

Following the changing Value Chains - towards Service-oriented Testbeds

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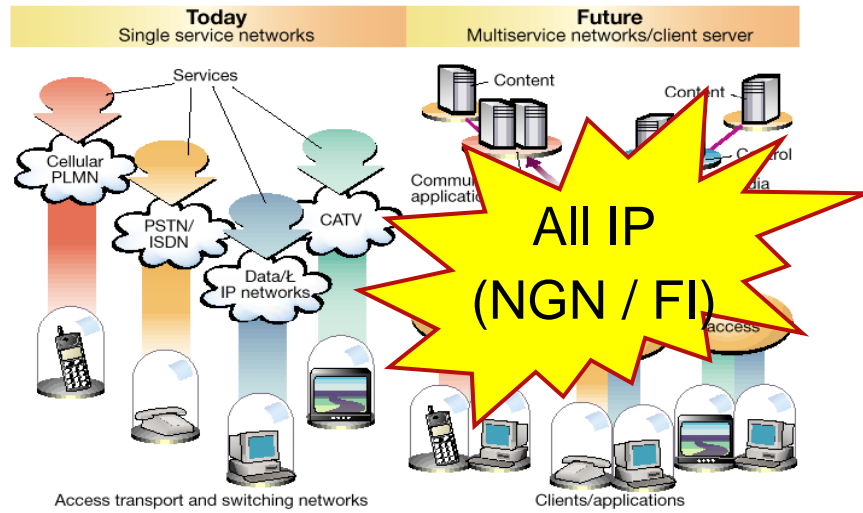
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Agenda

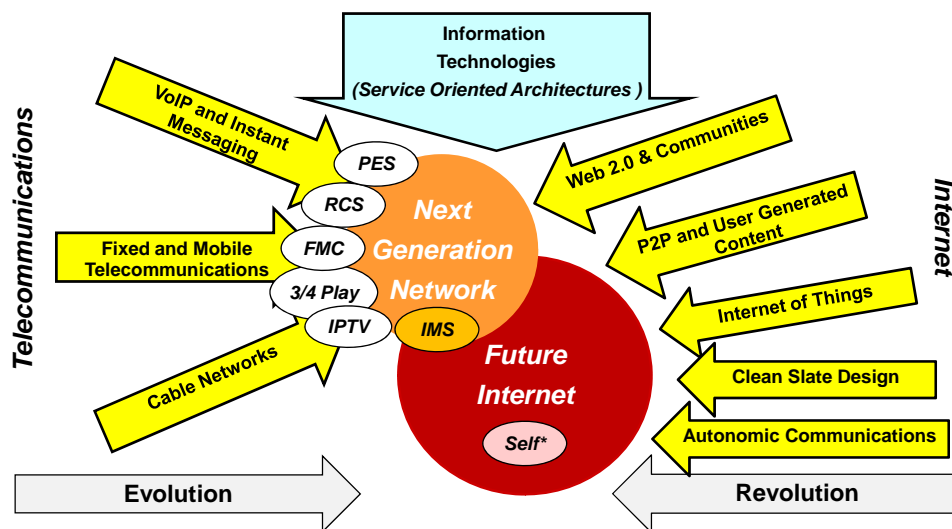
- **The changing value chain - From Networks to Services**
- **Service Platforms on top of converging Networks**
- **SOA in Telecommunications and NGN**
- **Testbeds for Services**
- **Management Issues of SOA based Testbeds**
- **Summary**

Towards IP-based Multi-Service Networks



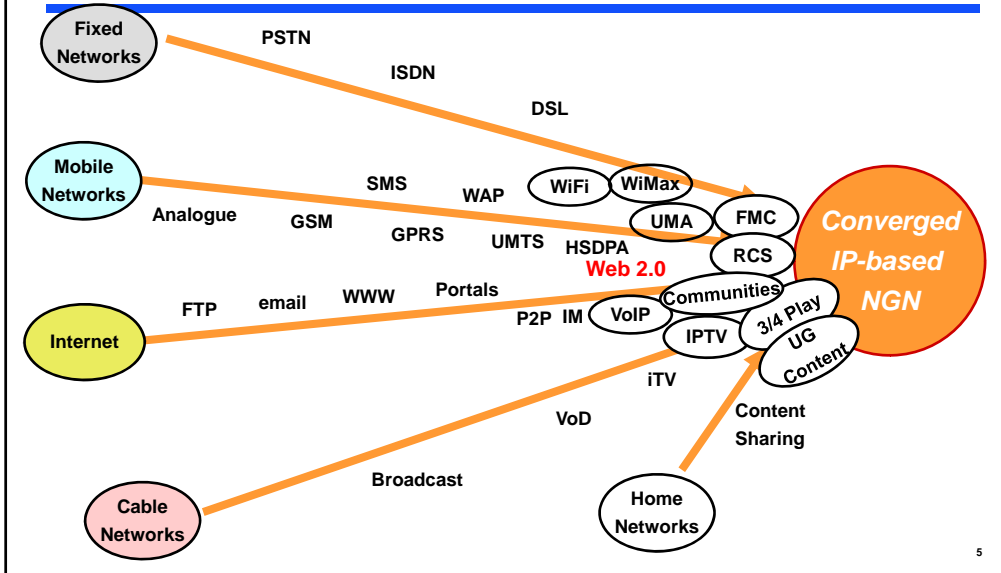
3

Next Generation Networks vs. Future Internet



4

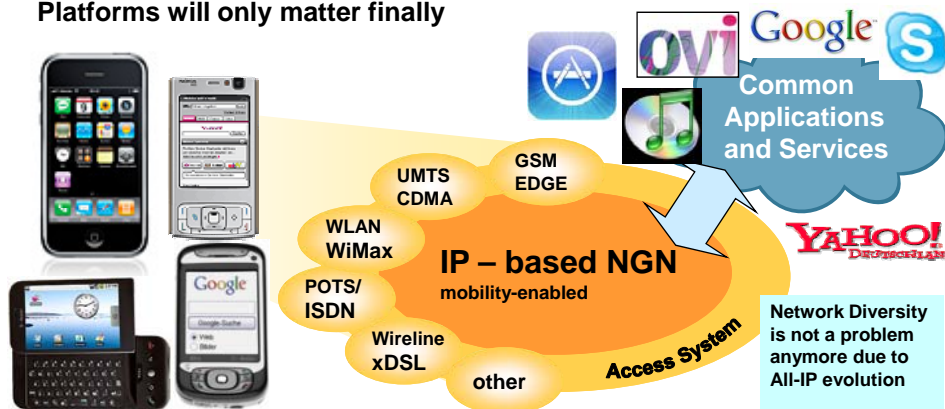
Converging Networks lead to new Services



