An noval approach to enhance the AODV routing protocol when nodes or links fails

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Abstract— In 21st century networks act as backbone of world to perform various task given to it. Adhoc network (MANET) is major part of netwok.But MANET is a dynamic network without the fixed infrastructure due to their wireless nature and topology changes due to their dynamic nature .Among various protocol used as routing protocol in the MANET the AODV is most popular and widely used due to their various beneficial characteristics .But its beneficial characteristics will degrades when Nodes or links fails as it sends the error message back to the source and whole process is repeat again. In this paper we had successfully developed an protocol that enhanced the major drawback of AODV during its nodes and links fails as compared to previous proposed algorithms .And thus it will also enhances the feature like throughput ,reliability , security , packet size ,overheads ,traffic congestion.)

Keywords— Reactive, Proactive, Hybrid protocol, Ad hoc on demand distance vector (AODV) routing , Mobile Adhoc network (MANET),Take another best route(TABR) , Acknowledgement to intermediate nodes(ACKI), Acknowledgement to Source nodes(ACKS),Source(S), Destination (d),Next Best Route (NBR).

I. Introduction

Wireless networks can be broadly classified into infrastructure based wireless network and infrastructure wireless networks or Ad-hoc networks. In Ad-hoc networks, the nodes are mobile and routing between source and destination node is achieved by intermediate nodes acting as routers if it not in radio range. .As Ad-hoc networks are highly dynamic, routing protocols plays a crucial role to achieve quality of service .Other important factors to be considered in Ad-hoc networks are dynamic networks topology, frequency of network updates, scalability, security and energy required. Basically MANET[1] is a group of wireless computing devices like Laptop, mobile phone, Personal Digital Assistant (PDA) or similar devices. In Ad-hoc networks routing protocols are broadly classified into proactive (table driven) routing protocol, reactive (On-demand) routing protocols and hybrid protocols.

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In proactive routing each node in the Ad-hoc network maintains a table or tables containing routing information of the network. Any node that needs to transmit data can start transmitting data using routes already present in the routing table enabling immediate data transmission. Popular proactive routing protocols include Destination sequence distance vector (DSDV)[2]routing protocol ,Wireless routing protocol (WRP)[3] and Optimized link state routing protocol (OLSR)[3] .The advantages of proactive routing protocols is it update its routing table irrespective of data traffic.

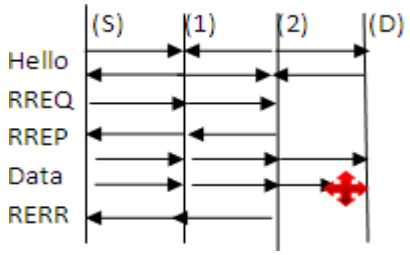
Unlike table driven routing protocols, Reactive protocols update routing information only when a route is required by a source node to transmit data .Reactive routing protocols reduce the control overhead which is advantageous in high mobility networks whereas periodic updates in routing information leads to significant increase in networks overheads even when there is no data transmission between nodes in the networks. Some of the popular Ad-hoc routing protocols falling in this category are Dynamic Source Routing (DSR)[4], Ad-hoc On demand Distance Vector (AODV)[4][5]routing and Temporarily Ordered Routing Protocols (TORA)[4].

II. AODV ROUTING PROTOCOL

AODV is an adaptation of Destination Sequenced Distance Vector (DSDV) protocol used in wired networks and overcomes the shortcomings of DSDV in wireless environment. AODV eliminates the counting to infinity problem faced in other distance vector protocols by implementing a sequence number. Unlike DSR which carries the entire route between the source and destination in the packet, the nodes in AODV carry only the next hop information corresponding to each data flow. Being a reactive routing protocol route is discovered as and when needed and the discovered routes are maintained as long as they are required.

A route discovery is initiated [6] when one of the nodes in the network wants to send a data packet to another node. If an active route is not available AODV initiates the route discovery process with the source node broadcasting a route request message (RREQ) to find a route to the destination. The route is

found either with the RREQ reaching the destination or an intermediate node in the network which has "fresh enough" route to the destination with the sequence number equal to or greater than the sequence number contained in the RREQ. Once a valid route is found it is made available by a route reply (RREP) message back to the originator of the RREQ. Once the route is established the nodes monitor the state of the links continuously. If a link breaks in an active route, a route error message (RERR) is sent to the other nodes of the link breakage. This initiates a new route discovery process.



