IETF June Interim ROLL

Routing over Low-Power And Lossy Networks

Chairs:

Dominique Barthel

Ines Robles

Secretary:

Michael Richardson

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BCP 9 (Internet Standards Process)
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BCP 79 (Patents, Participation)
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Meeting Materials

- Session: Friday 2020/06/26

- Remote Participation

  - Etherpad: https://etherpad.ietf.org:9009/p/notes-ietf-roll-interim-20200626

  - Slides: https://datatracker.ietf.org/meeting/interim-2020-roll-04/session/roll

  - Minutes taker: **Please volunteer, thank you :)**

- **Please sign blue sheets = add your name into the etherpad please :-)**

Agenda

```
+------------------------------------------------------------------------+
|                        ROLL Interim  Meeting                           |
+------------------------------------------------------------------------+
|                             AGENDA                                     |
|                                                                        |
|                       Friday, June 26, 2020                            |
|                                                                        |
|    Etherpad: https://etherpad.ietf.org:9009/p/notes-ietf-roll-interim-20200626  |
|              Github where the link to the recording will be posted:    |
|        https://github.com/roll-wg/ROLL-Interim-Meeting/tree/master/20200626  |
|                                                                        |
| Material: https://datatracker.ietf.org/meeting/interim-2020-roll-04/session/roll |
+-----------------+--------------------------------------+---------------+
|   Time (UTC)    |                Topic                 |   Presenter   |
+-----------------+--------------------------------------+---------------+
| 13:00 - 13:30   |              WG Status               | Ines/Dominique|
|    [30 min]     |                                      |               |
|                 |    -  status of unaware-leaves       |               |
|                 |    -  status of capabilities draft   |               |
|                 |       -  status of mopex draft       |               |
|                 |       -  status of useofrplinfo      |               |
+-----------------+--------------------------------------+---------------+
| 13:30 - 13:50   |    status of DIS Modification draft  |   Georgios    |
|    [20 min]     |                                      |               |
+-----------------+--------------------------------------+---------------+
| 13:50 - 14:10   | draft-thubert-roll-eliding-dio-information |  Pascal   |
|    [20 min]     |                                      |               |
+-----------------+--------------------------------------+---------------+
| 14:10 - 15:00   |             Open Floor               |   Everyone    |
|    [50 min]     |                                      |               |
+-----------------+--------------------------------------+---------------+
```

Milestones

Date	Milestone
Dec 2020	Initial submission of Mode of Operation extension and Capabilities for RPL to the IESG draft-ietf-roll-mopex-cap
Oct 2020	Recharter WG or close
Jul 2020	Initial submission of a root initiated routing state in RPL to the IESG draft-ietf-roll-dao-projection
Jul 2020	Initial submission of a YANG model for MPL to the IESG draft-ietf-roll-mpl-yang
Jun 2020	Initial submission of Enabling secure network enrollment in RPL networks draft to the IESG draft-ietf-roll-enrollment-priority
Jun 2020	Initial submission of a proposal to augment DIS flags and options to the IESG draft-ietf-roll-dis-modifications
Jun 2020	Initial submission of a proposal for Source-Route Multicast for RPL to the IESG draft-ietf-roll-ccast
Mar 2020	Initial submission of Common Ancestor Objective Functions and Parent Set DAG Metric Container Extension to the IESG draft-ietf-roll-nsa-extension
Mar 2020	Initial Submission of a proposal with uses cases for RPI, RH3 and IPv6-in-IPv6 encapsulation to the IESG draft-ietf-roll-useofrplinfo

Done milestones

Date	Milestone
Done	Initial submission to the IESG of mechanism to turn on RFC8138 compression feature within a RPL network draft-ietf-roll-turnon-rfc8138
Done	Initial submission of routing for RPL Leaves draft to the IESG draft-ietf-roll-unaware-leaves
Done	Initial submission of a reactive P2P route discovery mechanism based on AODV-RPL protocol to the IESG draft-ietf-roll-aodv-rpl
Done	Initial submission of a solution to the problems due to the use of No-Path DAO Messages to the IESG draft-ietf-roll-efficient-npdao

