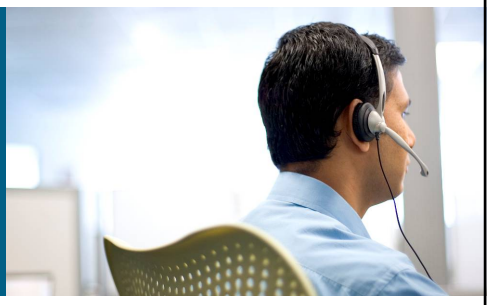
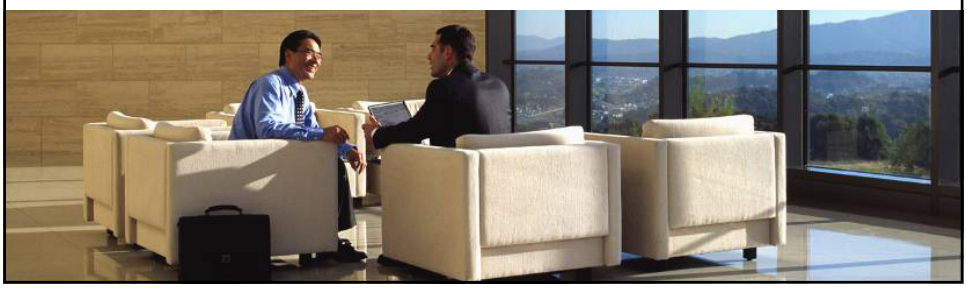
Wide Area Application Services (WAAS)

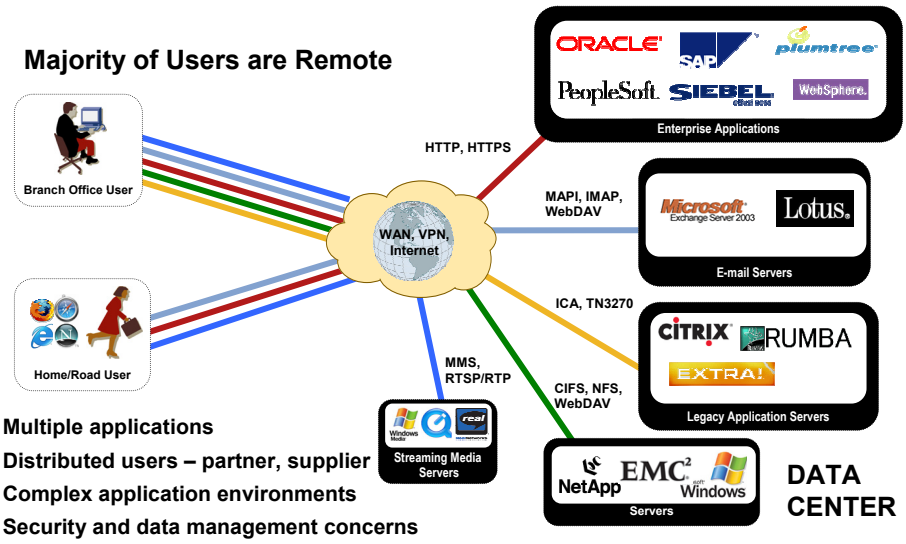


Agenda

- Cisco Application Networking Services
- Customer Challenges
- WAAS Product Overview
- Customer Value / ROI
- Summary



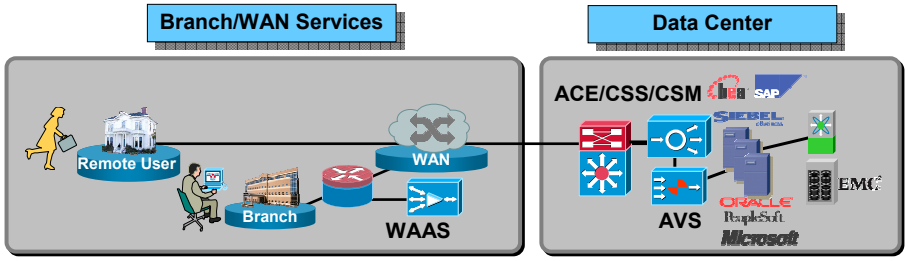
Typical Application Environment Today



- Multiple applications
- Distributed users – partner, supplier
- Complex application environments
- Security and data management concerns

Cisco Application Networking Services
Complete Solution for Application Delivery

- Broadest set of solutions for application delivery
  - From Branch to WAN to Data Center
- Branch/WAN products
  - Provide LAN-like application performance & branch consolidation
- Data Center products
  - Provide secure, reliable, high performing data center infrastructure for application traffic

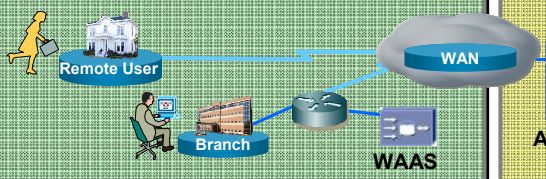


Cisco Application Networking Services:
Powerful Solution for Your Application Challenges

Branch/WAN Services

Wide Area Application Services

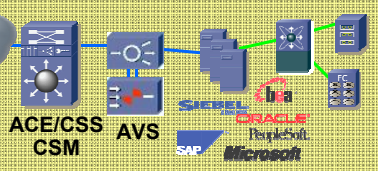
- Complete WAN optimization, application acceleration and WAFS
- Deployed in branch + data center
- Enables branch server, storage and backup consolidation



Data Center

Application Delivery

- Highly scalable server switching and load balancing
- Data center-based application acceleration
- Maximum application availability and time-to-service

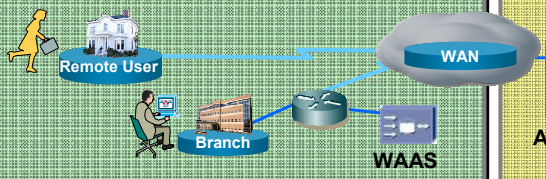


Cisco Application Networking Services:
Broad Range of Benefits

Branch/WAN Services

LAN-like application performance over the WAN:

