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QoS STANDARDS FOR IP-BASED NETWORKS

Quality of service (QoS) has been a subject of active research and standardization since the advent of telecommunications technology. The International Telecommunication Union — Telecommunication Standardization Sector (ITU-T) has done much work on QoS, whether in relation to performance metrics, network mechanisms to deliver the required performance, or a comprehensive definition.

It has been widely assumed that today's circuit-switched and packet-switched networks will gradually be put together in an Internet Protocol (IP)-based infrastructure that carries both public switched telephone network (PSTN) and traditional Internet application traffic. This convergence scenario has great appeal: it offers both cost savings through technology consolidation and industry growth through new service creation. However, the convergence is slow to materialize. From a technical viewpoint, the major stumbling block has been QoS. Traditional IP networks take a best effort approach to quality, affording users a fair share of the available network resources, but not ensuring that any particular performance levels will be met. The best effort paradigm has been spectacularly successful in supporting non-real-time data applications such as email and file transfer, and has been extended to near-real-time multimedia applications such as audio/video streaming and Web browsing. Given the current abundance of bandwidth on many routes, the best effort paradigm even meets the needs of many users today for interactive voice telephony and other real-time applications. However, with its inherently connectionless and stateless nature, guaranteeing service or network performance in an IP network is much more complex. This explains why IP QoS remains a subject of ongoing standardization in the ITU-T, Internet Engineering Task Force (IETF), and other standards bodies. To realize the full benefits of convergence, future IP-based networks will need to implement new resource sharing paradigms capable of reliably providing differentiated QoS to a large and diverse set of end user applications.

The articles in the standards column on QoS standards in IP-based networks address standard performance metrics and QoS classes, standards-based performance measurement technologies and measurement results, and standards requirements for QoS signaling including the QoS architecture work. Neal Seitz, who leads standardization on the network performance issues as Chair of WP4 ITU-T SG13, kindly suggested possible authors on QoS standards issues.

The introductory article, "QoS Standards for IP-Based Networks" by N. Seitz, describes ITU-T SG 13's development of Recommendations Y.1540 and Y.1541 on IP performance parameters and QoS objectives for IP-based networks. Recommendation Y.1540 defines the parameters to be used in specifying and assessing the speed, accuracy, dependability, and availability of IP packet transfer in international data communications. Recommendation Y.1541 specifies numerical values to be achieved, on international IP network paths between end user terminals, for each of the key performance parameters defined in Recommendation Y.1540.

The second article, "Standardized Active Measurements on a Tier 1 IP Backbone," by L. Ciavattone, A. Morton, and G. Ramachandran describes a networkwide measurement system currently in operation on a tier 1 ISP backbone. It describes the measurement design, with the goal of detecting and characterizing network performance degradation events in dimensions relevant to nontraditional IP network applications. The platform allows quick deployment and evaluation of new metrics for packet transfer performance in addition to the standard metrics.

The last article, "An Architectural Framework for Support of QoS in Packet Networks," by I. Faynberg and H-L. Lu describes an overview of the effort underway in ITU-T SG 13 on an architectural framework for QoS support in packet networks, with a focus on IP. It also provides pointers to standards efforts dealing with specific QoS network mechanisms.

The Guest Editor would like to express his sincere thanks to the authors for their hard work on these articles, and to the reviewers who include Arthur Reilly, Brian Moore, Chae-sub Lee, Chuck Dvorak, Hyungsoo Kim, Mark E. Perkins, Masato Okuda, Percy S. Tarapore, Richa Malhotra, Toshio Soumiya, and Yoshitoshi Kurose, for their helpful remarks that contributed to the outstanding quality of the articles.

BIOGRAPHY

YOICHI MAEDA [M] (maeda@ansl.ntt.co.jp) received B.E. and M.E. degrees in electronic engineering from Shizuoka University, Japan, in 1976 and 1978, respectively. Since joining NTT in 1980, he has been engaged in research and development on access network transport systems for broadband communications including SDH, ATM, and IP. From 1988 to 1989 he worked for British Telecom Research Laboratories, United Kingdom, as an exchange research engineer. He currently leads the Global Strategy and Business Access Systems Groups in that Optical Access Systems Project of NTT Access System Laboratories. Since 1989 he has been an active participant in ITU-T SGs 13 and 15. He is currently serving as vice-chair of ITU-T SG13, chair of WP3 of ITU-T SG13, and chair of OAN-WG of FSAN. He is a member of the IEICE of Japan. He has several publications on B-ISDN standards including *Introduction to ATM Networks and B-ISDN* (Wiley).