Cisco 7600 i ASR 1000 update

Cisco 7600
Cisco 7600 — Services Ethernet leadership
Convergence of Transport & Service capabilities

Carrier Ethernet
- 20G Linecards -> 40G Linecards
- 80G infrastructure capability
- NSF/SSO
- Resiliency: Multichassis LAG
- Ethernet OAM, CFM 8.1
- L2/L3 Services Flexibility and Scale
- EVC Infrastructure
- Provider Bridging

Mobility
- Broadband Aggregation
- Integrated Timing, SyncE, 1588v2
- Enhanced Gateway Capabilities
- Cell Packing
- Cell Site Backhaul over MPLS
- Integrated Mesh WiFi agg
- IP RAN Aggregation
- PDSN/GGSN

Video
- LSM: P2MP-TE
- RSVP Call Admission Control
- Inline Video Monitoring
- Flexible QoS
- Multicast HA
- WAN PHY/OTN PHY

Over 100,000 Cisco 7600 Units Deployed
Cisco 7600

**Engines**
- Supervisor 32 GE/10GE
- Supervisor 720 GE
- Route Switch Processor 720 GE
- Route Switch Processor 720 10GE

**Services Modules**
- Distributed Security; IPSEC, Firewall, IDS, DoS Protection

**High-Density Ethernet Modules**
- High-Density GE and 10GE with Distributed, Line-rate Performance

**Enhanced FlexWAN**
- 7500 Parity and PA Investment Protection

**High-Density Ethernet Service Modules (ES & ES+)**
- High-Density GE and 10GE with Rich QoS, Distributed, Line-rate Performance

**SPA Interface Processors**
- Modular Carriers Cards for WAN and Metro
- Shared Port Adapters
### Cisco 7600 Carrier Ethernet Roadmap

#### SRB
- **HW**: ES20, RSP720
- PW Redundancy (EoMPLS)
- Pseudowire Stitching
- PIM & IGMP Snooping for VPLS PW (SIP 400/600)
- Ethernet MPB (SIP 600, ES20)
- Flexible Mapping of QinQ (SIP 400, ES20)
- Auto-Disable MAC Learning (cGVRP)
- Service Scaling (16k EoMPLS)
- VPLS Auto-Discovery/Auto Provisioning
- PWE MIBs (Other AToM)
- **VLAN Local significance (ES20)**
- Ethernet OAM
- ARP Scalability
- 1R0C Policer with EVC
- PVLAN Support VPLS

#### SRC
- **HW**: CEoP SPA, E1/STM1/T SPAs
- 32K EVC Scale
- VPLS NSF / SSO
- VPLS Access Redundancy MST on NPE
- VPLS MAC withdrawal (N-PE Redundancy)
- AToM NSF/SSO
- Half Duplex VRF
- BFD Triggered FRR
- BFD with Static Routes
- RSVP CAC Phase 0
- BGP per neighbor GR

#### SRD
- **HW**: ES+40, ES+20, IPoDWDM
- Service Instance (EVC) on Portchannel
- Broadcast Storm Control (EVCs)
- DHCP Snooping (EVC)
- UDLD (EVC)
- IP Source Guard (EVC)
- Custom Ethertype (EVC)
- MAC address security (EVC)
- Private Host on interface VLAN
- MST on Service Instance (EVC) Bridge Domain
- NSF/SSO – E-LMI support
- NSF/SSO – 802.3ah OAM support
- NSF/SSO – CFM Support
- Asymmetric Carrier Delay
- L2VPN Routed Mode Interworking Ethernet/VLAN to ATM/FR/PPP
- L2TPv3 on ES+
- BRE on SIP-400
- Mini Protocol Analyzer using SPAN
7600: Ethernet Service Modules+

More Carrier Ethernet Features
- 40Gbps per slot
- 128K queues
- Enhanced Security
- Integrated Video Monitoring capabilities
- SyncE capabilities
- MAC-in-MAC (802.1ah) capabilities
- Integrated BRAS (ISG) capabilities
- IPoDWDM (G.709) cards
- Combo GE+TGE cards

ADVANCED IP License
- L2 -> L3 VPN
- Centralized Edge -> Distributed Edge design
## 7600 Module Comparison

