ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com

Vol. 5, Issue 7, July 2017

Mobile to Mobile Communication Using Wi-Fi

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ABSTRACT: In Mobile communication data transmission occurs between mobile users via a network. In this paper an android application is designed to support mobile to mobile data transmission bywi-fi network base hotspot connectivity is used for transmission. The experimentation is carried out at 3 different intervals in a day to measure the data signals. It is found that signals link quality improves by almost 15%. The reason behind this is due to reduce data traffic condition because of solving congestion.

KEYWORDS: - Android Application, Wi-Fi, signal link quality, hotspot,

I. INTRODUCTION

As in the past few decades, the development of science and technology, there is a huge demand of mobile devices and because of more number of mobile users demand there is also a vast growth in mobile data traffic. As telecom operators are struggling to accommodate the existing demand of mobile users, new data intensive applications are emerging in daily routines of mobile users ,Moreover, 4G cellular technologies ,which have extremely efficient physical and MAC layer performance, are still lagging behind mobile users' booming data demand. Therefore, researchers seeking for new paradigms to revolutionize the traditional communication methods of cellular networks. Device to-Device (D2D) communication is one of such paradigms that appear to be a promising component in next generation cellular technologies. D2D communication in cellular networks is defined as direct communication between two mobile users without traversing the Base Station (BS) or core network. D2D communication is generally non-transparent to the cellular network and it can occur on cellular spectrum or unlicensed spectrum. In the normal mobile communication system when data is transmitted from one user to another user then this data transmission process go through the journey of transmitter ,base station and receiver even two user are in a close range. In this paper , to develop a system in which data transmission is occur between two devices without intervention of base station . It simply means that when two user are in close range to interact with each other without involving of base station. So because of our developed system reduces data traffic that occur earlier at base station side is reduce to certain extent hence quality of signal is improved.

II. LITERATURE SURVEY

In [1], the authors also study the uplink interference between D2D and cellular users and propose two mechanisms to avoid interference from cellular users to D2D users and vice versa. In order to reduce the interference from cellular users to D2D communications, D2D users read the resource block allocation information from the control channel. Therefore, they can avoid using resource blocks that are used by the cellular users in the proximity . The authors propose to broadcast the expected interference from D2D communication on cellular resource block to all D2D users. Hence, the D2D users can adjust their transmission power and resource block selection in a manner that the interference from D2D communication to uplink transmission is below the tolerable threshold. The authors show via simulation that the proposed mechanisms improve the system throughput by 41%.

The authors of [2] propose incremental relay mode for D2D communication in cellular networks. In incremental relay scheme, D2D transmitters multicast to both the D2D receiver and BS. In case the D2D transmission fails, the BS retransmits the multicast message to the D2D receiver. The authors claim that incremental relay scheme improves the system throughput because the BS receives a copy of the D2D message which is retransmitted in case of failure. Therefore, this scheme reduces the outage probability of D2D transmissions. Although incremental relay mode

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consumes part of the downlink resources for retransmission, the numerical simulation results show that this scheme still improves the cell throughput by 40% in comparison to underlay mode.

In [3], a new interference cancellation scheme is designed based on the location of users. The authors propose to allocate a dedicated control channel for D2D users. Cellular users listen to this channel and measure the SINR. If the SINR is higher than a pre-defined threshold, a report is sent to the eNB. Accordingly, the eNB stops scheduling cellular users on the resource blocks that are currently occupied by D2D users. The eNB also sends broadcast information regarding the location of the users and their allocated resource blocks.Hence,D2D users can avoid using resource blocks which interfere with cellular users. Simulation results show that the interference cancellation scheme can increase the average system throughput up to 374% in comparison to the scenario with no interference cancellation. Janis et al. address a similar solution in [26], where the D2D users also measure the signal power of cellular users and inform the BS of these values. The BS then avoids allocating the same frequencytime slot to the cellular and D2D users which have strong interference with each other, which is different from [3]. The proposed scheme of minimizes the maximum received power at D2D pairs from cellular users. The authors first show via numerical results that D2D communications with random resource allocation can increase the mean cell capacity over a conventional cellular system by 230%. Next, they show that their proposed interference-aware resource allocation scheme achieves 30% higher capacity gain than the random resource allocation strategy.

