

# A Comparative Study of Delay-Tolerant Network And It's Various Methods

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**Abstract** - Currently the applications along with the research work on the domain of delay-tolerant network has now become very famous these days. Within the delay-tolerant-network there are few storage space is available in each node. Therefore in the absence of the links on the nodes the packets may be stored within the storage space. Delay-tolerant-network is capable to enable the services for communication within the unreachable and mostly in unfriendly areas. Actually the delay-tolerant-network forwarding-algorithms may route the traffic towards the specific nodes to increase the delivery rate and reduces the delays, whereas the traffic required raising these nodes that are now become not useful. In this paper, represent the review on the architecture of the delay-tolerant-network which is discovered at with the some features of the Delay-Tolerant-Mobile-Network routing=protocol within the delay-tolerant-network's problems.

**Keywords** - MANET, Delay, Tolerant, Power, Communication, etc.

## I. INTRODUCTION

Delay-tolerant-network is one of the approaches for the architecture of computer network which searches for referring the technical problems within the different types of networks which do not have the proper connectivity in network. The Delay-tolerant-network is basically introduced to perform efficiently within the long distance same as those networks that are found within the space of communication and within the inter-planetary range. One of the routing protocol of this concept is the store-carry-and-forward routing protocol which is applied within the delay-tolerant-network to direct the packets from one node to another. In order to resolve the issues, obe of the network architecture which is called as the Delay or Disruption-Tolerant-Networking [1, 2] have been introduced.

There are still various locations within this world where the connectivity is not reliable and may be unavailable also a requirement is there for the transfers of data from one node to another at those locations for example, for the processing of data which is collected through the various sensors or devices, in order to provide the basic communications like email.

The Delay-tolerant-networking is appears like to be the novel approach for complementing the communication which is available in the architecture in which the deployment costs are one of the prohibitive parameter. The communication-network may realize the straight-forwarding now a days, whereas it is very complicated

yet to send the data within the networks in the presence of the delay and the interruption. In order to prevent these problems, various researchers may have suggested several solutions for this. Though, these techniques are trying to refer the problem which is dependent on the basic protocols of network such that these models are not reliable in few cases that are result in the approach of delay-tolerant-network. A communications network that is capable of storing packets temporarily in intermediate nodes, until the time an end-to-end route is re-established or regenerated is known as a delay-tolerant-network or disruption tolerant networks such as delay-tolerant-network [3]. Delay-tolerant networking is an attempt to expand the reach of networks.

The delay-tolerant-network support the interoperability of the regional networks through managing various propagation delays in between or within the regional-networks and through translating in between the regional-network communication features. This is done through introducing in its layer structure a new layer called the Bundle layer on top of every region specific transport layer. [4] It is in this layer that the 'delay' is 'tolerated'.

In many studies and also according to many industrial experts, using vehicular networks for traffic safety and other commercial applications can reduce costs. Though, the delay-tolerant-network still has several problems to be resolved, such as how to enhance the delivery-rate and how to decrease the consumption of battery of

mobile nodes. Some protocols applied within delay-tolerant-network are Epidemic Routing and Spray and Wait. Within the epidemic-routing, also called as the infectious-routing, a node which may send the data by its copy to all the nodes to which it is connected. Merits of this type of routing are the delivery-rate which is high and the delay-time is less [5].

## II. DELAY IN NETWORK

Various emerging wireless-networks like the terrestrial networks that are connecting the mobile-wireless nodes, that are consisting of mobile phones, or wireless-sensor-networks within water or at land or some space-networks, like the Interplanetary Internet-Project [6] that do not ensure the Internet's consideration that are continuous or bidirectional end-to-End connection, the round-trips and the consistent-symmetric-data-rates in between one node to the another and the less error-rates at every connection [7]. These types of networks are classified as with the intermittent connections, with long or some variable-delay, having the asymmetric data-rates, or the high error-rates. Hence, the for connecting them with the Internet may need the interference of the service which may translate in between the incompatible type of networks features and that may offer a buffer space for the mismatched network-delays. The Delay-Tolerant Networking helps to address the above mentioned technical issues.

