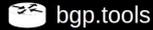


# Getting creative with IXP route collection

Ben Cartwright-Cox - PeeringDays 2023



# Quick overview of bgp.tools



AS206924

## Browse the Internet ecosystem

Search by ASN (AS13335), or Prefix (8.8.8.0/24), or DNS (bgp.tools)

Start here...



### You are connecting from

- IPv6: 2a0c:2f07:4663:4663:92e2:baff:fe61:c389
- Ben Cartwright-Cox (AS206924)
- 2a0c:2f07:4663::/48
- DNS: 185.230.223.109
- DNS: 2a0c:2f07:4896:666:216:3eff:feff:861f
- DNS: 2a0c:2f07:29:666::5353

### Example Pages

- [Cloudflare \(AS13335\)](#)
- [LINX LON1](#)
- [Google DNS Prefix](#)

### Recent Updates

- [March 2023 Changelog](#)
- [February 2023 Changelog](#)
- [January 2023 Changelog](#)

### Why use BGP.Tools?

#### We offer for free:

- Near Realtime BGP Data
- User Friendly interfaces
- [Frequently updated external data](#)

#### We offer for paid users:

- [BGP Network Monitoring](#)
- [IRR Database Monitoring](#)

[Scripting/API](#) [Credits](#) [Pricing](#) [Contact Us](#) [Issue Tracker](#) [Contribute Data](#)

Port 179 Ltd is a company registered in England and Wales (Registration Number: 14127855)



# bgp.tools

bgp.tools/as/202030

Start here...



Logged in as AS206924

View

Edit



## Icelandair ehf

AS Number 202030

Website <http://www.icelandair.is>

Overview

Prefixes

Connectivity

Whois

IX

Registered on

29 Apr 2014 (8 years old)

Network status

Active, Allocated under RIPE

Network type

Unknown

Prefixes Announced

5 IPv4, 0 IPv6

### Upstreams

- [AS44735](#) - Nova hf
- [AS30818](#) - Advania Ísland ehf

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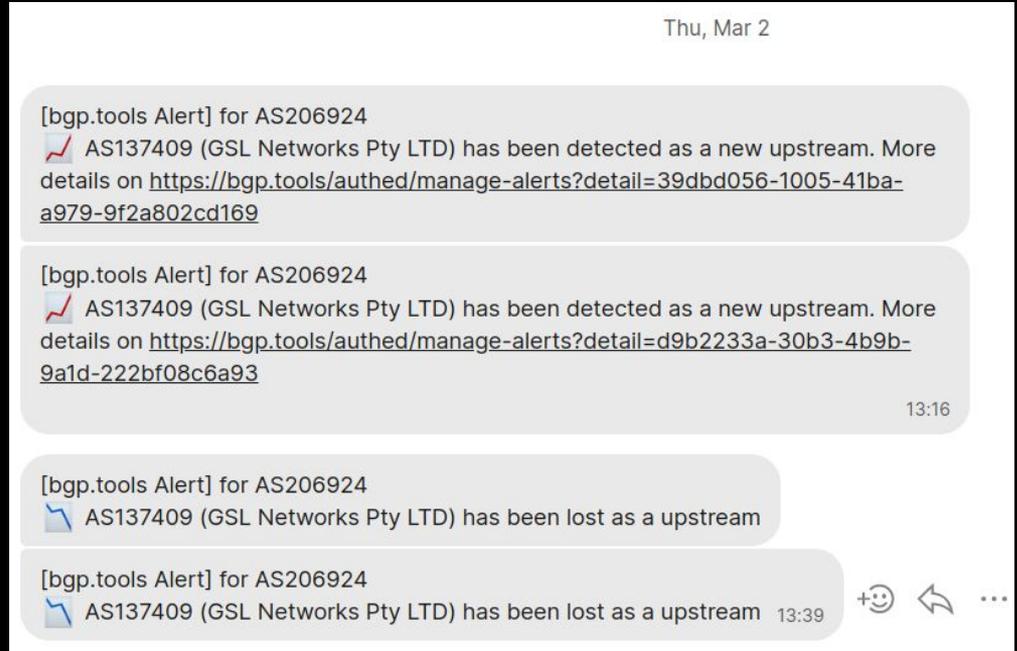
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# Core points

- Built out of the frustration I had with other tools
- 910~ BGP sessions established
- Practically realtime BGP peer updates
- WHOIS is handled with more care, and in some cases is updated in near realtime
- Frequently updated (~14 days):
  - ICMP Ping data scans of IPv4 /0
  - IPv4 and IPv6 RDNS data
  - Forward DNS data (Looking what A records point to a prefix)
- Peering IXP data is provided (MAC address vendors, ping data etc)

