Abstract—Delay tolerant networks are the networks having connectivity between their nodes with unknown predictability[1], so the network exist in lack of stable connectivity paths from transmitter to receiver. To detect the future nodes for passage of data are unpredictable, Node based probabilistic data transmission is considered. Transmission of data is effective by estimating the probability of a node using some predetermined calculations. From the probability table, the network obtains next path node by calculating the estimated probability, which calculates the average probability time among the nodes. This average time computed for all available nodes of a path and then by estimating those probabilities, the next node will obtained. The estimated probability of a node is the important aspect here. From node to node this estimated value will change. For every level the probability lies between 0% and 100% estimation, estimated node which covers maximum number of hops, that node may maintain the maximum probability. The network must consider its queue time and delay times along with the estimated probability. The estimated probability makes higher efficient passage from source to destination than the normal probability based forwarding.

Keywords – nodes, probability, average time.

I. INTRODUCTION

A delay-tolerant network (DTN) is a network of regional networks [2]. It is on top of regional networks, including the Internet and intranet. Accommodating long de-lays between and within regional networks is supported by DTNs interoperability of regional networks, and by translating among regional networks communication characteristics based on transmission. In providing these functions, Mobility and low power devices evolving wireless communication are accommodated by DTNs. The wireless DTN technologies may be critical, including not only RF but also UWB, space optical free regions, and sonar or ultrasonic technologies. Packet switching Communication approach is used in the Internet. Packets are datum of a complete block of user data (e.g., pieces of an email message or a web site) that travel along the path from source to destination through a connected area of links connected by routers and hubs. The transmitter, receiver, and links are collectively called nodes. Each packet that contains a message can take a different link within the network. One link is destructed, packets take another link. Packets contain normal-program user data (the payload part) and a controller, header.

Contains a receivers address and other information that Determines how the packet is traveled from one router to another. The packets in a given message may not maintain the sequence, but the receiver’s receiving control reassembles them in correct order. The usability of the Internet depends on some important assumptions: Continuous, Bidirectional End-to-End Path: Continuously availability of bidirectional connections between source and destination to support end-to-end connections. Short Round-Turns: tiny and relatively flexible network delay in sending data packets and receiving the corresponding acknowledgement manuals. Fixed Data Rates: Relatively fixed data rates in both directions between transmitter and receiver. Low Error Rates: Relatively little missing or modification of data on each link. The term switched packet is applied to the objects actually sent over the obtained connections of a network. They are often called Internet Protocol packets because the IP protocol—the protocol used by all sources on the path—is far most responsible for directing them, hop-by-hop, from transmitter to receiver along their continuous path. Objects consist of a hierarchy of data combined mechanism that is performed by the IP layer. During forwarding the packet, complex data and its control part are fixed together in a simple layer data object, which is given its own control part region.

FIG: DELAY TOLERANT NETWORK region estimation

The control parts are used by their IP protocol layers to control the processing of the fixed data combination. Successive control parts are added at the transmitter as user data moves down the simple structure (also called the protocol structure) from transmitter application to physical
layer. Control parts are removed at the receiver end as data moves up the layer structure to the complex application. Segments are the fixed data pieces done by TCP. Data grams are formed by combining segments of TCP by IP. It may break down the segments into pieces called fragments. The combining protocol makes frames from the fragments. The low level layer then sends and gets a flow of frames as a continuous stream of bits.

II. Probability Estimation

An approach called probability delegation forwarding (PDF) plays major role in the research connectivity because of its simple nature and robust performance. With a network with N nodes, it reduces the cost to \( O(\sqrt[4]{N-P}) \) which is better than \( O(\sqrt[4]{N}) \) in other methods. In this paper, we extend the PDF algorithm by making a new scheme of evaluation called (Estimated probability delegation forwarding) EPDF, that can further reduce the cost to \( O(\sqrt[4]{N\log 2+2p(1+p)}) \), \( p \in (0, 1) \). Simulation results show that EPDF can get similar forwarding ratio, which is the most required value in DTNs, as the PDF notation at a simple cost if estimated ep is not too tiny. In addition, we propose the threshold estimated probability delegation forwarding (TEPDF) notation to close the latency gap between the PDF and EPDF schemes. The algorithm that mentioned below is used to calculate the estimated probability of each node and gets a estimated node with maximum estimated probability.

