Agenda

• Release 12.4 Positioning
• Release 12.4 Highlights
• Upgrade Paths
• Summary
Delivers Advanced Functionality with Powerful Hardware Support

- Developed for the most demanding Enterprise, Access, and Service Provider Aggregation networks
- Provides a comprehensive portfolio of Cisco technologies, including the leading-edge functionality and hardware introduced in Release 12.3T
- Introduces more than 700 industry-leading features across the widest range of hardware in the industry
- Anchored by an intensive stability and testing program
Leading-Edge Functionality and Stability

Release 12.4 is a Major Release
Evolution to Release 12.4

Major Release 12.4
No new functionality (maintenance only)

Software fixes

Major Release 12.3
No new functionality (maintenance only)
Releases Consolidated in Major Release 12.4

“X” and “Y” Releases
Included in 12.3T* Now in Major Release 12.4

Partial Listing of 12.3(x)X, and 12.3(x)Y Series

- 12.3(2)XA
- 12.3(2)XB
- 12.3(2)XC
- 12.3(4)XD
- 12.3(2)XE
- 12.3(2)XF
- 12.3(4)XG
- 12.3(4)XH
- 12.3(7)XI
- 12.3(7)XJ
- 12.3(4)XK
- 12.3(7)XL
- 12.3(4)XN
- 12.3(4)XQ
- 12.3(7)XR
- 12.3(8)XX
- 12.3(8)YA
- 12.3(8)YC
- 12.3(11)YF
- 12.3(8)YH
- 12.3(14)YQ

*Release 12.3T is planned for End of Sales September 2005, and End of Engineering September 2006

Note:
No continued engineering support is planned for the “X” and “Y” releases. Customers are encouraged to migrate to Release 12.4 for continued support.
**Major Release 12.4**

**Advanced Functionality**

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<th>Security</th>
<th>High Availability</th>
<th>IP Routing</th>
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<tr>
<td>• Dynamic Multipoint VPN</td>
<td>• Cisco IOS Warm Upgrade</td>
<td>• Cisco IOS Optimized Edge Routing</td>
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<td>• Cisco IOS Firewall</td>
<td>• Cisco IOS IPsec Stateful Failover</td>
<td>• EIGRP MPLS VPN PE-CE Site of Origin</td>
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<td>Enhancements</td>
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<td>• EIGRP Prefix List Support</td>
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<td>• Network Admission Control</td>
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<td>• EIGRP Support for Route Map Fill   <strong>(continued below)</strong></td>
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<tr>
<td>• Cisco IOS Intrusion</td>
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<td>• Control Plane Policing</td>
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<td>• Role-Based CLI Access</td>
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<td>• Cisco IOS IP Service Level</td>
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<td>Agreements for VoIP</td>
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<td>• Cisco Unity Express</td>
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<td>• Cisco IOS IPsec Stateful</td>
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<tr>
<td>Failover</td>
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</table>

**More than 700 additional features since Major Release 12.3**

- Extended ACL Support for IGMP to Support SSM in IPv4
- Support for SSM Mapping with DNS
- IP Addressing
- Rate Limiting NAT Translation
- NBAR-NAT Integration and Real-Time Streaming Protocol
- Static Failover Asymmetric Outside-to-Inside
- Static IP Support
- IP Mobility
- Dynamic Security Associations and Key Distribution
- Multiprotocol Label Switching
- Multiprotocol Label Switching: Label Distribution Protocol Autoconfiguration
- MPLS - LDP Graceful Restart
- VPNs
- Layer 2 Tunneling Protocol Version 3

---

Release 12.4
Introduction, 5/05

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Major Release 12.4 Delivers Powerful Hardware Support

- Cisco Small Business 100 Series Routers
- Cisco MWR 1900 Series Routers
- Cisco EtherSwitch Service Modules
- VPN Acceleration Module 2+ (VAM2+)
- Cisco 3200 Series Mobile Access Routers
- Cisco Gigabit Ethernet High-Speed WAN Interface Cards
- High-Density Analog (FXS/DIDFXO) and Digital (BRI) Extension Module for Voice/Fax
- HWIC-4ESW and HWIC-9ESW 4-and 9-port 10/100 Ethernet switch for Cisco 2800 and 3800 series
- Cisco 1800 Series Integrated Services Routers
- Cisco 4-port 10/100BASE-T Fast Ethernet Switch WAN Interface Card
- Cisco 1711 and Cisco 1712 Security Access Routers
- AIM-CUE Advanced Integrated Module
- Cisco 2800 Series Integrated Services Routers
- IP Communications High-Density Digital Voice/Fax Network Module
- NM-8AM-V2 and NM-16AM-V2 Network Modules
- Cisco SOHO 90 Series and Cisco 830 Series Routers
- Cisco 3800 Series Integrated Services Routers
- Cisco Intrusion Detection System (IDS) Network Module
- IP Communications Voice/Fax Network Module
- 16- and 36-Port Ethernet Switch Module for Cisco 2600 Series, Cisco 3600 Series, and Cisco 3700 Series
- Cisco IAD2430 Series IOS Reduced IP subset/Voice
- 100BASE-FX SMF Network Module
- Cisco 1701 ADSL Broadband Router
# Major Release 12.4 Within the Cisco IOS Software Release Portfolio

