



Software Defined WAN

IWAN

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GC ENT Team
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What Are the Big Trends

Digital Innovation Overwhelming the Branch



Digital Displays



Omni-channel Apps



SaaS Enterprise Apps



Guest WiFi



HD Video



Online Training



Social Media



OS Updates



Mobile Apps



BRANCH

**MORE
USERS**

80%

Of employee and customers are served in branch offices*

**MORE
APPS**

20-50%

Increase in Enterprise bandwidth per year through 2018**

**MORE
THREATS**

30%

Of advanced threats will target branch offices by 2016 (up from 5%) **



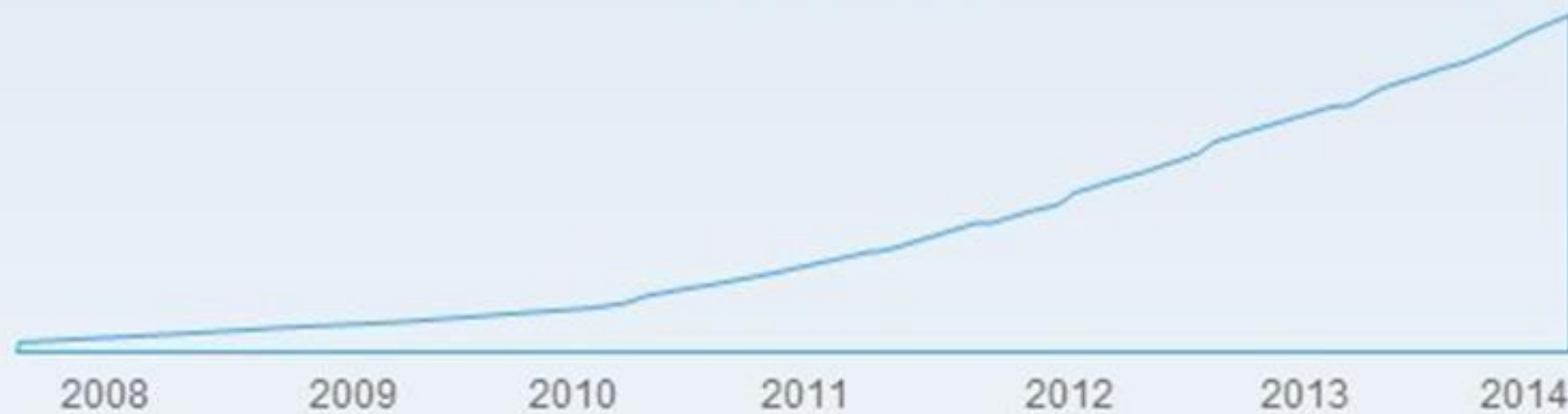
*Tech Target, Branch Office Growth Demands New Devices., 2013

**Gartner, Forecast Analysis: Worldwide Enterprise Network Services, Q2 2015 Update

*** Gartner: "Bring Branch Office Network Security Up to the Enterprise Standard, Jeremy D'Hoinne, 26 April. 2013.

What Are the Big Trends?

AWS Reaches Over 1 Million Active Customers



Installed Workloads
in Millions



20% of applications are the in cloud Growing 18% a year

40% of organizations will spend more on software as a service (SaaS) and a mix of public, private, hybrid and community clouds in 2015.



Applications that move between the branch, the cloud, and the DC

What If Your WAN Can...

Improve Your Application Performance

Pinpoint Application Issues Instantly



Hours

Minutes

Deliver More Bandwidth for Lower Cost

Increase WAN Utilization



1x

2x -20x

Ensure Security Over Any Connection

Consistent Security Policies



Backhaul

Local & Cloud

Reduce Network Complexity

Simplify Operations



Device-by-device

System

Moving to SD-WAN

What is SDN?

“SDN is the physical separation of the network control plane from the forwarding plane, and where a control plane controls several devices”

Open Networking Foundation

Mostly useless

Software Defined?

1986: This Cisco router was able to map one network protocol into another. The **software** was originally developed by Bill Yeager at Stanford, then licensed and enhanced by Cisco (from “San Francisco”) founders Len Bosack and Sandy Lerner.



CiscoAGS at Computer History Museum
Source: Evilrouters.Net

- Most networking devices have software
- Device behavior was always defined by its software
- Control Plane vs Data Plane separation effective today
 - ASR1000 Series, ISR-4000 Series, Catalyst Platforms
- Is it all hype ... or just marketing gone bad?
- Real-life requirements
 - Faster software development
 - Programmable network elements
 - Faster provisioning
 - Centralized intelligence

What problems are the industry really trying to solve?



...to “Simplify” the
administration and
deployment of the network....

(Reduce OpEx)

...to reduce the “Cost” of the
infrastructure ...

(Reduce CapEx)

... to “Accelerate” Application
Deployment Time ...

(Reduce Time-to-Value)

...and find a way for
“Applications” to have greater
control over the network

(Self Healing – Self Tuning)

What is SDN?

“SDN is an approach to networking that allows network administrators to manage network services through abstraction of lower level functionality”

This makes sense

Open Networking User Group (ONUG)

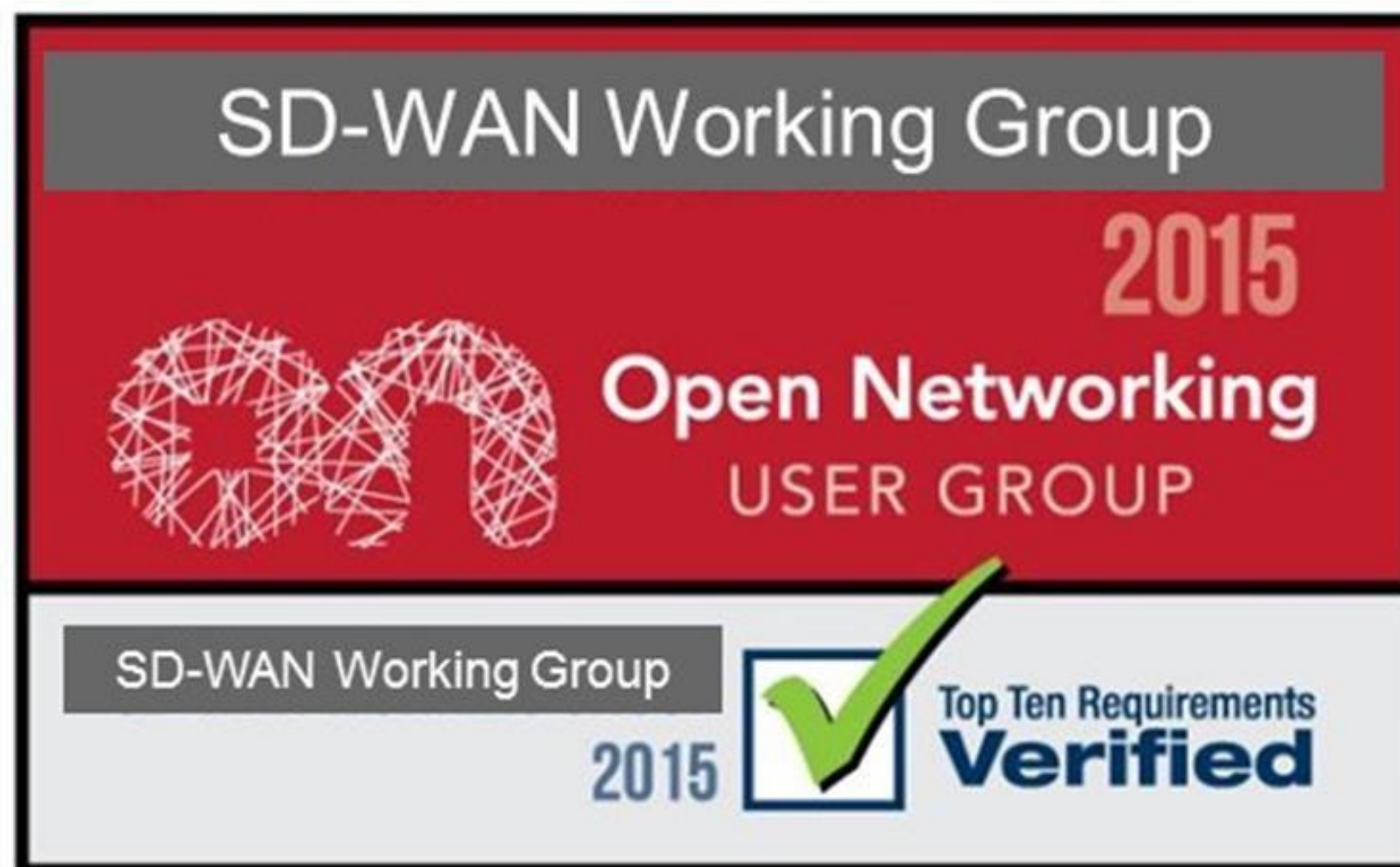


	ONUG Requirements	Cisco IWAN
1	Any Hardware: Deploy CPE in physical or virtual form factor on commodity hardware	
2	Zero-Touch Deployment: With minimal configuration changes for agility in provisioning and deployment	
3	Highly Secure Hybrid WAN: Dynamic traffic engineering across a public or private WAN based on application policy, and aware of network availability or degradation	
4	Active-Active Architecture: Remote sites connect to applications through a public or private WAN	
5	High Availability and Resilient WAN: Optimal for client user experience	
6	Layer 2 and 3 Interoperability: With a directly connected switch and/or router	
7	Visibility, Prioritization, and Steering Applications: Specifically business-critical and real-time applications per security, corporate governance, and compliance	
8	Management Dashboard: By site, application, and VPN performance level	
9	Open North-Bound API for Controller: For access and management, forward specific log events	
10	FIPS 140-2 Validation Certification: For cryptography modules and encryption with automated certificate lifecycle management and reporting	

Open Networking User Group (ONUG)



	ONUG Requirements	Cisco IWAN
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4	Active-Active Architecture: l	✓
5	High Availability and Resilien	✓
6	Layer 2 and 3 Interoperabilit	✓
7	Visibility, Prioritization, and security, corporate governance	✓
8	Management Dashboard: By	✓
9	Open North-Bound API for Controller: For access and management, forward specific log events	✓
10	FIPS 140-2 Validation Certification: For cryptography modules and encryption with automated certificate lifecycle management and reporting	✓



SD-WAN Use Cases

Save \$\$ on circuit costs
(Lower Operational
Costs)

Simplified Deployment &
Management
(Lower Operational
Costs)

VPN Segmentation with
Scale
(Reduce Risk)

Industry

SD-WAN Use Cases

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VPN Segmentation with Scale
(Reduce Risk)

Industry



Caching of Traffic –
Especially Apple IOS
(Customer/Employee Experience)

Local Survivable VOICE
(Customer/Employee Experience)

Multi-Domain Management
(Lower Operational Costs)

Extend Data Center to Branch with
LOCAL COMPUTE
(Lower Operational Costs)

Enhance Wireless
(Customer/Employee Experience)

Accelerate Web-Based Applications
(Customer/Employee Experience)

Federal Gov't or Payment Card (PCI)
Compliance at Branch
(Reduce Risk)

Currently Using EIGRP
(Lower Operational Costs)

What is IWAN?

