

Loop Free DODAG Repair  
draft-guo-roll-loop-free-dodag-repair-00

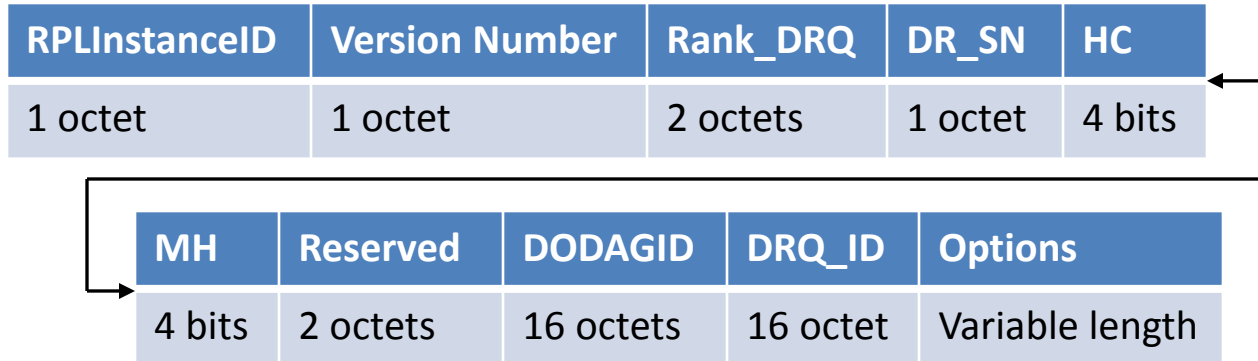
85<sup>th</sup> IETF Meeting  
November 4-9, 2012

Jianlin Guo  
Philip Orlik  
Ghulam Bhatti

# Motivation

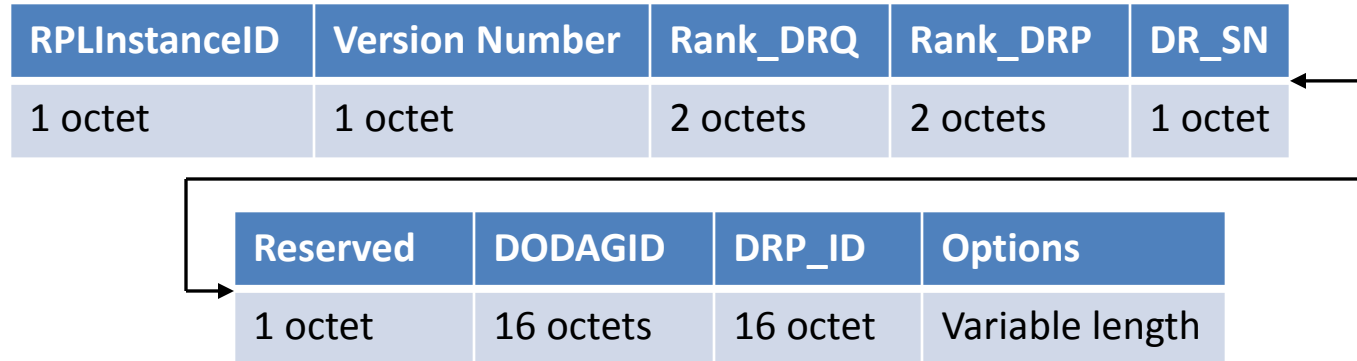
- IPv6 Routing Protocol for Low power and lossy networks (RPL)
  - A standardized routing protocol for low power and lossy networks (LLN)
  - A routing protocol designed for many applications
- Loop is an open issue in RPL
  - Occurs often
    - Refer to draft-clausen-lln-rpl-experiences-04
  - Cause of loop
    - Rank change increase in DODAG local repair
- Goal of this internet draft
  - Provide a loop free DODAG local repair mechanism via two new messages
    - DODAG Repair Request (DRQ)
    - DODAG Repair Reply (DRP)

# Format of DRQ Base Object



Description of new fields	
Rank_DRQ	Rank of node generating DRQ message
DR_SN	DODAG repair sequence number of DRQ message generator
HC	Hop count traveled by a DRQ message
MH	The maximum number of hops allowed for a DRQ message
DRQ_ID	IP address of DRQ message generator
Options	Pad1 and PadN Path: path traveled by a DRQ message, only present in non-storing mode

