



The Impact of IT Virtualization on Applications and Networks



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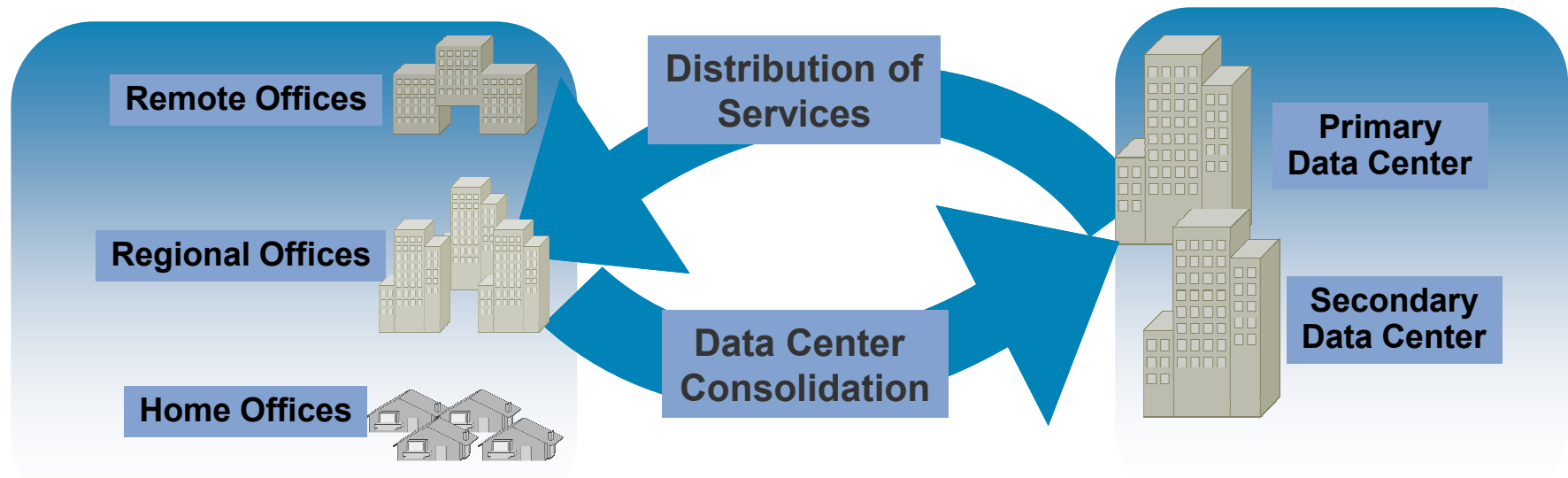
I/T's Application Delivery Dilemma

- **Scattered workforce requires distributed IT:**

Email, File, Print, Intranet
Customer Relationship Management
Enterprise Resource Planning

- **Cost control mandates centralized IT:**

Virtualization, CapEx & OpEx Control
Service Agility
Power, Cooling, Facilities



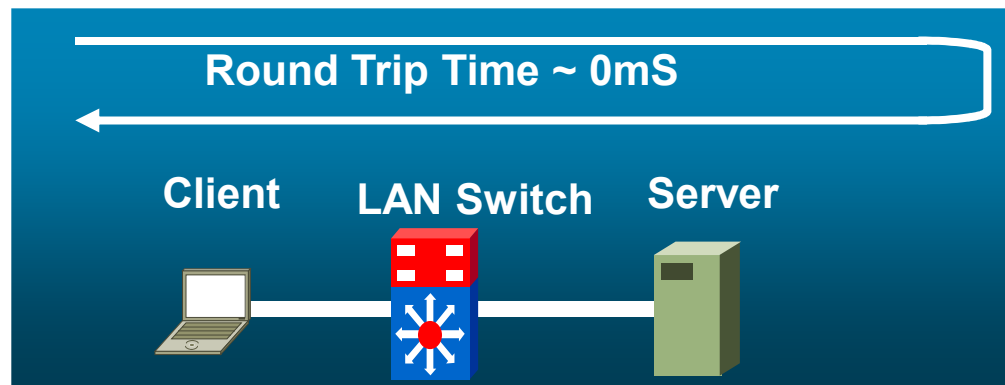
The Root Cause: WAN Limitations

- Applications and video work well on LAN:

High bandwidth

Low latency

Reliability



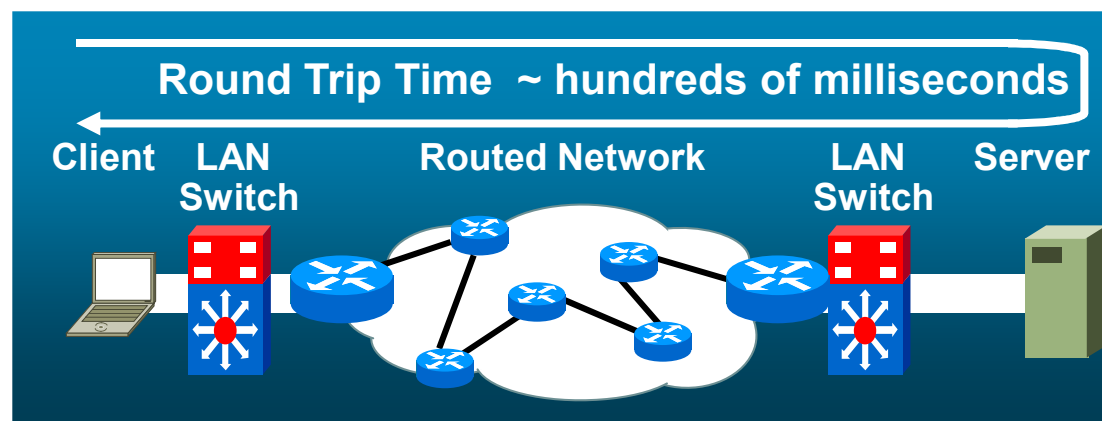
- But not on WAN:

Low bandwidth

Application chattiness

High latency

Frequent packet loss



WAN limitations cause poor application and video performance, and keep servers and storage in branch offices

The Solution: Make WAN Perform Like LAN



**TCP
Optimization**

Accelerates TCP performance over the WAN

**Data
Redundancy
Elimination**

Redundant data does not need to transit the WAN – reduces overall bandwidth usage

