Cisco live!

What You Make Possible

TOMORROW starts here.

CISCO

Next Generation Branch Networks:

Services, Design and Implementation

BRKCRS-2000

TOMORROW starts here.

Housekeeping…

- This session is designed to be highly interactive. Please feel free to ask questions or offer comments at any time.
- Please switch mobile phones to silent.
- Some of the products discussed here are in varying stages of development, and Cisco reserve the right to change things at any time.

Changing Business Environment

Video and Collaboration

- “Collaboration Enthusiasts” Use an Average of 22 Tools to Connect with Colleagues
- 45% Employed Millennials Use Social Networking Sites

Cloud and Virtualisation

- 40% of Customers Are Planning to Move to Cloud
- Cloud Computing Services to Grow Dramatically ($44.2 Billion) by 2013

Mobility and Wireless

- Seven Billion New Wireless Devices by 2015
- 50% of Enterprises Surveyed Allow Personal Devices Use for Work

Next-Generation Enterprise WAN Regional WAN Solution

Meet IT Challenges with Cisco Next Generation Enterprise WAN

Secure and Scalable WAN Architecture

- **Secure** to access Hardened from attacks
- **Scales** to 1000s of sites globally
- Pre-validated designs utilising **Cisco best practices**

Rich Network Services

- **Multiservice**—voice, video, data
- **Multiuse**—any device or app
- **Intelligent network services** for optimal user experience

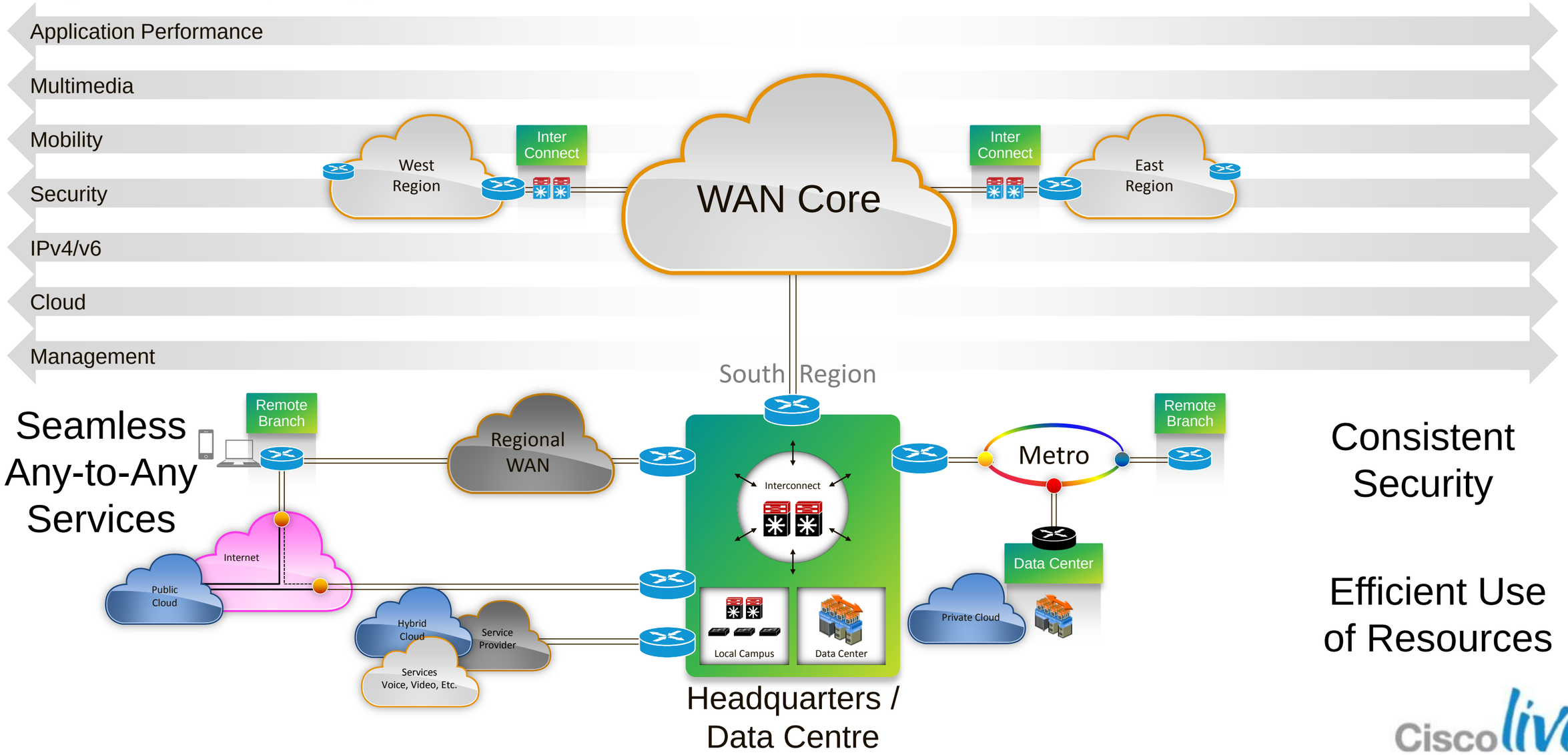
Simplified Operation and Implementation

- Reduced complexity with **integrated management**
- **Application visibility**—proactive optimisation and troubleshooting

An Architecture Blueprint to Transform Enterprise WAN to Support Changing Business Environments and Applications

Next Generation Enterprise WAN

High Level Topology



Regional WAN Branch Profiles

Performance and Availability

Flexible Deployment Options for Different Service Requirements

Mobile Branch
- 3G/4G or Satellite
- WAAS Express to boost application performance
- Branch mobility
- Deliver video over 4G*

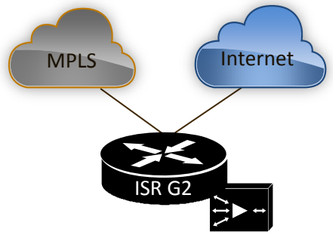
Standard Branch
- Most common deployment
- Migration from Serial to Ethernet
- SP MPLS with Internet as backup
- Application performance
- 4-9s availability
- Deliver SD video

High-end Branch
- Migration from DS3 to FastEthernet
- Dual SP MPLS
- Redundant router
- Application performance
- 5-9s availability
- Deliver HD video

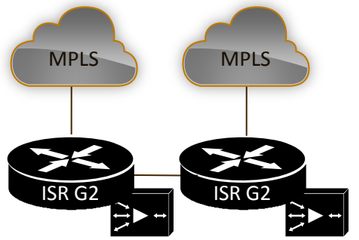
Ultra High-end Branch
- Very high BW—up to 1Gb
- Software and hardware redundancy
- Same profile as High-end Branch
- Services are provided by dedicated appliance

Retail Banking, Kiosk, Vehicles, Cruises

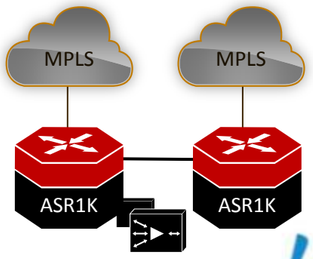
Typical Branch Office



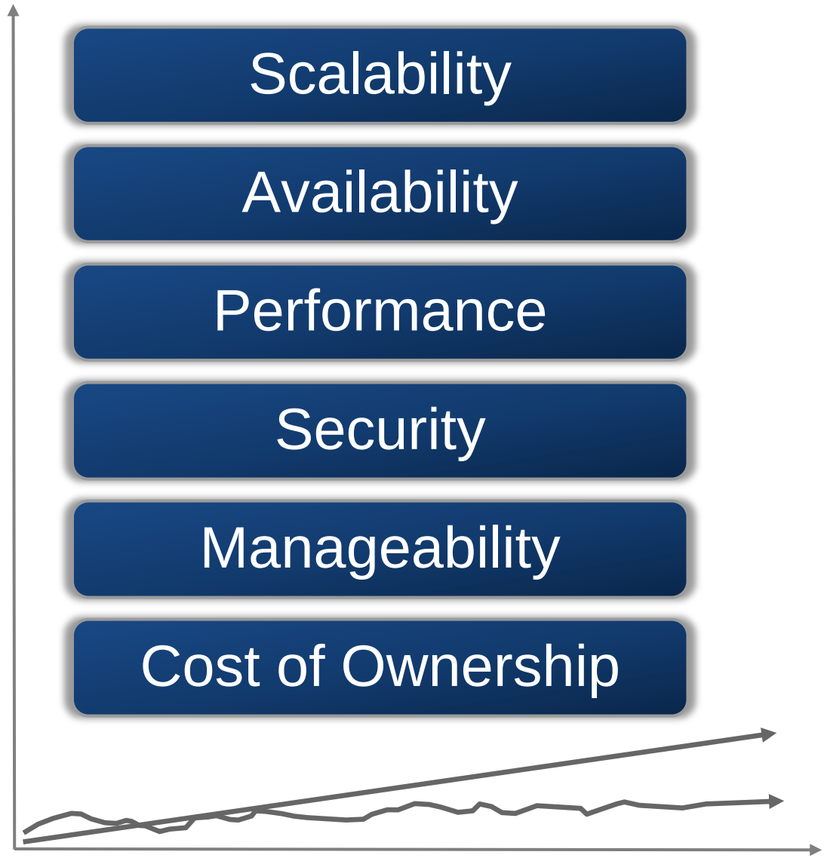
Financial Branch, Med/Large Branch Office



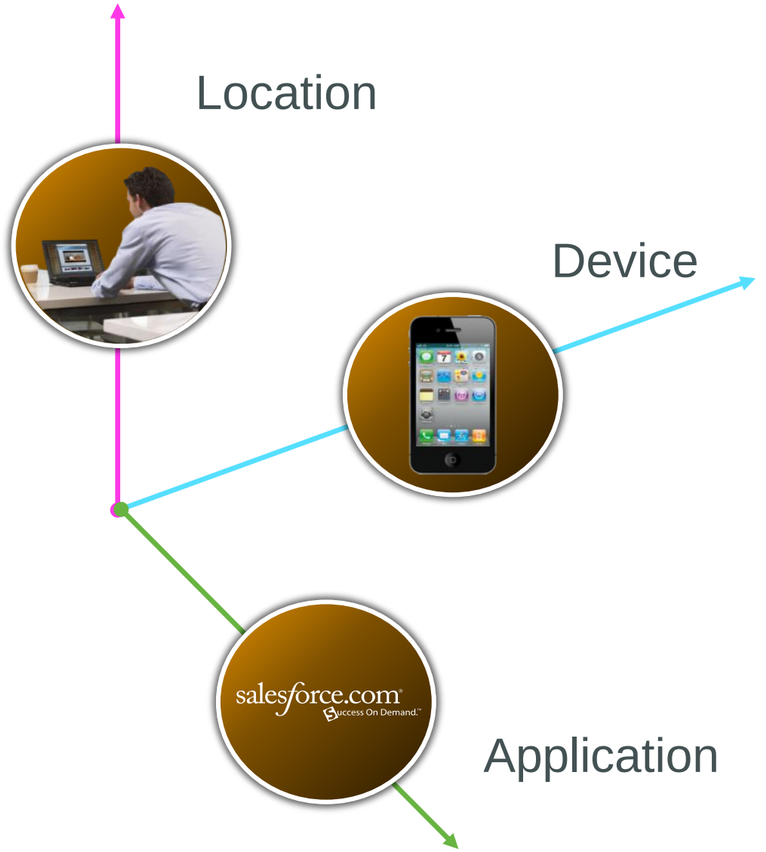
Remote Campus



Same Challenges: Increasing Complexity



Then: Linear



Scalability
Availability
Performance
Security
and
Manageability

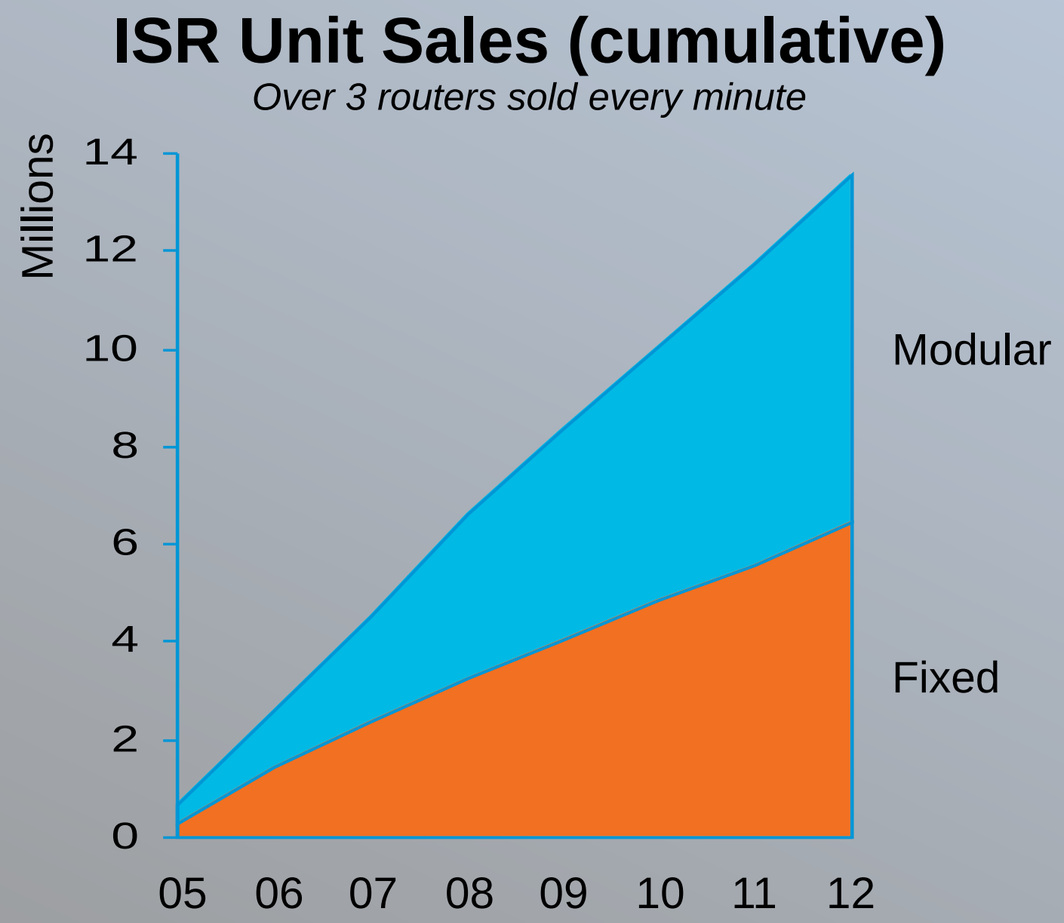
Across Non-IT-Controlled Environments

Now: Multidimensional

ISR G2 Portfolio

Cisco ISR Leads Enterprise Networking

"Perhaps the Best-Selling Network Product Line of All Time"



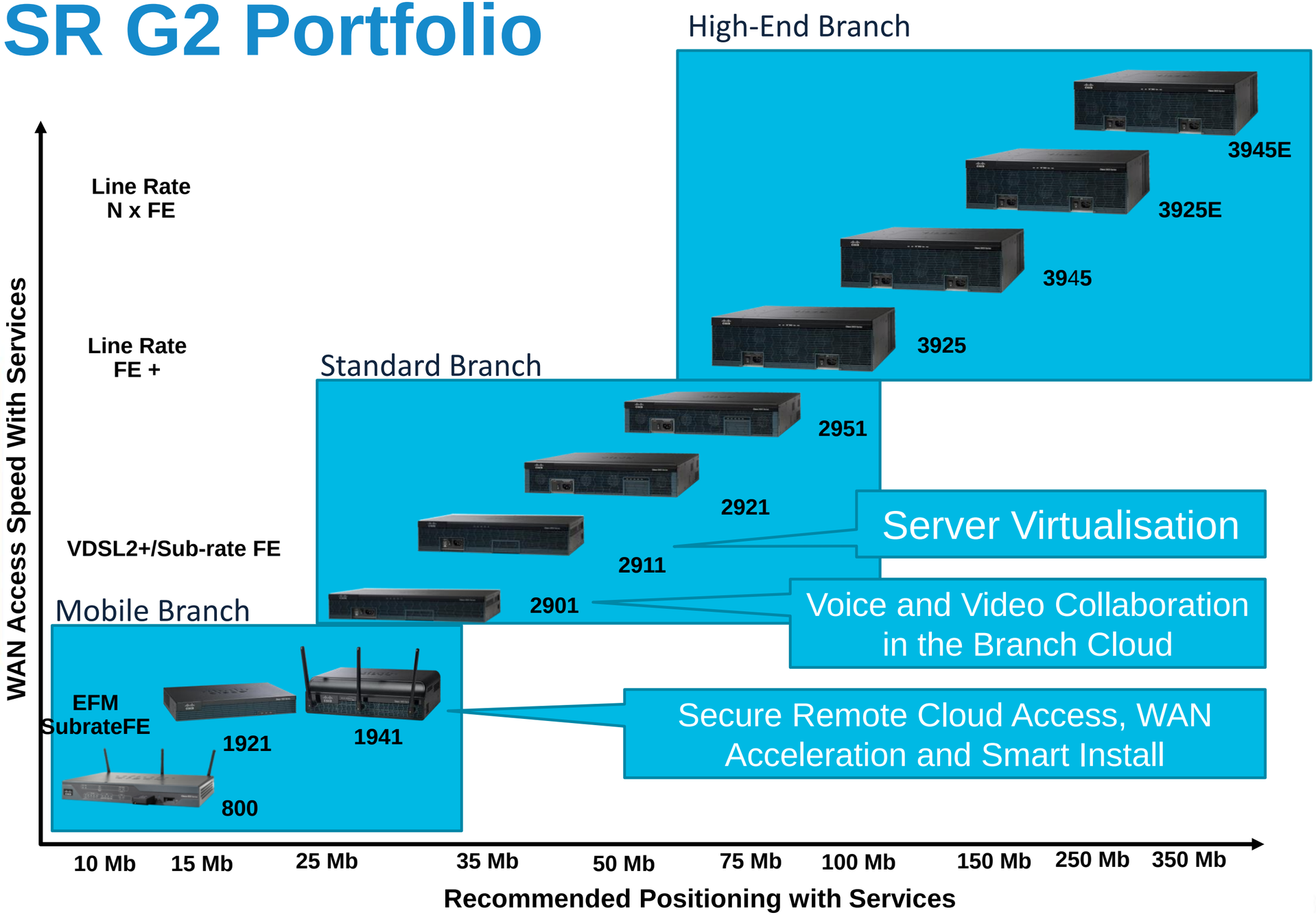
Source: Dell'Oro, Cisco bookings actuals, Fortune magazine, NetworkWorld

- **85%** market share in Q1CY12
- **#1** share in every major world region since market has been tracked
- **97** of the Fortune 100 have bought Cisco routers in the last 12 months
- **$45B** cumulative access router sales… excluding revenue from attached advanced technologies

"The ISR line is perhaps the best-selling network product line of all time. They've done a great job of keeping the ISR features set way ahead of any competitor… There's no product set that Cisco has put more focus on and it remains the cornerstone of their enterprise penetration strategy."

-- The Yankee Group

ISR G2 Portfolio



ISR G2 Models

Cisco 81x/86x/88x/89x

- Fixed Platforms for Ethernet, xDSL, 3G interfaces
- New 892-F offers 1 SFP port
- 802.11n Wifi, Integrated Switch w/POE, SRST optio
- Machine-2-Machine Offering

Cisco 1921/1941/1941W

- Modular platform with 2xEHWIC slots
- 1941/1941W Can support 9-port switch plus WAN interface
- 1921 provides 1 RU option
- Factory 802.11n Wifi on 1941W

Cisco 2901/2911/2921/2951

- UC and Video Ready platforms
- Increased density on GE and SFP ports, Service Module slots and PVDM3 slots
- Performance increase across the line with 2951 at 75Mbps WAN Access
- External RPS option on 2911-2951

Cisco 3925/3945/3925E/3945E

- Field replaceable Service Performance Engine (SPE) to upgrade performance up to 350 Mbps
- Online Insertion and Removal (OIR) support for Service Modules
- Support up to 4 Service Module slots
- Optional integrated Redundant Power Supply
- NEBS compliant

Cisco 800 Series

	890	880G	880	860	860VAE
10/100/1000 WAN	Yes				Yes *
10/100 WAN		Yes	Yes	Yes	Yes *
ADSL2/2+ WAN		Yes	Yes	Yes	Yes
VDSL WAN		Yes	Yes		Yes
G.SHDSL WAN		Yes	Yes		
LAN Interfaces	8x 10/100	4x 10/100	4x 10/100	4x 10/100	4x 10/100
802.11n (a/b/g/n)	Yes				
802.11n (b/g/n)		Yes	Yes	Yes	
SRST (4 users)			Yes		Yes *
3G Wireless		Yes			

Secure Mobility Platform

- Very small offices, Cisco Virtual Office (teleworkers)
- WAN Access with Security
- Integrated 3G + VDSL on 880 platforms
- Fixed configurations:
  - Pick your:
    - WAN interface(s)
    - 802.11 Wireless (Y/N)
    - SRST* (Y/N)
    - Backup Interface

* SRST available with 10/100 or G.SHDSL WAN

The 3945 Branch in a Box

Exploring the possibilities…

Service Performance Engine

- Upgradable Performance
- Advanced Routing Engine
- Universal IOS Image

Metal cover on CF slot

- Makes it harder for co-workers to steal flash for their cameras

Multi Gigabit Fabric

- Ethernet functions such as vlan trunking across router fabric
- Packet flow between modules without impacting CPU

NG DSP Modules

- High density DSP modules
- Configurable Power Saving modes

GE Ports

- Terminate Fibre directly on platform
- GPON/DPON SFP

EHWIC

- 3G interface for backup connectivity
- LTE Roadmap
- Wide variety of xDSL

EtherSwitch Module

- Up to 48 ports of L2/L3 ePoE switching
- Full feature parity with Cat 2K/3K

Internal Services Module

- VPN Acceleration
- Wireless LAN Controller

UCS-Express

- Bare Metal server virtualisation

Cisco WAAS

- Integrated WAN Optimisation

What's New?

