



The Next Generation of BGP Data Collection Platforms

Thomas Holterbach
University of Strasbourg

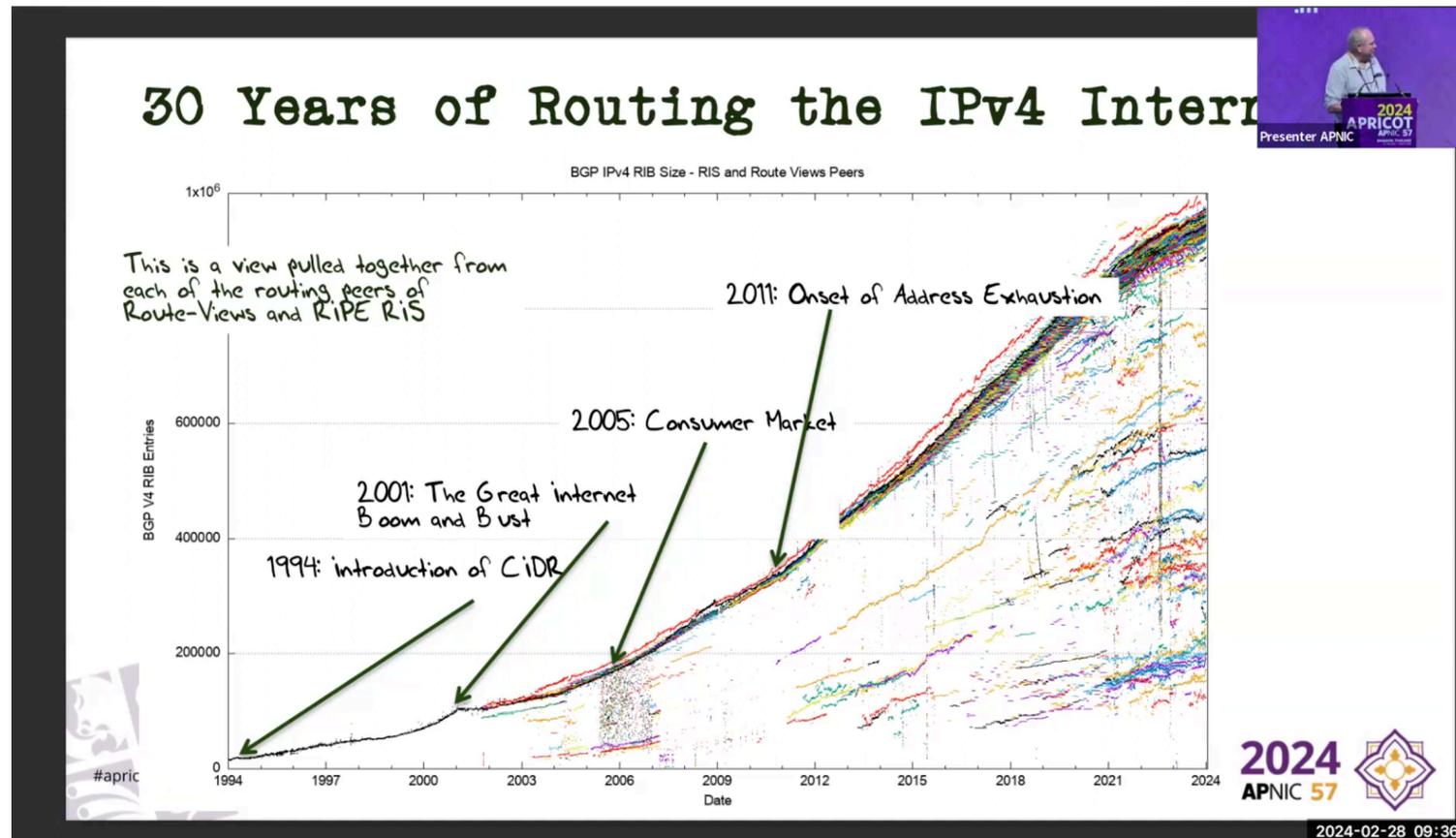
*Current
sponsors:*



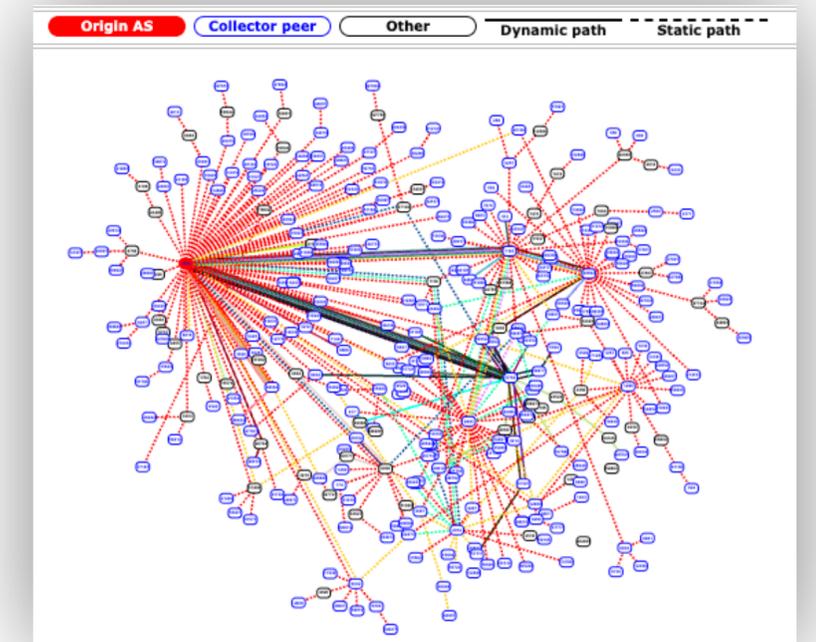
Joint work with:

Thomas Alfroy
Cristel Pelsser

The BGP data collected from actual BGP routers is essential for understanding and monitoring Internet routing



Geoff Huston: BGP in 2023
APRICOT'24



BGPlay
RIPEStat



Catchpoint's BGP map

Routers that share their BGP routes are like satellites observing the Earth's surface

Each router (or “*vantage point*”) provides a partial view

But together they allow monitoring at larger scale



The three longstanding platforms that collect, archive, and publicly share BGP data are RIPE RIS, RouteViews and PCH



▶ RIS and RouteViews collect and store data from ~1500 BGP routers (*a.k.a. "vantage points"*)

bgproutes.io

Our new next-gen BGP route collection platform



<https://bgproutes.io>

You can contribute data

bgproutes.io

Our **new** next-gen BGP route collection platform

We launched it
a year ago



<https://bgproutes.io>

You can contribute data

BGP data collection platforms typically pursue two main objectives

High coverage

Perpetual data retention

BGP data collection platforms typically pursue two main objectives that are not easily compatible

Priority	
High coverage	Perpetual data retention

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bgproutes.io	High priority 	Lower priority

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	High coverage	Perpetual data retention
RIPE RIS RouteViews	Lower priority	High priority 
bgproutes.io	High priority 	Lower priority

Our goal is to have accurate real-time and short-term historical monitoring tools

bgproutes.io

Our new **next-gen** BGP route collection platform

- ✓ Collection: High coverage
- ✓ Distribution: API + Dashboards



<https://bgproutes.io>

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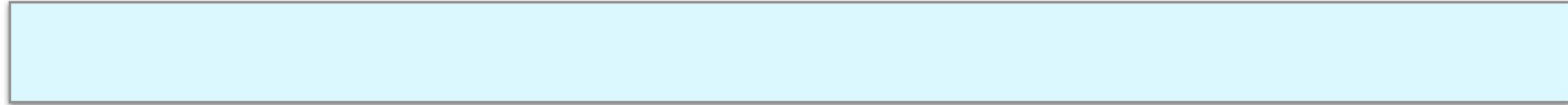


<https://bgproutes.io>

You can contribute data

bgproutes.io relies on three ingredients to increase its coverage

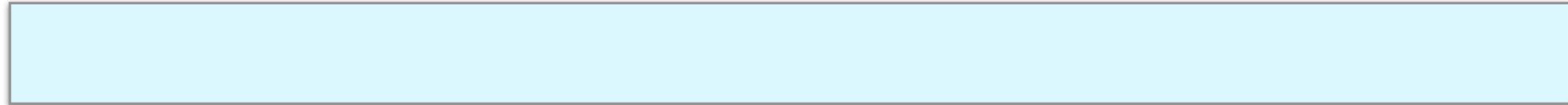
Ingredient #1



Ingredient #2



Ingredient #3



bgproutes.io relies on three ingredients to increase its coverage

Ingredient #1

Automated peering establishment

Ingredient #2

Ingredient #3

bgproutes.io simplifies, automates
and opens BGP data contribution to every ASN

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Network operators can authenticate
using peeringDB

Network operators just have to fill
a form to start peering with bgproutes.io

Step #1: Submit your connection details

Select the VM with whom you want to connect.

185.216.75.11 (USA) ▾

i We recommend selecting the VM with the lowest latency to your router for more accurate timestamps.

Tell us with which IP address we should start peering.

Your IP address (v4 or v6)

Tell us with which AS number we should start peering.

2200 ▾

Our AS number is **65000**.

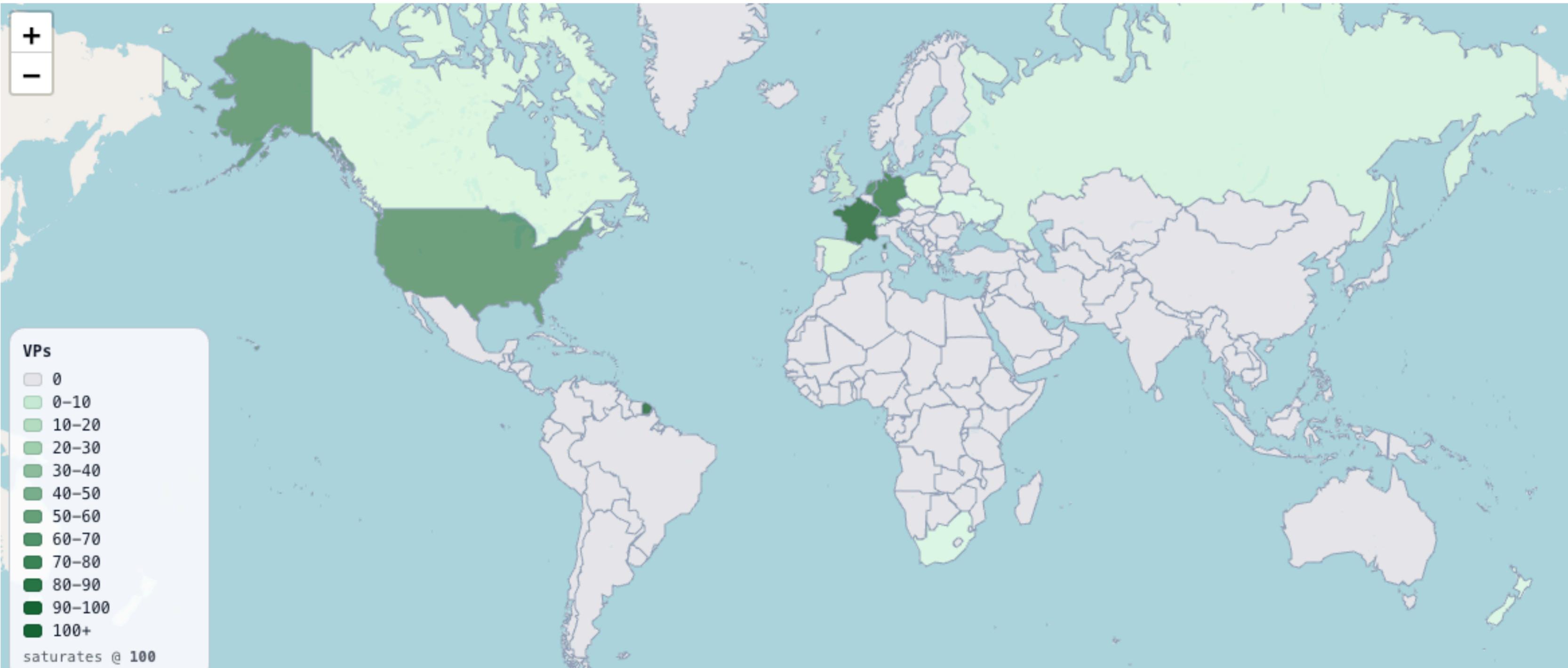
i We will soon make iBGP sessions possible. They will be recommended as updates with the NO_EXPORT community will still be forwarded to our platform through iBGP.

