iMAC Implementation Notes

Chuan Li

1 PRKS- Revision Reminder

- When receiving a sender_computed_next_timeslot, re-set @nextTxSlot[from sender and from receiver]
- 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.(DONE)
- $GetErInfoItemForLink()\dot{}$ needs to be changed (DONE)
- If conflicting set size is 0, do not send. (not a sender). If return value of $SenderComputePriority$ is false and $m\_currentTimeslot = 0$, do not send (DONE)
- If $m\_currentTimeslot = 0$ or is sending timesot, collect conflicting set and compute priority (DONE)
- Note that there is no concept of preempted links anymore. (DONE)
- Update next transmission slot information at the receiver side. (DONE)
- disable ACK ER control (DONE)
- When new estimation is made, set the $@allowPdrEstimation$ to be false, only when the receiver confirms that its sender has received this ER information, set $@allowPdrEstimation$ back to be true; (DONE)
- For link estimation, if after some time, (e.g., 100 timeslots), the new ER information still hasn't been received by its corresponding sender, RE-SET the item priority for such ER information item and let it be sent at the highest priority. This is to solve the problem that a receiver might never estimates link reliability again due to its corresponding sender never received its new ER information. (DONE)
- Check simulation time, why it takes so much time for a single simulation run to finish.
- independent links: $92 \leftrightarrow 97$, $58 \leftrightarrow 59$, $11 \leftrightarrow 16$, $22 \leftrightarrow 27$, $23 \leftrightarrow 28$, $39 \leftrightarrow 44$, $67 \leftrightarrow 70$, $68 \leftrightarrow 96$, $95 \leftrightarrow 95$.

2 Todo List

1. (done) $\Longrightarrow$ Only relay the ER info item when a node is in the oringal control packet sender's ER.
2. (done) $\Longrightarrow$ Decide which ER info item to store in the payload of the control packet (item priority).
3. (done) $\Longrightarrow$ quantile estimation.

4. (done) $\Longrightarrow$ compute the priority of control packet based on payload item priorities, use the max one.

5. (done) $\Longrightarrow$ Get rid of meaningful numbers in .cc file, define them in .h files.

6. (done) $\Longrightarrow$ d_0 sampling (first category sampling).

7. (done) $\Longrightarrow$ 8 levels of priorities in control packets.

8. (done) $\Longrightarrow$ remove PDR intial values, do EWMA estimation only when a node has the estimated PDR values.

9. (done) $\Longrightarrow$ Record the reception itme of each ER info item.

10. (done) $\Longrightarrow$ check which category the info item belongs to.

11. (done) $\Longrightarrow$ Quantile calculation and EWMA estimation for d_0 values of the 2,3 categories.

12. (done) $\Longrightarrow$ Change 1.5 transmission range as the intial ER edge.

13. (done) $\Longrightarrow$ 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) $\Longrightarrow$ piggyback ER info item reception time when transmit control signals.

15. (done) $\Longrightarrow$ piggyback d_0 values for the category 2 and 3.

16. (done) $\Longrightarrow$ Figured out the memory issue. sampling issue

17. (done) $\Longrightarrow$ drop ER info items if the current node is not in the ER specified by the ER info item link.

18. (done) $\Longrightarrow$ report control message reception only if a node is in the control message sender's Max ER.

19. (done) $\Longrightarrow$ implement the round-robin mechanism when choosing which er info item to transmit

20. (done) $\Longrightarrow$ 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) $\Longrightarrow$ when power control, add another ΔSNR.

22. (done) $\Longrightarrow$ 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) $\Longrightarrow$ Delay PDR estimation d_0 timeslot to enforce the right controller behavior.

24. (done) $\Longrightarrow$ Use the estimation of N+I, not just the latested received one, or, use pencentile as conservative, or use max. (currently using ewma estimation)

25. (done) $\Longrightarrow$ Compute the data packet loss due to inconsistency.

26. (done) $\Longrightarrow$ 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) $\Longrightarrow$ When do link estimation, use $payloadItem- > d\_0$, not use $m\_d0ForCategoryOne$.

28. (done) $\Longrightarrow$ Do not use d_0 ewma estimation, just use the quantile value of d_0.

29. (done) $\Longrightarrow$ When decide if a node should receive an Er infomation itme, 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.