ABSTRACT

In disaster areas, energy consumption of both devices and networks are of significantly important. Wireless networks supporting large area are then urgently required. In this thesis, we propose the usage of Unmanned Aerial Vehicle (UAV) as a flying mobile base transceiver station to discover devices having capability of communicating between Device-to-Device (D2D) in the disaster area. The D2D communication is preferable since it can reduce the energy consumption. The previous works do not consider the low energy consumption of the UAV and well as UAV flight path for typical disaster, e.g., flood, and earthquake. This thsis provide UAV flying paths that can adapt according to disaster condition which satisfy the UAV energy constraint.

Enhancement of four schemes for the UAV flying paths: O-path, Rectangular path, ZigZag-path, and S-path are has been done in this thesis. This enhancement reduces the flight path gap area and lead the increasing of covered area. To examine the best UAV flight path for certain disaster cases, several computer simulations are performed and discussed. The results show that for distributed damage pattern, the optimum UAV flying pattern is an S - path because of its large coverage area (covering around 80 percent of total devices in altitude 100 m). On the other hand, for centralized damage pattern, the optimum UAV flying patterns are O-path, and followed by Rectangular-path, and Zigzag-path because of their short flight duration and less energy consumption (eight times smaller than the S - path in altitude 100 m).

Keywords: Device-to-Device, UAV, Device Discovery, 5G, Emergency Communication