




Web Services
Derek Coleman, Chief Technologist
RosettaNet on loan from
Hewlett-Packard Software Global Business Unit

In this Presentation...

- Web Services in 5 minutes
- UDDI
- Web Services the technology behind the hype
- Converging Web Services and Document Exchange
- Acknowledgements

• Note this is a presentation of my views and does not necessarily reflect the position or strategy of RosettaNet or Hewlett-Packard

Web Services © copyright 2002 RosettaNet. all rights reserved. **ROSETTANET** 

Web Services

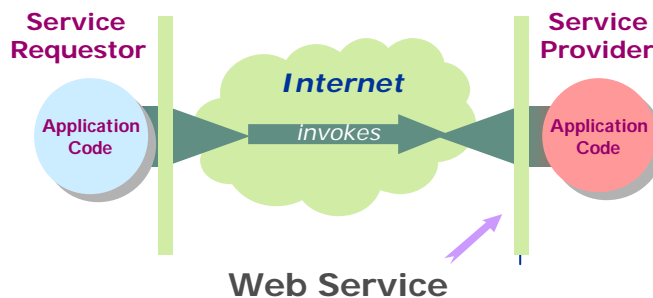
- Web Services are an emerging set of standards & technologies for
 - EAI, B2C, mobile, B2B etc
 - horizontal focus
 - (today) relatively simple message semantics
 - dynamic connections
 - from stateless interactions to B2B processes
- The web as the backbone of distributed applications
- By using HTTP/XML, it is possible to reach
 - any OS (not only Windows and Unix) and
 - any device (not only computers)

Web Services © copyright 2002 RosettaNet. all rights reserved.

ROSETTANET 

What is a Web Service?

- *An interface that defines a collection of operations that are network accessible through standardized XML messaging.*



- In Web Services the Service Requestor invokes services on the Service Provider by using the SOAP *remote procedure call* (rpc) protocol.

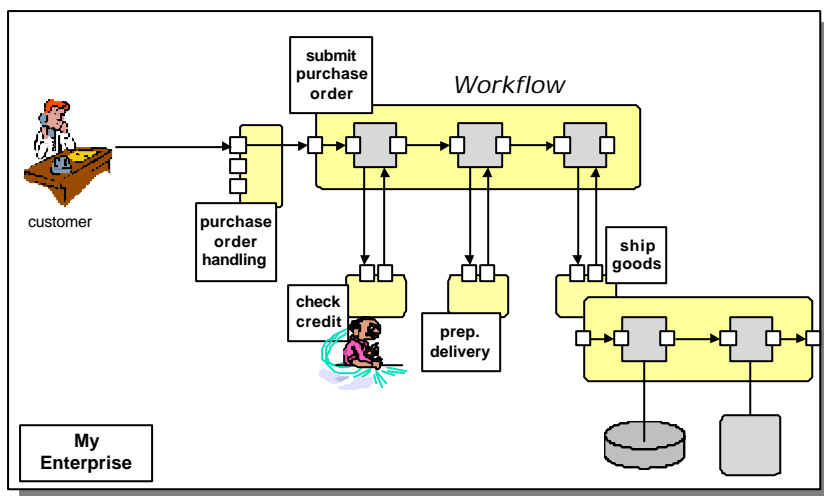
Web Services © copyright 2002 RosettaNet. all rights reserved.

