It's Still The Latency, Stupid : How a misconception is driving an industry.

Like most people, you probably refer to bandwidth as 'speed'. It isn't. We discuss what's going on.

By Andrew Marshall, Campus Technologies Inc, June 2019

You most likely have never read Stuart Cheshire's [May 1996 article](1) called *"It's the Latency, Stupid".* That isn't surprising, not many people have, and it's 23 years old. What is surprising is that technology has matured by a further 23 years and we are generally no closer to understanding the issue outlined in that article.

If you have time I'd suggest reading the original article, if you don't (TL;DR) I'll summarize the problem here: Internet performance issues are generally to do with latency and not bandwidth, and bandwidth isn't speed, it's capacity.

You heard right – bandwidth isn't speed, despite all the advertising and media talking about it as though it is. So when you have a 25 megabit per second broadband connection and your ISP sells you a 'faster' 50 megabit per second connection, it isn't any faster. It has a higher capacity, yes – but it's the same speed.

Consider this: If you had a 25 seater bus and a 50 seater bus driving down the highway,

and I told you the 50 seater bus was 'twice as fast' as the 25 seater bus, you would probably identify that as an incorrect statement straightaway - as they will both travel at a nearly identical speed. It is true that the 50 seater bus can carry more people, but only at the same speed, or thereabouts, as the 25 seater bus.

The speed of the bus and the capacity of the bus are clearly different things. You won't get to your destination in half the time traveling on the 50 seater bus than you will on the 25 seater bus.

This is analogous to bandwidth: bandwidth is capacity and not speed – so why are we continually told that it is, and why do we believe it? And what is speed as it relates to an Internet connection? To understand this, we need to talk about the two main factors that affect the performance of an Internet connection – Latency and Bandwidth.

Latency

Latency is the time delay between stimulation and response. In User Interface terms, that's the delay between clicking the mouse or hitting the enter key and

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[1] http://www.stuartcheshire.org/rants/latency.html

something happening in response. This latency largely determines how 'fast' or responsive you perceive things to be happening, and it's the speed of the bus traveling down the highway in our example.

If your action involves a communication or interaction with the Internet, then it's going to determine how responsive you think that Internet connection is.

Increasing response latency above 13 milliseconds (thousandths of a second or ms) has an increasingly negative impact on human performance for a given task. While imperceptible at first, added latency continues to degrade a human's processing ability until approaching 75 to 100 ms. Here we become very conscious that input has become too slow and we must rely on adapting to conditions by anticipating input rather an simply reacting to input. What this means in practice is that your concentration or attentiveness can be interrupted or broken. You switch onto other tasks, and lose the flow of what you were doing.

An ideal latency for your Internet connection is 35ms or less, but obviously the lower the better.

Bandwidth

Bandwidth is the maximum amount of data that can be transmitted over the link in a second – that's the link's capacity. It's the number of people a bus can carry in our earlier analogy.

Bandwidth is clearly important. If you want to transmit or receive large amounts of data, you need enough capacity to be able to do

that in a reasonable time. If you don't have enough bandwidth, then response times will suffer as a result.

Real World

The practical implication of this is that if you have enough bandwidth to do what you're doing, adding more will not make your connection faster. That's the single most important takeaway.

One of the most frequent complaints or service calls fielded by Internet Service Providers is that the customer's Internet is 'slow', either consistently or at certain times of day.

If you are continually told that bandwidth is 'speed', then the logical fix for a slow Internet experience is to buy more 'speed', which as far as everyone is concerned equates to more bandwidth (inevitably at more money).

The problem is that in the majority of cases the cause of an Internet performance problem isn't a lack of bandwidth. There are too many possibilities to go into here as to why an Internet connection may not be performing adequately, but the firmly held belief that bandwidth is speed will cause many to buy upgrades to fix a problem that cannot be solved that way.

Why does everyone call bandwidth 'speed'?

If I'm being generous, I'd say it was a common misconception. If not, I'd say it's sales technique to get people to buy bandwidth upgrades they don't strictly need. Possibly it's both, but ISP's are not rushing to set the record straight.

For residential ISP's, selling people higher 'speed' connections is a great way of increasing revenues at little or no cost to the ISP (as residential customers will not be able to use even a small fraction of their available bandwidth), and it's less obvious than a blatant rate increase.

We also have to appreciate that most consumers, and most customer support staff in most consumer ISP's do not have the skill set required to correctly troubleshoot and resolve an Internet performance problem. A convenient and profitable panacea of 'more bandwidth' is much easier but inevitably leads to dissatisfaction with the ISP's service quality and frustration on the part of the consumer.

Reality check

The consumer really just wants two things – Internet that always works, and always works in a consistently usable manner. Because there's so much complex technology involved, some belonging to the ISP and some to the consumer, this can be quite a hard trick to pull off. Because it can be hard – and expensive – to support this level of service, it doesn't happen and customers are left confused and annoyed at ISP's in general.

This situation can't go on indefinitely. Sooner or later, selling more bandwidth by calling it 'speed' will backfire on the industry.

It's true that you have to have enough bandwidth to avoid a lack of capacity being a bottleneck, but with today's state of the art that amount might be lower than you think.

Streaming 4k video or online gaming uses around 25 megabits per second. If that's what you're doing – or if you're doing less intensive things than that – it makes no difference if you have 50, 100 or 1,000 megabits per second, it will all perform the same way.

Bandwidth isn't speed. Tell your friends.

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Campus Technologies is a national vertically integrated managed network service provider designing, building and operating highly effective wired and wireless networks exclusively in student housing. See more at www.campustechnologies.com