



Wednesday 2020/09/30

# ROLL Interim Meeting

## Routing over Low-Power And Lossy Networks

### **Chairs:**

Dominique Barthel  
Ines Robles

### **Secretary:**

Michael Richardson



# Note Well

This is a reminder of IETF policies in effect on various topics such as patents or code of conduct. It is only meant to point you in the right direction. Exceptions may apply. The IETF's patent policy and the definition of an IETF "contribution" and "participation" are set forth in BCP 79; please read it carefully.

As a reminder:

- By participating in the IETF, you agree to follow IETF processes and policies.
- If you are aware that any IETF contribution is covered by patents or patent applications that are owned or controlled by you or your sponsor, you must disclose that fact, or not participate in the discussion.
- As a participant in or attendee to any IETF activity you acknowledge that written, audio, video, and photographic records of meetings may be made public.
- Personal information that you provide to IETF will be handled in accordance with the IETF Privacy Statement.
- As a participant or attendee, you agree to work respectfully with other participants; please contact the ombudsteam (<https://www.ietf.org/contact/ombudsteam/>) if you have questions or concerns about this.

Definitive information is in the documents listed below and other IETF BCPs. For advice, please talk to WG chairs or ADs:

BCP 9 (Internet Standards Process)

BCP 25 (Working Group processes)

BCP 25 (Anti-Harassment Procedures)

BCP 54 (Code of Conduct)

BCP 78 (Copyright)

BCP 79 (Patents, Participation)

<https://www.ietf.org/privacy-policy/> (Privacy Policy)

Source: <https://www.ietf.org/about/note-well/>

# Meeting Materials

- Session: Wednesday 2020/09/30
- Remote Participation
  - Etherpad: <https://codimd.ietf.org/notes-ietf-interim-2020-roll-05-roll>
  - Slides: <https://datatracker.ietf.org/meeting/interim-2020-roll-05/session/roll>
  - Jabber: xmpp:roll@jabber.ietf.org?join
  - Minutes taker: **Please volunteer, thank you :)**
- **Please sign blue sheets = add your name into the etherpad :-)**

# Agenda

## IETF - ROLL Interim Meeting

10:45 to 12:45 UTC - Wednesday 30th September

### Material:

<https://datatracker.ietf.org/meeting/interim-2020-roll-05/session/roll>

<https://github.com/roll-wg/ROLL-Interim-Meeting>

Etherpad: <https://codimd.ietf.org/notes-ietf-interim-2020-roll-05-roll>

Time	Duration	Draft/Topic	Presenter
10:45 - 11:05	20 min	WG Status	Ines/Dominique
11:05 - 11:15	10 min	ROLL in IETF 109	Ines/Dominique
11:15 - 11:25	10 min	Progress on Turn-on RFC8138 at IESG	Pascal
11:25 - 11:35	10 min	First IETF LC reviews of unaware-leaves	Pascal
11:35 - 11:50	15 min	New from P-DAO draft, discussion on managing complexity	Pascal
11:50 - 12:00	10 min	Updates in Capabilities and Mopex	Rahul
12:00 - 12:40	40 min	RPL v2 topics	Everyone
12:40 - 12:45	5 min	Open Floor	Everyone

# Milestones

## Milestones

Date	↕ Milestone
Oct 2021	Recharter WG or close
Dec 2020	Initial submission of Mode of Operation extension and Capabilities for RPL to the IESG <a href="#">draft-ietf-roll-mopex-cap</a>
Jul 2020	Initial submission of a root initiated routing state in RPL to the IESG <a href="#">draft-ietf-roll-dao-projection</a>
Jul 2020	Initial submission of a YANG model for MPL to the IESG <a href="#">draft-ietf-roll-mpl-yang</a>
Jun 2020	Initial submission of Enabling secure network enrollment in RPL networks draft to the IESG <a href="#">draft-ietf-roll-enrollment-priority</a>
Jun 2020	Initial submission of a proposal to augment DIS flags and options to the IESG <a href="#">draft-ietf-roll-dis-modifications</a>
Jun 2020	Initial submission of a proposal for Source-Route Multicast for RPL to the IESG <a href="#">draft-ietf-roll-ccast</a>
Mar 2020	Initial submission of Common Ancestor Objective Functions and Parent Set DAG Metric Container Extension to the IESG <a href="#">draft-ietf-roll-nsa-extension</a>
Mar 2020	Initial Submission of a proposal with uses cases for RPI, RH3 and IPv6-in-IPv6 encapsulation to the IESG <a href="#">draft-ietf-roll-useofrplinfo</a>

## Done milestones

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

# State of Active Internet-Drafts

<b>Draft</b>	<b>Status</b>
<b>draft-ietf-roll-aodv-rpl-08</b>	Revised I-D Needed
<b>draft-ietf-roll-capabilities-07</b>	Work in progress
<b>draft-ietf-roll-dao-projection-13</b>	Discussion Today
<b>draft-ietf-roll-dis-modifications-01</b>	Stand By
<b>draft-ietf-roll-efficient-npdao-18</b>	RFC Ed Queue
<b>draft-ietf-roll-enrollment-priority-03</b>	Work in progress
<b>draft-ietf-roll-mopex-02</b>	Work in progress
<b>draft-ietf-roll-nsa-extension-09</b>	Shepherd document in progress
<b>draft-ietf-roll-rpl-observations-04</b>	Work in progress
<b>draft-ietf-roll-turnon-rfc8138-16</b>	IESG Evaluation::AD Followup
<b>draft-ietf-roll-unaware-leaves-20</b>	Submitted to the IESG
<b>draft-ietf-roll-useofrplinfo-41</b>	Ready to go back to AD?

# State of Related Internet-Drafts

<b>Draft</b>	<b>Status</b>
<b>draft-jadhav-roll-storing-rootack-01</b>	Work in progress
<b>draft-thubert-roll-eliding-dio-information</b>	Expired, presented in the last interim meeting
<b>Draft-ietf-roll-mpl-yang-02 (Expired)</b>	To be continued
<b>Draft-ietf-roll-bier-ccast-01 (Expired)</b>	To be continued

# Open tickets

<https://github.com/roll-wg/efficient-route-invalidation/issues>

roll-wg / **efficient-route-invalidation**

<> Code **Issues 1** Pull requests 0

Filters

**1 Open** ✓ 0 Closed

- RPL Status Code of 130 is incorrect**  
#4 opened on Nov 26, 2019 by nyrahul

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

Capabilities

Pull requests Actions Projects Wiki Security

Filters

**2 Open** ✓ 8 Closed

- New message code for cap query/resp**  
#15 opened on May 26 by nyrahul
- Add scenario for capabilities exchange** needs draft-update  
#3 opened on Aug 25, 2019 by nyrahul

[/rpl-observations](#)

Issues 3 Pull requests Actions Projects Wiki Security Insights

Filters

**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

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



# Open tickets

<https://github.com/roll-wg/draft-ietf-roll-enrollment-priority/issues>

roll-wg / **draft-ietf-roll-enrollment-priority**

<> Code **!** Issues **1** Pull requests **0** Actions

Filters

**!** **1 Open** ✓ **0 Closed**

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

<https://github.com/roll-wg/dao-projection/issues>

roll-wg / **dao-projection**

<> Code **!** Issues **5** Pull requests **1** Actions Projects **0** Wiki Security

Filters  Label

**!** **5 Open** ✓ **1 Closed** Author  Label  Projects

- !** **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

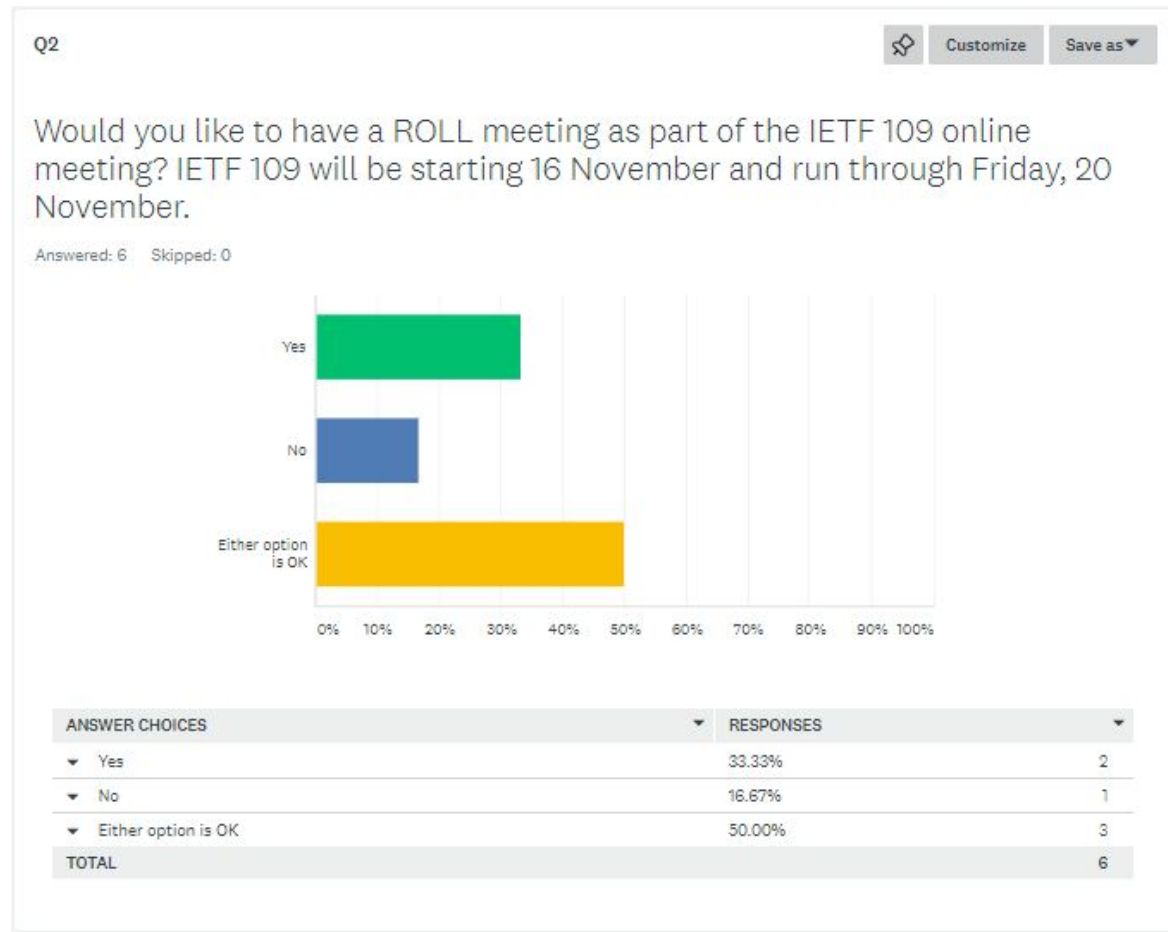
# Open tickets

<b>Ticket</b>	<b>Summary</b>	<b>Component</b>
#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>

