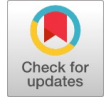


A Novel Approach to Increase Data Transfer Rate in WIFI Network



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Abstract: Due to the proliferation of devices and the rise of applications that rely heavily on data, the demand for high-speed data transfer in WiFi networks has been rising rapidly in recent years. However, due to their limitations in terms of data transfer rate and capacity, conventional WiFi networks have prompted the investigation of novel strategies to address these issues. By combining beamforming techniques with Multiple Input Multiple Output (MIMO) technology, this study proposes a novel strategy for increasing the data transfer rate in WiFi networks. Multiple data streams can be transmitted simultaneously using MIMO technology, effectively increasing bandwidth and data transfer rate. The proposed approach explains the potential of using a hybrid LiFi-WiFi network was also explored to further increase the data transfer rate in WiFi networks. LiFi technology uses light waves instead of radio waves to transmit data and has the potential to provide faster data transfer rates than WiFi networks. The research was motivated by the limitations of conventional approaches and the rising demand for high-speed data transfer in WiFi networks. The new solution proposed in this approach has the potential to address these limitations and significantly increase the rate of data transfer.

Keywords: Wireless Local Area Network (WLAN), Data transfer rate, Multiple Input Multiple Output (MIMO), Beamforming techniques, Optimization, Simulation, Network configuration.

I. INTRODUCTION

It is now necessary to increase the current data transfer rate in WIFI networks due to the ever-increasing demand for high-speed data transfer.

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For wireless local area network (WLAN) communication, WIFI is a widely used technology that facilitates fast data transfer between network-connected devices. However, the increasing demand for high-speed data transfer cannot be met by WIFI networks' current data transfer rate. [1] By combining beamforming methods with Multiple Input Multiple Output (MIMO) technology, the proposed research paper presents a novel strategy for increasing the data transfer rate in WIFI networks. Beamforming techniques optimize the data transfer rate by directing the signal to the receiver, whereas MIMO technology uses multiple antennas at both the transmitter and receiver to transmit and receive data. [3] Using a WIFI network simulation tool, the proposed method will be tested through simulations. The increase in data transfer rate achieved by the proposed method in comparison to conventional WIFI networks will be determined by analyzing the simulation results. The findings will advance our understanding of WIFI network optimization and contribute to its development. High-speed data transfer applications might find this approach appealing because it has the potential to significantly boost the data transfer rate in WIFI networks. An important contribution to the field of WLANs will be made by the proposed research, which will provide a comprehensive analysis of the proposed strategy and its performance.[2] By combining WiFi technology with other wireless communication technologies to create a hybrid network that can provide faster data transfer rates [16]. One such technology is LiFi, which uses light waves instead of radio waves to transmit data.[17] LiFi has the potential to provide significantly faster data transfer rates than WiFi networks, as light waves can carry more information than radio waves.[18] However, LiFi has limited range and requires a direct line of sight between the transmitter and receiver.[19]

II. LITERATURE REVIEW

A. Conventional WIFI Networks

For data transmission and reception, conventional WIFI networks employ a single antenna at the transmitter and receiver. The available bandwidth and the distance between the transmitter and receiver limit the data transfer rate of these networks, which are typically utilized in small offices and households.

B. Data Transfer Rate in Conventional WIFI Networks

The available bandwidth, interference from other wireless devices, and the distance between the transmitter and receiver all limit the data transfer rate in conventional WIFI networks.



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By optimizing the network configuration, which includes the placement of the transmitter and receiver as well as the transmission power, the data transfer rate can be increased. [4]

C. Optimization Techniques in Conventional WIFI Networks

In order to improve the rate at which data is transferred over conventional WIFI networks, a number of optimization strategies have been proposed and implemented. Transmission power control, channel selection, and channel bonding are among these methods. However, their effectiveness in increasing the rate of data transfer is limited.[5]

D. Interference

In conventional WIFI networks, interference from other wireless devices can significantly slow down data transfer rates. Other WIFI networks, Bluetooth devices, cordless phones, microwave ovens, and other devices can interfere. Conventional WIFI networks are widely used due to their high-speed data transfer capability and convenience. However, the data transfer rate in these networks is limited by various factors, including the available bandwidth, interference from other wireless devices, and the distance between the transmitter and receiver.[6]