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Status of current topics

- Status of draft-ietf-roll-aodv-rpl
  - version 08
    - Addressed tickets 194 (Introduction), 195 (Standard or Experimental), Ticket 196 (replacing RFC6997), 197(Link checks), #198 (nits)
    - New Ticket: 199 (Part I), 200 (Part II)
    - Action point: Comments to be addressed by the authors.
    - Current Status: AD-Evaluation

Status of current topics

- status of draft-ietf-roll-unaware-leaves
    - Version 18 updates:
        - Rahul spotted leftover text on RUL signaling in a storing mode RPL domain. That text was obsolete since we decided to use non-storing signaling only. This was removed in -16
        - optimize and remove the anonymous EDAR, since it never traverses a storing mode path that could cause the loss of the ROVR. This was removed in -17 and 18. Forced the DAO-ACK for a RUL so the 6LR knows for sure it can respond positively to the RUL.
        - Action point:
            - Request for comments to the community

MOPex & CAP updates

RPL Extended Control Options

```
 0                               1                               2
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+---------
|X|   OptionType| Option Length |Opt Flags|J|I|C| Option Data
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+---------
```

Currently, 0x80 to 0xFF reserved for RPL Extended Control Options

Another point: Set aside bigger range for ext control option from 0x40 to 0xff

Note: Extended Option can still serve as regular Options with an extra byte.

Capabilities Query/Response

- A node should be able to query the list of supported capabilities

- A node should be able to query specific capabilities details

- A set of capabilities to respond may exceed MTU. Thus a node should be able to send caps in multiple response messages.
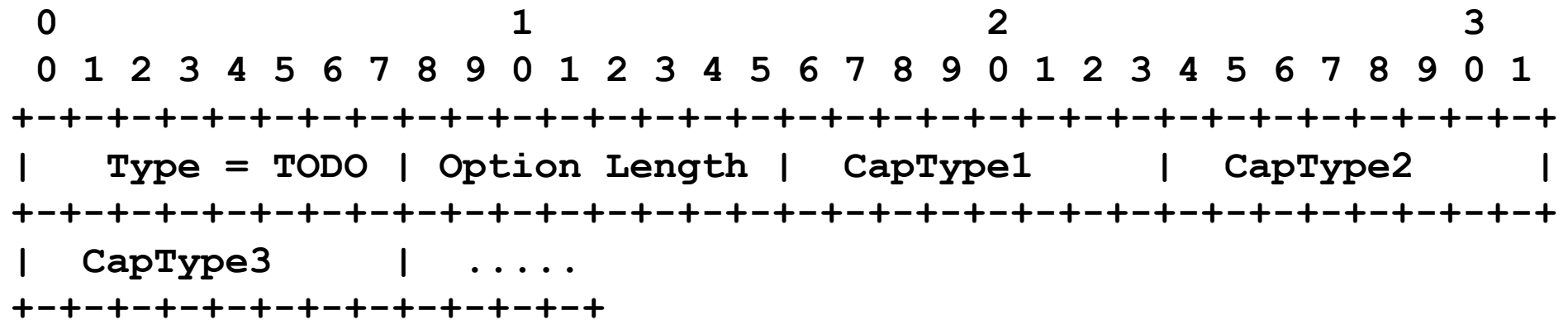
CAPQ
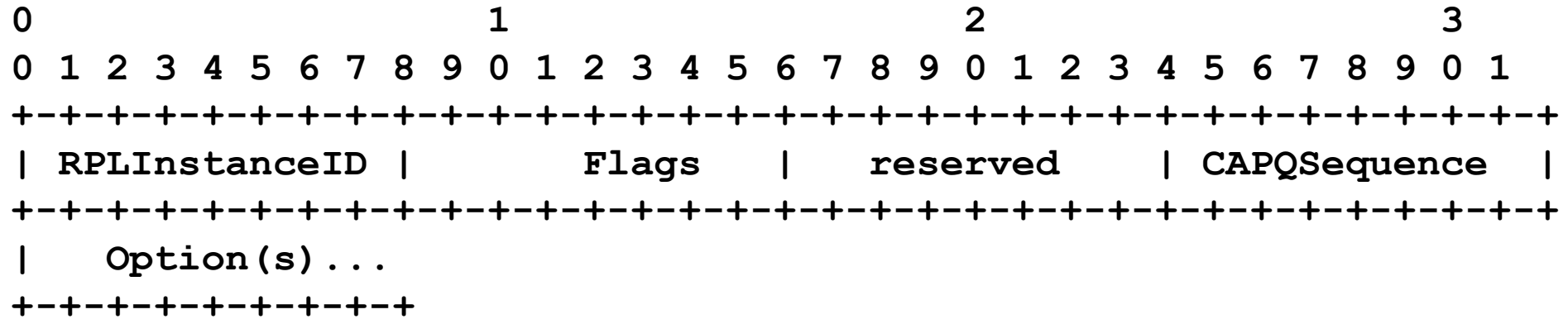
```
0                   1                   2                   3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| RPLInstanceID |      Flags      |    reserved    | CAPQSequence |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|    Option(s)...
+-+-+-+-+-+-+-+-+
```
Figure 3: CAPQ base object

```
 0                   1                   2                   3
 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
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |   Type = TODO | Option Length |   CapType1     |   CapType2     |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |   CapType3     |    .....
 +-+-+-+-+-+-+-+-+-+-+-+-+-+
```
Figure 4: Capability Type List Control Option

