ISSN(Online):2320-9801
ISSN(Print): 2320- 9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 2, Special Issue 3, July 2014

A Design for Video Streaming Using Multipath Routing in MANET

A.Sheganaz[1], Dr.P.D.R.Vijaya Kumar[2].

P.G.Scholar[1], Department of Computer Science and Engineering, Info Institute of Engineering, Coimbatore, India.

Assistant Professor[2], Department of Computer Science and Engineering, Info Institute of Engineering, Coimbatore, India.

ABSTRACT: Mobile Ad hoc Networks community provides us with a wealth of technologies that enable the source and the destination nodes to route the data through neighbouring nodes. Fast resources discovery and Quality of Service are key determinants for efficient multimedia transmission in MANET. In this paper, the technique of Multipath Routing using AOMDV routing protocol used for multimedia data transmission in MANET. Multi-path routing represents a routing method for wireless mobile ad hoc networks. Ad Hoc On-demand Multipath Distance Vector protocol is used to choose the multiple alternative paths for multicasting multimedia data in MANET, based on the distortion metric. The multimedia data further transferred to one and two hop neighbours. The ability of creating multiple routes from the source to a destination is used to provide alternative route. When primary route fails to deliver the packets in some way, the alternative route is used for maintaining connection establishment for route the data from source to destination. Multipath routing using AOMDV achieves lower average end-to-end delay, high video data delivery, lower routing overhead and packet loss rate, quality of service.

KEY WORDS: Multimedia, Multicasting, AOMDV, MANET

I. INTRODUCTION

An Ad-Hoc is obtained with multiple nodes connected by wireless links. A Mobile Ad-Hoc Network (MANET) is a collection of mobile nodes which does not rely on any infrastructure and which is free to move [1]. A MANET used to change its links to other nodes frequently.Routing is the process of selecting paths in a network to obtain a route to forward the data packets. Routing used to evaluate the path for transferring the data to destination. Proactive routing maintains route for transfer the data to destination and it periodically updates routing tables throughout the networks. Reactive routing protocol finds a route in an on-demand fashion for the transmission of data in MANET. Routing obtains the optimality for selecting the best route for the transmission of video data. The topology of ad hoc networks is frequently change in MANET.

II. RELATED WORK

Changqiao Xu et.al, [3] proposed a CMT-QA (quality-aware adaptive concurrent multipath transfer) solution for SCTP (Stream Control Transmission Protocol)-based data delivery over heterogeneous wireless networks. CMT-QA relies on three mechanisms: the path quality estimation model (PQEM), data distribution scheduler (DSS) and optimal retransmission (ORP) algorithm. PQEM chooses a reasonable estimation interval to calculate the data handling rate of entering and leaving sender buffer for each path, which describes any path's communication quality. DDS chooses a subset of suitable paths for load sharing and dynamically assigns them appropriate data flows. ORP upgrades the basic CMT retransmission policies to improve packet retransmission efficiency.Danqi Wang.et.al [4] have proposed Superchunk-Based Efficient Search in P2P-VoD System. One of the most extensively discussed proposals in P2P is the tree-based approach. In such an approach, peers are organized into a tree structure for delivering data, with each data packet being disseminated using the same structure. Nodes in the structure have well-defined relationships- "parent-child" as encountered in trees. A tree-based solutioncalled SURFNet used for P2P Video on Demand services.

ISSN(Online):2320-9801
ISSN(Print): 2320- 9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 2, Special Issue 3, July 2014

SURFNet is a content discovery mechanism designed for P2P-Video on Demand system, aiming to minimize seeking buffering delay.

