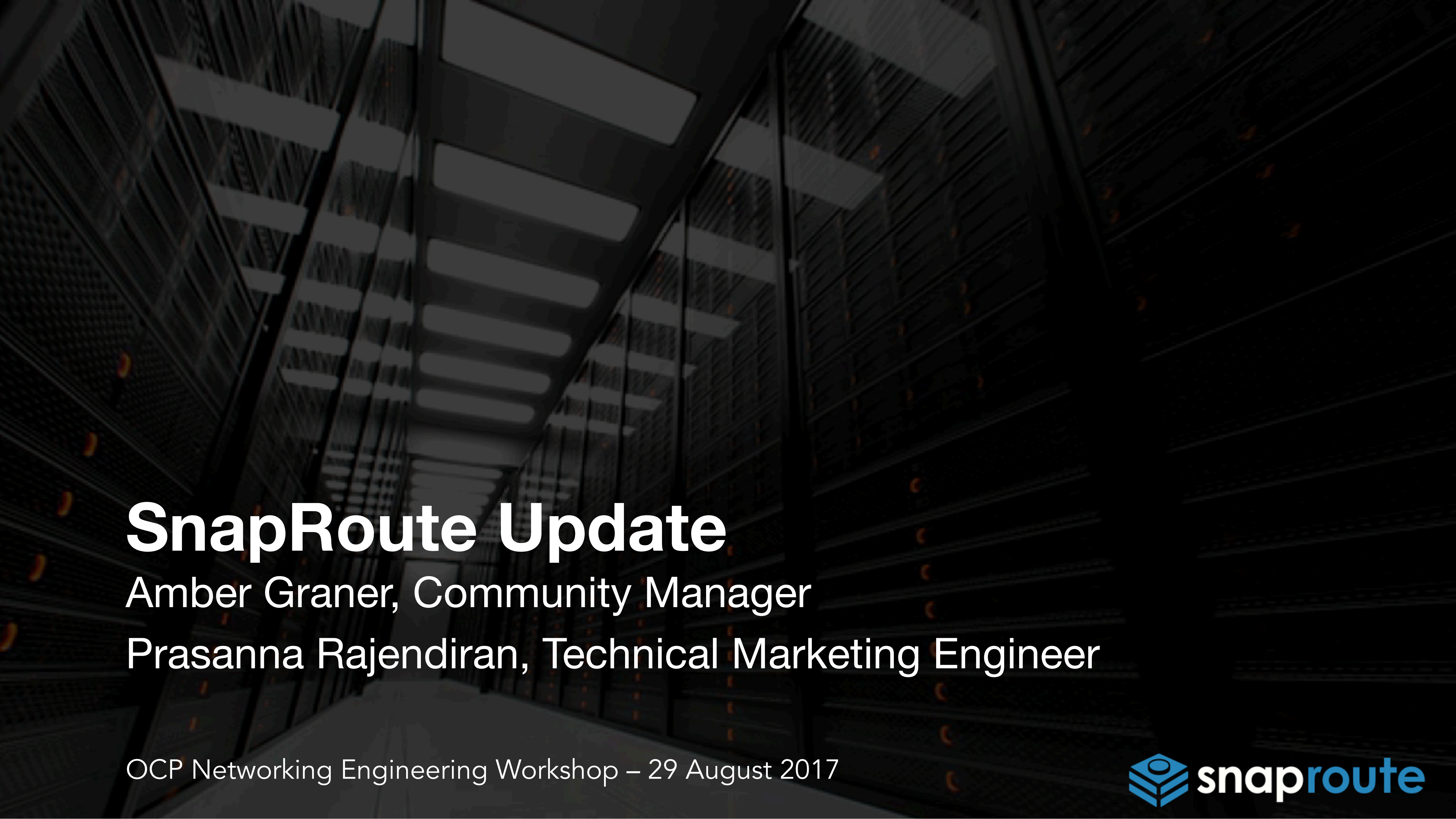


SnapRoute Update

Amber Graner, Community Manager

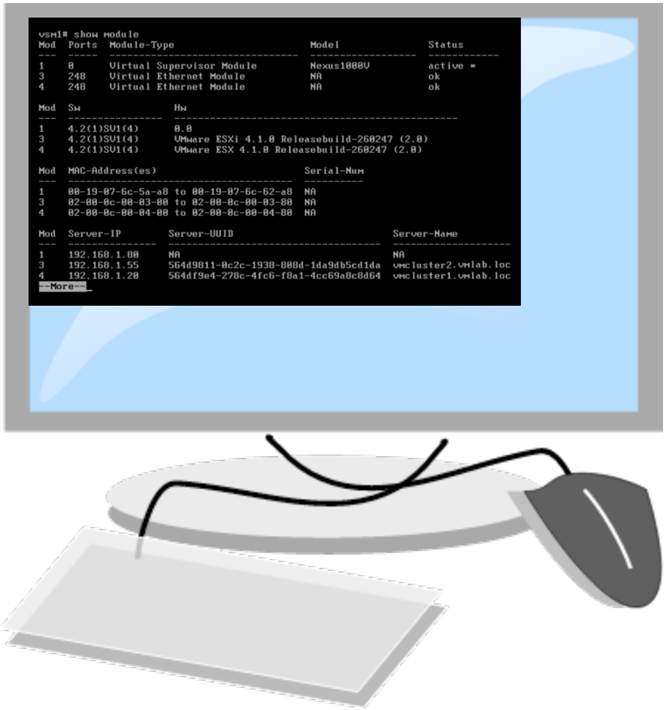
Prasanna Rajendiran, Technical Marketing Engineer

