



The Borderless Network Routing Update

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Agenda

ISR G 2 Overview

New IOS Software Packaging

Collaboration, Services Virtualization, Security

ASR 1000 Overview

Collaboration, Security





Integrated Services Routers Generation 2 Overview

Borderless Branch with ISR G2



Video Conferencing

- Rich-media applications
- High performance
- Application optimization

Customer
Experience



Service Customization

- Services "On-Demand"
- Customized Applications
- Cloud extension

Business
Innovation



Operational Excellence

- Greener technology
- Operational Simplicity
- Rapid ROI with Investment Protection

Lowest
TCO

Introducing: Cisco Integrated Services Router Generation 2

Performance, Scalability, Availability

860, 880, 890



1941, 1941W



2901, 2911,
2921, 2951



3925, 3945



Virtual
Office



Secure
Mobility



Customizable
Applications



Secure
Collaboration



Scalable Rich-
Media Services



← Enhancing the Customer Experience →

Next Generation Integrated Services Routers

Under the Covers

Services Performance Engine (3900)

- Upgradeable with newer engines in the future

Multi-core Network Processor

- Up to 5x performance increase

Multi Gigabit Fabric

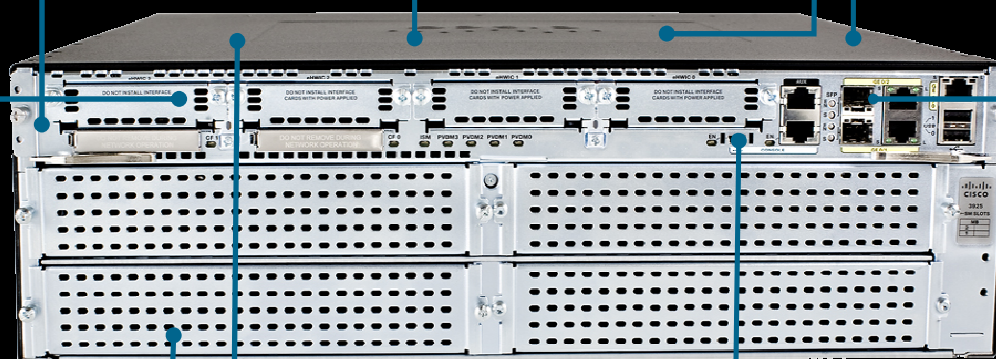
- Module to module communications
- Packet prioritization and shaping

NG DSP Modules

- Video ready DSP modules
- 4x increase in audio conferencing and transcoding
- Configurable power savings modes

EHWIC

- 2x performance increase
- HWIC/WIC/VWIC/VIC support natively
- EPoE capable



GE Ports

- Plus GE ports (3 on 2911+)
- SFP slots on 2921 and above

Service Modules

- 3x-7x increase in service module performance
- Existing NM support through adapter
- EPoE capable

Internal Services Module

- 3x increase in service module performance
- Configurable power savings mode
- 802.11n Option on 19xx

USB

- Console over USB
- Convenience storage
- Security credentials

Cisco 1900 Series

Integrated Services Routers



	1941W	1941
SM Slots	0	0
ISM Slots	Fixed 802.11n Radio	1
EHWIC Slots	2	2
Onboard WAN Ports	2 GE	2 GE
Onboard DSP Slots	0	0
Default Flash	256 MB	256 MB
Default DRAM	512 MB	512 MB
Form Factor	2RU	2RU

Secure Mobility Platform

- 25Mbps WAN Access with Services
- Factory selectable Integrated wireless 802.11n option
- Desktop form factor with Double Wide HWIC Support

Cisco 2900 Series

Integrated Services Routers



	2951	2921	2911	2901
SM Slots	2	1	1	0
ISM Slots	1	1	1	1
EHWIC Slots	4	4	4	4
Onboard DSP Slots	3	3	2	2
Onboard WAN Ports	3 GE (1 SFP)	3 GE (1 SFP)	3 GE	2 GE
Default Flash	256 MB	256 MB	256 MB	256 MB
Default DRAM	512 MB	512 MB	512 MB	512 MB
Form Factor	2RU	2RU	2RU	1RU

Secure Collaboration Platform

- Up to 75Mbps WAN Access with Services
- Video-ready DSP support
- Increased service density with Second Services module Slot
- 12 Inch Depth on 2911

Cisco 3900 Series

Integrated Services Routers



	3945	3925
SM Slots	4	2
ISM Slots	1	1
EHWIC Slots	4	4
Onboard DSP Slots	4	4
Field Upgradeable Motherboards	SPE-150	SPE-100
Integrated Redundant PS	Yes	Yes
Onboard WAN	3GE (2 SFP)	3GE (2 SFP)
Default Flash	256MB	256MB
Default DRAM	1 GB	1 GB
Form Factor	3RU	3RU

Scalable Rich-media Services Platform

- Up To 150Mbps WAN Access With Services
- Upgradeable services performance engine (SPE) for future expansion
- Configurable dual Integrated Redundant Power supplies
- 2x Default Memory

Introducing The Multi Gigabit Fabric (MGF)

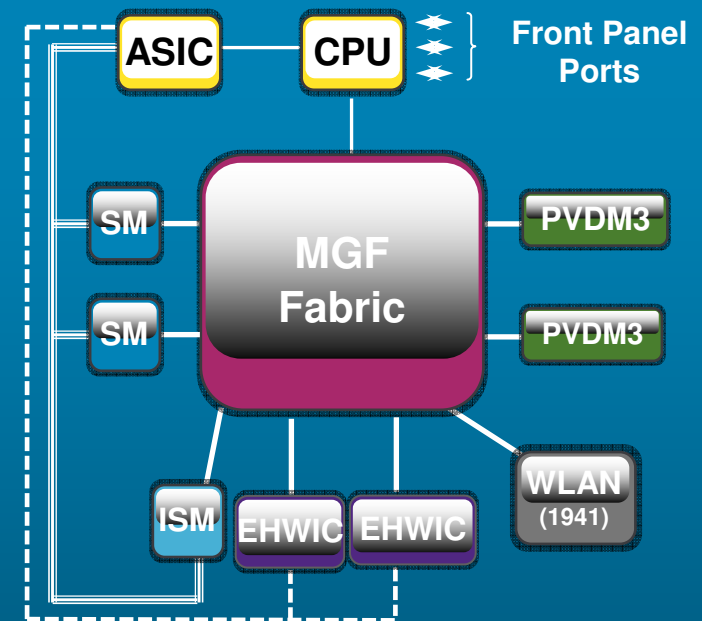
- Superior scalability by providing direct high-performance connectivity between services and modules

Provides connectivity between EHWICs, PVDM3s, SMs and ISMs through the backplane

- Offload the CPU when providing connectivity to internal modules or between services

There will be no CPU involvement when providing the service integration and traffic redirection as mentioned above

- Legacy interface modules do not benefit from the MGF and connect directly to the system CPU

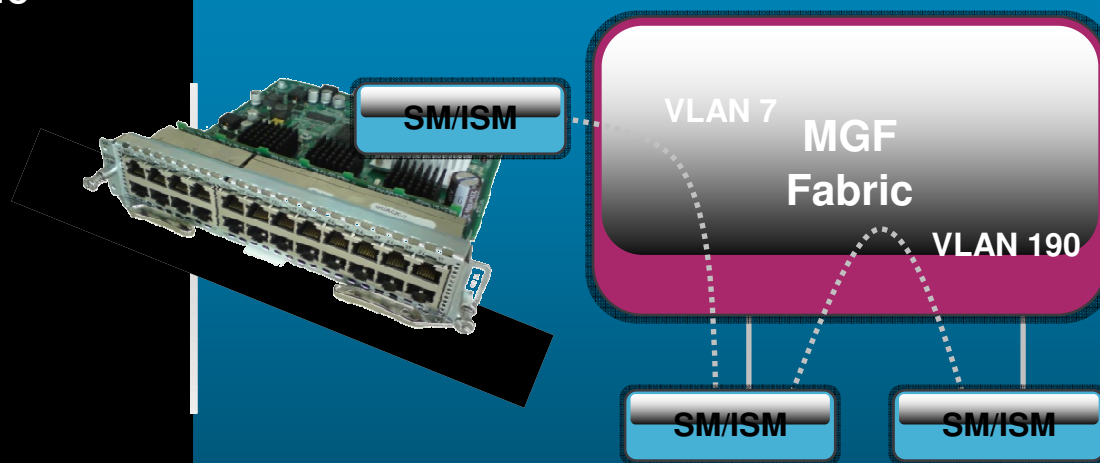


— GE Serdes
== PCIe
-- HWIC DDR

Note: Not all possible modules are shown

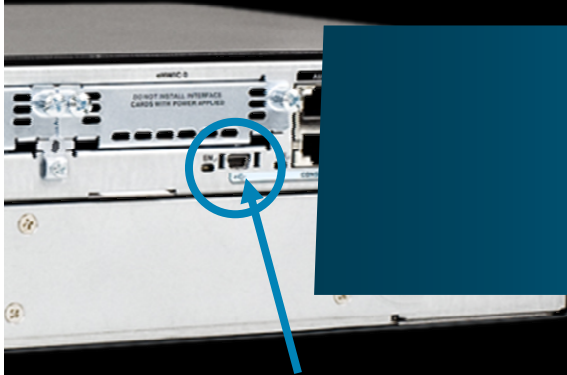
VLAN Connect for Intra Chassis Module Interconnect

- VLAN connect enables traffic in a certain VLAN from one Module to be directed to another Module
- Multiple VLANs can be connected from the source module



Model	3945	3925	2951	2921	2911	2901	1941
VLAN Connection	11	7	7	5	5	3	3

USB Console



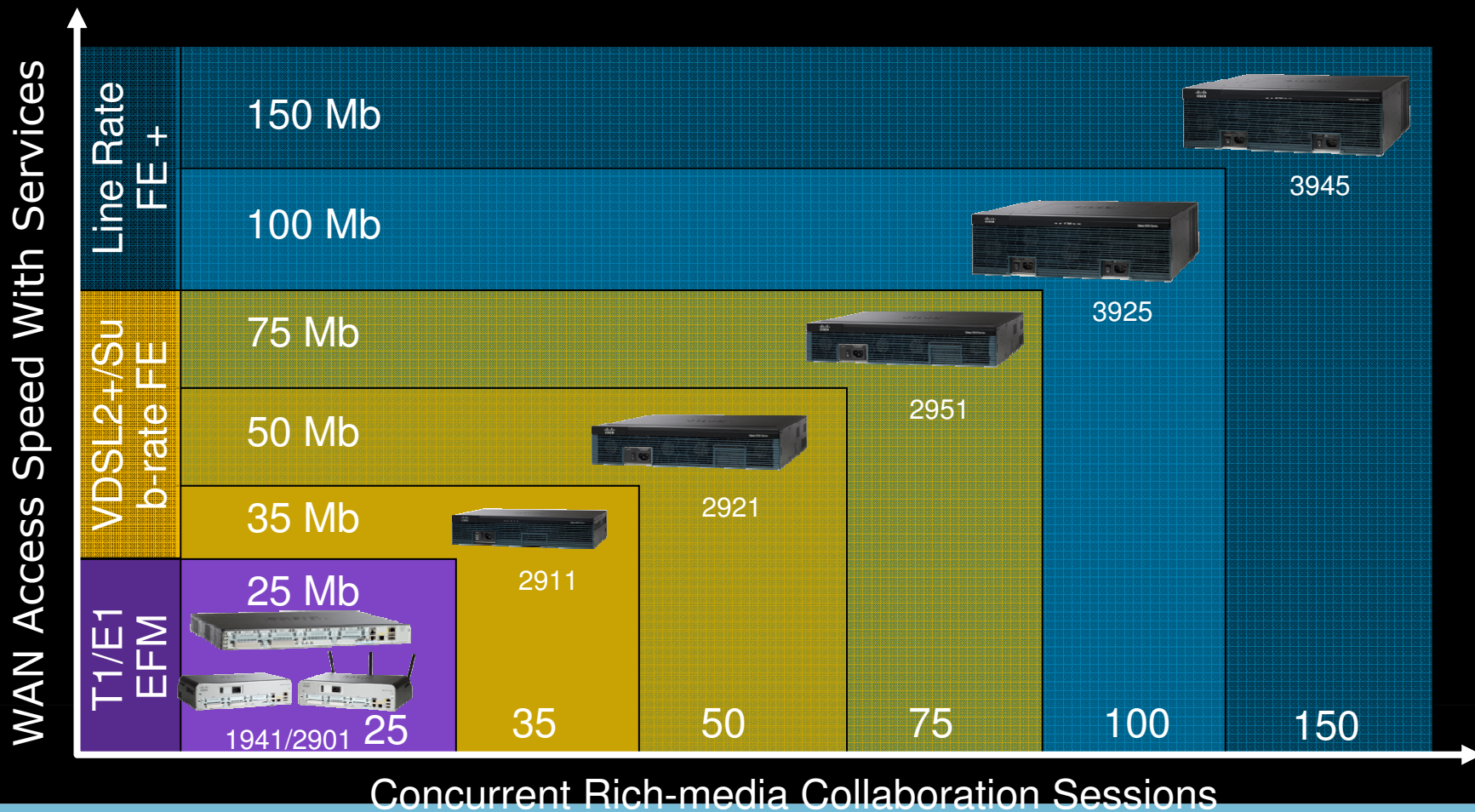
New Type B mini USB Console Port

- Enables use of a Mini USB cable for console access in addition to the Cisco console cable
- Mini USBs are commonly used for cell phones and digital cameras and offers a more flexible console access by not being limited to the Cisco console cable
- Only one console can be active at a time; USB cable always takes precedence

* Console cables in shipment of new router are an option that need to be configured at time of ordering

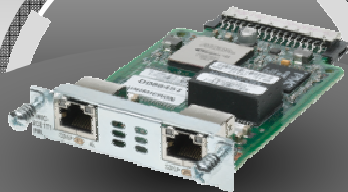
ISP C2 Performance Positioning

WAN Access and Collaboration



Service Modules and Interface Cards

Interface Cards
(WAN or LAN)



Internal Module for
Running Services
That Don't Require
Interface Ports,
Dedicated CPU
and Memory

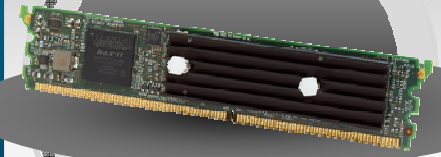


Independent CPU
and Memory for
Hosting Services *or*
High Density
Interface Ports.

