Enabling Cloud Computing with WebSphere
Podcast Education Series

CloudComputing_AO.mp3
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Application Optimization - Agenda

- General Background
- Why Application Optimization
- Self Balancing
- Intelligent Load Distribution
  - Dynamic Configuration
  - Session Affinity
  - WLC load distribution algorithm
- Application Routing
- Web 2.0
- Quiesce support

DataPower SOA Appliances Product Family

Low Latency Appliance XM70

- High volume, low latency messaging
- Enhanced QoS and performance
- Simplified, configuration-driven approach to LLM
- Publish/subscribe messaging
- High Availability

B2B Appliance XB60

- B2B Messaging (AS1/AS2/AS3)
- Trading Partner Profile Management
- B2B Transaction Viewer
- Unparalleled performance
- Simplified management and config

Integration Appliance XI50

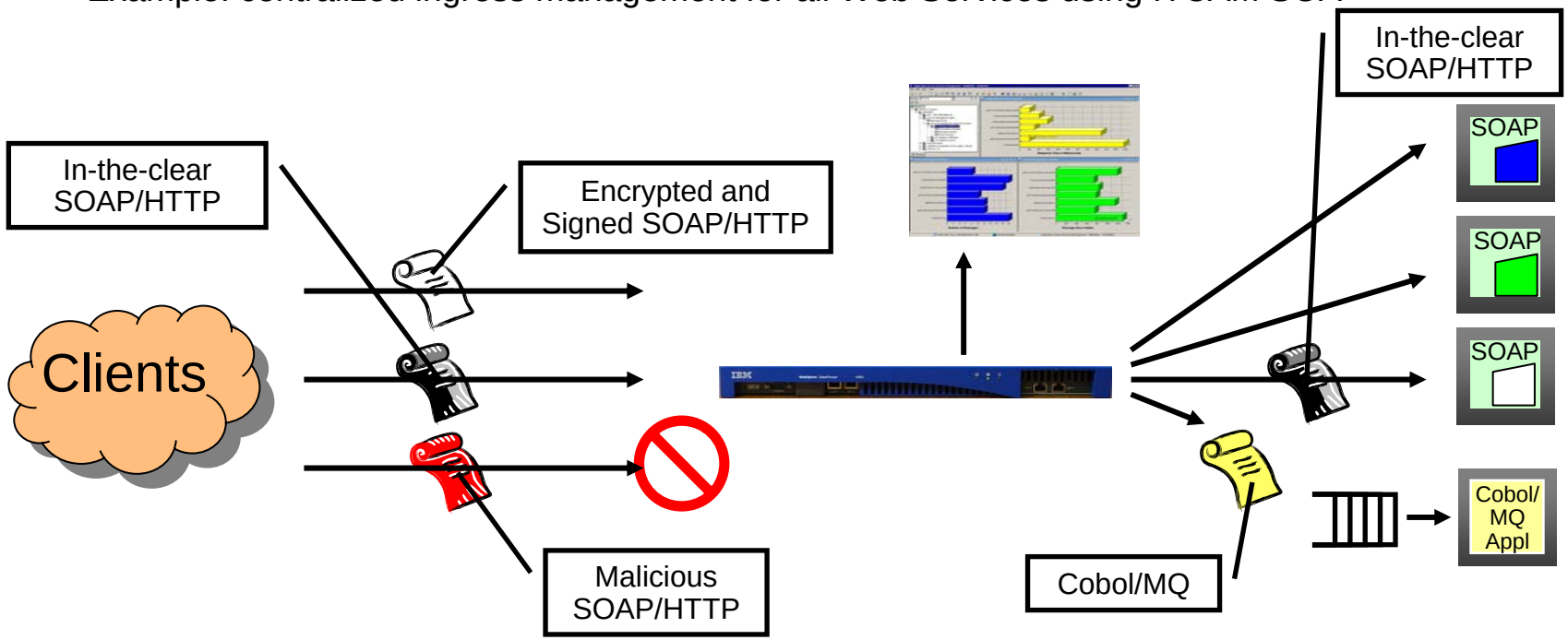
- Hardware ESB
- “Any-to-Any” Conversion at wire-speed with WS-TX
- Bridges multiple protocols
- Integrated message-level security

XML Security Gateway XS40

- Enhanced Security Capabilities
- Centralized Policy Enforcement
- Fine-grained authorization
- Rich authentication

Typical DataPower Use Cases

- Functional acceleration
  - Example: XSLT, WS Security
- Deep-content routing and data aggregation
  - Example: XPath (content) routing on Web Service parameters
- Application-layer security and threat protection
  - Example: XML Denial-of-Service protection, WS Security
- Protocol and message bridging
  - Example: Convert to WS to legacy Cobol/MQ
- Monitoring and control
  - Example: centralized ingress management for all Web Services using ITCAM SOA



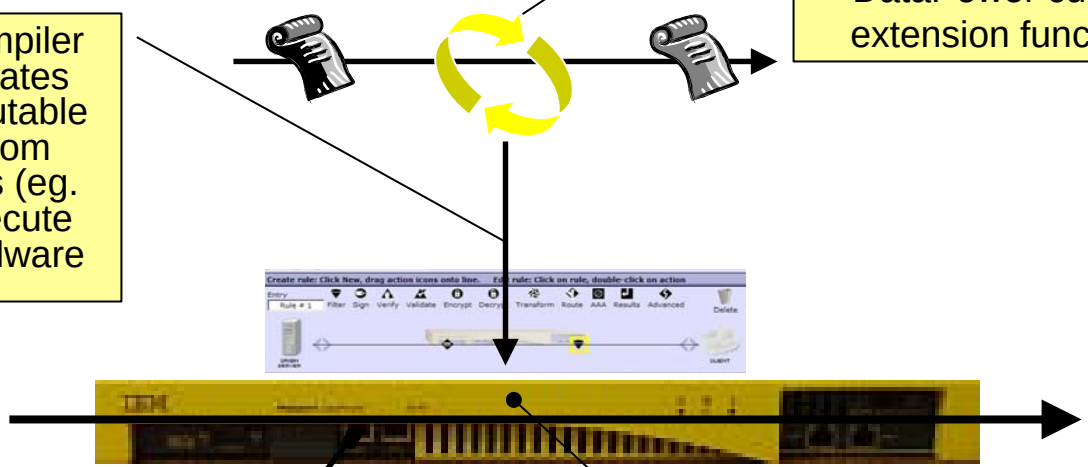
Why an Appliance for SOA?

