Elimination Of Redundant Data using user Centric Data in Delay Tolerant Network

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Abstract

In disruption delay tolerant networks communication is possible even if end to end connectivity is never achievable by using store and carry forward fashion. In this system it uses node by node custody transfer. If a message is lost and custody is not acknowledged by next node then last custodian retransmits the message. In this paper, propose an efficient scheme that ensures appropriate NCL selection based on probabilistic selection metric. Dynamic shortest path routing algorithm is used to find the path advance to minimize the average access delay. NCL reduces the use of wide area bandwidth.
Keywords: DTN, NCL, DSPR

I. Introduction

In wireless sensor network at intermittent connection loss of data during the transmission. To solve this issue delay tolerant network is imported. Delay Tolerant Networking (DTN) is an approach to computer network architecture aims to address the technical issues in heterogeneous networks that experience lack of continuous network connectivity. Delay Tolerant Networks (DTNs) enable data transfer when mobile nodes are only intermittently connected. Since the connectivity is not expected to be consistent in DTN, it employs what is called a store-carry-and-forward routing mechanism. In this, the intermediate mobile nodes carry data packets when they receive it and forward it to the next node as and when contact is established. As DTN depends on mobile nodes to carry data, the performance of routing the data solely depends on whether the nodes come in contact with each other or not.

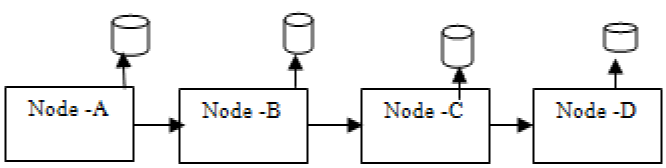

Fig. 1: Store and Forward Approach

Delay tolerant networks (DTNs) represent a wireless systems that virtually need minimum to none infrastructure and would support the functionality of networks experiencing frequent and long lasting then partitions. The routing problem in a DTN is the topology is assumed to be connected and the objective of the routing algorithm is to find the best currently-available path to move traffic end-to-end. In a DTN, however, an end-to- end path may be unavailable at all times; routing is performed over time to achieve eventual delivery by employing long-term storage at the intermediate nodes. The DTN routing problem amounts to a constrained optimization problem where edges may be unavailable for extended periods of time and a storage constraint exists at each node.

In this paper, two algorithms adapted are (1) network central locations used to reduce the data copies (2) dynamic shortest path routing algorithms finding the shortest path to increase the efficient for data access.

II. Related work

In Delay tolerant network the data are forwarded through opportunistic contacts, hence the data query and reply takes the different route. Due to these it need longer time to be replied to the requester. Several techniques are investigated to calculate the nodes to forward the message during intermittent connection. In [4] the data is forwarded by computing the frequency of connection and select the highest frequency node is the next node to forward the data. Message drop is reduced in this technique but high frequency value of message not have enough buffer space to carry it then no transmission will occur.

However these techniques are not reduces the redundancy of multiple data copies for same message. In this regard implement the NCL to eliminate the redundancy of data copy and dynamic programming algorithm used for reducing the data transmission delay.

III. Overview

A common technique used to improve data access performance is caching, i.e., to cache data at appropriate network locations based on query history, so that queries in the future can be responded with less delay. Due to these the average inter-contact time in the network is reduced and enables efficient access on data with shorter lifetime. Then the ratio of data access is reduced.
The basic solution to improve caching performance in

DTNs are to restrain the scope of nodes being involved for caching. Instead of being incidentally cached “anywhere,” data are intentionally cached only at specific nodes. These nodes are carefully selected to ensure data accessibility, and constraining the scope of caching locations reduces the complexity of maintaining query history and making caching decision

IV. Network central location

A. NCL Selection:

In general, network requires information about pair wise node contact rates and shortest path among nodes to calculate metric values of node. But in DTN network due to lack of end to end network connectivity it focuses on assumption of complete network information.

The NCL selection is based on a probabilistic selection metric. This metric value is calculated on the basis of history of encounters between nodes or history of their visit to certain location. The calculated metric value is broadcast to the entire network. Each node receives this value then selects the central node which is the highest metric value.

