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Verizon's Accidental Mea Culpa

Mark Taylor / 1 day ago

David Young, Vice President, Verizon Regulatory Affairs recently [published a blog post](#) suggesting that Netflix themselves are responsible for the streaming slowdowns Netflix's customers have been seeing. But his attempt at deception has backfired. He has clearly admitted that Verizon is deliberately constraining capacity from network providers like Level 3 who were chosen by Netflix to deliver video content requested by Verizon's own paying broadband consumers.

His explanation for Netflix's on-screen congestion messages contains a nice little diagram. The diagram shows a lovely uncongested Verizon network, conveniently color-coded in green. It shows a network that has lots of unused capacity at the most busy time of the day. Think about that for a moment: Lots of unused capacity. So point number one is that Verizon has freely admitted that it has the ability to deliver lots of Netflix streams to broadband customers requesting them, at no extra cost. But, for some reason, Verizon has decided that it prefers not to deliver these streams, even though its subscribers have paid it to do so.

The diagram then shows this one little bar, suggestively color-coded in red so you know it's bad. And that is meant to be Level 3 and several other network operators. That bar actually represents a very large global network, and it should be shown in green, since, as we will discuss in a moment, our network has plenty of available capacity as well. In [my last blog post](#), I gave details about how much fiber and how much equipment we deployed to build that network and how many cities around the globe it connects. If the Verizon diagram was to scale, our little red bar is probably bigger than their green network.

But here's the thing. The utilization of all of those thousands of links across the Level 3 network is much the same as Verizon's depiction of their own network. We engineer it that way. We have to maintain adequate headroom because that's what we sell to customers. They buy high quality uncongested bandwidth. And in fact, Verizon admits

as much because they conveniently show one direction across our network with a peak utilization of 34%; almost exactly what I explained in my last blog post. I can confirm once again that all of those thousands of links on the Level 3 network are managed carefully so that the peak utilizations look very similar to those Verizon show for their own network – IN BOTH DIRECTIONS.

So why does Verizon show this red bar? And why do they blame Level 3 and the other network operators contracted by Netflix?

Well, as I explained in my last blog post, the bit that is congested is the place where the Level 3 and Verizon networks interconnect. Level 3's network interconnects with Verizon's in ten cities; three in Europe and seven in the United States. The aggregate utilization of those interconnections in Europe on July 8, 2014 was 18% (a region where Verizon does NOT sell broadband to its customers). The utilization of those interconnections in the United States (where Verizon sells broadband to its customers and sees Level 3 and online video providers such as Netflix as competitors to its own CDN and pay TV businesses) was about 100%. And to be more specific, as Mr. Young pointed out, that was 100% utilization in the direction of flow from the Level 3 network to the Verizon network.

So let's look at what that means in one of those locations. The one Verizon picked in its diagram: Los Angeles. All of the Verizon FiOS customers in Southern California likely get some of their content through this interconnection location. It is in a single building. And boils down to a router Level 3 owns, a router Verizon owns and four 10Gbps Ethernet ports on each router. A small cable runs between each of those ports to connect them together. This diagram is far simpler than the Verizon diagram and shows exactly where the congestion exists.



Verizon has confirmed that everything between that router in their network and their subscribers is uncongested – in fact has plenty of capacity sitting there waiting to be used. Above, I confirmed exactly the same thing for the Level 3 network. So in fact, we could fix this congestion in about five minutes simply by connecting up more 10Gbps ports on those routers. Simple. Something we've been asking Verizon to do for many, many months, and something other providers regularly do in similar circumstances. But Verizon has refused. So Verizon, not Level 3 or Netflix, causes the congestion. Why is that? Maybe they can't afford a new port card because they've run out – even though

these cards are very cheap, just a few thousand dollars for each 10 Gbps card which could support 5,000 streams or more. If that's the case, we'll buy one for them. Maybe they can't afford the small piece of cable between our two ports. If that's the case, we'll provide it. Heck, we'll even install it.

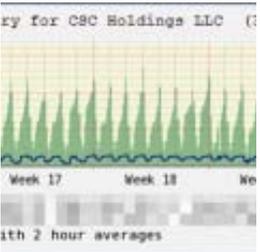
But, here's the other interesting thing also shown in the Verizon diagram. This congestion only takes place between Verizon and network providers chosen by Netflix. The providers that Netflix does not use do not experience the same problem. Why is that? Could it be that Verizon does not want its customers to actually use the higher-speed services it sells to them? Could it be that Verizon wants to extract a pound of flesh from its competitors, using the monopoly it has over the only connection to its end-users to raise its competitors' costs?

To summarize: All of the networks have ample capacity and congestion only occurs in a small number of locations, locations where networks interconnect with some last mile ISPs like Verizon. The cost of removing that congestion is absolutely trivial. It takes two parties to remove congestion at an interconnect point. I can confirm that Level 3 is not the party refusing to add that capacity. In fact, Level 3 has asked Verizon for a long time to add interconnection capacity and to deliver the traffic its customers are requesting from our customers, but Verizon refuses.

Why might that be? Maybe we should ask David Young.

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	Mark Taylor I work as VP of Content and Media here at Level 3. English expat and passionate new tech energy evangelist.

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109 thoughts on “Verizon’s Accidental Mea Culpa”



Sanjay July 17, 2014 at 12:42 pm

Seems like the Verizon post clearly states the reason for the “bottleneck” called out here. Seems like they want to get paid when there is a traffic flow imbalance. Makes sense to me.

> ... took steps to ensure that there was adequate capacity for their traffic to enter our network. In some cases, these are **settlement-free peering arrangements, where the relative traffic flows between an IP network provider and us remain roughly equal**, and both parties invest in sufficient facilities to match these roughly equal flows. That is the traditional basis for such deals. In other cases **there may be traffic imbalances, but the networks or content providers have entered into paid arrangements** with us to ensure connections and capacity to meet their needs for their out-of-balance traffic.

[Reply](#)



Mark Taylor July 18, 2014 at 8:37 am

Sanjay if the traffic flow through that Los Angeles router is 40Gbps from Level 3's customer to Verizon's customer and 10Gbps in the opposite direction then both networks carry 50Gbps. What matters then is how far we each carry it. If Level 3 carries it 800 miles and Verizon carries it 80 miles then Level 3 incurs a higher burden of cost – ten times in this example. If the direction of traffic then reverses our respective costs are unchanged as we both still carry 50Gbps, and Level 3 still carries it 800 miles and Verizon still carries it 80 miles. If the distance reverses, however, then our respective costs do change. So bits multiplied by distance (bit miles) determine costs. Level 3 is more than happy to incur its share of that cost. I appreciate that traffic ratios were used as a proxy for cost equality between backbone network peers historically. And that can work well because both networks are synchronous and likely have the same business model. But it completely fails to work as a proxy for shared costs when a synchronous backbone like Level 3 connects to an asynchronous broadband consumer network like Verizon. It simply isn't possible to get in balance even if balance was a measure of cost equality – and it isn't. Enforcing balance in these circumstances is, in our view, a way of arbitrarily raising a toll.

[Reply](#)



John July 18, 2014 at 8:54 am

“I appreciate that traffic ratios were used as a proxy for cost equality between backbone network peers historically ... Enforcing balance in these circumstances is, in our view, a way of arbitrarily raising a toll.”

In other words, you want to change the way interconnect business arrangements have been done in the past because it disadvantages you because you are the primary source network for probably the biggest sender of data in the history of the world. Not to mention that Netflix is paying you a lot for all that access bandwidth to your network. In this case, Verizon is quite explicit in that post that they either want you to pay them for the traffic

imbalance or have Netflix buy access directly to their network.

This does not seem unreasonable to me.

[Reply](#)



Mark Taylor

July 18, 2014 at 10:58 am

John, interconnect agreements between backbone networks used traffic balance as a proxy for each network equally sharing the cost of delivering traffic between their paying customers. When two synchronous networks interconnect and have much the same business model (sell the same types of services to the same types of customers) then this proxy generally works.

But when a synchronous network connects to an asynchronous network, traffic balance no longer works as a proxy for an equitable sharing of costs between those two networks. So if two such networks want to interconnect, and genuinely want to find a way of equitably sharing the cost of delivering traffic between each of their paying customers, then a different methodology is required. We have suggested that bit miles^2 should be used. That measure combines how much traffic is exchanged through the interconnect point and then how far each network carries it.

That is what should be in balance if, as I say, the goal is an equitable relationship. Level 3 is most certainly not asking for a free ride here.

We fully recognise we have to use our

network to carry traffic flows between our paying customer's and an ISP's paying customers. And we should bear at least half of that burden.

[Reply](#)



Tom July 18, 2014 at 9:08 am

“If Level 3 carries it 800 miles and Verizon carries it 80 miles then Level 3 incurs a higher burden of cost – ten times in this example.”

