Research Journal of Information Technology 5(1): 24-34, 2013
DOI:10.19026/rjit.5.5784
ISSN: 2041-3106; e-ISSN: 2041-3114

Submitted: August 18, 2012 Accepted: September 17, 2012 Published: March 01, 2013

Research Article

A Real Time Multimedia Streaming in Mobile Ad Hoc Networks using Multicast Tree Structure

[1]P.D.R. Vijayakumar and [2]T. Ravichandran
[1]Department of Computer Science and Engineering, Info Institute of Engineering, Coimbatore, Tamil Nadu, India
[2]Hindusthan Institute of Technology, Coimbatore, Tamil Nadu, India

Abstract: Multicast transmission is a more efficient mechanism when compared to unicasting in supporting real time multimedia applications and hence there is an important aspect required to enhance network developments. Mobile ad hoc networks have been the subject of active research for a number of years. This study investigates the feasibility of using such networks for transmitting multimedia streams. This study studied already available protocols such as Serial MDTMR and Parallel MNTMR and proposed a new methodology using Multicast-Tree Structure Protocol for MANETS. The study implements the MCT (Multicast-Tree) structure for MANETS and evaluates the performance with both Serial MDTMR and Parallel MNTMR.

Keywords: Ad-hoc networks, multicast-tree structure, multimedia

INTRODUCTION

Multimedia Streaming is usually sent from prerecorded video and audio files, but can be distributed as part of a live broadcast "feed." In a live broadcast, the video signal is converted into a compressed digital signal and transmitted from a special server that is able to do multicast, sending the same file to multiple users at the same time. The data is processed and played as it is received over a wireless channels i.e., downloaded and the content is discarded. So, even though you have downloaded a file, it will not and cannot be saved to your hard drive. Mobile Ad hoc Networks (MANETs) Mohapatra *et al*. (2004) refers to a class of wireless network that can be formed dynamically and randomly without the need for infrastructural setups. Such networks are able to adapt and reconfigure themselves on the fly according to node mobility and changing network topologies. These characteristics are particularly attractive to the military user due to the inherent unpredictability of the tactical environment. MANET technology has its roots in defense, having been developed from military research efforts.

MANET system is an interconnected system of wireless nodes which communicate over bandwidth-constrained wireless links. Each is an interconnected wireless node can function as a sender, a receiver or a router. When the node is a sender, it can send messages to any specified destination node through some route. As a receiver, it can receive messages from other nodes. When the node functions as a router, it can relay the packet to the destination or next router in the route. When necessary, each node can buffer packets awaiting transmission.

Mobile Ad hoc Networks (MANET's): A wireless mobile ad hoc network consists of mobile that are interconnected by wireless-multi-hop communication paths. These ad hoc wireless networks are self creating, self-organizing and self-administering. Figure 1 depicts a sample mobile ad hoc network. These mobile ad hoc networks offer unique benefits and versatility for certain environments and applications. With no prerequisites of fixed infrastructure or base stations, they can be intrinsically fault-resilient, for they do not operate under limitations of a fixed topology. Since all nodes are allowed to be mobile, the topology of such networks is necessarily time varying. The addition and deletion of nodes occur only by interactions with other nodes. Thus these types of networks offer many advantages where setting up wired-line networks are not feasible. Such advantages attracted immediate interest in its early use among military, police and rescue agencies and especially under disorganized or hostile environments, including isolated scenes of natural disaster and armed conflict.

Recently, home or small-office networking and collaborative computing with laptops computer in a small area (e.g., a conference classroom, single building, convention center, etc.) have emerged as other major areas of application. In addition, people have

Corresponding Author: P.D.R. Vijayakumar, Department of Computer Science and Engineering, Info Institute of Engineering, Coimbatore, Tamil Nadu, India

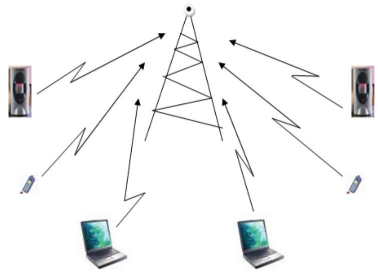

Fig. 1: Wireless structure infrastructure

recognized from the beginning that ad hoc networking has an obvious, potential use in all traditional areas of interest for mobile computing. This concept of mobile ad hoc networking emerged as an attempt to extend the services provided by the traditional internet to wireless mobile environment. All current works, as well as our research here, consider the ad hoc network as wireless extension to the internet, based on the ubiquitous IP networking mechanisms and protocols.

Today's internet processes an essentially static infrastructure where network elements are interconnected over traditional wire-line technology and these elements, especially the elements that provide the routing or switching functions, do not move. In a mobile ad hoc network, by definition, all the network elements move. As a result, numerous more stringent challenges must be overcome to realize the practical benefits of ad hoc networking. In addition, the mobility of nodes imposes limitations on their power capacity and hence, on their transmission range. These nodes must often also satisfy stringent weight limitations for portability. Further these mobile elements are no longer just end systems, they are also required to relay packets generated by other nodes, hence each node must also be able to function as a router. As a node move in and out of range with respect to each other, including those that are operating as routers, the resulting topology needs to be communicated to all other nodes as appropriate to maintain the connectivity information.

In accommodating the communication needs of the user applications, the limited bandwidth of wireless channels and their generally-hostile transmission characteristics, impose additional constraints on how much administrative and control information may be exchanged and how often. Ensuring effective routing is one of major challenges for ad hoc networking. As these mobile ad hoc networks are being increasingly considered for more and more complex applications, the various Quality of Service (QOS) attributes for these applications must also be satisfied as a set of pre-determined service requirements. In addition, because of the increasing use of the ad hoc network for military/police use and also due to the increasing commercial applications being envisioned to be supported on these types of networks, various security issues also needed to be addressed.

