

In cognitive radio network communication is done by using hybrid relay approach for improving security and reliability trade off

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ABSTRACT

In Cognitive network transmitted parameters based on interaction with the environment in which it operates. A relay network is a broad class of network topology commonly used in wireless networks, the source and destination are inter connected by means of some nodes. Consider that cognitive radio network consisting of a secondary transmitter, a secondary destination and multiple secondary relays in the presence of a snoop. A relay network is a type of network used to send information between two devices. The selection criterion uses the end-to-end signal-to-noise ratio (SNR) and the effective capacity which is a function of both the end-to-end SNR and the channel capacity length. We build a relay selection approach for protecting the secondary transmitter-secondary destination transmission against the snoop with the aid of single-relay. According to implementation Hybrid relaying scheme implies a trade-off between the security and reliability of the secondary transmission in the presence of snoop attacks. Simulation results reveal that the optimal relay selection based on effective capacity performs better in terms of network outage probability compared to the selection based on the SNR alone.

Index Terms—Security-reliability trade-off, relay selection, intercept probability, outage probability, Amplify Forward, Decode Forward ,cognitive radio

I.INTRODUCTION

To improve the spectral efficiency Cognitive radio is used. Different transmission schemes have been proposed to provide the best performance in cognitive radio network. The secondary user (SU) transmits the data when a spectrum hole is detected. Than data is transmitted simultaneously with the primary user (PU) under the same frequency band. The end-to-end performance of cooperative relay communication is derived with single relay and multiplr relay selection. The one best relay is selected to the data through secondary users under a fixed interference threshold. However, all works consider the sensing and transmission separately. The sensing result plays an important to effect on both the PU's transmission and SU's transmission. In practice the best relay chooses for data transmission that was proposed in multiple relay cognitive networks, and data transmit only when there exists a spectrum hole.

II. METHODOLOGY

In this only the best secondary relays is chosen. By using secondary transmission we analyze both the intercept probability and outage probability. We also evaluate the performance of direct transmission based method for the purpose of comparison with the proposed relay selection schemes. The intercept probability requirement is relaxed; the outage performance of the direct transmission, selection schemes improves.

Let H_0 and H_1 represent the event that the licensed spectrum is unoccupied and occupied by the primary base station [1]. Moreover, let H denote the status of the licensed spectrum detected by spectrum sensing. Specifically,

$H = H_0$ represents the case that the licensed spectrum is deemed to be unoccupied, While $H = H_1$ indicates that the licensed spectrum is deemed to be occupied [3].

The probability (P_{cd}) of correct detection of the presence of primary base station and the associated false alarm probability (P_{fd}) are denoted as

$$P_{cd} = \Pr(H = H_1/H_1),$$

$$P_{fd} = \Pr(H = H_1/H_0), \text{ respectively}$$

The missed detection of the presence of primary base station will result in interference between the secondary transmitter and secondary destination [5].

In order to guarantee that the interference imposed on the primary users is below a tolerable level, both the successful detection probability P_{cd} and false alarm probability P_{fd} should be within a meaningful target range.

The input signal is the TDMA MIMO modulated signal effect of fading can be suppressed by diversity technique. Diversity can be achieved with the help of Multiple Input Multiple output system [7]. In cognitive radio network different users will have different SNR values.

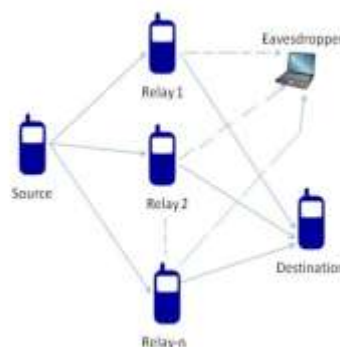


Fig 1:- A cognitive relay network consists of one source, one destination and number of relays in the presence of a snoop.

The TDMA modulated MIMO signals are transmitted through a Rayleigh fading channel [1].

Data transmission is done by using single and multiple hybrid relay approach.

Single relay: In this the cognitive relay network both SD and E are assumed to be beyond the coverage area of the ST, and N secondary relays (SRs) are employed for assisting the cognitive ST-SD transmission. Multiple relay: In this the multiple SRs are employed for simultaneously forwarding the source signal x_s to SD. To be specific, ST first transmits x_s to N SRs over a detected spectrum hole.

IV. PROPOSED MODEL

Multi-Hop Relay Selection is the most common relaying approach in the disquisition is to select a relay to help a transmission from a sender to a destination. Here the MRC technique is used for relay selection. The clogging free shortest path from source to destination is found by using the routing algorithm. When applied to multi-hop networks, this method desires the repetition of the relay selection procedure for each hop from sender to destination. However, such hop-wise harmony can reduce network capacity.

The operation of multi-hop relay selection approaches is as follows [6]: Potential relays access routing information creating a limited image of the network beyond the adjacent wireless links. Relays may decide to transmit overheard information to destinations, even in the absence of a direct link between the source and destination. Relays may have received the information to be relayed directly from the source or from other relays or intermediary nodes.

The destination node may receive more than two independent signals of the same packet e.g. via the selected relay node, via the intermediary node and directly via the source. This extra spatial diversity increases performance. We design a network with multiple nodes. 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. 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. So hybrid protocol is used to obtain secured data and comparison between single and multiple relay can show by using graphs.

V.RESULT

From our proposed methodology the signal transmitted by single relay and multiple relay approach through source to destination with and without hybrid approach.

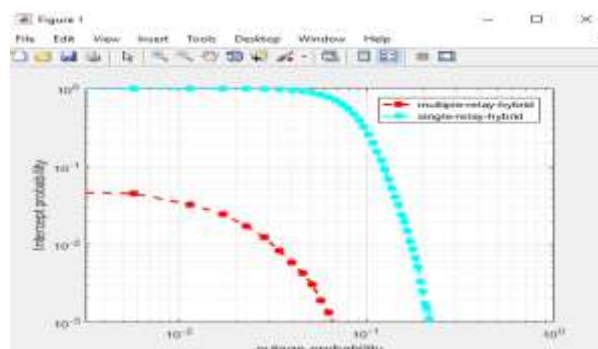


Fig 2:- Outage Probability versus SNR of the single relay Vs multiple relay selection schemes for $(P_{cd}, P_{fd}) = (0.9, 0.1)$

Graph shows that as the spectrum sensing reliability (P_{cd} , P_{fd}) = (0.9, 0.1). Result shows that Single relay hybrid approach and multiple relay hybrid approach comparison that gives better result for security and reliability trade off.

VI. DISCUSSION

So that Cognitive network consisting of a secondary source, a secondary destination and multiple secondary relays in the presence of a snoop. We examined the security and reliability performance of the single relay and multiple relay hybrid approach assisted 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. This is the novel approach to improve security and reliability by using hybrid approach.

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