Automating Cloud Networking with RedHat OpenStack

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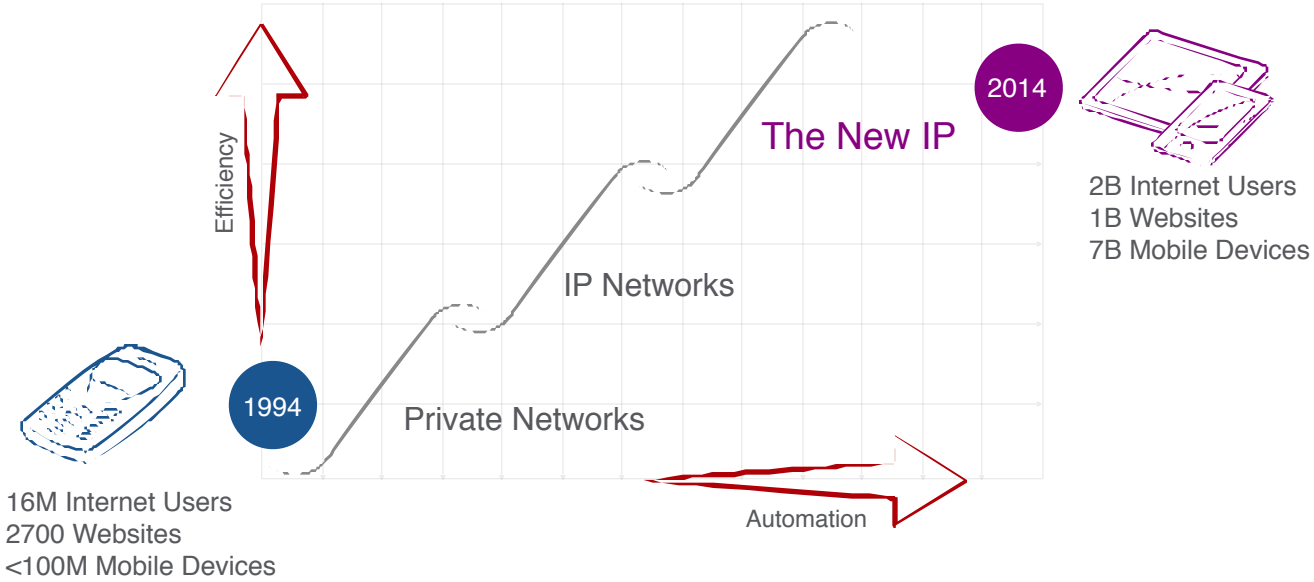
The New IP

The Foundation for the Digital Business



1/3rd of the world's population is connected to the internet

Can your Old IP handle a New IP world?

Our industry runs on 20 year innovation cycles, and we are on the forefront of the next wave, now is the time to embrace the new IP in order to improve business agility

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A Brief History of Networking

Intelligent Industry Solutions

3rd Platform

Mobile Broadband · Big Data/Analytics

Social · Cloud Services

Mobile Devices & Apps

2nd Platform

LAN/Internet · Client/Server

PC

1st Platform

Mainframe · Terminal

	Scale	Architecture	Compute	Network
3rd Platform	Billions/ Trillions	Open Virtualized SW-defined	Mobile Cloud-based	"The NEW IP" = Network for the 3rd platform
2nd Platform	Millions	Proprietary Standards-influenced HW-driven	Client/Server PCs	IP, LAN/WAN
1st Platform	Thousands	Closed Highly proprietary	Mainframe Systems	Systems Network Architecture (SNA)