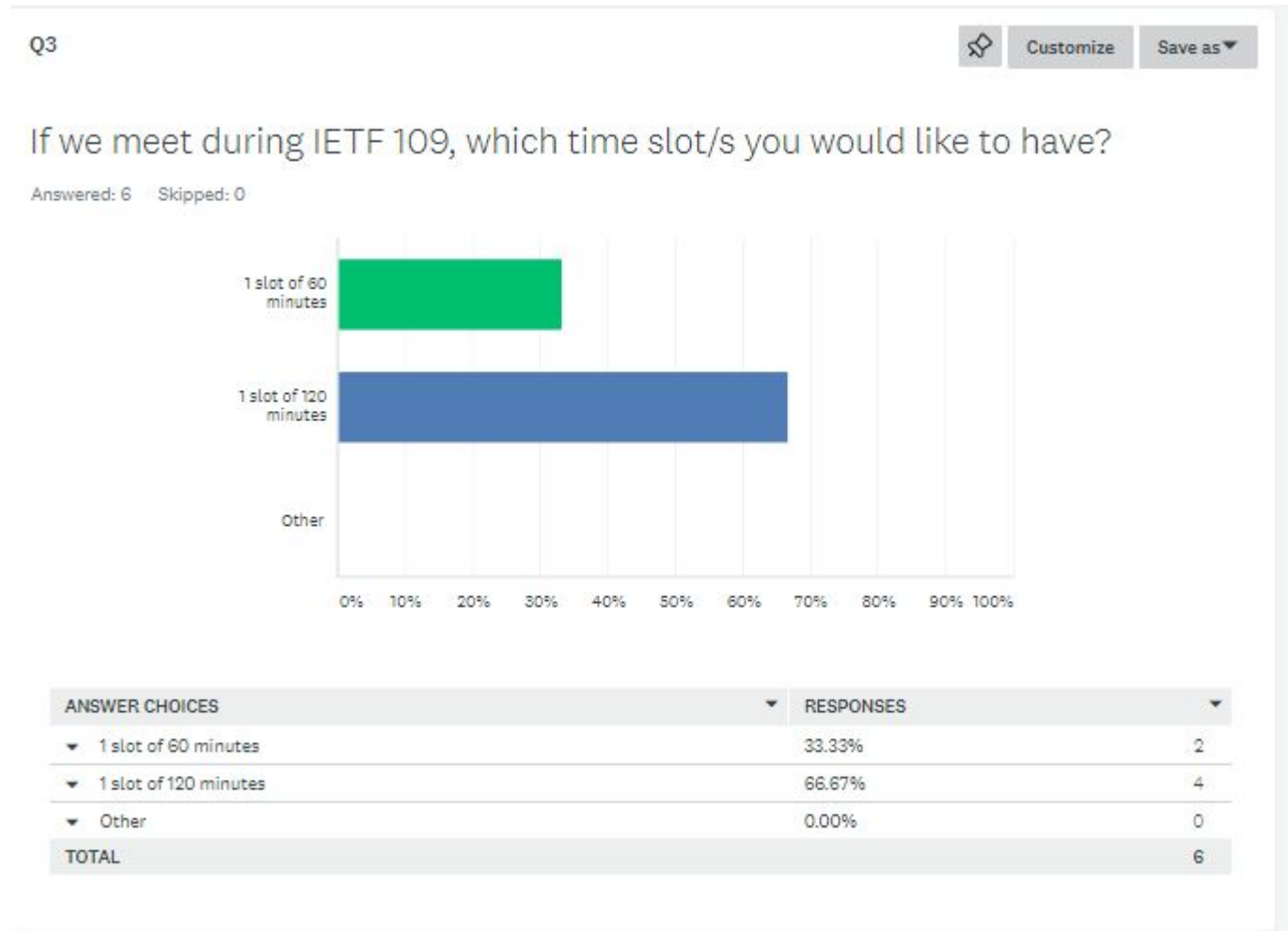
# IETF 109 - ROLL Survey

Responses:



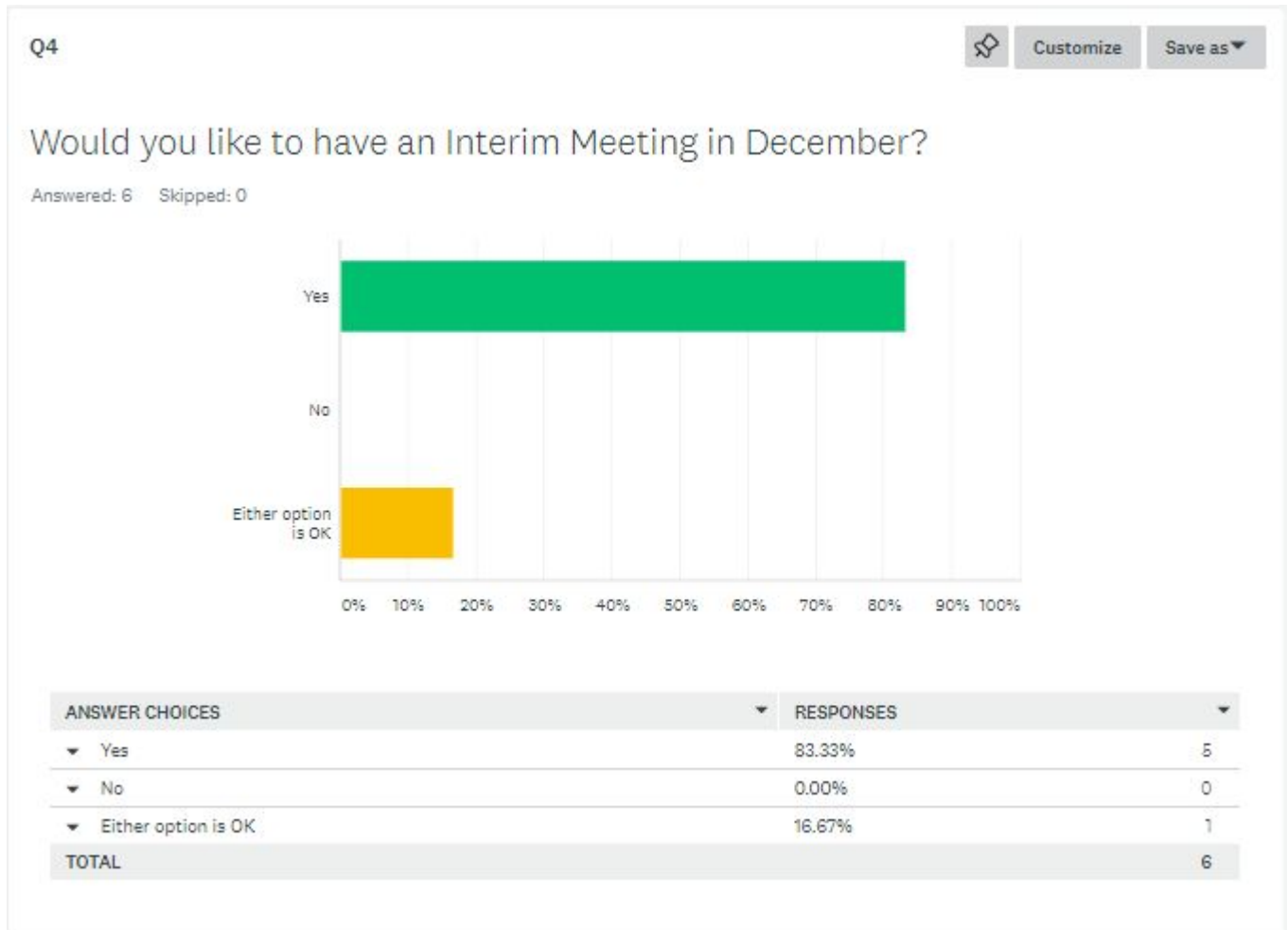
# IETF 109 - ROLL Survey

## Responses:




# IETF 109 - ROLL Survey

Responses:



# IETF 109 - ROLL Survey


## Responses:



Q5  Save as ▾

Additional Comments/Suggestions - Thank you for your answer :-)

Answered: 3 Skipped: 3

---

**RESPONSES (3)** WORD CLOUD TAGS (0)  Sentiments: OFF

Apply to selected ▾ Filter by tag ▾ Search responses   

Showing 3 responses

<input type="checkbox"/>	We could elaborate on RPLv2 on open mike	9/25/2020 6:26 PM	<a href="#">View respondent's answers</a>	<a href="#">Add tags ▾</a>
<input type="checkbox"/>	If interim meeting in December, please after the 8th.	9/16/2020 3:07 PM	<a href="#">View respondent's answers</a>	<a href="#">Add tags ▾</a>
<input type="checkbox"/>	I do not feel strongly.	9/14/2020 12:47 PM	<a href="#">View respondent's answers</a>	<a href="#">Add tags ▾</a>

# IETF 109 - ROLL Survey

- <https://www.surveymonkey.com/r/5KDZ8HH>
- Based on Survey we will request a meeting slot for IETF 109
- Slot of 120 minutes
- Comments?

# Configuration option for RFC 8138

**draft-thubert-roll-turnon-rfc8138**

Pascal Thubert

Interim Sept 30<sup>th</sup>, 2020

ROLL Virtual Meeting



# Status

- IESG Evaluation::AD Followup
- IESG review blocking (Martin & Benjamin)
- DISCUSSEs on MOP vs RPL config option
- Related formal update of RFC 6550
- Resolution proposed in useofrplinfo
- Published 16, 17 upcoming
- “For a MOP value of 7, [RFC8138] MUST be used on Links where 6LoWPAN Header Compression [RFC6282] applies and MUST NOT be used otherwise.”

