



## Cisco ASR 1000 Series Aggregation Services Router



Ahmad Chehime

**Saudi**  
**Cisco Expo**  
**2008**

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

1

## Cisco: History of Innovation ALWAYS Ahead of Market Trends

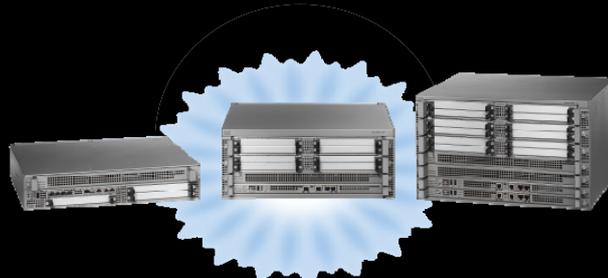
Then	Now
1995 <b>Cisco 7500</b>	More than 100,000 shipped
1995 <b>Cisco introduces 7200 series</b> optimized WAN aggregation router	Shipped in excess of 350,000 units
2001 <b>Cisco introduces 7600 series,</b> establishing Carrier Ethernet	More than 50,000 shipped, \$1B annual run rate
2004 <b>CRS-1</b> introduced for core, declared overkill by some with predictions of no more than 50 ever needed	More than 1000 shipped in less than three years
2004 <b>Integrated services router (ISR)</b> introduced for CPE	More than 2,000,000 shipped in first two years
2008	<b>Cisco ASR-1000 Series Aggregation Services Router Introduced for Edge</b>

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

2

## Introducing...

### Industry's Most Powerful, Compact Aggregation Routers



### Cisco ASR 1000 Series

### Transforming and Extending the Network Edge

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

3

## WALL STREET JOURNAL

### **New Routers Catch the Eyes of IT Departments**

*Multifunctional Boxes Keep Business Networks Humming, Curbs Sprawl*

By BOBBY WHITE; March 25, 2008; Page B7

*Information-technology professionals like Jeff Young want to cut down on the sprawl of networking equipment in their company's computer rooms.*

*In the process, they are being drawn to a new type of product coming out of the technology-networking industry.*

*Mr. Young, chief technology officer at financial data company FactSet Inc., used to buy a different piece of networking equipment to handle each different technology task. That meant he purchased one piece of gear to deal with email spam, another piece for Internet-traffic filtering, and yet other equipment for firewalls. Overall, his Norwalk, Conn., company had more than 300 "routers," the back-office networking gear that helps to direct and shape Internet traffic.*

*Having so many routers was expensive and took up space. So late last year, Mr. Young began testing a new type of router from networking company Cisco Systems Inc.*

**Called the ASR 1000, the router crams multiple functions -- including speeding data through computer networks and filtering out unwanted Internet traffic -- into one box. Cisco officially launched the product this month.**

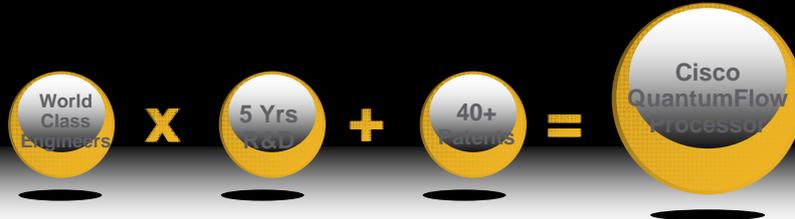


[http://online.wsj.com/article/SB120640298080130861.html?mod=google\\_news](http://online.wsj.com/article/SB120640298080130861.html?mod=google_news) wsj

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

4

# ASR 1000 Series Innovations Cisco QuantumFlow Processor (QFP)



## World's Most Advanced Piece of Networking Silicon

Performance	40Gbs Services	▶	Instant-on Service Delivery
Scale	Over 1.3 Billion Transistors		Low Touch Deployment
Availability	Customized QoS		Faster Qualification
Services	Integrated and Programmable		Future Ready Technology

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

5

## Introducing Cisco QuantumFlow Processor...

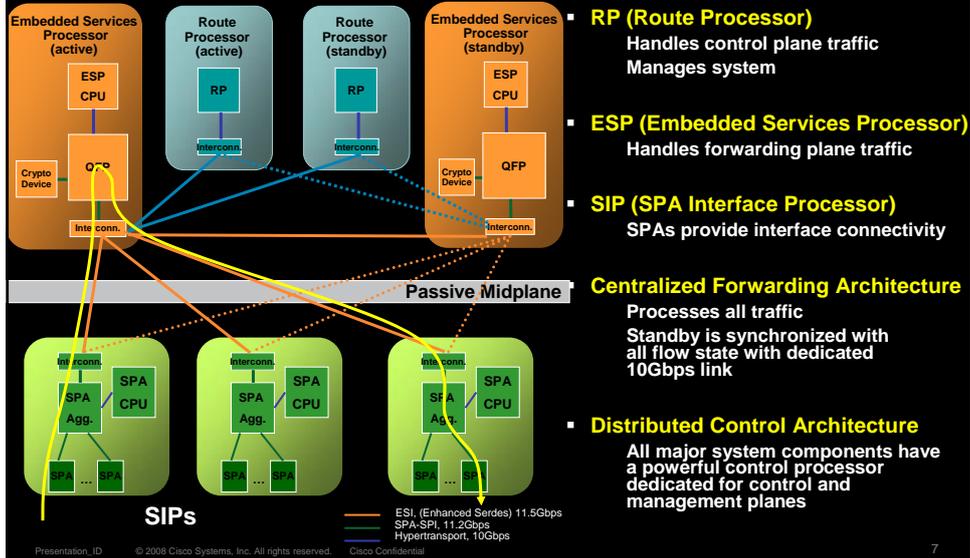
307 Million Transistors  
**Cisco QuantumFlow Processor**  
Technology

