

# Meraki MX64 Firewall/Router QoS Configuration Guide



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## Introduction

The Meraki MX64 Security Appliance is ideal for organizations considering a Unified Threat Management (UTM) solution, for distributed sites, campuses or datacenter VPN concentration.

Since the MX64 is 100% cloud managed, installation and remote management is simple. The MX64 has a comprehensive suite of network services, eliminating the need for multiple appliances. These services include SD-WAN capabilities, application-based firewalling, content filtering, web search filtering, SNORT® based intrusion detection and prevention, Cisco Advanced Malware Protection (AMP), web caching, 4G cellular failover and more. Auto VPN and SD-WAN features are available on our hardware and virtual appliances, configurable in Amazon Web Services.

### Key Security Features

- Stateful firewall
- Auto VPN™ self-configuring site-to-site VPN
- Active Directory integration
- Identity-based policies
- Client VPN (IPsec)
- 3G / 4G failover via USB modem
- Layer 7 application visibility and traffic shaping
- Application prioritization
- Content filtering
- Google SafeSearch and YouTube for Schools
- Intrusion detection & prevention (IDS/IPS)
- Advanced Malware Protection (AMP)
- Cisco Threat Grid2

## Performance and Capacities

- Ideal for small size businesses
- Recommended user count — 50
- Max throughput, all security — 200 Mbps
- Max connections — 100,000
- Max connections per second — 5000
- Max VPN throughput — 100 Mbps
- Max concurrent VPN tunnels — 50
- Max AV throughput — 250 Mbps
- Max concurrent VPN tunnels — 50
- WAN Interfaces — 2 x GbE RJ45
- 1 x USB (cellular failover)
- LAN Interfaces Fixed — 4 x GbE RJ45

### Note:


*The firewalls recommended here are quality hardware that we have tested internally and work reliably with our services. However, given the constantly updated firmware and physical changes made by manufacturers and the nature of cloud-based services, RingCentral cannot control the final configuration of the hardware or your computer systems/networks, or promise that any given firewall will work with your system, or guarantee that our information is 100% up to date.*

*This document is intended to be used as a guide to assist in customer network configuration.*

*These settings have been tested within the RingCentral Tier 3 Lab, and have been proven to increase the QoS per lab requirements.*

# Configure Your Firewall

## Meraki MX64 Firewall Configuration



Brand:

Model:

Firmware version:

Cisco

MX64

12.26

To review the Quick Start Guide for the Meraki click [here](#). See the Meraki Installation Guide [here](#).

- 1. Log into the Meraki Cloud interface..
- 2. Select **Security Appliance**. (Figure 1)

| Security appliance | MONITOR          | CONFIGURE          |
|--------------------|------------------|--------------------|
| Switch             | Appliance status | Addressing & VLANs |
| Organization       | Rogue APs        | Wireless settings  |
|                    | Route table      | DHCP               |
|                    |                  | Firewall           |

Figure 1

- 3. Select **Firewall** (Figure 2A) and Include the 7 RingCentral Supernets per the: [RingCentral Recommendations and Requirements Document](#).

Firewall

Layer 3

Inbound rules

Inbound traffic will be restricted to the services and forwarding rules configured below.

Outbound rules ⓘ

| # | Policy  | Protocol | Source ⓘ | Src port | Destination ⓘ    | Dst port | Comment      | Hits | Actions |
|---|---------|----------|----------|----------|------------------|----------|--------------|------|---------|
| 1 | Allow ▾ | Any ▾    | Any      | Any      | 185.23.248.0/22  | Any      | RC1          | 0    | ↕ ✕     |
| 2 | Allow ▾ | Any ▾    | Any      | Any      | 104.245.56.0/21  | Any      | RC2          | 0    | ↕ ✕     |
| 3 | Allow ▾ | Any ▾    | Any      | Any      | 199.68.212.0/22  | Any      | RC3          | 0    | ↕ ✕     |
| 4 | Allow ▾ | Any ▾    | Any      | Any      | 199.255.120.0/22 | Any      | RC4          | 0    | ↕ ✕     |
| 5 | Allow ▾ | Any ▾    | Any      | Any      | 103.44.68.0/22   | Any      | RC5          | 0    | ↕ ✕     |
| 6 | Allow ▾ | Any ▾    | Any      | Any      | 208.87.40.0/22   | Any      | RC6          | 0    | ↕ ✕     |
| 7 | Allow ▾ | Any ▾    | Any      | Any      | 192.209.24.0/21  | Any      | RC7          | 0    | ↕ ✕     |
|   | Allow   | Any      | Any      | Any      | Any              | Any      | Default rule | 0    |         |

