



# Web Services and SOA for Communication – Part I

Wu Chou  
Director, Avaya Labs Fellow  
wuchou@avaya.com  
06/15/07

IP Telephony

Contact Centers

Mobility

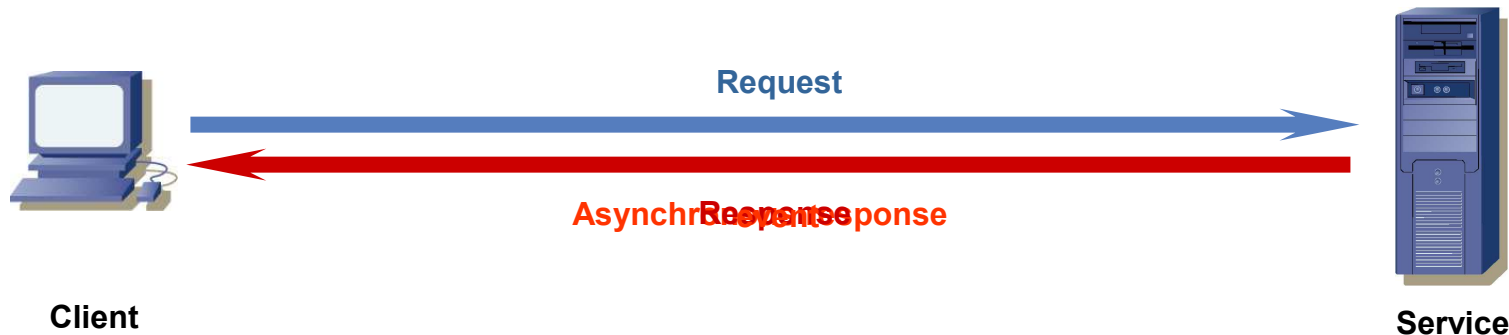
Services



## PART 1

# Web Services and SOA

# Web Services for SOA



- ❑ Web Services (WSDL/SOAP) is a new paradigm in distributed and service oriented computing developed/standardized by W3C
- ❑ It uses a standard based WSDL interface to couple two web service endpoints
- ❑ Services can be invoked/discovered/composed remotely through SOAP message exchange, which is agnostic to transport protocols, e.g. HTTP, JMS, SMTP, etc. or operating systems, e.g. Window, Linux, etc.
- ❑ WSDL interface provides a service abstraction layer for SOA enablement that allows applications loosely coupled with implementation platform
- ❑ ...

WSDL- Web Service Description Language SOAP - Simple Object Access Protocol  
SOA – Service-oriented architecture

# OOP and SOP in Software Engineering

- ❑ Object-oriented programming (OOP) focuses on creating objects that contain both state and behavior.
- ❑ Service-oriented programming (SOP) builds on top of OOP, allowing services to be built using OO techniques. These services themselves provide increased reuse of the business logic, by allowing the service to be used in diverse applications.
- ❑ OOP focuses on what objects an application consists of, while an SOP approach focuses on the application's functionality, or in other words, what the application does.

# Three Layers of Interoperability

## *Service Layer*

- CSTA Web Services (ECMA-348), Parley X Web Services, etc.

## *Message Layer*

- CSTA XML (ECMA-323), Java Business Integration (JBI), etc.

## *Object Layer (of the Programming Language)*

- CSTA Object Model (OM), e.g. UML of CSTA OM and Java binding



*Is my function foo( ) interoperable with your function bar( )?*

## Why Service-Oriented Architecture - some customer perspectives

New paradigm in software architecture with following benefits:

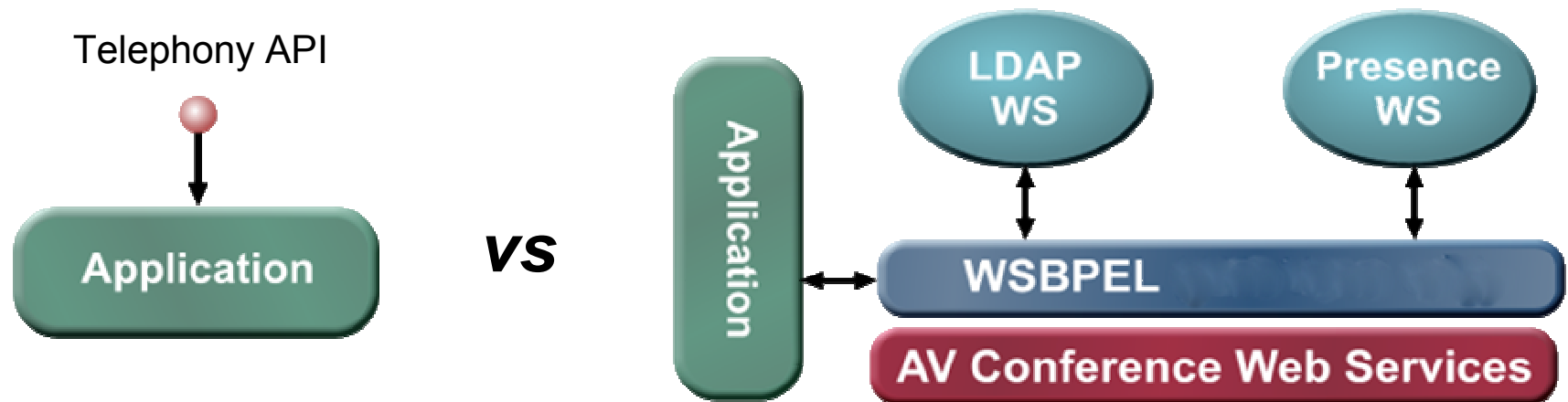
- Reduce integration cost and allow much more dynamic solutions to be deployed (agile business solution/integration, a dream for CIO)
- Reusability at macro (service) level rather than micro levels (e.g. objects) or re-invent wheels
- Composability that collection of services can be coordinated and assembled to form composite new services
- Loose coupling and late binding to minimize service dependencies on low level implementations
- Service abstraction for SOA that describes service contract while encapsulating the underlying details
- ...

# Web Service/SOA – some customer perspective

*This isn't click-n-call*

It is to create intelligent communication in end-to-end business process and transactions

Current environment



- Limited Functionality
- Inflexible

**Advanced** Functionality

- Extensible
- Reusable
- Easy Integration

## Some Market Data on Web Services

- Web services are increasingly popular among enterprises seeking better services for their customers and business partners.

In the next year, how will your organization use Web services? Here's what CIOs say.

60% - To integrate applications behind the corporate firewall.

53% - To integrate with external applications of known suppliers, customers or partners *outside the firewall*.

20% - To become a provider of Web services to third parties.

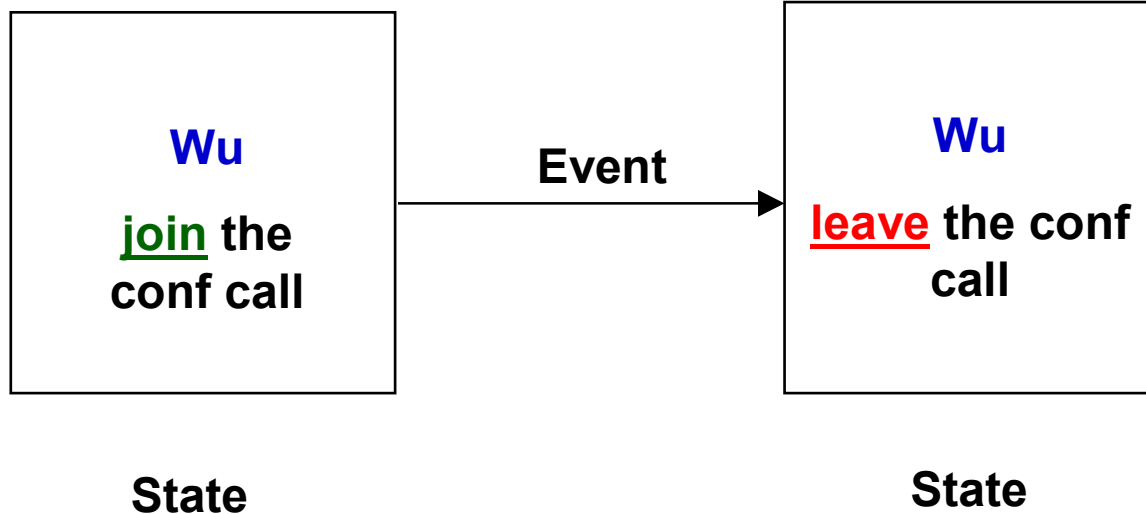
16% - To dynamically discover and interact with external applications from third parties.

