Overview

- ❏ **Intro to ETSI, TC GRID and STF331**
- ❏ **What is Grid/Cloud Computing**
- ❏ **Why Grid/Cloud computing is of interest to the Telco industry and therefore ITU**
- ❏ **Grid/cloud Standardization Gaps and Overlaps**
- ❏ **Combining Grid/cloud computing and the NGN - Architectural Options**
- ❏ **Plugtest and workshop**
- ❏ **Way Forward**

ETSI and TC GRID

❑ *About ETSI:*

➢ *ETSI produces globally-applicable standards for Information and Communications Technologies (ICT), including fixed, mobile, radio, converged, broadcast and internet technologies and is officially recognized by the European Commission as a European Standards Organization. ETSI is a not-for-profit organization whose 700 ETSI member organizations benefit from direct participation and are drawn from 60 countries worldwide. For more information, please visit: www.etsi.org*

❑ **ETSI Technical Committee GRID**

➢ **Formed in 2006, ETSI TC GRID's goal is to address convergence between IT (Information Technology) and Telecommunications, with particular reference to the lack of interoperable GRID solutions in situations which involve contributions from both the IT and Telecom industries.**

STF331

- ❑ **STFs**
  - ➤ **STFs are teams of highly-skilled experts working together over a pre-defined period to draft an ETSI standard under the technical guidance of an ETSI Technical Body and with the support of the ETSI Secretariat. The task of the STFs is to accelerate the standardization process in areas of strategic importance and in response to urgent market needs. For more information, please visit: http://portal.etsi.org/stfs/process/home.asp**

- ❑ **STF331 (GRID)**
  - ➤ **Is a part EC/EFTA funded project. The objective is to address, in general, IT-Telecom convergence and, in particular, the lack of interoperable GRID solutions built by IT in conjunction with the Telecom industry. It is a goal to contribute to improvement in worldwide cooperation of the ICT-Telecom collaborative Grid standardisation efforts. For more information, please visit: http://portal.etsi.org/STFs/STF_HomePages/STF331/STF331.asp**

What is Grid Computing

❑ **Grid or Grid computing – Vision
To create a universal source of computing power. The term Grid is chosen by analogy with the electric power grid.**

❑ **Grid or Grid computing - Definition
"Grid is a system that is concerned with the integration, virtualization, and management of services and resources in a distributed, heterogeneous environment that supports collections of users and resources (virtual organizations) across traditional administrative and organizational domains (real organizations) "
(*Source OGF)***

❑ **"The Grid" does not yet exist, in the way that "The NGN" does not yet exist. However there are many Grids which exhibit some or all of the characteristics of "the Grid".**

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 is cloud computing

❑ **Cloud or cloud computing – up to now there has been no clear definition**

❑ **Cloud or cloud computing – Proposed Definition "A rapidly provisioned compute or storage infrastructure that supports dynamic scaling with uniform interfaces to virtualized resources." (*Source ETSI STF331)***

❑ **To the wider community "cloud computing" can be represented as a three layer model:**

  ➢ *Software as a Service (SaaS)*

  ➢ *Platform as a Service (PaaS)*

  ➢ *Infrastructure as a Service (IaaS)*

❑ **The underlying resources could be:**

  • **"in-house" using licensed/purchased software/hardware**

  • **"external" hosted by a service/infrastructure provider**

What does "Cloud" offer?