819 M2M 3G Gateway w/ Wifi & 4G	812 MiFI (Cellular plus Wifi)	4G LTE HWIC
		
Compact, Hardened 802.11 a/b/g/n Dual Radio 4G/LTE , GPS, Mobile IP Ready	ISR w/ 3G in AP Form Factor Portable, Rapid Deployment POE Powered (Optional)	Downlink 100 Mbps / Uplink 50 Mbps Super Low Latency (< 50 ms) - 5x Lower than 3G

ISR 819

	819	819H	819W	819WH
3G/4G WAN	3G	3G	3G & LTE	3G & LTE
3G Antenna	External/Diversity	External/Diversity	Embedded & External/Diversity	Embedded & External/Diversity
WLAN (a/b/g/n)	no	no	2.4 or 5.0 GHz	2.4 or 5.0 GHz
Unified Support (Licensed Option)	no	no	yes	yes
Wifi Antenna	no	no	External	External
Onboard WAN Ports	1 GE	1 GE	1 GE	1 GE
12-in-1 Serial (Licensed Option for Sync WAN)	1	1	1	1
Onboard LAN Ports	4 FE	4 FE	4 FE	4 FE
GPS / SMS	yes	yes	yes	yes
IOS (Universal Image)	15.2(1)T	15.2(1)T		
Reset to Safe/Golden IOS & Config	yes	yes	yes	yes
Hardened (-20/60C / IP41)	no	yes	no	yes
Power Supply	External	External	External	External
Dimensions (HxDxW)	178x173x44 mm	178x173x44 mm	178x173x44 mm	178x173x44 mm

Cisco's First Enterprise Class 4G LTE ISR G2

"Enables high-performance, secure, reliable and seamless rich-media applications anywhere & anytime"

4G LTE

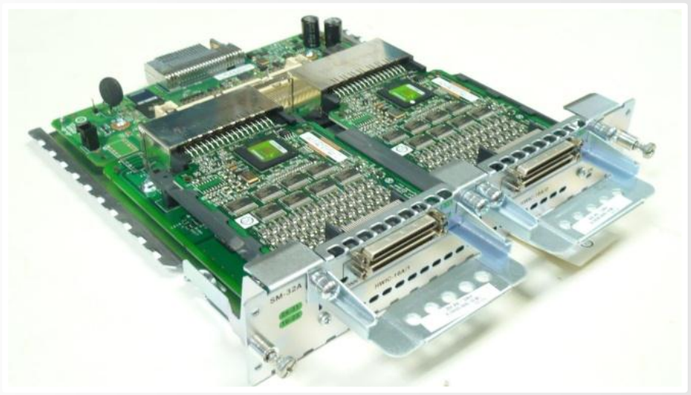
Downlink 100Mbps / Uplink 50Mbps

Multimode 4G LTE for ISR G2 with backward compatibility to 3.9G - 2.5G

- **High Performance** Throughput - Up to 20x Higher compare to 3G
- **Super Low Latency** (< 50 ms) – Round-Trip-Time up to 5x Lower than 3G
- **IP Multimedia Subsystem (IMS)** – VoIP & SMS on IPv6 over IMS Dedicated Bearers
- **Dual Stack IPv4/v6** with multiple bearers for QoS Traffic (Voice, Video, Data)
- Inter Radio Access Technology - **Smooth Seamless Handoff** from 3G to 4G LTE
- **Active GPS** with 2x2 MIMO Antenna

What Else is New?

High Density 32-port Async Serial	880 ISR with Voice	860VAE



SMB, Branch Offices & Enterprise Teleworker

- Up to 192 async ports
- Terminal / Dial access Server
- Feature Parity with HWIC-8A/16A

- Remote Call Centre Agent
- 4 FXS, 2BRI, 1 FXO
- SRST, Cube, CME
- Optional POE

- Std DSL chipset
- Fanless
- ScanSafe Support
- QoS and BGP

Expanding Fibre Portfolio

892F with pluggable SFP

Low-Cost Routed Port EHWIC
1 Port, Combo SFP/CU

GPON/EPON SFP

- Flexible Metro Ethernet Access Options
- Cisco and third party SFP support
- Consistency across the portfolio

Cisco 897VAMW Series

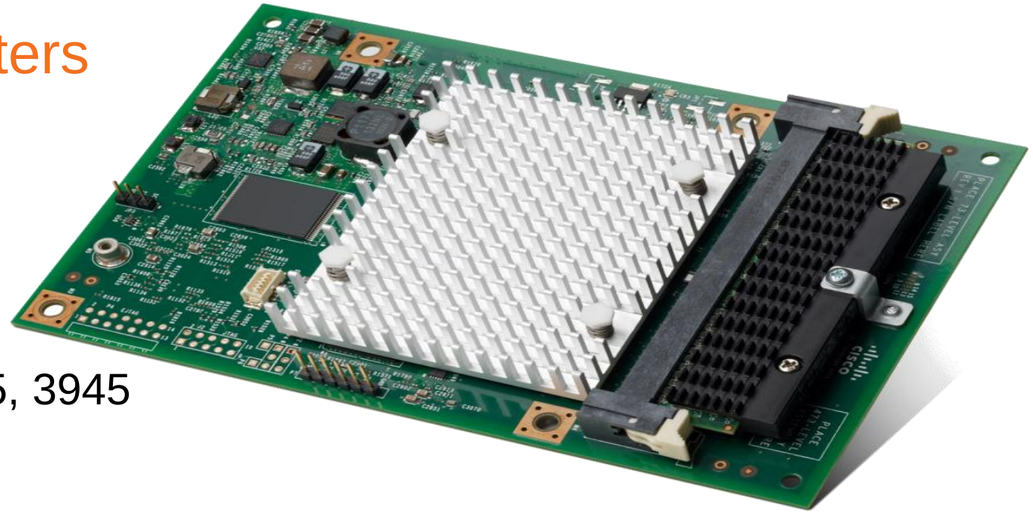
Memory
Flash
Default: 256 MB
Max: 256 MB

DRAM
Default: 512 MB
Max: 1G MB (License)

- Desktop chassis with external power supply
- One USB 2.0 flash memory or security e-token
- Default Cisco IOS Advanced IP Services feature set

Cisco VPN ISM for ISR G2

Delivering High Performance VPN for Branch Routers



Availability

- IOS Requirement: 15.2(1)T1 or later
- Supported Platforms: 1941, 2901, 2911, 2921, 2951, 3925, 3945
  - (Note: Not supported on 1941W, 3925E, 3945E)

Features

- Plug and play Internal Service Module (ISM) for VPN acceleration
- Hardware encryption support for both IPsec and SSL VPN
- Hardware support for IKEv2 and Suite B crypto algorithms

Performance

- High IPsec VPN throughput (Up to 1.2Gbps)
- Up to 3X throughput and 2X supported IPsec tunnels over onboard crypto engine

For Your Reference

IPsec Performance & Scale with ISM-VPN

Platform	IMIX Throughput ISM-VPN	IMIX Throughput IOS only	1400-Byte Throughput	Max Number of Supported Tunnels
1941	140 Mbps	60 Mbps	500 Mbps	500
2901	145 Mbps	60 Mbps	550 Mbps	750
2911	150 Mbps	65 Mbps	600 Mbps	1000
2921	220 Mbps	80 Mbps	700 Mbps	1500
2951	385 Mbps	150 Mbps	900 Mbps	2000
3925	550 Mbps	210 Mbps	1100 Mbps	2500
3945	600 Mbps	245 Mbps	1200 Mbps	3000

- Note: Single stream of IPsec traffic with AES encryption is used for the throughput measurement

Ethernet Switch Module Overview

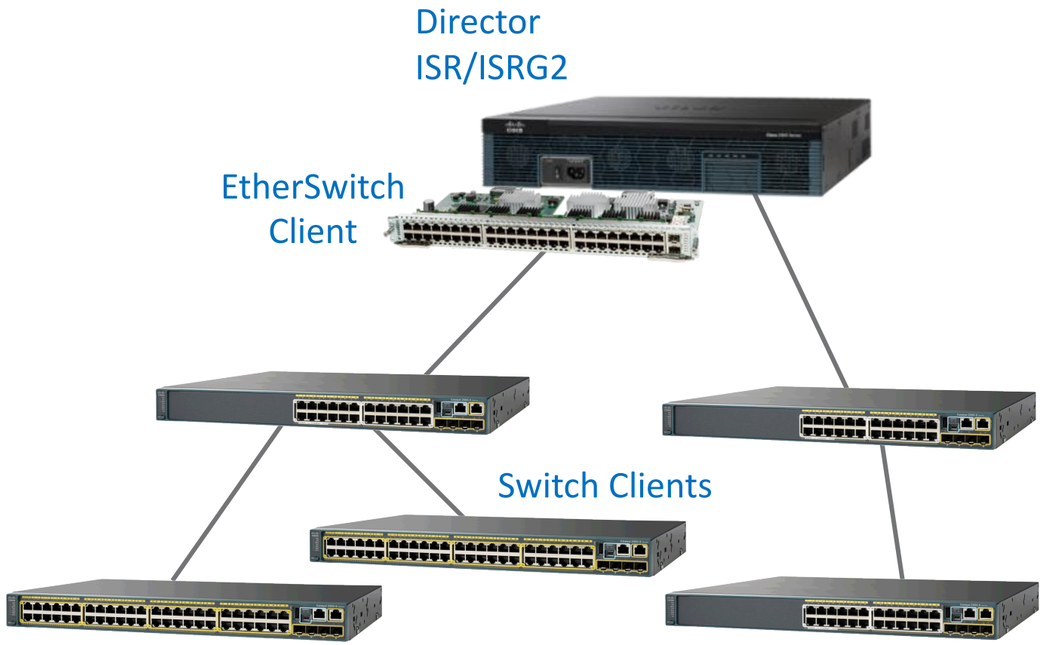
- Gigabit Ethernet 10/100/1000
- One L2/L3 and one pure L2 family offered
- 16, 24, and 48 ports of GE or FE LAN, Local line-rate Layer 2/3 switching
- Same feature set and roadmap as the latest LSBU Catalyst 3560-X/2960-S switches*
- Integration with the router's Multi Gigabit Fabric LAN optimises traffic between modules, with no impact on CPU/WAN performance
- Smart Install
  - Zero touch Install/Replace/Backup
  - AutoImage, AutoConfig
  - Treat the ESM like a line-card or a standalone switch

- Higher availability, up to 2x when compared to a standalone switch
- Designed to promote Borderless Networks
  - Support the same features and configurations in the branch are in the headquarters
  - Integrates the latest enterprise switch features into the router
- Increased Power Over Ethernet
  - Enhanced POE (ePOE) Up to 20 watts per port
  - Takes advantage of 2900/3900 increased power levels offering up to 1040 watts per chassis
  - Per port autosensing and configuration of power levels
- EnergyWise per port-based and per slot-based power saving controls

* No CTS PHY Encryption , or POE+ (30w)

Smart Install

Automatically Deploy Switches in the Branch



Routers:

Director only - 15.1(3)T

Switches:

Client – 12.2(52)SE

Director - 12.2(55)SE

Zero Touch Installation

Zero Touch Upgrade

Zero Touch Replacement

Director	ISRG2, ISR G1, Catalyst 3xxx series
Mix-and-Match Clients	Catalyst 3750, 3750-E, 3560, 3560-E, 2960, 2975, All NME and SM EtherSwitch modules

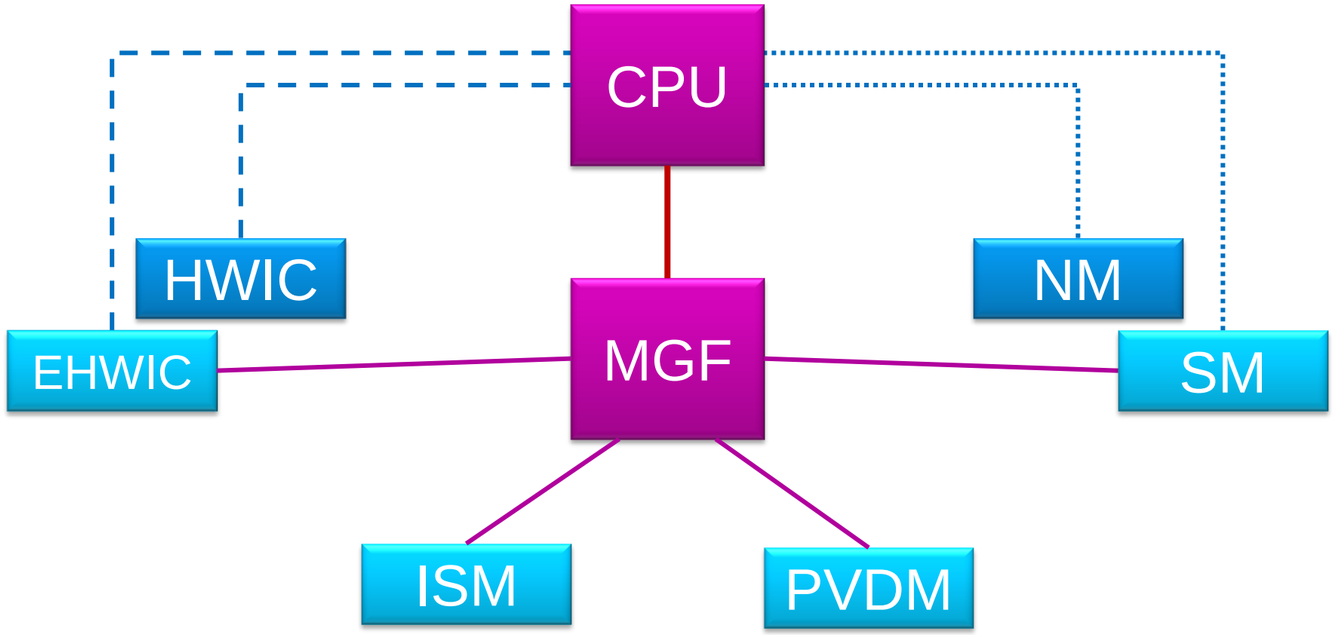
Cisco Integrated Customisation Services (CICS)

- High Volume, Zero Touch deployment solution from Cisco
- New Service from Cisco that supports Cisco Integrated Service Router (ISR) G2
- Helps customers realise cost savings, increase operational efficiency, and deliver services faster (time-to-market)
- Open to all Cisco customers
- Supported on Cisco Commerce Workspace (CCW) only
  - Cisco Commerce Workspace (CCW) provides a simplified commerce experience that allows partners to configure, price, and quote products, software and related service, and to submit orders from one screen
  - http://www.cisco.com/web/go/ccw
  - http://www.cisco.com/web/services/ordering/downloads/cisco_commerce_workspace_vod.mp4

Packet Flow in an ISR G2

ISR G2 Architecture

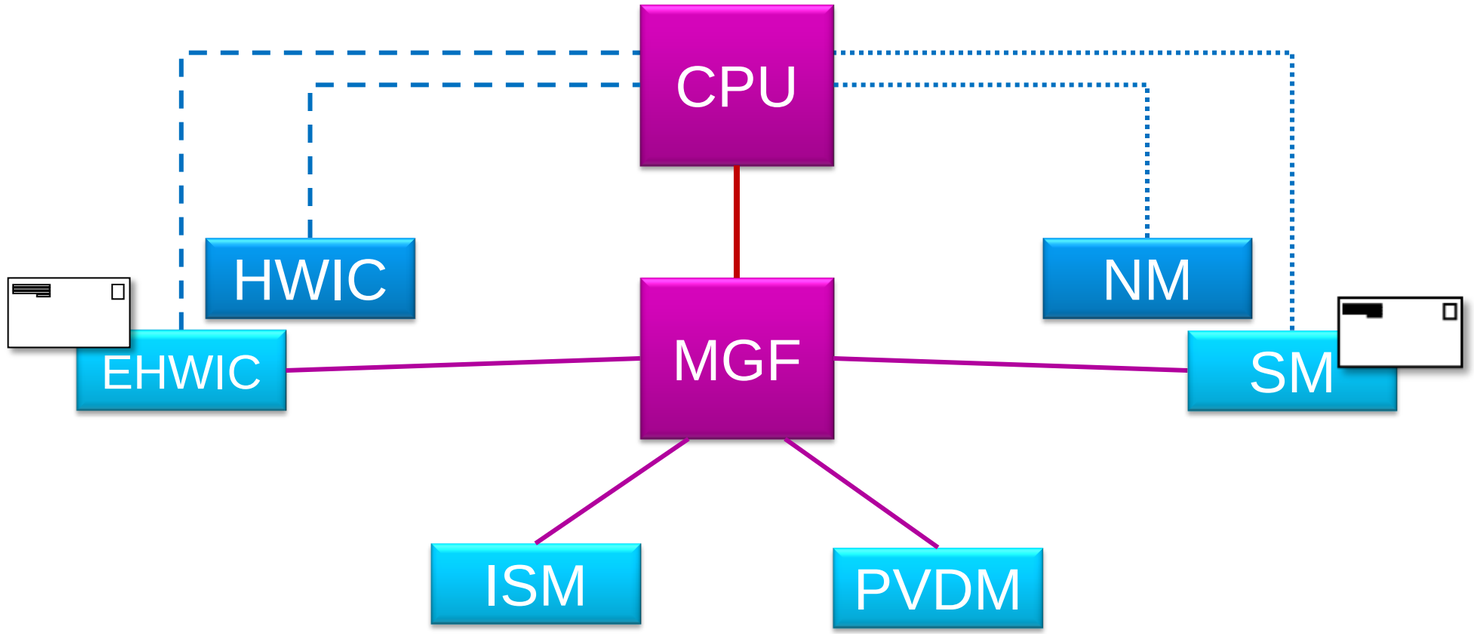
1941 and Above



Gigabit Ethernet
PCI-Express
HWIC DDR

ISR G2 Packet Flow

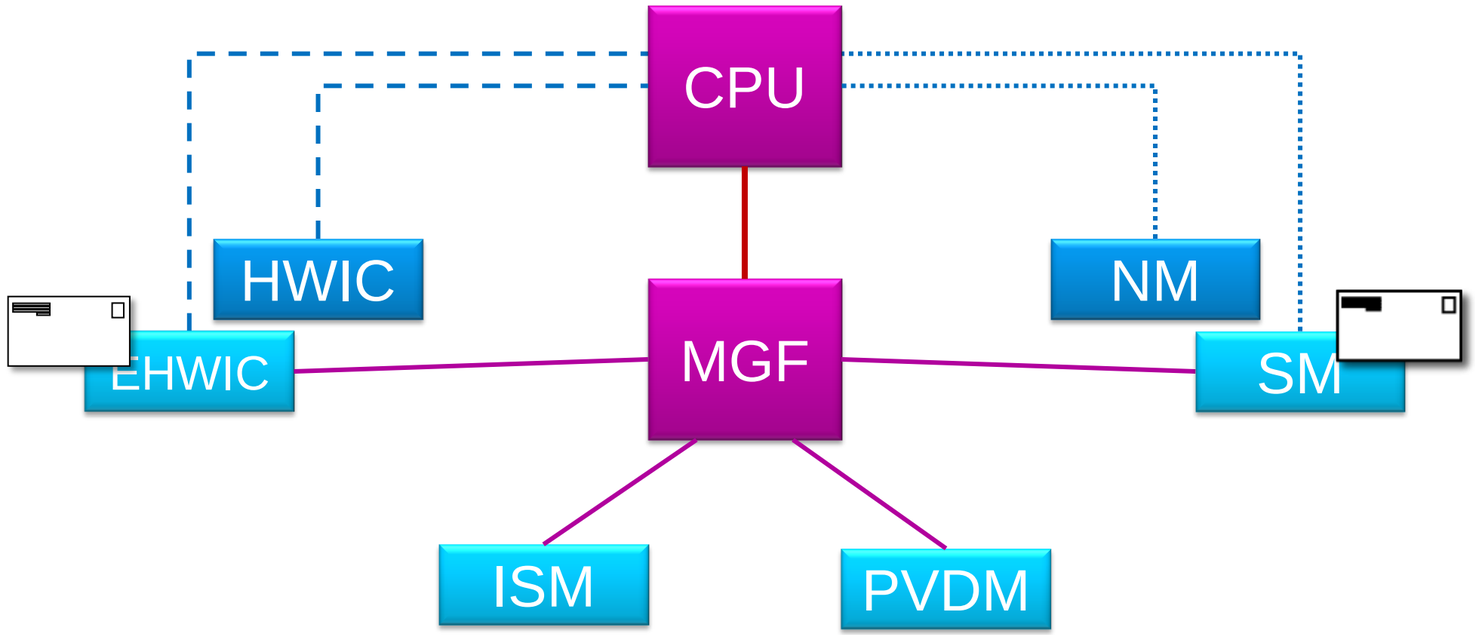
Normal Layer 3 Routing



Gigabit Ethernet
PCI-Express
HWIC DDR

ISR G2 Packet Flow

Module-To-Module Communication



Gigabit Ethernet
PCI-Express
HWIC DDR

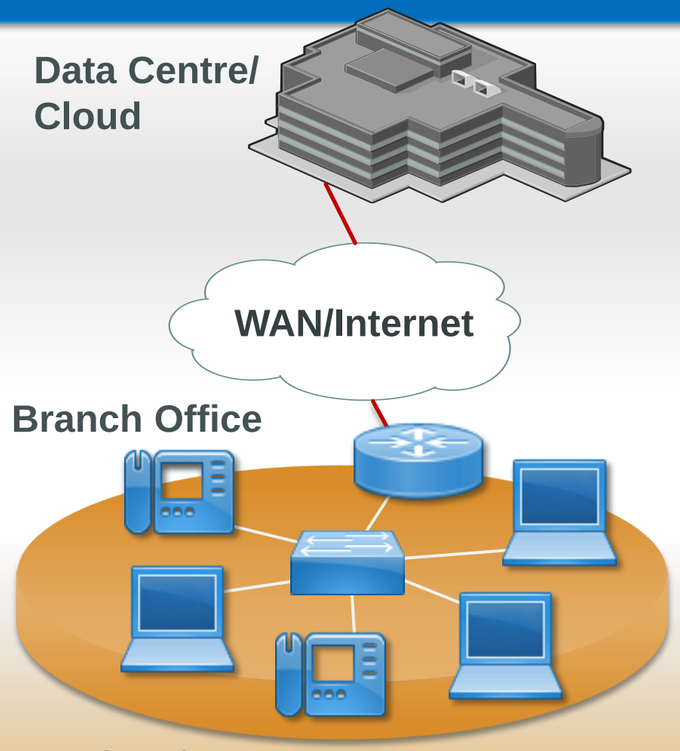
Cloud Intelligent Network

UCS E-Series

The Lean Branch Office

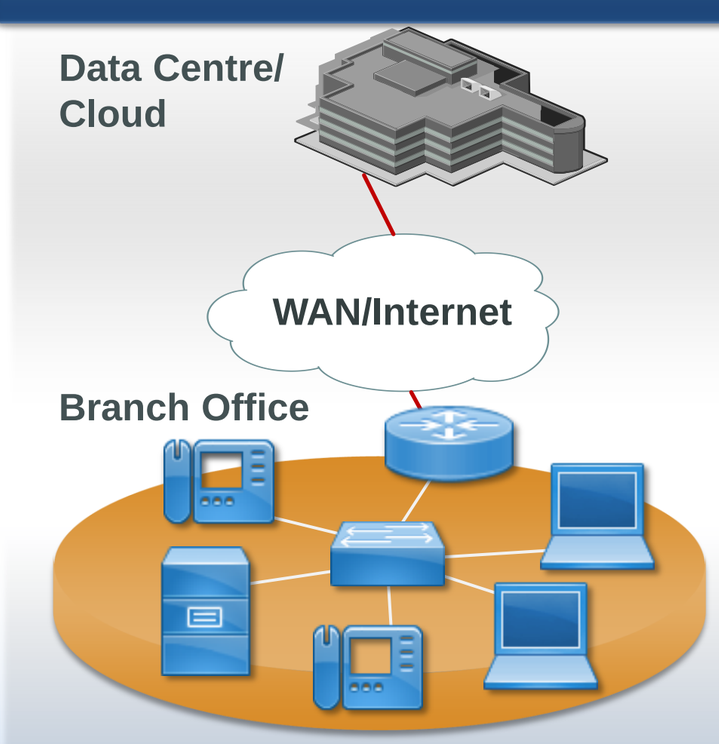
Balancing IT Efficiency and User Experience

