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The Bus Driver - A Network Fable

By Ethan Banks

The prep for the coming change was going well. Mostly. The change was complex and risky. Lab tests were generally positive, but there were a few issues we couldn't model and test for.

The stakeholders held a meeting to go over the process one last time. I was there as the network architect, as was my co-planner on the security side of the house. Our mutual boss was there too, the one the business looked to for blessing.

The boss had been a networking heavy back in the day. He knew the organization inside and out. He built half the data center infrastructure himself. He really knew where his packet-tinged towel was.

At least, he used to. He'd become distant from day to day operations. He had to. His management job was demanding, and he had too many direct reports--especially after we'd been acquired.

The senior execs at the meeting were anxious. The change had a big payoff if we could get it done, but the change window itself was risky. Even with all of our planning, there was a chance we'd drop some traffic. Some of our big customers might notice.

We had fixed a date on the calendar to make the change. It was the only day our new owners agreed with us on. Other dates were too soon for us to get our process down, or too far off to offer the new service driving the change.

The new service mattered. We needed to boost our revenue before year's end, and our sales team needed the new offering to close some big deals.

Our boss decided to be the voice of confidence. "Everyone, we've done our homework. We've got a good team here. These folks have proved themselves in other changes. We've got this. I recommend we go ahead and get it done. Then we can turn the salespeople loose and rack up a slam-bang quarter to close out the year."

The room and the conference bridge were silent for a few moments. The CTO finally chimed in. "Okay. Okay. Let's go ahead. I'll sign off."

I and my security colleague both wanted to proceed with the change, but we weren't comfortable with how our boss had framed the issue. The risk assessment was more complex than, "We've got this." We'd stressed to him that this could be a tough change because of issues we couldn't model in the lab. We didn't know what we didn't know.

But questioning the man who built half the data center just wasn't done--not by us, or anyone else. He made the call, the change was going ahead, and the CTO expected it to go smoothly.

On the fateful night, we took a hard outage of 34 minutes, as documented in the root cause analysis report. It was an issue we hadn't been able to test for. We reacted as quickly as we could, and kept the change moving forward. When it was done, we sort of felt like heroes for keeping the outage as brief as we did and not having to back out of the change.

However, the CTO was furious. Marquee customers had called him and demanded an explanation for the service interruption. We didn't get any medals.

The CTO summoned my boss, me, and my fellow lead architect into a conference room mid-morning. Exhausted from the long night, we sat in silence as the CTO chewed us out. We expected our boss to apologize for understating the risk of the change.

That's when our boss threw us under the bus and got behind the wheel. He told the CTO that we'd assured him the risk was practically non-existent. That the lab was a perfect replication of production. That we'd misled him so that we could get the change done and move onto other projects.

Then he backed up for another pass. "I hate to say it, but the answer here is to eliminate the architecture team. I need to be closer to the day to day."

We couldn't believe what we were hearing. Our boss had screwed up, and now he was using the outage to get back to the sort of work he used to do. It was a breathtaking display of corporate politics.

Fortunately, the CTO was having none of it. Our boss's power play fizzled, and no one got fired. Salespeople were trained on the new product we launched. We made our numbers. The company moved on.

Reflecting back on the event, all I can remember about my old boss was that he threw us under the bus. What will your co-workers remember you for?

Tech Blogs: How To

Do Packet Drops Matter for TCP Performance? - ipSpace.net

<https://blog.ipSPACE.net/2019/06/do-packet-drops-matter-for-tcp.html>

Ivan Pepelnjak dives into many of the issues that impact bandwidth utilization and TCP throughput, namely buffers and drops. The many bullet points raised by Ivan have been top of mind for me as I'm posting 18 lessons on QoS into Ignition for premium members, and have started planning a course on TCP fundamentals to support the issues raised in my QoS course. (We'll announce the QoS course just as soon as I get it assembled.) - Ethan

The Single Source of Truth - Constant Pinger

<https://constantpinger.home.blog/2019/05/30/the-single-source-of-truth/>

Ian Nightingale makes the single source of truth concept crystal clear, talking through how automation engineers can get this wrong and the price they pay as a result. - Ethan