5

Seamless Services – The Network value shrinks

- Network convergence based on IP has led to high competition
- Connectivity Services (QoS) versus Multimedia Services (Content)
- Users are interested in services – thus end systems and Service Platforms will only matter finally



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7

Telco vs. Internet Service Principles

Telecommunications

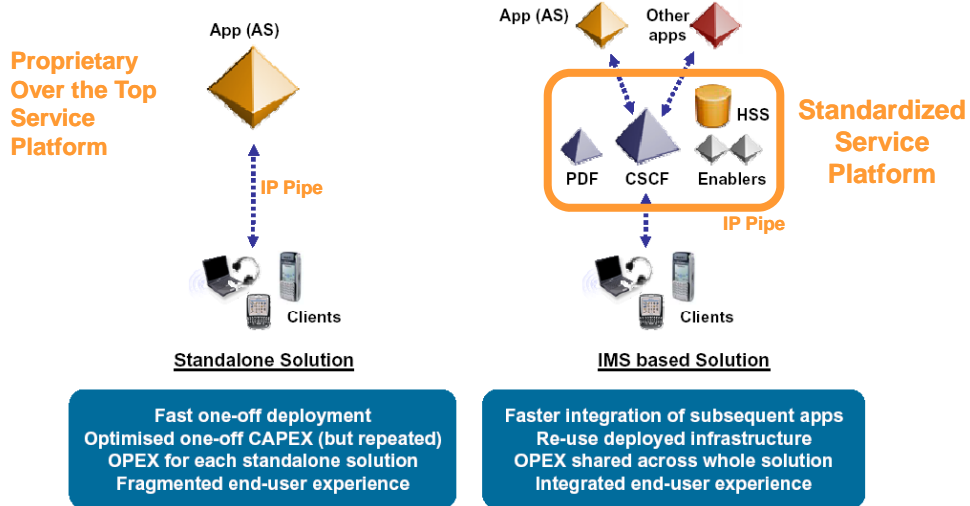
- High-available carrier grade services
- Strong focus on person to person communication
- Vertical service architecture
- Almost no feature interaction
- Limited to no openness to developer community
- Device centric services (rich client)

World Wide Web

- The web serves as a platform
- Data as the driving force
- Network effects created by an architecture of participation
- The end of the software adoption cycle ("the perpetual beta")
- Software above the level of a single device, leveraging the power of The Long Tail.
- Platform (network) centric services (slim clients / browser)

8

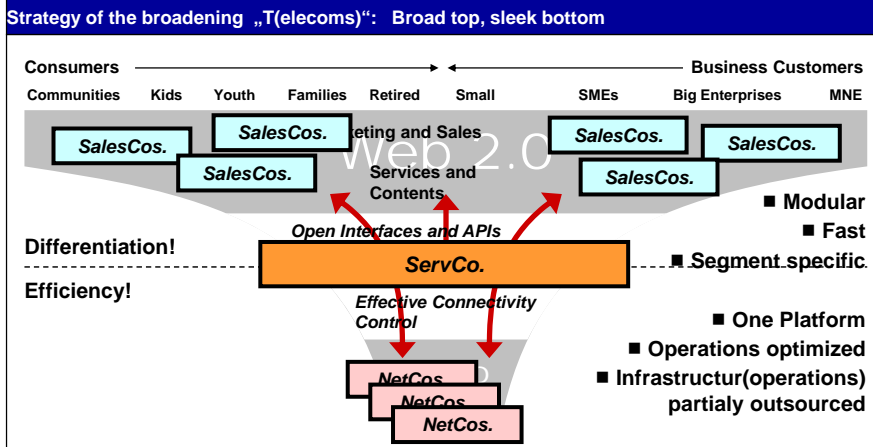
Proprietary (OTT) vs. standardized Approach



9

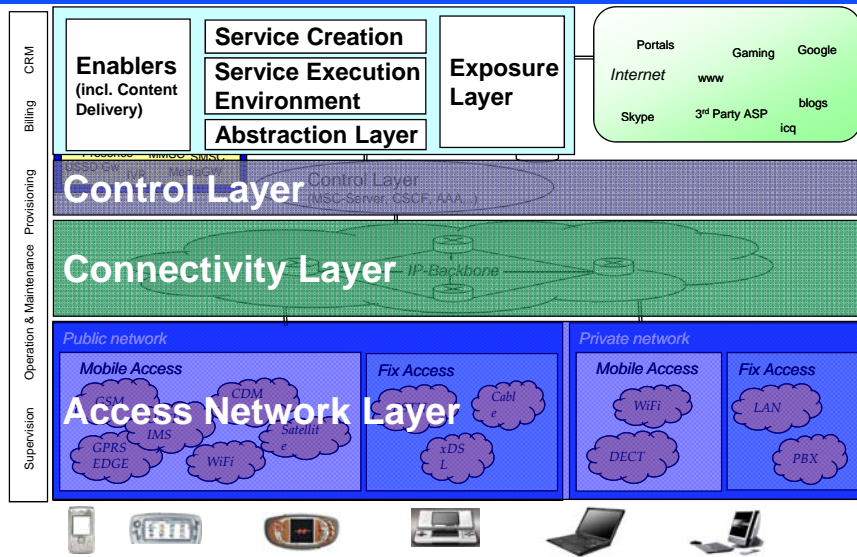
Internet impact on Telecoms: Service Diversity

Differentiation and Efficiency is needed to survive
NGN Service platforms / IMS has the potential to link Internet / web 2.0 and telecommunications



10

A Generic SDP Framework on top of different Networks



11

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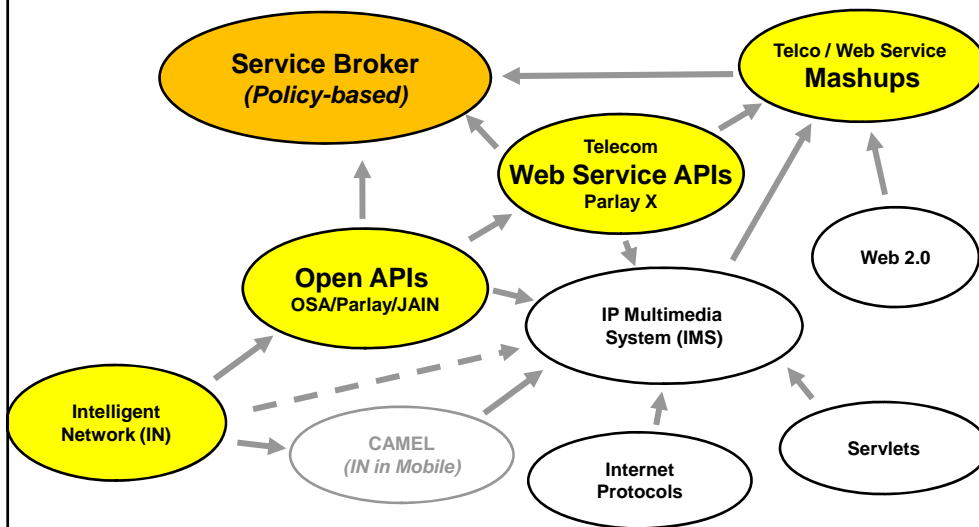
12

SOA Principles (Def. by The Open Group, or OASIS, IBM ...)

