



IBM Software Group

# WSTE – DataPower Application Optimization – How to Reduce Costs and Improve Efficiencies

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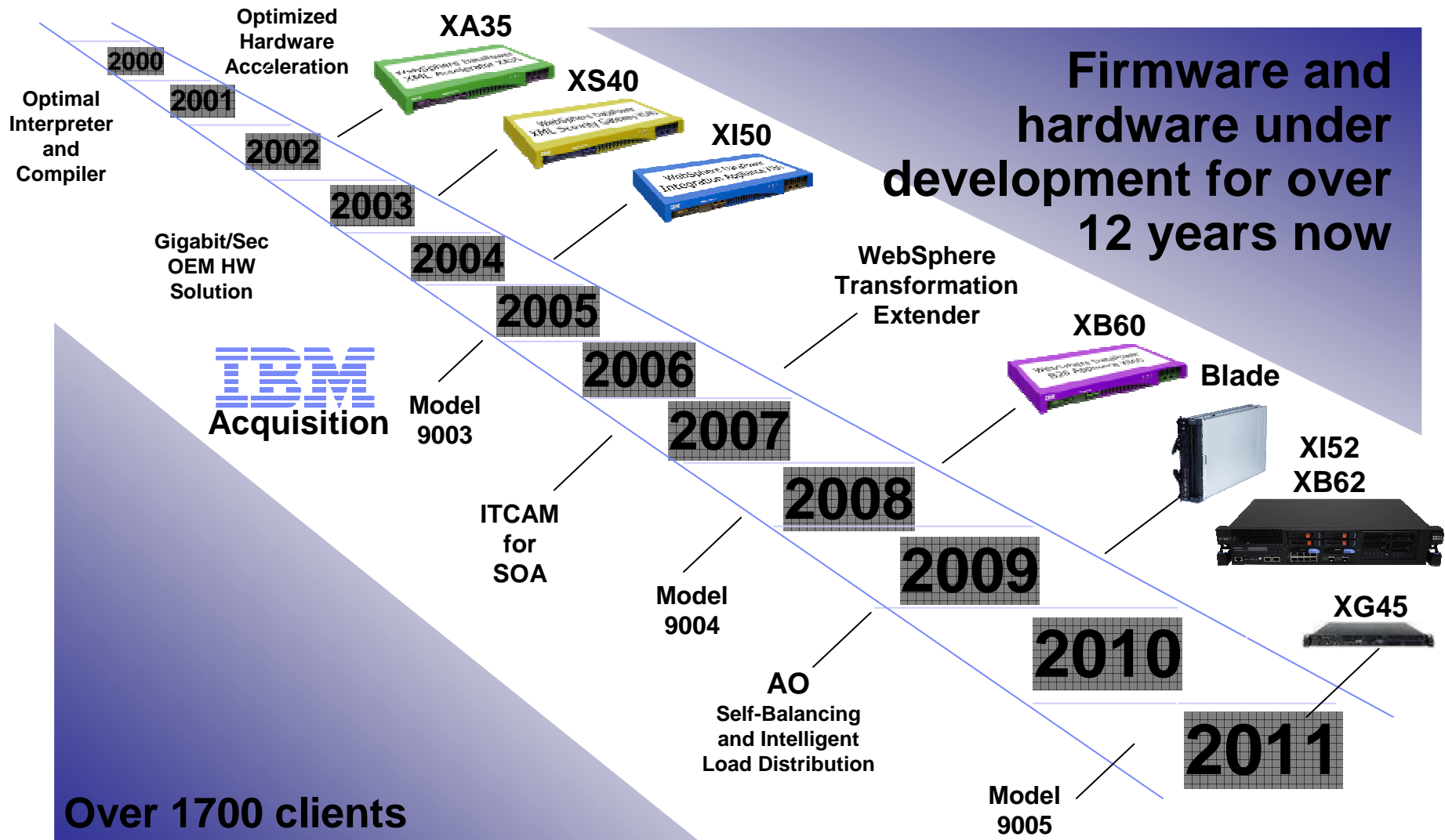
WebSphere® Support Technical Exchange



# Agenda

- **Introducing DataPower Appliances**
- Application Optimization
- Network Optimization
  - ▶ Self Balancing
- Application Intelligence
  - ▶ Intelligent Load Distribution
- Content Distribution
  - ▶ WebSphere Application Accelerator for Public Networks
- Security
  - ▶ Secure Cloud Connector

# DataPower -- over a decade of connectivity innovation



# Why use an appliance for connectivity?

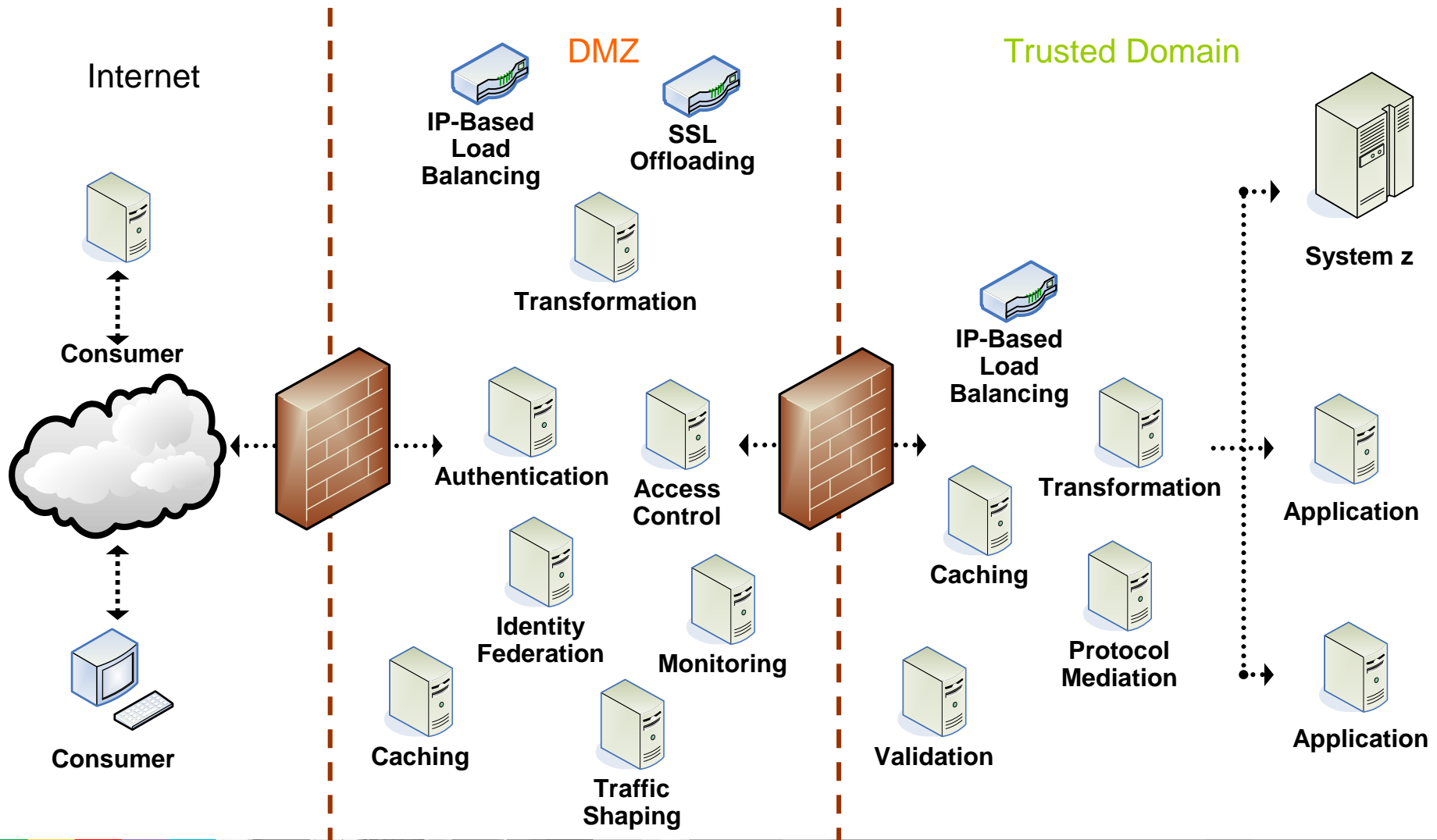
- Purpose-built, fine-tuned **consumable** hardware platform
- Provides high levels of certified **security** assurance
  - ▶ FIPS 140-2 Level 3
  - ▶ Common Criteria EAL4
- Achieves fast **performance** with multiple layers of specialized hardware acceleration
- Many functions incorporated in a **single device**
  - ▶ Service level management
  - ▶ Dynamic routing and load distribution
  - ▶ Edge security
  - ▶ Policy enforcement
  - ▶ Transport and message transformation
- **Simplified** maintenance model
  - ▶ Drop-in appliance form-factor
  - ▶ Secures traffic in minutes
  - ▶ Push-button flash upgrade process
  - ▶ Integrates with existing operations



