Technical Overview of WebSphere v7 Web Services Features

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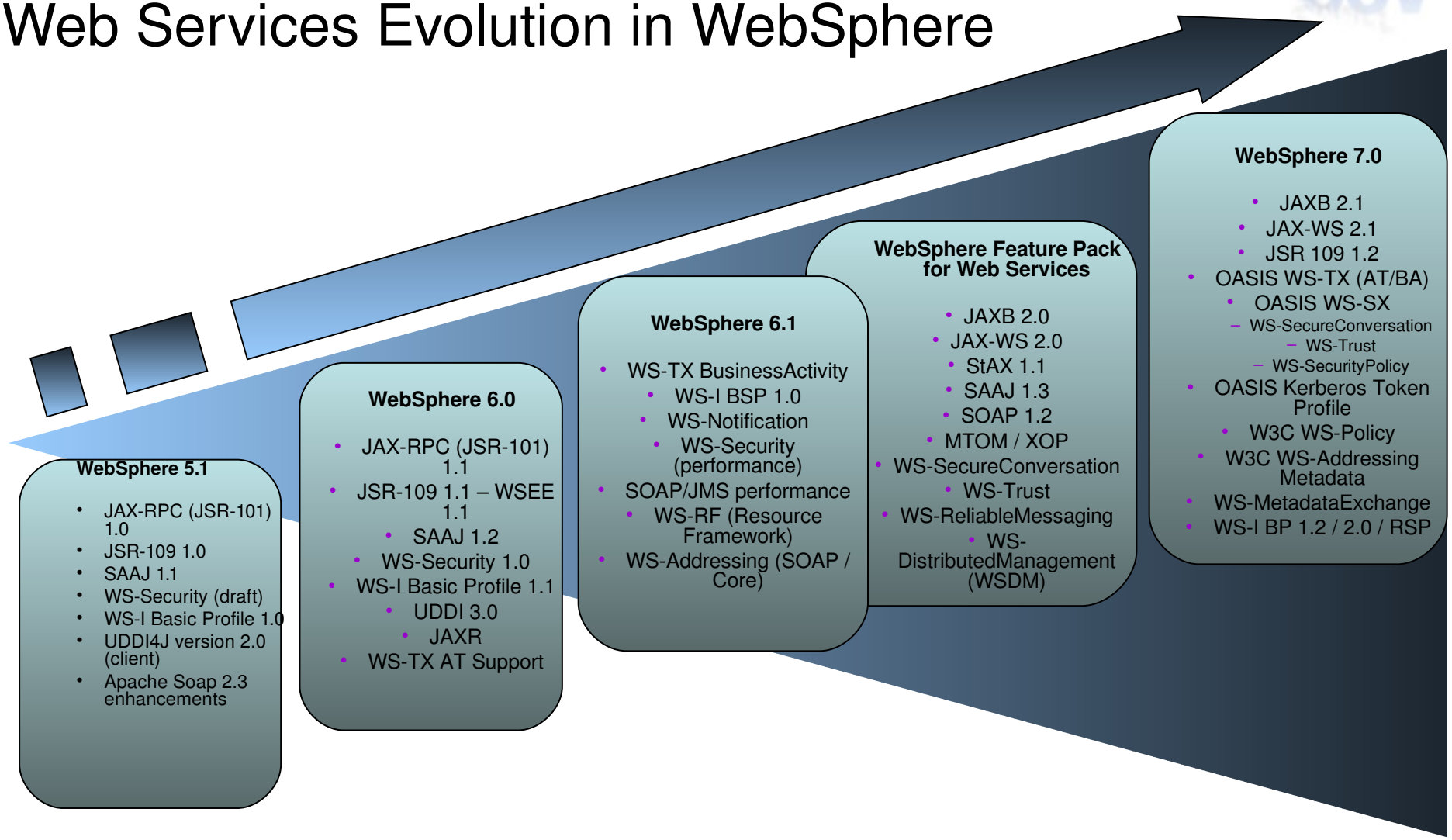
WebSphere software

IBM

Objectives

- Feature Pack for Web Services Overview
- WebSphere Application Server v7.0

Web Services Evolution in WebSphere



Web Services Feature Pack Support

Features

- JCP-based programming model
  - JAX-WS 2.0
  - JAXB 2.0
  - SAAJ 1.3
  - StAX 1.0
- Web Services Standards
  - WS-I Reliable Secure Profile
    - WS-ReliableMessaging
    - WS-SecureConversation
    - WS-Addressing
    - WS-I Basic Security Profile
    - WS-I Basic Profile 1.0
  - SOAP 1.2, MTOM / XOP
  - WS-Transactions
- Policy Sets

Benefits

- Standardized (and portable) application programming model
  - Simple annotation based
  - Fast pull parser based
  - Asynchronous programming model
- Standards-based Interoperability w/other vendors implementations
  - Securely
  - Reliably
  - Asynchronously
  - Efficiently
  - Transactionally
- Administration Improvements

WebSphere Application Server v7.0 Web Services

- Objectives
  - Continue to Drive Standards Adoption
    - Full Java EE 5 Web Services support
    - Extend and Uplift Standards Support
  - Enhance to support dynamic behavior
    - Client/service provider policy matching.
  - Continue to Simplify
    - Additional profiles and tooling validation of profile non-compliance

WAS V7.0 Web Services Support

Features

- JCP-based programming model
  - JSR 109 1.2
  - JAX-WS 2.1
  - JAXB 2.1
  - EJB 3.0
  - Stax 1.1
  - SAAJ 1.3
- Complete WS-Roadmap
  - W3C WS-Policy
  - WS-MetadataExchange
  - Updated OASIS versions of:
    - WS-AT / WS-BA (WS-TX)
    - WS-SecureConversation / WS-Trust / WS-SecurityPolicy (WS-SX)
  - WS-DistributedManagement 1.1 (WSDM)
  - OASIS Kerberos Token Profile
  - WS-Addressing Metadata
  - WS-I Basic Profile 1.2 and 2.0, Reliable Secure Profile 1.0 *
- Policy matching and intersection

Benefits

- Maturity and Integration of multiple technology stacks
- Standardized (and portable) application programming model for WS-Addressing
  - WSRF, WS-Notification and WSDM are among expanding group of standards to define application-level protocols leveraging WS-Addressing.
- Fill out the WS-* roadmap for delivery of functionality across all QoS required for enterprise SOA.
- Dynamic selection of endpoints QoS based on configured policy

JAXB 2.1 Upgrade

- Overall focus represents features typical with maturing the technology

- Customer Pain Points Addressed
  - Customers desired to develop stand-alone schemas as separate modules
  - Answer: Provide annotations to define existing generated classes and schema locations
  - Customer doing bottom-up mapping don't necessarily want to expose all metadata about the class
  - Answer: Provide XMLTransient annotation to ignore the mapped class
  - JAXB Global Binding files had hard-coded dependency to the XSDs they were modifying
  - Answer: Remove the hard-coded reference (and allow them to be re-used)
  - Make type substitution easier
  - Answer: Introduce @XMLSeeAlso to help define the subtypes

JAX-WS 2.1 Upgrade

- Overall focus is based on WS-Addressing and maturing the technology

- Customer Pain Points Addressed
  - WebSphere has **IBM** API/SPIs for programming to WS-Addressing since WebSphere 6.1
  - Answer: Standard JCP-based APIs are introduced to allow users to code WS-Addressing headers directly (via an Addressing Feature).

