# ITU-T NGN Workshop in Collaboration with IETF –

# Joint ITU-T / IETF Report

ITU Headquarter, Geneva, 1-2 May 2005

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# Workshop Summary

The meeting succeeded in allowing the IETF participants to better understand the scope and goals of NGN (which is seen by the ITU-T as the future direction of global network evolution leading to a multi-service, assured quality, secure, IP-based network), and in allowing the ITU-T participants to better understand the architectural view of the IETF (especially its view that IETF technology offers a substrate of protocol elements on which various forms of future network can be built). Briefly summarizing the findings from each session, we can state that

- The functional architecture of NGN places emphasis on the nature and quality of end to end service provided by the network, whereas the Internet protocol suite tolerates partial network failure and places the burden of end to end service on the end systems.

- The NGN approach to nomadicity and mobility envisions a convergence between wireless and wireline control architectures, maintaining traditional telecommunications access control, reliability, and public service requirements, whereas the IETF approach is focused on building specific nomadicity and mobility protocols that can fit into many architectures.

- NGN regards QoS and session signalling as a basic network feature, whereas the Internet protocol suite regards them as add-ons on top of a basic best effort service with no signalling.

- Partly as a result of the previous point, NGN has a broader approach to network management than the IETF, which tends to concentrate on device monitoring and configuration rather than on end to end or systems management.

- The NGN view of security is summarized in X.805, whereas the IETF has been focussed on multiple simultaneous efforts to improve security of all fundamental Internet technologies.

- As ITU-T develops its NGN architecture and associated standards, it is important that its requirements are coordinated with the appropriate Areas and WGs in the IETF.

In summary, there is scope for further dialogue to increase mutual understanding of requirements and capabilities. In particular, in the technical areas of mobility, QoS, management, and security many detailed topics for discussion were identified. It is important to ensure that IETF technologies take proper account of NGN (and that any extensions to the Internet protocols do not cause unintended side effects) and that the ITU-T recognizes the constraints of the Internet architecture when utilizing IP-based networking within the NGN.

The meeting adjourned with a spirit of cooperation exhibited by both organizations.

# Highlights of Technical Sessions

Each session was co-chaired by a representative from IETF and ITU-T. Representatives from both ITU-T and IETF gave presentations to highlight the work under way in the two organizations.

## *Session 1 – Requirements and Functional Architecture*

Session 1 led off the technical sessions, and focused on the broad area of general architecture, considering both the goals of the ITU's NGN project and of the Internet.

Given the breadth of the topic, the bulk of the discussion focused on the implication of principles such as the End-to-End principle on the architectural futures for both NGN and the Internet. For example, Mr. Meyer's presentation contained the following formulation of the End-to-End principle:

> *"Nothing should be done in the network that can be efficiently done in an end system."*

which sparked an interesting debate on how the End-to-End principle interacts with architectures such as IMS, as well as what constitutes a "service" in the NGN context.

Mr. Knightson's talk outlined the basic architectural definitions and tenets of NGN. In particular, ITU-T Recommendation Y.2001 states that an NGN is:

> *"A packet-based network able to provide telecommunications services and able to make use of multiple broadband, QoS-enabled transport technologies in which service-related functions are independent from underlying transport-related technologies."*

Other topics that were discussed included:
- The notion of the separation of services from transport, and the differences in NGN and IETF perspectives on this point, including:
  - Removal of vertically integrated networks (sometimes called "convergence")
  - Re-distribution of service intelligence
- Functional Architecture
- End-to-End Architecture Issues
- Overview of services in NGN Release 1
- Changing environment (past, present, and future)

The session did not address the complexity of solutions being proposed, or the operational issues which arise from such complexity.

The session ended with a discussion of opportunities for joint collaboration, including identifying those areas that could be further discussed and procedures for collaborative work between the IETF and the ITU-T.

## *Session 2 – Nomadicity and Mobility*

Mr. Lathia's talk described the NGN vision of an IP-based mobile network and noted some of the differences between the traditional mobile telephone network and Internet-based services. He noted that traditional telephone mobile networks tend to be heavily regulated to ensure very high reliability and support for emergency communications and location among other goals. He also described the ISIM subscriber authentication technology and its advantages, which include roaming support, fraud protection, network access control and maintaining user profile information.

