Recommended QoS Configuration Settings for SONICWALL SOHO Router
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Introduction

RingCentral® has taken the “guesswork” out of router selection. Since we know that Quality of Service (QoS) is paramount to your business, we have carefully selected and tested a set of dependable routers suitable for supporting high quality Voice-over-IP conversations.

This document provides recommended configuration settings to ensure the highest possible QoS for voice calls on the SONICWALL® SOHO wireless router.

Additional routers that have been tested and recommended are shown on the Recommended Routers page of the RingCentral website.

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.
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 Quality of Service (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 on the SONICWALL SOHO router. After configuring your router for optimum QoS, select port and firewall settings for mobile and softphone apps from the table here.

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 100Kbps up and down per call; Latency (one-way) less than 150ms; Jitter not to exceed 100ms; 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.
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). An MOS score of 4 is good.
Configure your router

SONICWALL SOHO QoS configuration

To review the guide that covers configuring QoS in the SonicOS operating system click here.

1. Log into the SONICWALL router with administrative permissions. The default username is admin and the default password is admin. Click OK.

2. On the left side of the page, expand VoIP / Settings.
   Check the Enable consistent NAT box and uncheck all other settings. Select Accept to save the changes.
   (See the graphic on the next page.)
2. On the left side of the page, expand **VoIP / Settings** – illustrated; see instructions above.
3. Go to Firewall Settings / BWM.

3A. Under Bandwidth Management Type, select Global.
3B. Under Priority, disable EVERY category, except for Medium, which is enabled by default; set Guaranteed to 50%; Maximum\Burst to 100%.
3C. Enable Realtime; set Guaranteed to 50%; Maximum\Burst to 100%.
3D. Click Accept to save changes/settings.
4. Go to Network / Interfaces / X1 (WAN).
   
   4A. Under the General tab, click the Configure icon (on far right).
   
   4B. Go to Advanced tab > Link Speed: and set to Auto Negotiate (UNLESS there’s a need to set it to something specific)
   
   4C. Under Bandwidth Management check Enable Egress; set Interface Egress Bandwidth to match the available bandwidth;
       check Enable Ingress; set Interface Ingress Bandwidth to match the available bandwidth.
   
   4D. Click OK to save changes/settings.
5. On the left side of the page, Expand Network. Select Address Objects and create objects and subnet masks for 80.81.128.0/255.255.240.0; 103.44.68.0/255.255.255.0; 104.245.56.0/255.255.248.0; 185.23.248.0/255.255.252.0; 192.209.24.0/255.255.248; 199.68.212.0/255.255.252.0; 199.255.120.0/255.255.252.0; 208.87.40.0/255.255.252.0 as shown at bottom.

5A. Scroll down and click Add to add the RCFFullRang Supernets.

5B. Create objects for the following: RingCentral Supernets.
Recommended QoS Configuration | SONICWALL SOHO | Configure your router

SONICWALL | Network Security Appliance
Name: RCFullRange 1
Zone Assignments: WAN
Type: Network
Network: 192.168.1.128.0
Network/Prefix Length: 255.255.248.0
Ready
Add Close

SONICWALL | Network Security Appliance
Name: RCFullRange 2
Zone Assignments: WAN
Type: Network
Network: 103.44.48.0
Network/Prefix Length: 255.255.255.0
Ready
Add Close

SONICWALL | Network Security Appliance
Name: RCFullRange 3
Zone Assignments: WAN
Type: Network
Network: 104.245.56.0
Network/Prefix Length: 255.255.248.0
Ready
Add Close

SONICWALL | Network Security Appliance
Name: RCFullRange 4
Zone Assignments: WAN
Type: Network
Network: 185.32.194.0
Network/Prefix Length: 255.255.252.0
Ready
Add Close

SONICWALL | Network Security Appliance
Name: RCFullRange 5
Zone Assignments: WAN
Type: Network
Network: 192.209.34.0
Network/Prefix Length: 255.255.248.0
Ready
Add Close

SONICWALL | Network Security Appliance
Name: RCFullRange 6
Zone Assignments: WAN
Type: Network
Network: 199.68.212.0
Network/Prefix Length: 255.255.252.0
Ready
Add Close

SONICWALL | Network Security Appliance
Name: RCFullRange 7
Zone Assignments: WAN
Type: Network
Network: 199.255.120.0
Network/Prefix Length: 255.255.252.0
Ready
Add Close

SONICWALL | Network Security Appliance
Name: RCFullRange 8
Zone Assignments: WAN
Type: Network
Network: 208.87.40.0
Network/Prefix Length: 255.255.252.0
Add Close

[Note: Each SONICWALL instance is managed separately, allowing for detailed configuration and monitoring of network security and QoS settings.]
6A. Once the address objects are added, add the address group from the same section of the interface, as seen below.

6B. Click OK. Once added you can expand the group and it should look like this:
7A. On the left side of the page, Expand Network and select Services.

A) **Incoming Interface:** WAN  
B) **Source Address:**  
   - Click Add button  
   - RC Network 1  
   - Click Add button  
   - RC Network 2  
C) **Outgoing Interface:** LAN  
D) **Destination Address:** all  
E) **Schedule:** always  
F) **Service:**  
   - Click Add button  
   - RC VoIP SIP RTP  
G) **Traffic Shaping:**  
   - Shared Shaper: Set to RC VoIP  
   - Reverse Shaper: Set to RC VoIP
7B. Under Services click the **Add** option. Then add the following services to support the RingCentral Desk Phone. (See Table B.1, here.)

1. RC1: UDP 20000 - 64999 – Media/Media Secured
2. RC2: UDP 5090 – Signaling
3. RC3: TCP 5090 – Signaling
4. RC4: TCP 5099 – Signaling (when line sharing is used)
5. RC5: TCP 5096 – Signaling Secured
6. RC6: TCP 5098 – Signaling Secured
7. RC7: UDP - 123 – Network Time Service
8. RC8: TCP 636 – LDAP Directory Service
9. RC9: TCP 443 – Provisioning

Other types of endpoints require addition of Services according to Tables B.2 through B.9, here.

7D. Now select the **Add Group** option from the **Service Groups** section, also under the **Services** section. Name the group RingCentral; highlight all RingCentral Services. Use the arrows in the box to move the highlighted information from left the right.

**Note:**

Selections shown at left are the default profiles for the SONICWALL router *before* step 7B.

Select **OK**. The RingCentral Service should now be added.
8. On the left side of the page, Expand Firewall. Select Access Rules. Click the Add button.
9. Create two new rules for WAN to LAN and LAN to WAN, as seen below. Select **Add** for both and select the drop-down menus as indicated in the screenshots.
10. The RingCentral Access Rule should now be added.

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<th>19</th>
<th>LAN</th>
<th>&gt;</th>
<th>WAN</th>
<th>7</th>
<th>Any</th>
<th>RCFullRNGGrp</th>
<th>Any</th>
<th>Allow</th>
<th>All</th>
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<td>11</td>
<td>RCFullRNGGrp</td>
<td>Any</td>
<td>Any</td>
<td>Allow</td>
<td>All</td>
</tr>
</tbody>
</table>

11. Click edit on both the LAN to WAN and WAN to LAN settings and go to the **Ethernet BWM** tab. Enable both the inbound and outbound bandwidth management settings and set to **Realtime**.
12. Go to the QoS tab and set the DSCP Marking Action to Explicit and set the Explicit DSCP Value to “46” and click OK to save.

**Congratulations.** You have finished configuring your SONICWALL SOHO firewall/router for QoS prioritization of voice packets.

Now select the port and firewall settings for mobile and softphone apps from the table on the next page.
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.