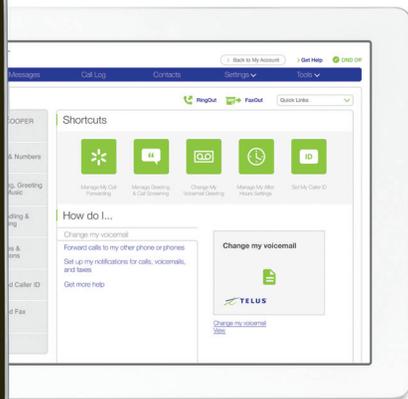


Router Configuration Guide

# TELUS Business Connect™



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## Section 1 - What is Quality of Service (QoS)

### Introduction

Welcome to your new TELUS Business Connect phone solution. Since our cloud based business phone system works through an Internet connection, you will need to make some basic adjustments to your router in order to ensure that it is optimized for the best quality. Most small-office routers are up to the task; however, they may not be optimally configured for Voice-Over-IP (VoIP). Fortunately, this document will present steps you can take to improve the quality of your calls.

### What is Quality of Service (QoS)?

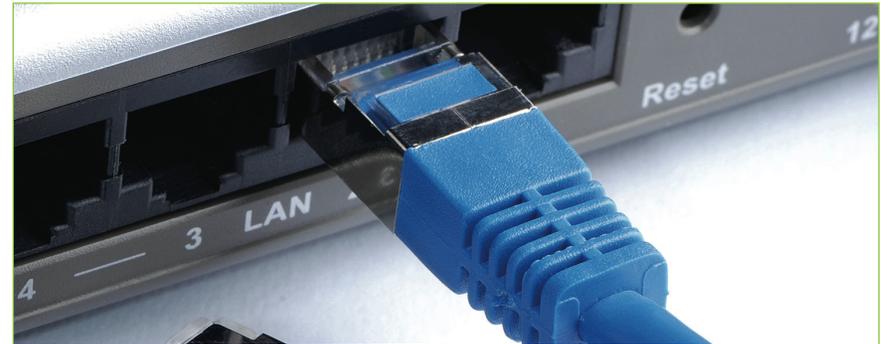
Quality of Service or (QoS) is a digital network solution that prioritizes your network traffic, including voice and multi-media, to ensure that your key data has priority over less important traffic during times of high usage. VoIP can guarantee high-quality voice transmissions only if the voice packets are given priority over other kinds of network traffic.

Your Internet connection and devices you use to connect to the Internet can affect your QoS. Design your network for voice and use QoS-enabled network equipment. There are special considerations when designing your network to support voice traffic. QoS-enabled routers prioritize voice traffic over lower priority network traffic, such as large downloads. QoS-enabled switches perform the same function in the switch.

### Ensure you have the right amount of bandwidth

A solid Internet connection means solid voice quality. We recommend using a high-speed DSL, cable, or fiber optic connection with dedicated upload and download bandwidth (speed only for voice, not sharing with data) How much bandwidth do you need? It depends on how many calls and devices you want to connect. Here is our rule of thumb. XX/YY represents your internet speed:

<b>How much capacity do I need?</b>	XX/1	XX/5	XX/10
<b>Number of concurrent calls</b>	1 to 3	1 to 25	1 to 50
<b>Number of connected devices</b>	Up to 5	Up to 50	Up to 150



### Why Do I Need To Adjust My Router?

Routers handle traffic from many devices. To ensure you the best performance from your VoIP phone service, you need to configure your router to make sure your service operates well. In order to make sure that your routers are configured properly, you need to follow the Quality of Service (QoS) best practices for your router.

### Why Do I Need to Optimize My Router for Voice (VoIP) Traffic?

In this case, adjusting the QoS will allow packets containing voice data, which is mandatory for maintaining the highest quality phone communication performance, to be treated as critical and therefore given top priority. Unless you instruct your network router to prioritize voice over data traffic, the two types of traffic will compete, often at the expense of voice quality. When your voice traffic is prioritized, the audio performance will be smoother, jitter will be reduced, and the overall user experience at both ends will dramatically improve.

