Cisco Data Center Network Architecture

Application Delivery Optimization

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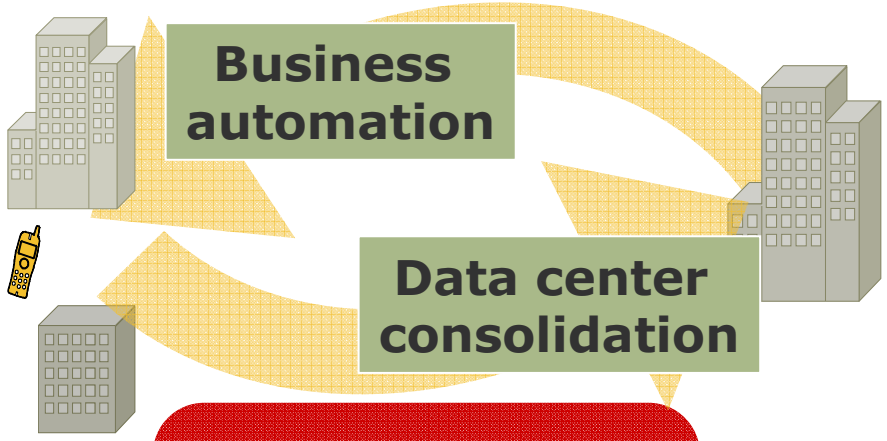
Application Delivery Agenda

- Application Challenges
  - IT Drivers
  - Why Applications Fail
- Application Delivery Solutions
  - I. Data Center: Let Servers Serve!
  - II. Branch Office: Moving Servers back to the Data Center
- Summary and Q+A

The Global 2000 Application Delivery Problem

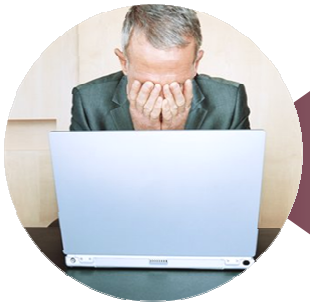
> 87% of users across the extended enterprise
(Nemertes Research, 2004)

nemertes RESEARCH
Independence. Integrity. Insight.



< 13% of users at HQ

Enterprise Application Delivery Breakdown

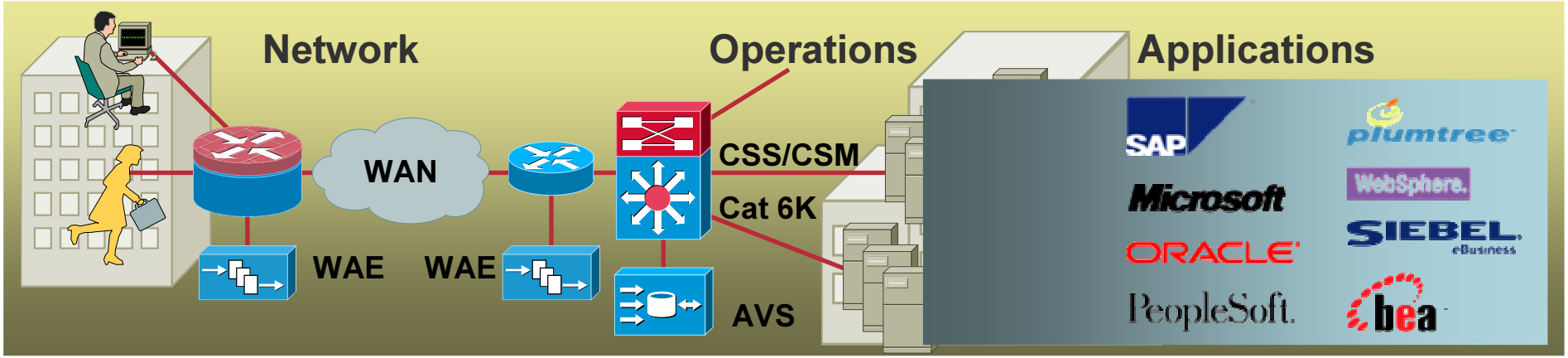


Poor performance
Limited visibility
Security vulnerabilities

A New Perspective for IT

Network	Operations	Applications
• More l[illegible]dwidth • Lots [illegible] poi[illegible]rodu[illegible]s • Replic[illegible]te data [illegible]rs	• More [illegible]ers • More [illegible]anag[illegible]ment [illegible]ols • Re-ar[illegible]itect in[illegible]ucture	• More t[illegible]g • Rewr[illegible]e app[illegible]ation[illegible] • Secur[illegible] patchi[illegible]

Cisco Application Delivery Solutions



IT Faces Dual Pressures in the Global Enterprise

Applications and Portals Are Centralized In Datacenters; Users and Branches Are Remote

Average WAN Links Cannot Accommodate Real-time Delivery of All Application Data, Especially Media and Large Documents

Generic Compression Solutions Cannot Accelerate SSL-based Applications

BRANCH OFFICE

Increasing User Functionality and Distribution

DATA CENTER

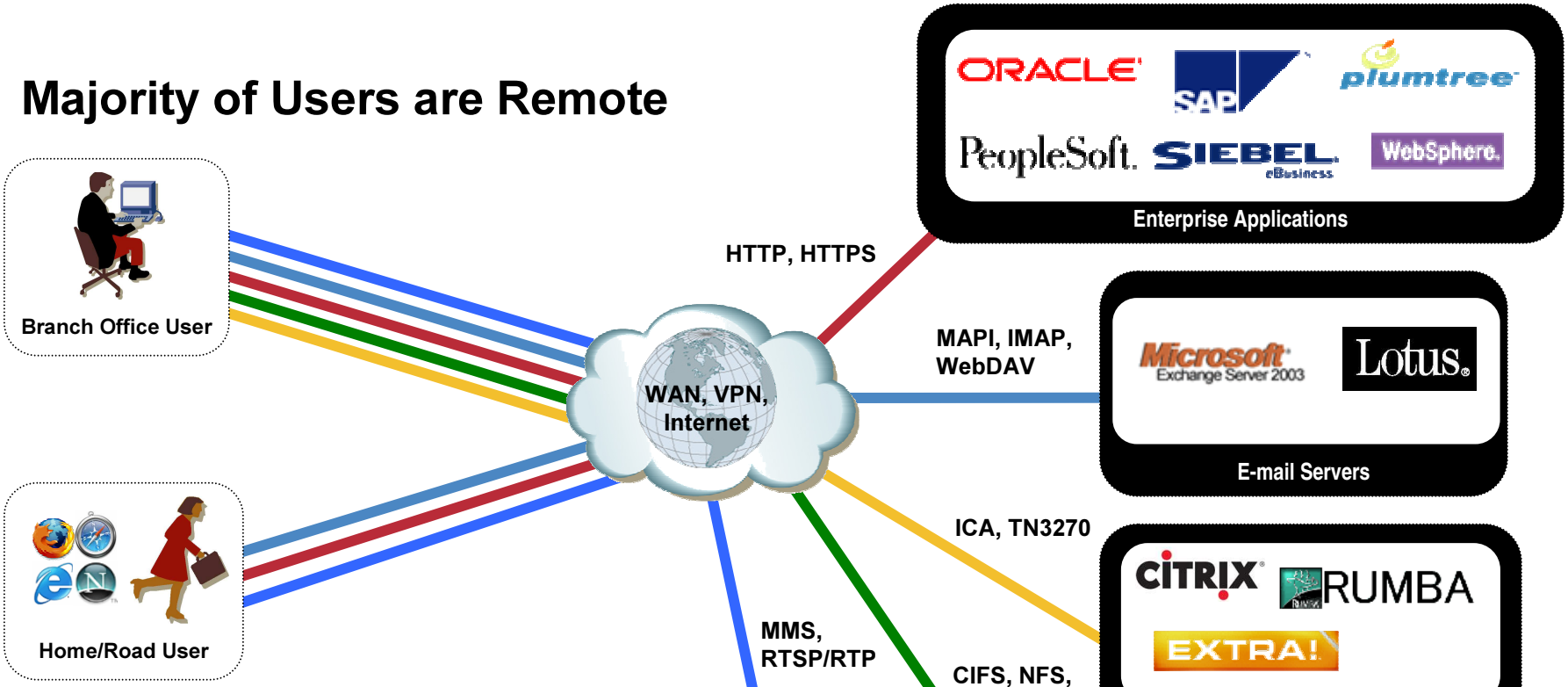
Increasing IT Consolidation and Compliance

