

A Matlab Based Test Tool for LTE Signal Analysis

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Long Term Evolution, called LTE, has been commercialized and used by many major carriers because of its high downlink and uplink peak rates. It is a highly complex system, dynamic in time and frequency. One question that arises is the issue of time synchronization between LTE mobile units. Time synchronization is one of the basic functions in any cellular system, and is required to initiate communication. Within the frame based protocol of LTE, the user equipment (UE) must first indicate where the subframe begins and ends by using the primary synchronization signal (PSS). PSS also helps to identify the physical layer identity (0 to 2) of the cell. In the second step, the UE finds the secondary synchronization signal to more precisely locate the frame and obtain the physical layer cell identity group number (0 to 267). Combining results from the previous two steps, the physical cell ID, time slot and frame synchronization will be acquired. This information will enable UE to proceed further in communication.

To gain a better understanding how LTE mobile cell search, time and frequency synchronization work, we develop a MATLAB test tool that investigates LTE frequency division duplexing (FDD). For practical purposes, various Verizon LTE signals received by a real time spectrum analyzer (RTSA) are used and analyzed here. The key of the simulation is to use cross correlation to detect the two synchronization signals. In this talk, we will discuss the obstacles and challenges faced in this process and aspects of this research that remain to be accomplished.