<table>
<thead>
<tr>
<th>Feature</th>
<th>7600-ES+xx</th>
<th>7600-ES20-xx</th>
<th>7600-SIP-400</th>
<th>WS-X67xx</th>
</tr>
</thead>
<tbody>
<tr>
<td>DFC</td>
<td>Integrated DFC3C or 3CXL Daughter Card</td>
<td>Integrated DFC3C or 3CXL Daughter Card</td>
<td>No (uses PFC3 on RSP/Sup)</td>
<td>Optional DFC3B/3C or XL support</td>
</tr>
<tr>
<td>Fabric connection</td>
<td>2 * 20G</td>
<td>2 * 20G</td>
<td>1 * 20G (throughput cca 2x 2.5Gbps)</td>
<td>1 OR 2 * 20G fabric Connection</td>
</tr>
<tr>
<td>Forwarding Rates</td>
<td>Up to 48Mpps</td>
<td>Up to 30Mpps</td>
<td>Up to 6Mpps</td>
<td>Up to 48Mpps with DFC</td>
</tr>
<tr>
<td>Interface Density</td>
<td>4<em>10G/40x1G/2</em>10G/20*1G</td>
<td>2<em>10G / 20</em>1G</td>
<td>1<em>10G / 10</em>1G</td>
<td>24<em>1G/48</em>1G/4*10G</td>
</tr>
<tr>
<td>Interface Support</td>
<td>Ethernet and IPoDWDM</td>
<td>Ethernet</td>
<td>Ethernet, POS, ATM, E1 ChSTM-1, ChSTM-4, RAN Circuit Emulation</td>
<td>Ethernet</td>
</tr>
<tr>
<td>Scheduler</td>
<td>Hierarchical CBWFQ</td>
<td>CBWFQ using Enhanced scheduler</td>
<td>CBWFQ using Enhanced scheduler</td>
<td>WRR / DWRR</td>
</tr>
<tr>
<td>Ingress Policing</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>Egress Policing</td>
<td>Supported</td>
<td>Not Supported</td>
<td>Supported</td>
<td>Supported</td>
</tr>
<tr>
<td>Number of Queues</td>
<td>256k for ES40, 128k for ES20+</td>
<td>16K per line card via MQC</td>
<td>16K per line card via MQC</td>
<td>1 OR 2 RX queues 4 OR 8 TX queues per port</td>
</tr>
<tr>
<td>Shaping</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>HQoS</td>
<td>Supported (4 levels)</td>
<td>Supported (2 levels)</td>
<td>Supported</td>
<td>Not Supported</td>
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<tr>
<td>LLQ</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
<td>Strict Priority + WRR</td>
</tr>
<tr>
<td>EVC</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>VPLS uplink</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>VPLS with MPLS edge</td>
<td>Supported</td>
<td>Supported</td>
<td>Supported</td>
<td>Not Supported</td>
</tr>
<tr>
<td>Local vlan significance</td>
<td>Supported</td>
<td>Supported only on EVC</td>
<td>Supported</td>
<td>Not Supported</td>
</tr>
</tbody>
</table>
Cisco 7600 RSP720-10GE at a Glance

- Faster CPU (1.2 GHz) and added memory
- Integrated 720-Gbps switch fabric
- Up to 1M Routes; 80k/96k MAC addresses
- 10GE and GE port options
  - 2x10Gigabit Ethernet and 3xGigabit Ethernet ports options (including 1x 10/100/1000 RJ45 port) on RSP
  - Interfaces are configured either in 10GE port mode only or in mixed-mode (GE and 10GE concurrently)
- High-density residential subscribers aggregation Support

<table>
<thead>
<tr>
<th>Feature</th>
<th>RSP720-3C-10GE</th>
<th>RSP720-3CXL-10GE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory (RP/SP)</td>
<td>Upto 4 GB / 2 GB</td>
<td>Upto 4 GB / 2GB</td>
</tr>
<tr>
<td>Compact Flash memory</td>
<td>512 MB/1 GB</td>
<td>512 MB/1 GB</td>
</tr>
<tr>
<td>NVRAM</td>
<td>4 MB</td>
<td>4 MB</td>
</tr>
<tr>
<td>FAT 32 file system</td>
<td>Supported</td>
<td>Supported</td>
</tr>
</tbody>
</table>
ES+XT
IPoDWDM with Advanced Ethernet Services