- Integrated
  - Many functions integrated into a single device
  - Addresses the divergent needs of different groups (architects, operators, developers)
  - Integrates well with other IBM SWG and standards-based products
- Hardware reliability
  - Dual power supplies, no spinning media, self-healing capability, failover support
- Security
  - Higher levels of security assurance certifications require hardware (HSM, government criteria)
  - Inline application-aware security filtering and intrusion protection
- Higher performance with hardware acceleration
  - Wire-speed application-aware parsing and processing
  - Ability to perform costly XML security operations without slow downs
- Consumability
  - Simplified deployment and management: up in minutes, not hours
  - Reduces need for in-house SOA skills & accelerates time to SOA benefits

The DataPower Secret Sauce

Everything is viewed as a transformation that is extensible via DataPower custom extension functions

Specialized compiler technology creates optimized executable object code from transformations (eg. XSLT) that execute natively on hardware

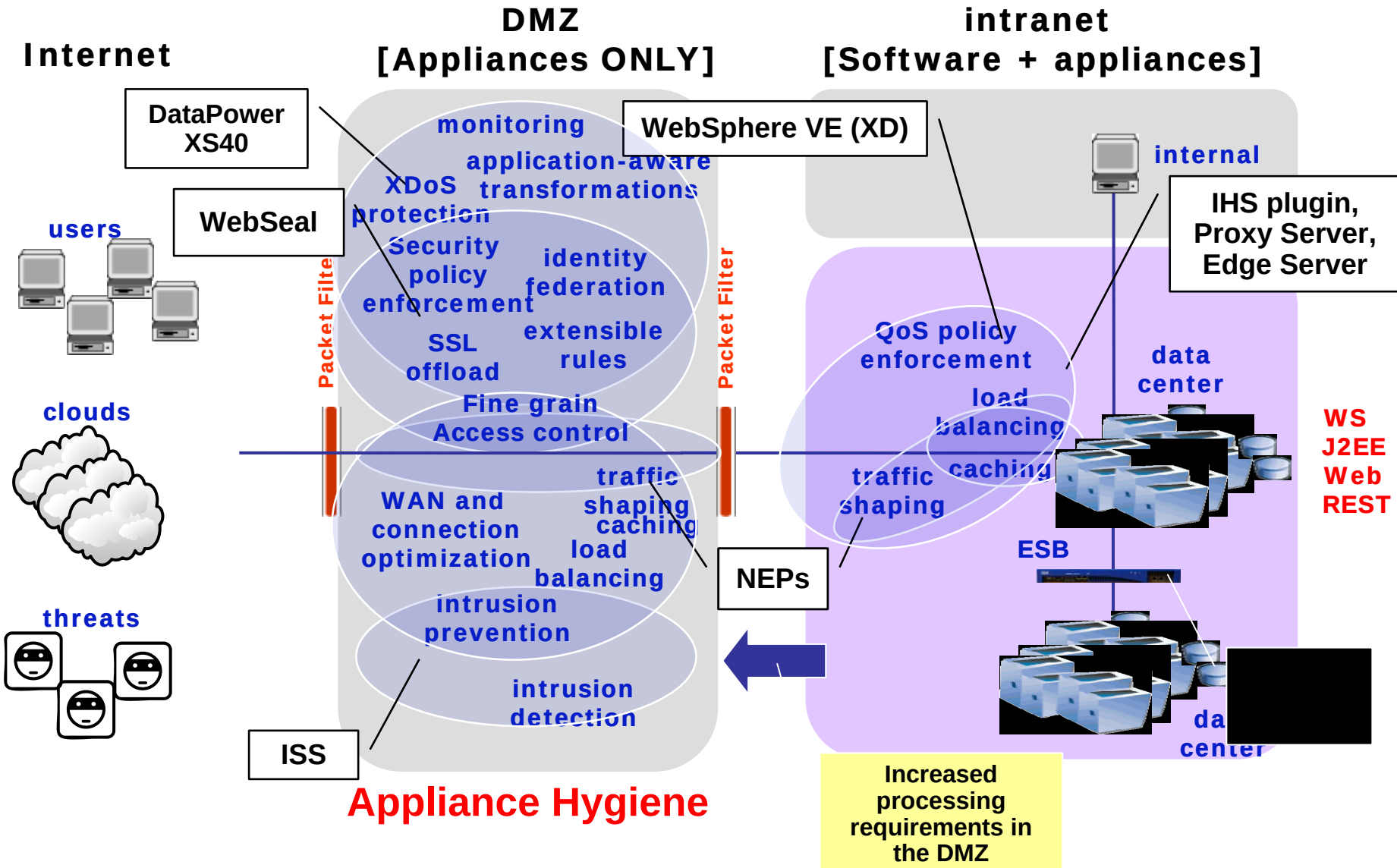


High-performing throughput-optimized engine yields wire-speed capabilities

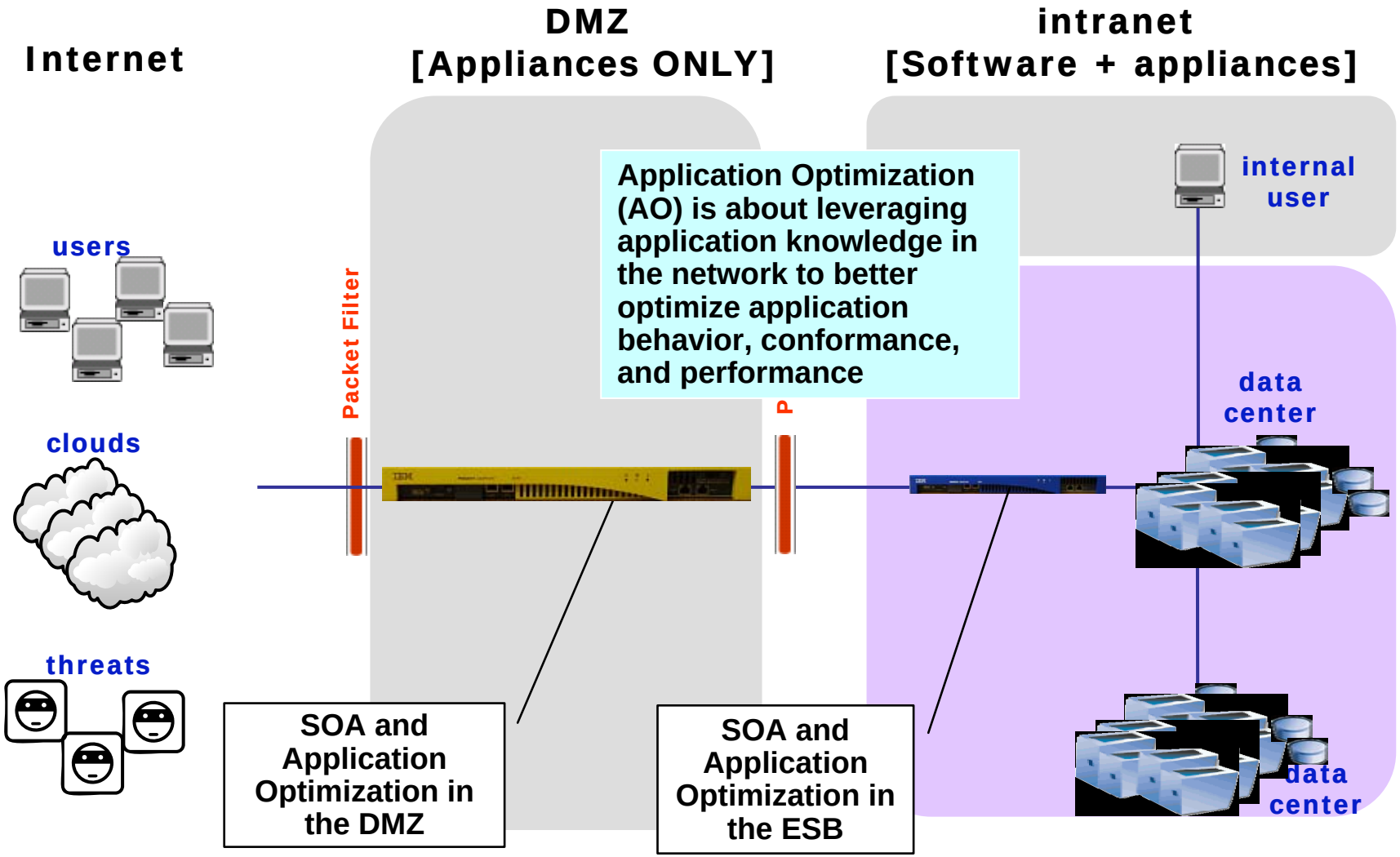
Purpose-built hardware to execute SOA workloads and transformations

