

Fast Web Services & Fast Infoset

Submitted To: Mobile Web Services

Date: 20 M09 2004

Availability: Public OMA Confidential

Contact: Paul Sandoz, Paul.Sandoz@Sun.Com

Source: Sun Microsystems

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Learn about the technologies and advantages of Fast Web Services and Fast Infoset for efficient processing of Web services and XML infosets

Agenda

The “Fast” set of technologies

XML or binary?

Standards and implementations

Fast Infoset and Fast Schema

Fast Web Services

Agenda With Section Highlights

The “Fast” set of technologies

XML or binary?

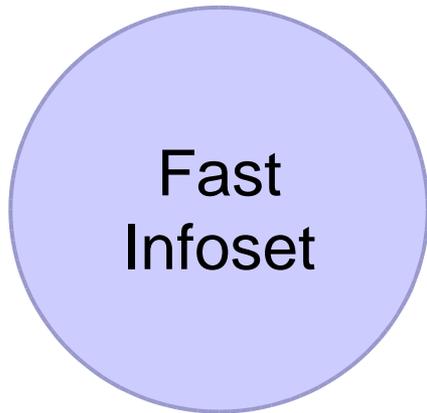
Standards and implementations

Fast Infoset and Fast Schema

Fast Web Services

The Set of Technologies

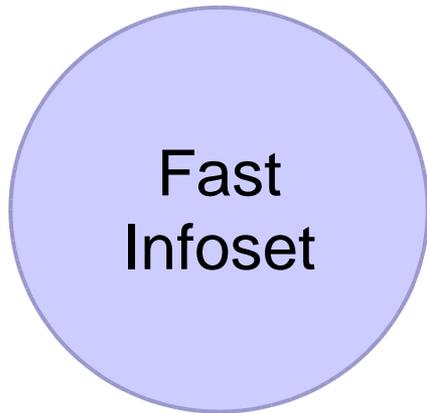
Fast Infoset



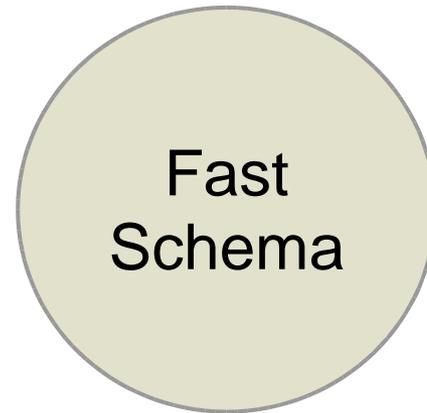
XML Infoset

The Set of Technologies

Fast Schema



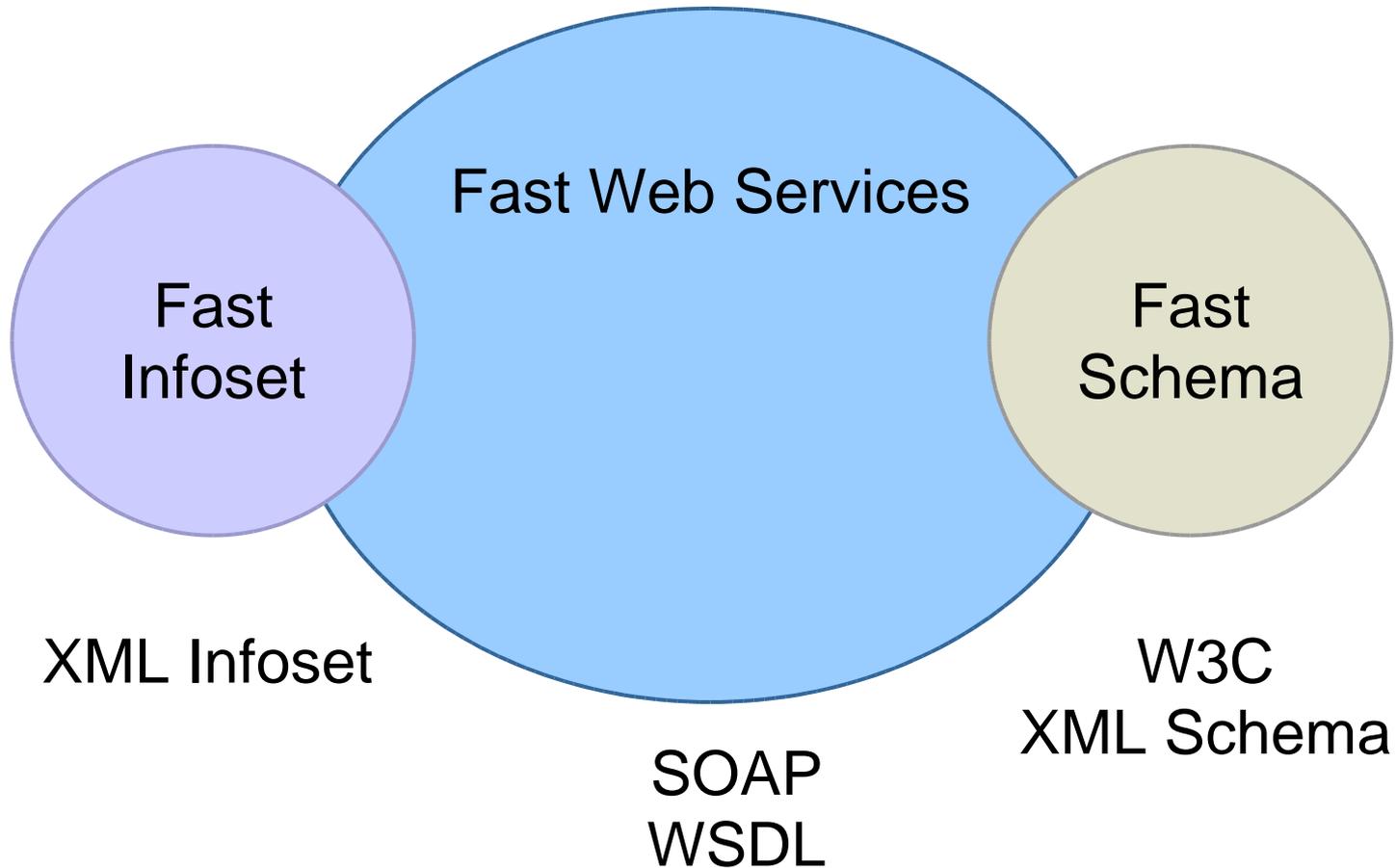
XML InfoSet



W3C
XML Schema

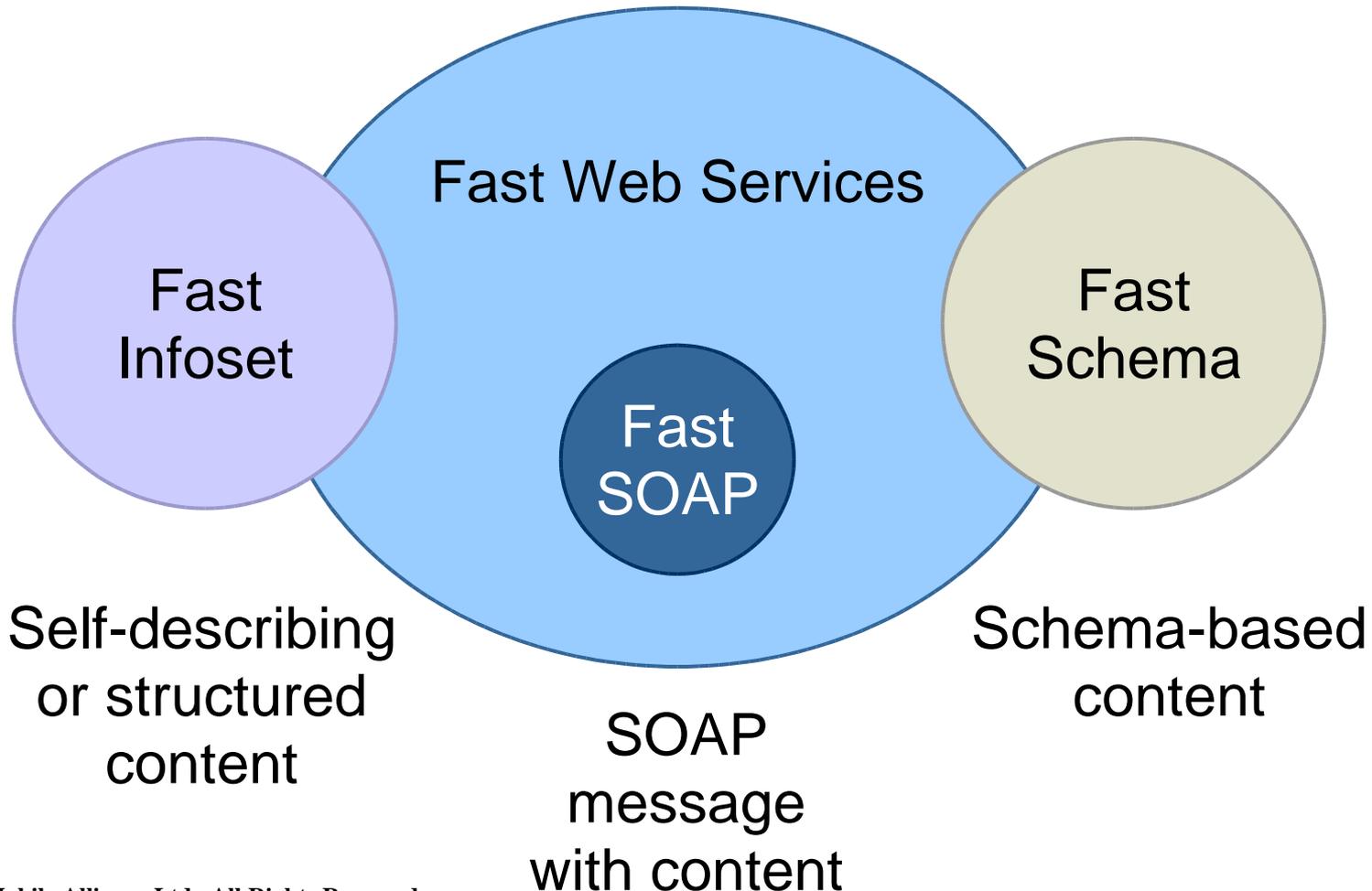
The Set of Technologies

Fast Web Services



The Set of Technologies

Fast Web Services with Fast SOAP



The Set of Technologies

Summary

- Fast Infoset
 - For efficient XML Infoset processing
 - Binary encoding of XML Infosets
- Fast Schema
 - For efficient schema-based processing
 - Binary encoding utilizing schema
- Fast Web Services
 - For efficient Web service processing
 - Combines Fast Infoset and Fast Schema for self-describing and schema-based content
 - Fast SOAP
 - Binary encoding of SOAP 1.2

Applicable Domains

The whole spectrum

- Mobile devices
 - Limited processing and bandwidth
 - Real-time constraints
- High-throughput systems
 - Processing constraints
- Heterogeneous systems
 - No bifurcation of domains
 - The “mobile Web” and the Web?
- Web services for the intra-net
 - Replacement for CORBA

Agenda With Section Highlights

The “Fast” set of technologies

XML or binary?

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Why XML? And why not?