SOURCES: IDC

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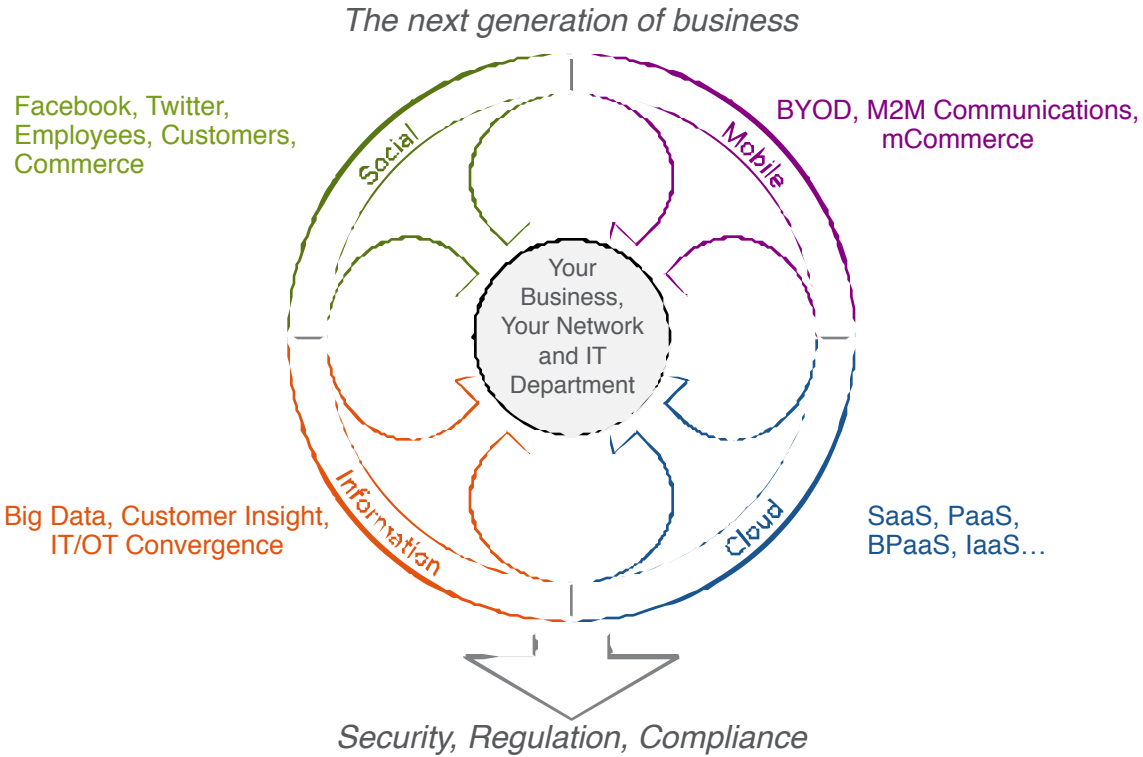
A new generation of Apps

Due to the rise of Social, Mobile, Cloud, Big Data, and Consumerization of IT



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Cloud Apps are changing Data Center Networking

- Cloud Native Apps comprised of many services (Microservices)
  - High rate of change
  - Ephemeral configurations
- Microservices need to networked
  - Scale out architecture
  - Network virtualization

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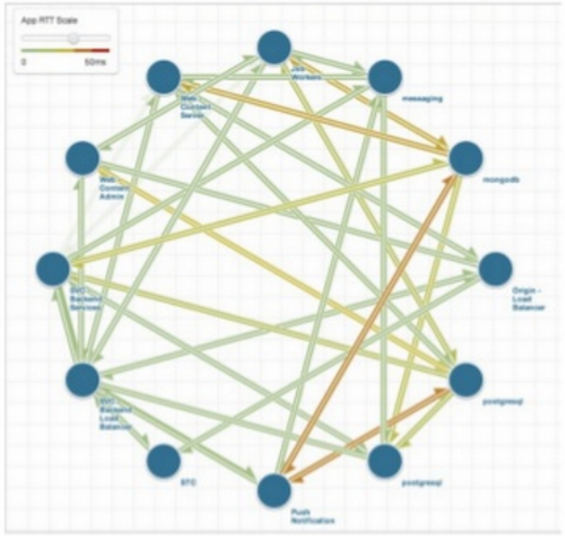
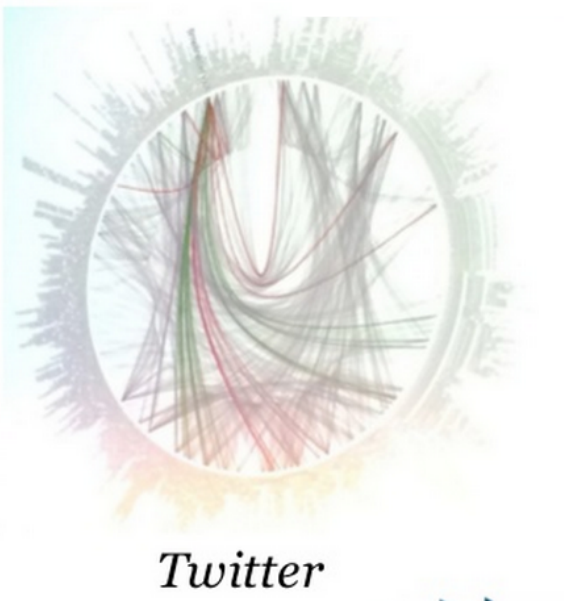
Microservices