## Discuss

Martin Duke  
Benjamin Kaduk

## Yes

Alvaro Retana

## No Objection

Deborah Brungard  
Alissa Cooper  
Roman Danyliw  
Erik Kline  
Murray Kucherawy  
Warren Kumari  
Barry Leiba  
Éric Vyncke  
Magnus Westerlund  
Robert Wilton

## No Record

Martin Vigoureux

# RPL Unaware Leaves

**draft-ietf-roll-unaware-leaves**

Pascal Thubert

Interim Sept 30<sup>th</sup>,  
2020  
ROLL Virtual Meeting

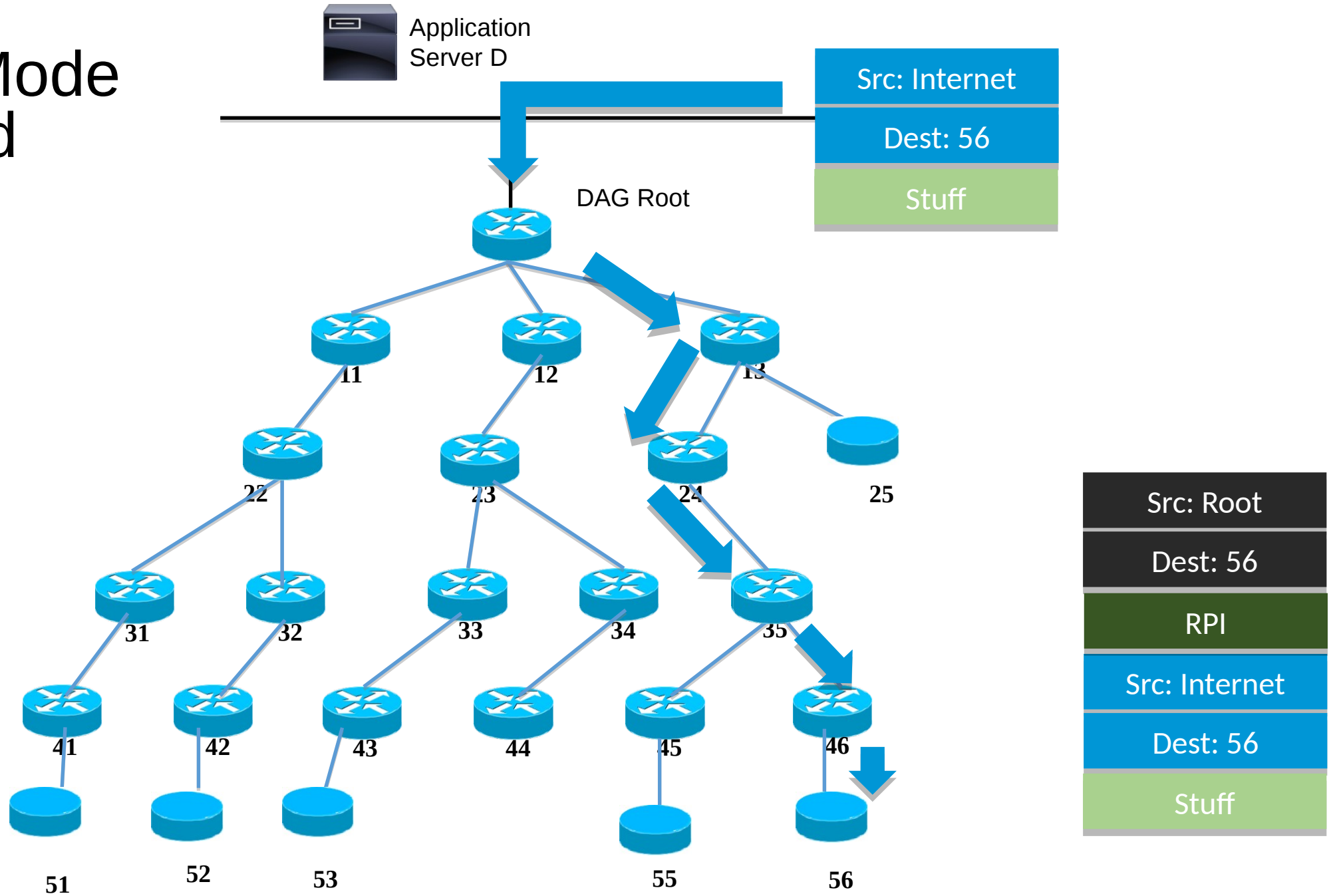
# Status to the draft

2020-09-24 AD Evaluation::AD Followup for 9 days  
33 pages New Submitted to IESG for Publication: Proposed Standard  
Reviews: iotdir  
Mar 2020

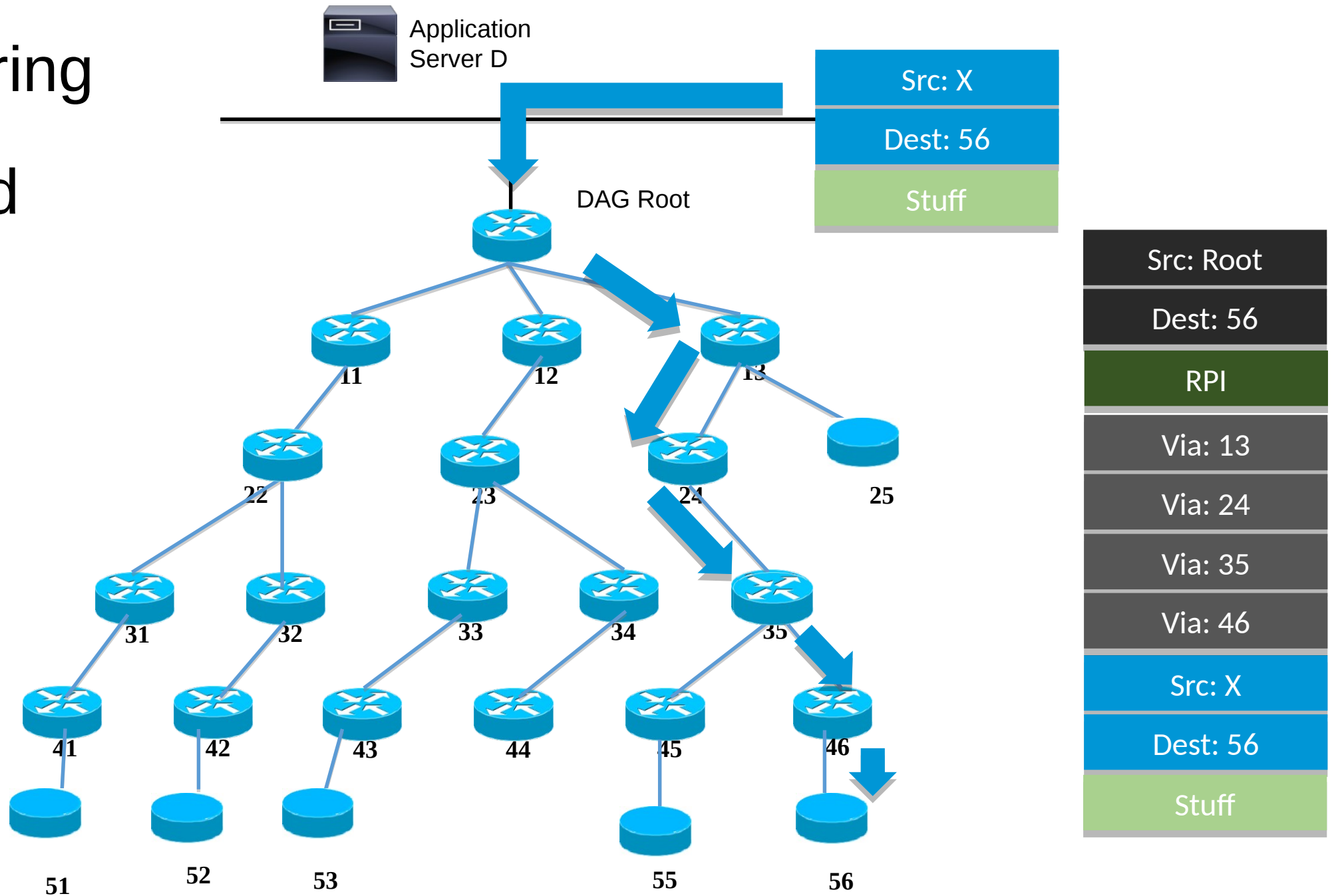
- AD review (thx Alvaro!) AD Evaluation::AD Followup
- Discussion on terms RUL, 6LN, 6LR; rewording there
- Blocked on the status of the RPL config option flags
- Resolution posted on 3 drafts (see useofrplinfo)
- Published -20, 21 coming up
- In Mop 7: “the Root is expected to perform the proxy operation by default.”

**THANKS!**

# Storing-Mode Overhead (RAN)



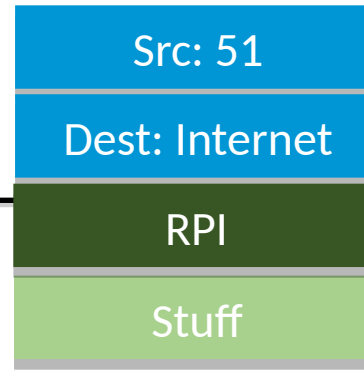
# Non-Storing Mode overhead (RAN)



