



WAN Optimizing af Data Center Teknologier

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Mikkel Brodersen
Systems Engineer
Cisco Systems, Danmark

mikkel@cisco.com

Key Application and Infrastructure Issues



APPLICATION PERFORMANCE

- WAN bandwidth constraints
- Network and application latency
- Global collaboration



BRANCH INFRASTRUCTURE COST

- Server and storage management
- Limited IT resources and budget
- WAN link costs

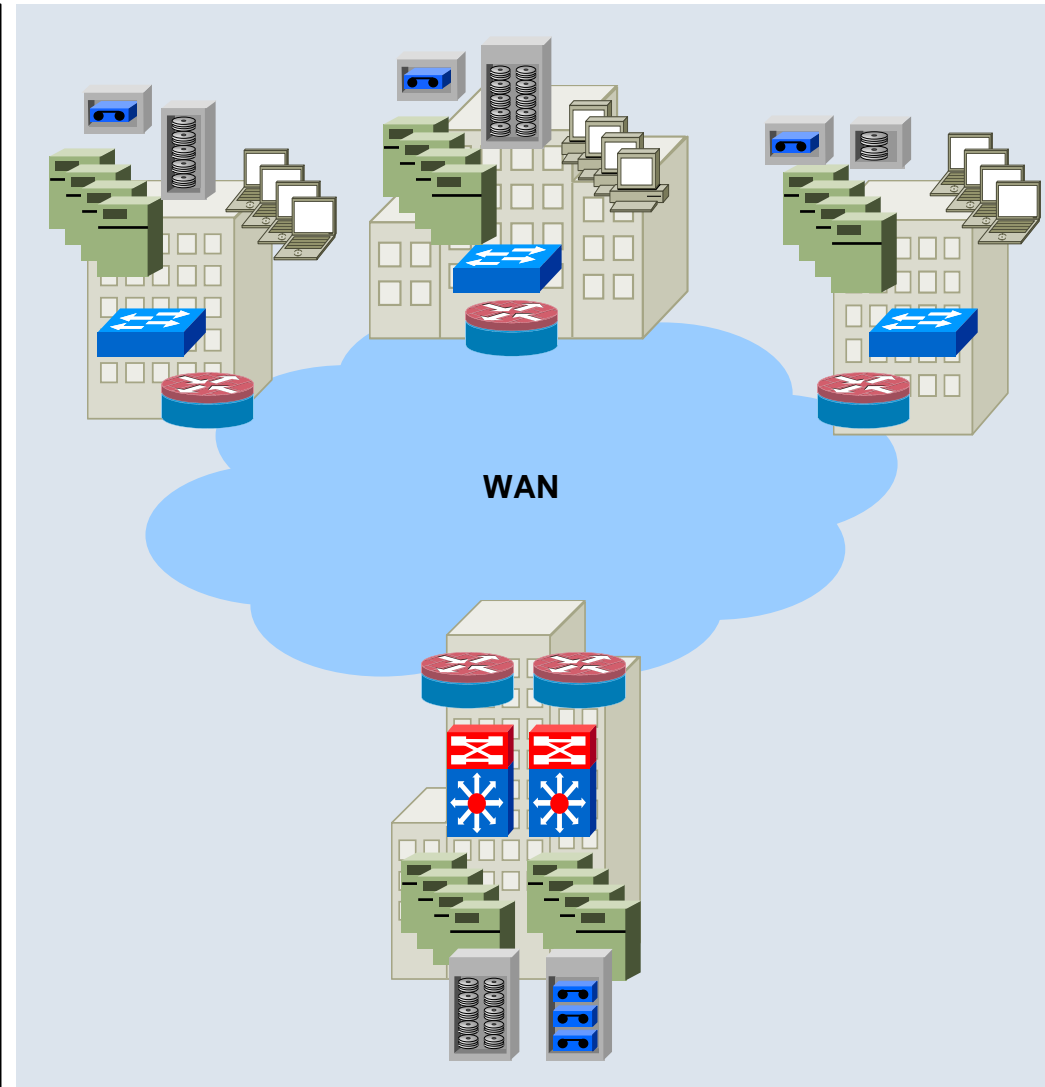


EXISTING NETWORK DEMANDS

- VoIP, client-server, other apps
- Corporate communications
- eLearning

Typical Distributed Enterprise

- **Expensive distributed I/T infrastructure**
 - File and print servers
 - Email servers
 - Tape backup
- **Application delivery woes**
 - Congested WAN
 - Bandwidth and latency
 - Poor productivity
- **Data protection risks**
 - Failing backups
 - Costly off-site vaulting
 - Compliance



The WAN Is A Barrier To Consolidation

- Applications are designed for LAN environments

High bandwidth

Low latency

Reliability

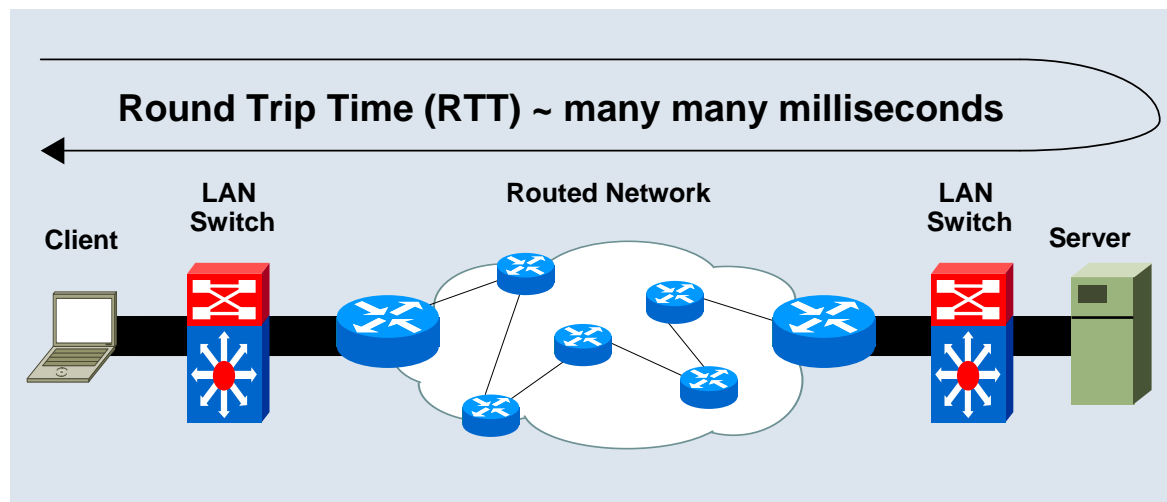
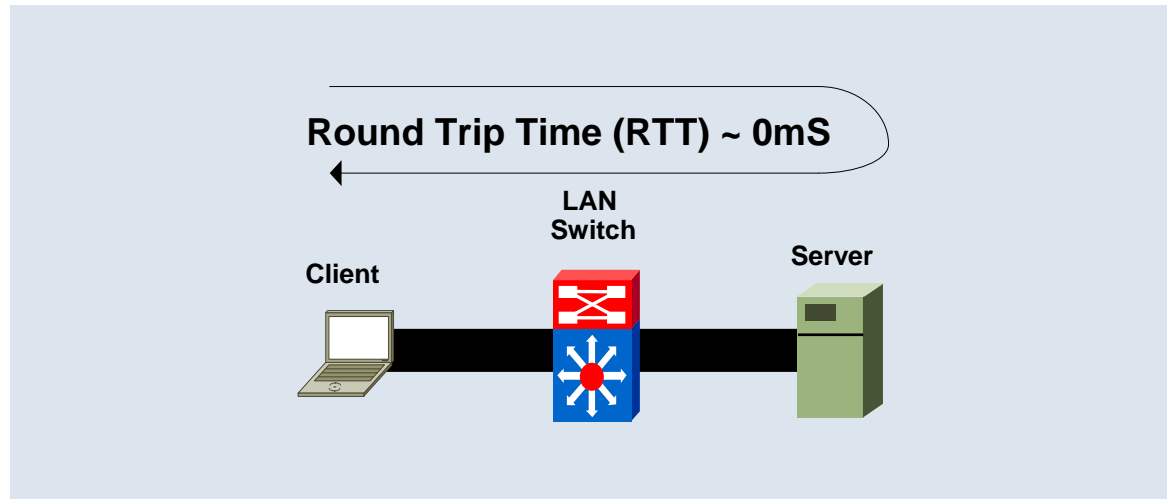
- WAN characteristics hinder consolidation

Already congested

Low bandwidth

Latency

Packet Loss



CIFS over WAN is a Challenge

> 1000 messages for single 1 MB Word File

1m_open.cap - Ethereal

Filter: smb

No.	Time	Source	Destination
1	0.000000	192.168.1.64	192.168.1.230
3	0.001773	192.168.1.230	192.168.1.64
4	0.001979	192.168.1.64	192.168.1.230
5	0.004579	192.168.1.230	192.168.1.64
7	0.198686	192.168.1.64	192.168.1.230
8	0.199904	192.168.1.230	192.168.1.64
9	0.200117	192.168.1.64	192.168.1.230
10	0.202321	192.168.1.230	192.168.1.64
11	0.202876	192.168.1.64	192.168.1.230
12	0.204118	192.168.1.230	192.168.1.64
13	0.204273	192.168.1.64	192.168.1.230
14	0.206460	192.168.1.230	192.168.1.64
15	0.206781	192.168.1.64	192.168.1.230
16	0.208288	192.168.1.230	192.168.1.64
17	0.208459	192.168.1.64	192.168.1.230
18	0.212825	192.168.1.230	192.168.1.64

Ethernet II, Src: 00:03:47:c9:c8:52, Dst: 00:03:47:c9:c8:52

Internet Protocol, Src Addr: 192.168.1.64 (192.168.1.64), Dst Addr: 192.168.1.230

Transmission Control Protocol, Src Port: 3604, Dst Port: 445

NetBIOS Session Service

File: 1m_open.cap 1513 KB | P: 3342 D: 2678 M: 0

Ethernet: Summary

File
Name: D:\Documents and Settings\ibensha\Desktop\1m_open.cap
Length: 1550120 bytes
Format: libpcap (tcpdump, Ethereal, etc.)
Packet size limit: 65535 bytes

Time
First packet: 2003-10-27 00:45:54
Last packet: 2003-10-27 00:46:28
Elapsed: 00:00:34

Capture
Interface: unknown
Dropped packets: unknown
Capture filter: unknown

Display
Display filter: smb
Marked packets: 0

Traffic	Captured	Displayed
Between first and last packet	34.513 sec	34.369 sec
Packets	3342	2678
Avg. packets/sec	96.833	77.920
Avg. packet size	447.823 bytes	378.042 bytes
Bytes	1496624	1012396
Avg. bytes/sec	43363.853	29456.974
Avg. MBit/sec	0.347	0.236

2678/2 = 1339 CIFS messages between client and server

Close

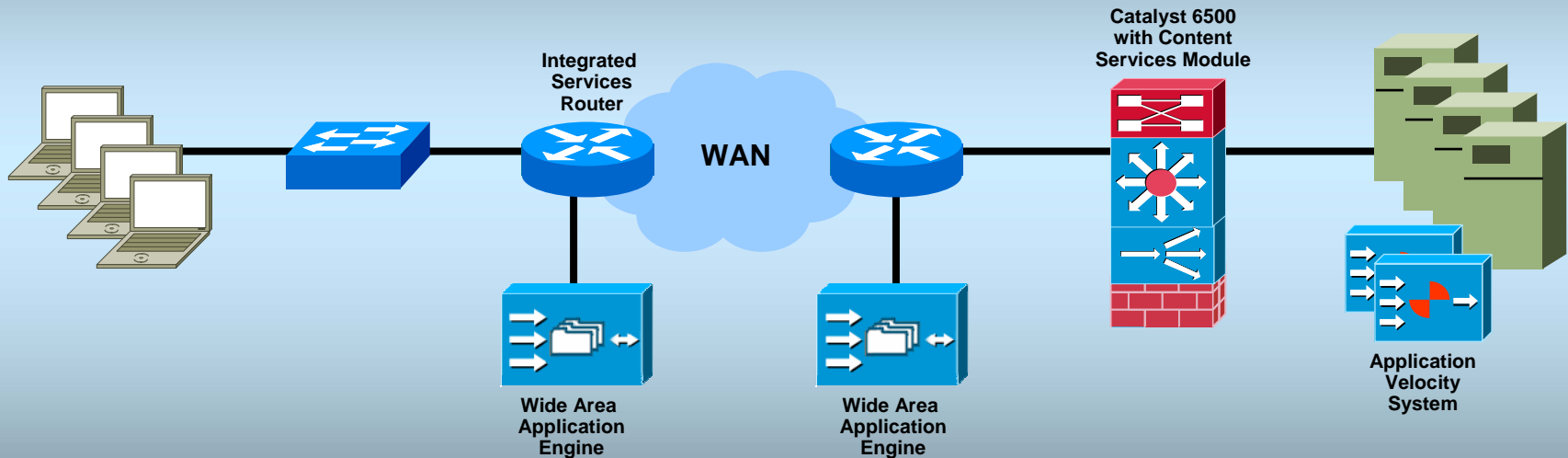
Application Optimization Infrastructure

Network Classification

- Quality of Service
- Network-Based App Recognition
- Queuing, Policing, Shaping
- Visibility, Monitoring, Control

Application Scalability

- Server load-balancing
- Site selection
- SSL termination and offload
- Service and availability monitoring



