International Journal of Engineering Science Invention (IJESI)
ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726
www.ijesi.org ||Volume 7 Issue 4 Ver. III || April 2018 || PP. 42-46

Link Failure Recover by Resilience Method in Wireless Mesh Network

Mrs. Jyoti Haweliya[1], Mr. Anup Mandloi[2]
[1] *Department of Computer Engineering, Institute of Engineering &Technology DAVV, Indore, India*
[2] *Department of Computer Engineering, Dhar Polytechnic Mahavidhyalaya, Dhar*
Corresponding Author: Mrs. Jyoti Haweliya

ABSTRACT: wireless mesh network(WMN) is a communication network. During their operating period, the wireless mesh network may suffer from frequent link failure which results in deficient performance of network. Hence, this paper proposes link failure recover by resilience method in wireless mesh network. By integer linear programming, when primary link or path fail, transmit data to its backup link or path via node disjoint path. Because resilience provided by several alternate paths constructed with in the primary path. Resilience can be defined as "ability of the network to provide and maintain an acceptable level of service in any failures to normal operation". Simulation results shown.

KEYWORDS: Resilience method, WMN, integer linear programming**,**

Date of Submission: 31-03-2018 Date of acceptance: 16-04-2018

I. Introduction

Wireless mesh network (WMN) is play an important role in wireless communication technology. Because of their advantages over other wireless network, Wireless mesh network is defined as, each node can communicate directly or indirectly with one or more peer nodes. it is also called mesh topology. it consists of mesh router, mesh gateway and client. They can support broadband and internet access, but now a day its most important features are provided reliable services, if any failure occurs in the network and also provide protection against any type of failure occur. One question has arisen how to protect any type of failure occurs in network. The term, resilience is provided protection an acceptable level of service in any error occur in normal operation [1,2,3,4].

Reference [5] proposed a particle swarm optimization (PSO) for adaptive placement of router, but gateway is fixed in wireless mesh network. The aim of this paper is, few-clients-covered by wireless routers and also analysis the performance of a Markov chain. Reference [6] proposed a gateway placement for throughput optimization in multi-hop wireless mesh networks. the aim of this paper is improved throughput by optimization. The method has been used a novel grid-based gateway deployment method. Reference [7] proposed a social-based particle swarm optimization approach. The purpose of this paper is following (1) maximize the network connectivity and user coverage. (2) improvement of the network performance can be possible with the help of router placement in dynamically manner. In terms of reducing number of the un-served mesh clients. Reference [8] proposed a simulated annealing algorithm for router nodes placement in wireless mesh network. The aim of this paper is improving network performance in terms of network connectivity and user coverage. using heuristic approaches solve mesh router placement problem in order to achieve near about optimal solution.

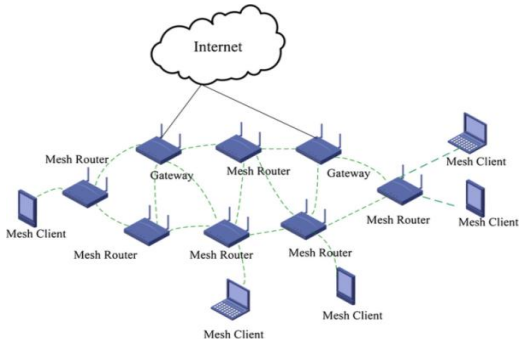

Fig.1. WMN architecture

Reference [9] proposed an optimization models for planning Wireless Mesh Networks (WMNs), the aim of this paper to minimize the network installation cost as well as optimal solution for coverage planning. Optimal solution can be achieved by integer linear programming. In order to increase the coverage for wireless mesh clients. Reference [9] proposed a heuristic approach and lower bound algorithm for solving interference problem occur in proactive network. The aim of this paper is increases coverage. Reference [10] proposed a greedy approximation for Diversity Assignment Problem (DAP), the type of assignment is variants to nodes in a network, which is obtained network resilience. Reference [11,12] proposed a resiliency of randomized routing against multiple edge failures. Reference [13,14] discuss recovery path setup method

II. Mathematical Formulation

2.1 Problem description

Figure 1 shows a structure of wireless access network. Nodes (mesh routers) serve as the function of bride between mesh clients and some Internet gateway, which provides access to the Internet. Each node (mesh router) is associated with a different-size coverage range. if coverages of two nodes (or a mesh router and an Internet gateway) are interfered, means there is link or nodes fail. My focus on optimal placement of router as well as protection provide to link fail or node using resilience recovery method in order to provide coverage of the end user.

