

---

# Service-oriented Architecture (SOA) and Web Services Security

12th German-Japanese Symposium

April 19th, 2007

Berlin, Germany

Kojiro Nakayama

Hitachi, Ltd. Systems Development Laboratory

# *Contents*

---

- 1* Introduction to SOA and Web Services

---
- 2* Security Challenges and Technologies

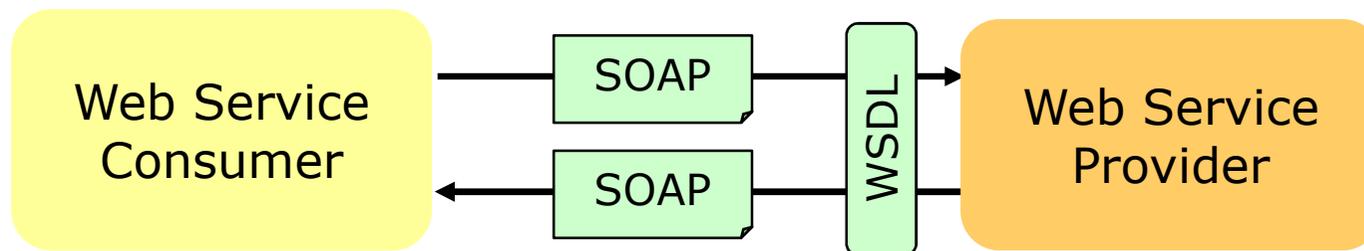
---
- 3* Standardization Trend

---
- 4* Conclusion

---

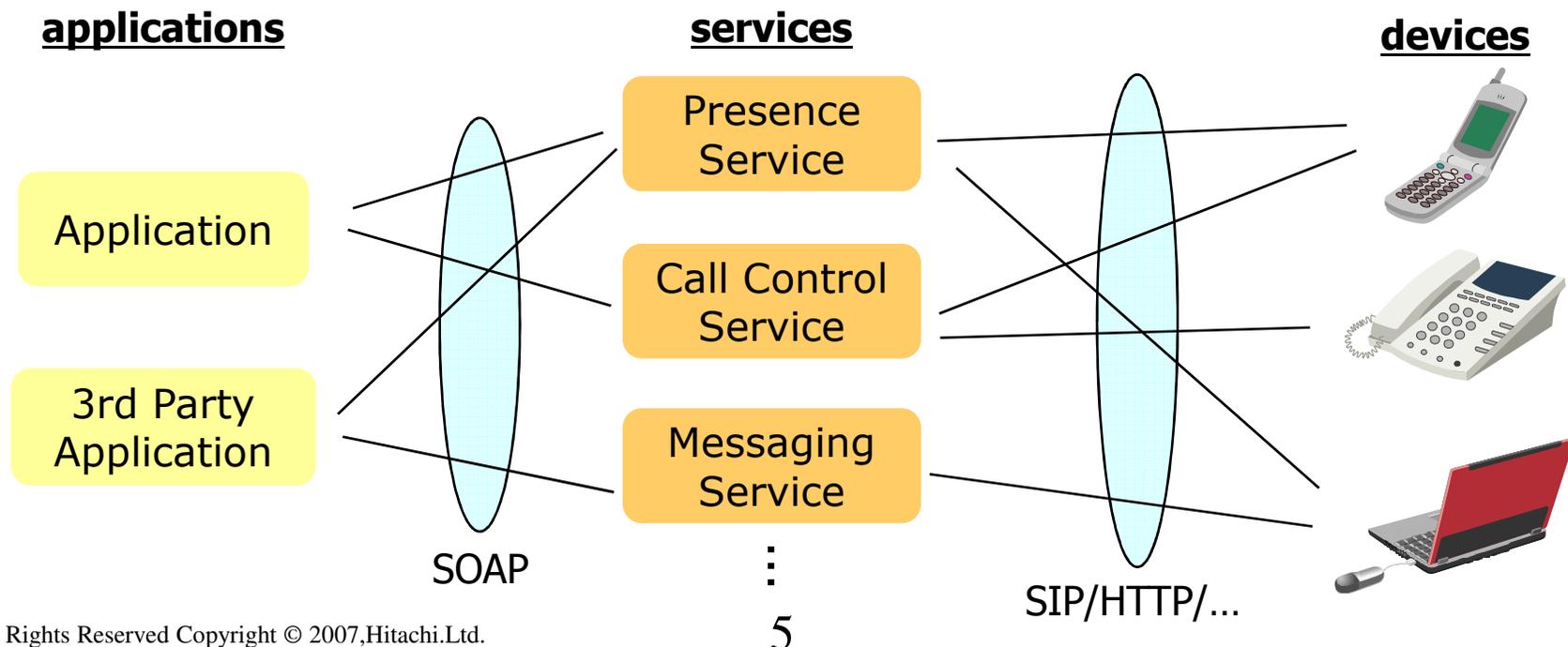
- What is Service-oriented Architecture (SOA)?
  - SOA is the latest paradigm in distributed computing
  - In SOA, applications are developed by combining services
- What is a service?
  - A service is a reusable software component that can be accessed from network
  - Each service has a defined interface that is independent of the underlying platform
- Benefits of SOA
  - Developers can utilize the existing services
    - ➔ Applications can be developed rapidly and at low cost
  - Applications can be modified by replacement of services
    - ➔ Applications have flexibility to a system change

