Periscope: Unifying Looking Glass querying

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Traceroute has multiple operational and research use cases

• Troubleshoot operational routing issues
• Measure and analyse performance
• Generate Internet topologies
• IP geolocation
• Detect prefix hijacks and outages
• Location of congestion
• …
Multiple traceroute platforms offer diverse Vantage Points (VPs)

• Crowdsourced traceroute VPs:
  • CAIDA’s Ark, RIPE Atlas, Dasu, …
  • Deployed over end hosts, such as home computers

• VPs deployed over the academic network:
  • iPlane

• VPs deployed by operators:
  • Looking Glasses (LGs)
  • Not an homogenous set of VPs
What is a Looking Glass (LG)

• Web-based interface to routers that allow the execution of read-only network commands

• Each LG can offer access to multiple backbone or border routers
  • Combine data-plane and control plane routing information

• Each LG is completely independently from each other
Requirements for unified LG querying

1. Automatic discovery of available LGs
   • No authoritative repository available
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2. Input and output standardization
   • LGs have disparate input parameters, output formats and supported commands
Requirements for unified LG querying

1. Automatic discovery of available LGs
   • No authoritative repository available

2. Input and output standardization
   • LGs have disparate input parameters, output formats and supported commands

3. Automatic discovery of interface changes
   • LGs are volatile in terms of availability and specifications
Looking glass discovery methodology

PeeringDB
Traceroute.org

Web Crawler

Looking Glass
HTML forms

Looking Glass
templates

Automatic
configuration
extraction

Manual
configuration
extraction

JSON
configuration
file

Health checker

http://www.phplg.com/
https://github.com/Cha0sgr/BGP-Looking-Glass-NG
http://sourceforge.net/projects/klg
http://mrlg.op-sec.us/
https://www.gw.com/sw/stripes/

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Looking Glass templates
Automatic configuration extraction
Manual configuration extraction

Health checker

JSON configuration file
Looking glass discovery methodology

- PeeringDB
- Traceroute.org

Web Crawler → Looking Glass HTML forms

- Looking Glass templates
- Automatic configuration extraction
- Manual configuration extraction

Health checker → JSON configuration file

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Filter-out dead, unresponsive LGs

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LG Client

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To enable querying by multiple concurrent users we need multiple LG querying clients.
Periscope’s querying architecture
Coverage of Looking Glasses

- **263** ASNs
- **1,640** VPs
- **77** countries
Commands supported by Looking Glasses

![Bar Chart](chart.png)

- **Traceroute** (IPv4: 1800, IPv6: 1000)
- **BGP Route** (IPv4: 1600, IPv6: 800)
- **Ping** (IPv4: 1200, IPv6: 600)
- **BGP Summary** (IPv4: 600, IPv6: 400)
- **BGP Regex** (IPv4: 200, IPv6: 100)

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## Overlap with other platforms

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<th>Datasets</th>
<th>ASes</th>
<th>AS links</th>
<th>IXPs</th>
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<td>Observed</td>
<td>Unique</td>
<td>Observed</td>
</tr>
<tr>
<td>LG</td>
<td>3109</td>
<td>809 (17%)</td>
<td>29525</td>
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<tr>
<td>Atlas</td>
<td>3369</td>
<td>1464 (31%)</td>
<td>55936</td>
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<tr>
<td>Ark</td>
<td>1608</td>
<td>59 (1.2%)</td>
<td>10237</td>
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<tr>
<td>All</td>
<td>4657</td>
<td>-</td>
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</table>
Overlap with other platforms

![Graph showing CDF vs Customer Cone for different platforms: Uniq-LG, Uniq-Atlas, Uniq-Ark, and Union.](image)
Current status

• Periscope is publicly accessible after email request: vgiotsas@caida.org

• API documentation: http://www.caida.org/tools/utilities/looking-glass-api/

• Current projects:
  • Facility mapping
  • Inference of complex relationships
  • Sibyl: A Practical Internet Route Oracle
  • IP-to-ASN mapping