Examples: Wireless LAN
Controller, WAN
Optimization, Etherswitch
Module



High Density
Rich-Media Voice
and Video DSP
Modules



EHWIC

Enhanced High Speed
WAN Interface Card

ISM

Internal Service
Module

SM

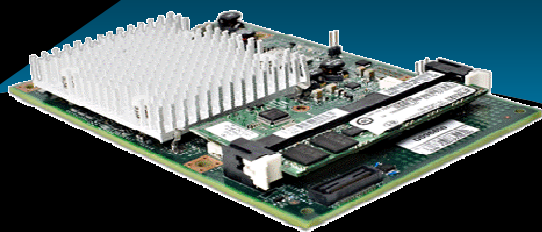
Service
Module

PVDM3

Packet Voice/
Data Module

ISR Generation 2

Services Ready Engines (SRE)



Internal Service Module (ISM)

Single Core x86
512MB RAM, 4GB Flash

Available on 1941 & above—Selected Services



Service Module (SM)

Dual Core High Performance x86
2–4GB RAM, 500GB–1TB HDD

Available on 2911 and above—Full Range of Services

Up to 7x Performance Improvement Compared to Previous Generation

Support for EnergyWise®—Reduces Power Consumption,

High Capacity Storage, RAID Capable and FRU Disks—Enable HA Deployments

Integrated Management, Troubleshooting, on-board HW Diagnostics Tool

Flexible “Service Ready” Deployment Model

- Deploy HW with router—SW can be deployed remotely saving truck roll costs
- Available Services: Application eXtension Platform, Cisco Unity Express
- Roadmap: WAAS, Wireless LAN Controller, Video Surveillance, Network Analysis, Server Virtualization, Windows Server

Platform Module Slot Evolution

WIC

Supports VIC,
VWIC



NM



AIM



HWIC

Supports WIC,
VWIC, VIC



NME,EVM

Supports NM,
NME-X,NME-XD



AIM



PVDM2



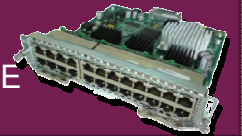
EHWIC

Supports WIC,
VWIC, VIC



SM

Supports NM,NME



ISM



PVDM3

Supports PVDM2
Via Adapter Card



NME-X



NME



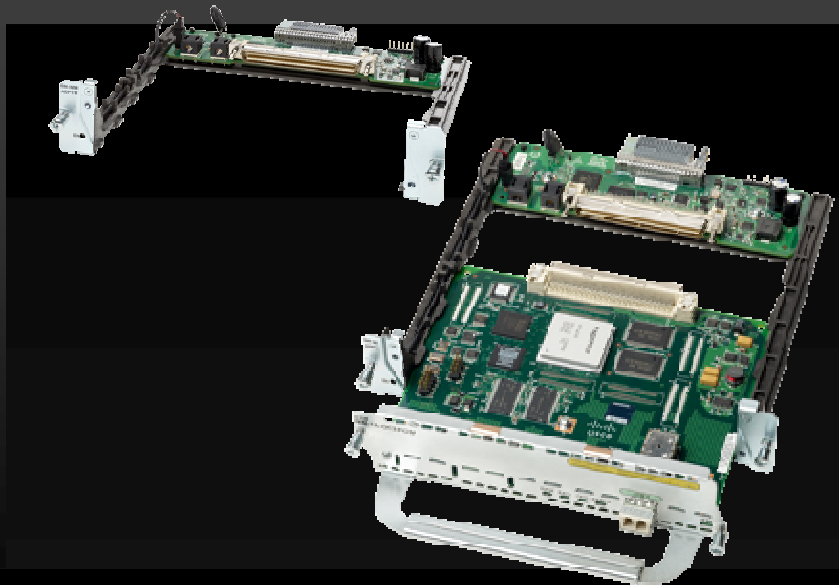
Pre-ISR

ISR

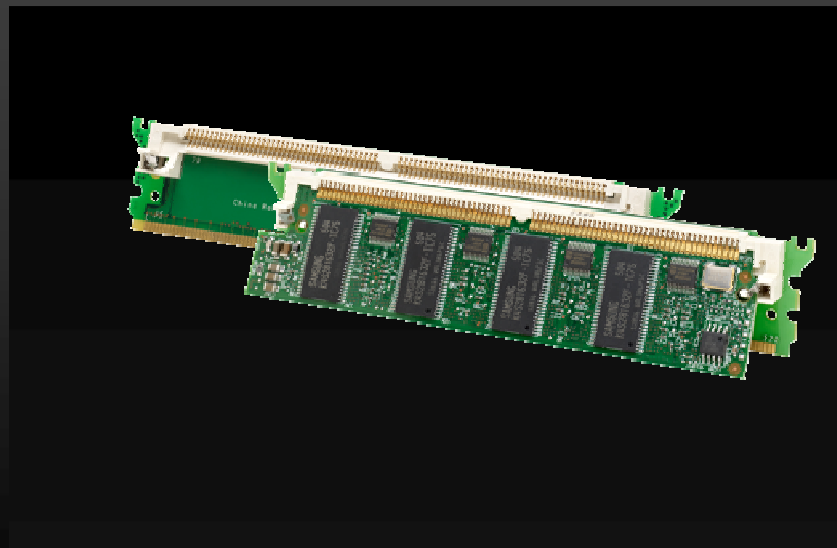
ISR G2

Adapters

- Maximize investment protection, while allowing for platform evolution
- Provide maximum interface coverage at platform FCS



**NM to
SM Adapter**



**PVDM2 to PVDM3
Adapter**

Key Highlights of the PVDM3 DSPs

- All PVDM3 SKUs supported on all ISR G2s
- Up to 4x voice channel density per slot
 - Up to 64-party G.711 conferences
- Single universal software image, packaged with the UC Technology Package
- Video feature ready
 - Enhanced multi-core DSP architecture optimized for rich-media UC applications
- Architectural and infrastructure enhancements
 - GE backplane interface for increased IP throughput
 - Improved DSP failure detection and health monitor features
- Easy migration: Co-existence of PVDM2 and PVDM3 on ISR G2
- Feature parity with the PVDM2 DSPs
 - TDM voice termination, fax/modem (except Cisco Fax Relay)
 - Voice conferencing and transcoding
 - H.320 video features
- Power save mode

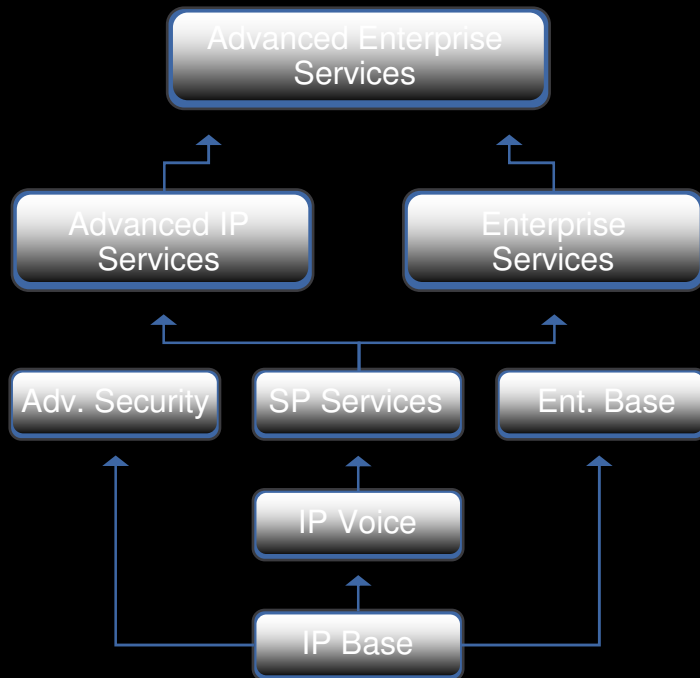
PVDM3 SKUs	G.711 Channels
PVDM3-16	16
PVDM3-32	32
PVDM3-64	64
PVDM3-128	128
PVDM3-192	192
PVDM3-256	256



New IOS Software Packaging

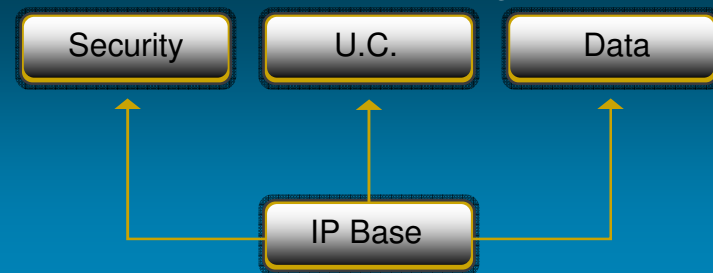
IOS Software Packaging Evolution Summary

Current



New

Universal Image



○ Simplified Software Management

A single IOS Universal Image will ship with all ISR G2 platforms

Four IOS enforceable licenses enable full suite of functionality that were previously offered in eight images

○ Less Costly Software Upgrades

IOS feature upgrades can be done by enabling a new license key, reducing the need for truck-roll to remote offices

○ Enable Development of New Software Based Business Models

Services on Demand—purchase upgrades as you need them via Cisco licensing

ISR G2 IOS Packaging

Software Activation Feature Licenses

- SSLVPN
- Intrusion Prevention (S)
- Content Filtering (S)

Right to Use Feature Licences

- LMR [Land Mobile Radio]
- CME: Voice and Video (C)
- SRST : Voice and Video (C)
- VXML/IVR Gateway (C)
- CUBE (C)

- Gatekeeper

- SNA switch

- IKE v1 / IPsec / PKI
- IPsec/GRE
- Easy VPN w/ DVTI
- DMVPN
- Static VTI
- Firewall
- Network Foundation Protection
- GETVPN

- TDM/PSTN Gateway
- Video Gateway [H.320]
- Voice Conferencing
- Codec Transcoding
- Secure Voice / SRTP
- RSVP Agent & Preconditions
- Fax T.37/38
- CAC/QOS
- Hoot-n-Holler
- SAF, IPV6 for SIP???

- MPLS BFD RSVP
- L2VPN
- L2TPv3
- Layer 2 Local Switching
- Flexible Netflow
- Mobile IP
- Multicast Authentication
- FHRP—GLBP
- ISIS IPv6 OSPFv6
- ISIS IPv6 OSPFv6
- IP SLAs PfR NTPv4
- DECnet ALPS
- AppleTalk RSRB BIP
- DLSw+ FRAS
- Token Ring
- ISL IPX STUN
- SNTP SDLC QLLC
- LAT

SEC

UC

Data

IP Base

AAA BGP, OSPF, EIGRP, ISIS, RIP PBR IGMP, Multicast DHCP HSRP,
GLBP NHRP HTTP HQF QoS ACL, NBAR GRE CDP, ARP NTP PPP
PPPoA PPPoE RADIUS TACACS SCTP SMDS SNMP STP VLAN DTP IGMP Snooping
SPAN WCCP ISDN ADSL over ISDN NAT - Basic X.25, RSVP

IOS Software Activation

Software Activation After Product Order

Customer purchases product activation keys (PAKs) for desired feature set and obtains Unique Device Identifier (Product ID + Serial Number), for the device he wants to upgrade

Using the Cisco website, the customer can purchase and generate a license for a feature set on that specific device

License is installed and activated using Cisco License Manager, Router Call-Home, or manual copy and install

