



Cisco WAAS Mobile Technical Overview



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Market Drivers: Client-Based Acceleration

The global **mobile worker** population is expected to increase to 543.1 million in 2009, representing approx. 20% of the workforce

Source: IDC

Number of employees who **telecommute** (either full-time or part-time) increased to 17% from 10% last year

Source: Nemertes Research

By 2009, 70% of knowledge work will occur in locations where workers will depend on **wireless and remote-access** infrastructure that is outside the enterprise's direct control

Source – Gartner Mobile workforce report

7 out of 10 companies use **mobile devices** for web access and nearly two-thirds use them to access enterprise applications and business data.

Source: Information Week

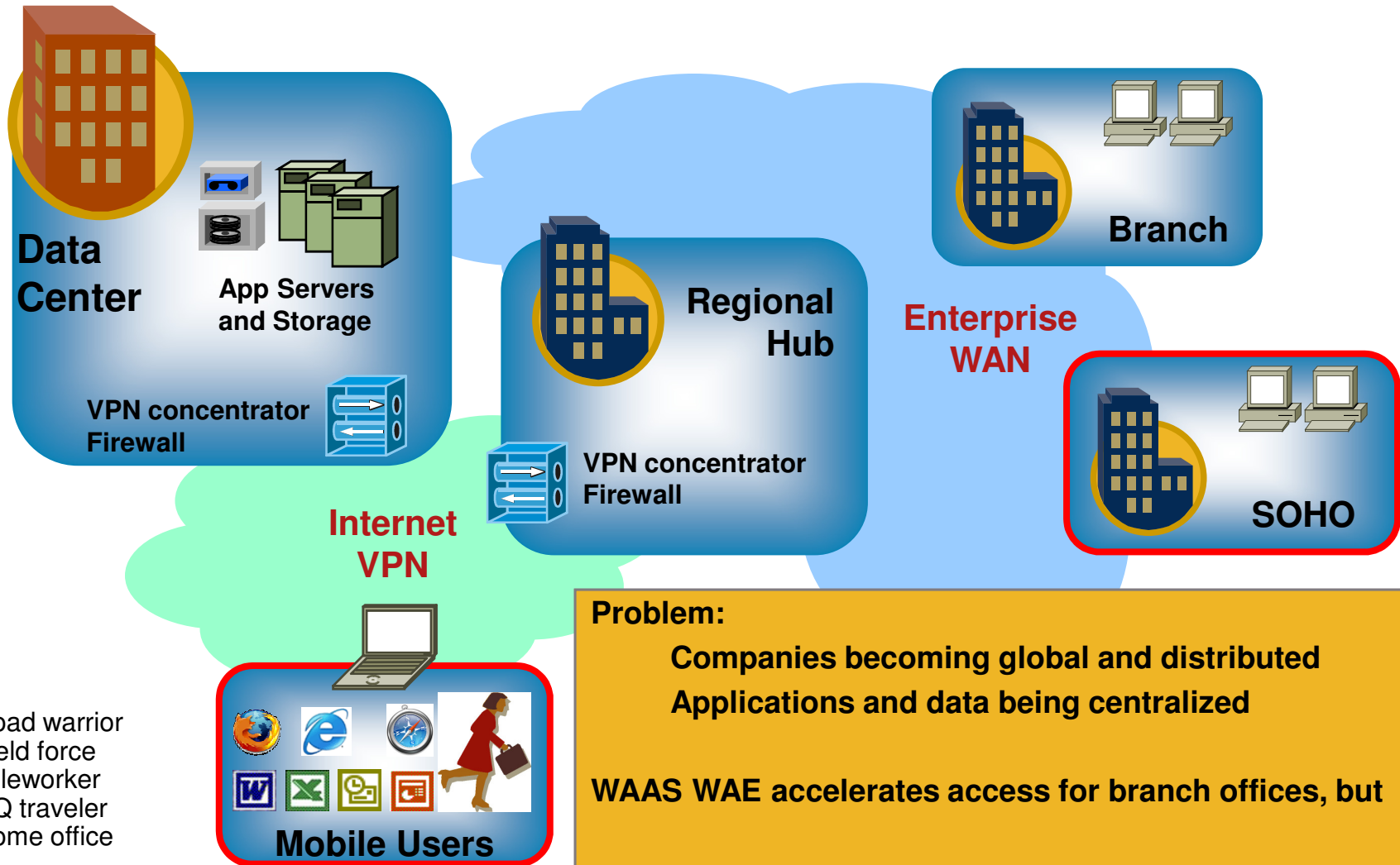
The **number of branch offices** is increasing 10% per year; remote worker productivity is compromised by the latency and sluggishness inherent in the wide-area environment

