

Cognitive Radio for Smart Grid: A Decentralized Emergency Management Approach

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Abstract:

With the remarkable advancements in wireless technology, the scarcity of the available spectrum has become more severe. Cognitive Radio (CR) technology is introduced as an emerging solution to alleviate the imbalance between spectrum under-utilization and high spectrum demands. CR enables unlicensed users to opportunistically transmit data through spectrum holes in licensed bands. In the context of smart grids, CR has become a key component to improve communication efficiency and spectrum usage. In particular emergency situations, some nodes are prone to failure, however the network must remain connected to the designated destination. In addition, the generated emergency communication and disaster relief cause high load of traffic that in turn will lead to congestion and affect the network coverage and capacity. In this paper, we introduced an efficient CR-based architecture for Smart Grid networks to enhance capacity coverage and scalability in the disaster and emergency case. The architecture is decentralized and consists of a set of clusters that communicate with each other in a secure way through number of gateways. CRT-based group key management has been used to manage the distribution of keys between gateways. In addition, the

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Contents

I. Introduction

The connotation of the smart grid (SG) is an intelligent control system that adopts a combination of technologies such as sensing, machine learning and network grid to optimize the efficiency power generation and utilization in connected power units [1], [2]. While wired solutions were conventionally adopted for realizing SGs requirements, wireless technology is proved to be a more efficient and flexible alternative, especially in disaster and emergency cases. Substantial research is being achieved in communications technologies for the SG.

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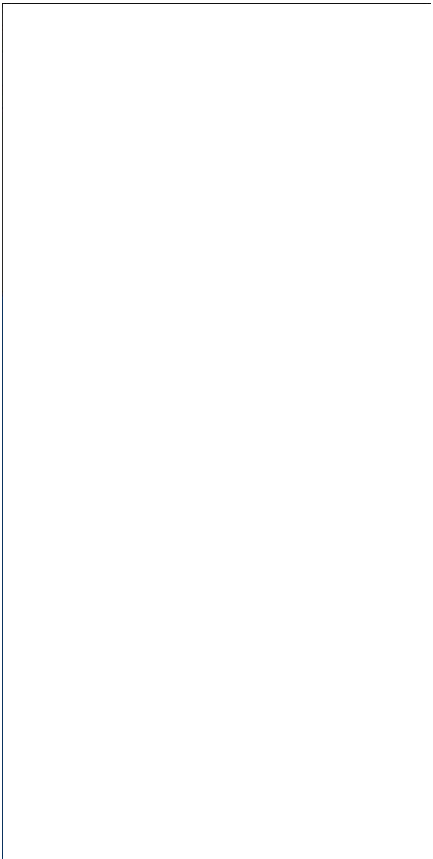


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