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CONGESTION AVOIDANCE USING BLUE ALGORITHM IN WIRELESS NETWORK

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ABSTRACT

In the existing system, the problem of TCP in MANET's environment is packet losses induced by network congestion. In case if congestion occurs it leads to the loss of data. In the proposed system, Blue algorithm is used for avoiding packet loss in TCP with wireless network based on checking size of queue. If the size of queue is maximum, gateway directly forwards the packet to destination through queue. If the size of queue is minimum, gateway compresses the packet and forwards the packet to destination with notification. Thus source node efficiently sends packet to destination via gateway and queue. The destination sends the acknowledgement to source via gateway. Gateway checks the acknowledgement. If acknowledgement is positive, gateway removes the packet from backup or if the acknowledgement is negative, gateway retransmits the packet to destination.

Keywords: MANETs, blue algorithm, gateway, queue, congestion control.

1. INTRODUCTION

A wireless sensor network is a collection of nodes organized into a cooperative network. Each node consists of processing capability (one or more microcontrollers, CPUs or DSP chips), may contain multiple types of memory (program, data and flash memories), have a RF transceiver (usually with a single Omni-directional antenna), have a power source (e.g., batteries and solar cells), and accommodate various sensors and actuators. The nodes communicate wirelessly and often self-organize after being deployed in an ad hoc fashion. Systems of 1000s or even 10, 000 nodes are anticipated. Such systems can revolutionize the way it live and work. Currently, wireless sensor networks are beginning to be deployed at an accelerated pace. It is not unreasonable to expect that in 10-15 years that the world will be covered with wireless sensor networks with access to them via the Internet. This can be considered as the Internet becoming a physical network. This new technology is exciting with unlimited potential for numerous application areas including environmental, medical, military, transportation, entertainment, crisis management, homeland defense, and smart spaces. In order to operate wireless systems efficiently, scheduling algorithms are needed to facilitate simultaneous transmissions of different users. Scheduling algorithms [7] for wireless networks have been widely studied since Tassiulas and Ephremides [2] proposed the max weight algorithm for single hop wireless networks and its extension to multi hop networks using the notion of back-pressure [4] or differential backlog. Such algorithms assign a weight to each link as a function of the number of packets queued at the link, and then, at each instant of time, select the schedule with the maximum weight, where the weight of a schedule is computed by summing the weights of the links that the schedule will serve. Tassiulas and Ephremides establish that the back-pressure algorithm (and hence, the max weight algorithm) is throughput optimal in the sense that it can stabilize the queues of the network for the largest set of arrival rates possible without actually knowing the arrival rates. The back-pressure algorithm works under very general conditions but it does not consider flow-level dynamics. It considers packet-level dynamics [12] assuming that there is a fixed set of users/ flows and packets are generated by each flow according to some stochastic process. In real networks however, flows arrive randomly to the network, have only a finite amount of data, and depart the network after the data transfer is completed. Moreover, there is no notion of congestion control in the backpressure algorithm. The papers show that some wire line networks could be still stable even without congestion control if buffers simply drop the packets when the queue overflows. However, most modern networks use some sort of congestion control mechanism for fairness purposes or to avoid excessive congestion inside the network [5]. Further, the focus of this paper is on wireless systems. There is a rich body of literature on the packet-level stability of scheduling algorithms, e.g., Stability of wireless networks under flow-level dynamics has been studied in, e.g. Here, by stability, the number of flows in the network and the queue sizes at each node in the network remain finite. Under flow-level dynamics, if the scheduler has access to the total queue-length information at nodes, then it can use max weight/back-pressure algorithm to achieve throughput optimality, but this information is not typically available to the scheduler because it is implemented as part of the MAC layer. Moreover, without congestion control, queue sizes at different nodes could be widely different. This could lead to long periods of unfairness among flows because links with long flows/files (large weights) will get priority over

ARPN Journal of Engineering and Applied Sciences

links with short flows/files for long periods of time. Therefore, congestion control to provide better Quality-of-Service With congestion control, only a few packets from each file are released to the MAC layer at each time instant, and scheduling is done based on these MAC layer packets. Specifically, the network control policy consists of two parts: (a) "congestion control" which determines the rate of service provided to each flow, and (b) "packet scheduling" [8] which determines the rate of service provided to each link in the network.