- **Service-Oriented Architecture (SOA)**
Service-Oriented Architecture (SOA) is an architectural style that supports service orientation.
- **Service orientation is a way of thinking in terms of services and service-based development and the outcomes of services.**
- **a service:**
 - is a logical representation of a repeatable business activity that has a specified outcome (e.g., check customer credit; provide weather data, consolidate drilling reports)
 - Is self-contained
 - *may be* composed of other services
 - Is a “black box” to consumers of the service

13

Evolution of SOA Concepts in Telecoms



14

NGN Service Broker

- **Need for a common flexible NGN application layer that serves legacy and NGNs paving the road for SOA in telecommunications.**
- **In a SOA, a broker is responsible for making the (Web) Services interface and implementation access information available to any potential service requestor.**
- **The broker might be utilized as a central control instance that orchestrates the components of the overall architecture.**
- **A service broker for telecommunications provides a central anchor point for any application requesting resources from a service provider / operator.**

15

Orchestration for Telecommunications

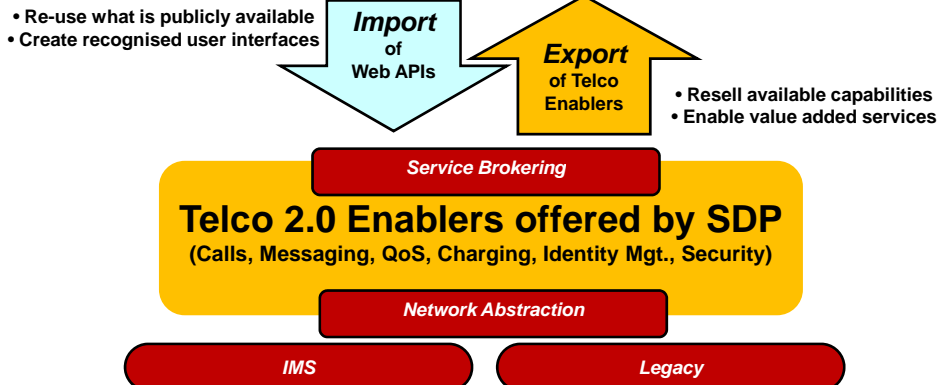
- **Web services orchestration is now being adopted for the coordination of real-time communications services, including telephony, video and multimedia communications.**
- **Do these communications services integrate into workflows in the same way as Web services in the data environment, and are orchestration mechanisms for Web services sufficient for the needs of workflows that involve real-time communications?**
- **Three approaches to orchestrating workflows:**
 - **BPEL – OASIS**
 - **Call Control eXtensible Markup Language (CCXML) – W3C**
 - **State Chart eXtensible Markup Language (SCXML) – W3C**

16

Import and Export of „Services Enablers“

Web 2.0 World Players and Services

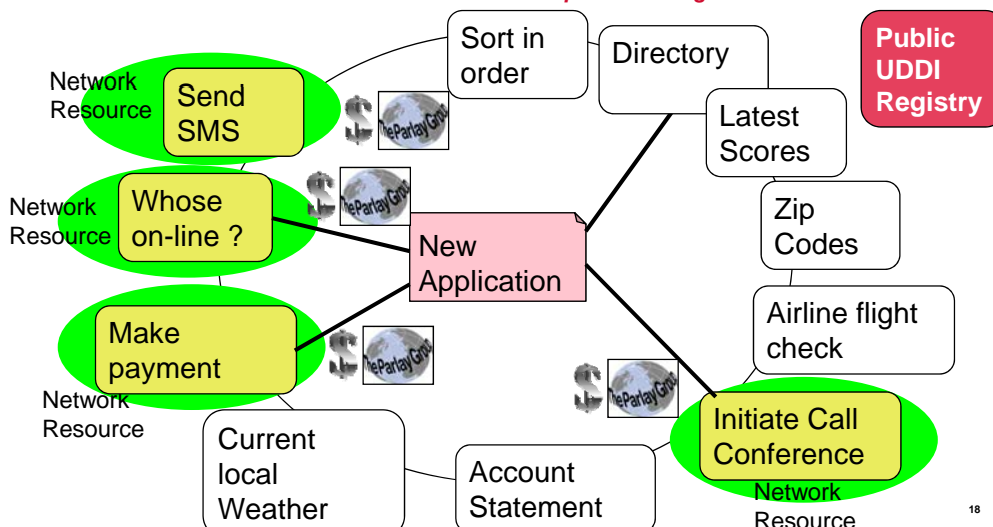
(Google Maps, YouTube, RSS Feeds, etc.)



