

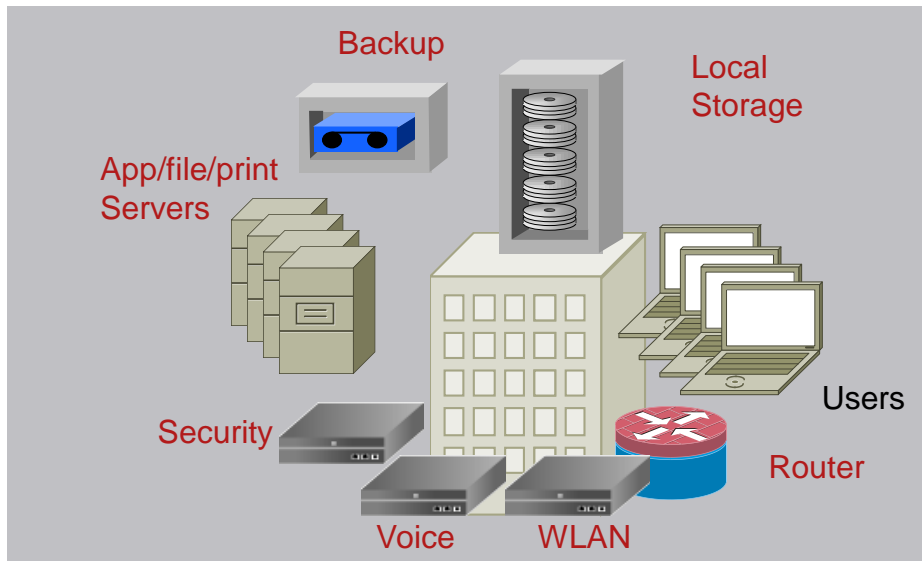


Cisco Wide Area Application Services



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Branch IT Infrastructure Challenges



- **Infrastructure cost/complexity**
 - File, print and application servers
 - Storage and backup
 - Plethora of networking equipment
- **Data protection concerns**
 - Failing backups/lost data
 - Costly off-site vaulting
 - Regulatory compliance
- **WAN limitations inhibit centralization**
 - Bandwidth and throughput limitations
 - Latency and packet loss
 - Poor end-user experience

Companies spend 6 billion dollars per year on branch servers, storage, backup and management *-Source: IDC, Gartner, Cisco*