2. LITERATURE SURVEY

Ronghui Hou and King-Shan [2], a node may need to buffer a sent packet for decoding a packet to be received later. If sent packets are not forgotten smartly, much buffer space will be taken up. This unexpected packet dropping harms the final throughput obtained. To solve the problem, a transmission-mode pre assignment procedure and a scheduling procedure were used. Finally evaluate the efficiency of our algorithm through simulations from the perspectives of throughput and packet loss ratio.

T. Daniel Wallace and Abdallah Shami [1] CMT using the stream control transmission protocol (SCTP) used to enhance data communications. While SCTP is a new transport layer protocol supporting multi homed end-points, CMT provides a framework so that transport layer resources are used efficiently and effectively when sending to the same destination with multiple IP addresses. Two techniques are used, one is based on renewal theory, and the other uses a Markov chain. Resources like a shared receive buffer (RBUF). The Markov chain to be more accurate, but suffered from scalability issues, the renewal model was more cost effective, but also less accurate. This theory is applied our models to a new problem called congestion window management, where the size of each congestion window is reconfigured for optimal performance.

Tairan Zhang *et al* [10], which can achieve an optimal rate-reliability tradeoff by allocating proper network traffic and resources based on the idea of network utility maximization The DPCC uses the congestion and reliability prices and feedback information to dynamically adjust the users" data sending rate and the end-to-end data reliability in an OBS network. The performance of DPCC is evaluated and analyzed through simulations. Results verify that DPCC works very well in terms of its convergence and optimality. Moreover, compared with TCP, DPCC can achieve a maximum network utility a parameter which can be used to reflect the overall user satisfaction degree in a network. DPCC is scalable due to its distributed nature.

Fan Qiu and Yuan Xue [3] been proposed as an approach to fair resource allocation in wireless networks. Existing solutions usually favor a distributed cross-layer deployment that requires timely communications among network components in seeking system stability and global optimum. However, this is unrealistic with feedback delay and channel capacity perturbation. The stability and efficiency of this algorithm face significant challenges. In this paper, a robust joint congestion control and scheduling algorithm, i.e., ROCS, for time-varying multi-hop mesh wireless networks with feedback delay, to bridge the gap between the existing approach and the reality of wireless networks. The fundamental idea behind ROCS is capacity space projection, which combines the slow time scale part of the channel capacity and a margin estimated from the fast time scale part, to form a new capacity space. The resource allocation problem is formulated into a utility maximization framework over the newly generated capacity space. The problem is solved by a control algorithm consisting of link scheduling [9] and congestion control [7]. Link scheduling coordinates wireless link utilization and congestion control allocates flow rates according to feedback information. Experiments conducted over simulated and real-world traces demonstrate that ROCS substantially achieves robustness and efficiency.

Xuming Fang [13], Multihop cellular networks (MCNs) have drawn tremendous attention due to its high throughput and extensive coverage. For mobile stations (MSs) near the cell edge, co channel interference (CCI) becomes severe, which significantly affects the network performance. Furthermore, the unbalanced user distribution will result in traffic congestion and inability to guarantee quality of service (QoS). To address these problems, propose a quantitative study on adaptive resource allocation schemes by jointly considering interference coordination (IC) and load balancing (LB) in MCNs. This paper focuses on the downlink of OFDMA-based MCNs with time division duplex (TDD) mode, and analyzes the characteristics of resource allocation according to IEEE 802.16j/m specification. It designs a novel frequency reuse scheme to mitigate interference and maintain high spectral efficiency, and provide practical LB-based handover mechanisms which can evenly distribute the traffic and guarantee users' QoS.

3. SYSTEM ARCHITECTURE

In the proposed system**,** Blue algorithm is used for avoiding packet loss in TCP using wireless network based on checking the size of queue. If the size maximum, gateway directly forwards the packet to destination through queue. If the size minimum, gateway compress the packet and forwards the packet to destination with notification via queue. Thus source node efficiently sends packet to destination via gateway and queue. Destination sends the acknowledgement to source via gateway. Gateway checks the acknowledgement .If the acknowledgement is positive, gateway removes the packet from backup or if the acknowledgement is negative, gateway retransmits the packet to destination. The system architecture diagrams consist of five parts.

