

Do we still need IRR?

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ISOC - Network Resources

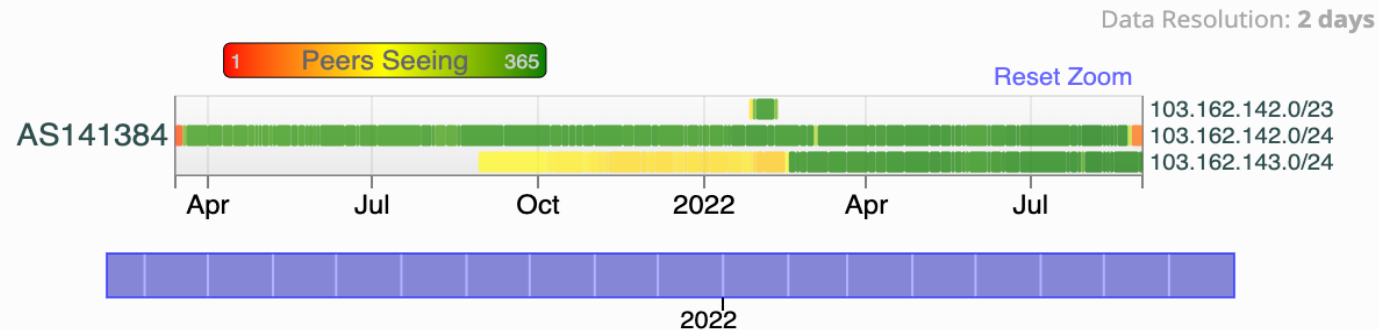
```
inetnum:      103.162.142.0 - 103.162.143.255
netname:      ISAL-SG
descr:        Internet Society Asia Limited
descr:        3 Temasek Avenue Level 21 Centennial Tower
country:      SG
org:          ORG-ISAL1-AP
admin-c:      ISAL1-AP
tech-c:       ISAL1-AP
abuse-c:      AI706-AP
status:       ASSIGNED PORTABLE
remarks:      -----
remarks:      To report network abuse, please contact mnt-irt
remarks:      For troubleshooting, please contact tech-c and admin-c
remarks:      Report invalid contact via www.apnic.net/invalidcontact
remarks:      -----
mnt-by:       APNIC-HM
mnt-routes:   MAINT-ISAL-SG
mnt-irt:      IRT-ISAL-SG
last-modified: 2021-02-05T03:52:16Z
source:       APNIC
```

```
% Information related to '103.162.142.0/24AS141384'

route:        103.162.142.0/24
origin:       AS141384
descr:        Internet Society Asia Limited
              3 Temasek Avenue Level 21 Centennial Tower
mnt-by:       MAINT-ISAL-SG
last-modified: 2022-02-10T02:19:58Z
source:       APNIC
```

```
% Information related to '103.162.143.0/24AS141384'

route:        103.162.143.0/24
origin:       AS141384
descr:        Internet Society Asia Limited
              3 Temasek Avenue Level 21 Centennial Tower
mnt-by:       MAINT-ISAL-SG
last-modified: 2022-01-27T10:06:57Z
source:       APNIC
```



