DataPower SOA Appliances
Simplify, Secure, and Accelerate SOA

Nitin Thukral, CISSP
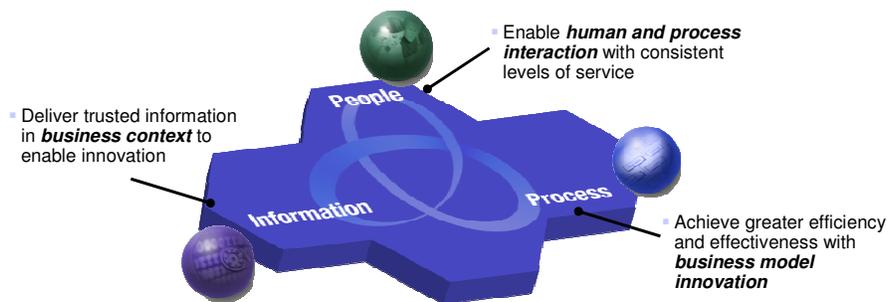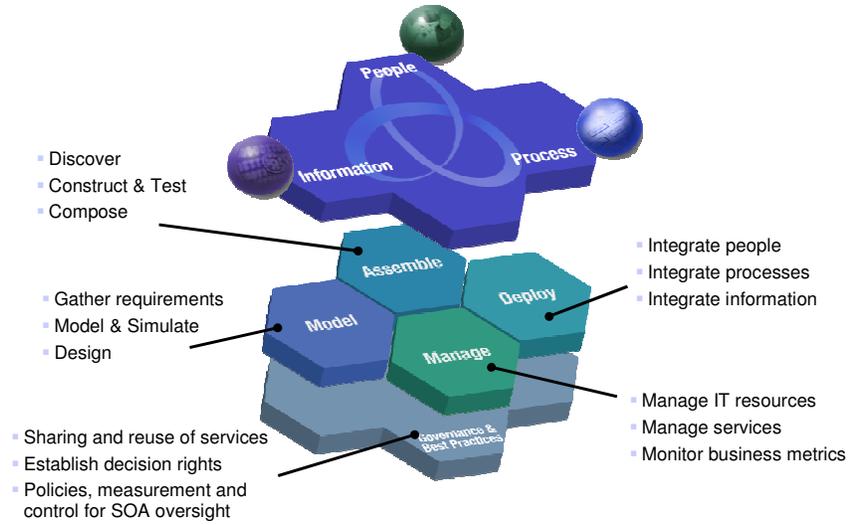*Canadian National Specialist*

Agenda

1. New Model Required for SOA and Web Services

2. DataPower SOA Appliances Overview

3. DataPower SOA Appliances Product Portfolio (XA35, XS40, XI50)

4. DataPower SOA Appliance Usage Scenarios

5. How DataPower SOA Appliances Work with Other IBM Products

6. Positioning DataPower SOA Appliances within the IBM ESB Portfolio

Agenda

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Business Centric SOA Starts with Your Most Critical Business Pain and Enables You to Build for Flexibility

- Enable **human and process interaction** with consistent levels of service

People

- Deliver trusted information in **business context** to enable innovation

Information

Process

- Achieve greater efficiency and effectiveness with **business model innovation**

4

2

And SOA Lifecycle Is The Key to Successful Projects

- Discover
- Construct & Test
- Compose

- Gather requirements
- Model & Simulate
- Design

- Sharing and reuse of services
- Establish decision rights
- Policies, measurement and control for SOA oversight

- Integrate people
- Integrate processes
- Integrate information

- Manage IT resources
- Manage services
- Monitor business metrics

People · Information · Process · Assemble · Deploy · Model · Manage · Governance & Best Practices

5

SOA Entry Points Help Customers Get Started
Both Business Centric and IT Focused

People · Information · Process · Manage · Best Practices

1 2 3 4 5

Connectivity Reuse

6

3
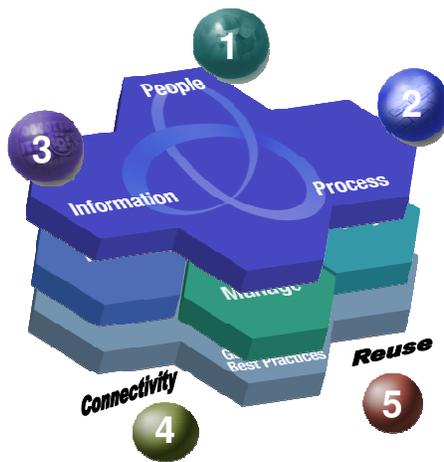
IBM's acquisition of DataPower

Software

Assemble

Deploy

Model

Manage

Governance & Processes

Skills & Support

A SOA Appliance…

Creates customer value through extreme SOA performance and security

- **Simplifies** SOA with specialized devices
- **Accelerates** SOA with faster XML throughput
- **Secures** SOA XML implementations
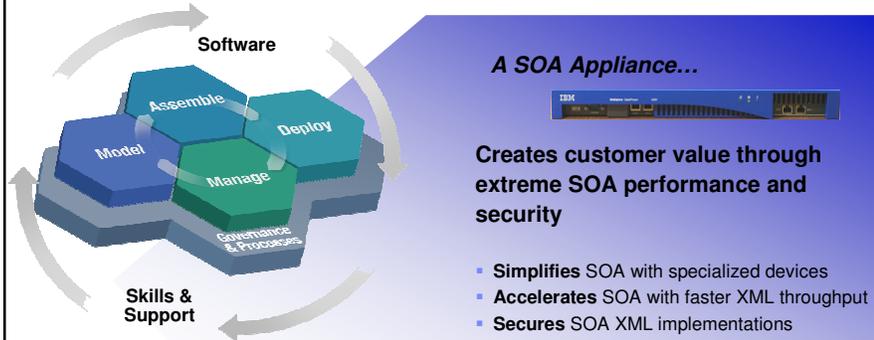
IBM WebSphere DataPower SOA Appliances redefine the boundaries of middleware extending the SOA Foundation with **specialized, consumable, dedicated SOA appliances** that combine **superior performance and hardened security** for SOA implementations

