

- **Use cases for DIS Modifications**

draft-papadopoulos-roll-dis-mods-use-cases-00

- **Actions based on DIS Modifications**

draft-ietf-roll-dis-modifications-01

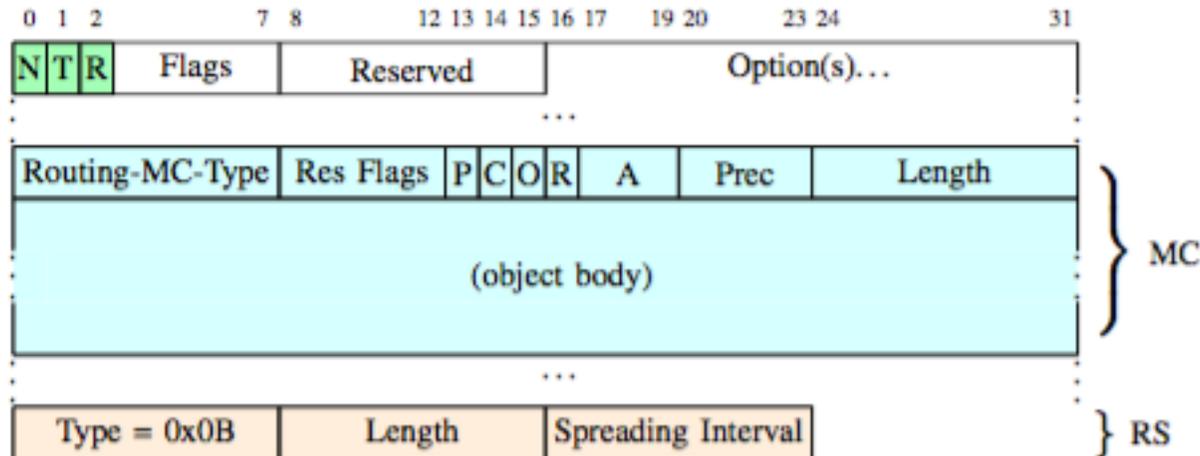
Georgios Z. Papadopoulos, Dimitrios Sourailidis,  
Aris-Remous Koutsiamanis and Dominique Barthel

# Use Cases

- Node Joining DODAG
  - A smart meter being replaced in the field, while a RPL network is operating and stable.
- Identifying Defunct DODAG
  - The node may fail to receive the neighbor's DIOs advertising an increased rank or the neighbor's membership in a different DODAG
- Adjacencies probing
  - RPL provides a mechanism in the form of unicast DIS to query a node for its DIO. A node receiving a unicast DIS must respond with a unicast DIO with Configuration Option.
  - This mechanism could as well be made use of for probing adjacencies.
- Sudden power shut down (then all devices send DIS packets)

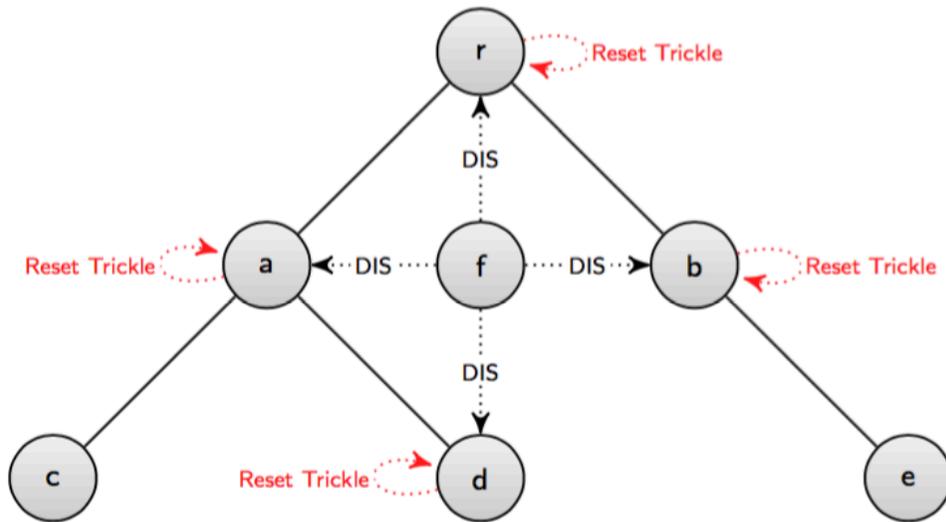
# DIS Modifications

- Actions that can be enhanced :
  - Multicast DIS and Trickle behavior (N and T flags)
  - Selectivity of multicast DIS messages (Metric Container)
  - Information carried by DIOs (R flag : Root, Prefix info)
  - Response Spreading (no to reply all together)

