

# A Mechanism to Measure the Quality of a Point-to-point Route in a Low Power and Lossy Network

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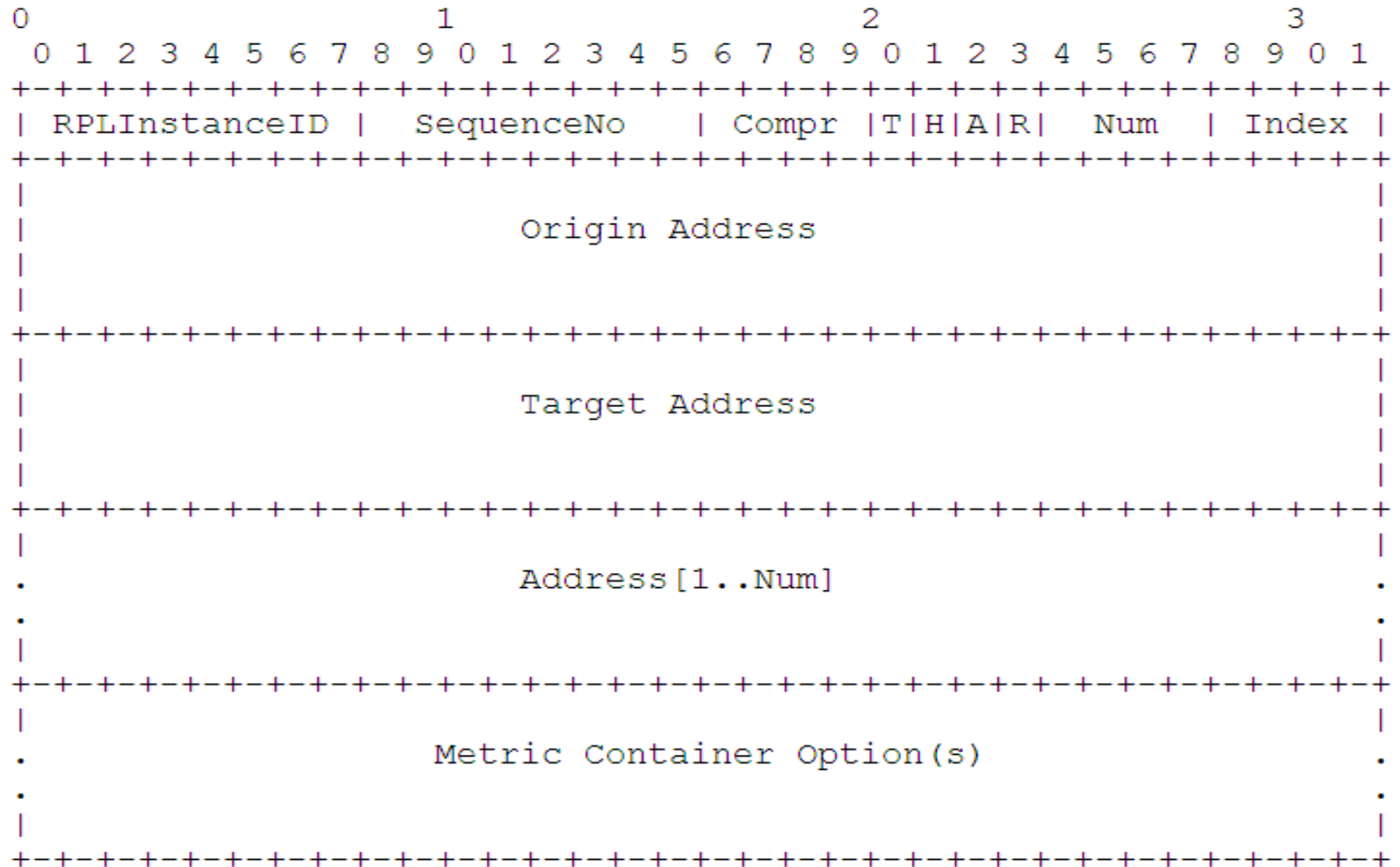
# Introduction

- When an existing route to a destination is not satisfactory, a router can use P2P-RPL mechanism to discover a better route.
- P2P-RPL route discovery requires the specification of routing constraints that the discovered route must satisfy.
- Thus, the router may need to determine the aggregated values of the routing metrics along the existing route and use this knowledge to frame reasonable routing constraints for use in P2P-RPL route discovery.
- The route to be measured can be a source route or a hop-by-hop route established using RPL or P2P-RPL.

# Functional Overview

- The origin sends a Measurement Request along the route to be measured.
- The Measurement Request accumulates the values of the routing metrics as it travels towards the target.
- Upon receiving the Measurement Request, the target unicasts a Measurement Reply, carrying the accumulated values of the routing metrics, back to the origin.

# The Measurement Object (MO)



# The Measurement Object

- Serves as both Measurement Request and Measurement Reply
- An MO consists of the following fields:
  - RPLInstanceID: Relevant only if the MO travels along a hop-by-hop route.
  - SequenceNo: Uniquely identifies a Measurement Request and the corresponding Measurement Reply.
  - Compr: Indicates the number of prefix octets that are elided from the IPv6 addresses in Origin/Target Address fields and the Address vector.
  - Type (T): Indicates whether the MO represents a Measurement Request or a Measurement Reply.
  - Hop-by-hop (H): Set if the MO travels along a hop-by-hop route identified by the RPLInstanceID and, if required, the Origin Address serving as the DODAGID.
    - In case the P2P route being measured lies along a non-storing DAG, an MO may travel along a hop-by-hop route till the DAG's root, which then sends it along a source route to its destination. In that case, the DAG root will reset the H flag and also insert the source route to the destination inside the Address vector.

# The Measurement Object

- Accumulate Route (A):
  - Relevant only if the MO is a Measurement Request that travels along a hop-by-hop route represented by a local RPLInstanceID.
  - Indicates if the Measurement Request MUST accumulate a source route for use by the target to send the Measurement Reply back to the origin.
- Reverse (R):
  - Relevant only if the MO is a Measurement Request that travels along a source route, specified in the Address vector.
  - Indicates if the Address vector contains a complete source route from the origin to the target, which can be used, after reversal, by the target to source route the Measurement Reply message back to the origin.
- Num:
  - Indicates the number of fields in the Address vector.
- Index:
  - If the Measurement Request is traveling along a source route , this field indicates the index in the Address vector of the next hop on the route.
  - If the Measurement Request is accumulating the reverse route, this field indicates the index in the Address vector where the next address must be stored.

# The Measurement Object

- Origin Address:
  - An IPv6 address of the origin. Also indicates the DODAGID if the MO travels on a P2P-RPL route. Compr number of prefix octets elided.
- Target Address:
  - An IPv6 address of the target after eliding Compr number of prefix octets.
- Address[1..Num]:
  - A vector of IPv6 addresses (with Compr number of prefix octets elided) representing a (partial) route from the origin to the target
- Metric Container Options:
  - An MO MUST contain one or more Metric Container options to accumulate routing metric values for the route being measured.