Application Acceleration

- Latency mitigation
- Application data cache
- Meta data cache
- Local services

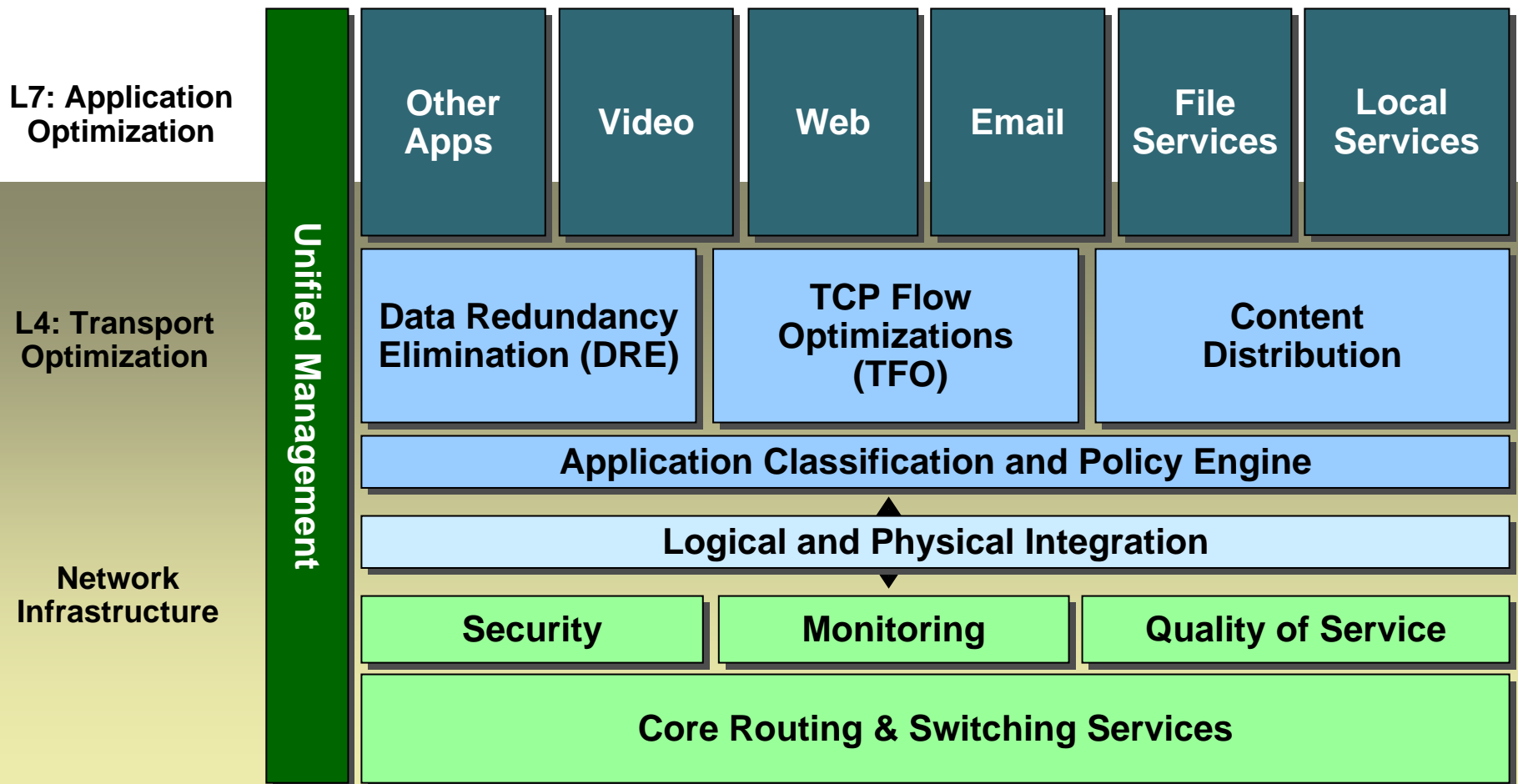
WAN Acceleration

- Data redundancy elimination
- Window scaling
- LZ compression
- Adaptive congestion mgmt

Application Optimization

- Delta encoding
- FlashForward optimization
- Application security
- Server offload

Cisco WAAS Optimization Architecture



Cisco WAAS Enables Consolidation

- **Cisco Wide Area Application Services (WAAS)**

 - Transparent integration

 - Robust optimizations

 - Auto discovery

- **Infrastructure Consolidation**

 - Remote costly servers

 - Centralize data protection

 - Save WAN resources

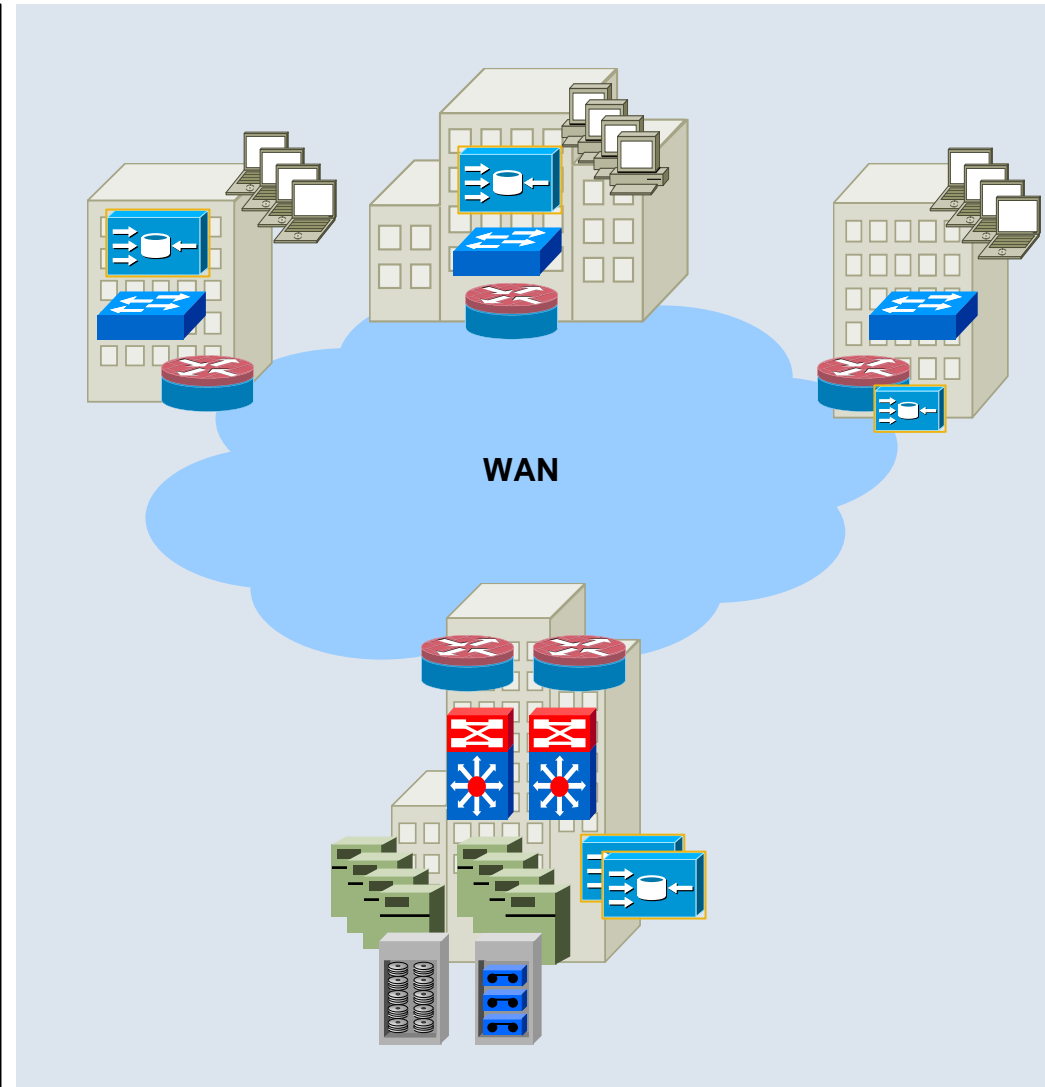
- **Application Acceleration**

 - Application adapters

 - Advanced compression

 - Throughput optimizations

 - Policy-based configuration



WAAS Addresses the WAN Challenge

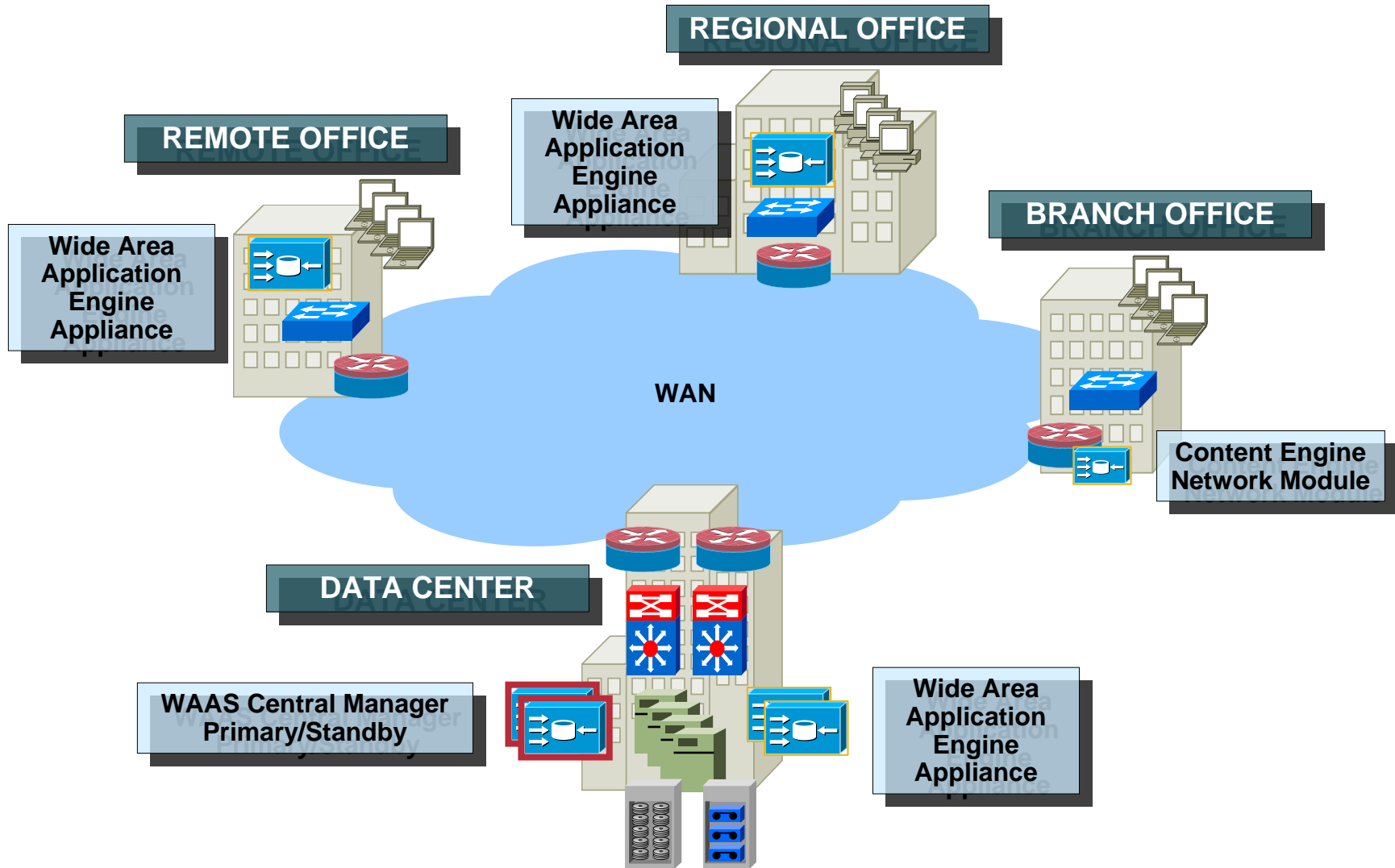
Source	Need	Technology
Latency Mitigation	<ul style="list-style-type: none">• Reduced number of network roundtrips from chatty application protocols	<ul style="list-style-type: none">• Intelligent Protocol Proxies
Bandwidth Management	<ul style="list-style-type: none">• Improve application response time on congested links by reducing the amount of data sent across the WAN	<ul style="list-style-type: none">• Application Caching• Data Redundancy Elimination (DRE)
Link Throughput Improvement	<ul style="list-style-type: none">• Improve network throughput (total # of data) by reducing TCP-related errors	<ul style="list-style-type: none">• Transport Flow Optimizations (TFO)
Network Integration	<ul style="list-style-type: none">• Integration into network devices• Compliance with network functions	<ul style="list-style-type: none">• Router modules, linecards• QoS, NetFlow, Firewalls
Local Services	<ul style="list-style-type: none">• Replacement for services that branch office servers provide	<ul style="list-style-type: none">• Centrally managed remote services interface

WAAS Accelerates Broad Range of Applications

Application	Protocol	Typical Improvement
File Sharing	<ul style="list-style-type: none"> Windows (CIFS) UNIX (NFS) 	<ul style="list-style-type: none"> 2X-100X
Email	<ul style="list-style-type: none"> Exchange (MAPI) SMTP/POP3, IMAP Notes 	<ul style="list-style-type: none"> 2X-50X
Internet and Intranet	<ul style="list-style-type: none"> HTTP, HTTPS, WebDAV 	<ul style="list-style-type: none"> 2X-50X
Data Transfer	<ul style="list-style-type: none"> FTP 	<ul style="list-style-type: none"> 2X-50X
Software Distribution	<ul style="list-style-type: none"> SMS Altiris 	<ul style="list-style-type: none"> 2X-100X
Database Applications	<ul style="list-style-type: none"> SQL Oracle Notes 	<ul style="list-style-type: none"> 2X-10X
Data Protection	<ul style="list-style-type: none"> Backup Applications Replication Applications 	<ul style="list-style-type: none"> 2X-10X
Other	<ul style="list-style-type: none"> Any TCP-based Application 	<ul style="list-style-type: none"> 2X-10X

* Performance improvement varies based on user workload, compressibility of data, and WAN characteristics and utilization. Actual numbers are case-specific and results may vary.