Application Optimization

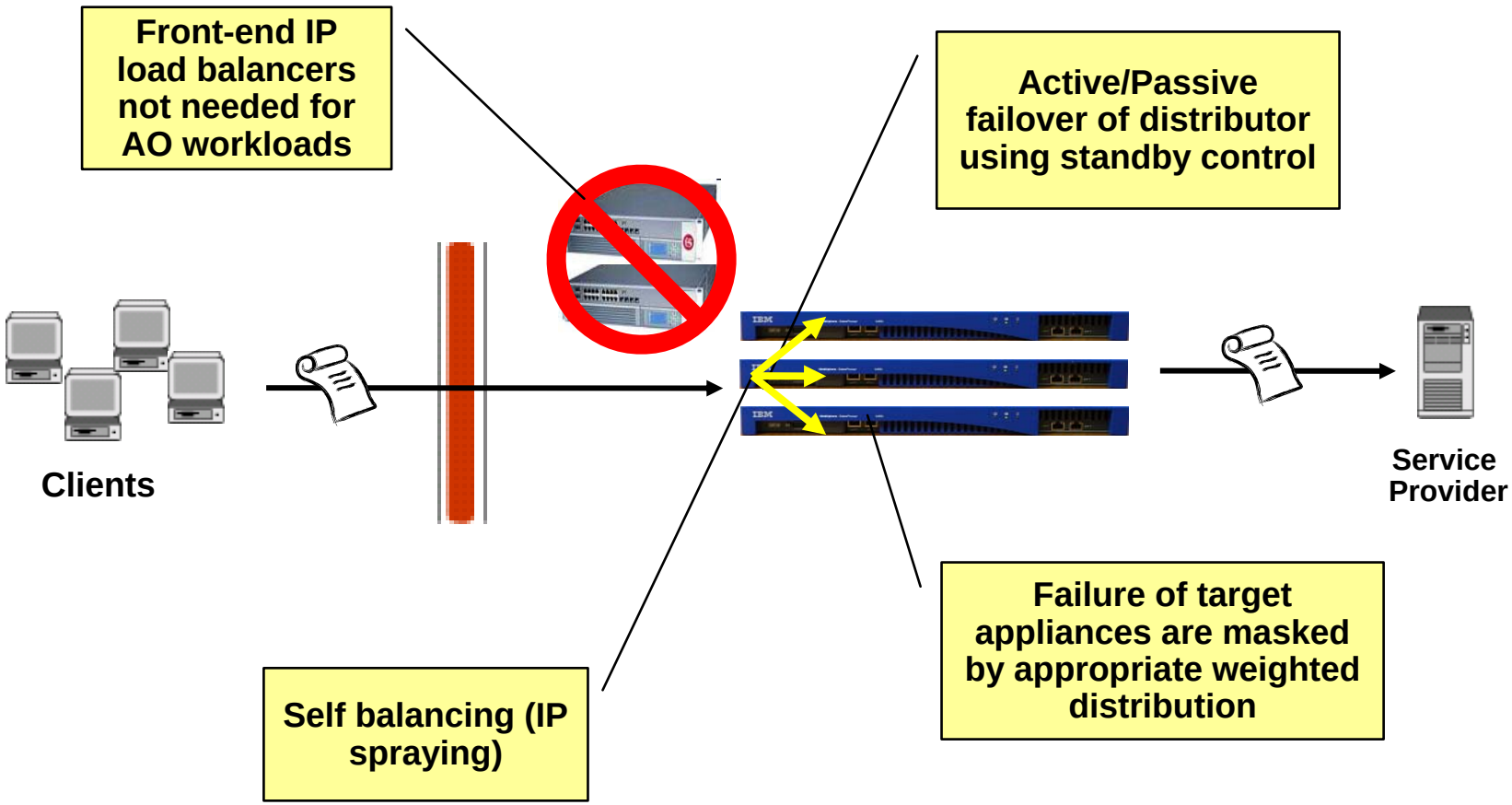
Today's DMZ


Internet
DMZ
[Appliances ONLY]
intranet
[Software + appliances]
DataPower XS40
WebSeal
WebSphere VE (XD)
users
clouds
threats
monitoring
application-aware transformations
XDoS protection
Security policy enforcement
identity federation
extensible rules
SSL offload
Fine grain Access control
WAN and connection optimization
traffic shaping
caching
load balancing
intrusion prevention
intrusion detection
Packet Filter
Packet Filter
NEPs
ISS
internal
IHS plugin, Proxy Server, Edge Server
QoS policy enforcement
load balancing
caching
traffic shaping
data center
WS
J2EE
Web
REST
ESB
Appliance Hygiene
Increased processing requirements in the DMZ

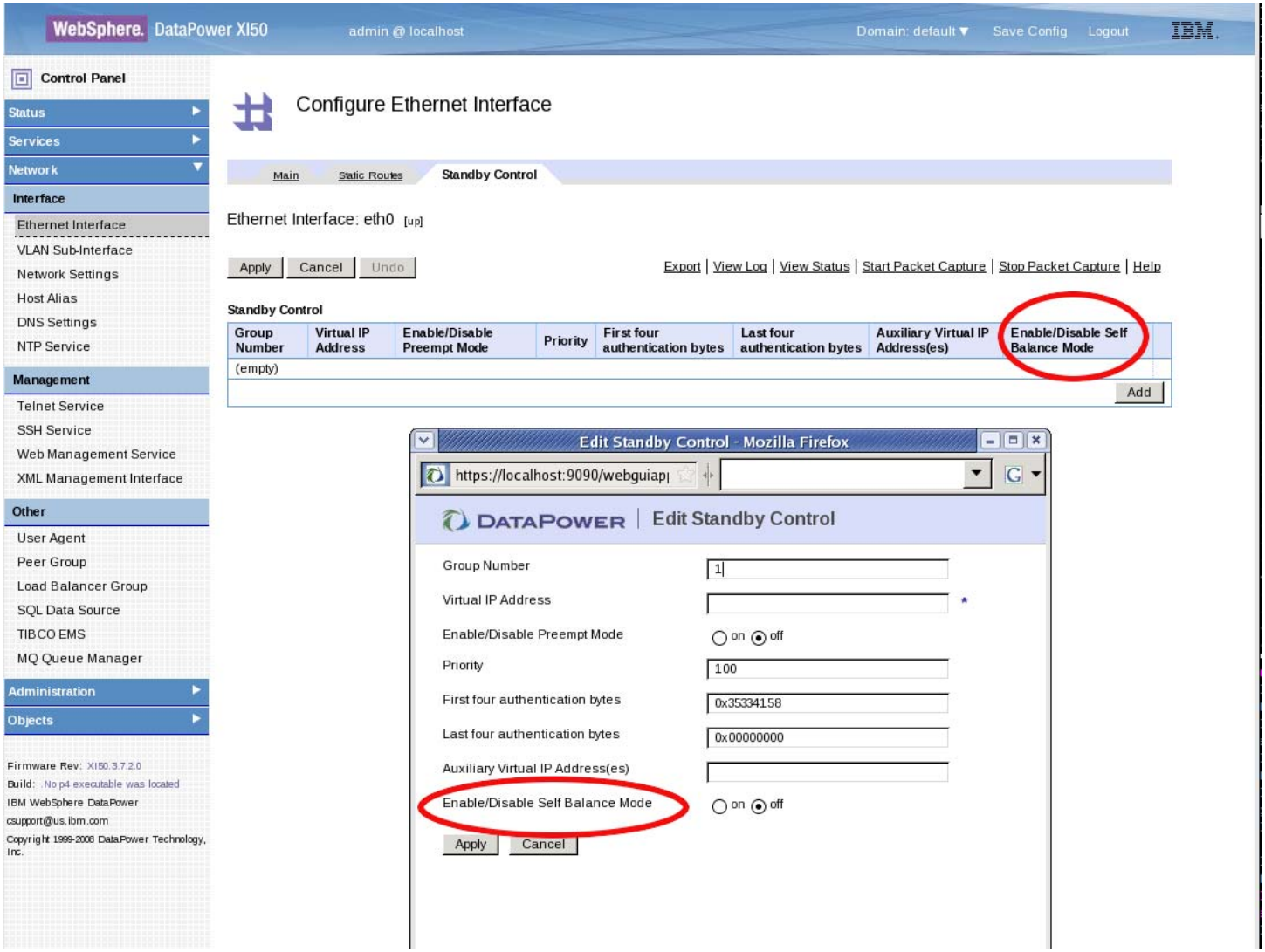
Application Optimization Clearly Defined



