Pieces of Human Infrastructure is a magazine-style newsletter from EtherealMind.com that comes about every 2 weeks.

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ETHEREALMIND Pieces of Human Infrastructure

A Newsletter on a Life in Networking

In This Issue

01/14/2015

Piece of Thought

"By working faithfully eight hours a day you may eventually get to be boss and work twelve hours a day."
- Robert Frost

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About Human Infrastructure

IT Infrastructure is a puzzle with hundreds or even thousands of pieces. Some pieces are hardware, some are software and some are business processes. But the most important piece is the people who design, deploy and operate the technology. Hence "Pieces of Human Infrastructure".

While our employers tell us that the most important factor is workforce, the last six months has seen vendors change selling tactics to promote the idea that operations is no longer necessary and companies should reduce spending on human infrastructure and spend more on capital purchase. In short, stop spending on people and spend the savings on our shiny new products.

To create even more confusion, the Devops movement is fundamentally about hiring more people so that automation leads to to needing less people. Will it even out in the long run ?

Where have you heard that sort of short term thinking before ? Car sales (still needs mechanics) ? Hire Purchase finance in the 80's (buy now! pay later!) ? Is this the last gasp of a dying marketplace ?

Overselling by vendors might be getting worse but I think it is important to focus on the most vital part of IT infrastructure - the people. Thats the focus of the this magazine.

*You can help me be successful by telling your friends and colleagues by forwarding them this email. They can head over to **signup page** for the list*

*(URL: **http://eepurl.com/JrXA5**).*

A Magazine Newsletter ?

Why A Newsletter ? I've been hot & cold about starting a newsletter for a couple of years now. Hot because I've always wanted to write one and reading other newsletters. Cold because publishing on EtherealMind blog has been successful, faster and just all round easier.

Publishing a newsletter is harder than it looks. I feel that a newsletter should be more than plain text with some headings, it should also be visually attractive at some level. Some graphics, nice layout and sections. Hence the idea of a newsletter that has a feel like a magazine but content like a newsletter. Getting the structure right and writing complete is a new thing for me. This edition is my first attempt and expect some experimentation for the next few weeks as I try different tools to get a comfortable "look and feel" (remember when we used to talk about that ?)

What will I write about ? Packet Pushers is steadily taking over my "day job". I spend time keeping in touch with the industry and technology through briefings, research and analysis. I also perform freelance working with clients and their networks where I provide advice, analysis and some engineering. And I get emails from listeners, comments on blog posts and much more.

With all of those inputs, I am never short of ideas and now I have an outlet for more of them.

More Personal Content Over time, my blogging has become more formal because my blog is front-facing. But I want to take a personal tone in this newsletter. I want to be writing about events that I've seen, done, discussed, reviewed or just simply read about.

I predict that the format of this newsletter will change somewhat over time as I settle into a routine of capturing ideas, topics that seem relevant and

ultimately finding patterns that seem to be interesting to you.

Please write back to me and ask questions, give me advice, give me some tips to new ideas and new concepts, and ask for follow-up. I can always add more in the next edition of the newsletter. My email is greg.ferro@packetpushers.net.

So welcome to this first edition of the "Piece of Human Infrastructure".

Right, lets get started.

Vendor News

Selection on news from vendors that might be worth looking at. Looking for unusual, exciting, weird or amazing without the ho-hum.

VMware NSX & ECMP Routing To the Core

VMware NSX can use ECMP routing over mutiple network adapters for scaling and redundancy. Think using 4 network adapters with ECMP in OSPF to load balance tunnel/overlay connections from the NSX agent in the ESX hypervisor.

In effect you can perform flow-by-flow balancing using IP routing across multiple 10G network adapters. Cheap scaling.

> The ultimate goal is avoiding the "rip and replace" of the existing physical infrastructure in order to keep up with the growing demands of the applications. Data centers running business critical applications need to achieve near 100 percent uptime. In order to achieve this goal, we need the ability to quickly recover from failures affecting the main core components. Recovery from catastrophic events needs to be transparent to end user experiences.