CAPS response to CAPQ

```
 0                   1                   2                   3
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| RPLInstanceID |      Flags       |      Reserved     | CAPQSequence |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Option(s)...
+-+-+-+-+-+-+-+-+
```

Figure 5: CAPS base object

The Options would be set of capabilities that are requested.
CAPS can only be sent in response to CAPQ.

Query supported Capability List
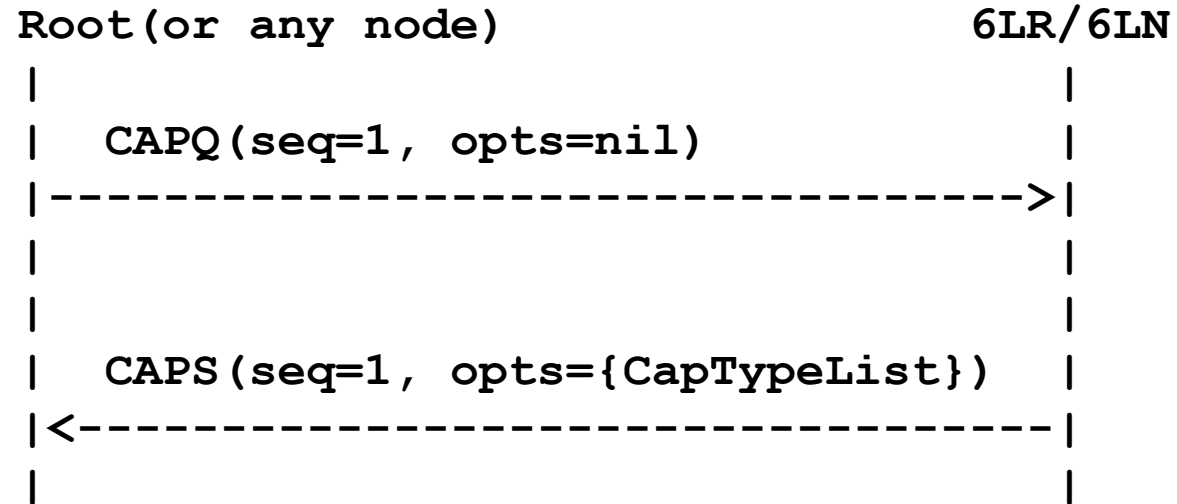
```
Root(or any node)                          6LR/6LN
 |                                             |
 |   CAPQ(seq=1, opts=nil)                     |
 |-------------------------------------------->|
 |                                             |
 |                                             |
 |   CAPS(seq=1, opts={CapTypeList})           |
 |<--------------------------------------------|
 |                                             |

         Figure 8: Query supported Cap Types
```