Level 3 has long and narrow networks from data center to data center, Verizon has wide and shallow networks. Yes, it's 80 miles to the specific end user, but multiply that by the number of accessible users that Verizon needs to be ready to deliver that traffic to and I think you'll find that the comparative number of miles is vastly different than 10:1.

[Reply](#)



Mark Taylor

July 18, 2014 at 11:25 am

Tom that's a reasonable point. But don't forget we both have a different product and a different commercial relationship with our respective customer. The architectures that each network operator deploys may be different. In our view that should be factored into how Level 3 charges for Internet Services and how the ISP charges for consumer broadband services.

[Reply](#)



Casey July 18, 2014 at 9:49 am

Also keep in mind, Level 3 isn't just randomly sending Netflix traffic to Verizon. Verizon's customers are asking for the Netflix traffic to consume. Verizon's customers are paying for Verizon to deliver any and all traffic from the Internet. If Verizon can't deliver the Internet to its customers at the speed promised by Verizon, then Verizon should be the one trying to fix the problem.

[Reply](#)



Bengie July 18, 2014 at 10:09 am

My ISP sends way more data to my home network than my home network sends to my ISP. Maybe my ISP should be paying me for access to my network.

I love this "imbalance" logic.

[Reply](#)



Joel July 17, 2014 at 12:55 pm

Wait,

V says, "In other cases there may be traffic imbalances, but the networks or content providers have entered into paid arrangements with us to ensure connections and capacity to meet their needs for their out-of-balance traffic."

L3 says, "Could it be that Verizon wants to extract a pound of flesh from its competitors, using the monopoly it has over the only connection to its end-users to raise its competitors' costs?"

So is this a case of extortion?

[Reply](#)

Pingback: [Internet congestionata \(ISPs vs Level 3\)](#)



Alan July 17, 2014 at 1:00 pm

Excellent post, Mark. I work for a major LA telecom and it's a pretty open secret that we throttle all of our customers with the exception of the highest payers. It's sad, because we could easily offer the same level of service across 95% of the customer base (there are some exceptions where bandwidth will be constrained based on location or use), but really it's a money grab.

[Reply](#)



Alex July 17, 2014 at 1:02 pm

Spot on, Mark.

Zero technical reason why this problem exists – it's being entirely manufactured by the ISPs.

[Reply](#)



spinn July 17, 2014 at 1:05 pm

Whoo, nothing like a facts-based takedown

[Reply](#)



BH July 17, 2014 at 1:06 pm

I hear what you're saying Mark. But you don't address the second half of David's article:

“What it boils down to is this: these other transit and content providers took steps to ensure that there was adequate capacity for their traffic to enter our network. In some cases, these are settlement-free peering arrangements, where the relative traffic flows between an IP network provider and us remain roughly equal, and both parties invest in sufficient facilities to match these roughly equal flows. That is the traditional basis for such deals. In other cases there may be traffic imbalances, but the networks or content providers have entered into paid arrangements with us to ensure connections and capacity to meet their needs for their out-of-balance traffic.

That has not recently been the case with Netflix and the networks carrying its traffic. Netflix sends out an unprecedented amount of traffic. Sandvine recently noted that Netflix now accounts for more than one-third of all North American downstream traffic during peak hours. For whatever reason (perhaps to cut costs and improve its profitability), Netflix did not make arrangements to deliver this massive amount of traffic through connections that can handle it.

Instead, Netflix chose to attempt to deliver that traffic to Verizon through a few third-party transit providers with limited capacity over connections specifically to be used only for balanced traffic flows. Netflix knew better. Netflix is responsible for either using connections that can carry the volume of traffic it is sending, or working out arrangements with its suppliers so they can handle the volumes. As we’ve made clear before, we regularly negotiate reasonable commercial arrangements with transit providers or content providers to ensure a level of capacity that accommodates their volume of traffic.”

So when you say “But Verizon has refused.” in regards to adding more links between border routers, aren’t they really saying “You have to pay us more” to deliver such an imbalanced load? How is their desire to do this different from you stating “We have to maintain adequate headroom because that’s what we sell to customers. They buy high quality uncongested bandwidth.”

If they allow those those 4 unused ports to be connected doesn’t their network off that border router jump to 100+% utilization and the traffic flowing from that increase the load on it’s interconnections?

What’s the debate here? Is it that Verizon should have to freely carry Netflix’s traffic to consumers because consumers pay for use of Verizon’s bandwidth?

Let me give a comparison: I pay out of my taxes for the government to maintain roads and bridges that I drive on. This doesn’t provide me

100% free use however, I still pay tolls. Businesses want to use these roads for shipping and to do that they use 18 wheelers to deliver. Because these 18 wheelers have a bigger impact on the roads, they pay a higher toll. If all of a sudden the waters dried up the sky turned to fire and all businesses could rely on for transport was the roads to ship, there would be so many more 19 wheelers on the road. Do you think the average citizen would want to pay for the roads to be repaved monthly due to the stress of this traffic? No...they would expect the companies to pay for it and for the governments to somehow regulate/arrange that. Is that fair for the company? After all, they say "The customer is paying their taxes for us to use the roads to sell them goods they want." I say no dice. The companies should pay and, should therefore likely have to raise their prices of goods to the consumer.

Netflix should raise their prices to pay for more bandwidth. Will they loose customers? Maybe. Where will those customers go? Maybe to the next company that can figure out how to compress high definition video to 1/3rd the size that Netflix uses. That will spur innovation and competition the things that drive the economy.

Is the problem here that L3 promised a certain level of access to Netflix through its provider that it can't no deliver based on the sheer capacity of it? If so, L3 signed a bad contract, and likely have to honor it until renegotiation time. L3 shouldn't be the one paying in the longterm for this...or even throwing their hat in the ring. Netflix should pay you to deliver their content just like I have to pay for my upstream bandwidth for my remote connections, you pay that to Verizon to increase your link with them.

It isn't like Verizon isn't paying money to deliver services to users... they have to deliver their infrastructure to the end user and that costs them. Netflix shouldn't think it doesn't need to increase it's distribution costs as it increases users.

[Reply](#)



Mark Taylor July 17, 2014 at 3:58 pm

BH, we did address that issue in both comments to my prior posting on this subject as well as Mike Mooney's last post. If two parties are genuine in wanting to share the cost of moving

traffic between their respective customers then traffic ratios or balance of traffic are irrelevant when it comes to connecting to a last mile network. In fact it isn't even possible to be in balance with a network operator who sells an asynchronous service. What matters is how many bits you each carry and how far you each carry them. As my very simple diagram shows there is a network on both sides if that interconnect. There are 40Gbps of traffic exchanged there. If Level 3 carried that traffic an average of 800 miles and Verizon carried that traffic an average of 80 miles does the distance of traffic matter? No it doesn't. Level 3 is absolutely not asking for a free ride here. Far from it. We are simply saying that network operators who are genuine about sharing the cost should do just that and not use an irrelevant metric to obfuscate why they are really not adding extra interconnect ports.

[Reply](#)



BH July 17, 2014 at 5:09 pm

Mark,

I just found and read <http://blog.level3.com/global-connectivity/heads-isps-win-tails-you-lose/> which I think is what you are referring to. I wish I had seen that one first (I don't normally frequent the blog), as it would have changed my explanation/questions somewhat.

I'm with you in the spirit of most everything written in that post. I just don't know that it is realistic.

What if, tomorrow, 3 new companies sprang up that were going to deliver services at the level Netflix requires. Based on the numbers thrown around about current load being close to 40-50% and without knowledge that Netflix accounts for like 60%+ of all traffic, I think it safe to say that the current infrastructure on any end would be pressed to deal with Netflix x4!

What you are asking for is full access through

Verizon's network in turn for you giving them full access through yours, right? What happens when those 4 extra ports aren't enough and they need to install another 8 ports and quadruple their current influx through their networks from L3 while utilizing only 7% of that back channel? I'm not sure where the balance comes in that.

For Verizon to provide that it would require consumers paying the cost.

Personally, I'd rather make sure that my ISP charges are fair and regulated and that those providing the content charge what they feel they need to deliver it.

It's a chicken and egg scenario because where would you guys be if Verizon didn't deliver service to customers? Then again, where would they be if L3 wasn't delivering any content from the providers? That's what makes it a 2-way street, but I'm not sure I'm fully on board with both parties paying the same for disparate use.

That being said, there shouldn't be additional charges above and beyond what it should take to carry that traffic. That is, Verizon can't charge Netflix (via L3) 2x for what it takes Verizon only 1x to deliver for its own content.

[Reply](#)



BH July 17, 2014 at 5:19 pm

In closing, while I agree with the spirit of the net neutrality in this issue, I'm not really sure that the end result as it scales out will actually be fair to the consumer. Will I have to pay 5x the cost from my ISP even though I am not streaming high bandwidth content all day?

I would like *someone* to give an

argument that encompasses both the philosophical and economic implications of how “net neutrality” is going to play out 5 years from now when more people are connected and there is much more content to deliver to many more endpoint.