Talking Tech Series: VMware NSX Edge Scale Out with Equal-Cost Multi-Path Routing | The Network Virtualization Blog - VMware Blogs

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Brocade publishes worthwhile whitepaper on SDN. Really.

This link goes direct to a PDF from Brocade on their SDN strategy. Surprisingly, this is a good read for any network architect and design since it focusses on use cases and strategy without any marketing bollocks. Just good solid information.

Reading it will help you understand the market around OpenDaylight. Even if you are going to look at Cisco or NSX, you should definitely read this at least once to understand the options.

> In this paper you will learn about a range of SDN and SDN-related technologies and how you can apply them to a series of cloud-related challenges. In addition, this paper illustrates how Brocade is implementing SDN vertically—in data, control, and management planes—and across its portfolio.

Exploring Software-Defined Networking with Brocade - Direct PDF Download

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Cisco Sues for the First Time in 10 Years, Chooses Arista. Why Now ?

Cisco has decided to sue Arista Networks declaring several patents and copyrights have been breached. Cisco has listed the patents in this article claiming they are "protecting innovation" yet none look like innovation to me. There are two interesting ones I will highlight:

First, SysDB was previously a legal patent claim by an Arista co-founder, David Cheriton, also an ex-Cisco executive. Is Cisco is now claiming patent rights where does it leave that claim ? And the concept of SysDB looks obvious to me in terms of software architecture and hardly original idea. Does a search for "SysDB and Arista" and read up.

Second is the claim that Arista uses Cisco IOS CLI. Arista EOS CLI is very close to IOS and many engineers would see this as feature. That said, the Cisco IOS CLI is a pile of crap these days with logical inconsistencies all over the place including bad spelling, poor logic and erratic structures. What has made Cisco IOS CLI "better" is that competitors implemented much worse CLIs (Avaya/Nortel had a spectacularly bad CLI that I have had the misfortune to use, although it is better today). Better than the alternatives doesn't mean "good".

Cisco hasn't sued anyone for a decade, so why now and why Arista ?
Lets make some guesses:

1. Arista is a threat in the market and starting to make an impact on Cisco sales.
2. The number of employees migrating from Cisco to Arista has reached epidemic proportions and causing impact to internal processes.
3. Cisco wants to send a warning big partners such as HP and Dell without offending too much in case they stop being Cisco partners. At least in the short term.

4. There is significant staff loss to startups in Silicon Valley and Cisco wants to scare them off.
5. Cisco wants to tell Wall St that it is doing something about the competitive threat posed by Arista and a patent fight doesn't cost much and can be dropped easily if needs be. This buys a couple of quarters of breathing space while they hope that other new strategies actually pay off.

For any of these scenarios, Cisco comes off looking a loser and playing defensive. Importantly, Arista is well funded and able to sustain a major legal battle and looks likely to do exactly that.

I'm getting a very large bucket of popcorn to eat and **jaffas** to roll down the aisle.

Protecting Innovation - Cisco Blog

Your Personal Details are Yours

I just want to say this because it is important to me. This newsletter will have sponsors but I will not be "selling" your email addresses to anyone. It is your privilege to decide if vendors should have your email address and personal details.
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I hope that you will support our sponsors by checking out their products and services. The money from sponsors means that I can allocate time to writing!

