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Comparative Analysis of SRAAA, SDSR, SAODV Routing Protocol for Video Streaming in MANET

V. J. Chakravarthy
P.G, Department of Computer Applications, Guru Nanak College, Velachery, Chennai, India

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ABSTRACT

The most challenging concern in MANET is video streaming and it essentially exaggerated by these important factors such as fading, node mobility, interference, topology on change in dynamic, collusion, shadowing in multi-path etc. One of the very attractive and considered for many applications is Mobile Ad Hoc Networks (MANET).Routing Protocol is most significant element which is considered as the MANET. Though, the quite demanding task is video streaming over MANET. This paper have been investigated the analysis of routing protocols over MANET for video streaming. The comparison of the three routing protocols are Secure Dynamic Source Routing (SDSR), Secure Ad hoc On-demand Distance Vector (SAODV) and secured Right angled and Ant search routing Protocol (SRAAA) on the basis of various performance metrics such as Throughput, Packet Delivery Ratio (PDR), Delay, Packet Delivery Fraction (PDF), Energy Consumption, Link Failure and Packet Drop has been obtainable in this paper for supporting video streaming applications. Based on the compared stimulated results concluded that SRAAA routing protocol is comparatively better in performance of all metrics than the SAODV and SDSR routing protocols.

Corresponding Author:

V.J. Chakravarthy,
P.G. Department of Computer Applications, Guru Nanak College,
Velachery, Chennai, India.
Email: chakku_vjc@yahoo.co.in

1. INTRODUCTION

MANET is a self-sorting out, decentralized, framework less, multi hop, remote system of cell phones [1]. Therefore, routing discovery and maintenance are critical issues in these networks. There are also limited battery power and low bandwidth available in each node. Efficient routing has always been a matter of concern for MANETs. While reactive protocols are competing with the performance of proactive protocols, hybrid protocols have attempted to brew the better of both [2]. MANET over Video Streaming is affected by provided factors such as multipath fading and shadowing, interference, collusion, node mobility and change in topology dynamically, etc. Figure 1 shows the Video Streaming technology over Internet. The causes of topology on change in dynamic are periodic connectivity that made results in huge packet loss. It has the major effect on the video quality.

The real time video streaming can overcome the packet losses which requires special techniques in the uncertain network.MANETs have been developed a prevalent issue of investigates as the practices of the notebooks and Wi-Fi network/802.11 have become extensive [3].The mobile module in this modern age such as mobile phone, laptop and PDA which have revealed good improvements in-terms of memory capacity and performance[4]. The formation and maintenance of MANET are the advancement in technology which have at utmost efficiency to made it possible to utilize the small mobile and suitable wireless modules [4], [5] The applications of MANET is to provide the service of data communication during the emergency and rescue operations. This kind of operation are partially or completely destroyed e.g earth quake or infrastructure

might not exist such as remote areas [3]-[6]. Based on this environmental issues, the multimedia services such as video conferencing or live video feeds are important for the personnel rescue [7]. But this is not a simple task over MANET for supporting these kinds of multimedia services. There are several research challenging issues are yet to be resolved [8]. In network designers, MANET in Video transmission systems is supporting and real challenging task [4], [8].Adaptive video coding and Multimedia centric based MANET routing protocols resolve the challenges issues to some extent.

This method is not frequently follows the layering principle and thus it is mismatched with the technology of existence and protocols which still in their beginner stage to be used by the user .In fact, cellular or Wi-Fi networks are not appropriate for MANET, since results adopted by infrastructure based effectiveness is highly dependent of video packet delivery on the basic of routing protocol [4].The main focus of the work have been finding suitable routing protocol is an important issues for supporting video streaming. In this study, various routing protocols have examined in order to find a appropriate routing protocol for video stream transmission over a real MANET. In this work, we focus on the following routing protocols SRAAA [9], SAODV and SDSR [10]. We have analyzed and compared the video streaming performances over these routing protocols considering different performance metrics such as Throughput, Packet Delivery Ratio (PDR), Delay, Packet Delivery Fraction (PDF), Energy Consumption, Link Failure and Packet Drop were the Simulation results are discussed [9]. The simulation results show that performance of routing protocol on the network as well as the video stream used. The overall performance of SRAAA is best in all parameter metrics are confirmed.