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<th>Planned Hardware</th>
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<td>Cisco Carrier Router System-1 (CRS-1)</td>
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<td>Enterprise Access</td>
<td>Cisco 800, 1700, 2600, 3600, 3700 Series Routers</td>
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<td>Cisco 7200 and 7500 Series Routers</td>
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<td>Enterprise, Access, Service Provider</td>
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<td>Aggregation</td>
<td>Cisco 7200 and 7500 Series Routers</td>
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<td>Cisco 7200, 7301, 7500 Series Routers</td>
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<tr>
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<td>Enterprise Core / Switching / WAN</td>
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<td>Aggregation, Service Provider</td>
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<td>Cisco 10000 Series Internet Router</td>
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<td>Release 12.0S</td>
<td>Service Provider Core / Aggregation</td>
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<td>Cisco 10000 and 12000 Series Internet Routers</td>
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<td>Release 12.1E</td>
<td>Enterprise Access / Aggregation</td>
<td>Cisco 6500, 7200, 7500, ONS15454 Series Routers</td>
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Agenda

• Release 12.4 Positioning

• **Release 12.4 Highlights**

• Upgrade Paths

• Summary
# Major Release 12.4

## Hardware and Feature Highlights

### New Hardware
- Cisco Integrated Services Routers
- Cisco 830 Series Routers

### Security
- Dynamic Multipoint VPN
- Cisco IOS Firewall Enhancements
- Network Admission Control
- Cisco IOS Intrusion Prevention System
- Cisco AutoSecure
- Control Plane Policing
- Role-Based CLI Access
- Cisco Security Device Manager

### Voice
- Cisco IOS IP Service Level Agreements for VoIP
- Cisco CallManager Express

### High Availability
- Cisco IOS Warm Upgrade

### IP Routing
- Cisco IOS Optimized Edge Routing
- Enhanced Interior Gateway Routing Protocol Enhancements

### IP Addressing
- Rate Limiting NAT Translation
- NBAR-NAT integration and Real-Time Streaming Protocol
- Stateful Failover Asymmetric Outside-to-Inside
- Static IP Support

### IP Mobility
- Dynamic Security Associations and Key Distribution

### Multiprotocol Label Switching
- Multiprotocol Label Switching: Label Distribution Protocol Autoconfiguration
- MPLS - LDP Graceful Restart

### Quality of Service
- Cisco AutoQoS for the Enterprise
- Bandwidth Estimation

### IP Multicast
- IPv6 Multicast MLD Access Group and Scope Boundaries
- Extended ACL Support for IGMP to Support SSM in IPv4
- Support for SSM Mapping with DNS

### VPNs
- Layer 2 Tunneling Protocol Version 3
Major Release 12.4

Hardware Highlights

- Cisco Integrated Services Routers
- Cisco 830 Series Routers

Cisco IOS Software Major Release 12.4

- Dynamic Security Associations and Key Distribution
- Cisco IOS Optimized Edge Routing
- Enhanced Interior Gateway Routing Protocol Enhancements
- Multiprotocol Label Switching: Label Distribution Protocol Autoconfiguration
- MPLS - LDP Graceful Restart
- Layer 2 Tunneling Protocol Version 3
- Rate Limiting NAT Translation
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- Stateful Failover Asymmetric Outside-to-Inside
- Static IP Support

IP Addressing

- Dynamic Multipoint VPs
- Cisco IOS Security Enhancements
- Network Admission Control
- Cisco IOS Intrusion Prevention System
- Cisco AutoSecure
- Control Plane Policing
- Role-Based CLI Access
- Cisco Security Device Manager

New Hardware

- Cisco Integrated Services Routers
- Cisco 830 Series Routers

Cisco.com
New Router Portfolio Fully Leverages a Systems Approach

- Cisco Integrated Services Routers (ISR)
  - Cisco 3800 Series
  - Cisco 2800 Series
  - Cisco 1800 Series

- First hardware / software system to deliver concurrent services at **wire-speed**

- Enables customers to:
  - Deploy the right router for every office
  - Maintain self-defending networks
  - Leverage advanced network routing capabilities
Scalable from Small Businesses to Large Enterprises

Cisco 3800 Series
- Highest Density and Performance for Concurrent Services
- Embedded, Advanced Voice, Video, Data & Security Services

Cisco 2800 Series
- Increased Value Extended to New Markets
  - Substantial increase in price/performance!
  - Extension into new markets!
  - Greater service densities across the portfolio!

Cisco 1800 Series
- Integrated Security & Data

Industry-leading Cisco IOS Software Release 12.4

- Enterprise Branch Office
- Small Branch
- SMB
Cisco Integrated Services Routers
Key Features & Benefits

Embedded Security and Voice
- Fast, on-board encryption
- Highest voice services densities
- Cisco IOS Software delivers seamless integration and business-critical services

Higher Performance
- New ASIC, Bus design, and processor boost performance for services
- Double services density and memory defaults
- Leverages Cisco IOS Software intelligence and automation

Increased Modularity
- Increased high speed slots — up to 2.2 Gbps
- High density, larger form factor network modules

Resiliency
- Redundant power option with online insertion and removal
- Cisco IOS Software enables network-wide resilience to increase IP network availability

Investment Protection
- Leverages existing modules
- Up to 4X memory capacity
- Cisco IOS Software: most widely leveraged network infrastructure software in the world

