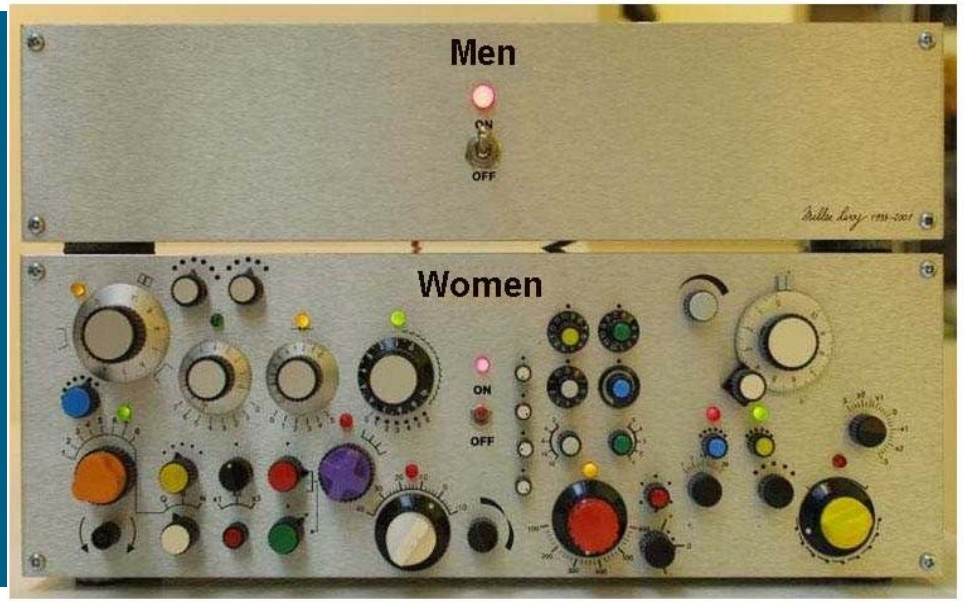
Cisco Virtual Update

Routing

November 2010



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ASR 1000 Enhancements **ASR1001+ASR1013**

Cisco ASR 1000 Series Routers: Overview

2.5 Gbps to 40Gbps Range - designed today for up to 360 Gbps in the future

Compact, Powerful Router	Business-Critical Resiliency	Instant On Service Delivery
▪ Line-rate performance 2.5G to 100G+ with services enabled ▪ Investment protection with modular engines, IOSCLI and SPAs for I/O ▪ Hardware based QoS engine with 128K queues	▪ Fully separated control and forwarding planes ▪ Hardware and software redundancy ▪ In-service software upgrades	▪ Integrated firewall, VPN, encryption, NBAR, CUBE-ENT,CUBE-SP ▪ Scalable on-chip service provisioning through software licensing

Embedded High-Performance Resilient Services

ASR 1001

2.5 - 5Gbps

ASR 1002
ASR 1002-F

2.5–10 Gbps

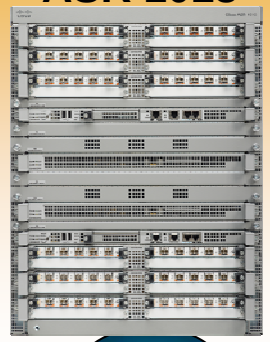
ASR 1004

10-40 Gbps

ASR 1006

10-40+ Gbps

ASR 1013



10-360 Gbps

Cisco ASR 1001

High-End Branch and Managed Services

Product Features

- Small Footprint (1-rack unit height)
- Performance range of 2.5 to 5-Gbps
- Up to 1.8 Gbps crypto throughput built-in
- 1 single height SPA slot for I/O connectivity and 4 built-in GE ports
- Three versions at First Customer Shipment
  - ASR1001
  - ASR1001-2XOC3POS (IDC)
  - ASR1001-4XT3 (IDC)

  …and more to come
- High Availability with SW redundancy support

Customer Benefits

- Most-compact (1RU) WAN aggregation routing solution with embedded instant-on services
- Versatile Routing Solution …
  - WAN Aggregation including secure WAN
  - Internet Gateway with Performance Routing and Firewall
  - Managed Services Solution with highly integrated services
  - High-end branch office solution
  - Highly scalable Route Reflector
- Easy performance upgrade via software activated license
- Tracking of licenses via software activation
- Same operational IOS “look & feel” as rest of ASR 1000 family

ASR 1001

2.5 to 5- Gbps

ASR1000 Maximum Interface Termination Capability

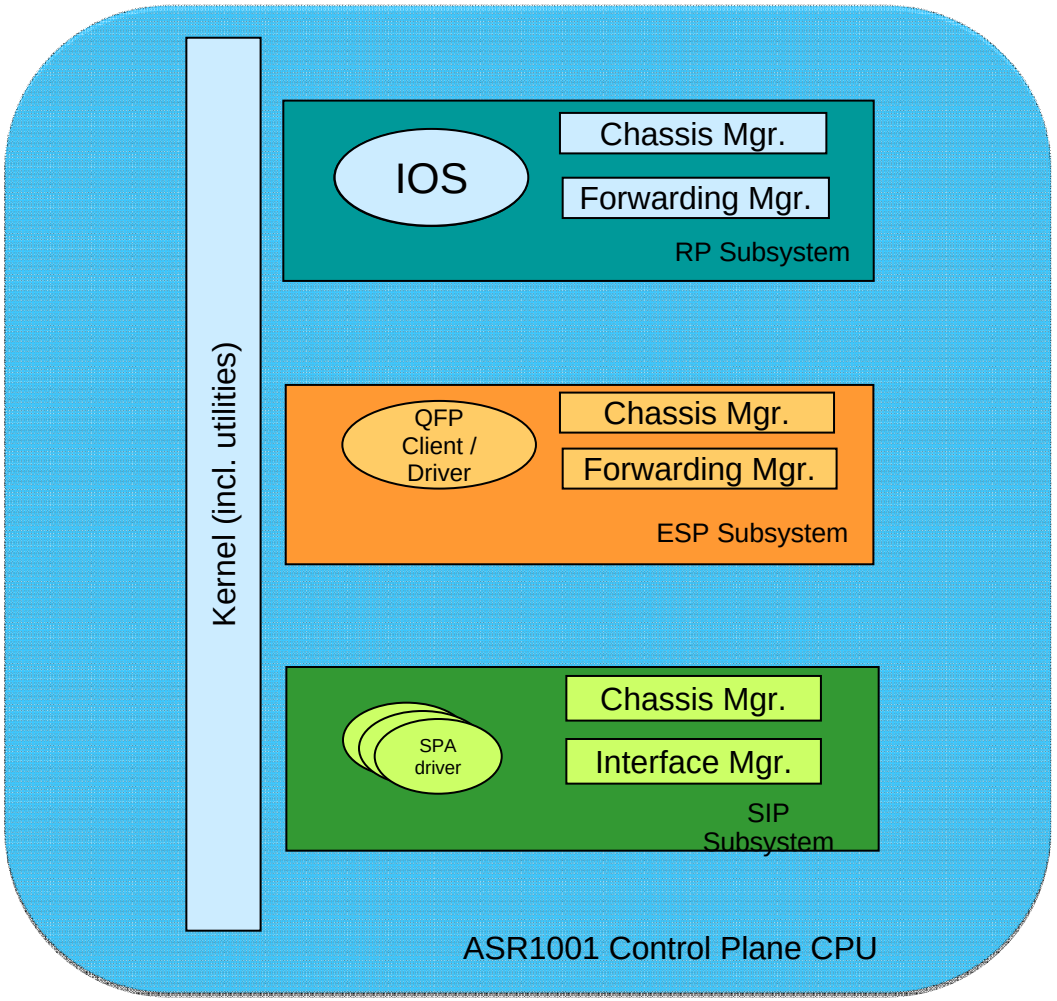
	1RU	2RU	4RU	6RU	13RU	Comment
# SPAs (single-height)	1	3	8	12	24	
10GE	1	3	8	12	24	1-port 10GE
GE	12	28	64	96	192	8-port GE SPA; 1RU and 2RU has 4 built-in GE ports
FE	8	24	64	96	192	8-port FE
STM-4	1	3	8	12	24	1-port STM4 POS
STM-1	4+2*	12	32	48	96	4-port STM1 POS
T3/E3	4+4T3*	12	32	48	96	4-port T3/E3
ChT3 @T1	112	336	896	1344	2688	4-port Channelized T3
ChT3 @DS0	1024	3069	8184	12276	24552	4-port Channelized T3
ChT1 / ChE1 @DS0	192/256	576/768	1536/2048	2304/3072	4608/6144	8-port Channelized T1/E1
V.35/X.21/EIA-232…	4	12	32	48	96	4-port Serial (12in1)
ChSTM1 @ T3 / E3	3/3	9/9	24/24	36/36	72/72	1-port Channelized STM1
ChSTM1 @ T1 / E1	84/63	252/189	672/504	1008 / 756	2016 / 1512	1-port Channelized STM1
ChSTM1 @ DS0	1023	3069	8184	12276	24552	1-port Channelized STM1
STM-64	1	3	8	12	24	1-port OC192 (single-height)
STM-16	4	12	32	48	96	4-port OC48