17

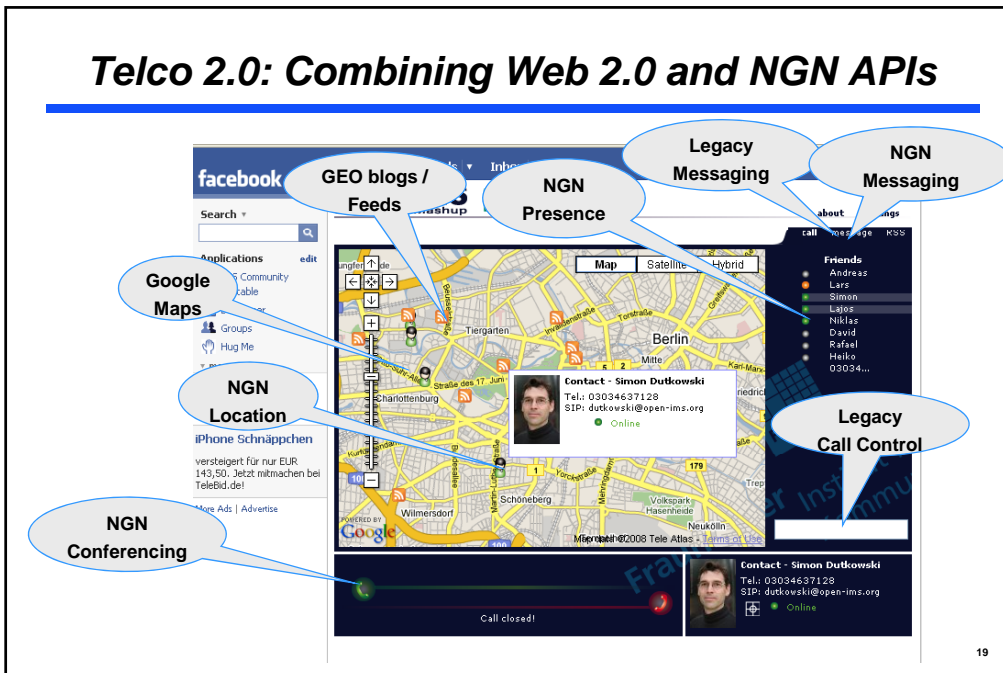
Example: Parlay X Telco Web Services

Note: Network Operator acting as Web Service Provider



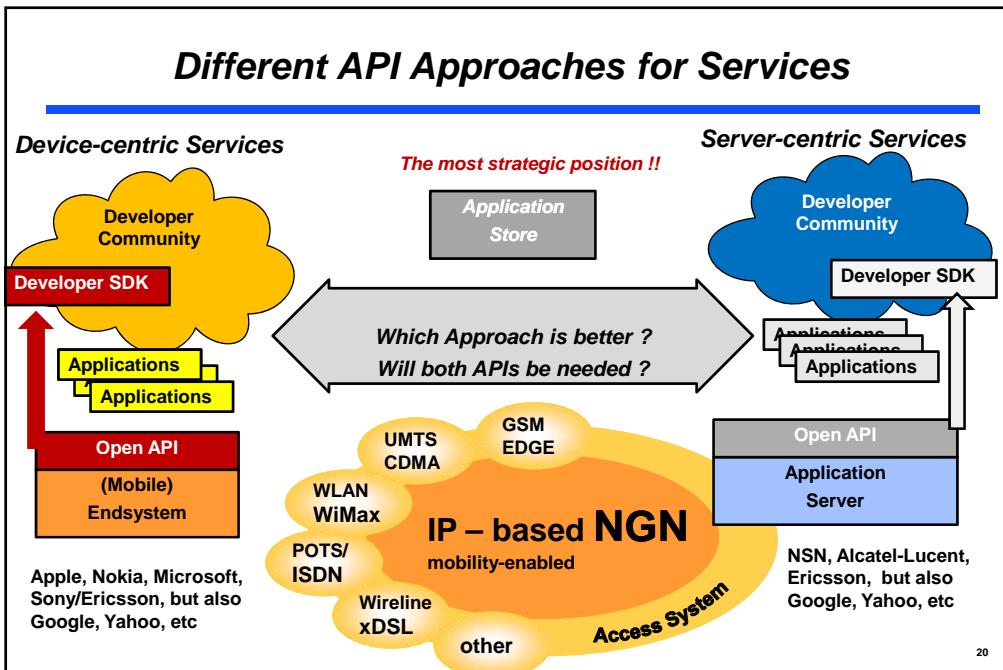
18

Telco 2.0: Combining Web 2.0 and NGN APIs



19

Different API Approaches for Services



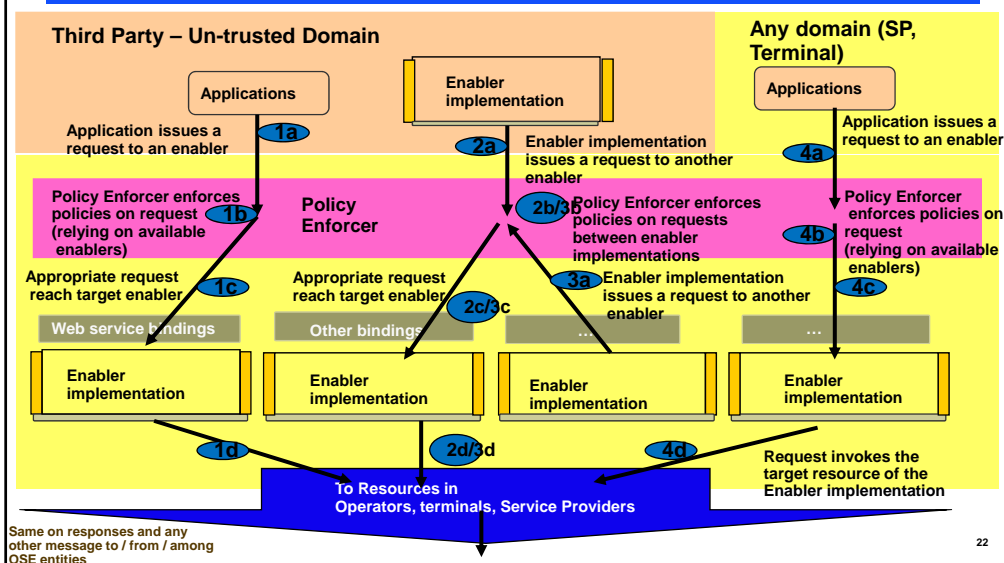
20

Towards Policy-based Service Exposure

- A Broker identifies the policies associated with a request.
- A Broker processes policies and:
 - evaluates policies using messages received and other context information
 - executes a policy action
 - may return a policy decision to a requestor
 - may enforce the corresponding policy
 - may allow a request to continue to its original target destination
 - may delegate to other resources
- A request for policy processing can arrive at the Broker either as a direct request for support from another entity or as a request from another entity to another resource.
- Open Mobile Alliance (OMA) Service Environment (OSE) and the related PEEM provides the standard for describing, creating, updating, deleting, provisioning and viewing of policies.

21

„Brokering“ in the OMA Service Environment



22

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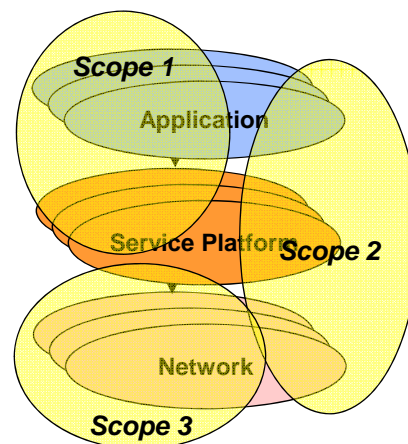
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23