These steps are the same for additional feature sets



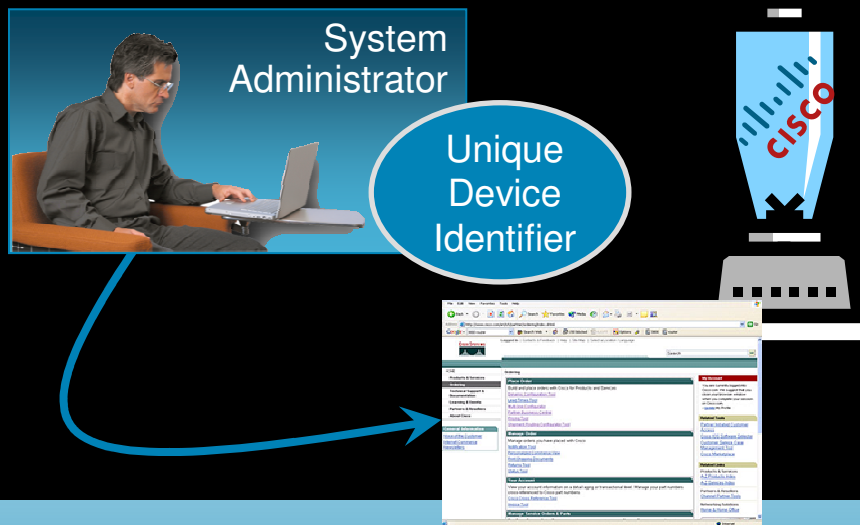
PAK



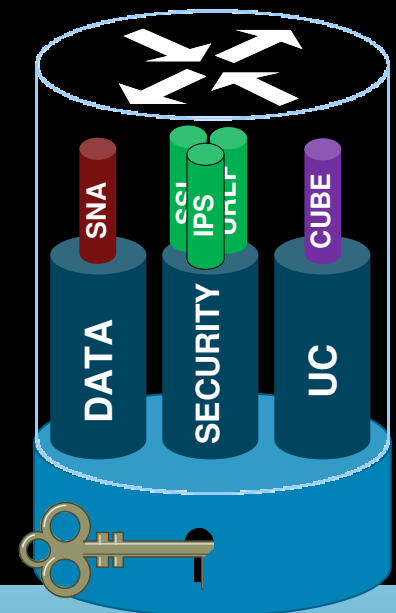
Product ID



Serial Number



Previously Purchased Router



Release 15 M and T

- Follow-on to Release 12.4 Mainline and 12.4T
- Features and platform support inheritance from Release 12.4T
- Proactive release support policies and software migration guidelines
 - Extended Maintenance M releases for long-term support
 - Standard Maintenance T releases between EMs for faster Cisco feature delivery
- Predictable release and maintenance rebuild schedules with measurable milestones
- New release three times/year; Extended Maintenance (EM) release every 18–20 months
- Initial rollout, **Release 15.0(1)M**, with 1941, 2900, and 3900





Collaboration, Services Virtualization, Security

ISR G2 Collaboration Enhancements

- Next generation DSPs
 - Higher density voice features
 - Video-ready
- High-density analog support
 - Fully populated EVM in SM slots
 - Up to 112 FXS; 64 FXO; 80 DID; 24 E&M
- Full digital DS0 connectivity support
 - 24 T1/E1
- VIC and VWIC native backward compatibility in EHWIC slots
- Significant NM backward compatibility in the SM slots with adapter card
- Onboard POE for up to 98 phones
- UC feature parity with Cisco 2800/3800 ISRs
 - Except: VoFR and VoATM no longer supported

Collaboration Feature and Application Support

- ISR G2s have feature parity with the 2800/3800 ISRs for all UC gateways, applications and services
 - Except: VoFR and VoATM no longer supported
- Voice and Video Gateway
 - Voice GW (Termination)
 - Video GW (Termination)
 - SIP trunking (CUBE)
- Call Agents
 - CME, SRST
- Applications
 - CUE, AXP
- Call Routing
 - CUSP, GK
- Contact Center GW
 - VXML GW
- IP Network Services
 - CUBE (SIP Trunking)
 - RSVP Agent
 - UC-Trusted Firewall (TRP)
 - MTP
- DSP Media Services
 - Conferencing
 - Transcoding

ISR G2 Release Compatibility



- ISR G2 is part of the Moscow UC-solution launch
 - CUCM 7.1.3
 - IOS 15.0.1M
- CME and SRST 7.1
- CUE
 - ISM: CUE 7.1
 - SM: CUE 8.0 (future)
- CUCM
 - MGCP GWs
 - 6.1.5 – Target release date: Dec 2009
 - 7.1.3 – Target release date: September 18, 2009
 - 8.0.1 – Target release date: Feb 2010
 - SIP/H.323 GWs
 - No dependency, any release can be used
- CVP 7.02

Overall 2900/3900 UC Positioning

Platform	Data Circuit Speed	TDM Gateway DS0s	CUBE Sessions	CTS Sessions		CME Phones	SRST Phones
				1000	3000		
2901	25M	100	100	-	-	35	35
2911	35M	150	200	2	1	50	50
2921	50M	240	400	4	2	100	100
2951	75M	400	600	6	3	150	250
3925	100M	480	800	10	5	250*	730
3945	150M	720	1000	20	10	350*	1200

*At FCS 200 (3925) and 300 (3945) phones are supported. The higher numbers are targeted to become available in a post-FCS 15.0.1M rebuild as a software-only upgrade.

Security for the Borderless Branch



Secure collaboration with video integration

- Integrated IPsec acceleration
- One-Touch Protection Capability
- Advanced Management and Instrumentation
- Hardened Foundational security, Compliance
- Upto 5X performance increase over the ISRs

Comprehensive, Secure Services for the Borderless Branch



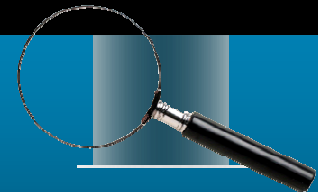
Secure Cloud
Computing
Architecture



Secure Unified
Mobile
Architecture



Secure
Connectivity with
Cisco TrustSec



Advanced
Security
Services

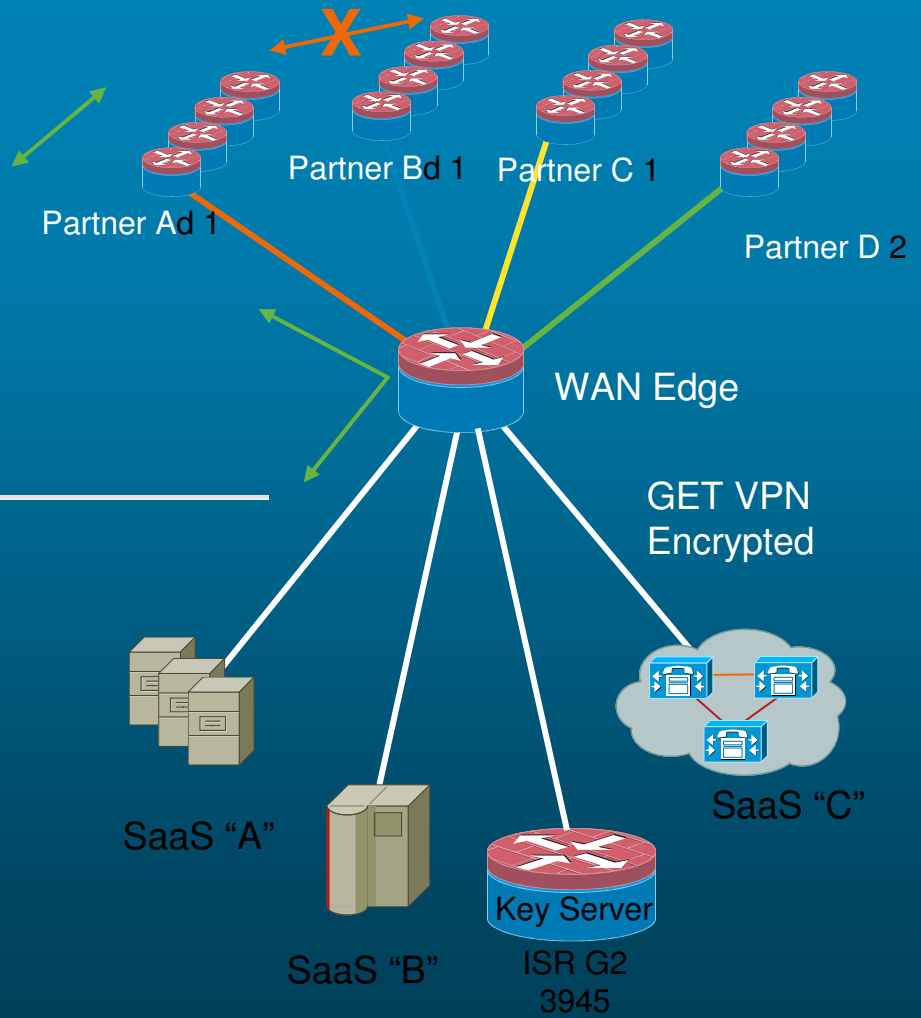
Secure Cloud Computing Architecture

Leverages GET VPN

- Secure Transport over private WAN for multiple partners accessing “Security as a Service” applications in the cloud
- Centralized deployment and management of infrastructure with flexibility to change

Applications:

- Enterprise/Government/SP:** Multiple departments/agencies/customers accessing applications running in virtualized data center servers
- Encryption Drivers:** Regulatory compliance especially for data in transit



Enterprise Mobility Challenges

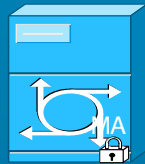
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Secure Unified Mobility Architecture Components

Zero Touch For :

- **VPN:** VPN Client, VPN Settings, Certificates
- **Dual Mode:** Dual Mode Client, Dual Mode Settings
- **Email:** Email Client, Email Settings, Certificate for SSL
- **Wifi:** Wifi Settings, Certificates

Component 4 – Provisioning from Corporate DMZ



Step1: Secure Zero Touch Deployment (Admin+End User)

Component 1 – smart phone

GSM/3G/Data

Step2: Tunnel Establishment

Corporate access to email, wifi, dual mode, roaming, CUMA, etc.

Component 3 – Service Dependent Servers like CME, CUCM, CUMA, IOSCA, etc.

Component 2 – IOS VPN Headend (ISR G2 3945)

Smart Phone

871/881
Home Office
(CVO)

BranchOffice

HeadQuarters

Cisco TrustSec (Trusted Security) Ready

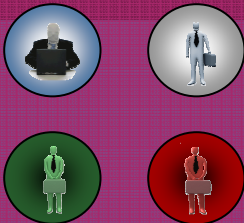
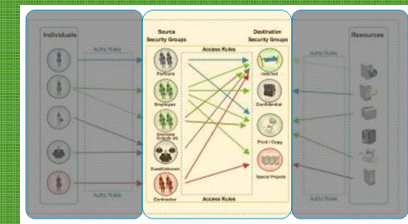
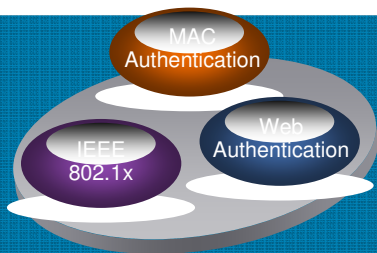
Network device admission control based on 802.1X

Seamless
Authentication for
Various Access Types

Secure LAN
Access Control

Converged Policy
Framework

Converged Policy Definition for
Different Access Types Policy
Enforced Throughout the Network



Transforming From
Topology-Aware to
Role-Aware Access Control

Role Aware
Network

Trust,
Integrity, and
Confidentiality

Network Device Admission Control
Prevent Data Sniffing and
Tampering with Line-rate Hop-by-
Hop Encryption

Topology independent access control

Based on user/device role

Advanced Security Services



Secure Borderless Branches with IPS

- Wider attack protection with IOS IPS for ISR G2
- Dedicated IPS Module with Global Correlation and Threat Reputation support
- Integrated security services fortified by Cisco Security Intelligence Operations



Zone Firewall in Borderless Branches

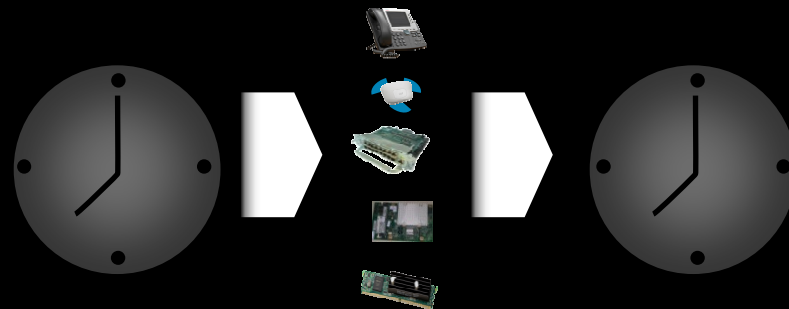
- User Group policies with Web-Auth and ACS
- Securing Collaborative Services such as Unified Communications – Trusted UC Firewall
- Securing mobile and optimization services

Power Management Modules and Scenario

Support Available in:

- ISM (SRE)
- SM (SRE—EtherSwitch)
- PVDm3
- EHWICs

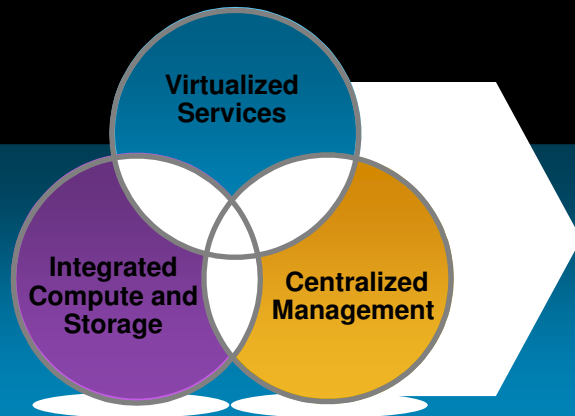
Policy : 12 Hours on per Working Day



	Hours	Days	Hours	Total
ON	Working days Mon-Fri	251 (x 12h)	3012	3012
OFF	Working days Mon-Fri	251 (x 12h)	3012	5748
OFF	Weekends	104 (x 24h)	2496	
OFF	Holidays	10 (x 24h)	240	
Total		365	8760	8760

