International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075 (Online), Volume-8 Issue-12, October 2019

A Binary Feedback Schemes for Detecting Failure of Node in Mobile Wireless Network

P.Naga Priyanka, K.LakshmiNadh, S.Siva Nageswara Rao

Abstract: ***The network topology of association was always active but the association between them may not be always connected and properties are restricted. On the time there is a chance of node failures and detecting the node failure is important. Two node failure detection schemes are implemented which are binary and non-binary feedback schemes. These schemes unite locality estimation, localized monitoring and node association. These results are applicable to both attached and detached networks. The schemes accomplish high disappointment discovery rates, low forged positive rates, and low correspondence overhead.***

Index Terms: Wireless Network, Mobile Networks, Binary Feedback Scheme and Non-Binary Feedback Schemes.

I.INTRODUCTION

A Mobile Wireless Network is an hardware and software infrastructure allowing to connect wirelessly IT elements. Mobile wireless networks are dynamic in nature and they are used for search and salvage [1], location monitoring [2], [3], tragedy reprieve [4], and military operations [5]. Such mobile networks are classically formed in an unplanned way (i.e., ad-hoc way), with either persistent or intermittent network connectivity.

Nodes in the network may failed because of reasons like hardware equipment, environmental issues. It is important to keep monitoring the network regarding node failures.

Some of the mechanisms are identified; out of them one approach is based on centralized monitoring. In centralized monitoring node failures can be identified by using heartbeat messages. Periodically nodes in the network send some heartbeat messages to the central node [6], [7], [8]. This process only applicable to only persistence connectivity why because each and every node need to connect with central node in the network. This type of connections leads the network traffic busy and network may become large. Localized monitoring is an approach, where nodes broadcast heartbeat messages to their one-hop neighbors and heartbeat messages are used to monitor the neighborhood nodes presence. Localized monitoring was only applicable to fixed networks [9]. If it is applied to movable networks, localized monitoring may face some inherent ambiguities.

Revised Manuscript Received on October 30, 2019.
***** Correspondence Author
P.Naga Priyanka*, pursuing M.Tech(CSE), Narasaraopet Engineering College, Narasaraopeta, AP – 522601, India.
Dr.K.LakshmiNadh, Associate Professor, Computer Science and Engineering, Narasaraopeta Engineering College, Narasaraopet, AP -522601, India.
Dr. S.Siva Nageswara Rao, Associate Professor, Computer Science and Engineering, Narasaraopeta Engineering College, Narasaraopet, AP -522601, India.

II.LITERATURE SURVEY

Many presented studies on detection of node failures in mobile wireless networks are implemented indifferent ways. The implementation can be done based on dynamic nature of the nodes. The following are the different detection schemes are identified. Most existing studies assume that network connectivity is the one which can detect the node failures in mobile wireless networks. Many schemes [6], [7], [8] implement probe-and-ACK or heartbeat based techniques that are commonly used in distributed computing [10], [11].Several presented studies [7], [12] adopt gossip based protocols. All the above techniques are appropriate to attached networks and which is the main drawback. And it can also increase the network-wide traffic bulky. In compare, the proposed system concentrates on traffic monitoring; it is appropriate to both attached and detached networks. Node mobility is one of the reasons for node failure in network. We cannot conclude that the node failure was done only when it doesn't hear the heartbeat messages. The scheme in [9] uses localized monitoring. It is not appropriate for mobile networks because the reasons for node failure is don't consider the node mobility. As other related work, the study of [13] detects pathological. The study of [14] localizes network interface failures with a very high overhead.

Disadvantages of Existing System:

- Techniques used for existing studies only applicable to static networks.
- Network connectivity has limited applicability.
- Detection of a node failure can be done in a resource conserving manner.

III.PROPOSED SYSTEM

The probabilistic approach and binary feedback schemes have proposed to address node failure detection. In the proposed system, in order to find the failure of a node in the network the proposed system make use of localized monitoring, location estimation and node collaboration techniques jointly.

Specifically, two schemes are proposed. Those are binary and non-binary feedback schemes. In the binary feedback scheme, when a node has not heard about its neighbor node then it make use of its own information to know the neighbor node's presence. In non-binary feedback scheme it uses neighbor nodes information mutually to know the nodes presence whether it is alive or not.

The proposed approach concentrates node mobility. In mobile networks node are dynamic. Finding the failed node in the network is done by using the location monitoring. The network is represented in hexagonal region. All nodes are placed in hexagonal region. The existing system uses circular shape to represent the network region. In the proposed system hexagonal region is used in order to describe the nodes presence.