Source: Nemertes Research



Remote worker productivity is compromised by the latency and sluggishness inherent in the wide-area environment

Fast applications required from anywhere

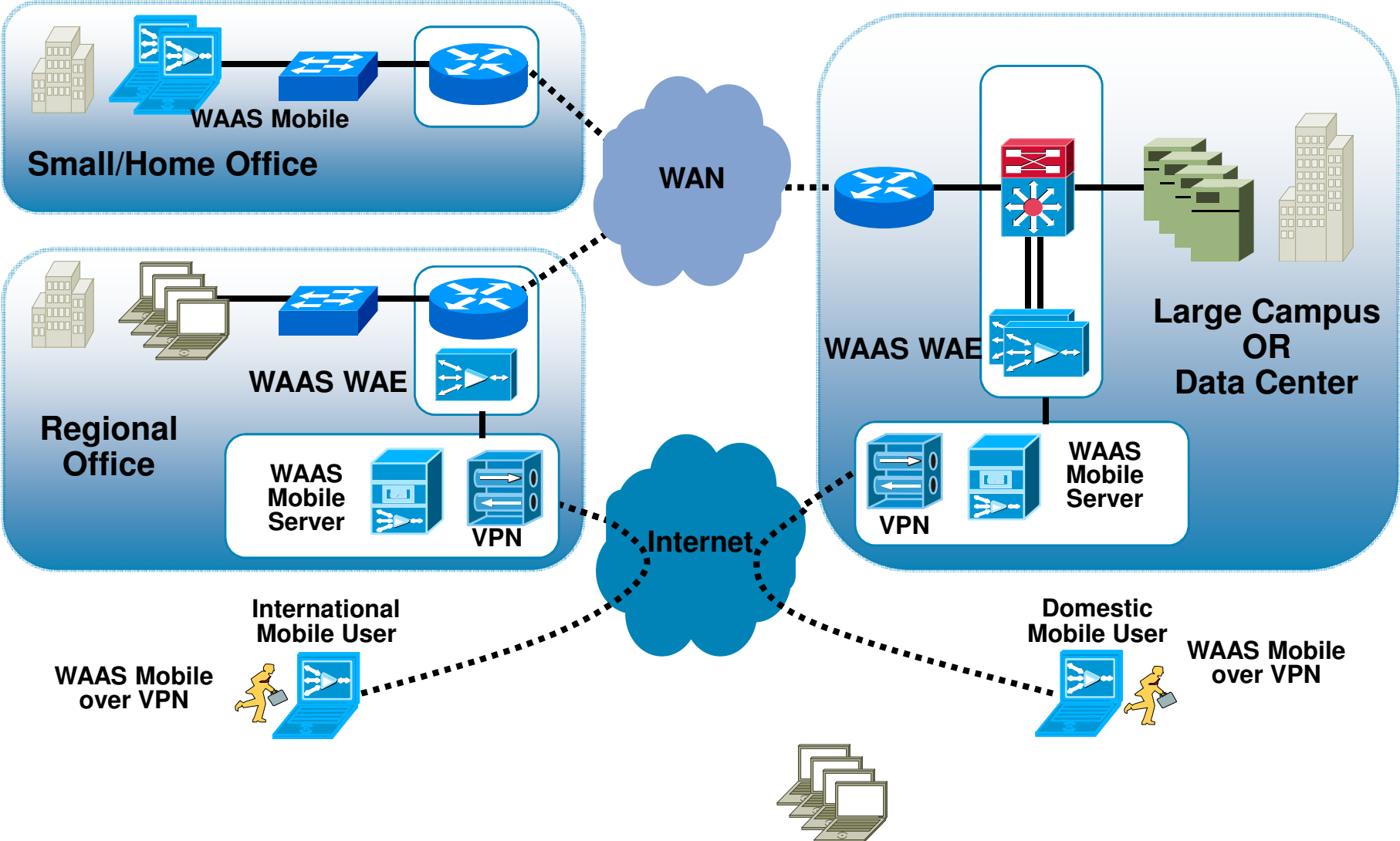


- Road warrior
- Field force
- Teleworker
- HQ traveler
- Home office

Mobile Workforce Has Unique Requirements

- Must work with very wide range of hardware, OS, and app infrastructures
 - Custom-built solution needed for PCs to ensure small CPU/Memory footprint
- Different class of support, interoperability & management requirements
 - “Open” Windows PC versus “controlled” appliance environment
 - Limited IT support resources available
 - Mobile software product issues results in a much higher volume of support calls
- Quality of the network connection lower than the corporate WAN
 - For connection types such as DSL, Wireless, Satellite, Dial-up, Cable, EVDO
 - Lower Bandwidth
 - Higher packet loss
 - Higher latency
 - “Time-slicing delay” in cellular wireless
 - Roaming through different network types each time you connect
 - Intermittent connectivity
- Results in worse performance for chatty enterprise applications
 - Web (HTTP and HTTPS), File Sharing (CIFS), and Email (MAPI)
 - Connections get dropped requiring login and restart of downloads

Cisco WAAS Mobile Solution Overview



Best of breed solution for Mobile Workers

- **Purpose-built for the PC/Laptop**

 - Results in better stability & reliability of on the Windows PC

 - Small PC footprint solution

 - Not an appliance software ported to Windows OS

 - Similar to Cisco's approach with VPN client

- **Industry leading performance**

 - Special encoders to improve first time download

 - Bi-directional, protocol independent acceleration of any size file or data object