Serverless Branch



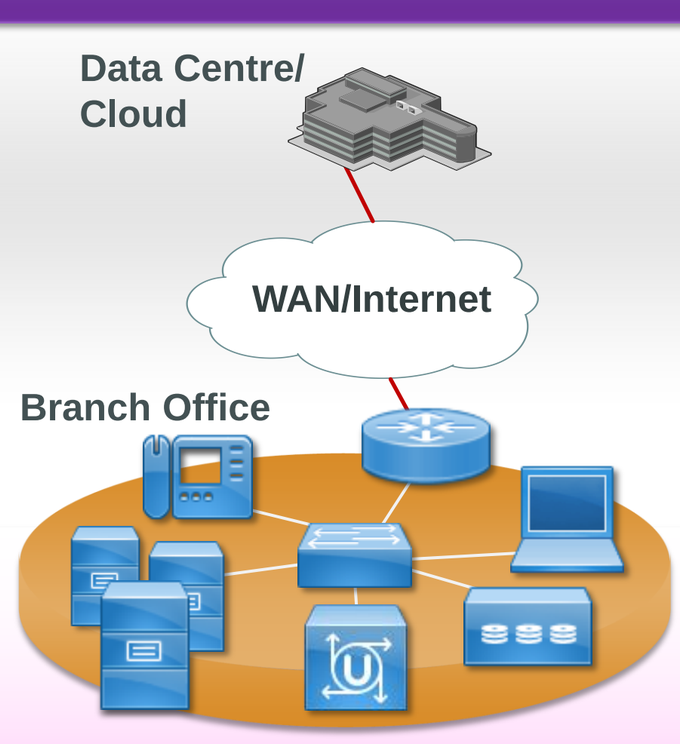
- No local servers
- Full reliance on WAN
- Simplicity, low cost
- No service guarantees

Lean Branch



- 4-5 local servers
- Full reliance on WAN except for mission-critical applications

Full-Service Branch



- All servers local
- No reliance on WAN
- Complexity, high cost
- Service guarantees

Lean Branch Office Applications

Edge Applications That Defy Centralisation

Core Windows Services

- DNS and DHCP Servers
- Microsoft Active Directory
- Windows Print Services
- Windows File Services
- Others …

Mission Critical Business Applications

- Point of Sale Server
- Bank Teller Control Point
- Electronic Medical Records
- Inventory Management
- Others …

Client Management Services

- Software Update Service
- Client Monitoring Service
- Backup and Recovery
- Terminal Server Gateway
- Others …

Cisco ISR G2 as Blade Server Enclosure

Use Slots on Most Widely Deployed Branch Device

Secure platform with small attack surface

Redundant power supply options

Direct blade to LAN connectivity

Long service life 2x typical blade system

1, 2, 4 blade slots options

2 and 3 RU options

Performance

Mobility

Connectivity

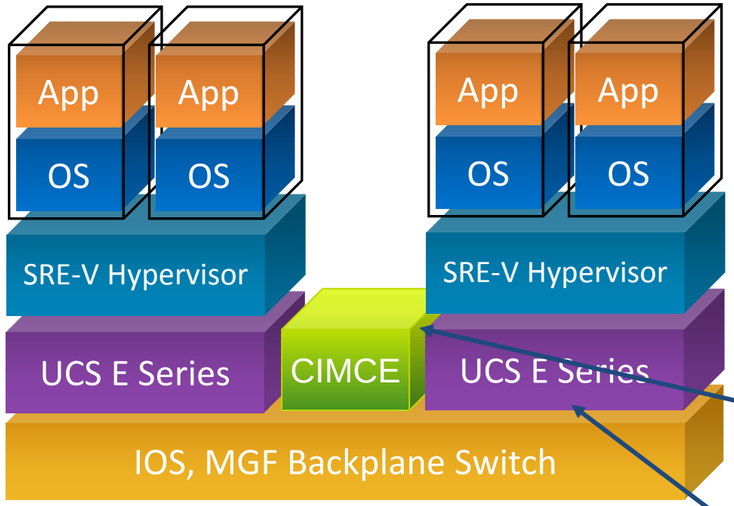
Applications

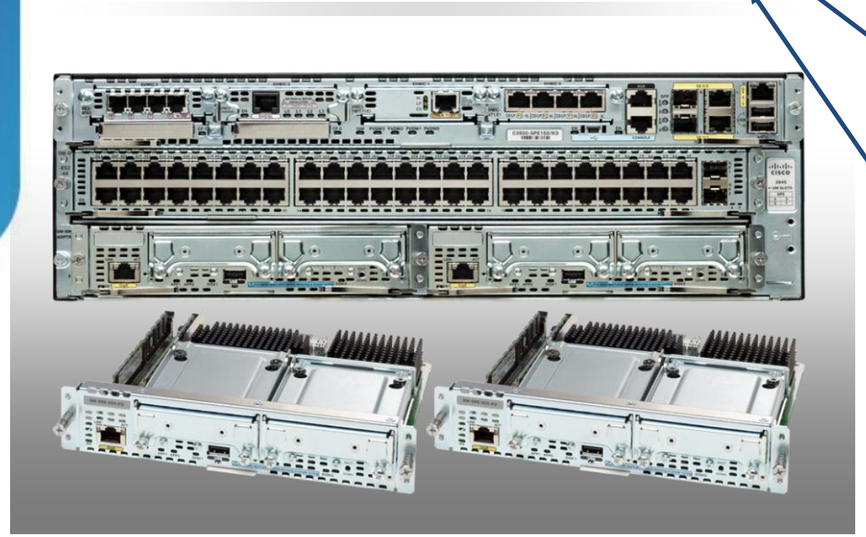
Collaboration

Security

Cisco UCS Express Components

Simplifying Lean Branch Office Infrastructure





Platform for Edge Applications

- Microsoft Windows Server certified

Server Virtualisation

- VMWare vSphere (ESXi) or other Hypervisor/Operating System

Dedicated Blade Management

- Cisco Integrated Management Controller
- Consistent management for UCS family

Multipurpose x86 Blades

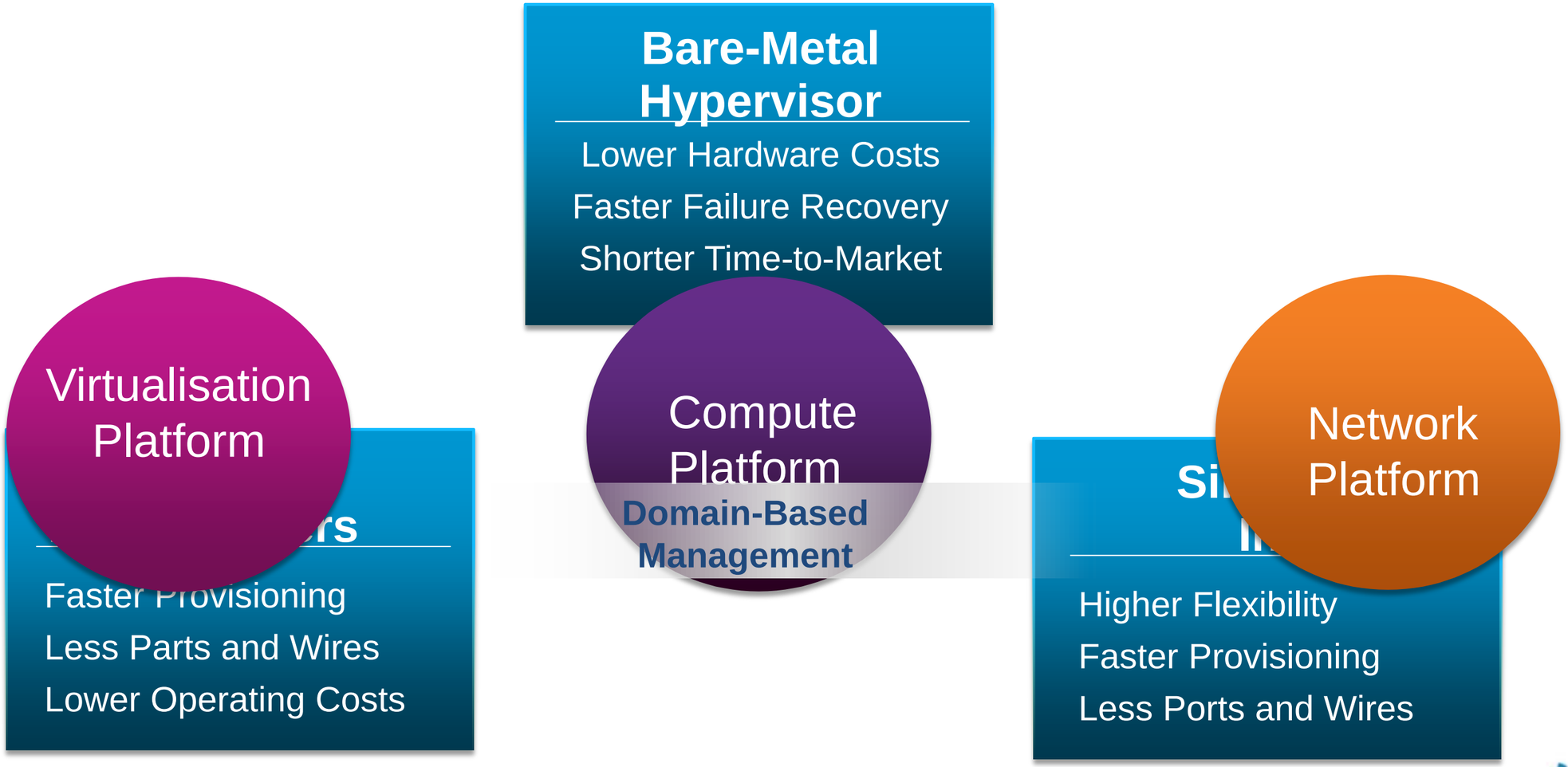
- Cisco UCS E-Series modules
- House up to 4 server blades in ISR G2

Single-device Network Integration

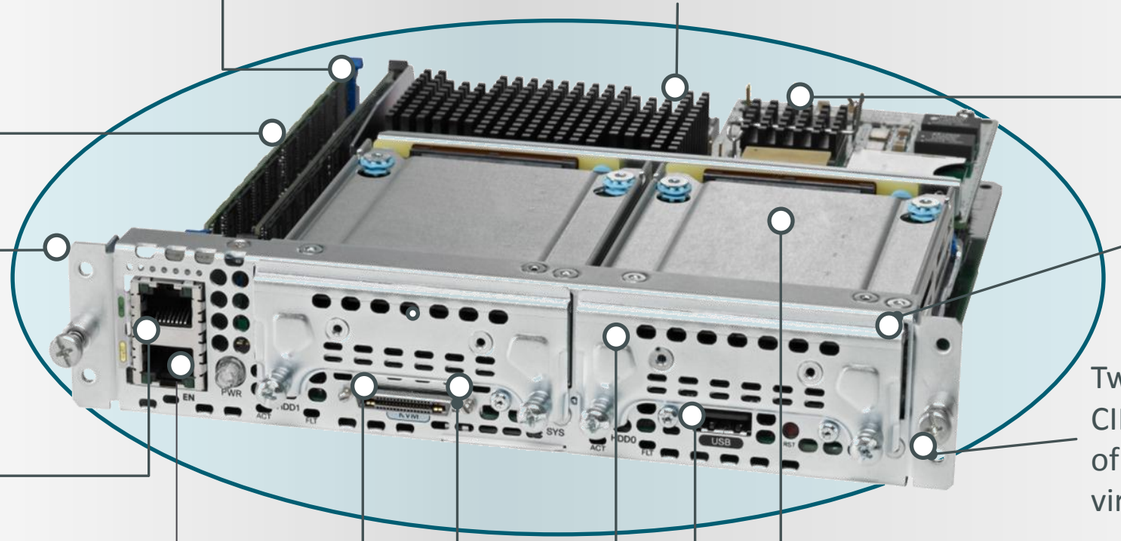
- House all devices in ISR G2 chassis
- Multi-Gigabit Fabric backplane switch

Unified Computing System Express

Addressing Lean Branch Office Challenges



UCS E Series Single-Wide



Maximum 65 W Power Draw
80% Less Than Server

Intel Xeon E3 family quad-core processor

iSCSI Initiator Hardware Offload

8 GB , 12 GB and 16 GB DRAM Options

Lights Out Configuration and Management Through CIMC

Remote and Schedulable Power Management

Two SD cards: one for the CIMC and temporary storage of OS and one for a blank virtual drive

One External and Two Internal GE Ports

Up to 2 SATA, SAS or SSD hard drives

10/100 Ethernet Management Port

USB 2.0 Port for External Device Connectivity

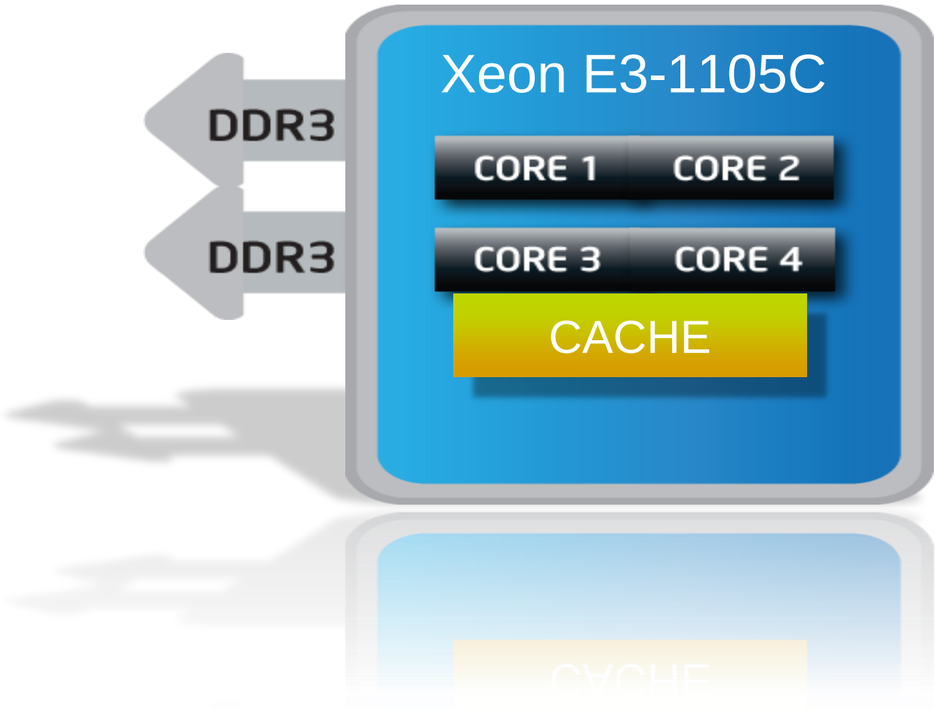
KVM Console connector

On board Hardware RAID 0/1 with Hot-Swap Capability

Wire-Free, Plug-and-Play Modularity, Low Shipping Weight (2.5 lb/1.1 kg)

Cisco UCS E-Series Single Wide CPU

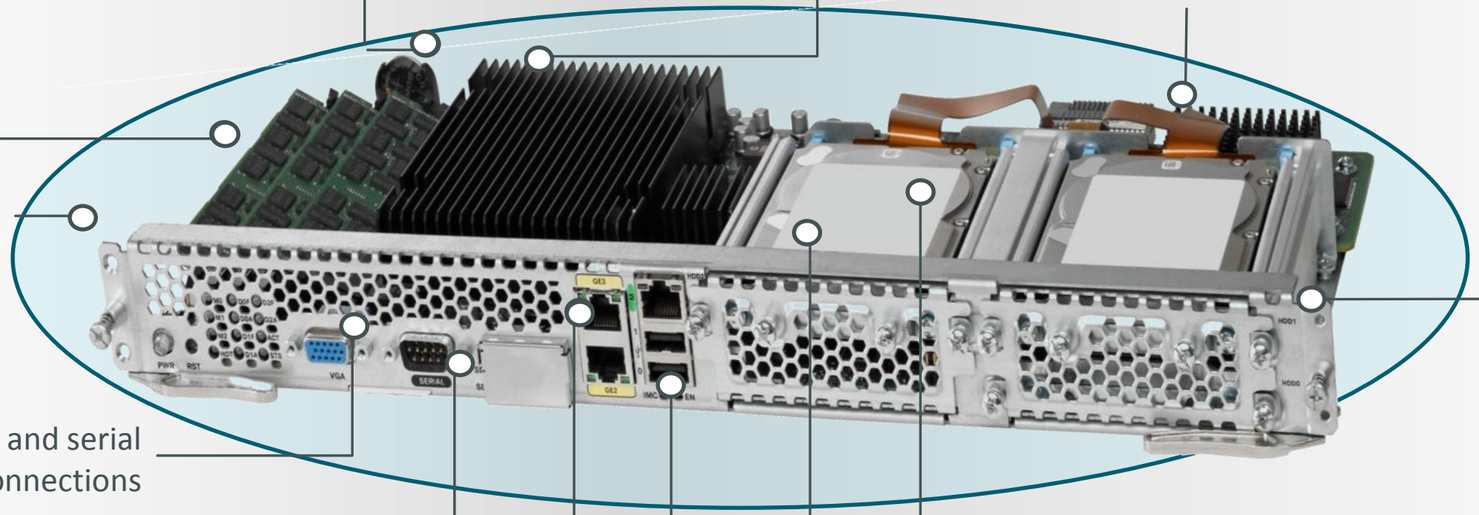
Intel® Xeon® Processor E3-1105C



4 Cores/ 8 Threads and 6MB of LLC at **25W thermal design power** (TDP) for small form factor communications applications.

Server-class features include 64-bit compatibility, Intel Virtualisation Technology, Intel AES-NI, and Error-Correcting Code (ECC) memory.

UCS E Series Double-Wide



Maximum 130 W Power Draw
80% Less Than Server

Intel Xeon E5-2400 quad core or six-core processor

8 GB - 48 GB DRAM Options

iSCSI Initiator Hardware Offload

Remote and Schedulable Power Management

Lights Out Configuration & MGMT Through CIMC

Front-panel VGA, 2 USB, and serial connections

Two SD cards: one for the CIMC and temporary storage of OS and one for a blank virtual drive

Up to 3 SATA, SAS, SSD hard drives or 2 HDD and a PCIe card

On board hardware RAID 0, 1 and 5 Configuration Options with Hot-Swap Capability

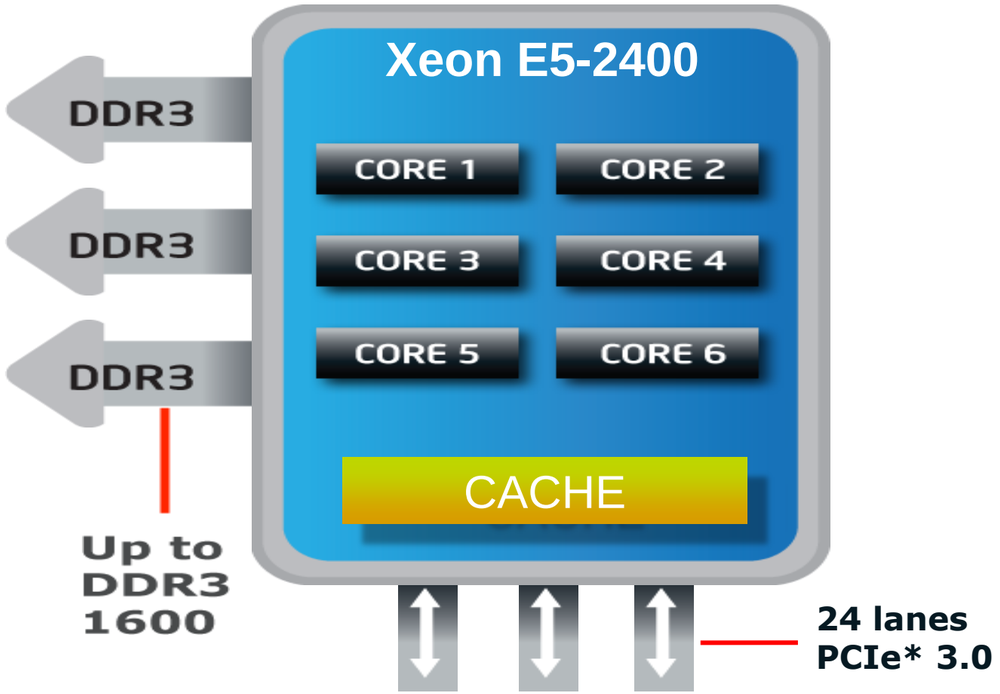
Two External and Two Internal GE Ports with TCP/IP Acceleration

Wire-Free, Plug-and-Play Modularity, Low Shipping Weight (7 lb / 3.2 kg)

Cisco UCS E-Series Double Wide Serverce

Intel® Xeon® Processor E5-2418L 0r E5-2428L

Addressing the Needs of Growing Small and Medium Business



Up to 3x performance increase compared to Intel® Xeon® processor E3-1200 v2 product family.[1]

More memory, I/O, and reliability for growing small and medium businesses.

Supports new technologies and features of Intel Xeon processor E5 family.

Makes small form factor solutions scalable with Intel Xeon processor E5-2418L and Intel Xeon processor E5-2428L.

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products.