* On ASR1001 with corresponding daughter card module

- Physical interface termination capacities only
- Assumes all SPA slots are filled with the respective SPA

ASR 1001 Software Architecture

- Single Control CPU
  - –Dual Core 2.2GHz CPU
  - – 64 bit OS
  - –4 GB and 8 GB memory support
- Standard IOS XE Processes
  - –Running over a single Linux kernel
- High Availability
  - –IOS software redundancy (not ISSU)
  - – Fault Containment
  - – Process Restartability
- Operational Consistency
  - – Same look and feel as standard IOS



Cisco ASR 1013

Broadband, Carrier Ethernet, IPSec Aggregation …

ASR 1013

Supported as of IOSXE3.1S (Jul'10)

Designed for up to 360-Gbps

Product Features & Customer Benefits

- 13-rack unit height chassis
- Modular platform
  - Embedded Services Processor – ESP40
  - Route Processor – RP2
  - SIP carrier card –SIP10 and SIP40
- At First Customer Shipment up to 40-Gbps throughput
- Designed for up to 360-Gbps throughput support
- Up to 12 Gbps crypto throughput built-in with ESP40
- 24 SPA slot for I/O connectivity
- High Availability with HW redundancy support
- Same operational IOS "look & feel" as rest of ASR 1000 family
- Positioned for a variety of routing solutions
  - Broadband, Voice Gateway, DPI, IPSec aggregation, Carrier Ethernet, DataCenter Interconnect, PE

ASR1000 Maximum Interface Termination Capability

	1RU	2RU	4RU	6RU	13RU	Comment
# SPAs (single-height)	1	3	8	12	24	
10GE	1	3	8	12	24	1-port 10GE
GE	12	28	64	96	192	8-port GE SPA; 1RU and 2RU has 4 built-in GE ports
FE	8	24	64	96	192	8-port FE
STM-4	1	3	8	12	24	1-port STM4 POS
STM-1	4+2*	12	32	48	96	4-port STM1 POS
T3/E3	4+4T3*	12	32	48	96	4-port T3/E3
ChT3 @T1	112	336	896	1344	2688	4-port Channelized T3
ChT3 @DS0	1024	3069	8184	12276	24552	4-port Channelized T3
ChT1 / ChE1 @DS0	192/256	576/768	1536/2048	2304/3072	4608/6144	8-port Channelized T1/E1
V.35/X.21/EIA-232…	4	12	32	48	96	4-port Serial (12in1)
ChSTM1 @ T3 / E3	3/3	9/9	24/24	36/36	72/72	1-port Channelized STM1
ChSTM1 @ T1 / E1	84/63	252/189	672/504	1008 / 756	2016 / 1512	1-port Channelized STM1
ChSTM1 @ DS0	1023	3069	8184	12276	24552	1-port Channelized STM1
STM-64	1	3	8	12	24	1-port OC192 (single-height)
STM-16	4	12	32	48	96	4-port OC48

* On ASR1001 with corresponding daughter card module

- Physical interface termination capacities only
- Assumes all SPA slots are filled with the respective SPA

ASR 1000 Hardware Compatibility

Including details on ESP40 and SIP40 support

Supported	Chassis	RP	ESP	SIP
Supported starting IOS XE 3.2S (ASR 1001)	ASR1001 ASR1001-2XOC3POS ASR1001-4XT3	Integrated	ESP2.5 – upgradeable to ESP5 via license (integrated)	N/A-built in
Supported before IOS XE 3.1S	ASR1002-F		ESP2.5 (integrated)	N/A-built-in
	ASR1002		ESP5	
			ESP10	
	ASR1004	RP1 or RP2	ESP10	SIP-10
			ESP20	
	ASR1006	RP1 or RP2	ESP10*	
			ESP20*	
Support starting IOS XE 3.1S (July 2010)	ASR1006*	RP2	ESP40*	ANY
	ASR1013		ESP40	

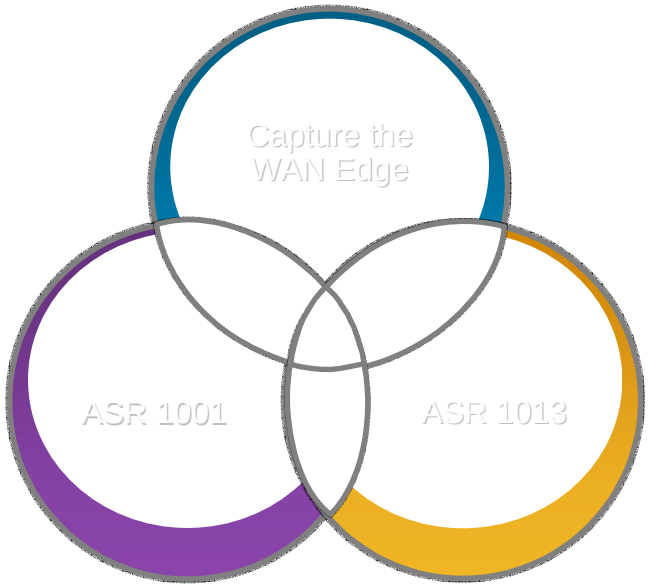
* NOTE:

- ASR1006 additional support is displayed in this matrix
- ASR1006 supports ESP10 to ESP20 and ESP20 to ESP40 upgrade
- SPA-4XT-Serial will be supported in IOS XE 3.1.1S (1st rebuild of IOS XE 3.1S)
- ESP40/SIP40 on ASR1006 is targeted for IOS XE 3.2.0S (Nov 2010)

Take Away

ASR 1000 Series …

- ✓ Plays a vital role in the Borderless Routing Infrastructure Architectures
- ✓ Is positioned with ISRG2s as the Borderless Network WAN-Branch solution of choice
- ✓ Offers now a wide range of bandwidth, control plane scalability and port density to choose from
  - ✓Bandwidth from 2.5-Gbps to 40-Gbps
  - ✓Crypto bandwidth – from 1-Gbps to 11-Gbps depending on ESP
- ✓ Provides In-Service Software Upgrade (ISSU) on ASR1006/ASR1013 w/ HW Redundancy and IOS Software Upgrade on ASR1001, ASR1002-F, ASR1002



ISR-G2 Enhancements

886VA, 887VA, 892F ISR-G2's

Introducing The CISCO88xVA Series

- New multi-mode VDSL2 and ADSL2/2+ platforms based on the CISCO880 series architecture
- Maximum flexibility for DSL WAN deployments
- Replacing existing 880 ADSL platforms
- Broadcom chipset (migrating from ST Micro)
- Annex A (ADSLoverPOTS), Annex B (ADSLoverISDN), Annex M (ADSL over POTS, annex M) options
- DSL Firmware and IOS Release can be certified independently
- Base SKUs available with IOS Release 15.1(2)T

CISCO886VA-K9	**Cisco 886VA router with VDSL2/ADSL2+ over ISDN**
CISCO886VA-SEC-K9	**Cisco 886VA Secure router with VDSL2/ADSL2+ over ISDN**
CISCO887VA-K9	**Cisco 887VA router with VDSL2/ADSL2+ over POTS**
CISCO887VA-SEC-K9	**Cisco 887VA Secure router with VDSL2/ADSL2+ over POTS**
CISCO887VA-M-K9	**Cisco 887VA Annex M router**

Cisco 892F Series ISR G2 – What's new?

