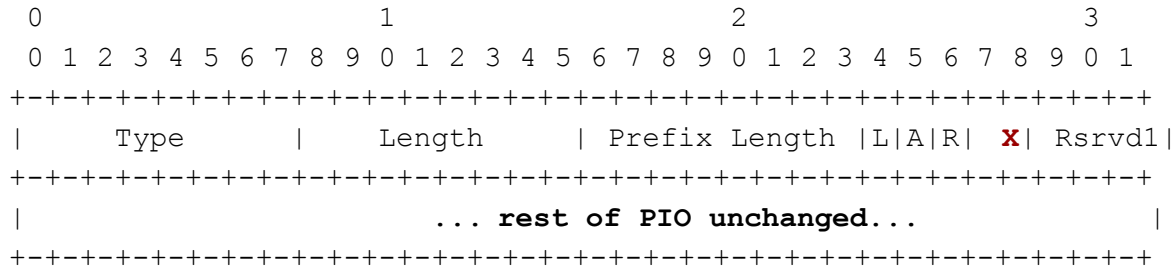# PIO eXclusive flag

ID draft-pioxfolks-6man-pio-exclusive-bit
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IETF 98

A brief reminder

Motivation

- ID-draft-ietf-v6ops-unique-ipv6-prefix-per-host proposes /64 per host
  - Same as 3GPP (RFC 7066)

- Advantages:
  - link-layer client isolation (security)
  - solves {link-layer, IP} pair state explosion (better scaling)
- If the client knew about this deployment model then:
  - DAD is not necessary
  - Multicast DNS may not be necessary
  - could creatively use all 2**64 addresses (RFC 7934) knowing it won't adversely impact the infrastructure

The proposal

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |     Type      |     Length     | Prefix Length |L|A|R| X| Rsrvd1|
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
 |                    ... rest of PIO unchanged...               |
 +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

- Allocate new bit in the PIO header to indicate to the host that it has exclusive use of the prefix
  - "X bit", "PIO-X" abbreviation used throughout the document
- Backwards compatible with non- PIO X flag aware hosts
  - they will perform DAD for GUAs, but no other node will answer

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Changes from -01

- Replace complicated, brittle host validation of an RA w/ PIO and X flag set with a more straightforward applicability statement.
  - PIO X flag is a feature that the infrastructure can offer clients on architectures that guarantee delivery to a single node.
- Updated flag location after finding the "R" flag ([RFC 6275 section-7.2](#)).
- Clarify that the router MUST NOT configure any addresses for itself from the host's exclusive use prefix.
- Clarify difference in semantics with DHCPv6 PD.

modified IETF 97 (Seoul) slides

Host changes

- X flag overrides L and A flags in the RA:
  - L=0
  - A=1
- If R=1 then ignore X flag
- DAD and ND for addresses within this prefix not performed
- Any (almost) use of the prefix is permitted
  - subject to valid use times
  - MUST NOT send RAs for subprefixes via the receiving interface
- Other behavior unchanged:
  - source address selection
  - next hop router determination

Router behavior

- MUST maintain {PIO-X, client} binding state
    - similar state maintenance requirements as DHCPv6 PD
- MUST NOT advertise the same or overlapping prefixes to multiple clients
- MUST NOT allocate for itself any addresses from PIO-X prefixes
- Deployment model best with assistance from the link-layer:
    - that client isolation is being enforced
    - timely detection of loss of client

Raised issues

- Persistent state in the router (what to do after reboot)
  - similar to DHCPv6 PD state issues
- What to do if device changes MAC address (perhaps for privacy reasons)
- Is the state machine correct as described in the draft?
- Considerations:
  - SAVI (Source Address Verification Improvements) devices?
  - DNA (Detecting Network Attachment) for IPv6

Future work

- Create PoC implementations in router and host
- Test state machine in router, try to find corner cases
- Test common host implementations: how do they react to X bit set?
- Guidance based on operational experience, once accumulated

Lastly...

- Questions
- Comments
- Any working group interest?