- Maturing of technology
  - Feature Extensibility
    - Enable/Disable MTOM feature
      - Limits on when to enable MTOM
    - Respect Bindings Feature
      - Requires respecting all WSDL Binding information (including extensions)

```
@WebService
@MTOM(enabled="true", threshold="2000")
public class MyServiceImpl {
                ...
}
```

JSR 109 1.2 Upgrade

- Focus is to upgrade to support JAX-WS along with JAX-RPC

- Customer Benefit is consistency with other declarative models.
  - Declarative model to define and/or override JAX-WS annotations
    - Examples include:
      - Handlers
      - MTOM enablement
      - Java EE environment entries

EJB 3.0 Support for Web Services

- Integration with the rest of Java EE native capabilities

- Customer Pain Points Addressed
  - The WebSphere Feature Pack for Web Services only addressed POJOs deployed within the web container for hosting services.
  - Answer: Extend current JAX-WS implementations providing EJB-specific capabilities:
    - Method-level authorization
    - Transactionality of individual requests
    - Compensation routines for WS-Business Activity
  - Answer: Allow for other transports to be introduced
    - SOAP / JMS leverages EJB-based implementations

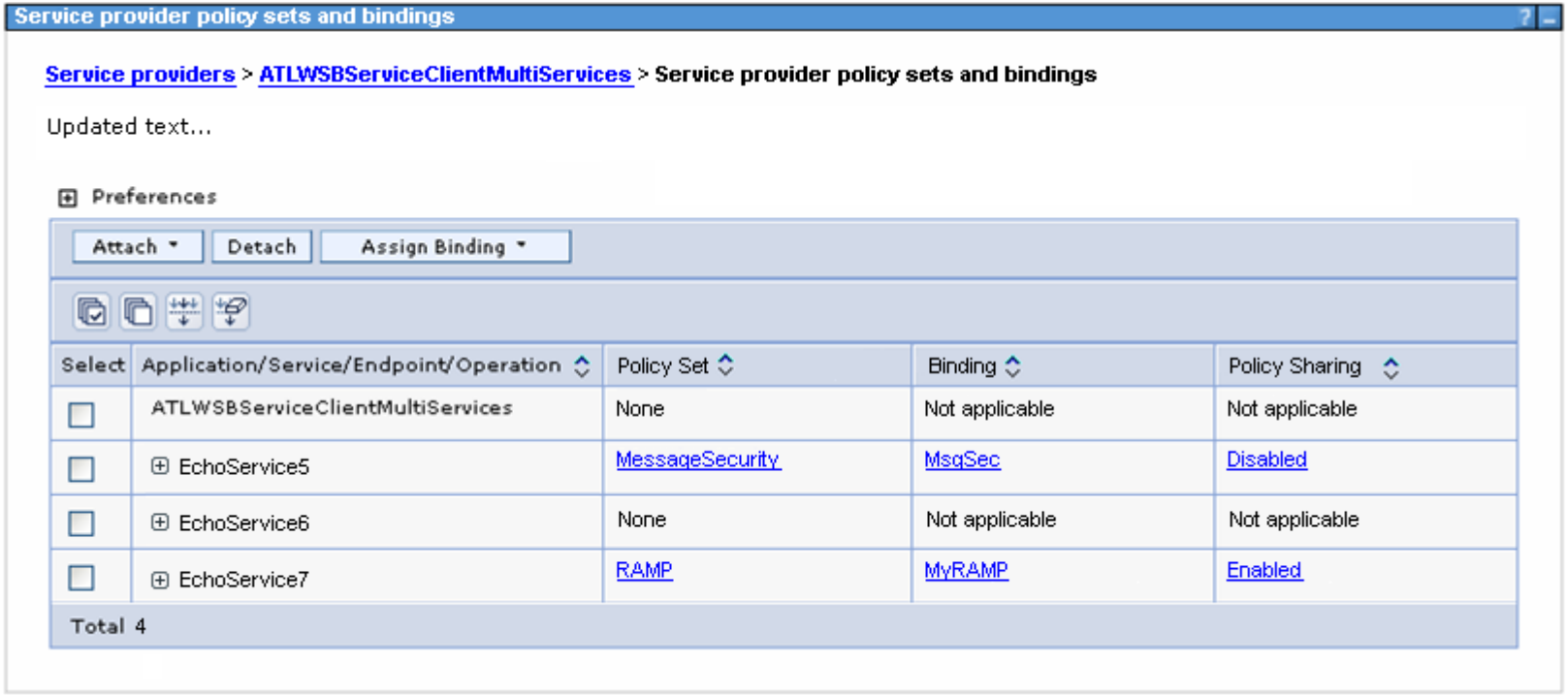
Complete the Web Service Standards Roadmap

Web Services Standard	Introduced in	Standards Completion	WAS v7.0
WS-Atomic Transaction	6.0	OASIS approved – 6/2007	✓
WS-BusinessActivity	6.1	OASIS approved – 6/2007	✓
WS-SecureConversation	6.1 FeP WS	OASIS approved – 3/2007	✓
WS-Trust	6.1 FeP WS	OASIS approved – 3/2007	✓
WS-SecurityPolicy		OASIS approved - 7/2007	✓
Kerberos Token Profile		OASIS approved – 2/2006	✓
WS-Policy		W3C recommend – 9/2007	✓
WS-Addressing Metadata		W3C recommend – 9/2007	✓
WS-MetadataExchange			✓
WS-DistributedManagement 1.1	6.1 FeP WS	OASIS approved – 8/2006	✓
WS-I Basic Profile 1.2		Targeted 2H of 2008	✓
WS-I Basic Profile 2.0		Targeted 2H of 2008	✓
WS-I Basic Profile RSP		Targeted 1Q of 2009	✓