Branches consume 70- 90% of business resources. *-Source:*

NetworkWorld

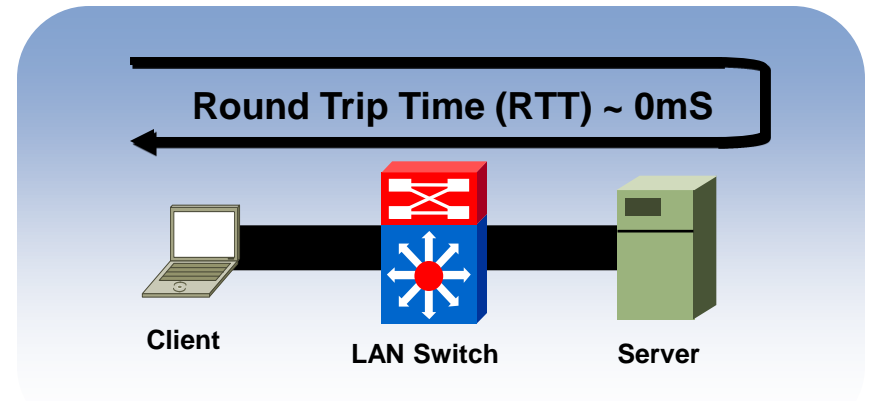
The WAN Is A Barrier To Consolidation

- **Applications perform well in LAN:**

- High bandwidth

- Low latency

- Reliability



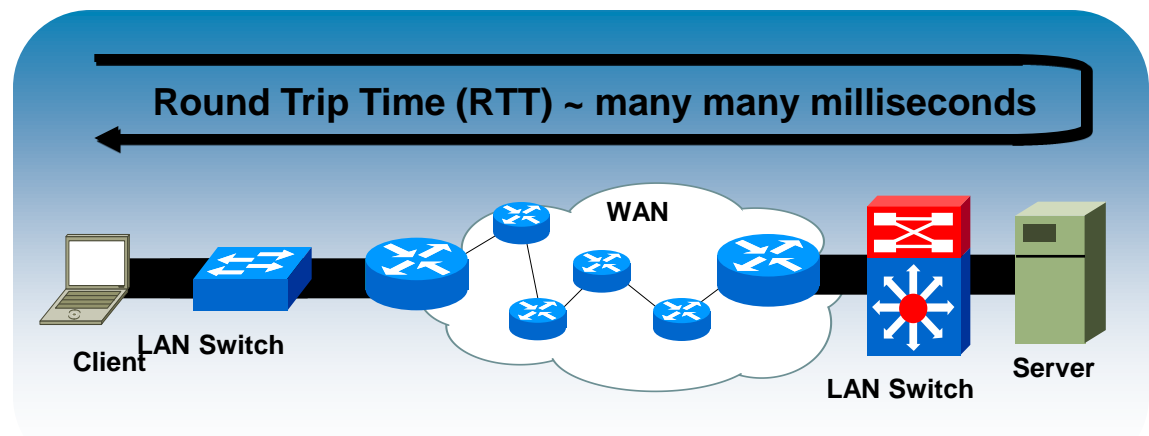
- **Applications perform poorly in WAN:**

