Routing Acesso ao Core

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Systems Engineer
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Platforms Quick Overview

Service-Rich
- End-to-end solutions

One IOS
- IOS features on IOS-XE
- QFP Acceleration

Price-Performance
- 10Mbit/sec-100Gbit/sec
- Figures include services
- Hardware Crypto

Example Use Cases
- Branch
- WAN Aggregation
- Cloud
- Data Center
- Enterprise Edge
- Managed Services

Feature-rich
Interface rich
Hardware Encryption
Multi-core CPUs
Market Transitions

**BYOD**
- IPv6
- Auth/Encrypt
- Cloud Apps
- ISE and 802.1X
- Integrated WLAN and WLC
- High-performing IPv6 with ISR G2 and ASR
- Hardware crypto
- IPv6 transition technology support

**Cloud**
- Workplace Flexibility
- Lean Branch
- Rapid Scalability
- Cloud Connectors
- WAN Optimization
- Private Cloud Enablers – Cloud APIs
- Performance Routing

**Video**
- Smartphone Adoption
- Business Video
- Immersive Video
- Low latency encryption
- Medianet
- Application Visibility and Performance
- DSPs
- Prime Assurance
- Qos
Market Transitions

VDI
Software Capabilities
- Best in class traffic queue handling for bursty traffic
- WAN optimization including Citrix Acceleration
- Ultra low latency GET VPN encryption
- Simplified QoS configuration

Save Costs
Unified Fabric

Internet of things
IPv6
- Ruggedized 819 for remote and mobile applications
- 3G access and LTE for low latency
- IoT-ready with high performing IPv6 and NAT64

Low Power Radio
SCADA/Telemetry

Legal
Closer Connections
- VPN and Suite B
- TrustSec
- VoIP Application Layer Gateways (ALG)
- CUBE
- IOS-XE
- Separated Data Plane

Regulations
Attacks

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<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cloud Connected Framework</td>
<td>Cloud Connectors and Network Services</td>
</tr>
<tr>
<td>Medianet</td>
<td>Works with any video device</td>
</tr>
<tr>
<td>TrustSec</td>
<td>Promotes closer working with partners/suppliers</td>
</tr>
<tr>
<td>Application Visibility and Control</td>
<td>Improves user experience with cloud/DC apps</td>
</tr>
<tr>
<td>Performance Routing</td>
<td>Maintains a good user experience in changing network conditions</td>
</tr>
<tr>
<td>FlexVPN</td>
<td>Simplified, more secure replacement for EasyVPN</td>
</tr>
<tr>
<td>Cisco Prime</td>
<td>End-to-end solution management portfolio</td>
</tr>
</tbody>
</table>
Cloud Enabled Branch

- Application Visibility and Control
- Quality of Service
- WAN Optimization
- Performance Routing
- Medianet
- Collaboration
- Cloud Connectors

Public Cloud
Private Cloud
HQ
Cisco Cloud Connected Portfolio

Cloud-Ready Routing and WAN Optimization Platforms

- **Branch/Remote Sites**
  - WAAS Express
    - ISR G2 (800, 1900, 2900, 3900)
  - WAAS on SRE
  - UCS E Series
  - WAVE
  - WAAS (WAVE 294, 594, 694)

- **Branch/WAN Aggregation/HQ**
  - ASR 1000 (1001, 1002, 1004, 1006, 1013)

- **DC/Cloud**
  - ASR 1000 (with OTV, LISP, etc.)
  - CSR
  - WAAS (WAVE 7541, 7571, 8541), vWAAS

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ISR-ASR Engaged Solutions

Cisco Prime
Reduce risk ■ Adopt new services ■ Easy to integrate

BYOD
WAAS
ScanSafe
FlexVPN
TrustSec

Cloud
Cloud Connectors
(Cloud Storage, HCS, ScanSafe)
WAAS
Application Velocity

Video
Medianet
Performance Routing
Application Velocity
CUBE

VDI
WAAS
GET VPN
Performance Routing

Internet of things
IPv6
NAT 64
Application Velocity

Network Systems
End-to-End Connectivity
Routing
Security
Encryption
Cisco Virtual Office

Integrated Services Router

3900
2951
2911
1941
890
ASR1013
ASR1006
ASR1004
ASR1002-X
880
ASR1002
ASR1001
860VAE
810
Aggregation Services Router

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Secure WAN

Benefits
- QoS Preservation
- Highly Scalable
- Highly Regarded
- Built-In

Technologies
- DMVPN
- GET VPN
- FlexVPN

Compliance
- ISO/IEC CC
- PCI/DSS
- ISO 27K
- FIPS-140-3
- Suite B

Interfaces
- Primary/Backup
  - 3G
  - 4G
  - DSL
  - SONET
  - ATM
  - 10GE
  - Ethernet

Internet
MPLS VPN
DMVPN Hub
GET VPN
Key server
DMVPN, GET VPN
Highly Regarded
Built-In
ISO/IEC CC
PCI/DSS
ISO 27K
FIPS-140-3
Suite B
Highly Scalable
QoS Preservation
Built-In

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Cloud Connectors

- WebEx Connector
- Cloud Storage Connector
- ScanSafe Connector
- HCS Connector
- Custom Connectors