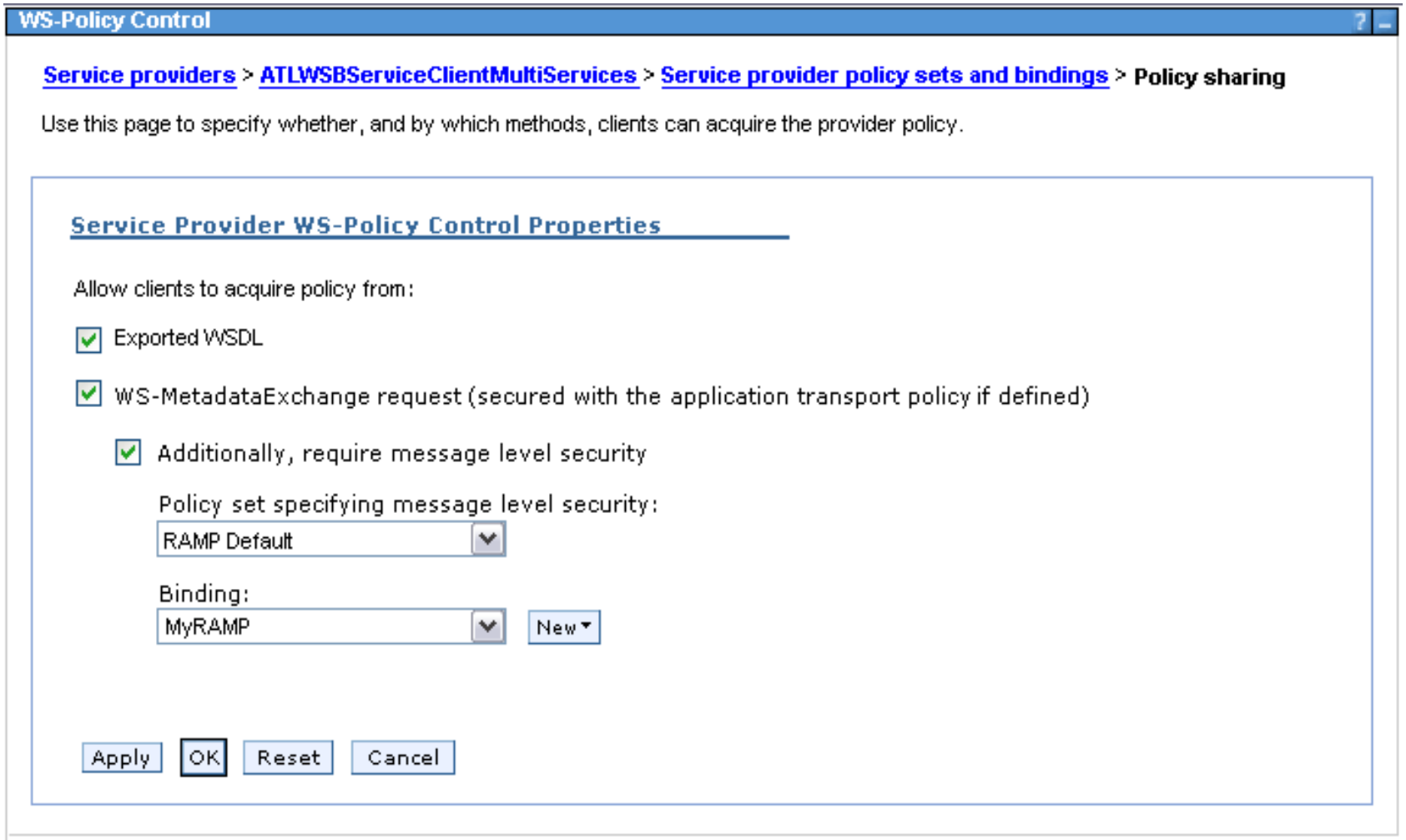
W3C WS-Policy Support

- Focus of support is enable movement towards:
  - Declaration of service constraints
  - Dynamic configuration of runtime
- Customer Pain Points Addressed
  - Static Configuration of Services is time-consuming and costly
  - Answer: Support WS-Policy and WS-MetadataExchange (and varying domain-specific policies such as WS-SecurityPolicy, WS-ReliableMessagingPolicy
- Administratively define which attached policy should be applied for policy intersection
  - Capabilities supported include
    - Expose WAS PolicySet in interoperable WS-Policy form, in context of provider WSDL
    - Provider WSDL available via:
      - HTTP Get of provider-url?wsdl
      - WS-Metadata GetMetadata request
    - Client retrieval of Policy and Dynamic calculation of Policy Usage

Configure Exposing Server “Policy”



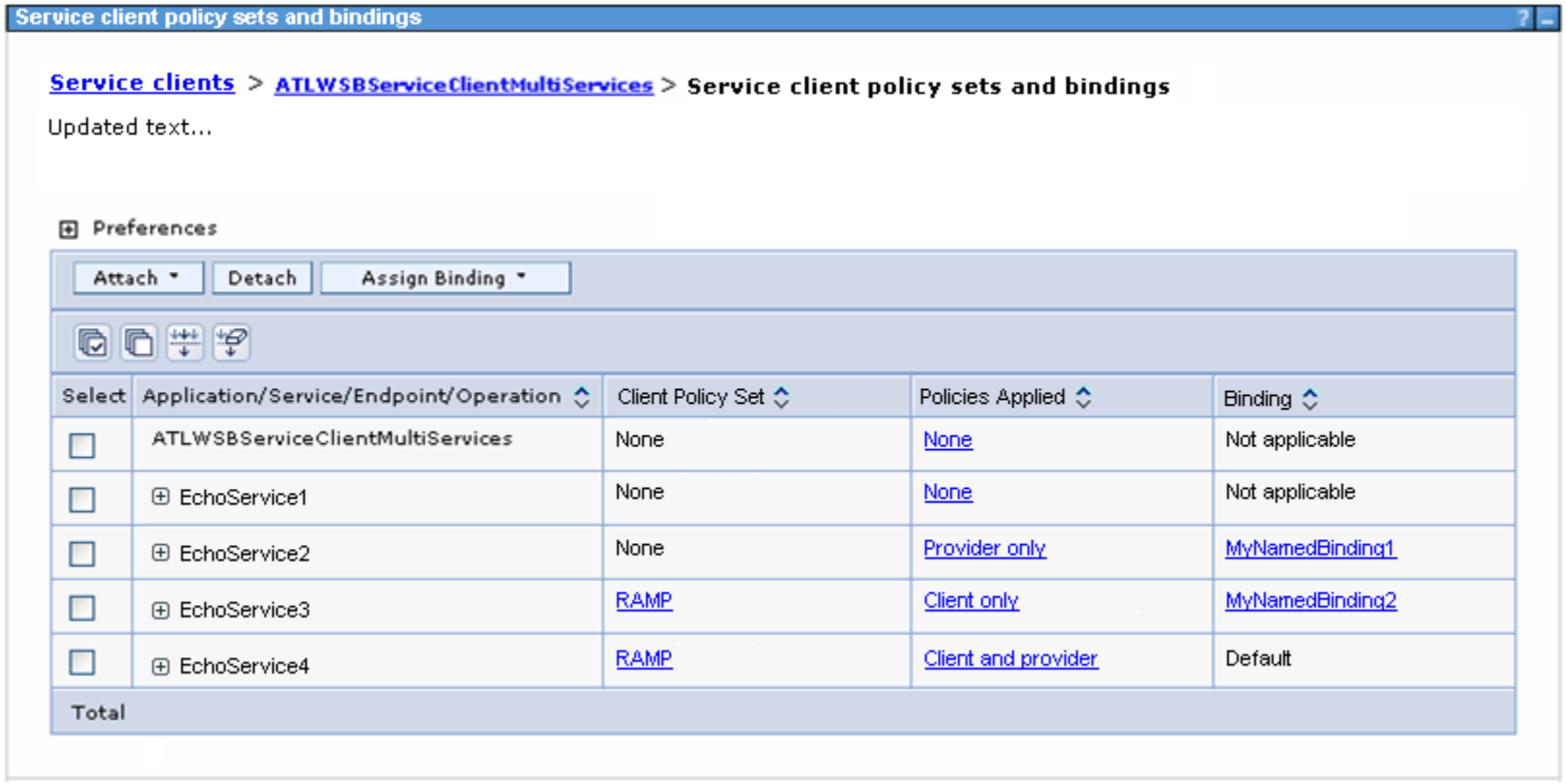
Options for Exposing Server “Policy”