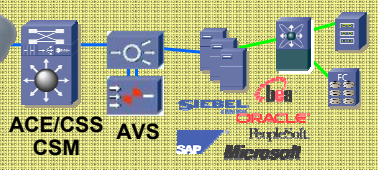
- *Consolidate branch server and storage infrastructure*
- *Deliver increased data protection, compliance, and cost savings*
- *Improved bandwidth utilization*
- *Higher productivity through improved response time*



Data Center

Next generation application infrastructure drives:

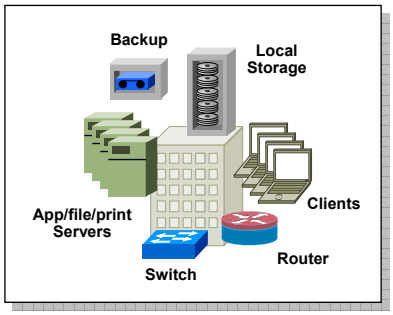
- *IT responsiveness*
- *Business alignment*
- *Streamlined topologies*
- *Lower OPEX and CAPEX*
- *Improved app security*



Agenda

- Cisco Application Networking Services
- Customer Challenges
- WAAS Product Overview
- Customer Value / ROI
- Summary

Today: Branch Office IT Issues



Companies spend 6 Billion dollars per year on branch servers, storage, backup and management
Source: IDC, Gartner, Cisco Analysis

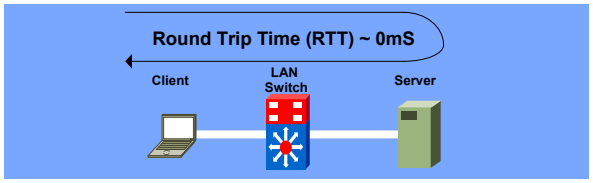
The average branch has 4-6 servers
Source: Nemertes Research

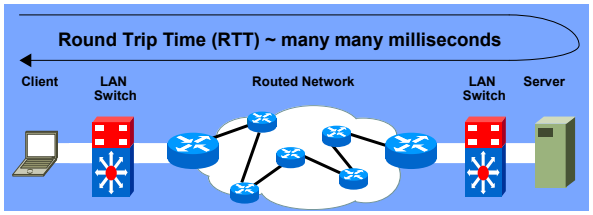
- Application performance
  - Bandwidth & throughput limitations
  - Latency and packet loss
  - End user experience
- Infrastructure cost / complexity
  - File, print and email servers
  - Storage and backup
  - WAN bandwidth
- Data protection
  - Failing backups / lost data
  - Costly off-site vaulting
  - Compliance

 8

The WAN is the Barrier to Branch Application Performance

- Applications are designed to work well on LAN's
  - High bandwidth
  - Low latency
  - Reliability
- WANs have opposite characteristics
  - Low bandwidth
  - High latency
  - Packet Loss





WAN Packet Loss and Latency =
Slow Application Performance =
Keep and manage servers in branch offices ($$$)

