Research article **Available online www.ijsrr.org** **ISSN: 2279–0543**

International Journal of Scientific Research and Reviews

Spectrum Sensing In Cognitive Radio Under Noise Uncertainty

C. Sharanya

[1]Department of ECE, VISTAS, Pallavaram, Chennai-600117,
Email: sharanya0608.se@velsuniv.ac.in

ABSTRACT

In cognitive radio networks, the spectrum access strategy plays an important role. The cognitive radio networks cannot achieve a maximal throughput by using the existing techniques like overlay, underlay strategies which are applied to multi-channel CRN's. In the proposed system, the generalized access strategy is applied to the multi-channel CRN's; also completed hybrid access strategy is derived. There are two users namely; primary user and secondary user. The primary users are licensed users whereas the secondary users are unlicensed users. In the generalized access strategy, the secondary user selects part of the channels for sequential spectrum sensing and access and accesses these channels based on the sensing results whereas, it accesses all other channels directly. The two phase optimization framework is formulated, which takes sensing channel allocation, sensing time allocation, and power allocation into consideration to maximize the gross average throughput of the multi-channel CRN. In sensing phase, the generalized access strategy algorithm is proposed, only part of the channels is selected for sensing to maximize throughput. In completed hybrid access strategy algorithm, the SU selects all the channels. To increase the throughput of the SU the SNR parameter is also taken into consideration. The dynamic access strategy is applied to increase the channel sensing and make decision on allocation of channels to SU. Hence, the throughput of the SU is maximized by using the proposed algorithm.

KEYWORDS: Hybrid access strategy, dynamic access strategy, multichannel CRNs

***Corresponding Author**

C. Sharanya

Department of Electronics and Communication

Vels Institute of Science, Technology And Advanced Studies,

P.V.Vaithiyalingam Road, Pallavaram,

Chennai- 600117, TamilNadu, India.

Email: sharanya0608.se@velsuniv.ac.in, Mob no - 8754568905

INTRODUCTION

The next big bang in wireless communication is expected to be the cognitive radio networks[1]. The step has been taken to open the door to dynamic spectrum access using this technology by Spectrum regulatory Committees in many countries and for its implementation the rules are laid down. For various applications the standardizing and harmonization of this technology has been striving by the International organizations. The future of wireless communications seems to have fundamental influence and provides definition of cognitive radio systems and standardization activities on cognitive radio all over the world, also describing the state of art in the regulatory. The varieties of wireless communication scenarios which can be applied to cognitive radio concepts are described[2]. The demand for radio spectrum has rapidly increased since the number of wireless applications. Cognitive radio (CR) technology accepts unlicensed wireless devices to use the under-utilized spectrum by obtaining the necessary observations about their surrounding radio environment[3].

SYSTEM DESIGN

The main blocks of the three sections are described below

Transmitter section

Channel Encoding: Transformation of information sequence into encoded sequence and addition of redundant information for error recognition and correction occurs[4].

Interleaver: Interleaving which is popularly used in digital communication and storage systems, improves the performance of forward error correcting codes

IFFT: This block computes the inverse fast Fourier transform (IFFT) across the first dimension of an N-D input

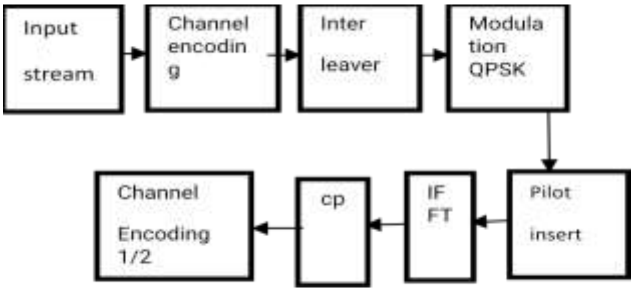
Channel section

AWGN: Additive white Gaussian noise (AWGN) is a basic noise model used in Information theory to mimic the effect of many random processes that occur in nature.

Receiver section

Equalizer: Equalization is the reversal of distortion incurred by a signal transmitted through a channel.

MMSE equalizer: This designs the filter to minimize E[|e|2], where e is the error signal, which is the filter output minus the transmitted signal.



