1 Introduction

We bought a family Christmas present this year – a Sony PlayStation PS4. While I am not much of a gamer, my twin daughters certainly enjoy a good video game. My elder daughter just moved to Toronto, with her own PS4, and I knew if we had a PS4, we could play online together – it’s how the modern family stays in touch. The icing on the cake was the fact that the PS4 plays Netflix. We have become quite the Netflix addicted family, and I was planning to set up Netflix Chromecast in the playroom anyway. The Netflix angle gave us the rationalization we need to justify the cost of a PS4.

I set up the PS4 and watched a Netflix movie, and shortly I was irked by a buffering symbol that interrupted my show. A curled red tail chased itself in endless circles, telling me I had to wait while it buffered the video stream. A percentage counter slowly built towards 100% before it resumed, sometimes for only a minute, before that dreaded circling buffer symbol returned. Within two days, my daughter told me she stopped watching Netflix on the PS4 because it spends too much time buffering. That is when I set off on my wifi mission.

I knew it was a wifi problem, because when I watch Netflix on my PC, which is wired directly to the router by an Ethernet cable, I never get a Netflix buffering icon. I had also noticed the annoying buffering icon was gradually occurring more frequently on the upstairs Chromecast. I should stop here and explain a Google Chromecast device lets you mirror a Youtube, Netflix, Shomi, Crave, and other streaming video from your handheld smartphone onto your television. You set up the show on your smartphone, tap the Chromecast icon, and instantly your Netflix show appears in full HD video on your big screen TV. We watch Netflix using Chromecast all the time, but have increasingly been bedeviled by the circling red tail.

I have a pretty strong tech background. I have a physics degree and I set up my own Internet Service Provider (ISP), complete with web, email, and FTP servers I used for my own business. Before the days of wireless, I wired my house with Ethernet and set up a Gigabit LAN. I am my extended family’s tech support – I constantly receive calls for help about tech issues. But I didn’t know much about wireless networks, so I went to Google school, and I am pleased to say I prevailed in my mission. We now live in a Netflix-buffering-free zone.

I was surprised how little information is available on the Internet for home wifi operators who want to speed up their wifi and improve the quality of their video feeds. Yes, there are thousands of web pages and YouTube videos that offer fragments of a solution, but no end-to-end description explains how to maximize your wireless network’s performance. That inspired me to write this article.

If you want your wifi to blaze like it’s on performance enhancing steroids, then read on. This article takes you from start to finish, and gives you several options. Anyone can perform the step-by-step illustrated procedures I describe in this article, but it takes patience and research to apply these procedures properly on your specific equipment.

All the screen shots and graphics are my own. You are free to copy and distribute this document as long as you do not modify it.
2 Analyzing Your Wifi Network

The problem with wifi is you cannot see what is happening. You cannot tell if the network is slowing down because your router is too far away, your device resides in a dark zone, or if neighbourhood wifi networks are interfering with your configuration. You must overcome this wifi blindness before you can understand the problems, let alone implement a solution.

To see your wifi environment, download a free wifi analyzer app onto your android or iPhone smartphone. I used Wifi Analyzer on my Android phone. It is very well rated, and it provided the information I needed to diagnose and later reconfigure my home wifi network.

![Wifi Analyzer](image.png)

Figure 1: A screenshot of the Wifi Analyzer Android app

The first thing I did was look at my wifi environment. I live in suburban Ottawa, Canada. It is all single homes in this neighborhood, and the houses are packed pretty closely together, so I was expecting to see a few other wifi networks, but to my surprise, the Wifi Analyzer detected 27 wireless access points. The screenshot in Figure 2, below, shows my original wifi mapping.

![Wifi Analyzer readings before fixing the Wifi network](image.png)

Figure 2: Wifi Analyzer readings before fixing the Wifi network

In the above graph, the vertical axis shows signal strength, and the horizontal axis labels the wifi Channels. The green TeraScope1 is my wifi router, and the purple TeraScope_CC is my Chromecast video streamer. I took this reading when I was standing beside the Chromecast device, which explains why the Chromecast signal is the highest one recorded.
It is important to understand how transient the wifi signal strengths are. Every time I checked the signal strengths of the wifi networks, they changed. The Wifi Analyzer app will show you in real time how the signal strengths wax and wane. The screenshot in Figure 3, below, shows how the green TeraScope1 signal fell below my neighbour’s mauve BELL787 signal strength, and operated at the same strength as a red signal called ‘chico’. I took this reading one minute after recording the screen shot in Figure 2, above, while standing in the same location.