Cisco WAAS Symmetric Deployment Architecture



Seamless, Transparent Integration

- **Seamless integration with the packet network with high availability, load-balancing, and failover**

WCCPv2

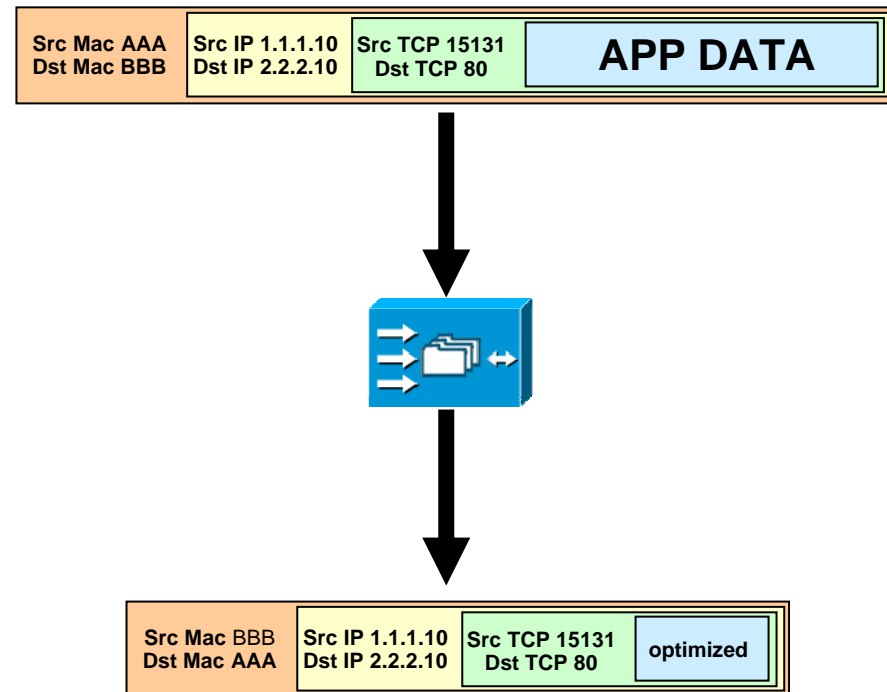
Policy-Based Routing

- **Full preservation of L3/L4 packet header information (IP/TCP)**
- **Compliance with network value-added features**

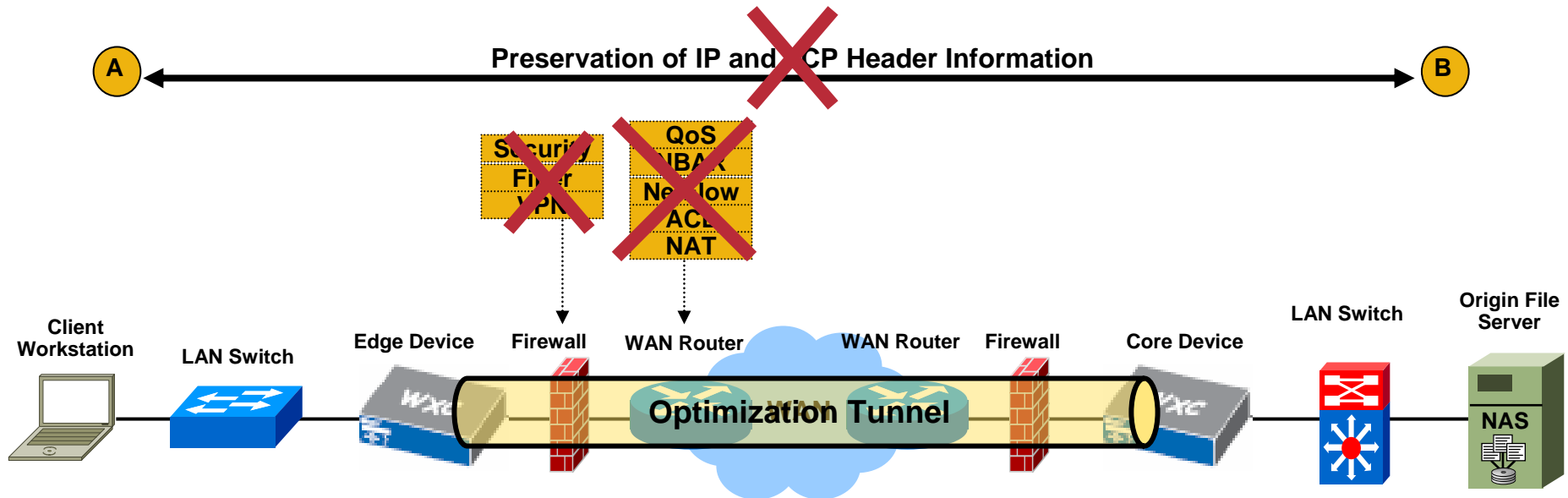
Classification - QoS, NBAR, Queuing, Policing, Shaping

Security - Firewall policies, Access Control Lists

Reporting - NetFlow, monitoring



Challenges with Optimizations Using Tunnels



- Networking devices in the path only see traffic amongst optimization appliances
- Difficult to manage and monitor network flows
- Disruptive migration to appliance-based features and security models
- Unnecessarily complex support model

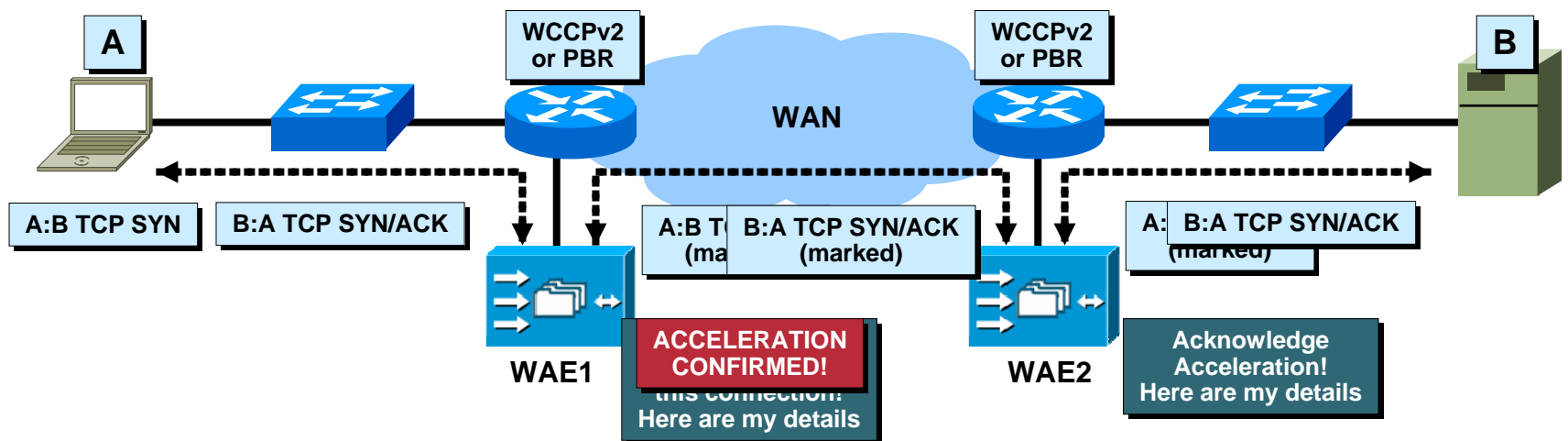
Cisco WAAS Auto-Discovery

- Cisco WAE devices automatically discover one another and negotiate optimization capabilities

Performed per TCP connection

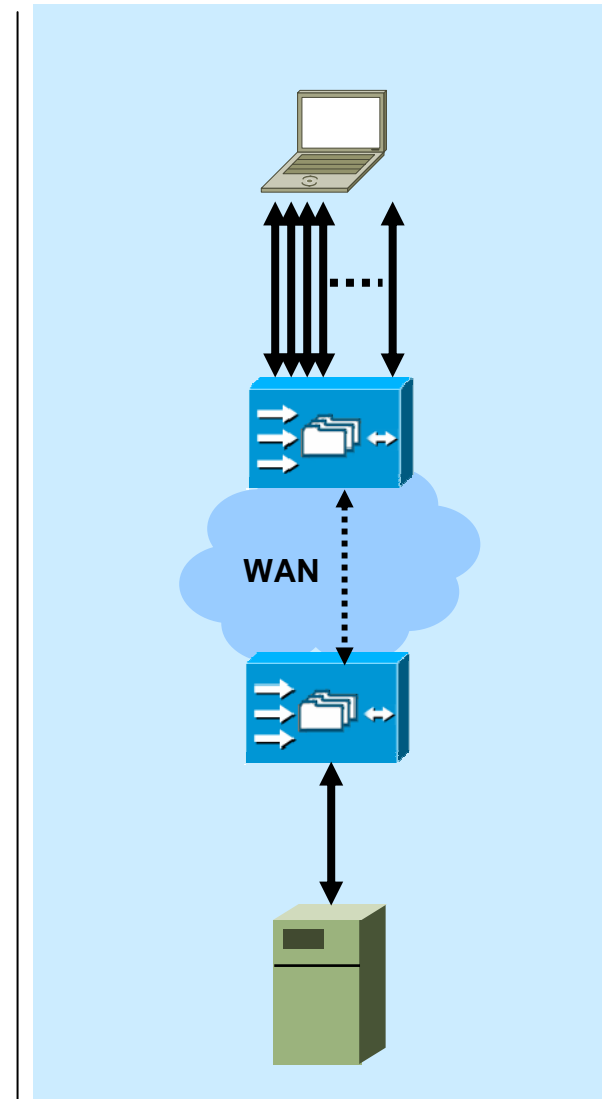
Flexible optimization configuration using ATP

Exchange of peer capabilities and limitations



Application Adapters Mitigate Latency

- **Application and protocol awareness**
 - Eliminate unnecessary chatter and transfer
 - Pre-populate edge cache as necessary
 - Enable disconnected operations
- **Intelligent protocol proxy**
 - Transparent or non-transparent
 - Improves application response time
 - Provide origin server offload
- **WAASv4 application adapters**
 - CIFS (Windows File Services)
 - NFS (UNIX File Services)
 - Windows printing



Application Adapters – File Services

- **Wide Area File Services (WAFS) application adapter provides near-LAN performance to users when accessing remote file server storage**
 - Latency mitigation – suppress unnecessary file protocol chatter and messaging**
 - Safe read and write caching – serve validated, unchanged content to requesting users, avoiding WAN transmission**
 - Scheduled data distribution – prepopulate edge cache to improve performance, i.e. software packages, patches**
 - Transparent integration – maintains file server security, quotas, and access control**
 - Disconnected mode of operation – WAFS provides read-only access to cached objects during periods of extended WAN outage**
- **Leverages WAN optimizations such as DRE, TFO, LZ compression provided by Cisco WAAS**

Application Adapters – File Services

This screenshot shows the Cisco Systems management interface for configuring a new file server. The page title is "Registering new File Server". The main configuration area is titled "File Server Configuration Settings".

Fields and options include:

- File Server Name: * SERVER
- Type: CIFS
- Available on WAN Failure:

A note at the bottom states: "Note: * - Required Field".

This screenshot shows the Cisco Systems management interface for enabling edge server services. The page title is "Enable Edge Server Services for WAE, EDGE-WAE".

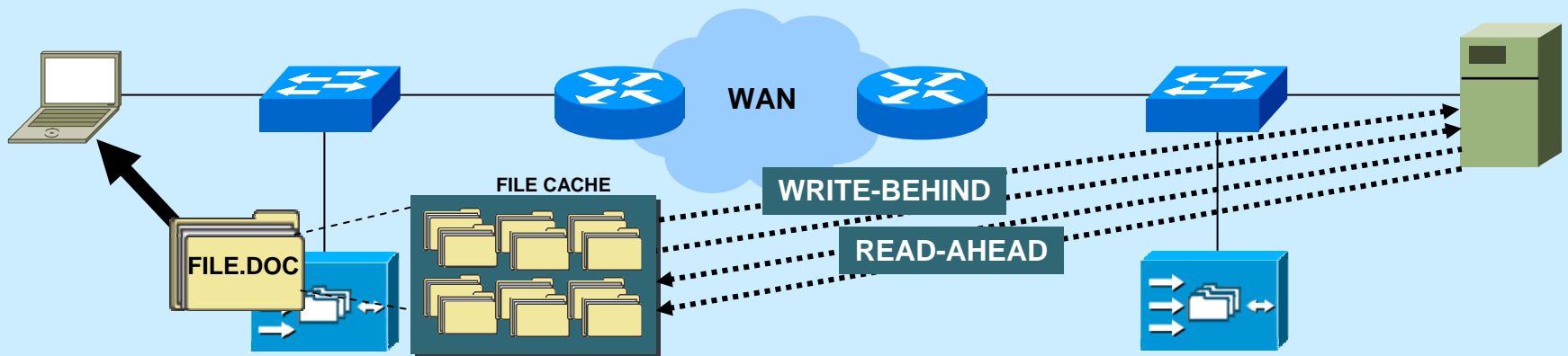
The configuration area is titled "Enable Edge Server Services" and includes the following settings:

- Current applied settings from WAE, EDGE-WAE
- Enable Edge Server:
- CIFS Configurations
 - Enable Transparent Mode:
 - Active directory site name: [Empty text box]
 - Enable CIFS over NETBIOS connections (tcp port 139):
 - Enable CIFS over TCP/IP connections (tcp port 445, requires WCCP):
- NFS Configurations

Buttons for "Submit" and "Cancel" are located at the bottom right.

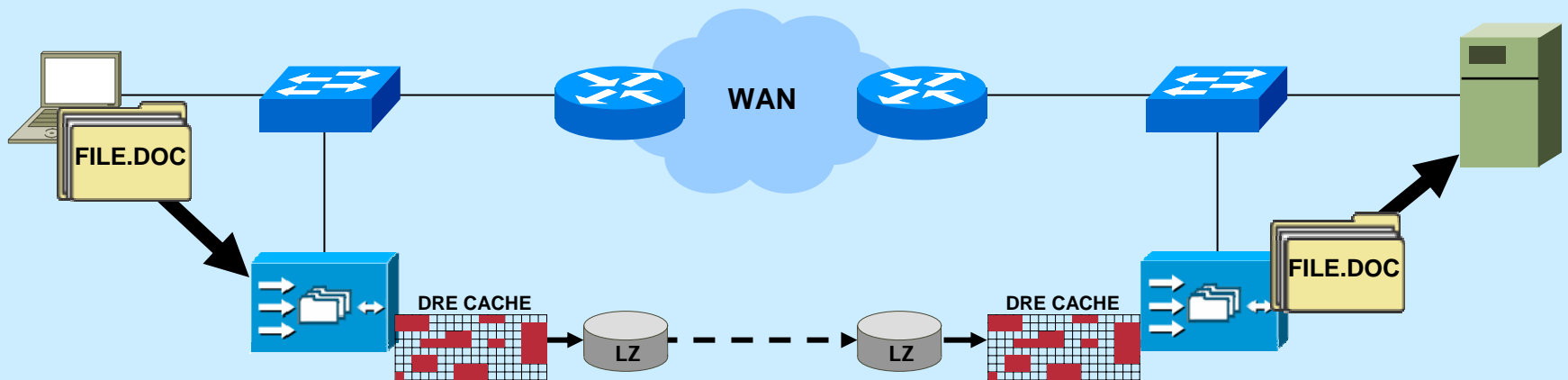
Caching Manages Bandwidth Usage

- Application-specific caches serve usable, validated content to requestors to minimize bandwidth utilization for application content
- Employs segment-level object caching, read-caching (and read-ahead), write-caching (and write-behind) for optimal performance over the WAN

