SUGHANTHI *et al*, International Journal of Computer Science and Mobile Applications,
Vol.3 Issue. 11, November- 2015, pg. 41-46 **ISSN: 2321-8363**

USING HYBRID GENETIC PSO IN QOD FOR HYBRID WIRELESS NETWORK TO OPTIMIZE THE COST

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Abstract:

Achieving QoS in real world transmission using wireless application is a tedious as well as most needed task. More researches are carried out to achieve QoS in wireless media. Next generation is moving towards a hybrid network, which is a combination of mobile wireless ad hoc network (MANET) and wireless infrastructure network. This hybrid network constitutes a better alternative for future generation. Hybrid networks inherit invalid reservation and race condition problems by directly adopting resource reservation-based QoS routing for MANETs. QOD protocol has been implemented to guarantee the QoS in hybrid networks. QoD protocol provides high QoS performance. In this paper hybrid genetic PSO based QoD protocol has been proposed, by using hybrid genetic PSO (practical swarm optimization) algorithm for nearest neighbour identification procedure. By using hybrid genetic PSO the computational cost is reduced. Thus providing, an economic hybrid wireless network. Experimental result shows that, the hybrid genetic PSO based QOD protocol shows enhanced performance with cost reduction than QOD.

Keywords: genetic, pso algorithm.

1. Introduction

The wireless network confronts a rapid development. It stimulates legion wireless applications which are used in many areas such as Commerce Department, emergency helps, military, education, and entertainment. There is lot of Wi Fi adequate to mobile devices letting in laptops and hand-held devices (e.g., smartphone and tablet PC) is rapidly increasing. The number of wireless Internet users has tripled in quantity for the last 3 years around world. This shows the necessity of the communication throughout wireless network. The far-flung usage of wireless and mobile devices increases necessitate for mobile multimedia system teeming services lead to a hybrid wireless network.

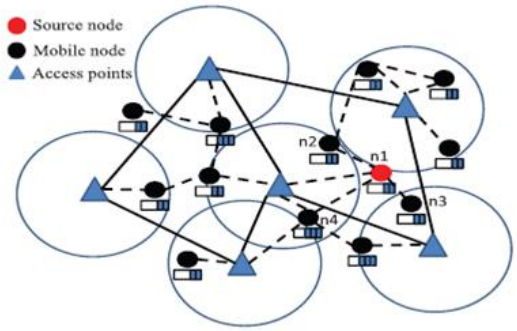

Fig 1. Architecture of Hybrid Network

Fig 1 shows the architecture of a hybrid network. For example, when a source node n1 wants to upload files to an Internet server through APs, it can opt to send out packets to the Aps straightaway by itself or require some neighbour nodes like n2, n3, or n4 to assist the packet transmission. There is a hastened need of good Quality of Service (QoS) support. Hybrid networks are constructed by combining wireless networks and MANETs. Specifically, infrastructure networks meliorate the measurability of MANETs, while MANETs self-organizing network which extends the coverage of the infrastructure networks [1]. How to ensure the QoS in hybrid wireless networks still remains a challenge. In order to enhance the QoS feature of hybrid networks, QoS-Oriented Distributed routing protocol (QOD) is utilized. QOD encloses five algorithms: 1) a QoS-ensured nearest neighbour selection algorithm to minimize transmission delay 2) to reduce the transmission delay, a distributed packet scheduling algorithm [2] is used. 3) A packet resizing algorithm modify the size of the packet based on the nodes' mobility.4) a traffic redundant elimination algorithm increases the transmission [2] output, and 5) a data repetition elimination-based transmission algorithm eliminates the replicating data for further improvement of the transmission QoS. It has following consequences.

1. In EDF algorithm, Task migration cost might be very eminent.
2. The performance of EDF drops in overloaded condition.
3. EDF requires to a greater extent of computations, thus increasing its cost.
4. Performs the task sequentially thus increasing the waiting time.

To overcome this, hybrid genetic PSO based QOD protocol is purported. Here hybrid genetic PSO algorithm is used for neighbour selection because it has flexibility in parameter selection, no derivative calculation and simpler procedure for implementation.

2. Related Work

Mobile ad hoc networking is challenging tasks due to the lack of resources reside in the network as well as the frequent changes in network topology. Although lots of research has been done on supporting QoS in the Internet and other networks, they are not suitable for mobile ad hoc networks and still QoS support for such networks remains an open problem. [11] Introduce a new definition of QoS in mobile ad hoc network, and suggested a cross-layer QoS model. Enhanced QoS-Oriented Distributed routing protocol with traffic awareness (TQOD) is in [4] proposed to upgrade the QoS support capability of hybrid wireless networks.

