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ADAPTIVE MULTICAST FOR DTN FOR REDUCING DELAY

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Abstract

Many Delay tolerant Network (DTN) application multicast services thus making efficient multicast communication support. In this paper we propose an adaptive multicast in delay tolerant network to challenge the intermittent link connectivity and frequently partitioned in DTN.In this paper our main aim is to minimize the packet drop problem and we analyze this problem by using NS-2 .In this we especially focus on packet drop problem, for minimizing this we use low duty cycle, setting packets are addressed to set of potential receiver and forward by the neighbor that wakes up first and it receive packet successfully and reduce delay and energy consumption by utilizing the potential of all neighbor.

Introduction

Delay tolerant networks (DTNs) are a class of emerging net- works that experience frequent and long-duration partitions [1, 2]. There is no end-to-end path between some or all nodes in a DTN. These networks have a variety of applications in situations that include crisis environments like emergency response and military battlefields, deep-space communication, vehicular communication, and non-interactive Internet access in rural areas [3, 4, 5, 6, 7, 8, 9, 10, 11]. Multicast service supports the distribution of data to a group of users. Many potential DTN applications operate in a group-based manner and require efficient network support for group communication. For example, in a disaster recovery scene, it is vital to disseminate information about victims and potential hazards among rescue workers. In a battlefield, soldiers in a squad need to inform each other about their surrounding environment. Although group communication can be implemented by sending a separate uncase packet to each user, this approach suffers from poor performance. The situation is especially acute in DTNs where resources such as connectivity among nodes, available bandwidth and storage are generally severely limited. Thus efficient multicast services are necessary for supporting these applications. Multicasting in the Internet and mobile ad hoc networks (MANETs) has been studied extensively in the past. However, due to the unique characteristic of frequent partitioning in DTNs, multicasting in DTNs is a considerably different and challenging problem. First, it is difficult to maintain a connected multicast structure (mesh or tree) during the lifetime of a multicast session. Second, data transmissions would suffer from many failures and large delays due to the disruptions caused by intermittent and opportunistic link among nodes. Third, the traditional approaches are designed with the assumption that the membership change during the multicast session is rare and can be ignored, which is norm rather than exception in the DTNs environments.

In this paper we have to minimize the problem of packets dropping .In DTN, there is a lot of dynamic nodes and intermittently connect scenarios, the major feature is no End-to-End path. For increasing the delivery ratio when the path is no End-to-End, the most common method is SCF (Store Carry Forward) mechanism [12]. It also means that each node should have a buffer queue to store messages. And, there are many routing methods have been developed, such as single-copy [13], multicopy [13] and grid-based routing [14].

For longer delay tolerant, the node have to wait for a long time until the message can be transferred to more suitable nodes or can be directly transferred to the destination node. The size of buffer queue is often not enough to store all the messages! Therefore, we must have to decide to discard some buffer message.

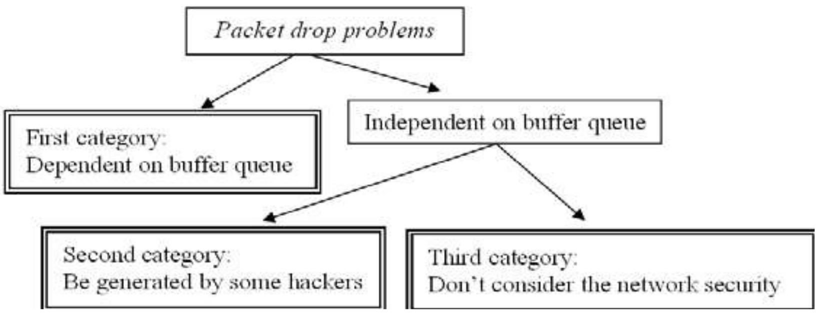

Fig.1 Three types of packet drop problem

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Issues

Ad–hoc on demand distance vector routing (AODV):

