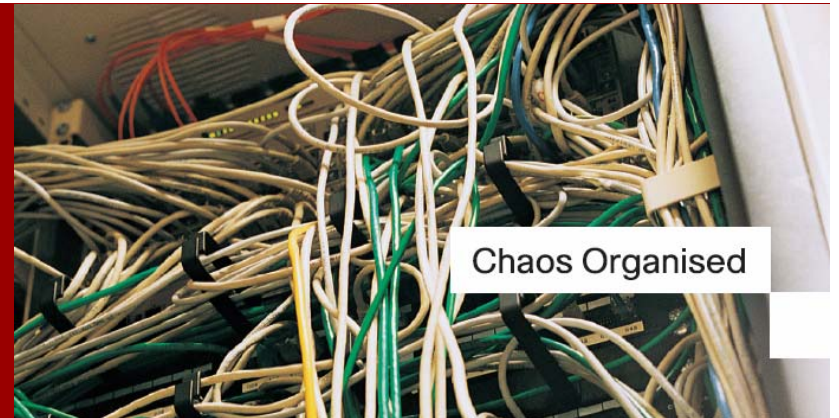




Cisco Data Center Day 2006

**Powerful Solutions to
Accelerate and Optimize your
Enterprise Applications**



Leo Chan
Product Manager – Application Networking Services
Cisco Systems APAC

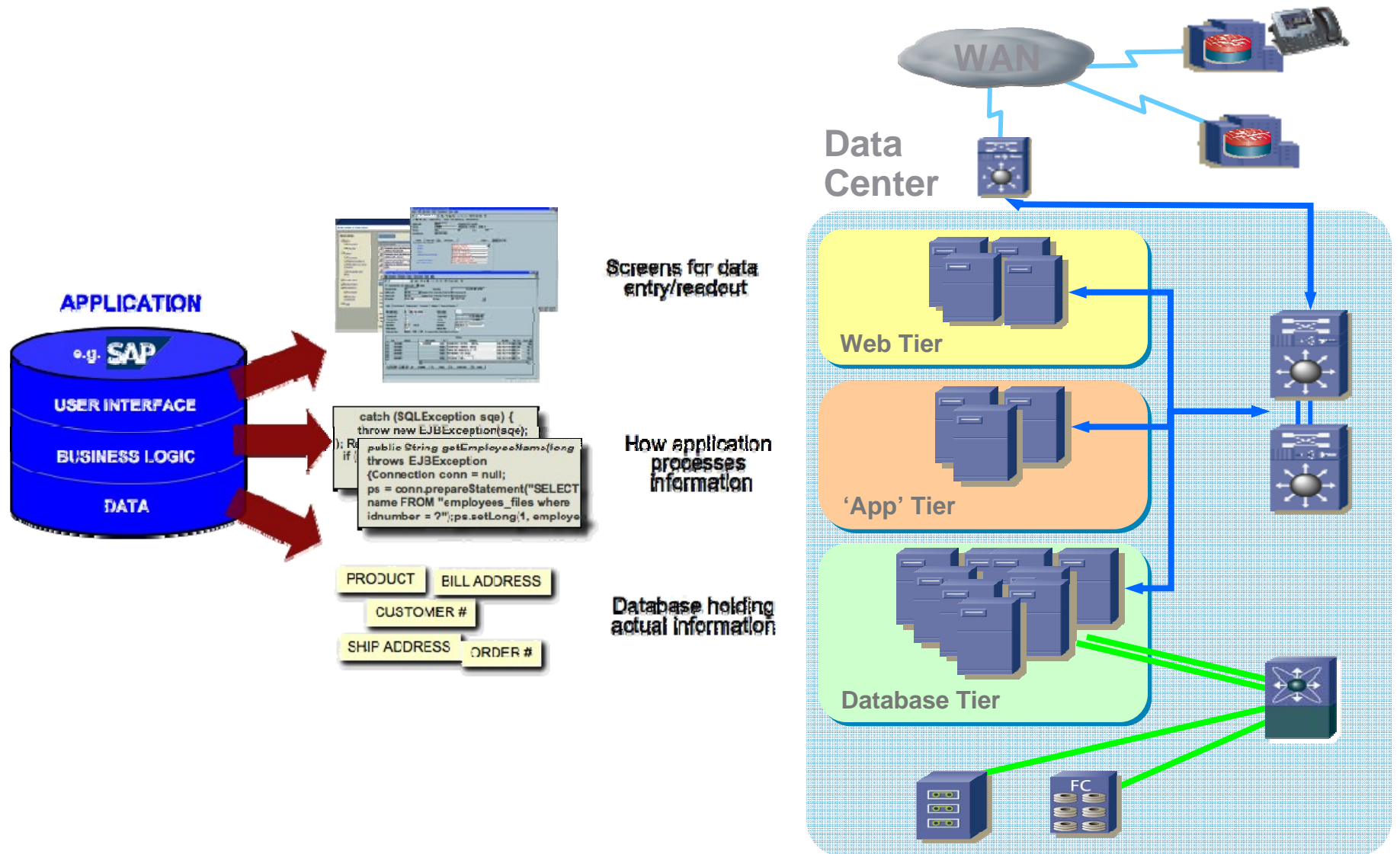
Agenda

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



Where Do Applications Fit in Today's Network?

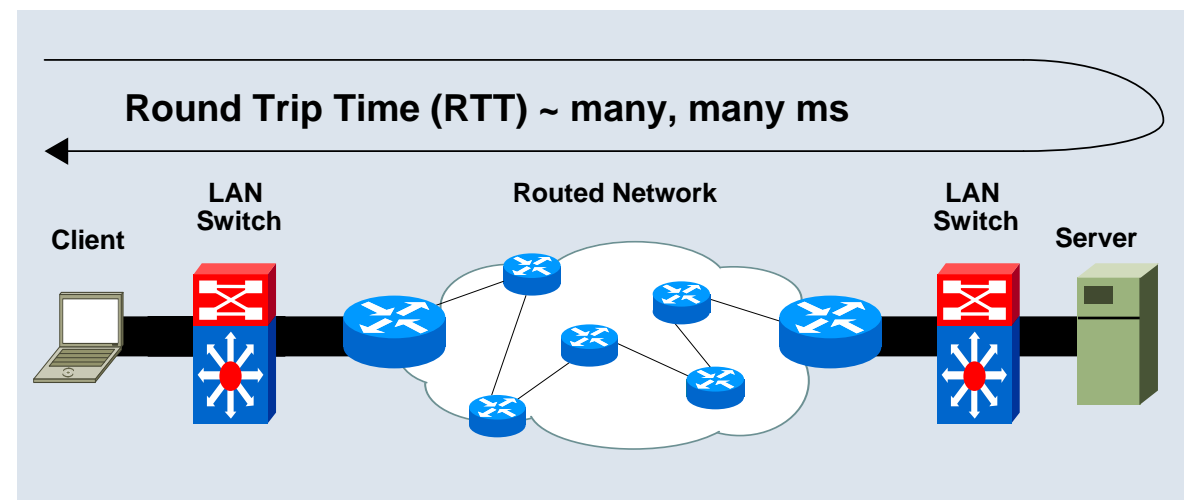
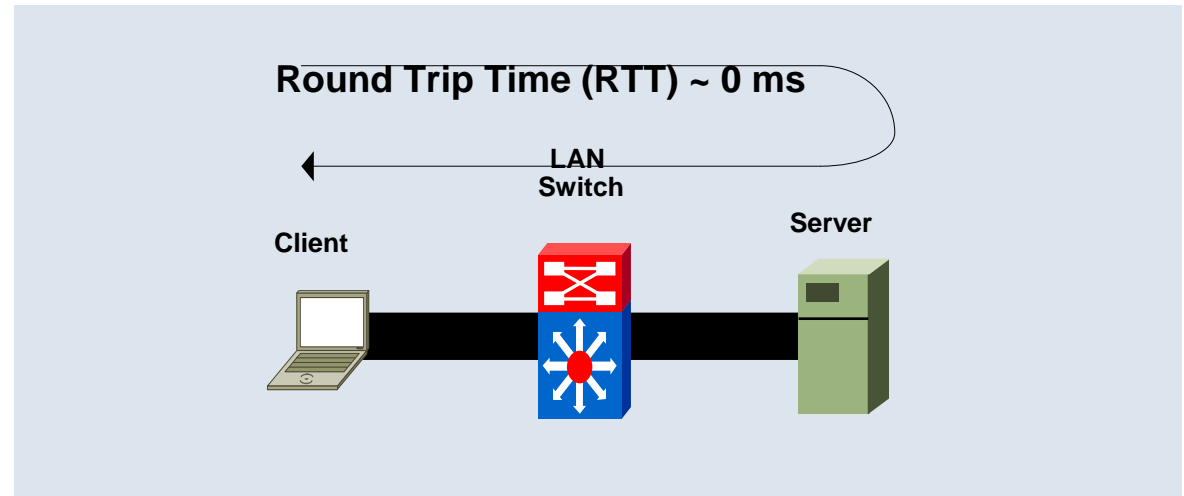
Run on DataCenter and Deliver Across the WAN



