An Efficient DTN Routing Algorithm for Automatic Crime Information Sharing for Rural Areas

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Abstract— Delay Tolerant Network shows many issues that are exist in traditional network. Opportunistic network emerge as interesting evolution in MANET. Mobile nodes in the opportunistic network communicate with each other even in case of no route connection. In this paper a kiosk (or hub station) that is connected to villages to establish internet connection. Such kiosk is placed where traffic frequency is high. We will use high frequency sensor in vehicles. When passing through kiosk, high frequency sensor will establish connection to kiosk & kiosk will connect villages to internet. This system is very useful in crime information sharing services. As an example, if there are a person who is victim of any crime or in a trouble condition. He/she have mobile devices connect to internet. They send a trouble message which is passed to near kiosk and passed on to vehicles and forward their information to police station. This system is helpful in villages, where network communication is not proper.

Key words: Opportunistic network, DTN, Epidemic, Prophet

I. INTRODUCTION

Delay Tolerant Networks (DTN) are remote systems in which nodes are irregularly joined and there is no ensure that a path exists from source to destination at any time instance. Today, there are numerous illustrations of such systems including tracking of wildlife systems [1], military systems and vehicular systems. In addition, the wide spread use of various types of devices with remote capacities among individuals and their surroundings has enabled the likelihood of opportunistic urban routing of messages. In DTN an opportunistic network provides communication among different routing from different wireless networks.

In standard system, mostly time nodes are connected. In case of DTN, connectivity is not properly maintained but it is still desirable to allow communication between nodes. Therefore the delivery of packets in traditional routing protocols is not possible between the hosts. So end to end connectivity between nodes required. The node mobility is other reason for absence of end to end connectivity. It also introduces the issue of lack of knowledge about current position of node, if mobility pattern is not known.

Delay tolerant network includes a variety of applications in situations such as deep-space communication and crisis environments. In this article introduce routing protocol in DTNs. Multicast [2] supports the distribution of data packets to a no. of users, when a service is required for many potential DTN applications. Due to the characteristic of frequent partitioning in DTNs, routing is a challenging issue.

Delay in the Delay-tolerant networking may differ depending upon the nodes location. There are mostly four delays kinds. a) Processing delay- time taken through routers to the procedure the packet header. b) Queuing delay-time in routing queues the packet spends. c) Transmission time- takes time to packets bits push onto the link. d) Propagation delay-time for a signal to destination reach. Delay-tolerant networking lacks instantaneous end-to-end path. Because of this, Ad hoc On Demand Distance Vector (AODV) and Dynamic Source Routing protocol may be fail to the route establish. These protocols first establish a route and after the route has been recognized, forward the real information to destination. When these instantaneous paths of end –to-end are complex to routing protocols establish, the store-carry-forward method is used. There are numerous examples of this network in the real life. Numerous rural projects connectivity involve conventional internet access attempt provide to remote areas.

Delay in DTN may vary contingent on the area of hubs. There are chiefly four sorts of postponements. a) Processing deferral time taken by the switches to transform the parcel header. b) Queuing deferral time the parcel spends in directing lines. c) Transmission time-time it takes to push the bundles bits onto the connection. d) Propagation postponement time for a sign to achieve its destination. DTN needs prompt end-to-end way. Because of this, AODV and DSR conventions may neglect to build up course. These conventions first set up a course and after course has been set up, forward the real information to destination. At the point when these momentary end –to-end ways are hard to set up directing conventions, the store-convey forward plan is utilized.

There are numerous illustrations of this system, in actuality. Numerous provincial network activities include endeavor to give customary web access to remote zone

II. OPPORTUNISTIC NETWORK

Opportunistic network is an MANET extension. Wireless networks‟ features, such as users mobility disconnection and also links‟ instability, nodes, network segment, are seen as exceptions in classical network. This makes the MANET design extensively much Difficult [3].

Opportunistic networks [4] are created out of the mobile devices approved through people, without any relying on the any network topology. Opportunistic networks consider partitions, disconnections, mobility, etc. as norms instead of exceptions. In the mobility of the network opportunistic is used as a method to present between disconnected„groups‟ of the nodes, communication rather than a disadvantage to be resolve.