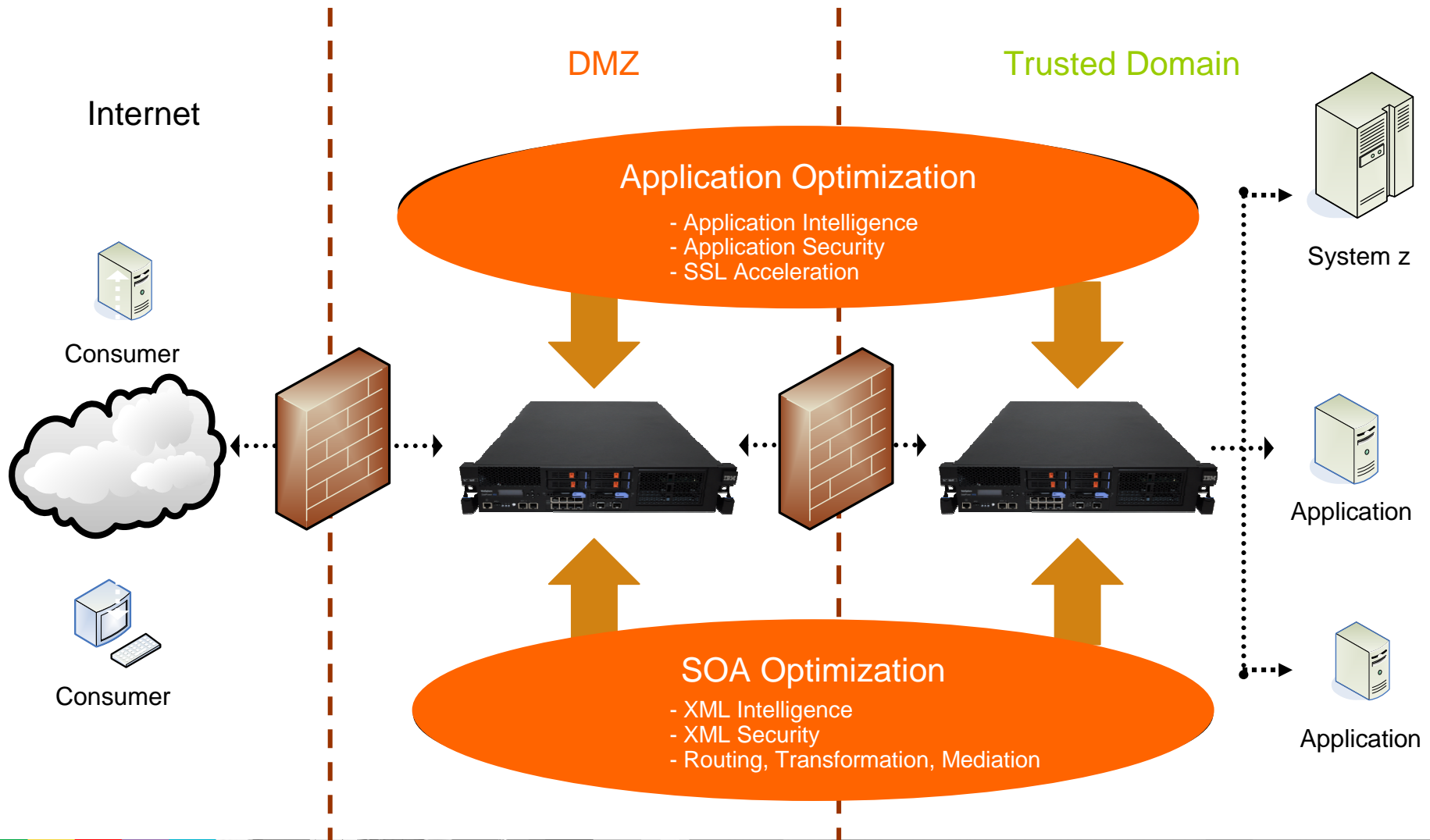
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# Current infrastructure -- complex, fragmented, and brittle.

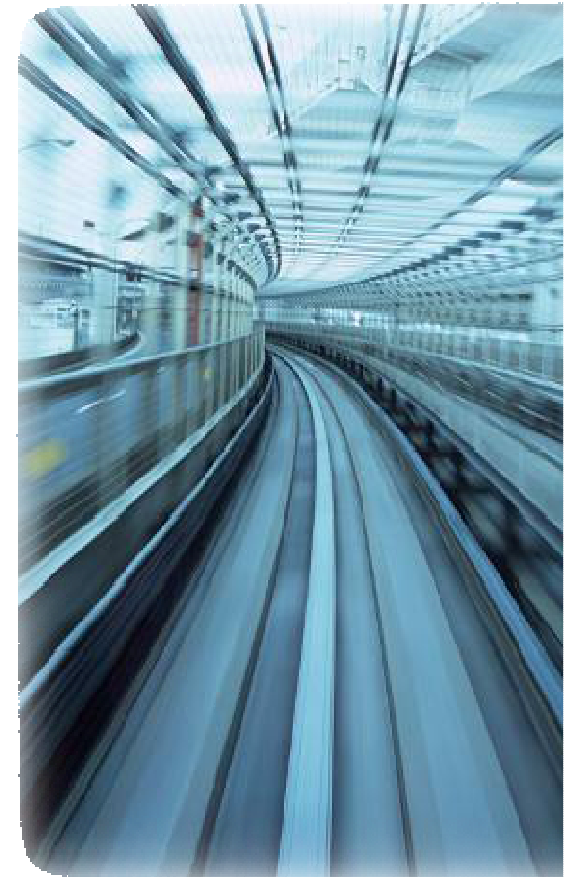


# Use WebSphere DataPower to consolidate the infrastructure



# Benefits of Application Optimization

- TCO dramatically reduced
  - ▶ Fewer boxes to purchase
  - ▶ Fewer boxes to keep current, manage, and configure
  - ▶ Reduction in separate learning curves for each hardware and software package
- Network infrastructure simplified
  - ▶ One tier of appliances versus a collection of networking equipment, appliances, and specialized software packages.
- Performance enhanced
  - ▶ Fewer network hops means fewer trips up and down protocol stacks
    - Lower Latency
    - Higher throughput
- Better security with a secure device.





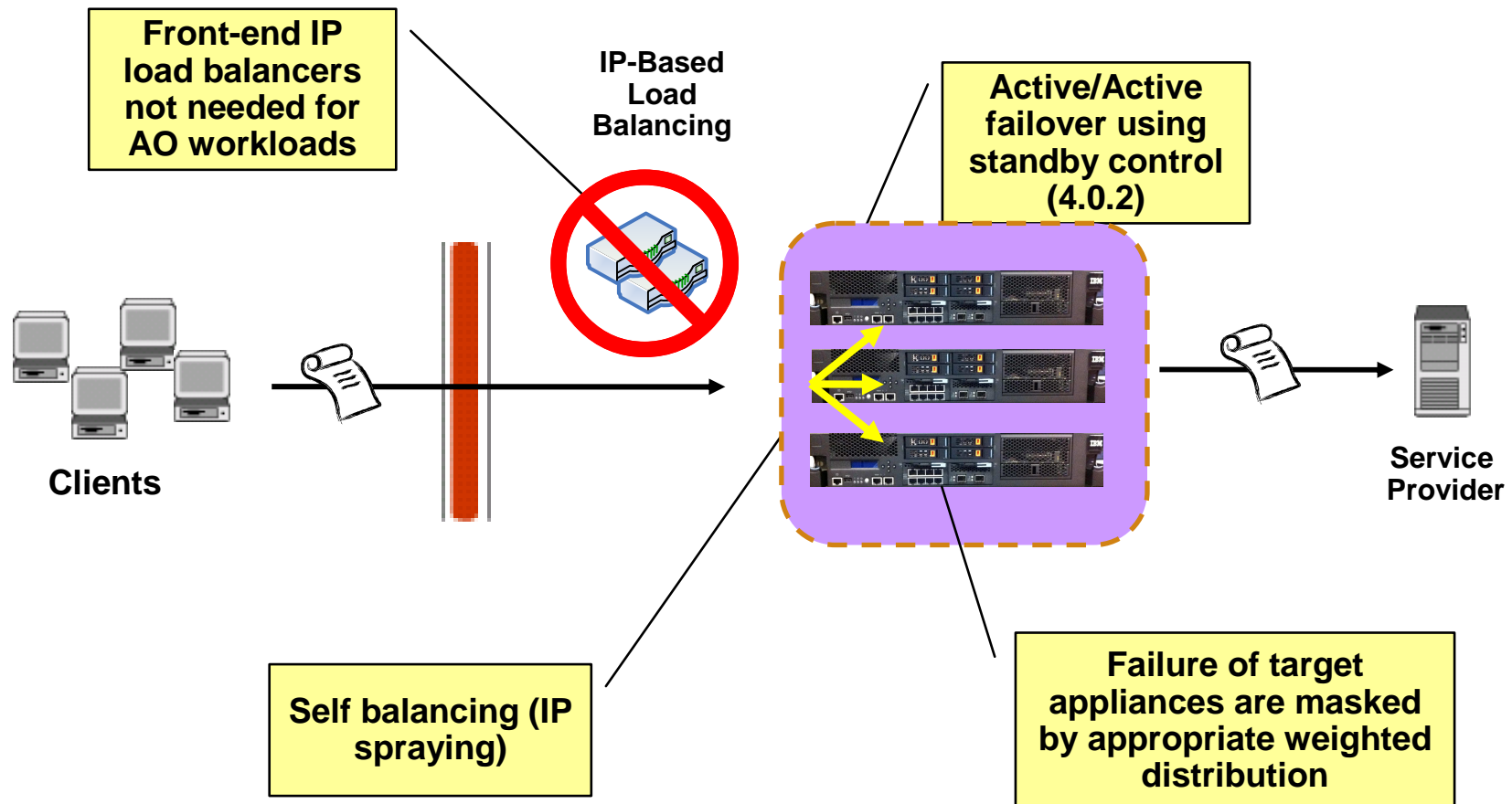
# Application Optimization

- Licensed Feature (Field upgradeable)
- Available on the following platforms
  - ▶ XS40
  - ▶ XG45
  - ▶ XI50, XI52, XI50B

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# Self Balancing of Co-located / HA Appliances



# Enabling Self Balancing

**WebSphere DataPower XI50** admin @ localhost Domain: default Save Config Logout

**Control Panel**

- Status
- Services
- Network
- Interface
  - Ethernet Interface
  - VLAN Sub-Interface
  - Network Settings
  - Host Alias
  - DNS Settings
  - NTP Service
- Management
  - Telnet Service
  - SSH Service
  - Web Management Service
  - XML Management Interface
- Other
  - User Agent
  - Peer Group
  - Load Balancer Group
  - SQL Data Source
  - TIBCO EMS
  - MQ Queue Manager
- Administration
- Objects

**Configure Ethernet Interface**

Main Static Routes Standby Control

Ethernet Interface: eth0 [up]

Apply Cancel Undo Export View Log View Status Start Packet Capture Stop Packet Capture Help

**Standby Control**

Group Number	Virtual IP Address	Enable/Disable Preempt Mode	Priority	First four authentication bytes	Last four authentication bytes	Auxiliary Virtual IP Address(es)	Enable/Disable Self Balance Mode
(empty)							

Add

**Edit Standby Control - Mozilla Firefox**

https://localhost:9090/webguiapi

**DATAPOWER | Edit Standby Control**

Group Number: 1

Virtual IP Address: \*

Enable/Disable Preempt Mode:  on  off

Priority: 100

First four authentication bytes: 0x35334158

Last four authentication bytes: 0x00000000

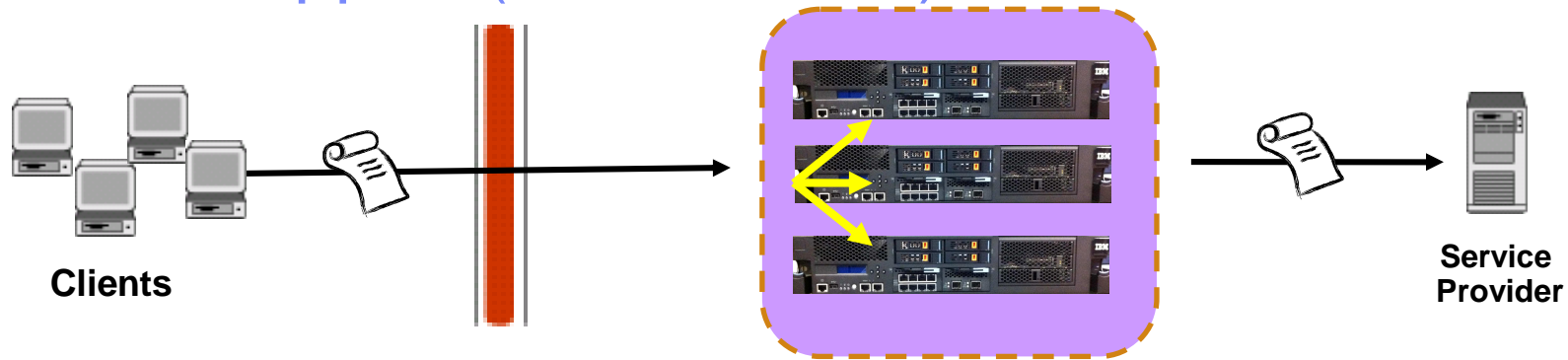
Auxiliary Virtual IP Address(es):