Integrated Services
Security
Voice
Content
L2 Switching
Wireless*
Management

Extended Services, Headroom and Investment Protection

* future
Cisco 830 Series Access Routers

- Offer advanced security for data, voice, and video access to small remote office and teleworkers that need secure Internet and corporate network connectivity
- Provide a wide range of integrated security & advanced QoS features for high-quality applications
- Offer easy deployment and remote management features with Cisco IOS Software
Cisco 830 Series Routers Feature Support

- Enterprise class VPNs
  Hardware-assisted encryption (3DES IPsec)
  Cisco Easy VPN remote/server
- Cisco V3PN
  Secure voice and video
  Quality of Service (QoS)
  Multicast
- Manageable, scalable, and reliable access
  Cisco SDM
  Cisco Router Web Set-Up Tool (CRWS),
  Integration with IP Solution Center
Major Release 12.4
Security Highlights

- Dynamic Multipoint VPN
- Cisco IOS Firewall Enhancements
- Network Admission Control
- Cisco IOS Intrusion Prevention System
- Cisco AutoSecure
- Control Plane Policing
- Role-Based CLI Access
- Cisco Security Device Manager

Cisco IOS Software Major Release 12.4

- Enhanced Interior Gateway Routing Protocol Enhancements
- Cisco IOS Optimized Edge Routing

IP Multicast
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IP Routing
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IP Addressing
- Dynamic Security Associations and Key Distribution

Cisco Integrated Services Routers
- Cisco 830 Series Routers

New Hardware
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- Role-Based CLI Access
- Cisco Security Device Manager

Cisco IOS Optimized Edge Routing
- Enhanced Interior Gateway Routing Protocol Enhancements

Dynamic Multipoint VPN

- Full meshed connectivity with configuration simplicity of hub and spoke
- Preserves (central) bandwidth and minimizes latency
- Supports dynamically addressed spokes
- Zero touch configuration for addition of new spokes in the DMVPN
DMVPN Spoke-to-Spoke Functionality

Enhances DMVPN by enabling the secure exchange of data between two branch offices without traversing the head office.
DMVPN Spoke-to-Spoke Functionality

Benefits

- **Intelligent tunnel creation**
  
  Connects branch offices directly via an existing Internet connection

- **Improved network performance**
  
  Decreases head office congestion, reducing latency and jitter, while optimizing head office bandwidth utilization

- **Simplified encryption and decryption**
  
  Avoids duplicate head office encryption/decryption with direct on-demand branch office tunnels
Cisco IOS Security Certifications

<table>
<thead>
<tr>
<th>Model</th>
<th>FIPS 140-2, Level 2</th>
<th>IPsec</th>
<th>Firewall</th>
<th>IPsec (EAL4)</th>
<th>Firewall (EAL4+)</th>
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<tr>
<td>Cisco 1700</td>
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<td>CY’05</td>
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<td>CY’06</td>
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<td>Cisco 2800 (ISR)</td>
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</table>

- Important note: “FIPS KITS” are required to meet FIPS Level 140-2 in full
- ICSA Certification for Cisco IOS Firewall
  newsroom.cisco.com/dlls/2005/prod_031405.html
- Cisco Security & VPN Certification/Evaluation
  www.cisco.com/go/securitycert/
Application Firewall – Advanced Application Inspection and Control

- **HTTP Inspection Engine**
  - Port 80 (http) is a conduit for web-embedded attacks & inappropriate application use
  - Delivers application level control through inspection of port 80 tunneled traffic
  - Convergence of Cisco IOS Firewall and Inline Intrusion Prevention System (IPS)
  - Control port 80 misuse by rogue apps that hide traffic inside http to avoid scrutiny
  - Example: Instant messaging and peer-to-peer applications (ie: Kazaa)
  - Manage bandwidth consumption through usage policies

- **Email Inspection Engine**
  - Control misuse of email protocols
    - SMTP, ESMTP, IMAP, POP inspection engines

- **Inspection Engines provide protocol anomaly detection services**
Router & Security Device Manager
Support for Application Firewall
Cisco IOS Firewall for IPv6

Enables the user to implement Cisco IOS Firewall in IPv4 and IPv6 networks
Cisco IOS Firewall for IPv6 Benefits

- Stateful packet inspection of TCP, UDP, and ICMP sessions
- Coexistence in IPv4 and IPv6 environments
- Traffic inspection
  Mitigates network attacks that would otherwise exploit IPv4 and IPv6 fragments
- IPv4 to IPv6 translation services
Network Admission Control

Leverages the network to intelligently enforce access privileges based on endpoint security posture

- Focused on limiting damage from viruses and worms
- Limits network access to compliant, trusted endpoints
- Restricts network access to compliant devices
- Supports multiple anti-virus vendors and Cisco Security Agent
- Cisco 3800, 2800, and 1800 security bundles ship with NAC capability

Coalition of market-leading vendors

- Trend Micro
- McAfee Security
- Symantec
- IBM

Cisco 3800, 2800, or 1800 Router

Policy Server

Decision Points

Hosts Attempting Network Access

Cisco Trust Agent

Notifications

Cisco

Trust

Agent

RADIUS

Access

Rights

Comply?

