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International
Telecommunication
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Service Oriented Architecture for ICT

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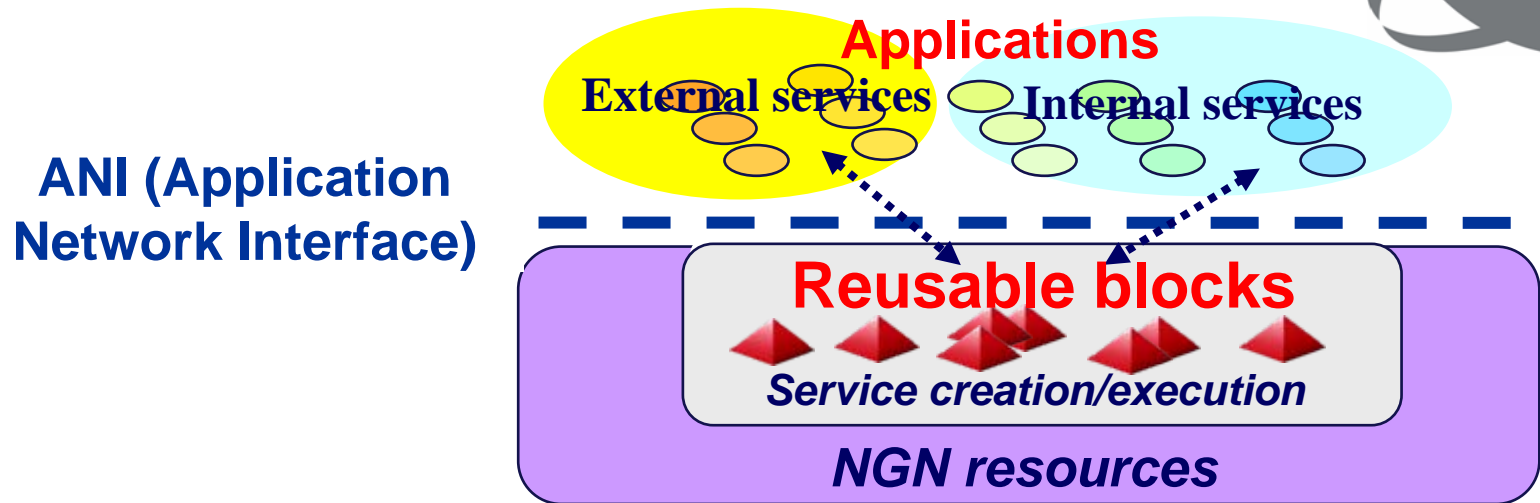
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Outline

- NGN open service environment
- SOA and Web Services for ICT
- A SOA application example

“Capabilities” as re-usable building blocks for services and applications in NGN



- **An NGN Open Service Environment for flexible and agile service creation, execution and management**
 - Leveraging new capabilities enabled by 3G & Internet technologies
 - Exposing capabilities via standard application network interfaces
 - Portability and re-usability of capabilities across networks
 - Flexible development of applications and capabilities by Service and Network Providers, as well as Third Party Providers

Opening the NGN: an essential topic going forward



- **How to open**
 - **Service Oriented Architecture (SOA) as framework ?**
 - **Web Services as implementation tool set ?**
- **What to open (expose)**
 - **Network capabilities <-> Applications ?**
 - **Network capabilities <-> Network capabilities ?**
- **Various related work items in ITU-T NGN GSI**
 - Open Service Environment capabilities
 - Web Services deployment scenarios
 - OCAF model and components
- **Relationship with other SDOs to be developed**
 - Architectures and capabilities for open service environment
 - OASIS, OMA, Parlay etc.
- **A very active market**
 - **Service Delivery Platforms, Middleware**

What are Web Services?