ROSETTANET 

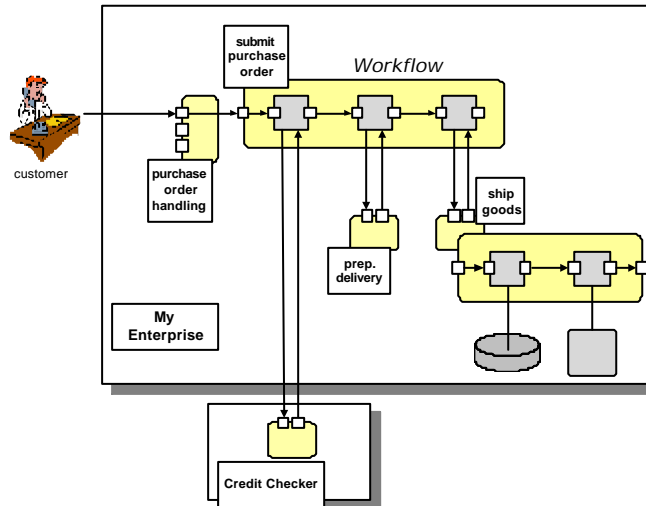
Web Services Model

- Asymmetrical Client-server model of computation
 - Service is a remote object which provides a interface
 - Client accesses service by invoking a rpc on the interface
- Synchronous: when a client sends a request, it waits for a response before doing anything else.
- Tightly coupled and resembles traditional distributed object paradigms, such as RMI or DCOM.
- “CORBA in the fresh air”

Existing Business Process



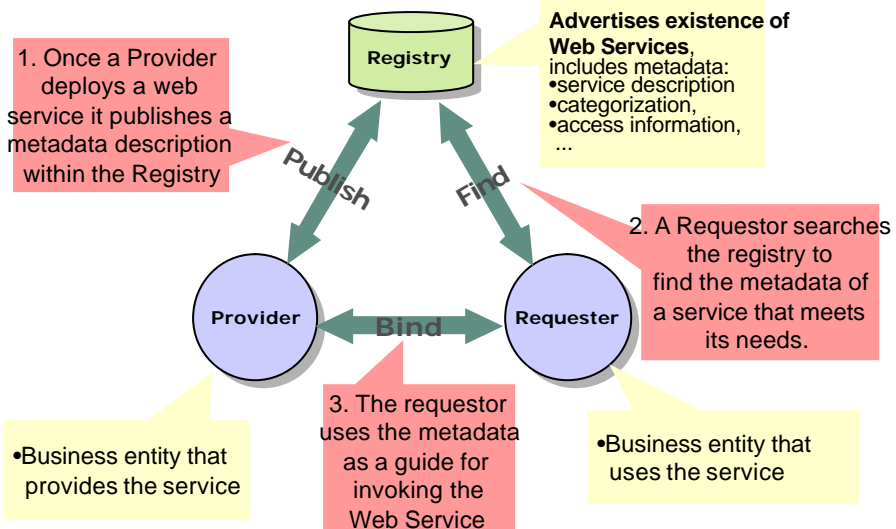
Using a Web service



Web Services © copyright 2002 RosettaNet. all rights reserved.

ROSETTANET

Dynamic Web Services



Web Services © copyright 2002 RosettaNet. all rights reserved.

ROSETTANET

UDDI.org Organization

Founders

IBM
Microsoft
Ariba

Operators

IBM
Microsoft
Hewlett-Packard
SAP

Working Group

IBM
Microsoft
Ariba
Hewlett-Packard
SAP
Oracle
Intel
Accenture
Fujitsu
Verisign
Sun
Compaq
Commerce One
Equifax
I2 Technologies

Advisory Group

All WG members
BEA
Boeing
British Telecom
Cargill
Dell
Ford
Hitachi
Interwoven
Iomega
KPMG
Merrill Lynch
Nortel Networks
NTT Communications
OAG
Rational
SABRE
WebMethods
... over 200 more ...

Web Services © copyright 2002 RosettaNet. all rights reserved.