MANET characteristics: A MANET has several marked characteristics. First, it does not have a centralized infrastructure. It is unlike the traditional mobile wireless networks in which base stations, access points and servers have to be deployed before the networks can be used. The ad hoc network is decentralized, with all mobile nodes functioning as routers and all wireless devices being interconnected to one another. Intuitively, this means that the MANET is also a self-configuring network in which network activities, including the discovery of the topology and delivery of messages, are executed by the nodes themselves.

The second characteristic of a MANET is that it has a dynamic topology. Nodes are free to move arbitrarily, causing the network topology to change rapidly and unpredictably over time. Alternative paths are automatically found, after which data packets are forwarded across the multi-hop paths of the network.

Thirdly, a MANET operates on bandwidth constrained variable-capacity links. Wireless links have significantly lower capacity than hard-wired links. As such, a MANET has relatively low bandwidth links, high bit error rates and unstable and asymmetric links. This is in contrast to wired networks which are characterized by high bandwidth links, low bit error rates and stable and symmetric links. One effect of having a low link capacity is that congestion is typically the norm rather than the exception.

Fourthly, a MANET is often bound by energy constrained operations. This is because its nodes are often hand-held battery-powered devices. Since the mobile nodes rely on these exhaustible means for energy, power conservation is important in a MANET system design.

Lastly, there is limited physical security by Wei and Zakhor (2007) Mobile wireless networks are more prone to the physical security threats of eavesdropping, interception, denial-of-service and routing attacks as compared to fixed-cable networks. Hence, security techniques have to be applied to reduce these threats. Nodes prefer to radiate as little power as necessary and transmit as infrequently as possible. This will decrease the probability of detection and interception. In addition, the decentralized nature of network control will add robustness against failure as opposed to the centralized networks.

LITERATURE REVIEW

Multicasting is an efficient means of one to much communication and is typically implemented by creating a multicasting tree Mohapatra *et al*. (2004). Because of the severe battery power and transmission bandwidth limitations in ad hoc networks, multicast routing can significantly improve the performance of this type of network. However, due to the frequent and hard-to-predict topological changes of ad hoc networks, maintenance of a multicasting tree to ensure its availability could be a difficult task. So, I have read some papers and mentioned some multicast routing protocols which already developed. We are choosing the concept of Alternate Path routing, which has been studied for providing QOS routing, effective congestion control, security, route failure protection and some important metrics to propose a scheme in which a set of multicasting trees is continuously maintained.

Recently, there has been a great deal of activities on video transport with path diversity, for both wireless ad hoc networks. From the reference the authors has proposed two multicast tree protocols which are used for a video conferencing in wireless and video distribution. The proposed system by introduced architecture for multiple tree video multicast communication (Wei and Zakhor, 2004; Mao *et al*., 2004; Wei and Zakhor, 2007) over wireless ad hoc networks. The basic idea is to split the video into multiple parts and send each part over a different tree, which are ideally disjoint with each other so as to increase robustness to loss and other transmission degradations.

The main important theme is to get a good video quality of video at destination side, for this they had proposed tree based data structure protocol is Serial MDTMR (Wei and Zakhor, 2004; Mao *et al*., 2004) which is having a two trees serially which contains N-nodes in Mobile environment to facilitate multiple tree video multicast. This will shows good tree connectivity while maintain the two disjoint trees. This routing protocol will provides the large routing overhead and construction delay. To alleviate these drawbacks, further proposed Parallel MNTMR (Wei and Zakhor, 2004; Mao *et al*., 2004; Wei and Zakhor, 2007) (parallel multiple nearly-disjoint trees multicast routing) in which nearly disjoint trees are constructed in parallel and in a distributed way. Using the Parallel MNTMR, each receiver is able to always connect to two trees, regardless of the node density. These two multicast routing protocol are used for a real- time multicast communication over Mobile environment. The serial and parallel protocols are used over MDC and SDC for robustness in mobiles.

The performance metrics are showed in this study while comparing to another multicast tree based architecture over MDC and SDC. The metrics like number of bad frames and bad periods, distortion, delay from source to destination is shown using simulation.

Lee *et al*. (1999) have designed a protocol of multicasting named as ODMRP (On Demand Multicast Routing Protocol) builds multicast mesh by periodically flooding the network with control packets to create and maintain the forwarding state of each node, when the source has packets to send. It takes advantage of the broadcast nature of the wireless network by forwarding group flooding, which provides a certain amount of diversity. A mesh structure is equivalent to a tree structure with tree flood enabled. This ODMRP is single tree multicast protocol.

On-Demand Multicast Routing Protocol is a protocol for routing multicast and unicast traffic throughout Ad-hoc wireless mesh networks. Lee *et al*. (1999), Anastasi*et al*. (2001) and Thomas (2003) ODMRP creates routes on demand, rather than proactively creating routes. This suffers from a route acquisition delay, although it helps reduce network traffic in general. To help reduce the problem of this delay, some implementations send the first data packet along with the route discovery packet. Because some links may be asymmetric, the path from one node to another is not necessarily the same as the reverse path of these nodes.

ADMR does not use periodic network-wide floods of control packets, periodic neighbor sensing, or periodic routing table exchanges. In ADMR, forwarding state is specific to each sender rather than being shared by the entire multicast group. This approach reduces unnecessary forwarding data redundancy. There is also a local sub tree repair scheme to detect a broken link by downstream node in Ayyagari *et al*. (2000), Bagrodia *et al*. (2000) and Mohapatra *et al*. (2004). So for going to a better performance establishing a new protocol called ITMAR.