- Addresses growing Ethernet WAN Opportunity by integrating Small Form-Factor Pluggable (SFP) Port on the existing Cisco 890 Series ISR G2.
- Support for higher bandwidth applications (video, IPTV, online gaming) with the feature richness of Cisco IOS
  - Rich media applications
  - Higher performance
  - Services on demand
  - Application Optimization

- Provides a single box solution to meet the growing market demand for Integrated Ethernet Access in the small to medium enterprise branches
- Complements Cisco's established Ethernet and SFP product portfolios with routing, security, services
- Provides for an integrated solution with an onboard SFP Port for scalability & greater operational efficiencies for managed services

Cisco 892F Series Integrated Services Routers - Feature Highlights

Desktop Chassis with External Power Supply

- WAN interfaces: SFP, GE & FE Copper
- WAN backup: ISDN
- LAN: 8-port FE managed switch; 4-port PoE
- Wireless 802.11 a/g/n, LWAPP support, Dual radios 2.4 & 5 GHz, 14 VLANs supported
- Two USB 2.0 ports
- Dedicated AUX & Console port
- Software: Cisco IOS Universal Image - Advanced IP Services feature license (Default)

- **Single box for broadband and Metro-Ethernet deployment scenarios**
- **Carrier class IOS Metro-E features**
- **Comprehensive Security & Threat defense**
  - IPSec acceleration: DMVPN, GET VPN, Easy VPN
  - IOS Firewall, IPS, SSL-VPN
  - Content filtering (license based)
- **Advanced Cisco IOS®Routing with**
  - Metro-E HQoS, E-LMI, E-OAM, IP SLA and Network Management
- **Business continuity & High Availability**
  - With Integrated ISDN
- **Lower total cost of ownership – simplifies deployment, maintenance & management**
  - Cisco® Configuration Professional (CCP)
  - CiscoWorks
  - Cisco Unified Wireless LAN Management

Ordering Information

SKU Names

CISCO892F	Cisco 892 Gigabit Ethernet Security Router with SFP
CISCO892FW-AGN-A-K9	Cisco 892 Gigabit Security Router with SFP, w/ 802.11n FCC Compliant
CISCO892FW-AGN-E-K9	Cisco 892 Gigabit Security Router with SFP, w/ 802.11nETSI Compliant

Cisco SFPs

GLC-LH-SM	GLC-LH-SM: 1000BASE-LX/LHSFP transceiver module for MMF and SMF, 1300-nm wavelength
GLC-SX-MM	GLC-SX-MM: 1000BASE-SXSFP transceiver module for MMF, 850-nm wavelength
GLC-ZX-SM	GLC-ZX-SM: 1000BASE-ZXSFP transceiver module for SMF, 1550-nm wavelength
GLC-BX-D	GLC-BX-D: 1000BASE-BX10-D downstream bidirectional single fiber; with DOM
GLC-BX-U	GLC-BX-U: 1000BASE-BX10-U upstream bidirectional single fiber; with DOM
GLC-GE-100FX	GLC-GE-100FX: 100FXSFP on GE SFP ports for DSBU switches
GLC-FE-100LX	Cisco 100BASE-LX10SFP with single-mode fiber-optic (SMF) link
GLC-FE-100BX-U	GLC-FE-100BX-U: 100BASE-BX10-U SFP for Fast Ethernet SFP Ports
GLC-FE-100BX-D	GLC-FE-100BX-D: 100BASE-BX10-D SFP for Fast Ethernet SFP Ports

Third party SFPs

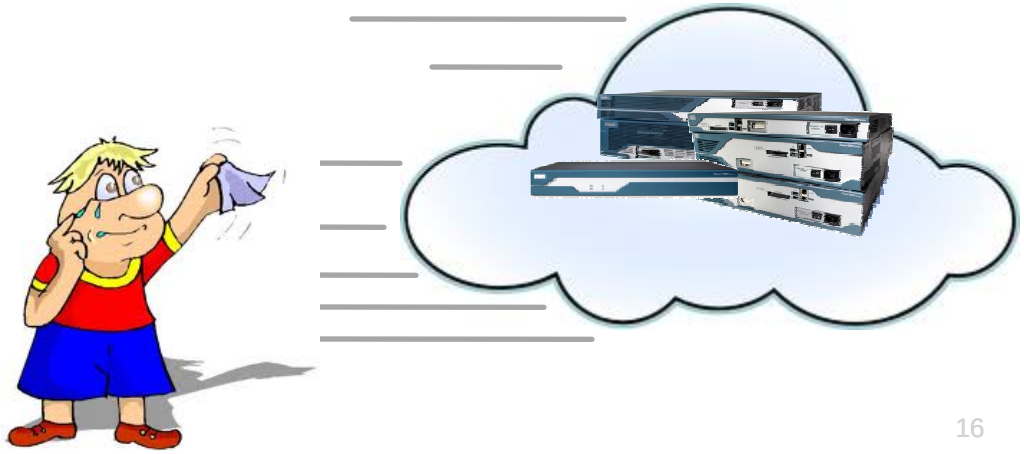
PX-20 Optics	Broadway EPONONUSFP w/Teknovus Chipset
PX-20+ Optics	Broadway EPONONUSFP w/Teknovus Chipset

Time to say goodbye

ISR-G1

ISR G1's EoS

November 1st 2011



Key ISRG1 End-of-Sale Dates

Date	Messaging
Nov 1, 2010	External EoS Announcement
Nov 1, 2011	ISR G1 End of Sale
Nov 1, 2014	End of Software Maintenance (15.1(4)M)
Nov 1, 2016	ISR G1 End of Support

What is going End-of-Sale?

- All models of the 1841
- All models of the 2800 Series
- All models of the 3800 Series
- Includes all bundles

- Spares (Memory, Power Supplies, rack mounts, etc. will be sold for 1 year past chassis End-of-Sale

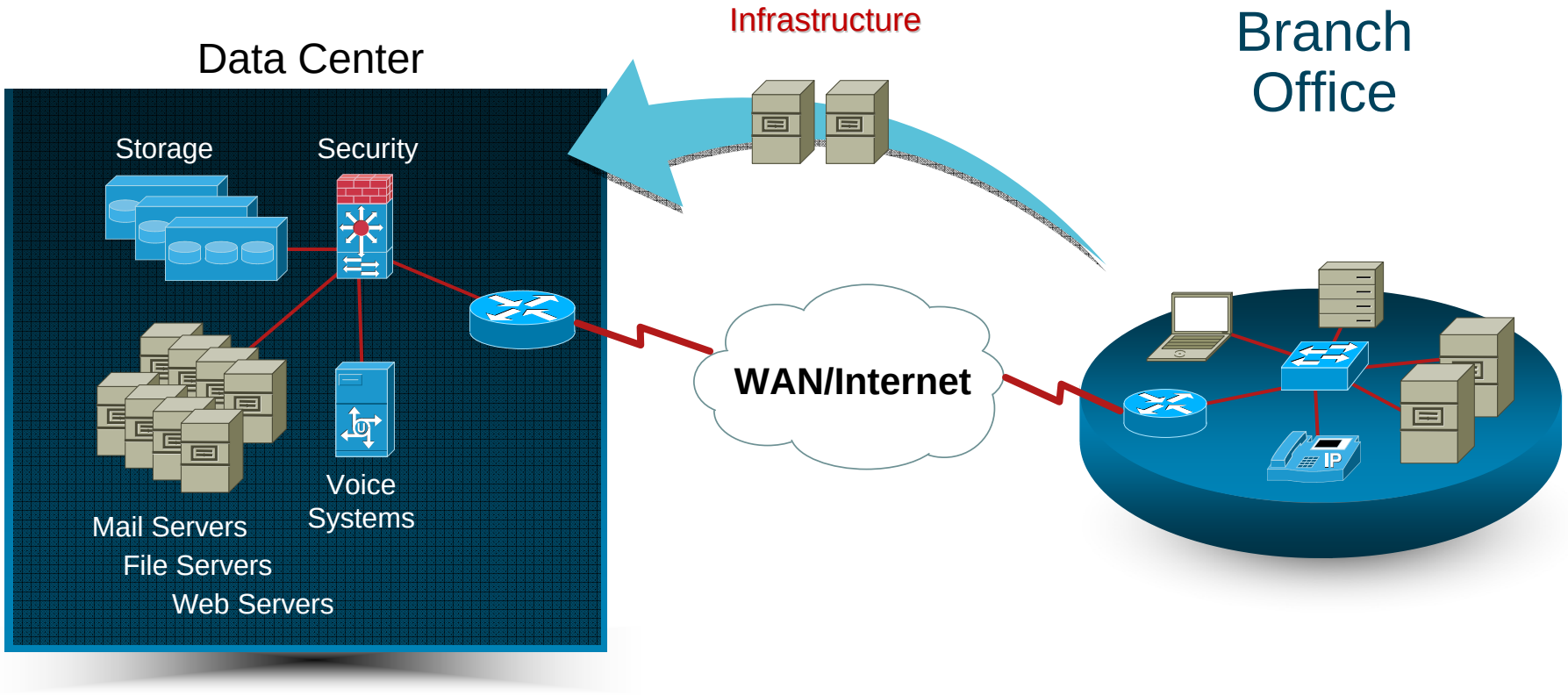
Cisco IOS Milestones

Release	FCS	EoS Announce	End of Sale	End of Software Maintenance	Total Life
12.4(24)T	Feb 2009	Oct 2010	Oct 2011	Oct 2013 (2 years till EoSM instead of typical 1 year EoSM)	~4.5 years (54 months)

Cloud Services for the Branch

Technology Trends In The Branch Office

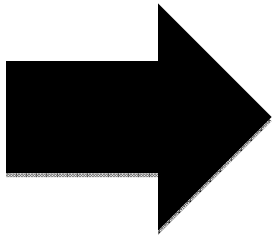
Infrastructure Centralization Improves IT Efficiency