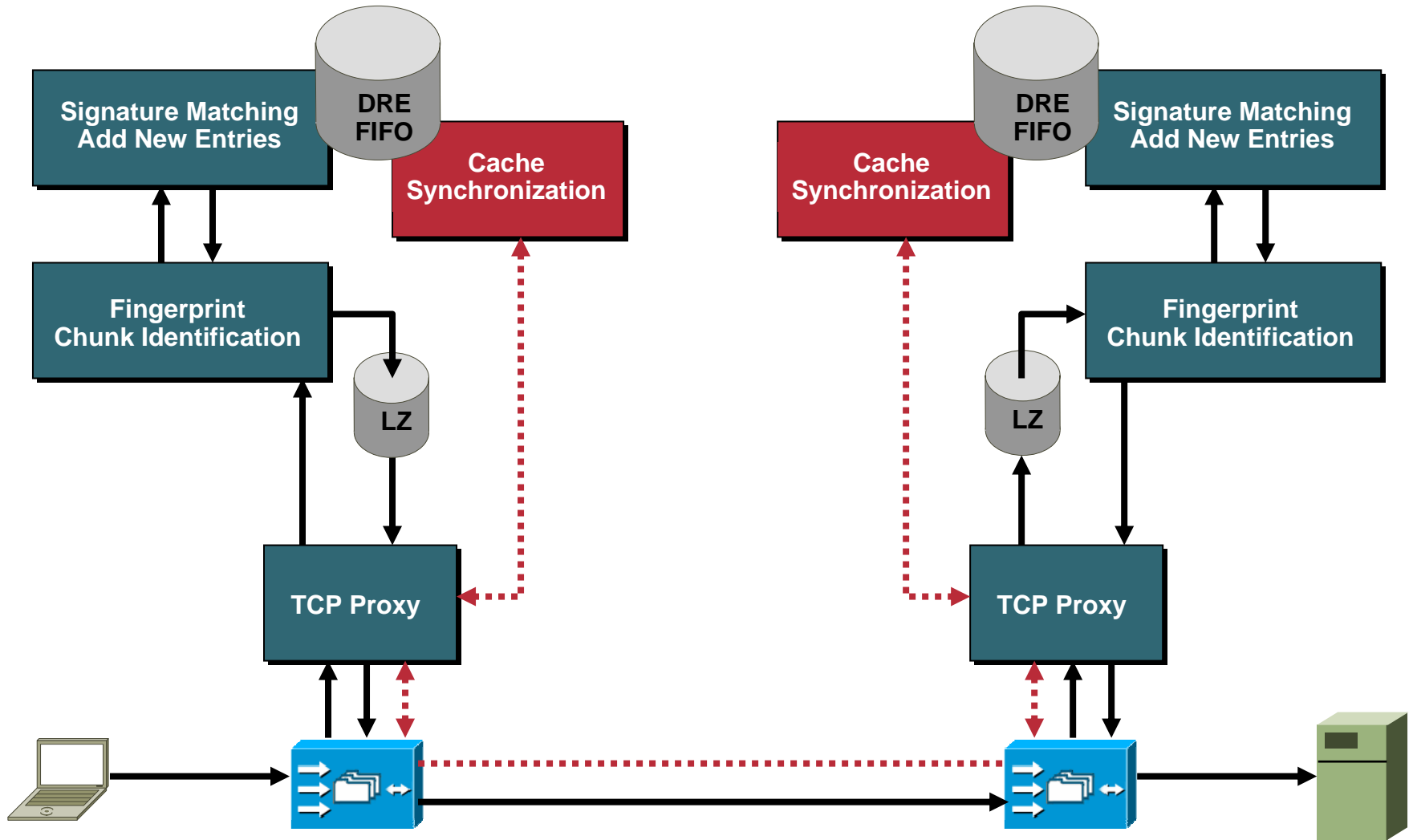


DRE and LZ Manage Bandwidth Utilization

- **Data Redundancy Elimination (DRE)** provides advanced compression to eliminate redundancy from network flows regardless of application
- **LZ compression** provides generic compression for all traffic (even traffic with redundancy removed)



Advanced Compression Block Diagram



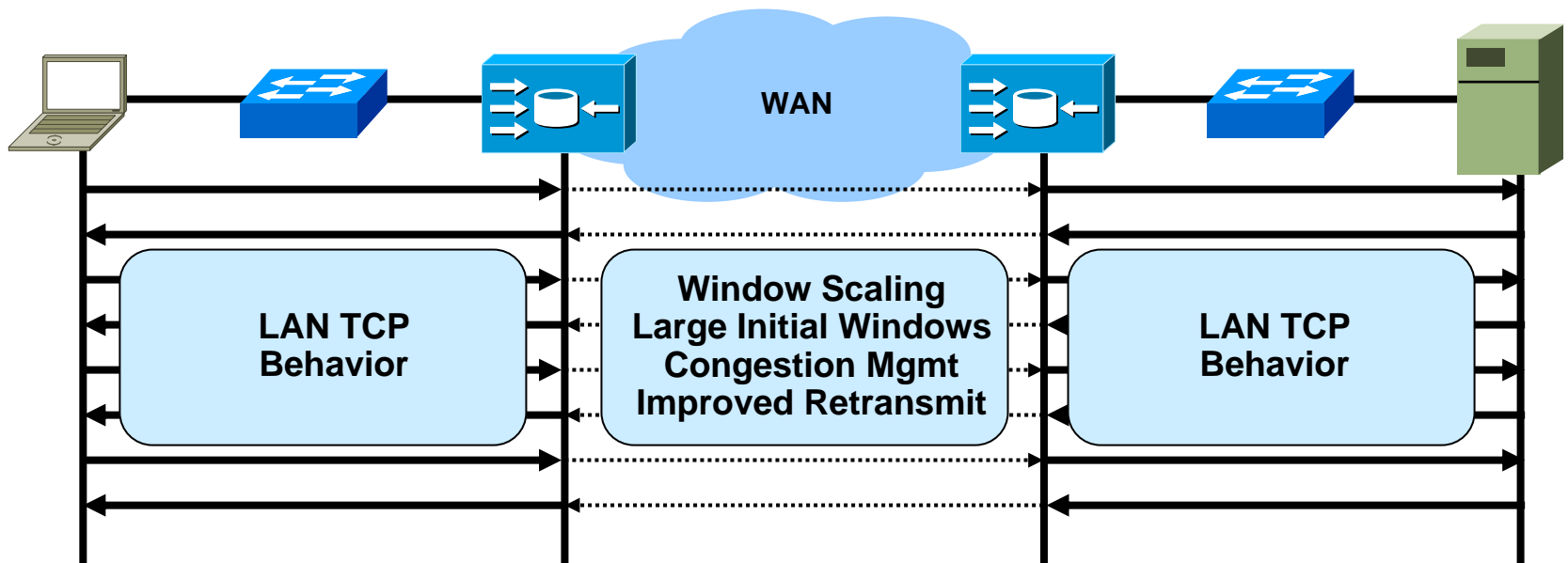
TFO Improves Application Performance

- TFO overcomes TCP and WAN bottlenecks
- Shields nodes connections from WAN conditions

Clients experience fast acknowledgement

Minimize perceived packet loss

Eliminate need to use inefficient congestion handling



Cisco WAAS Transport Flow Optimizations

- **Cisco WAAS Transport Flow Optimizations (TFO) is designed to overcome common challenges associated with standard TCP implementations**

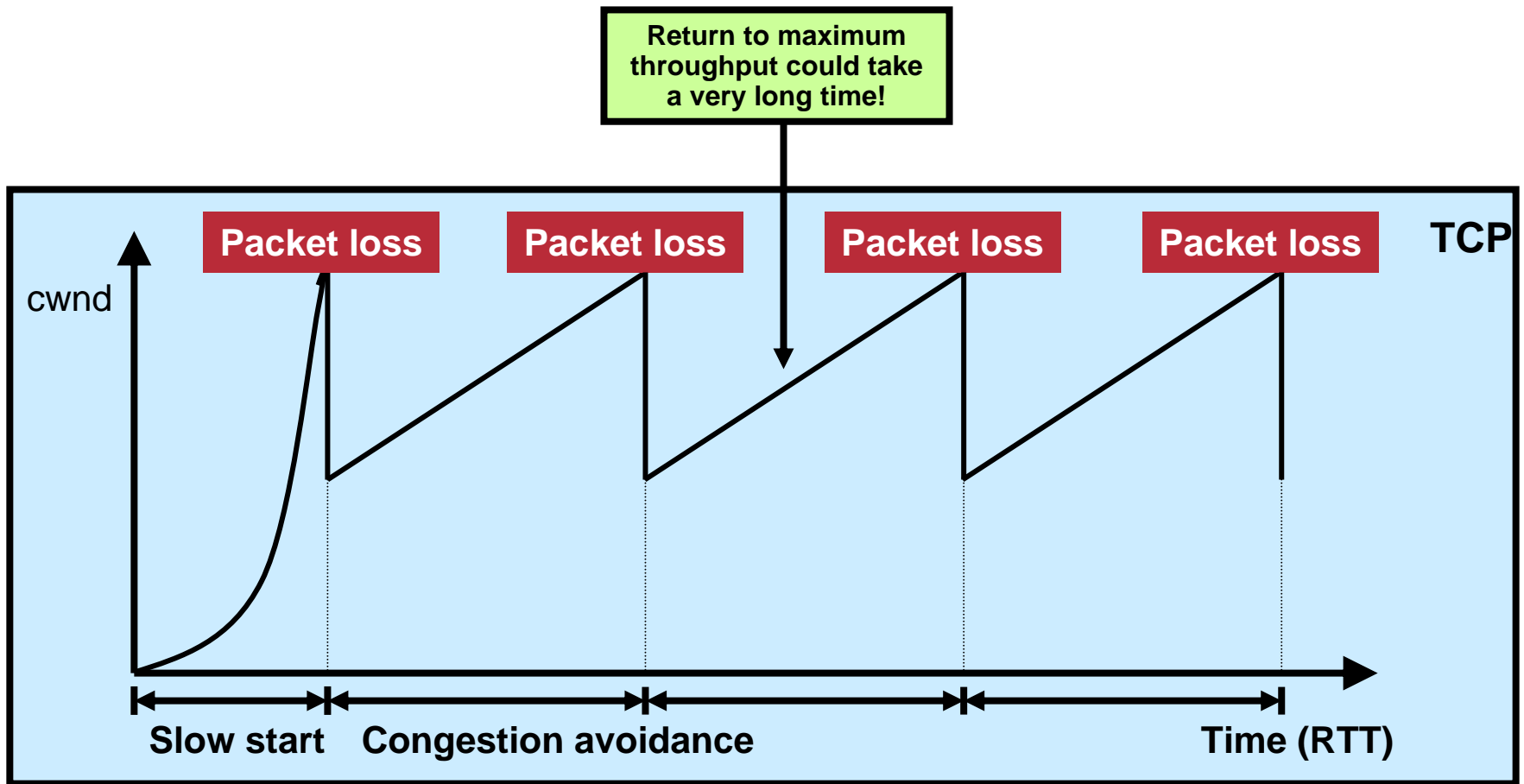
Window Scaling – capitalize on available bandwidth

Large Initial Windows – maximize transmission after connection establishment

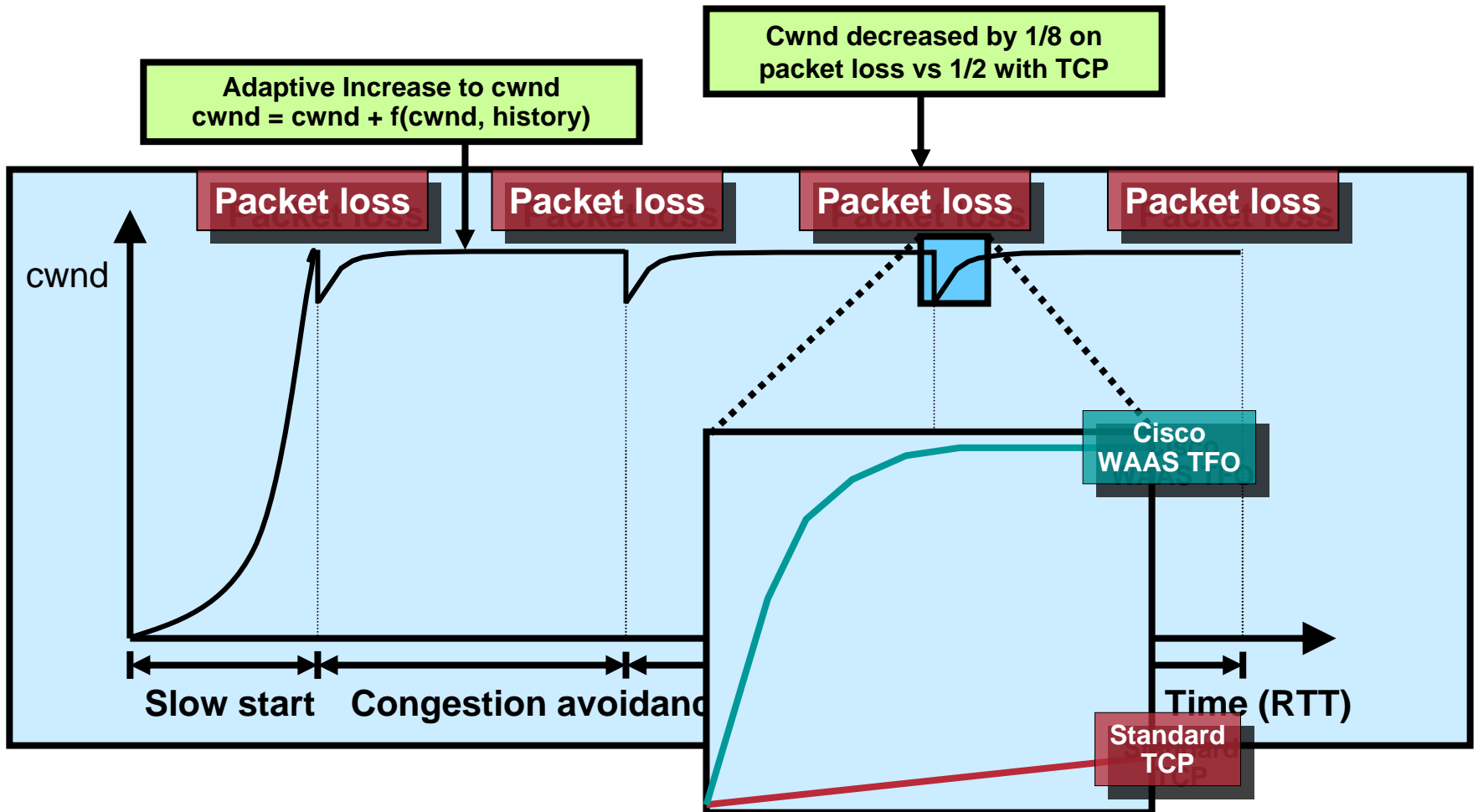
Selective Acknowledgement – efficient packet loss recovery and retransmission mechanisms

Binary Increase Congestion (BIC) – quick return to maximum throughput upon encountering congestion

Standard TCP Throughput “Saw-tooth”



