Cisco Catalyst 6500
Roadmap Update

Samuel Pasquier – Product Manager

TL9000

NOTE:
Forward Looking Statements

This presentation contains projections and other forward-looking statements regarding future product vision, strategies and roadmaps.

These projections or statements are reflective of the current plan of record (as of February 2012) and should be treated as such. Actual events or results may differ materially from those in the projections or forward-looking statements.

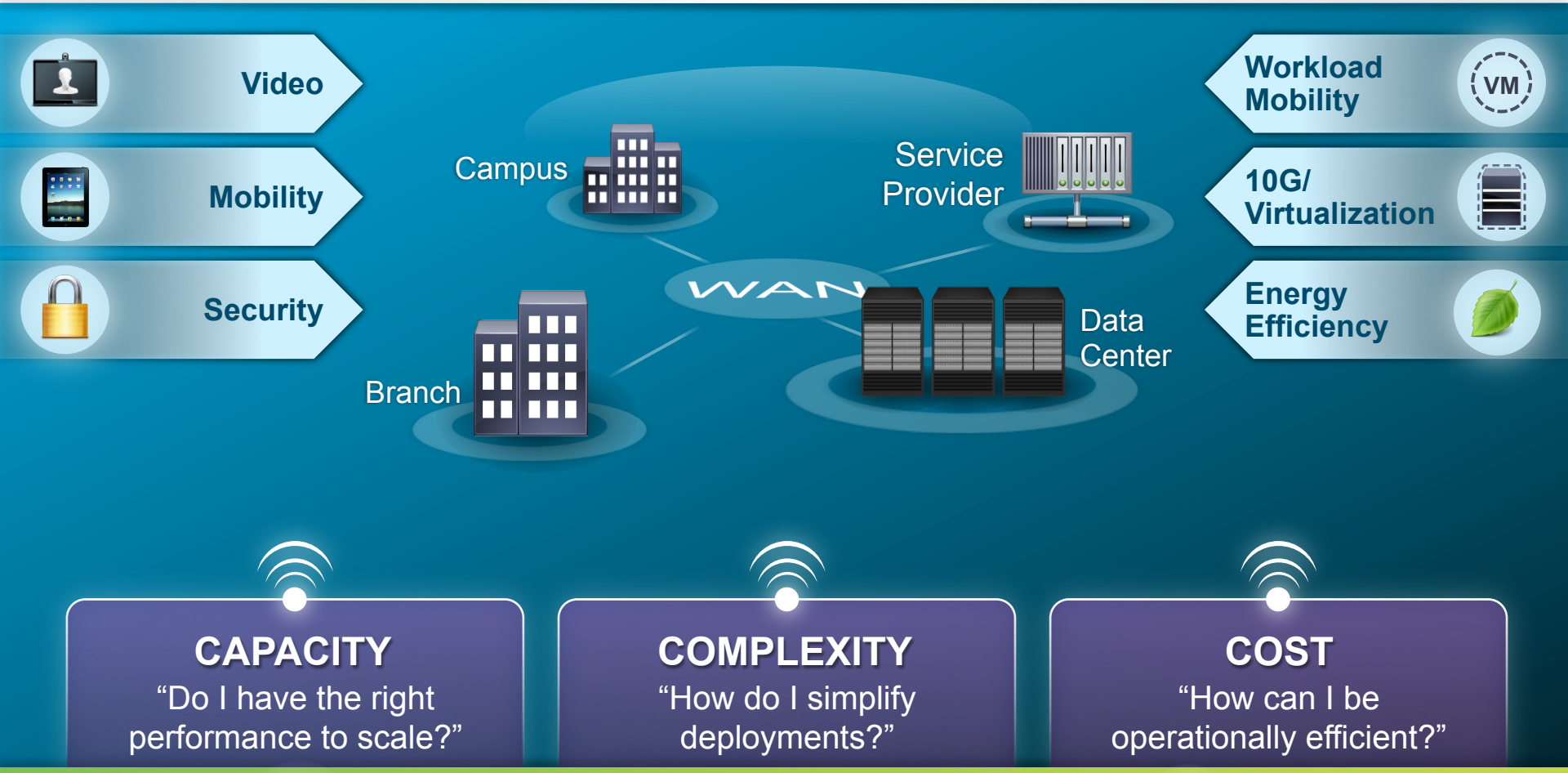
Please check with Cisco Account representatives for changes in the plan of record before making any business decisions.

All specifications subject to change without notice

Agenda

- The three “C”s and Network Core Considerations
- Catalyst 6500 Strategy to address Network Core
- The “2T” Product Family
- Foundation Services to address customer challenges
  Network Virtualization, High Availability, Security, Application Performance, MediaNet
- Catalyst 6500 Strategic Roadmap
- Key Takeaways

The IT Challenge



CAPACITY
"Do I have the right performance to scale?"

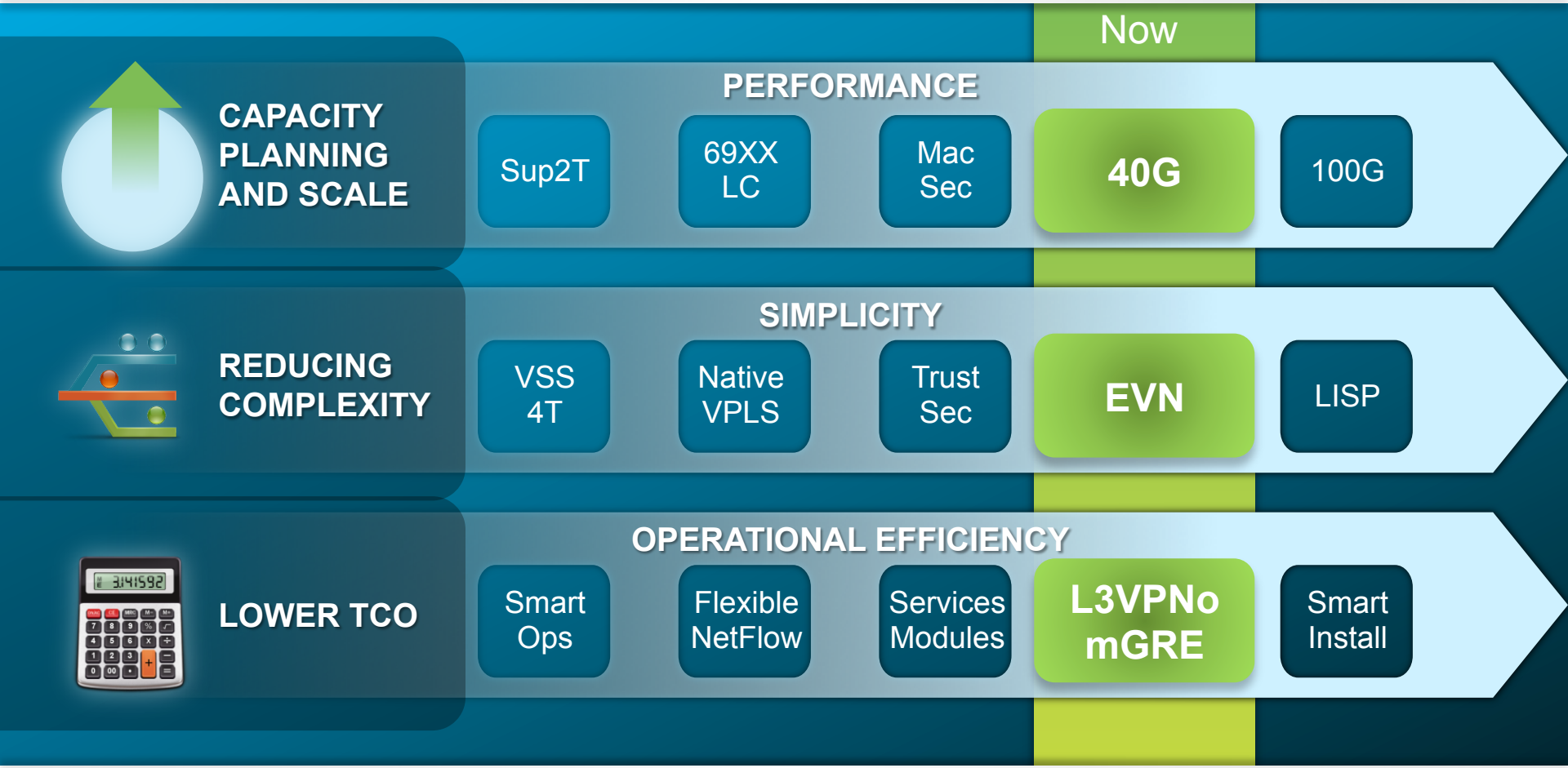
COMPLEXITY
"How do I simplify deployments?"

COST
"How can I be operationally efficient?"

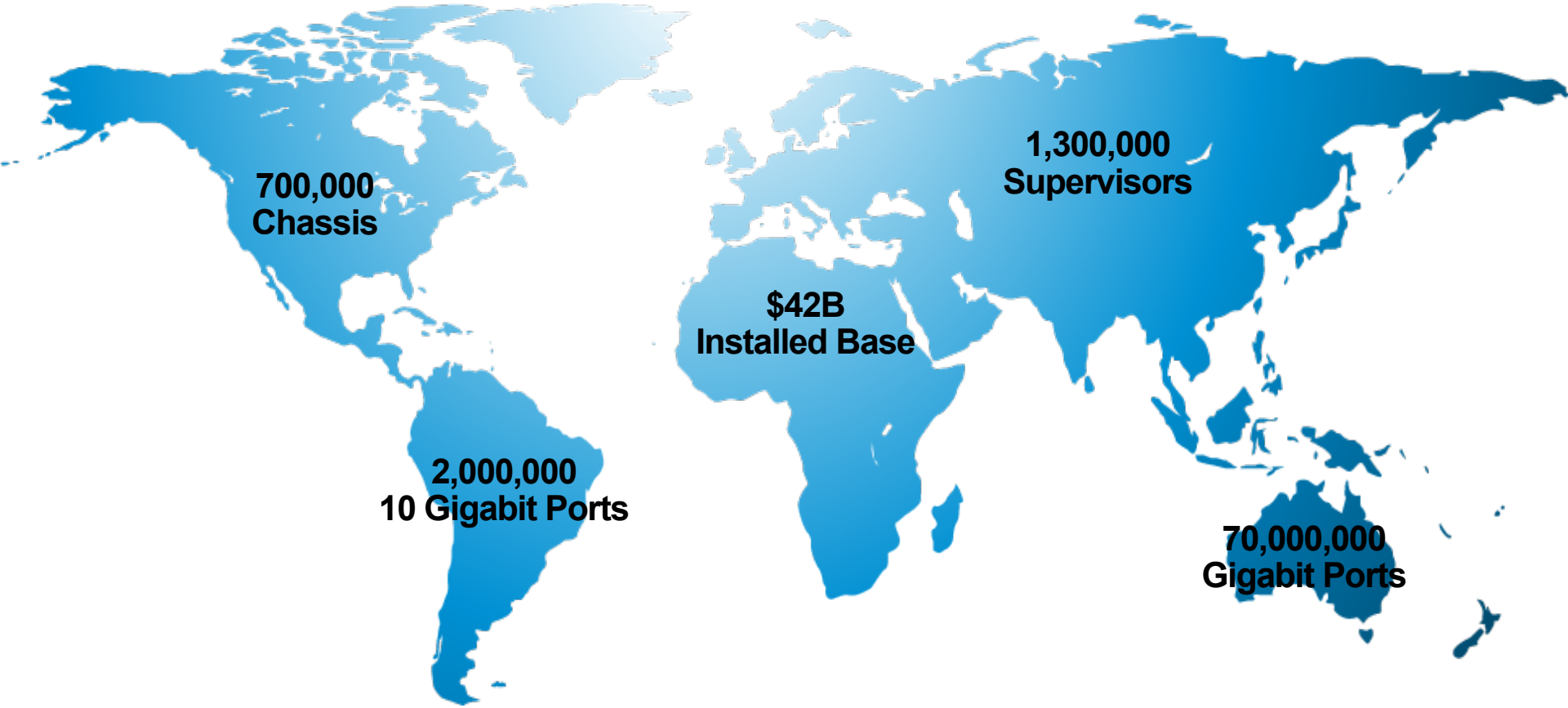
The IT Challenge: "Is My Network Ready?