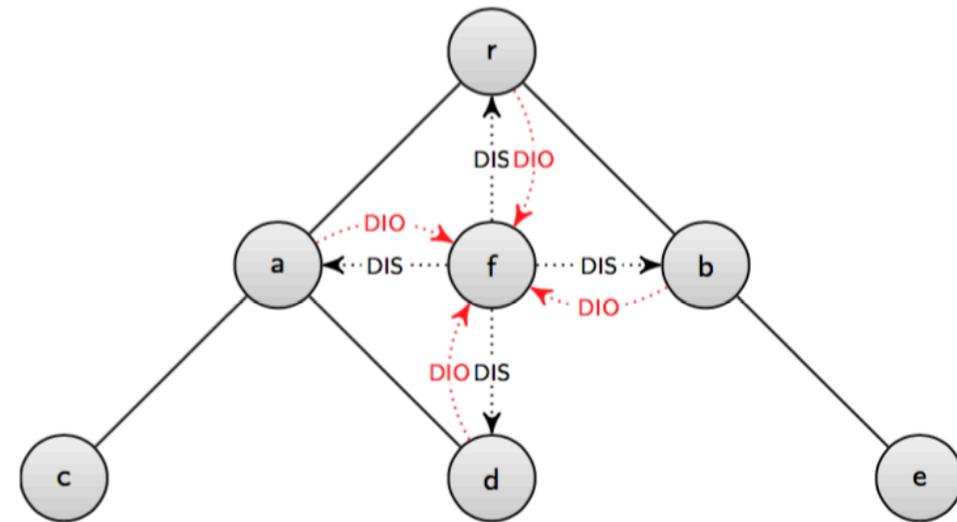


# Multicast DIS & Trickle behavior

- Stable Network → large Trickle intervals for DIOs
- Appearing Node requests DIOs with multicast DIS

