

IAF SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Fixed and Broadcast Communications (3)

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PERFORMANCE OF LEO SATELLITE BASED OFDM TRANSMISSION SYSTEM IN A MARITIME
ENVIRONMENT

Abstract

Though the use of Orthogonal Frequency Division Multiplexing (OFDM) based transmission schemes for LEO satellite communication has been researched to some extent, little research exists on the use of OFDM modulation techniques in a maritime environment. There is a need though for transmitting large amounts of data using such schemes in these environments, such as for use by the Global Maritime Distress and Safety System. In this research we start by proposing an OFDM transmission system suitable for such a purpose, and then evaluate its performance in the said environment. We model our system based on tried and tested Digital Video Broadcast systems for terrestrial applications, such as those used all over Europe and Japan. The features that distinguish such a system from a terrestrial broadcast system though are precisely the reason why such a system merits its own research. Firstly, unlike most terrestrial transmission systems both the transmitter as well as the receiver are mobile, and in the case of an LEO satellite with a large velocity. Additionally, we find that most popular channel fading models such as Rayleigh and Rician etc. are not suitable for application in a space to marine scenario, and thus a custom channel fading model needed to be developed for the purpose of this research. Having a transmission scheme and a channel fading model in hand, we are able to evaluate the performance of a demodulator for the defined system under various channel fading scenarios. We describe the results of our analysis and conclude by pointing out the advantages and disadvantages of deploying such a system onboard a constellation of small LEO satellites.