- Already congested

- Low bandwidth

- Latency

- Packet Loss



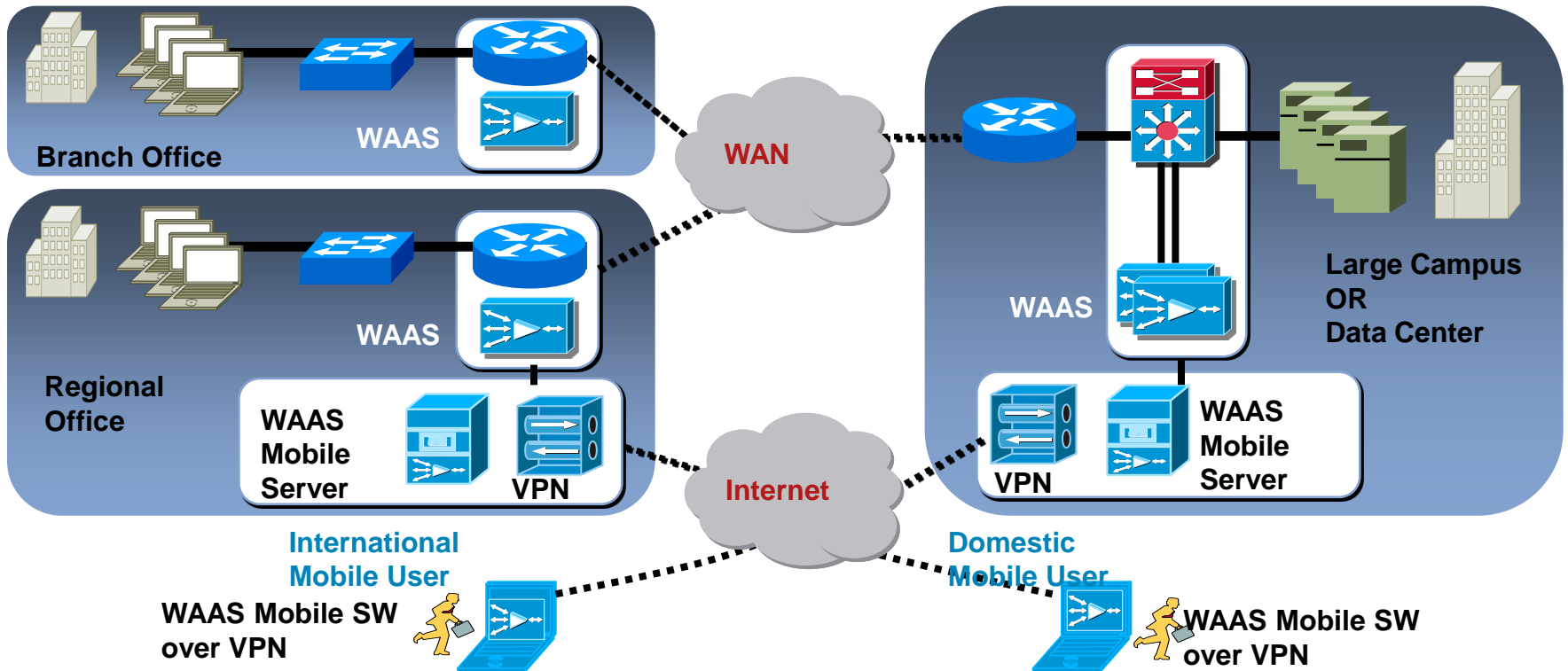
Deploy WAAS at Both Sides of the WAN

Branch IT Consolidation

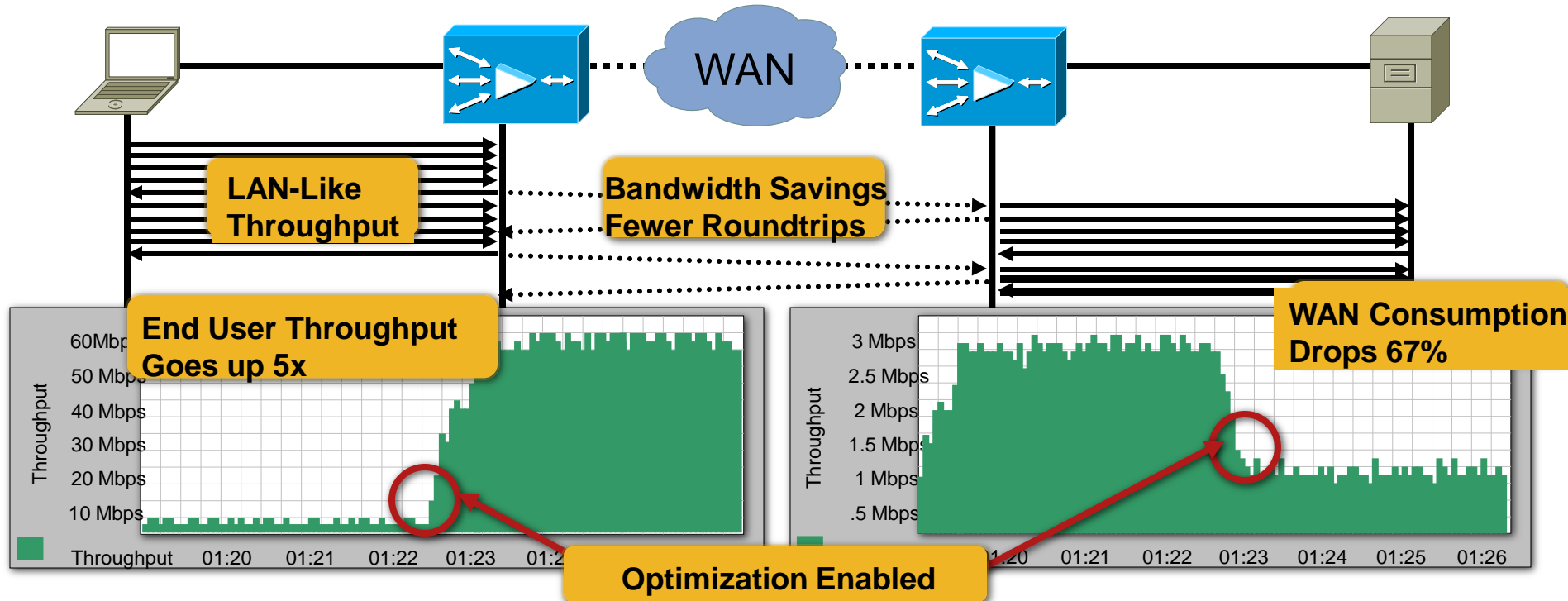
WAN Bandwidth Optimization

Simplified Data Protection

Application Acceleration



WAN and Application Optimization



Advanced Compression/Cache

- Data redundancy elimination (Up to 100:1 compression)
- Persistent LZ compression (additional 10:1 compression)

