• Use cases for DIS Modifications
draft-papadopoulos-roll-dis-mods-use-cases-00

• Actions based on DIS Modifications
draft-ietf-roll-dis-modifications-01

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Use Cases

• Node Joining DODAG
  o A smart meter being replaced in the field, while a RPL network is operating and stable.

• Identifying Defunct DODAG
  o 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
  o 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.
  o 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:
  o Multicast DIS and Trickle behavior (N and T flags)
  o Selectivity of multicast DIS messages (Metric Container)
  o Information carried by DIOs (R flag: Root, Prefix info)
  o 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·⋯·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

![Graph showing data points and time scale]

Dimensions: 780.0x540.0
N flag + RS (0 – 2 seconds)
N + T flags

![Graph showing N + T flags with Mote ID on the y-axis and Time (minutes) on the x-axis. The graph includes markers for Parent Status (0, 1), MC DIO TX, and UC DIO TX.]
N + T flags + MC + RS
Summary

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Number of DIO packets</th>
</tr>
</thead>
<tbody>
<tr>
<td>N, T, MC, RS</td>
<td>58.3%</td>
</tr>
<tr>
<td>N, T, RS</td>
<td>61.5%</td>
</tr>
<tr>
<td>N, T, MC</td>
<td>58.4%</td>
</tr>
<tr>
<td>N, T</td>
<td>61.7%</td>
</tr>
<tr>
<td>N, MC, RS</td>
<td>59.2%</td>
</tr>
<tr>
<td>N, RS</td>
<td>63.4%</td>
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<tr>
<td>N, MC</td>
<td>77.2%</td>
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<tr>
<td>N</td>
<td>82.5%</td>
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<tr>
<td>Default RPL</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Road Forward

• More Use Cases to be included in the draft?
  o TODO : the use case from Pascal needs to be included

• Opinions for the future of these drafts?
  o Move ahead as two separate drafts
  o Or to be included in the appendix of the solution draft?

• Regarding the solution draft :
  o draft-ietf-roll-dis-modifications-01
  o draft-thubert-roll-eliding-dio-information-04
Thanks!