Route Information Options in Neighbor Discovery Messages

Fred L. Templin (fltemplin@acm.org)
James Woodyatt (jhw@google.com)

IETF100 6man Working Group

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Draft History

- Posted on 6man list 1/9/2017 as Draft -00
- List comments resulted in Draft -01 presented at IETF98 3/30/2017
- More comments resulted in Draft -03 presented at IETF99 7/17/2017
- Updates after IETF99 for Draft-05 (subject for this presentation)
- https://datatracker.ietf.org/doc/html/draft-templin-6man-rio-redirect

Motivation

- Very large shared links with many nodes on the link (e.g., NBMA)
- Support direct neighbor-to-neighbor communications at L3
- Need a route discovery mechanism on links where traditional routing protocols are impractical (e.g., due to scale)
- Solution – include route information in IPv6 ND messages

Route Information Options (RFC4191)

- Included in Router Advertisement (RA) messages
- Informs recipient of more-specific routes reachable via the router
- RFC4191 identifies 3 types of hosts (Type A, B, C):
  - Type A and B both ignore RIOs
  - Type C processes RIOs in RA messages only
- This document introduces a new **Type “D”** host
  - same behavior as Type "C", **but also process RIOs in other IPv6 ND messages**
  - **Especially useful for hosts that receive prefix delegations for tethering or multi-addressing purposes (‘draft-templin-v6ops-pdhost’, RFC7934)**

New in -05: RFC4191 Update

- Draft updates RFC4191 to include RIOs in any IPv6 ND message
- Also updates RFC4191 to include “Solicit (S)” bit in RIO header
- Nodes include RIOs in NS/RS with S=1 to **SOLICIT** routes
- Nodes include RIOs in NS/RS/NA/RA with S=0 to **ASSERT** routes
- Routers include RIOs in Redirects with S=0 to **REFER** to other routers
  - Backward compatible:
    - Type ‘A’ and ‘B’ hosts ignore RIOs in all IPv6 ND messages as they always have
    - Type ‘C’ hosts process RIOs in RAs (while ignoring the S bit) and ignore RIOs in all other IPv6 ND messages as they always have
    - Type ‘D’ hosts process RIOs in all IPv6 ND messages and honor the S bit as above

Use Cases

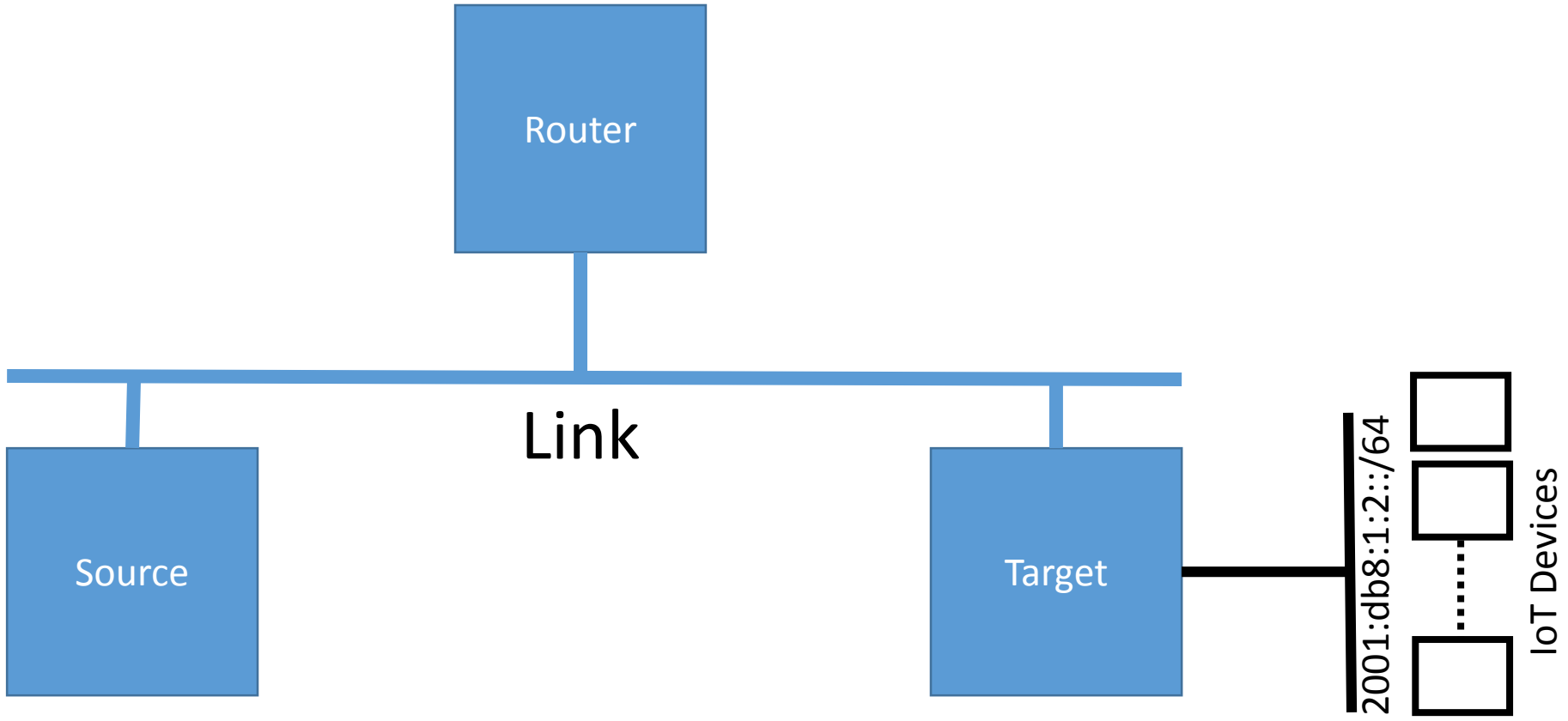
- IETF conference, airport, hotel WiFi networks with large numbers of nodes that receive prefix delegations
- Enterprise mobile devices (e.g., cell phones, tablets, etc.) that connect to the enterprise via VPNs
- Aeronautical communications (e.g., airplanes, air traffic control, etc.)
- Unmanned Air System (UAS) networks (vehicle to vehicle)
- Home networks with multiple subnets [HOMENET]