Ad–hoc on demand distance vector routing (AODV) is a stateless on-demand routing protocol. The Ad-hoc On Demand Distance Vector (AODV) classified under reactive protocols. The operation of the protocol is divided in two functions, route discovery and route maintenance. In Ad-hoc routing, when a route is needed to some destination, the protocol starts route discovery. Then the source node sends route request message to its neighbors. And if those nodes do not have any information about the destination node, they will send the message to all its neighbors and so on. And if any neighbor node has the information about the destination node, the node sends route reply message to the route request message initiator. On the basis of this process a path is recorded in the intermediate nodes. This path identifies the route and is called the reverse path. Since each node forwards route request message to all of its neighbors, more than one copy of the original route request message can arrive at a node. A unique id is assigned, when a route request message is created. When a node received, it will check this id and the address of the initiator and discarded the message if it had already processed that request. Node that has information about the path to the destination sends route reply message to the neighbor from which it has received route request message. This neighbor does the same. Due to the reverse path it can be possible. Then the route reply message travels back using reverse path. When a route reply message reaches the initiator the route is ready and the initiator can start sending data packets.

Dynamic Source Routing (DSR):

Dynamic Source Routing is a Pure On-Demand routing protocol [17], where the route is calculated only when it is required. It is designed for use in multihop ad hoc networks of mobile nodes.DSR allows the network to be self-organized and self-configured without any central administration and network infrastructure. It uses no periodic routing messages like AODV, thus reduces bandwidth overhead and conserved battery power and also large routing updates. It only needs the effort from the MAC layer to identify link failure.DSR uses source routing where the whole route is carried as an overhead. [16]

Destination-Sequenced Distance Vector routing (DSDV):

(DSDV) is a table driven routing scheme for ad hoc mobile networks based on the Bellman-ford algorithm. The improvement made to the Bellman-Ford algorithm includes freedom from loops in routing table by using sequence numbers [18].Each node acts as a router where a routing table is maintained and periodic routing updates are exchange, even if the routes are not needed. A sequence number is associated with each route or path to the destination to prevent routing loops. Routing updates are exchanged even if the network is idle which uses up battery and network bandwidth. Thus, it is not preferable for highly dynamic networks. In DSR, the whole route is carried with the message as an overhead, whereas in AODV, the routing table is maintained thus it is not required to send the whole route with the message during the Route Discovery process.

Proposed Method for implementation of Adaptive multicast for DTN using Low duty Cycle

Ad-hoc On Demand Multipath Distance Vector Routing (AOMDV)

Ad-hoc On Demand Multipath Distance Vector Routing is an extension of AODV. AOMDV employs the "Multiple Loop -Free and Link-Disjoint path" technique. In AOMDV only disjoint nodes are considered in all the paths, thereby achieving path disjointness. For route discovery route request packets are propagated throughout the network thereby establishing multiple paths at destination node and at the intermediate nodes. Multiples Loop-Free paths are achieved using the advertised hop count method at each node. This advertised hop count is required to be maintained at each node in the route table entry. The route entry table at each node also contains a list of next hop along with the corresponding hop counts. Every node maintains an advertised hop count for the destination. Advertised hop count can be defined as the "maximum hop count for all the paths". Route advertisements of the destination are sent using this hop count. An alternate path to the destination is accepted by a node if the hop count is less than the advertised hop count for the destination.

In this approach our aim is to minimize the dropping of packets when it delivers from the source to destination. Firstly we do the multicasting in network here we use both multicast and broadcast for packet delivery. In this we consider one node as a broadcasting node and all other nodes as a receiver nodes and use ad-hoc on-demand multicast distance vector which is use for both multicast and broadcast and to reduce the duty cycle for packets to achieve the less packets drop. Because of these we also achieve the minimization of cost because in delay tolerant network (DTN) we have a less delay, so for reducing the delay we do not have to add an extra devices, so automatically cost is reduced.