Simplified IT Operations, Higher Resource Utilization, Cost Savings

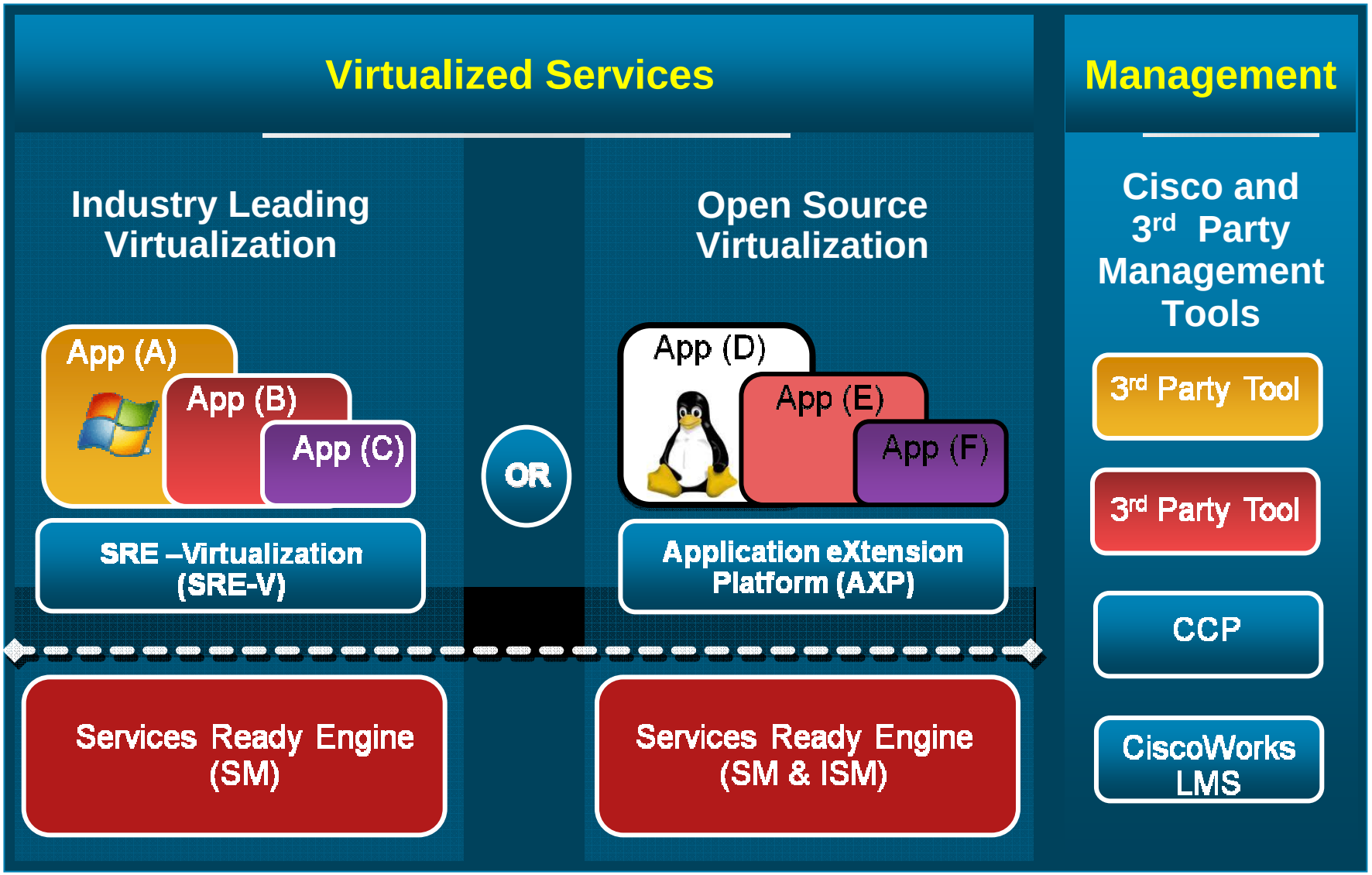
Branch Virtualization

- Everything can't be placed in a Data Center
  - Availability Requirements
  - Performance Requirements
  - Business / Privacy Requirements
- Deployment in Branch leads to other challenges
  - Lack of Onsite IT Expertise
  - Lack of Standardization
  - Limited Space
  - Limited IT Budget
- Goal: Virtualized, but run inside a router
  - Consolidation
  - Power Efficiency
  - Network Awareness
  - Increased Security



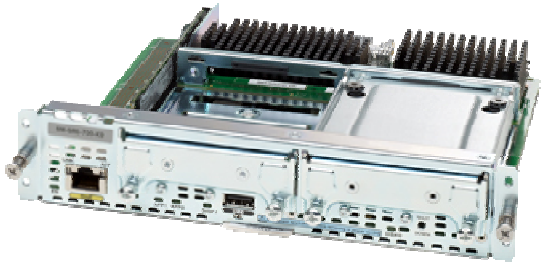
Lower TCO

Service Virtualization



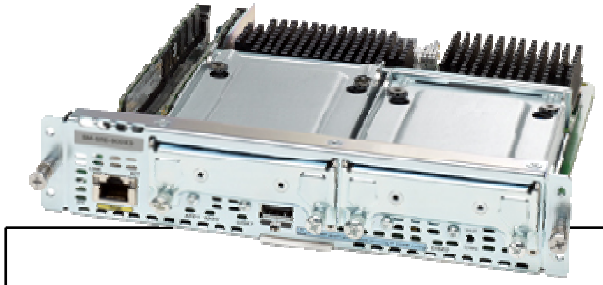
The Hardware
SRE-V & MGF
(Multi Gigabit Fabric)

SRE 700 SM Hardware Specs



Specifications	
SM 700 is a versatile form factor that plugs externally into the ISR G2 motherboard	
Processor	▪ Single-Core Intel® Core™2 Duo 1.86 GHz 64KB L1 Cache 3MB of L2 Cache 1066MHz FSB 64-bit VT-x
Memory	4GB DDR2 ECC DRAM
Storage	▪ 4 GB eUSB 2.0 Compact Flash ▪ 500 GB 5,400 RPM SATA HDD Field-replaceable
Supported ISR G2 Platforms	2911, 2921, 2951, 3925, 3945

