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Research Article

Performance Analysis of Multimedia Traffic in MANET with H.323 protocol

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Abstract

Mobile ad hoc network (MANET) is a self-directed system of mobile devices connected by wireless links. The node in MANETs moves in the region and modifies its locations by creating infrastructure less network without intervention of any network administrator. Varity of routing protocol for ad hoc network are probable. The main focus behind is to save resources (bandwidth) while using routing protocols. While deploying MANETs, a number of challenges involve like network scalability, Quality of services (QoS), energy utilization, security, privacy measures, bandwidth optimization and dynamic topology etc. In this paper an effort has been made to analyze the performance of multimedia traffic in terms of throughput, end to end delay, jitter and data received packet in the receiver by using AODV, OLSRv2 and FSR routing protocol with H.323 scalable video coding.

Keywords: *MANET, AODV, OLSRv2, FSR, Qualnet 6.1.*

1. Introduction

A wireless network is a rising new technology that will permit users to access services and information by electronic means, irrespective of their geographic location. Wireless networks can be divided in two kinds: infrastructure network and Infrastructure less (ad hoc) networks. Infrastructure wireless network is a network with fixed and wired gateways. A mobile host interrelates with base station within its communication radius. The mobile device move frequently when it is communicating with other mobile devices. A mobile ad hoc network (MANET) is a decentralised, self-organizing and self-configuring wireless network, without any fixed infrastructure Andrew *et al* (2011) mobile node behaves not only as a host, but also as a router which is capable of communicating with other nodes, using either direct wireless links, or multi-hop wireless links. Examples of ad hoc network applications include business associates sharing information during meetings or conferences, soldiers relaying information on a battlefield, and disaster relief personnel coordinating efforts after fires or earthquakes With such applications Haung *et al* (2007), MANETs are envisioned to become key components in the 4G architecture, as they will offer multimedia services to mobile users in areas with no pre-existing communications infrastructure exists. As nodes are mobile in a MANET, links are created and destroyed in an unpredictable way, which makes quite challenging the determination of routes between a pair of nodes that want to communicate with each other but In this network, mobile node configuration is quickly changing that causes delay, packet drop, security, lower bandwidth, load on network that degrade the performance of MANET so Rouging decision, to design the protocol and to apply QOS is also challenging task for the network designers.

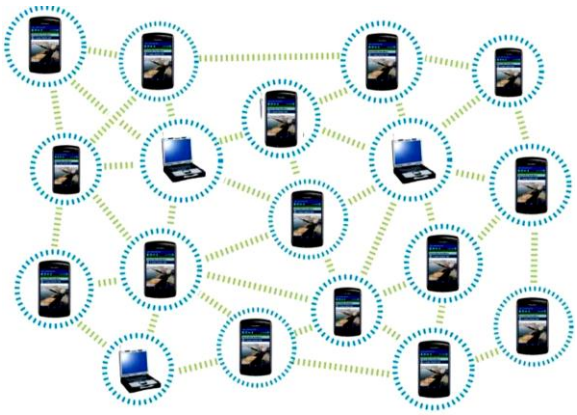

Fig.1.0 MANET scenario with MS

MANETs support a lot of technologies in the modern era. Routing in MANETs is one of the major tasks to provide the network functionally to each device at any time; at any place Ranga *et al* (2010) MANETs differ with other network due to it has no central control mechanism , limited power capacity, to main the information on regular basis to transfer information. Different routing protocols for Ad-hoc such routing protocols can be classified into two major classes: proactive protocols and reactive protocols. Proactive protocols disseminate routing information from each node to each other periodically, and

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find routes continuously, whereas reactive protocols find routes on demand, i.e. only when a source sends information for forwarding to a destination used to provide the consistent services to the mobile node Mittal *et al* (2009).

2. Wireless Routing Protocols

2.1 Ad Hoc On-demand Distance Vector Routing (AODV) protocol

Ad-hoc On-demand Distance Vector) is a reactive routing protocol Perkin *et al* (1999, each node of AODV maintains a routing table but unlike the DSDV protocol it does not necessarily maintain route for any possible destination in network. However, its routing table maintains routing information for any route that has been recently used within a time interval; so a node is able to send data packets to any destination that exists in its routing table without flooding the network with new Route Request (ROUTE_REQ) messages. In this way, the designers of AODV tried to minimize the routing overhead in the network caused by the frequent generation of routing control messages. AODV uses source and destination sequence numbers to avoid both loops and the count to infinity problems that may occur during the routing calculation process.

