



APPLICATIONS

- **Emergency First Responders**
Critical information delivery such as medical data and video feeds during in-progress events
- **Enterprise Campus Connectivity**
Extend main network to remote branch offices, warehouses or other out buildings without leased line
- **Mobile Hot Spot**
On-demand entertainment and broadband access solutions for ferry, transit busses and railway system commuters
- **Security and Surveillance**
Wireless solutions for bandwidth-intensive and high-definition IP-surveillance cameras located at important city and transportation infrastructure such as airports, bridges and trains
- **Business and Residential Last Mile Access**
Competitive broadband service alternative to DSL or cable modems for residences and T1 or Ethernet for businesses
- **Metropolitan Area Networks**
Secure and reliable connectivity between city buildings

Tsunami MP.11 Model 2454-R and 5054-R

Technical Specifications

<p>Part Numbers</p> <p>(North America region)</p>	<p><u>Model 2454-R</u> <u>Base Station Unit</u></p> <ul style="list-style-type: none"> • 2454-BSUR-US-WORLD Tsunami MP.11 Model 2454-R Base Station Unit with Type-N Connector – US PSU -WORLD <p><u>Subscriber Unit</u></p> <ul style="list-style-type: none"> • 2454-SUA-US-WORLD Tsunami MP.11 Model 2454-R Subscriber Unit with Type-N Connector – US PSU -WORLD • 2454-SUR-US-WORLD Tsunami MP.11 Model 2454-R Subscriber Unit with Integrated 16-dBi Antenna – US PSU -WORLD <p><u>Model 5054-R</u> <u>Base Station Unit</u></p> <ul style="list-style-type: none"> • 5054-BSUR-US Tsunami MP.11 Model 5054-R Base Station Unit with Type-N Connector – US PSU <p><u>Subscriber Unit</u></p> <ul style="list-style-type: none"> • 5054-SUA-US Tsunami MP.11 Model 5054-R Subscriber Unit with Type-N Connector – US PSU • 5054-SUR-US Tsunami MP.11 Model 5054-R Subscriber Unit with Integrated 23-dBi Antenna – US PSU
<p>Part Numbers</p> <p>(Europe and Middle East regions)</p>	<p><u>Model 2454-R</u> <u>Base Station Unit</u></p> <ul style="list-style-type: none"> • 2454-BSUR-EU Tsunami MP.11 Model 2454-R Base Station Unit with Type-N Connector – Europe PSU • 2454-BSUR-UK Tsunami MP.11 Model 2454-R Base Station Unit with Type-N Connector – UK PSU <p><u>Subscriber Unit</u></p> <ul style="list-style-type: none"> • 2454-SUA-EU Tsunami MP.11 Model 2454-R Subscriber Unit with Type-N Connector – Europe PSU • 2454-SUA-UK Tsunami MP.11 Model 2454-R Subscriber Unit with Type-N Connector – UK PSU • 2454-SUR-EU Tsunami MP.11 Model 2454-R Subscriber Unit with Integrated 16-dBi Antenna – Europe PSU • 2454-SUR-UK Tsunami MP.11 Model 2454-R Subscriber Unit with Integrated 16-dBi Antenna – UK PSU <p><u>Model 5054-R</u> <u>Base Station Unit</u></p> <ul style="list-style-type: none"> • 5054-BSUR-EU Tsunami MP.11 Model 5054-R Base Station Unit with Type-N Connector – Europe PSU • 5054-BSUR-UK Tsunami MP.11 Model 5054-R Base Station Unit with Type-N Connector – UK PSU <p><u>Subscriber Unit</u></p> <ul style="list-style-type: none"> • 5054-SUA-EU Tsunami MP.11 Model 5054-R Subscriber Unit with Type-N Connector – Europe PSU • 5054-SUA-UK Tsunami MP.11 Model 5054-R Subscriber Unit with Type-N Connector – UK PSU • 5054-SUR-EU Tsunami MP.11 Model 5054-R Subscriber Unit with Integrated 23-dBi Antenna – Europe PSU • 5054-SUR-UK Tsunami MP.11 Model 5054-R Subscriber Unit with Integrated 23-dBi Antenna – UK PSU