# Storing-Mode Routing stretch (RAN)

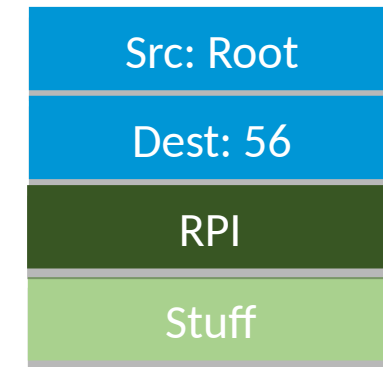
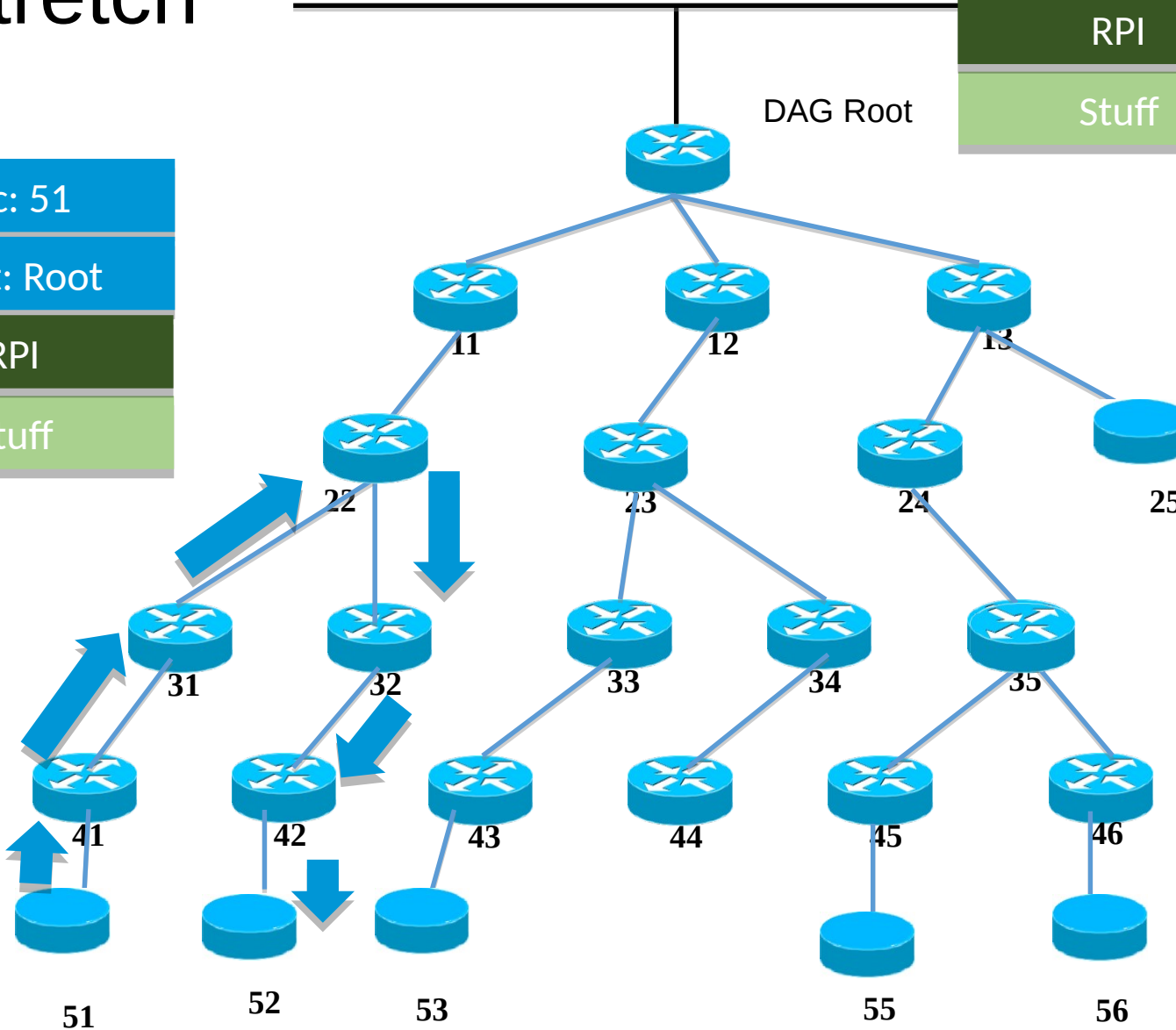
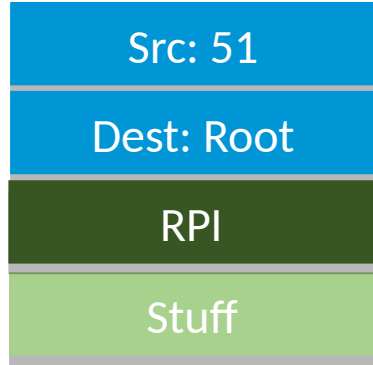


Application Server D

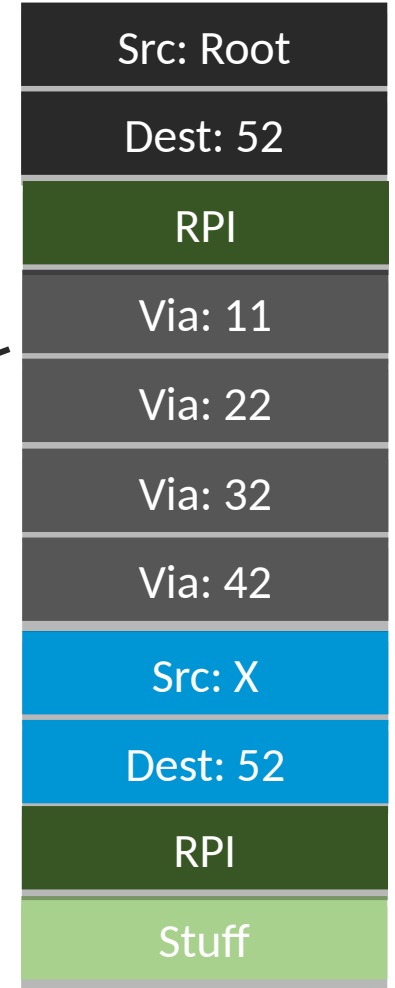
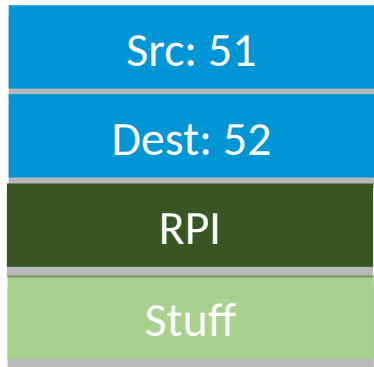
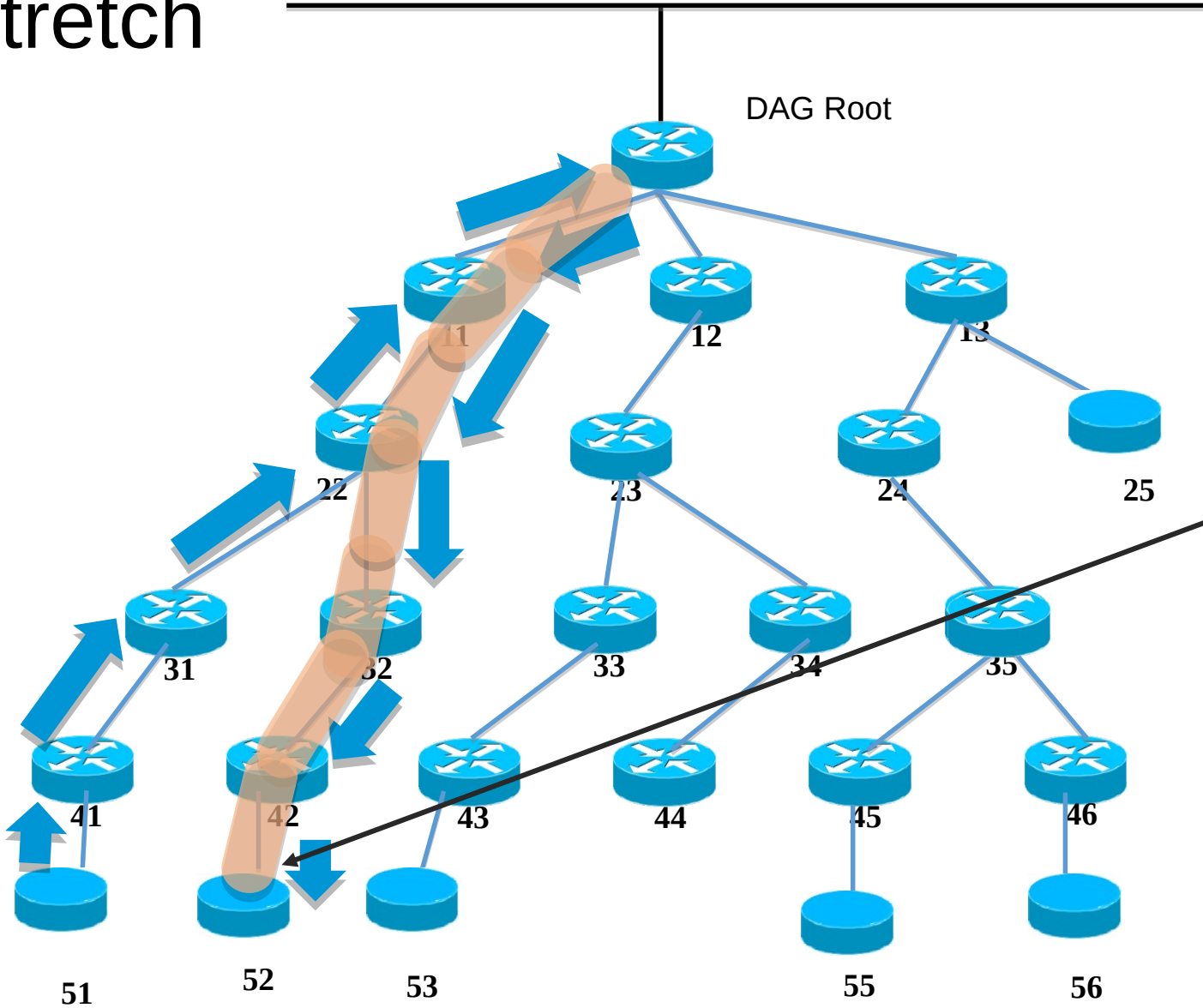


Same packet format from RAL to:

- Other RAL
  - Root
  - The Internet
- Due to RPI option type now 0x23

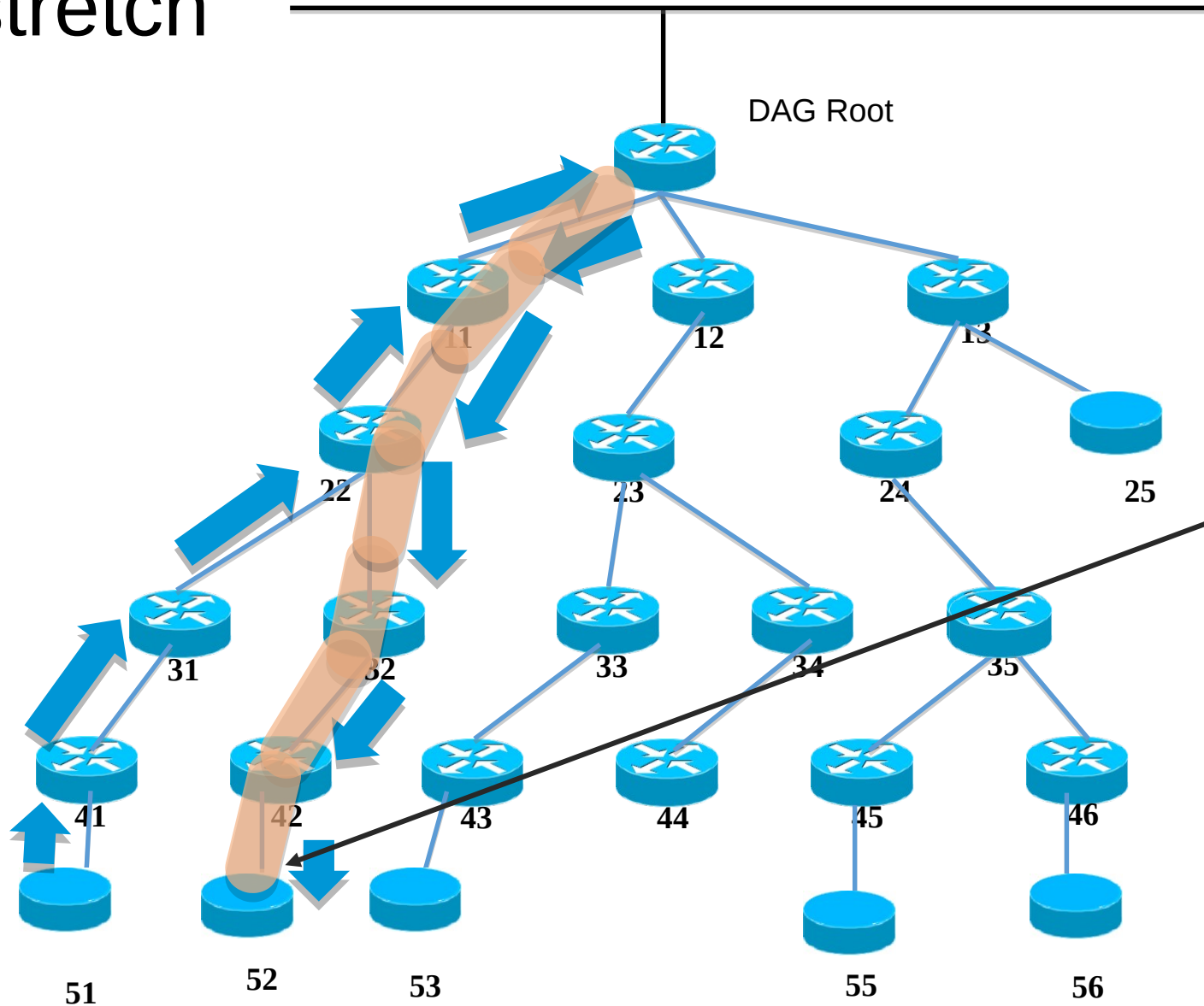


# Non-Storing Routing stretch (RAN)





# Non-Storing Routing stretch Alt (RAN)



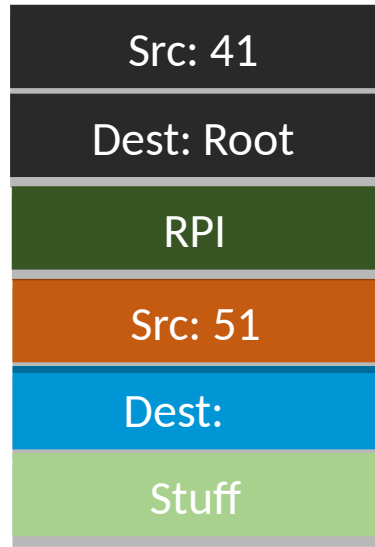
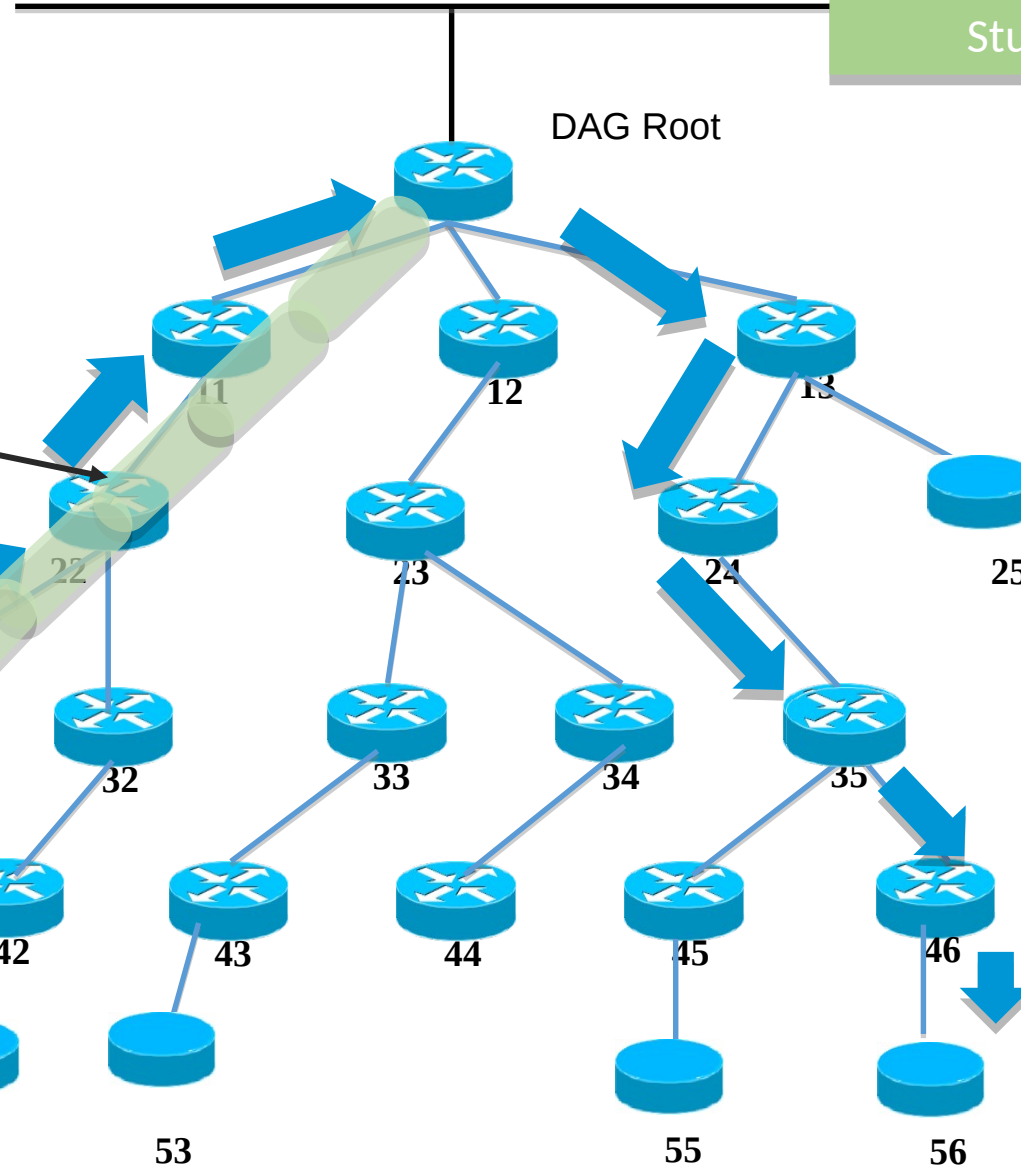
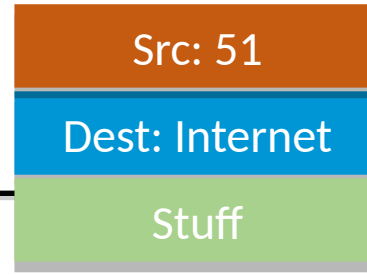
Src: Root
Dest: 52
RPI
Via: 11
Via: 22
Via: 32
Via: 42
Src: X
Dest: 52
Stuff

