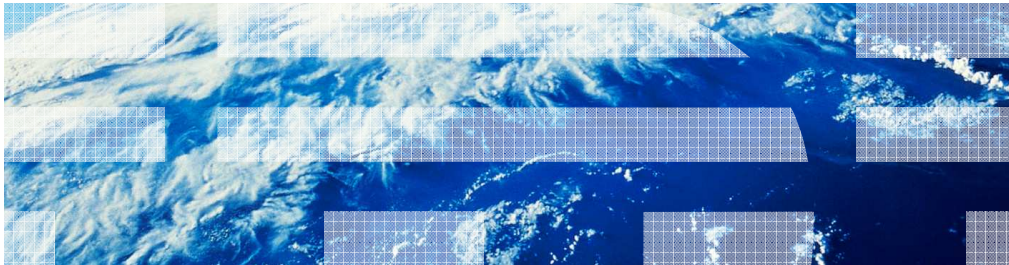

WebSphere DataPower Edge Appliance Release 1.0.0

WebSphere Application Accelerator for Hybrid Networks



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This presentation introduces features and functionality of the WebSphere® Application Accelerator for Hybrid Networks (WAXHN).

Overview

- IBM WebSphere Application Accelerator for Hybrid Networks is intended to speed delivery and performance of web-based cloud and SaaS applications, and boost productivity
- Provide an appliance-based proxy gateway for hybrid network access
- Consolidate traffic for centralized security policy management such as application access controls, single sign-on, DMZ session termination, and hardware accelerated Secure Sockets Layer (SSL) acceleration
- Enhance reliability of application availability over uncontrolled Internet channels to SaaS, cloud, and Platform as a Service (PaaS) services
- Increase performance for external application access by enterprise network users



2

WebSphere Application Accelerator for Hybrid Networks

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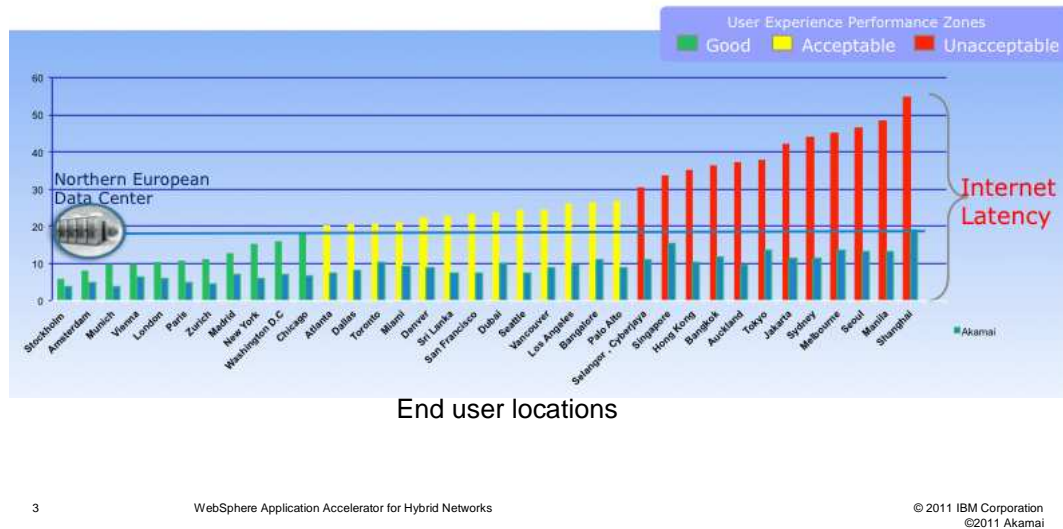
IBM WebSphere Application Accelerator for Hybrid Networks version 1.0, a managed service, is designed to provide enhanced reliability, security, and performance to users using externally hosted public cloud infrastructure and third-party Software as a Service (SaaS) applications from their corporate networks.

This service runs on the IBM DataPower® Edge Appliance XE82 only and requires an active subscription to IBM WebSphere Application Accelerator for Hybrid Networks. This service is not available on the IBM DataPower Integration Appliance XI50 or XI52.

IBM DataPower Edge Appliance XE82, a hardware appliance, is capable of providing consolidated traffic for centralized security policy management such as application access controls, single sign-on, DMZ session termination, and hardware accelerated Secure Sockets Layer (SSL) acceleration.

WebSphere Application Acceleration Internet challenges

- Proximity to your application server effects response time and user experience



Before we can fully appreciate the advantages of WebSphere Application Acceleration we need to understand the challenges we face when traversing the Internet to access our cloud hosted applications.

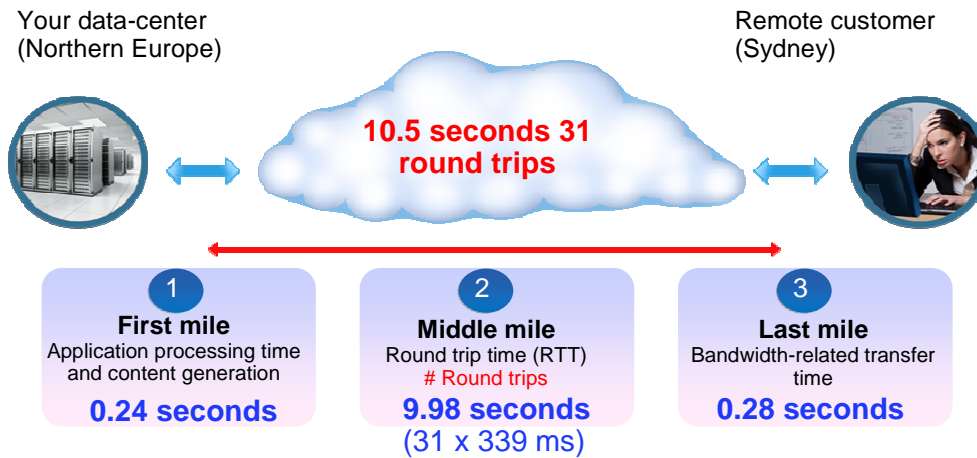
The chart on this slide depicts a data center located in Stockholm and an enterprise user attempting to access an application hosted in this northern European data center from Shanghai.

The X Axis contains cities located increasingly further away from the data center. The Y Axis labels the increasing latency in seconds, starting from 0 and increasing to 60 seconds.

The chart groups the city by city latency into user experience zones, good, acceptable and unacceptable.

Without IBM WebSphere Application Accelerator the latency quickly migrates from the good zone into, acceptable and then unacceptable. Accessing the data center from Shanghai results in unacceptable latency.

WebSphere Application Acceleration
 95% of total response time is due to the middle mile

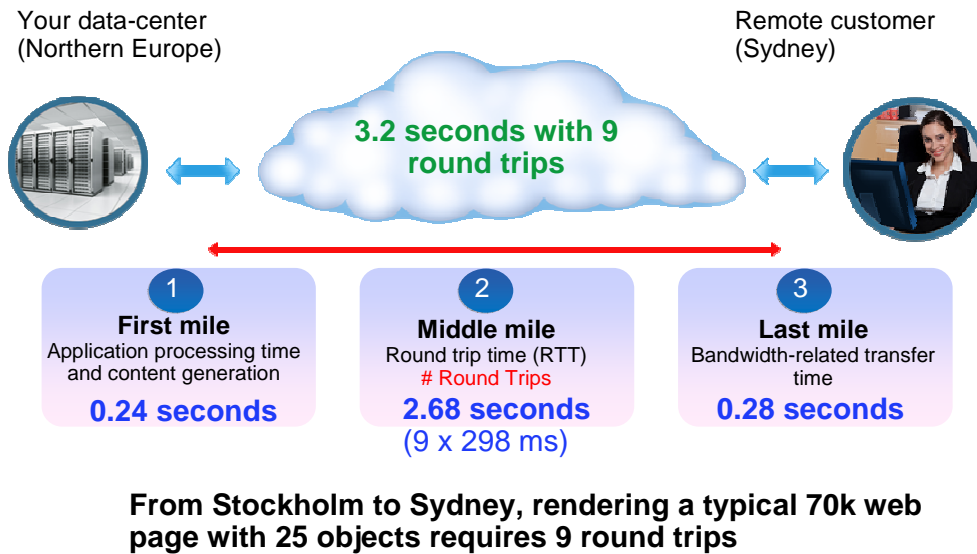


From Stockholm to Sydney, rendering a typical 70k web page with 25 objects requires 31 round trips

Understanding the problem further 95% of the total response time is due to the Internet and not the connection from the internet to the data center or end user, commonly referred to as the first mile and last mile, respectively.