Hanan Luss [5] have proposed Optimal Content Distribution in Video-on-Demand Tree Networks. A model that allows this flexibility would reduce the overall costs while satisfying different demands at different nodes of the network. The model is solved by a multistate Dynamic programming algorithm. The algorithm generalizes single-state algorithms used to solve simpler models for installing equipment in a tree network (e.g., DSL multiplexers or optical network units). Dynamic Programming that installs servers at a subset of the nodes with some or all programs at each of these servers. Tianyin Xu et.al [7] have proposedSupporting VCR-like Operations in Derivative Tree-Based P2P Streaming Systemsfor an interactive streaming system to provide continuous media streaming with VCR-like user interactivity in large-scale P2P network.The Derivative Tree Stream system mainly used with media servers, sessions and a Session Circles.Media servers simply provide media streaming service.Cooperative communication has received tremendous interests in wireless networks. Quansheng Guan et.al [1] have proposed Topology Control in Mobile Ad Hoc Networks with Cooperative Communicationsto improve the network capacity in MANETs by jointly considering both upper layer network capacity and physical layer cooperative communications. Cooperative communication typically refers to a system where users share and coordinate their resources to enhance the information transmission quality. Two constraint conditions need to be taken into consideration in the COCO topology control scheme. One is network connectivity, which is the basic requirement in topology control. The other aspect that determines network capacity is the path length.

W.-P.Ken Yiu et.al [9] have proposed VMesh: Distributed Segment Storage for Peer-to-Peer Interactive Video Streamingwhich efficiently supports random seeking functionality. Provisioning random access functions in peer-to-peer on-demand video streaming is challenging, due to not only the asynchronous user interactivity but also the unpredictability of group dynamics.In VMesh, videos are divided into segments and stored at peers' local storage in a distributed manner. VMesh utilizes distributed hash table to locate these segments. DHT is a structured overlay constructed among peers. Che-Liang Liu et.al [10] have proposed Cross-Layer Mobile Chord P2P Protocol Design for VANETto provide scalable content distribution in vehicular networks, Chord peer-to-peer overlay could be applied. Most P2P protocols, including Chord, are de-signed for wired-line network, and might perform poorly in mobile networks. Mobile Chord is proposed to enhance the P2P performance over Vehicular Ad Hoc Network.

Hyung Rai Oh et.al [11] have proposed an Effective Mesh-Pull-Based P2P Video Streaming System Using Fountain Codes with Variable Symbol Sizes for video-on-demand services. P2P video streaming is composed of a peer selection mechanism to guarantee seamless playback, a feedback- based Fountain encoding mechanism to determine the size of Fountain codes in order to minimize computational complexity with a short initial latency. In addition, the Fountain code symbol size is continuously adjusted to minimize additional computational overhead required for Fountain encoding/decoding P2P streaming.Ana Paula Couto da Silva et.al [12]have proposed Chunk Distribution in Mesh-Based Large-Scale P2P Streaming Systems: A Fluid Approach for different design choices adopted while building the overlay topology may have on the system performance. Fluid models allows to comparing the performance of different strategies providing guidance for the design of new and more efficient systems. Wang.S.et.al [13] have proposed a Qos Aware Routing Metric Based on Bandwidth for Wireless Networks that incorporates an admission control scheme and a feedback scheme to meet the Quality of Service requirements of real-time applications. The novel part of this Quality of Service aware routing protocol is the use of the approximate bandwidth estimation to react to network traffic. Multimedia streaming in Wireless Sensor Network is required for future military applications to provide high-quality information. E.P.C Jones.et.al [2] have proposed Multicast Traffic Load Balancing Through Link Rate Diversity in Wireless Networks to obtain the available capacity at a mesh node for a multicast transmission and it is not just a function of the aggregate pre-existing traffic load of other interfering nodes but intricately coupled to the actual (sender, receiver) set and the link-layer rate of each individual transmission.

Changqiao et.al [14] have proposed QoE-driven User-Centric VoD Services in Urban Multi-homed P2P-based Vehicular Networks for Video on Demand services in urban vehicular network environments. Quality of User Centric Video on Demand relies on a multi-homed hierarchical peer-to-peer and vehicular ad-hoc network architecture. Changqiao Xu.et.al [6] have proposed Performance Evaluation of Multimedia Content Distribution over Multi-Homed WirelessNetworks for a real-time multimedia transmission in SCTP Single Path Transfer scenarios in a tolerant of

ISSN(Online):2320-9801
ISSN(Print): 2320- 9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 2, Special Issue 3, July 2014

network failure manner. An optimum Stream Control Transmission Protocol configuration scheme for video transmissions analyzes the effect on end user perceived quality of utilizing various concurrent multipath transfer mechanisms during SCTP-based video delivery. C. Cordeiro [8] have proposed Multicast over Wireless Mobile Ad Hoc Networks.