Evolutionary Approach

Recent Catalyst 6500 Innovations



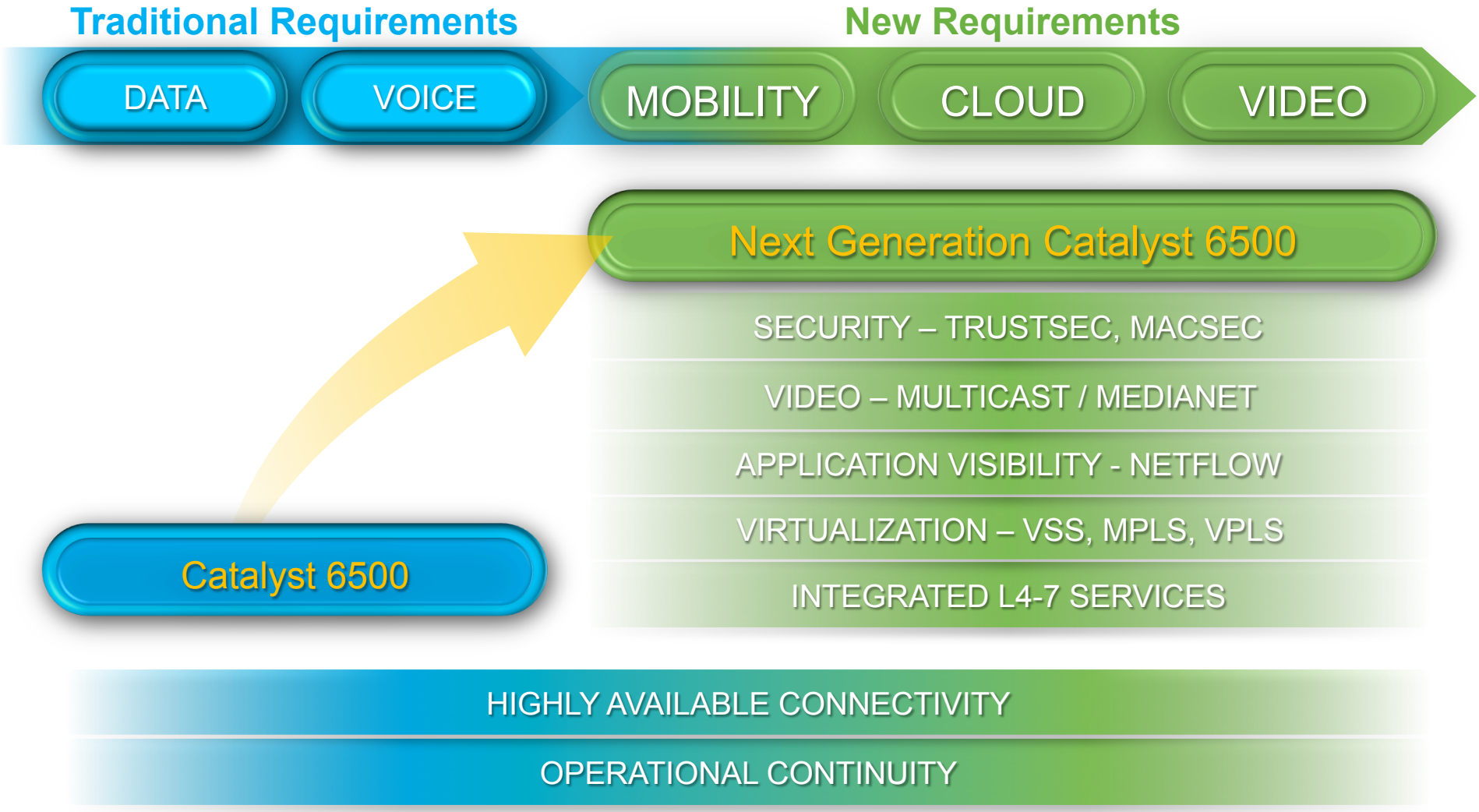
The Installed Base



The Largest Installed Base in the Industry

Cisco Catalyst 6500

Enabling the Next Generation Core



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Catalyst 6500 Strategy and Direction

INNOVATION

Innovation with
Investment Protection

DIFFERENTIATION

The Network Services
Platform for Unified
Access and Unified Fabric

CATALYST 6500
E-SERIES

TRANSITION

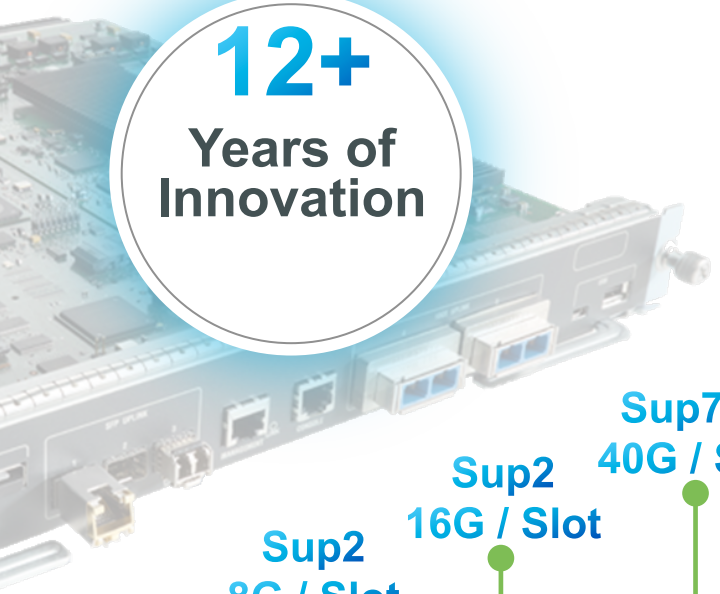
Driving Next-Gen
Ethernet
In the Campus
1G » 10G » 40G » 100G

LOWER TCO

Price/Performance

Virtualization,
Simplified Operations &
Change Management

Continuous Performances Increase



12+
Years of Innovation

Sup2
8G / Slot

Sup2
16G / Slot

Sup720
40G / Slot

VSS 1440

Sup2T
VSS 4T
80G / Slot

160G / Slot
and 100G
Capable

Raising the bar once more!

32G Bus

2001 2002 2003 2007 2011 2012+

INVESTMENT PROTECTION

6500 Chassis

6500-E Chassis

The New Catalyst 6500

Balancing Innovation with Investment Protection

69xx Series 80Gbps Built-in DFC4

- 8 port 10G
- 4 port 40G* or 16 port 10G

INNOVATION
The New Catalyst 6500

68xx Series 40Gbps

- Built-in DFC4
- 1GbE Fiber: 24/48 ports
- 10/100/1000: 48 ports
- 10GBASE-T: 16 ports
- 10G Fiber: 16 ports

2 Terabit Supervisor

Service Modules

- WiSM-2
- ASM-SM
- NAM-3
- ACE-30

INVESTMENT PROTECTION

- **All** E-Series Chassis
- All 61XXPOE/ POE+ Legacy Service Modules
- DFC4 Upgrade option for 67xx Line Cards

*Roadmap

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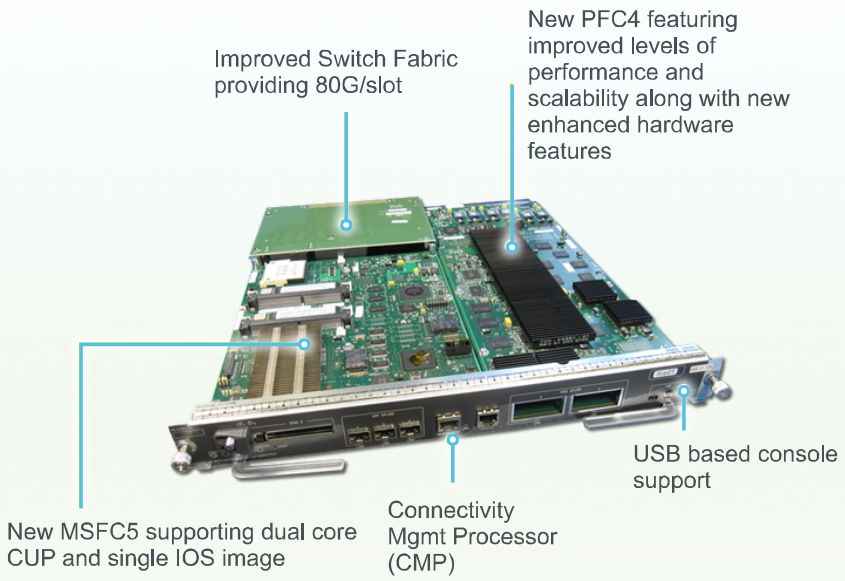
Next-Generation Sup2T At-a-Glance

