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Tutorial

Forward Error Correction in Optical Communication Systems

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Abstract

In this tutorial, the basics of forward error correction (FEC) will be presented, and the key terms related to FEC in optical communications will be clarified, e.g. net coding gain, code rate, Q limit, and Shannon limit. We will then review the three generations of FEC in optical communications. We will relate each generation of FEC to the Shannon limit, and discuss the ultimate NCG as a function of redundancy. An overview is given on the New FECs for upcoming multi-level modulation based digital coherent receivers.



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Takashi Mizuochi received his B.S., M.S., and Ph.D. degrees in electrical engineering from Osaka University, Osaka, Japan. In Mitsubishi Electric Corporation, he has been engaged in research on optical frequency-division multiplexing, coherent optical fiber communications and long-haul transmission systems, and WDM undersea communication systems. His current interests include the FEC and electronic digital signal processing for 100Gbps transport systems. He is currently R&D Manager, Optical Communication Technology, at the Information Technology R&D Center, Mitsubishi Electric Corporation. Dr Mizuochi is a Member of the IEEE ComSoc, IEEE Photonics Society, the OSA, the IEICE of Japan, and the Laser Society of Japan. He received the Ohm Technical Award, 2004, from the Association for Promotion of Electro-Science and Technology in Japan.