

Grid and Cloud Computing

Interoperability and
Standardization for the
Telecommunications Industry

Telecom World Congress 2009

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Specialist Task Force, TC
GRID

Integration of Grid and Cloud Computing with Next Generation Networks to enhance SDP

- ❑ **ETSI: European Telecommunications Standards Institute**
 - Over 500 members from around the world
 - Responsible for GSM and DECT standards
 - ... and hundreds of other telecom industry standards
- ❑ **Questions in 2006: Could grid computing technology improve:**
 - internal network operations?
 - interoperation with other networks?
 - platform for deployment of third party and customer originated services?
- ❑ **TC GRID formed to discuss and answer these questions**
- ❑ **Today: commercial interest moved away from “grid” and towards “cloud”**
 - I'll give you some ideas why this may be



World Class Standards

ETSI TC GRID Participants

Telefonica

Nokia Siemens
Networks



NEC



france telecom

HITACHI
Inspire the Next

THALES



IBM



ORACLE



Open mailing list grid@list.etsi.org
Contact me to be added:
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Alcatel·Lucent 

Grid vs. Cloud: Oversimplified

- ❑ Isn't "cloud" just the new name for "grid"?
 - No

- ❑ "Grid" is about mechanisms for federated, distributed, heterogeneous shared compute and storage resources
 - standards and software

- ❑ "Cloud" is about on-demand provisioning of compute and storage resources
 - services

"No one buys a grid. No one installs a cloud."

What does “Grid” offer?

❑ Grid Computing

- premise: provide federated data and application access in manner and scale similar to the Web
- born out of large scale distributed scientific computing, late 1990s
- goal: federate lots of heterogeneous computing centers with clusters and storage, plus the thousands of users at institutions around the world

❑ Functionality

- rich middleware layer to build applications from
- underlying configuration and components to support federated identity management, access control, and data management

❑ Standards ...

- ... of a sort
- 10+ years of use in public sector
- primarily through Open Grid Forum www.ogf.org
- relevant (new) standards also from IETF, W3C, OASIS, DMTF
- and lots of parts with single implementations lacking any standard

The interesting thing about Cloud Computing is that we've redefined Cloud Computing to include everything that we already do. . . . I don't understand what we would do differently in the light of Cloud Computing other than change the wording of some of our ads.

*-- Larry Ellison, Oracle CEO, quoted in the Wall Street Journal, September 26, 2008**

*<http://blogs.wsj.com/biztech/2008/09/25/larry-ellisons-brilliant-anti-cloud-computing-rant/>

What does “Cloud” offer?

❑ ETSI STF working definition:

- Dynamic compute and storage infrastructure provisioning in a scalable manner providing uniform interfaces to virtualized resources
- The underlying resources could be:
 - “in-house” using licensed/purchased software/hardware
 - “external” hosted by a service/infrastructure provider

❑ Consider using cloud computing if

- You have operational problems/constraints in your current data center
- You need to dynamically scale (up or down) access to services and data
- You want fast provisioning, lots of bandwidth, and low latency
- Organizationally you can live with outsourcing responsibility for (some of) your data and applications

❑ Consider providing cloud computing services if

- You have an ace team efficiently running your existing data center
- You have lots of experience with virtualization
- You have a specific application/domain that could benefit from being tied to a large compute farm or disk array with great Internet connectivity

And now, a message from our sponsors ...

- ❑ The European Commission has sponsored part of this work
- ❑ Future funding is based on knowing people are interested in grid/cloud and telco industry