WLC Client Debug, Parts 1-3 - mrn-cciew

<https://mrncciew.com/2014/10/15/wlc-client-debug-part-1/>

<https://mrncciew.com/2014/10/17/wlc-client-debug-part-2/>

<https://mrncciew.com/2019/06/03/wlc-client-debug-part-3/>

Stand back, wireless people. This is a three part series almost 5 years in the making from Rasika Nayanajith, CWNE#153, CCIE#22989 (RS & Wireless). Get your packet-level thinking cap on, and peer deeply into the air. Astonishing level of detail in these three posts, supported by highlighted Wireshark captures, ladder diagrams, and a PCAP you can download to answer Rasika's quiz questions. You got that right. He even gives you homework to make you a more powerful wireless engineer. - Ethan

Building a dynamic security infrastructure [in a box – with SDN] - The Forwarding Plane

<https://www.forwardingplane.net/2019/05/building-a-dynamic-security-infrastructure-in-a-box-with-sdn/>

Nick Buraglio revisits a personal project of his from a few years back, and updates it. This is a terse post, but Nick provides lots of links to the additional information and context you might need. A good place to get started if you're wanting to fiddle with SDN controllers and OpenFlow. "OpenFlow is dead," you say? Don't tell Nick. He's got use cases for days. - Ethan

When should you use IPv6 PA space? - Rule 11 Reader

<https://rule11.tech/when-should-you-use-ipv6-pa-space/>

If your knee-jerk answer to Russ White's question is "never," click through and read. - Ethan

New Whitepaper For Ignition Members

If you're a premium member of Ignition (i.e. you dropped \$99 on us), we've just released a new whitepaper available for download:

[Intent-Based Networking Part 2: A Deep Dive Into Network Abstraction & Continuous Validation](#), by Phil Gervasi.

The new whitepaper:

- Explores in technical detail how Intent-Based Networking (IBN) systems work
- Explains how IBN systems abstract network devices & configurations to build working models
- Discusses the pros and cons of different approaches to abstraction
- Reviews the closed-loop model that drives the value of IBN systems
- Provides key takeaways

Thanks to everyone who's signed on as a premium member. We'll have more premium content coming soon, including a new paper on SD-WAN, and Ethan is hard at work on a video course on QoS. We appreciate your support and patience as we build out a library worth your time and money.

Tech Blogs: Opinion

Will Patent Disputes Finally Kill Tape? - DeepStorage

<http://www.deepstorage.net/NEW/will-patent-disputes-finally-kill-tape/>

Howard Marks states, "Today it seems that the two companies that still make magnetic tape have decided to use their patent portfolios to keep each other from selling the latest LTO tape cartridges (LTO-7 and LTO-8) in one of the stupidest business moves I've seen in decades. ... If I were making a final decision between a new tape library

and an object store or cloud storage I'm going to have to start figuring tape supply risk into my calculations..." Yikes. Some of you will need bigger pipes to the cloud. - Ethan

What We Should Take Away from Google's Outage – CIMI Corporation's Blog

<https://blog.cimicorp.com/?p=3777>

A thoughtful analysis of the impact networking has on public cloud. "The problem with cloud computing isn't the computing part at all, but the fact that network connectivity is essential in the cloud. In fact, it's the foundation of the cloud." Much bold pontification also. "The thing that this outage proves is that we really do need some form of AI in networking, not just in the 'management' or 'traffic engineering' parts of it but also in the configuration management part." Not sure how I feel about all of that. Global cloud networking represents a complicated problem for which I think AI, no matter how applied, is likely to be an inadequate solution for a long time. Although...I'd be happy to be wrong about that. - Ethan

CCIE Renewed Once More - Exam 400-101 v5.1 · Lindsay Hill

<https://lkhill.com/ccie-renewed-once-more-400-101-...>

The topic of certification continues to drive page views. Lindsay goes through recertification but it's fair to say he has mixed feelings about it. His day-to-day work doesn't require the certification and, like many senior engineers, his career path likely doesn't require use of those skills. - Greg