Fundamental "Game Changing" Cisco Innovation

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

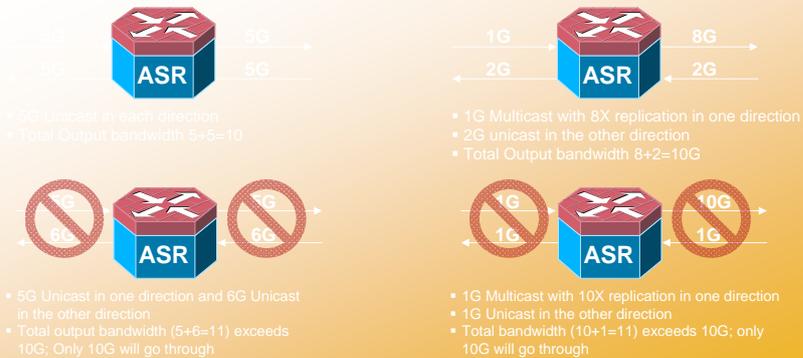
6

# ASR 1006 Series Building Blocks



# System Bandwidth

- ESP bandwidth denotes the total 'output' bandwidth of the system, regardless of the direction
- High priority traffic (as long as it is not over-subscribed)  
Example:  $\leq 10G$  for ESP-10G will not be affected by this bandwidth limit
- ESP-10G Examples:



## ASR 1000 Series Overview 6 RU

**2 RU**



**4 RU**



**6 RU**



SPA Slots	3-slot	8-slot	12-slot
# of ESP Slots	1	1	2
# of RP Slots	integrated	1	2
# of SIP Slots	integrated	2	3
IOS Redundancy	S/W	S/W	H/W
Built in GigE	4	n/a	n/a
Height	3.5" (2RU)	7" (4RU)	10.5" (6RU)
Bandwidth	5-10 Gbps	10-20+ Gbps	10-20+ Gbps
Performance*	4-8 Mpps	8-16+ Mpps	8-16+ Mpps
Air Flow	Front to Back	Front to Back	Front to Back
Power Supply (MAX Watts IN DC/AC, MAX OUT)	590 / 560, 470	1020 / 960, 765	1700 / 1600, 1275

**Aggregated Services & Scale**

\*With Services turned on  
Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential 9

## ASR 1000 ESP Generations Roadmap

	ESP-5G	ESP-10G	ESP-20G
<b>Bandwidth</b>	5Gbps	10Gbps	20Gbps
<b>Based on</b>	QFP	QFP	QFP
<b># of Processors</b>	20	40	40
<b>Clock Rate</b>	900 Mhz	900 Mhz	1.2 Ghz
<b>Crypto Engine BW</b>	~1Gbps	3Gbps	8Gbps
<b>QFP Memory</b>	256MB	512MB	1GB
<b>Packet Buffer</b>	64MB	128MB	256MB
<b>TCAM</b>	10MB	10MB	40MB

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential 10

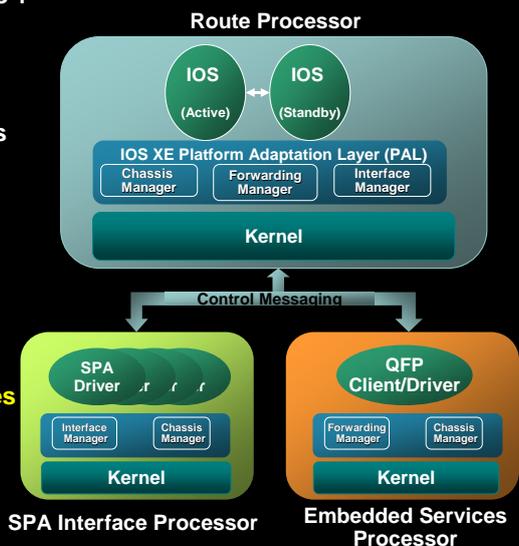
# ASR1000 SPA + SFP Support TODAY

1GE SFP & WDM	10GE XFP	Ethernet SPA
SFP-GE-L	XFP-10GER-OC192SR (10GE mode)	SPA-1X10GE-L-V2
SFP-GE-S	XFP-10GLR-OC192IR (10GE mode)	SPA-2X1GE-V2
SFP-GE-T	XFP-10GZR-OC192LR (10GE mode)	SPA-5X1GE-V2
SFP-GE-Z		SPA-8X1GE-V2
CWDM-SFP-1470		SPA-10X1GE-V2
CWDM-SFP-1490		SPA-4X1FE-TX-V2
CWDM-SFP-1510		SPA-8X1FE-TX-V2
CWDM-SFP-1530		
CWDM-SFP-1550		POS SPA
CWDM-SFP-1570		SPA-1XOC12-POS
CWDM-SFP-1590		SPA-2XOC3-POS
CWDM-SFP-1610		SPA-4XOC3-POS
		Serial + Channelized SPA
		SPA-2XT3/E3
		SPA-2XCT3/DS0
		SPA-4XCT3/DS0
		SPA-4XT3/E3
		SPA-8XCHT1/E1