## Section 2 - TELUS Business Connect Recommended Routers

### List of Recommended Routers

ASUS RT-N66U Dark Knight

Linksys E1200

NetGear G54

NetGear N300

NetGear N600

NetGear N750

NetGear N900

### What if my router is not listed?

Consult your router's user manual for how to configure QoS.

### Connecting Your Device

1. First, connect a computer to the router. This step can work through Wi-Fi, especially if you're reconfiguring a router instead of starting fresh. We recommend you use a wired, Ethernet cable to eliminate potential problems. Connect the cable between a PC and one of the router's LAN ports.
2. The next step is similar for different routers, although it can vary by brand. Frequently, Linksys routers use 192.168.1.1, D-Link uses 192.168.0.1, Belkin uses 192.168.2.1, and Netgear uses 192.168.0.1 or 192.168.1.1. Open a web browser, and enter the address, such as "http://192.168.0.1". Consult your documentation or search online for "[your router model] default IP address".
3. Next, you should be prompted for a username and password. Often, Netgear uses "admin" and "password". D-Link and Linksys routers often use "admin" and "admin", or just use "admin" for one and a blank value for the other. Belkin often uses "admin" and a blank value. You can look in your manual or search online for your specific brand.
4. If the router and computer are set for DHCP by default, as most are, you're finished. Once you're in, be sure to change the default password (and login if possible). Also, change the internal (LAN) IP address for the router. Pick something such as "192.168.n.1", where n equals anything between 2 and 254, like "192.168.22.1". Be sure to write down all of this information; you'll now reach the router in a web browser through that new IP address. If you lose any of these details, follow the manual's directions to reset the router.

## Section 3 - Configuration Guides

### Step by Step Router Configuration

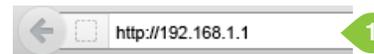
We've provided step by step configuration instructions for some of the most commonly available and recommended wireless routers to ensure that you will experience the finest QoS with your TELUS Business Connect service. Below you will find 7 routers listed by brand name and model number.

### Configuring QoS on the ASUS RT-N66U Dark Knight to Prioritize VoIP Traffic

Brand: ASUS  
Model: RT-N66U  
Firmware Version: 3.0.0.3.112



1. Log in to the router. Follow the prompts to create a password and a username will be given to you.



2. Click "Traffic Manager" on the left hand side.



3. Click on the "QoS" slider to turn QoS on.

4. When the QoS slider turns green, enter your current bandwidth for both the upload and download. (If unsure of your current bandwidth speed, please run a speed test at <http://toronto.speedtest.telus.com/>.)

5. Click “Save” after entering your bandwidth figures.

6. Be sure to power cycle/reboot the router before proceeding.

7. Your QoS should now be configured.

The screenshot shows a configuration panel for Quality of Service (QoS). The QoS toggle switch is turned ON and is highlighted with a green callout bubble containing the number 4. Below this, the Upload Bandwidth is set to 1.7 Mb/s and the Download Bandwidth is set to 1.9 Mb/s. The Save button is highlighted with a green callout bubble containing the number 5.

QoS	<input checked="" type="checkbox"/>	
Upload Bandwidth	1.7	Mb/s
Download Bandwidth	1.9	Mb/s

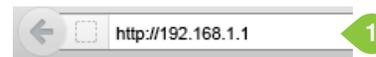
Save

## Configuring QoS on the Linksys E1200 to Prioritize VoIP Traffic (MAC Method)

Brand: Linksys  
Model: E1200  
Hardware Version: E1200  
Firmware Version: 2.0.04 build 1



1. Log in to the router. The default IP address is 192.168.1.1.  
The default username is "admin". The default password is "admin".



