Enhancing qos of manet by deploying omni directional antenna for ieee 802.11 networks

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Abstract:
MANET stands for Mobile Ad Hoc Networks that used in the area of Wireless Networking. In the MANET each node communicates with the other node temporarily and stops all the communication when all the data transfers done. In this paper we find the QOS (Quality of Service) of MANET and also evaluate the performance. The QOS mechanism does not create an additional bandwidth for the selected network; instead, it uses the available bandwidth in a way that the network can provide the maximum requested QOS with the maximum bandwidth available for that traffic during the session. The network traffic is selected based on classification of packets so that some packet flows can be treated better than the others. QOS parameters for typical applications are bandwidth and E2E delay. Bandwidth is the most obvious difference between the wired and the wireless domains, the wireless being much slower than the wired one. In this paper we are using RTS-CTS approach to avoiding the hidden nodes that utilizes unwanted bandwidth or throughput and affect the overall performance of the entire network. The simulated results presented in the paper and compared with other papers [4, 5] and found that the proposed approach used in this paper shows that QOS improved well.

Introduction
MANETs are designed to function without fixed infrastructure and provide reliable communications to ground vehicles, ships, aircraft, or individuals and form a self-healing network that will enable continuous communications even when one or more of its nodes are disabled or temporarily removed from the network [1] shown in figure1. In order to quantify the accuracy of state information, the QoS-related state needs to be propagated throughout the network.

Quality of service [16,19], with respect to computer networks, is a set of service requirements provided to certain traffic by the network to meet the satisfaction of the user of that traffic. QoS requires a capability in the network to be able to treat some selected traffic with better or different service than what other traffic receives. The QoS mechanism does not create an additional bandwidth for the selected network, instead, it uses the available bandwidth in a way that the network can provide the maximum requested QoS with the maximum bandwidth available for that traffic during the session. The network traffic is selected based on classification of packets so that some packet flows can be treated better than the others.

Figure 1: MANET Communication

Recently, because of the rising popularity of real-time applications and potential commercial needed of MANETs, QoS support has become an unavoidable task in this kind of network. Its dynamic nature not only makes the routing fundamentally different from the fixed networks, but also its QoS support.
The major challenge facing the QoS support in MANETs is the quality of the networks is varying with time.

1.1 IEEE 802.11 DCF.

The IEEE 802.11 standard defines a contention-based MAC component, known as the DCF. The DCF defines three interframe space (IFS) intervals: the short IFS (SIFS), the point coordination function IFS (PIFS), and the DCF IFS (DIFS). Each of them defines a fixed time period.

The SIFS is the shortest interframe space, and it is implicitly assigned to an MH which is expected to transmit immediately by the context of the communication process: for example, to send an acknowledgment for a received frame, or to send a frame after a polling signal is received by the AP.

The PIFS is used by a node operating as an access coordinator in PCF mode to allocate priority access to the medium. It is one slot time longer than the SIFS. Nodes operating inDCF mode transmit data packets using the DIFS. It defines the fixed length of time that nodes have to wait before a random countdown procedure in order to access the channel eventually. The IEEE 802.11 DCF works as a listen-before-talk scheme, and operates in either basic access mode or RTS–CTS mode.

The PCF is supported on the top of the DCF by exploiting the PIFS. The PIFS is the intermediate IFS (SIFS < PIFS < DIFS), and it is assigned to the Access Point (AP) only. Whenever the AP wants to take control of the channel, it waits up until the first idle PIFS time appears on the channel, and immediately transmits to take control of the channel.

2. AODV

The ad hoc on-demand distance vector (AODV) [22] routing protocol has been introduced for best-effort routing in MANET. AODV builds routes using a route request/route reply query cycle. When the source needs to find a path to reach a new destination, it broadcasts a RREQ packet across the network. Nodes receiving this packet update their information for the source node and set up backward pointers to the source node in the route tables.

In addition to the source node’s IP address, current sequence number, and broadcast ID, the RREQ also contains the most recent sequence number for the destination of which the source node is aware. A node receiving the RREQ may send a route reply (RREP) if it is either the destination or has a route to the destination with corresponding sequence number greater than or equal to that contained in the RREQ. If this is the case, it sends a RREP back to the source. Otherwise, it rebroadcasts the RREQ. Nodes keep track of the RREQs source IP address and broadcast ID. If they receive a RREQ, which they have already processed, they discard the RREQ and do not forward it.

As the RREP propagates back to the source, nodes set up forward pointers to the destination. Once the source node receives the RREP, it may begin to forward data packets to the destination. If the source later receives a RREP containing a greater sequence number or contains the same sequence number with a smaller hop-count, it may update its routing information for that destination and begin using the better route.

3. RTS-CTS

The RTS–CTS access mode executes the same carrier sensing and random backoff procedure as in the basic mode. It also uses the same BEB algorithm to regulate the adjustment of the contention window. In this paper, the RTS–CTS access mode enhances the Four way handshaking RTS–CTS–DATA–ACK procedure follows and to be deployed this approach in the scenario and shown in the section 4.

4. Simulated Scenario

In the above sections, the simulation setup and Scenario of simulation has been described. The Random Waypoint Mobility Model (see figure 3) is a
model used in the network scenario. In this mobility model, nodes move in varying directions and speeds, with a pause time between each movement and direction change.

5. Performance Evaluation of MANET
We perform extensive performance evaluations to determine the effectiveness of the proposed scheme that is RTS-CTS technique with AODV protocol. The quality of the routes is determined by obtaining the TCP end-to-end delay and Throughput using ns-2 and comparing with papers [4, 5].

5.1 Throughput of MANET
Throughput is the amount of data moved successfully from one place to another in a given time period. Figure 4 shows the throughput for wireless network with using Omni-directional antennas. From results we see that the higher value of throughput was achieved with use that was 1800 kbps achieved due to used the technique of RTS-CTS and compared better than [4,5] papers.

5.2 End to End Delay of MANET
End to end delay (see figure 5) is the average time taken for a packet to reach the destination. Only successfully delivered packets are counted. From results we see that the smaller value of end-to-end delay was achieved by using RTS-CTS approach, the value was 50 ms because less chances of collision occurred.

6. Conclusion
We propose a quality based routing for wireless mesh networks to improve the packet delivery and delay performance of multi-hop communications. Performance evaluations obtained from simulation experiments demonstrate that the proposed routing protocol is effective in improving both the Throughput and End to End delay performance in Wireless environments where the route selection is done by a AODV Protocol. Since the proposed routing protocol relies on precalculated models of Throughput and End to End delay, it is somewhat constrained by the parameters under which such models are based. This includes the assumed channel capacity, the offered transmission loads, etc.

REFERENCES
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