![Figure 3: Sometimes your own network is not the strongest signal](image)

The Wifi Analyzer also charts the signal strengths over time, shown in the screen shot in Figure 4, below. No wonder my Netflix Chromecast show stops for buffering every once in a while. Picking out TeraScope1 from the surrounding signals must be very challenging – perhaps even impossible at times.

![Figure 4: Wifi network signal strength constantly changes](image)

The typical urban wifi space is very crowded, and the relative signal strengths are constantly changing. When my wifi signal strength dips below a neighbour’s strength, Chromecast has difficulty staying locked on my signal, and the feed drops out until the signal strength returns.
The signal strength also varies as your device moves around, and that will affect the wifi performance of your handheld tablet or smartphone. In general, the closer your device is to your wifi router, the stronger that router’s signal will appear to your device, and the fewer wifi interruptions your device will experience.

Walk around your home with the Wifi Analyzer in your hand. Observe your router’s signal strength relative to the other wifi signals as you move around, and record hot spots and dead zones. Once you have mapped out your wifi signal strength, consider relocating your wireless device (your Chromecast dong), if practical. Alternatively (or additionally) move the router, if possible, and re-sample your home using the Wifi Analyzer, and see how that changed the hot spot and dead zone mapping. If you are lucky, that relocation might fix your wifi problems.

You might have noticed from the above screen shots that wifi routers seem to converge on channels 1, 6, and 11. There is a reason for that. There are 11 Wifi channels on the 2.4 GHz wifi network\(^1\). The problem is, the channels are spaced so closely together on the radio frequency spectrum that adjacent channels interfere with each other. A separation of 5 channels guarantees interference-free communication. That is why the Wifi Analyzer app graphs the signal strength in wide curves – it is showing you the cross-channel interference.

Most manufacturers default their equipment to channels 1, 6, or 11, where there is always at least 5 channels of separation from other equipment. For some reason, 6 seems to be the most popular default channel. Most consumers do not know this, and so when they bring their wifi device home and plug it in, they do not think about wifi channel congestion caused by their neighbours’ devices, also defaulted to channels 1, 6 (mostly) and 11.

3 Changing Channels

If the channel your wifi router uses is congested, you can move to another channel to avoid competition with neighbouring wifi devices. The screenshot in Figure 5, below, shows the red joemarshall router working on Channel 3, and the teal San Pelligrino router on Channel 9. These wifi operators analyzed the wifi environment, and they moved their routers to channels that were not occupied by neighbouring routers.

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\(^1\) Some regions and systems support 14 channels, but the standard North American 2.4 GHz Wifi channels range from 1 to 11.
You can use the Wifi Analyzer to select the best channel. Let the analyzer sample for a full minute before reviewing the results, as shown in the screenshot in Figure 6, to the right. This fictitious result shows channel 11 as the preferred channel. Ignore channels 12 to 14. In this case, you would set your router to channel 11, and expect to see a big improvement in your wifi performance.

To change a router’s wifi channel, you must log into that router’s administration page. First connect a PC or laptop directly to the router using an Ethernet cable. Although you can, you should not attempt to connect to your router’s administration page wirelessly. Plug the Ethernet cable into any LAN port (they usually have numbered labels), but do not plug it into a port labeled Internet, WAN, or ADSL. Disable the PC’s or laptop’s wireless transmitter, as shown in Figure 7, below.

If you have a D-Link router, visit this page\(^2\) to learn how to change the wifi channel. Visit this page\(^3\) to learn how to change the channel on a Linksys router. For Netgear, visit this page\(^4\). If you have another router, search for instructions for that manufacturer. I have a Rogers Hitron CGN3 router, which I explain how to use below.

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\(^3\) [http://www.linksys.com/us/support-article?articleNum=136797](http://www.linksys.com/us/support-article?articleNum=136797)

Then open a web browser (such as Microsoft Internet Explorer or Google Chrome) on the computer connected to the router. For the Hitron, enter ‘192.168.0.1’ as the web address (not including the quotes). Do not type in ‘www.’ or ‘http://’. Enter the four series of numbers, separated by periods, exactly as shown. You will see the login page shown in the screenshot in Figure 8, below.

The Hitron user id is always ‘cusadmin’ (without the quotes). If you have never entered a password, use the word ‘password’ (again, without quotes).

