

**A Review on Multiple Channel allocation in Mobile Ad hoc Networks**

Chandra Kanta Samal,

University of Delhi, New Delhi, India,

Abstract:- When a mobile nodes to join in the network no knowledge of the current state, while node leave and join in the network to inform the other nodes. The algorithm assigns time slots randomly to nodes with no prior knowledge of network topology. Frames are decomposed into reservation and information sub frames. All nodes compete in the reservation sub frame to reserve a time slot in the corresponding information sub frame. We focus on avoiding collisions but attention to reducing redundant rebroadcasts and broadcasting latency problems. In this paper we comparative study of the TSCP and NABS algorithms for slot allocation among mobile nodes. As per the simulation results of TSCP, we find the random nodes are simultaneously integrated for transmission schedule in the network and increasing network size more node are integrated. The NABS algorithm, if we use minimum time slot then the frame length schedule is minimum to improve the channel efficiency in the network.

Keywords:- Slot assignment, Channel efficiency, Interference, Broadcasting latency problems, Transmission schedule.

1. INTRODUCTION

A MANET is a collection of mobile nodes that they communicate to each other without the base station. If a source node is unable to send a message directly to its destination node due to limited transmission range, so the source node uses intermediate nodes to forward the message towards destination node. Hence, a multi hop scenario occurs, and several nodes may need to relay a packet before it reaches its final destination [6]. In wireless networks, broadcast plays an important role, relaying a message generated by one node to all other nodes. Broadcast is an integral part of a variety of protocols that provide basic functionality and efficiency to higher-layer services [8]. In multi-hop environment, mobile nodes depend to each others when they are communicated. It is a distributed network, nodes frequent connectivity changes, due to mobility of nodes and high demand on channel access protocols. Mobile nodes transmission on broadcast using omni directional antennas, then MAC protocols are required to transmissions among the mobile devices to avoid multiple access interference. One type of MAC protocols used in ad hoc networks is called contention based protocols. So this protocol lead to poor performance under heavy traffic loads but unable to guarantee regular access to the channel.

Another type of protocols to use on the channel for transmission is called transmission scheduling protocols [9], this protocol to make transmission schedules in which each mobile device is assigned transmission slots because to avoid contention for the channel and reach the intended receiver mobile host. It is possible in transmission scheduling protocols to guarantee for quality service of channels because mobile nodes can reserve regularly to assigned time slots. So transmission scheduling protocols can provide contention free and link level broadcast service available in mobile ad hoc network. However many transmission scheduling protocols suitable for static network topologies, it is not reliable in distributed network because of topology regularly changes in wide area network [9]. The initial slot assignments among the mobile nodes while transmitting on that time collision occur, when new link detects for joining or removes in the network in that case again the initial slot assignments. Many transmission scheduling protocols are proposed to improve the channel efficiency [3]. We focus on avoiding collisions but attention to reducing redundant rebroadcasts and broadcasting latency problems.

2. TECHNICAL APPROACH

In this section we review of Transmission Schedule Construction Protocol [9] and New Adaptive Broadcast Scheduling Protocol [3] that the transmission issues of multi channel access control in multi-hop of mobile ad hoc network. These protocols have designed a transmission schedule among mobile nodes while broadcasting in the network.

2.1 TRANSMISSION SCHEDULE CONSTRUCTION PROTOCOL (TSCP)

The advantage of this protocol is 100%, random nodes are simultaneously integrated for transmission schedule in the network [9], if nodes radius range is fixed in that case interference will be decreased (i.e. Hidden and Expose problem). If we are increasing network size more node are integrated. The transmission scheduling construction protocol is using in mobile ad hoc networks. When a terminal boots and want to join in the network at that time no knowledge about network's current state,

the new terminals first detect the network, if the channel frees then the new terminal to join in the exiting network and informs acknowledgement to other neighbor terminals of its presence and transmission for exchanging information with them. This process transmission it can make collision free broadcast transmissions. Transmission scheduling protocols make it possible to guarantee quality of service because when mobile nodes are transmission on the channels, we first slot reservation between mobile nodes and using a First in First Out method. After reserving all slot of the frame to form a frame schedules in regularly process to avoid contention for the channels or information reach the intended receivers. Broadcast scheduling protocols that can provide congestion free link level transmissions in a mobile ad hoc network. When the new terminals transmission based on knowledge of 1-hop or 2-hops away, which is decide whether or not to transmit in the network. So transmission scheduling decisions made on the basis of knowledge of local information, there is no need for a single mobile node coordinates the transmission to whole nodes in the network, control can be distributed to individual mobile nodes [14].

