

Introduction

The Tsunami MP.11 Model 954-R Base Station and Subscriber Units (BSUs and SUs) are flexible wireless outdoor routers that let you design solutions for point-to-point links and point-to-multipoint networks. The 954-R operates in the 900 MHz band.

The 954-R is part of the Tsunami MP.11 product family, which is comprised of several additional products, including:

- The 5054 Base Station (BSU) and the 5054 Subscriber Unit (SU) for indoor installation
- The 2454-R, 5054-R, and 4954-R Base Station and Subscriber Station Units for outdoor installation
- The 5054 Base Station (BSU), the 5054 Subscriber Unit (SU), and the 5012-SUI Subscriber Unit for indoor installation
- The 5012-SUR Subscriber Unit for outdoor installation

Key Features

Key features of the MP.11 product family include:

- The use of a highly optimized protocol for outdoor applications
- Routing and bridging capability
- Asymmetric bandwidth management
- Management through a Web Interface, a Command Line Interface (CLI), or Simple Network Management Protocol (SNMP)
- Software and configuration upgrade through file transfer (TFTP)
- Outdoor placement, close to the antenna, for significantly improved range and ease of installation
- VLAN support

Technical Specifications

Part Numbers

Radio Units

Base Station Unit

Part Number	Description
954-BSUR-US	Tsunami MP.11 Model 954-R Base Station Unit with Type-N Connector – US/CAN

Subscriber Unit

Part Number	Description
954-SUA-US	Tsunami MP.11 Model 954-R Subscriber Unit with Type-N Connector – US/CAN

Accessories

Surge Arrestors/Cables

Part Number	Description
5054-SURGE	Surge Arrestor 0-6 GHz - Standard-N Female to Female
848 274 171	20 ft Low Loss Antenna Cable St-N - Male-Male LMR 200
848 332 789	20 ft Low Loss Antenna Cable St-N - Male-Male LMR 400
5054-ULA400-50	50 ft Low Loss Antenna Cable St-N - Male-Male LMR 400
848 274 205	75 ft Low Loss Antenna Cable St-N - Male-Male LMR 400
69828	6 ft Low Loss Antenna Cable St-N - Male-Male LMR 600
5054-LMR600-50	50 ft Low Loss Antenna Cable St-N - Male-Male LMR 600
70251	PoE (Power over Ethernet) Surge Arrestor for Tsunami MP.11 and QuickBridge.11

Power Injector

Part Number	Description
69823	Spare Power DC Injector for Tsunami MP.11 or QB.11 (-R model ONLY)

Outdoor Ethernet Cables

Part Number	Description
69819	25m outdoor, terminated CAT5 cable for Tsunami MP.11 or QB.11 with three RJ-45 and one weather-proof Ethernet port cap
69820	50m outdoor, terminated CAT5 cable for Tsunami MP.11 or QB.11 with three RJ-45 and one weather-proof Ethernet port cap
69821	75m outdoor, terminated CAT5 cable for Tsunami MP.11 or QB.11 with three RJ-45 and one weather-proof Ethernet port cap

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Features and Specifications



External 900 MHz Antennas

TBD

Regulatory Approvals and Frequency Ranges

Region/Country	Country	MHz	Number of Channels	Certification
North America	USA	902 - 928	2	In Process
	Canada	902 - 928	2	In Process

OFDM Modulation Rates

NOTE: Maximum packet size: 1526 Bytes

Modulation	Rate
BPSK	6 and 9 Mbps
QPSK	12 and 18 Mbps
16-QAM	24 and 36 Mbps
64-QAM	48 and 54 Mbps

Wireless Protocol

Category	Specification
Wireless Protocol	Worp (Wireless Outdoor Router Protocol)

Interfaces

Category	Specification
Wired Ethernet	Auto-sensing 10/100BASE-TX Ethernet
Serial Connector	RJ11 port built-into the unit, DB9 Female via a converter included
Antenna Connector for BSU and SU with Type-N Connector	Standard Type-N Female

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Features and Specifications

Receive Sensitivity

NOTE: BER=10⁻⁶

- Rx Sensitivity values will have a tolerance of +/- 2 dB

Modulation	Rate
64QAM $\frac{3}{4}$	-70 dBm @ 54 Mbps
64QAM $\frac{1}{2}$	-73 dBm @ 48 Mbps
16QAM $\frac{3}{4}$	-79 dBm @ 36 Mbps
16QAM $\frac{1}{2}$	-82 dBm @ 24 Mbps
QPSK $\frac{3}{4}$	-86 dBm @ 18 Mbps
QPSK $\frac{1}{2}$	-87 dBm @ 12 Mbps
BPSK $\frac{3}{4}$	-89 dBm @ 9 Mbps
BPSK $\frac{1}{2}$	-90 dBm @ 6 Mbps

Maximum Throughput

NOTE: Actual throughput performance in the field may vary.

