# Human Infrastructure 101: Network Zen - The Duality Of Bandwidth


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## Network Zen - The Duality Of Bandwidth

## By Greg Ferro

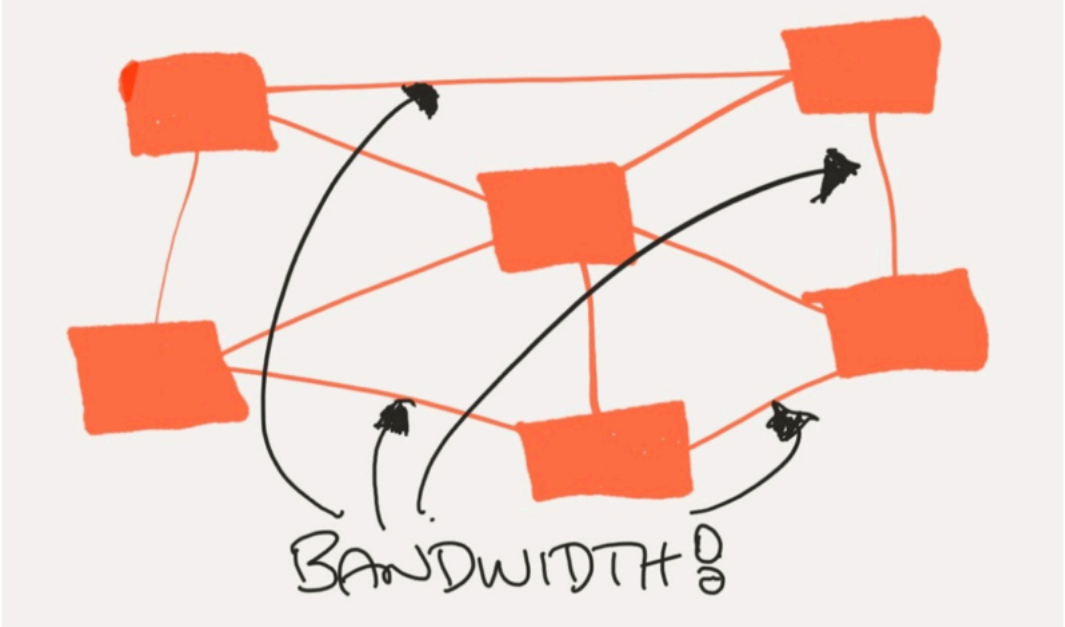
“Today’s meditation shall be to consider the true nature of bandwidth,” said the master. He sent the mendicant off to a desk in a remote corner to contemplate.

The mendicant was perplexed. Why had the master asked such a simple question? Of course she knew that the master would not have set this task unless there was a deeper meaning. The obvious was not the goal.

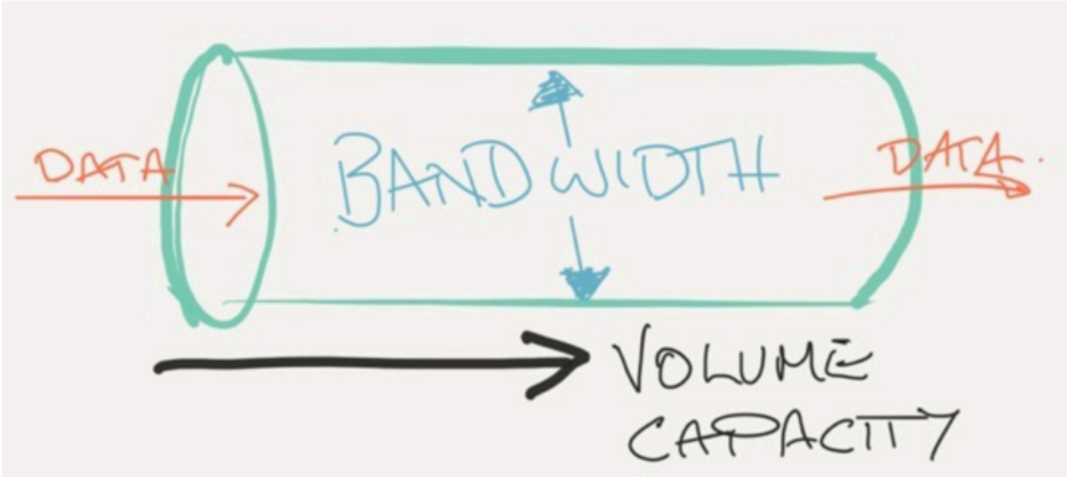
“Bandwidth is one of the fundamental natures of the network,” she thought. “Surely it is an element as natural as fire, earth, water, and air are to the physical world.”