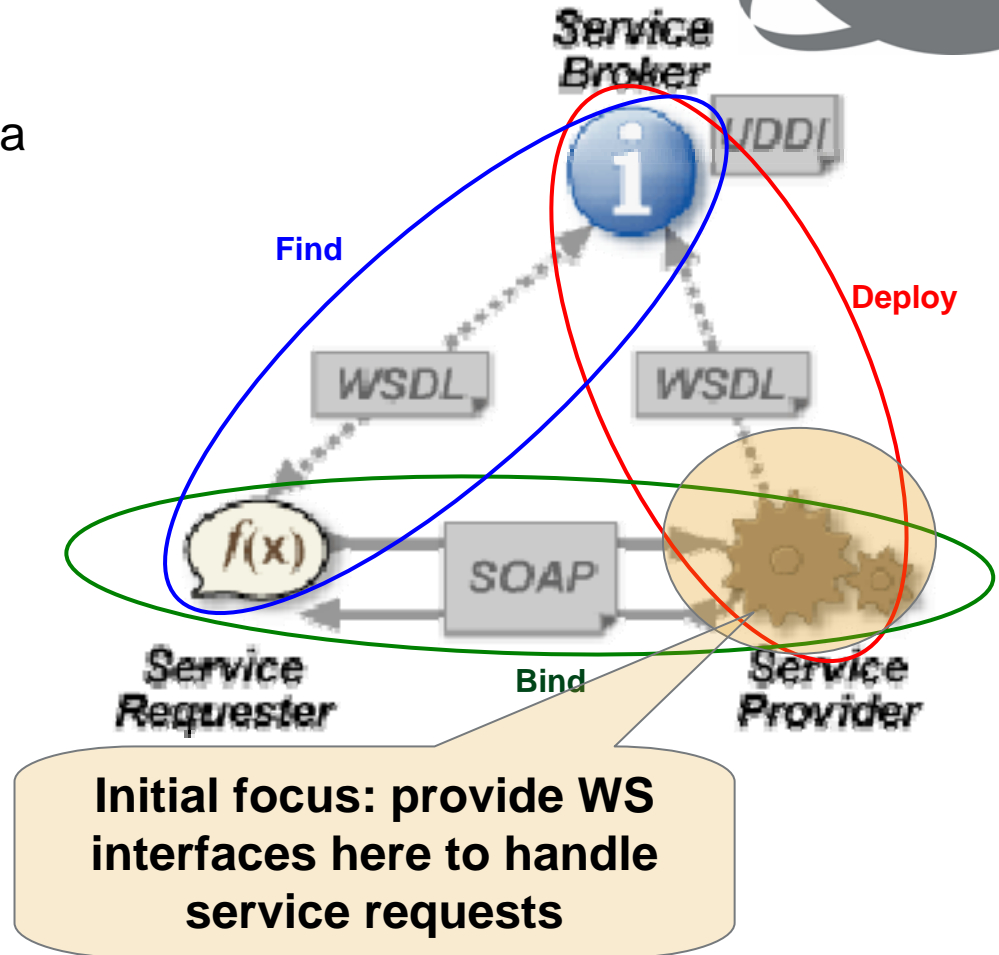


- Web Services are simple XML-based messages for machine-machine messaging
 - Web Services don't necessarily involve web browsers
 - Web Services act as XML-based APIs
 - Use SOAP as a transport Protocol
- Web Services use standard internet technologies to interact dynamically with one another
 - Well understood security model
 - Loosely coupled
 - Can be combined to form complex services
 - Open standards connect disparate platforms
- Middleware based on Web Services has enjoyed tremendous success in the past five years
 - Examples: eBay/PayPal, Amazon and Google - major users of Web Services

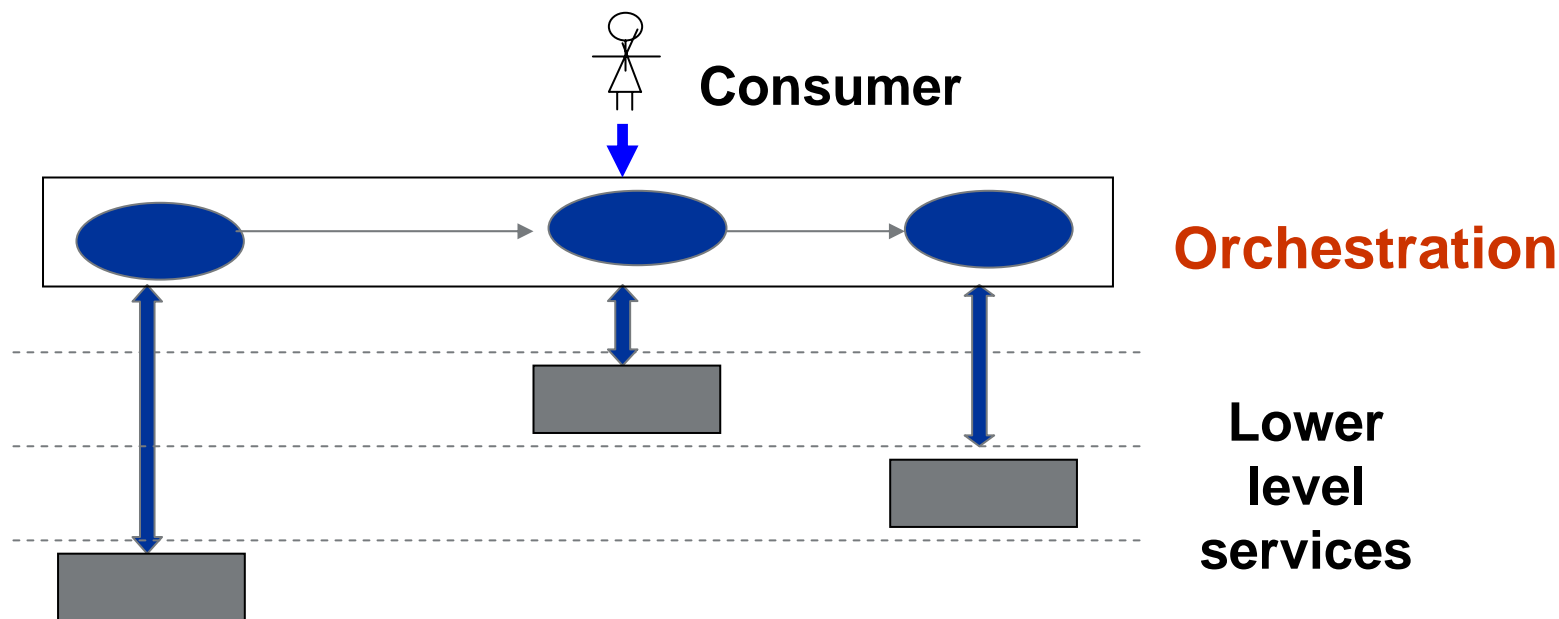
**Web Services rapidly becoming an essential part of many IT services,
in both B2B and B2C market categories**