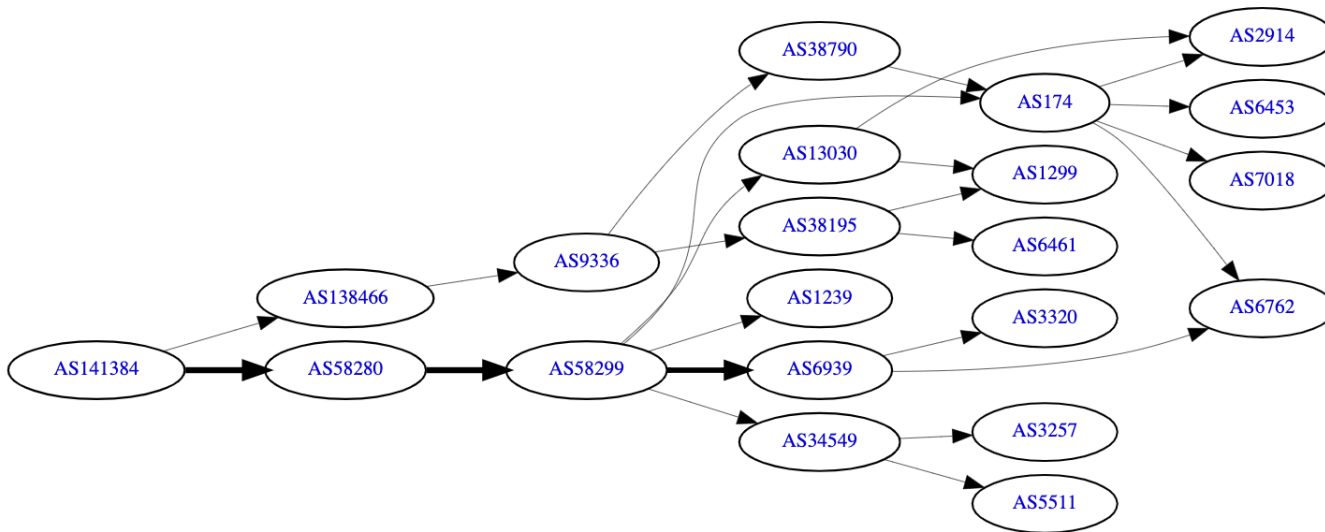
ISOC - Network Connectivity

AS141384 IPv6 Route Propagation

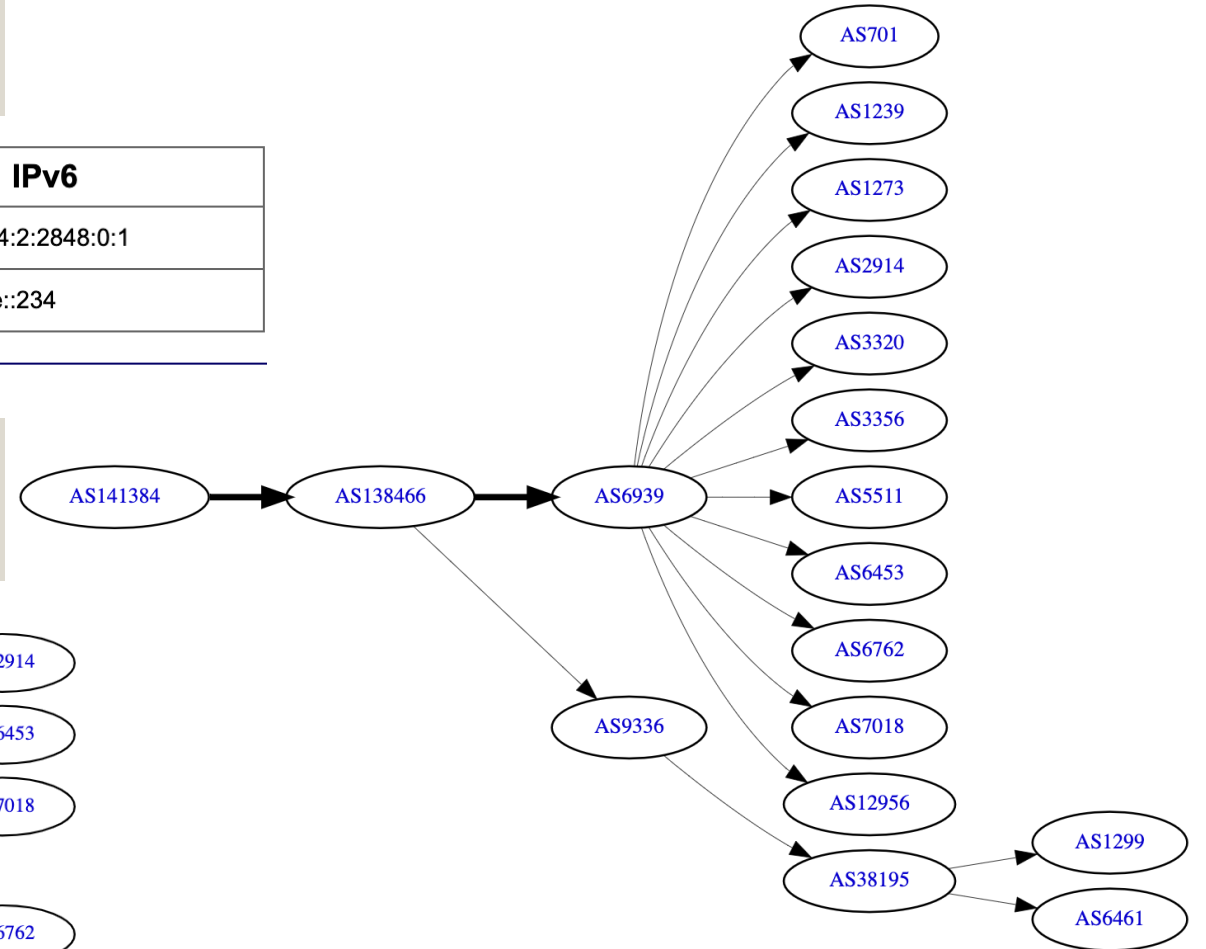
Exchange	CC	City	IPv4	IPv6
<u>IX Australia NSW</u>	 AU	Sydney	218.100.53.78	2001:7fa:11:4:2:2848:0:1
<u>IXP.ge</u>	 GE	Tbilisi	185.1.224.234	2001:7f8:11e::234

