

# iMAC Implementation Notes

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## 1 PRKS- Revision Reminder

- No previous  $d_0$  concept, which means we do not have to do  $d_0$  sampling anymore  $\rightarrow$  We can re-define the *ER - INFO - ITEM* we need to transmit.

## 2 Todo List

1. (done)  $\implies$  Only relay the ER info item when a node is in the original control packet sender's ER.
2. (done)  $\implies$  Decide which ER info item to store in the payload of the control packet (item priority).
3. (done)  $\implies$  quantile estimation.
4. (done)  $\implies$  compute the priority of control packet based on payload item priorities, use the max one.
5. (done)  $\implies$  Get rid of meaningful numbers in .cc file, define them in .h files.
6. (done)  $\implies$   $d_0$  sampling (first category sampling).
7. (done)  $\implies$  8 levels of priorities in control packets.
8. (done)  $\implies$  remove PDR initial values, do EWMA estimation only when a node has the estimated PDR values.
9. (done)  $\implies$  Record the reception time of each ER info item.
10. (done)  $\implies$  check which category the info item belongs to.
11. (done)  $\implies$  Quantile calculation and EWMA estimation for  $d_0$  values of the 2,3 categories.
12. (done)  $\implies$  Change 1.5 transmission range as the initial ER edge.
13. (done)  $\implies$  when received an ER info item, check which  $d0_{quantile}$  to use (by checking categories) and maintain  $d_{cat2}$  and  $d0_{cat3}$  for each link.
14. (done)  $\implies$  piggyback ER info item reception time when transmit control signals.
15. (done)  $\implies$  piggyback  $d_0$  values for the category 2 and 3.
16. (done)  $\implies$  Figured out the memory issue. sampling issue
17. (done)  $\implies$  drop ER info items if the current node is not in the ER specified by the ER info item link.

18. (done)  $\implies$  report control message reception only if a node is in the control message sender's Max ER.
19. (done)  $\implies$  implement the round-robin mechanism when choosing which er info item to transmit
20. (done)  $\implies$  change the  $d_0$  sampling for the category 2 and 3 ER info items. When receiving a new Er info item of category 2 or 3, do not immediately sample  $d_0$  for this item.
21. (done)  $\implies$  when power control, add another  $\Delta SNR$ .
22. (done)  $\implies$  For a node, if there are other nodes sending data to it or it will receive data from others, we consider all these nodes, including the node itself, if any of them is in the ER defined by the ER info item, we relay this ER info item;
23. (done)  $\implies$  Delay PDR estimation  $d_0$  timeslot to enforce the right controller behavior.
24. (done)  $\implies$  Use the estimation of N+I, not just the latest received one, or, use percentile as conservative, or use max. (currently using ewma estimation)
25. (done)  $\implies$  Compute the data packet loss due to inconsistency.
26. (done)  $\implies$  There may be some channel sensing issues, which caused the large  $N + I$  samples. Use difference quantile numbers to filter the large  $N + I$  samples
27. (done)  $\implies$  When do link estimation, use *payloadItem* -  $> d_0$ , not use *m\_d0ForCategoryOne*.
28. (done)  $\implies$  Do not use  $d_0$  ewma estimation, just use the quantile value of  $d_0$ .
29. (done)  $\implies$  When decide if a node should receive an Er information item, first check if this node is in control message sender's ER, then check if this node is in the original control message sender's ER. Finally, check if there is any node with whom this node could send data to or receive data from is in the two Er's.
30. check  $d_0$  enforcement.
31. When do power control, make sure *EVERY* node can receive the packet.
32. Check  $d_0$  quantile estimation accuracy.
33. When doing sliding window  $N + I$  estimation, make *two* copy of  $N + I$  samples, then sort one according to  $NI$  value, sort another one according to sampling time.
34. change initial *ER* value setting
35. Disable *ACK ER* since we want to make the concurrency in iMAC close to that in iOrder.
36. Always use the larger *ER* between the current er and the previous er when forwarding an er information item. (done)
37. Consider about the lifetime for each er information item.
38. Print out the  $d_0$  for the two categories, see the difference. We do not want the different to be too large.

### 3 Different Scenarios

1. use different quantiles of  $N + I$  samples, check which one works better for us.
2. use different quantiles for  $d_0$  samples
3. use power control or not
4. use  $d_0$  or not
5. use different estimation windows size for  $PDR$  estimation.