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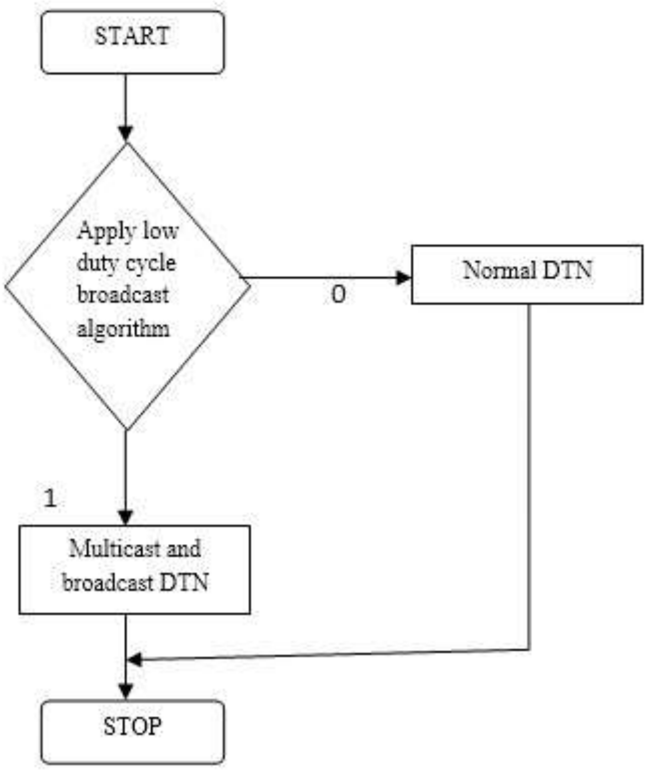

Fig.2 Flow Diagram for Adaptive multicast for DTN

In this section we have described about the tools and methodology used in our paper for analysis the performance i.e. about simulation tool, Simulation Setup (traffic scenario, Mobility model) performance metrics used and finally the performance of protocols is represented by using excel graph. In this paper the simulation tool used for analysis is NS-2 which is highly preferred by research communities. NS is a discrete event simulator targeted at networking research. Ns provides substantial support for simulation of TCP, routing, and multicast protocols over wired and wireless (local and satellite) networks [15]. NS2 is an object oriented simulator, written in C++, with an Otcl interpreter as a frontend. This means that most of the simulation scripts are created in Tcl (Tool Command Language). If the components have to be developed for ns2, then both tcl and C++ have to be used. The flow diagram given in figure4 shows the complete working of NS2 for analysis

Simulation Setup

NS version	Ns –allinone-2.34
Number of nodes	10 wireless nodes
Traffic	CBR(Constant Bit Rate)
CBR Packet size	512 bytes
Simulation Area size	300 x 300 m
Mobility model	Random Way Point mobility
Packet size	1000
Packet interval	0.01
Antenna Model	Omni antenna
Radio propogation Model	Two way ground

Fig-3 shows data transfer from source to destination. Dropping packets in fig shows the packets lost. Fig-4a nd 5 shows the graph of delay and throughput when packet size is 1000 bytes and interval between packet sending is 0.01 sec.From the graph we clearly

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see that the delay has become more when no duty cycle is applied, and when we applied that the delay will lwss and throughput is also nearly equal to hundred percent.

