

Enhancement of QOS for Multi-user Environment in Cognitive Radio Network



I. Chandra, D.Subitha, K Sarath Babu, C.Navaneethan , S.Meenatchi, P.Thanapal

Abstract : *CRT(Cognitive radio technology) enhances the utilization of available better spectrum in the channel. So to provide better Quality of Service for the user in this paper the Localizability aided localization(LAL) and Water filling Methodologies are proposed. This paper analyzes the routing protocols like AOMDV(Ad-hoc On-demand Multi-path Distance Vector routing), DSR (Dynamic Source Routing) and AODV (Ad-hoc On-Demand Distance Vector). Considering the AODV as the existing routing protocol, this paper proposed with AOMDV and DSR routing algorithms for Localizability aided localization(LAL) and Water filling methodologies respectively. Current work on improving Quality of Service, the different routing protocols are proposed in this paper. The main factors analyzing in this paper are throughput, PDR(packet delivery ratio) and Delay. The simulation results will confirm the accuracy of the proposed techniques.*

Keywords - protocol, network, throughput, delay, routing, localization, nodes.

I. INTRODUCTION

Technology is growing day by day in all aspects of the world. So we can see a drastic growth in the mobile industry also. As the usage of mobiles increasing day by day there will be a need of network availability for every individual user. So to provide the user with the better spectrum availability in the upcoming 20-30 years there will be a lot of challenges that will be faced by network providers. As the number of users increase there will be a challenge to provide the better Quality of service with in the available spectrum is the for all the users. The future society with the upcoming 5G/6G there will be a full of spectrum availability needed for the service providers and this spectrum availability will become a bottle neck for the network providers. As there will be a lot of users using the network at a particular time, the usage of the available spectrum without any delay and losses is the priority task. This main objective of this paper is to provide better Quality-of-service for users with in the available spectrum without any loss and delay in the network. This paper is considered the (PU) Primary users and (SU) Secondary users in a network.

A signal from the Primary User (PU) to the Secondary user(SU) is considered in this paper. In this transmission by applying different algorithms different factors like delay, throughput and packet delivery ratio are analyzed and compared in this paper.

II. LITERATURE SURVEY

In [1] Satyanarayan. K. Padaganur and Jayashree D uses a resource that shared by multiple nodes that are placed at optimized delay and distance from the supply. The dynamic scheme is compared with the static scheme where they used the dynamic scheme to optimize the delay. So for better QOS immediately they utilized the dynamic plan by which the disappointment rate is diminished by 20%. They didn't dissected the jitter (proportion of speed) which is one of the main consideration in the system.

In [2] Samoda Gamage, Duy T. Ngo, and Jamil Y. Khan utilizes the ideal power portion in a multiuser CRN to amplify the absolute compelling limit of the CRN while meeting power requirements and PU assurance strategies. Two iterative calculations are proposed in this paper which are unpredictable with colossal measure of detailing. Our proposed strategy is basic and viable. In [3] Mara Bukvi , Bogdana Stanojević, Mila

Stanojević discussed about the channel allocation problem and network selection in 5G heterogeneous networks. They used two bi-objective models in which the first model allocated SU's to networks with respect to cost, data rate capacities and target interference; while the second model split PN's in channels, and allocated SU's to channels with respect to their additional demands for low latency.

The proposed model consists of large amount of calculations and mathematical expressions which is very difficulty in case of data validation.

In [4] Sepehr Khodadadi, Dongyu Qiu, and Yousef R. Shayan examined about the astute powerful range distribution technique dependent on choosing the biggest accessible range opening to have the most extreme conceivable transmission rate. This paper proposes a hypothetical model to discover the likelihood appropriation of the biggest accessible range length.

As proposed model is a theoretical one it can simulate any number of channels, but the practical or reality cases are not considered. In [5] Rong Shi and Yue Xiao dissected about the ideal sticking asset portion Strategy on double channel ALOHA connect with long time deferral comprising of numerous intellectual radio terminals. Due to the Jamming resource allocation there will be a small delay in transmission. So in order to reduce the transmission delay this paper we proposed some new techniques[24].

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In [6] Shuying Zhang and Xiaohui Zhao discussed about the distributed power allocation scheme which is based on H - alpha control approach with delay and time-varying channel gain for a CRN.