- ❑ **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**

Why Grid/Cloud computing is of interest to the Telco industry and therefore ITU-T

❑ **Eurescom P1394 (TelcoGrid: Business Opportunities for Telecom Operators in the Grid Market) concluded that Telecom operators are bound to become key players in a Grid value chain as they provide connectivity and own computing resources, moreover they have established customer relationships and accounting/billing experience, essential for business/commercial grids.**

❑ **In the opinion of AT&T, the IT industry are looking for Telco like attributes from their Grid/Cloud computing service providers.**

❑ **Telecom Service Providers are looking to supply their customers with grid and cloud computing services.**

❑ **Telecom Service Providers are looking at Grid/cloud computing to improve the efficiency of their operations**

# Grid/cloud standardisation gaps and overlaps

❑ **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-existant**

❑ **Meta Issues**
  - ➢ **dynamic nature of infrastructure rarely taken into account**
  - ➢ **lack of concurrent support for multiple versions of different standards**

*For more information see ETSI TR 102 659-2*

Combining Grid/cloud computing and the NGN Architectural Options

❑ **Grid-enabled NGN application**

- ➢ **Option 1 - Treat a Grid AS/Grid enabled application as an NGN Application**

❑ **NGN subsystems offering Grid Services**

- ➢ **Option 2 - Offering Grid Services towards end-user applications providing them with resources managed by the "Grid Services" Subsystem**
- ➢ **Option 3 - Dedicated grid-enabled functions of other subsystems may use the Grid Service subsystem**

❑ **Grid technology for implementing NGN functionality**

- ➢ **Option 4 - Realise logical NGN functions (e.g. NASS or RACS) using Grid technology**

