Route Information Options in Neighbor Discovery Messages

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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)
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:
  o Type ‘A’ and ‘B’ hosts ignore RIOs in all IPv6 ND messages as they always have
  o 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
  o 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**