2. Click on "Applications & Gaming" tab.



3. Click on "QoS".

4. Select the radial button "Enabled" next to the field labeled "Internet Access Priority".



5. In the field labeled "Upstream Bandwidth", select "Manual" from the drop-down menu and enter your current upload speed. (If unsure of your current upload speed, please run a speed test at <http://toronto.speedtest.telus.com/>.)

6. Select "MAC Address" from the drop-down menu labeled "Category".

7. You will need the MAC address for each IP device to continue. In the field labeled "Enter a Name", enter a unique name for the device for which you will prioritize traffic.

8. In the field labeled "MAC Address" enter the MAC address for the device.

<b>Internet Access Priority</b> Upstream Bandwidth Category	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled
	Manual <input type="text" value="1800"/> Kbps <input type="text"/>
	MAC Address <input type="text" value="My Current PC's MAC Address: A4:BA:DB:DC:24:30"/>
	Enter a Name <input type="text" value="Cisco 525G2 Wired"/>
	MAC Address <input type="text" value="70:81:05:B8:30:34"/> <b>8</b>
Priority <input type="text" value="Medium (Recommended)"/>	

9. In the field labeled "Priority", select "High" from the drop-down menu.

<b>Internet Access Priority</b> Upstream Bandwidth Category	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled						
	Manual <input type="text" value="1800"/> Kbps <input type="text"/>						
	MAC Address <input type="text" value="My Current PC's MAC Address: A4:BA:DB:DC:24:30"/>						
	Enter a Name <input type="text" value="Cisco 525G2 Wired"/>						
	MAC Address <input type="text" value="70:81:05:B8:30:34"/>						
Priority <input type="text" value="Medium (Recommended)"/>							
<b>Summary</b>	<table border="1"><thead><tr><th>Priority</th><th>Name</th><th>Information</th></tr></thead><tbody><tr><td></td><td></td><td></td></tr></tbody></table>	Priority	Name	Information			
	Priority	Name	Information				

Medium (Recommended) **9**

- High
- Medium (Recommended)
- Normal
- Low

10. Click "Apply" to save changes.

**Internet Access Priority**

**Upstream Bandwidth**

**Category**

Enabled  Disabled

Manual  Kbps

MAC Address

<b>Enter a Name</b>	<input type="text" value="Cisco 525G2 Wired"/>
<b>MAC Address</b>	<input type="text" value="70:81:05:B8:30:34"/>
<b>Priority</b>	<input type="text" value="High"/>

10

11. Repeat steps 6-10 until you have entered all of the IP phones. When all have been entered and you see them in the "Summary" section, click on "Save Settings".

12. Power cycle/reboot the router before proceeding.

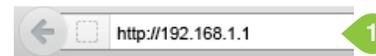
**Summary**

Priority	Name	Information		
High	Cisco 525G2 Wired	MAC 70:81:05:B8:30:34	<input type="button" value="Remove"/>	<input type="button" value="Edit"/>
High	Cisco 525G2 Wireless	MAC 70:81:05:B8:1B:4E	<input type="button" value="Remove"/>	<input type="button" value="Edit"/>
High	polycom	MAC 00:04:F2:40:83:24	<input type="button" value="Remove"/>	<input type="button" value="Edit"/>
High	pc softphone	MAC A4:DB:DB:DC:24:30	<input type="button" value="Remove"/>	<input type="button" value="Edit"/>

11

## Configuring QoS on the Linksys E1200 to Prioritize VoIP Traffic (Port Method)

1. Log in to the router. The default IP address is 192.168.1.1.  
The default username is "admin". The default password is "admin".