PID: VS-S2T-10G, VS-S2T-10G-XL

Supt2T



Scalability
Performance

	PFC3/DFC3	PFC4/DFC4
L2 MAC Table	96K	128K
Bridge Domains	4K	16K
MacSec/SGACL	–	Y
Etherchannel Hash	3 bits	8 bits
L2/IPv4 Mpps	48	60
FIB Table	256K/1M	256K/1M
L3 Interfaces	4K	128K
Netflow Table	128K/256K	512K/1M
Security ACL Table	32K	64K/256K
QoS ACL Table	32K	Programmable
ACL Labels	4K	16K
Port ACLs	2K	8K
Aggregate Policers	1K	8K
Shared uflow Policers	63	512

Supported with
LMS 4.1 & DCNM*

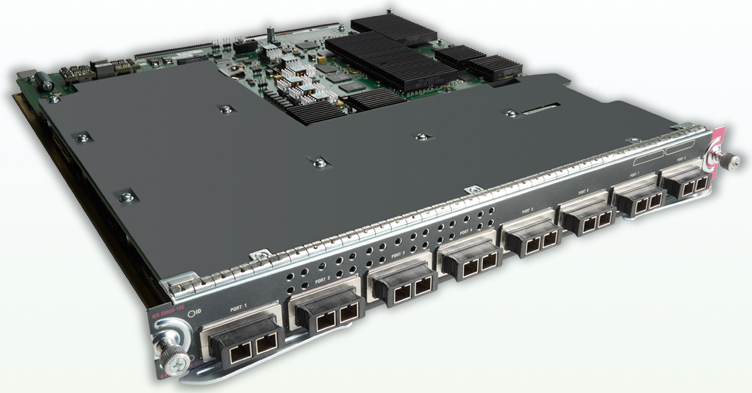
E-Series Systems for the “2T” Family

Unlock 80G/slot across ALL E-Series Chassis

6503-E	6504-E	6506-E	6509-E	6513-E	6509-V-E
34x10GE	50x10GE	82x10GE	130x10GE	180x10GE	130x10GE
96x1GE	144x1GE	240x1GE	384x1GE	528x1GE	384x1GE
8x40GE	12x40GE	20x40GE	32x40GE	44x40GE	32x40GE
150Mpps	210Mpps	330Mpps	510Mpps	720Mpps	510Mpps

WS-X6908-10G-2T / 2TXL
8 ports 10G

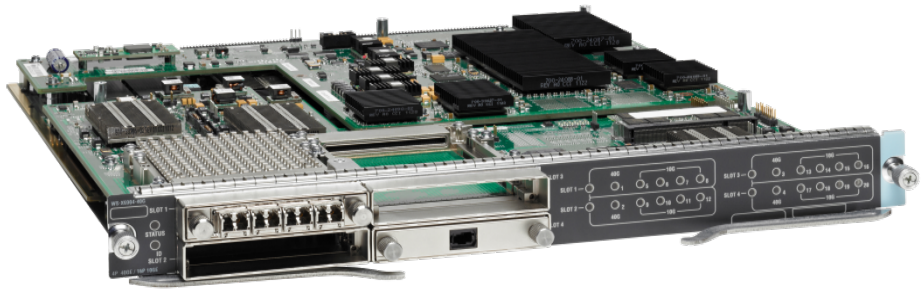
8p 10G Line Card



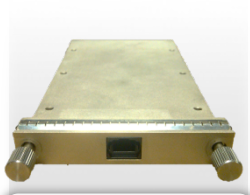
- Two SKUs: regular and XL tables (DFC4)
- X2 Transceiver or SFP+ w/ adapter
- Wire Rate MacSec (IEEE 802.1AE)
- Large packet buffers (256MB/port)
- Virtual Switch Link (for VSS)
- OTV and LISP ready*

WS-X6904-40G-2T / 2TXL

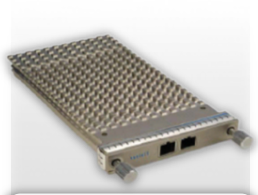
4 ports 40G / 16 ports 10G



FourX Adapter



CFP-40G-SR4

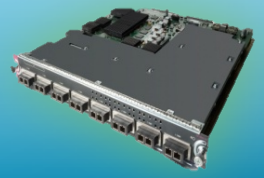
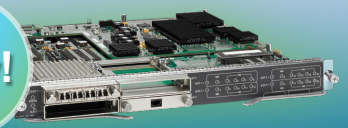


CFP-40G-LR4

- Two SKUs: regular and XL tables (DFC4)
- IEEE 802.3ba standard compliant
- CFP Transceiver for 40G, SFP+ for 10G
- Wire Rate MacSec (IEEE 802.1AE)
- 10G mode via FourX adapter
- Virtual Switch Link (for VSS)
- LISP ready*
- Up to 60Mpps local forwarding
- Ingress buffer (1 ms / 40 GE port – 1 ms / 10 GE port)
- Egress buffer (19.66 ms / 40 GE port – 19.66 ms/ 10 GE port)

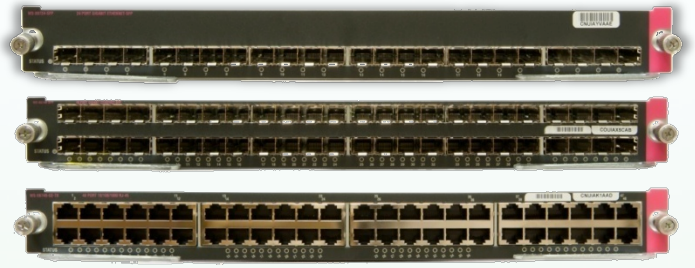
Supervisor 2T – 10G Portfolio

Providing Deployment Options

	WS-X6908-10G-2T	WS-X6904-40G-2T	WS-X6816-10G-2T
		New! 	
Bandwidth:	**10G 1:1**	**10G/40G 2:1**	**10G 4:1**
Optics:	X2	CFP, SFP+	X2
Throughput:	80 Gbps	80 Gbps	40 Gbps
Features:	Full-feature L2/L3 module with MPLS, VPLS. IPv4/IPv6 capabilities, 1M+ IPv4 Routes, 1M NetFlow		
Additional Hardware Features:	Large Buffers, SGT, MACSec, LISP*	10G flexibility, SGT, MACSec, LISP*, Campus FEX*, TRILL*	
Ideal for:	Campus Aggregation and Core	Campus Aggregation, and Core	Campus Aggregation

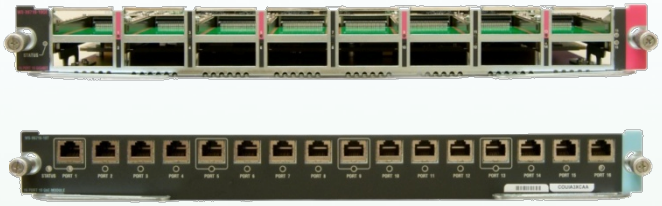
68xx Series Line Cards

1GbE Fiber and Copper



- Distributed Forwarding Card (DFC4)
- Two SKUs: Regular and XL tables
- 24 ports 1 GbE fiber
- 48 ports 1 GbE fiber and 10/100/1000
- 40G backplane

10Gbe Fiber and Cooper



- Distributed Forwarding Card (DFC4)
- Two SKUs: Regular and XL tables
- 16 ports 10GbE Fiber (X2 transceivers)
- 16 ports 10GBASE-T
- 40G backplane

Upgrading the Installed Base to Sup2T

Sup720	Sup2T
67xx Series w/ CFC	Supported
67xx Series 1GbE w/ DFC3	WS-F6K-DFC4-**A**
6704-10GE w/ DFC3	WS-F6K-DFC4-**A**
6716-10GE Fiber	WS-F6K-DFC4-**E**
6716-10GBASE-T	WS-F6K-DFC4-**E**
6708-10G Fiber	Special **TMP** program for **6908-10G** Fiber (80G)
61xx Series	Supported
Legacy Services Modules	Supported

Sup2T - Classic Cards and Service Modules

61xx Line Cards	Legacy Service Modules	Next Gen. Service Modules
WS-X6148A-RJ-45	FWSM	ASA-SM
WS-X6148A-45AF	ACE 20	ACE 30
WS-X6148-FE-SFP	WiSM	WiSM-2
WS-X6148A-GE-TX	NAM-1	NAM-3
WS-X6148A-GE-45AF	NAM-2	
WS-X6148E-GE-AT		

SIP Modules, ES40 and VSPA **NOT** Supported

New High Performance
Catalyst 6500 L4-7 Service Modules

Integrate Wire/Wireless Management

NEW

Next Generation WiSM Blade—WiSM-2

Performance	10 Gbps
Access Points	500 - 1000
Clients	10,000
Concurrent AP Upgrade/Joins	Up to 500
Mobility, Domain Size	Up to 18,000 APs

Accelerate & Balance Application Performance

NEW

Next Generation Load Balancer—ACE-30

UP to 16 Gbps	Performance
Up to 6 Gbps	Compression
30,000	Transactions per Second
250	Virtual Context
4000	VLANs

Enhance Visibility, Accelerate Troubleshooting

NEW

Next Generation NAM Blade—NAM-3

Monitoring Performance	Up to 15 Gbps
Capture to External Disk	Up to 5 Gbps
Performance Analytics	1588 Timestamps
HW Filters/ Packet Captures	Rapid Troubleshooting

Deliver Robust, Integrated, Streamlined Security

NEW

Next Generation Firewall Blade—ASA-SM

64 Gbps	System Performance
16 Gbps	Performance / Service Mod.
10,000,000	Concurrent Sessions
300,000	Connections per Second
250	Security Contexts
1,000	VLANs