Data Rate	Throughput
54 Mbps	30 Mbps
48 Mbps	28 Mbps
36 Mbps	18 Mbps
24 Mbps	14 Mbps
18 Mbps	12 Mbps
12 Mbps	9 Mbps
9 Mbps	7 Mbps
6 Mbps	5 Mbps

Latency

Category	Specification
Typical at Max Throughput	10 ms (as measured with test equipment under controlled lab conditions and best performing packet size)

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Features and Specifications



Transmit Power Settings

- Output Power Attenuation: 0 - 18 dB, in 1 dB steps
- Output Power Values will have a tolerance of +/- 1 dB

Frequency	6-24 Mbps @ 20 MHz 16QAM 1/2; QPSK 3/4; QPSK 1/2; BPSK 3/4; BPSK 1/2	36 Mbps @ 20 MHz 16QAM 3/4	48 Mbps @ 20 MHz 64QAM 1/2	54 Mbps @ 20 MHz 64QAM 3/4
902-928 MHz	28 dBm	26 dBm	24 dBm	23 dBm

Range Information

Frequency	54 Mbps	36 Mbps	6 Mbps
902 - 928 MHz	4 mi.	8 mi.	12 mi.

Hardware Specifications

Category	Specification
Processor	166 MHz Motorola 8241 processor
Memory	Flash: 8 MB; RAM: 16 MB

Software Features

Category	Specification
Key Features	<ul style="list-style-type: none"> • WOPR protocol • Transmit Power Control • Antenna Alignment (CLI output) • Integrity Check for Software Upload • QoS Support; up to 8 classes of service, up to 8 service flows per class (BSU only) • Satellite Density • Enhanced Dynamic Frequency Selection (Configured on BSU) • Redundancy • Spanning Tree (802.1D)
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)

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Features and Specifications



Category	Specification
Filtering	<ul style="list-style-type: none"> • Ethernet protocol (Ethertype) • Static MAC • Storm threshold • IP address • Broadcast protocol • Intra Cell Blocking (Configured on BSU)
Services	<ul style="list-style-type: none"> • DHCP Server (RFC 2131) • DHCP Client (RFC 2131) • Bi-Directional Bandwidth Control • NAT (RFC 3022) (Configured on SU) • DHCP Relay (RFC 2131) (Configured on SU)
VLAN	<ul style="list-style-type: none"> • 802.1Q (Configured on BSU)
Security Features	<ul style="list-style-type: none"> • Critical feature support via WORP 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 • MAC Authentication (Configured on BSU) • Secure “over the air encryption” with WEP, WEP+, and AES, and AES-CCB • RADIUS MAC Access Control (Configured on BSU) • RADIUS (RFC 2138) • Intra-cell blocking to allow the BSU to act as the central policy enforcer for SU to SU communications

Management

Category	Specification
Local	RS-232 Serial port (RJ11 port built-into the unit; DB9 female via a converter, included)
Remote	HTTP Server (RFC 2616); Telnet (RFC 855), TFTP Client (RFC 783), Link Test, SU/BSU Statistics, temperature logging, remote reboot/reset
SNMP	SNMPv1/v2 (RFC 1157); SNMPv2c (RFC 1907); MIB-II (RFC 1213); Ethernet-like MIB (RFC 1643); BridgeMIB (RFC 1483); 802.3MAU (RFC 2668); 802.11 MIB; Private MIB; ORiNOCO MIB

LEDs

Category	Specification
Types	Two indicators on RJ45 connector to indicate: <ul style="list-style-type: none"> • Power • Wireless Activity • Ethernet Activity

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Features and Specifications



Power Requirements

Category	Specification
Power-over-Ethernet	<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)
Outdoor Radio Unit	<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

Physical and Environmental Specifications

Category	Specification
Physical	
Dimensions (unpackaged)	10.5 in x 10.5 in x 3.25 in (267 mm x 267 mm x 83 mm)
Weight (unpackaged)	5.5 lbs (2.49 kg) Unit-only; .45 lbs (.20 kg) for power supply
Environmental	
Storage Temperature	-55° to 80°C (-41° to 176° Fahrenheit)
Operating Temperature	-33° to 60°C (-27.5° to 140° Fahrenheit)
Humidity	100%
Wind Loading	125 m.p.h

MTBF and Warranty

Category	Specification
MTBF	>100,000 hours
Warranty	1 year parts and labor