2. Click on "Applications & Gaming" tab.



3. Click on "QoS".

4. Select the radial button "Enabled" next to the field labeled "Internet Access Priority".

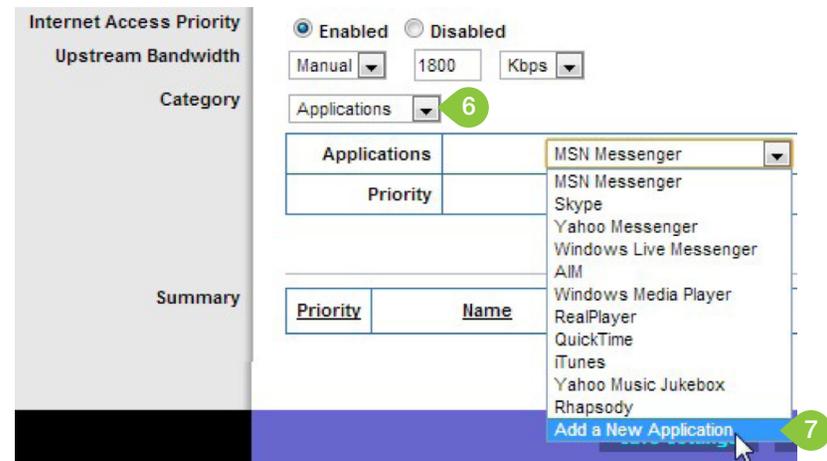


5. In the field labeled "Upstream Bandwidth", select "Manual" from the drop-down menu and enter your current upload speed. (If unsure of your current upload speed, please run a speed test at <http://toronto.speedtest.telus.com/>.)

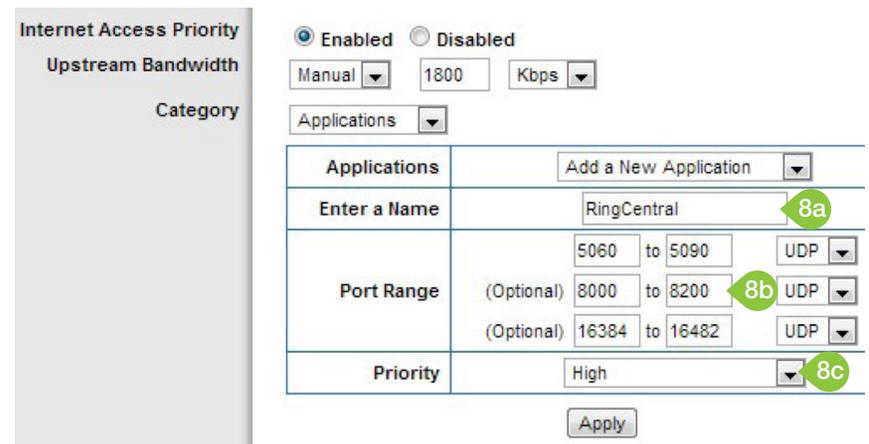


6. In the "Category" section, select "Applications" from the drop-down menu.

7. In the field labeled "Applications", select "Add a New Application" from the drop-down menu.



8. Enter a unique name in the "Enter a Name" field. Enter the following port ranges and select "UDP" from the drop-down menu to the right of each port range field and set the priority to "High" on the drop-down menu: 5060-5090, 8000-8200, 16384-16482.





## Configuring QoS on the Netgear G54 to Prioritize VoIP Traffic

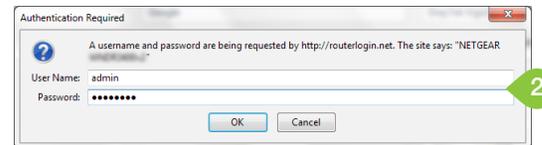
Brand: NetGear  
Model: G54  
Hardware Version: WGR614v10  
Firmware Version: V1.0.2.26\_51.0.59NA



1. Open your browser and navigate to <http://192.168.1.1>.



2. Log in to the router. The default username is "admin".  
The default password is "password".



3. Under the "Advanced" header, select "QoS Setup".



4. Check the box next to "Turn Internet Access QoS On".

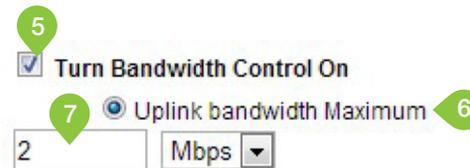
5. Check the box next to "Turn Bandwidth Control On".

