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A Popularity-Aware Buffer Management System to Stored Packet Memory in Massage Transmission Grade in Delay Tolerant Network

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ABSTRACT
A delay-tolerant network is a network designed so that momentary or flashing communication problems and limitations have the least possible unpleasant impact. As the storage-carry-forward paradigm is adopted to transfer messages in DTNs, buffer management schemes greatly influence the performance of routing protocols when nodes have limited buffer space. Two major issues should be considered to achieve data delivery in such challenging networking environments: a routing strategy for the network and a buffer management policy for each node in the network. The routing strategy determines which messages should be forwarded when nodes meet and the buffer management policy determines which message is purged when the buffer overflows in a node. This study proposes an enhanced buffer management policy that utilizes message properties. For maximization of the message deliveries and minimization of the average delay, two utility functions are proposed on the basis of message properties, particularly the number of replicas, the age and the remaining time-to-live(TTL). Simulation results show that our buffer management scheme canimprove delivery ratio and has relative lower overhead ratio compared with other buffer management schemes. In this scheme several type of buffered policies, null buffered , single copy buffered ,infinite buffered etc. Our work in null buffered policies there are no massage are available in buffered after massage send. In case massage send and this massage are discarded and buffered store only single copy of massage than retransmitted it.
KeyWords -Delay tolerant network, Routing, Buffer Management , Intermittent connectivity, Massage scheduling

I. INTRODUCTION

Delay-tolerant networking (DTN) is a field of network research focused on architectures and protocols that can operate in challenged networking environments with extremely limited resources, particularly in terms of CPU processing power, memory size and network capacity [1]. As the storage-carry-forward paradigm is adopted to transfer messages in DTNs, buffer management schemes greatly influence the performance of routing protocols when nodes have limited buffer space. These environments are typically distinguished by a distruption. Communication links, which leads to frequent and long periods of network partitioning, long delays, limited resources and heterogeneity. The implicit assumption in mobile and ad hoc networks is that networks are connected and an end-to-end path between any source and destination pair exists. Thus, data are buffered and queues and paths are not maintained because of mobility [2]. One of the issues is routing in DTN and the solutions proposed thus far for DTN routing range from the simplest mechanisms to sophisticated mechanisms. The simplest mechanism is the epidemic routing [3–5], where messages are flooded through the network to reach as much of the network as possible in the hope that each message will eventually reach its destination. Another important issue that must be considered in DTN is the impact of buffer management policies because DTN basically uses a store-carry-forward routing protocol [13]. In store-carry-forward routing, if the next hop is not immediately available for the current node to forward a message, the node should store the message in its buffer and carry it along while moving until the node gets a communication opportunity to forward this message farther. Therefore the nodes must be capable of buffering messages for a considerable time. Moreover, to increase the probability of delivery, we need to ensure the messages are replicated many times in the network because of the lack of complete information about other nodes [14]. As a result, the limited buffer in each node is likely to be consumed rapidly when the flooding messages are stored. According to the literatures, buffer management policies significantly affect the performance of DTN [13–16]. Zhang et al. [13] showed that widely used traditional buffer management policies, such as drop tail and drop front, perform poorly in DTN. Recently, the history-based drop (HBD) policy based on global knowledge of the network was proposed [15]; it outperforms traditional buffer management policies in terms of the delivery ratio and the average delay. Although the HBD outperforms traditional policies, the buffer management of DTN still has plenty of room for improvement. This study proposes an enhanced buffer management policy (EBMP) that utilises message properties to calculate the utility value of each message. This paper studies a novel message scheduling framework for DTNs under epidemic and two-hop forwarding, aiming to enable an effective decision process on which messages should be forwarded and which should be dropped when the buffer is full. Such a decision is made by evaluating the impact of dropping each buffered message according to collected network information for either optimal message delivery ratio or message delivery delay. To deal with the message propagation prediction under epidemic forwarding and evaluate the delivery delay and/ delivery ratio at any time instance during message lifetime, Markov chain model has been proven to be the best method in doing such evaluation providing numerical solution for such model becomes impractical when the number of nodes is large .

II. ROUTING STRATEGES BASSED ON BUFFER MANAGEMENT IN DTN

Routing in DTN is categorized in to two main categories, Flooding strategy and Forwarding strategy [26]. Flooding strategy is based on the principal of replicating messages to enough nodes so that destination nodes must receive it. Forwarding strategy uses knowledge about network to select best path to the destination.