# Monitoring services

- Goal is to fund the site (and myself) by providing nice paid tools like rapid BGP/RPKI/IRRdb monitoring, managed looking glasses, BGP Session data recording



# ANYWAY

Sorry didn't mean to do a sales pitch



bgp.tools

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# One of the core bits of today's adventure

## Upstreams

	ASN	Description	IPv4	IPv6
	<a href="#"><u>AS20473</u></a>	The Constant Company, LLC	✗	✓
	<a href="#"><u>AS5511</u></a>	Orange S.A.	✓	✓
	<a href="#"><u>AS6939</u></a>	Hurricane Electric LLC	✗	✓
	<a href="#"><u>AS3170</u></a>	VeloxServ Communications Ltd	✓	✓
	<a href="#"><u>AS44684</u></a>	Mythic Beasts Ltd	✓	✓



# Determining the upstreams of an ASN is a non trivial task

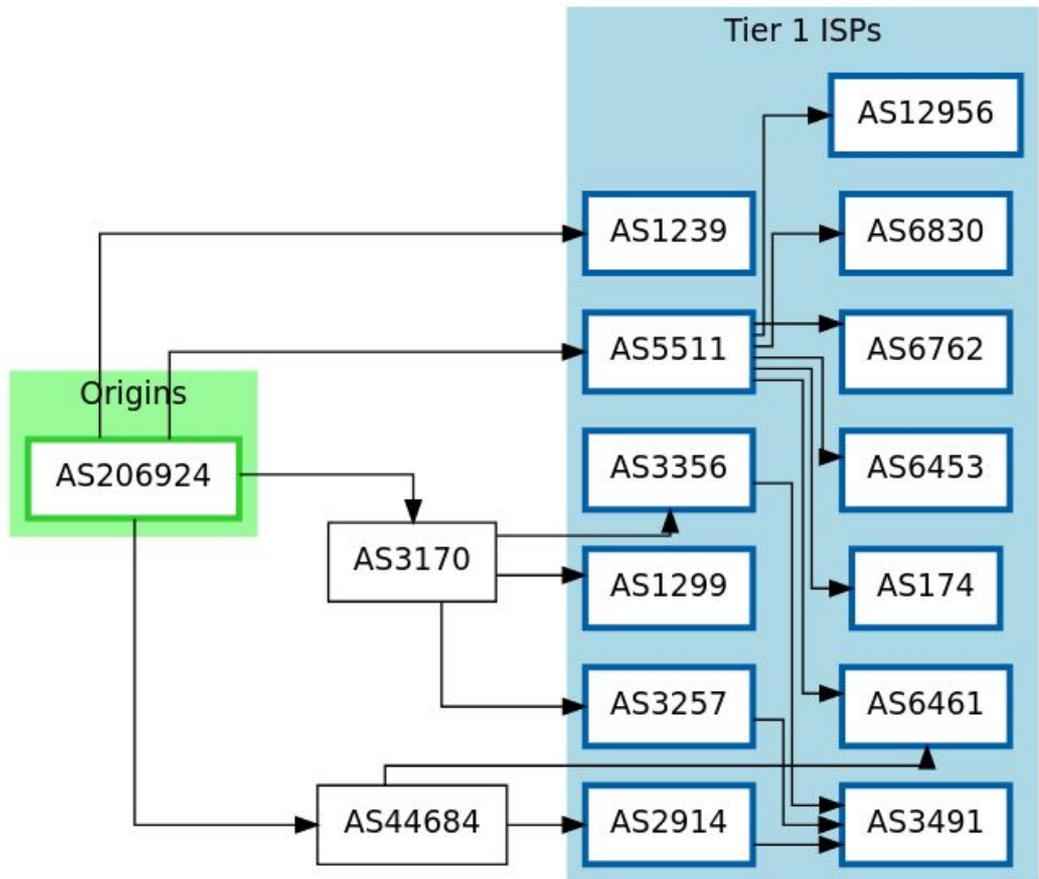
- You have to have loads of vantage points
- You have to detect and scrub route optimisers who lie to you

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- You have to detect and scrub route optimisers who lie to you
  
- "Upstreams" is not really a truly well defined concept, but I view it as someone who sends you eventually up to a T1 network