A generic distributed QoS adaptive routing engine (DQARE) architecture was introduced in [2]. DQARE architecture is furnished with three relevant traffic control schemes, namely, service differentiation, QoS routing, and traffic engineering. The main objective of this is to (i) provide a general configuration guideline for service differentiation, (ii) formalize the theoretical properties of different QoS routing algorithms and then introduce a QoS routing algorithm (QOPRA) based on dynamic programming technique, and (iii) propose QoS multipath forwarding (QMPF) model for paths diversity exploitation

3. Problem Statement

Proposed System aims to provide an efficient QOD protocol for the hybrid wireless network. The QoS-guaranteed neighbour selection algorithm is analysed and identified the pulls back of it. So hybrid genetic PSO algorithm is proposed. Here tasks are queued based on their deadline for task completion.

Hybrid genetic PSO identifies the processor which has less or no tasks and assigns task to processor. Because of this pre-emption will occur infrequently. Processor is used expeditiously. Since the process is performed on group of task, performance of algorithm will not reduce on overloaded situation. By this approach pre-emption cost is cut down, does not require derivative calculation which cuts down the cost of computation and the algorithm complexness is less which reduces the cost of run time. Thus the overall cost is reduced by the implementation of hybrid genetic PSO based QOD.

Secure QoS-Oriented Distributed routing protocol (SQOD) was suggested in [13] to upgrade the secure Quality of Service (QoS) routing in Hybrid wireless networks. SQOD contain two appliances: 1.QoS-Oriented Distributed Routing Protocol to reduce transmission delay, transmission time. And also enhance wireless network transmission throughput. 2. A new invasion-detection system for Hybrid wireless networks is implemented by Enhanced Adaptive Acknowledgement (EAACK). It prevents Hybrid wireless networks from attacks that have high malicious demeanour detection rate. Analytical and simulation result relies on the

important human mobility mode. SQOD will offer extremely secured performance in terms of Intrusion detection, overhead, delayed transmission.

QoS based routing protocol was purported in [1] with the goal of increasing QoS support in MANET communication. It integrates following: 1) a hybrid genetic PSO based neighbour selection algorithm to satisfy the transmission need 2) to reduce the time delay in transmission a distributed packet scheduling algorithm is utilized [2]. 3) A packet resizing algorithm alters the size of the packet based on the nodes' mobility. By depending on an observation, it has been show that, the hybrid genetic PSO based QOD protocol shows improved performance [2].

4. Hybrid Genetic Pso Based Qod

4.1 Network And Service Model Construction

A hybrid wireless network with related range of base stations spreading over the network is taken into account for this effectuation. N nodes are focusing on the network [2]. Assumption is made that, each node has 1 Wi Fi interface. Here, base stations are considered as access points (APs)[2]. APs and mobile nodes enable a communication via Wi Fi interface.

4.2 Neighbour Selection & Packet Scheduling

Hybrid genetic PSO algorithm is utilized to find the nearest neighbour in a better way. Further, the stream transmission time is brought down by distributed packet scheduling algorithm is taken for packet routing. The source calculates packet queuing time (T_Q) for each packet in an intermediate node, after receiving message's reply from intermediate nodes which has the scheduling details of all streams in their waiting line. Then the intermediate node is selected which satisfies following condition

$$T_Q < D_{QoS} - D_{SI} - D_{ID}$$

D_{SI} = Packet Size/ Source Nodes' Bandwidth
D_{ID} = Packet Size / Intermediate Nodes' Bandwidth

Let T_Q denotes the packet queuing time

D_{QoS} denote the delay QoS requirement
D_{SI} denotes the transmission delay between a source node and an intermediate node.
D_{ID} denotes the transmission delay between an AP and an intermediate node.
Packet Size denotes the size of packet.
W_S & W_I denotes the bandwidth of source node and intermediate node.

Here, for choosing of a neighbour (intermediate) node hybrid genetic PSO (Particle Swarm Optimization) algorithm is applied. T_Q and packets having earliest deadline is given as stimulus to the algorithm for discovering an appropriate neighbour. It allocates packets to the neighbour node which is given as output by hybrid genetic PSO algorithm. Selected neighbour will have long queue length or shorter queue length. Packet with earliest deadline will be put to the shorter queue length queue and tardiest deadline to neighbour having longer queue. Because of delay in transmission a packet stream can be reduced.

4.3 Packet Resizing

The larger size packets are assigned to an intermediate node having infrequent mobility and small size packets are assigned to an intermediate node having mobility in frequent nature [2]. This gains the QoS of packet transmissions. For this, packet resizing algorithm is used [2].

