

**INTERFERENCE EFFICIENCY: A NEW METRIC TO ANALYZE
THE PERFORMANCE OF COGNITIVE RADIO NETWORKS**

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ABSTRACT

- In this paper, we develop and analyze a novel performance metric, called interference efficiency, that shows the number of transmitted bits per unit of interference energy imposed on the primary users (PUs) in an underlay cognitive radio network (CRN).
- Specifically, we develop a framework to maximize the interference efficiency of a CRN with multiple secondary users (SUs) while satisfying target constraints on the average interference power, total transmit power and minimum ergodic rate for the SUs. In doing so, we formulate a multi objective optimization problem (MOP) that aims to maximize ergodic sum rate of SUs and to minimize average interference power on the primary receiver.



CONT...

- We solve the MOP by first transferring it into a single objective problem (SOP) using a weighted sum method. Considering different scenarios in terms of channel state information (CSI) availability to the SU transmitter, we investigate the effect of CSI on the performance and power allocation of the SUs.
- When full CSI is available, the formulated SOP is nonconvex and is solved using augmented penalty-method (also known as the method of multiplier). When only statistical information of the channel gains between the SU transmitters and the PU receiver is available, the SOP is solved using Lagrangian optimization. Numerical results are conducted to corroborate our theoretical analysis.



EXISTING SYSTEM

- In contrast to most previous works which assumed single secondary link sharing the same channel with one primary link.

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PROPOSED SYSTEM

- Once the performance metric of the system is formulated according to the proposed IE concept, the resources can be managed and optimally allocated to fit best with the characteristics of the interference limited systems.
- This can be achieved by maximizing the number of transmitted bits versus the unit of imposed interference energy, hence maximizing the IE.

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HARDWARE REQUIREMENTS

- Processor - Pentium-IV
- Speed - 1.1 Ghz
- RAM - 256MB(min)
- Hard Disk - 20 GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA

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SOFTWARE REQUIREMENTS

- Tool - Network Simulator-2
- Operating system - LINUX
- Front end - OTCL (Object Oriented Tool Command Language)

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REFERENCES

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- [3] G. I. Tsiropoulos, O. A. Dobre, M. H. Ahmed and K. E. Baddour, "Radio Resource Allocation Techniques for Efficient Spectrum Access in Cognitive Radio Networks," *IEEE Commun. Surv. & Tutor.*, vol. 18, no. 1, pp. 824-847, 2016.