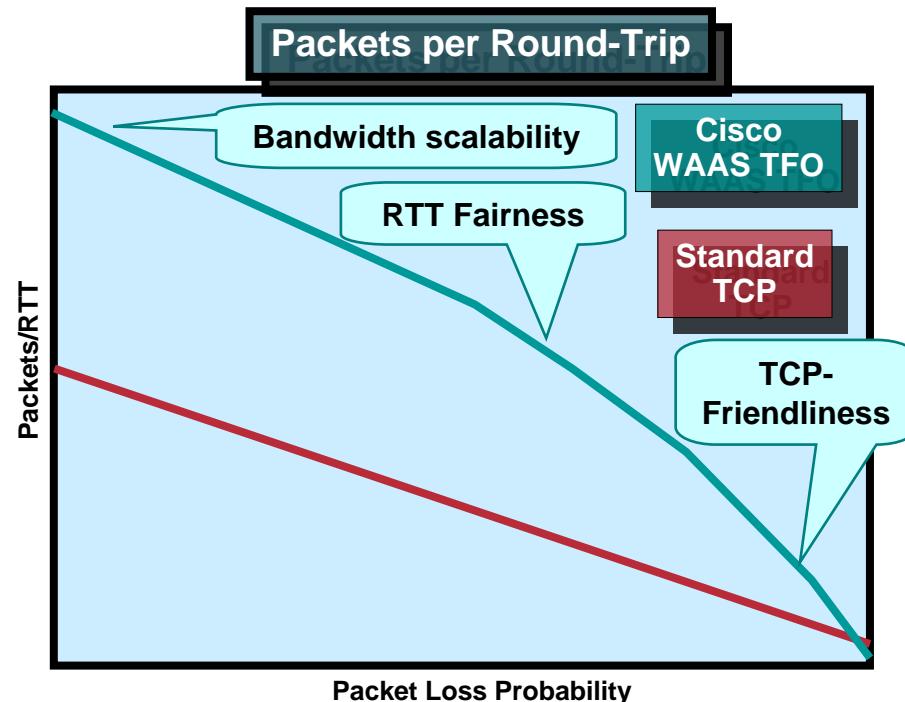
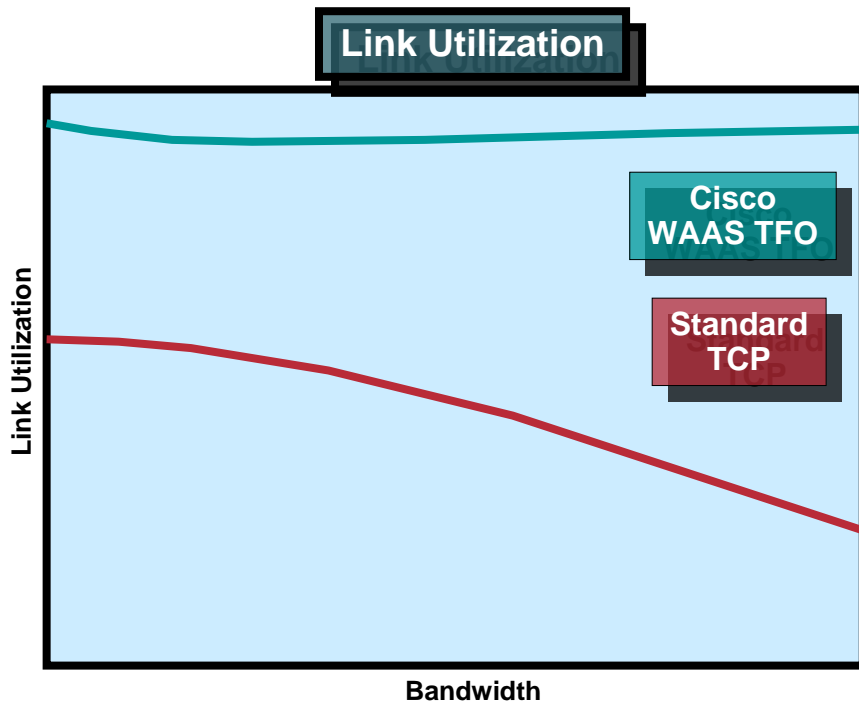
WAAS Throughput and Congestion Avoidance



TCP Throughput and Latency Optimizations

- TCP window scaling improves link utilization and throughput
- Optimized TCP stack improves recovery and congestion handling
- Priority for transactional traffic

- Compatible and friendly to other TCP connections on the network
- Large initial windows improves throughput for short-lived connections



DRE and TFO Application Performance

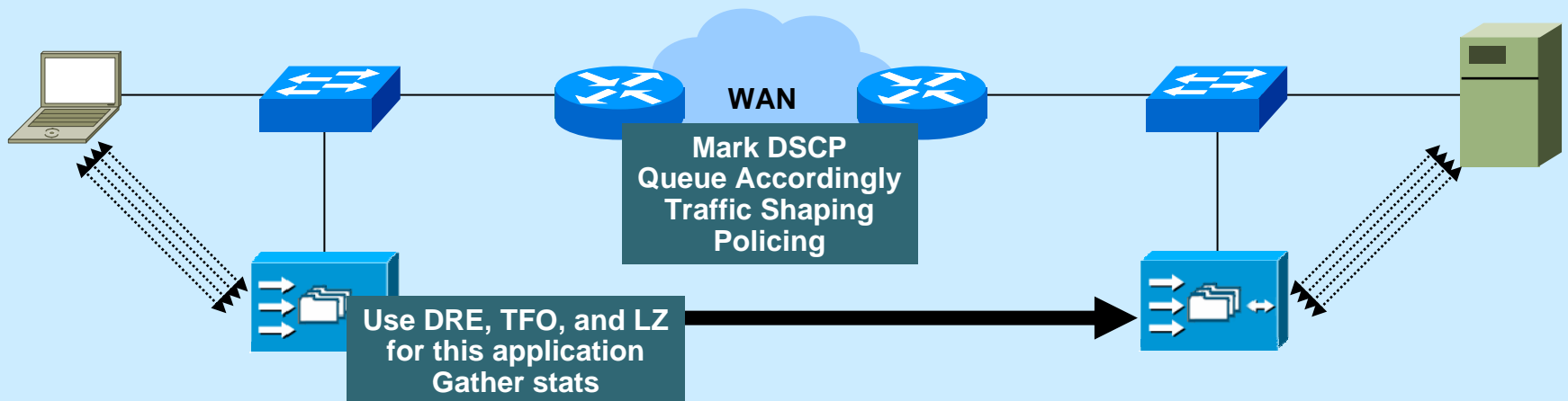
Test environment: 256Kbps circuit, 120mS roundtrip latency, .05% packet loss

Test	Average Aggregate Data Throughput (Kbps)			Average Response Time (sec)		
	Cisco WAAS	Vendor 1	Vendor 2	Cisco WAAS	Vendor 1	Vendor 2
MS Exchange	1218	1204	1193	.19	.2	.2
Internet Mail	111	109	115	.58	.57	.57
Lotus Mail	934	734	384	1.2	1.44	2.82
Oracle	543	533	579	7.82	8.13	7.34
SAP	598	384	474	1.44	2.17	1.81
Lotus Database	1535	1471	1776	2.27	2.64	2.26

*Note: **Preliminary** DRE and TFO performance test results are from August of 2005

Classification and Prioritization

- **Application Traffic Policy (ATP) engine allows for the customizable configuration of optimizations per application protocol, monitoring, statistics**
- **Full support for IOS Quality of Service (QoS) and Network Based Application Recognition (NBAR)**



Application Traffic Policy Engine

- **Centrally managed from GUI as well as device CLI**
- **Classify traffic based on L3/L4 attributes**
 - TCP Protocol Type**
 - Source/Destination IP Address/Range**
 - Source/Destination TCP Port**
- **Apply actions to classified traffic**
 - Actions include: compress, DRE, TFO, protocol specific optimization**
 - Bypass**
 - Monitor**
- **Default policies for common applications**
 - Includes 60+ policies for Citrix, MAPI, SQL, others**
 - Fully customizable classification and optimizations**

Application Traffic Policy Engine

Modifying Match Condition for Classifier, WWW8082

Match All:

Destination Condition

Destination IP Address: IP Address of network or host notation(10.77.0.0).

Destination IP Wildcard: IP Wildcard to be applied to decimal notation(255.255.0.0).

Destination Port Start:

Destination Port End:

Application assignments for DG, All

Rows: 10

Name	Comments	Monitor Enabled
FTP		Yes
WAFS		Yes
WWW		Yes

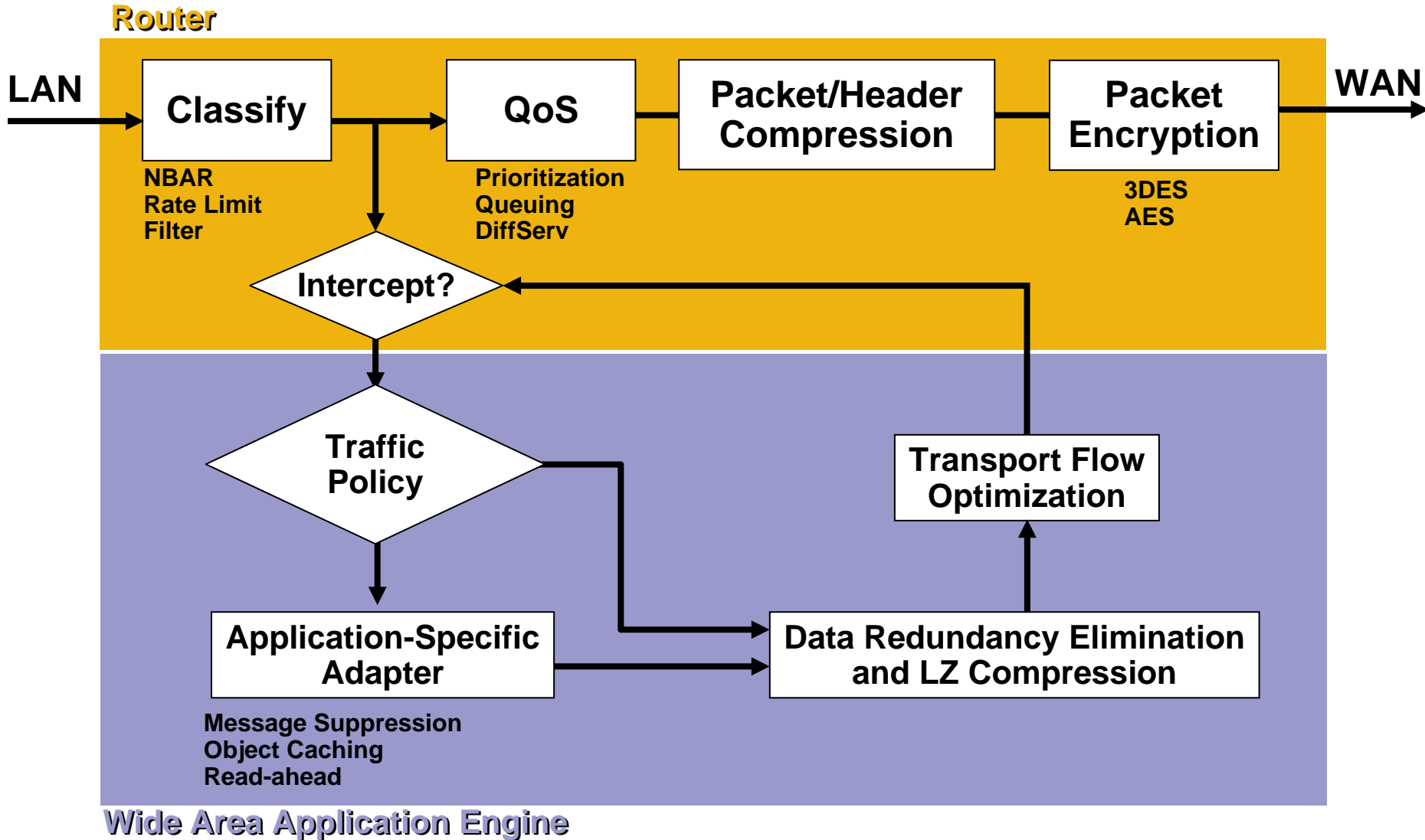
<< Page 1 >> Showing 1-3 of 3 Applications

Application Policies for Device Group, All

Position	Move	Application	Application Classifier	Action	Enabled
Basic Policies					
1	▼	WWW	WWW8082	Optimize(DRE,LZ)	Enabled
2	▲▲	FTP	FTPData	Optimize(DRE,LZ)	Enabled
3	▲	FTP	FTPControl	Optimize(LZ)	Enabled
Policy for Other Applications					
1		N/A	N/A	Passthrough	Enabled

<< Page 1 >> Showing 1-4 of 4 Application Policy

Router-Integrated Packet Flow



Windows Compatible Print Services

- **Centrally Managed Print Services**

 - Client driver distribution

 - Status and health reporting

- **Supports Any Printer**

 - Full feature compatibility

 - Job control and status monitoring

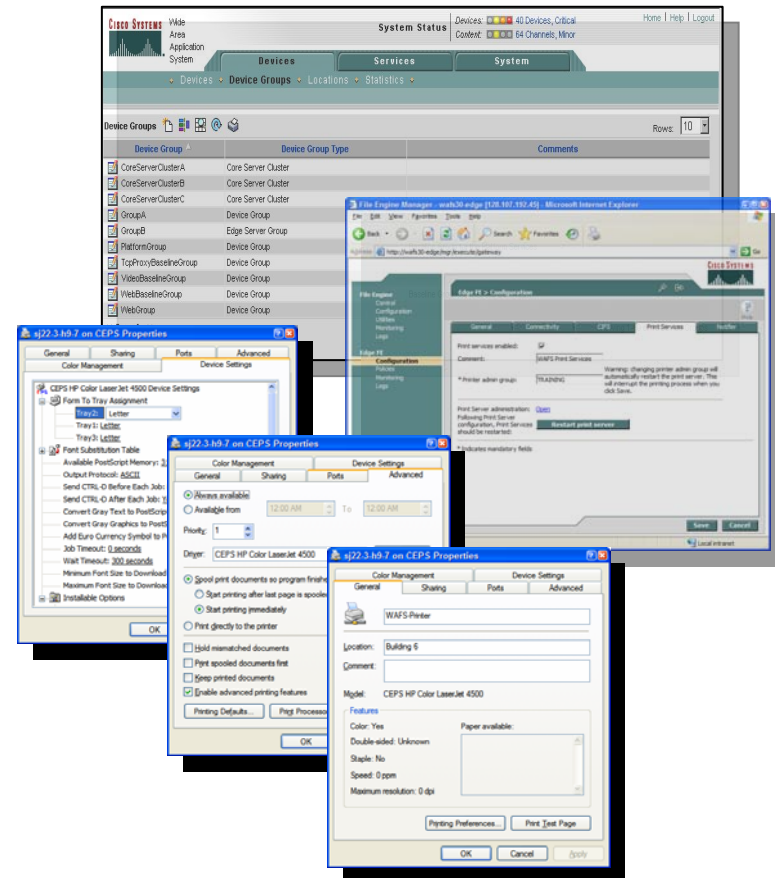
 - Guest and disconnected printing

- **Print Server Configuration**

 - Network parameters (IP, name, etc)