Performance
Security
Availability
Voice and Video Enablement - Medianet

Worry-free Video
Plan
Detect
Solve

Easy to Use
Turn on and forget
Eliminate Probes, Appliances

Future Proof
Works with any video device

Cloud Enabled Branch

Loss/Jitter

Internet
MPLS VPN
Non-Medianet Capable
ISR/ASR
ASR

Business
TP
Events
Medianet
At-a-Glance

Medianet Attributes

Media Awareness
Detection and Optimization of different media and applications

Endpoint Awareness
Automatic detection and configuration

Network Awareness
Automatically respond to changes in devices and service availability

Medianet Functions

Visibility

Diagnostics

Network Assessment

Flow MetaData

Synthetic Traffic

Initiator and Requester

Responder

Jitter/Packet loss

Performance Monitoring

Netflow

SNMP

Syslog

IPSLA

Video Operations

Medianet Attributes
Collaboration

Supports modern collaboration requirements
Voice, immersive and non-immersive videoconferencing support
Ability to manipulate (replicate) media streams for recording
Site-to-site and business-to-business telepresence support

Extremely high quality audio and video
DSP ‘Acoustic shock protection’ and noise reduction features that software-based communications platforms can not support
Ability to transcode voice and HD video
Layer 4 (non-app-aware)
Overall Internet usage from a large university in the US
Layer 7 Inspection
Overall Internet usage from a large university in the US
Better Application Performance
Application Visibility and Control (AVC)

Prime Assurance Manager
- Metric correlation
- End-to-end Latency View
- Understands WAAS

Cloud Enabled Branch

Branch
- 5ms

WAN Aggregation
- 50ms

Enterprise Edge
- 10ms

Internet
- 100ms

Server
- 200ms
Better Application Performance
Dynamic Routing – AVC with Performance Routing (PfR)

- Dynamically influence routing – before users even detect faults

**Improves Performance**
- Media- and Application-Aware Routing

**Improves Reliability**
- High availability for DC and Cloud apps
- Active probes for fast response

**WAN Cost Reduction**
- DSL/3G/4G

Cloud Enabled Branch

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Performance Routing (PfR) Examples
Protecting Critical Applications

Internet
- Cloud Service
- Best Effort traffic
- Detect loss > 10%
- ISP-1 (Primary)
- ISP-2 (Secondary)
- Cloud Service and Load Balancing Policy
  - Protect business Cloud applications from Internet brownout, Loss <10%
  - Cloud Service preferred path – ISP1
  - Maximize all ISP bandwidth by load sharing all other Internet traffic

WAN
- Voice/Video
- VDI
- Best Effort traffic
- SP-A (MPLS VPN)
- SP-B (MPLS VPN)
- Multimedia and Critical Data Policy
  - Protect voice and video quality, Latency < 200ms; Jitter < 30ms
  - Protect VDI applications from brownouts, i.e. Loss < 5%
  - Voice & Video preferred path SP-A
  - VDI preferred path SP-B
  - Maximize utilization by load sharing
Better Application Performance
WAN Optimization and Application Velocity

**Easy Branch Deployment**
- Just add an SRE card
- WAAS Express for small branches

**VDI**
- Citrix Acceleration (only product on the market)

**Works with AVC, QoS**
- Prime Assurance Manager compatible

Cloud Enabled Branch

SRE with WAAS (or WAAS Express)

ISR

ASR

WAE

MPLS

VPN

Internet
WAN Optimization
Example Deployment Scenario

**DC options**
WAAS appliance connects to ASR 1000 using WCCPv2 with no changes to the network
Virtual WAAS (vWAAS) also possible on VM

**Branch options**
WAAS on SRE is the ideal option for branches
Alternative: WAAS Express runs in IOS and is good for branches with less traffic and have already been deployed
For large branches, an external WAE appliance can be used
Quality of Service

### Cisco Benefits
- QoS preservation in Overload
- No performance loss during failover
- Natively support features – no Q-cards!
- Undisputed leader in QoS and Multicast

### Cisco Features
- Multiple Dynamic Input Queues
- Overload Priority Packet handling
- >200k Hardware Output Queues
- Native H-QoS

### Other Vendors
- Cost-cutting: Input queuing
- Simplistic Overload packet drop
- Simplistic Scheduling Hardware
- No per-VLAN QoS

### Low Cost Implementations
- Random Early Discarding
  - Packet marking + classification
  - Packet Forwarding
  - Output Interfaces
  - Input Interface
  - High-Pri
  - Low-Pri
IPv6 Readiness

IPv6 Technologies
All Transition Technologies are supported – including Stateful NAT64

IPv6 Enabled Features
Most features support IPv6 today
Cisco IPv6 Roadmap is industry-leading

High Performance
ISR G2 and ASR 1000 are designed for IPv6 Routing with Features

Branch
ISR
IPv4
WAN Aggregation
Dual Stack
Tunnel
Dual Stack
Translate
HQ
Enterprise Edge
DC
Simplified Network Management