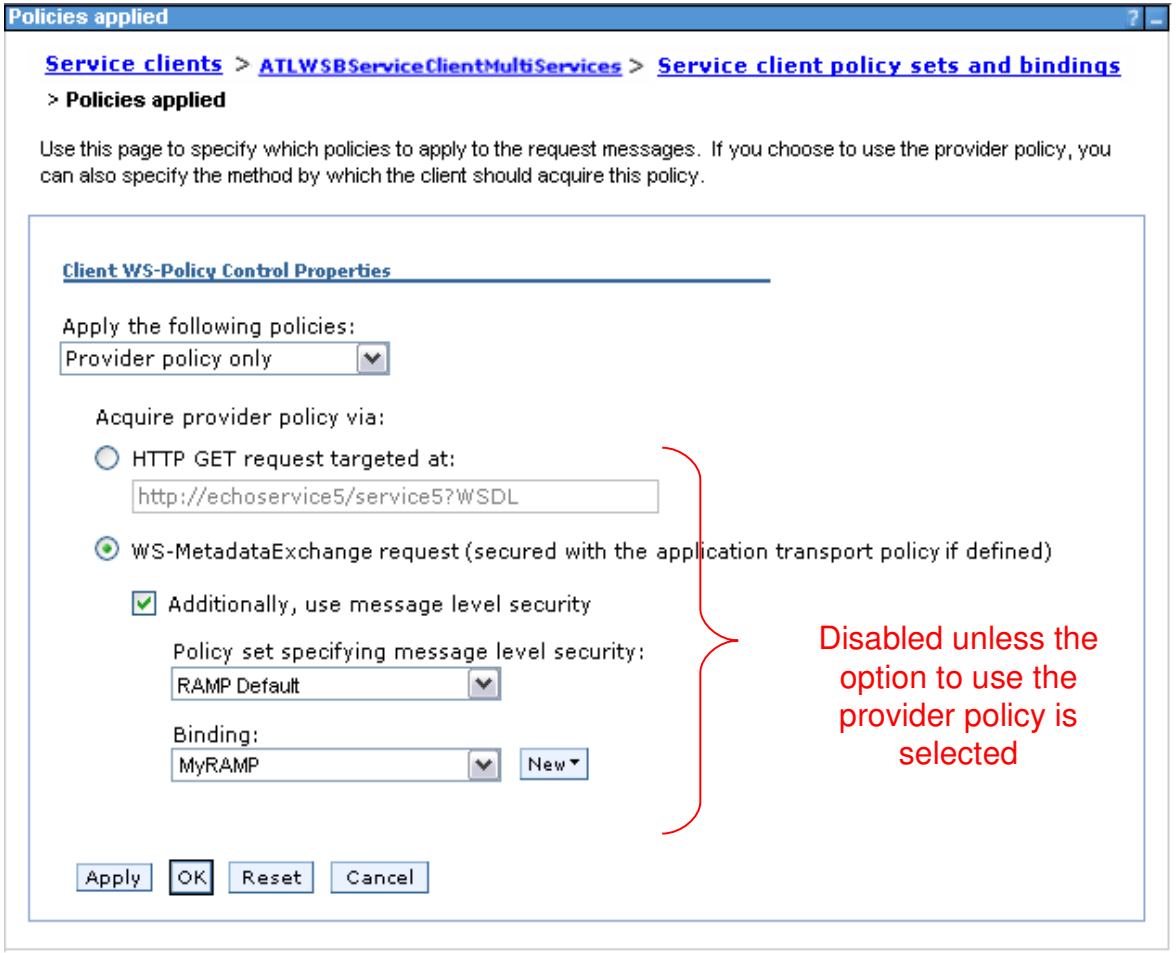
Applying Policy to a Client

- No policy
- Client policy
  - Policy calculated based on *static* client policy configuration (i.e. policy set). This is implicitly supported in the Web Services Feature Pack.
- Provider Policy – New
  - Policy calculated based on *dynamically* acquired provider policy. Administrator says “be guided by the provider’s policy requirements”
- Client and Provider Policy – New
  - Policy calculated based on dynamically acquired provider policy *and* static client policy configuration. Administrator says “be guided by the provider’s policy requirements… but I also want to statically configure some restrictions to what’s acceptable”

Configure Usage of Client “Policy”

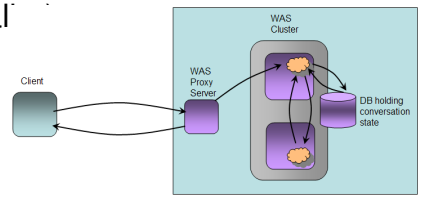


Client WS-Policy / WS-MEX Settings



OASIS WS-SecureExchange (WS-SX)

- Focus is on keeping pace with Standards for Interoperability
- Customer Benefit is to allow for increased interoperability with other vendors using the latest standards
- Capabilities include:
  - OASIS WS-Trust 1.3 support
    - Addresses obtaining Authentication tokens such as SecureConversation, SAML, etc…
    - OASIS submission & recommendation supported
  - WS-SecurityPolicy
    - Exposing Security Policy 1.2 for MEX and ?WSDL
    - Forms the basis of declarative model for Security (Transport and Message Level)
    - Assertion to specify caller identity (which token should be used for the cal
    - LTPA v2 (TFIM integration – more secure)
  - WS-SecureConversation
    - OASIS WS-SecureConversation 1.3 support
      - OASIS submission and recommendation supported
    - Allows Message Level Security processing to use symmetric cryptography (faster!)
    - Improved clustering support



Kerberos Token Profile

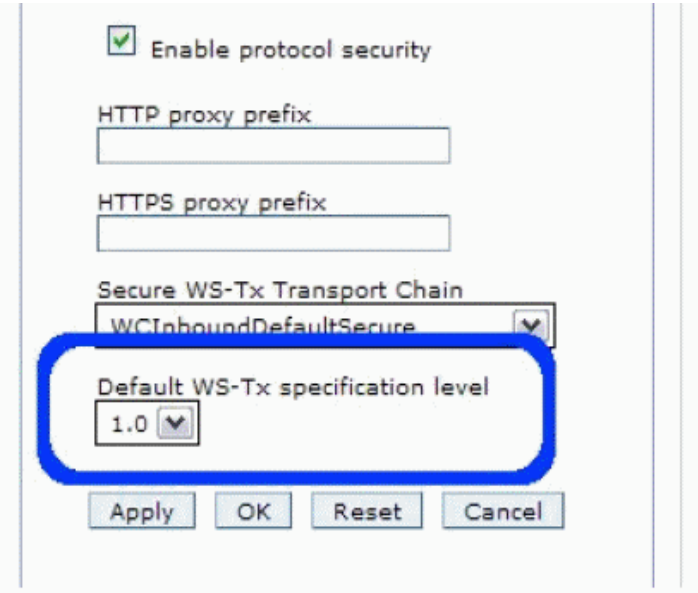
- Focus is to support multiple scenarios using a Kerberos Token for WS-Security processing
- Customer Business value is to provide Single Sign-on (especially when using Microsoft Infrastructure such as WSE and WCF)
- Support of OASIS WS-SecurityKerberos 1.1 Token Profile
  - AP_REQ and GSS token
    - Sign and encrypt SOAP Message with session key as secret key
    - Improves Performance and Security
    - Delegation
  - Web Service Programming model
    - JAX-WS (Primary focus and IBM Strategic direction)
    - JAX-RPC (Usage of Custom Token support in JAX-RPC)
- Integrates with Multiple Security Domain (MSD) in WebSphere

OASIS WS-Transaction

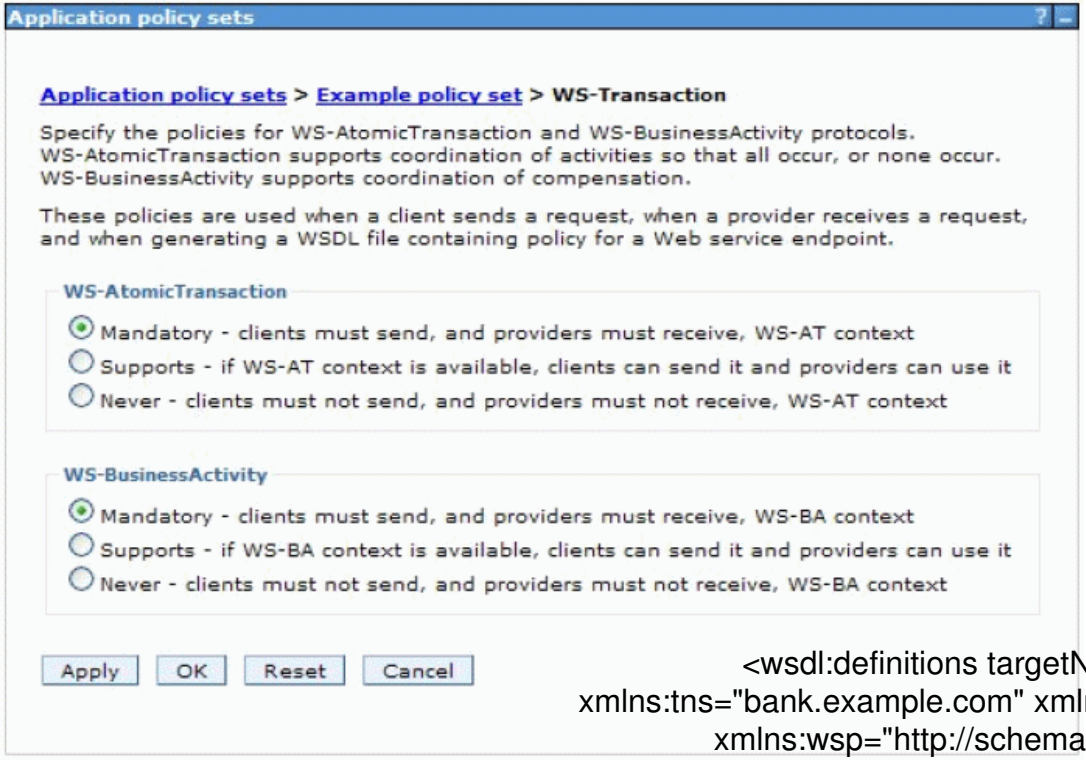
- Focus is on keeping pace with Standards for Interoperability
- Customer Benefit is to allow for increased interoperability with other vendors using the latest standards
- OASIS WS-TX 1.1/1.2 upgrade
  - WS-TX 1.1/1.2 only supported for JAX-WS-based applications
  - WS-TX 1.0 supported for JAX-RPC and JAX-WS-based applications
- Transaction-specific WS-Policy assertions
  - Require, Supports, Never
  - WS-AtomicTransaction (WS-AT), WS-BusinessActivity (WS-BA)