“Always check the fundamentals,” she recited to herself. This was one of the master’s most repeated lines. “And fundamentals always start with a diagram."

The mendicant started with nodes in the network and connected them together. Then she noted that bandwidth is the key aspect between nodes. Connections between nodes have a property of bandwidth that is determined by the rate of bits between them.




But what is the nature of bandwidth? It's the volume of data that can move between two nodes in network graph. Thus, a 10 gigabit network defines its capacity.



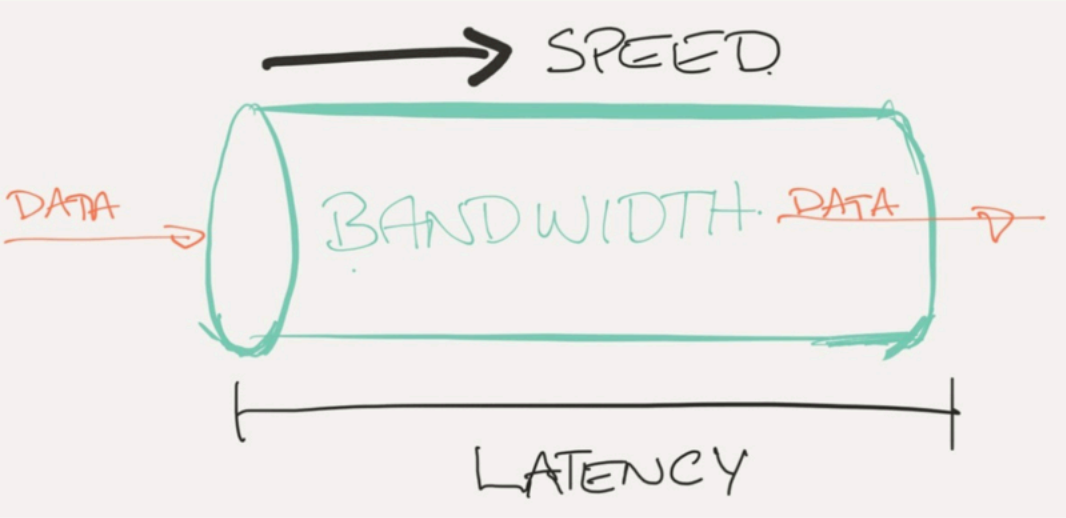

So bandwidth has a nature of volume or capacity, she concluded. This nature cannot be further reduced to

something else because bandwidth defines the size of the connection.

She approached the master and explained what she had


considered.

The master nodded, but was perhaps a little disappointed. He fetched his pen and drew the following:




He said, "Many people do not comprehend the dual nature of bandwidth. You see, a connection has both capacity and speed. Its dual nature involves time."

"A network connection is correctly measured in bits per second and defines the capacity in a time period. To have a capacity of 10 gigabits, one must also define over what time."

He smiled gently and said "Consider this. A one gigabit per second connection would carry 10 gigabits in ten seconds. At ten gigabits per second, the connection will carry 10 gigabits in one second. These are both the same capacity, but they are different in the context of the network."

The mendicant received this insight with joy and said "Bandwidth is a measure of BOTH capacity and speed." The master nodded.

The mendicant was disappointed that she had not seen this dual nature, but she felt there was something more.

"Master, is there not also a change in latency? I see that moving data at faster rate improves the throughput but also reduces the latency of the flow as it moves through the network."