Policy (AAA) Server

Credentials

Vendor

Server

Enforcement

Credentials
Cisco IOS Intrusion Prevention System

• First to market with IPS in a router – *inline* ability to mitigate network attacks
  
  DROP packet, RESET connection, SEND alarm

• Supports a wide range of attack/worm signatures supported (740+)

• Used for inline intrusion prevention and event notification

• Dynamically loads attack signatures to the router

• Integrates technology from Cisco IDS Sensor families

Cisco IDS 4200 Series Appliances, Cisco Catalyst® 6500 IDS Module, Network Module IDS appliance (NM-CIDS)
Cisco AutoSecure

- Disable non-essential services
  - Eliminate DoS attacks based on fake requests to router services
  - Disable mechanisms that could be used to exploit security holes
- Enforce secure access
  - Enforce enhanced security in accessing device
  - Enhanced security logs
  - Prevent attackers from knowing that packets have been dropped
- Secure forwarding plane
  - Protect against Synchronous (SYN) attacks
  - Anti-Spoofing
  - Enforce stateful firewall configuration on external interfaces for firewall images
Cisco AutoSecure Rollback and Logging

- Provides method to restore system configuration to the state prior to Cisco AutoSecure execution
- Simplifies tracking of Cisco AutoSecure command execution
- Initiate “one touch” device lockdown with confidence
Control Plane Policing

• **Secures the control plane**
  
  User-defined Quality of Service (QoS) policies manage and protect the control plane against reconnaissance and Denial of Service (DoS) attacks

• **Increases system reliability and availability**
  
  Secured control plane helps to sustain traffic destined to or originating from the control plane during an attack

• **Simplifies policy configuration**
  
  Support for Modular QoS CLI (MQC) minimizes the learning curve, number of provisioning errors, and the time and cost of deploying QoS and defining control plane policies
Role-Based CLI Access

- Provide a view-based access to CLI commands
  View: set of operational commands and configuration capabilities
- User authentication is done via an external or internal AAA Server (or TACACS+)
- Customer can define up to fifteen views, plus one reserve for the root user

Customized Access To Match Operational Needs
Role-Based CLI Access Benefits

• Security
  Enhances the security of the device by defining the set of CLI commands that are accessible to a particular user

• Availability
  Avoids unintentional execution of CLI commands by unauthorized personnel

• Operational efficiency
  Improves usability by prohibiting users from viewing CLI commands that are inaccessible to them
Cisco Security Device Manager

- Intuitive, web-based device management tool embedded within Cisco access routers
- Simplifies router and security configuration through intelligent wizards
  Enables customers to quickly and easily deploy, configure, and monitor a Cisco access router without knowledge of the Cisco IOS Software command-line interface
- Supports innovative, industry-leading features, including Security & 1-Step Router Lockdown
- Comprehensive coverage of security, LAN, WAN, and routing features
Cisco SDM Benefits

- Reduces Cisco router deployment time and complexity
  Startup Wizard, 1-Step lockdown, WAN/VPN Wizard
- Reduces total cost of ownership
  Leverages new Cisco IOS Security features with minimal staff re-training
  Simpler security configuration management
- Leverages network investment
  Quickly and easily integrates security into network
- Establishes a consistent security policy across Cisco routers with Security Auditing capabilities
Cisco SDM: Combining Ease Of Use & Application Intelligence

- Security Audit
  Security configuration recommended by ICSA and TAC
- Intelligent wizards
  Auto-detect configuration errors and propose fixes
  Ex: if WAN interface is DHCP-addresses, a hole is punched through the Firewall
- Quick deployment
  1-Step Router Lockdown: Firewall
  VPN Wizard: Site-to-Site, Easy VPN
- Tools for expert users
  ACL Editor
  VPN tunnel monitoring
Major Release 12.4
Voice Highlights

- Cisco IOS IP Service Level Agreements for VoIP
- Cisco CallManager Express
Cisco IOS IP Service Level Agreements for VoIP

- Is the network ready for VoIP?
  - Will network performance support VoIP?
  - Verify the effectiveness of QoS
  - Isolate network performance issues before and after deployment
  - Troubleshoot VoIP problems
### Cisco IOS IP SLAs Benefits

#### Measurements and Metrics

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<th>OPTIMIZED APPLICATIONS &amp; SERVICES</th>
<th>REDUCED TOTAL COST OF OWNERSHIP AND OpEx</th>
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<td>• Performance visibility</td>
<td>• Reduce VoIP deployment time</td>
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<tr>
<td>• Enhance acceptance of business-critical services and VoIP</td>
<td>• Lower mean time to restore and downtime</td>
</tr>
<tr>
<td>• Prove service levels</td>
<td>• Proactive identification of issues enforces higher reliability</td>
</tr>
<tr>
<td>• Enhance Customer satisfaction</td>
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</tbody>
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**Continuous**

**Predictable**

**Reliable**

**Automated Intelligence**

**Proactive**
## Cisco IOS IP SLAs Uses and Metrics

### DATA TRAFFIC
- Minimize delay, packet loss
- Verify Quality of Service (QoS)

### VoIP
- Minimize delay, packet loss, jitter
- Verify Quality of Service (QoS)

### SERVICE LEVEL AGREEMENT
- Measure delay, packet loss, jitter
- One-way

### AVAILABILITY
- Connectivity testing

### STREAMING VIDEO*
- Minimize delay, packet loss

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<th>VoIP</th>
<th>SERVICE LEVEL AGREEMENT</th>
<th>AVAILABILITY</th>
<th>STREAMING VIDEO*</th>
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<td>Minimize delay, packet loss, jitter</td>
<td>Minimize delay, packet loss, jitter</td>
<td>Measure delay, packet loss, jitter</td>
<td>Connectivity testing</td>
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<td>Verify Quality of Service (QoS)</td>
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<th>SERVICE LEVEL AGREEMENT</th>
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<td>Measure delay, packet loss, jitter</td>
<td>Connectivity testing</td>
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*Complete in CY'05
Cisco CallManager Express