ROSETTANET 

UDDI implements the Web Service Model



1) Service providers populate the registry with service descriptions and access info



3) Businesses use the services to fulfill needs



2) Marketplaces, search engines, and business apps query the registry to discover services

Telephone Book Metaphor

White Pages : Address, contact information

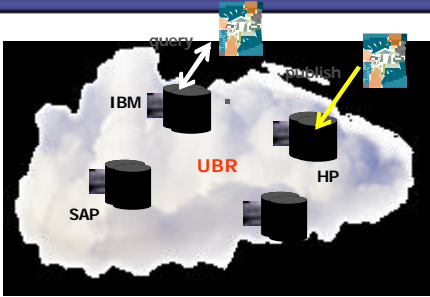
Yellow Pages : Industrial categorization

Green Pages : URLs for accessing services & meta-data

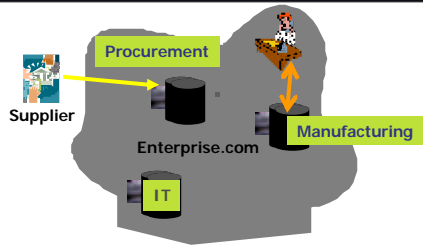
Web Services © copyright 2002 RosettaNet. all rights reserved.

ROSETTANET 

UDDI Public & Private Registries



Global registry of web services
 Standard API and repository to expose web-service businesses, the services they provide, & their electronic access instructions
 Hosted and replicated among small number of companies



Private or "local" registry of web services

- Access Control
- Standard API and repository to expose web-services, ...
- Intra-enterprise
- Trading communities
- Vertical markets

The image is split into two main sections. On the left, there is a large, textured, brown stone tablet, reminiscent of ancient inscriptions. On the right, the background is a light green color with faint, repeating patterns of text in various languages, including English and Korean. The text appears to be XML or SOAP code snippets. At the bottom right, there is a white speech bubble containing the text 'Web Services - the technology behind the hype'.

Web Services - the technology behind the hype

Protocols for Web Services

- Service Invocation
 - Simple Object Access Protocol (SOAP)
 - W3C XML Protocol WG – SOAP v1.2
 - Still in process
- Service Description
 - Web Services Description Language (WSDL)
 - WSDL v1.1 (IBM & MS) W3C Note Mar. 2001
 - W3C WS Description WG started Jan. 2002
- Service Composition
 - Web Services Flow Language (WSFL) **OR**
 - IBM proprietary
 - XLANG
 - Microsoft proprietary
- Service Discovery
 - Universal Description, Discovery and Integration (UDDI)
 - UDDI.org v2.0 specification June 2001

Web Services © copyright 2002 RosettaNet. all rights reserved.

ROSETTANET 

SOAP

- Simple Object Access Protocol
 - Fully based on HTTP (or Secure HTTP)
 - Remote Procedure call (RPC) model inspired by CORBA Internet Inter Object Protocol (IIOP)
 - Supported by W3C and by all major names in the computing industry (Compaq, HP, IBM, Microsoft, SAP Sun, Oracle, and other companies)
 - <http://www.w3.org/2000/xp/>
- WebService = SOAP interface
 - An URL (accessible using HTTP) that exposes a set of callable methods that conform to the SOAP XML schema
 - A device on the network (internet), can expose an unlimited number of WebServices

Web Services © copyright 2002 RosettaNet. all rights reserved.

