

# Avoiding insanity while trying to untangle the internet



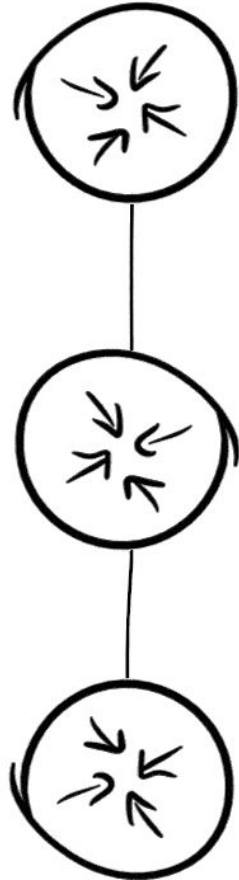
Ben Cartwright-Cox  
@ LU-CIX - Nov 16th 2022

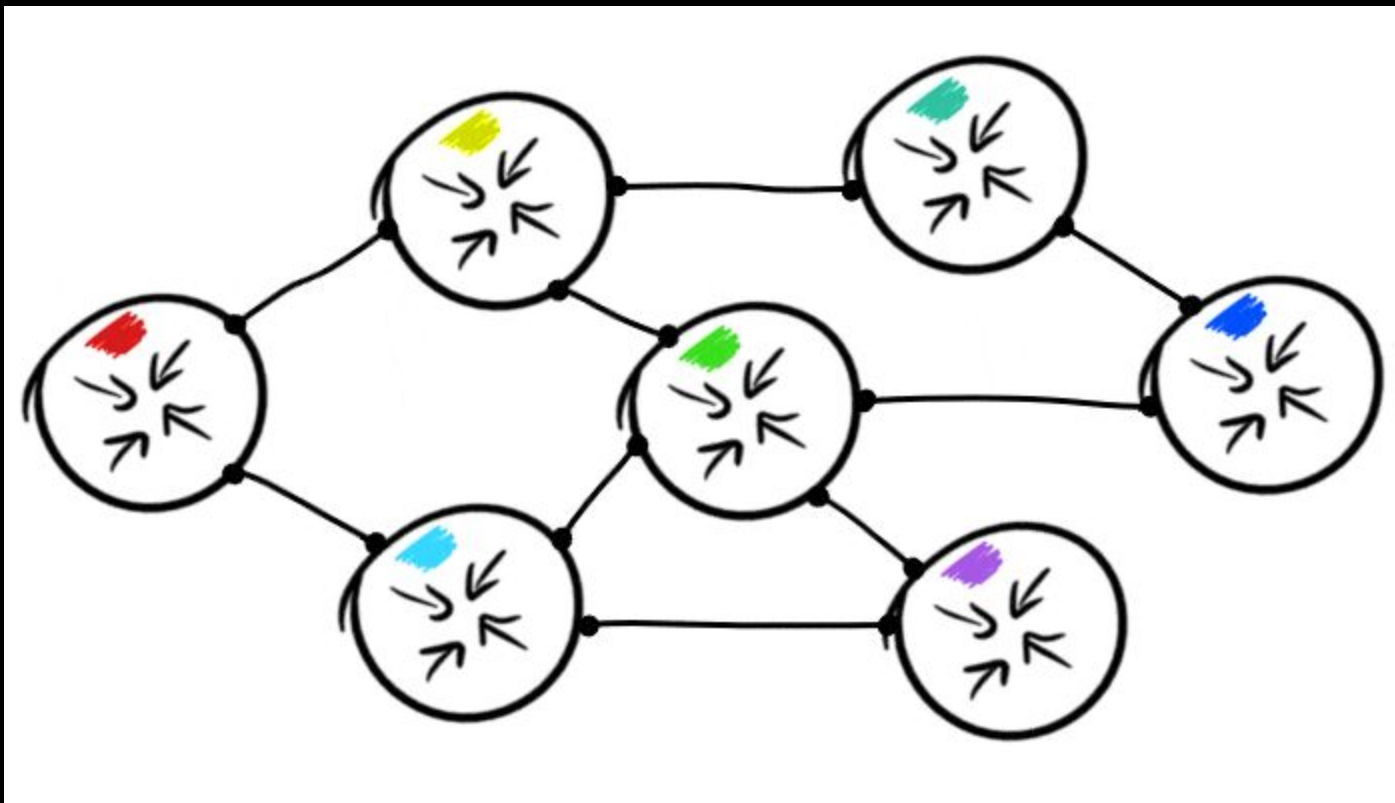
Can we take a moment to  
appreciate what humanity  
built?

Can we take a moment to appreciate what humanity

built?







+|62.193.131.0/24|28917 13004 6700|195.208.208.147|i|||28917:4000 28917:4100 28917:4103|195.208.208.147 28917|1667136299|1  
+|84.237.71.0/24|28917 9049 25549 25549 30797|195.208.208.147|i|||28917:3000|195.208.208.147 28917|1667136299|1  
-|213.145.128.0/24| | | | |195.208.210.40 6939|1667136297|1

Prefix	AS Path	Next Hop	BGP Communities	Data Source / ASN
--------	---------	----------	-----------------	-------------------

+ 62.193.131.0/24	28917 13004 6700	195.208.208.147 i	28917:4000 28917:4100 28917:4103	195.208.208.147 28917 1667136299 1
-------------------	------------------	-------------------	----------------------------------	------------------------------------

+ 84.237.71.0/24	28917 9049 25549 25549 30797	195.208.208.147 i	28917:3000	195.208.208.147 28917 1667136299 1
------------------	------------------------------	-------------------	------------	------------------------------------

- 213.145.128.0/24				195.208.210.40 6939 1667136297 1
--------------------	--	--	--	----------------------------------

Prefix	AS Path	Next Hop	BGP Communities	Data Source / ASN
--------	---------	----------	-----------------	-------------------

```
route-views.amsix.routeviews.org> show bgp ipv4 185.230.223.0/24
```

```
BGP routing table entry for 185.230.223.0/24
```

```
Paths: (27 available, best #13, table default)
```

```
Not advertised to any peer
```

```
211398 34854 44684 206924
```

```
185.1.167.45 from 185.1.167.45 (31.24.249.245)
```

```
Origin IGP, valid, external
```

```
Community: 34854:1001 65500:10000 65500:10100 65532:1000
```

```
Large Community: 44684:0:900 44684:1:2 44684:2:206924 44684:3000:1299 211398:245:100 211398:2760245:34854
```

```
Last update: Sun Oct 30 01:17:05 2022
```

```
39120 3356 3170 206924
```

```
80.249.210.28 from 80.249.210.28 (195.60.190.29)
```

```
Origin IGP, valid, external, atomic-aggregate
```

```
Community: 3356:2 3356:22 3356:100 3356:123 3356:500 3356:901 3356:2064 60945:0 65002:6830 65532:1000
```

```
Last update: Sat Oct 29 08:33:29 2022
```