Source: Jupiter/ERI Executive Survey June 2001 of 471 IT managers



# What is an Event?

- An event is a significant change in state.



# Advanced SOA: SOA+EDA

Enable agile real-time enterprise through SOA and EDA

## □ Event-Driven Architecture (EDA)

The communication is initiated by an “event”, a trigger that typically corresponds to some business occurrences

## Advanced Service-Oriented Architecture (SOA)

- Loosely coupled and service-oriented re-usable service components
- Agile *bi-directional* communication between service provider “server” and a service requester “client”

*SOA and EDA are compatible and complementary in advanced SOA*

*(SOA+EDA is indicated by Gartner analysts as “advanced SOA”, where the first generation SOA is characterized as client-server driven.)*

## EDA and SOA - Some Feature Comparisons

- ❑ EDA: Trigger is a business event
- ❑ SOA: Processes are initiated under more predicable conditions
- ❑ EDA: Supports one-to-one, one-to-many, and many-to-many communications
- ❑ SOA: One-to-one communication
- ❑ EDA: Flow of control determined by the recipient based on messages received
- ❑ SOA: Flow of control is controlled by the client (sender)
- ❑ EDA: Supports dynamic, parallel asynchronous flows through a network of processes
- ❑ SOA: Linear path of execution through a hierarchy of services (interactions typically synchronous in nature)

# JBI based SOA Framework

- **Java Business Integration (JBI) 1.0:** A Java SOA standard for service integration, discovery and deployment (JSR final standard release 08/17/05)
  - Defines a standard-based architecture and service provider interface (SPI) for developers of service engines and binding components
  - Allows third-party components to be “plugged in “ to a standard infrastructure, and allows those components to interoperate in a predictable, reliable fashion as an SOA component
  - Adopts SOA to maximize the decoupling between components, and creates well-defined interoperation semantics founded on standard-based messaging
  - **Extends the WSDL based message model and protocol neutral message exchanges to message flows between JBI components on the enterprise service bus**
  - Establishes a standard for packaging JBI components and for deployment of service artifacts to such component
  - Defines administrative and management hooks ...

(Note: JBI specifies normalized-message exchange on the bus which is not SOAP)

