Evaluation of LISP+ALT performance

LISP WG, IETF-75, Stockholm

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Motivation

• How would a LISP ITR perform in the current Internet?
• Performance of ALT?
• Current testbed too small to get some approximate performance numbers
• ALT has to be deployed in a scalable and efficient manner
• We propose the CoreSim simulator to get an idea of global ALT performance
A 3-layer ALT hierarchy

- No description in the ALT draft and no consensus on the mailing list about how ALT will be deployed on global scale
- L1 – fully meshed root layer
- L2 – /8 aggregation
- L3 – Map-Server
- L3 = current BGP
- No peering on L2
Topology

• Using the iPlane infrastructure (U. Washington):
  – DFZ prefix list
    • We filtered longer prefixes included in shorter
    • We have 112.233 prefixes after filtering
  – AS connectivity
  – Latency between arbitrary IPs
    • We observed about 65-80% coverage

• Apply to the 3-layer ALT
CoreSim

Legend
- CoreSim Module
- Input Data
- Results

- Latency, hop count and node load

Packet Buffer

iPlane

Map-Request Routing

Path Metrics

Mapping System Topology

Output

HIT

MISS

ITR

Trace File

CoreSim Module

Input Data

Results

Cache performance metrics

Mapping Cache

inFlight Buffer

HIT

MISS

Packet Buffer

Legend

ITR

ALT/DHT
Traces

- **24h egress traffic @ UCL border router, Louvain** (03/23/2009)
  - 752 GB / 1200 M packets = 69 Mbps avg. BW
  - 4.3 million IPs / 123,804 BGP prefixes

- **4h egress traffic @ UPC border router, Barcelona** (05/26/2009)
  - 463 GB /1200 M packets = 289 Mbps avg. BW
  - 4.3 million IPs / 111,492 BGP prefixes
Simulation Results

- About 10 days on Core 2 Xeon for each trace / MS combo
- Map-Request RTT:
Simulation Results (cont.)

• Hop count:
  – 95% of the time is 6 hops for ALT: to the root and down to L3

• Load:
  – Very non-homogeneous in ALT, due to uneven IPs/prefix distribution
  – In DHT has an interesting property: the first prefix after a large unallocated space has significantly more load
Dropping vs. Buffering

• How big a buffer do we need for “normal” traffic?
• Cache hit ratio of 99.5% for our traces
• Simulator replays trace, does not emulate connection setup → worst case values
• Median values of buffer occupancy:
  – ALT: 86 packets / 65 KB
  – DHT: 136 packets / 114 KB
• Traffic anomalies (malicious or benign) cause important spikes: maximum value: 70 MB !!!
Future Work

• Evaluate other possible ALT deployment scenarios?
• Different EID distribution
• Cache eviction algorithms
• Other traces
  – E.g.: content providers (vs. educational networks)
  – Simulator is open source, feedback and results with your data is welcome
Draft?

- ALT deployment recommendations draft?

http://www.cba.upc.edu/lisp
Buffer Occupancy (bytes)

UPC - Packet Buffer (worst case)

Max. octets/min (log-scale)

ALT (TCP)  DHT (TCP)

Time (h)

09:00  10:00  11:00

Max. octets/min (log-scale)

ALT (UDP)  DHT (UDP)

09:00  10:00  11:00