[11]

Figure 1 Blocks Of Transmitter Section

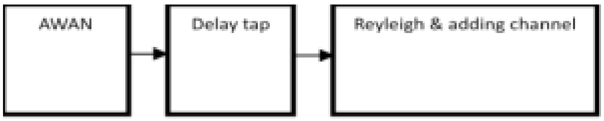


Figure 2 Blocks Of Channel Section

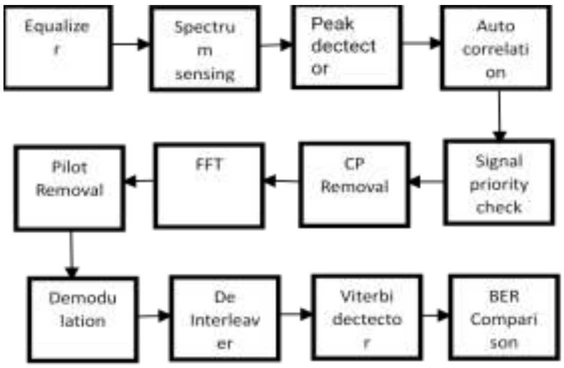


Figure 3 Blocks Of Receiver Section

Spectrum Sensing: Spectrum sensing is a key function of cognitive radio to prevent the harmful interference with licensed users and identify the available spectrum for improving the spectrum's utilization[5].

Autocorrelation: Autocorrelation, also known as serial correlation, is the correlation of a signal with a delayed copy of itself as a function of delay.

FFT:A fast Fourier transform (FFT) is an algorithm that samples a signal over a period of time (or space) and divides it into its frequency components.

Demodulation: Detection of the phase and Viterbi-decoding takes place.

De-interleaver : It performs the reverse function of interleaving.

Channel decoder: Transformation of received sequence into a binary sequence takes place.

Source decoder: It transforms the received signal to a continuous waveform signal.

RESULTS AND DISCUSSION:

Packet loss:

The above graph shows the packet loss scenerio. The packet loss is plotted by a calculation result. The calculation is done by summing the power for Inter Region with the data received energy consumption and also with the product of sensor node, data time interval and node transmission. The whole of the result is divided by the difference of Power for inter region with the threshold node level.

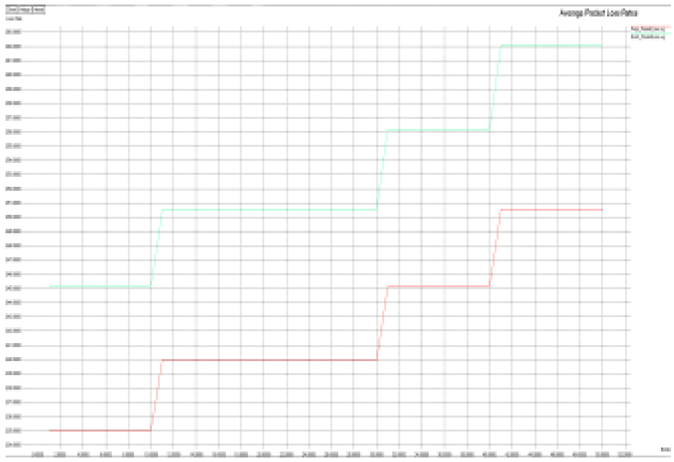


Figure 4 Plot For Average Packet Loss

Average channel sensing level:

The above graph shows the average of the channel sensing level. The result is obtained upon various calculations. It is based on the sum of the time interval, bandwidth of licensed channel and the number of co operative nodes with the product of bandwidth of the license free channel with node sequence. The result obtained is divided with the sum of energy consumption for data receiving with threshold node level.

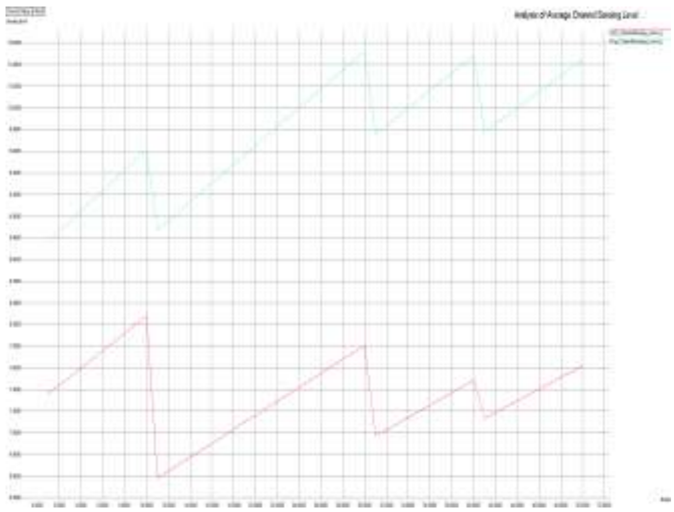


Figure 5 Plot For Average Channel Sensing Level

Through put:

The graph displayed above shows the throughput of the output. This is calculated by the sum of power for InterRegion, sufficient power level and the product of number of co-operative sensing nodes with the bandwidth of license free channel with the sum of node sequence. The result is divided by the sum of packet size for transmission, node transmission power and threshold node level.