![Figure 8: Rogers Hitron CGN3 Login](image)

Once you successfully log in, you will see the status page shown in Figure 9, below. Select the Wireless tab, indicated by the red arrow.

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5 For D-Link and Hitron use 192.168.0.1. For Linksys use 192.168.1.1. For Netgear, use http://www.routerlogin.net. For other brands, search for the login instructions.
Once you select the wireless tab, you will see the following page.

**Wireless**

This menu show the wireless settings

Select the desired wireless channel from the pull-down menu (red arrow 1). Do NOT select any channel higher than 11, since many devices do not support those channels. Then click the Save Changes button (red arrow 2), and wait for the interface to tell you it successfully made the changes. Finally, close the browser window.
Disconnect the Ethernet cable between PC and the router, and re-enable the wireless radio on your PC. That’s it – you’re done. Use your Wifi Analyzer app to confirm your router is now using the newly selected channel. Now you will enjoy an improved wifi experience, unless …

4 When Changing the Channel is not Enough

Chances are, if you live in an urban area, you did not find any channels that are suitable, as shown in the screenshot in Figure 11. When changing channels does not fix the problem, then you need to move the router closer to the devices you are using, so your router’s signal is strong enough to drown out any neighbouring interference. The problem is, in a house of any size, it is impossible for the router to be close to all rooms at the same time.

One way to fix this problem is to augment the primary wireless router with one (or more) wireless access points that collectively service the entire house. Many people mistakenly install a wifi extender (also known as a wifi repeater), thinking that will solve the problem by locating a router extender closer to the wifi devices. While a wifi extender can expand your wifi coverage, it does nothing to alleviate the channel congestion. In fact, the wifi extender exacerbates wifi crowding by adding another signal to the wireless environment. In most urban spaces, a simple wifi extender will not improve channel congestion, and you will still experience data loss and stream buffering.

Consumer wifi extenders were originally developed for very large house with distant neighbours. If that is your problem, then by all means go buy a wifi extender, and you will expand the wifi coverage in your mansion. For the rest of us, we still have to deal with urban wifi crowding, and wifi extenders do not address that problem, at least not in their simple operating mode.
There are two ways to defeat channel overcrowding, and both involve applying a wifi extender in a very particular way. I discuss both of these approaches in the next two sections.

5 Installing a Wired Router/Extender

The first extender option involves running a long Ethernet cable from your primary router to a second wireless router, and using that secondary wireless router as a wifi extender. Before your start snaking cable through your walls, confirm both your primary router and the secondary repeater router each have at least one spare physical LAN port. Also, check the specs of your routers, and confirm they both support 10/100 or 10/100/1000 Ethernet. Also, be sure to use an Ethernet cable rated for high speed. It should state CAT-5E, CAT-6, or higher. CAT-5 alone is not sufficient. The category (CAT) rating is printed right on the cable – look for it before you buy or use it.

This wired option works well in houses that are pre-wired with Ethernet, or in circumstances in which running an Ethernet cable from the primary router to the secondary router is straightforward. It is important that the secondary router be physically located as close to the devices it will serve as possible – certainly in the same room.
The secondary router does not require special equipment – any standard Internet wifi router will do, but it must have at 10/100 BaseT rated physical ports, or faster. No changes are required to the primary router, but you must perform several steps on the secondary router. First, connect a PC or laptop directly to the secondary router, as previously shown in Figure 7, above. Make sure the wifi radio on the PC or laptop is disabled. Then open a web browser, log on to the secondary router administration interface as described above, and then:

1. Give it a Service Set Identifier (SSID) value (Figure 14);
   - Make sure the SSID is a different from the one used in your primary router
   - I used TeraScope2, because TeraScope1 was my primary router
2. Select the wifi channel it operates on (Figure 14);
   - Choose a channel that is different from the primary router
   - Use Wifi Analyzer in the room the secondary router will go into to determine the best channel
3. Disable the DHCP server (Figure 15);
4. Disable the firewall (Figure 16);
5. Set the security mode and algorithm (Figure 17);
   - Unless you have a reason not to, use the same settings from your primary router; and
6. Set the security key (Figure 17)
   - I used the same security key as the primary router to simplify network access.
For most routers, you can leave all other settings alone. Figure 14 to Figure 17 provide actual screen shots showing how to perform the above six steps on the Linksys WRT54G, better known as the Linksys Wireless G router. Steps 1 through 6 above correspond to the red arrows in these screen shots. **BE CERTAIN TO SAVE YOUR CHANGES ON EVERY PAGE** by pressing the ‘Save Settings’ button at the bottom of each page. If you move onto the next page without saving, your changes will be lost.