The WAN Is a Challenge

Bandwidth and Latency

- Most applications are designed for reliable, high-bandwidth, low latency LANs
- **WAN**-induced bottlenecks are key barriers to **application performance**
 - Chatty application protocols (many, many sequential roundtrips)
 - High link latency, low throughput, spotty reliability
 - Little bandwidth management capability



The Latency Problem: CIFS Traffic

Example: Opening a 1MB File Over the WAN

The screenshot shows the Wireshark interface with a capture file named '1m_open.cap'. The main packet list shows 18 packets, with a filter set to 'smb'. The 'Ethereal: Summary' window is open, displaying the following information:

Ethereal: Summary

File
 Name: D:\Documents and Settings\ibenshou\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

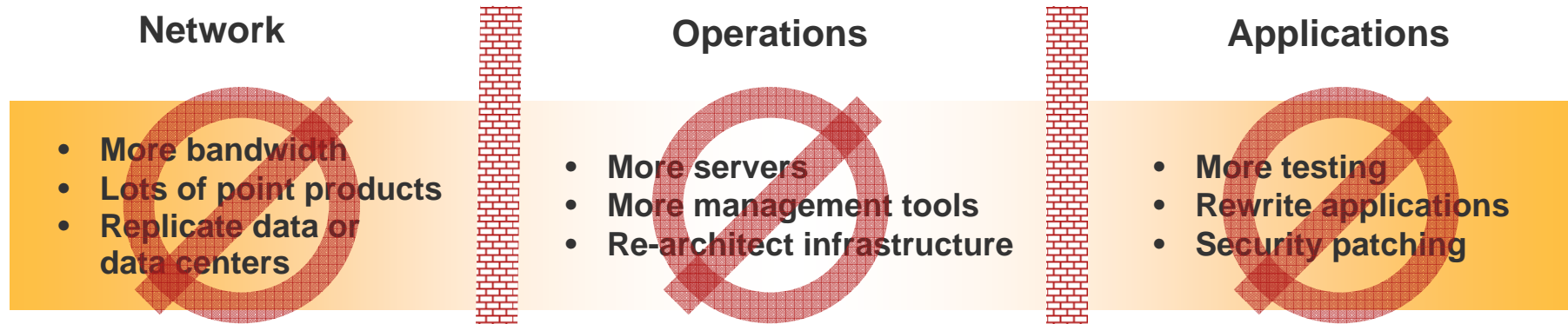
Display
 Display filter: smb
 Marked packets: 0

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

A red box highlights the calculation: $2678/2 = 1339$ CIFS messages between client and server. This calculation is based on the 'Packets' row in the traffic table, where the 'Displayed' value is 2678.

How To Solve The WAN Challenge?

Traditional Thinking Are Too Costly



Our customers tell us they want:

- *Fewer datacenters*
- *Fewer boxes in DC or branch*
- *Better utilizations (equipment and staff)*
- *Better user experience*

Answer:
Solutions that allow CONSOLIDATIONS

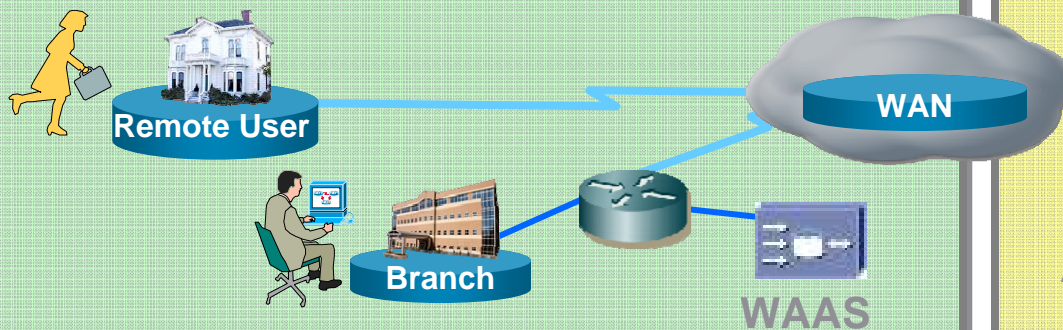
Cisco Application Networking Services:

Powerful Solutions for Your Application Challenges

Branch/WAN Services

Wide Area Application Services

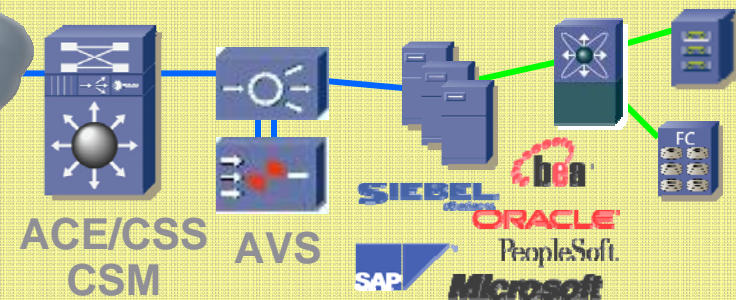
- Complete WAN optimization and application acceleration
- Deployed in branch + data center
- Enables branch server/storage consolidation



Data Center

Application Delivery

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



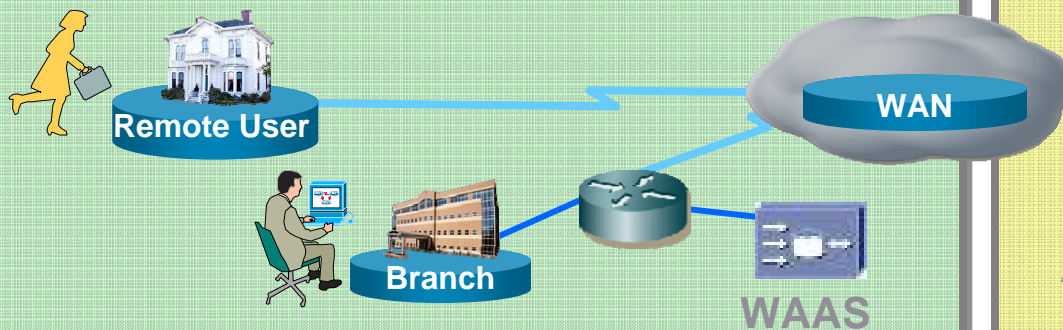
Cisco Application Networking Services:

Broad Range of Benefits

Branch/WAN Services

LAN-like application performance over the WAN

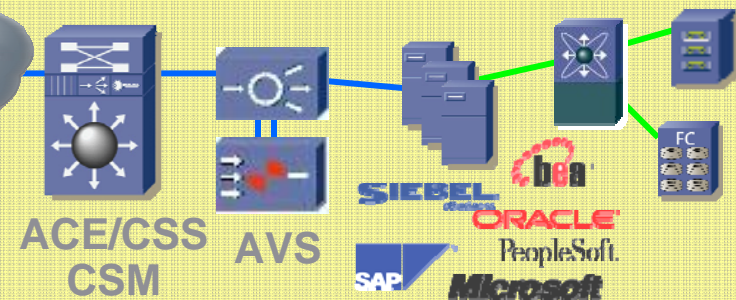
- ***Consolidate branch, server and storage infrastructure***
- ***Deliver increased data protection, compliance, and cost savings***



Data Center

Next generation application infrastructure drives:

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



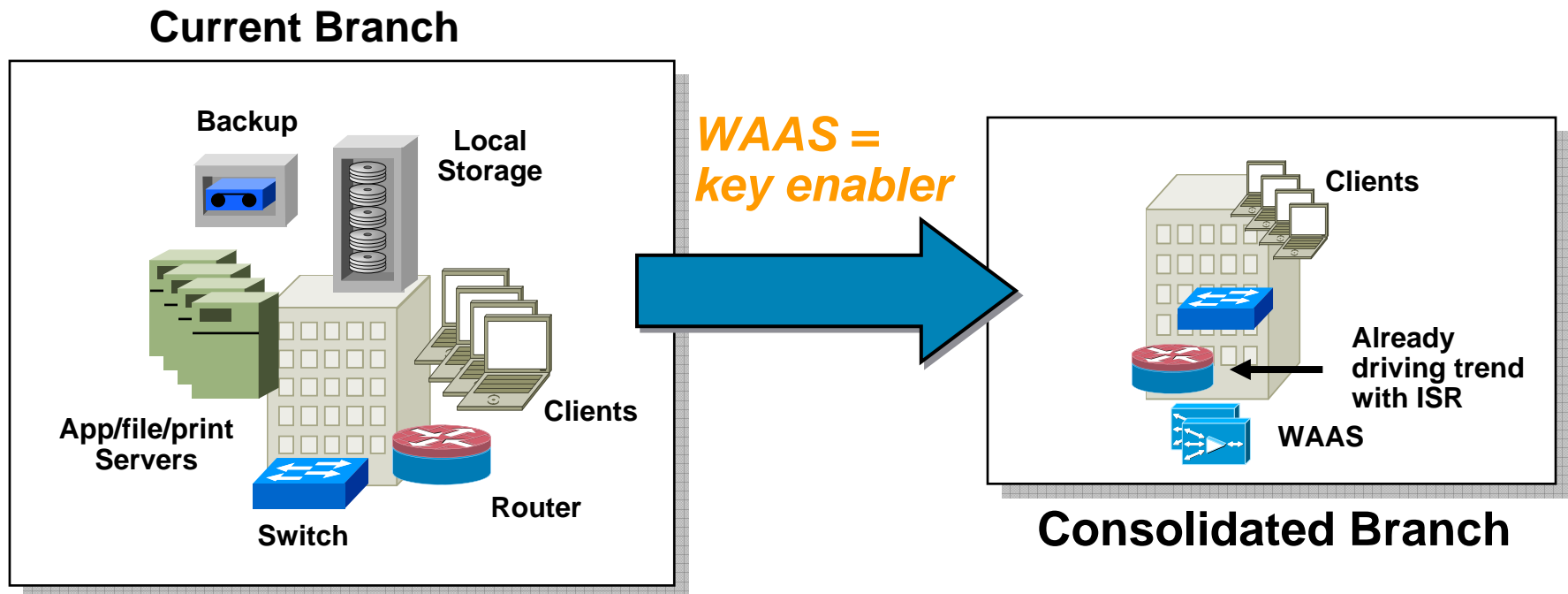
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Cisco Vision: The Consolidated Branch

Further Enhance Your ISRs

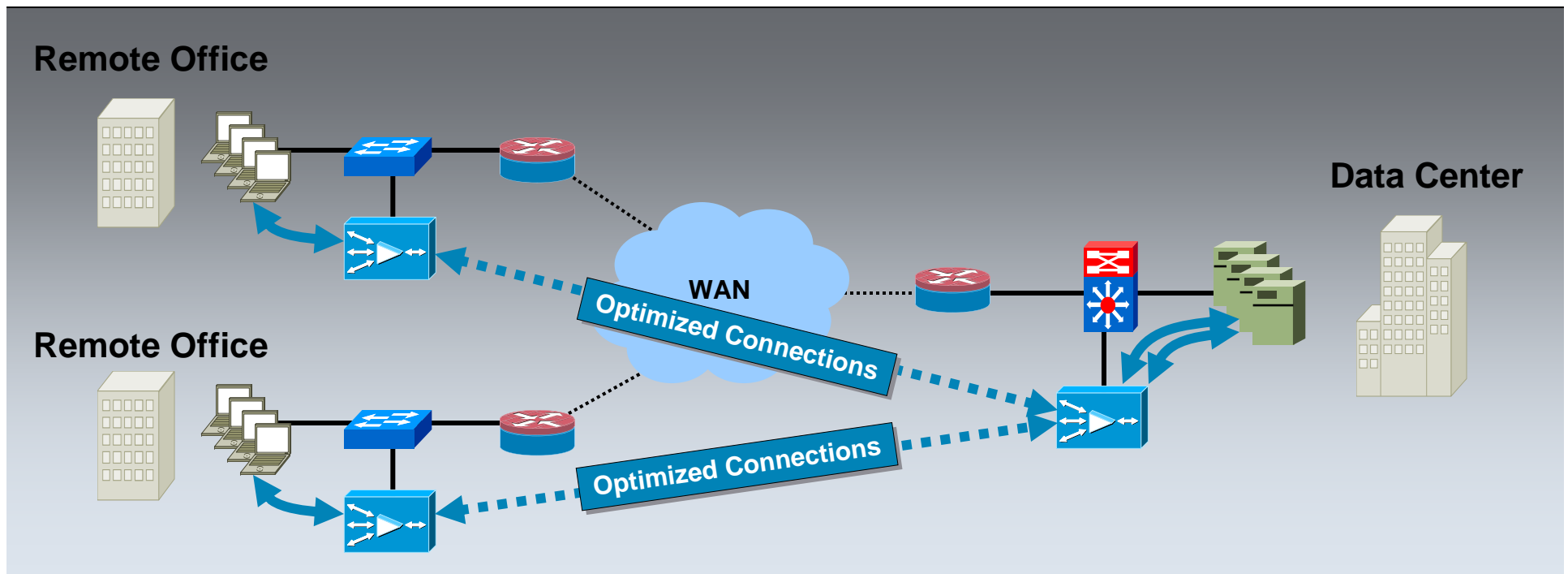


Design Goals:

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

Cisco WAAS Overcomes the WAN

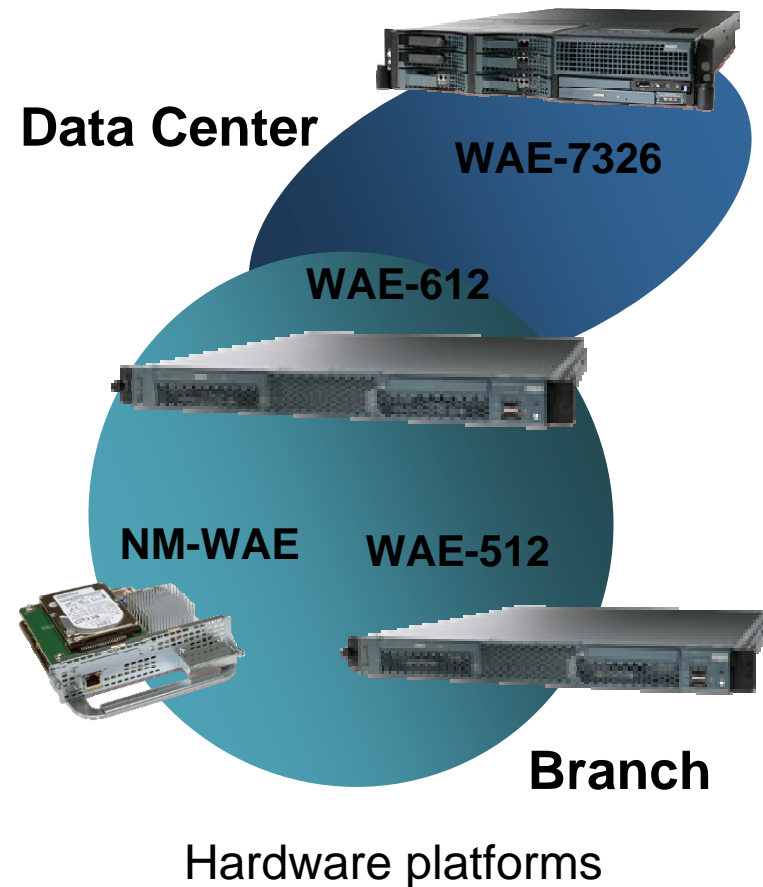
- Cisco WAAS is a solution that leverages a hardware footprint (WAE) in the remote office and in the data center to overcome application performance problems in WAN environments