Advantages and disadvantages

- Advantages
 - Ubiquity and momentum
 - Transparency
 - One syntax (unicode with <>)
 - Human readable
 - Enables loosely coupled robust (infoset) systems
- Disadvantages
 - Verbose
 - Redundancy
 - Data as characters
 - More processing
 - Parsing and binding

Interest in “Binary XML” From Many Parties

W3C XML Binary Characterization WG

- Many domains of interest
- 41 participants, 25 organizations

Adobe, AgileDelta, BEA, Cape Clear, Chevron Texaco, Cisco, Data Power, ETRI, Expway, France Telecom, Fujitsu, HiT, IBM, KDDI, Media Fusion, MITRE, Nokia, Oracle, OSS Nokalva, Siemens, Sun, Uni. Of Helsinki, Web3D

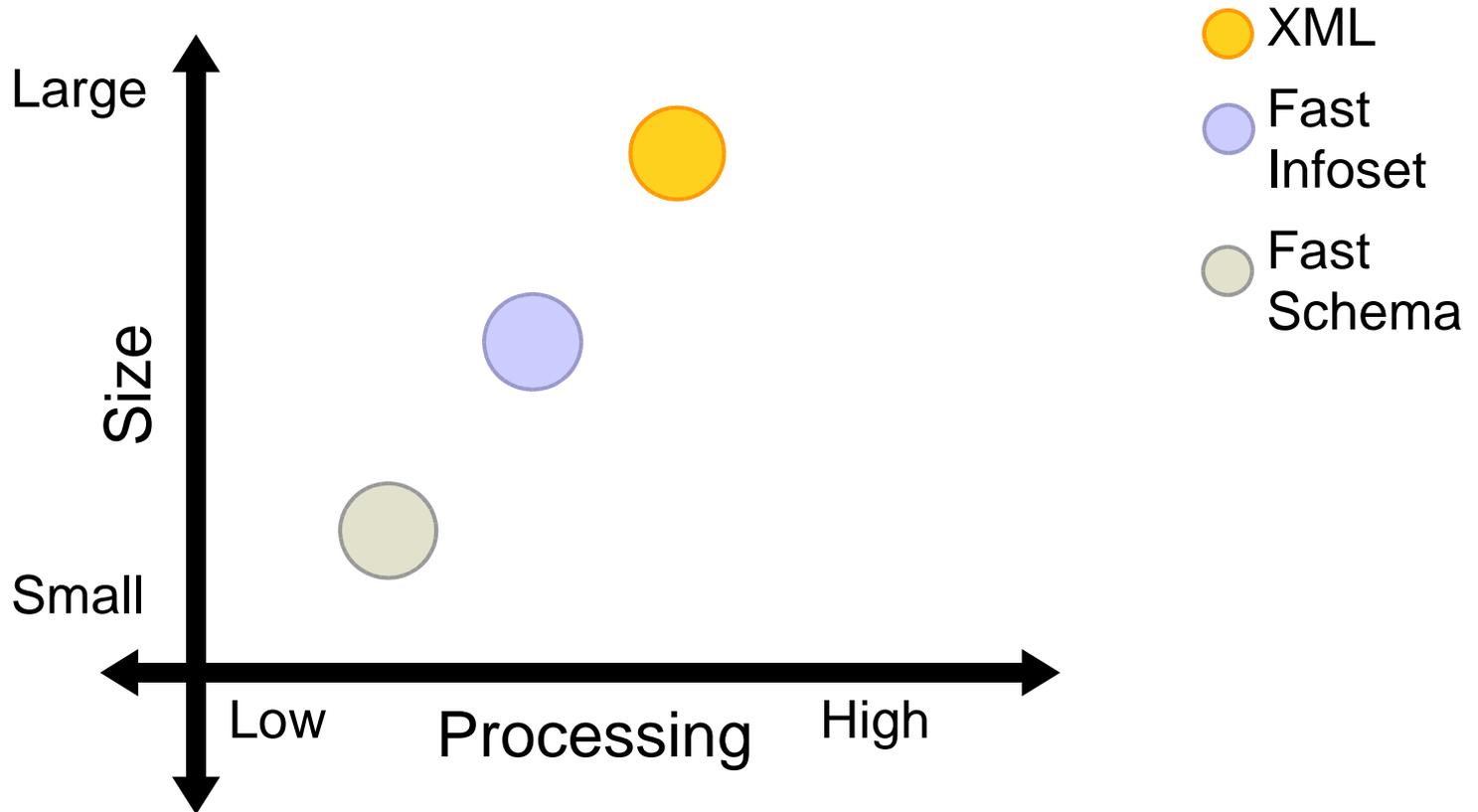
The Tradeoff

Choose for properties of system and environment

The Fast set of technologies trade some advantages of XML, or some features not considered vital in a particular domain, for more efficient size and processing

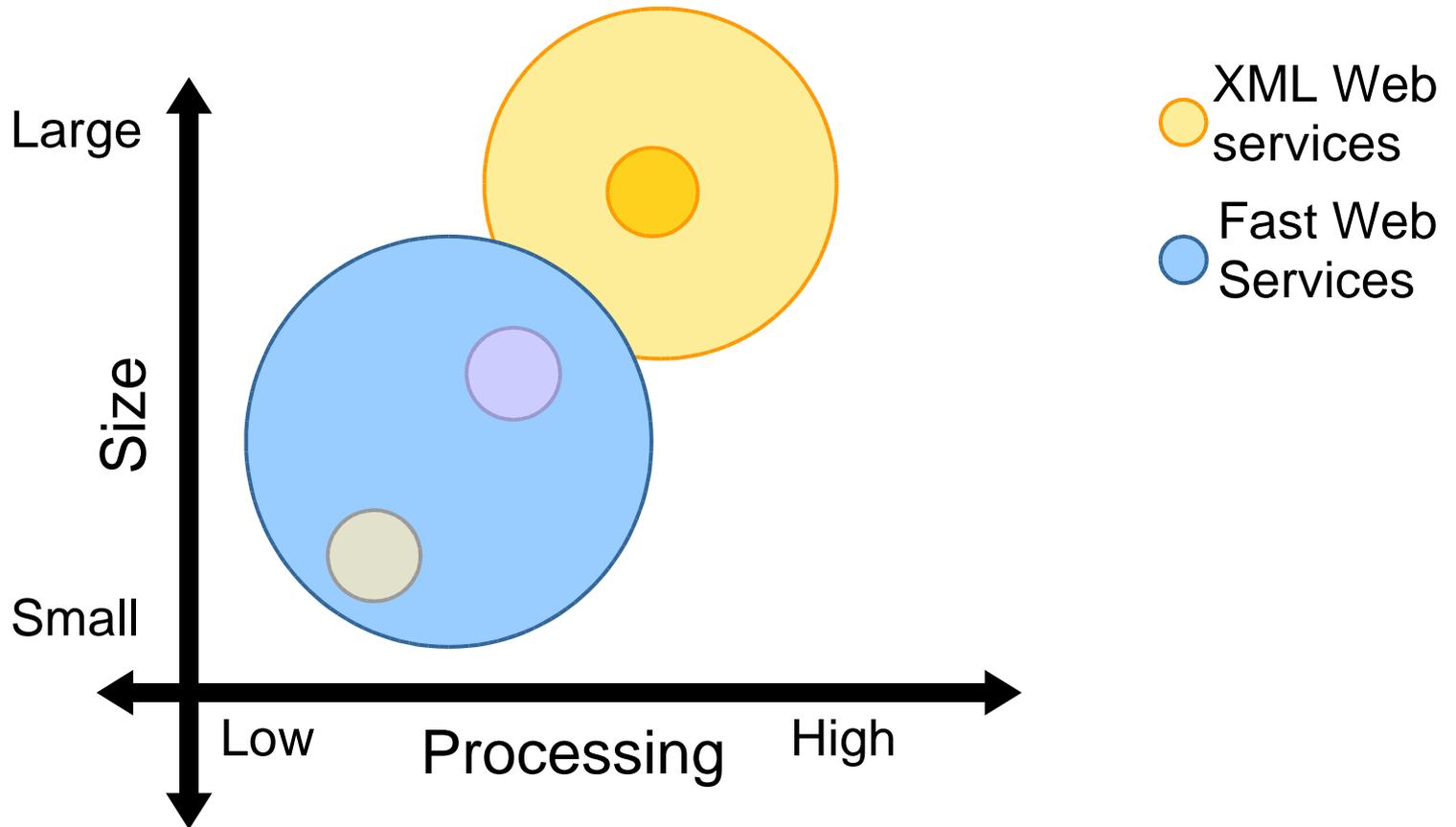
Size and Processing

XML, Fast Infoset and Fast Schema



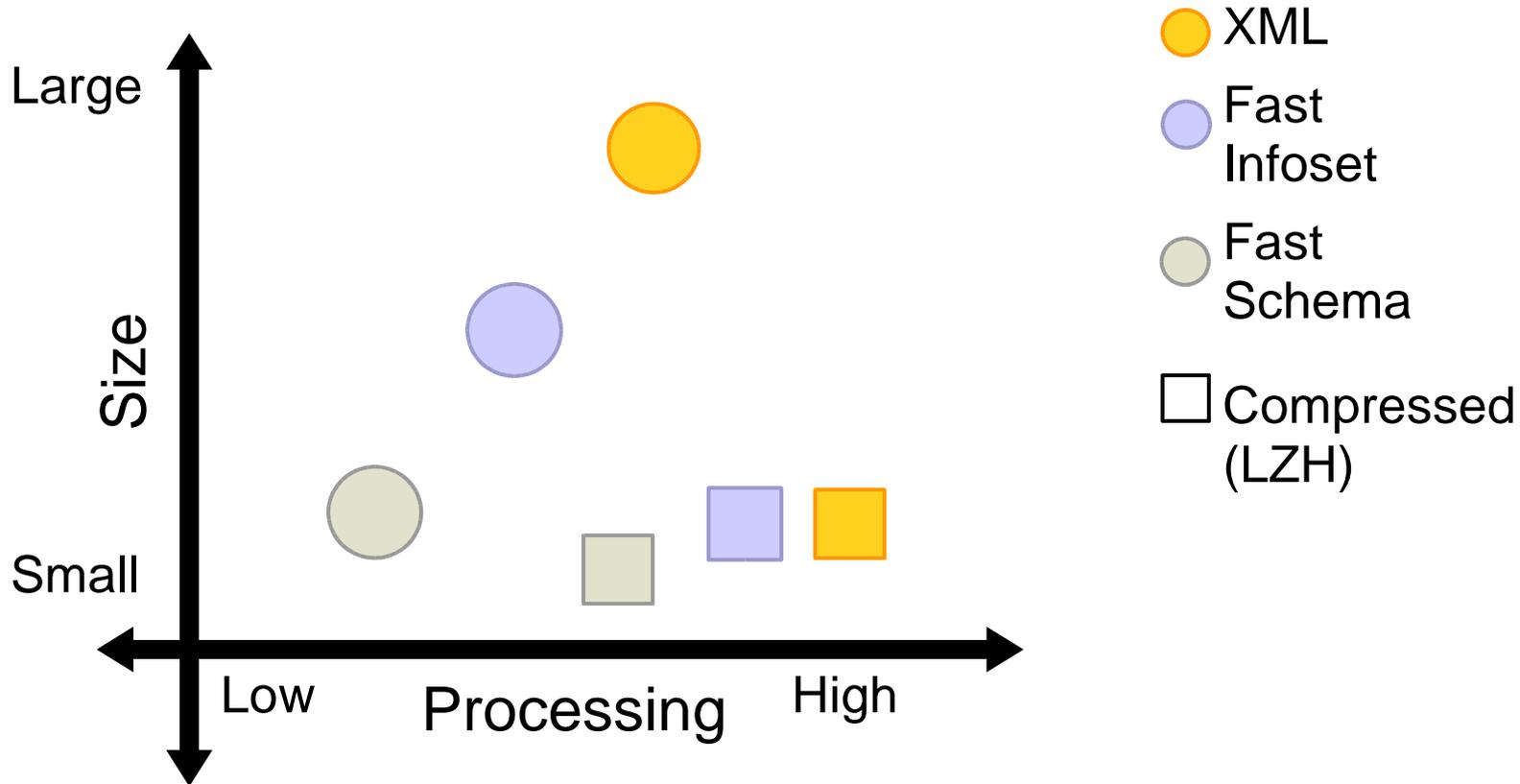
Size and Processing

XML Web services and Fast Web Services



Size and Processing

Compression



Compression

The good and the not so good

- Good for low bandwidth links and high processing nodes with static content
 - Downloading zip files or jars
- Not so good for dynamic content
 - Increases server load
 - Compression more expensive than decompression
- Small messages may not compress well
 - Uncompressed Fast Schema can result in smaller messages

Waiting for Moore's Law

Moore's law is not a ubiquitous law

- Mobile devices
 - Demand growing faster than hardware efficiency
 - Memory, battery and clock speed
- Wireless Bandwidth
 - Fixed radio frequencies can stay fixed for some time
- Network volume
 - Network volume growing faster than processing
- Miniaturization
 - Today PDA, tomorrow RFID

Agenda With Section Highlights

The “Fast” set of technologies

XML or binary?