- Node construction
- Verification of size and data forwarding
- Data compression with notification

- Data backup based on acknowledgement
- Performance analysis

Blue algorithm

1. **for** Each packet transfer **do**
2. **for** check size of queue
3. **if** size of queue == Max **then**
4. transfer the packet to the destination via queue
5. **else**
6. based on the threshold value of queue compress the data and send to destination with notification via queue
7. **for** Each acknowledgement **do**
8. **if** acknowledgement == positive **then**
9. remove the data from gateway backup
10. **else**
11. retransmit the lost data

3.1 Node construction

In this Paper first construct a network which consists of „n" number of Nodes. So that nodes can request data from other nodes in the network. All nodes are connected in the network. Network is used to assign and store all the Nodes information like Node Id, and other information. Also network will monitor all the Nodes Communication for security purpose.

3.2 Verification of size and data forwarding

In this module, source nodes in TCP network sends the packet to destination node in wireless network through gateway and queue. So source node first forwards the packet to gateway. Same time two or more source node sends data to destination via gateway. That time congestion is occurs. So it avoids the congestion, gateway checks the queue size based on blue algorithm. If the size is maximum means, then gateway forwards the packet to queue.

3.3 Data compression with notification

In this module, gateway checks the queue size before packet forwarding. If the size is minimum means, gateway compress the packet forwards the packet to destination node with notification based on explicit congestion notification algorithm. After receiving the packet, destination node sends the acknowledgement to source node through queue and gateway.

3.4 Data backup based on acknowledgement

In this module, the gateway checks if the received acknowledgement is positive or negative. If the received acknowledgement is negative means, then gateway retransmits the data to destination node based on its backup file. Although if the received acknowledgement is positive means, then gateway removes the packet from its backup files.

4 SIMULATION RESULTS

Simulation results consist of two parts such as comparison graph and screenshots.

4.1 Comparison graphs

The graph exhibits the comparison between the x axis and y axis, where x axis is packet delivery ratio and y axis is time. Data transmission with acknowledgement trace has been increased with respect to the threshold process trace. Data transmission with acknowledgement is more when compared with the threshold process is shown in the Figure-2. The graph exhibits the comparison between the x axis and y axis, where x axis is Throughput unit in mbps and y axis is Time unit in seconds. This graph provides Blue algorithm trace and Notification Trace. It is seen that throughput for the network has been increased when blue algorithm has implemented is shown in the Figure-3. The graph exhibits the comparison between the x axis and y axis, where x axis is End to End delay which is Latency and Y axis is time in Seconds. This graph provides Delay Trace and Negative acknowledgement trace. Delay and negative acknowledgement has been reduced in this module is shown in the Figure-4. The graph exhibits the comparison between the x axis and y axis, where x axis is Network efficiency or Network Performance and y axis is Time in second. It shows TCP transmission trace and UDP transmission trace. The packet transmission rate is increased by using Blue Algorithm in this project can been seen in below graph is shown in the Figure-5.

Node Construction in a Network is arranged file is shown in Figure-6. Data loss in wireless network is shown in Figure-7 Retransmission of packet is case of data loss file shown in Figure-8.

5. CONCLUSIONS AND FUTURE WORK

Our constraining assumptions regarding the congestion control mechanisms are very mild and compatible with the standard implementations like TCP. It is observed in the context of multiclass queuing systems that a fixed congestion window size implicitly solves an optimization problem in an asymptotic regime. It would be interesting to investigate how the congestion window dynamics and the links weights impact the system QoS performance for wireless networks. Our simulation results show that log-differential link weights, with a fixed congestion window size, reduce the file transfer delays. It will be certainly interesting to establish the validity of such an observation rigorously as a future research.

In a future work, it intends to carry out more simulations to investigate other performance metrics such fairness and friendliness of TCP. Our simulation results show that log-differential link weights, with a fixed congestion window size, reduce the file transfer delays. It will be certainly interesting to establish the validity of such an observation rigorously as a future research.

