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RELIABLE TOPOLOGY DESIGN IN MULTI DELAY TOLERANT NETWORKS USING FLOYD ALGORITHM

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ABSTRACT

Mobile Computing is a technology that allows transmission of data, voice and video via a computer or any other wireless enabled device without having to be connected to a fixed physical link. The main concept involves: Mobile communication, Mobile hardware, and Mobile software. As the heterogeneous network develops rapidly in the current dynamic world, it is essential to improvise Delay Tolerant Networks. So, Delay tolerant networks (DTNs) recently have drawn much attention from researchers due to their wide applications in various challenging environments. Previous DTN research mainly concentrates on information propagation and packet delivery. However, with possible participation of a large number of mobile devices, how to maintain efficient and dynamic topology becomes crucial. The proposed system handles the multiple path propagation using flooding routing method and it allows limited number of copies of a message to a certain nodes. Floyd algorithm is a shortest path between the sender and receiver. Blowfish algorithm is the best encryption algorithm for encryption process. SHA1 is to identify the attacker between the encryption and decryption. This approach is the best suited for multi propagation in DTNs to reduce the total cost, maintain reliable connectivity over a time period.

Keywords - Reliability, Blowfish algorithm, Floyd algorithm, SHA-1 algorithm, Delay tolerant network.

I INTRODUCTION

DELAY or disruption tolerant networks (DTNs) have been used for a wide range of applications to provide robust data communications in challenging environments, such as pocket switched networks, vehicular ad hoc networks, mobile sensor networks, mobile social networks, disaster-relief networks, or space communication networks. In DTNs, the lack of continuous connectivity, network partitioning, long delays, unreliable time-varying links, and dynamic topology pose new challenges in design of DTN network protocols. Recently, many new routing schemes have been proposed for DTNs to take the intermittent connectivity and time-varying topology into consideration. In addition, different mobility studies and graph modeling have been conducted for DTNs to understand

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the underlying social and temporal characteristics of the network participants. However, there is little research on how to maintain a cost-efficient and reliable topology of time-evolving DTNs.

Network topology is always a key functional issue to the design of any network system. For different network applications, network topology can be designed or controlled. Under various objectives (such as power efficiency, fault tolerance, and throughput maximization). Topology control protocols have been well studied in wireless networks, especially, wireless ad hoc and sensor networks. Christo Ananth et al. [6] discussed about a method, End-to-end inference to diagnose and repair the data-forwarding failures, our optimization goal to minimize the faults at minimum expected cost of correcting all faulty nodes that cannot properly deliver data. First checking the nodes that has the least checking cost does not minimize the expected costin fault localization. We construct a potential function for identifying the candidate nodes, one of which should be first checked by an optimal strategy. We proposes efficient inferring approach to the node to be checked in large-scale networks**.** DTNs often evolve over time: changes of network topology can occur if nodes move around.

The node mobility and the evolution of topology are heavily dependent on social and temporal characteristics of the network participants. For certain type of networks, the temporal characteristics of topology could be known a priori or can be predicted from historical tracing data. For example, it is easy to discover the temporal patterns of topology for a DTN formed by either public buses or satellites which have fixed tours and schedules, or a mobile social network consisting of students who share fixed class schedules. A recent study also shows that human mobility model can achieve a 93% potential predictability. For this kind of time-evolving and predictable DTNs, the space-time graph model, instead of the static graph model, can be used to capture both the space and time dimensions of the dynamic network topology and to enable the emulation of any "store-and-forward" DTN routing methods. Given such a space-time graph including all possible temporal and special links, the topology design.

- Malicious nodes injects corrupted blocks
- Failure to decode original blocks
- Security vulnerability in network coding
- Unreliable data transmission
- Less security of transmitted data

Some classical theoretical results, although provide important insights, would be difficult to apply in practice since they require the knowledge of the network topology during code construction, and require the link failures to follow certain predefined pattern for the code to be reliable. In practice, however, a content distribution network can be very dynamic in terms of the topology, membership, and failures existing some other problem.Our major contributions are summarized as follows: We formally define the reliable topology design problem which aims to build a sparser structure (also a space-time graph) from the original space-time graph such that for any pair of devices, there is a space time path connecting them with the reliability higher than a required threshold; the total cost of the structure is minimized.