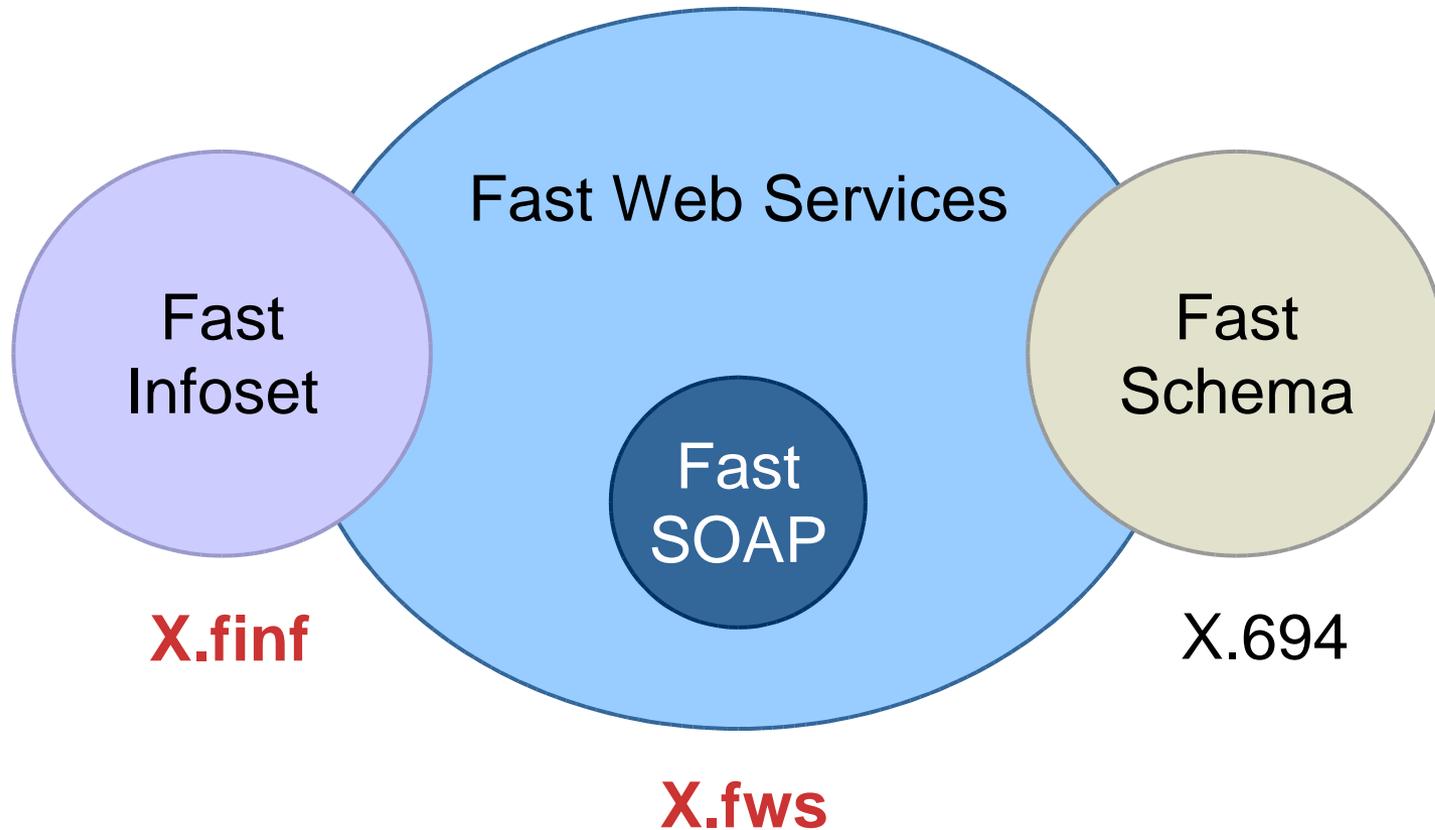
Standards and implementations

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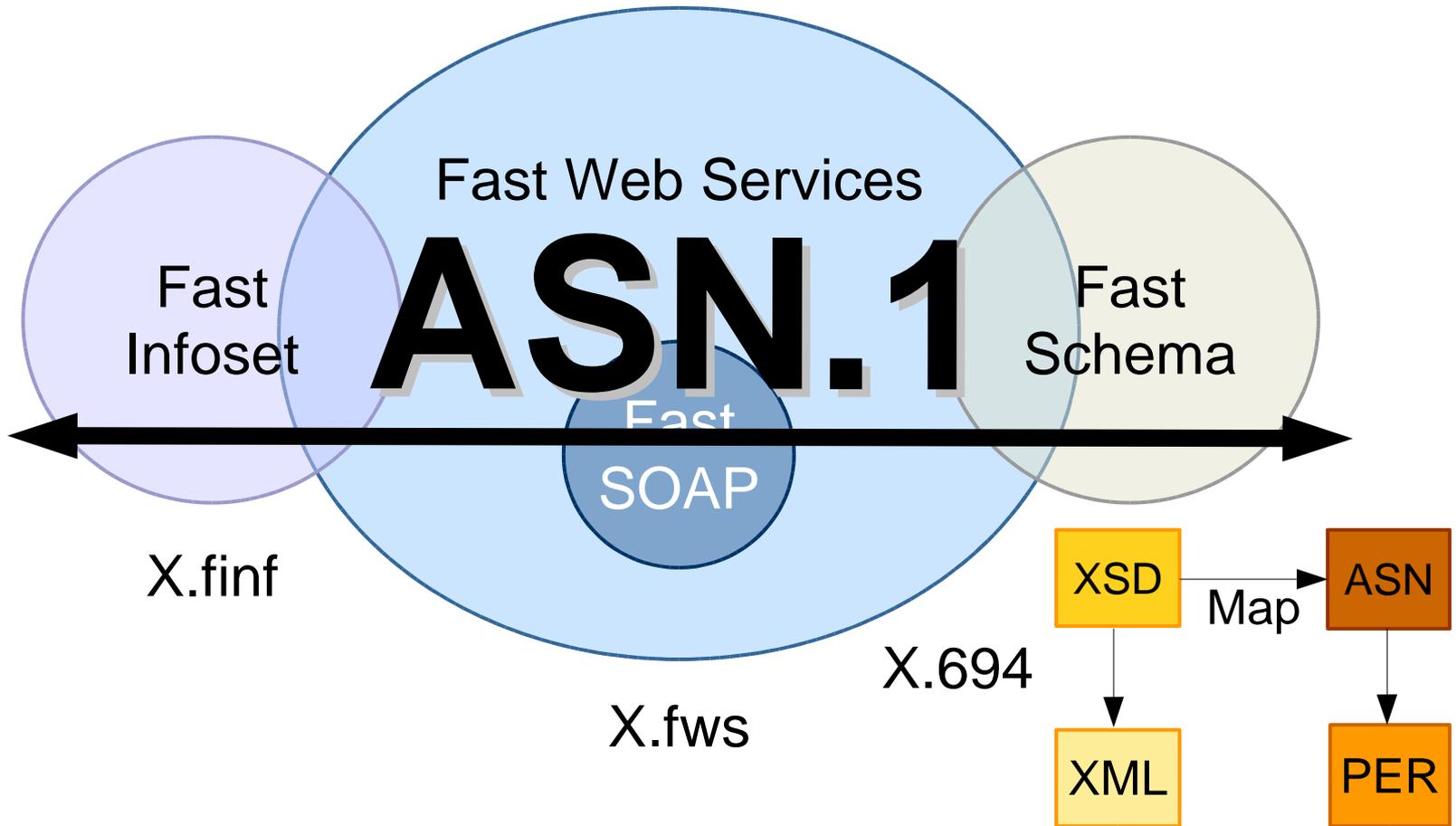
International Standards for Interoperability

Joint ITU-T | ISO/IEC standards



Foundation on International Standards

Abstract Syntax Notation One



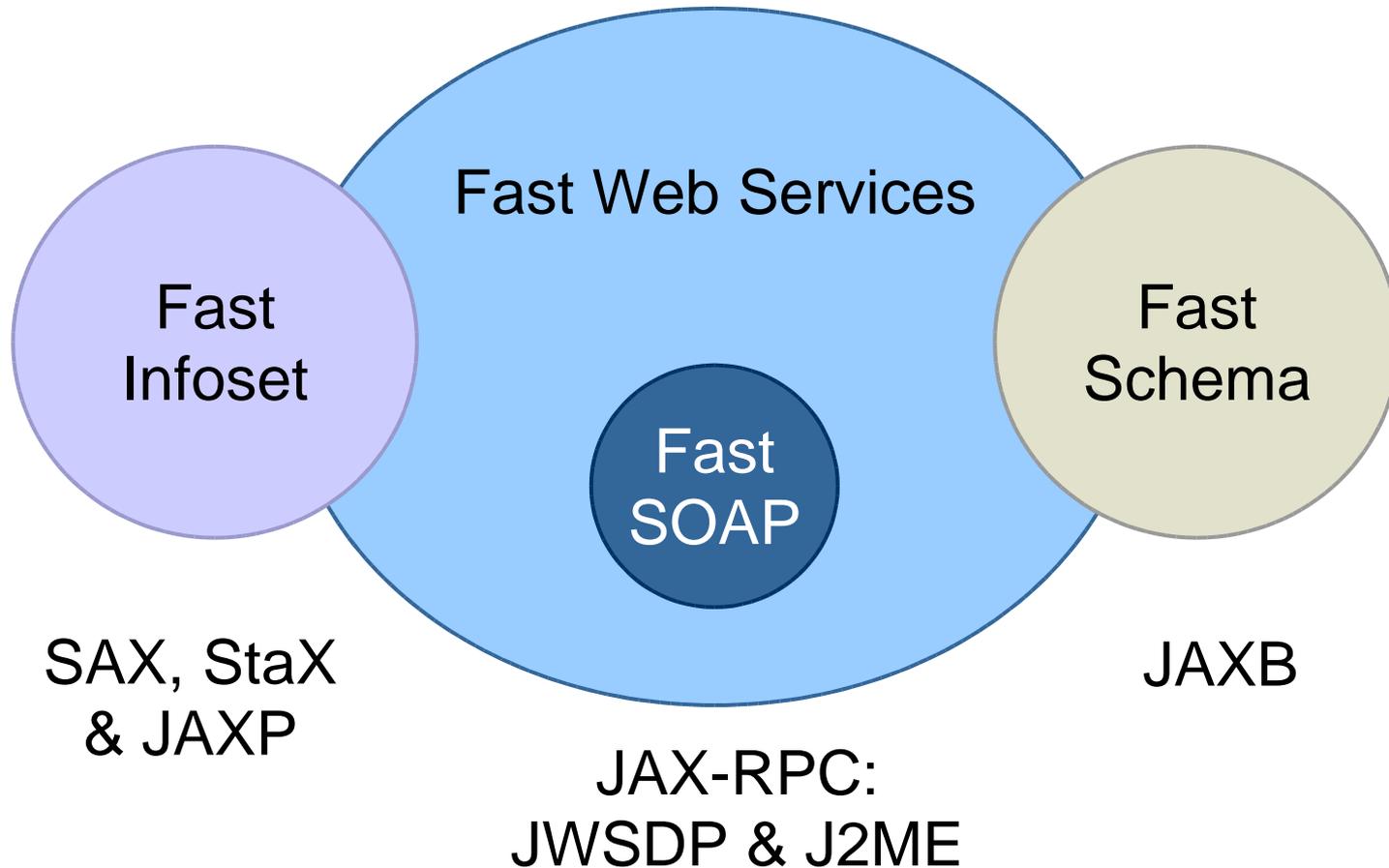
International Standards

Summary

- ASN.1: Abstract Syntax separate from Transfer Syntax
 - One Schema, multiple encoding rules
- Binary format specified using ASN.1
 - ASN.1 Schema and Packed Encoding Rules
- Joint work in International Telecoms Union (ITU-T) and International Organization for Standardization (ISO)
- X.finf and X.fws are drafts
- X.694 is an international standard

