In Cognitive Radio Network Multiple Relay Hybrid Approach Used for Improving Security and Reliability Trade Off

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Abstract – In radio spectrum the problem of underutilization has been solved by cognitive radio. The cognitive radio devices intelligently sense and feat the part of spectrum. Hybrid Cognitive Radio Network approach is useful to improving the security and reliability of the network. Hybrid cognitive radio network jointly used both the cognitive and licensed radio networks. This paper analyses the performance of Hybrid Cognitive relay network for single relay and multiple relay under AWGN and rician fading channels. The performance metrics such as channel capacity, bit error rate and outage probability are formulated and numerical simulations by using MATLAB are performed. This analysis is helpful in determining the Capacity and Bit error rate for optimum usage of power and bandwidth is better. This analysis is also helpful to compare the result of single relay and multiple relay hybrid graphs.

Aim of study: Improve Security and reliability in Cognitive radio network (communication) by using hybrid relay approach.

Findings: Data is more secured and reliable during transmission when this multiple relays hybrid approach is used.

Keyword: Amplify-and-forward, Decode-and-forward, Hop-wise harmony, Relay network, Cognitive radio, Many input many output.

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1. INTRODUCTION

In wireless channel when broadcasting is in process than a user transmits data to another user and nearby user can also receive the signal. These nearby users can act as relays to forward the received data from source to the destination. Such kind of collateral networks are known as relay networks. Relay selection technique is important for powerful communication and to main quality of service (QoS) and different parameters in Cooperative Networks (Li, 2011). To improve the execution (performance) of relay networks various relay selection strategies have been proposed. The simplest approach for single relay selection gives the strongest end-to-end path from source to the destination (Liu, 2009). Another processing techniques such as decode-and-forward (DF), amplify-and-forward (AF) and hybrid approach are also suggested. In Wireless Communication the data from source to destination is sent through the participation of intermediary relays (Nasir, et. al., 2014). Wireless networks are characterized by the phenomena of multi path fading, shadowing and path loss. The relays i.e. single relay or multiple relay form a virtual antenna array and with united strategy they can get the benefits of multiple-in multiple-out (MIMO) system. We analyze the performance of hybrid relaying scheme that reduces the required bandwidth and bit error rate. We will mainly analyze, a hybrid relaying scheme over fading channels by using single relay and multiple relay.

2. RESEARCH OBJECTIVE

Hybrid relay selection scheme (Decode and forward + Amplify and forward) is considered to boost the wireless secrecy capacity and to reduce the implementation complexity. Also analyzed the SRT by using hybrid relay approach over rician fading channel transmission. Apply Hybrid relay selection approach in

cognitive radio network based on multiple relay approach.

3. METHODOLOGY

CR represents a model that represents change in spectrum regulation and spectrum access. Spectrum shared by secondary users that can enhance spectrum utilization and achieve high throughput capacity.

Cooperative relay communications represents another new model for wireless communications (Sun and Letaief, 2008), (Bharadia, et. al., 2011)

Multiple licensed bands behave as a primary network and cognitive radio network having multiple relay links. Each relay link contains a cognitive radio transmitter, a cognitive radio receiver, and a cognitive radio relay. Firstly consider the cooperative spectrum sensing by the CR nodes. The models having both types of sensing errors, i.e., miss detection and false alarm. It can also derive the ideal value for the sensing threshold. This can be achieved by decode amplify and forward approach respectively, as well as the direct link transmission approach apply for comparison purpose.

Simulation evaluations of Hybrid cooperative relay strategies based, we find the analysis provides upper bounds for the simulated results, which are reasonably tight. There is no case that one completely dominates the other for the two strategies.