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

## Software Architecture – IOS XE

- IOS XE = IOS + IOS XE Middleware + Platform Software
- Operational Consistency - same look and feel as IOS Router
- IOS runs as its own Linux process for control plane (Routing, SNMP, CLI etc)
- Linux kernel with multiple processes running in protected memory for
  - Fault containment
  - Re-startability
  - ISSU of individual SW packages
- ASR 1000 HA Innovations
  - Zero-packet-loss RP Failover
  - <50ms ESP Failover
  - “Software Redundancy”



Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

12

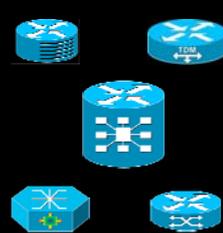
# Cisco Network Operating Systems

## The Right Tools in the Right Places

### Cisco IOS® XR Software

#### Core Focused

Service provider-grade services  
 State-of-the-art resiliency  
 Large-scale networks  
 WAN-core link-layer types



### Cisco IOS Software

#### Ubiquitous

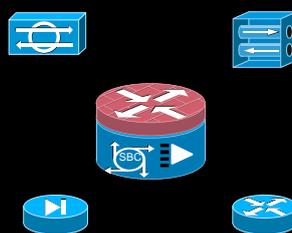
Powerful feature set  
 Powerful flexibility  
 Robust resiliency  
 LAN/WAN link-layer types



### Cisco IOS XE Software

#### SP Edge & Enterprise Focused

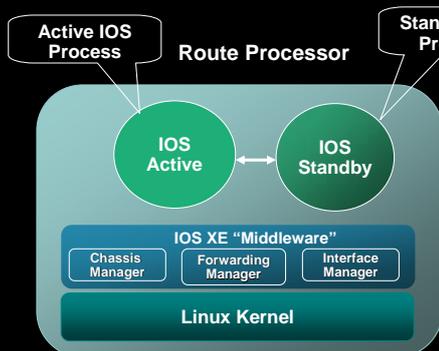
Service provider-grade services  
 State-of-the-art resiliency  
 Integrated Firewall and SBC Services  
 Broadband, Enterprise and SP network edge



Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

13

## SW Redundancy on ASR1002/1004



- Stand-by IOS sub package in the single RP systems (ASR1004/ASR1002)
- Two IOS sub packages in a single RP function similarly to the IOS sub packages on separate RPs
- Supports all NSF/SSO features as supported by dual RP system (ASR1006)
- Requires 4 GB DRAM on RP

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

14

# Cisco IOS XE Consolidated SW Packages for Enterprise and Managed Services CPE

<p><b>Cisco ASR1000 Series IP Base w/o Crypto (SASR1R1-IPB)</b></p> <ul style="list-style-type: none"> <li>• RIP, BGP, OSPF, ISIS</li> <li>• ACL</li> <li>• HSRP/RRRP</li> <li>• HA: BFD, ISSU</li> <li>• NAT</li> <li>• Netflow</li> <li>• QoS, WCCPv2</li> </ul>	<p><b>Cisco ASR1000 Series IP Base (SASR1R1-IPBK9)</b></p> <ul style="list-style-type: none"> <li>• *SSL, SSH</li> <li>• RIP, BGP, OSPF, ISIS</li> <li>• ACL</li> <li>• HSRP/RRRP</li> <li>• HA: BFD, ISSU</li> <li>• NAT</li> <li>• Netflow</li> <li>• QoS, WCCPv2</li> </ul>	<p><b>Cisco ASR1000 Series RP1 Advanced Enterprise Services (SASR1R1-AESK9)</b></p> <ul style="list-style-type: none"> <li>• *Legacy – IPX, Appletalk, DecNet, etc</li> <li>• Broadband</li> <li>• L2 &amp; L3 VPN</li> <li>• MPLS</li> <li>• IPv6</li> <li>• ATOM, VPLS</li> <li>• BGP, EIGRP, IGRP, OSPF</li> <li>• PIR</li> <li>• Security, LI</li> <li>• Multicast</li> <li>• SBC</li> <li>• *SSL, SSH</li> <li>• RIP, BGP, OSPF, ISIS</li> <li>• ACL</li> <li>• HSRP/RRRP</li> <li>• NAT</li> <li>• HA: BFD, ISSU</li> <li>• Netflow</li> <li>• QoS, WCCPv2</li> </ul>	<p><b>Optional Features</b></p> <p><b>Cisco ASR 1000 Series Feature Licenses</b></p> <ul style="list-style-type: none"> <li>• SW redundancy</li> <li>• SBC</li> <li>• IPSec</li> <li>• Firewall</li> <li>• Flexible Packet Inspection</li> </ul>
--	--	---	--