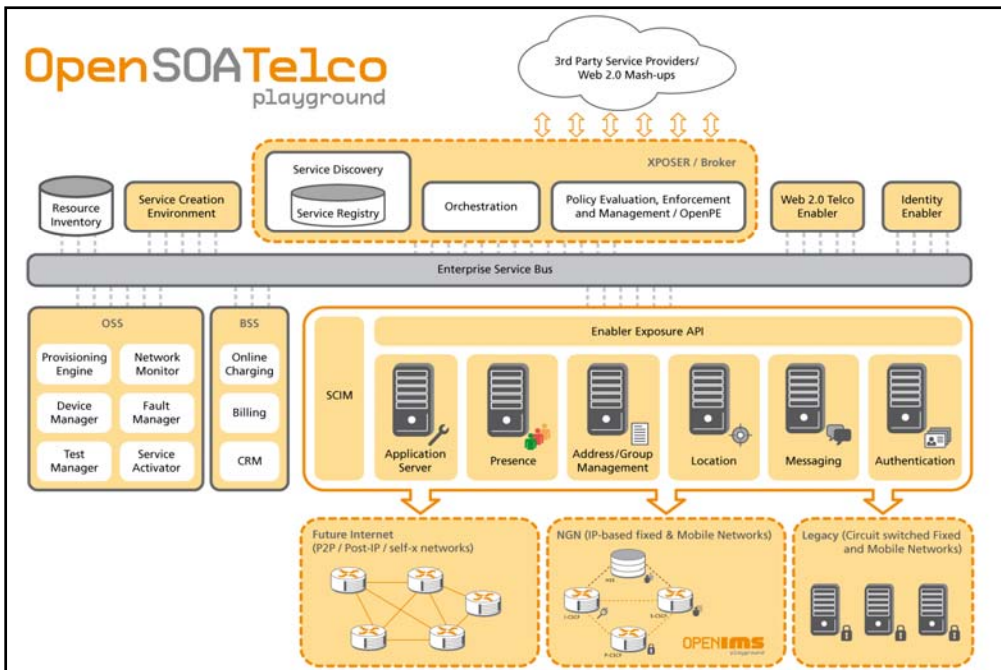
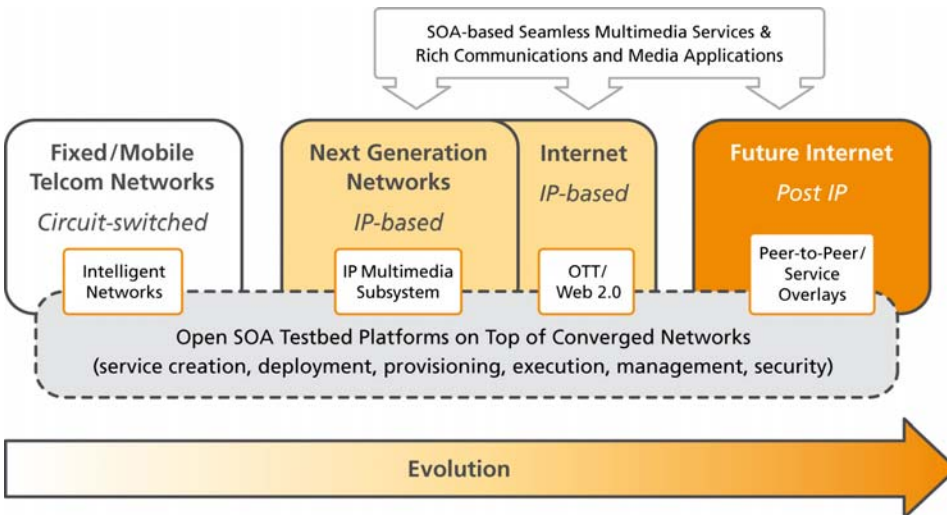
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Different Testbed Scopes

- Innovative multimedia applications
 - eHealth, eGovernment, e/mCommerce, interactive TV, web 2.0, telco2.0, etc.
- Service delivery platforms
 - IP Multimedia System, P2P systems, broadcasting systems, etc.
- Network technologies
 - 3G beyond, Wimax, LTE, Fixed Broadband, etc.
- Sometimes also beta test user communities
- Sometimes mixture of all above domains



24



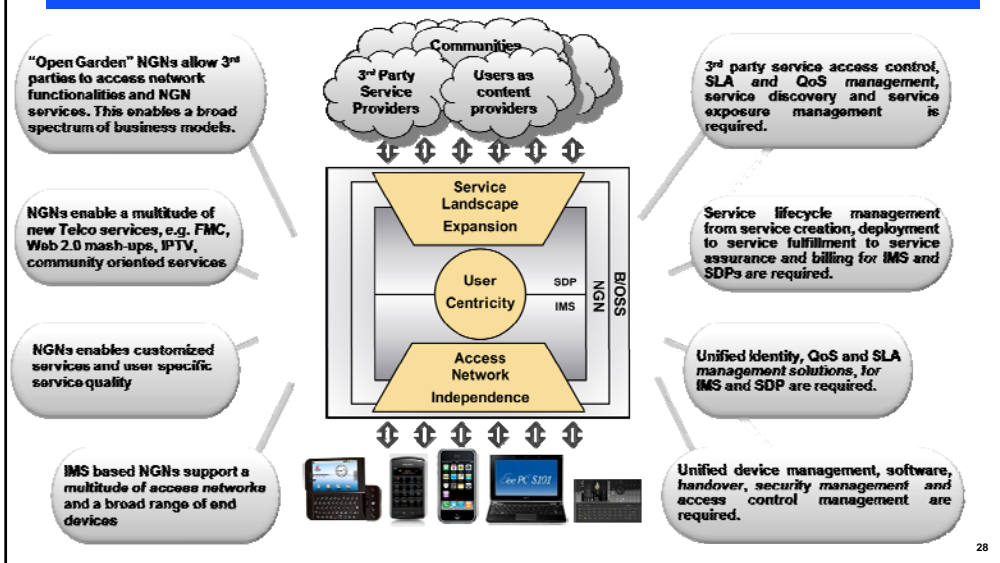
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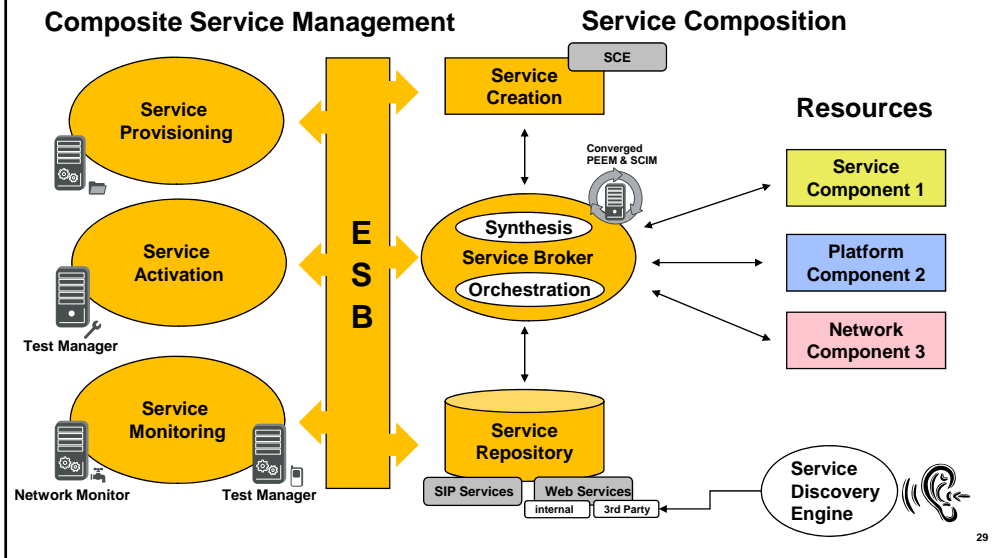
27