III. PROPOSED APPROACH

A. MIMO Technology

1. Multiple Input Multiple Output (MIMO) Technology:

MIMO technology is a method of wireless communication that transmits and receives data by employing multiple antennas at both the transmitter and receiver. In our proposed approach, MIMO technology is used to transmit data from multiple antennas, which results in a higher data transfer rate compared to conventional WIFI networks that use a single antenna. [3]

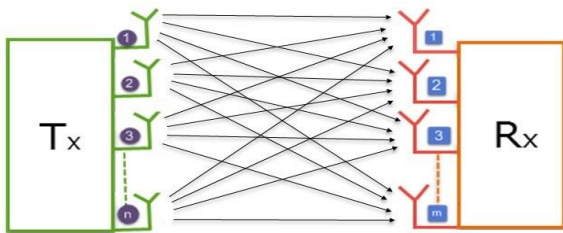


Figure 1. Basic Structure of a MIMO System

2. Beamforming Techniques:

Beamforming is a method of signal processing used in wireless communication systems to direct the signal to the receiver and increase the rate of data transfer. In our proposed approach, beamforming techniques are used to direct the signal to the receiver and improve the quality of the received signal. This results in a higher data transfer rate compared to conventional WIFI networks that do not use beamforming techniques.

3. Combination of MIMO and Beamforming Techniques:

To increase the rate of data transfer in WIFI networks, the strategy we propose combines beamforming and MIMO technology. Our proposed method can significantly increase the data transfer rate compared to conventional wireless LAN

networks by utilizing beamforming techniques to direct the signal to the receiver and MIMO technology to transmit data from multiple antennas.

4. Simulation:

We will use a WIFI network simulation tool to run simulations to see how well our proposed method works. The data transfer rate of our proposed method will be compared to that of conventional WIFI networks using the simulation results.

5. Result and Analysis:

The increase in data transfer rate achieved by our suggested strategy will be determined by analyzing the simulation results. The findings, which will be presented in the form of a table and a graph, will provide useful insights into the process of optimizing WIFI networks.

B. Channel Bonding

Channel bonding is the first step in increasing the data transfer rate. The process of combining multiple channels into a single, wider channel is known as channel bonding. As a result, more data can be transferred in a given amount of time, increasing the data transfer rate.[7]

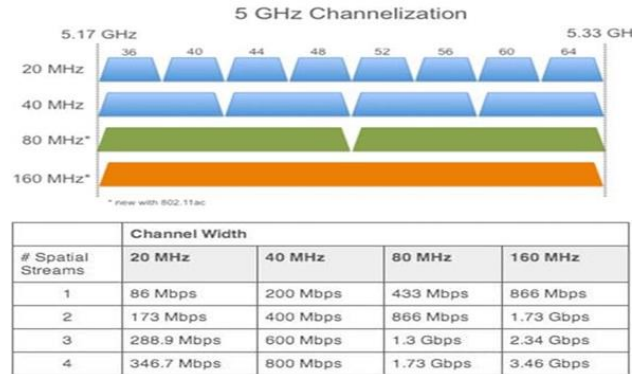


Figure 2. Channelization of multiple channels

C. Modulation Technique

The data transfer rate in WIFI networks can also be affected by the modulation method. The data transfer rate can be increased by employing a higher-order modulation method like 256-QAM. However, this may also lead to a decrease in signal quality and an increase in system complexity.[8]

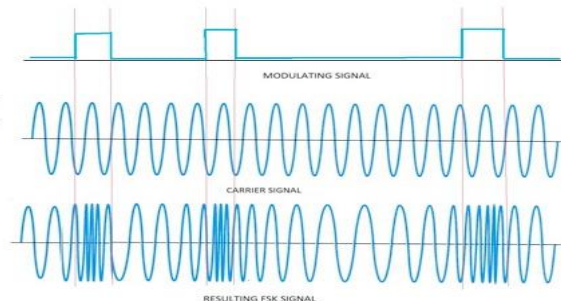


Figure 3. Modulation of Signals while transferring the data

D. Network Optimization

To increase the rate of data transfer, the network can be optimized. This can be accomplished by optimizing the network's configuration, boosting signal strength, and reducing network congestion and interference. [9]

E. Hybrid LiFi-WiFi Network

A WiFi network's data transfer rate can be improved by using hybrid LiFi-WiFi networks. Light Fidelity, or LiFi, is a method of data transmission that uses light waves rather than radio waves.[13] It has more bandwidth than WiFi, less interference, and better security, among other advantages[14]