The communication performance is increased with the power allocation algorithm is discussed and also the advanced applications are suitable for 5G technology [23].

In [7] Saranga Sarma, Manmohan Singh and Rajendra Pamula discussed about the viability of genetic algorithms as a smart control method in order to deriving the optimal parameters for radio-propagation and radio transmission which subject to environmental conditions and QOS constraints. This paper is just the study of transmission parameters for only one channel.

In [8] Gavrilovska, Shuminoski and Janevski examined about the QOS execution of heterogeneous systems with numerous heterogeneous hubs by utilizing distinctive enhancement procedures. The investigation demonstrates that the exhibition gain with AQUA module in 5G heterogeneous frameworks with various RAN's(Radio access arrange) is higher on the off chance that we have increasingly accessible heterogeneous hubs.

In [9] Laura Pierucci had a study on the Quality of experience viewpoint toward 5G innovation. This paper extends the vision of future 5G systems with the new QOE(Quality of experience) and dissects the effect of principle difficulties of 5G on QOE[25] and [26].

In [10] Maryan , Pleskanka and Yanyshyn examined about various range choice strategies for a Cognitive radio system (CRN). This paper is proposed to think about channel determination calculations by fundamental operational parameters to diminish the all out choice time. The principle point is to diminish the all out framework time with proficient yield.

III. METHODOLOGY

In order to provide better QOS for users, this paper is proposed with Localizability aided localization(LAL) and Water filling methodologies which uses AOMDV and DSR routing protocol respectively. This paper considered the smoothing load balancing technique which uses AODV routing protocol as the existing work. The AOMDV establishes a new way or route on demand and it creates loop free nodes. The AOMDV also maintain good connectivity and very efficient for fast recovery from failure. Localization is a technique for many networks which uses the AOMDV routing protocol is the proposed technique. Restriction is to discover the guide from the vertex. True organization showed that by and by a system isn't in every case completely localizable leaving a specific number of hypothetically non-localizable hubs. Localizability aided Localization (LAL) is fundamentally comprises of three stages: node localizability testing, network adjustment and segment tree development. Being aware of node localizability, all changes made by LAL are deliberately chosen. The simulation results will show how LAL can effectively guide the adjustment and how efficient the LAL is for simulating better results.

Water filling algorithm provides for optimal solution to the problem of maximizing the energy level of a time varying

channel (frequency) by adjusting the transmitted power based on channel gain. Water filling algorithm based power control along with DSR protocol is proposed to improve the transmission capacity of the cognitive system. The conventional water filling calculation can't be utilized in that capacity since there are more power limitations in a subjective system. The calculation is iteratively actualized to acquire an ideal transmission control. The water filling calculation are constantly performed iteratively to take care of the power designation issue and to diminish the computational intricacy.

The sample CRN network which consists of Primary Users and Secondary Users is considered. The nodes which named P1 to P8 are the Primary users and the nodes which named S1 to S4 are the Secondary users. In this sample network a single data transmission is shown between P5 node and the S2 node, where the P5 node is considered as Initializing node and the S2 node is considered as the receiving node. In the respective transmissions the proposed techniques are applied, how that need to select the adjacent node and reach the final destination node.

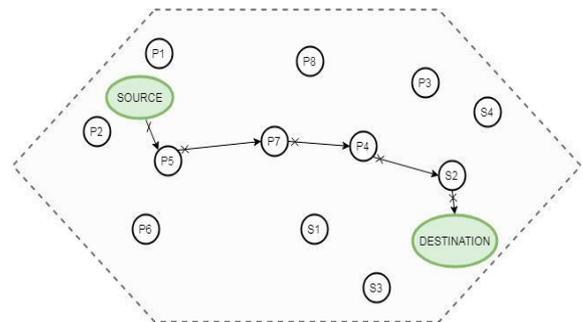


FIG.1. SAMPLE CRN NETWORK

The Fig 1. will present to you a lucidity how the information is shared among various hubs so as to achieve the date from Source to Destination. The choice of next hub from the present hub will rely on the calculation we connected for that transmission. The simulation results are obtained based on this transmission with different algorithms applied for each time. The throughputs, delays and PDR(packet delivery ratio) are the three factors which are considered and comparison is made for these 3 parameters with different algorithms.