- Simplify
- Integrate
- Reduce Costs

- Single Prime portfolio
  - No complex CLI to learn

- Standard Interfaces
  - XML and web protocols

- Pre-tested configs
  - Branch templates
  - Low-risk

- Readiness Assessments
  - IP SLA VO
  - PfR Reporting Mode
Summary

End-to-End solutions are Key Differentiators

Address market transitions
Scalable (single router in branch)
Pre-tested, best practice
Other vendor’s can’t offer such E2E solutions

Reliable and Easy to Use

Highly regarded core routing, security and encryption features
Deployment guides
Cisco Prime

Not Possible with Appliances

Appliances fail to deliver
- Reliability, QoS under congestion
- Ease of use
ISR+ASR BN features combine
- AVC+PfR, PAM+WAAS, etc
ISR+ASR+services
- Reduced TCO, Improved reliability + QoS,
  Centralized Management
Cisco Branch Platform Portfolio

- 2900 (2RU, 35M–75M)
- 3900(E) (3RU, 100M–350M)
- ISR 4451-X (2 RU, 1G–2G)
- ASR1001 (2.5G–5G)
- ASR1002-X (5G–36G)
Cisco 800 Fixed ISR Portfolio

- Price, Performance
- Enhanced Performance
- Improved Security
- Basic Connectivity & Security

Features, Scalability, Availability

- C890 Series
  - Two Primary WAN interfaces
  - Multimode ADSL2+/VDSL2
  - G.SHDSL with EFM and ATM
  - Enterprise-Class WLAN
  - Advanced IP Services IOS Features

- C880 Series
  - Enterprise Class 3G/4G
  - Multimode ADSL2+/VDSL2
  - G.SHDSL with EFM and ATM
  - Enterprise-Class WLAN
  - Advanced IP Services IOS Features

- 860VAE Series
  - Multiple WAN options (GE, ADSL2+/VDSL2)
  - Consumer grade WLAN
  - Advanced Security or IP Base IOS Features
Cisco 800 Series

Integrated Services Routers

Secure Mobility Platform

- Very small offices, Cisco Virtual Office (teleworkers)
- Up to 15 Mbps WAN Access with Security
- Integrated 3G + VDSL on 880 platforms
- Fixed configurations:
  
  Pick your:
  
  1. WAN interface(s)
  2. 802.11 Wireless (Y/N)
  3. SRST* (Y/N)
  4. Backup Interface

<table>
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<th>880G</th>
<th>880</th>
<th>860</th>
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<td>V.92 modem or ISDN BRI</td>
<td>✓</td>
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<td>3G or ext. modem</td>
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<tr>
<td>ISDN BRI or ext. modem</td>
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<td>ext. modem</td>
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## Cisco 800 Series Overview

<table>
<thead>
<tr>
<th>Feature</th>
<th>860VAE</th>
<th>880/880G</th>
<th>880V</th>
<th>890</th>
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<tbody>
<tr>
<td>GE WAN</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>SFP</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes (892F/892F-SP)</td>
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<td>FE WAN</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>VDSL2</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>ADSL2/2+</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>G.SHDSL</td>
<td>No</td>
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<td>No</td>
<td>No</td>
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<tr>
<td>Data Backup</td>
<td>No</td>
<td>ISDN BRI, HSPA+</td>
<td>No</td>
<td>ISDN BRI, V.92</td>
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<tr>
<td>PSTN Interconnect</td>
<td>No</td>
<td>No</td>
<td>FXO or BRI Voice</td>
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<td>FXS Ports</td>
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<td>802.11n</td>
<td>2.4 GHz (Future)</td>
<td>2.4 GHz, 5 GHz</td>
<td>2.4 GHz</td>
<td>2.4 GHz, 5 GHz</td>
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<tr>
<td>SRST, CUBE, CUCME</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
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### Cisco 800 Series Overview (Cont.)

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<tr>
<th>Feature</th>
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<th>880/880G</th>
<th>880Voice</th>
<th>890</th>
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<tbody>
<tr>
<td>Managed 10/100/1000 Switch Ports</td>
<td>4 + 1GE (W 3FE + 2GE)</td>
<td>4</td>
<td>4</td>
<td>8GE</td>
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<tr>
<td>VLANs (Wired and Wireless)</td>
<td>5</td>
<td>8</td>
<td>8</td>
<td>14</td>
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<tr>
<td>Hardware-Based IPsec Encryption</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Flash</td>
<td>128M</td>
<td>128M</td>
<td>256M</td>
<td>256M</td>
</tr>
<tr>
<td>DRAM (Standard/Maximum)</td>
<td>256M/512MB</td>
<td>256M/768M</td>
<td>512M/768M</td>
<td>1G</td>
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<tr>
<td>(Select Models Only)</td>
<td></td>
<td>512M/1G</td>
<td></td>
<td></td>
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<tr>
<td>DSP</td>
<td>No</td>
<td>No</td>
<td>1 (PVDM2-16)</td>
<td>No</td>
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<tr>
<td>Internal PoE Option</td>
<td>1 Port (Future)</td>
<td>2 Ports</td>
<td>2 Ports</td>
<td>4 Ports</td>
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<td>USB Ports</td>
<td>No</td>
<td>1 (USB 1.1)</td>
<td>1 (USB 1.1)</td>
<td>2 (USB 2.0)</td>
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<td>Wireless Features</td>
<td>Future</td>
<td>Autonomous, Unified</td>
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<tr>
<td>Security Features</td>
<td>Basic</td>
<td>Advanced</td>
<td>Advanced</td>
<td>Advanced</td>
</tr>
</tbody>
</table>
C890 Series