# BGP Implicitly encodes so much extra information

- Routing around expensive providers
  - You can observe when some carriers become uncompetitive over time
- Routing around physical issues
  - Recent de-prefing of some ISPs during the recent Marseille cuts
- Routing around with politics in mind
  - North Korea brought up a 2nd upstream (Russia) after suspected tensions(?) with China
- Literally routing stuff into blackholes with *Politics* in mind

```
show router bgp routes 8.8.8.8
```

```
=====
```

```
BGP Router ID:212.156.116.127 AS:9121 Local AS:9121
```

```
=====
```

Legend -

Status codes : u - used, s - suppressed, h - history, d - decayed, \* - valid

Origin codes : i - IGP, e - EGP, ? - incomplete, > - best, b - backup

```
=====
```

```
BGP IPv4 Routes
```

```
=====
```

```
Flag Network LocalPref MED
```

```
NextHop Path-Id VPNLabel
```

```
As-Path
```

```
-----
```

```
u*>? 8.8.8.8/32 100 None
```

```
212.156.253.130 None -
```

```
No As-Path
```

```
*? 8.8.8.8/32 100 None
```

```
212.156.253.130 None -
```

```
No As-Path
```

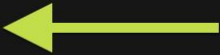
```
-----
```

```
Routes : 2
```

```
=====
```



*We would expect to see 8.8.8.0/24 here originated by AS 15169.*



*This is the proof of Turk Telekom hijacking Google DNS.*

```
show router bgp routes 8.8.8.8
```

```
=====
```

```
BGP Router ID:212.156.116.127 AS:9121 Local AS:9121
```

```
=====
```

```
Legend -
```

```
Status codes : u
```

```
Origin codes : i
```

```
=====
```

```
BGP IPv4 Routes
```

```
=====
```

```
Flag Network Loc
```

```
Nexthop Path-Id
```

```
As-Path
```

```
-----
```

```
u*>? 8.8.8.8/32
```

```
212.156.253.130
```

```
No As-Path
```

```
*? 8.8.8.8/32 10
```

```
212.156.253.130
```

```
No As-Path
```

```
-----
```

```
Routes : 2
```

```
=====
```



BGP data in aggregate is far more interesting

The screenshot shows a web browser window with the URL 'bgp.tools'. The page features a dark header with the 'bgp.tools' logo and a red bar on the right containing the text 'AS206924'. The main content area has a large heading 'Browse the internet ecosystem' and a search prompt 'Search by ASN (AS13335) or Prefix (8.8.8.0/24)'. Below this is a search input field with the placeholder text 'Start here...' and a red arrow button. The page is divided into three columns: 'You are connecting from' with a list of IP addresses and ASNs; 'Example Pages' with a list of links to 'Cloudflare CDN', 'BenjojoNET', and 'Google DNS Prefix'; and 'Why use BGP.Tools?' with a section 'We offer:' and a list of services including 'Near Realtime BGP info', 'Understandable interfaces', 'BGP Monitoring services', and 'Full list here'. The footer contains navigation links for 'Scripting/API', 'Credits', 'Pricing', 'Contact Us', 'Issue Tracker', and 'Contribute Data', along with a small text line: 'Port 179 Ltd is a company registered in England and Wales (Registration Number: 14127855)'.

### You are connecting from

- IPv6: [2a0c:2f07:4663:4663](#)
- Ben Cartwright-Cox ([AS206924](#))
- [2a0c:2f07:4663::/48](#)

### Example Pages

- [Cloudflare CDN](#)
- [BenjojoNET](#)
- [Google DNS Prefix](#)

### Why use BGP.Tools?

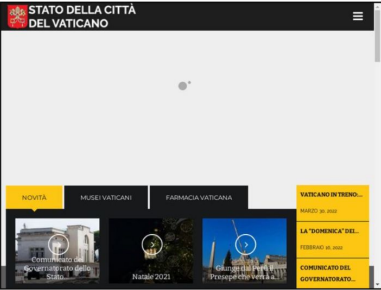
#### We offer:

- Near Realtime BGP info
- Understandable interfaces
- [BGP Monitoring services](#)
- [Full list here](#)

Start here... →

Logged in as AS206924

View Edit



# Holy See - Vatican City State

AS Number **8978**  
 Website <http://www.vaticanstate.va>

Overview Prefixes Connectivity Whois

Overview Prefixes Connectivity Whois

IX

Registered on  
**9 Apr 2002 (20 years old)**

Network status  
**Active, Allocated under RIPE**

Network type  
**Unknown**

Prefixes Announced  
**2 IPv4, 1 IPv6**

### Upstreams

- [AS174](#) - Cogent Communications
- [AS3356](#) - Lumen (Level 3)
- [AS3257](#) - GTT Communications Inc.
- [AS137](#) - Consortium GARR
- [AS12874](#) - Fastweb SpA
- [AS12637](#) - Seeweb s.r.l.

### Locations of Operation

- Holy See (Vatican City State)
- Italy

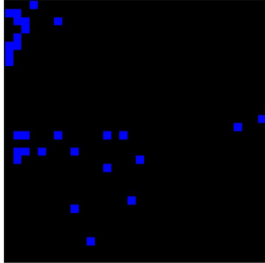
Tags:

bgp.tools/prefix/193.4 + 10

Start here... →

Logged in as AS206924

View Edit



# 193.43.128.0/22

Announced by [AS8978](#)

Overview Connectivity Whois DNS

Validation

# Networks are broken up into policies

Policy blissful\_hoover

18 Sep 22 12:17 UTC

The diagram shows AS206924 (Origins) connected to AS3170, AS44684, and AS1239. AS3170 and AS44684 connect to AS3356, AS3257, AS2914, and AS1299. AS1239 connects to AS6939, AS12956, AS7018, AS6830, AS6453, AS174, and AS6461. AS6939 connects to AS5511, AS3491, AS3320, AS12956, AS7018, AS6830, AS6453, AS174, and AS6461. A group of Tier 1 ISPs includes AS5511, AS3491, AS3320, AS12956, AS7018, AS6830, AS6453, AS174, and AS6461.

**Prefixes in selected policy**

Prefix	Description
2a0c:2f07:4896::/48	Colo in interxion LON3
2a0c:2f07:9459::/48	Shared v6 services
2a0c:2f07:29::/48	Colo in Cambridge business park

Policy upbeat\_gould

18 Sep 22 12:17 UTC

The diagram shows AS206924 (Origins) connected to AS6939. AS6939 connects to AS12956, AS7018, AS6830, AS6461, AS6453, AS5511, AS3491, AS3356, AS3320, AS3257, AS2914, AS1299, and AS1239. A group of Tier 1 ISPs includes AS12956, AS7018, AS6830, AS6461, AS6453, AS5511, AS3491, AS3356, AS3320, AS3257, AS2914, AS1299, and AS1239.