SRE 900 SM Hardware Specs

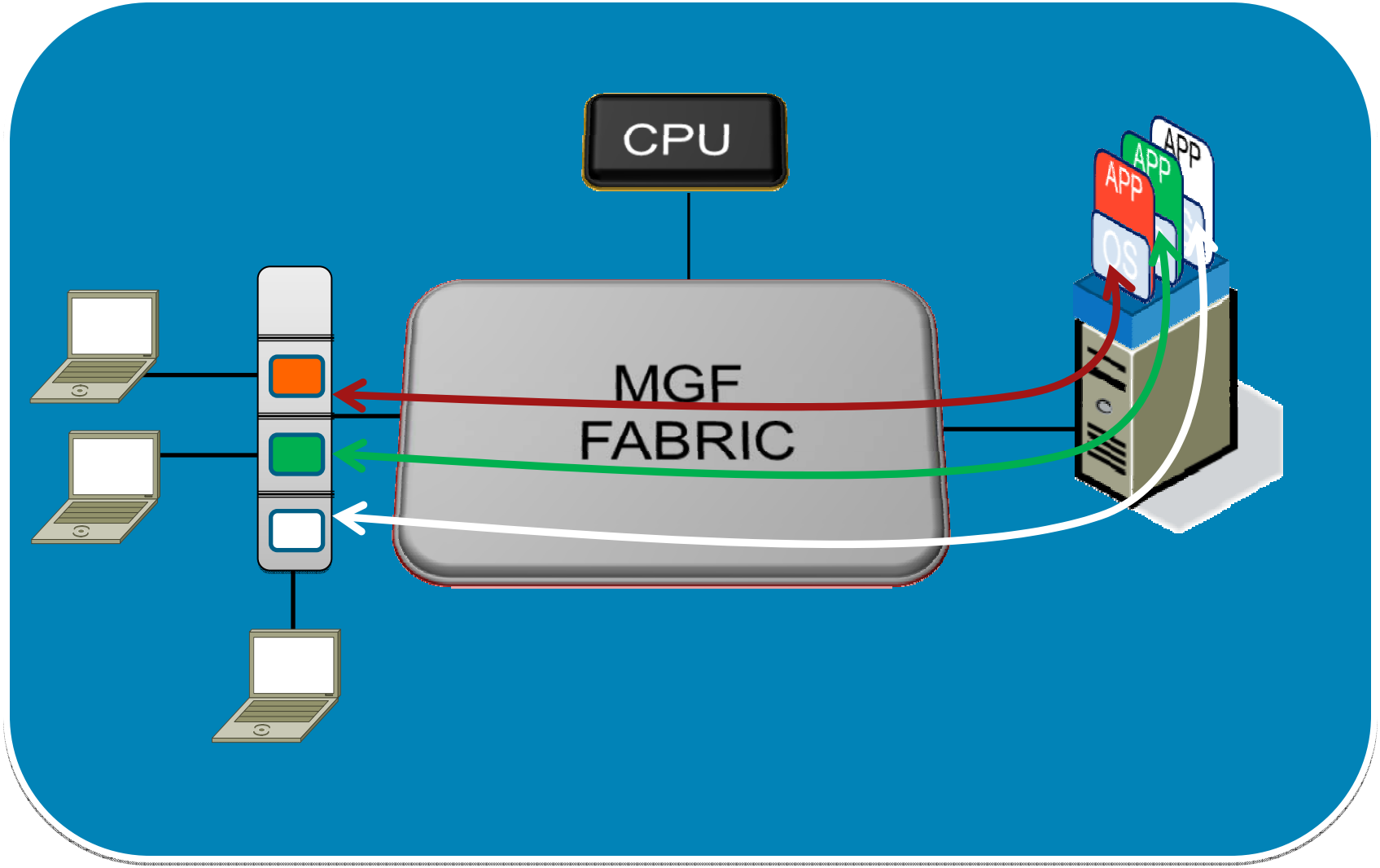


Specifications	
SM 900 is high-performance form factor that plugs externally into the ISR G2 motherboard	
Processor	▪ Dual-Core Intel® Core™2 Duo 1.86 GHz 64KB L1 Cache 6MB of L2 Cache 1066MHz FSB 64-bit VT-x
Memory	4GB DDR2 ECC DRAM (Upgradable to 8GB)
Storage	▪ 4 GB eUSB 2.0 Compact Flash ▪ 2 x 500 GB 5,400 RPM SATA HDD Field-replaceable Simple, linear, and RAID 1 configuration Hot-swappable
Power Consumption	50 Watts
MTBF	109,000 hours (non-RAID) 239,000 (RAID1)
Services	AXP, CUE, WLC, NAM, WAAS, VMSS, ISS

SM-SRE Support on ISR G2 Routers

ISR G2	SM-SRE-700	SM-SRE-900	Max Modules / Router
2911	Yes	Yes	1
2921	Yes	Yes	1
2951	Yes	Yes	2
3925	Yes	Yes	2
3945	Yes	Yes	4
3925E	Yes	Yes	2
3945E	Yes	Yes	4

Use case: Multiple VM(s) and Ether Switch (ESM)



The Service
UCS Express

Cisco End-to-End Solution

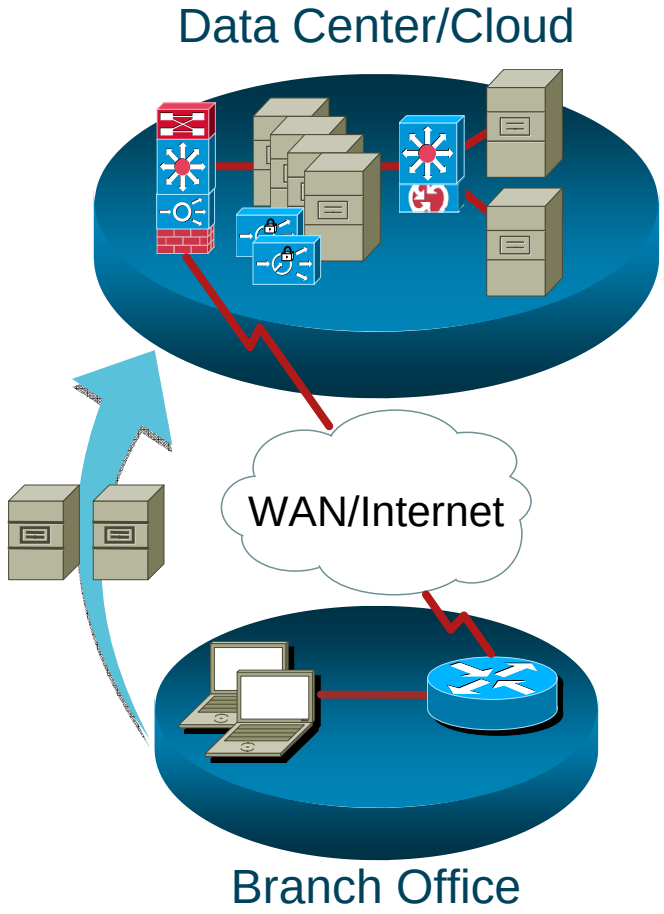
UCS for Data Center, UCS Express for Branch

Cisco UCS

Unified compute platform for infrastructure consolidation in the Data Center with innovative virtualization, memory, provisioning, I/O, and management capabilities

Cisco UCS Express

Residual compute platform with all-in-one device convergence that facilitates centralization of branch applications into Data Center



Consolidate Infrastructure

Centralize Applications

Support User Experience

Address WAN induced performance, availability compliance challenges

Location Suitable Form Factors, Consistent Device Management

UCS Express Benefits

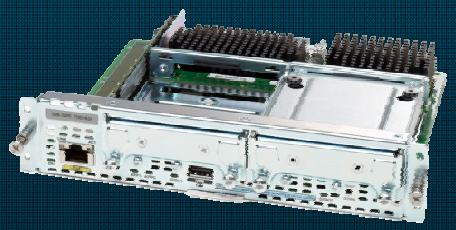
What are we trying to achieve

Server Virtualization

- Consolidate multiple physical servers to reduce costs
- Improve application uptime and failure recovery time
- Shorten time-to-deployment for new applications

Blade Form Factor

- Eliminate wires, components and space to reduce costs
- Rapidly provision hardware with plug-and-play modularity
- Right-size hardware profile for the lean branch office

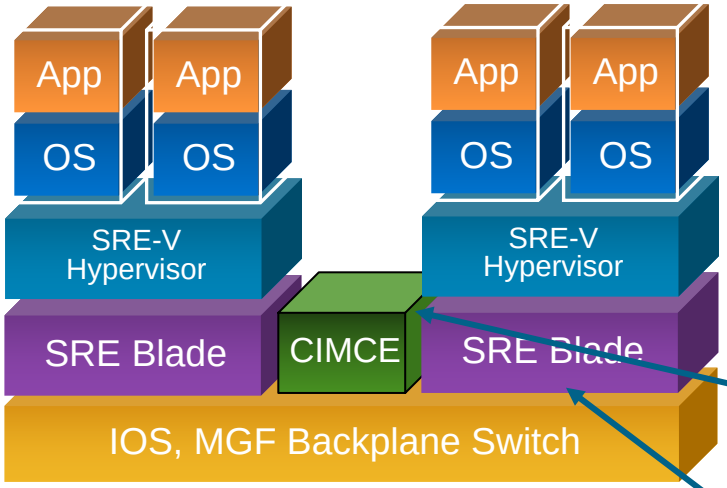


All-in-one Device

- Integrate all branch devices into one box to reduce costs
- Simplify infrastructure to reduce operational burden
- Improve IT responsiveness with on-demand services

Cisco UCS Express Components

Simplifying Lean Branch Office Infrastructure



Platform for Edge Applications

Microsoft Windows Server certified

Server Virtualization

Cisco SRE Virtualization powered by VMware vSphere Hypervisor™ (ESXi)

Dedicated Blade Management

Cisco Integrated Management Controller

Consistent management for UCS family

Multipurpose x86 Blades

Cisco Service Ready Engine modules

House up to 4 server blades in ISR G2

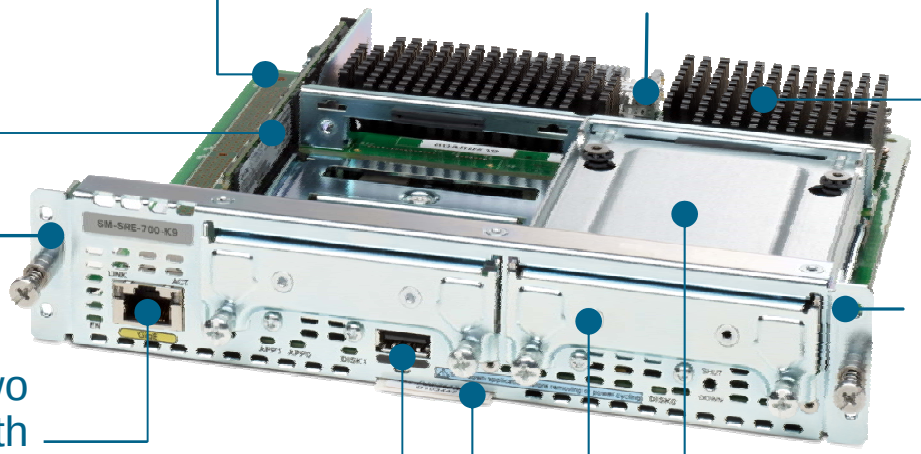
Single-device Network Integration

House all devices in ISR G2 chassis

Multi-Gigabit Fabric backplane switch

Cisco SRE x86 Blade Server

Compact, multi-purpose blade housed in ISR G2



Maximum 50W power draw
85% less than server

iSCSI initiator
hardware offload

Intel single and dual core
64-bit CPU options with
virtualization extensions

4GB and 8GB
DRAM options

Remote and
schedulable power
management

Single and multi-blade
provisioning and
configuration through
CIMC Express

One external and two
internal GE ports with
TCP/IP acceleration

One and two 500GB 2.5”
HDD options with field-
replacement protection

USB 2.0 port for
external device
connectivity

Non-RAID and RAID 1
configuration options
with hot-swap capability

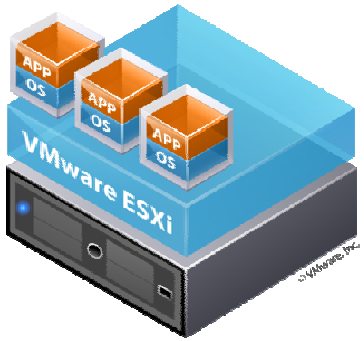
Wire-free, plug-and-play modularity, low
shipping weight (2.5lb/1.1kg)