6. Select the "Uplink bandwidth Maximum" radial button.

7. Enter in your current upload speed.  
(If unsure of the current upload speed, run a speedtest at <http://toronto.speedtest.telus.com/1>.)

8. Be sure to save any changes and reboot the router before proceeding.

9. Your QoS should now be configured.

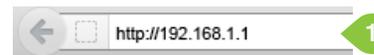


## Configuring QoS on the Netgear N300 to Prioritize VoIP Traffic

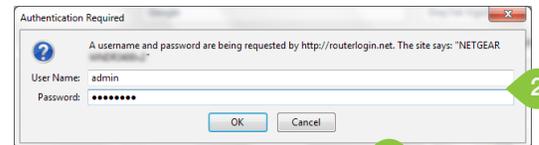
Brand: NetGear  
Model: N300  
Hardware Version: WNR3500Lv2  
Firmware Version: V1.2.0.16\_40.0.66



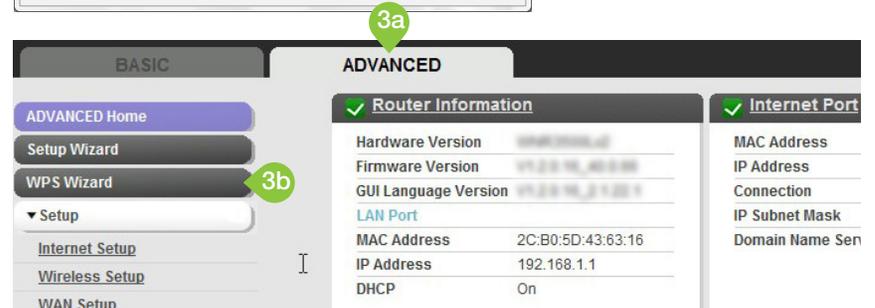
1. Open your browser and navigate to <http://192.168.1.1>.



2. Log in to the router. The default username is "admin".  
The default password is "password".



3. Select the "Advanced" tab and select "WPS Wizard" on the left hand side.



4. Select "Setup".

5. Select "QoS Setup".

6. Check the box next to "Turn Internet Access QoS On" if not already checked.

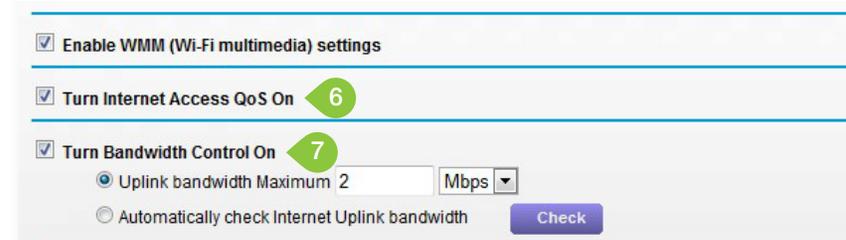
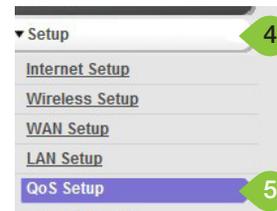
7. Check the box next to "Turn Bandwidth Control On".

8. Select the "Uplink bandwidth Maximum" radial button.

9. In the field to the right of the radial button enter in your current upload speed. (If unsure of the current upload speed, run a speedtest at <http://toronto.speedtest.telus.com/>.)