Query specific capability list
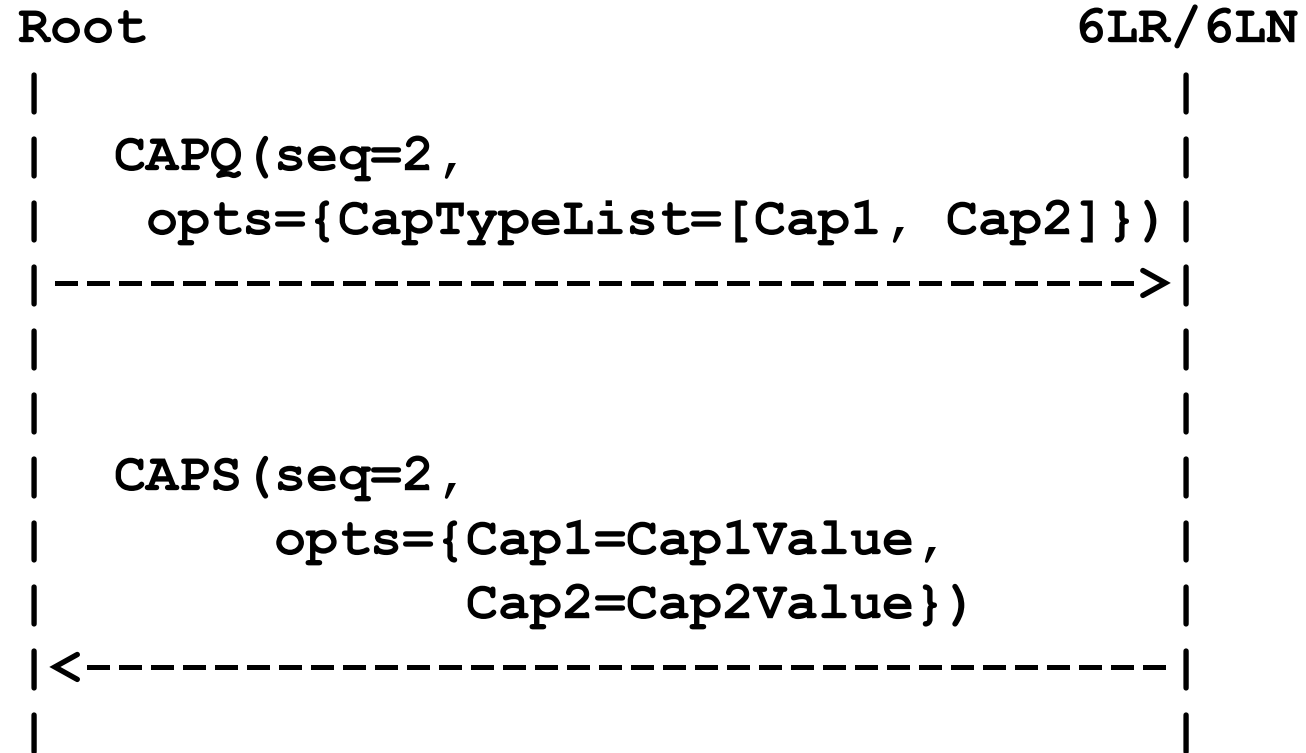
```
        Root                                6LR/6LN
         |                                     |
         |   CAPQ(seq=2,                       |
         |    opts={CapTypeList=[Cap1, Cap2]})|
         |----------------------------------->|
         |                                     |
         |                                     |
         |   CAPS(seq=2,                       |
         |        opts={Cap1=Cap1Value,        |
         |               Cap2=Cap2Value})      |
         |<-----------------------------------|
         |                                     |

            Figure 9: Query specific Cap Set
```