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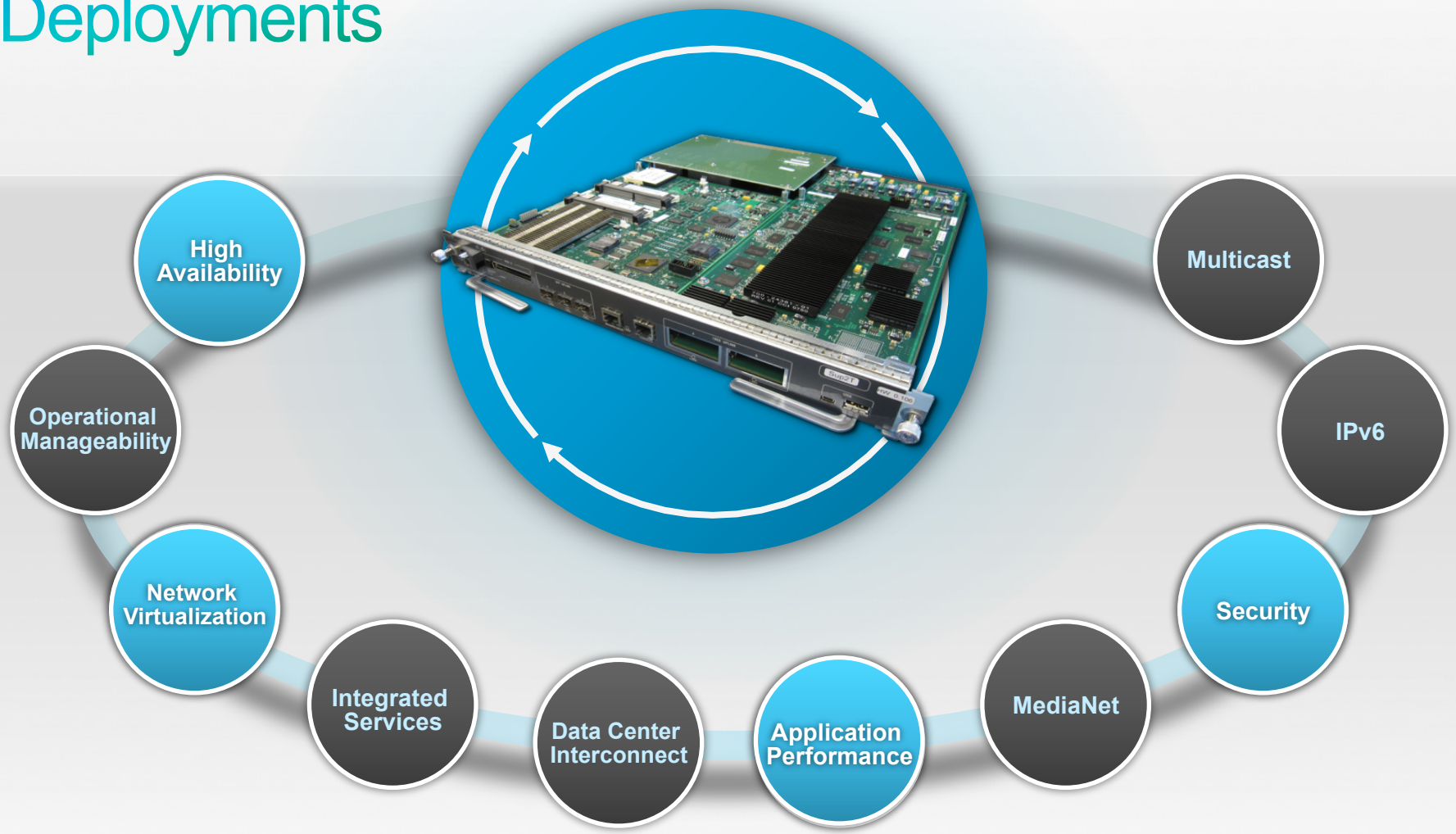
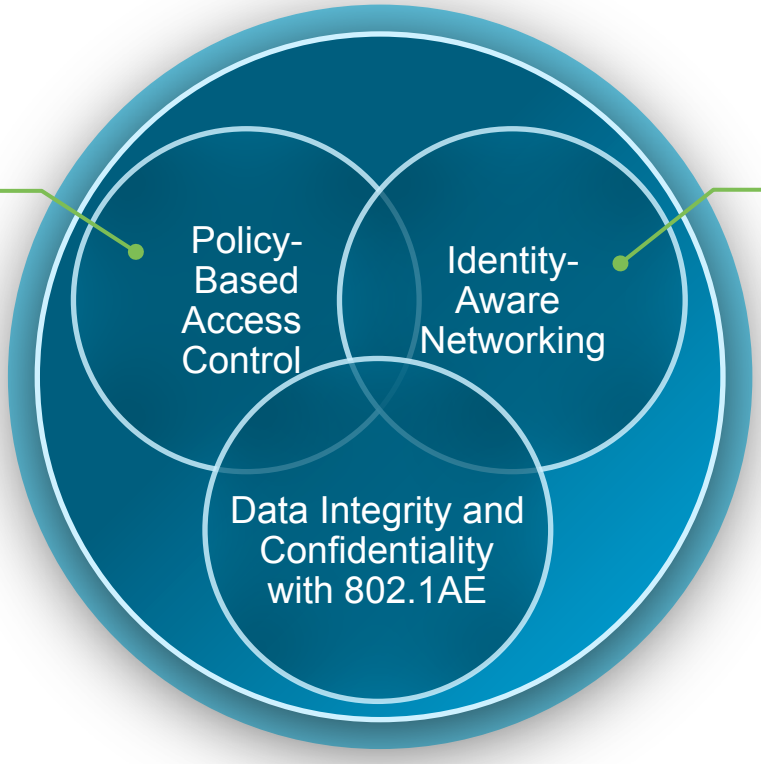
Catalyst 6500 Value Proposition for Borderless Deployments



TrustSec Overview

- Consistent policy for users and devices
- Distributed Policy enforcement
- Topology-independent access control via Security Group Access Control (SGAC)



Cisco TrustSec

- Controls based on user/device identity and attributes (time, location, access methods)
- Support for Cisco Medianet and QoS for business-critical applications associated with users in specific roles

Sup2T Enables End to End Security

VLAN to SGT Mapping NEW!
Marks any traffic belonging to a particular VLAN with the configured SGT value.

Subnet to SGT Mapping NEW!
Marks any traffic with source address within a subnet with the configured SGT value.

Layer Identity Port Mapping (IPM) NEW!
Marks any traffic passing -through a particular L3 interface with the configured SGT value.

SG NAME NEW!
Maps a user-friendly name to an SGT value.

Enhanced TrustSec Deployments

Backwards compatibility with existing segmented networks for easy migration.

Taking ACLs to the Next Level

What's New with Sup2T?

- ACL "Dry Run"—test if the ACL will fit in the TCAM before applying it

  Protect your control plane from unanticipated disruption due to ACL programming

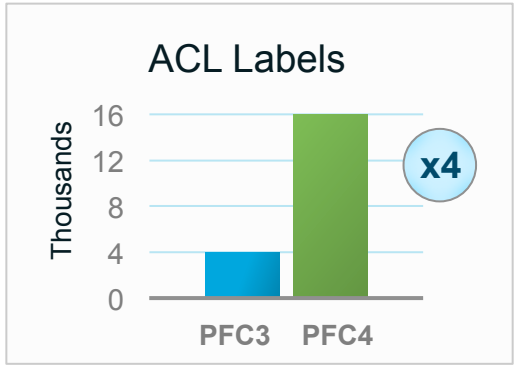
- ACL Atomic "Hitless" update

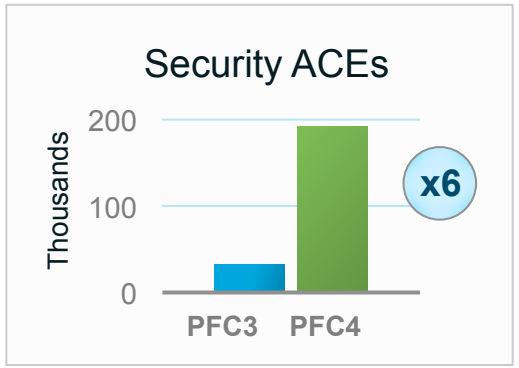
  No traffic disruption when applying complex ACL

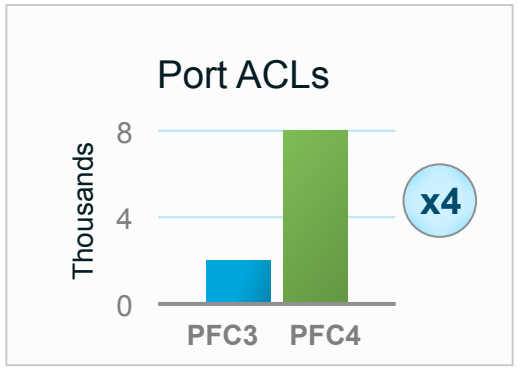
- Role-based ACL with SGACL

  Identity aware ACL

- 1:1 ACL masking to maximize TCAM usage
- New match criterias—DSCP, IP Prec, TTL, length, Q-Q inner and outer CoS and Vlan
- IPv4/IPv6 parity in ACL features
- Scale







Innovation in Control Plane Security

Protect Your Most Important CPUs of Your Infrastructure

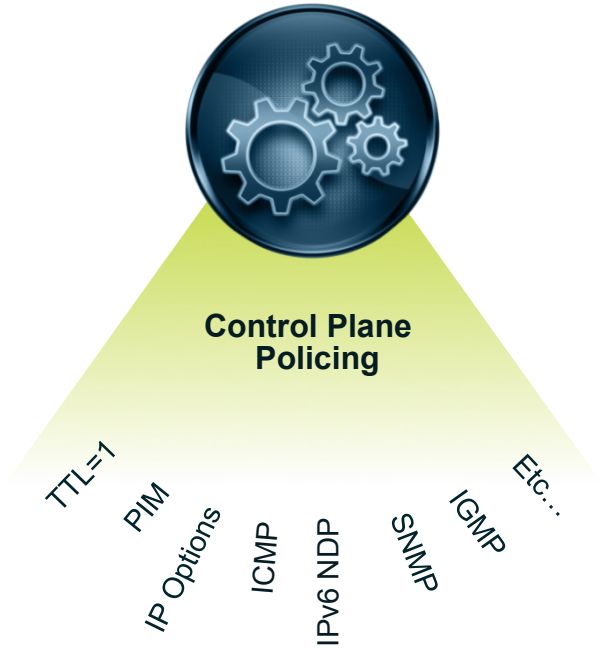
Why it matters?

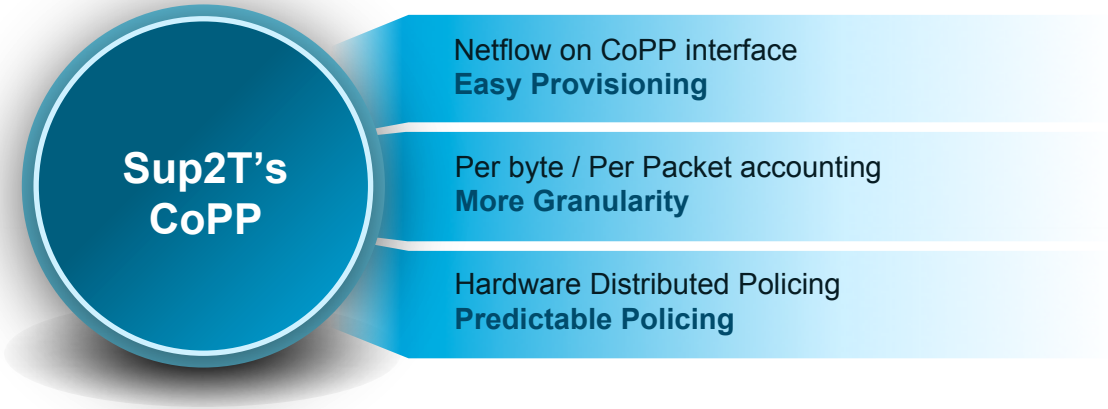
- When under a DOS attack, you want to avoid network meltdown, so you need to keep control on your network

How it protects the CPU?

