# Ad hoc Network for Dynamic Multicast Routing Protocol Using ADDMRP

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***Abstract***—In this paper, we proposed a new MANET (Mobile Ad hoc Networks) technology of routing protocol. The MANET has a mobility formation of mobile nodes in the wireless networks. Wireless network have two types architecture: the Tree based multicast and shared tree based. The two kind's architecture of general wireless networks have difficult to solve the problems existing in the network, such as connectivity, safety, and reliability. For this purpose, as using that ADDMRP (Ad hoc network Doppler effect-based for Dynamic Multicast Routing Protocol), this study gives the following suggestion for new topology through network durability and Omni-directional information. The proposed architectures have considered the mobility location, mobility time, density, velocity and simultaneous using node by Doppler effects and improved the performance.

***Index Terms***—MANET, mobility, Ontology, Cluster, Routing protocol, Context-aware

## I. INTRODUCTION

MANET is a mobile wireless network composed of multi mobile nodes, likely to communicate among themselves without the intervention of centralized existing infrastructure.[1] Ad hoc wireless networks are self organizing and self-administering.[2] Also MANETs could conserve the node energy by delivering a packet over a multi hop path that consists of optimal links. While wide-scale deployment of MANETs become, several efforts are currently underway to standardize protocols for the operation and management of such networks. So that it can define fixable networks which are organized by genuine mobile Node and multi Node. It also can be called multi sensor networks. [3]

However, this Ad hoc network protocol has been study ing at the point of how to control the packets message with over head, bandwidth waste, priority authority of each nodes, and overlap selection of repeater nodes.

In this paper we discuss the factors which influence the transmission power conserving, and the interplay between routing (Routing to hop to hop) and the MAC (Medium Access Control) layer. It is required the power conserving for low routing overhead. Ad-hoc networks have some constrains such as power shortage and unstable wireless environment. PERPA (Power Efficient Reliable Routing Protocol) users a new routing cost metric which is a function of routing paths composed of nodes which can supply enough battery power transmitting data packets. Otherwise this metric suppor ts multi-hop delivery advantage, mobility prediction.[4]

One of weakness of mobile networks is that the routing path between source and destination is easy to be broken during communication. To solve this problem, in this paper we proposed an approach to select the routes which nodes have the most stable behavior. Another strategy aims at improving the route optimal procedure,

The proposed strategy is based on the density of the nodes in the neighborhood of a route and on the availability of nodes in this neighborhood. Thus the loc ation information of moving nodes is calculated to search stratum path and get the optimal path.

This paper also used the multi routing method based on Doppler Effect ontology. A new proposed protocol call to be ADDMRP (Ad hoc network Doppler effect-based for Dynamic Multicast Routing Protocol) is suggested to improve the routing of MANET.

Protocol generally follows the Context-awareness of rule-base on algorithms. And connectivity of optimized network has been improved between hop to hop and hop to multi hop. So architecture of method supported which location of mobility, density, and velocity value for ontology Doppler effect-based.

This paper shows the improvement for optimal path and reliability of the network, so these sections are composed as follows: section Ⅱ analyzed the problem of existing structures based on the multicast tree structure. In section Ⅲ, we describe the mechanism of the ADDMRP on MANET. Section Ⅳ give the result of simulation for optimized of path on the ADDMRP structure method. Finally, section V provides the conclusions.

## II. ANALYSIS THE MULTICAST ROUTING PROTOCOLS

There are several classes existing multicast routing protocols. One class is the tree structure based protocol such as: AMR, AMRIS. DDM, MAODV, MZRP, another class is the shared tree based or Mesh based protocol such as: CAMP, DCMP, FGMP, and ODMRP, such one more than node without detour through single

Manuscript received September 15, 2007.

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path node transfer data.

Therefore, the tree-multicast-based protocol using in wired network is shown as fig.1. When source nodes send data to destination node, the routing path is delayed through each path tree S1, S2 and S3, which recovery is performing such as node path cutting transfer on single node path.

There are routing path based on tree structure from source node S1 to destination node D1, D2 and D3 as shown in fig.1. Single path methods are single node S1, S2 and S3 send data to destination node D2 and D3. Each node requirement of send was optimized path. Because each source nodes are send data through one node to each node.

