

# Recommended QoS Configuration Settings for NETGEAR R6400 Wireless 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 NETGEAR® R6400 router. Additional routers that have been tested and recommended are shown on the [Recommended Routers](#) page of the RingCentral Customer Care 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 experience on the NETGEAR R6400 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.

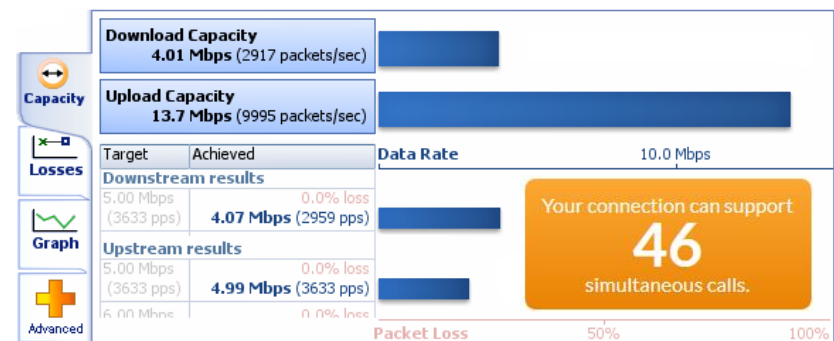
Start Test

**⊖ Advanced Options**

Download bandwidth starting point (Mbps):  ?

Upload bandwidth starting point (Mbps):  ?

Codec:



## 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:  i

**Advanced Options**

Test Duration (minutes):  i

Codect:  i

**Start Test**

VoIP
**RESULTS SUMMARY**

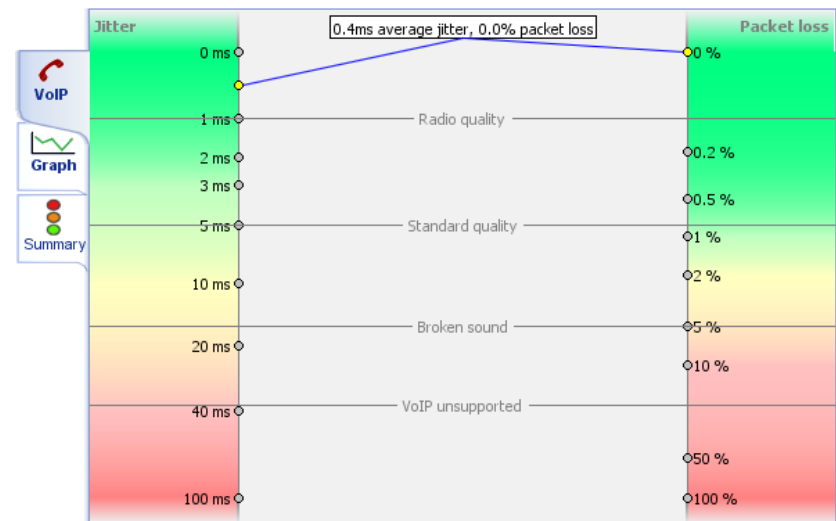
Graph
Test audit report

Summary

**0.4 ms** 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.

**0.0%** 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.



# Configure your Router

## NETGEAR RT6400 (AC1750) QoS Configuration



Brand:	NETGEAR
Model:	R6400
Hardware version:	R6400
Firmware version:	V1.0.1.20

To review the User Guide for the NETGEAR R6400 click [here](#).

1. Enter <http://routerlogin.net> in the address bar of a web browser. User Name is **admin** and the default password is **password**. Click **Log In**.

Authentication Required

The server <http://routerlogin.net:80> requires a username and password. The server says: NETGEAR R6400.