WS-Transaction

- Choose between supporting WS-Transaction 1.0 or 1.1 (as default)
- Interoperability is maintained with WebSphere 6.x using WS-TX 1.0
  - (default as shipped)



WS-Transaction Policy Configuration

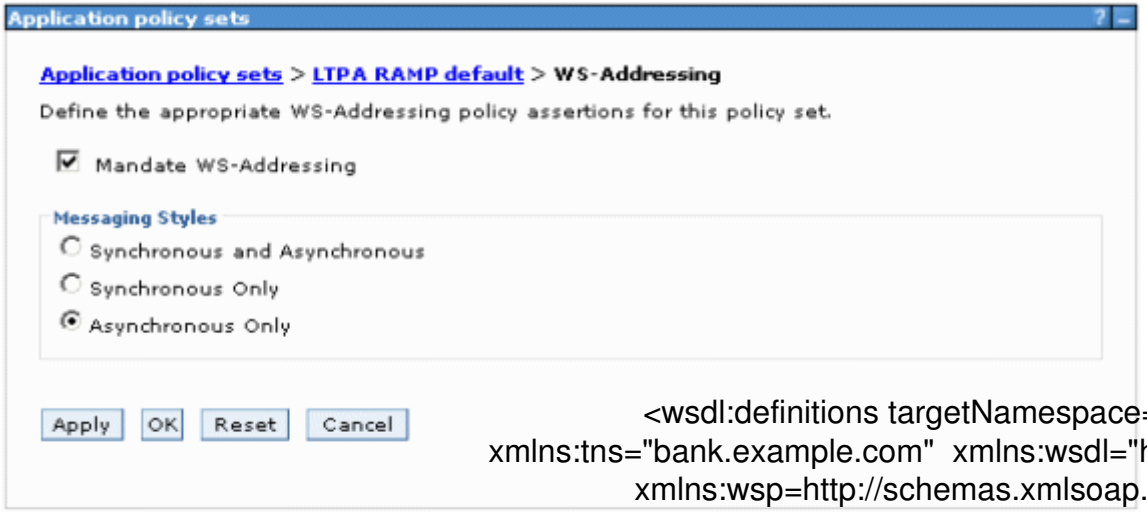



```
<wsdl:definitions targetNamespace="bank.example.com"
xmlns:tns="bank.example.com" xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
xmlns:wsp="http://schemas.xmlsoap.org/ws/2004/09/policy"
xmlns:wsat11="http://docs.oasis-open.org/ws-tx/wsat/2006/06"
xmlns:wsat10="http://schemas.xmlsoap.org/ws/2004/10/wsat"
<wsp:Policy wsu:Id="ATPolicy">
<wsp:ExactlyOne>
<wsat11:ATAssertion />
<wsat10:ATAssertion />
</wsp:ExactlyOne />
</wsp:Policy>
<!-- omitted elements -->
<wsdl:binding name="BankBinding" type="tns:BankPortType" >
:
```

WS-Addressing Metadata

- Focus is to complete the WS-Addressing standards
- Customer Benefit is declarative way to describe additional constraints on a service
- W3C WS-Addressing Metadata
  - Rounds out 3rd WS-Addressing Specification
  - Defines WS-Addressing Policy Assertions
    - Defines Mandatory or Supports
    - Defines Synchronous or Asynchronous behavior

WS-Addressing Policy Configuration



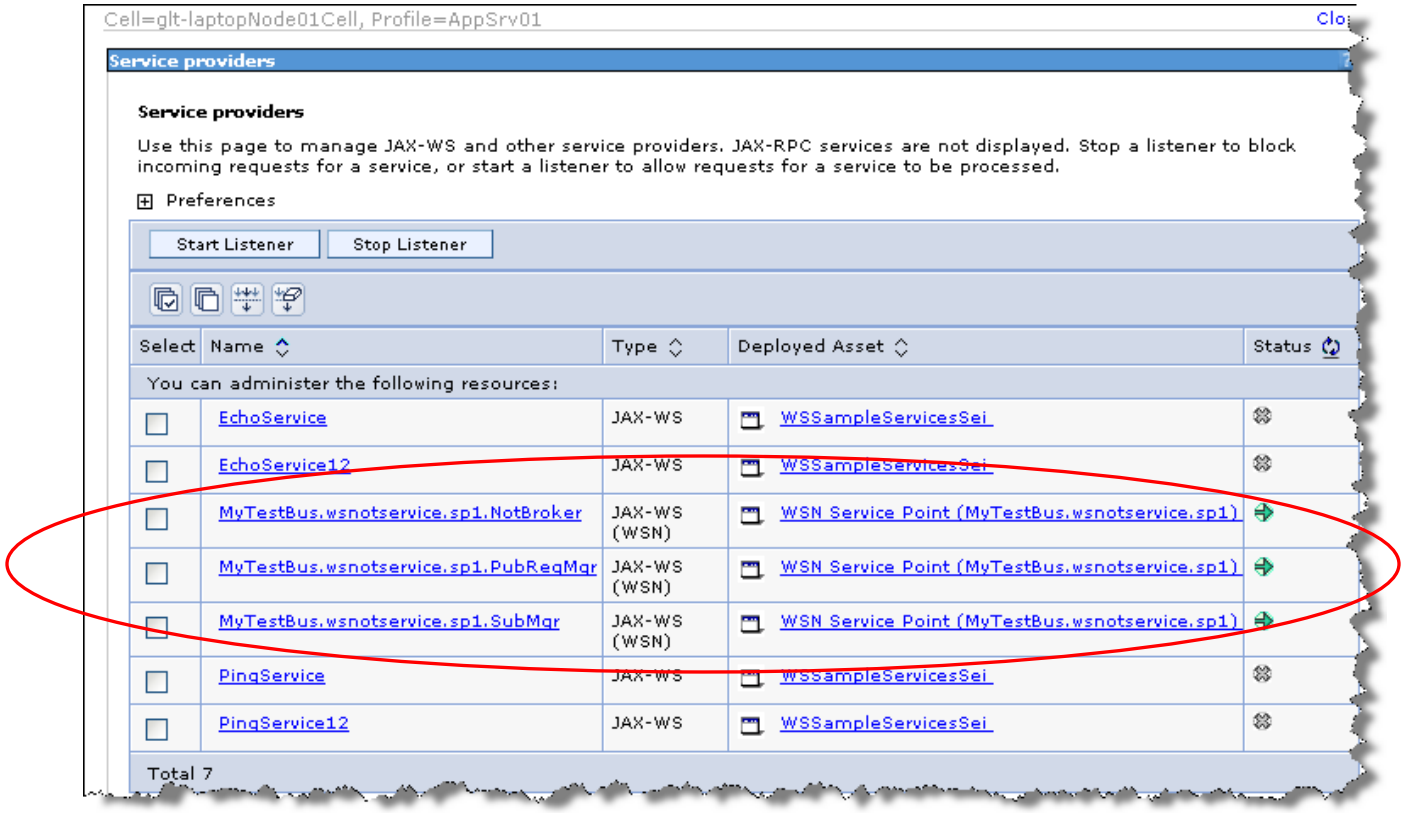

```
<wsdl:definitions targetNamespace="bank.example.com"
xmlns:tns="bank.example.com"  xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
xmlns:wsp=http://schemas.xmlsoap.org/ws/2004/09/policy
xmlns:wsam="http://www.w3.org/2007/05/addressing/metadata"   xmlns:wsu="http://
docs.oasis-open.org/wss/2004/01/oasis-200401-wss-wssecurity-utility-1.0.xsd" >
<wsp:Policy wsu:Id="WSAPolicy">
<wsam:Addressing wsp:Optional=”true”>
<wsp:Policy>
<wsp:ExactlyOne>
<wsam:AnonymousResponses wsp:Optional=”true” />
<wsam:NonAnonymousResponses />
</wsp:ExactlyOne>
</wsp:Policy>
</wsam:Addressing>
</wsp:Policy>
<!-- omitted elements -->
<wsdl:binding name="BankBinding" type="tns:BankPortType" >
<wsp:PolicyReference URI="#WSAPolicy" wsdl:required="true" />
<!-- omitted elements -->
```