Enable/Disable Self Balance Mode:  on  off

Apply Cancel

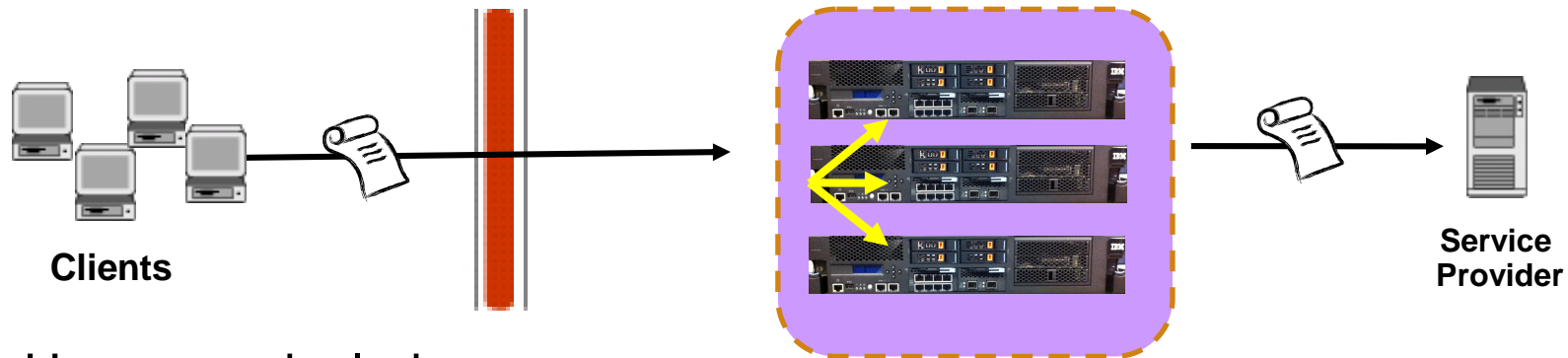
Firmware Rev: XI50.3.7.2.0  
 Build: No pd executable was located  
 IBM WebSphere DataPower  
 csupport@us.ibm.com  
 Copyright 1999-2008 DataPower Technology, Inc.

## Quiesce Support (New in 3.8.1)



- Stopping traffic in a graceful way
  - ▶ Ensure all existing transactions complete without error
  - ▶ Prevent new connections from arriving at an appliance through external load balancer configuration
  - ▶ Indicate when quiesced state is achieved
- Special hooks automatically remove quiesced targets from self-balanced sets

## Quiesce Support (New in 3.8.1)



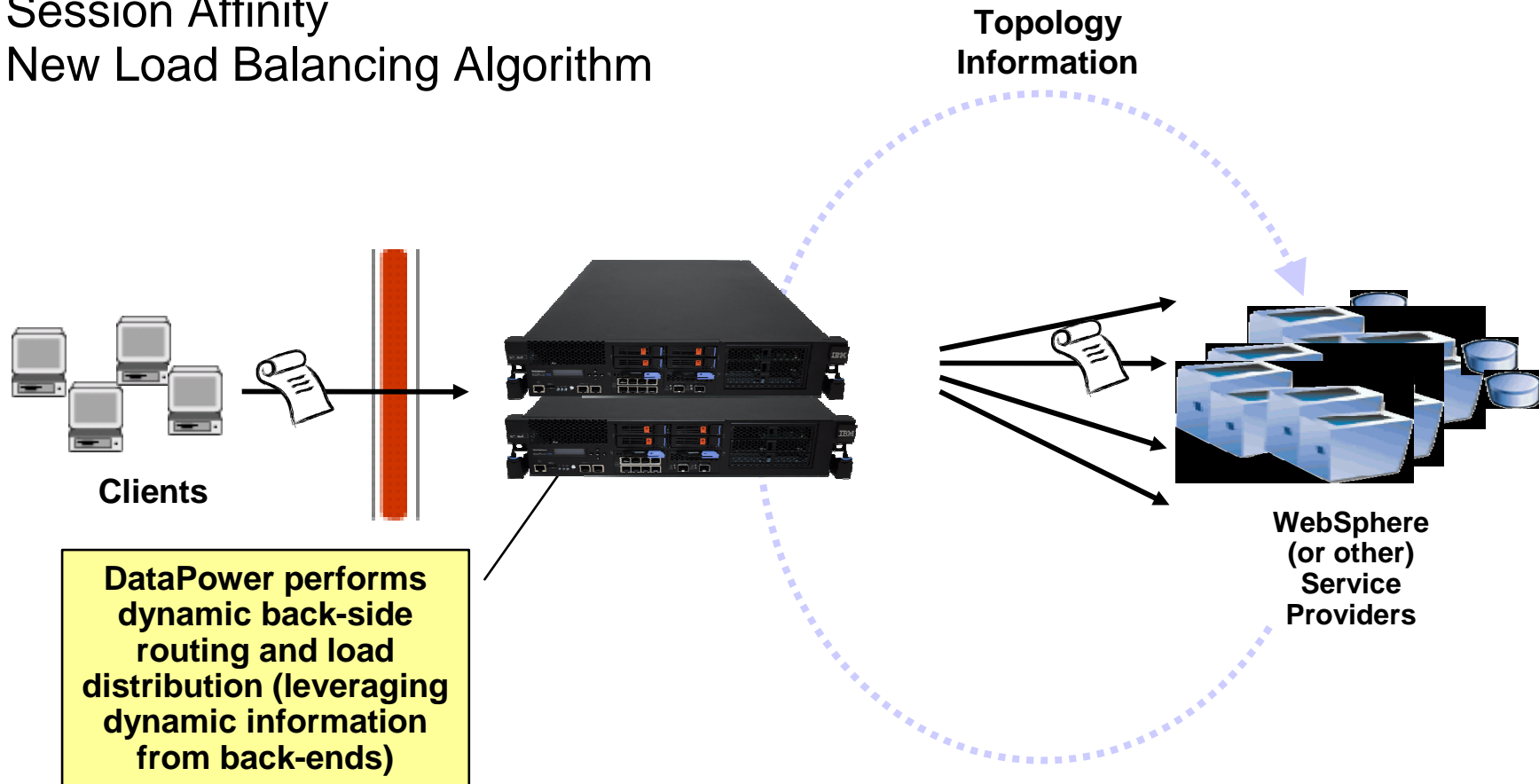
- Use cases include:
  - ▶ Firmware upgrades
  - ▶ Promoting configuration packages
  - ▶ Applying configuration changes
  - ▶ Troubleshooting
- Various levels of granularity
  - ▶ FSPH (configuration changes)
  - ▶ Service object (configuration changes)
  - ▶ Application domain (configuration promotion)
  - ▶ Entire appliance (firmware upgrades and proactive recycles)

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  - ▶ **Edition rollout**
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# Intelligent Load Distribution

- Dynamic configuration
- Session Affinity
- New Load Balancing Algorithm



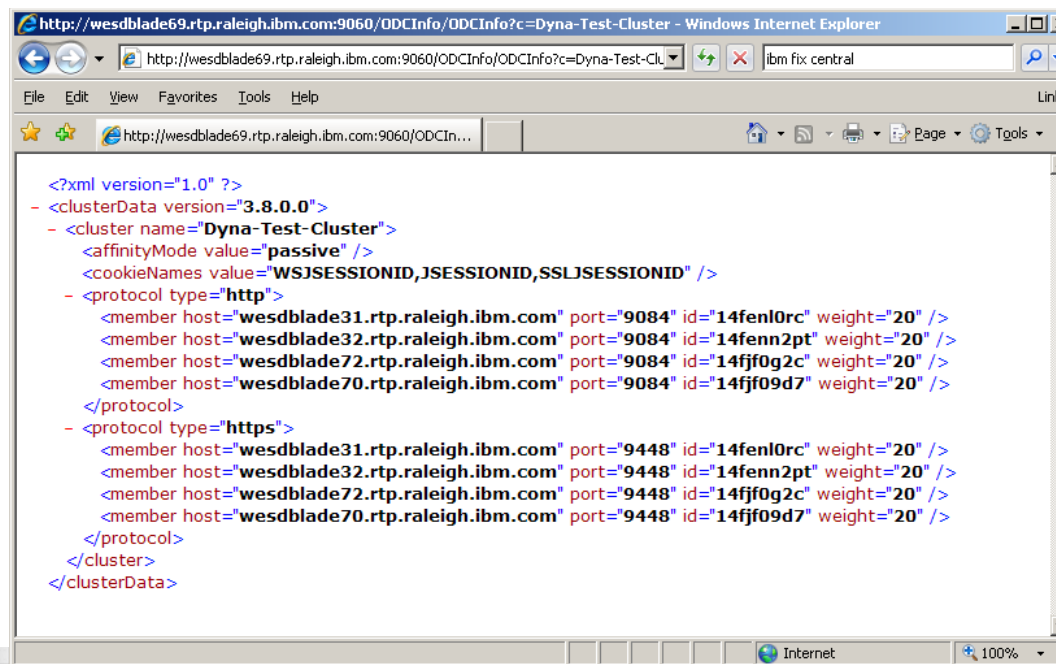


# Static vs Dynamic Configuration

- Static / Persisted Configuration
  - ▶ LBGroup configuration saved in non-volatile storage
  - ▶ Entered by an administrator or through SOMA
  - ▶ Initial Runtime Configuration
  - ▶ Static configuration is immediately available after a change is applied and before any dynamic population takes place.
- Dynamic Configuration
  - ▶ Runtime only. (Does not show up on configuration panels)
  - ▶ Overrides the static configuration when new information is retrieved
    - Members added / disabled
    - Member weights changed
    - Session Affinity tables changed
  - ▶ Shows up via the Load Balancer Group Status provider

# Usability Model

- Create a static LBGroup configuration to verify connectivity, service configuration, and data flow.
- Install and verify the ODCInfo Application on the DM of the WebSphere Cell.
  - ▶ ODCInfo verification script
  - ▶ Browser:  
[http://dm\\_host\\_name:9060/ODCInfo/ODCInfo?c=cluster\\_name](http://dm_host_name:9060/ODCInfo/ODCInfo?c=cluster_name)