A Bigger Picture: Service Oriented Architectures

- SOA: Resources made available to other participants in a network via independent services, accessed in a standardized way
- SOA systems comprise loosely joined, highly interoperable application services
- Attractive to businesses because:
 - Cross-platform
 - Highly reusable
- Most SOA implementations identify web services as the means for realizing an SOA



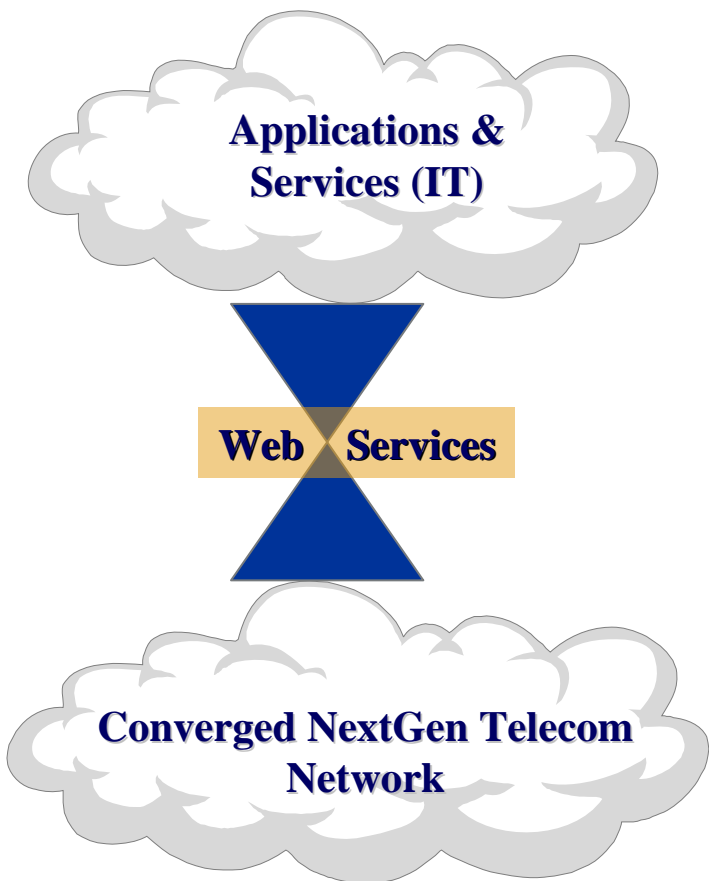
The SOA concept of service



- **Orchestration of lower level services to provide a higher level service**



IT \leftrightarrow Telecom Interface Standards Requirements



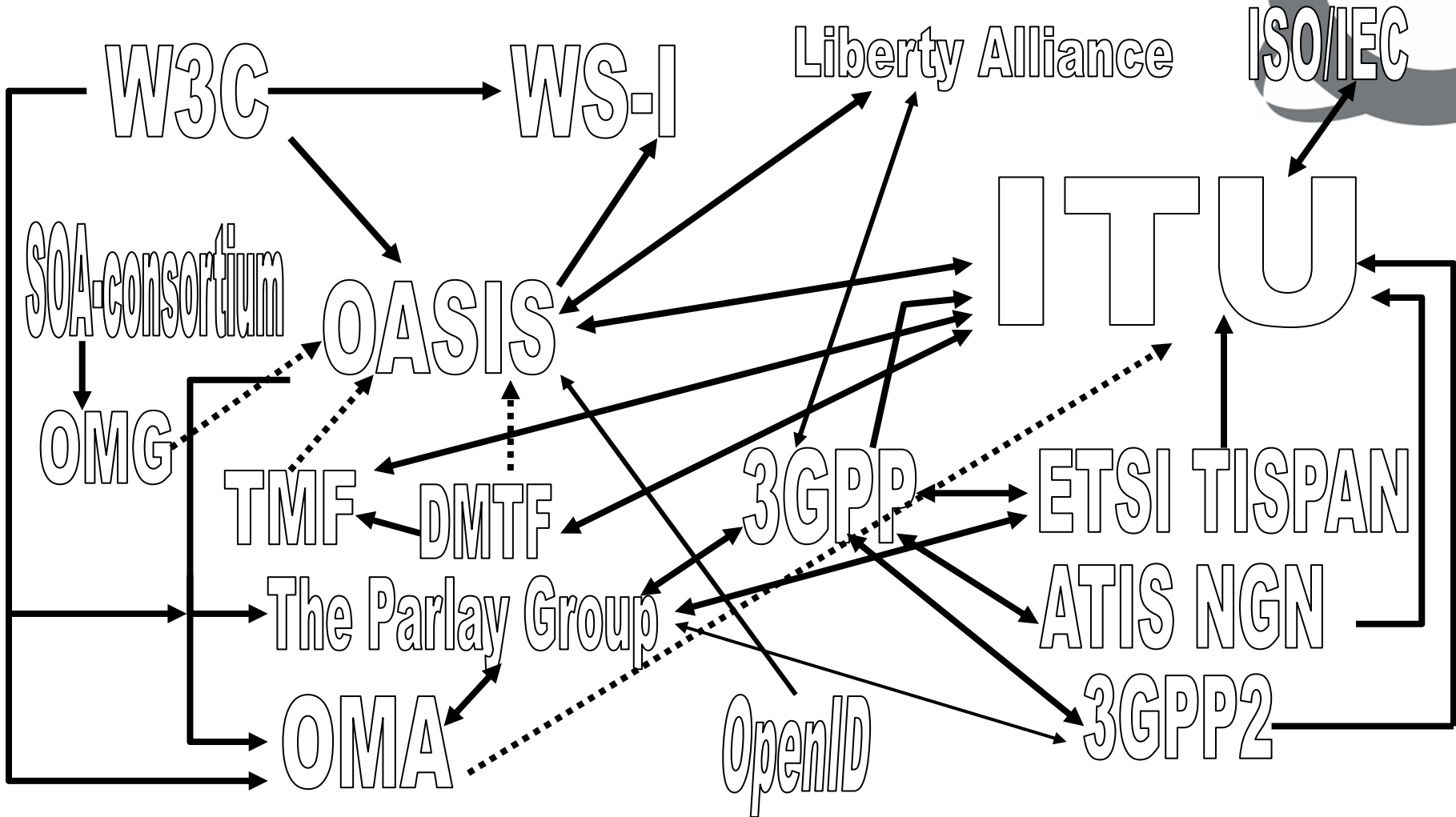
- **PREMISE:** Emerging IT Applications \leftrightarrow Telecom interface is the Web Services stack
- Standards:
 1. Open / expose the network intelligence and capabilities to the application layer through a unified interoperable set of interfaces to make it easy for IT to tap into the Telecom Services – driving demand for network assets which can provide intelligent service interfaces
 2. Ensure emerging Web Services standards can support Carrier Grade reliability and performance
 3. Ensure that competing standards converge



IT ← → Telecom Interface Focus

- Ensure emerging Web Services standards can support Carrier Grade reliability and performance
- Key areas for Carrier Grade Web Services focus:
 - Identity Management (Identity Layer)
 - Parlay-X
 - WS-Convergence
 - Business Process
 - WS-Management
 - Federation and Security
- Standards Organizations need to adapt to this reality

SOA/Web Services: key SDOs



----- indicates links in progress or in perspective

SOA/WS fundamental bricks



Additional Capabilities	Management	Portals	
Business Process Orchestration	Composition/Orchestration		
Composable Service Elements	Security	Reliable Messaging	Transactionality
Messaging	Endpoint Identification, Publish/Subscribe		
Description	XML Schema, WSDL, UDDI, SOAP with Attachments		
Invocation	XML, SOAP		
Transports	HTTP, HTTPS, Others		