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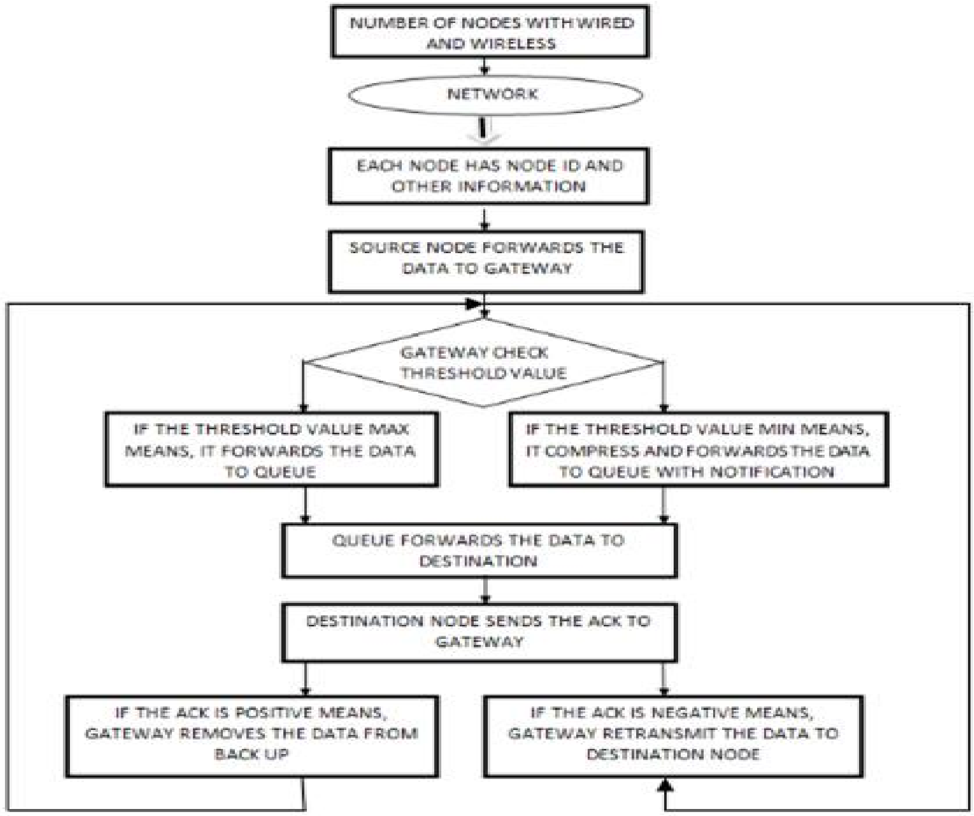

Figure-1. System architecture diagram.

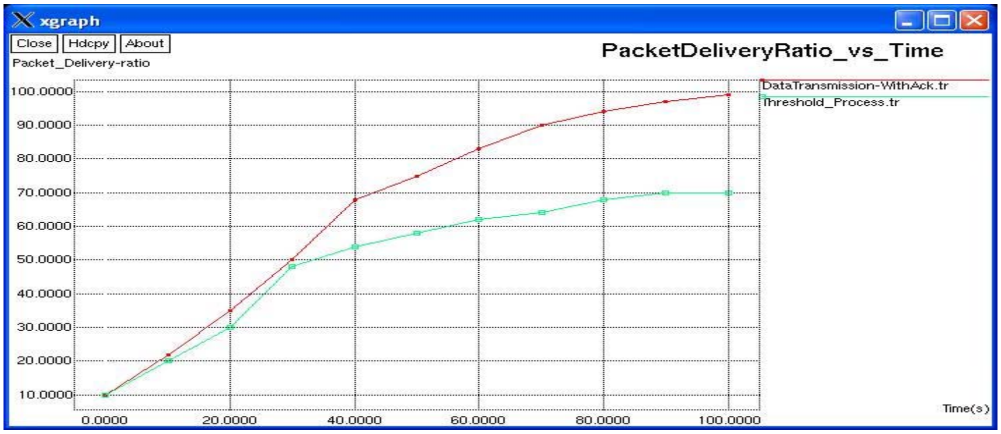

Figure-2. Packet delivery ration vs. time.