Sponsor Piece

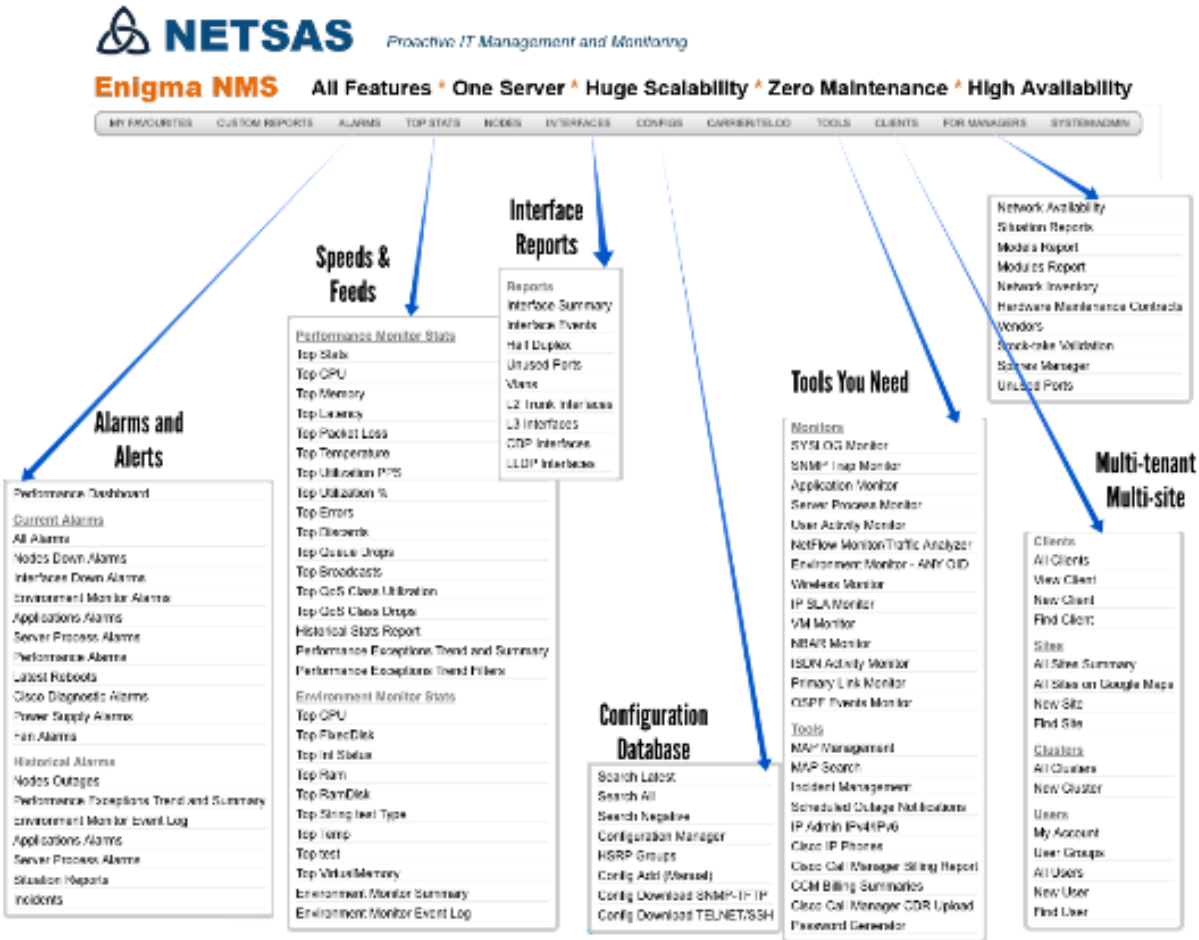
Enigma NMS - The Engineers Monitoring System

Network management and monitoring is at the heart of every network but not every product is based on client requests. Enigma NMS has been built by engineers for

engineers to use. That's why the interface will be totally familiar to you and has the features you expect to be in the product.

By default, Enigma NMS knows what you want to monitor on the device and simply does it for you. Of course, it monitors interfaces and the device but also MAC/IP mapping, inventory data, ISDN status and wireless signal strength, web page monitoring and more. There are no extras, no complex licensing because all features comes as standard.