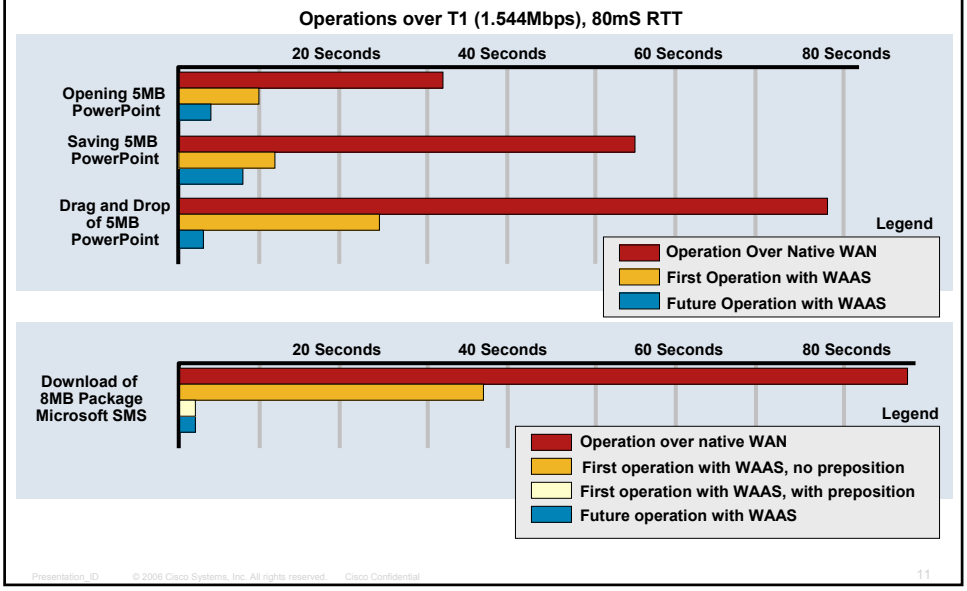
 9

Addressing the WAN Challenge

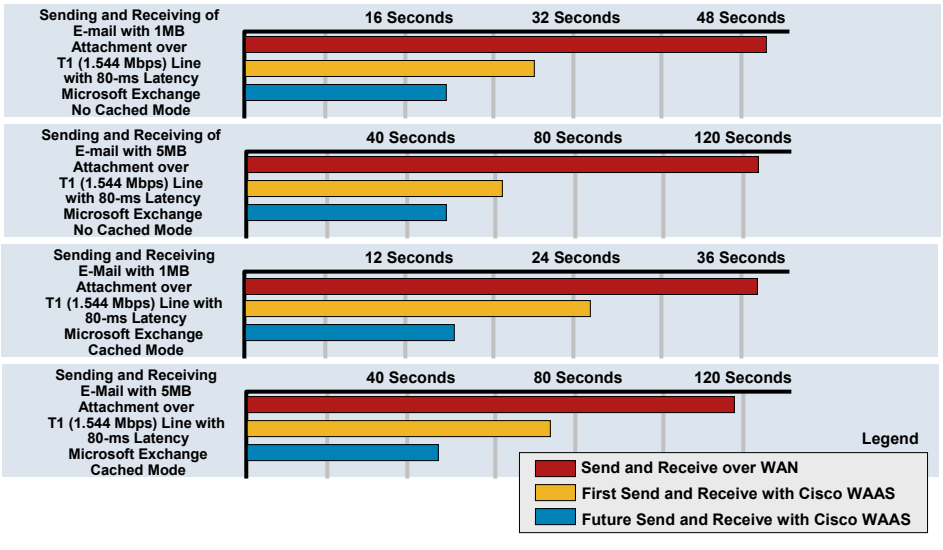
Source	Need	Technology
Latency	▪ Reduced number of network roundtrips caused by chatty application protocols	▪ Intelligent protocol proxies
Bandwidth Utilization	▪ Improved application response time on congested links by reducing the amount of data sent across the WAN	▪ Application caching ▪ Compression
Transport Throughput	▪ Improved network throughput (total amount of data) by improving transport behavior	▪ TCP optimizations ▪ Adaptive congestion mgmt.
Network Integration	▪ Physical integration into existing network platforms ▪ Compliance with network functions	▪ Router modules, linecards ▪ Feature interoperability
Administrative Traffic	▪ Replacement for services that branch office servers provide	▪ Centrally managed remote services interface

 10

Cisco WAAS Performance – File Services



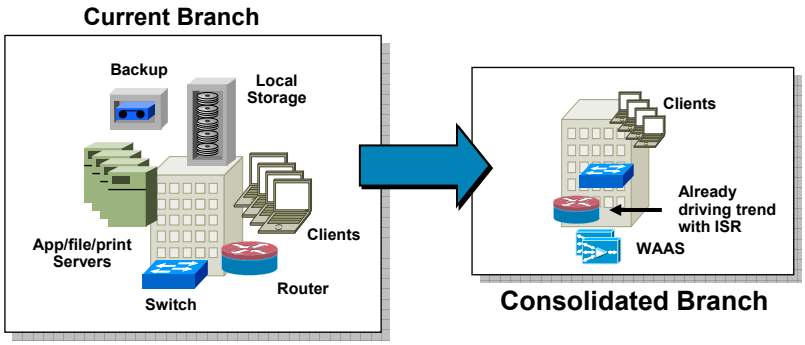
Cisco WAAS Performance – Exchange



Agenda

- Cisco Application Networking Services
- Customer Challenges
- WAAS Product & Technology Overview
- Customer Value / ROI
- Summary

Cisco Vision:
The Consolidated Branch



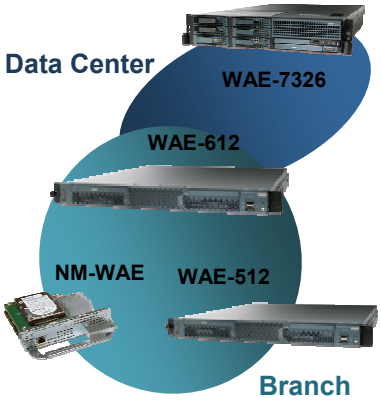
Design Goals:

- **Fewer local servers / no storage + backup**
- **Continued LAN-level application performance**
- **Ability to leverage centralized applications**
- **Preserve services of existing network**

 14

Cisco WAAS

- Comprehensive feature set
  - **Wide range of app acceleration**
  - **WAN optimization**
  - **WAFS / print server**
- Seamless network integration
- Combination software/hardware
  - **Transport & Enterprise versions**
  - **Router module & WAE appliances**
- Complete end-to-end solution
  - **WAAS + IOS + load balancing**



Hardware platforms

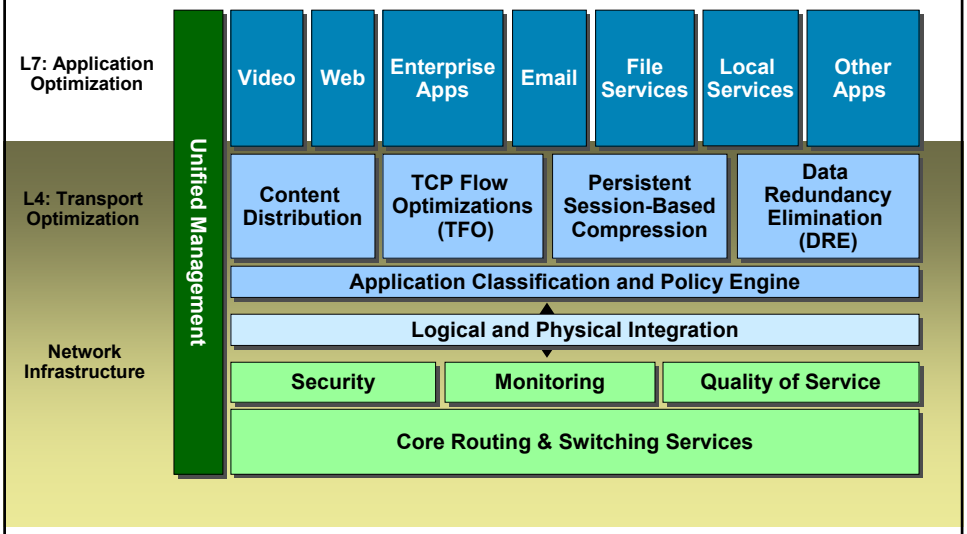
 15

WAAS Addresses WAN Performance Impact

Problem	Solution	Cisco IOS/WAAS Technology
Latency Mitigation	• Reduced roundtrips from chatty application protocols • Faster connection setup	• Intelligent Protocol Proxies • Transport Flow Optimizations (TFO)
Bandwidth Management	• Offload the WAN by preventing requests from going to the WAN • Improve application response time on congested links by reducing the amount of data sent across the WAN	• Caching • Data Redundancy Elimination (DRE) • Persistent Session-Based Compression • Content Distribution & Pre-positioning
Link Throughput Improvement	• Improve network throughput by reducing TCP-related errors	• Transport Flow Optimizations (TFO)
Traffic Prioritization	• Prioritize selected jitter-sensitive traffic (e.g. VoIP, Video) over the packet network	• Cisco IOS • QoS, NBAR, NetFlow
Local Services	• Replacement for services that branch office servers provide	• Centrally managed remote services interface • Local print services

