INTERNATIONAL TELECOMMUNICATION UNION

ITU-T Report

TELECOMMUNICATION
STANDARDIZATION SECTOR OF ITU

ITU-T/OGF Workshop on Next Generation Networks and Grids

(Geneva, Switzerland, 23-24 October 2006)

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EXECUTIVE SUMMARY

A joint ITU-T/Open Grid Forum (OGF) NGN and Grids Workshop was held in Geneva, 23-24 October 2006.

ITU-T's Global Standards Initiative on Next Generation Network (NGN-GSI) is well under way and is responding to urgent market needs for global NGN standards. NGN offers increased quality and service features for users, independent of the underlying transport technology.

Grids have been widely used in the scientific community. Increasingly, Grids are being deployed within commercial settings. The Open Grid Forum is actively reaching out to communities such as the Telco community to advance Grid adoption, interoperability and scalability. Different scenarios for Telcos can be envisioned: Telcos may 1) specialize in network SLAs that are optimally suited to Grids; 2) use Grids for their IT internal needs; and/or 3) offer Grids as a managed service to customers.

The joint ITU-T/OGF workshop was held to bring together the telecoms industry and the Grid community to understand how they could better collaborate and benefit from their synergies.

During the 2-day workshop, 84 representatives from 23 countries attended discussions in 5 sessions: 1) Visions of Grids and NGN, 2) GRID Tutorial and NGN Tutorial, 3) Management, Control and Interoperability Issues, 4) QoS, Performance and Security Aspects, and 5) Future Trends and Issues.

Two exhibitors (CERN and ITU-R) provided a demonstration of how their grid systems are related to the workshop theme.

All presentations of the event are also available at the workshop website at: http://www.itu.int/ITU-T/worksem/grid/programme.html.

HIGHLIGHTS OF SESSIONS

Welcome addresses were provided by Houlin Zhao, Director of the Telecommunication Standardization Bureau, ITU and Mark Linesch, Chairman, Open Grid Forum (OGF).

Session 1: Visions of Grids and NGN

The session moderators [Franco Travostino (Nortel) from the OGF and Brian Moore (Lucent Technologies) from the ITU-T] introduced this session and noted that the objectives of the keynote session – Visions of Grids and NGN were to present the vision, status, evolution and key players on Grids and NGNs.

Mike Fisher (BT Group) provided a service provider's perspective on the subject of Grids for Business. He noted the changes that were occurring in the IT industry and identified the potential of Grid technologies as well as their current status. His presentation also showed the relationship between Grids and NGNs, presented the requirements on Grids and discussed technical challenges and the need for standardization.

Kees Neggers (SURFnet) presentation focused on Grid networks in the research community and provided a brief history on research networking. He then talked about capacity evolution and the every growing need for bandwidth and how SURFnet5 will be replaced with SURFnet6 and he shared some of the characteristics of the SURFnet6 network. Mention was made of other committees that share some common objectives like the Global Lambda Integrated Facility (GLIF) international virtual organization intended to promote optical networking. Information was provided on the GLIF vision and its objectives and infrastructure and how it will be used to provide proof of concept.

Wolfgang Boch (European Commission) provided the European Union's vision for a Next Generation Grid. In this presentation he detailed the EU Grid research strategy and talked about the Grid research projects that were being funded. The presentation then moved on to discussions on Next Generation Grids and how the evolution would continue from Grids to Service Oriented Knowledge Utilities.

Conclusions and Recommendations of Session 1:

- No clear definition for Grid
- Grids are being deployed
- Networks are evolving to NGN
- Convergence of IT and Communications is occurring
- NGNs must include IT resources, if full potential is to be realized
- Grid technologies required to realize this potential
- Managed Grids: a potential service
- There is a need for standardization
- How to Challenges:
    - obtain consensus to create standards
    - predictable performance
    - predictable costs
    - infrastructure flexibility
    - management of infrastructure
    - security and trust

Session 2: Network QoS and Control

The session moderators [Robert Pulley (FT-Orange) from the OGF and Dick Knight (BT) from the

ITU-T] introduced this session noting that the objective was to set the scene for the Workshop by providing Grid and NGN Tutorials. Specifically these tutorials were to introduce OGF Telco work and ITU-T NGN standards activities.