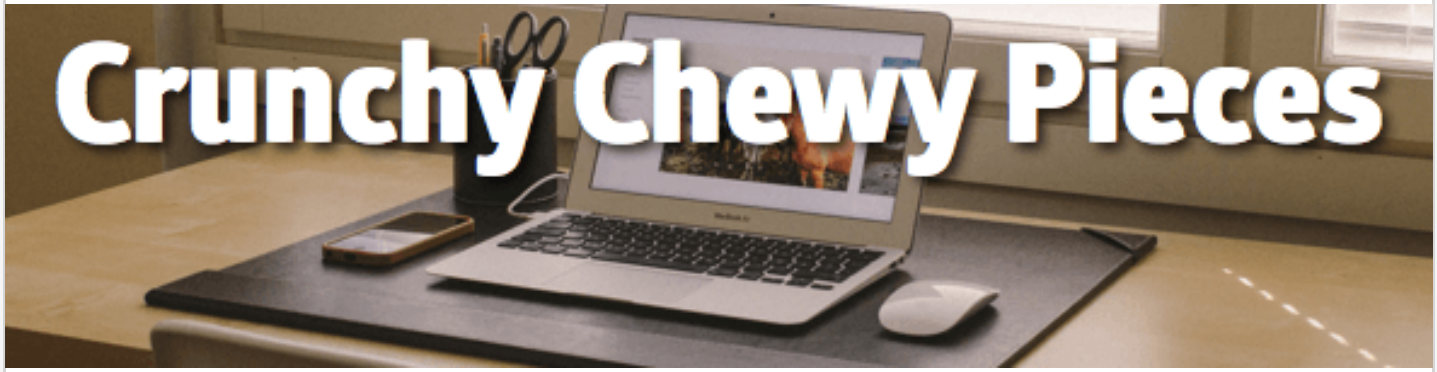
There are just so many options on the menus that we put this graphic together to try and show you just the menus.



Head over to the **Introduction to Enigma NMS** page for a fast overview and fill out the enquiry form on the right hand side and we will be ready to

help you monitor the network.

Or check out the detailed discussion on Packet Pushers **PQ Show 36 – ENIGMA NMS – Network Management – The Engineers Monitoring System from NETSAS Australia** we recorded last year.



My personal views on changes in the market or technology on topics, issues or technology that I am actively working on or researching. All original content that I will write for the magazine.

PIECE: 2015 is all about SDN WAN

The technology that gives me a "nerd hard-on" this month is Software Defined WAN (SDN WAN). Because the WAN is more than a decade overdue for modernisation plus utilisation is so low (which means wasted money).

SDN Data Centre is Incremental

Software Defined Networking in the Data Centre is so last year. The reality I am see is that a larger part of the Enterprise market doesn't want SDN that replaces the physical data centre network because of the risk and cost associated with that. Cloud Providers such Google, Amazon or Rackspace are a different market but they don't need or want physical networking either. Cisco claims that ACI has just a couple of hundred customers after 12 months

of marketing and beating the sales people into flogging that kit. People often say thats a lot of marketing dollars, sales effort, and not much results.

NSX and other SDN overlay networking solutions are better suited for the Data Centre because:

1. You can start today without replacing anything.
2. You can start small and incrementally grow over time.
3. It only impacts a small part of the data centre so working with Operations & Security on changes is easier.
4. Making small changes doesn't need the CIO or Executives to find big budget chunk to get it done.

It is rare for the Enterprise to spend big chunks of cash on new stuff. We don't have time to make huge changes and real day-to-day is about small, incremental progress that can take years to implement. Thats the SDN that is has most traction in the data centre.

SDN WAN

But hey, SDN Data Centre is so 2014. This year will be about SDN in the WAN where the budget justification is going to be much easier. The amount of money spent on service providers for bandwidth is just an enormously huge chunk of IT budget and even small amount can result in huge savings. WAN Optimisation technology lives by this reality.

Using overlay networking in the WAN gives you the same benefits as overlay networks in the data centre. There are five key things that I think are important:

1. **Increase utilisation by directing traffic flows over unused links.** Think about those backup WAN links that do nothing for 350 days of the year. Routing protocols like BGP & OSPF can only calculate a single path through the network, at best you can perform equal cost routing. At worst you can use hop-by-hop routing policy to override the default condition and then try to keep it operational. What about those regional links that get used at about 10% and you keep them clear.