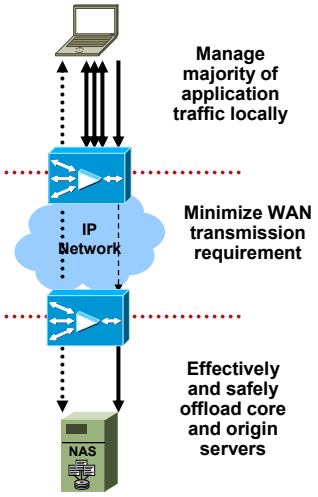
 16

Cisco WAAS Optimization Architecture



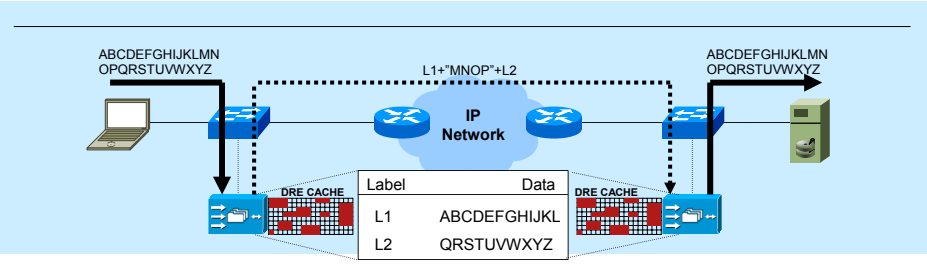
Application-Specific Intelligence

- Compression doesn't address latency - every message must still traverse the WAN
- Cisco 'Application Adapters' eliminate unnecessary chatter
- Protocol proxies handle messages locally where applicable
- Local object caching retain data close to client
- Data Integrity and Concurrency preserved



Data Redundancy Elimination (DRE)

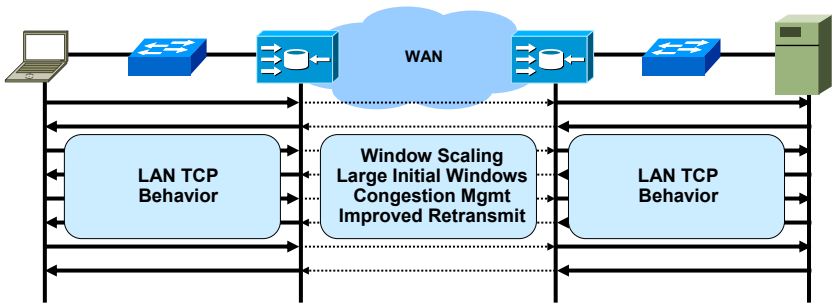
- Reduce overall WAN consumption based on redundancy
  - Maintain active database of previously sent and received traffic
  - Send database index on behalf of traffic that has been seen before
  - Realize 5x – 50x compression, minimize WAN bandwidth consumption
- Compress all outbound traffic with LZ compression
  - Additional 2x compression beyond data suppression
  - Very good compression for non-redundant data