III.1 Probabilistic Detection Approach

(a) At time s (b) At time s+1

Fig:1 Representation of nodes presence in a network

In Fig.1 (a), considering an example, Network regions are represented in hexagonal shape. At time s, all the nodes are alive and there is no packet loss or node failure occurred. T3 is the node which is located at the common region of both networks range. T3 utilizes the services of both the networks. T3 is connected to T1,T2 and T4. T1 can hear the heartbeat messages from T2, T3 and T4.

In Fig. 1(b) at time s+1, Node T3 is moved out of the T1's transmission range and node T2 is failed which is shaded. And the cross lines indicates the connection loss between the nodes. By localized monitoring, T1 can't get the response message from nodes T2 and T3. It doesn't know whether lack of message is due to node failure or node moving out of the transmission range. By using the location estimation, T1 gets the probability that T2 is within its transmission range and hence it declares that node T2 is failed. By using the neighbor nodes information T1 gets the probability about T3. It doesn't receives the messages from T3 directly rather it receives low probability value hence it declares that the node T3 is out of the transmission range but the T3 is still alive. This decision can be improved by node collaboration.

For instance T1 can broadcast an inquiry about T2 to its one-hop neighbors which is T5 at time s+1. The response from node T5 decides the T2 presence. This example indicates that it is significant to analytically join localized monitoring, location estimation and node collaboration.

III.2Node Failure Detection Schemes

In order to detect node failures two schemes are implemented by using the probabilistic approaches: binary and non-binary feedback schemes.

III.2.1 Binary Feedback Scheme

Consider two nodes P and Q. At the time s+1, Q may not hear by node P. On that time P decides that node Q has failed by computing the probability p. Let $\theta(0,1)$ is the pre-defined threshold. Based on the probability and threshold value θ, P decides the node Q's presence. If the probability value is more than the threshold value then P concludes that node Q has failed. In order to avoid the false alarms P sends inquiry messages along with calculated probability value p to its neighbor nodes. P starts timer with a random timeout value, when P has not hear about Q. P sends an inquiry message to its neighbors within the timeout period. If any neighbors heard about Q, among them the node which has the lowest timeout value can send the response message to P. Once the response message received by P from any node the response from all other nodes are refrain.

When P generates a failure alarm about Q. In attached networks, manager node directly gets the alarm message which is forwarded by P. For detached networks, the sink node which acts as mediator between nodes and manager node gets the alarm message and then it will pass it to the manager node. Some times to broadcast the alarm messages rapidly P uses DTN routing protocols.

III.2.2 Non-binary Feedback Scheme

Binary feedback scheme sends response messages in binary format (i.e., 0 or 1). And the usage of nodes was less in binary feedback scheme compared to non-binary feedback scheme. Using neighbor nodes information jointly it finds the conditional probability foe failed node Q. when P finds that Q has failed, P broadcasts the inquiry messages to neighbor nodes to know Q's presence. P sets random time out period to avoid multiple broadcast messages about Q. Broadcast messages are sent only when P has not heard about Q. P's neighbors can send responds message to P by using their information about Q.

In non-binary feedback scheme, assume that 'i' is the neighbor node which can sends the response messages to P about Q in two ways. If i heard about Q at s+1 time then i sends single bit 0 to P or else it sends the calculated probability p value. If the p is larger than the threshold value θ then P creates an alarm that Q has failed. If P gets binary value 0 then P decides that Q is alive.

III.2.3 Binary versus Non-binary Feedback Schemes

Communication overhead for the binary feedback scheme is less because the responds messages are in binary format (i.e., 0 or 1). Consider a fixed K; node failure detection in binary feedback scheme develops the confidence by increasing K. In order to get the node failure detection rate same in both schemes, The binary feedback scheme need to use the large K. Due to the advantage of lower communication overhead it is better to use binary feedback schemes for lower packet loss rate. If it is high then use non-binary feedback scheme because it needs smaller K.

IV. RESULT ANALYSIS

The following architecture (fig.2) describes that; initially service provider has done some tasks. Firstly find the node status. If the node status is on then the status of the node need be changed to off. Secondly verify the attacker's presence. Thirdly verify the assigned time and rebroadcast time with router. Finally finds the attackers presence. The above steps are also performed by router. If any attacker found then the send need to rebroadcast the data. At the end the destination receives files and verifies those files. Then the received files are stored.

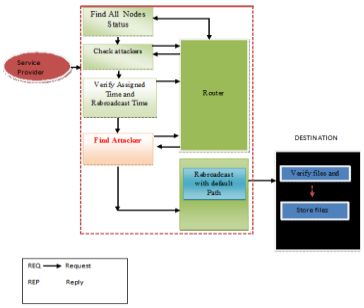

Fig 2 Architecture of the system

The data can transmit through the nodes in the network. In the following figure (Fig.3), data or file transferred from source to destination through nodes i.e., N1 to N10. The possible connection between the nodes is shown. Based on the selection of nodes the data or file can be transferred to the destination.