**XFP Based 10GigE Ports**
- LR, ER, ZR Optics
- ITU pluggable DWDM optics in 32 wavelengths (non-tunable at FCS)
- LANPHY, WANPHY, and OTN modes

**ES+ Based linecard with DFC-3CXL**
- 1M FIB Entires
- IPv4/IPv6 in Hardware
- Support for 96k MAC Addresses (more with 802.1ah)
- 256,000 HW Queues (128K today)
- 48Mpps forwarding capability
- 512MB buffer per port (100ms tx & rx)
- EVC, VPLS, MPLS, L2TPv3, REP

**BITS Interface**
- Used to capture external clocking
- 1588 and SyncE support (feature in planning)
IPoDWDM Integration Drivers

Reduction in Complexity and Cost

- Lowering CAPEX and OPEX
- Faster provisioning, more efficient use of fiber plant
- Robust OAM capabilities and enhanced features to meet tighter SLA’s
- G.709/FEC enable optical rings to span greater distances, **EFEC between 7600’s**
- Cost savings compared to 3rd party transponder implementations
IPoDWDM Integration Drivers

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- **Cost savings compared to 3rd party transponder implementations**
EVC (Ethernet Virtual Circuit) in IOS

- Service instance 10 ethernet
- Encapsulation dot1q 10 second-dot1q 777
- Rewrite ingress tag pop 1 symmetric
- Rewrite ingress tag translate 2-to-1

- Connect E-Line 10 Gig4/1/0 3 Gig4/2/1 5

- Interface Vlan 100
- IP address 10.1.1.0/24
- IP vrf forwarding VPN-A
- IP pim sparse-mode

- L3
- VPLS
- H-VPLS
- Bridging

- Bridge-domain 100
- Split-horizon

- QoS: service-policy input POLICE-256K
- Service-policy output SHAPE-QoS-4M

- Security: mac security maximum addresses 8
- Mac access-group L2-Filter in

- EoMPLS

- Xconnect 10.1.2.3 pw X
- No ip igmp snooping

- Xconnect 10.1.2.3 pw-class E-Lines
- Backup peer 10.1.2.4 pw-class E-Lines
Cisco 7600 i ASR 1000 update

Cisco 7600 SRE focus areas
12.2 SRE
Delivering Advanced Carrier Ethernet Services at the Edge

Resiliency Enhancements
mLACP, Hot-Standby Psuedowire, REP+EVC

Carrier Ethernet Convergence
802.1ah, CFM 8.1, EVC expansion

Broadband capability and scale
ISG and scalability focus

Video Integration
Multicast HA, LSM: P2MP-TE, Video Mon
12.2 SRE
Delivering ground breaking Mobile networking capabilities

**ES+XC Line Cards**

- **Front Panel 2x10GE (XFP) + 20x1GE (SFP)**
- **Front Panel 1x10GE (XFP) + 10x1GE (SFP)**

**LTE Gateway** - GTPv2

- User Authentication/ Provisioning/ Accounting
- IP Address allocation for Mobile OR provisioned on Radius/DHCP with GGSN
- Interfaces with SGSN/ Charging gateway/ RADIUS/ DHCP

**Timing Enhancements**
SyncE Physical Layer Support on ES+

**Cell Packing** - CEoPS and OC48 ATM SPA's

- Single Cell Relay
- Packed Cell Relay

PACKED CELLS MAX 28 (28*52=1456 bytes)
**ES+XC Ethernet Services Combo Card**

**Chassis Support:**
- 7606, 7609, 7603-S, 7604,
- 7606-S, 7609-S, 7613

**Processor Support:**
- Sup720-3B/XL
- RSP720-3C/XL
- RSP720-10GE-3C/XL

**General Feature Support:**
- Parity with ES+ at FCS

**ES+XC Feature Highlights**

- Slot efficiency
- 10GigE LANPHY support at FCS
- Grey and DWDM optic support
- SyncE Capable Hardware (SRE+)
- High Density QoS (128K queues ingress/egress)
- WANPHY and OTN Ready (SRE+)

* ES+XT parity - OTN (G.709/FEC) WANPHY support, post FCS (CY10)
ES+T Transport Card Overview
Cost effective Transport Services

Chassis Support:
7606, 7609, 7603-S, 7604, 7606-S, 7609-S, 7613

Processor Support:
Sup720-3B/XL
RSP720-3C/XL
RSP720-10GE-3C/XL

General Feature Support:
Subset of ES+ CoS and reduced feature scale
(EVC, QinQ, IP Sessions, Queues, Policers, etc.)

