

Active and passive measurements: measuring networks

Prof. Anja Feldmann, Ph.D.
Dr. Steve Uhlig

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`

Outline

- Whois
- Looking Glasses
- Internet ATLAS
- BGP data

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

Outline

- Whois
- Looking Glasses
- Internet ATLAS
- BGP data

Routing ATLAS

- ATLAS: “book of maps or charts”
- Tool to explore and compare networks:
 - CAIDA (as-rank.caida.org)
 - Fixedorbit (www.fixedorbit.com)
 - NetConfigs (www.netconfigs.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

Outline

- Whois
- Looking Glasses
- Internet ATLAS
- BGP data

BGP routing data

- Oregon RouteViews (www.routeviews.org)
- RIPE RIS (www.ris.ripe.net)
- Public Internet Exchange Points (IXP):
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:

```
1265313600|B|96.4.0.55|11686|0.0.0.0/0|11686 2914|IGP|96.4.0.55|0|0||
```

```
Timestamp Peer-router Prefix AS_path
```

- BGP updates:

```
1272672012|A|195.22.216.188|6762|109.194.96.0/22|...|IGP|195.22.216.188|0|0||
```

```
1272672012|W|154.11.11.113|852|207.219.26.0/2
```

```
Timestamp Withdraw_or_Update Prefix
```