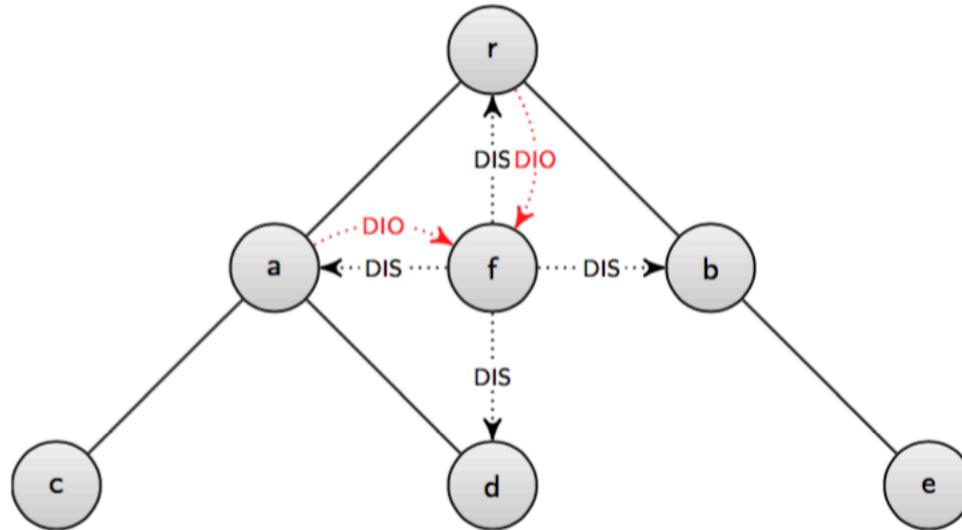


Mcast DIS – Reset Trickle



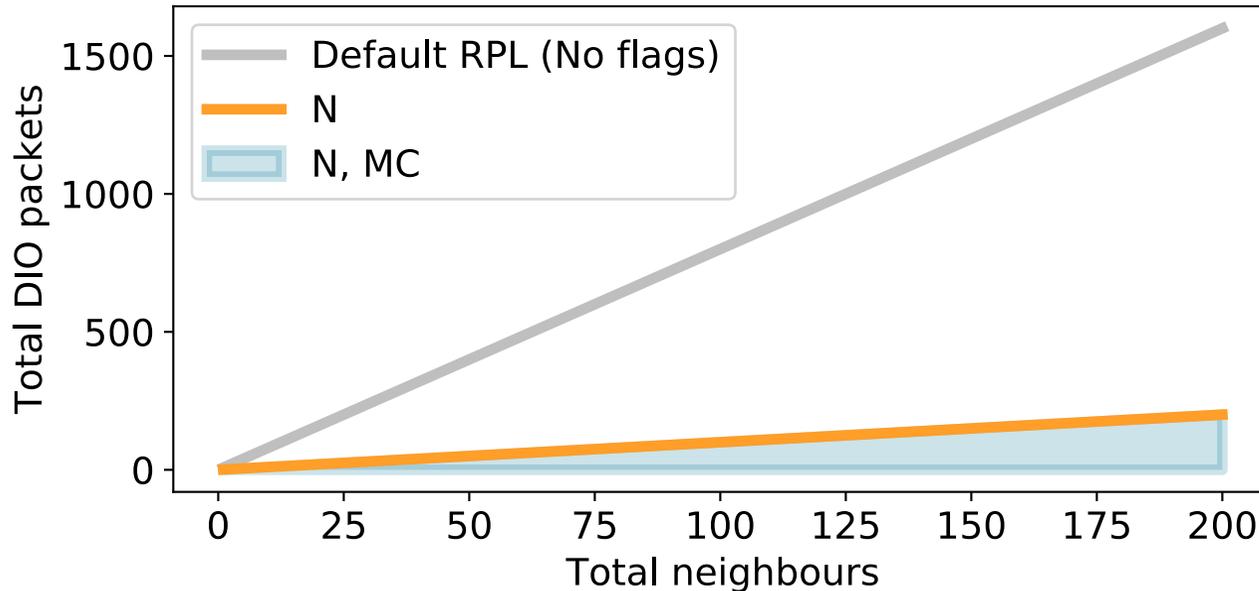
Mcast DIS – One-Shot Ucast DIOs

# Selectivity of Multicast DIS packets



- Allow Metric Container Options in DIS messages
  - Based on specified routing constraints, less neighbors will respond

# Theoretical count of DIO packets

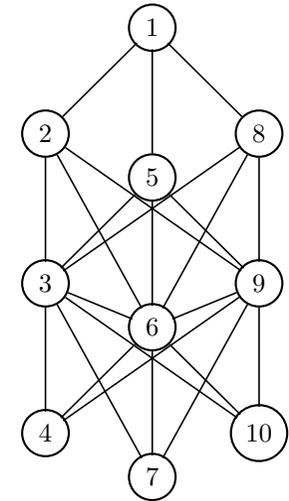


- # DIO packets sent in response to one DIS packet as a function of the number of neighbors receiving.
- The shaded region expresses the range of DIO counts depending on how many ( $[0 \dots M]$ ) of the  $M$  neighbors are filtered out by the use of the metric in the MC option.

# Simulation results on : draft-ietf-roll-dis-modifications-01

## Configuration setup :

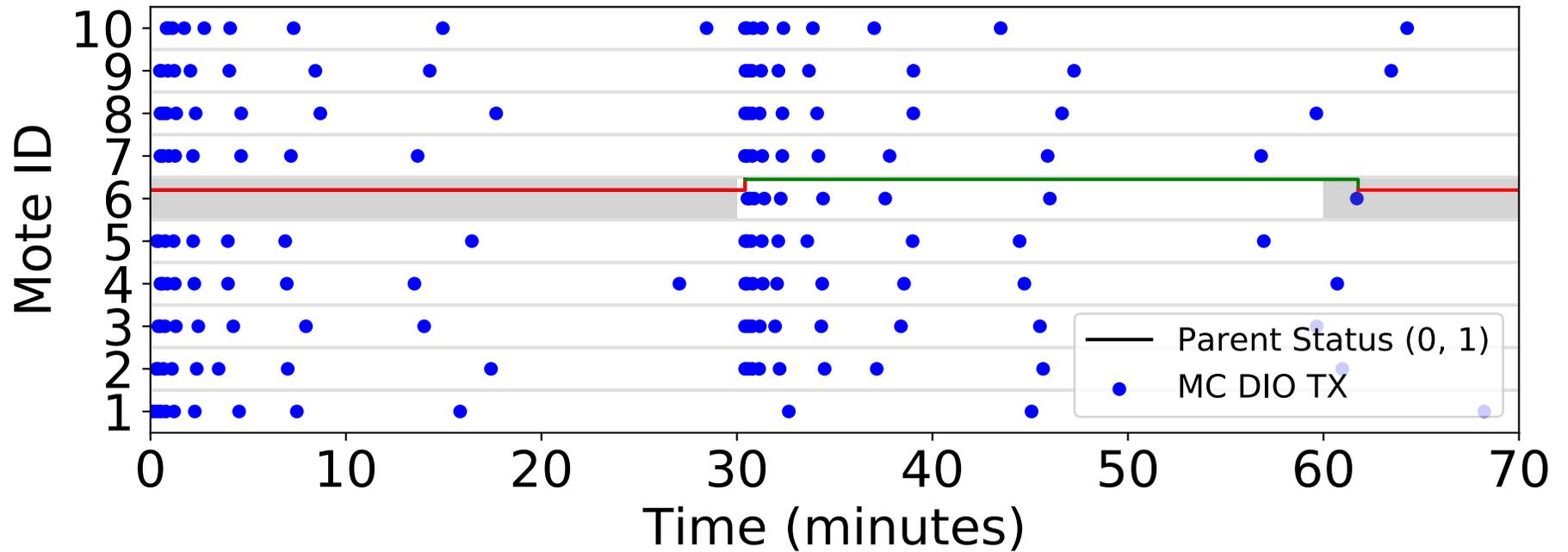
- Studied use case : node joining the DODAG
- Cooja – Contiki NG
- Network of 10 nodes in grid topology
- RPL
- 6TiSCH Minimal