Consolidating Remote Servers into the Data Center gives data protection, compliance, and lowered OS license costs

Server Offload of Basic Functions Like SSL Processing and Web Serving Is Required to Reduce Costs and Drive Throughput

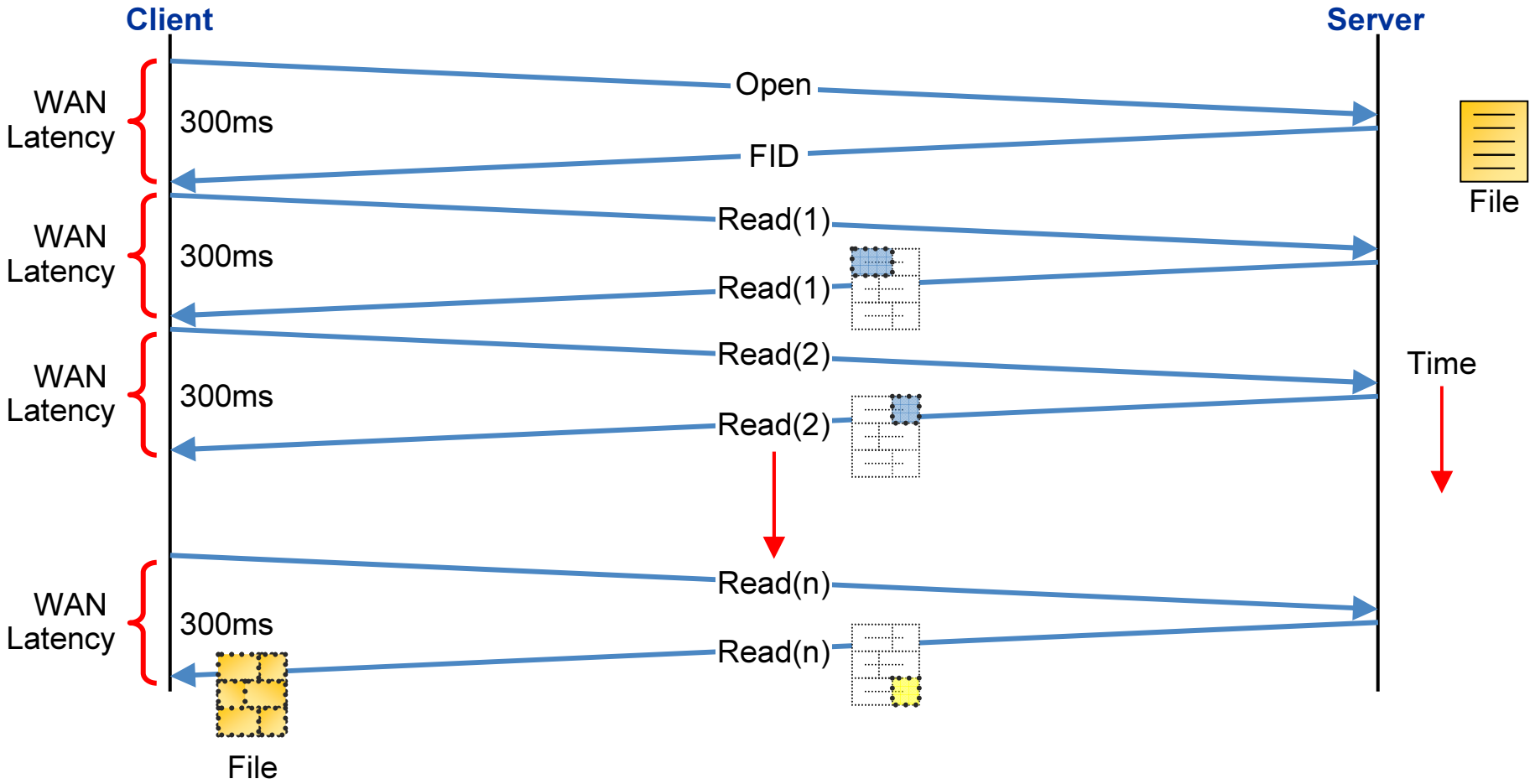
Basic Web Caching Solutions Cannot Handle Dynamic Application Delivery Without Losing Coherency

Typical Application Environment Today



- 100s TCP sessions/second
- SSL or IPsec encryption
- Rich content (graphics, XML)
- Complex app environments: SOA, XML/SOAP