 - Queue definition and ACLs

 - Standard Windows wizards for settings, accessories



WAAS Intuitive Central Management

- **Comprehensive Management**

Central configuration

Device grouping

Monitoring, statistics

Alerts, reporting

- **Easy-to-use Interface**

Graphical U/I, Wizards

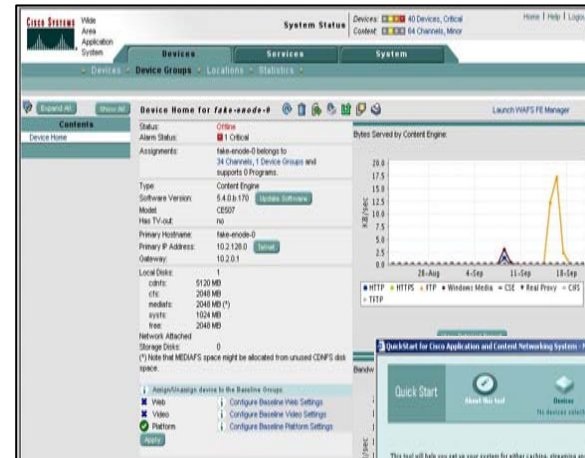
IOS CLI

Roles-based administration

- **Proven Scalability**

1000's of nodes

Redundancy and recovery



This screenshot shows two overlapping windows from the Cisco WAAS Central Management interface. The top window is a 'Device Groups' list with columns for 'Device Group' and 'Device Group Type'. The bottom window is a configuration page for a device, showing a list of configuration commands in IOS CLI format. The commands include enabling traps, configuring the device name, setting up authentication for 'windows-domain' users, and enabling the 'print-services' service.

```
snmp-server enable traps alarm police-critical
snmp-server enable traps alarm clear-critical
snmp-server enable traps alarm clear-major
snmp-server enable traps alarm clear-minor
snmp-server enable traps alarm clear-minor
snmp-server enable traps wafs waf-log
snmp-server enable traps wafs waf-log
snmp-server enable traps entity
snmp-server enable traps snmp-authentication
snmp-server enable traps snmp cold-start
snmp-server enable traps event
snmp-server community public rw

windows-domain usergroup "FE-SUN0"
windows-domain command "WFS Print Server"
windows-domain certfile name "fe-waas-0.cer"
windows-domain user-server 178.187.192.58
windows-domain password-server 178.187.192.58

subconf section "febas" name "print-admin" value "WAFS"
subconf section "print" name "write list" value "WAFS"
subconf section "print" name "force user" value "user"
subconf section "print" name "force group" value "root"
subconf section login local enable
subconf section login windows-domain enable primary
subconf section configuration local enable primary
subconf section print-services windows-domain enable

bold enable

print-services enable
print-services admin-group WFS

End of WFS configuration
falk-waas
```

Quick Start for Cisco Application and Content Networking System - Microsoft Internet Explorer

Quick Start

- About this tool
- Device
- Routing method
- Services
- Summary

This tool will help you set up your system for either testing, proving and/or provisioning of content. Quick Start offers basic steps to get your system up to the "Device" and "System" tabs in the main window.

If the following steps before running this tool:

- Beed using this tool.
- Beed connected to the network and can successfully communicate with other network device (e.g., using "ping") before the CSM's IP address.
- Beed in the device listing page in the CSM GUI. To view the device listing page, simply click on the [Provisioning] icon next to the device.
- Beed (if you want to use in your network).
- Beed the CLI of each device. To invoke this utility, use the "Setup" CLI command.

Next Step

Cisco WAE Hardware

- **Cisco WAN Application Engine (WAE) hardware family provides unified platform for application optimization and delivery**
- **Appliance models deliver 80GB – 1.8TB of capacity and provide data center scalability, reliability, and delivery for the enterprise edge**
- **Network-integrated module provides optimization and delivery for the enterprise edge**



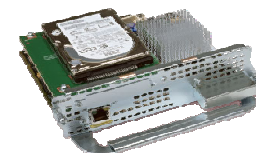
Cisco WAE Appliances



**Cisco WAE
Network Module**

Cisco WAE Hardware Specifications

Platform	Hardware	Positioning
NM-CE	<ul style="list-style-type: none"> 500MHz Pentium III 512MB of memory 80GB ATA 	<ul style="list-style-type: none"> Integrated branch services for small deployment
WAE-511	<ul style="list-style-type: none"> 2.8GHz Celeron 1GB memory 80GB to 500GB SATA 	<ul style="list-style-type: none"> Dedicated appliance for small-medium edge or core deployments
WAE-611	<ul style="list-style-type: none"> 3.0GHz Pentium IV 2GB of memory 288GB SCSI 	<ul style="list-style-type: none"> Dedicated appliance for medium-large edge or core deployments
WAE-7326	<ul style="list-style-type: none"> Dual 3.2GHz Xeon 4GB of memory 73GB to 1.8TB SCSI 	<ul style="list-style-type: none"> Dedicated appliance for enterprise edge or core deployments



NM-CE



WAE-511

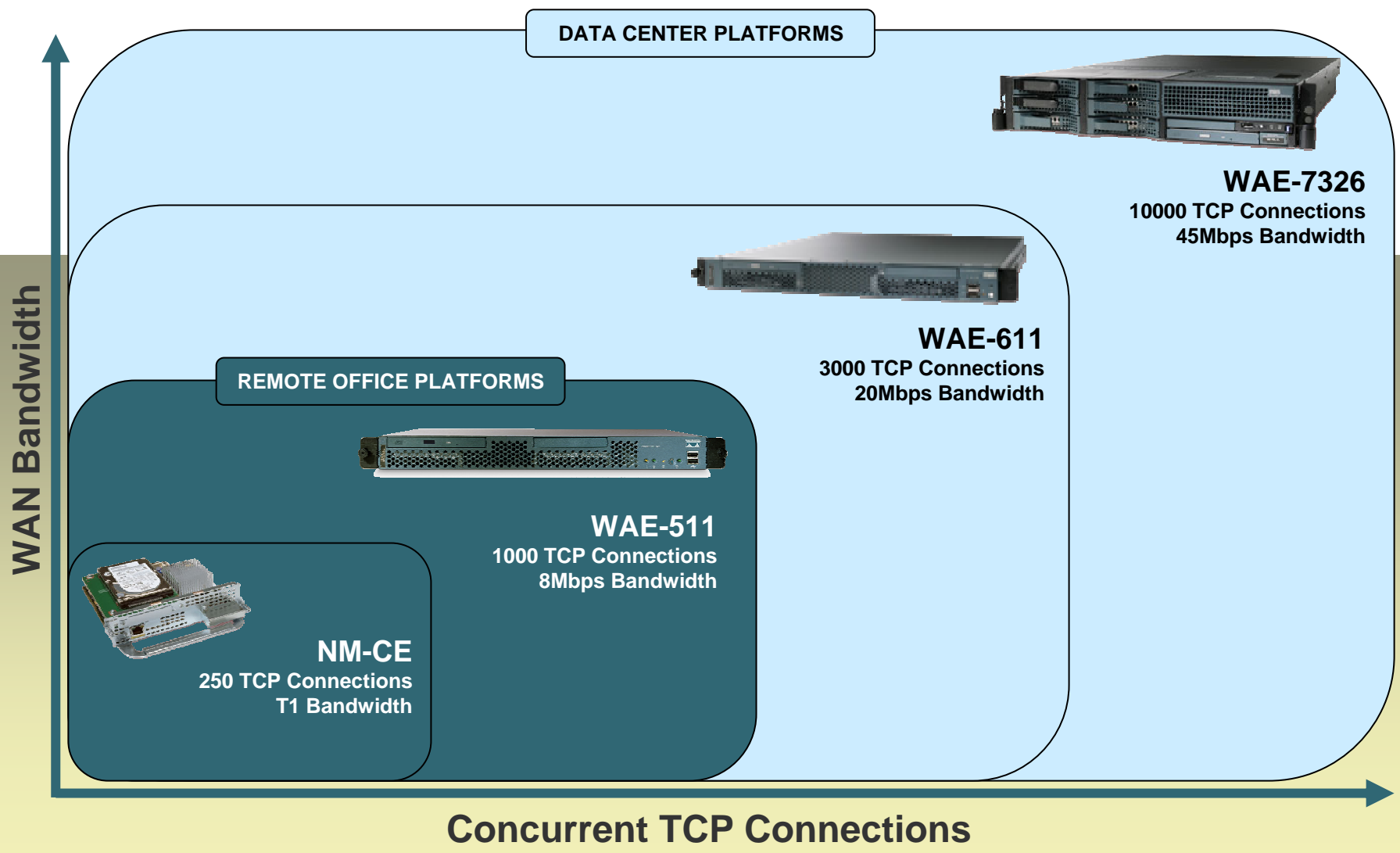


WAE-611



WAE-7326

Cisco WAE Hardware Positioning



Cisco WAE Family Performance and Scalability

Hardware	CIFS Sessions (Edge)	CIFS Sessions (Core)	Optimized TCP Connections	WAN Throughput (Uncompressed)
NM-CE	100	N/A	250	1.5Mbps
WAE-511 512MB Memory	250	1000	500	4Mbps
WAE-511 1GB Memory	500	2000	1000	8Mbps
WAE-611	1250	5000	3000	20Mbps
WAE-7326	2500	10000	10000	45Mbps

* Recommended capacity numbers, based typical user and branch definitions. Actual numbers are case-specific and results may vary.

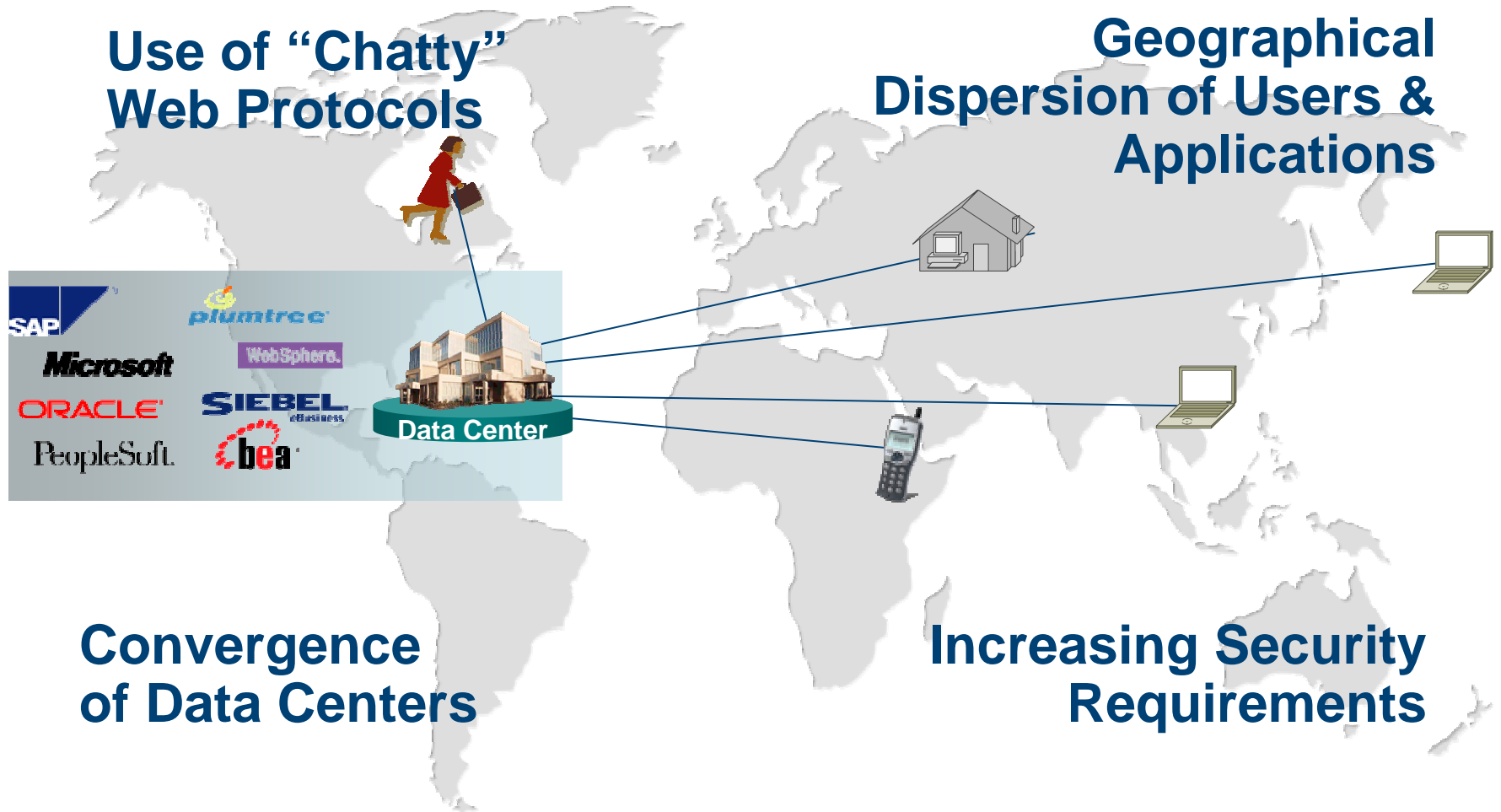
Why Choose Cisco WAAS?

- **Scalability: Proxies offload WAN and scale data center**
 - Fewer messages reach origin server
 - Stateless core lends to simple N+1 core clustering
- **Availability: Safe and simple failover**
 - Stateless core implies simple failover with minimal impact
 - Allow for offline operation under certain circumstances
- **Performance: Better and more scaleable performance**
 - Fewer messages utilize the WAN, decreasing application sensitivity
 - Generic network optimizations dramatically improve throughput
- **Correctness**
 - Safe read-ahead, write-back, message batching, and pipelining
 - Elimination of unnecessary application control traffic

Why Choose Cisco WAAS?

