Gratuitous Neighbor Discovery. Creating Neighbor Cache Entries on First-Hop Routers

draft-ietf-6man-grand-00

Jen Linkova
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Quick Recap

Problem: a host start sending traffic, the return flows arrive to the router, no neighbor cache entry, packets dropped until address resolution completes.

Solution:

- Hosts advertise their addresses by sending unsolicited NAs
- Routers create STALE entries
Changes since IETF106
Gratuitous NA Destination Address

More clarifying text on why to send to ‘all routers’ ff02::2

- Covers the asymmetric traffic case
- No increase in multicast level:
  - unsolicited NA instead of multicast NSes
  - MLD snooping helps too
Gratuitous NA Destination Address

- Shall hosts use RFC6085: map ff02::2 to unicast MAC?
  - Would not solve asymmetric routing case
  - Hosts need to know all routers MACs
Avoiding Disruption
(Duplicated Addresses)
Unsolicited NA Received for INCOMPLETE Entry

1. “Rightful” owner (host A) joins the network, sends packets.
2. Return traffic arrives to the router.
3. Another host (host B) assigns the same address.

Would unsolicited NA introduce disruption?
Host A sends traffic from IP_A

Router receives packets to IP_A

R. sends mcast NS

IP_A: INCOMPLETE

NA (S=1, 0=1) received from A

IP_A - MAC_A REACHABLE

Traffic to A dropped

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Host A sends traffic from IP_A

Router receives packets to IP_A

R. sends mcast NS

Host B gets Optimistic IP_A

NA (O=0) from B

IP_A: INCOMPLETE

IP_A <> MAC_B STALE

IP_A - MAC_A REACHABLE

Traffic to A dropped

With ietf-6man-grand

NA (S=1, 0=1) received from A
Unsolicited NA Received for INCOMPLETE Entry

Q: Would unsolicited NA introduce disruption?

A: No, in both cases traffic restored as soon as the legitimate owner responds with NA.
Unsolicited NA Received, no Entry

1. “Rightful” owner (host A) joins the network, sends packets.
2. Another host (host B) assigns the same optimistic address and sends an unsolicited NA.
3. Return traffic arrives to the router

Would unsolicited NA introduce disruption?
Host B configures Optimistic IP_A

Host A sends from IP_A

Router receives packets to IP_A Sends mcast NS

NA (S=1, 0=0) received from B

IP_A: INCOMPLETE

NA (S=1, 0=1) received from A

IP_A - MAC_A REACHABLE

W/o ietf-6man-grand

Traffic to A dropped
Host B configures Optimistic IP_A

Host A sends from IP_A

Router receives packets to IP_A

R. sends unicast NS

R. sends mcast NS

NA (S=1, 0=1) from A

IP_A - MAC_A

REACHABLE

NA (S=0) from B

DAD fails

STALE

DELAY

PROBE

Traffic to A dropped
Unsolicited NA Received, no Entry

Max. additional impact on the rightful owner:

\[
\text{DELAY\_FIRST\_PROBE\_TIME} + \text{MAX\_UNICAST\_SOLICIT} \times \text{RETRANS\_TIMER}
\]

Default: 8 secs

Conditions: The owner hasn’t been receiving traffic when the duplicated address is assigned to another host.
Questions to the Audience

Is the corner case bad enough?

Do routers use data plane flows to move from DELAY to REACHABLE?
QUESTIONS?

COMMENTS?