We use the transmission scheduling protocol for initial slot assignments and new terminal join in the network. When mobile nodes move and leave in the network, the new terminal (power down, enter a sleep mode, or affiliate with a different network of topologies), or mobile node join in the network (booting or wish to start processing for participating in the networking protocols), the transmission schedule protocol must be adapted to maintain congestion free transmissions [9]. The scheduling protocols monitoring the channels, if any changes require adapt the schedule accordingly to congestion free and maintain high channel utilization [9]. The new terminals initially want to join in the network, no knowledge of its 1-hop neighbors or network timing. The terminal can monitor the channel to detect the network timing of transmissions but we are still facing with a daunting task forming a new link requires not only terminals on both ends of the link to adjust their transmission. Assuming if the new terminal has n 1-hop neighbors, the terminal must have established communications with each 1-hop neighbors. If n 1-hop neighbors are larger than two or more then the overhead required to adjust the transmission schedules with dynamic protocols in that case is unacceptable. These types of problem solved by the transmission schedule construction protocol. The transmission schedule construction protocol (TSCP) is designed to enable a single terminal to integrate to an exiting network by constructing a collision free transmission schedule. The transmission schedule to check what changes are required at its 1-hop neighbors after that to make a transmission schedule.

We describe the TSCP for a new terminal how that is ready to determine its 1-hop neighbors and initiate to communicate with them. The operation of the neighboring terminals of the new terminal is mentioned. The TSCP protocol is that a collection of arbitrarily distributed terminals can self organize into a network. The TSCP actions divided into three phases.

- **Phase 1.** The new terminal when joining a network detects the terminals that will be its 1-hop neighbors. The first step requires a terminal to remain in the receive mode to know about as many neighbors as possible through overhearing packets and waiting for an initiate the protocol. The next step iterative process to try and contact as many of its neighbors as possible to establish a temporary polling schedule [9].
- **Phase 2.** The new terminal establishes a temporary transmission schedule to detect each of its 1-hop neighbors and it has identified to collect state information.
- **Phase 3.** The new terminal selects a color number and creates a transmission schedule for it determines if any of its 1-hop neighbors need to change their color numbers. The color number of the new terminal and its 1-hop neighbors is forwarded to the new terminal's 1-hop neighbors. Each 1-hop neighbors forwards a control packet to its 2-hop neighbors but a 2-hop neighbor does not need to change its color number. However it forwards a control packet to its neighbors, if it has checked of a new color number from any of its 1-hop neighbors [9].

NEW ADAPTIVE BROADCAST SCHEDULING ALGORITHM (NABS)

In adaptive broadcast scheduling, a central computing center is not maintained. Instead, each node maintains the state information record. Each node constructs this record by collecting information from its 1-hop, 2-hop neighbors. It is a dynamic protocol. The nodes are high mobile and it is 100% reachable within transmission range of the network. The NABS algorithm uses minimum frame length and maximum channel utilization for the network [3]. Its interference decreases when the schedule communicates on the network.

The state information record INFO contains the following details:

1. Node id.
2. List of 1-hop, 2-hop neighbors and their slots information (Local State Information).
3. The list of nodes out of its neighbor's transmission range and their slots information are updated in a record called OUT.

4. The current frame size.
5. The current maximum slot number.
6. The degree of the network.
7. The max hops distance of the network.
8. The network connectivity.

2.2.1 PROCESS FOR REGISTRATION

The purpose of the registration process is to make the new node known to all its 1-hop, 2-hop neighbors. If two or more nodes at a hop distance of one or two are willing to join the network, then only one of them succeeds through the registration process. A node that succeeds the registration process is called a Monitor. A node reserves the Broadcast-mini slot, if it does not, it will join the network [3]. If node B too wishes to join the registration process, it has to wait until A completes the registration process and become the monitor.