- **Industry-Leading Network Integration**
 - Transparent integration – no client or server changes
 - Network hardware platform modules and linecards
 - Compliance with advanced network functionality and topologies
- **Scalable Central management**
 - Proven capability to manage 1000's of devices
 - Directory-integrated central management, local appliance GUI
- **Global Service and Support**
 - Cisco's award-winning 24x7 Technical Assistance Center

Trends Impacting Application Delivery



Result: Performance declines - Security Decreases

Performance Impedes Web-based Business



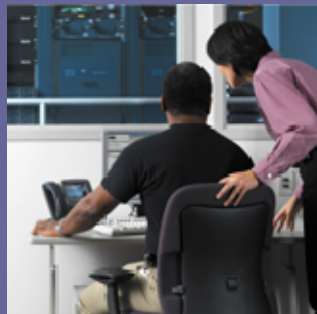
Applications Increasingly Represent the Business

- Web promoted process automation across the Extended Enterprise
- Pressure to move from staff to software drives productivity



Solutions Should Serve All Users, Everywhere

- Consolidation encouraging one-to-all application support for all
- Fewer and fewer managed endpoints
- Security adds necessary overhead



Applications Give Unprecedented Access to Critical Business Data

- Private Data, Confidential, Intellectual property
- Developers write for functionality
- Too expensive to fix all security bugs

Current IT Approaches Fall Short

Operations



- More servers
- More management tools
- Re-architect infrastructure

Applications



- More testing
- Rewrite applications
- Security patching



Data Center



Network



- More bandwidth
- Many point products
- Replicate data centers

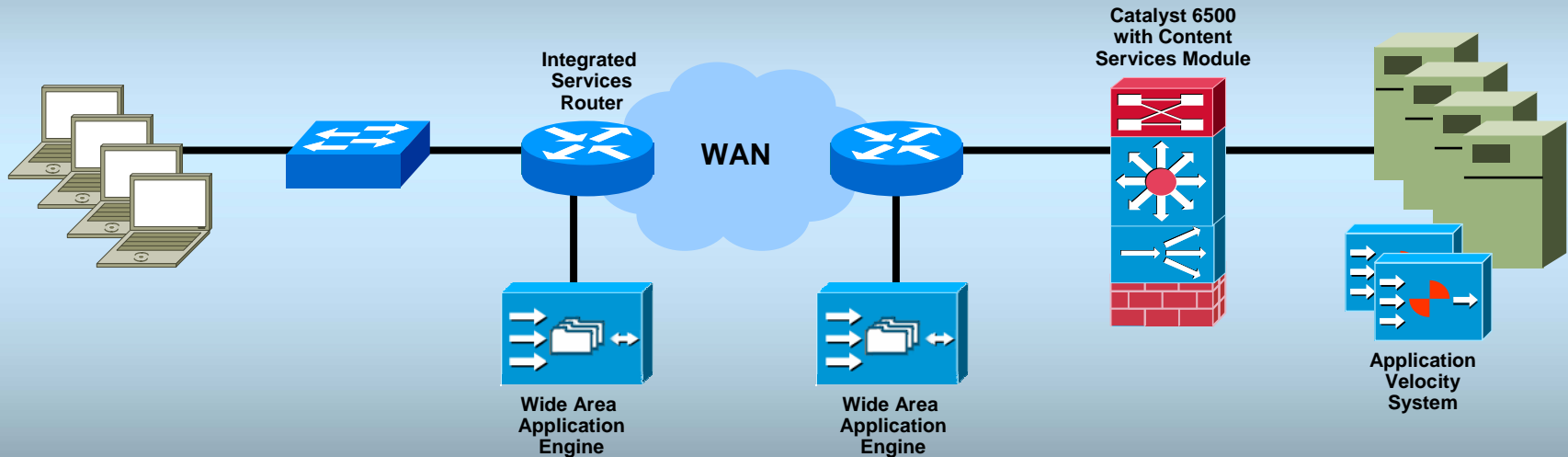
Application Optimization Infrastructure

Network Classification

- Quality of Service
- Network-Based App Recognition
- Queuing, Policing, Shaping
- Visibility, Monitoring, Control

Application Scalability

- Server load-balancing
- Site selection
- SSL termination and offload
- Service and availability monitoring



Application Acceleration

- Latency mitigation
- Application data cache
- Meta data cache
- Local services

WAN Acceleration

- Data redundancy elimination
- Window scaling
- LZ compression
- Adaptive congestion mgmt

Application Optimization

- Delta encoding
- FlashForward optimization
- Application security
- Server offload

Web Application Acceleration & Web Firewall Solution

- **Optimize at Layer-7**
 - 2X–response time improvements**
 - 80% decrease in bandwidth requirements**
 - 80% fewer server cycles**
- **Stop application hacking**
 - Safely deploy applications**
 - Secure mission critical data**
 - Streamline operations**

Secure, Fast & Reliable Applications



Cisco AVS 3120

AVS Delivers Real-World Value

Application	Software	AVS Improvement	Cost of Likely Alternative	Business Impact
Call Center (High tech)	PeopleSoft	↑270%	\$4MM (2 New Overseas Data Centers)	<ul style="list-style-type: none"> Meet support goals with no additional staffing or costs
Purchasing (Manufacturing)	SAP	↑350%	\$5MM (Multiple Overseas Data Centers)	<ul style="list-style-type: none"> Increase procurement automation
Mortgage Origination (Financial)	Custom J2EE: WebSphere	↑300%	\$2MM (Reengineer Apps and Infrastructure)	<ul style="list-style-type: none"> 30% more transactions across same infrastructure
Claims Management (Insurance)	Custom J2EE: WebSphere	↑220%	\$3MM (No Reengineering)	<ul style="list-style-type: none"> Support “zero-footprint” branch
B2B Operations (Retail)	Plumtree	↑350%	\$500K annually (Upgrade 650 Sites)	<ul style="list-style-type: none"> Move all costly paper-based processes online
CRM (Financial)	Siebel	↑290%	\$2.4MM annually (Upgrade 200 U.S. Locations)	<ul style="list-style-type: none"> Immediate jump in CRM usage with Improved account retention

Huge Lead in Acceleration Features

Functional Areas	AVS Acceleration Features
Latency Reduction	<ul style="list-style-type: none">▪ FlashForwarding*▪ Browser TCP multiplexing*▪ PDF download optimization▪ Response redirection control*
Bandwidth Reduction	<ul style="list-style-type: none">▪ GZIP Compression▪ Delta encoding*▪ Dynamic browser caching*▪ Dynamic image optimization▪ Flexible processing rules
Server Offload	<ul style="list-style-type: none">▪ TCP Offload▪ SSL Offload▪ RAM Caching▪ Dynamic caching*▪ Load-based caching*▪ Lazy request evaluation*▪ Single sign-on optimizations▪ XML merging/transformation

Application Acceleration Examples

FlashForward

- Embedded objects referenced in HTML container pages are served with **Expires:** which sets expiry in the future.
- On 2nd visit Browser will not send **GET** for objects in cache if the current date & time is not greater than the object expiry date.
- This reduces the total number of HTTP requests for subsequent visits to the same page.
- Benefits:
 - Decreased page download time
 - Decreased network congestion
 - Decreased number of requests to origin server

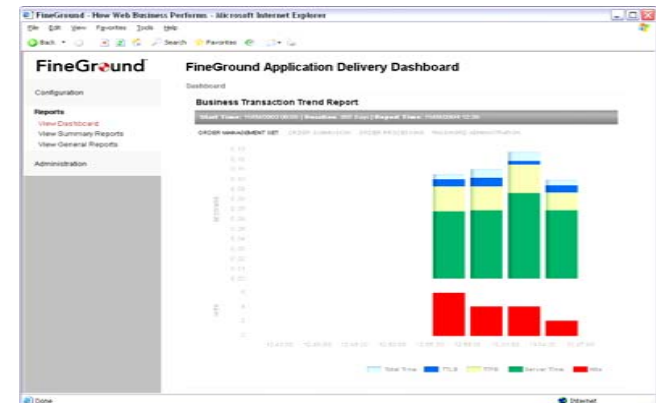
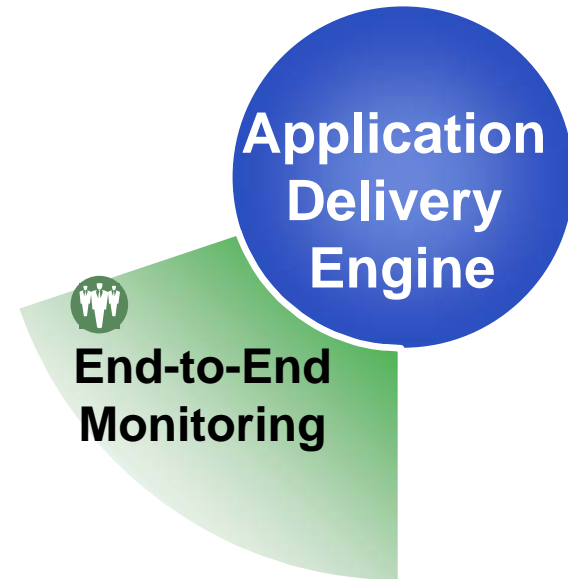
Application Acceleration Examples

Delta Encoding

- **HTML pages today are largely dynamically generated making it not cacheable**
- **Browser must download entire page each visit.**
- **Delta works by calculating and sending only the difference between two visits to an dynamic HTML page**
- **Benefits:**
 - Reduced bandwidth usage**
 - Reduced page download times**
 - Works in combination with other optimizations**

Application Monitoring

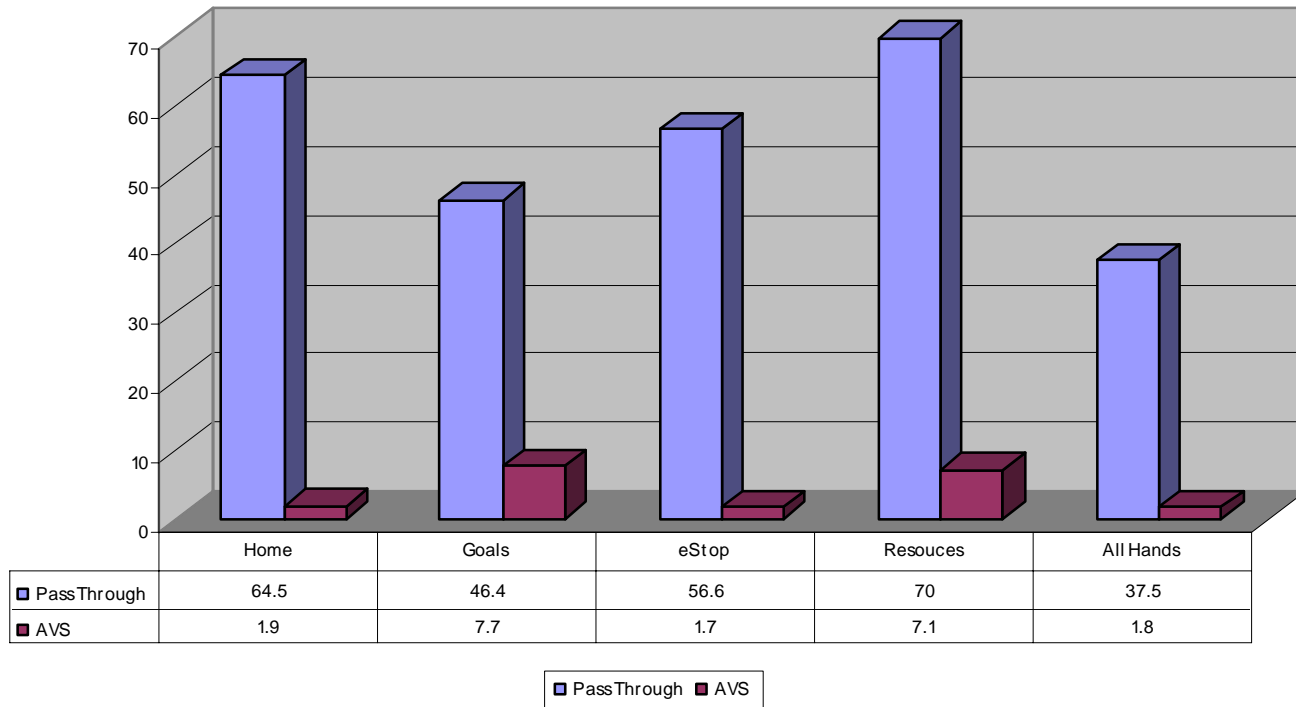
- **End-user response time monitoring**
 - Actual users and transactions
 - Business- and process-level aggregation
 - Full drill-down to page and location
- **“Drop-in” deployment**
 - No changes to application or desktop
 - Data center installation
- **Delivery Dashboard and flexible reporting**
 - Wizard-based transaction builder
 - Support for Enterprise Consoles (BMC, Tivoli, OpenView...)
- **Benefits**
 - End-user visibility
 - First-line problem triage
 - Reduce mean-time-to-repair



Sample Performance Report

- Performance Improvement

IS&T 28.8



Management Console

- **Browser based management**
- **Scalable and hardened appliance platform**
- **Powerful management console**
 - Local and remote management
 - Integrated reporting, diagnostics, and alert mechanisms
 - Fully SNMP compliant
- **Application scalability and failover via multiple certified options**
- **Integral part of the and products**

Transaction Type Mapping Status

Each time you change (add, remove, or update) a Transaction Type definition, a global version number is incremented. From that point on, all new transactions are categorized using the updated definition.

However, you may have existing transactions that were categorized using previous Transaction Type definitions. This screen allows you to see if you have any such transactions, and if so, it allows you to re-categorize those transactions based on the latest Transaction Type definitions.

The current Transaction Type global version number is: 10.

Transaction Type Version	Number of Transactions	Most Recent Transaction
10	154404	09/24/2004
0	59	09/17/2004

Update Mapping

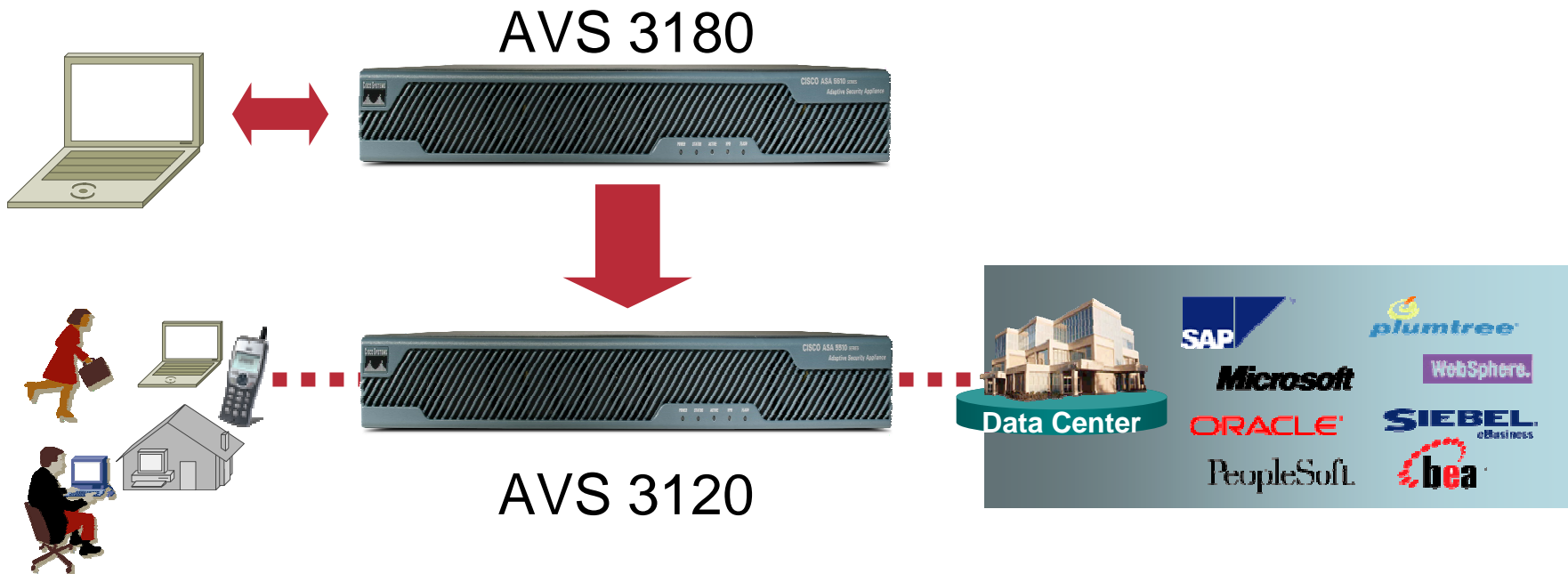
From Date: 09/24/2004

Click the Update button to update the Transaction Type mappings for all transactions recorded on or after From Date. If you leave the From Date field blank, all transactions will be updated.