OCP Networking Engineering Workshop – 29 August 2017

snaproute

Running the network is too difficult

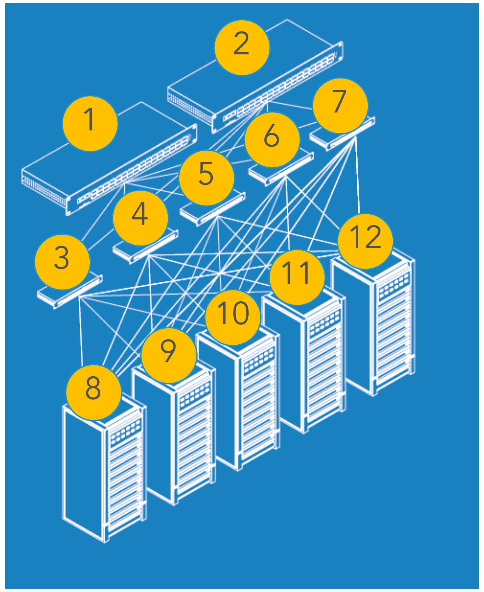
Old-School
Command Line Tools



```
vsm1# show module
Mod  Ports  Module-Type                       Model               Status
---  -----  --------------------------------  ------------------  ------------
1    0      Virtual Supervisor Module         Nexus1000V          active *
3    248    Virtual Ethernet Module           NA                  ok
4    248    Virtual Ethernet Module           NA                  ok

Mod  Sw                Hw
---  ----------------  ------------------------------------------------
1    4.2(1)SV1(4)      0.0
3    4.2(1)SV1(4)      VMware ESXi 4.1.0 Releasebuild-260247 (2.0)
4    4.2(1)SV1(4)      VMware ESX 4.1.0 Releasebuild-260247 (2.0)

Mod  MAC-Address(es)                         Serial-Num
---  --------------------------------------  ----------
1    00-19-07-6c-5a-a8 to 00-19-07-6c-62-a8  NA
3    02-00-0c-00-03-00 to 02-00-0c-00-03-80  NA
4    02-00-0c-00-04-00 to 02-00-0c-00-04-80  NA

Mod  Server-IP        Server-UUID                           Server-Name
---  ---------------  ------------------------------------  --------------------
1    192.168.1.80     NA                                    NA
3    192.168.1.55     564d9811-0c2c-1938-808d-1da9db5cd1da  vmcluster2.vmlab.loc
4    192.168.1.20     564df9e4-278c-4fc6-f8a1-4cc69a8c8d64  vmcluster1.vmlab.loc
--More--
```

Error-prone, manual configuration
and change control

Managing device-by-device



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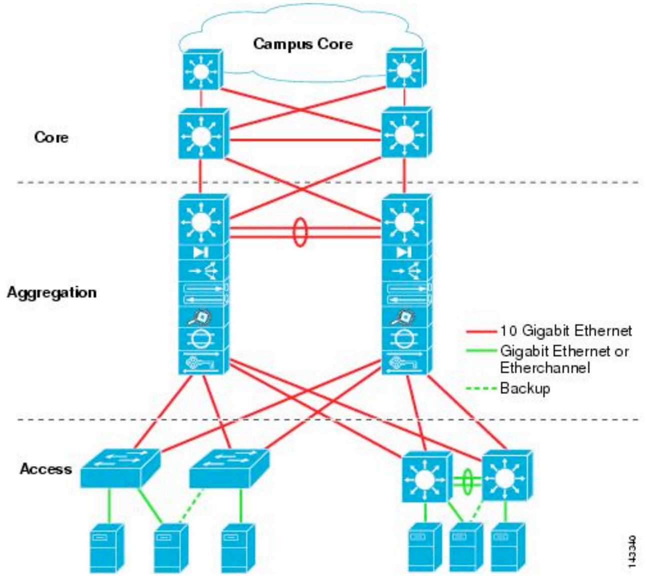
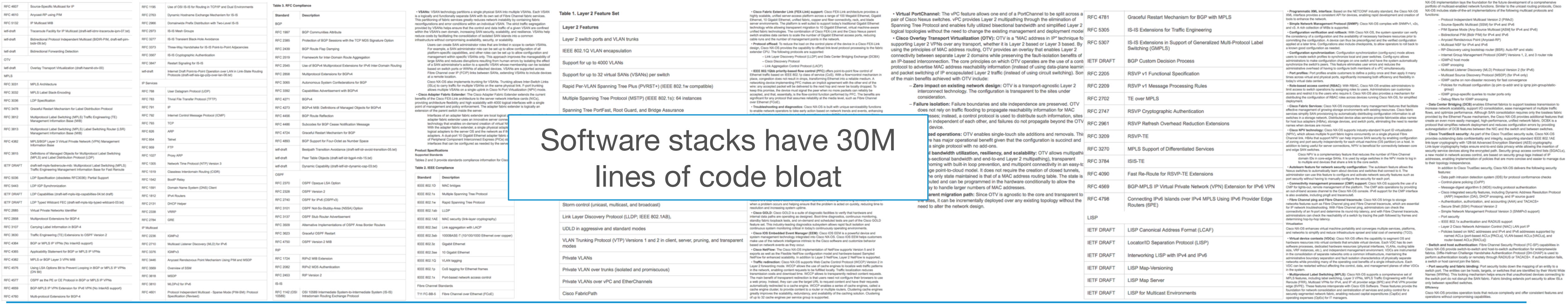
Devices and designs are brittle



Architectures are outdated and mandate too many protocols

“High Availability” that isn’t



Software stacks have 30M lines of code bloat

Table 1. Layer 2 Feature Set

Layer 2 Features
Layer 2 switch ports and VLAN trunks
IEEE 802.1Q VLAN encapsulation
Support for up to 4000 VLANs
Support for up to 32 virtual SANs (VSANs) per switch
Rapid Per-VLAN Spanning Tree Plus (PVRST+) (IEEE 802.1w compatible)
Multiple Spanning Tree Protocol (MSTP) (IEEE 802.1s): 64 instances
Spanning Tree PortFast, Root Guard, and Bridge Assurance
Storm control (unicast, multicast, and broadcast)
Link Layer Discovery Protocol (LLDP; IEEE 802.1AB),
UDLD in aggressive and standard modes
VLAN Trunking Protocol (VTP) Versions 1 and 2 in client, server, pruning, and transparent modes
Private VLANs
Private VLAN over trunks (isolated and promiscuous)
Private VLANs over vPC and EtherChannels
Cisco FabricPath

