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Infestation based Location – Aware Content Delivery System

Ravikant Sharma.L[1], Rajesh Kumar.N.S. R[2], VinothKumar.M[3], Karthikeyan.S[4] and Bala Ganesh.S[5]

[1,2,3,4,5]*UG-Student, Department of Computer Science and Engineering, K.S.R. College of Engineering, Tiruchengode, Namakkal, Tamil Nadu, India.*
[1]ravisharma.be@gmail.com

Abstract. With growing usage of thin computing devices like smart phones, tablets equipped with the technologies like 3G, Wi-Fi, GPS, etc., the information is available at the finger tip of the user. The main idea behind this paper is the efficient delivery of data in an Ad-Hoc network. With current technologies making use of internet facility to share the location aware content, through this paper we show that the same data could be achieved by deploying Wi-Fi infostations. In the latter half of the paper we introduce two algorithms that is based upon the sender's and receiver's approach during broadcasting of the information. These algorithms also avoid the congestion in the network and ensure that there is no data loss. In this paper some of the disadvantages of the traditional data transfer techniques i.e., unicasting and broadcasting has been rectified and hence the efficiency of data transmission is improved. The proposed idea includes node to node delivery along with unicasting and broadcasting.

Keywords: Research – Ad-Hoc network, Broadcasting, Data Fragmentation, Node to Node delivery, Unicasting, Sender and Receiver approach.

1 Introduction

In recent years the world has witnessed a huge increase in the usage of the so-called thin computing devices like smart phones, tablet PCs, laptops and other mobile devices. Given the fact that these devices are well equipped with the wireless technologies like 3G, GPRS, and Wi-Fi, the information is shared across the globe and is available at the finger tip of the users [1]. Here information is the location-aware content. Location-aware content is the information about the restaurants, shopping malls, hospitals, theatres and other facilities localized in and around an area. But this information comes at a cost [2]. Internet facility is required in order for the wireless technologies to function. These days with the invention of fast technologies like 3G and 4G, the internet facility providers are charging just too much that it becomes almost impossible for the common man to afford [3]. So, should he be deprived of the information about the world around him? With the current informative age, the answer is obviously NO. So, this is what this paper is based upon. The sharing of information is done using Wi-Fi infestations.

In the proposed system design, the Wi-Fi infestations are placed at different locations and the data is shared with the mobile users and the vehicles equipped with Wi-Fi. Hence clearly there is no cost involved in the data transfer as far as the users are concerned [4].

Delivering the data with high transfer rate to the vehicles such as car, bus, etc. is a great challenge.

Unicasting and Broadcasting are the two fundamental mechanisms that can be used in data transmission [5]. Unicasting is a technique in which a single node sends the data to a single node i.e., one to one communication is established between the nodes. Broadcasting whereas is the one in which a single node transmits the data to all the other nodes and a one to many communications is established between the nodes. Both the above said mechanisms have their own disadvantages.

With unicasting whenever too, many nodes are requesting for information from the Wi-Fi infestation and the infestation satisfying each node one by one, with the moving nodes i.e. the vehicles, there is a

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possibility that the some of the vehicles may move out of the range of the Wi-Fi infestation [6]. This problem is rectified by when broadcasting is used as all the nodes are served at the same time ensuring that the data is delivered before the vehicle moves out of the range.

In the environment where broadcasting is used as the mechanism for data transmission, a different problem is encountered [7]. The vehicles nearer to the Wi-Fi infestation have greater signal strengths when compared with those that are farther. Hence there is always a chance of data loss in case to father vehicles [16].

2 The System

2.1 Broadcasting Infestation

The design of the broadcasting Wi-Fi infestation is very simple. The infestation repeatedly processes all the files and transfers them while preserving their original sequence [8]. The data packets can be received by any vehicle falling in the range of the infestation. But there are chances that the data packets might get corrupted due to some random propagation effects. Hence, for the packets to return to their original state is a great challenge [15].

The Wi-Fi infestation can deploy several existing techniques to attain the originality of the data packets in broadcast data delivery, like application layer techniques like source coding, forward correction technique, data retransmission, etc. and the other physical layer solutions like smart antennas [9]. Though there are many solutions available, they still come at a high complexity cost. In the proposed scheme we make use of a simple and a well-known method of erasure encoding. In this scheme the entire file is fragmented into n packets and each packet is encoded into m different packets.

We deploy the above-mentioned scheme into the Wi-Fi infestation for two reasons. First is that since the encoding scheme is very simple, it results in minimum or less complexity. This allows us to differentiate unicasting from broadcasting [10] . Second, is that since the mentioned solution is capable of attaining the originality of the data packet, the throughput of the Wi-Fi infestation can be improved [11].

3 Node to Node Delivery

The disadvantage of unicasting not being able to deliver the information in time is overcome in the proposed system using node to node delivery [12]. In this case the Wi-Fi infestation shares its data with the vehicles nearby to it. If any other vehicle requires a data from the infestation that is now shared with the other vehicle, it can now get from its proxy [13]. When this chain progresses, the data can be delivered to any node from any node. Hence with the introduction of this technique along with unicasting we can overcome its drawback. Figure 1 shows the Unicasting with node to node delivery.