So how can we reduce the middle mile latency and increase its availability?

WebSphere Application Acceleration What if you could control the middle mile?



With IBM WebSphere Application Acceleration, the latency is reduced from 339 milliseconds to 298 milliseconds and the number of round trips from 31 to 9. This is possible using sure route and pre-fetching technology, which we will discuss in more detail shortly.

The Aberdeen Group report, “The Performance of Web Applications: Customers are Won or Lost in One Second”, states that application performance can impact overall corporate revenues by up to 9%



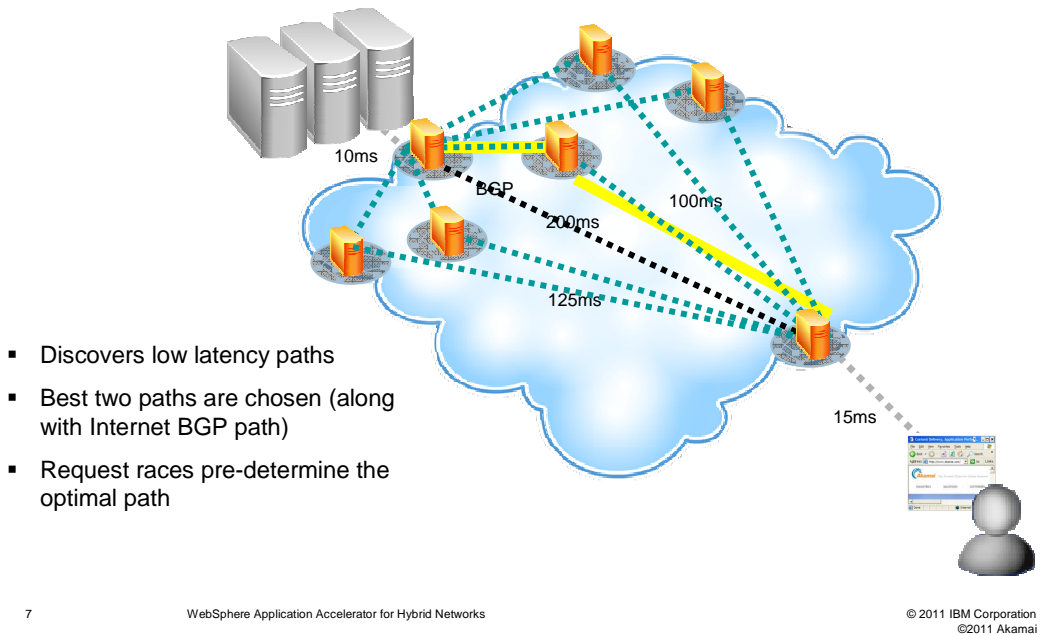
WebSphere Application Acceleration Akamai EdgePlatform

- 95,000+ servers, 1500+ locations, 1900+ networks
- Each node is within one network hop of 90% of Internet users
- Transparent to end-users and applications
- Routing based on DNS resolution

To control the reliability, availability and performance of the Internet IBM has partnered with Akamai Technologies. Akamai owns over 95,000 servers, at 1500 plus locations, geographically distributed across the globe.

Each node or server is within one network hop of 90 percent of all Internet users.

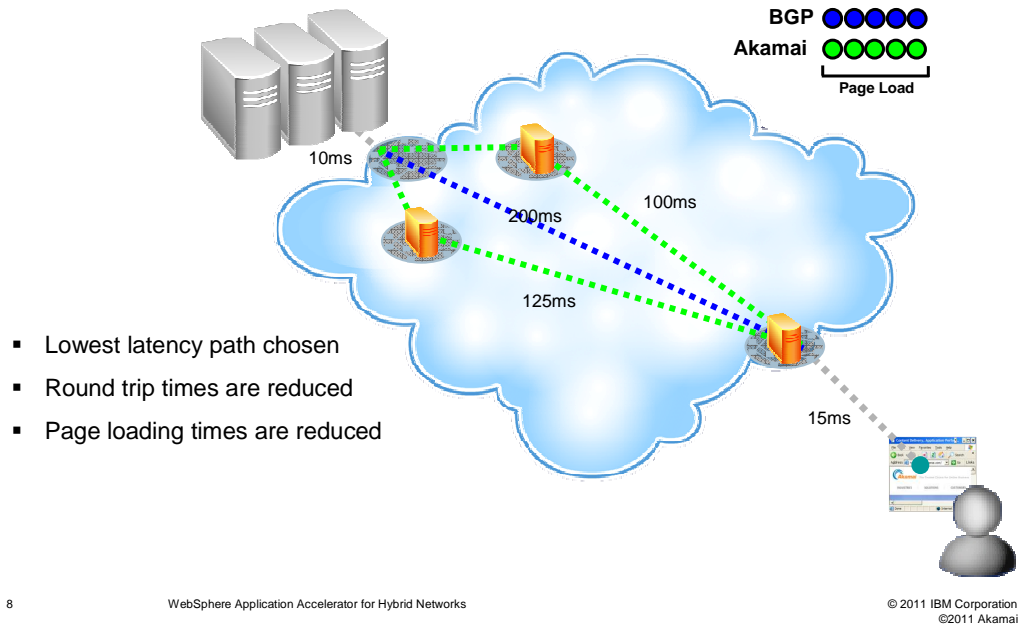
WebSphere Application Acceleration SureRoute path optimization



Sure Route path optimization uses parallel requests on disjoint paths to determine and cache the fastest or lowest latency paths across the Internet. The redundant disjoint paths can also be used for fail-over purposes.

For example, in this picture, the best path from the client's web browser to the web servers is the path highlighted in yellow. The B G P path is also identified as the black dotted line.

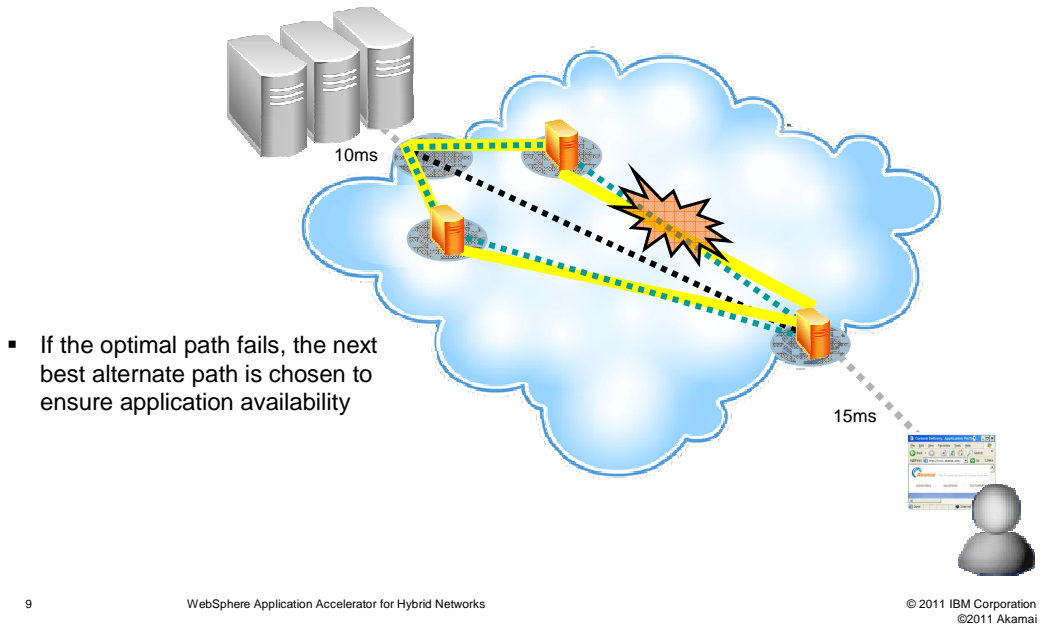
WebSphere Application Acceleration SureRoute versus BGP



Sure Route versus B G P. Because the lowest latency path is chosen, the reduction in page rendering times is cumulative. Complex web applications require many round trips between the user agent and the origin server, and even the smallest improvements in latency, add up quickly to a user visible difference.

