NAF
NETWORK AUTOMATION FORUM

PACKET PUSHERS
TOTAL NETWORK OPERATIONS

Total Network Operations (TNOps)

Navigating Disruption, Preparing for the Future

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AUTOCON 2

THE NETWORK AUTOMATION CONFERENCE

Roadmap for this Talk

What is TNOps? (10%)

NetOps is more than Automation (20%)

Managing and Leveraging Disruption to Improve NetOps (70%)

TNOps Overview

- A Project with a Podcast
  - On Packet Pushers!
  - Get great ideas in NetOps out to others
- Focused on elevating NetOps to make NetOps Better
- Big Ideas for TNOps
  - View Everything as Holistic System
    - Explore NetOps adjacencies
  - Always Keep Learning
  - Application of DevOps principles to NetOps

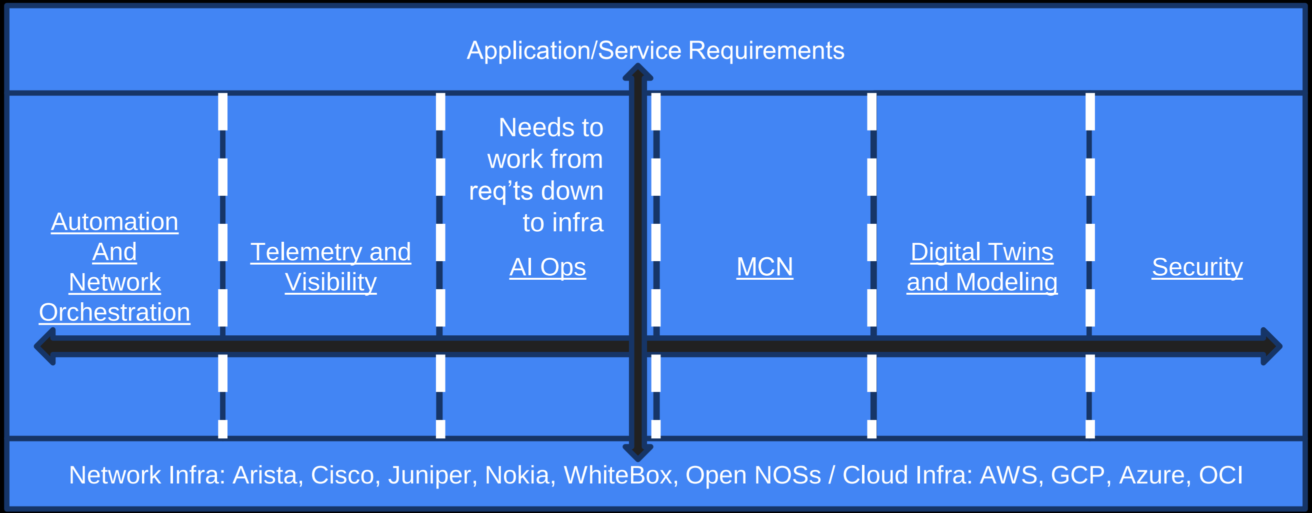
TNOps Main Premise

- NetOps as a community is underserved
- Some reasons why:
  - Lowest rung on the ladder, below NetEng and NetArch
  - Does not get the constructive attention it could use
  - CAPEX (gear) is easy to identify; OPEX for ops can be 10x, but is spread out, harder to track
- We can change this - maybe start a bit of a movement, even a revolution
  - Help NetOps participate in its own rescue

TNOps Evolution

- Network Automation: key in operations
- John Willis @ AC0: think holistically
- But there is MUCH more to the Ops Stack
  - The Infra, AI, Observability, Security, Trouble Ticketing…
  - **People**, **Process**, and Tech
  - Trad NetOps, DevOps, and NetDevOps
- Started as an idea for a framework - shifted to elevating Great Ideas via podcast+

The TNOps Stack / Framework



Application/Service Requirements

Automation And Network Orchestration

Telemetry and Visibility

Needs to work from req’ts down to infra

AI Ops

MCN

Digital Twins and Modeling

Security

Network Infra: Arista, Cisco, Juniper, Nokia, WhiteBox, Open NOSs / Cloud Infra: AWS, GCP, Azure, OCI

Why Focus on NetOps Now?

