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RESEARCH ARTICLE

A Mobility and Communication Aware Routing Approach for Nested Mobile Network

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Abstract: Nested mobile network is a hybrid communication network defined with complex architecture. In this network time, two levels of nodes are defined with different routing scenarios. In this work, a mobility aware route optimization is proposed for nested mobile network. The work in this network is divided in two main stages. In first stage, the mobility analysis is performed by tracking the nodes for two time stamps. Once the mobility of nodes is analyzed, the next work is to predict the next communicating neighbor by performing the communication level analysis. The optimized route is elected as the communication hop. The work is about to generate effective route based on communication and mobility vectors.

Keywords: Nested Network, Route Optimization, Mobility Aware

I. INTRODUCTION

Mobile networks are open area networks restricted with sensing range specification so that the muti-hop path will be generated for distance communication. One of the most effective properties of such network is the cooperative communication with neighboring nodes. These networks are generally situation aware network that provide the effective network communication for real time networks. These network types enable the communication history storage and analysis so that more adaptive path will be recognized for communication. This kind of network is significant to handle

the route based challenges under the specific constraints so that the reliable and efficient path will be generated over the network. These kinds of network are effective under the distance and energy based communication. The major requirements of such kind of network while generating the optimized route over the network are shown in figure 1.

The foremost decision vector for route optimization is the distance. The route with minimum distance is generally considered effective. Distance itself optimize the communication under different aspects such as

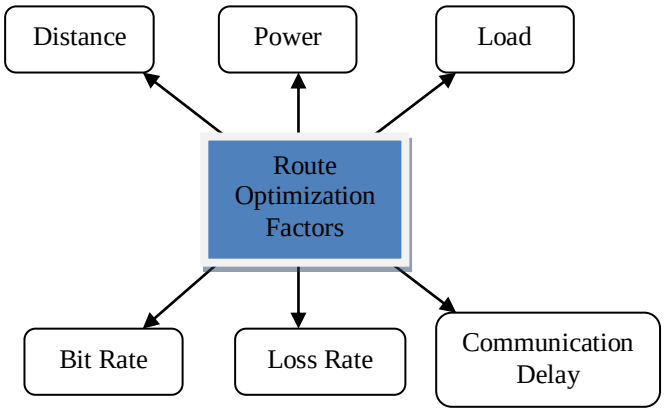

Figure 1 : Route Optimization Factors

Communication time, delay is also dependent on the communication distance travel by the packet. But always the smallest route consideration is not effective. Some other communication vectors are also considered. If the nodes are defined with battery backup in such case, energy of nodes is also the crucial vector to identify the effective route. In such network, to enable the communication each node is defined with specific energy limit. The power optimization if required to generate effective communication path. One more critical parameter to identify the effective communication path is called congestion vector. Communication load over a node is considered as the decision vector deciding the next hop. A node with higher load is never considered as effective node. Other route optimization parameters include the communication rate analysis, communication delay analysis and loss rate analysis.

Another consideration in route identification is communication scenario. In such network, situation aware routing is performed. Situation aware routing is intelligent routing approach that includes the effective route generation based on scenario requirements. The requirement analysis is performed in this work. The communication scenarios are defined in network analysis. Another kind of routing approach under application analysis is location aware routing. This routing approach is adaptive to the routing algorithm. Another communication approach defined in the network type is power aware routing.

In this paper, an effective routing approach is defined for nested mobile network. In this section, the exploration of routing approaches and relative aspects are explored for mobile networks. In section II, the work defined by earlier researchers is defined. In section III, proposed work is defined. In section IV, the conclusion obtained from the work is presented.

II. EXISTING WORK

Lot of work is already done by different researchers respective to the performance analysis for a mobile network. Different researchers have considered different parameters in their research work. Here the small review of the work provided by different researchers is presented. In year 2012, Chirag Kumar has defined a work on "Towards Realistic Performance Evaluation of Mobile Ad hoc Network". The author has performed the performance analysis of mobile network under different parameters as well as in different simulators. The work is checked for different scenarios, shapes of the network. Node movement is also taken for the analysis as well as analysis in case of obstacles is also considered. The work is beneficial to identify the limitation of the network and to decide the improvement in future[1]. In year 2009,

R. Lakshmi Priya, presented a brief study on different issues related to the Mobile Adhoc Networks respective to QOS. The author presented a review based work to study and present novel ideas regarding the QOS with the help of implementations. The work also includes the limitations and the restrictions followed by the network are also defined. The work also include the qualitative evaluation respective to comparative analysis as well the future aspects relative the QOS issues are discussed[16]. In year 2006, Patrick Stuedi presented a throughput analysis on multihop mobile network respective to the network capacity. The capacity is the major property, the perform the analysis based on network strength estimation based on physical parameters such as propagation, unidirectional links, scheduling etc. The work is based on the probabilistic capacity calculation by performing the graph scheduling over the network. The capacity analysis is defined under the realistic network model under different configuration model. The analysis is performed in ns2 environment based on throughput analysis on sink node[9]. In year 2007, J Abdullah presented a GA based QOS routing approach for the mobile network under the mobility constraint. The work is to analyze and improve the route quality under the random mobility model. The work also defined respective to the fitness variable and the GA based QOS optimization. The work is performed on the DSR protocol. The GA is the intelligent optimization tool that is used to achieve the efficiency as well as reliability over the network[6].