Figure 2A

| Table 3. RingCentral Supernets   |
|--|
| 104.245.56.0/21<br>192.209.24.0/21<br>199.68.212.0/22<br>199.255.120.0/22<br>208.87.40.0/22<br>185.23.248.0/22<br>103.44.68.0/22 |

Figure 2B

4. Go Back into Security Appliance and select Traffic Shaping. (Figure 3)

| Security appliance | MONITOR          | CONFIGURE          |
|--------------------|------------------|--------------------|
| Switch             | Appliance status | Addressing & VLANs |
| Organization       | Rogue APs        | Wireless settings  |
|                    | Route table      | DHCP               |
|                    |                  | Firewall           |
|                    |                  | Site-to-site VPN   |
|                    |                  | Client VPN         |
|                    |                  | Active Directory   |
|                    |                  | Traffic shaping    |
|                    |                  | Access control     |

Figure 3

5. Set the Uplink configuration for the bandwidth which your circuit is providing for each WAN link. (Example circuit 5 Mbps and no WAN 2 or Cellular.) (Figure 4)

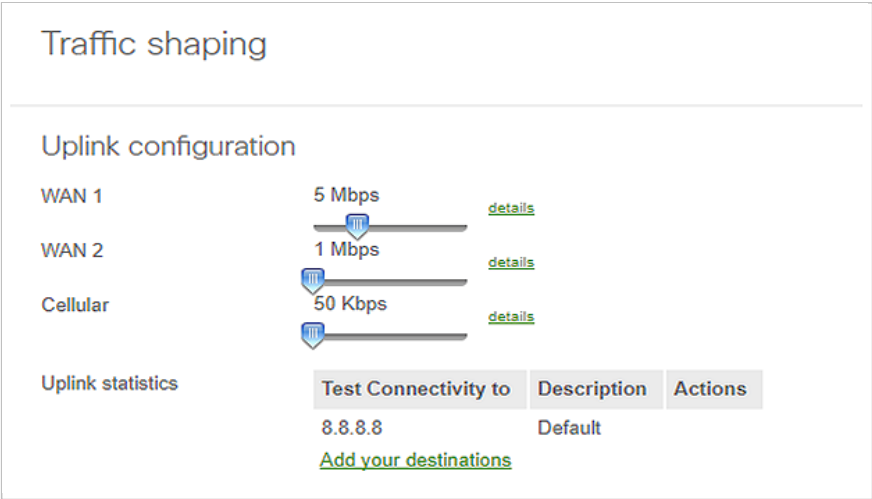
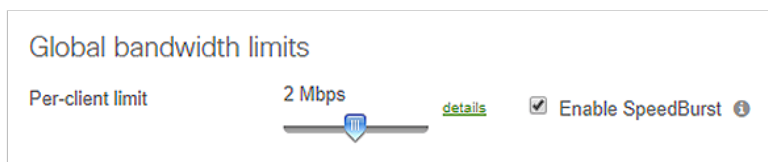


Figure 4

If utilizing WAN2 and Cellular assure the devices are utilizing only one Network on one subnet and you are not load balancing or traversing between Wired and/or Cellular Networks.

