Gulliver Project
- status update in 2009 -

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Introduction

• Gulliver Project
  – Active Measurement Framework
  – Performing DNS Active Measurement since 2006
  – http://gulliver.wide.ad.jp/

• Probes DNS reachability from worldwide locations
  – RTT, Query Timeout
  – Node ID (hostname.bind or server.id)

• 30 Probe Locations as of Feb. 2010
  – Including South/East Asia and Africa countries

• Targets
  – Root, ccTLD, in-addr.arpa DNS servers
Overview of Our Framework

(1) Measurement Requests
(2) Send commands to each node
(3) Upload Results
(4) Get Results
Management of measurement nodes
Analysis of DNS Measurements

• Span

• Targets
  – Root DNS Servers

• RTT distribution
  – We found there are 3 types of RTT distribution on Root DNS Servers
Histograms of RTT

D-ROOT

F-ROOT

M-ROOT

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Categorize Root DNS Servers by Anycasting deployment

- Root DNS Servers are categorized by its operation policy
  
  Type-1: Non Anycasting
  - B(1), D(1), E(1), H(1)

  Type-2: Anycasting
  - A(6), C(6), G(6), L(3), M(6)

  Type-3: Heavily Anycasting
  - F(49), I(34), J(70), K(18)

- Any relation ???
  - Anycast Changes, RTT, and Query Timeout
Query Timeout Rates

2008

2009
Node ID Changes

2008

2009

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Relation with RTT, Node Changes, and Timeout Rates

Anycasting Root Servers

Heavily Anycasting Root Servers

Node Changes (per day) vs. RTT (daily average) vs. timeout rates (%)

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Further works

- IPv6 measurements
  - Only a few probe locations support IPv6
- DNS packet size measurements
  - EDNS0
  - TCP query

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Problems of management

• Have been continued the measurements about 3 years...
• Measurement nodes in developing countries often lost connectivity
• Can not control measurement nodes
  – Affects results of long-term measurement
• Our measurement node does nothing under uncontrollable situation
  – For safety of measurement traffic
  – But lack of measurement data
Future Plan

• It is too costly to deploy and manage measurement framework.

• Collaboration with Other Measurement Frameworks
  – Data exchange
  – Interconnection of Measurement Mechanism
  – Planning to interconnect with TopHat