Java APIs and Implementations

XML Parsing to Web services and binding



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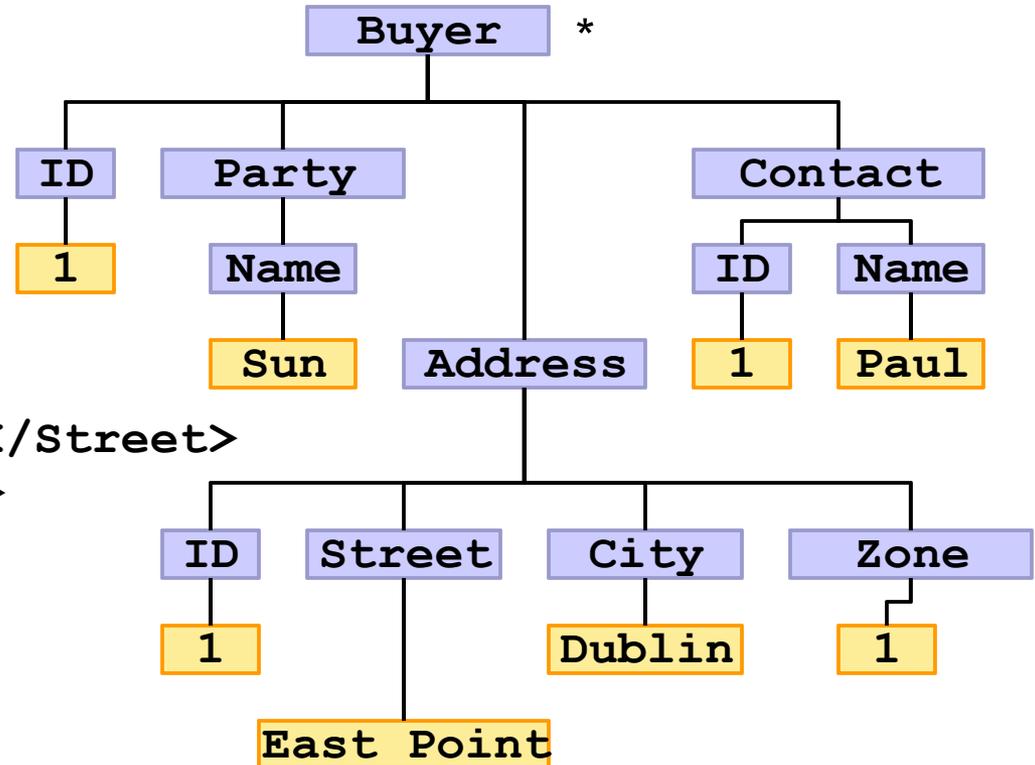
Fast Infoset and Fast Schema

Fast Web Services

XML Sample

Document and Tree View

```
<Buyer>
  <ID>1</ID>
  <Party>
    <Name>Sun</Name>
  </Party>
  <Address>
    <ID>1</ID>
    <Street>East Point</Street>
    <City>Dublin</City>
    <Zone>1</Zone>
  </Address>
  <Contact>
    <ID>1</ID>
    <Name>Paul</Name>
  </Contact>
</Party>
```



(* white spaces are removed)

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Slide #26

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Fast Infoset Sample

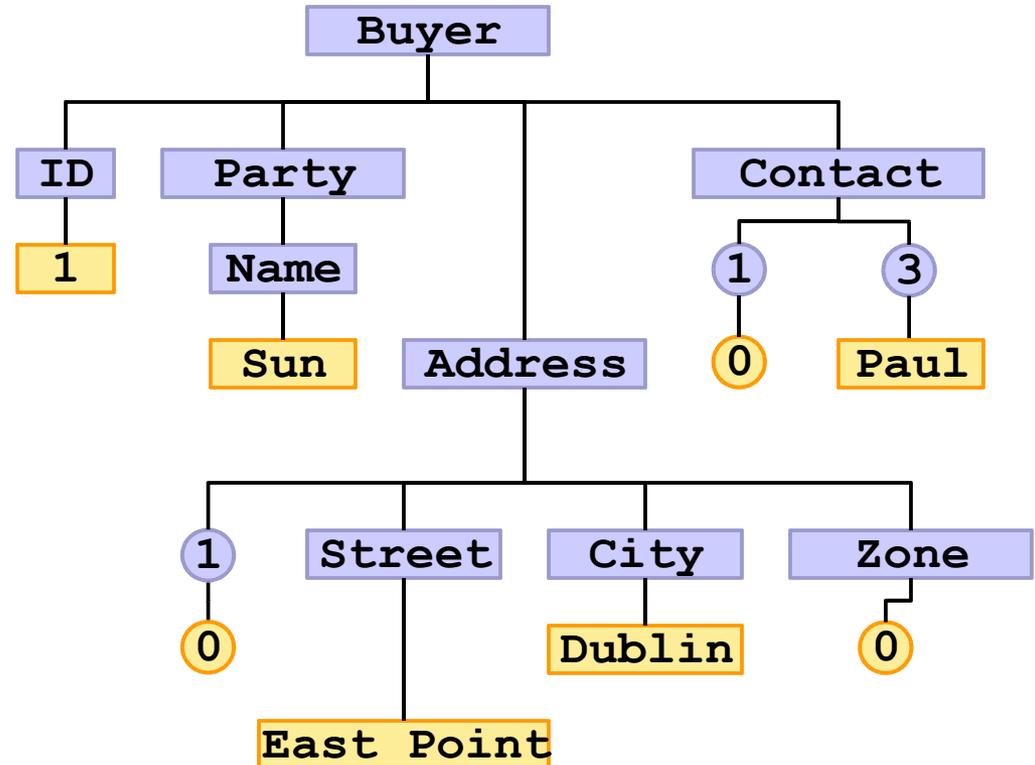
Tables and Indexing

Local Name Table

Local Name	Index
Buyer	0
ID	<u>1</u>
Party	2
Name	<u>3</u>
Address	4
Street	5
City	6
Zone	7
Contact	8