Cisco WAAS

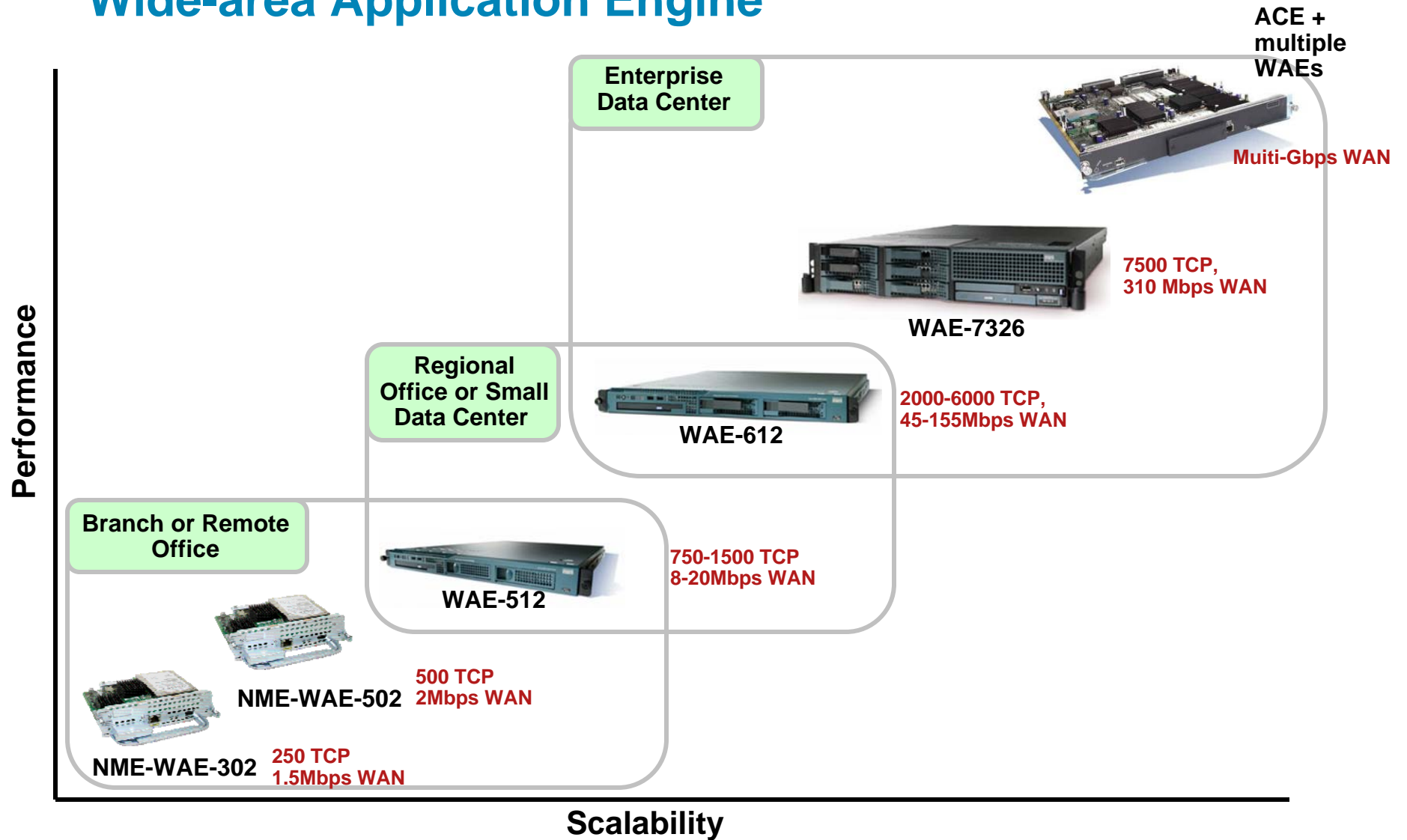
Wide Area Application Services

- Comprehensive feature set
 - Wide range of apps acceleration**
 - any TCP based applications
 - WAN optimization (LZ, DRE, TFO)**
 - WAFS / print services**
 - eliminate the need of local file / print servers
- Seamless network integration
- Deploy in Branch + Datacenter
 - Router module & WAE appliances**
 - Central Manager for 1-to-many management**
- Complete end-to-end solution
 - WAAS + IOS + load balancing**



Cisco WAE Product Family

Wide-area Application Engine



Cisco WAAS Central Manager

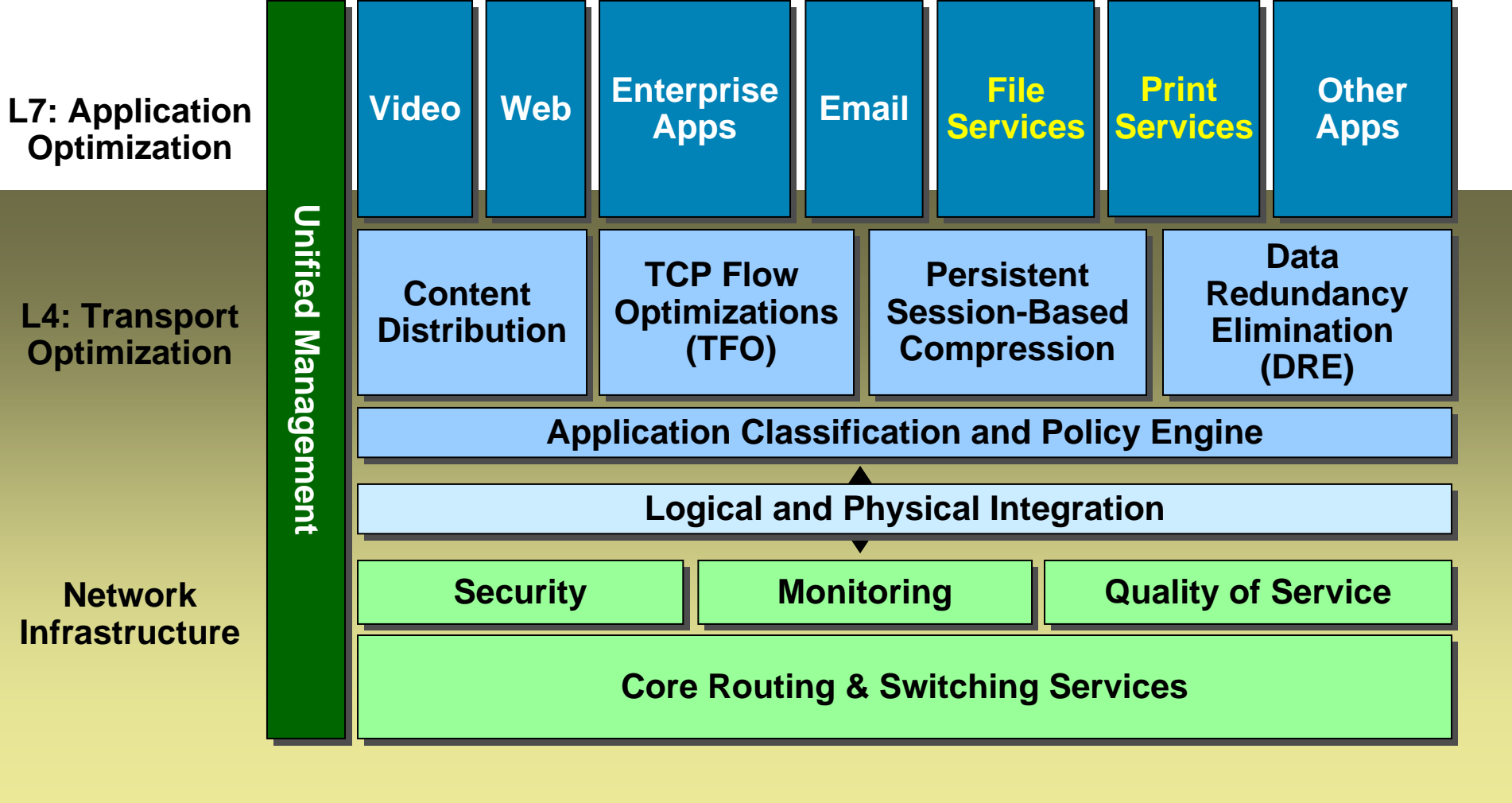
- Comprehensive Management
 - Central configuration
 - Device groupings
 - Monitoring, Stats, Alerts
 - Bandwidth Utilization and Savings by Application
- Intuitive Interface
 - Graphical U/I, Wizards
 - Command Line Interface (CLI)
- Role-based administration
 - Minimizes unauthorized changes & reduces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

