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The Key to Vendor Agnostic SDN/OpenFlow TTP

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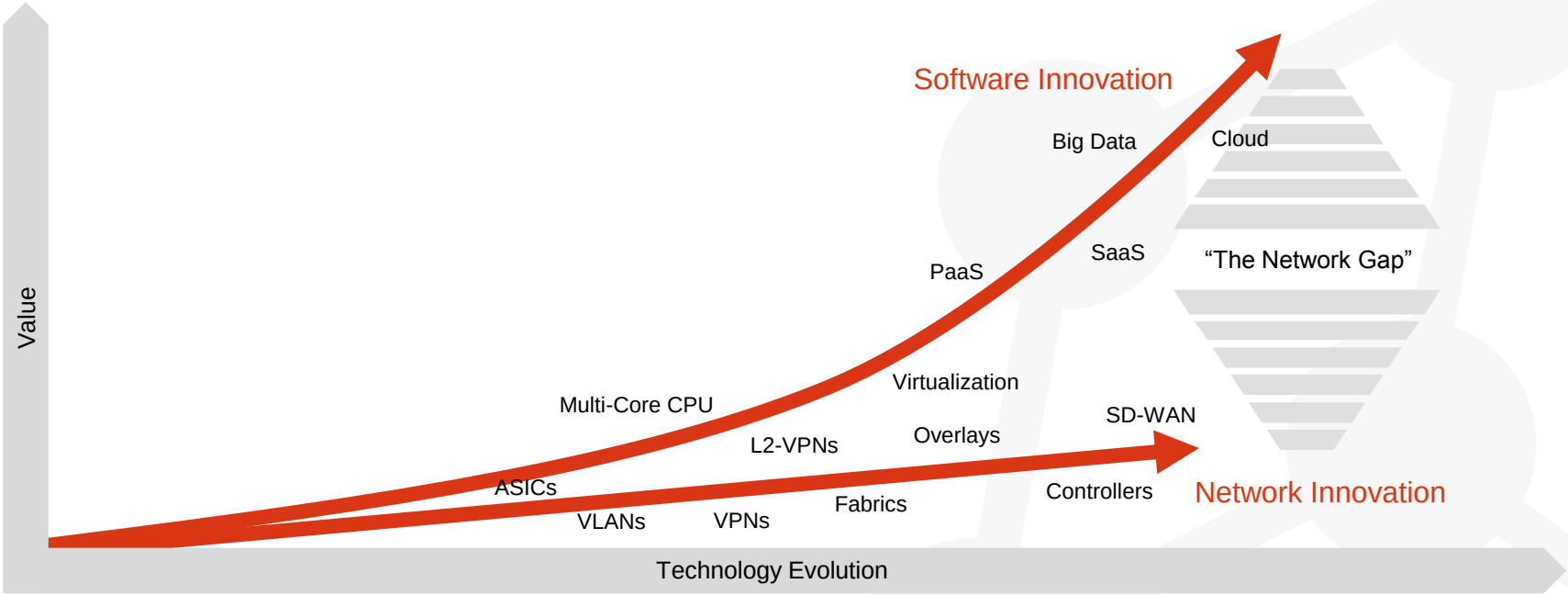
Is Networking a Single Vendor Play?

ORCHESTRATION	Controller	Openstack	Tivoli	Tail-f				
MANAGEMENT/ AUTOMATION	Chef	Puppet	EMS	API				
CONTROL PLANE	STP/TRILL	OSPF	ISIS	BGP	VPN	PCEP		
DATA PLANE	L2	IPv4/v6	MPLS	Overlays	WAN	Traffic Engineering	QoS	Security
ASICs	Custom	Broadcom	Cavium	Mellanox	Marvell	Barefoot		