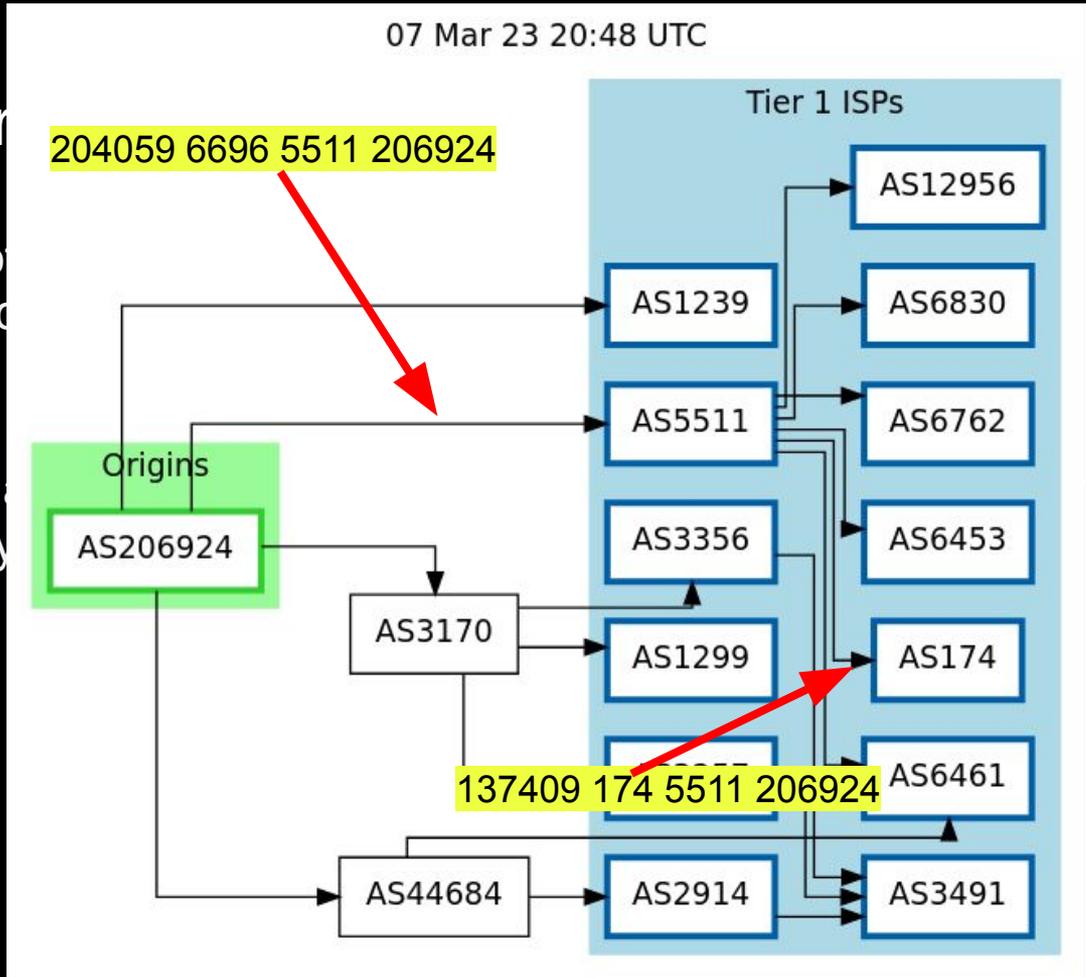
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- You have to have loads of vantage points
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- "Upstreams" is not really a truly well defined concept, but I view it as someone who sends you eventually up to a T1 network
  
- It is not clear that this is a good definition in some regions
- ISPs like Zayo and Sprint peer a *lot* on Route Servers, so you have to apply logic to them to avoid everyone on a IXP having Zayo and Sprint as a upstream

The two problems this talk will explore

You have to have loads  
of vantage points

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# What is upstreaming?

# Current status quo

- Bgp.tools considers any path that crosses a T1 a path where upstreams can be learned.
- Current calculation goes:
  - 917 137409 174 5511 206924 112
  - 917 -> 137409 -> 174 is ignored, since the feed could easily be lying about this to juice their upstream stats (or incompetence)
  - 174->5511 are considered peers, since they are T1s
  - 5511->206924 results in 206924 having 5511 as a upstream (and 206924 being a downstream of 5511)
  - 206924->112 results in the same effect, 112 as a upstream of 206924
  - All of this with a single BGP ASPATH!