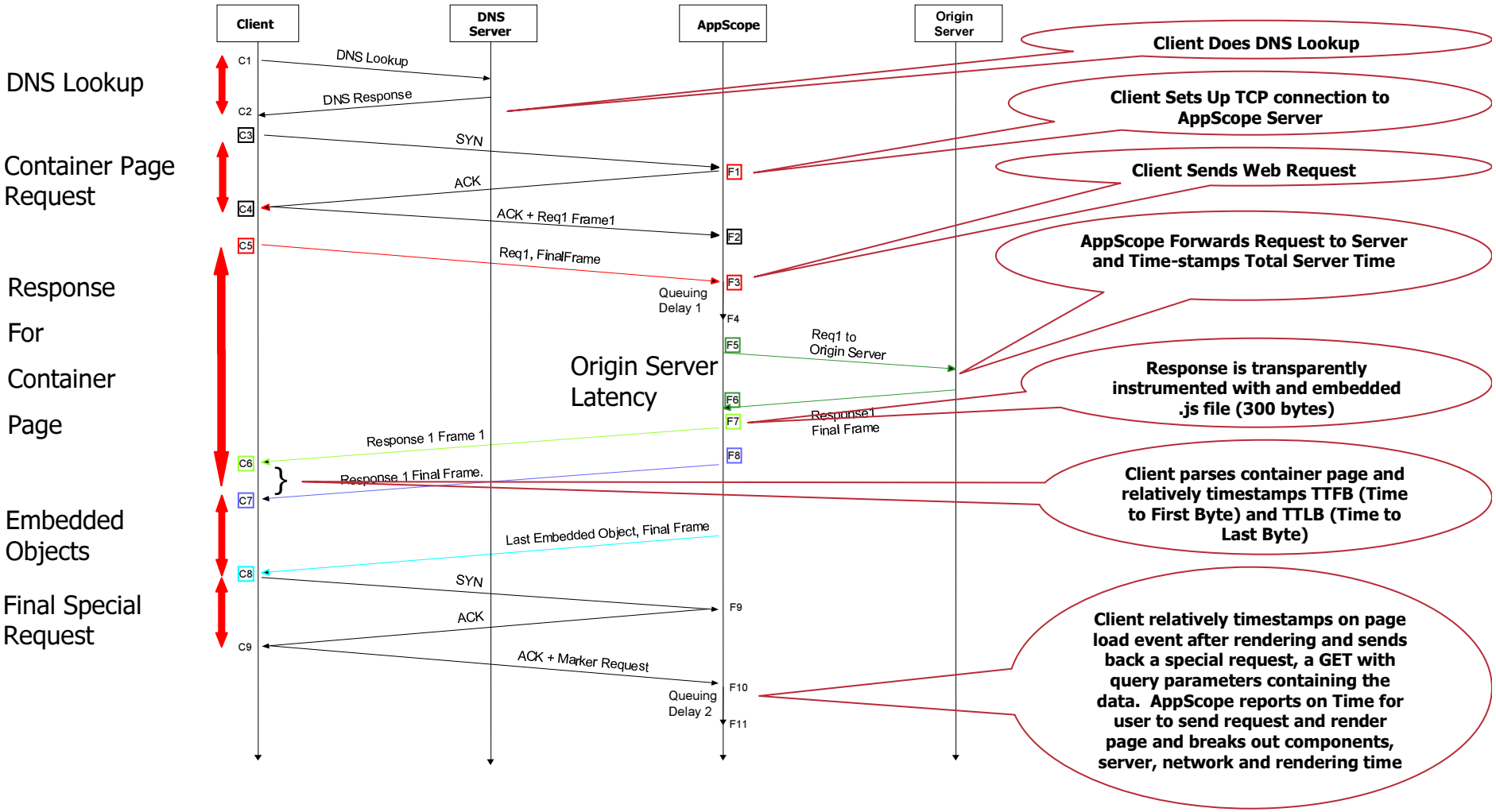
Why MS Applications are slow over the WAN



A File Copy can generate 4,000K Round Trips

LAN ➔ 4,000 x 10ms = 4 seconds WAN ➔ 4,000 x 300ms = 20 minutes!

Why WEB applications are slow over the WAN



Application Networking Agenda

- **Application Challenges**
  - **IT Drivers**
  - **Why Applications Fail**
- **Application Delivery Solutions**
  - **I. Data Center: Let Servers Serve!**
  - **II. Branch Office: Moving Servers back to the Data Center**
- **Summary and Q+A**

Cisco Application Delivery Solutions

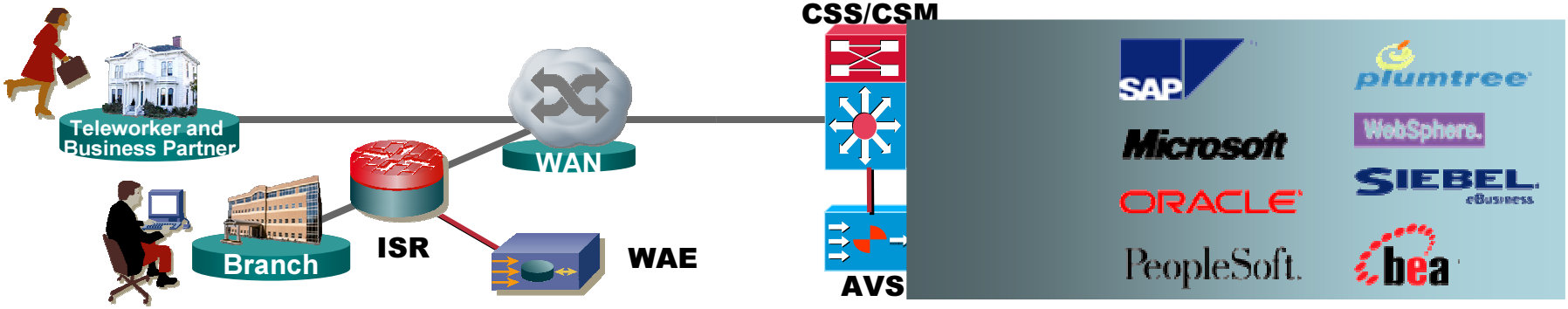
- **Cisco Application Delivery Solutions cooperate to deliver service across the extended enterprise, allowing users to interact as though they were local**
- **The Solutions**
  - **Are network-based devices**
  - **At different points in the network**
  - **That offload functions from servers**
  - **And process applications in real-time**
- **Allow IT to meet business requirements (service, flexibility) plus the IT mandate for lower costs and better compliance**

Like a reliable messenger, Cisco Helps IT Extend its Reach to Support all Users and Applications Across the Enterprise

Cisco Provides an Comprehensive Approach to Application Delivery

Cisco Application Delivery Solutions

Branch/WAN	Data Center
• Wide Area Application Engine (WAE) • Integrated Services Router (ISR) • IOS (NetFlow, NBAR, QoS, IP-SLA)	• Application Velocity System (AVS) • L4-7 Content Switches (CSS/CSM) • Catalyst 6500 LAN Switch



Letting Servers Serve

- **Accelerate and optimize web-based applications across the extended enterprise**
- **Data center-only deployment**
  - **No client-side deployment**
- **Only data center appliance to control and optimize at Layer-7**
  - **2X–3X response time improvements**
  - **80% decrease in bandwidth requirements**
- **Optimize, monitor, and secure application service to all users**