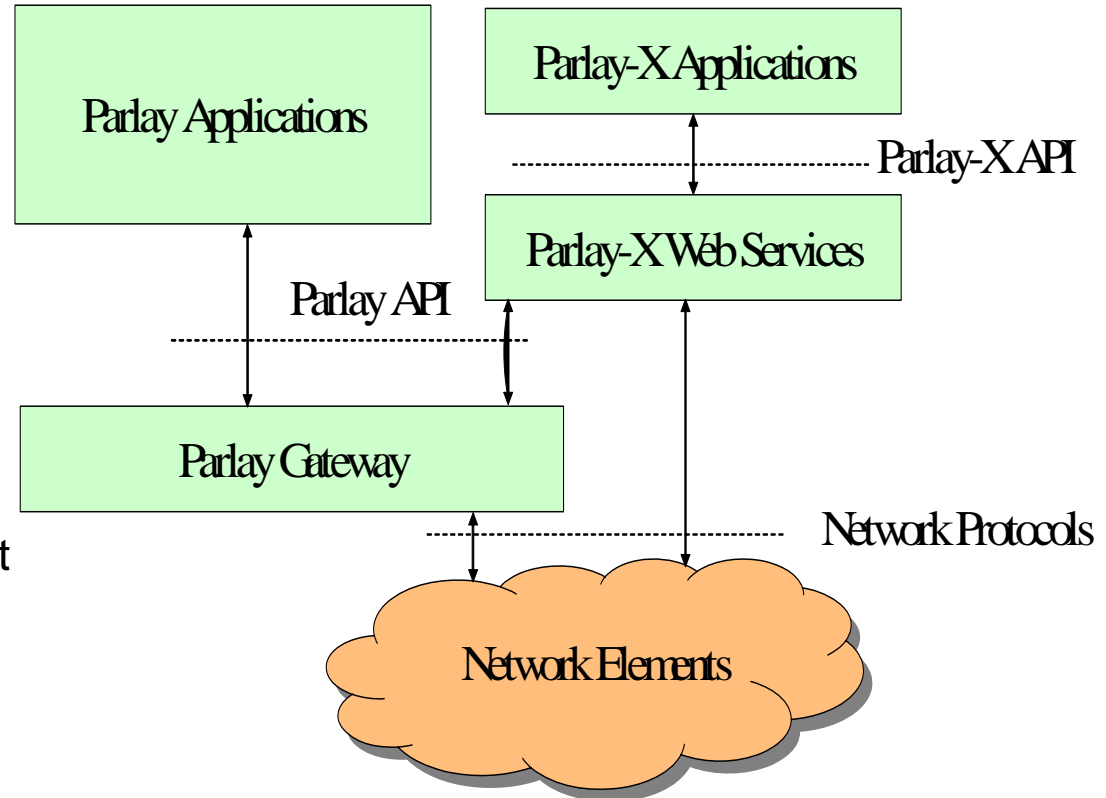
Source: WS-I

Parlay-X specifications

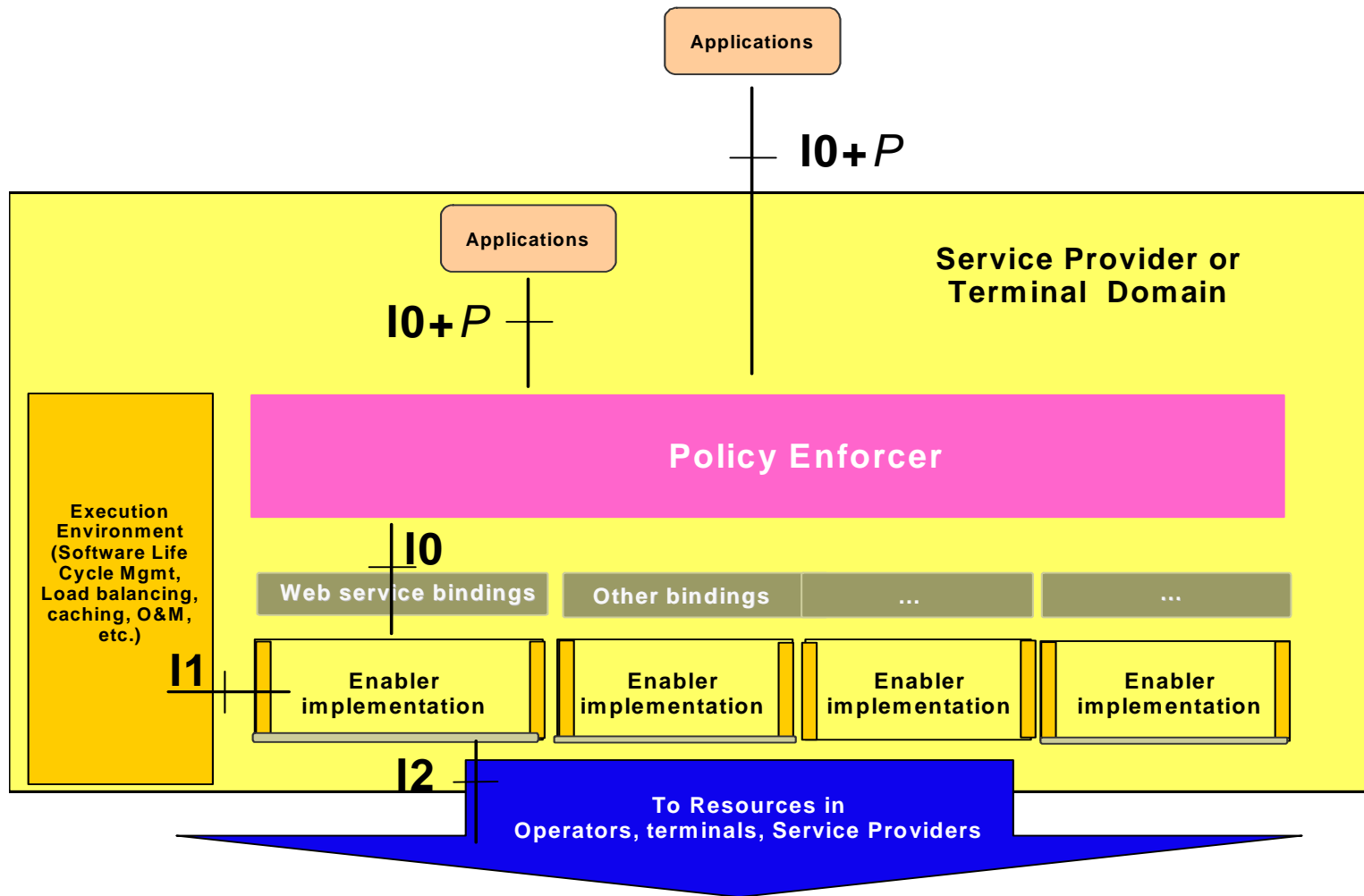


- Part 1: Common
- Part 2: Third Party Call
- Part 3: Call Notification
- Part 4: Short Messaging
- Part 5: Multimedia Messaging
- Part 6: Payment
- Part 7: Account Management
- Part 8: Terminal Status
- Part 9: Terminal Location
- Part 10: Call Handling
- Part 11: Audio Call
- Part 12: Multimedia Conference
- Part 13: Address List Management
- Part 14: Presence
- Part 15: Message Broadcast
- Part 16: Geocoding
- Part 17: Application driven QoS
- Part 18: Device Management
- Part 19: Multi-Media Streaming Control
- Part 20: Multi-Media Multicast Control