2.1 Flooding Strategy

In this strategy, the multiple copies of same message will be created and these copies will be delivered to the set of nodes called relay nodes. Relay nodes stores the messages until they come in contact with destination node [26].

2.1.1 Single Hop Transmission

The simplest strategy to transmit the data from source to destination in DTN is to transmit messages immediately as soon as the source and destination come in contact with each other directly.

2.1.2 Two Hop Transmission

In this strategy source node along with the nodes which at the fIrst instance come in contact with source node work in cooperative manner to increase message delivery probability to successfully deliver the message to the destination node.

2.1.3 Tree Based Flooding

In tree based flooding, the task of making copies to other relay node is distributed to the next nodes which come in contact with the already discovered node The relay nodes forms tree which is routed at source node [11].

2.1.4 Epidemic Routing

Epidemic routing [12] is an early sparse network routing protocol proposed for DTN. It assumes that each node has unlimited storage space and bandwidth [13]. Therefore every node can store all the messages transmitted during "contact" phase.

2.1.5 Spray and Wait

Spray and wait [16] approach consists of two phase, spray phase and wait phase. During spray phase, each node will flood (spray) each message to L no. of relay nodes when they come in subsequent contact with each other. This L is initialized by source node. If destination is encounter, message transmission is successfully terminated.

2.1 6. Spray and Focus

Spray and Focus [17] is modifIcation of spray and wait strategy. This is designed for specifIc application where the mobility of each node is localized. The nodes are assumed to move in small area for most of the time. Spray phase is similar to the spray and wait strategy [16]. The difference lies in second phase. In focus phase, single copy of message [18] is used to focus limited relay node to route the message to destination.

2.1.7. MaxProp strategy

In MaxProp [19] strategy, city environment are taken into consideration where nodes are city buses which has high probability to meet again. MaxProp approach exploits this behavior of city buses for exchanging messages in future.

2.2. Forwarding Strategy

Forwarding Approach makes use of the network topology and local or global knowledge to find best route along the path to destination. This best route is used to deliver the message.

2.2.1 Location Based routing strategy

This is the simplest forwarding strategy which makes use of basic knowledge about location of a node. Each node in the network is assigned the coordinate. The coordinate may be physical such as GPS coordinate. Then distance formula is used to estimate the cost of delivering message from one node to another [24], [25]. The main advantage of location based routing is that it eliminates the need for storing routing tables as well as control information transfer management.

2.2.2 Gradient Routing strategy

In this approach weights are assigned to the nodes in the network that represents it's suitability to deliver messages to a given destination. The relay nodes, which stores the messages temporarily contacts another node that has better metric for the message destination; it passes the message to it.

2.2.3 Label Based Forwarding Strategy

In this strategy first task is to create groups. These groups are labeled called labeled groups. These groups are then chosen as next node or next groups to forward message to the destination. This results in large improvements as the labeled nodes works in groups [26]. The group based routing efficiently utilizes bandwidth and consumption.

III. BUFFER MANAGEMENT

Only a few studies have examined the impact of buffer management and scheduling policies on the performance of DTN routing. Zhang et al. in [9] addressed this issue in the case of epidemic routing by evaluating simple drop policies such as drop front (DF) and drop tail, and analyzed the situation where the buffer at a node has a capacity limit.. Lindgren and Phanse in [10] evaluated a set of heuristic buffer management policies based on locally available nodal parameters and applied them to a number of DTN routing protocols. Fathima and Wahidabanu in [34] proposed buffer management scheme which divides the main buffer to a number of queues of different priorities. When the entire buffer is full, some of the messages in the lowest priority queue are dropped to give room for new messages. Similar idea was explored by Dimitriou and Tsaoussidis [39], who proposed a buffer management policy based on two types of queues for respective type of data traffic; namely a low-delay traffic (LDT) queue and a high-delay traffic (HDT) queue. Noticeably, all the above-mentioned policies are based only on static and local knowledge of network information. In [32], Dohyung Kim and Yeom presented a policy which discards first a message with the largest expected number of copies. Erramilli and Crovella in [35] proposed policies in a conjunction with forwarding algorithms. Two issues are raised in [35]. First, without addressing the message scheduling issue which is of the same importance as buffer management, the scheme in [35] may not be able to fully explore the possible performance gain in the buffer management scheme. Second, the absence of an analytical model leaves the scheme simply a heuristic hard to be evaluated. Krifa et al. in [11] proposed an interesting approach for solving the problem of buffer management by way of a drop policy and a scheduling scheme. This is the first study that explicitly takes global knowledge of node mobility as a constraint in the task of message scheduling. Specifically, their method estimates the number of copies of message I based on the number of buffered messages that were created before message i. Although interesting, the method may become inaccurate when the number of network nodes is getting larger, especially for newly generated messages. Meanwhile, the effect due to the change of the number of message copies during the remaining lifetime of a message.