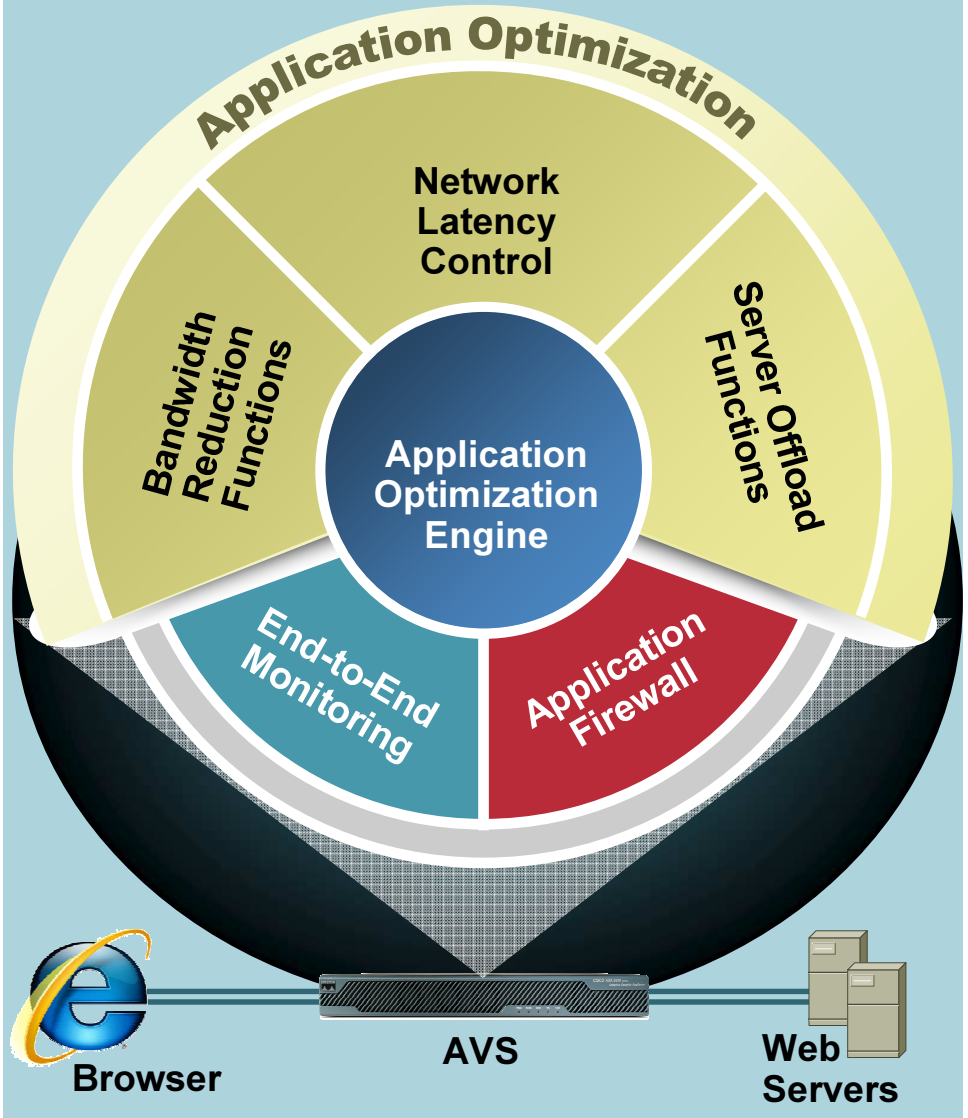
Application Velocity System

AVS

Cisco AVS 3120 and 3180

Application Optimization Processing

- Real-time application processing, control, and optimization
- Any HTML or XML-based application
- Transparent session optimization and client management
- Pre-built templates for applications and content
- Interoperability with other Cisco solutions



AVS 3100 Application Acceleration Technology
Dramatic Improvement on Response Times

Application	Software	Before	After	Transaction Time Reduction
Call center	PeopleSoft	63 sec	23 sec	↓ 63% (↑270%)
"JIT" manufacturing	SAP	76 sec	22 sec	↓ 71% (↑350%)
Store management	IBM WebSphere	46 sec	16 sec	↓ 66% (↑290%)
Claims management	IBM WebSphere	42 sec	19 sec	↓ 55% (↑220%)
Collaboration	Lotus iNotes	90 sec	28 sec	↓ 68% (↑320%)
Employee portal	Plumtree	204 sec	59 sec	↓ 71% (↑350%)
Portal consolidation	SunOne, Vignette	43 sec	6 sec	↓ 85% (↑670%)
Employee portal	PeopleSoft	103 sec	32 sec	↓ 69% (↑320%)
CRM	Siebel	389 sec	133 sec	↓ 66% (↑290%)

Notes: Bandwidth reduction averages 80-90%
All timings are customer-verified using either LoadRunner, FineGround AppScope, or in-house customer tools

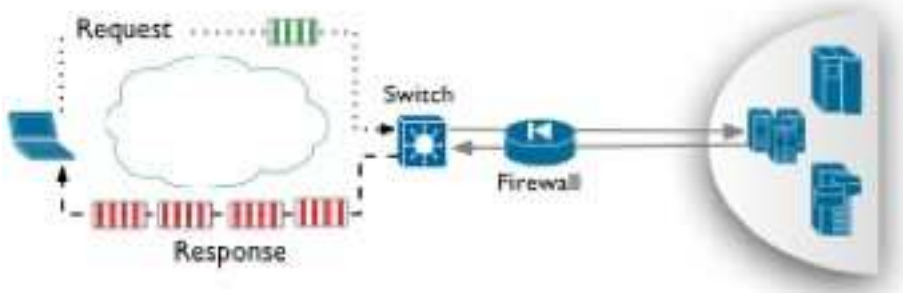
Cisco AVS 3100 Series
What's Behind the Magic

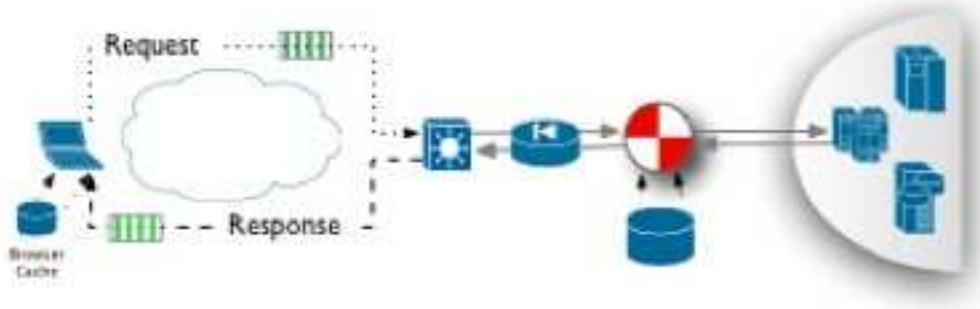
Functional Areas	Standard Features	AVS-only Features
Network Latency Management	•This is the number one issue, not addressed by other products	• Request aggregation/Browser cache management* • Browser TCP multiplexing* • PDF download optimization • Response redirection control*
Bandwidth Reduction	• Gzip/DEFLATE compression	• Delta encoding* • Dynamic browser caching* • Dynamic image optimization (JPG, GIF, PNG)* • Flexible processing rules
Server Offload	• TCP connection multiplexing • SSL offload and acceleration • Static caching	• Configurable dynamic caching* • Load-based caching* • Lazy request evaluation* • Single sign-on optimizations • XML merging/transformation
Application QoS	• Logging • System health checking	• End-to-end response time monitoring • Business transactions capability • First-line service triage
Application Security	• Rules-based definitions and capability	• Out-of-the-box Layer-7 protections • Policy-based implementation • Comprehensive exception handling and monitoring
Management and Integration	• SNMP access and control	• Application delivery dashboard • Service-level integration with BMC, HP, etc.