Cisco SRE Virtualization (SRE-V)

Powered by VMware vSphere Hypervisor (ESXi)

Key Functions

- Runs directly on SRE
- Acts as virtual hardware
- Runs multiple OS concurrently
- Controls resources allocation
- Captures and restores OS state
- Provides OS re-hosting capability



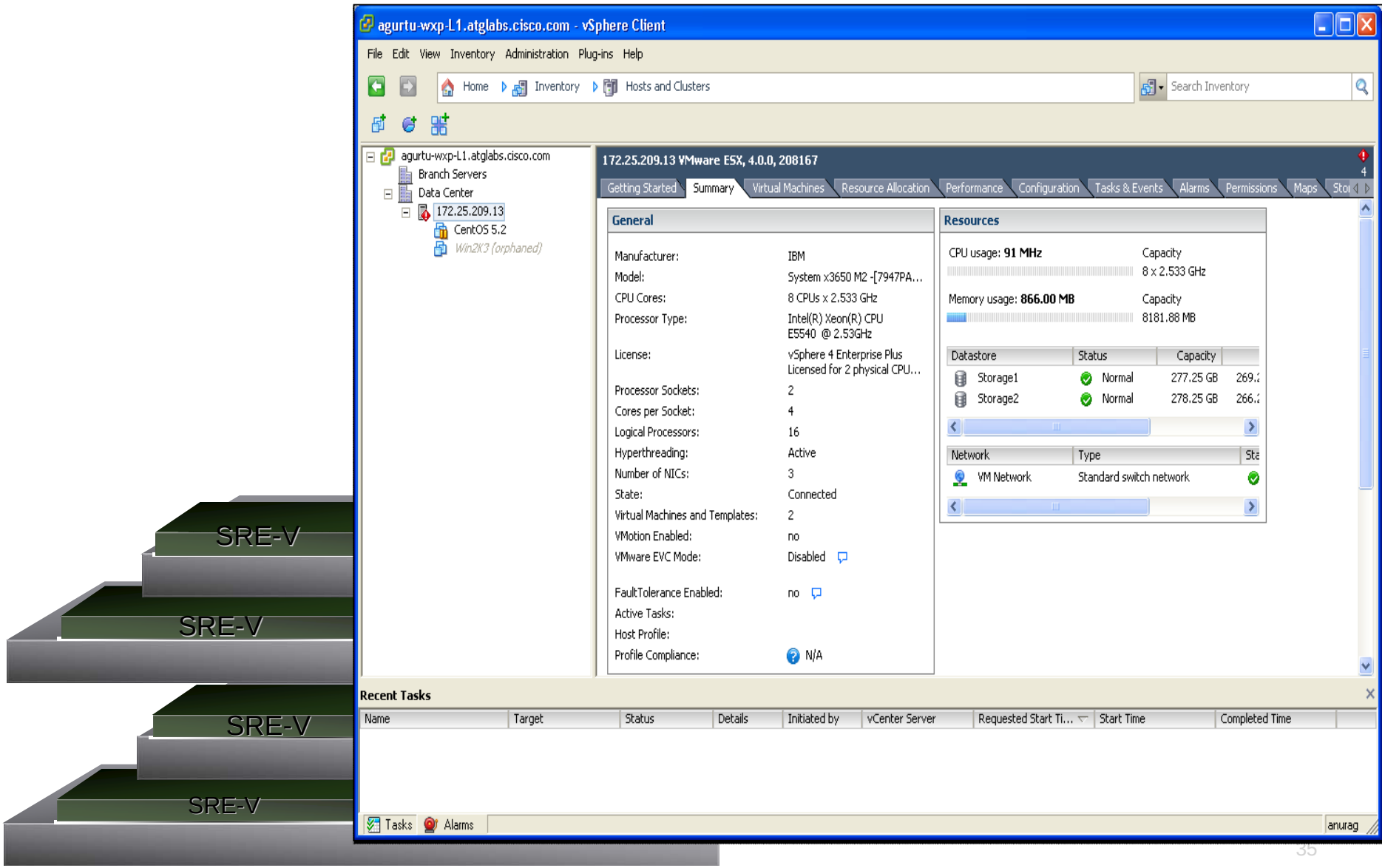
vmware®

vSphere Hypervisor™ (ESXi)

- Bare-metal hypervisor
- Optimized for SRE blades
- Tailored for branch use cases
- vSphere Essentials equivalent
- vCenter management option

- Enterprise-class, production-class virtual server platform
- Most widely deployed, secure, production-proven hypervisor
- SRE-V solution jointly developed by VMware and Cisco

vSphere And vCenter Management



Microsoft Windows Server Certification

Full Qualification of Most Widely Deployed Servers

Windows Hardware Quality Labs (WHQL) Certified

Certification of SRE for compatibility with Windows Server 2003 & 2008

Windows Server Virtualization Validation Program (SVVP)

Validation of SRE-V for supportability of Windows Server 2003 & 2008

Operating System	Certifications
Microsoft Windows Server 2003 SP2 Standard (32-bit & 64-bit)	WHQL, SVVP
Microsoft Windows Server 2003 SP2 Enterprise (32-bit & 64-bit)	WHQL, SVVP
Microsoft Windows Server 2008 R2 Standard	WHQL, SVVP
Microsoft Windows Server 2008 R2 Enterprise	WHQL, SVVP

Note: VMware vSphere Hypervisor™ (ESXi) supports large number of operating systems. These should function as expected, however, at this time only the above operating systems have been certified and will receive full support from Cisco Technical Assistance Center.

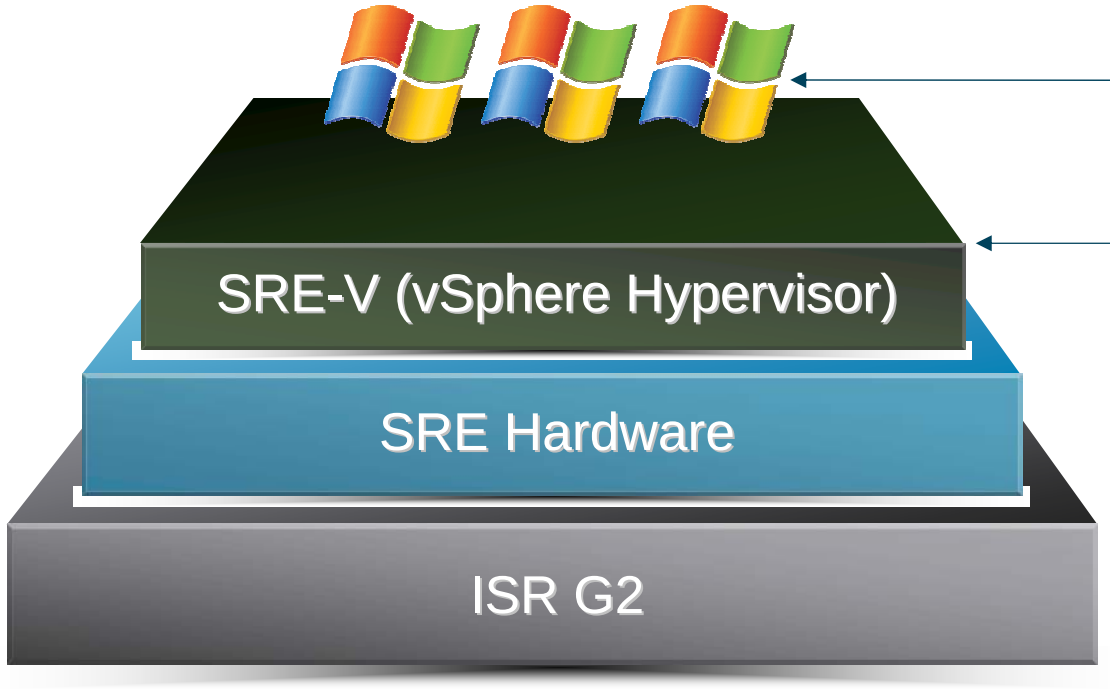
UCS Express Support Model

Hardware and Virtualization Support Provided by Cisco

SRE hardware and SRE-V is supported under ISR G2 SMARTnet

SRE-V support is provided by Cisco TAC only (not VMware)