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The Extensive Use of XML and Web Services Brings New Challenges and Requirements

- **Scalability**
  - XML is bandwidth, CPU, disk, and memory intensive
- **Performance**
  - Especially for XML Schema validation and XML transformation
- **Security**
  - SOA implies connecting systems never before connected
  - Clear text over HTTP with no inherent security
- **Standards Proliferation**
  - Sheer number and versions of standards have grown
  - Web Services implementations can vary… within the standards
- **Operations**
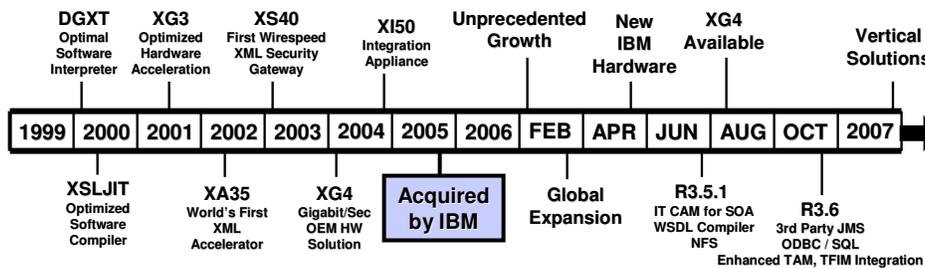 - Complexity of SOA solutions continues to grow

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DataPower Overview

- Extensive Experience in XML Processing Optimization
- Eight Years in a Seven Year Old Field
- Advantages: First to Market, Great Team, Deep Standards Involvement, Invented and Owns Core XML Technology, Comprehensive Product Portfolio

|												
DGXT Optimal Software Interpreter	**XG3** Optimized Hardware Acceleration		**XS40** First Wirespeed XML Security Gateway		**XI50** Integration Appliance	**Unprecedented Growth**		**New IBM Hardware**	**XG4 Available**		**Vertical Solutions**	
1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**FEB**	**APR**	**JUN**	**AUG**	**OCT**	**2007**
	XSLJIT Optimized Software Compiler		**XA35** World's First XML Accelerator		**XG4** Gigabit/Sec OEM HW Solution	**Acquired by IBM**			**Global Expansion**		**R3.5.1** IT CAM for SOA WSDL Compiler NFS	**R3.6** 3rd Party JMS ODBC / SQL Enhanced TAM, TFIM Integration

Post-Acquisition Innovation Continues

- 150% Staff increase / Core DataPower team intact / Global reach and expansion
- New improved hardware platform – IBM hardware combined with DataPower technology innovations
- New capabilities – WS-*, 3rd-party JMS, NFS, ODBC, XG4, WSDL compiler, XACML, etc.
- Continued IBM Technology Integration – TAM, TFIM, ITCAM for SOA, WebSphere JMS, WebSphere XD, etc.
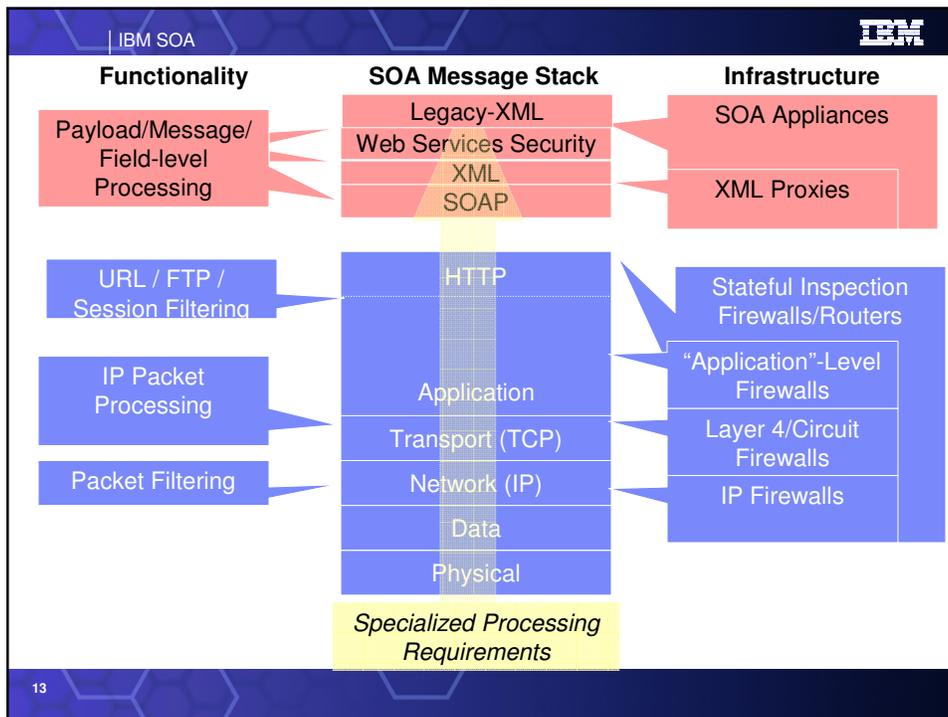
10

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Why Use an Appliance for SOA

- Hardened, specialized hardware for helping to integrate, secure, and accelerate SOA
- Many functions integrated into a single device
- Higher levels of security assurance certifications require hardware
  - Example: FIPS 140-2 Level 3 HSM, Common Criteria
- Higher performance with hardware acceleration
  - Impact: ability to perform more security checks without slow downs
- Addresses the divergent needs of different groups
  - Example: enterprise architects, network operations, security operations, identity management, web services developers
- Simplified deployment and ongoing management
  - Impact: Reduces need for in-house SOA skills & accelerates time to SOA benefits

- "Commodity" Processes Migrate to Hardware
- Historical Trend Favours Appliances for XML-Aware Networking

What is XML Aware Networking?