Most routers have similar interfaces. If you explore your router’s interface, you will likely discover how to adjust the same settings on your router, or refer to your router’s documentation.

![Figure 14: Set the (Step 1) secondary router’s SSID and (Step 2) Wifi Channel](image-url)
Figure 15: (Step 3) Disable the secondary router DHCP Server
Now disconnect the secondary router from the laptop or PC, re-enable the wifi radio on your PC, and then position the secondary router in its destination room, and connect the primary router to the secondary router using the Ethernet cable. Plug the Ethernet cable into any of the local LAN ports – do **NOT** plug it into a port labeled WAN, Internet, or ADSL.

That’s it! Now you have a wired extender. Because you have located the wired extending router close to the devices it serves, it will easily overpower any neighbouring interference, and you will never again experience that ghastly Netflix buffering icon.

You can configure as many Ethernet-wired secondary routers this way as you have free ports in your primary router.⁶

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⁶ Technically, you can daisy chain secondary routers, but this is not recommended for video streaming.
6 Installing a 5 GHz Wireless Extender/Extender

If your primary router does not have any (free) physical ports, or if running an Ethernet cable is not an option, an alternative is to set up a wireless extender, or repeater, that connects to your router over a 5GHz wireless link, and then services the onward wifi devices over the usual 2.4 GHz channels. As I explained before, installing a wifi extender in a simple operation mode will do little to overcome the neighbouring interference, and it will most likely be a waste of money.

If you plan to use a wireless extender/repeater to alleviate channel congestion, then you MUST use both a dual-band router and a dual-band extender, otherwise you are wasting your time and money. If your existing primary wireless router does not support dual-band operation, you will need to replace it before contemplating a wireless extender/repeater. The Rogers supplied Hitron router I use is a dual-band device, so I did not have to change the primary router.

The 5 GHz router channels fall under a regulated frequency band, whereas the 2.4 GHz router channels are unregulated. Unregulated means non-wifi systems, such as baby monitors, cordless phones, microwave ovens, and other cordless devices may use these frequencies, causing interference with your wifi network. Some of the wifi interference you experience might be caused by these non-wifi devices. The 5 GHz band is regulated, meaning other appliances are forbidden from using these channels, making the band less noisy. There are also fewer wifi routers that use the 5 GHz band, so channel overcrowding is not a problem (yet). Finally, the 5 GHz band requires 2 channels of separation for zero interference, compared to 5 channels separation for the 2.4 GHz band7. This permits more than twice the number of devices to communicate over the same number of channels.

The Wifi Analyzer screenshot in Figure 18, below, shows the original 5 GHz channel survey in my house. As you can see, TeraScope_HSL (my device – HSL stands for High Speed Link) is the only device using any channels on the 5 GHz band. I took this wifi reading in the same room as the I did for the screenshots in Figure 2 to Figure 5, above.

![Figure 18: Actual Wifi Analyzer reading for 5 GHz channel use](image)

This dual-band router/extender configuration appears in Figure 19, below.

7 Technically, the zero-interference separation is 4 channels on the 5 GHz band, however only even numbered channels are used, making it two usable channel separation.
In a dual-band router/extender configuration, both the router and extender become 2.4 GHz wireless access points. By locating the wireless extender close to your distant appliances (such as next to a Google Chromecast dongle) you will guarantee your 2.4 GHz wifi signal is strong enough to tolerate any neighbouring interference.

Another important consideration is, when you operate a wireless extender in dual-band mode, you control the 2.4 GHz channel it uses to communicate with its served devices. This is important, because now you can make sure your primary router and your wireless extender operate on different channels that do not interfere with each other. This approach creates a high speed and reliable wifi network that never causes Netflix buffering or data loss.

![Diagram](image)

To set up a dual-band router/extender configuration, refer to the extender's instructions for configuring the extender as a standard extender for the first time, if you have not already set up the extender for normal operation. If both your primary router and your extender have a WPS button, press the WPS button on the primary router first, and then press the WPS button on the extender. Follow the instructions for the extender for non WPS setup.