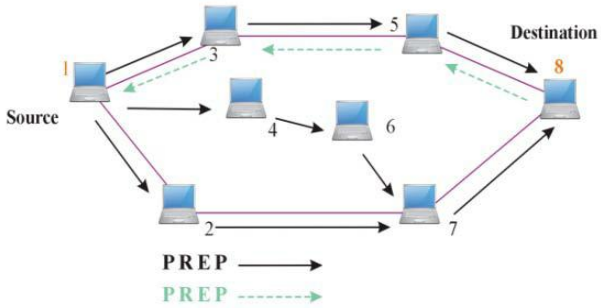

Fig.2.1 AODV Routing protocol

All routing packets carry these sequence numbers. AODV shares on-demand behaviour with DSR; however AODV stores routing information as one entry per destination in contrast to DSR, which cashes multiple entries per destination. Without source routing, AODV relies on routing table entries to propagate an ROUTE_REPLY back to the source and, subsequently, to route data packets to the destination. AODV has ability to interconnect nodes in a Pure MANET running AODV with other non-AODV routing domains, thus extending any network with fixed infrastructure to a network with both mobile wireless nodes and static nodes, e.g., Ethernet. AODV supports for both unicast and multicast routing, and also supports both bidirectional and unidirectional links.

2.2 OLSRv2

OLSRv2 is being standardized in the IETF MANET (Mobile Ad hoc Network) working group. OLSRv2 uses the common packet format that is also being standardized in the MANET WG Clausen *et al* (2006). OLSRv2-Niigata supports most functions included in the specification. For example,

- Attached network handling
- Multiple message aggregation to one packet
- Hop by hop TTL control mechanism
- Changing OLSRv2 parameters
- IPv4 and IPv6 support
- Address compression

OLSRv2-Niigata also supports the QualNet simulator [8]. But two features have not been yet implemented; OLSR packet fragmentation, and multiple addresses and multiple interfaces handling.

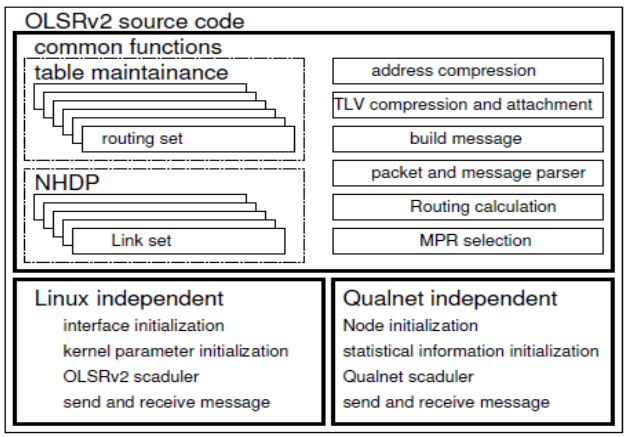

Fig.2.2 Implementation structure of OLSRv2

2.3 Fisheye State Routing

FSR is an implicit hierarchical routing protocol. It uses the fisheye technique used to reduce the size of information required to represent graphical data Kleinrock *et al* (1971). FSR is functionally similar to LS Routing in that it maintains a topology map at each node. In FSR, link state packets are not flooded. Instead, nodes maintain a link state table based on the up-to-date information received from neighbouring nodes, and periodically exchange it with their local neighbours only (no flooding). Through this exchange process, the table entries with larger sequence numbers replace the ones with smaller sequence numbers. The FSR periodic table exchange resembles the vector exchange in Distributed Bellman-Ford (DBF) (or more precisely, DSDV where the distances are updated according to the time stamp or sequence number assigned by the node originating the update. However, in FSR link states rather than distance vectors are propagated. Moreover, like in LS, a full topology map is kept at each node and shortest paths are computed using this map.

3. Simulation model and Platform

In this paper, Qualnet simulator tool are used to evaluate the performance of MANET using different routing protocol like AODV, OLSRv2 and FSR. The MAC protocol 802.11n is used in this simulation. The simulation model is designed over an area of 1500m x 1500m where 50 mobile stations connected to each other with random way point mobility model that moving with speed 0 to 50 mbps and channel frequency of 2.4GHz.In this scenario

we are using VOIP for transmission of different data like (video, audio i.e. for multimedia application purpose) from source to destination. Voice over Internet Protocol (VoIP) is a form of communication that allows you to make phone calls over a broadband internet connection instead of typical analog telephone lines. Basic VoIP access usually allows you to call others who are also receiving calls over the internet. Interconnected VoIP services also allow you to make and receive calls to and from traditional landline numbers, usually for a service fee. Some VoIP services require a computer or a dedicated VoIP phone, while others allow you to use your landline phone to place VoIP calls through a special adapter. For multimedia transmission we are also using H.323encoded video sequence to evaluate the performance of routing protocol in terms of throughput, end to end delay, jitter and data received packet in the receiver.H.323 responsible for performing various function like number of received call, number of rejected TCP connection and number of initiated and established call. The simulation is performed by using the network simulator Qualnet 6.1for evaluating different parameters which is shown in table 1 to identify which of protocols gives better performance among other routing protocols.