The screenshot shows a Windows Internet Explorer browser window. The address bar contains the URL: `http://wesdblade69.rtp.raleigh.ibm.com:9060/ODCInfo/ODCInfo?c=Dyna-Test-Cluster`. The page content is XML data representing a cluster configuration. The XML is as follows:

```
<?xml version="1.0" ?>
- <clusterData version="3.8.0.0">
- <cluster name="Dyna-Test-Cluster">
  <affinityMode value="passive" />
  <cookieNames value="WSJSESSIONID,JSESSIONID,SSLJSESSIONID" />
- <protocol type="http">
  <member host="wesdblade31.rtp.raleigh.ibm.com" port="9084" id="14fenl0rc" weight="20" />
  <member host="wesdblade32.rtp.raleigh.ibm.com" port="9084" id="14fenn2pt" weight="20" />
  <member host="wesdblade72.rtp.raleigh.ibm.com" port="9084" id="14jfj0g2c" weight="20" />
  <member host="wesdblade70.rtp.raleigh.ibm.com" port="9084" id="14jfj09d7" weight="20" />
</protocol>
- <protocol type="https">
  <member host="wesdblade31.rtp.raleigh.ibm.com" port="9448" id="14fenl0rc" weight="20" />
  <member host="wesdblade32.rtp.raleigh.ibm.com" port="9448" id="14fenn2pt" weight="20" />
  <member host="wesdblade72.rtp.raleigh.ibm.com" port="9448" id="14jfj0g2c" weight="20" />
  <member host="wesdblade70.rtp.raleigh.ibm.com" port="9448" id="14jfj09d7" weight="20" />
</protocol>
</cluster>
</clusterData>
```

# Usability Model

- Create WebSphere Cell object (points to ODCInfo app)
  - ▶ Retrieves the WebSphere Cell information
  - ▶ One WebSphere Cell object can support multiple clusters

The screenshot shows a web browser window titled "DataPower XI50 - Configure:WebSphere Cell Configuration - Mozilla Firefox: IBM Edition". The address bar shows the URL: `https://dp10.nivt.raleigh.ibm.com:8080/?skipNav=true&screen=genericDetail&action=edit&requestClass=WCCService&reques`. The main content area is titled "Configure WebSphere Cell Configuration" and features a "Main" tab. Below the tab, the text "WebSphere Cell Configuration: XD61Cell [up]" is displayed. There are three buttons: "Apply", "Cancel", and "Undo". To the right, there are links for "Export", "View Log", "View Status", and "Help". The configuration fields are as follows:

Admin State	<input checked="" type="radio"/> enabled <input type="radio"/> disabled
Comments	<input type="text"/>
Deployment Manager Hostname	<input type="text" value="dpblade34.nivt.raleigh.ibm.com"/> *
Deployment Manager Port	<input type="text" value="9060"/> *
SSL Proxy Profile	<input type="text" value="(none)"/> + ...
Polling Interval	<input type="text" value="10"/> seconds *

The status bar at the bottom shows "Done" and the address "dp10.nivt.raleigh.ibm.com:8080".

# Usability Model

- Configure the Load Balancer Group to consume the information.

The screenshot shows the configuration page for a Load Balancer Group named 'AutoLBGroup'. The interface includes a navigation bar with tabs for 'Main', 'Health', 'Session Affinity', and 'Members'. The 'Main' tab is active, displaying various configuration options. A red bracket on the right side of the form groups several fields under the label 'AO Questions'.

Field Name	Value
Admin State	<input checked="" type="radio"/> enabled <input type="radio"/> disabled
Comments	Uses WCC to retrieve canned result
Algorithm	Round Robin *
Retrieve Workload Management Information	<input checked="" type="radio"/> on <input type="radio"/> off *
Workload Management Retrieval	WebSphere Cell
WebSphere Cell	AutoWCC + ...
Workload Management Group Name	xyzCluster
Protocol	HTTP
Damp Time	120 *
Do not Bypass Down State	<input type="radio"/> on <input checked="" type="radio"/> off
Try Every Server Before Failing	<input type="radio"/> on <input checked="" type="radio"/> off
Masquerade As Group Name	<input type="radio"/> on <input checked="" type="radio"/> off

# Load Balancer Group Status Provider

WebSphere. DataPower XI50 admin @ dp10.nivt.raleigh.ibm.com Save Config Logout Domain: default

Control Panel

Debug-Level Logging is enabled, which impacts performance. [Manage debug settings.](#)

**Load Balancer Status**

[Refresh Status](#) [Show All Domains](#)

Group	Host	Port	Operational State	Weight	Administrative State
FB40	dpblade32.nivt.raleigh.ibm.com	9081	up	10	enabled
FB40	dpblade33.nivt.raleigh.ibm.com	9081	up	10	enabled
FB40	dpblade34.nivt.raleigh.ibm.com	9081	up	10	enabled
ND61LBgroup1	wasnode1	9081	up	3	disabled
ND61LBgroup1	wasnode2	9081	up	2	disabled
ND61LBgroup1	wasnode1.nivt.raleigh.ibm.com	9081	up	1	disabled
ND61LBgroup1	wasnode2.nivt.raleigh.ibm.com	9081	up	1	disabled
newtom4	mynode1	9081	up	1	disabled
newtom4	wasnode1	9081	up	3	disabled
newtom4	wasnode2	9081	up	2	disabled
tjs1	dpblade32.nivt.raleigh.ibm.com	9081	up	20	enabled
tjs1	dpblade33.nivt.raleigh.ibm.com	9081	up	10	enabled
tjs1	dpblade34.nivt.raleigh.ibm.com	9081	up	20	enabled
tomStatic	wasnode1.nivt.raleigh.ibm.com	9081	up	1	enabled
tomStatic	wasnode2.nivt.raleigh.ibm.com	9081	up	1	enabled

# Weighted Least Connections Algorithm

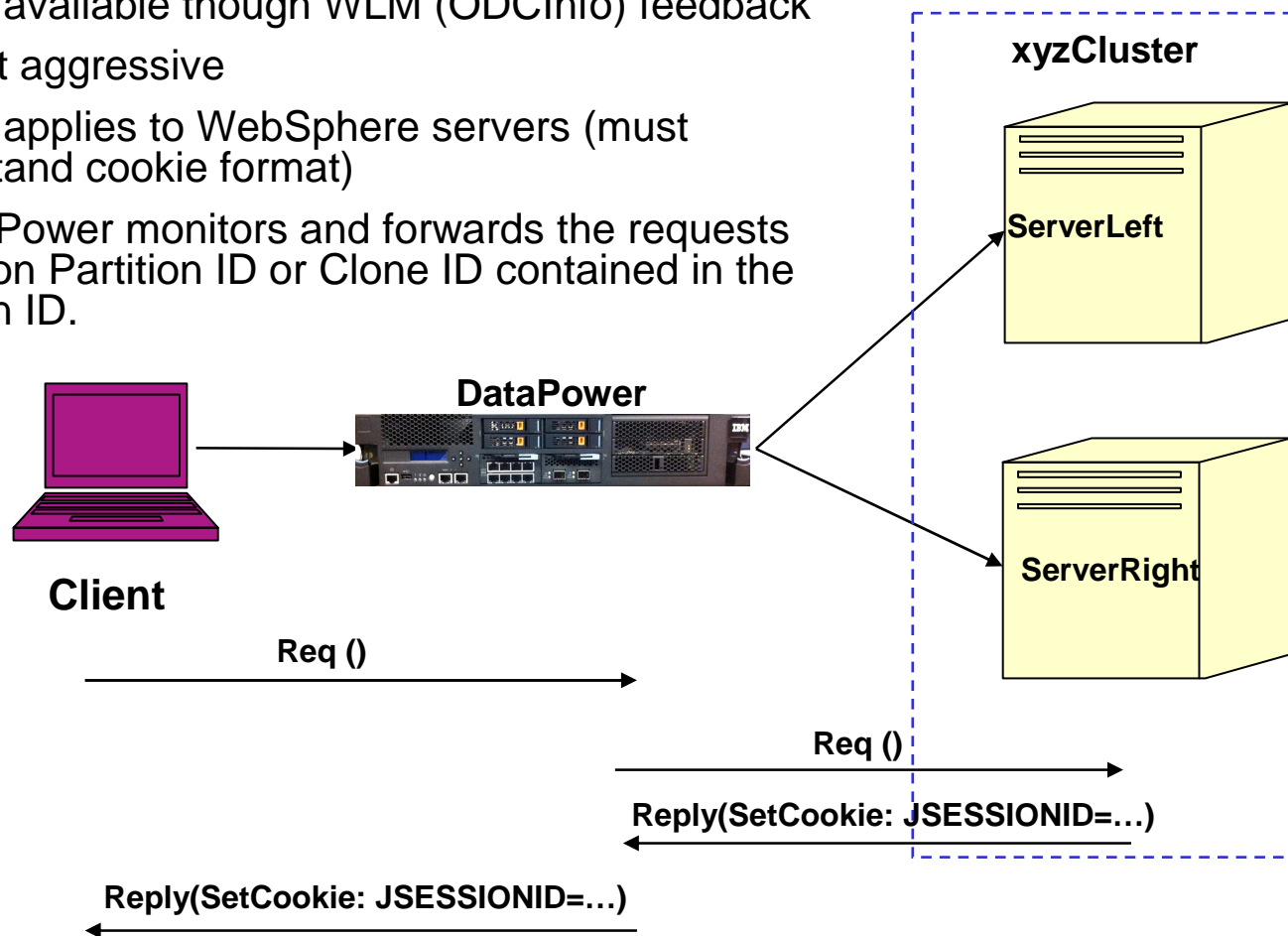
- Imposes weight infrastructure on top of Least Connections.
  - ▶ The larger the weight, the larger the percentage of connections that will go to a given server.
  - ▶ The smaller the number of connections, the more likely that a server will receive the next connection.
- Implicit back pressure re-routes requests to the healthier, faster servers.

# Session Affinity - Overview

- Cookies – the basis for persistent client state
- Session Affinity - uses cookies to more efficiently provide the persistent (session) information to an Application by forwarding every request within a session to the same server.
  - ▶ Required for efficient Session Management in application servers.
- A Session ID contains a name and a value
  - ▶ Session information (Ignored by DataPower)
  - ▶ Routing information (Clone ID, Partition ID, or a hash value)
- With Session Affinity enabled
  - ▶ If DataPower recognizes the session ID format and can resolve the routing information, it uses the routing information to forward the request.
  - ▶ If no session ID, or the routing information cannot be resolved, the request is load balanced.

