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Research on Routing based on Network Node Optimization

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Abstract: As the opportunities existing network routing protocols cannot optimize a number of indicators, cannot significantly improve overall network performance and routing inefficiencies, put forth a multi-destination routing decision algorithm. By the time delay, energy consumption and cache consumption attributable additive goal attribution multiplicative target transmission rate, bandwidth attribution extreme goals, the multi-objective decision theory and the basic principles of ant colony algorithm applied to the opportunity to network.

Keywords: routing algorithm; network;type;node

1. Introduction

Characteristics of the link with high latency, low data rate, may not exist a stable, end-to-end, connected network called challenged network [1]. The lack of interaction in network architecture; end systems with limited resources, limited life, low duty cycle operation of the network. In the challenged network, there is a certain type of such networks: Its central focus is that between the nodes does not exist continuous-end path. Such a network is called opportunity network. Opportunity network is composed of a mobile peer-to-peer communication node, the node with the message storage capacity. It appears by the random contract between nodes [2-4].

Routing technology is one of the most popular research field in opportunity network, the characteristics of opportunity network make the traditional wired networks and Ad-Hoc network routing protocols can not be effectively applied to opportunistic networks [5-6]. Therefore, some researchers have proposed a Delay/Disruption Tolerant Networking (Delay/Disruption Tolerant Networking, referred DTN) to solve the challenged network's problems of the interconnection interoperability. According to the characteristics of opportunistic networks, the existing routing protocols for DTN mainly used the "store - carry - forward" routing mechanism, when no communication nodes around the node, the node will be allowed to carry the data packets under the situation of caching allows until there is a communication opportunities or a data packet timeout before it forwards or deleted.

However, existing routing protocols lack comprehensive consideration of a number of evaluation indicators, often in superior performance on individual indicators, but can not optimize a number of indicators, the overall performance of the network is difficult to obtain greatly improved; In addition, existing routing protocols lack of demand for different applications on a case-handling routing strategy, resulting in inefficient routing.

2. Related Works of Opportunistic Network

Currently, people take more and more concern for opportunistic network, its architecture, routing, congestion control, security, privacy, application support and other aspects have become the hot research topic among the researchers, especially the most studied of the routing protocol.

Making routing decisions, routing and routing knowledge are keys objectives of the input. For routing knowledge, existing agreements are more used in historical information and node information. For routing target, due to routing loops or nodes with limited storage space causes the loss of message (or packet) , DTN routing's most basic goal is to maximize the probability of successful message transmission (or transmission rate), while minimizing end delay and resource consumption (such as storage space, bandwidth, battery power, etc.). These routing protocols are directed to a route target using the corresponding routing knowledge to make routing decisions, and are not considering the route target, and for opportunistic network routing destination and route knowledge have no uniform definition and classification, just knowledge in their areas of routing and routing objectives have been enumerated.

3. Algorithm Description

Multi-destination routing decisions are the judgment of routing target and routing knowledge, and to develop a forward program behavior. Multi-destination routing decisions basic activities including clear mission, planning program, and evaluation of programs of these three basic activities. Multi-objective decision-making activities of the input is the opportunity to network routing

destination and route knowledge, multi-objective decision-making activities is the output routing scheme. Functional structure of the entire routing algorithm shown in Figure1

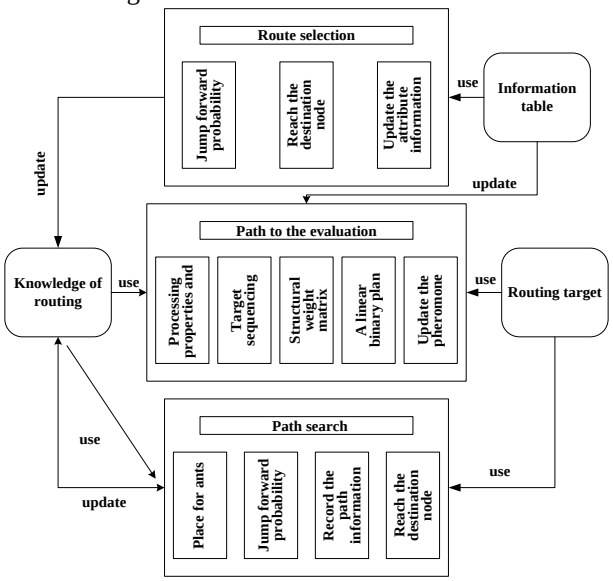

Figure.1. Functional Block Diagram Routing Protocol.

Route target is the entire network routing policy objective to be achieved or to follow the guidelines. According to the nature of the target routing protocol metric, route target can be divided into three categories: additive goals, multiplicative objectives and extreme (maximum and minimum) targets. In the opportunistic network routing algorithm, the most commonly used route targets including the transmission rate, delay, energy consumption, cache consumption and bandwidth. Corresponds to the above classification shows: latency, energy consumption, cache consumption targets are belong to additive target, transmission rate is multiplicative target, the bandwidth is extreme goals. The algorithm use the transmission rate, transmission delay and energy consumption ratio (once every successful delivery times need to consume forwarding) as the routing destination, organizing multi-destination routing's decision-making activities.

Formula (1) q is the evaporation coefficient, Δu is the time interval pheromone evaporation. Pheromone evaporation coefficient $q's$ size is directly related to the ant colony algorithm's size of the global search ability and convergence rate; while the residual pheromone factor $1-q$ reflects the ant strength of interaction between individuals.