- What is web services?
  - Web services is an XML-based system integration technology
    - XML-based message protocol (SOAP)
    - XML-based interface description Language (WSDL)
  - Web services is based on standard technologies
    - ➔ Achieve integration in a heterogeneous environment
  - Web services is the most important enabler for SOA



WSDL: Web Services Description Language, SOAP: Simple Object Access Protocol

- Telecom capabilities are provided as web services
  - Presence service, call control services, messaging service, etc.
- High-value applications can be developed rapidly by 3rd parties



- SOA poses new security challenges

## Characteristics of SOA

- Multiple systems in multiple organization are involved
- Services are replaced and changed frequently



## Security Challenges in SOA

**End-to-end  
Security**

**Trust  
Brokering**

**Policy-based  
Integration**

## Issue

- SOAP messages may pass through intermediaries
- Transport security (SSL/TLS) is not enough
  - SSL/TLS provides the point-to-point security
  - All information will be disclosed to the intermediary
  - The provider cannot authenticate the consumer



SSL: Secure Socket Layer, TLS: Transport Layer Security

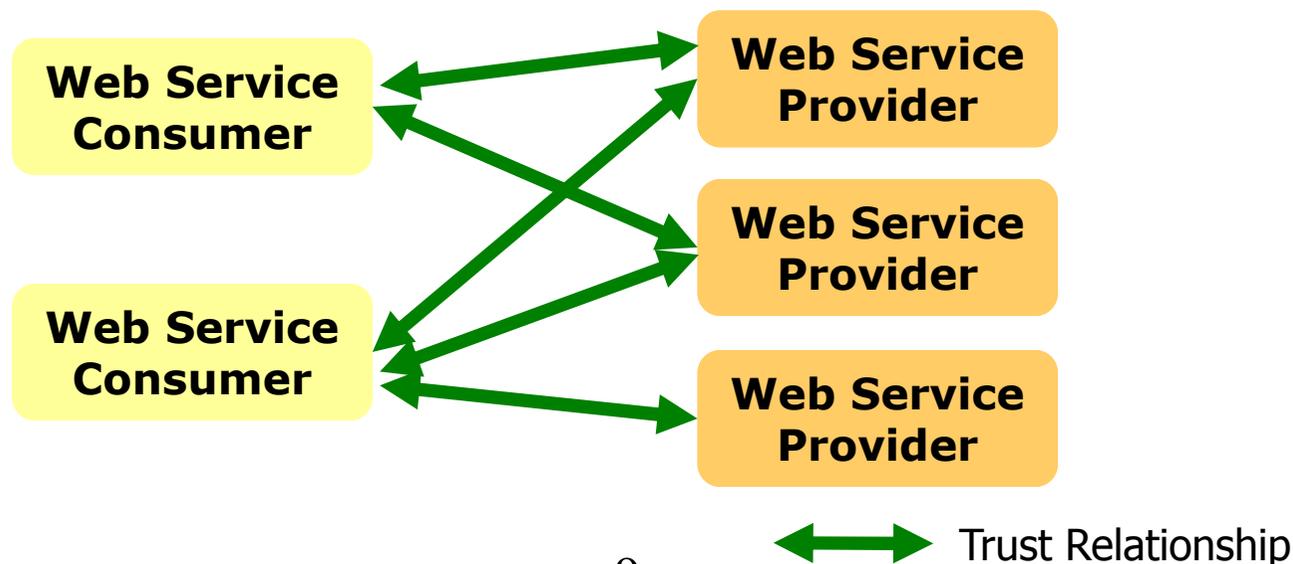
## Countermeasure

- WS-Security is the foundational specification of message level security for web services
  - Support integrity by signing the SOAP message
  - Support confidentiality by encrypting the SOAP message
  - Support authentication by attaching the security token to the SOAP Message
- By using WS-Security, SOAP message itself is secured  
➔ end-to-end security is ensured



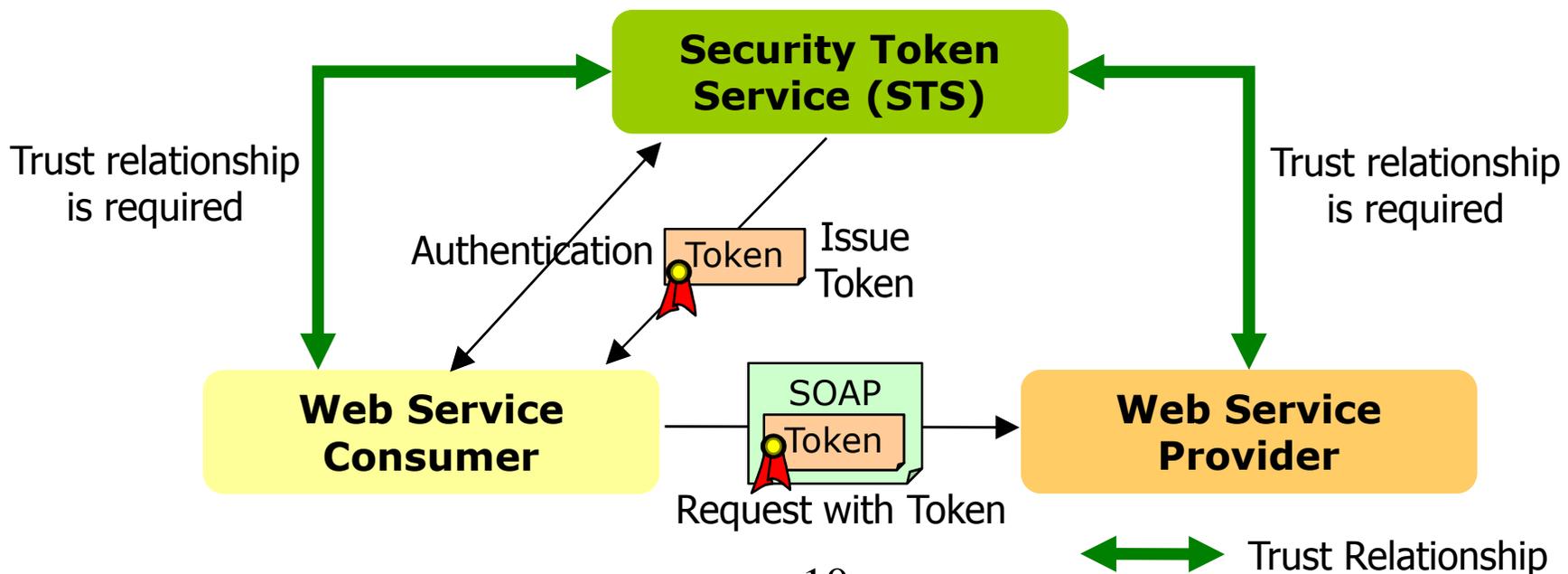
## Issue

- To accomplish the authentication, the provider and the consumer have to share the trust relationship
  - e.g. sharing an id and a password
- There are a large number of providers and consumers
  - ➔ It is inefficient to build a trust relationship individually