*** Patented or Patent-pending Technologies**

Minimize Bandwidth Needs

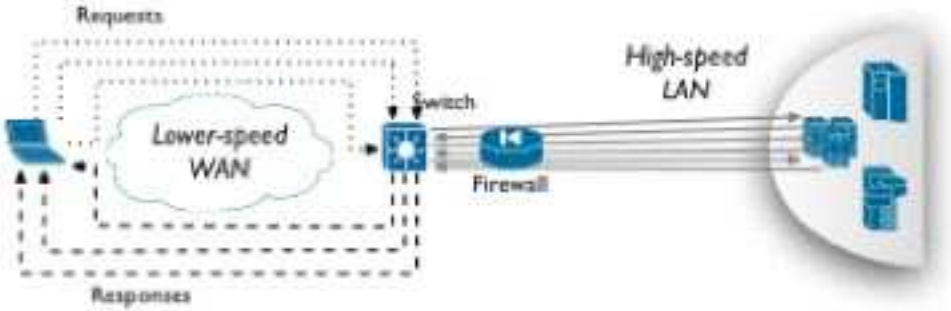
- **Intelligently reduces content payloads by up to 90% - well beyond standard compression**
- **Converts browser cache into dynamic engine**
  - – Delta Optimization
  - – Smart Image Compression
  - – Just-in-time object acceleration
  - – GZIP and DEFLATE compression

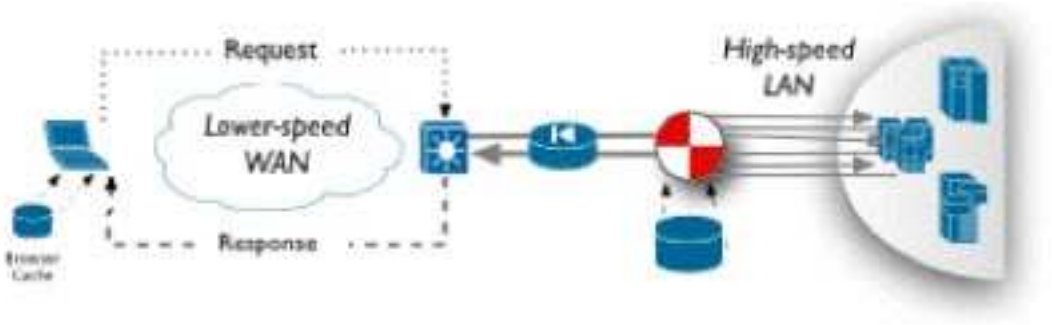




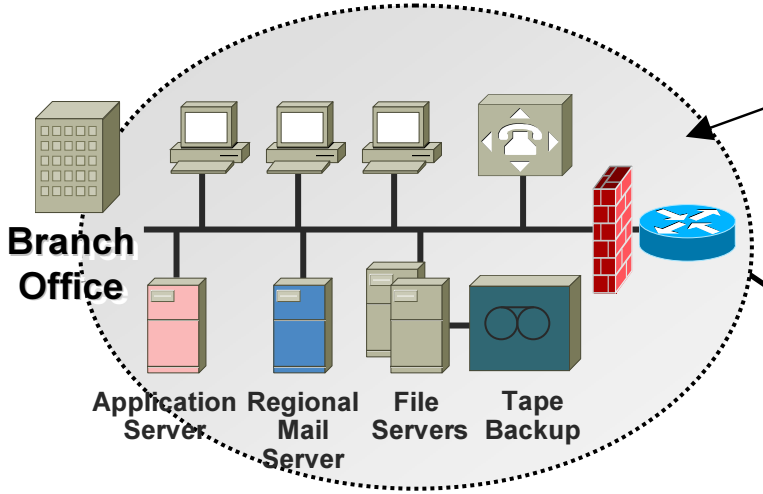
Manage The Effect of Network Latency

- **Minimizes network roundtrips per page or transaction**
- **Proxy manages sessions for both clients and servers**
  - FlashForward object acceleration
  - Smart redirect
  - Fast redirect
  - TCP Multiplexing





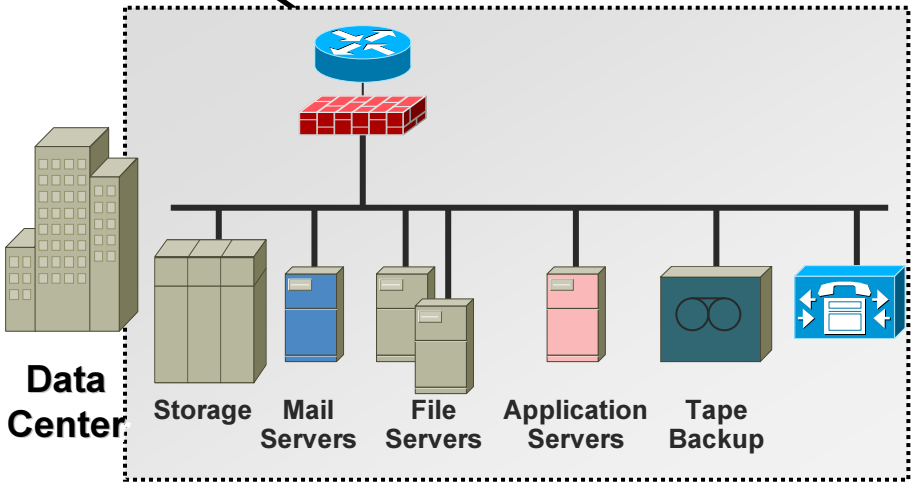
Branch Office Server Centralization
Performance vs. Operational Cost



WAN/VPN

Branch Services

- Mail
- File/Print
- Business apps
- Communication & Productivity apps
- DNS/DHCP
- Domain Controller
- Backup
- Content Delivery



