LISP Uberlay

draft-moreno-lisp-uberlay

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Overlay: Interconnection of multiple overlays

- Structure the LISP network hierarchically
  - Many site-overlays interconnected by a single transit “uberlay”
  - Only one uberlay, no backdoors
- Provide fate-isolation & site-overlay survivability
- Assist mapping system scale
  - Horizontally distribute state across site-overlays
  - Limit state to local EID-prefixes
- Segment RLOC space: private addressing, improved scale.
Multi-overlay Control Plane

- Site-overlay mappings are registered to local mapping system
- Border xTRs register 'default' mapping with local site RLOCs
- Border xTRs subscribe to all local mappings (0/0)
- Border xTRs register site-overlay EIDs with 'uberlay' RLOCs in Uberlay mapping system
- Site-overlay routes on site-overlay RLOCs only
- Site-overlay mapping system - not necessary to run LISP-DDT

- Uberlay has its own mapping system to collect site-overlay EIDs with uberlay RLOCs
- Uberlay underlay routes on uberlay RLOCs only
- Uberlay mapping system may run LISP-DDT

Benefits:
- Site-overlay mapping system has less state
- Site-overlay RLOCs not in Uberlay underlay
- Uberlay RLOCs only for borders are in site-overlay underlay
- Site-overlay RLOCs are private to site
- Reduced lookup latency for local EIDs
- Reduced registration latency for local EIDs

Drawbacks:
- Uberlay mapping system stores site-overlay EIDs but can be aggregated (modulo mobility)
Multi-overlay Forwarding

- Border xTRs subscribe to all local mappings (0/0)
- Site-overlay mappings are in the map-cache of the border xTRs
- xTR tunnels traffic to ‘default’ (border xTR) when destination EID is a remote site-overlay EID

- xTR de-encapsulates received traffic
- If destination EID not found in map-cache, query the overlay Mapping System
- Tunnel traffic to remote border xTR based on Map-reply

- Lookup map-cache at border xTR, if destination EID not found, query the overlay MS
- Tunnel traffic to remote border xTR based on Map-reply

Site Overlay

1.1.0.0/16 -> xTRA1
1.2.0.0/16 -> xTRA2
‘default’ -> (xTra, xTra’)

Uber Overlay

1.1.0.0/16 -> (A, A’)
1.2.0.0/16 -> (A, A’)
2.1.0.0/16 -> (B, B’)
2.2.0.0/16 -> (B, B’)

Site Overlay

2.1.0.0/16 -> xTRB1
2.2.0.0/16 -> xTRB2
‘default’ -> (xTRb, xTRb’)

Forward to Default
Forward to Remote
Forward to Local
Border xTR role

• Connect site-overlays to the uberlay
  • Re-encapsulating Tunnel Routers (RTRs)
  • Exchange EID info between site-overlay & uberlay mapping systems
    • Constrain advertisements into site-overlay
    • Split-horizon for Uberlay learnt EIDs (mobility)
  • Register default mapping into site-overlay

• Interconnect separate RLOC spaces:
  • Site-overlay facing RLOC-set
  • Uberlay facing RLOC-set

• EID mobility:
  • Site-overlay facing and uberlay facing away table
  • Relay mobility events between site-overlays and uberlay
Inter-site-overlay EID Mobility

- EID mobility in each site-overlay and in the overlay follows the procedures in draft-ietf-lisp-eid-mobility. The following additions enable Inter-site-overlay mobility:
  - The border xTRs on path will receive the Map-notify messages part of the eid-mobility procedures
    - Install the roaming EID in the away table facing the arrival overlay
    - Registration and eid-mobility procedures are triggered in the next overlay
Inter-site Multicast

• The procedures in RFC8378 are followed in each domain
• A Map-notify is sent towards the RP or multicast source by the mapping system in each overlay
  • Border-xTRs are the on path and receive this map-notify
• The Map Notify in one overlay triggers the registration of multicast interest in the next overlay towards the source.
• Multicast replication lists/trees are built in each overlay
• The border xTRs provide a natural point of replication
VPN Considerations

- Two sets of instance IDs:
  - Reuse set: Site-overlay specific, can be reused across site-overlays. Provide intra-site-overlay connectivity only.
  - Global set: Used across site-overlays and the uberlay. Provide inter-site-overlay connectivity.
Next steps

- Discuss first draft in the mailing list
- Improve state reduction in ubverlay
- Deeper exploration of VPN implications
Comments, Questions