Quickstart Wizards

BW Utilization & Savings

Centralized Policy Mgmt

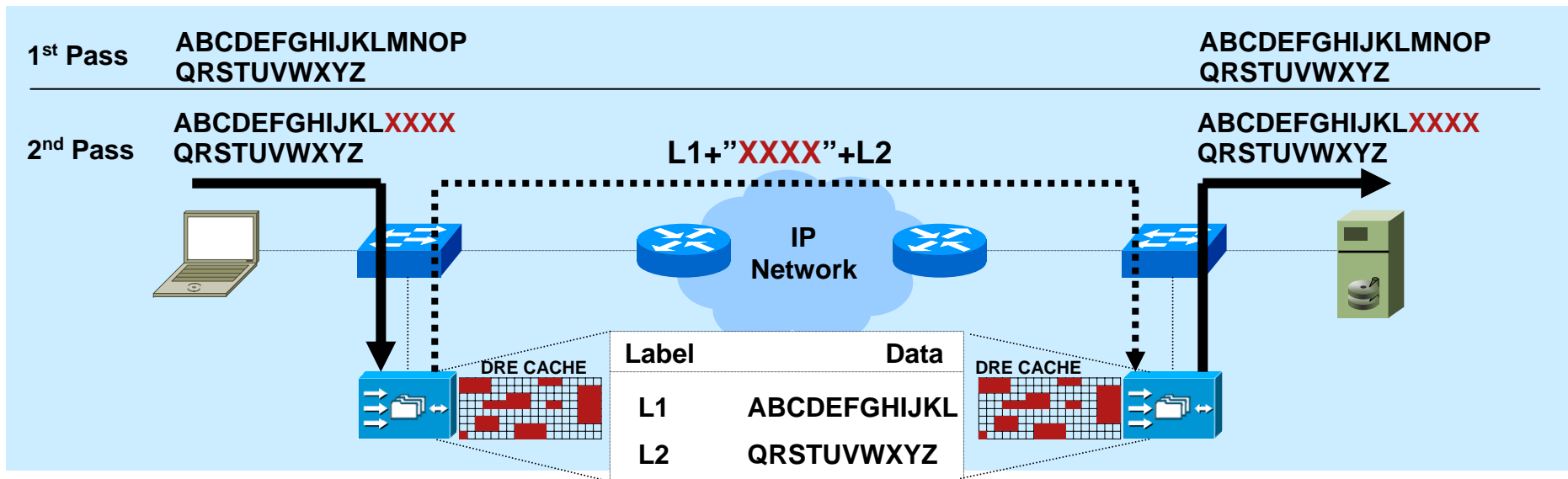
Cisco WAAS Optimization Architecture



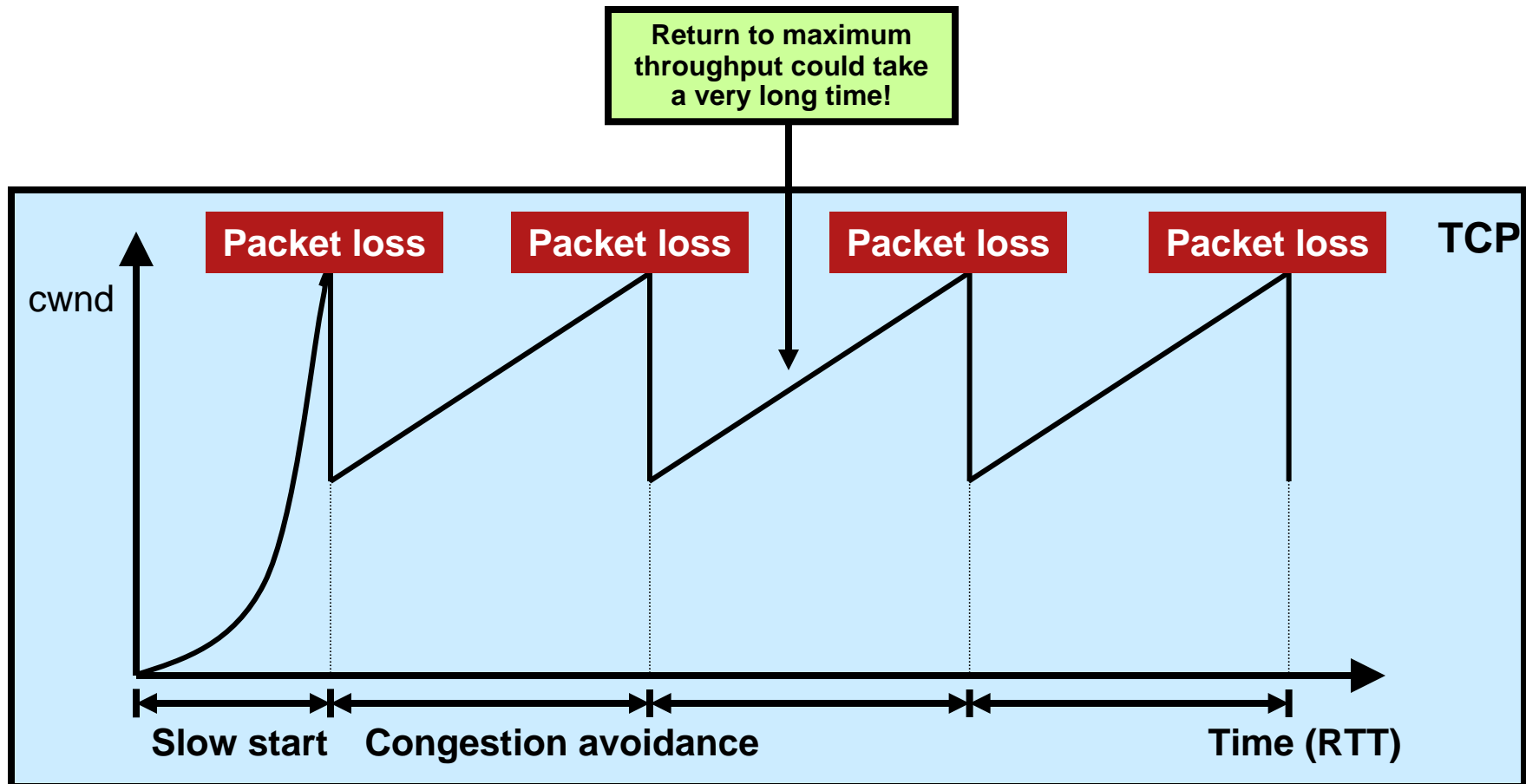
Data Redundancy Elimination (DRE)

