Meraki MX64 Firewall/Router
QoS Configuration Guide

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Contents

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.*

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Configure Your Firewall

Meraki MX64 Firewall Configuration
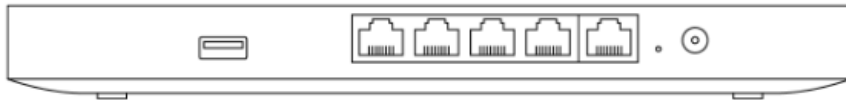
Brand:	Cisco
Model:	MX64
Firmware version:	12.26

To review the Quick Start Guide for the Meraki click here. See the Meraki Installation Guide here.

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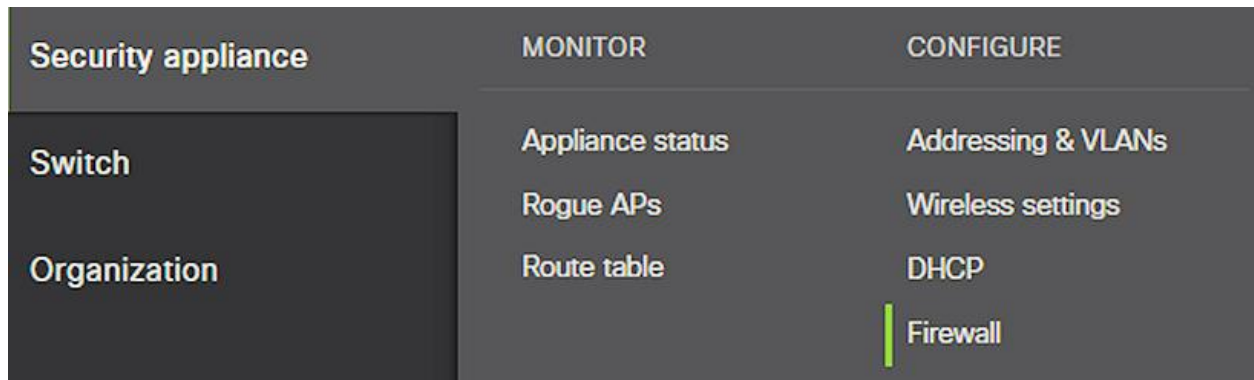
2. Select **Security Appliance**. (Figure 1)

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
192.209.24.0/21
199.68.212.0/22
199.255.120.0/22
208.87.40.0/22
185.23.248.0/22
103.44.68.0/22

Figure 2B

5

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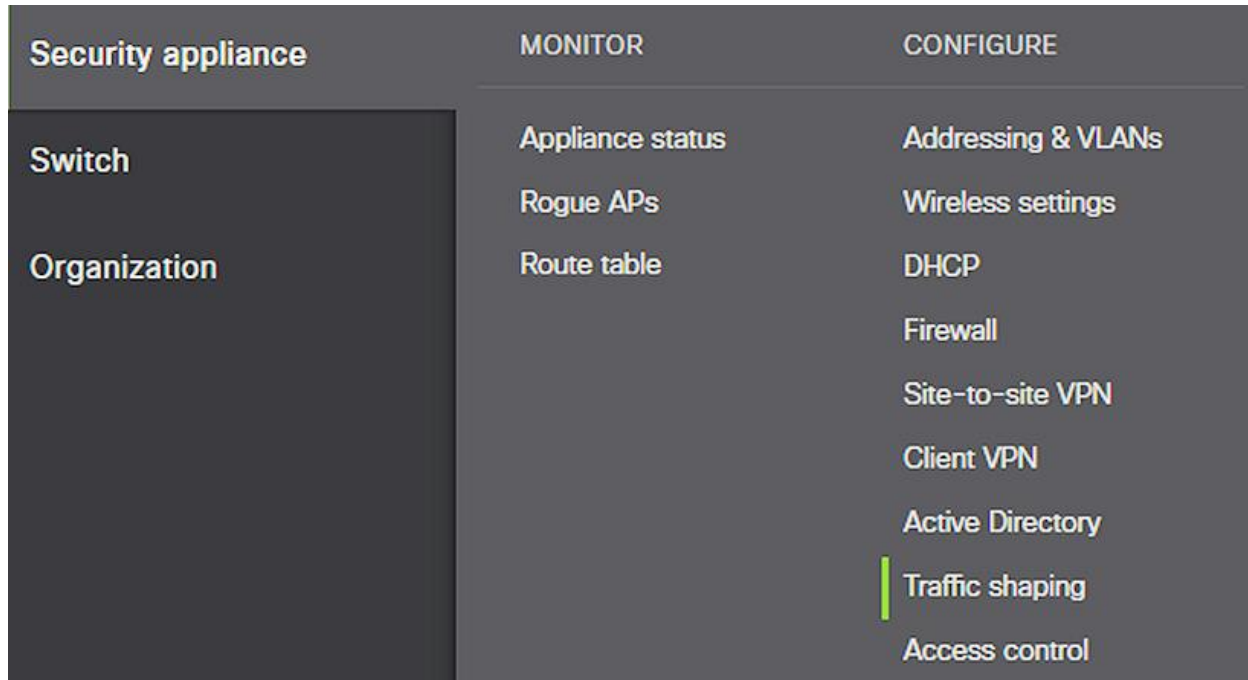