If a joining node A identifies an empty broadcast-mini-slot, it requests for registration by sending the request control packet in request- mini -slot. If A did not detect any collision when it was broadcasting its control packet and if it observes an empty collision - mini-slot, then A understands that none of its 1-hop, 2-hop neighbors is making a request for registration process. Hence A reserves the monitor-mini-slot by passing a monitor control packet. If none other than A had claimed to become the monitor, A becomes the monitor and the registration process ends [3].

2.2.2 PROCESS FOR RESOLUTION

Resolution is the process of collecting the local information, preparing a conflict-free schedule and run the schedule. The procedure registration guarantees that no two monitors are at a distance of 1-hop, 2-hop. With the coordination of the non-monitor nodes the resolution process allows no two monitors to run the scheduler at the same time. The non-monitor nodes analyses the information in the packets and accepts the monitor, this has higher priority as its head. Once this acceptance is received from all of A's 1-hopneighbors, A sends the acknowledgement to its 1-hop neighbors.

The 1-hop neighbor's node reset the state information about its new neighbors; they transmit the same to its 1-hop neighbors. Calls the NABS protocol to calculate the slots and then runs the new schedule [3]. The remaining monitor nodes are suspended from transmitting until the resolution process completes and A un-reserves the broadcast-mini slot. The NABS protocol is better computes the slot assignments, this algorithm minimizes the TDMA frame length and maximizes the channel utilization.

3. SIMULATION RESULTS

We had simulated the TSCP and NABS algorithms in GloMoSim v2.03 and compare the simulation results.

3.1 SIMULATION CONFIGURATION SETUPS

This section briefs about the simulation parameters and configuration file (config.in). In the simulation we have taken the physical terrain area in which nodes are being simulated is 2000 * 2000. The simulation time is being taken at 600 seconds and the seed value is 1. The number of nodes being varies in between 50 to 150 nodes and transmission range varies from 100m to 350m. The node placement is taken as UNIFORM, where the physical terrain is divided into number of cells within each cell the nodes will be placed randomly. Mobility parameter is taken as dynamic and nodes are free to move in the physical area of the network [16]. The only available mobility model in GloMoSim v2.03 is the *Random Waypoint Mobility Model* (RWPM) [15]. In this model a node is randomly selects a destination from the physical terrain, and then moves in the direction of the destination in a speed uniformly chosen between MOBILITY-WP-MIN-SPEED (0) and MOBILITY-WP-MAX-SPEED (30) parameters. After it reaches its destination, the node stays there for a MOBILITY-WP-PAUSE time period given for 60 seconds. For Path-loss model we have taken as PROPOGATION-PATHLOSS TWO-RAY model for free space between near earth and place path loss. NOISE-FIGURE is 10.0 and TEMPRATURE at 290.0, RADIO-BANDWIDTH is 2mb/s and edge 500m. To transmit and receive packets the RADIO-ACCNOISE standard radio model was taken into consideration. Radio packet reception model SNR-BOUNDED i.e. is if the Signal to Noise Ratio (SNR) is more than RADIO-RX-SNR-THRESHOLD which is taken as 10.0 (in dB), it receives the signal without error. Each nodes radio transmission power is defined at 10.0 dbm. Medium Access Protocol (MAC-PROTOCOL) is 802.11 and set PROMISCUOUS-MODE as "NO". For NETWORK-PROTOCOL the only currently available default value is 'IP'.

