LISP-DDT
implementation status and deployment considerations

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Agenda

- Brief review of how DDT works
- Implementation and deployment status
- Future direction – soliciting feedback
Review: what is LISP-DDT?

- **LISP Delegated Database Tree**
  - Hierarchy for Instance IDs and for EID Prefixes
  - Statically Configured
  - Delegations are signed (public-key) and verified when used

- Conceptually, similar to DNS (IN-ADDR hierarchy)
  - but different prefix encoding, messages, etc.
  - we did try using DNS protocol directly, but proved unsuitable

- Borrowed terminology:
  - DDT Node/Map-Server – defines EID topology and delegations
  - DDT Map-Resolver – walks EID topology to find ETR
Implementation Status

- Cisco IOS and NXOS implementations complete
  - Multi-AF (LCAF) support, public/private EID space separation
- OpenLISP implementation nearly complete
- Verisign implementation in progress
- Development and interoperability testing going on now
  - running on LISP beta network with around 200 end sites
- Does not include proposed DDT-SEC extensions
Example: DDT Node/MS EID Delegation

- Pretty simple – much easier than ALT
- Root server configuration:
  
  ```
  lisp ddt authoritative-prefix *
  lisp ddt delegate 217.8.111.1 instance-id 0 eid-prefix 85.184.184.0/24
  lisp ddt delegate 158.38.1.91 instance-id 0 eid-prefix 153.16.0.0/16
  lisp ddt delegate 173.36.254.167 instance-id 0 eid-prefix 153.16.0.0/16
  lisp ddt delegate 158.38.1.91 instance-id 0 eid-prefix 2610:d0::/32
  lisp ddt delegate 173.36.254.167 instance-id 0 eid-prefix 2610:d0::/32
  ```

- Sub-delegations for pilot network:
  
  ```
  lisp ddt authoritative-prefix instance-id 0 eid-prefix 2610:d0::/32
  lisp ddt authoritative-prefix instance-id 0 eid-prefix 153.16.0.0/16
  lisp ddt delegate 149.20.48.61 instance-id 0 eid-prefix 153.16.0.0/19
  lisp ddt delegate 193.162.145.50 instance-id 0 eid-prefix 153.16.32.0/19
  lisp ddt delegate 149.20.48.61 instance-id 0 eid-prefix 2610:d0:face::/48
  lisp ddt delegate 173.36.254.164 instance-id 0 eid-prefix 2610:d0:face::/48
  ```
DDT Map Server configuration

- Further sub-delegation to DDT Map Server:
  
  lisp ddt authoritative-prefix instance-id 0 eid-prefix 153.16.0.0/19
  lisp ddt map-server-peer 149.20.48.61 instance-id 0 eid-prefix 153.16.0.0/19
  lisp ddt map-server-peer 173.36.254.164 instance-id 0 eid-prefix 153.16.0.0/19
  lisp ddt map-server-peer 198.6.255.37 instance-id 0 eid-prefix 153.16.0.0/19
  lisp ddt map-server-peer 206.223.132.89 instance-id 0 eid-prefix 153.16.0.0/19

  lisp site vaf-xtr
    eid-prefix 153.16.10.0/24
    authentication-key xxxx
    description Contact: Vince Fuller vaf@cisco.com

- “peer” configuration Allows DDT MS to respond with “go ask someone else” if it does not have current ETR registration
DDT Map Resolver Configuration

- Very simple - just needs to know how to get to root:
  - `lisp ddt root 192.149.252.136`
  - `lisp ddt root 193.0.0.170`
  - `lisp ddt root 199.119.73.8`

- “root hints” file for DDT
- non-root DDT Map-Servers have this configuration also
- Pilot infrastructure boxes have combined functionality for both DDT Map-Resolver and DDT Map-Server
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: *
sigma.ddt-root.org (Verisign)
mu.ddt-root.org

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

ARIN-Region
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
isc-mr-ms
asp-mr-ms
cisco-sjc-mr-ms1
eqx-ash-mr-ms

Mobile Node Region
MR/MS's
153.16.21/24
153.16.22/24
2610:d0:1219::/48
2610:d0:120e::/48
asp-isis
isc-isis
intouch-isis

RIPE-Region
MR/MS:
EID Aggregates:
153.16.32.0/19
2610:D0:2000::/36

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

LACNIC-Region
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 Node with ‘child referrals’
Organization and Operational Status

- Collaboration among Cisco, Verisign, Intouch NV
  - discussions with others, more welcome
  - close dependency on PITR providers

- Common root: ddt-root.org
  - servers run by different companies/organizations

- Running on LISP pilot network
  - transition from LISP+ALT in March, 2012
  - ALT configurations removed in April, 2012

- Looking at various options for organizational structure
  - emphasis on transparency, scalability, efficiency, simplicity
Thoughts on Future Work

- LISP Mapping Provider “eco-system” (?)
  - need more public DDT providers and PITR providers
- Internet-Scale Deployment (?)
- DDT database syntax specification (?)
  - like RFC1035 sec. 5.3 for DNS
  - as an appendix to draft-ietf-lisp-ddt?
  - as a separate document?
- Explicit specification for split between public and non-public EID space (?)
  - draft mentions “hints” but not how used by DDT-MR/DDT-MS
  - IID registry, with range defined for private use (?)
LISP-DDT and LISP resources

- Recently adopted by WG: draft-ietf-lisp-ddt-00.txt
- www.lisp4.net
  - background information, pointers to other presentations
  - pilot network topology, traffic, etc.
  - LISP Network Operators Group (LNOG)
- lisp.cisco.com
  - Cisco implementation info, image downloads, etc.