Realize that most people care a lot more if their ISP rates get raised 40% than if Netflix/L3/Verizon make 50% less profit 😊

[Reply](#)



Mark Taylor

July 18, 2014 at 10:49 am

BH, what most people overlook is the cost of the equipment required to provide network bandwidth. It is mostly driven by Moore's law and as such we have seen dramatic reductions in the “cost to deliver a bit.” That reduction is ongoing and pretty predictable. It has been going on for years. And it has been decreasing faster than the increase in traffic.

This is also pretty apparent in the public financial results from ISPs.

Their profitability has been increasing over time.



Col. Jessep July 17, 2014 at 7:04 pm

“What matters is how many bits you each carry and how far you each carry them.”

So if Level 3 send the traffic from their CDN a few meters to an ISP and that ISP carries the traffic 200 miles, then the burden is on the ISP and not Level 3.

Or if Level 3 sells to a CDN and delivers the same way.

Flip side is if an ISP delivers traffic to Level 3 and Level 3 needs to carry it around the world.

This makes sense, but what % of traffic these days is CDN and really only carried a few meters?

[Reply](#)



Mark Taylor

July 18, 2014 at 10:48 am

Col. Jessep the way you have described the impacts of various types of traffic is absolutely correct. Two networks adopting this methodology would add up all those respective bit miles and see if there is an imbalance. The question then is what do you do about that imbalance? It turns out that there are lots of network changes that can be made to create a balance. And we have found that in every instance where we have done this it is relatively easy if two networks have that goal in mind.

[Reply](#)



April July 17, 2014 at 11:15 pm

I'll add that BH must live in the East, out West we don't have toll roads. Our major roads are paid for by taxes on each gallon of gas or diesel purchased. Consequently those who use the roads more pay more. The state also has yearly vehicle registration fees that go toward our transportation system.

Seems to me the best way to catch up with the rest of the world who has faster Internet is to break up the local monopolies the ISP enjoy in most places. Our last mile connections have become a mandatory utility service. It's time for We The People to add our regulation over the ISPs to keep them honest and to provide the Net to us.

[Reply](#)



BH July 18, 2014 at 10:56 am

Lived up and down the East coast and now in the mid-west and toll roads have always been a way of life. We also have state tax on fuel (not as high as CA, but we are in the top 10...add city tax onto that and we might be higher still). We also have yearly registration fees. I think most if not all of the country has a combination of these.

Point being...apart from one time registration fees, everyone is going to pay more the more they use the roads. Why shouldn't Netflix?

Currently, in-state drivers get toll road discounts for having lane-pass systems for their vehicles. If we had "road neutrality" this wouldn't exist because it means out of state drivers are being charged more for use of roads. It makes some sense because out of state drivers don't put in state registration fees to

subsidize.

I think it is a little bit of a convoluted argument to layer vehicle infrastructure on top of the net neutrality. But, really, why shouldn't I be able to drive through NY's tollways at the same rate a local can? Isn't that somewhat of the same argument here?

What net neutrality is saying is that *should* be the case. And, I agree, Netflix shouldn't pay more to transit Verizon's networks than it costs Verizon to transit their own data. That doesn't mean that they should only pay the same amount if they are transiting 10x the data.

As I mention above, it also doesn't have a logical conclusion when we scale out. What happens when Netflix accounts for 95% of the bandwidth as their subscription base increases. That leaves only 5% for the rest of content providers. Should Verizon suffer not being able to deliver their content because Netflix is taking the whole pipe?

I'm not saying I know the right answer, but I don't think anyone is giving us the full picture as to how this plays out.

[Reply](#)



A_Pickle July 17, 2014 at 11:47 pm

So, wait, then Verizon is trying to monetize the wrong party then. They should be charging Level 3, instead of Netflix! Problem solved.

[Reply](#)



Mark Taylor

July 18, 2014 at 10:10 am

A_Pickle, we have a better suggestion which is that both Level 3 and Verizon use their respective networks to equally share the cost of delivering traffic flows between our paying customers and Verizon's paying customers. No arbitrary interconnection fees are then needed.

[Reply](#)



Dave July 18, 2014 at 12:37 am

So are you saying that up until this point L3 and Verizon have not had synchronous peering arrangements?

[Reply](#)



Mark Taylor

July 18, 2014 at 10:11 am

Dave no I'm not saying that. I'm saying that our network is fully synchronous. But an broadband ISP's isn't. Therefore, traffic flows through an interconnection point between those two types of network will not be in balance. And to try and suggest that they should be in order to achieve settlement free interconnection is a fallacious argument. Because even if there were in balance it is the distance that each network carries the traffic that determines their respective costs. Traffic ratios in this context are in fact a

smokescreen hiding the fact that an arbitrary toll is being raised.

[Reply](#)



Mark July 18, 2014 at 7:20 am

Your diagram shows network on both sides of the peering but only shows one utilization figure for each of the interfaces. Is this a unidirectional peering where traffic flows only from Level3 to Verizon (which would imply transit, not peering), or is traffic flowing both ways? If there's traffic flowing both ways, does the figure mean that the entire 20 Gbps bidirectional capacity of the interface is in use, or are we only being shown utilization in one direction?

Michael Mooney confirmed in comments I exchanged with him in his blog post back in March that Level3 does indeed enter into contractual agreements with its peers. He also went on to confirm that the terms of those contracts are confidential. I'm okay with that; it's a necessary business practice. Personally, I have doubts that those terms include unlimited bandwidth for both sides whether or not the exchange of traffic is equitable. But it's all confidential, so we have to ignore the man behind that curtain.

Or do we? You've seen fit to reveal the things about this peering that bolster your side of the argument, so at least some confidentiality is out the window. How about providing the two other pieces of data required to evaluate whether or not there's any validity to your argument that Verizon is being a bad peer? One is the utilization figure for traffic in the other direction. Any router big enough to handle a Tier-1-sized peering keeps count of inbound and outbound traffic, so Level3 is in possession of that information. The other is whether or not the current state of things is within the definition of "equitable"

per the agreement you have with Verizon. In the interest of maintaining confidentiality, I won't even ask how "equitable" is defined. Of course, you could say "yes, it is," and it still wouldn't prove a thing. But at least you'll have said it in public and Verizon can throw the BS flag if it disagrees.

I bring this up because, despite your assertion that despite having lots of available network capacity, Level3 [de-peered Cogent in 2005](#) for pretty much the same reason that Verizon isn't upgrading the peering. The reason — and this is verbatim from a Level3 press release — was, "without paying, Cogent was using far more of Level 3's network, far more of the time, than the reverse. Following our review, we decided that it was unfair for us to be subsidizing Cogent's business." What I read into this is that Level3 does actually care about equitability in its peerings, at least when the imbalance of traffic isn't in its favor. I've been very critical of Cogent for its recent behavior, and Level3 deserves just as much scorn if it's doing the same thing.

By the way, I'm not a Netflix customer, but I am a Verizon residential customer. (My only other choice is Comcast, and that's a non-starter.) I also have some sentimental love for AS701 because I helped run it in the 1990s, but not so much love to automatically favor Verizon if they're being buttheads. What's amusing is that I lease and use a server in a distant data center which buys transit from both Level3 and Cogent. The routing from where I am works out such that traffic traverses Level3 in one direction and Cogent in the other, so I get the shaft if either or both of you happens to be wedged at your Verizon peerings at any given moment. So thanks for that.

[Reply](#)



Mark Taylor

July 18, 2014 at 10:02 am

Mark, I did say in the post that the utilization figures for those ports were for traffic in the direction from Level 3's customers towards Verizon's customers. You are correct these are synchronous links – the utilisation in the reverse direction is lower and is shown on the Verizon diagram in their blog post.

Yes we did have a disagreement with Cogent many years ago. I've also written about that elsewhere too. I agree that neither party handled that well but we resolved the problem within days and put an agreement in place that has stood the test of time ever since. Our issue was one of equitable sharing of costs. We have remained absolutely consistent in saying that what matters in assessing that is the amount of traffic that each network carries to and from the interconnect point multiplied by the distance that it is carried. We call that bit miles. I have given examples of how that works in several of the other comments here.

[Reply](#)



jeff July 18, 2014 at 10:10 am

btw bit miles

is it geographical miles or actual cable length miles?

If cable length, what's to keep an interconnect from simply wounding a wire around a spool.



Dave Smith July 18, 2014 at 7:41 am

Let me add a little bit here.

Home users are data consumers. They stream movies, download software and browse web sites. For the most part home users won't distribute data out to the Internet except when they're doing things like video conferencing, backup or peer-to-peer file sharing (which most home network providers hate).

So, as Mark says, it's impossible for there to be balanced traffic between a home network provider like Verizon and a long-haul backbone like Level 3. The idea of "balanced peering" is relevant between backbone providers, not between a backbone provider and a home network provider.

Furthermore, Verizon's customers have already paid Verizon to deliver data to them. Verizon simply wants to get paid twice.