Zhang et al. [4] propose a graph-based resource allocation method for cellular networks with underlay D2D communications. They mathematically formulate the optimal resource allocation as a non-linear problem which is NP-Hard. The authors propose a suboptimal graph-based approach which accounts for interference and capacity of the network. In their proposed graph, each vertex represents a link (D2D or cellular) and each edge connecting two vertices shows the potential interference between the two links. The simulation results show that the graph-based approach performs close to the throughput-optimal resource allocation.

The work in [5] proposes a new interference management in which the interference is not controlled by limiting D2D transmission power as in the conventional D2D interference management mechanisms. The proposed scheme defines an interference limited area in which no cellular users can occupy the same resources as the D2D pair. Therefore, the interference between the D2D pair and cellular users is avoided. The disadvantage of this approach is reducing multi-user diversity because the physical separation limits the scheduling alternatives for the BS. However, numerical simulations prove that the capacity loss due to multi-user diversity reduction is negligible compared to the gain achieved by their proposal. In fact, this proposal provides a gain of 129% over conventional interference management schemes. A similar method is also considered in , where interference limited areas are formed according to the amount of tolerable interference and minimum SINR requirements for successful transmission. The proposed scheme consists in: (i) defining interference limited areas where cellular and D2D users cannot use the same resource; and (ii) allocating the resources in a manner that D2D and cellular users within the same interference area use different resources. The simulation results show that the proposed scheme performs almost as good as Max-Rate and better than conventional D2D schemes.

The authors of [6] consider a single cell scenario including a cellular user (CUa) and a D2D pair (DUb and DUc). DUb and DUc communicate with each other over the D2D link and CUa communicates with the BS by using DUb as a relay . The relay (i.e., DUb) can communicate bidirectionally with the other D2D user DUc, as well as assisting the transmission between the BS and the cellular user CUa. The time is divided into two different periods: (i) during the first period, DUc and either the BS or CUa send data to Dub concurrently; and (ii) during the second period, DUb sends data to DUc and either the BS or CUa. The authors investigate the achievable capacity region of the D2D and the cellular link. Simulation results show that by adjusting the power of BS and cellular device, the area of capacity region of the D2D link and BS-device link can be enlarged by up to 60%.

Cai et al. [7] propose a scheduling algorithm to exploit both time-varying channel and users' random mobility in cellular networks. They consider a scenario where the BS broadcasts deadline-based content to different group of users. Users move randomly within the cell and users of the same group are assumed to be able to communicate directly at

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high rate when they are close to each other. Therefore, users can exchange all the content within their current lists during a contact period. During each slot, the BS dynamically selects a group of users to broadcast content to at a chosen service rate, based on the scheduling algorithm employed. If the service rate is too high for some users to successfully receive the content, these users will exploit the D2D communication to fetch content from nearby users in the near future. The authors formulate the scheduling problem with objective to maximize the group utility function. Next, they solve the maximization problem under the assumption of statistically homogeneous user mobility, and then extend it to the heterogeneous scenarios. Simulation results show that the proposed scheduling algorithm can improve the system throughput from 50% to 150%, compared to the scheduling algorithm without D2D communication.

III. SIMULATION EXPERIMENTATION

In this paper an android application is developed by socket programming with Java , Data transmission is occurs between two mobile user who are certain distance from each other , If personhave wi-fi android application installed in their respective mobile phone , when wi-fi is on and hotspot connection is establish then two devices are in range and they are able to communicate with each other, now the important point to discuss is that our system is work on client server architecture mechanism ,here one device is act as server and other devices i.e client connected to it .and to establish connection between them handshake signal occurrence must be necessary. After developing an application we establish the connection between them, and test the developed system in three phase real time scenario by considering the time and environment.Test the system in morning afternoon and night and take the reading of signals by considering the parameter such as amplitude distance obstacle and open space area. Taking the amplitude starting from 0.3 to 2.4 and distance 30 m in open space and 6 m in obstacle compact area.

A graph plot for all the three time instance morning afternoon and night by considering obstacle and open space with varying distance of 5 M to 50 M in open space and 2M to 6M varying distance in obstacle compact area.