RFC 4781	Graceful Restart Mechanism for BGP with MPLS
RFC 5305	IS-IS Extensions for Traffic Engineering
RFC 5307	IS-IS Extensions in Support of Generalized Multi-Protocol Label Switching (GMPLS)
IETF DRAFT	BGP Custom Decision Process
RFC 2205	RSVP v1 Functional Specification
RFC 2209	RSVP v1 Message Processing Rules
RFC 2702	TE over MPLS
RFC 2747	RSVP Cryptographic Authentication
RFC 2961	RSVP Refresh Overhead Reduction Extensions
RFC 3209	RSVP-TE
RFC 3270	MPLS Support of Differentiated Services
RFC 3784	ISIS-TE
RFC 4090	Fast Re-Route for RSVP-TE Extensions
RFC 4569	BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN
RFC 4798	Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers (6PE)
LISP	
IETF DRAFT	LISP Canonical Address Format (LCAF)
IETF DRAFT	Locator/ID Separation Protocol (LISP)
IETF DRAFT	Interworking LISP with IPv4 and IPv6
IETF DRAFT	LISP Map-Versioning
IETF DRAFT	LISP Map Server
IETF DRAFT	LISP for Multicast Environments

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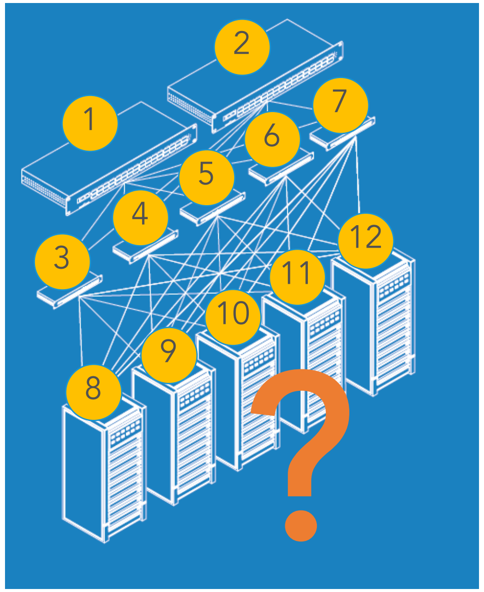
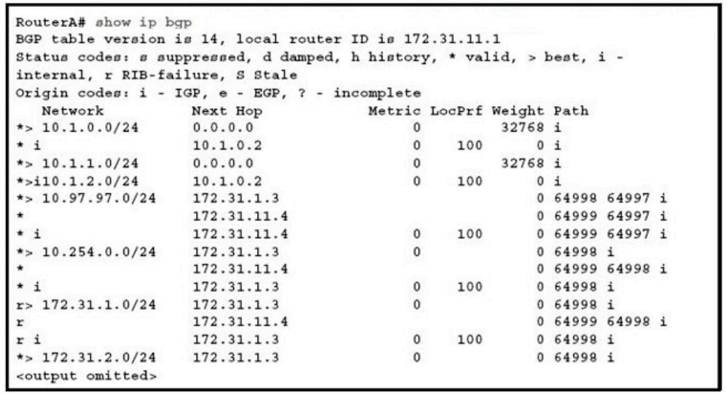
Troubleshooting is too time consuming



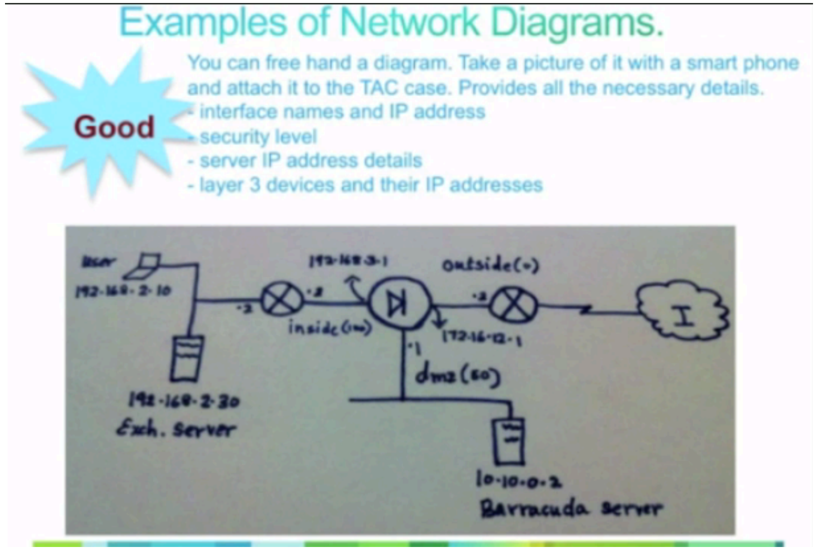
What and where is the problem?



```
RouterA# show ip bgp
BGP table version is 14, local router ID is 172.31.11.1
Status codes: s suppressed, d damped, h history, * valid, > best, i -
internal, r RIB-failure, S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete
   Network          Next Hop            Metric LocPrf Weight Path
*> 10.1.0.0/24      0.0.0.0                  0         32768 i
* i                 10.1.0.2                 0    100      0 i
*> 10.1.1.0/24      0.0.0.0                  0         32768 i
*>i10.1.2.0/24      10.1.0.2                 0    100      0 i
*> 10.97.97.0/24    172.31.1.3                             0 64998 64997 i
*                   172.31.11.4                            0 64999 64997 i
* i                 172.31.11.4              0    100      0 64999 64997 i
*> 10.254.0.0/24    172.31.1.3               0             0 64998 i
*                   172.31.11.4                            0 64999 64998 i
* i                 172.31.1.3               0    100      0 64998 i
r> 172.31.1.0/24    172.31.1.3               0             0 64998 i
r                   172.31.11.4                            0 64999 64998 i
r i                 172.31.1.3               0    100      0 64998 i
*> 172.31.2.0/24    172.31.1.3               0             0 64998 i
<output omitted>
```

Cannot reliably parse dozens of CLIs in a complex and changing network. Cannot see what matters.