The Network GAP



Three Reasons For The Network Gap

1. Closed Systems

2. Protocol Overload

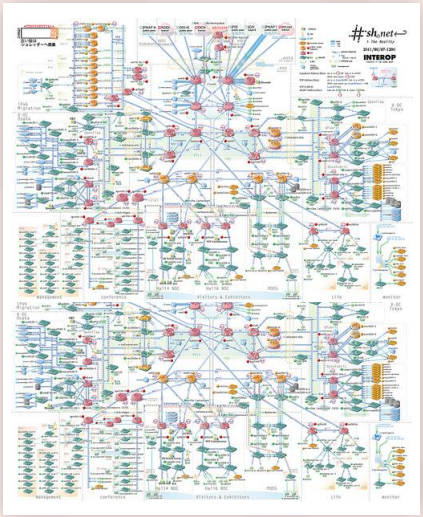
BGP, OSPF, QinQ, IS-IS

OpenFLow

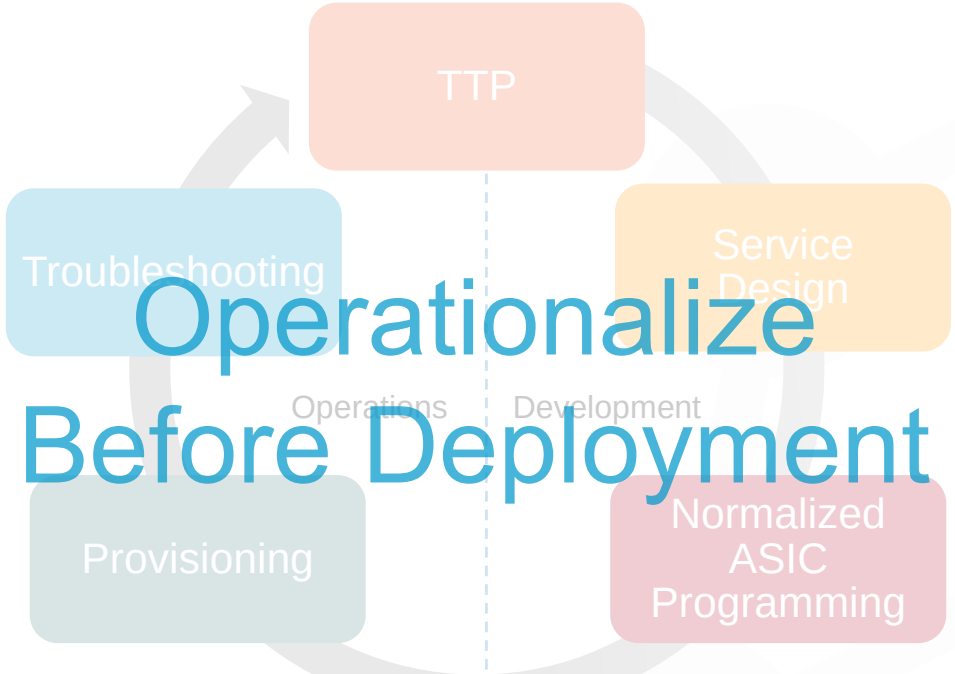
OVS, OVSDB

DevOps, CLI, SysAdmin

3. Inertia



TTP Closes Network Innovation Gap



TTP Profiles Can Be Deployed In..

Open Networking

NOS
ASIC
Metal

- ✓ Any network locale
- ✓ Incumbent alternative
- ✓ ASIC choice
- ✓ Normalized network services
- ✓ Open shim layer

Data Center Networks

Scale-out spine and leaf

- ✓ Standard L2/L3
- ✓ Scale out
- ✓ Automation-heavy
- ✓ Programmability with DevOps tools

Overlays

Network Virtualization

- ✓ VTEP support
- ✓ Multi-tenant clouds
- ✓ Data center interconnect
- ✓ Disaster recovery

SDN Solutions

SDN App Store

VPN | Traffic Eng. | Tap

- ✓ Custom solutions
- ✓ Ecosystem and controller integration
- ✓ OEM customers
- ✓ OpenFlow with L2/L3

