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PAMP Routing Algorithm in Wireless Networks

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***Abstract* - Routing Algorithms for wireless networks with high convergence and optimal utilisation of the resources is the challenge to the researcher. PAMP algorithm attempts to find the multiple paths available with maximum routes utilised for the transmission of the data. It uses the constrained multipath in wireless networks. In addition, PAMP auto balances the load, is free from the loop formation with in the network and conserves the power of the wireless nodes whenever they are not either transmission and/or reception of the data packets. PAMP stands for Power Aware Multipath**

Keywords: *Routing, PAMP, Constrained Multipath, Load Balancing, Wireless Networks*

I. INTRODUCTION

Routing in wireless networks has seen a huge body of work over the last decade as networking researchers have been identifying diverse target environments such as mesh networks, mobile or vehicular ad hoc networks (MANETs), and disruption-tolerant networks (DTNs).

Wireless networks appear a lot in this era Communications. Wireless networks allow a more flexible model of communication than traditional networks since the user is not limited to a fixed physical location. These plays a major role in the data transmission. I focused on the following elements while designing an algorithm for the data packet routing in wireless networks

a. Convergence of the Algorithm
b. Optimality
c. Power Aware

II. RELATED WORK

The research work related to this topic done by other researchers thoroughly analyzed, the following conclusion drawn from it.

W.S. Alvin Valera and S. Rao[1] worked on the extension of existing on demand routing protocols that can provide recovery from route failures built on top of DSR, uses co-operative packet caching and shortest multipath routing to reduce packet loss due to frequent link breakdowns.

S.J.Lee and M.Gerla's [2] work results in the Dynamic Load Aware Routing Protocol (DLAR) that carries congestion information forward in route request packet, allowing destination to choose the least consgested path.

D.Bertsekas and R.G.Gallager[3] work provided the Optimal Dynamic Routing and its formulation as solution of an Optimized Problem.

S.Vutukury and J.J.Garcia-Luna-Aceves[4], an approximation approach to minimum delay routing provides a set of loop free invariant conditions

M.P.Zygmunt Haas and P. Samar's[5] ongoing work on the Zone Routing Protocol, which provides loop free paths in both reactive routing and proactive routing.

C.E. Perkins and P.R.Bhagwat[6] worked on proactive protocols. Their research work is related to Highly Dynamic DSDV Protocol, which incur a large routing overhead in order to maintain routes for all destinations.

A. Nasipuri and S.R.Das[7] proposed Extended DSR with an update in route discovery phase, they provide sources and intermediate nodes an alternative path during this phase.

III. OBJECTIVES OF THE ALGORITHM

The PAMP is a optimal, robust and a convergent routing algorithm with the following specifications

1. Multipath Routing Algorithm - the algorithm provides multipath between source and destination pair. The packets of the data between a Source-Destination pair moves through different intermediate nodes to reach the destination. All the data packets resequenced at the destination.

2. Automatic Load Balancing - the flow of load among the routes gets balanced due to the multipath routing.

3. Loop free paths – the proposed algorithm guarantees the loop free paths at every instant of converging algorithm.

4. Utilization of maximum available paths – it is proposed to utilize the most of the available paths in the network. In general there exist many unutilized paths in almost all the networks.

5. Conserving the power of wireless node through Beacon interval – Each node is characterised by the three states, i.e Data Transmission state, data reception state and idle state. Whenever the node is in idle state, PAMP conserves the energy of the wireless nodes and utilises the same for data transmission and reception.

IV. PAMP ALGORITHM

The functionality of the algorithm can be understood in this section.

a) Multipath: The main objective of the algorithm is to find a optimized route from source to destination by using constrained multipath and rate value. The paths which satisfy the rate, $r_{\{i1,i2,\ldots im\}}(s, d) \geq r_{Avg,}$ are known as constrained multipath, which enables that all routes are serve as utilized routes for either of (source, destination) pair. I maintain the neighbor set for source and destination so as to avoid the looping in the traversal from and/or with in (source, destination) pairs.
I am considering the rate, but not only either path length or delay as a base, which enables us to opt for the best available and optimum path/route.

First, estimate the delay values from the initialization process, where the exchange of messages between any two nodes is done with the timestamp. Using these I determine the delay values which are considered as approximate after verifying with some sample packet transfer. The rate, referred as the path length to delay ratio term can be determined by dividing

the corresponding path length with its delay. The algorithm only permit those multipaths for which the rate, $r_{\{i1,i2,\ldots im\}}(s, d) \geq r_{Avg}$.

b) Loop Free: PAMP uses the Neighbor Sets for source and destination, Modified Neighbor Set concept of earlier work [8] to achieve loop free paths in the network.

c) Power Aware: In order to conserve the power of the node, I propose to assign the states to the nodes and these states enables in conserving the energy of the mobile nodes. The following states will be assigned

State # 1 – represented by 00 indicates Idle State.
State # 2 – represented by 01indicates the data transmission.
State # 3 – represented by 10 indicates the data reception.

These states will be assigned and frequently updated by the StateUpdater(). Depending upon the state of the mobile node, the energy of the node will be conserved.

V. CONCLUSION

This work is the proposed theoretical concept in implementing the PAMP routing algorithm in wireless networks to be analysed on the Network Simulator – 2 and also on the test bed environment. The constrained multipath routing with power aware addition enable the mobile nodes to last for long time in the network.

