Unique IPv4-Mapped Addresses
draft-thaler-6man-unique-v4mapped-00.txt

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AF_INET6 sockets

- Dual-IP-version Application
- Transport Layer
- Stateless Translation
- Name Resolution (DNS, etc)

- IPv6 addresses (::ffff:a.b.c.d)
- IPv4 addresses (a.b.c.d)

- Uses well-known IPv6 prefix (::ffff:0:0/96), LIR IPv4 prefix
- Name resolution synthesizes IPv6 addresses only if IPv4-only response
IPv4-Mapped Addresses

- `::FFFF:x.y.z.w` defined in IPv6 address architecture to hold IPv4 addresses
  - Used in APIs (e.g., RFC 3493, RFC 3542), e.g. to allow IP-version-agnostic apps to use same socket for both IPv4 and IPv6
- As implemented, addresses with this prefix tell TCP/IP to convert address to IPv4 and send to the IPv4 stack
- Supports all IPv4 addresses: global IPv4, RFC 1918 addresses, and link-local IPv4 (RFC 3927)
Scenario

• Non-global IPv4 addresses are ambiguous when you’re multihomed
  – This will become much more common as IPv4 depletion progresses
  – Ambiguity in IPv4 never worked in IPv4 APIs before
• We already went through the IPv6 equivalent in the site-locals discussion
  – IPv6 APIs provide a scope ID, and so do IPv4-mapped addresses
  – So you might think “Hey, this provides an incentive for apps to change to use IPv6-capable APIs even for IPv4 destinations!”
  – But you’d be wrong, at least today...
Problems with IPv4-Mapped Addr

• RFC 3484 requires IPv4-mapped addrs to be treated as globals (hence 0 scope id)
• Even if it were non-zero, same scope id problems arise that led to deprecation of site-locals
• Solution for site-locals was to deprecate and replace with Unique Local Addresses:
  – Embed the network id in the address, not the scope id
Unique IPv4-Mapped Addrs

<table>
<thead>
<tr>
<th>40 bits</th>
<th>40 bits</th>
<th>16 bits</th>
<th>32 bits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well-Known Prefix</td>
<td>Global ID</td>
<td>Comp.</td>
<td>IPv4 address</td>
</tr>
</tbody>
</table>

0:0:FF00::/40

Same as for ULAs

Checksum compensation (to get checksum neutrality like old IPv4-Mapped prefix)
Not yet covered in doc

• Impact on APIs that deal with IPv4-mapped addresses today

• Feedback/questions from 6man:
  – How generate Global ID if you don’t have a ULA
  – What happens if an address leaks to another host