Tsunami MP.11 Model 2454-R and 5054-R Technical Specifications

Part Numbers (Asia Pacific region)	<u>Model 2454-R</u> <u>Base Station Unit</u>	
	• 2454-BSUR-AU	Tsunami MP.11 Model 2454-R Base Station Unit with Type-N Connector – Australia PSU
	• 2454-BSUR-UK	Tsunami MP.11 Model 2454-R Base Station Unit with Type-N Connector – UK PSU
	• 2454-BSUR-US	Tsunami MP.11 Model 2454-R Base Station Unit with Type-N Connector – US PSU
	• 2454-BSUR-EU	Tsunami MP.11 Model 2454-R Base Station Unit with Type-N Connector – Europe PSU
	• 2454-BSUR-CN	Tsunami MP.11 Model 2454-R Base Station Unit with Type-N Connector – China PSU
	• 2454-BSUR-SK	Tsunami MP.11 Model 2454-R Base Station Unit with Type-N Connector – South Korea PSU
	• 2454-BSUR-US-WORLD	Tsunami MP.11 Model 2454-R Base Station Unit with Type-N Connector – US/CAN PSU – WORLD
	<u>Subscriber Unit</u>	
	• 2454-SUA-AU	Tsunami MP.11 Model 2454-R Subscriber Unit with Type-N Connector – Australia PSU
	• 2454-SUA-UK	Tsunami MP.11 Model 2454-R Subscriber Unit with Type-N Connector – UK PSU
	• 2454-SUA-US	Tsunami MP.11 Model 2454-R Subscriber Unit with Type-N Connector – US PSU
	• 2454-SUA-EU	Tsunami MP.11 Model 2454-R Subscriber Unit with Type-N Connector – EU PSU
	• 2454-SUA-CN	Tsunami MP.11 Model 2454-R Subscriber Unit with Type-N Connector – China PSU
	• 2454-SUA-SK	Tsunami MP.11 Model 2454-R Subscriber Unit with Type-N Connector – South Korea PSU
	• 2454-SUA-US WORLD	Tsunami MP.11 Model 2454-R Subscriber Unit with Type-N Connector – US/CAN PSU – WORLD
	• 2454-SUR-AU	Tsunami MP.11 Model 2454-R Subscriber Unit with Integrated 16-dBi Antenna – Australia PSU
	• 2454-SUR-UK	Tsunami MP.11 Model 2454-R Subscriber Unit with Integrated 16-dBi Antenna – UK PSU
	• 2454-SUR-US	Tsunami MP.11 Model 2454-R Subscriber Unit with Integrated 16-dBi Antenna – US PSU
	• 2454-SUR-EU	Tsunami MP.11 Model 2454-R Subscriber Unit with Integrated 16-dBi Antenna – EU PSU
	• 2454-SUR-CN	Tsunami MP.11 Model 2454-R Subscriber Unit with Integrated 16-dBi Antenna – China PSU
	• 2454-SUR-SK	Tsunami MP.11 Model 2454-R Subscriber Unit with Integrated 16-dBi Antenna – South Korea PSU
	• 2454-SUR-US-WORLD	Tsunami MP.11 Model 2454-R Subscriber Unit with Integrated 16-dBi Antenna – US/CAN PSU - WORLD
	<u>Model 5054-R</u> <u>Base Station Unit</u>	
	• 5054-BSUR-AU	Tsunami MP.11 Model 5054-R Base Station Unit with Type-N Connector – Australia PSU
	• 5054-BSUR-UK	Tsunami MP.11 Model 5054-R Base Station Unit with Type-N Connector – UK PSU
	• 5054-BSUR-US	Tsunami MP.11 Model 5054-R Base Station Unit with Type-N Connector – US PSU
	• 5054-BSUR-EU	Tsunami MP.11 Model 5054-R Base Station Unit with Type-N Connector – Europe PSU
	• 5054-BSUR-US-WORLD	Tsunami MP.11 Model 5054-R Base Station Unit with Type-N Connector – US/CAN PSU - WORLD
	<u>Subscriber Unit</u>	
	• 5054-SUA-AU	Tsunami MP.11 Model 5054-R Subscriber Unit with Type-N Connector – Australia PSU
	• 5054-SUA-UK	Tsunami MP.11 Model 5054-R Subscriber Unit with Type-N Connector – UK PSU
	• 5054-SUA-US	Tsunami MP.11 Model 5054-R Subscriber Unit with Type-N Connector – US PSU
• 5054-SUA-EU	Tsunami MP.11 Model 5054-R Subscriber Unit with Type-N Connector – EU PSU	
• 5054-SUA-US-WORLD	Tsunami MP.11 Model 5054-R Subscriber Unit with Type-N Connector –	

