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# Enhancement in Quality of Services using CEDAODV Protocol in Wireless Network

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***Abstract:*** *Over the years, we have witnessed a tremendous increase in the utilization and availability of wireless networks and devices. The heterogeneity and complexity of (wireless) networks are increasing as new technologies (e.g. IEEE 802.11ay and 802.11ax) are being released. Wireless devices have a plethora of technologies at their disposal to connect to the Internet and other services. Management and control of each technology are traditionally isolated, and coordination between technologies is nearly non-existent. This isolation leads to poor resource usage, which in turn reduces performance and service guarantees. To satisfy growing user demands, we need to leverage the different service guarantees offered by each technology. In this work we study and evaluate the performance of AODV and CEDAODV protocol and increase the performance of quality of services parameters in mobile ad-hoc network.*

***Keywords:*** *Mobile Ad-hoc network, Wireless sensor network, Cognitive radio network, Software defined radio, Network simulator, AODV.*

## 1. INTRODUCTION

Wireless communication and networking is a rapidly emerging technology in recent years, which regardless of geographic position allows devices to interconnect with each other. There are several types of wireless networks depending on the application, like Wireless Personal area networks (WPANs), Wireless local area networks (WLANs), Mobile ad-hoc networks (MANETs) etc. There are two types of wireless networks depending on facilities or not, infrastructure based the cellular network and infrastructure less wire-less networks. In infrastructure based networks there are stationary parts, like base stations or access points to which nodes can connect, while in infrastructure less or ad hoc networks there is no fixed infrastructure and nodes communicate with each other directly, while they reside within each other's radio range (single-hop) or in-directly through other nodes (multi-hop) when they are out of the receiver's radio range.

MANETs are formed by two or more devices or nodes without a central or fixed infra-structure. The term Ad Hoc states the absence of infrastructure. Because of this absence of base stations in MANETs nodes have to relay packets to reach the destination, that is to say, each node acts as a router for the neighboring nodes. The communication between nodes strongly depends on the nodes' cooperation. There is always the case of a misbehaving node to disrupt the normal reception of a packet. Such attacks will be detailed in a following chapter. A MANET is a self-organizing and self-configuring net-work with the potentiality of rapid deployment of mobile nodes forming a temporary and highly dynamic in most cases network, where nodes join or leave the network independently over time. The network could be partitioned in sub-networks, as in cluster based architecture, which is detailed below in this chapter. Nodes could move at will from a sub-network to another in the vicinity.

Mobile ad-hoc network is basically collection of nodes, the routing between the nodes id done using various routing protocols. The purpose behind combining both principles together is to search for the shortest path and similarly to maintain source route to random destination in the Mobile ad hoc network. The optimization is done with ad-hoc on demand distance vector routing and the secure and modified ad-hoc on demand distance vector routing protocol.

Another class of routing protocol is Reactive routing. In this category, the path is built when the sender nodes wish to transmit data to the receiver. The source node needs to broadcast a route request packet to the whole network. Nodes who received a request packet (not a destination node) will perform a re-broadcast of the requested route packet to neighboring nodes. This process continues until the desired destination is found. When the destination node receives a path request message (or intermediate route nodes know a path to the destination), the node replies to the sender node. Whenever a source node required transmitting data packets towards a destination, it floods the network with route request packets. The destination sends a route reply message in a unicast manner, then the source node transmits the data packet to the destination node. Dynamic Source Routing (DSR), Ad hoc On-demand Distance Vector Routing (AODV), and Temporally Ordered Routing Algorithm Protocol (TORA) protocols are examples of reactive routing protocols.

The rest of this paper is organized as follows in the first section we describe an introduction of mobile ad-hoc network. In section II we discuss the ad-hoc on demand distance vector routing protocol. In section III we discuss the proposed method and experimental result in mobile ad-hoc network using the enhanced optimized adaptive multipath routing protocol, finally in section IV we conclude the about our paper.