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AS141384 IPv4 Route Propagation



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RADb – HOW/WHY ????

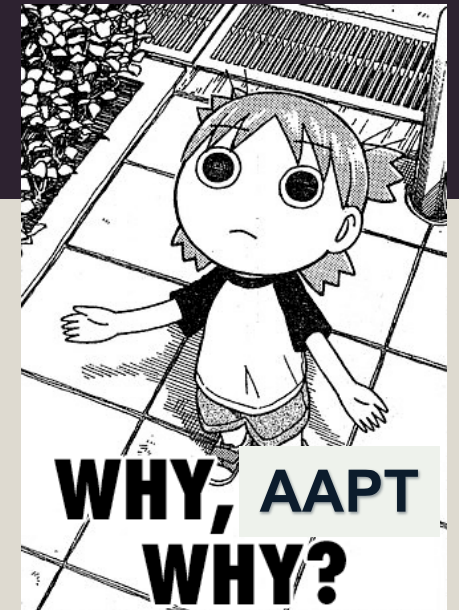
```
route: 103.162.142.0/24
origin: AS141384
descr: Proxy route
remarks: Proxy route
mnt-by: MAINT-AS7545
changed: core-neteng-support@tpg.com.au 20220203 #06:17:44Z
source: RADb
```

```
route: 103.162.142.0/23
origin: AS141384
descr: Proxy route
remarks: Proxy route
mnt-by: MAINT-AS7545
changed: core-neteng-support@tpg.com.au 20220203 #06:16:55Z
source: RADb
```

```
route: 103.162.142.0/24
descr: Proxy route object registered by AS2764
origin: AS38790 ←
remarks: This route object was created by AAPT on behalf of a customer.
remarks: As some of AAPT's upstream networks filter based on IRR objects,
remarks: this route object has been created to ensure that the advertisement
remarks: of this prefix is not rejected.
notify: routing.shared@aapt.com.au
mnt-by: MAINT-AS2764
changed: nobody@aapt.com.au 20210902
source: RADb
```

```
route: 103.162.142.0/23
descr: Proxy route object registered by AS38195
origin: AS141384
remarks: This route object was created by Superloop on behalf of a customer.
notify: au.noc@superloop.com
mnt-by: MAINT-AS38195
changed: au.noc+irt@superloop.com 20220116
source: RADb
```

```
route: 103.162.142.0/23
descr: Proxy route object registered by AS2764
origin: AS38790
remarks: This route object was created by AAPT on behalf of a customer.
remarks: As some of AAPT's upstream networks filter based on IRR objects,
remarks: this route object has been created to ensure that the advertisement
remarks: of this prefix is not rejected.
notify: routing.shared@aapt.com.au
mnt-by: MAINT-AS2764
changed: nobody@aapt.com.au 20210302
source: RADb
```



The Problem

Network operators must publicly document their intended routing announcements in the appropriate RIR routing registry, RADb or an RADb-mirrored IRR. This includes ASNs and IP prefixes originating on their own networks, as well as the networks for which they provide transit services.