2. **Gain independence from carrier / provider.** Overlays means that you can use many different providers in different locations and still build a single network. You don't have to use MPLS or fancy routing to weld a single IP routing space together. Use links from five or ten different providers and then create a single overlay network across all of them.

3. **End to End Visibility including QoS & Analytics.** Lets face it, SNMP is crap. Syslog is crap. NetFlow is pointless except at Core WAN sites and requires enormous amounts of processing and storage to be useful. The data sources for network monitoring are just awful and we get low quality data from devices, at best. SDN is about defining new data models as APIs that can be dynamically programmed.

And 'analytics' is about using big data software to analyse the data for patterns and use pretty graphs for something more useful than sales charts by region.

This technology is still emerging but expect to see this in 2016 not 2015.

4. **Incremental deployment.** SDN WAN doesn't have to replace your existing routers. You can deploy SDN WAN devices like WAN optimisation boxes in the places that matter. You can start small and grow over time, prove the solution, modify the operations and security plans and build over time.

5. **Speed of Deployment / Technology Independence.** I read somewhere that 75% of corporate WANs have been outsourced because there is just so much pain associated with managing large numbers of routers littered around the place. But what using 4G LTE to connect a new office while you wait for the tail circuit to be installed ? Why not use a WiFI provider ? Why not use them instead of a Leased Line ?

Incremental Change

The heart of SDN is about having programmable network devices that can be modified easily and reliably. I don't know where SDN WAN will end up but the

transition to SDN will be through a migration using overlays so that you can keep your existing 5 to 10 year WAN outsourcing contracts until they expire and add a few sites at the edge to begin a continuous migration over a couple of years.

The Human Piece

Almost no one gets rewarded for recommending radical change. It took a decade for WANs to connect every branch, for VMware ESX to become widely used, for Windows to lose its attraction and we should not expect SDN (of any form) to create revolution. No one wants to live through revolution but will embrace change that is an evolution.

It will take a decade to migrate to SDN in the WAN but I am sure that you will be able to see how SDN WAN works in 2015.

PIECE: Silicon Photonics

I have been hearing a lot about Silicon Photonics for the last year or so but it seems to be a technology that will arrive when I least expect it and its several years late already. If the vendors can get it right, it will change the fundamentals of our hardware devices (which, in turn, change the way we use or write our software).

Today we generate laser pulses using man-made jewellery (I am exaggerating but they are usually crystalline) that we excite with light pulses. We use low-power, low accuracy lasers on multi-mode and increase the accuracy and power as we move to single mode and longer distance.

The concept of Silicon Photonics is to generate laser signals from silicon and preferably from the silicon wafers used in factories today. Here are some collected thoughts :

- The goal is to replace electrical signals over copper with laser pulses over silicon.
- Fibre optic signalling is much faster than copper due to physical medium.

- Lasers are not subject to electrical interference which makes them easier (and cheaper) to install in building ceilings/walls and data centres.
- Means smaller connectors suitable for consumer applications - think about laser connectors on a CPU, motherboard, microwave instead of discrete components.
- High volume consumer applications mean that corporate use becomes viable at reasonable prices.

Some vendors are using silicon photonics to make 40GbE and 100GbE active patch leads that you buy today. There is silicon photonic components in the SFP headshell.

Where oh where will it be

Intel is spending serious big dollars on silicon photonics. I've seen presentations where chips would have photonics connection across the motherboard and replacing the electrical traces.

Think about what that means. Data rates for bus connections between chips would be free of the limitation of electrical signalling. I have had long conversations with chip designers who explain how hard it is to lay out components inside the chip.

Its a Manufacturing problem

So why don't we have it today ? Because the cost of manufacture and component yield isn't quite high enough. But there are new 100 Gigabit Ethernet standards that use it - 100GbaseCWDM4 and 100GbaseCLR4 which should converge early this year.

Action Plan ?

