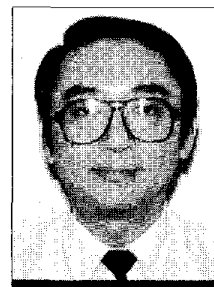# Broadband Service Concepts, Markets, Technologies, and Trials

Geng-Sheng Kuo

*A*t ICC '98, there was an SAS session, entitled "Broadband Services," which consisted of five speakers from the telecommunications industry and one speaker from the data communications side. The session inspired many discussions and interests. After that, there was a strong request from attendees to publish a feature topic in *IEEE Communications Magazine* discussing the most important aspects and advancements in broadband services.

In the communications industry, the ultimate goal is to provide customers with a variety of versatile broadband services. Here, the term broadband services does not only mean multimedia services, but also refers to interactivity and universal characteristics. As a fascinating buzzword the term has already been publicized for many years; all customers and providers are enthusiastic for the services. However, in real global networks we are still eagerly waiting for their deployment. Originally, broadband services were targeted to the traditional telecommunications networks based mainly on ATM and SONET. As technology has evolved, it is now very clear that the real broadband services will be first deployed and provided in future IP networks. Due to advancements of new information representation and networking technologies, the Web has been promoting strong consumer demand for broadband services and is driving the emergence of global multimedia services.

The objective of this feature topic is to provide the communications community with an open forum for discussing broadband services, including their current status, potential future directions, innovative concepts, state-of-the-art frameworks, etc. It is our expectation that recent field experiment results, important architectural issues, and future networking proposals can be compiled and shared by all interested parties.

After careful and serious review of all related information sources, it is our conclusion that the basic global broadband service infrastructure is still under development. Although we have a variety of concepts, thoughts, visions, and plans, the real operational infrastructure needs time to

shape its minimal maturity. The real product-oriented broadband services are fewer than what we expected. The most crucial obstacles are still the so-called last-mile infrastructure, insufficient bandwidth, QoS issues, video-server technology, simultaneous sharing capacity, etc., all of which need to solve issues of time, cost, and effort.

The key to the success of broadband services is the consumer. In recent years, the consumer's need for broadband services has been made very clear. A wide range of their applications to many different businesses are determined and developed day by day. For example, there is a global demand for Web-based broadband services. However, the last-mile infrastructure hinders consumers from accessing the needed broadband services. In other words, the real market is limited by the last-mile obstacle. If market size is not large enough to stimulate sufficient revenue, it is not possible to positively impact the deployment of all broadband services. Therefore, the last-mile barrier should be attacked immediately and innovatively to establish a minimal workable global infrastructure shaping a vast market for broadband services, leading to further dvelopment of digital economics and the information age.

There was a large volume of articles submitted for this feature topic. However, due to page limitations, only six articles could be accepted, so it was not possible to present a complete picture of broadband services. Our emphasis is on the currently operational broadband services and important architectural issues. Therefore, two articles were selected to present field experimental results and findings. The remaining four articles were chosen to explore the important issues.

The first article, "The AT&T Labs Broadband Fixed Wireless Field Experiment" from AT&T Laboratories, discusses an ongoing broadband fixed two-way wireless field experiment conducted by AT&T Laboratories – Research in Monmouth County, New Jersey, USA. The second article, "GMN: Broadband Multimedia Communications Service Concept and Field Trials" from NTT in Japan, analyzes market trends and customer demand in Japan, explains the

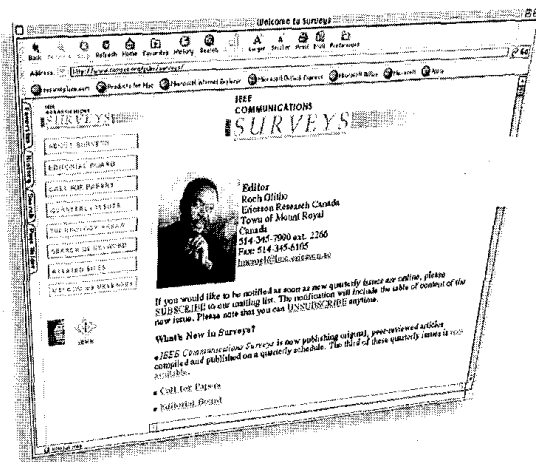GMN service concept and network architecture, and presents GEMnet testbed network and field trial results.

The third article, "Wireless Broadband Applications: Teleservice Model and Adaptive-QoS Provisioning" by A. Iera, A. Molinaro, and S. Marano, discusses a teleservice model for wireless broadband applications based on an adaptive-QoS paradigm. The fourth article, "A Wideband Two-Layer Radio Access Network Using DECT Technology in the Uplink" by M. Celidonio and D. Di Zenobio, describes a novel architecture of a broadband radio access network using the two-layer network solution. The fifth article, "Service Provisioning in an ATM-over-ADSL Access Network" by R. Cohen, addresses the architectural issue of service provisioning in an ATM-over-ADSL access network. The last article, "Dynamic Burst Transfer Time-Slot-Based Network (DBTN)" by K. Shiomoto and N. Yamanaka, proposes a new high-speed network architecture called Dynamic Burst Transfer time-slot-based Network (DBTN),

which is based on circuit-switched network technology.

It is our understanding that all efforts and activities in the communications industry are intended to achieve the charming dream of broadband services. Hopefully, this feature topic can contribute in some degree to broadband services becoming a reality.

BIOGRAPHY

GENG-SHENG (G.S.) Kuo [S'81, M'83, SM'95] (gskuo@ieee.org) received his Ph.D. degree in systems engineering from Case Western Reserve University, Cleveland, Ohio, in 1982. He then worked with R&D laboratories of the telecommunications industry in the United States, including AT&T Bell Laboratories. In 1990 he returned to Taiwan and joined the Department of Information Management, Information Technology Group at National Central University, where he is a professor. His current research interests include ATM-based broadband switching and networking technologies, and Internet service technologies. Currently, he is chair of the IEEE Communications Society Communications Switching and Routing Technical Committee, editor for communications architecture for the *IEEE Transactions on Communications*, a senior technical operations editor of *IEEE Communications Magazine*, and an area editor for *IEEE Communications Surveys*.

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