- Control Plane Policing protects the Switch Control Plane from being Compromised from excessive traffic loads
- Select and limit the traffic that will hit your CPU

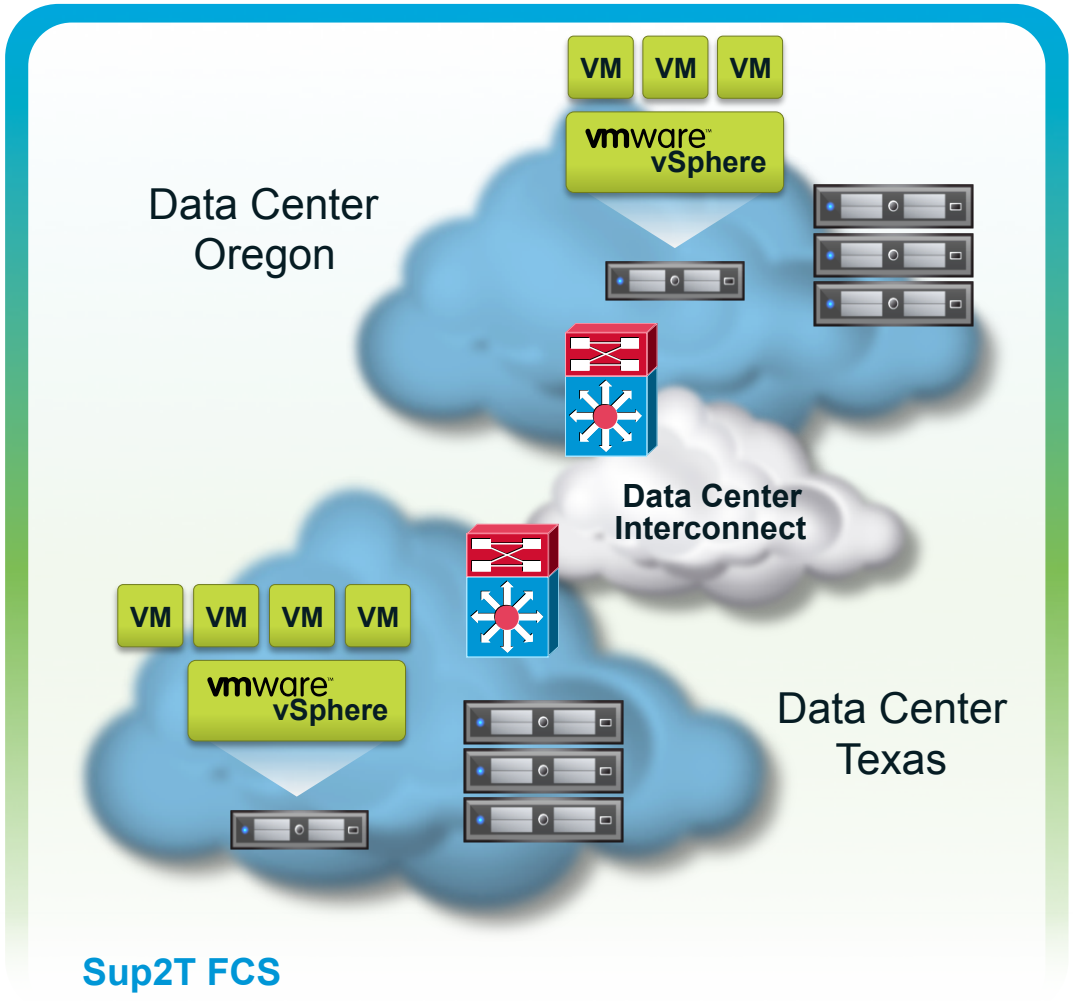
What's new with Sup2T?





Supervisor 2T VPLS on Any Port

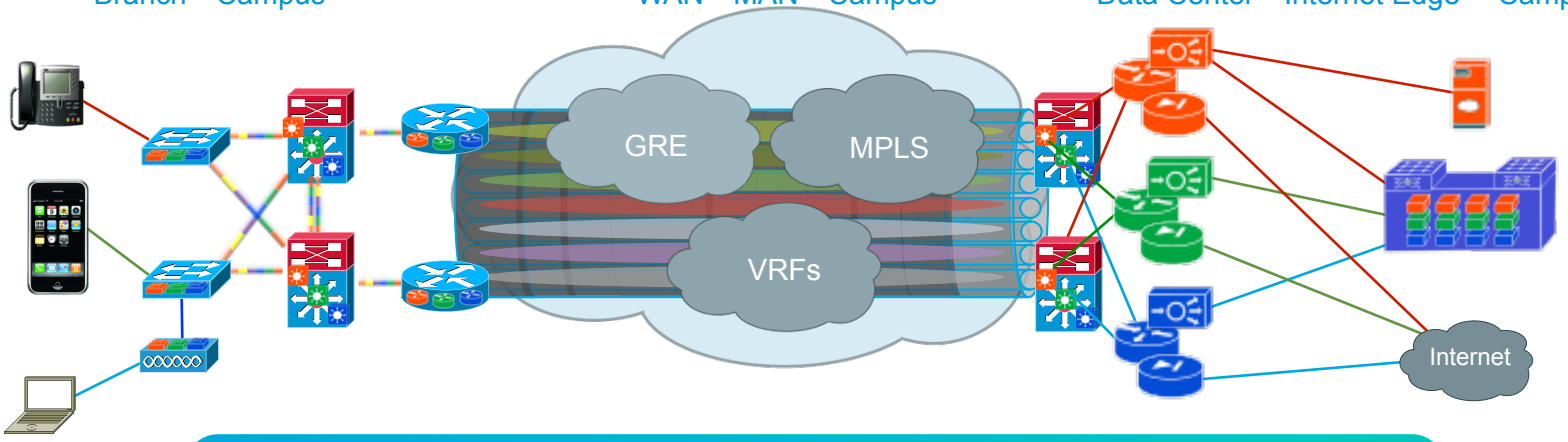
Data Center Interconnect



- Native VPLS support
- CapEx Savings: No need for SIP Based linecards
- True Scalable 10 Gigabit Data Center Interconnect
- Application VM mobility
  - Redistribute compute workloads
  - No Service Disruption
  - Capacity management
  - Disaster avoidance
  - Data center upgrades

Easy Virtual Networks (EVN)

ACCESS CONTROL	PATH ISOLATION	SERVICES EDGE
Branch—Campus	WAN—MAN—Campus	Data Center—Internet Edge— Campus



Easy Virtual Networks (EVN)

- Enterprise Scalability
- Simplified configuration and management
- Works with existing campus routing protocols
- Routing Contexts for ease of operations in a VRF
- Better Monitoring and Troubleshooting
- Shared Services between groups

Easy Virtual Networks - EVN

Reduce Complexity for Network Virtualization

VRF-lite (Manual)

- Backwards compatible with VRF-lite
- Interoperable with all WAN solutions: MPLS-VPN,
- VN trunk, Route Replication and Routing context

With VRF-Lite

Must configure

40 subinterfaces

```
interface TenGigabitEthernet1/1.101
 description 10GE to core 3
 encapsulation dot1Q 101
 ip vrf forwarding Red
 ip address 10.122.5.31 255.255.255.254
 ip pim query-interval 333 msec
 ip pim sparse-mode

interface TenGigabitEthernet1/1.102
 description 10GE to core 3
 encapsulation dot1Q 102
 ip vrf forwarding Green
 ip address 10.122.5.3
 ip pim query-interval
 ip pim sparse-mode

interface TenGigabi
 description 10GE to
 encapsulation dot1
 ip vrf forwarding Bl
 ip address 10.122.5.
 ip pim query-interval
 ip pim sparse-mode
...
interface TenGigabi
 description 10GE to
 encapsulation dot1
```

With EVN

Configure 4 interfaces

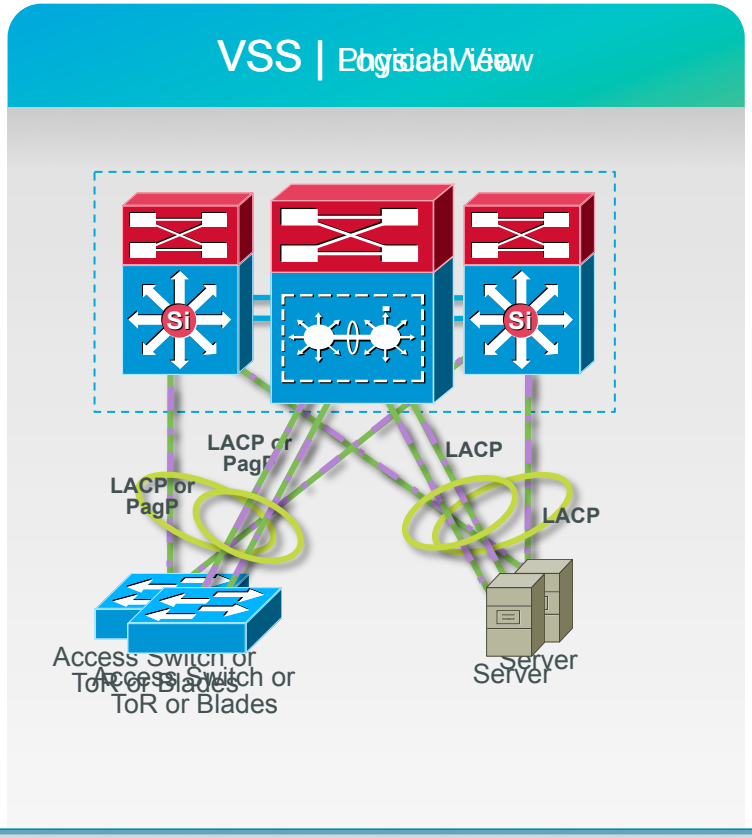
```
vrf definition Red
   vnet tag 101
vrf definition Green
   vnet tag 102
...
interface TenGigabitEthernet1/1
 description 10GE to core 3
 vnet trunk
 ip address 10.122.5.31 255.255.255.254
 ip pim query-interval 333 msec
 ip pim sparse-mode
```

