Cisco Expo 2009

Cisco WAAS Wide Area Application Services

Technical Overview & Important Features

Speed up applications, reduce latency, save bandwidth, consolidate servers

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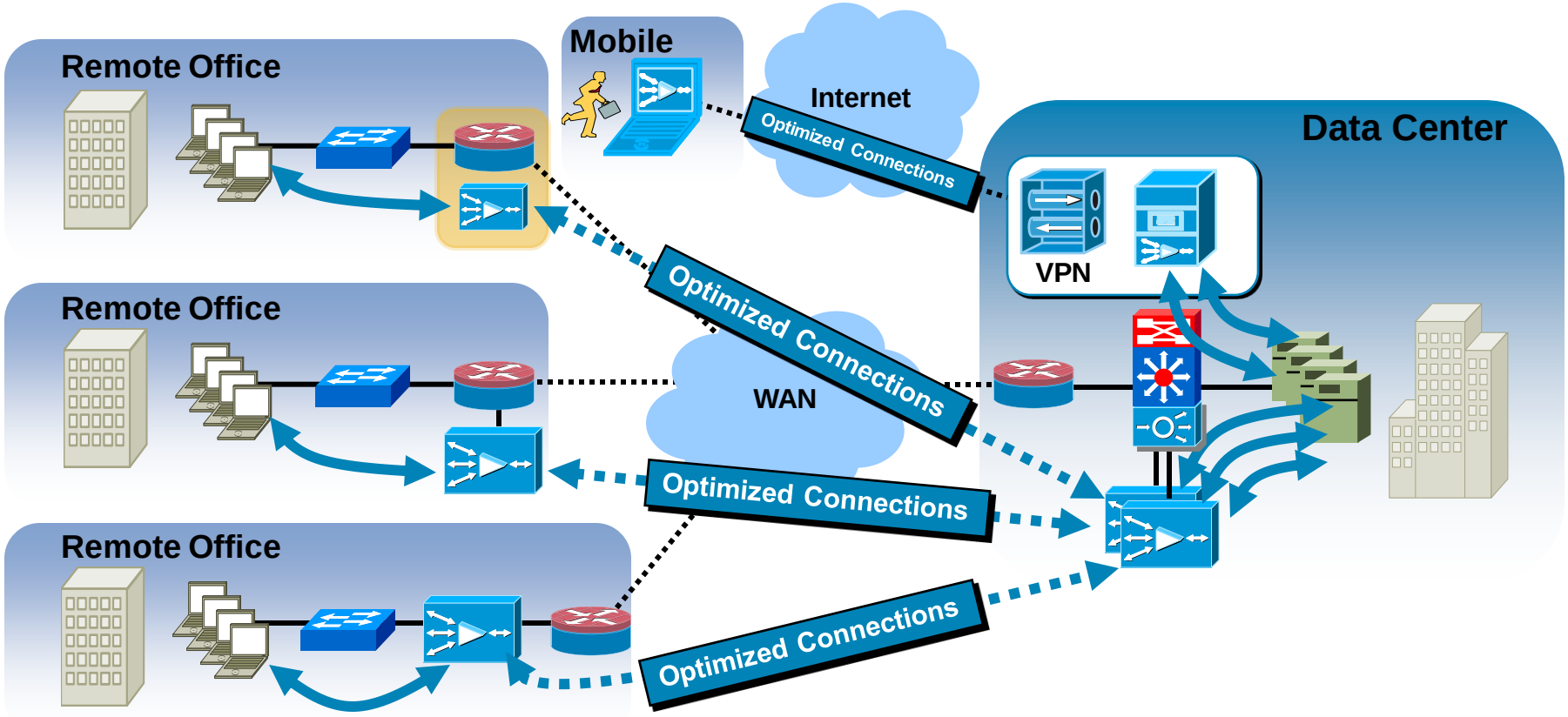
Agenda

- Cisco WAE Platforms
- Cisco WAAS Product Architecture
- Application Specific Acceleration
- Data Replication Acceleration
- Network-embedded virtualization
- Management
- Q&A

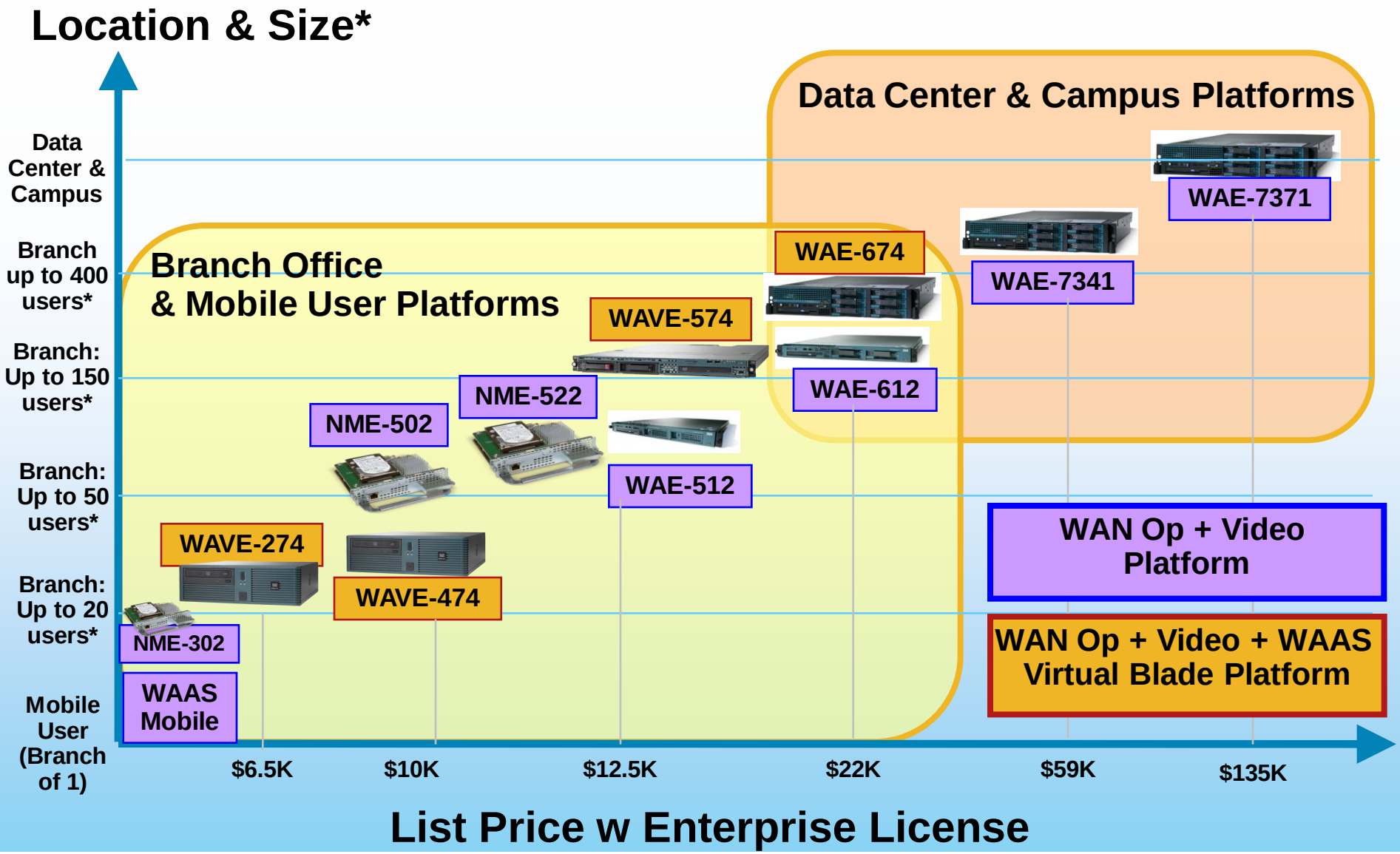
Cisco WAAS

Comprehensive WAN Optimization Solution

- Accelerates applications over the WAN
- Delivers video to the branch
- Provides local hosting of branch IT services



WAAS Product Line Overview



*** Indicative sizing only. Please refer to WAAS sizing guidelines to size specific to customer requirements.**

* NME-302 - offers TCP Optimization & Compression only. It does not support Enterprise License Features.

Cisco WAAS Router Modules

NME-WAE
Router-Integrated Network Module
for the Cisco Integrated Services Router

Cisco Integrated Services
Router Series

- Provides the lowest CapEx and OpEx; integrates within the ISR; addresses 80 percent of remote branch offices.
- Single-processor system; can be clustered with WCCPv2, PBR, and is supported in ISR models 2811, 2821, 2851, 3825, and 3845.

- Model NME-WAE-302:
  - 512 MB of RAM, 80 GB of disk
  - Up to 4 Mb/s WAN connections and up to 250 optimized TCP connections
- Model NME-WAE-502:
  - 1 GB of RAM, 120 GB of disk
  - Up to 4 Mb/s WAN connections and up to 500 optimized TCP connections
- Model NME-WAE-522:
  - 2 GB of RAM, 160 GB of disk
  - Up to 8 Mb/s WAN connections and up to 800 optimized TCP connections

WAAS on ISR G2

- WAAS edge deployment for small to medium offices
- Integration with ISR G2
- Application Acceleration validated with application vendors
- WAN Optimization
- Enable Server Consolidation

NME-WAE-502

Supported on 2911, 2921, 2951 and 3900 with Network Module Adapter

WAAS 4.1.5 or later

Available at ISR G2 FCS

Value Proposition on 502

Investment protection for current 502 customers

Available for immediate deployment

Proof of Concept for ISR G2 and WAAS

Cisco WAAS Appliance Family

WAE-512 Appliance

- WAE-512 Appliance:
  - Single-processor system with 250 GB of RAID-1-protected SATA2 disk capacity and optional disk encryption.
  - 1 GB memory configuration supports 8 Mb/s WAN connections and 750 optimized TCP connections.
  - 2 GB memory configuration supports 20 Mb/s WAN connections and 1500 optimized TCP connections.

WAE-612 Appliance

- WAE-612 Appliance:
  - Dual-core processor system with 300 GB of RAID-1-protected and hot-swappable SATA2 disk capacity and optional disk encryption.
  - 2 GB memory configuration supports 45 Mb/s WAN connections and 2000 optimized TCP connections.
  - 4 GB memory configuration supports 90 Mb/s WAN connections and 6000 optimized TCP connections.

Cisco WAAS Virtualization Appliance

WAE-674 Appliance

- WAE-674 Appliance:
  - Support for WAAS and Up to 3 Additional Virtual Blades
  - SCSI drives with RAID-5 & Hot Swap
  - Option to add redundant power & cooling
  - 300-GB for Virtual Blade
  - 300-GB Usable Disk for DRE, CIFS, etc.
  - Base memory 4 GB, option to upgrade to 8 GB of Memory
  - Hardware Assist for Enterprise Class Virtual Blades

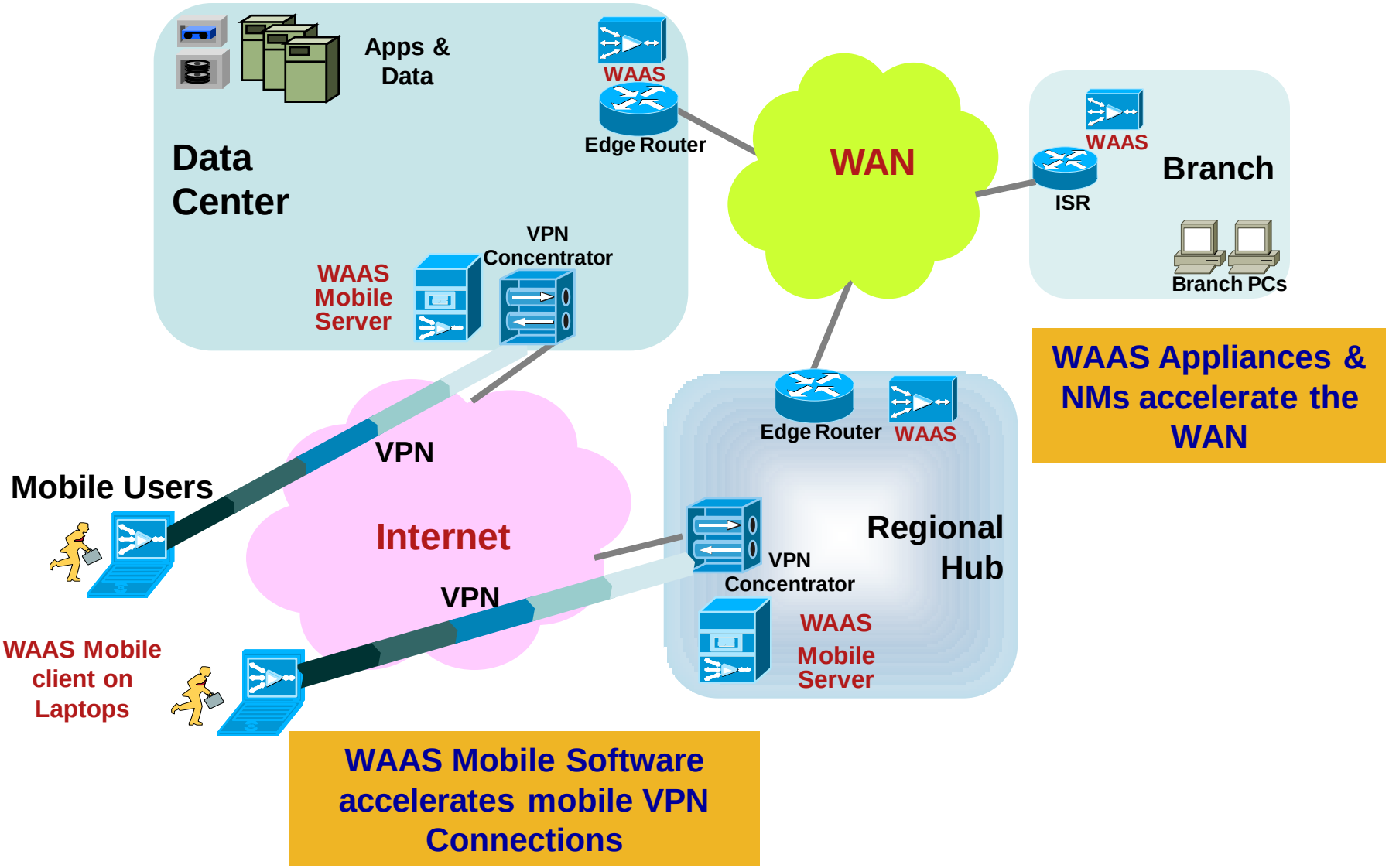
Cisco WAAS Data Center Appliances

WAE-7341
Enterprise Data Center Appliance

WAE-7371
Enterprise Data Center Appliance

- WAE-7341 Appliance:
  - Quad-core processor, 12 GB of RAM
  - Up to 310 Mb/s WAN connections and 12,000 optimized TCP connections
  - Up to 900 GB RAID-5-protected and hot-swappable SAS disk capacity with optional disk encryption
- WAE-7371 Appliance:
  - Dual quad-core processors, 24 GB of RAM
  - Up to 1 Gb/s WAN connections and 50,000 optimized TCP connections
  - Up to 1.5 TB RAID-5 protected and hot-swappable SAS disk capacity with optional disk encryption

Introducing Cisco WAAS Mobile



Cisco WAAS Licensing

License	Description	Use
Transport	Includes WAN optimization features only: ▪ Data Redundancy Elimination ▪ Persistent Session-Based LZ Compression ▪ Transport Flow Optimization Includes Cisco IOS-like command-line interface and Cisco WAE Device Manager GUI	Used for deployments where applications need to be optimized but protocol latency does not need to be mitigated (non-server-consolidation environments). Provides optimizations for all TCP-based applications, but no CIFS protocol acceleration (latency mitigation/caching), file server disconnected mode, or print.
Enterprise	Includes all the features of Transport license and: ▪ Application Acceleration: CIFS, HTTP, SSL, NFS, MAPI ▪ Disk encryption ▪ NetQos FlowAgent integration Enables a WAE to act as Central Manager for Cisco WAAS deployments: ▪ Includes Central Manager GUI ▪ Order two for active or standby deployments	Used for deployments where applications need to be optimized and file servers are being consolidated. Provides optimizations for all TCP-based applications and protocol acceleration for CIFS, HTTP, SSL, NFS, MAPI Required for each deployment of Cisco WAAS. Deployments without Central Manager are not supported under any circumstance.
Video	Enables the Live Video Streaming Acceleration *Add on to the Enterprise License*	Used for deployments where video streaming enhancements are required
Virtual Blade	Enables the Virtual Blade features *Add on to the Enterprise License*	Used for deployments where a server may be required for print services and directory services