BUT – neither these prefixes belongs to AS38790 (or ever originated by) nor these objects were created by us.



Reminder – Its an honor System:

IRR eco-system outside RIR jurisdiction is based entirely on trust

- There is no system to validation whether these objects are legitimate
- Lack of reliability of data because of stale objects



Lets Investigate!

We decided to find out who is updating these objects in RADb

There were just too many ways to investigate the IRR data, we (Max Stucchi, Amreesh Phokeer, Aftab Siddiqui) decided to do the following

- Compare RIR delegation file with RADb – (this work)
- Compare data between RIR's IRRdb vs RADb and ALTDB (2nd phase)
- All data is publicly available for further review

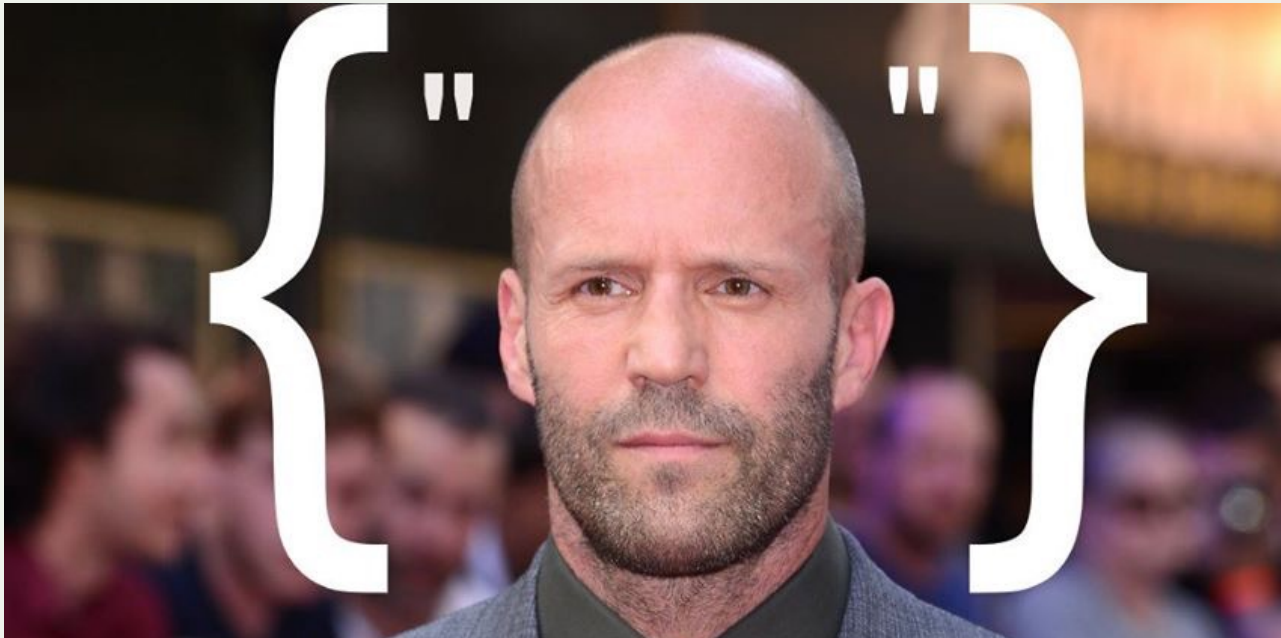


<http://103.162.143.30/route-check/data/>



Data - Snapshot

All route objects are in the JSON format for easy parsing.



```
[
  {
    "prefix": "1.0.0.0/24",
    "status": 4,
    "exacts_count": 0,
    "more_specifics_count": 0
  },
  {
    "prefix": "1.0.1.0/24",
    "status": 4,
    "exacts_count": 0,
    "more_specifics_count": 0
  },
  {
    "prefix": "1.0.2.0/23",
    "status": 4,
    "exacts_count": 0,
    "more_specifics_count": 0
  },
  {
    "prefix": "1.0.4.0/22",
    "status": 1,
    "exact": [
      {
        "descr": "(139763)",
        "origin": "AS56203",
        "mnt": "MAINT-AS2764",
        "last-modified": "nobody@connect.com.au 20120207",
        "source": "RADB",
        "prefix": "1.0.4.0/22"
      },
      {
        "descr": "Proxy route object registered by AS2764",
        "origin": "AS24130",
        "mnt": "MAINT-AS2764",
        "last-modified": "nobody@aapt.com.au 20130219",
        "source": "RADB",
        "prefix": "1.0.4.0/22"