Netflix



Gilt Groupe (12 of 450)



Twitter

From: http://www.slideshare.net/adriancockcroft/goto-berlin

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Characteristics of Cloud Applications

Traffic Patterns

- East-West traffic, server to server

Scale

- Millions to billions of endpoints

Agility

- Infrastructure, workloads, and endpoints powered-up and on-boarded in hours

Open & Flexible

- Open platform, open design, open architecture to run different applications on same infra

Resilience

- Cattle not Pets

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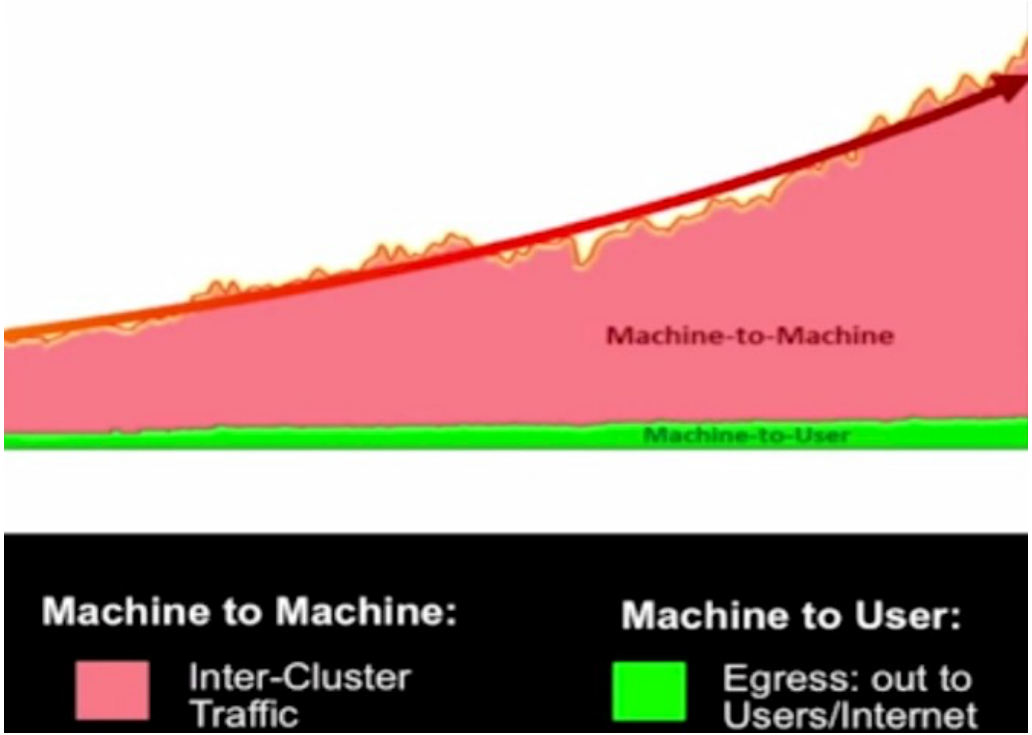
Learning from Hyper-Scale adopters



facebook

Source: http://www.enterprisetech.com/2014/11/18/facebook-gives-lessons-network-datacenter-design/

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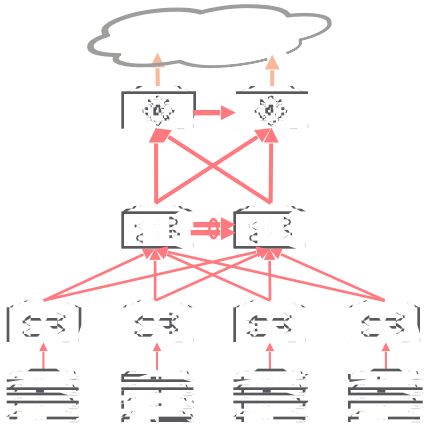
Traditional networks fall short…

Traditional



3-Tier Hierarchical

North to South

- Rigid architecture, north-south optimized
- Inefficient link utilization
- Individually managed switches, complex
- Scale-up
- VM-ignorant

