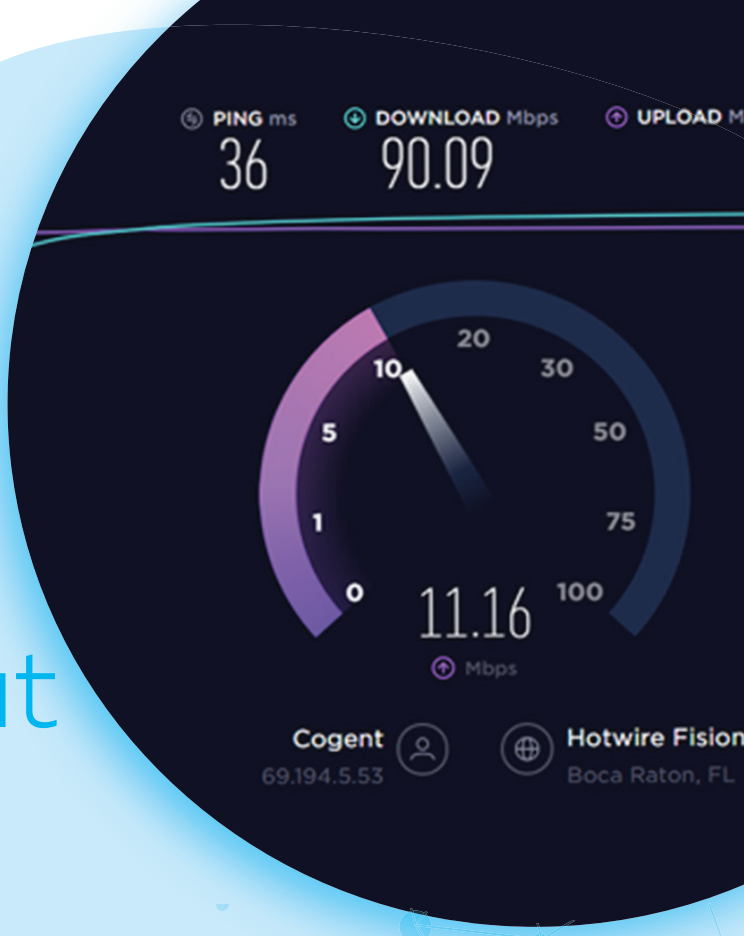
OMNINET

Why might **speedtest** results show less throughput when using **OmniWAN**?



It is common for a speedtest to show lower bandwidth results when **OmniWAN** is securing your network. One reason for the discrepancy is a result of how speedtest measures bandwidth versus how **OmniWAN** optimizes and creates high quality, prioritized bandwidth. With **OmniWAN**, higher rates of bandwidth may be sacrificed in order to provide a better, more reliable Internet experience.

The concept is analogous to RAID10 hard drive storage. RAID10 arrays, which are commonly used, can sacrifice 50% or more of disk storage to provide improved performance and resiliency. When it comes to Internet bandwidth, it is a reasonable proposition to give up a portion of it in order to increase its performance and ultimately, the value it provides for your business.

Following are other reasons you may see lower bandwidth results when using speedtest with **OmniWAN**.

MTU

MTU also impacts the results of speedtest. Typically a computer connected to a switch will use an interface MTU of 1500. Speedtest does not detect end-to-end (path) MTU, but instead transfers files utilizing UDP, which leaves MTU at 1500. With **OmniWAN**, packets of this size are fragmented, typically to 1403 MTU, since they are transported over an encrypted VPN tunnel (which commonly use 1403 MTU due to overhead). Therefore, a 1500 byte packet will be broken into 2 packets, resulting in reduced bandwidth results from the test compared to not using **OmniWAN**.

SERVER LOCATION

Speedtest will show high rates of throughput when a local ISP's speedtest server is chosen. It is a little known fact that many ISPs place speedtest servers directly on their network in order to show higher bandwidth rates to their customers. Additionally, ISPs frequently put a higher priority on speedtest traffic. Given these facts, the result of the test while using a local speedtest server does not provide a valid comparison to real Internet activity such as web browsing, VoIP calls, etc..