The master beamed. "Wonderful! And this is why the nature of QoS is the path to darkness and destruction. As you add bandwidth, you increase capacity and speed and reduce latency, thus increasing flow performance in three dimensions."

And the mendicant was enlightened.

## Day Two Cloud: A New Packet Pushers Podcast

Ned Bellavance has added his voice to the Packet Pushers podcast network, launching the Day Two Cloud podcast.

Why listen?

- Ned interviews cloud practitioners and users about real-world deployments

- He cuts through "unicorns and rainbows" marketing to get to the gritty realities of cloud operations
- Guests share practical insights and lessons learned

Subscribe to the Community Podcast channel to hear Day Two Cloud and let us know what you think.

## The Lulz


Shared by @packet_tel on Twitter

## Internets Of Interest: Blog

### The curious case of the Raspberry Pi in the network closet - Christian Haschek

https://blog.haschek.at/2018/the-curious-case-of-t...

They found a Raspberry Pie physically patched into their network with a high-powered RFID reader. That sounds like trouble. - Greg

### Just Say No to Jumbo Frames - NetCraftsmen

https://www.netcraftsmen.com/just-say-no-to-jumbo-...

Pete Welcher shares a practical perspective on jumbo frames. One popular argument in favor of jumbos? “Jumbos waste less bandwidth on headers. Reality check: that used to matter. ... At 10 Gbps, you likely have bandwidth to spare.” I agree with Pete. Jumbos used to matter, but probably aren’t worth the configuration headache and troubleshooting drama in a modern setting. - Ethan

### Do we really need network automation? - Mircea Ulinic

https://mirceaulinic.net/2019-01-09-do-we-need-net...

Mircea Ulinic delivers a lengthy treatise on network automation from the perspective of dispelling myths such as “everyone must learn to code,” “automation means we lose our jobs,” and “the CLI is dead.” There is huge amount of information to digest in this long piece. Want more Mircea? Listen to this podcast episode on network orchestration with Salt. - Ethan

## AWS Native Backups - The IT Hollow

https://theithollow.com/2019/01/22/aws-native-back...

Eric Shanks, by way of examples with screenshots, demonstrates the backup and restore capabilities of new AWS Backup service. Eric says, “This new service allows you to create a backup plan for EBS volumes, EFS, DynamoDB, RDS, and Storage Gateway. Now we can build plans to automatically backup, tier and expire old backups automatically based on our own criteria.” - Ethan

## Understanding the JunOS routing table - Das Blinken Lichten

http://www.dasblinkenlichten.com/understanding-the...

Jon Langemak writes an excellent primer on interpreting various JunOS commands that expose the routing table. Jon explains how to differentiate between the RIB, FIB, and various routing domains. Jon also highlights the impact of enabling multipath. Loaded with JunOS output that's explained in an easy-to-comprehend way, this post should be added to your permanent bookmarks. - Ethan

## Think IPv6 when it comes to security - APNIC

https://blog.apnic.net/2019/01/29/think-ipv6-when-it-comes-to-security/

Frank Herberg writes, "Most of us — including information security experts — still unconsciously 'think IPv4-only' when it comes to network security. We falsely assume our devices live in a single-protocol environment because that's what it has been for so long and what has been relevant for much of our past education." Frank makes the case that all networkers

must secure IPv6, and recommends lab resources to help. Don't think your network is running v6? Open Wireshark--it is. - Ethan

### Event-Driven Automation: The TL;DR No One Told You About - ipengineer.net

http://ipengineer.net/2019/01/event-driven-automat...

In this myth-dispelling rant, David Gee breaks down what event-driven automation is all about. And not about. David points out in his close, "The most simple concepts in automation are decades old and yet in our industry we're just beginning to stoke the fire. The worry of repeating failures and accidents thanks to not passing on lessons learnt is real and we can avoid them proactively for the better good." - Ethan

### Getting Started with Kubernetes - The IT Hollow

https://theithollow.com/2019/01/26/getting-started...