C892F-SP
C898EA

- Universal data CPE
- Multi-mode ATM and EFM WAN
- SFP/GE WAN for GPON
- 4 + 4 GE LAN ports (4 port PoE)

C896VA
C897VAW

- Universal data CPE
- Multi-mode VDSL2/ADSL2 + Annex A, B, M
- SFP/GE WAN for GPON
- 4 + 4 GE LAN ports (4 port PoE)
- Dual concurrent WiFi 802.11n
- Clean Air features
The Cisco ISR 819 M2M Gateway

**Compact**

Industry’s Most Compact Hardened M2M Gateway with Dual SIM

**Hardened**

Built for challenging environment – shock/vibe, humidity, splash water, temperature, dust

**Services-Rich**

IOS-Based – ISR Compatible, Secure native SMS Gateway with GPS Support

**BENEFITS:**

- Increased revenue with new business models
- Greater efficiency with remote real-time monitoring with existing management
- Flexible operations with ease of installation/deployment and lower TCO

Cisco ISR 819

- 4G-LTE
- Mobile IP and IPv6 Ready
Cisco ISR 819 Machine-to-Machine Gateway

Rich IOS Capabilities

- Integrated Security (Cloud, VPN, IPS)
- WAN Optimization ready
- Medianet ready

Comprehensive Management Capabilities

- Cisco Prime
- Cellular Management (3G, SMS)
Use Cases Across Verticals for M2M Services

Financial: ATM/POS/Vending
- Installation of ATMs with wireless backhauls
- Video surveillance from ATMs
- Emerging market with no wired infrastructure

Transportation
- Access to corporate applications
- Connect roadside equipment
- Remote camera integration
- Mobile applications

Industrial Automation
- Remote telemetry
- Utilities
- Process control
- Road transportation
- New service and business models

Tele-Healthcare
- Remote monitoring of patients
- Personal emergency response system
- Triage
## Cisco 1900 Series

### Integrated Services Routers

<table>
<thead>
<tr>
<th></th>
<th>1941W</th>
<th>1941</th>
<th>1921</th>
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<tbody>
<tr>
<td>SM Slots</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ISM Slots</td>
<td>Fixed 802.11n Radio</td>
<td>1</td>
<td>0</td>
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<tr>
<td>EHWIC Slots</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Onboard WAN Ports</td>
<td>2 GE</td>
<td>2 GE</td>
<td>2 GE</td>
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<tr>
<td>Onboard DSP Slots</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Default Flash</td>
<td>256 MB</td>
<td>256 MB</td>
<td>256MB</td>
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<tr>
<td>Default DRAM</td>
<td>512 MB</td>
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<td>Form Factor</td>
<td>2RU</td>
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<tr>
<td>PoE</td>
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<td>External</td>
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### 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

<table>
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<td>Onboard DSP Slots</td>
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<td>2</td>
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<tr>
<td>Onboard WAN Ports</td>
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<td>3 GE (1 SFP)</td>
<td>3 GE</td>
<td>2 GE</td>
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<td>Default Flash</td>
<td>256 MB</td>
<td>256 MB</td>
<td>256 MB</td>
<td>256 MB</td>
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<tr>
<td>Default DRAM</td>
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<td>512 MB</td>
<td>512 MB</td>
<td>512 MB</td>
</tr>
<tr>
<td>Form Factor</td>
<td>2RU</td>
<td>2RU</td>
<td>2RU</td>
<td>1RU</td>
</tr>
</tbody>
</table>

### 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

<table>
<thead>
<tr>
<th>Feature</th>
<th>3945E</th>
<th>3925E</th>
<th>3945</th>
<th>3925</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Upgradeable Motherboards</td>
<td>SPE-250</td>
<td>SPE-200</td>
<td>SPE-150</td>
<td>SPE-100</td>
</tr>
<tr>
<td>Onboard WAN</td>
<td>4GE (2 SFP)</td>
<td>4GE (2 SFP)</td>
<td>3GE (2 SFP)</td>
<td>3GE (2 SFP)</td>
</tr>
<tr>
<td>Perf w/ Services</td>
<td>350 Mbps</td>
<td>250 Mbps</td>
<td>150 Mbps</td>
<td>100 Mbps</td>
</tr>
<tr>
<td>SM Slots</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>ISM Slots</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>EHWIC Slots</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Onboard DSP Slots</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Opt Dual PS</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Default Flash</td>
<td>256MB</td>
<td>256MB</td>
<td>256MB</td>
<td>256MB</td>
</tr>
<tr>
<td>Default DRAM</td>
<td>1 GB</td>
<td>1 GB</td>
<td>1 GB</td>
<td>1 GB</td>
</tr>
<tr>
<td>Form Factor</td>
<td>3RU</td>
<td>3RU</td>
<td>3RU</td>
<td>3RU</td>
</tr>
</tbody>
</table>

