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ITU-T

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Report

**ITU-T/ATIS Workshop on Next Generation
Networks**

(Las Vegas, United States, 19-20 March 2006)

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Executive Summary

ITU-T organized a workshop on Next Generation Network Technology and Standardization jointly with ATIS (Alliance of Telecommunications Industry Solutions) at the Mandalay Bay Convention Centre in Las Vegas, USA from 19 to 20 March 2006 prior to the [TelecomNEXT](#) event.

Next Generation Network (NGN) standardization work is now well underway in the ITU-T and ATIS (as well as other standards organizations) to increase quality and service features for users, independent of the underlying transport technology. Following the success of these two organizations to identify and react to industry's NGN standards requirements, and in continuing their commitment to achieve interoperable global standards, this workshop built on the existing relationship between the two organizations to:

- examine the status of the work in both organizations
- identify standards work needed to support ongoing viable businesses for all parties as NGN becomes reality, and
- enhance and extend ITU-T and ATIS cooperation to further coordinate regional and global NGN standardization.

The combined objectives sought to promote successful NGN deployment and the transition from existing networks. A particular emphasis of the workshop was on NGN requirements and standards objectives from a North American perspective and the relationship of these with the global standardization work of the ITU-T.

During the 2-day workshop, 170 participants participated in discussion of business needs which are driving NGN standardization and five technical sessions: 1) ITU and ATIS standardization work 2) Implementable NGN architectures and capabilities 3) NGN Service enablers 4) Signalling and control 5) Interconnection, interworking and evolution.

This workshop achieved common understanding of NGN and good work alignment of work in ITU and ATIS, and reemphasized the importance of the continuing collaboration between ATIS and the ITU-T for the development of international standards in response to the industry's requirements and needs for NGN.

Concrete documents have been identified that will be brought to the ITU by ATIS, like the gap analysis performed by the ATIS FG on NGN.

A number of open issues has been identified in the technical areas of NNI and ANI, Service continuity, wireless-wireline integration, handling of user profiles, evolution of IMS, role of NGN for IPTV and other IPTV related issues. ATIS is expected to paly a major role in this area. On procedural issues further clarification of the release concept and on the issue of options is required.

In addition to a continuation of the good cooperation it was agreed to enhance efforts in the areas of IPTV and ordering/billing and to further improve the mechanisms for cooperation.

Highlights of Technical Sessions

NGN Market Drivers: A Carrier's perspectives

Speakers from major telecommunication companies (AT&T, BT and Quest) shared their views in business needs which are currently driving carriers upgrade to next generation networks and provide innovative applications.

Mr. Medford introduced that AT&T views IPTV as a major market driver to provide converged access and IP-based enhanced features to compete with traditional video delivery service. IP Video standardization will enable applications and services beyond what is available in today's proprietary networks. The transition to NGN will enable carrier to offer new services and expand new markets. He cautioned that standardization beyond the IP layer, e.g. security and customer protection, is required to provide IPTV service connectivity and believes that convergence will continue to happen, given devices are able to communicate over standardized interfaces.

Mr. Foster introduced *BT's perspectives* of critical elements needed for the success of its NGN project 21CN. The 21CN requires convergence, the ability to bring together capabilities and capacities in new ways to make life better, simpler and cheaper for BT's customers. BT is required to diversify their service offerings to include ICT, Mobile and IPTV. Customers demand speed, service, and no or low cost access. BT has responded with the development of the 21CN NGN project to rollout and upgrade products, services and process. BT has identified three core strategic objectives for the NGN: reduce cost, speed time to market for new services and give the customer more control. Standards are critical to the success of 21CN and BT is participating in the development of standards at the ITU-T, ETSI and ATIS. BT's needs for standardization include a common definition of NGN, the coordination of standards (removal of duplication, filling of gaps), the progress of ATIS work from the NGN-FG to working groups, the development of a global set of recommendations from the ITU-T, and the timely delivery of usable standards for BT can procure against.