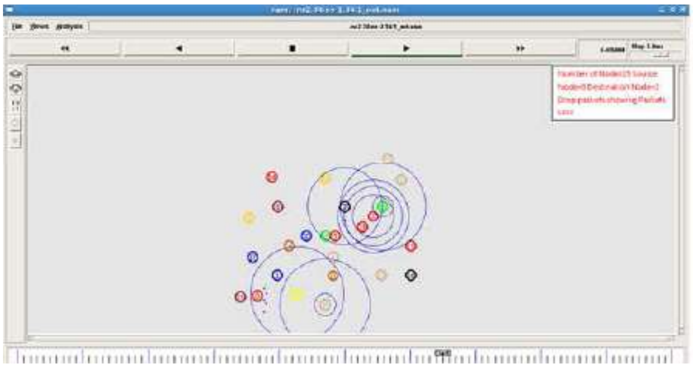

Fig.3 Simulation showing packet Transfer

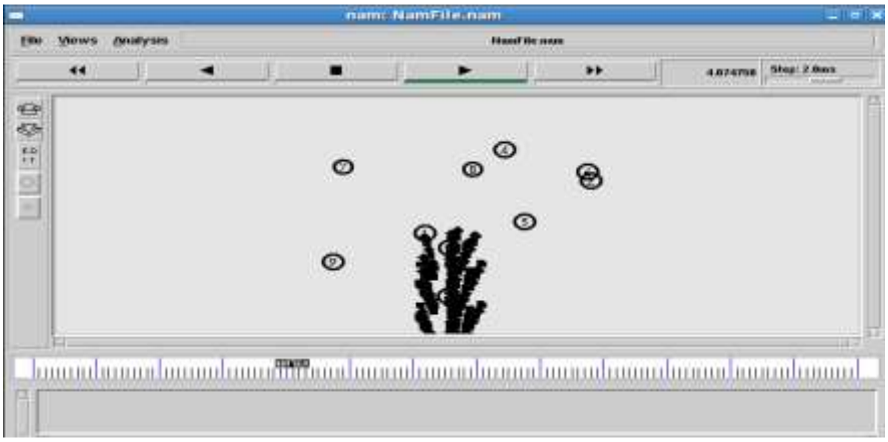

Fig 4. Plain Multicast flooding

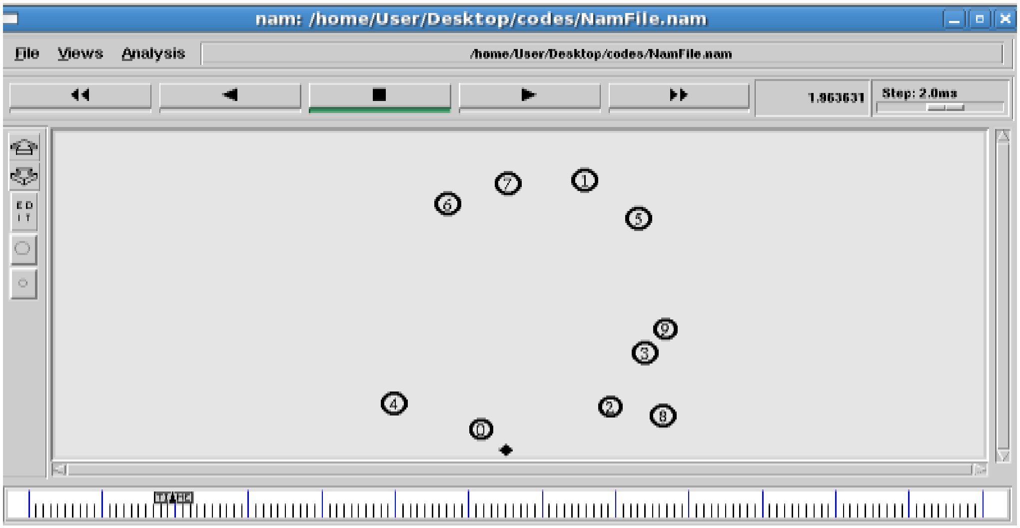

Fig 5. Multicast with AOMDV