Virtual Networks	6500 Neighbors	VRF Subinterfaces	EVN Trunks
10	4	40	4
20	4	80	4
30	4	120	4

EVN Simplifies Configuration By a Factor of 10x+

Business Continuity

Enhanced Availability and Simplified Network Design with VSS



The Solution

4 Tbps Virtual Switching System

Double Bandwidth Utilization

With Active-Active Multi-Chasis Etherchannel (LACP / PagP)

Simplified Network Design

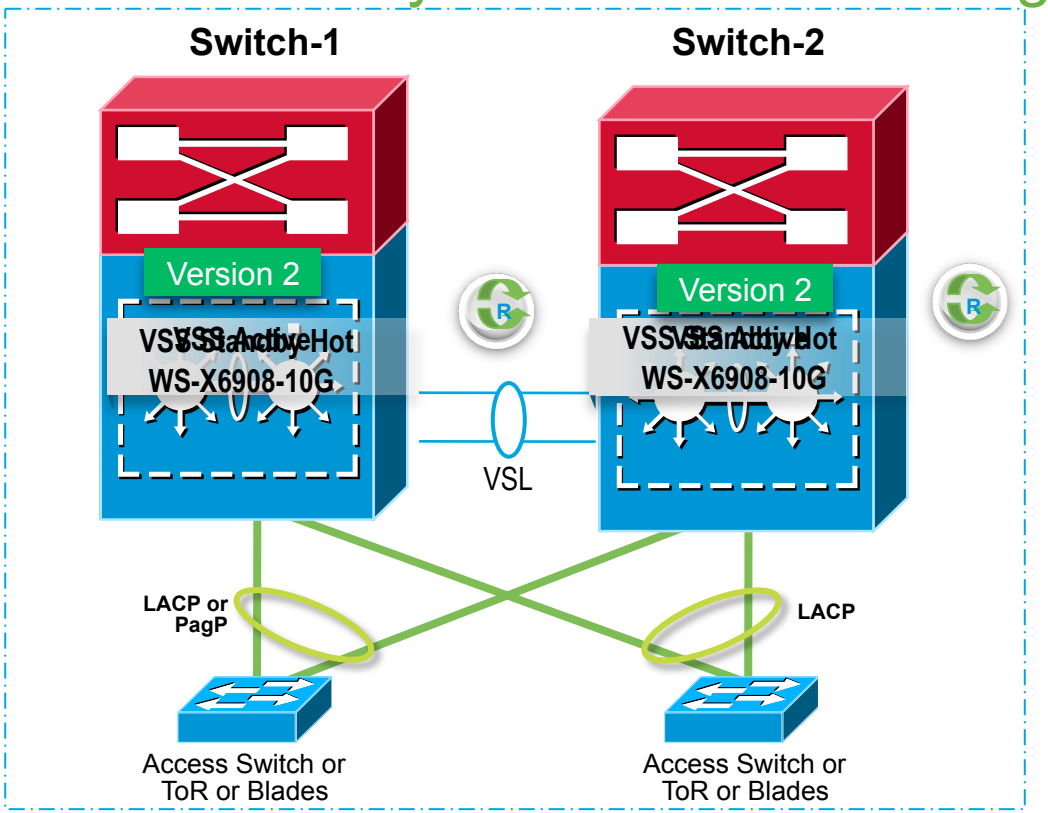
Spanning Tree and First Hop Redundancy Protocols Elminated

Minimized Traffic Disruption

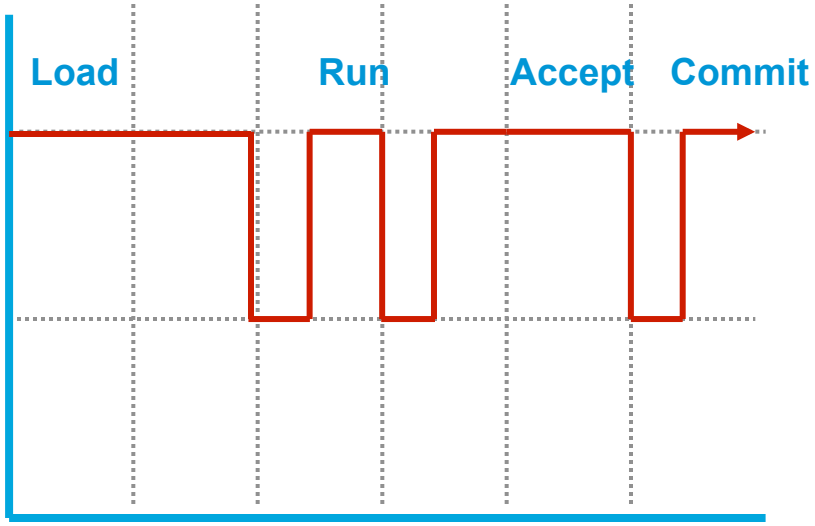
Subsec Stateful and Graceful Recovery (SSO / NSF)

Prevent Loss of Productivity

Network Always Available Even During Software Upgrades



Aggregate Bandwidth of both VSS chassis



With EFSU, a minimum of 50% bandwidth is available throughout the software upgrade process

The Solution

VSS + EFSU

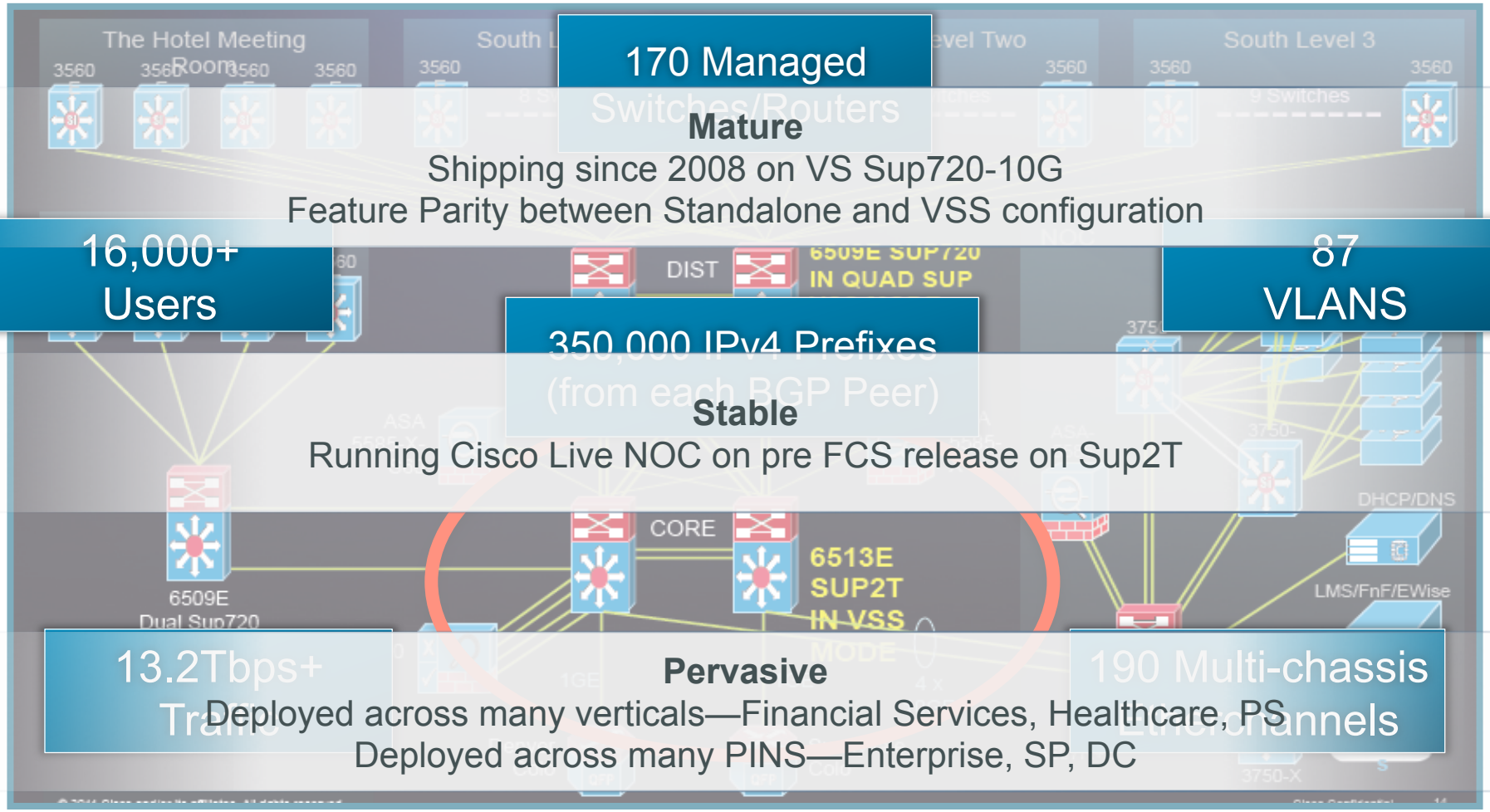
Simplified upgrade process, with four easy steps

Increased Availability as 50% bandwidth always available if servers/ switches are dual homed

Deterministic Recovery, supports Quad-Sup designs as well

4Tbps VSS Powering Cisco Live

Sup2T the Backbone of NOC



170 Managed Switches/Routers

Mature

Shipping since 2008 on VS Sup720-10G

Feature Parity between Standalone and VSS configuration

16,000+ Users

87 VLANS

350,000 IPv4 Prefixes (from each BGP Peer)

