6TiSCH Minimal Scheduling Function (MSF)

draft-ietf-6tisch-msf

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Issues proposed since IETF105

• Rules for CellList
  • Node MAY maintain a candidate cell pool for CellList
  • 6P request picks cells from the cell pool
• Schedule consistency
  • Caused by mote disappear (such as power-off)
  • Adding keep-alive mechanism back
    • Removed from version 03
• Downstream traffic adaptation
  • Strategy
  • Implementation result
Downstream traffic adaptation

• **Strategy**
  - **NumCellsUsed_rx++** when:
    - A frame is received from its preferred parent on the Rx cell
  - **NumCellsElapsed_rx++** when:
    - When the current cell is Rx cell to the preferred parent
  - **Counting the AutoRxCell at beginning**
    - Before network formed
      - Collision from children
      - After network formed
        - No collision most of time

![Diagram showing node traffic on AutoRxCell before and after network formed](image-url)
Downstream traffic adaptation

• Implementation
  • OpenWSN firmware
    • PR (merged): https://github.com/openwsn-berkeley/openwsn-fw/pull/483
  • OpenTestbed deployment
    • 36 OpenMote-B in an office building
    • Access OpenMote through MQTT architecture to
      • Flash the mote
      • Read serial output from mote
Downstream traffic adaptation

• Experiment settings
  • Wait until routing is established
  • Background upstream traffic
    • 1 packet/30 seconds
  • Generate downstream traffic
    • Ping mote b571 every 2 seconds
      • Roughly 1 slotframe duration
• Data Record
  • Traffic changes
    • Number of transmission per seconds
  • Number Tx Cells
    • AutoTxCell
    • NegotiatedTxCell
Downstream traffic adaptation

- **Experiment Result**
  - dagroot mote
    - Using AutoTxCell to send after pinging starts
    - Two Rx cells to target are installed
    - Two Rx cells to target are removed
  - Target mote
    - Installed a Tx Cell to dagroot after pinging starts
    - Removed a Tx cell to dagroot after ping ends
  - Number of Tx cell Fluctuation on target mote
    - Sixtop response packets is in back-off

**Diagram**

- **num_transmissions**
  - num_transmissions vs. time (s)
  - 1 packet/2 seconds

- **num_tx_cells**
  - num_tx_cells vs. time (s)
  - The reason
    - The negotiated Tx cell to target is not installed on time.
    - Ping request traffic (downstream) is buffered in queue.
  - Why
    - MSF adapts traffic to delete one cell.

- **target_num_transmissions**
  - target_num_transmissions vs. time (s)
  - 1 packet/2 seconds

- **target_num_tx_cells**
  - target_num_tx_cells vs. time (s)
  - Ping response traffic load (upstream) decreases because of less incoming request packets.
WGLC on draft-ietf-6tisch-msf-07

• WGLC on 6TiSCH mailinglist
  • Oct 18th – Nov 1st
  • No comments

• MSF-08 is published before the IETF meeting
  • With just typo fixing, words refining

• Next step
  • MSF team: MSF is ready to submit to IESG
  • Comments required from 6TiSCH chairs