 19

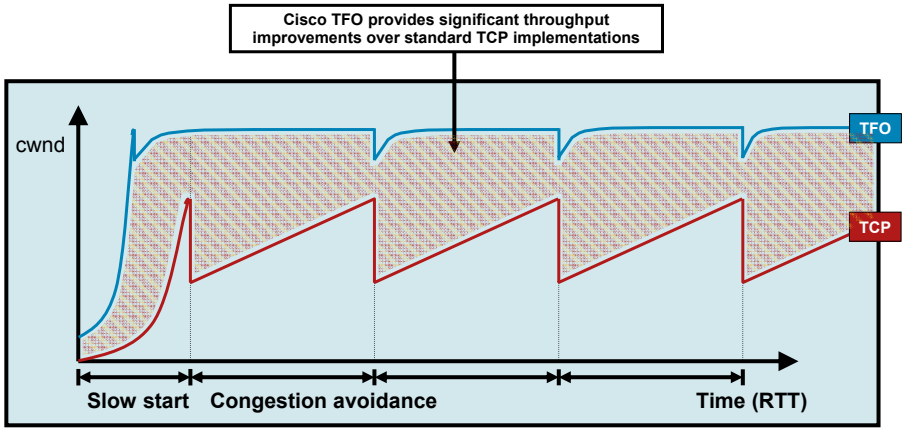
TFO Improves Application Performance

- 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



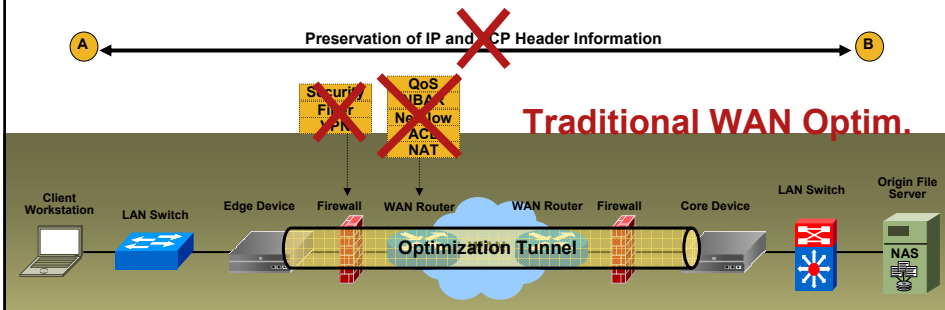
 20

Comparing TCP and TFO



 21

Traditional WAN Optimization:
Not Seamless, but Disruptive to Existing Network



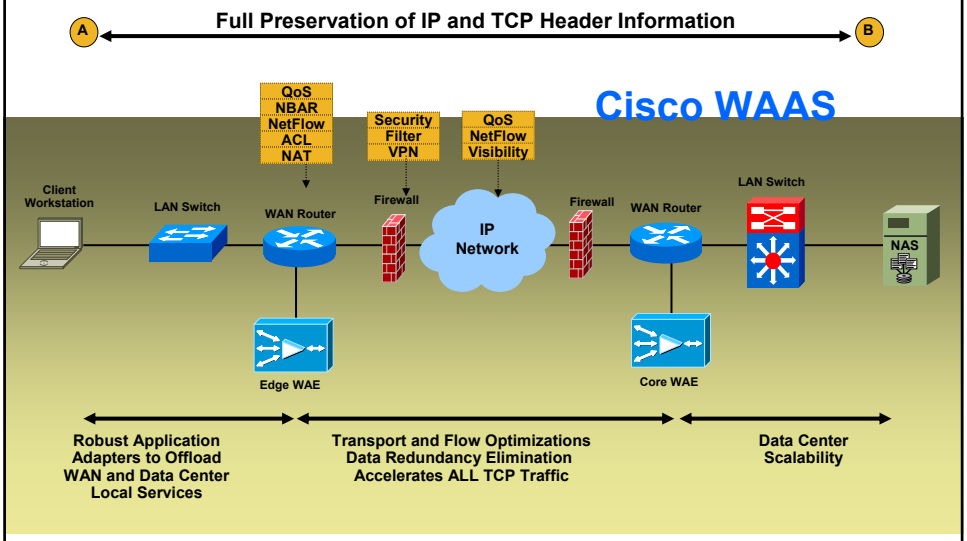
Traditional WAN Optimization changes TCP/IP header information

Result:
- **Services may not work**
- **Extra integration required**
- **Risk of downtime due to dedicated links**

 22

Cisco WAAS

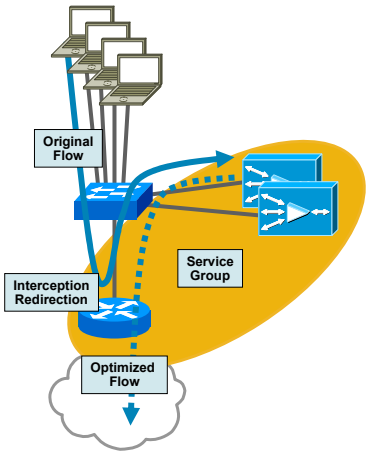
Seamless Network Integration, Service Preservation



 23

Cisco WAE WCCPv2 Deployment

- WCCPv2 interception:
  - Out-of-path with redirection of flows to be optimized (all flows or selective flows via a redirect-list)
  - Automatic load-balancing, load redistribution, fail-over, and fail-through operation
- Scalability and high availability:
  - Up to 32 WAEs within a service group and up to 32 routers
  - Linear performance and scalability increase as devices are added
- Seamless integration:
  - Transparency and automatic discovery
  - Supported on all WAE platforms



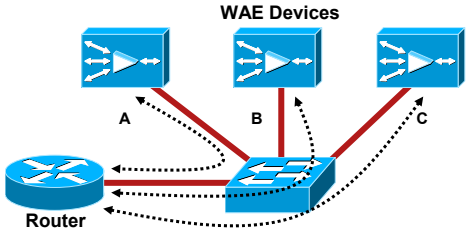
 24

WCCPv2 Availability Monitoring

WCCPv2 keepalive (heartbeat) information is exchanged every 10 seconds between WAEs and the router(s).

Should a WAE be unresponsive for three consecutive heartbeats, it is removed from the service group.

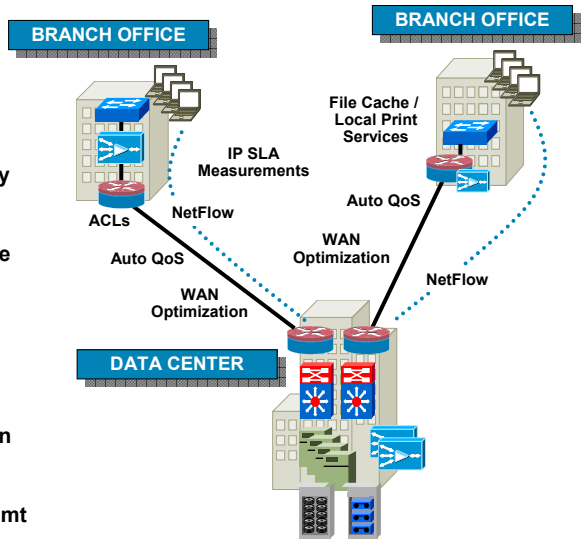
WCCPv2 heartbeat is stateful and process-based.



 25

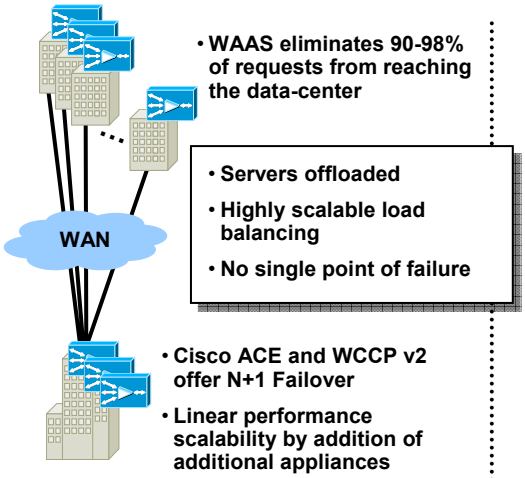
Cisco WAAS + IOS
Truly Integrated WAN Solution

- **Acceleration** — WAAS
  - Reduce response times
- **WAN Optimization**
  - Minimize bandwidth / latency
- **WAFS**
  - Consolidate file/print/storage
- **NetFlow** — IOS
  - Reduce network costs
- **AutoQoS**
  - Automatic QoS configuration
- **IP SLAs**
  - End-to-end performance mgmt