Parlay-X Architecture



An example of standardization work in relation with NGN Open Service Environment



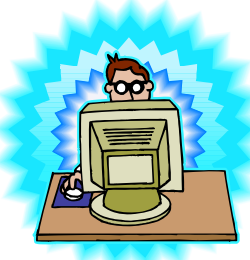
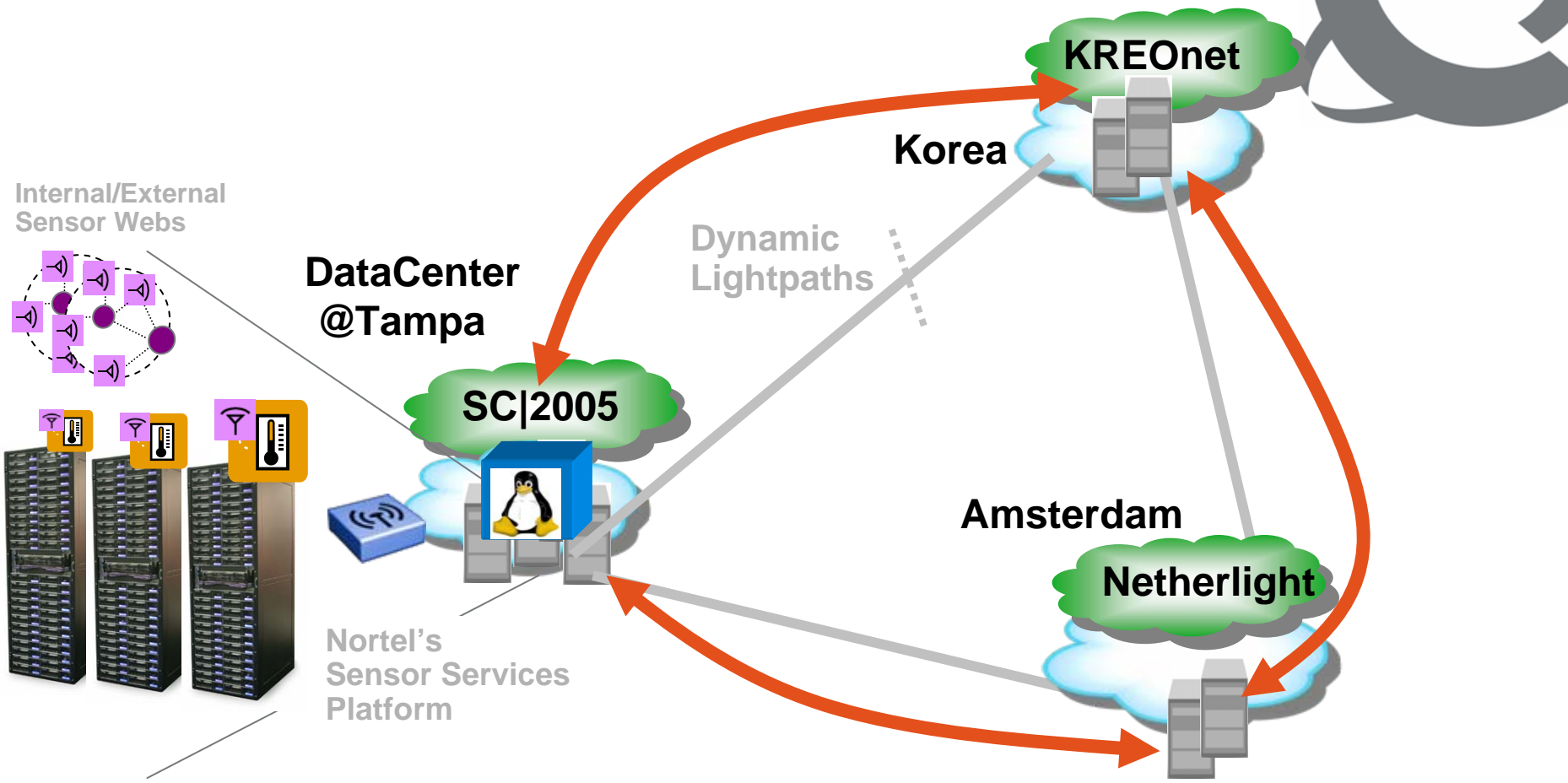
Source: OMA OSE



A SOA Application Example

- Scale the Data Center Automation – transforming the Data Center from a “glass house” to a virtualized Data Center spanning the whole globe
- Recent SOA/Web Services technology advances are applied to scale the dynamic control of networks and sensors
- These advances mainly concerning system-level support for stateful persistent resources and event-oriented asynchronous messaging