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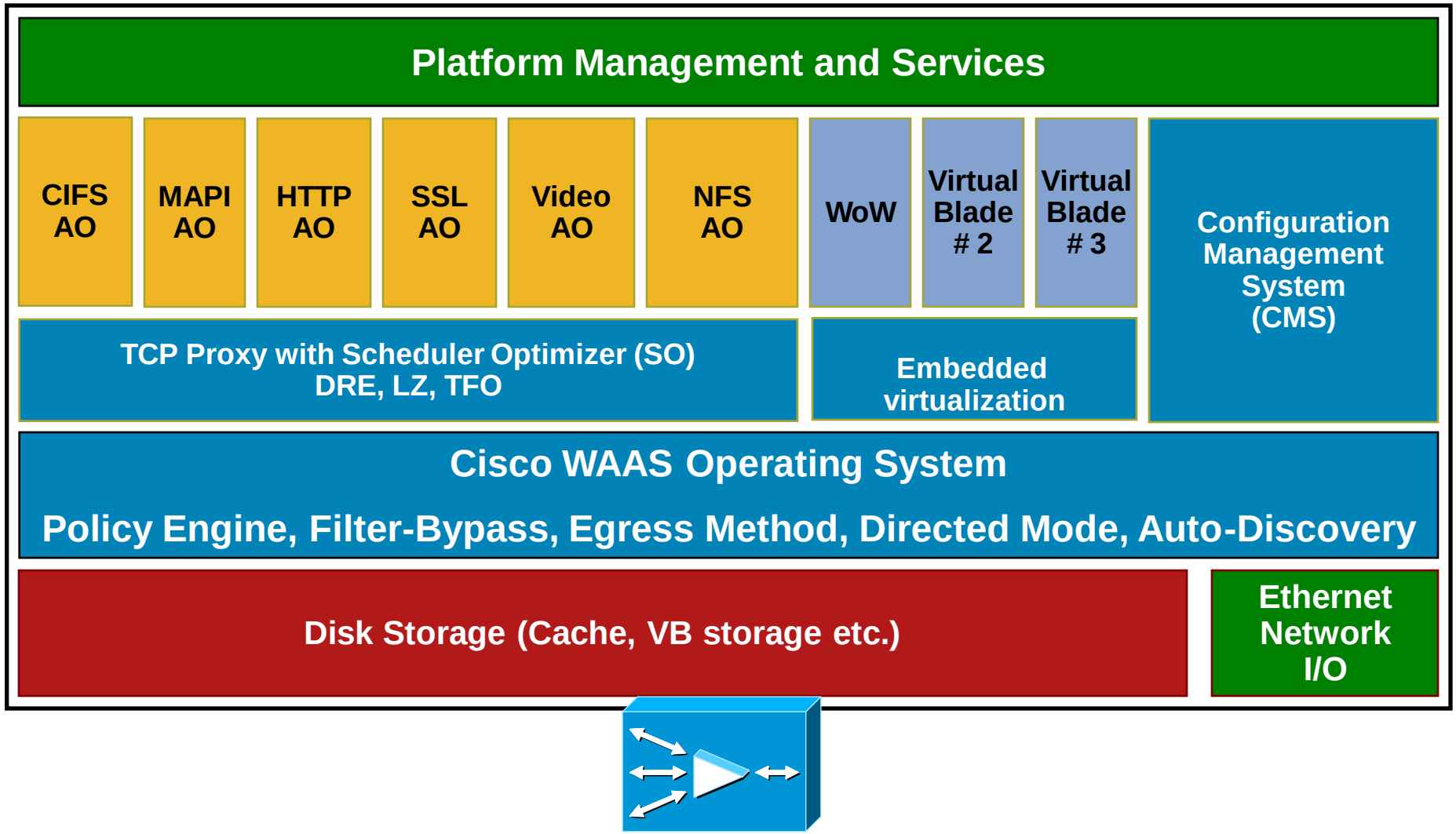
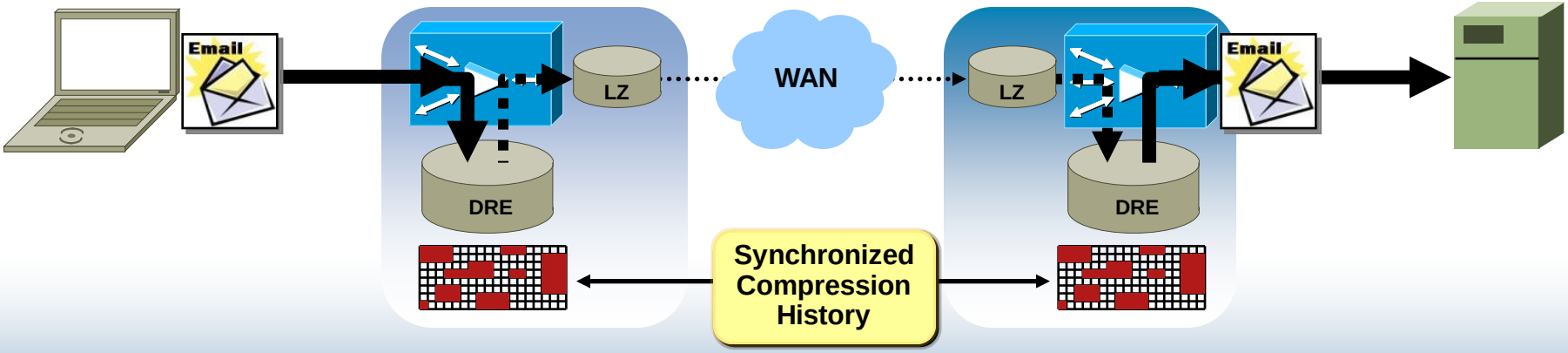
Cisco WAAS Product Architecture



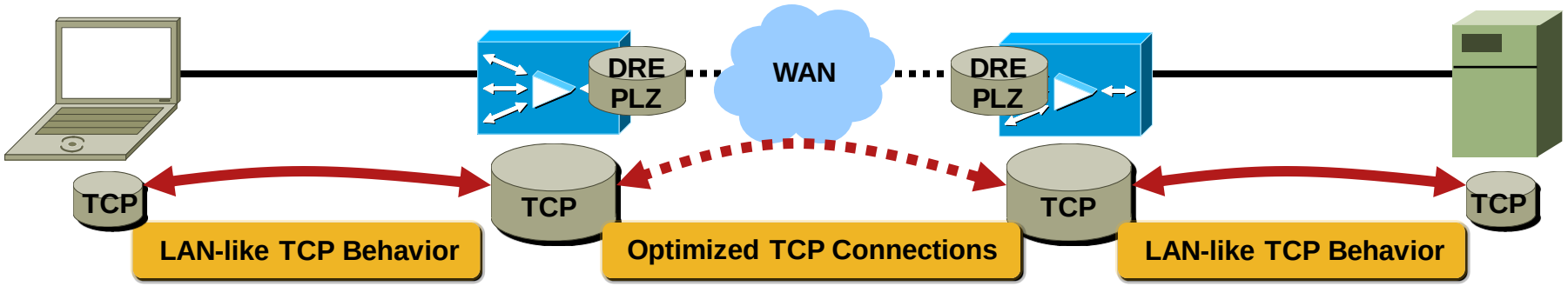
Advanced Compression

- **Data Redundancy Elimination (DRE)**:
  - –Application-agnostic compression
  - –Up to 100:1 compression
- **Persistent LZ Compression**:
  - –Session-based compression
  - –Up to an additional 10:1 compression even after DRE



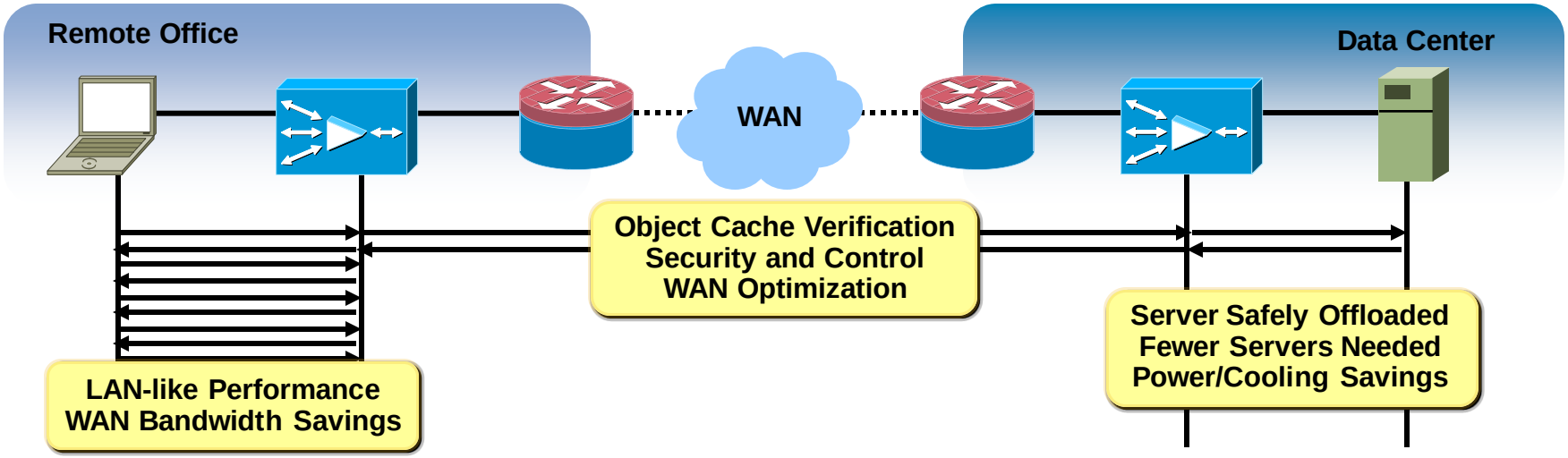
TCP Flow Optimization (TFO)

- Improves application throughput
- Improves existing WAN bandwidth utilization
- Shield end-nodes from unruly WAN conditions
  - Bandwidth scalability - help certain applications 'fill-the-pipe'
  - Connection fairness - ensure bandwidth is allocated fairly amongst flows
  - Loss mitigation - selective acknowledgement and retransmission
  - Slow-start mitigation - improve connection setup time
- TCP Proxy architecture provides LAN-like TCP behavior and provides higher levels of compression than per-packet compression
- TFO provides adaptive buffering to help ensure that connections requiring additional memory to achieve higher throughput



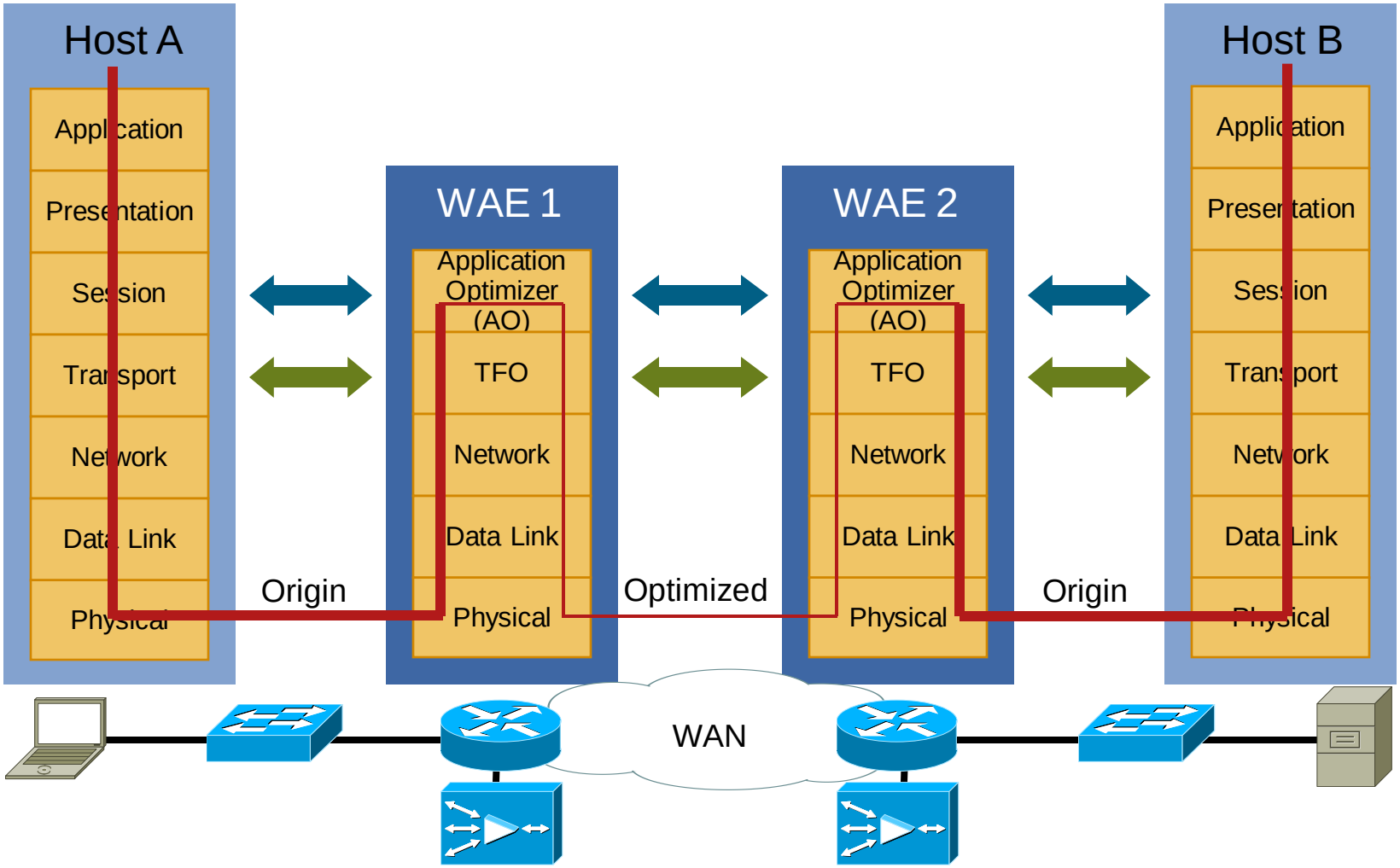
Application-Specific Acceleration

- Application and Protocol Awareness
  - Minimize chatter through protocol proxy-caching, read-ahead, write-behind, and other optimization
  - Safe caching preserves coherency, integrity while improving performance and saving WAN bandwidth
  - Scheduled File preposition enables intelligent distribution of large objects to improve performance
- Intelligent Server Offload
  - Caching and optimizations minimize workload on accelerated servers enabling consolidation along with centralization
- WAAS Application Accelerators
  - CIFS, NFS, MAPI, Video, HTTP, SSL
  - Windows printing
- Licensed developed and validated with application vendors



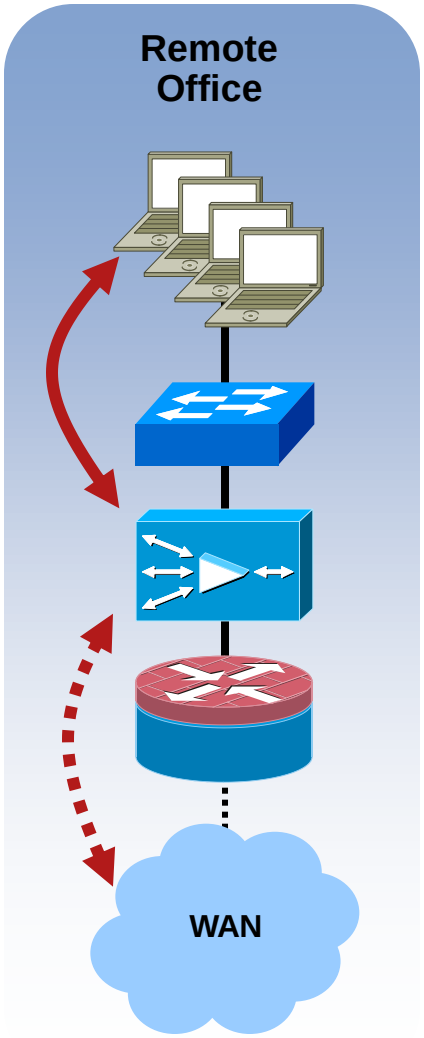
WAAS Overview

Session and Transport Layer Optimization



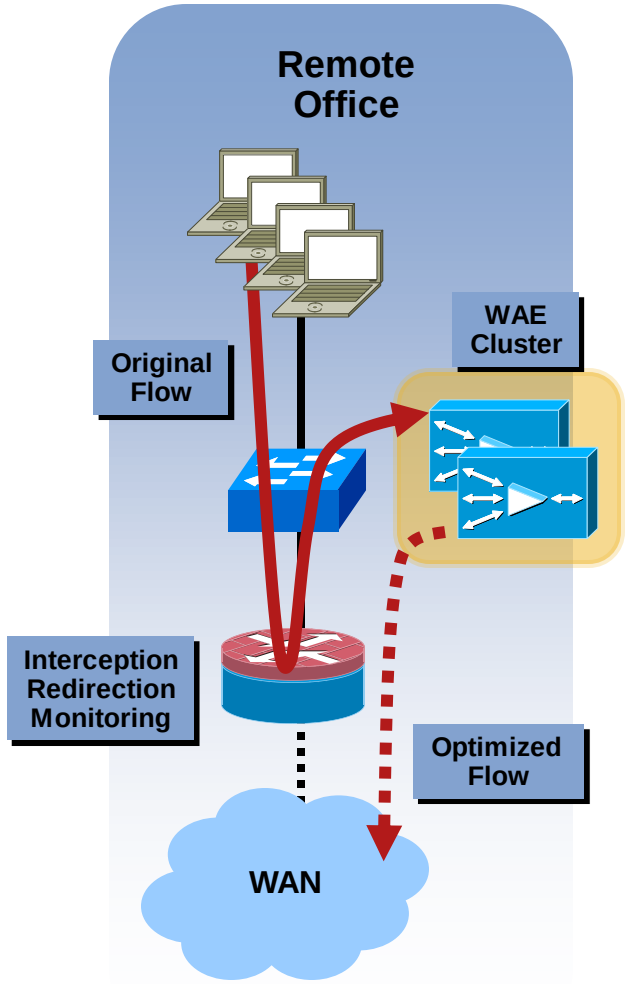
Simple Transparent In-path Deployment

- Simple Plug-and-Play Deployment
  - Physical in-path deployment between switch and router or firewall requires no network changes
  - Mechanical fail-to-wire upon hardware, software, or power failure
- Scalability and High Availability
  - Two two-port fail-to-wire groups provides support for redundant network paths and asymmetric routing
  - Serial in-path clustering with load-sharing and fail-over
- Seamless Transparent Integration
  - Transparency and automatic discovery
  - 802.1q VLAN trunking support
  - Supported on all WAE appliance models