Expert to Expert: Dos and Don'ts when sending data to your TAC engineer.



Examples of Network Diagrams.

Good

You can free hand a diagram. Take a picture of it with a smart phone and attach it to the TAC case. Provides all the necessary details.
- interface names and IP address
- security level
- server IP address details
- layer 3 devices and their IP addresses

Explaining to support.
Going through escalations.
Waiting on bug fixes.

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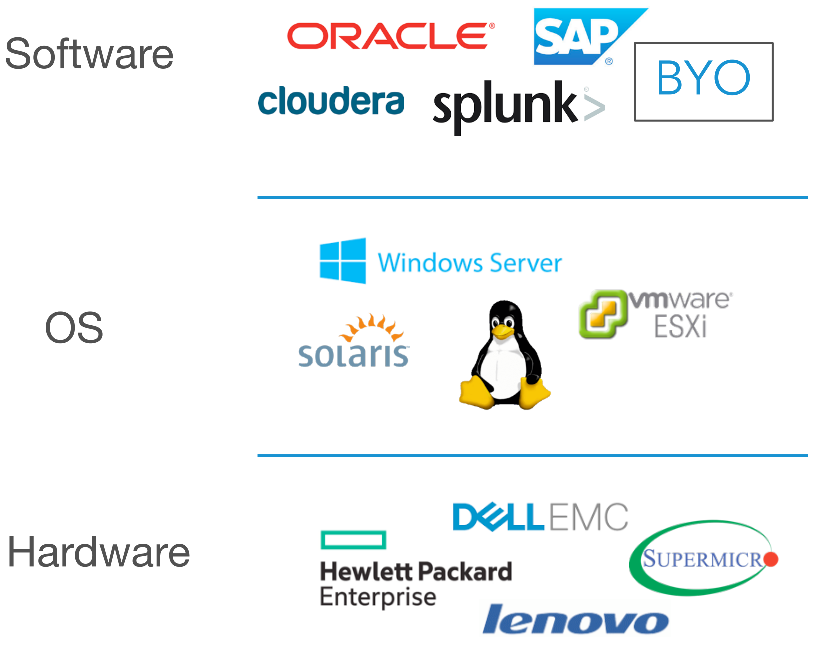
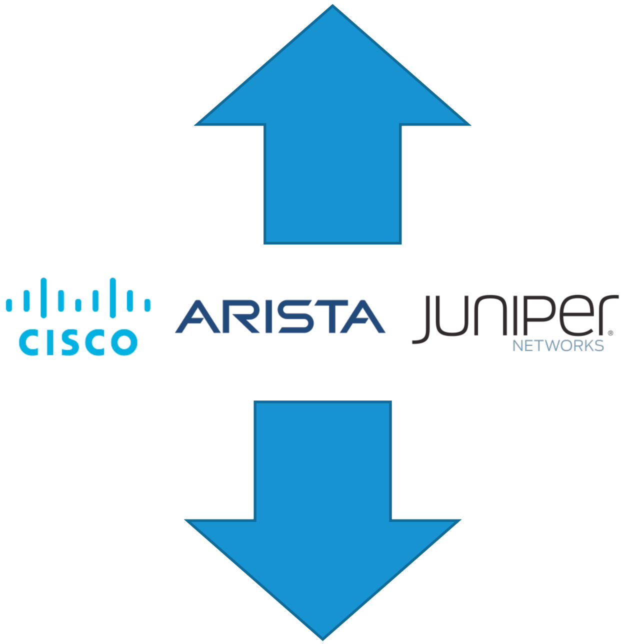
…and it’s all too proprietary


Software

OS

Hardware

Compute has an open and vibrant ecosystem



Networking is ruled by a few large and powerful players with closed systems

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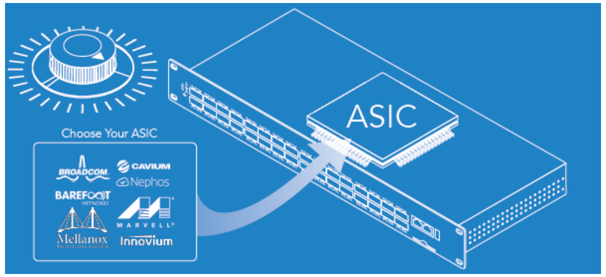
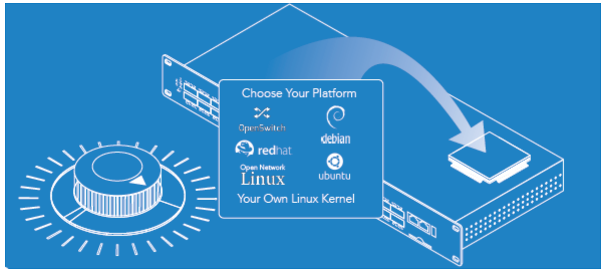
How hyperscalers solved these problems