*ES+T Feature Highlights

- 2x and 4x 10 Gigabit Ethernet
- 20x and 40x port Gigabit Ethernet
- 16 Queues Per Port
- Least common denominator DFC operation
- Transport level feature scale
## 7600 Ethernet Services Linecard Portfolio

### Flexible Services at the Edge

<table>
<thead>
<tr>
<th>7600 Ethernet Services Linecard Portfolio</th>
<th>ES20</th>
<th>ES+ (Excalibur)</th>
<th>ES+XT (Ginsu)</th>
<th>ES+XC (Combo)</th>
<th>ES+T (Low-Q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Queues</td>
<td>16k</td>
<td>128k (I/E)</td>
<td>128k (I/E)</td>
<td>128k (I/E)</td>
<td>16/port</td>
</tr>
<tr>
<td>BNG Capable</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>10G Interface Modes</td>
<td>LAN</td>
<td>LAN</td>
<td>LAN/WAN</td>
<td>LAN/WAN</td>
<td>LAN/WAN</td>
</tr>
<tr>
<td>OTN – G.709/FEC</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Video Mon Capable</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>L3VPN</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>H-QoS</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>L2VPN/VPLS</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>SyncE Capable</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>DFC Interfaces</td>
<td>3C/3CXL</td>
<td>3C/3CXL</td>
<td>3C/3CXL</td>
<td>3C/3CXL</td>
<td>3CXL</td>
</tr>
<tr>
<td></td>
<td>2x10GE</td>
<td>2/4x10GE</td>
<td>2x10GE</td>
<td>2x10+20X1</td>
<td>2/4x10GE</td>
</tr>
<tr>
<td></td>
<td>20xGE</td>
<td>20/40xGE</td>
<td>4x10GE</td>
<td>1x10+10X1</td>
<td>20/40xGE</td>
</tr>
</tbody>
</table>

### Extended capabilty to support higher subscriber density applications with 128k queues

### Provides transport service capability with 16 queues per port, and price conscious scale
7600 Series
Investment Protection

7606S
80G per slot
9 slots

7609S
80G per slot
13 slots

7613-S
80G per slot
13 slots

S-Chassis
Scale to
80Gig/Slot

Control Plane
Scale to 2T

Data & Service Plane Scale to 40 Gig

Evolution to 2T

SIP400
SIP600
ES20
ES+40
80G/LC

Sup-32
Sup-720
RSP-720
RSP-2T

RSP720-10GE

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Cisco 7600: Key competitive advantages

1. IP Multicast
   - fabric-based egress replication
   - MVPN (no additional hardware needed)
   - Video Monitoring in ES+20/40

2. HQoS and EVC infrastructure
   - EVC flexible matching, security and bridging features
   - H-QoS per customer (no additional cost incurred)
   - License-based L2->L3 upgrade (no hardware swap)

3. Integrated Services
   - ISG, LI, IP SLA...
   - No-hit ACL, Netflow, MVPN, VPLS

4. Public Tests
   - LightReading IPTV Test, ISOCORE tests

5. True Carrier Ethernet local references
   - T-Com Hungary, Slovakia, Montenegro, Macedonia
   - Telecom Italia, Romtelecom, BTC, Telefonica O2 Czech
   - Telecom Serbia, Slovenia, Bosnia&Hercegovina
Cisco 7600 i ASR 1000 update

Cisco ASR 1000 Services Edge Platform
Designed for Growth and Availability

**ASR 1000**

**Services**
- Simultaneous Service Deployments
- Broadband (ISG)
- Provider Edge: L2/L3 VPN Tunnels
- VoIP/SBC: NNI/UNI/TP
- Security: Personalized Firewall, IPSec

**Scale**

**Versatility**
- Powerful Network Processors
- Massive Session Scale with Inter-chassis Redundancy
- Millions of Routes
- Thousands of VPNS

**HA**

**Industry Leading Scalability**
- Powerful Network Processors
- Massive Session Scale with Inter-chassis Redundancy
- Millions of Routes
- Thousands of VPNS