The ACMRP (Adaptive Core Multicast Routing Protocol) ACMRP (Chris *et al*., 2002; Bruschi and Rosti, 2002; Lundberg, 2004) is an on-demand core-based multicast routing protocol that is based on a multicast mesh. A multicast mesh is created and maintained by the periodic flooding of the adaptive core. A core emerges on demand and changes adaptively according to the current network topology. This scheme outperforms ODMRP in multisource scenarios.

Multicast is essential technology for many application such as group video conferencing and video distribution. Multicasting MDC video was first introduced in CoopNet in the context of peer-to-peer networks to prevent web servers from being overwhelmed by large number of requests. CoopNet uses a centralized tree management scheme and each tree link is only a logical link, which consists of several physical links and as such is inefficient in wireless ad hoc networks.

Recently, proposed system has introduced architecture for multiple tree video multicast communication over wireless ad hoc networks. The basic idea is to split the video into multiple parts and send each part over a different tree, which are ideally disjoint with each other so as to increase robustness to loss and other transmission degradations. Then propose a simple serial multiple disjoint tree multicast routing protocol (Serial MDTMR), which constructs two disjoint multicast trees sequentially in a distributed way, to facilitate multiple tree video multicast. Serial MDTMR has a larger routing overhead (Mao *et al*., 2003) and construction delay than conventional single tree multicast routing protocols, as it constructs the trees in a sequential manner. To alleviate these drawbacks, further proposed parallel multiple nearly-disjoint trees multicast routing (Parallel MNTMR) in which nearly disjoint trees are constructed in parallel and in a distributed way. Using the Parallel MNTMR, each receiver is able to always connect to two trees, regardless of the node density.

Serial MDTMR: Serial Multiple Disjoint Tree Multicast Routing Protocol is constructed because of getting a good quality of streaming with a more robustness. This method constructs two node-disjoint trees in a distributed way. Firstly, it builds a shortest path multicast tree, then after requiring all the middle nodes in the first tree not to be middle nodes of the second tree, we construct another shortest path tree. Since these two trees do not share middle nodes at all, they are node disjoint. Since Serial MDTMR is a way of constructing two disjoint multicast trees, it can be easily applied on top of any suitable single tree multicast routing protocol. By comparing Serial MDTMR and ODMRP there won't be loss of generality in serial manner and it is easy to quantify the performance gain (Inn and Winston, 2006) obtained by the multiple tree multicast routing. When a multicast source has packets to send, it periodically triggers a two-step multicast tree construction/refresh process. So the serial MDTMR has a major advantage of finding a shortest path among the trees and good tree connectivity. Later for getting a low routing overhead and construction delay again proposed a protocol using multicast tree called parallel MNTMR.

Parallel MNTMR: Serial MDTMR achieves reasonable tree connectivity, while maintaining the disjoint nature of two trees. However, its routing overhead and construction delay are potentially twice as much as that of a parallel scheme that would build two trees simultaneously. To overcome a disadvantage of Serial MNTMR this multicast tree has been proposed called Parallel Multiple Nearly Disjoint Tree Multicast Routing Protocol. The routing overhead and construction delay of Parallel MNTMR should be increase while comparing to the above routing protocol.

PROPOSED SYSTEM

For achieving a good connectivity and distributedness in a Mobile Ad Hoc environment we have used one of the multi-ways Structures called Multicast-Tree Structure. Because of its balancing nodes, the path while sending a packet from source to destination will give a better video streaming with a less delay and with small amount of losing packets. The main advantages of a Multicast-Tree Structure are it follows balanced structure so the all nodes should be distributed easily without any losing of data.

A Multicast-Tree Structure (Luo *et al*., 2007) can use a more than one root node. This feature is more useful while in sending a large amount of data from source to destination. In a Mobile Ad Hoc network environment it can contains so many servers for transmitting a data to all remaining nodes/systems. This data structure may provide a good quality of performance in streaming a video. Because of its less height all the nodes are always connects each other with a less short of distance, so every system knows easily about transmitting a packet. The distributed environment in a Multicast-Tree will be use for using more nodes in a Wireless Ad Hoc Networks.

While comparing to the exits system like Serial MNTMR and Parallel MDTMR the Multicast-Trees are having a mobility structure using an inserting and deleting nodes when the data is transmitting also. So when a new packet arrives from a source or any server when a bandwidth is not sufficient for any node it has a chance to restructure its environments because of its mobility using an insertion/add and deletion methods.

Distributedness (Padmanabhan*et al*., 2002) the data structure Multicast-Tree is distributed because of its less height of a tree and it can use more than one root from the source side. While transmitting a video if a density is low, it might not be possible to maintain forwarding a packet from one node to another. But in Multicast-Tree because of mobility and distributed environment there is less amount of losing packets. The operations in a Multicast-Tree like inserting and deleting a node is done when a node wants to acquire a packet or a node wants to transmit a packet.

Multicast-tree generation: A session multicast tree is formed as a virtual Minimum Spanning Tree that connects all members. The minimum spanning tree calculation is performed at the session controller and results are communicated to all members in the form of a (parent, children) list. Link costs are representative of application specific performance metric which is computed by members in a distributed fashion and reported to the controller periodically.