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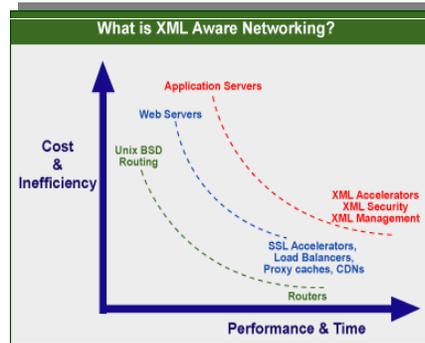
DataPower SOA Appliance Architecture
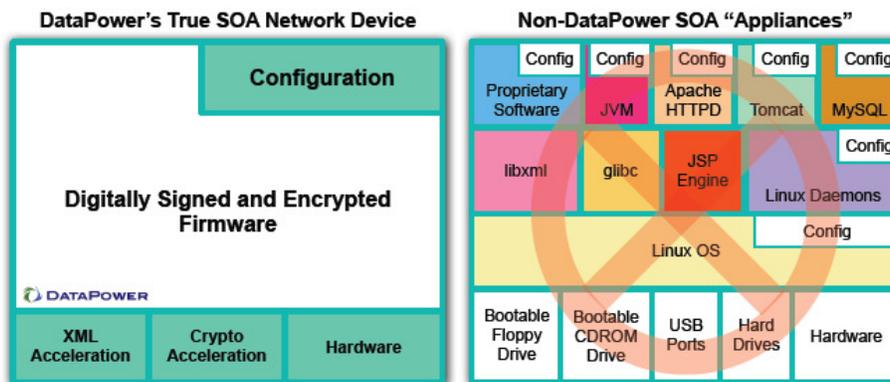
- Optimized hardware, firmware, embedded OS, locked-down configuration
- Security vulnerabilities eliminated (open source, Trojan horses, Java/C++ libraries)
- Secure hardware storage of encryption keys, locked audit log
- No drives/USB ports, tamper-proof case

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Functionality | **SOA Message Stack** | **Infrastructure**

Payload/Message/Field-level Processing

Legacy-XML
Web Services Security
XML
SOAP

SOA Appliances

XML Proxies

URL / FTP / Session Filtering

HTTP

Stateful Inspection Firewalls/Routers

IP Packet Processing

Application

"Application"-Level Firewalls

Transport (TCP)

Layer 4/Circuit Firewalls

Packet Filtering

Network (IP)

IP Firewalls

Data

Physical

Specialized Processing Requirements

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DataPower SOA Appliances Product Portfolio

- **Problem: WS Application Performance Degradation**
- *Accelerates* SOA and Web services deployments
- **Increases** performance throughput
- **Decreases** application latency
- **Reduces** cost and complexity
- **Lowers** overall TCO

XA35 XML Accelerator

Centralized XSLT Management
Applies Standards Across the Enterprise

- **Problem: WS Application Security Threats and Risks**
- *Secures* SOA and Web services deployments
- **Provides** comprehensive XML security
- **Advanced** XML firewall and security policy enforcement point functionality
- **Compliant** with most Web services standards

XS40 XML Security Gateway

Wirespeed Appliance
Purpose-Built for SOA Security

- **Problem: WS Application Integration**
- *Integrates* SOA and Web services deployments
- **Transforms** between disparate message formats (binary, legacy, XML, etc.)
- **Bridges** wireline transport-level protocols (HTTP, MQ, FTP, JMS, Tibco EMS, etc.)

XI50 Integration Appliance

Legacy Application Integration
Enhanced Protocol Support

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XML Accelerator XA35

Centralized XSLT Management
Offload XML Processing

- **Wirespeed XML/XSLT/XPath processing –** Accelerates XML processing, increasing throughput and decreasing latency for XML-based applications by offloading transformation and other resource-intensive functions

- **Schema Validation -** Performs XML Schema validation to ensure incoming/outgoing XML documents are legitimate and properly structured

- **XML Compression, XML Caching –** Reduces impact of increased XML traffic

- **Innovative XML Processing Capabilities** -- XML Pipeline processing, deployable in Proxy or co-processor mode, dynamic content generation, data and forms processing, support for popular XSLT extensions

- **SSL Termination/Acceleration –** Accelerates SSL with industry-leading hardware further lessening server workload

- **Easy Configuration & Administration -** Support CLI and WebGUI as well as fully integrated with industry standard IDEs such as Altova XML Spy and Eclipse allowing developers to design, debug and deploy against one single XML and XSLT processor, saving valuable cycles in the progression from pilot to production

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XML Security Gateway XS40

Easy to Use Appliance Purpose-Built for SOA Security

- **XML/SOAP Firewall -** Filter on <u>any</u> content, metadata or network variables
- **Data Validation -** Approve incoming/outgoing XML and SOAP at wirespeed
- **Field Level Security-** WS-Security, encrypt & sign individual fields, non-repudiation
- **XML Web Services Access Control/AAA -** SAML, LDAP, RADIUS, etc.
- **MultiStep -** Sophisticated multi-stage pipeline
- **Web Services Management -** Service Level Management, Service Virtualization, Policy Management
- **Transport Layer Flexibility -** HTTP, HTTPS, SSL
- **Easy Configuration & Management -** WebGUI, CLI, IDE and Eclipse Configuration to address broad organizational needs (Architects, Developers, Network Operations, Security)
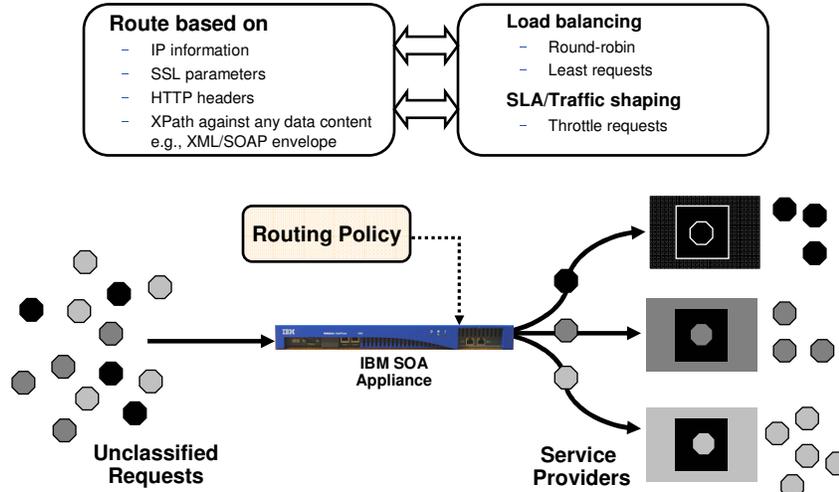
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XML Integration Appliance XI50

