LISP-DDT

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Agenda

- DDT Draft Review
- Deployment Experience
LISP DDT

- LISP Delegated Database Tree
  - Hierarchy for Instance IDs and for EID Prefixes

- DDT Nodes are pre-configured with delegations
  - DDT Map-Resolvers sends (ECM) Map-Requests
  - DDT Nodes Return Map-Referral messages

- DDT Resolvers resolve the Map-Server’s RLOC iteratively
LISP DDT Map Resolvers

- DDT Map Resolvers
  - Cache Map Requests from ITRs
  - Query the DDT hierarchy iteratively
  - Detect Loops/Delegation Errors
  - Resolve the location of the DDT Map-Server

- DDT Map Resolvers thus have state:
  - Referral Cache
  - Map-Request Queue
LISP DDT Referrals & Their Actions

- ‘Positive’ Referrals are used to discover a DDT-node’s RLOC for a given EID Prefix
  » Type 0, NODE-REFERRAL
  » Type 1, MS-REFERRAL
  » Type 2, MS-ACK

- ‘Negative’ referrals are used to indicate other actions:
  » Type 3, MS-NOT-REGISTERED
  » Type 4, DELEGATION-HOLE
  » Type 5, NOT-AUTHORITATIVE
**Setup & Configuration**

1) MR configured with Root, or MS1, RLOC

2) DDT-1, DDT-2, DDT-3, DDT/MS-4 configured children with child prefixes, and authoritative prefixes
   Ex. DDT-2 Delegates child 10.1.0.0/16 to MS3
   DDT-2 configured authoritative for 10/8 in IID0

3) ETR is registering its EID to the Leaf MS
First Request Packet Flow

DDT-Node Root 1
0.0.0.0/0

DDT Node 2
10.0.0.0/8

DDT Node 3
10.1.0.0/16

DDT-Node-4 MS
10.1.0.0/24

ETR 10.1.0.0/24

Map Request, Referral, & Reply

1) ITR sends MRQ to MR via ECM
2) MR sends Iterative-MRQ to its statically configured Root DDT-Node via ECM-Like-packet
3) MS1 Sends a Map Referral to MR informing the MR who is the next DDT-Node (2) to try
4) MR repeats steps 2 & 3 until it gets to leaf MS/DDT-Node which has the registered ETR (DDT-4)
5) DDTNode-4 sends Map-Referral to MR with done bit set
6) MS (DDT-4) receives, processes MR and fwd to ETR
7) ETR sends Map-Reply to the ITR

Static Delegation Hierarchy
ETR-MS Registration
Map Request
Map Referral
Map Reply
Once MR’s Referal-Cache is Populated

1) MRQ in ECM arrives on MR
2) MR sends MRQ in ECM (possibly double encaped if lisp-sec is used to secure referal path) to Cache’d Leaf-Map-Server (MS-4)
3) MS decaps ECM and then sends Map-Request in new ECM to ETR
   MS also sends a Map-Referal with Done Bit set back to MR
4) ETR sends Map-Reply to ITR
DDT Implementation Status

- IOS and NXOS implementations complete
- Development, and interoperability testing going on now
- Beta Network running DDT code
- Configuration is pretty simple
- Does not include proposed DDT-SEC extensions
Cisco’s DDT Roots:
(Iota-Root)
IID: *
EID: *
arin-ddt.rloc.lisp4.net
ripe-ddt.rloc.lisp4.net
vxnet-ddt.rloc.lisp4.net

Other DDT Roots
IID *
EID: *
root-verisign.ddt-root.org
mu-ddt-root.org

ARIN-Region
asp-isis
asp-mr-ms
cisco-sjc-mr-ms
eqx-ash-mr-ms

RIPE-Region
l3-london-mr-ms
tdc-mr-ms
intouch-ams-mr-ms
intouch-isis

AP-Region
apnic-mr-ms

LACNIC-Region
lacnic-mr-ms

MR/MS:
EID Aggregates:
153.16.0.0/19
2610:D0:1000::/36
2610:D0:FACE::/48
153.16.21.0/24 TO MN
153.16.22.0/24 TO MN

MR/MS:
Enterprise Region

MR/MS:
EID Aggregates:
153.16.64.0/19
2610:D0:3000::/36

MR/MS:
EID Aggregates:
153.16.128.0/19
2610:D0:5000::/36

DDT Beta- Network TLDs
IID 0
v4-EID: 153.16.0.0/16
v6-EID: 2610:D0/32
uninett-ddt.rloc.lisp4.net
sj-ddt.rloc.lisp4.net
msn-ddt.rloc.lisp4.net

DDT Beta- Network DDT TLD

Iota- root Servers

Mobile Node Region

DDT Node with ‘child referrals’

Static Delegation Hierarchy