IMPLEMENTATION OF STANDARD ACCESS POINT SELECTION ALGORITHM FOR HEFTY WI-FI NETWORK

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Abstract – The last few years have witnessed a significant increase in the use of portable computing devices such as smart phones, tablets and laptops. The popularity of these devices and the emergence of a range of innovative mobile applications and online services are driving the demand for more reliable wireless communication connectivity. Unlike current solutions that rely on received signal strength to determine the best AP that could serve a wireless user's request, a novel framework is proposed that considers the Quality of Service (QoS) requirements of the user's data flow. The proposed framework relies on a function reflecting the suitability of a Wireless-Fidelity Access Point to satisfy the QoS requirements of the data flow. In the proposed system the main objective is to select the stable AP in large Wi-Fi networks. Standard Access Point selection algorithm is used to analyze the networks in the basis of access point. The algorithm considers two parameters for selecting an AP and they are energy and distance. It also specifies total number of slot allocation which will be serviced in the current frame. It also enables the determination of the exact location in the frame of the time slot allocated to each serviced request. At the beginning of each frame, the Scheduler has a number of pending requests for slot allocation to service, which are either downlink Wi-Fi cells waiting to be transmitted, or uplink reservation requests, piggybacked in the data MPDUs.

Keywords – Wi-Fi Networks, Standard Access Point Selection, Quality Of Service

I. INTRODUCTION

A technology that enables two or more entities to communicate without network cabling is termed as wireless network. Wireless networking is a method by which homes, telecommunications networks and business installations avoid the costly process of introducing cables into a building, or as a connection between various equipment locations. Wireless telecommunications networks are generally implemented and administered using radio communication. The implementation takes place at the physical level of the Open System Interconnection (OSI) model network structure. Wireless networks use radio waves to connect devices such as laptops to the Internet, the business network and applications. When laptops are connected to Wi-Fi hot spots in public places, the connection is established to that business's wireless network. A wired network has some disadvantages when compared to a wireless network. The biggest disadvantage is that your device is tethered to a router. The most common wired networks use cables connected at one end to an Ethernet port on the network router and at the other end to a computer or other device. Previously it was thought that wired networks were faster and more secure than wireless networks. But continual enhancements to wireless network technology and Wi-Fi networking standards have eroded speed and security differences between wired and wireless networks. There are three major modes a Wi-Fi device can use. These modes define the role a Wi-Fi device has in the network, and network must be built out of combinations of devices operating in these different modes.

II. LITERATURE SURVEY

In 2007 Akihiro Fujiwara and Yasuhiro Sagara et.al, proposed two Access Point selection algorithms for maximizing two types of throughputs. These two algorithms are decentralized algorithms. The first AP selection algorithm known as Maximizing Total Throughput (MTT) is proposed for maximizing the average throughput of APs. At each stage of the first algorithm, each station (STA) computes the amount of increase in the throughputs for all APs and selects the AP that maximizes the amount of the increase. The second AP selection algorithm known as Increasing Minimum Throughput (IMT) is

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proposed for maximizing the minimum throughput of the STAs. At each stage of the second algorithm, STA computes the minimum throughputs for all APs, and selects the AP for which the minimum throughput is the maximum. The centralized algorithm is also proposed which is based on local search method. It is proposed for obtaining near optimal average and minimum throughputs. The obtained throughput become base measures for decentralized algorithms. In the first step, it generates an initial solution. In the second step, it searches each of the neighbors of the current solution. If a better solution is obtained from the neighbor, then it is repeated until no new solution is found.

In 2008 Heeyoung Lee and Seongkwan Kim et.al, proposed a new association metric called Estimated aVailable bAndwidth (EVA). This metric is non-intrusive, fully distribute and independent of infrastructure. It requires no need of external information from nearby AP or STAs. It is designed to reflect the available bandwidth in a Base Station Subsystem (BSS) that is the maximum achievable throughput when associated with the target AP. In order to accurately estimate the available bandwidth, EVA estimator considers the contention level on a BSS by calculating collision probability and channel idle ratio based on channel state assessment. After searching all accessible channels and in turn, available APs on scanned channels, a station with the EVA estimator chooses the AP that provides the largest EVA. The typical time spent on scanning the channels varies from 300 to 500 milliseconds depending on WLAN client devices. The approximate scanning time for a single channel is 100 milliseconds. If the scanning time is too short then it represents EVA is less accurate. If the scanning time is too long then it represents enhanced accuracy of EVA. It provides no additional overhead.