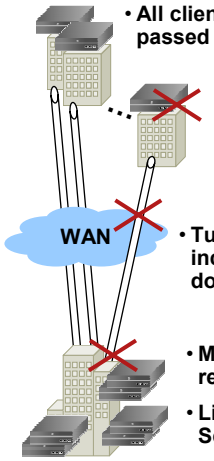
 26

Cisco WAAS
True Enterprise Scalability + Availability



- WAAS eliminates 90-98% of requests from reaching the data-center
- Servers offloaded
- Highly scalable load balancing
- No single point of failure
- Cisco ACE and WCCP v2 offer N+1 Failover
- Linear performance scalability by addition of additional appliances

Cisco WAAS

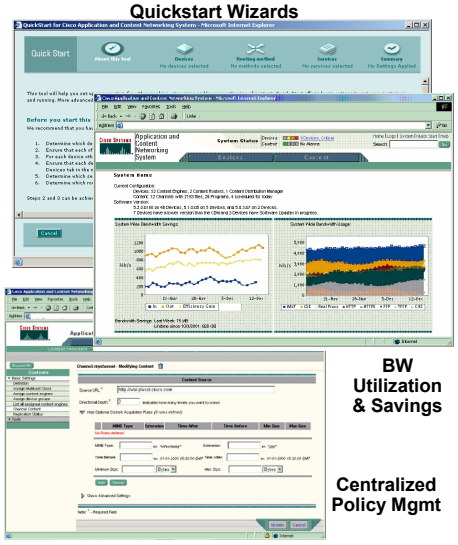


- All clients requests passed to data center
- Read-ahead optimization increases server load
- Tunneling increases downtime risk
- More hardware required for HA
- Limited Solution Scalability

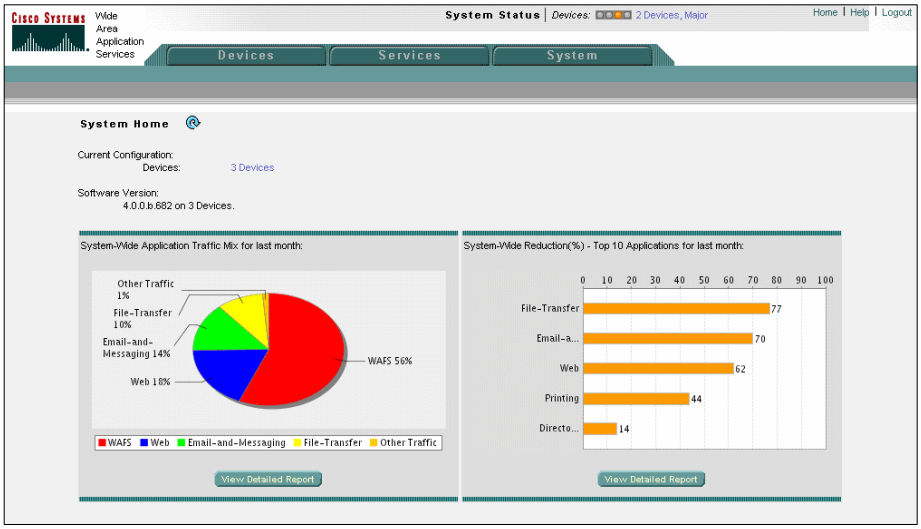
Traditional WAN Optim.

Cisco WAAS Central Manager

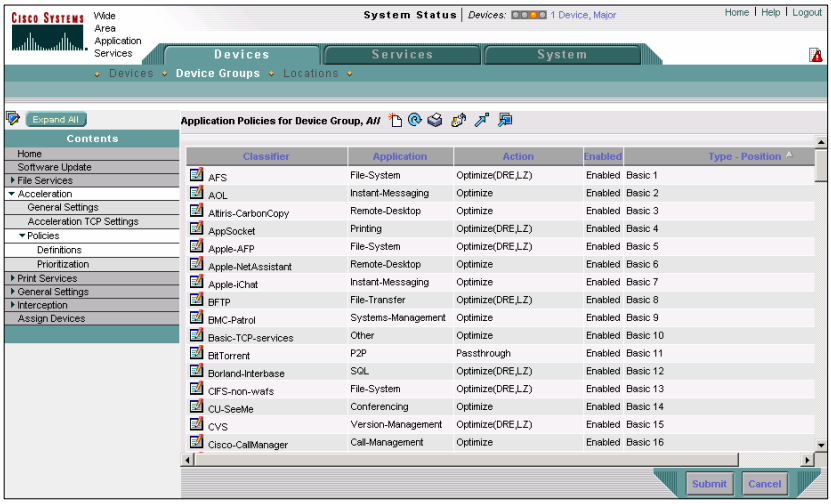
- Comprehensive Management
  - Central configuration
  - Device groupings
  - Monitoring, Stats, Alerts
  - Bandwidth Utilization and Savings by Application
- Intuitive Interface
  - Graphical U/I, Wizards
  - Command Line Interface (CLI)
- Role-based administration
  - Minimizes unauthorized changes & reduces human error
- Scaleable Architecture
  - 1000's of nodes
  - Redundancy and recovery