6. Under Global bandwidth limits set your per-client limit. (With our 5 Mbps circuit we are allowing 2 Mbps per client with a burst if needed.) (Figure 5)



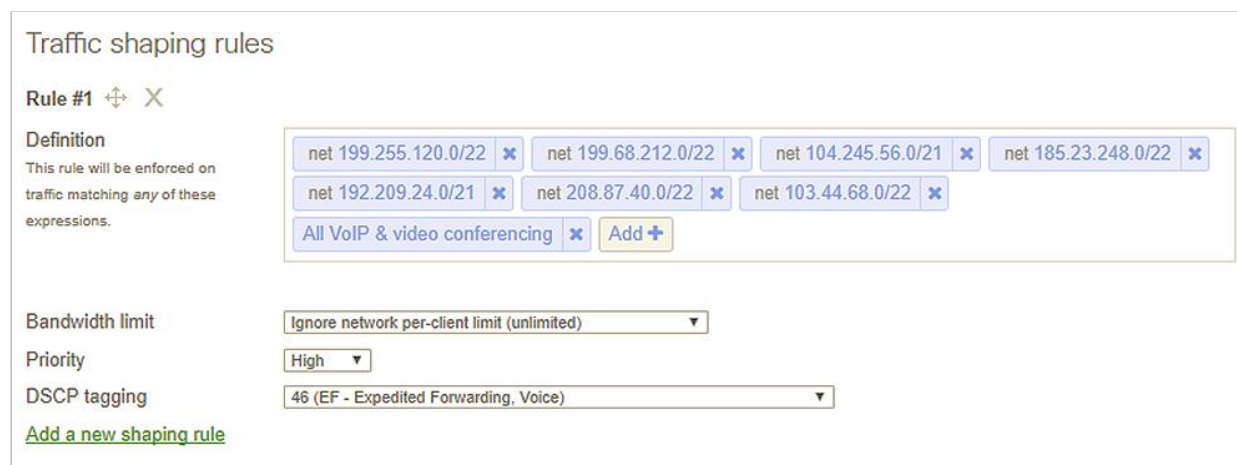
Global bandwidth limits

Per-client limit 2 Mbps [details](#) ☒ Enable SpeedBurst ⓘ

Figure 5

7. Set a Traffic shaping rule: (Figure 6)

- a) Rule #1.
- i. Set bandwidth management (BWM) for the RingCentral Supernets.
  - ii. Bandwidth limit set to “Ignore network per-client (unlimited)”.
  - iii. Priority set to “High”.
  - iv. DSCP tagging set to “46 (EF - Expedited Forwarding, Voice)”.



Traffic shaping rules

Rule #1 ⚙️ ✕

**Definition**  
This rule will be enforced on traffic matching any of these expressions.

net 199.255.120.0/22 ✕ net 199.68.212.0/22 ✕ net 104.245.56.0/21 ✕ net 185.23.248.0/22 ✕  
net 192.209.24.0/21 ✕ net 208.87.40.0/22 ✕ net 103.44.68.0/22 ✕  
All VoIP & video conferencing ✕ [Add +](#)

**Bandwidth limit** Ignore network per-client limit (unlimited) ▼

**Priority** High ▼

**DSCP tagging** 46 (EF - Expedited Forwarding, Voice) ▼

[Add a new shaping rule](#)

Figure 6



## Quality of Service

RingCentral provides reliable, high-quality voice service. Your local network, internet connection, and your router all contribute to overall call quality, with sufficient dedicated bandwidth to voice calls being the biggest factor. To help you manage your call quality, RingCentral offers tools to check your internet connection speed, and instructions to configure the Quality of Service (QoS) settings of your routers.

The QoS settings on your router enable it to give priority to real-time voice traffic over lower-priority data traffic, such as large downloads. This document provides recommended configuration settings to ensure the highest-possible QoS experience on the Meraki MX64 Firewall/Router. Please reference the relevant TCP/UDP settings on the [Ports and Firewalls](#) table to complete the recommended setup.

## Test Your Connection Capacity

The RingCentral **Connection Capacity test** will help determine the maximum number of simultaneous RingCentral calls that can be supported on your broadband connection. Run this test during normal business hours when the connection is in use by other applications, including large file downloads.

The capacity test should be run using the maximum number of simultaneous call connections needed, and should use the G.711 codec selection.

### Specific requirements for QoS:

- Bandwidth—100 Kbps up and down per call
- Latency (one-way)—less than 150 ms
- Jitter—not to exceed 100 ms
- Packet loss—less than 3%

These requirements are the foundation for ensuring your local network can support satisfactory VoIP. Failure to meet these requirements will result in poor voice quality.

When the test completes, you will see the recommended number of simultaneous calls your connection can support while maintaining good quality voice calls.