The packets of the video are distributing to the child nodes using Multicast-Tree. This data structure is useful when a root node (server) is trying to send a data over wireless links with a size of 100 mbps to the leaf nodes. Imagine all the nodes are mobiles which containing wireless channels like Bluetooth and Wi-Fi. When a root node is busy with a heavy traffic or lack of a power, mobility then the node (root) will clone some servers which are in the next level. All the nodes at the destination nodes will not get the data at the same time because of link failures in systems.

When a data is started sent from the root node with a bandwidth of 100 mbps the node will try to send the file to the nodes which are in the premises. Using a wireless channels like Bluetooth or Wi-Fi the nodes are connects to root. If a node is busy with a lack of power or mobility that servers are shifted to the next leave nodes and so on. Using Multicast-Tree techniques the nodes in a MANET's are distributed and will have good mobility. All the nodes are connected to each other this information data is stored in a database. The bandwidth of a cable will divides into 25 mbps per each link which distributed the bandwidth till lower lever.

Because of the low bandwidth at the lower lever the quality of a video will be reduce and it leads to delay, losing packets, increasing the bad periods. As compared to upper level the lower lever nodes are containing less bandwidth and less communication of all nodes. When an operation like searching, insertion and deletion is will be occurs for a good quality of a video.

The performance factors are:

- Rearranging the nodes
- Throughput
- Signal (wireless) strength
- Communication at levels

Rearranging the nodes: While a data sent from the root to the next level nodes if some node is not able to get a data from it successor, it may borrow from a next nodes. In this type the deletion and insertion operation will be useful. But, before going for a insertion and deletion the nodes are should search for the node which contains the available data. Here all nodes and the structures of the system will rearrange and it will be balanced.

Throughput: In a wireless networks the throughput will be measures in terms of "data packets per second" or "data packets per time slot". While streaming is doing using a 2-3-4 tree all the nodes will having some throughput. The root node will be having the throughput 100%. And it will decrease for the next levels.

Signal strength: The signal strength will be measured the nodes how they will be communicating with the other nodes which are in a premises. The signal strength will be high when two systems will be in less distance and its high of a two systems are in far end. The signal strength for a Multicast-Tree will be good because of its distributed nature.

Communication at levels: When a root system is giving a links to several nodes it means that that communication level will be high. So, the transferring of packets will be more per second. At the same time the delay will be less up to those level systems. A tree will be containing n-number of levels. For each level performance will be reduced. But in Multicast-Tree the height of a tree will be less. So, it increases the performance.

ARCHITECTURAL DESIGN

The Fig. 2 explains how to streaming a multimedia and transmitting both video and audio from nodes to nodes. The devices from both client and server should have an option to connect the other device over the wireless network. This particular architectural design has the general idea of video streaming. This