**App-Specific
Acceleration**

Optimizes application protocols, such as MAPI, CIFS, NFS, HTTP, Print – eliminates protocol inefficiencies

**Video delivery
optimization**

Streamlined video delivery ensures one copy of live streaming transits the WAN

Cisco WAAS Solution Elements



WAAS Software:

- WAN optimization for branch users
- Integrated video delivery
- Windows Server on WAAS (WoW)
- Data replication acceleration



WAAS Mobile Software:

- WAN optimization for mobile users

WAAS Hardware:

- Wide Area Application Engine (WAE)
- Wide Area Virtual Engine (WAVE)
- Integrated Services Router Modules



Desktop Virtual Computing Architectures and Players

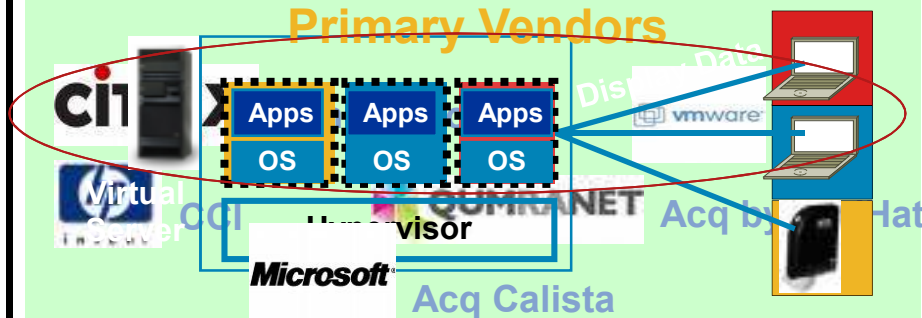
OS Desktop

Virtual Desktop Streaming Primary Vendors



\$200M by 2011 (30% 5-yr CAGR)

Virtual Desktops Primary Vendors



\$1.7B by 2011 (88% 5-yr CAGR)

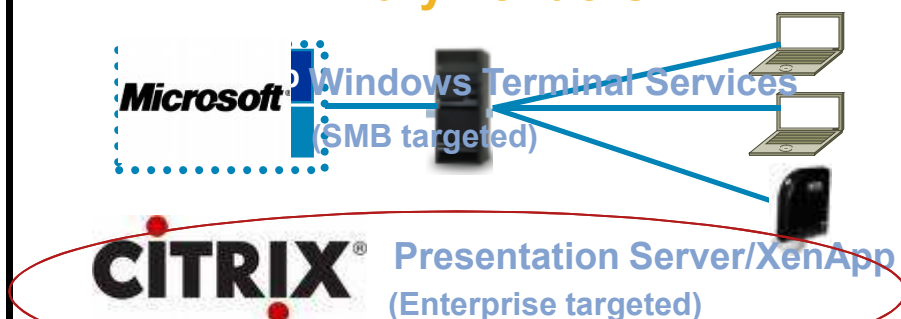
Application

Application Streaming Primary Vendors



\$200M by 2011 (42% 5-yr CAGR)

Terminal Services Primary Vendors



\$2.2B by 2011 (12% 5-yr CAGR)

Client-Based Computing

Server-Based Computing

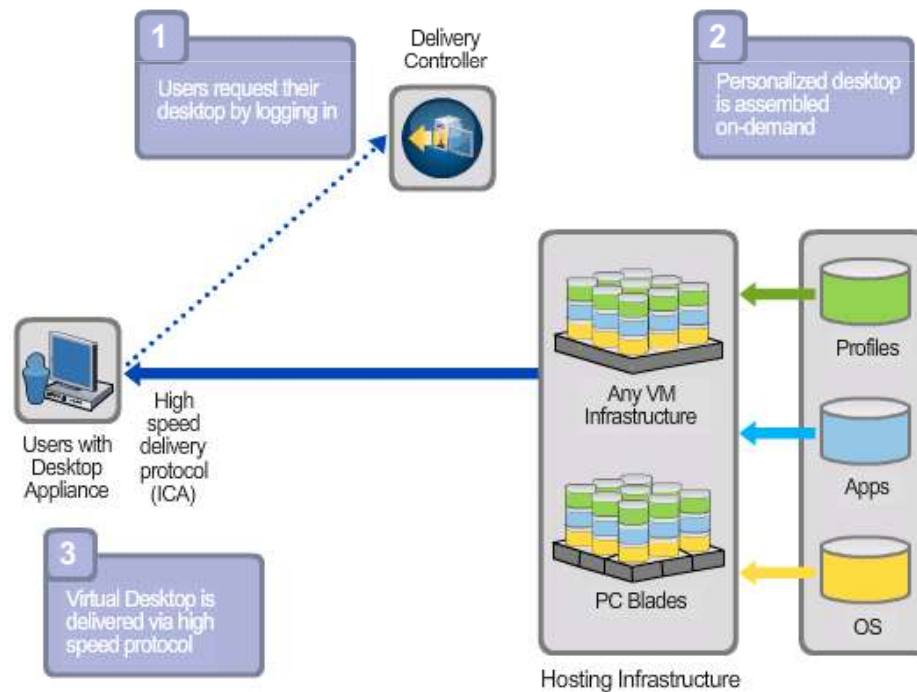
VMware View 3 Architecture

- **Virtual desktops running on ESX in secured data center**
- **View Manager manages resources and provides secure access to clients**
- **Clients access VMware View Desktops via**
 - **Web Browser**
 - **VDM Client**
 - **Thin Client**
- **Virtual desktop delivered via RDP natively or over HTTPS**