When OmniWAN is used, the perimeter of the network moves to the nearest OmniNet data center (i.e. outside the local ISP's network). The distance between speedtest endpoints is now greater compared to a test using an ISP's server.

Crossing ISP peering points while running a speedtest provides a much different result compared to testing within your local ISP. It is, however, a more realistic comparison to general Internet usage since most resources accessed on the Internet are outside your local ISP's network. Running a speedtest that crosses ISP peering points will often introduce congestion and latency, therefore negatively impacting bandwidth results.

Whenever possible, select a speedtest server that is not on your local ISP's network and that is geographically distant from the origin of the test. Doing so will provide a more realistic test of normal Internet traffic.

OMNIWAN TRAFFIC PRIORITIZATION

OmniWAN automatically prioritizes traffic and reserves some bandwidth for EF-46 (High Priority) traffic, such as VoIP. Speedtest, on the other hand, is given the lowest priority and is throttled by the OmniWAN Quality of Service (QOS) engine.

With OmniWAN, bulk traffic, such as large file downloads, data backups and cloud storage syncs are placed in a low priority queue. Bulk traffic is purposely prioritized lower because it is not real-time and by definition, not susceptible to issues due to higher latency.

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Do High Rates of Bandwidth Improve the Internet Experience?

Your ISP may try to sell you on this idea but the answer is "probably not." There are 2 main reasons:

1. **Improved quality provided with OmniWAN minimizes packet loss, latency, and jitter:** If your high-speed Internet connection is low quality and packets are dropped at a rate of more than 1%, you will not effectively use the subscribed bandwidth due to retransmission. Time-sensitive applications, such as VoIP will suffer. Increased jitter, the result of a low-quality Internet connection, can cause the "bubble" effect.

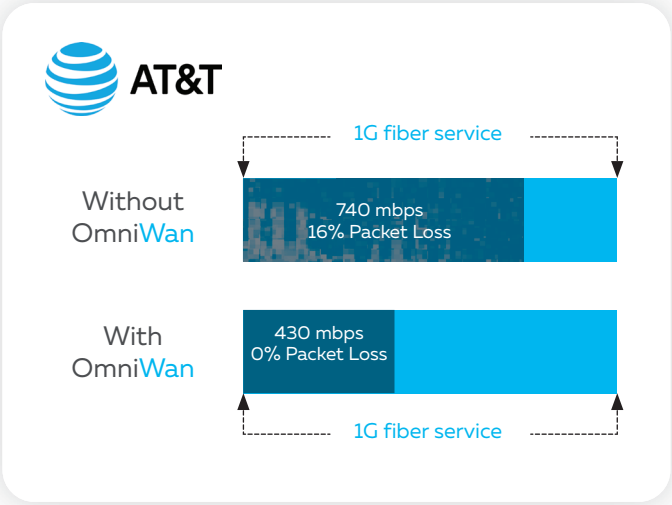
2. **More bandwidth does not mean better quality:** Subscribing to more bandwidth will not improve any of the above mentioned issues. Consider the following: How much bandwidth do you really need? The total bandwidth required for one 4k stream + two HD streams + five YouTube streams + fifty people working on email, phone calls, browsing web etc.. requires approximately 60Mbps. If your Internet connection is of poor quality and has marginal packet loss, increasing the bandwidth to 500Mbps will not improve packet loss and time-sensitive applications will still not function optimally.

Realistically, a high-quality (i.e. minimal packet loss with low rates of latency and jitter) 100Mbps service is ample for an office of up to 100 people. A good rule of thumb that fits most environments is to have a base of 50Mbps for up to 50 people and add approximately 1Mb per additional person.