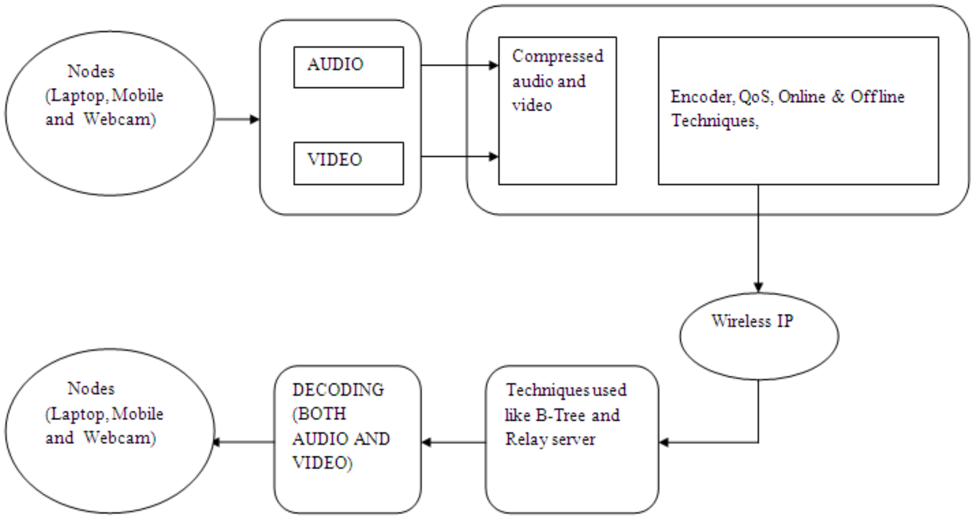

Fig. 2: Complete architecture of the proposed system

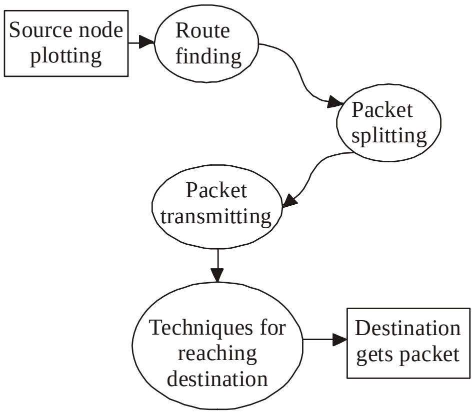

Fig. 3: Packets transmitting from source to destination

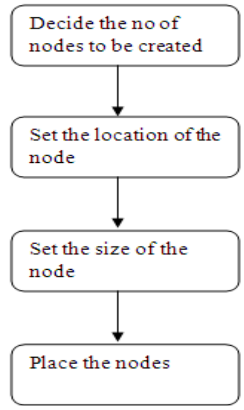

Fig. 4: Flow chart for node plotting

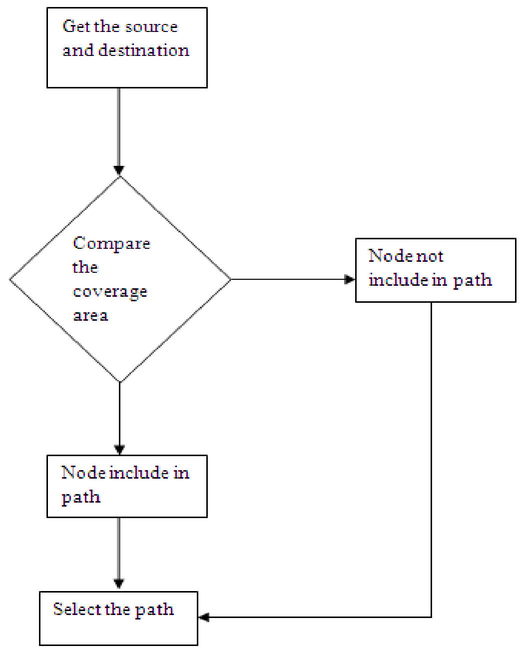

Fig. 5: Flow chart for route finding

architecture provides basic idea for a network that is for few systems. Here the media from some system at the server side is transmitting the data as both audio and video. Then again it will combine and compressed using some technologies. After that the data/packets are encoded and this data will be transport to the other system using a Wireless protocols. The main theme of this proposed system is distributing the data/packets in the end systems with getting any delay and loss of packets.

Modular design: The Fig. 3 gives the general data flow diagram wherein here the data flow starts from plotting the nodes resembling peers and then the path finding stage the predefined paths are considered and then to the packet splitting stage the packets are spitted to travel from source to destination through the packets mentioned then at the estimation the on-line and off-line techniques are applied for optimization process and hence the obtained packets are combined and displayed to the end user.

IMPLEMENTATION

The implementation is done in NS-2 (Zhu and Kunz, 2004) Network Simulator and results are compared with MDTR and MNTR for different performance metrics as explained with the graphs below.

Module Implementation:

- Node plotting
- Route finding
- Packet splitting
- Sending Packets
- On-line and Off-line Techniques
- Calculation of Metrics
- Plotting the Metrics graphically

Node plotting: This is the first module in this proposed system. In this module all users like laptop, mobiles, etc., are source system and among these nodes any one node can acts as server and sometimes several systems used to acts as a servers depends on the particular size of the file. In this module we can use n-number of nodes at the source side. Set the location of the node and set the size of the node before transmitting any data from the node which shown in Fig. 4. These particular nodes plotting module for sending files which gives the actual resemblance of a Mobile Ad Hoc Networks and there forth to work on the network. The nodes are created here statically. In the runtime the nodes act as the Mobile Ad Hoc Network for the active transmission of the video streams which gives the actual resemblance of a packet moving from source and destination.

Route finding: The Fig. 5 explain the second module of the proposed system, in this particular module we can get the input as source and destination. Then we

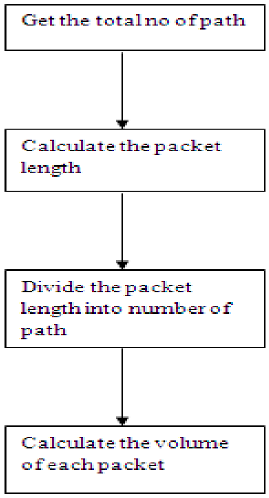

Fig. 6: Flow chart for packet splitting

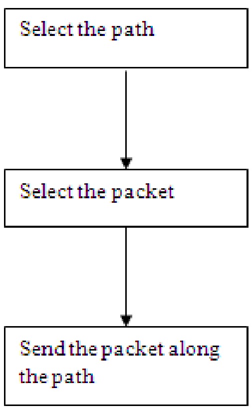

Fig. 7: Flow chart for packet sending

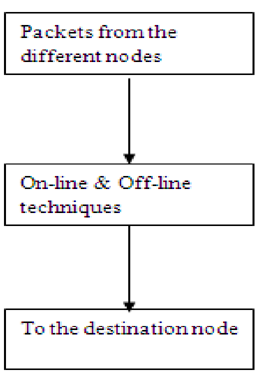

Fig. 8: Flow chart for on-line and off-line techniques

can choose the path between this source and destination based on the coverage area of the node that we plotted. If the node that will exist within that coverage, it will be included in that path otherwise it won't be included.

Here this module has the stuff like selecting the path where in these paths for every source to destination or for every nodes is pre-defined in an database, so once the source and destination has been selected this module searches for the available path from the database and hence the obtained paths are considered and this different paths are taken for the packets to be transmitted from source to destination. So once the paths are obtained the packets move through this paths to the destination.

Packet splitting: The Fig. 6 gives details about the third module in the proposed system. In this module files are split into number of packets based on the certain criteria. First it will calculate the shortest path from source to destination. Then the file length will be divided by total number of path. Each path having an equal amount of packet length.

Here the packet splitting is done because for streaming the media which can't be done as a single packet and hence using scalable coding techniques the video is split and that video is taken as packets and this packets are sent from source to destination through various paths. Here the split packets are assigned different numbers for recognizing which s to be played first. On the other side the packets are received and the techniques area p plied for optimization and displayed back to the user.

Sending packets: In the packet transmission through one node to other in the network is one more module of the proposed system which makes the packets sends from source to destination without loss of packets. Each packet that will select its own path for packet transmission that will appropriately send a packet between source and destination.

Here the packets sent take different paths for to reach the destination and hence the packets will reach the destination not in a sequential way but reach in unusual way but during play back the packets are played accordingly. Figure 7 shows how packets will move from source to destination with their paths.