# Passive Session Affinity Flow

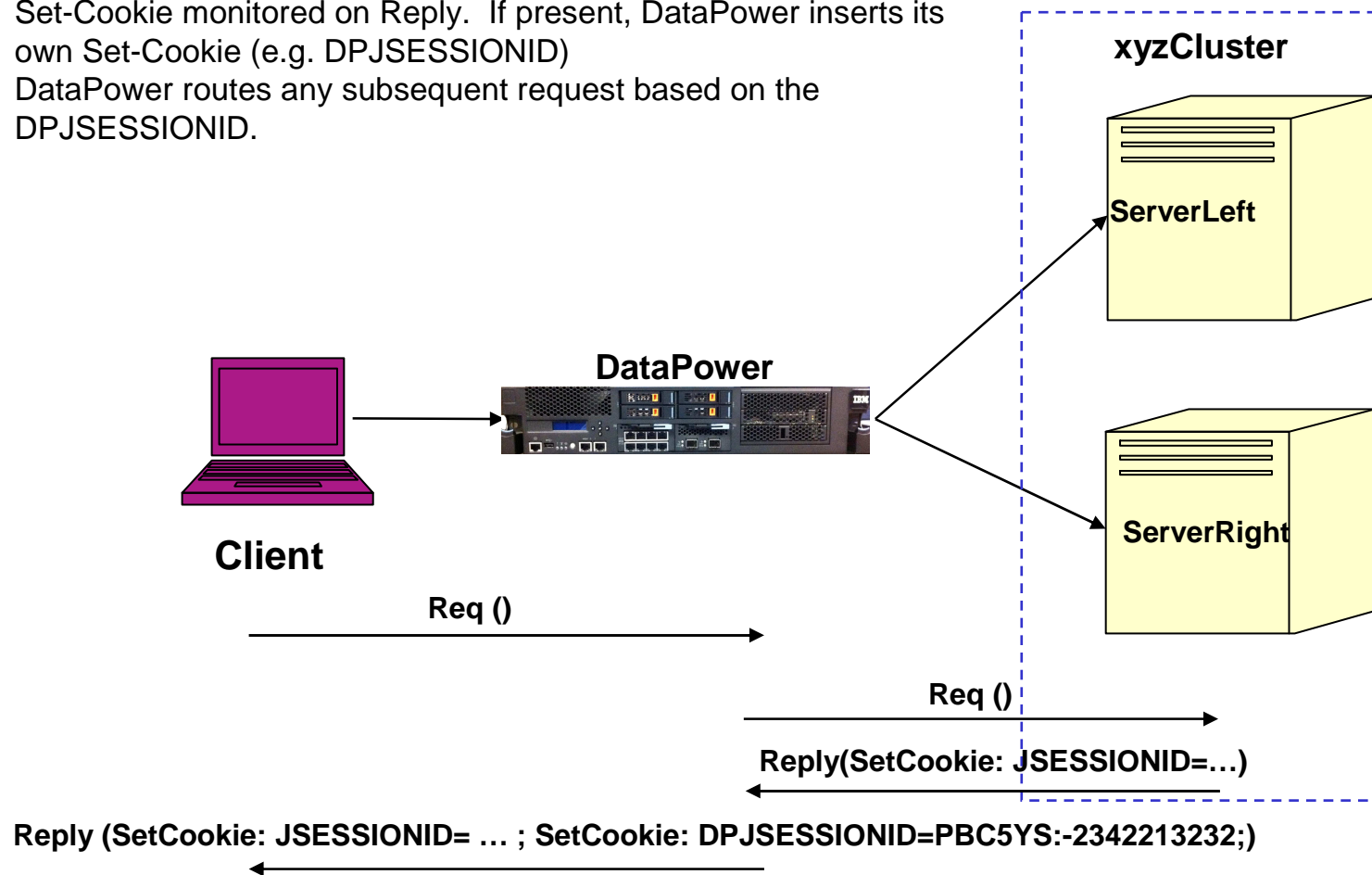
- ▶ Only available through WLM (ODCInfo) feedback
- ▶ Least aggressive
- ▶ Only applies to WebSphere servers (must understand cookie format)
- ▶ DataPower monitors and forwards the requests based on Partition ID or Clone ID contained in the Session ID.





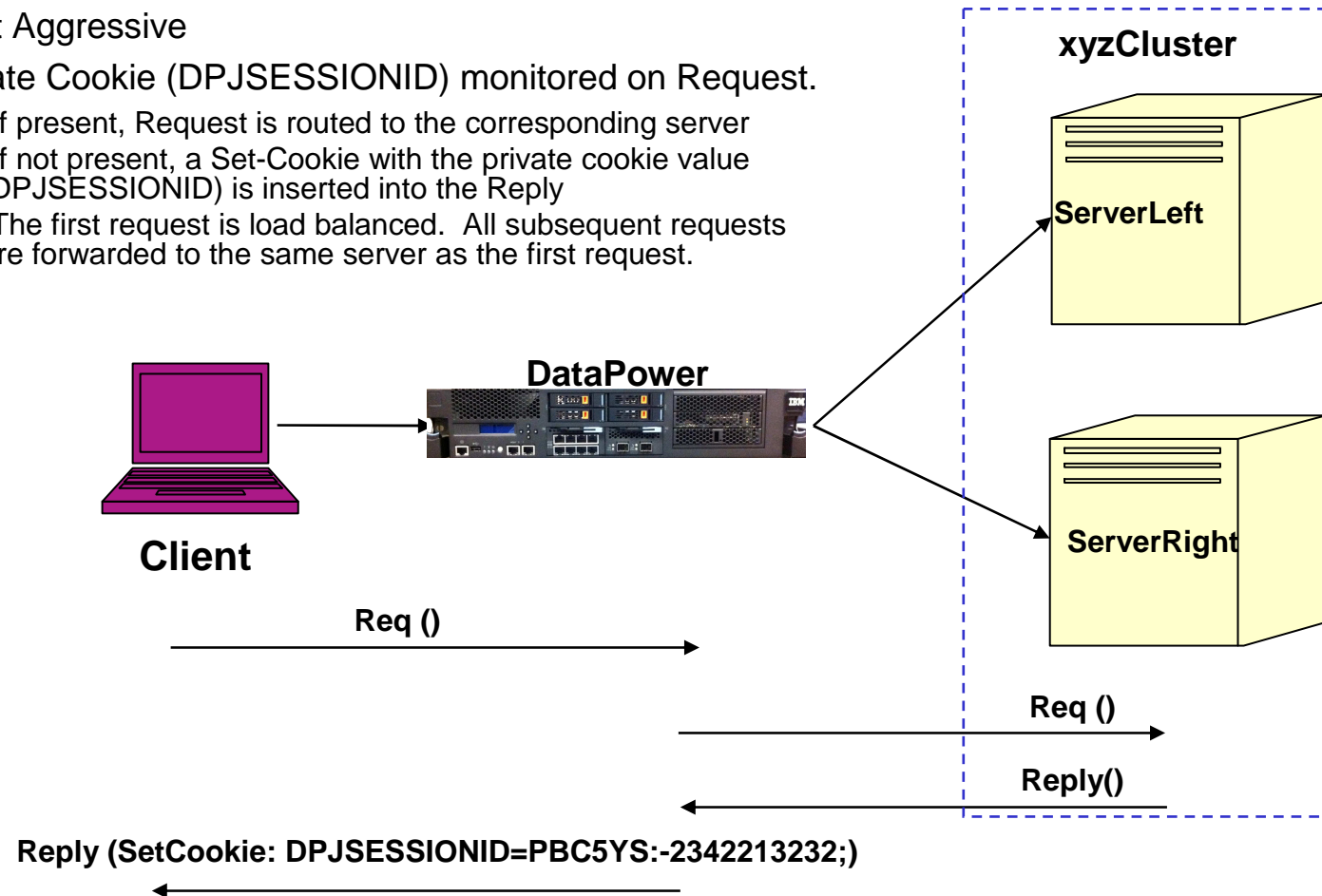
# Active-Conditional Session Affinity Flow

- Applies to any back-end server
- Set-Cookie monitored on Reply. If present, DataPower inserts its own Set-Cookie (e.g. DPJSESSIONID)
- DataPower routes any subsequent request based on the DPJSESSIONID.

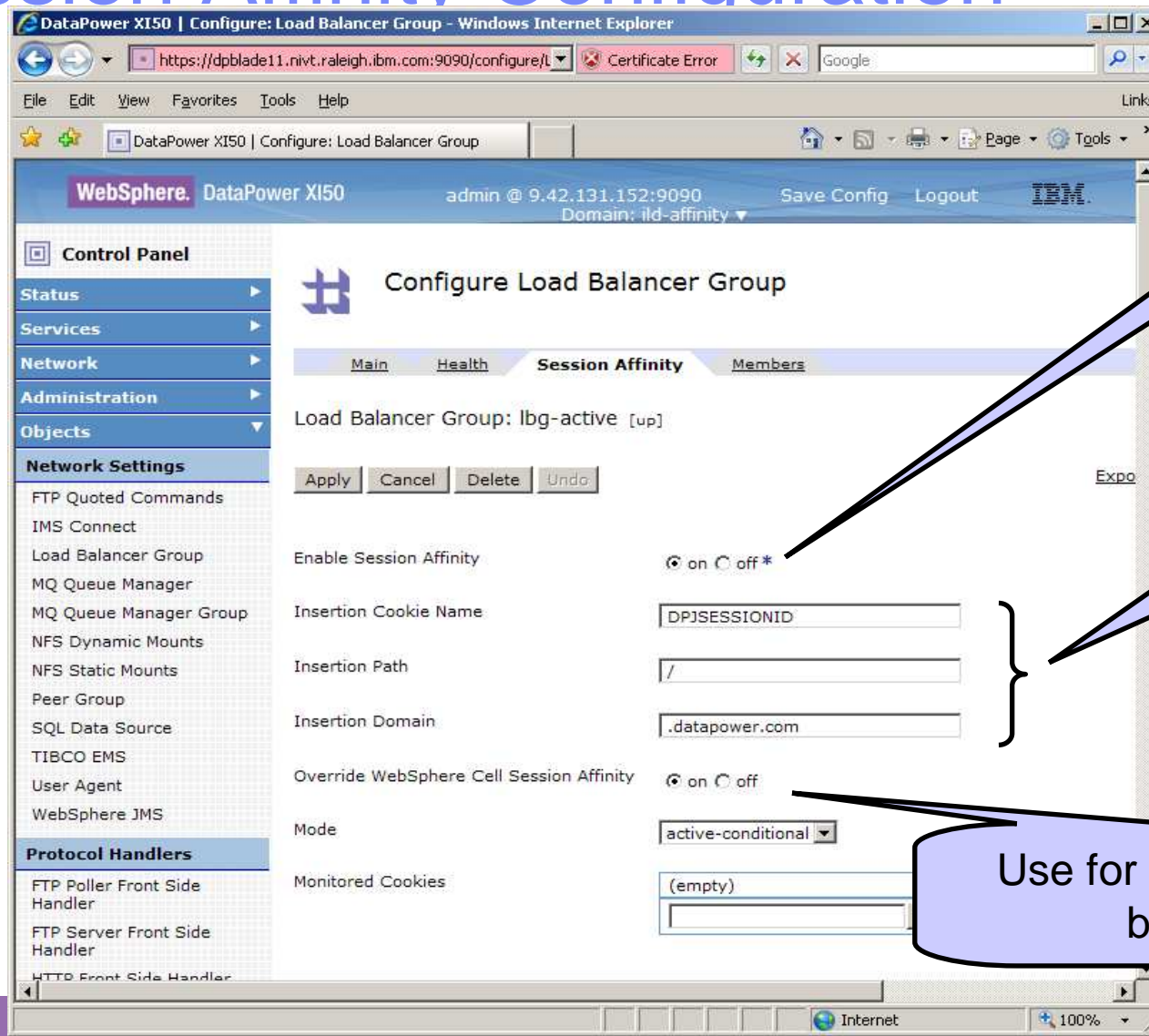


# Active Session Affinity Flow

- ▶ Applies to any back-end server
- ▶ Most Aggressive
- ▶ Private Cookie (DPJSESSIONID) monitored on Request.
  - If present, Request is routed to the corresponding server
  - If not present, a Set-Cookie with the private cookie value (DPJSESSIONID) is inserted into the Reply
  - The first request is load balanced. All subsequent requests are forwarded to the same server as the first request.



