CISCO BORDERLESS NETWORKS

Enabling the Borderless Organization
Agenda

Borderless Networks Performance Challenges

Performance Optimization for Borderless Networks

Cisco WAAS and WAAS Mobile
Borderless Networks
Architecture for Agile Delivery of the Borderless Experience

Borderless End-Point/User Services
- Mobility
- Workplace Experience
- Video

Securely, Reliably, Seamlessly: AnyConnect

Borderless Network Services
- Mobility: Motion
- Green: EnergyWise
- Security: TrustSec
- Application Performance
- Video: Medianet

Infrastructure
- Switching
- Routing
- Wireless
- Security
- WAAS
Is My Network Borderless?

Do I have a consistent access policy architecture across my network for all users and devices?

Can mobile devices access my network transparently and securely?

Can my network deliver real time collaboration experience?

Am I using my network to reduce my energy cost?

Can I secure my assets on premise and in the cloud?

Can my network optimize performance of applications anywhere, anytime?

Is my network ready for current and future regulatory requirements?
The Transformation
New Borderless Enterprise

Anyone

Employee, Partner, Customer

Anything

Business and Personal Applications
Person / Device, Device / Device

Borderless Experience

Work, Home, On the Go…

Anywhere

Always Works, Instant Access, Instant Response

Anytime
“Bordered” IT Architectures Overlaid App Performance on the Infrastructure

Business Requirements
- Basic Collaboration
- Limited Mobility
- Some apps, some locations

IT Architecture
- Limited centralization
- Multiple servers at branch-offices
- Basic link optimization
Borderless IT Architectures Need App Performance Built Into the Network

Business Requirements
- Any-Any Collaboration
- Mobile workforce
- Any app, anywhere

IT Architecture
- Centralized IT
- Low-footprint branches
- All links highly optimized

Pervasive Performance
Visibility
Optimization
Service Virtualization
Borderless Performance: System Elements

Visibility And Control
- Gain visibility into apps and network
- Prioritize business-critical apps
- Enable optimization decisions

Optimization And Acceleration
- Optimize network resources
- Accelerate applications
- For remote and mobile users

Service Virtualization
- Network-Integrated app hosting
- Services “on-demand” – no truck-rolls
- Cloud-ready
Borderless Performance System Elements: Visibility & Control

- Discover network traffic with application-level insight
  - Deep packet visibility into web traffic
- Monitor application usages and anomalies
- Build reporting for capacity planning, compliance
- Prioritize business-critical apps via bandwidth prioritization, optimized routing and P2P control

Application Visibility, Control and Reporting Across Networks

**Discover Network Applications**
- NBAR, SCE
- L7 visibility (Web2.0, P2P, IM...)

**Monitor Application Perf**
- NetFlow, IP SLA, NAM, Medianet
- Video monitoring

**Analyze App Trending**
- QPM, Business Intelligence etc
- WAAS CM
- Partner Ecosystem

**Enforce Application Control**
- Adv QoS
- Perf Routing
- P2P Control
- Identity Integration
Borderless Performance System Elements: Optimization And Acceleration

Policy Integration
- Transparent integration w/Netflow, QoS policies
- Policy-based mobile to land N/W handoffs
- Auto-discovery of optimization peers

Network Optimization
- Efficient WAN utilization
- Improved WAN resiliency
- Rich media ready N/W

App Acceleration
- App-fluent acceleration
- Any app
- App-vendor validated

App-Friendly Acceleration

<table>
<thead>
<tr>
<th>Category</th>
<th>Applications</th>
<th>2X</th>
<th>5X</th>
<th>10X</th>
<th>25X</th>
<th>50X</th>
<th>100X+</th>
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<tr>
<td>File Sharing</td>
<td>Windows, UNIX</td>
<td>2-20X Avg</td>
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<td></td>
<td></td>
<td>&gt;100X Peak</td>
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<td>Email</td>
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<td>2-6X Avg</td>
<td>20X Peak</td>
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<td>Web and Collaboration</td>
<td>Windows, WebSphere</td>
<td>2-10X Avg</td>
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<td></td>
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<td>100X Peak</td>
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<td>2-20X Avg</td>
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<td></td>
<td>&gt;100X Peak</td>
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<td>Enterprise Applications</td>
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<td>Backup Applications</td>
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<td></td>
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<td></td>
<td>50X Peak</td>
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</table>
Borderless Performance System Elements: Service Virtualization

- Centralize most IT, host select services in the branch
  - Windows services
  - Custom apps
- Gain local performance for select services
- Deploy optimization on-demand (policy-based)
- Optimize cloud applications such as Webex