On-line and off-line techniques: In this module we develop the techniques for pre-fetching the split packets arriving at the destination from different nodes as shown in Fig. 8 and so the video that has been viewed will be an optimized one. The online and offline techniques may involve encoding and decoding of a packets and packet distribution using relay server.

Here we use different techniques for pre-fetching that is off-line and on-line we have used for having a comparison on these algorithms used which gives a better optimization and this results is used to draw different metrics.

Calculation of metrics: Here we take into consideration some metrics like Delay, Distortion, Lost of packets, Lost of bad periods, Delay from end to end, scalability which is to be considered for the reason to know whether the optimization is achieved or not and this is calculated based on the techniques used and then in turn this obtained results ought to be plotted for to have a comparison in between the techniques considered. All metrics are compared with our proposed system.

Pointing the metrics graphically: Here we take the results obtained from the metrics and then plotting the results for the comparison that the techniques considered are performing their best and to find out which is better of all the techniques considered.

RESULTS AND DISCUSSION

The ratio of bad frames: Here we have taken number of frames in X-axis and the maximum speed in microseconds in a Y-axis shown in Fig. 9. When a frame has sent from some system it does not start moving immediately because of end system will measured that upcoming frame is already exist or not and any interruptions.

Ex. The packet is start sending it will split into small frames. When ever increasing the time the frame size will be reduced and its effects to the bad quality. From the Fig. 9 when the video packets is sent at 0'sec two frames has lost at 0.023 sec, like it when time is increasing the loss ratio of packets will be increases shown in Table 1. But when compare a MDTMR with a Multicast-Tree a losing packet ratio will be somewhat decreased. Because of MDC is encodes one frame into two packets the packet will be loss at the time of 0.023 sec, while in SDC it encodes a one frames into a one packets the loss of packet will be start 0.15 sec. The graphs will be showing the comparing between Multicast-Tree and MDTMR over MDC and SDC.

The ratio of bad periods: A bad period consists of contiguous bad frames. This metric reflects the number of times that received video is interrupted by the bad frames. When a video of packets starts sending from a any node in a MANET because of heavy traffic or miscommunication between nodes and server some periods will be lost during the transmission. It will cause to less quality in the output. The Table 2 shows us how many periods are losing per particular time. The periods are started dispatch at 2 sec and at the time 20 periods are lost shown in Fig. 10.

Normalized control packets: The total number of control packets transmitted by any node in the network, divided by the total number of video frames received by all the receivers. This metric represents the control packet overhead of the routing protocol normalized by the successful video frames received. On X-axis we are considering maximum speed and on Y-axis the packet

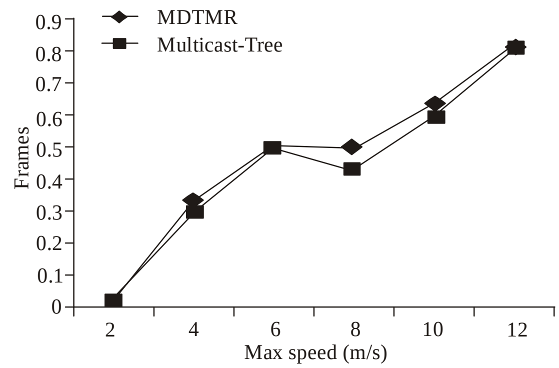

Fig. 9: Graph for the ratio of bad frames in MDC

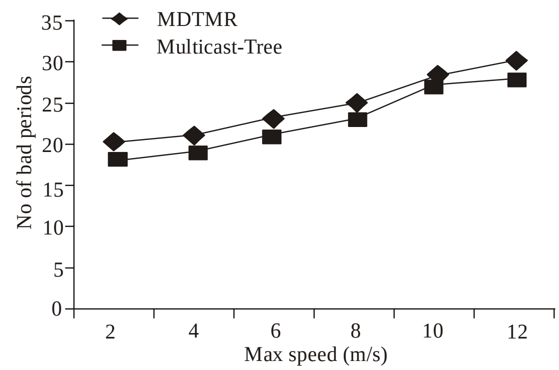

Fig. 10: Graph for the ratio of bad periods

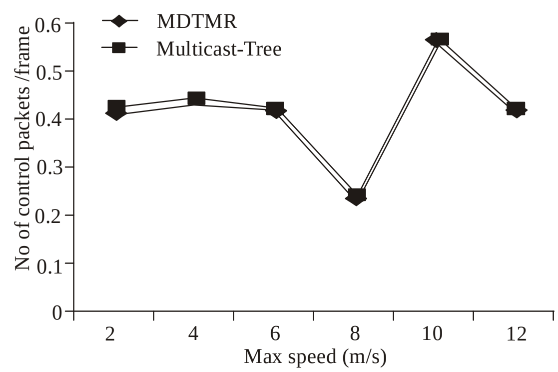

Fig. 11: Graph for normalized control packets

which are controlling by other nodes. When a packets are controlled by others its gets less delay and less bandwidth from the Fig. 11. The ratio of packet frame may or may not increase when a time in increased. Ex. When a number of bad frames in a data will be less always. At the time of 2 sec here 0.42 frames are lost and at the time of 10 sec 0.56 frames has lost which shown in Table 3.