Event attendance list

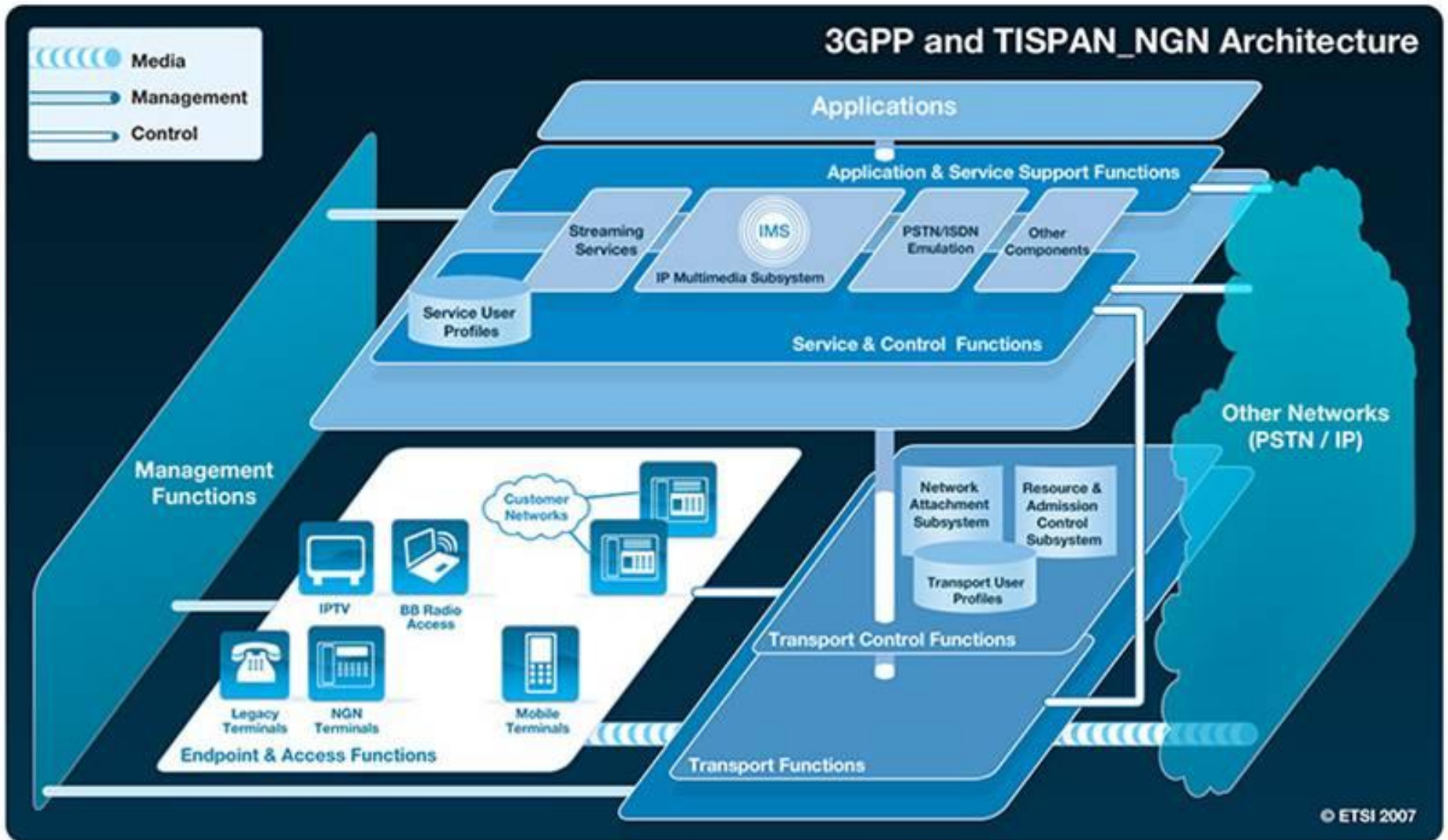
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STFLINK
ETSI - 650, route des Lucioles,
F-06921 Sophia Antipolis Cedex
France

EC/EFTA Contract reference: SA/ETSI/ENTR/000/2006-10
STF 331 - ICT GRID Technologies Interoperability and Standardization