# Session Affinity Configuration



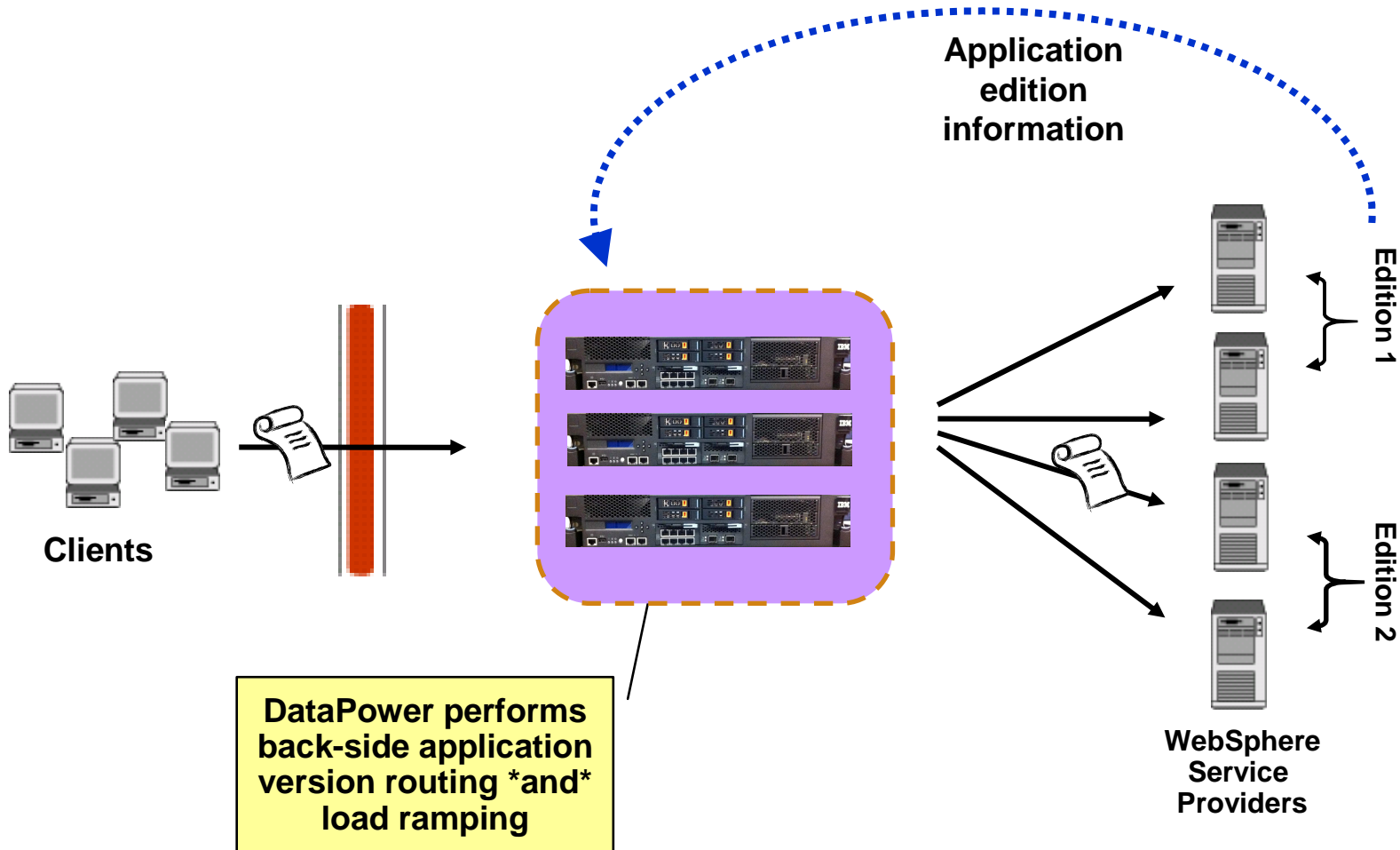
Enable Switch

Insertion Cookie Information

Use for non-WebSphere backends



# Application Edition Routing (3.8.1)



# Enabling Application Edition Routing

The screenshot shows the DataPower XI50 configuration interface in a Windows Internet Explorer browser window. The main configuration area is titled 'Load Balancer Group: AutoLBGroup [up]'. A yellow rectangular box highlights a specific section of the configuration, which includes the following settings:

- Damp Time: 120
- Do not Bypass Down State:  on  off
- Try Every Server Before Failing:  on  off
- Masquerade As Group Name:  on  off
- Enable Application Routing**:  on  off

Other visible settings in the main interface include: Admin State (enabled), Algorithm (Round Robin), Retrieve Workload Management Information (on), Workload Management Retrieval (WebSphere Cell), WebSphere Cell (AutoWCC), Workload Management Group Name (xyzCluster), Protocol (HTTP), and Damp Time (120).

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## What is Akamai?

Akamai deploys servers into thousands of ISPs close to applications & end users

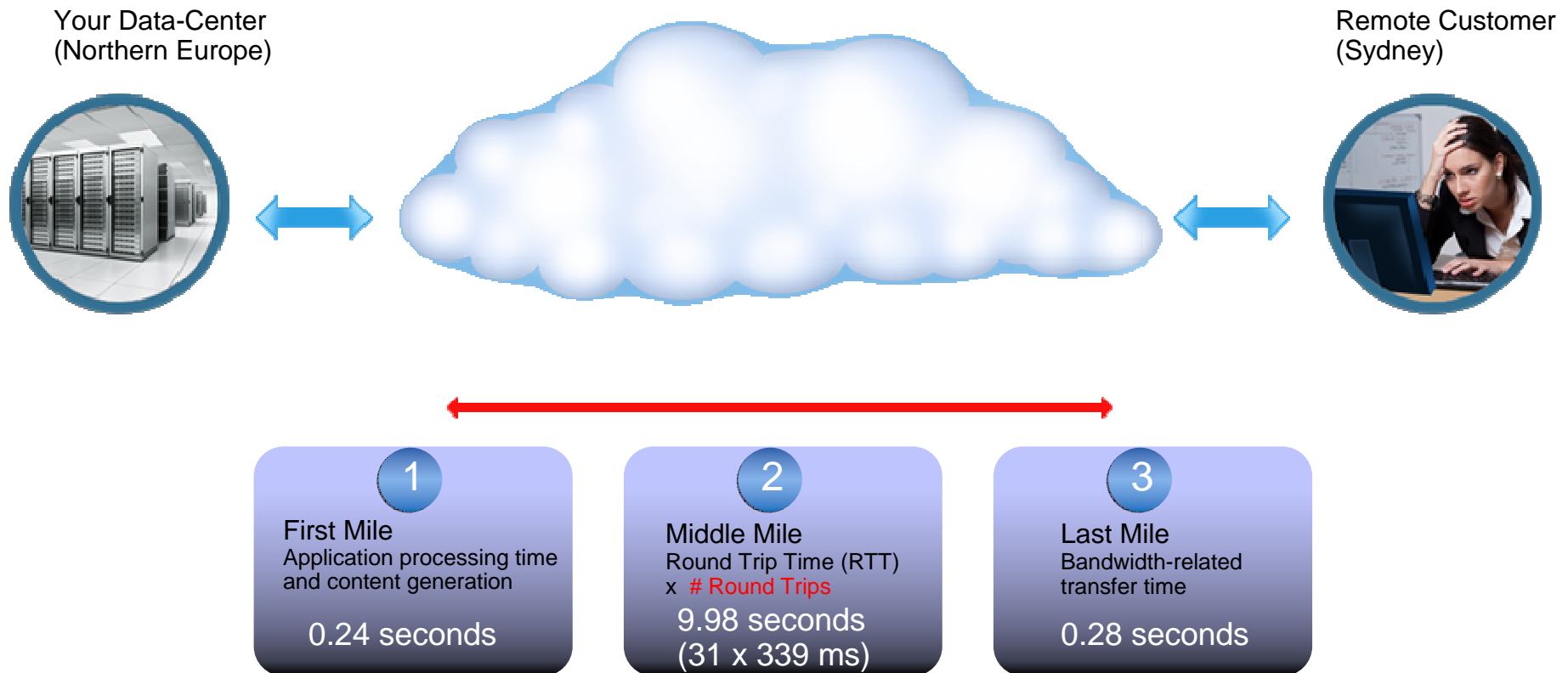
- 84,000+ Servers
- 1,000 Networks
- 71 Countries
- 3,000 PoPs
  
- 90% of Internet users are within one 'hop' (of an Akamai server)
  