Distortion: The expecting results on distortion in a video streaming will may provide accuracy. When a data packets always obtain sufficient approximation of the distortion-reduction for each packet as shown in

Table 1: Results for the ratio of bad frames

Max speed (m/sec)	MDTMR	Multicast-tree
2	0.026	0.023
4	0.330	0.300
6	0.500	0.500
8	0.500	0.430
10	0.630	0.600
12	0.820	0.810

Table 2: Results for the ratio of bad periods

Max speed (m/sec)	MDTMR	Multicast-tree
2	20	18
4	21	19
6	23	21
8	25	23
10	28	27
12	30	28

Table 3: Results for the ratio of normalized control packets

Max speed (m/sec)	MDTMR	Multicast-tree
2	0.41	0.42
4	0.43	0.44
6	0.42	0.42
8	0.23	0.24
10	0.55	0.56
12	0.41	0.42

Table 4: Results for the distortion

Bit rate (Kbps)	MDTMR	Multicast-tree
0	33	29
50	32	33
100	36	37
150	38	39
200	40	41

Table 5: Results for delay on single and multiple servers

	On single server		On multiple servers	
Node speed	Multicast-tree	MDTMR	Multicast-tree	MDTMR
1	0	31	20	57
5	8	54	32	67
8	6	63	43	81
13	9	65	60	80
17	21	89	80	100

Table 6: Results for the delay (source to destination)

Traffic	MDTMR	Multicast-tree
1	1.5	1.1
2	1.7	1.2
3	1.8	1.3
4	2.0	1.4
5	2.1	1.5
6	2.2	1.6
7	2.3	1.7
8	2.5	1.8

Table 7: Results for packets loss

Node speed	MDTMR	Multicast-tree
1	31	0
5	54	8
8	63	6
13	65	9
17	89	21

Fig. 12. In addition the packets or frames of a video may be gives a better quality of a video and audio.

In our expecting results the video packets are will transmit properly with respect to time as shown in Table 4. Distortion for 20 kbps cable the ratio of the noise will be around 28 for a Multicast-tree when compared to MDTMR the Distortion will be less and sometimes increases.

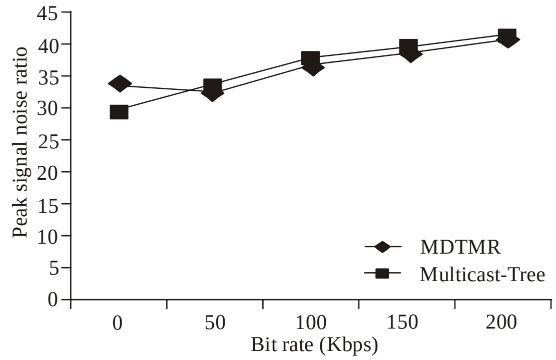

Fig. 12: Graph for distortion

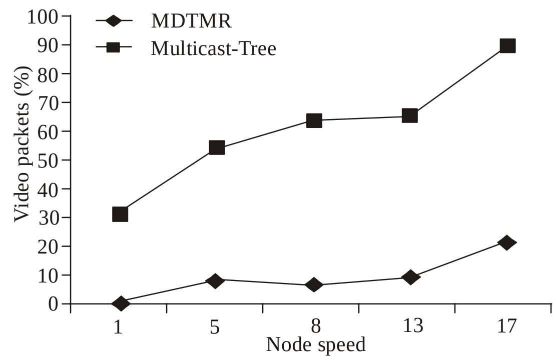

Fig. 13: Graph for the delay in system using single server

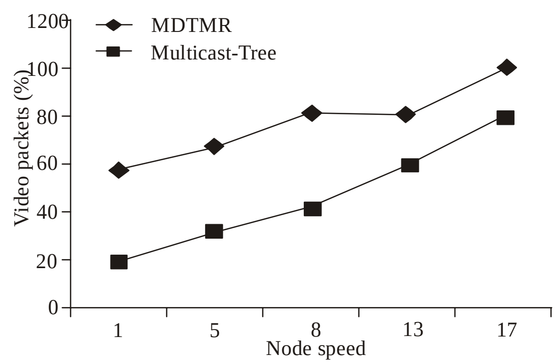

Fig. 14: Graph for the delay in system using multiple servers

Delay: The delay is important problem in a multimedia video streaming. The delay will be in microseconds or in a Pico seconds. At server side when a video is started the running packets and frames should be visible in end system also. The following Fig. 13 will show the excepted results in proposed system. The proposed system will give a better quality of a video and a delay will be less when compared to the existing system.

The delay will be considered in a minutes, seconds, microseconds and picoseconds. The Fig. 14 shows us at

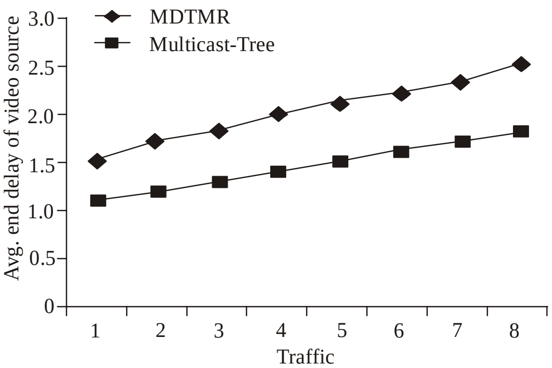

Fig. 15: Graph for the delay from source to destination

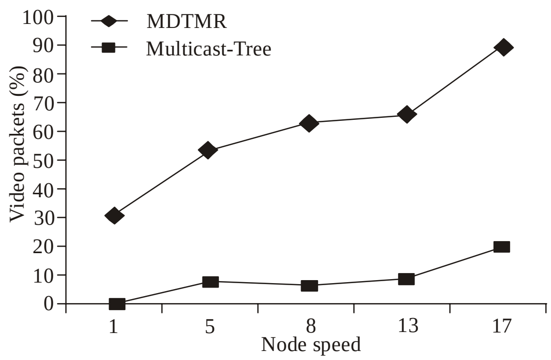

Fig. 16: Graph for the loss of packets from source to destination

the time of 1 sec almost 30% gap will be occurs to the original multimedia but whereas using a multiple servers the delay is increased to 20 in a Multicast-tree which shown in Table 5. But when in an existing system the delay is more while using in both single and multiple servers.

