Problem statement on address resolution in VM migration

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Assumption for VM migration

- Same MAC and IP address
- Service provided by VM should not be interrupted.
Problems on address resolution in VM migration

- No signaling message to indicate VM having left server
  - No “ARP leave” message to make other nodes forget the learned address/port
  - Blackhole before entry ageing.
    - Keepalive?
    - De-registration?
    - Management plane (like vCenter) knows vm is migrating. Can it inform network management system?
- Uncertainty of signaling message after VM starts to operate at new location
  - gratuitous ARP request, gratuitous ARP reply, reverse ARP
  - Different implementation to handle different ARP type, result may not be always as we expected (see next slide)
- Difficulty of traffic redirection after migration
  - all switches in the network should be able to correctly send the frame to VM’s new location
  - Redirect packet in cache at old location to new location may be needed?
- Different optimization methods
  - How to tell it is a new VM or migrated one? Blind flooding or optimized multicast?
Examples for VM migration

### Diagram:

- **Default GW**
  - STP root
  - g0/0/1

- **ToR1**
  - 192.168.10.11
  - g0/0/3

- **ToR2**
  - 192.168.10.12
  - g0/0/4

- **Hic1**

- **Server-1**
  - (192.168.10.101)

- **Hic2**

- **Server-2**
  - (192.168.10.102)

- **vm A**

- **vm A’**

### Table:

<table>
<thead>
<tr>
<th>#</th>
<th>Packet sent after VM migration</th>
<th>Is VM’s interface updated to ift2 on GW?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>std gratuitous ARP</td>
<td>Y</td>
</tr>
<tr>
<td>2</td>
<td>broadcast ARP reply</td>
<td>N</td>
</tr>
<tr>
<td>3</td>
<td>RARP</td>
<td>N</td>
</tr>
<tr>
<td>4</td>
<td>ARP request with GW as target IP</td>
<td>Y</td>
</tr>
<tr>
<td>5</td>
<td>ARP request with other host as target IP</td>
<td>N</td>
</tr>
<tr>
<td>6</td>
<td>unicast ARP reply with GW as destination</td>
<td>Y</td>
</tr>
<tr>
<td>7</td>
<td>unicast ARP reply with other host as destination</td>
<td>N</td>
</tr>
</tbody>
</table>
Security concerns

- Some existing mechanism may not be applicable
  - MAC locking: locking a MAC address to a specific physical port of the switch.
  - DHCP snooping: binding IP/MAC by snooping DHCP ACK to port of switch.