Bridging Needs between Line Of Business & IT

Cisco Intelligent Branch Delivers Business Outcomes

LOB

Personalized
Experience

Rich Content
Delivery

Innovative
Offerings



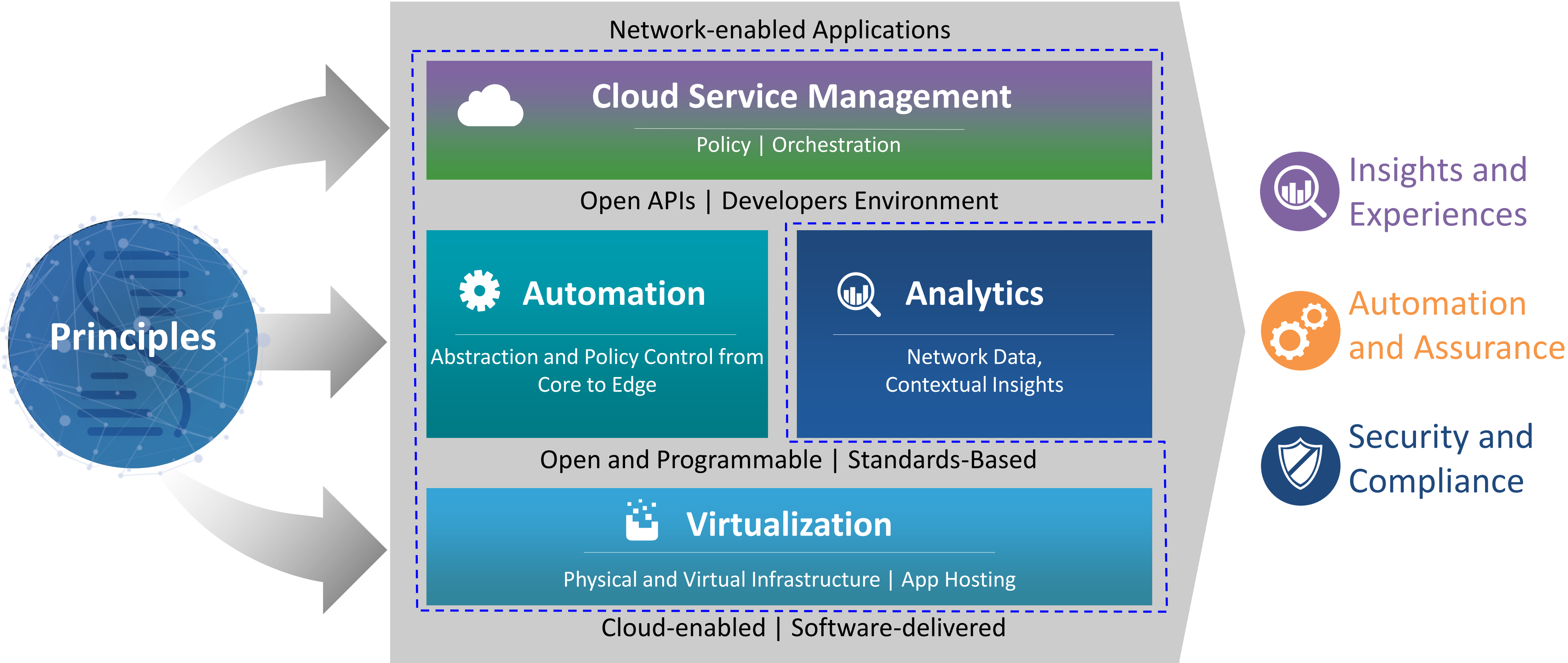
IT

WAN Cost
Reduction

Apps Visibility,
Control, and
Agility

Simplicity and
Automation

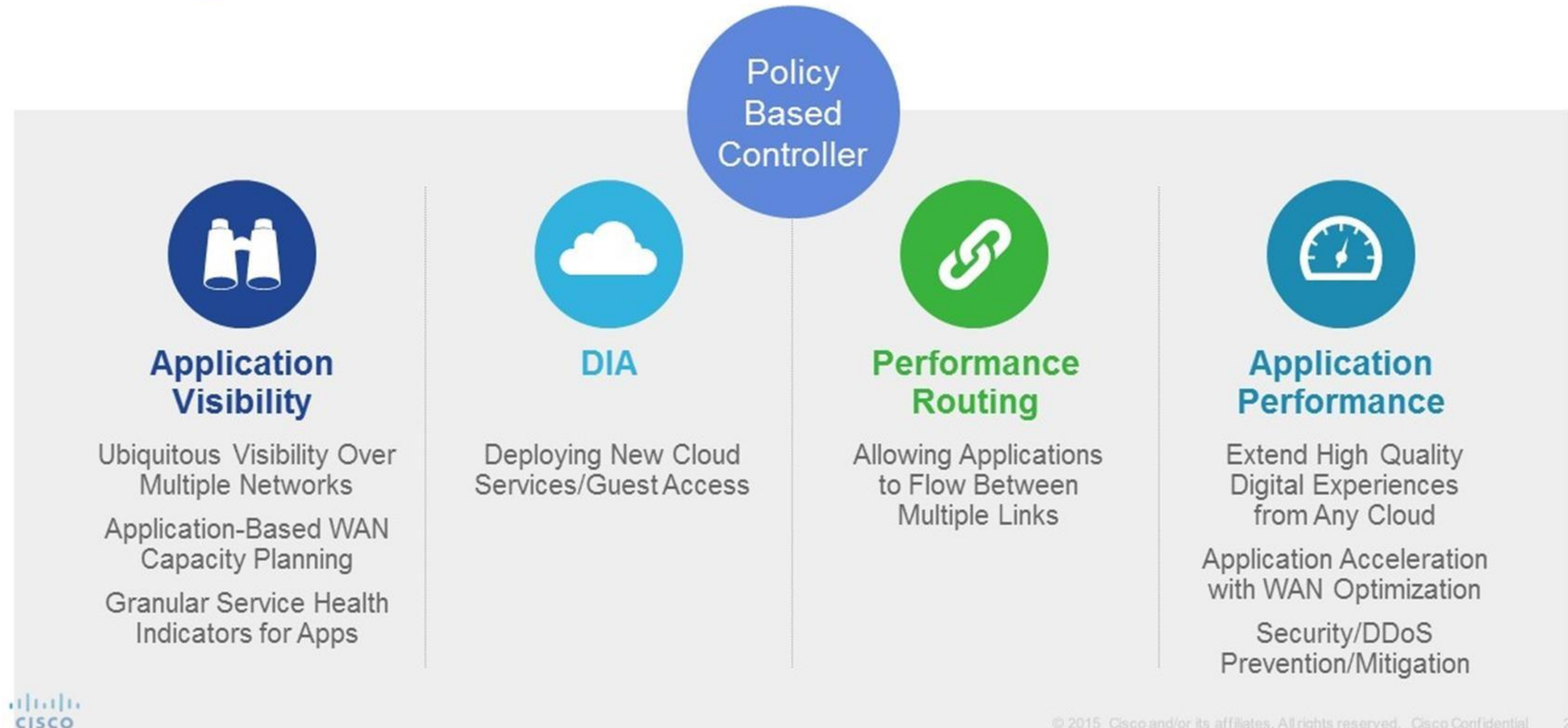
Cisco Digital Network Architecture



Cloud Enabled | Cisco ONE Software Delivered

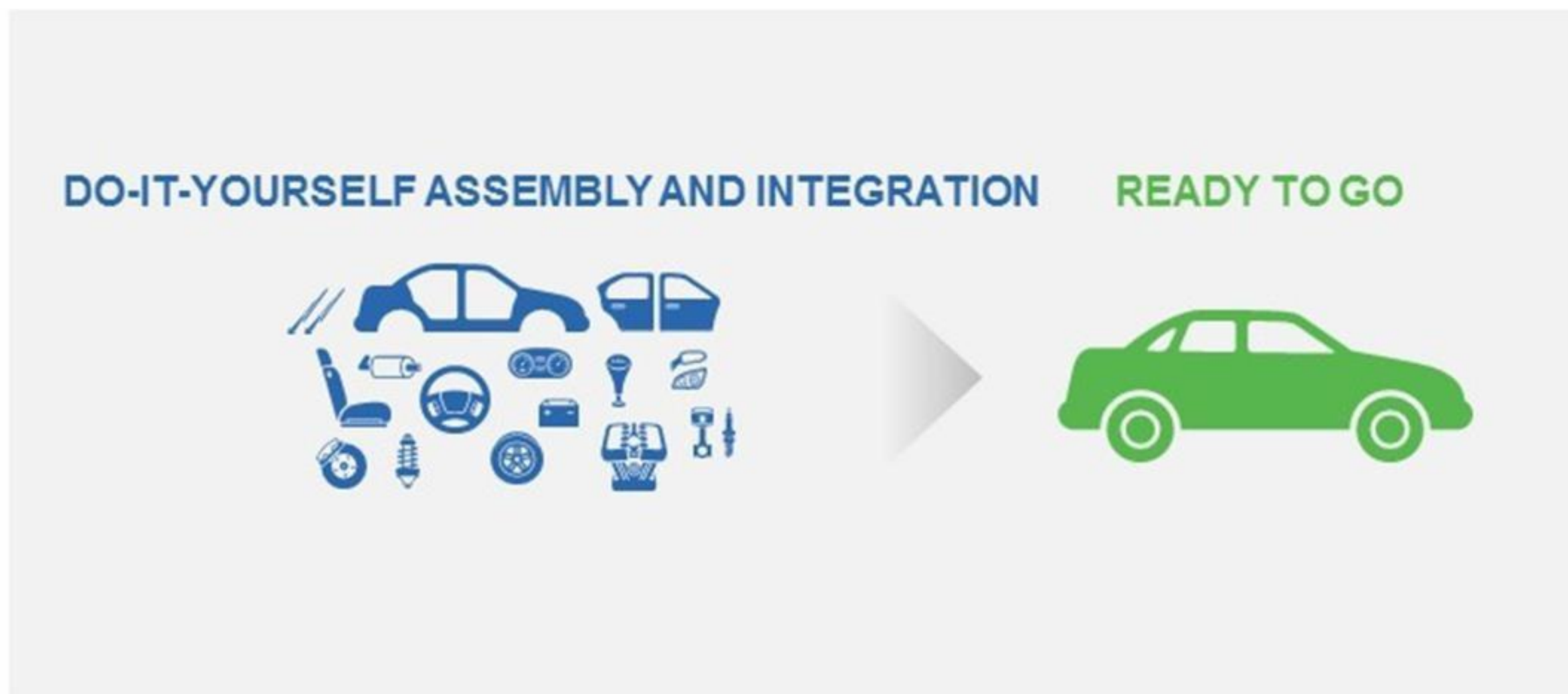
SD-WAN Done Right – Cisco Intelligent WAN