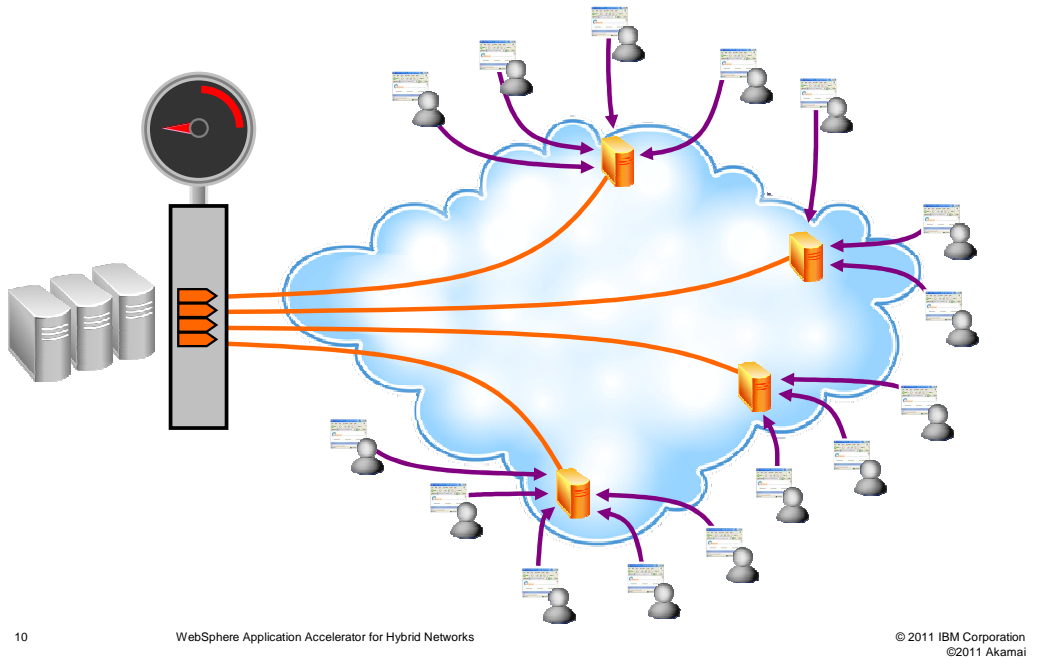
For example, in this picture, the client uses a web browser to access a website. Because the top most path has the lowest latency, this will be used to service the user's request. The request travels from the orange server closest to the user, to the top-most orange server, and eventually reaches the web servers. The web servers return a document which travels the same path back to the user's web browser. Five round trips in this fashion would result in about a one-second latency improvement over the B G P path, and this improvement gets larger with each new request.

WebSphere Application Acceleration Automated path failover



If the optimal path fails, the next best alternative disjoint path is chosen to ensure application availability. Alternative paths are cached and thus convergence time is fast. For example, in this picture, the two best paths are highlighted in yellow. Once the top most path fails, the bottom most path is automatically used.

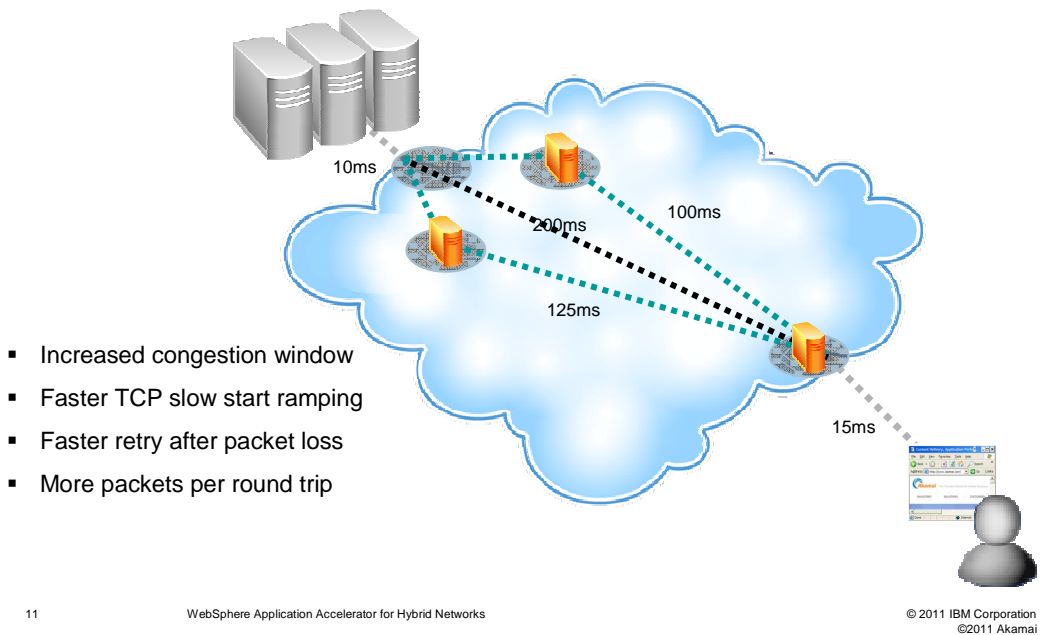
WebSphere Application Acceleration Persistent connections



Persistent connections greatly reduce the TCP handshake overhead, but this situation is further optimized by maintaining connection pools at the closest point of presence to a local group of user agents. This further reduces the load on the origin server and has security benefits as denial of service attacks can be detected close to the originator and can be dropped or filtered well before the origin server.

For example, in this picture, each client connects to an orange server to access the web servers. These orange servers maintain the multiple connections required to directly talk to each client. However, these orange servers are the only ones that have connections with the web servers. The orange servers pass each clients requests through these connections to the web servers.

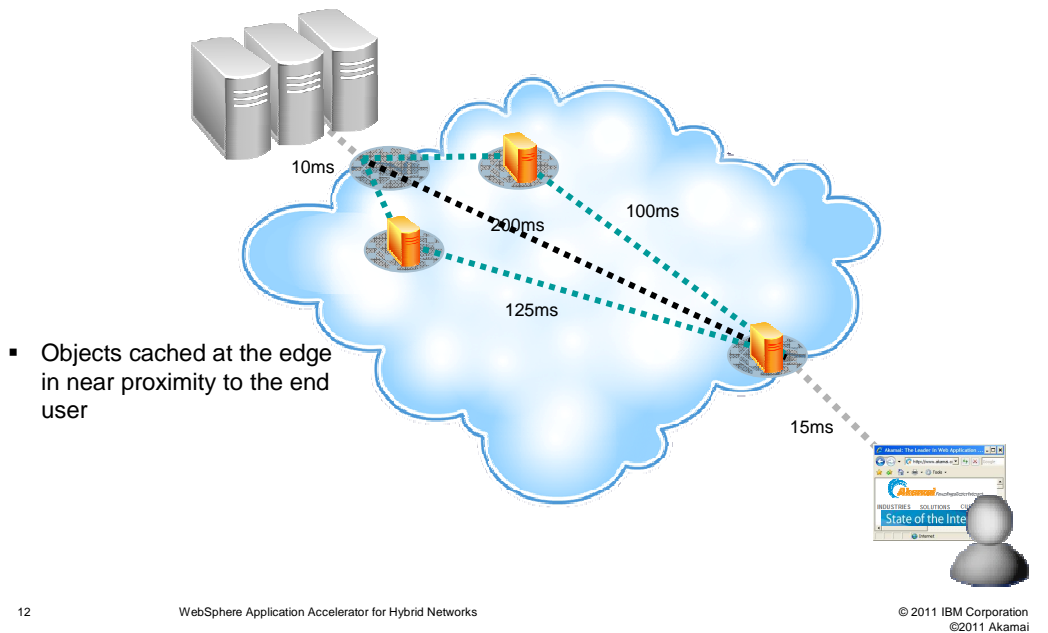
WebSphere Application Acceleration TCP optimization



The Akamai overlay also performs transport TCP optimizations to improve latency and throughput. Some examples are, increased congestion window, faster TCP slow start ramping and faster retry after packet loss.