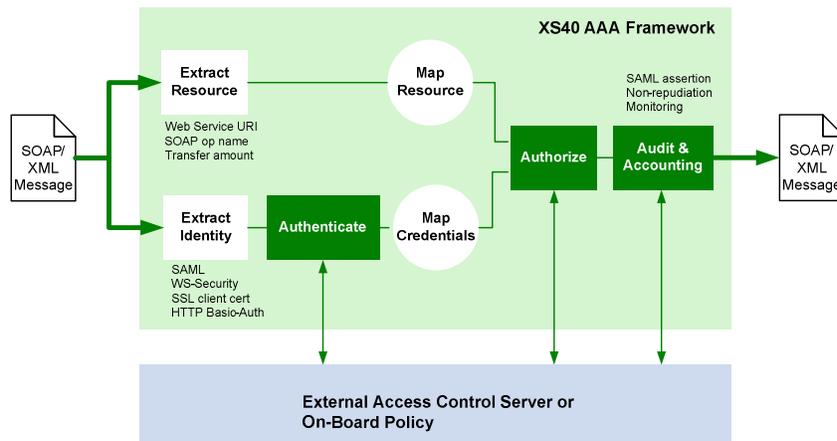**Middleware Appliance Purpose-Built for Application Integration**

- **DataGlue "Any-to-Any" Transformation Engine**
  - Support for Contivo Analyst, IBM WebSphere Transformation Extender (TX)*
- **Content-Based Message Routing**
  - Message Enrichment via ODBC, NFS, etc.
- **Protocol Bridging (HTTP, MQ, FTP, JMS, Tibco EMS, etc)**
  - Request-response and sync-async matching
- **XML/SOAP Firewall -** Filter on <u>any</u> content, metadata or network variables
- **Data Validation -** Approve incoming/outgoing XML and SOAP at wirespeed
- **Field Level Security-** WS-Security, encrypt & sign individual fields, non-repudiation
- **XML Web Services Access Control/AAA -** SAML, LDAP, RADIUS, etc.
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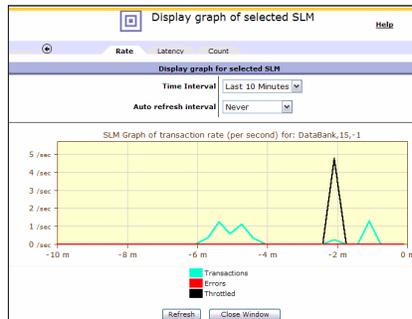
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Content-Based Routing Features

Route based on
- IP information
- SSL parameters
- HTTP headers
- XPath against any data content e.g., XML/SOAP envelope

Load balancing
- Round-robin
- Least requests

SLA/Traffic shaping
- Throttle requests

Routing Policy

IBM SOA Appliance

Unclassified Requests

Service Providers

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AAA Framework Diagram
Authenticate, Authorize, Audit Enforcement

XS40 AAA Framework

SOAP/ XML Message

Extract Resource

Web Service URI
SOAP op name
Transfer amount

Map Resource

SAML assertion
Non-repudiation
Monitoring

Authorize

Audit & Accounting

SOAP/ XML Message

Extract Identity

SAML
WS-Security
SSL client cert
HTTP Basic-Auth

Authenticate

Map Credentials

External Access Control Server or On-Board Policy

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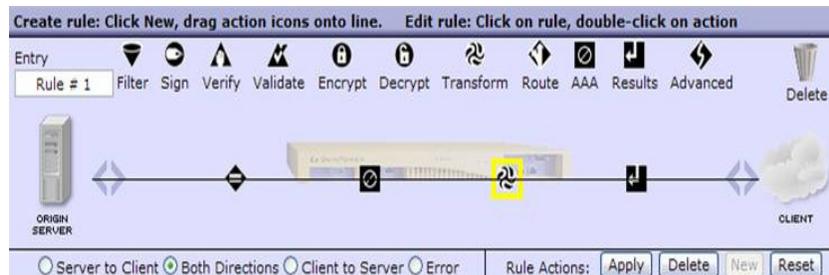# Web Services Management:
Service Level Management

- Configure and install in minutes
- Hierarchical Service Level at WSDL, service, port, operation level
- Flexible actions when reaching a threshold: notify/alert, shape, throttle
- Threshold for both overall requests and failures
- Graphical display

Display graph of selected SLM   Help

Rate   Latency   Count

Display graph for selected SLM

Time Interval   Last 10 Minutes

Auto refresh interval   Never

SLM Graph of transaction rate (per second) for: DataBank,15,-1

Transactions
Errors
Throttled

Refresh   Close Window

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Intuitive WebGUI: Ease of Use

- WSDL-based policy creation
- Hierarchical policies applied at WSDL, service, port, operation level
- Drag & drop policy creation screen allows flexible chaining of operations
- Configures and installs in minutes

Create rule: Click New, drag action icons onto line.   Edit rule: Click on rule, double-click on action

