draft-ietf-6tisch-msf-01
experimental campaign

Tengfei Chang

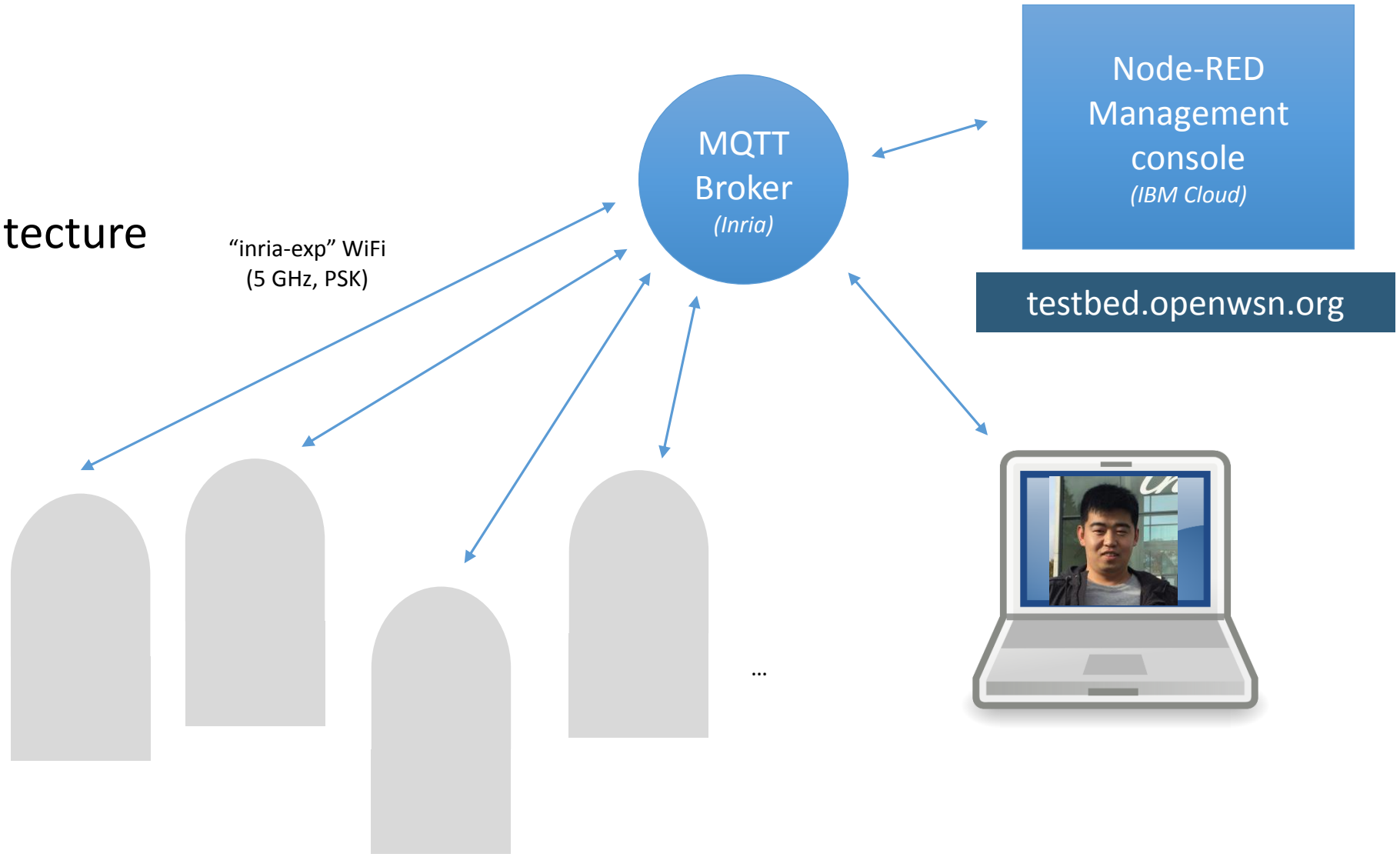
Experimental testbed

- OpenTestbed
  - OTBox
    - Raspberry Pi + 4 OpenMote-B
    - Single-file Python program
    - Open-source
    - Offers simple API to:
      - Reprogram motes
      - Reset motes
      - Interact with serial port
      - Update software
  - Deployed in Inria-Paris office building