Improve app performance and reliability without server-sprawl

• Virtualized Branch Services hosted in the Network
• On-demand provisioning of Performance
• Cloud Optimization
• Business Continuity
Borderless Performance: Building the System

Visibility And Control
- Switching - Cat 3K, 4K, 6K
- ISR G2
- Netflow, NBAR, IP SLA
- QoS, Perf Routing
- ASR 1000 SCE
- Reporting and Monitoring
- NAM
- WAAS CM

Optimization & Acceleration
- WAAS
- WAAS Mobile
- ISR G2

Branch Service Virtualization
- ISR G2 w/SRE
- Webex on ASR
- AXP on ISR G2
- WAAS Virtual Blades
WAAS Overview
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

- **Cisco WAAS**
  - Branch Users
  - Mobile Users
  - WAN in LAN Speed
  - Data Center

**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
WAAS Product Line

Location & Size*

Data Center & Campus Platforms
- WAE-7371

Branch Office & Mobile User Platforms
- WAVE-474
- WAVE-574
- WAVE-274
- NME-522
- NME-502
- NME-302
- WAAS Mobile

Branch up to 400 users*
- Branch: Up to 150 users*
- Branch: Up to 50 users*
- Branch: Up to 20 users*

Mobile User (Branch of 1)

List Price w Enterprise License
- $6.5K
- $10K
- $12.5K
- $22K
- $59K
- $135K

* Indicative sizing only. Please refer to WAAS sizing guidelines to size specific to customer requirements.

* NME-302 - offers TCP Optimization & Compression only. It does not support Enterprise License Features.
### Improve Remote User Productivity

**Application Acceleration**

| Applications           | CIFS  | NFS  | Exchange | HTTP | HTTPS | System Center Configuration Manager | Microsoft | Oracle | SAP | System Center Data Protection Manager | Legato | Veritas | System Center Data Protection Manager | Legato | Veritas | EMC SRDF | EMC IP Replicator | NetApp SnapMirror | Data Domain | Double-Take | Veritas Vol Replicator |
|------------------------|-------|------|----------|------|-------|--------------------------------------|-----------|-------|-----|--------------------------------------|--------|--------|--------------------------------------|--------|--------|----------|---------------------|------------------|-------------|-------------|-----------|---------------------|
| File Sharing           |       |      |          |      |       |                                      |           |       |     |                                    |        |        |                                      |        |        |           |                     |                  |             |             |           |                     |
| Response Time Reduction| Typical Reduction | 20% | 50% | 90%  | 80%  | 95%                                  | 90%       | 85%  | 90% | 85%                                |        |        |                                      |        |        |           |                     |                  |             |             |           |                     |
|                        | Maximum Reduction | 99% |     |      | 90%  |                                      | 90%       |      |     |                                    |        |        |                                      |        |        |           |                     |                  |             |             |           |                     |

**Typical Reduction**

- CIFS: 20%
- NFS: 50%
- Exchange: 90%
- HTTP: 80%
- HTTPS: 95%
- Microsoft: 90%
- Oracle: 85%
- SAP: 90%
- System Center Data Protection Manager: 85%
- Legato: 90%
- Veritas: 85%
- EMC SRDF: 99%
- EMC IP Replicator: 99%
- NetApp SnapMirror: 99%
- Data Domain: 99%
- Double-Take: 99%
- Veritas Vol Replicator: 99%
Cisco WAAS Advantages

Application Vendor Validated
- Architecture leadership and joint R&D
- Lower risks via technology licensing
- Ease of integration and support escalation

Network Integrated
- Ease of operations via network transparency
- Accurate application SLA monitoring
- Secure acceleration
- Better with VoIP and video

Cost of Ownership Minimized
- Minimized device complexity via router integration
- Integrated high quality video
- Reduced data center server OpEx via offload technology
WAAS Mobile Overview
Fast applications required from anywhere

Problem:
- Companies becoming global and distributed
- Applications and data being centralized

WAAS appliances accelerate access for branch offices

But...