Keith Knightson (Industry Canada) provided a presentation that focused on answering the question "What is NGN: Architecture". The presentation introduced basic concepts, showed high-level view points and identified architectural challenges. Additionally, a report was given on the current status of the architectural work and the areas for further study were identified.

Marco Carugi (Nortel) provided insights about the ITU-T NGN services and network capabilities that are expected to be supported in NGN Release 1. He then went on to discuss service enablers for NGN and showed that 'capabilities" were intended to be used as re-usable building blocks for services. He indicated that the main sources for these Release 1 enablers were 3GPP and the OMA. The concept of 'open service environments' to allow for flexible and agile service creation, execution and management was also introduced and the intention to align with the Service Oriented Architecture was stated. With the work on Release 1 requirements completed he noted that Release 2 requirements were now underdevelopment

Dave Berry (National e-Science Centre, UK) provided a presentation that focused on answering the question "What is a Grid". He discussed how computing has become a commodity and also showed the relationship of grids to distributed computing. A number of examples of where grids were being used were identified and he identified that grids were bringing new opportunities in the area of middleware. He noted that grid activities were expected to be service oriented architecture and infrastructure aligned.

Franco Travostino (Nortel) provided a presentation which identified a spiral of goodness that showed a relationship exists between infrastructure breakthroughs, large scale service roll-outs, new applications and demand explosions. He then went on to discuss the traits of grid traffic and identified grid requirements posed to the network and how grids could engage the network. He then shared the structure of the OGF and their current work activities.

Richard Schlichting (AT&T) provided a presentation which provided a review of possible Telco roles in grid computing. He then shared information about grid activities occurring in various Telcos. In the remainder of the presentation he provided AT&T's vision related to grids.

These presentations were followed by a Panel discussion and a Q&A: 'What can Grids do for Telcos and what can Telcos do for Grids?'

Conclusions and Recommendations of Session 2:

- NGN fosters:
  - Services separation
    - Location independent
    - Single transport fabric
  - Open service environment
  - Use of reusable capabilities
  - Convergence: wireline and wireless
- NGN Challenges:
  - Transport Control
  - QoS Control
  - Generalized Mobility
- NGN Next Steps - Integration of:

        - Streaming Services including IPTV
        - RFID/Sensors Services
        - Home Network
        - Home Gateway Management
        - Evolution of transport infrastructure
    - Grids:
        - Go beyond distributed computing
        - Straddle disciplines
        - Create new middleware opportunities
        - Create demand for infrastructure
        - Requires engagement of the network
    - Grid Challenges
        - Security and trust
        - Impact on networks
        - Impact on network providers

Session 3: MANAGEMENT, CONTROL AND INTEROPERABILITY ISSUES

The session moderators [Bob Cohen (Economic Strategy Institute) from the OGF and Dave Sidor (Nortel) from the ITU-T] introduced this session noting that the objective was to describe how Grid management and the management control interfaces integrate with the NGN.

Dave Sidor (Nortel) provided a presentation that provided an Overview of NGN Management from an ITU-T perspective. In particular he noted the ITU-T SG 4 management activities. He went on to show how this work was being complemented by the ITU-T SG4's NGN Management Focus Group. He drew special attention to the NGN management specification roadmap and discussed how the management activities were being harmonized across many committees

Horst Dumcke (Cisco) provided a presentation that discussed factoring Network Management into Grids. The presentation first explained what was meant by the phrase "factoring the network into the grid" and then discussed a digital video rendering use case to facilitate understanding of the technical proposal. The presentation also discussed multi-autonomous domain constructs and associated challenges.

Dominique Verchere (Alcatel) provided a presentation that discussed a grid optimized network control plane. He first addressed the requirements placed on carrier networks by grid applications. It went on to talk about current practices and various operational models and the implications and the levels of grid application and network control associated with the various operational models. He then noted that there were synergies between standards organizations that should be tapped to progress this work.

Michael Haley (IBM) provided a presentation that discussed the implications for next generation networks and grid computing to support IPTV and IMS infrastructures. It provided an overview of IPTV, IMS and discussed the emerging Web 2.0. He then went on and discussed his observations related to the applicability of Grids for IP services and made a number of suggestions on how to approach standards development in this area.