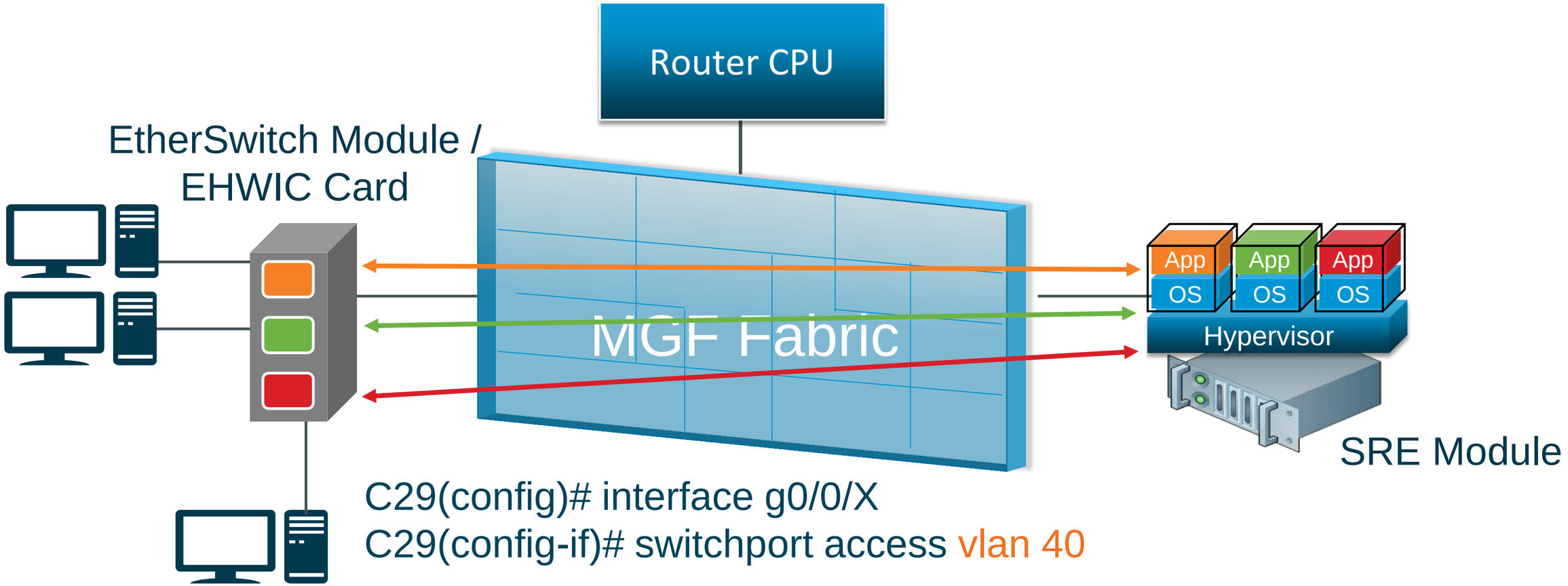
Source: Intel internal measurements on SPECjbb*2005 benchmark as of March 2012

UCS E Series Specs

For Your Reference

	UCS-E140S	UCS-E140D(P) UCS-E160D(P)
Processor	Intel Xeon (Sandy Bridge) E3-1105C (1 GHz)	Intel Xeon (Sandy Bridge) E5-2428L (2 GHz) / E5-2418L (1.8 GHz)
Core	4	4 / 6
Memory	8 - 16 GB DDR3 1333MHz	8 - 48 GB DDR3 1333MHz
Storage	200 GB- 2 TB (2 HDD) SATA, SAS, SED, SSD	200 GB- 3 TB (3 HDD*) SATA, SAS, SED, SSD
RAID	RAID 0 & RAID 1	RAID 0, RAID 1 & RAID 5*
Network Port	Internal: 2 GE Ports External: 1 GE Port	Internal: 2 GE Ports External: 2 GE Ports PCIE Card: 4 GE or 1 10 GE FCOE

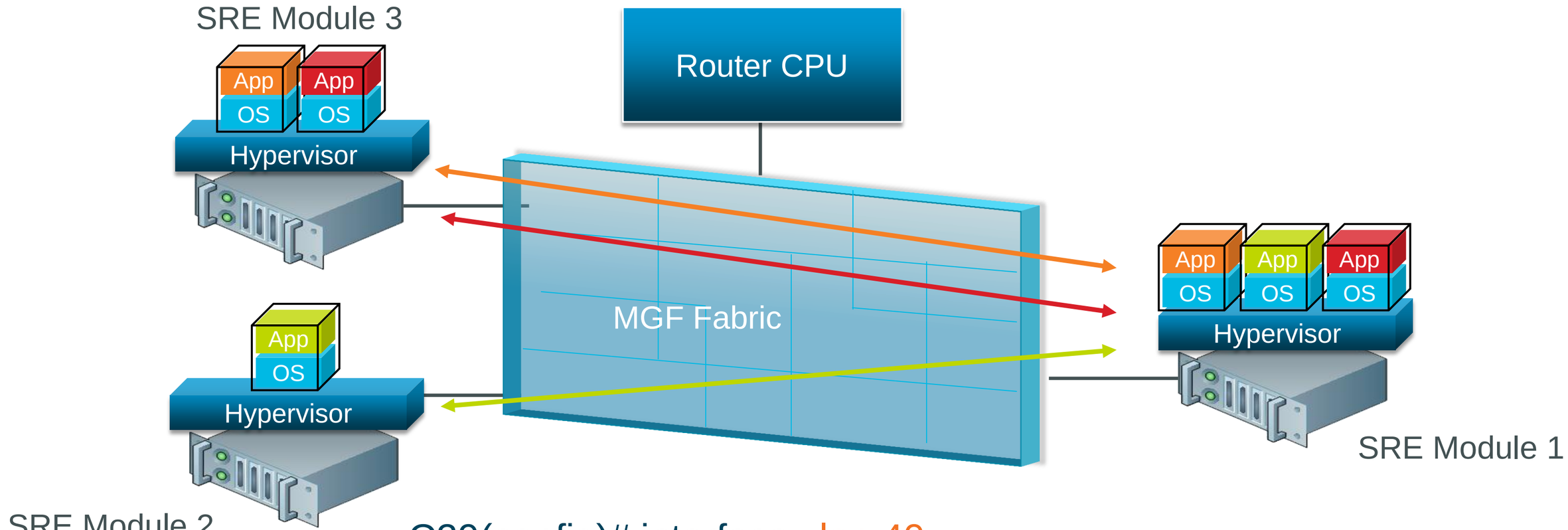
Use Case: Multiple VMs in Different VLANs and EtherSwitch Module/Card



C29(config)# interface g0/0/X
C29(config-if)# switchport access vlan 40

C29(config)# interface vlan 40
C29(config-if)# ip address 10.1.40.1 255.255.255.0

Use Case: Multiple VMs in Different VLANs on Multiple SREs



C29(config)# interface vlan 40

C29(config-if)# ip address 10.1.40.1 255.255.255.0

Cisco UCS E-Series Server Hypervisor and OS Support

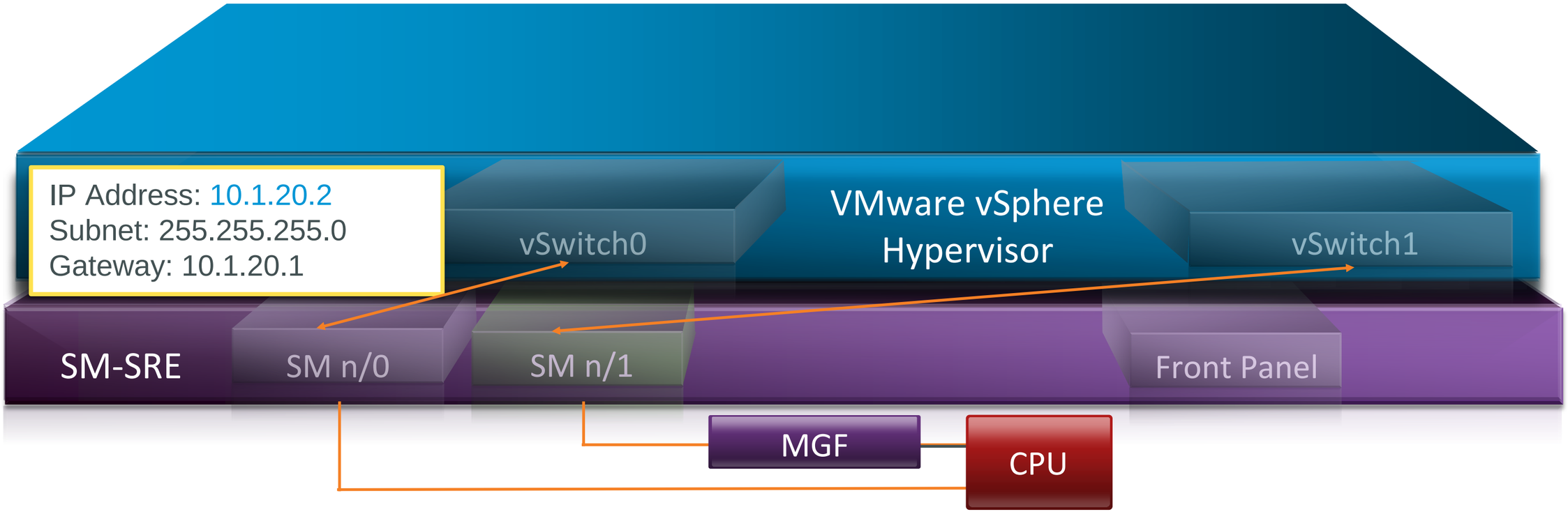
Hypervisors

- Microsoft Hyper-V
- VMware vSphere
- Citrix XenServer

Operating Systems (Bare Metal)

- Microsoft Windows Server
- Red Hat Enterprise Linux (RHEL)
- SUSE Linux
- Oracle Enterprise Linux

Configuring Network Connectivity

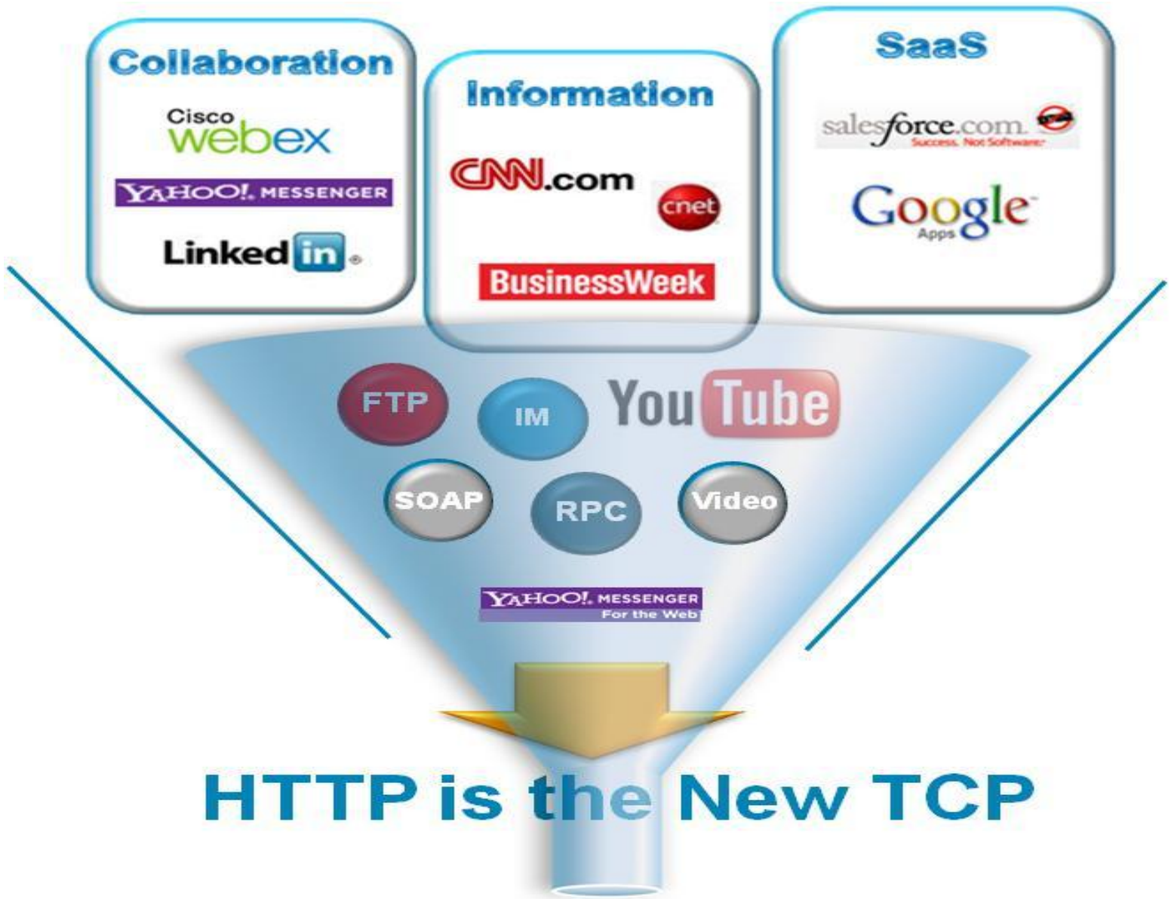



```
int SM 1/0
  ip address 10.1.20.1 255.255.255.0
  service-module ip address 10.1.20.2 255.255.255.0
  service-module ip default-gateway  10.1.20.1
```

```
int SMn/1
  switchport mode trunk
```

Application Visibility and Control (AVC)

“Today Network is an IT Blind Spot”



- Static port classification is no longer enough
- More and More apps are opaque
- Increasing use of Encryption and Obfuscation
- Application consists of multiple sessions (Video, Voice, Data)

What is An Application?

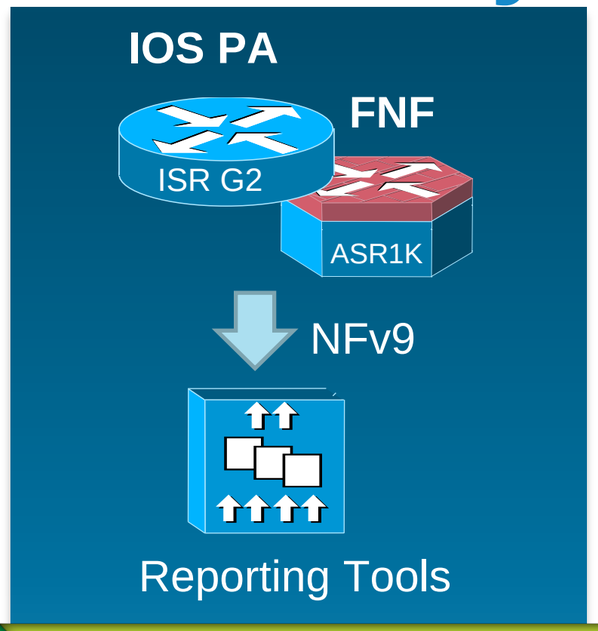
HTTP	→	80
FTP	→	20/21
POP3	→	110
IMAP	→	143
HTTPS	→	443
SMTP	→	25

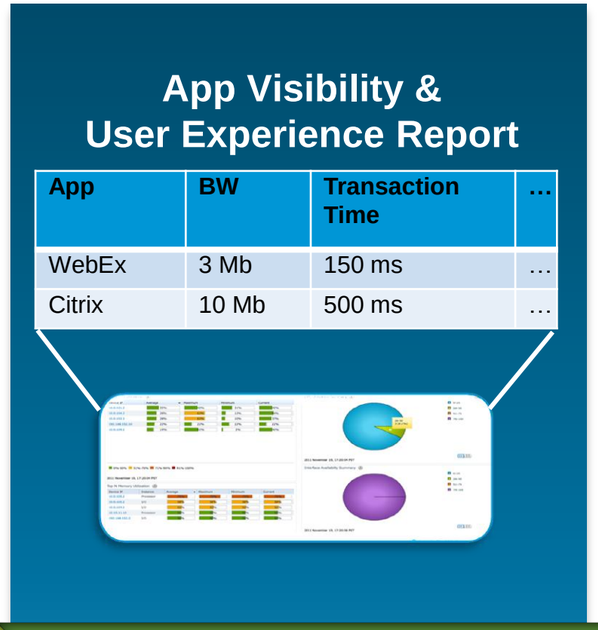
Are these applications?

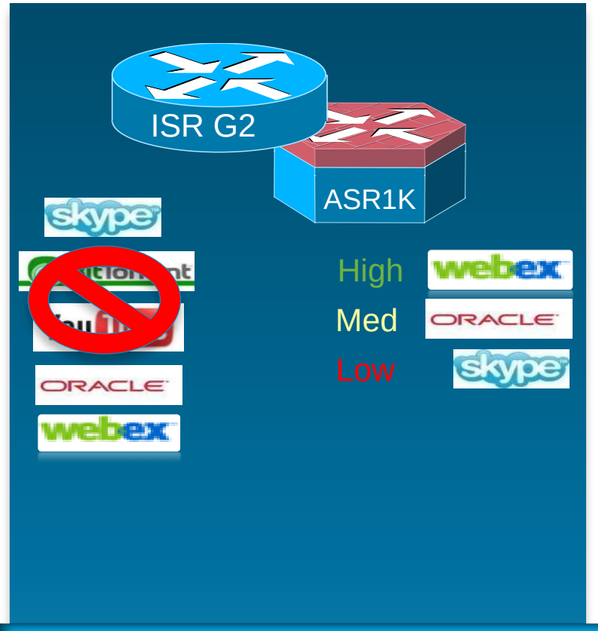
Or just ports?

What about these?

Application Visibility and Control







Deep Packet Inspection → Perf. Collection & Exporting → Reporting Tool → Control

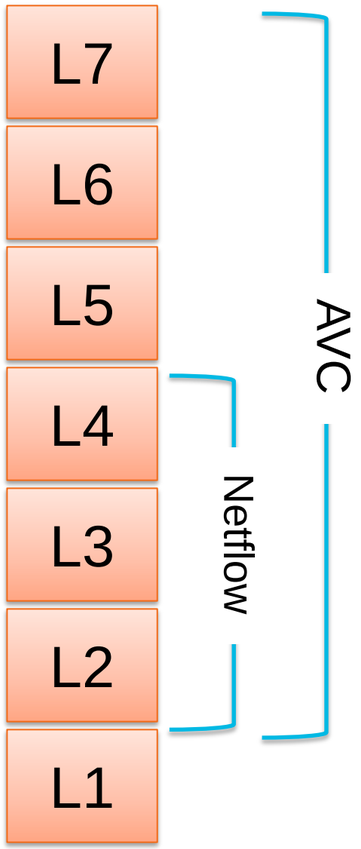
DPI engine (NBAR2) identifies applications using L7 signatures

ISR G2 & ASR collect application bandwidth and response time metrics, and export to management tool

Advanced reporting tool aggregates and reports application performance

Use QoS or PfR to control application network usage to improve application performance

Application Visibility and Control - Vision



- Expand platform **visibility** options up the full OSI stack
  - –Provide full Layer 2-7 view, rather than just Layers 2-4
  - –Know what **application**, not only ports that are being used
- Use that knowledge to **report** on key parameters
  - –… and allow you to choose **what** information is collected
- Use that knowledge to **prioritise** or **control** applications
  - –… using a well known, familiar QOS mechanisms

What is Really in Your Network?