Intelligent caching of TCP's chunks

- 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

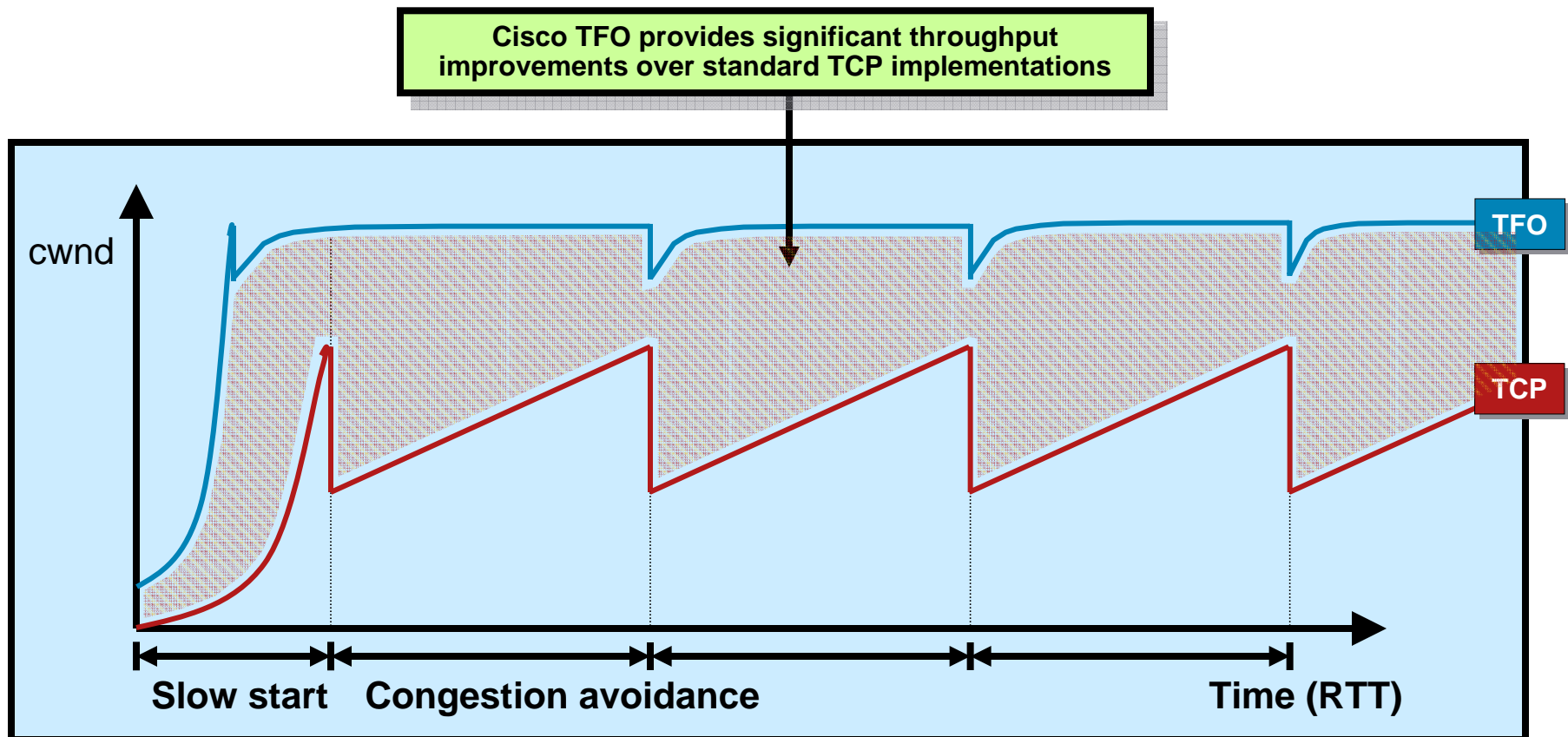


TCP Over a Congested WAN



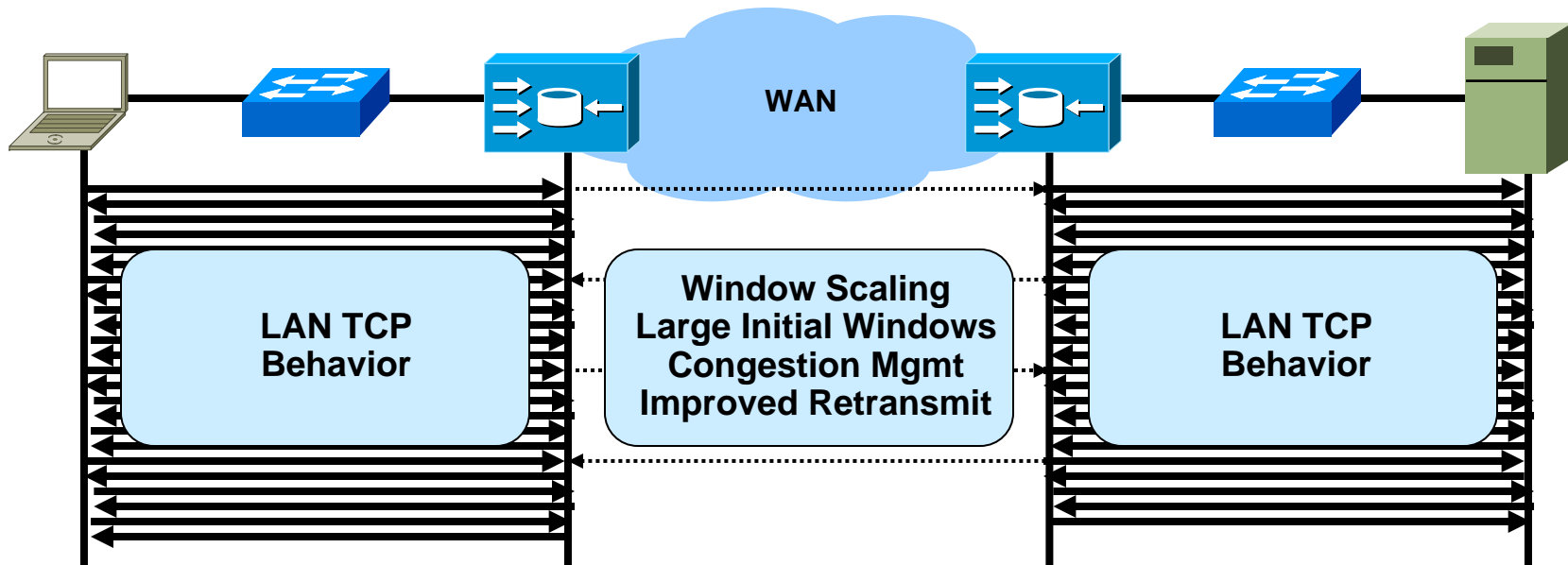
TCP Flow Optimizations (TFO)

Latency Reduction and Rapid Recovery Upon Congestions



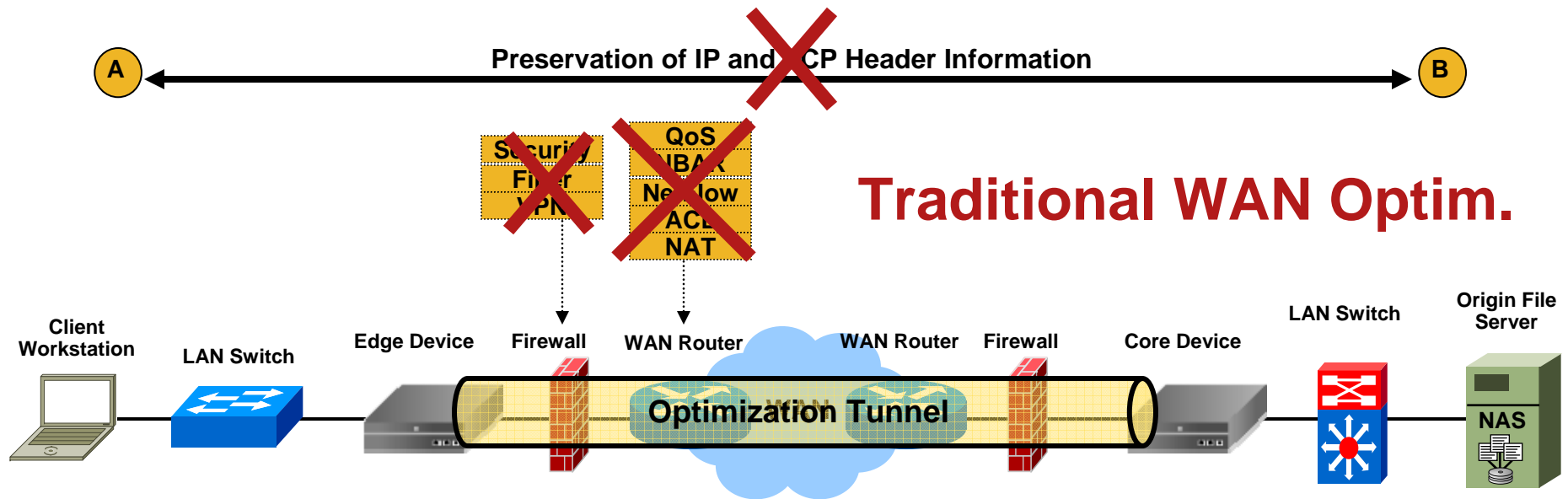
TFO Improves Application Performance

- 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



Traditional WAN Optimization:

Not Transparent, but Disruptive to Existing Network



Traditional WAN Optim.