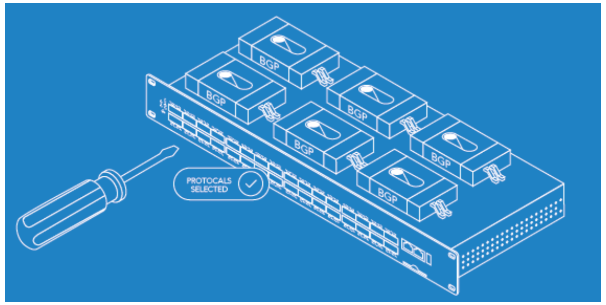
Created a broad ecosystem of merchant silicon & white-box hardware

Choice & Flexibility



Used standard Operating Systems

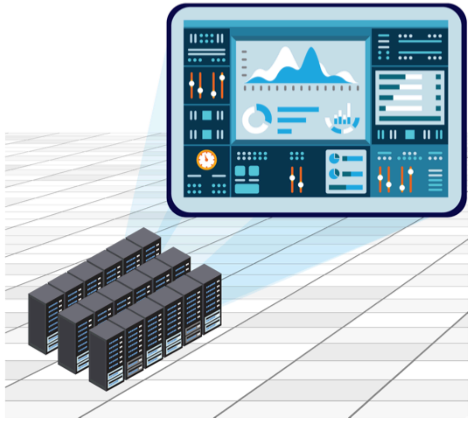
Proven, Open & Secure



Ran simplified protocol stacks tailor-fit to specific purposes

Reliable & Fast to Fix

All highly **automated** and **instrumented**



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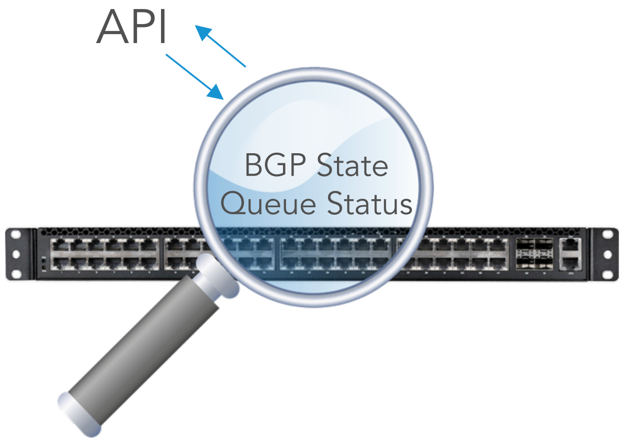
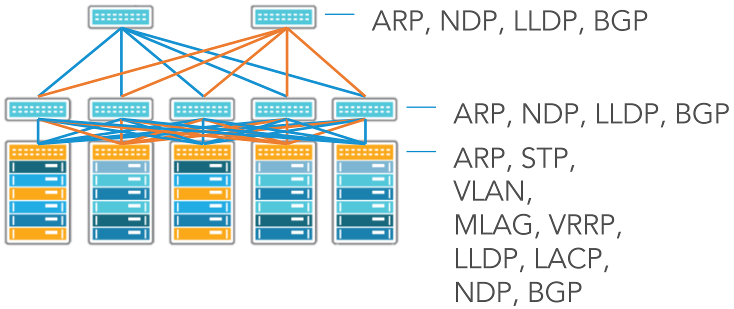
A BETTER APPROACH TO NETWORKING

FlexSwitch

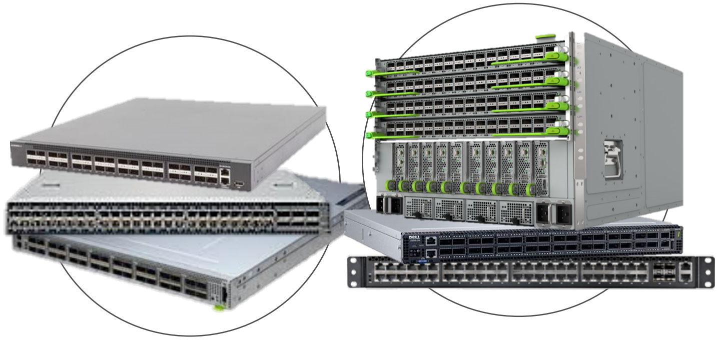
Guiding **SnapRoute** Principles



Deep, Programmatic Access
Automate & see everything
Simplify troubleshooting



Simplified Architectures
Install Only What's Needed
Simple, Stable, Reliable



Complete Choice & Control
Leverage White Box Agility & Economics

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Software was the missing link – so we built it

Software	ORACLE SAP cloudera splunk> BYO
OS	Windows Server solaris vmware ESXi
Hardware	DELL EMC Hewlett Packard Enterprise SUPERMICRO lenovo

Compute has an open and vibrant ecosystem

cisco ARISTA JUNIPER NETWORKS

Networking is ruled by a few large and powerful players with closed systems

?

redhat LINUX
ubuntu
debian
OPEN NETWORK LINUX
Open Switch

Edge-core NETWORKS
Celestica
DELL EMC
Agema

Disaggregation, enabled by white-box hardware, just needs the right software

snaproute

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Modern, modular, microservices architecture

- Reliability & Ease of Troubleshooting: Less code running on the switch. Fewer opportunities for bugs. Easier to diagnose and repair.

- Fault Tolerance: User space daemons do not crash the entire switch

- Rapid Development: API-defined interactions between microservices reduce dependencies and allow for independent module development paths.