Mr. Hardie noted that the IETF tended to develop technological building blocks that could be used in many applications rather than subsets of an overall coherent architecture because the building block approach permitted more flexibility and the building blocks, if carefully designed, could work with many architectures. He then described some of the IETF technologies which can be used to support nomadicity and mobility including IPv4 and IPv6 mobility, SCTP as well as virtual private network support and tunnelling technologies. He also mentioned that additional IETF efforts were underway that will be useful in the areas of nomadicity and mobility such as the Host Identity Protocol, IPv6 multi-homing and the Shim6 mobility effort. Finally Mr. Hardie described the IETF work in service delivery such as the SIP presence work and the triple-A work with Diameter and Radius extensions.

Mr. Zhang described fixed-mobile convergence (FMC) which is the trend towards integrating wireless and wireline networks and services to create a unified telecommunications system. He noted that there were four aspects of the convergence: commercial, service, network and terminal. He then described the NGN IMS-based convergence solution and provided some examples of what the results of the conversion will be. Mr. Zhang noted that there were still some open issues remaining to be resolved including user identification, authentication and authorization, interoperability between types of networks, numbering, and handoff mechanisms. He provided an overview of which Standards Developing Organizations (SDOs) were working in the various areas impacted by FMC.

Finally, Mr. Tschofenig reviewed the IETF geographic location and privacy work. He said that the IETF geopriv working group had standardized a location object that can be used by many applications -- this location object includes a set of privacy rules by which the user can describe how the location information can be used. He described the generalized geopriv architecture and noted that the geopriv technology can be used to augment presence-based applications such as selecting the proper emergency response center for emergency (e.g. 911) calls. Mr. Tschofenig noted that the location information could come from the network or from the end host.

There was a general feeling that there is a significant overlap of areas of interest and that there were issues that the IETF and ITU-T could work together.

## Session 3 – QoS, Control and Signalling

The session addressed three issues of importance in achieving reliable Quality of Service (QoS) in IP-based multi-service, multi-provider networks:
- User requirements for the key IP applications (including voice)
- Network mechanisms for traffic control and resource management
- Signaling technologies to relate the requirements with the mechanisms in setting up IP flows.

Regarding user requirements, it was noted that ITU-T has standardized a set of QoS Classes for current IP applications in Recommendation Y.1541. These requirements have been adopted for use in the ITU-T's Focus Group on Next Generation Network (FGNGN). In IETF, the Diffserv Basic Service Classes (BSCs) are in development as guidelines.

Regarding network mechanisms, it was noted that multiple resource management structures can be supported by IETF-defined network protocols. Examples cited were RSVP-TE, MPLS-DSTE, Diffserv PHBs and PDBs, and aggregation structure designs.

Development of IP QoS signaling to link QoS requirements with resource management protocols is currently in progress. Signaling solutions may be path-coupled or path-decoupled, end-to-end or

hop-by-hop. ITU-T has defined technology-agnostic IP QoS signaling requirements in Q-Series Supplement 51. In ITU-T/FGNGN, current QoS control work is focused on (1) resource and admission control signaling architecture and (2) filling standards gaps in performance measurement and management. In IETF, current QoS control work is focused on (1) resource management protocol completion, deployment, operation, and refinement and (2) the NSIS protocols, including NTLP, NSLP, NAT/firewall transversal, and extensibility.

It was observed that ITU-T/IETF collaboration on QoS has generally been healthy and fruitful. The QoS metrics defined in ITU-T SG 13 and IETF IPPM are largely compatible. An Y.1541 QoS class model for NSIS is under development, and is fully compatible with the NSIS design. Results of respective ITU-T/IETF groups could support implementation of an evolvable path-coupled QoS solution. The groups have the same users and their outputs will be deployed synergistically into the same networks.

## Session 4 – Network Management

The NGN Management Focus Group (NGNMFG) is the focal point for identifying the relevant management specifications from ITU-T and non-ITU-T sources. Initial specification candidates to be included in the NGN Management Roadmap are under evaluation, with the initial Roadmap due September 2005.