In 2015 K. Sireesha and C. Shoba Bindu et.al, proposed the metric which is combined with the existing metrics such as Received Signal Strength Indication (RSSI), load information and it can be named as Scanning based Association Time Delay Minimization (SATDM). The proposed metric is expected to minimize the association delay and hence maximizes the overall performance in terms of resultant throughput. The technique is based on the association delay cost in the process of associating to an AP in a wireless LAN. The association cost of one AP is compared against the association cost of other working APs in the network.

The algorithm first monitors the AP selection cost of current AP. Then it monitors the AP selection cost of other APs through periodical background scanning. If the cost of current AP is less than the cost of other APs in the network, associate with the current AP. If the cost of current AP is more than the cost of other APs, get associate with one of the other APs whose selection cost is below a given threshold value, T. It is repeated until a best access point is found to get associates with.

In 2016 Qiang Ma and Abdullah Al- Dhelaan et.al, proposed the new intuitive mathematical model called Simplified Coefficient of Variation (SCV) model. In a multi-rate 802.11 WLAN environment, the trade-off between users' fairness and network throughput might be unacceptable. The objective is to improve the trade-off between user fairness and network throughput via power control in multi-rate WLANs. SCV could optimize and enhance the trade-off problem through controlling the power of Access Points.

In 2005 S. Vasudevan and C. Diot et.al, proposed a methodology for the estimation of potential upstream and downstream bandwidth between a client and an AP based on measurements of delay incurred by 802.11 Beacon frames from the AP. Here potential bandwidth is identified as the metric based on which hosts should make affiliation decisions, and define it as the bandwidth that the client is likely to receive after affiliating with a particular AP. It can also facilitate more informed roaming decisions. The proposed methodology does not require the end-host to change its current affiliation and introduces very little overhead. Here the assumption is that the client has credentials to associate with any AP within range and selects the AP offering the highest bandwidth in the direction the client will use for its data transfer. Beacon frames are broadcast by APs periodically, and are used by APs to announce their identity as well as for the synchronization of the entire network. The delay between the time when a beacon frame is scheduled for transmission and its eventual transmission captures the load of the AP and the contention inside the network, conditions that the client would face if affiliated with that AP. The corresponding delay of data frames provides an estimate for the bandwidth a client will receive from the AP downstream. Upstream potential bandwidth estimation relies on frames sent by the client to the AP in the unaffiliated state and is based on a similar methodology that quantifies the respective delays.

In 2016 Derrick D'souza and Krishna Prabhu Sundharan et.al, proposed ways to mitigate latency and suggests improvements in QoS using a custom built Open Flow controller based on Floodlight. Internet Service

Providers (ISP) and networking companies are apprehensive about implementing a Software-Defined Network (SDN) as a universal solution because of the lack of quality research done in the field. The proposed system focuses on Quality of Service as an influential factor differentiating a service provider's perspective in choosing between a centralized SDN versus a distributed traditional routing network. An application prone to latency and jitter can severely impact its performance leading to a dismal customer experience. Most service providers today need a network with fast provisioning and quick support. SDN aims to provide this capability to the service provider with a valid exhibit of QoS. The networking tool iPerf is used to measure the QoS performance characteristics. This research hypothesizes that service providers can implement SDN to save Capital Expenditure (CapEx) and to reduce Operating Expenditure (OpEx). To achieve these cost-savings, network is simulated using Mininet and Open vSwitch (OVS) connected to a custom built controller. After achieving the desired results, the same setting is implemented in a physical environment consisting of two Raspberry Pis, each running OVS and both connected to the custom controller; two end-hosts acting as Real-time Transport Protocol (RTP)/data server and client; and a Netgear switch connecting the Pis to the controller.

In 2008 Matteo Cesena and Ilaria Malanchini et.al, proposed a game-theoretic framework to model the problems of network selection and resource allocation, capturing the interdependencies of decisions taken by different players that are users Vs networks. On the network's side, there exists a resource allocation problem dealing with the development of effective strategies to allocate and dynamically manage the radio resources when different networks operated by different and potentially competing actors coexist. On the end-user's side, the main challenge deals with network selection, that is, the development of strategies to automatically select the best connectivity opportunity to match the user Quality of Service (QoS) constraints. Game theory has been widely used to tackle both problems, since it provides powerful modeling tools to capture the dynamics and the equilibrium of multi-agents situations. Namely, the problem is casted as a non-cooperative game where users and access networks act selfishly according their specific objectives: maximization of the perceived quality of service for the end users, maximization of the number of customers for the access networks. There are two equilibriums has to be characterized and tested. They are Interference-based Network Selection Game (INSG) and Network Selection and Resource Allocation Game (NSRAG). In INSG, radio resources are statically assigned to the access networks. The players are the end users, the feasible strategies are the available access networks, and the pay-off of each user depends on the number of interfering stations in the chosen access network. Here each end user adopts a strategy which maximizes their own pay-off, regardless of the status of the other users. In NSRAG, the radio resource allocation is not pre-determined, but the access networks can decide a specific radio resource allocation strategy to maximize their own utility. This scenario is modeled as a bi-level stage game where the payoffs for the resource allocation game played by the access networks depend on the outcome of a nested network selection game played at the lower level by the end users.