 - Application protocol optimization for HTTP/S, CIFS, MAPI, FTP, SMTP, POP

 - Optimized performance for low quality, high latency networks

 - Interoperable with wide range of VPNs, including SSL web client VPNs

- **Lowest TCO**

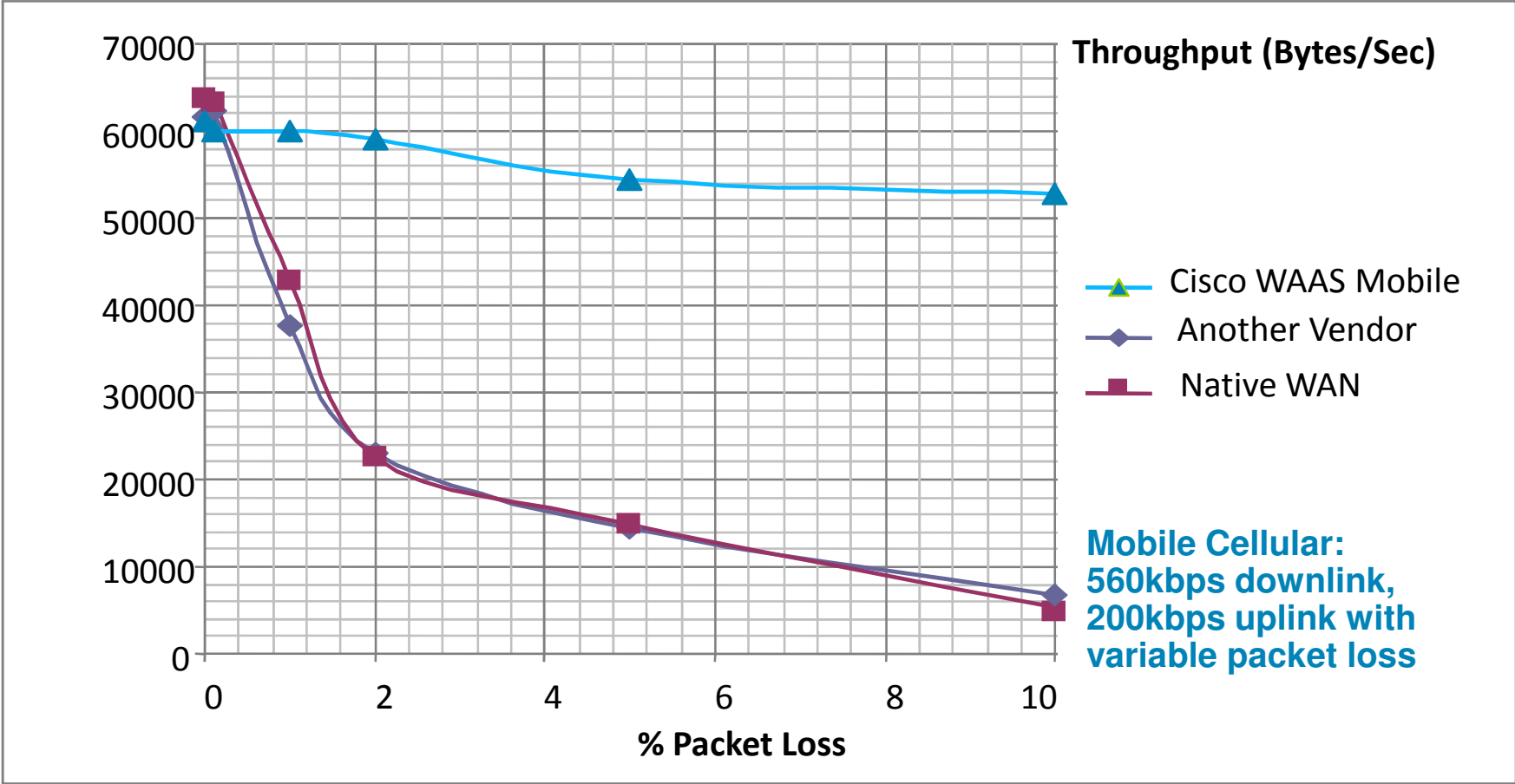
 - Deployable via standard enterprise software distribution systems

 - Centralized client configuration and software update management

 - 1-click troubleshooting

➔ **Results in the best mobile users' experience**

Highest Throughput In Mobile Environments



Transport Optimization

WAAS Mobile Performance

Application	Application Protocol	1 st Download Improvement*	Warm Start Improvement*
File Sharing	• Windows (CIFS/SMB)	3x-5x	5x-100x+
Email	• Outlook/Exchange (MAPI) • Lotus Notes / Domino • SMTP/POP3, IMAP	3x-5x 2x-4x 2x-4x	2x-50x+
Public/secure web browsing	• HTTP, HTTPS	2x-5x	2x-5x
Public/secure web download	• HTTP, HTTPS	2x-5x	5x-200x+
Data Transfer	• FTP	2x-4x	2x-50x+
Collaboration	• SharePoint	3x-5x	5x-200x+
ERP / CRM	• Oracle • SAP • Siebel	3x-5x	3x-5x
Other	• Any TCP-based app	2x-4x	2x-20x+

Top Performer in First Time Downloads

Top Performer in Second Time Downloads

Dramatic Reduction in Data on the Network

* Performance results are “typical” and based on user workload, compressibility of data, WAN characteristics and utilization. Actual results are often better.

Purpose-Built for PCs

- Extensively tested for interoperability

<p>Business Applications</p>	<p>VPN Software</p>	<p>Security</p>							
<p>Operating Systems</p>	<p>Wireless Networks</p>	<p>Deployment Software</p>							
<p>Protocols</p> <table> <tr> <td>HTTP</td> <td>SMTP/POP3</td> </tr> <tr> <td>HTTPS</td> <td>IMAP</td> </tr> <tr> <td>FTP</td> <td>Exchange</td> </tr> <tr> <td>SMB</td> <td>RDP</td> </tr> </table>	HTTP	SMTP/POP3	HTTPS	IMAP	FTP	Exchange	SMB	RDP	<p>Web Browsers</p>
HTTP	SMTP/POP3								
HTTPS	IMAP								
FTP	Exchange								
SMB	RDP								

