

Mobile Web Services

Applications of Web Services in Mobile Domain

15 September 2003
LogOn Web Day Helsinki

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Abstract

- The Mobile industry has started to apply Web Service technologies to expose and integrate the value it holds in the Mobile domain. The Web Services brings an Opportunity to lower integration costs between operators and content partners.
- The key opportunity of Web Services in the mobile context lies in open standard server-to-server interfaces enabling more efficient service and content deployment. This involves developing and standardizing a family of web Services, or rather Mobile Web Services.
- Standardization activities are progressing under the Open Mobile Alliance.
- In this presentation we will look into :
 - What it means to specify a family of Web Services,
 - What do we mean by Mobile Web Services,
 - What is the rationale behind this.
 - Update on the what is progressing currently in Mobile Domain regarding Web Services Specification and Standardization
 - Future directions

Presentation Outline

- Mobile Web Services
 - Introduction
 - Rational behind Mobile Web Services
 - Industry approaches on Mobile Web Services
 - Family of Mobile Web Services
- Web Service Interface Standardization
 - Family of Web Services
 - Benefits of interface standardization
 - Requirements for specification
 - Approaches on specification
- Standardization update
 - OMA, JCP, WS-I, Liberty
- Future issues and Directions
 - Mobility to Web Services

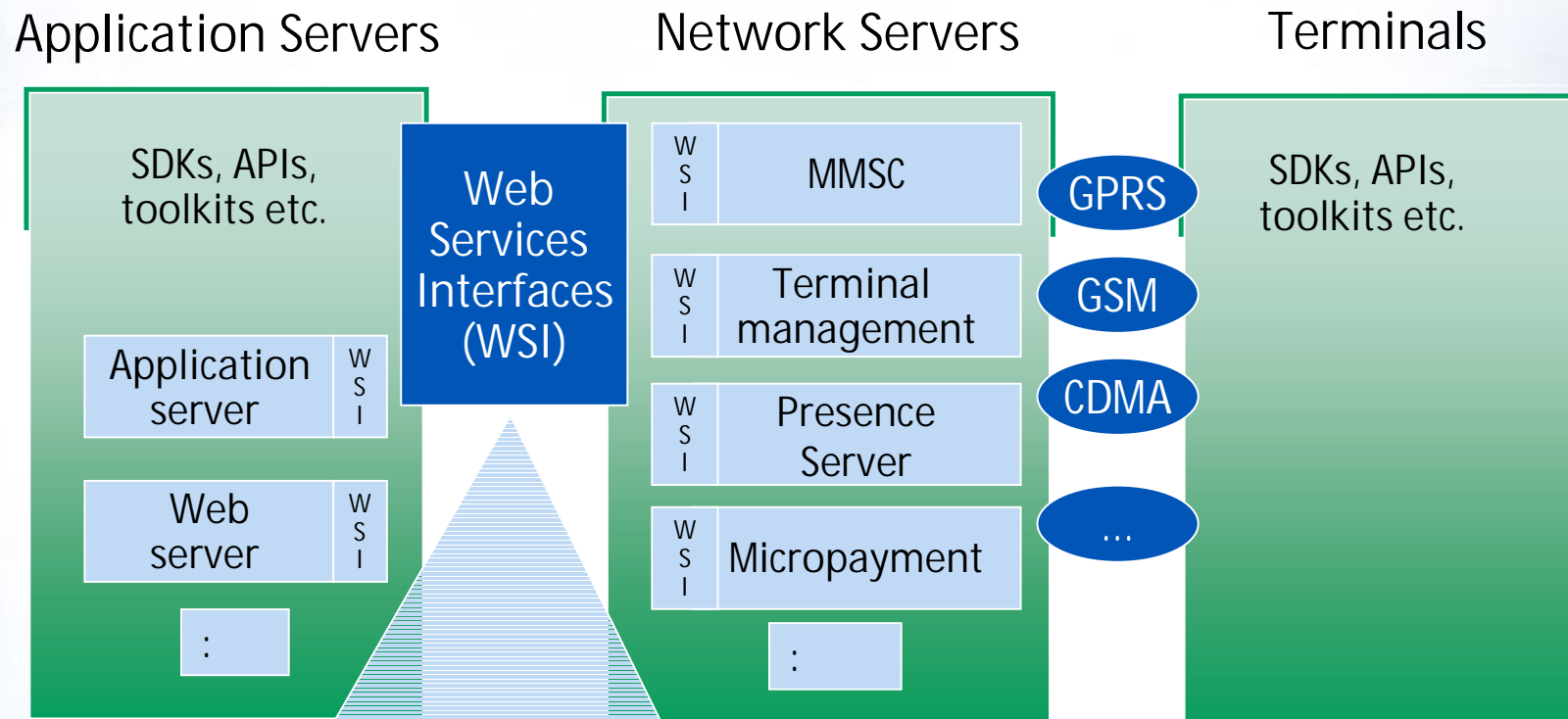
Mobile Web Service - Introduction

- Mobile domain holds key services and capability enabling mobility of essential information and service elements which are crucial for mobile users