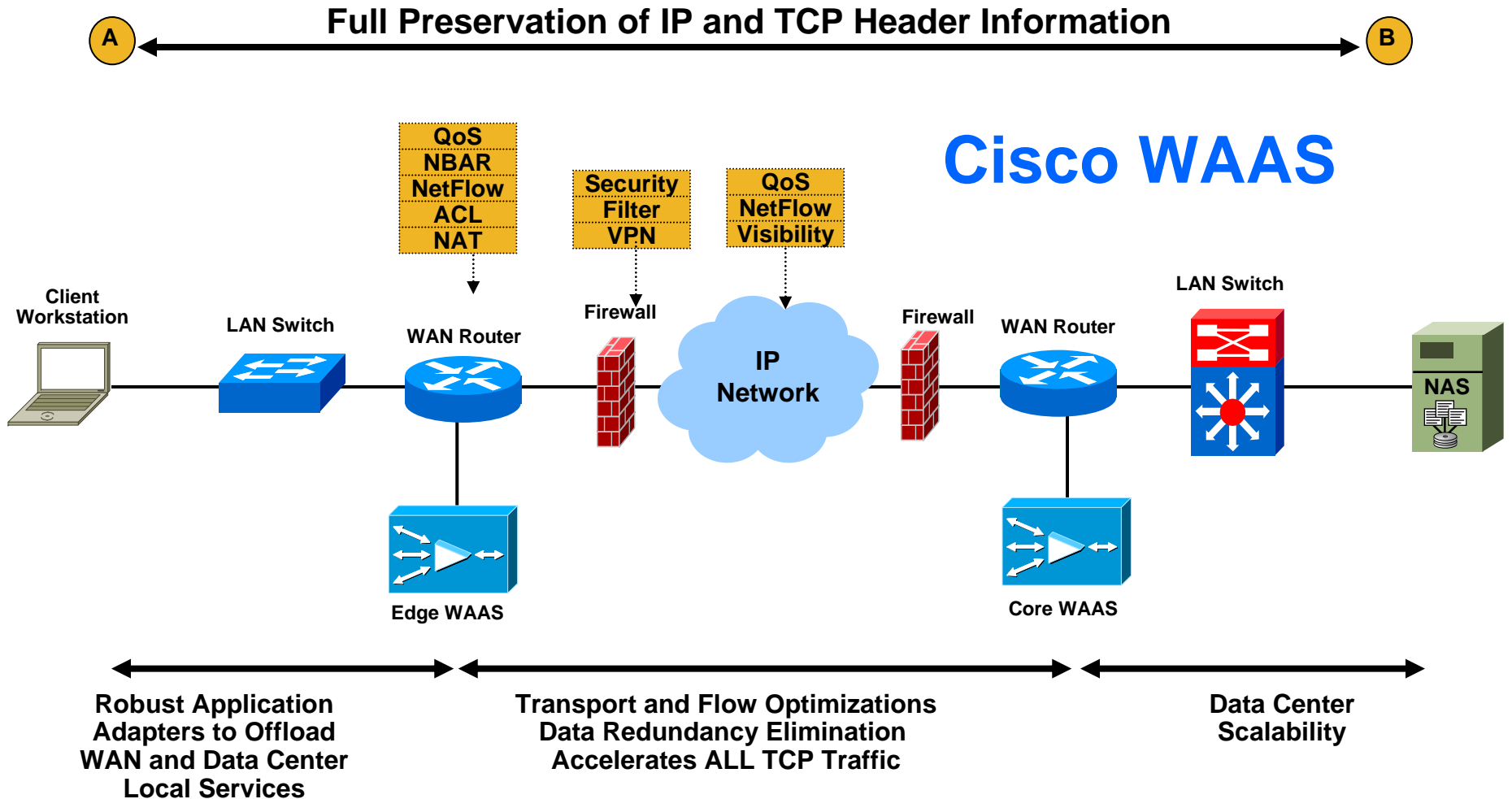
Traditional WAN Optimization changes header information

Result:

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

Cisco WAAS:

Transparent Network Integration, Service Preservation



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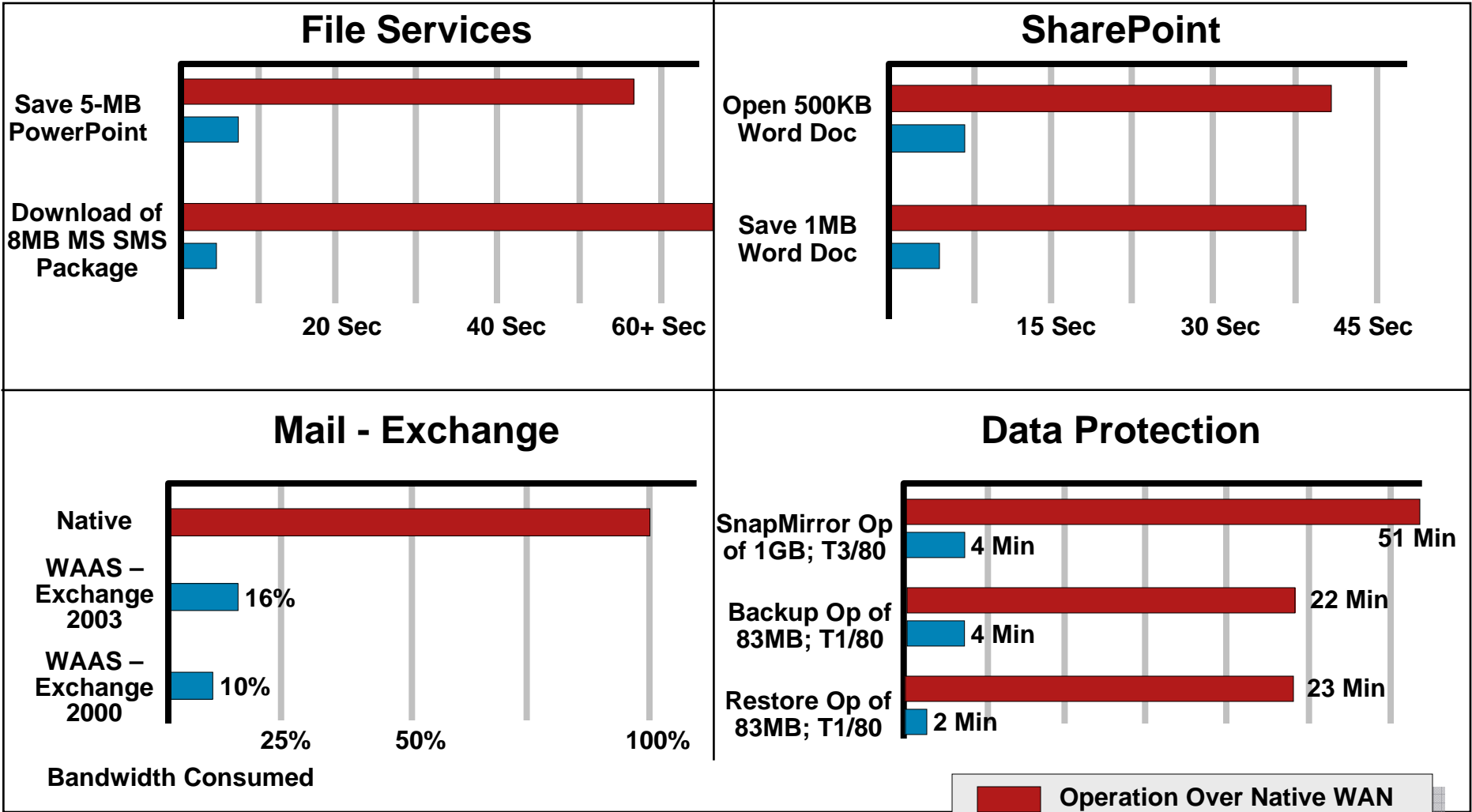


WAAS Accelerates Broad Range of Applications

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.**

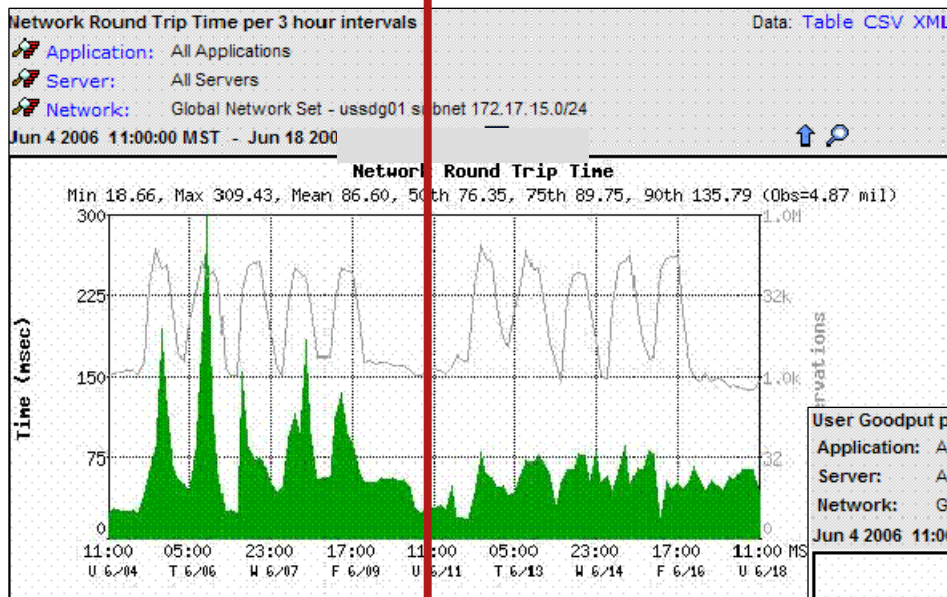
LAN-Like Access to Various Applications



[Network Link—T1, 80ms Latency]