66% of the
Time It
Could Be
Off

Service Virtualization



Cisco Services Ready Engine

- Service modules with integrated compute & storage in small, router integrated footprint
- Range of virtualized services and applications to meet branch needs
- Centralized deployment and management of services with flexibility to change without truck rolls

Any Service, Any Branch, Any Where

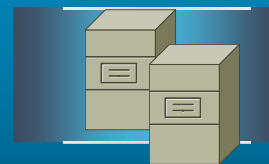


**Network and
Collaboration
Services**

**Optimized Branch
Experience**

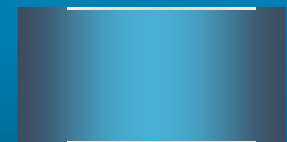


**Network-aware Lean
Applications**



**Server
Virtualization**

Server Consolidation



**Survivability
for Cloud /
Data Center**

Business Continuity

ISR G2 Service Modules Portfolio

Network and Security Services

Collaboration Services

Compute Services and Applications

Network Services

Network and Physical Security

Unified Communications

Application Infrastructure

Industry Applications



Get More from the Network

- Wireless LAN Controller (WLC)
- Infoblox core network services (AXP)
- Cisco Network Analysis (NAM)
- Cisco Wide Area Application Services (WAAS)



Secure, Protect, Compliance

- Video Surveillance
- Intrusion Prevention



Enable New Capabilities

- Cisco Unity® Express module (voicemail, IVR)
- NICE Voice Recording (AXP)
- Sagem Interstar Fax over IP (AXP)
- SingleWire Informacast (AXP)



Consolidate Branch IT

- Cisco Application Extension Platform (AXP)
- Integrated Storage System
- **Industry leading virtualization**
- **Windows Server**



Custom Solutions

- ICW Healthcare Connector on AXP
- Tiani Medical Data Exchange on AXP
- Global Protocols Skipware (AXP)

○ Available

○ **Roadmap**



Aggregation Services Router 1000 Overview

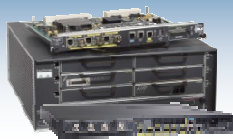
Cisco Routing Platform Positioning

Performance and Services Scalability

ISR Series



7200 Series



ASR 1002-F (ESP-2.5G)

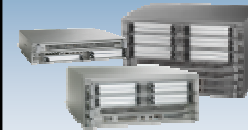


New

ASR 1000 with ESP-5G or 10G



ASR 1000 with ESP-20G



7600 Series/ Catalyst 6500 Series



Modular software,
Consistent
LAN/WAN services

Highest Capacity,
Highly Available,
Modular Services

High-performance embedded Services, Services Flexibility

Hardware/Software Resiliency, Modular Software

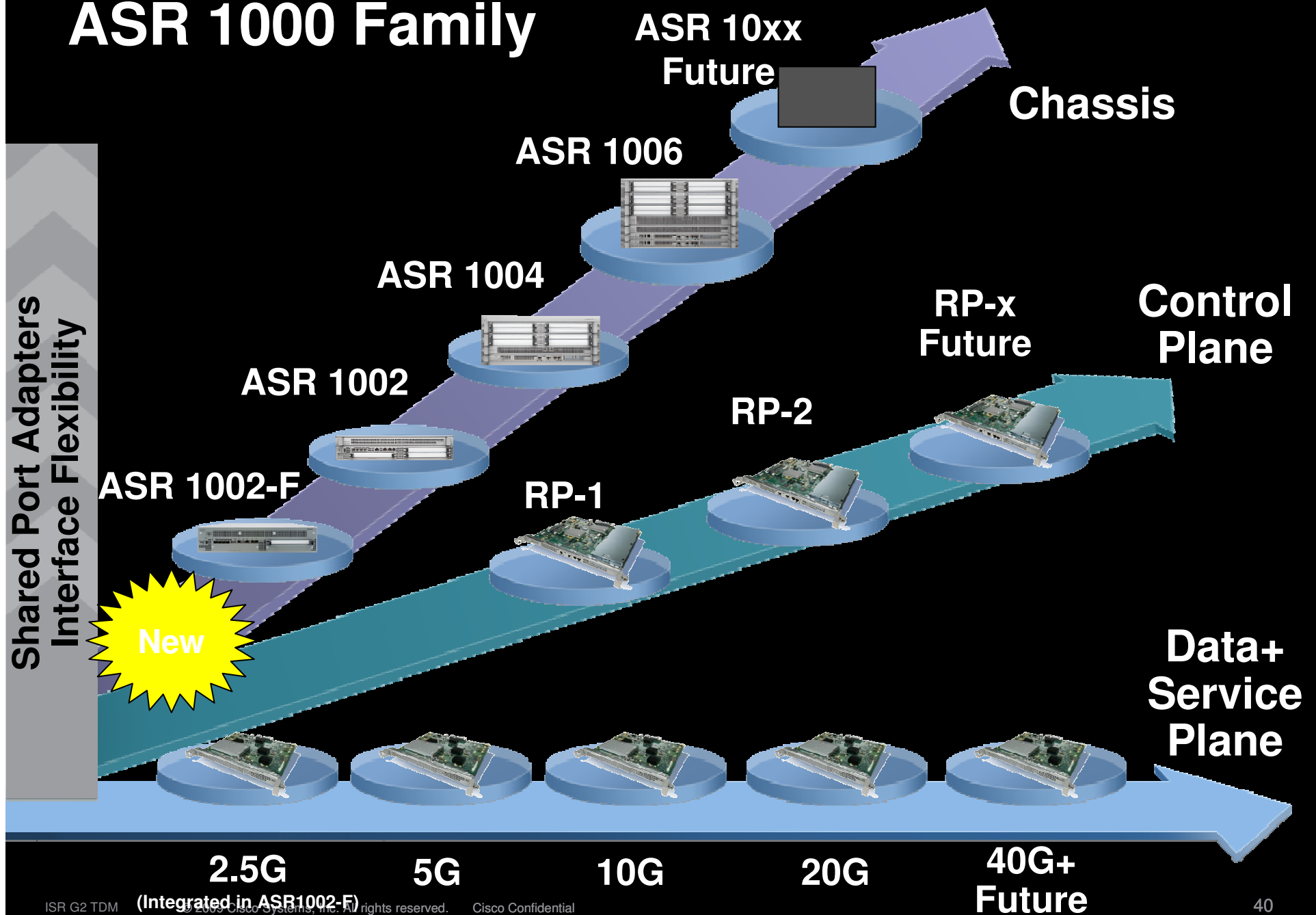
Secure, Reliable, Concurrent WAN Services Aggregation

Routing System with Integrated Services — Security, Voice, Video, Wireless, WAN Optimization

Branch

Head Office / WAN Aggregation

ASR 1000 Family



ASR 1000 Product Family



SPA Slots

of FP Slots
of RP Slots
of CC Slots
IOS Redundancy
Built in GigE
Height
Bandwidth
Performance
Air Flow
Power Supply (Watts)

3-slot

1
Integrated (RP1)
Integrated (SIP10)
S/W
4
3.5" (2RU)
5-10 Gbps
4-8 Mpps
Front to Back
470

8-slot

1
1
2
S/W
n/a
7" (4RU)
10-40+ Gbps
8-16+ Mpps
Front to Back
765

12-slot

2
2
3
H/W
n/a
10.5" (6RU)
10-40+ Gbps
8-16+ Mpps
Front to Back
1275

ESP Generations

	ESP5	ESP10	ESP20
Bandwidth	5Gbps	10Gbps	20Gbps
Based on	QFP-10	QFP-10	QFP-10
# of Processors	20	40	40
Clock Rate	900 Mhz	900 Mhz	1.2 Ghz
Crypto Engine BW	1Gbps	4Gbps	7Gbps
CPP Memory	256MB	512MB	1GB
Packet Buffer	64MB	128MB	256MB
TCAM	10Mb	10Mb	40Mb

ASR 1000 Series

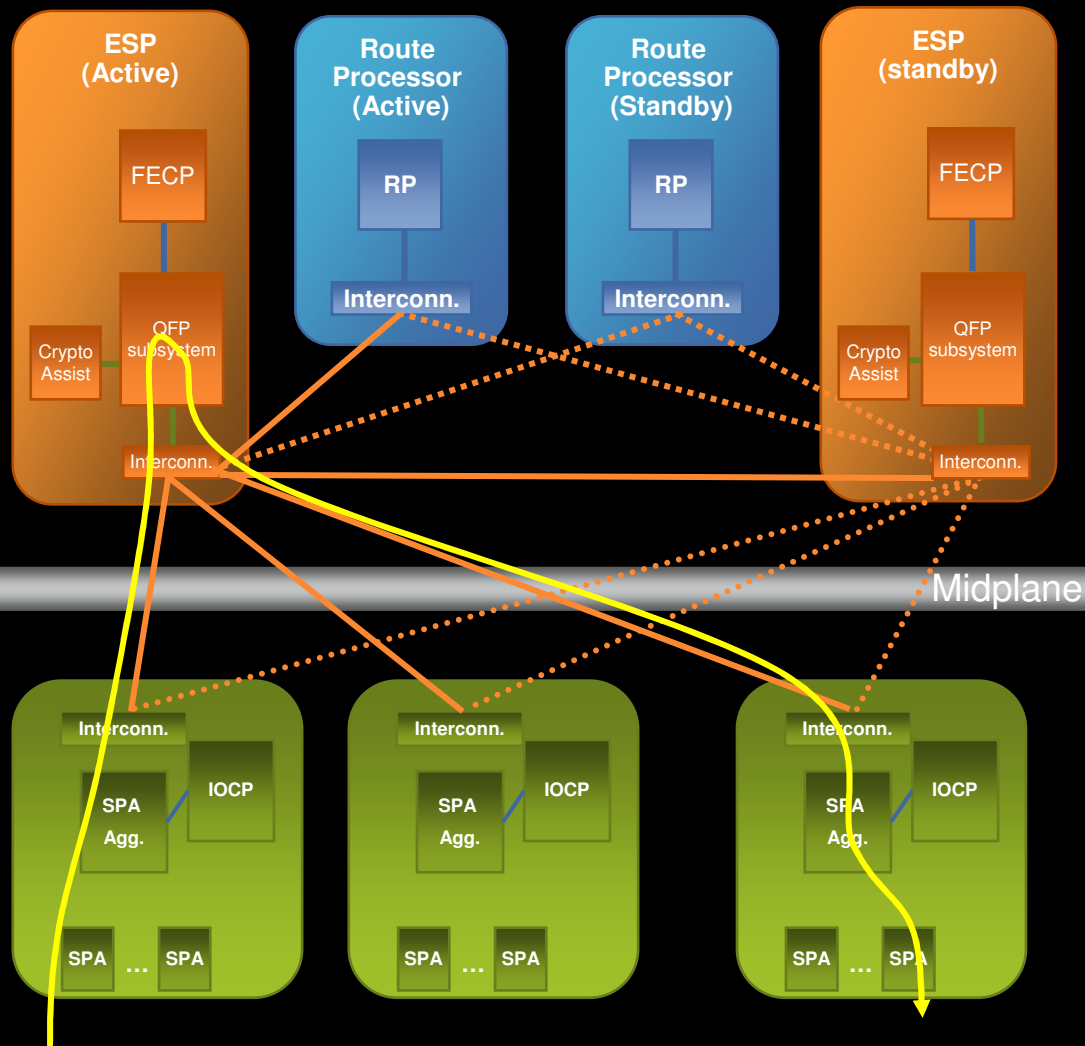
Models Comparison Matrix

Chassis	ESP2.5	ESP5	ESP10	ESP20	RP1	RP2	Integrated GigE	SPAs
ASR 1002-F	✓				✓		4	1
ASR 1002		✓	✓		✓		4	3
ASR 1004			✓	✓	✓	✓		8
ASR 1006			✓	✓	✓	✓		12
Encryption Throughput	1.0Gbps	1.8Gbps	3.8Gbps	7.0Gbps				

Comparison of ASR 1002-F & 7200

	ASR 1002-F	7206 with NPE-G2 and VSA
Size: Rack Units	2RU	3RU
Maximum Raw Throughput	2.5 Gbps	2 Gbps
Maximum IPv4 Unicast PPS	3 Mpps	1.9 Mpps
Maximum IPSec Throughput (1400B)	1 Gbps	960 Mbps
IPSec Tunnels in Real World Scenarios	4,000	2,000
Built-in GE Interfaces	4	3
I/O Interface Slots	1 SPA Slot	6 PA Slots
Software Release	IOS XE	IOS T Train
List Price for IPSec Configuration	\$40,000 USD	\$43,000 USD

Cisco ASR 1000 Building Blocks



- **RP (Route Processor)**
 - Handles control plane traffic
 - Manages system
- **ESP**
 - Handles forwarding plane traffic
- **SPA Interface Processor**
 - Houses the SPAs
- **SPAs**
 - Provide interface connectivity
- **Centralized Forwarding Architecture**
 - All traffic flows through the ESP

— ESI, (Enhanced Serdes Interface) 11.5Gbps
— SPA-SPI, 11.2Gbps
— Hypertransport, 10Gbps

ASR 1000 Control Plane Links

■ Ethernet out-of-band Channel (EOBC)

