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Are you getting the speed that you pay for? Understanding Internet Speeds

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Powering Community Broadband

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Overview

Internet connections are provided to consumers in two general types of service plans:

1) Plans where you purchase a certain maxiumum speed with or without data caps;
2) Plans where you purchase amounts of data consumed, most typically with cell phone services.

AireBeam sells Internet service based upon the maximum speed of the circuit service that you select. Like all internet service providers who offer service based upon speed, the speed of the circuit offered is offered at **speeds up to the maximum speed of the circuit**. No ISP is able to guarantee that you will be able to test at the rated speed all of the time, especially at peak traffic times on the Internet.

The discussion that follows is designed to help you better understand the nature of speed on the Internet.

Internet – A Shared Public Resource

All parts of the Internet are shared resources. That included the:

1) Servers that you are accessing via the URL you type into your web browser
2) The movie servers that you are accessing when you watch a Netflix movie
3) The connection between the tower to which your antenna is connected and the servers at the other end that you are accessing.

Your connection between your home and the tower is, however, exclusively allocated to you for your exclusive use. That connection is the one that you rent from your ISP and that connection is the one rated at the maximum speed that you pay for.

ISP Network Resources

Your ISP is in business to provide the best possible service to all of its customers all of the time. At AireBeam, we reinvest heavily in our network resources every year. This reinvestment is required because consumers are doubling their demand for bandwidth each 12 months so, that means that the ISP has to upgrade its internal resources constantly to stay ahead of the demand.

AireBeam runs monitoring servers that capture and graph network utilziation continuously and that enables us to know, in advance of a capacity issue, that we need to upgrade a particular link in our network which is becoming over used.

About Speed and Speed Tests

Most transactions on the Internet are conducted as bursts of traffic, including watching movies on Netflix. That means that at any instant in time there are many short lived bursts of traffic and the sum of those bursts may clog a particular network segment, either inside your ISPs network or out on the Public Internet for a brief period of time.

Speed tests run using Ookla Speed Test servers, send a block of data for a period of at least 30 seconds and flood the connection while timing the transfer time and computing how much data they were able to stuff down the pipe between the speed test server and your home or business.

Speed test servers themselves are share public resources and if they are being used simultaneously to conduct speed tests for multipe users are the same instant, their results will be skewed.

During the test, if traffic bursts from other customers raise the traffic level along the route that your speed test also travels, the result again will be skewed.

The point here is that the instantaneous speed test, while being a measure of the maximum burst speed attainable at a particular instant, is not a measure of your connection's ability to get the work that you need performed completed in a timely manner.

For instance, if you are watching Netflix, there is a buffer of the most recent information sent from Netflix to your computer. Netflix is NOT streaming to your computer on a continuous basis. The size of the buffer and the frequency of the interval that Netflix refills your buffer is dependent upon the speed of your connection which is measured by Netflix at the beginning of the show and periodically during the show.

Traffic Jams

Traffic jams occur on Interstate highways and they also occur on Internet highways. Your State's DOT does its best to plan for reasonable traffic loads but does not engineer for infinite traffic loads. Your ISP and the ISPs upstream providers do the same. We engineer for 2-5 times the capacity that we expect based upon the the number of customers we have along a particular route. We do not provide infinite capacity however. The same goes for servers at the URLs that you enter into your web browser. Both the servers themselves and the circuits that lead to those servers are subject to overloading and when that happens the perceived speed of your connection is deminished.

<u>Your computer and your Router – Are they capable of sustaining the rated speed of your connection?</u>

Most customers today have wireless routers in their houses to create the WiFi environment to allow their smart phone and tablets to connect to the Internet within their home. There are two kinds of wireless routers:

1) Single Band
2) Dual Band

The word "Band" refers to the Radio Frequency Ranges used by the router. AireBeam's network (like most other wireless ISPs) uses the 5Ghz Band. If you have a dual band router, you **<u>MUST</u>** disable the 5Ghz band and use ONLY the 2.4Ghz band. If you leave the 5Ghz band enabled, your router will "**<u>step on</u>**" the freqencies used by AireBeam, causing interference and your connection **<u>will not perform</u>** at the rated speed. This is not an optional compliance matter. Disabling the 5Ghz band is **<u>mandatory</u>**. In fact, if you just purchased your dual band router and can return it for a less expensive single band 2.4Ghz router, you should select that option.