The identification of the relevant management specifications is highly dependent on the identification of the NGN functional and physical entities to be managed which is hampered by the abstract nature of the current NGN architecture. Clarifying contributions to the NGNMFG are essential.

NGNMFG discussions on NGN management based on an examination of the relevant output of the world's major SDOs, forums, and consortia have shown the need and opportunity for specification harmonization. The NGNMFG is expected to identify where such a need exists and encourage appropriate harmonization.

As evidenced by the progress of work in ITU-T SG 4, the needs of NGN and the influence of requirements based on business processes have already led to a significant evolution of management architecture.

The scope of NGN management is much broader than the current IETF work in this space. That is, the IETF has a lot of focus on element management protocols and on element instrumentation for management. The ITU-T and the NGN NM efforts also look at the Network Management Layer, The Service Management Layer and the Business Management Layer.

The IETF presented several technologies for consideration for NGN NE (network element) interfaces supporting monitoring, configuration, and security. If any of those IETF technologies do not meet NGN NM requirements, then NGN participants are welcome to present those requirements in the relevant IETF Working Groups (WGs) and develop solutions within those WGs in the IETF.

IETF participants interested in NGN management should contribute relevant IETF specifications to the NGNMFG. Similarly, NGN folk interested in Network Management should check the IETF NM protocols and related work as published in various RFCs and as being produced in various IETF Working Groups.

## Session 5 – Security

As expected, the discussion was both heated and productive; certain aspects of the discussion (such as authentication and authorization for QoS requests), were, in fact carried over from the QoS Session of the previous day. The ITU participants suggested that X.805 (in some form) be brought into the IETF, both for IETF review and perhaps to incorporate into the IETF security architecture. (Subsequent note: ITU-T SG 17 had sent IETF the pre-published version of X.805 in a liaison statement https://www.ietf.org/IESG/LIAISON/itut-sg17-ls-x805-end2end-communications.pdf. The published ITU-T Recommendation differs only in editorial corrections from the pre-published version which dates from 2003.)

## *Session 6 – Evolution*

Discussion centred on the need to proceed by stages (of evolution), not through "revolutionary steps". Clearly, this session represented only the beginning of discussion in order to be able to elaborate an understanding of (all) requirements for future networking.

There was discussion of, and diverging viewpoints raised with respect to, expectations of appropriate financial models and traffic flows. These are related in terms of ensuring appropriate means for authorization and management (within the network), as well as legal and external management of organizations supporting the network.

Considerable discussion focused on the (real or logical) separation of data and control planes within the network.

There was general agreement that ongoing interaction and discussion (over time) are still the best mechanisms for evolving NGN and its use of IETF protocols.

All sessions and conclusions of the event are now available on the web http://www.itu.int/ITU-T/worksem/ngn/200505/index.html and ITU is hosting an audio-archive of this event at: http://www.itu.int/ibs/ITU-T/ngn05/index.html.

# ANNEX 1

## Workshop Programme

1 May 2005

**09:15 – 09:30   Opening Session**
   Mr Houlin ZHAO, Director of Telecommunication Standardization Bureau, ITU
   Mr Brian MOORE, Chairman of ITU-T SG 13 (NGN)
   Mr Brian CARPENTER, Chairman of IETF

**09:30 – 11:00   Session 1: Requirements and Functional Architecture**
   Co-chairmen:
   (ITU-T) Mr Dick KNIGHT, BT
   (IETF) Mr Dave MEYER, Cisco Systems
   9:30 – 10:30   Presentations
   (ITU-T) Mr Keith KNIGHTSON, Industry Canada
   *Basic NGN Architecture Principles and Issues*
    (IETF)   Mr David Meyer, Cisco Systems
   *A Brief Overview of the IETF and the Internet Architecture: Past, Present and Future*
   10:30 – 11:00   Discussion