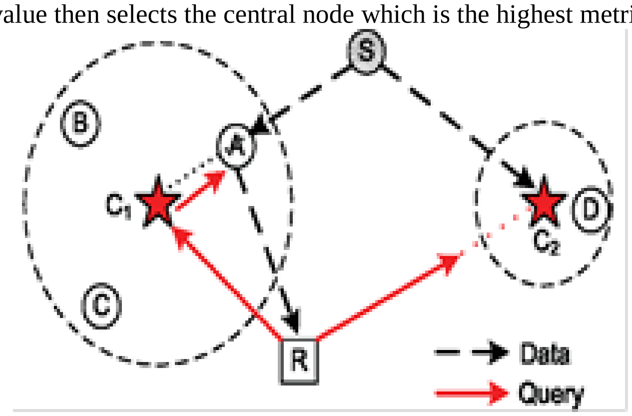

Fig. 2: The Big Picture of Intentional Caching

In the Fig. 2, the central nodes C1 and C2 are prioritized to cache the data. If the buffer of C1 is full, data are cached at A rather than C2 because A is closest to the receiver. Hence the data accessing delay is reduced. To improve caching performance in DTN the datas are cached at only specific nodes instead of anywhere nodes.

B. Caching Scheme:

The central node NCL is act as a cooperative caching scheme which allows sharing and coordination of cached data among mobile nodes. When a requester generates the query it pushes toward NCL which can be promptly accessed by other nodes. The NCL immediately replies to the requester with data if it is cached locally. Otherwise it broadcast to the nodes nearby. If the query expires then query broadcast is finished.

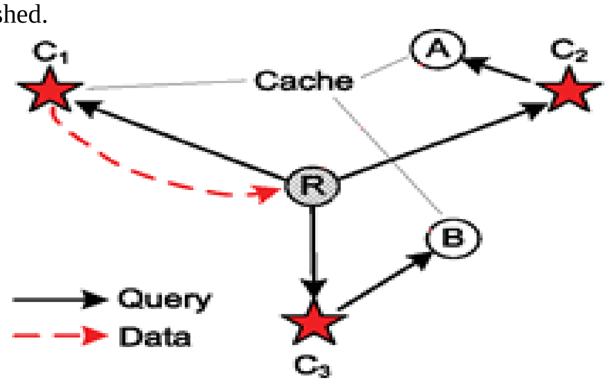

Fig. 3: Pulling Data from the Ncls

This process is illustrated in Fig 3. While requester R broadcast the query to the central nodes. The node C1 replies immediately if it is cached locally. Otherwise it broad cast to other nodes. To save the large amount of cache space it avoids the data to cache if all request of data from the same node.

C. Selecting New Central Node:

When the central node fails the new central nodes is selected based on the highest NCL metric value among the current non central nodes in the network

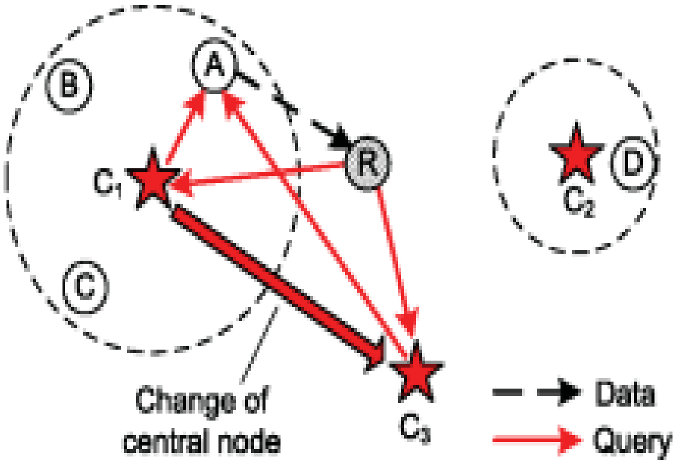

Fig. 4: New NCL Selection

The Fig 4. Shows the central node C1 gets fails then the function is taken by C3. But it is far away from the requester the node which have highest metric value near to the requester node A is selected as central node instead of C1.If it is unable to detect the highest metric value node due to the sudden failure then the one of the contact node which have maximum battery life as its backup and synchronizes this node with all information. That is when the node get suddenly fails this backup is responsible for selecting new central node.

V. PATH FIND

In a standard network, since the nodes are connected most of the time, the routing protocol forwards the packets in a simple way. The cost of links between nodes are mostly known or easily estimated so that the routing protocol computes the best path to the destination in terms of cost and tries to send the packets over this path. Furthermore, the packet is only sent to a single node because the reliability of paths is assumed relatively high and mostly the packets are successfully delivered. However, in DTN like networks, routing becomes challenging because the nodes are mobile and connectivity is rarely maintained.