Table.1 Simulation parameter

Routing protocols	AODV, OLSRV2, FSR
Radio type	802.11n
No. of Channels	One
Channel frequency	2.45 Ghz
Simulation time	500 sec
FFT	1024
Standard protocol	H.323
Mobility modal	Random way point
Traffic type	CBR and VOIP
Simulation area	1500x1500
No of nodes	50
Simulator	Qualnet 6.1

4. Result and Discussions

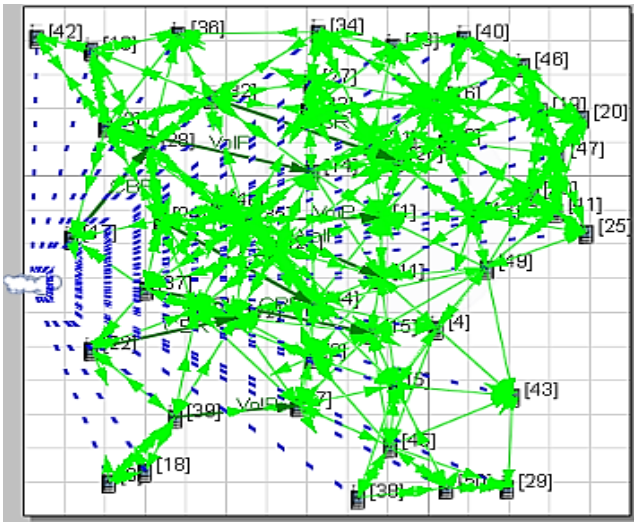

Fig.4 Simulation scenario of MANET with 50 nodes for multimedia traffic.

In this simulation network simulation model is designed over an area of 1500m x 1500m where 50 mobile stations connected to each other with random way point mobility model that moving with speed 0 to 50 mbps and channel frequency of 2.4GHz.Performance of MANET multimedia traffic analyze with the help of throughput, end to end delay, jitter and data received packet in the receiver of CBR and VOIP traffic model.

4.1 Throughput

Throughput is defined as the average rate of successful delivery of packet at the receiver..There are three different routing protocols with 50 nodes that moving with speed 0 to 50 mps. Figure 4.1 show throughput performances of AODV, OLSRv2 and FSR routing protocol .from result Throughput performance of AODV routing protocol for CBR and VOIP is better than OLSRv2 and FSR. Throughput performance of VOIP is good than CBR connection,