Tsunami MP.11 Model 2454-R and 5054-R Technical Specifications

	<ul style="list-style-type: none"> • 5054-SUR-AU • 5054-SUR-UK • 5054-SUR-US • 5054-SUR-EU • 5054-SUR-US-WORLD 	<p>US/CAN PSU - WORLD</p> <p>Tsunami MP.11 Model 5054-R Subscriber Unit with Integrated 23-dBi Antenna – Australia PSU</p> <p>Tsunami MP.11 Model 5054-R Subscriber Unit with Integrated 23-dBi Antenna – UK PSU</p> <p>Tsunami MP.11 Model 5054-R Subscriber Unit with Integrated 23-dBi Antenna – US PSU</p> <p>Tsunami MP.11 Model 5054-R Subscriber Unit with Integrated 23-dBi Antenna – EU PSU</p> <p>Tsunami MP.11 Model 5054-R Subscriber Unit with Integrated 23-dBi Antenna – US/CAN PSU - WORLD</p>
<p>Part Numbers</p> <p>(Caribbean and Latin America region)</p>	<p><u>Model 2454-R Base Station Unit</u></p> <ul style="list-style-type: none"> • 2454-BSUR-US <p><u>Subscriber Unit</u></p> <ul style="list-style-type: none"> • 2454-SUA-US • 2454-SUR-US <p><u>Model 5054-R Base Station Unit</u></p> <ul style="list-style-type: none"> • 5054-BSUR-US • 5054-BSUR-BR <p><u>Subscriber Unit</u></p> <ul style="list-style-type: none"> • 5054-SUA-US • 5054-SUA-BR • 5054-SUR-US • 5054-SUR-BR 	<p>Tsunami MP.11 Model 2454-R Base Station Unit with Type-N Connector – US PSU</p> <p>Tsunami MP.11 Model 2454-R Subscriber Unit with Type-N Connector – US PSU</p> <p>Tsunami MP.11 Model 2454-R Subscriber Unit with Integrated 23-dBi Antenna – US PSU</p> <p>Tsunami MP.11 Model 5054-R Base Station Unit with Type-N Connector – US PSU</p> <p>Tsunami MP.11 Model 5054-R Base Station Unit with Type-N Connector – Brazil PSU</p> <p>Tsunami MP.11 Model 5054-R Subscriber Unit with Type-N Connector – US PSU</p> <p>Tsunami MP.11 Model 5054-R Subscriber Unit with Type-N Connector – Brazil PSU</p> <p>Tsunami MP.11 Model 5054-R Subscriber Unit with Integrated 23-dBi Antenna – US PSU</p> <p>Tsunami MP.11 Model 5054-R Subscriber Unit with Integrated 23-dBi Antenna – Brazil PSU</p>
<p>Part Numbers</p> <p>(Universal)</p>	<p><u>Accessories</u></p> <ul style="list-style-type: none"> • 848 274 163 • 5054-SURGE • 848 274 171 • 848 332 789 • 848 274 197 • 848 274 205 • 69828 • 5054-LMR600-50 • 70251 <p><u>Outdoor Ethernet Cables</u></p> <ul style="list-style-type: none"> • 69819 • 69820 • 69821 <p><u>Power Injector</u></p> <ul style="list-style-type: none"> • 69823 	<p>Surge Arrestor 0-3 GHz - Standard-N Female to Female</p> <p>Surge Arrestor 5 GHz - Standard-N Female to Female</p> <p>20 ft Low Loss Antenna Cable St-N - Male-Male LMR 200</p> <p>20 ft Low Loss Antenna Cable St-N - Male-Male LMR 400</p> <p>50 ft Low Loss Antenna Cable St-N - Male-Male LMR 400</p> <p>75 ft Low Loss Antenna Cable St-N - Male-Male LMR 400</p> <p>6 ft Low Loss Antenna Cable St-N - Male-Male LMR 600</p> <p>50 ft Low Loss Antenna Cable St-N - Male-Male LMR 600</p> <p>PoE (Power over Ethernet) Surge Arrestor for Tsunami MP.11 and QuickBridge.11</p> <p>25m outdoor, terminated CAT5 cable for Tsunami MP.11 or QB.11 with three RJ-45 and one weather-proof Ethernet port cap</p> <p>50m outdoor, terminated CAT5 cable for Tsunami MP.11 or QB.11 with three RJ-45 and one weather-proof Ethernet port cap</p> <p>75m outdoor, terminated CAT5 cable for Tsunami MP.11 or QB.11 with three RJ-45 and one weather-proof Ethernet port cap</p> <p>Spare Power DC Injector for Tsunami MP.11 or QB.11 (-R model ONLY)</p>

