D-PLCA Node Count Increase (Late Comment)

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Background

- **The D-PLCA Coordinator maintains the plca_node_count such that the last transmit opportunity immediately prior to the BEACON is unused / unclaimed**
  - New D-PLCA followers will listen and select / claim this TO
  - Once the new D-PLCA follower claims the last TO, the coordinator increases plca_node_count

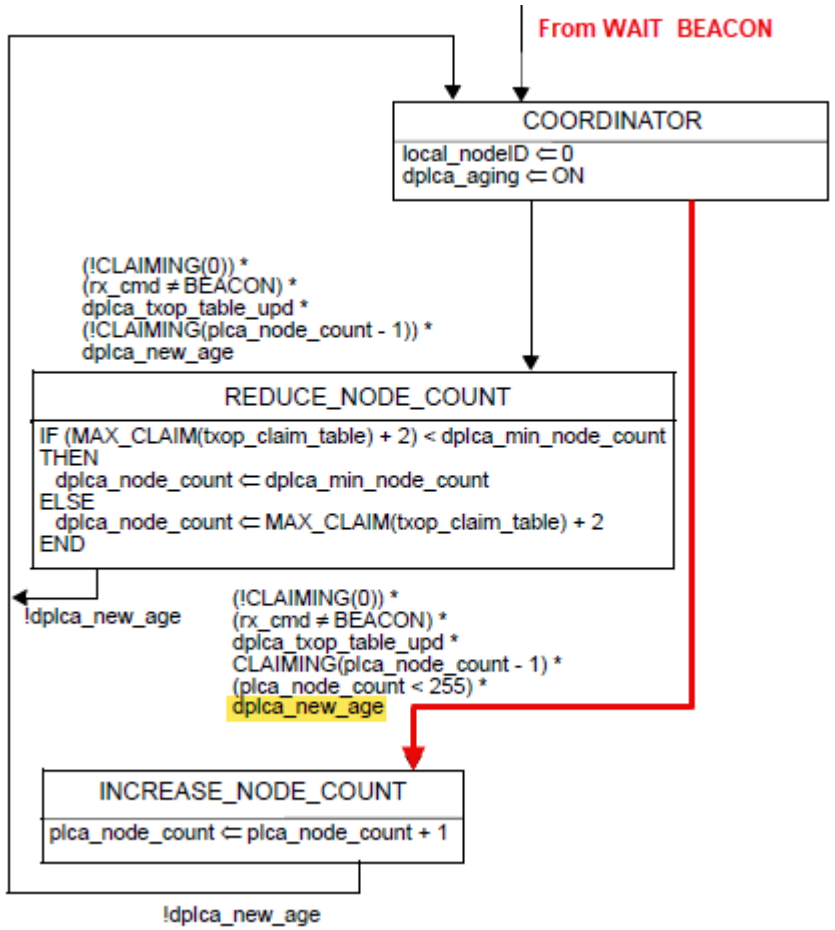

Fig 148-8 – D-PLCA Control State Diagram (pg 86)

Background

- **The D-PLCA Coordinator only checks if the last TO of the cycle is claimed when:**
  - The claim table is updated
    - dplca_txop_table_upd == TRUE
  - The aging period has elapsed and a new claim table made active with expired TO claims.
    - dplca_new_age == TRUE
      - Aging period defaults to 64 PLCA cycles (BEACONS)