**Prefixes in selected policy**

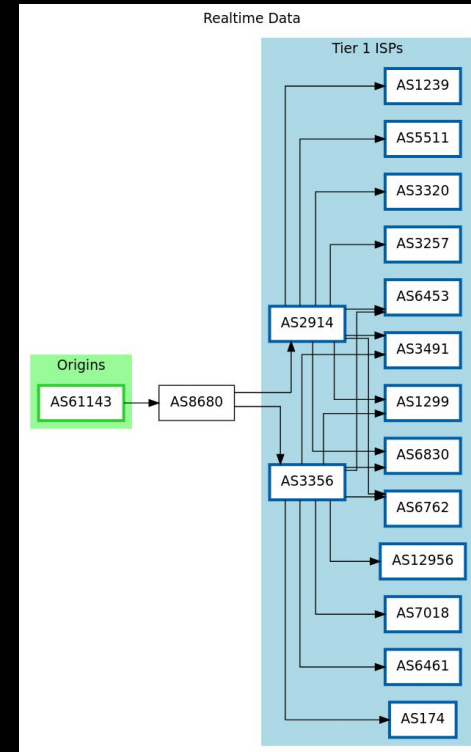
Prefix	Description
2a0c:2f07:f::/48	KCIX SiteLocal
2a0c:2f07:d::/48	KleyReX SiteLocal









































What is a upstream anyway?



# What does bgp.tools count as a upstream?

- Any path that intersects a tier 1 ISP is activates logic that "sets" upstream/downstreams
- Walk up from the tier 1 ISP and set downstreams all the way,
  - Aka, a path like
  - 112 **174 2914** 8680 61143
  - Every link is set as a peer
  - Everything onwards from 2914-> is set as a downstream
  - Upstreams are inverse of downstreams
- This has *some* flaws
  - Some people peer with tier 1 providers. Causing some misleading info



  	<a href="#">AS33891</a>	Core-Backbone GmbH	195.66.224.238	2001:7f8:4::8463:1	400 gbps
  	<a href="#">AS61226</a>	Flexiscale Technologies Limited	195.66.224.239	2001:7f8:4::ef2a:1	10 gbps
  	<a href="#">AS21396</a>	NetConnex Broadband Ltd.	195.66.224.240	2001:7f8:4::5394:1	10 gbps
  	<a href="#">AS30827</a>	Extraordinary Managed Services Ltd	195.66.224.241	2001:7f8:4::786b:1	10 gbps
  	<a href="#">AS35598</a>	Inetcom LLC	195.66.224.242	2001:7f8:4::8b0e:1	10 gbps
  	<a href="#">AS12390</a>	KCOM GROUP LIMITED	195.66.224.243	2001:7f8:4::3066:2	40 gbps
  	<a href="#">AS8881</a>	1&1 Versatel Deutschland GmbH	195.66.224.245	2001:7f8:4::22b1:1	100 gbps
  	<a href="#">AS212263</a>	Rocket Fibre Ltd	195.66.224.246	2001:7f8:4::3:3d27:1	10 gbps
  	<a href="#">AS50957</a>	MEMSET Ltd	195.66.224.247	2001:7f8:4::c70d:1	10 gbps
 	<a href="#">AS35399</a>	Online50 Limited	195.66.224.248		100 mbps
  	<a href="#">AS34066</a>	Telappliant Limited	195.66.224.249		10 gbps
  	<a href="#">AS199335</a>	Talk Straight Ltd.	195.66.224.250		10 gbps
  	<a href="#">AS2906</a>	Netflix Streaming Services Inc.	195.66.224.251	2001:7f8:4::b5a:3	100 gbps
 	<a href="#">AS6663</a>	Turk Telekom International	195.66.224.252	2001:7f8:4::1a07:1	10 gbps

Detected Vendor: IBM Corp

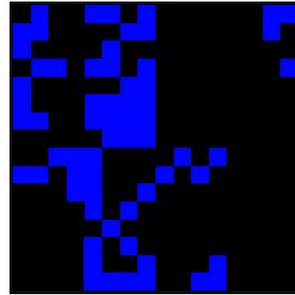
View

Edit



# 185.186.64.0/24

Announced by [AS202562](#)



Full ICMP /0 scan every 30 days

Overview

Connectivity

Whois

DNS

Validation

## Show Reverse DNS

Address	PTR
185.186.64.1	core2.ein.aperture-networks.net.
185.186.64.2	core1.ams.aperture-networks.net.
185.186.64.3	core1.ein.aperture-networks.net.
185.186.64.4	core1.fra.aperture-networks.net.
185.186.64.5	core1.ciab.aperture-networks.net.
185.186.64.6	core1.mci.aperture-networks.net.
185.186.64.8	core1.lax.aperture-networks.net.



RDNS gets re-scanned if the DNS SOA changes

View

Edit



# 2a04:ad80::/47

Announced by [AS44684](#)

Overview

Connectivity

Whois

DNS

## Show Reverse DNS

Address	PTR
2a04:ad80::53d0:59a0	i.v6.20hz.biz.
2a04:ad80::8613:e3c2	l02a.shelladdress.co.uk.
2a04:ad80::bec6:c021	hv302.nl1.bhost.net.
2a04:ad80::d437:8afa	ipv4.totallysucks.co.uk.
2a04:ad80::d51e:7035	nether.juzam.net.
2a04:ad80::f676:8691	hv301.nl1.bhost.net.
2a04:ad80:0:79::e74d	lists.videsfonds.lv.
2a04:ad80:0:ac::4239	ichenil.com.