❑ **Combining Grid and networking resources in a new architecture**

- ➢ **Option 5 - Share resources (e.g. execution/computing, network and storage) and the management of those resources between Grid and NGN implementations**
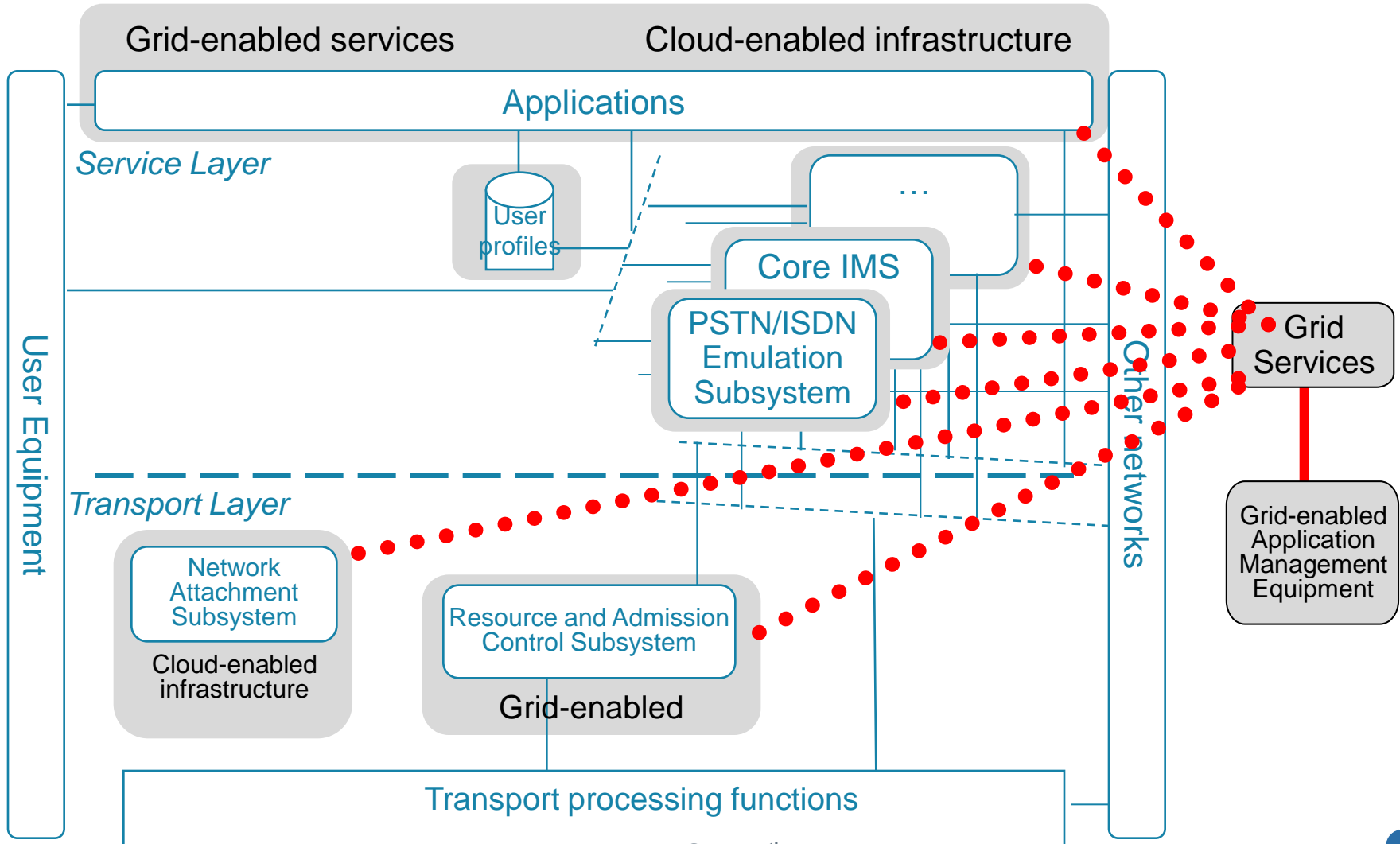
Case 1: Grid on top of NGN (application layer)
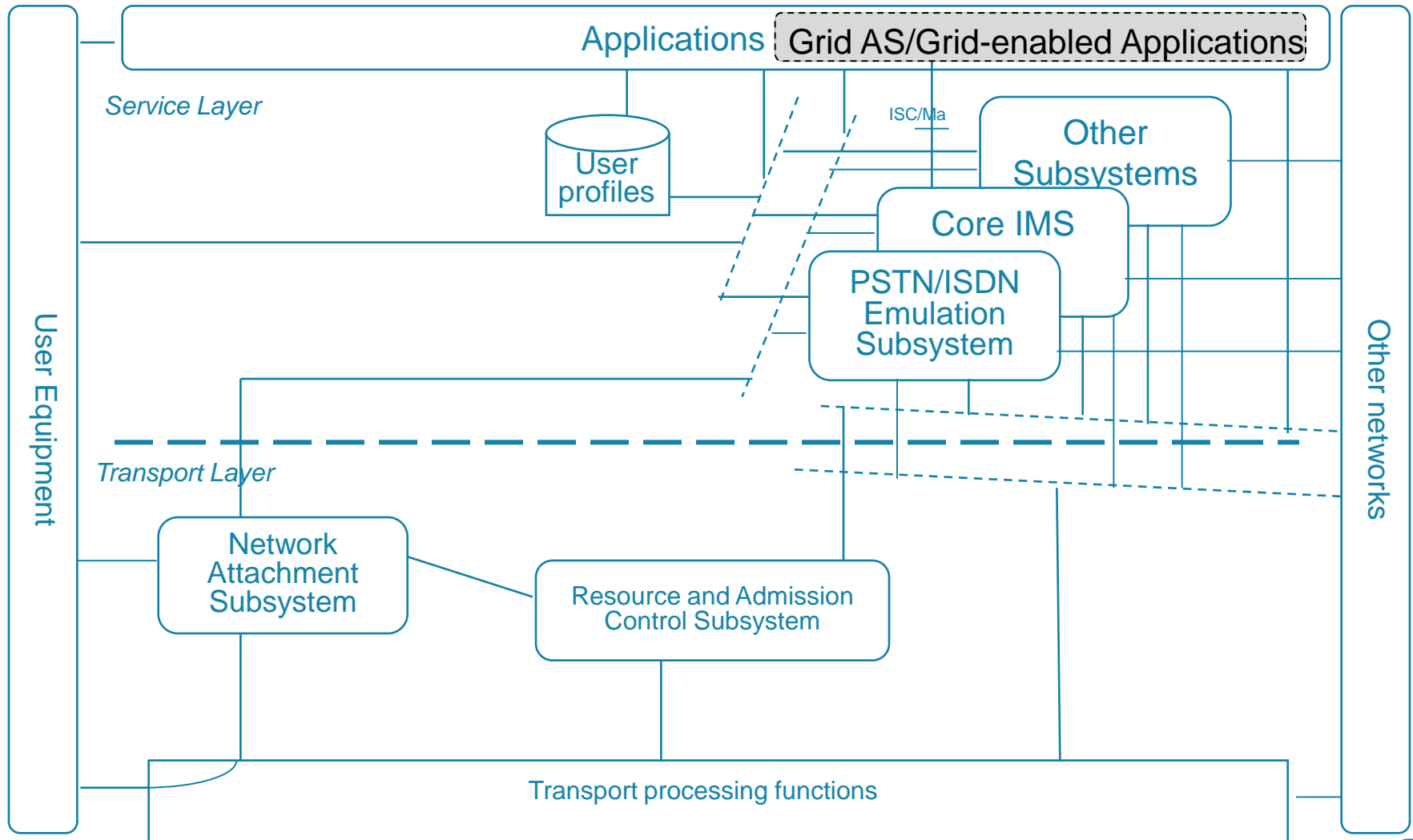
