1. An Overview of LTE Advanced

This chapter provides a high-level description of the LTE-Advanced (LTE-A) network and associated technologies to form a basis for discussion of the co-existence issues that exist for unlicensed LTE and Wi-Fi. Understanding the underlying architecture and protocols employed in LTE-A networks will provide readers a comparative framework to grasp how, and at what levels, LTE and Wi-Fi networks may interact and interfere with each other, and form a greater understanding of the challenges to be address in designing coexistence mechanisms. Specifically, this chapter will overview the LTE-A network, its capabilities and protocols, with specific emphasis on the physical layer and medium access sub-layers to illuminate specific sources of co-existence issues. Proposed changes which may be included in future LTE releases are discussed in the context of LTE/Wi-Fi coexistence.

* 1. System Overview
     1. Network Architecture
     2. Capabilities and Features
  2. Channel Access Mechanisms
     1. LTE-A Physical Layer Protocol
     2. LTE-A Medium Access Protocol
  3. Changes Expected for Future Releases

1. Network-aware Adaptive Listen Before Talk Co-existence Mechanism

In the absence of coordination between radio access technologies, and with the goal of deploying unlicensed LTE without requiring changes to the Wi-Fi MAC layer, it falls to the LTE base stations to ensure fair coexistence. As we have seen, Wi-Fi employs a fairly simple multiple access method which can easily lead to Wi-Fi stations being barred from the channel if LAA-LTE is not designed to promote fairness. If no changes are to be made to Wi-Fi devices, then the greatest gains in fair coexistence are achieved when unlicensed LTE behaves in as Wi-Fi like a manner as possible, however, this may not allow LTE to make the best use of the channel. In this chapter, a network-aware adaptive LBT mechanism (NALT) is proposed which monitors both channel conditions and usage activity to maximize its transmission opportunities, while maintaining fair sharing of the channel, in a way that is transparent to incumbent Wi-Fi devices.

* 1. Background and Theoretical Basis
  2. Proposed Mechanism
  3. Performance Evaluation
     1. System Model
     2. Simulation Results
  4. Discussion and Future Work

**CV/Bio**

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