- There are plethora of vendors and service providers who need to utilize the services of the mobile domain to enable delivery of mobile services to end users
- The need to be provide services globally is increasing and inter-operability plays an important role in making available content and services globally feasible.
 - Content Provider - Operator interfaces
 - Service provider - Operator interfaces
 - Operator - Operator interfaces
- The approaches are traditionally based on weaving the integration these different inter-operability issues into a specific platform environments
- Web Services will enable maintain Zero - Technology Dependency and enable focus on the interface specification and exposing functionality amongst service providers, operators, content provider, distributors

Rational behind Mobile Web Services

- The Role of Mobile content is ever growing
- High costs and low development cycle in deploying content Mobile, due to :
 - Fragmentation of frameworks and interfaces (billing etc)
 - Different technologies in web and mobile domains
 - High integration costs
- 3rd party content and services strongly contributes to operator revenues and complements operators own services
- Ability to charge 3rd party service and content provider for unique mobile assets such as MMS, micro payment, delivery of Java etc
- Faster integration work and lower costs
- Easier access to more users / new revenues via operator partnerships

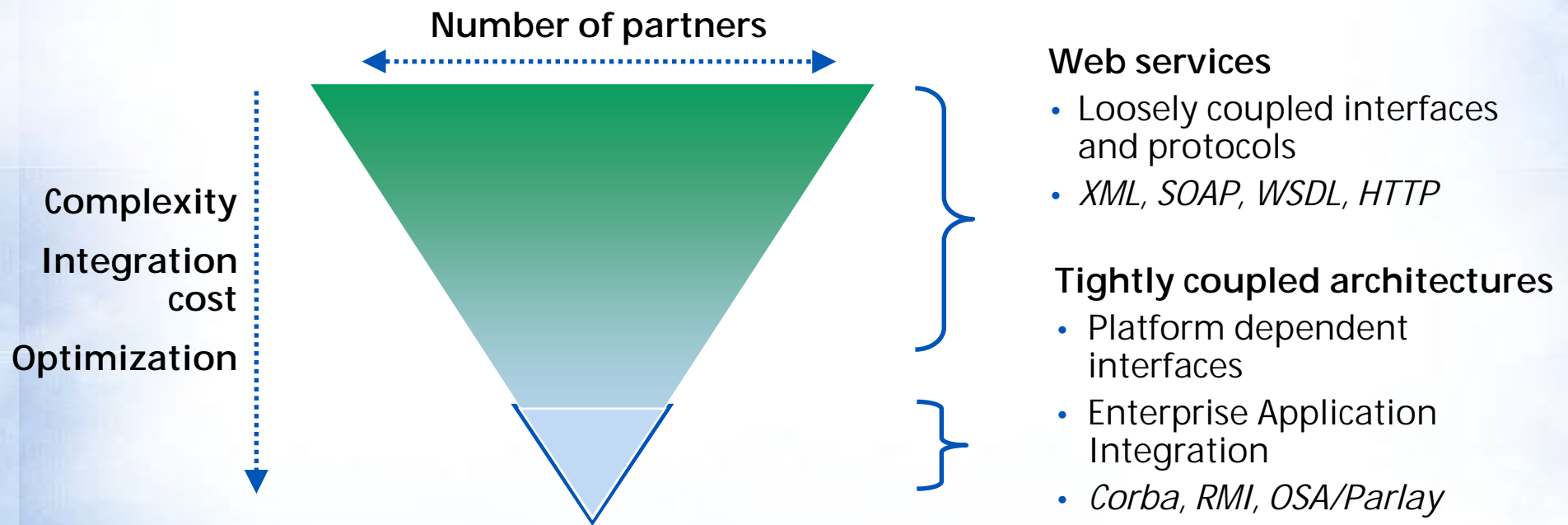
Industry approaches on Mobile Web Services: Opportunity to lower integration costs between operators and content partners



