

LESSONS OF THE GREAT EAST JAPAN EARTHQUAKE



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The last *IEEE Communications Magazine* Feature Topic related to disaster was published in January 2011 under the title “Network Disaster Recovery,” where various discussions on disaster prevention and rapid recovery were discussed from technological and managerial points of views.

Three months later, on March 11, 2011, the Great East Japan Earthquake with 9.0 magnitude happened together with enormous Tsunami and caused 15,800 dead, 3500 missing persons, and 270,000 destroyed houses. Network systems were seriously damaged by the earthquake itself and the following tsunami waters and power losses, and network services were also severely affected by the traffic concentration. Moreover, the nuclear power plant disaster in Fukushima followed.

The Japanese government, network operators, industries, and universities took immediate and strong actions to recover from these difficulties. After several months, depending on their situations, network services were recovered to almost normal status.

Now, three years after this disaster, it is the duty of Japanese IEEE members to record these valuable experiences, such as how the network was damaged by the disaster, how services were affected, how far the network infrastructures have recovered, what are the lessons we learned, and what are our proposals for safer and more secure networks.

As the first action, all IEEE sections in Japan and the Institute of Electronics, Information, and Communications Engineers (IEICE) hosted the first Region-10 Humanitarian Technology Conference held in Tohoku University, Sendai, in August 2013 under the title of “Lessons Learned from Japan’s 2011 Earthquake and Other Natural Disasters,” where more than 200 participants exchanged their views on communication networks, robotics, medical care,

energy, human assistance technology, information service, and sensors.

In this Feature Topic, five network oriented papers from this conference are presented to give readers the facts and wider views gained from the Great East Japan Earthquake.

The first article, “Experience of Infrastructure Damage Caused by the Great East Japan Earthquake and Countermeasures against Future Disasters,” reports from the network operator’s view the facts of the Earthquake itself and the recovery process, and views on future robust network services.

The second article “What Is the Role of Universities in Disaster Response, Recovery, and Rehabilitation? Focusing on Our Disaster Victim Identification Project,” reports various actions by researchers at the core university located in the disaster-affected area playing a leading role in post-disaster response, relief, recovery, and rehabilitation.

The third article, “Resilient ICT Research Based on Lessons Learned from the Great East Japan Earthquake,” reports communication tools in the disaster, and proposes long-term research projects for developing robust and dependable communication networks led by the National Institute of Information and Communications Technology.

The fourth article, “Analysis of and Proposal for a Disaster Information Network from Experience of the Great East Japan Earthquake,” describes the problems of current information network systems and proposes a “Never Die Network” based on the experiences of the disaster area university.

The last article, “How Broadcasters Used the Internet: Simulcasting at the Time of the Great East Japan Earthquake,” reports how the Japanese broadcasters immediately decided to use the Internet as their distribution network, discussing the criteria such as having public and comple-

menting nature, and also the future incorporation of simulating in broadcasting systems.

This Feature Topic is published three years after the Earthquake, in memory of the people who suffered there and to honor the people who worked hard on the recovery.

BIOGRAPHIES

TOMONORI AOYAMA [LF'02] received his B.E., M.E. and Dr. Eng. from the University of Tokyo, Japan. Since he joined NTT in 1969, he has been engaged in research and development on communication networks and systems in NTT's Electrical Communication Laboratories. From 1973 to 1974, he stayed at MIT as a visiting scientist. In 1995 he became director of the NTT Optical Network Systems Laboratory, and in 1997 he left NTT and joined the University of Tokyo as a professor in the Department of Engineering. In April 2006, he moved to Keio University as a professor, and also served as R&D Advisor to the National Institute of Information and Communication Technologies (NICT) until 2012. He is Professor Emeritus of the University of Tokyo, and served as a member of the Science Council of Japan for six years. He served as IEEE Tokyo Section Chair in 2011/2012. He has served as Co-Guest Editor of *IEEE JSAC* Special Issues three times. He served as President of IEICE 2009 and is now an IEICE Fellow. He has been serving as President of NPO, Digital Cinema Consortium of Japan (DCCJ) since 2001, and also serves as Chair of the Global Inter-Cloud Technology Forum (GICTF), Vice-Chair of Japan Cloud Consortium (JCC), Ubiquitous Networking Forum, and the New Generation Network Promotion Forum. He has received several awards from Japanese Ministries, IEICE and IEEE ComSoc.