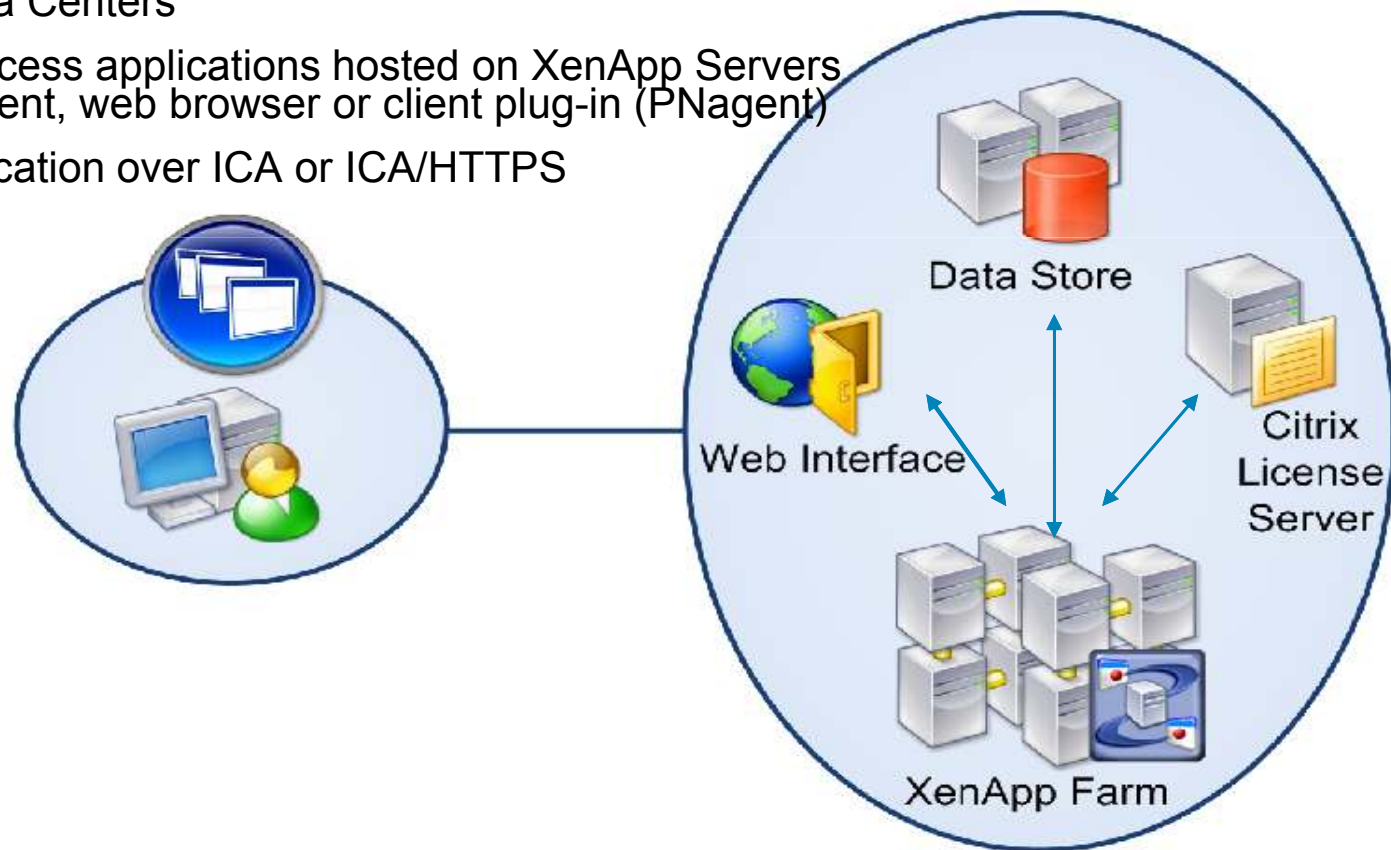
Citrix XenDesktop Architecture

- Clients access Virtual Desktops hosted in a virtualized environment
 - Web Browser (ICA over HTTP/HTTPS)
 - Thin Client (ICA)
 - PNagent
- Virtual Desktop delivered over ICA



Citrix XenApp Architecture

- Formerly known as Citrix MetaFrame Server and Presentation Server
- Applications are hosted on XenApp servers deployed in the Data Centers
- Clients access applications hosted on XenApp Servers via thin client, web browser or client plug-in (PNagent)
- Communication over ICA or ICA/HTTPS



Virtual Desktop Challenges

End-user performance over the WAN

Limited bandwidth and high latency over WAN links



Printing Challenges

Poor Print Performance over the WAN



High bandwidth consumption

Native compression benefit is limited to single user
Print traffic consumes large amount of WAN bandwidth and results in poor performance.