Submit

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bgproutes.io relies on three ingredients to increase its coverage

Ingredient #1

Automated peering establishment

Ingredient #2

Data aggregation

Ingredient #3

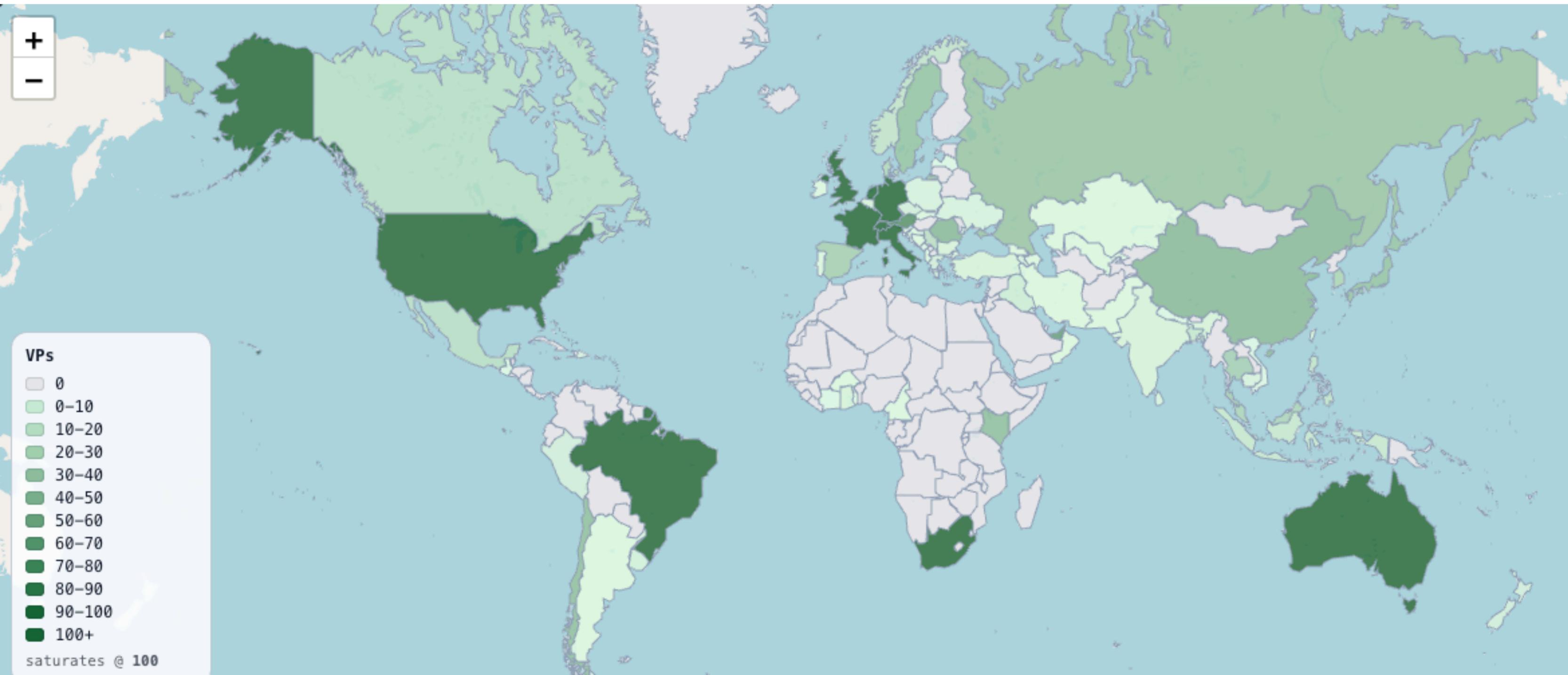
bgproutes.io increases coverage by centralising all data collected by RIPE RIS, RouteViews, PCH, CGTF into a single database

Data providers ⓘ

Name	Number of vantage points
bgproutes.io	v4: 33 v6: 8
RIPE RIS	v4: 833 v6: 695
RouteViews	v4: 745 v6: 706
PCH	v4: 2150 v6: 397
CGTF RIS	v4: 16 v6: 51