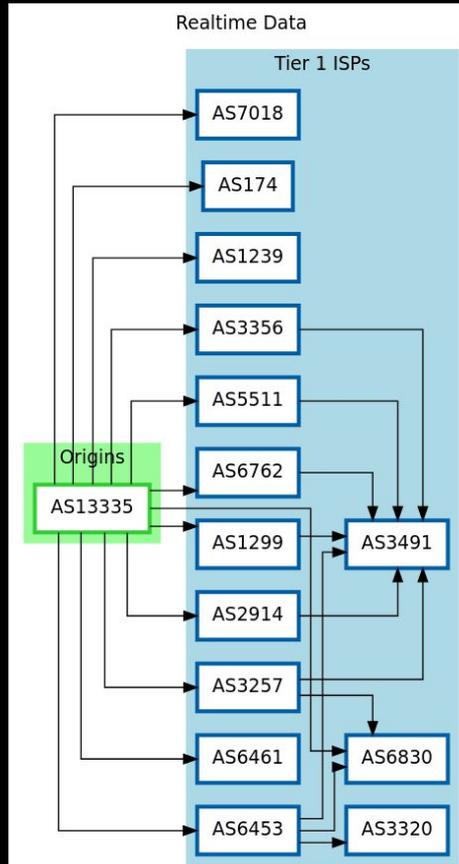
# Current status quo (problems #1)

- This does not consider that you may be a peer of the T1.
  - If I see **137409 174 206924** It could (but very unlikely) be that AS206924 is a peer of cogent
  - This is more likely with (A) Zayo, (B) Sprint since (A) peers a lot, (B) imports peers on the route servers of IXPs
    - Though sprint won't be a problem for too much longer I guess...
  - Zayo and Sprint have a requirement of a "double hop", meaning we **must** observe two T1 ASN hops before considering it a upstream route
    - Since that would imply that route is in their customer cone
  - This trick works well, but it does not scale to all T1's because...

# Current status quo (problems #2)

My code

AT&T, Liberty Global, ✨, 🍊, TATA, GTT, NTT, Lumen, Cogent and 🦁 are upstreams



My (own brain) interpretation

AT&T might be peering???  
Cogent is almost defo transit  
Sprint, Zayo are likely peering

🍊, Lumen, ✨, 🦁, NTT, GTT, TATA are all double hops. Assumed upstreams

AT&T, Liberty are likely not upstreams



# New idea

- A upstream is someone who (*with consent*) carries your routes to their peers/upstreams
- Basically, if it's in your cone, you are a upstream for them
  
- The basic way of implementing this is to keep doing the T1 logic, but also import in IXP route servers, since they are a great insight into the cone of networks in a pure-ish way
  
- Downside: You must get feeds from loads of different IXP route servers

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# RIS and Routeviews

# Peering LAN first

- Most collectors live on IXPs
- Kind of a mess of IXP peers just sending their customer cone, not their full table
- Previously (Maybe still currently?) RIS has been limiting new sessions due to capacity concerns?

Name	Physical Location	Type	Scope	Raw Data
RRC00	Amsterdam, NL	multihop	global	<a href="#">data</a>
RRC01	London, GB	IXP	LINX, LONAP	<a href="#">data</a>
RRC03	Amsterdam, NL	IXP	AMS-IX, NL-IX	<a href="#">data</a>
RRC04	Geneva, CH	IXP	CIXP	<a href="#">data</a>
RRC05	Vienna, AT	IXP	VIXP	<a href="#">data</a>
RRC06	Otemachi, JP	IXP	DIX-IE	<a href="#">data</a>
RRC07	Stockholm, SE	IXP	Netnod	<a href="#">data</a>
RRC10	Milan, IT	IXP	MIX	<a href="#">data</a>
RRC11	New York, NY, US	IXP	NYIIX	<a href="#">data</a>
RRC12	Frankfurt, DE	IXP	DE-CIX	<a href="#">data</a>
RRC13	Moscow, RU	IXP	MSK-IX	<a href="#">data</a>
RRC14	Palo Alto, CA, US	IXP	PAIX	<a href="#">data</a>
RRC15	Sao Paulo, BR	IXP	PTTMetro-SP	<a href="#">data</a>
RRC16	Miami, FL, US	IXP	Equinix Miami	<a href="#">data</a>
RRC18	Barcelona, ES	IXP	CATNIX	<a href="#">data</a>
RRC19	Johannesburg, ZA	IXP	NAP Africa JB	<a href="#">data</a>



# But I can't deny IXP collection does not work

- RIPE has ~1500 BGP sessions online,
  - 374 / 403 Full IPv4/IPv6 tables
  - (by their own calculations)
  - Some of these sessions have issues about to be mentioned, **some are immensely useful views of the internet though!**
- bgp.tools is eBGP Multihop only
  - 910~ Sessions online
  - 522 / 800 Full IPv4/IPv6 tables (!!)