Src: 51
Dest: Root
RPI
Src: 51
Dest: 52
Stuff

# Any Mode from RUL To \*



Application  
Server D

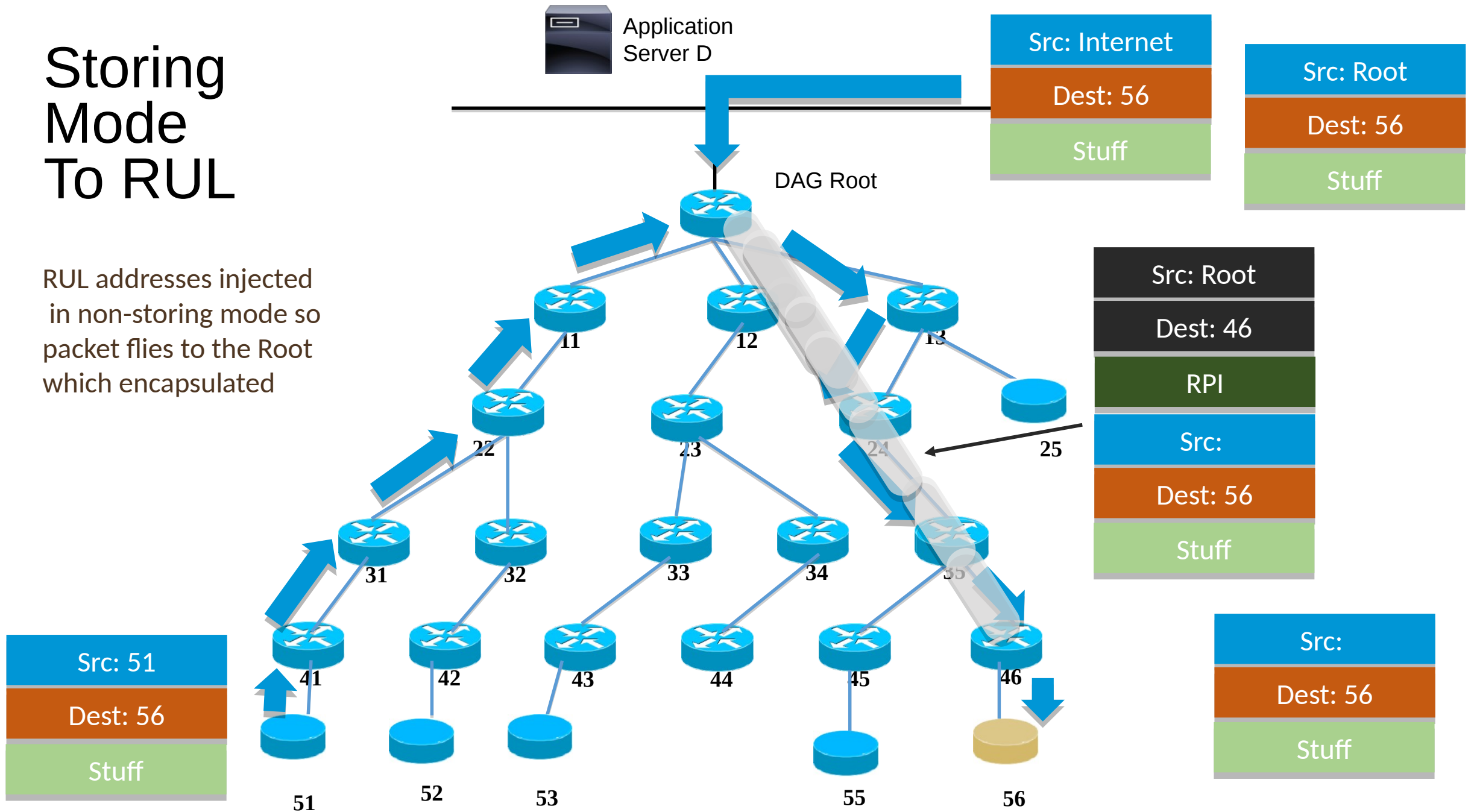


e.g. Storing  
to RAN



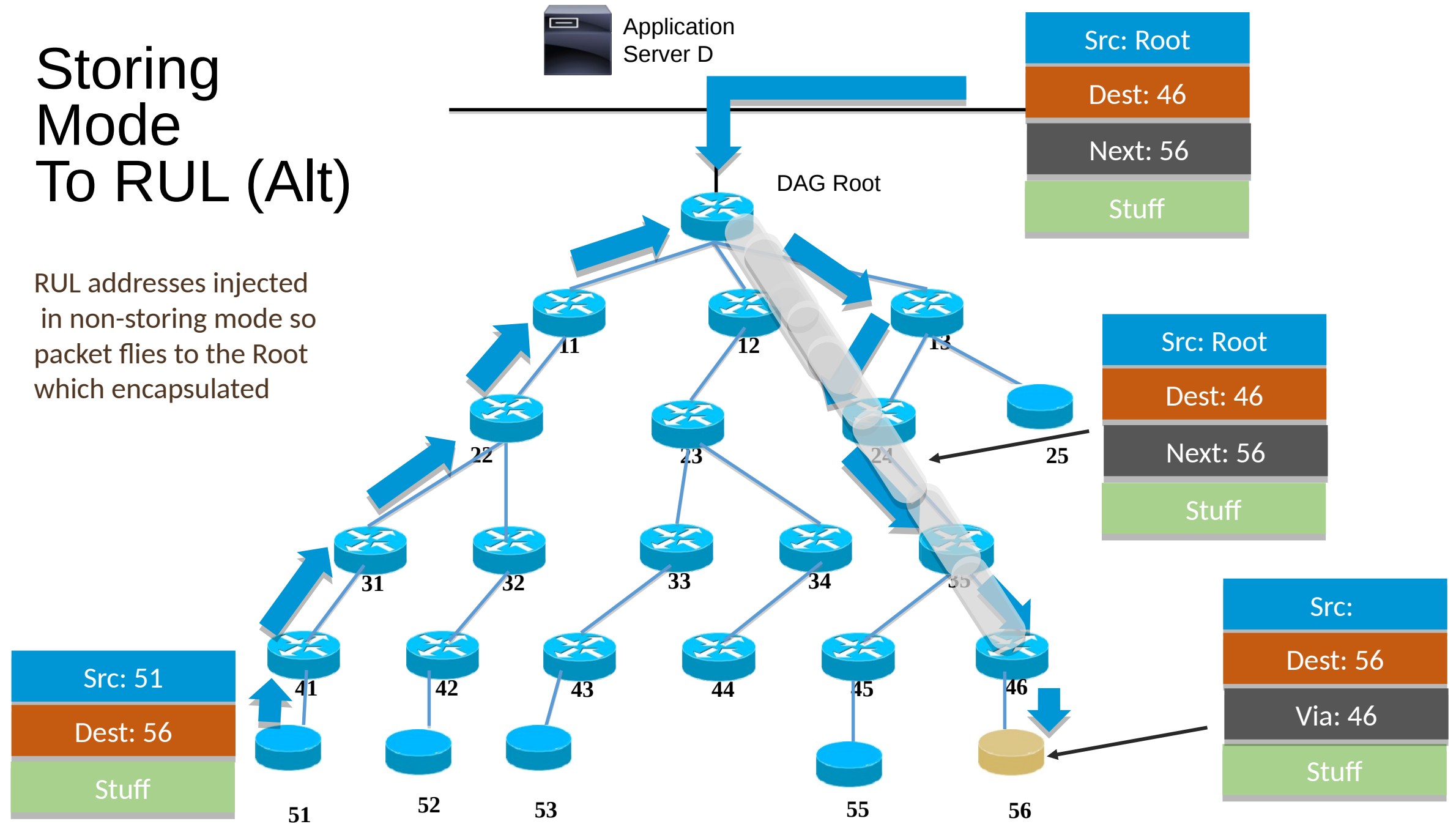
# Storing Mode To RUL

RUL addresses injected in non-storing mode so packet flies to the Root which encapsulated



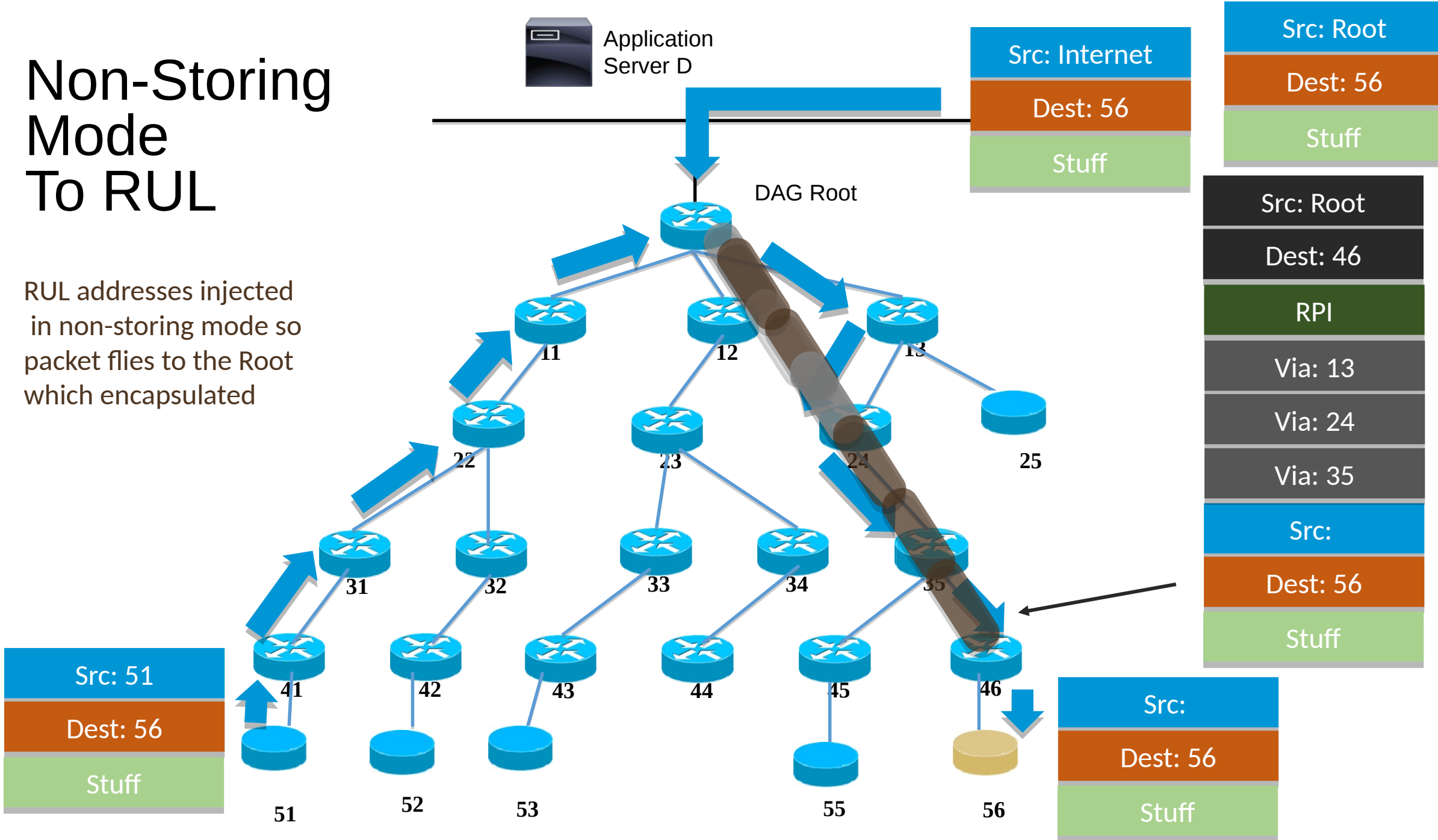
# Storing Mode To RUL (Alt)

RUL addresses injected in non-storing mode so packet flies to the Root which encapsulated



# Non-Storing Mode To RUL

RUL addresses injected in non-storing mode so packet flies to the Root which encapsulated



# Root initiated routing state in RPL

**draft-ietf-roll-dao-projection**

Pascal Thubert

Interim Sept 30<sup>th</sup>, 2020

ROLL Virtual Meeting

# Simplifying changes

- Only one main Instance / One main DODAG
- Only non-storing mode main instance
- Only storing P-DAO in main
- Storing P-Route is strict hop by hop
- And cannot be encapsulated in another track
- Multiple Targets Option but just one (SR)VIO