ROSETTANET 

SOAP: Simple Object Access Protocol

```
POST /StockQuote HTTP/1.1
Host: www.stockquotesever.com
Content-Type: text/xml;
charset="utf-8"
Content-Length: nnnn
SOAPAction: "www.stockquotesever.com/services/getquote.htm"

<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
  SOAP-ENV:encodingStyle="http://schemas.xmlsoap.org/soap/encoding/">
  <SOAP-ENV:Body>
    <m:GetLastTradePrice
      xmlns:m="www.stockquotesever.com/services/getquote">
      <symbol>SSSW</symbol>
    </m:GetLastTradePrice>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

Envelope - how data types are encoded and serialised

Real Data

Web Services © copyright 2002 RosettaNet. all rights reserved.

ROSETTANET 

Microsoft SOAP Extensions

- Four specifications (October 2001) built on the SOAP and XML
- WS-Security
 - describes how digital credentials should be placed within SOAP messages
 - how these credentials should be associated with a message to ensure message integrity and confidentiality.
- WS-License
 - how to use X.509 certificates and Kerberos tickets, as WS-Security credentials
 - includes extensibility mechanisms that enable new license formats to be easily incorporated into the specification

Web Services © copyright 2002 RosettaNet. all rights reserved.

ROSETTANET 

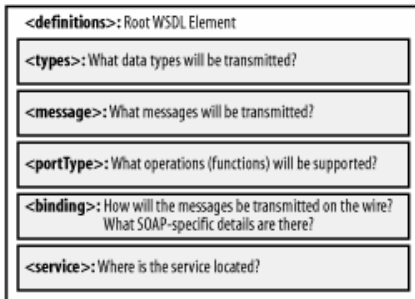
Microsoft SOAP Extensions

- WS-Routing
 - provides addressing mechanisms that enable specification of a complete message path for the message (including its return path)
- WS-Referral
 - enables the routing between SOAP nodes on a message path to be dynamically configured.

Web Services Description Language

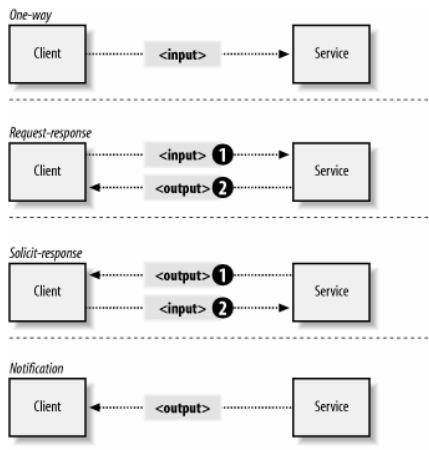
- WSDL (Web Service Definition Language) Contract
 - An XML document that describes the WebService for programmatic use.