IV. PROPOSED METHOD OF BUFFER MANAGEMENT FRAMEWORK

We give a describable definition: Delay tolerant network in such opportunistic networking is such an ad hoc network, where the contact chance obtained from the nodal mobility is utilized to exchange messages between encountered nodes, by the method until the messages is delivered to the destination when the complete path does not exist between the source and the destination. In case the node are destroy the one copy of massage are stored in the buffer.

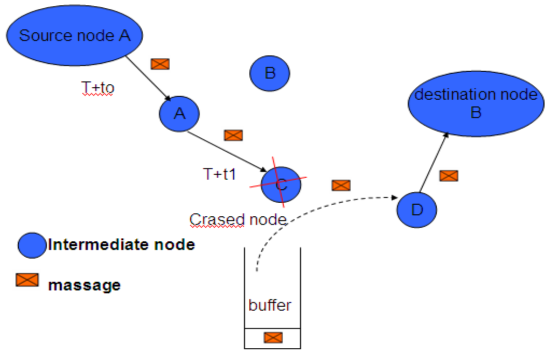


Fig. Buffer store the massage in the Queue

The process of forwarding messages is as follows: at *t1*, source node S wants to send a message to destination node ***D***, but ***S*** can't communicate with ***D*** directly since it is not in the radio range of node ***D***. So ***S*** firstly sends the message to its neighbor ***node*** 3. ***Node*** 3 gets the message and carries it until itself enters the communication range of ***node*** 4 closer to the destination and forwards the message to ***node*** 3 at *t2*. The message is eventually delivered to the destination ***D*** when ***node*** 4 encounters node ***D*** at *t3*. In this al scenario, in case node 2 is crashed and our sending packet is dropped. In this case buffer management scheme is also use full the buffer store every sending packet in one copy. In case our packet is lost but is packet one copy is already available in buffer queue and any time this packet is retransmit the destination node.). Another important issue that must be considered in DTN is the impact of buffer management policies because DTN basically uses a store-carry-forward routing protocol [13]. In store-carry-forward routing, if the next hop is not immediately available for the current node to forward a message, the node should store the message in its buffer and carry it along while moving until the node gets a communication opportunity to forward this message farther.

V. Buffer Management Scheduling Scenario

5.1 Node Bandwidth:
This factor determines the number of messages that can be transmitted at each encounter opportunity. For instance, if the bandwidth of a DTN device is sufficient to transmit all the requested traffic load within a given encounter duration, then this is reasonable. However, if the traffic load increases due to a large number of users or a larger size of messages being transmitted, then the unsuccessful transmissions due to insufficient encounter duration should be taken into account. Therefore, to estimate the number of messages that can be successfully transmitted is useful to reduce the number of aborted messages due to insufficient encounter duration. In addition, to transmit messages according to a corresponding priority is beneficial to utilize the bandwidth.

5.2 Buffer Space:
The sufficient buffer space is essential for the carried messages, since they would be buffered for a long period time until the upcoming encounter opportunity is available. In light of this, to discard the least important message due to buffer space exhaustion is beneficial to utilize the buffer space.

5.3 Node Energy:
A DTN device often has limited energy and can not be connected to the power supplier easily. Energy is required for transmitting, receiving, storing messages and performing routing process. Hence, the routing algorithms which transmit few messages and perform less computation are more energy efficient.

5.4.flow of how to stored massage in buffer
In communicating source node A can transmit the packet the nearest node on the Intermediate node on the Network. The packet size i less than the N is the intermediate node. The intermediate node stored the packet and than after send the next node.