PICOS

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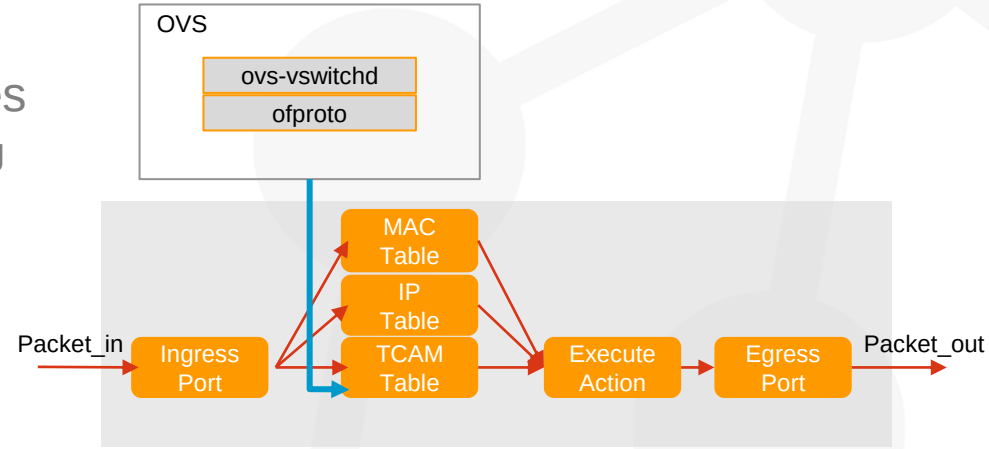
TTP Enables SDN

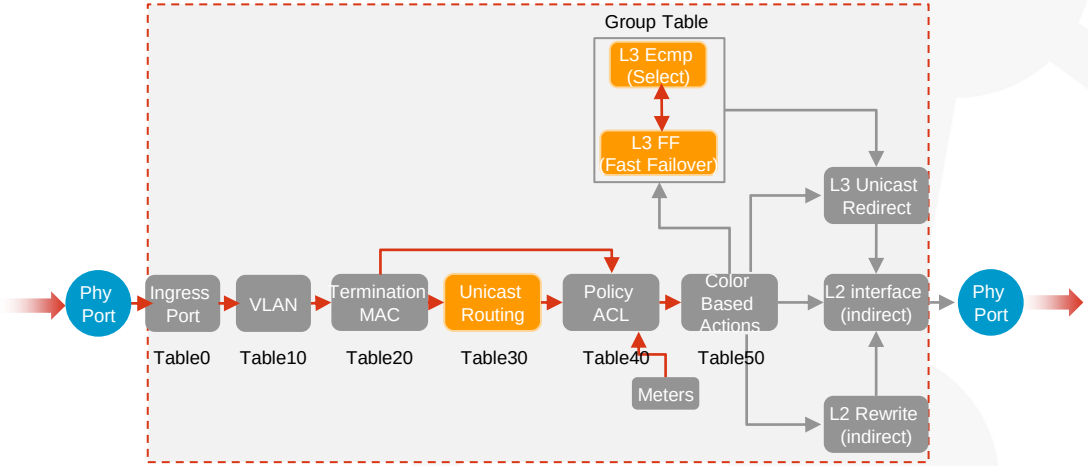
Current Implementations

- Underutilization of ASIC capabilities
  - OVS programs the TCAM tables
- Underuse of Openflow capabilities
  - Exposing the MAC/IP tables assuming a fixed pipeline
- Only priority based lookups
  - Features such as group-tables implemented in TCAM
- Results in an expensive solution
  - Scale restricted to TCAM size