RDNS scanning also works on IPv6\*

\* Assuming the DNS server is RFC Compliant

# 2a04:ad80::/47

Announced by [AS44684](#)

Overview

Connectivity

Whois

DNS

## Show Forward DNS

AAAA	DNS
2a04:ad80::10b8:b5b6	isolation.thordendal.ru, thordendal.ru, 410.thordendal.ru
2a04:ad80::53d0:59a0	l02a.customhost.org.uk
2a04:ad80::8613:e3c2	l02a.shelladdress.co.uk
2a04:ad80::d51e:7035	nether.juzam.net
2a04:ad80:0:ce::7295	bh00051.vs.mythic-beasts.com
2a04:ad80:0:114::e2b7	cloudy.sh
2a04:ad80:0:182::8d3e	dungeons.sh, transylvanian.recipes
2a04:ad80:1:6e::1	mastergen.com, dev.mastergen.com, www.mastergen.com ( <a href="#">4 more...</a> )
2a04:ad80:1:79::d547	joseph.walton-rivers.uk, walton-rivers.uk
2a04:ad80:1:8b::1	grothendieck.bio, ecosocial.space, tsmithe.net, loby.life ( <a href="#">6 more...</a> )

We can also show you what DNS points \*to\* that prefix\*

\* Assuming it has issued a SSL cert

Features - bgp.tools

bgp.tools/features

# Data Freshness

When debugging issues, data freshness is critical, not all data sets can be gathered instantly, so here is a list of how long it takes us to fetch information from various sources

Source	Last Updated
BGP Sessions Online	499 out of 513
Edits awaiting Moderation	3
Website Screenshots	Best Effort: 7 Days
RIPE+APNIC ASN and Prefix Whois	24 hours
All other Whois	Best Effort: 2 Months (Often Faster)
Automatic Network Tagging	7 Hours ago
IPv4 Ping Scans	Every 30 days
Internet Exchange Point testing	Every 24 hours
PeeringDB Import	6 Hours ago
IPv6 RDNS Scans	Every 30 days
IPv4 RDNS Scans	14 days after the SOA serial changes
IPv4 Anycast detection scan	5 Hours ago
IPv6 Anycast detection scan	4 Hours ago

I built my own BGP collector

# A New BGP daemon for a new use case

PID	USER	PRI	NI	VIRT	RES	SHR	S	CPU%	MEM%	TIME+	Command
28436	165534	20	0	4446M	987M	9676	S	107.	0.4	31:15.47	neo-bgp-prod -worker -tag umop93159t -comment [AS
16879	165534	20	0	3638M	203M	6544	S	24.2	0.1	1h42:47	neo-bgp-prod -worker -tag qj87ly5urd -comment [AS on :33509]
19200	165534	20	0	5932M	2124M	9808	S	20.4	0.8	6h52:58	neo-bgp-prod -worker -tag 594yczjob0 -comment [AS on :32073]
16730	165534	20	0	3505M	145M	9716	S	17.1	0.1	45:58.72	neo-bgp-prod -worker -tag sezmlg00qc -comment [AS on :2]:46365]
21647	165534	20	0	6813M	2580M	9732	S	16.5	1.0	13h39:53	neo-bgp-prod -worker -tag f5qoyzrcup -comment [AS on :1]:37405]
3577	165534	20	0	3702M	334M	9800	S	14.9	0.1	5h07:24	neo-bgp-prod -worker -tag gnhqwya61v -comment [AS on :6c:2]:39891]
16213	165534	20	0	3570M	173M	9728	S	14.9	0.1	1h01:05	neo-bgp-prod -worker -tag d609njt6jn -comment [AS on :]:51233]
16068	165534	20	0	4724M	1016M	9960	S	9.4	0.4	10h54:57	neo-bgp-prod -worker -tag 7eeb98i7xs -comment [AS on :]:269]:51233]
26486	165534	20	0	4448M	910M	9592	S	5.5	0.4	16:47.77	neo-bgp-prod -worker -tag imhyb01deq -comment [AS on :1]:52034]
16687	165534	20	0	6348M	2130M	9732	S	3.9	0.8	8h30:09	neo-bgp-prod -worker -tag 3cdfx1cmk0 -comment [AS on :]:1]:43911]
14589	165534	20	0	3502M	201M	9912	S	2.8	0.1	3h10:31	neo-bgp-prod -worker -tag iiedt5yvv5 -comment [AS on :]:1]:51232]
20863	165534	20	0	3567M	233M	9680	S	2.8	0.1	2h49:40	neo-bgp-prod -worker -tag gmvq4jdk2 -comment [AS on :2]:60590]
17597	165534	20	0	3501M	176M	9908	S	2.8	0.1	2h42:09	neo-bgp-prod -worker -tag f83j1shw0g -comment [AS on :25::251]:57617]
22137	165534	20	0	3500M	201M	9732	S	2.8	0.1	2h42:00	neo-bgp-prod -worker -tag umzst8brb0 -comment [AS on :]:1]:33245]
26656	165534	20	0	3831M	454M	9632	S	2.2	0.2	24:05.65	neo-bgp-prod -worker -tag yjrvb4vh0x -comment [AS on :44713]
16275	165534	20	0	5196M	1319M	9812	S	1.7	0.5	4h08:26	neo-bgp-prod -worker -tag w9yno4i99w -comment [AS on :58397]
17673	165534	20	0	3700M	275M	9848	S	1.7	0.1	1h43:31	neo-bgp-prod -worker -tag 1754rzwj4 -comment [AS on :]:3]:35029]
19046	165534	20	0	3701M	278M	9744	S	1.7	0.1	2h02:40	neo-bgp-prod -worker -tag ppm5wd2f1b -comment [AS on :]:1]:40705]
15516	165534	20	0	3700M	280M	9728	S	1.7	0.1	1h39:55	neo-bgp-prod -worker -tag jna748ntt9 -comment [AS on :]:1]:52875]
19003	165534	20	0	3633M	246M	9792	S	1.7	0.1	1h41:31	neo-bgp-prod -worker -tag a9yzhjn64 -comment [AS on :]:34932]
18370	165534	20	0	3567M	227M	9700	S	1.7	0.1	4h20:08	neo-bgp-prod -worker -tag lhvrq59mn2 -comment [AS on :57957]
22253	165534	20	0	3570M	208M	9724	S	1.7	0.1	1h12:54	neo-bgp-prod -worker -tag ww0r5kot4m -comment [AS on :57945]
24116	165534	20	0	3568M	205M	6040	S	1.7	0.1	10h14:53	neo-bgp-prod -worker -tag hf2oei9e3e -comment [AS on :53170]
15652	165534	20	0	3497M	197M	9724	S	1.7	0.1	1h12:18	neo-bgp-prod -worker -tag hh2h56p9hh -comment [AS on :53170]
16308	165534	20	0	3498M	207M	9784	S	1.7	0.1	1h16:04	neo-bgp-prod -worker -tag jaw813cukd -comment [AS on :53170]

It turns out if you don't need to converge routes writing a bgp daemon can be easy, runs ~500 Site QPS

300+ Million Routes, Over 64 CPU cores. 10k/s route updates on average, Surges of 100k/s+



# Fun things you can do if you "*simply*" write your own bgpd

- Rather than processing paths, you can directly implement code for what the site is doing (List Prefixes Originated, Upstreams, Peers, etc)
- Direct support for "watching" changes to ASNs/Prefixes
- Point in time snapshots
- Point in time reload (go backwards in time)

## Edit Monitoring Settings for AS206924

Higher Sensitivity (Will decrease alerting latency, but may result in flaps)

Automatically enable new alert types when they are released

### Prefix Visibility

Alert on new prefixes announced from ASN

Alert on a prefix from this ASN losing global visibility

### Hijack Detection

Alert on detected BGP hijack (using prefix list)

Alert if any new route/route6 objects are created IPs in the prefix list

## AS Relation Alerts

Alert on a new BGP Upstream

Alert on a new BGP Downstream

Alert on the loss of a BGP Upstream

Alert on the loss of a BGP Downstream

## RPKI Alerts

Alert if any prefixes become RPKI Invalid

Alert if any prefixes become RPKI Unknown

Alert if any prefixes RPKI ROAs are 6 hours from expiring


Alert if any changes to ROAs pointing to this ASN

## IRR Database Alerts

Alert if any new route/route6 objects are created for this ASN

Alert if this ASN is added to any AS-SETS

[bgp.tools Alert] for AS206924

 The prefix ( 2a0c:2f07:384::/48 ) has lost visibility from the global routing table.