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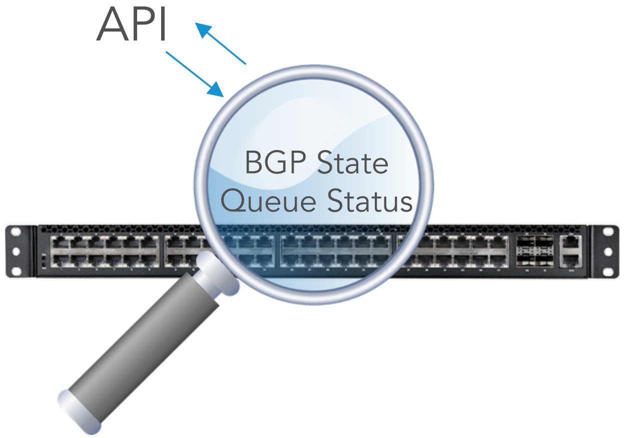
The SnapRoute Network

FlexSwitch APIs



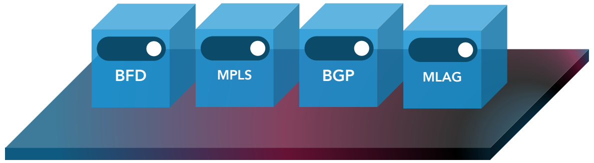
Deep, Programmatic Access

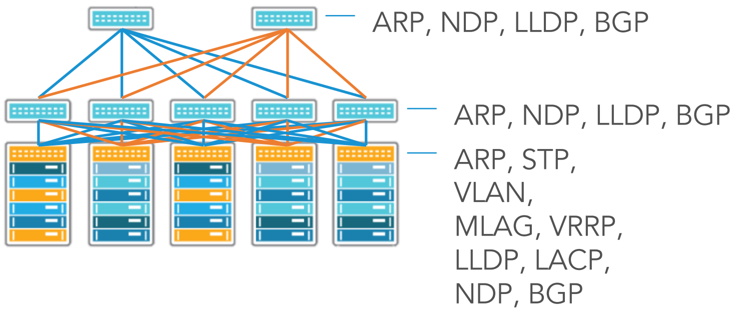
Automate everything

Simplify troubleshooting

Configure, Monitor, and Troubleshoot through automation. Manage a network, not multiple individual devices.

FlexSwitch NOS



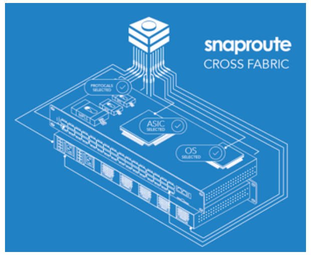


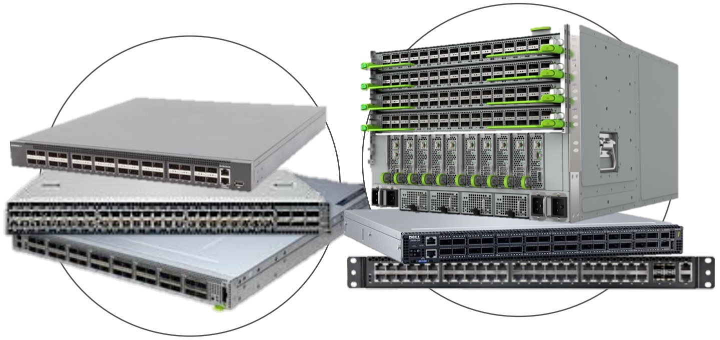
Install Only What's Needed

Simple, Stable, Reliable

We run exactly what is needed for each specific point in the network. Nothing more. Increases reliability and simplifies troubleshooting.

CrossFabric





Any ASIC, Any Switch, Any OS

Complete Choice & Control

Leverage White Box Economics

Incumbent switch hardware cannot or does not provide access, control, and visibility mechanisms we need. So we built on top of white-box.

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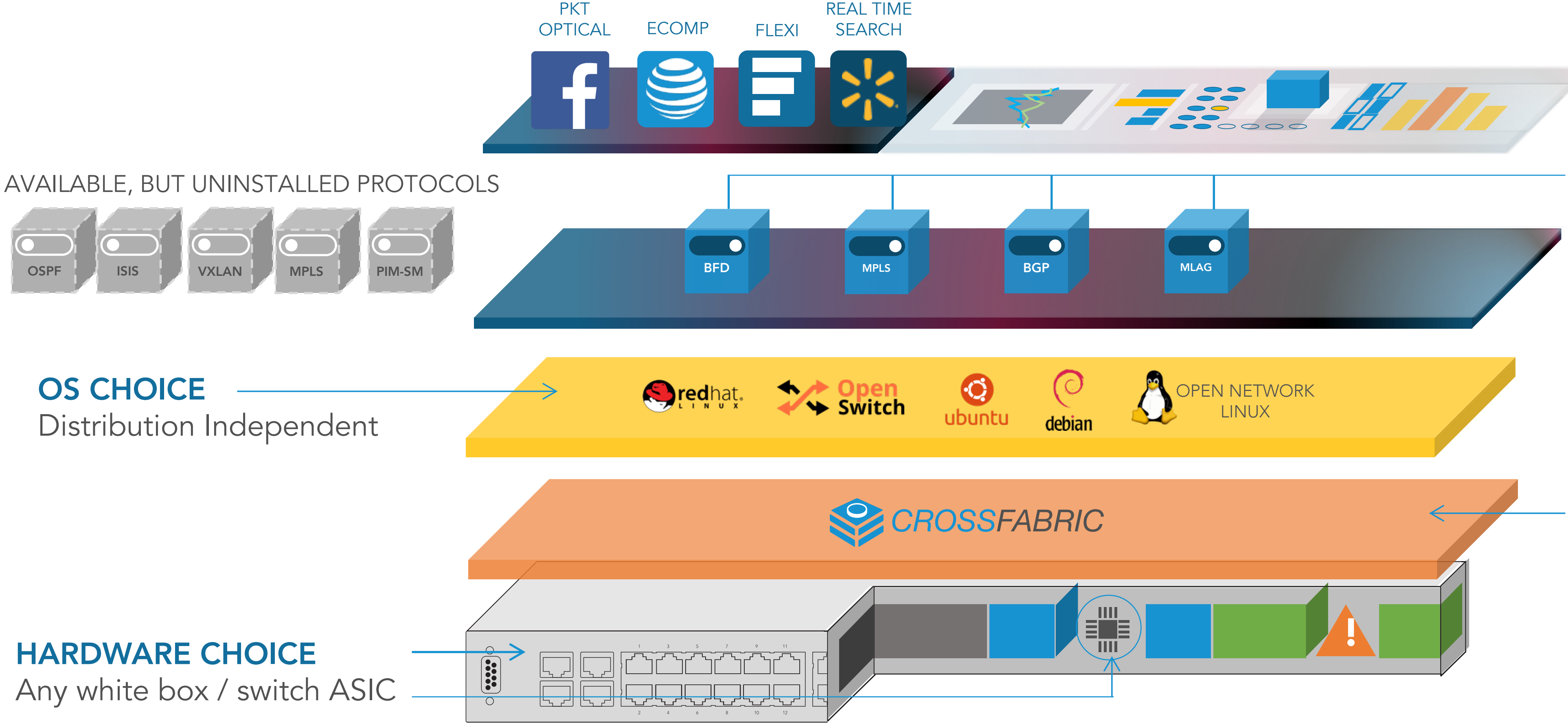
The FlexSwitch Stack