In the opportunistic networking a whole path between two different nodes wishing to the communicate is unavailable [5]. Opportunistic networking aims to solve this issue through eliminate the physical end-to-end connectivity assumption and permit such nodes to the information exchange. Through applying the paradigm of store-carry-

and-forward [6] middle nodes store data when there is no any forwarding opportunity towards the endpoint, and also exploit any other future contact opportunity with the other different mobile devices to the bring the data closer and also closer to endpoint.

Therefore routing is the most compelling issue. The well-organized routing protocols design for the opportunistic networks is commonly a hard mission because of the about network topology information absence. Routing performance depends on the information of network topology [7]. Unfortunately, this knowledge type is not forever presented. Context knowledge is a basic piece of the information to design effective routing protocols. Context knowledge signifies users‟ working address and also establishment, probability of the meeting with other different users or particular places visiting. It represents the present effective atmosphere and also user's behavior. It is the most help full to classify appropriate forwarders based on the context knowledge about the endpoint. We can categorize the basic approaches of routing proposed in literature based on the context knowledge users quantity they exploit. Particularly, we recognize two phases, corresponding to the context-aware protocols and context-oblivious.

III. Routing Protocols

In common routing protocols in the DTN are classified into 2 basic group which is based on property is used to destination discover: Flooding families & forwarding families. To discover the evaluation, two various methods of knowledge and replication are used. The replication is used in flooding approach & there are numerous algorithms to the manage of multiple copies data & to make those copies. While the information is used in the forwarding approach & few works have been devoted to derive much effective technique to find various network state knowledge & then to use it make routing result.

A. *Epidemic Routing:*

In this protocol each nodes can be become the transporter, and it is confirmed that data can be delivered with the high possibility. However, the network resources are consumed greatly. Data are spread to each neighbors. When there is no any room in data queue, dispossessed oldest data. Data are always forwarded according to a policy of FIFO and no bound on various replicas are considered [8].

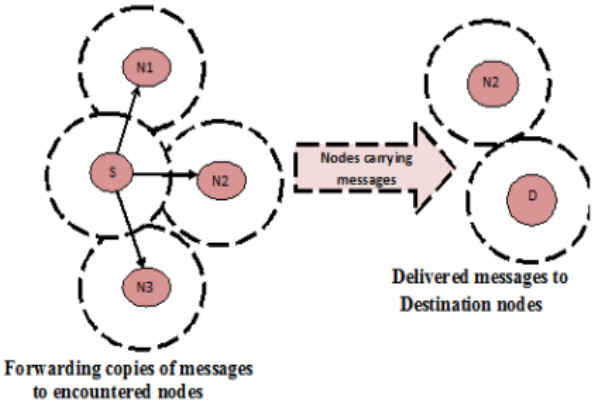

Fig. 1: Epidemic Routing Protocol Method

B. *Probabilistic Routing:*

PROPHET [6], a Protocol of Probabilistic Routing applying Transitivity and Encounters History define use of the observations that the real users typically in the move predictable fashion. If a user has location visit various times before, there is much probability to location visit again. PROPHET uses this knowledge to routing performance progress. To the accomplish this, PROPHET maintains delivery predictability metric at each node. This represents metric data release probability of the host to an endpoint. PROPHET is same to the Epidemic Routing but it initiates a novel delivery predictability idea. Delivery predictably is node to the encounter a various endpoint probability. When two meet nodes, they also exchange knowledge delivery predictability using summary vectors. This knowledge is used to the update delivery predictability metric knowledge. When a data comes at a node, node checks that endpoint is presented or not. If endpoint is not obtainable, data stores node and upon every encounters with the another different device, it takes data transfer based decision transferred information to the other different node if the other different node has probability of higher data delivery to the endpoint [6].