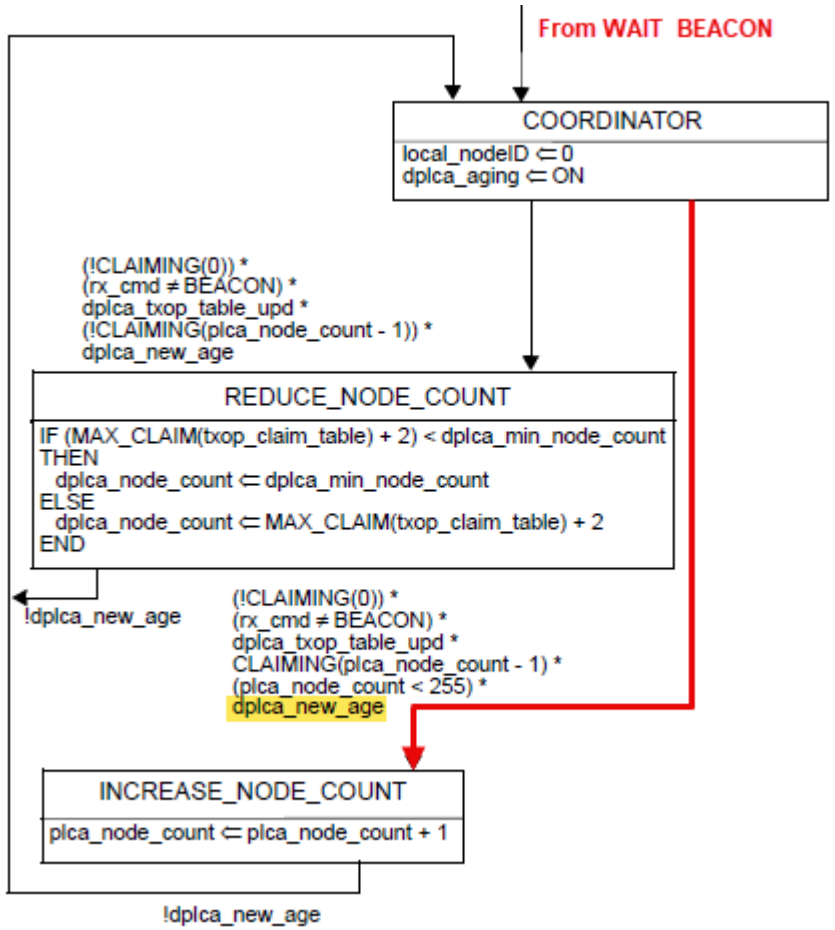

Fig 148-8 – D-PLCA Control State Diagram (pg 86)

Problem

- **Multiple D-PLCA followers may pick a TO during a single aging period**
  - The first follower to pick a TO will select the unused TO at the end of the cycle immediately prior to the BEACON as expected.
  - If the first follower then transmits and claims the last TO of the cycle, a second follower will end up selecting the first TO *beyond* the end of the cycle
    - This is when the Coordinator will transmit the BEACON
    - If the second follower transmits it will then **collide with the BEACON**

Problem - Example

- **plca_node_count = 7**
  - PLCA Cycle consists of **TO 0 through TO 6**
  - TO 6 is to remain unused / unclaimed
- **TO 0 through TO 5 are claimed by existing followers**
- **Two new followers join**
  - The first new follower selects and transmits to claim **TO 6**
  - The coordinator does not check TO 6 for a claim until end of aging period
  - The second new follower selects and transmits to claim **TO 7**
- **Since the coordinator did not increase plca_node_count yet, when the second new follower transmits in TO 7 it will collide with the BEACON**

Why?

- **The D-PLCA Coordinator only checks if the last TO of the cycle is claimed when:**
  - The aging period has elapsed and a new claim table made active with expired TO claims.
    - dplca_new_age == TRUE
    - Aging period is 64 PLCA cycles (BEACONS)