Eric Shanks offers this guide, "meant to get a beginner started with the process of understanding Kubernetes. They include basic level information to start understanding the concepts of

the Kubernetes service and include both theory and examples.” Kubernetes is here to stay, so perhaps Eric’s guide could be your gateway if you haven’t paid K8s any attention yet. - Ethan

### Stretched Clusters - DeepStorage.net

http://www.deepstorage.net/NEW/stretched-clusters/

Howard Marks takes on the risks of stretching hyperconverged infrastructure clusters between geographically distant locations--latency and the increased chance of partitions--and how those risks are mitigated. Howard covers quorums, witnesses, replicas, and stripes among other technologies important in the wonderful world of distributed systems. A worthwhile read for anyone responsible for infrastructure architecture. - Ethan

### The fundamental problem with Silicon Valley’s favorite growth strategy - Quartz

https://qz.com/1540608/the-problem-with-silicon-va...

Tim O'Reilly (yes, that O'Reilly) has a very long piece that critiques "blitzscaling," a startup growth strategy that revolves around raising gobs of venture cash, seizing a market faster than competitors, and using network effects for steroid-like growth. But like steroids, O'Reilly argues that blitzscaling isn't healthy for startups or the economy. It leads to bloated, rage-fueled behemoths that lie, cheat and steal to maintain dominance (ahem, Uber), and results in a market that "is largely closed off to new ideas." Part of the problem is that the media delights in and fosters the narrative of slick whiz kids who blitzed their way to billions of dollars. This narrative ignores a) all the 'roid-riddled corpses of tech companies that blitzed and failed and b) all the thriving tech companies that chose slower, quieter, more sustainable paths to profits.

This is a really long read with a few self-promotional sidetracks, but if you're interested in entrepreneurship and alternative venture models, check it out. - Drew

## You Can Call Me Al - Al Rasheed's Blog

https://alarasheedblog.wordpress.com/2019/01/31/yo...

Al Rasheed hit me hard with this post. “There are times no matter what we do as IT professionals, it’s never enough. I’ve worked 12-hour days and on the weekends... At times, I’m surrounded by selfishness and my career growth has suffered because of it.” He goes on to wonder, “Will it ever change for the better? Why do I continue to deal with this behavior? Is IT the career I truly want to continue pursuing? Is my mental and physical health being affected? How has my family been affected by this?” - Ethan

## Internets Of Interest: Tech News

### Google Goes All In on Confidential Computing - SDxCentral

https://www.sdxcentral.com/articles/news/google-go...

Oh, hai! A new marketing buzzword to track. Confidential computing! I’m sure this is the game changer that will save us all, keeping our personal data private as we process on shared compute stacks. Why? Because Google’s behind it, and we know we can trust them. Right? - Ethan

### Beyond SD-WAN: Cisco ACI Anywhere, VMware NSX Everywhere, Is All This Going Somewhere? - SDX Central

https://www.sdxcentral.com/articles/analysis/beyon...

Roy Chua cogitates on the claims of Cisco and VMware that they have network fabrics that tie everything together--data center, SD-WAN, and cloud. Roy cuts through marketing fluff to see both current and eventual realities. - Ethan

## Industry & Vendor Links

### Juniper Networks Expedites 5G Transformation for Service Providers - Juniper Networks

https://newsroom.juniper.net/press-releases/junipe...

Juniper Networks is expanding its MX 5G router portfolio, among other developments, to attract service providers as they roll out 5G networks. - Drew

## 6WIND and Advantech Unveil White Box Border Router for Internet Service Providers - 6Wind

http://www.prnewswire.com/news-releases/6wind-and-advantech-unveil-white-box-border-router-for-internet-service-providers-300795685.html?tc=eml_cleartime

6WIND and Advantech have partnered on x86-based border routers. The press release notes "The 6WIND and Advantech Border Router bundle fulfills the promise of white box networking by integrating 6WIND's vRouter software appliances with Advantech's commercial-off-the-shelf (COTS) servers, giving ISPs an alternative to expensive, proprietary hardware routers. " - Drew

## The End Bit



**Human Infrastructure is bi-weekly newsletter with view, perspectives, and opinions. It is edited and published by**

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We don't give away your email address or personal details because that would suck.