Network-Integrated Off-path Interception

- Transparent integration and automatic discovery regardless of interception method
- WCCPv2 Interception
  - Active/active clustering supports up to 32 WAEs and 32 routers with automatic load-balancing, load redistribution, fail-over, and fail-through operation
  - Near-linear scalability and performance improvement when adding devices
- Policy-Based Routing Interception
  - Routing of flows to be optimized through a Cisco WAE as a next-hop router
  - Active/passive clustering provides high availability and failover using IP SLAs as a tracking mechanism



Scalable Data Center Integration

- Application Control Engine (ACE)

  Appliance and Catalyst 6500 series module provide industry-leading scalability and performance for the most demanding data center networks

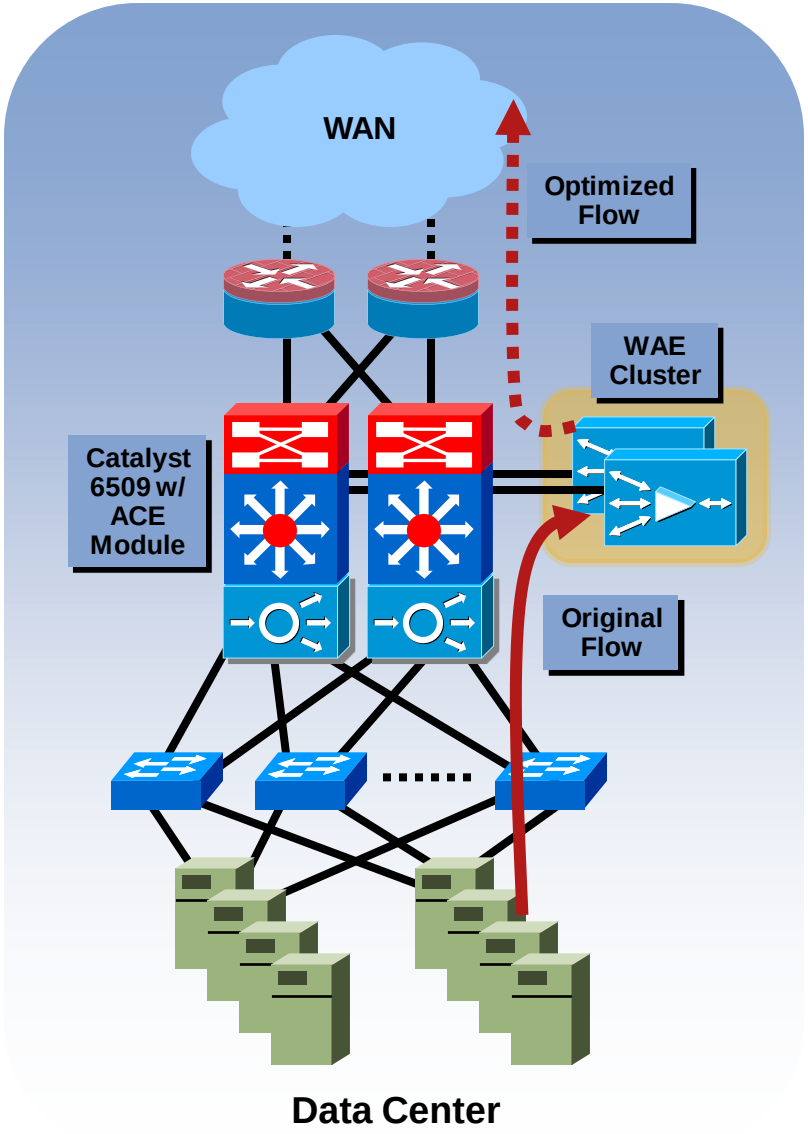
  Supports from 1Gbps to 64Gbps of aggregate throughput and up to 4M concurrent TCP connections

  Cluster management for hundreds of WAE devices provides industry's most scalable and high-performance WAN optimization solution

- Asymmetric Optimization

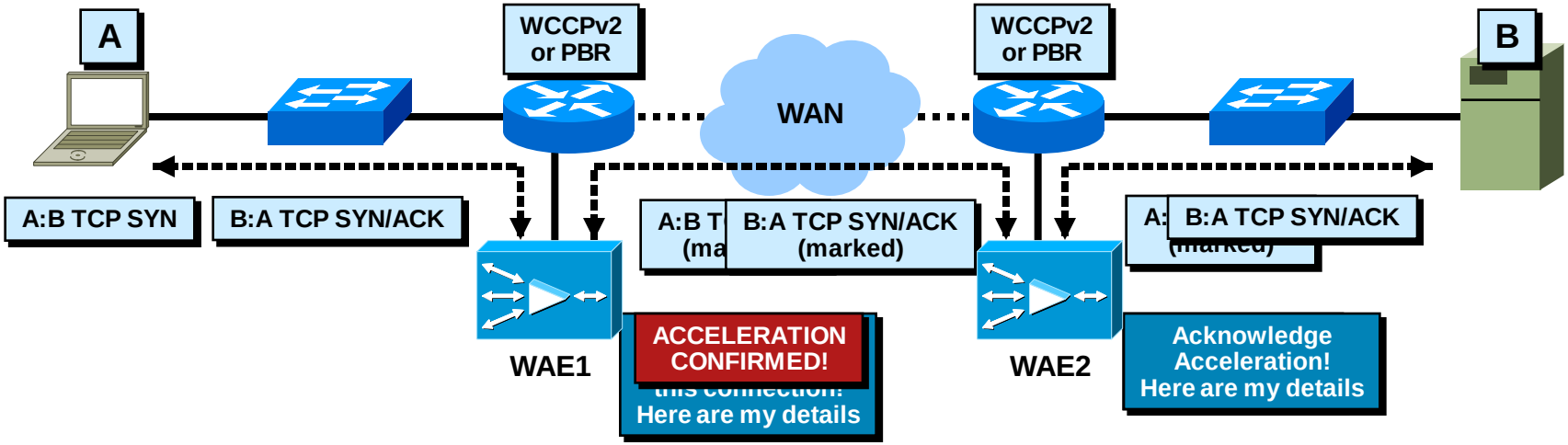
  Host of asymmetric optimizations that complement WAAS and provide single-ended performance and scalability improvements

  Includes intelligent compression, latency reduction for HTTP applications, SSL offload, and TCP connection re-use



Cisco WAAS Auto-Discovery

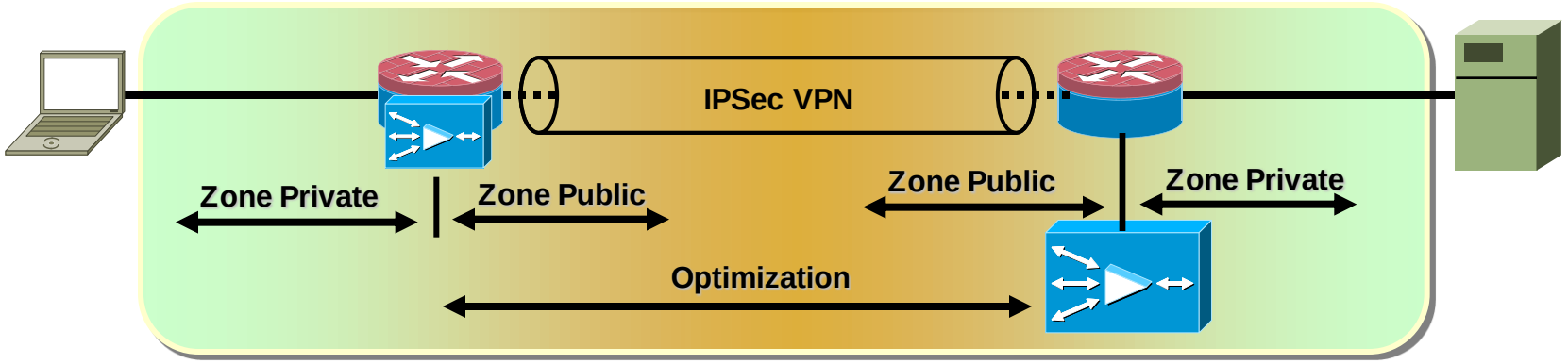
- Cisco WAAS devices automatically discover one another and negotiate optimization capabilities
- Eliminates the need for complex overlay networks with tunnels that could double management effort and break control, security, and monitoring systems



Secure WAN Optimization

- Security technologies have gone mainstream in today's branch office:
  - Represent a significant investment and priority.
  - Must not be compromised by emerging WAN acceleration technology.
- Cisco WAAS has unique capabilities to provide secure WAN optimization at the branch:
  - Firewall interoperability
  - Disk encryption
  - Role Based Access Control (RBAC):
  - PCI compliance
  - Common Criteria certification

Cisco WAAS: Security Integration



Firewall recognition of the TCP options used in WAAS autodiscovery:

- Permits the initial sequence number shift for the connection
- Maintains the Layer 4 state on the optimized path

WAAS interoperability with leading Cisco security platforms:

- IOS Firewall 12.4(11)T2
- FWSM 3.2.1
- ASA/PIX release 7.2.3

IOS Firewall

- Independent IOS Firewall:

  IOS Firewall 12.4(11)T2 incorporates an enhancement to observe WAAS TCP sessions:

  - Identifies TCP options used in autodiscovery.
  - After successful completion of autodiscovery it permits the initial sequence number shift for the connection without compromising stateful inspection.

  Solution applies to both inline and WCCP interception WAAS appliance deployments.

  Full Stateful Firewall for optimized traffic.

Cisco WAAS: Firewall Integration

Cisco WAAS provides autodiscovery utilizing TCP options:

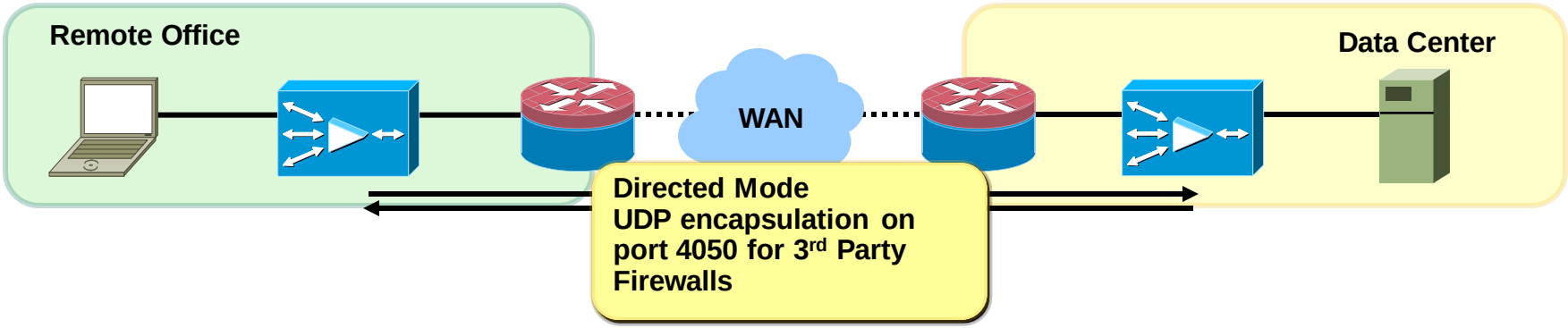
- Firewalls might scrub TCP options used for autodiscovery

Cisco WAAS sequence number shift used to distinguish between optimized and nonoptimized flows:

- Firewalls see the sequence number shift and drop the session

Cisco Firewalls can be made WAAS aware which avoids these problems

Cisco WAAS Directed mode supports 3rd party firewalls that do not support the auto discovery process.



Cisco WAE Disk Encryption

- Cisco WAE Disk Encryption

  Optional feature applied against data partitions within the WAE to mitigate concern of data theft due to stolen drives or physically compromised WAE devices

  Keys fetched from CM upon boot and stored in memory only, WAE will pass-through if keys are unavailable

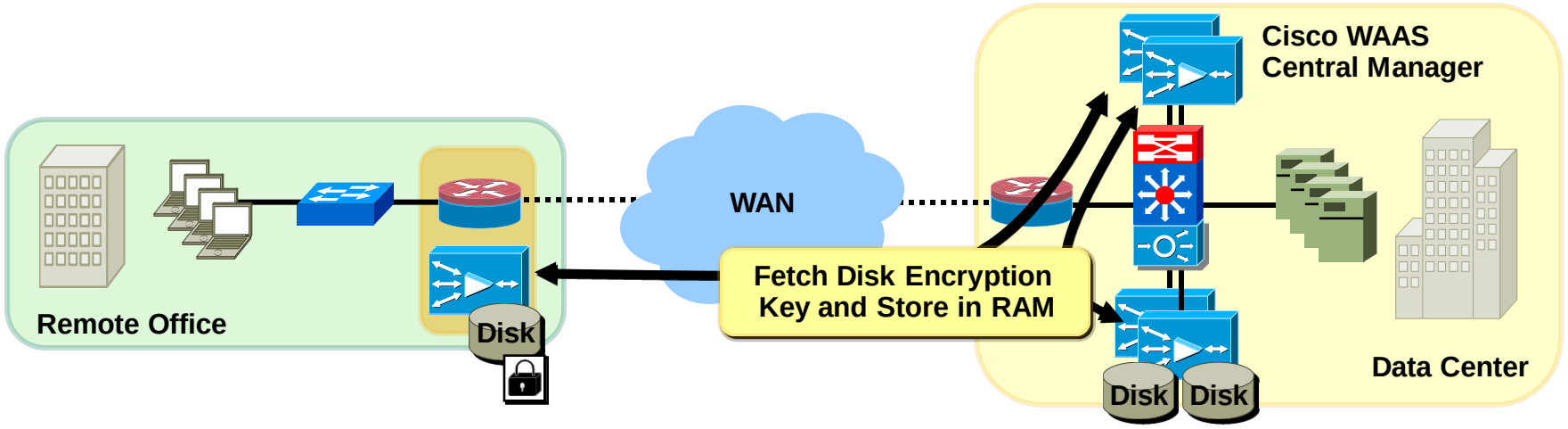
  Keys synchronized amongst Central Managers to ensure high availability

- Standards-Based Strong Encryption

  Follows FIPS 140-2 level 2 specification with certification to follow

  256-bit Advanced Encryption Standard (AES) cipher, which is the standard for US Government data protection and the strongest commercially-available encryption

  Cisco WAAS is 'In Evaluation' with Common Criteria certification



Common Criteria

- Common Criteria is an international standard (ISO 15408) for security features in a product:
  - In the United States, federal government agencies prefer products that are Common Criteria “Certified” or “In-evaluation.”
  - Common Criteria is a part of a U.S. government initiative between the National Institute of Standards and Technology (NIST) and the National Security Agency (NSA).
- Cisco WAAS is the first WAN acceleration product certified under Common Criteria:
  - Certification is under EAL4 (level of certification).
  - Cisco WAAS is the first product to be certified.
  - URL: http://www.niap-ccevs.org/cc-scheme/in_evaluation.cfm

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CIFS Application Optimizer

Problem

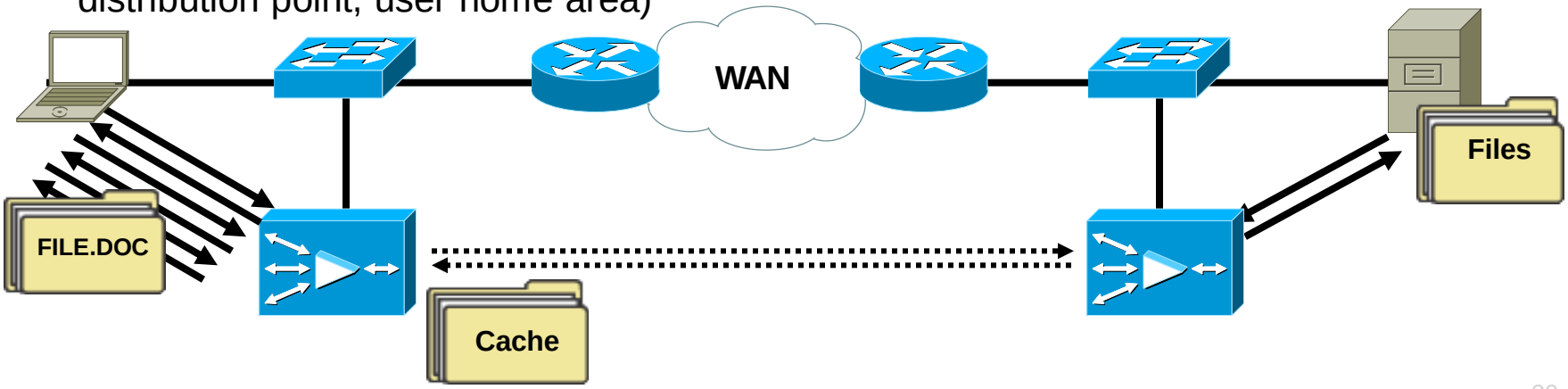
CIFS is a "chatty" protocols and when used in an environment with high latency, packet loss, and bandwidth constraints such as a WAN, file server access over the WAN is significantly diminished.