C. *Spray & wait*

Spray-and-Wait (SnW) [9] protocol a simple scheme proposed which is manages to overcome shortcomings of the epidemic routing and other different flooding-based approach, and also avoids the performance issue inherent in the utility-based method. Spray-and-Wait (SnW) [9] protocol limits the various copies through associating with all copy the numerous additional copies to spread. When no more spreading is permitted carrying node keeps the packet until it either meets the endpoint or the packet is dropped because of lifetime expiry or buffer overflow.

IV. Literature Review

Anshul Verma et.al [11] in the opportunistic networks a simultaneous way existence is not assumed to the transmit a information between a sender to a receiver. Knowledge about the context in which users is a key piece of information to the effective routing protocols design in networks. But this knowledge type is not always presented. When users are most isolated, context knowledge cannot be dispersed, and also cannot be used for the assuming efficient routing endpoint. In such cases, context oblivious based on method are only way to the enable communication in between various users. in the network As faster as users become more social, context information spreads, and also context based routing becomes an effective solution. In this paper they propose an integrated routing protocol that is able to utilize context knowledge as faster as it becomes existing and also falls back to the endpoint which is based routing when the context knowledge is not presented. Then, we provide comparison between PROPHET and Epidemic; these are representative of context aware routing and context oblivious protocols.

Sushant Jain et.al [12] delay-tolerant networking routing issue is formulate, where data are to be change the end-to-end across a graph connectivity that is the time-varying but also whose dynamics may be called as in advance. The challenge has added the finite buffers

constraints at each nodes and the common property that the no any contemporaneous end-to-end may ever exist. This condition limits classical routing methods applicability that tends to outages treat as the failures and also seeks to an existing end-to-end path find purpose. They proposed for routing algorithms framework in such atmosphere. We then develop various algorithms and then use simulations to performance compare regarding the quantity of information they require about any network topology. We obtain that, as expected, algorithms applying the least information tend to the achieve badly. We also obtain that with limited extra information, far less than total global information; effective algorithms can be for routing constructed in such atmosphere. To the best of our data this is first such of routing investigation problem in DTNs.

Vikas et.al [8] DTN (Delay/Disruption tolerant networking) is another network communication techniques class developed to the sustain long link delay and also frequent link disruption. Lot of work have been done in the estimate the performance and effectiveness of the different type of DTN Protocols when they are applied on different environment (like the environment where we don't have continuous path between source and sink e.g. Village network, IPN (interplanetary network) etc.). In this paper presented a study on evaluation of the TCPCL (Transmission Control Protocol Convergence Layer) for Communication and also long-delay communication (eg. MaxProp, Epidemics Routing etc.). A comparative study of several TCPCL has also been carried out.

B. Shubashini et.al [11] Delay-tolerant networks are a new development in network research, the hope of connecting people and devices that hitherto were either unable to communicate, only at great cost. In this paper review on existing method for routing in such networks. For this investigate ways amount of changes per fits best under the instantaneous conditions with their features such as intermittent connectivity, resource limitation and high delay. The fuzzy membership functions can be adaptively constructed based on known network parameters. The fuzzy decision mechanism is very simple compared to complex prediction mechanisms used in many other DTN protocols.

V. PROPOSED WORK

MANET permits nodes with the wireless adaptors to communicate with the one another without infrastructure of pre-existing network. Accessible protocols of ad hoc routing, while robust to quickly network topology altering, assume the connected path presence from the source endpoint. We are implementing a network in which high frequency sensor are used. In our proposed system, we are introducing a network establishment process using high frequency sensor used in vehicles. We will create a kiosk which will connect all the villages situated nearby kiosk's location. All the villages will connect to the server (internet). This process is useful in medical system. A person can use this connection to upload patient's symptoms & get medical help as soon as possible.