Mike Fisher (BT, ETSI TC GRID Chair) provided a presentation that focused on ETSI and Grid Standardization. He provided some background regarding ETSI and the various technical committees it supports. He went on to discuss the current focus of the ETSI TC Grid group and the various resources available to ETSI technical bodies. He then talked about the proposal for a specialist task force on the grid and indicated the standards bodies with which they collaborate.

These presentations were followed by a Panel discussion and a Q&A: 'What are the missing links in NGN management to support Grids?'

Conclusions and Recommendations of Session 3:

- ITU-T views:
  - The NGN Management Focus Group is the focal point for identifying the relevant management specifications from ITU-T and non-ITU-T sources via the NGN Management Specification Roadmap.
  - The work on NGN management based on the relevant output of the world's major SDOs, forums, and consortia has increased the need and opportunity for specification harmonization.
  - The needs of NGN and the influence of requirements based on business processes have already led to a significant evolution of management architecture.
- Grid views
  - Grid and virtualization have strong opportunity to optimize deployments of NGN services and infrastructures for Telcos. SOA (service oriented architectures) are core to migration of legacy services and new IP-based services. Grids, NGN and SOA appear to be consistent in goals of standards-based infrastructures.
  - Lessons from IPTV/triple play, IMS and projections of future Web 2.0, show specific, immediate opportunities for grid/virtualization in Telco environments.
  - Little consideration has yet been given to explore applicability of grid operations to more easily match performance, timing and loading of IP-based NGN services; however, it should be explored.
  - Propose an action item be accepted to match grids vs. NGN services. This may lead to a valuable industry standard or recommendations jointly benefiting the Telco and Grid communities, as well as speed reliably deployments for both.

Session 4: QoS, PERFORMANCE AND SECURITY ASPECTS

The session moderators [Pascale Primet (INRIA) from the OGF and Igor Faynberg (Lucent Technologies) from the ITU-T] introduced this session noting that the objectives were to provide a review on the subject of QoS (Quality of Service) performance and security parameters relevant for Grid applications and NGN, and a review of the requirements from both the users and service provider/network provider perspectives.

Hui-Lan Lu (Lucent Technologies) provided a presentation that discussed QoS as it relates to the NGN. The presentation focused on the drivers and the basic requirements and then moved on to NGN QoS activities with the ITU-T. After these two topics, the presentation moved on to various aspects related to resource and admission control functions.

Martin Dolly (AT&T) provided a presentation that gave an overview of the security activities within the ITU-T. He started off by discussing why there was security needed for NGNs and identified the major security issues. He then went on to identify the various ITU-T groups that were working on security and then focused in on the security activities currently under way in Question 15 of SG 13. He noted that security, authentication and trust models were dealt with in this work.

Pascale Primet (INRIA) provided a presentation that discussed QoS and security issues as they relate to Grids. The presentation discussed grid challenges and the discussion was reinforced with an example. The presentation then tackled the subject of grid security and why security is so hard to implement in a

grid environment. The final topic covered by the presentation was the subject of QoS as it relates to grids. A number of references were to related OGF documents.

Michael Fehse (T-Systems) provided a presentation that talked to the subject of steering via SLAs (Service Level Agreements). It showed how their vision was applicable to IT and the NGN. It suggested that by raising the abstraction level resources can become services and as a result it makes obects self-*able services. This approach was explained in the context of an example.

These presentations were followed by a Panel discussion and a Q&A: *What do QoS and security requirements for NGN and Grid have in common, where do they differ?*

Conclusions and Recommendations of Session 4:

ITU-T Views as to current QoS issues:

- NGN QoS is an active standardization area in the ITU-T
- RACF for dynamic, application-driven resource management plays a central role
  - *Y.2111/Y.RACF* (on the architecture and requirements for Release 1) and *Y.2171/Y.CACPriority* about to be approved
  - RACF protocols are under development in SG 11
  - Draft new Recommendations *Y.123.qos* and *Y.enet* address the application of RACF to Ethernet environments
- Other aspects are addressed by new draft Recommendations underway (*Y.mpm, Y.e2eqos.1, Y.flowreq, Y.RestPriority,* etc.)
- Close cooperation among relevant SDOs is essential to the development of consistent and interoperable standards
- Discussion of the impacts of Grids is in order