Solution

- File and Metadata caching
- Read-ahead
- Message pipelining
- Scheduled preposition to pre-populate
- Transparent integration
- Dedicated CIFS cache (SMS distribution point, user home area)

Benefits

- Enable consolidation of distributed file and print resources into the data center without compromising performance.
- Offload of Data Center Servers



Windows Printing Application Optimizer

Problem

Windows Print protocol uses MS-RPC which is very “chatty”

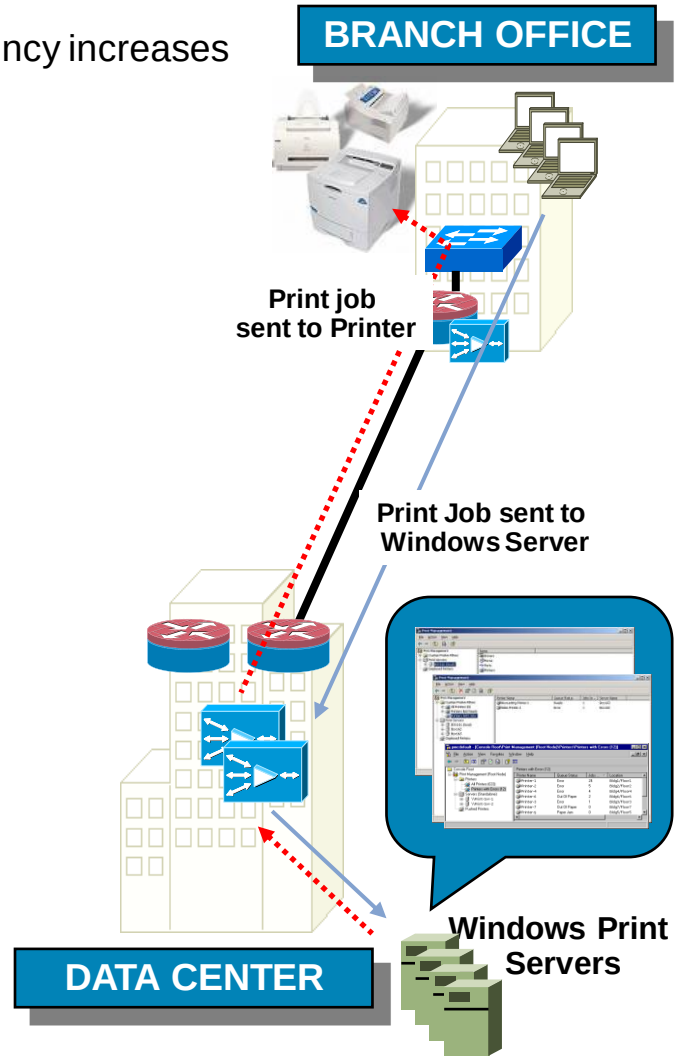
As A result Windows Print over WAN degrades exponentially as latency increases

Solution

- Based on licensed Microsoft Print Protocols
- Optimized access to print queue status and printer settings
- Bi-directional Acceleration
- Printer and Queue meta-data caching
- Async write
- DRE hints for enhanced payload compression
- MS-RPC message optimization
- RPC command fragments are handled asynchronously
- Delayed close of printer handles (OPEN requests local)

Benefits

- Users print at near-LAN speeds
- No need for Network IT group to manage Branch Print
- No configuration on WAAS – just turn it on!
- Enable scalable centralized Windows Print services
- Fully Transparent to Windows AD Management
- Easy server migration from branch to datacenter



NFSv3 Application Optimizer

Problem

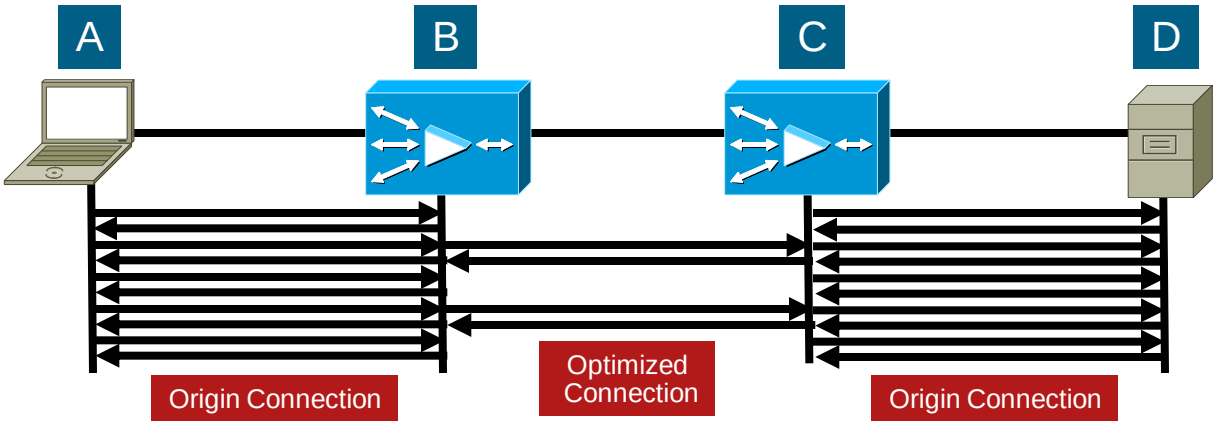
- In UNIX environments Network File System (NFS) protocol is being used for large file exchange such as software builds, CAD applications and large directory access
- NFSv3 is a “chatty” RPC protocol
- Clients cannot efficiently operate on high-latency/high-bandwidth WANs

Solution

- Read-Ahead
- Asynchronous write
- DRE hints
- Meta-data caching

Benefits

- Can fill high-bandwidth links regardless of latency
- Transparent to client and server. No configuration required.
- Tested for compliance with IBM AIX, Linux and Solaris clients + Leading NAS vendors!



HTTP Application Optimizer

Problem

- Slow page load on Interactive Web applications
- Browsers serially open and close connections to fetch small objects (e.g graphics)
- Latency in a connection open/close could be higher than object transmit time.

Solution

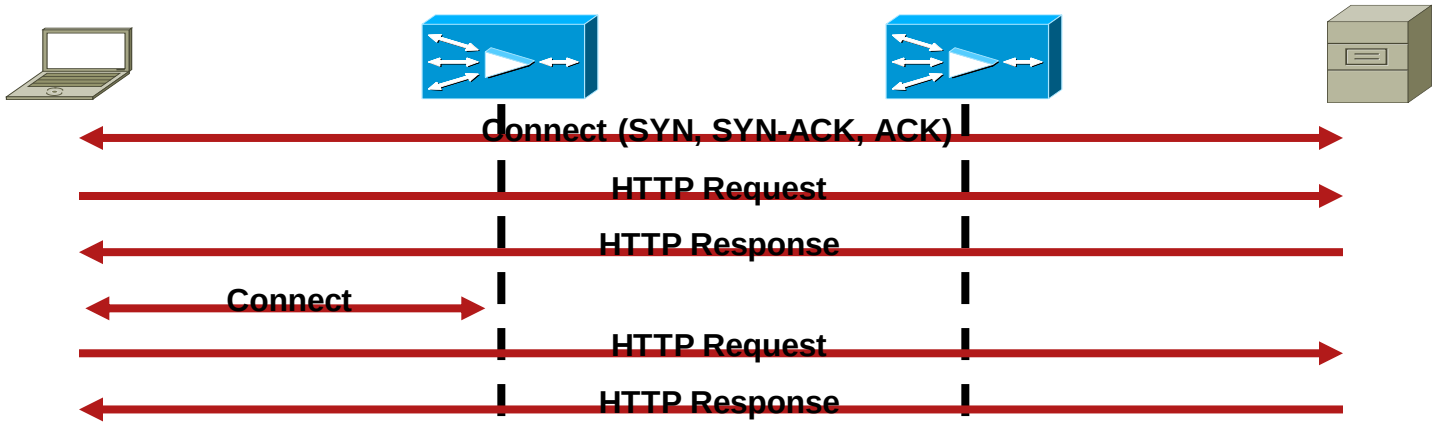
- Fast Connection Reuse - Optimized connections on the WAN remain active for a short period of time to be re-used should additional data between the client-server pair need to be exchanged
- Proxy Connect to SSL Servers – Each HTTP request is being inspected and forwarded to the HTTP or SSL AO or general optimization

Benefits

- This eliminates the latency caused by establishing multiple connections between clients and servers
- Tuned to offset connection "bursts"

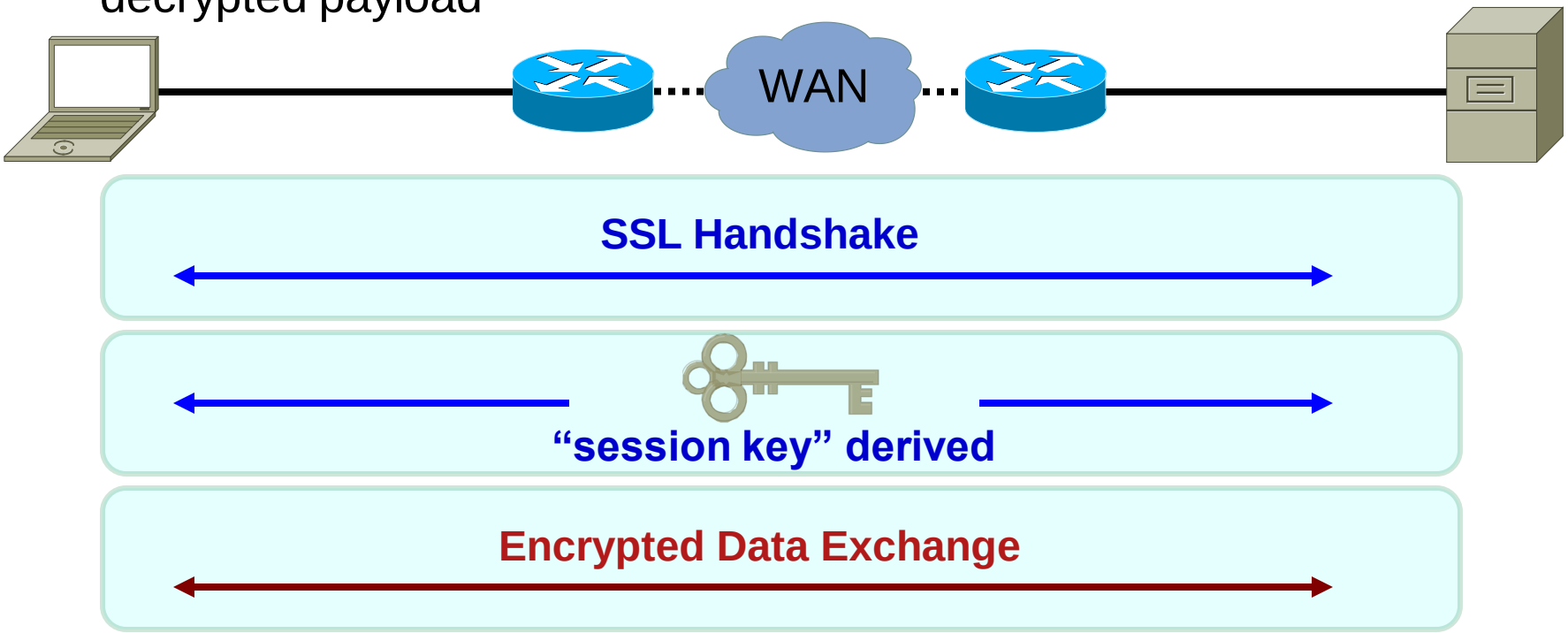
  Bounded session and idle timeouts
- Transparency is maintained

  Only same pair of client and server requests are reused
- Compliments and preserves http application pipelining



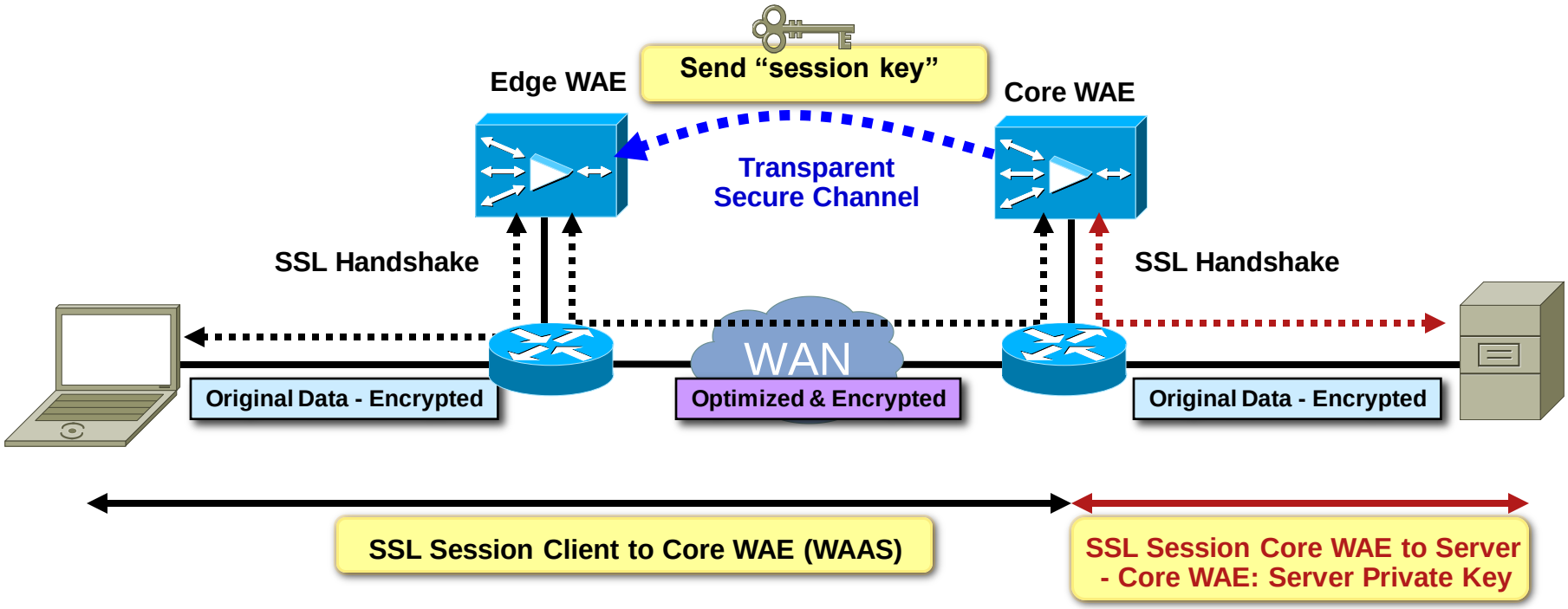
The Need for SSL Acceleration

- WAAS optimization benefits are maximized only when applied to decrypted payload



Cisco WAAS SSL Optimization Solution

- Core WAE acts as a Trusted Intermediary Node for SSL requests by client
- Private Key and Server Certificate are stored on the Core WAE device
- Core WAE participates in SSL Handshake to derive “session key”
- Distributes the “session key” securely in-band to the Edge WAE over the established connection between the Edge WAE and Core WAE



Cisco WAAS SSL – Benefits Summary

- **Trust Model maintained in Data Center = Better Security**
  - Server private keys stored securely only on Core WAE; **never** pushed out to branch.
  - Edge and Core WAE communicate securely with each other, after verifying each-other's identity
- **Widest Range of SSL Acceleration**
  - Online security check of certificates against enterprise and root authorities (OCSP)
  - Supports Client Authentication and validation
  - Supports high-security mode (DHE key exchange) - default in some popular browser & server combinations
- **Flexible Deployment**
  - PKI integration - Import Original Server Certificate and Private Keys signed by CA
  - Use Wildcard Certificates signed by CA
  - Use Enterprise CA signed Certificate – derive session key without original server private key
- **Ease of Operation = Lower Opex**
  - SSL Service policy required only on the Core WAE
  - Scalable service configuration using Wildcard certificates

Cisco WAAS SSL differentiators

Feature	What is this feature about?	Why is this important?
Online Certificate Status Protocol (**OCSP**)	Real-time check whether SSL certificates are valid and/or revoked	▪ Real-time certificate checks are effective only if all devices that intercept SSL traffic have OCSP support. SSL devices that don't support OCSP becomes the weak link from the security perspective
Client Authentication	Server authenticates client based on client certificates. WAAS SSL an optimize traffic using client certificates	▪ Provides user-id level identity control ▪ Common in Federal, Defense, and foreign financial firms.
Explicit HTTP(S) Proxy	WAAS can optimization connections that upgrades from clear text to a crypto-SSL during connection set-up	▪ Most enterprise and large commercial customers use URL filtering & explicit proxy
Diffie-Hellman (DHE) Key Exchange	Higher Security Key Exchange Method	▪ Default option for some popular browsers and servers (Apache/Firefox)
Simplified Group based Trust configuration	Automated trust relationship negotiation between WAAS devices using device group	▪ This simplifies deployment compared to the manual setup of trust relationships required on competitive products

MAPI Application Optimizer

Problem

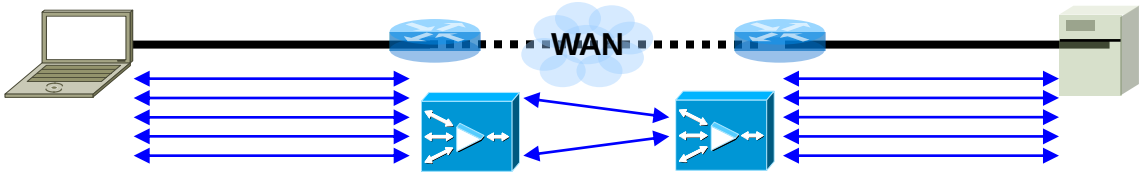
- MAPI is using MS-RPC which is a chatty request-response protocol.
- MAPI exchanges many interactive control messages, perform meta-data operations and large object transfers.
- MAPI traffic is negotiated using MS Port Mapper (port 135) and is using dynamic ports
- Data encoding is negotiated by client/server Outlook 2000 obfuscates data ,Outlook 2003 and 2007 compress data (LZ) or obfuscate if uncompressible

Solution

- Full application support - Developed in conjunction with Microsoft
- Asynchronous Writes
- Read Ahead
- Messages Decompression-
- DRE hints
- EndPoint Mapper - Listens to client communication with PortMapper server and creates dynamic ATP entry for negotiated port

Benefits

- Reduced send and receive time and improves response time of interactive control operations – very important for Outlook 2000 users
- Cleans up the outbox faster – important for cached mode users
- Faster downloads of OAB, while significantly reducing BW consumption as this is a redundant transfer across user population
- Optimizes native Outlook 2007 operations (Note: requires encryption to be disabled on server)
- Transparent, automatic optimization. Simple enable/disable control, no requirement for modification of MAPI ports as Riverbed does. Integrated with EPM adapter for classification
- No reverse engineering (MSFT licensing) - Full protocol compliance with the different protocol versions –
- No security hole of keeping sessions open even after users have logged out



