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1 Introduction

Reference [6] introduces a refinement in which a cell may transmit its sync burst in a time slot and also listen for the sync bursts of its neighbors.

This paper gives an example to illustrate that, taking advantage of this refinement, the Sync Channel Approach provides a higher effective rate of measurements than the RACH Approach for equivalent allocations of resources.

2 Background

In reference [6] it was proposed that, in the Sync Burst Approach, a cell can both transmit its sync burst and listen for the sync burst of its neighbors. It was also proposed that a cell can receive and process multiple sync bursts in the same slot, as long as the neighboring cells are assigned appropriate time offsets.

The analysis of the following paragraph will show that this yields significant improvements in the average number of received measurements per unit time.

3 Sample Scenario

Assume that there are seven cells, a master with assumed correct time, and six other cells, attempting to synchronise to it.
Assume the following schedule.

- For the RACH concept, a dedicated slot is reserved once per 3 seconds (1 slot per 300 frames).
- The cells rotate, so that each cell transmits once per 21 seconds.
- Each of cells 1 to 6 receives the master, cell 0, once per 21 seconds.
- The master, cell 0, receives each other cell, once per 21 seconds.

Assume that each measurement is received with probability of success = 1.0.
The average number of measurements per pair is 1/21 seconds.

Now repeat the scenario for the Sync Channel Approach.
Assume

- A dedicated slot is reserved once per 3 seconds
- Each cell transmits and listens for the others and has the potential to receive a measurement for each other cell once per 3 seconds
- Assume that each measurement is received with a probability of success = 0.5.
- Each of cells 1 to 6 measures the sync burst from cell 0 on the average 3.5 times
- Cell 0 successfully measures the sync burst of each of the other six cells, on the average 3.5 times.

4 Conclusion

For the same allocation of assigned resources (i.e. time slots reserved for Node Sync) the Sync Burst Approach yields a higher rate of successful measurements per unit time than the RACH Approach. This is true even if the Sync Burst Approach has only a 50% probability of success per measurement, while the RACH Approach has 100% probability of success.

References

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