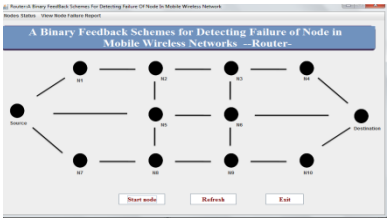

Fig. 3 Assumed Network

Initially there is a need to check the status of all nodes. Set the status of all nodes to OFF. And give the transmission time in milliseconds (i.e.,2000Msec, 4000Msec etc.)

Set the path by selecting the nodes in the network.

The below figure (Fig.4) shows the selected path in the network.

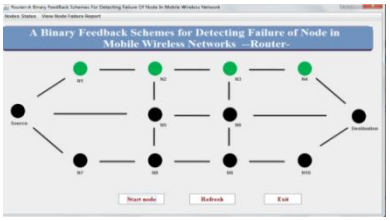

Fig 4 Selection of path through nodes

We need to choose the data file to be transferred and receiver which is in the network. And then the IP Address of the system should be entered. Then press OK. File sending process was shown in the source page. The below figure (fig.5) illustrates how the data is transmitted through the nodes. From source, at first the router transmits the data through the default path. Then transmission failed (Node failure occurred) because the node was not selected. Hence it choose another path. Now the data or file is transmitted successfully through the selected nodes in the network.

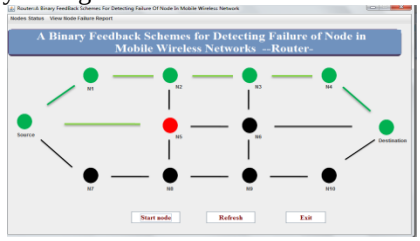

Fig.5 Transmission of data files through nodes in the network

If the transmission done successfully the data is displayed at the receiver as shown below (Fig.6).

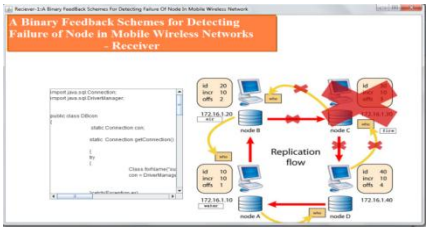

Fig.6 Successfully data transmitted to the receiver

The below figure (Fig.7) shows the time gap between the assigned time and routing time of transmission in the network.

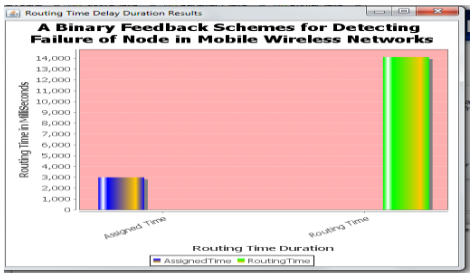

Fig.7 Graph representation for Transmission time

V. CONCLUSION AND FUTURE ENHANCEMENT

In the proposed system, the Binary feedback schemes combines localized monitoring, location estimation and node collaboration for mobile wireless networks. The proposed schemes accomplish high disappointment discovery rates, low forged positive rates, and low correspondence overhead. By using these schemes the node failure is easily identified in Mobile Wireless Networks. It can be used for search and salvage, location monitoring, tragedy reprieve, and military operations. The percentage of failure rate and detection rate can improve more efficiently. We can get better the transmission period with in the less duration and developing more strategies to give better results is left for future work.

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AUTHORS PROFILE

P.Naga Priyanka, pursuing M.Tech in Computer science and engineering from Narasaraopet Engineering College, Narasaraopet, Guntur, Andhra Pradesh 522601, India. Her area of interest includes Mobile Computing, Wireless Networks, Computer Networks, machine learning and data mining.

Dr.K.LakshmiNadh qualified in Ph.D. in Computer Science & Engineering from JNTUK, Kakinada. He received the B.Tech and M.Tech from JNTU, Hyderabad. He is currently working as Associate Professor in Narasaraopeta Engineering College. His research interests are Computer Networks, Mobile Computing, Software Engineering, Agro Tech using IoT, Machine Learning and Deep Learning. He is a Coordinator for Entrepreneurship Development Centre and MOOCs Courses.

Dr. S. Siva Nageswara Rao qualified in Ph.D. in Computer Science & Engineering from JNTUK, Kakinada. He received the B.Tech and M.Tech from JNTU, Hyderabad. He is currently working as Associate Professor in Narasaraopeta Engineering College. His research interests are Mobile Computing, Wireless Sensor Networks and Cloud Computing.