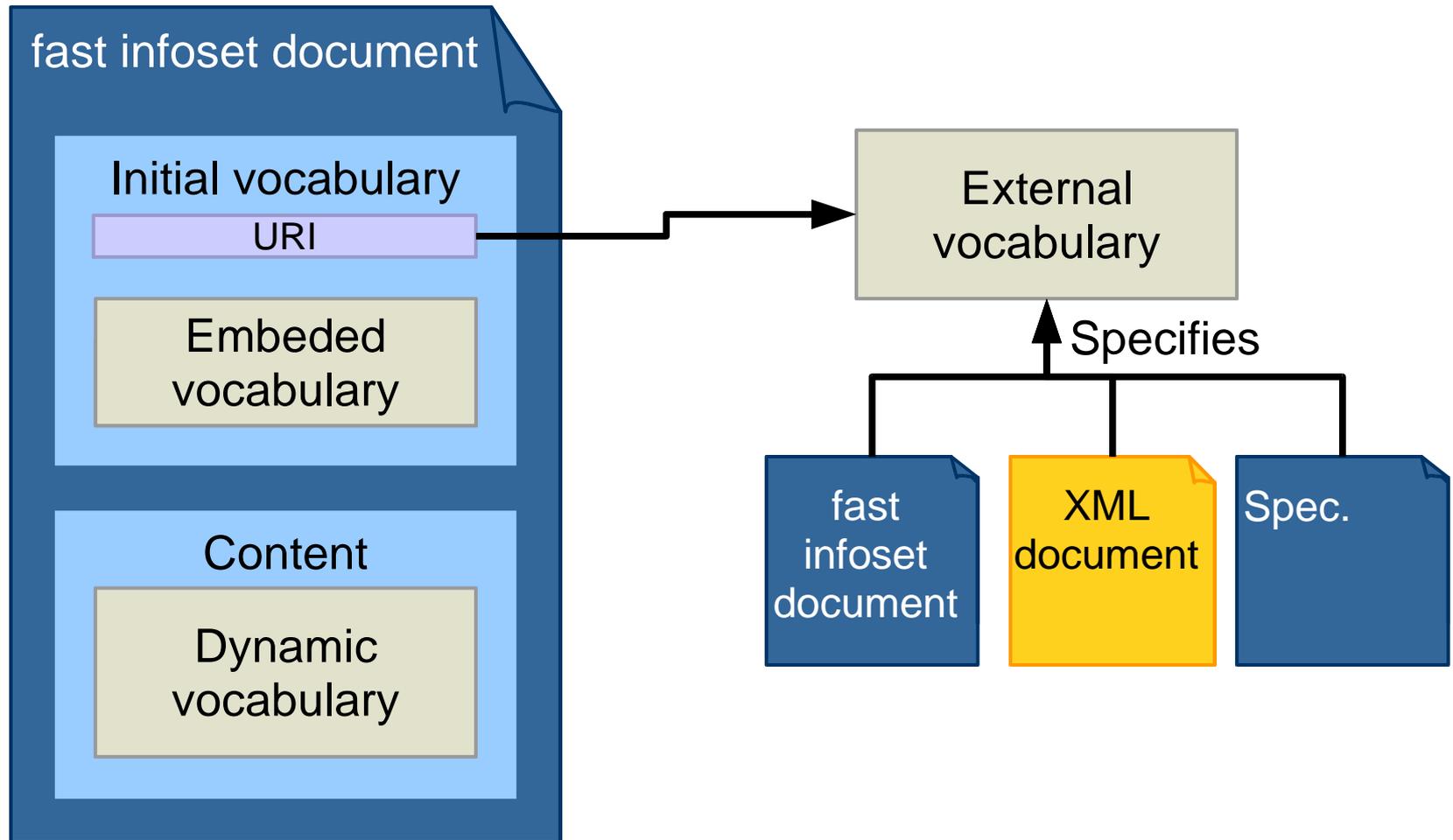
Content Table

Content	Index
1	<u>0</u>
Sun	1
Paul	2
East Point	3
Dublin	4



Fast Infoset Vocabulary

Initial, external and dynamic

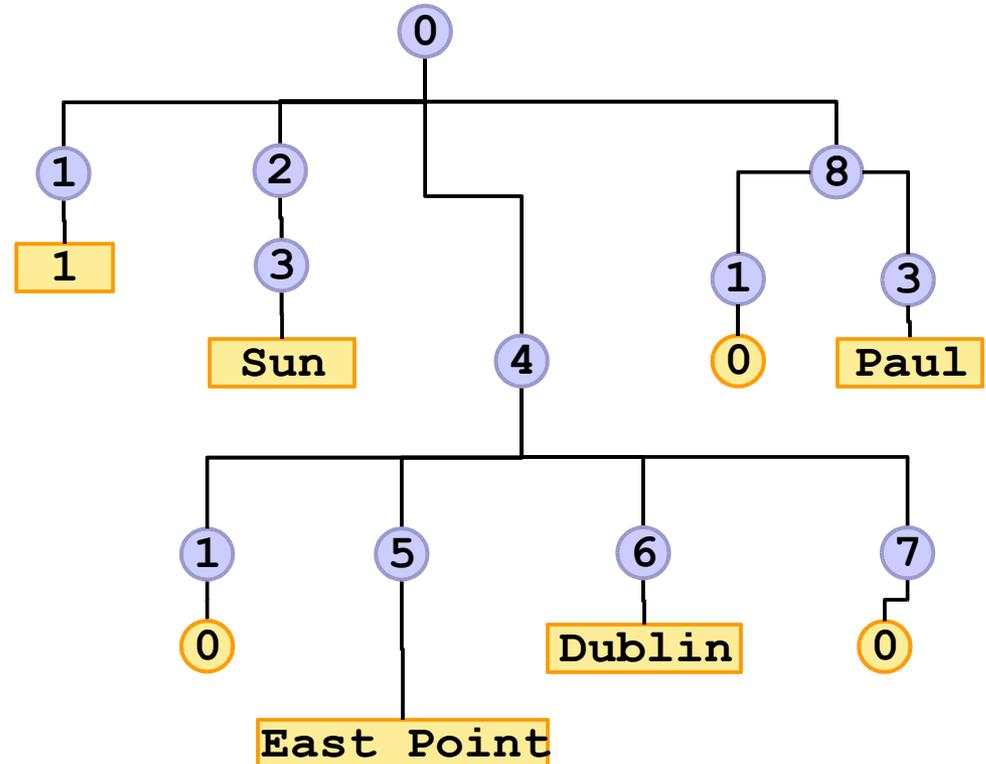


Fast Infoset Structure

External vocabulary

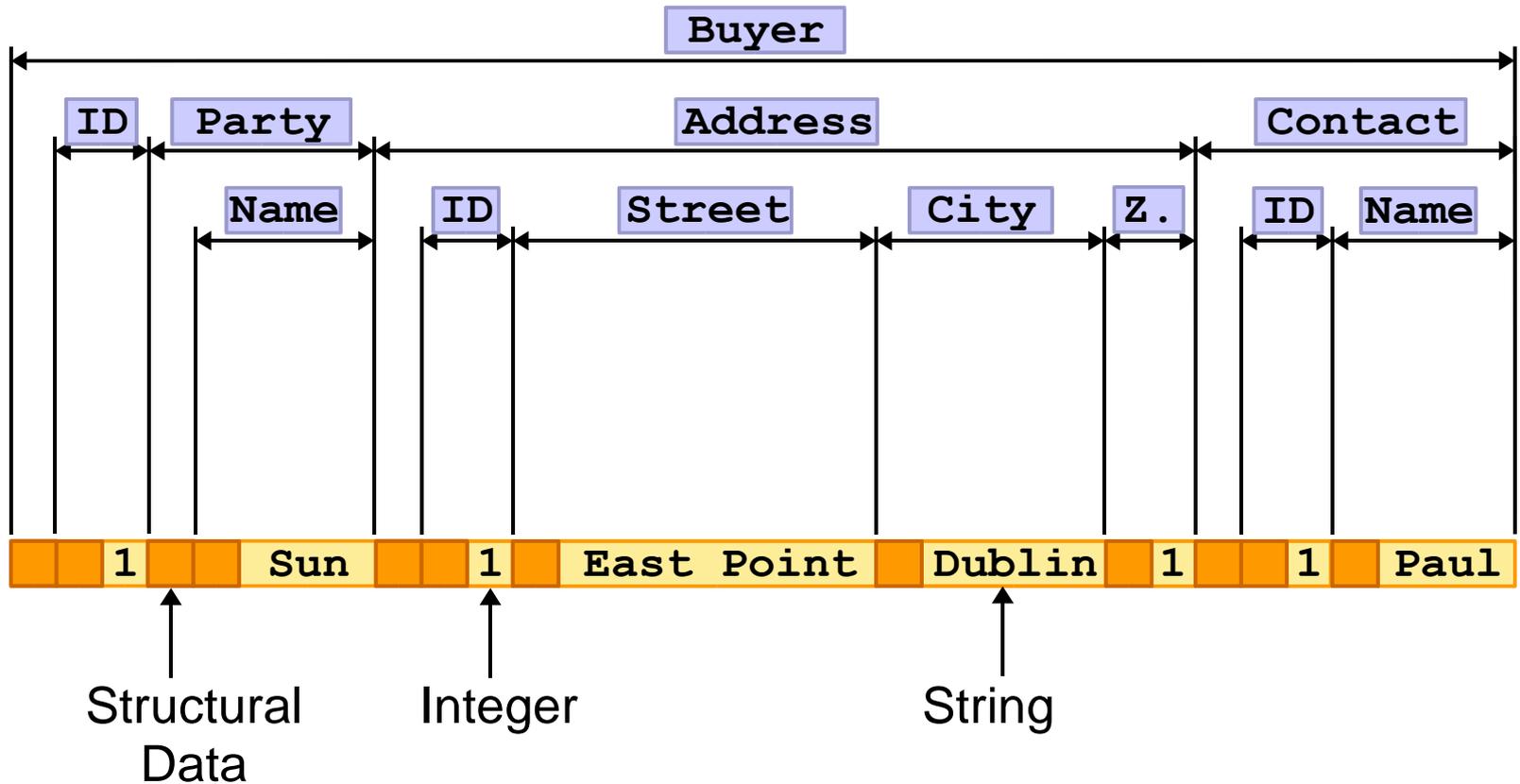
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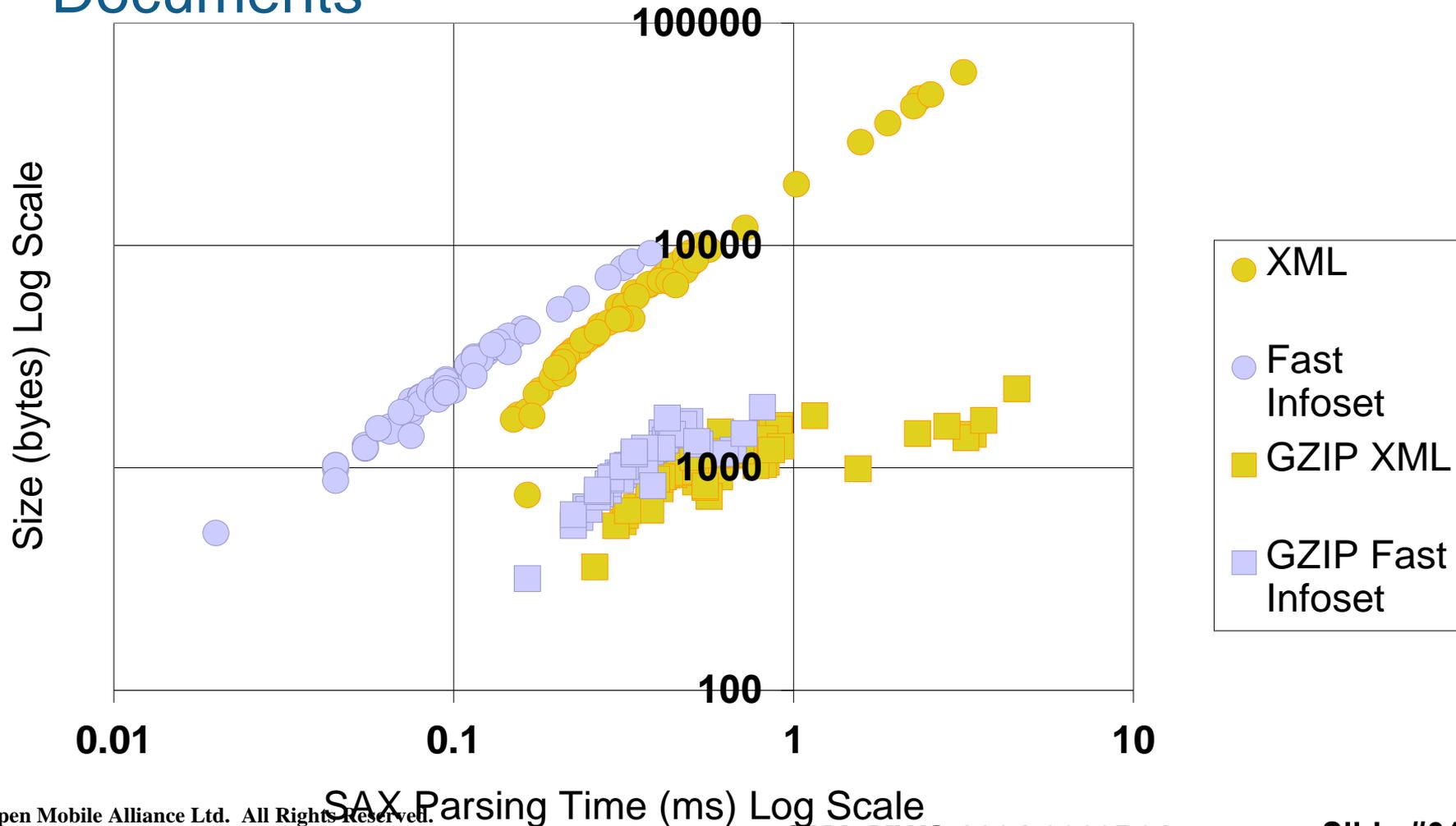
Fast Schema Sample