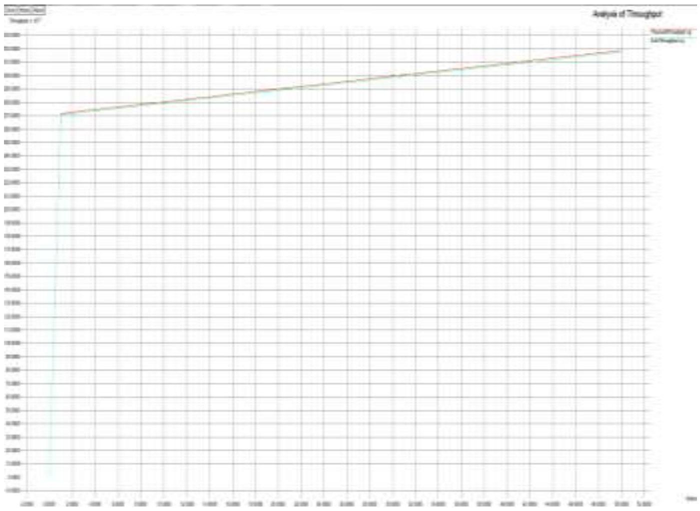


Figure 6 Plot For Throughput

Network lifetime:

The above graph shows the network lifetime scenerio. This is plotted by a calculation result. The calculation is done by summing the data amount for sensor node, bandwidth of licensed channel with aggregation rate and also with the product of no of co-operating sensing nodes and bandwidth of license free channel. The whole of the result is divided by the sum of packet size for transmission, node transmission power with the threshold node level.

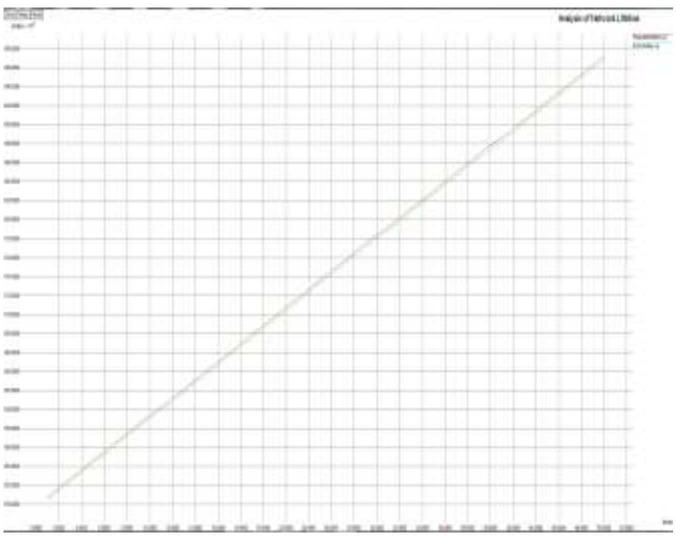


Figure 7 Plot For Network Lifetime

Bandwidth:

The above graph shows the packet loss scenario. The packet loss is plotted by a calculation result. The calculation is done by summing the power for IntarRegion, power for inter region, sufficient power level, no of co-operative sensing nodes with bandwidth of licensed channel. The whole of the result is divided by the sum of packet size for transmission, energy consumption for data receiving and threshold node level.