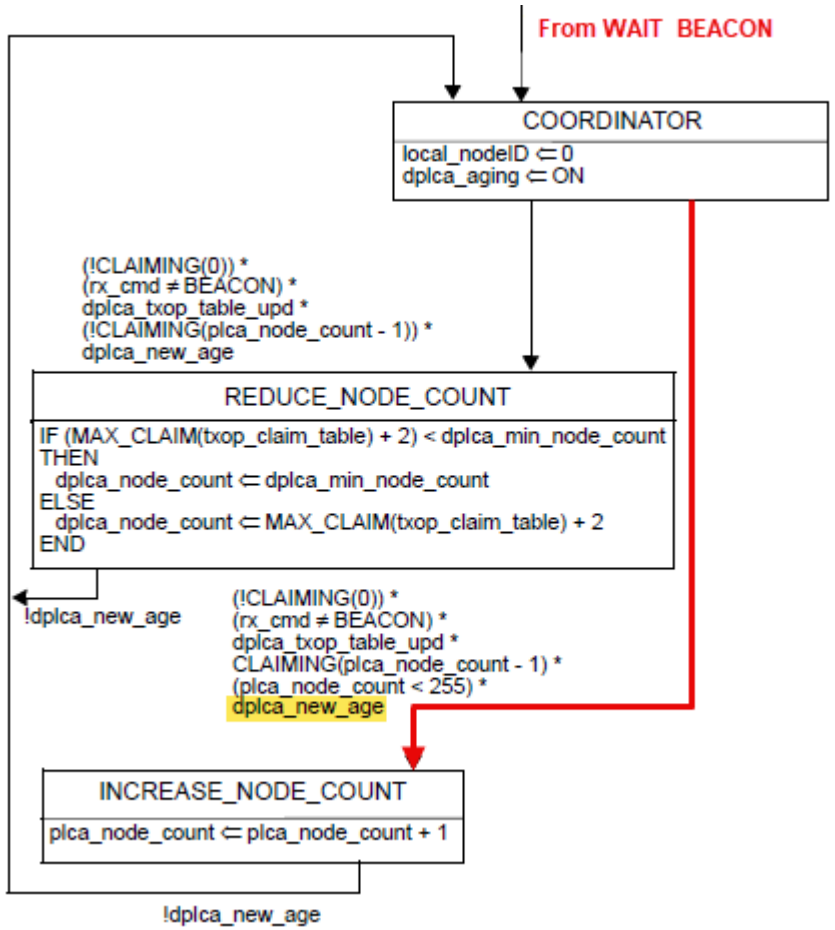

Fig 148-8 – D-PLCA Control State Diagram (pg 86)

Proposed Solution

- **Eliminate the dependency on dplca_new_age when transitioning from COORDINATOR to INCREASE_NODE_COUNT**
  - Check the claim table to see if the last TO of the cycle is claimed following every update to the claim table
  - Allows the number of Transmit Opportunities per cycle in increase faster

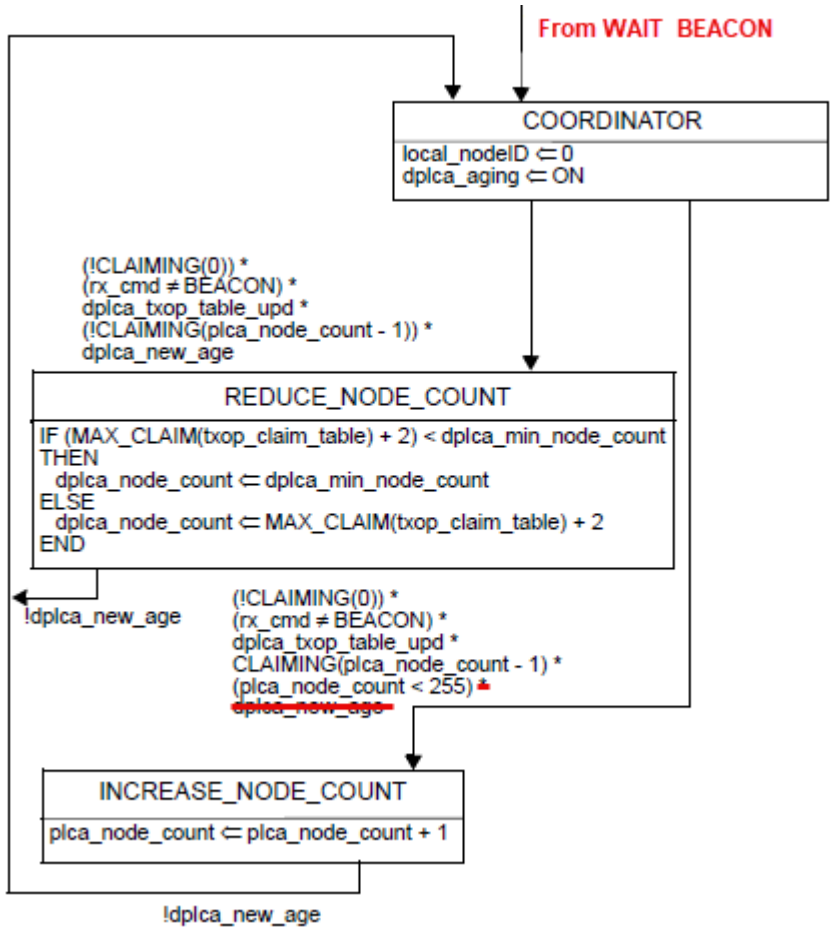

Fig 148-8 – D-PLCA Control State Diagram (pg 86)

Can the PLCA cycle grow too fast?