Figure 3

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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)
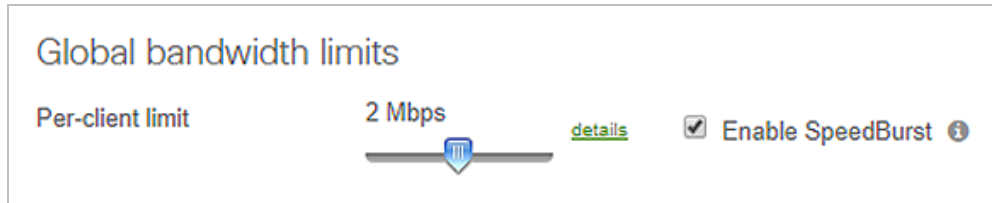
Figure 5

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. DSP tagging set to "46 (EF - Expedited Forwarding, Voice).
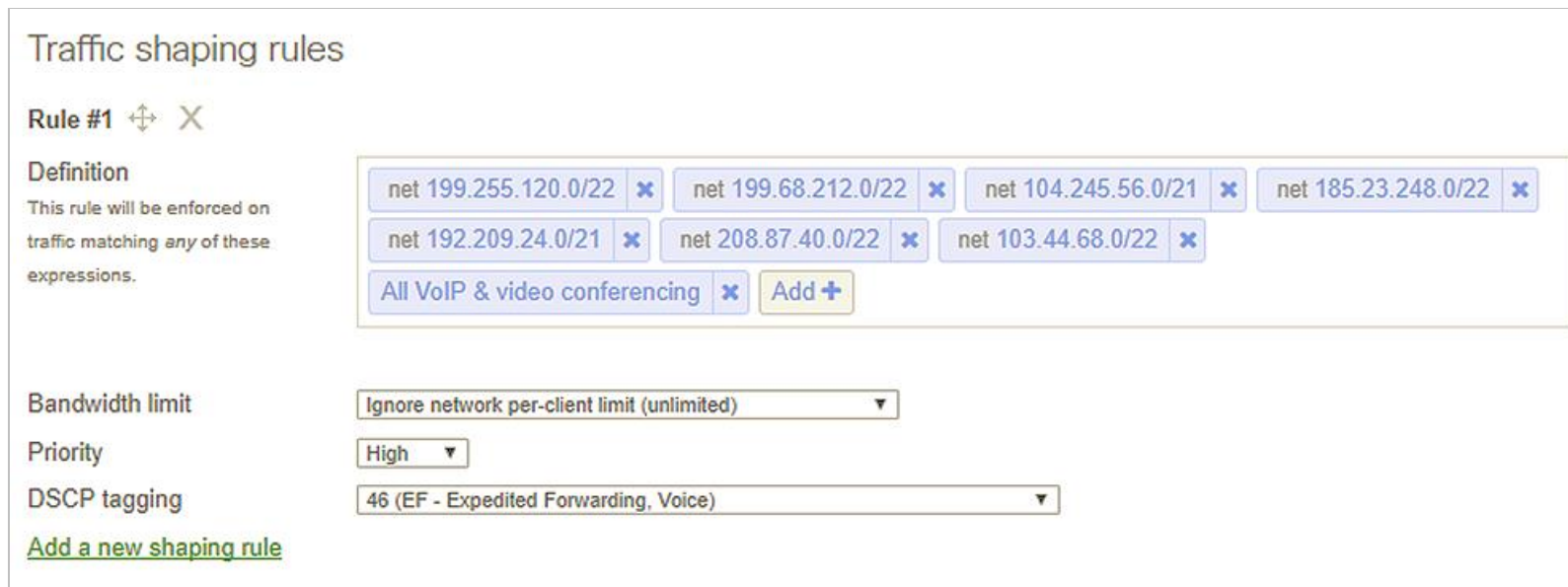
Figure 6