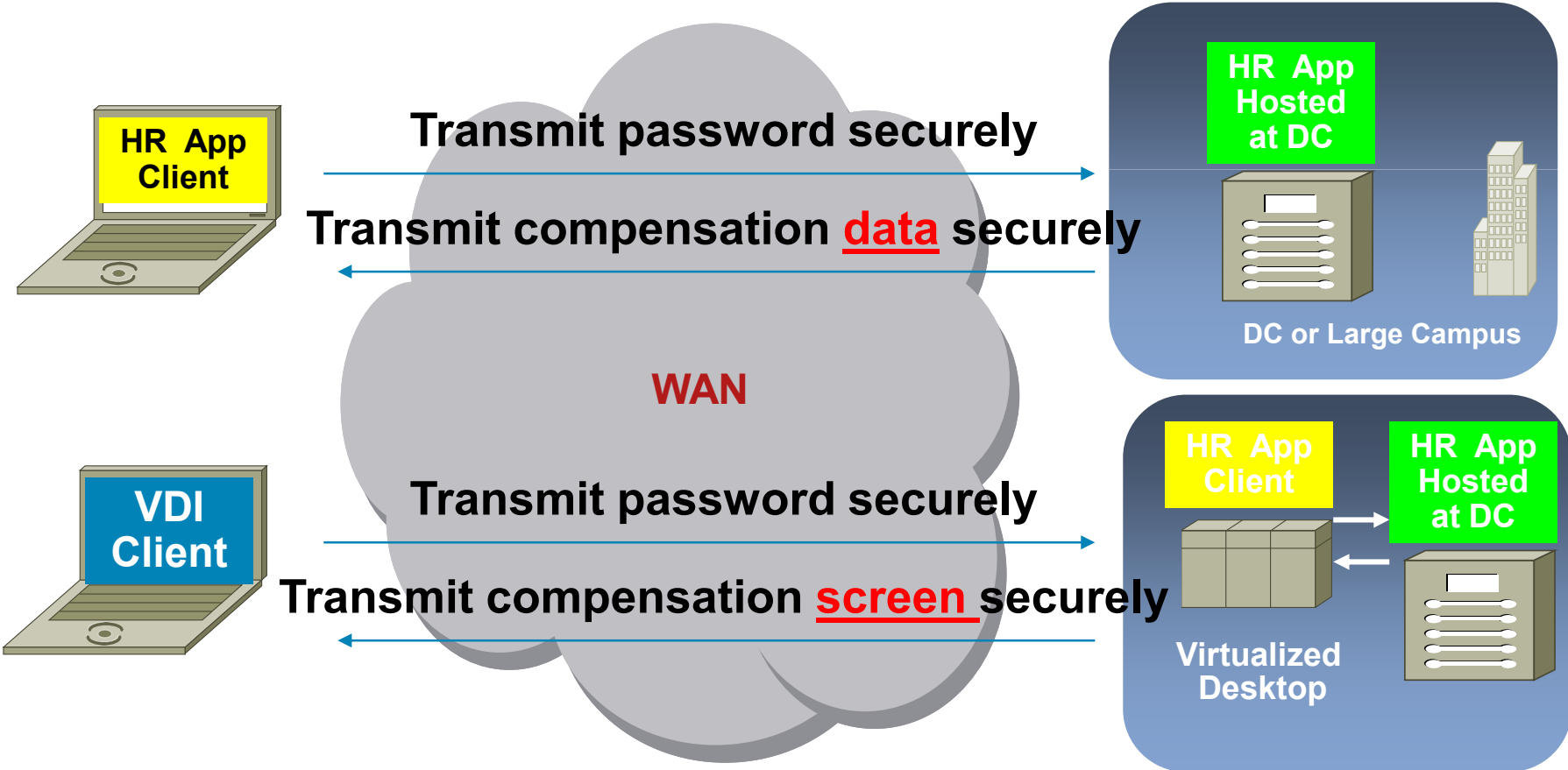
High cost of scalable deployments

T1 link supports only 5-6 users for VDI application, 10-14 users for XenDesktop application
Requires bandwidth upgrade to support large scale deployments



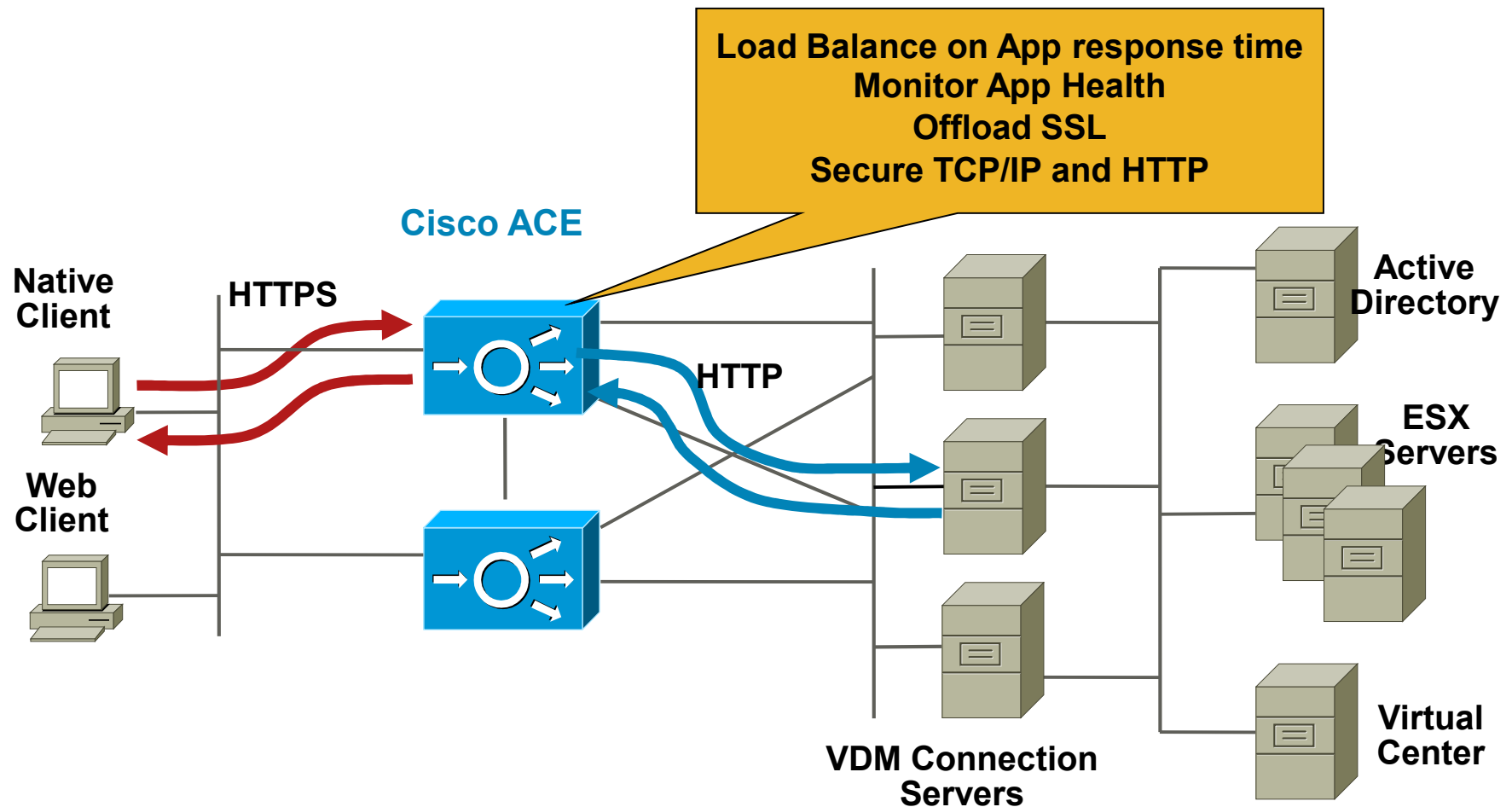
Virtual Desktop connections need to be encrypted to preserve existing security levels

- Traditionally, sensitive application data is encrypted over the WAN
- With, VDI Keyboard/monitor traffic may still need encryption
Apps are executed locally at Data-Center