Entry

Rule # 1   Filter   Sign   Verify   Validate   Encrypt   Decrypt   Transform   Route   AAA   Results   Advanced   Delete

ORIGIN SERVER   CLIENT

○ Server to Client ⦿ Both Directions ○ Client to Server ○ Error   Rule Actions: Apply   Delete   New   Reset

Ease of Use Example – Graphical User Interface providing drag and drop services, in order desired, for XML filtering, signing, verification, schema validation, encryption, decryption, transformation, routing, access control, service level monitoring, and advanced operations

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Simple Appliance Configuration for Complex Functionality

Fits into your existing environment

- Address broad organizational needs *(Architects, Developers, Network Operations, Security)*

- Complete Configuration from GUI or CLI interface

- IDE integration/Eclipse plug-in

- XPath / XML config files

- SNMP

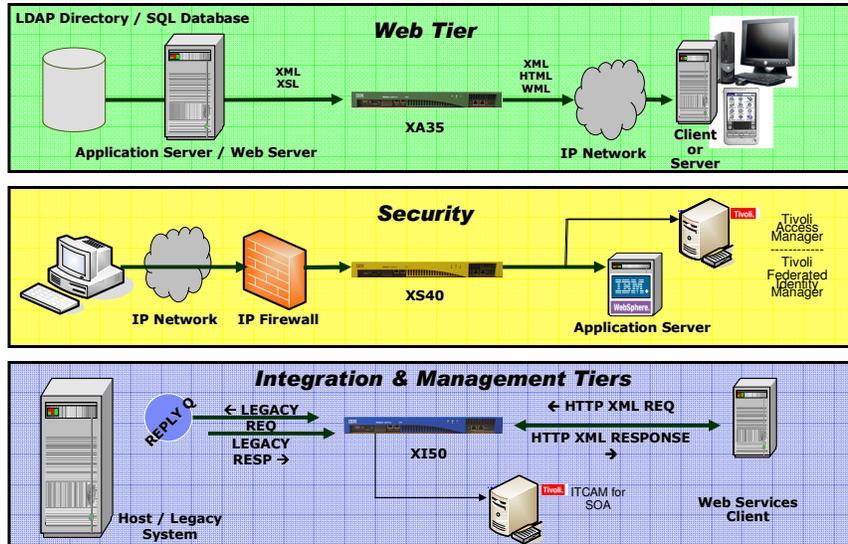- SOAP management interface

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SOA Appliances Operations

- Logging

- Role-based Management

- Managing configs & policy – Deploying, backing up, Diff/Undo, App domains: many virtual devices

- Separate, locked audit log

- Troubleshooting aids

- Security – Device security, Key and Certificate management, HSM option, Security Audit, Single Image Firmware Upgrade

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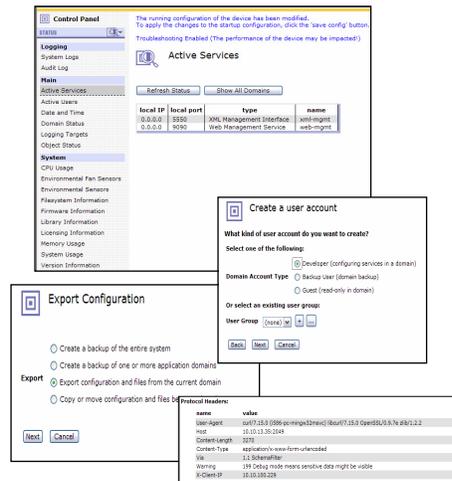
IBM SOA Appliance Deployment Summary

Web Tier

LDAP Directory / SQL Database

XML
XSL

XML
HTML
WML

XA35

Application Server / Web Server

IP Network

Client
or
Server

Security

IP Network   IP Firewall

XS40

Application Server

Tivoli
Access
Manager

Tivoli
Federated
Identity
Manager

WebSphere.

Integration & Management Tiers

REPLY Q

← LEGACY
REQ

LEGACY
RESP →

XI50

← HTTP XML REQ

HTTP XML RESPONSE
→

ITCAM for
SOA

Host / Legacy
System

Web Services
Client

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DataPower SOA Appliance Usage Scenarios

1. Securing Web Services
   - **Securely enabling access to back-end system of record for partners and customers**
   - **Protecting against XML-borne threats**

2. Legacy Integration
   - **Connecting mainframe or legacy application to Web services/SOA**
   - **XML-enabling mainframe and legacy systems**

3. Hub Mediation
   - **Efficiently transforming, routing, logging messages among applications and Web services**

4. Enterprise Service Bus (ESB) Deployments
   - **Provide on- and off-ramps to ESBs, manage Web services easily through service-level management, security management, enterprise management console**

5. Web Portal Acceleration
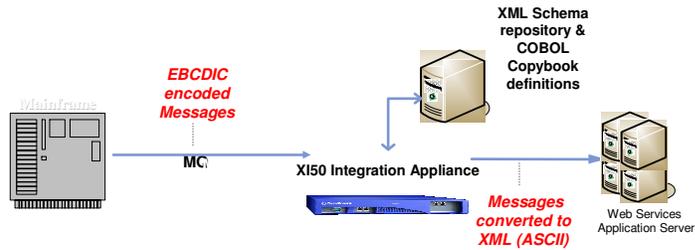   - **Speed up rendering for dynamic content generation**

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Use Case 1: Securing Web Services
Protect Against XML-Borne Threats