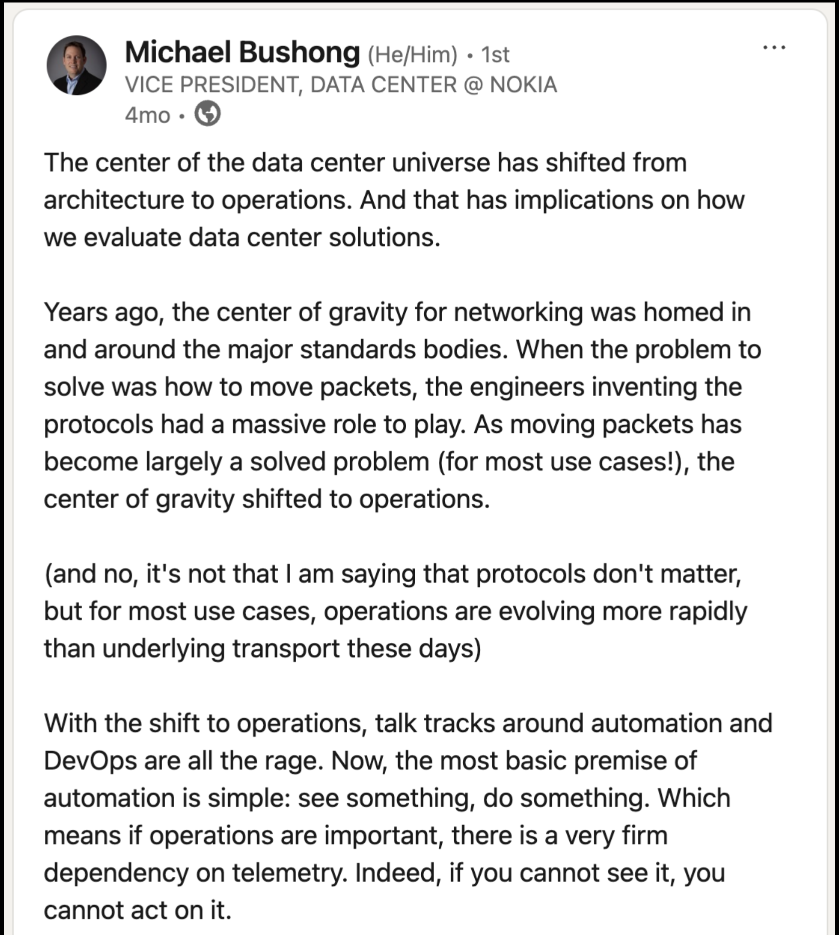
- Honestly, it's been time for awhile
- It's a mature market: Commoditization
  - Competition
  - White boxes
  - Plumbing – increasing expectation that it will just work
  - NaaS models
- Some architectures are stabilizing and simplifying
  - DC in particular - and increasing importance of this networking domain
  - Networking for AI - interesting exception, but mixed impact; small number of large companies will build their own AI clusters, but they will spend alot and drive features that may be useful to others, and may also drive hype
- Even if you don't completely agree, there is room to improve NetOps

Why NetOps Now: DC as an Example

Standard Architectures
+
Commoditization of Gear

==results in==

Opportunities for Optimization in Ops



Michael Bushong (He/Him) • 1st
VICE PRESIDENT, DATA CENTER @ NOKIA
4mo •
...

The center of the data center universe has shifted from architecture to operations. And that has implications on how we evaluate data center solutions.

Years ago, the center of gravity for networking was homed in and around the major standards bodies. When the problem to solve was how to move packets, the engineers inventing the protocols had a massive role to play. As moving packets has become largely a solved problem (for most use cases!), the center of gravity shifted to operations.

(and no, it's not that I am saying that protocols don't matter, but for most use cases, operations are evolving more rapidly than underlying transport these days)

With the shift to operations, talk tracks around automation and DevOps are all the rage. Now, the most basic premise of automation is simple: see something, do something. Which means if operations are important, there is a very firm dependency on telemetry. Indeed, if you cannot see it, you cannot act on it.

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Organizing Ops to Manage Disruption

The Reality of Disruption

- It's part of Tech and IT overall
- We've seen disruption (progress?) in other areas; we should expect it in NetOps as well
- New tools and tech will require (and benefit from) new processes and views

Software Eats the World

- Marc Andreesen, a16z, ~2012
- A main driver behind disruption hitting NetOps
- Big idea: software is fungible, and combined with agile processes, can generate solutions and products rapidly
- Caveats
  - Beware Buzzphrase affinity
  - Hardware is still important - thank you Nvidia
  - All software runs on hardware (“someware” 🤓)

Disruption in Software and Computing

- Punch cards, lowest-level programming - binary instructions , Assembler
- COBOL and Fortran >>> C, C++ >>> json >>> Python, Rust, Go
- Mainframe, mini, micro, PC
- Networking – as a disruptor to computing!
- Stand-alone to clustering
- CISC and RISC
- Cloud, compute at volume
- CPU to GPU
- **So: you should expect disruption in networking too**