4. PROPOSED MODEL

Multi-Hop Relay selection is the most informal relaying approach in the treatise is to select a relay to help a transmission from a sender to a destination. Data send by direct transmission also from source to destination (Prasad, et. al., 2014). Single transmission/data transmission can do by using with and without hybrid approach. By using the routing algorithm the loss free shortest path from source to destination is found. We design a network with multiple relay nodes. In this methodology first node behaves as a source and last node behave as a destination. From source to relay decode and forward technique is chosen. This will help to reduce the error present in the transmitted signals, and retransmit to the next relay or destination. Hybrid can work combination of decode forward and amplify forward approach. If the next node is a relay, then decode and forward is chosen else if the next node is destination, then amplify and forward is chosen. Amplify and forward is mainly used to amplify the received signals.

To obtain secured data hybrid protocol is used.

The steps to be followed in the proposed technique are

Step 1: Random SNR signal generation.

Step 2: Check the higher SNR value and choose the acceptable signals.

Step 3: Source to relay and relay to destination apply direct transmission.

Step 4: Again signal transmission by using multiple relay approach with hybrid approach i.e., signal transmission Source to relay communication –decode and forward, Relay to destination communication – amplify and forward for multiple relay Hybrid approach.

Step 6: Final output

5. RESULT

The X-axis Y-axis represents variables respectively the outage probability and the intercept probability. Our proposed methodology shows the signal transmitted by direct transmission, artificial noise, single relay, multiple relay data transmission through source to destination without hybrid approach and also single relay, multiple relay data transmission through source to destination with hybrid approach.

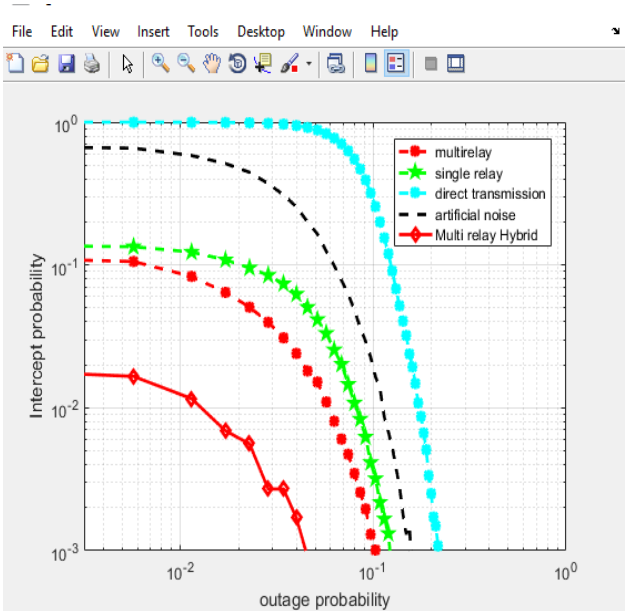

Fig 2:- IP versus OP of the direct transmission, artificial noise, single relay scheme, multiple relay scheme, single relay hybrid scheme, multiple relay hybrid scheme for (Pcd, Pfd) = (0.9, 0.1)

Graph shows that as the spectrum sensing reliability (*Pcd, Pfd*) = (0.9, 0.1). For improving security and sensing reliability, an unoccupied licensed band would be detected more accurately and less mutual interference occurs, which results in a better security and reliability trade off.

Result shows that multiple relay hybrid approach gives better security and reliability trade off rather than direct

transmission, artificial noise, single relay scheme, multiple relay schemes, single relay hybrid approach. Means signal transmission through multiple relay hybrid approach gives better security and reliability trade off in cognitive radio network.

6. CONCLUSION

We examined the SRT performance of the signal transmitted by direct transmission, artificial noise, single relay, multiple relay data transmission through source to destination without hybrid approach and also single relay, multiple relay data transmission through source to destination with hybrid approach secondary transmissions in the presence of relay sensing and spectrum sensing. The security and reliability of secondary transmissions are denoted in terms of IP and OP, respectively. The above results and analysis shows the importance of including the relaying links and the combining techniques into the performance analysis of cognitive networks. The novel approach to improve security and reliability by using hybrid approach i.e for multiple hybrid approach.

7. REFERENCES

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