- Transparent to end-users and applications



# Impact of the Typical Middle Mile

Response time to end user takes **10.5 seconds** with 31 round trips

95% of Total Response Time is Due to the Middle Mile



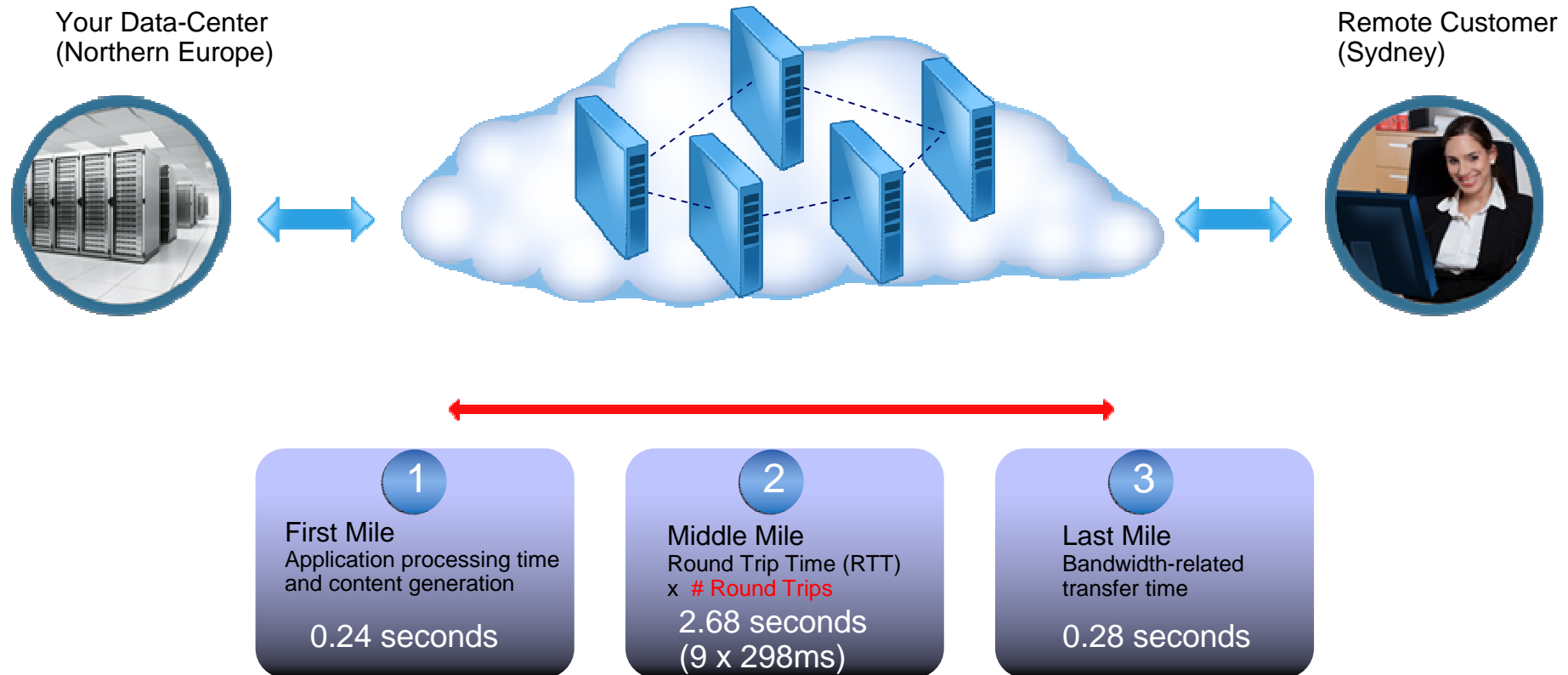
From Stockholm to Sydney, rendering a typical 70k Web page with 25 objects requires 31 round trips



## With an Efficient Middle Mile

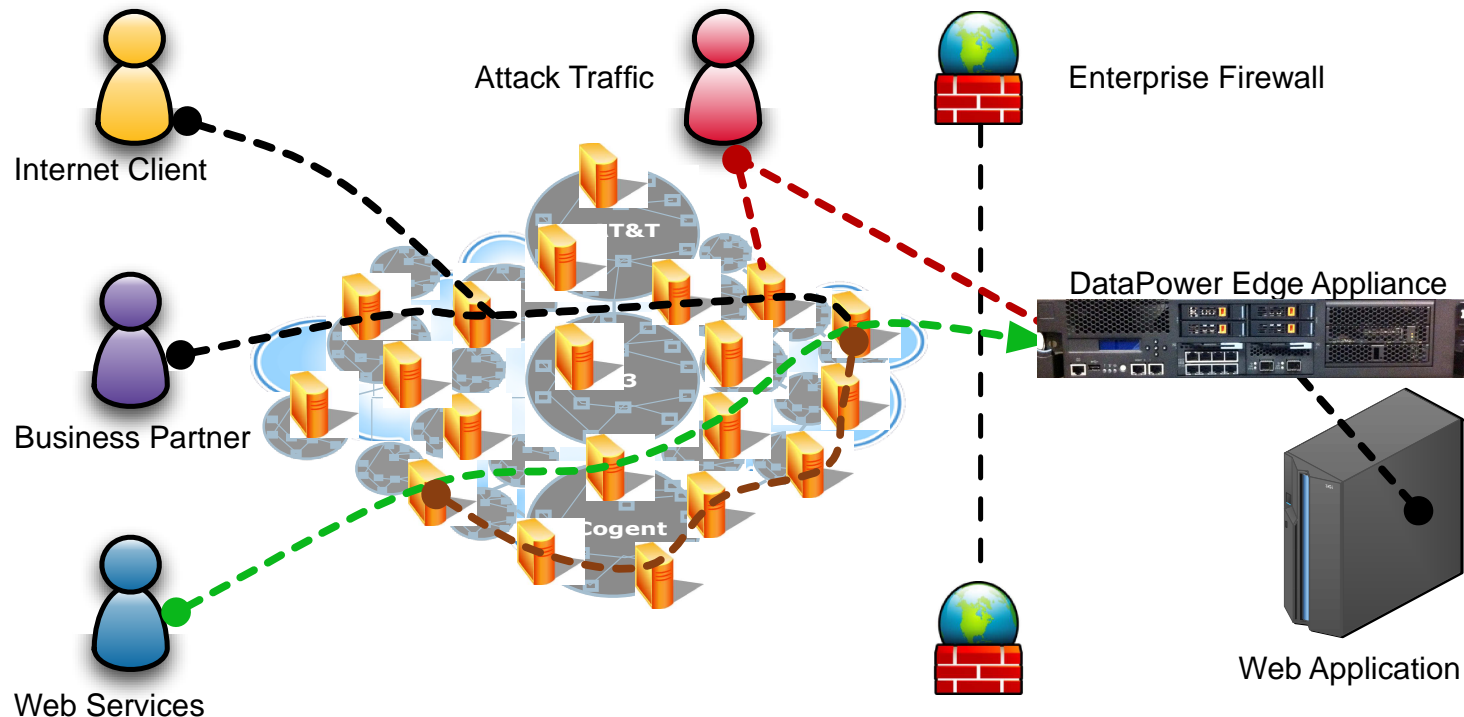
*Response time to end user reduced to **3.2 seconds** with only **9 round trips***

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 9 round trips

# WebSphere™ Application Acceleration (WAXPN)

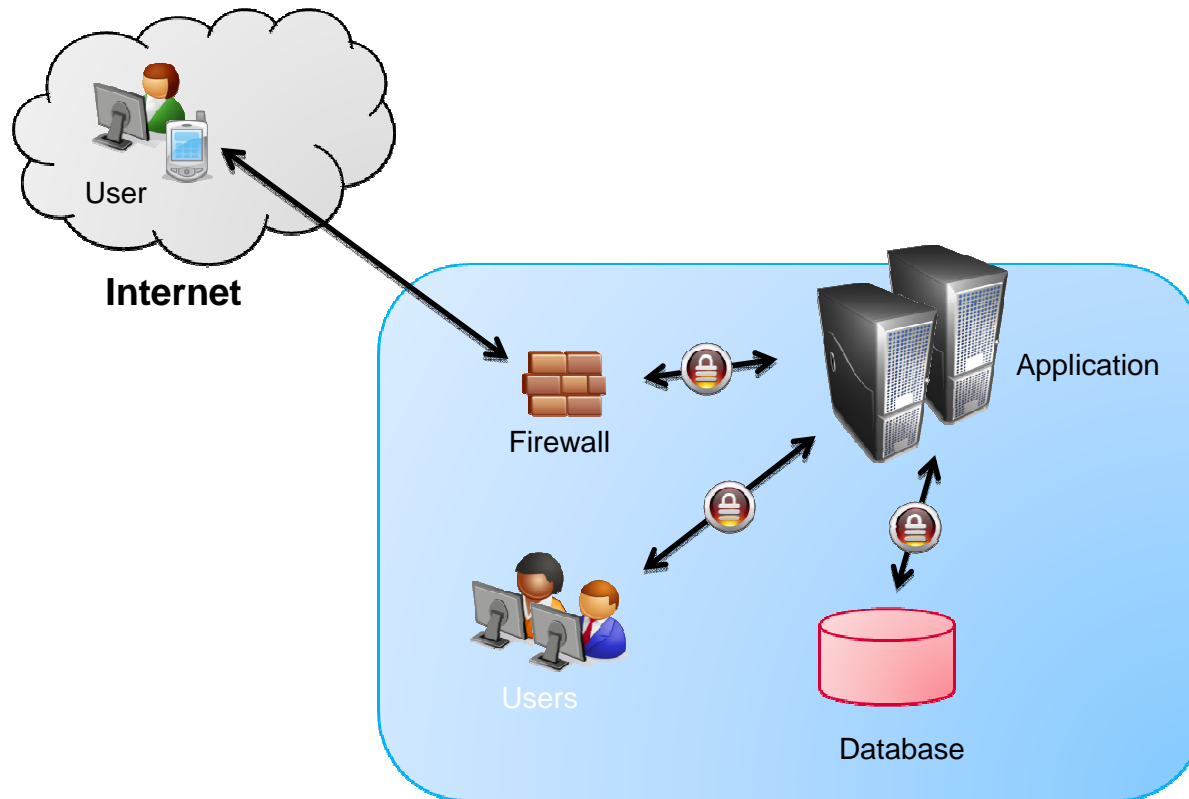


1. Security and Internet threat protection
2. Akamai SureRoute™ Beacon Off-load and Management
3. Result: Performance and Acceleration

