International Journal of Advanced Information Science and Technology (IJAIST) ISSN: 2319:2682
Vol.10, No.07, July 2021

An Efficient Handover Process For Achieving Optimum Resource Allocation In Heterogeneous Network

Ramakrishna Pasula
Asst. Professor
Department of ECE
Siddhartha Institute of Technology and Sciences
Narapally, Hyderabad, Telangana, India

S P Roja Rani
Asso.Professor
Department of CSE
Siddhartha Institute of Technology and Sciences
Narapally, Hyderabad, Telangana, India

Abstract- **Now-a-days We explore heterogeneous networks for Wi-Fi offloading because wireless networking is the most essential and high sector in both academic and research fields. We presented a new Wi-Fi offloading architectural paradigm to expand coverage and minimize traffic load by providing more Access Points (AP). Our main goal is to improve the network's throughput and efficiency for all participants. The network initially examines the signal strength of each AP from the user, and if it receives a strong signal from the nearest AP, packet routing is initiated. In order to maximize throughput and network efficiency, the AP evaluates two criteria: resource availability and Quos. For the scheduling procedure, the resource availability analyses the signal strength and Quos. To avoid packet loss and congestion, the AP also examines the traffic on each path and chooses the way with the least amount of traffic. Finally, each user's throughput is calculated and compared to existing models that demonstrate superior throughput and efficiency.**

Key Terms: Wi-Fi offloading, Quos, Wi-Fi Access Point.

1. INTRODUCTION

The number of smart phone users has exploded in recent years, resulting in increasing network or data traffic. According to a Cisco analysis on network traffic in the coming years, global mobile data traffic will exceed 10 Exabytes per month in 2016, up 18-fold from 2011. Nonetheless, mobile networks' current capacity cannot keep up with the exponential growth rate of mobile data. Furthermore, with greater data flow and a growing number of smart phone users, it is vital to consider the exploitation of unique mobile applications. User traffic will soon outstrip the capacity of next-generation cellular networks like Wi-MAX. As a result, other solutions must be discovered in order to handle this problem effectively.

Mobile data offloading is a technique used by complementary network topologies to send data to the nodes that were originally targeted as destinations. There are other data offloading options available, but we will focus on Wi-Fi offloading, which is a popular and efficient method for data unloading in cellular networks. [4]. Wi-Fi is a prominent technology that offers so many benefits that it is frequently used as a primary offloading method. Wi-Fi technology, when compared to cellular networks, can give comparable data rates. We can save energy by adopting Wi-Fi technology instead of cellular networks because it uses energy efficient routing. Wi-Fi Access Points (AP) are significantly easier to setup and require very little money. Thousands of Wi-Fi networks and hotspots have been deployed in rural urban regions.

Nowadays, the majority of smart products come with Wi-Fi built-in. Over wireless networks, the Wi-Fi network can provide a communication environment for network users. The unexpected deployment of Wi-Fi with the overlay network is the supporting network for mobile data offloading. The effectiveness of Wi-Fi offloading has been proved in the following experiments. Lee et al. [5] showed the offloading of existing Wi-Fi networks, demonstrating that around 65 percent of all mobile network traffic can be offloaded. Because there is no delayed transmission during the trace driven simulation process, this approach can save up to 55% of energy (battery power).

Ristanovic et al. [6] devised two techniques for delay-tolerant Wi-Fi offloading. The researchers revealed that two algorithms perform well in data offloading and deliver a significant volume of data traffic while also having a good impact on battery life. In a heterogeneous network environment with IEEE 802.11 UMTS and Wi-Fi, Deifet al. [1] introduced a new architecture for Wi-Fi offloading paradigm. According to Aijaz et al. [3,] Wi-Fi offloading can preserve more than 65 percent of cellular network energy at the base station. Jung et al. [2] introduced a network-assisted user-centric Wi-Fi offloading paradigm that uses network information to boost the performance of each participating network user.

2. PROBLEM STATEMENT

In this section, thee existing approaches to Wi-Fi offloading is shown, and these research have been conducted on heterogeneous networks (such as WLAN, WiMAX, and cellular WLAN) since it offers efficient communication between Wi-Fi and cellular networks. The Access Network Discovery and Selection Function (ANDSF) is supported by the 3GPP LTE [15] standard, which employs a User Equipment (UE) to locate and run non-cellular access networks such as Wi-Fi. Many research have been undertaken on the effects of Wi-Fi offloading. Ristanovic et al. [7] proved that using Wi-Fi effectively offloads network data traffic by up to 70%. According to Aijaz et al. [8,] the Wi-Fi offloading procedure reduces the power consumption of each base station by up to 65 percent.

According to Lee et al. [9], the existing Wi-Fi network is capable of offloading around 65 percent of total network traffic while preserving power for Mobile Stations (MS). They also demonstrated an on-the-spot Wi-Fi offloading concept, in which all users can offload data traffic while connected to a Wi-Fi Access Point. In a heterogeneous network, Zhuo et al. [10] investigated the relationship between user latency and offloaded traffic, and they proposed a bonus structure to encourage all users to offload data traffic. Dimatteo et al. [11] suggested a Wi-Fi offloading architecture based on cellular network signaling. They established that data offloading is responsible for half of the data in a cellular network by using real traces for a large city.