The remainder of this paper is organized as follows. Section II explains the proposed system of this paper. Section III discusses the results of proposed system. Section IV draws some conclusion. Finally, Section V discusses the future work.

III. PROPOSED SYSTEM

1.Framework of MANET

A group of mobile, wireless nodes which cooperatively and spontaneously form a network independent of any fixed infrastructure or centralized administration.A node communicates directly with nodes within wireless range and indirectly with all other destinations using a dynamically determined multi-hop route though other nodes in the MANET. Self- creating is not relying on a preexisting fixed infrastructure. Self- organizing is not predetermined topology. Streaming used to provide a efficient resources for multimedia data delivery from one node to other node. By using appropriate end-to-end protocols deal with connectivity loss and longer outages in MANETs in order to provide full reliability and efficiency.

2.Multipath routing Selection and Establishment for Multicasting Mobile Nodes

AOMDV protocol is used to choose the multiple paths available for multimedia transmission , based on routing metric in MANET. Multipath agents are attached to the nodes for connection establishment and maintenance for routing.

2.1 Route request of nodes using Multipath Routing

The AOMDV Routing Protocol uses an on-demand approach for finding routes, that is, a route is established between a source and destination in an on-demand fashion.

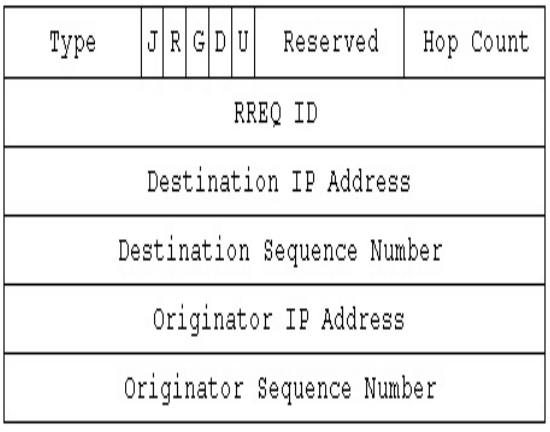

Figure 1. Format of Route Request

By using receiver sequence numbers, the most recent path has been identified.A Route Request carries the Source Identifier, the Destination Identifier, the Source Sequence Number, the Destination Sequence Number, the Broadcast Identifier and the Time To Live field. DestSeqNum used to provide the sequence number for receiver to route the data packets. When aintermediate node receives a Route Request, it forwards the request to the other nodes having valid route to the destination

ISSN(Online):2320-9801
ISSN(Print): 2320- 9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 2, Special Issue 3, July 2014

2.2 Route Discovery

When a source node wants to communicate with a destination node, it checks the validity of route with its routing table to route the multimedia data. If the valid route is obtained, it sends the multimedia data packet to the neighbour nodes towards the destination.
However, if the node does not have a valid route, it must initiate a route discovery process from the source to destination. For the route discovery process, the source creates a RREQ packet.

3. Multicasting Scheme of Video Nodes using Multipath Routing

Routing of multimedia data can be either unicast or multicast transmission. The transmission of data in unicast can be done by a single source to a destination. Multicasting is the networking technique of delivering the packet to a group of nodes through multiple paths in MANET.

3.1 Partial Video Sequence (PVS) Caching Scheme

Partial Video Sequence decomposes video sequences into a number of parts by using a scalable video compression algorithm. Video parts are selected to be cached in local video servers based on the bandwidth usage that would be obtained from the distribution network to route the video data through a number of intermediate nodes .

3.2 Prefix Caching

Prefix Caching used to decreases the waiting time of client. The network bandwidth also has been decreased by the prefixcaching scheme through sharing of video content from the source to destination.

4. Distortion Estimation of Video Nodes for Throughput Capacity

A metric used for estimating video nodes is *rate-distortion*, instead of conventional network performance metrics (i.e. hop-count, loss probability, and delay) for video routing. The rate distortion is estimated by using the network prediction models.

The steps to estimate the video distortion introduced by a node:

- First, packet error probability is estimated during the transmission of video packets.
- Second, packet loss probability due to congestion is estimated

5. Topology Construction

Topology construction used to place the components to provide routing in MANET. The topology of the network is dependent on the relative locations and nodes that can be connected within the network. The optimization of nodes used to provide a efficient topology control in routing . These methods involve determining the transmission cost of video data in MANET.