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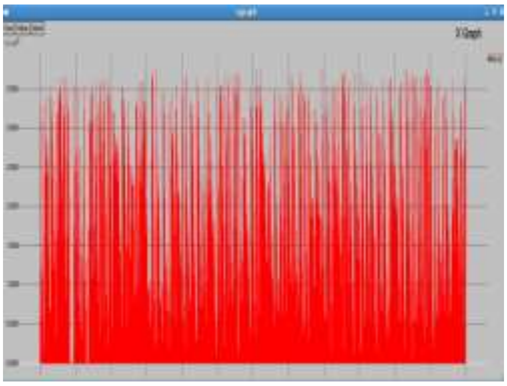
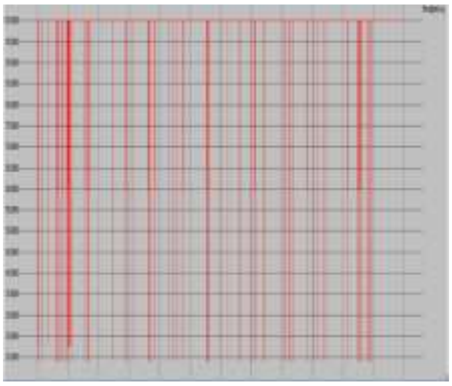

Fig.6 Graph of Delay and Throughput

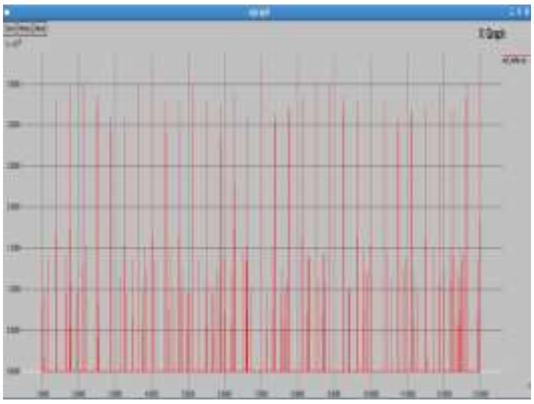
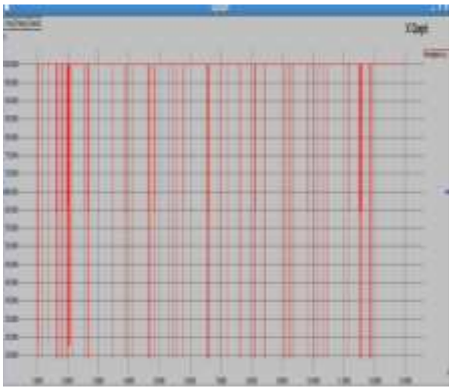