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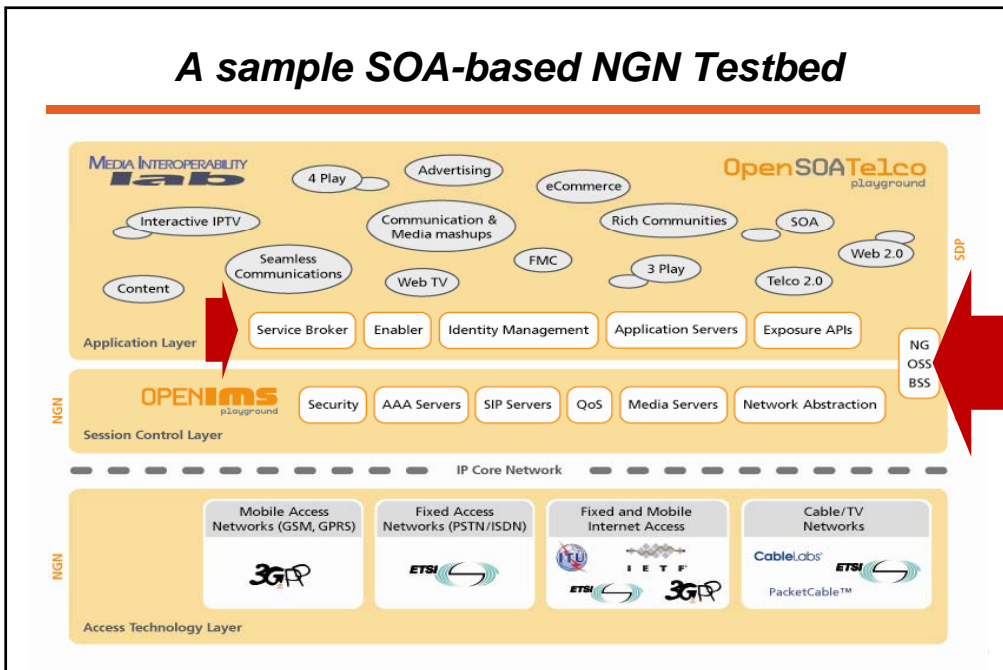
NGN (Testbed) Management Challenges



SOA based OSS of NGN Composite Services



A sample SOA-based NGN Testbed



Policy-based Service Exposure

- **A Broker identifies the policies associated with a request.**
- **A Broker processes policies and:**
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The component may delegate to other resources
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- **A request for policy processing can arrive at the Broker either as a direct request for support from another entity or as a request from another entity to another resource,**
- **OMA PEEM provides the standard for describing, creating, updating, deleting, provisioning and viewing of policies.**

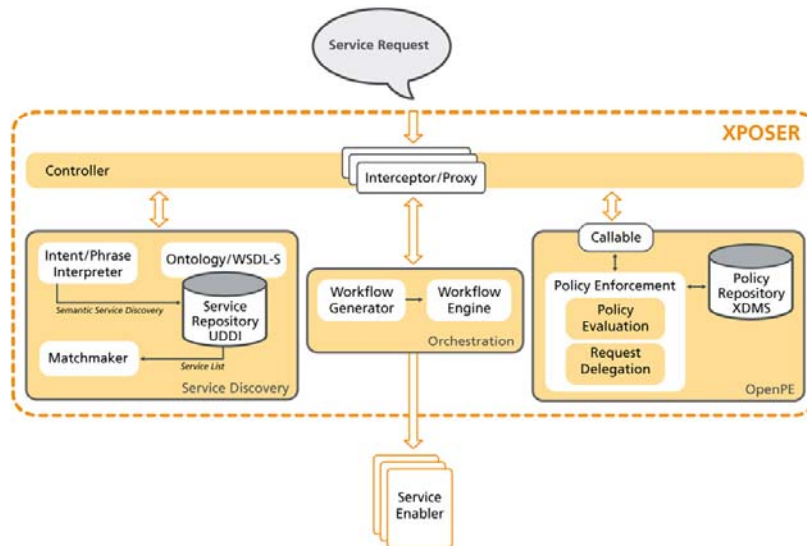
31

FOKUS XPOSER

- ***XPOSER = eXtended POLicy based, Semantically enabled sERVICE bRoker***
- **Development of a SDP component for:**
 - Service exposure
 - Service discovery
 - Request delegation
 - Service orchestration
- **Components / Technologies**
 - Web / Telco API
 - OMA PEEM for exposure
 - Ontologies for service discovery
 - Annotated service descriptions for delegation
 - Work-flow engine for orchestration