Case 2: Grid-enhanced NGN subsystems
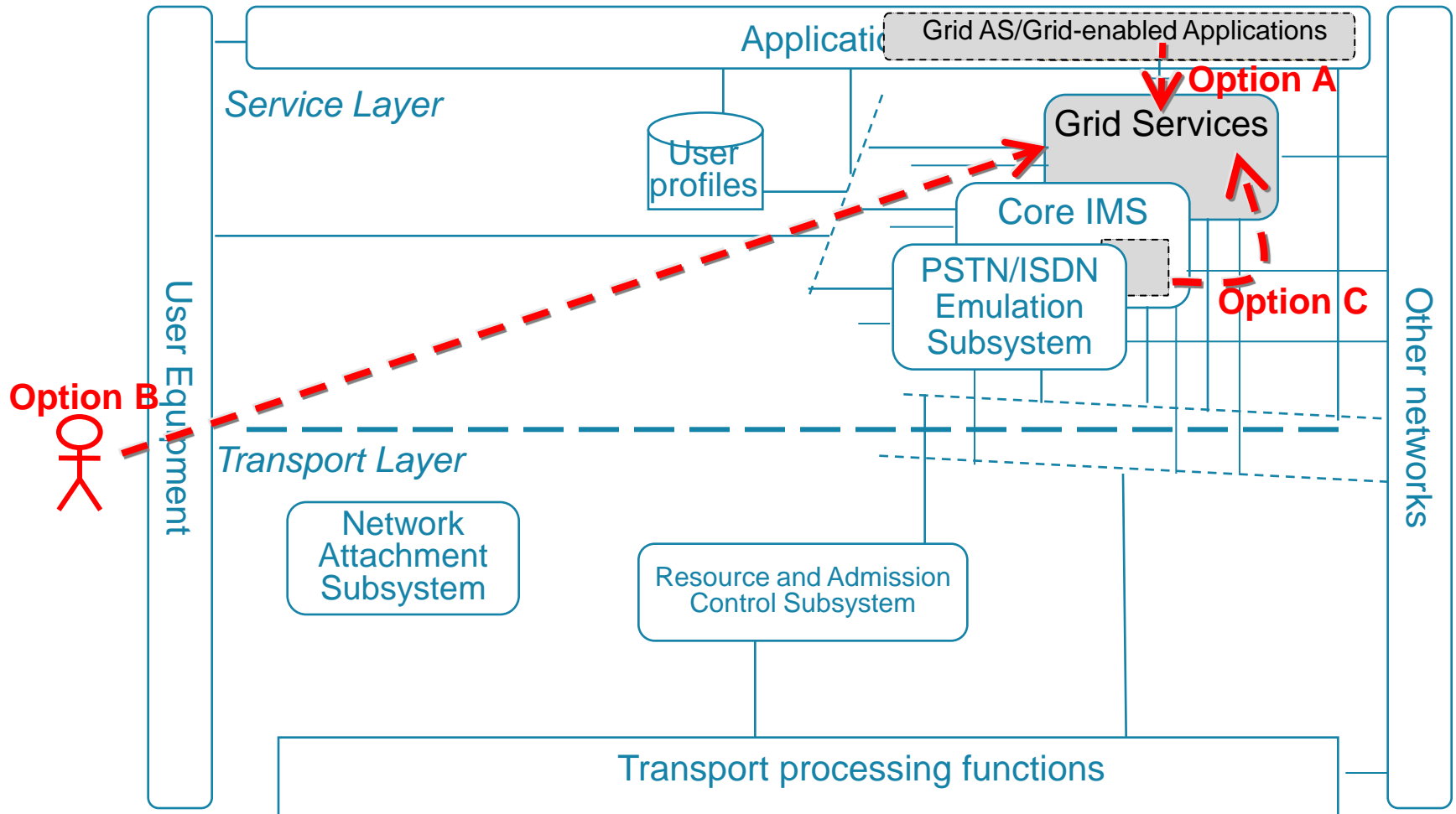
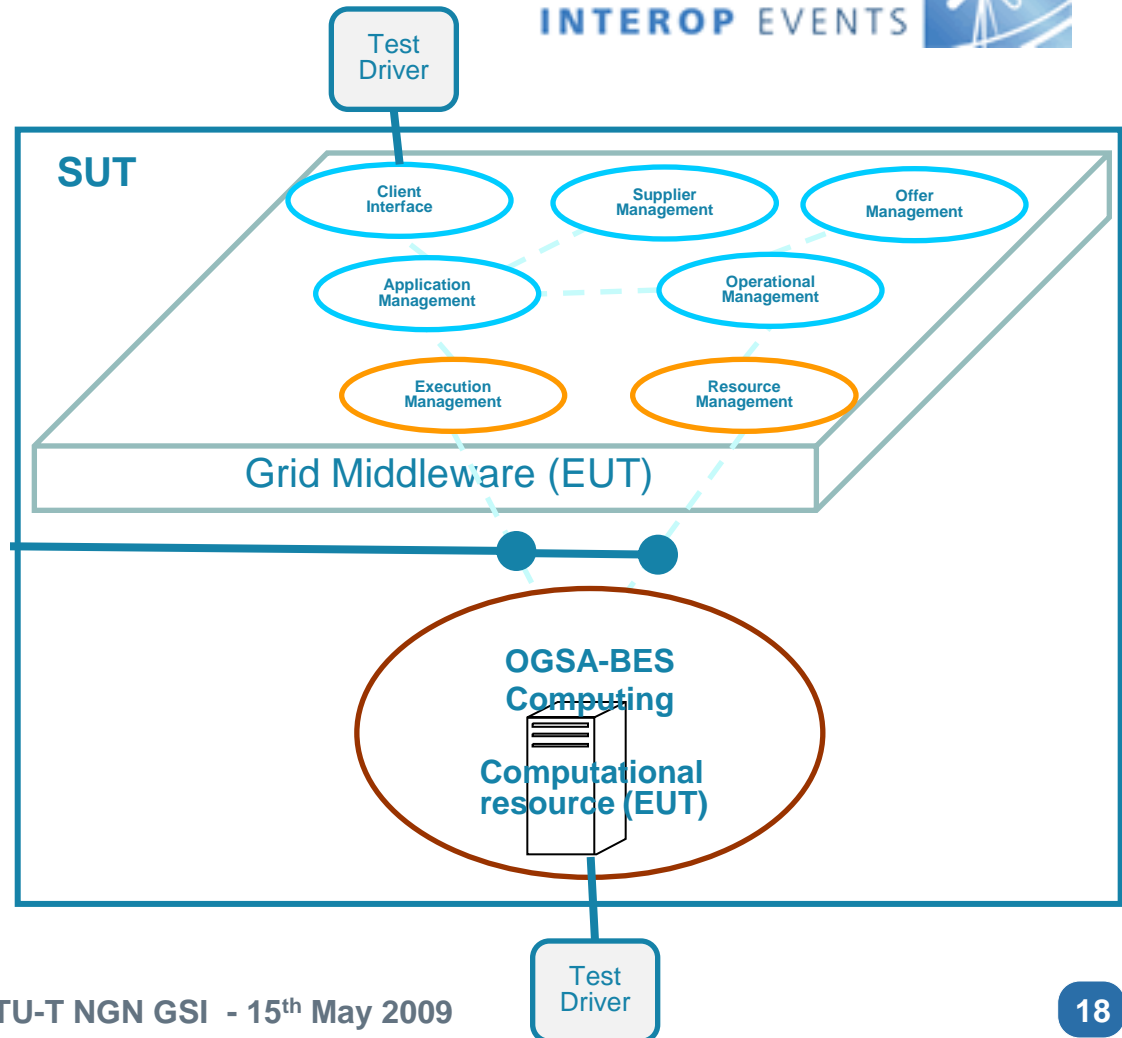# Case 3: NGN on top of grid and cloud