IV .DISCUSSION ON RESULTS

A) Simulation Parameters

The proposed system of AOMDV routing used to obtain parameters like packet delivery ratio, end to end delay for multimedia transmission.

ISSN(Online):2320-9801
ISSN(Print): 2320- 9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 2, Special Issue 3, July 2014

1) Packet Delivery Ratio

The packet delivery ratio is obtained with the TCP protocol to provide a high transmission of video data when compared to existing method. Number of video packets is delivered highly with in a period of time.

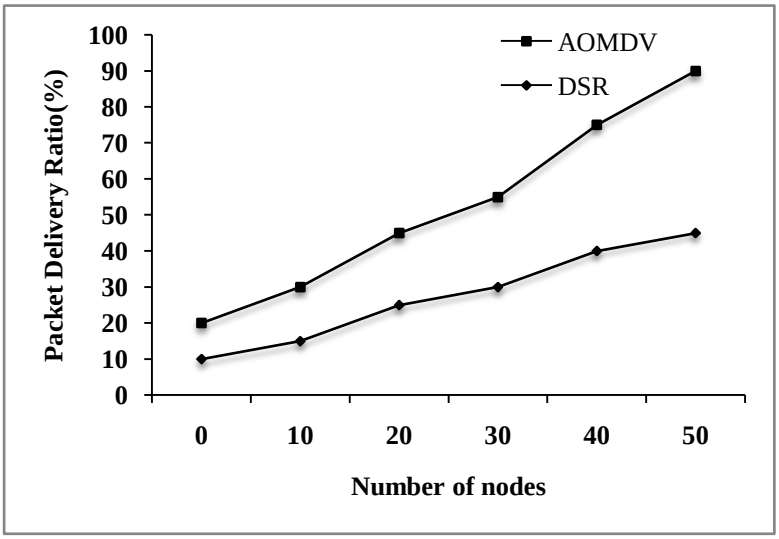

Figure 2. Packet Delivery Ratio of AOMDV and DSR Routing Protocol

The Figure 2. shows that the packet delivery ratio is highly increased because of using multiple paths to sent the data from source to destination. Packet delivery ratio is highly increased using AOMDV protocol.

2) Average Delay

Delay is occurred during the transmission of video data. The delay includes the transmission of multimedia data etc.

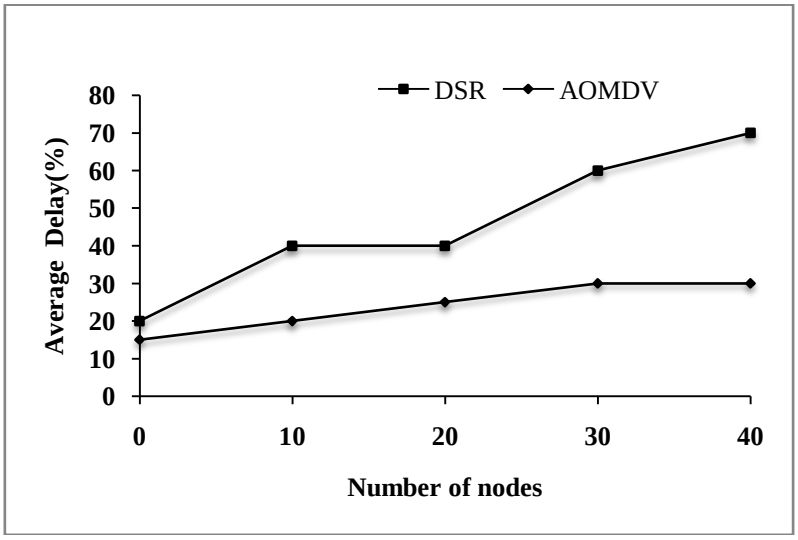

Figure 3. Average Delay of AOMDV and DSR Routing Protocol

ISSN(Online):2320-9801
ISSN(Print): 2320- 9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 2, Special Issue 3, July 2014

The figure 3. shows that the delay is decreased because of the retransmission of nodes are reduced. So the delay is decreased when compared to the existing method.