10:32

[bgp.tools Alert] for AS206924

 AS206924 has been added to "as-bgptools-test" on the RIPE IRR database

[bgp.tools Alert] for AS206924

 A route object for "2a0c:2f07:ff::/48" for AS206924 has been added to the RIPE IRR database

2a0c:2f07:ac11::48 - bgp.tools

bgp.tools/prefix/2a0c:2f07:ac11::48#connectivity

```

SSH: root@107.191.37.231
GNU nano 5.4 /etc/bird/bird.conf
neighbor 2001:19f0:ffff::1 as 64515
local 2001:19f0:5:4d8:5400:3ff:fed5:bed4 as 206324;
multihop 2;
local as 206324;
password "boop";
ipv6 {
  export filter {
    if (source = RTS_STATIC) then {
      bgp_community.add((20473,6000));
      bgp_community.add((64699,1299));
      bgp_community.add((64699,2914));
    }
  };
  reject;
};
import none;

# BGP example, explicit name 'uplink1' is used instead of default 'bgp1'

```

```

SSH: root@149.28.65.132
GNU nano 5.4 /etc/bird/bird.conf
neighbor 2001:19f0:ffff::1 as 64515;
local 2001:19f0:6001:5fb2:5400:3ff:fed5:bec7 as 206324;
multihop 2;
local as 206324;
password "boop";
ipv6 {
  export filter {
    if (source = RTS_STATIC) then {
      bgp_community.add((20473,6000));
      bgp_community.add((64699,1299));
      bgp_community.add((64699,2914));
    }
  };
  reject;
};
import none;

# BGP example, explicit name 'uplink1' is used instead of default 'bgp1'

```

8

SSH [3]

File Hosts Send Help

Overview

Connectivity

Whois

DNS

```

SSH: root@140.82.38.174
GNU nano 5.4 /etc/bird/bird.conf
neighbor 2001:19f0:ffff::1 as 64515;
local 2a05:f480:1800:899:5400:3ff:fed5:beb6 as 206324;
multihop 2;
local as 206324;
password "boop";
ipv6 {
  export filter {
    if (source = RTS_STATIC) then {
      bgp_community.add((20473,6000));
      bgp_community.add((64699,1299));
      bgp_community.add((64699,2914));
    }
  };
  reject;
};
import none;

# BGP example, explicit name 'uplink1' is used instead of default 'bgp1'

```

```

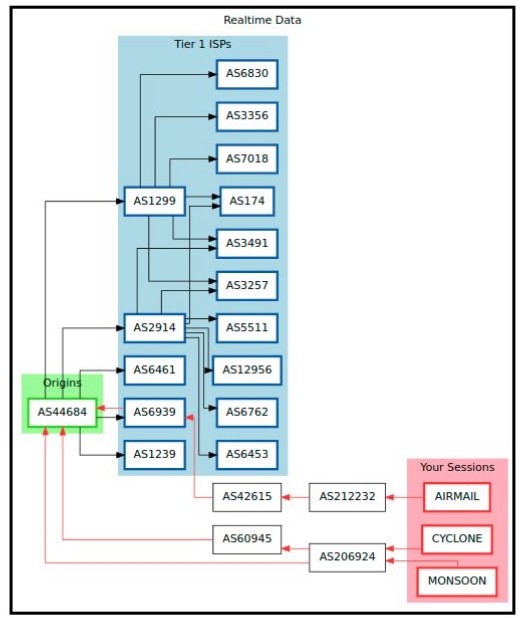
graph TD
  AS1299 --- AS5461
  AS1299 --- AS5453
  AS1299 --- AS5511

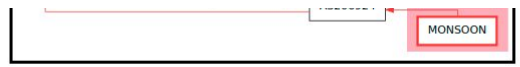
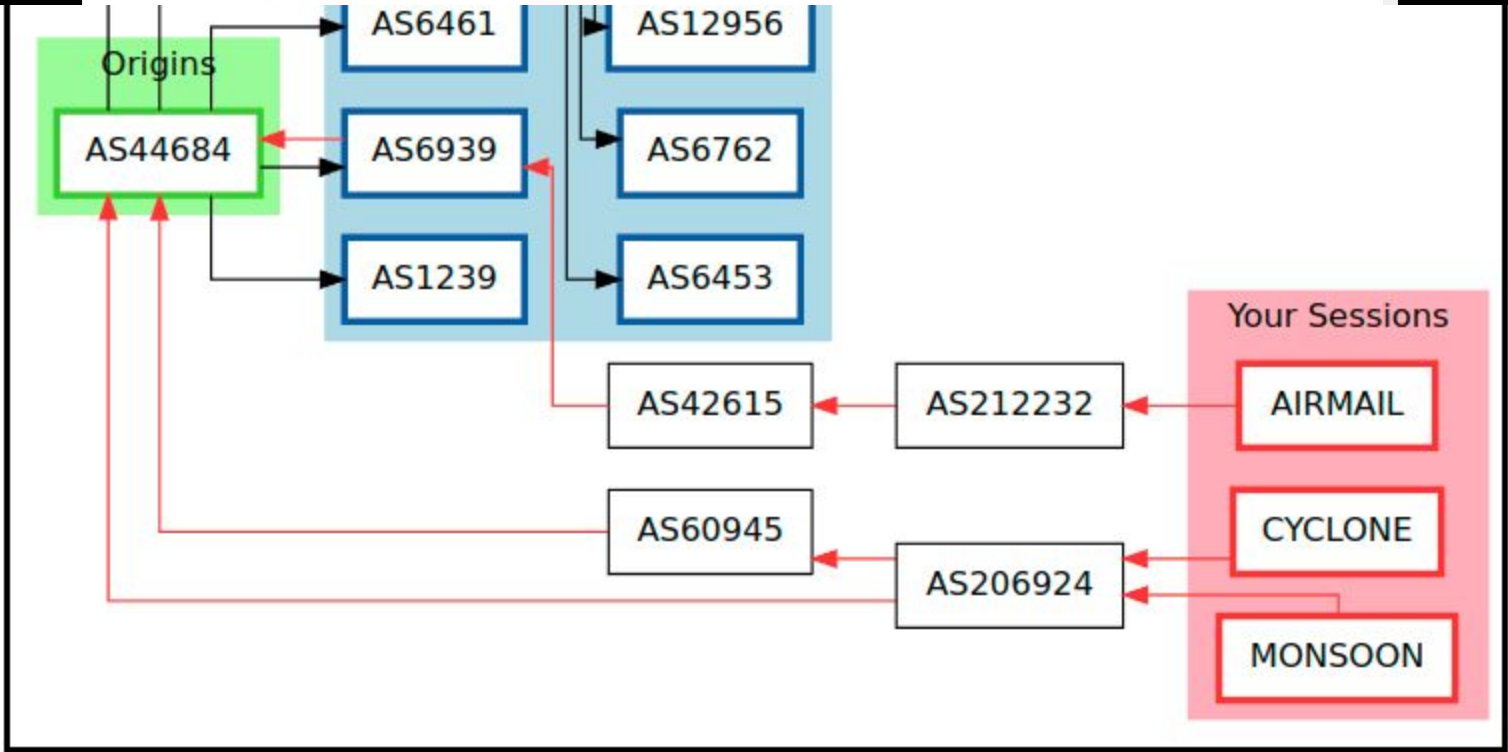
```