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II RELATED WORK

2.1 Delay Tolerant Networks

Existing research in DTNs mainly focuses on routing. Most of the existing schemes adopt the "store and forward" strategy, in which nodes store the packets in their buffers if there is no opportunity for message forwarding and wait for future opportunities. Then the key problem is how to select appropriate relay nodes for message forwarding during encounters. Two types of solutionsare used in DTN routing: single-copy or flooding based. In single-copy DTN routing, there is only one copy of each message in the network at any time so that the resulting propagation path of a message is a single path from thesource to the destination. To make the right routing decision (i.e., picking the right relay at each step), a good metric to measure the ability of nodes to deliver the message is essential. Existing methods use metrics obtained from historicalencounter information, mobility information, or social properties.

2.2 Time-Evolving Networks

Modelling the time-evolving networks has been studied in both mobile ad hoc networks and DTNs Xuan et al. first study routing problem in a fixed schedule dynamic network modelled by an evolving graph (i.e., an indexed sequence of sub graphs of a given graph). Then, also use evolving graphs to evaluate various ad hoc and DTN routing protocols. Shashidhar et al. Study the routing problem in a space-time graph. Liu and Wu also model a cyclic mobispace as a probabilistic space-time graph in which an edge between two nodes contains a set of discretized probabilistic contacts. All of these works only focus on the routing problem in the dynamic networks modelled by either evolving graphs or space-time graphs, and they usually aim to deliver the messages to their destinations. In this paper, we investigate the topology design problem in these networks with a different focus on the cost efficiency of the network topologies.

2.3 Topology Design

Topology design (or topology control) has drawn a significant amount of research interests in wireless ad hoc and sensor networks. Primary topology design algorithms aim to maintain network connectivity and conserve energy. All existing methods deal with topology changes by re-performing the construction algorithm. Fortunately, most of the algorithms are localized, thus the update cost is not expensive. However, all methods assume that the underlying communication graph is fully connected at any time and they do not consider the time domain knowledge of network evolution. The most relevant work with this study is our recent study where we consider the basic topology design problem of reliable space-time graphs for either connectivity or spanner property. The proposed methods there assume that all links are reliable and the prediction of future links is perfect. In this paper, we remove such unrealistic assumption by considering the probability of link reliability. Notice that Liu et al. have studied topology control over unreliable sensor networks. However,their study only considers the problem for a static sensor network without any time dimension dynamic. To our best knowledge, this paper is the first attempt to study topology design for time-evolving networks with unreliable links. We believe that topology can be controlled more wisely and efficiently if the network evolution over time is considered.

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2.4Floyd's algorithm (Shortest path finding algorithms)

The algorithm is also known as Floyd's algorithm, the Roy–Warshall algorithm, the Roy–Floyd algorithm, or the WFI algorithm.The Floyd algorithm compares all possible paths through the graph between each pair of vertices. It is able to do this with $\Theta(|V|^3)$ comparisons in a graph. This is remarkable considering that there may be up to $\Omega(|V|^2)$ edges in the graph, and every combination of edges is tested. It does so by incrementally improving an estimate on the shortest path between two vertices, until the estimate is optimal.Consider a graph G with vertices V numbered 1 through N. Further consider a function shortest Path(i, j, k) that returns the shortest possible path from i to j using vertices only from the set {1,2,...,k} as intermediate points along the way. Now, given this function, our goal is to find the shortest path from each i to each j using only vertices 1 to $k + 1$.

For each of these pairs of vertices, the true shortest path could be either

(1) a path that only uses vertices in the set {1, ..., k}

Or

(2) a path that goes from i to $k + 1$ and then from $k + 1$ to j.

We know that the best path from i to j that only uses vertices 1 through k is defined by shortest Path(i, j, k), and it is clear that if there were a better path from i to $k + 1$ to j, then the length of this path would be the concatenation of the shortest path from i to $k + 1$ (using vertices in {1, ..., k}) and the shortest path from {$k + 1$} to j (also using vertices in {1, ..., k}).

