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End To End Physical Layer Design for Efficient Data Transmission in Wireless Communication

Neelima Gupta & Alok Srivastava
(vivid.neel@gmail.com[1]), (srivastava.alok1979@gmail.com[2])
Chandravati Group of Institutions

ABSTRACT:
In any network designed for data or communication physical layer is the most important layer because it is ultimately depends upon physical layer for any type of transmission. Its importance can be understood by the fact that all the layers of open system interface or transmission control protocol are designed either for serving physical layer or being served by physical layer. The main problems associated with physical layers are attenuation, noise and bandwidth limitations while main responsibilities are end to end efficient and secure data transmission. With the increasing demand bandwidth availability is decreasing while other factors like noise and attenuation is also increasing. In this paper we have designed a physical layer for a wireless channel because on one hand a wireless channel has to face noise, attenuation and bandwidth limitation more severely than its wired counterpart while on other hand and they are most widely in use because of easiness of establishment.

KEYWORDS: *OSI, TCP, Physical Layer, Computer network.*

I.INTRODUCTION

Communication is the most important aspect of modern edge life. Electronic communication evolved in dependently in different parts of world, so compatibility was a major concern for intercontinental communication. To solve this problem first open system interface and then transmission control protocol reference models, proposed layered architecture for networking. In both the reference models there were some similarities and differences as given in table 1.

Sr No	OSI	TCP/IP
1	Layered architecture	Layered architecture
2	Not dependent on protocols	Depends on protocols
3	Total 7 layers	Total 4 layers
4	Transport and presentation layers defined	No such layers exists
5	Top down approach	Level or horizontal approach
6	Clear classification of works	Multiple tasks has been assigned to same layer
7	Transport layer guarantees end to end packet delivery	Does not have any such layer even though equally reliable
8	Can be used for connection less and connection oriented services.	Can be used for connection less and connection oriented services.
9	Transport layer deliver packets after making connections	Transport layer is not dependent on connection.
10	Network layer works in both modes ie connection oriented and connection less	Network layer works in connection less mode

However both the reference models have some similarities and some differences, both of them depends on physical layer for smooth and

efficient data transfer. The ultimate goal of these models is to provide seamless communication between different type of communication medium and equipment used in different parts of world.

2. PHYSICAL LAYER

The physical layer itself includes various elements necessary to carry signals. These signals can be divided in two parts

(a) Analog Signal: These signals are continuous in nature and may attain any value. Normally these signals are blend of various types of signals but can be represented by sine wave.
(b) Digital signal: These signals may be continuous or discrete in nature but may attain only predefined fixed values.

These signals flow through either wired or wireless medium. This part of communication system is most critical as these are most affected by noise and face maximum attenuation. Various types of codes has been used depending upon condition of environment and channel conditions.

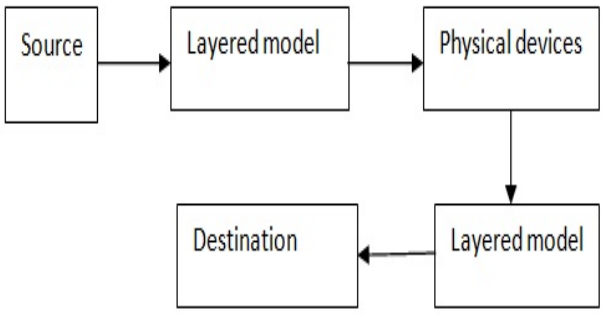


Fig 1 Block diagram source to destination data transmission

So in short physical layer work can be divided in 4 parts

(a) Hardware specific: Physical layer have to deal with cables, switching system etc
(b) Line encoding: This is the work of physical layer to generate signal and encode data according to the physical devices used.
(c) Data support: Physical layer have to convert data packets to signal and vice versa.
(d) Physical network design: This layer also deals with the physical address of device.