**High Availability**
- Modular HW / SW Architecture
- In Service Software Upgrade (ISSU)
- Inter-chassis HW / SW Redundancy
ASR 1000 Series

Overview

- Advanced Midrange Router Series
  2RU / 4RU / 6RU chassis
  5 / 10 / 20+ Gbps forwarding with services
  Dual AC or DC power supplies

- Key Differentiators
  Designed for High Availability
  - HW HA for 6RU (RP and ESP) with ISSU
  - SW HA for 2RU/4RU: ISSU capable, even with one RP
  Advanced H-QoS (3 level, 128K+ queues)
  Integrated services (no service blades), software-licensed features (SBC, FW, NBAR, etc.)
  Powerful and scaleable control plane in RP

- Simple Migration
  SPA support – Consistency across Cisco platforms
  IOS Software: Simplified migration from 7200 leveraging key features and look/feel (CLI)
ASR1000-RP2/ESP20 Broadband Application Highlights

Distributed BRAS for PTA

LAC/LNS

Broadband Deployments Benefit from Performance and Scale of the RP2/ESP20 Combination in the Following Ways

- Session Scaling to 32K
- L2TP Scaling Up to 16K Tunnels
- Broadband High Availability (HA)
- Integrated Features (SBC, RA-MPLS, etc.)

L2TP Tunnel Switch

Per-User Firewall
ASR1000-RP2/ESP20 SP-Edge Application Highlights

L3VPN Distributed PE Router

Internet Peering

Multi-Service Edge Router/ L2VPN Distributed PE Router (Release 4)

Route Reflector

High-End IPSec Terminator

The Combination of the RP2/ESP2 with the ASR1000 Series Gives Service Providers Unparalleled Performance and Scale in an Edge Routing Platform – Benefits Include

- Unmatched BGP, BFD, and VRF Scalability
- Highly Robust QoS – QFP Architecture
- Rich Cisco IOS Routing Feature Set
- Integrated Feature Support (S/BC, NAT/FW, Others)
- SPA-Based I/O Up to 10GE/OC48
- Carrier Class HA
ASR1000 IOS XE 2.3 Overview

### Software Features – High level

- **ATM**
  - ATM Basic Features
  - ATM Pseudo-wire Features
- **MPLS**
  - MPLS TE/FRR – Phase I
- **Routing**
  - 4-Byte ASN
- **Security**
  - GETVPN 1.2 – Group Member
  - CoPP - Secure Management Interface
  - NBAR Phase II
- **QoS**
  - 256 Class-maps per policy
  - Egress service-policy on user-defined classes within single level
  - 4k unique policy-maps
- **Broadband**
  - 32K session support with ESP20/RP2
  - PPPoE Tag
  - PPPoE Relay

### Hardware Features

- **ASR1000 Hardware**
  - Route Processor: ASR1000-RP2
- **New SPA Support**
  - SPA-1XOC3-ATM-V2
  - SPA-3XOC3-ATM-V2
## ASR 1000 NBAR Protocols Support