Tsunami MP.11 Model 2454-R and 5054-R

Technical Specifications

	<p>2.4 GHz Antennas</p> <ul style="list-style-type: none"> 848 515 722 5 dBi Omni-Directional Vehicle Antenna w/Integrated 250 cm cable 848 312 591 7 dBi Omni-Directional Base Station Antenna - St-N Female 848 515 698 10 dBi Omni-Directional Base Station Antenna - St-N Female 848 515 706 12 dBi Directional Wide Angle Antenna (120 degrees) - St-N Female 2411WA12-STN 12 dBi Wide Angle Antenna with Integrated 2 m cable (st-N) Mountable on Window or Flat Surface 848 515 714 24 dBi Directional Antenna (Parabolic Grid) - St-N Female 2400-SA60-14 14dBi Directional sector antenna (60 degrees) 2.4GHz St-N Female <p>5 GHz Antennas</p> <ul style="list-style-type: none"> 5054-PA-18 18 dBi Panel Antenna - St-N Female - 5.25 - 5.875 GHz 5054-PA-23 23 dBi Panel Antenna - St-N Female - 5.725 - 5.875 GHz 5054-OA-8 8 dBi Omni Directional Antenna - St-N Female - 5.47-5.850 GHz 5054-OA-10 10 dBi Omni Directional Antenna - St-N Female - 5.47-5.850 GHz 5054-SA120-14 14 dBi Sector Antenna - St-N Female - 5.25-5.850 GHz - 120 degrees 5054-SA60-17 17 dBi Sector Antenna - St-N Female - 5.25-5.850 GHz - 60 degrees 																																																																																																																																
<p>Regulatory Approvals and Frequency Ranges for 2454-R¹</p>	<p>Model 2454-R</p> <table border="1"> <thead> <tr> <th>Country</th> <th colspan="4">Number of Channels</th> <th>Certification</th> </tr> </thead> <tbody> <tr> <td colspan="6">North America</td> </tr> <tr> <td>USA</td> <td>(GHz)</td> <td>5MHz</td> <td>10MHz</td> <td>20MHz</td> <td rowspan="3">Yes</td> </tr> <tr> <td>Canada</td> <td>2.40 - 2.4835</td> <td>11</td> <td>Up to 11</td> <td>Up to 11</td> </tr> <tr> <td>Mexico</td> <td>2.40 - 2.472</td> <td>13</td> <td>Up to 13</td> <td>Up to 13</td> </tr> <tr> <td colspan="6">EU Countries</td> </tr> <tr> <td>Austria</td> <td colspan="4" rowspan="16"> <table border="1"> <thead> <tr> <th>(GHz)</th> <th>5MHz</th> <th>10MHz</th> <th>20MHz</th> </tr> </thead> <tbody> <tr> <td>• 2.40 - 2.4835</td> <td>13</td> <td>Up to 13</td> <td>Up to 13</td> </tr> </tbody> </table> </td> <td rowspan="16">Yes</td> </tr> <tr><td>Belgium</td></tr> <tr><td>Cyprus</td></tr> <tr><td>Czech Republic</td></tr> <tr><td>Denmark</td></tr> <tr><td>Estonia</td></tr> <tr><td>Finland</td></tr> <tr><td>France</td></tr> <tr><td>Germany</td></tr> <tr><td>Greece</td></tr> <tr><td>Hungary</td></tr> <tr><td>Ireland</td></tr> <tr><td>Italy</td></tr> <tr><td>Latvia</td></tr> <tr><td>Luxemburg</td></tr> <tr><td>Lithuania</td></tr> <tr><td>Malta</td></tr> <tr><td>Netherlands</td></tr> <tr><td>Poland</td></tr> <tr><td>Portugal</td></tr> <tr><td>Spain</td></tr> <tr><td>Sweden</td></tr> <tr><td>Slovakia</td></tr> <tr><td>Slovenia</td></tr> <tr> <td>United Kingdom</td> <td>(GHz)</td> <td>5MHz</td> <td>10MHz</td> <td>20MHz</td> <td rowspan="2">Yes</td> </tr> <tr> <td></td> <td>2.40 - 2.4835</td> <td>13</td> <td>Up to 13</td> <td>Up to 13</td> </tr> <tr> <td colspan="6">Other European Countries</td> </tr> <tr> <td>Iceland</td> <td colspan="4" rowspan="4"> <table border="1"> <thead> <tr> <th>(GHz)</th> <th>5MHz</th> <th>10MHz</th> <th>20MHz</th> </tr> </thead> <tbody> <tr> <td>2.40 - 2.4835</td> <td>13</td> <td>Up to 13</td> <td>Up to 13</td> </tr> </tbody> </table> </td> <td rowspan="4">Yes</td> </tr> <tr><td>Liechtenstein</td></tr> <tr><td>Norway</td></tr> <tr><td>Switzerland</td></tr> <tr> <td colspan="6">South America</td> </tr> <tr> <td>Brazil</td> <td>(GHz)</td> <td>5MHz</td> <td>10MHz</td> <td>20MHz</td> <td rowspan="2">In Process</td> </tr> <tr> <td></td> <td>2.40 - 2.4835</td> <td>13</td> <td>Up to 13</td> <td>Up to 13</td> </tr> <tr> <td colspan="6">APAC</td> </tr> </tbody> </table>	Country	Number of Channels				Certification	North America						USA	(GHz)	5MHz	10MHz	20MHz	Yes	Canada	2.40 - 2.4835	11	Up to 11	Up to 11	Mexico	2.40 - 2.472	13	Up to 13	Up to 13	EU Countries						Austria	<table border="1"> <thead> <tr> <th>(GHz)</th> <th>5MHz</th> <th>10MHz</th> <th>20MHz</th> </tr> </thead> <tbody> <tr> <td>• 2.40 - 2.4835</td> <td>13</td> <td>Up to 13</td> <td>Up to 13</td> </tr> </tbody> </table>				(GHz)	5MHz	10MHz	20MHz	• 2.40 - 2.4835	13	Up to 13	Up to 13	Yes	Belgium	Cyprus	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Ireland	Italy	Latvia	Luxemburg	Lithuania	Malta	Netherlands	Poland	Portugal	Spain	Sweden	Slovakia	Slovenia	United Kingdom	(GHz)	5MHz	10MHz	20MHz	Yes		2.40 - 2.4835	13	Up to 13	Up to 13	Other European Countries						Iceland	<table border="1"> <thead> <tr> <th>(GHz)</th> <th>5MHz</th> <th>10MHz</th> <th>20MHz</th> </tr> </thead> <tbody> <tr> <td>2.40 - 2.4835</td> <td>13</td> <td>Up to 13</td> <td>Up to 13</td> </tr> </tbody> </table>				(GHz)	5MHz	10MHz	20MHz	2.40 - 2.4835	13	Up to 13	Up to 13	Yes	Liechtenstein	Norway	Switzerland	South America						Brazil	(GHz)	5MHz	10MHz	20MHz	In Process		2.40 - 2.4835	13	Up to 13	Up to 13	APAC					
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Regulatory Approvals and Frequency Ranges for 5054-R ¹	Model 5054-R					
	Country	Number of Channels				Certification
	North America	(GHz)	5MHz	10MHz	20MHz	
	USA	5.25 - 5.35	Up to 15	Up to 7	Up to 3	
		5.725 - 5.85	Up to 21	Up to 11	Up to 5	
Regulatory Approvals and Frequency Ranges for 5054-R ¹	Model 5054-R					
	Country	Number of Channels				Certification
	North America	(GHz)	5MHz	10MHz	20MHz	
	USA	5.25 - 5.35	Up to 15	Up to 7	Up to 3	
		5.725 - 5.85	Up to 21	Up to 11	Up to 5	
	Canada	5.25 - 5.35	Up to 15	Up to 7	Up to 3	Yes
		5.725 - 5.85	Up to 21	Up to 11	Up to 5	
	Mexico	5.25 - 5.35	Up to 15	Up to 7	Up to 3	
		5.725 - 5.85	Up to 21	Up to 11	Up to 5	
	EU Countries					
	Austria					Yes
	Belgium					
	Cyprus					
	Czech Republic					
	Denmark					
	Estonia					
	Finland					
	France					
	Germany					
	Greece					
	Hungary					
		(GHz)	5MHz	10MHz	20MHz	
		5.47 - 5.70	Up to 46	Up to 23	Up to 11	
	Latvia					
	Luxemburg					
	Lithuania					
	Malta					
	Netherlands					
	Poland					
	Portugal					
	Spain					
	Sweden					
	Slovakia					
	Slovenia					
	United Kingdom	(GHz)	5MHz	10MHz	20MHz	Yes
		5.47 - 5.70	Up to 46	Up to 23	Up to 11	
		5.725 - 5.85	Up to 23	Up to 11	Up to 4	
	Ireland					
	Other European Countries					
	Iceland					Yes
Liechtenstein	(GHz)	5MHz	10MHz	20MHz		
	5.47 - 5.70	Up to 46	Up to 23	Up to 11		
Norway						
Switzerland						
Russia	(GHz)	5MHz	10MHz	20MHz	In Process	
	5.15 - 5.85	Up to 141	Up to 71	Up to 36		
South America						
Brazil	(GHz)	5MHz	10MHz	20MHz	Yes	
	5.47-5.70	Up to 46	Up to 23	Up to 11		
	5.725 - 5.85	Up to 19	Up to 10	Up to 5		
Argentina	(GHz)	5MHz	10MHz	20MHz	Yes	
	5.25-5.35	Up to 9	Up to 5	Up to 3		
	5.725 - 5.85	Up to 13	Up to 7	Up to 4		
Colombia	(GHz)	5MHz	10MHz	20MHz	Yes	
	5.25-5.35	Up to 15	Up to 7	Up to 3		
	5.725 - 5.85	Up to 21	Up to 11	Up to 5		
APAC						
Australia	(GHz)	5MHz	10MHz	20MHz	Yes	
	5.725 - 5.85	Up to 21	Up to 11	Up to 5		
New Zealand						
Hong Kong						