Video Application Optimizer

- Windows Media Stream Splitting - Each new client request (over LAN) will reuse existing incoming stream (over WAN) for the same stream URL
- Data-reduction and optimization for non-WMT/RTSP video – WAN optimization and bandwidth reduction for other video formats including video over HTTP, Flash, QuickTime, RealVideo, and any other video protocol that uses TCP as a transport
- Video-on-demand caching – Cisco WAAS CIFS acceleration can be used in conjunction with prepositioning to provide a powerful VoD-delivery architecture for enterprise e-Learning, training, and video message archival and playback
- Intelligent video server offload – Cisco WAAS video delivery services minimize the burden placed on the origin video server by intelligently
- RTSP/TCP rollover - Client requests over RTSP/UDP automatically rolled over to RTSP/TCP

VoD Streaming in Microsoft Environment – Windows Media, CIFS Servers and Active Directory

BRANCH OFFICE

User Desktop

DATA CENTER

eLearning Web Portal

1 Open Web page

2 Click on VoD (Video.asx)

3 ... opens Windows Media Player

4 Play Video .wma file

Video.asx

*.ASX Windows Media file points to *.WMA video file

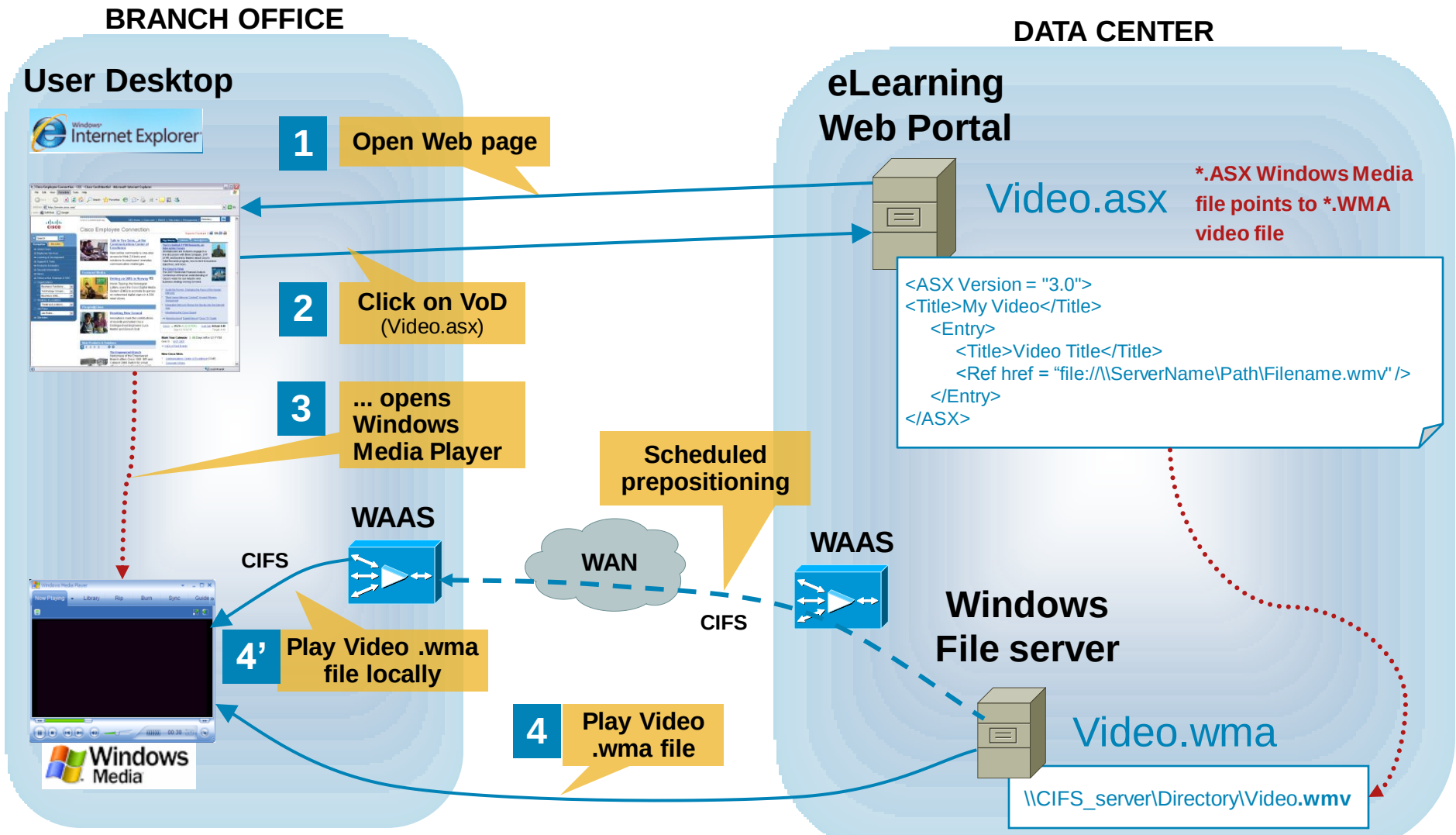
```
<ASX Version = "3.0">
<Title>My Video</Title>
    <Entry>
        <Title>Video Title</Title>
        <Ref href = " href =
"file://\\ServerName\Path\Filename.wmv/>
    </Entry>
</ASX>
```

Windows File server

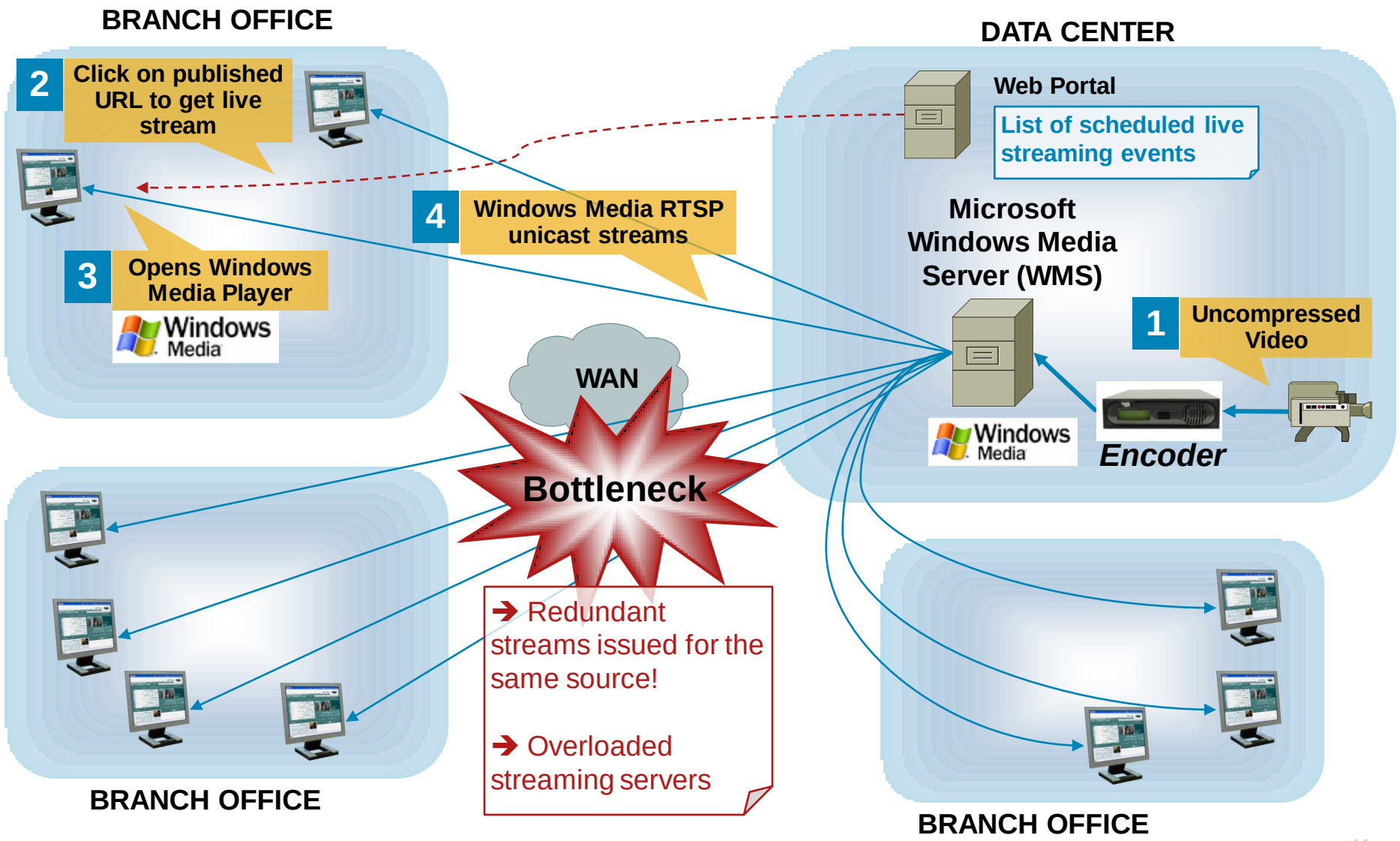
Video.wma

\\CIFS_server\Directory\Video.**wmv**

VoD Streaming in a Microsoft Environment –

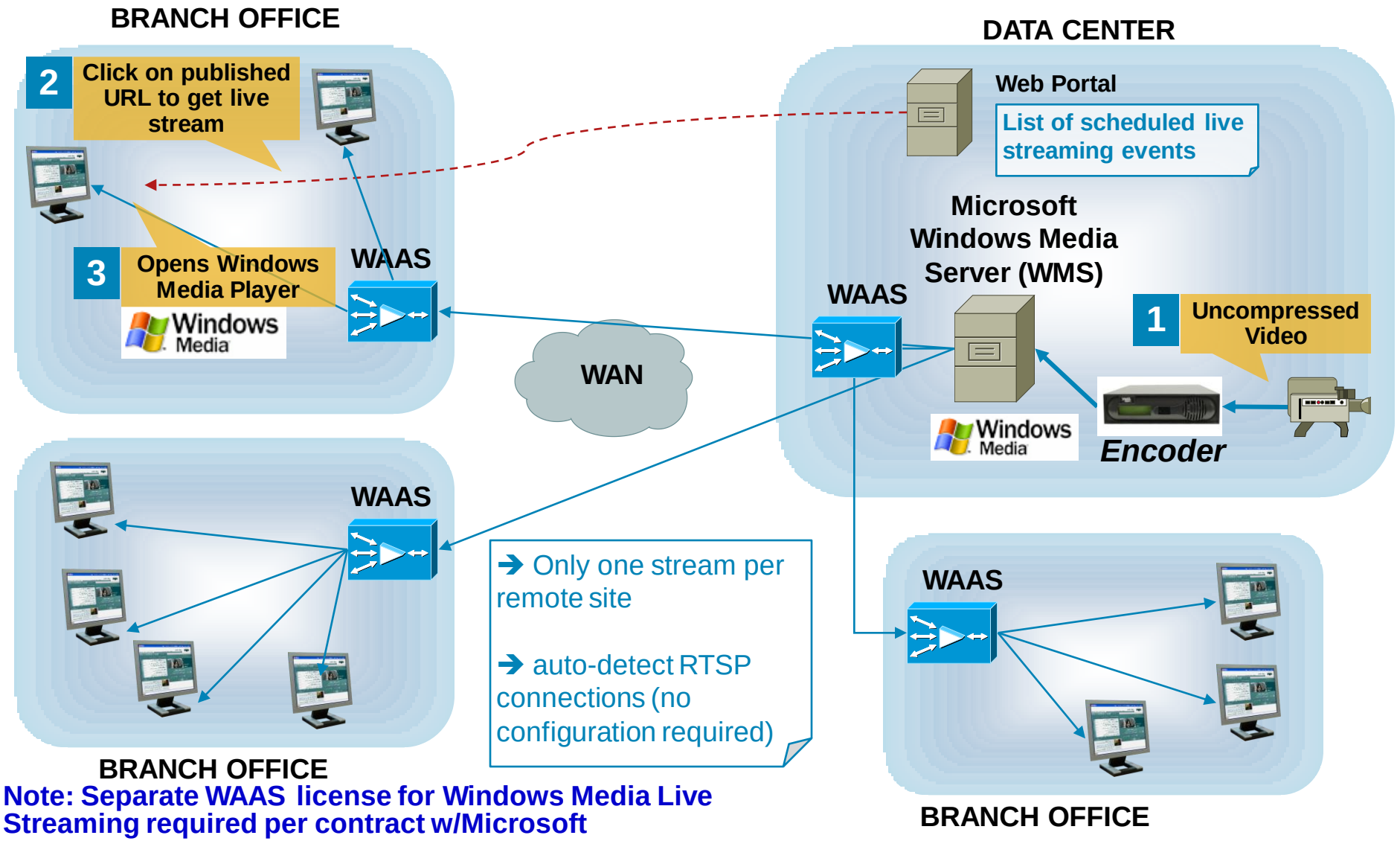


Live Video Streaming for Windows Media Environment



Live Video Streaming with WAAS

Edge stream splitting



Note: Separate WAAS license for Windows Media Live Streaming required per contract w/Microsoft

Cisco DMS & WAAS to enable Video Applications in the Branch

- **Video to Branch Desktop**

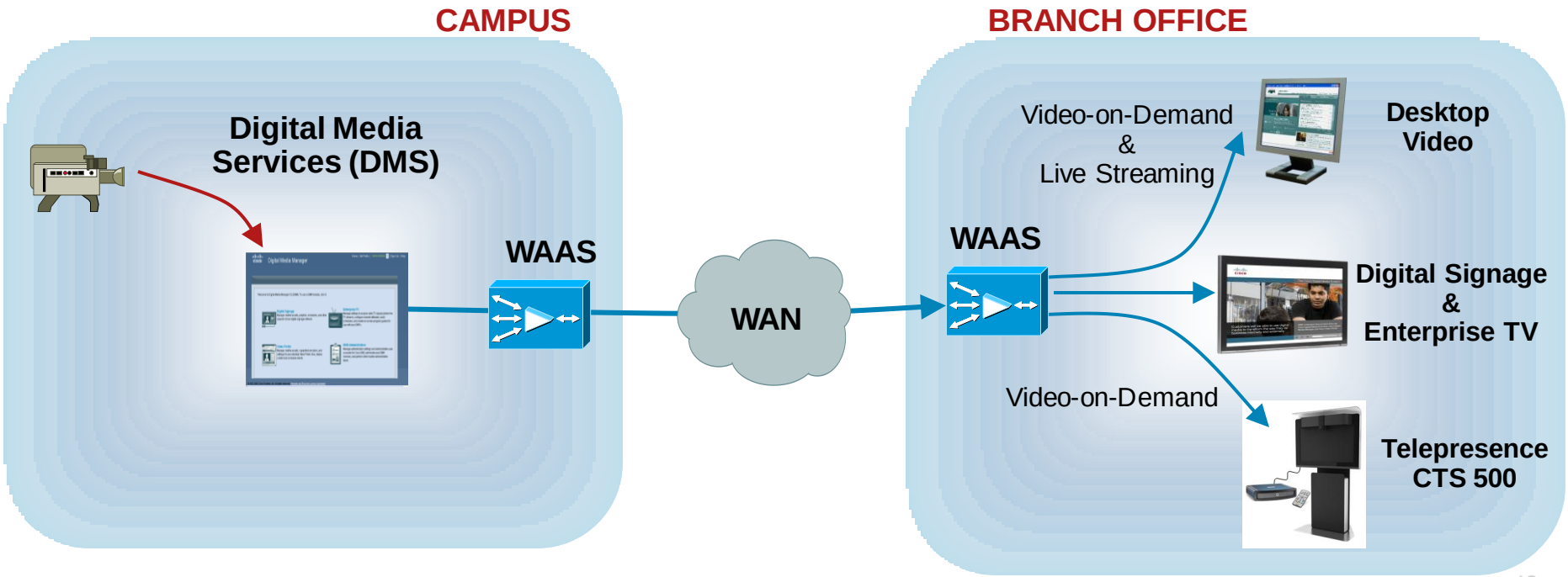
  Live streaming and Video-on-Demand (VoD)

