Identifier Locator
Addressing with IPv6
(Presenting in LISP WG)
draft-herbert-nvo3-ila-04
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Overview

- ID/locator split without encapsulation
- Split IPv6 address into two parts
  - Locator: “where” of an entity
  - Identifier: “who” of the entity
- Applications see identifier (SIR) addresses
- How to send
  - Lookup identifier in hash table
  - Overwrite SIR prefix with found locator
  - Csum neutral translation to keep L4 csums correct
Address split

- **Locator**
  - 64 bits identifier of physical hosts
  - Routable
  - Not used as connection endpoint

- **Identifier**
  - 64 bit logical endpoint address of virtual node
  - Routable to an translator (NVE)
  - Used as connection endpoint
  - Typed to allow different modes
Flow example

1) Destination: 3333::1
2) Destination: 2222:1::1
3) ILA redirect 3333::1->2222:1::1
4) Send directly to destination 2222:1::1

ILA router/NVE

Source

Application send to 3333::1 (e.g. from DNS)

Destination Loc: 2222:1::1

Translate 2222:1::1 to 3333::1, app receives from 3333::1
Checksum neutral mapping

- Like RFC6296
- Good csum on wire without needing to access L4 headers
- Use low order 16 bits in identifier as a checksum adjustment value (SIR->ILA)
  - csum-adjust += csum_diff(SIR-prefix - locator)
- Reverse operation going ILA->SIR
## ILA use cases

<table>
<thead>
<tr>
<th>USE CASE</th>
<th>DESCRIPTION</th>
<th>SCALING # NODES</th>
<th>RATE/SEC OF MAP UPDATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC task virtualization*</td>
<td>Assign every task an IP address</td>
<td>10’s of millions</td>
<td>1000’s</td>
</tr>
<tr>
<td>DC virtualization</td>
<td>Assign “everything” and IP address</td>
<td>Up to 10’s of billions</td>
<td>Millions</td>
</tr>
<tr>
<td>Multi tenant virtualization</td>
<td>VNID + Vaddr (VMs)</td>
<td>10’s of millions</td>
<td>1000’s</td>
</tr>
<tr>
<td>5G mobility</td>
<td>Every UE has identifier</td>
<td>Billions maybe more</td>
<td>Millions</td>
</tr>
</tbody>
</table>

* Currently being deployed
Advantages of ILA

- Not encapsulation
  - No on the wire overhead
  - No MTU, UDP checksum, or other tunneling issues

- No changes to transport layer
  - Checksum neutral translation
  - Application, DNS only deal with untranslated globally router addresses

- Open source implementation
  - Linux host side implementation
  - ILA router in XDP, VPP
Challenges for ILA

- ICMP
  - Hosts can get ICMP errors for packets with ILA destinations
  - If host is ILA-aware attempt reverse translation there
  - If ILA router is in return path of ICMP error, reverse there as in NAT (RFC5508)

- Multicast
  - Can’t modify destination, modifying source address would be problematic at non-ILA receiver
  - Conclusion: ILA not appropriate with multicast
Status

- Asking int-area to take up draft as WG item
- Deploying for task virtualization @FB
- ILA router development
  - BPF/XDP program
  - Control plane
  - BGP initially
  - Resolution/redirect protocol for ILA hosts
  - IDEAS
Relationship to LISP

● Possibly complementary, logically a compressed LISP?
● Control plane (identifier to locator mappings) seem like something to be common
  ○ Is LISP control plane extensible
  ○ How does this relates to IDEAS
Thank you!