WS-Notification Enhancements

- Focus is on increased maturity
- JAX-WS implementation of WS-N
- Benefits include
  - XPath Selector for finer granularity in topic space
    - Improves performance and reduces unnecessary messages
  - Upgrade to OASIS WS-Notification 1.3
    - Improves standards compliance to allow for better interoperability
  - Ability to configure and utilize Policy Sets
    - Improves qualities of service with WS-Notification

WS-Notification and Policy Sets

- Allow Policy Sets to compose with WS-Notification
  - Value obtained is reliable notification



WS-Reliable Messaging Enhancements

- Focus is on continuing to enhance from comments from the feature pack
- Integration with WS-Policy
- OASIS WS-RX upgrade
  - WS-RM 1.1/1.2, WS-MC 1.0/1.1, WS-RMP 1.1/1.2
- Customer benefit is improved performance and recovery
  - Automatic recovery for 1-way requests on server start up
  - Send on execution thread
    - For unmanaged endpoints, this allows for standard programming model usage (no WebSphere-specific API usage)

Continue to Simplify

Policy Set Enhancements

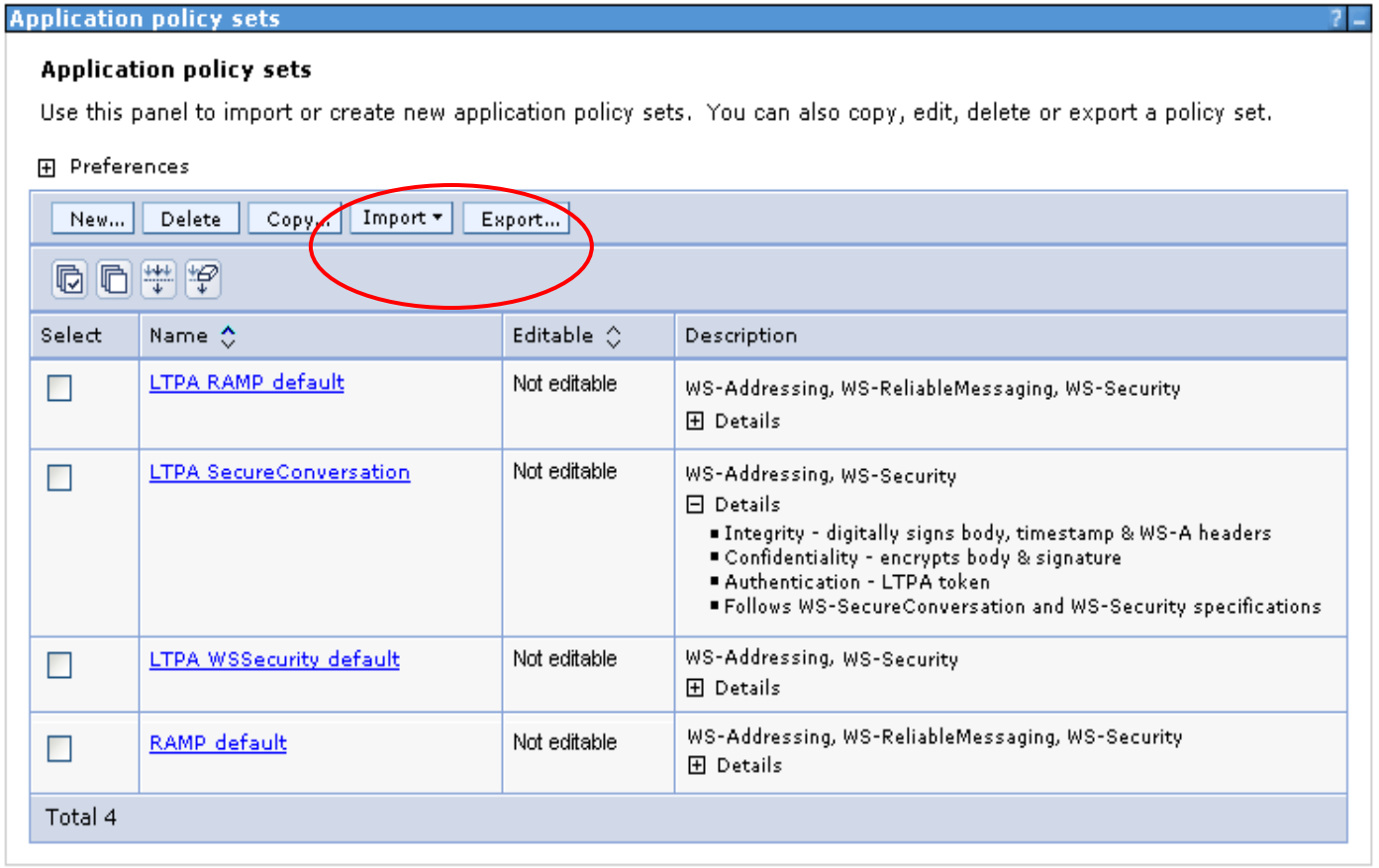
- Focus on maturity and continued ease-of-use

- Customer Benefits include
  - Extending for WS-Notification Service / Client endpoints
  - Multiple named cell-level bindings (allows greater flexibility and reuse)
  - Import / Export (both policy set and bindings)