Minimal Structural Data and Binary Content



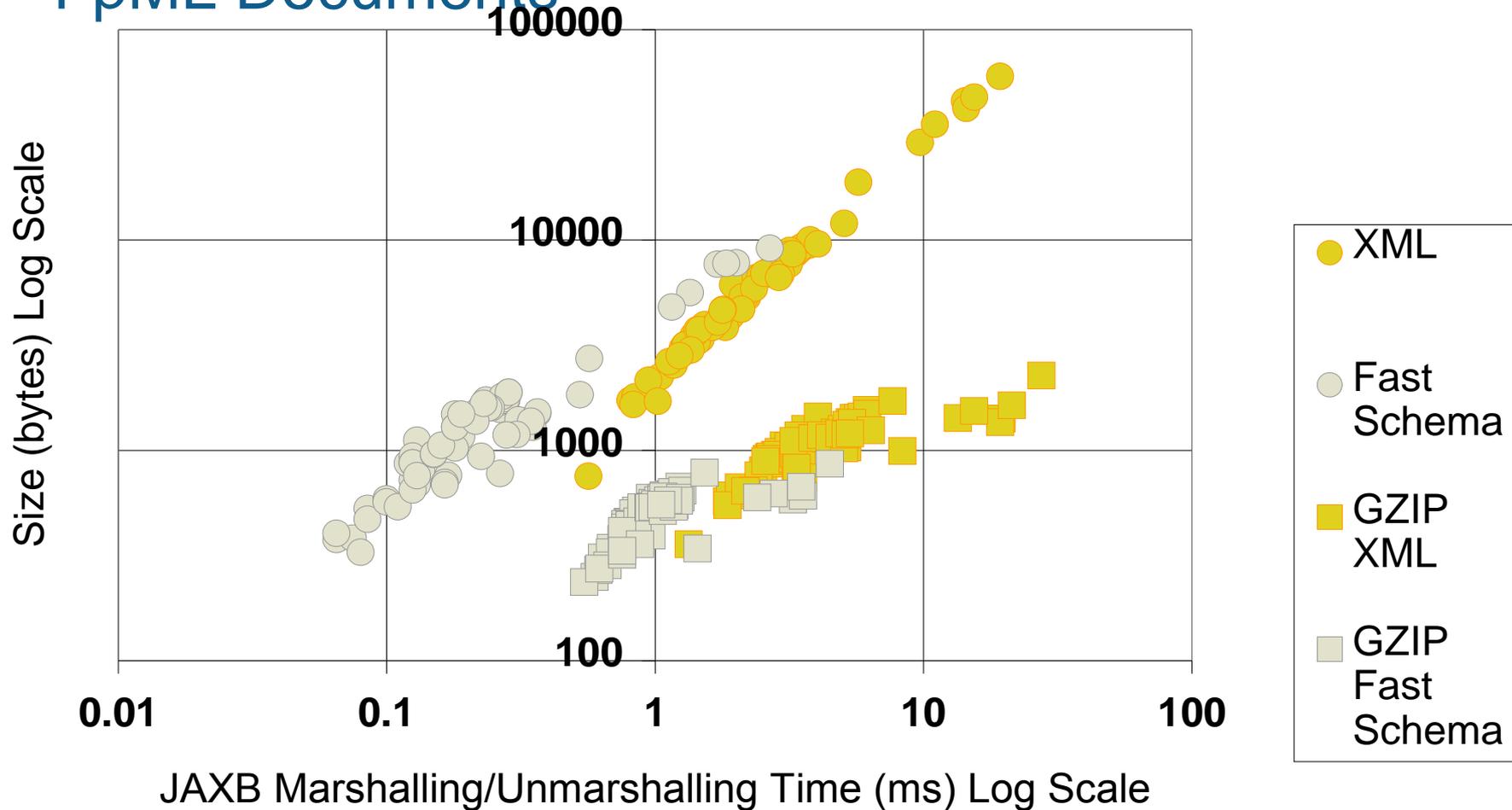
Fast Infoset Size and Processing

In Memory SAX Parsing for UBL and FpML Documents



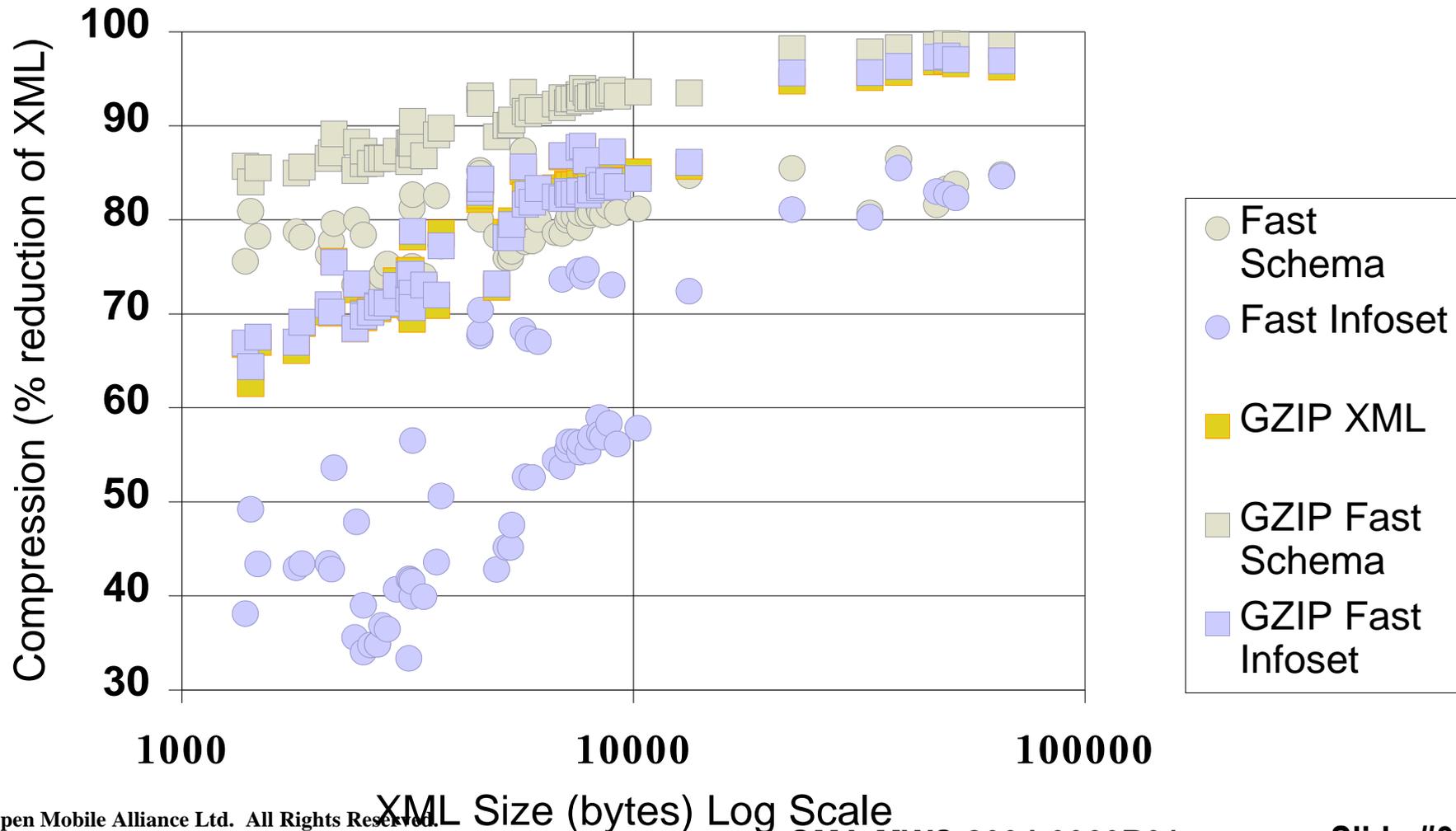
Fast Schema Size and Processing

In Memory Processing Using JAXB for UBL and FpML Documents



Fast Schema and Fast Infoset Size

Compression for UBL and FpML Documents



Fast Infoset

Advantages and Disadvantages

- Advantages
 - Self-describing/structure, enables loose coupling
 - Moderate improvement in processing
 - Compact large messages
 - In some cases comparable to or better than Fast Schema
 - Easy to integrate
- Disadvantages
 - Not human-readable
 - Not so good optimization with non-repeating markup and content
 - Not so good size optimization with further redundancy-based compression

Fast Schema

Advantages and Disadvantages

- Advantages
 - Very fast processing
 - Compact
 - Good optimization with further redundancy-based compression
 - Good for binding applications
- Disadvantages
 - Not human-readable
 - Not self-describing, tightly coupled
 - More difficult than Fast Infoset to integrate
 - Higher level of trust required when parsing

Agenda With Section Highlights

The “Fast” set of technologies

XML or binary?