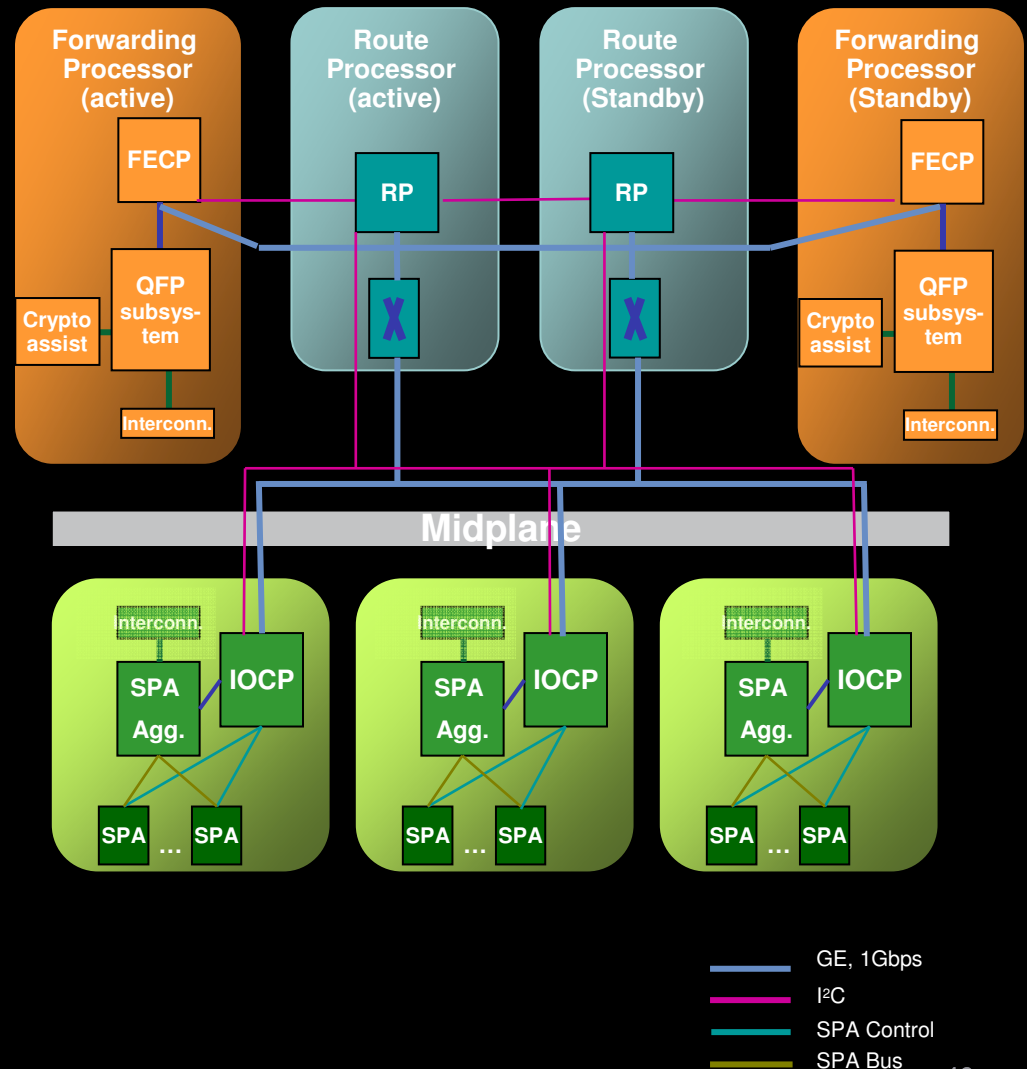
- Run between ALL components
- Indication if cards are installed and ready
- Watchdog timers
- State information exchange for L2 or L3 Protocols

■ I²C

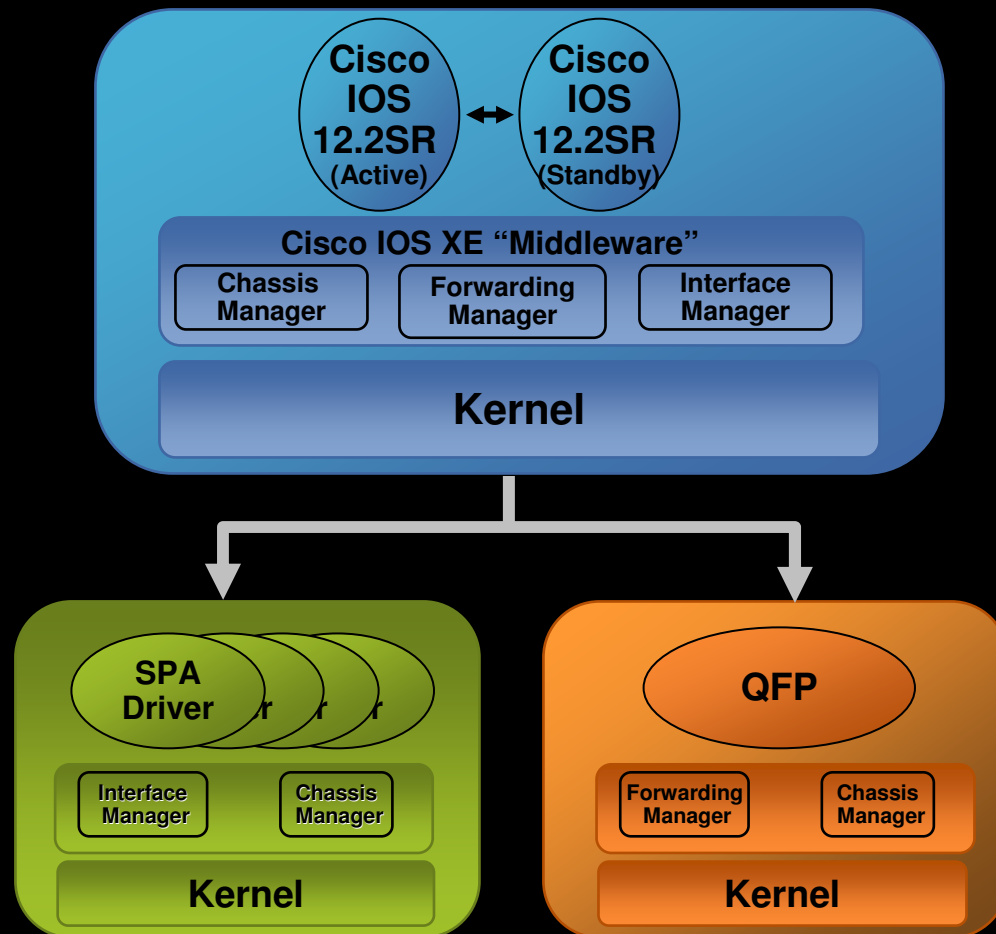
- Monitor health of hardware components
- Control resets
- Communicate active/standby, Real time presence and ready indicators
- Control the other RP (reset, power-down, interrupt, report Power-supply status, signal ESP active/standby)
- EEPROM access

■ SPA control links

- Run between IOCP and SPAs
- Detect SPA OIR
- Reset SPAs (via I²C)
- Power-control SPAs (via I²C)

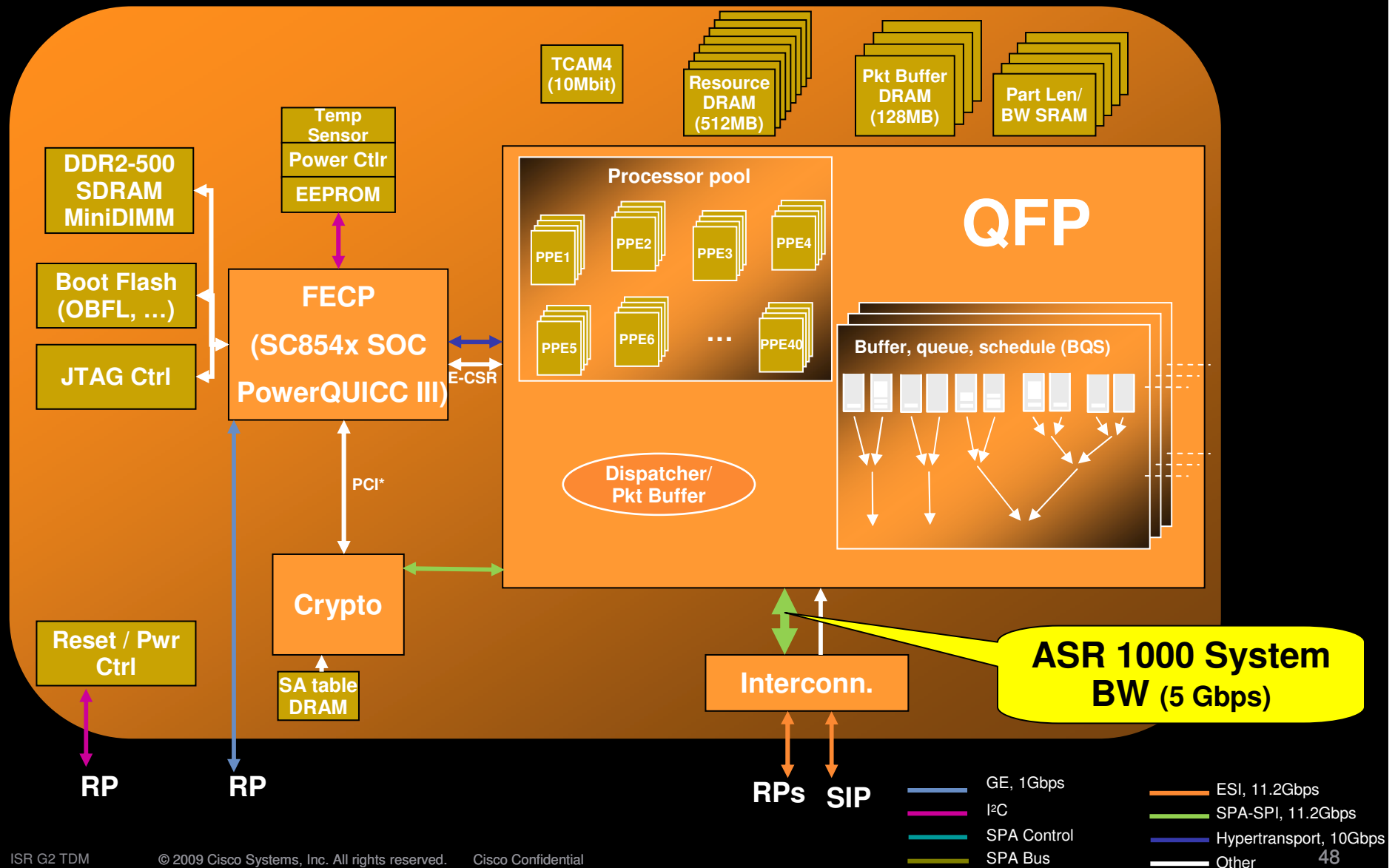


Software Architecture: Cisco IOS XE

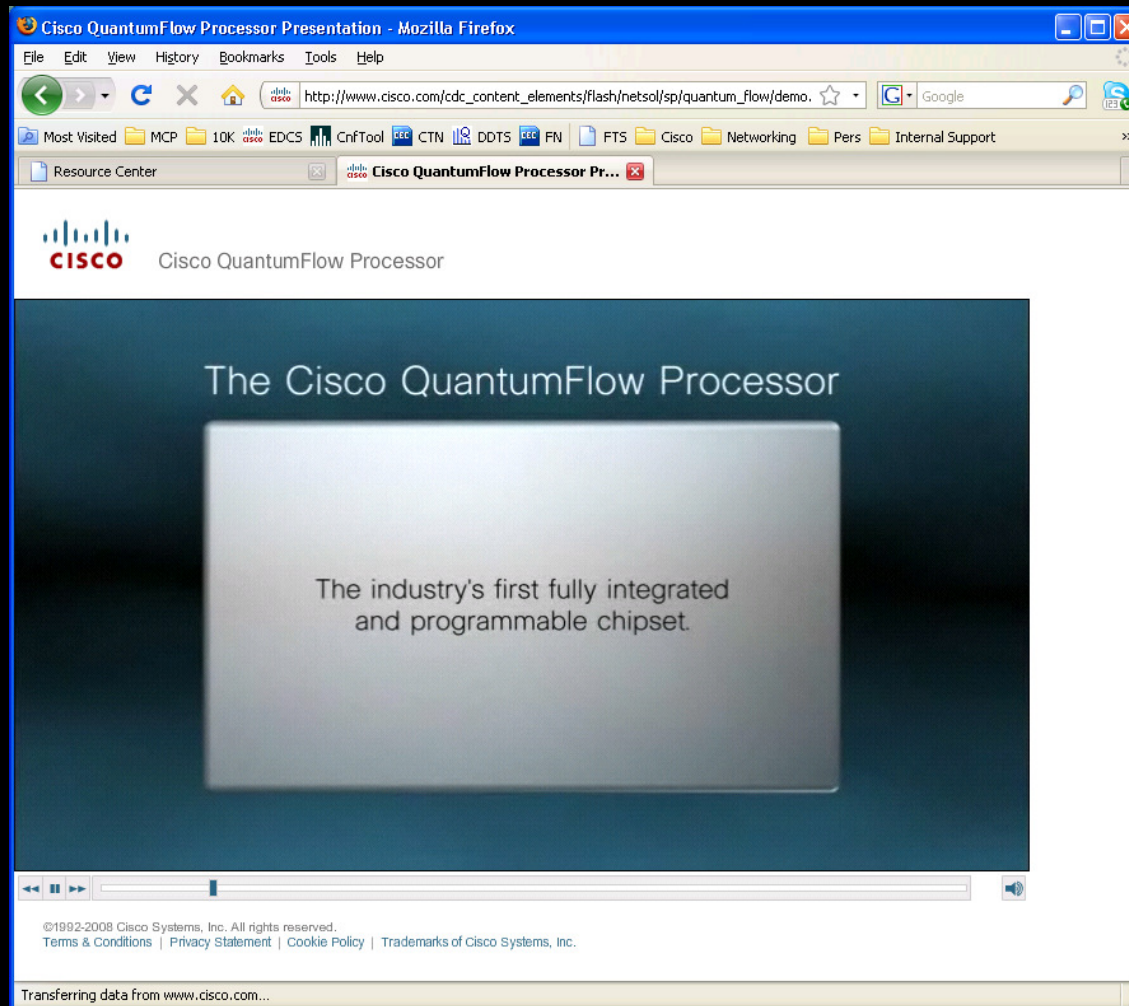


- Cisco IOS XE = IOS + Middleware + Platform software
- Operational consistency—same look and feel as Cisco IOS Router
- Cisco IOS runs as a Linux process for control plane (Routing, SNMP, CLI etc). 32bit and 64bit options
- Linux kernel with multiple processes running in protected memory for
 - Fault containment
 - Re-startability
 - ISSU of individual SW packages
- ASR HA Innovations
 - Zero-packet-loss RP failover
 - <50ms ESP failover
 - Software redundancy