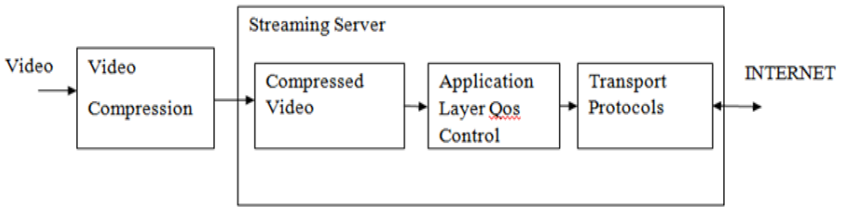

Figure 1. Video Streaming Technology

In this section performance of addressing Video streaming over MANET from various perceptions can be found in the review. A Mobile Ad-Hoc Network (MANET) is a collection of wireless mobile nodes that communicates with each other without using any existing infrastructure, access point or centralized administration .wireless LAN is an IEEE 802.11 standard [11].This study discussed using two routing protocols such as Dynamic Source Routing (DSR) protocols and Neighbor-Aware Cluster Head (NACH) to evaluate the performance of H.264 Protocol [12]. The researcher illustrate that it is possible to have video streaming in MANETs within an average of requiring 5.5Mbps and the average distance of 6hops. The major drawback of this work is performances of delay and throughput have not been inspected. This literature, the author analyzed the video streaming performance of throughput over MANETs. The investigation based on the 3 different types of routing protocols. 25 nodes based one network and 81 nodes based on other network. The area of network is specified as 800m by 1600m and the study has been made, comparison between the technologies of two PHY layer namely 11Mbps on IEEE 802.11a and 54Mbps on IEEE 802.11g. In this paper based on outperforms of both standard Dynamic Source Routing (DSR) and OCEAN which is a generic mechanism based reputation of routing protocol for video streaming in MANET in which the author proposed a novel service-aware reputation [13]. These proposal, author have considered Video streaming on TCP using optimized link state routing protocol (OLSR) and also Video streaming on UDP [14], [15]. These two protocols shown the appropriate for saving bandwidth and rapid reconfiguration of the path breaks, and also in this work other reputable routing protocols have not been investigated. This paper author proposes the performance over MANET in a multimedia traffic on the impacts of traffic type, mobility and traffic intensity are evaluated by using DSR Protocol [16]. The parameters are used for performance analyzes which are namely the packet delivery ratio, end to end delay and the normalized routing load. In this paper, we have analyzed some of the popular routing protocols namely SAODV, SDSR and SRAAA. The performances of these routing protocols have been investigated for video transmission.

2. ROUTING PROTOCOL OVER MANET

Due to the entire absence of infrastructure support and administrative of wireless networks with special characteristics are MANETs. The challenging task of MANETs becomes a key component of efficient routing protocols. There are 5 types of routing protocols which can be categorized according to the structure of network [17].

a. Routing Protocols on Flat Topology

This grouping subdivision which includes proactive, hybrid and reactive routing protocols.

b. Hierarchical Routing

It can be segmented into core node, cluster-based and Zone based.

c. Geographic Position

It includes 3 subdivisions which are Hierarchical, Single path (Greedy Forwarding) and Multi-path (Flooding) type of protocols.

d. Power Aware Routing Protocols

It is based on how the power consumption to reduce and the network lifetime to maximize, this can be classified into 4 classes which are Power control, Load distribution, Sleep/Power down Mode and Transmission on Power Management.

e. Multicast Routing Protocols

This routing protocol is used for how the data packets send to a group of users. It can be classified into 2 subdivisions a) Mesh-based and b) Tree-based routing protocols .In this paper the study based on routing techniques of the routing protocols.

2.1. Secure Ad-Hoc on Demand Distance Vector Routing Protocol (SAODV)

The version of AODV based on secure is called as secure AODV (SAODV) [18], [19]. It offers the features such as non repudiation of data routing, integrity and authentication. It integrates two securing schemes of AODV. The first scheme involves the messages of node signing example Route Reply (RREP), Route Request (RREQ). This permits the other nodes to validate creator of the message. This scheme does not change once these messages are created which can be used for protective portion of information in RREP and RREQ messages. Even though RREP and RREQ messages want to be changed by every node namely hop count. It also contains a field. Such the information is changeable, the creator of the message ignored when signing the message. The scheme of SAODV is used for which the mutable information have been protecting [20], [21]. This system influences the idea of hash chains. Signing routing messages suggests that the several nodes wants to have an important pair that make use of an asymmetric cipher. In addition to those nodes in the network also essential of the other nodes that to be aware of the authentic public keys.