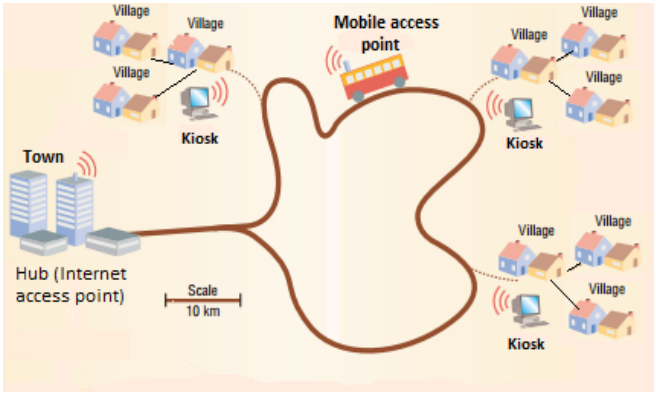

Fig. 2: Network Connectivity Model

A. Algorithm

When the one node encounters another node, then we subtract the simulation time and last encounter Time and compare them with I_TYP (typical interconnection time in seconds value I_TYP=1800)

(SimulationTime - LastEncounterTime) < I_TYP)

With the help of that we can change the delivery probability calculation

```
if(LastEncounterTime==0)
PEncounter = PEncMax;
   Else
  if((SimulationTime - LastEncounterTime) < I_TYP)
  {
 PEncounter=PEncMax*((SimulationTime - LastEncounterTime)/ I_TYP);
  }
  Else
{
   PEncounter = PEncMax;
   double oldValue = getPredFor (host);
   double newValue = oldValue + (1-oldValue) * PEncounter;
   preds.put(host, newValue);
   LastEncounterTime.put(host, simulationTime);
}
```

1) We can improve the time of message holding by every node by increasing the value of aging constant (old value of aging constant is 0.98 to new values of aging constant is 0.999885791).

The predictabilities intended for every destinations D further than E are "aged"

$P(M,D)_{new} = P(M,D)_{old} * Y^{K}$

2) Predictabilities be exchange among and E, they are transitive property of the predictability of endpoint Dintended for which E have a P(E,D) value on the statement that M is likely to meet E again.

```
Double pold = getPredFor(e.getKey());
pNew = pForHost * e.getValue()*beta;
if(pNew > pold)
preds.put(e.getkey(), pNew);
}
}
```

P(M,D)new = P(M,D)old +(1-P(M,D)old) * P(M,E) * P(E,D) * B where B is a scaling constant.

In our proposed work we improved the value of B(transitivity property), if the last encounter time of node is near to the old than we will take the old value otherwise we will take the new value.

VI. RESULT ANALYSIS

A. *Buffer Time*

Number of Nodes	Epidemic Routing	Prophet Routing	Prophet2 Routing
20	2680	2745	2786
25	2276	2575	2523
30	2714	2887	2989

Table 1: Shows the buffer time of Epidemic, Prophet, and ProphetV2.

B. *Latency*

Number of Nodes	Epidemic Routing	Prophet Routing	Prophet2 Routing
20	2375	2523	2076
25	2501	2157	2494
30	3023	2948	3012

Table 2: Shows the latency of Epidemic, Prophet, and ProphetV2.

In the table 1&2 shown above consider three different routing protocols such as Epidemic, Prophet, and Prophetv2 for varying number of nodes. For buffer time and latency the table shown number of node increase our proposed prophetv2 buffer time and latency decreases.

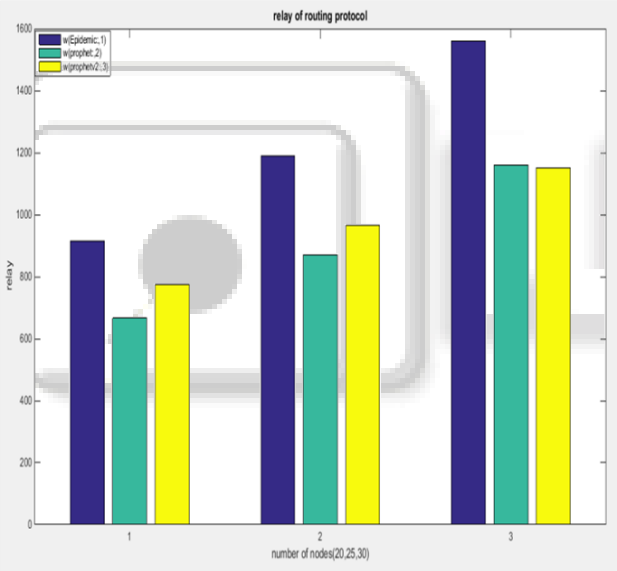

Fig. 3: Shows Comparison of number of nodes and drop relay routing protocols

Figure 3. Shows the relay routing for different values of routing protocols. The relay of routing shows the proposed protocol is better from prophet when no. of nodes is 20. But when increase in number of nodes prophet and prophetv2 the relay of routing is bitter difference. As the number of nodes increases the relay of proposed protocol also improved.