# 2a00:1098::/32

Announced by [AS44684](#)

- Overview
- Connectivity**
- Whois
- DNS
- Validation





Some interesting things about the LU market

Luxembourg Network Rankin x +

bgp.tools/rankings/LU?sort=cone

bgp.tools Start here... AS206924

## Luxembourg Network Rankings

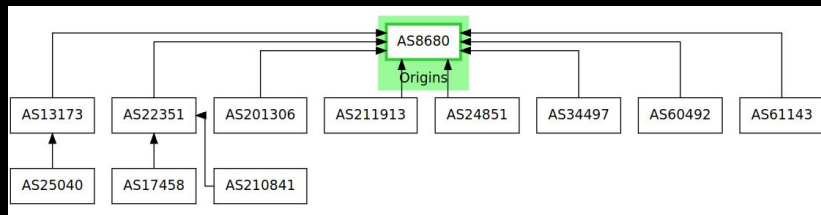
Sort by: AS Cone

[Learn more about how these ranks are calculated](#)

AS	Name	Peer Rank	Cone Rank	Eyeball Rank	Host Rank
<a href="#">AS199524</a>	G-Core Labs S.A.	#1 (365)	#1 (368)	#4	#1 (7.2 K)
<a href="#">AS6661</a>	POST Luxembourg	#5 (124)	#2 (48)	#1	#6 (2.4 K)
<a href="#">AS29467</a>	LUXNETWORK S.A.	#6 (94)	#3 (34)	#21	#20 (185)
<a href="#">AS56665</a>	Proximus Luxembourg S.A.	#3 (133)	#4 (15)	#3	#12 (412)
<a href="#">AS12684</a>	SES ASTRA S.A.	#8 (86)	#5 (11)	#7	#36 (19)
<a href="#">AS15965</a>	CEGECOM S.A.	#9 (72)	#6 (9)	#18	#21 (149)
<a href="#">AS206610</a>	Mixvoip S.A.	#11 (56)	#7 (7)	#12	#13 (327)
<a href="#">AS24611</a>	Datacenter Luxembourg S.A.	#14 (24)	#8 (6)	#25	#3 (5.6 K)
<a href="#">AS60497</a>	Uwe Zeidler	#15 (19)	#8 (6)	#34	#50 (0)
<a href="#">AS208374</a>	LU-CIX Management GIE	#27 (5)	#9 (4)	#44	#50 (0)
<a href="#">AS25273</a>	Broadcasting Center Europe (an RTL Group Comp...	#21 (11)	#9 (4)	#31	#22 (106)
<a href="#">AS210834</a>	LU-CIX Management GIE	#23 (9)	#9 (4)	#44	#40 (12)
<a href="#">AS34683</a>	TELKEA TELECOM SA	#27 (5)	#9 (4)	#15	#19 (192)
<a href="#">AS9008</a>	Visual Online S.A.	#16 (17)	#10 (3)	#9	#9 (1.8 K)
<a href="#">AS60391</a>	Papa-Razzi Media Group A.s.b.l.	#24 (8)	#10 (3)	#44	#50 (0)

Sum of all of the ASNs "behind" (downstreamed) another ASN.

For example, this ASN has a cone of 12 (including itself)



Luxembourg Network Rankin x +

bgp.tools/rankings/LU?sort=eyeballs

Start here... AS206924

## Luxembourg Network Rankings

Sort by: Estimated Eyeball

[Learn more about how these ranks are calculated](#)

AS	Name	Peer Rank	Cone Rank	Eyeball Rank	Host Rank
<a href="#">AS6661</a>	POST Luxembourg	#5 (124)	#2 (48)	#1	#6 (2.4 K)
<a href="#">AS202422</a>	G-Core Labs S.A.	#31 (1)	#12 (0)	#2	#2 (7.2 K)
<a href="#">AS56665</a>	Proximus Luxembourg S.A.	#3 (133)	#4 (15)	#3	#12 (412)
<a href="#">AS199524</a>	G-Core Labs S.A.	#1 (365)	#1 (368)	#4	#1 (7.2 K)
<a href="#">AS8632</a>	Luxembourg Online S.A.	#7 (87)	#12 (0)	#5	#14 (291)
<a href="#">AS204279</a>	Eltrona Interdiffusion S.A.	#26 (6)	#12 (0)	#6	#26 (71)
<a href="#">AS12684</a>	SES ASTRA S.A.	#8 (86)	#5 (11)	#7	#36 (19)
<a href="#">AS2602</a>	Fondation RESTENA	#14 (24)	#10 (3)	#8	#11 (677)
<a href="#">AS9008</a>	Visual Online S.A.	#16 (17)	#10 (3)	#9	#9 (1.8 K)
<a href="#">AS42848</a>	European Commission	#30 (2)	#12 (0)	#10	#46 (4)
<a href="#">AS43375</a>	EUROPEAN PARLIAMENT	#31 (1)	#12 (0)	#11	#43 (8)
<a href="#">AS206610</a>	Mixvoip S.A.	#11 (56)	#7 (7)	#12	#13 (327)
<a href="#">AS25094</a>	Centre des technologies de l'information de l...	#27 (5)	#12 (0)	#13	#18 (212)
<a href="#">AS204403</a>	HOTCITY SA	#16 (17)	#12 (0)	#14	#37 (16)
<a href="#">AS34683</a>	TELKEA TELECOM SA	#27 (5)	#9 (4)	#15	#19 (192)

A mixer metric, using bittorrent data, ads, and other "eyeball" signals, ranked.