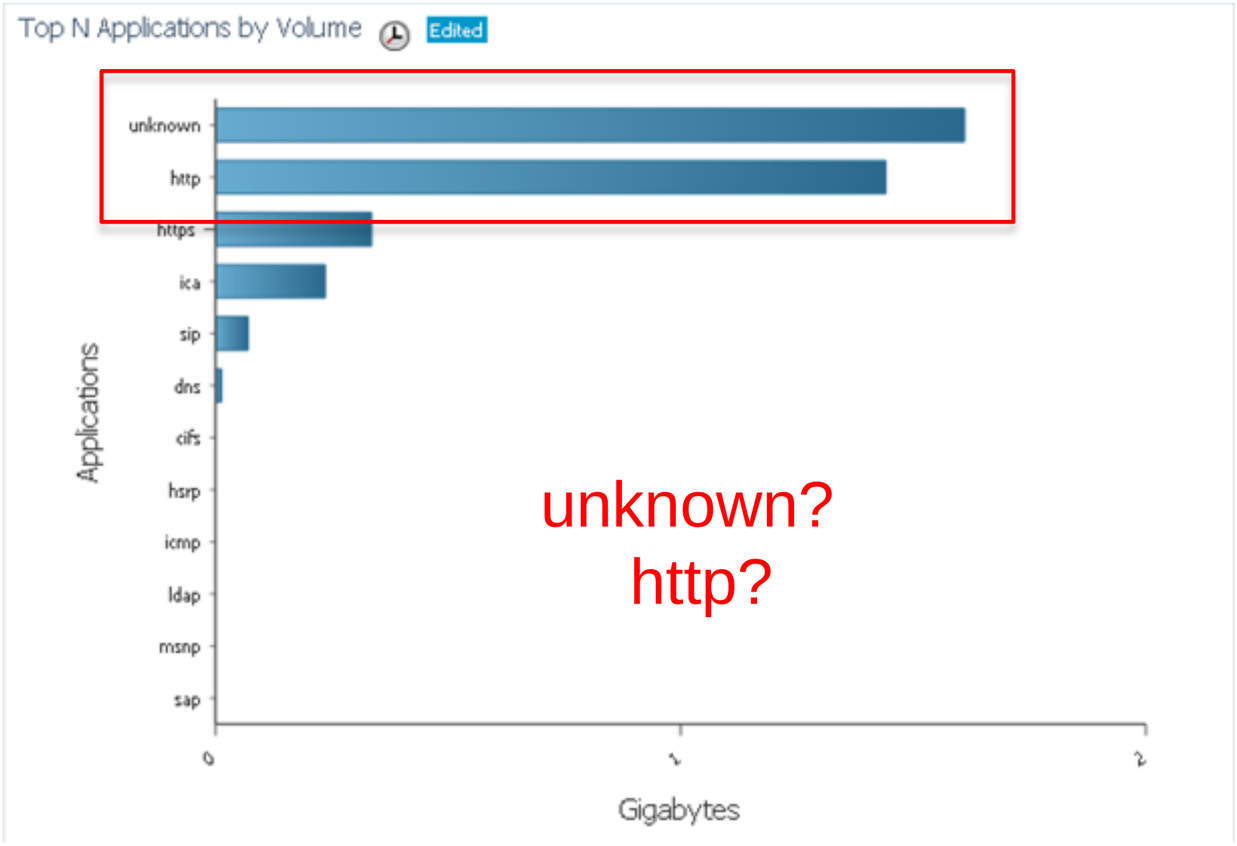
Cisco Prime Assurance

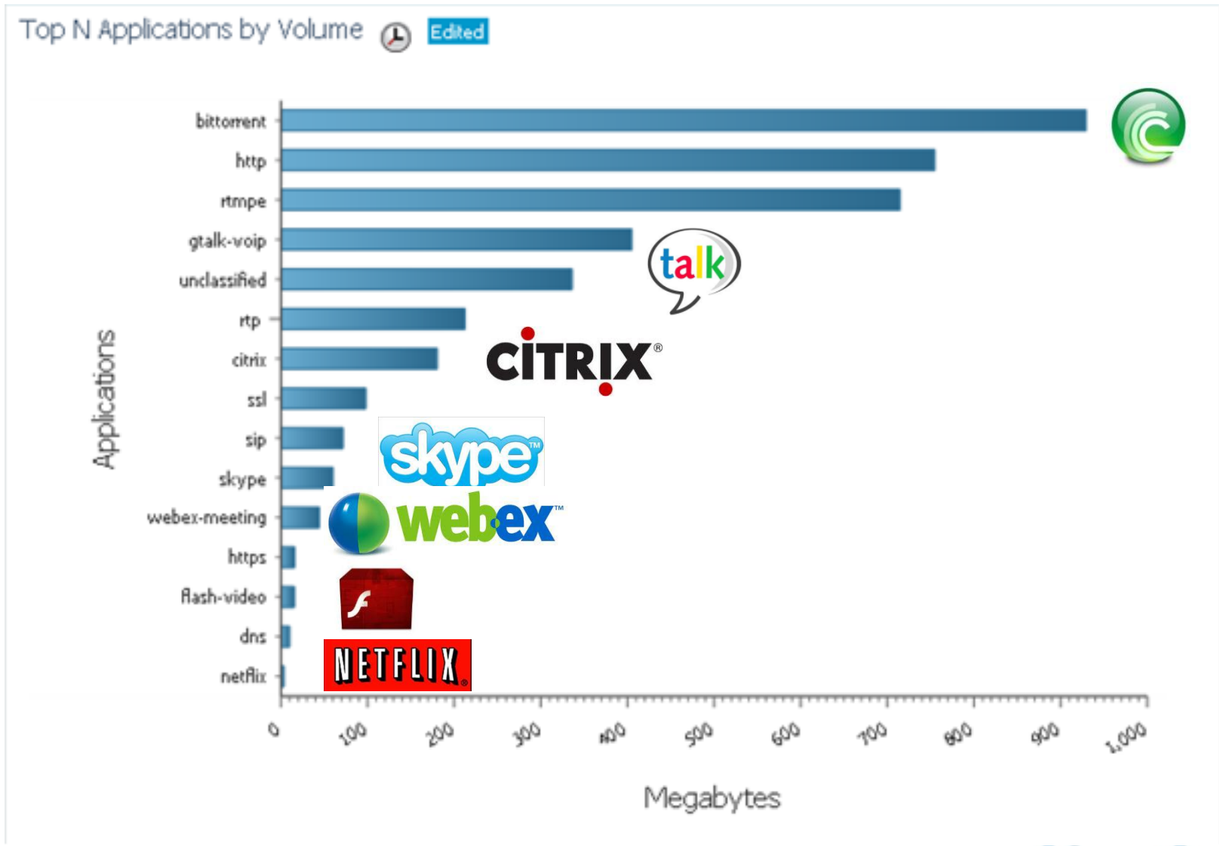
Overview Incidents

ministration

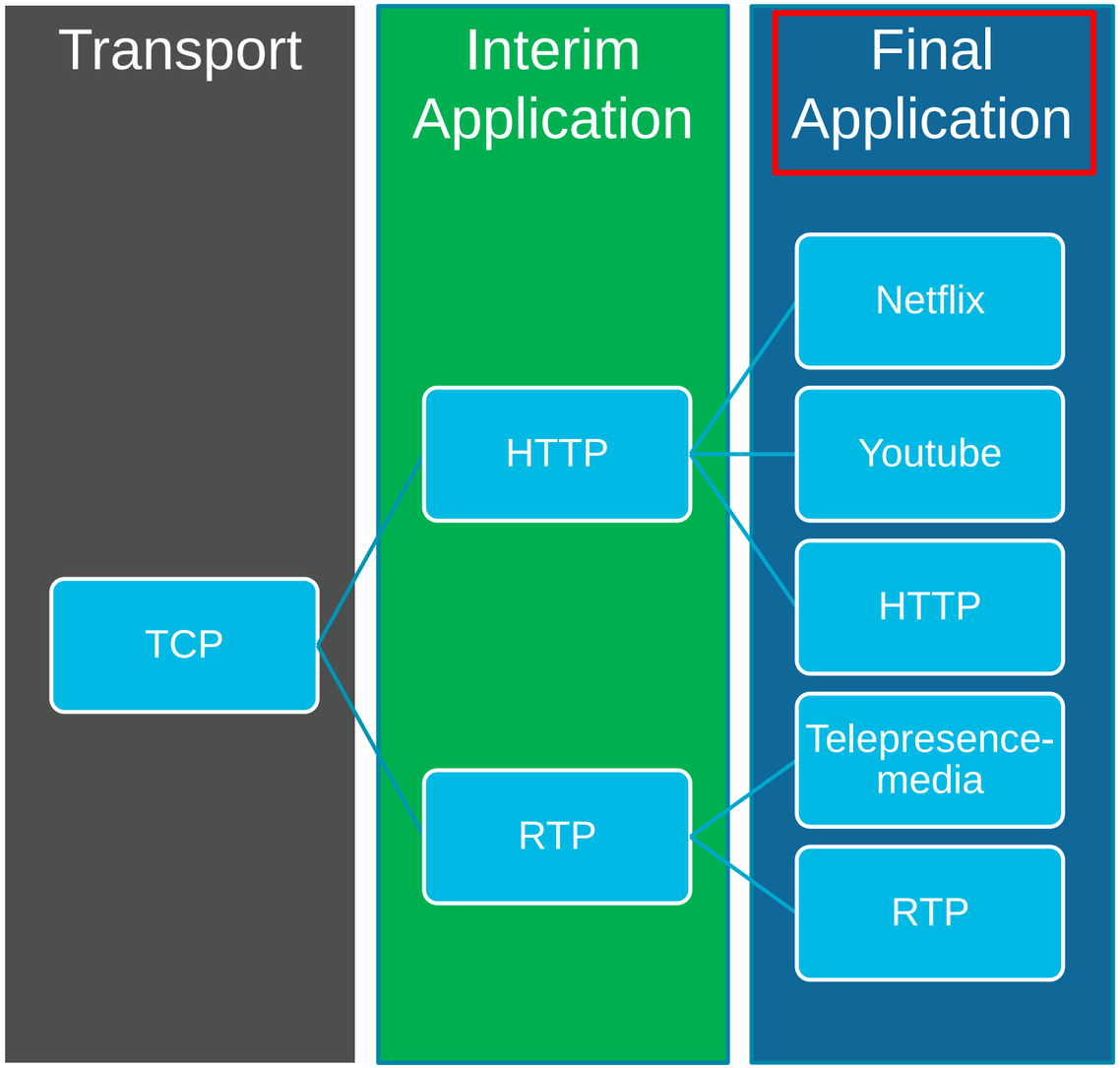
Port Monitoring

Application Monitoring





NBAR2 Classification Behaviour



- NBAR2 classification returns the best possible match for the traffic
- NBAR2 application ‘http’ includes only HTTP traffic not already matched by other specific signatures

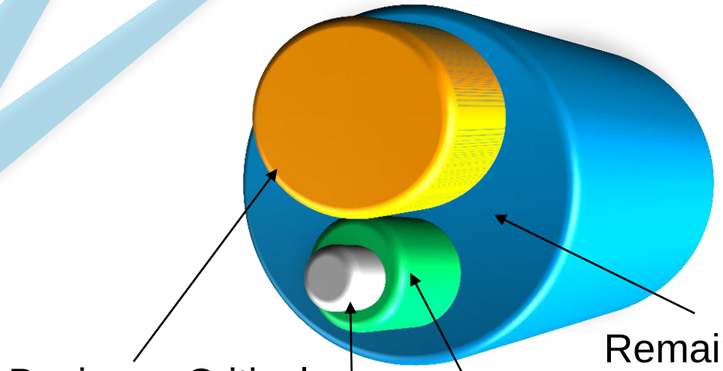
List of all NBAR2 Attributes and Values

NBAR2 Category	NBAR2 Sub-category	NBAR2 Application Group		P2P Technology	Encrypted	Tunnel
browsing	authentication-services	apple-talk-group	skype-group	n	n	n
business-and-productivity-tools	backup-systems	banyan-group	smtp-group	y	y	y
email	client-server	bittorrent-group	snmp-group	unassigned	unassigned	unassigned
file-sharing	commercial-media-distribution	corba-group	sqlsvr-group			
gaming	control-and-signalling	edonkey-emule-group	stun-group			
industrial-protocols	database	fasttrack-group	telepresence-group			
instant-messaging	epayement	flash-group	tftp-group			
internet-privacy	file-sharing	fring-group	vmware-group			
layer2-non-ip	inter-process-rpc	ftp-group	vnc-group			
layer3-over-ip	internet-privacy	gnutella-group	wap-group			
location-based-services	license-manager	gtalk-group	webex-group			
net-admin	naming-services	icq-group	windows-live-messanger-group			
newsgroup	network-management	imap-group	xns-xerox-group			
obsolete	network-protocol	ipsec-group	yahoo-messenger-group			
other	other	irc-group				
trojan	p2p-file-transfer	kerberos-group				
voice-and-video	p2p-networking	ldap-group				
	remote-access-terminal	netbios-group				
	rich-media-http-content	nntp-group				
	routing-protocol	npmp-group				
	storage	other				
	streaming	p2p-file-transfer				
	terminal	pop3-group				
	tunnelling-protocols	prm-group				
	voice-video-chat-collaboration	skinny-group				

Application Aware QoS

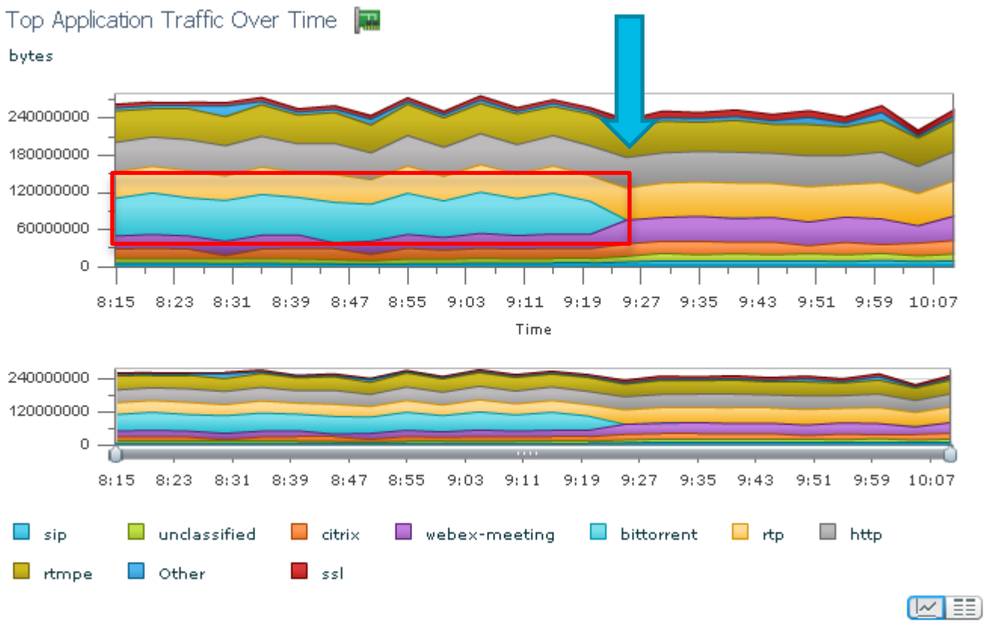
```
class-map match-all business-critical
      match protocol citrix
      match access-group 101

class-map match-any browsing
      match protocol attribute category browsing

class-map match-any internal-browsing
      match protocol http url "*myserver.com*"

policy-map internal-browsing-policy
      class internal-browsing
            bandwidth remaining percent 60

policy-map my-network-policy
      class business-critical
            priority percent 50

      class browsing
            bandwidth remaining percent 30
            service-policy internal-browsing-policy

interface Serial0/0/0
      service-policy output my-network-policy
```

Application	BW	Priority
Business Critical	Committed 50%	High
Browsing	30% (=15% of the line)	Normal
Internal Browsing	60% (Out of Browsing)	
Remaining	70% (=35% of the line)	Normal

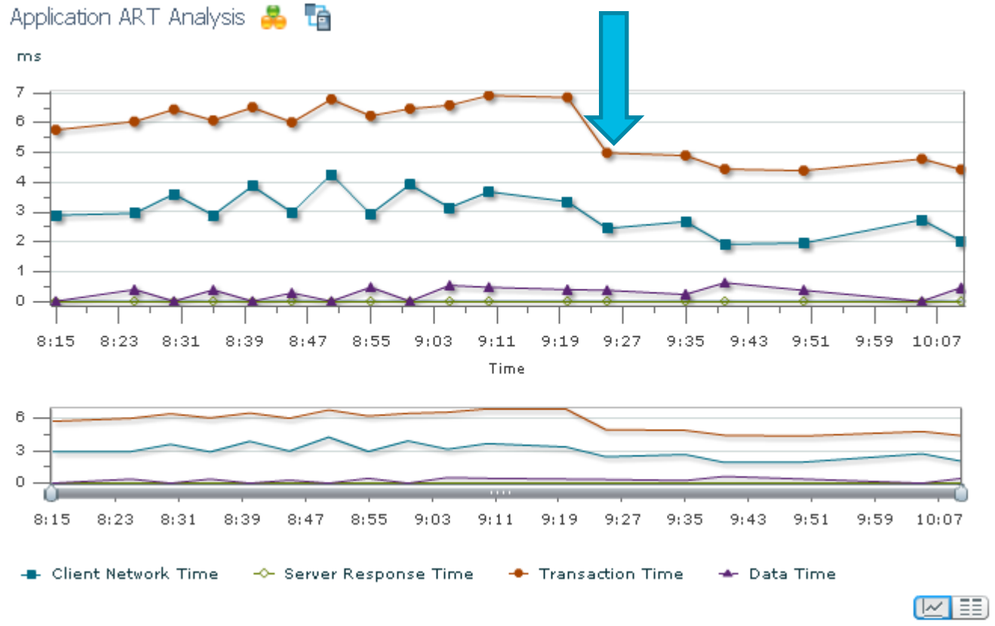


Example: Stop P2P Applications with AVC

Bandwidth Usage
After apply control policy



Critical Apps Response Time improves
After apply control policy




```
class-map match-any p2p-app
 match protocol dht
 match protocol attribute sub-category p2p-file-transfer
policy-map control-policy
 class p2p-app
  police 8000 conform-action transmit exceed-action drop
```

Shaping Example


```
class-map match-all browsing
 match protocol attribute category browsing
class-map match-all p2p
 match protocol attribute sub-category p2p-file-transfer
!
policy-map my-priority-policy
 class p2p
  bandwidth remaining percent 20
 class browsing
  bandwidth remaining percent 80
policy-map my-network-policy
 class class-default
  shape average 50000000
  service-policy my-priority-policy
!
interface GigabitEthernet0/0/2
 service-policy output my-network-policy
```

AVC Performance on ISR G2

Fixed Platform	Throughput (Mbps)
888-EA (ATM)	5
888-EA (EFM)	10
898-EA (EFM)	20
892-FSP	20

Modular Platform	Throughput (Mbps)
1941	48
2921	61
2951	78
3945	119
3925E	185

- Typical Enterprise WAN Traffic used
- CPU is approximate 80%

AVC Performance on ASR1K

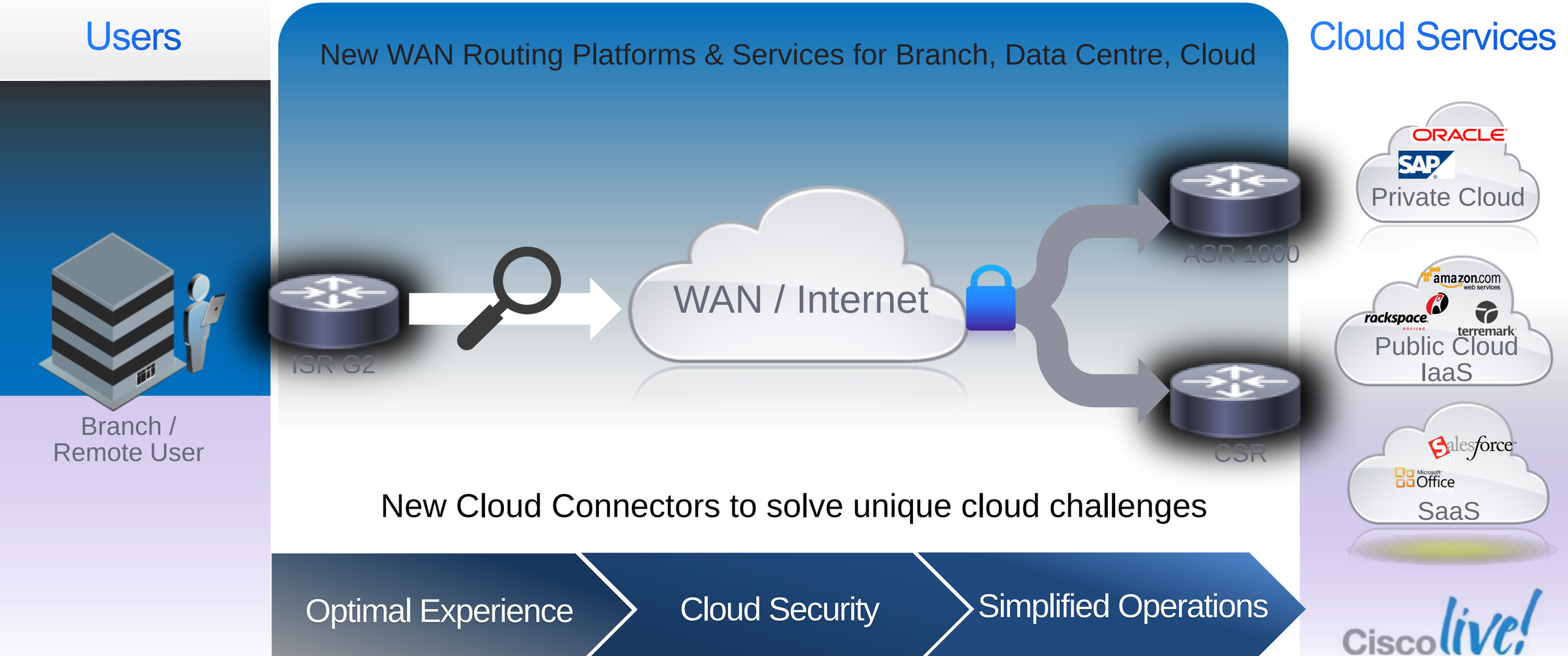
ASR1000 ESP	Max BW [Gbps]	Max PPS [MPPS]	Max IP Flows [M]	Max CPS [KF/S]	Typical L7 BW [Gbps]
ESP5	5	TBD	0.75	TBD	2.5
ESP10	10	3.5	1.65	150	5
ESP20	20	5	3.5	200	10
ESP40	20	5	3.5	200	10

- Typical ISP Traffic used
- NBAR2: no CPU impact on the RP but only an impact on ESP CPU
- Transaction Record is sampled 1 out-of 1000 connections

Cloud Intelligent Network (CIN)

Announcing : Cisco Cloud Intelligent Network

Key Foundation of the Cisco CloudVerse Solution



Current Networks Are Not Ready for Cloud

Key Findings – Cisco Global Cloud Networking Survey, April 2012*

Expectation

20%

Will have more than 50% apps in the cloud by 2012

37%

Consider Cloud-Ready WAN to be the most important infrastructure for cloud

Reality: Top Network Challenges

60%

Cited Performance as a key challenge for cloud

66%

Cited security and policy as a key challenge for cloud

60%

Cited management as a key challenge for cloud

* 1300+ Global IT professionals across 13 countries

Need for a Major Architectural Shift in the Network

* *1300+ Global IT professionals across 13 countries*

The Private Cloud Challenge: User Experience

Virtual Desktop (Private Cloud)

Users

New York
Branch Office

Keystroke

Mouse Control

Video

Screen

1500 Miles

Cloud Services

IaaS

Dallas Data Centre

Bandwidth Explosion: Typical VDI takes 500kbps (< 20 VDI sessions for typical WAN link)

WAN Latency: Cloud applications require <**50ms** latency, IT can't predict behaviour*

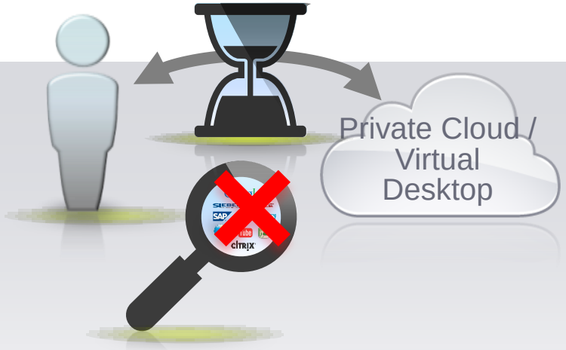
LACK OF VISIBILITY, CONTROL, AND PRIORITISATION

*Cisco Global Cloud Index, December 2011

Current Networks Cannot Keep Up with Cloud Needs

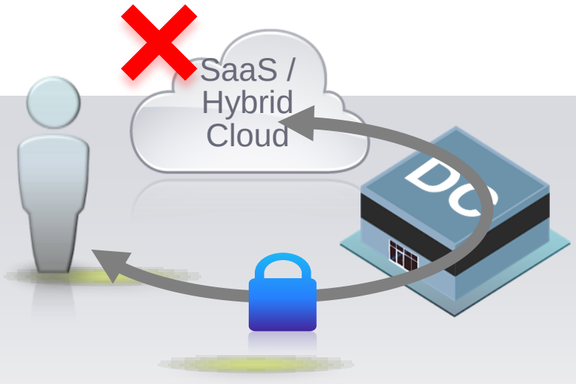
Typical WAN can't handle more than **20 VDI** sessions

Typical user of cloud application prefers **50ms** of latency- most IT Managers can't predict behaviour[1]



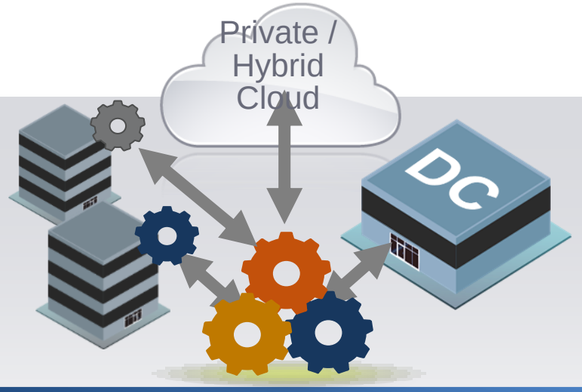
90% of businesses back-haul Internet traffic over WAN links for Security[2]

Hybrid Cloud Islands with no Any to Any VPN connectivity to the Enterprise



Reduced: Opex and Headcount to manage IT infrastructure

Inconsistent policy and visibility to manage DC, Branch and Cloud



Performance 60%*

Security 66%*

Operations 60%*

1 Cisco Global Cloud Index 2011
2 Cloud Networking Report, Metzler Assoicates, 2011

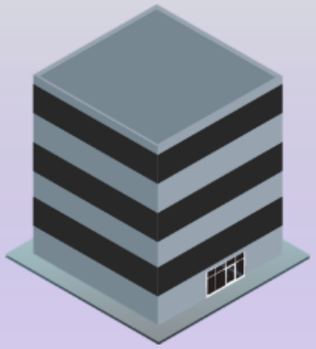
Need for a Major Architectural Shift in the Network

*Top Network Challenges, Cisco Global Networking Survey, Apr 2012

Cisco Cloud Intelligent Network Framework

Delivering Optimal Experience, Pervasive Security, and Simplified Operations

Users



Branch

Integrated Management and Policy

Cloud Connectors

Collaboration Survivability

Web Security

Storage

3rd Party

Cloud-Ready Network Services

Visibility | Optimisation | Security | Collaboration | App Hosting

Cloud-Ready Platforms

ISR

ASR

CSR

Branch Office

HQ / Data Centre

Cloud

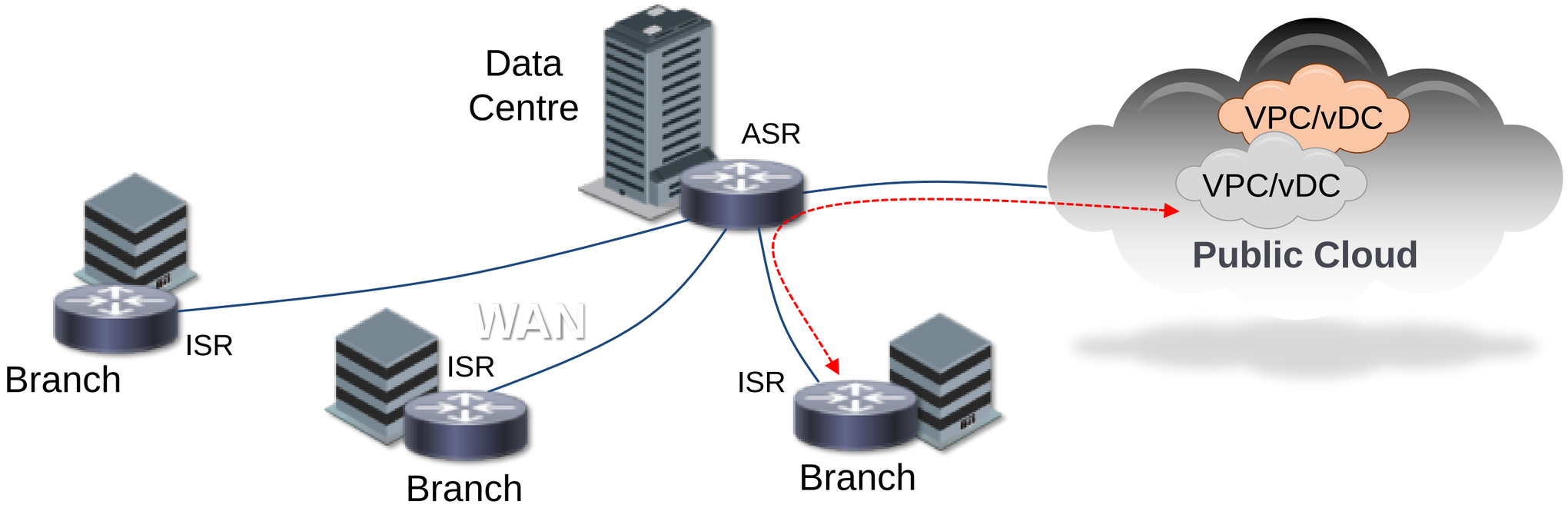
Cloud Services

Private/Public/Hybrid

Solving the Cloud Challenge

External Cloud Networking Challenges

Lack of Consistency Creates Barriers to Adoption



Security Risks

- Inconsistent VPN policies
- Limited connection reliability
- Error-prone topology changes