- Complete integrated voice and data capabilities
- Key system / low-end PBX Feature Set for < 100 station market
- Flexible configuration using CLI or web-based GUI
- Provides ease of upgrade and complete investment protection to centralized CCM-based hardware
- Future-proof IP architecture enable converged applications
  
  Examples: Content Networking, QoS, Cisco IOS Firewall, VPN, DSL, Ethernet, and XML
Cisco CallManager Express with Cisco Unity Express: All-In-One Solution

- Single hardware product to manage, stock, and maintain – reduces operating costs
- Small footprint
- Single support contract – reduced maintenance cost
- Lower total cost of ownership
- Provides annuity revenue opportunity through Service Provider managed services
- Flexibility enables additional advanced services (ie: security or application acceleration)

Deployment Option: Small Semi-Autonomous Office

Management GUI

PSTN Interconnect—Analog or Digital Trunks

1760*/2600/3700 access router

Internet Data Connectivity
Cisco Unity Express

- Intel Low Power PIII 500MHz with Embedded OS
- Voice message storage: 100 hours
- 20GB IDE Hard Drive
- Cisco IOS Connectivity to CallManager Express
- No external interfaces; no cabling
- Local auto-attendant & voice mail system
- 12-100 Mailboxes, 4-8 sessions, 100 hours of storage
- Integrated into Cisco 2600XM and 3700 Series Routers; Cisco 2691 Router
- Entry level Cisco voice storage & processing products
Major Release 12.4
High Availability Highlights

Cisco IOS Software Major Release 12.4

High Availability
- Cisco IOS Warm Upgrade
System Level Resiliency: Warm Upgrade

- Reduces downtime for planned upgrades for single RP platforms
- Builds upon Warm Reload
- The new image does not have to support Warm Upgrade

Warm Upgrade process

- Normal Reloading without Cisco IOS Warm Upgrade
  Router loses packet forwarding for about 3.5 minutes
- With Cisco IOS Warm Upgrade
  Router loses packet forwarding for about 30 seconds
Major Release 12.4
IP Routing Highlights

### New Features
- Cisco Integrated Services Routers
- Cisco IOS Series Routers

### Security
- Dynamic Security Associations and Key Distribution
- Cisco IOS Optimized Edge Routing
- Enhanced Interior Gateway Routing Protocol Enhancements
- Cisco AutoQoS for the Enterprise
- Bandwidth Estimation
- IPv6 Multicast MLD Access Group and Scope Boundaries
- Extended ACL Support for IGMP to Support SSM in IPv4
- Support for SSM Mapping with DNS

### IP Multicast
- Cisco IOS Warm Upgrade
- High Availability
- Dynamic Security Associations and Key Distribution
- Cisco IOS Optimized Edge Routing
- Enhanced Interior Gateway Routing Protocol Enhancements

### Quality of Service
- Cisco Integrated Services Routers
- Cisco 830 Series Routers
- New Hardware
- Dynamic Multipoint VPN
- Cisco IOS Firewall Enhancements
- Network Admission Control
- Cisco IOS Intrusion Prevention System
- Cisco AutoSecure
- Control Plane Policing
- Role-Based CLI Access
- Cisco Security Device Manager

### Multiprotocol Label Switching
- Cisco IOS Optimized Edge Routing
- Enhanced Interior Gateway Routing Protocol Enhancements
- Multiprotocol Label Switching: Label Distribution Protocol Autoconfiguration
- MPLS - LDP Graceful Restart
- Layer 2 Tunneling Protocol Version 3

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Cisco IOS Optimized Edge Routing

Dynamic **route optimization** per prefix for two or more physical or virtual paths

WAN Access Links are biggest end-to-end bottleneck!

By default BGP chooses best path based on fewest AS-Path hops!

Optimize by: Latency, packet-loss, throughput, load &/or monetary cost
Cisco IOS OER Benefits

• Improve network performance
  - Brown-outs
  - Bottlenecks
• Increase uptime
• Assist application deployment
  - Business critical applications (ie: ERP, CRM, Oracle)
  - VoIP
  - Video On Demand (unicast)
• Minimize bandwidth costs
• Support services rollout
  - VPN
  - SLA
EIGRP MPLS VPN PE-CE Site of Origin

• Possible routing loops are the biggest danger with backdoor links
  
  Site1 advertises a network through the back door to site 2
  
  C prefers this route, and redistributes it into BGP
  
  B prefers the BGP route, and redistributes it into EIGRP, forming a loop

• Solution is to automatically tag all the routes originating in site 1 so they will be rejected by C

• This tag is called the Site of Origin (SoO)
EIGRP Prefix Limit Support

- Generic Redistribution: limits the number of redistributed routes/prefixes
- MPLS VPN PE-CE: limits the number of prefixes on a given PE router for
  - Entire VPN
  - Individual CEs/neighbors
- Provides optional facility to force an upper bound on the number of prefixes learned by the EIGRP routing process
- Useful for preventing unwanted oversubscription of resources (memory and CPU)
EIGRP Support for Route Map Filtering

