

论文与技术报告

用于HFC上行信道的新型抗噪声调制解调器

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摘要:

HFC网络上行信道内部噪声复杂且难预测,限制了发展和应用。基于该信道的传输特性,针对上行传输系统噪声大且限制调制技术选择的缺陷,推导出噪声对调制技术的影响关系;采用多元位置相移键控(MPPSK)技术,完成了对其上行信道接入网电缆调制解调器的改进;分析了同轴电缆网络电气特性,推导出新型调制信号在网络传输中的变化规律,利用Matlab对改进后的上行信道同轴电缆传输体制进行数学建模,实现了MPPSK调制信号的传输测试仿真。结果表明,系统误码率改善了2-3个数量级,能量节约了3-4dB,降低了门限信噪比,压缩了信号带宽,提高了频谱利用率。分析和实验表明了MPPSK调制解调技术在上行传输中抗噪声干扰的可行性和有效性。

关键词: 光纤同轴电缆混合网; 上行信道; 多元位置相移键控; 电缆调制解调器; 抗噪声

An Anti-noise Modem used over HFC Uplink

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Abstract:

The noise in HFC upstream channel is both complex and hard to predict, which has limited the networks' development and application. According to the characteristics of uplink transmission and aiming at the defects of modulation selection constrained by the strong noise, the relationship between the uplink noise and modulation techniques was derived, which took the M-ray Pulse Position Shift Keying to improve the HFC uplink modem. The transmission characteristics of the MPPSK signals was deduced based on analysis of the electrical characteristics of the coaxial cable network. Using Matlab to model the transmission scheme, the MPPSK signals transmission in coaxial cable was simulated. The theoretical analysis and experimental results effectively showed that the SNR threshold was reduced and the spectrum efficiency enhanced, the BER was declined by 2-3 orders of magnitude, and 3-4dB saved in signal energy. The MPPSK modem demonstrates a better anti-noise performance than the traditional techniques.

Keywords: HFC Uplink MPPSK Modulation Cable Modem Anti-noise

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