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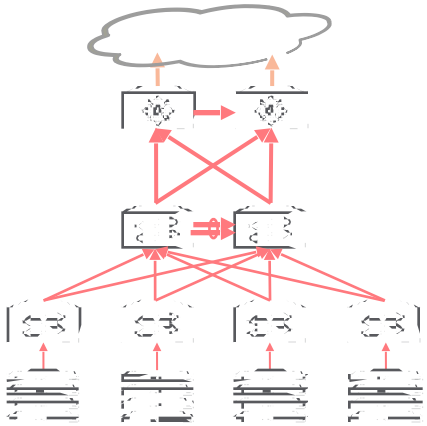
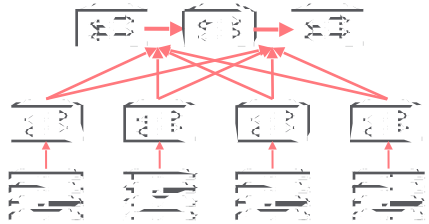
New architectures stepping up…

Traditional



3-Tier Hierarchical

L2 Fabrics - Driven by Virtualization



- Topology freedom, east-west optimized
- Fabric managed as one logical switch
- Scale-out
- VM-aware

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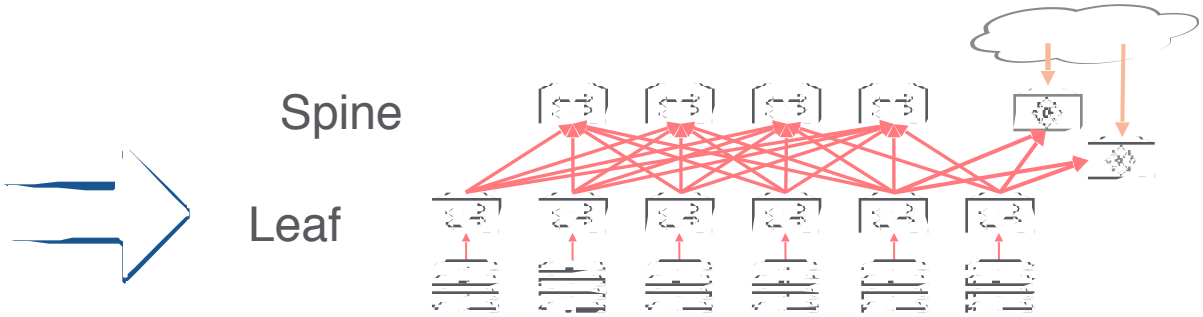
Driven by Cloud

IP Fabrics



L3 CLOS

- Cloud has brought scale far greater than virtualization
- Automation has moved from CLI and scripts to programmatic interfaces, tool chains, policy and controllers
- Multi-tenancy has gone from VLANs and VRFs to micro segmentation and virtual networks
- Mind share has moved from vendors to user community.

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Clos Architecture 101

Invented by Charles Clos in 1953

How to build large telephony networks without building large telephony switches

A Clos Architecture is made up of network switch elements bearing the designations “spine” and “leaf” that identify the place in the network or “PIN” as well as the function of the device and requirements, i.e. features, performance.

http://en.wikipedia.org/wiki/Clos_network

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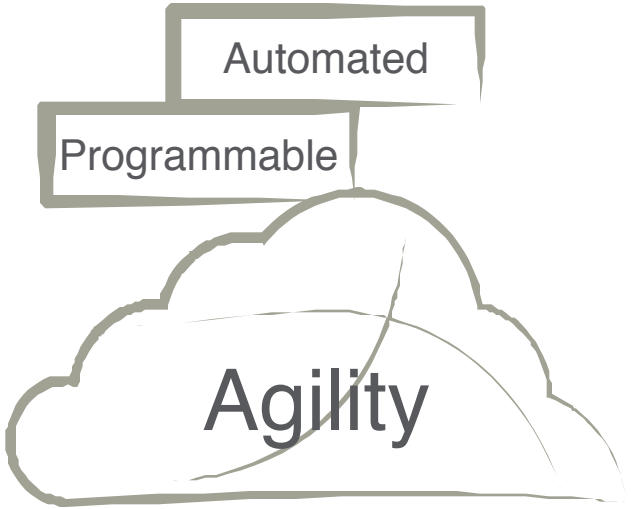
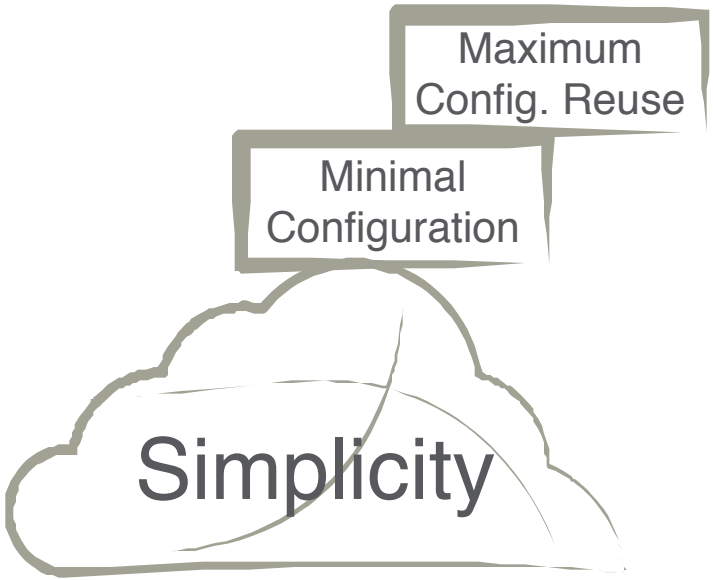
The Zen of Cloud Networking