Application Specific Acceleration

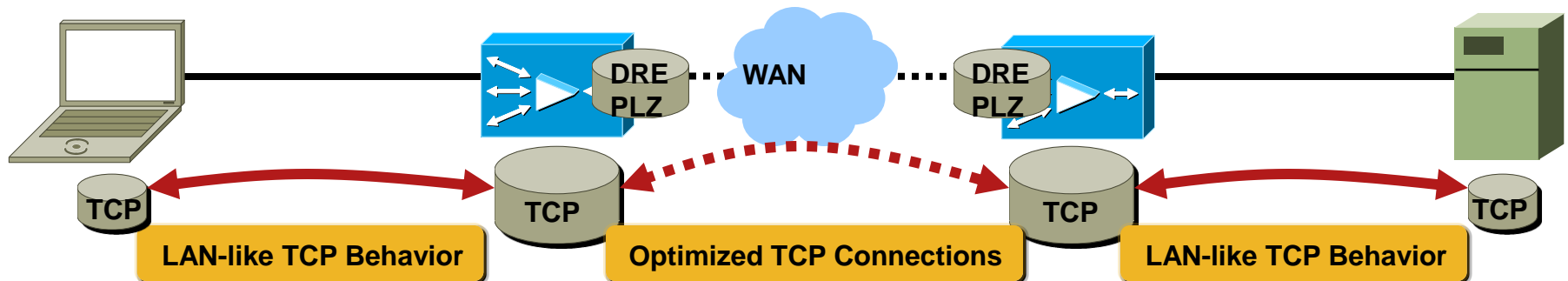
- Application protocol aware
- Windows file services (CIFS)
- Windows print services
- Server offload technology

TCP Flow Optimization (TFO)

- LAN-like TCP behavior
- Loss mitigation
- Slow-start mitigation

TCP Flow Optimization (TFO)

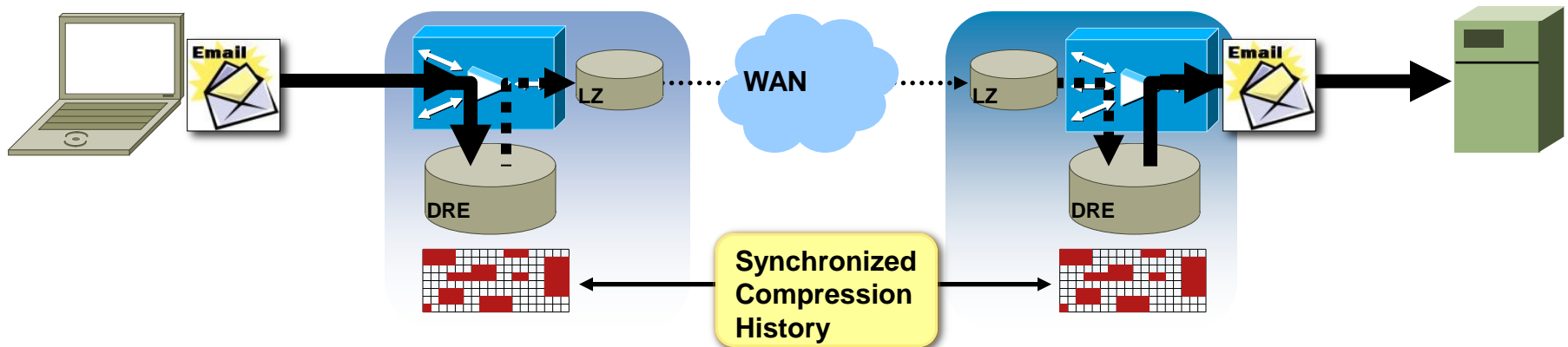
- Improves application throughput
- Improves existing WAN bandwidth utilization
- Shield end-nodes from unruly WAN conditions
 - Bandwidth scalability - help certain applications 'fill-the-pipe'
 - Connection fairness - ensure bandwidth is allocated fairly amongst flows
 - Loss mitigation - selective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