A Failed Test - Becky's Bits And Bytes

<http://beckyelliott.com/blog/2019/06/04/a-failed-test/>

The certification blog could be its own literary genre, akin to sci-fi, fantasy, or vampire fiction (though with considerably fewer space ships, dragons, or the sexy undead). Like any genre, the certification blog has common themes. Professional ambition motivates the certification seeker. The seeker undertakes the journey with enthusiasm, which is quickly blunted by trepidation, despair, self-loathing, and exhaustion. Like all stories, the ending is either happy or sad. Becky Elliott contributes to the genre with a short post on her attempt at an AWS cert. I think she's got an insightful takeaway: "My regret isn't that I didn't study enough to pass; it was that I didn't fail soon enough. Fear of failure and study time expectations prompted me to delay taking the test...for months and months. I could have had this certification months ago." - Drew

Squirrels and Fiber - POTs and PANs

<https://potsandpansbyccg.com/2019/06/04/squirrels-...>

When it comes to WAN outages, I'm expecting my service provider to make up some sort of excuse about the reason. This article talks a bit about the fact the squirrels and gophers are a real problem for US cabling. I'm still expecting to be lied to. - Greg

The Lulz



IT News

Microsoft, Oracle Link Clouds to Support Enterprise Workloads - SDxCentral

<https://www.sdxcentral.com/articles/news/microsoft-oracle-link-clouds-to-support-enterprise-workloads/2019/06/>

Networking-centric people should note that this link is more than just plumbing. “The move provides interoperability for workloads running across the respective cloud operations. ... This means those customers can run different parts of their workloads in those different cloud environments simultaneously. ... Customers can access the interconnectivity through a unified, single sign-on.” The only interconnect exists between Azure US East and Oracle Ashburn today, but more interconnections are coming. - Ethan

‘Robots’ Are Not ‘Coming for Your Job’ – Management Is - Gizmodo

<https://gizmodo.com/robots-are-not-coming-for-your-job-management-is-1835127820>

This story tweaked my “To the barricades!” impulse. Here’s the jist, written by Brian Merchant : “Robots are not threatening your job. Business-to-business salesmen promising automation solutions to executives are threatening your job. Robots are not coming for your job. The CEOs who see an opportunity to reap greater profits in machines...they’re the ones coming for your job.” - Drew

Huawei Exits Submarine Cable Business - SDxCentral

<https://www.sdxcentral.com/articles/news/huawei-exits-submarine-cable-business/2019/06/>

“Huawei is retreating from the undersea telecom cable business. The Chinese company, which is increasingly challenged by a U.S. government-led campaign to ban the use of its equipment, has inked a deal to sell its majority stake in Huawei Marine

Systems for an undisclosed sum, according to Reuters. ... The deal marks the first major asset sale for the company as it mounts a legal challenge against the U.S. government and battles accusations of being a participant in espionage under direction of the Chinese government.” Still no good news for Huawei. Still no tears over here. - Ethan

Industry Takes & New Products

If DARPA Has Its Way, AI Will Rule the Wireless Spectrum - IEEE Spectrum

<https://spectrum.ieee.org/telecom/wireless/if-darp...>

Frequency hopping is not a new idea but adding smarts to the detection algorithm to maximise usage and throughput is an obvious idea that requires an enormous amount of work. As this IEEE Spectrum post notes:

Instead, we’re seeing that a better approach is to predict what the spectrum will look like in the future. Then, a radio could use those predictions to decide which frequencies might open up—even if only for a moment or two, just enough to push through even a small amount of data. More precise predictions will allow collaborating radios to capitalize on every opportunity to transmit more data, without interfering by grabbing for the same frequency at the same time. Now our hope is that second-wave AIs can learn to predict the spectrum environment with enough precision to not let a single hertz go to waste.

