

Contents

Abstract.....	11
1 Introduction.....	12
1.1 Motivation.....	14
1.2 Problem Definition.....	14
1.3 Contribution of the Project Work.....	14
1.4 Organization of the Project Work.....	15
2 Background Study and Related Works.....	16
2.1 Background Study.....	16
2.1.1 Cognitive Radio.....	16
2.1.2 Cognitive Radio Network (CRN) working process.....	17
2.1.2.1 Sensing (Cognitive capability).....	17
2.1.2.2 Understand (Self-Organized capability).....	18
2.1.2.3 Decide (Decide capability).....	18
2.1.2.4 Adapt (Reconfigurable capability).....	18
2.1.3 Ad-hoc architecture.....	19
2.1.4 Interference Analysis.....	19
2.1.5 Spectrum Sharing Technique.....	20
2.1.6 Free-Space Path Loss (FSPL).....	21
2.1.7 Concepts of Dynamic Programming.....	21
2.2 Related Works.....	22
3 The Proposed Scheme.....	24
3.1 System Model and Assumptions.....	24
3.1.1 Network Model.....	25
3.1.2 HEAD selection among the SUs.....	25
3.1.3 Information to the HEAD.....	26
3.2 Proposed Approach and Design.....	26
3.2.1 Cognitive Users Selection Procedure.....	27
3.2.2 Secondary Users Selection Algorithm.....	28
4 Simulation Results and Observations.....	30
4.1 Throughput with greater Interference Tolerance of PU.....	30
4.2 Received Signal Strength with increasing distance from the PU.....	31
4.3 Interference Tolerance of PU with increasing Number of SUs.....	32
4.4 Throughput with increasing Number of SUs.....	33
5 Conclusion and Future Work.....	35
References.....	36

List of Figures

Figure 1.1: Spectrum utilization [3].....	12
Figure 1.2: Infrastructure of CRN.....	13
Figure 1.3: Opportunistic access of white spaces in frequency spectrum.....	14
Figure 2.1: An illustration of working process of CRN [9].....	17
Figure 2.2: An ad-hoc CRN architecture.....	19
Figure 4.1: Average Throughput vs. Interference Tolerance of the PU.....	30
Figure 4.2: Worst case scenario for greedy approach with $SUs = 5$ & $I_{tol}(PU) = 43dBm$	31
Figure 4.3: Received Signal Strength vs. Distance of SUs from PU.....	31
Figure 4.4: Interference Tolerance of the PU vs. Number of SUs.....	32
Figure 4.5: Worst case scenario for greedy approach with $SUs = 5$ & $I_{tol}(PU) = 43dBm$	33
Figure 4.6: Average throughput vs. Number of SUs.....	33

List of Tables

Table 3.1:	List of symbols and their notations.....	24
Table 4.1:	Values of the different parameters used in simulations.....	30

List of Algorithms

Algorithm 3.1:	For selection of HEAD for channel assignment.....	25
Algorithm 3.2:	For selection of SUs.....	28