  DMS in Data Center, WAAS 4.1 in Branch

- **Video to Branch Digital Signage**

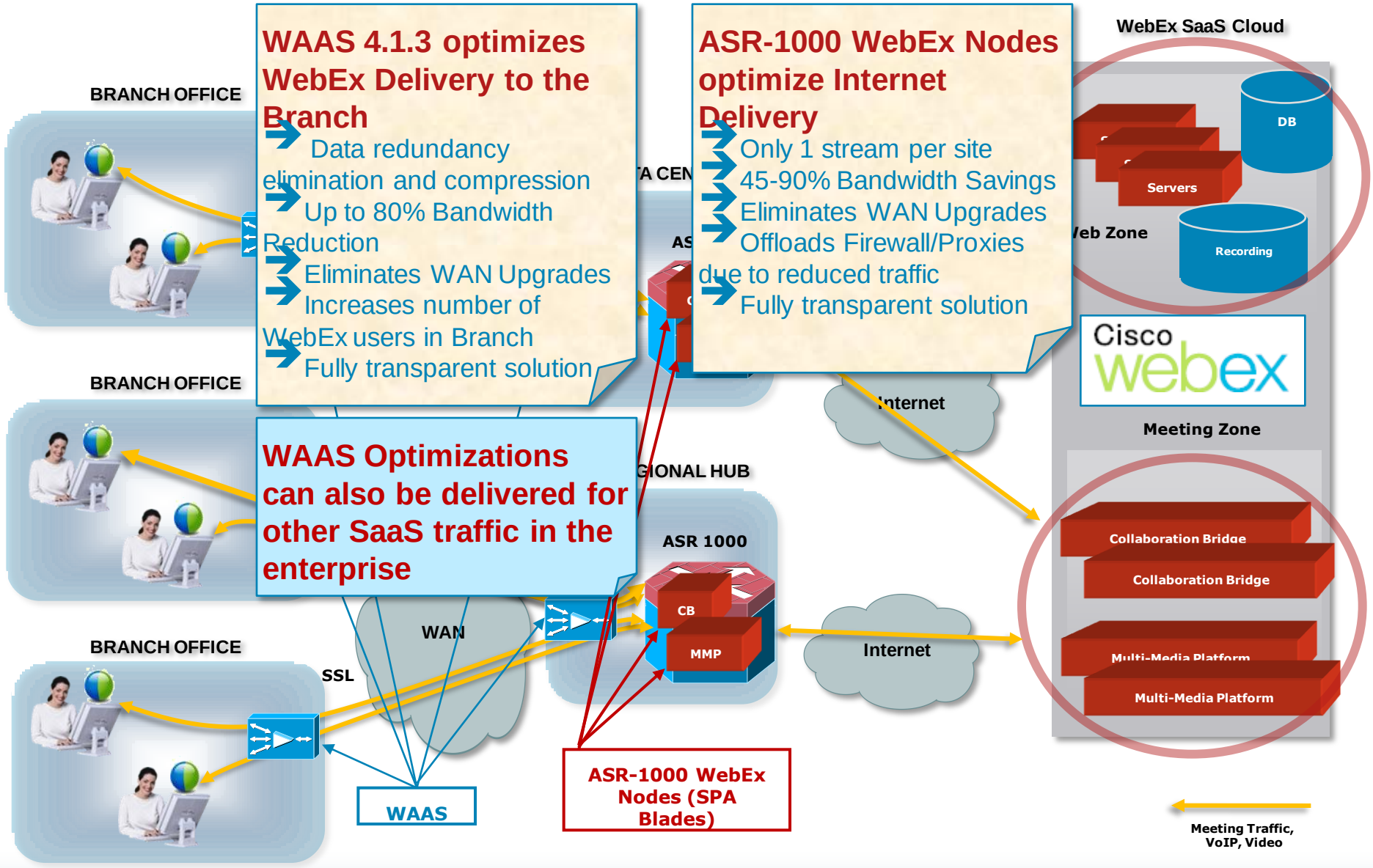
  Cisco Digital Media Player (DMP) to pull video from WAAS (New DMP Feature)

  WAAS can also deliver video to signage enabled Telepresence



Cisco WAAS and ASR-1000 WebEx Node optimize delivery of WebEx to branch users

TODAY



Cisco is the only WAN Op vendor that offers validated solutions with the top 3 app vendors

Application	Certification and Testing Activity
ORACLE	▪ Joint Cisco-Oracle Enterprise Solutions Engineering Lab ▪ Joint solution papers published
SAP	▪ Joint solution development and testing at SAP Labs ▪ Joint solution papers under development ▪ Joint technology development discussions
Microsoft	▪ Royalty-paying agreement for key Microsoft protocols – e.g. Microsoft Exchange, CIFS, Windows Media, MS-RPC ▪ Joint testing of applications at Microsoft Labs ▪ Joint escalation support agreement

Cisco WAAS leads the market in solution development and testing with leading application vendors

Application	Certification and Testing Activity
IBM	▪ Joint Cisco-IBM Enterprise Solutions Engineering Lab ▪ Joint solution papers under development
EMC² where information lives	▪ Inclusion on Cisco-EMC products in each others product development test beds for file services ▪ Joint solution development underway for SRDF ▪ Joint escalation support agreement done
NetApp®	▪ Joint solutions tested with published papers ▪ Joint escalation support agreement done
vmware® AN EMC COMPANY	▪ Strategic investment from Cisco with WAAS being one of the top 5 areas for joint solution development
CISCO	▪ IOS Regression Testing and Certification Labs ▪ Cisco 28xx,38xx Branch Access Router Performance and Scale Testing labs ▪ Cisco Voice & Security Solutions Labs ▪ Cisco NSite, Safe Harbor/DCAP, PSIRT Labs

Agenda

- Cisco WAE Platforms
- Cisco WAAS Product Architecture
- Application Specific Acceleration
- Data Replication Acceleration
- Network-embedded virtualization
- Management
- Q&A

Data Backup and Restore and Replication

- Online Data Backup and Restore

  Backup is accessible directly over the WAN

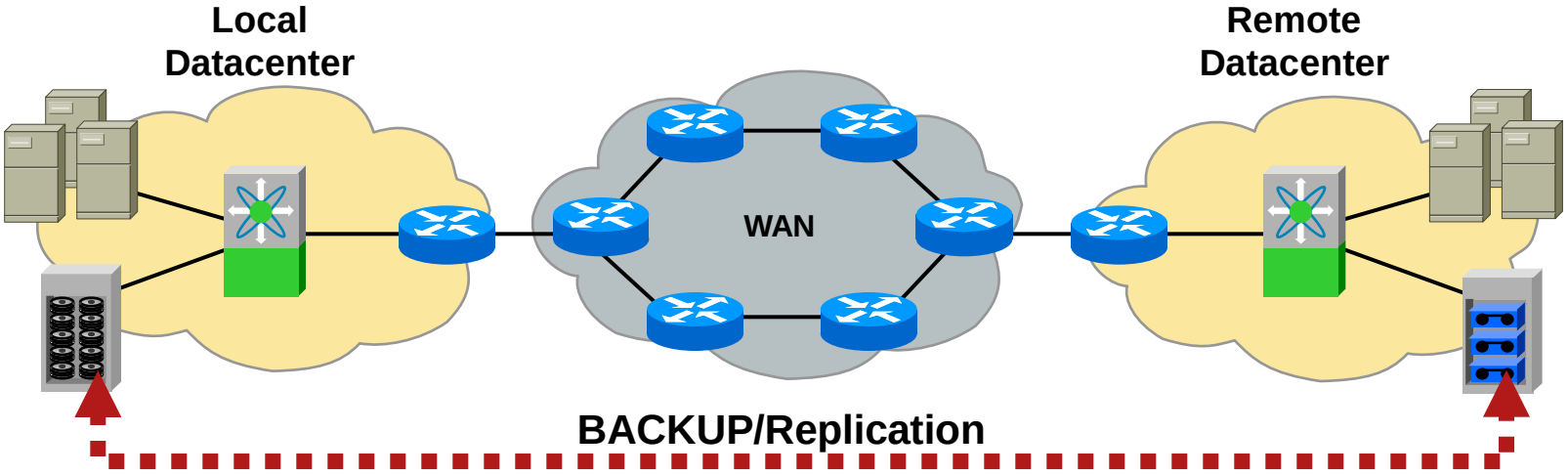
  Reduces recovery time

- Data Replication

  Data is continuously synchronized across the network

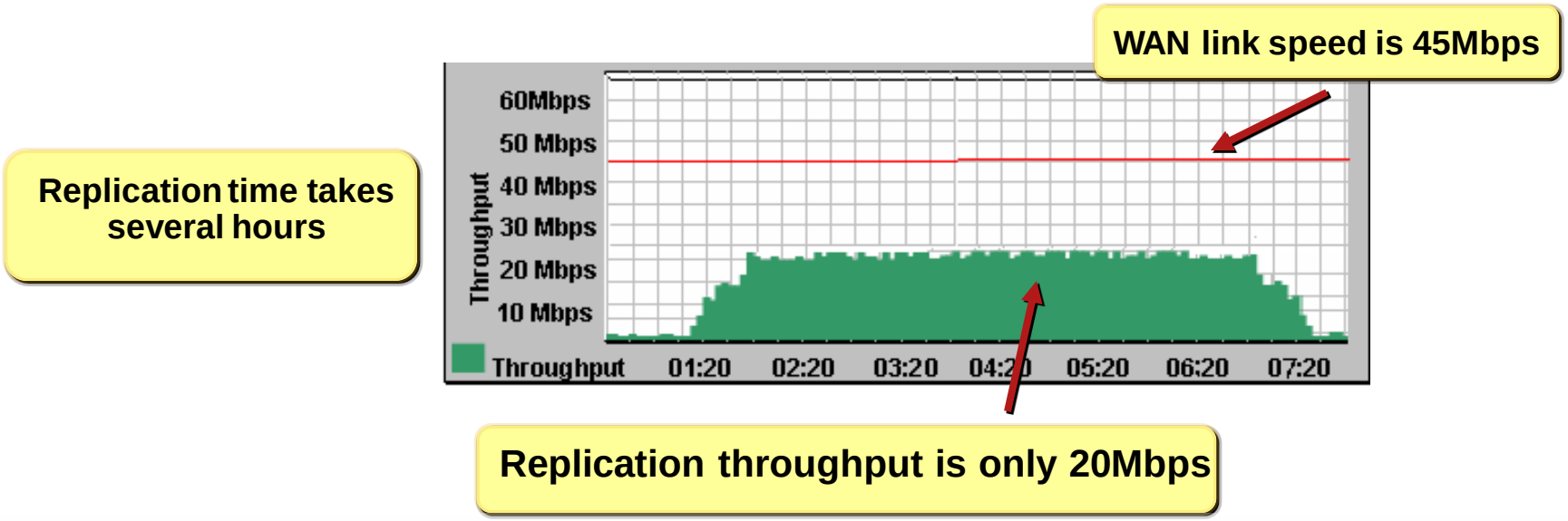
  Enables rapid failover to remote datacenter for 24/7 data availability

  Reduces recovery time and improves recovery point

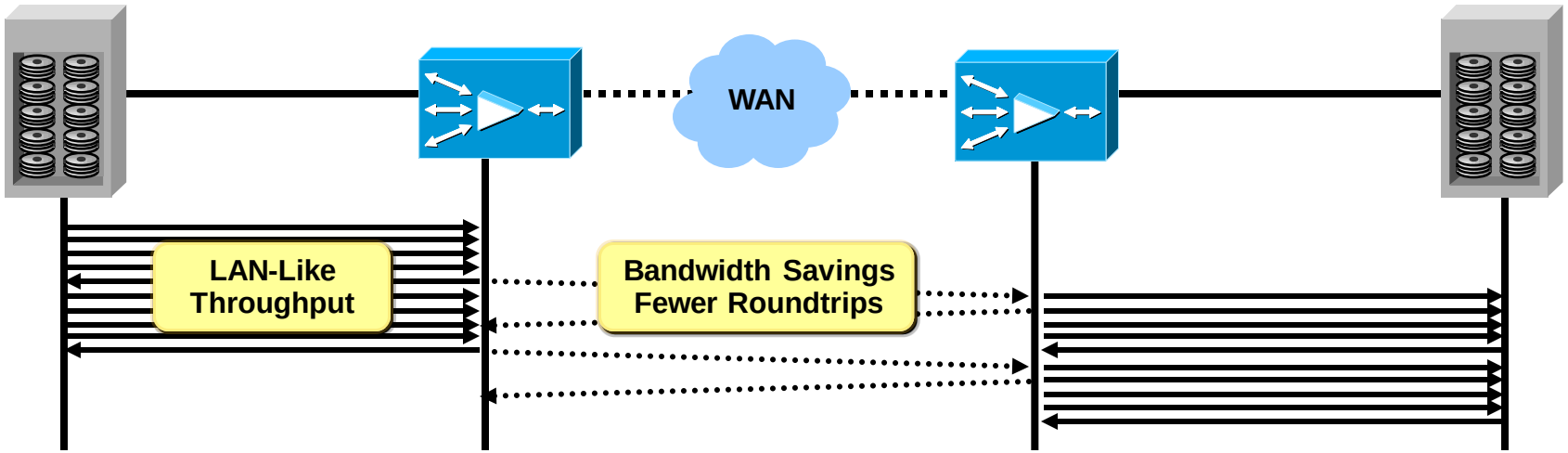


Data Replication Challenges

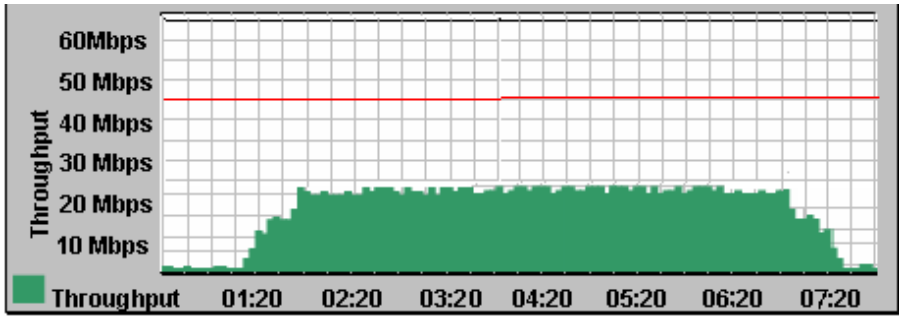
- Requires High Bandwidth Low Latency Links
- Inability of storage systems to fill WAN link due to latency/packet loss issues
- High cost of bandwidth for Data Replication
- Need to increase the distance of the disaster recovery site



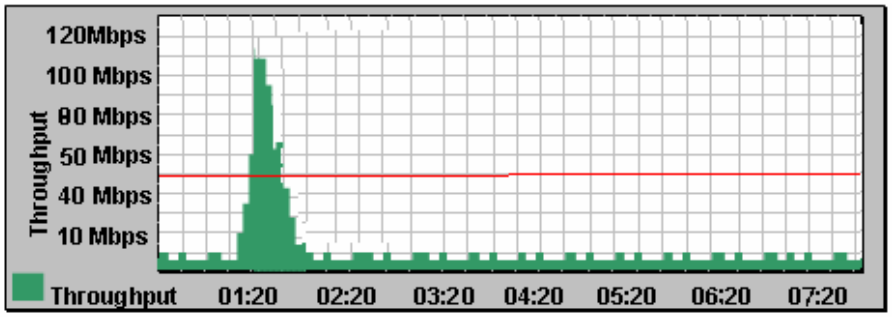
Combined Power of TCP Optimization and Advanced Compression



No WAAS



WAAS enabled with Replication Accelerator Mode



Replication Acceleration Mode Overview

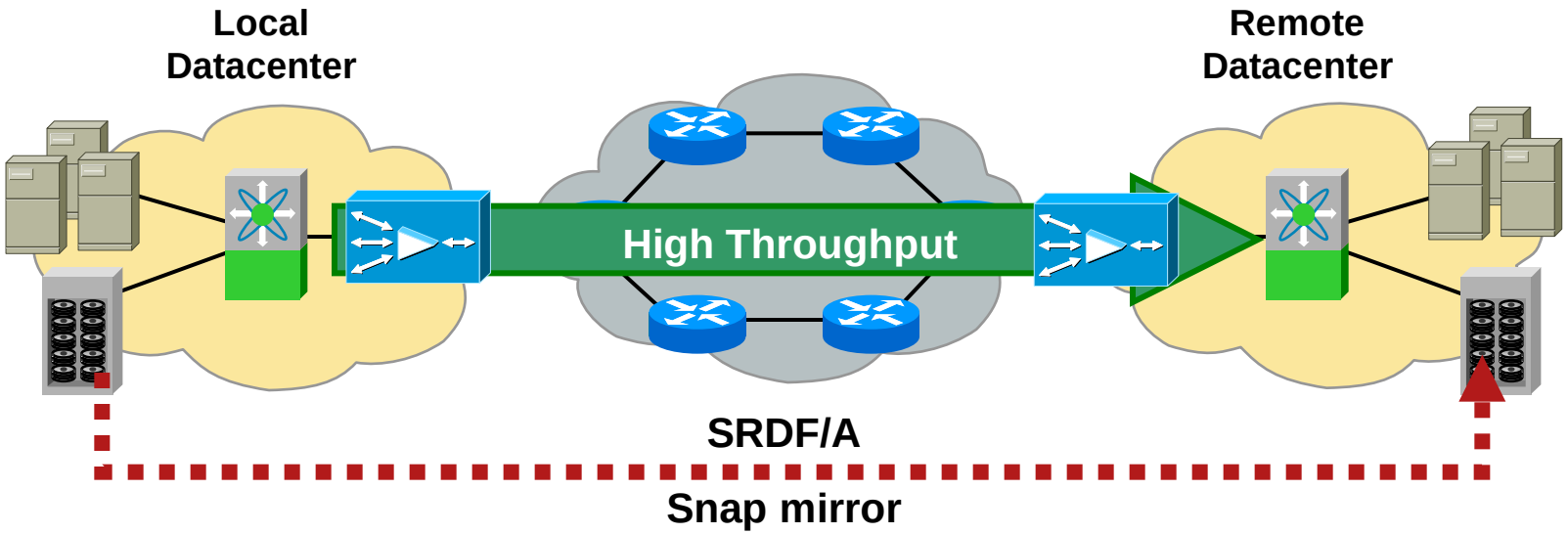
New

WAEs in Replication Accelerator mode have

TFO tuned to **address TCP issues for high speed** WAN links

DRE tuned for **low latency processing** requirements for DC to DC Replication

Default policy in Replication Accelerator mode is tuned for Replication Applications



Cisco WAAS Data Center Appliances in Replication Accelerator Mode

WAE-7341
Enterprise Data Center Appliance

WAE-7371
Enterprise Data Center Appliance

- WAE-7341 Appliance:
  - Quad-core processor, 8GB of RAM
  - Up to 310Mbps WAN connections and 2500 optimized TCP connections (when in Replication Accelerator Mode)
  - Up to 900GB RAID-5 protected and hot-swappable SAS disk capacity with optional disk encryption
  - Fan Out - 4
- WAE-7371 Appliance:
  - Dual Quad-core processors, 24GB of RAM
  - Up to 1Gbps WAN connections and 5000 optimized TCP connections (when in Replication Accelerator Mode)
  - Up to 1.5TB RAID-5 protected and hot-swappable SAS disk capacity with optional disk encryption
  - Fan-Out - 9