Stable

Running Cisco Live NOC on pre FCS release on Sup2T

13.2Tbps+ Traffic

Pervasive

Deployed across many verticals—Financial Services, Healthcare, PS

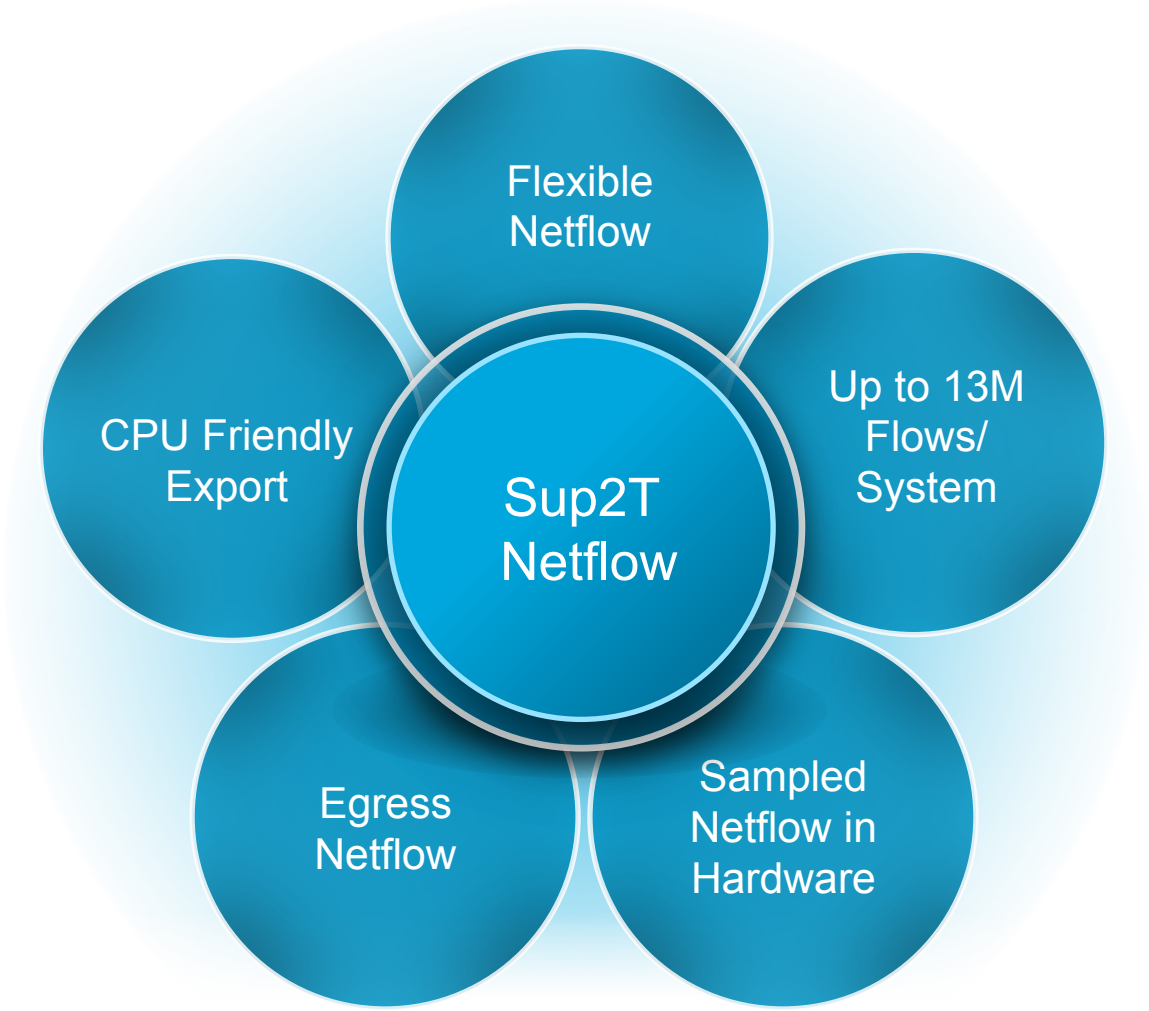
Deployed across many PINS—Enterprise, SP, DC

190 Multi-chassis EtherChannels

Sup2T also the backbone of InterOp, Las Vegas, May 2011

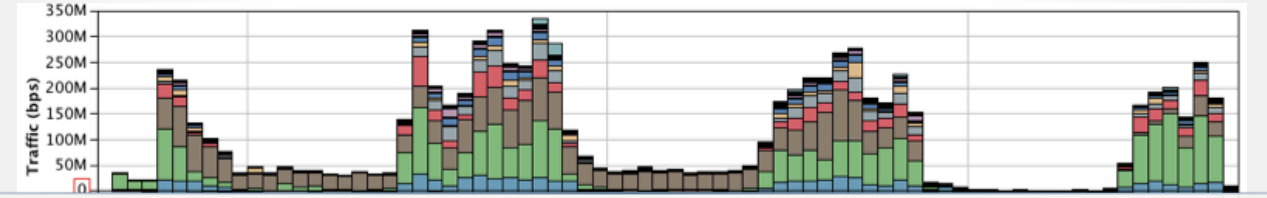
Sup2T Netflow Innovations

Fits All the Needs for High-Flow Backbone Environments



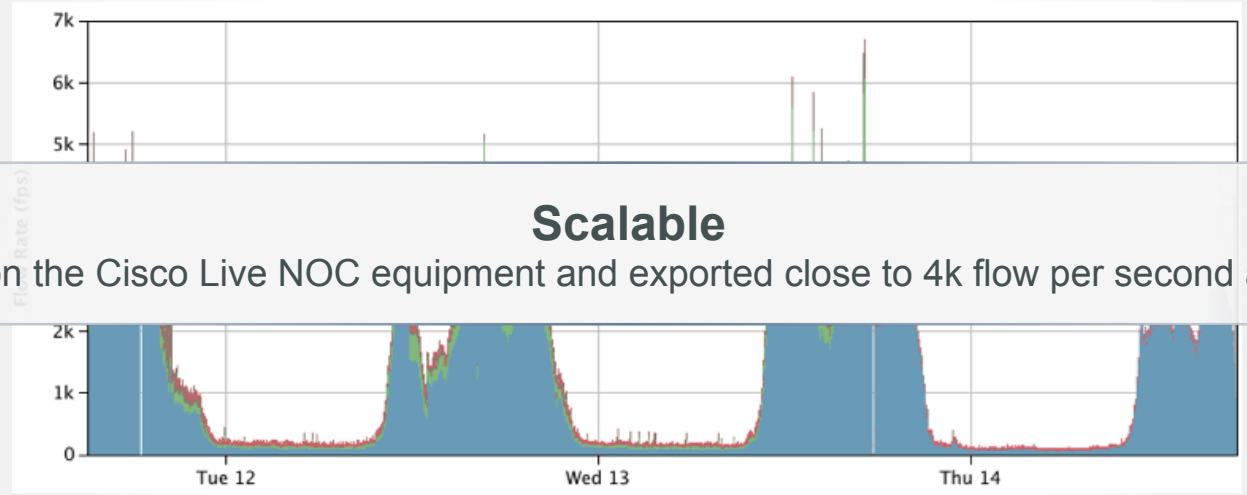
Sup2T NetFlow Monitoring Cisco Live

Sup2T the Backbone of NOC



Deep Monitoring

Get a full view of the network utilization and able to detect DDoS as well as scan on the network



Scalable

Deployed on the Cisco Live NOC equipment and exported close to 4k flow per second at rush hour

Stable

Running Cisco Live NOC on pre FCS release on Sup2T

How Much Is a lot of Flows?

Deployment	Typical fps Rates
3 computer home office	~2 fps
100 employee small office	~160 fps
Enterprise core Cat6k	~7,500 fps
Large ecommerce website	~35,000 fps
30k student college campus	~75,000 fps

Catalyst 6513-E w/Sup2T-10G

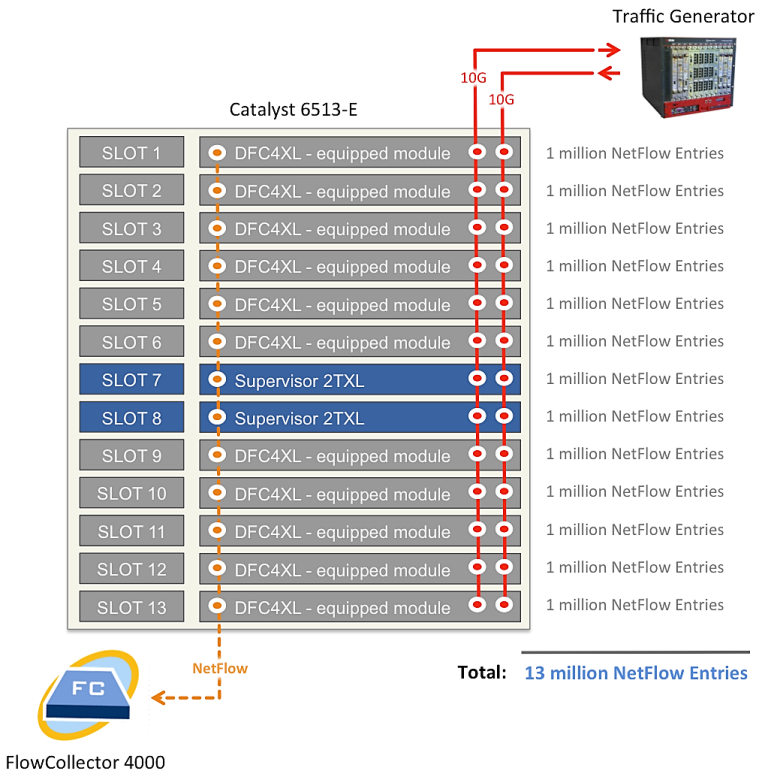
= up to 180,000 fps!

(that's a lot of flows)

Future Proofing

NetFlow on Sup2T is built to be able to export the amount of flows that the new enterprise megatrends will generate

Sup2T NetFlow Scalability Tests



Tested with:

STEALTH WATCH By Lancope

ARBOR NETWORKS

- Videos on Youtube

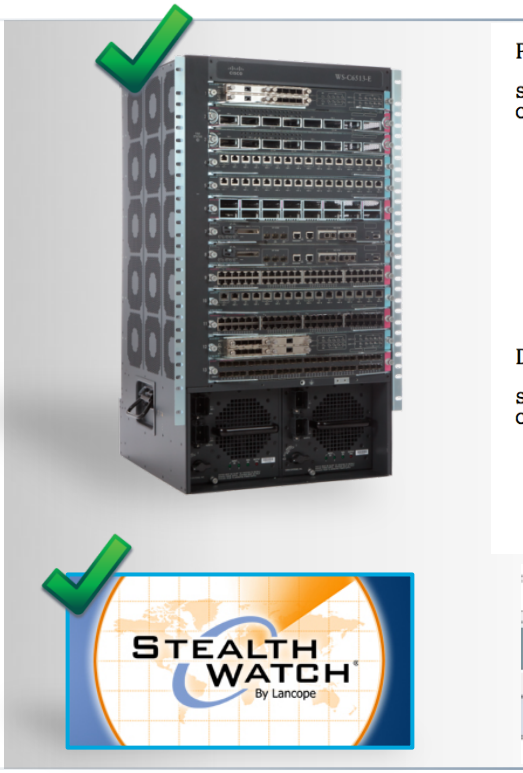
  Lancope
  http://www.youtube.com/watch?v=UOdbCDNYOeA