## 2. DATA LINK LAYER

The MAC layer is a sub-layer of the data link layer of the OSI reference protocol, and it is present in most communication networks; wire line as well as wireless. The MAC protocol is responsible for determining who has the right to send on the channel for the moment. There exists many different MAC protocols and we have chosen to classify them here as being either contention based or conflict-free protocols. Conflict-free protocols ensure that a transmission is not interfered by any other transmissions, i.e., no overlap occurs in time, frequency, or space between transmitters and thus no collisions arise. FDMA, on the other hand, divides the frequency band into narrower sub-channels where each user is allotted a sub-channel and after that always has the ability to send at any point in time in the sub-channel. The drawback with these protocols in their original design is that they generally require a central mechanism such as a base station or an access point that can share the resources among the users (i.e., allot time slots or frequency bands to users). A combination of TDMA and FDMA is used in the GSM mobile system which duly has a centralized network topology. With contention based protocols, on the other hand, the user is not guaranteed an exclusive right to send (using the assigned resources in a predetermined way) and hence collisions can occur. Contention based protocols provide mechanisms for taking care of the collisions such that a transmission eventually should be possible. There are two large groups of contention based protocols; Aloha and CSMA.

CSMA is an improved Aloha protocol where the transmitter starts by sensing the channel before the transmission is initiated and only transmits if the channel is free, i.e., “listen before talk.” In order to reduce the probability that several transmitters starts sending immediately when the channel becomes free, each transmitter randomizes a back-off time during which it defers channel access. These two protocols are very popular, since they are easily deployed. The drawback is that there is a possibility that two or more transmissions collide and continues to collide infinitely many times and hence packets may suffer unbounded delays. This drawback is especially severe in a real-time system intended for traffic safety applications where a worst case access time is a must.

## 3. EXPERIMENTAL WORK

AODV utilizes destination sequence numbers to ensure all routes are loop-free and contain the most recent route information. Each node maintains its own sequence number, as well as a broadcast ID. The broadcast ID is incremented for every RREQ the node initiates, and together with the node's IP address, uniquely identifies a RREQ. Along with its own sequence number and the broadcast ID, the source node includes in the RREQ the most recent sequence number it has for the destination. Intermediate nodes can reply to the RREQ only if they have a route to the destination whose corresponding destination sequence number is greater than or equal to that contained in the RREQ. During the process of forwarding the RREQ, intermediate nodes record in their route tables the address of the neighbor from which the first copy of the broadcast packet is received, thereby establishing a reverse path. If additional copies of the same RREQ are later received, these packets are discarded. Once the RREQ reaches the destination or an intermediate node with a fresh enough route, the destination/intermediate node responds by unicasting a route reply (RREP) packet back to the neighbor from which it first received the RREQ. As the RREP is routed back along the reverse path, nodes along this path set up forward route entries in their route tables which point to the node from which the RREP came. These forward route entries indicate the active forward route. Associated with each route entry is a route timer which will cause the deletion of the entry if it is not used within the specified lifetime. Because the RREP is forwarded along the path established by the RREQ, AODV only supports the use of symmetric links. Routes are maintained as follows. If a source node moves, it is able to reinitiate the route discovery protocol to find a new route to the destination. If a node along the route moves, its upstream neighbor notices the move and propagates a link failure notification message (a RREP with infinite metric) to each of its active up stream neighbors to inform them of the erasure of that part of the route. These nodes in turn propagate the link failure notification to their upstream neighbors, and so on until the source node is reached. The source node may then choose to reinitiate route discovery for that destination if a route is still desired.