[Reply](#)



Azzy23 July 18, 2014 at 10:58 am

This is very simply and well-said Dave.

[Reply](#)



Pj July 18, 2014 at 8:48 am

Thank you! I've been hearing about this peering debate for ages, and I'm so tired of the "asynchronous traffic" argument. Apparently it makes just enough sense that anyone who doesn't really think about it finds it acceptable. It's

particularly sad when, while making an argument, people get confused over whether it is the person who sends data or the person who receives it who should pay, but that doesn't clue them in to the fact that they're using the wrong metric.

So Level 3 should pay Verizon since they're sending Verizon more data than they're accepting? OK, so then I guess Verizon should be paying their customers when they finally deliver that data to their customers, right? I mean, if the rule is "he who sends the data pays" then Verizon owes a lot of money to their customers who watch Netflix. ...or is the rule "Verizon gets the money no matter which direction the data is flowing?"

You're right, it's absolutely about who carries the data the furthest. I pay my ISP for internet access. They either need to provide that by running wires between me and all of the web sites I want to visit, or they can just run it a few miles, then pay someone else to take it the rest of the way around the world. For them to cover only half the route, then insist that someone else pay them for the privilege of taking it the rest of the way is absurd. This is nothing more than Verizon telling Netflix "we own your customers, so you're going to pay us."

[Reply](#)



Matt July 17, 2014 at 4:55 pm

> What's the debate here? Is it that Verizon should have to freely carry Netflix's traffic to consumers because consumers pay for use of Verizon's bandwidth?

FIOS already has the internal capacity to carry the streams, but they are refusing to open the tap all the way.

And yes, that is exactly what a last mile ISP should be doing. This is how it works. This is how it has always worked. No customer, no one ever in the history of the internet. has said

to themselves “Gee, I sure do wish I could selectively partition my bandwidth so I can pay different rates for different services. Wouldn’t that be nice?”

The analogy of an 18-wheeler doesn’t really hold up. Using a network connection doesn’t cause it to wear out more quickly, and in this case it isn’t even some faceless entity driving the big rigs, it’s the customers themselves. If I paid my taxes and bought the right to drive my truck on a road 100 times a month, does it matter if I choose 90 of those trucks to be Netflix trucks?

[Reply](#)



WSC July 17, 2014 at 5:19 pm

BH> “Netflix sends out an unprecedented amount of traffic.”

Excuse me, above sentence sounds like a big, fat, abominating lie.

Isn’t it a traffic that Verizon customers _requested_?

Isn’t it a traffic that requesting it customers paid Verizon for?

[Reply](#)



Znuff July 17, 2014 at 6:52 pm

>Is it that Verizon should have to freely carry Netflix’s traffic to consumers because consumers pay for use of Verizon’s bandwidth?

Yes.

Because their own network doesn’t handle it. Specifically, their peering with other ISPs (like Level3).

[Reply](#)



Shaun July 17, 2014 at 9:34 pm

BH, your comparison falls a little short. To make it a more proper comparison, end users are the car drivers that use their cars to go shopping. They pay their registration fees for their vehicles which all include a roads and bridges tax (Their ISP fee). That tax allows them to use the roads. They can make one trip a month to the store (content provider) or they can make a million trips to the store (content provider), but they have PAID. You don't turn around to the content provider and demand they pay more because half of the cars on the road are going there.

[Reply](#)



Robert July 18, 2014 at 12:41 am

BH sounds like he works for verizon.

At the end of the day, Verizon has many customers that PAY for high speed internet, and Verizon is failing to give customers what they pay for. They are trying to double dip (ie. get money from the customer AND Netflix!)

[Reply](#)



flux July 18, 2014 at 12:51 am

All right, but Verizon has a near-monopoly position on consumers who pay them for Internet service. If they want Netflix, the obligation is on Verizon to build out their network to accommodate what their own paying customers are using (ie, Netflix). That there's an imbalance in the network is unavoidable, given that Verizon is a last-mile provider and does not allow users to run servers on residential connections. Free peering agreements shouldn't come into play for last-mile providers, as they're not providing transit as

Level 3 does; they provide the pipes into the customers' houses.

Customers don't have a lot of options, either. It isn't as if they can tell Verizon to stuff it and leave – there's nowhere to go. Where I live, my options are CenturyLink DSL (max 5 Mbps) or Comcast. If I need more than 5Mbps, I can only go to Comcast, who will charge way more, try to wheedle me into cable service I don't want, then mock me with fliers in the mail twice a week showing they're going to charge new customers half what I'm already paying them.

[Reply](#)



Robert Bohannon July 18, 2014 at 2:02 am

“Is it that Verizon should have to freely carry Netflix's traffic to consumers because consumers pay for use of Verizon's bandwidth”

That's exactly right. There's nothing “freely” about it. Netflix isn't “sending out an unprecedented amount of traffic” as much as Verizon's customers who have paid for it, are requesting it. It's Verizon's job to deliver what their customers are paying for, regardless of where that traffic comes from.

If our political system wasn't already so corporately corrupt Verizon would have already received a huge smack down for their extortion and greed.

[Reply](#)



Mark Taylor July 18, 2014 at 10:07 am

My addition to this thread is to refer to Mike Mooney's previous blog post (<http://blog.level3.com/global-connectivity/heads-isps-win-tails-you-lose/>). In order to help solve these interconnection issues we have suggested fair and

equitable ways for those connections to be maintained without congestion. Level 3 is not suggesting we get a free ride. We have paying customers on one end of the traffic flows too. And as such we have an obligation, when we interconnect with an ISP like Verizon, to do our fair share of moving that traffic between our respective customers.

[Reply](#)



Anthony Koltenuk July 18, 2014 at 3:58 am

I like your analogy which equates road traffic, because it really perfectly shows why the attempts to get extra money from content providers is flawed.

Lets continue to assume that the internet is like a highway, and that high content deliverers cause degradation in the network over time. If this were like a highway, we would choose one of 2 models. The first is the public highway option. This highway is entirely paid for through taxes (Subscribers) and receives funds for maintenance that way. The second option is to create a toll road which receives funds by those transporting the goods over the highway. The costs can be assessed based on the weight of the goods. Both models are capable of fully funding the highway independently. Now, in Verizon's model, they would get the full revenue from both sides, while also not performing their required maintenance.

Either model provides more than enough, but in an industry which has monopolized itself out of competition, they have decided to screw both their actual customers, and the providers of the product their customer demands.

Keep in mind, the only reason that people want the road is because goods are being shipped over the road. If those goods become too costly due to having to pay tolls to send and receive, people will build a different road.

[Reply](#)



Jay July 18, 2014 at 4:40 am

“Is it that Verizon should have to freely carry Netflix’s traffic to consumers because consumers pay for use of Verizon’s bandwidth?”

Freely =\= paid for.

I realise I’m probably coming to this argument with very few relevant facts, but in my view – if Verizon has customers paying for a given speed of access to content (including Netflix), they should provide that to the best of their ability. Is it the fault of any other company if they have decided to market their service at a speed or contention higher than they think they can provide? No. Restricting access to the product doesn’t seem like the right answer for the customer (bearing in mind that the product is “access to the internet, at speed x, for this cost per period).

If they feel they can’t provide the services they’re selling without restriction, why are they advertising/selling them at that level?

[Reply](#)



Eric July 18, 2014 at 5:55 am

What’s the debate here? Is it that Verizon should have to freely carry Netflix’s traffic to consumers because consumers pay for use of Verizon’s bandwidth?

Answer: Yes. Verizon should deliver to Verizon customers the content that Verizon customers are paying Verizon to deliver to them. Verizon customers pay Verizon money because they expect Verizon to deliver to them the content they request.

[Reply](#)



rudy July 18, 2014 at 6:42 am

“Is it that Verizon should have to freely carry Netflix’s traffic to consumers because consumers pay for use of Verizon’s bandwidth?”

Yes. US taxpayers paid huge subsidies to have these networks built.

[Reply](#)



MA July 18, 2014 at 7:37 am

“Netflix did not make arrangements to deliver this massive amount of traffic through connections that can handle it.”

Realistically, Netflix isn’t obligated to ensure that Verizon has sufficient transit from their customer networks to the transit networks that connect them to Netflix’ infrastructure. At no other point in the history of Internet peering has any content delivery company ever been made to be responsible for how an ISP gets its transit, but now for some reason Verizon wants to shift part of its own responsibility onto Netflix, with no clear and reasonable explanation as to why this should be. Netflix isn’t sending unsolicited traffic to its customers, rather Netflix is responding to requests from its customers, requests that those customers pay their Internet service providers to facilitate. Those requests are not being facilitated properly due to congestion that Verizon refuses to address.