      }
    ]
  },
  {
    "prefix": "1.0.4.0/22",
    "status": 1,
    "exact": [
      {
        "descr": "(139763)",
        "origin": "AS56203",
        "mnt": "MAINT-AS2764",
        "last-modified": "nobody@connect.com.au 20120207",
        "source": "RADB",
        "prefix": "1.0.4.0/22"
      },
      {
        "descr": "Proxy route object registered by AS2764",
        "origin": "AS24130",
        "mnt": "MAINT-AS2764",
        "last-modified": "nobody@aapt.com.au 20130219",
        "source": "RADB",
        "prefix": "1.0.4.0/22"
      }
    ]
  },
  {
    "prefix": "1.0.4.0/22",
    "status": 1,
    "exact": [
      {
        "descr": "(139763)",
        "origin": "AS56203",
        "mnt": "MAINT-AS2764",
        "last-modified": "nobody@connect.com.au 20120207",
        "source": "RADB",
        "prefix": "1.0.4.0/22"
      },
      {
        "descr": "Proxy route object registered by AS2764",
        "origin": "AS24130",
        "mnt": "MAINT-AS2764",
        "last-modified": "nobody@aapt.com.au 20130219",
        "source": "RADB",
        "prefix": "1.0.4.0/22"
      }
    ]
  },
  {
    "prefix": "1.0.4.0/22",
    "status": 1,
    "exact": [
      {
        "descr": "(139763)",
        "origin": "AS56203",
        "mnt": "MAINT-AS2764",
        "last-modified": "nobody@connect.com.au 20120207",
        "source": "RADB",
        "prefix": "1.0.4.0/22"
      },
      {
        "descr": "Proxy route object registered by AS2764",
        "origin": "AS24130",
        "mnt": "MAINT-AS2764",
        "last-modified": "nobody@aapt.com.au 20130219",
        "source": "RADB",
        "prefix": "1.0.4.0/22"
      }
    ]
  }
]
```

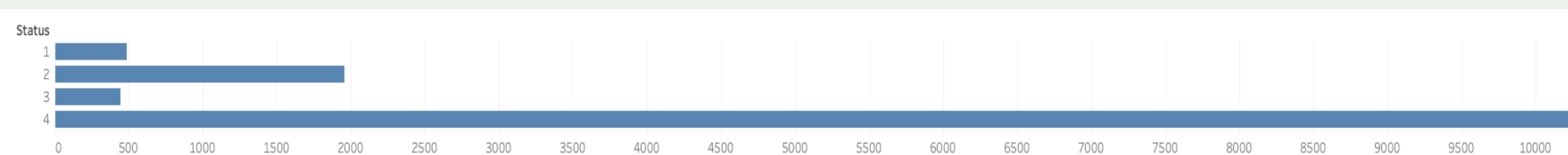
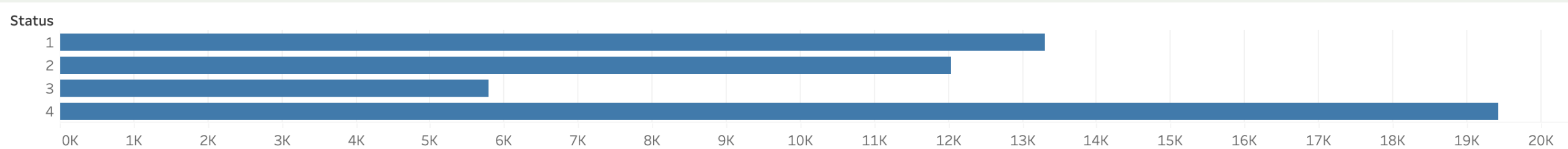