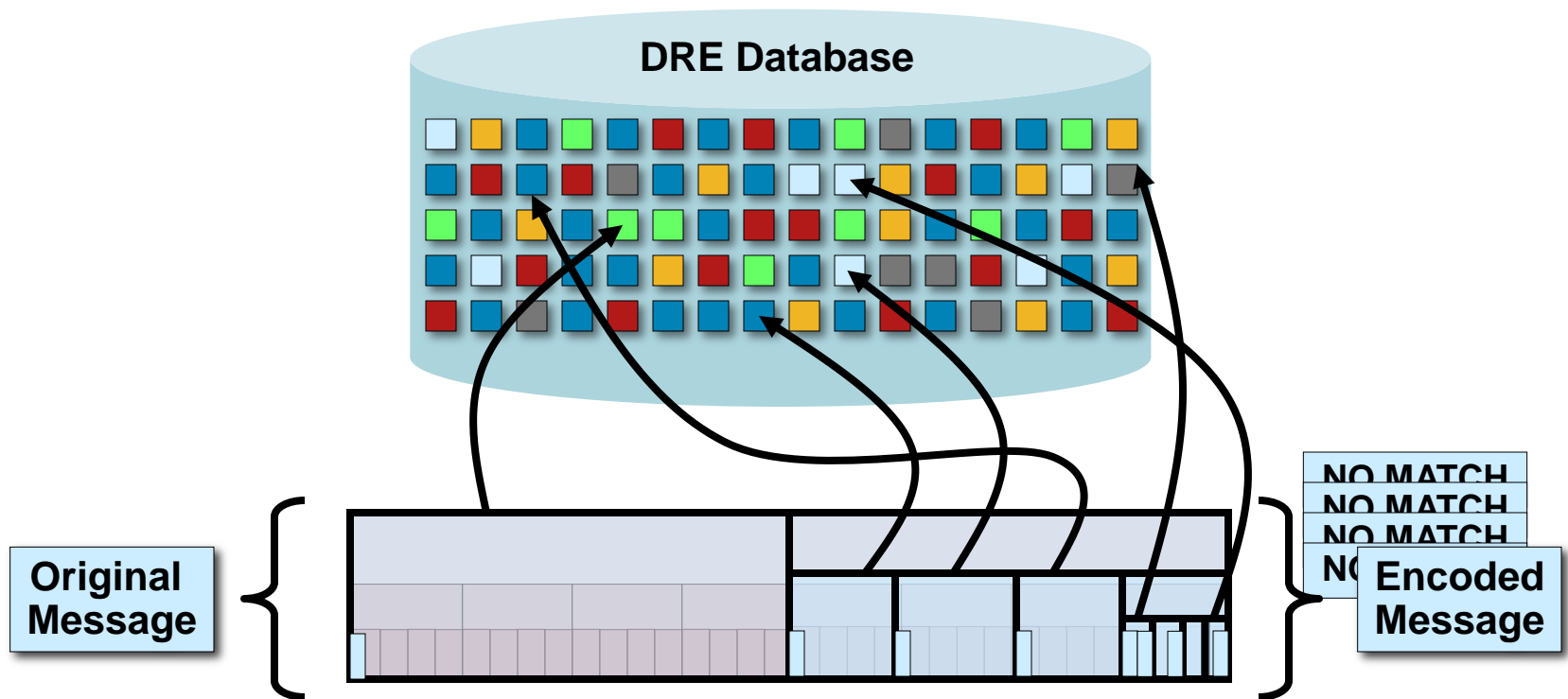
Cisco WAAS Advanced Compression

Cisco WAAS Employs 2 Forms of Advanced Compression:

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















DRE Pattern Matching



Lempel-Ziv (LZ) Compression

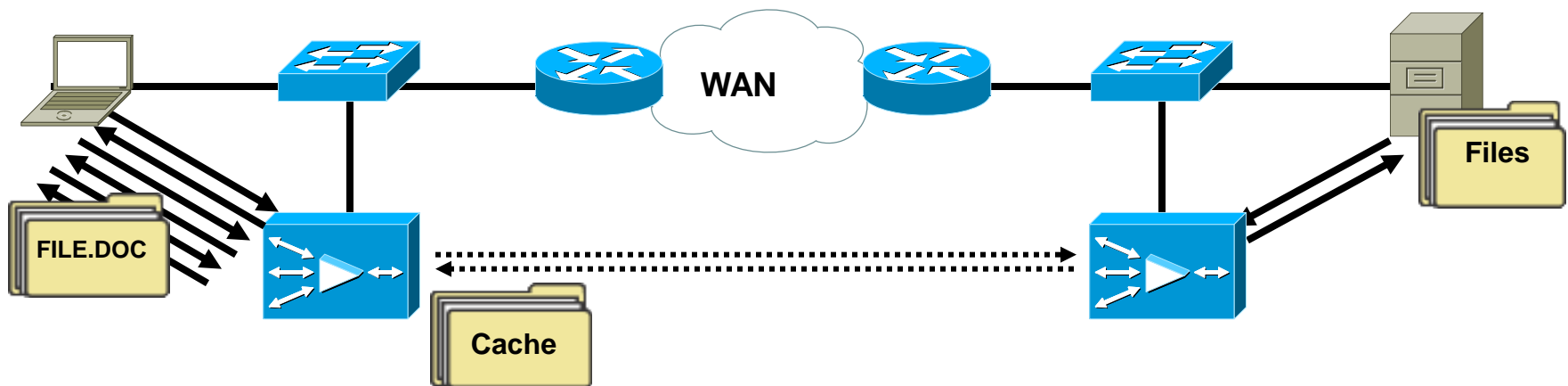
- Searches redundancy within a message
- Uses a small compression context
 - Provides compression for 1st time transfers
- Cisco WAAS uses a modified version of LZ, referred to as Persistent LZ (PLZ)
 - Compression context is shared across all messages for a TCP connection
 - Provides improved compression rates, especially for application protocols that utilize small messages
- WAAS PLZ implementation is also adaptive
 - Bypasses LZ for highly compressed (DRE) messages or messages with a low probability of good compression