The key opportunity of Web Services in the mobile context lies in open standard server-to-server interfaces enabling more efficient service and content deployment

Web services are most useful for fast, simple and flexible low cost integration

- **Web services:** Optimized for mass partnering, simple low cost integration of different systems / can be build on top of existing systems
- **Tightly coupled architectures:** Optimized for internal operations or limited number of close high volume partners



Family of Mobile Web Services

- The industry has started to specify a family of Mobile Web Services which provide services that can be exposed by a mobile Domain to external partners and service provider directly and as well as across operators.
- Nokia is committed to making Mobile Web services happen in the industry
- Nokia's focus now is to demonstrate the viability of the approach and gather learning(s) for Web services standardization in OMA
- Therefore Nokia has now announced the 1st Web services interfaces (WSI) in it's server product portfolio
- Once OMA Web services standards are ready Nokia is planning to implement these throughout the server portfolio

Nokia's 1st Web services Interface (WSI) Announcements



**Nokia
MMSC
MM7 WSI**



**Nokia
Terminal
Management
Server WSI**



**Nokia
Presence
Server WSI**

Most important mobile Web services interfaces to standardize from business perspective



- MMS
- Delivery (downloading Java, polyphonic ring tones etc)
- Payment
- Location
- Presence
- Device management
- Authentication

Web Service Interface Standardization

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Web Services - Current Deployment methods

- **Business Integration solutions**
 - Business to Business Integration solutions
 - Enterprise Application Integration
 - Business to Consumers : Yahoo, Google and Amazon in-order to provide basic building block services to business partners.
- **Middleware Solutions:** J2EE, .NET
- **Client Solutions**
 - Web client solutions (Apache Axis, etc).
 - Mobile device clients: Lightweight clients infrastructure for Handheld devices
- **Tools**
 - Integrated Development Environment (IDE's),
 - Automatic code generators
 - WS Interface (WSI) generators from the existing code.

Web Services Development Model

Top Down Approach

A. WSDL Creation:

- Identify & define the datatypes to be used (Custom as well as from the XML Schema DT base)
- Define the interfaces to be used
- Define the different operations & their bindings

B. Utilise tool to create stubs :

- Run through tool to create required automatically generated parts of the code

C. Implementation:

- Complete the implementation to receive the SOAP requests, process and deliver a Response incase required to do so.

D. Deploy the WS:

- Utilise the tools to deploy and host the WS
- Publish the WS into a registry like using UDDI, WSIL (optional)

Web Services Development Model

Bottom Up Approach (Implementation exists)

A. Implementation

- If not already existing Develop a system using Java, C++ or any other programming language.

B. Create WSDL :

- Define the WSDL Manually and then map the SOAP requests to the API calls using the standard APIs or then
- Run through tool to create required automatically generated parts of the WSDL and the bindings (for exampleJava2WSDL, ApacheAxis).
- Integrate the generated parts

C. Deploy the WS

- Utilise the tools to deploy and host the WS
- Publish the WS into a registry like using UDDI, WSIL (optional)

Family of Web Services

- What ?
 - A set of inter-related services providing services to a specific industry domain and solving a common domain of problems.
 - There are certain level of inter-dependencies with interfaces between these set of Web Services
 - These WSI are aimed to a certain domain of application and service providers.
 - The functionality of the services are inter-related and have greater commonality between each other
 - These WSI could have a modular and common developer tool to integrate and implement them into enterprise or enterprise like wider solutions
- How ?
 - Standardize WSI addressing a particular problem/application domain
 - Enable semantic inter-operability and reusability by identifying the common denominator of application information and interfaces
 - Reuse the common element set for defining WSI specifications
 - Develop better and semantically inter-operable tools and solutions
- When ?
 - This is the best time to realize this fact before the complexity reaches to its peak and requires reverse engineer and normalization.