Integration Issues

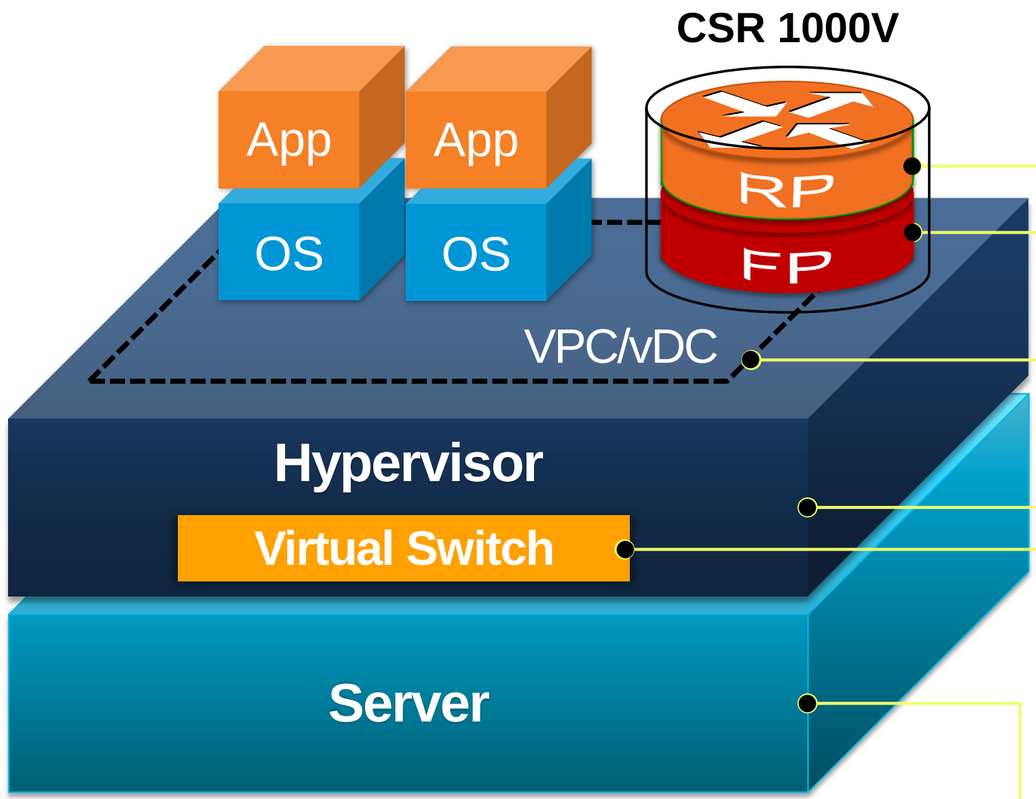
- Incompatible IP addressing
- Incomplete network services
- Different management tools

User Experience

- Indirect traffic path through DC
- Few WAN optimisation options
- Inability to prioritise traffic

Cisco CSR 1000V

Cisco IOS Software in Virtual Form-Factor



Cisco IOS XE Cloud Edition

- Selected feature set of Cisco IOS XE
- Virtual Route Processor (RP)
- Virtual Forwarding Processor (FP)

Virtual Private Cloud/Data Centre Gateway

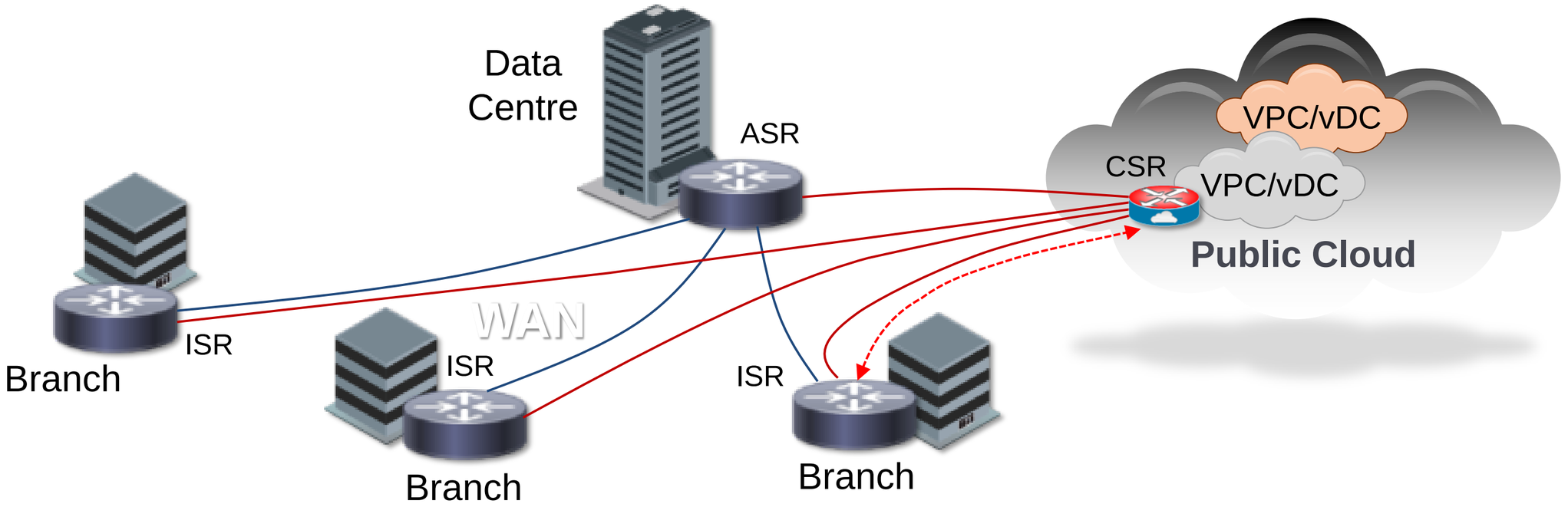
- Optimised for single tenant use cases

Agnostic to Other Infrastructure Elements

- Hypervisor agnostic
- Virtual switch agnostic
- Server agnostic

Cisco Cloud Services Router (CSR) 1000V

Extending Enterprise WAN to External Clouds



Secure Connectivity

- Globally uniform VPN policies
- Scalable and reliable VPNs
- Automatic topology updates

Network Consistency

- Datacentre to Cloud IP mobility
- Full range of network services
- Familiar management tools

Traffic Control

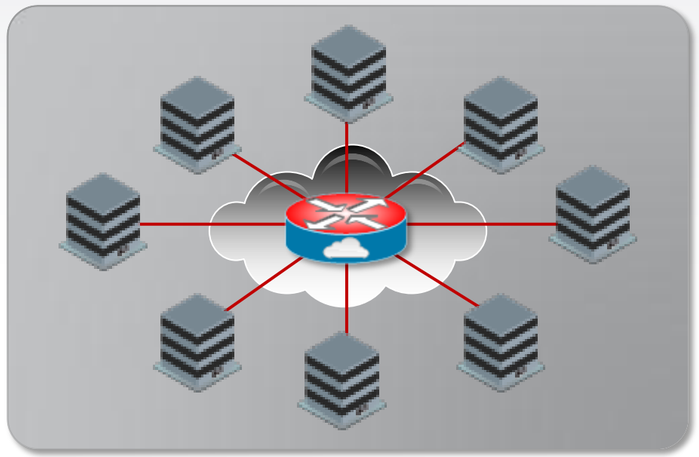
- Shortest path from any location
- Interception and redirection
- Classification and prioritisation

CSR 1000V Benefits

Reducing Barriers to IaaS Adoption in External Cloud

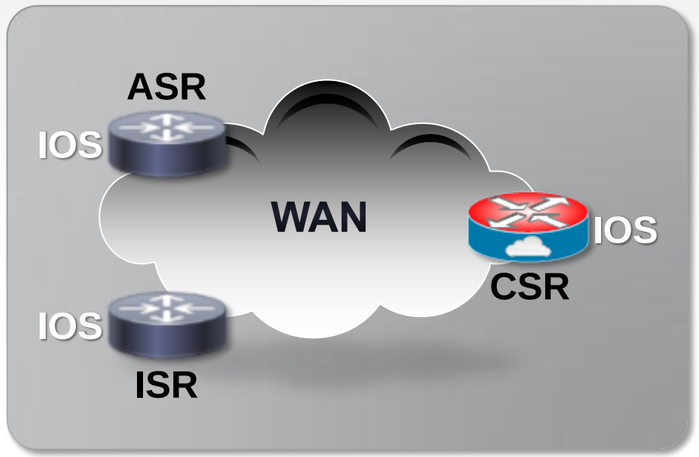
Secure Connectivity

- Reduce security vulnerabilities with uniform VPN access policy
- Eliminate operational overhead with dynamic VPN scalability
- Facilitate network evolution with dynamic routing protocols



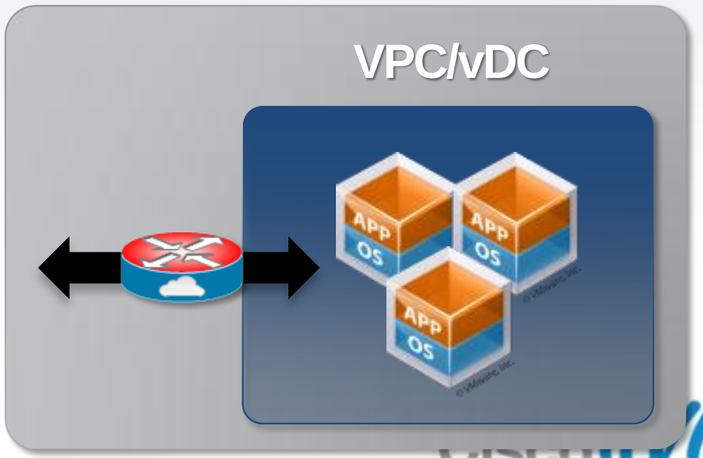
Network Consistency

- Remove integration barriers with uniform network services
- Prevent connectivity issues with holistic WAN architecture
- Extend operational practices into cloud with familiar IOS



Traffic Control

- Improve user experience with WAN optimisation and QoS
- Increase service availability with granular resiliency control
- Minimise risk of threats with granular inspection policies



CSR 1000V Management

Familiar Management Tools and API Support

	Self-Managed Environment	Automated Environment
CSR 1000V	• Cisco Prime • Cisco IOS CLI and SNMP • Third Party Network Management	Cisco CSR 1000V RESTful API
Hypervisor	VMware vCenter Server	VMware vSphere Management API
Multi-Tenant Environment[1]	• Cisco VNMC and NSM • VMware vCloud Director	• Cisco NSM API • VMware vCloud API

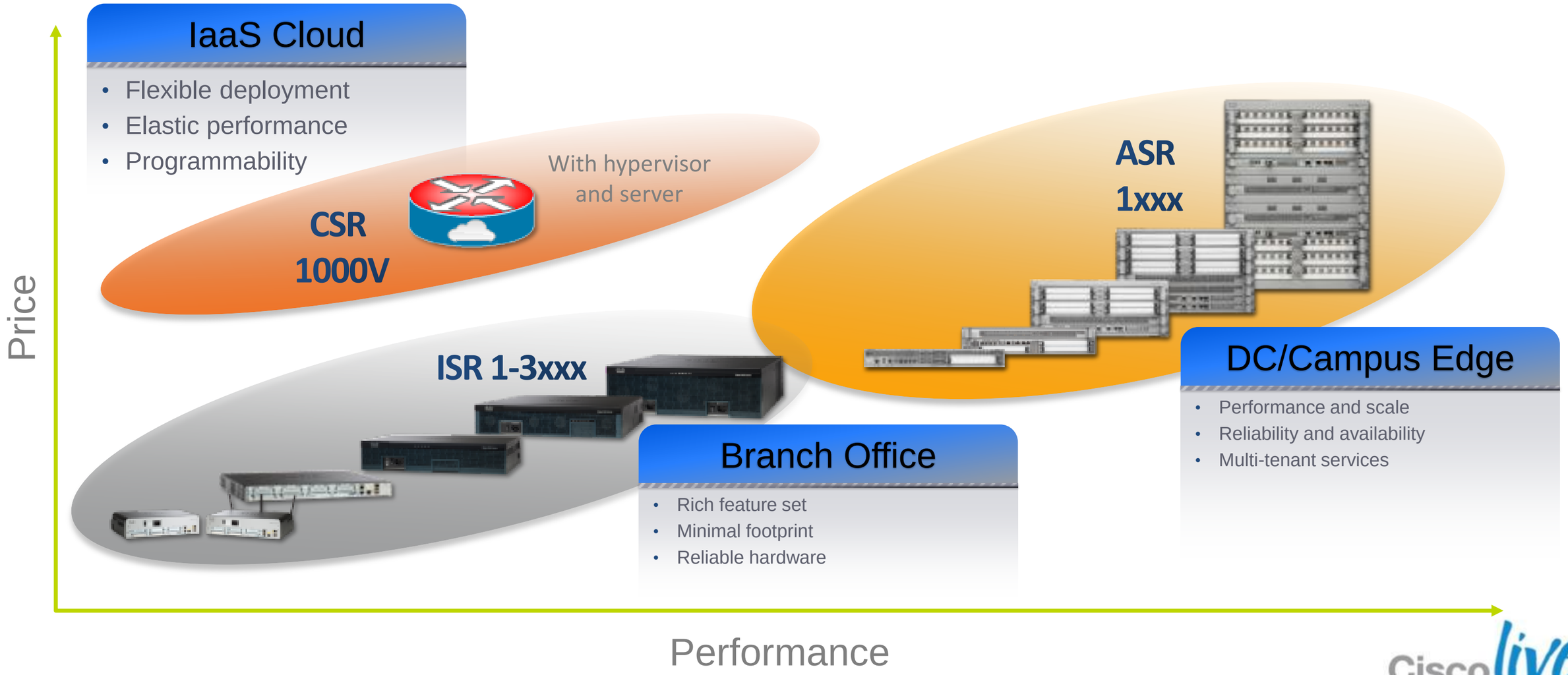
Notes:

[1]Multi-tenant management options available in phases

Additional hypervisor options will be available in the future

CSR 1000V Price/Performance Comparison

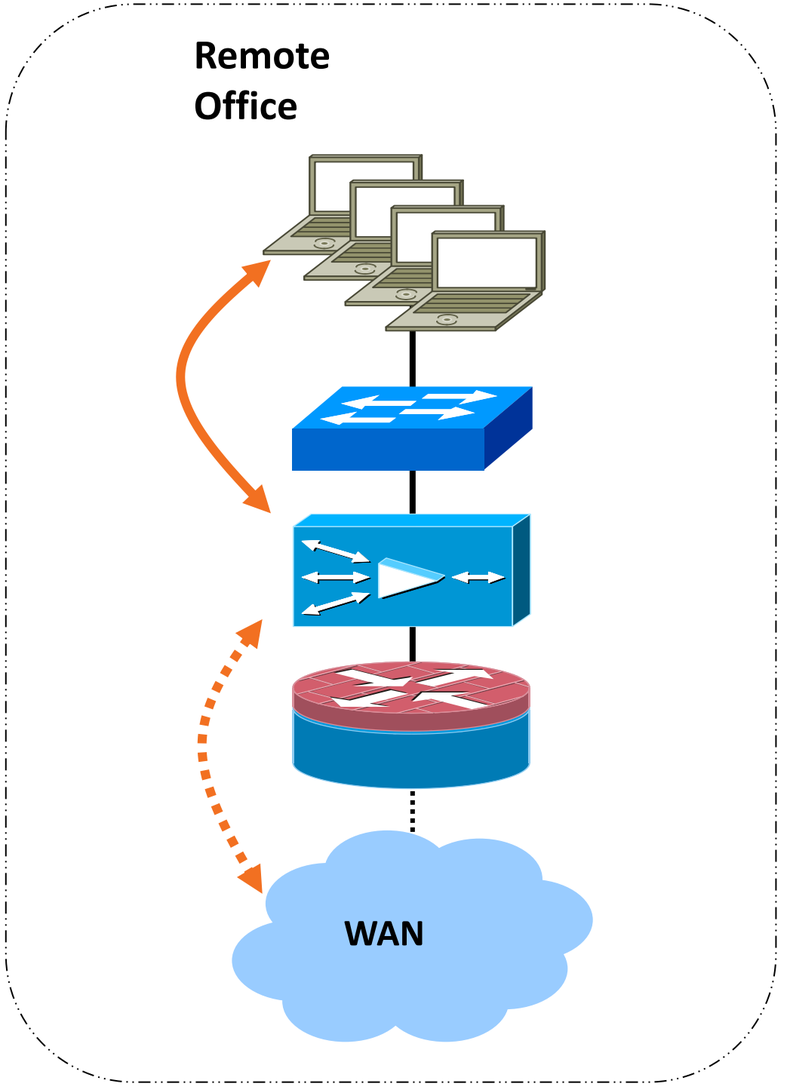
Providing Flexibility, Elasticity, and Programmability for Cloud Environments



WAAS Deployment with appNav

Simple Transparent In-path Deployment

- ✓Plug-and-Play
  - No network changes
  - Mechanical fail-to-wire
- ✓Scalability and High Availability
  - Up to 2
  - Redundant network paths & asymmetry
  - Load-sharing and fail-over
- ✓Transparent Integration
  - Transparency and auto discovery
  - 802.1q VLAN trunking
  - All WAE appliances
  - Interception access list



Network-Integrated Off-path Interception

WCCPv2

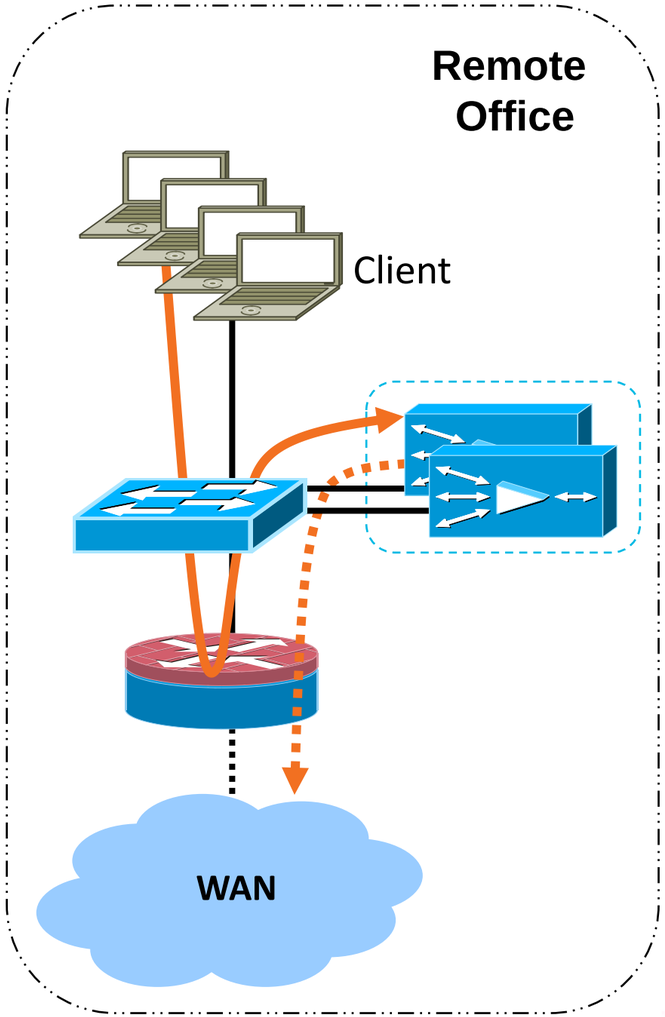
- Active/active clustering
- Load redistribution
- Fail-over
- Fail-through operation
- Near-linear scalability & performance

WCCP variable timer
- ✓ Configurable timeout (9,15,30 Sec)
- ✓ default = 30 Sec (same as pre WAAS 4.4)

WCCP L2 Egress
- ✓ L2 Egress, WAAS remembers the source Router for every flow
- ✓ WAAS **ensures** as traffic leaves, it returns to the original router.