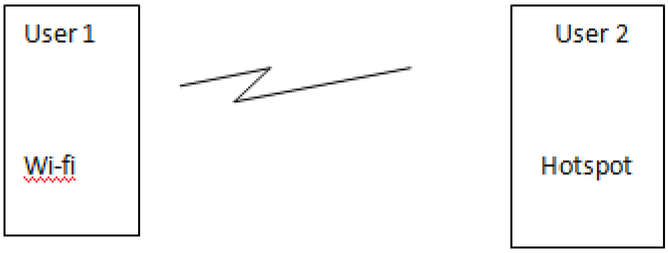

Fig.I:- Data transmission in open space

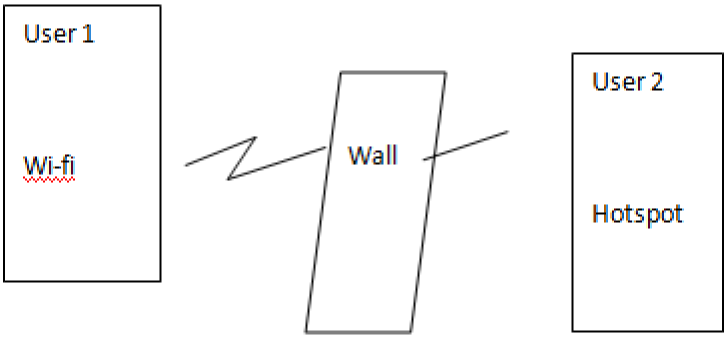

Fig II:- Data transmission in compact space

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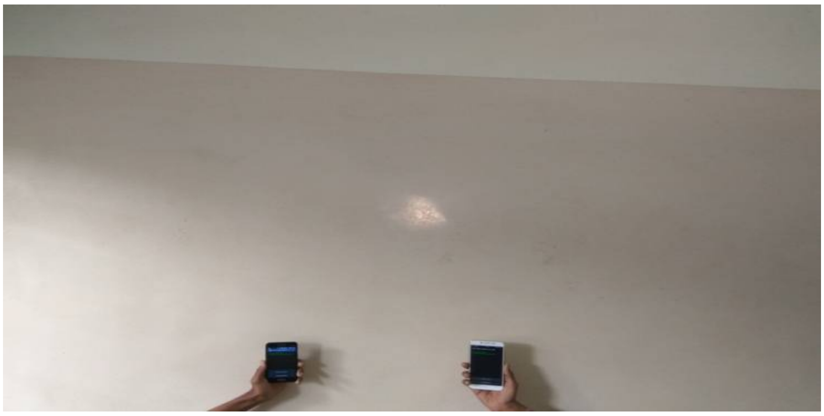
IV. SYSTEM IMPLEMENTATION

The Proposed Architecture of Mobile to Mobile (M2M) Communication without Base station is achieved with help of Wi-Fi technology. In this work two person are apart from each other they communicate with each other by installing an android app in their respective mobile application. now for communication they must have smart phone with wi-fi and hotspot connectivity in it. The proposed system architecture is base on the client server architecture. In this work, one mobile phone is act as server while another mobile phone is act as a client. mobile phone having wi-fi enable act as Server while device with enabled hotspot is act as client . when the handshake signals are occure between then and only then data transmission will occure.

The mobile to mobile communication through wi-fi is shown in figure below.



FigIII:-Mobile to mobile data transmission through wi-fi

V. FIELD EXPERIMENTATION

Following Fig.IV-VI represent the graph of morning afternoon and evening time respectively.The morning graph is clean and silent , less number of user less data traffic will occurs .At this time we take the reading at Mahesh galaxy Society we get better quality of signals and less interference of noise and performance of proposed system is good. In morning we had taken four reading such as open space without noise ,open space with noise , in compact space without noise and in compact space with noise.