Before you configure your wifi extender further, you have to program your dual-band router to transmit properly on the 5 GHz band. The steps I show below are for the Rogers Hitron CGN3 router. Log on to the router administration page, and then navigate to the **Wireless > Basic Settings > 5G page**. Enter the SSID for the 5 GHz wireless router (it must be different from the
2.4 GHz SSID), and select enable, then press Save Changes, as shown in Figure 20, below. I used TeraScope_HSL as the 5 GHz SSID, where HSL stands for High Speed Link.

![Wireless Configuration Screen](image)

Figure 20: Enable the 5 GHz band on the primary wireless router

Then, navigate to the **Wireless > WPS & Security** page, click on the 5 GHz SSID you entered above, and in the area below, configure the security and encryption modes, and enter a new pass phrase, as shown in Figure 21, below. I used the same security and encryption as I did for the 2.4 GHz configuration, but I used a different pass phrase, because I do not want anyone to connect to a 5 GHz channel – its sole purpose is to provide a high speed link to the wireless extender and to support certain smartphones. Remember to save your changes on each page.
With these changes complete, confirm your router is transmitting on the 5 GHz band using the Wifi Analyzer. Tap the upper left corner of the Wifi Analyzer screen to switch between 2.4 GHz and 5 GHz readings.

Now you can go back to configure the extender to connect to the router over the 5 MHz link, and to communicate with all the devices over the 2.4 GHz link. The method I describe below is for the NetGear model EX6200 1200 AC extender.

Use a laptop, tablet, or smartphone to connect wirelessly to the NetGear by selecting the SSID for the dual-band extender. The extender SSID may have been automatically set for you when you first set up the extender. Once your device’s wifi connects to the extender, open an internet browser, and enter ‘www.mywifiext.net’ (exactly as shown, without the quotes) as the URL. You will be challenged for a login. If you have not set a username and password, then use ‘admin’ and ‘password’ respectively.

Navigate to the Settings > Connect to Existing Network page, shown in Figure 22, below. The NetGear will list all the SSID’s it finds. Select the SSID that matches the 5 MHz link from your primary router, which is the SSID you defined in Figure 20, above. In my case, the SSID is TeraScope_HSL. Then click Continue.
Maximizing Wireless Network Performance

Figure 22: Select the router-to-extender 5 GHz SSID link

The extender will next display the screen shown in Figure 23, below. Enter the network key for the 5 GHz link. The extender network key is the 5 GHz router pass phrase you defined in the primary router, shown in Figure 21, above. Then click Continue. The NetGear extender may take a minute or two to establish the new link. Be sure that the device you are using does not switch wifi’s to another SSID while you are waiting for the NetGear extender to complete the connection. If it does switch to another SSID, switch it back to your wifi extender’s SSID.

Figure 23: Enter the router 5 GHz link network key

Once the extender completes its 5 GHz connection with the router, it will display a success message. Now navigate to the Advanced > Operating Mode page. Select ‘Fast Lane Technology’, and under that, select Device-to-extender in 2.4 GHz only and extender-to-router in 5 GHz only, as shown in Figure 24, below. Then click Apply.
Now navigate to the **Settings > Wireless** page, shown in Figure 25, below, and enter the SSID this wireless extender will transmit. I called my wireless extender TeraScope3, because TeraScope1 is my primary router, and TeraScope2 is my new wired router/extender. Next choose the 2.4 GHz WiFi channel this wifi extender will use to connect to its devices. Use the Wifi Analyzer app in the room the extender will operate in to determine the best channel. Remember to keep at least three, and ideally five channels of separation between all your 2.4 GHz routers, but at the same time, avoid highly congested channels. Finally, enter the pass phrase users must enter to access this extender. I used the same 2.4 GHz pass phrase for this wireless extender, my wired extender/router, and for my 2.4 GHz primary router. One pass phrase for all 2.4 GHz wireless access points in your home greatly simplifies network access. Then press Apply.
Now you have an extender that significantly improves your wireless network performance. Enjoy the show.

7 Results

With the new configuration of a wired router/extender (TeraScope2) and a dual-band wireless extender (TeraScope3), all areas of the house now enjoy uninterrupted, high speed wifi coverage. Since I implemented these changes, we have not experienced the ghastly Netflix buffering symbol – not a single time – on the PS4 downstairs and on the Chromecast upstairs.