Policy Based Routing

- Cisco WAE as a next-hop router
- Active/passive clustering

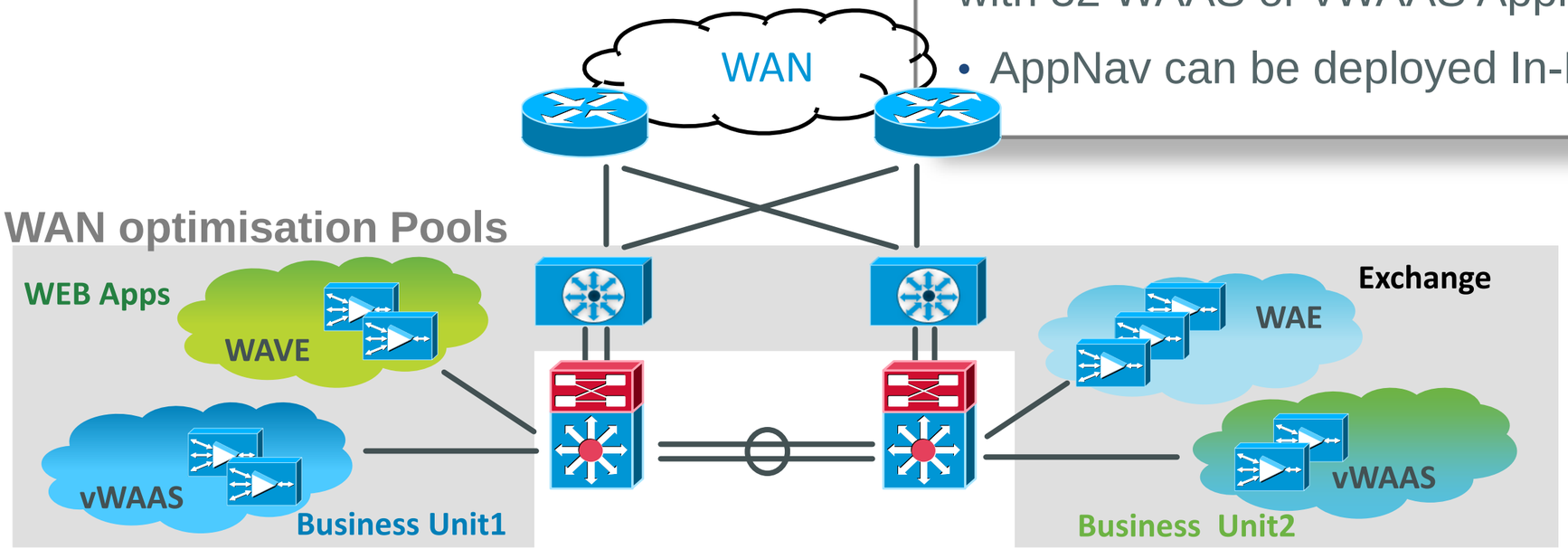


Cisco AppNav

AppNav gives the ability to ***Virtualise*** WAN optimisation resources into ***pools of elastic resources*** with ***business driven bindings***

Benefit

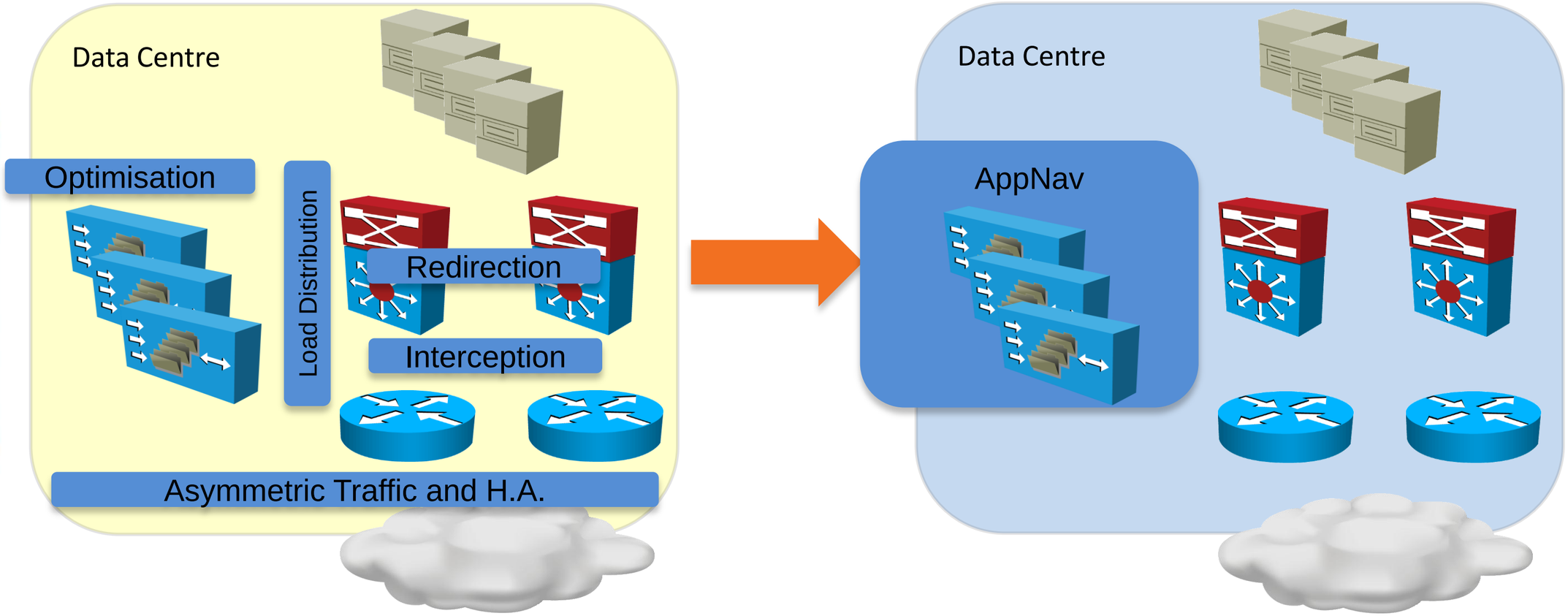
- AppNav IOM contains it's own network hardware, processing data independent of the WAVE Appliance.
- The host appliance for a AppNav module can still be used to optimise traffic.
- AppNav can scale up to 8 AppNav modules, along with 32 WAAS or vWAAS Appliances.
- AppNav can be deployed In-Path and Out-of-Path



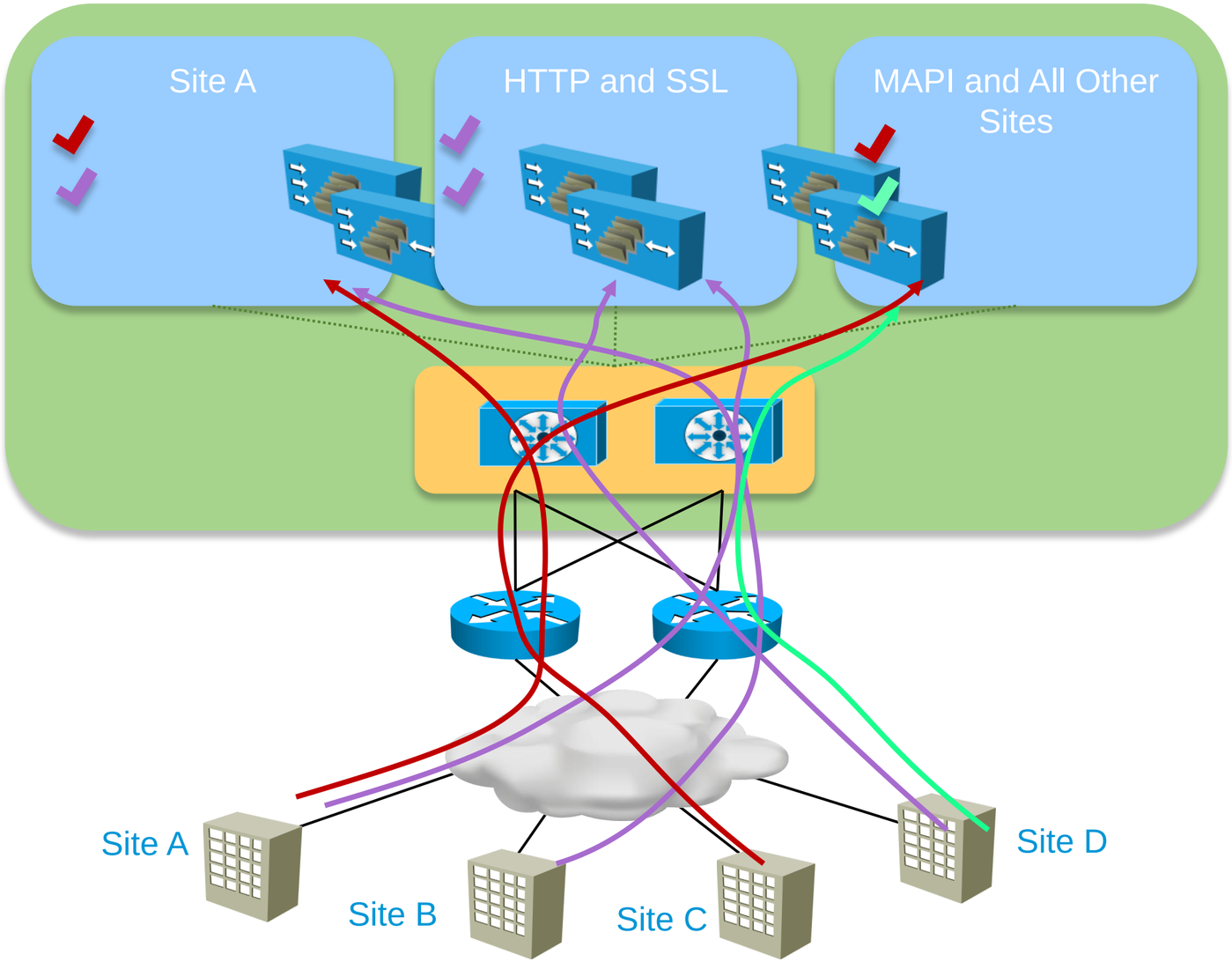
AppNav Simplifies Service Insertion Easily Solve Deployment and Scalability Headaches

Deployment Consideration	In Path	Off Path	AppNav (In Path)	AppNav (Off Path)
No Cable Insertion Outage	✗	✓	✗	✓
No Router / Switch Code Dependency	✓	✗	✓	✓
No Router / TCAM Impact	✓	✗	✓	✓
Load and performance aware flow distribution	✗	✗	✓	✓
Asymmetric flow support	✓	✓	✓	✓
Inline Modes	Parallel and Serial	N/A	Only Parallel Required	N/A
Ability to scale out / add capacity	Constrained by Inline Device	Constrained by Router TCAM	Constrained by Inline Device	10's of Gbps / Millions of Connections

AppNav Solution

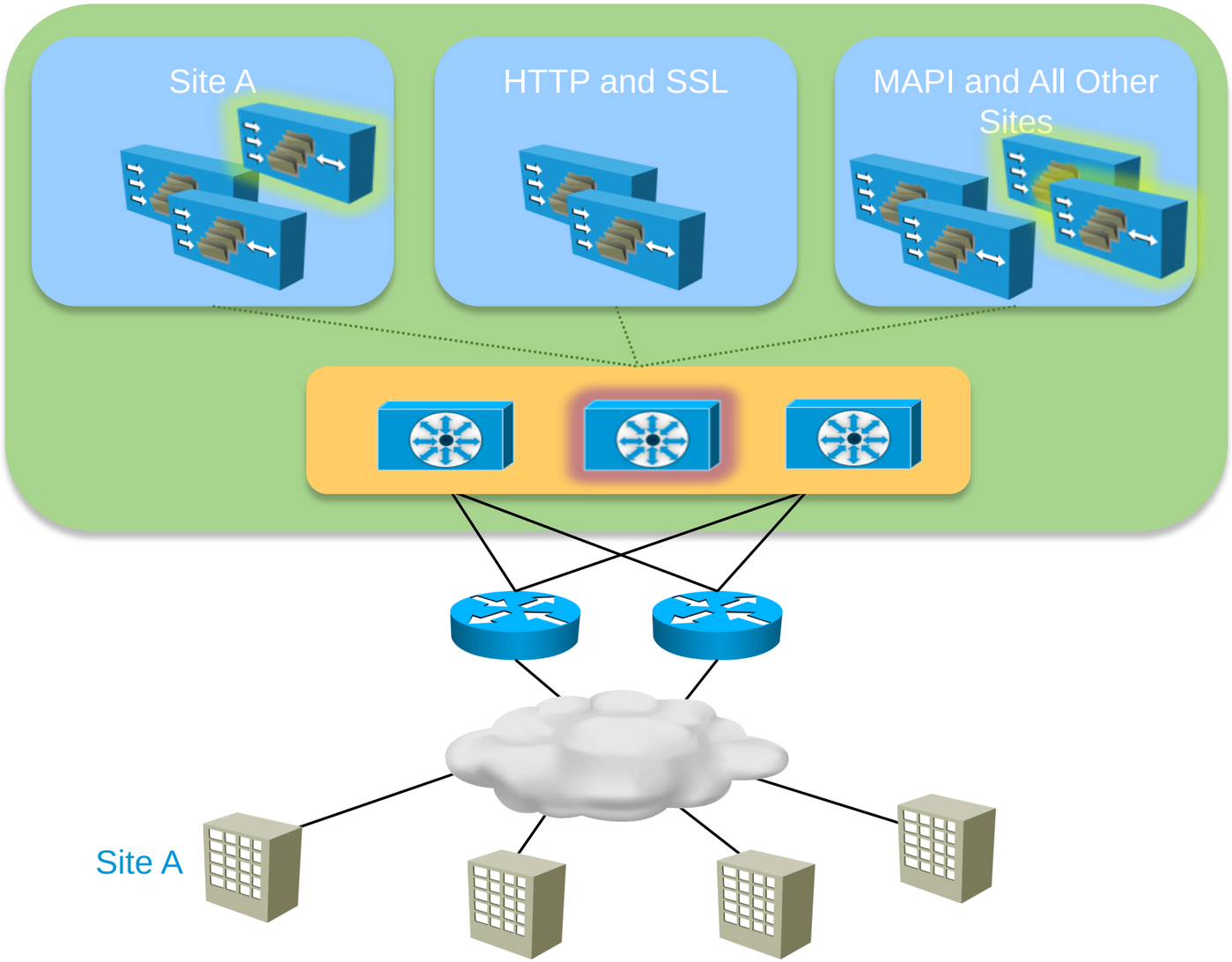


Intelligent Flow Distribution



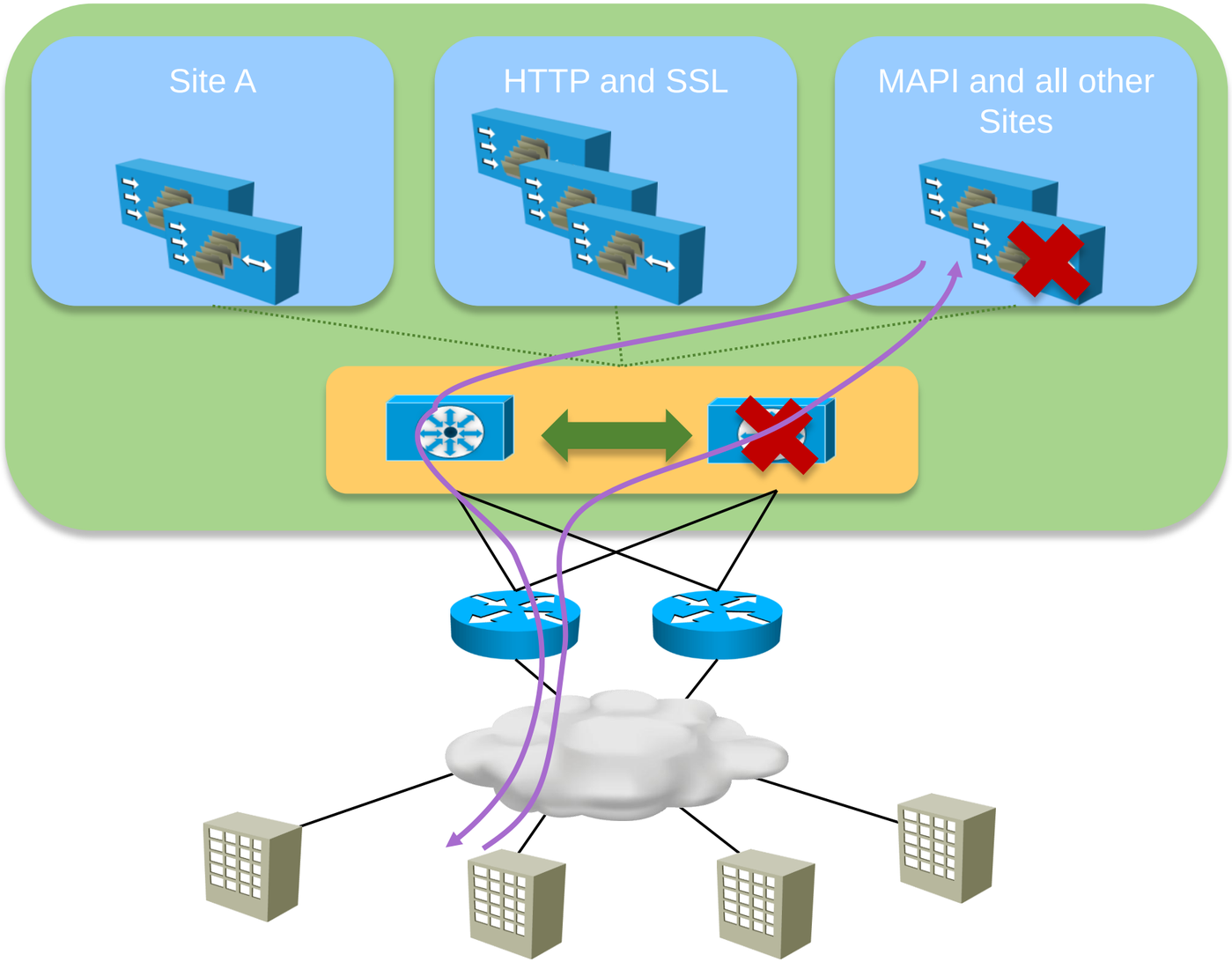
- Site affinity:
  - Identified via branch WAE ID or site IP subnet
  - Reserve optimisation capacity for critical sites
  - Improves compression performance through DRE
- Application affinity:
  - Identified via source/destination IP addresses and ports
  - Reserve optimisation capacity for applications
  - Consolidates application-specific optimisation options

Elastic Provisioning of WAN Optimisation Resources



- Optimisation resources can be added gracefully without disruption, as farms with business driven bindings (branch, application, etc.) scale.
- Interception/redirection/flow distribution resources can be added gracefully without disruption, as data centre scales when adding applications, customers, or raw traffic volume.

Cluster HA and Asymmetric Traffic Handling



- Health probes between ANCs and WNs:
  - AO Health and load included in reply.
  - WNs enter and exit the cluster gracefully.
- Heartbeats between ANCs synchronise cluster information:
  - Flow distribution tables, WN reachability, and WN load are shared.
  - ANCs enter and exit the cluster gracefully without impacting traffic flows.
  - Asymmetric traffic is distributed consistently.

Cloud Intelligent Network

onePK – Universal API

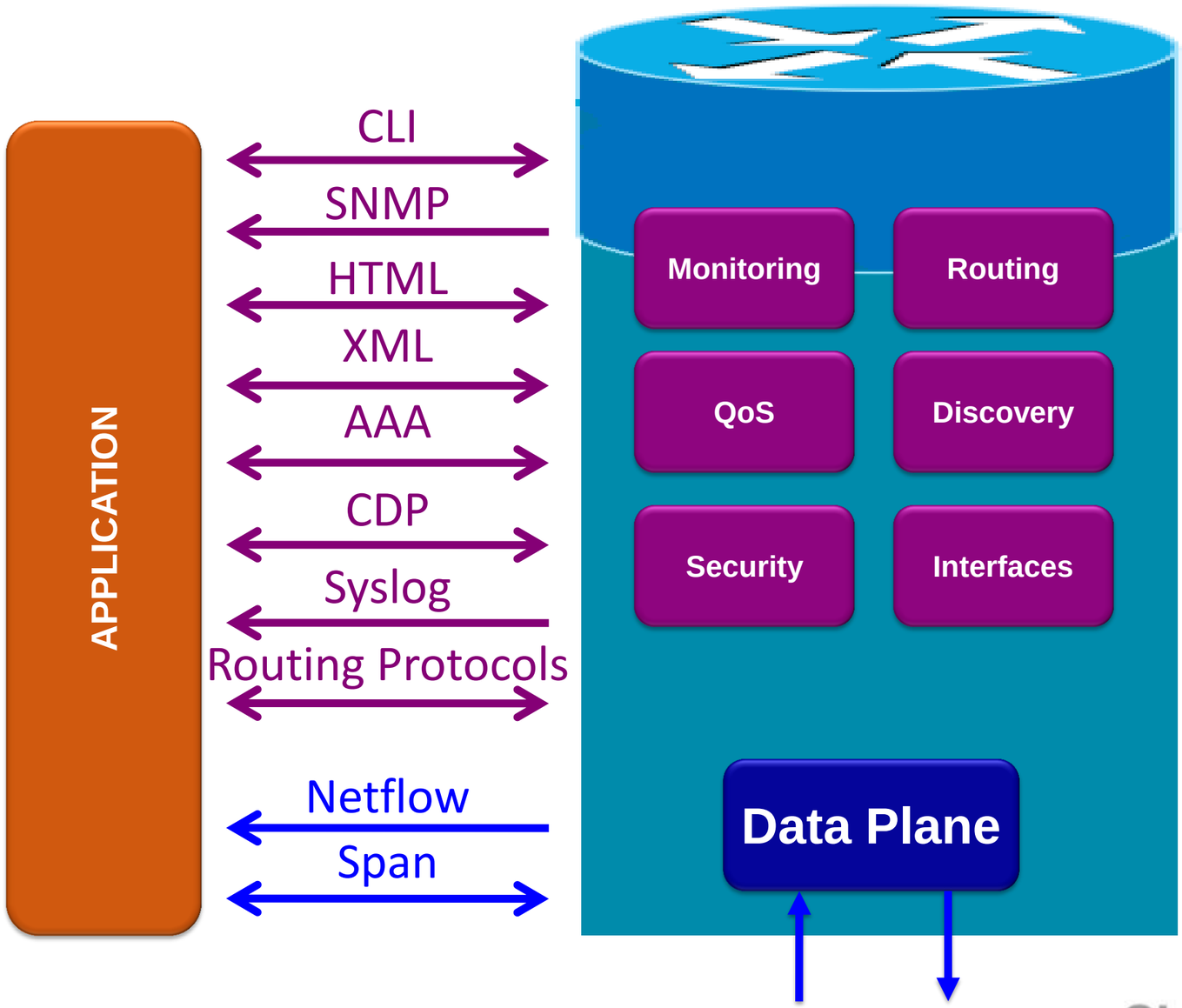
How We Interact With Routers & Switches Today

Vast Toolkit

- Familiar
- Many knobs
- Controlled Access
- Special Purpose Tools

Not Vast Enough

- Gaps
- Inconsistencies
- Not programmatic



What's Missing from Today's Interactions?