An Example: SuperComputing '06 Demo



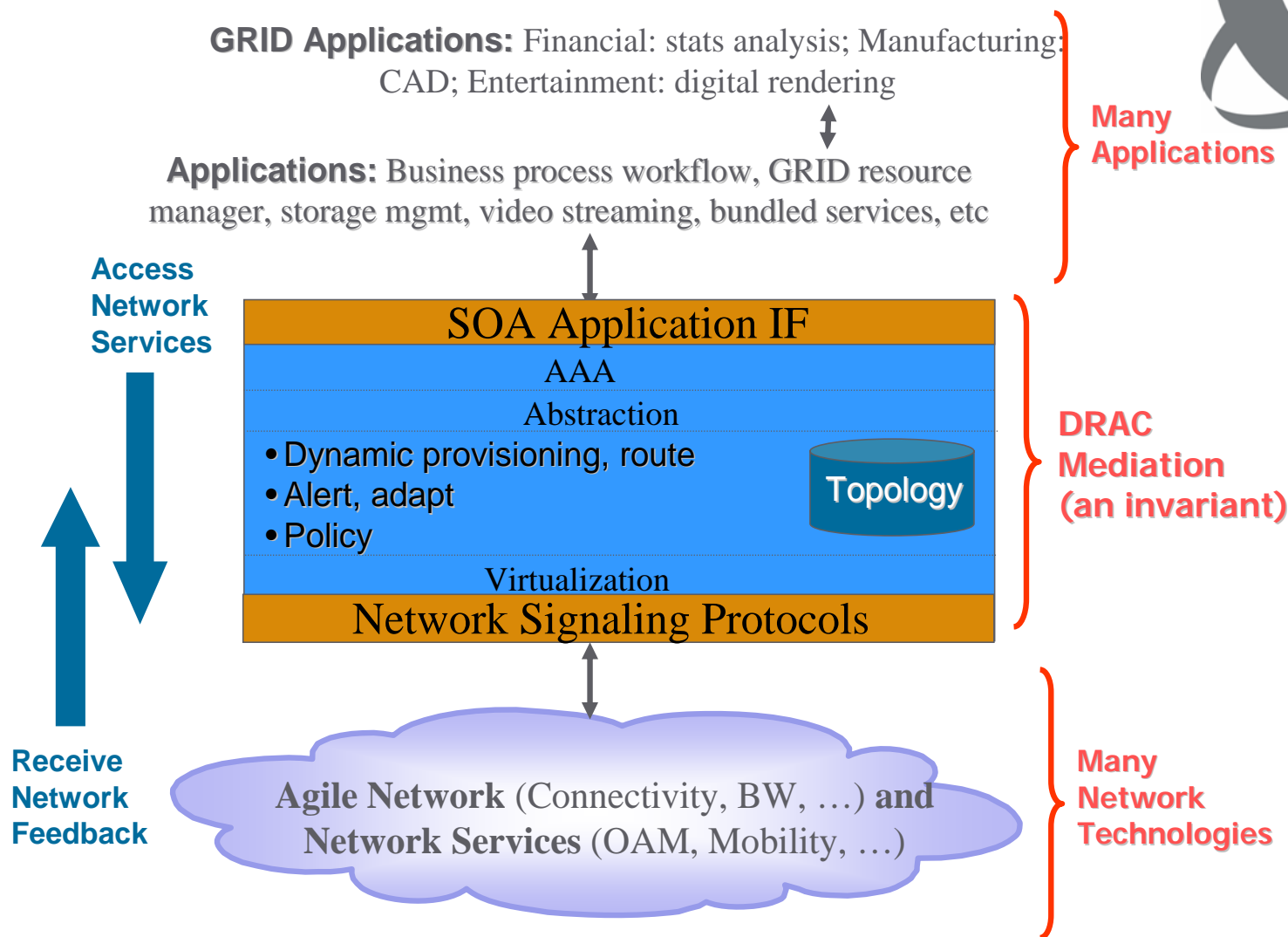
Computation at the Right Place & Time
We migrate live VMs, unbeknownst to applications and clients,
with dynamic cpu+data+net+sensor orchestration.