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<tr>
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<th>Network Mail Services</th>
<th>Internet</th>
<th>Miscellaneous</th>
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<tr>
<td>Citrix</td>
<td>GRE</td>
<td>IMAP</td>
<td>FTP</td>
<td>Nickname</td>
</tr>
<tr>
<td>PCAnywhere</td>
<td>IPINIP</td>
<td>POP3</td>
<td>Gopher</td>
<td>NPP</td>
</tr>
<tr>
<td>Novadigm</td>
<td>IPsec</td>
<td>Exchange (2003,2007)</td>
<td>HTTP (no options incl url and host)</td>
<td>RCP</td>
</tr>
<tr>
<td>SAP</td>
<td>L2TP</td>
<td>Notes</td>
<td>HTTP url and options</td>
<td>RTelnet</td>
</tr>
<tr>
<td>Oracle</td>
<td>PPTP</td>
<td>SMTP</td>
<td>IRC</td>
<td>Spooler (same as print)</td>
</tr>
<tr>
<td><strong>Routing Protocols</strong></td>
<td><strong>SFTP</strong></td>
<td><strong>Streaming Media</strong></td>
<td><strong>Telnet</strong></td>
<td><strong>Sysstat</strong></td>
</tr>
<tr>
<td>BGP</td>
<td>SHTTP</td>
<td>CU-SeeMe</td>
<td>TFTP</td>
<td>Tacacs</td>
</tr>
<tr>
<td>EGP</td>
<td>SIMAP</td>
<td>Netshow</td>
<td>NNTP</td>
<td>Time</td>
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<tr>
<td>EIGRP</td>
<td>SIRC</td>
<td>Real Audio</td>
<td>NetBIOS</td>
<td>VNC</td>
</tr>
<tr>
<td>OSPF</td>
<td>SLDAP</td>
<td>StreamWorks</td>
<td>NTP</td>
<td>Whois</td>
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<tr>
<td>RIP</td>
<td>SNNTP</td>
<td>VDOLive</td>
<td><strong>Miscellaneous</strong></td>
<td>X</td>
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<tr>
<td><strong>Network Management</strong></td>
<td><strong>SPOP3</strong></td>
<td><strong>RTSP</strong></td>
<td>AppleQTC</td>
<td>XDSAR 1000</td>
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<tr>
<td>ICMP</td>
<td>STELNET</td>
<td>MGCP</td>
<td>Charggen</td>
<td>FIX</td>
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<td>SNMP</td>
<td>SOCKS</td>
<td><strong>Database</strong></td>
<td><strong>Corba</strong></td>
<td><strong>Custom Protocol</strong></td>
</tr>
<tr>
<td>Syslog</td>
<td>SSH</td>
<td>SQL-NET</td>
<td><strong>ClearCase</strong></td>
<td></td>
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<tr>
<td><strong>RPC</strong></td>
<td><strong>Voice</strong></td>
<td><strong>SQL-Exec</strong></td>
<td><strong>Daytime</strong></td>
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<tr>
<td>NFS</td>
<td>H.323</td>
<td><strong>Peer-to-Peer</strong></td>
<td><strong>Doom</strong></td>
<td></td>
</tr>
<tr>
<td>SUN-RPC</td>
<td>RTCP</td>
<td><strong>BitTorrent</strong></td>
<td><strong>Echo</strong></td>
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</tr>
<tr>
<td><strong>Directory</strong></td>
<td><strong>RTP</strong></td>
<td>Direct Connect</td>
<td><strong>IBMDB2</strong></td>
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<td>SIP</td>
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<tr>
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<tr>
<td><strong>Signaling</strong></td>
<td><strong>LockD</strong></td>
<td><strong>MSSQL</strong></td>
<td><strong>Beyond 2.5 (examples)</strong></td>
<td></td>
</tr>
</tbody>
</table>

*Items supported in IOS XE 2.1* | *Items supported in IOS XE 2.3* | *Items targeted for 2.5 (Sept09)* | *Beyond 2.5 (examples)*
QoS Enhancements

1. Increased support for number of classes per policy-map to 256
   - 255 user-defined classes plus class-default

2. Increased support for number of unique policy-maps from 1000 to 4000

3. Child policies in user-defined classes
   - allowed on user-defined classes (and default class)
   - both queuing and non-queuing actions on egress
   - shaping / bandwidth remaining ratio (brr) on the parent at egress
   - policing/ marking on parent and child policies.

4. Service-fragment for Metro-Ethernet
   - Bandwidth sharing between VLANs (unused bandwidth can be re-allocated)
ASR 1000 RP-2 (Route Processor)

Advanced Hardware
- Dual Core Intel Xenon processor at 2.67 GHz
- 8 GB DRAM default, up to 16 GB scalable
- 80 GB hard disk for storage

Cisco’s First 64 Bit IOS Implementation
- Uses 64 bit IOS XE
- Able to address 16GB of memory

Performance Validated
- Tested by Isocore for 20M+ IPV4 Routes (RR)
- 3-4 times the performance of RP1
- 8k RR Clients
- 4k+ VRFs

World’s Most Scalable Control Plane Engine!
Performance and Scale
- Integrated ESP2.5G, RP1, and SIP10
- ESP throughput of 2.5Gbps
- Integrated RP1 with 4GB DRAM

Integrated Services
- Same features and services across entire ASR 1000 family
- Encryption throughput of 1.0G

High Availability
- Dual AC or DC power supplies by default on all units
- IOS redundancy and ISSU capabilities

