



Minimum and Recommended Bandwidth for VOIP Service

These guidelines will help you determine how much bandwidth you need to support high-quality VOIP phone service.

The bandwidth that our [VOIP phone service](#) requires depends on the number of concurrent calls you want to make. The table below shows the minimum bandwidth required to make calls from a DiamondVoice.com account, as well as recommended speeds for optimal performance.

NUMBER OF CONCURRENT CALLS	MINIMUM REQUIRED BANDWIDTH	RECOMMENDED SPEED
1	100 Kb Up and Down	3 MB Up and Down
3	300 Kb Up and Down	3 MB Up and Down
5	500 Kb Up and Down	5 MB Up and Down
10	1 MB Up and Down	5-10 MB Up and Down

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How Does VOIP Use My Bandwidth?

The answer is simple and complex. VoIP services use a variety of **codecs** to compress and decompress voice data, allowing it to travel over the Internet efficiently. DiamondVoice.com uses codecs that require approximately 100 kilobits per second (kbps) traveling **up** from your phone line and **down** to your phone line per second for each call. So if you have three people, all on calls at the same time, the minimum requirement is 300 kbps up and 300 kbps down.

In addition, since the Internet “pipe” into your home or business is being used for other functions too—web browsing, sending and receiving email, file transfers, web-based office services, point-of-sale systems, and so on—there are numerous candidates contending for bandwidth.

How to Determine Your Functional Bandwidth

It helps to know how much bandwidth you really have. However, your Internet Service Provider (ISP) will probably only confirm what you signed up for, also known as the advertised “up to” value, as in “up to 50 Mbps” or “up to 150 Mbps.”

The best way to determine your bandwidth, is to run a [throughput test](#) using a site like www.speedtest.net. This will give you a snapshot of your current functional bandwidth, but it is important to note that this metric can vary depending on how much bandwidth all of the different applications you are using require at any given point in time. This test also provides variable results depending on the location used for testing.

Keep in mind that your upload speed is usually slower than your download speed, so you need to make sure that the lower number of the upload speed matches what you need. Since most service providers do not guarantee sustained bandwidth besides the up-to value, we recommend adding a 5x to 10x safety margin when estimating bandwidth.

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Calculating the Bandwidth You Need

If you know that your ISP can sustain a certain speed, simply multiply the number of expected concurrent calls by 100 kbps. If you deal with an “up to” ISP, a good solution would be to add the safety margin mentioned above so that you can sustain the required bandwidth, even when your Internet service falters.

For example, 10 concurrent users would require 1 Mbps (10 X 100 kbps x safety margin), which means you would be smart to allow for 5 to 10 Mbps both up and down. Depending on the other services and applications using your Internet connection and on the capabilities of your router, 3 to 5 Mbps may be sufficient, or you may need to increase your bandwidth. This must be evaluated on a case-by-case basis, as each organization is different.

Optimizing Your Quality of Service

High-quality voice calls are the norm today but consistent quality does require some effort. Also, some but not all routers have the ability to prioritize voice services so that the impact of other applications doesn't degrade voice quality. To prevent audio issues caused by voice and data competing for the same bandwidth, make sure your network router's Quality of Service (QoS) settings are set as follows, so that they prioritize the transmission of voice packets to your WAN connection (ISP).

- UDP/5060 – Priority: High
- UDP/6060 – Priority: High
- UDP/16384 to 32768 – Priority: High

Finally, if your router has an Application Layer Gateway (ALG) function, that should be disabled. We also recommend disabling the Stateful Packet Inspection (SPI) function—in some cases, the router cannot handle the high rate of inbound voice packets when the SPI feature is enabled. In all cases, though, check with your security expert before changing configuration settings.