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论文

基于光电振荡器的宽带射频下转换及在高清视频传输的应用

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摘要:

以无压缩全高清视频的光载无线传输为背景,通过研究宽带射频光子下转换技术,从而构建全高清视频的实时传输系统,其中下转换系统主要基于光电振荡器实现.由于光电振荡器的注入锁定,光微波信号中的载波信号被提取出来,并反馈至调制器,与宽带光微波信号混频,在光域实现信号下转换.实验论证了载频为10GHz,码率大于2Gb/s的信号下转换和有线无线传输.利用天线和光纤实现了距离为0.5m的无线分发和距离为10km的有线传输.本文还成功实现了1.5Gb/s无压缩高清视频信号的实时传输.实验结果表明,该系统具有大带宽、抗电磁干扰等优点,同时利用光电振荡器的自动相位跟踪技术,无须外加锁相等操作.整个下转换系统简单稳定,为高清视频的有线无线传输提供了论证和演示平台.

关键词: 下转换 光电振荡器 高清视频传输 光载无线

Wideband Photonic Microwave Downconversion Based on an Optoelectronic Oscillator for Uncompressed HD Video Distribution

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Abstract:

Wideband photonic microwave downconversion based on an optoelectronic oscillator (OEO) is proposed and demonstrated for the uncompressed HD video radio-over-fiber (RoF) transmission system. By using the injection locking of the OEO, high-quality RF carrier is extracted from the optical microwave signal. The extracted RF carrier is then fed back to the modulator to perform the downconversion in the optical domain. An experiment is performed. The distribution and downconversion of the signal with a carrier frequency of 10 GHz and a data rate of ≥2 Gb/s is verified. The wireless distance is 0.5 m and the length of optical fiber is 10 km. The distribution of a real-time 1.5-Gb/s uncompressed HD video is also demonstrated in the radio over fiber link. The results show that the system features wide bandwidth and low electromagnetic interference. Meanwhile, thanks to the automaic phase tracking of the OEO, no additional phase-locking operation is needed. The overall system is simple and stable, which provides a presentation and demonstration platform for HD video transmission.

Keywords: Downconversion Optoelectronic oscillator HD video distribution Radio over fiber

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