

Research Description

In the recent years, we are seeing a new trend where mobile carriers are increasingly deploying hotspots i.e. an area where a user carrying a mobile device can switch from a cellular network to a WiFi network while experiencing better bandwidth and quality of service. This ability to offload a part of the traffic from the cellular network to a WiFi network, alleviates the traffic overhead experienced by a mobile carrier infrastructure while providing better quality of service to the users.

Due to the success of early versions of hotspots, we now have an emerging standard for public-access WiFi (led by WiFi alliance) called Hotspot 2.0 that allows a mobile device to seamlessly roam among WiFi networks and between WiFi and cellular networks without requiring the user sign-on and authentication. While Hotspot 2.0 is a promising standard, there are various challenges in its efficient implementation. These challenges include but are not limited to the following:

- i) seamless migration of TCP connections while roaming across networks,
- ii) maximizing the quality of service experienced by users who have both WiFi and cellular networks available.

In this research project, we aim to address the above-mentioned challenges in efficient implementation of Hotspot 2.0 standard. We aim to conduct this research using an experimental test-bed comprising of a WiFi network, and a low-powered nano-cell base-station (Model: *nanoLTE E40*, Manufacturer: *ip.access*) supporting communication over LTE bands. Using this experimental test-bed, we will be able to evaluate and compare the performance of a LTE cellular network and a WiFi network in a controlled environment. Moreover, we will be able to evaluate our implementation of seamless-roaming feature between WiFi and cellular networks.

Due to the nature of this research, this becomes essential for us to have access to UMTS-FDD frequency bands 1, 3, 7 and 20 that is used by the nano-cell base-station for communication. While the existing communication facilities allow us to evaluate the performance of WiFi networks, these facilities are definitely inadequate to i) evaluate the performance of LTE networks, and ii) test the roaming capability between LTE and WiFi networks. If our experimental license is approved, we will be able to conduct our research towards building a Hotspot 2.0 infrastructure that will maximize the joint performance of cellular networks and WiFi networks.