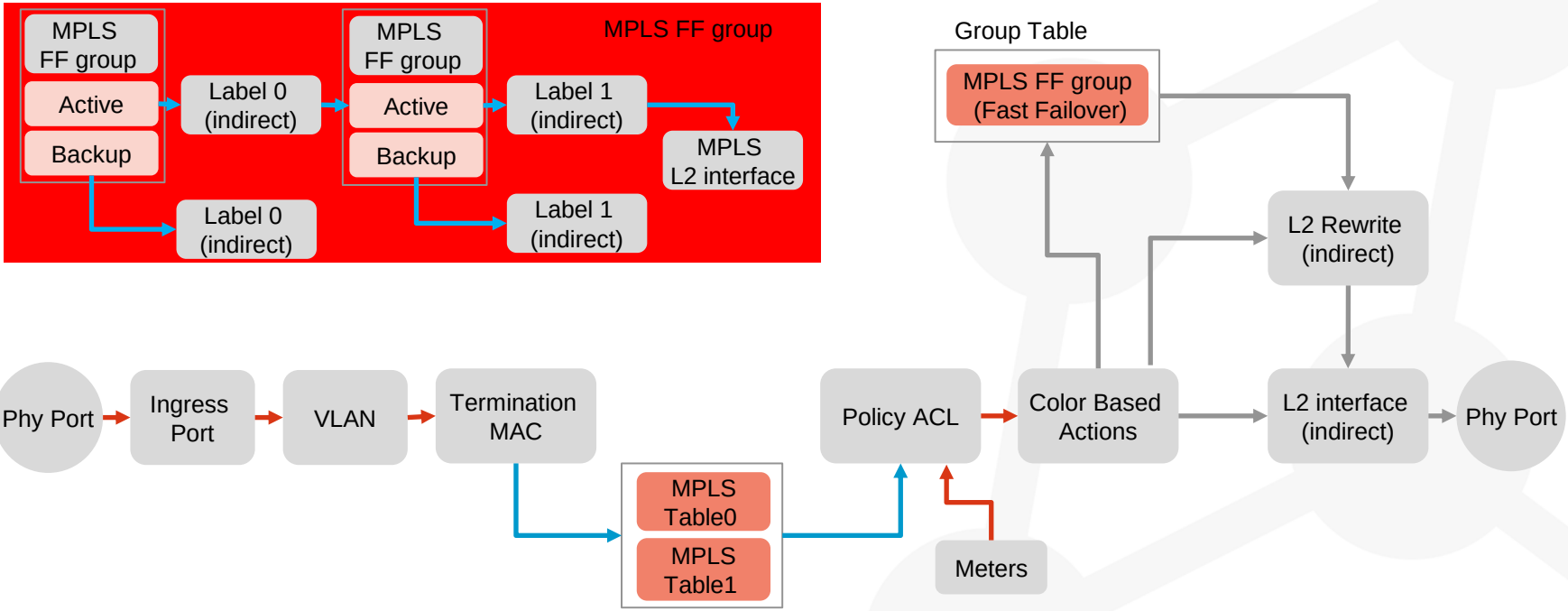


TTP: Unicast Routing Pipeline

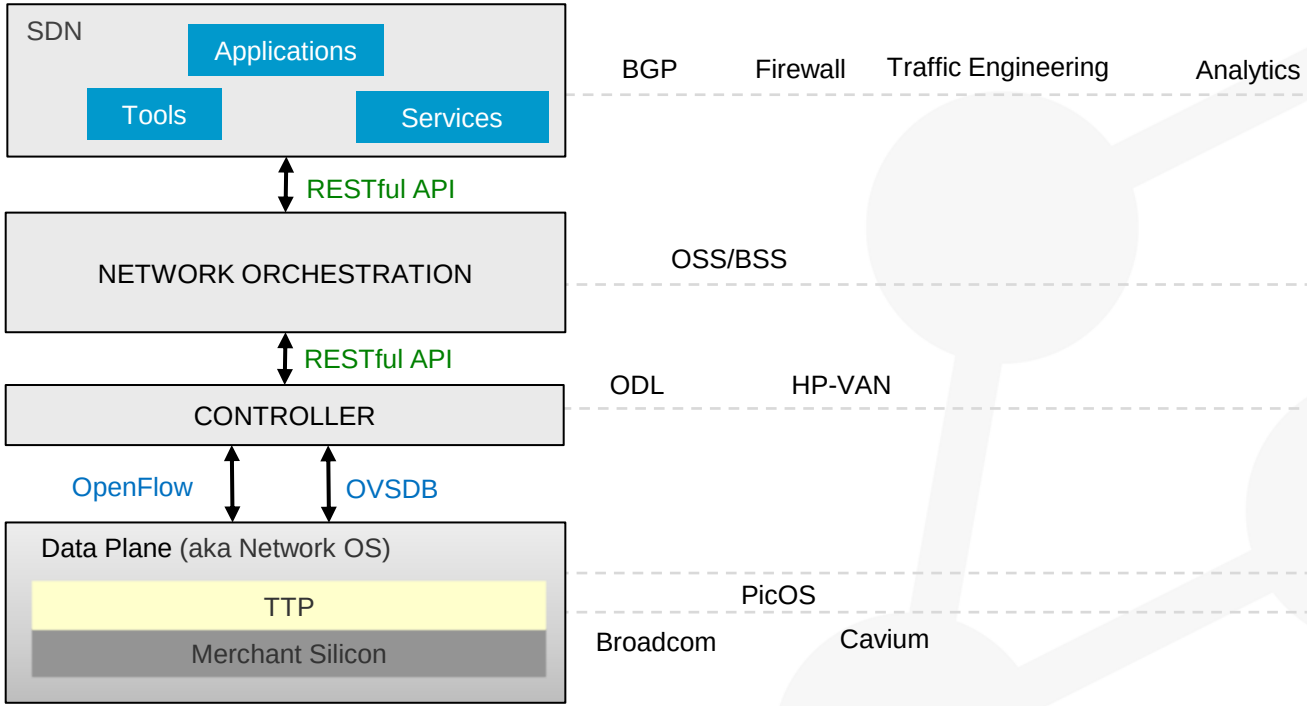
- Utilize all ASIC tables (VLAN+MAC+IP+TCAM) via Openflow
- Enables flexible pipelines
  - Choose between priority or LPM algorithms for lookups
- Scale comparable to incumbent routers/switches



TTP: VPLS Pipeline



Stacking It Together



Benefits Realized

Feature	Improvement	Grading
Scale	1000x (upto 2M) over single table implementation (2k)	Comparable to incumbent equipment
Performance	Line-rate	Comparable to incumbent equipment
Security	Linux security tools	Needs work
Interoperability	Support for traditional pipelines and enhancements dynamically	Works across multiple ASIC pipelines
Simplicity	Onboarding SDN applications on production environments	Better than incumbent equipment