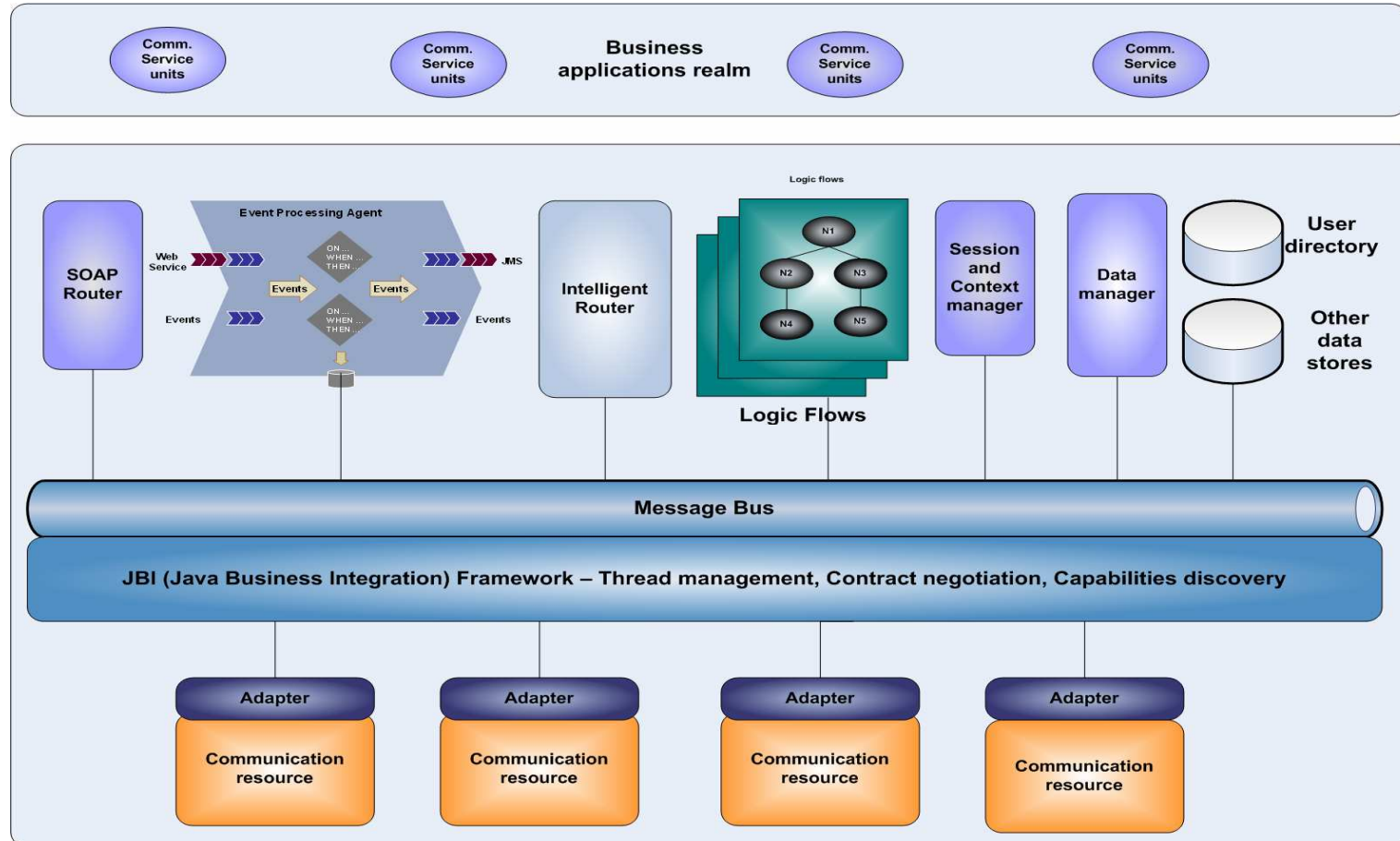
## SCA: An SOA Framework in Progress

- **Service Component Architecture (SCA):** An SOA framework under development by IBM, Oracle, SAP, BEA, Sybase, etc.
  - Defines a SOA framework based on SDO (Service Data Object) and component hierarchies of system, subsystem, module, component, interfaces, artifact, entry point, service reference, binding, etc.
  - Describes a model for building applications and systems using SOA (a good tie-in for model-driven architecture (MDA))
  - Extends and complements prior approach to implementing services.
  - Based on open standards such as Web services
  - Decouples service implementation and service assembly from the details of infrastructure capabilities and from the details of access methods
  - Supports implementations written in conventional objected oriented and procedure based programming languages, e.g. Java, C++, and XML centric languages, e.g. BPEL, XSLT.