## Countermeasure

- WS-Trust is the specification for brokering trust relationship
  - The security token service (STS) brokers trust relationship between consumer and provider
  - The providers and the consumers don't have to share trust relationship individually

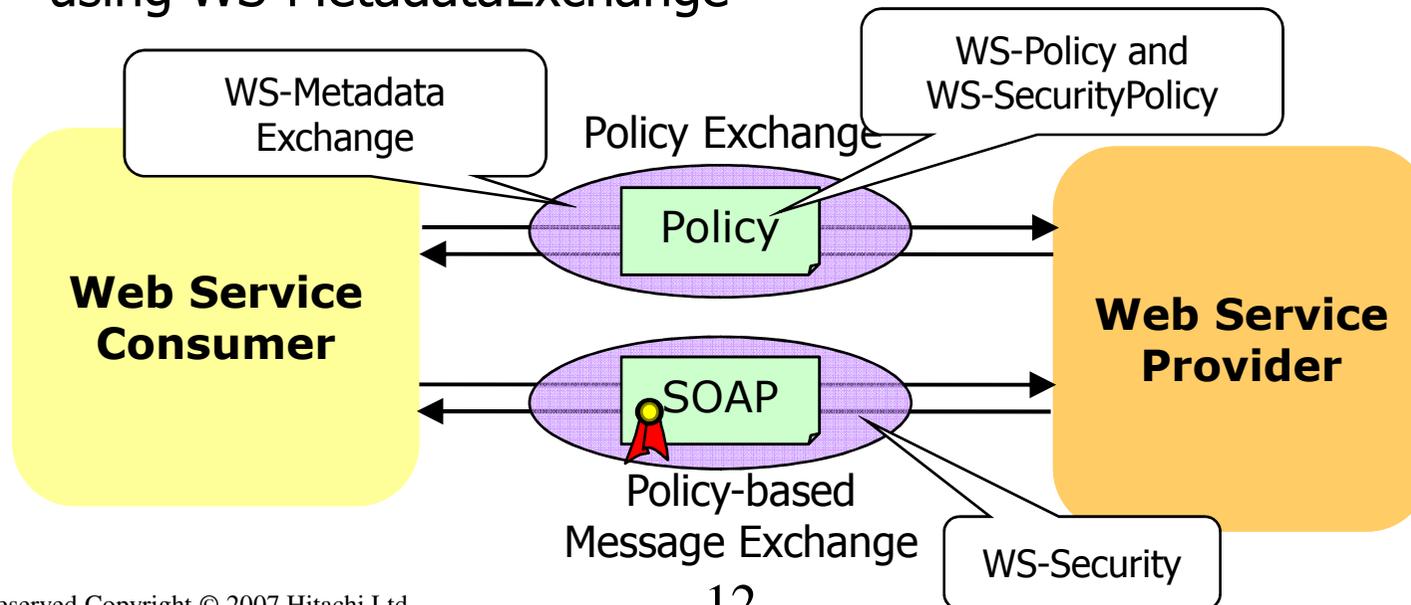


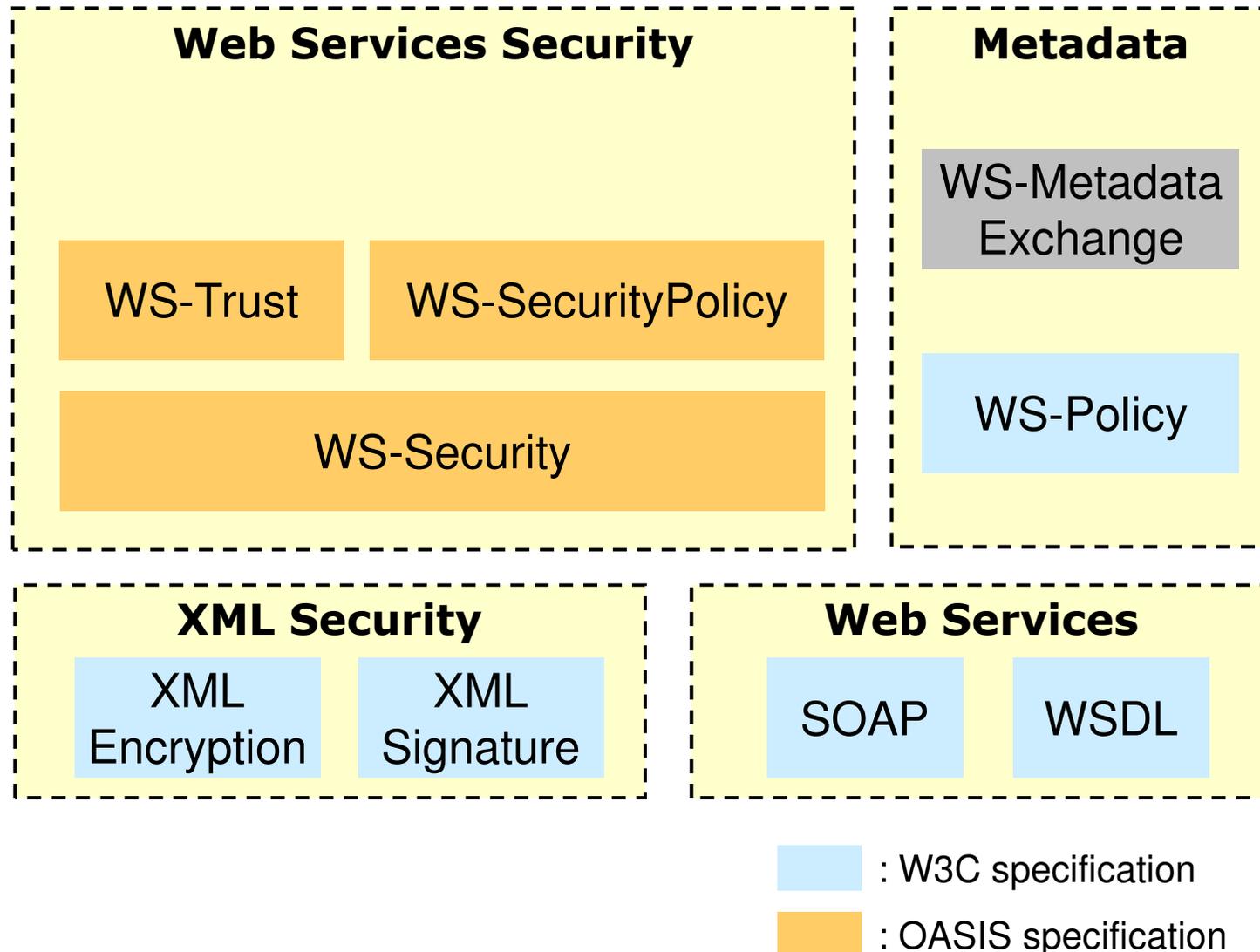
## Issue

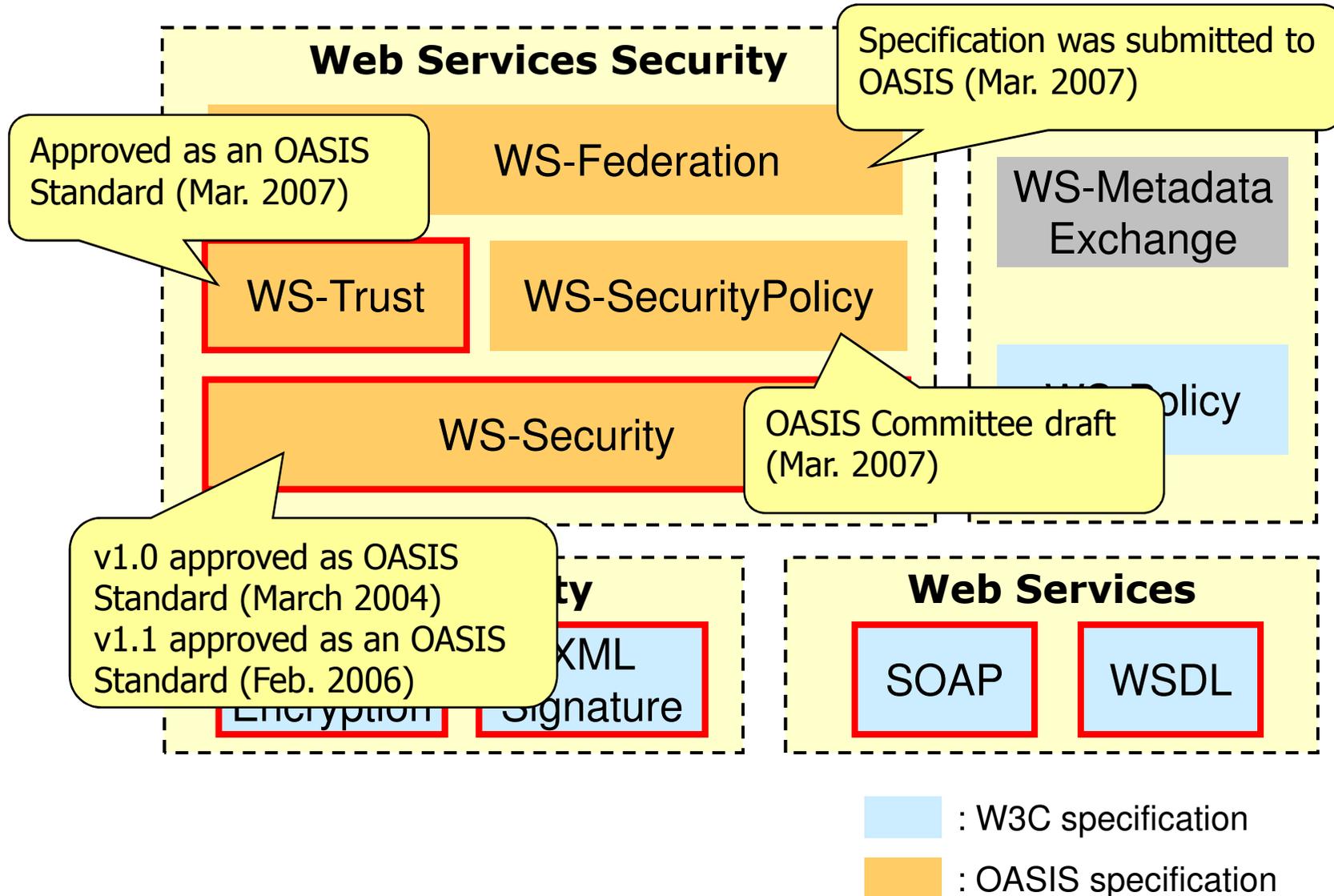
- Different organizations are involved in message exchange
- Each service might have different security policies, e.g.
  - SOAP message must be encrypted using WS-Security
  - X.509 based authentication is required
- The security mechanism have to be switched depending on the policy of the system in communication

## Countermeasure

- WS-Policy and related specifications provide a framework for policy-based message exchange
  - Security policies are described using WS-Policy and WS-SecurityPolicy
  - The consumer and the provider exchange their policy using WS-MetadataExchange







- SOA provides agility and flexibility to enterprise systems
- SOA poses new security challenges also
  - End-to-end security
  - Trust brokering
  - Policy-based integration
- Technologies for these challenges are moving through the standardization process

An important next step is to apply these technologies to actual business!

---

# Service-oriented Architecture (SOA) and Web Services Security

Kojiro Nakayama

Hitachi, Ltd. Systems Development Laboratory

E-Mail : [kojiro.nakayama.fc@hitachi.com](mailto:kojiro.nakayama.fc@hitachi.com)