ESP5 Block Diagram

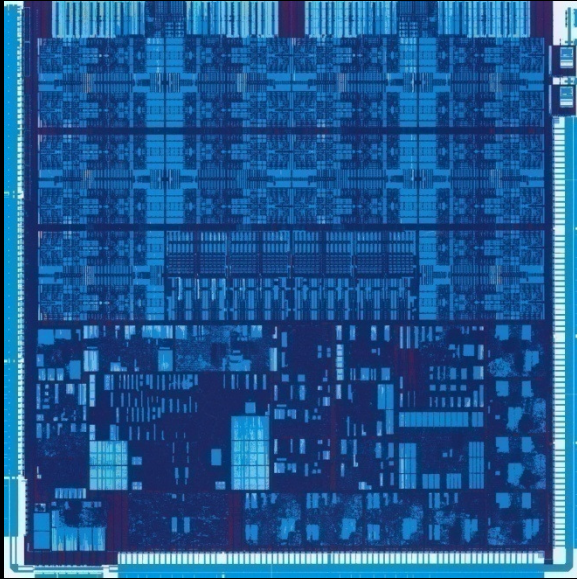


QFP Flash



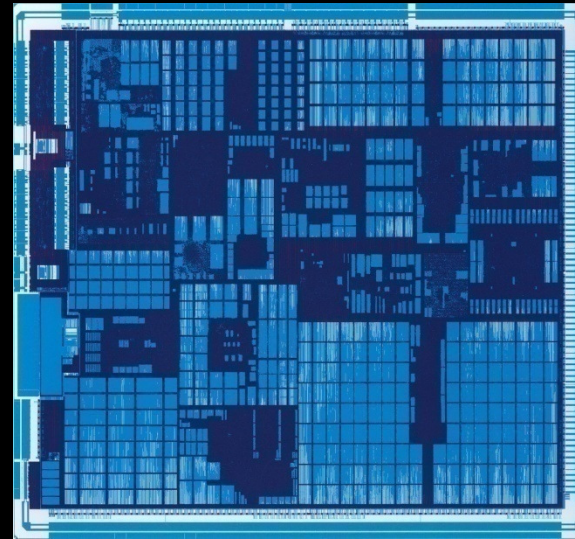
http://www.cisco.com/cdc_content_elements/flash/netsol/sp/quantum_flow/demo.html

QFP10 Chipset



Multi-Core Packet Processor

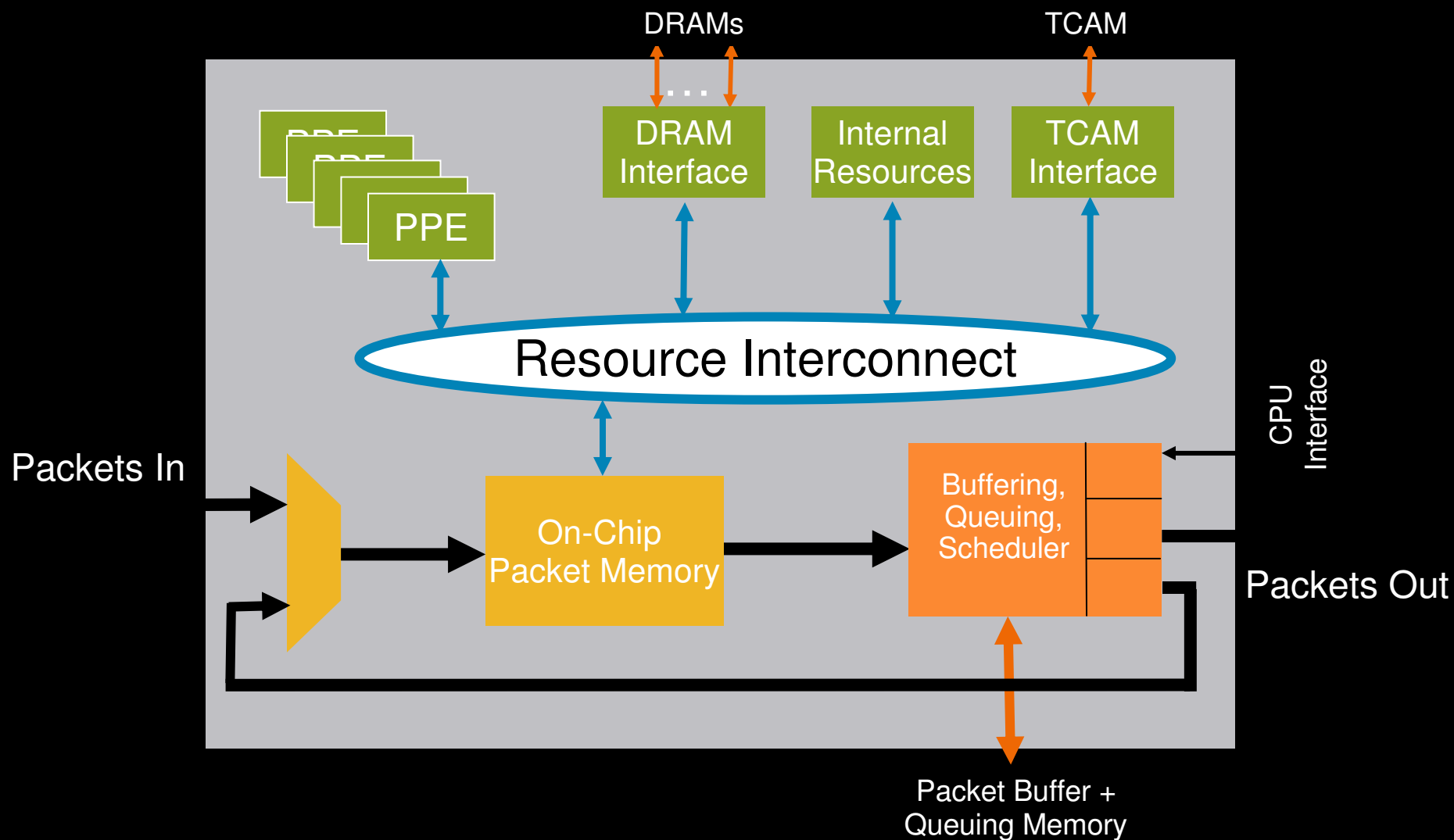
- 1.2 GHz/400 MHz
- 40 custom multi-threaded CPUs
- TI 90nm, 8-layers metal
- 19.54 x 19.54 (382 mm²)
- 307 million transistors
- 20 Mb SRAM
- 1019 I/O, including 800 MHz DDR



Traffic Manager and Interface Chip

- 400 MHz
- Buffering, 200K queues, hardware HQF scheduling
- TI 90nm, 8-layers metal
- 19.0 x 17.48 (332 mm²)
- 522 million transistors
- 70 Mb SRAM
- 1318 I/O, including 800 MHz DDR

QFP – High Level Architecture

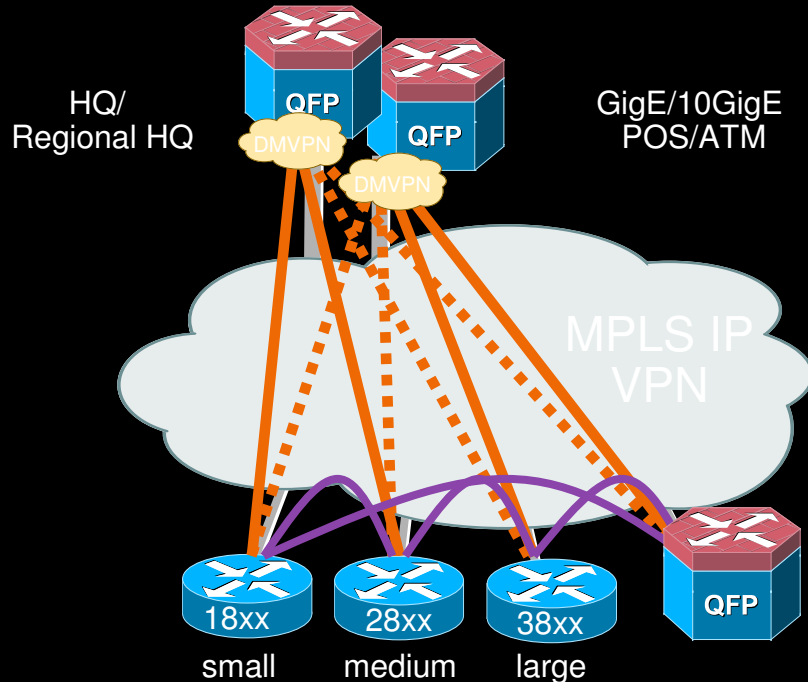




Collaboration, Security

ASR 1000: IPsec VPN Solution

Managed FR ATM (Higher BW)
Going to → Managed L2VPN/L3VPN



Branch Offices
Full T1's w/Satellite, DSL etc. Backup
Going to Multiples of Ethernet/DSL/Wireless...

Solution Objective

- Offer a full service IPsec VPN Aggregation Router which scales to meet new BW demands of SP IP VPNs

Solution Benefits

- Consolidate a stack of 7200s into 1 ASR 1000
- Investment protected by smooth transitions to more Crypto bandwidth as requirements change
- No service blades
- Optimized for QOS and Multicast

Keys to ASR 1000 (ESP20/RP1, IOS XE 2.2)

- 4000 IPsec tunnels (up to 90tps)
- 7 Gbps crypto BW + 13 Gbps non-crypto/clear text
- 3DES/AES/SHA-1/IKEv1
- DMVPN Phase 2
- Diffie-Hellman 14,15,16 (ESP5,ESP, ESP20, starting w/ IOS XE 2.2)

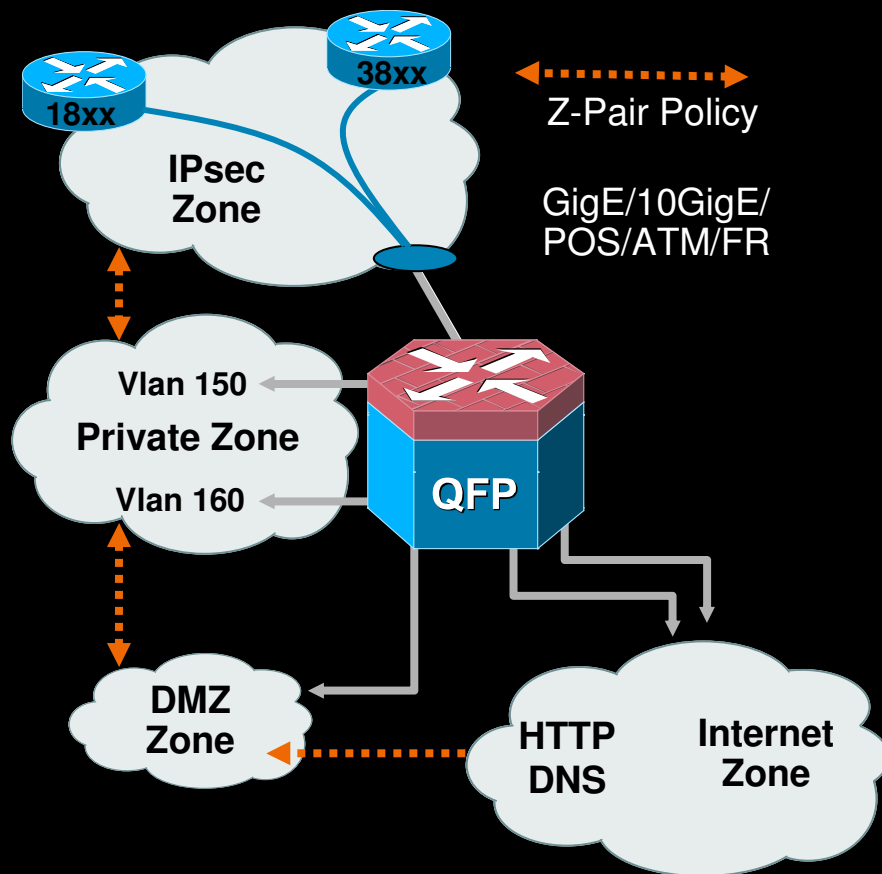
VPN Technology Positioning

	EzVPN	DMVPN	GET VPN
Infrastructure Network	<ul style="list-style-type: none"> Public Internet Transport 	<ul style="list-style-type: none"> Public Internet Transport 	<ul style="list-style-type: none"> Private IP Transport
Network Style	<ul style="list-style-type: none"> Hub-Spoke; (Client to Site) 	<ul style="list-style-type: none"> Hub-Spoke and Spoke-to-Spoke; (Site-to-Site) 	<ul style="list-style-type: none"> Any-to-Any; (Site-to-Site)
Routing	<ul style="list-style-type: none"> Reverse-route Injection 	<ul style="list-style-type: none"> Dynamic routing on tunnels 	<ul style="list-style-type: none"> Dynamic routing on IP WAN
Failover Redundancy	<ul style="list-style-type: none"> Stateful Hub Crypto Failover 	<ul style="list-style-type: none"> Route Distribution Model 	<ul style="list-style-type: none"> Route Distribution Model + Stateful
Encryption Style	<ul style="list-style-type: none"> Peer-to-Peer Protection 	<ul style="list-style-type: none"> Peer-to-Peer Protection 	<ul style="list-style-type: none"> Group Protection
IP Multicast	<ul style="list-style-type: none"> Multicast replication at hub 	<ul style="list-style-type: none"> Multicast replication at hub 	<ul style="list-style-type: none"> Multicast replication in IP WAN network

