International Journal of Trend in Scientific Research and Development (IJTSRD)
Volume: 3 | Issue: 3 | Mar-Apr 2019 Available Online: www.ijtsrd.com e-ISSN: 2456 - 6470

Performance Analysis of Preamble Detection at Maximum Throughput Level for OFDM

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How to cite this paper: Ayushi Upadhyay "Performance Analysis of Preamble Detection at Maximum Throughput Level for OFDM" Published in International Journal of Trend in Scientific Research and Development (ijtsrd), ISSN: 2456-6470, Volume-3 | Issue-3, April 2019, pp.535-536, URL: http://www.ijtsrd.com/papers/ijtsrd21380.pdf

IITSRD21380

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ABSTRACT

WiMAX which represents "Worldwide Interoperability for Microwave Access" is a major part of BWN "broadband wireless network" having IEEE 802.16 standard provides innovative fixed as well as mobile platform for broadband internet access anywhere in anytime. In this paper we, investigate signal detection and frame synchronization for wireless network signal using preamble detection method such as MSC, MGM, MMSE and MML and preamble we used AWGN and Reyligh channel, also used modulation techniques QAM with OFDM. The performance has been concluded based Sample versus Detection value and output through MATLAB-R3013a Simulation.

KEYWORDS: *AWGN, SNR, BPSK, OFDM, Detection of Preamble*

I. INTRODUCTION

WiMAX (Worldwide Interoperability for Microwave Access) is a family of wireless communication standards based on the IEEE 802.16 set of standards, which provide multiple physical layer (PHY) and Media Access Control (MAC) options. The IEEE 802.16 group was formed in 1998 to develop an air interface standard for wireless broadband. The group's initial focus was the development of a LOS-based point-to-multipoint wireless broadband system for operation in the 10GHz-66GHz millimeter wave band. The resulting standard-the original 802.16 standard, completed in December 2001-was based on a single carrier physical (PHY) layer with a burst time division multiplexed (TDM) MAC layer.

II. Methods of Preamble Detection

In simple terms, preamble is used to communicate to the receiver that transmitted data is on the way. In the context of Wi-Fi (802.11) Technology, Preamble allows the receiver to acquire the wireless signal and synchronize itself with the transmitter. In wireless OFDM systems like WiMAX (802.16e), preamble is first symbol of the downlink transmission which is used for initial frame timing/synchronization by mobile stations. Initially, when a MS (Mobile Station) enters a network, it has to search for the neighboring BSs (Base Station) in order to achieve synchronization. Preamble detection is done for the synchronization and synchronization is done in the basis of two types symbol timing and carrier frequency offset. OFDM has been shown to be sensitive to symbol timing errors. Symbol timing estimation is typically performed in two steps:

1. Course estimate in the time domain,
2. Fine estimate in the frequency domain.

III. Simulation Results

In this correlation of preamble detection (maximum normalized correlation (MNC or MINN), Schmidt and Cox maximum normalized correlation (SC or MSC), maximum normalized correlation using a geometric mean (GM or MGM), maximum likelihood (ML or MML) method are comparison on OFDM using AWGN Channel. In this model we have used QAM (Quadrature Amplitude Modulation) in modulation technique, and required SNR value is 25dB and 45dB the performance done by used MATLAB R2013a version.

A. Preamble detection in SNR at 25dB

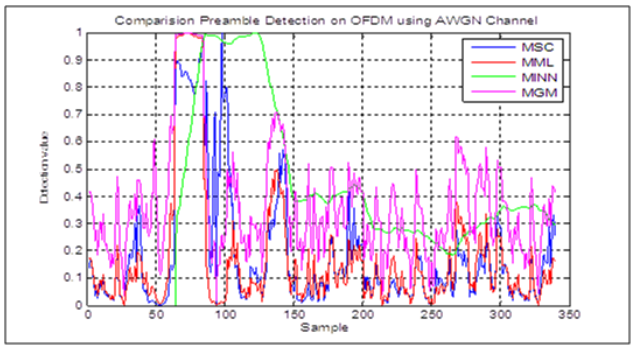

Fig. 1: Correlation between Different signals at SNR=25 dB

Table 1: Performance analysis of Preamble detection at SNR=25dB

Preamble Technique	SNR	Maximum Detection Value	Sample
MSC	25dB	1.0	96
MML		1.0	65
MINN		1.0	75
MGM		1.0	65

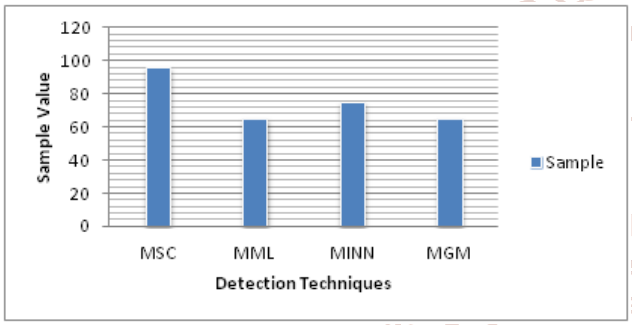

Fig. 2: Comparisons of Detection techniques at SNR=25dB

B. Preamble detection in SNR at 45dB

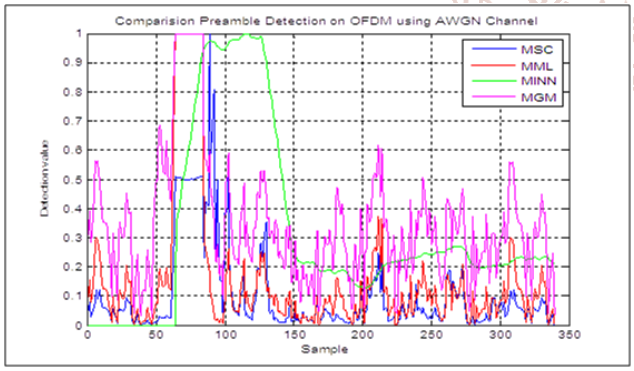

Fig 2: Correlation between Different signals at SNR=45 dB

Table 2: Performance analysis of Preamble detection at SNR=45dB

Preamble Technique	SNR	Maximum Detection Value	Sample
MSC	45dB	1.0	90
MML		1.0	72
MINN		1.0	120
MGM		1.0	65

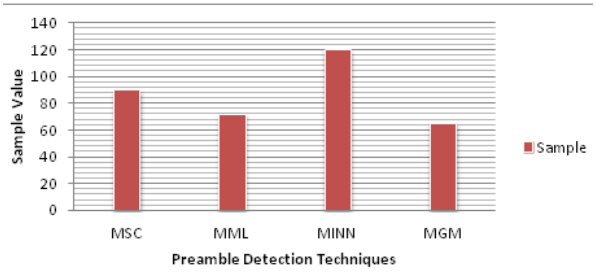

Fig. 4: Comparisons of Detection techniques at SNR=25dB

Conclusion:

In above result we have done analysis of all preamble techniques (MSC, MML, MSC and MGM) at different SNR value (25dB and 45dB). The MINN technique is better than all techniques because its performance is smooth. It gradually down and rise at all point so t MINN is better than all techniques.

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