# Problems with IXP Route Collection

- Really expensive if you don't have friends
  - IXP Membership fees + XC fees + colo fees
  - IXP membership alone can be more than the last two
  - <https://peering.exposed>
- **Huge** bias to AS6939
  - They are on almost all of the large IXPs, and provide you 180k+ of peered v4 routes that will likely be preferred over transit, hiding transit paths from the collector

# Solving for XC Fees / Colo

- What is the cheapest, smallest, most insane thing we could ship to a willing IXP?



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<https://blog.benjojo.co.uk/post/smart-sfp-linux-inside>

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# Solving for XC Fees / Colo

- What is the cheapest, smallest, most insane thing we could ship to a willing IXP?



- No XC, The switch is the power supply, you can hitch backhaul either via someone friendly on the IXP, or relaying via a VPS or something
- Cheap, Around 150 USD all in
- Single core ARMv7, with 512M of RAM running Debian Jessie
- **Completely deranged.** Everyone is going to look at you like you lost the plot!
- Made by a Russian company who is totally now a Dubai company since the Russian Invasion of Ukraine



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<https://blog.benjojo.co.uk/post/smart-sfp-linux-inside>

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Looking in the right places



# Looking in the right places



- 80~ USD from FS.com
- Runs a 400Mhz 32bit MIPS core, 64MB of RAM
- Literally running OpenWRT out of the packaging
- Also, here are the SSH credentials to all of them
  - user **ONTUSER**
  - password **7sp!1wUBz1**
- The constrained RAM and MIPS CPU  $\mu$ Arch makes this a challenge to program for
- Thankfully Zig lang has a mostly working MIPS target!
- Can change the vendor to w/e with just ``sfp_i2c -i 0 -s "CISCO"```



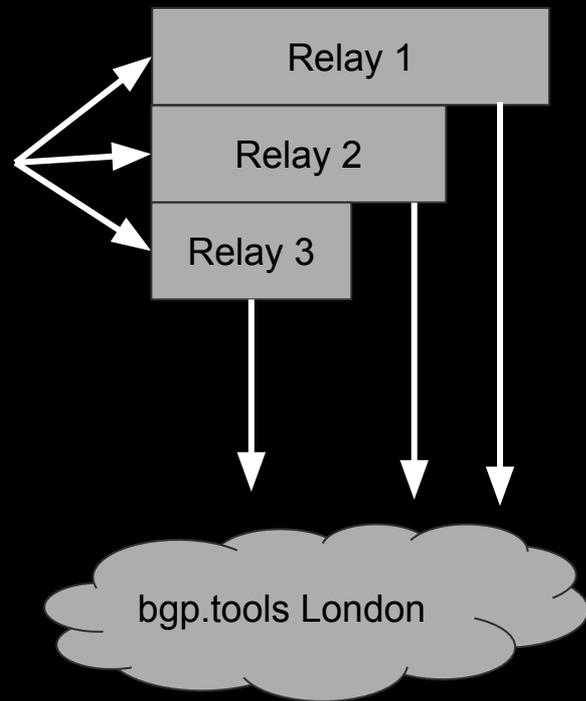
# Dialing down the insanity

- A lot of IXPs have reseller programs, and with friends you can pick up very cheap ports and maybe a tagged vlan on a virtual machine.
- Downside is that even with this, a lot of the IXPs still require you to be a full member to be present on the LAN

# All roads lead back to London

- You have have noticed it isn't really possible to store a *modern* full internet table on 64MB of RAM.
- Instead of storing sessions locally, the local collector will "rehost" the BGP session back in London where all of the infra is.
- This is because with how bgp.tools is designed, all BGP data has to be within 1ms~ of the web server to ensure a enjoyable experience

# Overall



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# Current expanding plans

- NL-IX is coming up via a reseller port
- African IXP relays are slowly being figured out via two different carriers
- Got contacts at AMS-IX / DE-CIX / FranceIX / MIX? I'd love to know them
- IX.BR is home to a lot of interesting networks that don't wish to eBGP multihop peer, I am slowly working out a reseller port setup there!
  - Same with some African networks
  
- Some IXPs are setting up eBGP multihop sessions from their route servers!  
Very nice of them!

# Questions?

Want to feed bgp.tools?

go to [bgp.tools](https://bgp.tools) and go to bottom link "Contribute Data"

More complex queries:

IRC: Benjojo-bgptools (terahertz) / benjojo (everything else)

Or email: [admin@bgp.tools](mailto:admin@bgp.tools)



**bgp.tools**