3.2 SIMULATION RESULT ANALYSIS

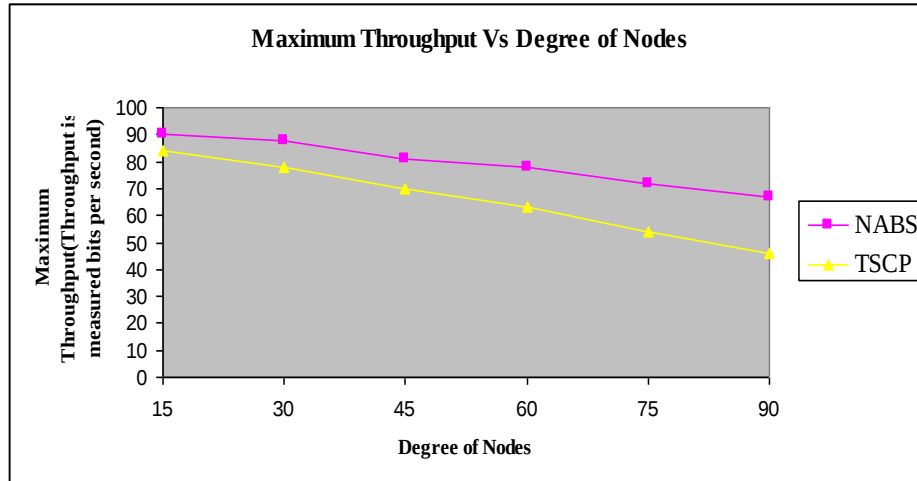


Figure 1: Maximum Throughput Vs Degree of Nodes
(Number of nodes is 150 and mobility of nodes is 30m/s)

The above figure 1 simulation result shows that NABS is a Maximum Throughput of the network with number of 150 nodes, if we increase degree of nodes from 15 to 90 and mobility of nodes is 30m/s in that case throughput of network decreases due to more number of interference nodes. So the NABS protocol is better than TSCP protocol.

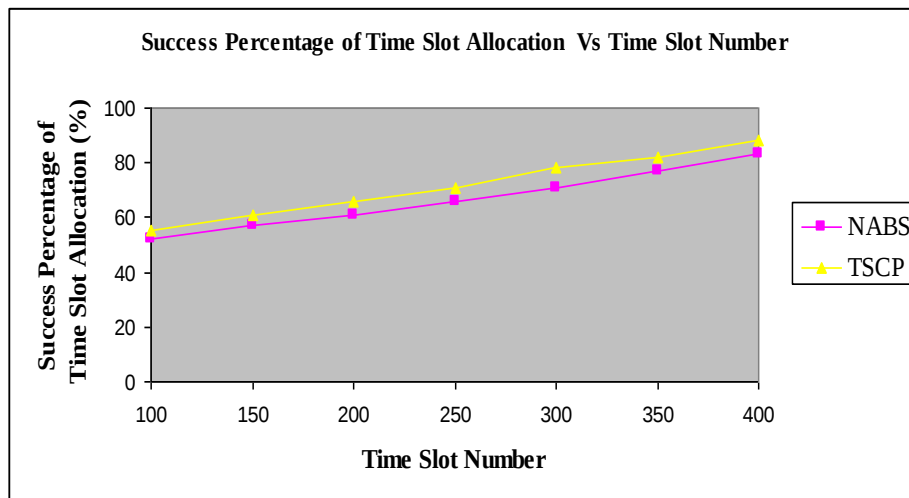


Figure 2: Success Percentage of Time Slot Allocation Vs Time Slot Number
(Traffic load is 1/120 and the speed of nodes is 20m/s)

In the figure 2 simulation result shows that TSCP is better result than NABS algorithm. This paper we had used two algorithms for slot allocation among mobile nodes to design the frame schedule, TSCP time slot allocation success percentage is better than NABS algorithm. From figure 2 it seen that traffic load is 1/120 and the speed of nodes is 20m/s, if we increase time slot numbers regularly then success percentage of time slot allocation is increased. Which means interference of nodes is decreased in the network.