### Scalable Rich-media Services Platform

**New Services Performance Engine 200s:**
- Up To 350Mbps WAN Access With Services
- 4 GE ports onboard

**All 3900 Series:**
- Up to 1040 watts with PoE Boost
- Configurable dual Integrated Redundant Power supplies
- Hot swappable fans and power supply
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
Platform Module Slot Evolution

WIC
Supports VIC, VWIC

NM

AIM
Supports VIC, VWIC

Platform Module Slot Evolution

HWIC
Supports WIC, VWIC, VIC

NME, EVM
Supports NM, NME-X, NME-XD

AIM
PVDM2

EHWIC
Supports HWIC WIC, VIC & VWIC

SM
Supports NM, NME & EVM via Adapter card

ISM
PVDM3
Supports PVDM2 via Adapter Card

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
Cisco ISR G2, The Branch Work Horse
The Market’s Most Widely Deployed Branch Device

- Cisco IOS Firewall
- Embedded switch
- Cisco Unified Communications
- Multi Gigabit Fabric
- Cisco VPN/IPSec/Remote Access
- WAN termination
- Modular motherboard
- Mission-Critical applications
- Cisco vWAAS
- Cisco vWLC
- Cisco VSM
- Switching with PoE

All-in-One Device for Branch Services

- WAN Optimization
- Wireless LAN/WAN
- Routing/Switching
- Application Hosting
- Unified Communications
- Security
IOS Software Packaging Evolution Summary

**PAST**

- Advanced Enterprise Services
- Advanced IP Services
- Enterprise Services
- Adv. Security
- SP Services
- Ent. Base
- IP Voice
- IP Base

**Actual**

- Universal Image
  - Security
  - U.C.
  - Data
  - IP Base

- **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
4G/LTE for ISR news 2014
SMB/Retail/Branch/Enterprise - During 2014

Cisco 89X
- C899G-LTE-GA-K9
- C896VAG-LTE-GA-K9
- C897VAG-LTE-GA-K9
- C898EAG-LTE-GA-K9
- C897VAMG-LTE-GA-K9

4G LTE NIM for 4400
- NIM-4G-LTE-GA

Cisco 887 & Cisco 881
- C887G-4G-GA-K9
- C881G-4G-GA-K9
Redefining Branch Routing
Unprecedented Performance and Service Scalability with IT Simplicity

Appliance-level Services Performance

- 1-2 Gbps Performance
- Separate Services Planes for Continuity
- Pay-As-You-Grow Model
- No Disruptions or Truck Rolls

Simplified Service Integration

- Ease of L2-L7 Service Deployment
- Native, Full-featured WAN Optimization
- Security with Application Visibility
- Application Service Assurance

Cisco ISR 4451-X
The Ultimate ISR with Application Experience
Best of Interop Networking Winner! – Cisco ISR 4451-X Converged Branch Infrastructure

ISR 4451-X with UCSE & SM-X ES3 Switch module

“The 4451-X is poised to address the gap between networking functions that are fully virtualized and those that are still embedded in dedicated networking devices … transforming a product line that began as a way to connect remote sites to corporate networks and the Internet into a small-scale data center in a box.”

Kurt Marko, Best of Interop Judge
IT Operational Simplicity

**On-demand Deployment**
- 1 Gbps
- 2 Gbps

**Ease of Mgmt and Provisioning**
- Elastic Services and Performance
- No Service Disruption or Truck Rolls
- Standardize on one platform
- Simplified provisioning
- App visibility with Cisco or 3rd parties
- Infrastructure Visibility for health monitoring and rapid resolution

**Programmable and Automated**
- SDN Ready
- Ease of Configuration and Deployment via onePK

**All-in-One-Box Simplified Application Integration**
USB Connections
- 2 x Type A for file storage and charging your cell phone
- USB Type B Console in addition to RJ45 Console and Aux ports

Front Panel GE
- 4 RJ45/SFP GE Interfaces
- PoE available on 2 Interfaces

Management Interface
Connects control plane directly to a management network.

Network Interface Modules (NIM)
- Larger & more powerful than EHWICs
- Up to 8 ports per module
- DSPs directly on modules

Optional Drive NIM for Embedded Applications
- RAID 1 for data protection
- Single HD (future) & Dual SSD Options

Enhanced Service Modules
- Compatible with ISR G2
- Up to 10Gb connection to system
- Faster & more powerful than SMs
# Available 4451-X Modules

<table>
<thead>
<tr>
<th>Interface Type</th>
<th>Form Factor</th>
<th>Supported in Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,2,4,8 port T1/E1 &amp; DSP</td>
<td>NIM</td>
<td>3.10</td>
</tr>
<tr>
<td>1 port T3/E3</td>
<td>SM-X</td>
<td>3.10</td>
</tr>
<tr>
<td>1, 2 &amp; 4 port Synchronous Serial</td>
<td>NIM</td>
<td>3.12</td>
</tr>
<tr>
<td>UCS E-Series M2 (Ivy Bridge)</td>
<td>SM-X</td>
<td>3.12</td>
</tr>
<tr>
<td>Disk carrier card (SSD)</td>
<td>NIM</td>
<td>3.10</td>
</tr>
<tr>
<td>16, 24 &amp; 48 port L2/L3 Switch</td>
<td>SM-X</td>
<td>3.11</td>
</tr>
<tr>
<td>6 port GE/SFP</td>
<td>SM-X</td>
<td>3.11</td>
</tr>
</tbody>
</table>