It also catches VPN networks. Raw numbers are hard to understand, so are hidden from view.



Luxembourg Network Rankin x +

bgp.tools/rankings/LU?sort=dns

bgp.tools Start here... AS206924

## Luxembourg Network Rankings

Sort by: Uniq Domains Hosted

[Learn more about how these ranks are calculated](#)

AS	Name	Peer Rank	Cone Rank	Eyeball Rank	Host Rank
<a href="#">AS199524</a>	G-Core Labs S.A.	#1 (365)	#1 (368)	#4	#1 (7.2 K)
<a href="#">AS202422</a>	G-Core Labs S.A.	#31 (1)	#12 (0)	#2	#2 (7.2 K)
<a href="#">AS24611</a>	Datacenter Luxembourg S.A.	#14 (24)	#8 (6)	#25	#3 (5.6 K)
<a href="#">AS213183</a>	Zonat S.A.	#28 (4)	#12 (0)	#17	#4 (3.9 K)
<a href="#">AS212882</a>	dnx network sarl	#29 (3)	#12 (0)	#44	#5 (2.4 K)
<a href="#">AS6661</a>	POST Luxembourg	#5 (124)	#2 (48)	#1	#6 (2.4 K)
<a href="#">AS5577</a>	root SA	#28 (4)	#11 (2)	#16	#7 (2.2 K)
<a href="#">AS34655</a>	DuoDecad IT Services Luxembourg S.a r.l.	#4 (126)	#11 (2)	#42	#8 (1.9 K)
<a href="#">AS9008</a>	Visual Online S.A.	#16 (17)	#10 (3)	#9	#9 (1.8 K)
<a href="#">AS198095</a>	EBRC SA	#28 (4)	#12 (0)	#34	#10 (1.1 K)
<a href="#">AS2602</a>	Fondation RESTENA	#14 (24)	#10 (3)	#8	#11 (677)
<a href="#">AS56665</a>	Proximus Luxembourg S.A.	#3 (133)	#4 (15)	#3	#12 (412)
<a href="#">AS206610</a>	Mixvoip S.A.	#11 (56)	#7 (7)	#12	#13 (327)
<a href="#">AS8632</a>	Luxembourg Online S.A.	#7 (87)	#12 (0)	#5	#14 (291)
<a href="#">AS200129</a>	LHISP S.A.	#19 (13)	#12 (0)	#44	#15 (288)

Using the forward DNS database, I count the amount of domain names (rounded up to the domain) that points to each ASN.

Example:

**a.b.benjojo.co.uk -> benjojo.co.uk**

One domain can occupy more than one ASN, so if you sum up the whole host rank numbers, the resulting number will be larger than the number of all domains.

Luxembourg Network Rankin x +

bgp.tools/rankings/LU?sort=peering

Start here... AS206924

## Luxembourg Network Rankings

Sort by: Adjacencies

[Learn more about how these ranks are calculated](#)

AS	Name	Peer Rank	Cone Rank	Eyeball Rank	Host Rank
<a href="#">AS199524</a>	G-Core Labs S.A.	#1 (365)	#1 (368)	#4	#1 (7.2 K)
<a href="#">AS203577</a>	Fumon Shimadate	#2 (255)	#12 (0)	#44	#50 (0)
<a href="#">AS56665</a>	Proximus Luxembourg S.A.	#3 (133)	#4 (15)	#3	#12 (412)
<a href="#">AS34655</a>	DuoDecad IT Services Luxembourg S.a r.l.	#4 (126)	#11 (2)	#42	#8 (1.9 K)
<a href="#">AS6661</a>	POST Luxembourg	#5 (124)	#2 (48)	#1	#6 (2.4 K)
<a href="#">AS29467</a>	LUXNETWORK S.A.	#6 (94)	#3 (34)	#21	#20 (185)
<a href="#">AS8632</a>	Luxembourg Online S.A.	#7 (87)	#12 (0)	#5	#14 (291)
<a href="#">AS12684</a>	SES ASTRA S.A.	#8 (86)	#5 (11)	#7	#36 (19)
<a href="#">AS15965</a>	CEGECOM S.A.	#9 (72)	#6 (9)	#18	#21 (149)
<a href="#">AS202828</a>	Ho Ho Yeung	#10 (57)	#10 (3)	#44	#50 (0)
<a href="#">AS206610</a>	Mixvoip S.A.	#11 (56)	#7 (7)	#12	#13 (327)
<a href="#">AS212568</a>	David Moes	#12 (54)	#12 (0)	#44	#50 (0)
<a href="#">AS198290</a>	Global IT Services PSF SA	#12 (54)	#12 (0)	#35	#27 (54)
<a href="#">AS197692</a>	Conostix S.A.	#13 (47)	#11 (2)	#44	#16 (278)
<a href="#">AS2602</a>	Fondation RESTENA	#14 (24)	#10 (3)	#8	#11 (677)

Sum of all visible unique peering (A<->B) relationships.

Is easily "gameable" and is biased to what data I have.

Also (probably because of this) a well loved metrics for sales and marketing

Want to improve your peering number?

# Frictionless and easy

- Login via PeeringDB, or sign up for a bgp.tools account
- We setup some kind of communication method (That includes more "exotic" stuff like Discord, Slack, Telegram, Signal, Webhooks)
- You can **instantly** create a new session and the backend and UI live updates to the status

[Home](#) [Contacts](#) [BGP Sessions](#) [Monitoring](#) [Profile](#) [Log out](#)

---

## Configured BGP Sessions

Below are the BGP sessions that are setup with bgp.tools. You can add more, edit, or delete them. This page updates automatically

	Description	OurASN/YourASN	Routes	AddPath	Displayed	-
<input checked="" type="checkbox"/>	2com1	206924/206924	198646	x	<input type="checkbox"/>	<a href="#">Edit</a>
<input checked="" type="checkbox"/>	CYCLONE	212232/206924	323706	✓	<input type="checkbox"/>	<a href="#">Edit</a>
<input checked="" type="checkbox"/>	MONSOON	212232/206924	399964	✓	<input checked="" type="checkbox"/>	<a href="#">Edit</a>
<input checked="" type="checkbox"/>	AIRMAIL	212232/212232	157351	x	<input type="checkbox"/>	<a href="#">Edit</a>

---

[Click here to add a new session](#)

# This is all you need

## New BGP Session:

Description for Router/Session: (max 16 chars)

Select the ASN you would like us to use for you. We will only accept [AS212232 \(bgp.tools\)](#), AS206924, and Private ASN ranges

Select the ASN you are going to use with us. We will only accept AS206924 and Private ASN ranges

Select the IP you will be connecting from.