- **Wouldn’t this just cause the number of TO between BEACONs to grow too fast?**
  - **No**
    - New D-PLCA followers listen for one aging period (64 cycles) plus a random additional delay of up to one-half an aging period.
    - The PICK_FREE_TXOP function returns the **lowest** unclaimed transmit opportunity.
      - If there is an unclaimed TO lower than the last TO of the cycle prior to the BEACON, the new follower will select the lower TO
    - Following the end of every aging period, the coordinator will reduce the number of TO per cycle such that only the last TO prior to the BEACON is unclaimed.

Editing Instructions

Cl 148.4.7.5, Figure 148-8, Page 86, Line 33

Change the transition condition from COORDINATOR to INCREASE_NODE_COUNT as follows:

(!CLAIMING(0)) *
(rx_cmd ≠ BEACON) *
dplca_txop_table_upd *
CLAIMING(plca_node_count - 1) *
(plca_node_count < 255) ~~*~~
~~dplca_new_age~~

Cl 148.4.7.5, Figure 148-8, Page 86, Line 43

Change the transition condition from INCREASE_NODE_COUNT to COORDINATOR from:

~~!dplca_new_age~~

to:

!dplca_txop_table_upd

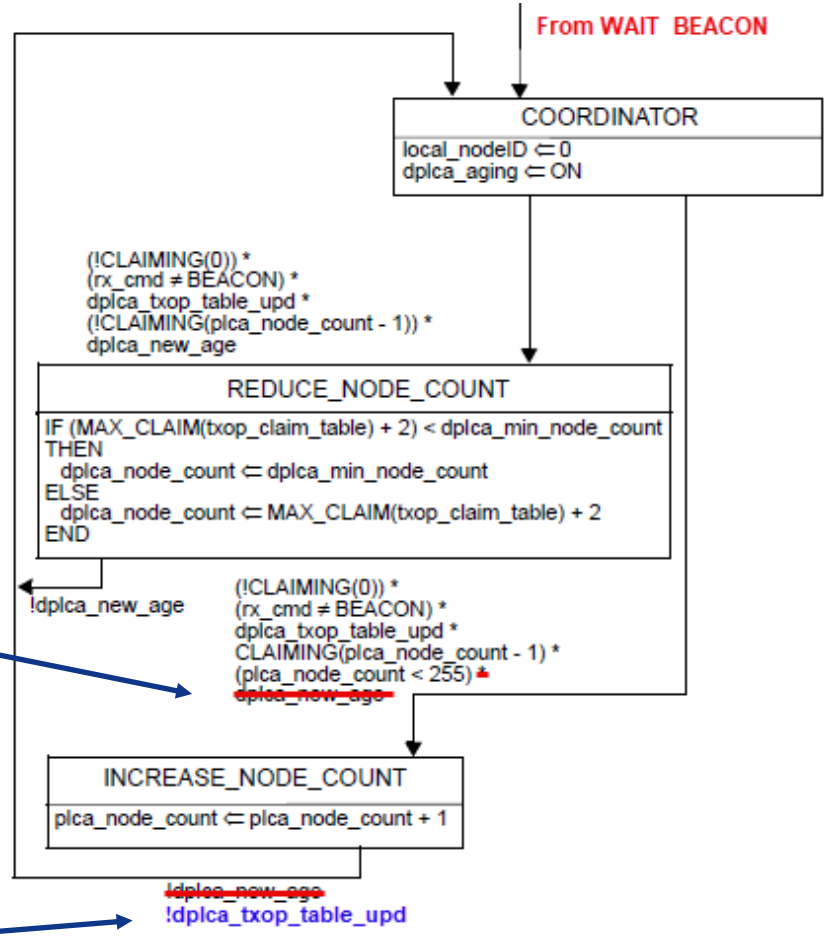

Fig 148-8 – D-PLCA Control State Diagram (pg 86)

Thank You

Questions?