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Working Definitions

NetOps and DevOps

- NetOps: “trad” network operations
- DevOps: from the world of software delivery, does not map directly to NetOps in all ways
    - It’s a movement - so it’s hard to define
    - Important principles (a very partial list)
        - Reduce distance between Dev and Ops (key)
        - Radical collaboration
        - Use best sw dev processes and tools, and drive improvement of those processes and tools

…and NetDevOps

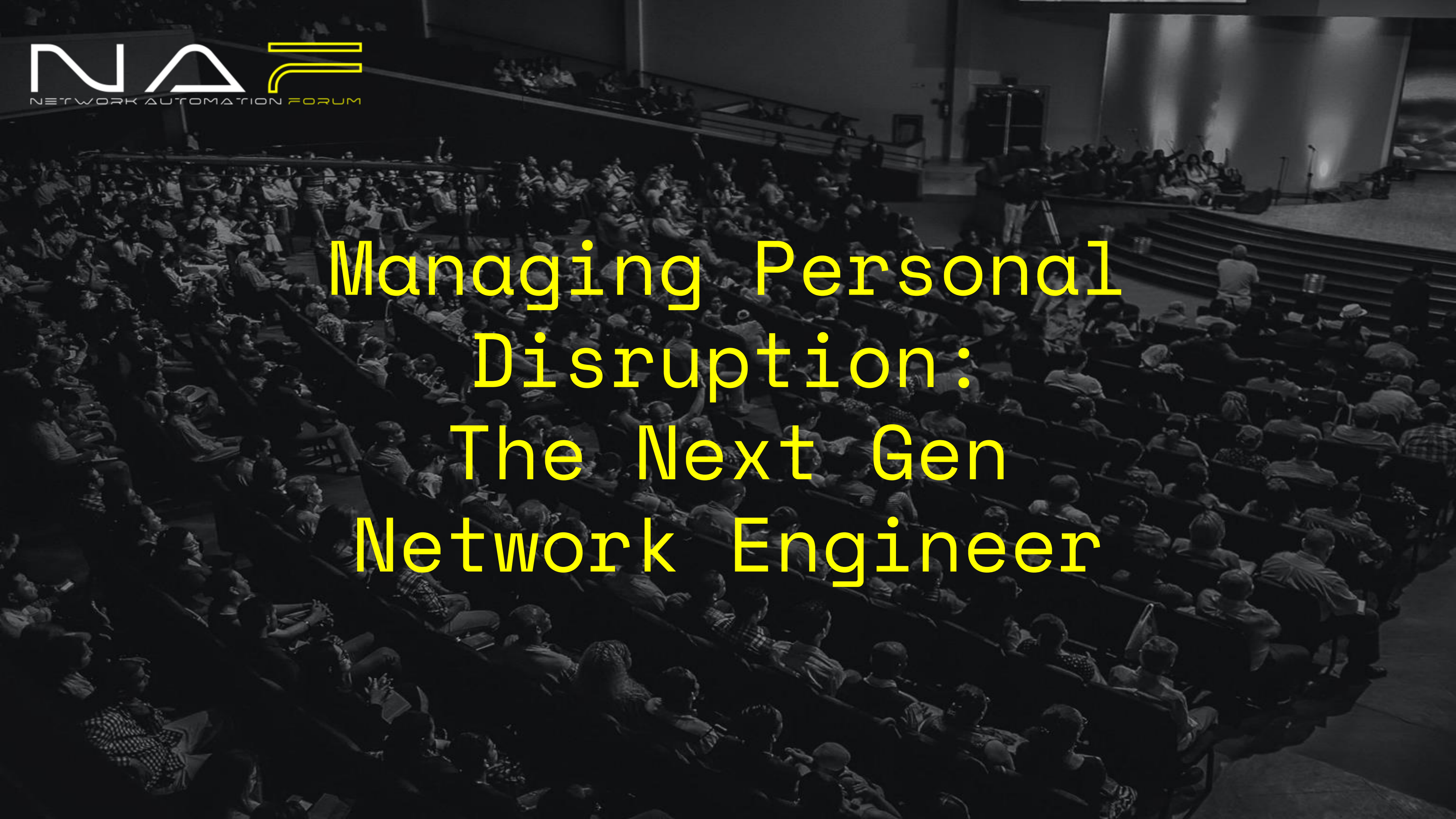
- NetDevOps: a decent hybrid, adapting DevOps principles to NetOps
    - Needs to account for the presence of physical equipment and constraints
    - Needs to consider the development of software delivery skills that are not native to networkers

First Principles

- Re-applying DevOps ideas to NetOps in a way that acknowledges the differences in networking
- Select Deming ideas that influenced DevOps
    - Small experiments, small changes
    - Gather data and iterate
    - Continuous Improvement
    - Feedback loops
    - Empowering people
    - Responsibility of leaders
- TNOps seeks to apply those principles directly to networking

A Continuum for NetDevOps

- One size does not fit all
  - Example - automation: roll your own, shrink-wrapped products, combo of the two
- The Continuum
  - Trad NetOps <<<<<>>>>> Full NetDevOps
  - Where are you now? Where do you want to go?