XS40 provides first line of XML defense and enforces access policy stored in an Identity Management Solution (e.g. IBM Tivoli Access Manager, CA Netegrity SiteMinder, EMC RSA ClearTrust / Access Manager, LDAP, Microsoft Active Directory, etc.)
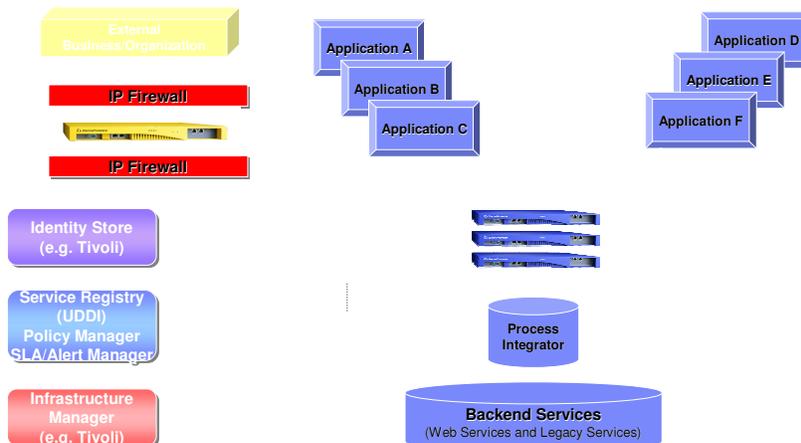

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Use Case 2: Legacy Integration
Facilitate Mainframe Modernisation

XI50 connects to the mainframe via MQ or other connection mechanism, converts mainframe data (e.g. COBOL Copy Book from VSAM or ISAM) to XML data, validates it, and sends it to a destination via web services protocol (SOAP/HTTP).

XML Schema repository & COBOL Copybook definitions

Mainframe

EBCDIC encoded Messages

MQ

XI50 Integration Appliance

Messages converted to XML (ASCII)

Web Services Application Server

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Use Case 3: Hub Mediation
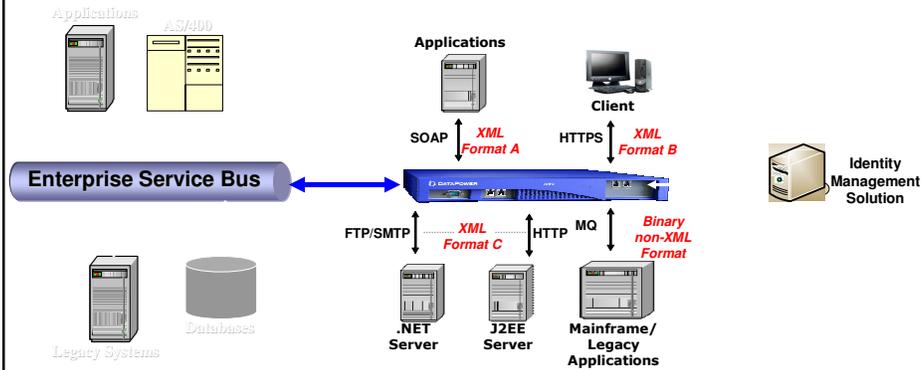### *Centralise Policies and Routing*

XI50 acts as the central hub for all XML/Web Services. Based on the origin, and destination of the message, different policies are applied and the XML is normalized.

External Business Organisation

Application A

Application B

Application C

Application D

Application E

Application F

IP Firewall

IP Firewall

Identity Store (e.g. Tivoli)

Service Registry (UDDI) Policy Manager SLA/Alert Manager

Infrastructure Manager (e.g. Tivoli)

Process Integrator

Backend Services
(Web Services and Legacy Services)

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Use Case 4: ESB Deployments
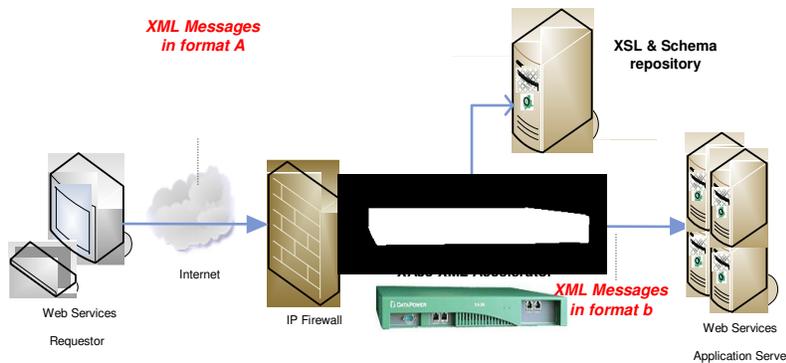### Provide On- and Off-Ramp Functionality for ESBs

XI50 acts as the on and off ramp to the ESB, offloading expensive transformations from the ESB, and bridging different protocols (e.g. HTTP, MQ, FTP, WebSphere JMS, Tibco EMS, etc).

Applications

AS/400

Applications

Client

SOAP *XML Format A*   HTTPS *XML Format B*

Enterprise Service Bus

Identity Management Solution

FTP/SMTP *XML Format C*   HTTP MQ   *Binary non-XML Format*

Legacy Systems   Databases

.NET Server   J2EE Server   Mainframe/ Legacy Applications

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Use Case 5: Web Portal Acceleration
Optimise Dynamic Content Generation

XA35 fields all requests but processes only XML requests. XML messages are validated against a schema and then transformed from format A to format B using an XSL stylesheet.

XML Messages in format A

XSL & Schema repository

Internet

Web Services Requestor

IP Firewall

XA35 XML Accelerator

XML Messages in format b

Web Services

Application Server

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Integration Across IBM

- XI50 ships with WebSphere MQ Support
- XS40 and XI50 embed TAM RTE / remote client
- Auto-configure XML firewall by importing WebSphere service descriptors
- Tivoli Ready
    - **Fine-grained access control with Tivoli Access Manager (TAM) - Certified**
    - **Tivoli Federated Identity Manager (FIM) Certified (SAML, WS-Trust) - Certified**
    - **Monitoring of XML traffic flows with Tivoli NetView**
    - **End-to-end SOA Management with ITCAM SE for DP and ITCAM for SOA**
- IBM Autonomic integration - Certified
- RAD / Eclipse integration
    - **Rich console allows creation of policies and monitoring of multiple appliances from within IDE**
- Futures
    - **Integrated SOA tooling across the portfolio**
    - **Continued investment in 3rd-party (competitive middleware) integration and interoperability**