It calculates the new packet size based on the following equation

$$\text{Packet Size (new)} = \frac{\text{lamda}}{v} \text{Packet Size (unit)}$$

where Packet Size is packet size, lamada is a scaling parameter and v is the relative mobility speed of the source node and intermediate node [3] and Packet Size (unit) = 1 kb.

4.4 Packet Forwarding

To achieve the fairness in the packet forwarding, Least Slack First scheduling algorithm is used [3]. Packet ps' slack time is defined as

Slack time = current time - persisting packet transmission time.

An intermediate node calculates the slack time of each of its packets periodically and sends on the packet that has minimum slack time. If the same slack time value goes on for more than one packet, then randomly chosen packet is to be sent out.

5. Data Redundancy Elimination

By eliminate the data redundancy, QoS of the packet transmission in hybrid genetic PSO based QOD is amended. For this traffic redundancy elimination (TRE) is used in QOD. The AP and mobile nodes cache packets and overhear. By overhearing, the receiver of the packet will be known. The source node skims the message for duplicated chunks in its cache, while commencing to send a packet. If the duplicated chunks are identified by a sender and it knows receiver who has got this chunk before, then it replace the signature data by chunk. The signature value is computed by an algorithm named SHA-1. If the AP gets the chunk with the signature, it sends a message to the sender and replaces the signature with data chunk. Otherwise, the AP asks the chunk of the signature from the sender. By this approach, the sizing of the message is reduced further thus increasing QoS functioning of the system.

5.1 Performance Evaluation

The performance of QOD is compared with hybrid genetic PSO based QOD on the ground of number of packets transferred over a period of time. Fig 2& 3 shows the chart representation of number of packets transferred per time in micro second.

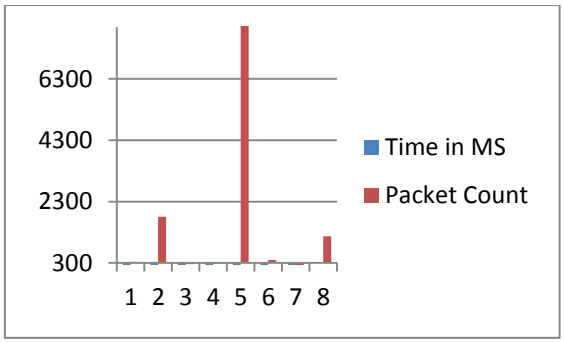

Fig 2. QOD Comparative Chart

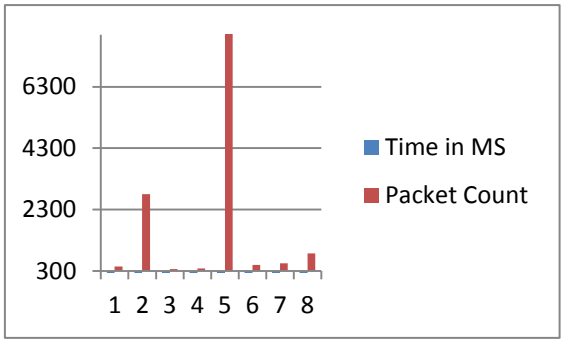

Fig 3 . PSO Based QOD Comparative Chart.

The rate of packet transfer is faster in hybrid genetic PSO based QOD. Increased transfer rate is achieved by avoiding the pre-emption of task. Hybrid genetic PSO effectively optimizes the neighbour selection process. Since packet transfer rate is faster and tasks' pre-emption is understated, recourse is expeditiously utilized, thus results in efficient task completion with less cost.

6. Conclusion

A hybrid network structure constructed by combing Wireless network and MANET. This hybrid structure is awaiting futures expectation. To meet the expectation of future need ie enabling communication at anywhere everywhere concept the hybrid genetic PSO based QOD protocol is proposed. Here for neighbour selection the hybrid genetic PSO algorithm plays a vital role by identifying an approximate neighbour by taking packets deadline value and the queue waiting time. Since hybrid genetic PSO does not involve in derivative calculation, its complexity is less and reduces the computational cost. It also minimizes the task migration thus reducing the task migration cost. The packet is performed based on the mobility speed of the node. Thus adds a value to the hybrid genetic PSO based QOD by assigning a large size packet to the less mobility node and small size packet to more mobility node. For early forwarding of a packet least slack first (LSF) scheduling algorithm is utilized. To minimize the bandwidth utilization, traffic redundancy elimination (TRE) algorithm is used. This eliminates the duplicates effectively by using SHA-1 value as signature.

Since there is reduction in computation, task migration, band width utilization and reduced waiting time for resource in a queue reduces the overall cost of the process. Thus achieving cost optimal wireless hybrid network with hybrid genetic PSO based QOD.

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