Central Manager Home Page



Managing Policies



Accelerates Broad Range of Applications

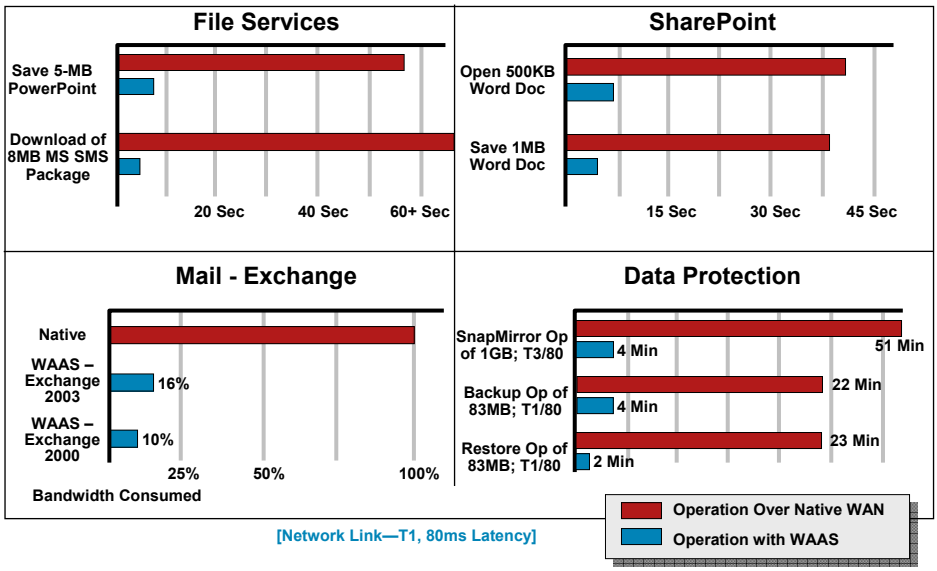
Application	Application Protocol	Improvement
File Sharing	• Windows (CIFS) • UNIX (NFS)	• 2X-400X
E-mail	• Exchange (MAPI) • SMTP/POP3, IMAP • Notes	• 2X-50X
Internet / Intranet	• HTTP, HTTPS, WebDAV	• 2X-50X
Data Transfer	• FTP	• 2X-50X
Software Distribution	• SMS (CIFS, HTTP) • Altiris (HTTP)	• 2X-100X
Database Applications	• SQL • Oracle • Notes	• 2X-10X
Data Protection	• Backup Applications • Replication Applications	• 2X-50X
Other	• Any TCP-based Application like Citrix	• 2X-10X

- **Ensures LAN-like performance for branch-based access of corporate applications**
- **Enables branch server and storage consolidation without affecting workflow and employee productivity**
- **Simple network integration enables lower TCO**

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

 31

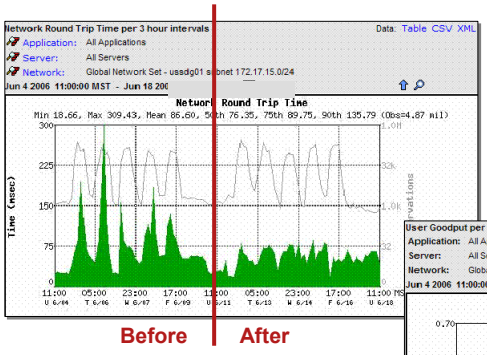
LAN-Like Access to Various Applications



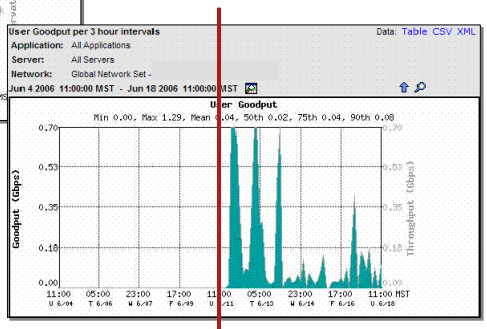
[Network Link—T1, 80ms Latency]

 32

Cisco WAAS:
Application Performance & Throughput

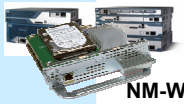


- 4-100x response time improvement
- Any TCP application

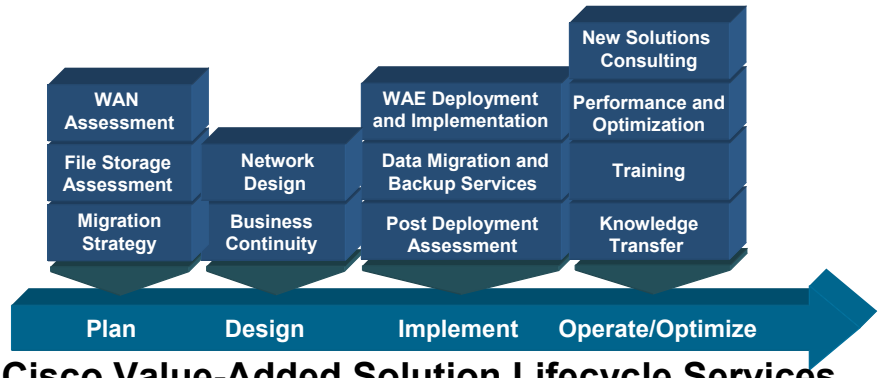


- Up to 99% elimination of redundant data
- Significant improvement in WAN throughput

Cisco WAE

Platform	Hardware	Positioning	
NM-WAE	▪ 1processor, up to 1GB memory, up to 12 SATA storage (New)	▪ Router integrated branch services	 NM-WAE
WAE-512	▪ 1 Processor; 1-2 GB memory; 250 GB SATA disk storage (optional RAID-1)	▪ Branch Office Appliance	 WAE-512
WAE-612	▪ 1 Dual Core Processor; 2-4 GB memory; 300GB SCSI disk storage (optional RAID-1)	▪ Large Branch Office Appliance ▪ Small Data-Center /Hub Appliance	 WAE-612
WAE-7326	▪ Dual Processor; 4GB of memory up to 1.8TB SCSI disk storage	▪ Campus Appliance ▪ Data-Center/Hub Appliance	 WAE-7326