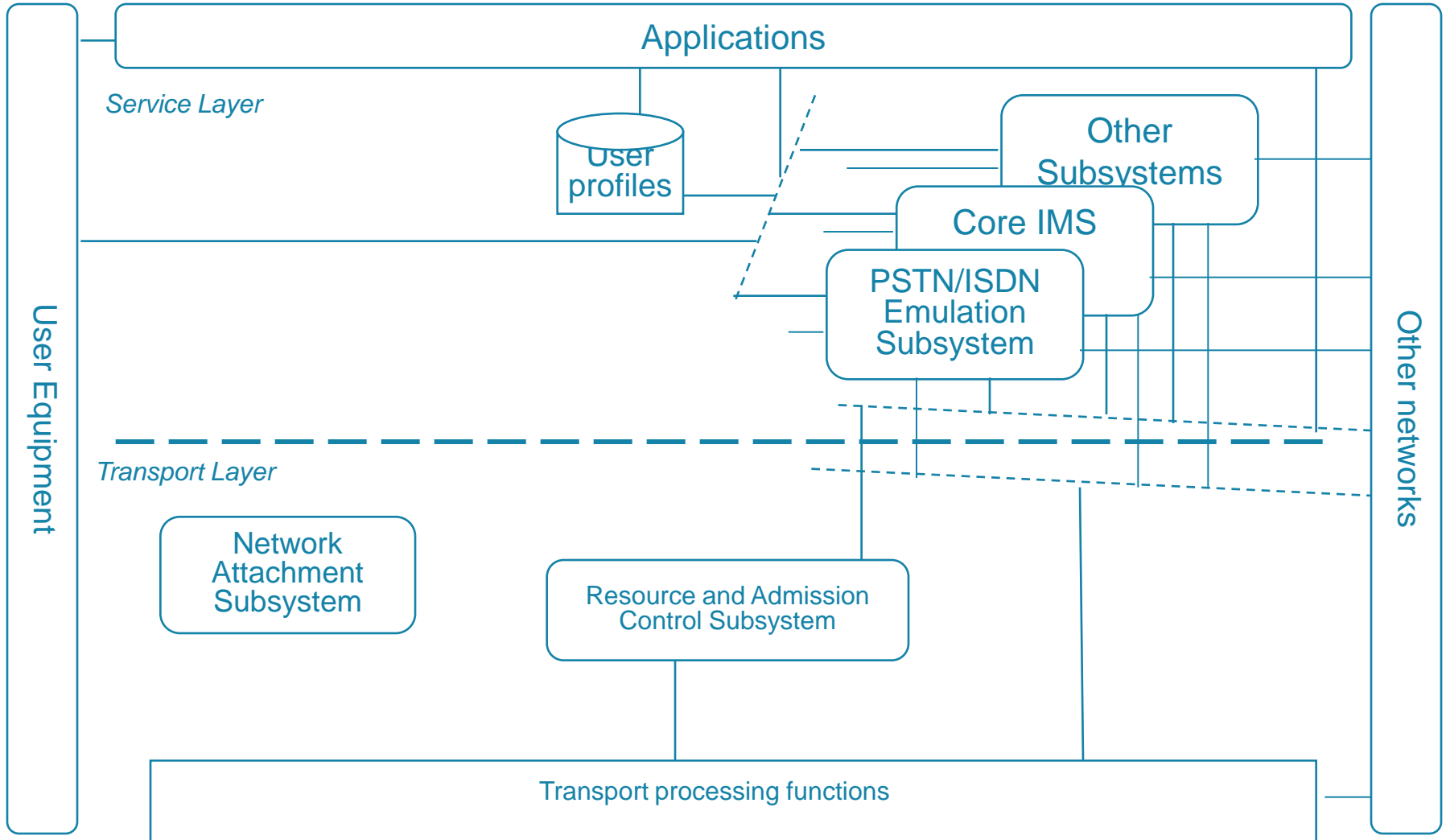
Name of responsible STF expert: Ian Stokes-Rees
Event name: Telecom World Congress
Event type: Workshop
Place (city/country): Amsterdam, Netherlands
Dates (from/to): April 22-24, 2009