The Wifi Analyzer screen shots in Figure 26 through Figure 28, below, show the wireless access point signal strengths after I implemented the above modifications. Figure 26 was taken inside my office where two laptops and a printer connect to TeraScope1 wirelessly. I set TeraScope1 (the primary Rogers Hitron router) on channel 1 even though there are at least four neighbouring SSIDs operating on this channel. The other SSID signal strengths are quite low relative to TeraScope1, therefore my wireless devices should have no trouble staying locked on to the primary router.
Figure 26: Primary router 2.4 GHz (TeraScope1) signal strength after wireless network modifications

Figure 27, below, shows the Wifi Analyzer screenshot when I was standing beside the PS4 in the playroom downstairs. TeraScope2 (the wired Linksys router/extender) is clearly the strongest signal, and it stands alone on channel 4. As the screenshot shows, TeraScope2 is three channels away from TeraScope1, creating minimal interference between the two SSIDs. Not as many neighbouring SSIDs were visible on this screenshot. I presume that occurred because the neighbouring routers' signals are weakest in my basement.

Figure 27: Ethernet wired router/extender (TeraScope2) signal strength after wireless network modifications

Figure 28, below, shows the Wifi Analyzer screenshot when I was standing beside the Google Chromecast dongle upstairs, beside TeraScope3, the NetGear dual-band wifi extender. Here, TeraScope3 is clearly the strongest signal, and except for the Chromecast itself (the deep blue curve showing just a blue asterisk (**)), no other wifi networks operate on its channel 9. Moreover, TeraScope3 has a full five channels separation from TeraScope2, ensuring there is no cross interference between these two 2.4 GHz wireless access points. This screenshot shows a total of 15 SSIDs, the most of all three screenshots. I assume this happens because, being upstairs, the Wifi Analyzer is able to pick up more neighbouring wireless networks.

Figure 28: TeraScope3 (NetGar dual-band wifi extender) signal strength after wireless network modifications
Figure 28: Wireless extender (TeraScope3) signal strength after wireless network modifications

Figure 29, below, shows the Wifi Analyzer screenshot of TeraScope_HSL, the primary Rogers Hitron router’s 5 GHz wifi signal strength. I took this screenshot while standing beside the NetGear wireless extender, TeraScope3. Three noteworthy items become apparent in this screenshot. First, the TeraScope_HSL SSID (blue) is alone on its own channel with no neighbouring networks to interfere with it. Second, the TeraScope_HSL channel number has changed. This is because I configured the primary router to pick the best 5 GHz channel, and so it changes from time to time. Third, for the first time I see another wireless network on the 5 GHz band, called FibeTVM9131SA7501 (yellow). Clearly the TeraScope_HSL signal strength is strong enough to provide uninterrupted transmission.

Figure 29: Primary router 5GHz (TeraScope_HSL) signal strength after wireless network modifications
I downloaded another Android app, SpeedTest. It performs an end-to-end analysis of the speed of your internet connection. Table 1, below, documents the download SpeedTest results.

<table>
<thead>
<tr>
<th>Router / SSID / Band</th>
<th>Location of Sample</th>
<th>Result (Mb/S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Router</td>
<td>In office, next to the TeraScope_HSL primary router</td>
<td>91.84</td>
</tr>
<tr>
<td>TeraScope_HSL 5 GHz Band</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Router</td>
<td>Upstairs, next to the TeraScope3 wifi extender</td>
<td>73.32</td>
</tr>
<tr>
<td>TeraScope_HSL 5 GHz Band</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Router</td>
<td>In office, next to the TeraScope1 primary router</td>
<td>29.67</td>
</tr>
<tr>
<td>TeraScope1 2.4 GHz Band</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wired Secondary Router</td>
<td>Downstairs, next to PS4 Play Station</td>
<td>21.60</td>
</tr>
<tr>
<td>TeraScope2 2.4 GHz Band</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wireless Wifi Extender</td>
<td>Upstairs, next to Chromecast dongle</td>
<td>23.52</td>
</tr>
<tr>
<td>TeraScope3 2.4 GHz Band</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Netflix recommends at least a 5 Mb/S connection for HD quality video streaming. The results in Table 1 indicate the newly configured wifi environment in our home supports three simultaneous HD Netflix emissions with ample capacity to spare. I was surprised by the 91 Mb/S reading for the 5 MHz band, because the Rogers cable service I subscribe to only guarantees 60 Mb/S.

8 Conclusion

Although it took a lot of work, the end result was well worth the effort. I was paying for a Netflix service that I was not satisfied with. By reconfiguring my home wifi network, I was able to completely eliminate all Netflix buffering problems. As an added benefit, the browsing speeds and responsiveness on all our smartphones and tablets have improved noticeably.