Policy Set Import and Export

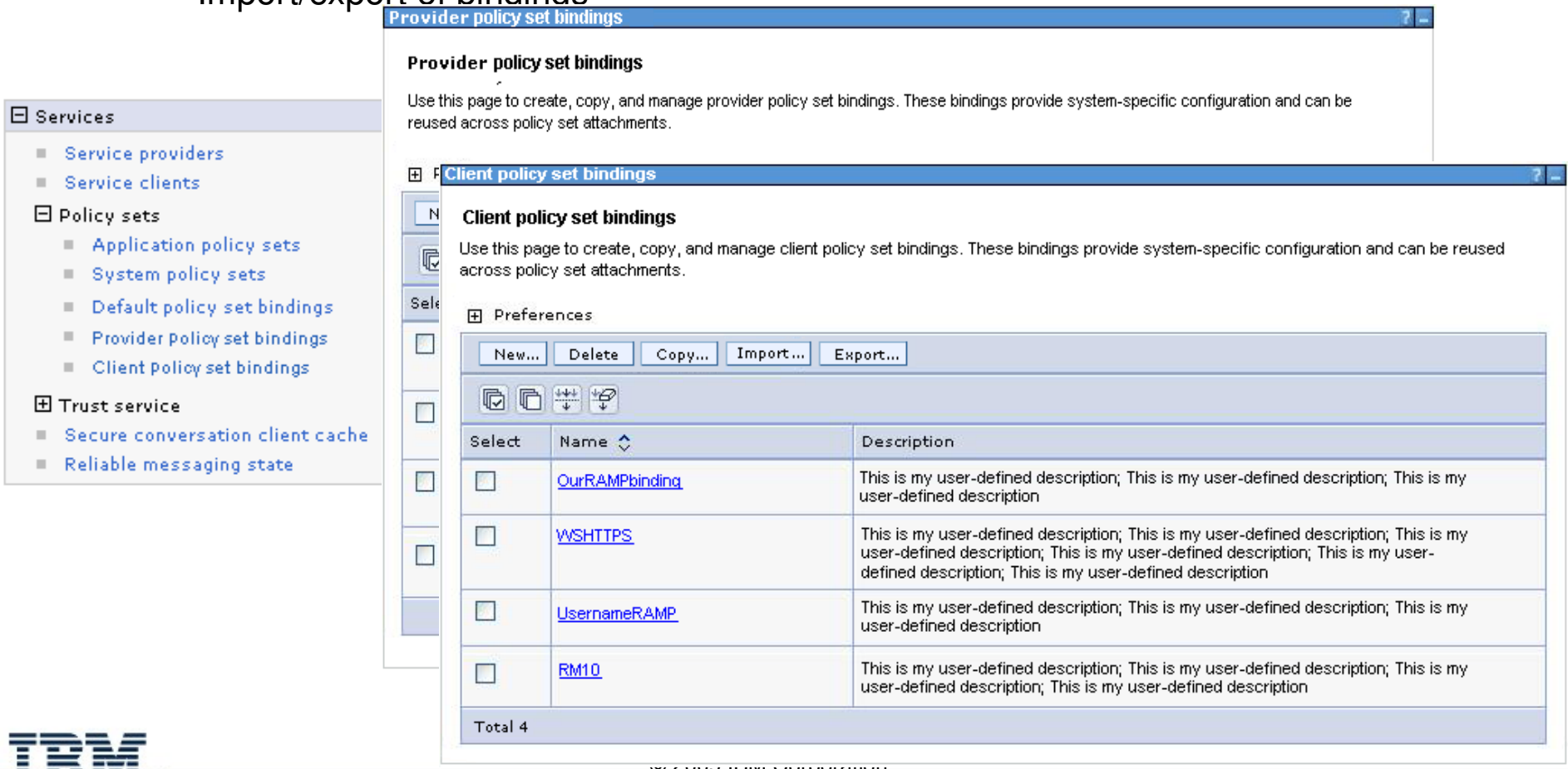
- Support to move Policy Sets from

  Development -> Test -> Production



Policy Set Bindings

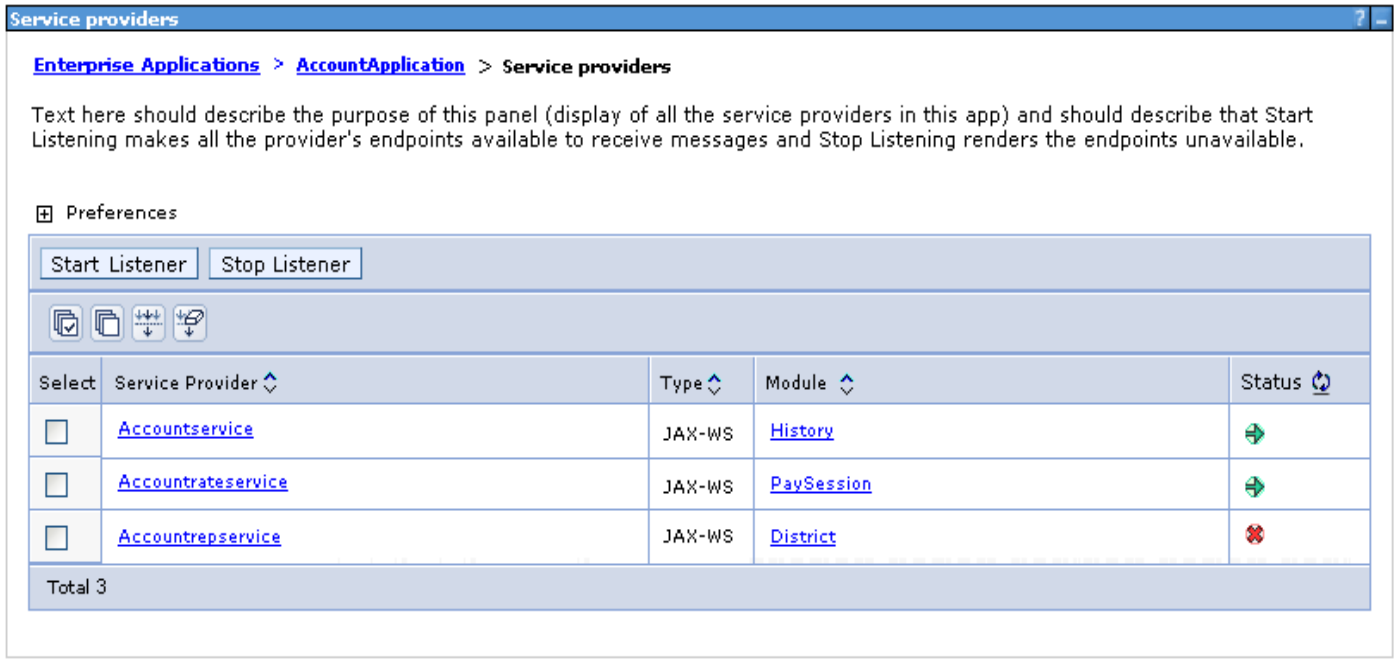
- Flexibility achieved through
  - Multiple named cell-level bindings
  - Import/export of bindings



Admin Console Enhancements

- Focus is to continue to simplify and provide maturity

- Customer value includes
  - Start and Stop listening endpoints (e.g. to control throughput into the system)
  - Migration/install mixed cell
  - Consumability re-factoring updates of names (to provide simplicity and consistency)



SOAP/JMS support

- Focus is to add additional reliable transport support

- Customer benefit allows for
  - Reusing existing skill for to achieve “reliable messaging”
  - Leveraging JAXB for full mapping
  - Standardized SOAP/JMS specification submitted to W3C

W3C Member Submission

SOAP over Java™ Message Service 1.0

W3C Member Submission 26 October 2007

This version:
http://www.w3.org/Submission/2007/SUBM-SOAPJMS-20071026
Latest version:
http://www.w3.org/Submission/SOAPJMS
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Abstract

This document specifies how SOAP should bind to a messaging system that supports the Java™ Messa
1.1 and SOAP 1.2 using the SOAP 1.2 Protocol Binding Framework.