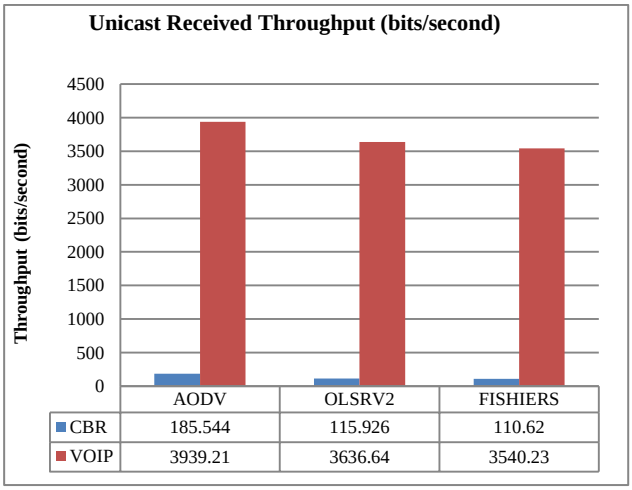

Fig.4.1 Unicast received throughput for AODV, OLSRv2 and FSR routing protocol

4.2 Average Jitter

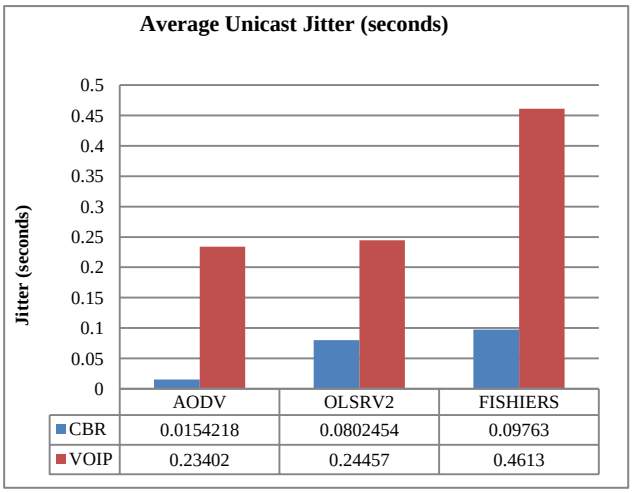

Fig.4.2 Average unicast jitter AODV, OLSRv2 and FSR routing protocol

Jitter is the variation in delay for packet belonging to same flow. This is the difference between end to end delay and jitter. There Figure 4.2 show jitter performance of AODV, OLSRv2 and FSR routing protocol .from result AODV routing protocol for CBR and VOIP is low jitter than OLSRv2 and FSR. Jitter performance of CBR is good than VOIP connection.

4.3 Average End-To-End Delay

End-to-end defined as, the time taken by the packet to travel from sender to receiver. It represents the average data delay an application or a user experiences when transmitting data. There are different routing protocols are used for random way point mobility to evaluating the performance of different 50 MS.Fig.4.3 shows average end to end delay for CBR and VOIP using different routing protocols in which end to end delay of AODV for CBR is having better results among all routing protocols whereas for VOIP, OLSRv2 is good than AODV and FSR.

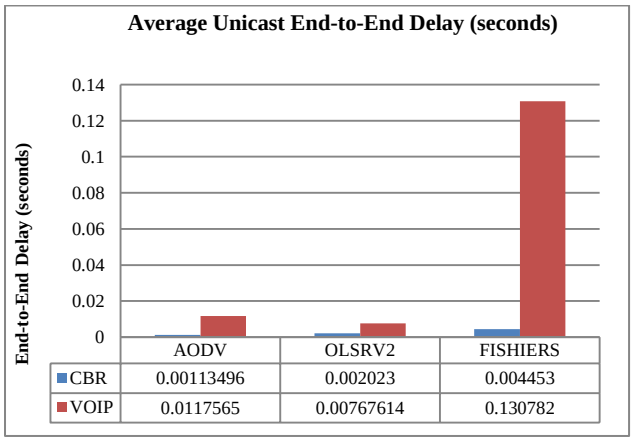

Fig.4.3 Average unicast end to end delay AODV, OLSRv2 and FSR routing protocol

4.4 Data received

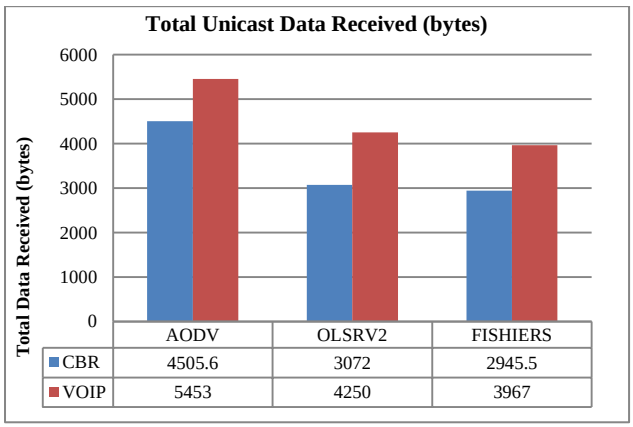

Fig.4.4 Total Unicast Data Received (bytes) AODV, OLSRv2 and FSR routing protocol

It is defined as the successful delivery of data packet at the receiver. From result number of successful delivery of packet for AODV routing protocol of both CBR and VOIP is better than other routing protocol.

Conclusion

In this paper, the performance of routing protocol has been analyzed by using Qualnet simulator 6.1The simulation results shows the performance of AODV,OLSRv2 and FSR using different parameters over MANET using multimedia application (video transmission) and analyze the performance of the network. The study of these routing protocols shows that the overall performance of AODV routing protocol in terms of Throughput, end-to-end, packet delivery ration and Jitter for CBR and VOIP is better than OLSRv2 and FSR routing protocol. As per analysis, it can conclude that AODV protocol is best performer as compared to all other protocols and FSR protocol is the worst performer**.**

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