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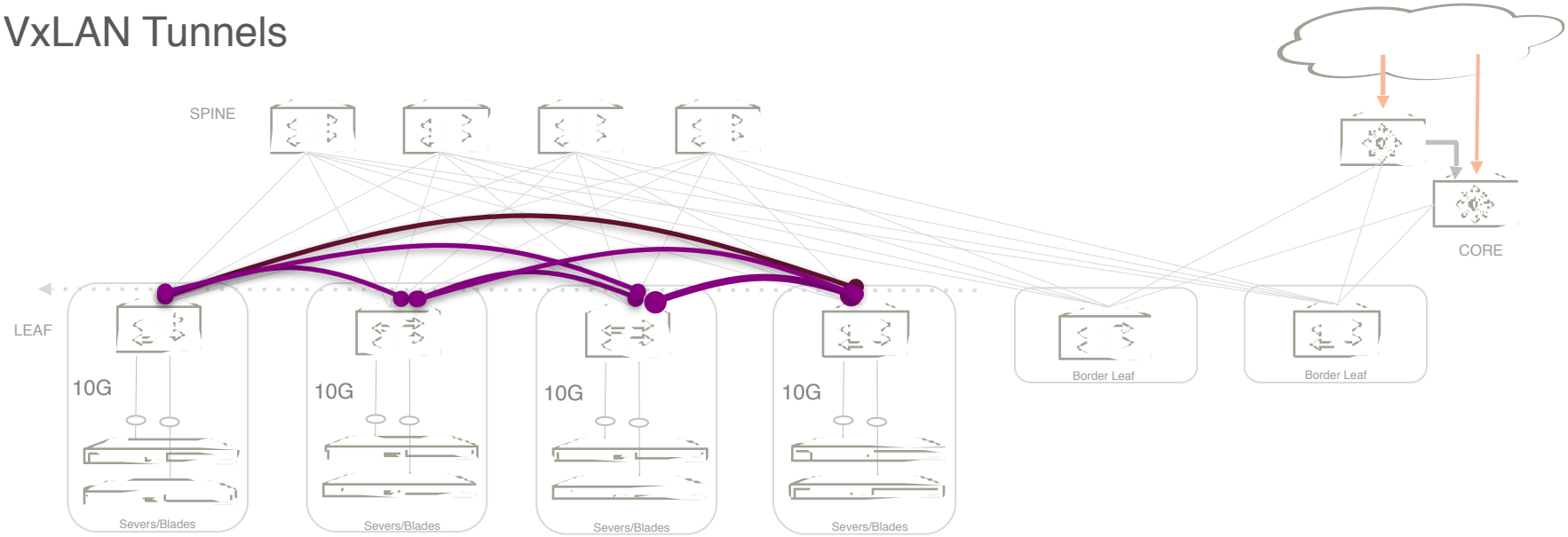
L2 Overlay – Offloading tunnels to TORS

VxLAN Tunnels



- Same IP Subnet across Leafs
- VxLAN Tunnels carry L2 traffic between Leaf
- Full Mesh of VxLAN tunnels between Leaf's