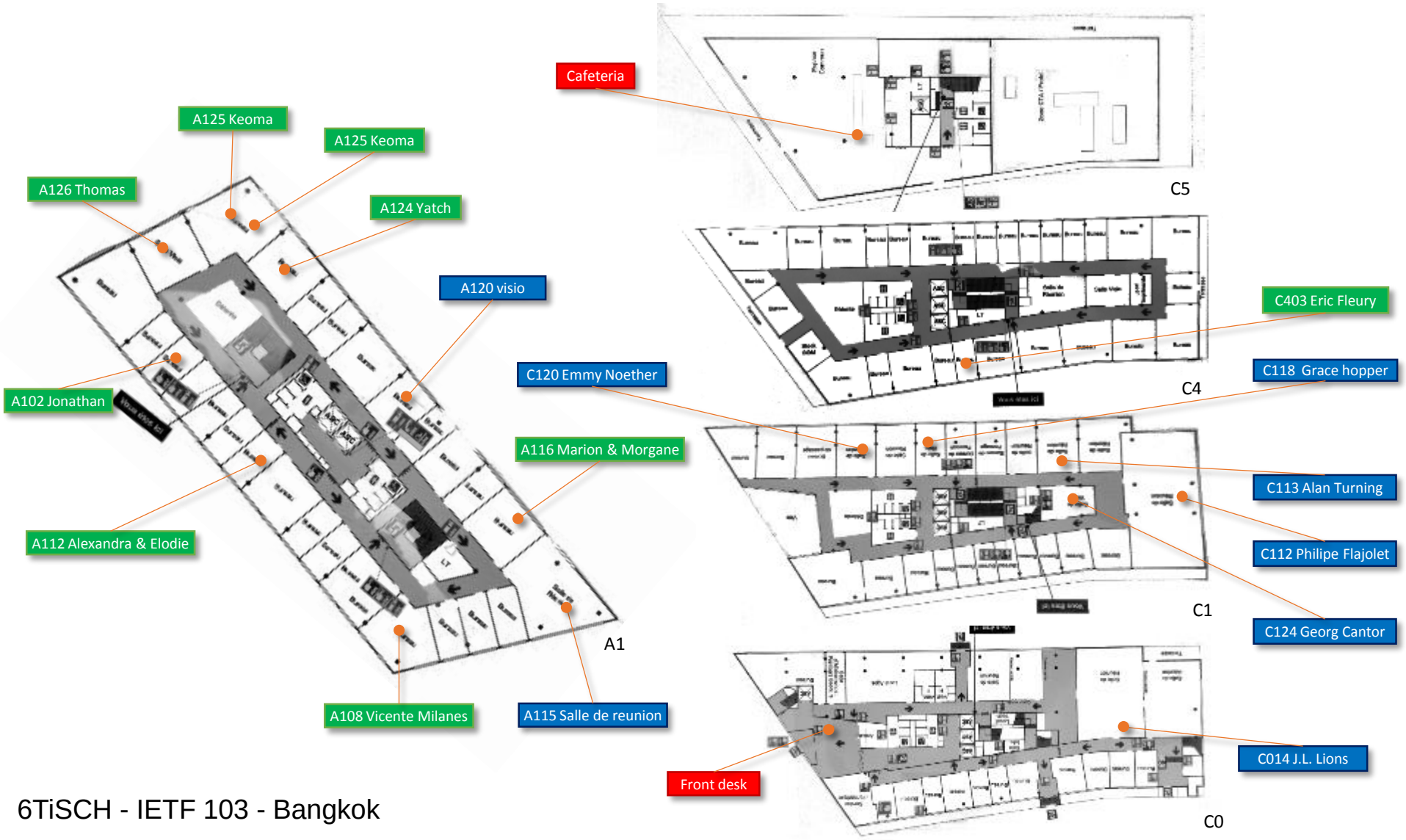
https://github.com/openwsn-berkeley/opentestbed

