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A Study of Routing Characterization in Mobile Network

Kritika[1] and Ajay Kumar Jaiswal[2]

[1]Student, M.Tech (ECE), N.C. College of Engineering
Panipat, Haryana (India)
urmilanain20@gmail.com

[2]Lecturer, ECE, N.C. College of Engineering
Panipat, Haryana (India)
ajay.jaiswal006@gmail.com

Abstract

A Mobile Network is open area network with hybrid network formulation under different parameters. Because of this complex architecture, network faces number of associated challenges. To optimize the network communication and to ensure the reliable packet delivery, it is required to optimize the routing for this network. In this paper, a study on different routing constraints and challenges are explored. The paper has also presented the efforts of earlier researchers to optimize the network communication. The main concern of this paper is to define different routing approach under the network scenario and strength specification.

Keywords: *Mobile Network, Flat Routing, Routing Challenges*

I. Introduction

A Mobile network is busiest public area network that provides the wide range communication. A Mobile network itself is divided in different types under scenario and network specification. Because of public nature and cooperative communication nature, the network faces number of associated challenges. These challenges include the QoS optimization, Route optimization, security etc. As the network is defined without any centralized controller, the cooperative communication is performed over the network. To improve the effectiveness of network, it is required to optimize the particular communication feature of network. In this paper, the main concern is given to optimize the route generation over the cooperative mobile network[1][2][3]. In this section, the study of the different optimization factors are been discussed. These all factors are shown in figure 1. The parameters considered for route optimization are divided in two broader categories called physical parameters and the communication parameters. The physical parameters are generally the static parameters that represent network or node capabilities[4][5][6]. These all parameters are described in this section.

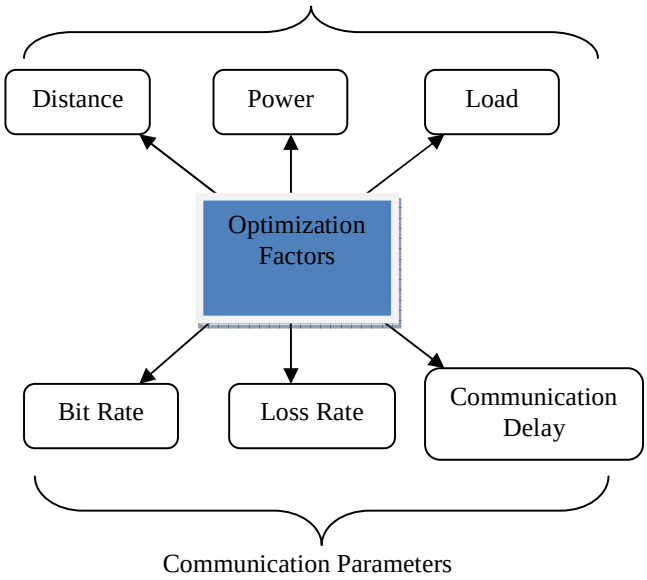

Figure 1: Optimization Factors

To optimize the communication route, it is required to reduce the communication distance. To optimize this, the shortest path algorithms are suggested by different protocols. The distance is directly related to the communication delay and power consumed to perform the communication. But if the communication is always

performed from same shortest distance route, the load over the path will be increased. The load is another vector that affects the routing decision. The load can be exceeded because of algorithmic approach or it can be increased by some attacker intentionally. Heavier the network load, lower the communication reliability will be. It is required to select a node with lower load as next hop[7][8][9][10]. Another physical parameter associated with individual node is the battery or the power. Generally, the network nodes are not defined with energy specification, but some of the critical and real time mobile network are defined with energy specification such as war or rescue scenario network. In such case, the network route with lower energy consumption is selected as the effective route for network communication. In personal area network and smart sensor network, such kind of node based characteristic is effective for route generation[11][12]. Another category of optimization parameters is communication parameters. The communication parameters are analyzed dynamically. These parameters are analyzed either for a particular instance of time or for a particular session. The session based parameters are periodic and analyzed for a fixed interval. These parameters include the delay analysis, communication loss analysis and communication rate analysis. A network with path with lower delay, lower loss rate and higher communication rate is considered as effective communication route. The lossrate where represents the reliability of packet delivery, the communication rate and communication delay represents the efficiency parameters[13][14]. In this paper, a study on different routing approaches in mobile network is explored. In this section, an introduction to mobile network and associated challenges is defined. The section also explained the associated parameter that affects the communication QoS over the route. In section II, earlier work defined by the different researchers is presented. In section III, the study based work is defined on routing approaches. In section IV, the conclusion of this study work is explained.