We’ll see what happens. - Greg

Ignore misconfigurations at your peril - APNIC Blog

<https://blog.apnic.net/2019/05/31/ignore-misconfigurations-at-your-peril/>

We haz the dumb. And because we’re not so smart, we’re getting hacked. “Security misconfigurations are one of the easiest targets for hackers because they’re so commonplace. This type of vulnerability includes weak or default passwords, out-of-date software, unnecessary features that are enabled, and unprotected files or databases.” And yet we focus on things we can patch, which I suspect is an issue with how we use vulnerability scanners. We’re “teaching to the test” so to speak. Hey, no vulnerabilities detected. We must be secure! Nope. - Ethan

For most, virtualization reduces data center capacity demand more than anything else - Uptime Institute Blog

<https://journal.uptimeinstitute.com/for-most-virtualization-reduces-data-center-capacity-demand-more-than-anything-else/>

Your data center isn’t going away yet. We don’t all need to be public cloud architects tomorrow...although that wouldn’t hurt. Because hybrid. But anyway, “Participants in

our research told us enterprise data center demand (especially for storage) is still rising.” - Ethan

All I Want For Christmas Is ... RESTCONF? - SolarWinds Thwack Blog

<https://thwack.solarwinds.com/community/solarwinds-community/geek-speak/blog/2018/12/13/all-i-want-for-christmas-is-restconf>

John Herbert wants your feedback. Are you using RESTCONF as an automation interface? “Automating the infrastructure is hard enough without battling against multiple protocols. How about we just all agreed that RESTCONF is a good compromise and start supporting it across all devices? But here’s the problem: when did you last hear of anybody trying to automate with RESTCONF? That’s what I’d like to see.” The post is a few months old, but John’s still seeking input. - Ethan

Google Cloud Platform Outage Analysis - ThousandEyes Blog

<https://blog.thousandeyes.com/google-cloud-platform-outage-analysis/>

ThousandEyes, long time Packet Pushers sponsor, writes a detailed analysis of the recent Google outage from their point of view. Interesting analysis (i.e. the Google network broke dramatically), as well as being a decent showcase of what ThousandEyes is capable of from a network monitoring perspective. I’m hoping we get an engineering perspective from Google on what really happened inside their walled garden, but suspect we’ll be left with the spin doctors. (Sorry if I just earwormed that one song into your head. Also not sorry.) - Ethan

Six Tips to Help with Your Next Configuration Audit - Gluware Blog

<https://gluware.com/six-tips-to-help-with-config-audit/>

Terry Slattery, widely known as the first CCIE, writes a practical post for the Gluware blog. Parting thoughts include, “Since configuration errors are the source of most network outages, good configuration consistency practices reduce the opportunity for error and are critical for a smoothly operating network.” By the way, we Packet Pushers folks did a live event with Gluware back in May. You can watch all of the [presentations from Gluware Intent’19 on our YouTube channel](#). If you are interested in adding automation to your network, we think Gluware is worth checking out. - Ethan

K-vswitch - GitHub

<https://github.com/k-vswitch/k-vswitch>

“k-vswitch is an easy-to-operate, high performance and secure Kubernetes networking plugin based on Open vSwitch. WARNING: k-vswitch is in active development and is not advised for production environments. There will be a production-ready release in

the future.” I haven’t messed with this at all, but thought some of you might be keen. - Ethan

Workflows: Automation First Steps - NRE Labs

<https://networkreliability.engineering/2019/05/workflows-automation-first-steps/>

NRE Labs is a free training site that teaches network automation tools and concepts. It’s funded by Juniper, but it’s operated as an open-source project and the company is doing a good job of keeping it out of the hands of traditional marketing types; in other words, it’s actually useful and not full of marketing crap. This post from the NRE blog looks at a few new lessons, and shares the writer’s experience creating content for the site. - Drew

Share Your Favorite Tech Tip

We've got a newsletter, you've got a tech tip. Let's get together! What do we mean by a tech tip? It could be:

1. A useful little script
2. A favorite tcpdump command line parameter
3. Screenshot of an underappreciated feature in a GUI for some networking tool
4. A link to, and brief explanation of, a neat open source tool
5. Something else

If you've got something you'd like to share in this newsletter, drop me a line at drew@packetpushers.net. If we like it, and it's suitable for a newsletter format, we'll publish it in an upcoming issue (giving you all due credit, of course). Then you can sit back and bathe in the adulation that's sure* to follow.

*Adulation not guaranteed

The End Bit

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