10. Be sure to save any changes and reboot the router before proceeding.

11. Your QoS should now be configured.



## Configuring QoS on the Netgear N600 to Prioritize VoIP Traffic

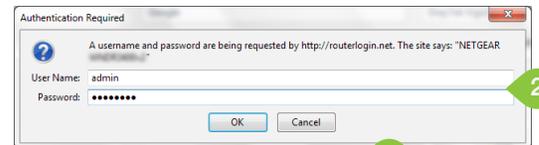
Brand: NetGear  
Model: N600  
Hardware Version: WNDR3400v2  
Firmware Version: V.1.0.0.34\_1.0.52



1. Open your browser and navigate to <http://192.168.1.1>.



2. Log in to the router. The default username is "admin".  
The default password is "password".



3. Select the "Advanced" tab and select "WPS Wizard" on the left hand side.



4. Select "Setup".

5. Select "QoS Setup".

6. Check the box next to "Turn Internet Access QoS On" if not already checked.

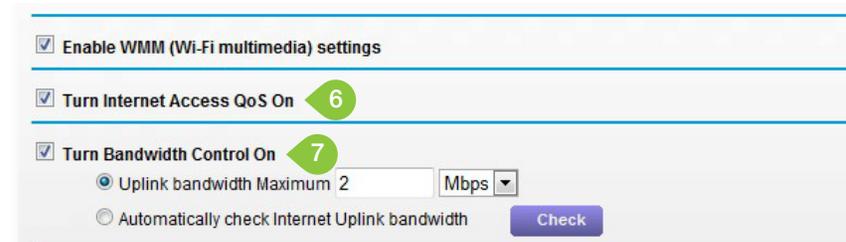
7. Check the box next to "Turn Bandwidth Control On".

8. Select the "Uplink bandwidth Maximum" radial button.

9. In the field to the right of the radial button enter in your current upload speed. (If unsure of the current upload speed, run a speedtest at <http://toronto.speedtest.telus.com/>.)

10. Be sure to save any changes and reboot the router before proceeding.

11. Your QoS should now be configured.



## Configuring QoS on the Netgear N750 to Prioritize VoIP Traffic

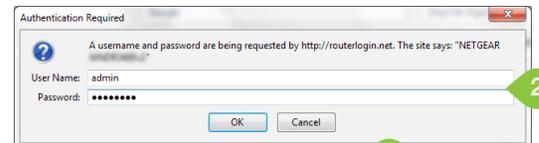
Brand: NetGear  
Model: N750  
Hardware Version: WNDR4000  
Firmware Version: V1.0.0.90\_9.1.79



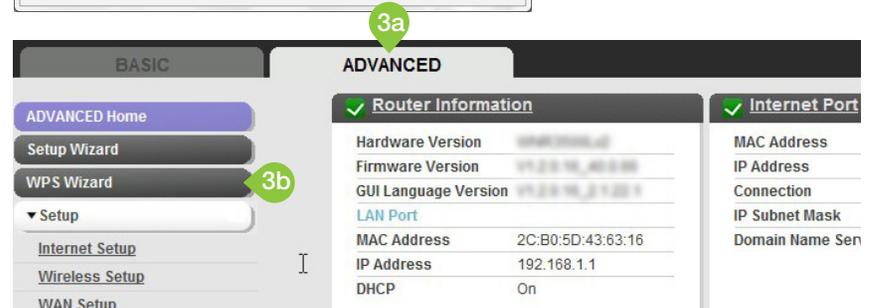
1. Open your browser and navigate to <http://192.168.1.1>.



2. Log in to the router. The default username is "admin".  
The default password is "password".



3. Select the "Advanced" tab and select "WPS Wizard" on the left hand side.



4. Select "Setup".

5. Select "QoS Setup".

6. Check the box next to "Turn Internet Access QoS On" if not already checked.

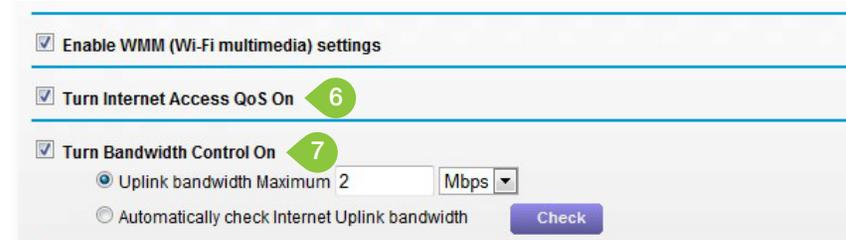
7. Check the box next to "Turn Bandwidth Control On".