V. CONCLUSION

In this paper, the problem of real-time video multipath multicasting communication over wireless ad hoc networks has been analyzed. The proposed technique Adhoc On-demand Multipath Distance Vector Protocol used to choose the multiple paths for video transmission, based on the rate-distortionmetric. The multimedia packets are further transferred to neighbours. Route Selection includes the process of route discovery and initiates the process of incoming multimedia text.. By making use of Multipath Routing using AOMDV ensures the efficient video delivery between mobile nodes achieves high packet rate delivery, lower average delay and improve throughput.

VI. FUTURE ENHANCEMENT

In future enhancement, the infrastructure, ad hoc configurations and the factors such as overhead, security and reliability will be considered for multipath routing using AOMDV for multimedia transmission. The other parameters such as jitter and bandwidth can also be taken to improve the performance even better.

REFERENCES

[1] GUAN Quansheng, JIANG S. M, YU F. R *et al*. "Topology Control in Mobile AdHoc Networks with Cooperative Communications[J]". IEEE Wireless Communications, 2012.
[2] Jones E. P. C, Karsten. M,and Ward P. A. S "Multicast Traffic Load Balancing Through Link Rate Diversity in Wireless Networks". Wireless and Mobile Computing, Networking and Communications, 2005.
[3] GUAN Jianfeng, LIU Tianjiao, XU Changqiao, *et al*. "CMT-QA: Quality-Aware Adaptive Concurrent Multipath Data Transfer in Heterogeneous Wireless Networks[J]". IEEE Transactions on Mobile Computing, 2012.
[4] WANG Danqi, YEO C.-K. K. "Superchunk-Based Efficient Search in P2P-VoD System Multimedia[J]". IEEE Transactions on Multimedia, 2011.
[5] LUSS H. "Optimal Content Distribution in Video-on-Demand Tree Networks"[J]. IEEE Transactions on Systems, Man and Cybernetics", 40(1): 68-75, 2010.
[6] XU Changqio, FALLON E., QIAO Yuansong, *et al*. "Performance Evaluation of Multimedia Content Distribution over Multi-Homed Wireless Networks[J]". IEEE Transactions on Broadcasting, 57(2): 204-215, 2011.
[7] CHEN Jianzhong, LI Wenzhong, XU Tianyin, *et al*. "HAMDI M. Supporting VCR-like Operations in Derivative Tree-Based P2P Streaming Systems". Proceedings of IEEE International Conference on Communications (ICC'09). Dresden, Germany: IEEE Press, 2009.
[8] Agrawal.D, Cordeiro.C and Gossain.H "Multicast over Wireless Mobile Ad Hoc Networks": Present and future directions, IEEE Netw., vol.17, number 1, pp. 52–59, Jan. / Feb, 2003.
[9] CHAN S.-H.-H G, JIN Xing, YIU W.-P K., "VMesh: Distributed Segment Storage for Peer-to-Peer Interactive Video Streaming". IEEE Journal on Selected Areas in Communications, 25(9): 1717-1731, 2007.
[10] LIU C.-L., WANG C.-Y., WEI H.-Y. "Cross-Layer Mobile Chord P2P Protocol Design for VANET[J]". International Journal of Ad Hoc and Ubiquitous Computing, 6(3): 150-163, 2010.
[11] OH H. R., SONG H. J. "An Effective Mesh-Pull-Based P2P Video Streaming System Using Fountain Codes with Variable Symbol Sizes [J]". Computer Networks, 55(12): 2746-2759, 2011.
[12] ANA P.C., DA S., LEONARDI E., *et al*. "Chunk Distribution in Mesh-Based Large-Scale P2P Streaming Systems: A Fluid Approach [J]". IEEE Transactions on Parallel and Distributed Systems, 22(3): 451-463, 2011.
[13] Wang S. and Qiu Z, "A Qos Aware Routing Metric Based on Bandwidth for Wireless Networks". Proceeding of the 8th International Conference on Signal Processing, Vol.4, Nov.16-20, IEEEXplore Press, Beijing. DOI:10.1109/ICOSP.2006.346103 23, 2006.
[14] GUAN Jianfeng, XU Changqiao, ZHAO Futao, *et al.* "QoE-driven User-Centric VoD Services in Urban Multi-homed P2P-based Vehicular Networks [J]". IEEE Transactions on Vehicular Technology, 2012.