The final routing algorithm is described as follows:

```
a.  ALGORITHM
b.  INPUT:GRAPH Topology<E,M,T>, NODE Source.
c.  OUTPUT:PATHPatls[l].
d.  PATH Patlrs[]
e.  Double parameters about ants
f.  INTEGER ;
g.  PHEROMONE Pheromones;
h.  DOUBLE Last Pher Weak←0, PHE_UPDATE_INTERVAL←12;
i.  IF(Sim Clock get Time 0-Last Pher Weak=PHE-UPDATE_INTERVAL)THEN
j.      Pheromones. decrease():decrease the pheromone periodically
k.          Last Pher Weak=SimClock. getTime()
l.  ENDIF
m.  FOR  TO N-1 DO//SEND ants to other nodes
n.  sendAnt();
o.  FOR m IN Source. get Message Collection() DO
p.      IF(m is AntMessage& &m, dest!=soure. id)THEN
q.          FOR c IN Source. get Conections() DO
r.              IF(c,choose()) THEN //choose the nest hop by random function
s.              ELSE
t.  Continue:
u.              ELSE
v.  Continue;
w.      ENDIF
x.   REPEAT
y.  RETURN Path[]s
z.  END SEARTH
```

Figure.2. Dynamic Topology Search Algorithm Pseudo Code.

4. Experimental Environment

This selected ONE(Opportunistic Network Environment Simulator) simulation software as an experimental simulation platform. To verify MODM protocol processing can distinguish different routing needs, experiment is made by trimming the weight of route target to achieve the effect of the route target adjustable. At the same time, we will be proposed MODM algorithm and First Contact (FC), Epidemic (ED) and Direct Delivery (DD) three typical DTN routing algorithm simulation experiments and comparative analysis of characteristics of different nodes (node cache size, node speed) for different route target (transmission rate, transmission delay) effects.

Shown in Figure 2, with the increase of node cache, the transmission rate and transmission delay will increase, because with the data packets' increase in the node carrying, the probability of data packet delivery to the target node also increases, but also because the data packet transmission delay increases retention. Compared with many routing algorithm, MODM algorithm will reach 300kB cache and after that showing relatively good performance. Not as many copies Epidemic algorithms, but it is better performance compared with Direct Delivery and First Contact of a single-copy routing.

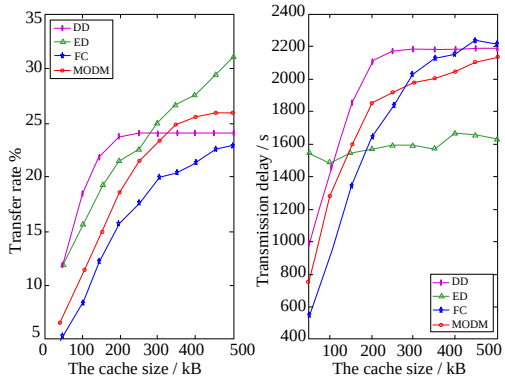

Figure.3. Route Target Is Variation With Node Cache Size.

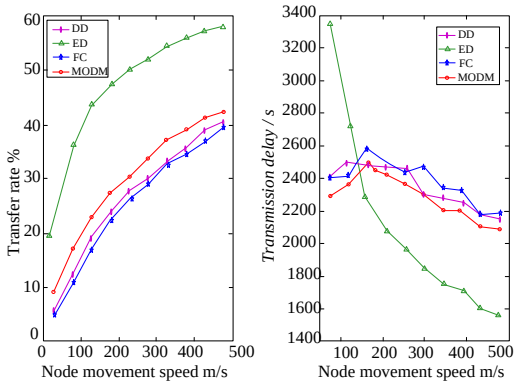

Figure.4. Route Destination Is Variation With Velocity Magnitude Of Node Movement.

Shown in Figure 3, moving speed increases, the transmission rate and transmission delay will be improved, as the nodes' moving speed increases, the encounter interval between nodes reduced, which will greatly improve the transfer rate, while reducing the transmission delay. In comparison with many agreements, MODM algorithm is also superior to other single-copy routing performance.

5. Conclusion

This paper analyzes the existing opportunity network's routing protocols, as well as multi-destination routing protocol's characteristic under other environments, gives the opportunity network's decision-making activity; research and gives a dynamic topology discovery based on ant colony algorithm, based on linear assignment France appraised path algorithm. In these studies, the design and implementation of prototype system based on ant colony chance multi-objective routing algorithm, and gives the experiments and analysis of results. Simulated experiment's results show that.

References

[1] KasmanSuhairi, Ford LumbanGaol, The Measurement of Optimization Performance of Managed Service Division with ITIL Framework using Statistical Process Control. Journal of Networks, Vol 8, No 3 (2013), 518-529

[2] http://dx.doi.org/10.1109/PIMRC.2011.6140008

[3] D. Xu, Z. Y. Feng, Y. Z. Li, et al. Fair Channel allocation and power control for uplink and downlink cognitive radio networks. IEEE., Workshop on mobile computing and emerging communication networks, 2011:591-596

[4] W. Q. Yao, Y. Wang, T. Wang. Joint optimization for downlink resource allocation in cognitive radio cellular networks. IEEE., 8th Annual IEEE consumer communications and networking conference, 2011:664-668

[5] Guang Yan, Zhu Yue-Fei, Gu Chun-Xiang, Fei Jin-long, He Xin-Zheng, A Framework for Automated Security Proof and its Application to OAEP. Journal of Networks, Vol 8, No 3 (2013), 552-558

[6] R. Berangi, S. Saleem, M. Faulkner, et al. TDD cognitive radio femtocell network (CRFN) operation in FDD downlink spectrum. IEEE, 22nd International Symposium on Personal, Indoor and Mobile Radio Communications, 2011: 482-486