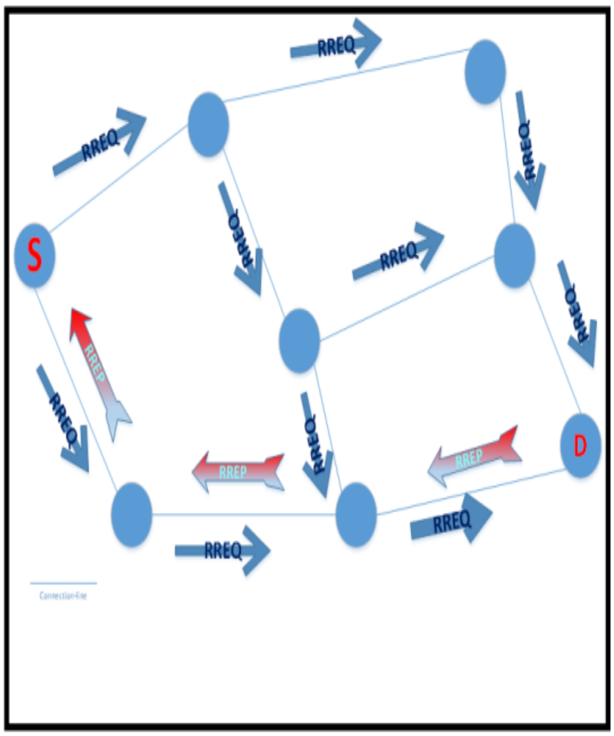


**Figure 1:** AODV Route Discovery.

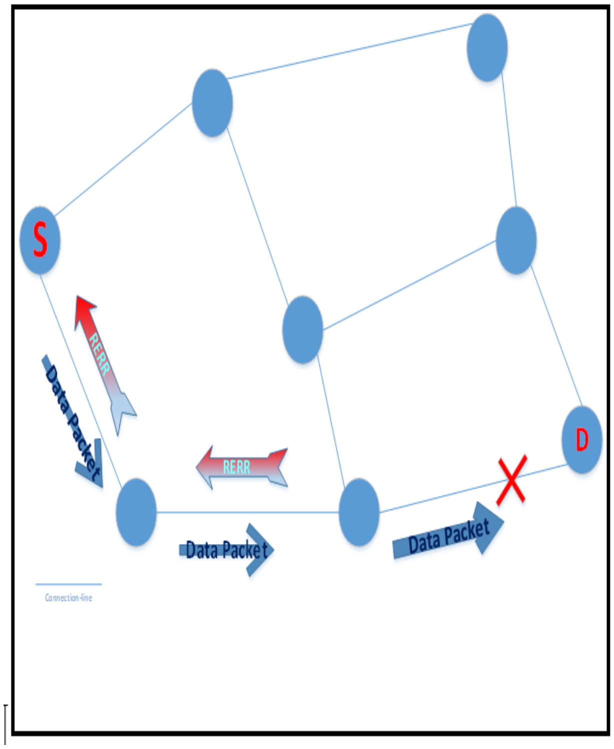


**Figure 2:** AODV Route Discovery maintenance.

In this section we discuss about the proposed experimental results compare with the existing techniques; also discuss about the simulation experimental environment and the snapshot for the proposed and existing methods results. The proposed work gives the better results than the existing techniques, the performance evaluation parameters are such as the delay between the packets are transmitting between source and destination, throughput for the delivered number of packets and the packet delivery ratio for a packet between source and destination, here we also discuss comparative performance result summary using existing and proposed methods with tabular form and graphical representation also.

Ad hoc networks are made up of an autonomous system of mobile devices which act as both hosts and routers [2]. This permits the mobile devices to interconnect one another through multi-hops without a predefined communication. Ad hoc networks may support different wireless standards, the present state-of the-art remains to be mostly limited to their operations in the 900 MHz and the 2.4 GHz industrial, scientific and medical (ISM) bands. With exponentially growing growth of wireless devices, these bands are increasingly getting congested.

CEDAODV is a partitioning routing protocol emphasizing QOS support. And also it is an algorithm for QOS routing in ad hoc network environments. Each partition includes core nodes. Core extraction means the election of some nodes and then responsible for topology establishment & maintenance of self configuring routing infrastructures called core. The core node selected by distributed algorithm. The election of core nodes is based on the approximation of mathematical principle called minimum dominating set of network. This is the minimum subset of nodes such that all the nodes are at most one hop away from a dominating node. Next components of the CEDAODV is link state propagation it provides link state propagation from all network nodes to all core nodes only stables link states are propagated. Propagates the link states of stables, high bandwidth link in the core through increase /decrease waves. The slow moving increase waves(signal) and fast moving then decrease waves which is denotes by corresponding changes in the available bandwidth on link. Next is the route computations first establishes a core path form the dominators of the sources to that the destination. The core path provides the directionality of routes from source to destination based on the satisfying the requested bandwidth using only local information (i.e partial knowledge of the ad hoc network topology). The routes selection and computation is on demand, all the computation is done by core nodes.