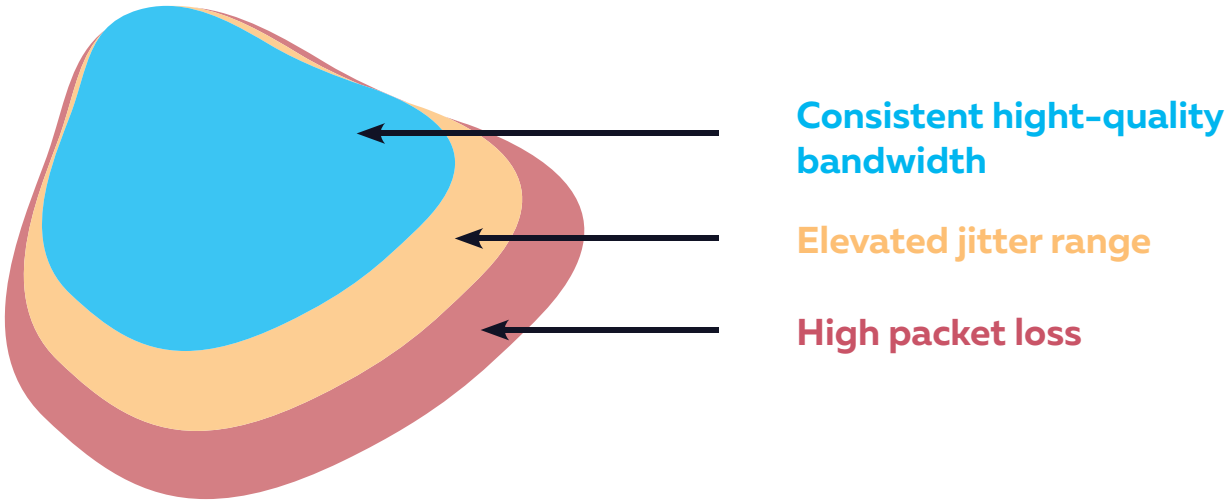
Additionally, subscribed bandwidth rates do not mean that rate can be delivered over a sustained period. Speedtest delivers data for a short duration - or burst. ISPs generally support traffic bursts but due to oversubscription models, do not deliver high rates of data over an extended time.

REAL-LIFE SCENARIO

AT&T 1G fiber service was delivered to an apartment. While running tests on the service, it was established that at 740Mbps, packet loss exceeded 16% - a clearly unacceptable rate. At approximately 430Mbps packet loss was lowered to 0%. In this scenario, the OmniWAN guardrails were set at 430Mbps. This example shows that even a high-quality fiber connection can introduce packet loss problems at data rates that are near the subscribed rate.



HOW DOES OMNIWAN UTILIZE BANDWIDTH?



The graphic above illustrates what is typically seen on a broadband circuit. Although results can vary, it displays a common reality: When the limits of a circuit are pushed, jitter shows up. At higher data rates when more packets are pushed down a connection, the more susceptible they are to being dropped. There are multiple reasons including ISP limits, oversubscription, congestion, the quality of the equipment and cables, sunspots, and other electromagnetic interferences along the way. **OmniWAN** monitors the circuit 10 times per second and detects when degradation is occurring. **OmniWAN** recognizes and automatically lowers data throughput by inserting dynamic guardrails at those points giving up the outer limits of the circuit to maintain the highest quality at the core. When circuit quality resumes to a higher level, the guardrails will be expanded to the original setting.

The result is lower jitter rates and fewer dropped packets.

SUMMARY

While speedtest can give you a general idea of how much bandwidth is delivered to your place of business, it is not a measure of the quality of the bandwidth.

ISPs hype the need for high levels of bandwidth as applications continue moving to the cloud. Many people use speedtests in order to validate they are getting the bandwidth they are subscribed to. However, it is the quality of internet circuits that play a huge role in making time-sensitive applications such as VoIP work well. As was pointed out above, higher bandwidth subscriptions will not fix issues that are a result of low quality.

OmniWAN's SD-WAN capabilities include quality-inducing features such as jitter reduction, dynamic guardrails, application-aware prioritization, and load balancing across multiple ISP connections among others.

As this paper has shown, high subscribed bandwidth will not improve Internet experience. **OmniWAN** can greatly improve the quality of Internet circuits and therefore, improve the experience of many

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