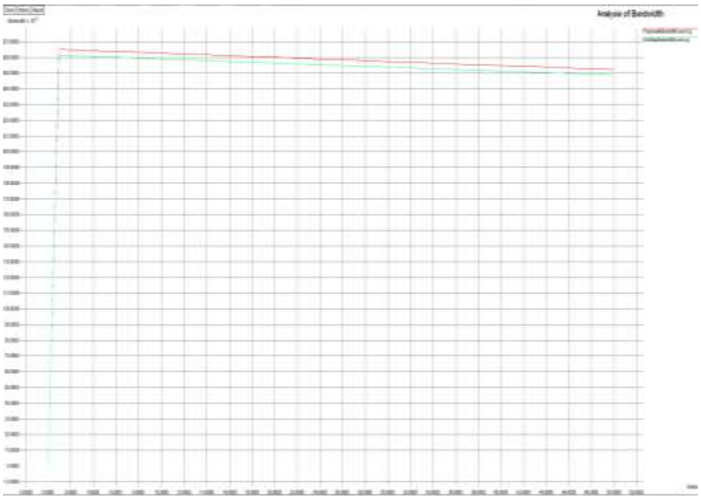


Figure 8 Plot For Bandwidth

Spectrum estimation:

The above graph displays the spectrum estimation technique. Spectral estimation provides us an effective means to analyze and look into random signals from different angle, i.e., from the frequency domain point of view. This is done by plotting the frequency with the power. The frequency values are plotted on the X-AXIS and the power values are plotted on the Y-AXIS.

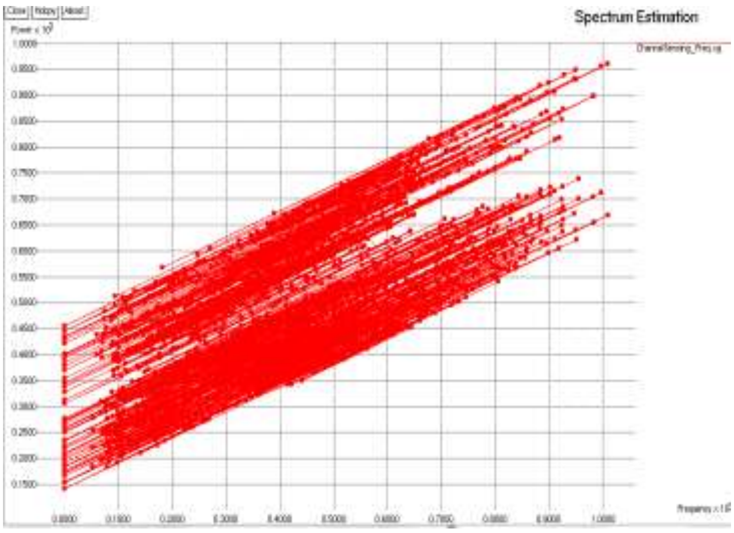


Figure 9 Plot For Spectrum Estimation

CONCLUSION:

The generalized access strategy in a multi-channel CRN smart home environment and formulating a two-phase optimization framework to maximize the gross average throughput has been proposed. In the sensing to find the optimized number of sensing channels and sensing times, first proposed a GAS, in which not all of the channels need to be sensed. Under the conditions some channels have sufficient low idle probabilities or the total number of channels is large. Then proposed a CHAS in which all the channels are sensed. The STA is used with low computational complexity. In the transmission phase, the transmission powers are optimized. In the newly proposed algorithm, static sensing method is modified as dynamic sensing method and SNR parameter is considered. The computational complexities are analyzed and simulations are used for convergence analyzing. Hence in the proposed algorithm, the simulated results indicate that the performance is increased considerably while comparing to the existing mechanism.

REFERENCES:

1. Kang XY, Liang H, Garg K, and Zhang R. Sensing-based spectrum sharing in cognitive radio networks. IEEE Transactions on Vehicular Technology. 2009; 58(8): 4649–4654.
2. Khoshkholgh MG, Navaie K, and Yanikomeroglu H. Access strategies for spectrum sharing in fading environment: Overlay, underlay and mixed. IEEE transactions on mobile computing. 2010;9(12): 1780-1793.
3. Jiang H, Lai L, Fan R, et al. Optimal selection of channel sensing order in cognitive radio. IEEE Transactions on wireless communications. 2009; 8(1): 297-307.
4. Pei YY, Liang C, Teh KC, and Li KH. Energy-efficient design of sequential channel sensing in cognitive radio networks: Optimal sensing strategy, power allocation and sensing order. IEEE Journal on Selected Area in Communications. 2011;29(8):1648–1659.
5. Mingchuan Yang, Yuan Li, Xiaofeng Liu, Wenyan Tang et al. Cyclostationary feature detection based spectrum sensing algorithm under complicated electromagnetic environment in cognitive radio networks. China Communications. 2015; 12: 9: 35 – 44.