For Your Reference

- Next generation 16 & 24 port L2/L3 Switch
- 1,2,4,8 port T1/E1 & DSP
- XEON E3&E5 UCS E-Series
- 6 port GE/SFP Routed ports
Operational Simplification and Manageability

Application Visibility and Control
- NBAR2
- Medianet (Media Monitoring)
- QoS
- PfR (Intelligent Path Selection)

ISR-WAAS
- Application Acceleration
- TCP Compression
- Data Redundancy Elimination

Security
- VPN Encryption
- IOS Firewall
- Intrusion Prevention

Hardware for ISR-AX
- Hard Drive NIM
- Option to extend WAAS capacity on UCS-E Series Server

ISR 4451-X The Purpose Built Application Delivery Platform - Ultimate Application Experience
ISR 4451-X: Packaging/License Model

- High Security
- Application Experience
- Unified Collaboration
- Performance
ASR 1000
Cisco ASR 1000 Series Routers: Overview
2.5 Gbps to 200Gbps- Available Today

<table>
<thead>
<tr>
<th>Compact, Powerful Router</th>
<th>Business-Critical Resiliency</th>
<th>Instant On Service Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ Line-rate performance 2.5G to 200G</td>
<td>▪ Fully separated control and forwarding planes</td>
<td>▪ Scalable on-chip service enablement through software licensing</td>
</tr>
<tr>
<td>▪ Investment protection with modular engines, IOS CLI and SPAs for I/O</td>
<td>▪ Hardware and software redundancy</td>
<td>▪ Industry leading VPN/Crypto solutions</td>
</tr>
<tr>
<td>▪ Hardware assists for ACL, HQoS, etc.</td>
<td>▪ In-service software upgrades</td>
<td>▪ Optimal user/app experience with AVC, PfR, and AppNav</td>
</tr>
<tr>
<td>▪ Hardware-based QoS engine with up to 464K queues</td>
<td>▪ Inter and Intra-chassis redundancy</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ASR 1001</th>
<th>ASR 1001-X</th>
<th>ASR 1002-X</th>
<th>ASR 1004</th>
<th>ASR 1006</th>
<th>ASR 1013</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="ASR 1001" /></td>
<td><img src="image2" alt="ASR 1001-X" /></td>
<td><img src="image3" alt="ASR 1002-X" /></td>
<td><img src="image4" alt="ASR 1004" /></td>
<td><img src="image5" alt="ASR 1006" /></td>
<td><img src="image6" alt="ASR 1013" /></td>
</tr>
<tr>
<td>2.5-5 Gbps</td>
<td>2.5-20 Gbps</td>
<td>5-36 Gbps</td>
<td>10-40 Gbps</td>
<td>10-100 Gbps</td>
<td>10-200 Gbps</td>
</tr>
</tbody>
</table>
Cisco Edge Routing Portfolio
Innovative Services to address Enterprise and select SP Use Cases

Performance, Scalability, Availability

200 Gbps

100 Gbps

40 Gbps

20 Gbps

I/O on Demand/Scale
2x10G
1xNGWIC
1xSPA
8G Crypto
ESP 2.5-20

Higher Throughput/QoS/ACL, Better Clocking, Flexible I/O
3xSPAs, 4G Crypto, ESP 5-36

Modularity, Higher I/O Scale/Crypto
8xSPA
13G Crypto
ESP 10-40

Higher Throughput/ I/O Scale/Crypto
HW HA/ISSU

12xSPA
29G Crypto
6M FW/NAT
ESP 100-100

24xSPAs
78G Crypto
6M FW/NAT
ESP 40-100-200

Higher Throughput/ I/O
Scale/Crypto
HW HA/ISSU

I/O on Demand/Scale
2x10G
1xNGWIC
1xSPA
8G Crypto
ESP 2.5-20

Higher Throughput, Better Clocking, Flexible I/O
3xSPAs, 4G Crypto, ESP 5-36

8xSPA
13G Crypto
ESP 10-40

12xSPA
29G Crypto
6M FW/NAT
ESP 100-100

24xSPAs
78G Crypto
6M FW/NAT
ESP 40-100-200

ASR 1001-X

ASR 1002-X

ASR 1004

ASR 1006

ASR 1013

Optimized Application and User Experience

Innovative Services to enable iWAN, DCI, SP Wif-Fi and Broadband
## ASR1002-X

- Next Generation ASR1002

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
</table>
| **Chassis & HW** | • 2RU form factor  
• Integrated RP, ESP & SIP  
• Redundant AC/DC PSU, same as ASR1002 |
| **System BW**   | • 5G, 10G, 20G, 36G, via software upgrade |
| **Performance** | • Up to 32 Mpps |
| **Crypto BW**   | • 4Gbps (8Gbps option in a future release) |
| **Control Plane** | • Quad-core @2.13GHz processor  
• 4/8/16 GB Memory Options |
| **Data Plane**  | • Integrated ESP with SW selectable BW from 5G to 36G |
| **I/O**         | • 3 SPA bays + 6 built-inGE ports (SyncE capable)  
• Console / MGMT Ethernet / Aux  
• External USB storage  
• Optional HDD (160GB) |
| **FW/NAT**      | • 36G FW/NAT, 2 M sessions |
| **Network Timing** | • Stratum 3/G.813 Clocking, BITS timing, GPS, SyncE, 1588 |
| **Image Security** | • Secure boot  
• Code Signing (FIPS-140-3) |