Delivering Value Within the Network



An Architectural and Systems Approach

- **IWAN is a Solution Architecture**
 - Solves a network problem
 - Use Case Driven
 - Systems Development Approach
- **Prescribed. Tested. Interoperable.**
 - Bounded Scope and Complexity
 - Enables Automation and Quality
- **Delivers Business Outcomes**
 - Reduce WAN costs. Increase bandwidth
 - Improve and Protect application performance
 - Direct Internet Access
 - Guest Access Offload
 - OpEx Reduction



ISR4000 – Platform for IWAN

Simplified Services Integration

The Ultimate Converged Branch – No More Appliances



Native, Full Featured
Security, AVC, WAN Opt, UC

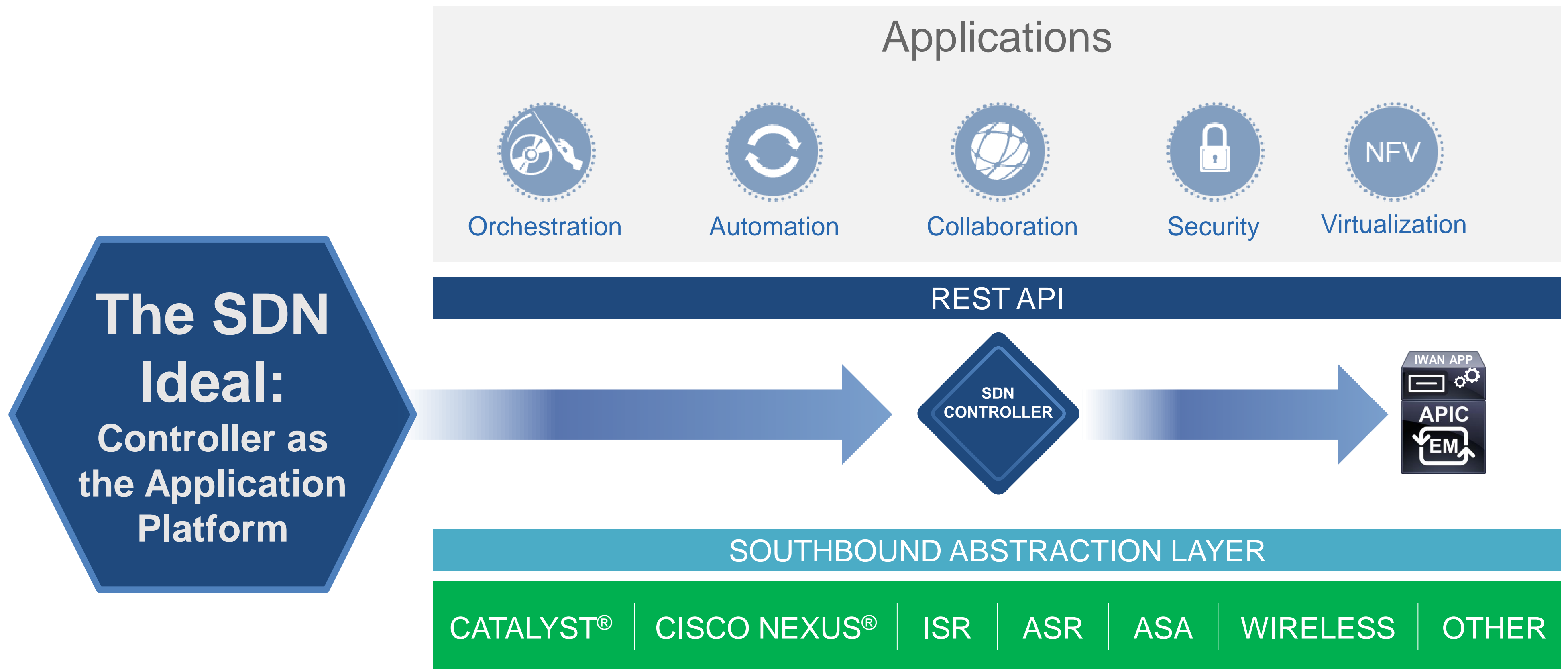


Ease of Service Deployment
– No Truck Rolls

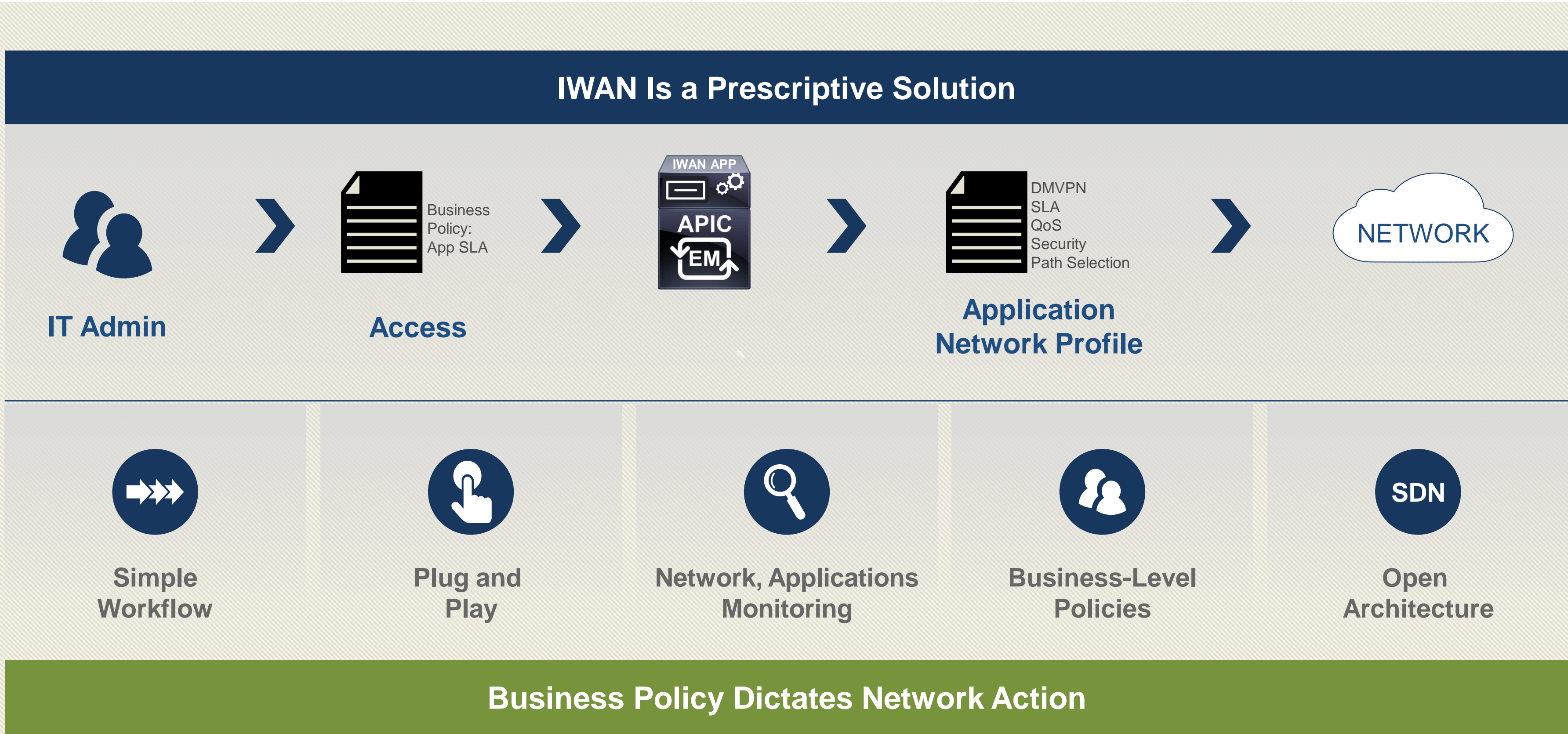
Network, Compute
and Storage

Where is my controller?

Network-Wide Abstractions Simplify the Network with **APIC-EM**



Cisco Intelligent WAN App for the **APIC-EM**





Audit Logs

Hub site is ready.
Manage branch sites.

0

Provisioned

5

In-Progress

0

Failed



Update Hub Site & Settings

Configured



10 Scheduled Job(s)



Administer Application Policy

4 Business Category(s)

6 Scavenger Category(s)

3 Default Category(s)

2 Scheduled Job(s)



Set up Branch Sites

6 Unclaimed Device(s)

5 Site(s)

11 Scheduled Job(s)

Provisioning Site

Apply Changes

Select Topology

Edit site name and loca...