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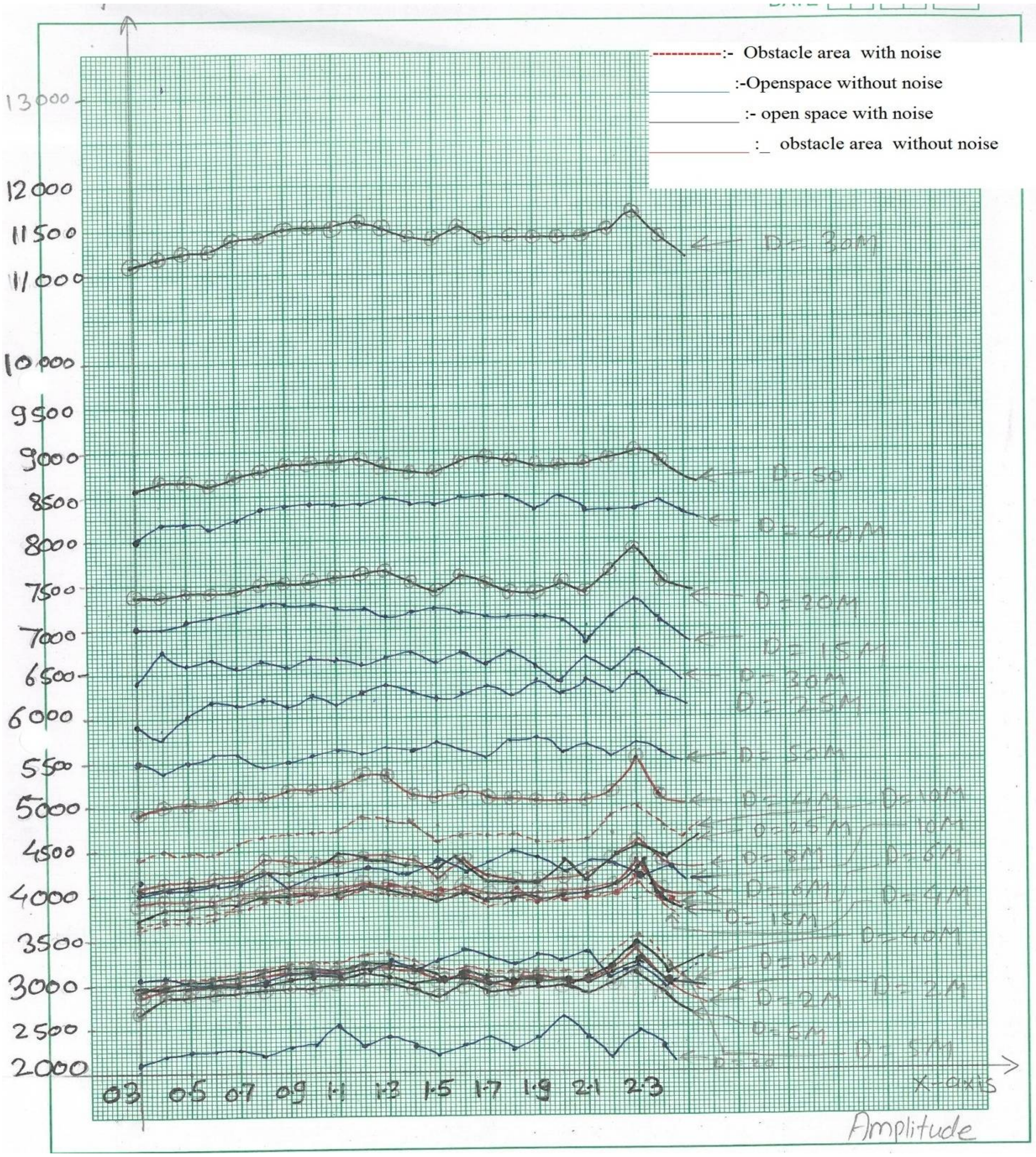

Fig.IV:- Morning Graph Reading

Fig V, show the afternoon reading .we take the same reading at Mahesh galaxy society here we observed that in afternoon quality of signal is degreaded and noise interference is more because of environmental condition and more number of users.