# Cisco IOS XE Consolidated SW Packages for Service Providers

<p><b>Cisco ASR1000 Series IP Base w/o Crypto (SASR1R1-IPB)</b></p> <ul style="list-style-type: none"> <li>• RIP, BGP, OSPF, ISIS</li> <li>• ACL</li> <li>• HSRP/RRRP</li> <li>• HA: BFD, ISSU</li> <li>• NAT</li> <li>• Netflow</li> <li>• QoS, WCCPv2</li> </ul>	<p><b>Cisco ASR1000 Series IP Base (SASR1R1-IPBK9)</b></p> <ul style="list-style-type: none"> <li>• *SSL, SSH</li> <li>• RIP, BGP, OSPF, ISIS</li> <li>• ACL</li> <li>• HSRP/RRRP</li> <li>• HA: BFD, ISSU</li> <li>• NAT</li> <li>• Netflow</li> <li>• QoS, WCCPv2</li> </ul>	<p><b>Cisco ASR1000 Series RP1 Advanced IP Services (SASR1R1-AISK9)</b></p> <ul style="list-style-type: none"> <li>• Broadband</li> <li>• L2 &amp; L3 VPN</li> <li>• MPLS</li> <li>• IPv6</li> <li>• ATOM, VPLS</li> <li>• BGP, EIGRP, IGRP, OSPF</li> <li>• PIR</li> <li>• Security, LI</li> <li>• Multicast</li> <li>• SBC</li> <li>• *SSL, SSH</li> <li>• RIP, BGP, OSPF, ISIS</li> <li>• ACL</li> <li>• HSRP/RRRP</li> <li>• HA: BFD, ISSU</li> <li>• NAT</li> <li>• Netflow</li> <li>• QoS, WCCPv2</li> </ul>	<p><b>Optional Features</b></p> <p><b>Cisco ASR 1000 Series Feature Licenses</b></p> <ul style="list-style-type: none"> <li>• SW redundancy</li> <li>• SBC</li> <li>• Full packet inspection</li> <li>• BB subscribers</li> </ul>
--	--	--	---

## ASR 1000 ENT + SP INSERTIONS

### SERVICE PROVIDERS

- High Speed CPE
- Per-user Firewall
- Route Reflector
- Distributed Session Border Controller (DBE)
- Broadband Aggregation

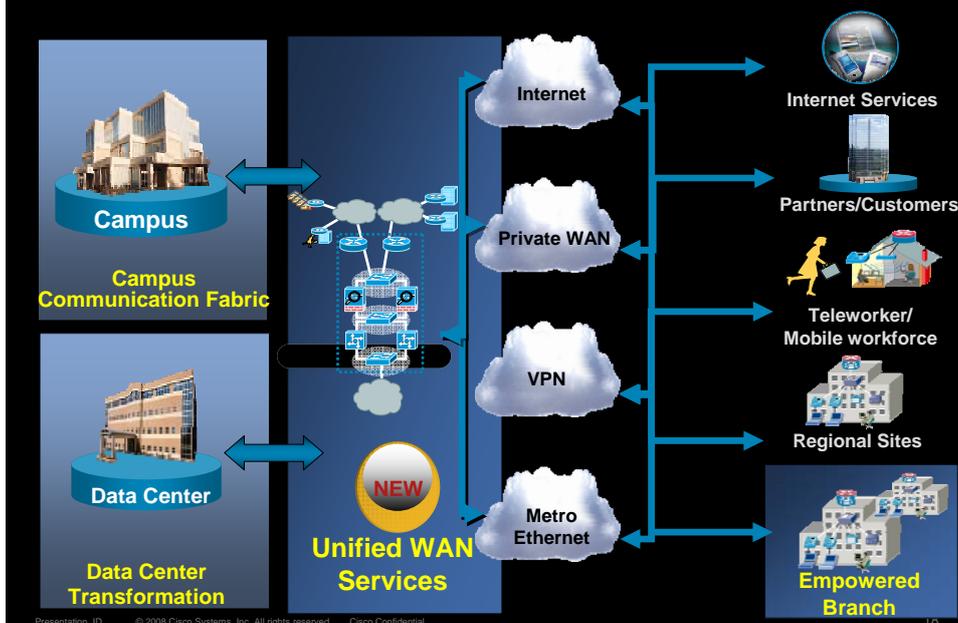
### ENTERPRISE

- WAN Aggregation
- Large IPSec Scale
- Internet Gateway

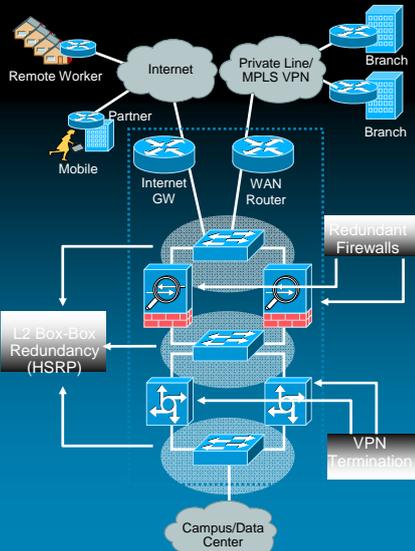
Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

17

## ASR1000: Enterprise Places in the Network



# WAN Edge Transformation



## WAN Edge Functionalities

- WAN Services Aggregation
- Secure Internet Gateway
- Branch Concentration
- Bandwidth/Traffic management
- Metro Ethernet Services

## WAN Edge Challenges

- Bandwidth requirements
- Device interoperability
- Configuration complexity
- Incremental services cost
- Operational complexity and cost

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

19

# Unified WAN Services Framework for the Next Generation WAN

## High-Performance Services

Anytime, everywhere access  
System Scalability  
Embedded Services

## Integrated Security

Network Foundation Protection  
Unified Threat Management  
Encryption Services

In-Service Upgrade  
System Redundancy  
Application Availability

## Non-Stop Communications

Bandwidth Management  
Application Optimization  
Service-level Intelligence

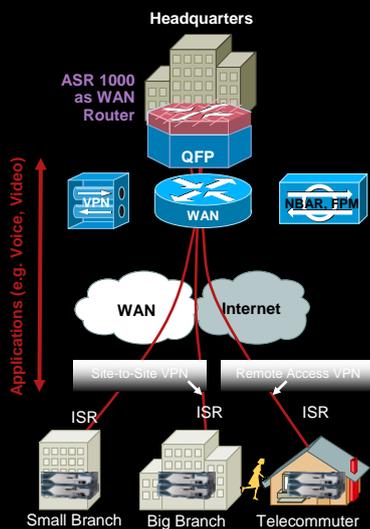
## Application Intelligence

Operational Efficiency  
Consolidation  
Aggregation

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

20

# Multi-service, Secure WAN Aggregation Services



## Business Problem

- Need to readily adapt to new business requirements
- Long qualification time for new deployments
- Need proactive and pervasive integrated security services
- Regulations requiring confidential communications