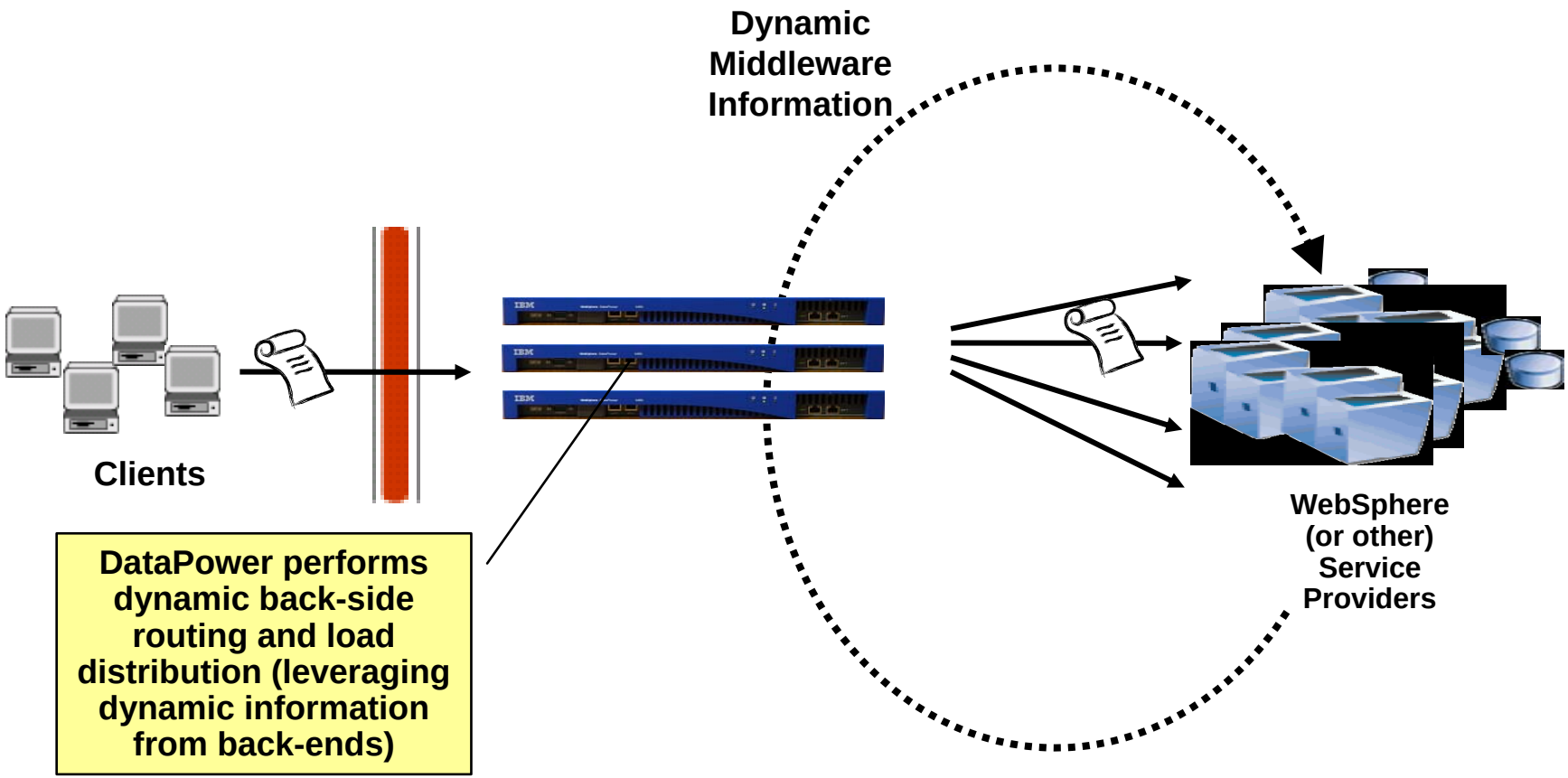
Self Balancing and HA of Co-located Appliances



Enabling Self Balancing (3.8.0, AO Option)