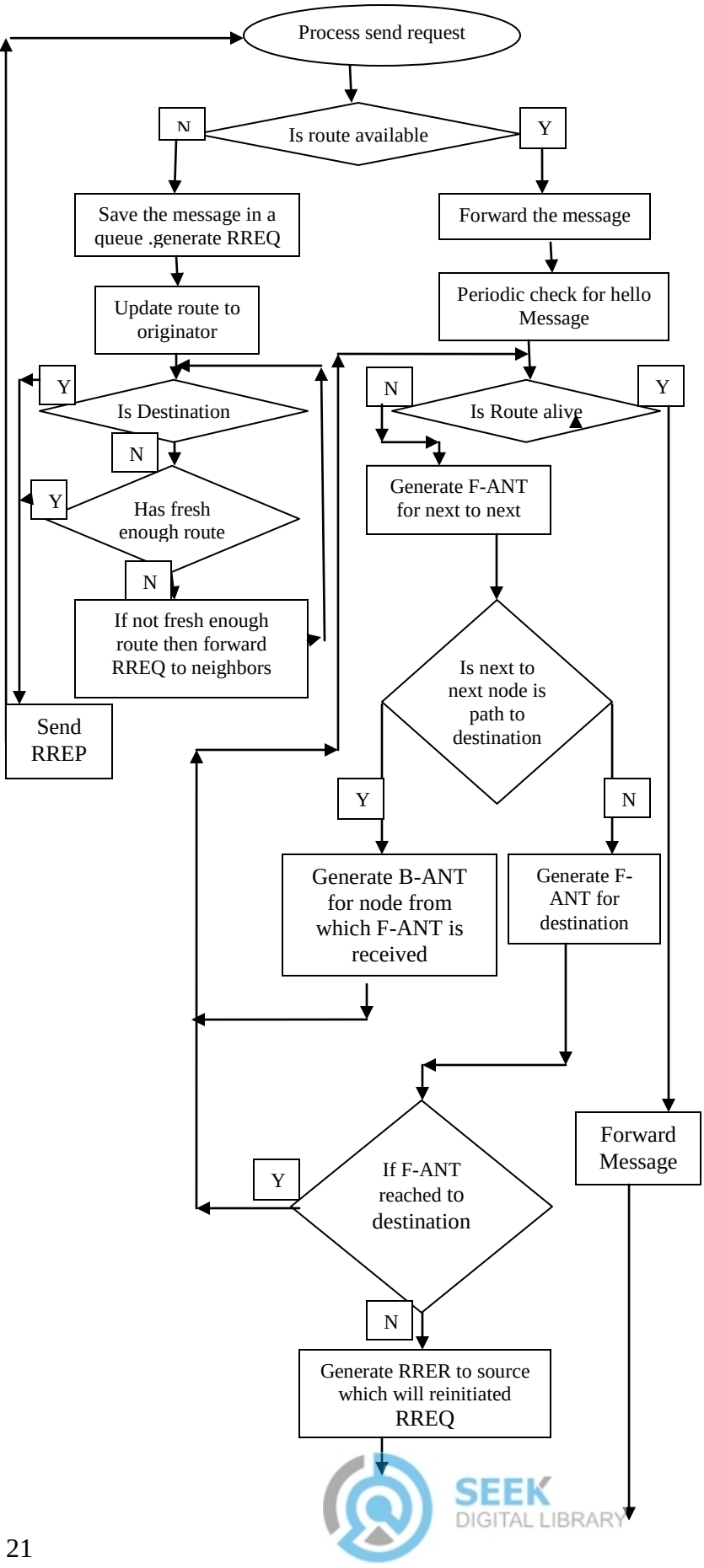
The advantages of AODV routing protocol is the selection of the least congested route instead of the shortest path. AODV supports both uncast and multicast data transmission. Performance is not drastically affected even if the topology changes continuously. Since source routing is not used, there are no additional overheads in the data[7].

III. THE PREVIOUS ARCHITECTURE AND THEIR PROBLEMS

After days of constant searching on AODV routing protocol when nodes or links fails we came across a research paper “On Demand Local Link Repair Algorithm for AODV Protocol”[8]. In this writer have introduced the new algorithm to handle the data packets at the time of nodes or links fails thus avoiding it to reach back to source for starting retransmission procedure but to carry forward the packet from the last node it received successfully.

