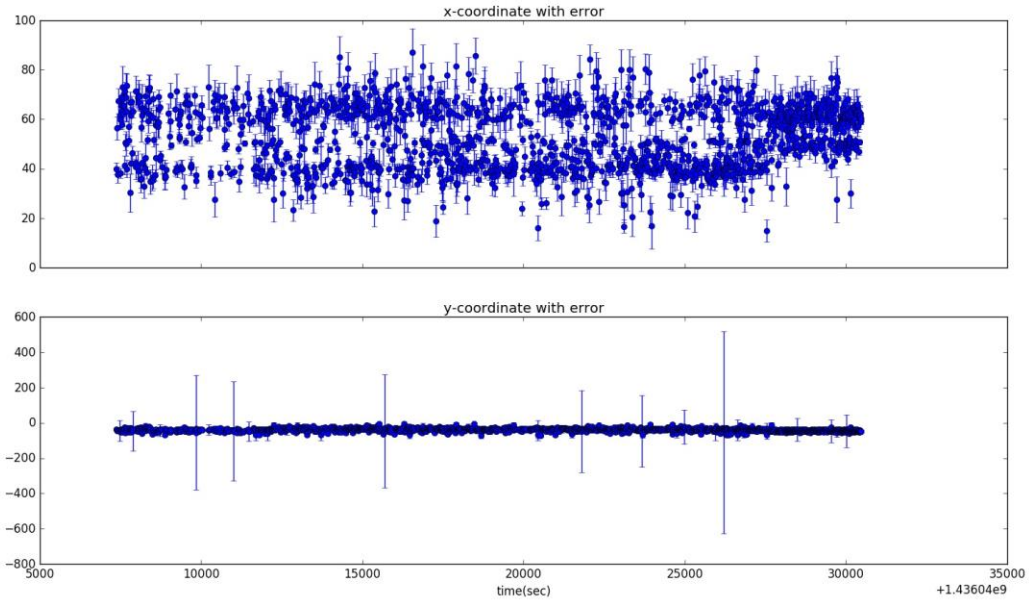
Estimation of coordinates through time

Let us look at the estimations of the coordinates of addresses through time. I take the most persistent address, with most packets sent (e1deda99-163f-4b68-9ade-e1f05d070bf2) and I filter the estimations by the following:

Prob_chi > 0.3 and stderrX < 5 and Chi2PerDof <1.2

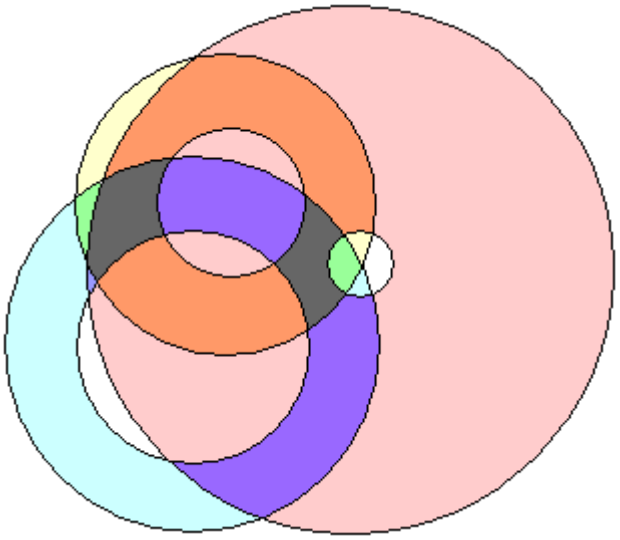
where stderrX is the error of the mean. So, I take into account only the high-quality estimations. (The numbers above are arbitrary, but the graph does not change much if I play with the numbers)

I draw the coordinates through time, with the error bar having a half-length of 2*stderrX (for a 95% confidence) . To avoid clutter, I don't take into account more than one estimation per second.



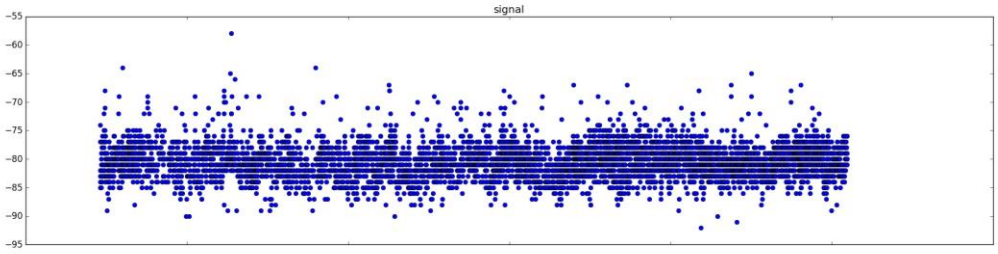
Ok, so this bi-modal distribution of the position estimate is prevalent in any address that I took into account, regardless of whether it is non-randomized or randomized.

My assumption is that this is because there are more than one optimal location estimations, even when not all routers are colinear (we discussed it with Jan some time ago). For example, if every ring is the error of the signal estimation for router, then we have two regions where the optimal location estimation is hiding:



And this can happen also if the thick ring is not so thick.

For a sanity check, I draw the signal strength through time for that address for all drones, and for drone 112 they look like this (the signals are also stable for other drones, no bimodal distribution)



Anyway, if the problem was up to the signals then it would have been visible in the quality of the estimation.

Ok, let us hope that with the Huawei routers the bi-modal distribution will disappear. Otherwise, we will need some background information for a precise estimation ….(this problem cannot be solved in a general case with a math technique)