

SIMULATION AND PERFORMANCE ANALYSIS OF SUB-CARRIER BASED WAVELENGTH MULTIPLEXED RADIO OVER FIBER SYSTEMS

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Abstract

Radio over Fiber (RoF) technology the integration of microwave and optical networks is a potential solution for increasing capacity and mobility as well as decreasing costs in the broadband access network. The concept of RoF means to transport information over optical fiber by modulating the light with radio frequency signal (RF) or at an intermediate frequency signal (IF) to take advantage of the low loss characteristic of an optical fiber. RoF technique has the potential to be the backbone of the wireless access network. RoF system is very cost-effective because the localization of signal processing is in the central station and also use a simple base station. In our system, the subcarrier multiplexed system (SCM) with a combination of Wavelength division multiplexing (WDM) has to be used. The combination of SCM-WDM technologies offers us both the advantages of SCM and WDM technologies. SCM is more mature than optical devices; the stability of a microwave oscillator and the frequency selectivity of a microwave filter is better than their optical counterparts. In addition, the low phase noise of RF domain easier than optical coherent detection and advanced modulation formats can be applied easily, whereas, WDM enables the efficient exploitation of the fiber network's bandwidth. The performance analysis of the proposed SCM based WDM RoF system with four electrical carriers modulated by phase shift keying (PSK) and optical external modulation using Mach-Zehnder modulator (MZM) in terms of Bit Error Rate (BER), Quality factor (Q-factor) and Eye diagram by varying the fiber length and data rates.

Keywords: Radio over fiber systems (RoF), Subcarrier multiplexing, Wavelength division multiplexing, External optical modulation, Optisystem.