Delegate	Representing organization	E-mail address (optional)	Signature

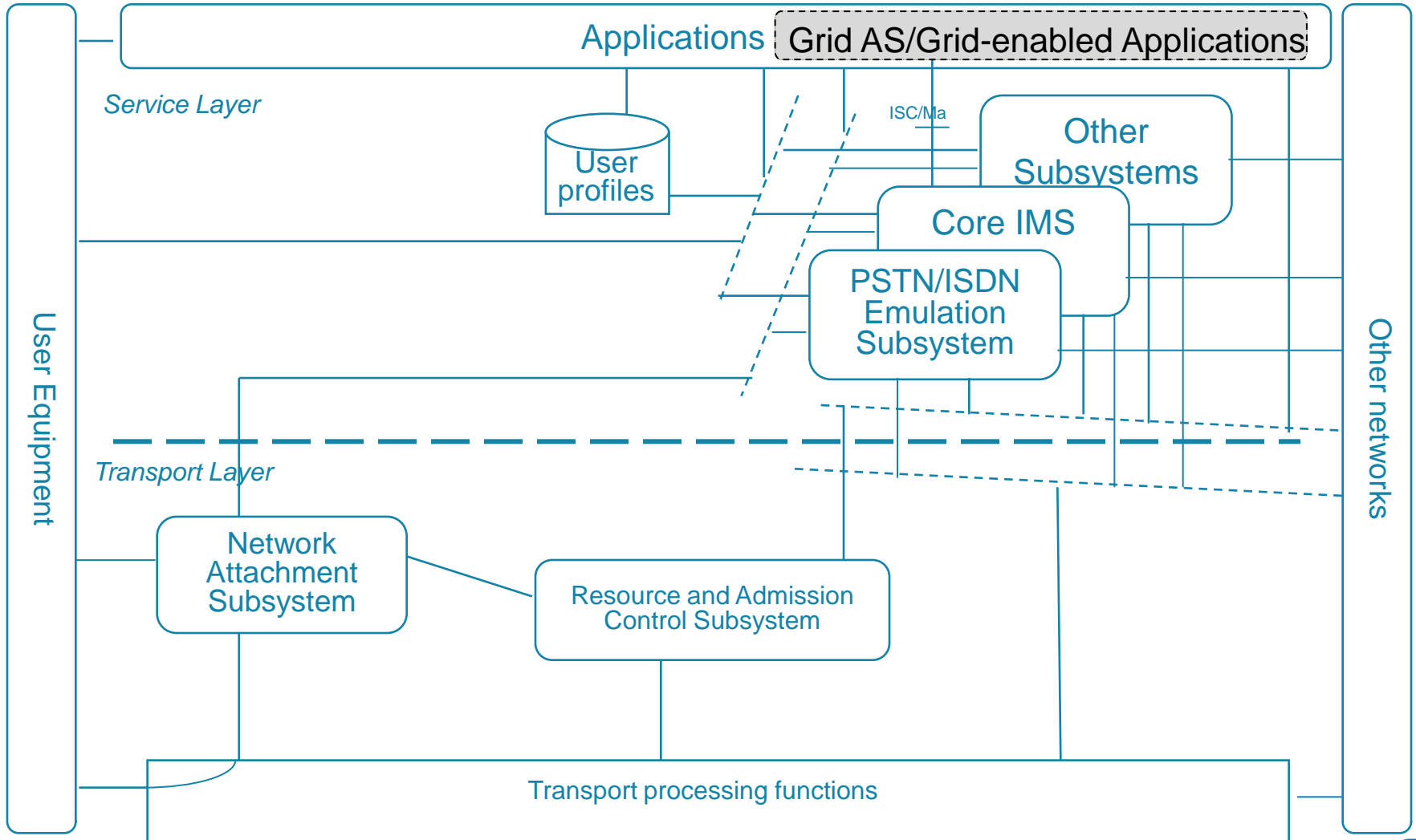
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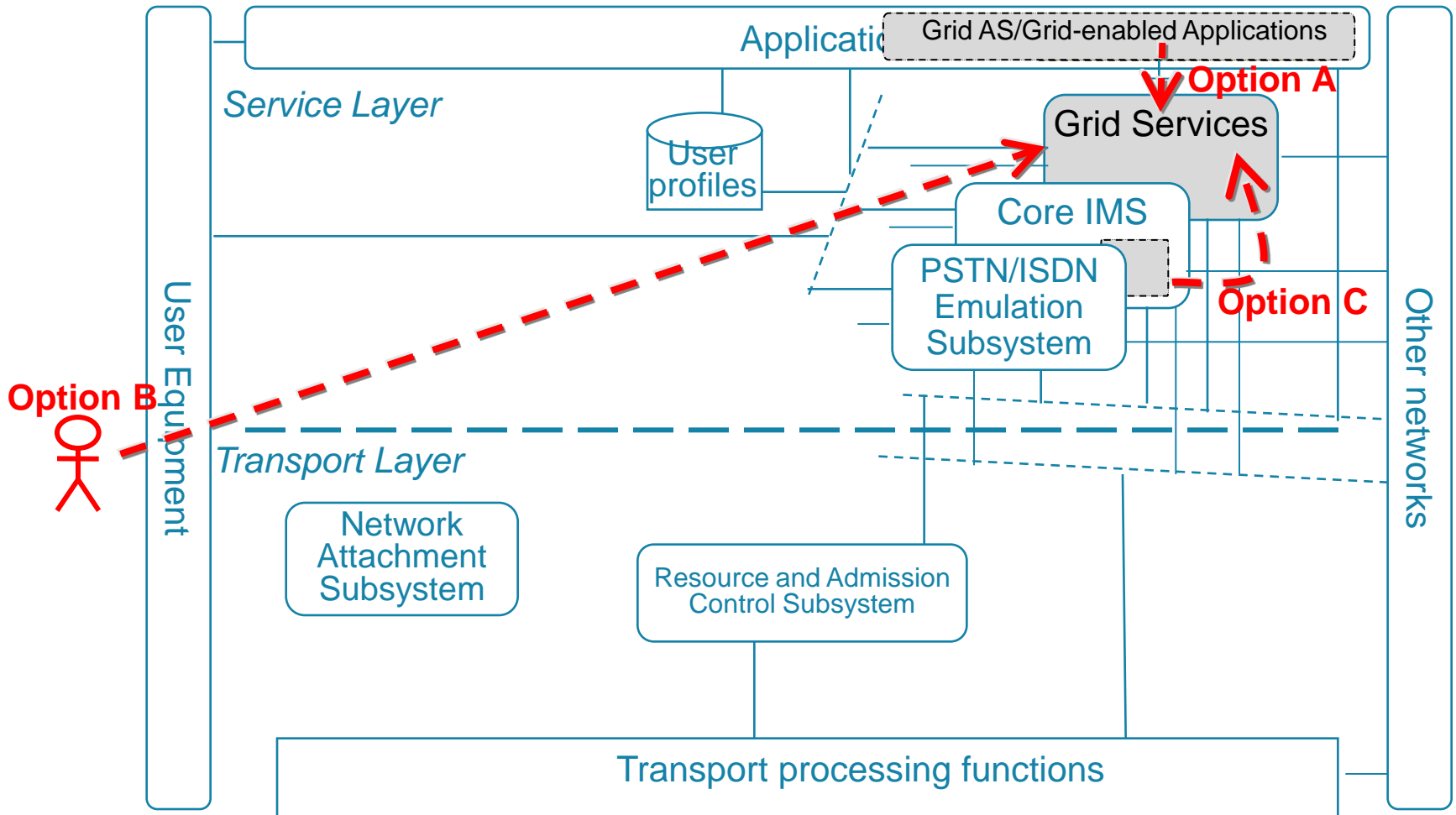
NGN Reference Model