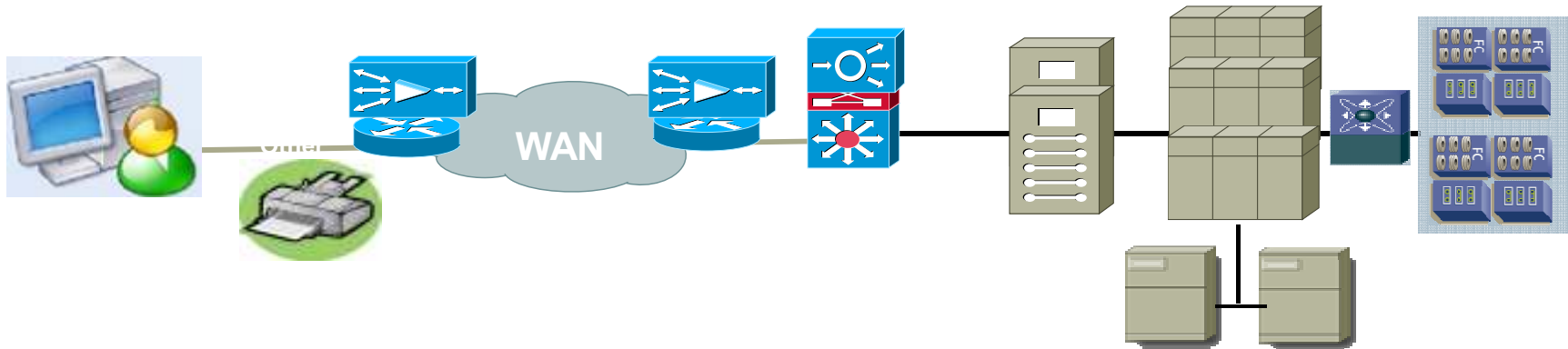


Cisco ACE for View-3 (Virtual Desktop Architecture)

Scaling, Server Offload, Integrated Security



WAAS Solution for Virtual Desktop



- Leverage data redundancy across users at the same location, increase the scalability of virtual desktop delivery applications
 - More effective compression than native protocol – results in bandwidth saving
 - Native compression and encryption needs to be turned off
- Reduced application response time, improve user experience through TCP optimization
- Optimize print traffic to further reduce WAN bandwidth consumption
- Provide acceleration for encrypted virtual desktop traffic while preserving security trust model with SSL AO

<http://www.cisco.com/go/optimizevmware>

WAAS Virtual Desktop Solution Cisco Advantages

- Vendor validated solution with VMware
- Preserve security, while providing optimized access with SSL AO
- Strategic partnership with top application vendors such as Microsoft and VMWare

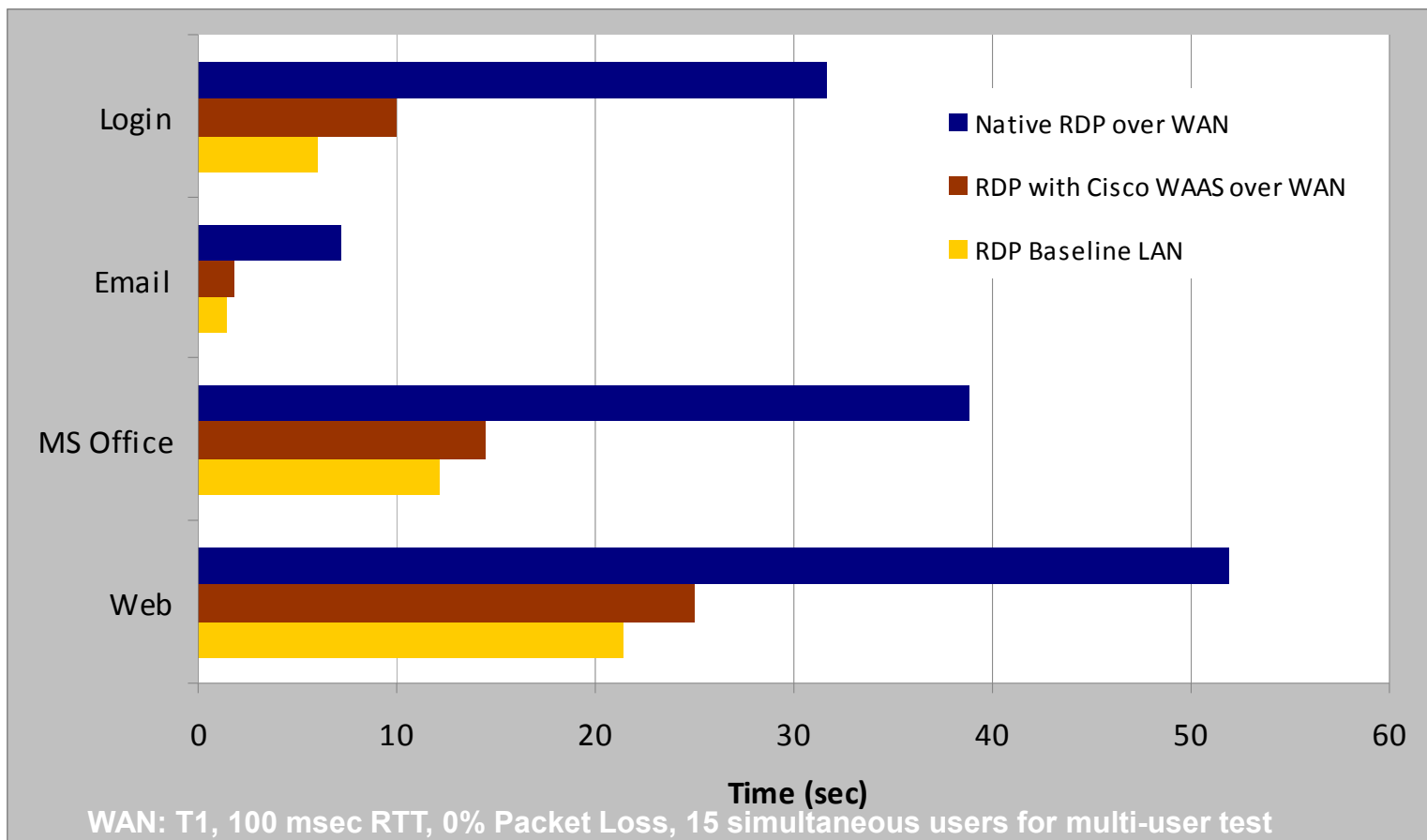
The following hotfix was only possible because Cisco brought together the two vendors (VMware and Microsoft) to resolve a limitation in combined solution for a large financial organization for military personnel -

Microsoft Windows XP 32-bit version requires a hotfix to apply these settings which can be downloaded from Microsoft website at <http://support.microsoft.com/default.aspx?scid=kb;EN-US;956072>