Managing Personal Disruption: The Next Gen Network Engineer

Developing Software Literacy

- Big idea: increasing literacy in software development processes and models means the process and tooling knowledge (and the tooling itself) is becoming more common in NetOps (and more)
- This is where the puck is going
- The trick is to figure out how much of it you need now, versus a year from now

NGNE Development: 100 level

- Networking basis: CCNA / JNCIA / Arista L1 / etc.
- The New NGNE “Basic” Skills
  - Linux
  - GitHub (or another SCCS)
  - Python (or another language suited for automation (Go))
  - At least one cloud platform (AWS)
  - AI-enhanced NetOps skills
  - AI-enhanced learning of all 100/200/300 level topics
- Vendor skills: driven by product decisions, add to your learning plan accordingly

NGNE Development: 200 level

- Source of Truth (caveated with current vernacular)
- IAC concepts (Terraform)
- APIs – really understand them, not fairy dust
- Ansible
- CI/CD Pipelines - this might go more naturally with Git
- Workflow - as a concept, how to implement and use it

NGNE Development: 300 level

- MCN: multicloud networking
- Observability and Telemetry
- Security
- Other Adjacencies (Optical, more)
- Kubernetes

Other NGNE Elements

- This is all still cooking
- Tailor all of the above to your environment: vendors, priorities, etc.
- Set some priorities - start somewhere
- A year from now, this list WILL change
  - Ex: k8s in networking could be even more important
- What does the “OSI Model” for NGNE look like?
- Proactive and intentional Mentoring (thank you Du’An!)

It's not just you: NetOps Org Evolution

Org NetDevOps Readiness

- People need to skill up and grow - so do organizations
- Why would you want to modernize your network and NOT modernize your NetOps?
- Again, one size does not fit all
  - small/med enterprises will not be hyperscalers EVER
- But we can adapt and improve NetOps at all levels
- Assess where you are
  - How many skills do you have in the new categories?
  - Corporate desire to move forward toward NetDevOps?

Assessing Org NetDevOps Readiness

- Are you willing to budget time to support your team to skill up?
  - Remember disruption - invest in your people; don't just pile more on and discard them
  - My personal examples - I feel pretty strongly about this, leadership responsibility
- Do you budget time and resources for team members to develop those skills?
- Do you have a plan to grow literacy in these NetDevOps areas?
- Are you willing to look at workflows and reengineer how things get done with new tools?
  - Start enforcing independent config review or script review?
- Are you making tool and process changes in connection with business decisions?
- Are you willing to create some new roles to shepherd these changes (like an Ops Architect)
- Are you willing to support continuous investigation of improving NetOps tools and processes?

Gaps to Address

- Demonstrating business value of NetDevOps
    - This is not surprising; we generally do a poor job in the industry on RoI for things like this
    - Some companies are better at this than others
- Protecting NetOps Interests
- Skills and Personnel Gaps
    - Build non-trad people pipelines
    - Combine new tool efficiency (AI) with hiring
- We’re on the lookout for other areas
    - Excellent reason to keep talking to people

What's Next?

Change Beyond Personal Skills

- We’re here @ AC2 focused on what we can do in the Automation realm
    - that’s good and necessary (and awesome!), but not sufficient
- There needs to be engagement with NetOps org leaders to turn the ship
    - This is challenging
    - Complement and support grass roots efforts
    - This is what I want to do with TNOps

What's Next for TNOps

Keep Talking to and Learning From Operators

Keep Talking to Vendors to cultivate Ops Focus

Create and Curate Useful Materials and Resources

Look at adjacencies: Security, Optical, the IT stack

Engage with companies that want to do NetOps Better

Please send good people my way

Please listen and provide feedback:

https://packetpushers.net/podcast/total-network-operations/

To Sum It Up

Automation is key to NetOps

NetOps is much more than Automation

Disruption is here to stay - Personally and Organizationally

We CAN make NetOps better - Personally and Organizationally

TNOps can help!

Questions?

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Thank YOU