ONBOARD NETWORK APPLICATIONS
Open platform to drive specific business needs

BUILT FOR AUTOMATION
CLI, API, JSON, DEVOPS

COMPLETE ACCESS & VISIBILITY
Down to the Silicon



MODULAR PROTOCOLS
Independent microservices: install and run only what's needed at each node

OS CHOICE
Distribution Independent

COMPLETE ABSTRACTION
Platform, ASIC, Optics

HARDWARE CHOICE
Any white box / switch ASIC

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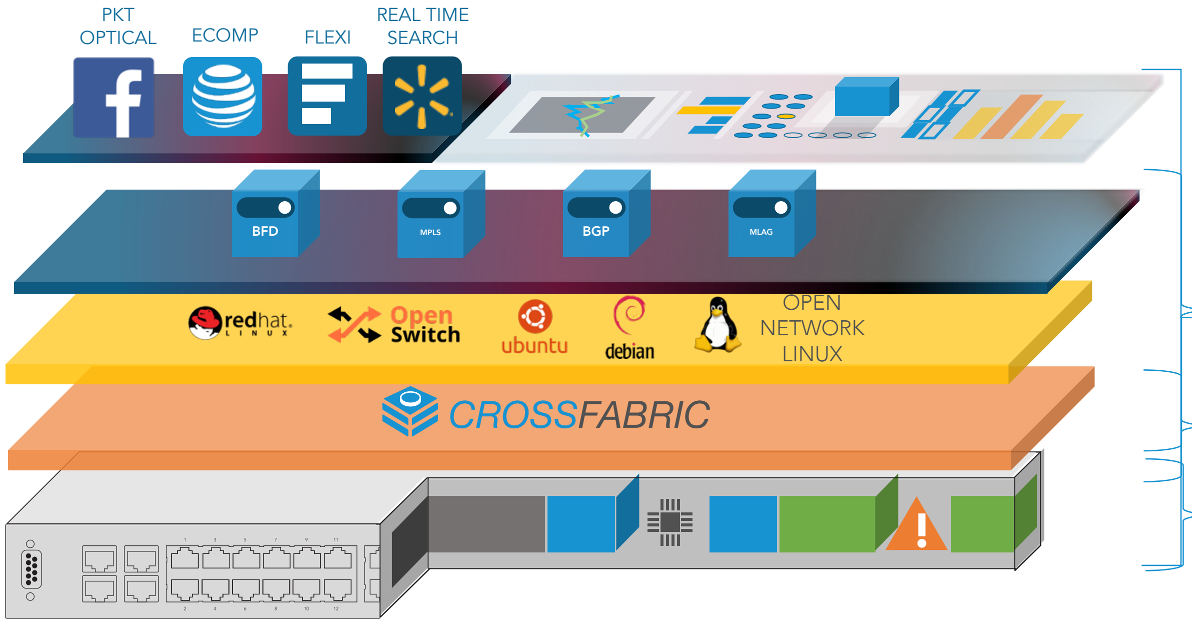
FlexSwitch Foundation

Leverages Proven Technologies



FlexSwitch core and protocol stacks written in Go. Built for high concurrency (Google web servers). Requires fewer lines of code.

Communication between FlexSwitch modules is via nanomsg. Fast and scalable.

Memory [illegible] database [illegible] development. Switch configuration, state, and RIB leverage Redis.

Modern switches have powerful, multi-core CPUs. Go & Thrift take full advantage without custom RPC code.