III. SYSTEM ARCHITECTURE

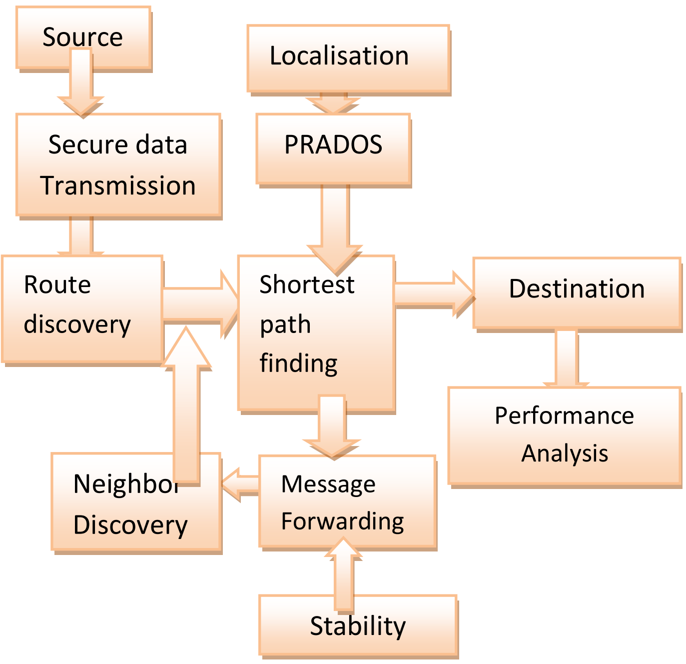

Fig 1: System Architecture

In this architecture, when the user requests for wireless connection, at first the request is encrypted using Data Encryption Standard (DES) algorithm. Localization is used to find the location of wireless Access Point that would be connected to the requested wireless user. Prioritized Regulated Allocation Delay Oriented Scheduling (PRADOS) is used for traffic regulation based on traffic characteristics and maintaining the delay constraints of the connections in the radio interface. At the beginning of each frame, the scheduler has a number of pending requests for slot allocation to service which are either downlink Wi-Fi cells waiting to be transmitted or uplink reservation requests piggybacked in the MPDUs. Then the neighbor AP to the user is identified based on stability using standard Access Point selection algorithm. The shortest path to the identified AP is determined and the requested user is connected with the destination.

IV. PROPOSED WORK

The proposed framework relies on a function reflecting the suitability of a Wi-Fi Access Point to satisfy the QoS requirements of the data flow. In the proposed system the main objective is to select the stable AP in large Wi-Fi networks. Standard Access Point selection algorithm is used to analyze the networks in the basis of access point. The algorithm considers two parameters for selecting an AP and they are energy and distance. It also specifies total number of slot allocation which will be serviced in the current frame. It also enables the determination of the exact location in the frame of the time slot allocated to each serviced request. At the beginning of each frame, the Scheduler has a number of pending requests for slot allocation to service, which are either downlink Wi-Fi cells waiting to be transmitted, or uplink reservation requests, piggybacked in the data MPDUs.

V. CONCLUSION

The proposed framework relies on a function reflecting the suitability of a Wireless-Fidelity Access Point to satisfy the QoS requirements of the data flow. In the proposed system the stable AP is selected in large Wi-Fi networks. The network is analyzed using Standard Access Point selection algorithm in the basis of access point. The algorithm considers two parameters for selecting an AP and they are energy and distance. This paper proposes an innovative algorithm that uses novel AP selection metrics that inherently consider the heterogeneity of the requirements for the different stations accessing the network.

The proposed framework has been evaluated via simulations to enable its comparison against the strategies found in the existing system. The simulation result shows reduced signal loss and reduced average end-to-end delay when compared to existing system. In future, additional QoS requirements like throughput and jitter will be considered. The algorithm will be optimized to more quickly access the wireless network without any interference or delay. The specialized algorithm will be developed to detect an attacker and to find a reliable routes in wireless networks.

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