█ Operation Over Native WAN
█ Operation with WAAS

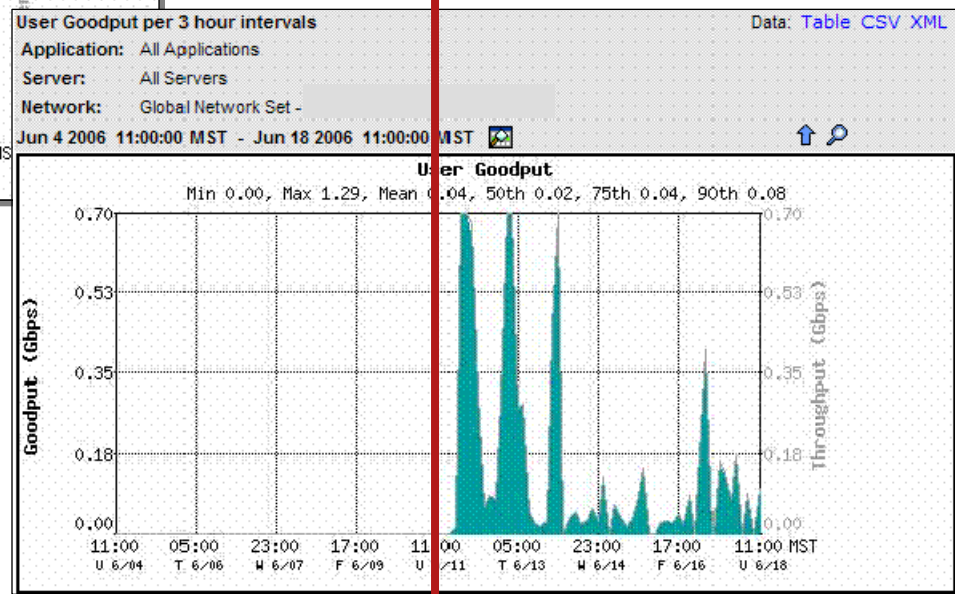
Cisco WAAS: Application Performance & Throughput



Before After

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

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

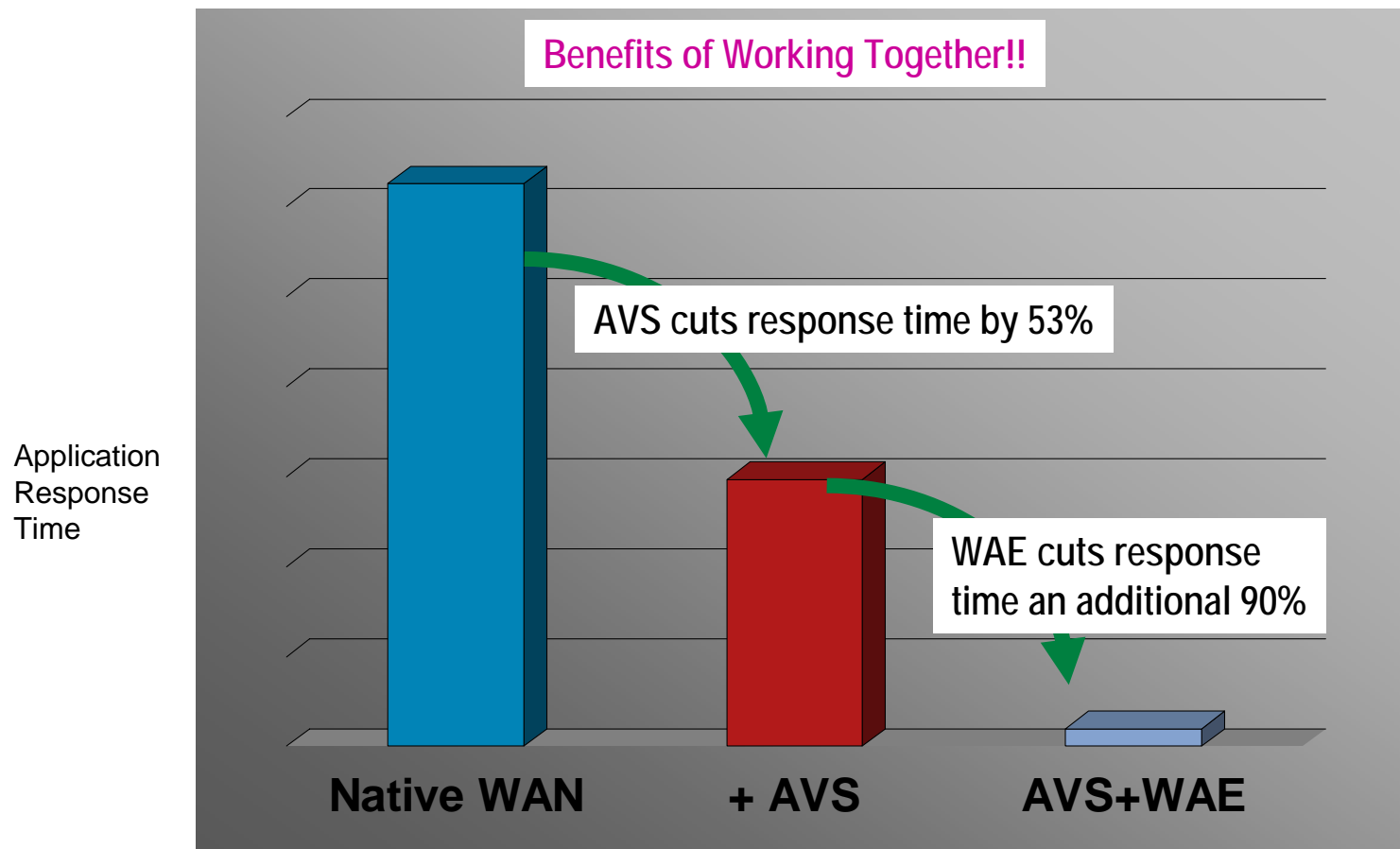


Before After

Works Well With Other Cisco ANS Solutions

Example: Compliments Cisco AVS Technology

AVS: Acceleration of a SPECIFIC application (server/datacenter side)
WAAS: Acceleration of ANY applications (client/branch side)



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 Cost			\$1,994
Savings Summary			
Reduced		\$470	\$2,812
Increased		\$8	\$10,168
Reduced IT Ma			\$16,875
Total Annual Savings		\$29,515	\$29,855
Net Benefit (NPV)	\$25,839	\$24,570	\$22,210
Cumulative NPV	\$25,839	\$47,641	\$64,747
2 & 3 Year Return on Investment (ROI)		261%	355%
2 & 3 Year Project Net Present 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

WAAS Delivers Real Customer Value

Branch Server Consolidation



Global Consulting Co.

Costly server, storage & backup infrastructure in each branch

Lower branch CapEx & OpEx costs;
Greater data protection & compliance

\$8+M savings over 5 years

Remote Application Performance



Fortune 100 Financial

Slow access to centralized web-based CRM application

Faster response time and improved user productivity

8x faster response time

WAN Cost Reduction



Regional Bank

Increasing branch uses and data; more apps deployed

Lower bandwidth costs; able to avoid WAN upgrade

4x bandwidth savings

Branch Server Backup



Global Financial Institution

Backup in branches is not compliant with regulation

Branch data is backed-up and protected in the data center

Enterprise-wide compliant backup

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Cisco WAAS: Solution for Today's Branch

- Addresses range of IT branch challenges
- Comprehensive technology set
 - Accelerations of ANY TCP applications
 - WAN optimization
 - Advanced File/Print Services
 - Eliminates servers in branch while providing LAN-like performance
- Transparent integration into existing networks
- Integrated with other Cisco ANS technology to provide complete end-to-end application delivery solution