<https://vp-explorer.bgproutes.io>

bgproutes.io already stores data
for more than 5000 vantage points



bgproutes.io relies on three ingredients to increase its coverage

Ingredient #1

Automated peering establishment

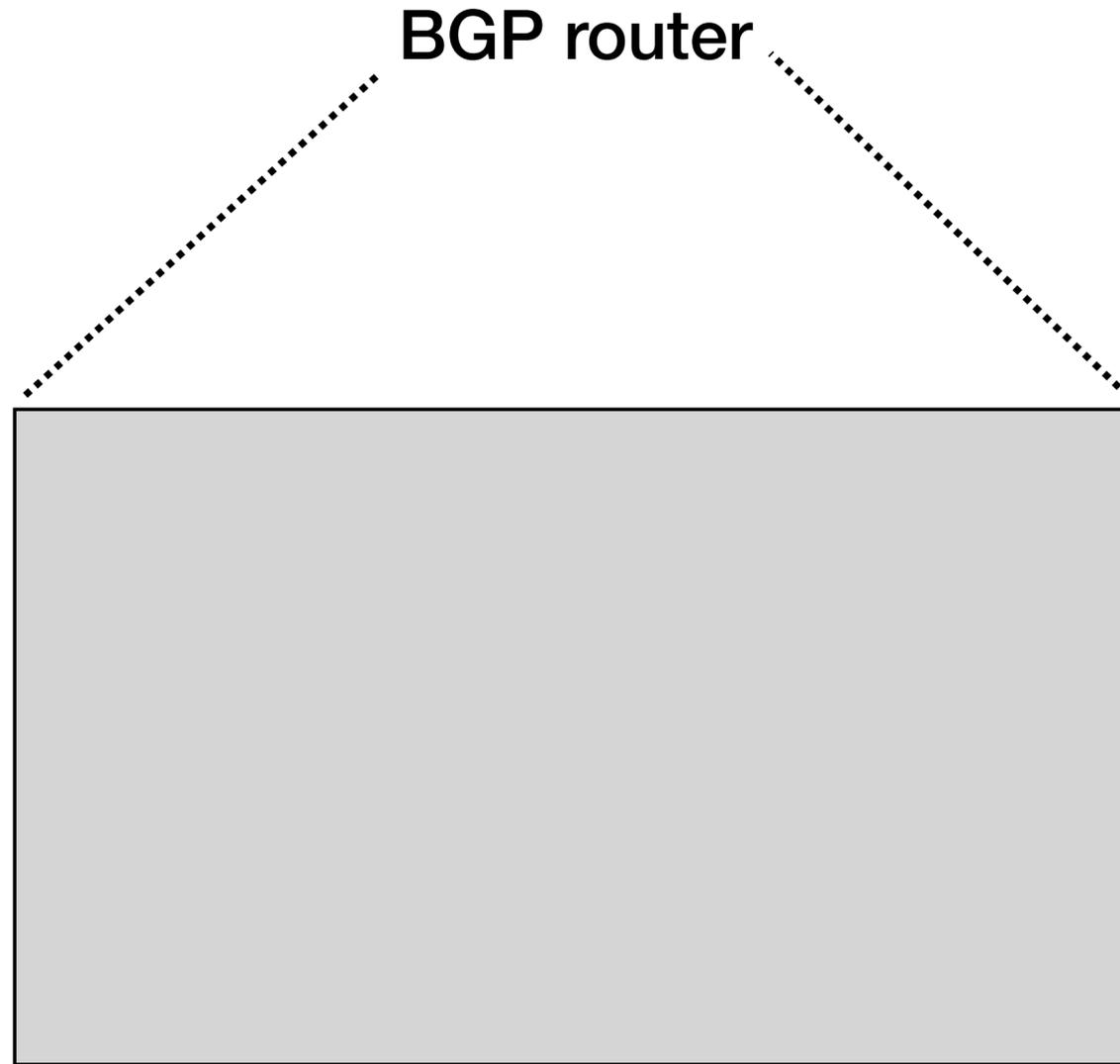
Ingredient #2

Data aggregation

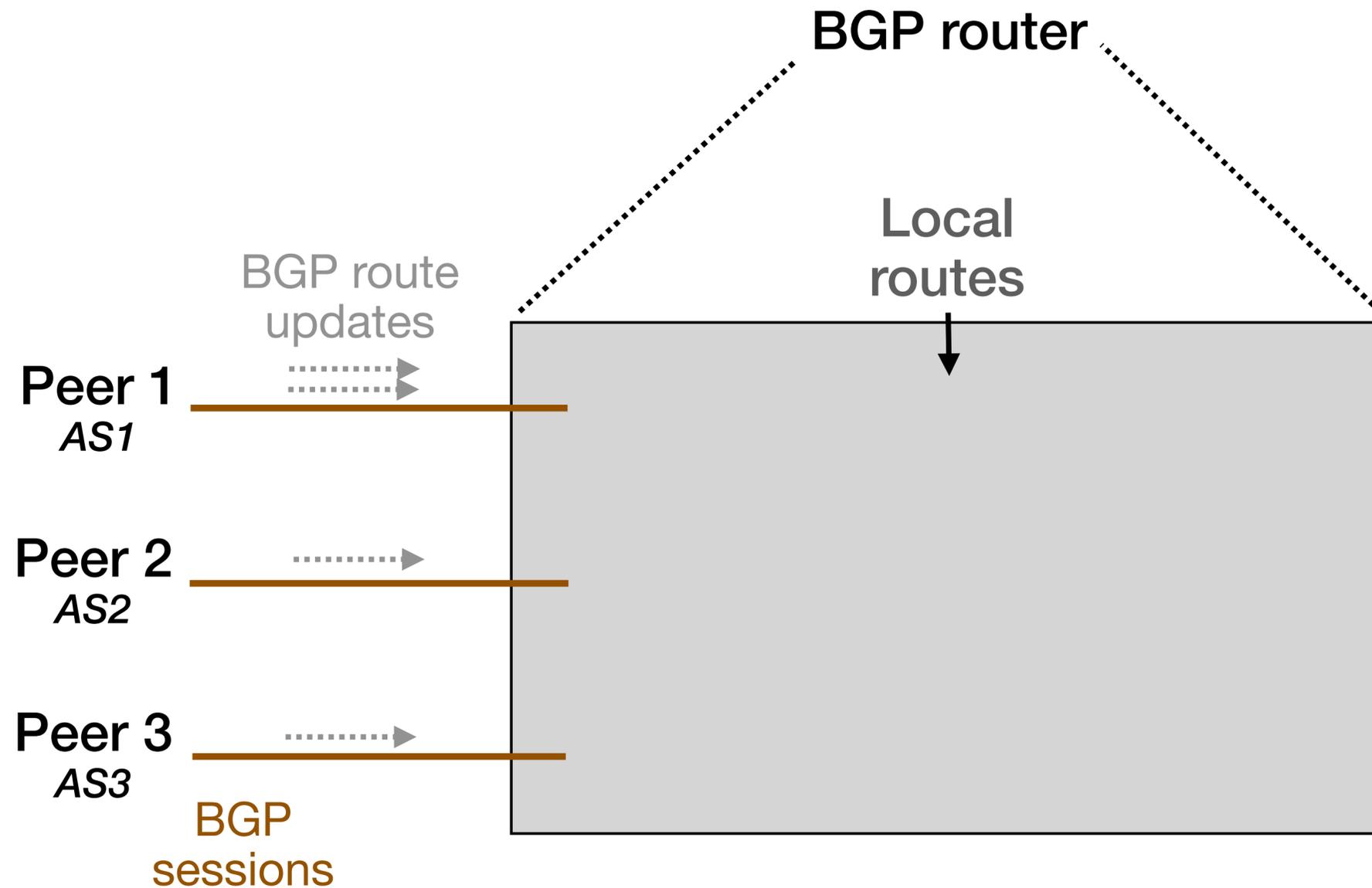
Ingredient #3

BMP

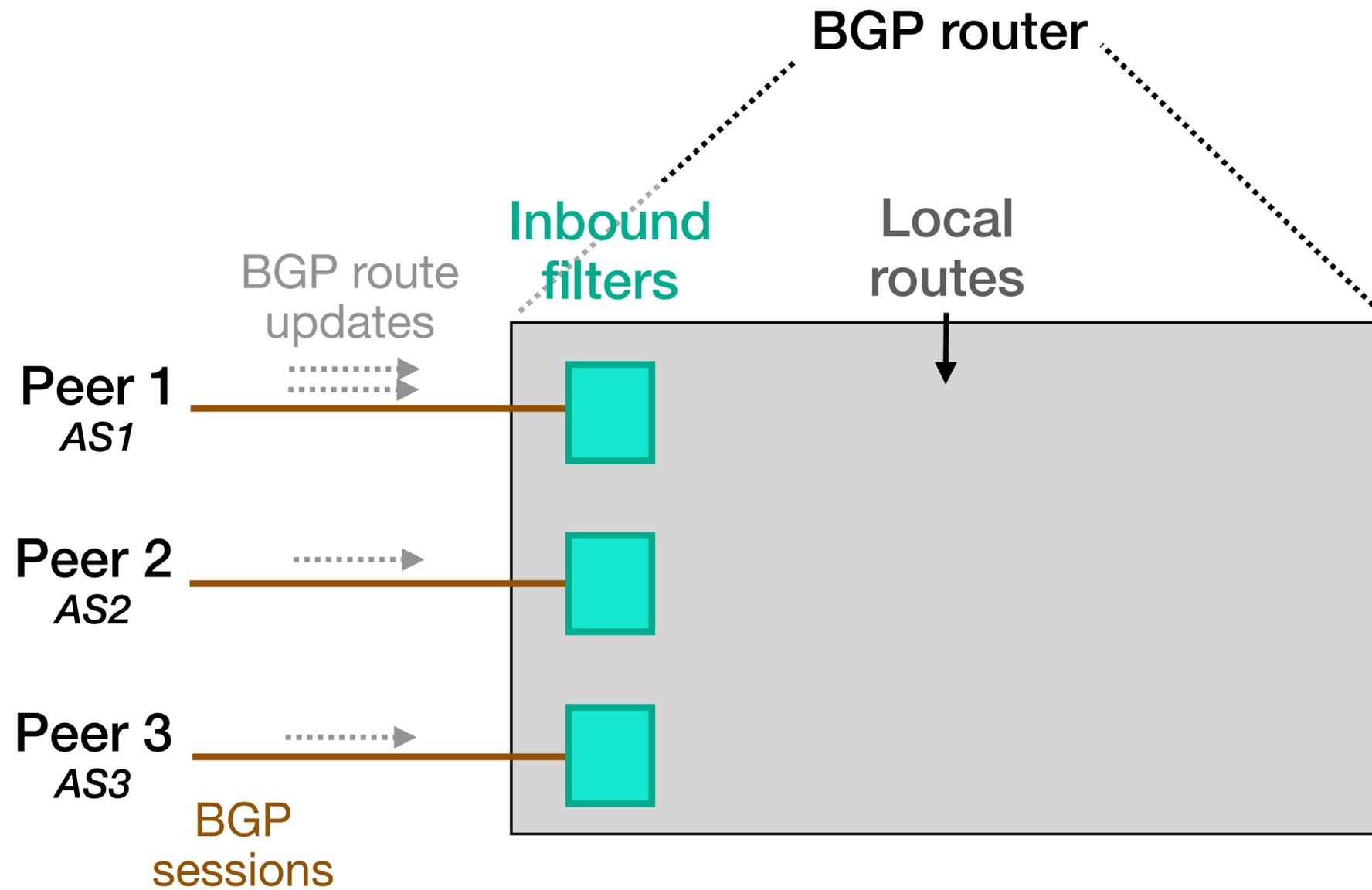
Problem: When an operator shares data via a BGP session, only a small fraction of its routes are visible due to BGP route hiding