32

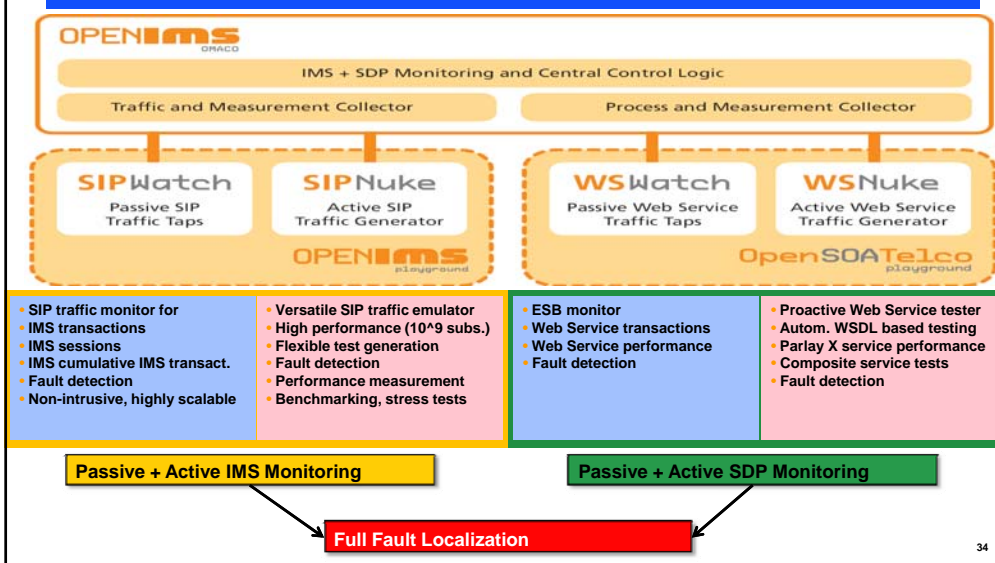
XPOSER Architecture



33

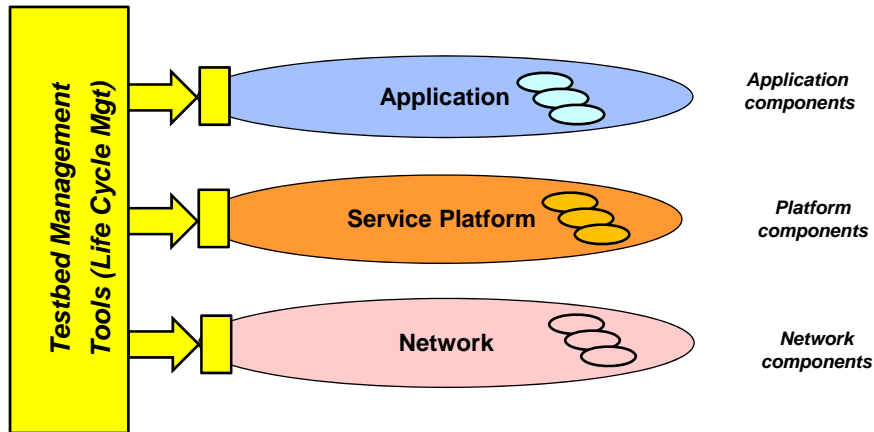
OMACO for NGN + SDP Management

T. Magedanz / N.Blum, (Fraunhofer FOKUS / TU Berlin) 2008



34

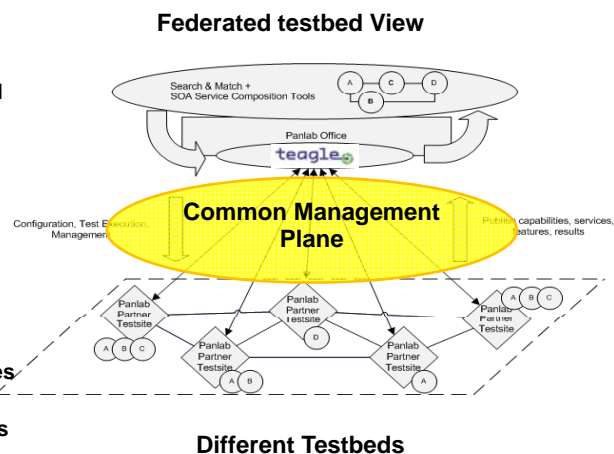
Testbed Components at various Layers



35

teagle The Search & Match Tool

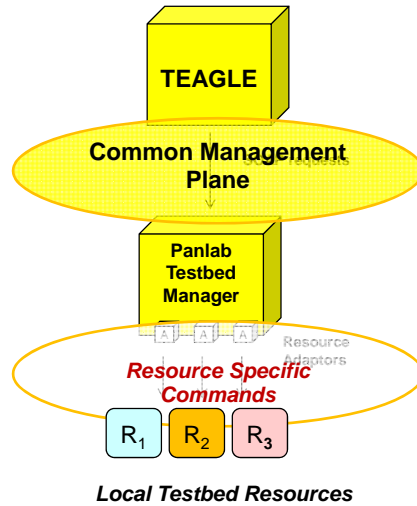
- Support life cycle of testbed federation management via common management plane
- Provides repositories for testbed and component descriptions (registration)
- Search available resources, i.e. infrastructure and services (discovery)
- Orchestrator of services and testing infrastructures
- Initiate automated deployment / provisioning
- Monitoring of federated resources (fault / performance) mgt
- Generation of usage data/records



36

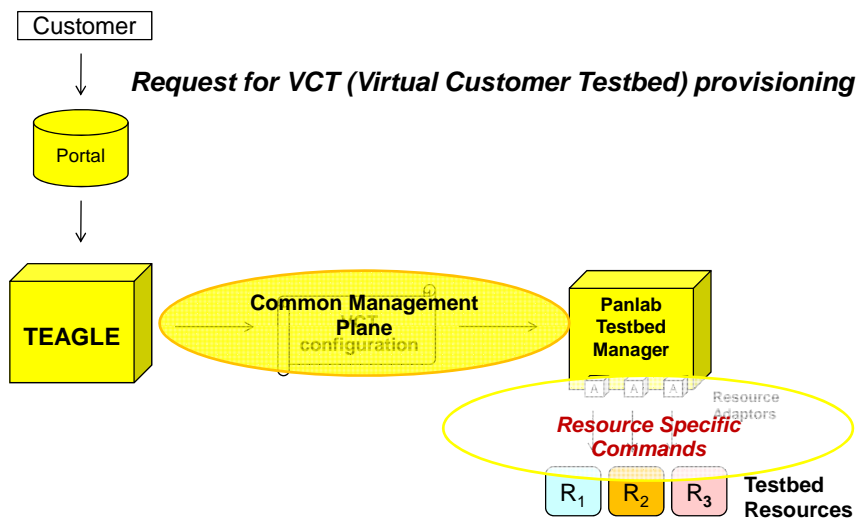
The PTM as local Docking Station for Testbed Resources

- TEAGLE issues provisioning requests via common management plane
- Each testbed exposes resources via a PTM (*Panlab Testbed Manager*)
- A PTM has „device-driver-like“ modules for specific testbed resources
- Resources can be controlled via standard interfaces or proprietary interfaces (this is when „driver“ is needed → PTM adaptor must be implemented)