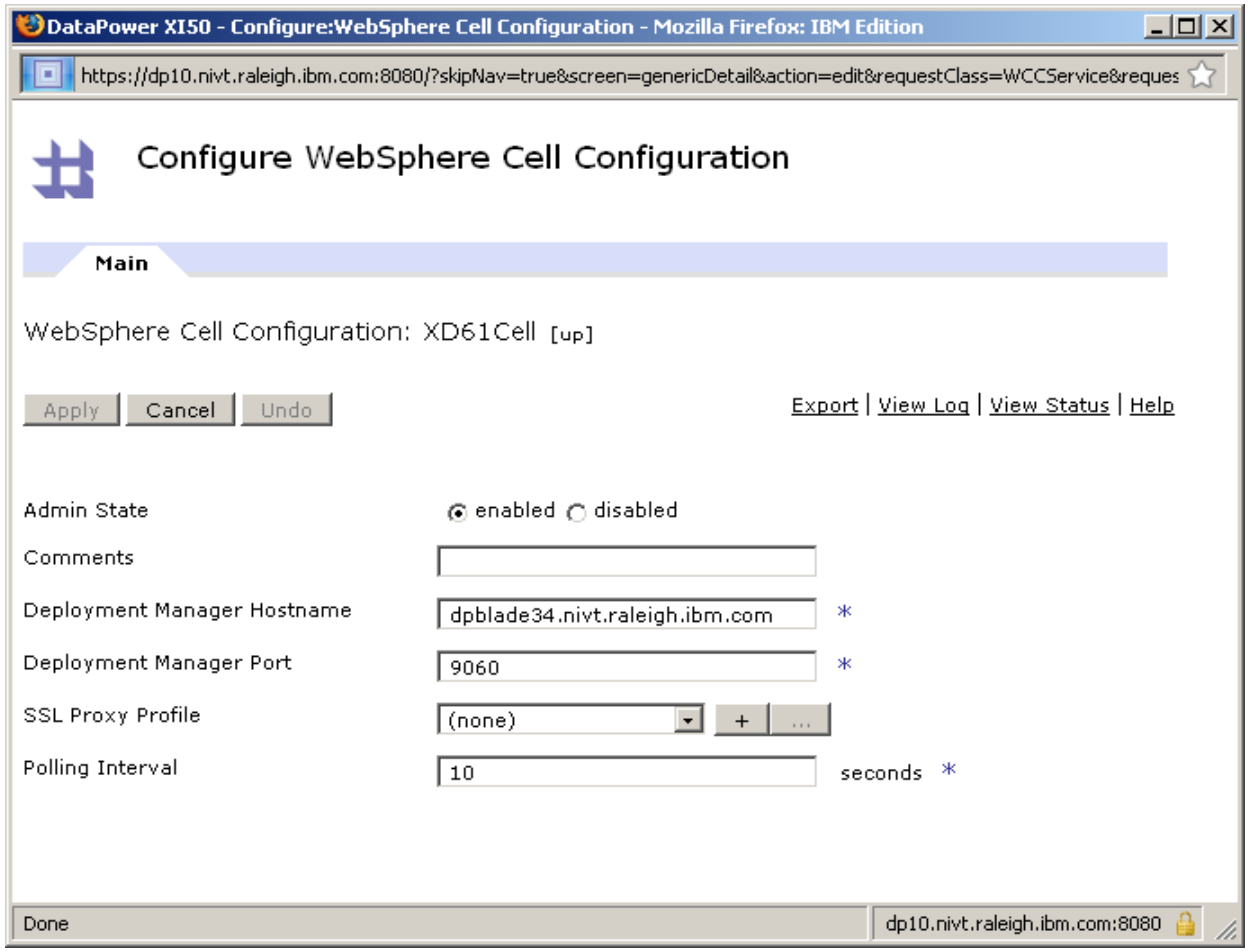
Intelligent Load Distribution (3.8.0, AO Option)



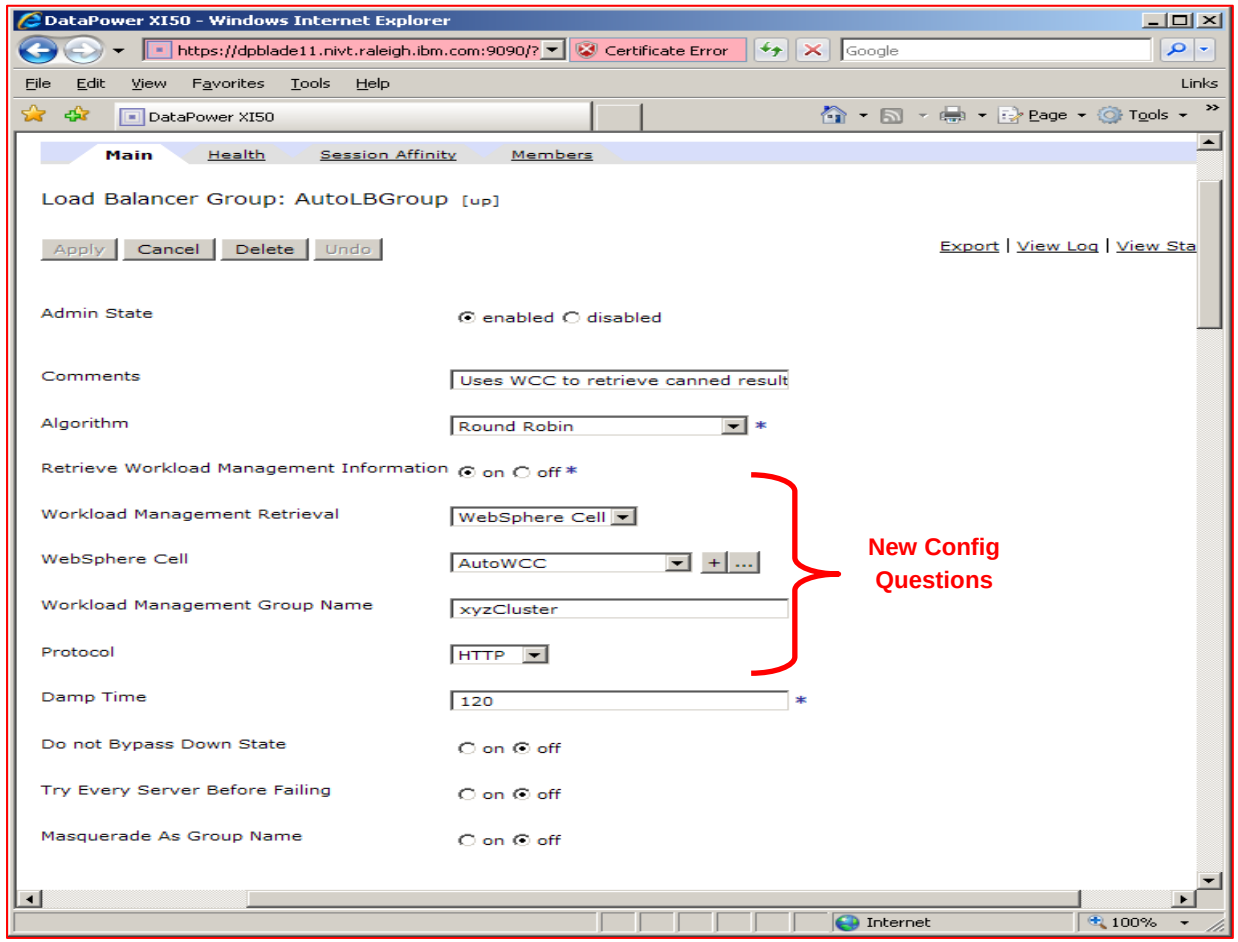
Static vs Dynamic Configuration (3.8.0, AO option)