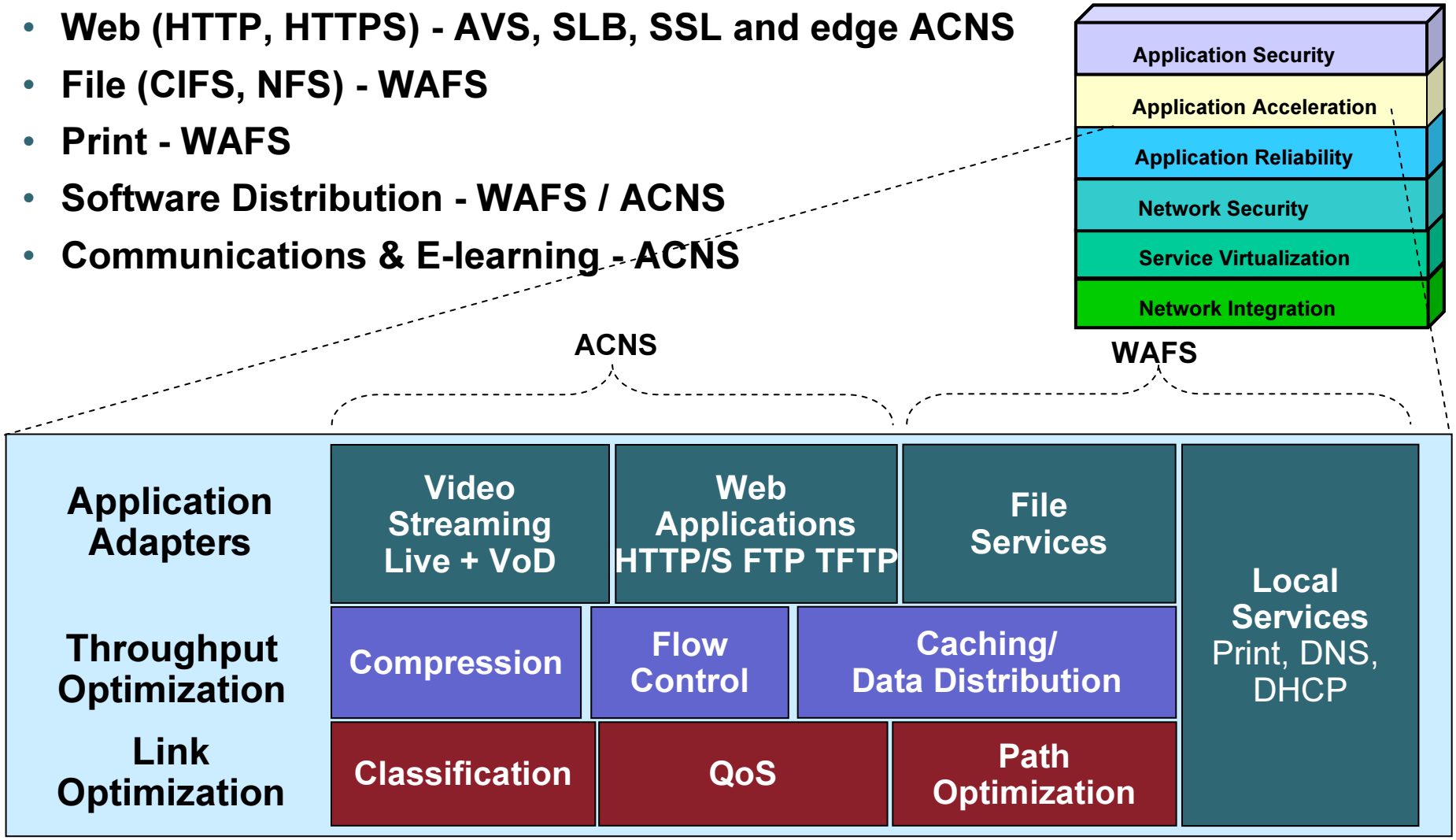
Performance Problems

- ERP: 5 Sec ➔ 60 Sec
- File copy: 10 Sec ➔ 10 Min
- Mail open: 2 Sec ➔ 5 Min
- WAN Outage ➔ Office shutdown

Source: Gartner

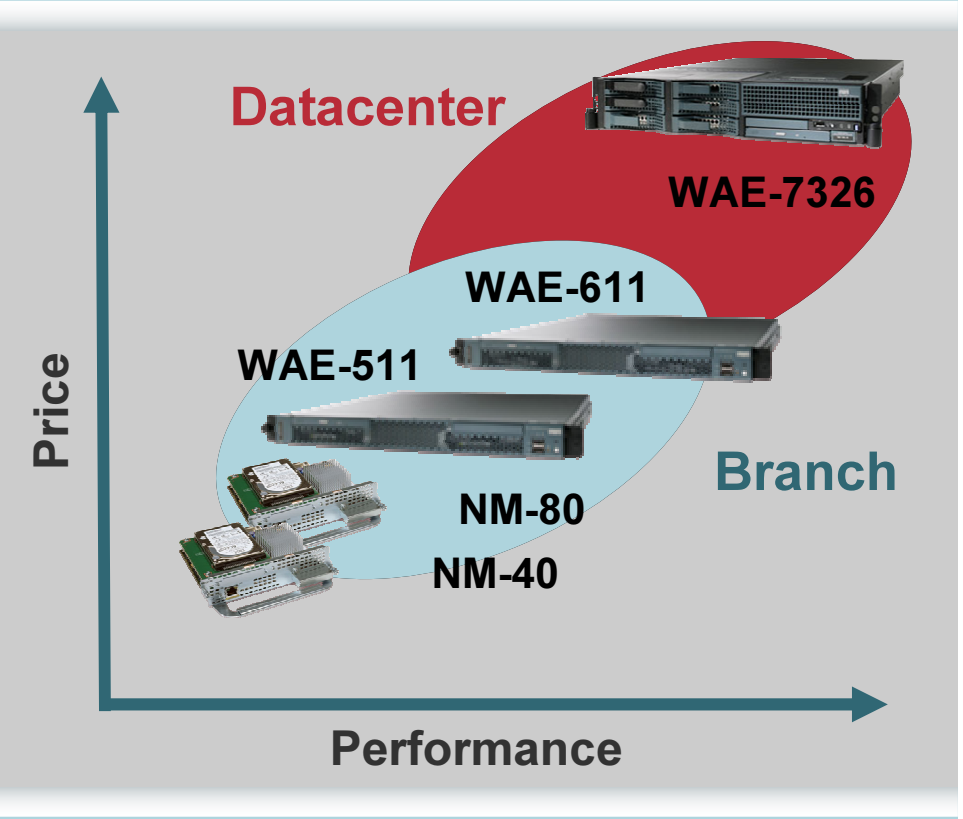
Wide-Area Application Services Elements

- Web (HTTP, HTTPS) - AVS, SLB, SSL and edge ACNS
- File (CIFS, NFS) - WAFS
- Print - WAFS
- Software Distribution - WAFS / ACNS
- Communications & E-learning - ACNS