Note: If you have a lot of data, updating the mappings may take a long time.

Monitoring Requires AVS 3120 & 3180

- AVS 3180 Polls the 3120 for Performance Data
- Browser into the 3180
- AVS 3180 also allows you to manage one or more AVS 3120



AVS Delivers Applications Securely

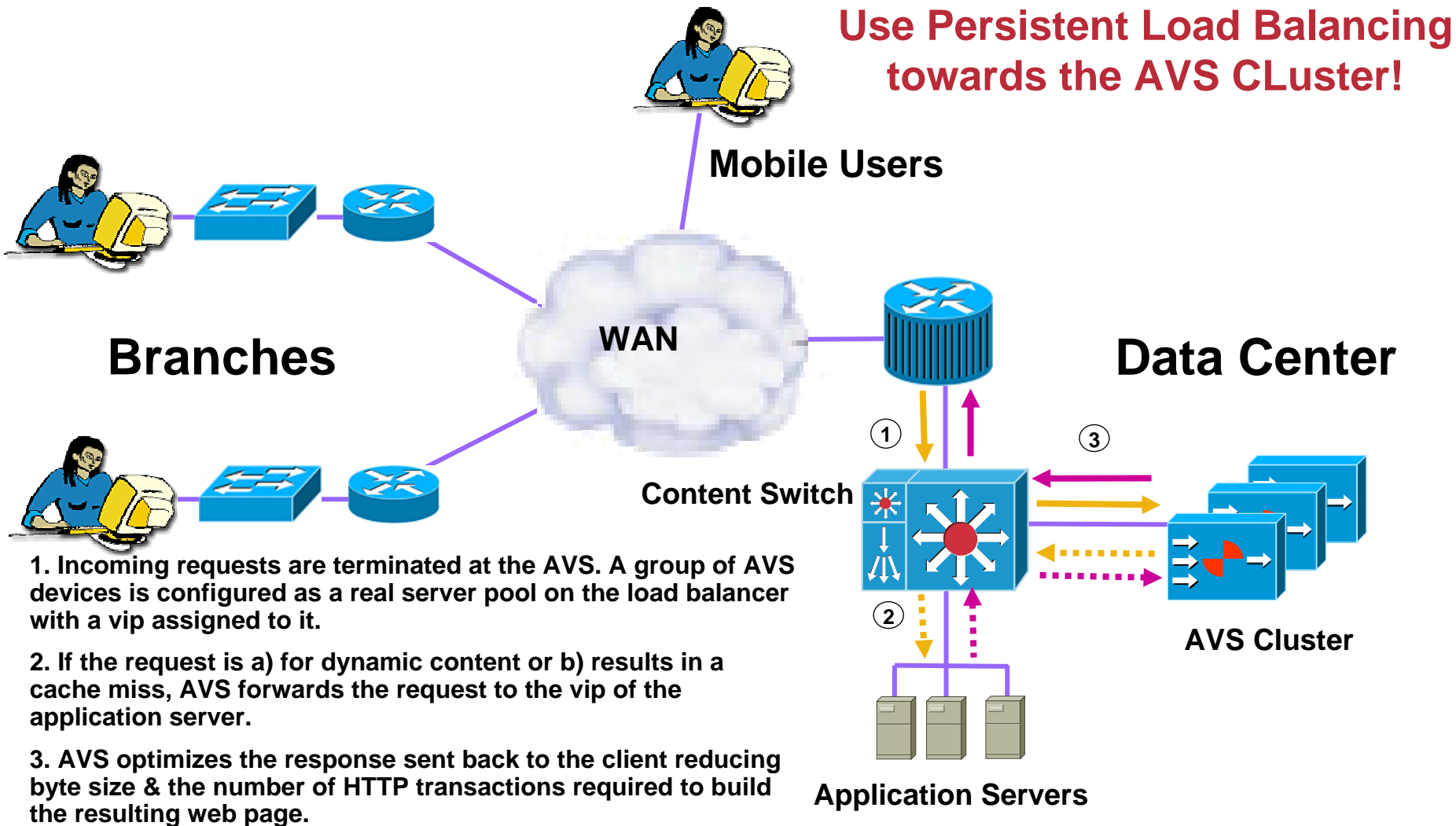
INSPECTS FOR:

SQL Injection
Cross-Site Scripting
Command Injection
Cookie/Session Poisoning
Application Reconnaissance
LDAP Injection
Buffer Overflows
Directory Traversals
Attack Obfuscation
Application Platform Exploits
Zero Day Attacks
Cookie Poisoning
Parameter Tampering



- **Bi – Directional Deep Inspection**
- **Positive & Negative Security**
- **Protocol compliance and anomaly detection**
- **Transaction logging and report for application security forensics**

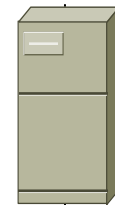
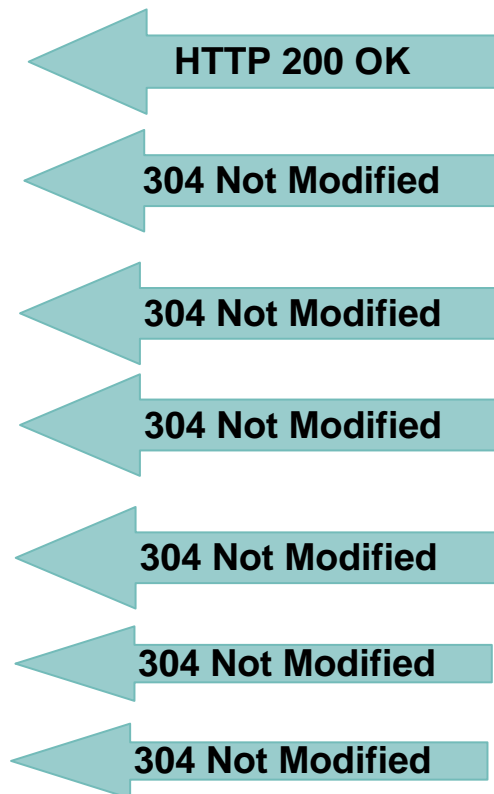
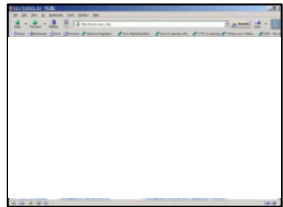
AVS Deployment Scenario



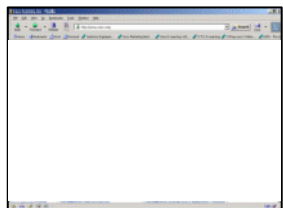
CISCO SYSTEMS



Browser behavior w/o FlashForward

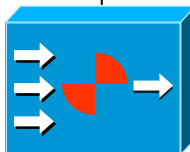


Browser behavior with FlashForward 2nd Visit –AVS cacheTTL is expired



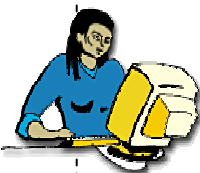
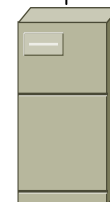
Client Requests
HTML page

GET Index.html

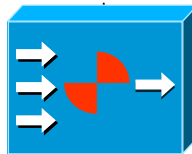
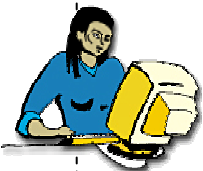
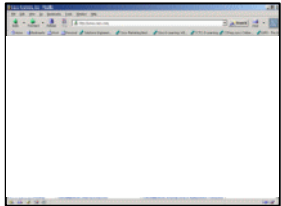


AVS forwards request
to Server

GET Index.html



Browser behavior with FlashForward 2nd Visit –AVS cacheTTL is expired

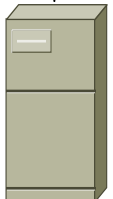


**Server returns
updated content**

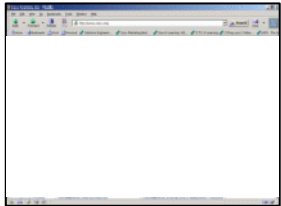
GET Index.html

HTTP 200 OK

**AVS Parses the
Container HTML
For Embedded Objects**



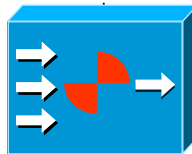
Browser behavior with FlashForward 2nd Visit –AVS cacheTTL is expired



AVS validates
embedded objects



2 Objects have
changed



304 Not Modified

304 Not Modified

HTTP 200 OK

HTTP 200 OK

304 Not Modified

304 Not Modified

IMS Foo.gif

IMS Foo.js

IMS Foo.jpg

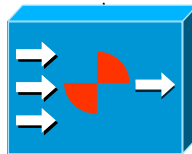
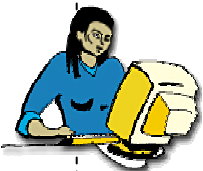
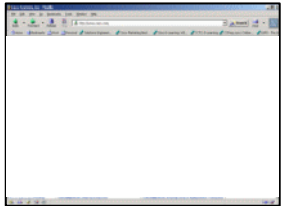
IMS Foo.css

IMS bar.gif

IMS bar.js



Browser behavior with FlashForward 2nd Visit –AVS cacheTTL is expired



AVS updates the references to embedded objects in HTML

Object Reference:

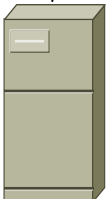
```

```

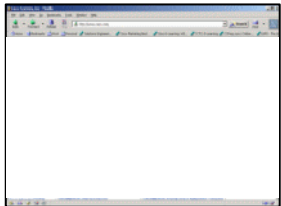
Transformed Obj. Ref:

```

```



Browser behavior with FlashForward 2nd Visit –AVS cacheTTL is expired

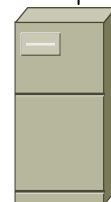
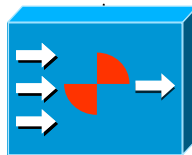


As objects change
AVS updates the new
object references in
HTML

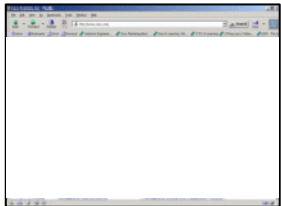
Transformed Obj. Ref:

```

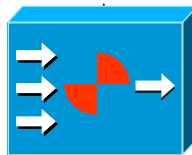
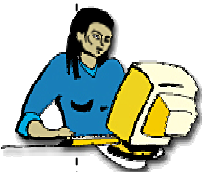
```



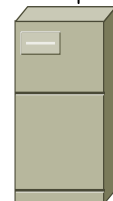
Browser behavior with FlashForward 2nd Visit –AVS cacheTTL is expired



The URL is updated
to include a new **MD5**
hash



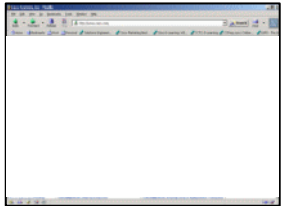
New transformed Obj. Ref:



```

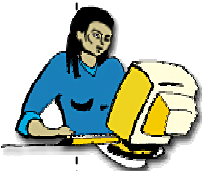
```

Browser behavior with FlashForward 2nd Visit –AVS cacheTTL is expired

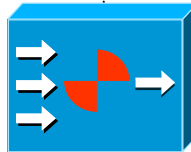


**Client downloads
HTML page**

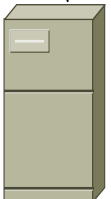
**The requested HTML
with updated object
references is now
sent to the client**



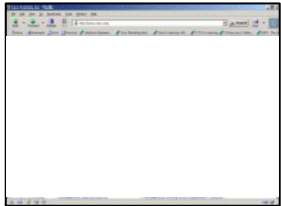
HTTP 200 OK



**Client parses HTML
and retrieves fresh
embedded objects
from browser cache**



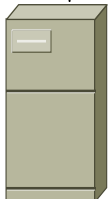
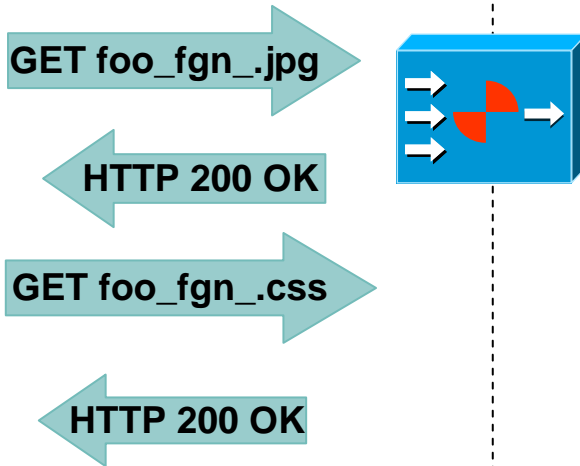
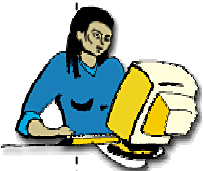
Browser behavior with FlashForward 2nd Visit –AVS cacheTTL is expired



**Client downloads
new updated objects
referenced in HTML
Not found in cache.**

**Only 3 round trips
across the WAN
were required to
build the updated
page.**

**Round trip latency is
avoided with each
Flash Forwarded
object cached in
the browser's cache.**



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