## ASR 1000 Solution

- w/ ESP-10G: secure, scalable WAN Aggregation router
- **Scalable:** 10K site-to-site and remote tunnels, 3.5G IPsec encryption with services enabled
- **Key Attributes:** IPsec, VPN services, Application Intelligence - NBAR, FPM

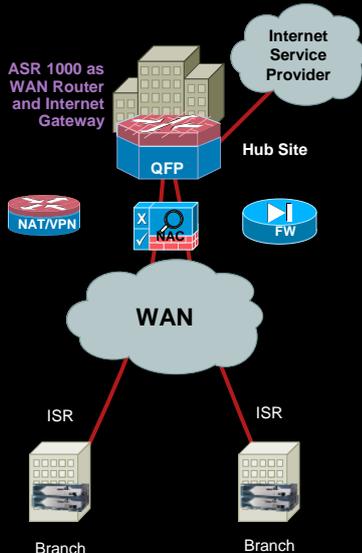
## Benefits

- Scalable solution to meet bandwidth requirements
- Reduced maintenance and lower TCO with one device
- Seamless security with minimal loss in performance
- Flexible architecture for a future proof investment
- Simplified network management and fast deployment

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

21

# WAN Edge Integrated Threat Defense Services



## Business Problem

- Need security, bandwidth management services at WAN edge
- Need efficient network monitoring and planning
- High performance router as internet gateway for the enterprise

## ASR 1000 Solution

- **Integrated security:** 10Gb Firewall, 3.5Gb encryption services, hierarchical QoS services
- **Management/Monitoring:** High-speed Netflow v9 logging, Cisco Security Manager, LAN Mgmt Solution, ERSPAN
- **Key features:** Firewall, NAT, NAC, NBAR, PfR, MPLS VPN, QoS, ACL

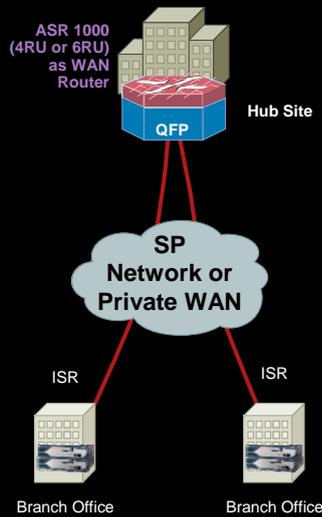
## Benefits

- Wide range of connectivity options (GE/10GE) to the ISP
- Carrier class availability for consistent reliable services
- Simplified network management and fast deployment
- Seamless security with no loss in performance

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

22

# Application Optimization Services



## Business Problem

- Integrate data, voice and video applications to increase WAN functionality and reduce cost
- Ensure performance of high-priority latency-sensitive applications
- Managing internet use policy

## ASR 1000 Solution

- Built-in secure application optimization with NBAR, flexible packet matching
- Hierarchical, scalable classification of applications—very low latency for high-priority applications
- Application integration to increased performance

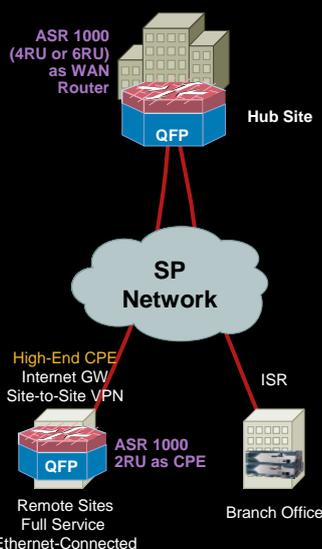
## Benefits

- Prioritize business critical applications
- Improved service delivery and application performance over WAN
- Increased application, resource access—anytime, everywhere

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

23

# High-end CPE for Remote Sites



## Business Problem

- Require full integrated services with higher performance
- Need managed WAN connectivity, security and VPN services

## ASR 1000 Solution

- ASR 1002 with GE/10GE SPA interfaces and redundancy
- Built-in 5Gb/10Gb firewall, NAT, 1.5/3.5Gbps IPSec VPN encryption

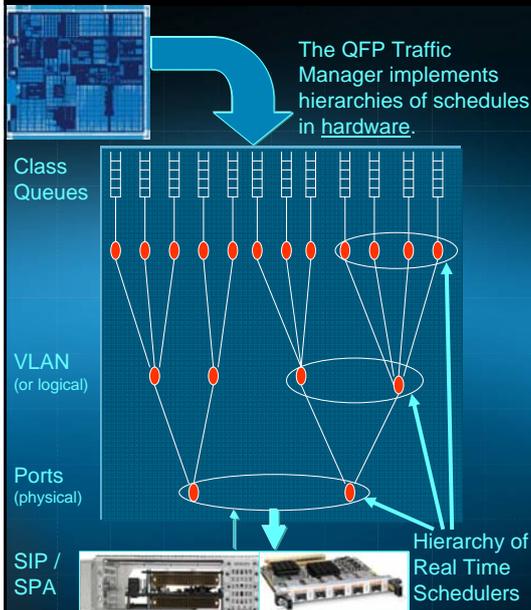
## Benefits

- More bandwidth for applications at a cheaper cost
- Scaleable Services at large branch with high performance
- High performance with features enabled—QoS, NAT, ACLs
- Managed or unmanaged high-end CPE