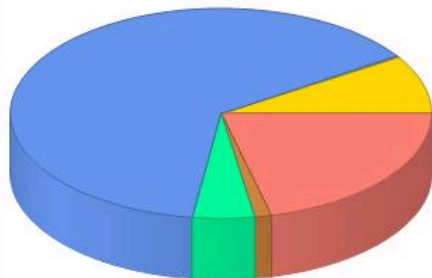
Centralized Acceleration Performance Visibility

- Example: Traffic Summaries

Traffic Summary

Application Summary

Last Refreshed: 7/14/2008 10:40:05 AM



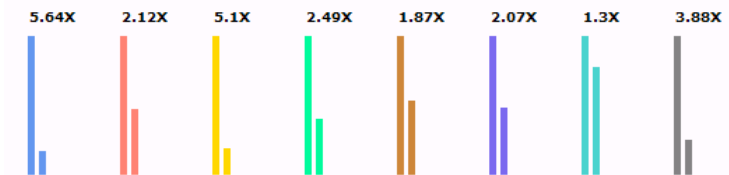
Total Uncompressed Data Processed: 104218 MB

Application	Percentage of Traffic (%)	Data Processed (MB)
SMB	63.52	66194.3
HTTP	21.15	22042.38
Other TCP	9.02	9404.81
MAPI	4.76	4963.93
HTTPS	1.28	1334.66
POP3	0.23	237.25
SMTP	0.04	40.72