Experimental testbed

- OpenTestbed
  - MQTT based architecture

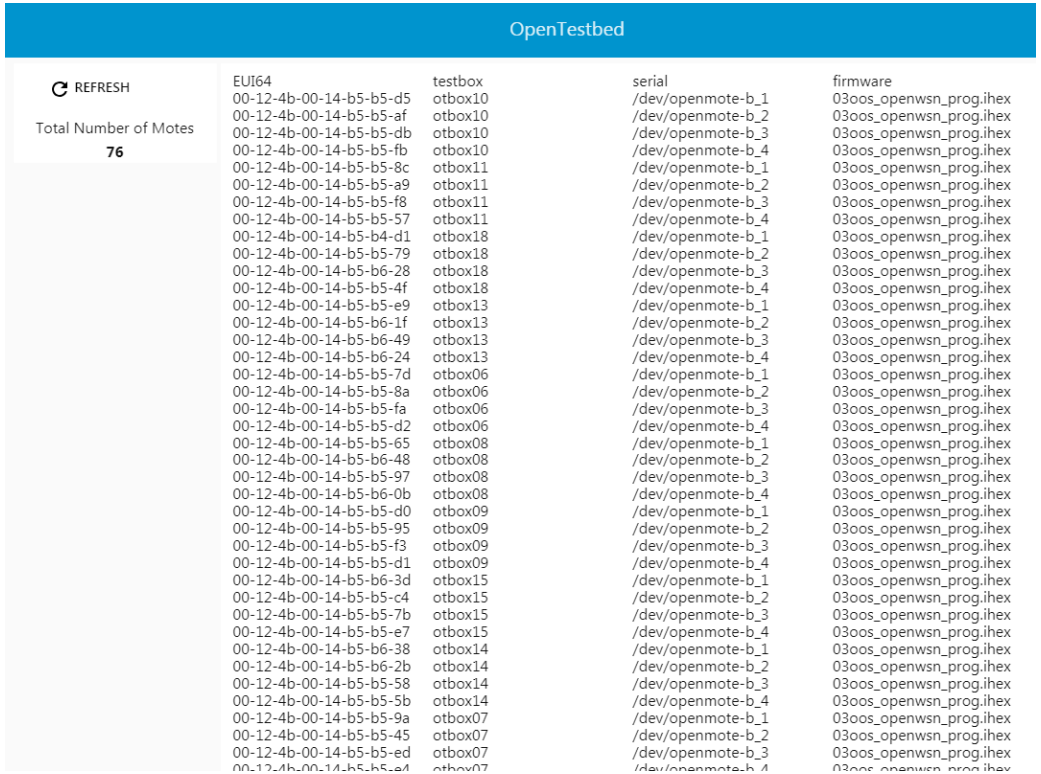


Experimental testbed



6TiSCH implementation

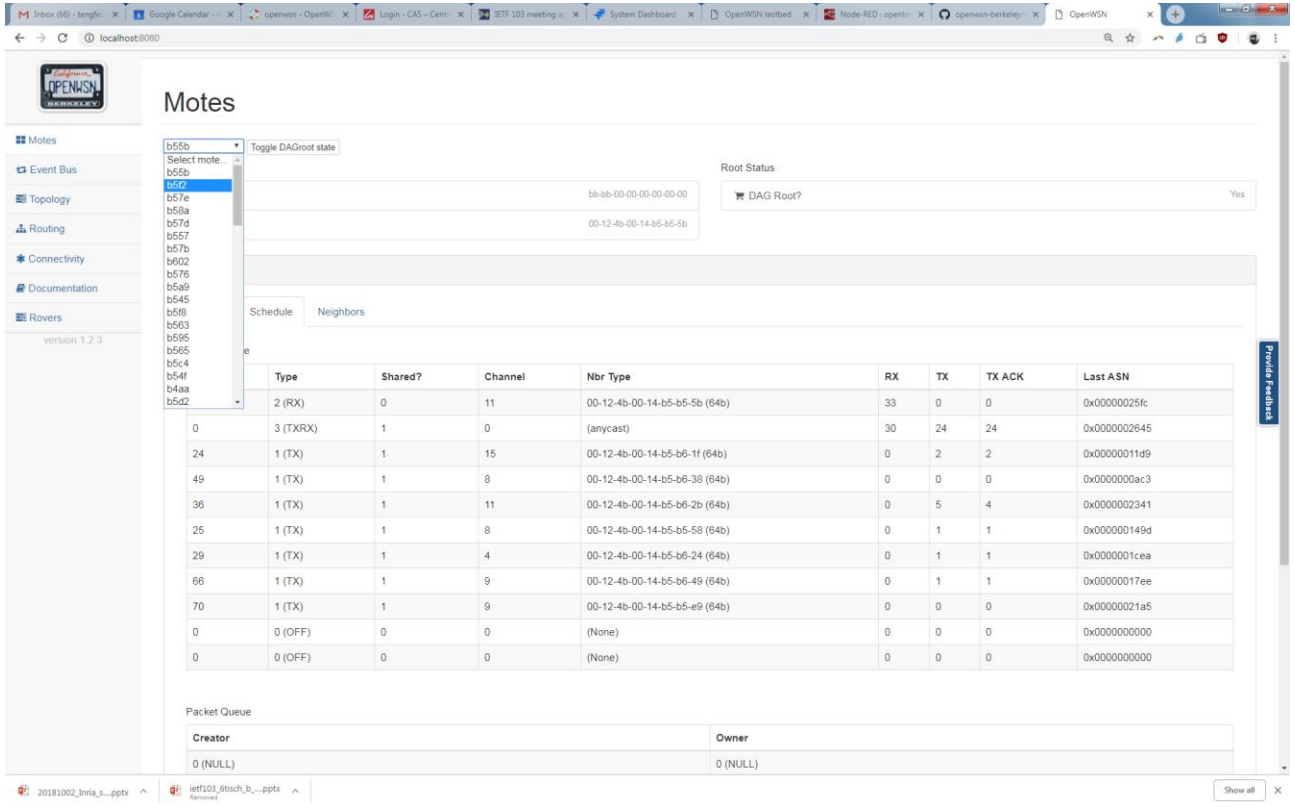
- OpenWSN
  - Latest Release: REL-1.22.0
    - OpenMote-B port only for 2.4GHz
      - Range test over opentestbed
    - Xon/Xoff feature
      - Enable 100% serial communication with Motes
    - Implementation of draft-ietf-msf-01
    - Bug fix:
      - Motes stopped communicating unwished: https://openwsn.atlassian.net/browse/FW-737 (Reported during last 6TiSCH plugtest event)
    - Support firmware uploading to OpenTestbed