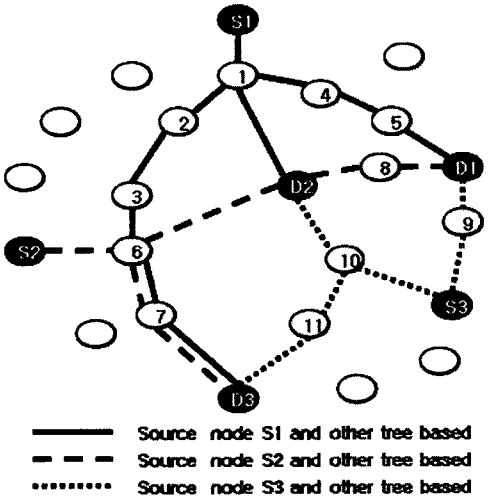



Fig. 1 Tree multicast based

As a result, tree multicast based topology is efficient to delay time for path. Also transmitted data from source node has less status with concentrate traffic to single node path in networks which transfer through tree path each repeater node 1,2,3,4,6,7,8,9,10 and 11. So this tree multicast based structure improved path delay time, data collision and control message.

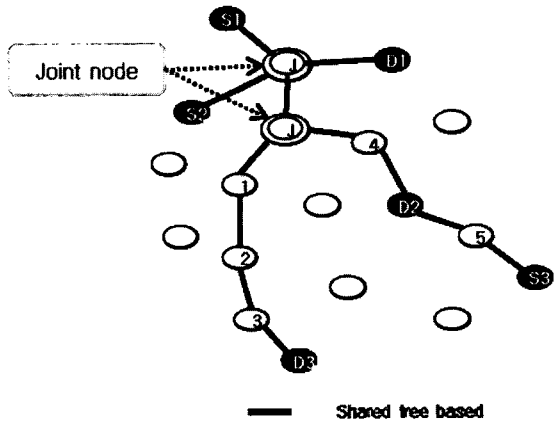



Fig. 2 Shared tree based

Fig.2 is proposed that shared tree based scheme which source node S1, S2 and S3 through "Ⓙ" node as same node paths. For example is source node S1 is through J node to D1 (Destination node). In case of source node S2 is through Ⓙ node, ④ and D2. Source node S3 is node ⑤, D2, ④, Ⓙ, ①, ②, ③ and D3. Shared tree based is free strategy node path. So this shared tree based strictures is point of optimized path sending data and organized of simple path because instead of method for shared and reduced delay path time. But this method of shared tree based has increased defect that path delay time, data collision and control message as like as tree multicast based.

It showed that AODV (Multicast operation of the Ad hoc On-demand Distance Vector routing protocol)[5]. OM(Overlay Multicasting). QoS (Quality of Service) and A re-route method for reliable data transport in Ad hoc Networks" [6] [7].

To solve this problem, a hybrid structure based on tree topology and mesh topology is suggested in this paper. This proposed protocol improves the QoS of the network based on the information of distance, velocity, direction value and density value. Otherwise, it will be reduced the path collision, control message, overhead between the nodes.

## III. DESCRIBE THE ADDMRP FOR MANET

According to propose method, the node direction, mobility, density, velocity and RF strength has basic structure as fig.3. This fig.3 shows the dynamic Doppler Effect architecture. Also express the mobility node has neighborhood node Ⓑ, Ⓒ, Ⓓ, Ⓔ and ⓝ from source node Ⓐ which full dynamic path as context awareness technology including Doppler Effect.

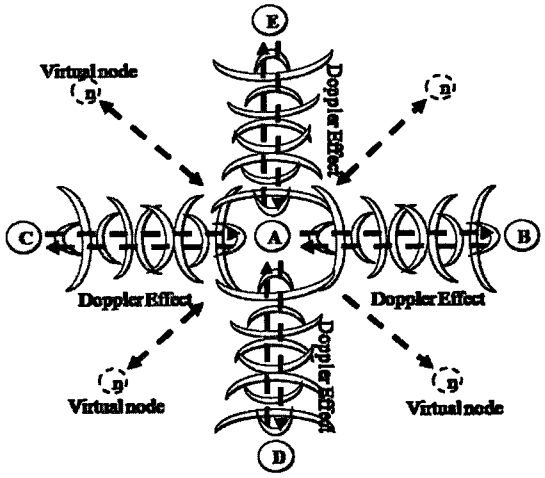



Fig. 3 Dynamic structure of Doppler effect- based

These source nodes have network process through the optimized path. At that time, Fig.2 showed that different method of occurrence direction when the source node and the neighborhood nodes has mobility. The fluctuation velocity values of the direction nodes on