- Up to 4X Performance of ASR1002
- One IOS-XE Feature Set
- NSA “Suite-B” Security
## ASR1001-X

- **Next Generation ASR1001**

<table>
<thead>
<tr>
<th>Category</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chassis &amp; HW</strong></td>
<td>1RU form factor</td>
</tr>
<tr>
<td></td>
<td>Integrated RP, ESP &amp; SIP</td>
</tr>
<tr>
<td></td>
<td>Redundant AC/DC PSU</td>
</tr>
<tr>
<td><strong>System BW</strong></td>
<td>2.5G, 5G, 10G &amp; 20G via software upgrade</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td>Up to 17 Mpps</td>
</tr>
<tr>
<td><strong>Crypto BW</strong></td>
<td>8Gbps (1400 bytes), 5Gbps (IMIX)</td>
</tr>
<tr>
<td><strong>Control Plane</strong></td>
<td>Quad-core @2 GHz processor</td>
</tr>
<tr>
<td></td>
<td>8G (Default) /16 GB Memory Upgrade Option</td>
</tr>
<tr>
<td><strong>Data Plane</strong></td>
<td>Integrated ESP with SW selectable BW from 2.5G to 20G</td>
</tr>
<tr>
<td><strong>I/O</strong></td>
<td>1 SPA bays + 1 NIM (same as ISR4451-X)</td>
</tr>
<tr>
<td></td>
<td>Built-in 6 x GE ports + 2 x 10GE ports (SyncE capable)</td>
</tr>
<tr>
<td></td>
<td>Console / MGMT Ethernet / Aux</td>
</tr>
<tr>
<td></td>
<td>External USB storage</td>
</tr>
<tr>
<td></td>
<td>Optional HDD (2x200GB SSD)</td>
</tr>
<tr>
<td><strong>FW/NAT</strong></td>
<td>20G FW/NAT, 2 M FW/NAT sessions</td>
</tr>
</tbody>
</table>

*Get a closer look and talk to the ARS1001-X experts in the World of Solutions*
ASR1000 purpose built for Services

SPA Interface Processor
Shared Port Adapters provide interface connectivity
10 or 40 Gbps aggregate
Half or full height

ESP (Embedded Services Processor)
Handles forwarding plane traffic

RP (Route Processor)
Handles control plane traffic
Manages system

Centralized Forwarding Architecture
All traffic flows through the active ESP, synchronized with standby ESP
Feature consistency
# ASR1001 - Capability Comparison

<table>
<thead>
<tr>
<th>Platform</th>
<th>ASR4451-X</th>
<th>ASR1001</th>
<th>ASR1001-X</th>
<th>ASR1002-X</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAYG Bandwidth</td>
<td>1-2G</td>
<td>2.5-5G</td>
<td>2.5-20G</td>
<td>5-36G</td>
</tr>
<tr>
<td>Built-in I/O</td>
<td>4x1GE</td>
<td>4x1GE</td>
<td>6x1GE; 2x10GE</td>
<td>6x1GE</td>
</tr>
<tr>
<td>Extensible I/O</td>
<td>3XNIM,2XSM</td>
<td>1x SPA</td>
<td>1x SPA, 1x NIM</td>
<td>3x SPA</td>
</tr>
<tr>
<td>Encryption Throughput</td>
<td>1.4G(IMIX)</td>
<td>1G (IMIX)</td>
<td>5G (IMIX)</td>
<td>4G (IMIX)</td>
</tr>
<tr>
<td>High Availability</td>
<td>No</td>
<td>Yes</td>
<td>Yes (Redundant IOS)</td>
<td>Yes (Redundant IOS)</td>
</tr>
</tbody>
</table>
## Embedded Services Processors (ESP)

- Based on Quantum Flow Processor (QFP)