Tsunami MP.11 Model 2454-R and 5054-R Technical Specifications

	China																					
	Taiwan	(GHz)	5MHz	10MHz	20MHz	Yes																
		5.25-5.35	Up to 15	Up to 7	Up to 3																	
		5.725-5.85	Up to 17	Up to 9	Up to 5																	
	Singapore	(GHz)	5MHz	10MHz	20MHz	In Process																
		5.15-5.25	Up to 13	Up to 7	Up to 4																	
		5.725-5.825	Up to 17	Up to 9	Up to 5																	
	India	(GHz)	5MHz	10MHz	20MHz	In Process																
		5.15-5.35	Up to 32	Up to 16	Up to 7																	
		5.725-5.825	Up to 17	Up to 9	Up to 5																	
Integrated Antenna Specification	<p>Model 2454-R Subscriber Unit with Integrated 16-dBi Antenna</p> <ul style="list-style-type: none"> • Part Number 2454-SUR-xx • Frequency range 2.4 to 2.5 GHz • Nominal Impedance 50 Ohms • Gain 16 dBi • Front-to-Back Ratio 25 dB • HPBW/vertical 22 degrees • HPBW/horizontal 15 degrees • Cross Polarization 20 dB • Power handling 1 W • VSWR 1.5 : 1 Max <p>Model 5054-R Subscriber Unit with Integrated 23-dBi Antenna</p> <ul style="list-style-type: none"> • Part Number 5054-SUR-xx • Frequency range 5250 - 5875 MHz • Nominal Impedance 50 ohms • Gain 23 dBi • Front-to-Back Ratio 35 dB • HPBW/vertical 9 degrees • HPBW/horizontal 9 degrees • Cross Polarization 23 dB • Power handling 1 W (cw) • VSWR 2.0 : 1 Max 																					
RF Modulation and over-the-air rates	<p>Model 2454-R and 5054-R OFDM (Orthogonal Frequency Division Multiplexing)</p> <table border="1"> <thead> <tr> <th></th> <th>20 MHz Channels</th> <th>10 MHz Channels</th> <th>5 MHz Channels</th> </tr> </thead> <tbody> <tr> <td>• BPSK</td> <td>6 and 9 Mbps</td> <td>3 and 4.5 Mbps</td> <td>2.25 and 1.5 Mbps</td> </tr> <tr> <td>• QPSK</td> <td>12 and 18 Mbps</td> <td>6 and 9 Mbps</td> <td>3 and 4.5 Mbps</td> </tr> <tr> <td>• 16-QAM</td> <td>24 and 36 Mbps</td> <td>12 and 18 Mbps</td> <td>6 and 9 Mbps</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • Maximum Packet Size 1522 Bytes 							20 MHz Channels	10 MHz Channels	5 MHz Channels	• BPSK	6 and 9 Mbps	3 and 4.5 Mbps	2.25 and 1.5 Mbps	• QPSK	12 and 18 Mbps	6 and 9 Mbps	3 and 4.5 Mbps	• 16-QAM	24 and 36 Mbps	12 and 18 Mbps	6 and 9 Mbps
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• 16-QAM	24 and 36 Mbps	12 and 18 Mbps	6 and 9 Mbps																			
Wireless Protocol	<ul style="list-style-type: none"> • WORP (Wireless Outdoor Router Protocol) 																					
Device Interface	<p>Ethernet</p> <ul style="list-style-type: none"> • Auto-sensing 10/100BASE-TX Ethernet <p>Antenna Connector for BSU and SU with Type-N Connector</p> <ul style="list-style-type: none"> • Standard Type-N Female 																					
Network Architecture Type	<ul style="list-style-type: none"> • Infrastructure 																					