Replication Accelerator Benefits

- Reduced cost of WAN bandwidth for Replication
- Shortening of the backup/replication windows
- Extension the distance of the disaster recovery site
- Integrates with the existing Data-Center Network
- Auto Discovery and Configuration drives ease of deployment
- Meets/exceeds the availability & reliability requirements for storage customers
- Validated solutions w storage vendors

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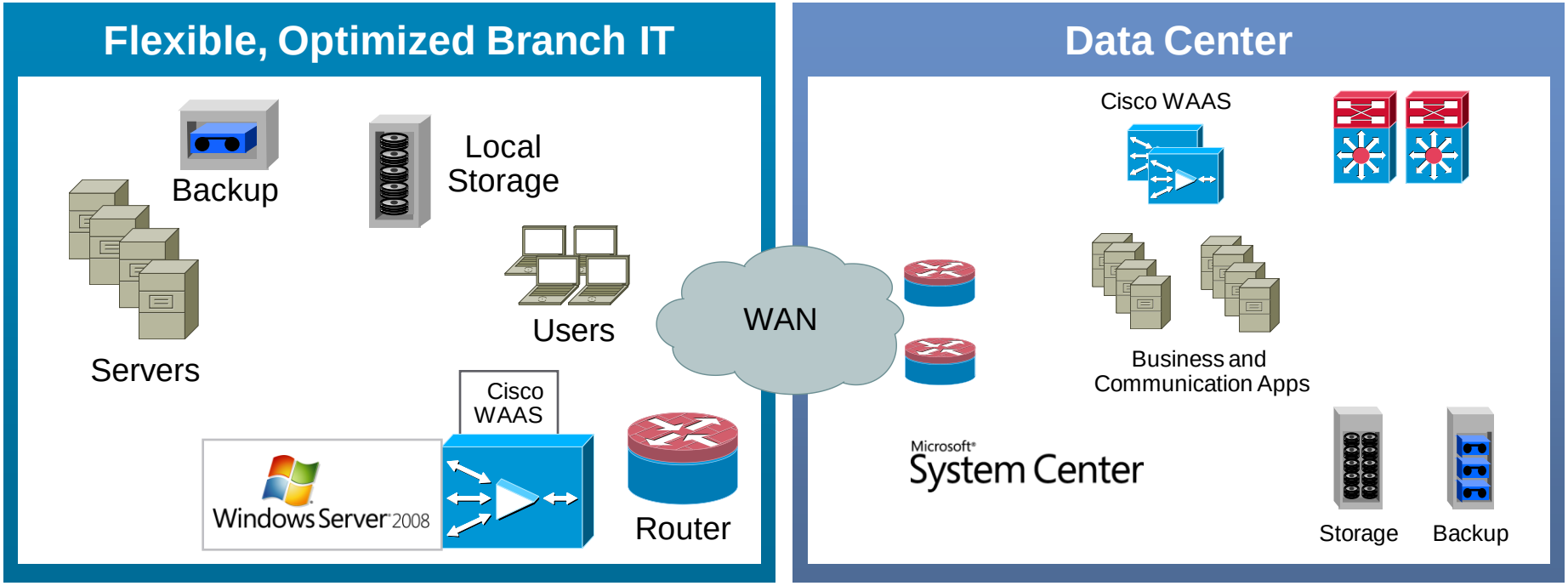
Virtualized App Delivery for Branch Office

New

Cisco WAAS 4.1 with Virtual Blade Technology

- Centralize what you can with WAAS
- Locally host services (e.g. Windows Server) on same WAAS device



Cisco WAAS Virtual Blade Technology

Providing Best Mix of Distributed and Centralized IT Services

Validated by Microsoft for Windows Services

Cisco WAAS Virtual Blade

- A virtual blade is the equivalent of having a generic PC built into the WAAS device.
- This generic PC has

  Firmware: BIOS and possible extensions.

  Hardware: one or more CPUs, memory, host bridge, VGA, one or more NICs, disk controller, disk, CD drive, serial port, etc.
- Software configuration of the virtual blade allows control on some of these items.

  How much memory, size of the disk, how many CPUs etc.

Cisco Wide Area Virtualization Engine (WAVE)

WAVE 274

- **HW:** All inclusive fixed config for easy ordering
  - 250GB, 3GB DRAM
  - 2 port inline
- **SW:** Enterprise License included
- **Options:** Virtual Blade, Live Video Streaming
- **Capacity:** up to 20 users, max 200 connections
- **Form:** Desktop
- **List Price:** $6,500

WAVE 474

- **HW:** All inclusive fixed config for easy ordering
  - 250GB, 3GB DRAM
  - 2 port inline
- **SW**: Enterprise License included
- **Options**: Virtual Blade, Live Video Streaming
- **Capacity:** up to 50 users, max 400 connections
- **Form**: Desktop
- **List Price:** $9,900

WAVE 574

- **Base HW config**
  - 500GB, 3GB DRAM
- HW Upgrades:
  - 500GB (RAID-1)
  - 3GB DRAM
  - 2 or 4 port inline
- **SW:** Enterprise License included
- **Options**: Virtual Blade, Live Video Streaming
- **Capacity**: up to 150 users max 750 conn w 3GB, max 1300 conn w 6GB
- **Form:** 1RU rack server
- **List Price**: $12,500

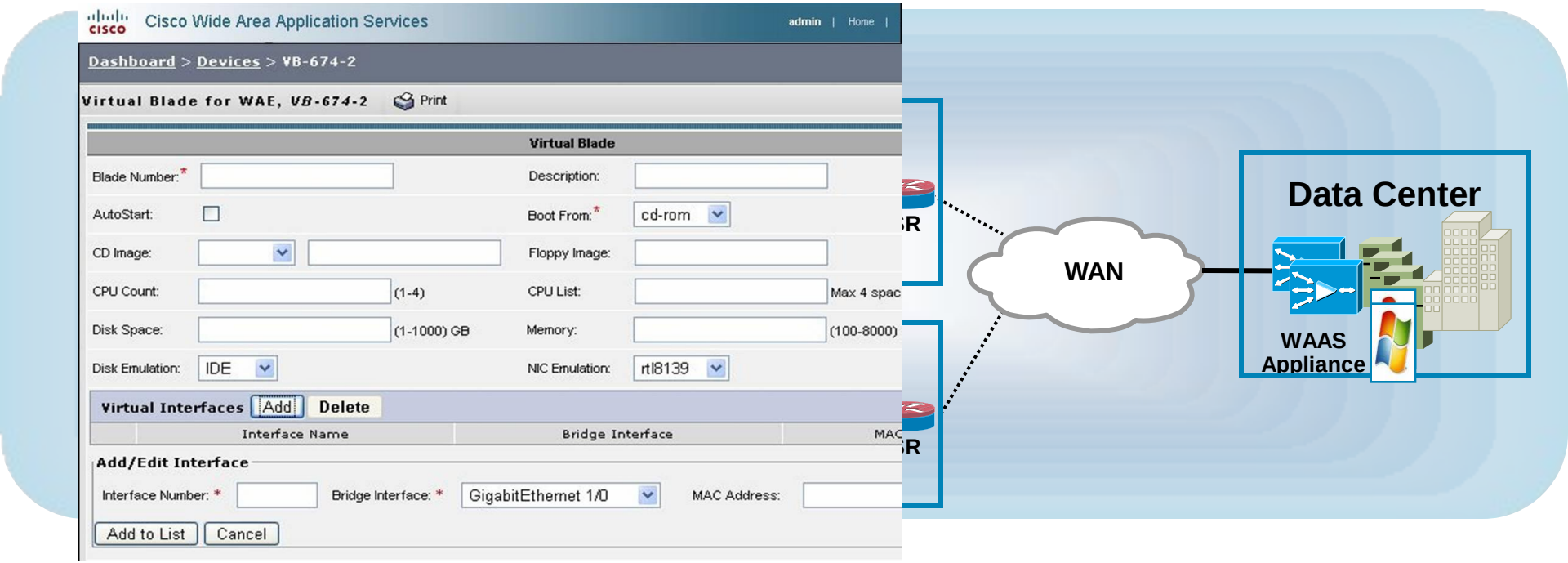
Virtual Blade – Sample Flow
Allocate Resources and Deploy Image

- Allocate resources and start Virtual-Blade instance

  Easy & Simple - from WAAS CM or from CLI

- Centrally deploy server image over to WAE

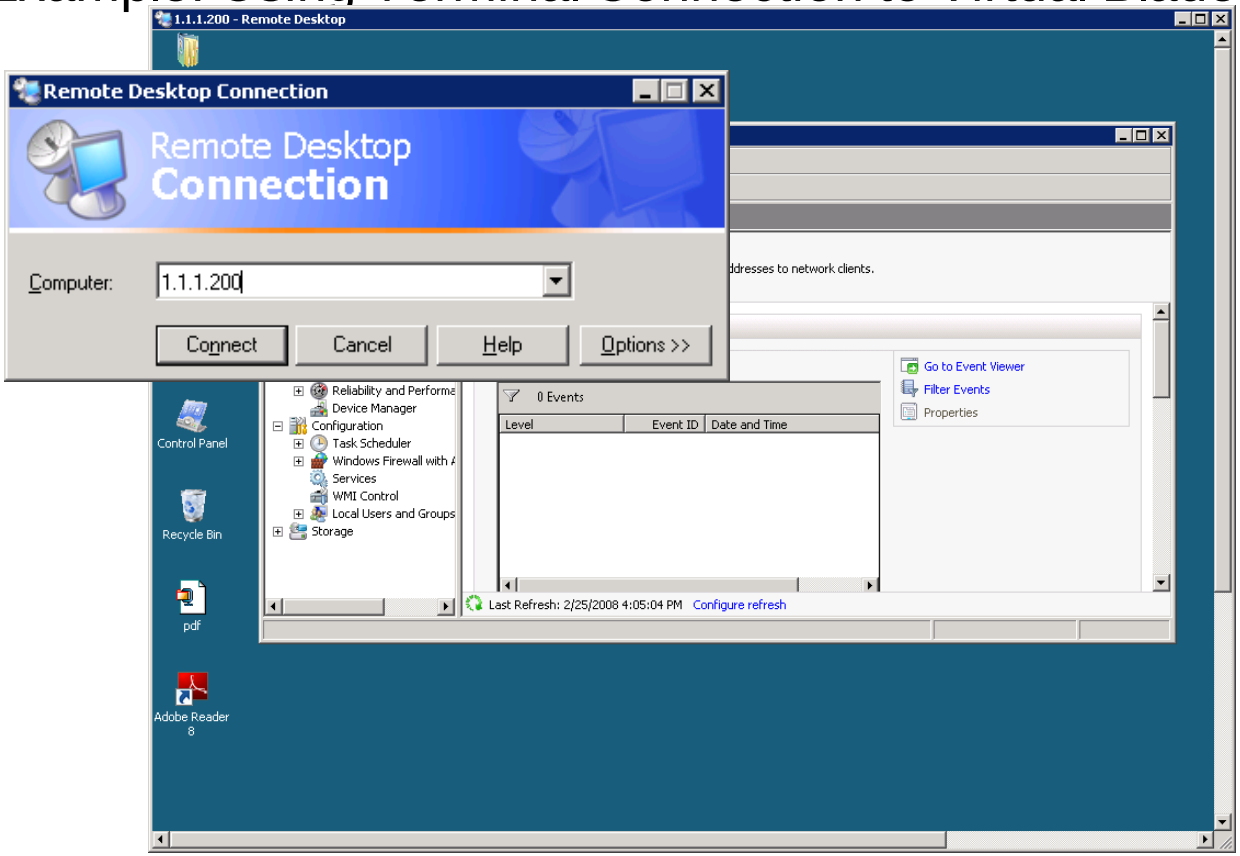
  From CLI or WAAS CM, using FTP or HTTP



Virtual Blade – Sample Flow Centrally Manage

- Remote access and management using Windows Management facilities

Example: Using Terminal Connection to Virtual Blade IP



Microsoft and Cisco Solution

Microsoft Windows Server 2008 Server Core

- Branch optimized IT services
  - Read-only Domain Controller
  - Print services
  - DNS/DHCP services

Cisco WAAS with Virtualization

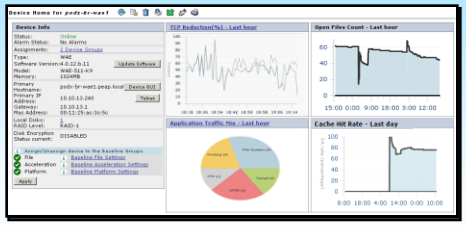
- Complete WAN optimization + application acceleration
- Ability to host Windows services locally

Cisco WAAS with pre-packaged Windows Server 2008 services

Windows Server 2008

- ✓ **Jointly developed architecture**
- ✓ **Joint customer support**

Cisco WAAS Virtual Blade (Cont.)

Microsoft cisco	▪Architecture jointly developed and validated by Microsoft and Cisco ▪Joint support for solution from Cisco and Microsoft
Embedded systems virtualization architecture	▪Native hardware performance for network services ▪Optimized performance of virtualized Windows
Central Management 	▪Management of virtual blades using WAAS CM by network and server administrators ▪WAAS CM minimizes operational dependencies by providing role-based management
Appliance experience Windows Server 2008	▪Pre-installation option for Windows Server 2008 –Eases migration to 2008 –Small image foot-print reduces patching needs

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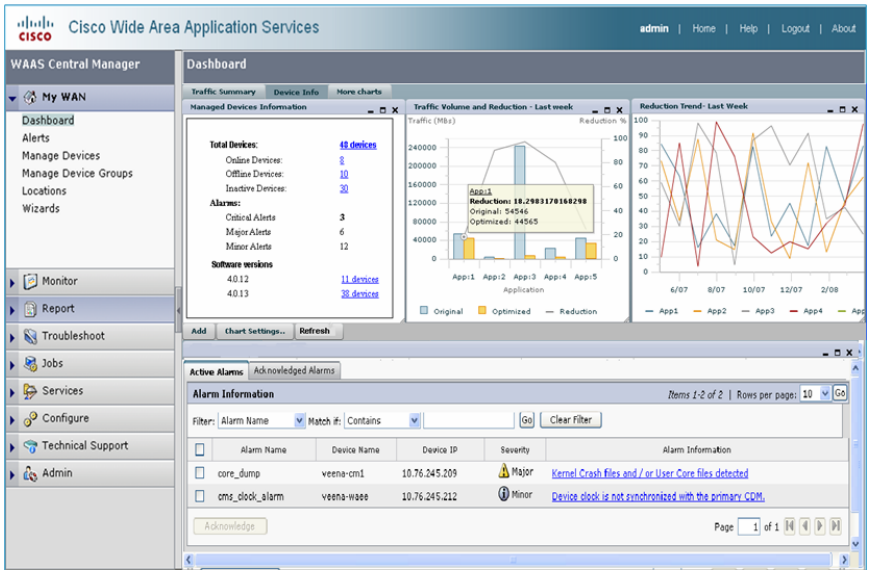
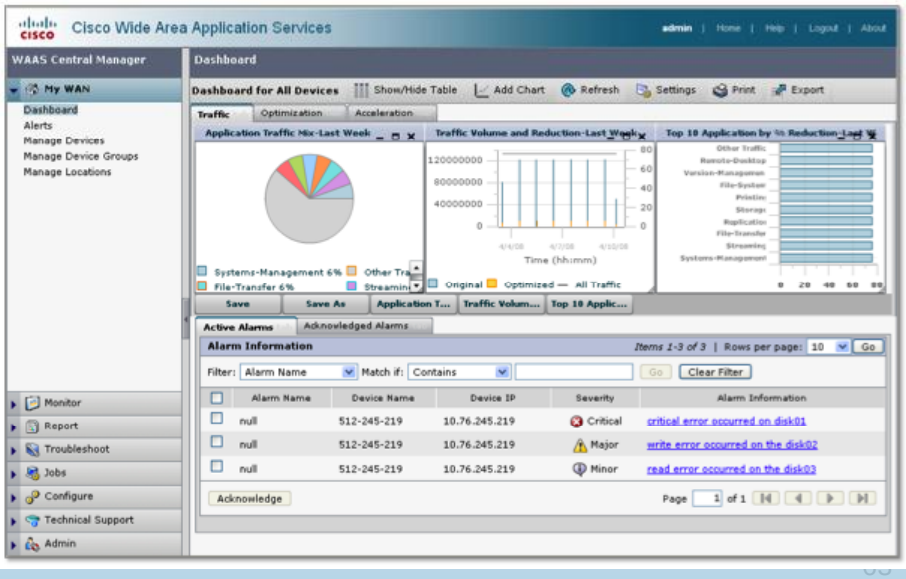
Scalable, Secure Central Management