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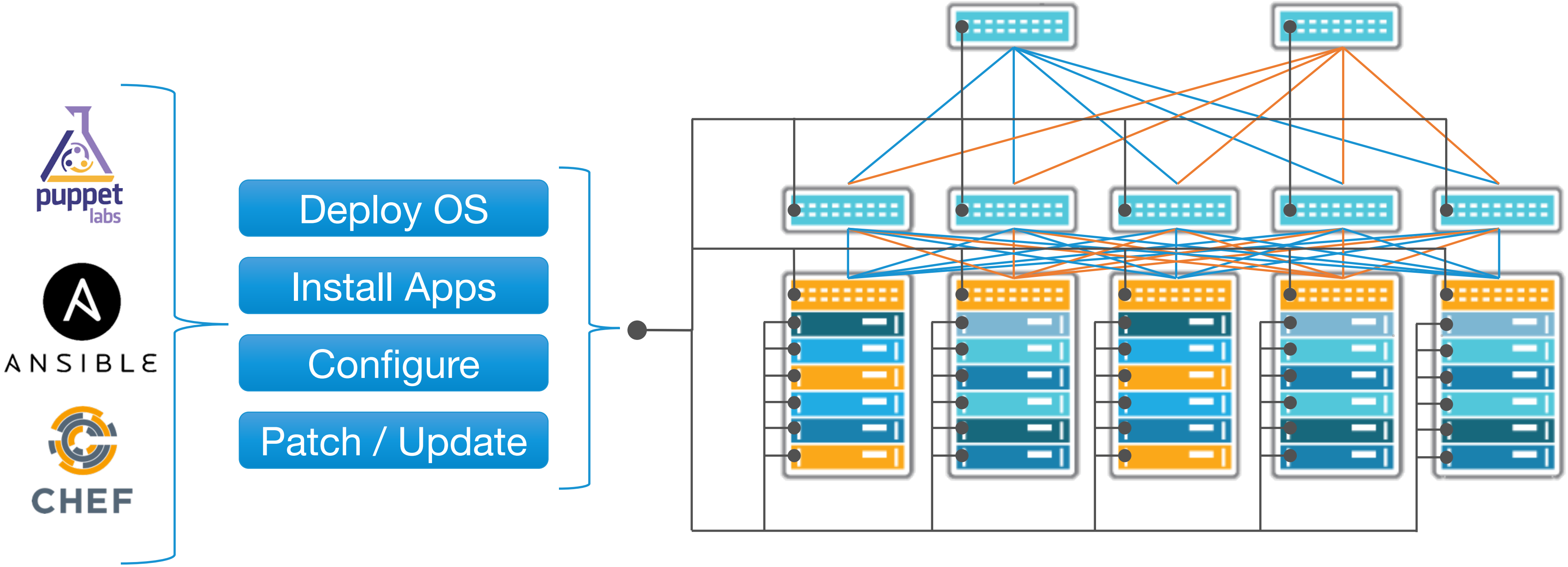
Leverage modern data center automation

Configure, manage, and monitor at scale, just like servers



Deploy OS

Install Apps

Configure

Patch / Update

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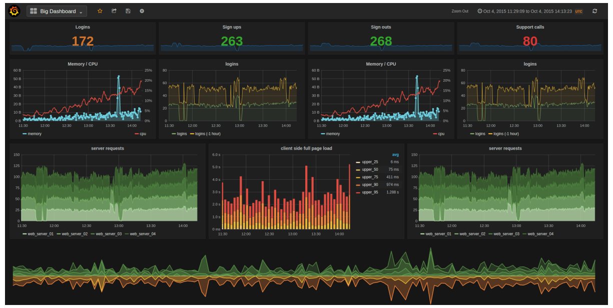
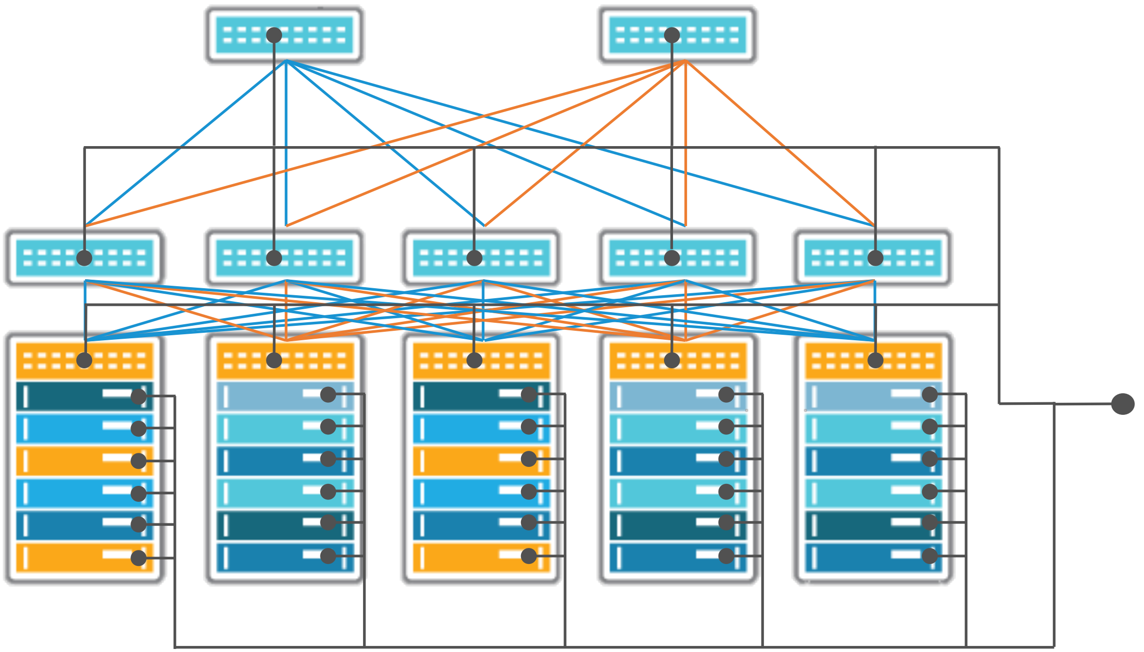
Leverage modern data center automation

Configure, manage, and monitor at scale, just like servers





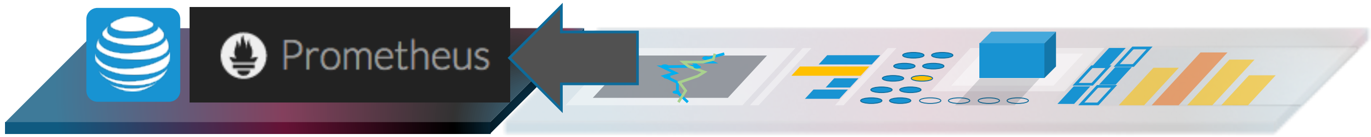
- Publish
- Analyze
- Correlate
- Visualize

Grafana

influxdata

Prometheus

ECOMP



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Thank you.

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