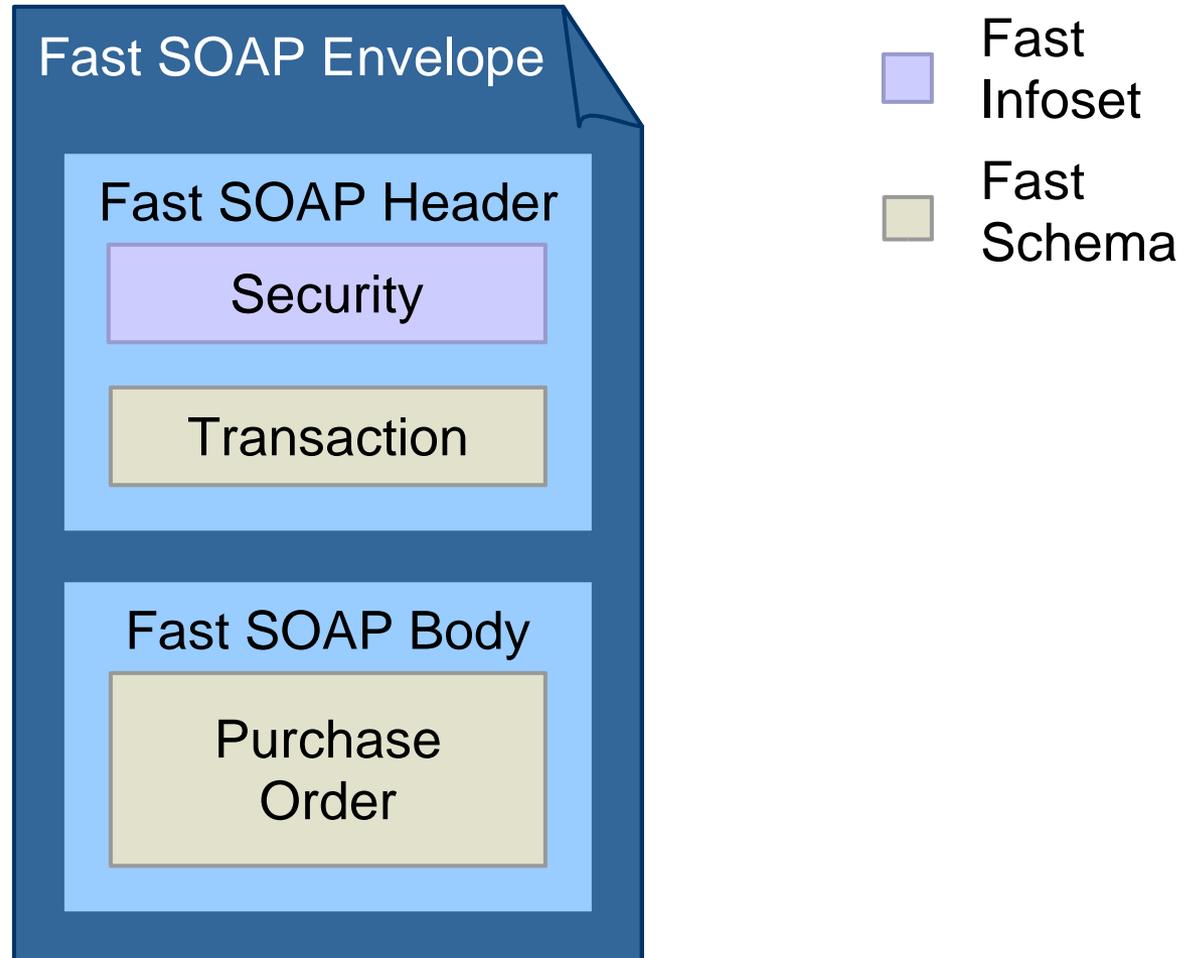
Standards and implementations

Fast Infoset and Fast Schema

Fast Web Services

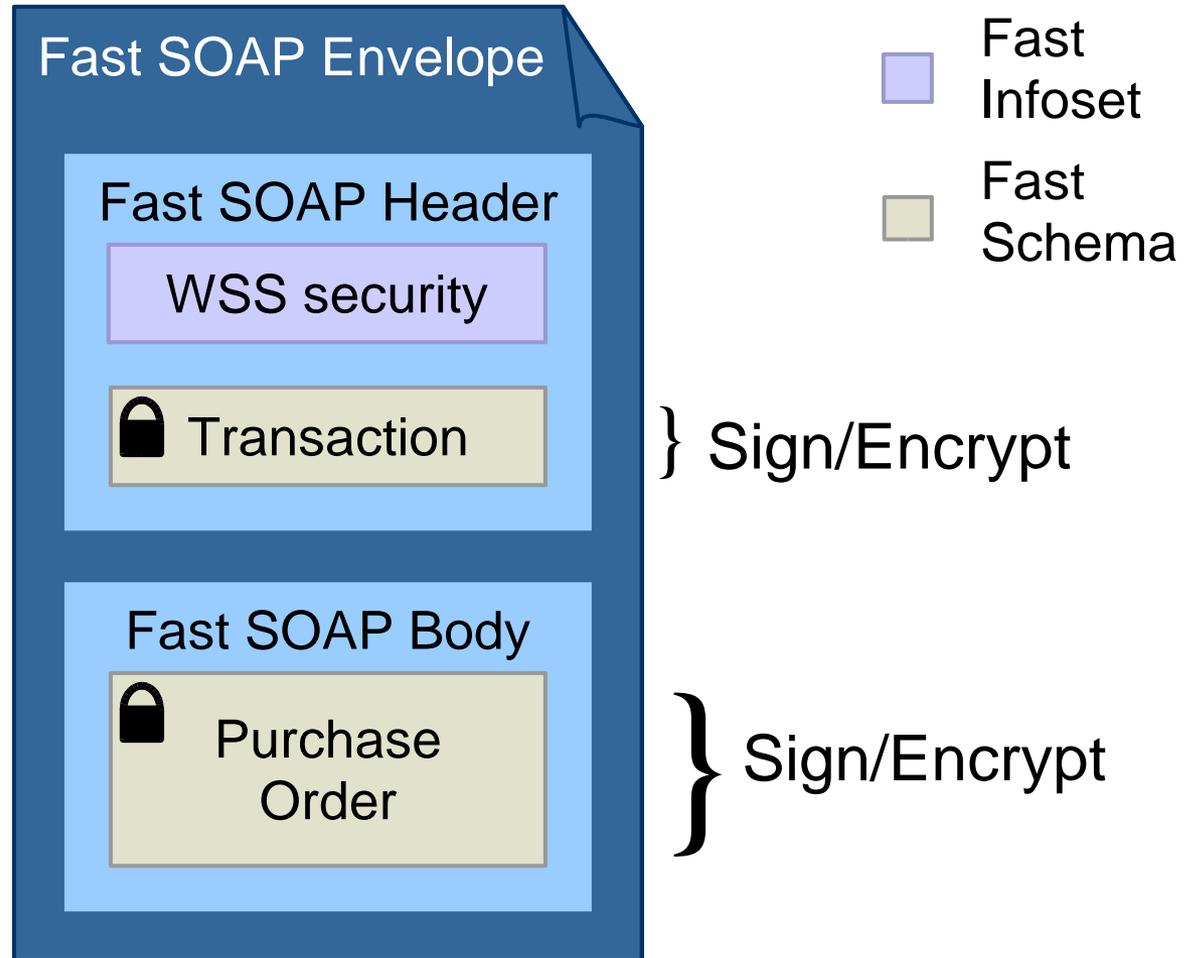
Fast SOAP Messages

Fast Web Service message using Fast SOAP



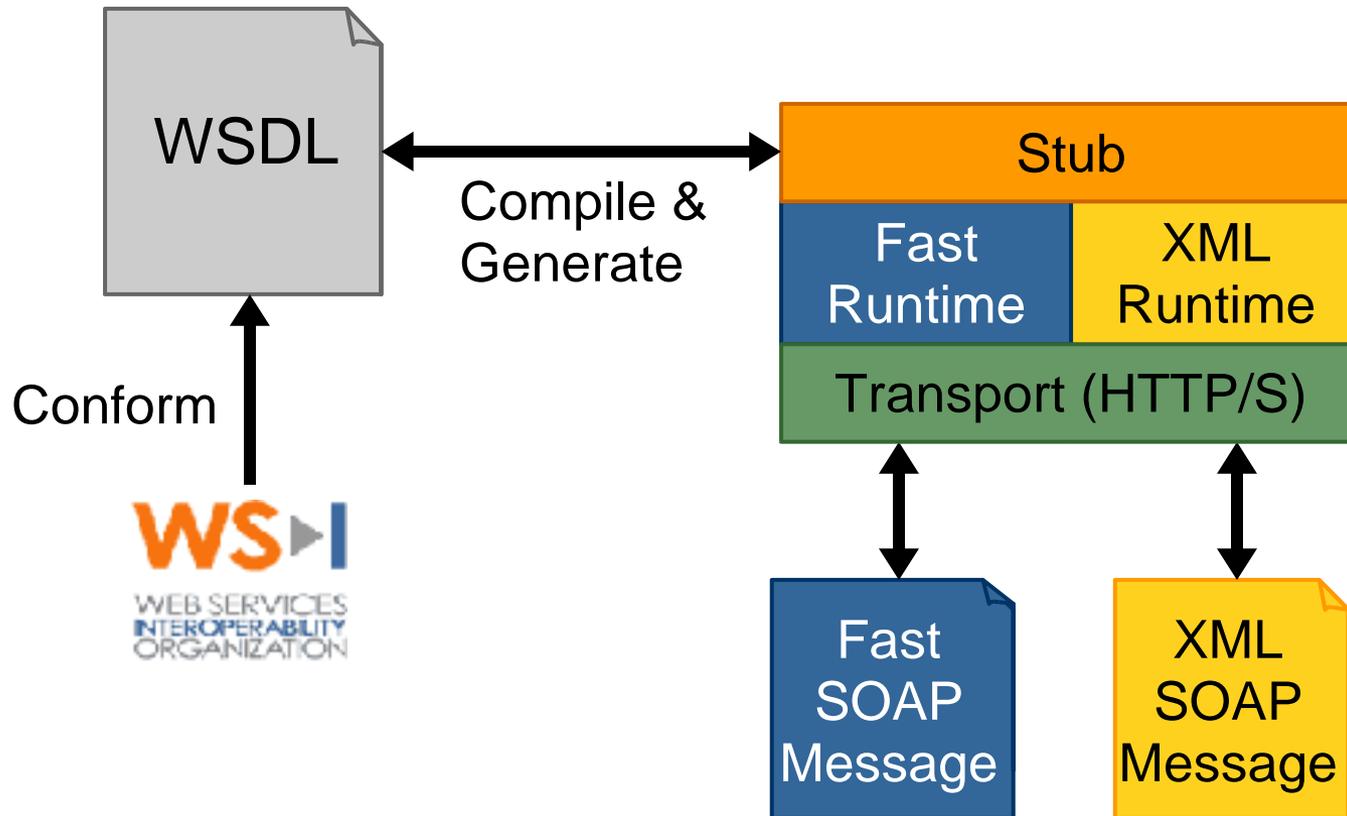
Security with Fast Schema

Sign/Encrypt Header Block or Body Content



Service Descriptions with Fast Web Services

No modification of WSDL



Fast Web Services

Summary

- Fast SOAP conforms to the SOAP 1.2 processing model
 - Fast Infoset and Fast Schema content
- Simple security patterns apply to Fast Schema but not to Fast Infoset
 - Require canonical Fast Infoset
- No modification to WS-I BP 1.0 conforming WSDL
 - X.694 maps WSDL types
 - SOAP binding interpreted as Fast SOAP binding
 - Specified Fast Web Services annotations are allowed

Summary

- Fast technology: Infoset, Schema, SOAP, Web services
- Binary can be an alternative to XML
- Standards and implementations are progressing
- Fast Infoset and Fast Schema optimize both size and processing

Conclusion

The Fast technologies are alternatives to XML (not replacements) to be used when performance is an issue. They complement other XML-based technologies

For More Information

- Fast Web Services
<https://jwsdp.dev.java.net/fast>
- XML and ASN.1
<http://asn1.elibel.tm.fr/xml/>
- W3C XML Binary Characterization WG
<http://www.w3c.org/XML/Binary/>
- ITU-T SG 17
<http://www.itu.int/ITU-T/studygroups/com17/index.asp>

Additional slides

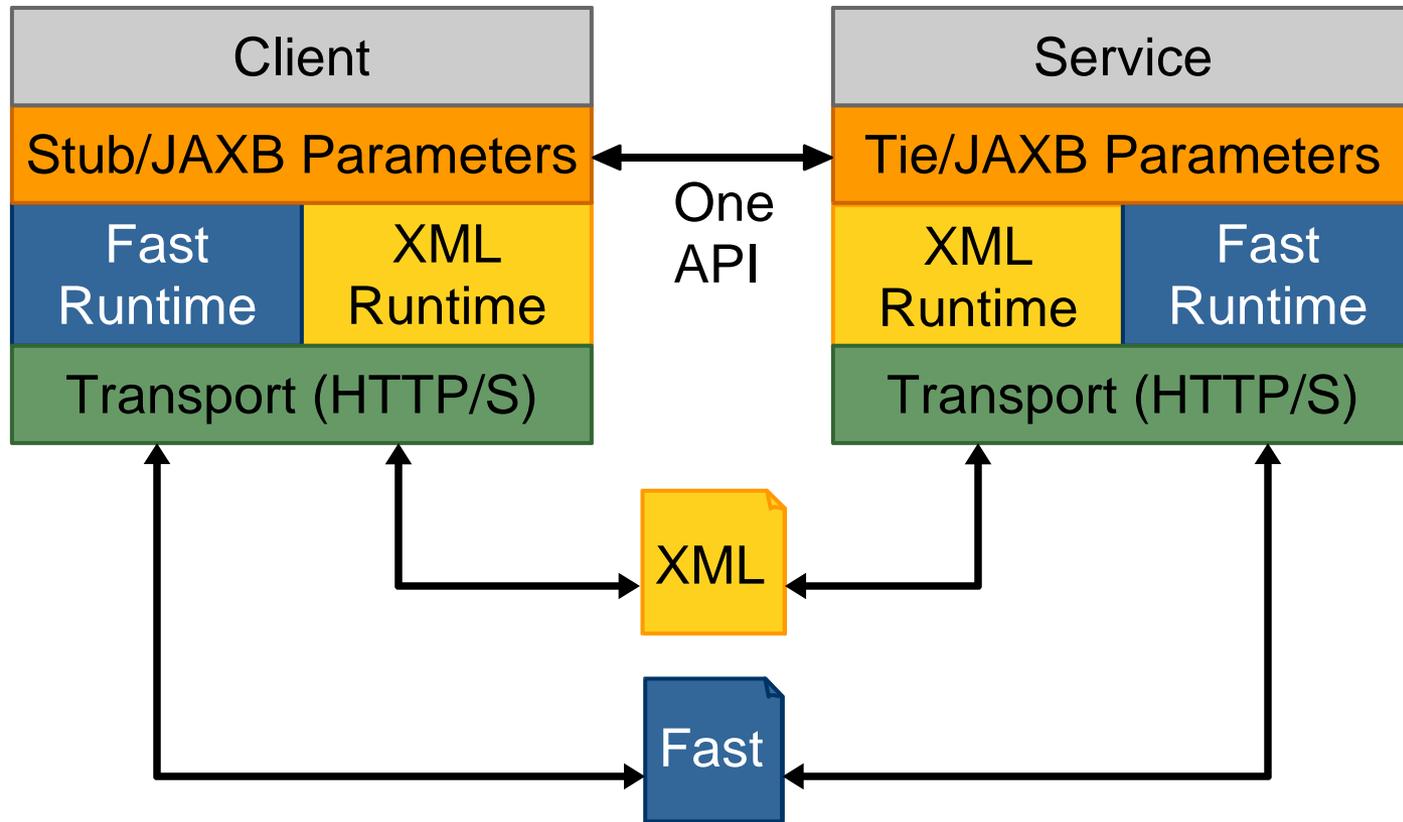
Fast Web Services and the Integrated Stack

The integration of JAX-RPC and JAXB

- APIs and specifications
 - JAX-RPC 2.0 (JSR-224)
 - JAXB 2.0 (JSR-222)
 - JAX-RPC delegates to JAXB for data-binding
- Implementation
 - One service endpoint interface API for Fast Web Services and XML Web services
 - Fast Web Services will plug in
 - Utilize PEPT 2.0 architecture for modularity
 - **P**resentation, **E**ncoding, **P**rotocol & **t**ransport
 - Used in J2SE ORB
 - Content negotiation