the two sides have little difference direction path. The improved previous structure of fig.3 has shown that Mobility node of Doppler effected from source node Ⓐ to node Ⓑ, Ⓒ, Ⓓ, Ⓔ and ⓝ nodes that analyzed for reflection of node distance value and velocity value which observed for the each node information.

*A. Distance:*

The relation of receive time and receive time when the transmitted pulse hit neighborhood node Dt is shown as formula (1).

$$D_t = \frac{2R}{c} \tag{1}$$

Frequency speed $c$, number 2 is signal to until destination node as return length. Fig.4 showed that each path of nodes are arithmetic of reflected distance value between source node and destination node which source node A to B node, A node to C node and B node to A node as Doppler effect-based.

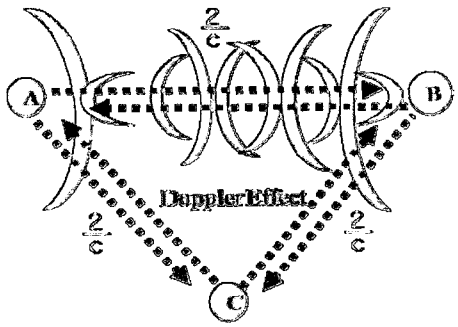



Fig. 4 Reflect distance method

*B. Velocity:*

When moving node is far from each other, it showed negative (-) appearance. But when closing to source node, it showed positive (+) appearance.

$$f_o = f_o\left(1 \pm \frac{d}{v}\cos\theta\right) \tag{2}$$

And the relation of the Doppler frequency $f_o$, frequency velocity $v$, and distance $d$ is shown as formula (2). Light wave did not existing physical medium as transfer circle. Thus it depends on wave source and relative velocity of observer. As fig.5, it express to node velocity between wave source frequency and observed frequency when wave source and neighborhood node(observer) active motion of relative velocity and straight line which relative effectiveness at same time. Thus it completed formulation (3):

$$F' = f * \frac{\sqrt{1-\beta}}{1+\beta} \tag{3}$$

$$\left(\beta = \frac{d}{v}\right)(v: \text{wave source})$$

Wave source node F' also it completed formulation (4) when wave source active motion to direction of $\theta$ angle.

$$F' = f * \frac{1-\beta\cos\theta}{\sqrt{1-\beta\cos\theta^2}} \tag{4}$$

Fig.5 showed that velocity factor has relativity with source node to destination node according to the (A), (B), (C) and (D). Source node "Ⓢ" has angle value to destination node Ⓓ which connected path. It showed that principal direction of the path from source node to destination node with radial velocity e. (B) shows the angle value from source node to destination node is 0 and cos0=1. In (B) case, the relativity between the source node and destination node will become strong path when the distance becomes farer from each other. (C) Have sector value 90 angle and cos90=0, in this case, the stability between source node and neighborhood will be intensified when velocity value low as source node to neighborhood node. (D) would appear difference value for different path connection and optimized path according to (A), (B) and (C) status.

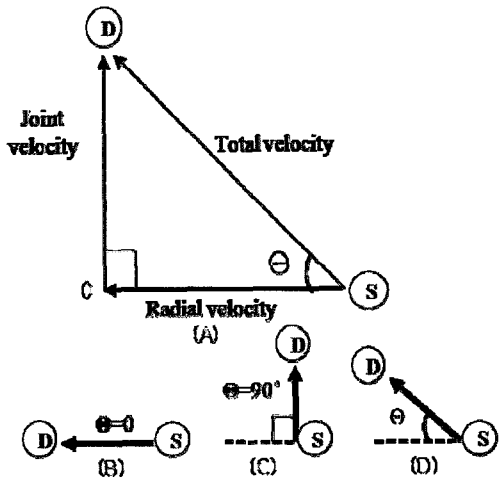



Fig. 5 Principal factors of velocity

Given case are follows virtual scenario of path connection probability based on velocity and distance which expressed situation as fig.6.follows:

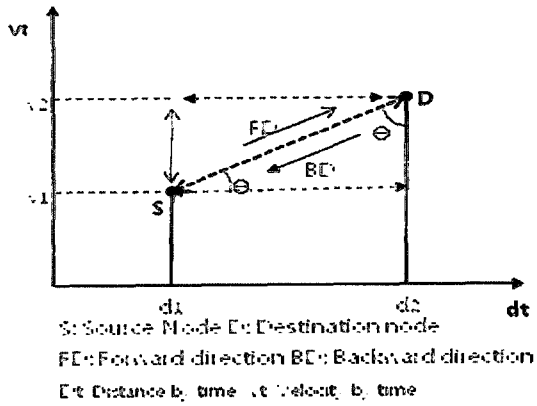



Fig. 6 Method of virtual scenario

▪ **Condition1** - source node/static neighborhood node/static

Distance between source node S and destination node D length $d_{SD}$ as follow formulation (5);

$$d_{SD} = \sqrt{(X_S - X_D)^2 + (Y_S - Y_D)^2} \quad (5)$$

Maximum length of Forward Direction FD is $FD_S$ as follow formulation (6);

$$FD_S = R_S - d_{SD} \quad (6)$$

▪ **Condition2** - source node/static neighborhood node/move

Radius length $BD_D$ of Backward Direction BD as follow formulation (7);

$$BD_D = R_D - d_{SD} \quad (7)$$

According to above formulation using that length of direction value $BD_D$ as follow formulation (8);

$$BD_D = R_D \cos\theta - d_{SD} \sin\theta \quad (8)$$

▪ **Condition3** - neighborhood node/move neighborhood node/move

Delivery length of Move Direction $MD_D$ as follow formulation (9);

$$MD_D = \min_0(FD_S, BD_D) \quad (9)$$

The node basic information is shown as Fig.7. It materialized optimized node path status between source node and neighborhood node through analyzing context awareness information. And also it processed high performance process of context-awareness.

| Node ID | Distance value | Velocity value | Transmitted time | Reflection time |
|---|---|---|---|---|

Fig. 7 Statement of basic node information

The connectivity is changing based on the node's condition because wave compressed process direction is either closing node's moving velocity or far node's moving velocity according to our virtual simulation method. It defined Doppler Effect when node's connectivity becomes high or low according to the density of node that status of connectivity sheet.

Thus, if the context-awareness is rule-based, multi context-awareness result value can be got due to if or then algorithms. The fig.8 has shown that high performance process of context-awareness which information of node ID, transmitted time, reflection time, distance value, Velocity value, and density value with status.

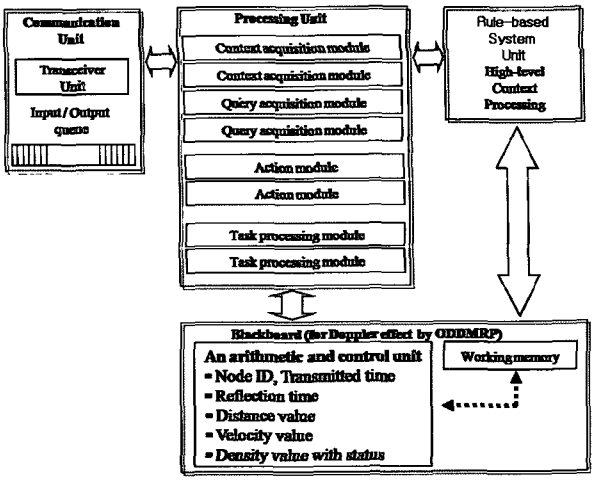
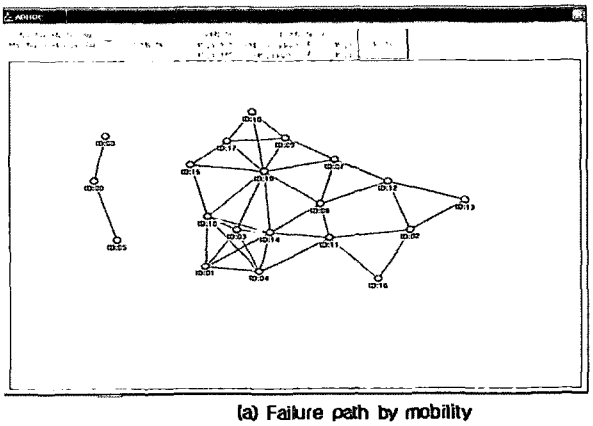