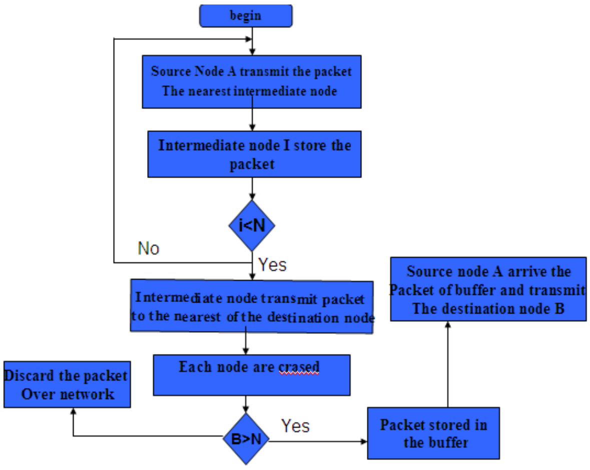
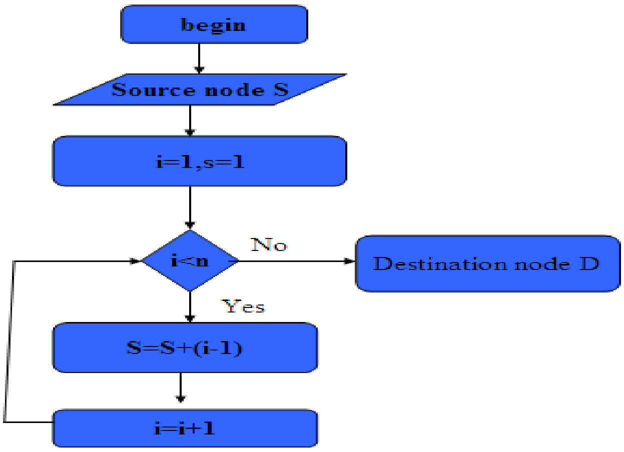


Fig 4.2 Flow of buffer storage

The Intermediate node sends the packet on the destination node and in case the node is crashed and buffer B is check the node size N. The N is less than B than packet is stored the buffer. Than finally source node A is arrive the packet of buffer and than after retransmit the destination node D.

5.5 node capability
The basic agents in the simulator are called nodes. A node models a mobile endpoint capable of acting as a store-carry-forward router (e.g., a pedestrian, car or tram with the required hardware). Simulation scenarios are built from groups of nodes in a simulation world. Each group is configured with different capabilities. Each node has a set of basic capabilities that are modelled. These are radio interface, persistent storage, movement, energy consumption and message routing. Node capabilities such as the radio interface and persistent storage that involve only simple modelling are configured through parameterization (e.g., communication range, bit rate, peer scanning interval and storage capacity). More complex capabilities such as movement and routing are configured through specialized modules that implement a particular behaviour for the capability (e.g., different mobility models).



In source node S is defined the path of the i th intermediate node than calculate the all the node capacity and find the best node to meet the destination node.

5.6 Node compare to the buffer space

The weight φ*i* actually express the percentage of the service flow *i* in the entire bandwidth *B*. φ*i* will not change with packet scheduling algorithms, and meet

$$\sum_{i=0}^{N} \varphi i = 1$$

Where *N* expresses the number of service flows in the link. And the service volume is described. Where *i*, *j* denotes two different service flows. In GPS based Algorithms, the bandwidth allocation of different service flows meets the requirement *Bi*/ φ*i* = *Bj*/ φ*j*, where *Bi* is the allocated bandwidth of the service flow *i*.

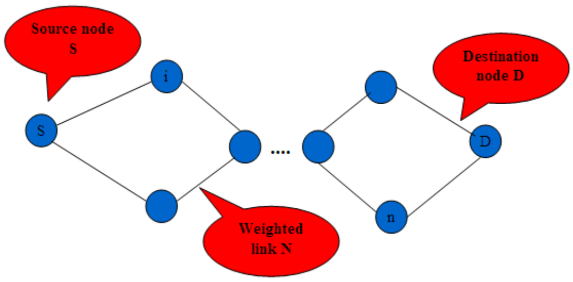


Fig 4.4weighted allocated node to compare the buffer space

In buffer management algorithms, how to control the buffer space occupation .Here we define,

Ci/Wi=Cj/Wj.

where *Ci* is the buffer space occupation, and *Wi* expresses the synthetic weight of the service flow *i*. When the buffer cache is full, the service flow with the largest value of Ci/Wi will be droped in order of fairness. If all packet lengths are the same, the algorithm only needs one cycle to compare and select the service flow with the largest weighted buffer space occupation.

VI. CONCLUSION

In this work, we investigate the problem of buffer management in delay tolerant network. In buffer management scheme is estimated the replication of number of node and at list one copy stored in the buffer in queue man or (FIFO). Then buffer is full than drop the incoming packet. In this issue is implemented in feature work.

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