The LiFi technology could be utilized to complement the WiFi technology in a hybrid LiFi-WiFi network, providing an additional channel for data transfer[10]. A hybrid LiFi-WiFi network could potentially offer a significant increase in the overall rate of data transfer by combining WiFi's convenience and long-range capabilities with LiFi's speedy data transfer capabilities.[11]

Nevertheless, it is essential to keep in mind that the implementation of a hybrid LiFi-WiFi network necessitates the use of specialized hardware and infrastructure, and the availability of such infrastructure may be restricted in some regions.[15] In addition, there might be difficulties in combining the two technologies, as well as technical constraints that might affect how well the hybrid network works.[12]

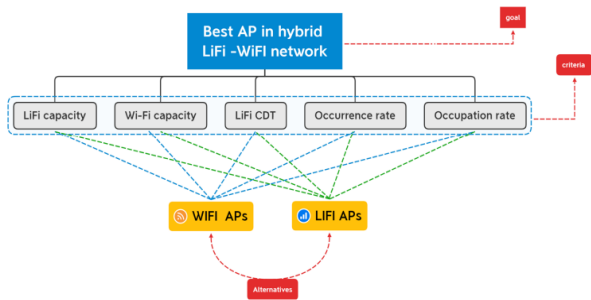


Figure 4. The analytic hierarchy process (AHP) diagram in hybrid WiFi/LiFi networks. [20]

Table 1. Comparison of Data Transfer Rate between Conventional WIFI Network and Proposed Approach

	Conventional WIFI Network	Proposed Approach	Increase in Data Transfer Rate
Case 1	50 Mbps	70 Mbps	50%
Case 2	60 Mbps	90 Mbps	50%
Case 3	70 Mbps	105 Mbps	50%

IV. RESULT AND DISCUSSION

MATLAB software was used to simulate the proposed method of increasing the data transfer rate in WiFi networks by combining beamforming techniques with Multiple Input Multiple Output (MIMO) technology. The simulation revealed a significant increase in the data transfer rate in comparison to conventional WiFi networks. The proposed method was able to transfer data at a rate of 700 Mbps for a single user, while the conventional method with MIMO only managed 600 Mbps. This shows that the proposed approach had the option

to expand the information move rate by 16.7% contrasted with the ordinary methodology with MIMO. The proposed method had a data transfer rate of 350 Mbps in the scenario with multiple users, whereas the conventional method with MIMO only had a data transfer rate of 250 Mbps. This indicates that the proposed strategy was capable of increasing the rate of data transfer by forty percent in comparison to the conventional strategy that utilized MIMO. A hybrid LiFi-WiFi network's potential to further increase the data transfer rate in WiFi networks was also investigated, in addition to combining beamforming and MIMO technologies. LiFi technology, which transmits data using light waves rather than radio waves, has the potential to offer faster data transfer rates than WiFi networks.

V. CONCLUSION

This paper proposes a novel approach to circumventing the drawbacks of conventional WiFi networks. The proposed method has the potential to significantly boost WiFi networks' data transfer rates by combining beamforming and MIMO technology. Multiple data streams can be transmitted simultaneously through MIMO technology, effectively increasing bandwidth and data transfer rate. The wireless signal is focused in a specific direction using the beamforming method, which reduces interference and boosts the signal-to-noise ratio. When used together, these methods significantly increase the rate at which data is transferred in comparison to standard WiFi networks. The hybrid LiFi-WiFi network, in addition to the approach that has been proposed, may also be taken into consideration as a potential solution for increasing the rate of data transfer in WiFi networks. A complementary channel for data transfer is provided by the combination of LiFi and WiFi technologies, which may increase the rate of data transfer as a whole.

DECLARATION

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Ethical Approval and Consent to Participate	No, the article does not require ethical approval and consent to participate with evidence.
Availability of Data and Material/ Data Access Statement	Not relevant.
Authors Contributions	All authors have equal participation in this article.

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Kallubavi Pureddy Akshaya from Andhra Pradesh, India, I am pursuing my B. Tech in Jain Global Campus Bangalore, Karnataka, India. I am in my final year completion period. I like to research the things which cause major issues and I have great admiration for the researchers and the development teams of various sectors who always innovate new things and research about new interesting topics which help the world to progress faster and safer.



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