ITU-T Views as to current security issues:

- Key distribution (for end-users and network elements) and Public Key Infrastructure
- "Network privacy"—topology hiding and NAT/Firewall traversal for real-time applications
- Convergence with IT security
- Management of security functions, e.g. policy
- Guidelines on the implementation of the IETF protocols, e.g. IPsec options
- Security for supporting access: DSL, WLAN, and cable access scenarios
- Security guidelines for handling multiple access technologies in NGN

Grid Views relating to QoS and security:

- The network is a key component of the Grid
- Specific issues include:
  - High performance in heterogeneous network environments
  - Network control and end to end transfer delay bounds
  - End to end security
  - Optimizing network resource utilization.
- Need a general view of performance control in grids.
- Need more knowledge on real requirements
- Hybrid QoS strategy that combines QoS differentiation and advance reservation
- Still a big research & development topic

Session 5: FUTURE TRENDS AND ISSUES

The session moderators [Dimitra Simeonidou (University of Essex, UK) from the OGF and Reinhard Scholl (TSB Deputy Director) from the ITU-T] introduced this session noting that the objectives were

to identify future trends and issues likely to turn up to support Grid applications and their impact on the standardization framework as well as identify future trends in NGN.

Niranth Amogh (Huawei) provided a presentation that discussed using a Self Adaptive Overlay Network as a means of innovating the NGN Architecture. The presentation started off by discussing the practical issues of grids and the current state of the art and noted that service providers need a solution to meet future requirements and it is important to identify whether the solution is grid technologies. The presentation then provided an overlay vision as a means to meet the anticipated future requirements. It noted that the overlay architecture, which uses an overlay enabled grid, could evolve to encompass the NGN.

Piet Demeester (IBBT – Interdisciplinary Institute for BroadBand Technology) provided a presentation that focused on advanced grid applications. His presentation first discussed why media production was a driver for grids. It then showed how the need for grids would flow naturally to more consumer applications. It pointed out various options for meeting the grid requirements, e.g. optical circuit switching, optical burst packet switching, and the implications of using each. The presentation then went on to discuss the extension of grids to mobile terminals and the need for wireless-thin clients.

These presentations were followed by a Panel discussion and a Q&A: 'NGN and Grids five years from now.'

Conclusions and Recommendations of Session 5:

- Multimedia processing is a major driver for new grid applications
- Multimedia requirements will drive the need for optical solutions, e.g.
  - Optical Circuit Switching (OCS)
  - Optical Burst/Packet Switching (OBS/OPS)
  - Hybrid solutions
- Evolution will occur from the professional market (Media Grid) towards the home/office (Consumer Grid) and mobile market (W-Thin Client Grid) .
- Challenges include scalability, security, and optimization of resource management, both network and no-network resources

Session 6: Wrap-up

The session moderators [Bob Cohen (Economic Strategy Institute) from the OGF and Joe Zebarth (Nortel) from the ITU-T] for the wrap-up session indicated that a summary presentation was available. A number of questions were posed to determine how the committees could better work together and if they had information that should be shared as part of a collaborative effort. The workshop concluded that shared benefits could be obtained by ITU-T and OGF collaboration and it was agreed that documents would be exchanged.

Conclusions and Recommendations of Session 6:

- It was concluded that much valuable information had been shared during the meeting,
- Each group had valuable information that should be immediately exchanged between the ITU-T and the Open Grid Forum,
- Documents to be made available by the Open Grid Forum to ITU-T will be submitted into the ITU-T SG 13 April 2007 meeting
- There would be merit in ongoing future collaboration
- ITU-T and GGF leadership agreed to collaborate on a going forward basis.

ANNEX

Workshop Evaluation Result

Of 84 participants, 27 returned the filled evaluation form. From the respondents, 30% indicated an overall ranking for the Workshop as —very satisfied“, 56% as —satisfied and 14% as —neutral“.

1= very dissatisfied, 2= dissatisfied, 3= neutral, 4= satisfied, 5= very satisfied

The average overall ranking of the Workshop was: 4.1

To the question ‘Would you like to see another event on the same subject?’, 37% of respondents answered ‘yes’ and wanted it in the next 1-2 years, while 27% of the respondents said ‘no’.