Integrated Stack Architecture

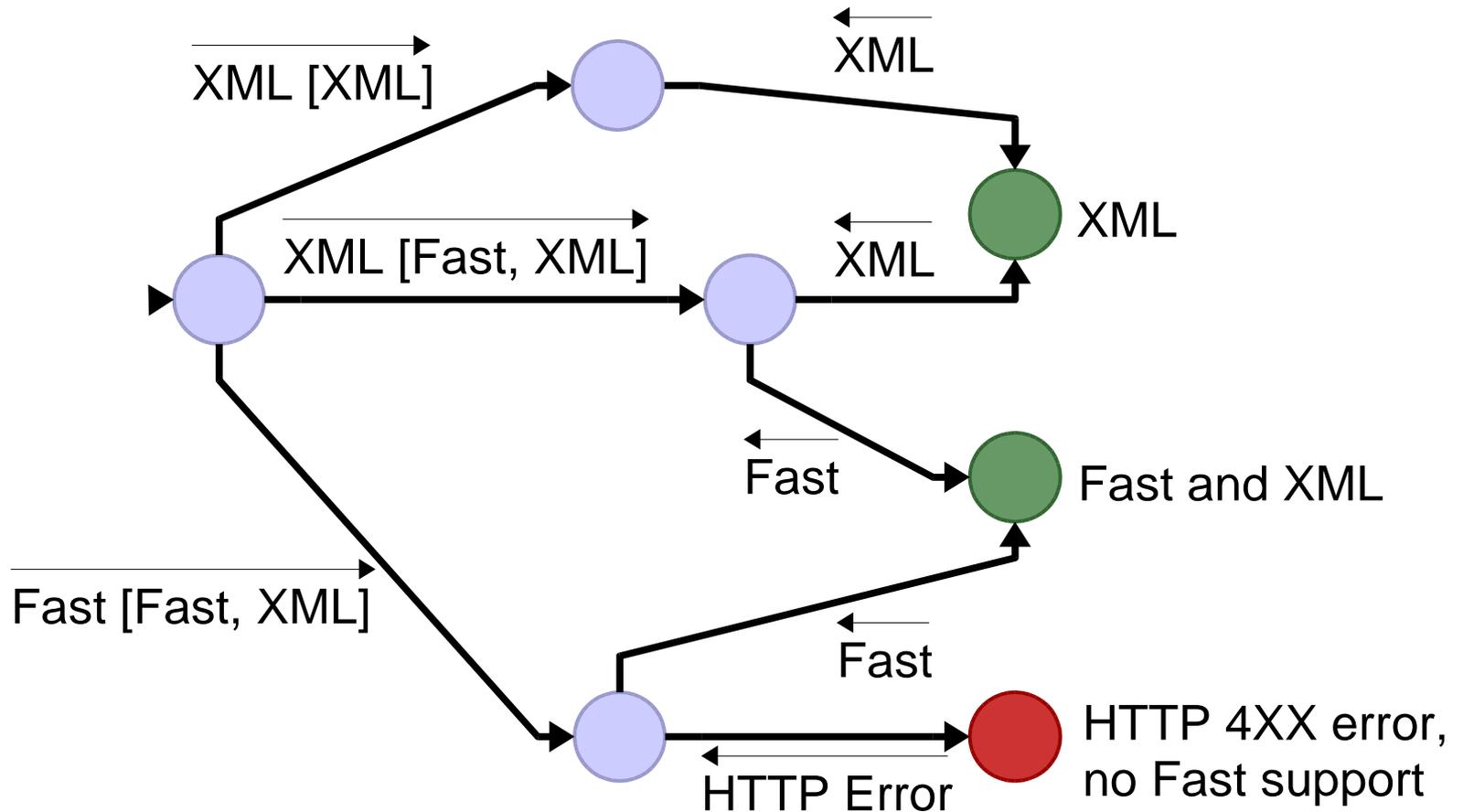
One API with Content Negotiation



Content Negotiation

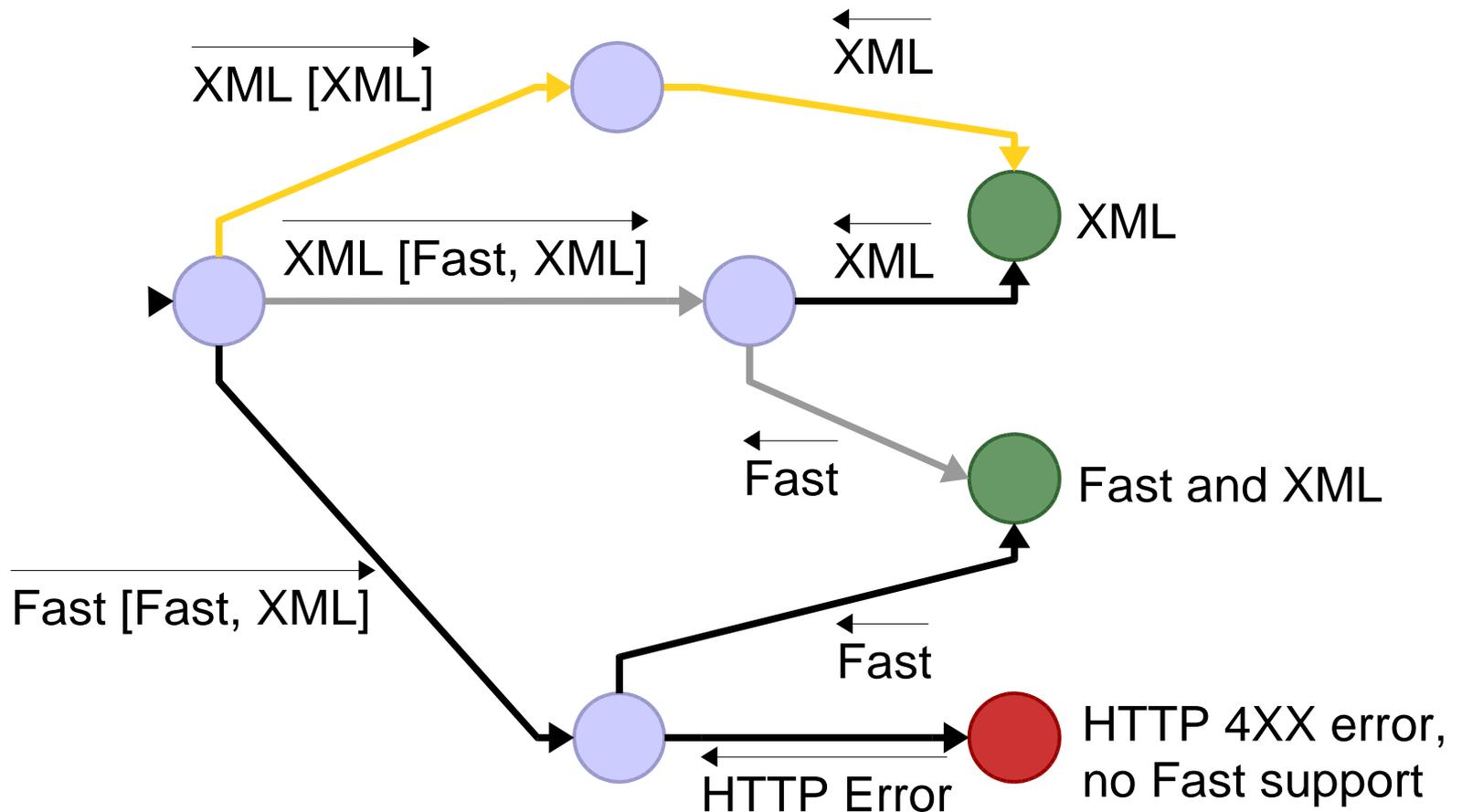
State Transition Diagram

Client support of Fast Web Services and/or XML



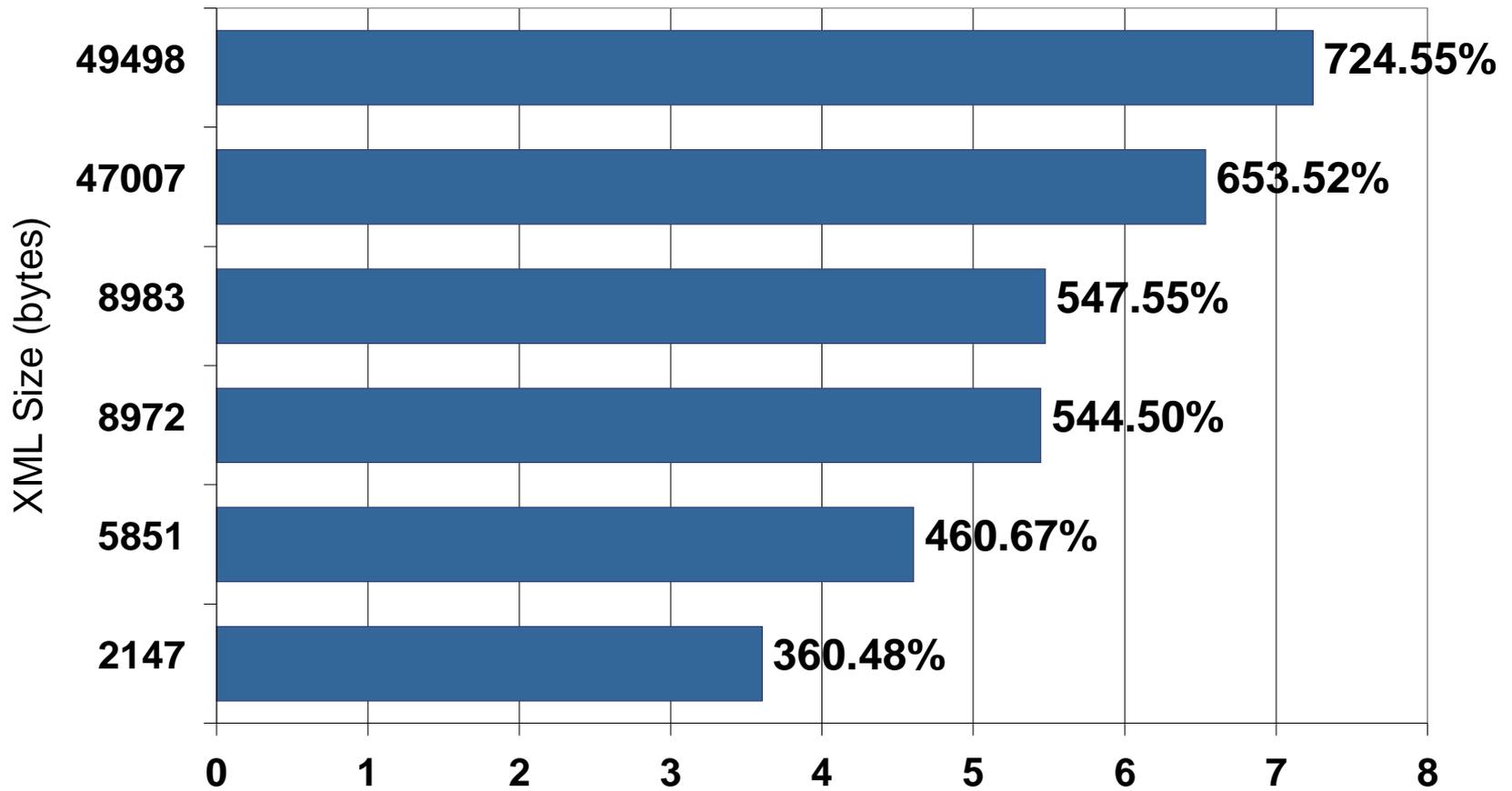
State Transition Diagram

XML request/response and XML request, Fast response



Speedup with Fast Schema

Speed Up of Loopback Latency for UBL Documents using JAXB-based Client/Servlet



Fast Speed Up

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Web Services for J2ME

JSR 172

- Support for XML/SOAP for small devices
 - Subset of JAXP and JAX-RPC
- WSDL to Java generation of static stubs
- Document style, literal use (doc/lit) only
- Portable runtimes via the use of Service Provider Interfaces (SPIs)
- Support for CLDC and CDC configurations
 - Including MIDP 1.0 and MIDP 2.0 profiles

Fast Web Services in J2ME

RI with support for Fast