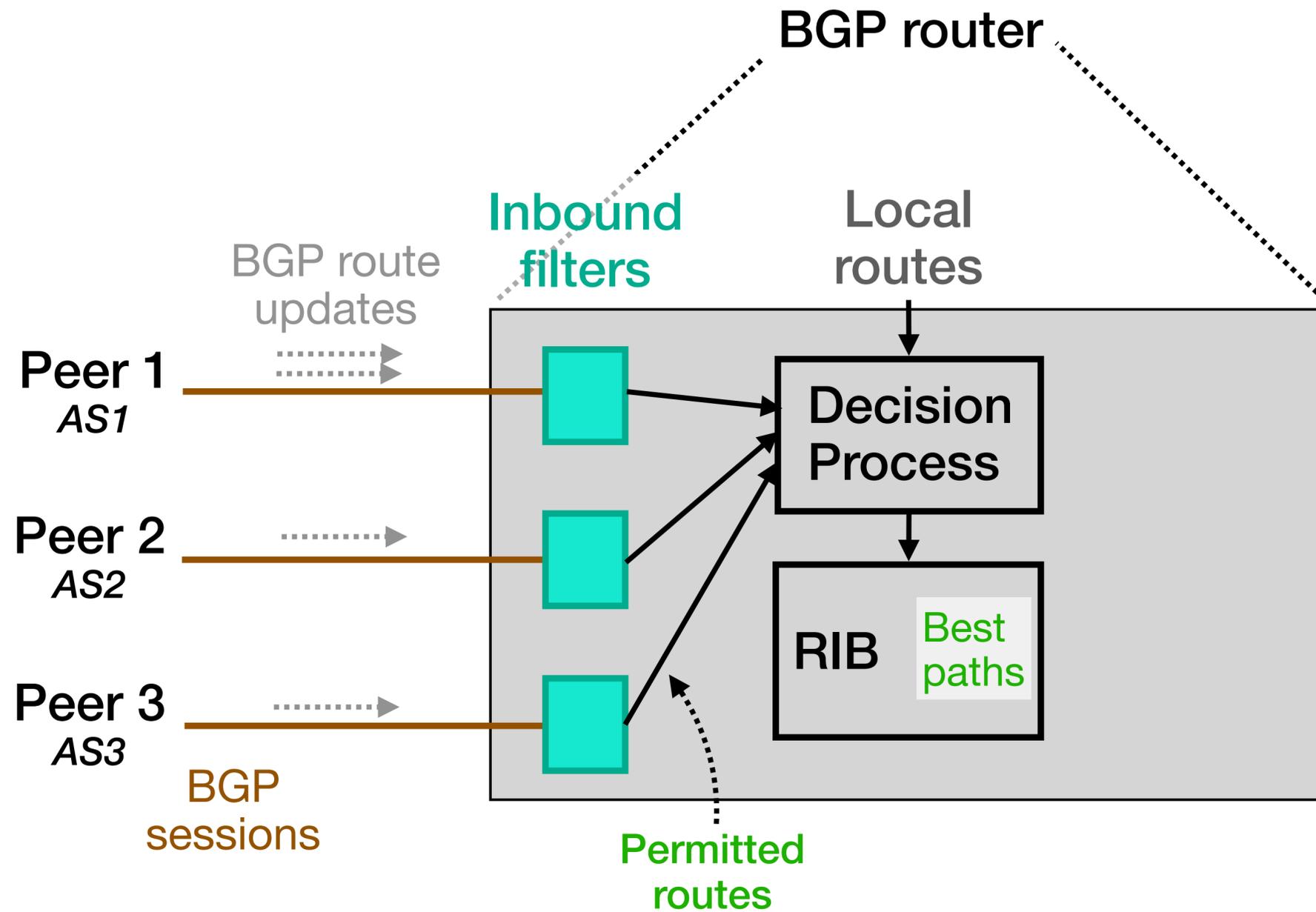
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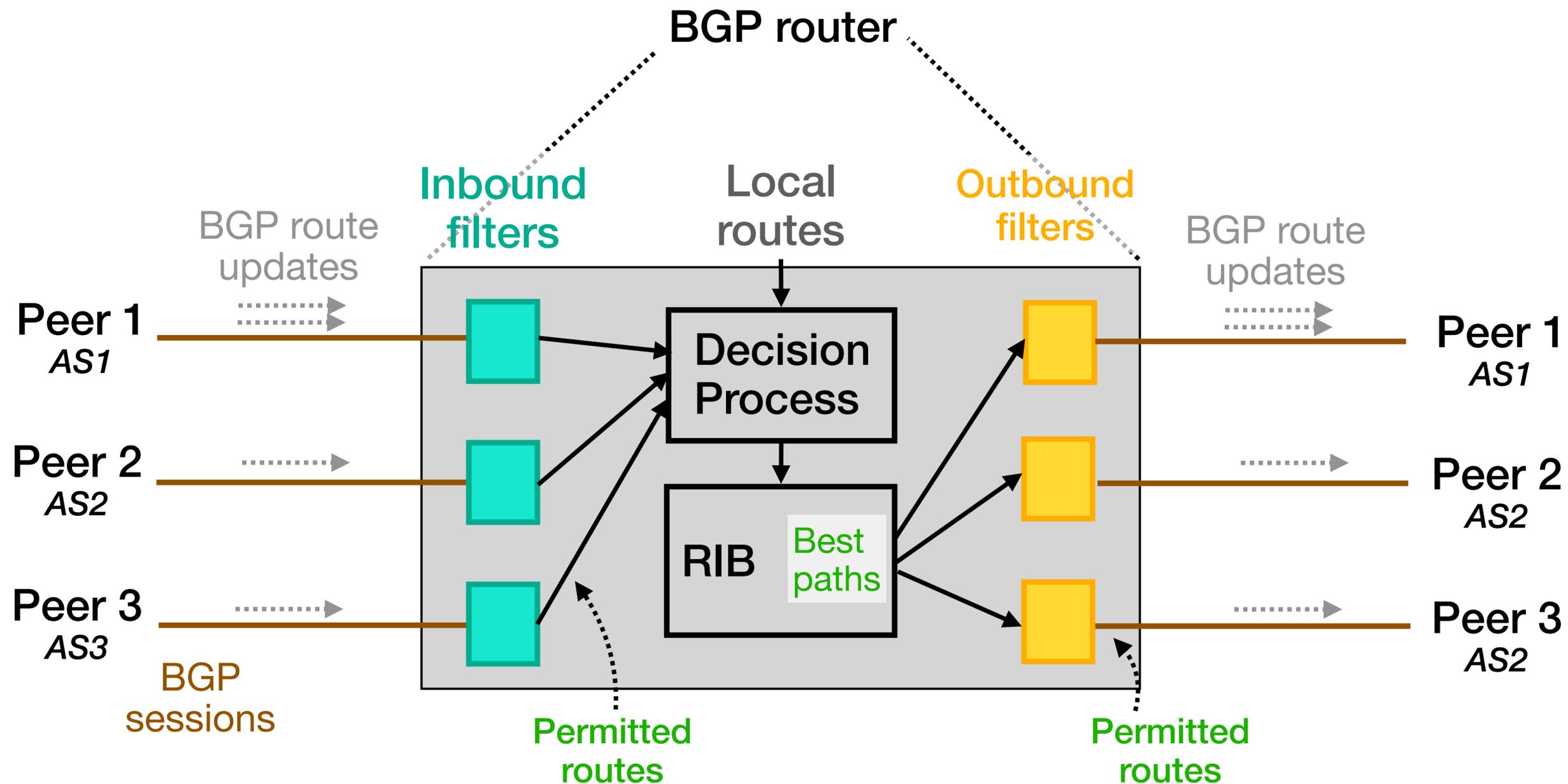
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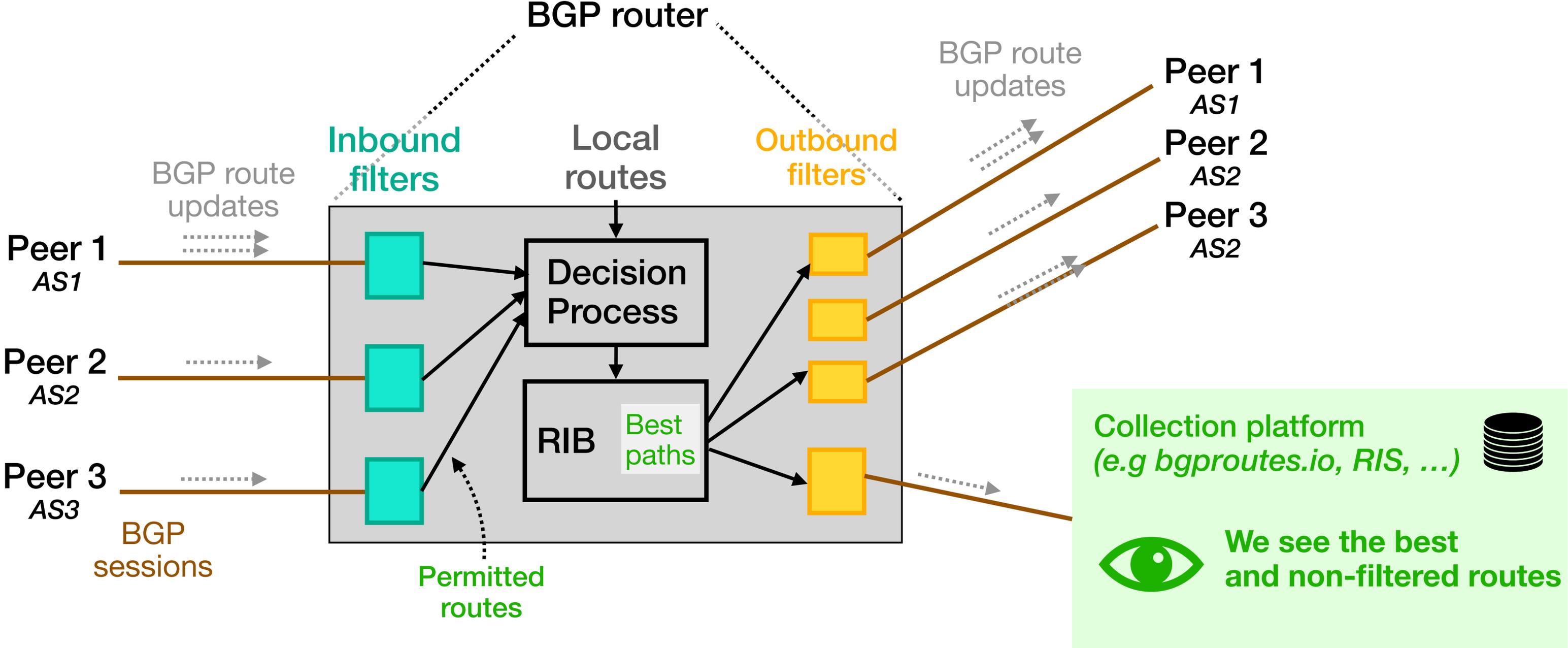
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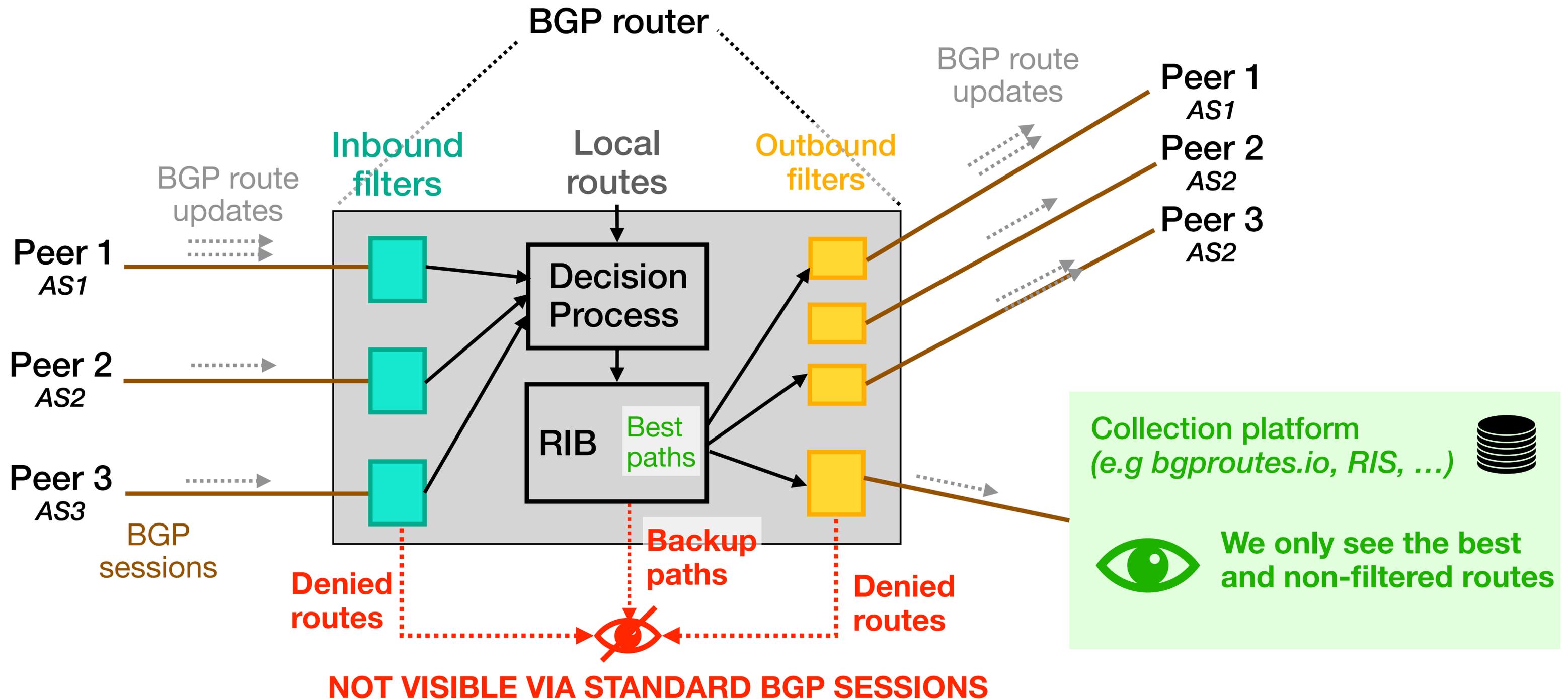
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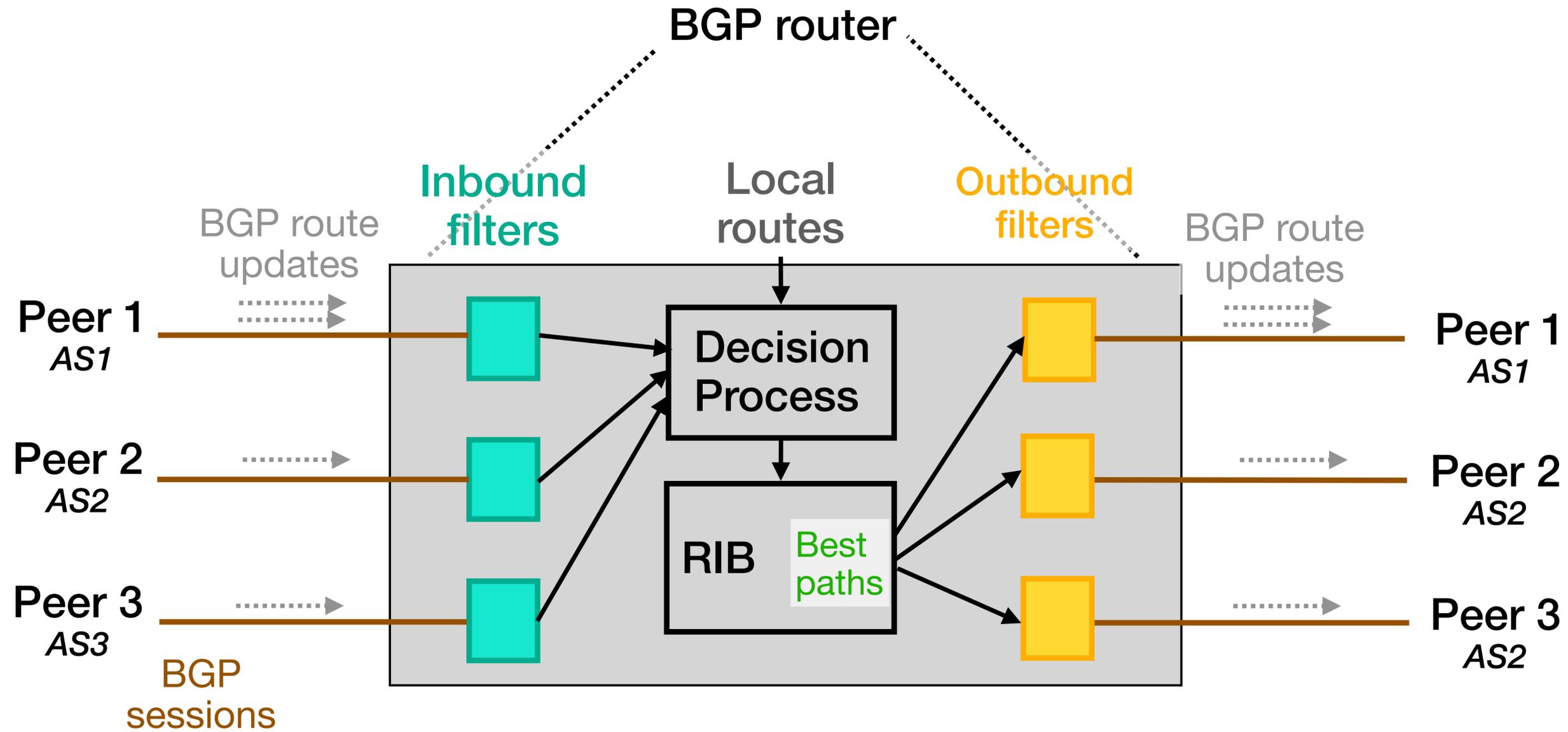


bgproutes.io can gather BGP route updates via the BGP Monitoring Protocol (BMP) – *and it's much more efficient!*