Maybe having a larger market will drive more investments in manufacturing which will drive lower cost components for all us. In the short term, the cost of SFP hardware will reduce

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Your Feedback Means We Will Grow

Back in **Show 200 - State of the Pushers**, Ethan and I talked candidly about four years of publishing the Packet Pushers Podcast. And ***yes, thats is us in the photo there***. The day that we recorded the show we were both tired from long hours of working the $dayjob, travelling with the show, juggling many responsibilities of family and the work administration load of running Packet Pushers.

Following the show, we got literally dozens of emails with support, feedback, offers of help, advice and quite a few begging us to keep going. This was astonishing to us. We simply couldn't get over how many people were disappointed that we were even considering slowing down or giving up.

At the end of Show 200 in August 2014 , I remember that Ethan & I said that this show would probably determine where we are heading in 2015. My powers of prophecy are seemingly substantial.

The result has been dramatic. We have new energy and buzz. Knowing that people get excited about the show, what we do and more offers to help changed our attitude. We have hired part-time staff to help us run the business, we have plans to grow over time. We have a vision of what we want from Packet Pushers as a startup company.

Packet Pushers is extending its corporate side and we are moving to be more business-oriented. In plain speak, we are charging more for sponsorship so that Packet Pushers can become a bigger part of our working lives. We have long term goals of building a full time roles but that will take another year or

two before we can build up. Until then, we will continue to work multiple jobs and keep family, work and Packet Pushers rolling along.

Ethan talks more about the content in **A Look Ahead to Packet Pushers Content in 2015** on PacketPushers.net but we will continue and expect to offer more than ever before.

Because "Too Much Networking Would Never Be Enough"

or something.

Internets of Interest

> Collection of useful, relevant or just fun places on the Internet and a bit commentary about what I've found interesting about them

Solid round-up of tips on hardening SSH against known NSA attacks (because if the NSA can do it and it is public knowledge then anyone can do it). Note: Almost none of these apply to network devices because of the lack of crypto.

https://stribika.github.io/2015/01/04/secure-secure-shell.html

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I enjoyed to article on Radia Perlman who talks about growing up and how her life followed a strange path

> You've been called the Mother of the Internet, and you've also said that you do not like that title. What bothers you about it?
>
> The Internet was not invented by any individual. There are lots of people who like to take credit for it, and it drives them crazy when anyone other than them seems to want credit, so it seems best to just stay out of their way. I did indeed make some fundamental contributions to the underlying infrastructure, but no single technology really caused the Internet to succeed. And sometimes, things get invented multiple times until the time just happens to be right. The thing that happened to be there at the right time isn't necessarily better than the other ones.

Radia Perlman: Don't Call Me the Mother of the Internet - Atlantic

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SDN Adoption Much Slower Than Expected

A report from Piper Jaffray predicts that SDN adoption will be much slower that is currently believed.

> "While we do not discount the fact that SDN will likely change the traditional IT hardware landscape as we know it, we believe adoption, and ultimately deployment will be vastly different and slower than expected," the company said in its fourth annual CIO Survey.

I found this after I wrote the earlier peiece about slow adoption of SDN. So it confirms my own bias with real data.

Financial Analyst Tempers Fast SDN Adoption Expectations – Enterprise Systems

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Packet Pushers Community Bloggers

Posts of Note by Packet Pushers Community

One of the greatest things about Packet Pushers is having a website that we can share with other people. This month has already seen some great posts - here are three that were popular or that I particularly liked.

Parsing Junos XML with Python

I'll admit it – I've drunk the "**Network Engineers should learn programming**" Kool-Aid. In so doing, I'm gearing up for **Kirk Byers** upcoming **"Python for Network Engineers" course** by hacking a bit of Python most every evening. Kirk has recently released a Python "wrapper" module for the popular Python SSH module "**Paramiko**" that simplifies connections to popular network vendor devices, which he's named "**Netmiko**". So having downloaded and installed his module into my Python modules directory, I coded up a few scripts that use Netmiko to connect to some Cisco and Juniper switches I have in my lab, and have been experimenting with parsing the results of some "show" command output.

