UAV-Assisted Wireless Channel and Interference Characterizations (VL1-15)

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Introduction

Wi-Fi, one of the most widely used wireless technologies, covers over 4 million households worldwide to connect laptops, smart phones and even televisions, lights, and air conditioners with the Internet. LTE is a wireless communication standard developed for providing high-speed data transmission for mobile phones. Its uplink speed is up to 30 megabytes per second (Mbps) and downlink speed is up to 100 Mbps. The user experience of many mobile services, required fast data transmission (e.g. music and video streaming), is highly improved from the development of this technology.

For Wi-Fi service providers and communication operators providing LTE services, it is necessary to understand situations of the communication channels they are providing for the customers. Traditionally, there are three approaches proposed for conducting a site survey. However, they are highly labor-intensive and time-consuming.

Objective

- Accelerate and smooth the wireless site survey procedures in outdoor environment.
- Use smartphones to detect the signal strength of a Wi-Fi/LTE transmitter.
- Use the GPS function to generate the geographical information automatically.

Methodology

- When users enter the application, the LTE detection module starts detecting.
- It will create a LTE list globally in the background and keep updating the table in each scanning. This mechanism is also applied to the Wi-Fi detection module.
- As for LTE, the LTE List Fragment displays the Physical Cell Identifier (PCI), Reference Signal Received Power (RSRP), and Arbitrary Strength Unit (ASU) Level of each signal tower.
- As for Wi-Fi, the Wi-Fi List Fragment will display the Service Set Identifier (SSID), Basic Service Set Identifier (BSSID) and the Received Signal Strength Indicator (RSSI) of each access point (AP).
- The Location Fragment will display a Google map that zooms in your location.
- According to the signal level obtained, a dot will be plotted on the map.

Main Result

- Integrated Testing: The application first scans the LTE detection. And one of the signal towers was selected. Then we walked around the environment to generate the whole heat map. The result is shown in Figure (1). The changes of signal strength were captured. The tested location was the Fok Ying Tung sports center in HKU.

- Conclusion: Smartphone is a desired platform to conduct wireless site survey. However, most of the mobile applications in the market are not fully utilizing the features of smartphones. Our project application is a huge improvement comparing to most of the site survey applications nowadays. In the future, we will include the radio propagation model in our application in order to produce a heat map covering the whole region of interest.