A Public Web Services Security Framework Based on Current and Future Usage Scenarios

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Web Services Usage Scenarios

- Point-to-point system integration
- Enterprise application integration
- Technology integration
- Business partner collaboration
- Composite business processes
- Reducing I.T. lifecycle costs
- I.T. investment protection

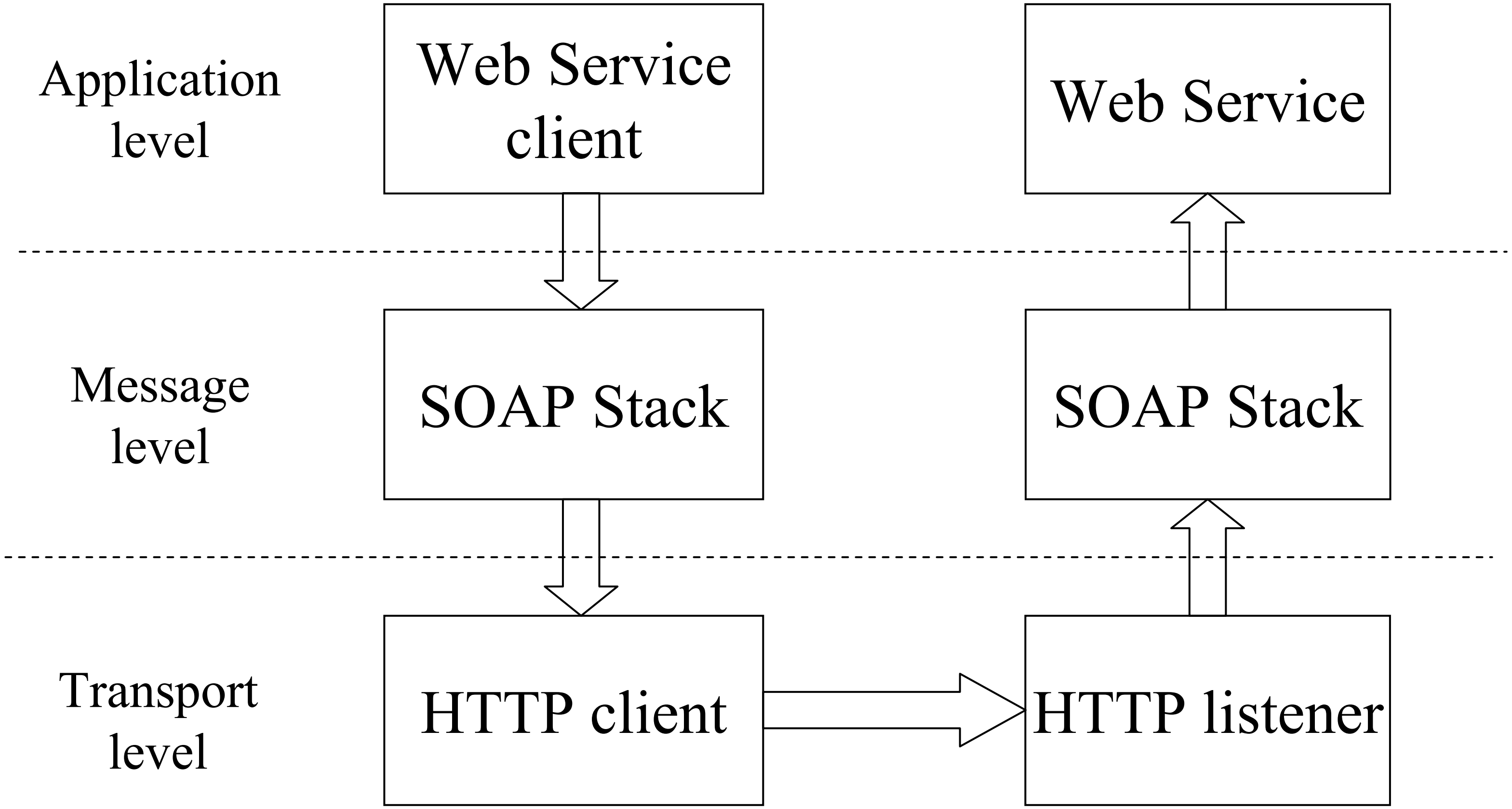
3 Main Concerns of a Security Framework

- Authentication – identity
  - Who is the caller?
  - How do we prove they are who they say they are?

- Authorization – access control
  - What is the caller authorized to do?
  - Is the caller permitted by perform the operation it is requesting?

- Confidentiality – encryption and tamper-proofing
  - How do we prevent snoopers viewing our messages and data?
  - How do we prevent messages being tampered with between sender and receiver?

Web Service Interaction Levels



Transport Level Security

- Uses existing Web tier technology such as HTTP and SSL
- Authentication
  - HTTP authentication schemes – Basic or Digest
  - SSL client side certificates
- Authorization
  - J2EE Servlet declarative security constraints
- Confidentiality
  - SSL encrypted connections

Message level security

- Security data built in to the XML message text – usually as additional SOAP header fields
- Authentication
  - SSO (single sign-on) header tokens
  - SAML authentication assertions
- Authorization
  - SSO session details
  - SAML attribute assertions
- Confidentiality
  - XML Encryption specification
  - XML Digital Signatures specification

Application level security

- A Web Service application handles its own security scheme – for example, UDDI

- Authentication
  - App specific authentication messages
  - App specific credential headers in other messages
  - App maintains its own security domain

- Authorization
  - App performs its own access control checks
- Confidentially
  - App can apply an encryption scheme to some or all data fields
  - XML Digital Signature specification for tamper detection

Lessons from the First Wave

- Existing Web tier security infrastructure usually sufficient for internal projects
- Necessary to accommodate third-party security products already in use in the organization
- End-to-end framework is necessary to avoid security gaps
- Operational security procedure best practices for Web services have yet to be developed
- XML security standards have not yet been widely adopted
- Rival XML security standards are still emerging
- Lack of experience and training on XML security standards is holding back adoption

Recommendations for the future

- Track usage scenarios in an organization to determine security levels
- Start with “proof-of-concept” projects to gain experience
- Integration with Microsoft .NET security schemes will be vital
- Track emerging XML security specifications
- Don’t throw away the organization’s existing security infrastructure
- Plan to implement end-to-end security

Conclusions – Key Issues

- A Web Services security framework must support existing security products
- Must be an end-to-end framework (not just a “firewall” layer) to avoid any security gaps
- New XML security standards are not yet proven (so probably contain “holes”)
- Use existing proven Web tier security infrastructure until XML security standards and infrastructure is validated

Resources

- CapeScience
  - Papers, articles, tutorials, and webcasts for Web Services developers
  - http://www.capescience.com
- Cape Clear Academic Licenses
  - Free licenses for Cape Clear products to academic users
  - http://www.capescience.com/academic/