APNIC Resource Status



There are 4 – Status types

- Status 1 – There are objects for “**Exact**” allocation size and also for “**More Specifics**”
- Status 2 – There are objects only for “**Exact**” allocation size, no “**More Specifics**”
- Status 3 – There are objects only for “**More Specifics**”
- Status 4 – There are no objects (neither “**Exact**” match nor “**More Specifics**”)

APNIC Resource Status v4 and v6



APNIC Resource Status

- As per the APNIC delegation file 1.0.4.0/22 was allocated in 20110412.
- In RADb, there are 4 route objects of “Exact” match

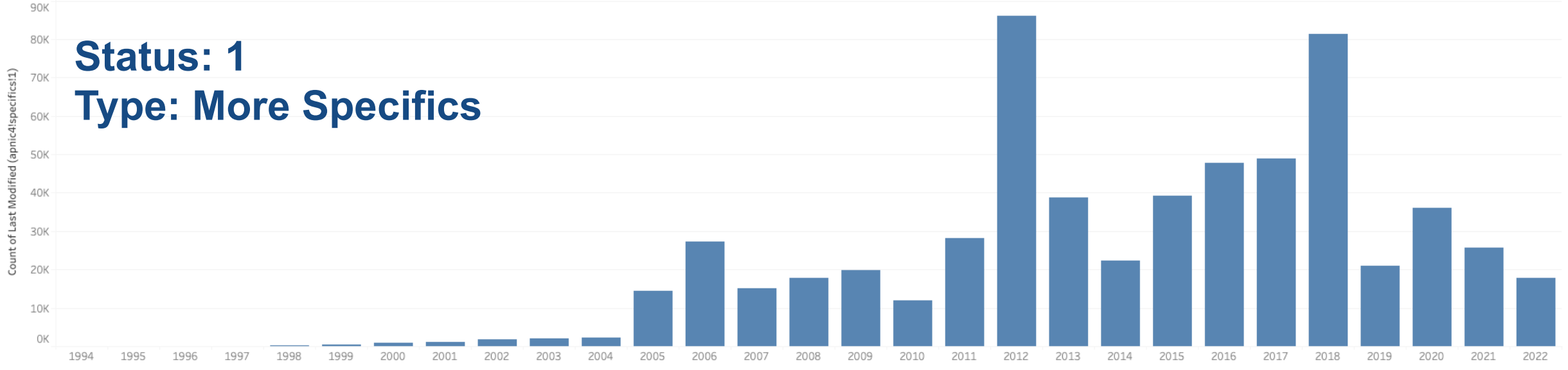
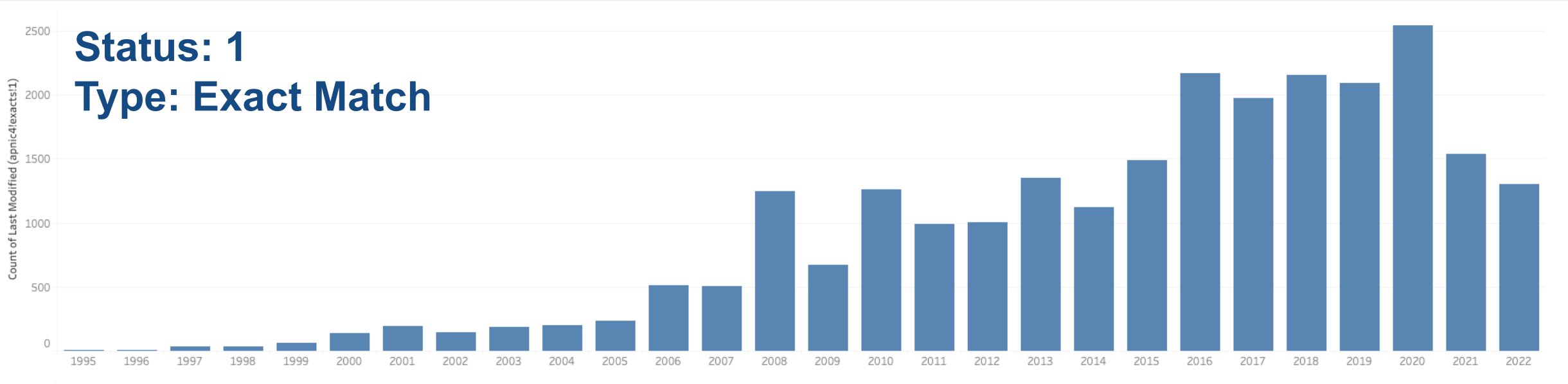
apnic | AU | ipv4 | 1.0.4.0 | 1024 | 20110412 | allocated