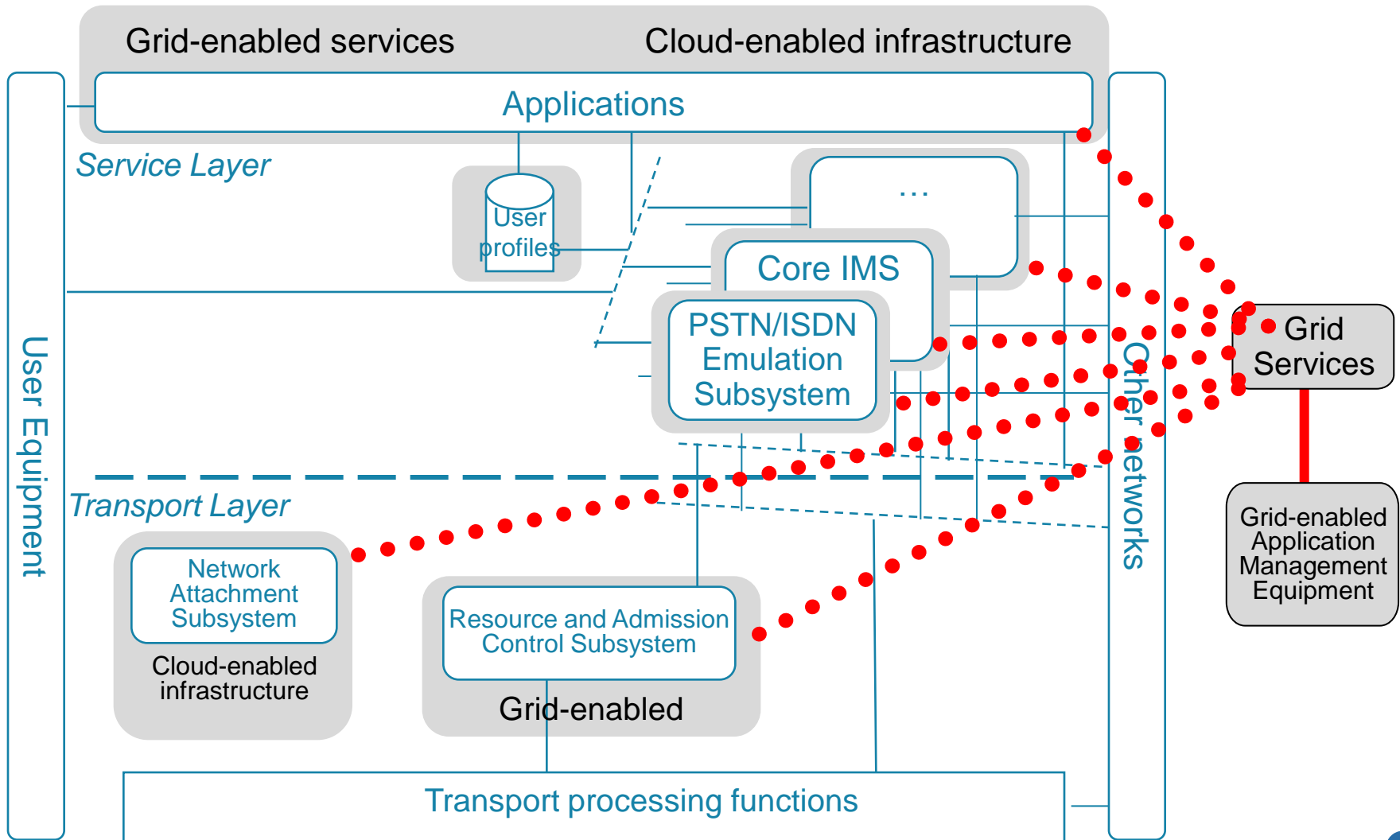
Case 1: Grid on top of NGN (application layer)