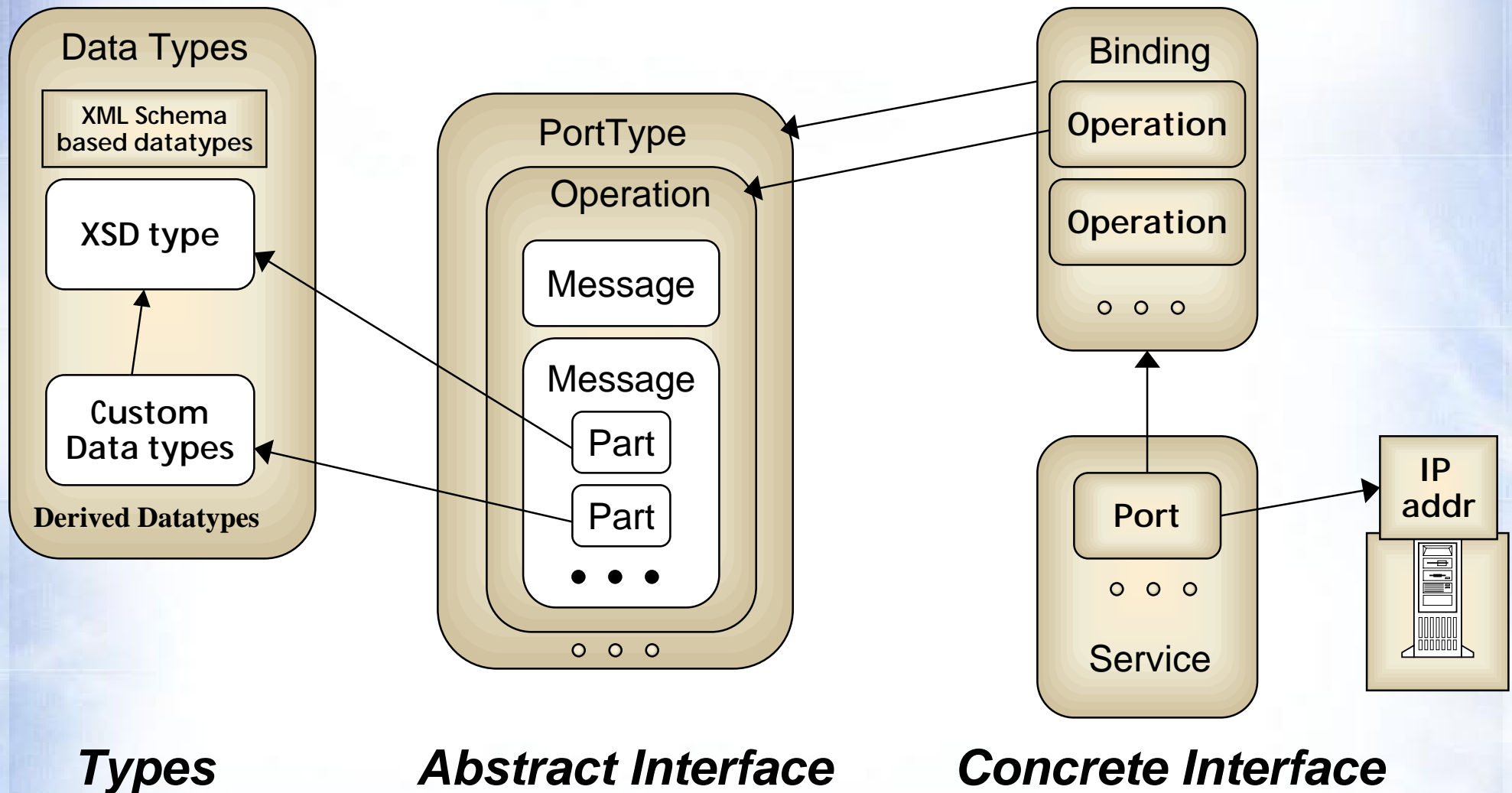
Benefits of WS Interface Standardization

- Enables to deliver better semantically inter-operable solutions
- Simplifies integration problems between operators, services and content providers and third party integrators
- Provides a window for opportunities and fuels healthy competition among third party solutions providers
- Provides wider acceptance among developer community considering the wide variation and plethora of interfaces to port a solution to.
- The complexity of the Webservice is better managed by splitting these set of functionality into multiple WSIs
- The reusability of the common core elements becomes advantages to maintain semantic inter-operability between the services developers and consumers