Mr. White presented Quest's vision of NGN as customer centric which gives the customer control over services by centralizing user profile information and by providing device agnostic access to applications. Service providers should serve mass market through high-volume core services and niche communities through wholesale bundles to ASPs (Application Service Provider). Services should be delivered independent of access with consistent experience. Standardization needed is in the following areas:

- Multi-Service Profile (Media Services, WWW)
- Access Independence & Mobility
- End-to-End QoS
- Inter-provider Business Model & Connection

Session 1: ITU-T/ ATIS, update on NGN Activity

Mr. Brain Moore provided an overview of the NGN standardization activities in the ITU-T and introduced the ITU-T NGN Global Standards Initiative (NGN-GSI). NGN work in the ITU-T started in Study Group 13 mid 2003. ITU-T Director launched the NGN Focus Group in June 2004. The NGN Focus Group, at end of 2005, handed over its results to Study Group 13 and other relevant study groups to continue the development of global NGN standards under the banner of the NGN Global Standards Initiative (NGN-GSI). At each GSI event, a Technical and Strategic review (TSR) will take place, a function previously not performed that will provide consistency of the technical work. An NGN Release 1 Scope document has been developed which provides an overview of the major components. The details including the interfaces between NGN and user functions, between NGN and network nodes, and between NGN and 3rd party application

providers, are described in FGNGN-FRA (Y.NGN-FRA) – Functional Requirements and Architecture of the NGN. An interactive online project management database for NGN work items and deliverables will be online to indicate relevant work in hand and deliverables from the various standards organisations.

Mr. Jeffries provided an overview of NGN activities of ATIS. He noted the work being done within every level of ATIS structure: the Board of Directors, TOPS Council, and Committees. The NGN-FG, commissioned by the TOPS Council to develop an ATIS set of requirements for NGN, has completed a comprehensive analysis of NGN standards with a focus on the North American market. Part I of this analysis documented the broad requirements for the NGN, while Part II identified the key NGN service enablers to meet those requirements. Part III about to finish provides a standards gap analysis for the highest priority service enablers. Multiple ATIS committees are engaged in the development of NGN standards. The NGN activities taking place within ATIS provide the global arena with the unique North American user and regulatory perspective ATIS will continue to work together with the ITU-T to achieve harmonized NGN-related specification and standards. ATIS has sent contributions to ITU on frameworks and requirements and is becoming full sector member of ITU-T. This joint workshop is to identify tools and mechanisms for closer collaboration between ATIS and ITU-T.

Session 2: An Implementable NGN Architecture and its Capabilities

Mr. Bailey provided an overview of the ATIS objectives regarding NGN architecture, and the resulting technical approaches. ATIS has defined that NGN Architecture should be IP Based, Multimedia Capable, contain an IMS Based Core, provide Services Capable of Continuity, be supported by Multiple Networks and Carriers and include Emergency Services and Government Support. A number of organizations including ITU-T, ATIS, ETSI, 3GPP have undertaken NGN standards work. The future standardization areas include Network-to-Network Interconnection and Interworking, Application Server Interface Functionality, Service Continuity across different access modes and between different operators and Wireless-Wireline Integration for portable service with continuity across different access networks.

Mr. Igor Faynberg presented the ITU-T work on NGN Security and its relationship to other SDOs. He highlighted the security-related outputs of NGN Focus Group including the *Security Requirements for NGN Release 1*, and *Guidelines for NGN Security Release 1*. He also introduced the recent starting of the SG 13 Security work, and top NGN security issues for the future work will be Key distribution (for end-users and network elements) and Public Key Infrastructure, “Network privacy”—topology hiding and NAT/Firewall traversal for real-time applications.

Mr. Dave Sidor summarized the SG4 work of Network Management: M.3060 NGN Management, M.3050 Business Process Architecture, M.3060 NGN Management Logical Layered Architecture, and M.3016 Security of the Management Plane. Many of these functions are not new but carried over from previous architectures. M.3016 Security of the Management Plane is based on work from the ATIS TMOC on T1.276. The ITU NGNMFG was formed to address several FCAPS (Fault, Configuration, Accounting, Performance, and Security Management) management interfaces. It is a collaboration of SDOs (including ATIS and ETSI), and forums. Its main deliverable is the Management Specification Roadmap. Both a protocol neutral and protocol specific version of interface specification will be created. Harmonization activities are occurring in architecture; alarm reporting; state management; accounting charging and billing (ATIS TMOC and 3GPP application guidelines); Information models; and XML based framework and models.

Ms. Lu introduced the NGN QoS study in ITU and mentioned ATIS has been an active contributor. NGN QoS standard’s key goal is to develop an end-to-end QoS solution that allows incremental deployment. In ITU-T, several related work items are ongoing, including: *Y.racf*, the approach of dynamic application-driven resource and admission control to support performance assurance and

network border control; *Y.123.qos* and *Y.enet* apply RACF to specific environments; *Y.pmm*, the basic framework for inter-domain performance measurement and management; QoS and *priority*, further support emergency telecommunications services. To develop consistent and interoperable mechanisms, which are essential for effecting end-to-end QoS, cooperation among related standards efforts across SDOs is critical.