 - Every Web Service should expose a WSDL contract that allow the automated interface discovery by SOAP clients
- Allows discovery of your webservices by other software (or human being).
- It can contain documentation in human-readable format

Web Services Description Language



- *Message* - an abstract description of the data to be exchanged. A message consists of one or more parts that describe its contents.
- *Operation*, an abstract description of an action the service supports.
- *Port Type*, a set of operations supported by one or more endpoints.

WSDL - Operation Patterns



- Four basic patterns of operation:
- *One-way* The service receives a message.
- *Request-response* The service receives a message and sends a *response*.
- *Solicit-response* The service sends a message and receives a response.
- *Notification* The service sends a message.

Service Composition

- WSFL/XLANG two proprietary specifications aimed at business process specification
- Both built on WSDL
- WSFL from IBM
 - Only deal with choreography - not message exchange controls
 - except for the myth of WSEL
- XLANG from Microsoft
 - incomplete & erroneous spec
 - does not deal with message exchange controls
- Well-founded rumour that XLANG & WSFL will be merged
- Proposed as competitors to ebXML BPSS

Web Services Flow Language

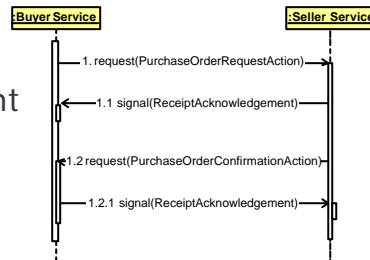
- WSFL 1.0 is a specification from IBM
- builds on top of WSDL to capture the process flow and orchestration aspects of Web Services
- designed to capture both public and private process choreography aspects of Web Services.
- WSFL is based on two fundamental models:
 - the Flow-Model and
 - the Global-Model.
- WSFL cannot specify message exchange controls

Flow & Global Models