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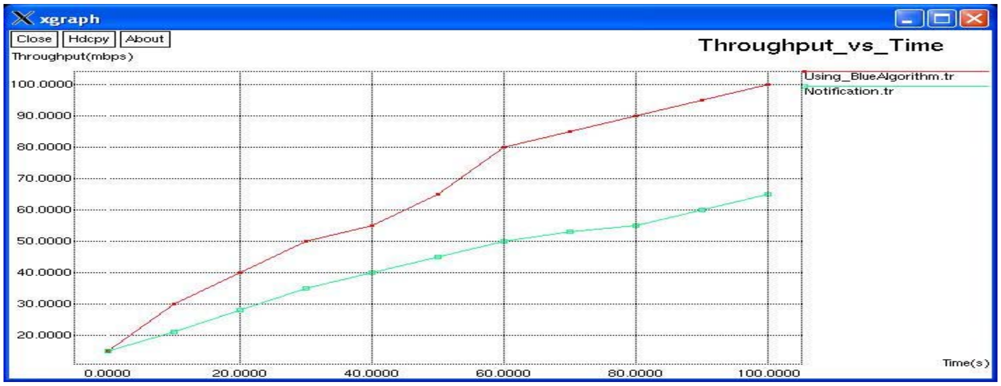

Firure-3. Throughput vs. time.

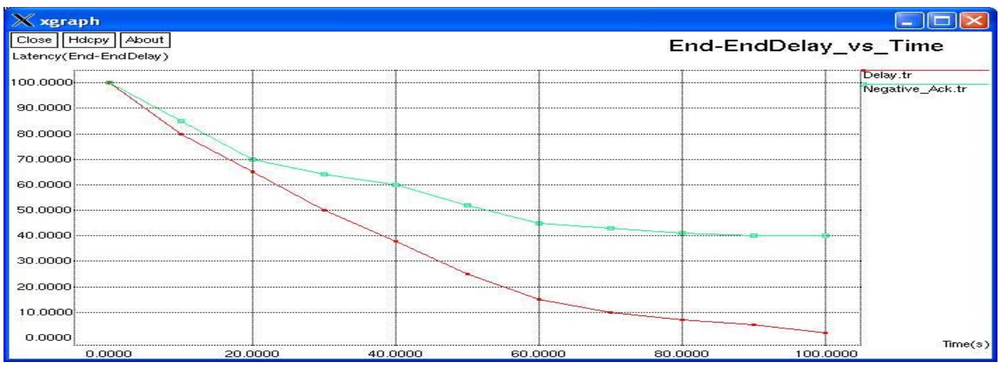

Figure-4. End to end delay vs. time.

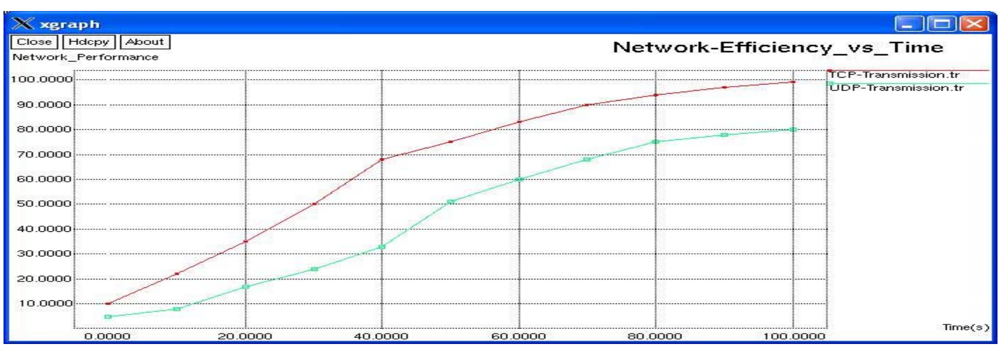

Figure-5. Network efficiency vs. time.