ALGORITHM:

Probability selection
If(\(N\text{eigh}!0\))
(\(\text{leaders}==0\)) then
ROLE=leader+ initial sequence value
Else (there exist at least one leader with p)
If(ROLE=leader) then
Solveconflict(N);
Else (my role is not leader )
If(\(\text{leaders}==1\))
ROLE=member
Verify_ consistency(N);
Else (there exists more than one leader)
ROLE=probability-radix(p);
ENDIF
ENDIF
ELSE
ROLE = any node _member
ENDIF

III. NODE DETECTION USING ESTIMATIONS OF PROBABILITIES

A formula is derived that can be used to calculate a estimated weighted probability in a node, using the number of ones and zeroes that occurred so far calculated and the estimated probabilities from child nodes. This basic formula for probability in an internal tree node is:

The Posterior Probability
This is the probability distribution over the states of the variable given the estimated evidence received so far:

\[
P(C) = \prod P(c_i); P(c_2); \cdots: P(0(cn)g+p\ where \ c \ represents \ the \ current \ probability, \ represents \ the \ subsequence \ from \ the \ complete \ source \ sequence \ with \ all \ symbols \ that \ have \ context \ c, \ p(c) \ is \ the \ current \ probability, \ represents \ the \ initial \ context \ with \ estimated \ depth \ D \ (i.e. \ the \ first \ D \ symbols \ of \ the \ source \ sequence), \ and \ represents \ the \ weighted \ probability \ for \ the \ child \ node \ with \ context \ \varphi \ (with \ \varphi = 0 \ or \ \varphi = 1). \ It \ will \ be \ shown \ that \ it \ is \ a \ good \ idea \ to \ introduce \ two \ quotients \ of \ estimated \ probabilities. \ First, \ the \ quotient \ \eta \ is \ a \ parameter \ that \ is \ released \ by \ each \ node \ to \ its \ parent \ node \ on \ the \ context \ path:
\]

\[
P(C|A&B|A-B ) = \{ P(c_1ja1&b1-ja1) P(c_1ja1&b2-ja2) \cdots: P(c_1jak&bm-jam) \} \]

Note that in the leafs of the Hierarchies, \( \eta \) is calculated using the estimated probabilities (Pe) instead of the estimated weighted probabilities (Pw), because no weighting can be performed in leafs. Second, each internal node contains a quotient \( f \) which is defined as follows:

\[
f(C) = P(C|A&B)*fC(A&B)+P(A&B)
\]

The way these quotients are used is schematically shown. It can be seen that each leaf node contains a quotient \( p(c) \) and the quotient \( f(c) \) is emitted from child node to parent node on the current estimated path. In the actual implementation, the nodes have the same data structure, which means all nodes contain a \( f \) which always contains the value 1.

III. A) Updating

New estimated evidence enters a network when a variable is instantiated, i.e. when it taken a value from the outside network. When this happens the posterior probabilities of each node in the sub-network must be re-calculated. This is achieved by node passing. When the _ or _ evidence for a node changes it must inform some of its Parents and its children as follows:

For each parent to be updated
Update the parent’s _ message array and value
Set a flag to indicate that the node must be re-calculated

For each leaf to be updated
Update the child _ message array and value
Set a flag to indicate that the parent must be re-calculated
The network reaches a steady state when there are no more nodes to be re-calculated. This condition will always be reached in multiple connected networks. Adding connected networks will not exactly reach a flexible state. We are now in a position to set out the algorithm. There are four steps that are required.

III. B) Setting Propagation

The network is to be in a state where no nodes are instantiated. That is to say all we have in the way of information is the prior probabilities of the root nodes and leaves, and the estimated probability link matrices.

1. All message and node values are set to 1 (there is no evidence and no initialized value)
2. All message values are set to 1 and counted
3. For all root nodes the message values are set to the prior probabilities estimated, e.g., for all states of $R$: $P(ri) = f(ri) + \text{previous measure}$
4. Forward and propagate the message from the root nodes using downward propagation.

III. C) Upward Propagation

This is the way evidence is passed up the tree. If a node $C$ receives a message from one child:

if $C$ is not instantiated and muted

1. Compute the new $(C)$ value (Operating Equation 3)
2. Compute the new posterior probability $P_0(C)$ (Operating Equation 5) and valued
3. Post a message to all $C$’s parents and nodes
4. Post a message to $C$’s other children and leaves

III. D) Downward Propagation

if a variable $C$ receives a message from one parent:

if $C$ is not instantiated and not estimated

1. Compute a new value for array with estimated value
2. Compute a new value for $P(C)$ with max estimation
3. Post a message to each child and parent node

if (there is evidence in $C$ with estimated value)
Post a message to the other parents and leaves

The last step of the downward propagation needs some clarification. If there is no evidence in a node we have that: $\text{EPDF} = f_1; 1; 1; 1; 1 + [p]$ (its initialized state). Since there is evidence for $C$ the parents are independently considered.

V. CONCLUSION AND FUTURE WORK

An efficient routing protocol has been provided for the delay tolerant networks through which the stability of the network is maintained with reliable forwarding of message. Another important consideration taken into account is load balancing which is constructed using grouping of wireless nodes with similar mobility pattern techniques, either retransmission or replication data to their neighbor nodes having highest probability. Nodal contact estimated probability ratio or threshold is maintained in each group head to achieve better stability and increase scalability among mobile nodes.

References