https://github.com/openwsn-berkeley/openwsn-fw/releases/tag/REL-1.22.0

Evaluation 6TiSCH implementation

- OpenVisualizer
  - Support connecting to OpenTestbed
    - Receiving debug information from mote
    - Sending command to mote
  - Optimization on serial frame parsing
    - Support 76 motes sending 10 debugging message every one second at same time.

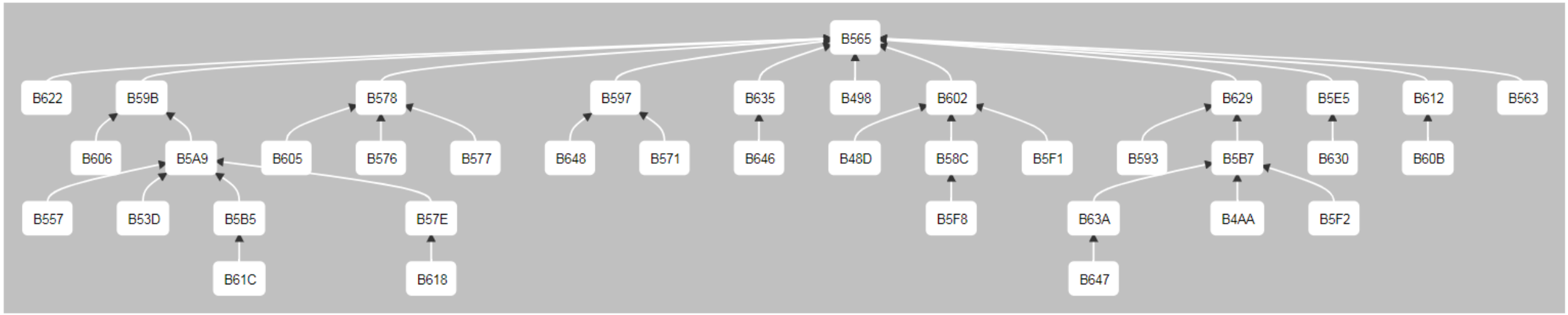


https://github.com/openwsn-berkeley/openvisualizer

Experimental Result

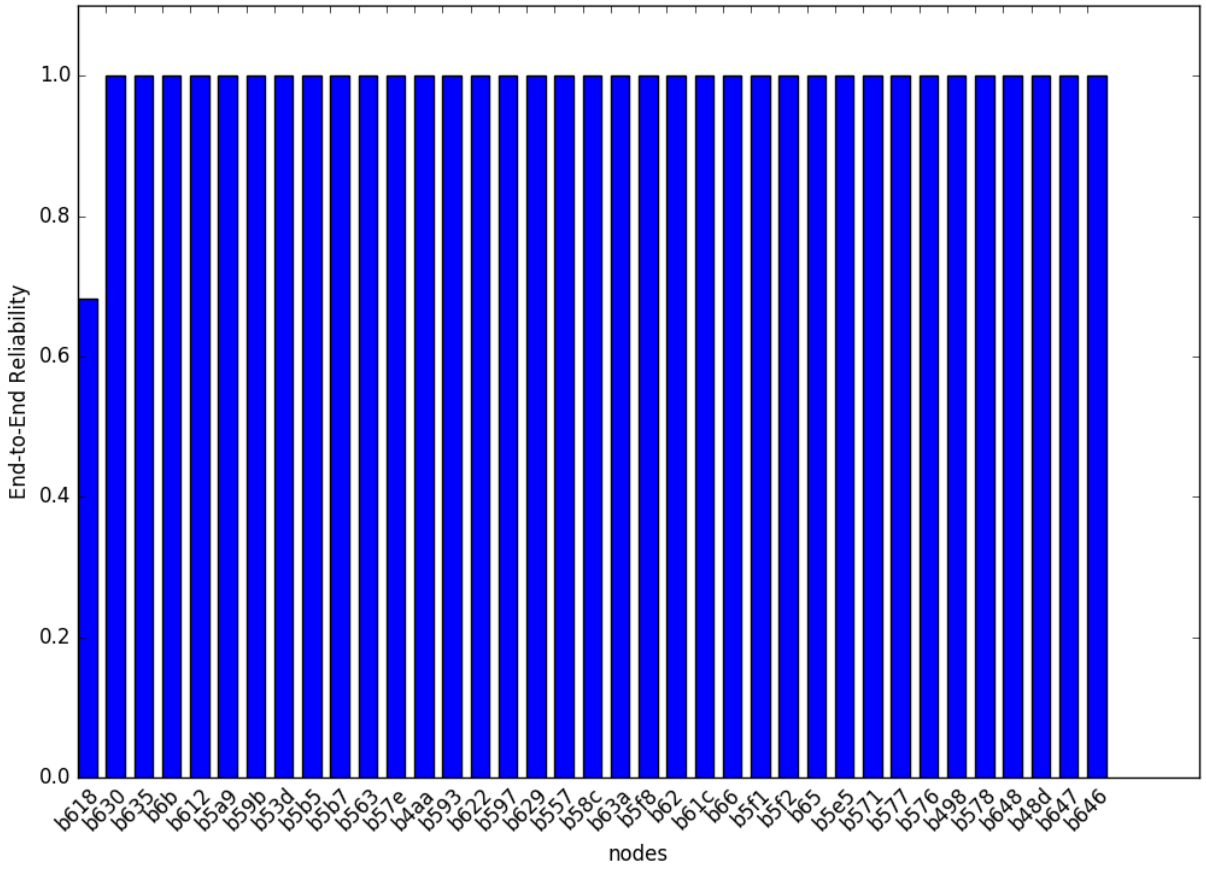
Routing

Current RPL Routing



Experimental Result

- End-to-End Reliability
  - Configuration
    - NUMTRIES: 3
  - Average: 99.14%
    - Experiment in Office building
    - Need to understanding what happened with mote b6-18, should be 100%



Lessons Learnt from MSF experiments

- MSF-01:
  - Probability broadcasting EB/DIO sometime makes the synchronization taking longer (depending on the topology)
  - Reserve a TX autonomous cell for each neighbor could cause schedule overflow problem.
  - The Tx autonomous is in a CSMA fashion, this will cause App packet drop because collide with other packet sent by siblings.
  - The adapting to traffic could be triggered because of colliding on Tx autonomous cell, which shouldn't
- Propose in MSF-02:
  - Only reserve autonomous cell to parent
    - Reserve TxRx shared autonomous cell to parent (unicast cell)
    - Reserve TxRx non shared autonomous cell (anycast)
  - Bring back the one managed Tx cell (reserved by Sixtop) aside with autonomous cell
  - Only send DIO when one managed Tx cell is installed