Traffic Summary

Compression Summary

Last Refreshed: 7/14/2008 10:41:41 AM



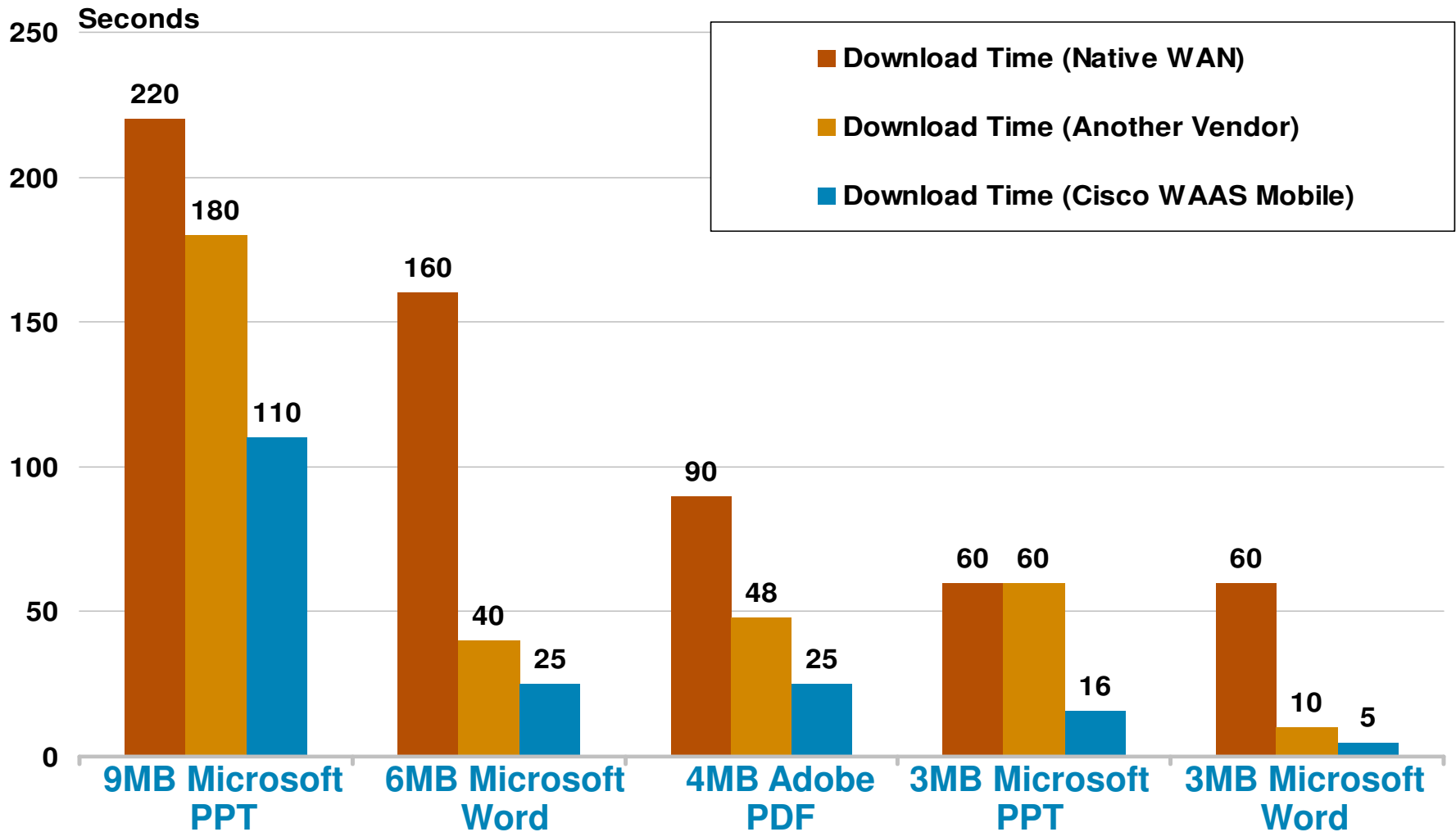
Compression Ratio By Application

Application	Normal Size (MB)	Compressed Size (MB)
SMB	66194.3	11746.61
HTTP	22042.38	10391.52
Other TCP	9404.81	1845.88
MAPI	4963.93	1991.19
HTTPS	1334.66	714.74
POP3	237.25	114.55
SMTP	40.72	31.37
Total	104218	26835.86

WAAS Mobile Features

- Unparalleled performance over low quality/high latency/high congestion/intermittent networks
 - Intelligent Data Transport (ITP) outperforms TCP and optimized TCP in challenging network environments
 - Persistent sessions feature maintains acceleration through network connection interruptions
- Unparalleled “cold” up/download performance
 - Advanced compression encoders optimize first time up/download
- Industry-leading “warm” up/download performance
 - Bi-directional acceleration achieved for up/down and down/up transfers
- Accelerates any size file
 - Protocol independent accelerator built on a scalable single-instance store
- Optimizes chatty application protocols
 - HTTP/S, CIFS, MAPI, FTP, SMTP, POP
- Dynamic bandwidth reservation for softphone VoIP