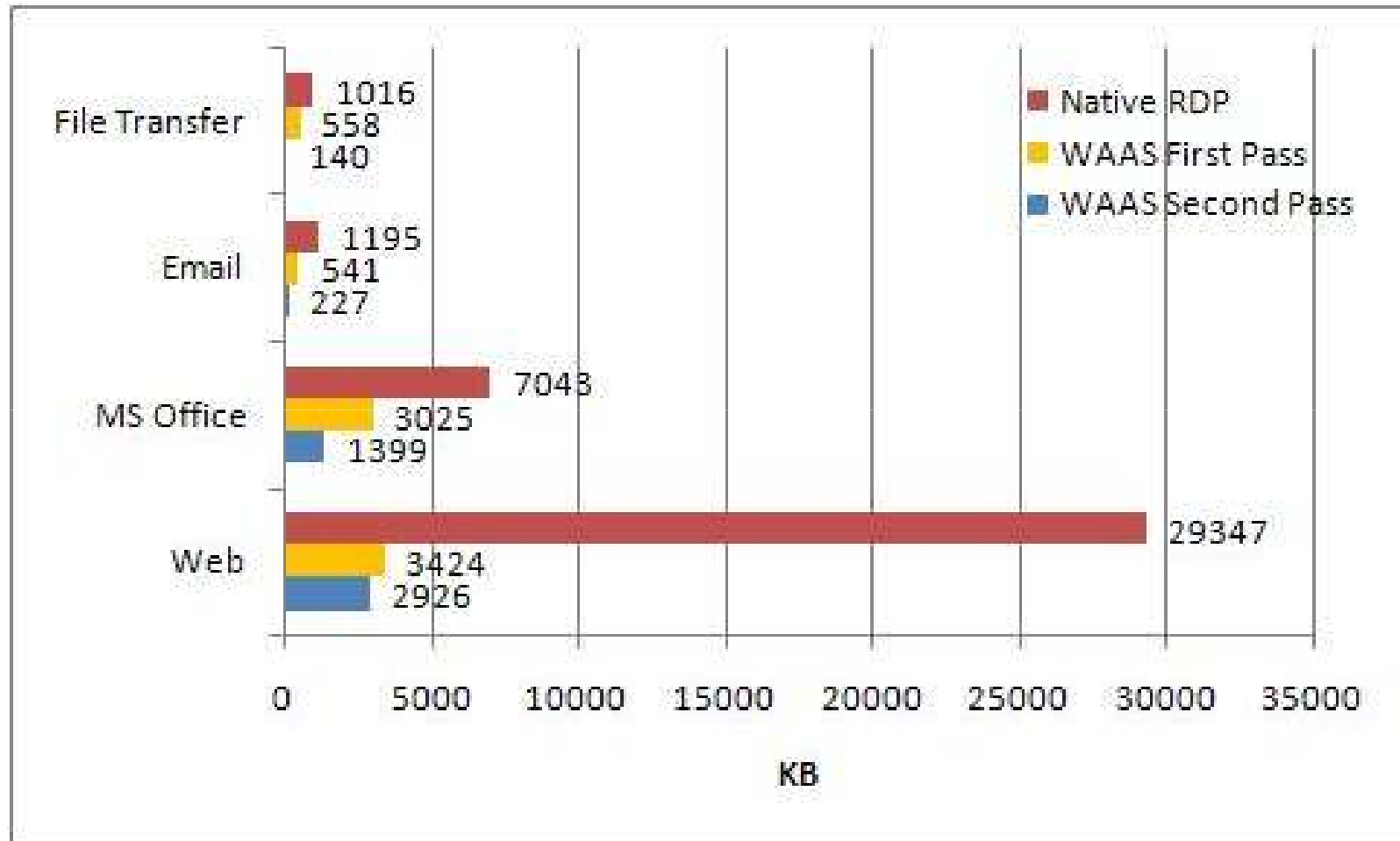
- Best Performance for Virtual Desktop optimization

WAAS Solution Benefits for VMware Virtual Desktop

- Secure VDI accelerated up to 70%
- Bandwidth requirements reduced by up to 2X-4X
- Number remote VDI users scaled by up to 4X
- Print performance over the WAN improved by up to 80%