IV. RESULTS

The shown sample network as in Fig.2. the following is reenacted utilizing the Network Simulation 2 device which is coded by utilizing the TCL(Tool order language) programming language. The simulation will be carried in the following manner as shown in Fig3. Total three techniques are simulated and the results obtained from the simulation are compared below. The proposed first method is Localizability aided localization(LAL) which uses the AOMDV routing protocol. The proposed second method is the Waters filling method which uses DSR(Dynamic Search Routing) routing protocol. The existing methodology considered in this Load based smoothing algorithm which uses the AODV routing protocol.

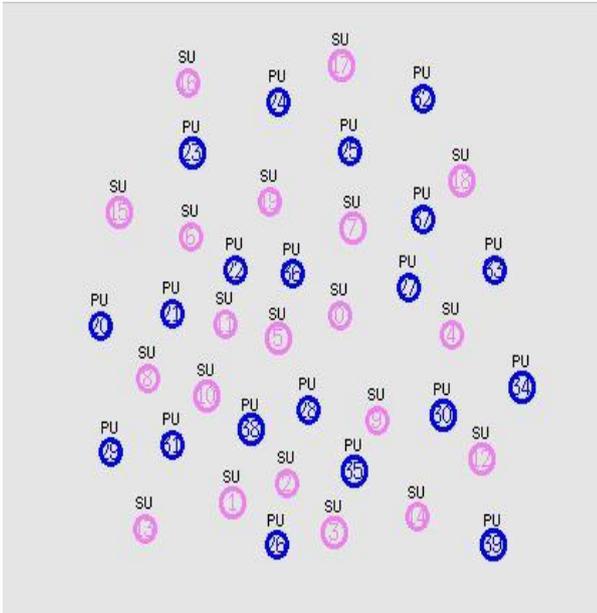


FIG.2. SIMULATION SETUP – INITIAL STAGE

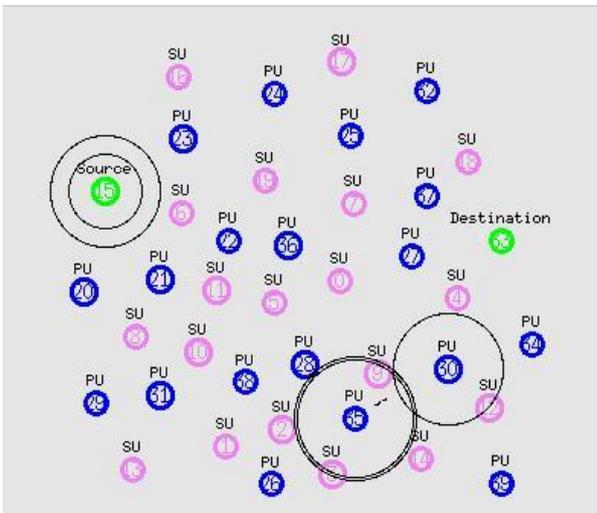


FIG.3. SIMULATION SETUP ALONG WITH DATA SHARING

The throughput ratio in the Fig.5 can be defined as the amount of data transferred successfully from one point to another point in a particular time. From the simulation results in Figure.5, we can see that the throughput is more in the AOMDV protocol when compared with the DSR and AODV. The AOMDV is very efficient in sending the data from one point to another point in a short span of time. So from the Fig.4 and Fig.5 simulation results if we want a technique with a better packet delivery ratio with some loss we can choose DSR algorithm and if we want a technique with good throughput, that means even with some loss if we want to transmit the huge amount of data in a short span of time we can go for AOMDV technique.

