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COGNITIVE RADIO

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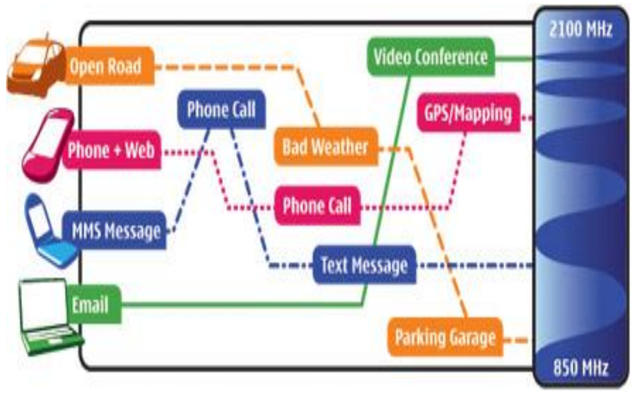
ABSTRACT

The main aim is to exploit sparsity of the spectrum.This provides a more efficient use of the spectrum as well as reduce power consumption thereby enabling high priority communications to take precedence if needed. Varied devices will be able to detect other radios around them and work together to optimize the use of spectrum, allocate resources and more easily communicate to their peers.

Keywords: SPECTRUM

I. INTRODUCTION

Cognitive radios are aware of their surroundings and bandwidth availability and are able to dynamically tune the spectrum usage based on location, nearby radios, time of day and other factors. This provides for a more efficient use of the spectrum as well as reducing power consumption, and enabling high priority communications to take precedence if needed.



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Varied devices will be able to detect other radios around them and work together to optimize the use of spectrum, allocate resources and more easily communicate to their peers.

Cooperative spectrum sensing improve PF for given PD (and vice versa) but it requires extra bandwidth for negotiation between SUs and cognitive BS. The overhead associated with the communication of initial decisions and the waiting time is rather negligible for small cluster sizes, it becomes more important as the cluster size increases. Consequently there is an optimum cluster size which results in the maximum effective throughput.

II ORGANIZATION

1. SYSTEM DESIGN:

To take advantage of the spectrum sparsity first the spectrum must be sensed (SS).
Some SS methods are Energy detection, LRT, match filtering, cyclostationary detection and *Energy detection* does not need extra information about the PU and therefore it is more popular.Probability of detection (PD) and probability of false alarm (PF) are two important parameter to measure the performance of the sensing. The interference induced from the SU on

the PU is proportional to the probability of misdetection (1-PD). The throughput of the SU is proportional to 1-PF.

2. SPECTRUM SENSING

Spectrum sensing can be performed as either distributed or cooperative. Cooperative spectrum sensing improve PF for given PD (and vice versa) but it requires extra bandwidth for negotiation between SUs and cognitive BS. The overhead associated with the communication of initial decisions and the waiting time is rather negligible for small cluster sizes, it becomes more important as the cluster size increases. Consequently there is an optimum cluster size which results in the maximum effective throughput.

3. SPECTRUM SENSING FUSION

Conventional sensing fusion methods are the And-rule, the Or-rule and the min M out of N rule.

$$P_d^{OR} = 1 - \prod_{n=1}^{N} \left(1 - P_d^{\ n}\right), \qquad P_d^{AND} = \prod_{n=1}^{N} P_d^{\ n},$$

$$P_f^{OR} = 1 - \prod_{n=1}^{N} \left(1 - P_f^{\ n}\right), \qquad P_f^{AND} = \prod_{n=1}^{N} P_f^{\ n}.$$

III. SENSING METHODOLOGIES

There are a number of attributes that must be incorporated into any cognitive radio spectrum sensing scheme. These ensure that the spectrum sensing is undertaken to meet the requirements for the particular applications. The methodology and attributes assigned to the spectrum sensing ensure that the cognitive radio system is able to avoid interference to other users while maintaining its own performance.

- ***Spectrum sensing bandwidth:*** There are a number of issues associated with the spectrum sensing bandwidth. The first is effectively the number of channels on which the system will sense whether they are occupied. By sensing channels apart from the one currently in use, the system will be able to build up a picture of alternative channels that can be used should the current one become occupied. Secondly the actual reception bandwidth needs to be determined. A narrow bandwidth will reduce the system noise floor and thereby improve the sensitivity, but it must also have a sufficiently wide bandwidth to detect the likely transmissions on the channel.
- ***Transmission type sensing:*** The system must be capable of identifying the transmission of the primary user for the channel. It must also identify transmissions of other units in the same system as itself. It should also be able to identify other types of transmission that may be spurious signals, etc.
- ***Spectrum sensing accuracy:*** The cognitive radio spectrum sensing mechanism must be able to detect any other signal levels accurately so that the number of false alarms is minimised.
- ***Spectrum sensing timing windows:*** It is necessary that the cognitive radio spectrum sensing methodology allows time slots when it does not transmit to enable the system to detect other signals. These must be accommodated within the frame format for the overall system.

V. CONCLUSION

Cognitive radio should minimize interference it creates to licensed users. This can be done by using minimum amount of transmitter power. In an active cognitive radio system, spectrum sensing sensitivity together with worst case link budgeting tells how much transmission power is allowed to use in order to avoid interfering with primary receivers. In a cognitive radio network using active awareness principles, delays cannot be avoided because of periodical sensing. Such a network is not good for real-time communication. Thus, power control method does not need to assure delay less communication.

The cognitive radio approaches have also some limitations. In particular, the key question in the evolution of cognitive radios into future cognitive networks is how to arrange control signaling between neighboring nodes in a rapid, robust and efficient way. Rapidity is a consequence of the limited time period when the spectrum holes are vacant. Robustness is due to the requirements of real life environment where reliable communication is needed. Efficiency aims at minimizing the use of resources such as energy and computations.

REFERENCES

[1] S. Haykin, “Cognitive Radio: Brain-empowered Wireless Communications”, IEEE Journal on Selected Areas in Communications (JSAC), Vol.
23, No. 2, pp. 201-220, Feb. 2005.
[2] I. F. Akyildiz, W. Lee, M. C. Vuran, S. Mohanty, “NeXt Generation/Dynamic Spectrum Access/Cognitive Radio Wireless Networks: a
Survey”, Computer Networks Journal (Elsevier), Vol. 50, No. 13, pp.
2127-2159, Sept. 2006.
[3] I. F. Akyildiz, W. Su, Y. Sankarasubramaniam, E. Cayirci, “A Survey on
Sensor Networks”, IEEE Communications Magazine, Vol. 40, No. 2, pp.
102-114, Aug. 2002
[4] .[Agarwal 2004] A. Agarwal and P. R. Kumar, “Capacity bounds for ad hoc and hybrid wireless networks,” ACM SIGCOMM Computer Communications Review, Vol. 34, pp. 71–82, July 2004.
[5].[Ahlswede 2000] R. Ahlswede et al., “Network information flow,” IEEE Transactions on
Information Theory, vol. 46, pp. 1204-1216, July 2000.