

Field measurement results for drone LTE enhancement

KDDI Corporation

- In RAN#75, the study item “Enhanced Support for Aerial Vehicles” was approved[1]. It shows strong industry interests of using LTE cellular network for drones.
- In this paper, we will share the results of our experimental drone trial, including characteristics of the network coverage at higher altitude (up to 100m)
- The propose of this document is to identify problems for using LTE cellular network for drones.

[1] RP-170779 New SID on Enhanced Support for Aerial Vehicles
NTT DOCOMO INC, Ericsson

- Trial Location : An airfield near a marine port (Japan)
- Drone : Controlled over Wi-Fi (LTE is only used for data transmission for UE on drone)
- LTE Frequency : 800MHz
- Flight route : a square about 100 m on a side (Figure 1)
- Drone Altitude : 0m, 25m ,50m, 75m, 100m (Figure 2)



Figure 1

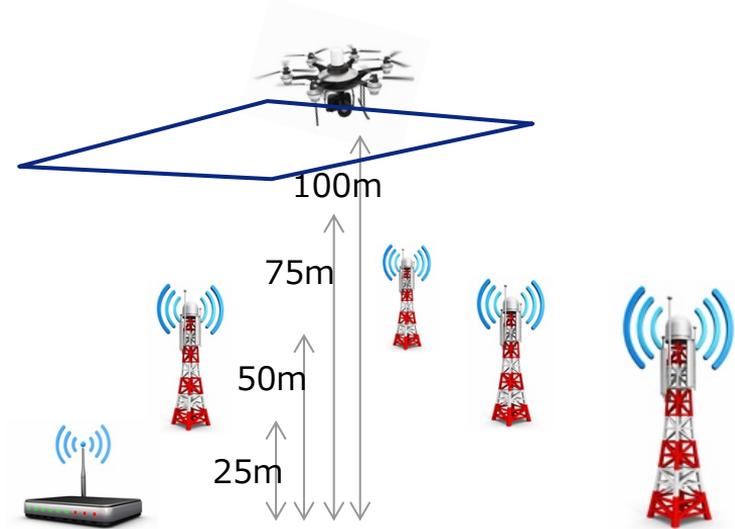


Figure 2

① Number of Handover success/ Failure

- Results show the following points
 - Near the ground (0m, 25m), thanks to good deployment design and parameter tuning, handover failure did not occur.
 - Above altitude 50m, some handover failure occurred, and it is assumed that is because of the interference from many neighbor cells
- The following observation and proposal can be made from the above points
 - Observation : Deployment design and parameter tuning for terrestrial operation cannot be applied for drone use cases
 - Proposal : RAN WGs work on developing solutions to address handover failure

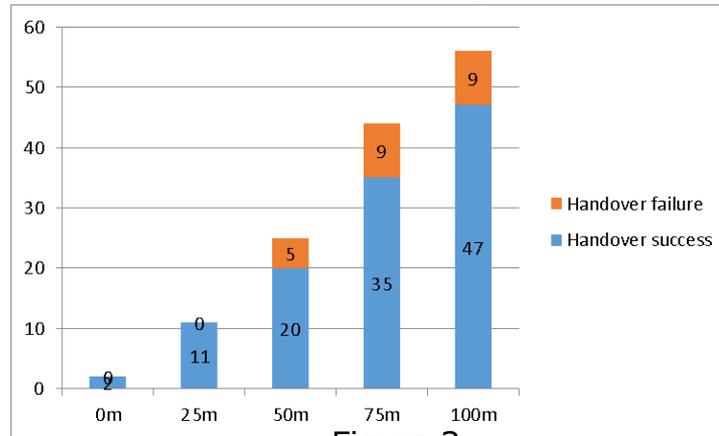
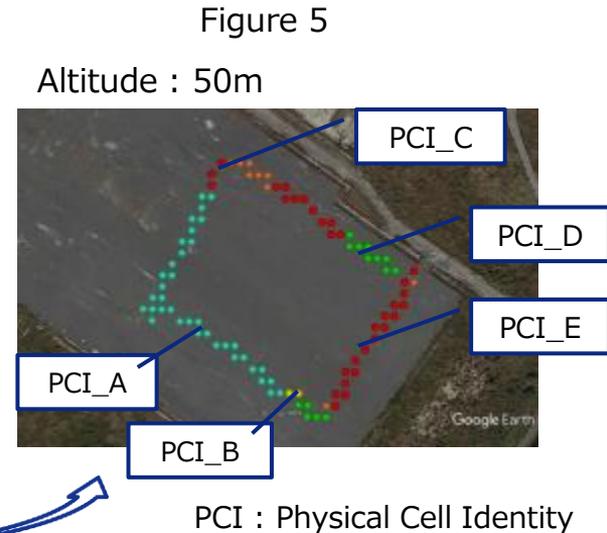
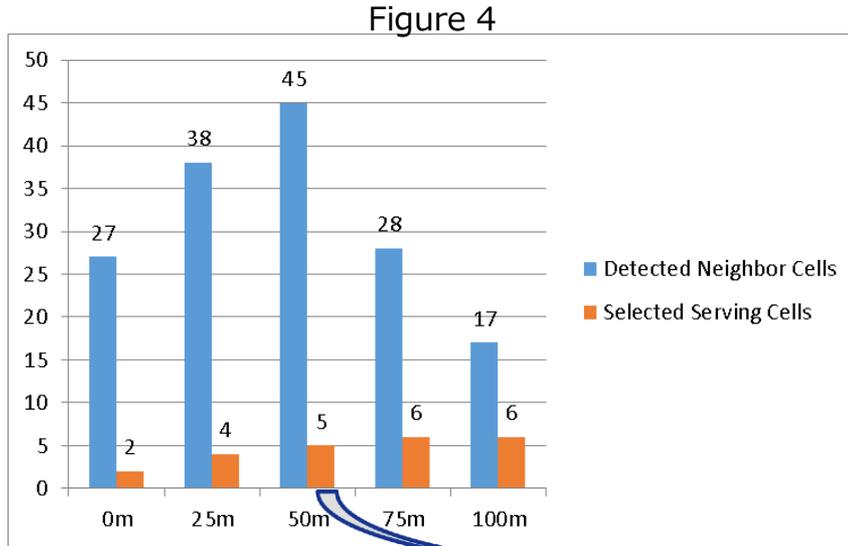


Figure 3

② Number of neighbor cells and connected cells (Figure 4)

- At altitude 50m, UE can detect maximum 45 neighbor cells, and UE selects 5 cells as a serving cell. Which cell UE selects as a serving cell can be seen in Figure 5.
- Above altitude 75m, the number of neighbor cells which UE detected decrease, because UE receives many synchronization signals from many eNBs, which lead to difficulty of correlation detection of the signals.



In this contribution, we provide the results of our drone trial, and make the following observation and proposal.

- **Observation : Deployment design and parameter tuning for terrestrial operation cannot be applied for drone use cases**
- **Proposal : RAN WGs work on developing solutions to address handover failure**