Next Steps

- 6man WG item?

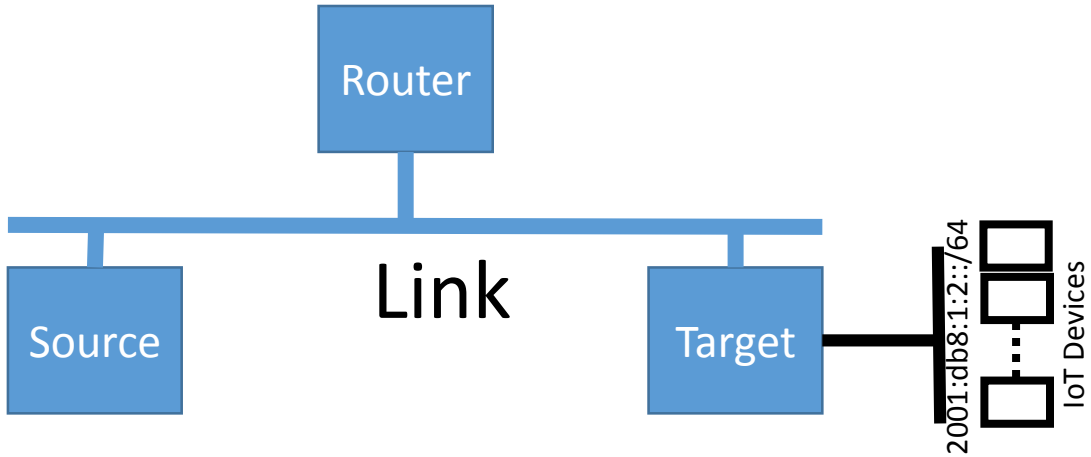
Backups

Common Redirection Scenario (RFC4861)



RIO Redirection Scenario

- Source sends packet toward destination via Router
- Router forwards packet to Target, and also sends Redirect to Source
- Redirect contains:
  - Target Address set to target addr
  - TLLAO with target link-layer
  - **RIO w/prefix 2001:db8:1:2::/64**



Testing the Path with NS/NA

- **After Redirection, continue to send data packets via Router until direct path is tested**
- To test path, **Source sends NS with desired RIOs directly to Target**
- **Target sends NA back to source with RIOs that match the ones it received in the NS**
- Source populates its routing table based on NA RIOs and **allows future packets to flow directly to Target without involving Router**