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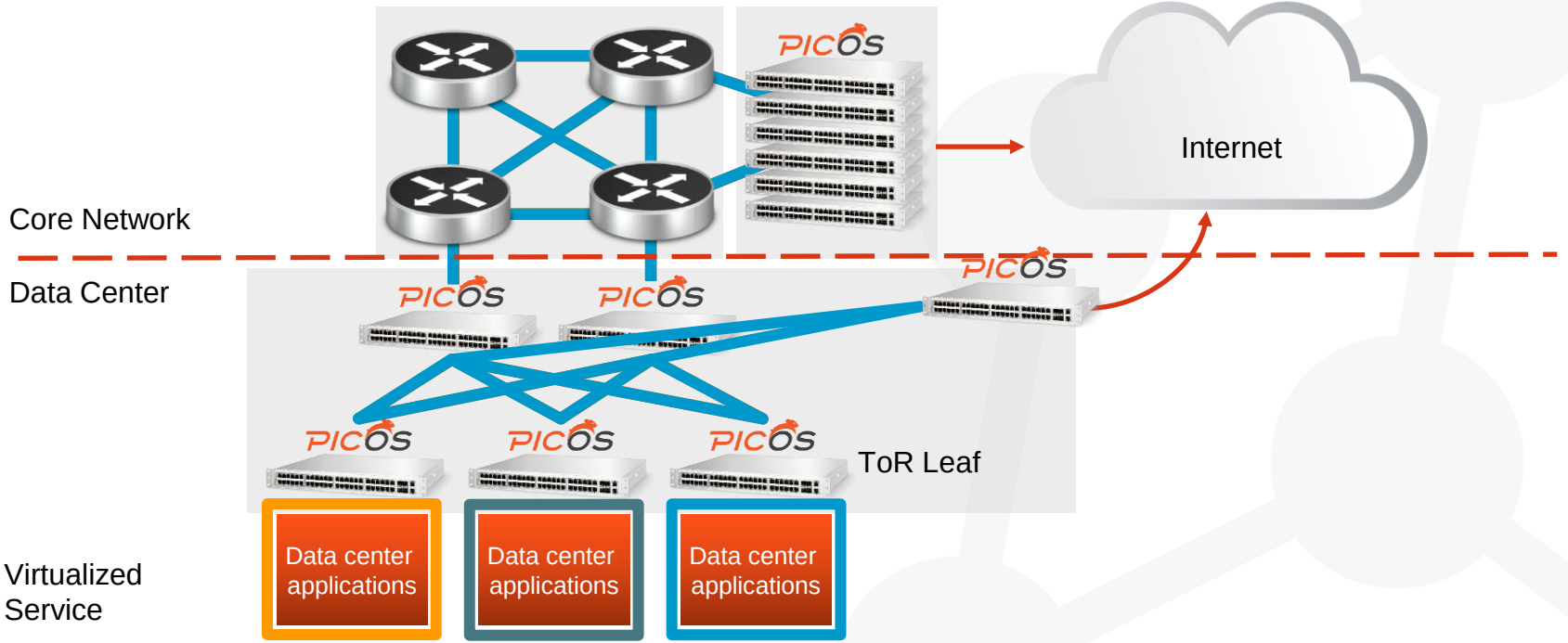