In delay-tolerant-network, the data from the source is relayed through mobile nodes to the destination. However, when the connection to other nodes is not available, the data is stored in the buffer. Once the mobile node travels into the transmission range of other nodes, the data in a buffer can be forwarded to the next hop. In this way, the packet can reach the destination by hopping over the mobile nodes even though the connection between the mobile nodes may not be always available.

This research targeted on applying the delay-tolerant-network to capture the information regarding the security of the user within the disaster locations where the mobile communication services are disturbed. Delay-tolerant-network may contain the mobile nodes of the users and the mobile nodes of the information holder and the shelter nodes. Here suggested the use of a bundle-layer protocol which is dependent on the receiver-triggered handshake-protocol. This type of protocol is purposed to prevent the network-congestion and decrease the consumption of battery and the usage of storage of the mobile nodes through restricting the bundles which are produced.

Because of Delay-tolerant-network constraints, security protocols are lacking for this type of network. The

constraints include bandwidth, memory size, battery life, processing power, and a lack of end-to-end routing tables. These constraints limit the utility of IA schemes and protocols used in traditional packet-switched networks. There are a number of different definitions and models for information assurance that involve a multitude of different attributes.

There are numerous architectures and routing protocols proposed for use in a Delay-tolerant-network [8]. They rightfully focus on the challenges associated with establishing and maintaining communication in a mobile ad hoc network where individual nodes cannot effectively maintain end-to-end routing. As nodes move through the network, a routing protocol attempts to quickly establish communication with those within broadcast

## III. DELAY TOLERANCE IN NETWORK

In Delay Tolerance in Network communication nodes do not have the default communication facilities and they move randomly. The characteristics of their energy and bandwidth are also constrained. Therefore, routing problem in Delay-tolerant-network is more complex than the traditional networks routing.

The research workgroup of delay-tolerant networks has been established as a part of the Internet research workgroup, the purpose of which is to specify protocol design rules and architecture needed for delay-tolerant networks that can easily work in the environments in which permanent connections are not available. In order to optimize network efficiency, routing algorithm must select the appropriate contact based on the next step and determined transport time.

When no connection is available, the message received from higher layers is kept in Bundle layer to set a proper contact or, finally, the message is discarded. Considering the main nature of delay-tolerant networks and unavailability of permanent connections, increasing packet delivery rate and reducing final delay are among the main goals of routing algorithms.

Epidemic Routing [9] is also called an infectious-routing where the transmission nodes may send the bundles to all relay-nodes which is connected in the network. This enhances the probability along with the bundle that reaches their destination node, which is resulting in the high delivery-rate. And the down-side is that the sending of the bundles may generates the network-congestion. Additionally, each time the node is get connected along with the relay-node and then it transmits the data, it also utilizes their battery, that is important at the disaster conditions.

In the Spray and Wait [10] algorithm the enhanced version of epidemic-routing is used. Within this type of algorithm the terminals are not sharing the replicant to every other node but an approximate amount of nodes are got chosen at which the source terminal may send the message. Two phases are there within this technique these are spray and wait. Within spray phase, source-node may duplicate the message at the several nodes and then those several nodes may again send the message to various relay-nodes.

Within the Direct Contact [11] routing algorithm, the source node will directly forward the bundle to the destination node. The source node first creates the bundle and then waits for the destination node. As the algorithm does not require any information about the network so it falls in the category of flooding based routing.

#### IV. LITERATURE REVIEW

In this paper [12], suggested an effective content-sharing approach for the Smartphone-based delay-tolerant-networks. Here tried to use the benefits of current Smart-phones which is having the availability of various localization along with the communication approaches that are appropriately create the accurate protocol. Within the designing of the content-sharing algorithm, mainly targeted on the two points first is the people can wondering at the meaningful locations and their mobility is anticipated. Dependent on this type of proposition, introduced the mobility-learning and the prediction-algorithm to estimate the function. Hence, the traditional approaches that are suggested here for sharing approach never needed the contact history. In this mentioned that the contents are by default have the geographical and the temporal type of validity.

Within this paper [13], suggested the routing problem of the delay-tolerant-networks that was analyzed and the latest routing approach was suggested which is dependent on the epidemic-routing. Through the combination of the benefit of the various related routing approach, like the Limited-Multi-copy Optimal-Path-Hybrid-Routing have been placed forward which is belongs to the transmitting of the message approach. Here one of the optimal tree-mixed strategies which are dependent on the priority has been also suggested for message sharing.