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.
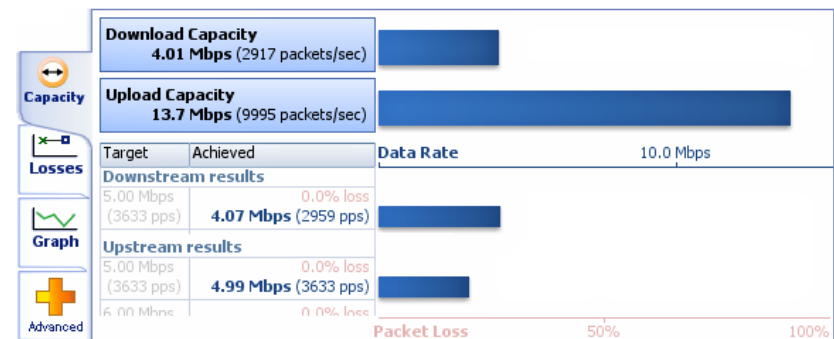
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Test Your Connection Quality

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: 45

⊖ Advanced Options

Test Duration (minutes): 2

Codec: G.711 (High)

Start Test

RESULTS SUMMARY

Test audit report

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 whould be of good quality.

Your connection's MOS score is estimated to be 4.2.

VoIP

Graph

Summary

0.4ms average jitter, 0.0% packet loss

Jitter / Packet loss
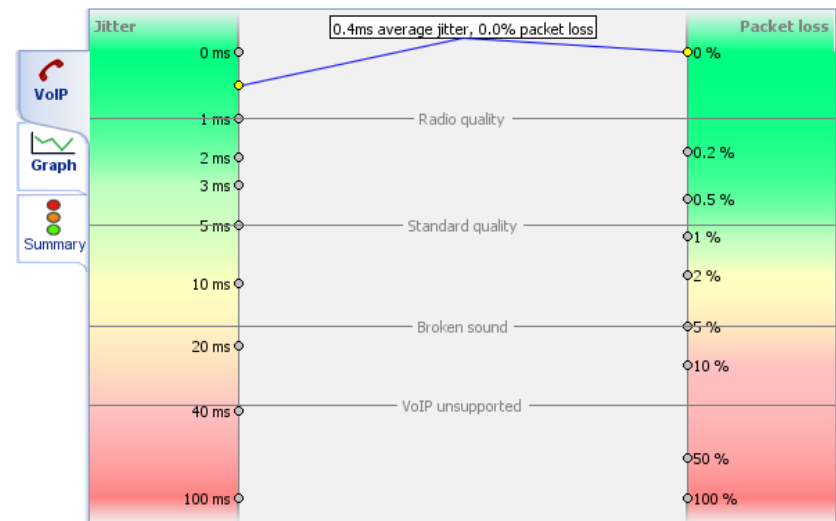
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Ports and Firewalls Settings for RingCentral VoIP Service

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.