User Name:

Password:

2. Click **Advanced**; then **Setup**. Select option **WAN Setup**. Check the option for **Disable SIP ALG** and click the **Apply** button

The screenshot shows the router's configuration interface. On the left is a sidebar with a 'BASIC' tab and an 'ADVANCED' tab. Under 'ADVANCED', there are several menu items: 'ADVANCED Home', 'Setup Wizard', 'WPS Wizard', 'Setup' (expanded), 'Internet Setup', 'Wireless Setup', 'WAN Setup' (highlighted in blue), 'LAN Setup', 'QoS Setup', and 'Guest Network'. Below these are 'USB Functions', 'Security', 'Administration', and 'Advanced Setup'. The main content area is titled 'WAN Setup' and contains several settings:

- Disable Port Scan and DoS Protection
- Default DMZ Server
- Respond to Ping on Internet Port
- Disable IGMP Proxying

Below these are sections for 'MTU Size(in bytes)' and 'NAT Filtering', with the following option checked:

- Disable SIP ALG

At the top right of the 'WAN Setup' section, there are two buttons: a green 'Apply' button and a purple 'Cancel' button.

### 3. QoS Setup

- 3A. Click **QoS Setup** under that same **Setup** tab.
- 3B. Click **Upstream QoS**.
- 3C. Click **Enable Upstream QoS**.
- 3D. Set the Uplink Bandwidth using the **Speed Test** option.
- 3E. Click **Apply**.

The screenshot shows the router's configuration interface. The 'ADVANCED' tab is active. In the left-hand navigation menu, the 'Setup' category is expanded, and 'QoS Setup' is highlighted. The main panel displays the 'Upstream QoS' configuration. The 'WMM' tab is selected, and the 'Upstream QoS' sub-tab is highlighted with a red box. Below this, the 'Enable Upstream QoS (Optimized for Gaming)' checkbox is checked. The 'Uplink bandwidth: Maximum' is set to 5 Mbps, and the 'Speed Test' button is visible. The 'OOKLA' logo is also present. At the bottom, there is a 'QoS Priority Rule list' section with a 'Setup QoS rule' button. The 'Apply' and 'Cancel' buttons are located at the top right of the main panel.



#### 4. QoS Priority Rules

4A. Click **Setup QoS Rule** under that same **Upstream QoS** section.

4B. Click **Add Priority Rule** and set using the below template for all of RingCentral's **required ports**:

- a. QoS Policy for: RC1
- b. Priority: Highest
- c. Connection Type: TCP/UDP
- d. Starting Port: 5060
- e. Ending Port: 6000

### QoS - Priority Rules

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Priority	
QoS Policy for	<input type="text" value="RC1"/>
Priority Category	<input type="text" value="Applications"/>
Applications	<input type="text" value="Add a new application"/>
Priority	<input type="text" value="Highest"/>

---

Specified Port Range	
Connection Type	<input type="text" value="TCP/UDP"/>
Starting Port	<input type="text" value="5060"/> (1-65535)
Ending Port	<input type="text" value="6000"/> (1-65535)

5. Create new priority rules for all required RingCentral ports.

## 6. QoS Priority Rules—continued

6A. Click **Downstream QoS** under the **QoS Setup** tab.

6B. Check **Enable Downstream QoS**.

6C. Add rules based on **By Device**. Select the RingCentral phone under the list of devices and click **Add**.

6D. Repeat this process for all RingCentral phone devices on this list.

**\*\*Please be aware: Adding rules By Keyword is not recommended.\*\***

**ADVANCED**

WMM   Upstream QoS   **Downstream QoS**

Apply   XCancel

**Downstream QoS**

**Enable Downstream QoS (Improved Video Streaming)**

Streaming Database Auto Update  

Streaming Database Version: v1.9

Add Rules:  by Keyword    **By Device**

	Rule Name	Device Name
<input checked="" type="radio"/>	DEVICE_MAC_89AD1E	--
<input type="radio"/>	DEVICE_MAC_86730A	--
<input type="radio"/>	DEVICE_MAC_D29D20	--
<input type="radio"/>	DEVICE_MAC_1A53A3	LPRC4047
<input type="radio"/>	DEVICE_MAC_2FA824	SEP80FAEB2FA824
<input type="radio"/>	DEVICE_MAC_4D4D40	android-65832cc88b813bc8

Rule Name:

MAC Address:

Device Name:

## 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](#).