IO Flexibility
- One SPA slot that supports same SPAs as ASR 1000 family
- 4 built-in GigE ports
1. Lawful Intercept (RADIUS & SNMP)
2. Broadband
   - 4-level Hierarchical QoS
   - Dynamic Policy Control
   - ANCP
   - Service Accounting
   - Cluster Concept – PPPoE Server Selection
3. SBC
   - uSBC for SIP Trunking, VoIP Peering, B2B Telepresence
   - SIP-SIP, TLS, SRTP, Registration forwarding, Radius Based Billing, CAC, DSCP remark, Policing, NAT Traversal
4. L2VPN
   - EoMPLS (incl. Ethernet Interworking)
5. QoS
   - Aggregate Priority Queue (BB)
   - 3-level QoS (policing only at 3rd level) applied to phy int or VLAN
   - WRED queue limit in bytes
6. Security
   - NAT/FW ALGs (SIP, H.323)
   - DMVPN – Phase III
7. Webex Integration

Software Features – High level

Hardware Features

- SPAs
  - WebEx Node
  - SPA-8XOC12-POS
  - SPA-8XOC3-POS
  - SPA-2XOC12-POS
  - SPA-4XOC12-POS
  - SPA-OC192POS-XFP (POS Mode)
  - SPA-1XOC48POS/RPR (POS mode)

Network Management

- Cisco Security Manager (CSM)
- Cisco Multicast Manager (CMM)
- Traffic Engineering Manager (TEM)
ASR 1000 → BRAS Cluster Concept

Solution Objective
- Centralized clustered single-edge or multi-edge
- Decentralized single-edge

Solution Benefits
- High scalability (bandwidth per subscriber)
- Lower Capex with clustering than competition’s “god boxes”
- Pay as You Grow: perfect for the wholesale model (LAC/LNS, L2VPN, L3 wholesale VPN)
- Operational efficiencies in provisioning and troubleshooting

Keys to ASR 1000
- Integrated services edge (“instant-on services” via software licenses, no add’l HW)
- Scalability up to 32K sessions with QoS
- Carrier-class high availability and modular chassis
ASR 1000 → Dynamic Session Policy Control

Solution Objective
- Configuration of service and QoS parameters via RADIUS

Solution Benefits
- Either user or operator can provision bandwidth
- This causes RADIUS server to send QoS or L4R policy to push down to ASR and apply instantaneously
- Improves operational efficiency by sending RADIUS message instead of downloading whole policy map (COA)

Keys to ASR 1000
- Increases performance availability for other value-add traffic
- Stateful high availability
- Carrier-class modular chassis
ASR 1000 → SBC Unified

Solution Objective
- To enable end-to-end feature rich and secure IP communications

Solution Benefits
- ASR 1000 form factors & performance suited for SBC at Subscriber Edge, Peering or enterprise premises.
- Support SP Peering, SIP Trunking, B2B Telepresence and residential IP telephony.
- Eliminate need for overlay networks & standalone appliances
- Unified SBC deployment model where all SBC functions are integrated for easier deployment (available in May 09)

Keys to ASR1000
- No extra service blades required
- Scalable solution, upto 32K* sessions
- High Availability (SSO, ISSU)
- Consistent w/ other high end Cisco SBCs for features and interop
- Extensible through modular design

* 32K dSBC sessions tested with RP1/ESP10. uSBC under test
**Solution Objective**

- Enable IPv6 Broadband services on ASR1000
- Deployment models suitable to IPv4 and IPv6 Hybrid network

**Solution Benefits**

- Standard compliance
- Multiple deployment models
- Same across IOS platforms

**Keys to ASR1000**

- Scalable solution
- High performance
- Carrier-class modular chassis
Unified Wan Services Solutions