If $w(i, j)$ is the weight of the edge between vertices i and j, we can define shortestPath(i, j, $k + 1$) in terms of the following recursive formula: the base case is

shortestPath(i, j, 0) = $w(i, j)$

and the recursive case is

shortestPath(i,j,k+1) = min(shortestPath(i,j,k), shortestPath(i,k+1,k) + shortestPath(k+1,j,k))

This formula is the heart of the Floyd's algorithm. The algorithm works by first computing shortestPath(i, j, k) for all (i, j) pairs for $k = 1$, then $k = 2$, etc. This process continues until $k = N$, and we have found the shortest path for all (i, j) pairs using any intermediate vertices. Pseudo code for this basic version follows:

1) let dist be a |V| × |V| array of minimum distances initialized to ∞ (infinity)
2) for each vertex v
3) dist[v][v] ← 0
4) for each edge (u,v)
5) dist[u][v] ← w(u,v) *// the weight of the edge* (u,v)
6) for$k$from 1 to |V|
7) for$i$from 1 to |V|
8) for$j$from 1 to |V|
9) ifdist[i][j] >dist[i][k] + dist[k][j]
10) dist[i][j] ← dist[i][k] + dist[k][j]
11) end if

A. Example

The algorithm above is executed on the graph on the left below:

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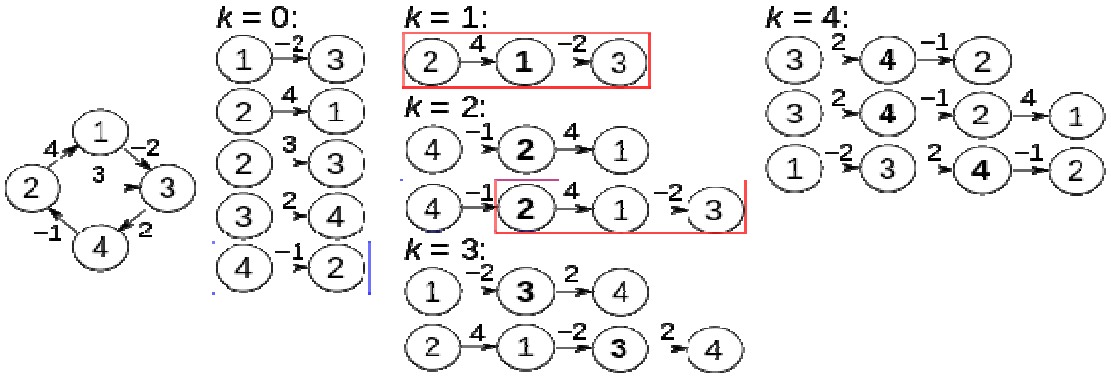

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Prior to the first iteration of the outer loop, labeled *k*=0 above, the only known paths correspond to the single edges in the graph. At k=1, paths that go through the vertex 1 are found: in particular, the path [2,1,3] is found, replacing the path [2,3] which has fewer edges but is longer (in terms of weight). At k=2, paths going through the vertices {1,2} are found. The red and blue boxes show how the path [4,2,1,3] is assembled from the two known paths [4,2] and [2,1,3] encountered in previous iterations, with 2 in the intersection. The path [4,2,3] is not considered, because [2,1,3] is the shortest path encountered so far from 2 to 3. At k=3, paths going through the vertices {1,2,3} arefound. Finally, at k=4, all shortest paths are found.

III PROPOSED METHOD

Allowing multiple path propagation by flooding multiple messages in DTNs can significantly improve the chances of successful delivery. The simplest flooding routing method is epidemic routing where a copy of the message is given to every encountered node. However, such approach suffers from large overheads. To overcome this issue, some flooding-based routing methods (such as Spray & Wait or Select & Spray) limit the number of copies of a message to a certain constant or the possible relays to certain nodes. Recently, there are also studies on how to maximize information propagation in DTNs via flooding and how to deploy additional throw boxes to assist the message delivery in DTN. Here we have used for finding the shortest distance from the sender to receiver Floyd algorithm. here for the security purpose we are using Blowfish algorithm so, the original data(plain text) will be converted into encrypted data(cipher text) 16-bit key used for encryption and decryption the attacker cannot able to attack the data without knowing the secrete key and for key generation we are using SHA-1(Secure HashAlgorithm-1).