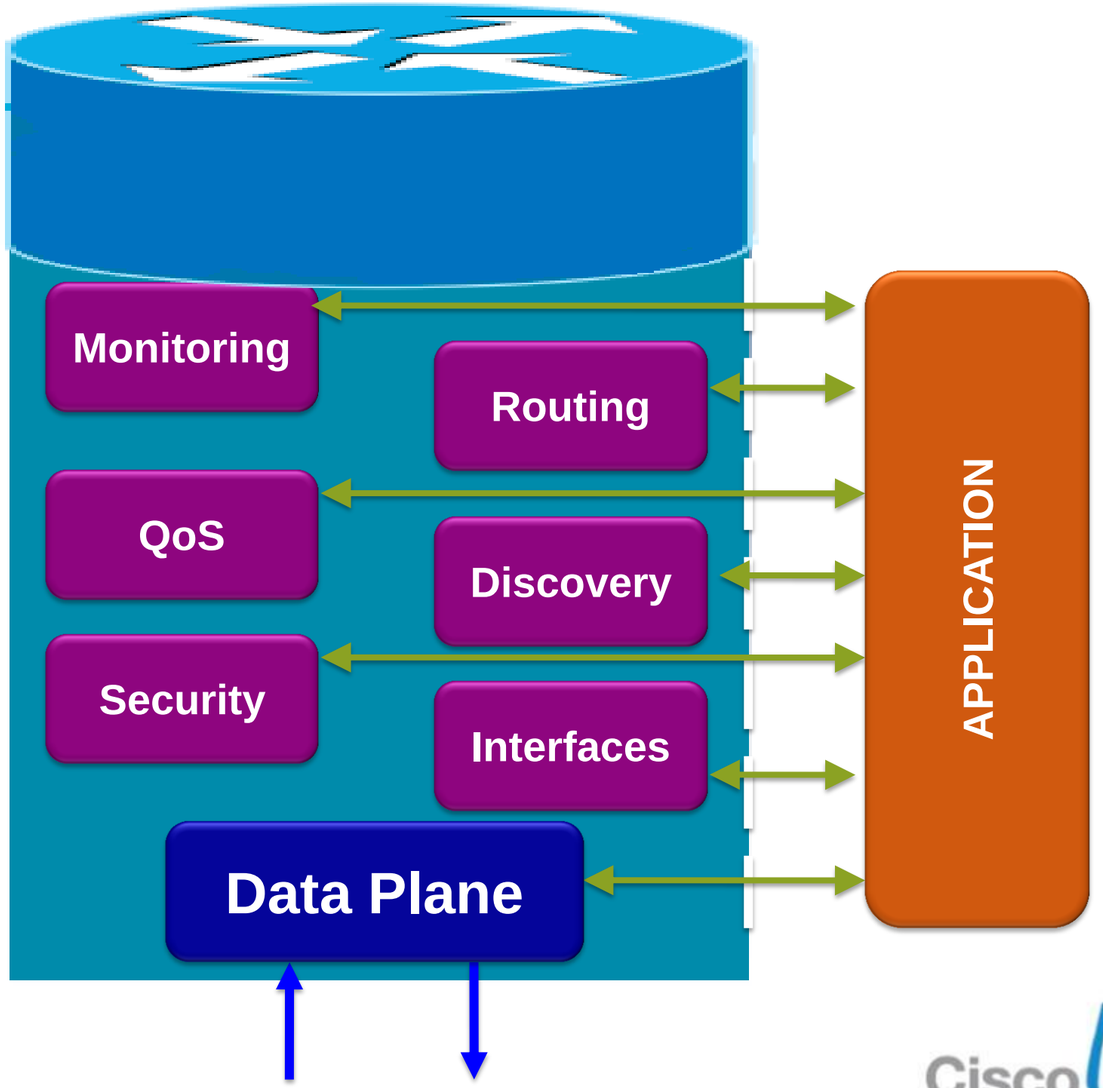
Consistency Across Platforms

Rich Actions

Modern Programming Languages

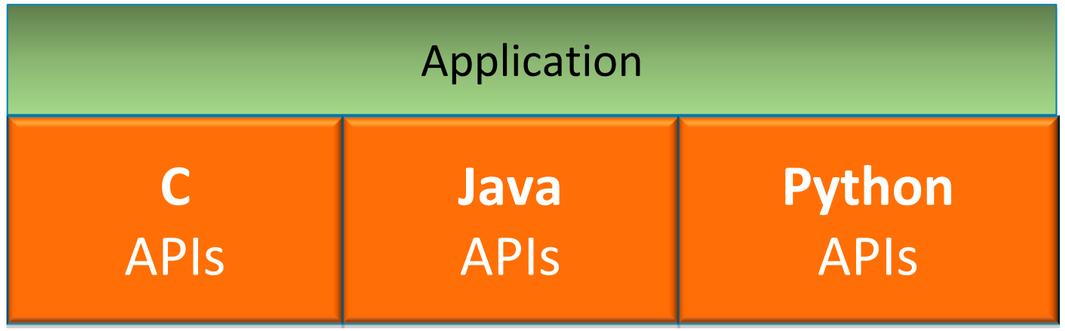
Multiple Deployment Models

Data Plane Interaction



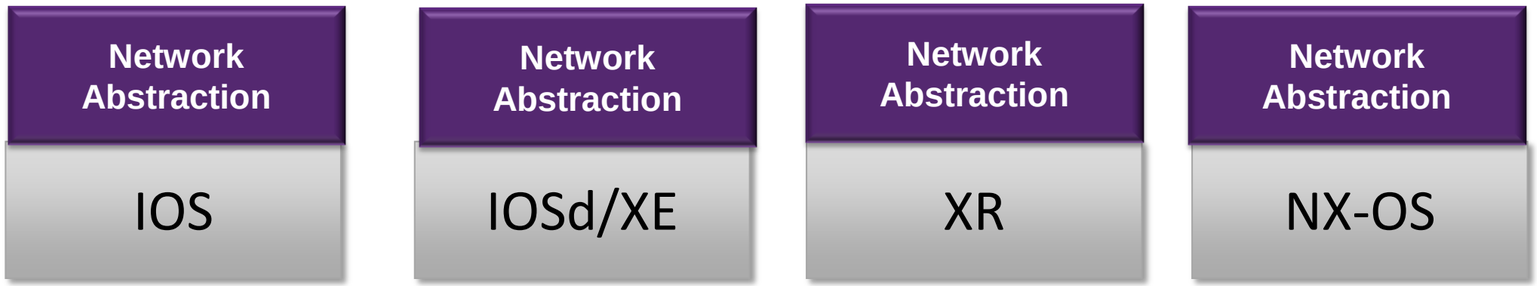
OnePK Architecture

1) Write An App



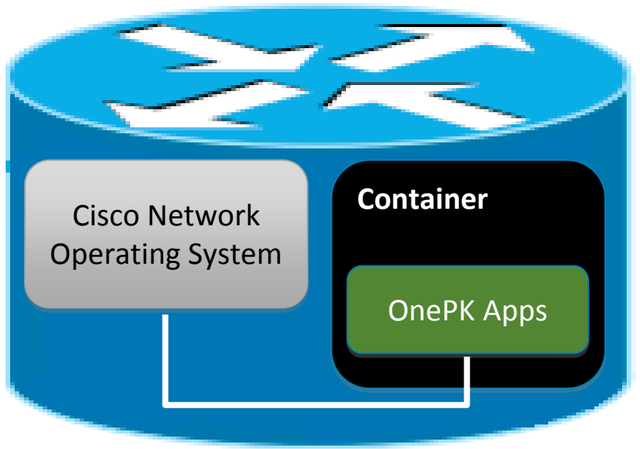
2) App Talks To Devices

3) Devices Do Stuff



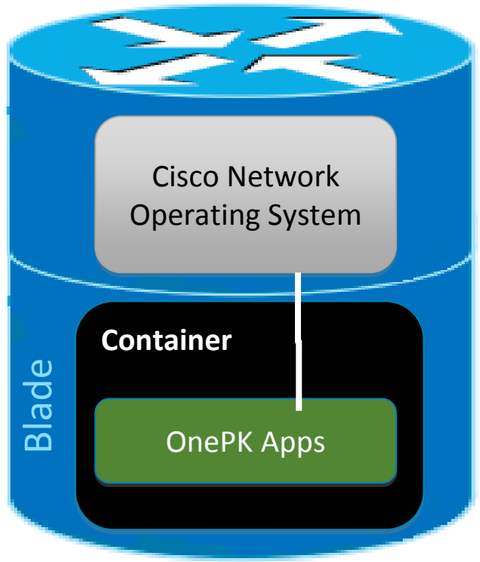
OnePK Provides Three Deployment Models

Process Hosting



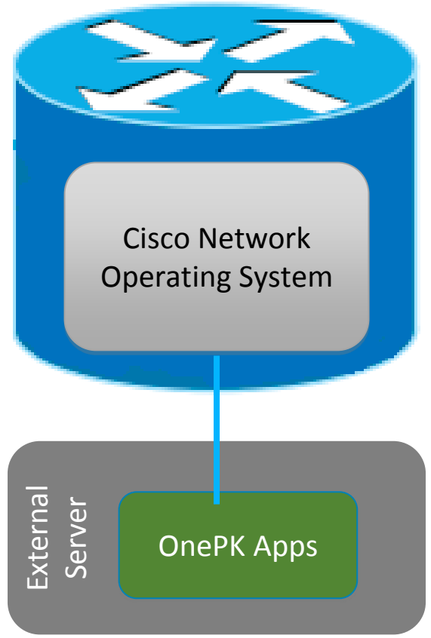
Best For:
- Powerful RPs
- Low Latency

Blade Hosting



Best For:
- Real Time
- Data Plane

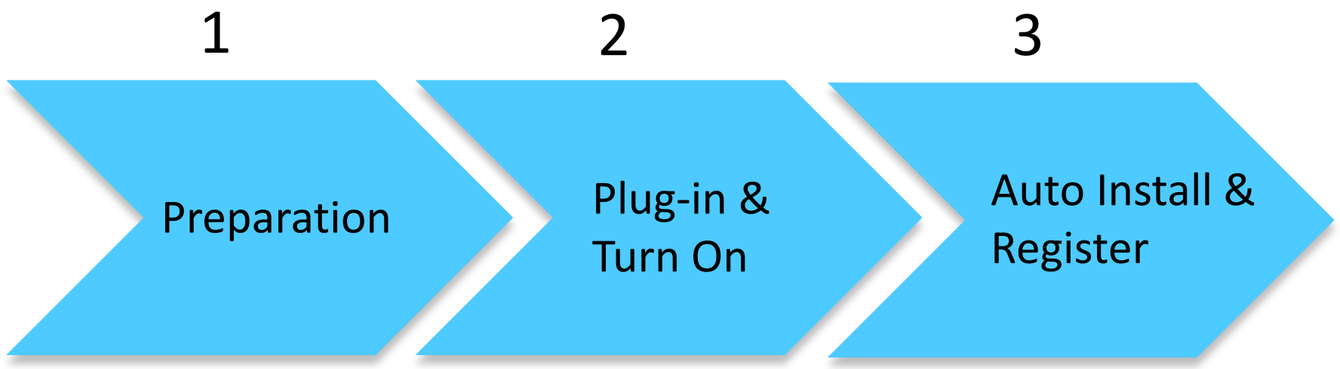
End-Point Hosting



Best For:
- Less Delay Sensitive
- Multi-Element Apps

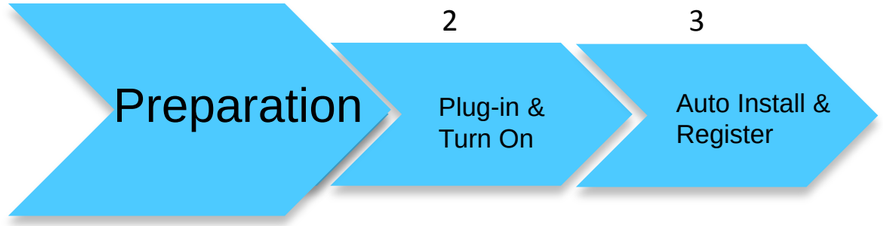
WAAS Feature Update
Branch WAAS Auto Deploy

Simple as 1, 2, 3 with Auto Deploy

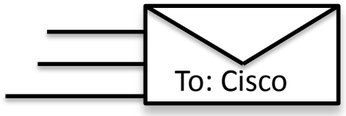


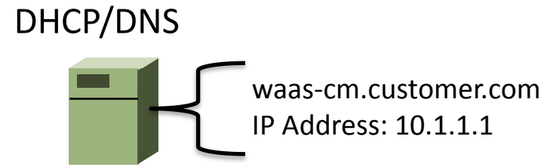
- Auto Deploy is a simple process designed to:
  - Significantly reduce time and OPEX spent at remote sites
  - Enable rapid deployment of WAN Optimisation system

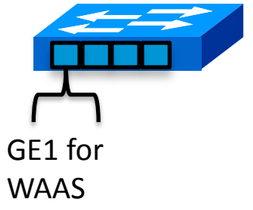
Simple as 1, 2, 3 with Auto Deploy



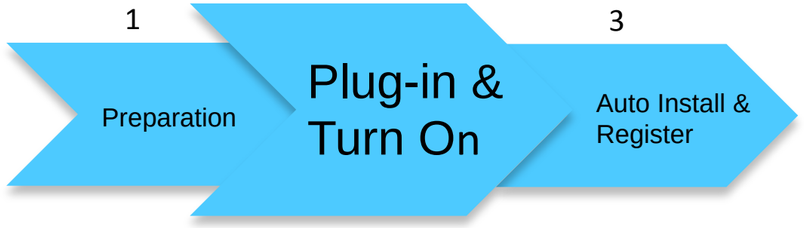
- Order WAAS for remote site
  - Update DHCP & DNS for central manager name
  - Configure switch/router for WAAS device



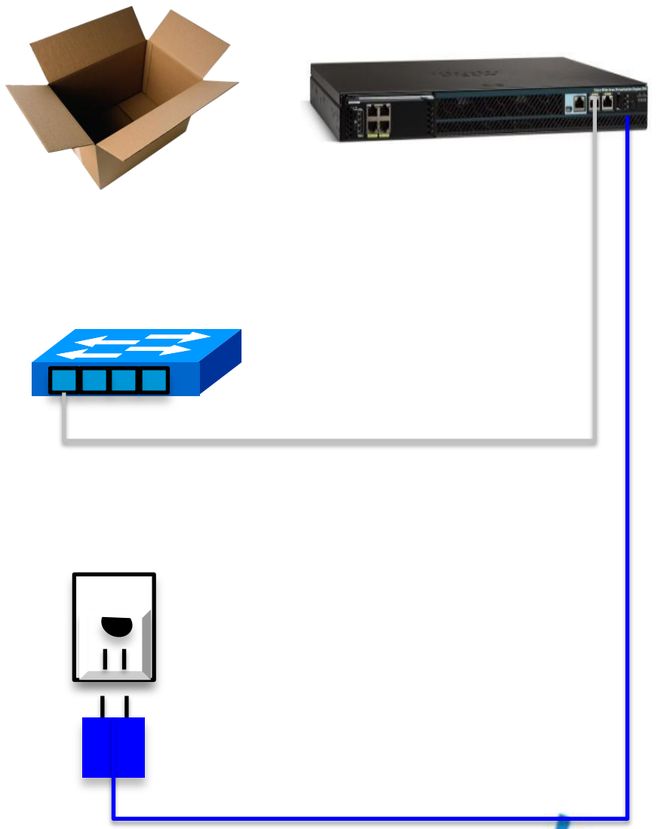




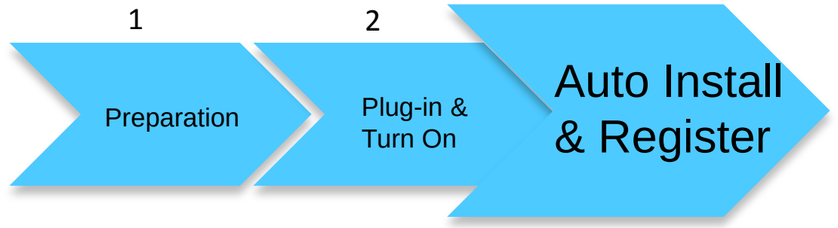
Simple as 1, 2, 3 with Auto Deploy



- Unpack the WAAS device and mount
  - Connect WAAS to the network
  - Plug it in and push “ON”

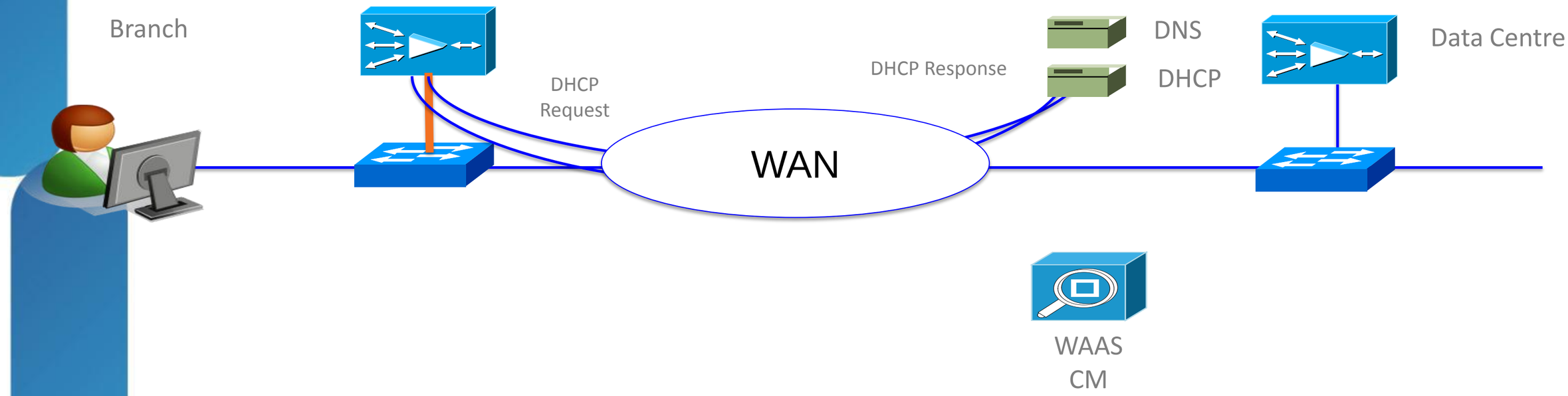


Simple as 1, 2, 3 with Auto Deploy



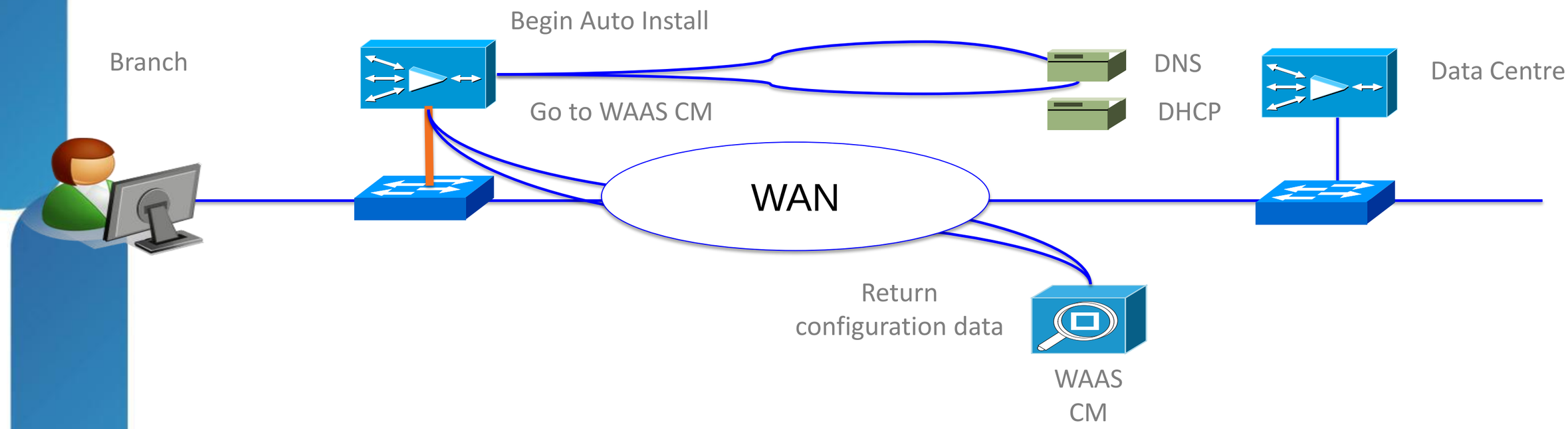
- WAAS begins auto installation
- Installation process completes
- WAAS registers to the Central Manager

Fast Setup with Auto Deploy



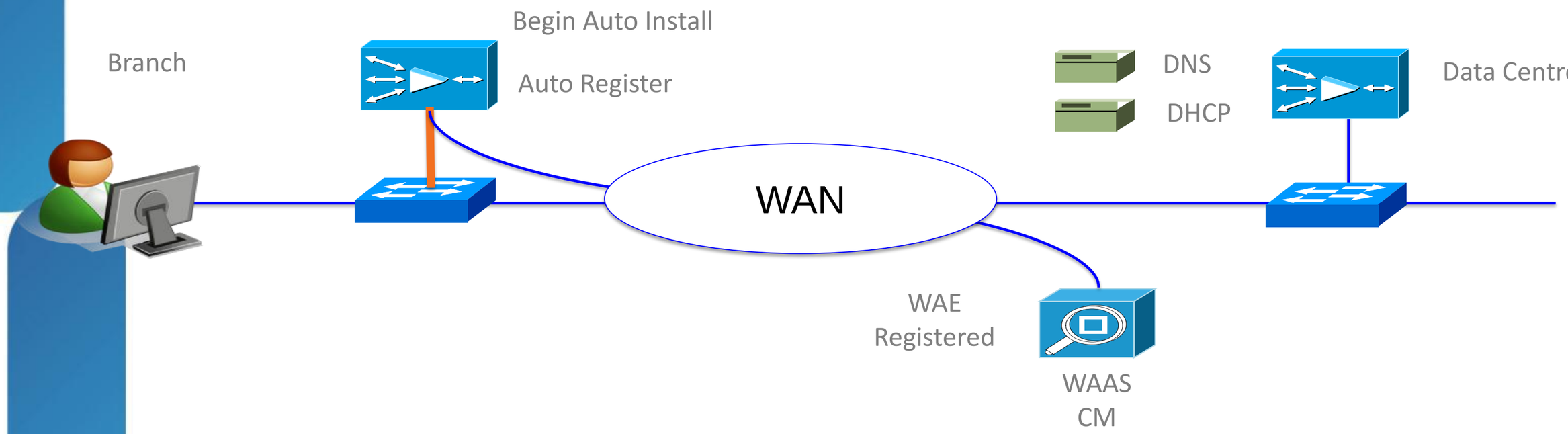
- WAAS Device Shipped to Branch and plugged in
- WAAS Obtains DHCP address upon boot up

Fast Setup with Auto Deploy



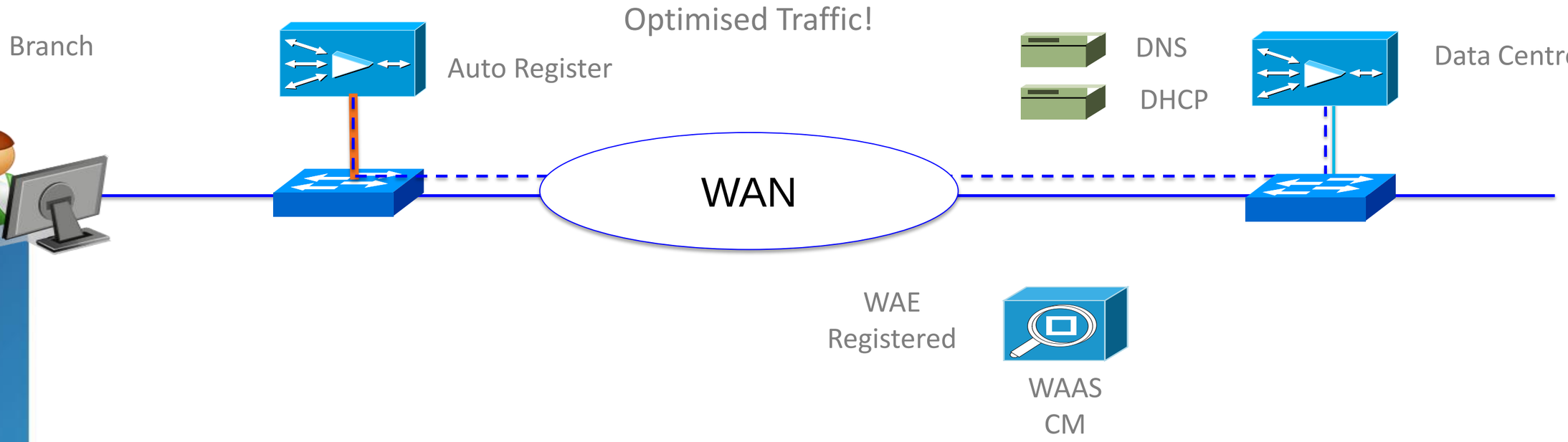
- IP address of CM obtained by DNS
- WAAS device pulls data from CM
- WAAS Auto Installation starts

Fast Setup with Auto Deploy



- WAAS Auto Registers to the WAAS CM

Fast Setup with Auto Deploy



- WAAS auto-discovers other devices and begins optimising traffic

Summary

- Branches continue to face the challenge of an increasingly flexible environment supported by off-site IT resources. We aren't just mindlessly pushing packets anymore.
- Protocols do not define applications anymore, and businesses make value decisions based on applications.
- The "Cloud" is more of a method than a location – it takes looking at things from an application perspective to the next level.
- Elasticity of application resources is only valuable if you have elasticity of network services to match.
- Iaas/Public (Hybrid) Cloud will only succeed if the economic and flexibility benefits can be realised without any technical risk.

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