Campus
Communication Fabric

Private WAN

Internet Edge

Internet Gateway

Services Aggregation

Secure WAN / Services Aggregation

Teleworker / Mobile workforce

WebEx Node / TelePresence

Regional Sites

WebEx Node / TelePresence

Regional Sites

Empowered Branch

Data Center Interconnect

Data Center

Unified WAN Services

Metro Ethernet

Private WAN

Internet Services

Partners/Customers
# Enterprise WAN MPLS VPN Use Cases

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<tr>
<th>MPLS Transport</th>
<th>IP Transport (XoIP)</th>
<th>Encryption (MPLS/IP)</th>
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</table>
| • MPLS VPN solution to extend Layer 2 and Layer 3 over MPLS transport/cloud up to 10Gbps and 20Gbps  
  • Integrated H-QoS, Netflow  
  • MPLS TE FRR capabilities  
  • MEC/VSS or VPC based Ether Channel | • L3VPN over GRE solution to extend Layer 3 and Layer 2 MPLS VPN's over IP transport/cloud up to 10Gbps and 20Gbps  
  • Integrated H-QoS  
  • IP MTU setting and PBR available for tuning at the provider edge. | • MPLS over GRE over IPsec using built-in encryption engine in a seamless manner up to 7Gbps  
  • Simplified deployment for encryption using existing IOS CLI  
  • IP MTU tuning available for PE  
  • TCP MSS-ADJUST capabilities |
ASR1000 L2VPN Deployment: EoMPLS (RLS 2.4)

**ASR1000 supports**
- EoMPLS Port Mode
- EoMPLS VLAN Mode with egress/ingress VLAN rewrite
- EoMPLS QinQ/QinAny mode with tag rewrite
- Ethernet to VLAN Ethernet/IP interworking
- QinQ to Ethernet/VLAN Ethernet/IP interworking
- Scale up to 16K
- Pseudowire Redundancy with TE/FRR link/node/path protection
Data Center Interconnect – VPN Use Cases

**MPLS Transport**
- EoMPLS PWs solution to extend Layer 2 over MPLS transport/cloud up to 10Gbps
- Integrated H-QoS, and WCCPv2 (for Layer 3 DCI)
- MEC/VSS or VPC based Ether Channel

**IP Transport**
- EoMPLS over GRE solution to extend Layer 2 over IP transport/cloud up to 10Gbps
- Integrated H-QoS, and WCCPv2 (for Layer 3 DCI)
- MEC/VSS or VPC based Ether Channel

**Encryption (MPLS/IP)**
- EoMPLS over GRE over IPsec using built-in encryption engine in a seamless manner up to 7Gbps
- Simplified deployment for encryption using existing IOS CLI
- Interoperable with Nexus 7000’s 802.1AE (TrustSec) solution using 802.1AE over EoMPLS PWs (port mode)
- TrustSec over EoMPLS provides native MPLS encryption
Unified WAN Services - Secure

**DMVPN** (Ph3 RLS 2.5)
- On-demand point to multipoint Encrypted VPNs
- Integrated voice, video, and data encryption with reduced TCO
- Simplified branch to branch connectivity solutions
- OPEX reduction using zero-touch deployment
- Resilient VPN solution combining both crypto and routing control plane

**GETVPN** (RLS 2.3)
- Tunnel-less Encrypted VPNs
- Any-to-Any Encrypted VPN connectivity suitable for IP VPNs
- No overlay routing
- Simplified QoS integration with Crypto
- Reduced latency and jitter due to direct communication with no central hub
- Eliminates p2p IKE relationship with group encryption keys
- High availability to avoid key server as single point of failure

**Easy VPN**
- LAN-like Encrypted VPN experience for a diverse set of VPN clients including software clients
- Uses existing basic crypto technologies
- Enhances interoperability by consolidating tunnels from teleworkers, retail stores, or branch offices
- Centralized policy and management control
VRF Awareness

VRF Aware Firewall (RLS5)
1. VRF lite
2. VRF to MPLS
3. Shared service

VRF aware NAT (RLS5)
1. VRF Inside Global Outside
2. VRF Inside MPLS outside
3. MPLS Inside Global Outside

IPSec VRF awareness (RLS6)
1. Crypto Map Based Site to Site VRF Aware IPSec
2. VRF Aware GRE+IPSec
3. VRF Lite GETVPN
Cisco ASR 1000 WebEx Node

Bandwidth
- Cuts web meeting traffic on WAN, proxies and firewalls

Performance
- Improves user experience for WebEx web meetings, VoIP, and Video

- Shared Port Adapter for Cisco ASR Router
- Not a full SaaS replacement
- Extends the Cisco WebEx Collaboration cloud on-premise
- Meeting front-end continues to reside in cloud
- Also in cloud: NBR, billing, reporting, site administration

WebEx Node SPA for ASR 1000
Cisco Networkers
Barcelona
Registruije se