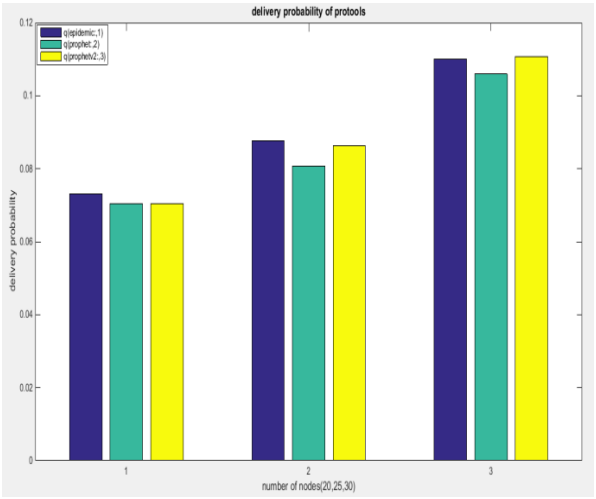

Fig. 4: Shows Comparison of number of nodes and delivery probability routing protocols

Figure4. Shows the delivery probability for different values of routing protocols. The delivery_probability of the prophetv2 protocol is higher than the Epidemic, Prophet as the number of nodes increases. At 20 nodes the delivery prob of epidemic is slightly better than other protocol but as no. of nodes increases proposed prophetV2 is better from other protocol. As the number of nodes increases the delivery probability of proposed protocol also increases.

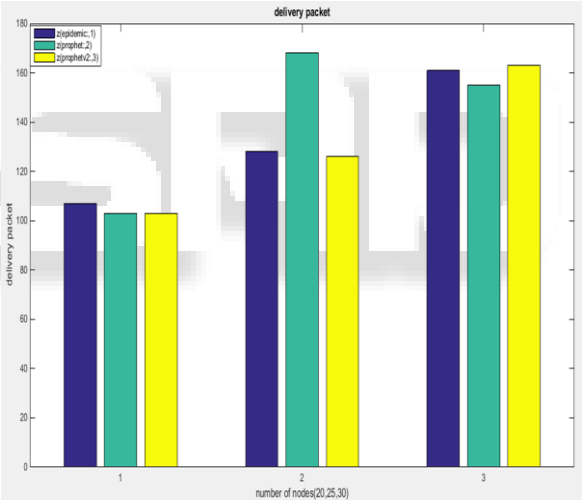

Fig. 5: Shows Comparison of number of nodes and delivery packet

Figure 5. Shows the delivery packet for different values of routing protocols. The delivery of maximum packets shows the message sending capability of the proposed protocol. The number of packets sent by the ProphetV2 protocol is better than PROPHET, and Epidemic routing protocols as no. of nodes increases. As the number of nodes increases the packet delivery of proposed protocol also increases.

VII. CONCLUSION

In this work, we have proposed an enhanced routing for the opportunistic networks and also performance evaluated across a performance range‟ values, in the comparison using Epidemic, PROPHET and PROPHETV2 routings. We have observed that the proposed enhanced routing is able to the meet out the issue of other different routing method for the networks opportunistic, particularly the information delivery and delay probability, when the context knowledge about

user is accessible or not. The current findings clearly indicate that the context-based forwarding is a most interesting communication method in the opportunistic networks; however, in flooding-based protocols comparison it is not appropriate. The current routing is able to provide improved outcome in the presence as well as context knowledge absence, particularly in term of data delivery and delay probability.

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