The bellow system architecture is going to propose the multicast communication using Floyds Algorithm. In this system using a shortest path algorithm 1 for generating a key value with security purpose. Blowfish algorithm is using to encrypt the downloaded data.

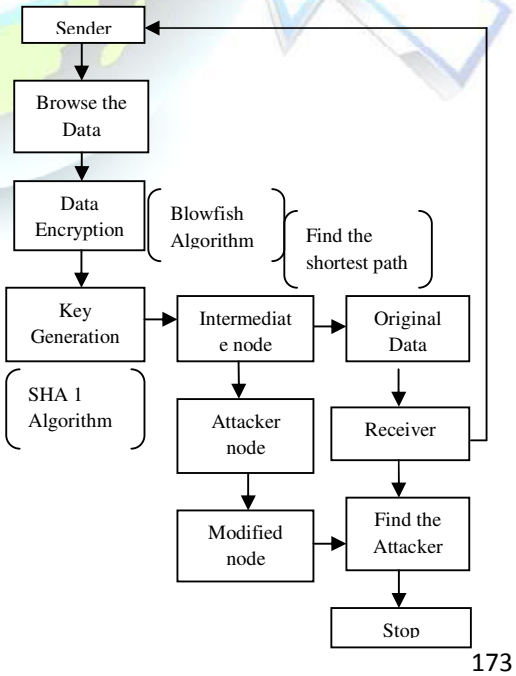

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Figure 1: Proposed system

The flow shows the Delay tolerance networking site implementation for the demonstrative purpose to understand the proposed system. The user login to the network, his act of adding friends and sharing photo but in a regulated manner.The main modules of the proposed application are

- Connection Establishment between terminals
- DTN topology
- Cryptographic operations
- TCP level improvement
- Acyclic random graph

3.1 Connection Establishment between terminals:

- The server instantiates a ServerSocket object, denoting which port number communication is to occur on.
- The server invokes the accept() method of the ServerSocket class. This method waits until a client connects to the server on the given port.
- After the server is waiting, a client instantiates a Socket object, specifying the server name and port number to connect to.
- The constructor of the Socket class attempts to connect the client to the specified server and port number. If communication is established, the client now has a Socket object capable of communicating with the server.
- On the server side, the accept() method returns a reference to a new socket on the server that is connected to the client's socket.

3.2 DTN topology:

DTNs to take the intermittent connectivity and time-varying topology into consideration. DTNs mainly focuses on routing .nodes store the packets in their buffers if there is no opportunity for message forwarding and wait for future opportunities. Then the key problem is how to select appropriate relay nodes for message forwarding during encounters. Two types of solutions are used in DTN routing: single-copy or flooding based. In single-copy DTN routing, there is only one copy of each message in the network at any time so that the resulting propagation path of a message is a single path from the source to the destination. To make the right routing decision (i.e., picking the right relay at each step), a good metric to measure the ability of nodes to deliver the message is essential.

3.3 Cryptographic operations:

In this module we have done the encryption and decryption techniques from this method the data will be highly secure so, have used the AES encryption techniques. As a cipher, AES has proven reliable. The only successful attacks against it have been side-channel attacks on weaknesses found in the implementation or key management of certain AES based encryption products. AES allows for three different key lengths: 128, 192, or 256 bits. And hash key

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generation also used for unique identification purpose.

3.4 TCP level improvement:

We consider is the TPC level improvement in the wireless networks as explained in the above module. In this case, we test our proposed algorithm on a Acyclic random graph, and we show that the general framework can be applied also to this case, resulting in very close-to-optimal results.

3.5 Acyclic random graph:

Acyclic random graph is a directed graph with no directed graph. It is formed by a collection of vertices and directed edge, each edge connecting one vertex to another, such that there is no way to start at some vertex and follow a sequence of edges that eventually loops back to again. Acyclic is an adjective used to describe a graph in which there is no cycle, or closed path. In other words, it is a path with no repeated vertices (nodes that form the graph, or links between vertices). In computer science, it is used in the phrase "directed acyclic graph" (DAG). Technically, DAG is a graph formed by connecting different vertices with edges that are directed in a manner that does not allow navigating through a sequence that can have a vertex passing through it more than twice; therefore, there is no closed path.

