Active and passive measurements: measuring networks

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Outline

- Whois
- Looking Glasses
- Internet ATLAS
- BGP data
Whois

- Who is who in the Internet?
  - Internet domain name and network number directory service
  - Information about
    - Domains: google.com, microsoft.com, ...
    - Internet address space
    - Networks: AS3320
  - Databases maintained by the Internet routing registries:
    - ARIN: Northern America
    - RIPE: Europe
    - APNIC: Asia–Pacific
    - LACNIC: Latin America
    - AFRINIC: Africa
Whois

whois [-h host] [-p port] name ...

-h host
Use the specified host instead of the default variant. Either a host name or an IP address may be specified.

-p port
Connect to the whois server on port. If this option is not specified, whois defaults to port 43.

• Examples
  • whois www.google.com
  • whois –r ww.ripe.net AS3320
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- **Looking Glasses**
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Looking glasses

- Publicly available remote servers that run BGP commands and traceroutes:
  - show ip bgp
  - show bgp neighbors
  - show ip bgp regexp
  - show thread cpu
  - traceroute
  - traceroute with AS numbers (IPv4 only)

- Operated by ISPs or NOCs, e.g. DTAG.

- Wide list available at
  http://www.bgp4.as/looking-glasses
RIPE RIS

- RIPE Routing Information Service: http://www.ris.ripe.net
- General routing statistics
  - Prefix size distribution
  - Neighbors
  - AS path lengths
  - Whois
  - Bogon filtering
- Looking glass
  - BGP summary
  - BGP neighbors
  - show CPU
  - traceroute with AS numbers
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Routing ATLAS

- ATLAS: “book of maps or charts”
- Tool to explore and compare networks:
  - CAIDA (as-rank.caida.org)
  - Fixedorbit (www.fixedorbit.com)
  - NetConfiggs (www.netconfiggs.com)
- Metrics to compare networks:
  - IP space originated
  - Number of peers
  - Customers
  - Average path length
Internet ATLAS

- TeleGeography (www.telegeography.com)
- Information about
  - Pricing: access, IP transit, enterprise networks
  - Internet: bandwidth growth, IXPs
  - Communication infrastructure: fiber layout and plans, hosting,
  - Business: Internet and mobile phone market, 4G
  - Maps: submarine cables, Internet, global traffic
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BGP routing data

- Oregon RouteViews (http://www.routeviews.org)
- RIPE RIS (http://www.ris.ripe.net)
- Public Internet Exchange Points (IXP): http://www.bgp4.as/internet-exchanges
- Example: Cyclops (cyclops.cs.ucla.edu)
  - Collects public BGP data + looking glasses
  - Statistics about
    - Global visibility
    - AS classification
    - Peering relationships
BGP routing data

- Reading BGP data: bgpdump
  - bgpdump -m bgpfile
- Routing table output:

<table>
<thead>
<tr>
<th>Timestamp</th>
<th>Peer-router</th>
<th>Prefix</th>
<th>AS_path</th>
</tr>
</thead>
<tbody>
<tr>
<td>1265313600</td>
<td>B 96.4.0.55</td>
<td>11686 0.0.0.0/0</td>
<td>11686 2914</td>
</tr>
</tbody>
</table>

- BGP updates:

<table>
<thead>
<tr>
<th>Timestamp</th>
<th>Withdraw_or_Update</th>
<th>Prefix</th>
</tr>
</thead>
<tbody>
<tr>
<td>1272672012</td>
<td>A 195.22.216.188</td>
<td>6762 109.194.96.0/22</td>
</tr>
<tr>
<td>1272672012</td>
<td>W 154.11.11.113</td>
<td>852 207.219.26.0/2</td>
</tr>
</tbody>
</table>

Timestamp  Withdraw_or_Update  Prefix