Configure WAN Clouds

Configure LAN

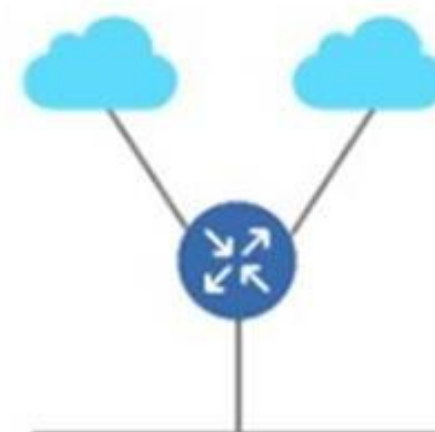
Site Summary

Select Topology

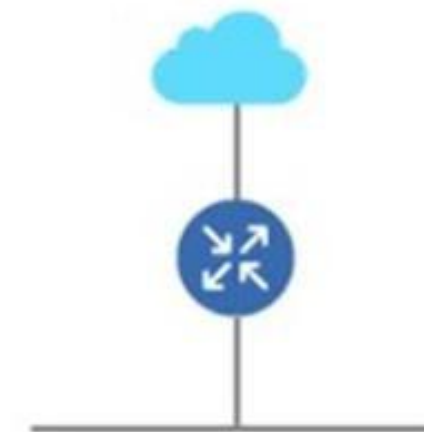
Two Router Configuration



One router with two WAN clouds configuration



One Router Configuration

[Previous](#)

Next

Apply Changes

Site Summary

 LAN

Next



Site Status

Success

Branch Topology

Address Allocation

Site Name : Wichita KS

Site Location : Wichita KS

WAN Cloud : MPLS

Bandwidth(Mbps) : 300

CE IP Address : 1.2.5.5

PE IP Address : 4.4.4.4

WAN Cloud : Inet

Bandwidth(Mbps) : 100

Type : ISR4331/K9

Serial Number : FLM1915W0CP

Host Name : PRE-GA-2-BR-MPLS

Type : ISR4331/K9

Serial Number : FLM1915W0GB

Host Name : PRE-GA-2-BR-INET



Default

 mpls ▼

No App Performance ▼

Drop

No App Performance ▼

Application Policy

Categorize Applications



Define Application Policy



Apply Changes

Add Application

Search Apps

Applications can be dragged and dropped to other categories; By default not all the applications are visible, you can make them visible [Teach me](#).
Not all Categories are shown by default, [Show](#) hidden categories.

backup-and-storage 4 ...	browsing 6 ...	business-and-productivity-tools 18 ...	consumer-file-sharing 10 ...
consumer-internet 6 ...	consumer-messaging 7 ...	consumer-streaming 20 ...	database 3 ...
email 9 ...	epayment 0 ...	file-sharing 11 ...	gaming 1 ...
instant-messaging 7 ...	other 10 ...	social-networking 7 ...	software-updates 9 ...
voice-and-video 35 ...			