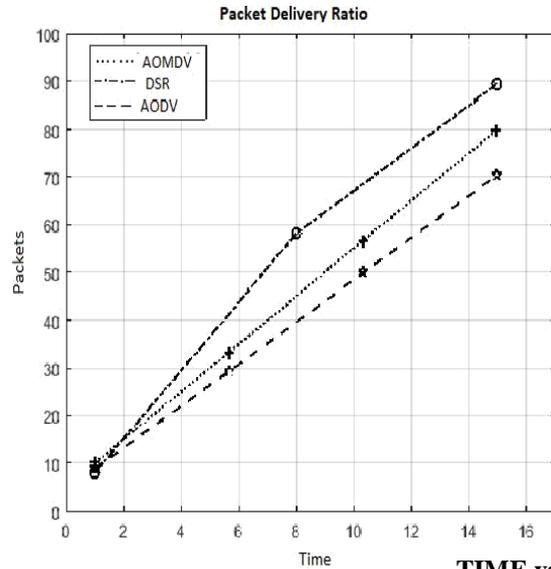


FIG.4. TIME vs PDR

The three variables throughput, deferral and bundle conveyance proportion which are considered in this paper are analyzed in the graphical portrayal by the outcomes got from the recreation. Bundle conveyance proportion can be characterized as the proportion of number of parcels sent by the source hub to the goal hub. The reenactment aftereffects of parcel conveyance proportion is plotted in Fig4. From the recreation results we can say that the parcel conveyance proportion is more in DSR than in AOMDV and AODV. This is a result of the novel component and uncommon nature of the DSR calculation. Next the AOMDV bundle conveyance proportion is more when contrasted and the current AODV.

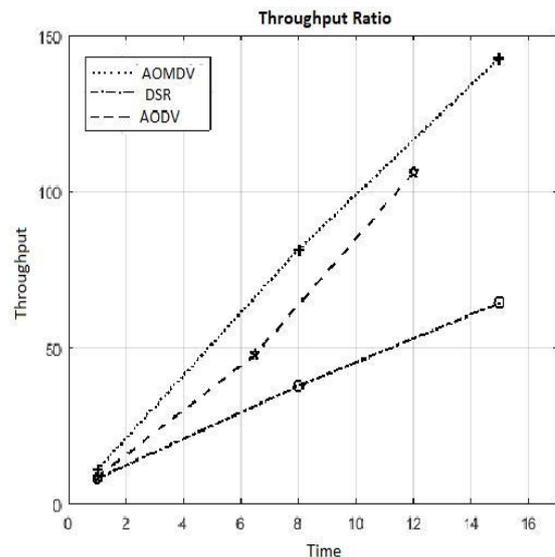


FIG.5. TIME vs THROUGHPUT

The point to point delay simulation results are plotted in Fig.6. From this simulation results, we can clearly say that the AOMDV is having very low delay when compared to AODV and DSR(Dynamic search routing). Next the DSR is having less delay than the existing AODV

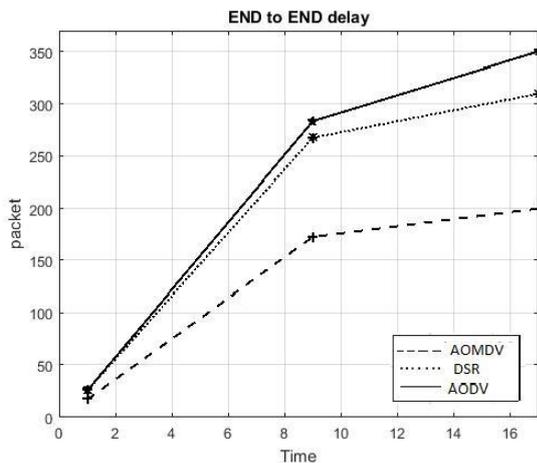


FIG.6. TIME vs PACKET

technique. So from the above simulation results, we can clearly say that the proposed AOMDV and DSR technique is better than the existing AODV technique.

V. DISCUSSION

As discussed in the literature survey there were several different network simulation techniques that were used for the improvement of QOS

(Quality of Service) for users. So for the improvement of QOS different authors select different parameters and worked on improving those parameters. Hence for the enhancement of QOS in this paper, the throughput, delay and PDR are considered. The entire work done by the author for the enhancement of QOS is simulated and plotted in graphs for these parameters. So from the parameters considered and the results obtained by applied techniques leads to the better QOS for the users.

VI. CONCLUSION

The data transmission from the initializing node to the destination node in a Cognitive Radio Network by applying different techniques like AOMDV, DSR and AODV is simulated in this paper. This paper is proposed with Localizability aided localization (LAL) and Water filling methodologies which uses AOMDV and DSR routing protocol respectively. The existing Load based smoothing algorithm which uses DSR routing protocol is considered in this research. The throughput, delay and packet delivery ratio parameters are considered in this work and the simulation has been done for the proposed and existing techniques and the results obtained are compared and they are plotted in the graphical way.

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