Fig.7 Graph of Optimized Delay and Throughput

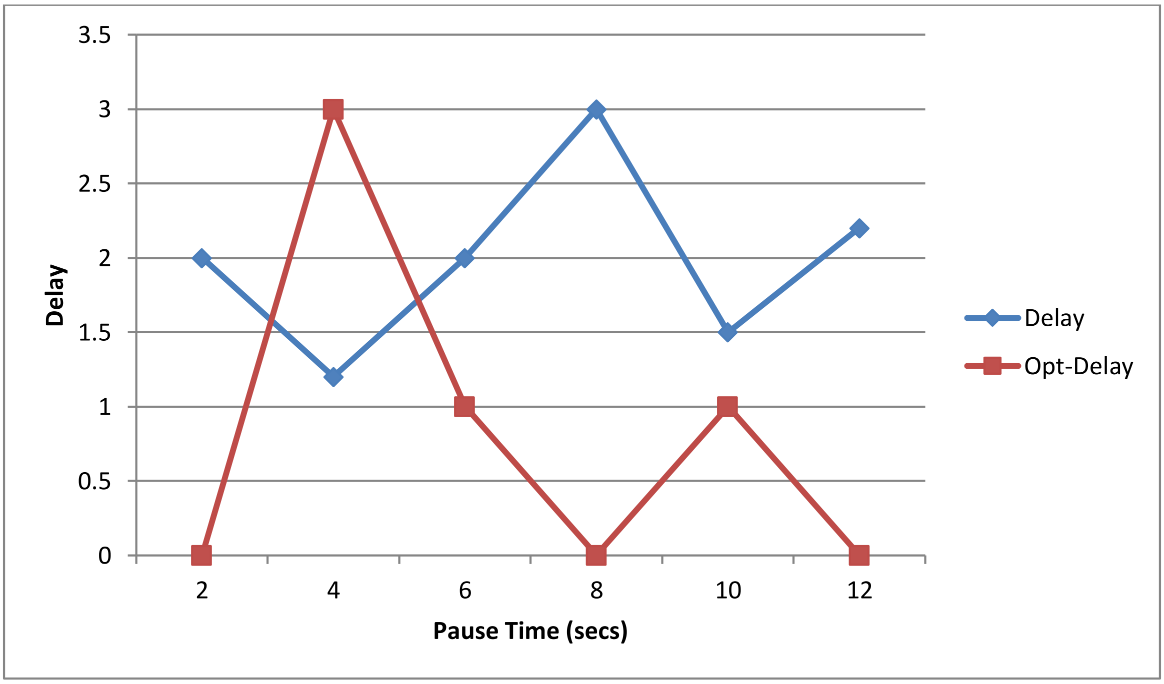

Fig.8 Comparison graph of delay

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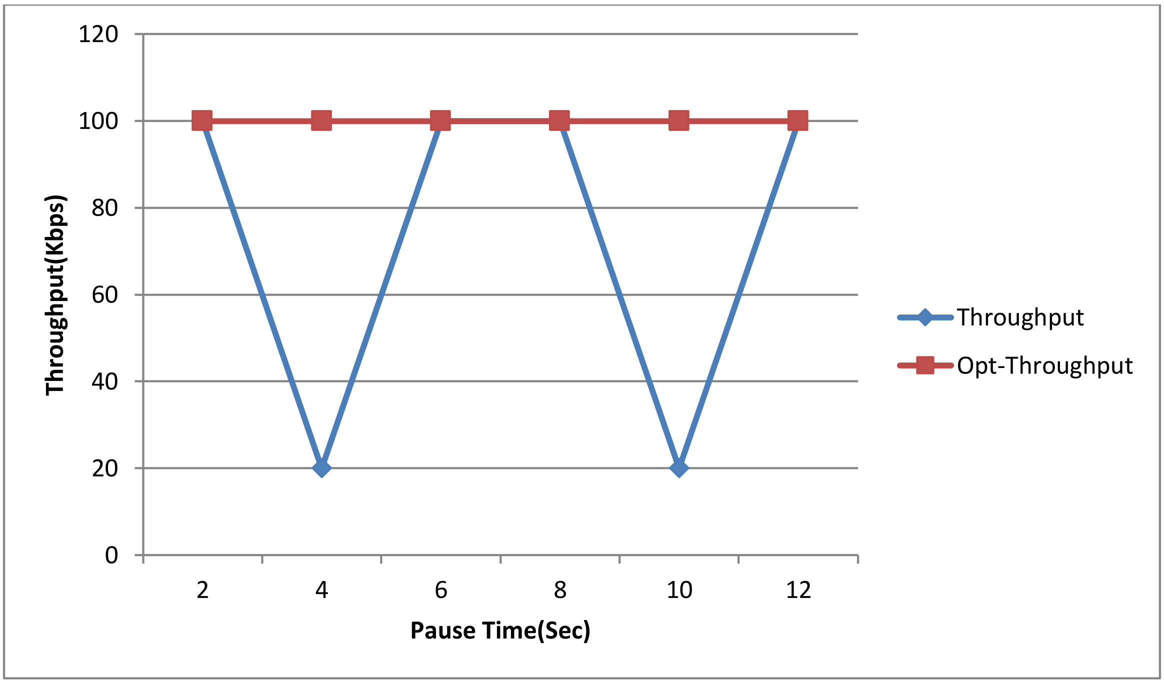

Fig.9 Comparison graph of throughput

Conclusions

This paper describes the design of Adaptive multicast for delay tolerant network. This paper evaluated the performance of normal DTN and DTN with low duty cycle.Comparision is based on the delay, throughput .The design techniques that we have used in this paper to achieve low delay, low cost, better throughput. For simulation we used network simulator NS-2.

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