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

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The 6TiSCH Simulator
https://bitbucket.org/6tisch/simulator/

• The new release, v1.1.6, has just been released 🎉
• What protocols are implemented?
  • RPL: RFC6550, RFC6552
  • Trickle Algorithm: RFC6206
  • 6LoWPAN Fragment: RFC6282, RFC4944
  • Fragment Forwarding: draft-ietf-6lo-minimal-fragment-00
  • 6top Protocol (6P): RFC8480 (not draft-ietf-6tisch-6top-protocol any more)
  • 6TiSCH Minimal Security (secure join): draft-ietf-6tisch-minimal-security-07
  • 6TiSCH Minimal Configuration: RFC8180
  • TSCH: IEEE802.15.4-2015
• And, of course, MSF (draft-ietf-6tisch-msf-01)
Typical Use Case

1. Come up with an idea...
2. Evaluate the idea with the simulator...
3. Test it with physical devices...

Share your great idea with others!

- Iteration with the simulator is much faster than with real hardware
- You can run the simulator on a computer cluster (much faster!)

Did you know...?
The 6TiSCH simulator can run with connectivity trace which is obtained in a real deployment or a testbed.
Working closely with the real-world

We’ll conduct further performance comparison with 6TiSCH stack implementations

We’re building 6TiSCH evaluation solutions with testbeds and this simulator


Mališa Vučinić, et al. "SODA: 6TiSCH Open Data Action", 1st Workshop on Benchmarking Cyber-Physical Networks and Systems (CPSBench), 2018
Lessons on MSF
(from Implementation and preliminary simulations)

• Only a few or no dedicated cells are allocated...
  • NumCellsUsed hardly reaches LIM_NUMCELLSUSED_HIGH when only an autonomous cell is available to communicate with the parent.
  • This is because NumCellsUsed is not incremented during backoff wait delay for the TSCH retransmission algorithm.

• Then, each mote tends to have one TX autonomous cell to its parent and one RX autonomous cell from its children, without dedicated cell
  • Inflow exceeds outflow; TX queue grows; packets are dropped...
  • The frame pending bit feature could make the situation worse.
Lessons on MSF (cont’d)

• Other comments can be found on 6TiSCH WG ML
  • https://www.ietf.org/mail-archive/web/6tisch/current/msg06067.html
  • https://www.ietf.org/mail-archive/web/6tisch/current/msg06098.html
  • https://www.ietf.org/mail-archive/web/6tisch/current/msg06099.html

• Now we’re evaluating MSF with the latest simulator release. Will share the result.
Conclusion

• Introducing the autonomous cell may not be as easy as we expected
• Frame pending bit is interesting!
  • However, it’s underspecified...; looking forward to new text by TGm4d 😊
    • [https://mentor.ieee.org/802.15/documents?is_group=04md](https://mentor.ieee.org/802.15/documents?is_group=04md)
    • A task to rewrite Section 7.2.1.3 of IEEE802.15.4-2015 is tracked as CID 93
• Not sure what we should do...
  1. when a frame is lost in an unscheduled slot
  2. when a frame having the pending bit on is received successfully but there is no memory to handle another frame

• You want to try by yourself? Get [the 6TiSCH Simulator](https)!
A complete flowchart of TSCH Transmission for unicast frames without PCA (updated, November of 2018) For further information, see this thread: https://www.ietf.org/mail-archive/web/6tisch/current/msg05936.html

CCA is intentionally skipped even on shared links when TschCca=OFF

BE is a global variable
NB and backoff window are per-frame variables