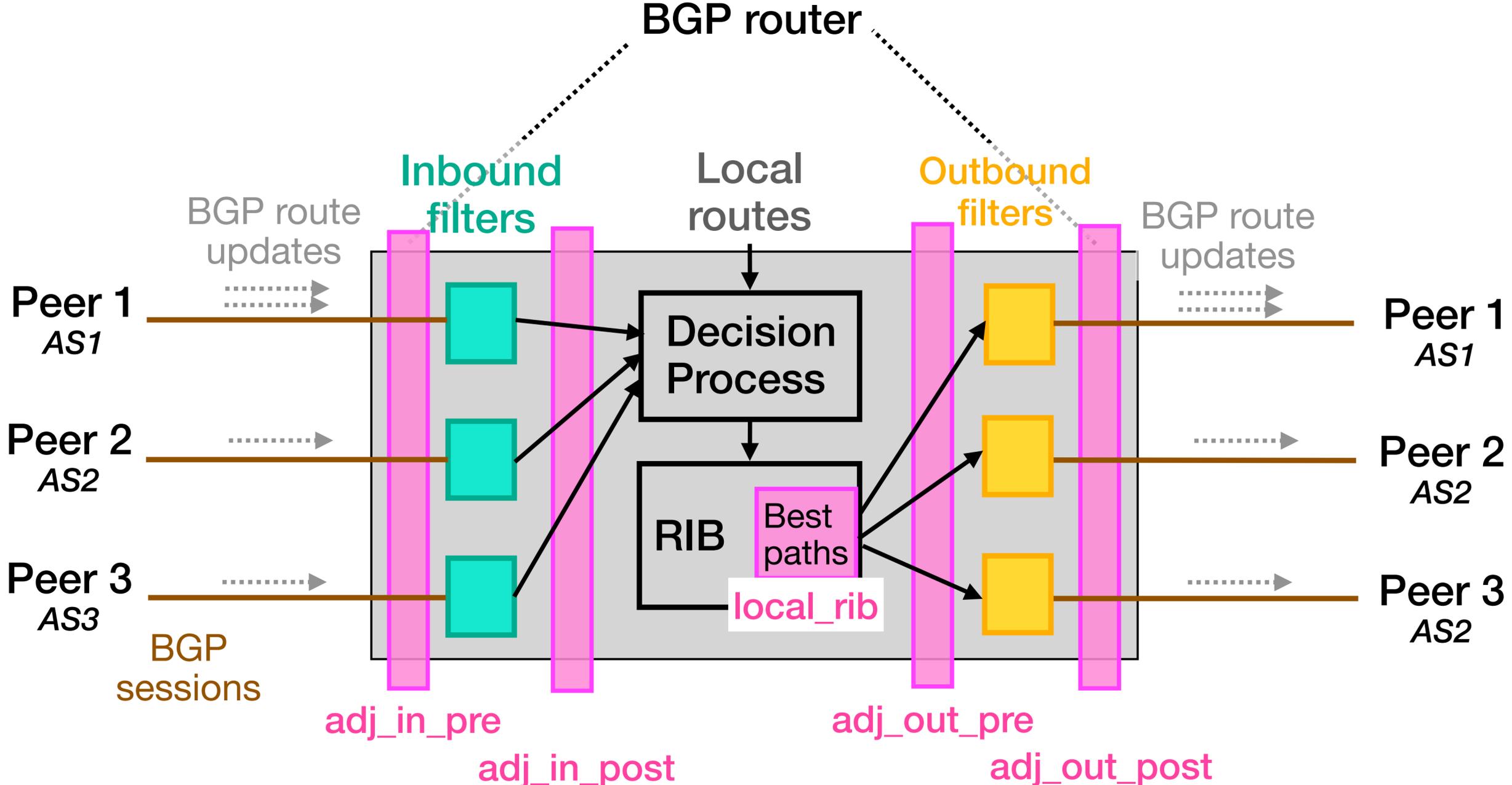
- ✓ BMP provides all route updates on a per-peer basis
- ✓ BMP provides route updates at all stages of the BGP processing pipeline

➔ BMP is also simple to configure

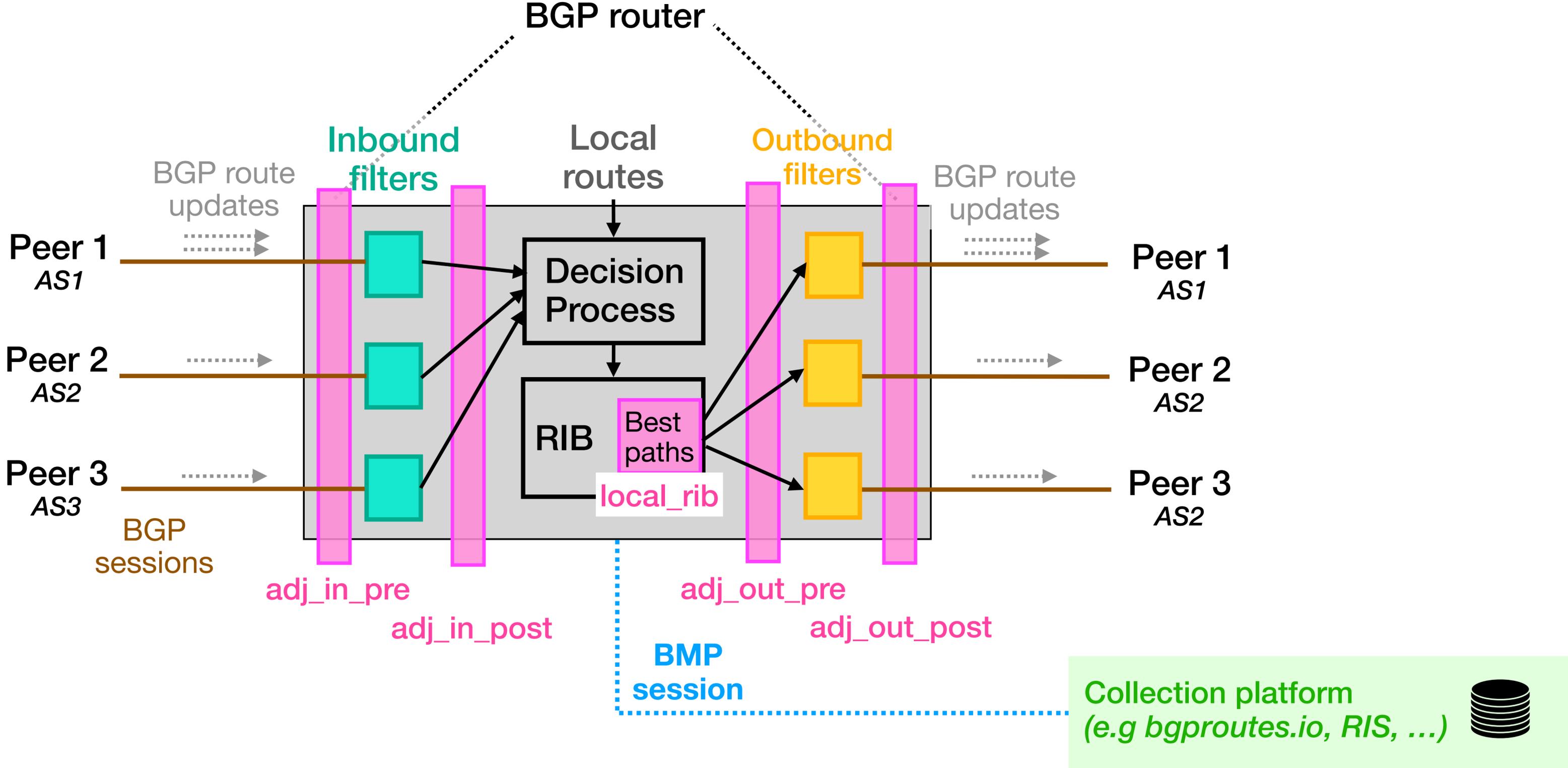
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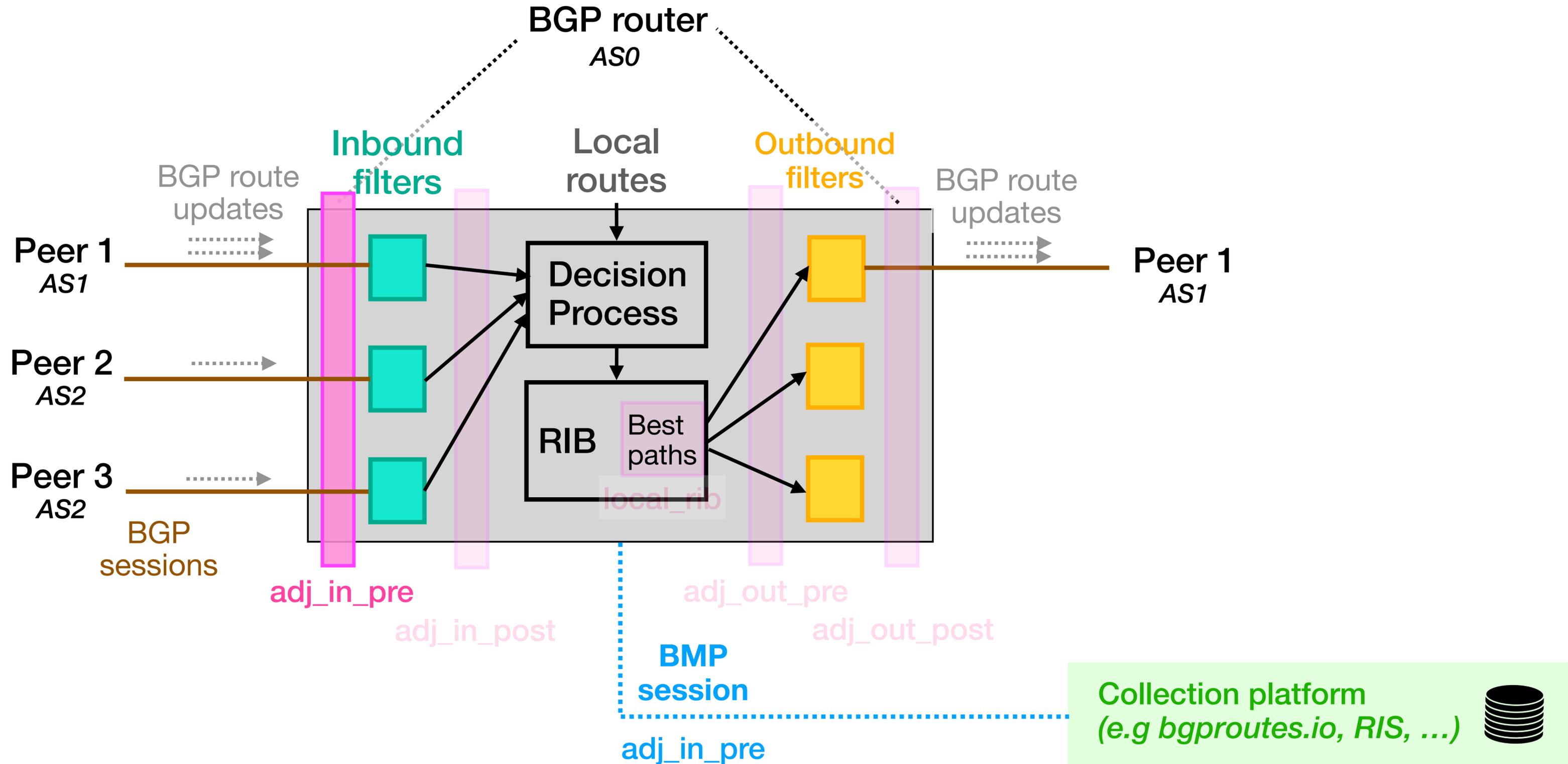