# Changes Highlights (some major!)

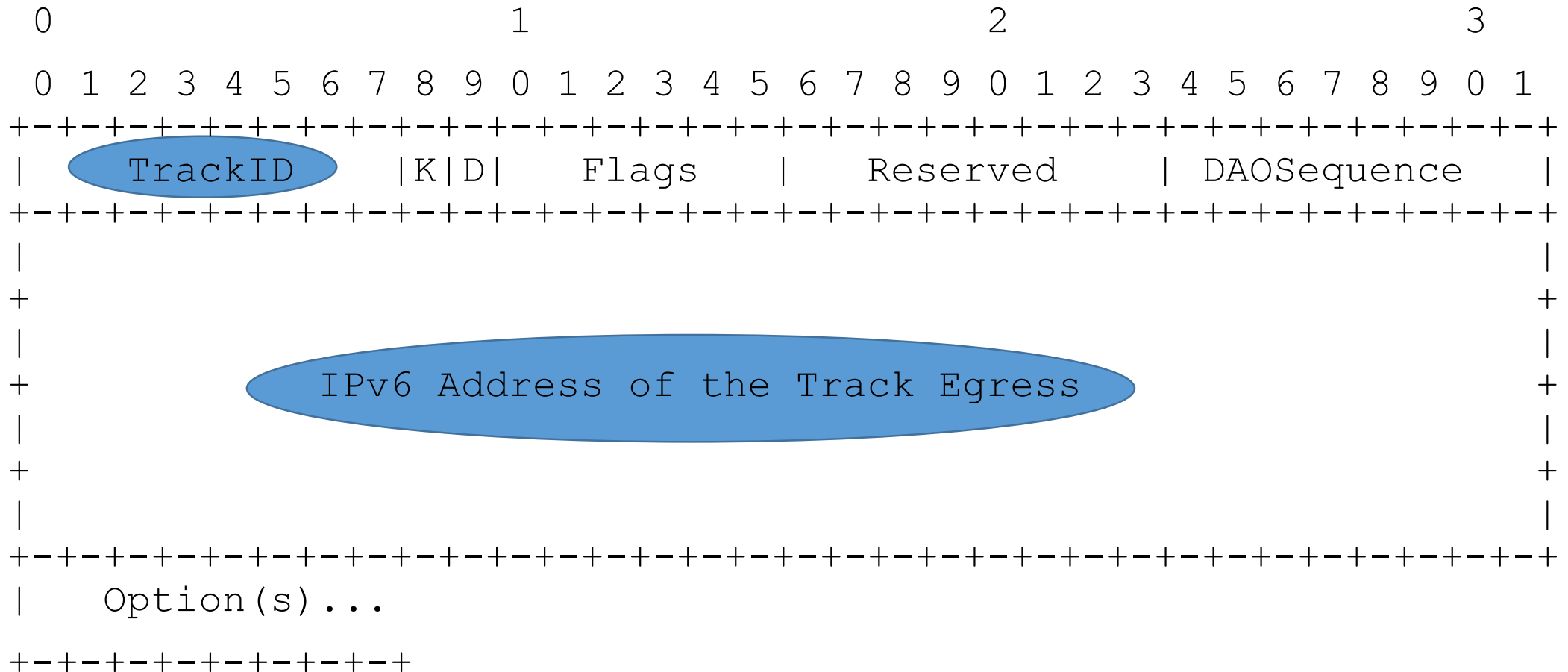
- Compressing P-DAO natively
  - Using RFC 8138
- Specified TrackID as a RPL instanceID
  - Enables to signal the flow in the packet  
=> (destination IP + local Instance)
  - Missing segment ID
- Added Sibling information
  - Optional metrics container
  - Sibling Selection out of Scope (need OF-type plug-in)



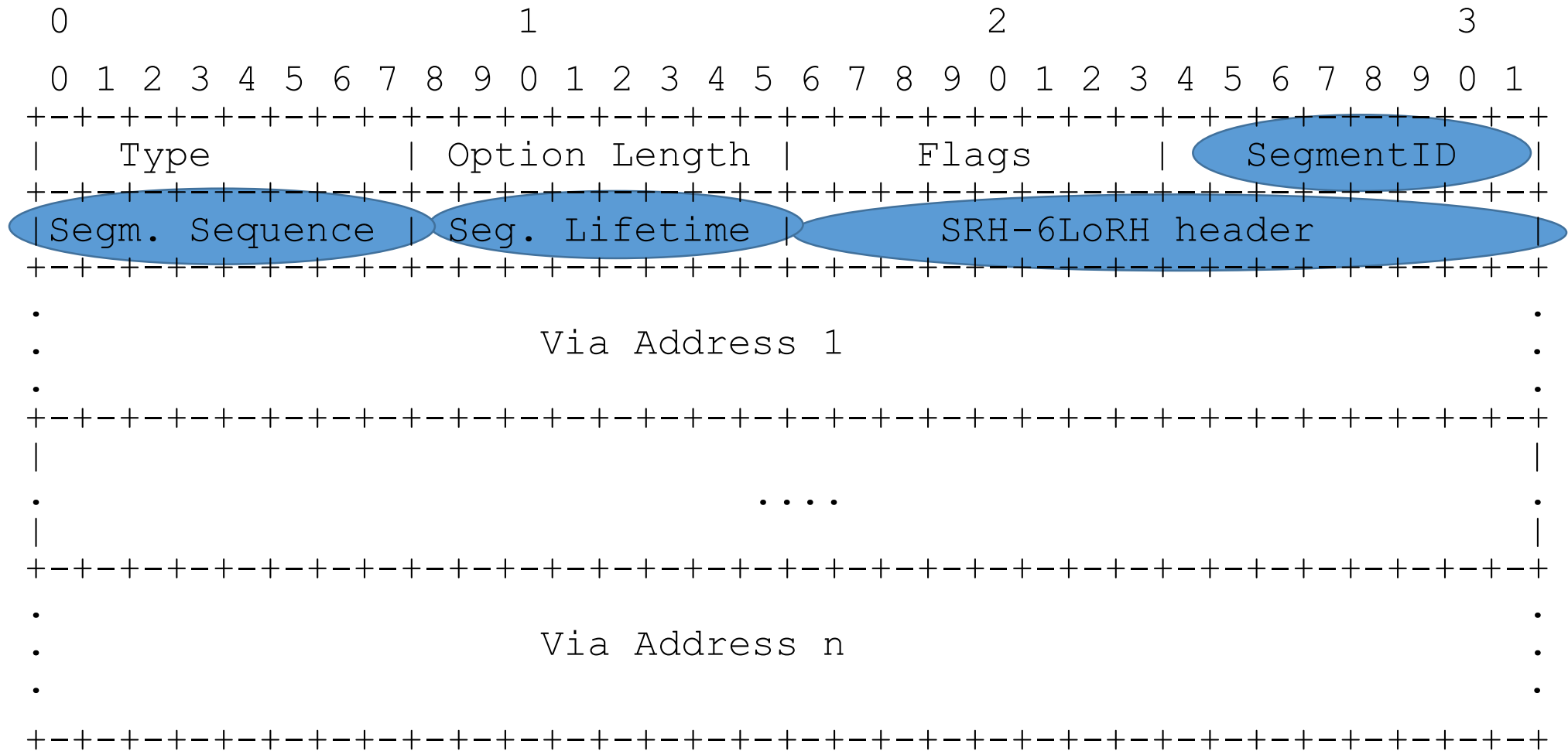
# Changes Highlights (Cont.)

- New Message to query a P-DAO
  - P-DAO request and PDR-ACK
- **Stitching P-DAO segments**
  - Correlated by TrackID
  - Missing stitching operation (e.g. Replication)
- Aligned Track def. with 6TiSCH and RAW
- Need improvements on security section

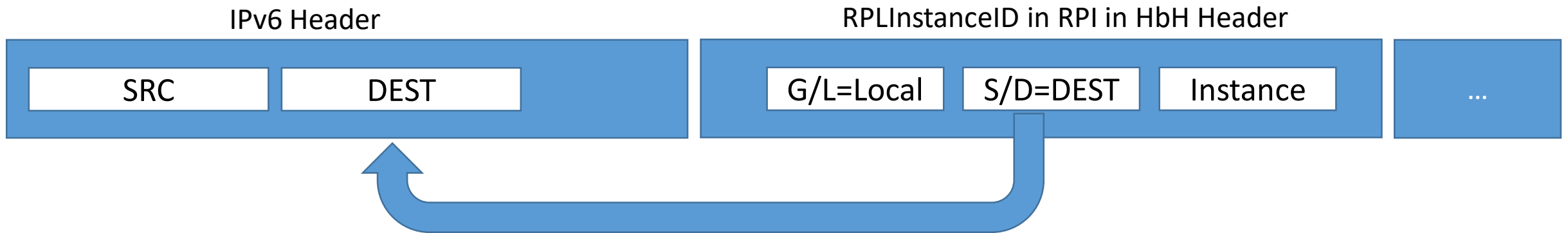
# P-DAO Format for a Track



# Updated Route Projection Options



# Signaling the Track in Packet



- A Track is a Local Instance of the destination
- Signaled in the packet in the classical RPL fashion