8. Select the "Uplink bandwidth Maximum" radial button.

9. In the field to the right of the radial button enter in your current upload speed. (If unsure of the current upload speed, run a speedtest at <http://toronto.speedtest.telus.com/>.)

10. Be sure to save any changes and reboot the router before proceeding.

11. Your QoS should now be configured.



## Configuring QoS on the Netgear N900 to Prioritize VoIP Traffic

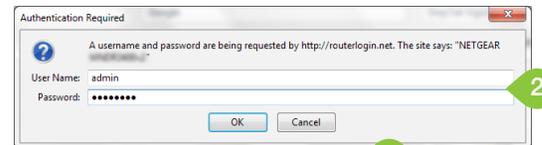
Brand: NetGear  
Model: N900  
Hardware Version: WNDR4000  
Firmware Version: V1.0.1.20\_1.0.40



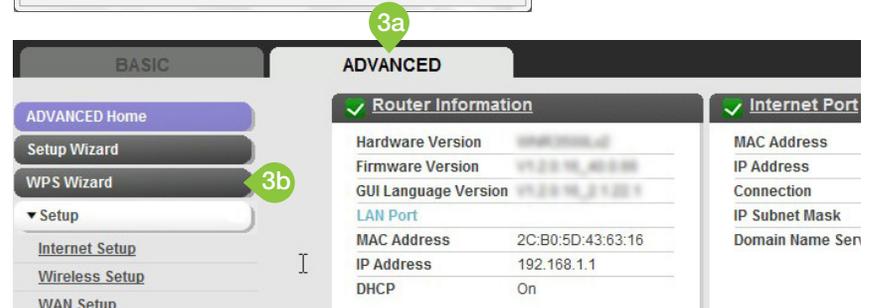
1. Open your browser and navigate to <http://192.168.1.1>.



2. Log in to the router. The default username is "admin".  
The default password is "password".



3. Select the "Advanced" tab and select "WPS Wizard" on the left hand side.



4. Select "Setup".

5. Select "QoS Setup".

6. Check the box next to "Turn Internet Access QoS On" if not already checked.

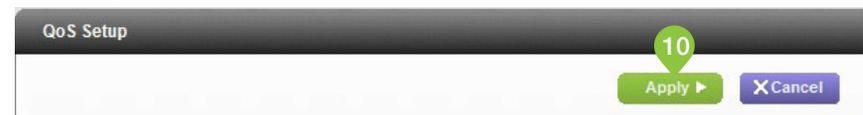
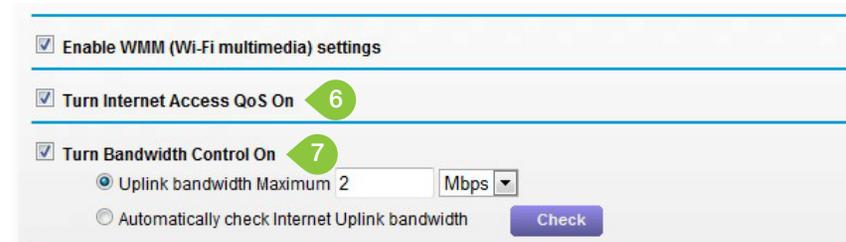
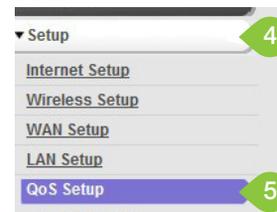
7. Check the box next to "Turn Bandwidth Control On".

8. Select the "Uplink bandwidth Maximum" radial button.

9. In the field to the right of the radial button enter in your current upload speed. (If unsure of the current upload speed, run a speedtest at <http://toronto.speedtest.telus.com/>.)