For example, in this picture, the client uses a web browser to access a website. The request travels from the orange server closest to the user, to the top-most orange server, and eventually reaches the web servers. The web servers return a series of documents. When this document is received by the top-most orange server, the server performs some level of optimization to forward the documents to the orange server closest to the user. This server then forwards the document to the web browser.

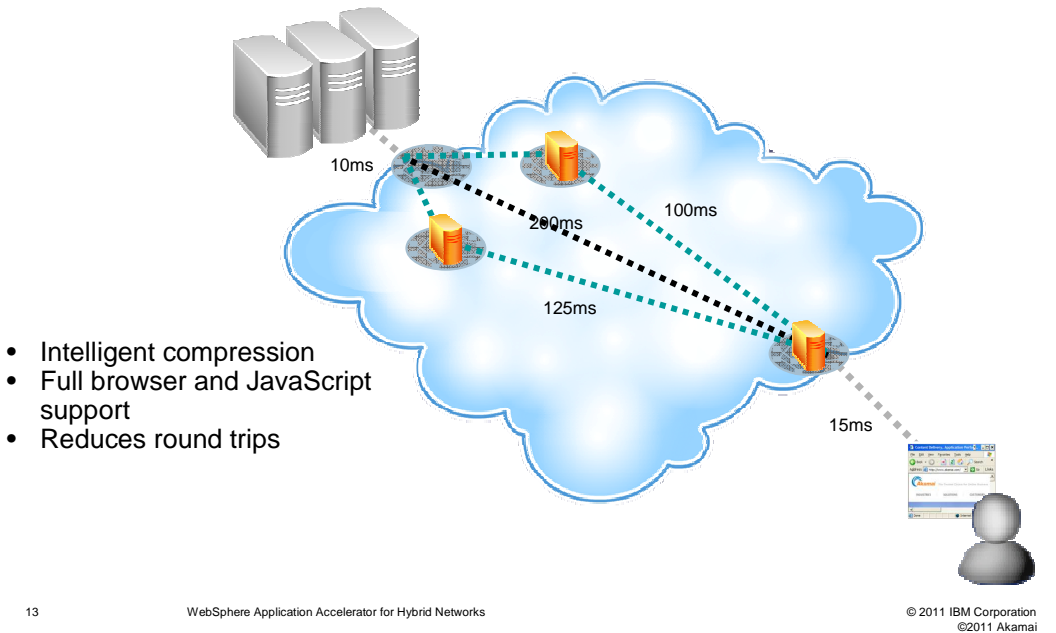
WebSphere Application Acceleration (WAXPN) Edge caching



Edge Caching caches high frequency objects in near proximity to the consumer or end user. Caching reduces the number of round trips to the origin or dramatically reduces the quantity of data transmitted from the origin to the end user. When combining IBM WebSphere DataPower technology it is possible to enable the Akamai network to cache dynamic content, over and above the typically cached static content such as images and JavaScript.

For example, in this picture, the client uses a web browser to access a website. The request travels from the orange server closest to the user, and eventually reaches the web servers. The web servers return a document. When this document is received by the orange server closest to the user, the document is cached. This server then forwards the document to the web browser. Future requests by this user or other users that use the same orange server as the original user, the cached document is returned to the user. Serving up this cached document improves user observed latency, reduces load on the web server, and reduces traffic on the larger network.

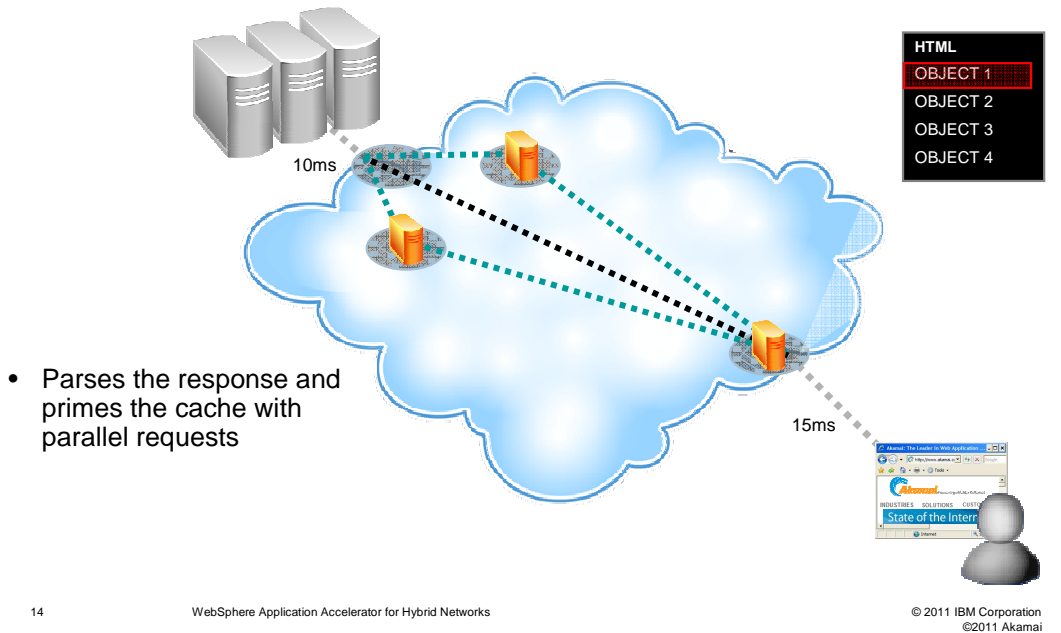
WebSphere Application Acceleration Compression



Intelligent Compression compresses content to reduce the size and therefore the latency required to transmit the objects across the Internet. A typical 100k byte page compresses down to 15k bytes. Intelligent compression ensures that already compressed objects are not double compressed and that compatibility is maintained regardless of user agent type or version.

For example, in this picture, the client uses a web browser to access a website. The request travels from the orange server closest to the user, to the top-most orange server, and eventually reaches the web servers. The web servers return a large document. When this document is received by the top-most orange server, the document is compressed and sent to the orange server closest to the user. This server forwards the document to the web browser. Since there is browser support for compression, this document is decompressed and rendered for the user.

WebSphere Application Acceleration Prefetching



Prefetching parses web content at the closest point of presence to the end user and prefetches objects for what will be requested in the near future. This primes the cache, increasing the cache hit count and further reduces the latency experienced by the end user.

For example, in this picture, the client uses a web browser to access a website. The request travels from the orange server closest to the user, and eventually reaches the web servers. The web servers return the HTML document. The orange server closest to the user parses the HTML and discovers there are four objects referenced by this HTML document. Therefore, at the same time the orange server sends the HTML document to the web browser, the orange server requests each of the four objects from the web server. By the time the web browser parses the HTML document and requests the four objects from the web server, the orange server already has the response from the web server with these objects. Therefore, the orange server is able to serve these back to the web browser immediately, thereby reducing latency.

WebSphere Application Acceleration



You have just covered some of the technologies used to control the Internet or middle mile and this set of technologies is relevant to these IBM products:

WebSphere Application Accelerator for Public Networks is designed to further enhance or enable the Akamai network for Internet users accessing applications hosted by the enterprise.

WebSphere Application Accelerator for Hybrid Networks is designed to securely connect to the Akamai network and to further enhance and enable it for Enterprise users attempting to access third party SaaS applications or Enterprise applications hosted in the Cloud.



WebSphere Application Acceleration Benefits of WAXHN

- First hybrid cloud acceleration platform
- “Hybrid Networks” blend locally owned and remotely rented Cloud infrastructure. Benefits include:
 - Improved scale, flexibility, TCO, security, performance
 - Pragmatic adoption of Cloud and SaaS offerings
 - Cloud hosted and third party SaaS acceleration
 - Extends the WAX fabric into the enterprise
 - Caching of application data on the Edge appliance
 - Reduce Internet uplink bandwidth requirements
 - Only available on the WebSphere DataPower Edge Appliance

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WebSphere Application Accelerator for Hybrid Networks

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IBM WebSphere Application Accelerator for Hybrid Networks is an industry first hybrid cloud acceleration platform which is designed to securely connect enterprise users to third party SaaS applications or enterprise owned applications hosted in the cloud in a secure scalable way.