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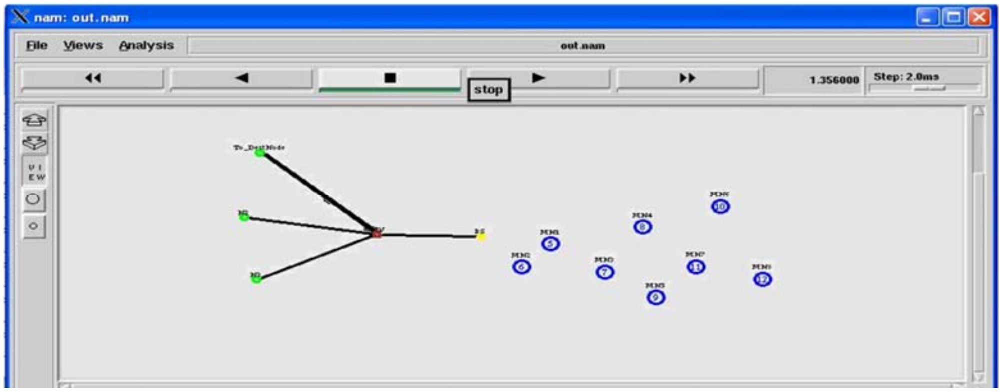

Figure-6. Node construction in network.

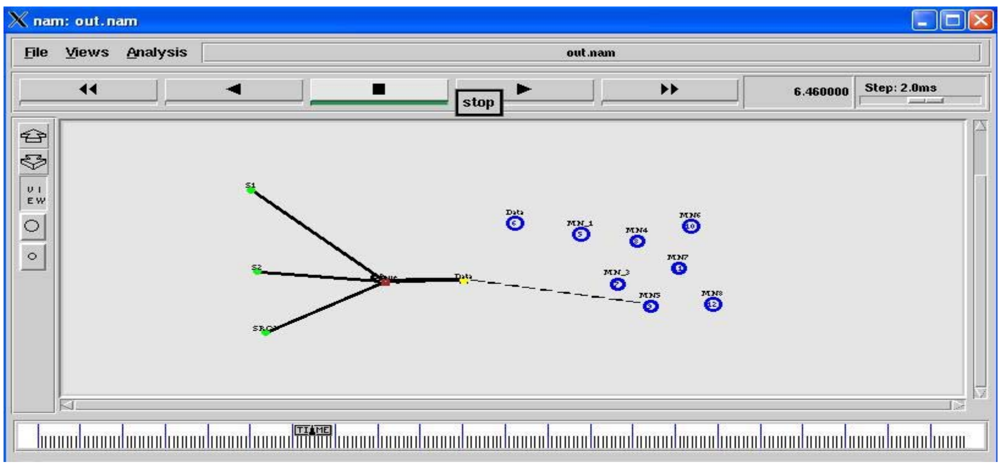

Figure-7. Data loss.

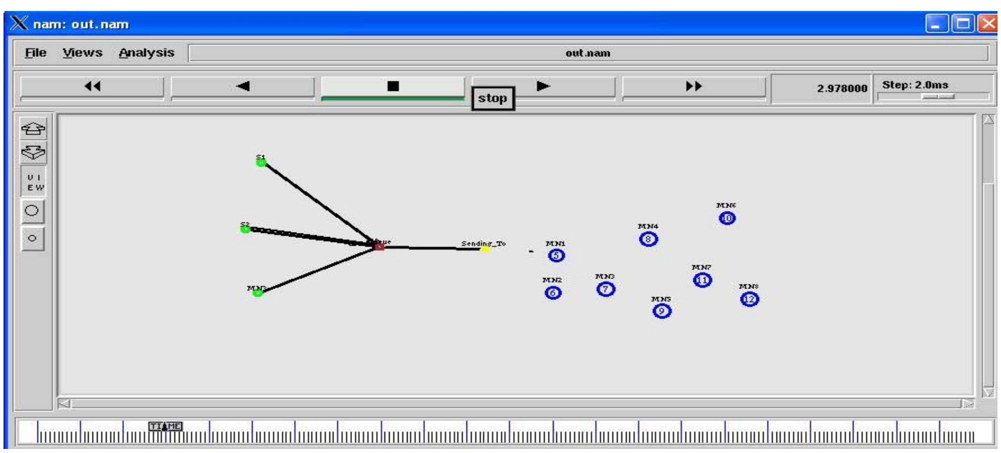

Figure-8. Retransmission of packet.

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