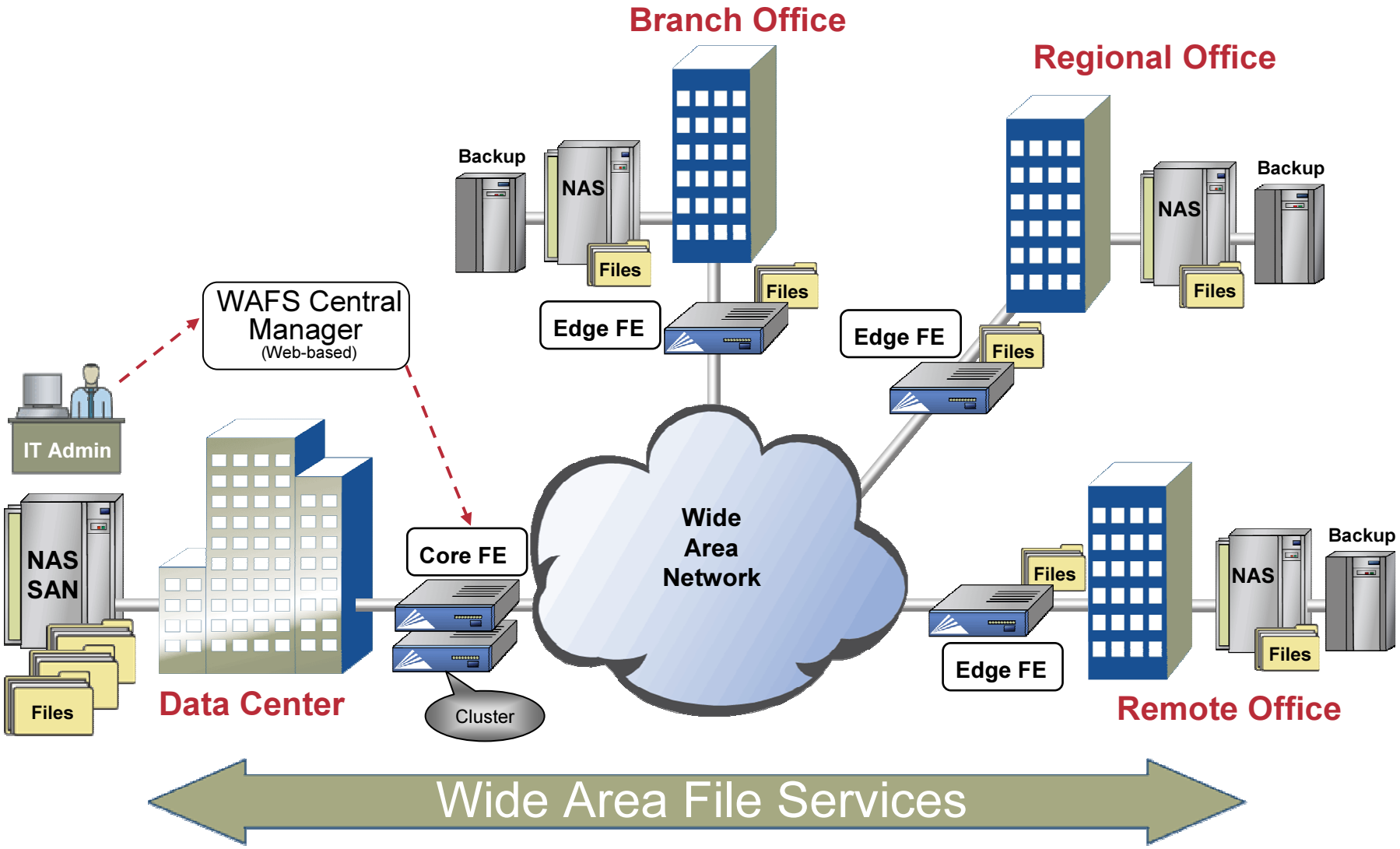


New Application Delivery Platform

- **Single branch delivery platform**
  - Multi-service platform across applications, content, and files into the branch
  - Combines File Engine (WAFS) and Content Engine (ACNS) into common platform
- **Production deployments throughout the Fortune 500**
- **Fully integrated into network fabric**
  - Fully compatible with existing security and management solutions
  - Highly configurable yet low maintenance