- Provides capability to filter internal and external routes based on multiple route-map options
- Enables EIGRP to process set and match parameters within route-map
- Controls advertisement and learning of routes for fine-tuning the network
- This allows setting the metric using a route map to prefer one path over another, for instance

```
route-map setmetric permit 10
match interface serial 0/0
  set metric 1000 1 255 1 1500
route-map setmetric permit 20
match interface serial 0/1
  set metric 2000 1 255 1 1500
route-map setmetric permit 30
...
router eigrp 100
distribute-list route-map setmetric in
```
EIGRP Simple Network Management Protocol MIB Support

- EIGRP Traffic Statistics
  - AS Number
  - Hellos Sent/Received
  - Updates Sent/Received
  - Queries Sent/Received
  - Replies Sent/Received

- EIGRP Topology Data
  - Destination Net/Mask
  - Active State
  - Feasible Successors
  - Origin Type
  - Distance
  - Reported Distance

- EIGRP Interface Data
  - Peer Count
  - Reliable/Unreliable Queues
  - Pacing
  - Pending Routes
  - Hello Interval

- EIGRP Neighbor Data
  - Peer Address
  - Peer Interface
  - Hold Time
  - Up Time
  - SRTT/RTO
  - Version

And many more....
Major Release 12.4
Quality of Service Highlights

Cisco IOS
Software Major Release 12.4

Quality of Service
- Cisco AutoQoS for the Enterprise
- Bandwidth Estimation

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Quality of Service Highlights
- Cisco Integrated Services Routers
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Cisco.com
Cisco AutoQoS Automates the Key Elements of QoS Deployment

- **Application Classification**
  Example: automatically discovering applications and providing appropriate QoS treatment

- **Policy Generation**
  Example: auto-generation of initial and ongoing QoS policies

- **Configuration**
  Example: providing high level business knobs, and multi-device / domain automation for QoS

- **Monitoring & Reporting**
  Example: generating intelligent, automatic alerts and summary reports

- **Consistency**
  Example: enabling automatic, seamless interoperability among all QoS features and parameters across a network topology – LAN, MAN, and WAN
Cisco AutoQoS for the Enterprise

- Cisco introduced Cisco AutoQoS in Releases 12.2T and 12.3
- Enhancements in Release 12.3(7)T enable automation for the deployment of QoS policies in a general business environment
- Benefits
  - Comprehensive QoS deployment in two steps
  - Automatically provisions up to 10 traffic classes
  - Reduces QoS deployment time and expense

<table>
<thead>
<tr>
<th>Traffic Class</th>
<th>DSCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP Routing</td>
<td>CS6</td>
</tr>
<tr>
<td>Interactive Voice</td>
<td>EF</td>
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<tr>
<td>Interactive Video</td>
<td>AF41</td>
</tr>
<tr>
<td>Streaming Video</td>
<td>CS4</td>
</tr>
<tr>
<td>Telephony Signaling</td>
<td>CS3</td>
</tr>
<tr>
<td>Transactional/Interactive</td>
<td>AF21</td>
</tr>
<tr>
<td>Network Management</td>
<td>CS2</td>
</tr>
<tr>
<td>Bulk Data</td>
<td>AF11</td>
</tr>
<tr>
<td>Best Effort</td>
<td>0</td>
</tr>
<tr>
<td>Scavenger</td>
<td>CS1</td>
</tr>
</tbody>
</table>
Cisco AutoQoS for the Enterprise: AutoDiscovery Trust Option

- Extends the power of Cisco AutoQoS for the Enterprise to routers for which Differentiated Services Code Point (DSCP) values have already been assigned at the network edge.
- AutoDiscovery is not invoked: QoS policy is based on statistics for DSCP-marked traffic received by router.

> auto discovery trust
Cisco AutoQoS for the Enterprise: AutoDiscovery Trust Option Benefits

- **Automated provisioning**
  
  Automatically provisions up to ten traffic classes using customer-defined DSCP values

- **Extended coverage**
  
  Generates QoS policies for routers on which traffic arrives with DSCP markings

- **Lower total cost of ownership**
  
  Further reduces deployment time and expense by leveraging trusted DSCP markings to set the QoS policy behind the trusted edge
Cisco AutoQoS for the Enterprise Suggested Policy

- Increases customer flexibility by allowing users to view, compare, and edit a Cisco AutoQoS suggested policy prior to application
Bandwidth Estimation using Corvil Bandwidth Technology

- Adequate bandwidth is essential for application performance
  - Too little bandwidth can make business services unusable
  - Too much bandwidth can be very costly
- Corvil Bandwidth provides the minimum bandwidth required to meet a Quality of Service target
  - The ability to obtain bandwidth values for user-specified QoS targets distinguishes Corvil Bandwidth from other approaches
  - Use Corvil Bandwidth values to allocate bandwidth using existing Cisco IOS QoS policy mechanisms

What you need to know:
CORVIL BANDWIDTH (CB)

E.g., the CB is 460 Kbps for this application to achieve no more than 250ms delay & 0.1% loss

What you see today
Mean Traffic Rate
E.g., 300 Kbps over a 5-minute period

Real-Time Traffic Bursts

Too Much Bandwidth

Too Little Bandwidth
Bandwidth Estimation using Corvil Bandwidth Technology Benefits

- Enables users to set service-level objectives for the desired performance of networked applications
- Allows network managers to eliminate operational overhead and guesswork in bandwidth provisioning and QoS configuration
- Provides the potential for significant bandwidth cost savings while meeting QoS requirements
- Increases the capability and flexibility to offer bandwidth-on-demand types of services
Major Release 12.4
IP Multicast Highlights