Query response with partial set
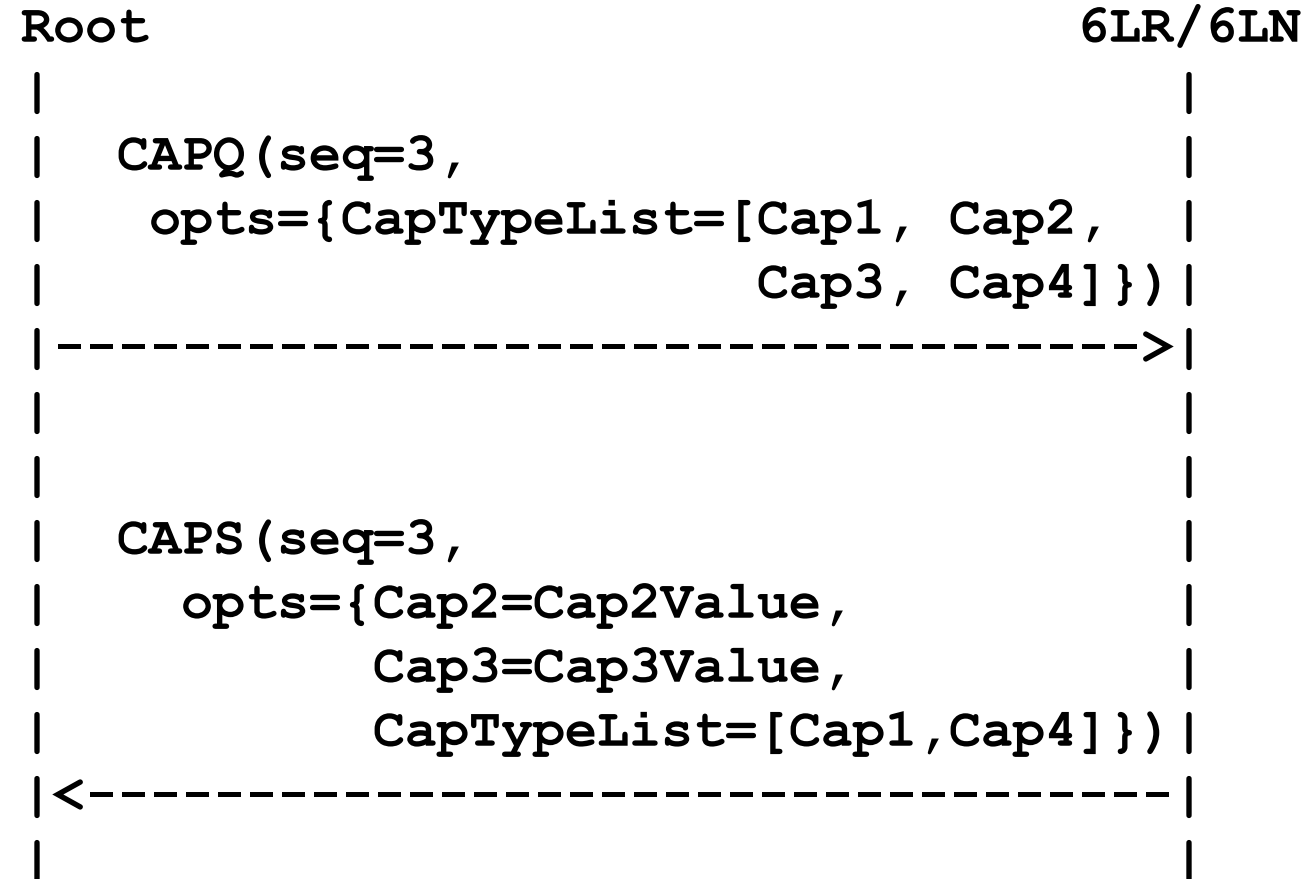
```
Root                                    6LR/6LN
|                                          |
|   CAPQ(seq=3,                            |
|    opts={CapTypeList=[Cap1, Cap2,        |
|                       Cap3, Cap4]})|
|----------------------------------------->|
|                                          |
|                                          |
|   CAPS(seq=3,                            |
|     opts={Cap2=Cap2Value,                |
|           Cap3=Cap3Value,                |
|           CapTypeList=[Cap1,Cap4]})|
|<-----------------------------------------|
|                                          |

         Partial Capability Set handshake
```

Status of current topics

- status of useofrplinfo
    - Was pulled from RFC Editor in July 2019, version -31
    - New version -40
        - Nits fixed
    - ChangeLog:
      https://github.com/roll-wg/useofrplinfo/blob/master/ChangeLog
    - Comments welcome from community
    - Shepherd write-up updated, changelog provided.
    - Action Point: Ready to return it to IESG?