Bringing together three concepts

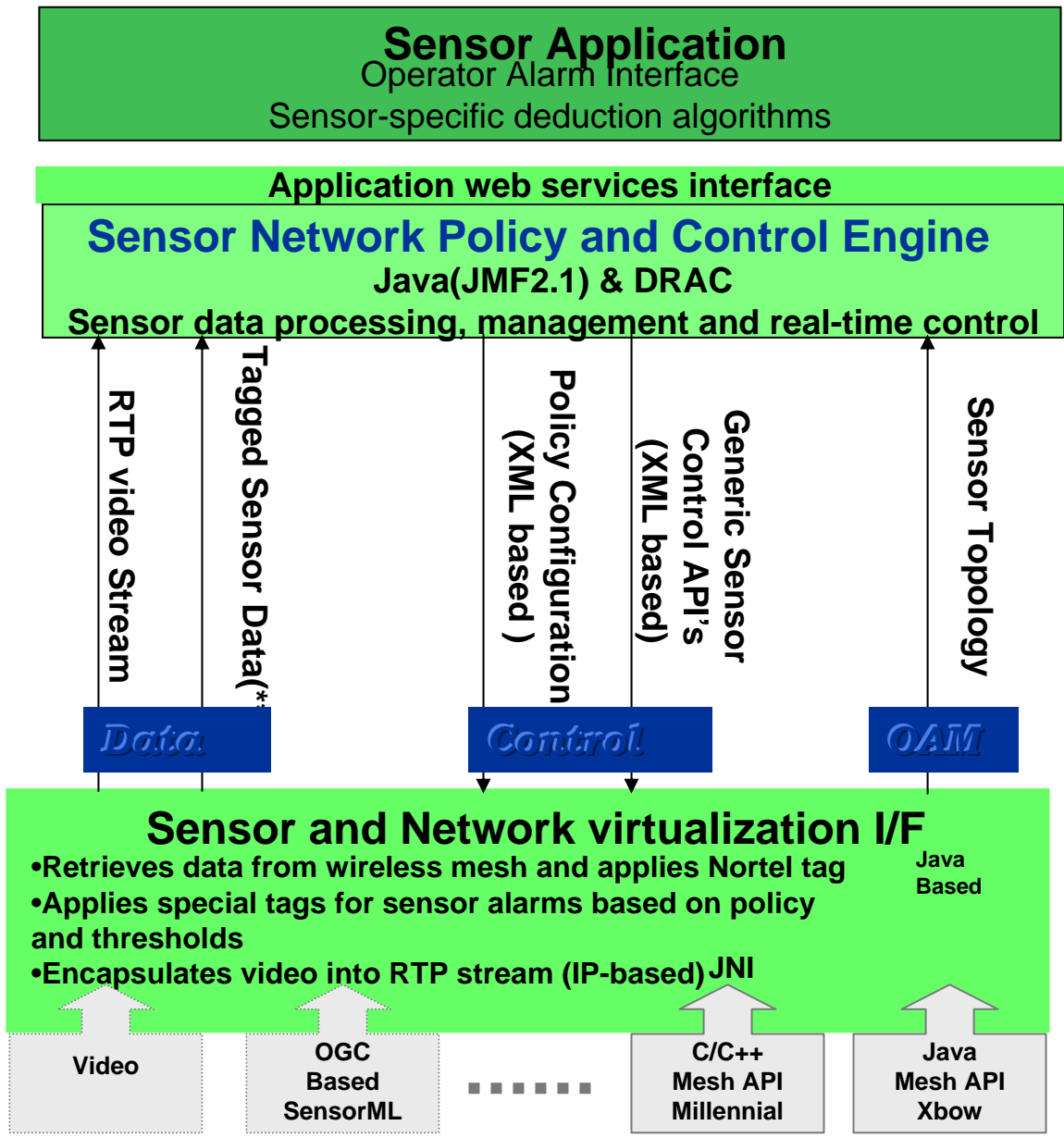
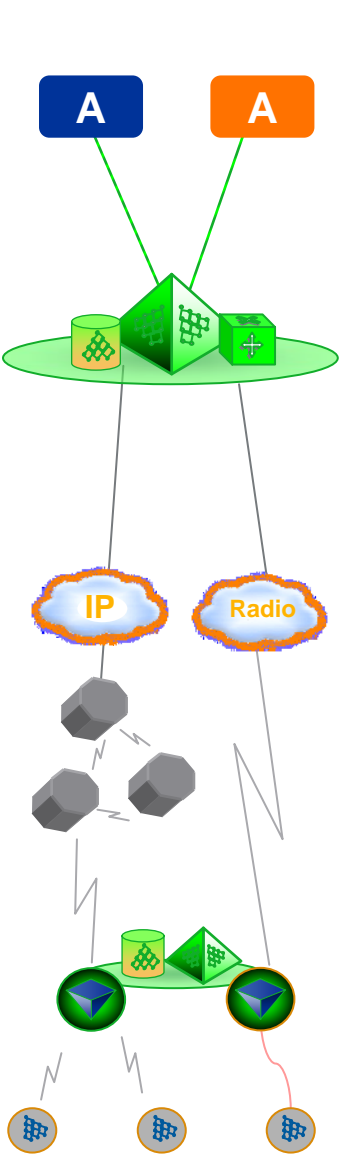
- System Virtualization
 - Isolation, consolidation, migration of resources
 - For this, resources are abstracted out of their physical instantiation
- Service Oriented Architecture (SOA)
 - Loose integration of functions
 - It overcomes separation
- Grids
 - Distribution and aggregation of functions
 - It makes productive use of separation
 - Builds upon SOA (and may use system virtualization)

With DRAC, we SOA-ize the network and give Applications the means to drive their own hi-touch network experience



Consider adapting the network to applications, not always the way around

Distributed network intelligence for real-time data delivery



*Provide
Sensor
Services*

*Manage
Flows*

Virtualize



Conclusion

- SOA for ICT enables new business revenues for the ICT ecosystem
- SOA for ICT brings new challenges to standards development – the intersection of **IT** and **C** in **ICT**
- A SOA framework for NGN open service environment
- Many SDOs, Forums, and Consortia → Alignment and Harmonization is essential



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