Name

yahoo-messenger-video		
webex-app-sharing		
ms-lync		

Cisco SD-WAN and Beyond

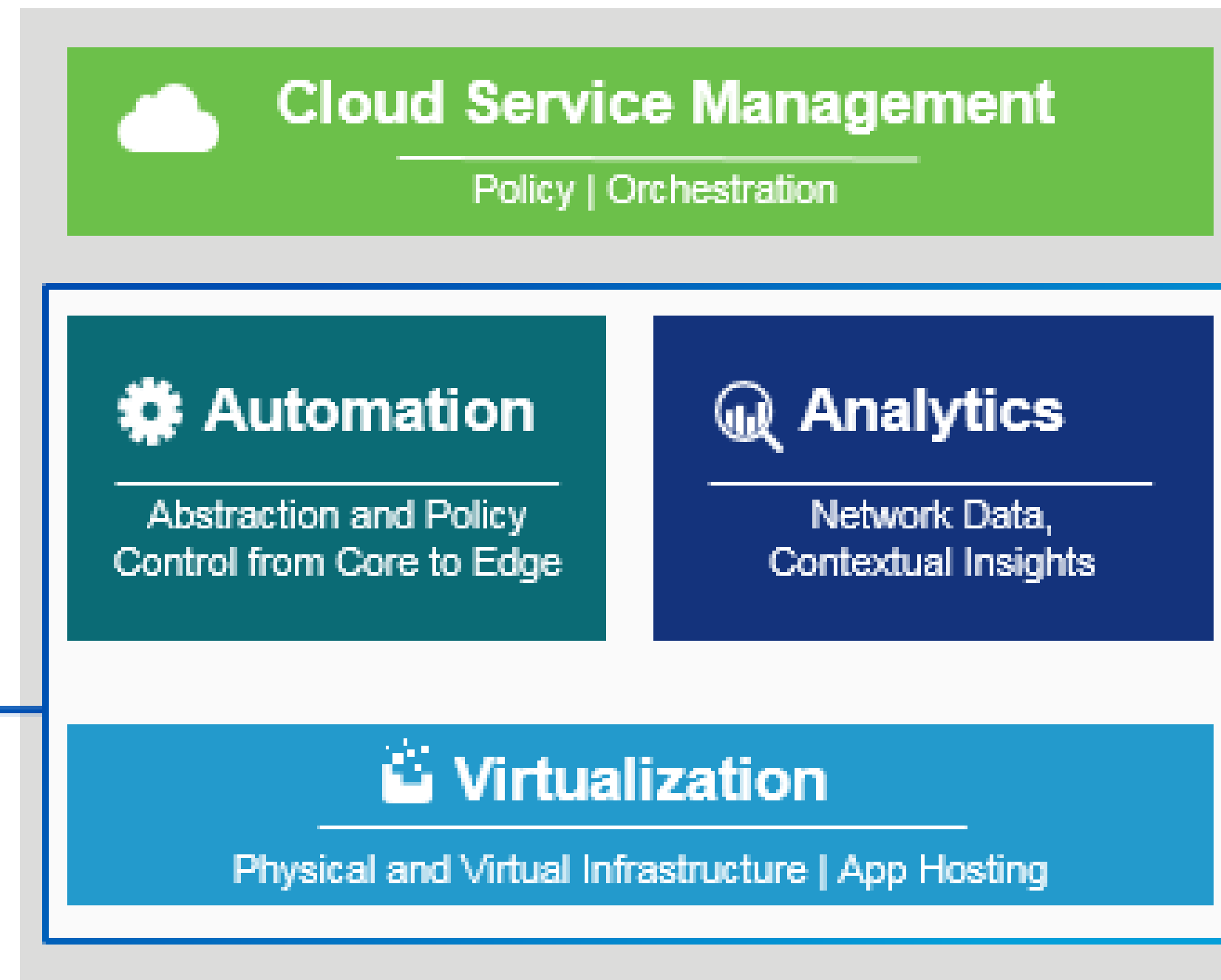
Cisco Digital Network Architecture

Cisco® Intelligent WAN

Automate with policies

Analytics with network insights

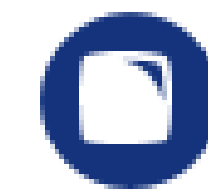
Physical and virtual platforms



Respond to threats faster



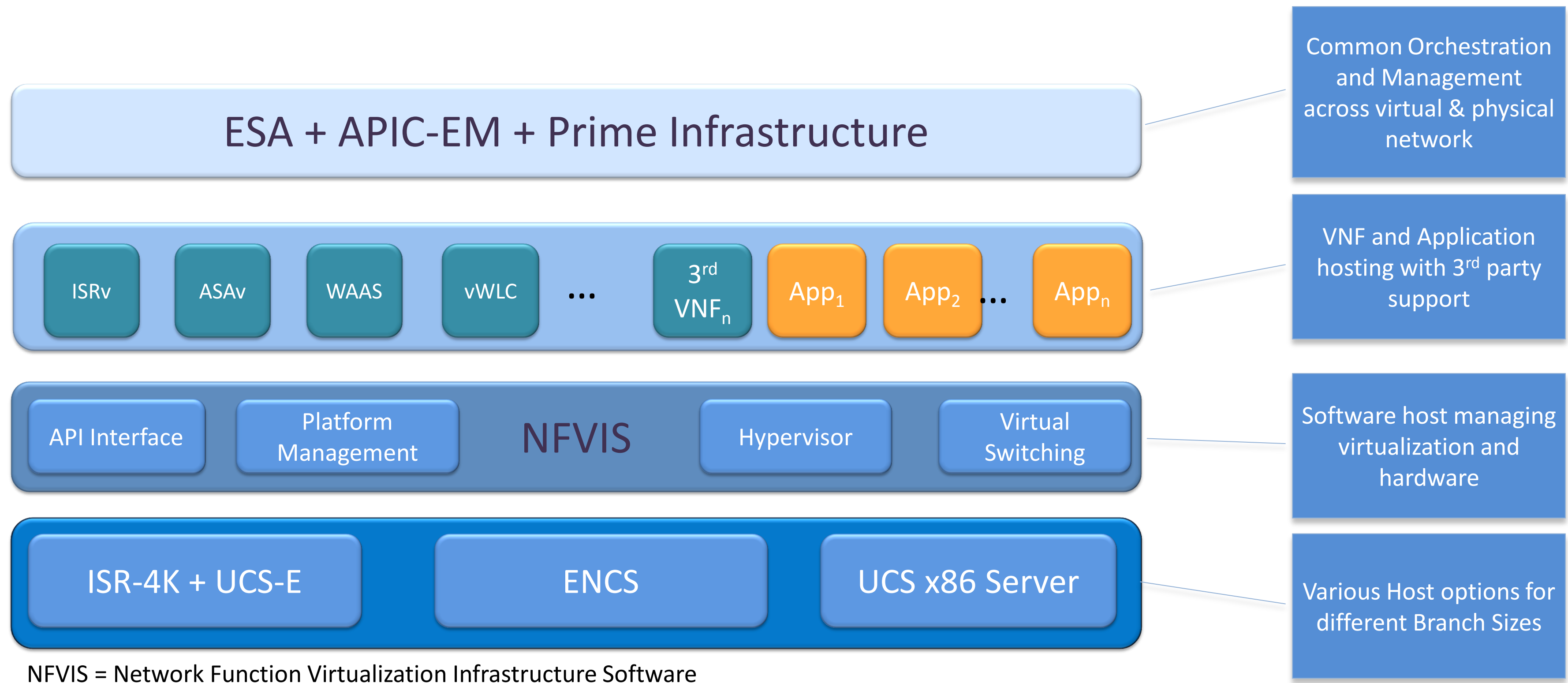
Deploy locations faster



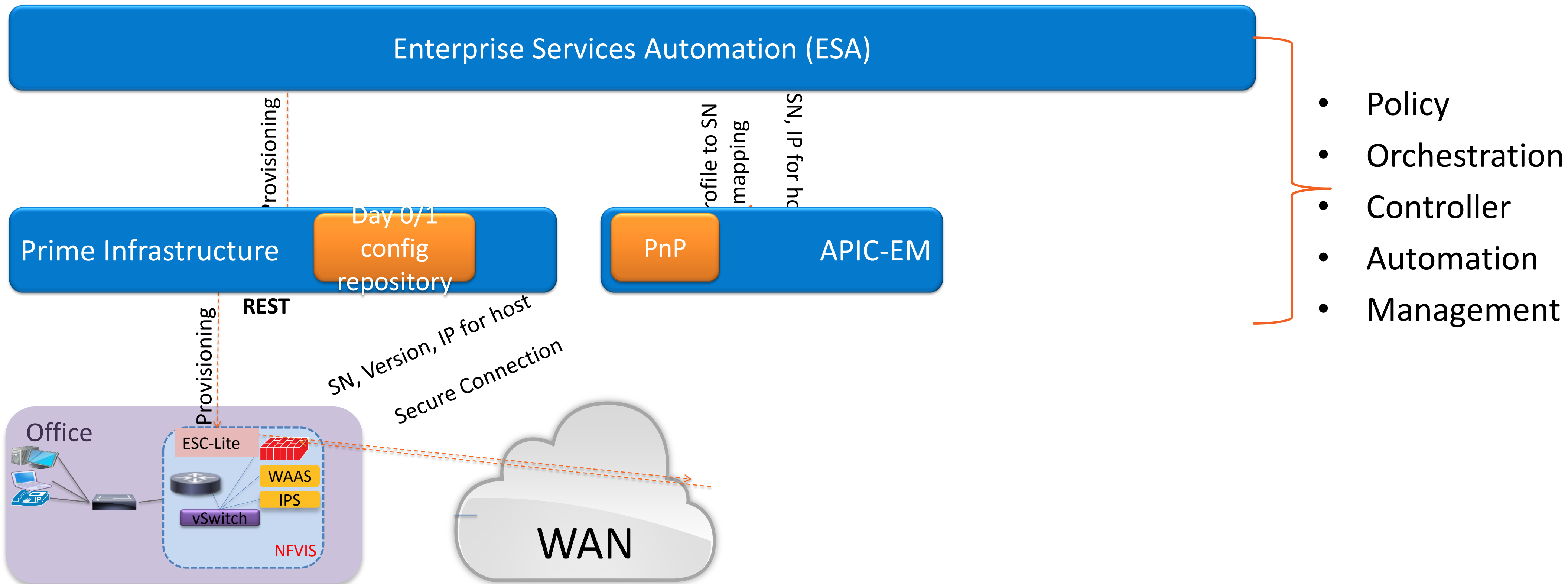
More responsive user apps

The Enterprise NFV Approach

Enterprise NFV Solution Architecture



Orchestration & Management for Day 0/1



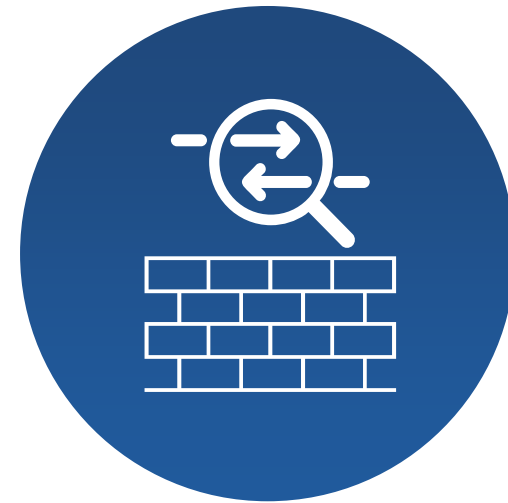
Best-of-breed Trusted Services from Cisco

Consistent software across physical and virtual



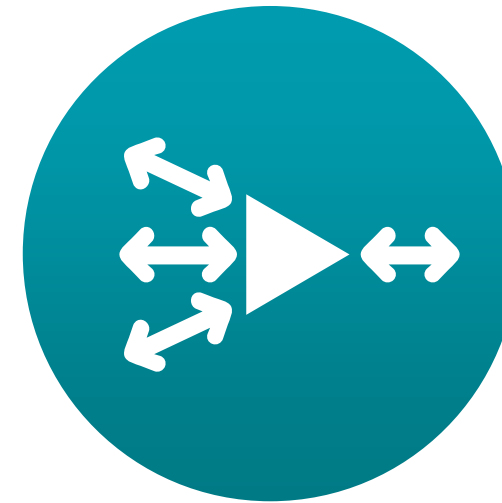
ISRv

High Performance
Rich Features
End-to-end Support
Proven Software



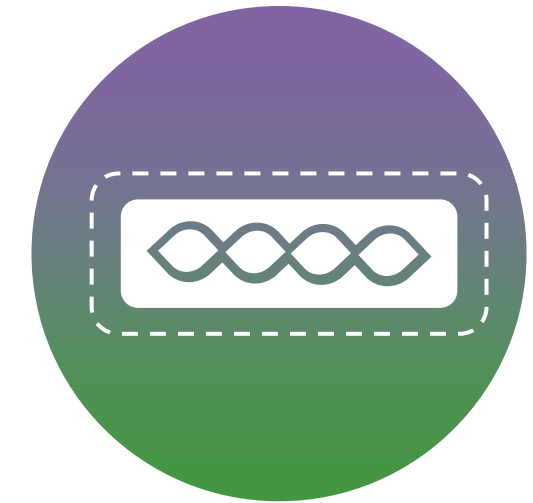
ASA/FTD *

Comprehensive Protection
Full DC-class Featured
Functionality
Designed for NFV
Cost-effective with NFV



vWAAS

Application Optimization
Superior Caching with
Akamai Connect



vWLC

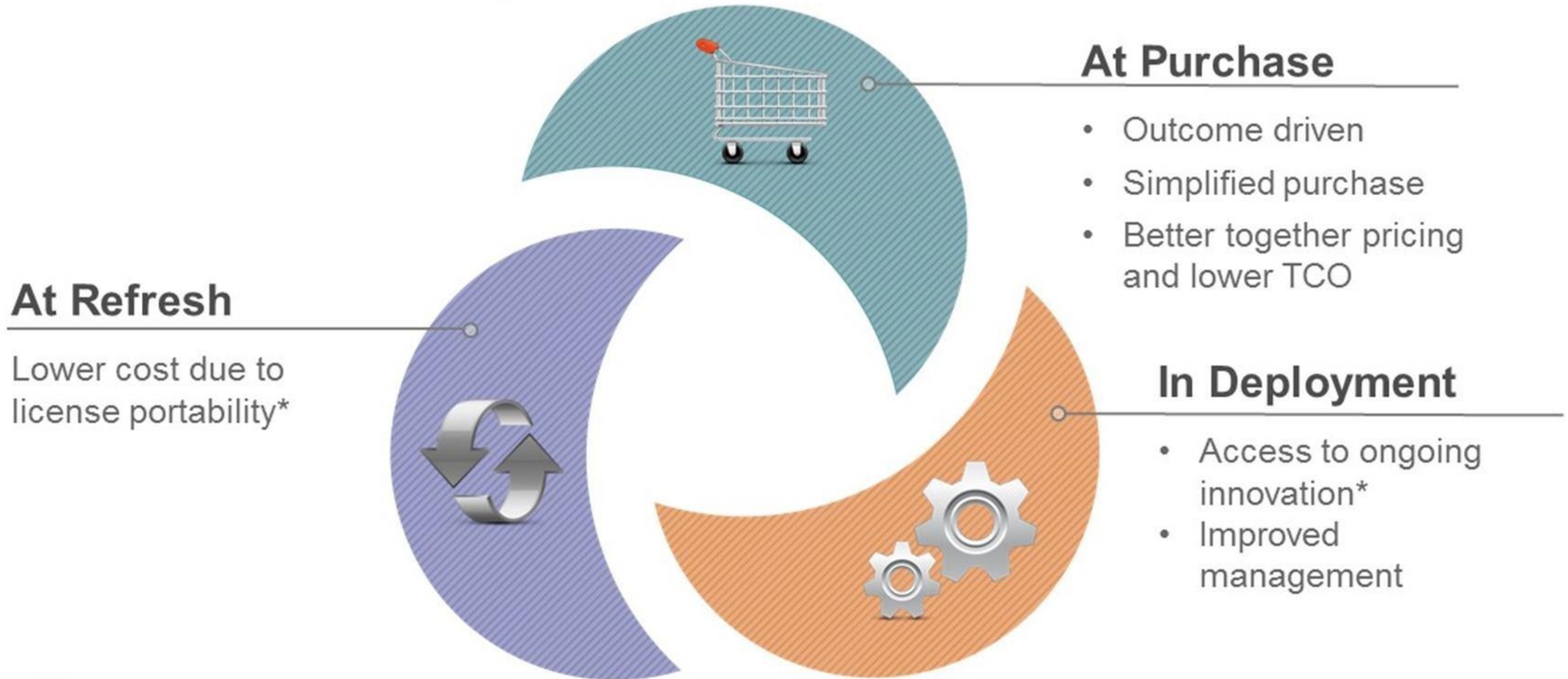
Survivability & Scale
Consistency across the Data
Center and Switches
Built for small and medium
branches