Mobile and small office workers require similar solution.
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 and interoperability with PC apps
- Different class of support, interoperability & management requirements
  - “Open” Windows PC versus “controlled” appliance environment
  - Limited IT support resources available
- 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
  - 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
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
  - Optimized for mobile workers – VoIP quality preservation, persistency while roaming, thin client (RDP/ICA) acceleration
  - Unparalleled performance for low quality, high latency networks (e.g., 3G)
  - Application protocol optimization for HTTP/S, CIFS, MAPI, FTP, SMTP, POP
  - Bi-directional, protocol independent acceleration of any size file or data object

- 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
## Cisco WAAS Mobile Performance

<table>
<thead>
<tr>
<th>Function</th>
<th>Application</th>
<th>1&lt;sup&gt;st&lt;/sup&gt; Time Improvement*</th>
<th>Subsequent Improvement*</th>
</tr>
</thead>
<tbody>
<tr>
<td>File Shares</td>
<td>Windows shares/ NAS</td>
<td>3x-5x</td>
<td>5x-100x+</td>
</tr>
<tr>
<td>Email</td>
<td>Outlook/Exchange, Lotus Notes / Domino, SMTP/POP</td>
<td>3x-5x, 2x-4x, 2x-4x</td>
<td>2x-50x+</td>
</tr>
<tr>
<td>Web browsing</td>
<td>Internet access</td>
<td>2x-5x</td>
<td>2x-5x</td>
</tr>
<tr>
<td>Collaboration</td>
<td>SharePoint, Documentum, Interwoven, Oracle</td>
<td>3x-5x</td>
<td>5x-200x+</td>
</tr>
<tr>
<td>ERP / CRM</td>
<td>Oracle, SAP, Siebel</td>
<td>3x-5x</td>
<td>3x-5x</td>
</tr>
<tr>
<td>Data Transfer</td>
<td>FTP</td>
<td>2x-4x</td>
<td>2x-50x+</td>
</tr>
<tr>
<td>Other</td>
<td>Any TCP-based app</td>
<td>2x-4x</td>
<td>2x-20x+</td>
</tr>
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</table>

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

- Amazon EC2
- MS SharePoint
- Terremark
- SalesForce.com

Challenges
- Poor app performance
- Cloud deployment
- Security

WAN = Latency

Mobile Users
Cisco WAAS: WAN Like LAN

- Deploy WAAS seamlessly on virtualized cloud Infrastructure
- SaaS apps optimized without changes to cloud
- Results: Security + Optimization

WAAS Optimizes Cloud Access For Branch And Mobile Users
Introducing Cisco WAAS Mobile for Clouds!

New

- Seamless cloud acceleration
  - In virtualized infra, “cloud-ready”

- Cloud-agnostic
  - Amazon, Terremark, Force.com…

- Securely accelerate

Benefits

- Lower costs of cloud adoption
  - 70%+ bandwidth savings

- Enhance remote user productivity
  - 90%+ acceleration

- Foster green IT

![Chart showing response time improvements with WAAS]

<table>
<thead>
<tr>
<th></th>
<th>Native</th>
<th>Refresh</th>
<th>Open</th>
<th>Save</th>
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<tbody>
<tr>
<td>Browse</td>
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<tr>
<td>WAAS</td>
<td>1.1</td>
<td>0.8</td>
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Clouds Services with Cisco WAAS Mobile

<table>
<thead>
<tr>
<th>Weakness</th>
<th>Strength</th>
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<tbody>
<tr>
<td>Interoperability</td>
<td>Performance</td>
</tr>
<tr>
<td>Availability</td>
<td>Reliability</td>
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<tr>
<td>SLAs</td>
<td>Security</td>
</tr>
<tr>
<td>Trust</td>
<td>Flexibility</td>
</tr>
<tr>
<td>Cost</td>
<td>Cost</td>
</tr>
</tbody>
</table>

Features:
- Cost
- Flexibility
- Trust
- Security
- SLAs
- Performance
- Reliability
- Availability
- Interoperability

- Weakness
- Strength
Summary

- Cisco WAAS Mobile extends acceleration to public clouds
  Cloud agnostics, secure acceleration, ease and fast deployment

- Cisco WAAS Mobile in UCS and Virtual Machine foot prints

- Extending Server and client OS support
  Windows 7 (32 and 64 bit), Server 2008 and R2

- Continued investment in easy of use and management
  Universal view of users across servers
  New enhanced web based client GUI

- Flexible Deployment and network integration
  Simultaneously accelerations across multiple data centers
  Client IP preservation
Borderless Performance Integrated In the N/W

User Productivity
- Performance consistency
- Applications anywhere
- Business apps prioritized

IT Efficiency
- Centralized IT
- Virtualized branch services
- Optimized WAN resources

Pervasive Performance
Visibility
Optimization
Service Virtualization

HO Applications & Data
Campus

DR Site

xAAS - Cloud

Branch Office
Home Office/ Coffee Shop