2.2 Notations

Variable	**Meaning**
x, y ϵ (1,2…LXL)	Location of router
n	No. of routers
r	Index of router
xi ϵ {0,1}	Binary variable and Indicate router place
$\pi_{i,j} \epsilon \{1, -1,0\}$	Binary variable and node to node connectivity
$\theta_{i,j}^{x\,y}$	Wireless path from i to j on the link.
$d_{x,y}$	Distance between the location i and j
$\rho_{i,j}^{x\,y}$	Segment Wireless path from i to j link
$\mu_{i,j}^{x\,y} \epsilon \{1,-1,0\}$	Binary variable

2.3 Integer linear programming formulation

$$in \sum_{i \epsilon n} r x_i \qquad (1)$$

Subject

$$\sum_{i \epsilon n} r = 1 \qquad \forall\, i \epsilon n$$

Node to node connectivity

$$\sum_{y=1, y \neq x}^{L \times L} \theta_{i,j}^{x\,y} - \sum_{y=1, y \neq x}^{L \times L} \theta_{i,j}^{y\,x} \qquad (2)$$

$$\begin{cases} \pi_{i,j} & if \quad x=i,\ x\neq y,\ i\neq j \\ -\pi_{i,j} & if\ y=j,\ x\neq y,\ i\neq j \\ 0 & otherwise \end{cases}$$

$$\theta_{i,j}^{x\,y} \leq \pi_{i,j} \ \forall x, y, i, j, x \neq y, i \neq j \qquad (3)$$

$$\sum_{y=1, y\neq x}^{L\times L} \rho_{i,j}^{x\,y} - \sum_{y=1, y\neq x}^{L\times L} \rho_{j,i}^{x\,y} \qquad (4)$$

$$\begin{cases} \mu_{i,j} & if\ x=i, x\neq y,\ i\neq j \\ -\mu_{i,j} & if\ x=i,\ x\neq y,\ i\neq j \\ 0 & otherwise \end{cases}$$

$$\rho_{i,j}^{x\,y} \leq \mu_{i,j} \ \forall x, y, i, j, x \neq y, i \neq j \qquad (5)$$

III. Proposed Approach

protection method is based on backup path established in advance. Resources can be allocated before a failure occurs or they can be allocated [15]. According to graph network, a network is show as an interconnection of nodes by link. Now find the shortest path by Dijkstra algorithm. We have proposed node disjoint path because of the independence and resilience provided by a number of alternate paths constructed within the primary path and also with each other. This technique for constructing multipath-disjoint nodes can be divided depending on the global knowledge of topology.

Algorithm. Recovery (protection) path setup method

Input:
L = area
n = the number of routers.
d= distance between routers
R = Communication range
S = segments of routers

output:
resilience path

1. Initialize L
2. Initialize n
3. For iϵ n do
4. Compute according to eq. (1)
5. Mapped (n)
6. End for
7. If d<R
8. Exist
9. l=1
10. Else l=0
11. End if
12. Compute according to eq. (2)
13. Mapped (S)
14. For i = 1: S-1
15. For j = i+1: S
16. If distance of S<R
17. Exist l=1
18. Else l=0
19. End for
20. End for
21. End if

22. Calculate resilience against path

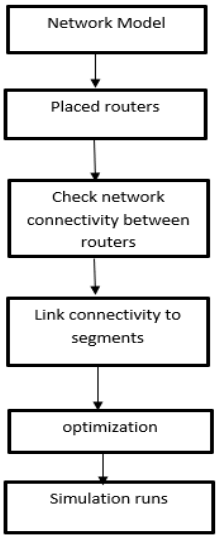

Fig.2 data flow diagram of proposed scheme

IV. Simulation Results

In this section we simulate WMN by MATLAB 8.3 version. The simulation environment is a 1000*1000m, where 50 routers after optimization 47 router are placed. Router 25, 36, and 42 are not link with segments as shown on fig.3 and backup path are placed, as shown on fig.4.

