IPv6 Changes in Mobile IPv6 from Connectathon

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Overview of Recent Changes

I submitted ***draft-ietf-mobileip-ipv6-10.txt*** on February 10:

- Issues raised at last IETF meeting (Washington, DC)
- Some issues raised on mailing list and private email

I submitted ***draft-ietf-mobileip-ipv6-11.txt*** on March 10:

- Issues raised by implementors at Mobile IPv6 interoperability testing at ***Connectathon 2000*** that week
- A few more issues raised on mailing list and private email

Areas of changes since last IETF meeting:

- IPsec processing
- ***Duplicate Address Detection***
- ***Movement detection***
- ***Dynamic Home Agent Address Discovery***
- Miscellaneous

Duplicate Address Detection for Home Address

While away from home:

- Needed, for example, when home subnet renumbers
- Added a Duplicate Address Detection (D) bit in the Binding Update
- Requests mobile node's home agent to perform DAD on the mobile node's home link for the home address in this binding
- Home agent performs DAD before returning the Binding Acknowledgement
- Returns new Status value of 138 (Duplicate Address Detection failed) in Binding Acknowledgement, if failure
- Mobile node knows it needs to wait extra time for the Binding Acknowledgement if it sets the D bit in Binding Update
- Mobile node uses same procedures/algorithms for use of DAD as if it were at home

Duplicate Address Detection for Home Address

When returning home:

- Mobile node needs to send a Binding Update to its home agent
- But home agent is defending mobile node's home address for DAD
- Home agent also is set to tunnel home address to care-of address
- Mobile node may already know home agent link-layer address, for example from Router Advertisements
- If Neighbor Solicitation is needed, must set Solicitation source address to the ***unspecified address***
- Alternative is to send Binding Update to MAC address corresponding to ***solicited-node multicast address*** for its home agent
- Mobile node must not perform DAD on its own home address

Performing DAD for Care-of Addresses

IPv6 says perform DAD before assigning a new address:

- Defined in RFC 2462 (IPv6 Stateless Address Autoconfiguration)
- Used for all addresses, whether stateless or stateful
- For stateless, can test only link-local address if all others use the same interface identifier

Problem for Mobile IPv6:

- Mobile node would need to perform DAD for each new care-of address, ***each time it moves!***
- DAD takes a “long” time:
  - Mobile node sends DupAddrDetectTransmits (default: 1) Neighbor Solicitations, each separated by RetransTimer (default: 1 second)
  - If first message to be sent from an interface after interface (re)initialization, should random delay between 0 and MAX_RTR_SOLICITATION_DELAY (1 second)

Can We Avoid This?

Is DAD for each address really required?

- RFC 2462 is ambiguous and contradictory on this
- “Duplicate Address Detection MUST take place on all unicast addresses, regardless of whether they are obtained through stateful, stateless or manual configuration”
- “For safety, all addresses must be tested for uniqueness prior to their assignment to an interface”
- “Each individual unicast address SHOULD be tested for uniqueness”

Can we optimize the use of DAD in any way?

- For example, random delay for MAX_RTR_SOLICITATION_DELAY should be safe to skip
- Designed to randomize many hosts all booting at the same time
- But in a foreign network, we aren’t booting
- Also, can we perform DAD in parallel with normal use?

Movement Detection for Mobile Nodes

Mobile node's must be able to detect when they move:

- For example, wireless movement out of range of access point
- Need to detect this and configure a new care-of address from some new router from which you hear Router Advertisements
- Defined mechanism is deliberately flexible, to allow choice by implementors
- But an incorrect implementation at Connectathon made us think more about the defined mechanism

Planning to define a more specific movement detection mechanism:

- Want something that allows quick movement detection
- Want something that works with non-mobile-aware local routers
- Need to detect new and missed Router Advertisements, plus expiration of Default Router List and Prefix List entries
- But its hard to know when you've missed a Router Advertisement
- Can also supplement with lower layer information on some links

Dynamic Home Agent Address Discovery

Originally specified use of anycast Binding Update is awkward:

- All Binding Updates must be authenticated
- But this one can't be, since destination is anycast address
- And it really is very different than normal Binding Update processing

New mechanism defined in version 11 of draft:

- Mobile node sends ***ICMP Home Agent Address Discovery Request*** to home agent anycast group
- Some home agent on home link responds with ***ICMP Home Agent Address Discovery Reply***
- Reply contains ordered list of home agents
- Removed Home Agents List Sub-Option definition and Binding Acknowledgement option Status value of 135 (dynamic home agent address discovery response)
- Still need ICMP type code assignments from IANA (I've requested them)