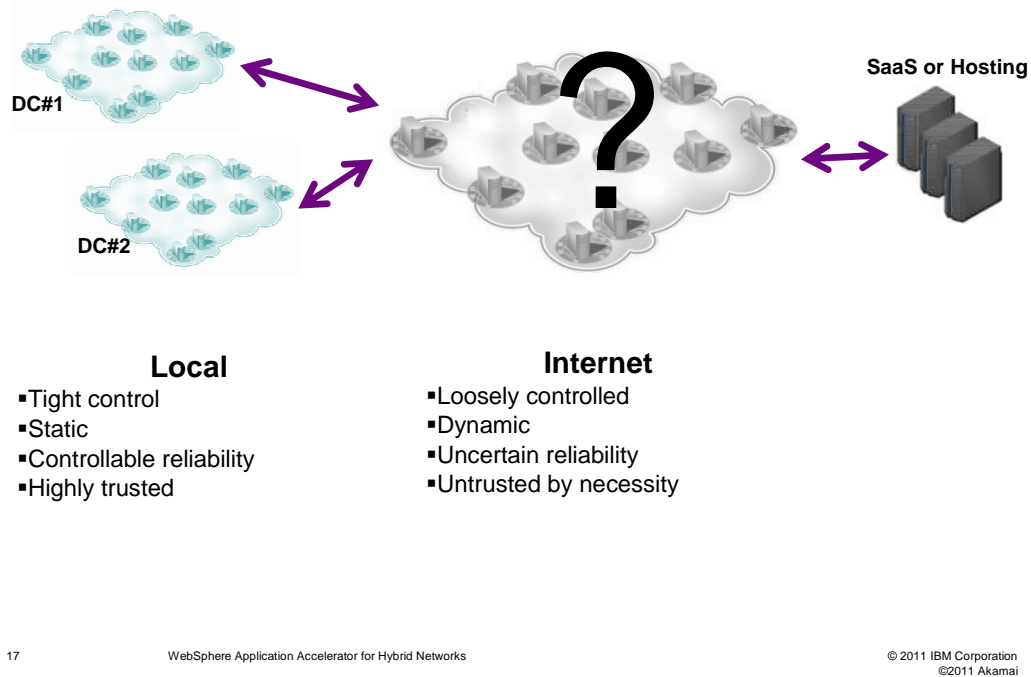
Some of the key benefits include:

Brings greater reliability, predictability and performance to Internet communications, facilitating cloud adoption for mission critical applications.

Gives applications global reach without the need to build out global data centers.

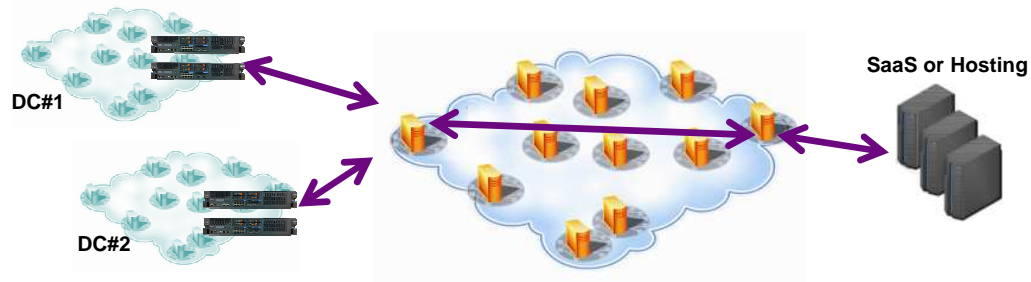
Gives enterprises the ability to cloudburst peak loads to cloud hosted solutions while maintaining near local LAN speeds.

What is a “Hybrid network” – Before



What is a hybrid network? a system that federates private and public clouds, matching workloads to the most optimal environment. Without IBM WebSphere Application Accelerator for Hybrid Networks, the private cloud or local network is highly trusted, tightly controlled and mostly static, making it difficult to connect to Internet resources.

What is a “Hybrid network” – After



Edge appliance

- AAA control point
- Caches dynamically
- Self-balanced cluster
- High availability

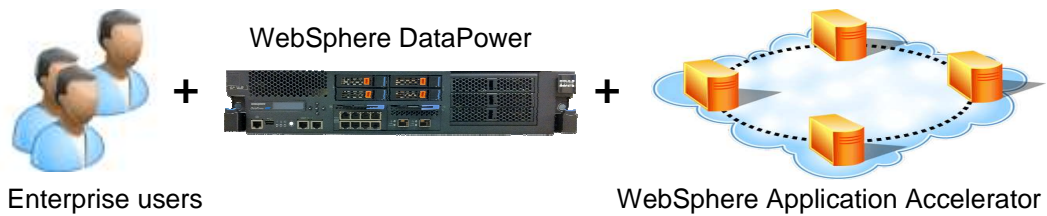
WAXHN

- Overlaid control
- Responds dynamically
- Certain reliability
- Trustable by design

After deploying IBM WebSphere Application Accelerator for Hybrid Networks the Internet becomes an extension of the local network, leveraging the hardware appliances for self-balancing, HA, caching behind the enterprise firewall and triple A as a policy enforcement point. The Internet is controllable using the Akamai overlay, responds faster and is more reliable and is trustable by design.

WebSphere Application Acceleration (WAXHN) Features of WAXHN

- An Internet network service sold by IBM, operated by Akamai called WAXHN
- Secure enterprise connection point to the Akamai network
- Same acceleration, security and availability as described earlier (varies by type of traffic and prevailing network conditions)



Its an internet network service sold by IBM and operated by technology partners, Akamai. It requires the WebSphere DataPower XE82 hardware appliance to provide the secure connection point to the Akamai network. The hardware appliance also extends the caching capabilities of the overlay network into the Enterprise.

WAXHN Sample usage scenarios

3rd Party SaaS

- TCP optimization
- Route optimization

Infrastructure as a Service (Hosted)

- Prefetching, Caching, Compression
- TCP optimization, Route optimization

Data Center to Public Cloud Transfer (Hosted)

- Prefetching, Caching, Compression
- TCP optimization, Route optimization

The level of performance and the number of acceleration capabilities provided depends on the target application and the system configuration. Third party applications benefit from transport level acceleration techniques to ensure the highest level of interoperability. The acceleration techniques used depend on the Akamai EdgeControl portal configuration and the application type selected. Customer owned applications provide the most flexibility when selecting which acceleration techniques to deploy. In rare situations, modifications to the application can be needed to get the most benefit from the service. IBM software services will assist you on a case-by-case basis to provide the best possible benefit.



Implementation outline

- Determine the use case to optimize and application type, third party or customer owned
- Determine collective monthly bandwidth and gateway locations
- Contact IBM sales and purchase the WebSphere Application Accelerator for Hybrid Networks service
- Activate WAXHN feature on the DataPower Edge appliance
- Acquire appropriate SSL certificates and configure the service by way of Akamai Edge Control Portal. Copy a subset of configuration items into the WAXHN appliance.
- Retarget DNS or web browser proxy configuration

Determine the use case that needs optimization. In most cases the Enterprise will have already attempted to deploy one or more applications to the Cloud and has quickly discovered blocking performance, availability or security concerns that need addressing. So the first step is to identify the candidate applications, determine the application type, whether its customer owned or third-party. Customer owned effectively means you have the ability to modify the application if needed and have legal rights to the content, all other applications are considered third-party. After identifying the applications, the next step is to determine the collective monthly bandwidth requirements and WebSphere DataPower Edge appliance locations, typically a minimum of two appliances per data center location. Next contact IBM sales and purchase the WebSphere Application Accelerator for Hybrid Networks service tier corresponding to your bandwidth and geographic requirements. Activate the WAXHN feature on the DataPower edge appliance. Acquire the appropriate SSL certificates and configure the Akamai Edge Control using the implementation guide linked to directly from the portal. Once the Edge Control portal configuration is complete, you need to copy a small subset of configuration details into the XE 82 WAXHN configuration panel. Next retarget the DNS configuration to point to the DataPower Edge appliance or distribute a web browser proxy profile to proxy to the DataPower Edge appliance. Final step, test the application and enjoy the gained performance improvements.