Windows 2012 and Linux Server also supported

Cisco One Software for WAN

Cisco ONE Software Benefits

Across the Entire Lifecycle

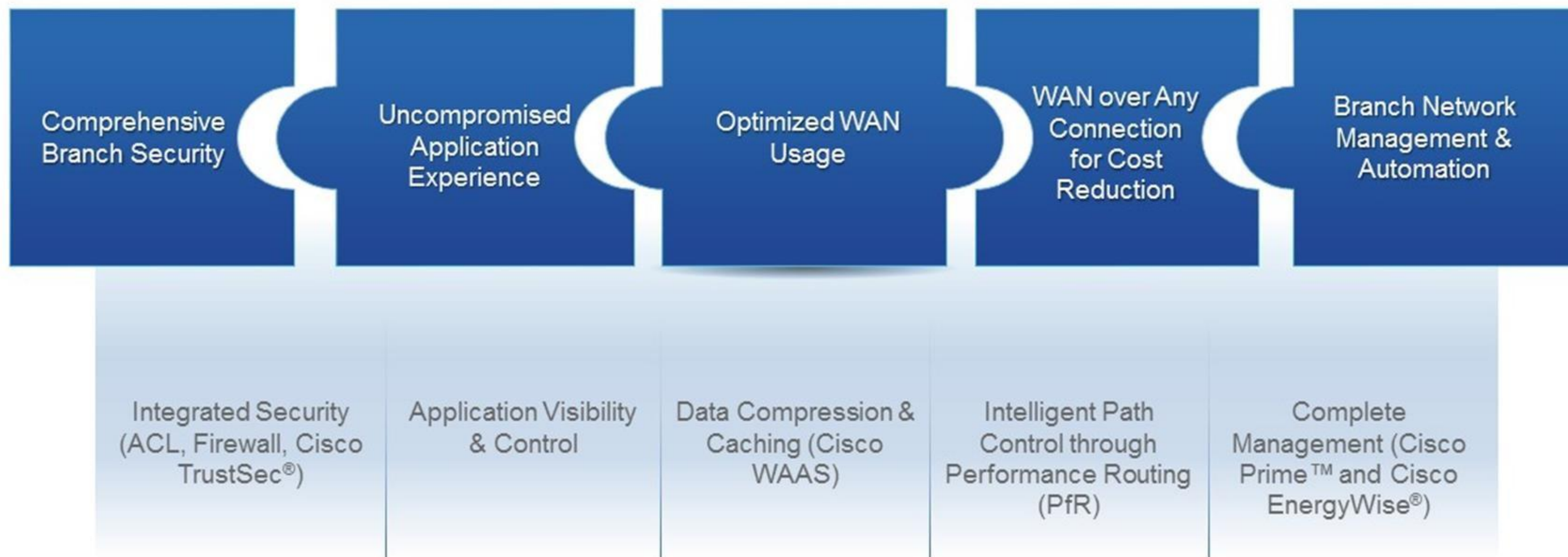


Cisco ONE Software Suites: Intelligent WAN Enabled By Foundation for WAN



Cisco ONE Software Foundation for WAN Delivers the Intelligent WAN

Connect your branches and campus over any connection – securely and cost optimized



Cisco ONE Example

- Customer is deploying a new branch with ISR4331
- Customer wants the full IWAN architecture
- Akamai Connect, Performance license and additional memory is added

ISR 4331 AX Bundle

- Cisco ISR 4431
- Security License
- AppX License
- Akamai Connect for up to 750 conn
- Performance on Demand License for 4330 Series
- Upgrade to 16GB DRAM/16GB Flash, 200GB mSATA SSD bundle

C1-ISR4331

- Cisco ISR 4431
- Security License
- AppX License
- Akamai Connect for up to 750 conn
- Performance on Demand License for 4330 Series
- Upgrade to 16GB DRAM/16GB Flash, 200GB mSATA SSD bundle

- Cisco ONE vNAM Software 6.0 and 150 Mbps License
- Cisco ONE Energy Mgmt Perpetual Lic - 200 DO End Points
- Cisco ONE PI Device License for LF & AS for ISR
- SWSS UPGRADES C1 Foundation Perpetual Lic ISR 4331

Total A La Carte: \$13,960 (GPL)

Total Cisco One: \$13,400 (GPL)

What You Get With Cisco
ONE Foundation For WAN

"Better Together Pricing"

- Intelligent Path Control
- Application Visibility, & Control
- Optimized WAN Usage

- Integrated Security
- Complete Network Management
- Energy Management

Summary

Cisco IWAN is SD-WAN done right!

Uncompromised Experience Over Any Connection

➤ Mixed Transports with High Reliability

➤ SLAs for Business Critical Applications

➤ Centralized Policy Management
IWAN App with APIC-EM

➤ Lower Costs without Compromise,
Cisco ONE Licensing



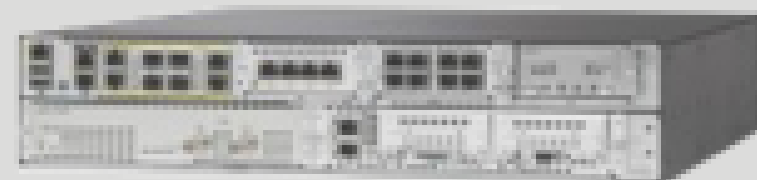
Cisco Intelligent WAN Platforms

Cisco Intelligent WAN Platforms

Branch



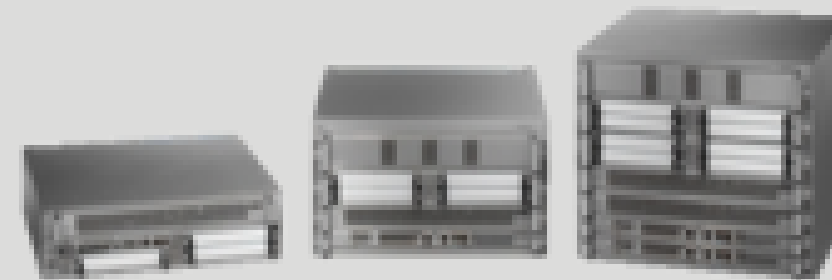
890 Series ISR



4000 Series ISR +
Cisco UCS® E-Series

All-in-one branch platform
physical or virtual

Head-end



Cisco® ASR 1000 Series

High availability

Cloud



CSR 1000V

Secure your cloud
connectivity

Common Software-Defined WAN Capabilities Across Your Entire Portfolio

Cisco SD-WAN and Beyond

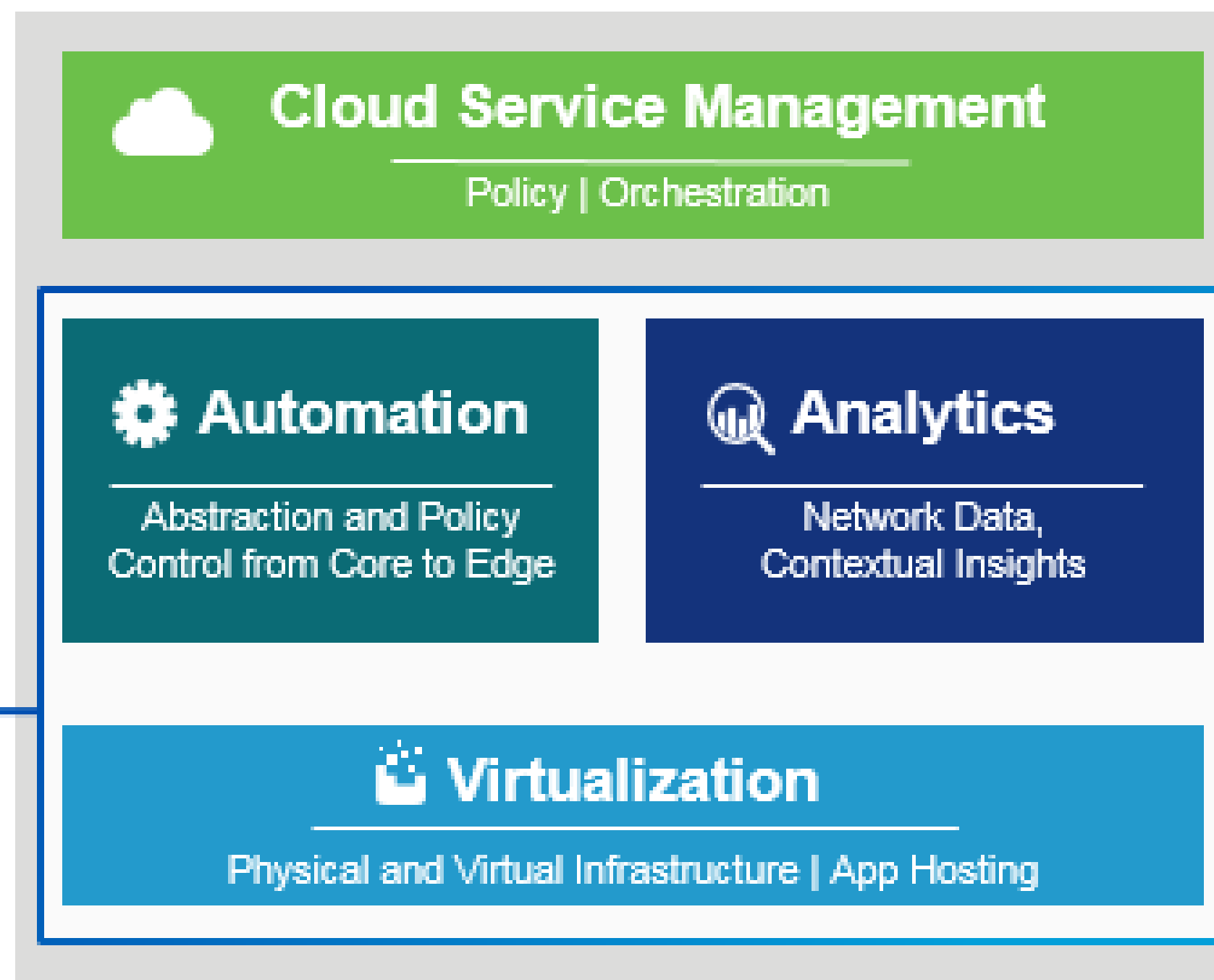
Cisco Digital Network Architecture

Cisco® Intelligent WAN

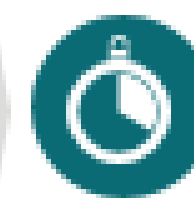
Automate with policies

Analytics with network insights

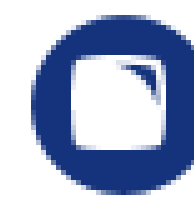
Physical and virtual platforms



Respond to threats faster



Deploy locations faster



More responsive user apps

ASR 1002-HX&1001-HX (ASR1K精品) Architecture Overview



ASR 1002-HX in a Nutshell

Pay as you go

- 100 Gbps system performance
- Port on demand performance (based on I/O licenses)

Control plane

- CPU: Quad Core @ 2.5 GHz
- Memory: 16GB DDR3 default memory, upgradeable to 32GB

System management

- Cisco Prime
- Glue Networks

Application level service performance

- 58M Packets Per Second
- Diverse VPN security solutions, up to 25G IMIX
- 13M Firewall and traditional NAT Sessions