Application Performance Improvements

Category	Applications	2X	5X	10X	25X	50X	100X+
File Sharing	CIFS NFS 	2-20X Avg		>100X Peak			
Email	Microsoft Exchange Lotus Notes Internet Mail 	2-5X Avg	20X Peak				
Web and Collaboration	HTTP WebDAV FTP Microsoft Sharepoint   	2-10X Avg		100X Peak			
Software Distribution	Microsoft SMS Altiris HP Radia 	2-20X Avg		>100X Peak			
Enterprise Applications	Microsoft SQL Oracle, SAP Lotus Notes    	2-5X Avg	20X Peak				
Backup Applications	Microsoft NTBackup Legato Networker Veritas Netbackup CommVault Galaxy  	2-10X Avg		50X Peak			
Data Replication	EMC SRDF/A EMC IP Replicator NetApp SnapMirror Data Domain Double-Take Veritas Vol Replicator	2-10X Avg		50X Peak			

CIFS Accelerator

- Intelligent local handling and optimization of protocol mitigates latency
- File caching removes the need for unnecessary file transfer; validation ensures stale data is never served
- Transparent integration ensures no client or server changes to apply optimization
- Sessions are maintained end-to-end to ensure no security reconfiguration
- Auditing, access-control, and quotas are fully preserved
- Scheduled preposition to prepopulate Data Redundancy Elimination and edge data cache



- Advanced WAN optimization layer improves throughput and efficiency
- DRE eliminates redundant network data
- TCP optimizations to improve protocol ability to fully use the network



HTTP Application Optimizer

Problem

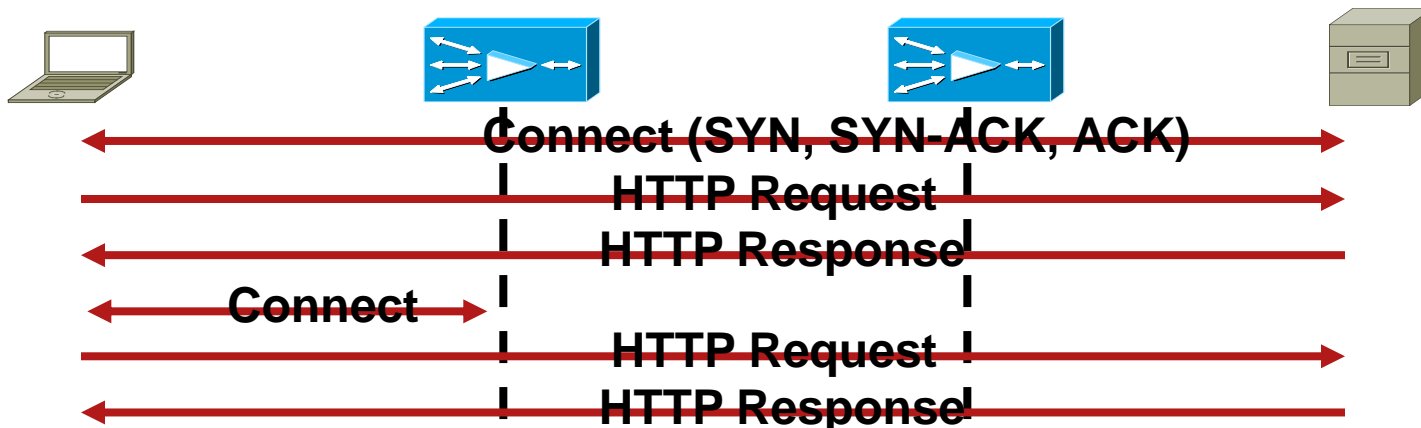
- Slow page load on Interactive Web applications
- Browsers serially open and close connections to fetch small objects (e.g graphics)
- Latency in a connection open/close could be higher than object transmit time.

