 300 Mbps-interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73			
RF Shield Mode 802.11a	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate 6 Mbps	O Mbps (20MHz), 13.5 - 300 Mbps-interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88			
RF Shield Mode 802.11a	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps	O Mbps (20MHz), 13.5 - 300 Mbps-interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73			
RF Shield Mode 802.11a	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK)	0 Mbps (20MHz), 13.5 - 300 Mbp interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19 19 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88			
RF Shield Mode 802.11a	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK) MCS 1/9 (QPSK)	0 Mbps (20MHz), 13.5 - 300 Mbp interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19 19 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88 -85			
RF Shield Mode 802.11a	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK)	0 Mbps (20MHz), 13.5 - 300 Mbp -interference with other radios  Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19 19 19 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88 -85			
RF Shield Mode 802.11a	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK) MCS 3/11 (16-QAM) MCS 4/12 (16-QAM)	O Mbps (20MHz), 13.5 - 300 Mbp  -interference with other radios  Typical AVG. TX Power  Per-Chain (dBm)  Tolerance = +/- 2dB  Measure at board connector  19  19  19  19  19  19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88 -85 -83			
RF Shield Mode 802.11a	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK) MCS 3/11 (16-QAM)	O Mbps (20MHz), 13.5 - 300 Mbp  -interference with other radios  Typical AVG. TX Power  Per-Chain (dBm)  Tolerance = +/- 2dB  Measure at board connector  19  19  19  19  19  19  19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88 -85 -83 -80 -76			
RF Shield Mode 802.11a	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK) MCS 3/11 (16-QAM) MCS 4/12 (16-QAM) MCS 5/13 (64-QAM) MCS 6/14 (64-QAM)	O Mbps (20MHz), 13.5 - 300 Mbp  -interference with other radios  Typical AVG. TX Power  Per-Chain (dBm)  Tolerance = +/- 2dB  Measure at board connector  19  19  19  19  19  19  19  19  19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88 -85 -83 -80 -76 -72			
RF Shield Mode 802.11a 802.11n_HT20	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK) MCS 3/11 (16-QAM) MCS 4/12 (16-QAM) MCS 5/13 (64-QAM) MCS 6/14 (64-QAM) MCS 7/15 (64-QAM)	O Mbps (20MHz), 13.5 - 300 Mbp I-interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19 19 19 19 19 19 19 19 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88 -85 -83 -80 -76 -72			
RF Shield Mode 802.11a 802.11n_HT20	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK) MCS 3/11 (16-QAM) MCS 4/12 (16-QAM) MCS 5/13 (64-QAM) MCS 6/14 (64-QAM) MCS 7/15 (64-QAM) MCS 0/8 (BPSK)	O Mbps (20MHz), 13.5 - 300 Mbps-interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19 19 19 19 19 19 19 19 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88 -85 -83 -80 -76 -72 -70			
RF Shield Mode 802.11a 802.11n_HT20	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK) MCS 3/11 (16-QAM) MCS 4/12 (16-QAM) MCS 5/13 (64-QAM) MCS 6/14 (64-QAM) MCS 7/15 (64-QAM) MCS 0/8 (BPSK) MCS 1/9 (QPSK)	O Mbps (20MHz), 13.5 - 300 Mbps-interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19 19 19 19 19 19 19 19 19 19 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88 -85 -83 -80 -76 -72 -70 -69 -85 -82			
RF Shield Mode 802.11a 802.11n_HT20	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK) MCS 3/11 (16-QAM) MCS 4/12 (16-QAM) MCS 5/13 (64-QAM) MCS 6/14 (64-QAM) MCS 7/15 (64-QAM) MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK)	O Mbps (20MHz), 13.5 - 300 Mbp I-interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19 19 19 19 19 19 19 19 19 19 19 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88 -85 -83 -80 -76 -72 -70 -69 -85 -82			
RF Shield Mode 802.11a 802.11n_HT20	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK) MCS 3/11 (16-QAM) MCS 4/12 (16-QAM) MCS 5/13 (64-QAM) MCS 6/14 (64-QAM) MCS 7/15 (64-QAM) MCS 1/9 (QPSK) MCS 1/9 (QPSK) MCS 1/9 (QPSK) MCS 3/11 (16-QAM)	O Mbps (20MHz), 13.5 - 300 Mbp I-interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19 19 19 19 19 19 19 19 19 19 19 19 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88 -85 -83 -80 -76 -72 -70 -69 -85 -82 -78			
RF Shield Mode 802.11a 802.11n_HT20	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK) MCS 3/11 (16-QAM) MCS 4/12 (16-QAM) MCS 5/13 (64-QAM) MCS 6/14 (64-QAM) MCS 7/15 (64-QAM) MCS 1/9 (QPSK) MCS 1/9 (QPSK) MCS 1/9 (QPSK) MCS 3/11 (16-QAM) MCS 3/11 (16-QAM) MCS 3/11 (16-QAM)	O Mbps (20MHz), 13.5 - 300 Mbp I-interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19 19 19 19 19 19 19 19 19 19 19 19 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88 -85 -83 -80 -76 -72 -70 -69 -85 -82 -78 -76 -73			
RF Shield Mode  802.11a  802.11n_HT20	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK) MCS 3/11 (16-QAM) MCS 4/12 (16-QAM) MCS 5/13 (64-QAM) MCS 6/14 (64-QAM) MCS 7/15 (64-QAM) MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK) MCS 3/11 (16-QAM) MCS 3/11 (16-QAM) MCS 3/11 (16-QAM) MCS 3/11 (16-QAM) MCS 5/13 (64-QAM)	O Mbps (20MHz), 13.5 - 300 Mbp I-interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19 19 19 19 19 19 19 19 19 19 19 19 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88 -85 -83 -80 -76 -72 -70 -69 -85 -82 -78 -76 -73 -69			
RF Shield Mode  802.11a 802.11n_HT20	802.11n: 6.5 Mbps - 13 Included, to block cross Data Rate  6 Mbps 54 Mbps MCS 0/8 (BPSK) MCS 1/9 (QPSK) MCS 2/10 (QPSK) MCS 3/11 (16-QAM) MCS 4/12 (16-QAM) MCS 5/13 (64-QAM) MCS 6/14 (64-QAM) MCS 7/15 (64-QAM) MCS 1/9 (QPSK) MCS 1/9 (QPSK) MCS 1/9 (QPSK) MCS 3/11 (16-QAM) MCS 3/11 (16-QAM) MCS 3/11 (16-QAM)	O Mbps (20MHz), 13.5 - 300 Mbp I-interference with other radios Typical AVG. TX Power Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector 19 19 19 19 19 19 19 19 19 19 19 19 19	Typical RX Sensitivity Per-Chain (dBm) Tolerance = +/- 2dB Measure at board connector -88 -73 -88 -85 -83 -80 -76 -72 -70 -69 -85 -82 -78 -76 -73			

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 by diseases			
LED Indicators	1 y Doyler		
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)		