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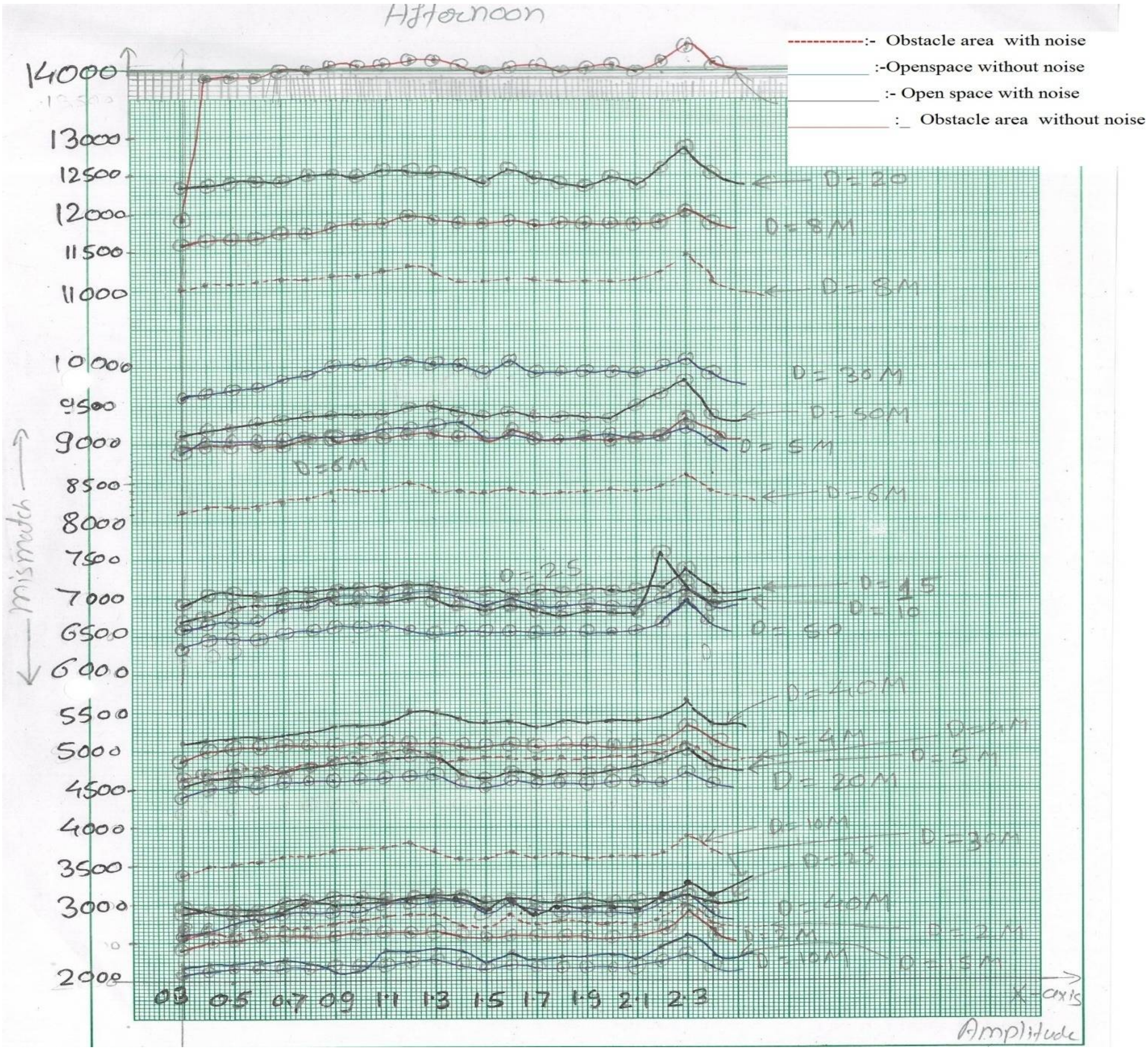

FigV:- Afternoon graph reading

Fig VI show Night graph reading ,here after 8 PM in evening we take the reading and here we found that signal quality is poor than morning and afternoon signal quality. The reason behind is that more data traffic because of more number of user in that cell and also noise interference is more in that area.

