

Chapter 5

Realization of Route Reconstructing Scheme for Mobile Ad Hoc Network

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ABSTRACT

Mobile Ad Hoc Network (MANET) is a centerless packet radio network without fixed infrastructure. In recent years tremendous attentions have been received because of capabilities of self-configuration and self-maintenance. However, attenuation and interference caused by node mobility and wireless channels sharing weaken the stability of communication links especially in ubiquitous MANET. A mathematical exploring model for next-hop node has been established. The negative impact of wireless routes discontinuity on pervasive communication is alleviated by a novel route reconstructed scheme proposed in this paper based on restricting the route requirement zone into a pie slice region on intermediate nodes according the solution of the exploring equation. The scheme is an effective approach to increase survivability and reduce average end-to-end delay during route maintenance as well as allowing continuous packet forwarding for fault resilience so as to support mobile multimedia communication. The ns-2 based simulation results show remarkable packets successful delivery rate and end-to-end delay improvements of source-initiated routing protocol with route reconstructing scheme, and especially in the case of high dynamic environments with heavy traffic loads, more robust and scalable performance will be obtained.

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Mobile ad hoc network, always shorted for MANET, is a wireless self-organized network composed of heterogeneous mobile nodes, which can form any provisional topology freely and dynamically to make interconnect and interworking of any people and equipment available in environment without any infrastructure located in advance or those once existing have been destroyed. Since the nodes in a network of this kind can serve as routers and hosts, they can forward packets on behalf of other nodes and run user applications (Frodigh, Johansson, & Larsson, 2000).

With technology of embedded handheld terminal fast mature, MANET will be applied to fighter aircraft, battlewagon, tank, a single soldier, and cars, portable computers, PDA, cell phones *et al* as well (Zhang, CI, & Yang, 2005). As a peer-to-peer network, nodes in MANET are nomadic to create and demolish relationships with others, while being a data communication network, it should be set up and respond to topology changes rapidly enough to support multimedia communication. Different mobile styles and radio wave propagational conditions changing with time and position could cause the connection off and on between adjacent nodes in MANET, the result of which is making MANET a time-varying network (Rickenbach, Schmid, Wattenhofer, & Zollinger, 2005). One of the greatest differences of MANET from other ad hoc networks is the rapidly changing topology, impacted by scalability of network and mobility of nodes (Hean, K. O., Hean, L. O., Tee, & Sureswaran, 2006). There is a large span and hundreds or thousands of nodes are included. Great changes can exist inside the network, such as the nodes motion velocity, direction and so on. Compared to a lot of wireless networks, nontrivial challenges in MANET design and operation are derived from facts of lack of central administration, possibility of nodes moving and all communications lying on wireless medium (Forde, & Doyle, 2006). As wireless communication seems vulnerable in front of propagative damnification, there is seldom any stability in

connection. Hops are adopted in MANET due to transmitting scale of nodes is far smaller than that of the whole network. The information in routing tables is continuously upgraded. Such incessant network reconfigurations will cause a lot of control information exchanging frequently to reflect the current state of the network, which will make finite bandwidth a great waste by too much overhead (Cheikh, Claude, Guillaume, & Guérine, 2008). An exploring model for next hop is presented in this paper for the condition that when wireless link is unavailable. Based on the solution of the optimal exploring equation, a route reconstructing scheme is proposed to restrict requirement zone into a pie slice region on intermediate nodes, that is to say, when route from source to the destination is broken up, the routing discovery for optimal path to substitute initials from the upstream node rather than from the current one, the purpose of which is to improve survivability, keep data transmitting when a route is invalid, at the same time reduce overhead and delay in route reconfiguration, thereby realize route reconstructing performance. Actually, the scheme focuses on reducing average end-to-end delay on premise of maintaining connectivity to shorten the time for recovery.

OPTIMAL EXPLORING MODEL

Nodes mobility in MANET will cause network topology changing dynamically for sure, which is, to a great extent, a random rapid and unpredictable change. In wireless link environment, the necessary procedure to ensure robustness, reliability and effectiveness of network is to realize dependable communications between nodes.

The Optimal Exploration for Route

The optimal exploring theory is on how to find a target already existed, which is called exploring target, in an optimal way (Dimitrakakis, 2006).

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