Parsing Junos XML with Python

Raspberry Pi RSPAN Capture Box

For some time I have had issues while doing captures such as finding the elusive "spare laptop" you can use, multiple trips out to the site to pick up the captures, or

finding another NIC to put in there so you can connect remotely and copy the captures over the network, taking up 2 switch ports. Overall it's just a lousy situation. Recently I came up with a solution in the form of a Raspberry Pi using only the built-in NIC. It's a very easy to set up for very little money, but I haven't seen this idea anywhere so thought I would share it. What I am doing on the Cisco side is setting up an RSPAN monitor session and a trunk port; on the Linux side I just enable 802.1q, capture on the RSPAN vlan, and manage on the native vlan.

Raspberry Pi RSPAN Capture Box

A Single Architect for Your Network

I finally got around to reading The Mythical Man Month (MMM), a famous book on large-scale software development projects (think operating systems) written in 1975, revised in 1995, and still strikingly relevant today in the neighboring field of building and managing massive networks. While multiple points land directly on those of us working on massive networks, I'd like to focus on the idea of a single, master architect.

A Single Architect for Your Network

You can also blog at Packet Pushers, everyone has at least one blog post and our website has a pre-packaged, ready-to-use audience who love hearing about your stories, knowledge and experience. If you want to blog there simply send us an email to packetpushers@gmail.com, tell use who you are and why you to blog. Then we will setup your account.

My Published Content

Occasionally I will research and publish white papers for other organisations. When they are relevant and released to the public then I will list them in this section.

Agility and programmability of SDN-powered distributed networking

Gigaom Research (Subscriber Only) published my whitepaper on **Agility and programmability of SDN-powered distributed networking** that was underwritten by Pluribus Networks. In this paper, I examine the nature of SDN controllers and applications and how this programmability changes network devices.

Key highlights from this report include:

Existing networking architectures have inherent limitations in their design.

- *The real business value in SDN networking is derived from the application software that taps into the new capabilities the network controller enables.*
- *SDN, which consists of many technologies, products, and platforms, focuses on managing flow state in the network via programmable interfaces.*

- *Two business outcomes from new data methods are visibility and the rise of network analytics.*
- *SDN solutions that focus on a centralized-controller design offer a low-cost and fast software development process, but have issues that impact customer networks.*
- *Distributed SDN offers greater technology and business features than those of centralized SDN. It has three key advantages: load sharing, network design simplification, and single-operational interface. The distributed SDN model is further optimized when based on a server-switch architecture*

SDN And Security: Start Slow, But Start - Dark Reading

This whitepaper was written to explain how to gradually build an SDN infrastructure while learning how to keep it secure. I mostly recommend to companies that they avoid replacing their entire network infrastructure because the impact to operations and security is just so enormous. Its not just network engineers who need to adapt to SDN,

Software-defined networking can be a net plus for security. The key: Work with the network team to implement gradually, test as you go, and take the opportunity to overhaul policies

This free report is available at **Dark Reading** (registration required)

About Piece of A Human Infrastructure

A strongly curated newsletter produced by Greg Ferro that contain observations and thoughts on IT Infrastructure with a networking focus that he has seen, done, discussed, reviewed or just simply found on the Internet.

The format is structured but flexible (like any magazine) and will change over time as I settle into a routine of capturing ideas, topics that seem relevant and ultimately finding patterns that seem to be interesting to you. Your feedback will drives changes so don't hesitate to email with feedback or ask followup questions for the next edition.

About Greg Ferro

Greg is a co-host of the Packet Pushers Podcast a weekly podcast on Data Networking which has over 8000 subscribers. He blogs regularly at EtherealMind.com for the last eight years and is pretty well known these days. He also write as an analyst for Network Computing and Gigaom Research. He speaks at major events on Data Centre Design, SDN and life in technology. He moderates panels, advises customers and technology companies.

He works as a part-time network engineer in the UK on a freelance basis. Because real work configuring routers and switches remain not only a passion but important to keeping touch with the industry.