Tsunami MP.11 Model 2454-R and 5054-R Technical Specifications

Receive Sensitivity (BER=10⁻⁶)	Model 2454-R				
	Modulation	40 MHz Channels Turbo Mode (US Only)	20 MHz Channels Standard Mode	10 MHz Channels Standard Mode	5 MHz Channels Standard Mode
	16QAM ¾ 16QAM ½ QPSK ¾ QPSK ½ BPSK ¾ BPSK ½	N/A	-79 dBm @36Mbps -84 dBm @24Mbps -87 dBm @18Mbps -89 dBm @12Mbps -91 dBm @9Mbps -91 dBm @6Mbps	-82 dBm @18Mbps -87 dBm @12Mbps -90 dBm @9Mbps -92 dBm @6Mbps -94 dBm @4.5Mbps -94 dBm @3Mbps	-85 dBm @9Mbps -90 dBm @6Mbps -93 dBm @4.5Mbps -95 dBm @3Mbps -97 dBm @2.25Mbps -97 dBm @1.5Mbps
	Model 5054-R				
	Modulation	40 MHz Channels Turbo Mode (US only)	20 MHz Channels Standard Mode	10 MHz Channels Standard Mode	5 MHz Channels Standard Mode
	16QAM ¾ 16QAM ½ QPSK ¾ QPSK ½ BPSK ¾ BPSK ½	-75dBm @72Mbps -78dBm @48Mbps -81dBm @36Mbps -83 dBm @24Mbps -84 dBm @18Mbps -85 dBm @12Mbps	-77 dBm @36Mbps -80 dBm @24Mbps -83 dBm @18Mbps -86 dBm @12Mbps -87 dBm @9Mbps -88 dBm @6Mbps	-80 dBm @18Mbps -83 dBm @12Mbps -86 dBm @9Mbps -89 dBm @6Mbps -90 dBm @4.5Mbps -91 dBm @3Mbps	-83 dBm @9Mbps -86 dBm @6Mbps -89 dBm @4.5Mbps -92 dBm @3Mbps -93 dBm @2.25Mbps -94 dBm @1.5Mbps
Maximum Throughput (Mbps)	Model 2454-R				
	Data rate	20 MHz Channels	10 MHz Channels	5 MHz Channels Standard Mode	
	54Mbps	30 Mbps			
	48Mbps	28 Mbps			
	36Mbps	18 Mbps			
	24Mbps	14 Mbps			
	18Mbps	12 Mbps	12 Mbps		
	12Mbps	9 Mbps	9 Mbps		
	9Mbps	7 Mbps	7 Mbps	6.8 Mbps	
	6Mbps	5 Mbps	5 Mbps	5 Mbps	
	4.5Mbps		4 Mbps	4 Mbps	
	3Mbps		2 Mbps	2.7 Mbps	
	2.25Mbps			2 Mbps	
	1Mbps			1.4 Mbps	
	Model 5054-R				
	Data rate	40 MHz Channels Turbo Mode (US Only)	20 MHz Channels Standard Mode	10 MHz Channels Standard Mode	5 MHz Channels Standard Mode
	108Mbps Turbo 54				
	96Mbps Turbo 48				
	72Mbps Turbo 36	N/A			
	48Mbps Turbo 24	N/A			
	36Mbps Turbo 18	N/A			
	24Mbps Turbo 12	N/A			
	54Mbps				
	48Mbps				
	36Mbps		23 Mbps		
	24Mbps		18 Mbps		
	18Mbps		13 Mbps	13 Mbps	
	12Mbps		10 Mbps	9 Mbps	
	9Mbps		8 Mbps	7 Mbps	7 Mbps
	6Mbps		5.5 Mbps	5 Mbps	4.7 Mbps
	4.5Mbps			3.6 Mbps	3.8 Mbps
	3Mbps			2.4 Mbps	2.7 Mbps
	2.25Mbps				2 Mbps
	1Mbps				1.2 Mbps
	*Maximum-throughput data with release 2.2.6, as measured with test equipment under controlled lab conditions and best performing packet size. In some instances, data compression yields throughput equal to the configured data rate. Actual throughput performance in the field may vary.				