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

24

## ASR 1000 → Superior Application Availability



### Objective

- Guarantee delivery of High Priority Applications regardless of which features are enabled

### Benefits

- Guarantees High Priority Applications to be forwarded up to entire system BW.
- Clamps an arbitrary collection of Low Priority traffic to a certain BW
- High throughput for Quality of Service features
- Enables queue based operations without a performance hit

### ASR 1000 delivers...

- Flexible Hierarchies
- 128K Queues
  - 2 Priority queues per policy
- Low 10s of usec of latency

## Service Provider Trends Increasing BW needs!

### Video



Integral to nearly every major service experience

### Web 2.0 Collaboration



Increasing dependency of services and applications

### Emerging Services



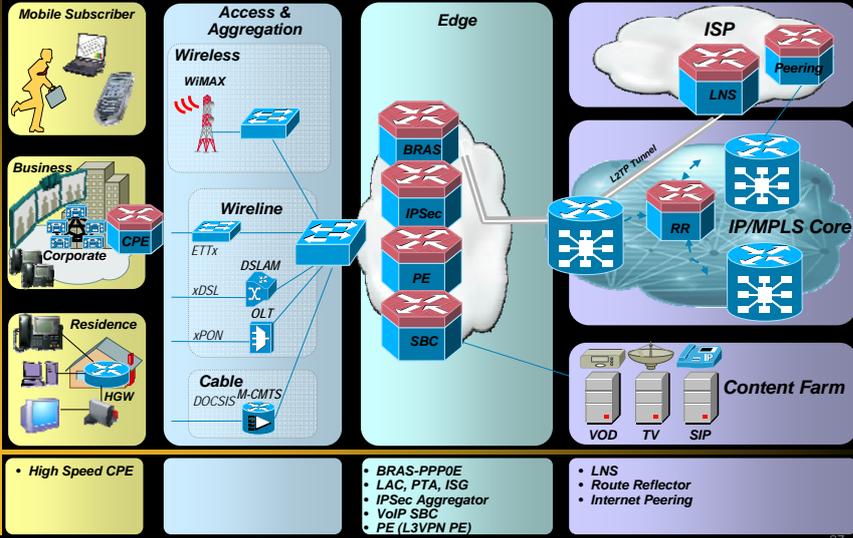
Network Intelligence needed to seize market opportunities

### Cost Efficiencies



CapEx and OpEx not growing as fast as change on networks, power not unlimited

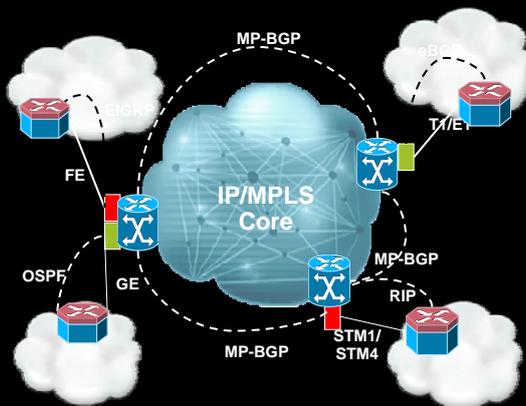
# ASR 1000 in Service Provider IP Next Generation Network



Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

27

# ASR 1000 Series Applications Managed High-Speed CPE



## Solution Objective

- Offer managed L3 VPN connectivity for Enterprise customers

## Solution Benefits

- Support for intranet, extranet, remote access
- Different QoS levels
- End-to-end SLAs & reporting
- Load sharing
- Investment protection via modular design & ESP upgrades
- Upsell services: voice, firewall, multicast

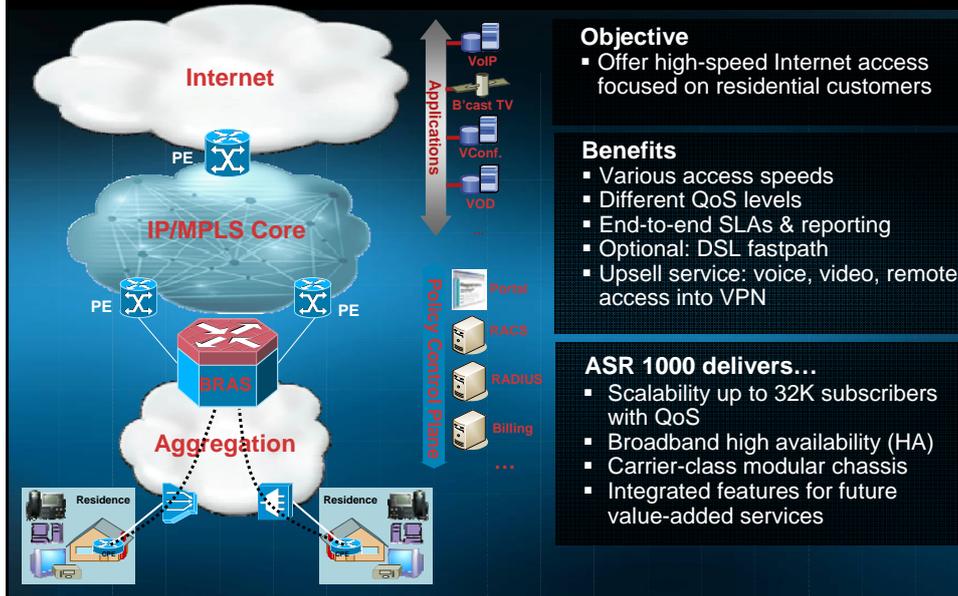
## ASR 1000 delivers...