<table>
<thead>
<tr>
<th></th>
<th>ESP-2.5G</th>
<th>ESP-5G</th>
<th>ESP-10G</th>
<th>ESP-20G</th>
<th>ASR1001-X ESP</th>
<th>ASR1002-X ESP</th>
<th>ESP-40G</th>
<th>ESP-100G</th>
<th>ESP-200G</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>System Bandwidth</strong></td>
<td>2.5 Gbps</td>
<td>5 Gbps</td>
<td>10 Gbps</td>
<td>20 Gbps</td>
<td>2.5/5/10/20 Gbps</td>
<td>5/10/20/36 Gbps</td>
<td>40 Gbps</td>
<td>100 Gbps</td>
<td>200 Gbps</td>
</tr>
<tr>
<td><strong>Performance</strong></td>
<td>3 Mpps</td>
<td>8 Mpps</td>
<td>17 Mpps</td>
<td>24 Mpps</td>
<td>17 Mpps</td>
<td>30 Mpps</td>
<td>24 Mpps</td>
<td>58 Mpps</td>
<td>130 Mpps</td>
</tr>
<tr>
<td><strong>Crypto Engine BW</strong></td>
<td>1 Gbps</td>
<td>1.8 Gbps</td>
<td>4.4 Gbps</td>
<td>8.5 Gbps</td>
<td>8 Gbps</td>
<td>4 Gbps</td>
<td>11 Gbps</td>
<td>29 Gbps</td>
<td>78 Gbps</td>
</tr>
<tr>
<td><strong>Control CPU</strong></td>
<td>Single core 800 MHz</td>
<td>Single core 800 MHz</td>
<td>Single core 800 MHz</td>
<td>Single core 1.2 GHz</td>
<td>Quad core 2.0 GHz</td>
<td>Dual core 2.13 GHz</td>
<td>Dual core 1.8 GHz</td>
<td>Dual core 1.73 GHz</td>
<td>Dual core 1.73 GHz</td>
</tr>
<tr>
<td><strong>Control Memory</strong></td>
<td>1 GB</td>
<td>1 GB</td>
<td>2 GB</td>
<td>4 GB</td>
<td>8/16 GB</td>
<td>4/8/16 GB</td>
<td>8 GB</td>
<td>16 GB</td>
<td>32 GB</td>
</tr>
<tr>
<td><strong>Chassis Support</strong></td>
<td>ASR 1001 (Integrated), ASR 1002</td>
<td>ASR 1001, 1004, 1006</td>
<td>ASR 1001, 1004, 1006</td>
<td>ASR 1001-X</td>
<td>Integrated</td>
<td>ASR 1004, 1006, 1013</td>
<td>ASR 1006, 1013</td>
<td>ASR 1013</td>
<td></td>
</tr>
</tbody>
</table>
### Route Processors (RP)

<table>
<thead>
<tr>
<th></th>
<th>ASR1001-X</th>
<th>ASR1002-X</th>
<th>RP1</th>
<th>RP2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU</td>
<td>Quad-Core 2.0GHz Processor</td>
<td>Quad-Core 2.13GHz Processor</td>
<td>General Purpose CPU Based on 1.5GHz Processor</td>
<td>Dual-Core Processor, 2.66GHz</td>
</tr>
<tr>
<td>Memory</td>
<td>8GB default (4x2GB) 16GB maximum (4x4GB)</td>
<td>4GB default 8GB 16GB</td>
<td>2GB default (2x1GB) 4GB maximum (2x2GB) RP1 with 4GB built in ASR 1002</td>
<td>8GB default (4x2GB) 16GB maximum (4x4GB)</td>
</tr>
<tr>
<td>Built-In eUSB Bootflash</td>
<td>8GB</td>
<td>8GB</td>
<td>1GB (8GB on ASR 1002)</td>
<td>2GB</td>
</tr>
<tr>
<td>Storage</td>
<td>SSD (200G or 400G)</td>
<td>160GB HDD (optional) &amp; External USB</td>
<td>40GB HDD and External USB</td>
<td>80GB HDD and External USB</td>
</tr>
<tr>
<td>Cisco IOS XE Operating System</td>
<td>64 bit</td>
<td>64 bit</td>
<td>32 bit</td>
<td>64 bit</td>
</tr>
<tr>
<td>Chassis Support</td>
<td>Integrated in ASR1001-X chassis</td>
<td>Integrated in ASR1002-X chassis</td>
<td>ASR1002 (integrated), ASR1004, and ASR1006</td>
<td>ASR1004, ASR1006, and ASR1013</td>
</tr>
</tbody>
</table>
ASR 1000 High Density Fixed Ethernet Line Cards
Ethernet Line Card 6 x 10G Port Density – 40G Bandwidth Support per Card

Key Features
• Complete parity with existing Ethernet SPA features
• SyncE
• IEEE 1588v2 (Future)
• Y.1731 (CFM)
• 40 Gbps BW total

20x1G and 2x10G = 40Gbps I/O Capacity Per Slot
• Chassis: ASR1004, ASR1006, ASR1013
• RP: RP2
• ESP: ESP40, ESP100, ESP200

Order Now

Just Launched
March 2014
ASR 1000 High Density Fixed Ethernet Line Cards
Ethernet Line Card 6 x 10G Port Density – 40G Bandwidth Support per Card

Order Now

Just Launched
March 2014

20x1G and 2x10G = 40Gbps I/O Capacity Per Slot
• Chassis: ASR1004, ASR1006, ASR1013
• RP: RP2
• ESP: ESP40, ESP100, ESP200

Key Features
• Complete parity with existing Ethernet SPA features
• SyncE
• IEEE 1588v2 (Future)
• Y.1731 (CFM)
• 40 Gbps BW total
ASR 1000 High Density Fixed Ethernet Line Cards
Ethernet Line Card with higher 1G and 10G Port Density – 40G Bandwidth Support per Card

Key Features
• Complete parity with existing Ethernet SPA features
• SyncE
• IEEE 1588v2 (Future)
• Y.1731 (CFM)
• 40 Gbps BW
• No SIP needed

20x1G and 2x10G = 40Gbps I/O Capacity Per Slot
• Chassis: ASR1004, ASR1006, ASR1013
• RP: RP2
• ESP: ESP40, ESP100, ESP200

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Thank you.