As the global telecommunications industry continues its transformation, we have been witnessing a steady stream of advances in all communications technologies from optical transport to access networks. However, worldwide attention to access network deployments with the entire global industry’s concerted effort on standards-compliant product development has been most notable. Although we very recently, in February 2011, devoted a special OFC/NFOEC ‘11 supplement to passive optical network (PON) advances, we have selected PONs as our theme again in this Optical Communications Series (OCS) issue in recognition of this continuing worldwide focus on PON technologies. Two excellent examples of this global focus on PONs are the gigabit PON (GPON) optical network unit (ONU) certification timetable announced by Broadband Forum at their third quarter 2011 meetings held in Shanghai, China, during the week of September 19, 2011, and the high level of participation at the FTTH Council Conference & Expo held in Orlando, Florida, during the week of September 26, 2011.

In this issue, we have selected three contributions that address 10 Gb/s Ethernet PON (10G-EPON) performance, dynamic spectrum management in existing PONs, and technology advances toward next-generation PONs (NG-PONs).

In the first contribution, Rajesh Roy, Marek Hajduczenia, Glen Kramer, and Henrique J. Silva present their evaluations of 10G-EPON performance in view of the growing interest in this technology. The 10G-EPON standards, developed by the IEEE 802.3av Task Force, were recently approved. While the performance of its predecessor G-EPON has been examined in great detail, the 10G-EPON with such new features as line coding and forward error correction (FEC) techniques has not been put to the test. Thus, this first contribution presents an overview of 10G-EPON components and transmission performance with their analysis of practical deployment scenarios.

In the second contribution, Ning Cheng, Guo Wei, and Frank Effenberger present dynamic spectrum management (DSM) in PON systems. The DSM-PON approach promises to enhance such key parameters as the bandwidth, split ratio, and loss budget in current PON systems, without ONU and passive optical component replacements. However, ONU spectral distribution management and the need to use filters of various designs emerge as major challenges in DSM-PON systems. In this contribution, the authors go beyond a discussion of DSM-PON capabilities to explore system applications with practical deployment and operational benefits.

In the third contribution, Ahmad R. Dhaini, Pin-Han Ho, and Gangxiang Shen address a growing concern in energy usage in the operation and maintenance of telecom networks in general and PON systems in particular. With major global telecommunication service providers’ growing emphasis in telecom networks’ energy efficiency, NG-PON has been attracting a great deal of attention for its energy-saving potential. Thus, this contribution presents a comprehensive overview of the global telecommunications industry efforts to date on energy management in modern telecommunications networks. The authors propose solutions that involve network design and operational advancements to guarantee compliance to the established quality of service (QoS) benchmarks for each type of service.

Biographies

Osman S. Gebizlioglu (SM) (osman.gebizlioglu@huawei.com) joined Huawei Technologies USA as a principal consultant for optical distribution network (ODN) technology research in February 2011. From 1987 when he joined Bellcore until his departure from Telcordia Technologies at the end of January 2011, he was involved with the development of performance and reliability assurance requirements for optical communications components. In addition to his work to support the implementation of optical communications technologies in major service provider networks, he has been involved in failure analysis and reliability assurance efforts on aerospace and defense communications networks. He holds B.Sc and M.Sc degrees in chemical engineering (Middle East Technical University, Ankara, Turkey) and a Ph.D in chemical engineering and polymer materials science.
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