Delay (end to end system): The delay for the end to end system will be more while comparing to single, multi servers. The Fig. 15 shows the delay in the video from source to destination. The delay will be in minutes. The delay in end to end system will be increased when compared to one node to other node which shown in Table 6.

Here the delay is 1.5 sec it's almost three times more than when an environment using 2-servers.

Packet lost on transmission: When the video packets frames are transferring to from one system to another system the lost of packets will be less when compare to using more than one server because of the traffic. The packet lost graph will be measured by video packets with respect to node speed. The loss of packets while in transmission will more at the destination side because of heavy traffic and distributedness. In a Multicast-Tree the loss of packets are 6 but in a MDTMR the loss of packets are 63 at the 8 sec which shown in Table 7. It causes a less quality of videos in a destination side as shown in Fig. 16.

CONCLUSION AND RECOMMENDATIONS

The streaming system in Mobile Ad Hoc Network's implemented successfully. This proposed system significantly improves the system that is present in this field of Media Streaming. The proposed system takes into consideration the metrics like loss of packets, ratio of bad frames and bad periods, delay, distortion, Forward efficiency etc. So here the video after transferring from source to destination the metrics mentioned above are calculated and the graphs are plotted. So, it gives the better performance of all metrics while streaming a video in a Mobile Ad Hoc Networks. The present system accepts several nodes in general where an organization in future must be able to decide the number of nodes or peers it should use. The database presently stores all the paths for the packets to travel from source to destination, but in general these paths ought to be calculated by the system itself and hence this also lays extension for the future work. Finally, the video can be viewed only after the entire transmission is completed and there forth this is to be rectified and the video is to be viewed during the transfer.

REFERENCES

Anastasi, G., A. Bartoli and F. Spadoni, 2001. A reliable multicast protocol for distributed mobile systems: Design and evaluation. IEEE T. Parall. Distrib. Syst., 12(10): 1009-1022.

Ayyagari, D., A. Michail and A. Ephremides, 2000. A unified approach to scheduling: Access control and routing for Ad-Hoc wireless networks. Proceedings of the Vehicular Technology Conference (VTC-Spring), 1:380-384.

Bagrodia, R., M. Gerla, J. Hsu, W. Su and S.J. Lee, 2000.A performance comparison study of ad hoc wireless multicast protocols. Proceeding of the 19th Annual Joint Conference of the IEEE Computer and Communications Societies (INFOCOM), 2: 565-574.

Bruschi, D. and E. Rosti, 2002.Secure multicast in wireless networks of mobile hosts. J. Mob. Networks Appl., 7(6): 503-511.

Chris, B., M. Achla, V.M. Madhav and D. Martin, 2002. Characterizing the interaction between routing and MAC protocols in Ad-Hoc networks.Proceeding of the 3rd Symposium on Mobile Ad Hoc Networking and Computing. Lausanne, Switzerland, pp: 92-103.

Inn, E.R. and K.G.S. Winston, 2006.Distributed steiner-like multicast path setup for mesh-based multicast routing in ad-hoc networks. Proceeding of IEEE International Conference on Sensor Networks, Ubiquitous and Trustworthy Computing, TIME, pp: 192-197.

Lee, S., M. Gerla and C. Chiang, 1999.On-demand multicast routing protocol.Proceeding of IEEE Wireless Communications and Networking Conference (WCNC), pp: 1298-1302.

Lundberg, D., 2004. Ad Hoc protocol evaluation and experiences of real world Ad Hoc networking.Uppsala University Department of Information Technology, Technical Report 2004-026.

Luo, J., D. Ye and F. Mingyu, 2007. Research on topology discovery for IPv6 networks. Proceeding of 8th ACIS International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel Distributed Computing (SNPD), pp: 804-809.

Mao, S., S. Lin, S. Panwar, Y. Wang and E. Celebi, 2003. Video transport over ad hoc networks: Multistream coding with multipath transport. IEEE J. Sel. Areas Comm., 21(10): 1721-1737.

Mao, S., X. Cheng, Y. Hou and H. Sherali, 2004. Multiple description video multicast in wireless ad hoc networks. Proceeding of 1st International Conference on Broadband Networks, BroadNets, pp: 671-680.

Mohapatra, P., J. Li and C. Gui, 2004. Multicasting in Ad Hoc Networks. Book Chapter, Kluwer Press.

Padmanabhan, V.N., H.J. Wang, P.A. Chou and K. Sripanidkulchai, 2002. Distributing streaming media content using cooperative networking. Proceeding of 12th International Workshop on Network and Operating Systems NOSSDAV '02.

Thomas, K., 2003. Reliable multicasting in MANETs. Contractor Report, Communications Research Centre, Ottawa, Canada.

Wei, W. and A. Zakhor, 2004.Multipath unicast and multicast video communication over wireless Ad Hoc networks. Proceeding of 1st International Conference on Broadband Networks, BroadNets, pp: 496-505.

Wei, W. and A. Zakhor, 2007. Multiple tree video multicast over wireless ad hoc networks. IEEE T. Circ. Syst. Vid., 17(1): 2-15.

Zhu, Y. and T. Kunz, 2004. MAODV implementation for NS-2.26 systems and computing engineering. Carleton University, Technical Report SCE-04-01.