About ETSI's Grid Plugtest 2009

❑ **Planned to be hosted in Sopia-Antipolis, FR, from Nov 30 to Dec 2 co-located with a workshop organized by TC Grid (Dec 2 and 3)**

➤ **NDA to protect event participants**

➤ **Overall results from Plugtest to be presented at workshop**

❑ **Different format than previous ETSI Grid Plugtests**

➤ **Not programming contest – applications used for testing are fixed prior to event**

➤ **Goal is evaluation of application deployment onto different grid and cloud computing infrastructures based on ETSI GCM standards**

❑ **Intend is to bring key players of telecom community together with grid and cloud infrastructure providers**

➤ **Event open to participation for commercial as well as open source infrastructure providers, ETSI as well as non-ETSI members**

➤ **Telecom operators and equipment vendors will observe the event**

ETSI Plugtests

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

PLUGTESTS™
INTEROP EVENTS

Test Driver

SUT

Client Interface

Supplier Management

Offer Management

Application Management

Operational Management

Execution Management

Resource Management

Grid Middleware (EUT)

OGSA-BES Computing

Computational resource (EUT)

Test Driver

Thank you!

Questions

(backup slides follow)

Further Reading
http://pda.etsi.org/PDA/queryform.asp

❑ **TR102 659-1 GRID; Inventory of ICT Grid Stakeholder**

➢ **Published version undergoing revision based on feedback and to add a section on Telcos (publication due last quarter 2009)**

❑ **TR102 659-2   GRID; Interoperability Gaps and proposed solutions**

➢ **First version identifying gaps is published, is now being updated to add proposed solutions and way forward (publication due last quarter 2009)**

❑ **TR 102 767   GRID; Grid Services and telecom Networks; Architectural Options**

➢ **(published)**

❑ **TR 102 766   GRID; ICT Grid Interoperability Testing Framework and survey of existing ICT Grid interoperability solutions (publication due last quarter 2009)**

• **(publication due last quarter 2009)**

❑ **GRID 0007   Technical Specification GRID; ICT Grid Interoperability Testing Framework**