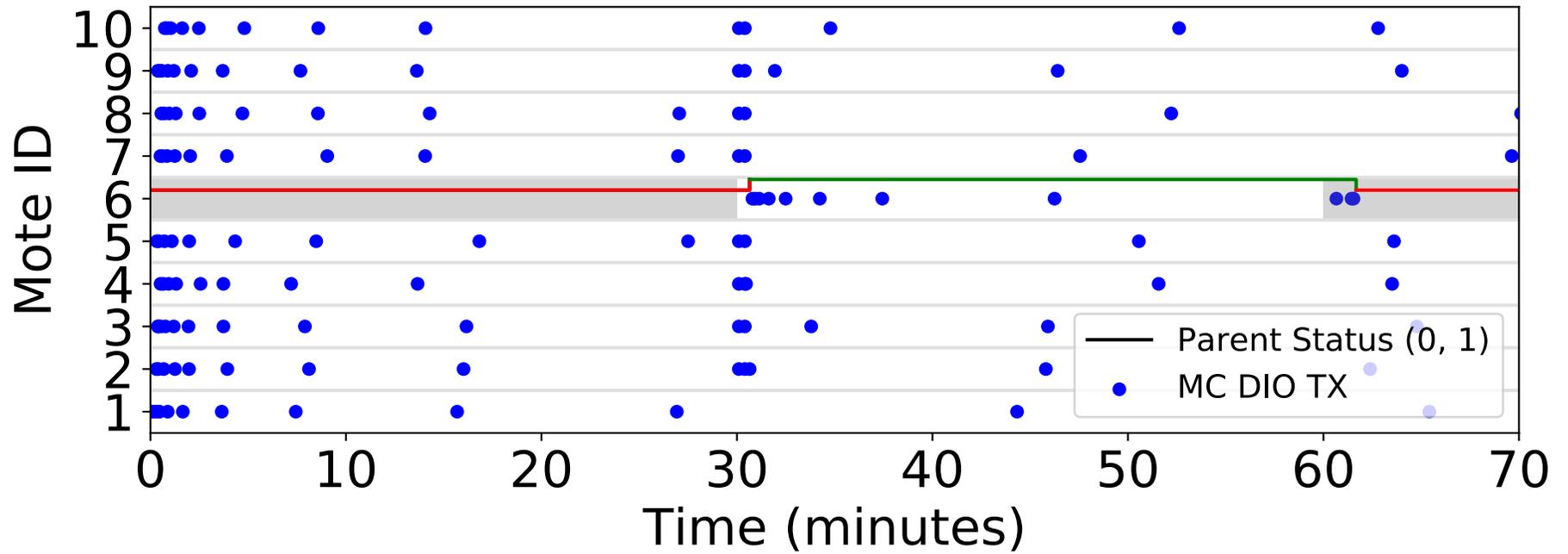
For more details :

D. Sourailidis, R.-A. Koutsiamanis, G. Z. Papadopoulos, D. Barthel and N. Montavont,  
"RFC 6550: On Minimizing the Control Plane Traffic of RPL-based Industrial Networks,"  
In Proc. IEEE DIPI Workshop 2020 - Cork, Ireland, September 2020