  Arbor
  http://www.youtube.com/watch?v=VMBIfJT4naU

- Whitepaper:

  http://www.lancope.com/cisco/catalyst6500

Sup2T NetFlow Scalability Test Results

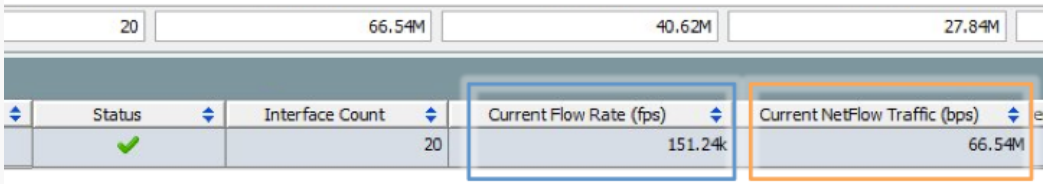


PFC4/Supervisor CPU @ 150,000 fps:

```
SM_13slot#sh proc cpu | ex 0.00%
CPU utilization for five seconds: 3%/0%; one minute: 7%; five minutes: 9%
 PID Runtime(ms)   Invoked      uSecs   5Sec   1Min   5Min TTY Process
 135     1790060    430015       4162  0.23%  0.23%  0.22%   0 OIR Process
 155    22424232  72104221        310  0.87%  2.22%  2.21%   0 slcp process
 353     5743104    290896      19742  1.75%  0.91%  0.93%   0 Lif stats hw rea
 387      908884   3236357        280  0.23%  0.12%  0.11%   0 QOS Stats Gather
 557     7407492   1455503       5089  0.15%  0.10%  0.83%   0 NF SE Intr Task
 638     5184728   1313930       3945  0.23%  0.60%  0.63%   0 Env Poll
 703       37544    809213         46  0.23%  0.05%  0.02%   0 EEM ED RF
```

DFC4XL CPU Utilization @ 150,000 fps:

```
SM_13slot-dfc1#sh proc cpu | ex 0.00%
CPU utilization for five seconds: 3%/0%; one minute: 4%; five minutes: 5%
 PID Runtime(ms)   Invoked      uSecs   5Sec   1Min   5Min TTY Process
 189    14707660  65955469        222  0.63%  1.26%  1.29%   0 fw_lcp process
 198    10449340    570804      18306  2.23%  2.28%  2.25%   0 Lif stats hw rea
 293       35484    937661         37  0.07%  0.03%  0.01%   0 NF MGMT Service
 295    11930344   2544679       4688  0.15%  0.09%  0.53%   0 NF SE Intr Task
```



Scalability Enabled by

Direct Data export for the linecards. Each linecard with DFC performs its own export

NetFlow CPU yielding export. Throttle the NetFlow export Rate based on the CPU utilization

Simplified Management with Sup2T

Manageability NEW on Sup2T

Connectivity Management Processor (CMP)

Per Protocol (v4, v6, MPLS, VPN Interface) Interfaces Statistics

Over 2 million counters!

Blue Beacon LEDs

- GOLD
- EEM
- Smart Call Home
- ERSPAN
- Mini-Protocol Analyzer
- Comprehensive MIBs

Blue Beacon LEDs

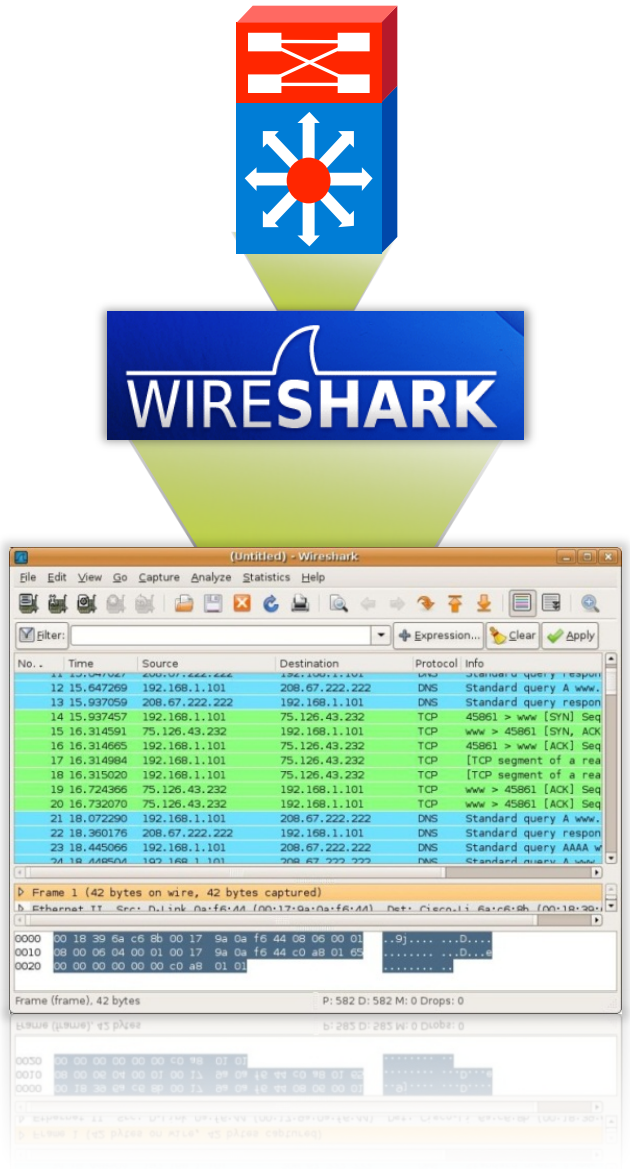
Quickly identify the hardware

- Help local technician
- Troubleshooting
- Replacement
- Change cables
- Plug a new optic…

Mini Protocol Analyzer

For In- and Outside-the-Box Monitoring

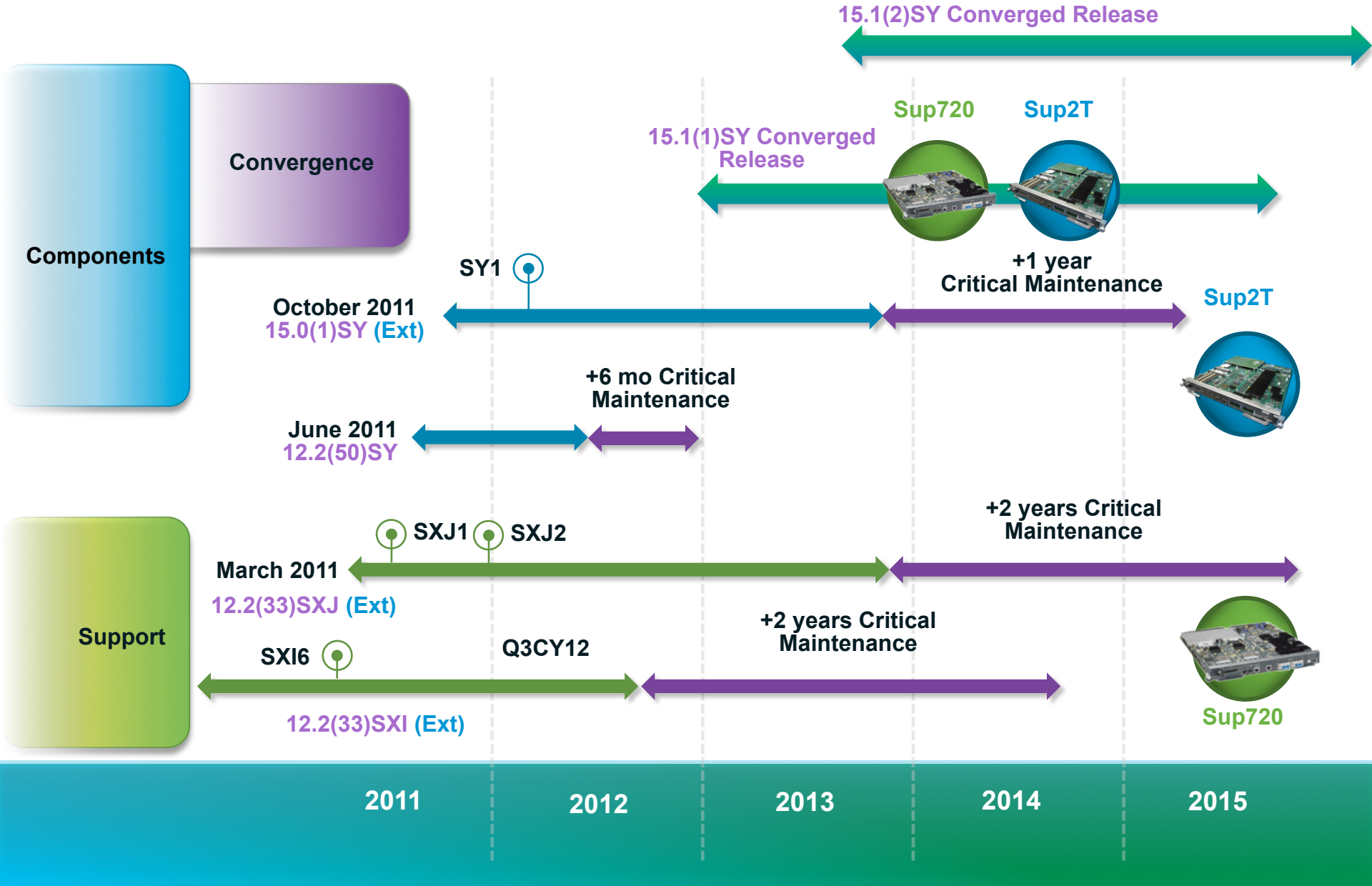
- Built-in hardware span to the RP
- Capture and monitor traffic
- Wireshark compatible tool running on the RP to analyze captured packets
- Dive deeper with full Wireshark compatibility for off the box analysis



Agenda

- The three “C”s and Network Core Considerations
- Catalyst 6500 Strategy to address Network Core
- The “2T” Product Family
- Foundation Services to address customer challenges
  Network Virtualization, High Availability, Security, Application Performance, MediaNet
- Catalyst 6500 Strategic Roadmap
- Key Takeaways

Catalyst 6500 Software Release Strategy



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Summary and Key Takeways

INNOVATION

2T Innovations address key Enterprise trend enabling you to build the Next Gen Campus with **Investment protection**

UNIFIED SERVICES

2T portfolio delivers IOS & integrated services for Borderless and Data Center deployments

CATALYST 6500 E-SERIES

TRANSITION

2T optimizes performance while maximizing services for Campus providing transition paths to 10G/40G and 100GE readiness

LOWER TCO

2T portfolio provides 4x price/performance improvement with a roadmap to take the platform beyond 2020

Thank you.