## Supported Browsers for Test

- Internet Explorer® 11 or higher (Windows® XP, 7, 8 or higher)
- Firefox® version 36 or higher (Windows and Mac®)
- Safari version 6.2 or higher (Mac)

### Note:

*The routers recommended here are quality hardware that we have tested internally and work reliably with our services. However, given the constantly updated firmware and physical changes made by manufacturers and the nature of cloud-based services, RingCentral cannot control the final configuration of the hardware or your computer systems/networks, or promise that any given router will work with your system, or guarantee that our information is 100% up to date.*

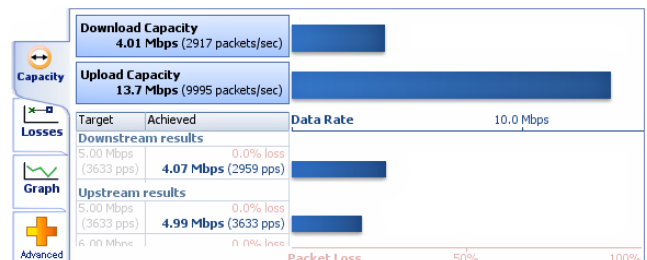
### Start Test

#### Advanced Options

Download bandwidth starting point (Mbps): 5.0 

Upload bandwidth starting point (Mbps): 5.0 

Codec: G.711 (High) 



## Test Your Connection Quality

RingCentral provides a **VoIP Quality test** that will simulate VoIP calls between your computer and RingCentral, and provide an estimate of the voice quality you should expect when using our service. For the most accurate results, run this test *at least* three different times throughout a business day, and *during peak usage times*, while connected to the network that you plan to use for RingCentral.

A two-minute test is typically sufficient, while longer tests are useful to find intermittent problems or to simultaneously test VoIP performance along with other traffic, such as file transfers or remote access.

Select the maximum number of simultaneous users you expect to support, and set the test duration between 1 and 5 minutes; 2 minutes is considered sufficient in most instances.

Click [jitter](#) and [packet loss](#) on the **RESULTS SUMMARY** panel to view the overall quality of your expected VoIP connection.

**MOS score** (Mean Opinion Score) refers to a test that has been used for decades in telephony networks to obtain the human user's view of the quality of the network. The MOS is the arithmetic mean of all the individual scores, and can range from 1 (worst) to 5 (best). A MOS score of 4 is good.

Number of simultaneous calls:  ⓘ

⚙️ **Advanced Options**

Test Duration (minutes):  ⓘ

Codec:  ⓘ

Start Test

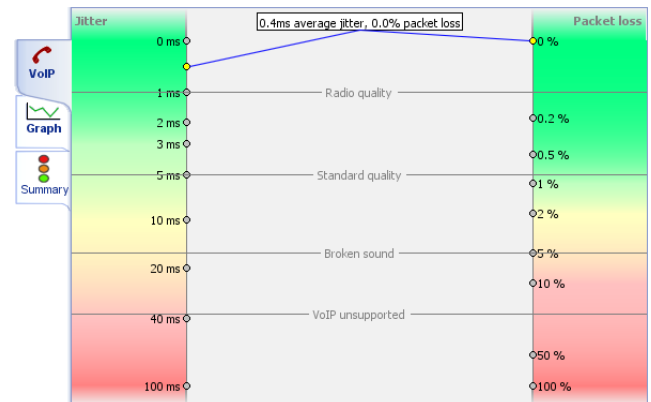
Test audit report

**RESULTS SUMMARY**

Your connection's [jitter](#) was measured as 0.4 ms, which indicates that it can produce a constant flow of data. Voice-over-IP conversations should be of good quality.

Your connection's [packet loss](#) was measured at 0.0%, which indicates that it is accurately transferring data. Voice-over-IP conversations should be of good quality.

Your connection's [MOS score](#) is estimated to be 4.2.



## Ports and Firewalls Settings for RingCentral VoIP Service

Please see RingCentral [Ports and Firewalls](#) reference link for the required TCP/UDP ports that need to be opened for RingCentral devices to work. Categories are:

- Device Type
- Protocol
- Source Port—Customer Side
- Destination Port—RingCentral Side

Also see information on **Port Triggering** on the referenced [page](#).