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DataPower and IBM Integration Roadmap

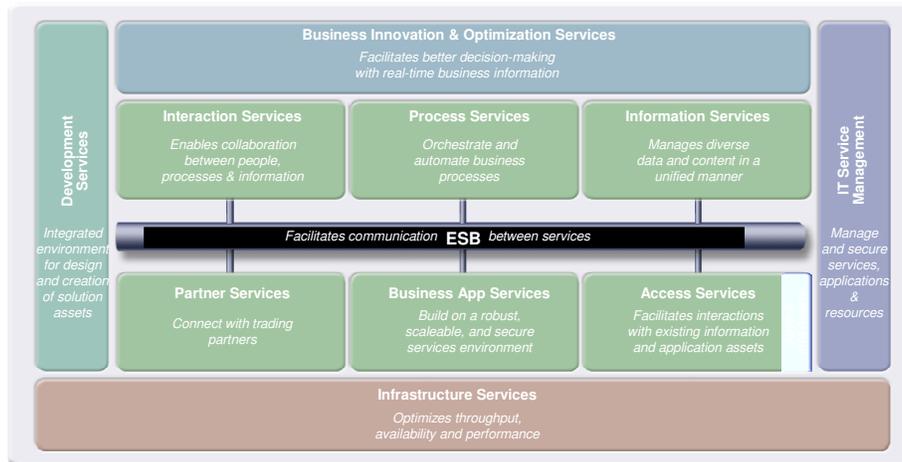|	At Acquisition (October 2005)	Near-Term (2006, early 2007)	Future (2007+)
WebSphere. software	• WebSphere MQ support • RAD/Eclipse support • XML FireWall service auto-configuration	• Fully integrated administration, management and deployment • WebSphere ESB integration • WSRR integration	• Enhance integration with WebSphere's mediation capabilities • Standardise development tooling
Tivoli. software	• TAMeb certification • Tivoli FIM certification • Tivoli NetView support • IBM Autonomic certification	• Web Services Management proxy (ITCAM for SOA) • Auto-configure with IBM TAM policy	• Comprehensive SOA management and security • Dynamic deployment of SOA mediation
@server®	• IBM Systems and Technology Group partnership • IBM BladeCenter integration	• Explore IBM Blade technology • DataPower XG4 XML hardware	• Explore Power and Cell processor
DB2 Information Management Software			• IBM DB2 Viper XML Optimization

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SOA Reference Architecture: ESB Positioning

Business Innovation & Optimization Services
Facilitates better decision-making with real-time business information

Development Services

Integrated environment for design and creation of solution assets

Interaction Services
Enables collaboration between people, processes & information

Process Services
Orchestrate and automate business processes

Information Services
Manages diverse data and content in a unified manner

Facilitates communication **ESB** *between services*

Partner Services
Connect with trading partners

Business App Services
Build on a robust, scaleable, and secure services environment

Access Services
Facilitates interactions with existing information and application assets

IT Service Management

Manage and secure services, applications & resources

Infrastructure Services
Optimizes throughput, availability and performance

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DataPower Adds New Capabilities to the IBM ESB Portfolio

- Innovative hardware appliance deployment option
  - Consumable form factor
  - Straightforward configuration
- Reduced total cost of ownership (TCO) for ESB solutions
- Hardened security and rich gateway functions
  - Delivers well-respected XML firewall, access control enforcement, Web services security
  - Provides gateway functions, including service level management, monitoring and audit
  - Does not require deploying separate SOAP firewall / web services security product
  - Ensures secure DMZ deployment
- Enables wire speed, lower latency and higher throughput
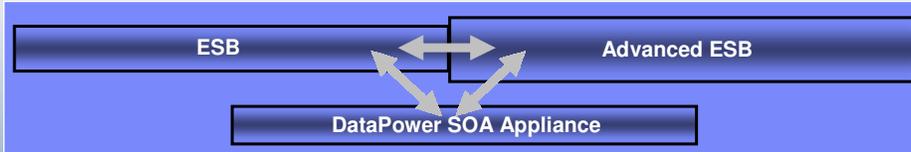 - Optimized processing without significant additional resources

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IBM Delivers a World-Class ESB Portfolio

ESB:

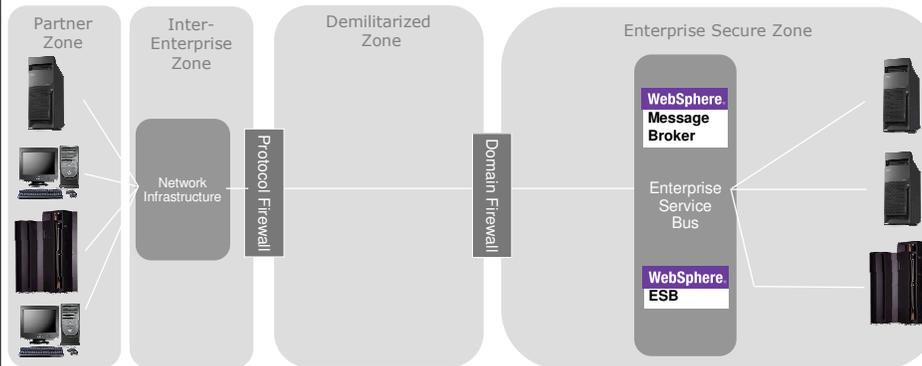**WebSphere ESB** provides Web Services connectivity and data transformation

Advanced ESB:

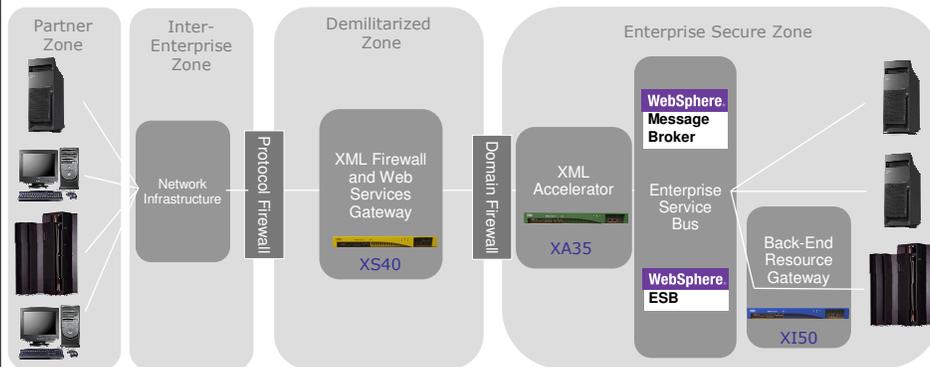**WebSphere Message Broker** provides universal connectivity and data transformation

ESB	Advanced ESB

DataPower SOA Appliance

SOA Appliances:

WebSphere DataPower provides simplified connectivity and wirespeed data transformation with enhanced security

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A Typical SOA/ESB Design Pattern

Partner Zone

Inter-Enterprise Zone

Demilitarized Zone

Enterprise Secure Zone

Network Infrastructure

Protocol Firewall

Domain Firewall

WebSphere.
Message Broker

Enterprise Service Bus

WebSphere.
ESB

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Applying DataPower to the SOA/ESB Design Pattern

What Does DataPower Add to WebSphere Message Broker and WebSphere ESB environments?

- WebSphere DataPower adds:
  - Enhanced throughput, reduced latency for XML processing and security processing
  - XML firewall & XML threat protection (eligible for DMZ deployment)
  - A higher level of security assurance including DoS protection
  - Additional administrative capabilities (CLI, signed and encrypted logging, etc.)
  - Service Level Management capabilities

- WebSphere DataPower brings to WebSphere Message Broker:
  - Enhanced WS-* (in particular WS-Security support)
  - Web services gateway functionality (eligible for DMZ deployment)
  - Wirespeed any-to-any transformation

- WebSphere DataPower brings to WebSphere ESB:
  - Enhanced WS-* support
  - Wirespeed any-to-any data transformation
  - TIBCO EMS connectivity
  - Advanced Web services gateway functions

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What Does WebSphere DataPower add to non-IBM ESB Software Solutions?

- For competitively installed (and happy) customers looking to extend their ESB …
  - Add value to a competitive environment

- For customers where IBM software-based solutions do not meet customer requirements …
  - Appliance-based ESB solution

- There are scenarios where an ESB appliance will be all that a customer requires

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What Does WebSphere ESB Add to a DataPower Scenario?

- Persistent JMS messaging server
- General purpose programming environment, and support for arbitrary integration logic
  - Java
  - J2EE programming environment (with the full capabilities of WebSphere Application Server)
- Full transaction support
  - XA transaction coordination
  - XA transaction participation
- Wide range of application and technology adapters including robust support for IBM transaction processing environments

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What Does WebSphere Message Broker Add to a DataPower Scenario?

- Persistent messaging server
- General purpose programming environment, and support for arbitrary integration logic
  - Java, C, ESQL
- Advanced message and event processing
  - Complex message flow implementations
  - Complex event processing
- Full transaction support
  - XA transaction coordination, XA transaction participation
  - Multiple transactions within a message flow
- Tight integration with IBM transaction processing systems, including CICS and IMS
- Adapter and protocol support
  - Support for multiple transport protocols
  - *Any* third party JMS 1.1 provider - including transaction management across 3rd-party JMS providers
  - Wide range of application and technology adapters

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DataPower in the WebSphere ESB Ecosystem

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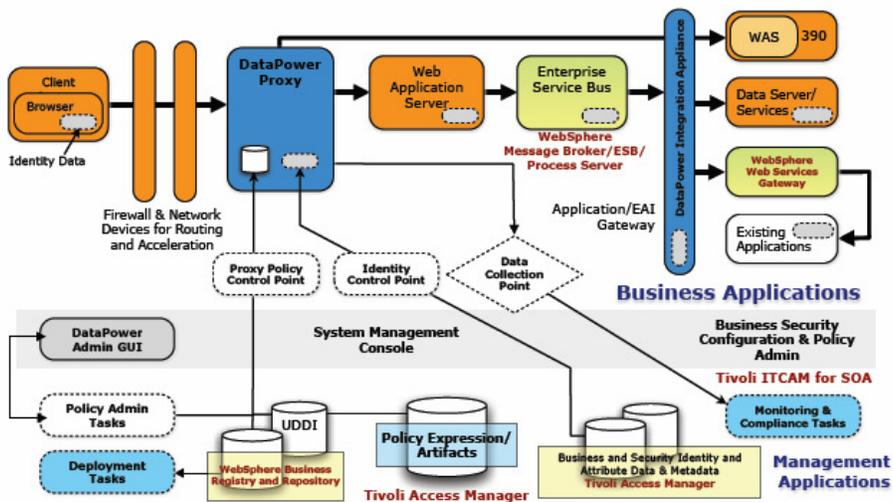
Only WebSphere Delivers the Most Comprehensive ESB Solutions to Power Your SOA

WebSphere continues to offer two robust ESB Software components
- **WebSphere ESB, delivering an ESB**
  - Connect using SOA standards and enjoy a full general programming environment
- **WebSphere Message Broker, delivering an *advanced* ESB**
  - Universal connectivity with SOA standards and non-SOA standards with the richest set of broker functionality

2. **WebSphere now offers an innovative appliance deployment option**
   - **WebSphere DataPower, proven SOA Appliances to power your ESB**
     - Connect with increased security, improved gateway functions and increased performance

3. **WebSphere offers the broadest range of ESB capabilities on the market today**
   - **Most powerful solutions _combine_ WebSphere DataPower with WebSphere Message Broker to deliver an Advanced ESB or WebSphere ESB for a standards-focused ESB**

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Questions

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