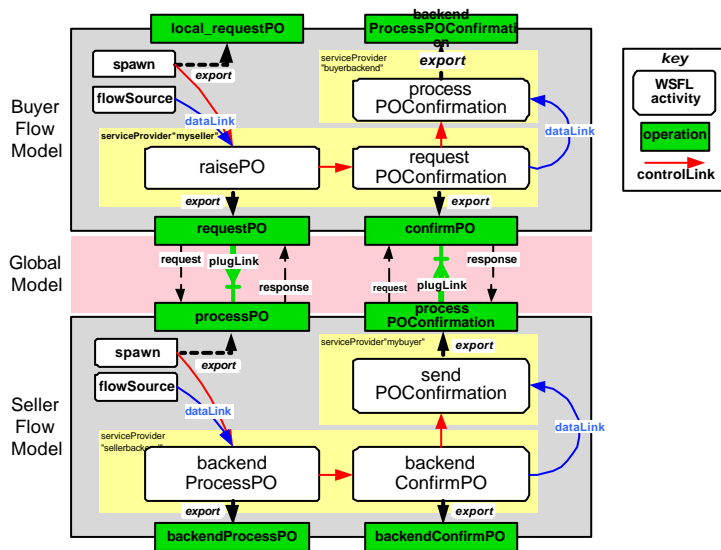
- The *flow-model* is primarily intended for capturing private process choreography
- specifies the sequencing of operations/activities on a port (service) with the external interfaces exposed by the port (Web Service) “exported” by these activities.
 - Uses state machine
- The connectivity and directionality of the exported interfaces between two (or more) Web Services is accomplished via Plug-Links in *Global Model(s)*.

Modelling PIPs as Web Services

- Web Service standards such as WSDL and WSFL (or XLANG) provide a basic set of concepts for low level architecting of web services
- As a simple example consider PIP3A4, Request Purchase Order
- Using WSDL & WSFL we can specify component behavior and the interfaces of the RosettaNet gateway



PIP3A4 in WSFL/WSDL

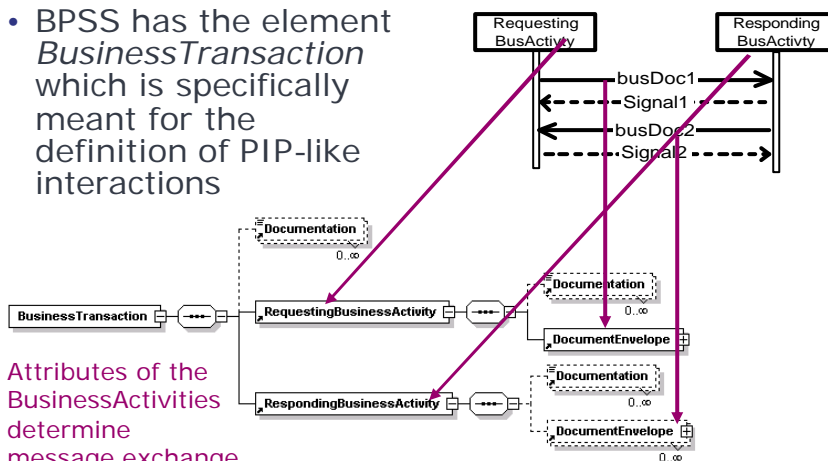


Web Services © copyright 2002 RosettaNet. all rights reserved.



Using BPSS to Define PIP® Process Specs

- BPSS has the element *BusinessTransaction* which is specifically meant for the definition of PIP-like interactions



Attributes of the BusinessActivities determine message exchange controls

Web Services © copyright 2002 RosettaNet. all rights reserved.





Converging Web Services and Document Exchange

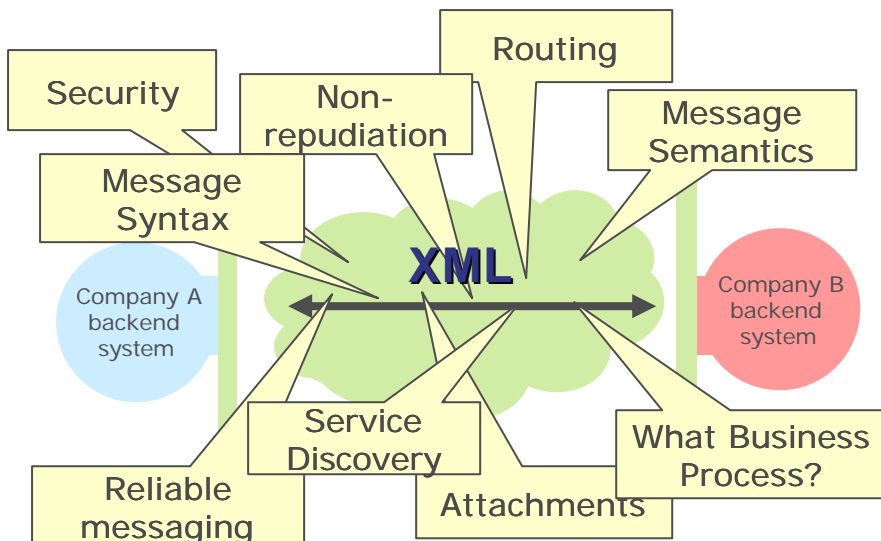
Document Exchange Model

- Loosely coupled asynchronous
- Symmetrical relationship between two services.
- Requesting service sends an entire document, such as a purchase order, rather than a discrete set of parameters.
- Responding service accepts the entire document, processes it, and may or may not return a resulting document or signal.
- Inherent transactional properties
- Promotes a looser coupling between client and server, for example routing via hubs.

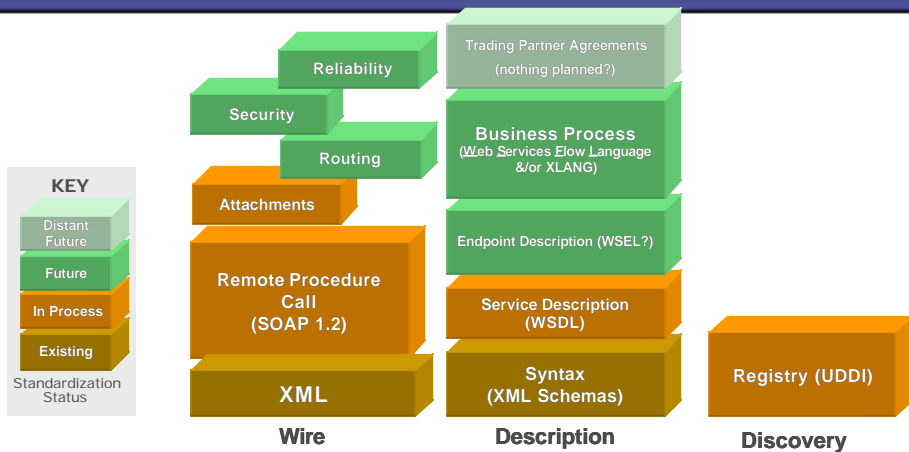