Wireless routers seem to have a short life cycle in Arizona. The reason is **E**lectro**S**tatic **D**ischarges (ESD). When the air is dry in Arizona (which it is most of the time) or when, during the monsoon season, thunder cells move through the area, static electricity builds up on the plastic skins of the router and may discharge on the the electronic board inside the router. These discharges can completely disable the router, but are more likely to damage the chips in the router such that the maximum speed of the router is deminished. These ESD events are random, so, it doesn't matter how new your router is. If the router is subjected to ESD, then, it will become slower until it fails completely. AireBeam's trucks carry wireless <u>Air Gateways</u> and <u>Air Routers</u> and we both sell or rent them to our customers. We charge a flat fee to configure the router and an additional fee for each device that you have us configure. Click on this link to read more about AireBeam's routers:

http://airebeam.com/?wpsc-product=routers_switchs_accessories

Now, if your router is working to specification, where are you in the house or office in relation to the location of the router? Each layer of wall board (sheet rock) (and there are at least two on each wall one on each side of the studs) deminishes the strength of the signal the router and your device. As a rule of thumb, if you were to take a pistol and, standing where you are, shoot the router, count up the layers of sheet rock that the bullet would penetrate on its way to the router. If it is 6 or more, don't expect full speed results from your router.

Lastly, what about your device? Is it an laptop with 4gb of RAM or less and an old technology graphics card installed? Don't expect to get the rated speeds from your connection with a device that is more than a couple of years old. You need at least 8bg of RAM and more is better.

And, is your Internet Web Browser cache cleared? Or have you never done so recently? Each time you ask your device to go to a web site, it searches the cache on the device to see if the page you are requesting is already on the device and if it is the same age as the page on the web site. As this cache gets larger and larger, the search time through the cache takes longer and longer.

All devices including laptops and smart devices run web browsers and those browsers have options to clear the cache. You should do so frequently. More frequent is better.

Is your device infected with a worm or malware?

If you are NOT running an Antivirus and Antimalware program on your Windows device or you have an android or IOS device, your device is subject to infection from Malware or viruses. One of the most common effects of such infections is to dramatically increase the time that your device takes to look up the IP address of the URL. So, if you don't have current antivirus installed, do so and let it clean up your system.

What AireBeam looks for when you complain about slow speeds

When a customer complains about slow speeds here is what we do:

1) First, we examine the customer's connection between his house/office and the tower to make sure that it is performing to specification. We do that by examining the stats of the antenna's radio and the stats at the tower. If the antenna is not performing to specifications, we set up a service call.

2) Then we look at the shared resources a the tower and the the links that connect that tower back to our gigabit backbone to make sure that there is adequate headroom on those links to carry the traffic without delay. If we see indications of insufficient headroom, we increase the capacity of the circuit.

3) If we don't see any issues with your connection or the backhaul circuits, our support reps are trained to ask you to perform certain tests, the most important of which is to bypass your router by plugging the Internet cable directly into your laptop and then disabling the wireless router and the wireless interface on our laptop (so that Windows is not confused about which interface to use to get to the Internet). Sometimes, customers are frustrated and refused to perform these tests.

   If you refuse to perform the tests, our technicians are instructed to advise you that there is nothing further that AireBeam can do to help you. So, while we understand

What is the bottomline about your connection's speed?

Most speed complaints occur during the peak times of Internet traffic which run from about 4-10pm in Arizona or on Sundays for most of the day. During those time periods, it is very difficult to obtain a speed test that will equal the maximum rated speed of your connection, simply because everyone who has connections all over the world is using the Internet at the same time. The real measure is can you get the work done that you want to do? Can you browse web pages, retrieve email or watch Netflix without continous buffering messages? Can you make VOIP phone calls without the sound being garbled?

IF the answer to those questions is yes, then by most ISPs measures, you are good to go and the ISP will take no further action. If the answer is no, then, the ISP will be responsive and take the actions necessary to improve the performance of the network segments that are congested.

What is involved in increasing the capacity of the circuits?

AireBeam uses both microwave radios and fiber optic circuits inside its network to build the network link segments. Increasing capacity involves switching out microwave radios for units of greater capacity or replacing microwave segments with fiber optic cable segments. Both of these operations can take from 30 – 60 days, depending upon how much work has to be done to make fiber availbale between the locations in question.

Should I Increase the Speed of my Connection?

One option available to customers is to purchase a faster connection. Here are some "rules of thumb" about what connection speeds are appropriate for what Internet activity:

- 1-3mbps – casual Internet usage, email and web browsing – not suitable for videos, TV or ePhone (including Skype)
- 5-8mbps – Suitable for videos, movies and Skype
- 10mbps and higher – suitable for gaming and downloading large files.

Upgrading your speed is simple. Just call Support at 520-233-7400. When you upgrade in the middle of your billing cycle, you pay only the prorated amount of the difference in price and then at your next billing cycle you are billed at the full price for the speed you have chosen.

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