And, this type of strategy applied the priority-based cache-management approach which was suggested that the mentioned approach may provide the guarantee that the high message delivery-rate will be obtained by this approach and also decreased the consumptions of node's energy.

Within this paper [14], described that the delivery of the message never provides the guarantee of 100 percent since neither here any constant path is there nor the networks obeys the homogeneous rules. The nodes in this area move up and down continuously therefore the pre-estimated approach is never performs as reliable. In this the Monitor-Incorporated-Adaptive delay-tolerant-network has been suggested to satisfy this type of issues in delay-tolerant-network. Monitor-Incorporated-Adaptive delay-tolerant-network has some extra nodes which are referred as the monitor-nodes those are only used to estimate the performance of each node and then allocate the performance associated value to each node. This type of value is used during the routing that has been explained extensively in this paper.

Here in this paper [15] Vehicular Delay-Tolerant-Network approach is suggested, in which no direct end-to-end link is there in between the source node and the destination node. Here the traffic of source node sends the data to the mobile router then this mobile-router within the vehicle may receive the data and then stores it in the buffer space. Then the vehicle may move when it is within the range of transmission, then the data within the buffer is transmitted to the base station. And the buffer-management along with its queuing approach got suggested here to observe the performances of the mobile router within the vehicular delay-tolerant-network. Hence, the sources of traffic have been non-cooperatively enhances their transmission approaches to obtained the high utility. This type of queuing approach estimation is useful to analyze the performance along with the behavior of the VDTN.

In this paper [16] the main objective is to offer a mechanism through which an intrinsic message ferrying-capability can be obtained. Here first analyzed the use of the message-ferries which is mobile generalization of a well-defined application of the linked dominating set-based-routing within the wireless networks then next assumed the issue of recognizing the set of the nodes within a mobile-network that may perform as the message-ferries by the virtue of mobility-pattern. In order to get the final output here described the approach of the connected-message-ferry-dominating-set in a way that it obtained the delivery of data in a specific performance limits. The general CMFDS algorithm is built around a core algorithm that determines whether a single node in the network can act as a ferry.

In this paper [17] describes the delay-tolerant-network faces from issue like frequent network dis-connectivity and various routing issues. In this paper suggested the transmission caused a failure because of these issues. So the available system may introduce an iTrust approach

to find out the malignant nodes which slow down the transmission speed. Hence this type of detection approach may work at the specific probability along with the reputation to decrease the cost also to confirm their security. This suggested approach provides the delay-tolerant-network into the form of clusters then applied the similar detection approach which may build the network effective more as compare to the available system through decreasing the traffic load, energy and time consumption though enhancing the lifetime of delay-tolerant-network.

Within this paper [18] described the issue of reducing the cost of remote communication for the multi-cast within delay-tolerant-network. This formulation manages the actual conditions within which the source of data is regularly get updated and the nodes are required to obtain the current versions of the data. Here observed the issue within the situation of the scheduled trajectories and the known traffic which is needed and the suggested solution is dependent on the novel-graph-indexing-system. Here also represent an adaptive enhancement that may perform with the restricted information of the mobility of node. This approach may decrease the space of search apparently along with finding the best solution within the given time. In this the result of experimental observation on the huge, real and the synthetic data-sets represents that the suggested approach is completed within less than the 10 seconds over the data-sets along with the millions of occurrences along with an enhancement of 100 times than the traditional mechanisms.

## V. CONCLUSION

In this paper described the delay-tolerant-networks that are with the extreme analysis for their several types of routing algorithms along with the domain of their applicability. Several routing-algorithms have been analyzed and the epidemic and spray & wait routing protocols have been described in this paper. Every algorithm may have some merits and demerits. This algorithm is dependent on the flooding that has the best delivery rate whereas it utilized the various resources than the forwarding based approaches. The described algorithms that are used for the routing-protocols within delay-tolerant-network are not bound only to the algorithms that are described within this paper. The previous routing-protocols within delay-tolerant-network are categorized as on their techniques for controlling the message copies then building the forwarding decision. Here it is concluded that the based on the various existing literatures on this domain this approach may provide the best way for the high delivery rate with lowering the consumption of energy of node.

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