09 December 2016 Webex

IPv6 over the TSCH mode of IEEE 802.15.4

Chairs:
 Pascal Thubert
 Thomas Watteyne
Etherpad for minutes:
 http://etherpad.tools.ietf.org:9000/p/6tisch?useMonospaceFont=true

6TiSCH interim Dec. 09 2016

Note Well

This summary is only meant to point you in the right direction, and doesn't have all the nuances. The IETF's IPR Policy is set forth in BCP 79; please read it carefully.

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- BCP 25 (on the Working Group processes)
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Minutes are taken *
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*** From the Webex login

Agenda

- Administrivia   [2min]
  - Agenda bashing
  - Approval minutes from last meeting
  - Status of drafts   [5min]
- Update on security   [5min]
- Wrap up ML discussions on 6top   [25min]
- Next steps on SF0   [15min]
- AOB   [2min]

Agenda [proposed]

- Administrivia
  - Agenda bashing
  - Approval minutes from last meeting
  - Status of drafts
- **draft-ietf-6tisch-minimal-17**
- **Misc discussions on ML**
- Update on security
- Wrap up ML discussions on 6top
- Next steps on SF0
- **draft-ietf-6tisch-terminology-07**
- AOB

Administrivia

Admin is trivia

- Approval Agenda
- Approval minutes

Draft status

- Minimal draft: IESG telechat - 2017-01-05

- Adopted security drafts

    - draft-richardson-6tisch-dtsecurity-secure-join

    - draft-vucinic-6tisch-minimal-security

    => Please resubmit as draft ietf *** 00 with NO CHANGE

- Paging Dispatch at 6lo => RFC 8025

- Routing Dispatch at ROLL, in IANA review

- Backbone router WG doc being split: RFC6775 update => In adoption call at 6lo

- draft-ietf-roll-dao-projection adopted at ROLL

Milestones

Apr 2016 - Second submission of draft-ietf-6tisch-minimal to the IESG

Apr 2016 - WG call to adopt draft-ietf-6tisch-6top-sf0

Apr 2016 - WG call to adopt draft-ietf-6tisch-6top-sublayer

Jul 2016 - ETSI 6TiSCH #3 plugtests

Dec 2016 - Initial submission of draft-ietf-6tisch-6top-protocol to the IESG

Dec 2016 - Initial submission of draft-ietf-6tisch-6top-sf0 to the IESG

Dec 2016 - Evaluate WG progress, propose new charter to the IESG

Apr 2017 - Initial submission of 6TiSCH terminology to the IESG

Apr 2017 - Initial submission of 6TiSCH architecture to the IESG

Dec 2017 - 6TiSCH architecture and terminology in RFC publication queue

draft-ietf-6tisch-minimal-17

draft-ietf-6tisch-minimal-17

- Lots of reshuffling of text following Suresh's AD review

- No changes in technical contents

- <u>Trust, but verify!!</u>

Misc discussions on ML

Timeslot template and slot duration

https://www.ietf.org/mail-archive/web/6tisch/current/msg05037.html

From draft-ietf-6tisch-minimal-17:

```
    /--------------------- Timeslot Duration ----------------------/
    |                                            / (5) /          |
    |                  |              / tsRxAckDelay /| |  |       |
    |-----------------+-------------+-----------------+------+---|
TX |/(1)/  (2)  / (3) /|   TX frame  |                |RX ACK|   |
    |----+--------+------+-------------+-----------------+------+---|
    |/    tsTxOffset    /|            |                |      |   |
    |                   |            |                |      |   |
    |-----------------+-------------+-----------------+------+---|
RX |                 | |  | RX frame |                |TX ACK|   |
    |----------------+--+--+----------+-----------------+------+---|
    |                | |  |          |                |      |   |