Solution

- Fast Connection Reuse - Optimized connections on the WAN remain active for a short period of time to be re-used should additional data between the client-server pair need to be exchanged

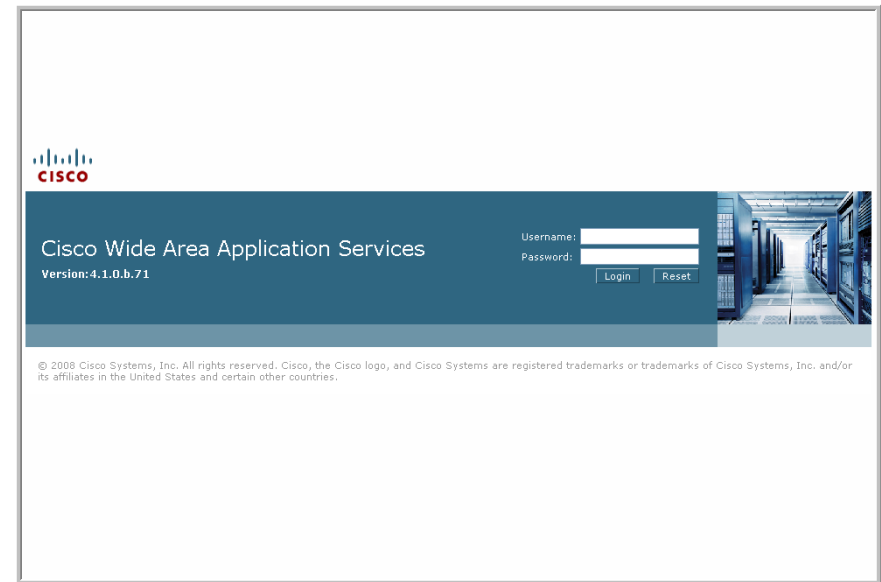
Benefits

- This eliminates the latency caused by establishing multiple connections between clients and servers
- Tuned to offset connection “bursts”
 - Bounded session and idle timeouts
- Transparency is maintained
 - Only same pair of client and server requests are reused
- Compliments and preserves http application pipelining



Device Mode—Central Manager

- Provides a GUI interface to centrally manage the entire WAAS deployment
- Requires a dedicated appliance
- Sole purpose is to provide configuration management and reporting—no user traffic is accelerated by CM
- Secure communication with registered WAEs using SSL
- Supports a single primary and multiple warm standby central managers

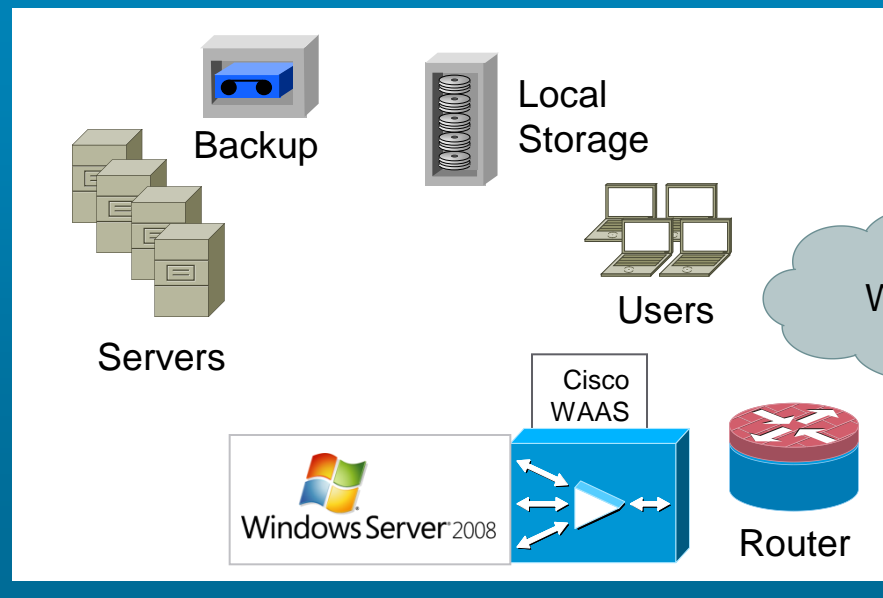


Virtualized App Delivery for Branch Office Cisco WAAS 4.1 with Virtual Blade Technology