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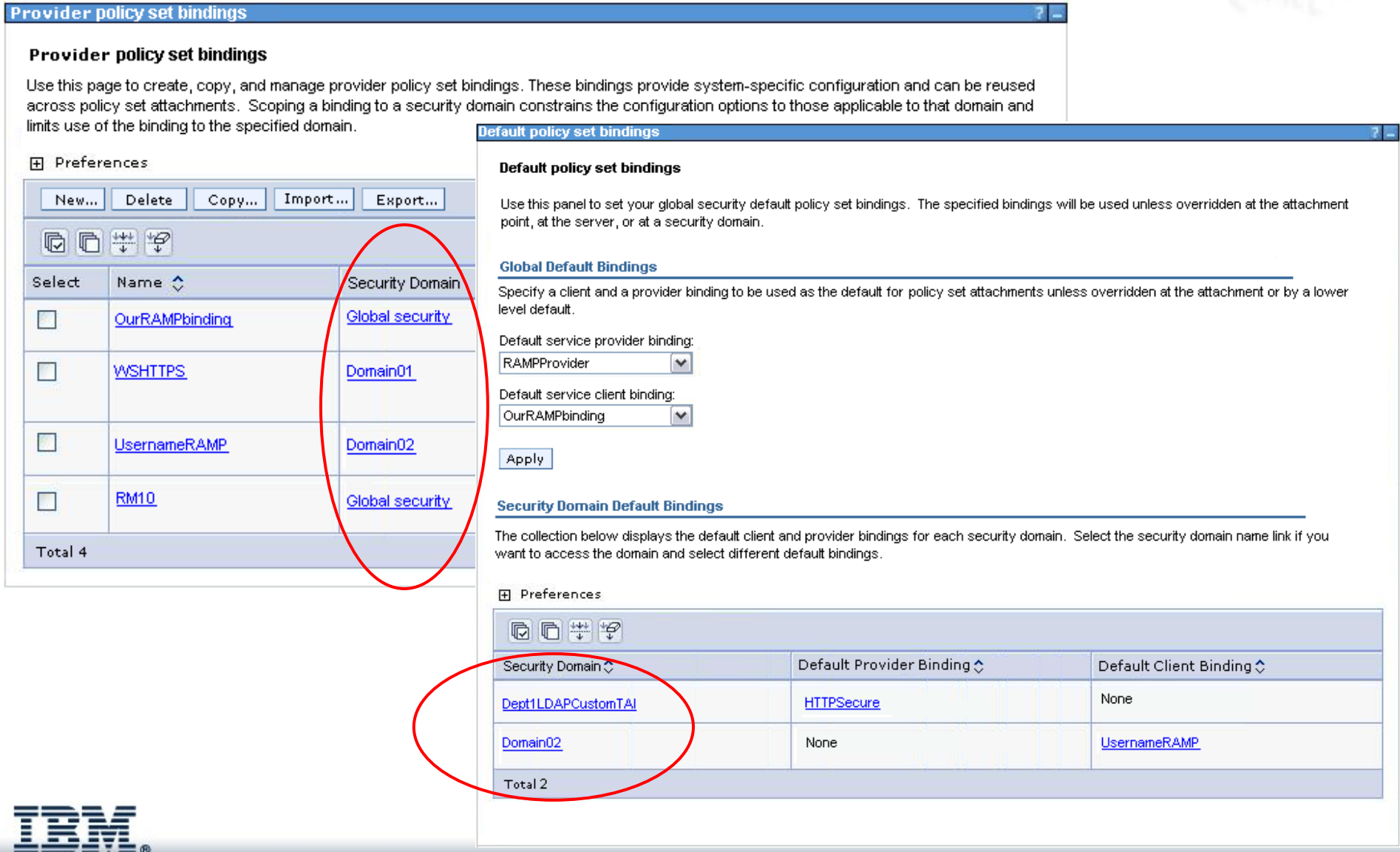
Integration with Multiple Security Domain



Performance Improvements

- Techniques include building up “golden paths”
- Customer benefit is increased performance and reduced instructions
- Areas of focus include:
  - JAXB Fastpath
  - MTOM attachments
  - Reliable Messaging (in-memory persistent)
  - WS-Security Processing improvements

Interoperability

- Focus on interoperability involves multiple approaches
  - WS-I Profiles
  - Common Component within IBM
  - Apache Componentry
    - Axis2 and Sandesha2
  - Web Services Test Forum (WSTF)

Web Services Test Forum (WSTF)

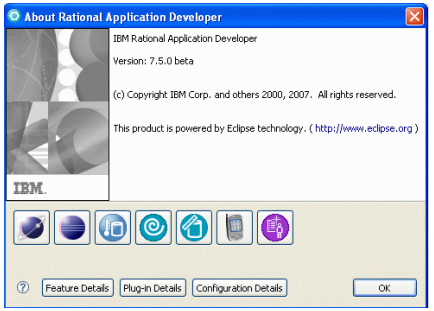
- Objective

  "Provide an environment in which members of the Web Services community can develop and test interoperability scenarios that go beyond the specification testing done elsewhere, which is typically limited to a single Web Services specification."

- All activities are private (unless voted to turn public)
- Participation is open to any individual/company
- Anyone can create a scenario
- Long-lived endpoints are encouraged

- Customer benefits include earlier testing (by various vendors) to showcase and build best practices and resolve issues

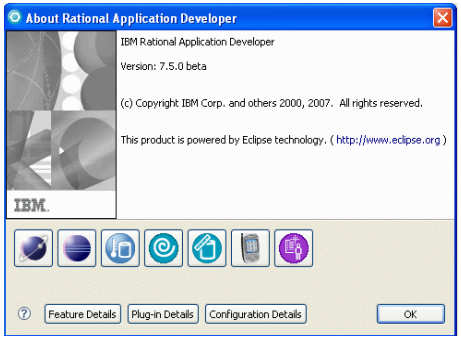
New R.A.D. v7.5 Web Services Functionality - Common to v6.1 WSFP and v7



- Functionality
  - New Services views to replace JSR-109 and JAX-WS nodes
    - View Web services and clients by project and by workspace
    - Extended to support JSON services (Web 2.0 feature pack)
  - Annotations Autocompletions
    - Templatized with implied run time attributes
    - JAX-WS not needed on the project classpath
  - Quickfixes
    - Convert a plain Java project into a dynamic Web project to host a Web service
    - JAX-WS Annotations Processor problems (e.g. Auto-implement SEI methods)
  - Web Service Wizards
    - Customized Schema Library to improve reuse of schema code
    - Portable JAX-WS clients (embedded WSDLs with relative URL references)
  - Qualities of Service
    - Consolidated preferences for Policy Sets and WS-I profile compliance
    - Extended WSDL validation for WebSphere specific issues
  - Ant tasks
    - wsant.bat(.sh) script improvements. No more copying/editing required

New R.A.D. v7.5 Web Services Functionality - WebSphere v7

- Functionality
  - JSR-109 1.2 support
    - Generation of Deployment Descriptors from the Services views
    - New webservices.xml and client side deployment descriptor editors
  - Web Service Wizards
    - Bottom up and Top Down JAX-RPC EJB3 support
    - Top down JAX-WS EJB3 support
    - Standardized and IBM proprietary SOAP/JMS support
    - JAX-WS 2.1 code generation option
  - Qualities of Service
    - Integration of Named Bindings into preferences
    - WS-MEX support for WS-Policy
    - Kerberos Token Support for JAX-RPC and JAX-WS



Summary

- Objectives of v7.0
  - Continue to Drive Standards Adoption
    - Full Java EE 5 Web Services support
    - Extend and Uplift Standards Support
  - Enhance to support dynamic behavior
    - Client/service provider policy matching.
  - Continue to Simplify
    - Additional profiles and tooling validation of profile non-compliance

References

- Valuable Web Services Interoperability Articles
  - http://www.ibm.com/developerworks/websphere/library/techarticles/0710_levay/0710_levay.html
  - http://www.ibm.com/developerworks/websphere/library/techarticles/0712_levay/0712_levay.html
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  - http://www.ibm.com/developerworks/websphere/library/techarticles/0803_das/0803_das.html
- The Web Services Feature Pack Redbook.
  - http://www.redbooks.ibm.com/abstracts/sg247618.html
- SecureConversation Interoperability using WS-SecurityPolicy
  - http://cattail.cambridge.ibm.com/cattail/#view=hychung@us.ibm.com/files/0D291A70A3933DD8A565B0DA7F000001

Questions

- Thank you!!