NORIO SHIRATORI [M'86, F'98] is currently a professor of the Graduate School of Global Information and Telecommunication Studies (GITS), Waseda University, Tokyo. He is a Professor Emeritus and visiting professor of Tohoku University, Sendai. He is also a Board Member of Hakodate Future University. He is a Fellow of the Japan Foundation of Engineering Societies (JFES), Information Processing Society of Japan (IPSI), and IEICE. He was the President of the IPSJ (2009–2011), Chair of the IEEE Sendai Section (2010–2011), and Vice Chair of the IEEE Japan Council (2013–2014). He received the Science and Technology Award (Research Division) by Ministry of Education, Culture, Sports, Science and Technology — Japan (MEXT) in 2009, an IEICE Honorary Member in 2012, and an IPSJ Honorary Member in 2013, among many others.

KAZUO HAGIMOTO [M'84, SM'06, F'08] received B.S. and M.S. degrees in physical electronics engineering from the Tokyo Institute of Technology

1978 and 1980, respectively. In 1980, he joined the NTT Electrical Communications Laboratories, Yokosuka, Japan, where he has led R&D on high-speed optical communications systems including the F-1.6G and F-10G system. After serving as senior manager of the operation support systems group of the Network Business Unit of NTT Communications, he was responsible for cutting-edge technologies of NTT Laboratories from 2009 to 2013. He is currently president and CEO of NTT Electronics Corporation (NEL). He is a fellow of the IEICE of Japan and a member of OSA. He has served as Program Co-Chair of the OSA Optical Amplifier Topical Meeting, OAA '93, in Yokohama, Japan, General Chair of APCC '08, ICC '11 TPC Chair in Kyoto, and HTC '13 in Sendai. He has served as Director, General Affairs of IEICE in 2006–2007 and President of the IEICE Communications Society. He received the Sakurai Memorial Prize from the Optoelectronic Industry and Technology Development Association in 1989, the Oliver Lodge Premium from the IEE in 1991, the Kenjiro Takayanagi Memorial Award in 1994, the Achievement Award from the IEICE in 1994 and 2006, and the Distinguished Achievement and Contributions Award of IEICE in 2013.

HIROHISA GAMBE [M'75, SM'07] is a technology advisor of Fujitsu Advanced Technology Ltd, Japan. He received B.E. and Ph.D. degrees from Tokyo Institute of Technology, Japan, in 1973 and 2004, respectively, and his M.S. degree from the Polytechnic Institute of New York in 1978. His major area of study was signal processing for communications such as speech codecs and wireless signal coding. He has worked in the Fujitsu Group since 1973 and has 41 years of experience in industrial R&D. In recent years, he was a member of the Board of Fujitsu Laboratories and led R&D activities as a president of Network Systems Laboratories, and also promoted global collaborations with academia and industry partner organizations. He has served IEEE members in both technical and regional areas. His interests include network architecture, photonic systems, and wireless systems.

YUKOU MOCHIDA [M'69, F'04] worked for Fujitsu Laboratories for 40 years and was a senior vice president and member of the Board until 2004. He developed and managed various digital network systems, in particular, transmission and digital signal processing systems. He was CTO and vice president at France Telecom Japan from 2007 to 2013 and is now senior advisor of the Freistaat Bayern Representative Office in Tokyo. He is now Vice Chair of the Life Members Affiliate Group of IEEE Tokyo Section. He received B.S. and Ph.D. degrees in electrical engineering from the University of Tokyo in 1964 and 1988, respectively. He stayed at the Technical University of Munich from 1965 to 1966. He was a visiting professor of Waseda University and Beijing University for Posts and Telecommunications. He is a Fellow of IEICE and a member of the Engineering Academy of Japan.