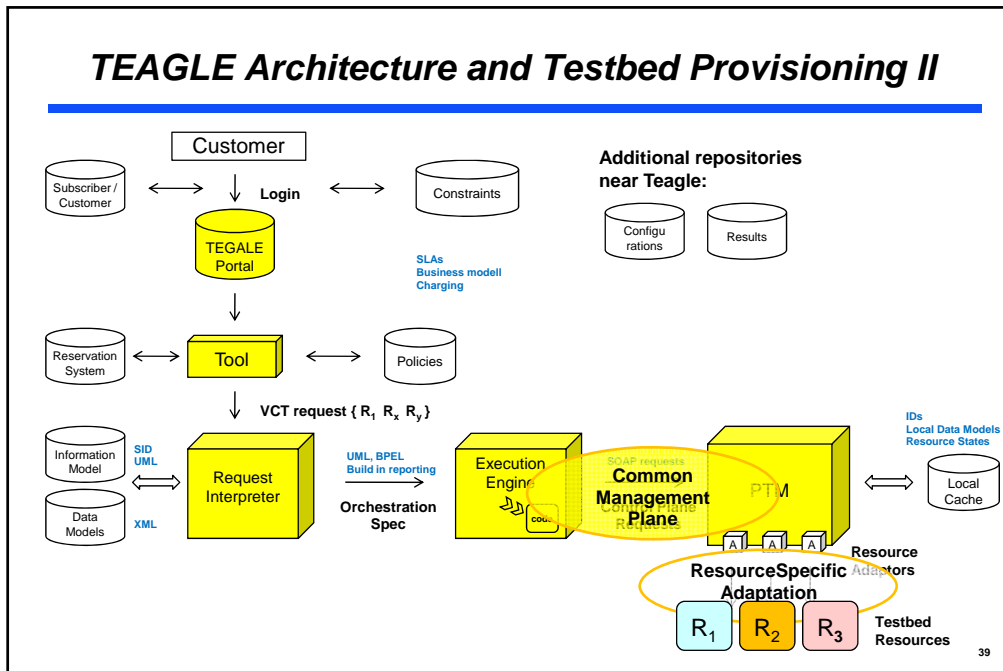
37

TEAGLE Architecture and Testbed Provisioning



38

TEAGLE Architecture and Testbed Provisioning II



Agenda

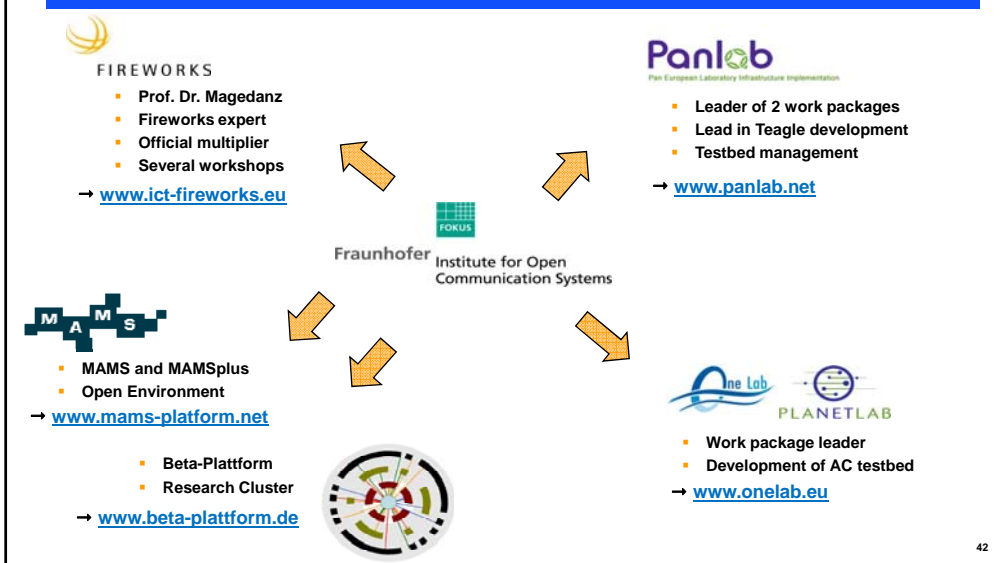
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Summary

- The key question: what drives service and network architectures: Technologies or Services?
- Service Orientation is a means for abstraction from specific (network) technologies
- SOA is today a key principle in distributed overlay service platforms, although bound to the service layer
- In face of the future internet and new FI cross layer service architectures also SOA principles have to be extended the network layer and others as well
- Future Internet Testbeds have to reflect this!

41

FOKUS Testbeds on FIRE



42

Call for Participation

TridentCom 2009

The 5th International Conference on Testbeds and Research Infrastructures for the
Development of Networks & Communities
April 6-8, 2009, Washington D.C., USA

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- *Early Bird registration ends March 7th!*

43



Any Questions?

44

Related Publications

- T. Magedanz, P. Weik, D. Vingarzan, F. Carvalho de Gouveia, and S. Wahle. Experiences on the Establishment and Provisioning of NGN/IMS Testbeds - The FOKUS Open IMS Playground and the Related Open Source IMS Core. In 11th International Conference on Intelligence in service delivery Networks (ICIN), Emerging Web and Telecom Services: Collision or Cooperation? ICIN 2007, October 2007. Bordeaux, France.
- N. Blum, T. Magedanz, F. Schreiner, "Definition of a Service Delivery Platform for Service Exposure and Service Orchestration in Next Generation Networks", UbiCC Journal - Volume 3 Number 3, 2008, http://www.ubicc.org/journal_detail.aspx?id=17, ISSN: 1994-4608
- N. Blum, T. Magedanz, "Requirements and Components of a SOA-based NGN Reference Architecture", e&i - elektrotechnik und informationstechnik, Österreichischer Verband für Elektrotechnik, Juli/August 2008, pp. 263 - 267, Springer-Verlag 2008, ISSN 0932-383X
- T. Magedanz, N. Blum, S. Dutkowski, "Evolution of SOA Concepts in Telecommunications - A Déjà vu?", Special Issue on Service Oriented Architectures, IEEE Computer, November 2007, ISSN 0018-9162
- N. Blum, T. Magedanz, F. Schreiner, "Services, Enablers and Architectures: Definition of a Connected Web 2.0 / Telco Service Broker to Enable New Flexible Service Exposure Models", Proc. of International Conference on Intelligence in Networks (ICIN), Bordeaux, 20 - 23 October 2008
- S. Wahle, N. Blum, and T. Magedanz, "Evolution of the Open IMS Playground - Open Next Generation Network Testbeds in Face of Service Oriented Architectures, Web2.0 and European Testbed Federations" In Mobilfunk - Technologien und Anwendungen, ITG-Fachbericht 208, pages 49-54. VDE VERLAG GmbH, May 2008. ISBN:978-3-8007-3104-6, ISSN:0932-6022
- Florian Schreiner, Sebastian Wahle, Niklas Blum, Thomas Magedanz: "Modular Exposure of Next Generation Network Services to Enterprises and Testbed Federations", HUT-ICCE 2008, 2nd International Conference on Communications and Electronics, June 4-6, 2008, Hoi An, Vietnam, ISBN 978-1-4244-2425-2, IEEE CN CFP0816B-PRT
- Sebastian Wahle et al. Network Domain Federation - Infrastructure for Federated Testbeds. In NEM Summit 2008 Proceedings, October 2008. Saint-Malo, France