Cisco IOS Software Major Release 12.4

IP Multicast
- IPv6 Multicast MLD Access Group and Scope Boundaries
- Extended ACL Support for IGMP to Support SSM in IPv4
- Support for SSM Mapping with DNS

Cisco Integrated Services Routers
Cisco 830 Series Routers
New Hardware
- Dynamic Multipoint VPN
- Cisco IOS Session Management
- Network Admission Control
- Cisco IOS Intrusion Prevention System
- Cisco AutoSecure
- Control Plane Policing
- Role-Based CLI Access
- Cisco Security Device Manager

Release 12.4
Introduction, 5/05
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IPv6 Multicast Listener Discovery Access Group

Checks Against Source S and Group G for MLDv2 Reports

IPv6 Source Specific Multicast (SSM) Core

1. MLDv2 Join for (Source 1, Group G)
2. Only Permit MLDv2 Join for (Source 1, Group G)
3. PEMMITTED
4. PIM (S,G) Join

Source 1 | Group G
Source 2 | Group G

MLDv2 Join for (Source 2, Group G)

DENIED
2a

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IPv6 Multicast Scope Boundaries

- Minimizes BW costs by keeping High-BW sources to local site(s)
- Sets well defined boundaries on different types of multicast traffic through hierarchical addressing
- Simplifies network planning by doing away with “TTL-threshold” hacks
Extended ACL Support for IGMP to Support Source Specific Multicast in IPv4a

Checks Against Source S and Group G for MLDv2 Reports

Before

H1
- IGMPv3 Report
  - Source: 10.0.0.1
  - Group: 224.1.1.1

H2
- IGMPv3 Report
  - Source: 20.0.0.1
  - Group: 224.1.1.1

224.1.1.1
- IGMPv3 Report
  - Include: 10.0.0.1

224.1.1.1
- IGMPv3 Report
  - Include: 20.0.0.1

All (S,G) Channel Subscriptions Will Be Accepted; Cannot Filter say (20.0.0.1,224.1.1.1)

ACCEPTED

After

H1
- IGMPv3 Report
  - Source: 20.0.0.1
  - Group: 224.1.1.1

H2
- IGMPv3 Report
  - Source: 20.0.0.1
  - Group: 224.1.1.1

224.1.1.1
- IGMPv3 Report
  - Include: 10.0.0.1

224.1.1.1
- IGMPv3 Report
  - Include: 20.0.0.1

DENIED

IGMPv3 Report for say (20.0.0.1, 224.1.1.1) can now be filtered using ACL
Support for Source Specific Multicast (SSM) Mapping with DNS

- Support for both IPv4 & IPv6
- Provides group to source mapping using DNS reverse lookup
- Allows rapid deployment of Source Specific Multicast (SSM) without IGMPv3/MLDv2 dependency
- Operation transparent to IGMPv2/MLDv1 hosts

Diagram:
1. IGMPv2/MLDv1 Group Join
2. Reverse DNS lookup for Group G
3. DNS Response: Group G -> Source S “Mapping”
4. PIM (S,G) Joins

DNS Record Format:
<v4/v6 group G addr>  IN A <v4/v6 Source S addr>
## Major Release 12.4

### IP Addressing Highlights

- **Dynamic Security Associations and Key Distribution**
- **IP Mobility**
- **Cisco IOS IP Service Level Agreements for VoIP**
- **Cisco CallManager Express**
- **Cisco IOS Software Major Release 12.4**
- **Cisco AutoQoS for the Enterprise**
- **Bandwidth Estimation**
- **Quality of Service**
- **IPv6 Multicast MLD Access Group and Scope Boundaries**
- **Extended ACL Support for IGMP to Support SSM in IPv4**
- **Support for SSM Mapping with DNS**
- **Cisco IOS Warm Upgrade High Availability**
- **Cisco IOS Optimized Edge Routing**
- **Enhanced Interior Gateway Routing Protocol Enhancements**
- **Multiprotocol Label Switching: Label Distribution Protocol Autoconfiguration**
- **MPLS - LDP Graceful Restart**
- **Layer 2 Tunneling Protocol Version 3**
- **VPNs**
  - Rate Limiting NAT Translation
  - NBAR-NAT Integration and Real-Time Streaming Protocol
  - Stateful Failover Asymmetric Outside-to-Inside
  - Static IP Support
- **IP Multicast**
  - Cisco IOS Firewall Enhancements
  - Network Admission Control
  - Cisco IOS Intrusion Prevention System
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- **IP Routing**
  - Multiprotocol Label Switching
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- **IP Addressing**
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- **New Hardware**
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- **Security**
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Rate Limiting NAT Translation

- Allows extensive control over how NAT address pools and the translation table are allocated and used
- Provides an option to implement a hierarchy of rate limiting tailored to a specific network, or to specific device requirements and concerns
- Allows control over the number of concurrent translations that all users or a specific, individual IP host can have
- Enables rate limiting across all MPLS VPNs and sets limits for a specific MPLS VPN
- Helps control and mitigate Denial of Service attacks
NBAR-NAT Integration and Real-Time Streaming Protocol

- Extends NAT/PAT support of Voice/Video protocols
- Enables the many customers who use NAT to now run Real Time Streaming Protocol (RTSP) applications in Port Address Translation (PAT) mode
- RTSP is a client-server multimedia presentation control protocol that underlies multimedia applications (i.e., video delivery) that are becoming increasingly popular:
  - RealSystem G2 by RealNetworks
  - Windows Media Services (WMS) by Microsoft
  - QuickTime by Apple
  - IPTV by Cisco
Stateful Failover Asymmetric Outside-to-Inside