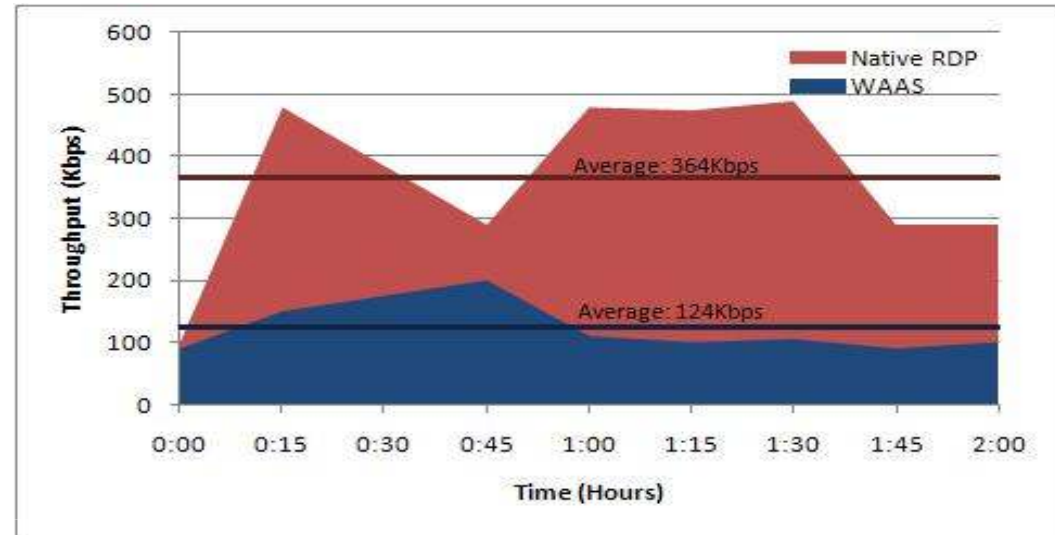
Application Bandwidth Comparison



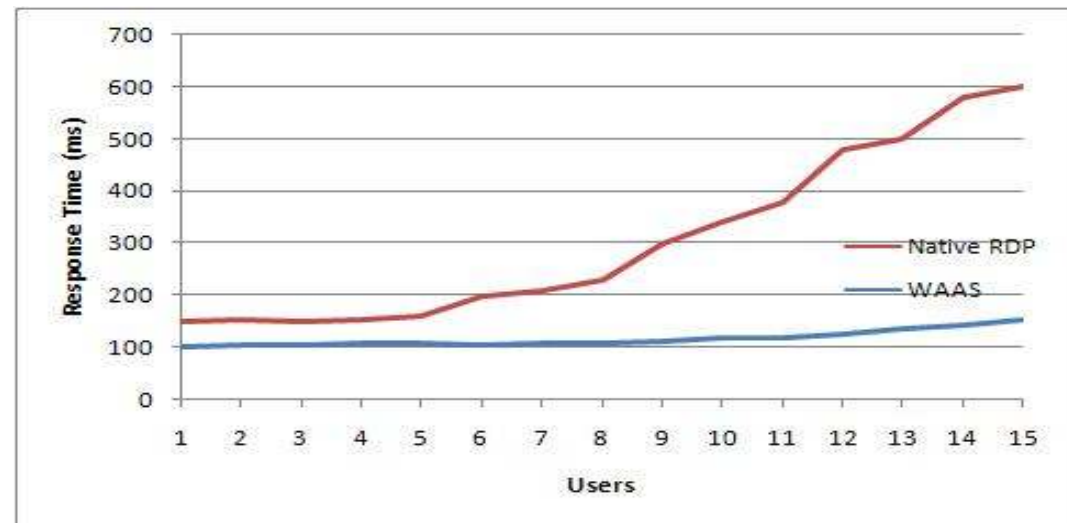
WAN: T1, 100 msec RTT, 0% Packet Loss

WAAS Increases Scalability of # Users by 2X-4X

- A Single RDP session consumes > 300 Kbps
- Less than 5-6 users supported on a T1 link
- WAAS Reduces B/W consumption by 3X

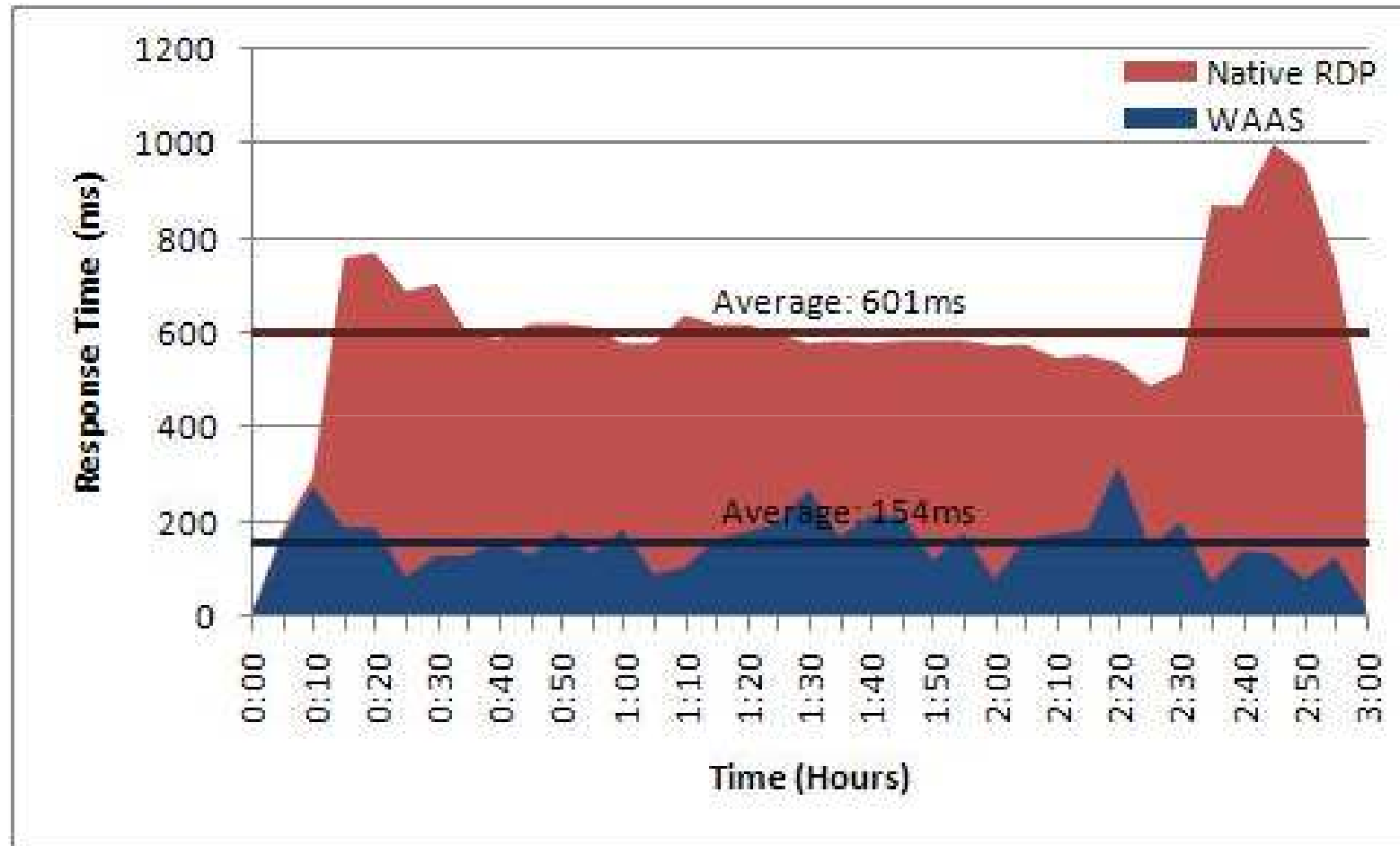


- WAAS Increases number RDP users on WAN by 2x-4x
- Accelerate your VDI deployments