Case 2: Grid-enhanced NGN subsystems



Case 3: NGN on top of grid and cloud



State of Play: Standards

❑ Grid

➤ Open Grid Forum

- www.ogf.org
- predominant grid-related standards body
- criticism is time required to agree and release standards

➤ also IETF, W3C, OASIS (WS-*), and others

❑ NGN

➤ ETSI TISPAN:core NGN standards

➤ 3GPP: mobile Internet and IP services/protocols

➤ ITU-T: NGN interoperability

❑ Cloud

➤ Most “cloud” systems come with a user manual, not a standard

➤ Some have APIs (e.g. Amazon EC2 WSDL interface)

➤ Most things called “cloud” aren’t, according to our definition

State of Play: Providers

❑ Grid

- dominated by public sector national and international infrastructures
- connecting large and small federated computing centers and users
- limited interoperability between grid infrastructures
 - due to incompatible mix of grid middleware, or configuration of that m/w
- Some names: EGEE/gLite, UK NGS, D-Grid, Grid5000, NorduGrid, WCLG, Open Science Grid

❑ NGN

- most telco providers and suppliers are rolling out NGN (or some variation of it)

❑ Cloud

- Amazon (EC2), AT&T (Synaptic), Deutsche Telekom (Zimory spin-off), GoGrid, SingTel/HP (Alatum)
- dominated by private sector custom systems for paying customers of bespoke services

Opportunities for Interoperability

- ❑ **First, there are lots of kinds of interoperability**
 - **NGN doesn't talk a lot about grid or cloud level services**
 - **Grid and cloud don't talk a lot about network level services**
- ❑ **Security**
 - **X.509 PKI (ITU/IETF) has largely been a success in grid infrastructures**
 - **allows identification of all parties (servers, people, services, equipment)**
- ❑ **Data Movement**
 - **Storage Resource Manager (OGF) v2.2 widely used**
 - **GridFTP (OGF) for high performance data movement**
- ❑ **Information System**
 - **CIM (DMTF) and GLUE (OGF) provide standardized information models**
- ❑ **Job Submission**
 - **JSDL (OGF) and BES (OGF) provide standard mechanisms to define and submit batch-like computing jobs**