    |                / (4) /          /   tsTxAckDelay  /     |   |
    Start                                               End
    of                                                  of
    Slot                                                Slot
/(1)/ tsCCAOffset
/(2)/ tsCCA
/(3)/ tsRxTx
/(4)/ tsRxWait
/(5)/ tsAckWait

  Figure 3: Timeslot internal timing diagram (refer to Figure 6-43 in
                  IEEE802.15.4-2015.)
```
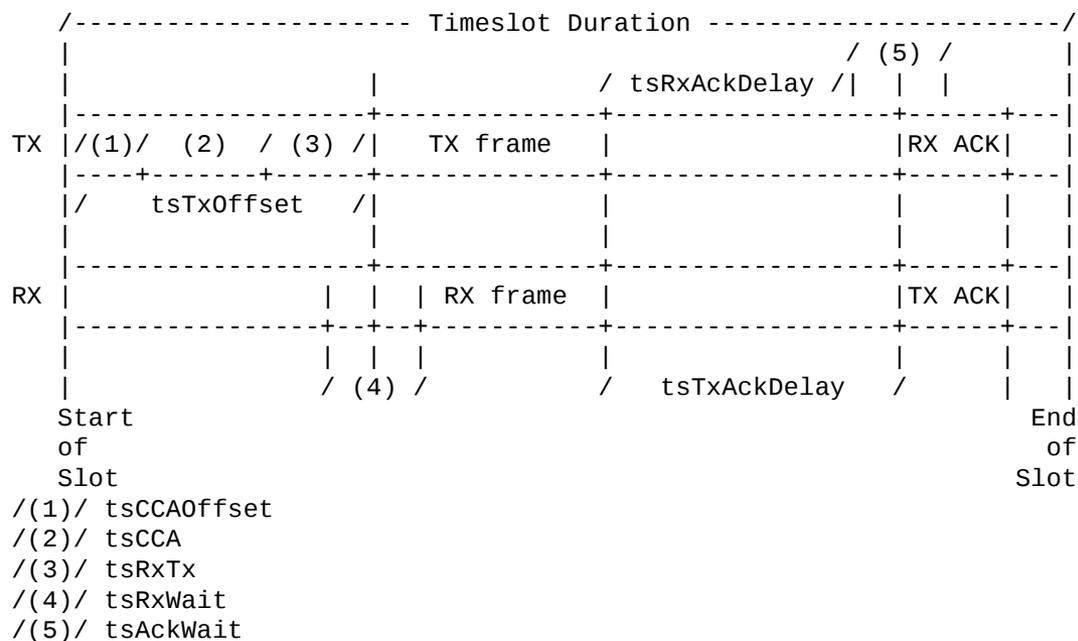
update on security
(no slides)

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draft-ietf-6tisch-6top-protocol-03

6P unclarities 1 [1/2]

https://www.ietf.org/mail-archive/web/6tisch/current/msg04977.html

Section 4.2.7: why do cells only have a recommended format? I guess it's up to the SF, but if so, this is worth stating explicitly.
→ Already stated explicitly: The SF MAY redefine the format of the CellList field.

Section 4.2.7: what happens when cells don't fit a single packet? This was answered here [1] but I couldn't find any info in the text.
→ I think this is already discussed?

Section 4.3: protocol behavior. only 2-way transactions are detailed, why not 3-way?
→ 3-way transaction is allowed but not worked out by any SF at this point

Section 4.3: when to use 2 or 3-way transactions? Is the latter for added reliability or only to handle the case where the request has CellList == []. Clarification needed IMO.
→ agree. A priori for case when it's the requestee that proposes cells.

Section 4.3: do we wait for a link-layer ACK on the Response (or Confirmation) before committing the transaction?
→ reponse/confirmation. L2 ACK doesn't carry any 6P meaning

Section 4.3: no description of the STATUS command?
→ Does it need a description?

6P unclarities 1 [2/2]

Section 4.3.2: interaction among different SFs: does LIST return only the current SF's cells or all cells in the system? Can DELETE remove cells installed by other SFs? Does CLEAR clear cells installed by other SFs?

→ Only this SF. Need text to mean ALL SFs?

Section 4.3.11.1: single bit for the GTX/GRX count value means two consecutive failed transactions will be forever unnoticed. Is that ok? Couldn't we use a single 4-bit counter instead of two 2-bit? Wouldn't a simple counter work instead of lollipop?

→ Can you come up with example?

Terminology: I've seen both "2-steps" and "2-ways" used in the document

→ agreed, need to homogenize.

General / open: is there any option to install broadcast cells? (a bit tricky as this needs consensus over 2+ nodes, this probably takes a 2PC or 3PC, but can be needed)

→ No mechanism at this point. Needed?

General / open: should we recommend / force having at least one rendez-vous cell (via minimal or otherwise), so as to guarantee reachability of all nodes? Else, a single failed CLEAR transaction results in definitive loss of connectivity between two nodes.

→ policy, not mechanism?

6P unclarities 2 [1/4]

https://www.ietf.org/mail-archive/web/6tisch/current/msg04978.html

Section 4.2.2: [Q] Why must the value of SeqNum increment *by exactly one* at each
new 6P request to a certain neighbor?
→ Why not?

Section 4.2.6: [C] There are ineffective combinations of CellOptions in Figure 11, for example,
"TX=0,RX=0,S=1".
→ agreed, added for completeness

[C] I'd suggest listing only valid combinations of CellOption bits and mentioning others are invalid.
→ isn't that policy?

[C] The phrase, "marked as", in Figure 11 is a bit ambiguous... Something like "its linkOptions
matches exactly" is better?
→ editor?