➢ **(publication due last quarter 2009)**

ETSI STF Working Model of Grid and Cloud
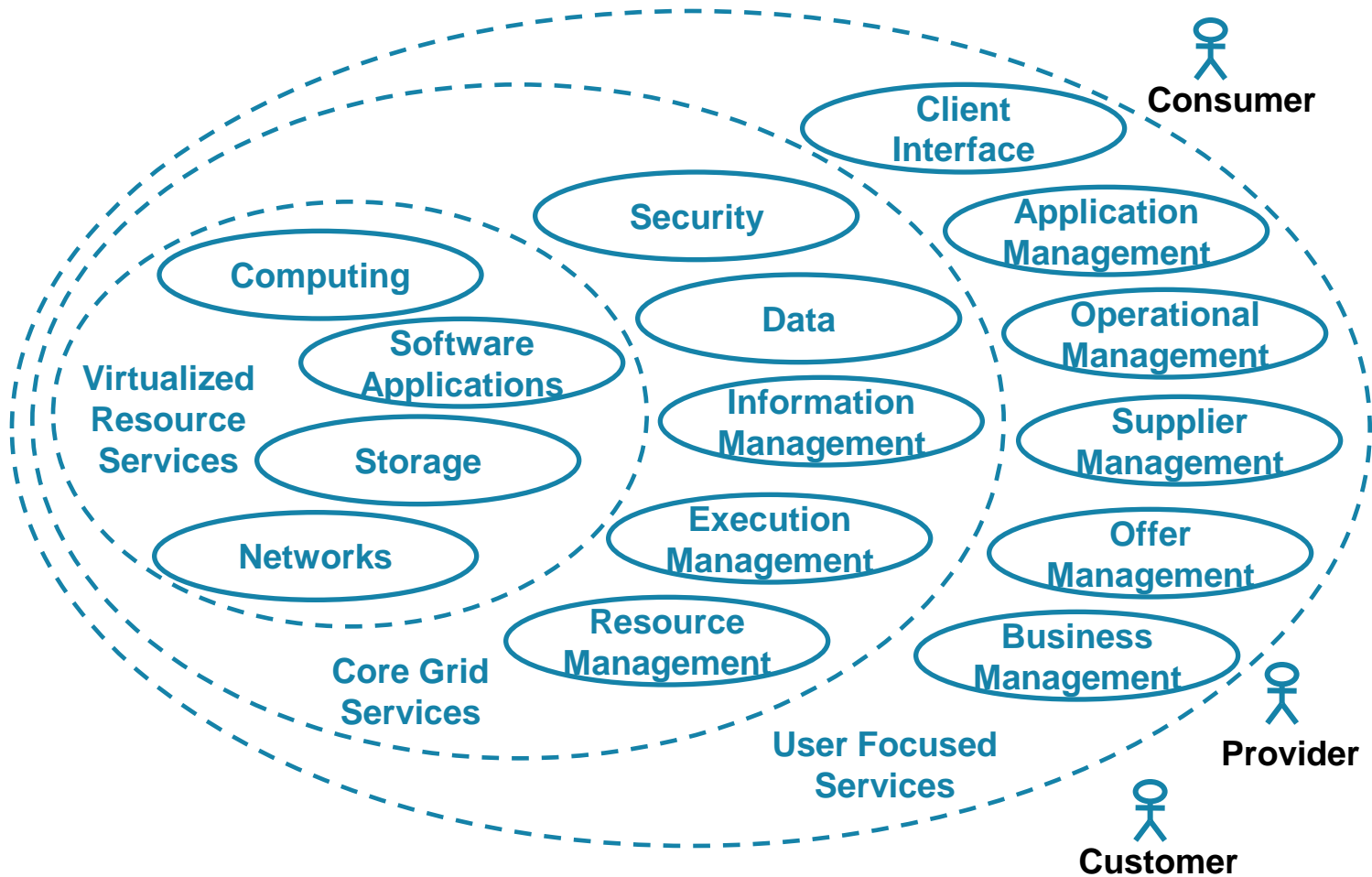
ETSI Test Development

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

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**

➢ **ITU-T Study Group 13**

➢ **ETSI TISPAN: (core NGN standards)**

➢ **3GPP: IMS**

❑ **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**

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