As for the trucking “comparison,” you need to understand that cars and trucks and roads is a woefully poor analogy to Internetworking. We aren’t dealing with roads that wear down. We aren’t dealing with public infrastructure. We aren’t dealing with capacity that can be involuntarily constrained. Every bit of exchange between Verizon and Level3 is voluntary, every bit of that exchange is paid for to Verizon by its customers. Every single bit of Netflix traffic that traverses an interconnection between Verizon and Level3 is a bit that Verizon’s customers paid Verizon to facilitate. Verizon does

not get to turn around and complain about Netflix because Verizon doesn't wish to provide its customers with the service that they pay for.

[Reply](#)



WW July 18, 2014 at 8:06 am

Toll roads are private enterprise and not government roads of which you pay a fuel tax to maintain. (see the highway trust fund). Commercial drivers have additional fees and regulations, but that is born only once and is passed on to the customer. Sorry, but I worked in shipping and transportation for nearly a decade and I understand the issues. What Verizon is doing or wants to do is double bill: Bill the customer in the home or office for the bandwidth and connection costs plus profit margin, and then bill the other end of the connection for the same bandwidth and infrastructure. One of those connections is pure profit. Simply greed. So to fix your road analogy: Company X is shipping a truck load of widgets and has to pay for the cost of the fuel, a road tax, and fees to the shipping company before being allowed to use the road. On the other end, the receiver of the goods has to pay the cost of the fuel, a road tax, and fees before delivery can be made by the shipping company. That's what Verizon wants to do: charge twice for the same movement of stuff.

[Reply](#)



Matt Wheeler July 18, 2014 at 8:31 am

Actually, Verizon are getting paid for that traffic.... from the customers. I pay them to bring netflix to my house. I pay them to have the capacity to do that for the last mile. Netflix pays level 3 to bring it the majority of the way. The only way around this is for netflix to set up their own ISP.

[Reply](#)



Eric July 18, 2014 at 8:34 am

Your road/toll road analogy has some flaws, and your point is weakened (even reversed) if you correct it. To stick with the shipping analogy:

- 1) Netflix is like a ship-to-home retailer (think Amazon).
- 2) The companies that maintain the roads are also the companies that run trucks across them – the trucks are full of Netflix's goods, but Netflix isn't running the trucking company.
- 3) L3 provides trucking and roads until it "peers" with Verizon's roads. Netflix isn't paying for use of L3's roads, it's paying L3 to use their fleet of trucks to bring stuff across their roads to where it meets Verizon's.
- 4) At the peering point, Netflix's goods that have been purchased by their customer are loaded from L3's truck on L3's road to Verizon's truck on Verizon's roads.
- 5) The customer has already paid for Verizon to deliver up to 10 thousand kilograms of goods per second, no matter the source. Verizon has already received payment from their customer for their shipping service/road use.
- 6) The toll-road part of your analogy makes no sense because Verizon owns and maintains the road and trucks – they aren't charging a toll to themselves – thus that part of your analogy needs to be eliminated.

Now that I've corrected the analogy, you have a customer who purchased a shipment of goods from Netflix. Netflix has paid L3 for the delivery of those goods to as far as L3 can bring them. The customer has already payed Verizon for them to continue carrying those goods to the customer's house.

The situation we have here is that when L3's trucks show up at the peering point ready to load the goods onto Verizon's trucks, Verizon knows the goods on that particular shipping line are likely from Netflix, and puts up "road closed" signs on

half their lanes and “Truck out of order” signs on all the trucks in those lanes, so L3 has to load all of the goods from Netflix onto a fraction of the trucks only capable of carrying 1 kilogram per second of goods to the end customer (1/10th of what they are actually paying Verizon to carry!)

Verizon is telling L3 “If you want our other lanes open and trucks in service to bring Verizon customers the goods they have already paid to have delivered, you or the retailer who sent those goods need to grease our palms!”

Also, Verizon just happens to run a competing ship-to-home retailer that doesn't have to deal with this cost because they will never close roads and shut down trucks inside their network to cause congestion. In fact, goods shipped from Verizon's stores eventually won't even count against your 10 thousand kilogram per second shipping limit.

[Reply](#)



Evan Adams (@evan_adams)

July 18, 2014 at 11:09 am

Rather than using roads, use railroads / standard oil & kerosene.

[Reply](#)



Jimmy July 18, 2014 at 8:43 am

You don't pay taxes to use a toll road, as they are generally funded by private parties (at least in Texas). The 18 wheelers already pay a good bit more than you do for taxes, mostly since they drive more and thus pay more gas tax. Your vehicle is much more efficient also, so you pay less gas tax per mile. The government doesn't restrict what you drive on the public roads (as long as properly licensed). If you choose to drive a Prius instead of a Peterbuilt everywhere, then that is your choice.

The real point being, that like our public roads, once you pay the gas tax, the government doesn't say you can't drive down main street, that you have to stick to the more congested 2nd street because of which store you bought the gas from.

Verizon is basically saying that they don't want to upgrade the interconnects because it will allow more Netflix traffic in from L3. They would rather that Netflix pay them AND L3 to move their traffic to the customers that are already paying Verizon for that traffic too. At what point does it stop? Does Netflix need to pay every mom and pop ISP in the world (like me) to move their traffic also? Does Verizon need to collect a "toll" from every single website in the world?

How about we swap this scenario around to give it more perspective. You pay for internet already. You also pay for a Netflix subscription. Netflix also pays for internet access on their side. Now what if instead of Verizon wanting Netflix to pay them for the traffic, what if they wanted it the other way. They wanted you to pay them an extra \$10 per month to be able to access Netflix, even though you already paid for internet and Netflix yourself. Now you know how Netflix feels. Why stop there though. What if they decided that Google searches or Youtube uses a lot of bandwidth and now they want you to pay extra to access them also.

[Reply](#)



jeff July 18, 2014 at 10:03 am

If you took the George Washington bridge as an example.

you don't pay tolls to go to Jersey,

you pay tolls to go to NY.

truckers do pay more.

Chris christie decided he wanted to add a traffic pattern test during times when the bridge is heavily being used and closed off 3 lanes on the GW bridge.

the bridge had plenty of bandwidth, businesses are still paying more for their usage, people are still paying tolls to utilize the bridge, but the bottle neck was from jersey.

Guess what happened to Chris christies cronies? You know why? Because there is only 1 resource in town and it's owned by 1 person. You can't exactly build another bridge right next to the GW bridge if you wanted to.

I'm all for business making their monies. Verizon has a contract wiht me as an end user to provide "blazing speed" They fulfill that as their speed test always show that I'm getting 50mbps down and 35 up. Except the issue is that we all know it's kind of pointless if there's no content being delivered to me due to their interconnect to level3 (and that's ALWAYS the case). So if there were more competition in the market, I would HAPPILY say goodbye to verizon and move to another carrier. Except as Mark has pointed out, they're a monolpoly and i'm kind of stuck. So, everyone in my area on verizon, is paying a premium to verizon, for them to skimp on their infrastructure costs to L3. Considering they have increased revenues on inet by 15% year on year and also generate 1.15\$ earnings per share of profit, i'd have trouble believing that paying a few extra thousand dollars to upgrade their interconnect pipes would cripple their profits.

[Reply](#)



Edge July 18, 2014 at 11:54 am

I don't understand your car analogy. The government hasn't agreed or advertised to give me a certain amount of road usage. They don't advertise unlimited use of every road. Verizon however does advertise unlimited usage and advertises an expected level of bandwidth for the price. People pay Verizon for that full bandwidth. I'm sure Netflix pays their ISP an exorbitant amount as well for their bandwidth. It makes no sense to me that you want Netflix to pay because I'm using more of my (already paid for by me) bandwidth. If Verizon does not have the infrastructure to support the what they've advertised to their customers, then it's absolutely Verizon's problem.

If that means that Verizon gets raked across the coals because of a poorly thought out peering arrangement with L3, I'm sorry. Be more careful with your terms when the contract comes up for renewal. In the meantime, they need to provide

what they've advertised.

[Reply](#)



Robert Ivey July 18, 2014 at 12:02 pm

Netflix does not and should not pay Verizon a dime.
I as a Verizon customer and every single verizon customer
am paying Verizon to provide me with internet access at the
speeds they promised me. Netflix is not thier customer I am.
If I want to use my internet connection to stream on 6 different
computers 6 different netflix shows I should not have my
Netflix throttled.
If I want to down load 25 games off steam, stream all of the
Simpsons and play world of warcraft at the same time I
should be able to do it. Netflix is not Verizon's customer, I am
its my internet connection not Netflix's.

[Reply](#)



Donald July 17, 2014 at 1:24 pm

So cool to see you people hammering home the point of failure and
who's control it falls under. It is too easy for some public facing PR pro
to absolve a company of guilt and simply claim innocence. "The glove
appears to fit!"

[Reply](#)



Joe B . July 17, 2014 at 2:05 pm

Thanks for ecludiation with evidence, this report may prove damning.

[Reply](#)



Matt July 17, 2014 at 2:16 pm

This is a great blog post Mark, it appears that Level 3 is ready to connect additional ports with Verizon, but Verizon is refusing to upgrade their own equipment. This leads to a question that I have: since Netflix has already paid Verizon for interconnecting, is Verizon not holding up their end of the deal? Should other content companies look at that Netflix / Verizon deal and not feel comfortable about signing a contract?