Proposed work: For the paper we have simulated a communication system as per the following block diagram

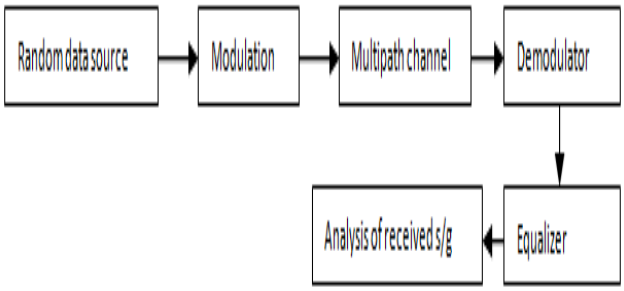
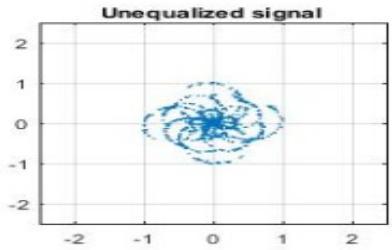
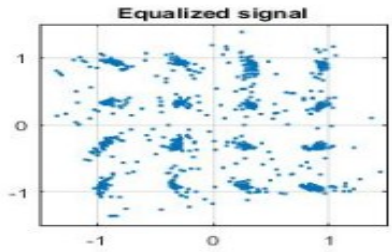


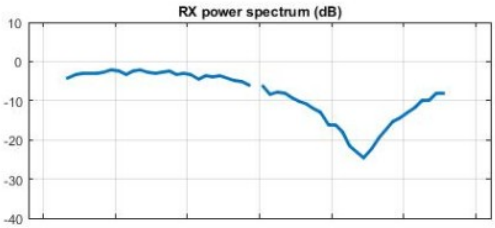
Fig 2 Block diagram of proposed work

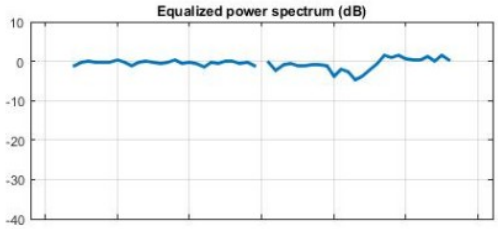
For the system we used OFDM modulator and frequency domain equalizer because OFDM modulators (orthogonal frequency division multiplexing) are capable to modulate digital data on multiple frequency carriers. Thus we can reduce the effect of selective attenuation in a particular channel while frequency domain analyser keeps control over bandwidth requirement of the transmitted signal.

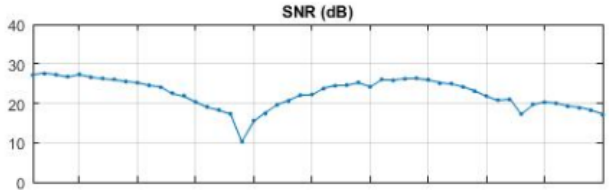
3. RESULTS

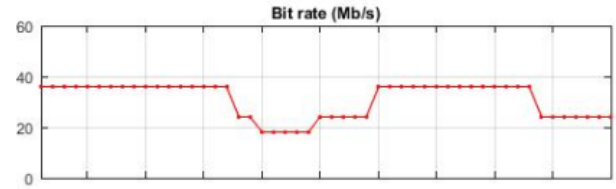


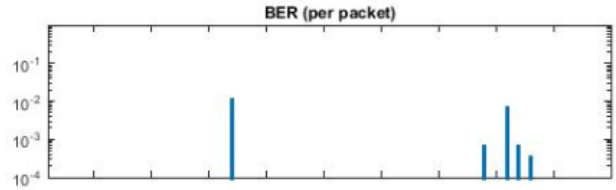












By analyzing the results it is very clear that that output is optimized. We also find SNR within the range of 0-12 and symbol error rate 0-10. So using OFDM along with MIMO has improved the signal reception.

5. CONCLUSION & FUTURE SCOPE

We have not disturbed the conventional system of data transmission so definitely this system will have no impact on cost and system can be implemented very easily.

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