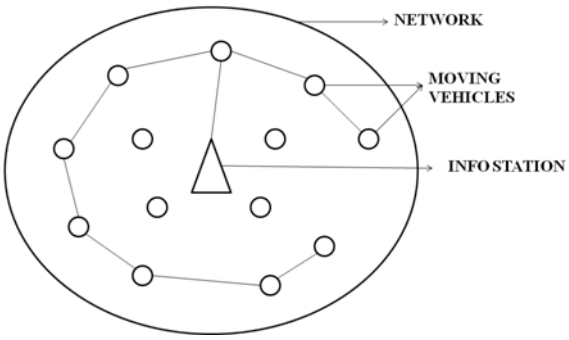

Figure 1: Unicasting with Node to Node delivery.

4 Data Fragmentation

In the case of broadcasting, the disadvantages of poor signal strength causing data loss is rectified using the proposed idea called Data Fragmentation [14]. The idea is that the total size of the data to be sent is divided into smaller data of similar or different size and each one is transmitted to its neighboring node and then transmitted further. The chain progresses and the entire data get transmitted to all the nodes in a small interval of time. Figure 2 and Figure 3 shows the data.

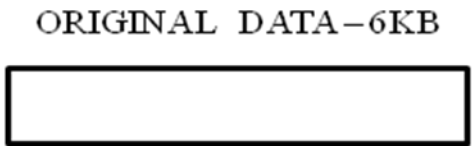

Figure 2: Original Data.

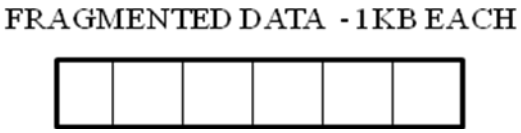

Figure 3: Fragmented Data.

The above fragmented data is then transmitted from the Wi-Fi infestation to its neighboring vehicles as shown in the figure 4. below.

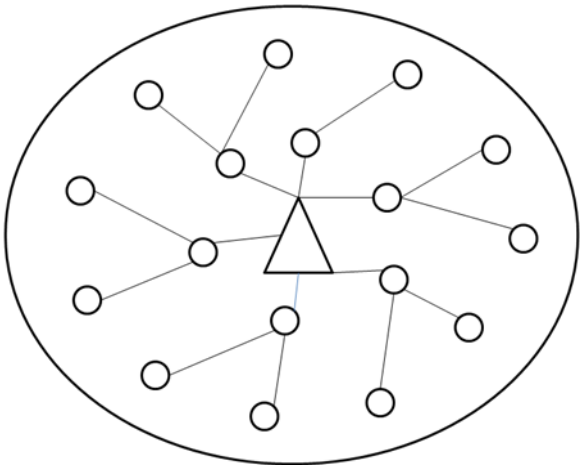

Figure 4: Data Fragmentation and Broadcasting.

Clearly from the above fig. it becomes evident that the content can be delivered very efficiently with any data losses.

5 SENDER APPROACH

During the transmission of the data there may arise a problem where a node after receiving a data may decide whether it has to transmit it to the further requesting nodes. Figure 5 shows the Sender denying from sending the data.

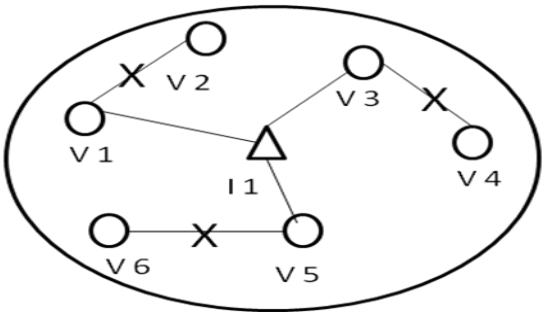

Figure 5: Sender denying from sending the data.

6 Receiver Approach

The idea of this is to provide the receiver with the option of deciding the source for receiving the data from a group of multiple sources. Figure 6 shows the Receiver selecting the source.

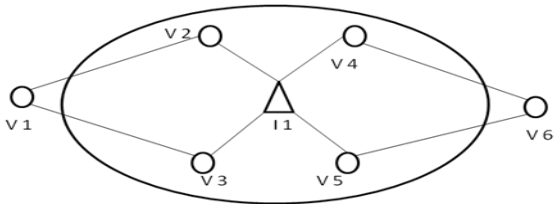

Figure 6: Receiver selecting the source.

As can be seen above the receiver V1 and V6 can select any one of the sources from V2, V3 and V4, V5 respectively.

7 Conclusion and Future Work

The proposed idea can be considered as a replacement for Google Maps as it provides all the necessary location - aware data when the Wi-Fi infestations are deployed in the necessary locations.

As part of the future work we would consider to enhance the data transmission rate and efficiency.

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