Verizon is greatly sacrificing their own customer's experience for bottom line profits. Other companies need to be aware of the games that Verizon likes to play before doing business with them.

[Reply](#)



Mark Taylor July 18, 2014 at 8:35 am

Matt my comments don't relate to any direct connection that Verizon has with Netflix.

[Reply](#)



Mark July 18, 2014 at 8:56 am

Netflix has paid Verizon for direct, Netflix-to-Verizon-and-back transit. Netflix has not paid Verizon to upgrade its peering with Level3.

[Reply](#)

Pingback: [Did Verizon accidentally admit it's slowing down Netflix traffic? Level 3 thinks so | Content Generator](#)



Paul July 17, 2014 at 2:36 pm

Thank you for clarifying the issues and for pointing out the details the Verizon neglected and/or omitted. Glad I ditched them years ago.

[Reply](#)



Aaron Von Gauss July 17, 2014 at 2:55 pm

This back and forth is getting really tiresome, neither this post nor the ones from Verizon are giving anywhere close to a complete picture of how the business relationship has been conducted in the past and present. Offering to pay for Verizon to upgrade their ports is like one of your customers offering to pay for the ports / cross connects to your network without any ongoing usage costs. No, its not an exact comparison, but it's close enough for this grand-staging effort being conducted by all three levels (content producer, transit, residential ISP).

As to the "suggestions" that this is an intentional effort by Verizon to thwart NetFlix, the simple questions can be asked... Why are you selling a service (transit) to NetFlix that you know very well in advance that you cannot fully fulfill? If NetFlix is being targeted by Verizon (or Comcast, AT&T) unfairly, why have they and you elected not to pursue any legal remedies to date but rather instead wage a public "public relations" campaign?

The latest tactic appears to ask the US government to intervene, which may or may not be a bad thing, but remember most consumers only realize their NetFlix experience sucks and doesn't understand or care about peering in any shape or fashion. Regulation may come, but the government is not known for subtle or light gestures, its quite possible all parties involved will find themselves in a much worse position afterwards. Let's also not forget, the regulation may not stop at residential ISPs, interconnections are far more important than any single ISP.

To summarize: I believe all of the parties involved are simply trying to look out for their own interests and profits, rather than any genuine concern about how the Internet works. None of the parties to date have released any meaningful data publicly to support any of their claims,

but rather have released highly summarized data that can not be analyzed or verified by any uninvolved party.

[Reply](#)



Mark Taylor July 18, 2014 at 8:28 am

Aaron, we have a settlement free peering agreement with Verizon that has been in place for many, many years. Each party has an obligation to augment the capacity at those interconnects to avoid congestion. As my diagram makes clear we remain willing to meet that obligation. When we sold services to Netflix we most certainly did not know in advance that Verizon would no longer continue to act as the good partners that they had for many years prior to that event.

[Reply](#)



Tom July 18, 2014 at 8:49 am

Yes, the settlement free connections were established years ago for mutual connectivity benefit, and it appears from both you and Verizon that these links are sufficient for normal bi-directional traffic.

You sold Netflix service on the assumption that you can abuse these settlement free links with a dramatic and completely predictable imbalance of traffic and now complain that Verizon isn't rolling over and, at no cost to you, helping create further imbalance by opening up additional ports which will effectively be entirely unidirectional.

Now, if you can tell me that Verizon has refused to consider opening up non-settlement-free ports that Level 3 will pay for the traffic on then I think we can consider that to be deliberately obstructive. As it is, it looks like Level 3 is abusing the settlement-free

links in a way that was never intended when they were created.

The fact that your customers, like Netflix, are stepping up and paying ISPs for links that you aren't willing to pay for only reinforces this perception.

[Reply](#)



Mark Taylor

July 18, 2014 at 10:56 am

Tom, the traffic imbalance is a smokescreen. We have always said Level 3 should share the cost of moving traffic between our paying customers and Verizon's paying customers. If we do that why should there be an additional arbitrary toll?

[Reply](#)



Andrew July 17, 2014 at 2:58 pm

Publish your communications with them, show us

[Reply](#)



Nick July 17, 2014 at 3:01 pm

“ This congestion only takes place between Verizon and network providers chosen by Netflix. The providers that Netflix does not use do not experience the same

problem. Why is that?

This crosses the line of credibility. The amount of traffic Netflix generates in the US dwarfs any other source on the Internet. You know that.

Of course you want Verizon to give you more ports so you can charge Netflix more money for sending more data. Especially when the alternative is Netflix cutting out the middle man, i.e. you.

[Reply](#)



Mark Taylor July 18, 2014 at 8:33 am

Nick the statement that congestion only occurs with providers chosen by Netflix was actually made by Verizon in their blog post. I simply repeated it and asked how could that be? Of all the Internet backbone providers in a massively competitive market (unlike the broadband ISP market) that only those connected to Verizon carrying Netflix traffic are blocked, but those that don't are not blocked.

[Reply](#)



John July 18, 2014 at 9:09 am

“Of all the Internet backbone providers in a massively competitive market (unlike the broadband ISP market) that only those connected to Verizon carrying Netflix traffic are blocked, but those that don't are not blocked.”

Maybe those other backbone providers don't push hugely unbalanced traffic onto their network because they aren't a source network for Netflix the biggest source of send data in the history of the world???

[Reply](#)



Lennis July 18, 2014 at 11:08 am

Netflix is not trying to force unsolicited traffic to verizon's customers (or anyone else). The fundamental issue here is that Verizon's customers are 'asking' for all of that content – to which, 'yes' — both Netflix and Level3 are happy to oblige.

It seems to me like Verizon is trying to double dip here — as both a last mile internet provider and a tier 1 backbone provider. Verizon – or any other ISP, should not be able to charge for data entering it's network — that was requested by it's network!

[Reply](#)

Pingback: [Did Verizon accidentally admit it's slowing down Netflix traffic? Level 3 thinks so | Tech Auntie](#)

Pingback: [Level3: Verizon Intentionally Causing Netflix Congestion - »](#)



Larry Seltzer July 17, 2014 at 4:10 pm

“This congestion only takes place between Verizon and network providers chosen by Netflix. The providers that Netflix does not use do not experience the same problem. Why is that? ”

Could it be because those other network providers aren't serving by far the single largest user of bandwidth on the Internet?

[Reply](#)



Crypto da Mr Bitcoin July 17, 2014 at 4:32 pm

Hey! This was an amazing article and wanted to thank you for providing me some extra information before I switch providers, but at the same

time, I think ISPs (in general) all should upgrade their networks, at least making USA a competitive in terms of the speeds against other ISPs in other nations. Its just sad that we have to spend all this time with arguments, debates and blame game, when we could all just focus on increasing the amount of data from every stand point (Datacenters to users).

[Reply](#)



A July 17, 2014 at 5:23 pm

I'm on the east coast, sysadmin, I've been proving to Verizon that their connections are failing for us at times from their network to Level3. The last ticket they admitted there was an issue with a port card and that it was replaced. I was told 'alter' is an old name for some of their equipement from MCI I think.

```
4: ae12-0.PHIL-BB-RTR2.verizon-gni.net (130.81.163.148)
5.729ms
5: 0.xe-7-3-0.BR1.IAD8.ALTER.NET (152.63.3.125) 14.520ms
6: no reply
7: v1-3501-ve-115.ebr1.Washington12.Level3.net
(4.69.158.18) 14.390ms asymm 11
```

[Reply](#)



Dan July 17, 2014 at 5:59 pm

Thank you for the excellent post, some bells need to be rung over at Verizon. Verizon's BS posts are damning to anyone with experience in the industry.

[Reply](#)



Ryan July 17, 2014 at 6:32 pm

Mark, surely there is a group within Verizon that is responsible for provisioning these ports. Is it Level3's belief there is someone very high up at Verizon who was engaged on this before the ports filled up and said "oh this is Netflix traffic don't provision more ports?" That group has to be foaming at the mouth with wanting to provision these ports and level off the traffic. Level3 should offer a bounty for an engineer at Verizon who will work with Level3 to provision more ports, assuming that means they lose their job for doing so. Offer a bounty for anyone who can take a picture of Verizon's equipment showing they have unused ports sitting there.

[Reply](#)



Charles McCabe July 17, 2014 at 6:56 pm

It speaks volumes that Level 3 is allowing this open communication. Please keep it coming!

[Reply](#)



David Malcolm July 17, 2014 at 7:04 pm

I work for a Canadian ISP. Maintaining a lack of network congestion is difficult, but it's entirely doable. I don't work on the back end but I know that we have to install a lot of hardware and often have to run more fiber optic cable to various areas so that the various areas aren't saturated. It's not cheap, though relative to the cost that we charge customers, it's not bad.

TV providers don't like Netflix, mostly because they offer customers a lot more content (not necessarily always the content you want mind you) on demand for a really reasonable price.