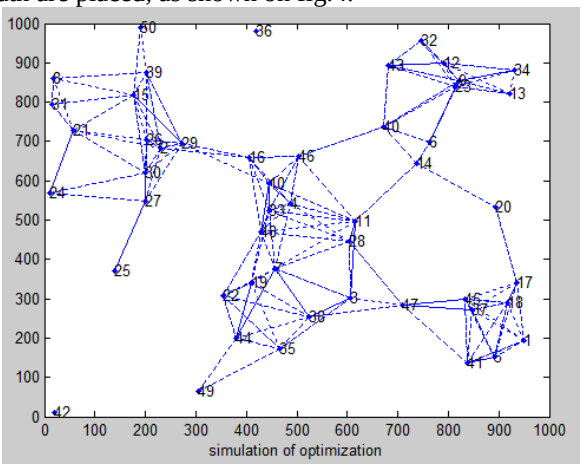

Fig. 3 Link connectivity to segments

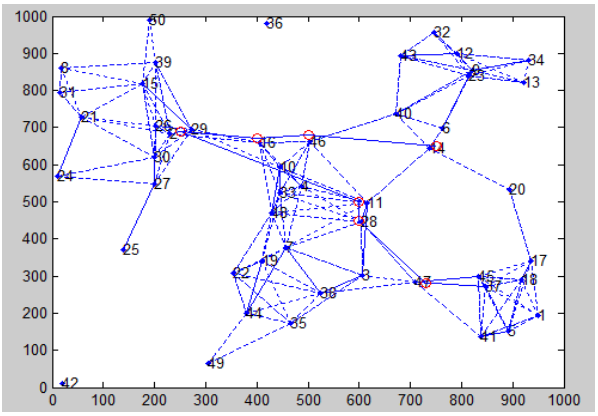

Fig. 4 WMN planned by recovery setup method

V. Conclusion

In this paper we have presented link failure recover by resilience method in wireless mesh network. This is provided protection against any failure link or path occur in network. We have proposed optimization model for minimize the router by integer linear programming. We have proposed node disjoint technique for shortest path finding. In order to achieve improve performance in terms of reliability. Simulation result shown in fig.3 and fig.4.

References

[1]. M. D. Williams," Broadband for Africa: developing backbone communications networks", World Bank Publications, 2010.

[2]. J. P. Sterbenz, R. Krishnan, R. R. Hain, A. W. Jackson, D. Levin, R. Ramanathan, and J. Zao, "Survivable mobile wireless networks: issues, challenges, and research directions," in Proceedings of the 1st ACM workshop on Wireless security. pp. 31–40, ACM, 2002.

[3]. P. Cholda, A.Mykkeltveit, B. E. Helvik, and O. J. Wittner," a survey of resilience differentiation frameworks in communication networks" IEEE Communications Surveys & Tutorials • 4th Quarter 2007.

[4]. J. Raj," Resilient routing in communication networks", Springer (2015).

[5]. T. H. Chen, H. H. chin, C. C. lin,"Adaptive router node placement with gateway positions and QoS constraints in dynamic wireless mesh networks" journal of network and computer application, Volume 74, Pages 149-164, October 2016.

[6]. F. Li, Y. Wang, X. Y. Li, A. Nusairat, Y. Wu, "Gateway Placement for Throughput Optimization in Wireless Mesh Networks", Mobile NetwAppl 13:198–211, (2008).

[7]. C. C. Lin, P. Tsung, T. Y. Wu, D. J. Deng,"Social-aware dynamic router node placement in wireless mesh networks", Wireless Netw 22:1235–1250, (2016).

[8]. F. Xhafa, A. Barolli, C. Sánchez, L. Barolli, "A simulated annealing algorithm for router nodes placement problem in Wireless Mesh Networks", Simulation Modelling Practice and Theory 19, 2276–2284, (2011).

[9]. E. Amaldi, A. Capone, M. Cesana , I. Filippini, F. Malucelli,"Optimization models and methods for planning wireless mesh networks" Computer Networks 52, 2159–2171, (2008).

[10]. A. Newell, D. Obenshain, T. Tantillo, C. N. Rotaru, and Y. Amir,"Increasing Network Resiliency by Optimally Assigning Diverse Variants to Routing Nodes" Technical Report TR-13-002, Department of Computer Science, Purdue University April 24 2013.

[11]. M. Chiesa, I. Nikolaevskiy, S. Mitrovic, A. Panda, A. Gurtov, A. M¸adry, M. Schapira, and S. Shenker,"on the resiliency of randomized routing against multiple egde failures", 43rd International Colloquium on Automata, Languages, and Programming (ICALP). Article No. 134; pp. 134:1–134:15, 2016.

[12]. J.P.G Sterbenz, D. Hutchison, "Resilient: Multilevel resilient and survivable networking initiative", wiki. http: //wiki.ittc.ku.edu/resilient (2008).

[13]. A. Haider, R. Harris, "Recovery techniques in next generation networks", IEEE Communication Survey & Tutorial, 9(3), 2-17 (2004).

[14]. P. Cholda, A. Jajszczyk.," Recovery and its quality in multilayer networks". IEEE/OSA Journal of lightwave technology. 28(4), 372-389 (2010).

[15]. W. Molisz, J. Raj., "Region protection/restoration scheme in survivable networks, lecture notes in computer science, Springer, 3685, 442-447 (2005).

[16]. J. Haweliya, A. Mandloi.," Planning of link recovery in wireless mesh network using resilience scheme". IJESI, e-ISSN 2319-6734, p-ISSN 2319-6726 (2018).