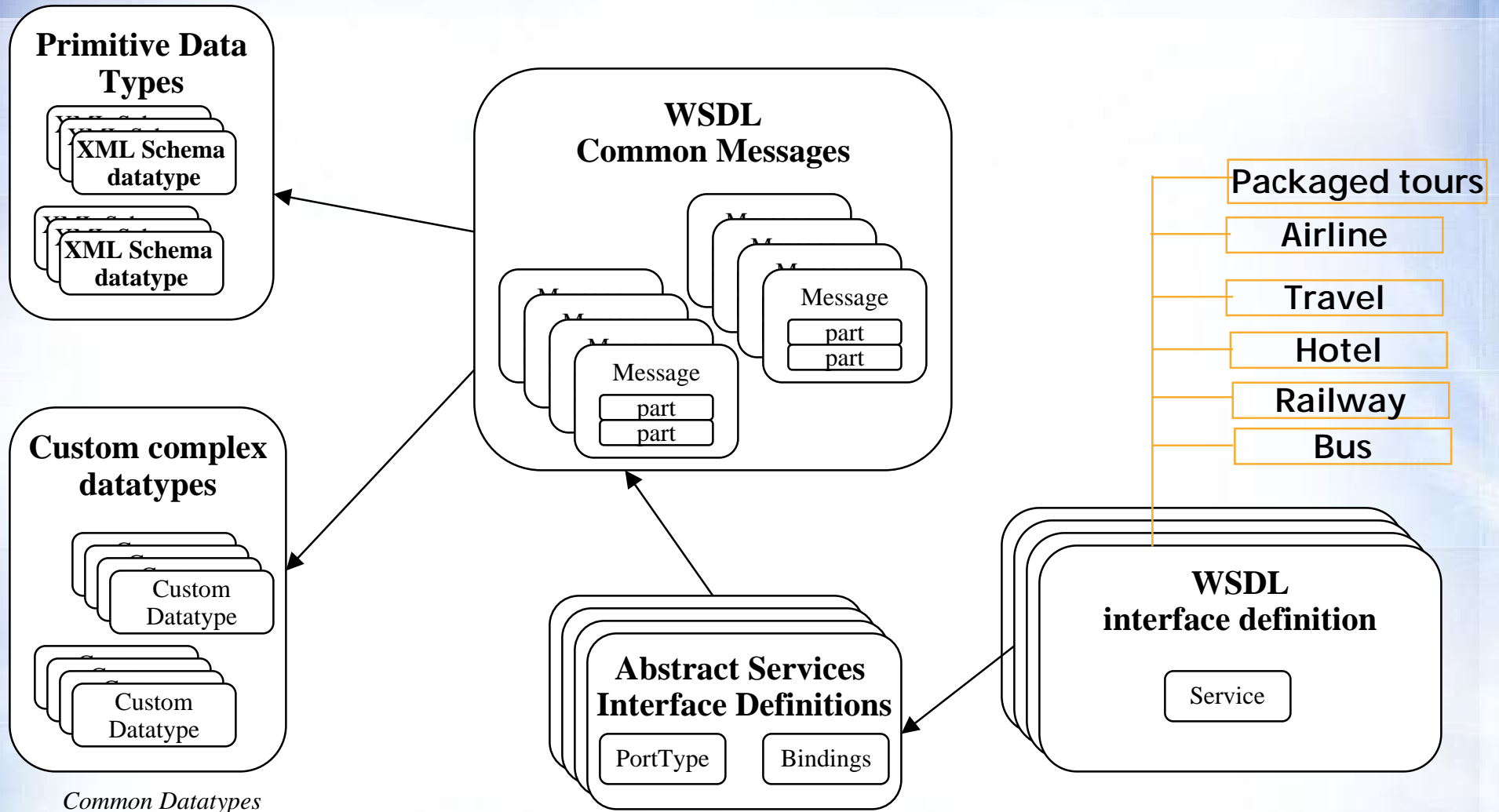
Requirements of WSI Specifications

- Common understanding and agreement of the functionality of specific set of services addressing a particular problem domain
- Identification and common agreements on the architectural aspects of solving specific WS interface functionality.
- Reusability of already existing interfaces definitions
- Identification of several common core requirements
 - Versioning and backward compatibility issues
 - Authentication and Security aspects
 - Privacy aspects taken into consideration
 - Charging and Billing aspects
- Define a process in collecting the WSI specifications requirements, For e.g:
 - Use case development for the set of services
 - Interaction / sequence models
 - Normalization of services commonalties (Identification of common core elements) - XML Schema level
 - WSI specification - WSDL specifications
 - Transport bindings