- Controller-based or controller-less architecture

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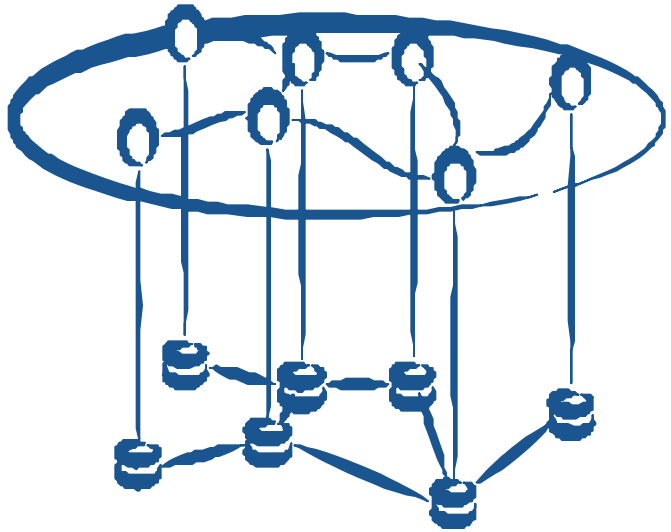
Benefits of the new Cloud Networking architecture

- VM migration domain
  - Legacy layer 2 to overlay virtual technologies
- Scalability
  - Decouple underlay and overlay network technology
- Resilience
  - On-demand overlay
- Automation
  - OpenStack, SDN Controller-based, Netconf, Python



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Video Demo
Auto-provisioning of IP Fabric & L2 extension with OpenStack

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Questions

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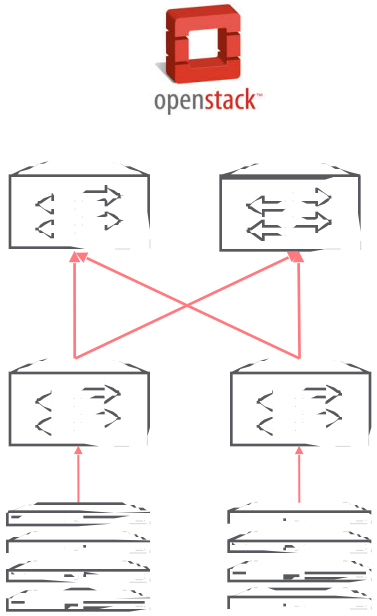
Demo Setup



- Basic Spine-leaf topology
- Orchestration using OpenStack
  - IP Fabric underlay
  - VxLAN tunneling on TORS

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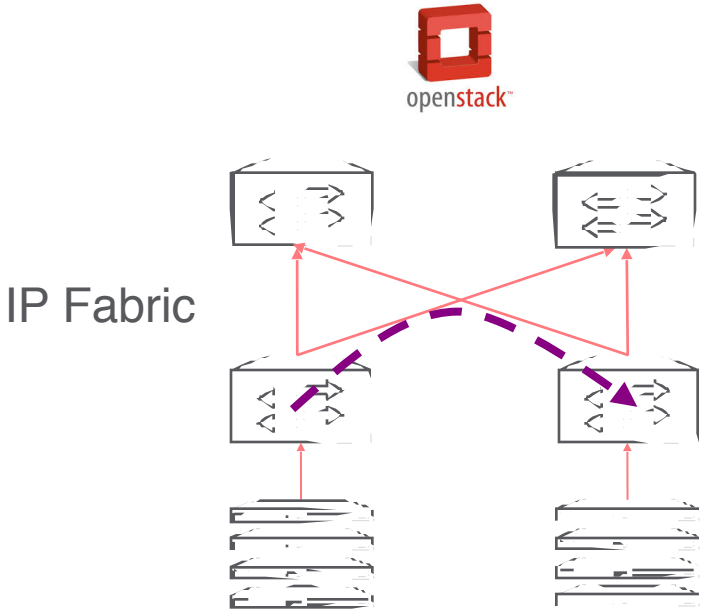
Offloading VxLAN tunneling on TORS



- VXLAN Tunnels between TOR
- Hardware based VXLAN Encapsulation
- Openstack Integration
  - Setup/Dismantling of tunnels
  - VNI(VLAN) mapping

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Demo

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Conclusion

- Automation of Underlay Network
  - Discovery of Spine Leaf Topology
  - Provisioning of links & BGP
- Automation of Overlay Network
  - Setup and cleanup of tunnels based on VM Lifecycles across Racks
  - VM traffic transiting through Spine Leaf topology.
- L3 ECMP

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