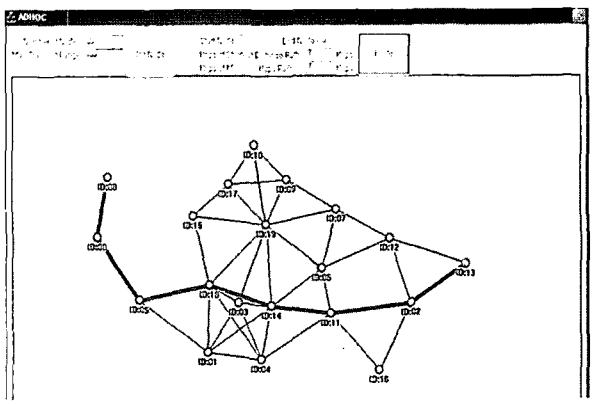

Fig. 8 High performance process for context-awareness

## IV. RESULTS OF PROPOSED METHOD

As fig.9, mobility network composed of random nodes is shown. This network contains 20 nodes in virtual status. The optimized ADDMRP protocol is shown is fig.9, (a) shows the failure path and (b) shown Repaired path.



(a) Failure path by mobility



(b) Optimized path by mobility

Fig. 9 Results of simulation for path

These optimized structures considered the distance value and from source node to destination and the

velocity value information of every node. Shortest hop and shortest distance can be got to improve the routing in MANET using ADDMRP. And this proposed protocol considered the node condition information which influences Doppler Effect such as density, distance, direction, RF strength and velocity. The proposed protocol contributed to improve reliability by keeping optimized path. And it improved the ad hoc network multicast routing.

Simulation kits of prototype showed as fig.10. It is used for small module design and Node sampling.

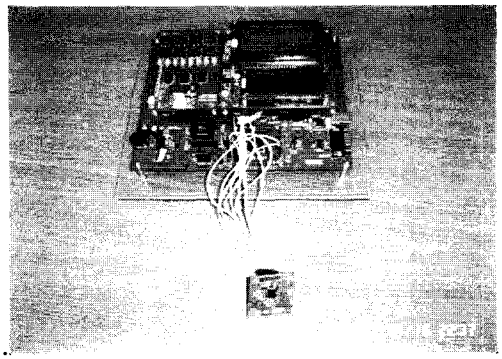


Fig. 10 Control board with node

## IV. CONCLUSIONS

This paper designs a new protocol ADDMRP (Ad hoc network Doppler effect-based for Dynamic Multicast Routing Protocol) to supply reliable routing path for ad hoc network. And the performance of ADDMRP is autonomic based on the distance, velocity, density, direction, and RF strength of nodes.

Our approached was ontology Doppler based on thorough analysis of the available mechanisms and simulation tools that take into optimal node path of service in mobile Ad hoc networks. Thus we introduced the concept of ontology Doppler effect-based and described how the network could exploit this method to improve the optimized Ad hoc network. The simulation results confirmed our hypothesis; the duration of node of path repair after a failure is optimized. In addition, our architecture drastically reduced that connectivity of node path, number of hop, collision of path and control message.

We also highlighted a situation of path that the ADDMRP could be obtaining to advantage and stable transmit path possible to optimize routing through scenario simulation structures. It has been improve that collect information on reliability of mobility network path and data transmit rate in face of increase density each node.

## ACKKNOWLEDGEMENT

This research was financially supported by the Ministry of Commerce, Industry and Energy (MOCIE) and Korea Industrial Technology Foundation (KOTEF) through the Human Resource Training Project for Regional Innovation.

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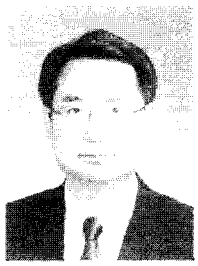

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