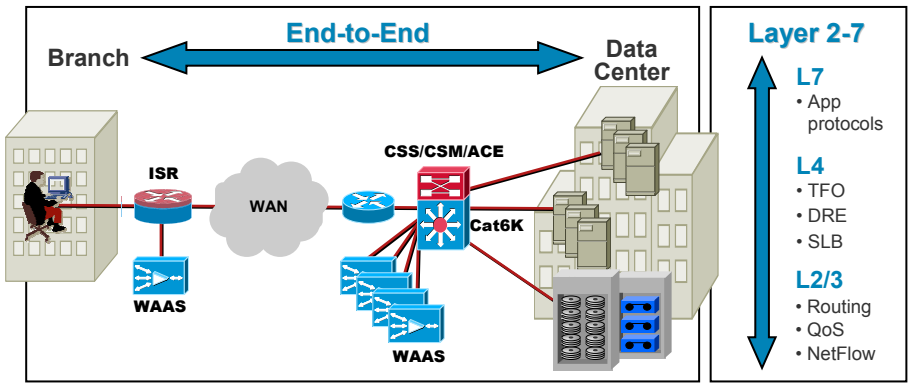
Cisco Portfolio of WAAS Services



Cisco Value-Added Solution Lifecycle Services reduces risk and ensure delivery on ROI projections

 35

WAAS: Complete End-to-End Solution
From Data Center to Branch



Production-proven: 1 million+ ISRs, 10000s of WAEs, 10 years of load balancers

 36

Agenda

- Cisco Application Networking Services
- Customer Challenges
- WAAS Product Overview
- Customer Value / ROI
- Summary

Customer ROI Example

- Demographic
  - **100 branch offices**
- Need
  - **Data protection & compliance**
  - **Lower branch management costs**
  - **Faster access to centralized apps**
- Alternative
  - **File servers, backup in branch offices**

	Year 1	Year 2	Year 3
Projected Costs			
Labor			
Installation			
Other Professional Service			
File Engine Appliance			
Discounted Price 1		N/A	N/A
SMARTnet Service 2			
Data Center			$103
Total Projected C			$1,994
Savings Summary			
Reduc		470	$2,812
Increased		68	$10,168
Reduced IT Ma			$16,875
Total Annual Savin		$29,515	$29,855
Net Benefit (NP		$24,570	$22,210
Cumulative N	$25,839	$47,641	$64,747
2 & 3 Year Return on Inve t (ROI)		261%	355%
2 & 3 Year Project Net Pre t Value		$47,641	$64,747
Project breakeven occurs within		5.0 months	
Number of Locations			100
Total Enterprise Wide Savings			$ 6,474,656

355% ROI
5 Month Payback
$6.5 Million Savings

Assumptions | HW-SW Svgs | Bandwidth Svgs | Ops Savings | Summary

Agenda

- Cisco Application Networking Services
- Customer Challenges
- WAAS Product Overview
- Customer Value / ROI
- Summary

Key Benefits & Differentiators

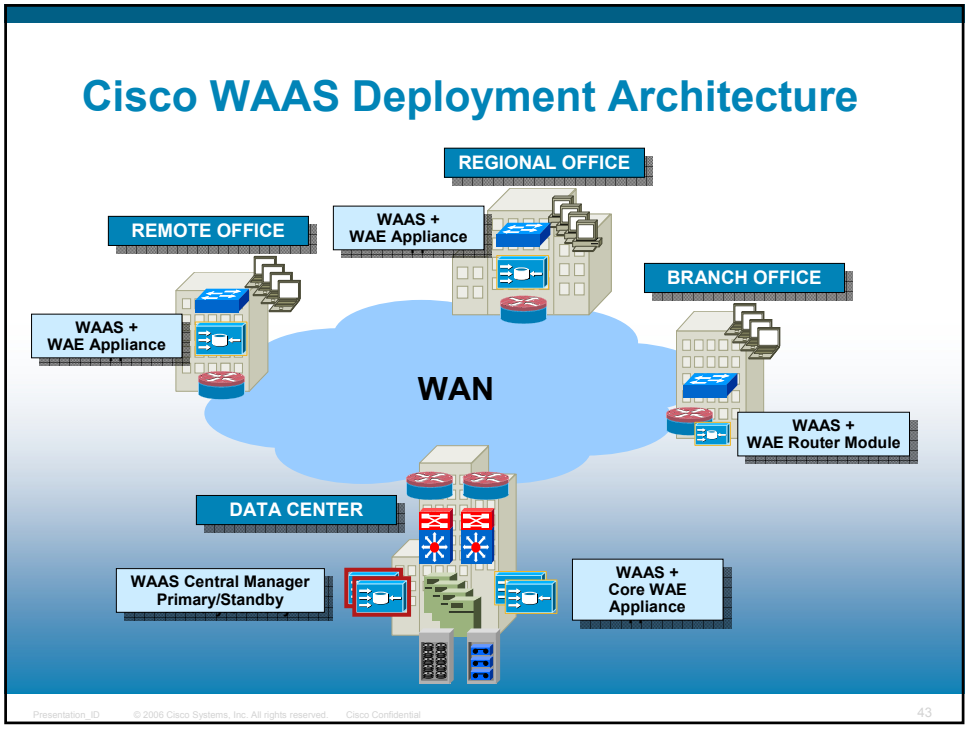
Benefits	**Improved application response times**
	Cost savings from servers & bandwidth
	Rapid integration / time-to-service
	Maximizes compliance & data protection
	Designed for the enterprise
Differentiators	**Complete end-to-end solution**
	Seamless integration into existing network
	Performance under real world load
	Server offload vs. OVERLOAD
	Ease of deployment: integration, advanced services, global support

Cisco WAAS: Solution for Today's Branch

- Addresses range of IT branch challenges
- Comprehensive technology set
  - Application acceleration
  - WAN optimization
  - WAFS
- Seamless integration into existing IOS networks
- True enterprise performance, scalability and resiliency
- Comprehensive solution for consolidated branch

 41

 42


Cisco WAAS Deployment Architecture
REGIONAL OFFICE
WAAS +
WAE Appliance
REMOTE OFFICE
WAAS +
WAE Appliance
BRANCH OFFICE
WAN
WAAS +
WAE Router Module
DATA CENTER
WAAS Central Manager
Primary/Standby
WAAS +
Core WAE
Appliance
Presentation_ID
© 2006 Cisco Systems, Inc. All rights reserved.
Cisco Confidential
43