Multi-Core Network Processor

- 124 Cores
- 4 Packet Threads / Core
- 496 simultaneous threads

Miscellaneous

- RJ45 & mini-USB console
- SSD
- Secure Boot

Network Interface Module

- 1 double wide or 1 single wide NIM
- NIM - Compatibility with ISR4400 and ASR1001-X



EPA - Ethernet Port Adapter

- 1x EPA slot

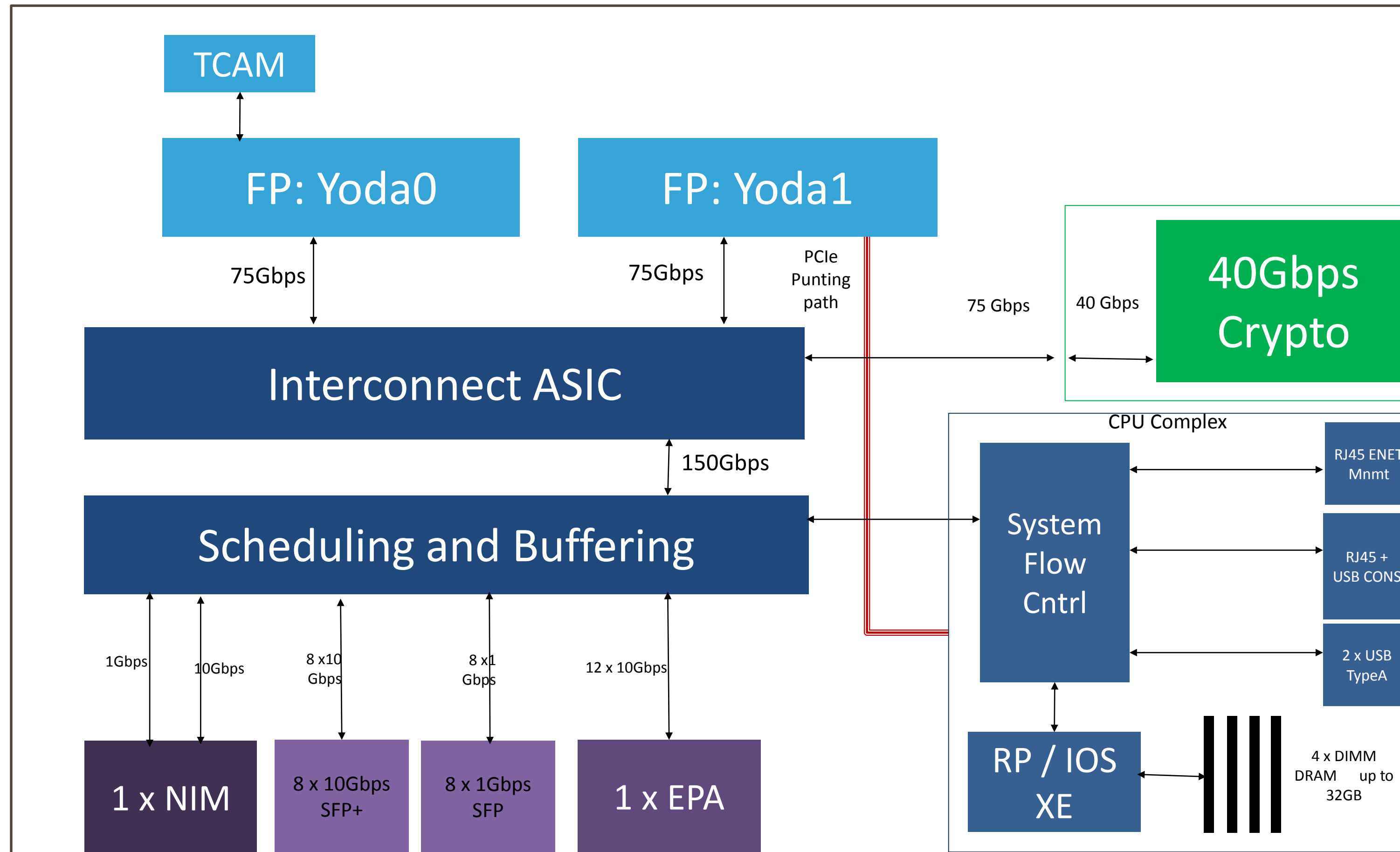
Built in I/O

- 8x Gigabit Ethernet interfaces in base
- 8x TenGigabit Ethernet interfaces enabled by license
- Multipoint MACSEC for line rate encryption (1G & 10G)

Crypto module

- Field upgradeable

ASR1002-HX Hardware Block Diagram



ASR 1001-HX 60G Fixed



Pay as you go

- 60 Gbps system performance
- 16 Built-in 10GE/1GE ports enabled via software license
- No modular interfaces

Application level service performance

- 30M+ Packets Per Second
- Up to 20G Crypto IMIX w/ Suite B for diverse VPN security solutions
- 6M Firewall and traditional NAT Sessions

Multi-Core Network Processor

- 62 Cores
- 4 Packet Threads / Core
- 248 simultaneous threads

Control plane

- CPU: Quad Core @ 2.5 GHz
- Memory: 8GB DDR3 default memory, upgradeable to 16GB

Power Supplies

- 2x AC or DC

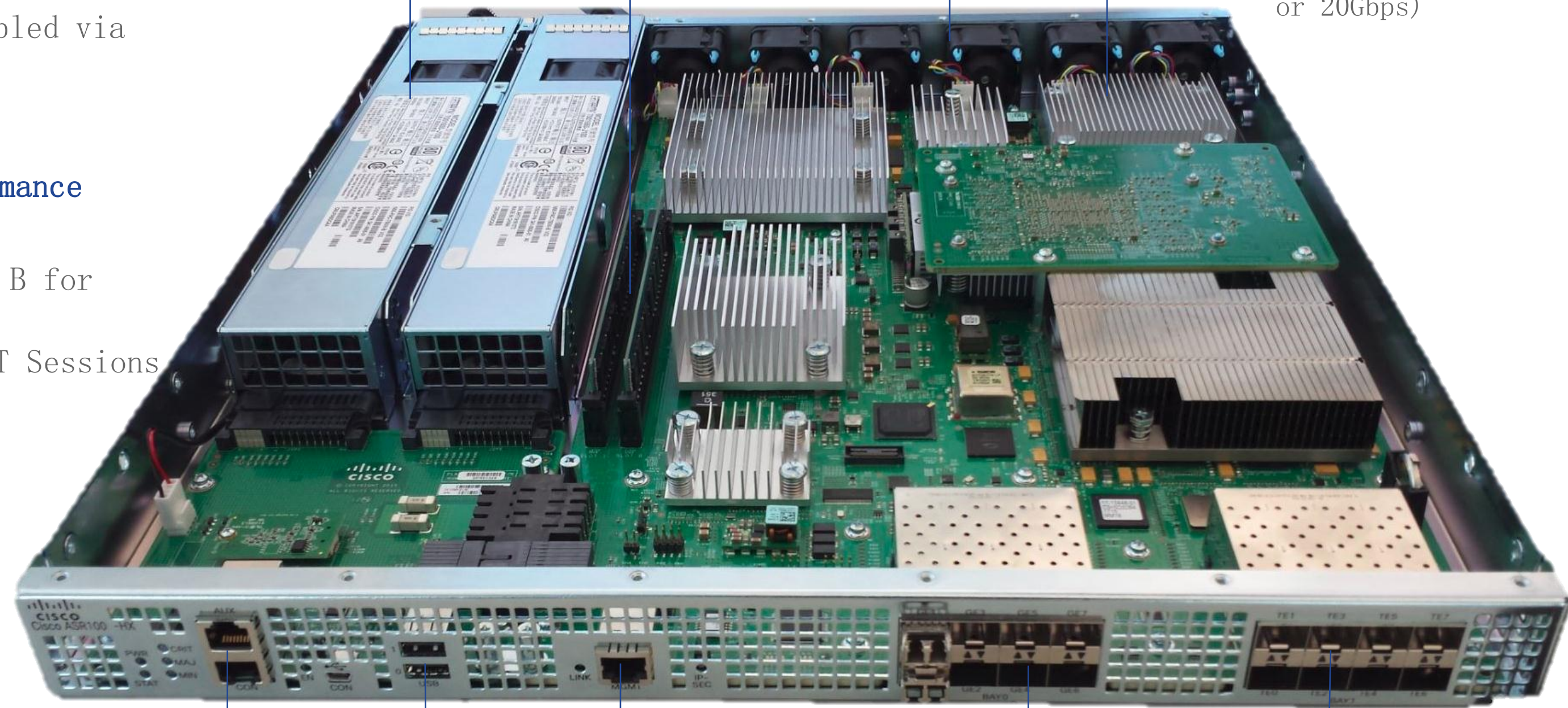
Memory

- 2x DIMM slots (8GB each)

6x Fans

Crypto module

- Field upgradeable (8 or 20Gbps)