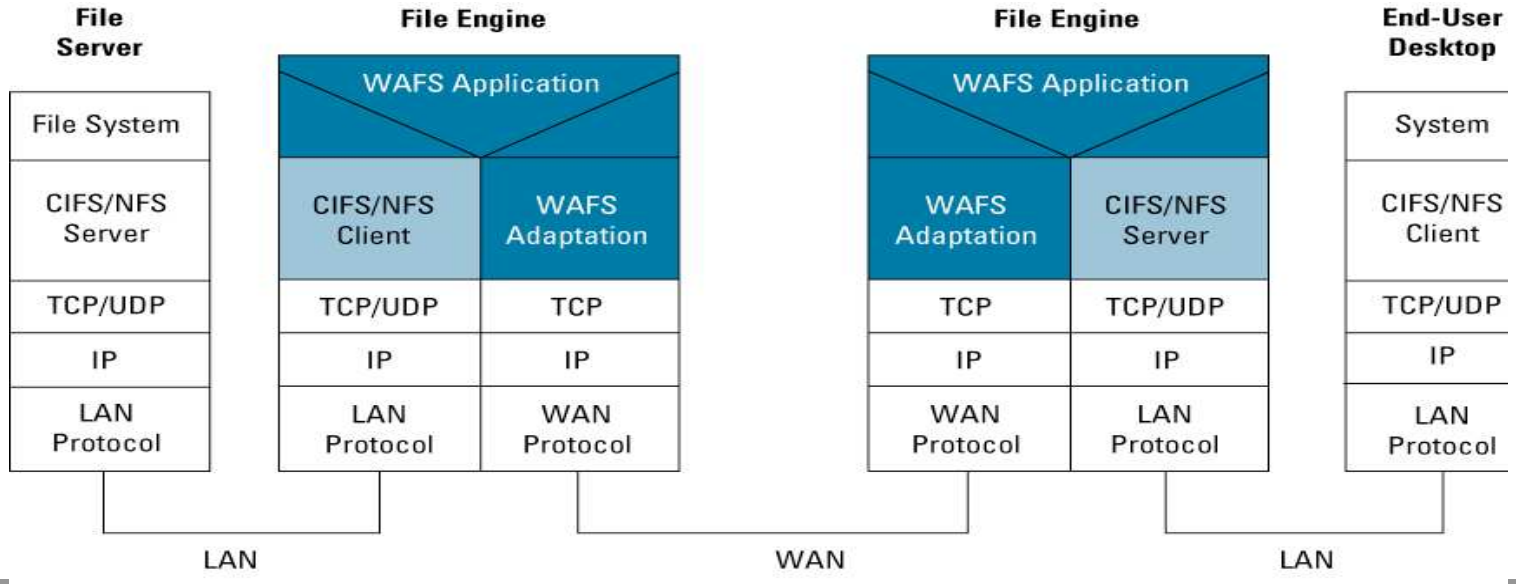


Cisco WAFS Solution

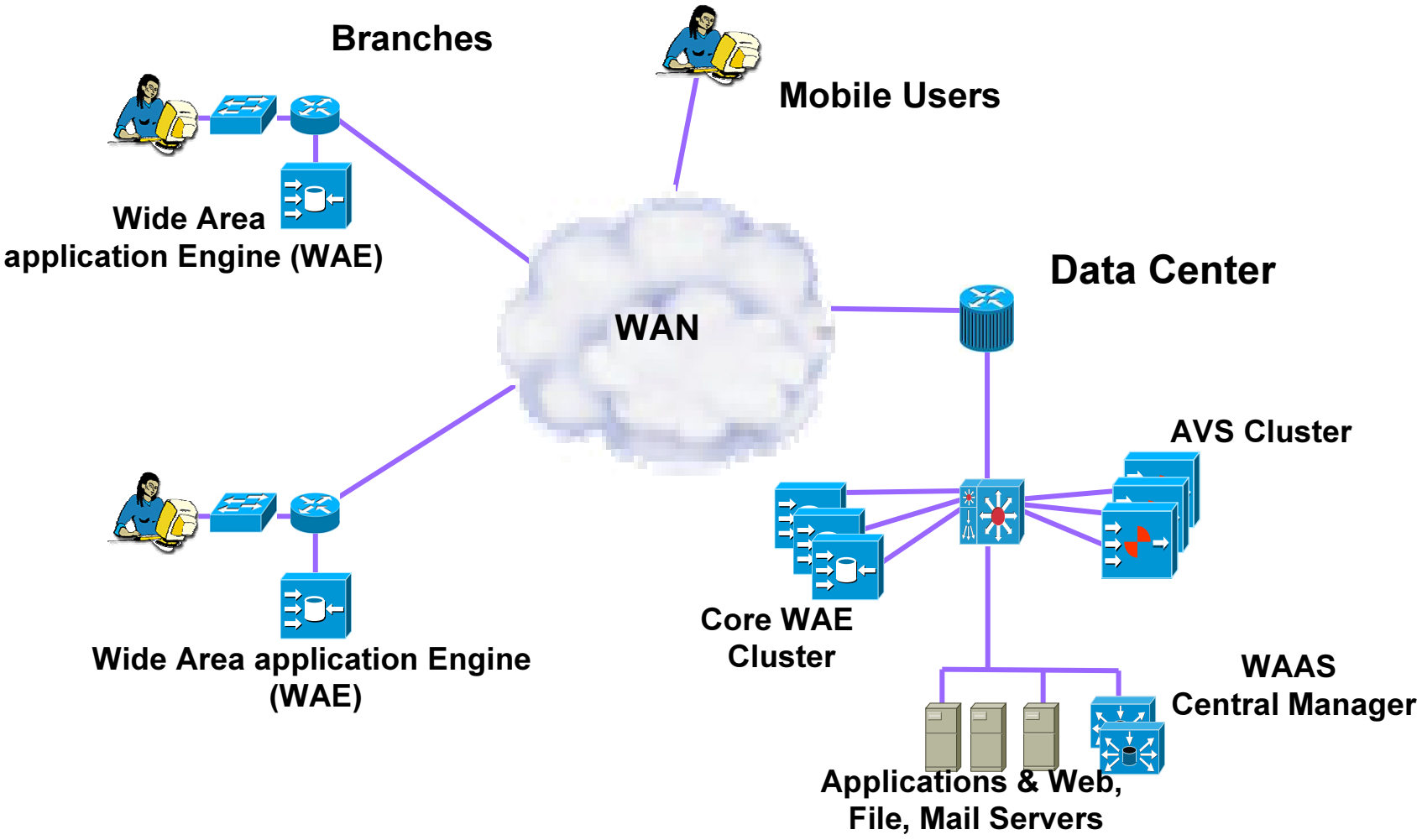


WAN Transport

- Both NFS and CIFS are LAN-based protocols, not intended to operate over WAN links.
- WAFS uses its own proprietary adaptation protocol layer between the Edge File Engine and Core File Engine over the WAN, while retaining the standard NFS or CIFS at the client and server ends.



AVS + WAE – Benefits of working together



WAE and AVS Cooperate in the Branch

- **End-user pull**

  AVS makes dynamic content fully cacheable

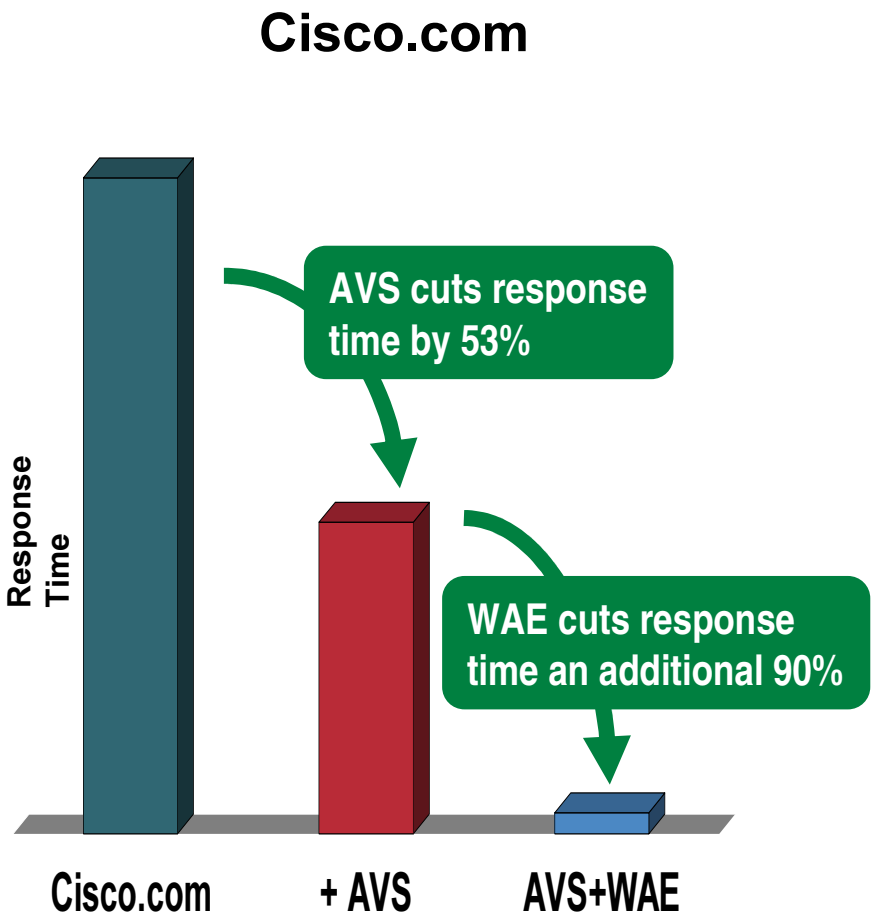
  WAE serves locally in the branch

- **IT or Line of Business push**

  Content pre-positioned in the branch

  AVS ensures freshness

- **Solutions cooperate to optimize SSL sessions**



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How to Optimize Latency-Bounded Applications

- **Reduce the Number of Turns per Transaction**
  - Eliminate unnecessary calls/queries/session setups
- **Reduce the Conversation Interaction**
  - Caching of frequently used items
- **Ensure the Application does not Reset Connections**
  - Increase maximum TCP window size
  - Configure reasonable timeout parameters
- **Ensure More Data is Carried in each Frame**
  - Increasing the amount of data in a frame allows the reduction in the number of frames required to transport the data
- **Apply Network Refinements**
  - Optimize routing paths
  - Prioritize traffic with QoS

How to Optimize Bandwidth-Bounded Applications

- **Reduce the Amount of Data on the Wire**
  - Caching of frequently used items
  - Distribute Software Updates & Video to Local
- **Reduce the Conversation Interaction**
  - Reduce the number of Calls by increasing the efficiency of data received
- **Reduce TCP Window Size**
  - Ensures constant flow instead of bursts
  - Stems retransmissions
- **Increase Network Capacity**
  - Can be Expensive

Q and A

Like a reliable messenger, Cisco Application Delivery Optimization Helps IT Extend its Reach to Support all Users Across the Enterprise