ASR 1000: Zone-Based Policy Firewall

**20G FW
Available Now!**

WAN Aggregation Head-End
or Internet Gateway



Solution Objective

- Being able to scale Cisco IOS FW in a router to multi-gigabit BW

Solution Benefits

- Cisco IOS FW in a router with 20/10/5 Gbps
- Cisco IOS Firewall supported on all interfaces in the router
- No service blades required
- IOS ZPF uses Class-Based Policy Language (CPL)
- Inspection engines: H.323, SIP, SCCP, DNS, FTP, TFTP, ICMP, RTSP

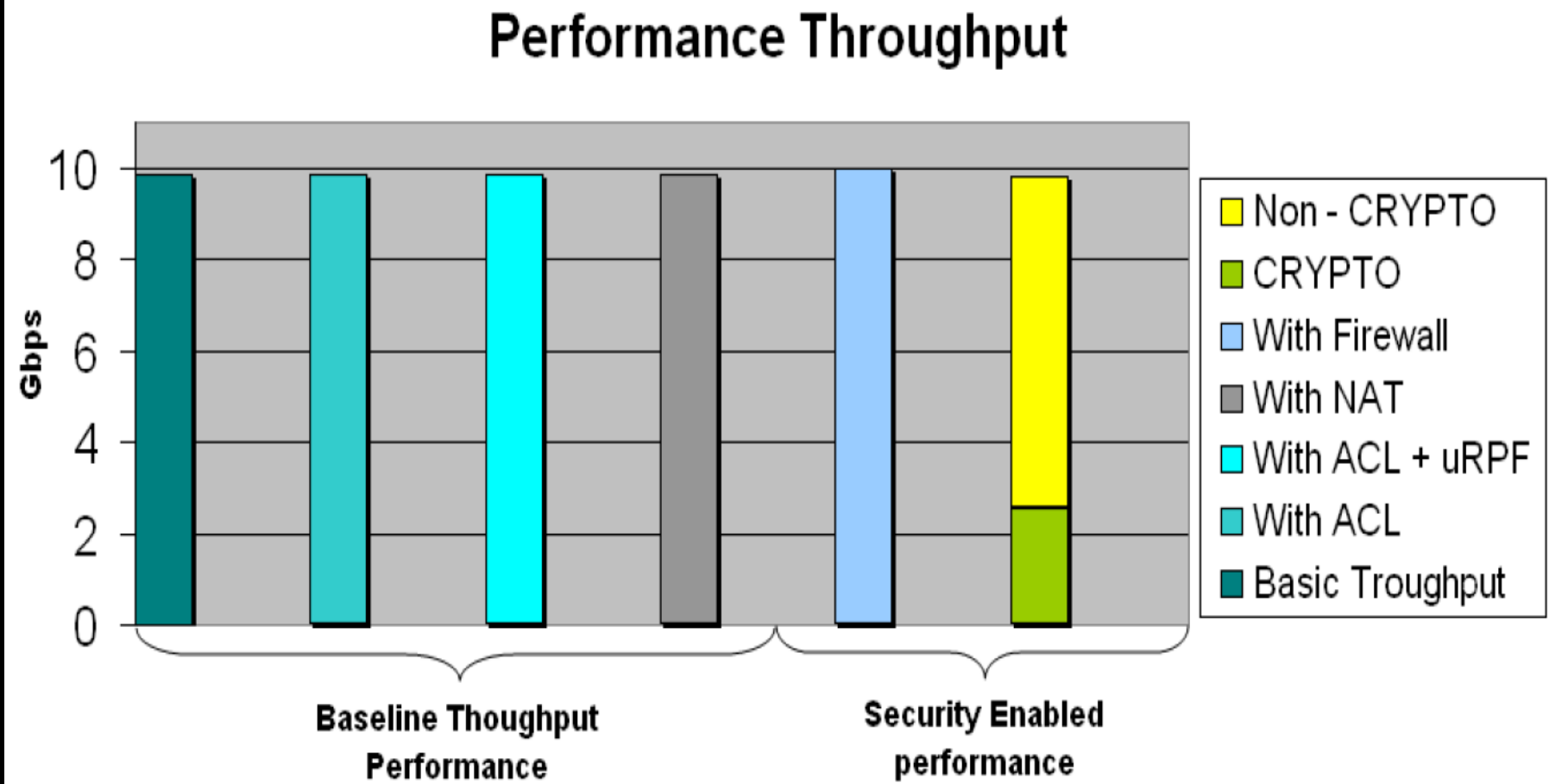
Keys to ASR 1000 (ESP20/RP1, IOS XE 2.2)

- ALL FW processing is done within QFP up to 20Gbps:
 - HTTP Max Setup: 200K
 - HTTP Max Connections: 2 Million
- High-Speed Logging via NetFlow v9

ASR 1000 Security Performance & Scalability

	ESP-5G	ESP-10G	ESP-20G
IPSec			
Encryption Throughput (Max/IMIX)*	1.8/1 Gbps	4/2.5 Gbps	7/6 Gbps
Tunnels (Total/Tested)	4,000	4,000	4,000
Tunnel Setup Rate with RP1 (IPSec/EasyVPN with Cryptomap)	90/30 tps	90/30 tps	90/30 tps
Firewall			
Firewall Throughput	5 Gbps	10 Gbps	20 Gbps
Total Sessions	250K	1M	2M
Session Setup Rate	50K/s	100K/s	200K/s
ACEs/ACLs	50K/4K	50K/4K	100K/4K
Firewall Zones/Zone Pairs	4K/4K	4K/4K	4K/4K

Miercom Test Results



The Solution: WebEx Node for ASR 1000



WebEx Node SPA Board

Plug-in module for Cisco ASR Router

Runs WebEx components

Premise-based meeting data 'switch'

Meeting front-end continues to reside in Cloud

Also in cloud: NBR, Billing, Reporting, Site Admin

Not a full-replacement for SaaS




Two Software Variants in ONE single IOS XE WebEx Subpackage (software image-available for download on cisco.com and available as a part number to configure an ASR 1000 system in the configuration tool)

1. WebEx Node – Web Presentation
2. WebEx Node – VoIP/Video solution

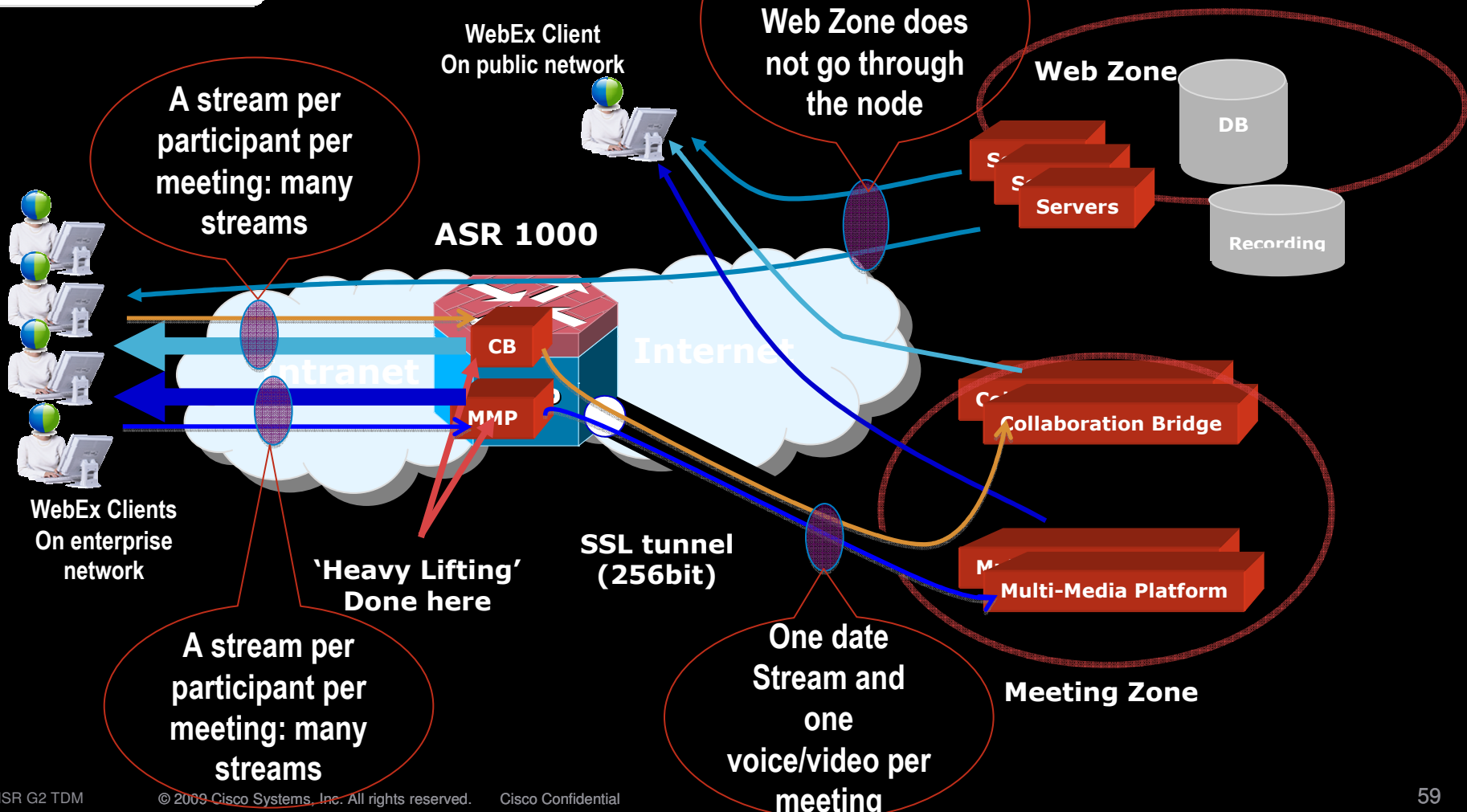
Both software variants get installed with the same WebEx node software image. Customer chooses one variant to run at a single time when setting up the WebEx Node on the WebEx Data Center GUI interface

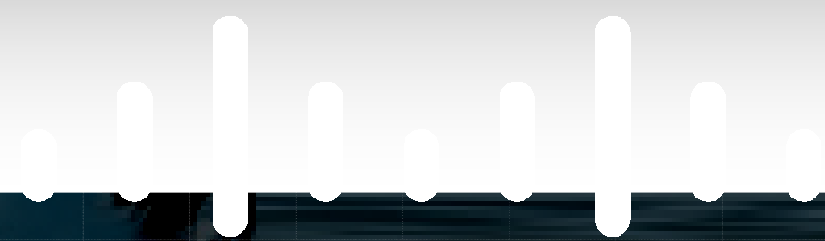
WebEx Deployment Model

With WebEx Node

-  Session Initiation
-  Meeting traffic
-  VoIP/Video

Bandwidth	• Cuts web meeting traffic on WAN, proxies and firewalls
Performance	• Improves user-experience for WebEx web meetings, VoIP, Video
Security	• Meeting Traffic between WebEx Data Center and customer premises only





CISCO

UC Module Support and Migration

Supported	Unsupported
Analog and BRI Cards (VIC)	
VIC2-2FXO	VIC-2FXS
VIC2-4FXO	VIC-2FXO
VIC2-2BRI-NT/TE	VIC-2FXO-EU
VIC3-2E/M	VIC-2FXO-M1/M2/M3
VIC3-2FXS/DID	VIC-2E/M
VIC3-2FXS-E/DID	VIC-2DID
VIC3-4FXS/DID	VIC-2BRI-S/T-TE
	VIC-2BRI-NT/TE
	VIC-2CAMA
	VIC-1J1
	VIC-4FXO-M1
	VIC-4FXS/DID
	VIC2-2FXS
	VIC2-2E/M