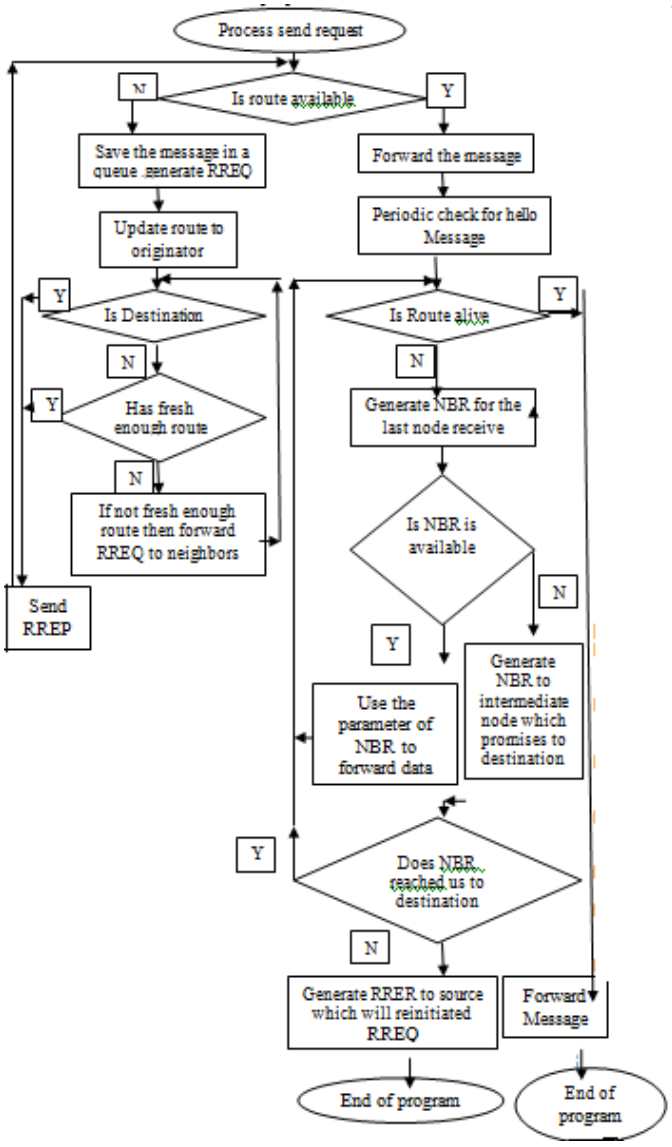
The major drawbacks with this architecture is that it enables each node to store address value of all the other node available in its neighbors and also of their neighbors (here use of pointer kind of variable is required to store address of node)which process extra timing as compared to the normal variable. As according to the writer of this architecture if nodes or links fails then also data packet follows same path but it jump using F-ANT procedures over the broken links or nodes. So thereby it only follows single path but that can be risky, no alternative path is available for data packet to switch to other. Basically they follows the procedure of Ant, as ant always take single route to transfer materials from here and their but if some obstacles comes in path then they climb that obstacles and again continue on that same path.

The previous architecture of them was as follows since they used two keyword in this architecture F-ANT(means forward ant) and B-ANT (Backward ant):



IV. PROPOSED ARCHITECTURE

The proposed architecture provides better handling procedure to handle the data packet at the time of nodes or links fails. As it based on the simple procedure or application taken from game (like football , hockey etc. not like cricket) or person travelling in bus in a city. These two application domain really deals with our present problem and also provides us solution to evacuate from it. By simulating them with AODV routing problem we would able to design a new architecture which is definitely achieve better performance than previous one. The proposed architecture is:



In order to evaluate the performance of the proposed architecture, we first implement both the AODV protocol architecture's using C++ and then execute them on an various processor equipped computer system running Windows 7 or Windows XP as an operating system. The common data set given as an input to both the architecture during implementation.

The table below contains the average execution time of both the architecture implementation. The average execution time is obtained by considering different path (but same on both architecture) and dividing it by total number of path considered .they is as follow:

Processor	*Previous Architecture (millisecond)*	*Proposed Architecture (millisecond)*
Pentium 4	15170	14504
Dual core	12940	11890
Core 2 duo	8570	7462
i3	4581	3896
i5	2504	2308

Acknowledgement

The newly proposed architecture really works well and providing better result when compared it with previous architecture. Basically when it comes to the network, its performance can be calculated on the basis of the time taken to deliver the data packet from source to destination. The proposed architecture not only deliver the packet fast (when nodes or links fails) but also enhance the features like throughput, reliability, security, packet size, overheads, traffic congestion. These entire things really make the proposed architecture better than previous one.

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About Author (s):

[I am Brijesh Soni as Research Scholar. This thesis is really helpful and efficient and on comparing with previous one its throughput is high under several condition which make it better. The design of newly proposed algorithm is being based on the games like Hockey, Football and also when a person travelling in Bus.]