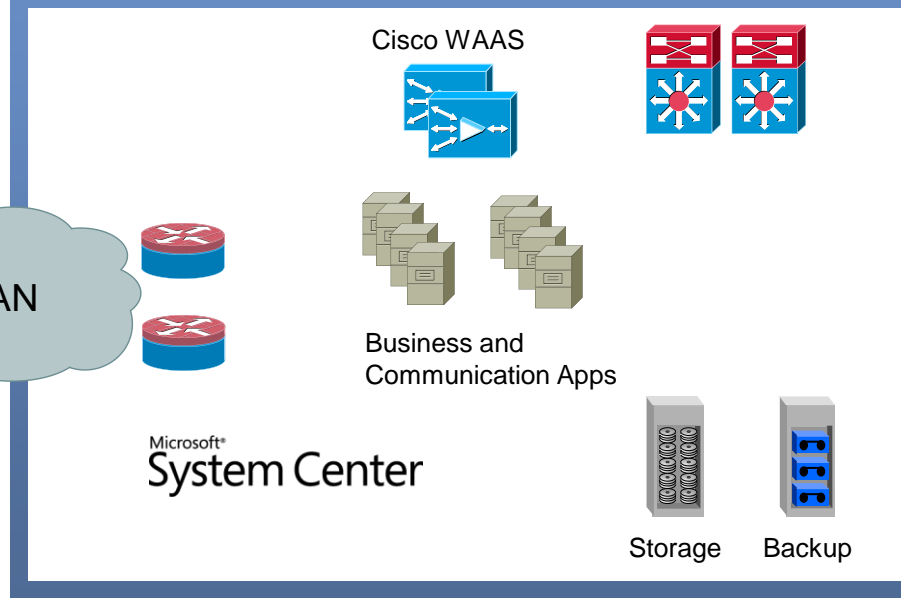
New

- Locally host services on same WAAS device including:
 - Microsoft Windows Server 2003/SP2 and 2008. Windows Active Directory, DNS, DHCP, WINS and Print services

Flexible, Optimized Branch IT



Data Center



Cisco WAAS Virtual Blade Technology

Providing Best Mix of Distributed and Centralized IT Services

Validated by Microsoft for Windows Services



Introducing Cisco WAVE Platforms

WAAS appliance & WAAS Virtual Blade Capable Appliance

WAVE 274



Small Office

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

WAVE 474



Branch Office

- **HW:** All inclusive fixed config for easy ordering
 - 250GB, 2GB DRAM
 - 2 port inline
- **SW:** Enterprise License included
- **Options:** Virtual Blade, Live Video Streaming
- **Capacity:** up to 50 users, max 500 connections
- **Form:** Desktop

WAVE 574



Mid-sized Branch Office

- **Base HW config**
 - 500GB, 2GB DRAM
- **HW Upgrades:**
 - 500GB (RAID-1)
 - 2GB DRAM
 - 2 or 4 port inline
- **SW:** Enterprise License included
- **Options:** Virtual Blade, Live Video Streaming
- **Capacity:** up to 150 users max 750 conn w 2GB, max 1500 conn w 4GB
- **Form:** 1RU rack server

* Number of connections and virtual blade is to be used as a starting guideline. Final recommendations requires a detailed sizing exercise that include application traffic mix, traffic characteristics, application load and other factors mentioned in the sizing guidelines.

Cisco WAAS Data Center Appliances



WAE-7341
Enterprise Data Center Appliance



WAE-7371
Enterprise Data Center Appliance

- **WAE-7341 Appliance:**
 - Quad-core processor, 8GB of RAM
 - Up to 310Mbps WAN connections and 12000 optimized TCP connections (2500 in Replication Accelerator mode)
 - Up to 900GB RAID-5 protected and hot-swappable SAS disk capacity with optional disk encryption
- **WAE-7371 Appliance:**
 - Dual Quad-core processors, 24GB of RAM
 - Up to 1Gbps WAN connections and 50000 optimized TCP connections (5000 in Replication Accelerator mode)
 - Up to 1.5TB RAID-5 protected and hot-swappable SAS disk capacity with optional disk encryption

Cisco WAAS Router Modules



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



**Cisco Integrated Services
Router (ISR) Series**

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

- **Model NME-WAE-302**

512MB of RAM, 80GB of disk

Up to 4Mbps WAN connections and up to 250 optimized TCP connections

- **Model NME-WAE-502**

1GB of RAM, 120GB of disk

Up to 4Mbps WAN connections and up to 500 optimized TCP connections

- **Model NME-WAE-522**

2GB of RAM, 160GB of disk

Up to 8Mbps WAN connections and up to 800 optimized TCP connections

