Ground Based LISP (GBL)
IETF100, Singapore

draft-haindl-ground-lisp-atn

November, 2017
Background

- Use of LISP to address the requirements of the worldwide Aeronautical Telecommunications Network with Internet Protocol Services (ATN/IPS)
- International Civil Aviation Organization (ICAO) is proposing to replace existing services with an IPv6 based infrastructure for Air Traffic Management (ATM).
- ATN/IPS handles Air Traffic Controllers (ATC) and Airline Operation Controllers (AOC)
- draft-haindl-ground-lisp-atn was presented at the ICAO IPS Mobility Sub-Group
- Builds on mechanisms defined in draft-ietf-lisp-eid-mobility
Ground Based LISP (GBL) - Reference Topology

AC-R: Access Ground Router
A-R: Airborne Router
A-E: Airborne End-system

A/G-R: Air/Ground Router (LISP XTR)
G/G-R: Ground/Ground Router (LISP XTR)
ATS-E: ATS End-system
Aircraft registration and ground-to-air traffic

Aircraft attaches to one or more A/G Networks

A/G Network advertises reachability of the aircraft delegated prefix (EID)

Aircraft preference and link QoS can be signalled over A/G Network (region 2 preferred)

1. Aircraft (A-R) attaches to IPv6 ICAO Net X

2. A/G Network advertises reachability of the aircraft delegated prefix (EID)

3. Traffic tunnelled over Internetwork

4. LISP MS/MR

5. Each A/G-R has RLOC address

6. Traffic tunnelled over Internetwork

7. G/G-R needs to query which RLOC(s) serve destination EID

8. AOCATS

9. X

Mapping Server maintains RLOC-EID mapping
Default Forwarding Path

IPv6 ICAO Net X

IPv6 ICAO Net Y

Default Forwarding Nodes (RTR) may be separate from MS/MR

Map-request/reply

Forwarding path before Map Resolution is complete
Optimized Multi-link mobility (1)

IPv6 ICAO Net X
IPv6 ICAO Net Y

A-R
AC-R
A-G-R 1
A-G-R 2
G/G-R X

Map-request + subscribe
Map-reply

AOC-ATS Region X
Interworking Region (LISP RLOC Space)

Forwarding path via best metric

G/G-R-X is subscribed to NetY
Optimized Multi-link mobility (2)

IPv6 ICAO Net X

A-R

Advertise Net-Y with better metric

IPv6 ICAO Net Y

A-R

Advertise Net-Y with poorer metric

AC-R

Radio Region 1

A/G-R 1

Map-Notify Regional Peers

Interworking Region (LISP RLOC Space)

A/G-R 2

G/G-R X

G/G-R-X is subscribed to NetY

AOC-ATS Region X

Map-Notify Subscribers

Forwarding path via best metric
Better metric pushed to subscribers
Regional Peers are notified
Only subscribers and regional peers are updated
Optimized Multi-link mobility (3)

IPv6 ICAO Net X

IPv6 ICAO Net Y

AOC-ATS Region X

A/G-R 2

A/G-R 1

G/G-R X is subscribed to NetY

Traffic redirect complete
Signaled only relevant Routers
Seamless Convergence (direct subscriber cache update)
Direct Connectivity (no anchor points)
High Availability

- Resilient Map-Servers based on parallel registrations
- Resilient G/G and A/G Routers
- Mobility without anchor points isolates mobile end-point fate from anchor point fate
- Leverage underlay multi-pathing
Security

• Control Plane message exchange can be secured as specified in ietf-lisp-sec

• Data Plane traffic may be secured as specified in RFC8061

• DoS Mitigation:
  • Control Plane rate limiting
  • Scoping of IP addresses to regions (domestic aircraft)
Next Steps

- Looking for comments from LISP WG