IV PERFORMANCE ANALYSIS

The performance of the proposed work is studied by constructing a similar Delay tolerance networking platform and the working is studied in terms of security. Then the proposed technique is adopted by the networking traffic platform. This platform requires Windows XP operating system over the Net Beans 6.8 IDE. The application is designed in Java language with MySQL database. The resulting screenshots are provided to strengthen the solutions described in the proposed work.The hardware requirement of the proposed study a Pentium IV computer system with 1.4GHz processor speed, 80 GB harddisk, 1GB RAM, 15VGA color monitor, mouse and a keyboard. In the following screenshots, the proposed system is well illustrated for better understanding on privacy preservation for the users of social networking sites.

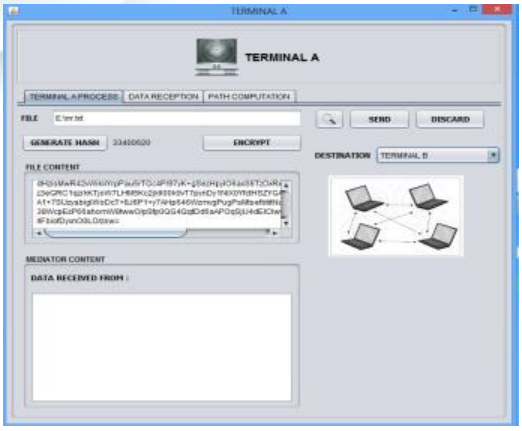

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Figure 2 and 3: File upload and key generation

This proposed work presented the networking traffic condition, in design just open to design of the method and it will file chosen window Fig 2 and fig 3 file choose encrypted to the file and it will be key generation.

Figure 4 and 5: Illustration and Intermediate level

Fig 4 illustrates the possibility of duration of the networking traffic. It will be shortest path will be calculated, and it will be policy on the method of the intrusion level will be calculate If the node of the intermediated of the node by node share the networking part. Then the proposed work verifies the policies verified to the sender to receiver. Fig 5 in the node will be pass the method just intermediated to the possible way of the method additionally packet dropping activity and other malware activity should analysis incase data not forward means sender will be wait on the acknowledgement. We will be choose on different path.

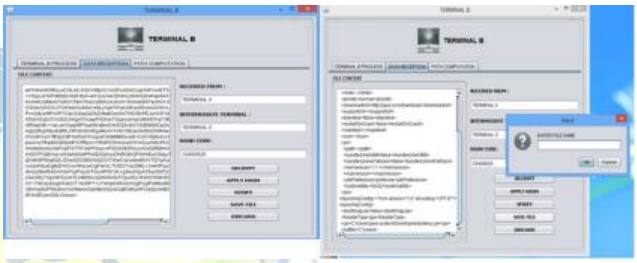

Figure 6: Verification

A better secure communication, Secure data aggregation, Cost for transferring data will be very low. Resilience against node capture

Figure 7: Execute the result

The advantages of the proposed system includes,

- Maximum throughput
- Robustness to link failures

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- Integrity of transmitted data is consistently maintained
- Shorter buffering delays
- Minimal bandwidth

V CONCLUSION AND FUTURE WORK

Reliable topology design problem in a predictable time-evolving DTN with unreliable links modeled by a probabilistic space-time graph. We first show that it is NP hard, then propose a set of heuristics which can significantly reduce the cost of topology while maintain the connectivity and reliability of paths over time. Simulation results from random networks,a synthetic space DTN, and real-world tracing data demonstrate the efficiency of our methods. We believe that this paper presents the first step in exploiting topology design for time-evolving DTNs with unreliable links. The topology design problem defined in this paper and our proposed algorithms have several limitations and weaknesses. in our problem, the connectivity and reliability are only considered for a fixed time period T we still assume that the predictions of future links and their reliabilities are feasible, which limit the application of this problem to certain DTNs; here we mainly consider the connectivity and reliability of the constructed topology, however, removing links may hurt the performance of communication protocols. In our project they detect the attacker node or malicious node in the network in the future work, will implemented the identified node and implement the eliminate the node from sender in the network.

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