- 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

Configure the WebSphere Cell Object



Load Balancer Group



Session Affinity – Overview (3.8.0, AO Option)

- 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.

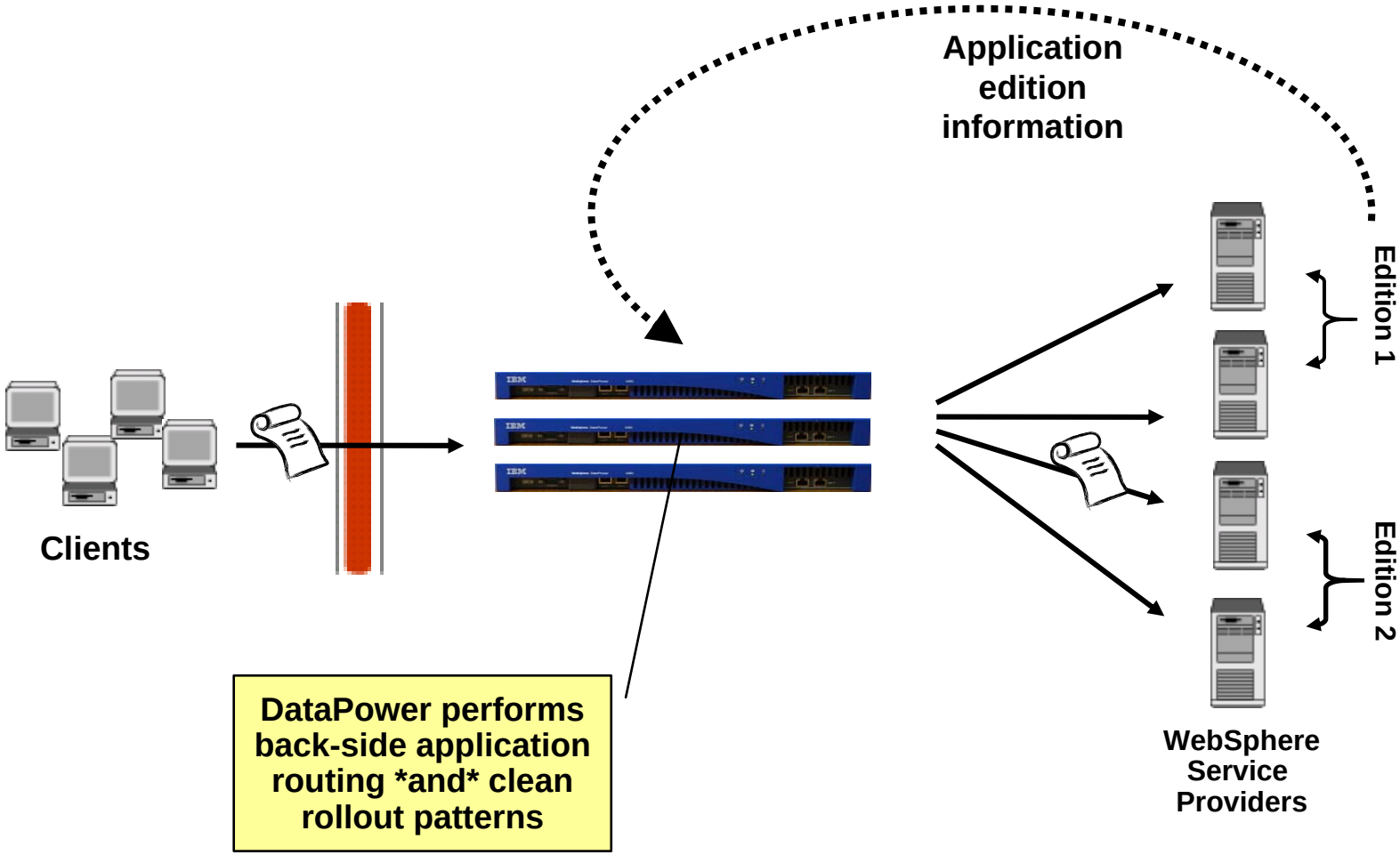
Session Affinity (3.8.0, AO option)

- Passive
  - Only available though 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
  - 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
  - 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.

Weighted Least Connections Algorithm (3.8.0, AO option)

- 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.
  - member_wlc = constant * (member_connections / member_weight); The member with the lowest member_wlc receives the next connection attempt.
- Reference Count used to track number of connections on each member

Application Routing (3.8.1, AO option)