WAN: T1, 100 msec RTT, 0% Packet Loss

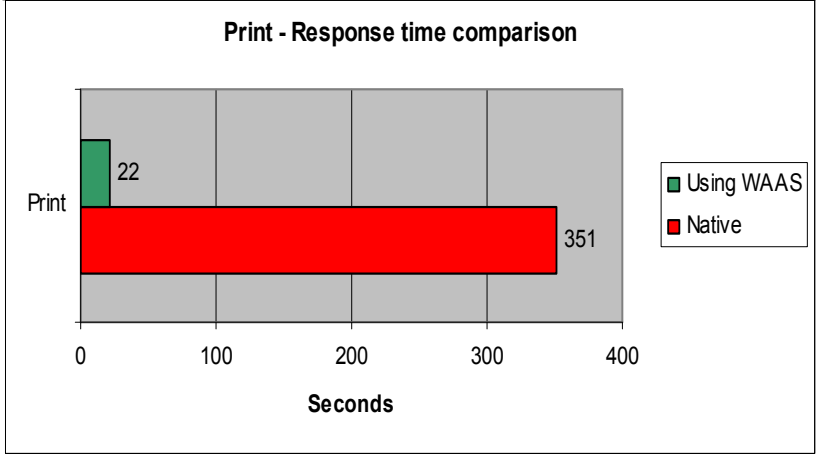
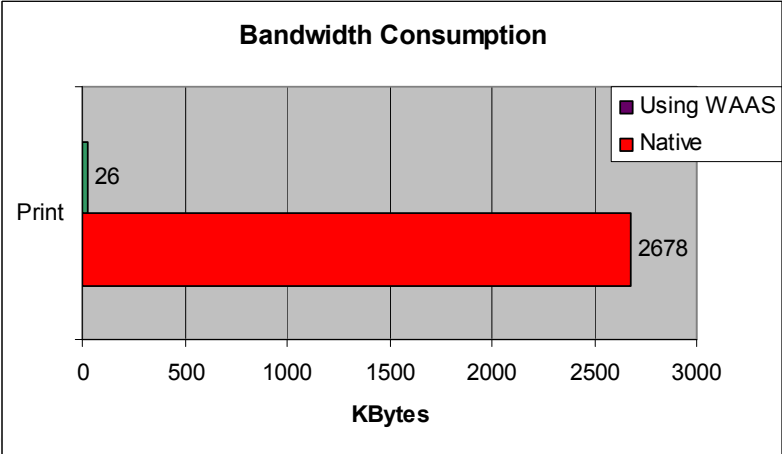
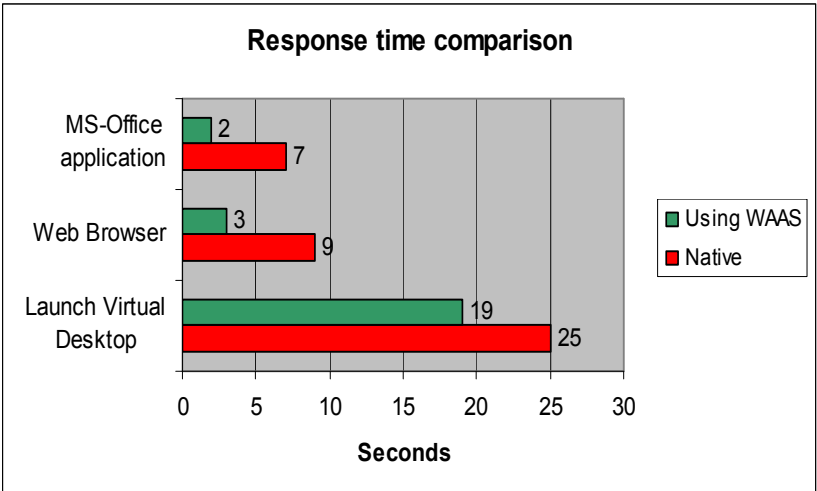
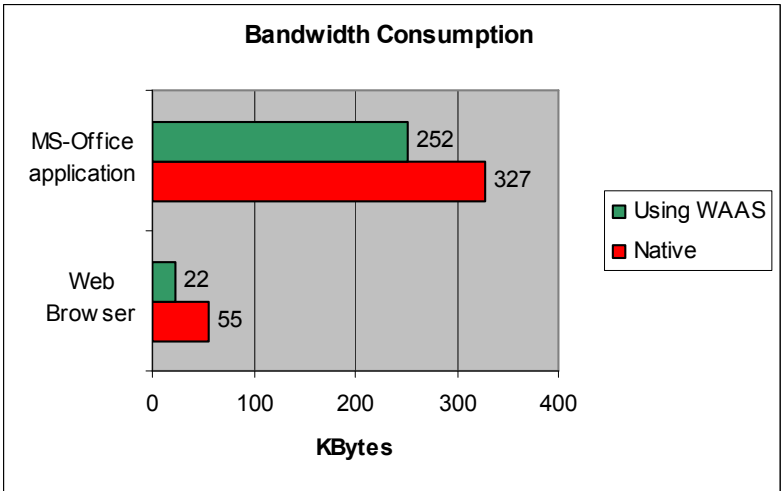
Application Response Time Comparison



WAN: T1, 100 msec RTT, 0% Packet Loss, 15 simultaneous users

WAAS Solution Benefits for Citrix's Virtual Desktop

- Improve the productivity of virtual desktop users
- With Print AO WAN b/w consumption reduced up to 98%
- Reduced WAN bandwidth consumption up to 60%
- Increase number of branch users by 2x



WAAS Optimization for Virtual Desktop Applications

Techniques	How it helps with this application?	Benefits
TFO	<ul style="list-style-type: none"> • Smoother, more consistent response time on the virtual desktop session, reduce the occurrences of application hang-ups or freezing. 	<ul style="list-style-type: none"> • Improved user experience • Efficient use of bandwidth
DRE	<ul style="list-style-type: none"> • ICA/RDP screens contains redundant data, highly compressible by DRE • Redundancy among different users at the same location • Significantly reduce print spool traffic 	<ul style="list-style-type: none"> • Higher scalability • Reduce bandwidth consumption per user
LZ	<ul style="list-style-type: none"> • Virtual desktop screens are highly compressible 	<ul style="list-style-type: none"> • Further reduction on bandwidth consumption
Print AO	<ul style="list-style-type: none"> • Optimize virtual desktop printing with centralized print server 	<ul style="list-style-type: none"> • Reduce print size, faster printing
SSL AO	<ul style="list-style-type: none"> • Enable full optimization while maintaining security trust model 	<ul style="list-style-type: none"> • Enable Encryption offload with faster response time