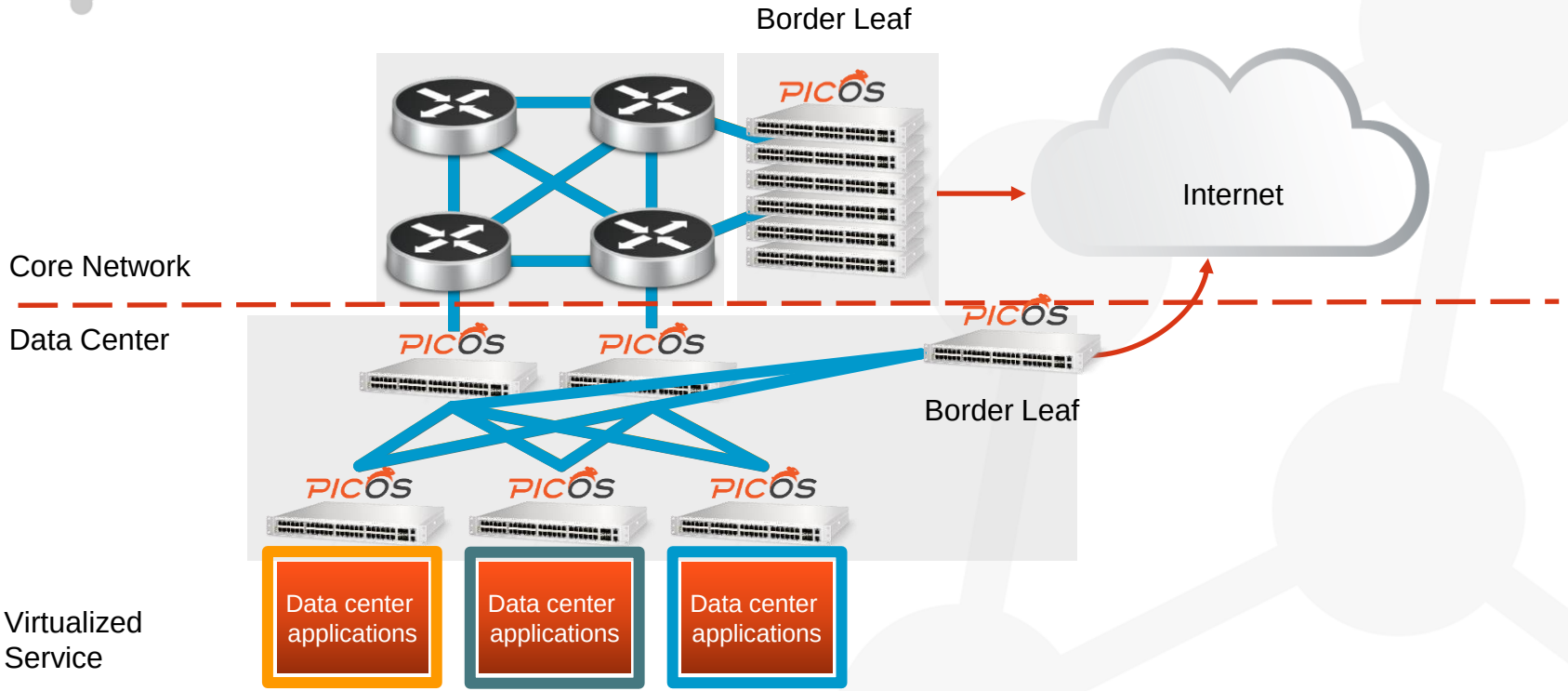
Case Studies