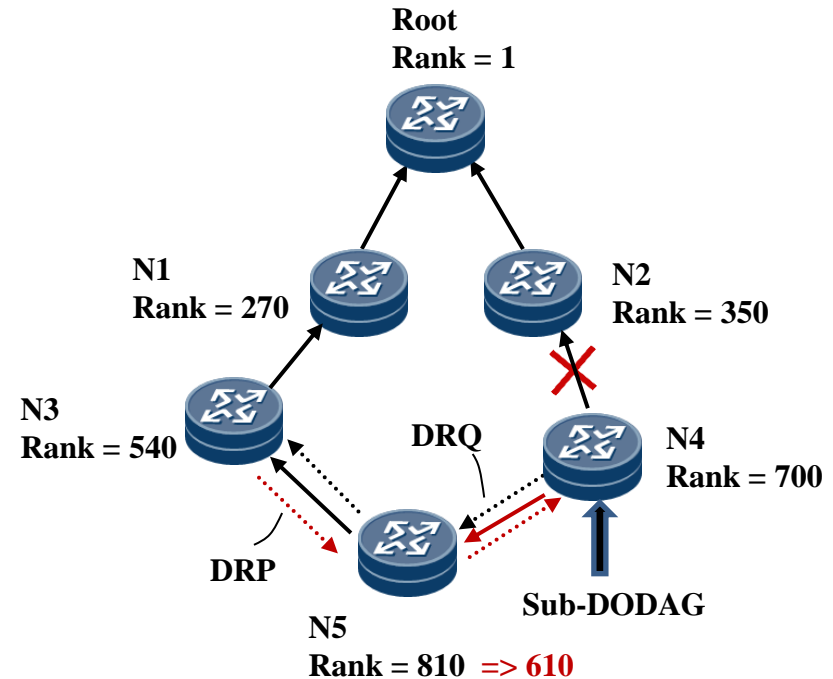
# Format of DRP Base Object



Description of new fields	
Rank_DRQ	Rank of node generated DRQ message
Rank_DRP	Rank of node transmitting DRP message
DR_SN	DODAG repair sequence number of DRQ message generator
DRP_ID	Destination address of DRP message, equal to DRQ_ID
Options	Pad1 and PadN Path: path to a DRP message destination, only present in non-storing mode

# DODAG Local Repair in Storing Mode

- To repair DODAG locally
  - Multicast a DRQ message
  - Wait for DRP message(s)
- Handling of DRQ message
  - If Rank  $\Rightarrow$  Rank\_DRQ
    - Record reverse route
    - Forward DRQ to a parent
  - If Rank < Rank\_DRQ
    - Generate a DRP message
    - Forward DRP to DRQ transmitter
- Handling of DRP message
  - Decrease rank if necessary
  - Update Rank\_DRP field of DRP
  - Forward DRP to next hop
- DODAG is locally repaired when a DRP message reaches DRQ message generator

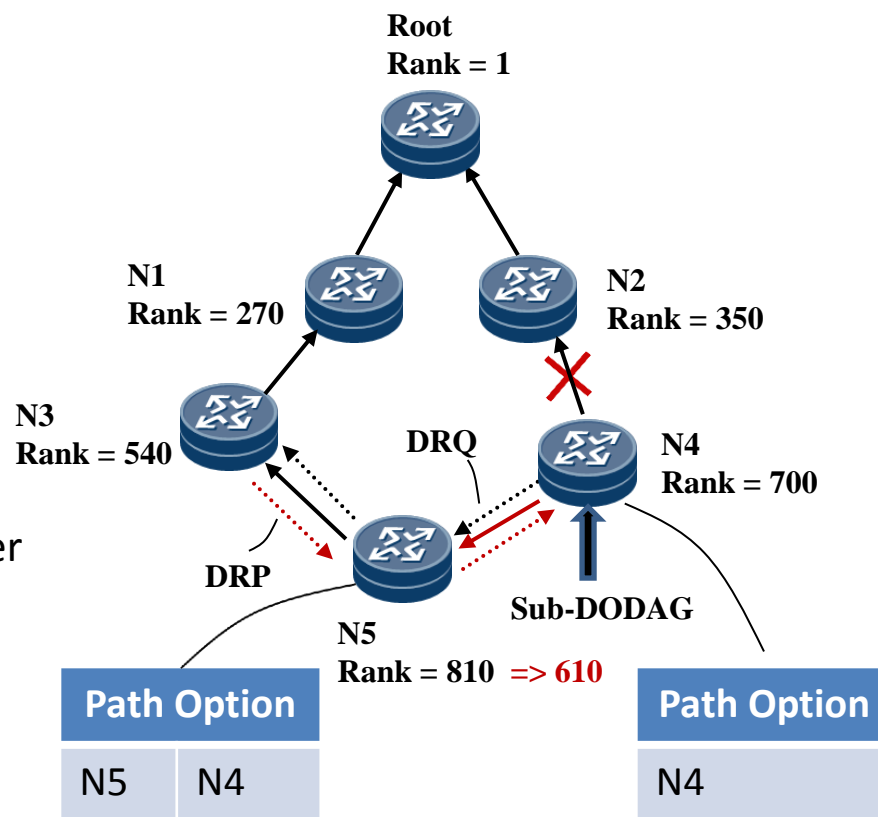


N5's routing table	
Destination: N4	Next hop: N4

N3's routing table	
Destination: N4	Next hop: N5

# DODAG Local Repair in Non-Storing Mode

- To repair DODAG locally
  - Multicast a DRQ message
  - Wait for DRP message(s)
- Handling of DRQ message
  - If Rank  $\Rightarrow$  Rank\_DRQ
    - Insert its ID into Path filed
    - Forward DRQ to a parent
  - If Rank < Rank\_DRQ
    - Generate a DRP message
    - Forward DRP to DRQ transmitter
- Handling of DRP message
  - Decrease rank if necessary
  - Update Rank\_DRP field of DRP
  - Forward DRP to next hop
- DODAG is locally repaired when a DRP message reaches DRQ message generator



# Next Step

- Welcome comments
- Adopt as WG document?