State of Active Internet-Drafts

Draft	Status
draft-ietf-roll-dao-projection-10	New version - Close open tickets if are solved
draft-ietf-roll-dis-modifications-01	Discussion Today
draft-ietf-roll-efficient-npdao-18	RFC Ed Queue - New version - Discussed today
draft-ietf-roll-enrollment-priority-02	Work in progress - Review to be gotten at the end of July
draft-ietf-roll-nsa-extension-08	Work in progress - Shepherd assigned
draft-ietf-roll-rpl-observations-04	Work in progress
draft-ietf-roll-turnon-rfc8138-07	Submitted to the IESG
draft-ietf-roll-unaware-leaves-18	Submitted to the IESG

Related Internet-Drafts

Draft	Status
draft-papadopoulos-roll-dis-mods-use-cases-00	Discussion Today
draft-thubert-roll-eliding-dio-information-04	
draft-baraq-roll-lbsa-00	No discussion initiated so far
draft-jadhav-roll-storing-rootack-01	Work in progress

Open tickets

Ticket	Summary	Component
#179	Security considerations for dao projection	dao-projection
#180	13 issues to address in dao projection draft (lifetime, MOP, retransmissions, route cleanup)	dao-projection
#187	New version of RFC6550 - Topics to include	rpl
#188	Should 6LBR be included into the DODAG root?	rpl
#199	Issues in version 08	aodv-rpl
#200	Issues in version 08 - Part II	aodv-rpl

https://trac.ietf.org/trac/roll/report/2

Open tickets

https://github.com/roll-wg/Capabilities/issues

- 3 Open ✓ 7 Closed

- New message code for cap query/resp
  #15 opened on May 26 by nyrahul

- New Options and backward compatibility problem
  #11 opened on Apr 13 by nyrahul

- Add scenario for capabilities exchange needs draft-update
  #3 opened on Aug 25, 2019 by nyrahul

https://github.com/roll-wg/rpl-observations/issues

- 3 Open ✓ 4 Closed

- Parent Address MUST be empty in Transit Information for storing MOP
  #10 opened on Mar 16 by nyrahul

- Implications of using smaller lollipop counter window
  #9 opened on Dec 12, 2019 by nyrahul

- Path Control bits handling
  #6 opened on Nov 12, 2019 by nyrahul

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Open tickets

☐ ⓘ **1 Open** ✓ 0 Closed

☐ ⓘ **nits to fix and complete the TODO section**
#1 opened on Nov 16, 2019 by inesrob

☐ ⓘ **5 Open** ✓ 1 Closed   Au

☐ ⓘ **Issues to address in dao projection draft (lifetime, MOP, retransmissions, route cleanup)**
#7 opened on Nov 15, 2019 by inesrob

☐ ⓘ **Security considerations for dao projection**
#6 opened on Nov 15, 2019 by inesrob

☐ ⓘ **should DAO projection have a new MOP?**
#5 opened on Oct 28, 2019 by mcr

☐ ⓘ **Information Missing in VIO abbreviation**
#3 opened on Oct 27, 2019 by rabinsahoo

☐ ⓘ **cleanup handling of common network segment for two P-DAO**
#2 opened on Dec 16, 2018 by nyrahul

Status DIS modifications draft

Eliding and Querying RPL Information

draft-thubert-roll-eliding-dio-information

P. Thubert, D. Barthel, R.A. Jadhav

Pascal Thubert

June 26th, 2020

ROLL Virtual Interim

Changes Highlights

- 04 published in March, minor changes
- Needs WG attention to progress
- So far we were really busy
  - What with NP-DAO, RUL, turnon-RFC8138, UseOfRPLInfo drafts!
- Now a good time to reboot this?
- Next To Do's
  - Adapt to new MOPEXT/ CAPABILITIES split
  - Addressing Rahuls's comments

Rahuls's comments

- Complexity of the AOO and RCSS per option
  - Would be simpler if all options progress with the RCSS

- Doable with the current specification
  - But needs capability signaling

- Alt to drop the idea completely
  - Huge simplification
  - but all options must be sent when the RCSS increments

WG recommendations

- RCSS per option with AOO, or global
- Adoption ?

What is this draft?

- The draft presents a method to safely elide a group of RPL options in a DIO message by synchronizing the state associated with each of these options between parent and child

- This is achieved using a new sequence counter in DIO messages called RPL Configuration State Sequence (RCSS)

- A child that missed a DIO message with an update of any of those protected options detects it by the change of RCSS and queries the update with a DIS Message.

- The draft also provides a method to fully elide the options in a DAO message.