VI. REFERENCES

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Table-1: Comparison of Multipath with PAMP

Algorithm/Protocol	**Procedure**
W.S. Alvin Valera and S. Rao *(built on the top of DSR)*	Shortest MutiPath Routes are utilised as supported by DSR.
Wardrop Routing *(STARA, M-STARA & P-STARA algorithms)*	Probability Update and Delay Calculation.
PAMP Algorithm	Constrained MultiPath routing, allows certain routes among existing multiple paths such that the maximum availability of the routes is guaranteed.

Table-2: Comparison of Loop free with PAMP

Algorithm/Protocol	**Procedure**
M.P.Zygmunt Haas and P. Samar	Provides loop free paths in both reactive routing and proactive routing.
Wardrop Routing *(STARA, M-STARA & P-STARA algorithms)*	Probability Update and Delay Calculation.
PAMP Algorithm	A loop free routing algorithm is employed to avoid loops.

Table-3: Comparison of Power Aware with PAMP

Algorithm/Protocol	**Procedure**
Minimum Total Transmission Power Routing *(MTPR)*	Calculate the total transmission power for all routes between source and destination. Select the route with minimum total transmission power among all routes.
Abdel fettah Belghith and Wafa Akkari *HANA Research Group* *National School of Computer Sciences (ENSI)*	Handshaking Information Tapping – improve the energy conservation without changing or requiring additional control or management frames. PSM relies on a handshaking procedure to announce data traffic before its transmission. This announcement traffic puts a heavy constraint on the sizes of both the ATIM window and the beacon interval and consequently on the network throughput, delay and power saving.
PAMP Algorithm	Using the Neighbor Set, Modified Neighbor Set concept the loop free routes are discovered.

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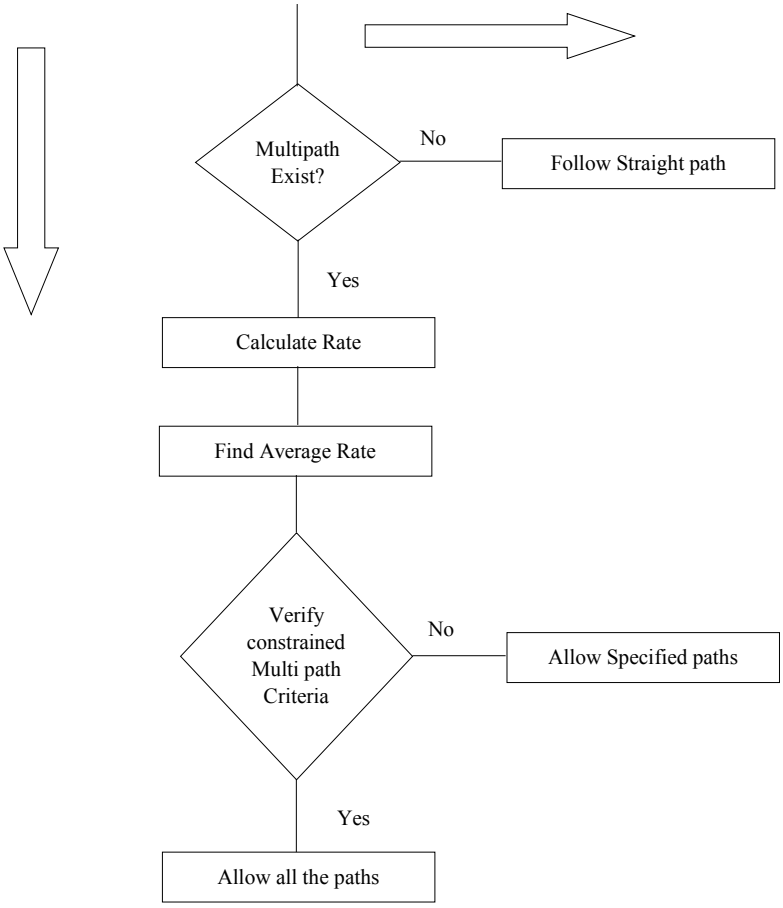

Fig.1 Multipath Flow Diagram

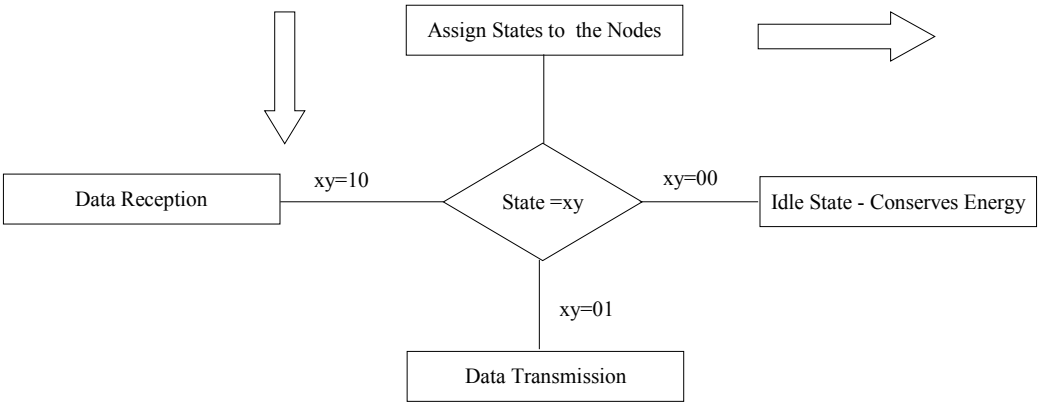

Fig. 2 Power aware (state) Flow Diagram

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