Issues in Convergence

- Different conceptual models
 - document exchange is **symmetrical** between a requesting and responding service
 - web services have an **asymmetrical client** server model
- Different protocol stacks
 - document exchange based on mature standards RNIF/ebXML
 - web services based on emerging standards from W3C and IBM/Microsoft proprietary standards
 - B2Bi has a stronger set of “must have” QoS requirements than EAI or B2C, e.g. non-repudiation, routing through hubs

Must Have Requirements for B2Bi



Web Services Stack in 2002

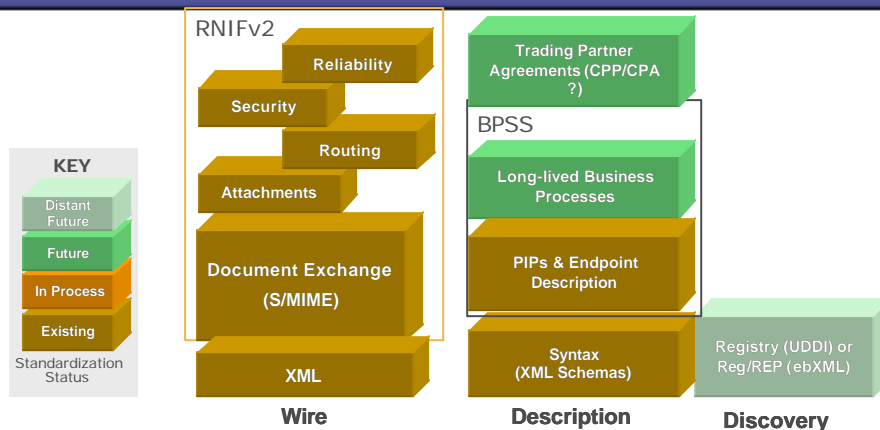


- Web Services stack is immature but has momentum
- Open but proprietary
- Does not meet B2B needs today

Web Services © copyright 2002 RosettaNet. all rights reserved.

ROSETTANET 

RosettaNet Stack in 2002

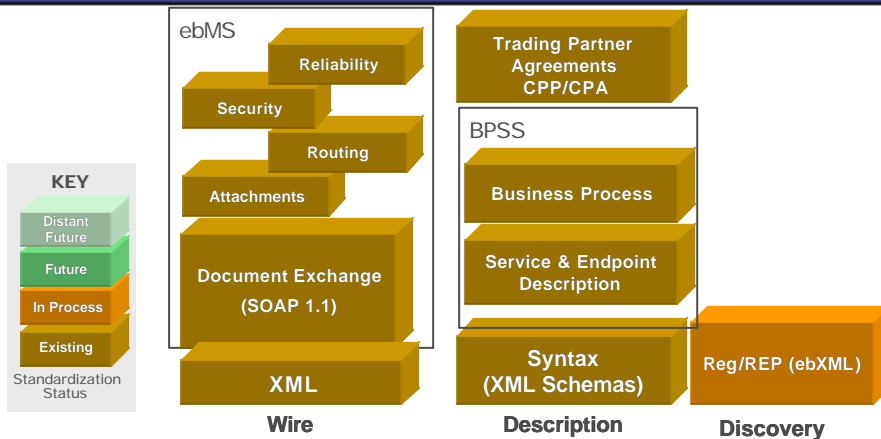


- RosettaNet standards are mature and in widespread use, e.g. RNIF
- Need to adopt XML based definitions for business processes etc

Web Services © copyright 2002 RosettaNet. all rights reserved.

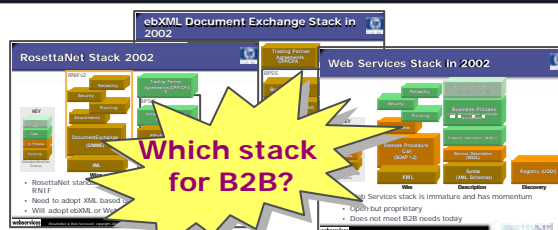
ROSETTANET 

ebXML Document Exchange Stack in 2002



- ebXML standards are mature but not (yet) in widespread use
- meet B2B needs

Converging Web Services & B2B



A personal opinion ..

- Cannot use Web Services stack for production today
- RosettaNet will
 - continue planned & selective migration from current standards to ebXML, e.g. BPSS
 - evaluate emerging web standards
- Participate in the development of the ebXML & W3C stacks & foster convergence.
- Move to converged ebXML/Web Services stack as it matures

Acknowledgements

- Kamarul Zmaran, RosettaNet Malaysia
- Kenji Nagahashi, Fujitsu
- Prasad Yenduri, WebMethods
- Pat O'Sullivan, Intel
- Pallavi Malu, Intel