**(Note: SCA is a much larger and sophisticated specification than JBI initiated by major application Server vendors, e.g. IBM, BEA, Oracle, SAP, Sybase, etc. SCA and SDO submitted to OASIS Composite Service Architecture (CSA) Forum for standardization as OASIS open standards)**

# A Service Platform Diagram for CEBP

## - Communication Enabled Business Process



SOAP router is a web service gateway that exposes communication as service to enable communication enabled business process (CEBP)

# Next Generation Web and Services

- **Fundamental paradigm shift from server does all model to collaborative and distributed service model**
  - **Rich client:** Server and client collaboratively generate the service contents.  
(e.g. AJAX that server provides raw XML data with instruction for the client to execute and render to provide the service.)
  - **Web services:** An extensible service infrastructure to enable distributed computing, service discovery, invocation, composition, etc. for program-to-program interaction and collaboration
  - **Wiki server:** A collaboration infrastructure allowing multiple authors to collaborate and co-author on the same web page and content
  - **P2P file sharing server and communication super nodes:** A collaborative and rich client based community model that a client is not only a user but also a collaborative server resource to provide services for other nodes

● ...

Note: Some abovementioned services are also referred to as Web 2.0 services

# Advantages of Next Generation Web

- Huge resource savings at the server side, because client (user) contributes significant amount of resources to enable services
- Huge savings on bandwidth, because of no need to transmit a complete page, especially for content updates
- Faster and better services, because server can be off loaded to do content predication and caching for the next data frame. This can be done before its client finishes the presentation of the current page, e.g. Google Map.
- Richer content and collaborative authorship with Wiki server, where multiple authors can work together on the same project/page
- Web clients become computing terminals (online desktops), such as distributed computing resources (e.g. rich client), invoking services/programs online (e.g. web services), client-side service execution/composition (e.g. Java script)
- ...



## Some Comments of Web 2.0 and SOA

### *Distributed computing environment at Internet Scale*

- Web 2.0 primarily distinguished by the ability of users/clients to contribute information and resources for collaboration and sharing.
- Web 2.0 applications use web services, and may include client side program interface (e.g. AJAX), web syndication, blogs, wiki, etc.
- Web 2.0 is regarded as displaying SOA characteristics utilizing the web infrastructure for distributed, reusable, and composable services
  - Web services, richer client, etc. in Web 2.0 have made web a distributed computing environment and a distributed service grid.
  - Marshups and “enterprise marshup” of Web 2.0 have been coined to describe web applications that combine from more than one source into an integrated service/experience, which share many characteristics of SOA and are applications of composed services through a declarative and distributed manner.
  - ...

## **Web Services and SOA: Some Industry Standardization Efforts**

- **W3C** – (fundamental infrastructure of Web Services)
  - SOAP and WSDL specifications (latest effort on WSDL 2.0)
  - WS-Addressing 1.0 (Core, SOAP Binding) is W3C Recommendation
  - WS-Addressing 1.0 WSDL Binding is W3C Proposed Recommendation
  - WS-Choreography
  - ...
- **OASIS** – (global Industry standard consortium for e-Business)
  - UDDI (Universal Description, Discovery and Integration)
  - WS-Security
  - WS-BPEL (Web Service – Business Process Execution Language)
  - WS-Reliable Messaging
  - WSDM (Web Services for Distributed Management)
  - Many of new efforts in SOA
  - ...

## ***Web Services and SOA: Some Industry Standardization Efforts***

### **● JCP - (Java Community Process)**

- JSR 208: Java Business Integration (JBI)
- Open ESB (Enterprise Service Bus)
- ...

### **● ECMA International and ISO**

- ECMA-348: *Web Service Description Language for CSTA Phase III*
- TR-90: *“Session Management, Event Notification, and Computing Function Services - Amendments for ECMA-348”*
- WS-Session (ECMA-366 and ISO/IEC 25437) : *Web Services for Application Session Services*
- ...

## ***Web Services and SOA: Some Industry Standardization Efforts***

### **● WSI - (Web Service Interoperability <http://www.ws-i.org>)**

- A standard integrator to provide implementation guidance to promote interoperability among Web services
- WSI – Basic Profile
- ...