10. Be sure to save any changes and reboot the router before proceeding.

11. Your QoS should now be configured.



## Section 4 - Troubleshooting Port and Firewall Issues

In a typical network, routers are used to allow access to any device that connects to the local network or the Internet. Routers have built-in security features that prevent unrequested access to the network. A router firewall may cause issues with your VoIP connectivity through the TELUS Business Connect service.

Port triggering is a configuration that you can set on your router to allow access to specific service ports in a secure manner. A router acts like the sender and receiver of requests, allowing VIP pass to these service ports that are Triggered.

To allow seamless Voice over IP (VoIP) connectivity to your devices, the following ports should be triggered on your router.

Device type	Protocol	Source Port Customer Side	Destination Port TELUS Side
<b>Deskphone signaling</b>	SIP/UDP	5060-5090	5090
<b>Deskphone signaling</b>	SIP/TCP	5060	5090
<b>Deskphone media</b>	RTP/UDP	16384-16482	20000-39999
<b>Deskphones signaling Secure Voice</b>	SIP/TLS/TCP	5060	5096
<b>Deskphones media Secure Voice</b>	SRTP/UDP	16384-16482	40000-49999
<b>Deskphone provisioning</b>	HTTP/IP/TCP	80, 443	80, 443
<b>Deskphone clock sync</b>	NTP/UDP	123	123
<b>Deskphone BLA/Presence</b>	SIP/UDP	5060	5099
<b>Deskphone BLA/Presence</b>	SIP/TCP	5060	5090
<b>Mobile App signaling</b>	SIP/UDP	5060	5090-5091
<b>Mobile App signaling</b>	SIP/TCP	random	5090-5091
<b>Mobile App media</b>	RTP/UDP	4000-5000, 20000-60000	50000-59999
<b>Mobile App signaling Secure Voice</b>	SIP/TLS/SRTP	random	5097
<b>Mobile app media Secure Voice</b>	SRTP/UDP	4000-5000, 20000-60000	60000-64999
<b>Mobile app BLA/Presence</b>	SIP/TCP	N/A	5091
<b>Mobile app BLA/Presence</b>	SIP/UDP	N/A	5099
<b>Mobile app data sync with RC backend</b>	HTTPS	443	443
<b>Desktop app signalling</b>	SIP/UDP	5060-5090	5091
<b>Desktop app signalling</b>	SIP/TCP	random	5091
<b>Desktop app media</b>	RTP/UDP	8000-8200	50000-59999
<b>Desktop app signalling Secure Voice</b>	SIP/TLS/SRTP	random	5097
<b>Desktop app media Secure Voice</b>	SRTP/UDP	4000-5000, 20000-60000	60000-64999
<b>Desktop app BLA/Presence</b>	SIP/TCP	N/A	5091
<b>Desktop app BLA/Presence</b>	SIP/UDP	N/A	5099
<b>Business Connect Meetings signalling</b>	SIP/TCP	N/A	8801, 8802
<b>Business Connect Meetings signalling Secure</b>	SIP/TLS/TCP	N/A	443
<b>Business Connect Meetings media</b>	RTP/UDP	N/A	8801
<b>Business Connect Meetings media Secure</b>	TLS/TCP	N/A	443

## Section 5 - Support Information

If you have additional questions or are experiencing difficulty in setting up your router to work with your TELUS Business Connect service.

**There are several ways to access support.**

1) For self-help visit the Business Connect support page to access:

- How-to guides
- Troubleshooting tips
- User guides and manuals

<http://business.telus.com/en/business/support/bundles-business-connect-support/learningcentre/Guides-and-Manuals/business-connect-user-guides>

2) For account support call 1-844-626-6638, enter your TELUS Business Connect number and follow the prompts.

3) For technical support call 1-844-626-6638, enter your TELUS Business Connect number and follow the prompts.