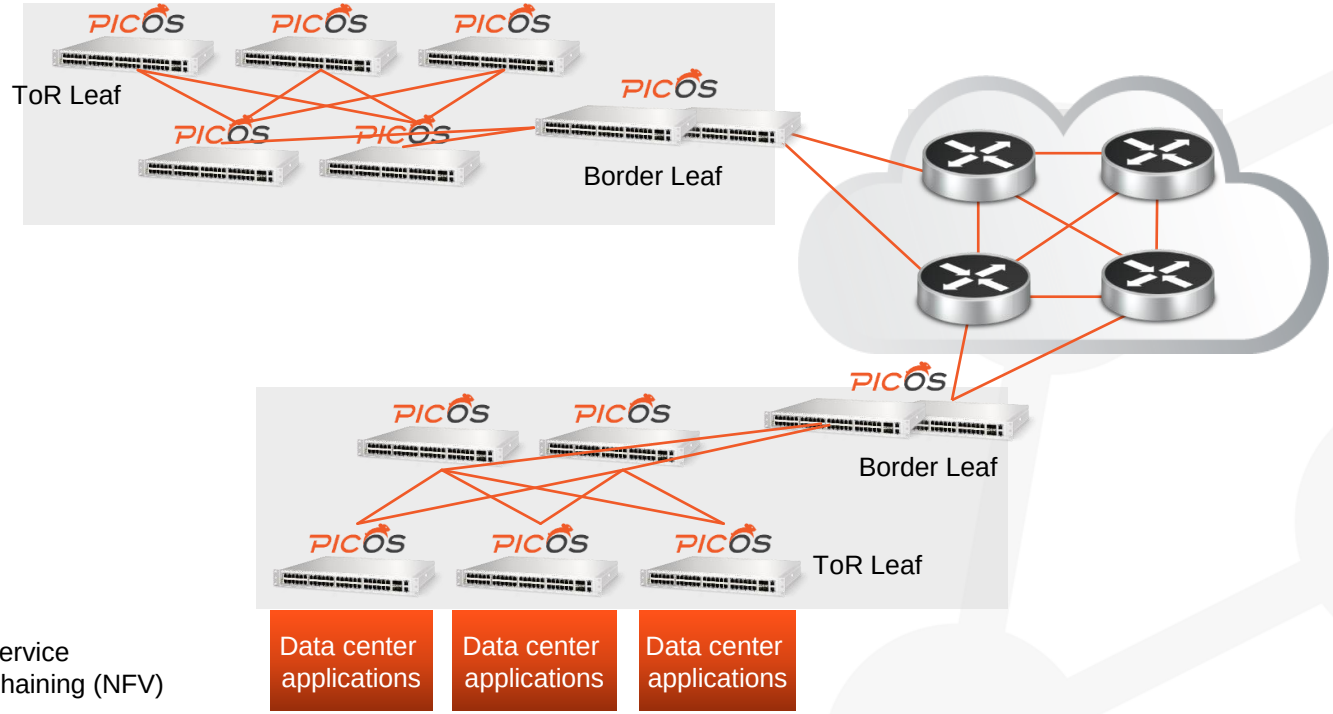
Case 1: Routing-a-a-s TOR (Leaf) TTP



Case 2: WAN Service Border Leaf TTP

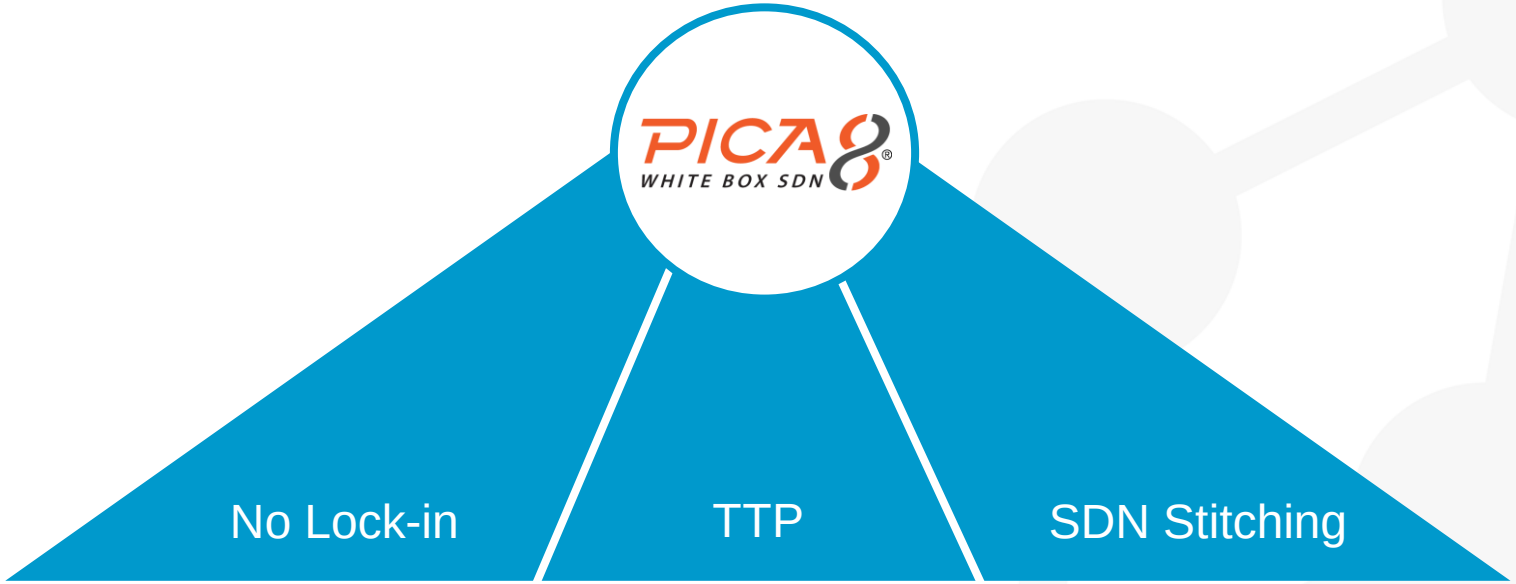


Case 3: Overlay/ WAN Service On-demand



Service Chaining (NFV)

Networking “Made to Order”



“When standard networking can’t get the job done, TTP delivers the flexibility and control to get you there”

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Thank You

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