II. Related Work

In this paper, lot of work defined by earlier researchers is presented and discussed. This work is on mobile network and associated challenges. Some of the routing approaches adapted by different researchers is also presented in this work. Admir Barolli[1] has defined a work on QoS optimization in case of routing for mobile network. Author presented a study based work under genetic algorithm to optimize the communication over the network. Author defined different routing algorithms under genetic approach. Author also provided the improvement and investigation against different routing approaches under GA approach. Leonard Barolli[2] has defined a work on route optimization under QoS parameters. Author defined the routing improvement under Genetic approach. Author considered two main parameters called delay analysis and loss rate analysis to generate the optimize route. Author used the genetic approach for improving the network performance and also presented a comparision over existing approaches. Xi Cheng[3] has defined the route optimization for mobile network using ACO approach. Author defined a hybrid optimization algorithm using genetic and ACO approach. Author defined the source adaptive route generation algorithm under path modelling with different network traffic parameters. Rahul Bhattacharya[4] has defined a work on Genetic algorithm under multicast routing approach. Author defined a routing scheme based genetic algorithm to obtain the network optimization and to reduce the computational complexities for the network. Author defined a genetic based algorithm to optimize the communication and to improve the network effectiveness. Hui Liu[5] has defined an adaptive hybrid approach to geneate multi path over the mobile network. The hybrid approach included the fuzzy and genetic approach. The fuzzy rule is here used to define the parameter based analysis whereas the genetic is used the evolutionary computing to identify the optimize path over the network. Author defined the work under uncertain conditions and with adaptive network constructs to generate the effective and reliable path over the network. Cheng Peng[6] has defined the application layer based modelling to perform multicast routing under genetic approach. Author defined the network route analysis and evaluation under different constraints and parameters. Author defined three main function for application layer evaluation. These parameters includes the load analysis, cost analysis and communication analysis. Author defined a fitness function based performance analysis to generate the optimize routing under the tree level performance analysis and effective route generation. Admir Barolli[1] has defined a work on QoS optimization in case of routing for mobile network. Author presented a study based work under genetic algorithm to optimize the

communication over the network. Author defined different routing algorithms under genetic approach. Author also provided the improvement and investigation against different routing approaches under GA approach. Leonard Barolli[2] has defined a work on route optimization under QoS parameters. Author defined the routing improvement under Genetic approach. Author considered two main parameters called delay analysis and loss rate analysis to generate the optimize route. Author used the genetic approach for improving the network performance and also presented a comparision over existing approaches. Xi Cheng[3] has defined the route optimization for mobile network using ACO approach. Author defined a hybrid optimization algorithm using genetic and ACO approach. Author defined the source adaptive route generation algorithm under path modelling with different network traffic parameters. Rahul Bhattacharya[4] has defined a work on Genetic algorithm under multicast routing approach. Author defined a routing scheme based genetic algorithm to obtain the network optimization and to reduce the computational complexities for the network. Author defined a genetic based algorithm to optimize the communication and to improve the network effectiveness. Hui Liu[5] has defined an adaptive hybrid approach to geneate multi path over the mobile network. The hybrid approach included the fuzzy and genetic approach. The fuzzy rule is here used to define the parameter based analysis whereas the genetic is used the evolutionary computing to identify the optimize path over the network. Author defined the work under uncertain conditions and with adaptive network constructs to generate the effective and reliable path over the network. Cheng Peng[6] has defined the application layer based modelling to perform multicast routing under genetic approach. Author defined the network route analysis and evaluation under different constraints and parameters. Author defined three main function for application layer evaluation. These parameters include the load analysis, cost analysis and communication analysis. Author defined a fitness function based performance analysis to generate the optimize routing under the tree level performance analysis and effective route generation.