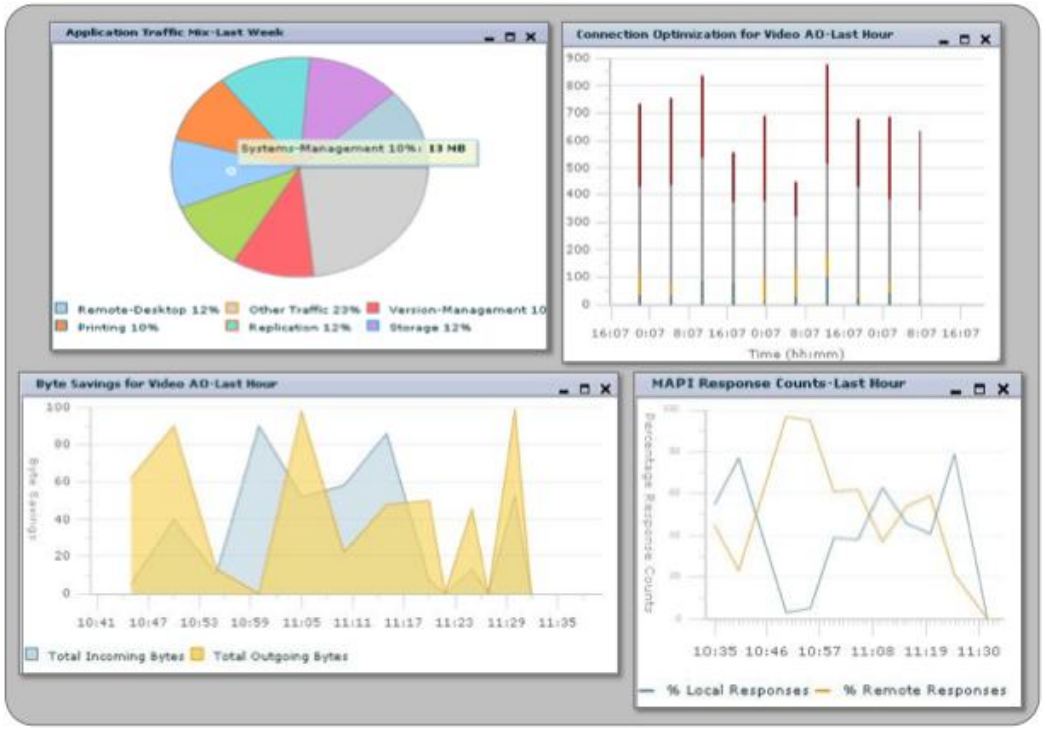
- Centralized Management
  - Robust management, monitoring, and reporting for up to 2500 nodes
  - Device grouping for simplified rollout of configuration changes
  - Device and system alarms, as well as integration with SNMP and syslog
- Secure Management Platform
  - SSL-encrypted HTTP GUI and intra-device communication
  - Roles-based Access Control (RBAC) to isolate users to specific capabilities and domains of management
  - Integrated IOS-like CLI accessible via SSH (also telnet, serial)
- High Availability Configurations
  - Active/standby deployments with automatic failover, replication of Central Manager database, and encryption keys
- SOA-ready Monitoring
  - Standard XML Web Service (SOAP)
  - Integration with external reporting and monitoring portals





Configurable Comprehensive Reporting

- Device Dashboard
  - Configurable list of reports to display on a device or device-group homepage
- Customizable, schedulable reports
  - Device and system health, WAN optimization performance, application acceleration performance, and traffic statistics
- Traffic Statistics
  - Optimized vs pass-through traffic mix including pass-through reason
  - Application traffic mix over period of time (hr/day/wk/mo/custom)
- Per-Connection Statistics
  - Connection monitoring shows near real-time view of optimized connections and details
- Compression Statistics
  - Bandwidth savings per application over time (hr/day/wk/mo/custom)
- Acceleration Statistics
  - Examine accelerated connections, open files, cached resources, cache hit ratio, and average throughput

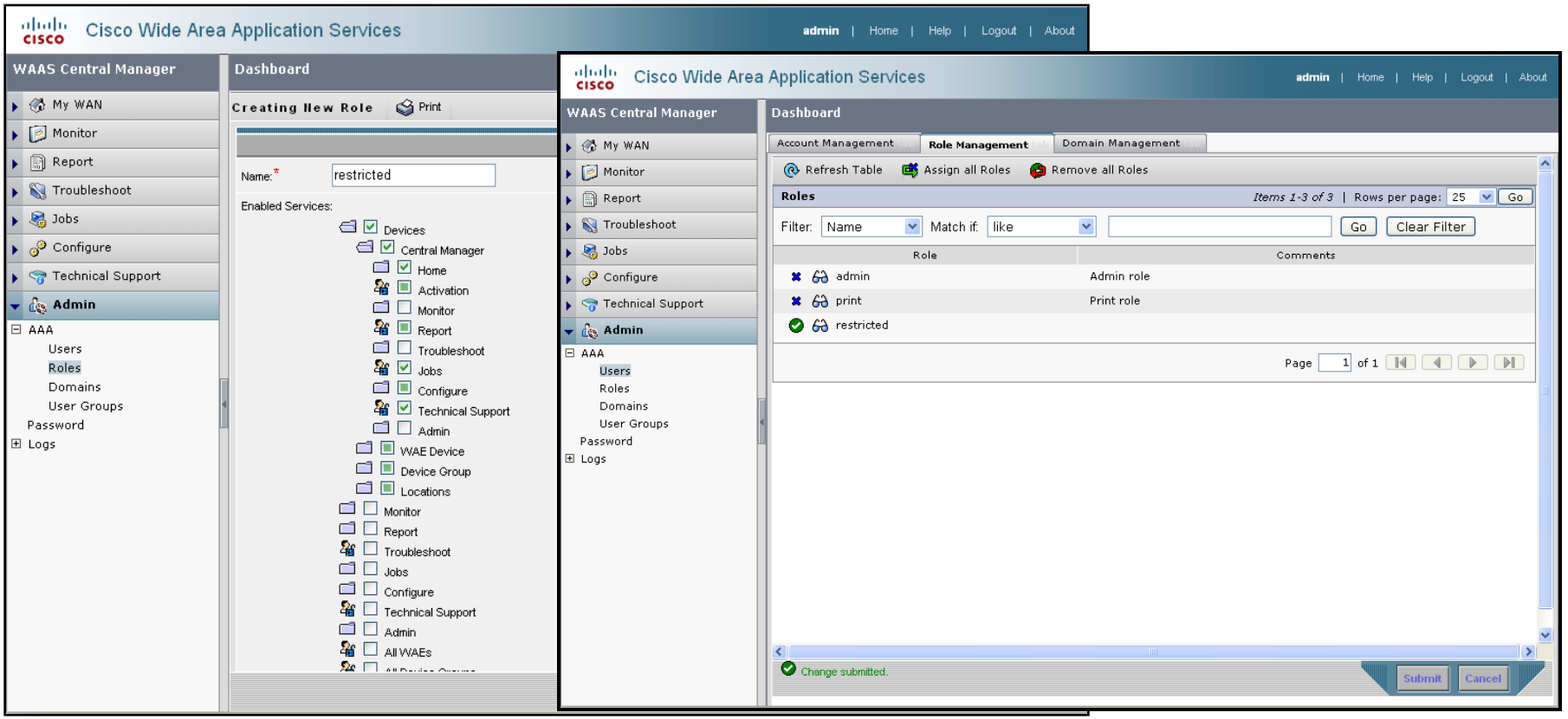


Role-Based Access Control

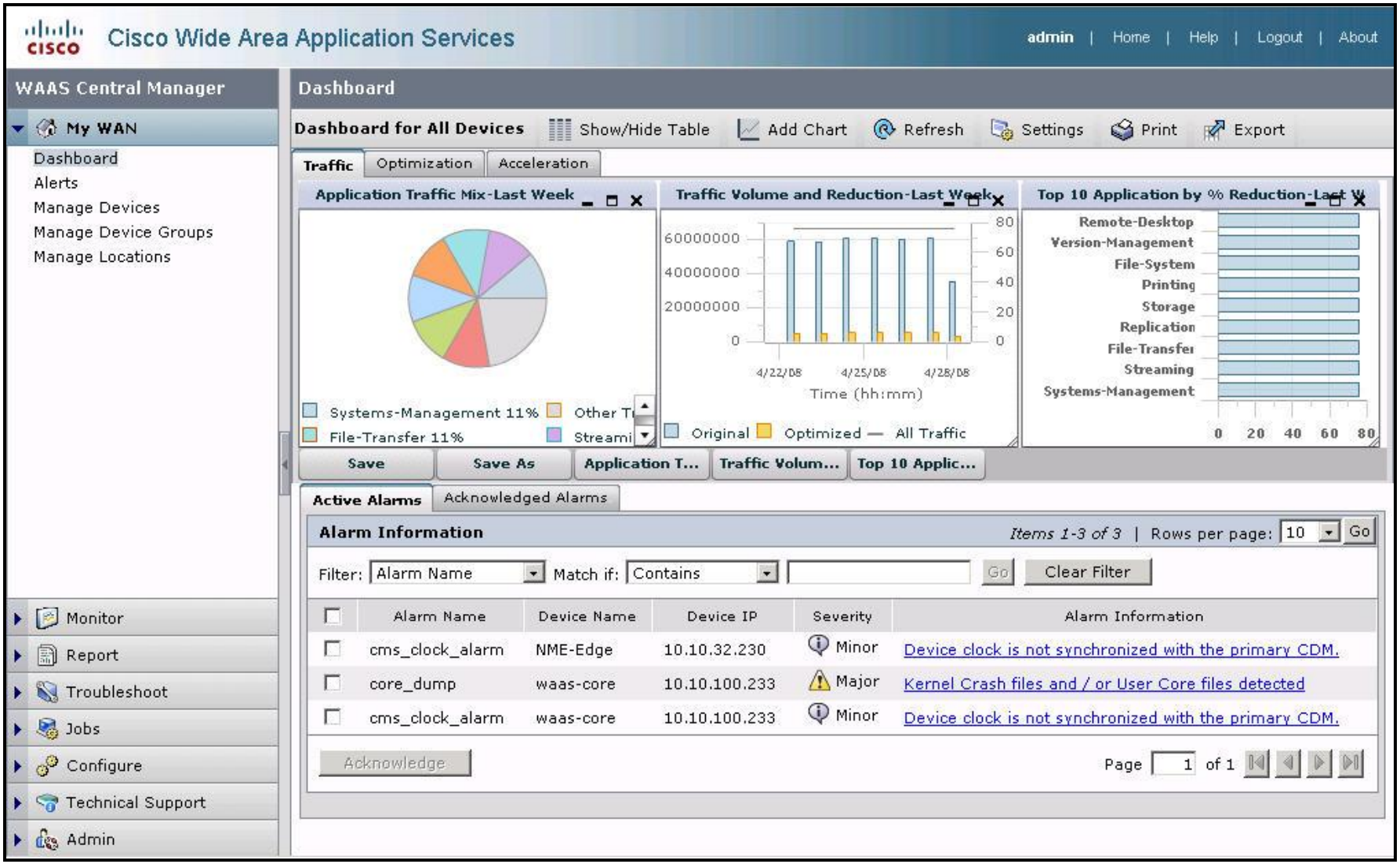
Custom roles define the services that a user can manage in the WAAS network.

Domain configuration defines the device groups or WAEs that are accessible by the user.

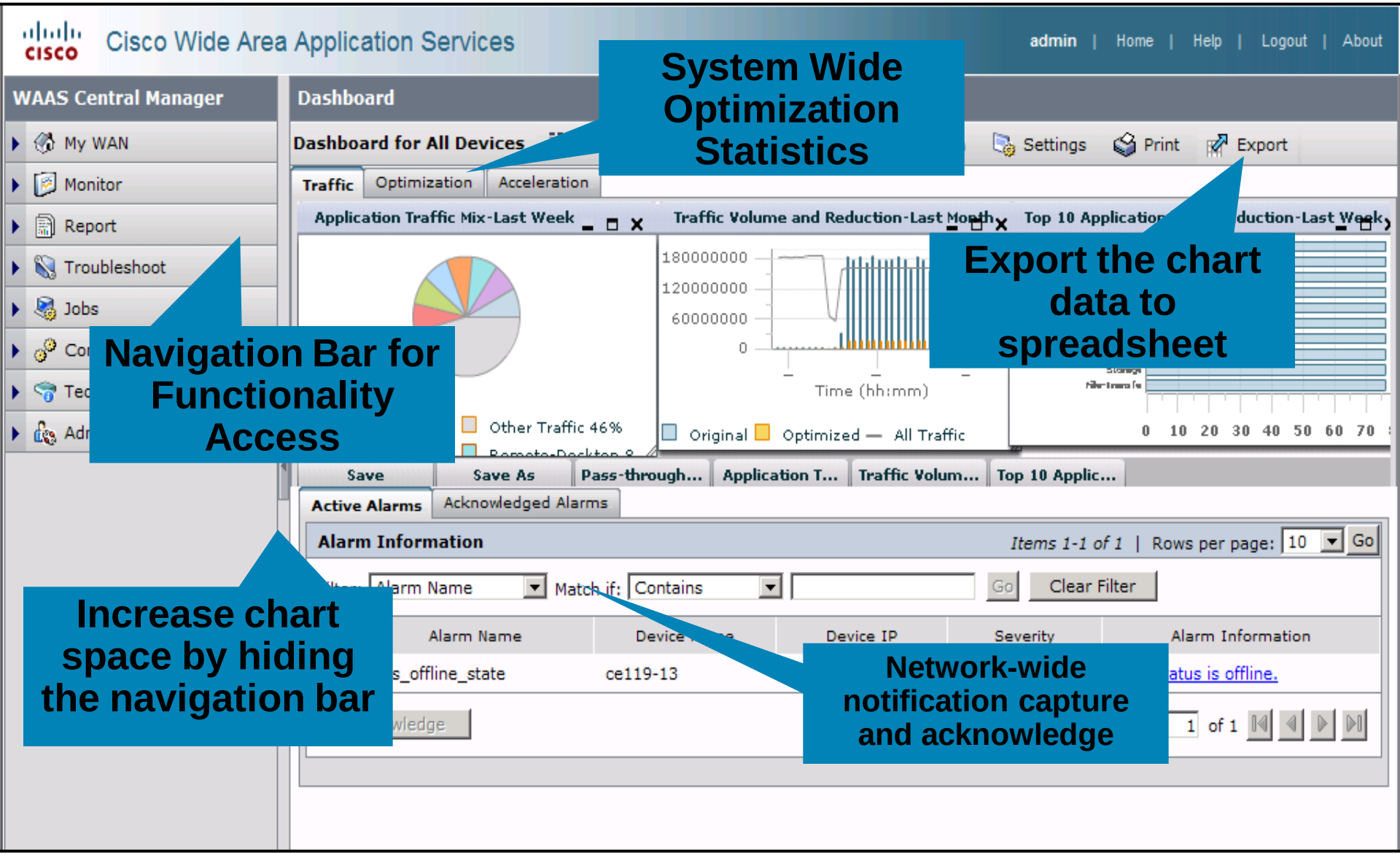
Read-Only roles for viewing of pages and screens



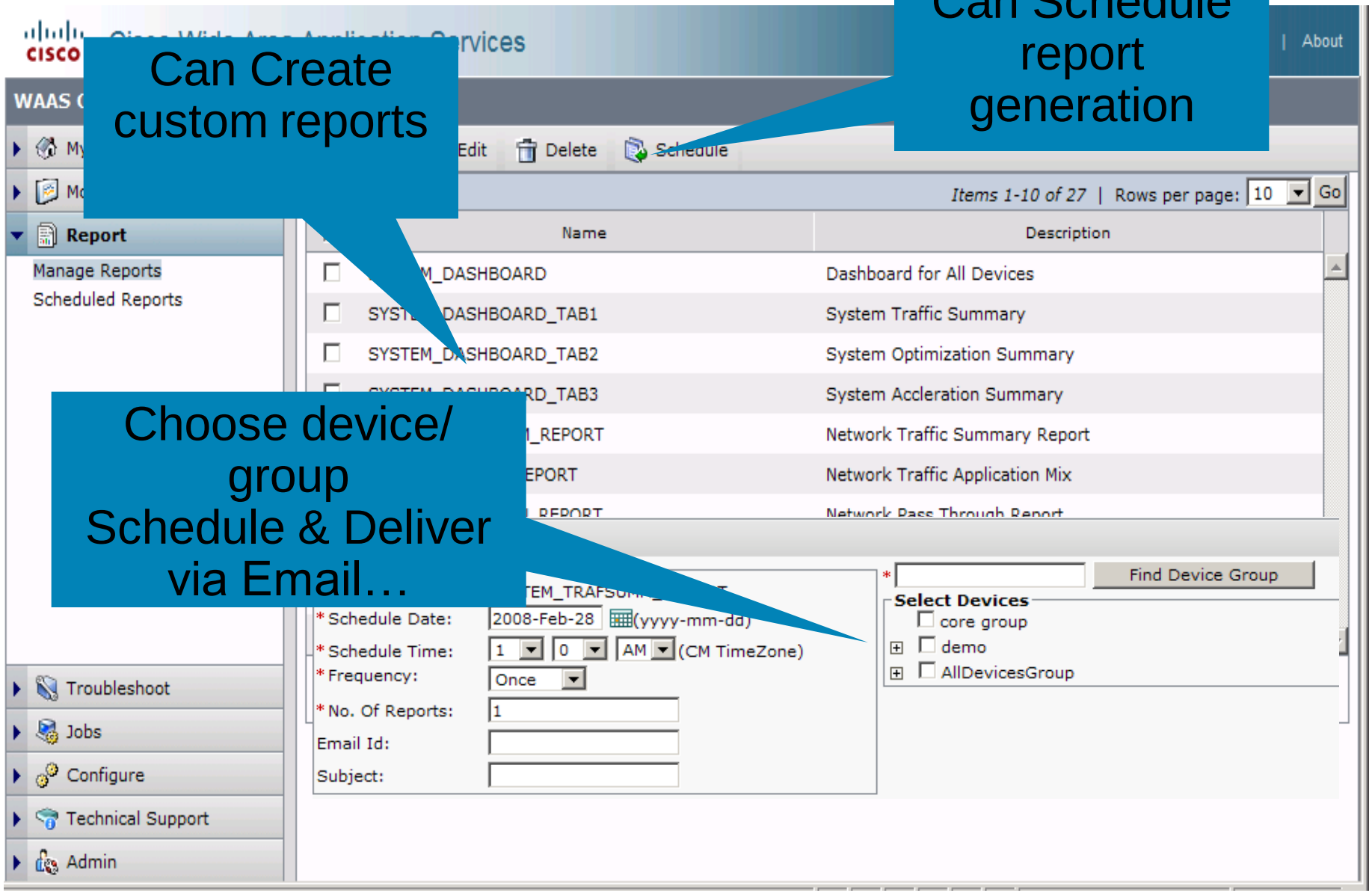
Central Manager Home Page



New, Customizable, System Dashboard



Reporting Capabilities – Manage Reports



Reporting Capability – Scheduled reports