Proposed method

- New RPL Configuration State Sequence (RCSS)
- Updates base objects
  - DIO to add RCSS
  - DAO to indicate it is abbreviated
  - DIS base objects to query missing options
- New "Abbreviated Option" Option (AOO)
  - Replacement for a full option, indicates last RCSS

Protected Options

The protected options are:

1. The Route Information Option (RIO) defined in section 6.7.5 of [RPL]

2. The DODAG Configuration Option (DCO) defined in section 6.7.6 of [RPL]

3. The Prefix Information Option (PIO) defined in section 6.7.10 of [RPL]

4. The Extended MOP Option (MOPex) defined in [MOPEX-CAP]

5. The Global Capabilities Option (GCO) defined in [MOPEX-CAP]

draft-thubert-roll-eliding-dio-information

New Abbreviated Option Option

- Used as replacement of the full option
- Indicates the RCSS of the last change for this option

```
 0                   1                   2                   3
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Option Type  | Option Length | Abbrev. opt.  | Last Mod RCSS |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```
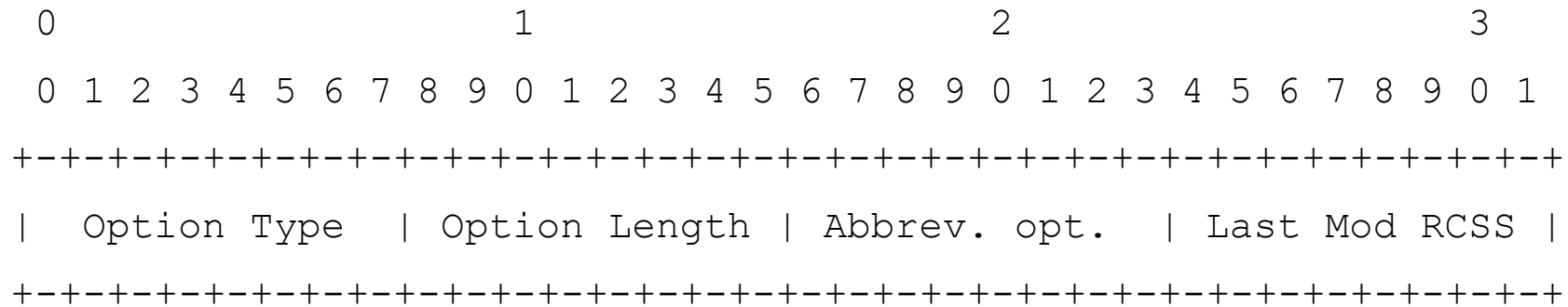
Figure 3: Abbreviated Option Option Format

Updated DIS object

- New bits to indicated requested options
- Last RCSS to which this node is synchronized

```
 0                   1                   2
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

|R|D|P[M|O| Flg | LastSync RCSS |   Option(s)...

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Figure 2: Updated DIS Base Object

RCSS operation

- The RCSS applies to a DIO Message and a same value of the RCSS can be used in DIO messages that are sent consecutively with no change in the protected options.

- The RCSS is incremented by the Root using a lollipop technique

- A reboot of the Root is detected when the RCSS moves from the circular to the straight part of the lollipop.

- During the straight part of the lollipop, a second reboot of the Root might not be recognized. For that reason the protected options MUST be provided in full with each increment on the RCSS during the straight part of the lollipop.

- When a field is modified in one of the protected options, the Root MUST send a DIO with an incremented RCSS and the modified protected option(s) in full.

draft-thubert-roll-eliding-dio-information

Resync operation

A child can resynchronize any of the protected options to the latest RCSS by sending a DIS Message to a candidate parent that advertises that RCSS in DIO messages.

The child MUST set the desired combination of 'R', 'D', 'P', 'M' and 'O' flags to indicate the option(s) that it needs updated.

The child MUST signal in the Last Synchronized RCSS field of the DIS the freshest value of RCSS for which it was fully synchronized

The DIO message that is sent in response MUST contain in full all the options that are requested and that were updated since the Last Synchronized RCSS in the DIS Message. The other options MUST be added in the abbreviated form.

The options MAY be spread over more than one DIO message sent in a quick sequence.

Next ROLL Meeting

- ROLL will not meet during July 2020 and thus not at IETF 108
- Action Point: Send Doodle for first weeks of September (after vacations)

Open Floor