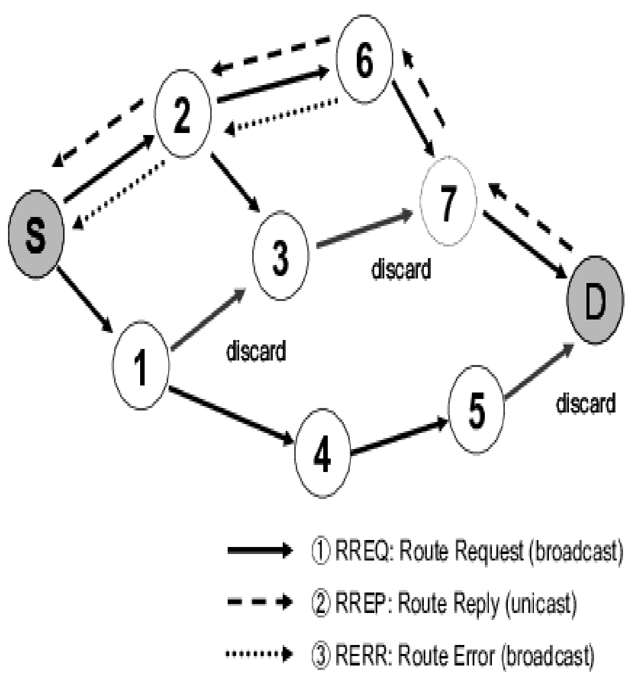


**Figure 3:** This picture represents the CEDAODV protocol.

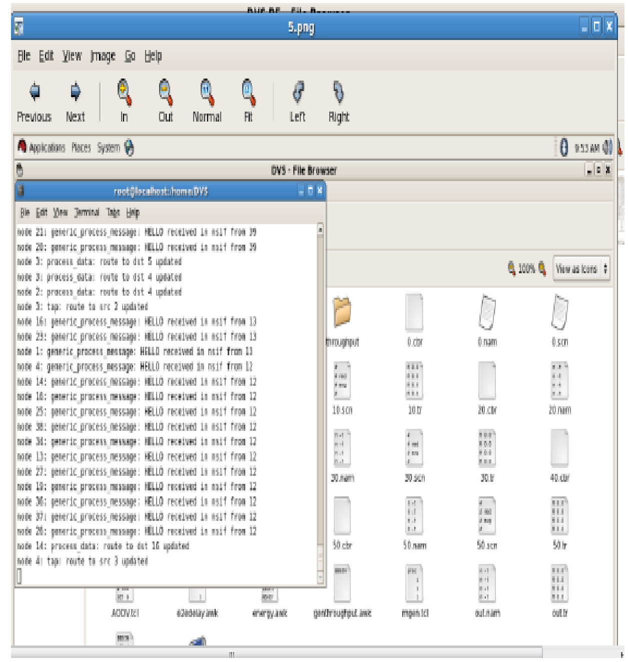


**Figure 4:** This window shows the running shell files in a network simulator.

## 4. CONCLUSION

The inflexible management and operation of today's wireless access networks cannot meet the increasingly growing specific requirements, such as high mobility and throughput, service differentiation, and high-level programmability. This work carried out the detailed analysis of Cognitive radio network routing protocols theoretically and through simulation by NS-2 for CEDAODV on the basis of different performance metrics viz. packet delivery ratio, end to end delay, residual energy and average throughput. These performance metrics are analyzed for the CEDAODV routing protocols by varying the node density. Simulation of routing protocols provides the facility to select a good environment for routing and gives the knowledge how to use routing schemes in static network.

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