### **● ETSI**

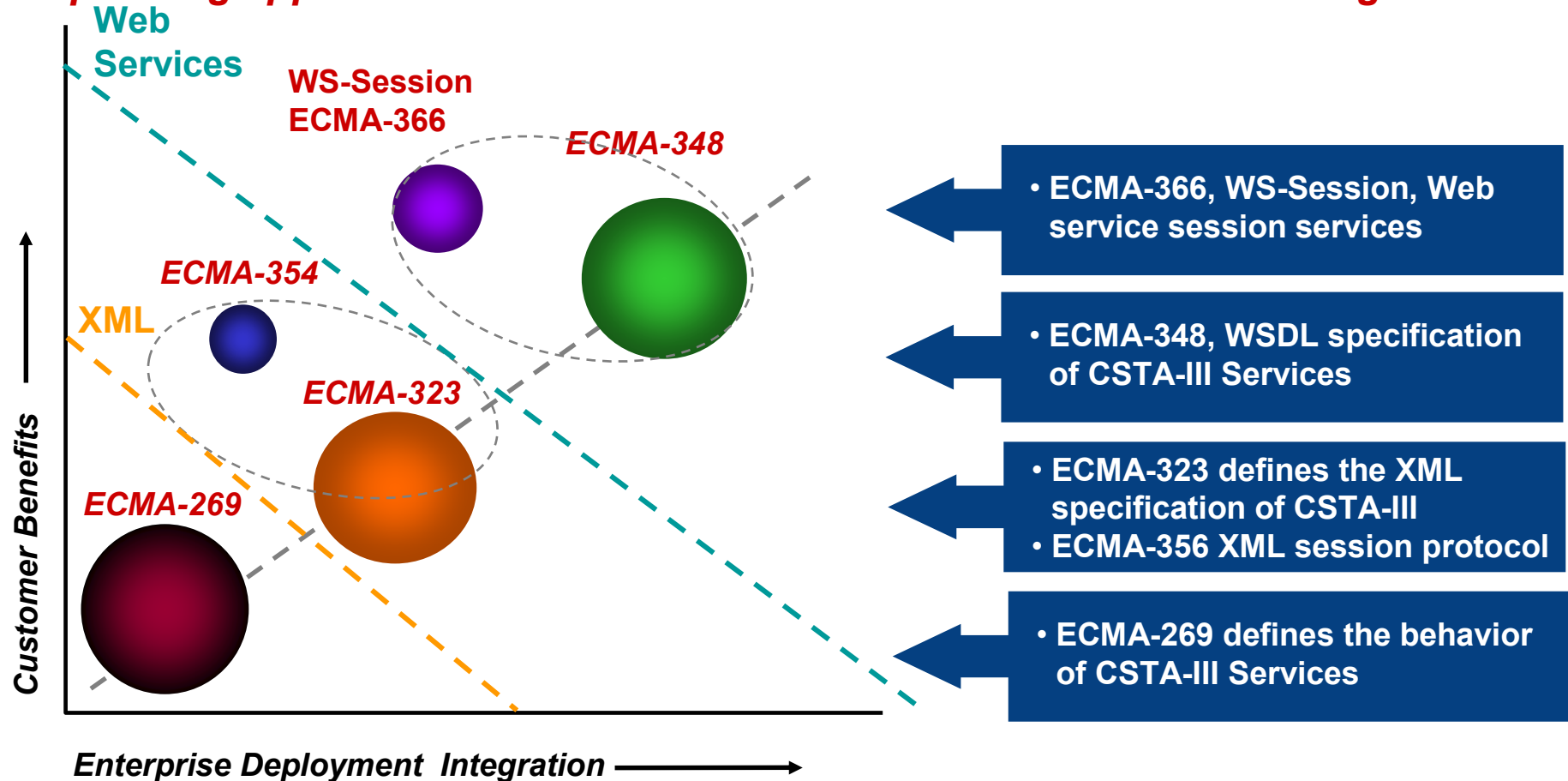
*Open Service Access (OSA)*

*Parley X Web Services:*

- ETSI ES 202 3912-12 (2005-03) Multimedia Conference
- ...

# Industry Standard Movement on CSTA (Computed Supported Telecommunications)

*Separating apps from infrastructure and standardize the service integration*



 ECMA-266 is the foundation of CSTA-III service standards