Session 3: NGN Service Enablers

Mr. McEachern overviewed the output of the ATIS NGN-FG gap analysis with a focus on the key NGN service enablers. The ATIS NGN-FG identified 19 “enablers” to the NGN, the functionality provided by these enablers, and the key standards gaps associated with them and proposed work items for each enabler. Actionable work items were proposed for Unified User Profile, Service Transparency, QoS, Resource and Admission Control, DRM, and Emergency Services.

Mr. Wright introduced the ATIS IPTV Interoperability Forum (IIF). IIF was established in June 2005 and has undertaken work in developing Architecture Requirements and Reference Model, addressing Interoperability issues in Content Security (DRM) and identifying QoS Measurement Points, Metrics and Methods. The Architecture group is working three issues including Requirements & Roadmap, Packet Loss, and Definition of Reference Architecture. The DRM Task Force is working on completing DRM Requirements. The QoS Metrics Task Force is currently working on a QoS Metrics document.

Mr. Ohta presented the latest standardization status on Ethernet OAM and protection switching which will enhance advantages and attractiveness of Ethernet as a transport technology for NGN. In order to realize "carrier class" Ethernet, ITU-T SG13 developed Recommendation Y.1731 on Ethernet OAM mechanisms with close collaboration with IEEE 802.1ag. It was consented in January 2006 and is under AAP (Alternative Approval Process) now. This Recommendation specifies fault management OAM functions as well as performance management OAM functions. To enhance reliability of the Ethernet, Recommendation G.8031 on Ethernet protection switching was consented in February 2006 and is under AAP now. It specifies 1+1/1:1 bidirectional protection switching and 1+1 unidirectional protection switching.

Mr. Visser pointed out in his presentation the number of mobile subscribers continues to grow rapidly globally while the number of fixed subscribers is declining or, at best, growing slowly. Operators see opportunities for providing innovative new services as well as cost reductions through integrating previously diverse environments (fixed, mobile, data, entertainment) towards a converged infrastructure. NGN network infrastructure is based on key concepts and architectures developed in the mobile community and extended to additional access interface capabilities and new services. There is clear consensus on evolution to an IP-based access-independent core network infrastructure. Fix-Mobile convergence requires underlying transport converging on IP/SIP and IMS network architecture. The SGs involved in the ITU NGN-GSI have four questions on convergence and are working on joint deliverables.

Mr. Noah Luo introduced Next Generation of Multimedia Terminals with emphasis on the envisaged impacts on networks and NGN standardization. The next generation multimedia terminals must have the capability to provide high quality media contents using different compression Standards, intensive media processing, error-resilient transport, interworking with legacy MM protocol and support downloadable service features. Driving technologies behind the demand include multimedia compression, transcoding, error-resilient transport, 3DAV, HD display, wireless and Multi-modal man-machine interfaces. ITU-T SG 16 is now working on new multimedia standard H.325 and a requirements document is available. Key working areas in H.325 are streaming media based services, enhancement of H.248, error resilient QoS support, end to end QoS and QoE, and audio codec convergence. Open issues include the relationship of H.235 with

IMS, interaction with non-session based services, and the possible use of P2P mechanisms and grid computing.

Session 4: Signalling and Control

Mr. Mainwaring provided an overview of using the IP Multimedia Subsystem (IMS) as the basis for the NGN with specific emphasis on the role of the Resource and Admission Control Function (RACF). The ETSI and ITU configuration are in sync in most areas, but for RACS/RACF and some other aspects of the service and transport stratum more alignment work will be done.

Mr. Shaikh provided an overview of the signaling architecture being pursued within the ATIS PTSC which will be used in and to transition to the NGN architecture. Some specific areas of difference between the ITU-T and ATIS versions are highlighted. He also described several example call flows to illustrate signaling and control.

Mr. Dolly examined the support of Emergency Services, both government (e.g., ETS) and civil (e.g., E911), in Next Generation Networks. The special needs of Emergency Services including priority routing of the IP packets were highlighted. ETS Call flows and the continued needs for the architecture were described. ATIS is addressing IP-ETS and Packet Priority Marking within PTSC. IP-ETS Phase 1 is in the approval process. Packet Priority Marking is in the letter ballot process. An issue statement for IP-ETS Phase 2 has been approved and work will be done in conjunction with ITU-T SGs 11 and 13. Phase 2 has an emphasis on Authentication and Security.

Ms. Humphrey described the needs to IMS for fixed-mobile convergence. IMS work started at 3GPP in 1999 and it was defined for the mobile network. To use IMS in fixed network there must be support for the legacy networks and multiple access technology. Missing elements must be addressed such as alternative authentication procedures, additional signaling information for Location management, different resource reservation at the access, network access security, and support of NAPT. Work to define these enhancements currently in progress in ITU-T Study Group 11 and 13.