Microsoft Windows Server is supported by Microsoft



Supported by Microsoft
Purchased Separately

Supported by Cisco SMARTnet
Attached to ISR G2

WAAS on SM-SRE

SM 700	SM 900
4GB RAM	4GB RAM
500G HDD	2x500G HDD. RAID 1. Hot swappable
1.86GHz single core	1.86GHz dual core
Target up to 500 TCP connections, up to 20Mbps WAN bandwidth	Target up to 1000 TCP connections, up to 50Mbps WAN bandwidth
Supported on 2911, 2921, 2951, 3925, 3925E, 3945, 3945E	

On demand WAAS deployment

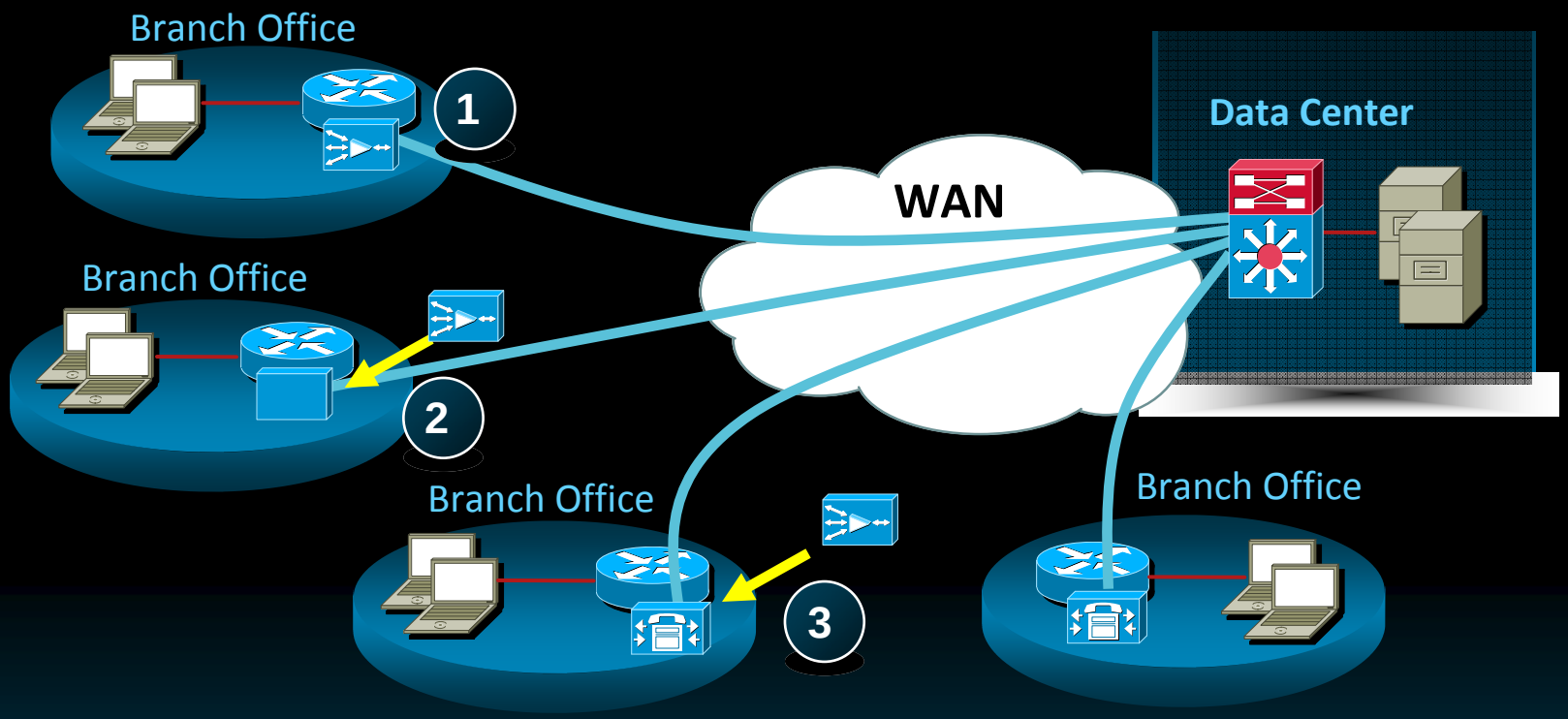
- Purchase a “blank” SM
- Deploy WAAS remotely, no truck roll
- No router reboot needed

Simple WAAS enablement

- Purchase WAAS software and licenses
- Deploy WAAS with tools (CLI, Cisco Works, Configuration Professional)
- Manage via WAAS Central Manager

Better Performance/Price, Lower Operating Cost, Investment Protection

Flexible Deployment Options



1. Deploy router and SRE with WAAS pre-loaded
2. Deploy WAAS remotely on blank SRE
3. Replace current application remotely with WAAS

Tiered License Model on WAAS-SM

- 3 new license types for SRE based on sizing
  - Small (S) – home offices, small branch offices. Up to 200 TCP connections
  - Medium (M) – Medium offices. Up to 500 TCP connections
  - Large (L) – Large branch offices, regional offices. Up to 1000 connections (only on SM900)
- All licenses on SM 700 available on SM 900

  Enterprise and Transport options available

  Only SM 900 supports Large Enterprise license for 1000 connections
- Priced attractively for upfront WAAS software on SM-hardware purchase

  Spare SKUs and upgrade SKUs also available for SM-blank customers

	Network Modules (NM)			Service Modules (SM)				
	302[3]	502	522	700-S	700-M	900-S	900-M	900-L
Accelerator Mode (With All AOs and Virtual Blades)								
WAN Bandwidth (Mbps)[7]	4	4	8	20	20	50	50	50
Optimized TCP Connections[8][18]	250	500	700	200	500	200	500	1000
Optimized Throughput (Mbps)[6]	90	150	200	200	200	300	300	300

- No Transport-1000 connection license offered on SM 900

Deployment Recommendations and Best Practices

- IOS Version
  - 15.0(1)M3 recommended
- WCCP Configuration
  - Redirection: WCCP GRE(default)/L2*
  - Egress: IP forwarding
  - Assign: Hash (default)/Mask*
  - * L2 redirect and Mask assign should be configured for optimal router CPU performance
- Initial WAAS installation on SRE
  - Applicable only for Blank SRE, or SRE with other applications
  - Download the “SM/SRE Install Zip File” and stage on FTP/HTTP server
  - Verify all 6 files are in the same location
  - Verify connectivity to FTP/HTTP server
  - Check installation progress using the “service-module SM x/x status” command

Cisco WAAS on The SRE:
On Demand WAAS Deployments

Key Requirements

- Enhance branch user productivity with reduced network and IT infrastructure
- Manage bandwidth expenses while Increasing service agility and flexibility
- Consolidate and virtualize data centers
- Deploy new, rich-media applications and desktop virtualization
- Deliver high-performance cloud services and software-as-a-service (SaaS) applications

Solutions/Benefits

- On-demand orchestration of WAN optimization
- Remote installation and activation eliminates truck-rolls and on-site IT personnel
- Flexible deployment options increases IT service agility
- Single screen configuration speeds deployment with setup wizard or Cisco Configuration Professional
- Router integration lowers branch operational expenses