6P unclarities 2 [2/4]

Section 4.2.13: [C] The length of "Num. Cells" is 2-octet long in the text, but 1-octet in the figure.
  # The Wirehark patch for draft-03 treats the field as a
  # one-octet field.

```
draft> When responding to an STATUS request, the "Other Field"
draft> contains the number of cells scheduled between node A and node
draft> B that match the CellOptions field, encoded as a 2-octet
draft> unsigned integer.  This is shown in Figure 12.
draft>
draft>                             1                   2                   3
draft>   0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
draft>  +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
draft>  |Version| T | R |     Code      |     SFID      | SeqNum|GAB|GBA|
draft>  +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
draft>  | Num. Cells    |
draft>  +-+-+-+-+-+-+-+-+
draft>
draft>                            Figure 12
```

→ Good point. Editor?

6P unclarities 2 [3/4]

[Q] Are the following sentences correct? They allow a pair of nodes
to open two transactions in parallel. I think these transactions
might cause inconsistency in their schedule generations.

```
draft> Only a single 6P Transaction between two neighbors, in a given
draft> direction, can take place at the same time.
draft> (snip)
draft> Nodes A and B MAY support having two transactions going on at
draft> the same time, one in each direction.
```

Here is a simple example in which nodes update their schedule
generation counters after receiving a MAC-level ACK for a 6P
Response frame:

Step-1: Node A Send Request (GAB=0, GBA=0) : Queued
Step-2: Node B Send Request (GAB=0, GBA=0) : Queued

Step-3: Node B Recv Request   : Send MAC-ACK
Step-4: Node B Send Response (GAB=0, GBA=0) : Queued
Step-5: Node A Recv Request   : Send MAC-ACK
Step-6: Node A Send Response (GAB=0, GBA=0) : Queued

Step-7: Node A Recv Response   : Send MAC-ACK
Step-8: Node B Update GTX/GRX   : (GTX=0, GRX=1)
Step-8: Node B Recv Response (GAB=0, GBA=0) : Detect Inconsistency

6P unclarities 2 [4/4]

[C] I'm not sure typical use cases of the LIST operation. When does
    a SF use STATUS and LIST...? I think these commands would be
    useful for the purpose of management or administration. But,
    it's not within the scope of SF, is it? I'd be nice that a
    typical use case of LIST is provided in the text.
→ Recover after reset

[C] The draft implies that a MAC address of the peer is set to the "macNodeAddress" attribute of a allocated cell. If
    this is the case, it'd be better to mention that in the text.
→ agreed. Editor?

I have a couple of related questions in addition to what Simon asked:

[Q] What if a node has a short address as well as an extended address?
→ To be discussed, probably node has to learn both long and short address of its neighbor

- Is there any plan for 6P to support the following cells?
    - a cell whose macNodeAddress is a group MAC address or a 16-bit multicast address
→ No. Use case?
    - a dedicated TX cell to multiple recipients
→ IEEE802.15.4e question, multiple cells?
    - a RX cell shared with multiple senders
→ supported

6P signaling traffic

- https://www.ietf.org/mail-archive/web/6tisch/current/msg05018.html
- Is there (should there be) a recommendation on which cells to use for 6P signaling traffic?

AOB 6P?

draft-ietf-6tisch-6top-sf0-02

sending a CLEAR request to old parents

- https://www.ietf.org/mail-archive/web/6tisch/current/msg04962.html

- Rough consensus:

  - Step 1: keep CLEAR command

  - Step 2: 4.3.X. Disconnecting from a neighbor

    - If the SF realizes connection to a particular neighbor is no longer
    - needed (for example a change in parent by the routing protocol),
    - the SF MAY send a CLEAR request to that neighbor to speed up the
    - cleanup process of the cells allocated with that neighbor.

- Action item: Diego to take into account

draft-ietf-6tisch-terminology-07

Update from Maria Rita
(no slides)

SF

- https://www.ietf.org/mail-archive/web/6tisch/current/msg05000.html
- OLD

```
The "6top Scheduling Function" (SF) is the policy inside
the "6TiSCH Operation Sublayer" (6top) which decides when
to add/remove cells.  General guidelines for designing a
SF are provided in [I-D.wang-6tisch-6top-protocol].
```

- NEW (proposed)

```
The "6top Scheduling Function" (SF) the cell management entity that
allocates or deallocates cells dynamically based on its allocation
policy in order to fulfill cell requirements. Its cell negotiation
with a neighbor is done with use of 6P. General guidelines for
designing a SF are provided in [draft-ietf-6tisch-6top-protocol].
```

AOB ?

Rechartering

- Use of DAO projection?
- 6top along tracks

Thank you!