Session 5: Interconnection, Interworking and Evolution

Mr. Erzol described Service Provider needs for both the User to Network Interfaces for Individual SIP Endpoints such as an IP Phone and Aggregate Endpoints such as an IP PBX. For individual Endpoints, a baseline profile is needed as well as support for service customization to enable Service Providers to offer VoIP services to customers using a broad range of IP devices while preserving the current ease of use of TDM phones. For Aggregate Endpoints a baseline profile is also needed as well as interoperability with IMS. For both types of endpoints a common codec is needed to avoid transcoding, which includes good legacy PSTN support, good quality at low bit rates, commonality across Wireline/Wireless, and be high-quality to drive adoption of VoIP and advanced applications.

Mr. Ohba explained a signalling profile at the Network-to-Network Interface (NNI) will help spread the Next Generation Networks smoothly while retaining a high possibility of interoperability among different carriers. This presentation examined the service-level signalling (i.e., SIP and SDP description) profile for the NNI, as well as the related standardization activities. It is one of the most important areas of ATIS/ITU-T collaboration.

Mr. Helms noted in his presentation that session border control is a heatedly debated issues causing confusion among many. Session border controllers are implementations of session border control functions. S/BC is not an explicit function of 3GPP IMS Architecture but is explicitly identified in

the ATIS Functional Architecture and Interfaces. It is essential to adopt a consistent view across SDOs as to terminology and the “proper” level of granularity to utilize in discussing S/BCs.

Mr. Andreev noted the necessity of conformance, compatibility, and interoperability testing for the NGN for protocols and services for equipment and the network. Testing should take place on distributed and dedicated model networks in a similar way to how products and services are tested for a non-NGN environment. ITU-T is developing testing principles for model networks through several questions.

Mr. Singh suggested in his presentation that a definition of which authentication requirements must be supported in the NGN should be developed now, and not retrofitted later. Authentication must occur across UNI, NNI, and ANI. Authentication must be developed for Network Access, Service/Application, Network-to-Network, User Peer-to-Peer, User Authentication of Network, and 3rdParty Provider.

Closing Session: Wrap-up & Next Steps

At the end of the workshop, Helmut Schink and Art Reilly reviewed the outcome of the workshop and discussed how to focus effort on standardization for home networking. Key conclusions from this and all the other sessions are identified below.

Open Issues

NNI and ANI need to be fully specified to allow inter-operator interconnection and rapid service deployment. Stage 1, 2 and 3 (implementable) specifications are required incl. QoS, security, and network/service management across operators and incl. charging billing aspects. The business models for interconnection are still evolving (shared backbone vs. p2p), standards need to provide support

Service Continuity across different access modes and locations (mobility) and between different operators for Wireless-Wireline Integration, Common Services (Portable) and continuity across different access networks needs to be specified.

Further questions that need clarifications are:

- Handling of user profiles/centralized data base
- Release concept needs to be fully implemented
- Will IMS need to evolve towards a modular approach with extensions?
- How can UNI standards best enable innovation in user appliances/devices used in NGNs
- What is the role of NGN for IPTV and should NGN support of non-SIP applications? Work on IPTV should re-use of building blocks / NGN service enablers and cover performance requirements for media channel and control issues like channel change time and support of X-casting

Other IPTV issues need to be covered like the definition of IPTV, DRM for streaming and peer-to-peer file sharing and security issues, such as protection from viruses and spyware

While standards gaps need to be filled, agreement is also needed where multiple standards exist (includes selection among options)

Next steps

ATIS and the ITU-T will continue good and close cooperation on common technical specifications, wherever possible and consider other advanced areas. They will work together to leverage areas of ATIS leadership, e.g. on IPTV interoperability, including DRM, and Ordering and Billing. They will further consider appropriate mechanisms/platforms, e.g. additional Joint ATIS-ITU Workshops, ITU-T Focus Groups, new work areas and the further use of Release concept. Several challenges /opportunities need coordinated action within the ITU like IPTV, home networking and networked RFID.

ANNEX

WORKSHOP EVALUATION RESULT

Of 170 participants, 43 returned the filled evaluation form. From the respondents, 21 % indicated an overall ranking for the Workshop as “very satisfied”, 51% as “satisfied and 12% as “neutral”.

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

The average overall ranking of the Workshop was: 4.1

44% of respondents would welcome another ITU_T workshop on the same subject in the next 1-2 years