2.2. Secured Dynamic Source Routing Protocol (SDSR)

This will be the integration of secured message transmission (SMT) with DSR and Secured Routing Protocol (SRP) to get secured Dynamic Source Routing (SDSR), which is used for capable of secured route discovery. This explores the extension of feasible improved throughput and efficiency that also incorporates the concurrent usage of multiple cached routes to the route cache management [22], [23].A idea of proactive route discovery dependent on the applications like voice over IP, Video conference etc, which has particularly high and sustained bandwidth.

2.2.1 Enhance Dsr for Secured Route Discovery

The basic functioning of SDSR retains the functionality of DSR which has the basic route discovery and the integration of security aspects is based on SRP proposals. The secure based route discovery between two communicating nodes of multiple routes is achieved in SDSR in the methodology of DSR and SRP with minimum modifications.

2.3. Secured Right Angled and Ant Search Hybrid Routing Protocol (SRAAA)

The developed RAAA [24] protocol will go for RREQ/RREP, RREQ/SRREP and SRREQ/SRREP cycle with RABGR and ANT Search method using BNPS and NNPS technique SRAAA Mechanism:
Our main focuses are to introduce SRAAA [25] to protect data transmission and to construct a secure routing protocol. Our SRAAA approach uses a hybrid of security mechanisms so that it satisfies the main security requirement and guarantees the discovery of a correct and secure route. The security mechanisms that the protocol uses are the hash function, Certificates, time synchronization and route discovery request. SRAAA works as a group and has 4 stages, examined in turn in the remainder of this section:

a. Route Request Process

1. Route Request message MD5 encryption by Destination

2. Send Encrypted Route Request Message with Symmetric key from Destination with unique ID (MAC Address)
3. Decrypting MD5 by source and check the route request

b. Detect and Eliminate the Attackers from The Routing table Process

1. Detecting Attackers in the network by looking up duplicate requests
2. Removing those nodes from the routing table

c. Certificate Distribution to all the authenticated nodes

Source Generates and distribute the Certificates to all the authenticated nodes

d. Packet Transfer Process

1. Sending Packets to the proper destination with SES data encryption technique
2. Receiving packets and SES decryption by destination

3. VIDEO STREAMING OVER MANET

Nowadays, video streaming over MANET becomes in multimedia applications, since the mobile device are capable and inexpensive to transmit, maintain and share the video streaming. These type of applications has a serious requirements are sensitive to delay, packet drop, jitter and congestion that must be accomplished at the end user-side to attain a certain level of quality [26], [27].In MANET each node is dynamically free to move in any pathway and leave at any time, a new node can join the network and will change continually its links to the other devices. Node is separately moved free into the network. Recently, video communication over MANET is growing a great interest because of its lot of application in education, disaster relief applications, military areas, emergency situation, video conferencing etc. It takes the advantage in wireless communication and advances of video coding techniques. In order to providing reliable video communication in MANET have so many challenges. These types of challenges that begin from the weakness of compressed video to packet losses and dynamic topology change in network. There is limited transmission range in MANET will cause a multiple hops are required to transmit the information for one node to other node. It is involved in the network for the purpose of energy saving.

4. SIMULATION RESULTS ON ROUTING PROTOCOLS FOR VIDEO STREAMING OVER MANET

The performances of the routing protocols supporting video stream transmission have been investigated by using NS2 simulator. The simulation metrics used to analyze the performance of different routing protocols are SRAAA, SAODV and SDSR.

4.1 Throughput

Figure 2 shows the graph of SRAAA with SAODV and SDSR protocols. The X-axis of the graph indicates the number of nodes and the Y-axis shows the Data rate which relates the throughput. As we can clearly observe from the graph, the throughput of SRAAA is very much better when compared with SAODV and SDSR. Thus in case of Throughput, SRAAA performs significantly well when compared to SAODV and SDSR.