Differentiator

- Router-integrated
- On-demand WAN Optimization for Branch Offices

WAAS Express

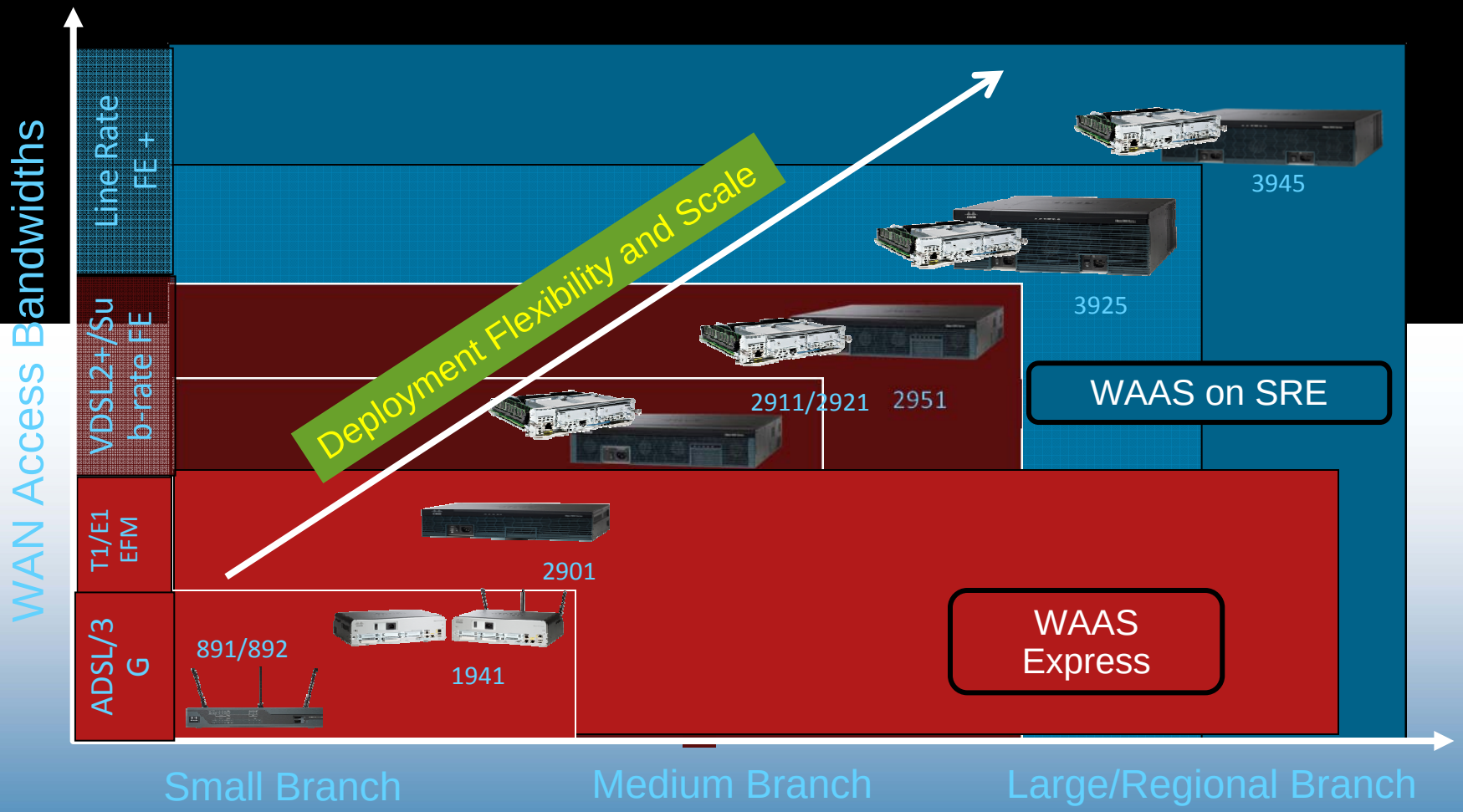
Small-footprint, Cost effective,

IOS based WAN Optimization

What is WAAS Express?

- Expansion of the Cisco WAN Application Acceleration system.
- Integrates WAN Optimization functionality natively into Cisco IOS® via a feature license.
- Interoperable with existing Cisco WAE appliance / module product range.
- Supported on ISR-G2 platforms.
- Increase available bandwidth to small/medium branch sites

Router Integrated WAAS Solution: Product Positioning



Key WAAS Express Features

- Optimization
  - Auto-Discovery
  - TFO
  - LZ Compression
  - DRE
- Management
  - Offers simplified CLI configuration
  - WAAS Central Manager for management and provisioning
- Network Integration
  - Compatible with WAAS appliances
  - Inline IOS feature - Interoperates with IOS Security and QoS
  - Support for mixed devices (WAAS appliances, WAAS on SRE, WAAS Express

Cisco WAAS Express Sizing Recommendations

Platform	Total DRAM Required	Maximum WAN bandwidth Supported	Recommended Number of Users	Max TCP Connections
89x	768 M	2 Mbps	1-10	75
1941	2.5 G	4 Mbps	15-20	150
2901	2.5 G	6 Mbps	15-20	150
2911	2.5 G	6 Mbps	25	200
2921	2.5 G	6 Mbps	25	200
2951	4 G	6 Mbps	25	200
3925	4 G	10 Mbps	50	500
3945	4 G	10 Mbps	50	500

- WAAS Express requires maximum DRAM installed as indicated
- Typical Interfaces – 3G, T1, E1, Multi T1s, Multi E1s, and Serial
- Performance Testing Conducted with IOS FW, VPN (IPsec), NAT, and, QoS

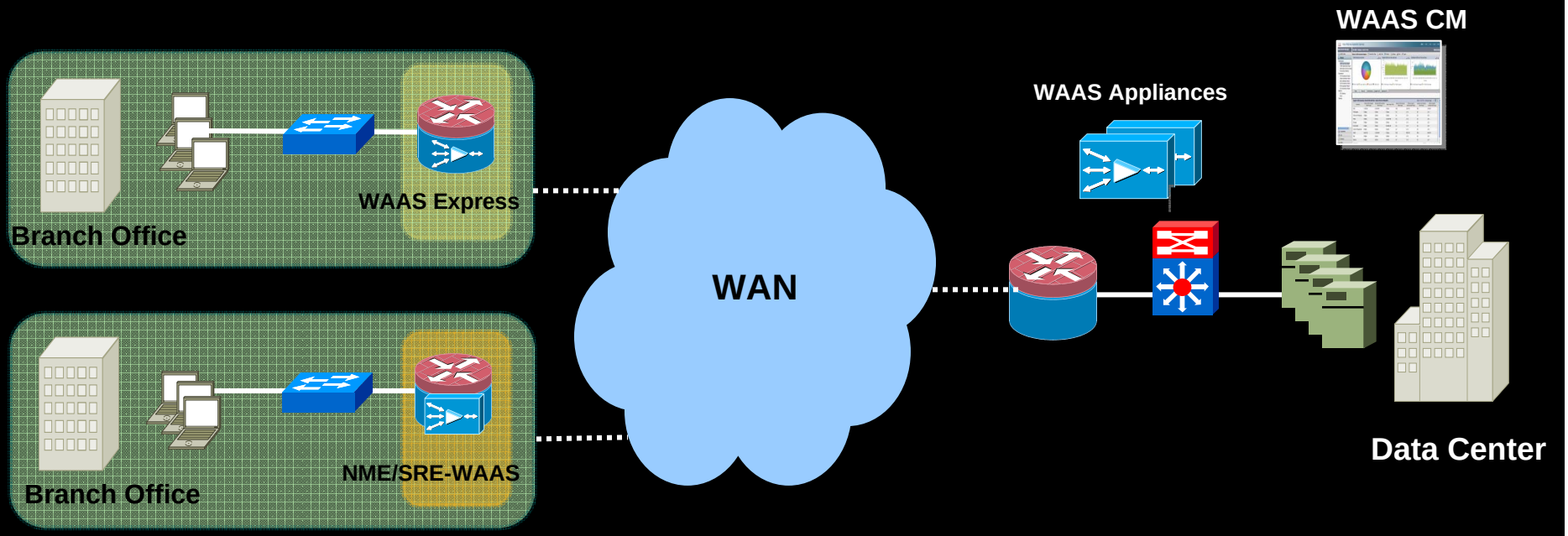
Target Deployment

- Small Footprint, Cost Sensitive Sites
- Focus on Retail, Banking, and Managed Service Deployments
- Deployment Sweet Spot:

  89x,1941, 2901, 2911
- WAAS Express is only for Branch deployments

  Need WAAS appliance at the Data Center

  Express to Express optimization is TFO/LZ only.



WAAS/WAAS Express Feature Comparison

	WAAS Express (15.1(2)T2)	Cisco WAAS hardware (SM-SRE/Appliance)
Auto-discovery	**Supported**	**Supported**
TFO	**Supported**	**Supported**
LZ	**Supported**	**Supported**
DRE	**Memory based.** **Non-persistent cache.**	**Disk based.** **Persistent cache.**
WAAS CM	**WAAS 4.3+ (upcoming)**	**Supported**
CLI	**Supported**	**Supported**
AOs	**None supported (today).**	**Supported**
Peer Compatibility	**Cisco WAAS Version 4.2 +**	**All WAAS versions**

- All the negotiation and data formats (TFO, LZ, DRE, AO) are same as the Cisco WAAS implementation.
- WAAS-Express will perform TFO/LZ only optimization with other WAAS-Express devices

WAAS Express:
Small-footprint, Cost effective, IOS based

Key Requirements

- Bandwidth optimization
- Fast delivery of data over low speed, high latency WAN links from data centers

Solutions/Benefits

- Small-footprint cost-effective software solution, transparently integrates into the ISR G2
- Natively uses capabilities of Cisco IOS® Software
- Increases remote user productivity
- Reduces WAN bandwidth costs
- Offers investment protection by interoperating with existing Cisco WAAS infrastructure.

Differentiator

- WAAS Express offers an integrated solution in a small footprint, Not an overlay or bolt-on solution.
- More cost effective for small branches