The transient network connectivity needs to be of primary concern in the design of routing algorithms for DTNs. Therefore, routing of the packets is based on store-carry-and-forward paradigm. Moreover, even a node meets with another node, it should carefully decide on whether to forward its message to that node. It is obvious that to forward a message to multiple nodes increases the delivery probability of a message. However, this may not be the right choice because it can cause a huge messaging overhead in the network which then causes redundant energy and resource consumption. Consequently, it is clearly seen that there is a tradeoff between the message delivery ratio and the energy consumption and delivery delay in the network. Hence, the dynamic programming algorithm is used to find the path in the network. These algorithms use the meeting history of nodes (which can be obtained locally through encounters with other nodes) and forward the messages over different paths in a nondeterministic manner. It follows the method to break down the problems into sub problems. It solves the different parts of sub problem and combines the solution of sub problems to get the overall solution. It solves each sub problem only once and it reduces the number of computation. The solution of sub problem is memorized next time same solution is used when it is needed. According to this the central node is responsible to communicate with all other nodes and collect the information about the history of nodes. This information is stored for finding the shortest path at each node. That is, for shortest path based DTN routing algorithms, use conditional intermeeting times rather than standard intermeeting times and route the messages over conditional shortest paths.

VI. SYSTEM DESIGN

A. Proposed Approach:

The network central nodes play vital roles in cooperative caching in DTNs. First, the central nodes cache the most popular data in the network and respond to the frequent queries for these data. Second, the central nodes are also responsible for broadcasting all the queries they receive to other caching nodes nearby. However, such functionality may quickly consume the local resources of central nodes that include their battery life and local memory. After caching the node at central the dynamic programming approach is used to find the shortest path by considering three parts: 1) the time for query to be transmitted from requester to central nodes; 2) the time for central nodes to broadcast query to caching nodes; 3) the time for the cached data to be returned to requester. This timing information is memorized for future use to predict shortest path easily.

B. System Architecture:

The major part of the project development sector considers and fully survey all the required needs for developing the project. System architecture is the conceptual model that defines the structure, behavior, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system.

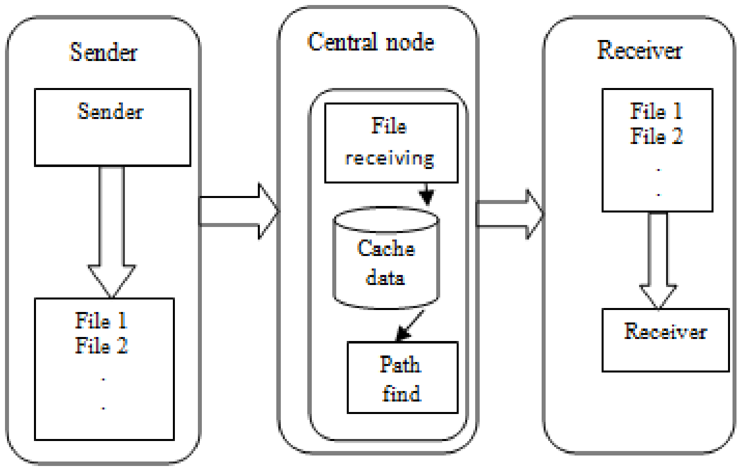

Fig. 5: System Architecture

C. Advantages of Proposed System:

This scheme greatly improves the ratio of queries satisfied and reduces data access delay and performance. When time is large, indicating long inter-contact time among mobile nodes in the network, this experimental setup increases the data lifetime accordingly.

VII. CONCLUSION

Delay Tolerant Networks will form one of the most important facets of modern day networking, given the necessity of connectivity. Bur it's routing and redundancy of data copy appears to be a rich and challenging problem. Routing requires techniques to select paths, schedule transmissions, estimate delivery performance, and manage buffers. The basic idea is intentionally cache data at a NCL which can be easily accessed by other nodes. This approach allows to cache data only at specific nodes to ensure data accessbilityand reduces the complexity of maintaining query history and making caching decision. Dynamic programming algorithm prioritizes the popular data with higher utility during the caching decision to discover the best shortest path in the network.

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