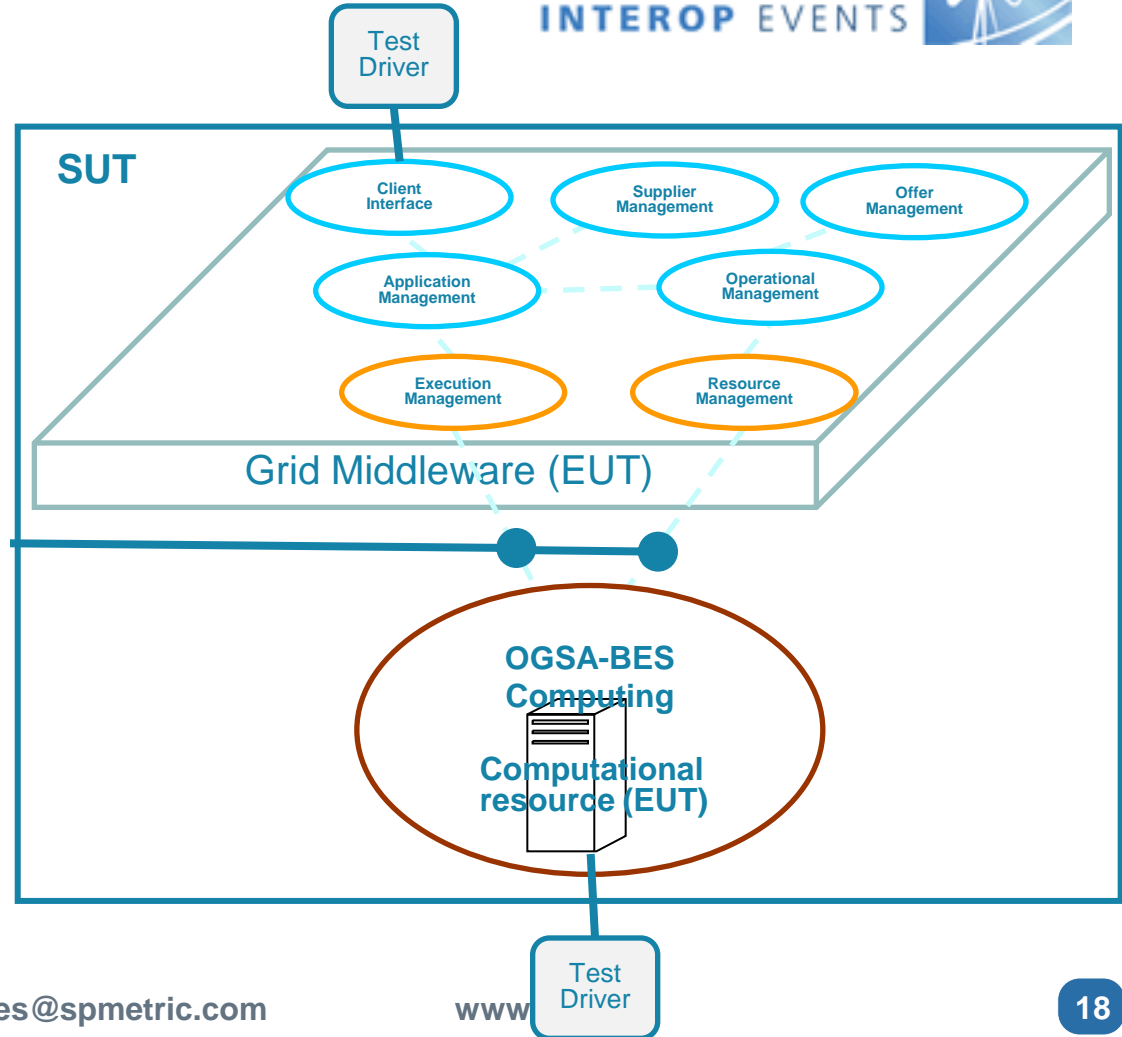
Gaps in Standards and Interoperability

- ❑ **Security and User Model**
 - Many of the necessary details are not standardized
 - Key distribution and management, ACLs, policies
 - Virtual Organizations are not hierarchical or dynamic
- ❑ **Accounting and Charging**
 - Clouds generally adopt “per unit” charging model
 - Limited adoption of accounting or charging standards in grid domain
- ❑ **Service Monitoring and Discovery**
 - No accepted standard for resource discovery and registration
 - Limited standards for service and resource monitoring
- ❑ **SLA and QoS**
 - WS-Agreement provides a starting point, but not complete picture
 - QoS management is non-existent
- ❑ **Meta Issues**
 - dynamic nature of infrastructure rarely taken into account
 - lack of concurrent support for multiple versions of different standards

ETSI Plugtests



- ❑ ETSI organizes plugtests for many standards and technologies
- ❑ 5 Grid Plugtests since 2004
- ❑ 2009 will host 6th Plugtest to evaluate GCM standard
- ❑ Open to all
- ❑ Goal: test interop, improve standards, gain experience



Grids, Clouds, and Telco Industry: What Next?

- ❑ Look at the ETSI white paper
 - in your delegate pack – complimentary to this presentation
- ❑ Talk to me at the break (or email)
- ❑ Contact me to arrange a phone/web conference with ETSI experts
 - we have some significant accumulated expertise in telco/grid/cloud
 - only “cost” is signed EC participation form
- ❑ Read our Technical Reports
 - Freely available at: <http://portal.etsi.org/grid> under “Latest Drafts”
 - ETSI TR 102 659-1: Inventory of ICT Grid Stakeholders
 - ETSI TR 102 659-2: Interoperability Gaps and proposed solutions
 - ETSI TR 102 766: ICT Grid IOP Testing Framework & Survey
- ❑ Join ETSI TC GRID and observe or participate
 - email me for details or to join grid@list.etsi.org
- ❑ Watch other industry fora and SDOs
 - ITU-T ➤ OGF ➤ OASIS
 - ATIS ➤ IETF ➤ W3C

Thank you!