Tsunami MP.11 Model 2454-R and 5054-R

Technical Specifications

Latency	< 10ms typical at maximum throughput* * under throughput test conditions indicated above.																																
Transmit Power Settings	<p>Model 2454-R</p> <table border="1"> <thead> <tr> <th></th> <th>6-24 Mbps @ 20 MHz 16QAM ½ QPSK ¾ QPSK ½ BPSK ¾ BPSK ½</th> <th>36 Mbps @ 20 MHz 16QAM ¾</th> </tr> </thead> <tbody> <tr> <td>2.400-2.483 GHz</td> <td>16 dBm</td> <td>16 dBm</td> </tr> </tbody> </table> <p>Output Power Attenuation: 0 - 18dB, in 3dB steps Output Power Values will have a tolerance of +/- 1.5 dB</p> <p>Model 5054-R</p> <table border="1"> <thead> <tr> <th></th> <th>6-24 Mbps @ 20 MHz 16QAM ½ QPSK ¾ QPSK ½ BPSK ¾ BPSK ½</th> <th>36 Mbps @ 20 MHz 16QAM ¾</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> 5.15-5.35 GHz 5.47-5.725 GHz 5.725-5.850 GHz </td> <td> <ul style="list-style-type: none"> 15 dBm 16 dBm 16 dBm </td> <td> <ul style="list-style-type: none"> 13 dBm 13 dBm 13 dBm </td> </tr> </tbody> </table> <p>Output Power Attenuation: 0 - 18dB, in 3dB steps Output Power Values will have a tolerance of +/- 1.5 dB</p>				6-24 Mbps @ 20 MHz 16QAM ½ QPSK ¾ QPSK ½ BPSK ¾ BPSK ½	36 Mbps @ 20 MHz 16QAM ¾	2.400-2.483 GHz	16 dBm	16 dBm		6-24 Mbps @ 20 MHz 16QAM ½ QPSK ¾ QPSK ½ BPSK ¾ BPSK ½	36 Mbps @ 20 MHz 16QAM ¾	<ul style="list-style-type: none"> 5.15-5.35 GHz 5.47-5.725 GHz 5.725-5.850 GHz 	<ul style="list-style-type: none"> 15 dBm 16 dBm 16 dBm 	<ul style="list-style-type: none"> 13 dBm 13 dBm 13 dBm 																		
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System Processor and Memory	<ul style="list-style-type: none"> 166MHz Motorola 8241 processor 16 Mbytes RAM 8 Mbytes FLASH 																																
Software Specification	<p>Base Station and Subscriber Units</p> <ul style="list-style-type: none"> Miscellaneous <ul style="list-style-type: none"> WORP protocol 																																

Tsunami MP.11 Model 2454-R and 5054-R

Technical Specifications

	<ul style="list-style-type: none"> • Dynamic Data Rate Selection • Transmit Power Control • Antenna Alignment • Integrity Check for Software Upload • 5, 10, and 20MHz channels <ul style="list-style-type: none"> • Satellite Density <ul style="list-style-type: none"> • Dynamic Frequency Selection <ul style="list-style-type: none"> • Redundancy <ul style="list-style-type: none"> • Spanning Tree (802.1D) <ul style="list-style-type: none"> • Bridging and Routing <ul style="list-style-type: none"> • Bridge (802.1d) • IP/ RIPv1 (RFC 1058) • IP/ RIPv2 (RFC 1388) • CIDR (RFC 1519) • ICMP (RFC 792) • IP (RFC 791) • ARP (RFC 826) <ul style="list-style-type: none"> • Filtering <ul style="list-style-type: none"> • Ethernet protocol (Ethertype) • Static MAC • Storm threshold • IP address • Broadcast protocol <ul style="list-style-type: none"> • Services <ul style="list-style-type: none"> • DHCP Server (RFC 2131) • DHCP Client (RFC 2131) • Bi-Directional Bandwidth Control <ul style="list-style-type: none"> • VLAN <ul style="list-style-type: none"> • 802.1Q <ul style="list-style-type: none"> • Security Features <ul style="list-style-type: none"> • MAC Authentication • Radius MAC Access Control • WEP/AES-OCB encryption • RADIUS (RFC 2138) <ul style="list-style-type: none"> • Mobility <ul style="list-style-type: none"> • Subscriber Unit Roaming <p><u>Base Station Unit</u></p> <ul style="list-style-type: none"> • Filtering <ul style="list-style-type: none"> • Intra Cell Blocking <p><u>Subscriber Unit</u></p> <ul style="list-style-type: none"> • Services <ul style="list-style-type: none"> • NAT (RFC 3022) • DHCP Relay (RFC 2131)
Security	<ul style="list-style-type: none"> • WORP provides critical feature support for secure long-range wireless deployments in unlicensed frequency spectrum. • MD5 (embedded in WORP) authentication between BSU and SU. • Filter based on packet information such as unicast/multicast/ broadcast MAC or IP. • Secure "over the air encryption" with WEP, WEP+, and AES, and AES-CCB.