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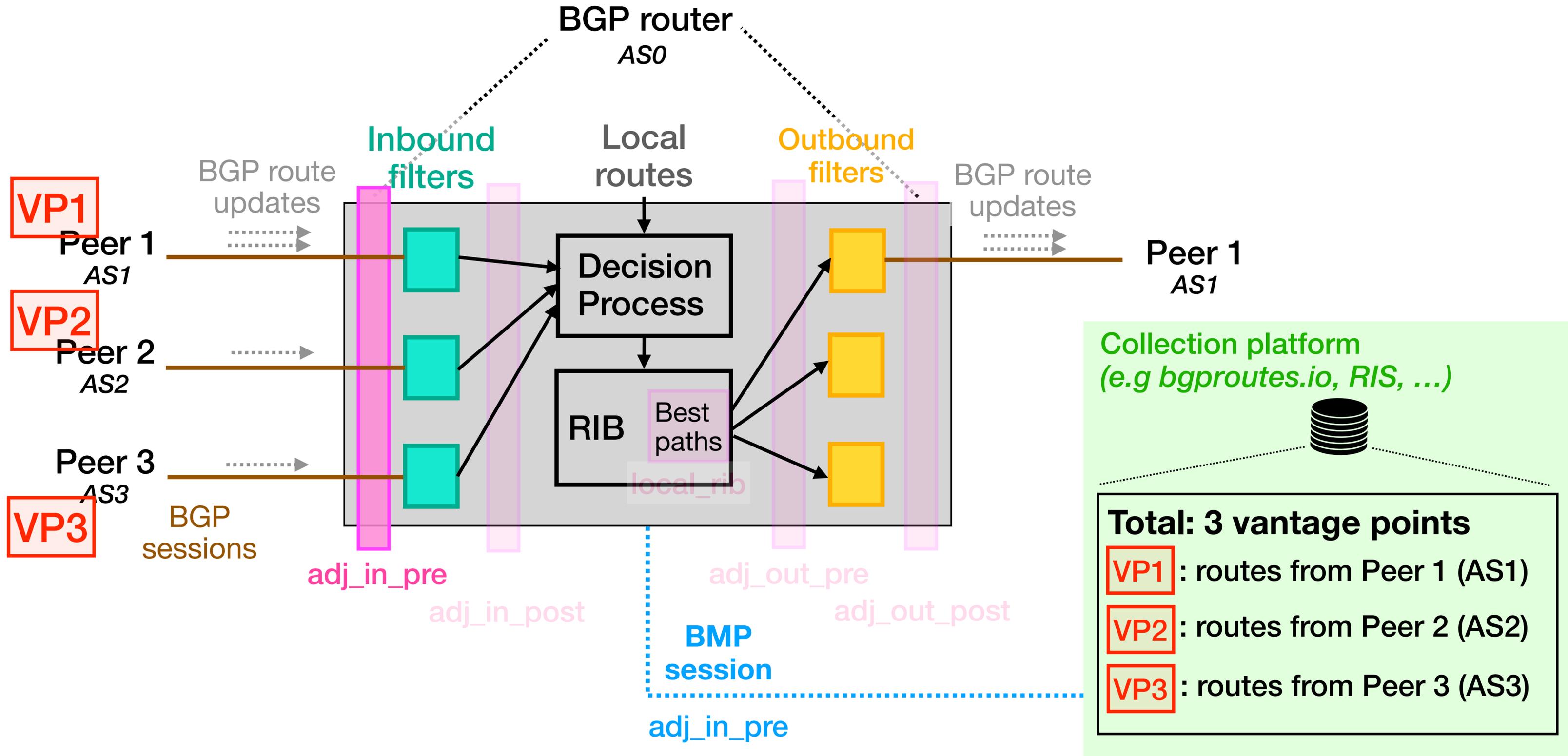


We recommend exporting data for the `adj_in_pre` stage only

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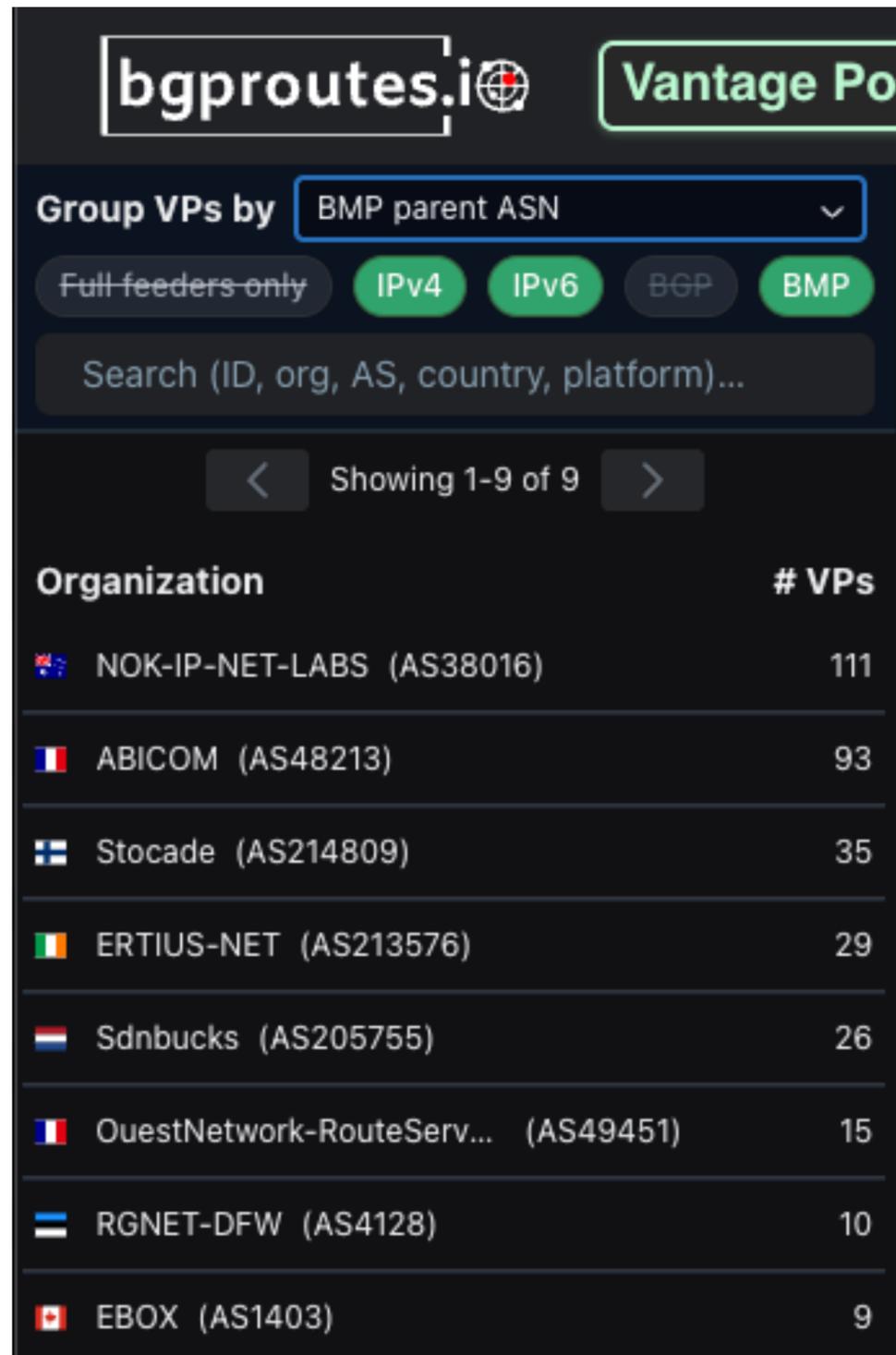


We recommend exporting data for the `adj_in_pre` stage only



bgproutes.io has ~15 BMP sessions with 9 networks,
which translate into ~200 VPs!