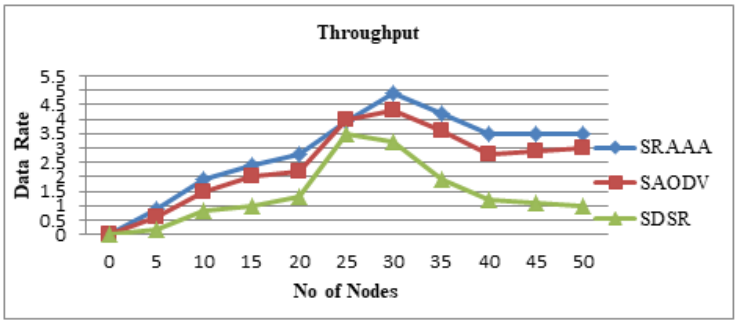

Figure 2. Number of Nodes Vs Data Rate

4.2 Packet Delivery Ratio (PDR)

Its represent to the packet delivery ratio can be increased compare with existing system source to designation PDR value is increased. In Figure 3 SRAAA shows increment in packet delivery probability so, as the total number of nodes increase the possibilities to meet with the destination node in the Direct Delivery routing increases.

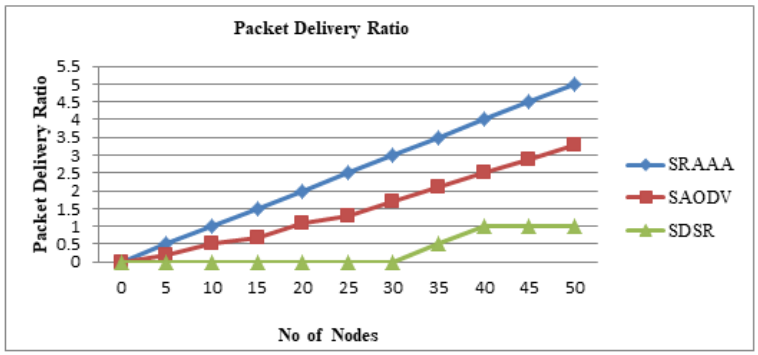

Figure 3. Number of Nodes Vs Packet Delivery Ratio

4.3 Delay

The Graph Shown in Figure 4 comprises the results of No of Nodes with Data rate, taking No of nodes along X-axis and data rate along Y-axis, we could conclude that our SRAAA protocol has low delay at low data rate as well as at high data rate when compare to all other protocols.

Delay = No of Nodes/ Data Rate (Kbs)

This graph represents by the total delay for existing and proposed system value this can be reduced and single strength is increased. SRAAA improves the Delay in terms of Data rate when compared with all other protocols.

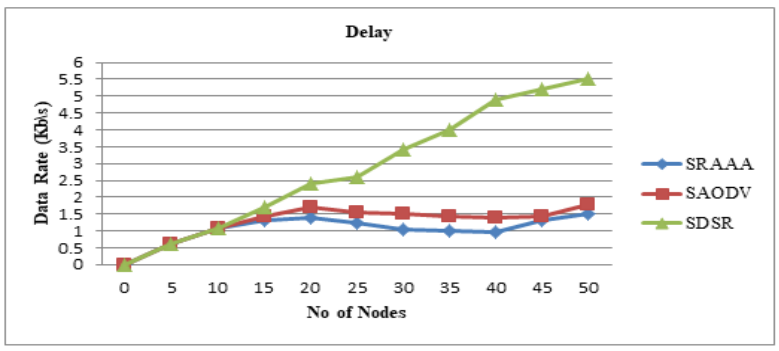

Figure 4. No of Nodes Vs Data Rate

4.4 Packet Delivery Fraction

Figure 5 SRAAA deliver a greater fraction of data packets with high mobility in large mobile networks when compare to other existing protocol.

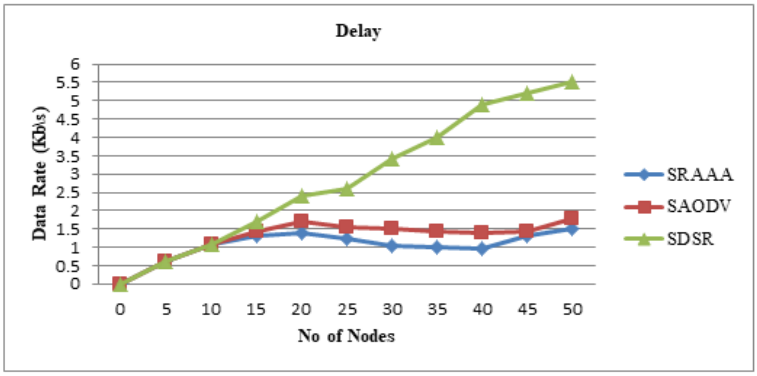

Figure 5. No of Nodes Vs Packet Delivery Fraction

4.5 Energy Consumption

Figure 6 shows that as compared to other routing protocols, SRAAA used almost 100% less amount of energy for transmitting data among other nodes.