Approaches: Exploit the WSDL Modular Extensions



WSDL Reusability - Enables definition of core WS Libraries for a family of Web Services



Standardization Update

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Good start in Web services standardization for the mobile industry

- Promising 1st steps to standardize how to apply Web services technology in mobile
 - 3GPP in MMS: MM7
 - Mobile Web Services Group in Open Mobile Alliance (OMA) started in August 2002
- Nokia views that the Open Mobile Alliance (OMA) is well positioned to lead Web Services standardization in the Mobile Industry
 - Over 220 member companies representing the whole value chain needed for mobile services
 - Cooperation between OMA and other key forums is crucial (3GPP, W3C, OASIS, Liberty etc)

Open Mobile Alliance (OMA)

- Drives Open standards for inter-operable Mobile Services
- Mobile web services working group within OMA will create guidelines on how the interfaces should be specified
- The Mobile Web Services group is addressing :
 - A specification Suite that will aid developer to apply Web Services :
 - Web Services Discovery
 - Access &
 - leverage Service enablers with OMA Framework
- OMA mobile Web Services framework standardisation
 - How to use Web Service technologies and specifications in the mobile domain
 - Use existing specifications and work as much as possible (don't re-invent the wheel)
 - Actual specification done in other forums (e.g. WS-I and W3C)
 - Nokia is an active member in the OMA mobile Web Services framework standardisation

Liberty Alliance Project

- Specifies an Identity Web Services Framework (Nokia takes an active role here)
- Based on SOAP1.1, WSDL1.1, SAML and WS-Security
- Three distinct Liberty Identity efforts :
 - Federation Framework (ID-FF)
 - Provides core protocols, schemata and profiles. This allows implementers to create standardized, multi-vendor identity federation network.
 - Web Services Framework (ID-WSF)
 - Provides a set of protocols, schemata and profiles to provide a basic framework of identity services, such as: Identity Service discovery and invocation.
 - Service Instance Specification
 - Utilize the ID-FF and ID-WSF to provide network Identity services, such as contacts, presence detection or wallet services that depend on networked identity.

Ref: <http://www.projectliberty.org/specs/draft-lib-arch-idwsf-primer-v1.0-04.pdf>

WS-I

- Assist in creations and deployment of inter-operable Web Services
- Development of common best practices for Web Services usage in the development, deployment and integration of business applications
- Deliverables for WS-I being :
 - Interoperability Profile
 - Testing tools
 - Sample Applications
- The Basic Profile1.0 consists of SOAP1.1, WSDL1.1, UDDI2.0
- WS-I and OMA do complementary work in mobile web services IOP area
- Nokia is active in the use cases and scenarios work, interoperability testing tool definitions, and sample application work

Java Community Process

- JSR-172: Web Services for Mobile Devices
 - Is based on the JAX-RPC technology , but for the J2ME Java platform for mobile devices.
 - Provides tools such as :
 - XML Parsing APIs
 - WSDL to Java mapping,
 - API to support generated stubs,
 - Investigation of a suitable and compact encoding mechanism for XML based RPC messages

Future Directions and Issues

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Mobility to Mobile Web Services

- Mobile Web Service Interfaces standardized (OMA) and inter-operability amongst the solutions providers tested (WS-I)
- Application of crucial Web Services technologies to ensure business critical operations successful
 - Authentication
 - Security
 - Reliability
 - Charging and payments
- Web Services from Mobile Devices
 - Ability to access web services from terminals (JCP)
 - Ability to expose the capabilities and values a terminal contains to the external parties (Terminal hosted capabilities/ based on Reverse HTTP Binding) (Liberty)

Author's note

- **Acknowledgements:** Goes to the Web Service teams in NRC and NMP