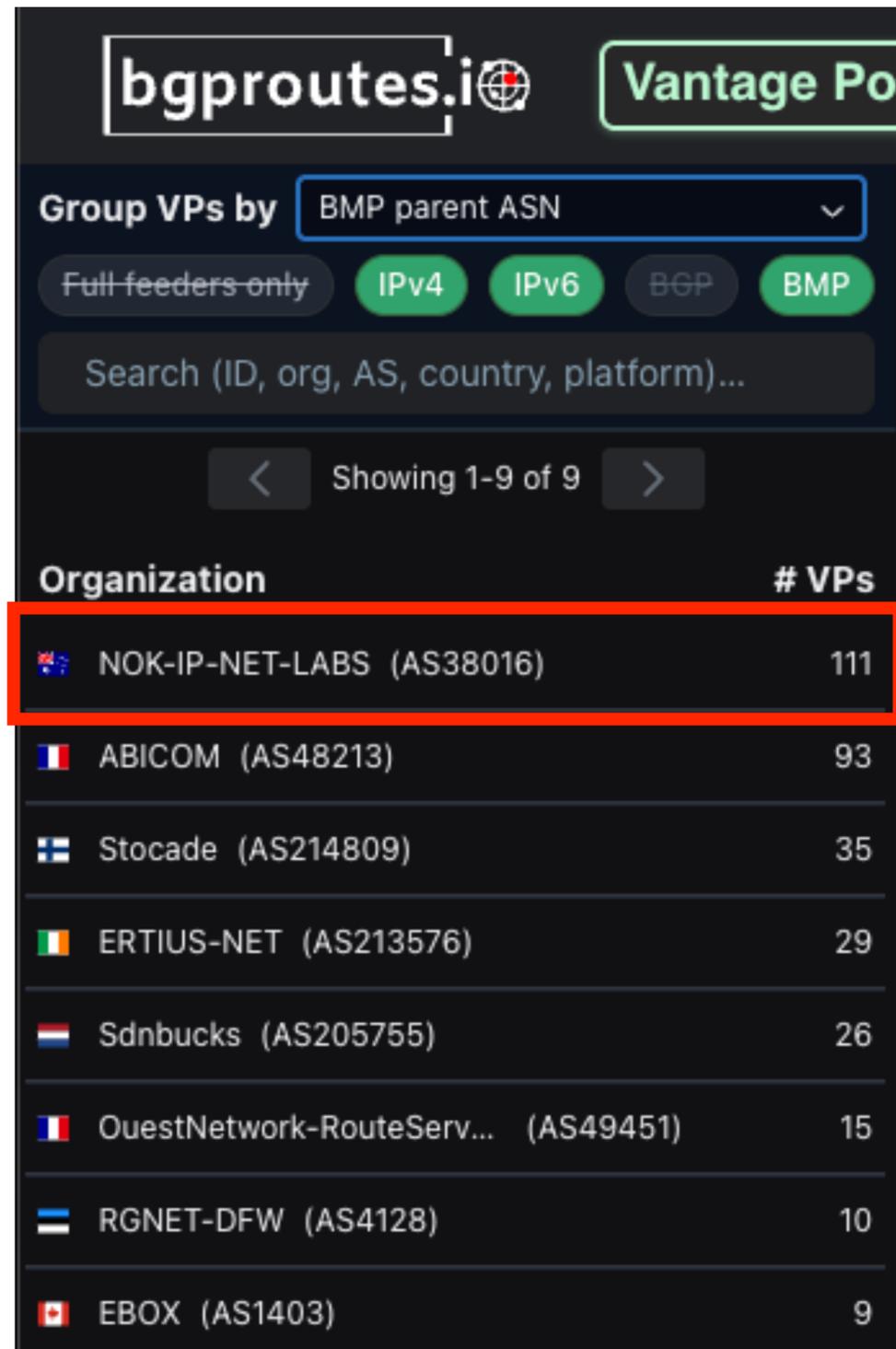
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The screenshot shows the bgproutes.io website interface. At the top left is the logo 'bgproutes.io' with a globe icon. To its right is a 'Vantage Po' badge. Below the logo is a dropdown menu labeled 'Group VPs by' with 'BMP parent ASN' selected. There are several filter buttons: 'Full feeders only', 'IPv4', 'IPv6', 'BGP', and 'BMP'. A search bar is present with the placeholder text 'Search (ID, org, AS, country, platform)...'. Below the search bar is a pagination control showing 'Showing 1-9 of 9'. The main content is a table with two columns: 'Organization' and '# VPs'. The table lists the following organizations and their respective number of VPs:

Organization	# VPs
 NOK-IP-NET-LABS (AS38016)	111
 ABICOM (AS48213)	93
 Stocade (AS214809)	35
 ERTIUS-NET (AS213576)	29
 Sdnbucks (AS205755)	26
 OuestNetwork-RouteServ... (AS49451)	15
 RGNET-DFW (AS4128)	10
 EBOX (AS1403)	9

bgproutes.io has ~15 BMP sessions with 9 networks, which translate into ~200 VPs!



The screenshot shows the bgproutes.io interface with the following elements:

- Logo: bgproutes.io
- Subscription: Vantage Po
- Group VPs by: BMP parent ASN
- Filters: Full feeders only, IPv4, IPv6, BGP, BMP
- Search: Search (ID, org, AS, country, platform)...
- Showing 1-9 of 9
- Table with columns: Organization, # VPs

Organization	# VPs
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→ One BMP session exports data received from 111 BGP sessions!

bgproutes.io

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- ✓ Distribution: API + Dashboards



<https://bgproutes.io>

You can contribute data

Collecting more data is useful

But only if users can effectively process it

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Current MRT archives consist of 1000+ compressed files for updates and RIB dumps

The BGP data is intermingled across all these files

➔ MRT is hard to process

Index of /bgpdata

<u>Name</u>	<u>Last modified</u>	<u>Size</u>	<u>Description</u>
Parent Directory		-	
2001.10/	2004-02-23 20:19	-	
2001.11/	2004-02-23 20:20	-	
2001.12/	2004-02-23 20:27	-	
2002.01/	2004-02-23 20:36	-	
2002.02/	2004-02-23 20:46	-	
2002.03/	2004-02-23 20:56	-	
2002.04/	2004-02-23 21:08	-	
2002.05/	2004-02-23 21:19	-	
2002.06/	2004-02-23 21:29	-	
2002.07/	2004-02-23 21:40	-	

/2025.05/RIBS

	<u>modified</u>	<u>Size</u>	<u>Description</u>
rib.20250501.0000.bz2	2025-05-01 00:00	85M	
rib.20250501.0200.bz2	2025-05-01 02:00	85M	
rib.20250501.0400.bz2	2025-05-01 04:00	85M	
rib.20250501.0600.bz2	2025-05-01 06:00	85M	
rib.20250501.0800.bz2	2025-05-01 08:00	85M	
rib.20250501.1000.bz2	2025-05-01 10:00	87M	
rib.20250501.1200.bz2	2025-05-01 12:00	88M	
rib.20250501.1400.bz2	2025-05-01 14:00	88M	
rib.20250501.1600.bz2	2025-05-01 16:00	88M	
rib.20250501.1800.bz2	2025-05-01 18:00	88M	
rib.20250501.2000.bz2	2025-05-01 20:00	88M	

Typical MRT archive

bgproutes.io comes with a **simple** and **fast** API that provides **high-granularity** access to BGP data

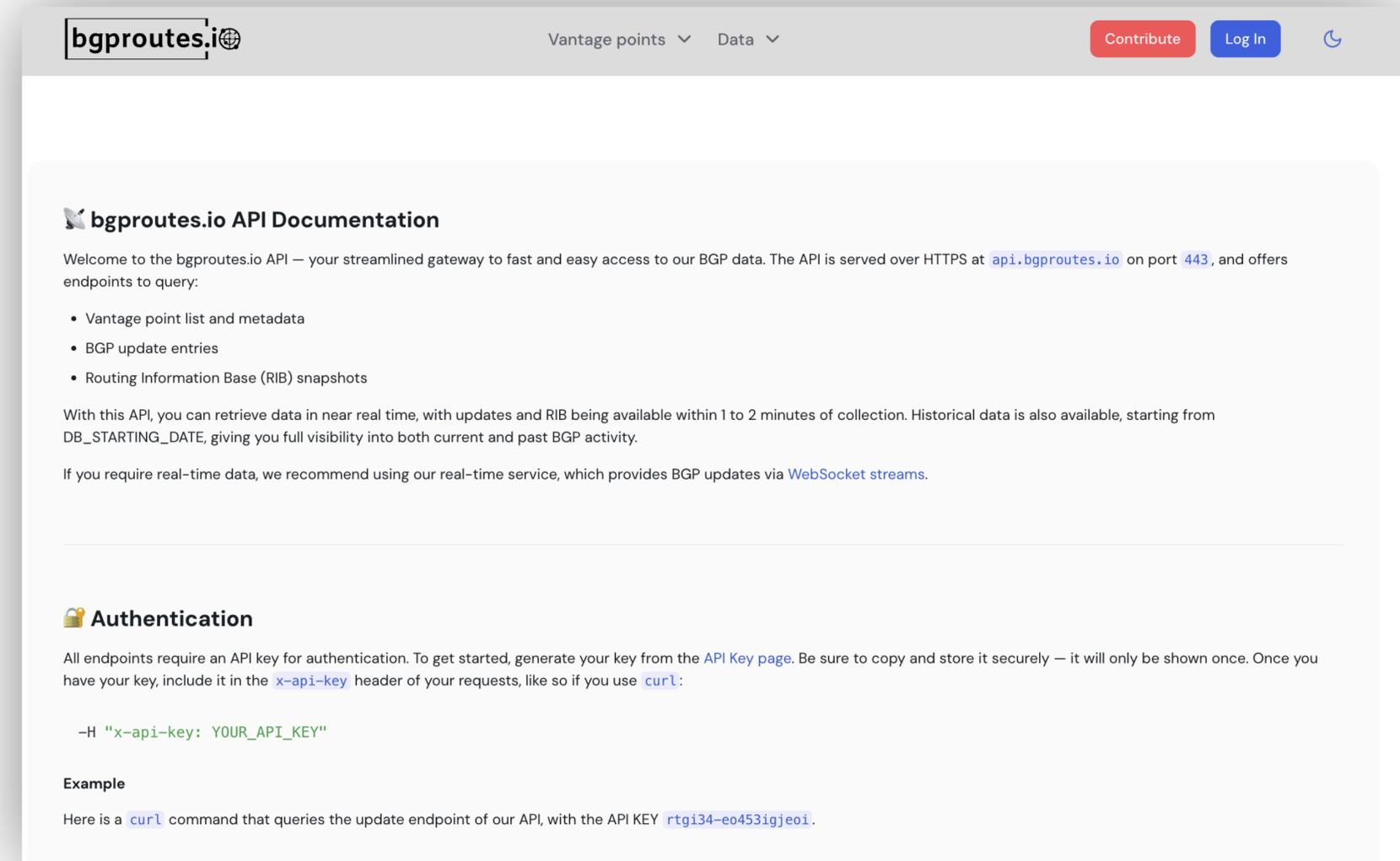
The API offers four endpoints:

vantage_points

updates

rib

topology



bgproutes.io/data_api

Imagine a network operator trying to retrieve all BGP updates for which their ASN appear in the AS path on February 10, 2026

```
# Let's use our Python client to retrieve the data  
from pybgproutesapi import vantage_points, updates
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# Let's use our Python client to retrieve the data
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vps = vantage_points(source=['bgproutes.io', 'ris'])
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# We retrieve updates and print them for every VP
for vp in vps:
    vp_upd = updates(
        vp_ip=vp,
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        aspath_regexp="(^| )3( |$)"

    print(vp_upd)
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Example of an output

Time	Prefix	ASPath
T1	1/24	1-3-7
T2	2/24	3-9-4
T3	3/24	2-4-3
T4	4/24	3-4-5

Each returned update includes the RPKI ROV and ASPA status

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Route Origin Validation: Verify that the origin of an AS path is legitimate

Possible outcome: **Valid**, **Invalid**, **Unknown**

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ASPA-based Validation: Verify that there is no valley-free violation in the AS path

Possible outcome:

Upstream **Valid** or
Upstream **Invalid** or
Upstream **Unknown**

And

Downstream **Valid** or
Downstream **Invalid** or
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Example of an output

Time	Prefix	ASPath	ROV status	ASPA status
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T2	2/24	3-9-4	Unknown	Up-valid Down-valid
T3	3/24	2-4-3	Invalid	Up-invalid Down-invalid
T4	4/24	3-4-5	Valid	Up-valid Down-Unknown

Other attributes omitted for space

Users can filter BGP route updates based on their ROV or ASPA status

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... *and easily compute statistics!*

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... ***and easily compute statistics!***

Example: Let's analyse ASPA for downstream AS paths
using all collected updates within a 2-hour timeframe

99.3% are
Unknown

There are only ~500
ASPA objects so far

Users can filter BGP route updates based on their ROV or ASPA status
... *and easily compute statistics!*

Example: Let's analyse ASPA for downstream AS paths
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99.3% are
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0.04% are
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Potential route leaks!

Users can filter BGP route updates based on their ROV or ASPA status
... and easily compute statistics!

Example: Let's analyse ASPA for downstream AS paths using all collected updates within a 2-hour timeframe

99.3% are
Unknown

There are only ~500
ASPA objects so far

0.04% are
Invalid

Potential route leaks!

0.7% are
Valid

Most of them are
short AS paths (avg length: 2.6)

bgproutes.io

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<https://bgproutes.io>
You can peer with us!

bgproutes.io provides four dashboards, and more will come soon

**AS
Explorer**

General info about
ASes, prefixes, IXPs

**Prefix
Explorer**

“Giant”
looking glass

**Vantage Points
Explorer**

List all VPs and
provide statistics

AS Rank

Rank ASes based
on various metrics

Our goal is that these dashboards bridge the gap between users and the raw data

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The screenshot shows the bgproutes.io AS/IXP/IP Explorer interface. The top navigation bar includes the logo, a search bar, and buttons for 'Start peering with us!', 'Doc', and a moon icon. Below the search bar is a search prompt: 'Search for ASNs, IXPs, IPs, prefixes, or organization names.' The main content area is divided into two columns. The left column displays details for (AU) AS131074, including its name 'APNIC Research and Development APNIC-JP-RD', type, website, and organization ID. A warning box states 'This AS does not currently contribute data.' The right column shows a 'Connectivity' tab with a message about data inference from BGP data. Below this, there are tabs for 'Upstreams (2)', 'Downstreams (1)', and 'Peers (0)'. The 'Upstreams' tab is active, showing a table of upstream ASNs with columns for ASN, Name, Type, Country, and Inference. The table lists two upstreams: 4608 (Asia Pacific Network Information Centre, Non-Profit, AU) and 22548 (Núcleo de Inf. e Coord. do Ponto BR - NIC.BR, Non-Profit, BR). Navigation controls for the table are visible at the bottom right.

bgproutes.io AS/IXP/IP Explorer

Start peering with us! Quick setup · public data

Doc

Search Search Reset

Search for ASNs, IXPs, IPs, prefixes, or organization names.

(AU) AS131074 —

APNIC Research and Development
APNIC-JP-RD

Type: -
Website: -
Looking glass: -
Organisation ID: ORG-ARAD1-AP-APNIC
Allocated under: APNIC

⚠️ This AS does not currently contribute data.
If you operate this AS, you can change that and start contributing to bgproutes.io.

Connectivity summary

v4+v6 v4 only v6 only

Connectivity Prefixes IXPs Facilities Siblings Vantage points

Upstreams, downstreams, and peers are inferred from the BGP data collected by bgproutes.io. More data helps produce more accurate inferences, but errors can still occur. We describe our inference algorithm in the doc.

Upstreams (2) Downstreams (1) Peers (0) Search...

ASN ^	Name —	Type —	Country —	Inference —
4608	Asia Pacific Network Information Centre	Non-Profit	AU	Detail
22548	Núcleo de Inf. e Coord. do Ponto BR - NIC.BR	Non-Profit	BR	Detail

Page 1 of 1

Our goal is that these dashboards bridge the gap between users and the raw data

Click to see the raw data used to infer the AS relationship

AS relationships

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Page 1 of 1

ASN ^	Name -	Type -	Country -	Inference -
4608	Asia Pacific Network Information Centre	Non-Profit	AU	Detail
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Page 1 of 1

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AS paths used to infer relationships

× Inference detail

We found **597** distinct AS-paths where **AS131074** and **AS22548** are directly connected. **AS131074** appeared as a downstream of **AS22548** in **597** AS-paths where **AS22548** is connected to a tier one. On the other hand, **AS22548** appeared as a downstream of **AS131074** in **0** AS-paths where **AS131074** is connected to a tier one. Therefore, **100.00 %** of the AS-paths used for the inference enabled bgproutes.io to infer **AS131074** as a customer of **AS22548**.

For each inference, we provide at most 100 AS paths used in the inference.

AS 131074 is customer of AS 22548 No AS paths in this category

AS 131074 is provider of AS 22548 Expand to show 100 AS paths

AS-Path	Step
AS41327 Tier1 AS2914 AS22548 AS131074 AS24021	Step #1
AS20253 Tier1 AS1299 Tier1 AS2914 AS22548 AS131074 AS24021	Step #1
AS6447 AS23673 AS23764 Tier1 AS6762 AS16735 AS22548 AS131074 AS24021	Step #1
AS24785 Tier1 AS12956 AS22548 AS131074 AS24021	Step #1
AS16260 Tier1 AS3257 Tier1 AS6762 AS16735 AS22548 AS131074 AS24021	Step #1

Our goal is that these dashboards bridge the gap between users and the raw data

Our goal is that these dashboards bridge the gap between users and the raw data

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Search in results... 540 entries loaded 1/6

#	Vantage Point	Prefix	AS Path	Community
0	ID4 AS39122 IP195.66.226.97 BLACKNIGH ✓ 185.193.84.0/22 39122 1299 39392 29504 1299:430 1299:1000 1299:30000 1299:30850			
1	ID13 AS2914 IP195.66.224.138 NTT-DATA- ✓ 185.193.84.0/22 2914 1299 39392 29504 2914:420 2914:1009 2914:2000 2914:3000			
2	ID15 AS3170 IP195.66.227.195 VELOXSERV ✓ 185.193.84.0/22 3170 174 39392 29504 174:21101 174:22016 60945:0			
3	ID16 AS271253 IP195.66.231.56 ✓ 185.193.84.0/22 271253 1299 39392 29504			
4	ID25 AS15562 IP165.254.255.2 SNIJDERS ✓ 185.193.84.0/22 15562 2914 1299 39392 29504 2914:420 2914:1009 2914:2000 2914:3000			
5	ID35 AS207841 IP195.66.227.233 INFERNO ✓ 185.193.84.0/22 207841 61049 15935 29504 15935:300 15935:302 15935:29504			
6	ID38 AS3491 IP195.66.224.167 CONSOLE-C ✓ 185.193.84.0/22 3491 1299 39392 29504 1299:30000 3491:3000 3491:3001 3491:9002			
7	ID43 AS35266 IP5.57.81.216 EXN-AS ✓ 185.193.84.0/22 35266 1299 39392 29504 1299:30000 35266:60 35266:1299			
8	ID44 AS58057 IP194.50.92.251 SECUREBIT ✓ 185.193.84.0/22 58057 34549 1299 39392 29504 0:34927 0:56382 0:58299 1299:30000 34549:0			
9	ID48 AS42473 IP195.66.226.113 AS-AMFXTA ✓ 185.193.84.0/22 42473 1299 39392 29504 1299:30000 47147:1500 47147:2000 47147:2100			

Filters

Prefix (up to 10, v4 or v6)
185.193.84.0/22 ✓

Full-feeders VPs only On

Date (UTC). Default is now-5min
16/01/2026, 18:41:35

Prefix match type
Exact

Collection platform
All

VPs' ASN(s)
e.g., 3333,559,2914

VPs' ASN country codes
e.g., FR,DE

VPs' IP geolocation country codes
e.g., FR,DE

VPs' BMP parent ASNs (BMP only)
e.g., 205755,3356

What to show
Existing and missing ent...

Prefix visibility
Count per origin AS

All prefixes (1)
185.193.84.0/22

As-path length distribution
For hops: 1-6 and >6

Top 5 second-hop AS numbers
Prepended AS numbers omitted

AS39392	310
AS15935	85
AS6939	64
AS24482	6

Top 5 third-hop AS numbers
Prepended AS numbers omitted

AS1299	189
AS174	111
AS33891	59
AS50263	12

Our goal is that these dashboards bridge the gap between users and the raw data

Advanced filtering capabilities

The dashboard displays a table of routing data with columns for Vantage Point, Prefix, AS Path, and Community. A sidebar on the right contains a 'Filters' panel with various search and filter options. At the bottom, there are four charts: Prefix visibility, As-path length distribution, Top 5 second-hop AS numbers, and Top 5 third-hop AS numbers.

#	Vantage Point	Prefix	AS Path	Community
0	ID4 AS39122 IP195.66.226.97 BLACKNIGH	✓ 185.193.84.0/22	39122 1299 39392 29504	1299:430 1299:1000 1299:30000 1299:30850
1	ID13 AS2914 IP195.66.224.138 NTT-DATA-	✓ 185.193.84.0/22	2914 1299 39392 29504	2914:420 2914:1009 2914:2000 2914:3000
2	ID15 AS3170 IP195.66.227.195 VELOXSERV	✓ 185.193.84.0/22	3170 174 39392 29504	174:21101 174:22016 60945:0
3	ID16 AS271253 IP195.66.231.56	✓ 185.193.84.0/22	271253 1299 39392 29504	-
4	ID25 AS15562 IP165.254.255.2 SNIJDERS	✓ 185.193.84.0/22	15562 2914 1299 39392 29504	2914:420 2914:1009 2914:2000 2914:3000
5	ID35 AS207841 IP195.66.227.233 INFERNO	✓ 185.193.84.0/22	207841 61049 15935 29504	15935:300 15935:302 15935:29504
6	ID38 AS3491 IP195.66.224.167 CONSOLE-C	✓ 185.193.84.0/22	3491 1299 39392 29504	1299:30000 3491:3000 3491:3001 3491:9002
7	ID43 AS35266 IP5.57.81.216 EXN-AS	✓ 185.193.84.0/22	35266 1299 39392 29504	1299:30000 35266:60 35266:1299
8	ID44 AS58057 IP194.50.92.251 SECUREBIT	✓ 185.193.84.0/22	58057 34549 1299 39392 29504	0:34927 0:56382 0:58299 1299:30000 34549:0
9	ID48 AS42473 IP195.66.226.113 AS-AMFXTA	✓ 185.193.84.0/22	42473 1299 39392 29504	1299:30000 42473:1500 42473:2000 42473:2100

Filters Panel:

- Prefix (up to 10, v4 or v6): 185.193.84.0/22
- Search / Reset filters
- Full-feeders VPs only: On
- Date (UTC). Default is now-5min: 16/01/2026, 18:41:35
- Prefix match type: Exact
- Collection platform: All
- VPs' ASN(s): e.g., 3333,559,2914
- VPs' ASN country codes: e.g., FR,DE
- VPs' IP geolocation country codes: e.g., FR,DE
- VPs' BMP parent ASNs (BMP only): e.g., 205755,3356
- What to show: Existing and missing ent...

Prefix visibility: Count per origin AS. 185.193.84.0/22: 528 (green), 12 (red).

As-path length distribution: For hops: 1-6 and >6. Radar chart showing distribution across hop counts.

Top 5 second-hop AS numbers: Prepend AS numbers omitted.

AS39392	310
AS15935	85
AS6939	64
AS24482	6

Top 5 third-hop AS numbers: Prepend AS numbers omitted.

AS1299	189
AS174	111
AS33891	59
AS50263	12



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