System Management

- Console
- AUX

System Management

- RJ45 GE Ethernet
- 2x USB Ports

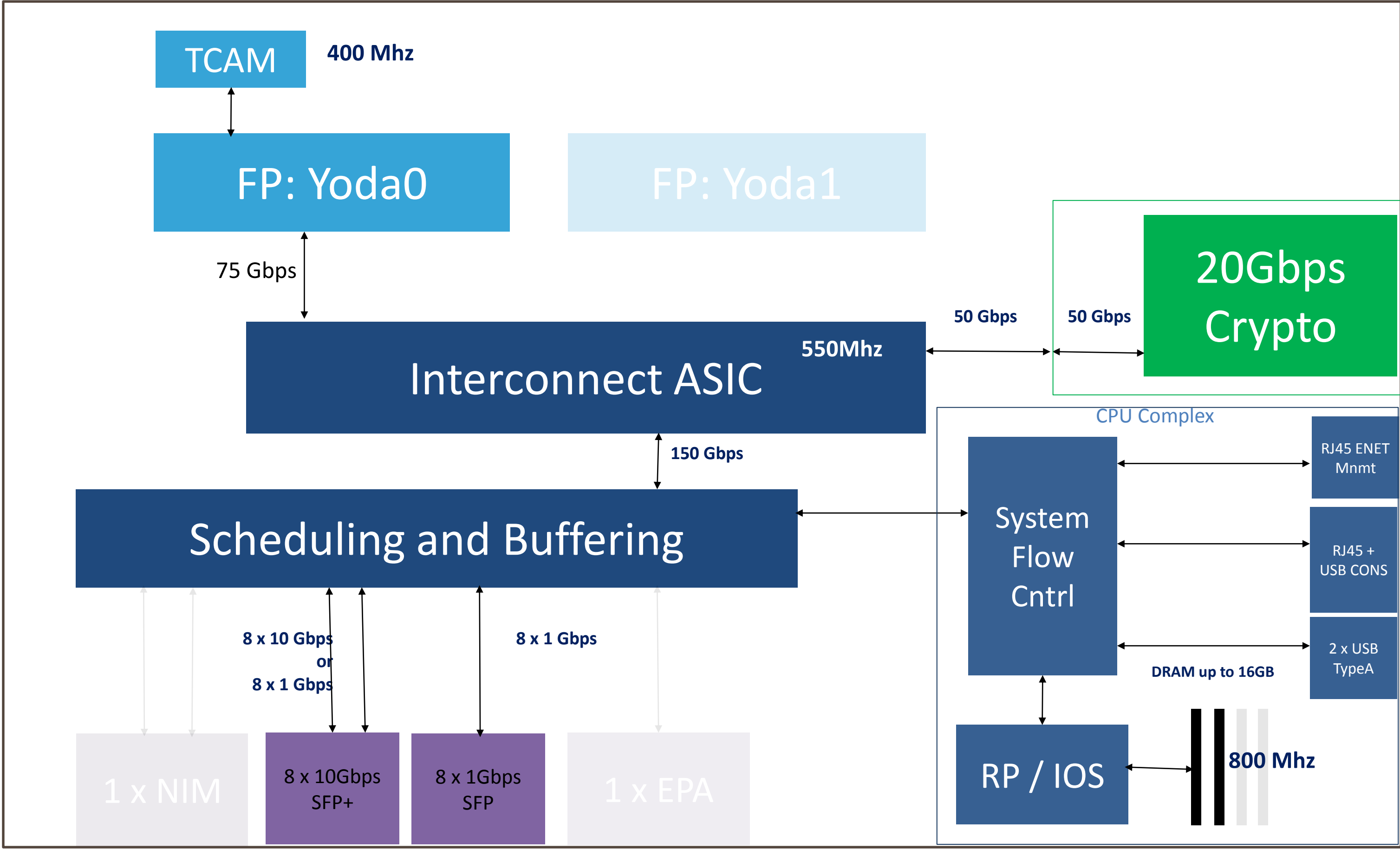
8x 1GE Ports

- MACSec enabled

8x 10GE / 1GE Ports

- Enabled by license
- Configurable to 1 or 10GE
- MACSec enabled

ASR1001-HX Hardware Block Diagram



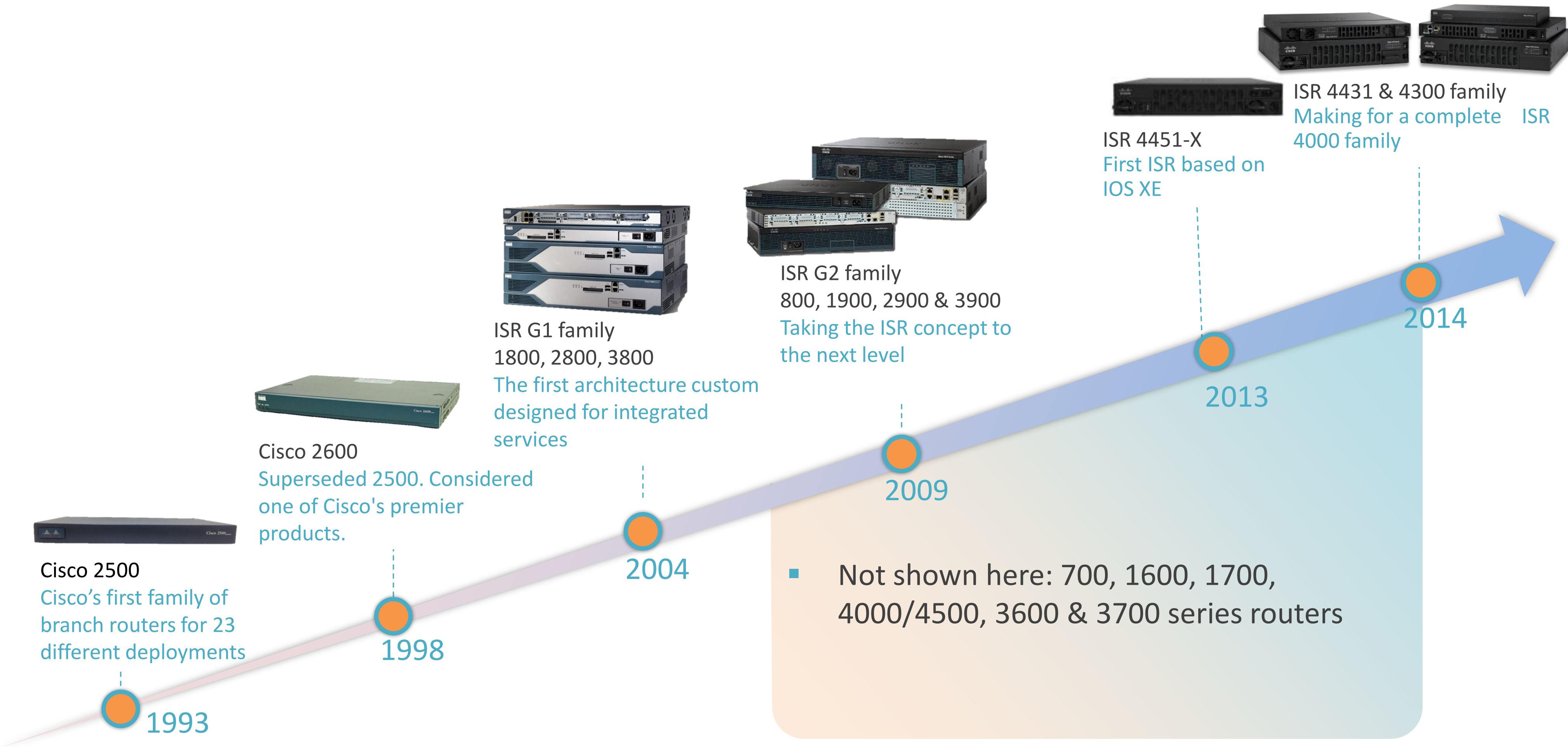
ASR1002-HX to ASR1001-HX deltas

- No NIM or EPA slots
- Built in 8 x 1GE ports and 8 ports that can be either 1GE or 10GE
- No BITS interface for clocking
- CPU DDR3 Memory – 8GB default, field upgradable to 16GB of DDR3
 - 16G configuration is comprised of two 8GB UDIMM
 - 8G configuration is comprised of two 4GB UDIMM
- IP-Sec bandwidth with up to 20Gbps crypto bandwidth on ASR1001-HX
- Based on ESP-100 Crypto architecture - 32 core Octeon II CN6870-800Mhz
- Some ASICs running at slower speeds to lower cooling requirements
- Feature scale will generally track ASR1002-X numbers
- 116K QoS queues

Cisco 4000 Series Integrated Services Routers

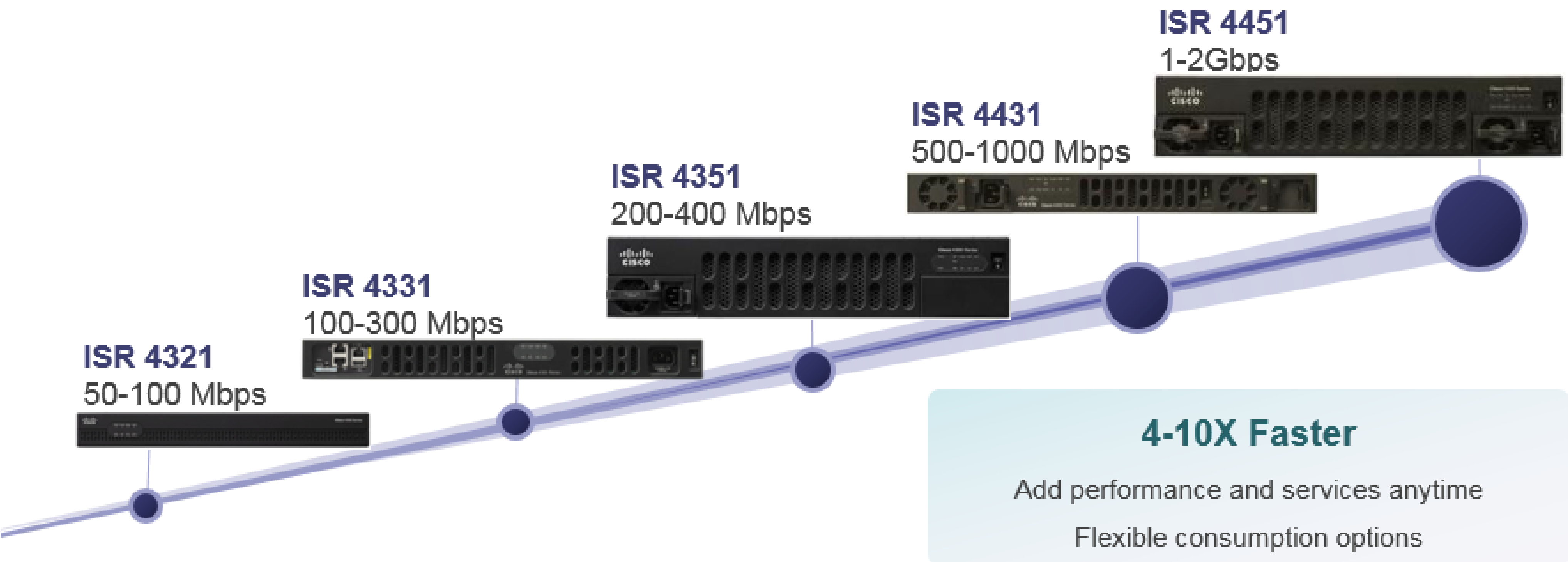


Cisco Branch Router Evolution



Pay-As-You-Grow with Cisco ISR 4000 Series

Investment Protection Without Oversubscription



ISR G2 and ISR 4000 Platform Pricing Overview