WebSphere DataPower Edge Appliance XE82 User interface

- Web user interface
- Command line interface (CLI)
- XML Management Interface (XMI)
- developerWorks®: Managing WebSphere DataPower Device configurations for high availability, consistency, and control (Series)
- WebSphere Appliance Management Toolkit
- developerWorks: Managing multiple DataPower Appliances with the WebSphere Appliance Management Toolkit (Series)
- RAS and IBM Support Assistant
- FFDC, must gather, logging and trace, failure notification

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WebSphere Application Accelerator for Hybrid Networks

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WAXHN features can be configured using any of the available configuration interfaces. This include a Web GUI interface, a TTY command line interface, and an external XML request response interface.

XE82 appliances can be managed using the WebSphere Appliance Management Toolkit. One program product that uses this interface to allow for convenient management of clusters of XE82 appliances is the WebSphere Appliance Management Console..

A substantial collection of debug facilities including First Failure Data Capture, logs, and trace facilities allow problems to be isolated and resolved in a timely fashion.

WebSphere DataPower Edge Appliance XE82

The screenshot displays the WebSphere DataPower Edge Appliance XE82 management interface. The top navigation bar shows the user 'admin @ edge001' and the domain 'default'. The left sidebar contains a 'Control Panel' menu with categories like Status, Services, Hybrid Services, Web Application Gateway, Web Service Proxy, Miscellaneous, Network, Administration, and Objects. The main content area is divided into several sections: 'Control Panel', 'Services' (with icons for Web Service Proxy and Web Application Gateway), 'Monitoring and Troubleshooting', and 'Files and Administration'. A 'Secure CLI' window is open in the foreground, showing a terminal session with the following text:

```

Secure SSH connection to XE - 98x25
Unauthorized access prohibited.
login: admin
Password: *****
Welcome to DataPower XE82 console configuration.
Copyright IBM Corporation 1999-2011

xe82# con
Global configuration mode
xe82(config)# waxhn
Options:
waxhn-activate      Activate WebSphere Application Acceleration for Hybrid Networks
waxhn-proxy        Enters WAXHN Application Proxy Configuration Mode
waxhn-applications Enters WAXHN Application List Configuration Mode
waxhn-reset-app-stats Reset WAXHN Application Statistics
waxhn-cache-purge  Enter WAXHN cache parameters to purge specific cache items
waxhn-cache-search Enter WAXHN cache parameters to get status on specific cache objects
Unknown command or macro (waxhn)
xe82(config)#
xe82(config)#
xe82(config)#
xe82(config)#
xe82(config)#
xe82(config)#
xe82(config)#
xe82(config)#

```

At the bottom of the interface, the text 'WebSphere Application Accelerator for Hybrid Networks' and '© 2011 IBM Corporation ©2011 Akamai' is visible.

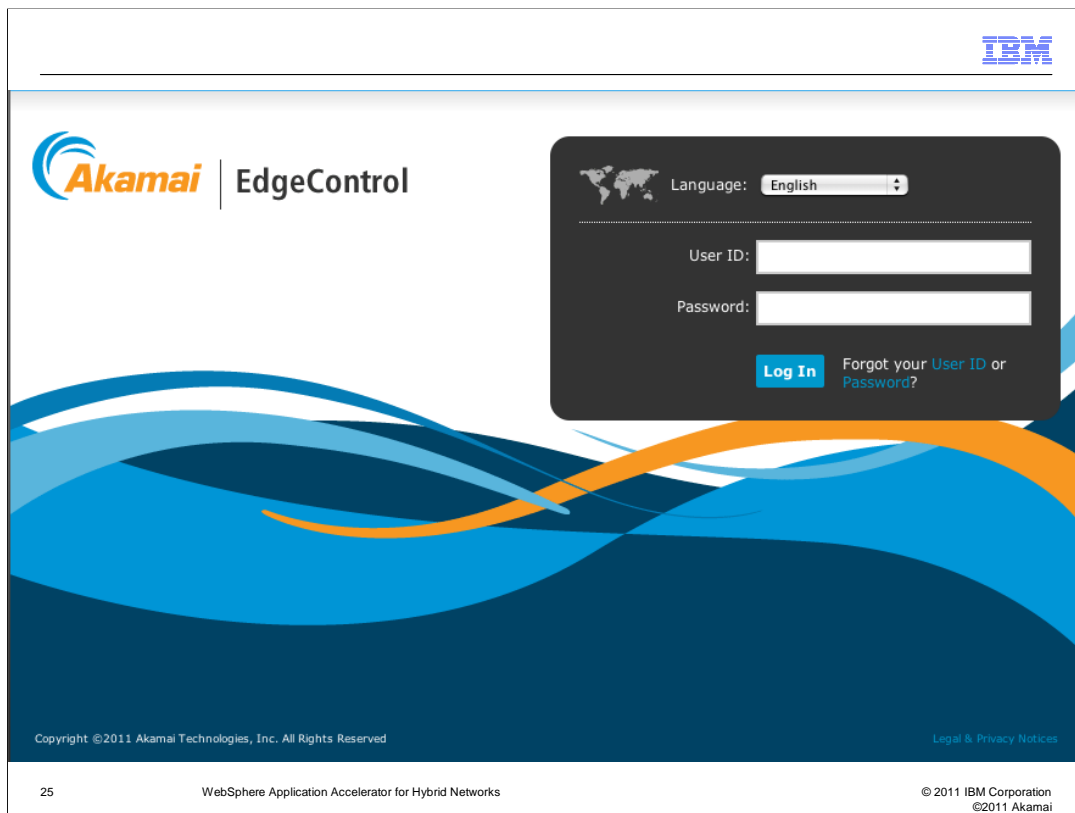
The upper left screen capture is an example of configuration using the Web Graphical User Interface. The lower right screen capture is an example of configuration and help using the Command Line Interface.



WebSphere Application Acceleration (WAXHN) Configuration

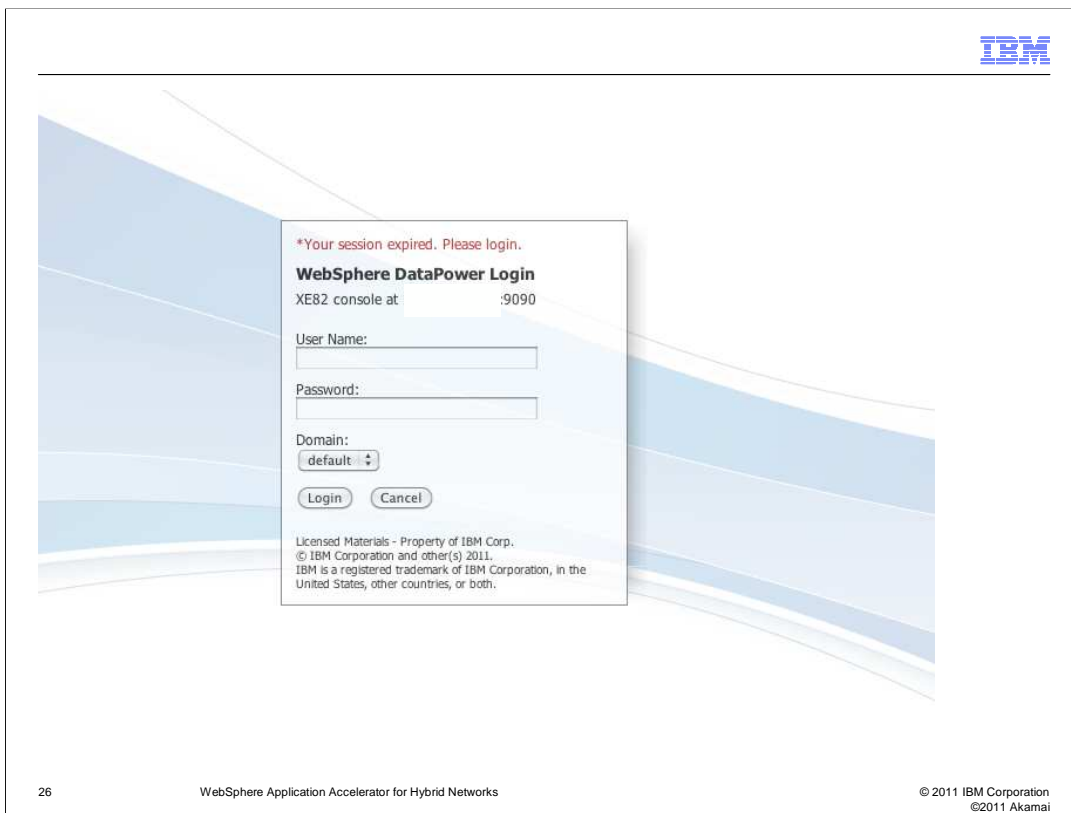
- Akamai EdgeControl Portal
- DataPower XE82
- WAXHN Application Proxy Activation
- WAXHN Application List
- Retarget Enterprise DNS