**11:30 - 13:00   Session 2:  Nomadicity & Mobility**
   Co-chairmen:
   (ITU-T) Mr Naotaka MORITA, NTT
   (IETF) Mr Scott BRADNER, Harvard University
   11:30 – 12:30   Presentations
   (ITU-T) Mr Kirit LATHIA, Siemens
   *Mobility vs. Nomadicity: IETF Protocols for Mobile Communications*
   (IETF)  Mr Ted HARDIE, Qualcomm
   *Overflight of IETF work enabling Mobility and Nomadicity:  The view from 10km*
   (ITU-T) Mr Bao Feng ZHANG, Huawei Technologies
   *Fix Mobile Convergence's Standardization*
   (IETF)  Mr Hannes TSCHOFENIG, Siemens
   *Geographical Location and Privacy at the IETF*
   12:30 – 13:00   Discussion

**LUNCH BREAK (sponsored by Cisco Systems)**

**14:30 - 16:00   Session 3: QoS, Control & Signaling capabilities**
   Co-chairmen:
   (ITU-T) Mr Neal SEITZ, Institute for Telecommunication Sciences (ITS)
   (IETF) Ms Allison MANKIN, Shinkuro Inc.
   14:30 – 15:30   Presentations
   (ITU-T) Ms Hui-Lan LU, Lucent Technologies
   *Quality of Service Standardization for Next Generation Networks*
   (IETF)  Ms Allison MANKIN, Shinkuro Inc.
   *Overview of IETF QoS*
   (ITU-T) Mr Keith MAINWARING, Cisco Systems
   *NGN Focus Group Activities -- Resource and Admission Control*
   (IETF)  Mr Hannes TSCHOFENIG, Siemens
   *Next Steps in Signalling (NSIS) QoS Applications*
   15:30 – 16:00   Discussion

**COFFEE BREAK (sponsored by Cisco Systems)**

**16:30-18:00   Session 4: Network Management**
  Co-chairmen:
  (ITU-T) Mr Dave SIDOR, Nortel Networks
  (IETF) Mr Bert WIJNEN, Lucent Technologies
16:30 – 17:30   Presentations
  (ITU-T) Mr Dave SIDOR, Nortel Networks
  *ITU-T Overview of NGN Management*
  (IETF)   Mr Bert WIJNEN, Lucent Technologies
  *Overview of IETF Network Management Activities*
  (ITU-T) Mr Leen MAK, Lucent Technologies
  *NGN Management – En Route to Convergence*
17:30 – 18:00   Discussion


2 May 2005


**09:00 - 10:30   Session 5: Security Capabilities**
  Co-chairmen:
  (ITU-T) Mr Igor FAYNBERG, Lucent Technologies
  (IETF) Mr Jon PETERSON, Neustar
09:00 – 10:00   Presentations
  (ITU-T) Mr Zachary Zelstan, Lucent Technologies
  *ITU-T Recommendation X.805 and its application to NGN*
  (IETF)   Mr Russ HOUSLEY, Vigil Security
  *IETF Security Overview*
  (ITU-T) Mr Jiashun Tu, ZTE
  *Next Generation Network Security (Direction and Status of FG NGN Work)*
  (IETF)   Mr Jon PETERSON, Neustar
  *Securing Real-Time Communications*
10:00 – 10:30   Discussion


**COFFEE BREAK**


**11:00 - 12:30   Session 6: Evolution**
  Co-chairmen:
  (ITU-T) Mr Keith DICKERSON, BT
  (IETF) Ms Leslie DAIGLE, Verisign
11:00 – 12:00   Presentations
  (ITU-T) Mr Ghassem KOLEYNI, Nortel Networks
  *Evolution to NGN*
  (IETF)   Ms Leslie Daigle, Verisign
  *Macrocosm and Microcosm of Internetwork Evolution*
  (ITU-T) Mr Keith DICKERSON, BT
  *The Future Packet-Based Network (FPBN) – Issues & Questions*
  (IETF)   Mr Gonzalo Camarillo, Ericsson
  *SIP Evolution*
12:00 – 12:30   Discussion


**12:30 - 13:00   Wrap-up Session**
  Co-chairmen:
  (ITU-T) Mr Chae-Sub LEE, ETRI
  (IETF) Mr Brian CARPENTER, IBM

# ANNEX 2

## Workshop Evaluation

227 people registered for the one-and-half day workshop. 69(30%) of the participants returned the evaluation form.   The average overall ranking of the Workshop is 4.1 on a scale of 1 (very dissatisfied) to 5 (very satisfied).