In year 2006, Dijiang Huang has explored a work on the traffic analysis under the unlinkability measure for a mobile network. The work is based on two major analytical approaches called statistical approach and the evidence based approach. These two approaches are used in a series to identify the unlinkability over the network as well as its effect over the network. The network transmission model respective to channel definition and analysis is presented in this work. The analysis is performed on the receiver side based on the evidence theory to obtain the maximum throughput over network[2]. In year 2009, A Simulation based analysis is performed on AODV protocol by Md. Monzur Morshed. The author has analyzed the network under the protocol specification for the different parameters. The parameter includes the efficiency, reliability, loop free routing etc. The Author has defined different network scenarios and performed the variation in terms of network delay, jitters etc and the relative effective is analyzed and presented in the form of graphs. The work is the verification of performance of AODV protocol under different network formations as well as the parameters[8]. In year 2008, Quan Le-Trung presented a work to analyze the effect of load balancing on mobile network. Mobile network is one of the busy network. The author is includes the hybrid metric discussion based on quantitative analysis in terms of packet transmission ratio over the network under adhoc routing protocol. The work is about to perform analysis to get better performance in terms of packet delivery ratio and transmission delay at the cost of signaling overhead[15]. In year 2006, Moussa Ayyash presented a work on the performance analysis respective to the network infrastructure. The author has perform the analyze the network based routing protocol optimization under different metrics and the behaviors. The author has proposed a QOS virtual backbone to achieve the robustness for routing and monitoring. The QOS is basically selected based on routing and monitoring. The work also includes the stability and availability analysis respective to the bandwidth analysis[9].

In year 2009, Patrick Sondi has defined the protocol based service optimization for the voice communication in mobile adhoc network. The author has presented a network Extended OLSR protocol that will work on voice communication and provide the best effort routing and the high quality of service in the real time environment. The work also includes the confirmation for end to end delay analysis and the jitter constraint for the network formulation. The author has discussed the delivery ratio with better perspective [11]. In same year, an evolutionary mechanism to optimize the quality of service for the wireless network. The work presented by the author includes the network design under parameter specification with wireless communication effects such as power control, routing failures, erratic development model etc. The work also includes the real world scenario specification under the scalability and some other parametric models. The author has presented a polynomial complete model using the evolutionary programming to overcome the network delay and to improve the network effectiveness and teh quality of service. The author also suggested the use of associative memories and the genetic algorithm during the QOS analysis phase[16].

III. CLASSIFICATION TECHNIQUES

The presented work is about to design an effective route in case of nested mobile network. The presented mobile architecture is having number of mobile networks controlled by top level mobile network. The communication within the particular mobile network will be controlled by top level controller. The communication can also be performed between two mobile nodes present in different mobile networks. In such case, the communication will be performed between the mobile and the controller node to manage the communication. While generating the effective route between the nodes, the two level analyses will be performed. The first level analysis will be in terms of velocity analysis and second level

analysis will be performed based on the communication parameters. Based on these weighted parameters, the next hop selection. The work includes the dynamic selection of neighboring nodes based on the velocity and distance analysis. The velocity will be identified by generating the request at two time stamps so that effective route identification will be performed. Once the speed and direction is presented, the next work is to identify the effective neighbor nodes under distance based analysis. On these neighbor nodes, the analysis under communication parameters is performed to identify effective next hop. The algorithm for the proposed work is given here under.

Table 1 :Algorithm

```
Algorithm()
{
1.      Define a network with N number of nodes with
        mobility specification
2.      Define the source Node Src and Destination
        Node Dst
3.      Identify the Average Response Time over the
        network nodes called AvgResTime
4.      Identify the Average Communication count
        over the network called AvgNetCount
5.      While (Src<>Dst)
6.      {
7.      Perform the mobility analysis of source node
        under speed and direction analysis
8.      Perform distance based comparision to identify
        neighboring nodes
9       For i=1 to M
9.      {
10.     If
        (ResponseTime(Neighborlist(i))>AvgResTime+T
        hreshold)
11.     {
12.     Set Node as bad node
13.     }
14.     If (CommunicaitonCount
        (Neighborlist(i))>AvgNetCount+Threshold)
15.     {
16.     Set Node as bad node
17.     }
18.     C=ReplyCount(i)-ReqCount(i);
19.     If(C>Threshold)
20.     {
21.     Set Node as Bad Node
22.     }
23.     }
24.     EffectiveNode=0;
25.     For i=1 to N
26.     {
27.     If(Not IsBad(Neighborlist(i)))
28.     {
```



```
29.  If(Throughput(Neighborlist(i))>Throughput(Effe
     ctiveNode)) and
     Delay(Neighborlist(i))<Delay(EffectiveNode))
30.  {
31.  Set EffectiveNode= Neighborlist(i);
32.  }
33.  Else
     If(Throughput(Neighborlist(i))>Throughput(Effe
     ctiveNode)))
34.  {
35.  Set EffectiveNode= Neighborlist(i);
36.  }
37.  Else
     If(Delay(Neighborlist(i))>Delay(EffectiveNode)))
38.  {
39.  Set EffectiveNode= Neighborlist(i);
40.  }
41.
42.  }
43.  Set Cur=EffectiveNode
44.  }
45.  }
```

IV. CONCLUSION

In this work, an effective communication approach is defined for mobility based nested mobile network. The approach divided in two stages. In first stage, the mobility analysis is performed and later on communication analysis is defined. The work will provide the effective route generation over mobile network.

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