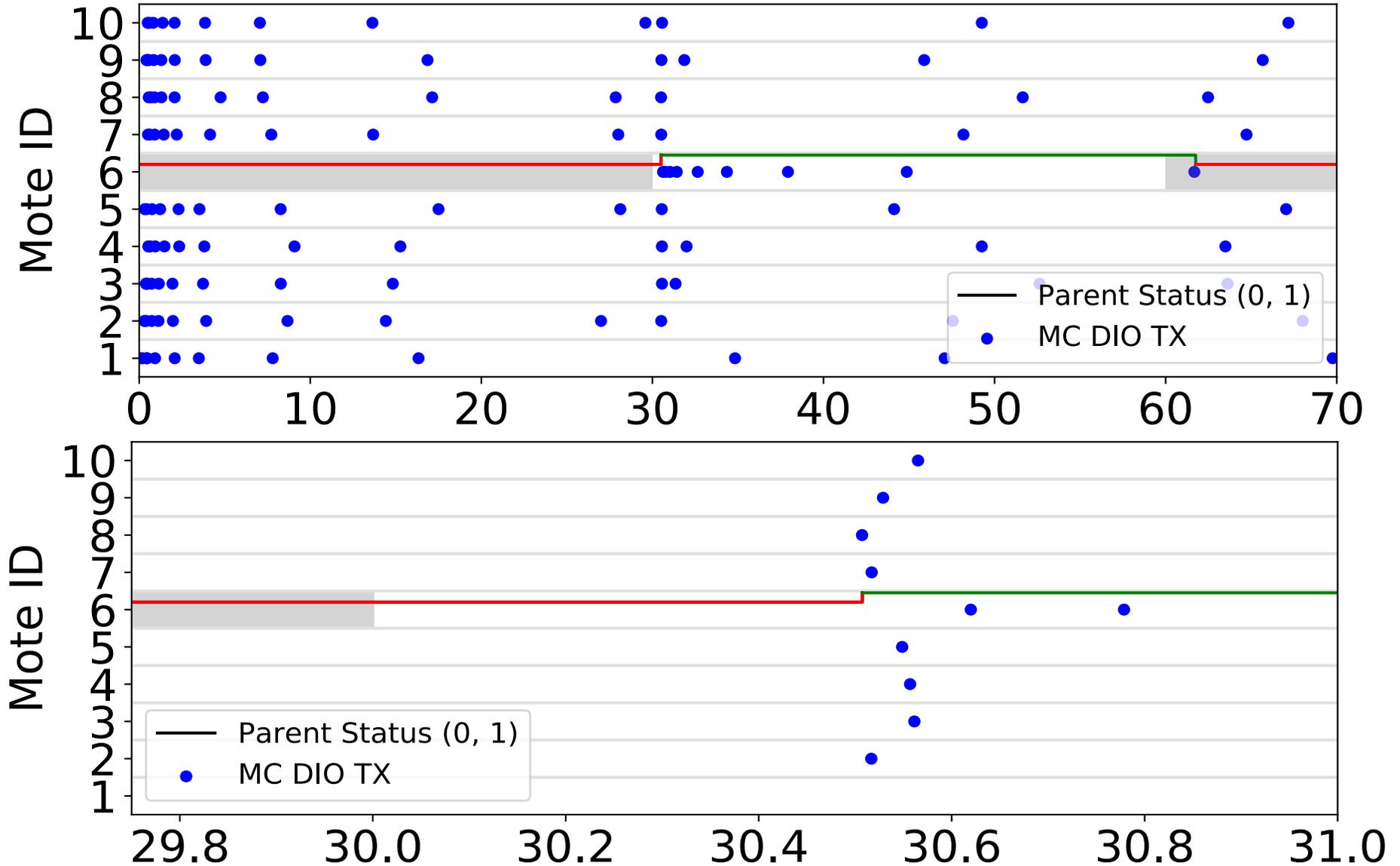
# No flags



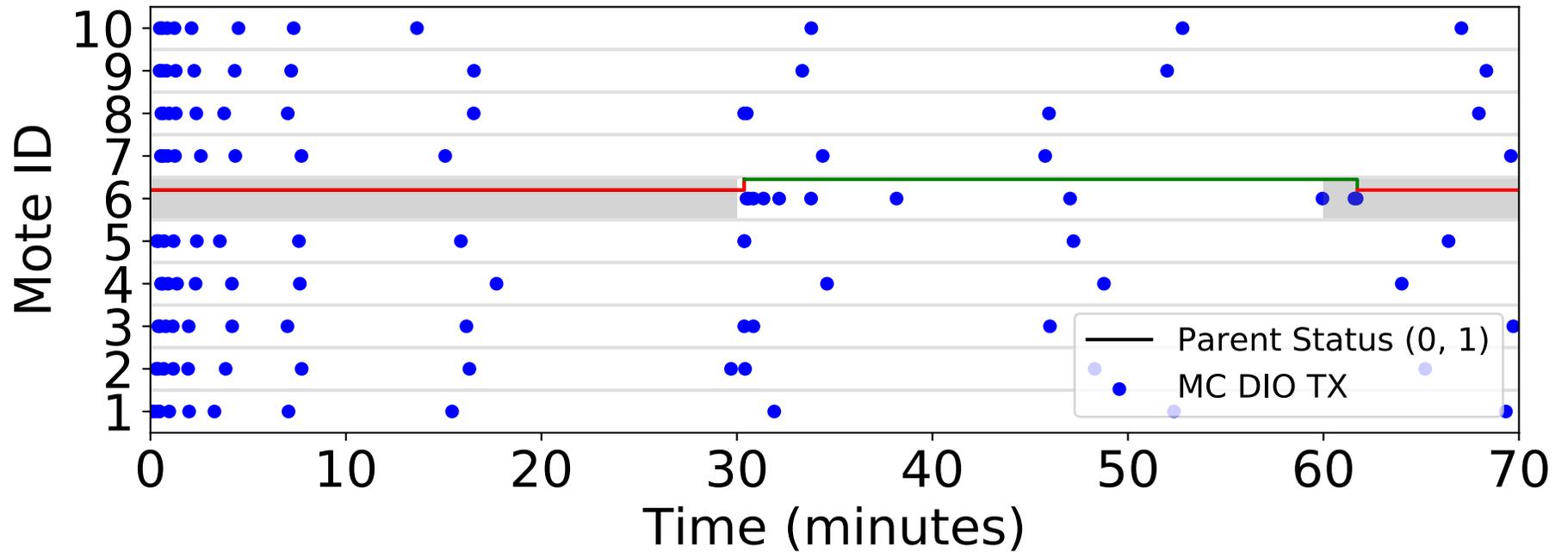