- Scalable performance up to 10 Gbps
- Up to 10GE/OC48 for HQs
- ASR1002 with 3 SPA slots and 4 built-in GE

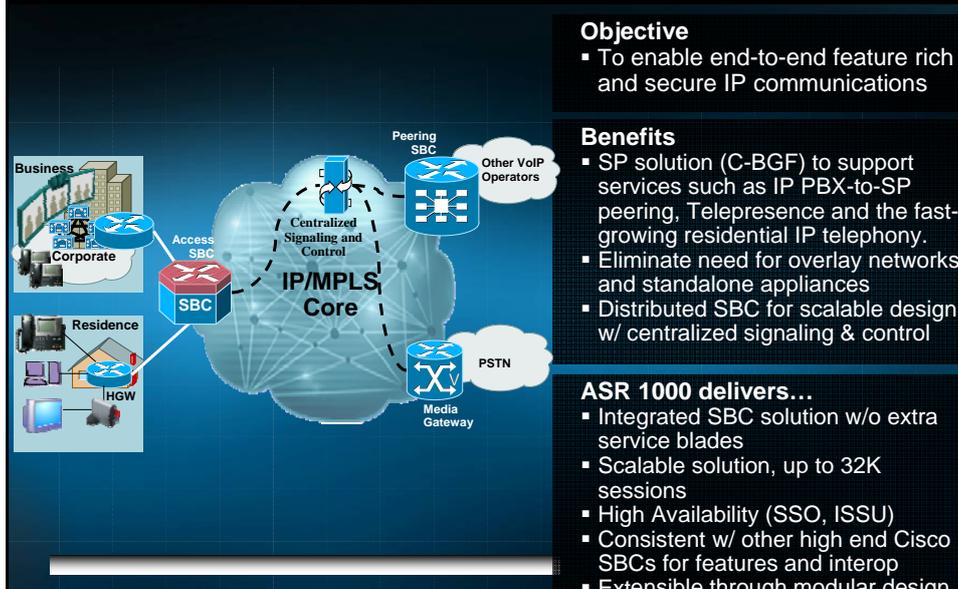
Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

28

## ASR 1000 → Distributed BRAS for PTA



## ASR 1000 → Session Border Controller



# Cisco ASR 1000 Series The Anatomy of Innovation

## High Performance Services

- Instant-on services
- Future-ready provisioning
- Wire-speed secure services
- Reduced IT OpEx and CapEx

## Integrated Security

- Instant-on highly available security services
- Tight integration of routing & security services
- Standards based, certified security services
- Auditable security services

## NonStop Communications

- Rapid failover without service disruption
- In-service maintenance
- Reusable hardware
- Industry first - Dual-image software availability

## Operational Excellence

- Reduced real-estate, power requirement
- Service and device consolidation
- Software redundancy, ISSU for hitless upgrades

## Application Intelligence

- Ensures mission-critical application performance
- Full-circle optimization: Monitor, classify, control
- Meets compliance requirements



Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

31

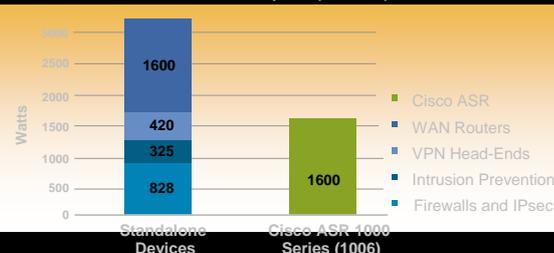
# Delivering Green Efficiency



## ASR 1000 Green Efficiency

- Power savings vs. multiple devices
- Reduced real-estate requirements
- Reduced electronic waste after lifetime
- Remote provisioning eliminates truck rolls

Power Consumption (In Watts)

