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Graph based automatic centralized PCI assignment in LTE

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Abstract:

Physical Cell Identity (PCI) is cell identifier on the physical layer which can be used to create synchronization signals. There is a mapping between synchronization signals and physical cell identity, and then User Equipment (UE) can search cells through this mapping. Traditionally, PCI was configured during network planning process. While with 3G Long Term Evolution (LTE) has been prevalent in the future network, auto configuration of radio parameters has become a necessity. This paper proposed an automatic centralized PCI assignment mechanism using OAM as central server to collect cell information of the network, and create an abstract graph using information given which reflects the relationship in real-world network. After that, an enhanced graph-coloring algorithm which can greatly reduce time complexity while keeping a high PCI utility ratio was provided to create a collision and confusion free PCI for the new cell.

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I. Introduction

LTE is well known for self-sensing, self-configuration, self-optimizing and self-healing without much human intervention and great operational expenditure (OPEX) and capital expenditure (CAPEX) reduction. In self-configuration phase, when a new evolved NodeB (eNB) is introduced into the network, a series of parameters such as antenna tilt, pilot power need to be configured. PCI is one of the radio parameters which ranges from 0 to 503 [1] and is used to scramble the data to help the mobile separate information from different transmitters. While in most cases, cells in a network are more than 504, the PCI need to be used more than once. During the assignment of PCI, it must fulfill both collision and confusion free with respective neighbor cells [2].

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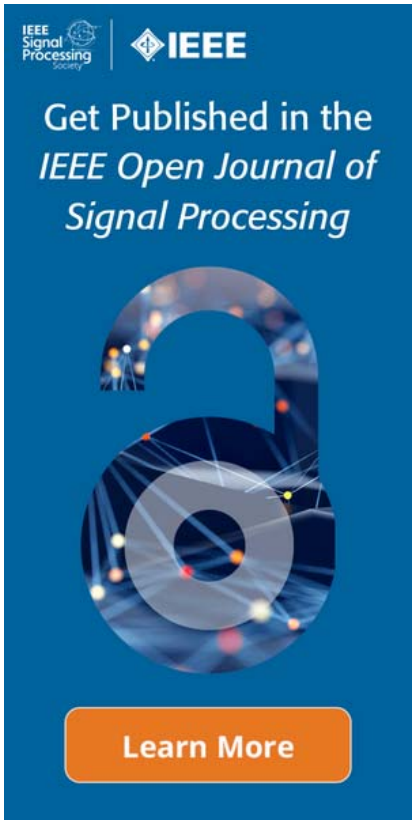

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