Download Time Comparison

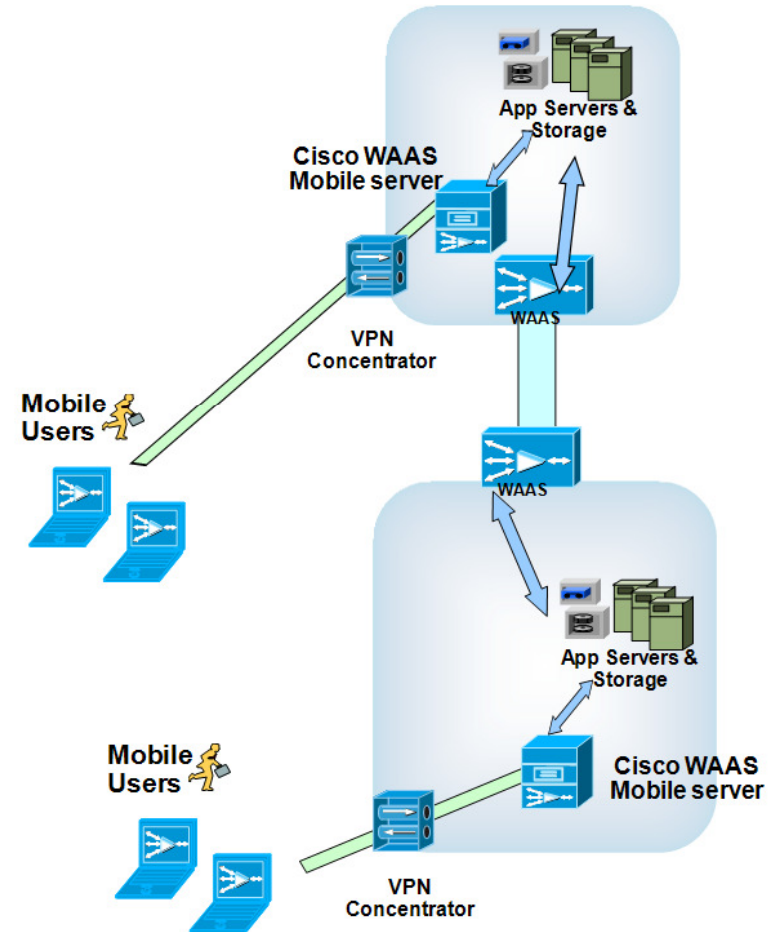


•512Kbps WAN Uplink and 768kbps WAN Downlink

•90ms Round Trip Delay with 2% Packet Loss

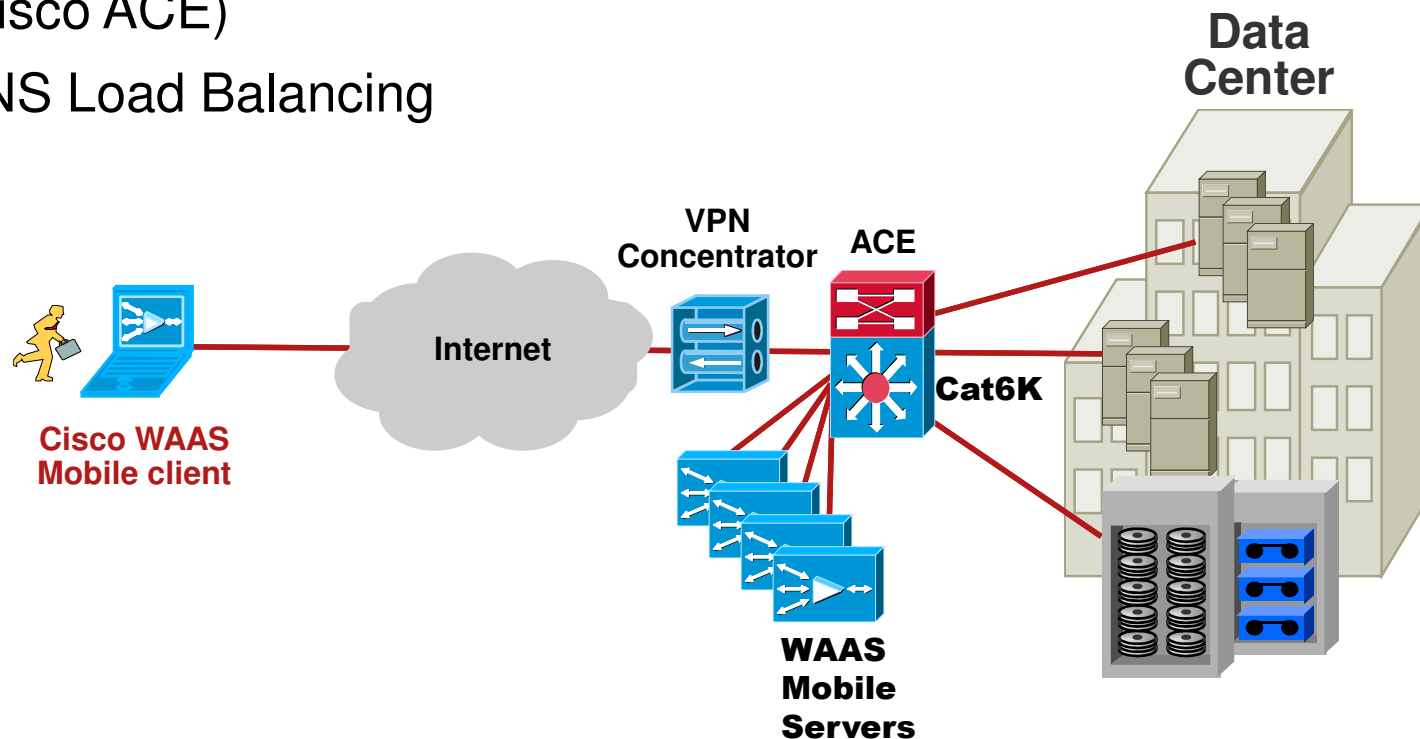
WAAS End-to-End Solution

- Deploy WAEs in data centers, large and medium-size branch offices
- Deploy WAAS Mobile Client to laptops and small and home offices
- At VPN aggregation points
Deploy WAAS Mobile Server
Also deploy WAE if VPN aggregation point not co-located with the data center