What providers are afraid of is Netflix's continued growth of popularity, and the depreciation of value of their TV options. Netflix makes the expensive hardware, back end and customer service reps that Verizon has already paid for seem VERY expensive in comparison, partly because it is.

Everyone knows that they're doing this to make Netflix's inexpensive service seem shoddy, they're not remotely interested in the pennies they could get from Netflix, verses the dollars they can continue to charge consumers.

[Reply](#)



Dave Taht July 17, 2014 at 8:29 pm

While I agree with your dissection of the “jeeze, just plug in a couple more ports” stupidity, there is one piece of data I'd like to get out of level3 – how much delay and packet loss does a 100% congested port on level3 actually have in this case?

(while I also agree with overprovisioning always, in the core! as a member of the ietf aqm working group I'd like to know what is happening when you are not overprovisioned, as in this case.)

5ms? 100ms? what?

[Reply](#)



Morgan July 17, 2014 at 9:19 pm

Once again all you're doing is talking which will change NOTHING at these scumbag companies. We need Google Fiber to come in and destroy them. HELP GOOGLE FIBER DESTROY THEM, PLEASE

[Reply](#)



Mark Taylor July 18, 2014 at 10:18 am

Morgan we have been doing a lot more than talk. We have been active participants in the debate with regulators and we have spent a lot of time and effort to negotiate agreements with many, many interconnect partners.

Your point, however, about having more competition for broadband consumers is certainly one I do agree with. I don't want anyone destroyed I just want there to be more choice.

[Reply](#)



Steve Noble July 17, 2014 at 9:38 pm

I spent half of the 90's fighting battles like this. Sadly level 3 (or better said their acquisitions) were on the other side of the conversation.

For example:

Level3 released a press release in 2005 saying that Cogent communications was sending "far more traffic to the Level 3 network than Level 3 was sending to Cogent's network"

Now Level3 claims that it is wrong for Verizon to do the same thing..

[Reply](#)



Mark Taylor July 18, 2014 at 10:17 am

Steve, we are being consistent here. We had a disagreement in 2005 with Cogent over how far we each carried the traffic flowing through our interconnects. We resolved that within a very short period and traffic has been flowing through unfettered ever since. In Verizon's case we have also said that we certainly do not expect a free ride. That in fact Level 3 should share the cost of carrying traffic between our paying customers and Verizon's paying customers. We reached an agreement quickly with Cogent to do that. We have been unable to get that agreement with Verizon.

[Reply](#)

Pingback: [End of the Internet \(or end of net neutrality\)](#)



Brandon July 17, 2014 at 10:09 pm

I'm not sure what the likelihood of this being read is but from my network perspective (Verizon FIOS) this article is largely accurate. As of recent what's been confusing me is the unreasonable and unusable routes taken.

It is well known that Netflix is in the eastern AWS region. Any routes my traffic takes that come remotely close to crossing that area, including IAD, takes a route through a 'peering arrangement' (sarcastic use of quotes) with Comcast! I'm no CCIE but I have never seen two carriers who compete in the same market for the same subscriptions exchange traffic in this way. It is not until my traffic hits the Comcast network that it becomes latent. To me, this arrangement is not an accident.

I am at a massive disadvantage here. As an engineer:

- I need frequent and fast access in and out of the AWS cloud to maintain my products.
- I need frequent and fast access to GitHub to do my work! There are nights where it will take upwards of an hour to sync ~800kb just to continue working.
- I pay a premium on Fios to eliminate these problems.

Unfortunately, it takes carriers the size of Level3 to say something. I applaud Level3's position and feel better about the situation knowing Level3 cares about the issue.

[Reply](#)



RME July 17, 2014 at 10:32 pm

1) Most last mile technology is inherently asymmetric, even FiOS GPON. Traffic can NEVER be balanced to most last mile networks.

2) Traffic balance rules were established long ago to protect long haul networks from the effect of hot potato routing by BGP. Such rules are being incorrectly applied to traffic flows to last mile network operators.

3) Geolocation systems today select the source server closest to the

requesting client. So, in many cases, the content is being handed to the last mile operator (eg Verizon) IN THE SAME CITY as the destination client requesting the content.

In the literal sense, Verizon is refusing to carry traffic from one side of Los Angeles to the other, unless some one pays them a bribe.

The (not insubstantial) payment Verizon receives from their own FiOS customers is not enough for VZ management. They want to tax content suppliers even though VZ is not bearing the cost of long haul transport of the content.

4) Maintaining congestion on network interconnections causes traffic flows to experience unequal quality. Suppliers who don't pay a bribe to VZ don't get through. This is certainly NOT net neutrality in action. In any other setting this would be clearly identified as extortion.

5) FiOS customers are being significantly misled by Verizon. This seems like a golden opportunity for yet another customer class action lawsuit against Verizon. If government worked right, The FTC and state Attorney Generals would begin criminal proceedings against abusive last mile operators.

[Reply](#)

Pingback: [Level3 \(network backbone\) Confirms Verizon is PURPOSELY Throttling Netflix Traffic. | My Blog](#)



Huittinen Massive July 18, 2014 at 12:10 am

This constant back and forth between all providers and netflix about congestion is getting old.

Instead of pointing fingers, someone should address the market dynamics leading to this situation. Settlement-free peering works, because it's usually tit-for-tat.

But once one customer represents 1/3 of Internet, it clearly starts to feel unfair if one party gets paid to transport it, other party does not get paid to transport it.

The fundamental problem is, that ultimately there is strong incentive to drop bits, as every delivered bit eats into your margins, because no one is getting paid for the bits.

Because the bits actually have a cost and delivering has a cost, this makes situation unviable. Right now solutions how the unviable situation is handled

1. low/average users subsidize heavy users => unfair
2. users are indirectly billed via content providers (netflix/youtube et.al. have to pay premium to comcast/FT etc to access their network) => inefficient
3. packets are dropped instead of delivered => low quality

We could give financial incentive to deliver bit, and all these disputes would be gone, because you'd love to get traffic, since you could bill more.

But for some reason metered INET is curse word, because when we've had had it, charges have been unfair, fair charge today would likely be 0.1cent < 20cent per GB, you'd also need low fixed base price to address various fixed costs, which could contain some GB of traffic as base-product.

Sure there is alternative solution, which US political climate will never- ever accept. Monopolize infrastructure, monopoly stake-holders would be service providers, with no own employers. Monopoly building costs would be covered by customer-share of the network, if you have lot of customers, you pay larger share of the infra. Incentive to build fast and act fast exists, because stake-holders can't sell without monopoly building.

Monopoly should not be profitable, stake-holder costs should reflect actual building costs by regulation. What service-providers charge their end-customer would be free.

Anyone building new access network would have to connect to nearest monopoly pop, get and give access to use the monopoly infra at same rate as everyone else.

This way flat-rate MIGHT still work, because everyone has same cost ultimately and consumer can choose any provider.

[Reply](#)



Bob July 18, 2014 at 1:21 am

I appreciate what BH is saying but his analogy is false. According to his reasoning, the consumer has already paid their ISP for the right to drive a big rig at the maximum allowable speed limit on the highway but

their ISP is only allowing bicycles up on ramp from some providers.

The consumer is being being treated unfairly by their ISP in this situation. Consumer level ISP connections are asymmetric as consumers are net downloaders of data. The ISP knows that their customers are net consumers of download bandwidth as the ISPs sell asymmetric connections and their terms of service usually do not permit uses that would increase net upload traffic (such as running your own commercial server off your household access). ISPs also price internet connection to consumers based on the speed of the connection and not on the type of data or volume of data on the connection. If the consumer is not being delivered the speeds that they have been contracted to receive from the ISP, it is the ISP's responsibility to fix the problem. Whether the data is video or text, it is all the same to an IP connection. Aside from attacks on the IP infrastructure, there is no basis in reality for the ISP throttling the consumer's connection based on the type of data traveling through the connection.

It boils down to the fact that the consumer is paying Netflix for a license to view content and paying their ISP proportionately for the speed of their connection. If the consumer paid for a highway, they should not be provided a dirt road.

[Reply](#)



BOFH July 18, 2014 at 4:48 am

Hey, if they want to pull the balanced traffic card to explain why they want to be paid to transfer third-party traffic into their network I have a perfect solution: their customers should do the same.

“Well, mr Verizon, I just had a look at my traffic stats and noticed you're pushing an awful lot of traffic into my network, while I hardly send anything back. I think we should renegotiate this here broadband contract, the numbers just don't add up. How about you pay me to deliver broadband to my network instead of the other way around?”

[Reply](#)



ADP July 18, 2014 at 5:35 am

As a FIOS subscriber in the Mid Atlantic, I've noticed the effect of this between Verizon and Netflix.

What can *I* do about it?

Because anything on Netflix, 24/7 is affected.