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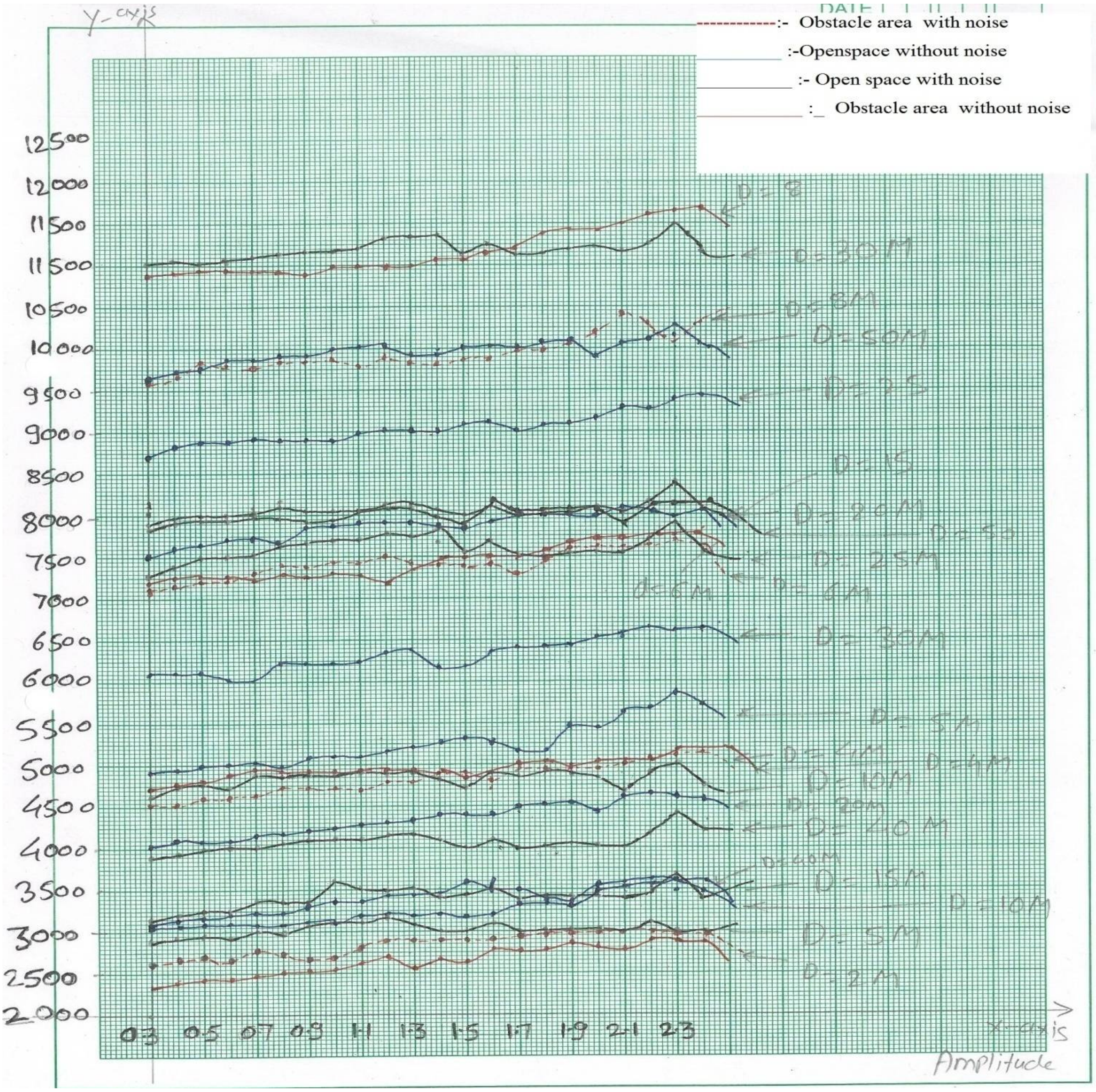

Fig VI:- Night Graph Reading

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VI. RESULT AND MEASUREMENT

Table I:-Detailed timing performance measurement

A	D=2M	D=4M	D=6M	D=8M	D=10M
0.3	2465	4954	8966	11683	11945
0.4	2543	5032	9044	11761	13965
0.5	2568	5057	9069	11786	13990
0.6	2573	5062	9074	11791	13995
0.7	2638	5127	9139	11856	14060
0.8	2674	5163	9175	11892	14096
0.9	2707	5196	9208	11925	14129
1.0	2721	5210	9222	11939	14143
1.1	2752	5241	9253	11970	14205
1.2	2806	5295	9307	12024	14259
1.3	2780	5269	9281	11998	14233
1.4	2691	5180	9192	11909	14144
1.5	2614	5103	9115	11832	14067
1.6	2753	5242	9254	11971	14206
1.7	2648	5137	9149	11866	14101
1.8	2637	5126	9138	11855	14090
1.9	2644	5133	9145	11862	14097
2.0	2651	5140	9152	11869	14104
2.1	2617	5106	9118	11835	14070
2.2	2774	5263	9275	11992	14227
2.3	2980	5469	9481	12198	14433
2.4	2663	5152	9164	11881	14116

 DOI: 10.15680/IJIRCCE.2017. 0507012

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International Journal of Innovative Research in Computer and Communication Engineering

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Vol. 5, Issue 7, July 2017

VII. CONCLUSION

In this paper, an android application is developed for communication through wi-fi. The performance of the proposed scheme highly relies on environmental condition.A performance testing analysis is carried to evaluate the impact of environmental condition on signal quality.The communication signal strength at three different time interval is measured to compare the frame losses. It is observed that in morning signal strength is good as compared to afternoon and night time duration. In case of afternoon, signals at receiver side with somewhat reduce in the quality of signal. In night signal quality is degraded because of environmental effect and data traffic. Furthermore , take the helpof current research in mobile to mobile communication .With proper system design, get good quality of application and take the signals at three time interval and plot the graph of mismatch versus amplitude and it has been found that mismatch signals are vary from 15 % to 60% in range.

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