Tsunami MP.11 Model 2454-R and 5054-R

Technical Specifications

	<ul style="list-style-type: none"> • Authentication via Radius • Intracell blocking allows the BSU to act as the central policy enforcer for SU to SU communications.
Management	<ul style="list-style-type: none"> • SU/BSU statistics • Link Test • Temperature logging <ul style="list-style-type: none"> • SNMPv1/v2 RFC 1157 • SNMP v2c RFC 1907 • HTTP Server RFC 2616 • Telnet RFC 855 • TFTP client RFC 783 • CLI <ul style="list-style-type: none"> • MIB-II RFC 1213 • Ethernet-like MIB RFC 1643 • Bridge MIB RFC 1493 • 802.3MAU RFC 2668 • 802.11 MIB • Remote reboot (reload) or reset to factory default via power injector • Private MIB • Orinoco MIB
Antenna Alignment Tools	<ul style="list-style-type: none"> • Audible Tone • CLI output
Status LEDs	<ul style="list-style-type: none"> • Two indicators on the RJ-45 connector to indicate power, wireless traffic, and Ethernet traffic
Local Configuration Support	<p><u>RS-232 Serial port</u></p> <ul style="list-style-type: none"> • RJ11 port built-into the unit • DB9 Female via a converter (included)
Compliance and Standards	<p><u>Safety</u></p> <ul style="list-style-type: none"> • UL 60950, UL50 • CSA 22.2 No. 60950-00 • IEC 60950 3rd Ed (1999) <p><u>Radio Approvals</u></p> <ul style="list-style-type: none"> • USA FCC 15.107, 15-109; 15-203-15.205, 15.207, 15.209; 15.247; 15.401-15.407 • Canada RSS-102; RSS-210; ICES-003 • Europe (ETSI) EN 301.893; EN 300.328; EN 301.489-1; EN 301.489-17; EN 300-440; EN50371 • ARIB STD-T71, STD 33, STD 66 <p><u>EMI and Susceptibility (Class B)</u></p> <ul style="list-style-type: none"> • USA FCC Part 15.107 • Canada ICES-003 <p><u>Water and Dust Proof</u></p> <ul style="list-style-type: none"> • NEMA4/IP56
Electrical	<p><u>5054-R / 2454-R POE Power Injector</u></p> <ul style="list-style-type: none"> • Custom Power over Ethernet (802.3af compatible) • Input: Voltage 110 to 250 VAC (47-63Hz) • Output: 48V @ 420mA MAX (injected into the Cat-5 Cable) • Pin for Remote reboot (reload) or reset to factory default

Tsunami MP.11 Model 2454-R and 5054-R Technical Specifications

	<p><u>5054-R / 2454-R Outdoor Radio Unit</u></p> <ul style="list-style-type: none"> • Power Consumption: 7.5W typical. Up to 20 Watts across full operating temperature range. • Input: Voltage 42 to 60 VDC
Dimensions	<p><u>Base Station and Subscriber Unit</u></p> <ul style="list-style-type: none"> • Packaged: 14.57 in x 13.70 in x 8.19 in (370 mm x 348 mm x 208 mm) <p><u>Base Station and Subscriber Unit with Type-N Connector</u></p> <ul style="list-style-type: none"> • Unpackaged: 10.5 in x 10.5 in x 3.25 in (267 mm x 267 mm x 83 mm) <p><u>Subscriber Unit with Integrated 23-dBi Antenna</u></p> <ul style="list-style-type: none"> • Unpackaged: 12.60 in x 12.60 in x 3.50 in (320 mm x 320 mm x 89 mm)
Weight	<p><u>Base Station and Subscriber Unit with Type-N Connector</u></p> <ul style="list-style-type: none"> • Packaged weight: 9.2 lbs (4.2 kg) • Unpackaged weight: 5.5 lbs (2.49 kg) Unit-only, .45 lbs (.20 kg) for power supply <p><u>Subscriber Unit with Integrated 23-dBi or 16-dBi Antenna</u></p> <ul style="list-style-type: none"> • Packaged weight: 10.1 lbs (4.6 kg) • Unpackaged weight: 6.0 lbs (2.72 kg) Unit-only, .45 lbs (.20 kg) for power supply
Environmental	<p><u>Operating</u></p> <ul style="list-style-type: none"> • -33° to 60°C (-27.5° to 140° Fahrenheit) • 100% humidity • Wind loading: 125mph <p><u>Storage</u></p> <ul style="list-style-type: none"> • -55° to 80°C (-41° to 176° Fahrenheit) • 100% humidity
Packaging Contents	<p><u>Base Station or Subscriber Unit</u></p> <ul style="list-style-type: none"> • One Tsunami MP.11 Model 2454-R or 5054-R Base Station or Subscriber Unit • One wall/ pole mounting bracket • One Power-Over-Ethernet injector for Model 2454-R or 5054-R • One country specific power cord • One Ethernet cable weather-proof plug • One Documentation and Software CD-ROM
MTBF	<ul style="list-style-type: none"> • 100,000 hrs
Warranty	<ul style="list-style-type: none"> • One year

- 1 Check with the local regulatory agency for certain restrictions
- 2 - PMP configuration using USA regulations for L and U bands, ETSI regulations for M bands
 - Clear LOS
 - 99.995% availability
 - Sector antenna (17dBi, 60-degrees) at BSU with short 1dB jumper cable
 - Fade margin minimum of 10dB to 2 miles, 0.2dB additional fade margin for every 0.1 mile to 15dB
 - Predicted availability >99.990% (one-way) for all configurations
 - Distance calculations for 5 and 10 MHz channels are comparable for ETSI regulatory domains. Proper TPC settings (3 and 6dB) respectively, should be set to meet power density rules. Increased distances are possible in the US with proper link engineering.

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