WAAS Mobile Servers with Cisco ACE

- Built In Load Balancing
- Standard Server Farm Load Balancing (Cisco ACE)
- DNS Load Balancing



ACE provides the highest scaleable solution supporting thousands of servers

Demo

The screenshot displays the Cisco WAAS Mobile Client Manager application window. The title bar reads "Cisco WAAS Mobile Client Manager" with a close button. The interface is divided into several sections:

- Connection Monitor:** Includes tabs for "Advanced" and "Support".
- Connection Status:** Shows "Server: 171.68.96.190" and "Connected".
- Statistics:** A table showing data for Sent and Received bytes, compressed bytes, and ratios. A "Clear Statistics" button is located below the table.
- Events:** A log window showing connection events and bandwidth/round-trip time measurements. A "Clear Events" button is located below the log.
- Buttons:** "Restart" and "Always On Top" (checkbox) are at the bottom left.
- Dialog Buttons:** "OK", "Cancel", "Apply", and "Help" are at the bottom right.

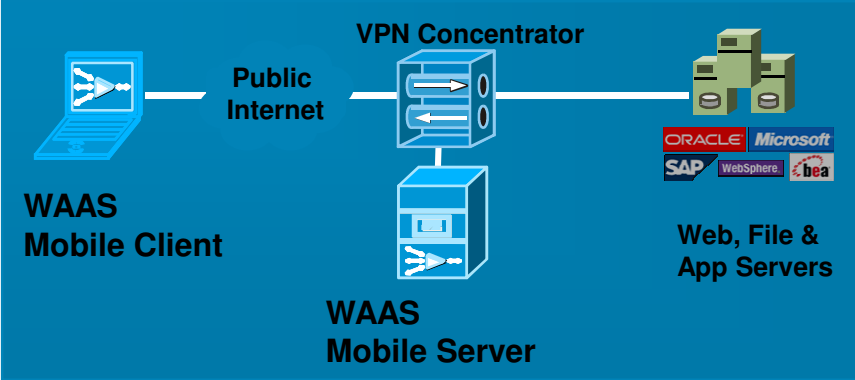
	Raw Bytes	Compressed Bytes	Ratio
Sent	21297	4506	4.73:1
Received	5620226	676503	8.31:1

Events Log:

```
2:08:39: 171.68.96.190: Connecting...
2:08:57: 10.61.1.54: Testing UDP connectivity
2:08:57: 10.61.1.54: Finalizing connection
2:08:57: 10.61.1.54: Server Ready!!!
2:08:59: Download bandwidth (bytes/sec) is 705870
2:08:59: Upload bandwidth (bytes/sec) is 59379
2:08:59: Round-trip time (msecs) is 78
```

Cisco WAAS Mobile Summary

1. Where It Sits



2. What It Does

Installs on Windows Desktop
Accelerates Mobile VPN connections over the Internet

3. Why It's Better

<p>Purpose Built for the Windows PC/Laptop</p>	<ul style="list-style-type: none"> ▪ Not an appliance software ported to Windows OS ▪ Similar to Cisco's approach with VPN client ▪ Results in reliability & stability on the Windows PC
<p>Industry-leading Performance</p>	<ul style="list-style-type: none"> ▪ Significantly higher throughput ▪ Better application performance ▪ Tested under a wide range of links
<p>Lowest TCO</p>	<ul style="list-style-type: none"> ▪ Best reliability, stability and troubleshooting tools reduce cost of support ▪ Centralized policy based management reduces deployment and support cost ▪ Integration with software distribution tools reduces deployment costs