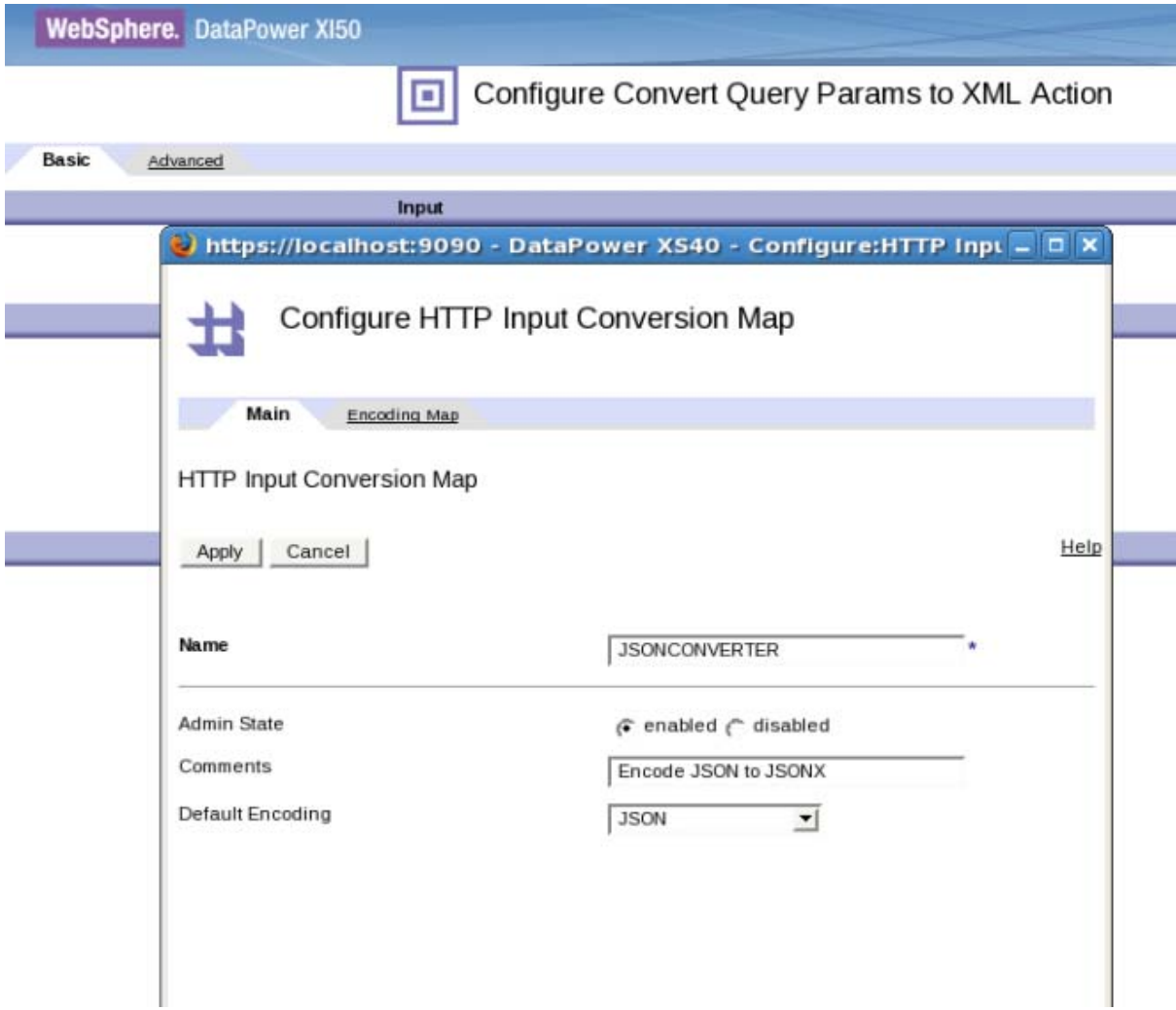


DataPower Web 2.0 REST Enhancements (3.8.0)

- RESTful HTTP Method Enhancements
  - Better accessibility to the HTTP verbs
- RESTful Message Processing
  - Ability to handle differing payload requirements within a single policy definition
  - Bypass “One way exchange pattern”
- RESTful Bridging / Proxy support
  - Ability to rewrite HTTP Request line (method (new) + uri)

Processing JSON payloads (3.8.0)

- New HTTP Input encoding
  - **JSON** encoding
  - Converts JSON to JSONX
  - Specified using the Convert HTTP action as default encoding
  - Canned JSONx to JSON stylesheet on box (jsonx2json.xsl)
  - Canned XSD on box (jsonx.xsd)



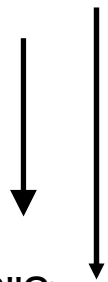
What is JSONX?

- IBM Internal Standardization of JSON modeled in XML
  - xmlns:json=http://www.ibm.com/xmlns/prod/2009/jsonx
  - Strict model of RFC 4627 – application/json
  - Productized by DataPower and Data Web Service Team
- Developed to be generically schema validate-able (json is validated)
  - Not an arbitrary representation of JSON data as XML
  - Not an attempt to model any XML as JSON
- Developed to be a non-lossy transformation of JSON types/data
- Useful for everything DataPower
  - RESTful json bridge to SOAP
  - Threat protection for Ajax clients that use eval(json)

JSON to JSONX (3.8.0)

A simple JSON object with two properties

```
{ "First" : "John",
  "Last": "Wayne" }
```



```
<?xml version="1.0" encoding="UTF-8"?>
<json:object xsi:schemaLocation=http://www.datapower.com/schemas/json json.xsd
             xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance
             xmlns:json="http://www.ibm.com/xmlns/prod/2009/jsonx">
  <json:string name="First">John</json:string>
  <json:string name="Last">Wayne</json:string>
</json:object>
```

Quiesce Support (3.8.1)

- Operational maintenance of DataPower appliances due to
  - Upgrade firmware
  - Promote configuration packages
  - Apply dynamic configuration changes
- Design goals
  - Ensure all existing transactions complete without error
  - Indicate administrator quiesced state
  - Various levels of granularity
    - FSPH (configuration changes)
    - Service object (configuration changes)
    - Application domain (configuration promotion)
    - Entire appliance (firmware upgrades and proactive recycles)
- Usage model
  - Prevent new connections from arriving at an appliance through external load balancer configuration
  - Special hooks automatically remove quiesced targets from self-balanced sets

Questions?