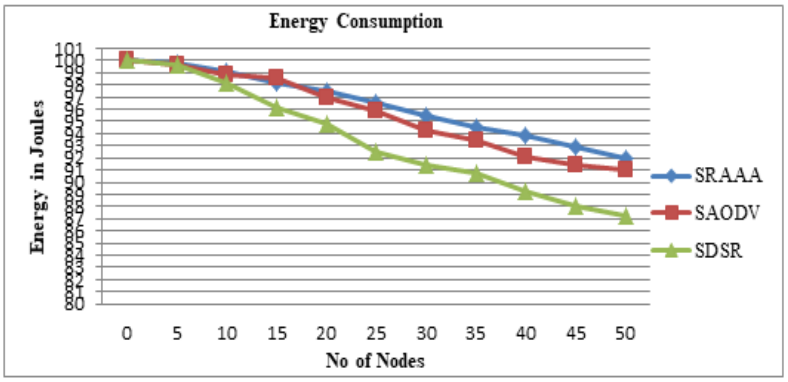

Figure 6. No of Nodes Vs Energy

4.6 Link Failure

Figure.7 SRAAA shows increment in packet delivery probability so, as the total number of nodes increased the possibilities to meet with the destination node in the Direct Delivery routing increases. Link failure is less in SRAAA compare to SAODV and SDSR protocol.

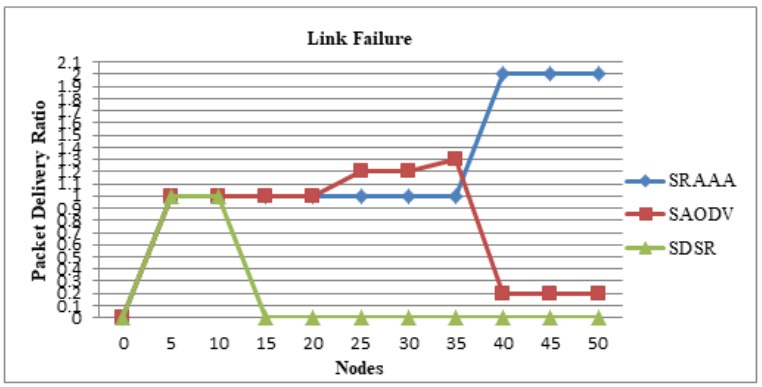

Figure 7. Number of Nodes Vs Packet Delivery Ratio

4.7 Packet Drop

Figure 8 represent by the proposed system of SRAAA, the packet drop value in no of nodes Vs no of packets is reduced compare with existing protocol.

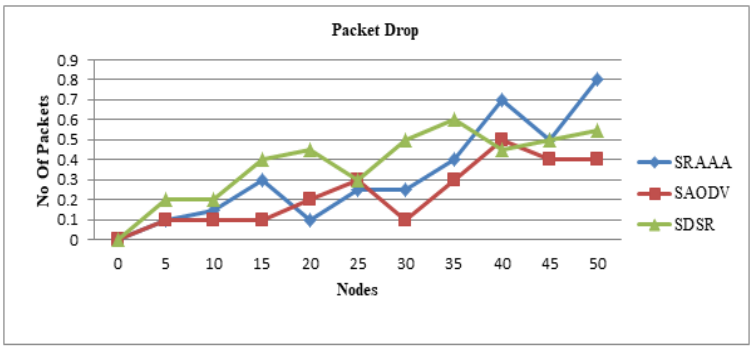

Figure 8. No of Nodes Vs No of Packets

5. CONCLUSION

Thus launching the video streaming over MANET were concluded with acceptable quality. The simulation results show that performance of routing protocol on the network as well as the video stream used. The overall performance of SRAAA is best in all parameter metrics are confirmed. SRAAA uses the optimizing routes function to improve the routing. The performance of SDSR protocol has high packets which degrades heavy loads and traffic conditions and also does not perform good result in video transmission. The performance of SDSR is poor when compared with SRAAA and in case of SAODV very closer to SRAAA. SRAAA protocol is the best routing protocol for video transmission among the other two protocols.

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