# N flag



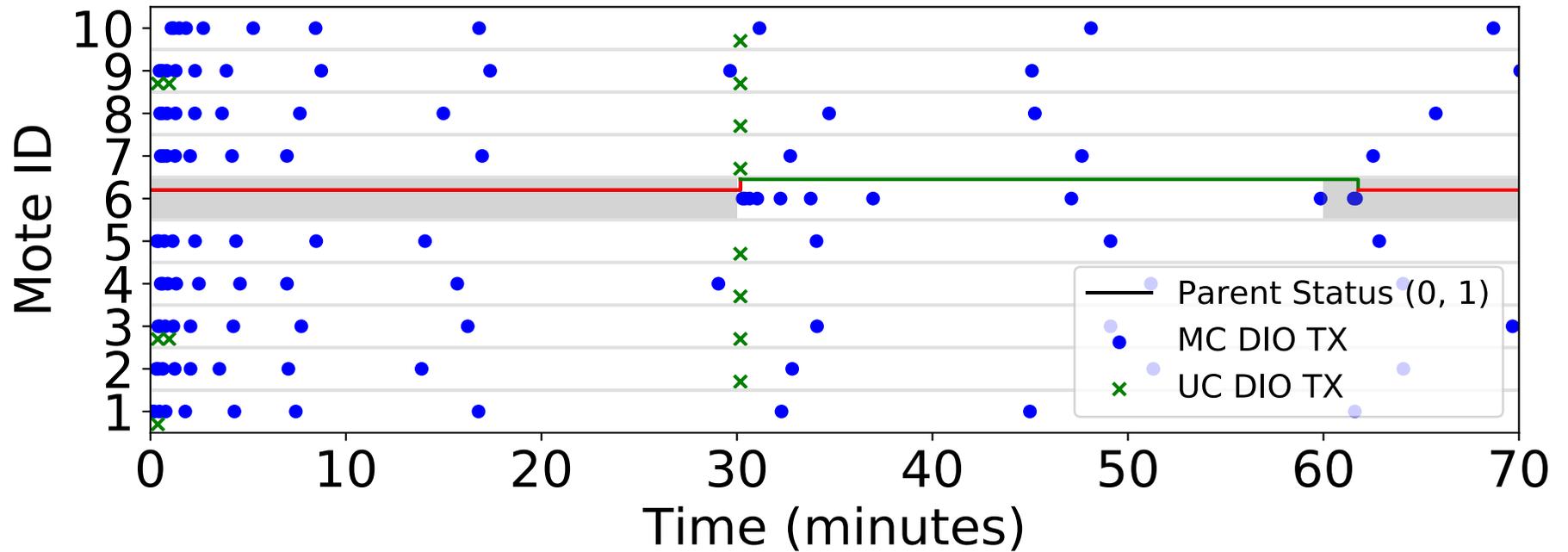
# N flag + RS (0 – 2 seconds)