Supported	Unsupported
Digital T1/E1 Cards (VWIC)	
VWIC2-1MFT-T1/E1	VWIC-1MFT-T1
VWIC2-2MFT-T1/E1	VWIC-1MFT-E1
VWIC2-1MFT-G703	VWIC-2MFT-T1
VWIC2-2MFT-G703	VWIC-2MFT-E1
	VWIC-2MFT-T1-DI
	VWIC-2MFT-E1-DI
	VWIC-1MFT-G703
	VWIC-2MFT-G703
EVM and EM Cards	
EVM-HD-8FXS/DID*	NM-HDA
EM-4BRI-NT/TE	EM-HDA-8FXS
EM-HDA-3FXS/4FXO	EM-HDA-4FXO
EM-HDA-6FXO	EM2-HDA-4FXO
EM3-HDA-8FXS/DID	

UC Module Support and Migration

Supported	Unsupported
Network Modules (NM)	
NM-HD-1V*	NM-1V/2V
NM-HD-2V*	NM-HDA
NM-HD-2VE*	NM-HDV
NM-HDV2*	NM-HDV-FARM-C36
NM-HDV2-1T1/E1*	NM-HDV-FARM-C54
NM-HDV2-2T1/E1*	NM-HDV-FARM-C90
Application Modules	
NME-CUE*	AIM-CUE
NME-UMG*	NM-CUE
NME-UMG-EC*	NM-CUE-EC
NM-CUSP-522*	
NME-APPRE*	
ISM-SRE-300-K9 (CUE)	
SM-SRE-700-K9 (CUE)	

Supported	Unsupported
DSP Cards (DSP, PVDM, EC)	
PVDM2-8**	PVDM-12
PVDM2-16**	DSP-HDA-16
PVDM2-32**	PVDM-4
PVDM2-48**	PVDM-8
PVDM2-64**	PVDM-256K-4
EC-MFT-32	PVDM-256K-8
EC-MFT-64	PVDM-256K-12
PVDM3-16	PVDM-256K-16
PVDM3-32	PVDM-256K-20
PVDM3-64	PVDM-256K-16HD
PVDM3-128	PVDM-256K-20HD
PVDM3-192	
PVDM3-256	
Adapter Cards	
PVDM2-ADPTR	
SM-NM-ADPTR	

Additional UC Slot and Module Support Notes

	2901	2911	2921	2951	3925	3945
EHWIC Slots	4	4	4	4	4	4
Onboard DSP Slots	2	2	3	3	4	4
ISM Slots	1	1	1	1	1	1
SM (EVM*) Slots	0	1	1	2	2	4
CUSP Support	No	Yes	Yes	Yes	Yes	Yes

- *EVM Support
 - ISR G2: SM slots can be fully populated with EVM cards
 - ISR: Max 1 on 3825, max 2 on 3845
- CUSP Support
 - ISR G2: Supported on all SM-capable platforms using the SM-NM adapter
 - ISRs: Supported on 3800s only
- Image pre-requisites
 - CUE and CUSP are supported on IP Base
 - All other UC modules require the UC Technology Package

TDM GW Overall Positioning

Platform	Channels	T1s	E1s
2801	32	1	1
2811	70	3	2.5
2821	112	4	3.5
2851	170	7	5.5
3825	340	14	11
3845	450	18	15
2901	100	4	3
2911	150	6	5
2921	240	10	8
2951	400	16	13
3925	480	20	16
3945	720	24	24

TDM Gateway: Physical DS0 Connectivity

	2801	2811	2821	2851	3825	3845	2901	2911	2921	2951	3925	3945
FXS	16	28	52	52	52	88	16	40	40	64	64	112
FXO/CAMA	16	24	36	36	36	56	16	28	28	40	40	64
E&M	8	12	12	12	16	24	8	12	12	16	16	24
Analog-DID	16	24	40	40	40	64	16	32	32	48	48	80
BRI Ports	8	12	20	20	20	32	8	16	16	24	24	40
BRI Channels	16	24	40	40	40	64	16	32	32	48	48	80
Total T1/E1 Ports	8	12	12	12	16	24	8	12	12	16	16	24
Onboard T1/E1 Ports	8	8	8	8	8	8	8	8	8	8	8	8
NM-based T1/E1 Ports	0	4	4	4	8	16	0	4	4	8	8	16
T1 Channels: DS0 Connectivity	192*	288	288	288	384	576	192	288	288	384	384	576
Onboard T1 DS0 Connectivity	192*	192	192	192	192	192	192	192	192	192	192	192
NM-based T1 DS0 Con'tivity	0	96	96	96	192	384	0	96	96	192	192	384
E1 Channels: DS0 Connectivity	240*	360	360	360	480	720	240	360	360	480	480	720
Onboard E1 DS0 Connectivity	240*	240	240	240	240	240	240	240	240	240	240	240

* Limited by DSPs to 128 channels

TDM Gateway Channel Capacity

With Encryption Options, NTE 75% CPU

	2801	2811	2821	2851	3825	3845	2901	2911	2921	2951	3925	3945
Maximum Simultaneous Calls												
Standalone Voice GW												
No encryption	32	70	112	170	340	450	100	150	240	400	480	720
SIP TLS with SRTP	32	65	104	160	320	420	100	150	240	400	480	720
H.323 Signaling-in-IPSec with SRTP	32	60	96	140	290	370	100	150	240	400	480	720
H.323 Signaling-and-Media-in-IPSec	32	34	52	80	150	185	100	150	195	325	360	385
WAN Edge GW												
No encryption	32	48	80	140	270	320	100	150	240	400	480	650
SIP TLS with SRTP	32	45	75	130	250	300	100	150	240	400	480	645
H.323 Signaling-in-IPSec with SRTP	32	41	80	124	220	270	100	150	240	400	480	565
H.323 Signaling-and-Media-in-IPSec	22	22	44	60	110	135	100	125	145	235	265	285
WAN Edge GW with cRTP												
No encryption	26	35	61	120	225	270	100	150	240	400	480	550
SIP TLS with SRTP	26	32	56	112	210	255	100	150	240	400	480	540
H.323 Signaling-in-IPSec with SRTP	22	31	51	100	185	225	100	150	240	400	445	475
H.323 Signaling-and-Media-in-IPSec	14	17	28	50	93	113	95	105	120	200	220	240
Max CPS	0.5	0.7	0.8	1	3	7	1	1.5	2	3	10	15

CUBE Performance with Additional Features

Platform	CUBE (VAD-Off)	CUBE (VAD-On)	SW MTP	CUBE + SW MTP	CUBE + Xcoding
2801	55	75	60	30	30
2811	110	150	120	55	55
2821	200	300	220	105	105
2851	225	325	250	115	115
3825	400	500	440	210	210
3845	500	600	550	260	260
AS5000XM	600	850	N/A	N/A	310
2901	100	130	110	55	55
2911	200	260	220	110	110
2921	400	520	440	220	220
2951	600	780	660	330	330
3925 SPE-100	800	1000	880	440	440
3945 SPE-150	1000	1250	1050	500	500

SRST/CME Phone/DN Capacity

*At FCS 200 (3925) and 300 (3945) phones are supported. The higher numbers will become available in a post-FCS 15.0.1M rebuild.

Platform	SRST Phone	SRST DN	CME Phone	CME DN
880-SRST	4	50	N/S	N/S
1861	15	76	15	76
IAD2430	N/S	N/S	24	
3250	N/S	N/S	20	100
3270	N/S	N/S	48	240
3725	144	960	144	500
3745	480	960	192	500
2801	25	150	25	150
2811	35	144	35	144
2821	50	192	50	192
2851	100	288	100	288
3825	350	960	175	500
3845	730	960	250	720
2901	35	200	35	200
2911	50	300	50	300
2921	100	400	100	400
2951	250	500	150	500
3925	730	1000	250*	600
3945	1200	1800	350*	900

CUE Hardware, AA, Mailbox and IVR Support

CUE 7.1 Hardware Support

- 2800/3800
 - AIM-CUE, AIM2-CUE
 - NME-CUE
- 2900/3900
 - ISM-SRE-300-K9
 - NME-CUE (SM-NM-ADPTR adapter)

ISM-SRE-300-K9: 512MB DRAM, 4GB flash
 SM-SRE-700-K9: 2GB DRAM, 500GB HDD

CUE 8.0 Hardware Support

- Target FCS 1H10
- 2800/3800
 - AIM2-CUE, NME-CUE
- 2900/3900:
 - ISM-SRE-300-K9
 - NME-CUE (SM-NM-ADPTR adapter)
 - SM-SRE-700-K9

Platform	Hardware	Bundled Ports	Max Ports	Max IVR Sessions	Max Mailboxes	Storage (hours)
2800/3800	AIM2-CUE	6	6	6	65	14
	NME-CUE	8	24	24	275	300
2900/3900	ISM-SRE-300-K9	2	10	10	100	60
	SM-SRE-700-K9	4*	32*	32*	300*	600

Video Traffic Support

Traffic Type	BW	2901	2911	2921	2951	3925	3945
Desktop Video (Streaming, VODs...)	200K	125	175	250	375	500	750
	512K	48	68	97	146	195	292
	1.5M	16	23	33	50	66	100
Desktop Video Collaboration	384K	65	91	130	195	260	390
	768K	32	45	65	97	130	195
TelePresence							
CTS-1000	5M	5	7	10	15	20	30
CTS-3000	14.1M	1	2	3	5	7	10
H.320 ISDN Gateway	384K	65	91	130	195	260	390
	768K	32	45	65	97	130	195
Video Surveillance	SD (MPEG4) 1M	25	35	50	75	100	150
	HD (H.264) 4M	6	8	12	18	25	37
Digital Signage	SD 3M	8	11	16	25	33	50
	HD (H.264) 10M	2	3	5	7	10	15

Maximum support with router's entire throughput dedicate to this traffic

MediaNet Video BW Ranges

Approximate Bandwidth Requirements Per Video Stream

Video Category	Specific Video Application	Approximate Bandwidth Per Stream / Participant
Desktop Video	Standard Definition VoDs and Live	200 Kbps – 1.5 Mbps
Digital Signage / Enterprise TV	Standard Definition VoDs and Live	1.5 Mbps – 5 Mbps
	High Definition VoDs and Live	8 Mbps – 15 Mbps
Cisco TelePresence	CTS-500 / CTS-1000 720p Resolution	2.1 Mbps – 8.7 Mbps
	CTS-500 / CTS-1000 1080p Resolution	4.5 Mbps – 10.8 Mbps
	CTS-3000 / CTS-3200 720p Resolution	4.5 Mbps – 14.1 Mbps
	CTS-3000 / CTS-3200 1080p Resolution	11.7 Mbps – 20.4 Mbps
Desktop Video Collaboration	CUVA and CUPC	50 Kbps – 1.5 Mbps >384 Kbps Recommended
	Cisco IP 7985G Phone	Up to 768 Kbps
	WebEx Conference via Webcam (Video Only)	32 Kbps – 284 Kbps (Max of Six Streams)
IP Video Surveillance	Cisco 4400 Series HD Cameras – H.264 Mode	~ 4 Mbps Typical
	Cisco 2500 Series Cameras – MPEG-4 Mode	~ 1 Mbps Typical

ISRs in a MediaNet Network

Area	Role and Features
QoE	CAC (RSVP, Call Counting, Gatekeeper) WAAS (2800/3800 only) IPSLA QoS, Policing and Marking, Queuing, Traffic Shaping PoE
Delivery	Multicast Performance Routing (PfR) Policy Routing Dynamic Routing (RIP, BGP, OSPF,EIGRP etc)
Security	AAA, Firewall, VPN, DMVPN, GETVPN, IPS, Content Filtering, FPM, AutoSecure, Control Plane Policing VRF, UC-trusted FW (TRP) SRTP, TLS, IPSec
Content	ISR DSP media resources for audio transcoding, conferencing, MTP IVPS-16 and VMSS (2800/3800 only)
Session Control	CUBE; SIP Proxy (CUSP); CUCME Video H.323, SIP, SCCP H.320 Video GW
Mobility	3G WWAN, 802.11a/b/g/n
Management	Cisco Security Manager (CSM), Cisco netManager Unified Comm, Cisco Configuration Professional (CCP), Cisco Unified Operations Manager, SAF...

PVDM3 Technology Overview

- PVDM SKU labels indicate the maximum number of G.711 calls supported
- PVDM3 DSP modules are supported on the motherboard slots of the 2900 and 3900 platforms
- Requires 15.0.1M

PVDM3	G.711 Channels	DSP Technology
PVDM3-16	16	Single DSP, single-core
PVDM3-32	32	Single DSP, single-core
PVDM3-64	64	Single DSP, dual-core
PVDM3-128	128	Single DSP, three-cores
PVDM3-192	192	Two DSPs: One dual-core DSP, one three-core DSP
PVDM3-256	256	Two DSPs Each with three-cores

DSP Capacity Summary

PVDM	TDM DS0s (G.711)	Transcoding (G.711-G.729A)	Conferences* (8-party G.711)	H.320 video (384K calls)
PVDM2				
PVDM2-8	8	4	4	1
PVDM2-16	16	8	8	2
PVDM2-32	32	16	16	4
PVDM2-48	48	24	24	6
PVDM2-64	64	32	32	8
PVDM3				
PVDM3-16	16	12	8	2
PVDM3-32	32	21	13	5
PVDM3-64	64	42	26	10
PVDM3-128	128	96	48	21
PVDM3-192	192	138	74	31
PVDM3-256	256	192	96	42