

光通信

高速相干光正交频分复用系统实现方案研究

郝耀鸿^{1,2}, 李玉权², 王荣², 黄卫卫¹

1 军事体育进修学院, 广东 广州 510500;

2 解放军理工大学通信工程学院, 江苏 南京 210007

摘要:

相干光正交频分复用系统 (Coherent Optical Orthogonal Frequency Division Multiplexing, CO-OFDM) 作为未来高速光通信的重要解决方案, 是近年来光传输领域的研究热点。高速CO-OFDM系统需要较高带宽的模数/数模转换器 (DAC/ADC), 目前技术水平难以达到。文章改进了正交频带复用技术 (Orthogonal Band Multiplexing, OBM) 的光域实现方案; 结合偏振复用技术和偏振分集接收, 提出了基于OBM的100Gb/s高速CO-OFDM系统; 并对系统传输性能进行数字仿真。结果表明: 基于OBM技术的MIMO CO-OFDM系统可有效降低对DAC/ADC的处理速度要求, 在不需任何在线色散补偿和偏振控制器件条件下, 通过单模光纤传输800km, 系统Q值保持在13dB以上。

关键词: 光通信 正交频分复用 长距离传输 偏振复用

Implementation for high-speed coherent optical orthogonal frequency division multiplexing system

HAO Yao-hong^{1,2}, LI Yu-quan², Wang Rong², HUANG Wei-wei¹

1 PLA Institute of Physical Education, Guangzhou 510500, China;

2 Institute of Communications Engineering, PLA University of Science and Technology, Nanjing 210007, China

Abstract:

Coherent optical orthogonal-frequency-division-multiplexing (CO-OFDM) has drawn significant attention in optical transmissions as an attractive modulation format for the forthcoming 100Gb/s Ethernet. However, CO-OFDM system requires high-speed digital-to-analog converters (DAC) and analog-to-digital converters (ADC), which may not be available today. To resolve ADC/DAC bandwidth bottleneck, with the help of OBM and polarization division multiplexing (PDM), 100Gb/s CO-OFDM system based on OBM is presented. With this scheme, simulation is done to validate the feasibility of the system model and algorithm. The result shows that, the performance of MIMO CO-OFDM system based on OBM is maintained above 13dB at 0-GHz channel spacing for 800km standard single mode fiber (SSMF) transmission without any inline dispersion compensation and polarization controller (PC) and the DAC/ADCs do not need to operate at extremely high sampling rate.

Keywords: optical communications orthogonal frequency division multiplexing long-haul transmission polarization division multiplexing

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通讯作者: 李玉权 (1944-) 教授, 博士生导师, 从事光通信方面的研究.

作者简介: 郝耀鸿 (1983-) 博士生, 从事光通信方面的研究, E-mail: hyh82910@126.com

作者Email: Proflyq@126.com

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