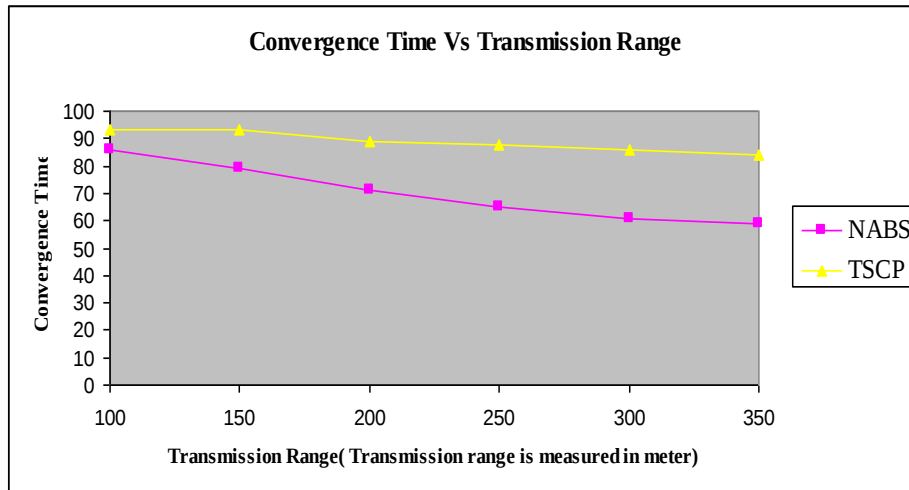


Figure 3: Convergence Time Vs Transmission Range

Our simulation result in the figure 3 shows that TSCP is better than NABS protocol, if we are increasing transmission ranges in the simulation environment, the convergence time is better result in TSCP algorithm. It decreases delay and the overload of node.

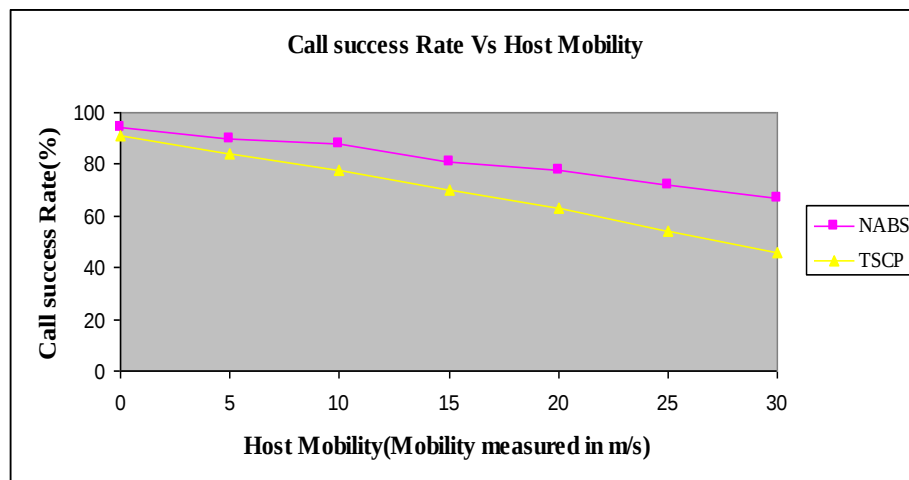


Figure 4: Call Success Rate Vs Host Mobility

The figure 4 simulation result show that NABS algorithm is better than TSCP algorithm. When we increase speed (5ms to 30ms) of the mobile nodes then the two algorithm's call success rate decreases.

CONCLUSION

ADVANTAGE OF TSCP

Random nodes are simultaneously integrated for transmission schedule in the network. If we are increasing network size more node are integrated. It is a static protocol, as per the simulation results output on Success Percentage of Time Slot Allocation Vs Time Slot Number and Convergence Time Vs Transmission Range is better than NABS protocol.

DISADVANTAGE OF TSCP

In this protocol, if we are increasing network size more collision will occur and there will be time delay for slot allocation. The TSCP transmission range is constant and not a variable in the network and each terminal requires 1:15 slots for terminal convergence time slot allocation, so frame size is increased and some time slots are unused, more collision will occur due to

high mobility of the nodes. If degree of the nodes is increased, no traffic control is there and there is an increase in the network size. The TSCP is not effective in adding a new terminal to an existing network.

ADVANTAGES OF NABS

If we use minimum time slots in the frame schedule, in that case size of frame length is minimum so the maximum channels are properly utilization in the networks and the node's 100% reachable within transmission range of the network. This protocol benefit for low power conservation.

DISADVANTAGES OF NABS

When slot allocation among the channels, it there small collision will occur within the transmission range of the network. In a network, if we increase degree size and network size the result would be degraded. When more nodes are participating for slot allocation the delay occurs and it does not reduce redundancy, rebroadcast and broadcast latency. If we increase degree size in the network collisions will occur because of no traffic control.

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AUTHOR

B.Sc. and M.C.A from Utkal University, Odisha, India: M.Tech (Comp.Sc.) and Ph.D (Comp.Sc.) from Jawaharlal Nehru University, New Delhi, India: Presently working as Assistant Professor AND College, University of Delhi, New Delhi, India.