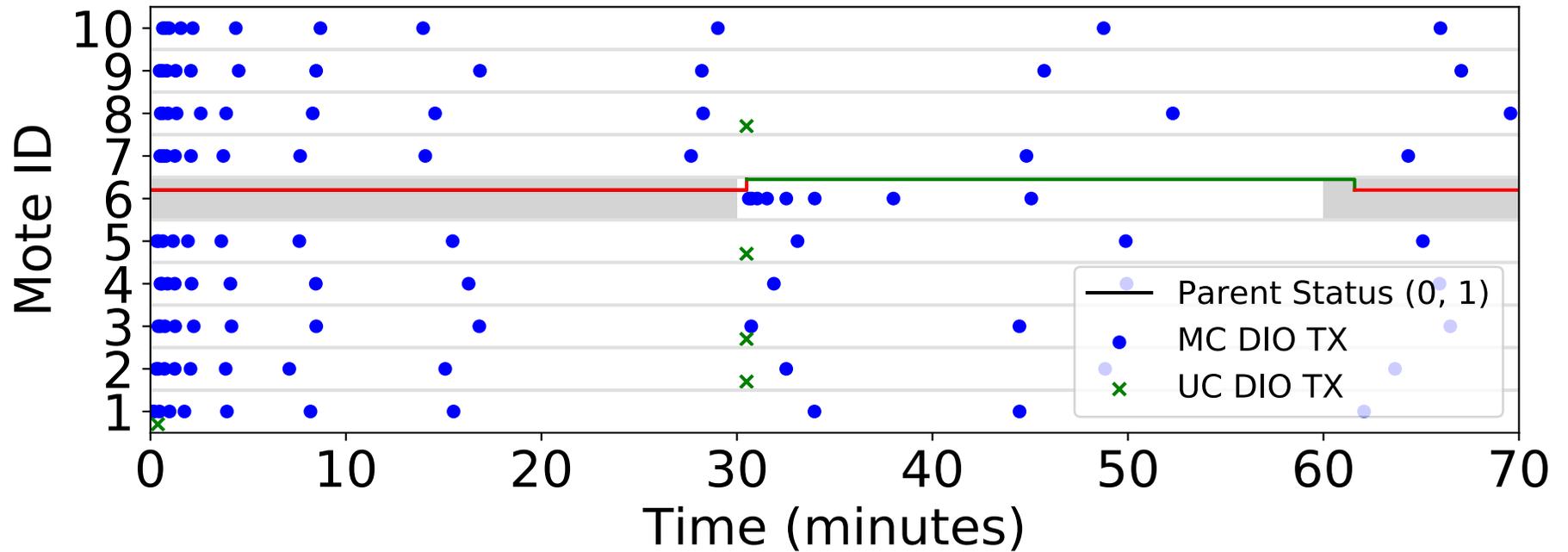
# N flag + RS + MC



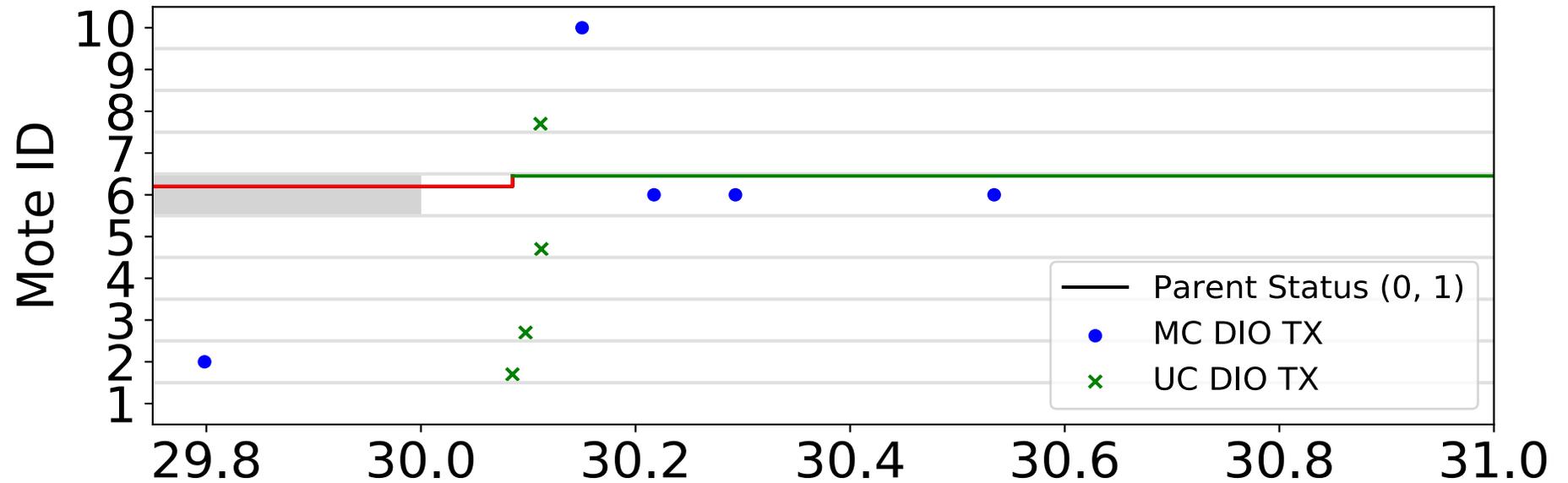
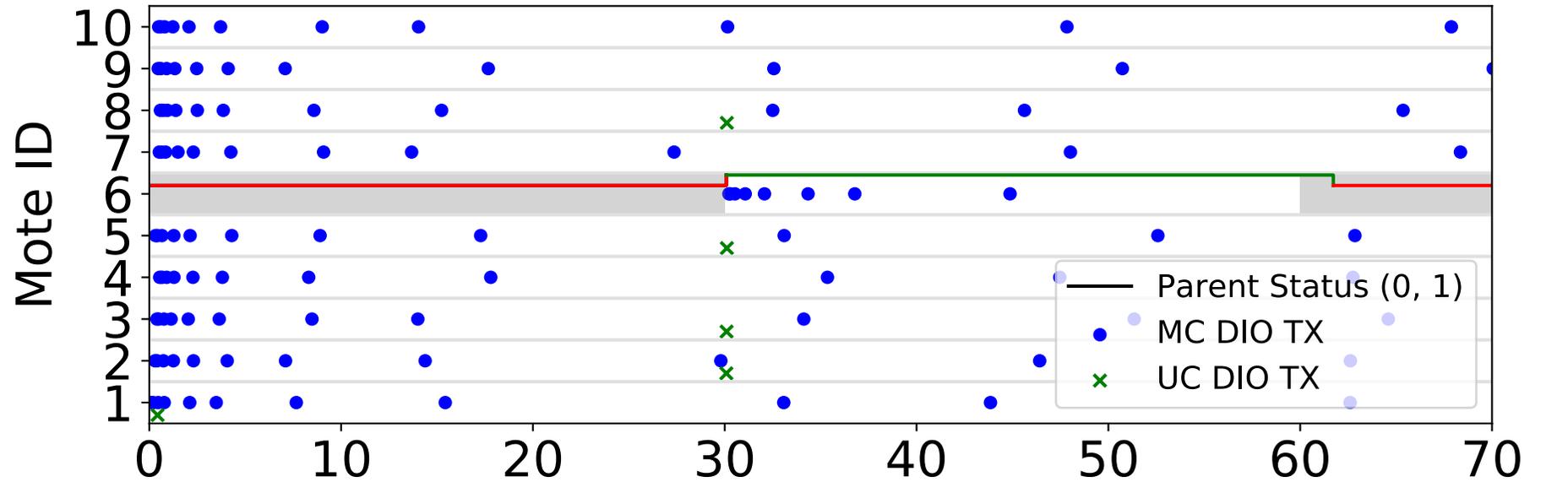
# N + T flags