[Reply](#)



Angelo M July 18, 2014 at 7:02 am

Mr Taylor,

You're right on. I've been in the datacenter business for years, and recently attempted to explain this in a reddit comment to an earlier post about this, but no one understood how easy this is to fix. OK, if there are no remaining ports it's a little more than just adding a SFP and a cable, but still – even in the worst scenario, it's a new router on either or both ends to add the peering capacity. The problem can easily be solved technically. The problem won't be solved, if their business people insist on trying to avoid fixing the problem. Honestly, this is quite shameful for Verizon. Peering agreements are supposed to work to provide mutual benefit. I get it – “mutual” is blurry in this situation, but you have to take the good with the bad. It's always been that way.

I hope more and more technical people who can articulate the facts like this will get more screen time. The problem can be fixed. Thanks.

[Reply](#)



Mark Milliman July 18, 2014 at 7:24 am

The value of a network is its ability to connect unfettered to as many other points as possible. I would think that a last-mile provider would want to ensure that their customers receive the best possible service to

all potential end-points. That is a great theory but it loses a bit in practice. First is the fact that Verizon provides its own video service. Could it directly or indirectly allow Netflix services to degrade in favor of its own service? Possibly. Another more likely possibility is that some District Manager or Director just doesn't want to spend the money to provision another 10G port? It seems like such a simple solution to add more peering capacity but I have seen it all too often where peering is left congested because working out the port assignments, changing routing tables, etc. is too much work. The operations people have to get network engineering involved and then they have to contact their counterparts. It simply is too much work to be bothered. I'm just reporting a possible explanation not excusing it. I have seen this at telco and MSO too many times not to bring it up.

As a consumer this is frustrating because they don't have the tools or ability to solve these issues. I recently did experience some congestion reaching a certain provider in CA that co-incidentally transited through Level 3. Using ping it looked like my traffic was transiting through Paris but when actually sending TCP and UDP packets I determined the real route. It was much shorter. The access provider tried to blame the out-of-network providers, but I was able to show congestion on one of their local links. It took 2 months of me reaching into network engineering of this company to get them to add another 10 Gbit/s link, but it was done and my round-trip latency dropped to 18 ms. Now the typical consumer can't do this so what is the solution?

For too long residential broadband has been a best-effort service with some minimum bandwidth requirements. If the carrier could do a TCP throughput test and show that they could deliver that bandwidth to some point in their network then they were off the hook. I believe that service level agreements should be added to residential broadband services that specify not only minimum bandwidth, but maximum latency, jitter, and packet loss ratios to points just outside their networks. That solution would not address specific throttling issues with certain end-points though. This is why I advocate open access last-mile networks so we can have true facility competition in the last mile. Level 3 can't get by with this behavior because customers have a choice of other long-haul carriers. If cities would build the fiber infrastructure then they could sell access to any service provider on a non-discriminatory basis to provide true service competition.

[Reply](#)



Mike July 18, 2014 at 7:31 am

When you initially set up shop with an ISP, do you not sign some kind of contract that enables you to scale up your bandwidth for an agreed upon cost?

The “hey, just go plug in another cable” suggestion sounds simple enough, if you ignore some realities of how business works. For example, if I go to Whataburger, it would be pretty easy for the guy to throw an extra patty on my burger. He won’t do that without charging me a little extra though, for obvious reasons. It’s the work that his company sells.

Your offer to pay for the cost of a new card conveniently doesn’t include ongoing maintenance costs associated with that card, which is where I suspect some of the contention comes from.

[Reply](#)



Mark Taylor July 18, 2014 at 9:57 am

Mike, a peering agreement, like the one we have with Verizon, contains obligations on both parties to augment (add) interconnect capacity before there is any congestion. The language typically says something like “each party shall add interconnect capacity if the utilization of the ports at a location exceeds 70% over five or more days. That capacity shall be turned up within 30 days.”

[Reply](#)



Wayne Boissicat July 18, 2014 at 10:52 am

Mark, if Verizon is breaching the peering agreement as you say then why not sue?

One of the top comments on [reddit is](#)
Hey Level3, you want to prove your point. Send out

a message that you will be at the interconnect in 5 days with 4 10gbps cards and the cables. Live stream your guys waiting there for Verizon to simply allow you hook it up. Reddit will watch. Others will watch.

[Reply](#)



J. Grizzard July 18, 2014 at 11:04 am

Are those peering agreements not legally binding documents? If so, isn't Verizon's refusal to add capacity a breach of those contracts and legally actionable?

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Pingback: [Verizon blaming Netflix for slow streaming speeds is an 'attempt at deception' says Internet backbone provider | Tech-RSS.com](#)

Pingback: [Did Verizon admit it's slowing down Netflix? | Android Authority](#)



Steven July 18, 2014 at 8:43 am

For those suggesting Level 3 should pay, remember that the consumer already pays their ISP for the "last-mile".

If Verizon doesn't have enough bandwidth to handle all of it's customer's streaming Netflix then it's Verizon's fault as the customer is paying Verizon for the last-mile usually for x GB worth of usage.

Verizon is trying to double dip.

Level 3 is only handing off traffic to Verizon, that Verizon's customers have asked (and paid) for.

Imagine if Level 3 turned to Verizon and asked Verizon for more money to deliver Netflix to their customers?

Netflix pays Level 3, The customer pays Verizon.

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Pingback: [Peering Dispute: Level3 Says Fix Would Cost Verizon A Few Grand Per 10G - Telecompetitor](#)

Pingback: [droidultimate » Did Verizon admit to slowing down Netflix?](#)

Pingback: [Level3 called out Verizon on their dickishness by DMAUL - TribalWar Forums](#)



David July 18, 2014 at 9:40 am

“ Netflix sends out an unprecedented amount of traffic.

People seem to be missing the point about what Netflix is sending to Verizon. Netflix is not “sending” data to Verizon on just a whim or on speculation. At the lowest level, Verizon customers are initiating TCP connections to Netflix servers and *requesting* content. Verizon customers, as part of their usage of the service they paid for, are requesting content and Netflix just happens to be popular. Netflix also pays a fair amount to get their “unprecedented amount of traffic” on the wire from their end – and are paying for that bandwidth delivery.

Mark has clearly pointed out that Verizon is intentionally limiting the bandwidth through Level-3. Verizon may publicly blame Netflix, but anyone who really understand networking knows that they are really throwing Level-3 under the bus. There’s no reason why Level-3 should let that stand if they are willing to add capacity and it’s Verizon keeping that from happening. Should Netflix send data using other exchanges, it wouldn’t surprise me to hear Verizon making the same claims, yet now the problem is at another interchange point.

Given that most consumer network activity (especially the web) has a higher download than upload ratio, Verizon is positioning in this can be used against any content provider, not just Netflix.

[Reply](#)



Snide July 18, 2014 at 10:14 am

How about people start throttling payments to companies that throttle their service.

[Reply](#)



Kane Y July 18, 2014 at 10:56 am

Hey Level3, you want to prove your point. Send out a message that you will be at the interconnect in 5 days with 4 10gbps cards and the cables. Live stream your guys waiting there for Verizon to simply allow you hook it up.

I guarantee you — people will watch. You might even get a crowd.

(First part is copied from Reddit comments/ second paragraph is me.)

[Reply](#)

Pingback: [Verizon blaming Netflix for slow streaming speeds is an 'attempt at deception' says Internet backbone provider – Health and Fitness](#)



Dave July 18, 2014 at 11:26 am

I'm no network engineer, but could Verizon's reluctance to increase their Level3 interconnect capacity be partly due to the need to maintain network overhead? Yes, Verizon has plenty of capacity now, but if they add in those other 10Gbps cards, how much will it increase? The diagrams from both Verizon and Level3 seem to indicate the respective networks run about 50% capacity at peak usage, while the interconnect is maxed out at 100%. As Mark Taylor seems to indicate, Verizon could double the interconnect capacity so presumably it would also run a little over 50% (since it's over-congested now). How much would that increase Verizon's network traffic, if in fact Netflix accounts for 1/3 (or 2/3 or whatever the statistic is) of peak traffic. Presumably, Verizon wouldn't want that utilization number near 100%, so there's some truth to the fact that this specific interconnect may represent special problems for Verizon's network (compared to other peers), but it depends on the details. What's the ideal number purely from Verizon's own technical needs?

All this is beside the point that others have made that customers are paying Verizon to deliver that content, and the reality of the internet as it is used today is that delivering high-definition video from Netflix, YouTube, Amazon, Hulu, etc. etc. is the biggest bandwidth hog and will probably stay that way for a while. Furthermore, home broadband has ALWAYS had asynchronous speeds, because home users always request more data than they send, so Verizon's arguments a la "traditionally, peering agreements..." don't make much sense in the context of network-to-ISP interconnect. Is Verizon really claiming that bits going one way cost more than those going the other? From this perspective, Level3's argument makes sense.

Also, doesn't Netflix specifically offer a caching server to install in data centers so ISPs can reduce traffic coming from Netflix? Or is that not relevant in this architecture?

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