# New P-DAO Request

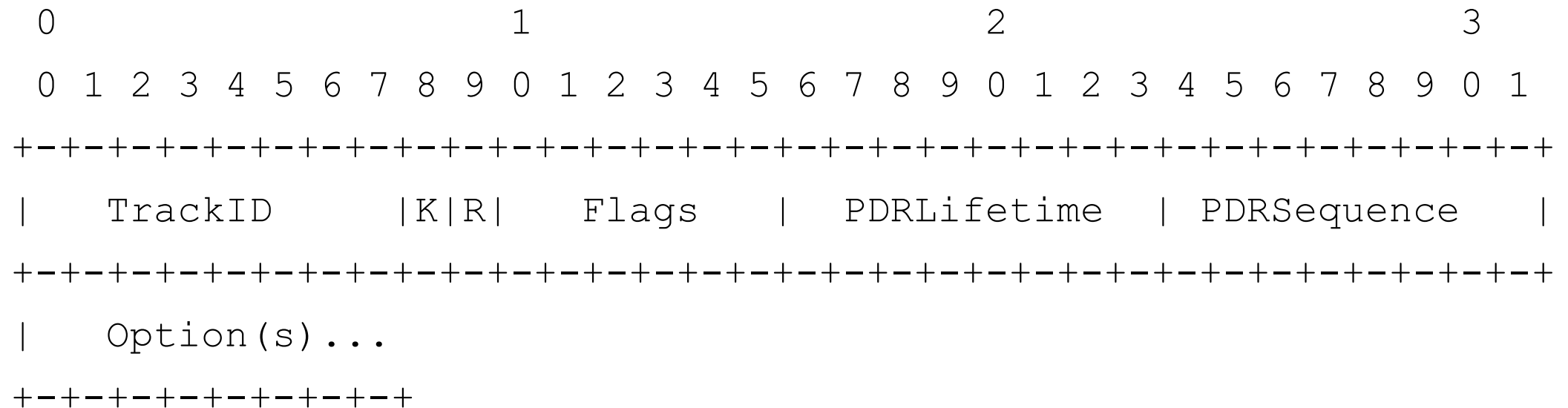
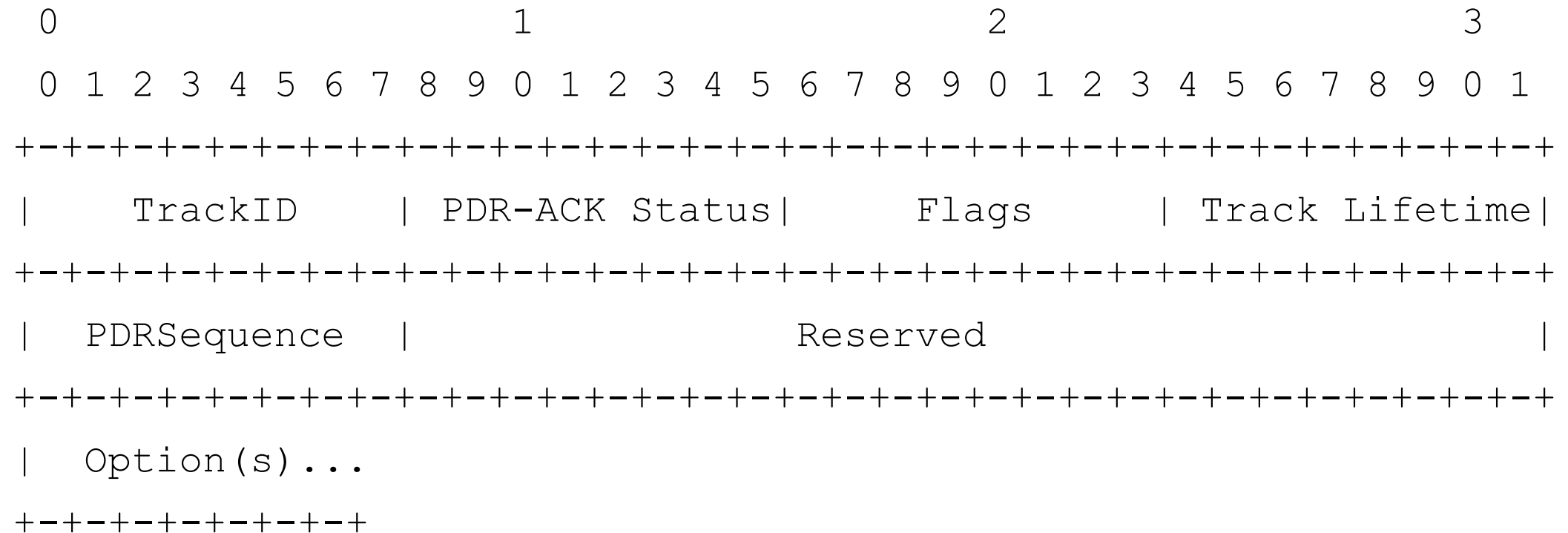


Figure 1: New P-DAO Request Format

# New PDR-ACK



# Pending Issues / Missing features

- Signal Egress as last element in (SR)VIO?
  - Useful if RFC 8138 compression
  - Needed in Global instance
  - Duplicate with DODAGID in Track
- Inter DODAGs?
  - Sibling in another DODAG?



# Pending Issues / Missing features

- Security Considerations (Ticket [#179](#))
- How P-DAO messages could be abused by
  - a) rogue nodes
  - b) via replay of messages
  - c) if P-DAO messages may deal with any threats?
- Lifetime, MOP, Retransmissions, Cleanup (Ticket [#180](#))
- Configuration parameters for Local Instance in P-DAO
  - Also P-DAO parameter option in PDAO request

# Next Steps

- Gather feedback on the proposals
- Remaining bugs
  - Dodagid of the main dodag elided (we do only storing mode)
  - Duplicate and inconsistent text
- WGLC around next IETF ?

# Capabilities Updates

draft-ietf-roll-capabilities  
ROLL Interim 30th Sep 2020

# Changes

- Updates based Dominique's feedback. Thank You Dominique

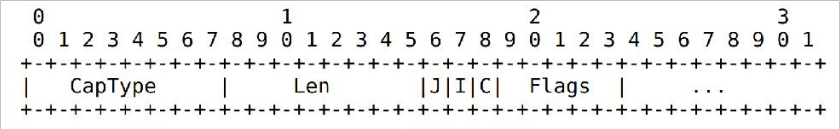
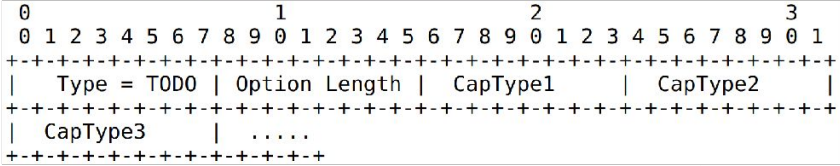
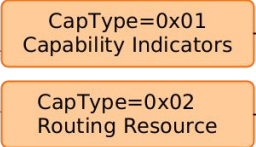
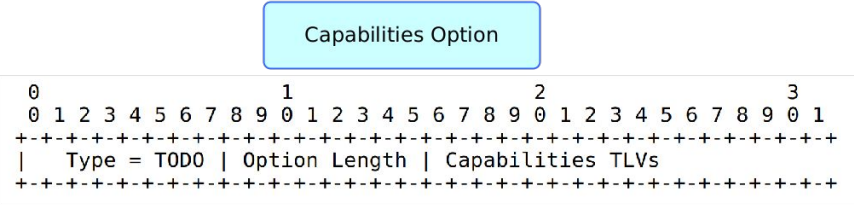
# What does the document contain?

- Capability Options that can be carried in any RPL messages
- Two specific capabilities
  - Capability Indicator flags
  - Routing Resource Capability
- Capability Query/Response signalling
- Guidelines for defining new capabilities

## MUSTs:

- Handling of Capabilities MUST be supported if the network uses MOPex [I-D.ietf-roll-mopex].

# Capability Options



Join as Leaf  
if cap not understood

Copy cap  
if not understood

Ignore msg if cap  
not understood

# Capability Query/Response

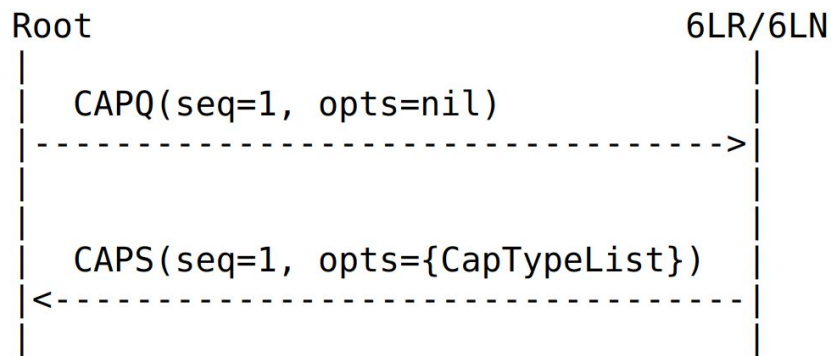


Figure 8: Query supported Cap Types

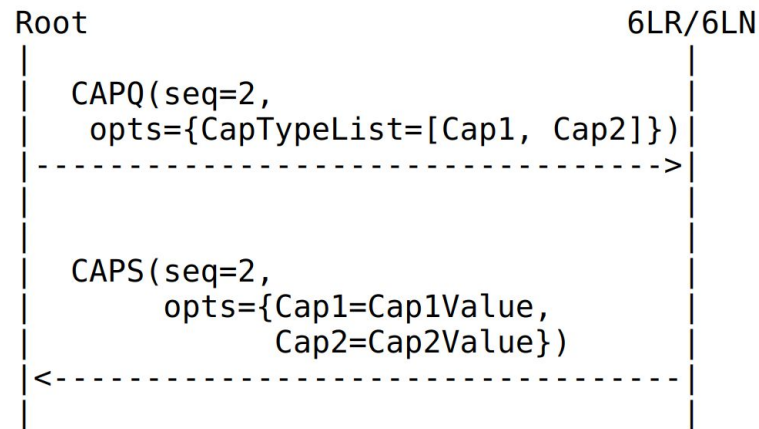


Figure 9: Query specific Cap Set

And the corresponding secure messages.

# MOPex Updates

draft-ietf-roll-mopex



# Extending RPL Control Options

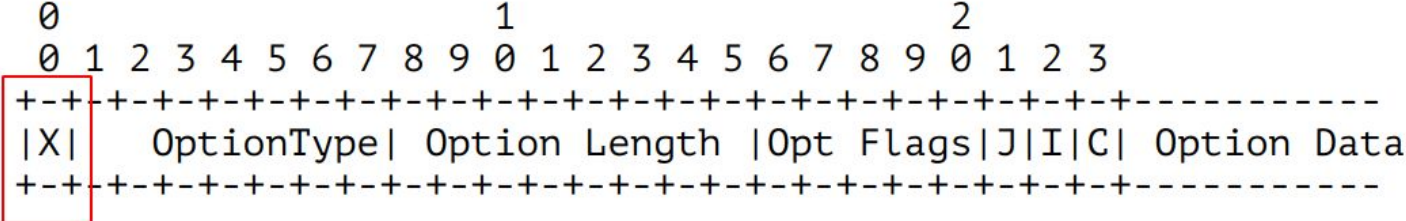


Figure 2: Extended RPL Option Format

- Earlier the location of 'X' bit was second most MSB.
- IANA section is updated to reflect this

# RPLv2 topics - Prepare Table of content

Source:<https://mailarchive.ietf.org/arch/msg/roll/hMUjtgxj05aA7fwaSXXhwqWTlIE/>

[https://mailarchive.ietf.org/arch/msg/roll/Sw3XbEaWe\\_AssG6cGC1QaZz43gc/](https://mailarchive.ietf.org/arch/msg/roll/Sw3XbEaWe_AssG6cGC1QaZz43gc/)

1. Use of revised Option Type (0x23) in RPI ... (Obsolete use of 0x63 RPI Option Type value).
  2. Mandating the use of 6LoRH (RFC 8138) , turn-on
  3. MOPex
  4. Support for Ext Control Options. (Allows Backward compatibility for new extns... part for same mopex draft)
  5. Support for Capabilities. (Enables backward compatibility, allows incremental feature support)
  - 6) P-DAO for SDN-RPL
  - 7) AODV-RPL.
- RPL Observations issues

**AOB**