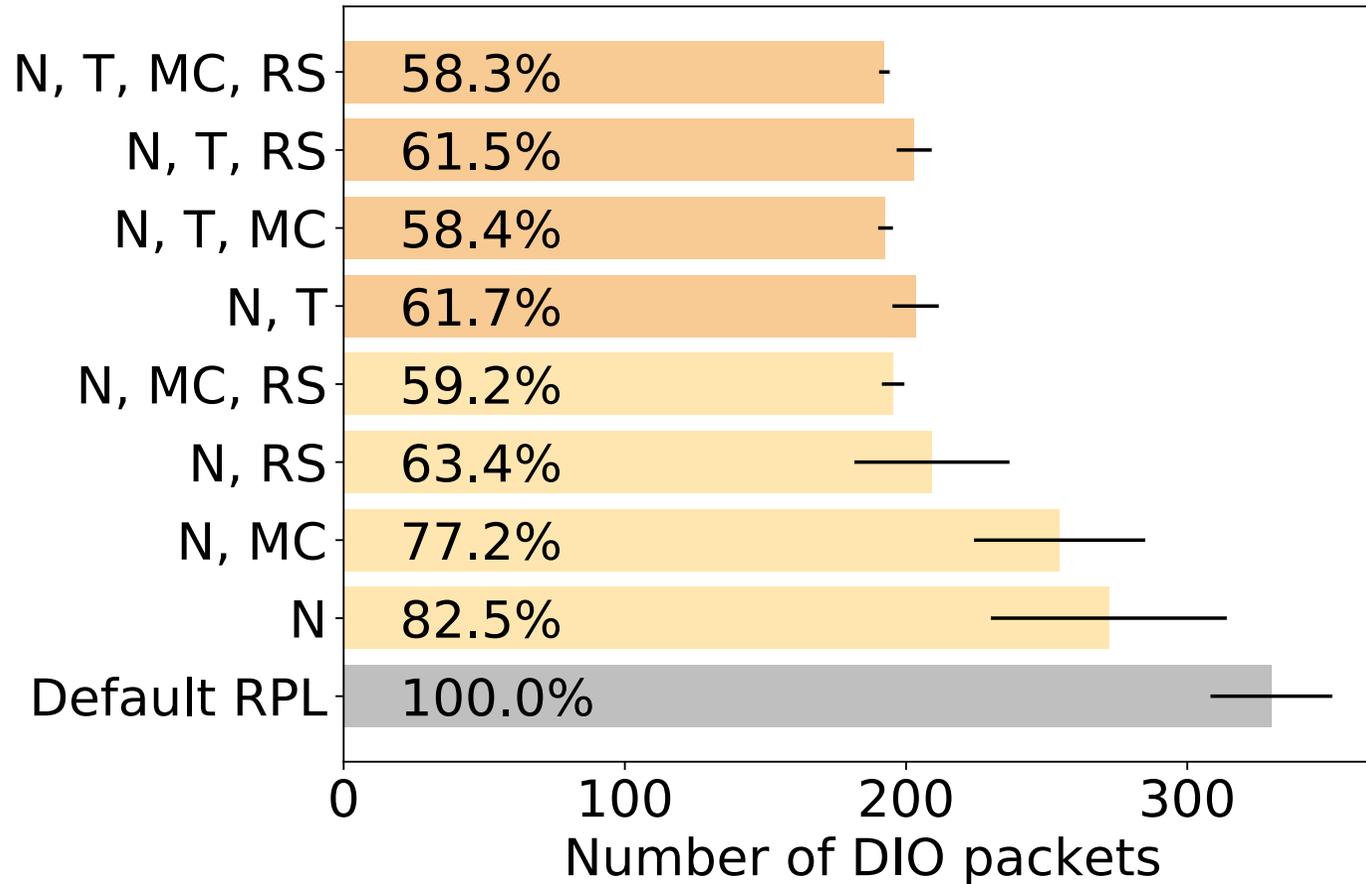
# N + T flags + MC



# N + T flags + MC + RS



# Summary



# Road Forward

- More Use Cases to be included in the draft?
  - TODO : the use case from Pascal needs to be included
- Opinions for the future of these drafts?
  - Move ahead as two separate drafts
  - Or to be included in the appendix of the solution draft?
- Regarding the solution draft :
  - draft-ietf-roll-dis-modifications-01
  - draft-thubert-roll-eliding-dio-information-04

**Thanks!**