- Enables two NAT routers to participate in a Primary-Backup design, which improves customer ROI as the Backup NAT router is not sitting idle
- Supports multiple routing paths from outside-to-inside
- Handles IP Flow or Per Packet load balancing of asymmetric routing from outside-to-inside
- Adds support for ALL embedded addressing for all the ALGs in NAT
- Adds support for ALL NAT/PAT configuration types
Static IP Support

• Enables customers that have statically assigned IP Addresses for their “home” network to access a public WLAN network and gain access to the IP network and related service offerings

• Help to prevent malicious clients from preventing access to valid host on the outside domain

• Requires no client reconfiguration for clients configured with static IP addresses

• Allows accounting information to be generated per user session

• Provides an Access Zone Router that supports:
  Web login using static IP address
  802.1x login using static IP address
Major Release 12.4
IP Mobility Highlights

### Cisco IOS Software Major Release 12.4

- Dynamic Security Associations and Key Distribution
- IP Mobility
  - Cisco IOS Optimized Edge Routing
  - Enhanced Interior Gateway Routing Protocol Enhancements

### New Hardware
- Cisco Integrated Services Routers
- Cisco 3925 Series Routers
- Cisco 830 Series Routers

### Security
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### Multiprotocol Label Switching
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- QoS with VRF

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- Cisco Security Device Manager
Dynamic Security Associations and Key Distribution

- Greatly improves network security and usability for mobile users while also simplifying Mobile IP provisioning for network administrators
- Improves security with renewable, dynamically generated keys; improves usability and provisioning with "single sign-on" capability for mobile users

Enables Mobile IP to automatically derive the security associations from its user's Windows login name and password upon logging in to the Windows domain

Eliminates the need for manually configuring security associations and additional key allocation to mobile users

Leverages the existing Windows infrastructure for mobile user authentication
Major Release 12.4
Multiprotocol Label Switching Highlights

Cisco IOS
Software Major
Release 12.4

Multiprotocol Label Switching
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Cisco AutoSecure
Control Plane Policing
Role-Based CLI Access
Cisco Security Device Manager
Multiprotocol Label Switching: Label Distribution Protocol Autoconfiguration

- Provides a global configuration command that automatically enables LDP on interfaces for which a specified Interior Gateway Protocol (IGP) has been enabled
- Simplifies LDP configuration
- Enables more product deployment options
- Features consistency across products
MPLS - LDP Graceful Restart

- Provides Nonstop Forwarding (NSF) Awareness for LDP traffic, which enables continuous forwarding and graceful recovery of MPLS LDP traffic during an LDP reset or session restart
- Enables more product deployment options
- Features consistency across products
- Increases MPLS LDP network uptime and reliability
Major Release 12.4
VPNs Highlights

Cisco IOS Software Major Release 12.4
Layer 2 Tunneling Protocol Version 3
Extends IP Capabilities to Layer 2 VPNs

- L2TPv3 is designed for **multiservice tunneling** over IP networks
- Extends L2TPv2 (RFC 2661), the standard protocol for tunneling PPP
- **Simple** edge configuration is all that is required!
- Fixed header allows for **high-performance/HW-accelerated decapsulation**
- **Standards Based** (RFC 3931), open architecture allows extensibility to many transport types

![Diagram](https://example.com/diagram.png)
Layer 2 VPNs with Layer 2 Tunneling Protocol Version 3 Benefits

- **Reduces total cost of ownership**
  Consolidates multiple core technologies (i.e., IP and ATM) into a single, packet-based infrastructure

- **Simplifies services**
  Enables Service Providers to provide Layer 2 connectivity, maintaining customer autonomy (Service Providers do not participate in customer routing)

- **Protects investments**
  Allows Service Providers to leverage an existing IP infrastructure to support Layer 2 networks without a Layer 2 infrastructure

- **Enhances feature support**
  Enables Service Providers to use advanced Cisco IOS Software features (i.e., QoS) to tailor Layer 2 traffic to customer requirements

- **Increases revenue**
  Provides new service/revenue opportunities for IP-based networks (i.e., Layer 2 transport and Metro Ethernet services)
Agenda

• Release 12.3T Family
• Introducing Release 12.3(8)T
• Cisco IOS Packaging

• Upgrade Paths
• Summary
Release 12.4 Upgrade Paths

Major Release 12.4

- Releases 12.2, 12.3, & 12.3T
- X Releases

For maturity, wide deployability, Release 12.3T functionality and hardware

For new functionality and hardware

Release 12.4T
Agenda

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• Introducing Release 12.3(8)T
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• Upgrade Paths

• Summary
Cisco IOS Software Major Release 12.4

Delivers Advanced Functionality with Powerful Hardware Support

- Developed for the most demanding Enterprise, Access, and Service Provider Aggregation networks
- Provides a comprehensive portfolio of Cisco technologies, including the leading-edge functionality and hardware introduced in Release 12.3T
- Introduces more than 700 industry-leading features across the widest range of hardware in the industry
- Anchored by an intensive stability and testing program
Major Release 12.4 References

- Cisco IOS Software Release 12.4
  www.cisco.com/go/release124/

- Cisco Integrated Service Routers
  www.cisco.com/go/isr/

- Feedback and Questions