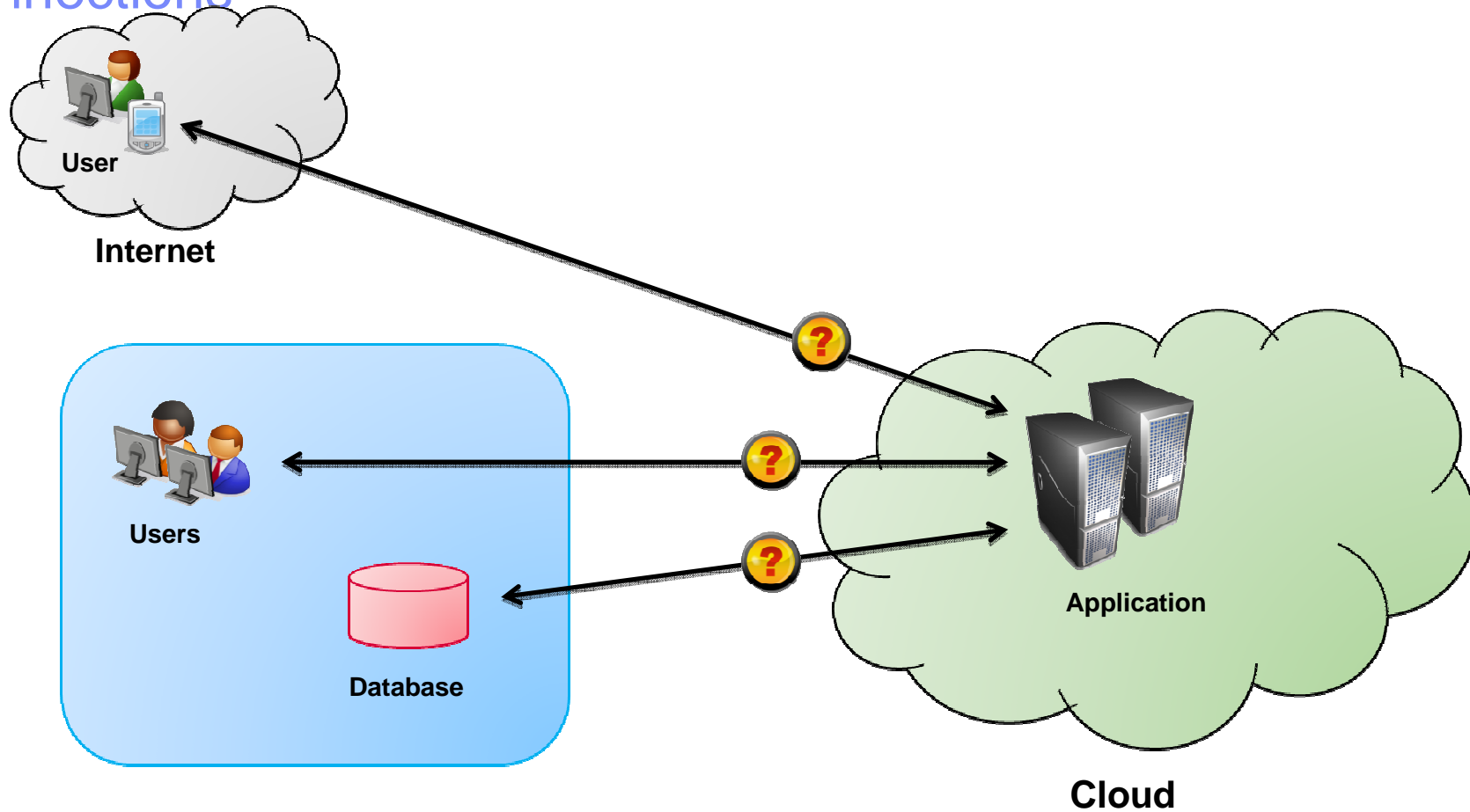
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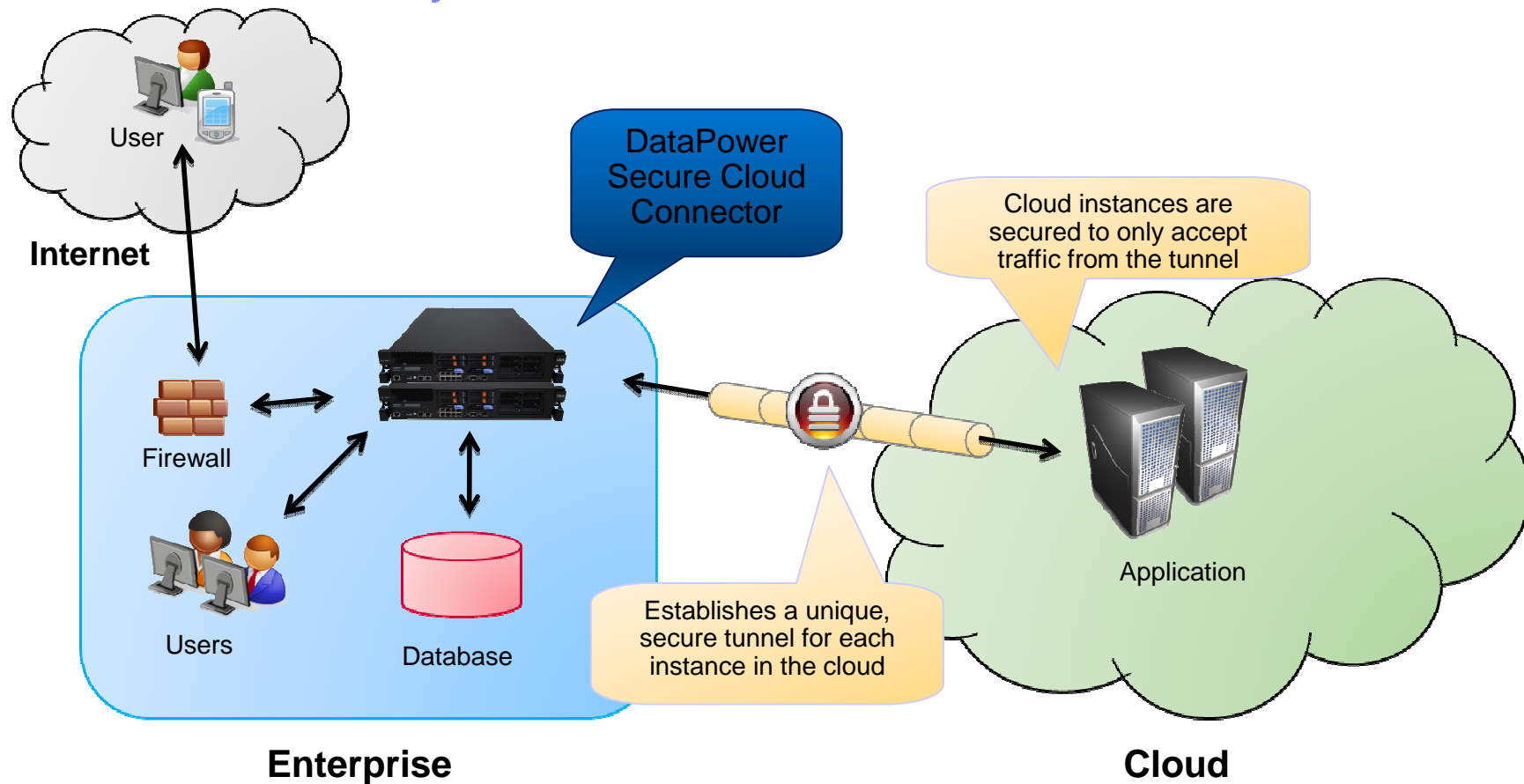
# Traditional applications control connection security within the enterprise



# Moving applications to the cloud exposes previously secure connections



# The DataPower Secure Cloud Connector restores your connection security

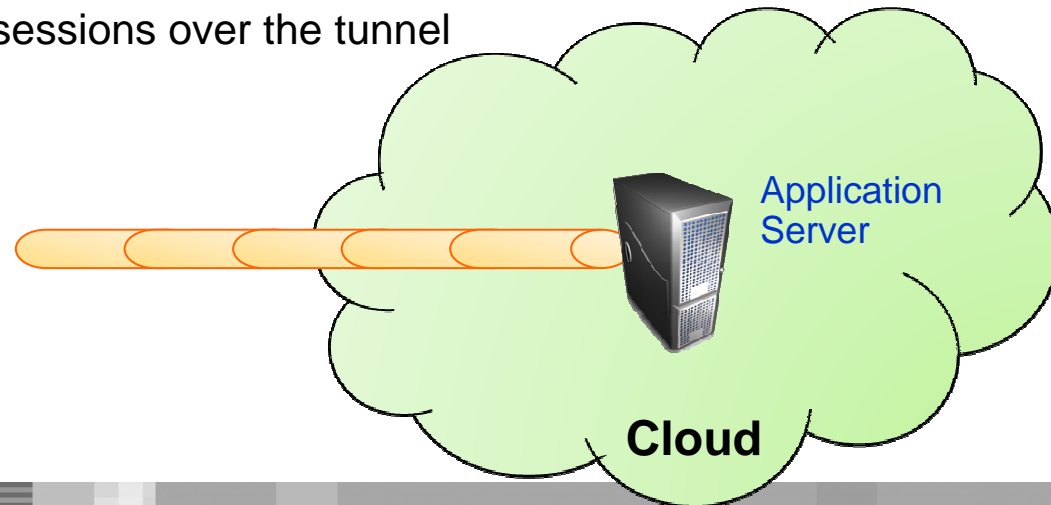


## Secure Cloud Connector (new in 3.8.2)

- WebSphere DataPower Secure Cloud Connector
  - ▶ Application Optimization license is required
- Utilizes SSH to create a secure tunnel between the appliance and an endpoint in a cloud
  - ▶ Minimum supported server level is OpenSSH 4.3p1
  - ▶ Only IPv4 addressing is supported
  - ▶ Tunnel creation must be initiated from the appliance
  - ▶ Once an SSH tunnel is created either endpoint can initiate sending data
  - ▶ Supports multiple two-way sessions over the tunnel



XG or XI appliance with  
Application Optimization license



# Configuring a Secure Cloud Connector

Control Panel

Debug-Level Logging is enabled, which impacts performance. [Manage debug settings.](#)

## Configure Cloud Instance

Main

Cloud Instance

Apply Cancel Help

Name  \*

Administrative State  enabled  disabled

Comments

Remote Host  \*

Remote Port  \*

SSH Client Profile  + ... \*

Local Tunnel IPv4 Address  \*

Remote Tunnel IPv4 Address  \*

Remote Tunnel Identifier

Remote Auto Configuration  on  off

ICMP Liveness Check  on  off

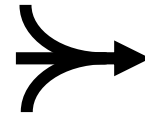
Firmware Rev: X150.3.8.2.0  
Build: .No change number available  
IBM WebSphere DataPower



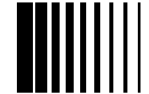
# WebSphere DataPower Appliances...



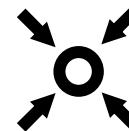
**SECURE**



**SIMPLIFY**



**ACCELERATE**



**GOVERN**

[www.ibm.com/software/integration/datapower](http://www.ibm.com/software/integration/datapower)



# Additional WebSphere Product Resources

- Learn about upcoming WebSphere Support Technical Exchange webcasts, and access previously recorded presentations at:  
[http://www.ibm.com/software/websphere/support/supp\\_tech.html](http://www.ibm.com/software/websphere/support/supp_tech.html)
- Discover the latest trends in WebSphere Technology and implementation, participate in technically-focused briefings, webcasts and podcasts at:  
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- Join the Global WebSphere Community:  
<http://www.websphereusergroup.org>
- Access key product show-me demos and tutorials by visiting IBM® Education Assistant:  
<http://www.ibm.com/software/info/education/assistant>
- View a webcast replay with step-by-step instructions for using the Service Request (SR) tool for submitting problems electronically:  
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# Questions and Answers