Deif et al. [12] proposed a new Wi-Fi offloading model based on the Received Signal Strength of different networks. Kim et al. [14] investigated the impact of Wi-Fi offloading in a heterogeneous network with many access points. Balasubramanian et al. [13] are interested in determining the throughput of 3G and Wi-Fi networks, as well as the rate of terminal loss. They also demonstrated Wiffler, a Wi-Fi offloading API that allows for quick switching. They save 45 percent on 3G usage by using Wiffler, and the network performance is determined by the number of APs in the area. Contending STAs, which are present in each AP, play a key part in calculating throughput accurately.

3. IMPLEMENTATION OF THE PROPOSED SYSTEM

A network's communication nodes are deployed initially, followed by the assignment of source and destination nodes. Thousands of people can be found in a network. A source is a user who wishes to communicate or transmit packets to another user, while a destination is a user that receives packets. In each region, the number of Wi-Fi access points (APs) is set. After that, each packet is assigned a packet id. The user determines whether access points are available and obtains the strength of all Wi-Fi access points in the network. If the nearest access point provides the strongest signal among all access points, choose the access point with the next strongest signal. When a large number of people use an access point, the signal strength of that access point decreases. As a result, users that connect to that access point have very weak signal strength. When the signal of the present access point is too weak, our suggested protocol automatically chooses the nearest access point to avoid such a situation. The Handover procedure is the name given to this network operation. When the packets arrive at their destination, the procedure is repeated.

4. EXPERIMENTAL RESULTS

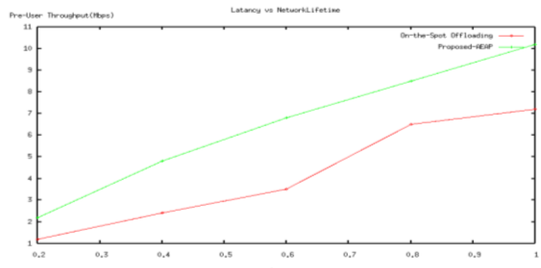

Fig 1: Performance between Proposed PBPC and On-the-spot offloading in Per-User Throughput and Latency

The performance of On-the-spot offloading is shown in red, whereas the performance of our suggested PBPC protocol is shown in green. Per-User Throughput and Latency are plotted in these graphs. When latency is raised, On-the-spot offloading's Per-User Throughput increases somewhat, and PBPC increases frequently when compared to the On-the-spot offloading protocol. In general, a network with low latency and high per-user throughput performs better.

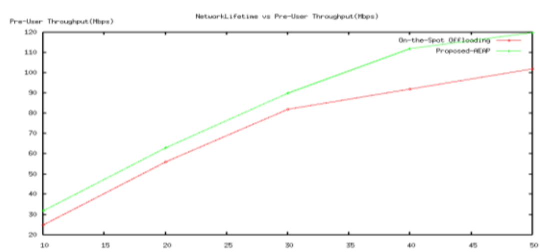

Fig 2: Performance between Proposed PBPC and On-the-spot offloading in Per-User Throughput and Network Life-Time

The performance of On-the-spot offloading is shown in red, whereas the performance of our suggested PBPC protocol is shown in green. Per-User Throughput and

Network Life-Time are plotted in these graphs. When Per-User Throughput is increased, On-the-Spot Offloading's Network Life-Time increases gradually and then suddenly decreases at a certain point, whereas PBPC is frequently increased in comparison to On-the-Spot Offloading protocol. In general, a network with a longer Network Life-Time has higher performance.

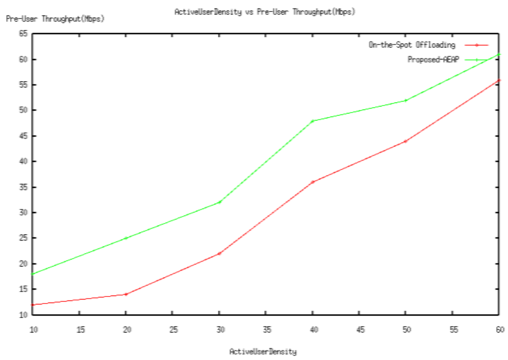

Fig 3: Performance between Proposed PBPC and On-the-spot offloading in Per-User Throughput and Active User Density

The performance of On-the-spot offloading is shown in red, whereas the performance of our suggested PBPC protocol is shown in green. These graphs show the relationship between Active User Density and Per-User Throughput. In comparison to the On-the-spot offloading protocol, when the Active User Density is increased, the Per-User Throughput of On-the-spot offloading increases somewhat and PBPC increases often. In general, a network with a high per-user throughput and a large number of Active User Densities performs better.

5. CONCLUSION

As a result, we developed a new architecture model for Wi-Fi offloading in a heterogeneous network to boost throughput and efficiency of each participating user while increasing coverage. The network coverage is expanded in our suggested strategy by offering a larger number of APs for successful Wi-Fi offloading. When the number of APs is increased, network traffic is reduced, and each participating user's data reception or offloading rate is raised, resulting in greater throughput. As a result, efficiency can be raised automatically. Our proposed method outperforms other current methods in terms of efficiency and throughput.

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