LISPmob: enhanced network layer mobility solution

Lori Jakab

FOSDEM
February 4th, 2012
What if your mobile gadget...

• … could roam across different radios without dropping connections?
  – or even use them simultaneously?
• … could maintain its IP address regardless of location
  – and accept incoming connections?
Existing (sort of) solutions

• Tunnels and VPNs
  – E.g. free SIXXS IPv6 tunnel
  – Constant IP, but path stretch (RTT and privacy issues)

• Mobile IP
  – Path stretch can only be avoided for IPv6
Locator/ID separation

• Users keep using **DNS** names (are you still hardcoding IPs??)
• Applications bind to Endpoint IDentifiers (**EIDs**)
• Routing is done on Routing LOCators (**RLOCs**)

```
DNS        EID           RLOC
www.lisp4.net → 153.16.10.11 → 173.36.254.162
```

• It’s like creating dynamic tunnels
LISP-MN

- Global IP mobility solution
- Multi-homing, with ingress traffic engineering
- Changing network layer attachment does not affect transport layer connections
- IETF draft specification
Encapsulation

IPv4 EID

LISP Data

UDP port 4341

IPv4 RLOC

IPv6 EID

LISP Data

UDP port 4341

IPv4 RLOC

https://lispmob.org/
Does it work behind NAT?

- NAT traversal specification is currently being worked on
- The project is already working on the code to support it
LISPmob project history

• Internal tool at Cisco for IETF protocol specification development

• UPC became open sourcing partner
  – Added features
  – Improved usability

• Building a community of users and developers
  – Source available on Github
  – Project web page at UPC (links on last slide)
  – Can provide EIDs to developers and early users
Architecture

- **lispd**: Control Plane
- **lisp.ko**: Data Plane
  - Encap/Decap
- **lisp_int.ko**: LISP virt iface

**NETLINK**
- User space
- Kernel space
- (lisp_ipc.h)

- Interface management
- Register to mapping system
- Look up EID → RLOC bindings
- Check for locator liveliness
- Signal handovers

---

https://lispmob.org/
Implementations

• Generic Linux
  – Developed on Ubuntu 10.04 LTS
  – Will soon switch to 12.04 LTS
  – NetworkManager must be disabled

• MeeGo 1.2 CE on the N900
  – Needs custom kernel (to support advanced routing)
  – Connection Manager must be disabled
  – LISPmob code needs no modifications
Implementations (cont.)

• Android Gingerbread
  – Developed by Chris White
  – Separate control plane, may be open sourced later

• OpenWRT
  – Developed by Vasileios Lakafosis
  – Tested on the Linksys WRT160NL
  – Under review upstream
Other open source code bases

- OpenLISP
  - FreeBSD, similar kernel/user space split architecture
  - Luigi Iannone at Deutsche Telekom Laboratories
- GSoC 2010
  - Generic Linux
  - Alex Lorca (aless)
  - Little activity after GSoC
<table>
<thead>
<tr>
<th>No.</th>
<th>Time</th>
<th>Source</th>
<th>Destination</th>
<th>Protocol</th>
<th>Info</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0000000</td>
<td>85.184.2.22</td>
<td>84.88.81.2</td>
<td>LISP</td>
<td>Map-Request</td>
</tr>
<tr>
<td>2</td>
<td>0.000740</td>
<td>84.88.81.2</td>
<td>85.184.2.22</td>
<td>LISP</td>
<td>Map-Reply</td>
</tr>
<tr>
<td>3</td>
<td>9.182046</td>
<td>84.88.81.2</td>
<td>195.50.116.18</td>
<td>LISP</td>
<td>Map-Register</td>
</tr>
</tbody>
</table>

Frame 2: 106 bytes on wire (848 bits), 106 bytes captured (848 bits)


Internet Protocol, Src: 84.88.81.2 (84.88.81.2), Dst: 85.184.2.22 (85.184.2.22)

User Datagram Protocol, Src Port: lisp-control (4342), Dst Port: lisp-control (4342)

Locator/ID Separation Protocol

0010 ....... ....... ....... ....... = Type: Map-Reply (2)
........ 1........ 1........ 1........ P bit (Probe): Set
........ ....... 0........ 0........ E bit (Echo-Nonce locator reachability algorithm enabled): Not set
........ ....... 00 0000 0000 0000 0000 = Reserved bits: 0x000000

Record Count: 1

Nonce: 0x6b38c606bb5c03

EID prefix: 153.16.32.16/28, TTL: 1440, Authoritative, No-Action

0000 ....... ....... ....... = Reserved: 0x0000
........ 0000 0000 0000 = Mapping Version: 0

Local RLOC: 84.88.81.2 (probed), Reachable, Priority/Weight: 1/100, Multicast Priority/Weight: 255/0

Local RLOC: 2001:40b0:7500:15::2, Reachable, Priority/Weight: 2/100, Multicast Priority/Weight: 255/0

Nonce (lispnonce), 8 bytes

Packets: 288 Displayed: 288 Marked: 0 Load time: 0:00.105
Profile: Default
Integration

• Are you a developer for a project that could use LISPmob?
• Let us know your needs, we’ll try to cater to them...
  – … so that you can integrate it
  – … or that we can interface with it
https://lispmob.org/

https://github.com/LISPmob/lispmob