The next set of slides will take you through information as to how the WAXHN feature is configured on both the Akamai and DataPower side.

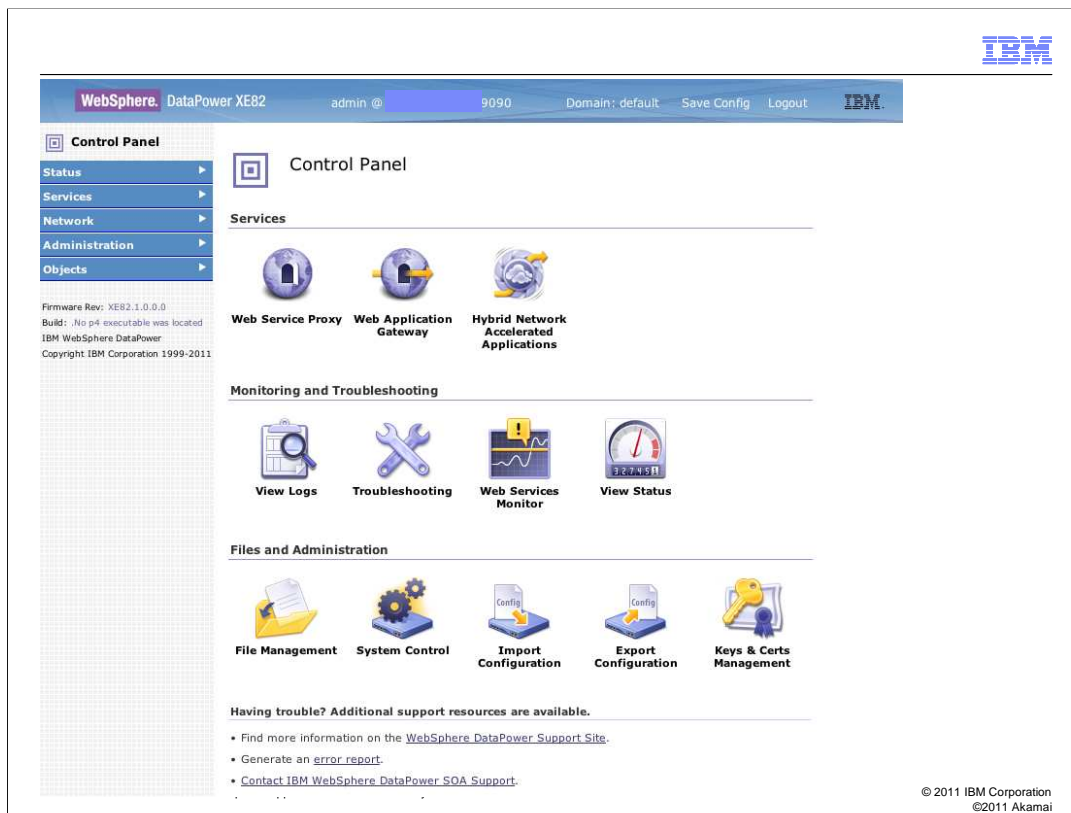


The Akamai Edge Control configuration manager must be setup before you can configure WebSphere Application Accelerator for Hybrid Networks on the DataPower XE82 and before the service can be invoked end-to-end.

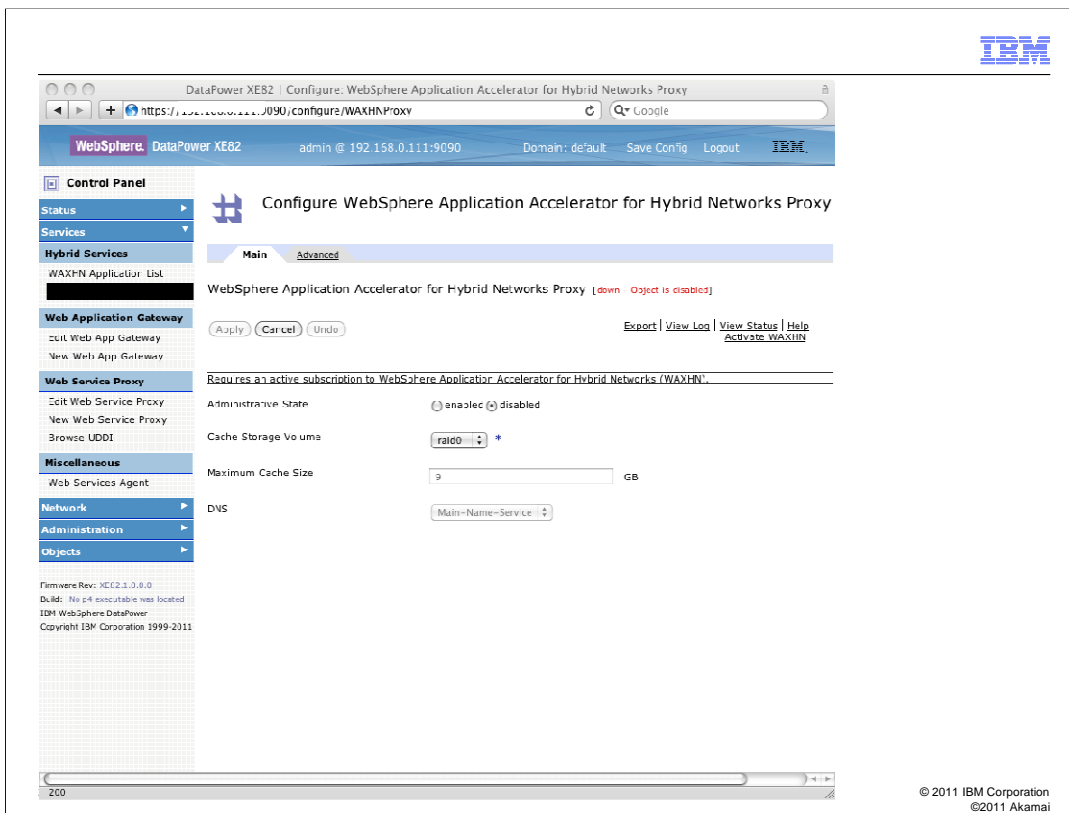
Akamai Edge Control Portal is at <https://control.akamai.com>. Within five days of your company's service contract submission to Akamai from IBM, you should receive an email with your account information. If you haven't received the email or don't have the information for any other reason, you can get it from your IBM activation team. You need your user ID and password to login and retrieve your CP codes, which are used for reporting and billing purposes to complete the configuration process.



The next set of slides addresses the configuration of the DataPower XE82 appliance to take advantage of the WAXHN feature. This image is the login panel for the Web GUI interface of the XE82



The control panel is shown immediately after logging in. The two prominent services of the XE82 are the Web Service Proxy and the Web Application Gateway. The third icon under services is the Hybrid Network Accelerated Application which is used to configure which applications are accessed through the Akamai network.