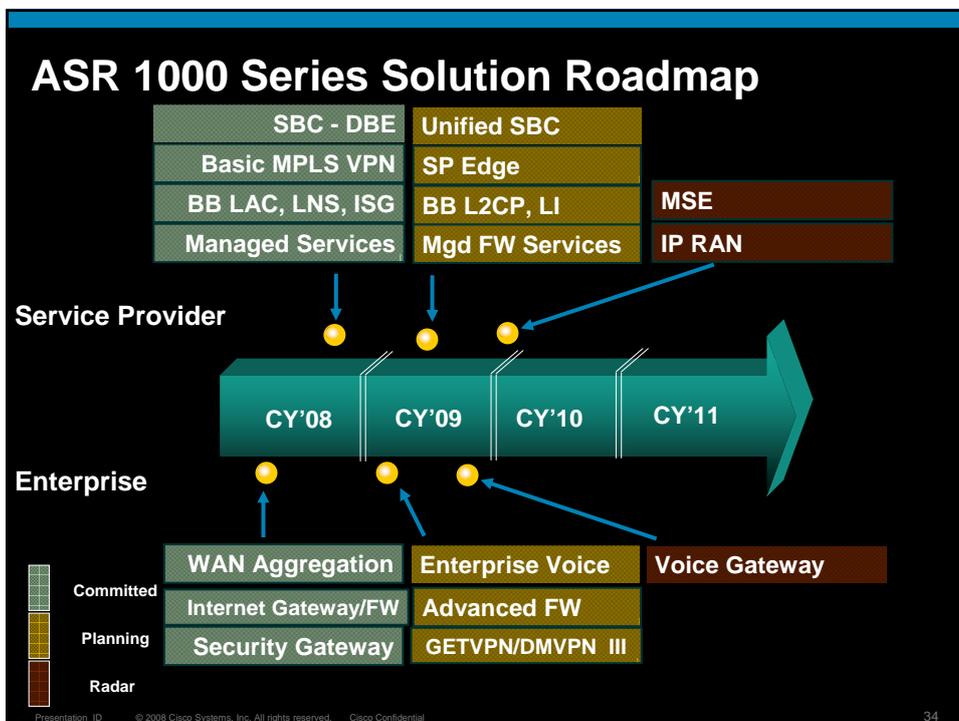
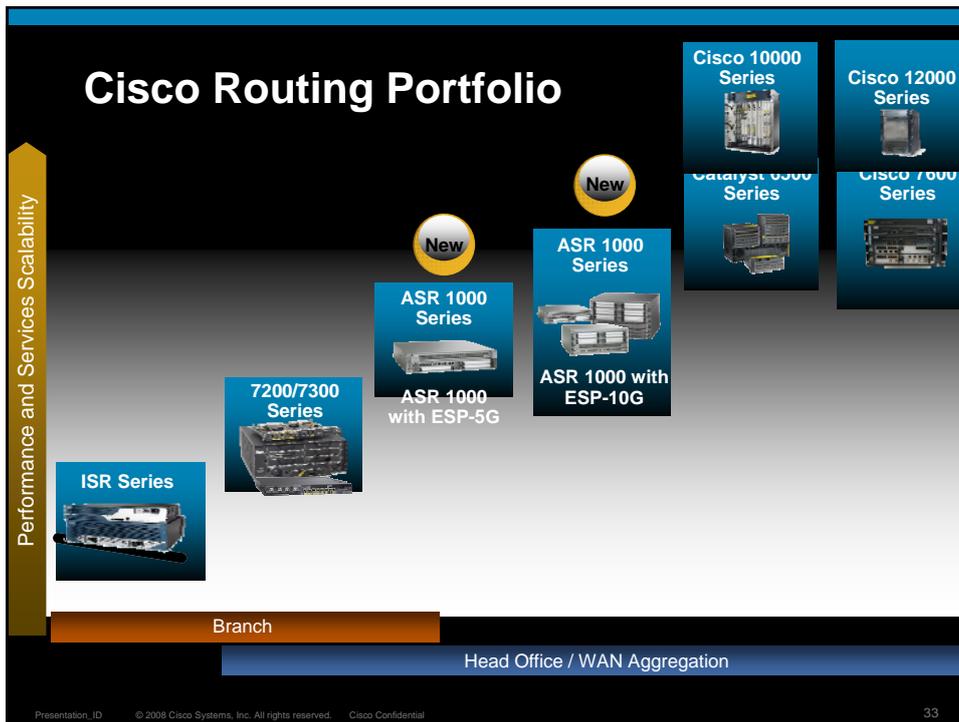


- 2x power efficiency, >10x the performance
- 1,304 gallons of gas saved annually
- ~ \$170K power cost savings over 5-years\*

\* with 20 WAN routers deployed.

Presentation\_ID © 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential

32



## IMPORTANT DATES

- ASR 1004 and ASR 1006 are...  
Orderable NOW with the 10 Gbps Embedded Services Processor

**Started shipping April 2008**

- ASR1002 orderability is targeted for May with a target FCS ~ 4 weeks after order ability

## What Customers Are Saying...



"The ASR 1000 is uniquely positioned to blend a very positive TCO with flexibility and innovation to support not only our current requirements, but **those that we are just beginning to envision**. Scalability, security and reliability are three areas where we look to the ASR 1000 as a ground-breaking platform."

**John Burns, Vice President, Network Architecture and Planning**



"We operate IT systems for our customers that are critical for their core business processes. So non-stop operations is an extremely important issue for us. We are witnessing an increased demand on **highly secure, scalable, and reliable IT infrastructure services**. The Cisco ASR 1000 Series helps us meet those demands. For example, the 'in service software update' feature offers great improvements towards non-stop operations."

**Bardo Werum, VP Cross-Industries and Operation, Lufthansa Systems**



"For Texas Instruments, the Cisco ASR 1000 Series gives us the assurance we need to manage and secure vastly greater traffic flow at our network edge, while enabling us to focus on what we do best - **accelerating the pace of innovation** and serving our customers."

**Brian Bonner, CIO, Texas Instruments**

## Cisco ASR 1000 Series Powered by Cisco QuantumFlow Processor

Massive  
Parallel  
Processing

Customized  
Quality of  
Service

**Technical Benefits**

- 40 independent processors
- 160 threads in parallel
- Services without penalty

**Cisco QuantumFlow Processor**

Advanced  
Memory  
Management

Integrated  
Services and  
Programmability

**Business Benefits**

- High performance embedded services
- User/Application optimization
- Platform longevity

**World's Most Advanced Piece of Networking Silicon**

Presentation\_ID
© 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential
37

## Summary

Cisco transforms and extends the Enterprise WAN & SP Edge

Cisco ASR 1000 Series Routers deliver instant-on, secure, and reliable services

Cisco ASR 1000 Series simplifies operation and delivers increased return on investment

Cisco ASR 1000 Series is part of Cisco TMP + and bundle availability is scheduled for Q2CY08

**ASR 1000 Series Routers  
Services .. without compromise or complexity**

Presentation\_ID
© 2008 Cisco Systems, Inc. All rights reserved. Cisco Confidential
38