You will get the remote (bgp.tools side) IP after you create the session.

Please send **Full tables** rather than just your peering routes/customer routes. bgp.tools may automatically switch your sessions to only import your peering routes to save RAM, but allow us to figure that out for future flexibility!

We support (and encourage) BGP AddPath, and MultiProtocol/MultiFamily BGP

---

If you absolutely need a MD5 Password on the session, please enter the desired MD5 password

Export this data into publicly available MRT files

Also allow commercial products to use those MRT files

Send notifications if session is down for more than 2 hours


# MRT Support will be offered soon

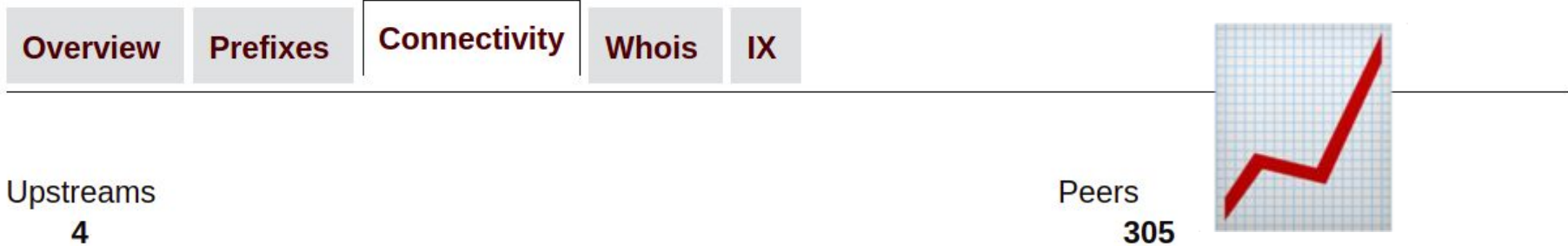
People can opt in to having their routes exported out into a large MRT file.

To deal with usage concerns, the files are split between profit allowed and non-profit uses.

- Export this data into publicly available MRT files
- Also allow commercial products to use those MRT files
- Send notifications if session is down for more than 2 hours

# If you like this tool, Please setup BGP Collector sessions

- I'm in particular need for Verizon (AS701(2,3)), DTAG (AS3320), Telefonica (AS12956), Sparkle (AS6762), and the  LU ecosystem
- However if you want a better peering rank, you should feed anyway



- This also will help the academic community get access to unique AS Path data!

# Questions? / Requests?

Or [admin@bgp.tools](mailto:admin@bgp.tools) / [ben@benjojo.co.uk](mailto:ben@benjojo.co.uk)

Longer term bgp.tools goals:

- Work with poorly covered networks/regions (*Like Luxembourg*) to start sessions with us
- Continue to build better debugging systems designed for real network engineers to use, not marketing slides
- Historical data pull back
- **Talk to me in person for more plans!**



# Backup slides

# API... ish?

- Similar whois+bulk mode server to Team Cymru's

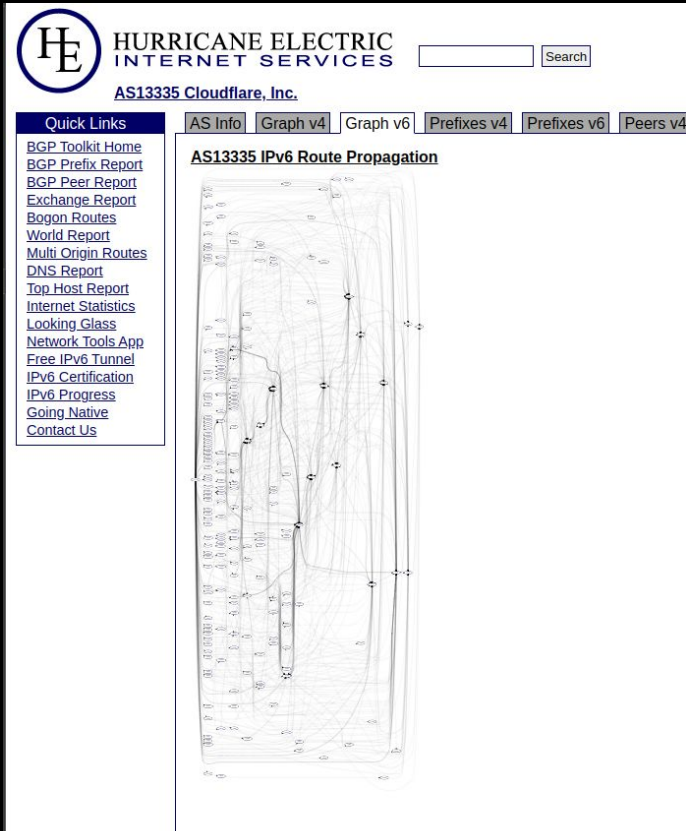
```
[16:56:34] ben@metropolis:~$ whois 185.230.223.69 -h bgp.tools
```

AS	IP	BGP Prefix	CC	Registry	Allocated	AS Name
206924	185.230.223.69	185.230.223.0/24	GB	RIPE	2022-06-21	Ben Cartwright-Cox

- table.txt / table.jsonl for full table <-> ASN mapping
- asns.csv for **ASN -> Name mappings**
- Dumping of network tag members
- Gopher (yes, really) support if you *really* hate yourself

<https://bgp.tools/kb/api>

# Avoids situations like this:



The screenshot shows the Hurricane Electric website interface. At the top left is the HE logo and the text "HURRICANE ELECTRIC INTERNET SERVICES". To the right is a search bar. Below this is the text "AS13335 Cloudflare, Inc.". A navigation bar contains tabs for "AS Info", "Graph v4", "Graph v6", "Prefixes v4", "Prefixes v6", and "Peers v4". The "Graph v6" tab is selected. The main content area is titled "AS13335 IPv6 Route Propagation" and displays a complex network graph with numerous nodes and dense connections, representing a routing spaghetti. On the left side, there is a "Quick Links" menu with various links such as "BGP Toolkit Home", "BGP Prefix Report", "BGP Peer Report", "Exchange Report", "Bogon Routes", "World Report", "Multi Origin Routes", "DNS Report", "Top Host Report", "Internet Statistics", "Looking Glass", "Network Tools App", "Free IPv6 Tunnel", "IPv6 Certification", "IPv6 Progress", "Going Native", and "Contact Us".

← GraphViz Routing Spaghetti

# General Data Flows of bgp.tools