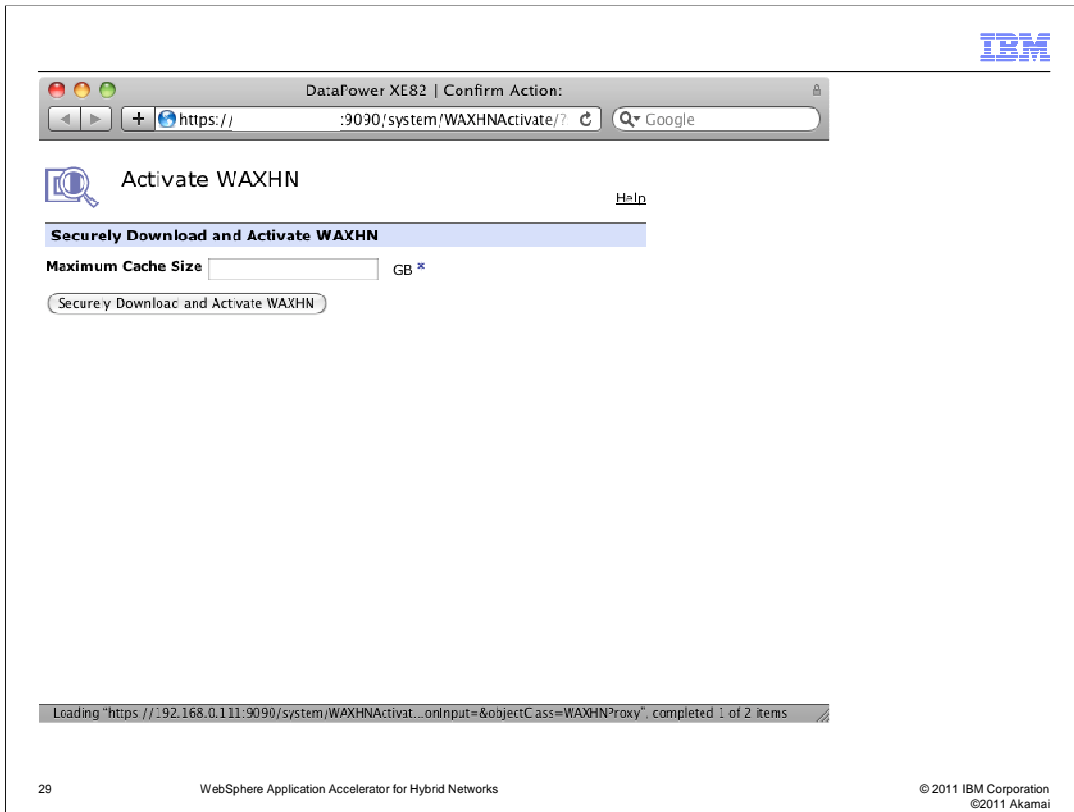
This screen capture shows the WAXHN proxy configuration panel. This panel is used to define and activate the WAXHN feature.

To activate the WAXHN feature, you must have purchased a subscription to the WAXHN program offering and accepted its terms and conditions.

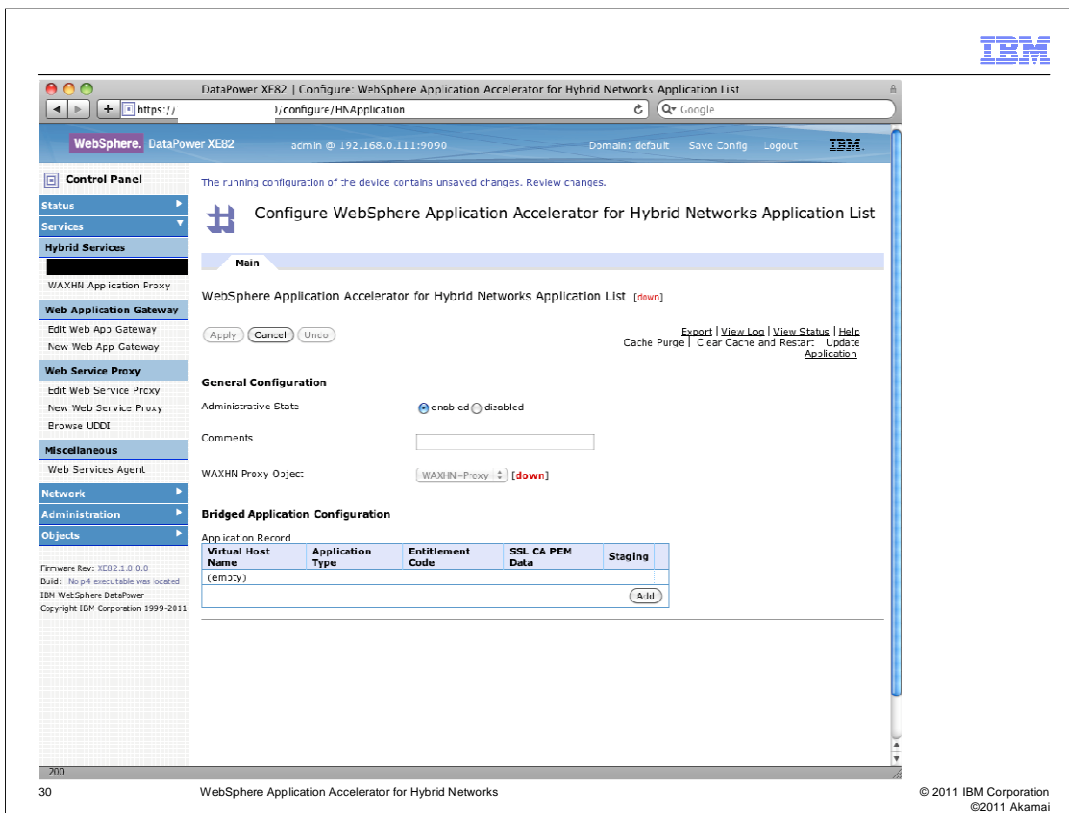
You must define which storage volume and how much space is to be used for the Akamai cache area.

You must also select a DNS configuration that tells the Akamai software where to resolve names.

After configuring the necessary information, you need to click the “Activate WAXHN” link.



After you have pressed the “Activate WAXHN” link, you are taken to another dialog. Click the “Securely Download and Activate WAXHN” button.



After the WAXHN proxy configuration has been entered and the WAXHN feature has been activated, you will need to configure the WAXHN Application List. The WAXHN Application list is the list of applications that you want to accelerate. The Bridged Application Configuration will contain one entry per application that you want to accelerate using WAXHN.

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WebSphere Application Accelerator for Hybrid Networks

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This slide shows a Bridged Application being configured.

The Virtual Host Name is the fully qualified domain name of the host where the application that you want to accelerate resides. The Virtual Host Name is used as the basis for sending things through the Akamai network. If you create a Web Service Proxy or Web Application Gateway with the back end destination matching any of the Virtual Host Names specified in the application list, the request is immediately routed through the Akamai network.

The Application Type can be either “third party” meaning an external website or “customer owned” meaning a web site that this customer owns and maintains.

The Entitlement Code is provided to you by way of the Akamai Edge Control Portal when you purchase the WAXHN feature. You must enter it exactly as it has been given to you.

The SSL CA PEM Data is an optional certificate that can be sent when establishing connections to the application.

WebSphere Application Acceleration

- Retarget the DNS or use an internet browser proxy
- Production versus staging
- Fix pack process
- The Akamai component is part of the firmware and cannot be upgraded separately

Once you have configured the application list to be accelerated, you need to make the users in your enterprise send requests to the XE82 appliance that has implemented the service directing traffic through the Akamai network. This can be done by updating the enterprise DNS to route traffic through the DataPower appliance, or it can be done by setting up an Internet browser proxy.

Note that Akamai provides a “Production” and a “Staging” environment. For more information on how to use them, consult the Akamai documentation.

One last word about the Akamai component. The Akamai firmware is linked internally to the XE82 base firmware and cannot be upgraded separately. If fixes are required, the latest fix pack obtained for the XE82 will hold the link to any upgrades required on the Akamai firmware.



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This module is also available in PDF format at: [../100Education_WAXHN.pdf](..../100Education_WAXHN.pdf)

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