Questions

(backup slides follow)

Convergence of Internet and Traditional Network

❑ NGN: Next Generation Network(s)

- Enhanced services
- Service delivery platform (SDP)
- Third party services
- Enterprise-specific services

❑ TISPAN

- Telecoms and Internet converged Services and Protocols for Advanced Network
- <http://www.etsi.org/tispan/>



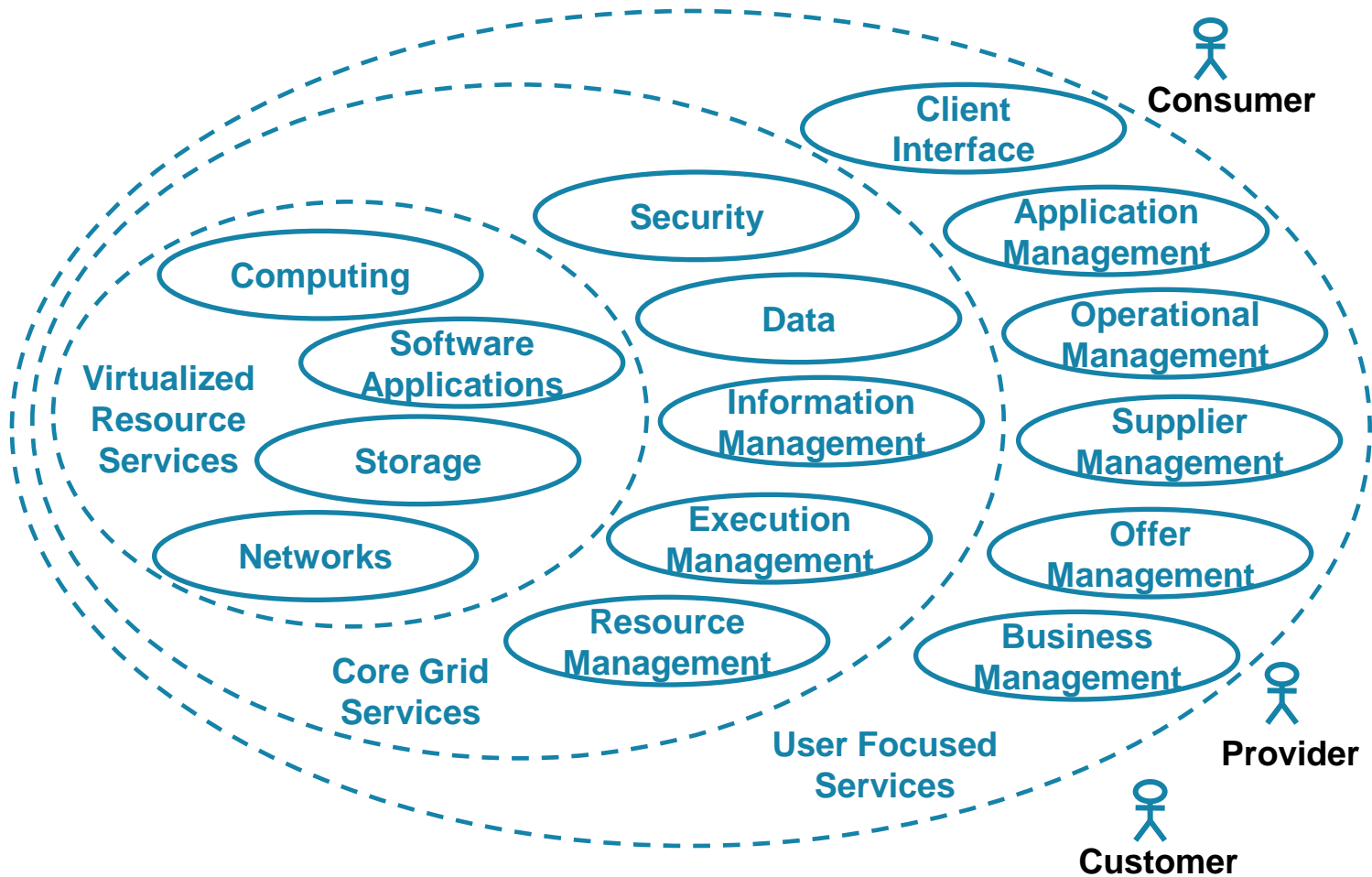
❑ Grid

- Federated, distributed, heterogeneous, manageable, secure

❑ Cloud

- On-demand, dynamically scalable, replicated, fault-tolerant, virtualized

ETSI STF Working Model of Grid and Cloud



ETSI Test Development

Base Standard or Profile specification

ETSI Test Development Process

1. Identification and cataloguing of requirements
2. Implementation Conformance (or Functional) Statement (ICS/IFS) specification
3. Test Purposes (TP) definition and Test Suite Structure (TSS) description
4. Test Description (TD) specification
5. Test Case (TC) development

Validation of Test Cases

Final conformance or interoperability test specification

Current and Emerging Global Communications Network