III. Routing Approaches

A Mobile network is having the potential to provide the reliable and effective communication in internet access as well as to provide the distance communication with multi hop communication. In this network, each node behaves as a normal host as well as a router to take the routing decision about the communication. This kind of network is defined under the feature specification at node as well as network level. The network is defined with variable position as well as fixed position scenarios. The positions of nodes are defined under mobility specification and limited range setting under the implication of stability. The network is defined under the limitation of route identification and volume limit specification. The network is defined under the node neighbor identification that can identify the effective next hop to generate the effective communication route over the network. The hop identification can be done with the range and other parameters specification. In this section, the routing approaches adapted by different mobile network are presented and discussed. These all approaches are shown in figure 2.

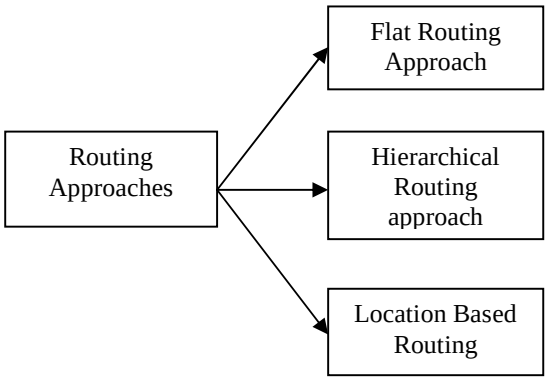

Figure 2 : Routing Approaches

A) Flat Based Routing

This kind of routing approach is used in homogeneous network with randomized parameters specification. All the network nodes are of similar type and the multi hop route is adapted to optimize the network route. In most of the intra-cluster mobile network, such kind of routing approach is been used to perform the network communication. This routing approach is based on the destination adaptive and data adaptive communication performed over the network. The network also includes the multi case communication to reduce the communication effort. To perform the multi cast

communication aggregative communication approach is adaptive in such networks. This kind of routing approach also requires reducing the number of intermediate nodes as well as reducing the communication effort of each participating node over the network. This kind of communication route analyze the next neighbor under different physical and communication parameters and select the node with effective throughput and minimum expected loss and delay. The work is about to reduce the flooding by storing the routing information as well as reduce the redundancy in communication. The work is also effective to perform the broadcasting of the network as well as effective hop selection over the network.

B) Hierarchical Routing

In this routing approach, the inter cluster communication is performed. The nodes can be homogenous or heterogenous but the nodes in a particular network are considered as homogenous. The network area considered in this network type is generally large and scalable. Each sub network is defined under the specification of controller node so that the effective network aggregation will be performed by the node. This controller node takes the adaptive decision regarding the node specification and the sub network head specification. The segmented communication is formed in the form of tree and at each tree node decision regarding the next network election will be done.

C) Location Based Routing

The routing approach defined here for the specification of network node and tracking of node under the location specification and generation. This routing approach based on the node position and the signal strength of different location over the network. The satellite specification is used to identify the position of the node and to generate the activity of the network under specification of protocol. GPS analysis is performed for node position monitoring and indication to identify the node and to perform the zoning of the network with specification of the criticality for the network with specification of routing and mobility.

IV. Conclusion

In this work, a study of routing behavior in mobile network. This behavior includes the characterization of routing approaches along with exploration of different routing approaches used in mobile network. The challenges associated with these routing approaches are also discussed in this paper.

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