LTE-U and LAA

Instructor Led Live Virtual Class | Duration: 0.5 Day | Course Number: TPR1020

Exponentially rising data traffic, scarcity of spectrum, and expectations of enhanced user experience are leading operators to explore the use of unlicensed spectrum to carry traffic. 3GPP has defined specific approaches for using the unlicensed spectrum. In one approach, some or all of the traffic is carried by the Wi-Fi network in the unlicensed spectrum. Example mechanisms of such approach include Wi-Fi offload and LTE-Wi-Fi Link Aggregation (LWA). In another approach, the traffic is carried by LTE and its evolutionary technologies (e.g., LTE-Advanced) simultaneously on licensed spectrum and unlicensed spectrum. Example mechanisms of such approach include LTE-Unlicensed (LTE-U), Licensed Assisted Access (LAA) and enhanced LAA (eLAA). Operators around the globe are in the process of deploying LTE-U and LAA. The course first provides an overview of these mechanisms. The course then provides a closer look at LTE-U and LAA by discussing key components such as Small Cells, Carrier Aggregation, and techniques of sharing of the unlicensed spectrum with Wi-Fi networks.

Intended Audience

This is a basic overview course, primarily intended for those in system integration and test, systems engineering, operations and support, LTE network planners, design engineers and managers.

Learning Objectives

After completing this course, the student will be able to:

- Explain the motivation behind the use of unlicensed spectrum
- Distinguish among Wi-Fi offload, LWA, LTE-U, LAA, eLAA, and MulteFire
- List benefits of using LTE in unlicensed spectrum instead of Wi-Fi
- Describe the mechanisms that LTE-U uses to share the unlicensed spectrum with Wi-Fi networks
- Summarize how downlink data transfer occurs in LTE-U
- Illustrate deployment scenarios for LTE-U
- Describe the mechanisms that LAA uses to share the unlicensed spectrum with Wi-Fi networks
- Summarize required changes in the UE and the network to support LTE-U and LAA

Suggested Prerequisite

- Working knowledge of LTE and LTE-Advanced
- [LTE_102] LTE Overview (eLearning)

Course Outline

1. **LTE in Unlicensed Spectrum**
   1.1. Motivation for unlicensed spectrum
   1.2. Evolution of unlicensed LTE
   1.3 LTE-Wi-Fi interworking
       1.3.1 Wi-Fi offload
       1.3.2 LWA
   1.4 Carrier aggregation with unlicensed spectrum
       1.4.1 LTE-U
       1.4.2 LAA and eLAA
   1.5 MulteFire

2. **LTE-U**
   2.1. Motivation for LTE-U
   2.2. LTE vs. Wi-Fi
   2.3. Key LTE-U components
       2.3.1. Unlicensed spectrum (bands and regulations)
       2.3.2. Small Cells
       2.3.3. Carrier aggregation
   2.4. Deployment scenarios
   2.5. Wi-Fi Coexistence mechanisms
       2.5.1. Dynamic channel selection
       2.5.2. CSAT
       2.5.3. Opportunistic SDL
   2.6. UE and Network changes for LTE-U
   2.7. UE operations
       2.7.1. Network attach
       2.7.2. UE configuration
       2.7.3. Downlink data transfer

3. **LAA and eLAA**
   3.1. Motivation for LAA
   3.2. Listen before Talk (LBT)
   3.3. Channel priority classes
   3.4. UE and network changes for LAA
   3.5. UE operations for LAA
   3.6. Motivation for eLAA
   3.7. Uplink CA
   3.8. Dual connectivity
   3.9. UE and network changes for eLAA