<http://ftp.apnic.net/apnic/stats/apnic/delegated-apnic-latest>



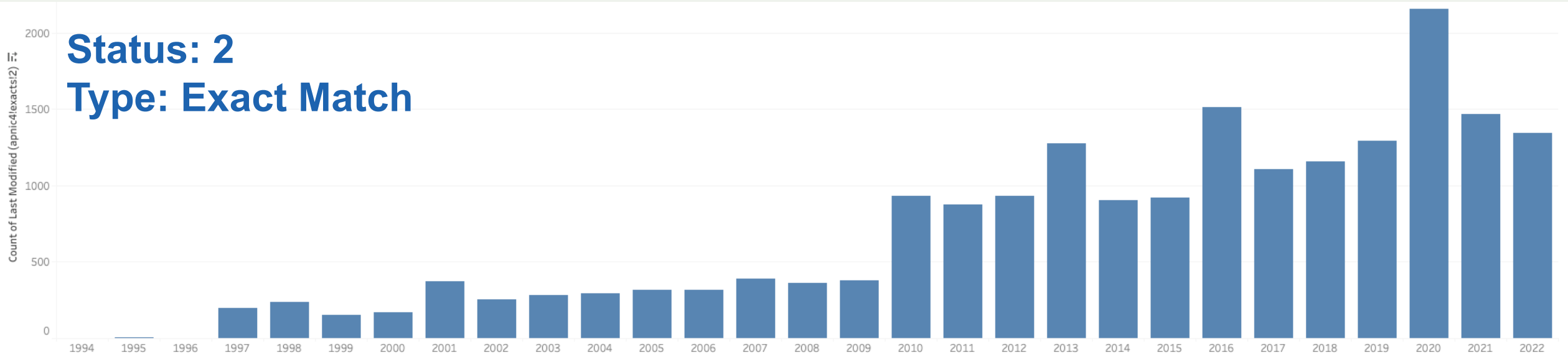
```
[
{
  "descr": "(139763)",
  "origin": "AS56203",
  "mnt": "MAINT-AS2764",
  "last-modified": "nobody@connect.com.au 20120207",
  "source": "RADB",
  "prefix": "1.0.4.0/22"
},
{
  "descr": "Proxy route object registered by AS2764",
  "origin": "AS24130",
  "mnt": "MAINT-AS2764",
  "last-modified": "nobody@aapt.com.au 20130219",
  "source": "RADB",
  "prefix": "1.0.4.0/22"
},
{
  "descr": "Proxy route object registered by AS2764",
  "origin": "AS7545",
  "mnt": "MAINT-AS2764",
  "last-modified": "nobody@aapt.com.au 20130628",
  "source": "RADB",
  "prefix": "1.0.4.0/22"
},
{
  "descr": "Proxy route object registered by AS2764",
  "origin": "AS38803",
  "mnt": "MAINT-AS2764",
  "last-modified": "nobody@aapt.com.au 20210701",
  "source": "RADB",
  "prefix": "1.0.4.0/22"
}
]
```

APNIC IPv4 Resource Status

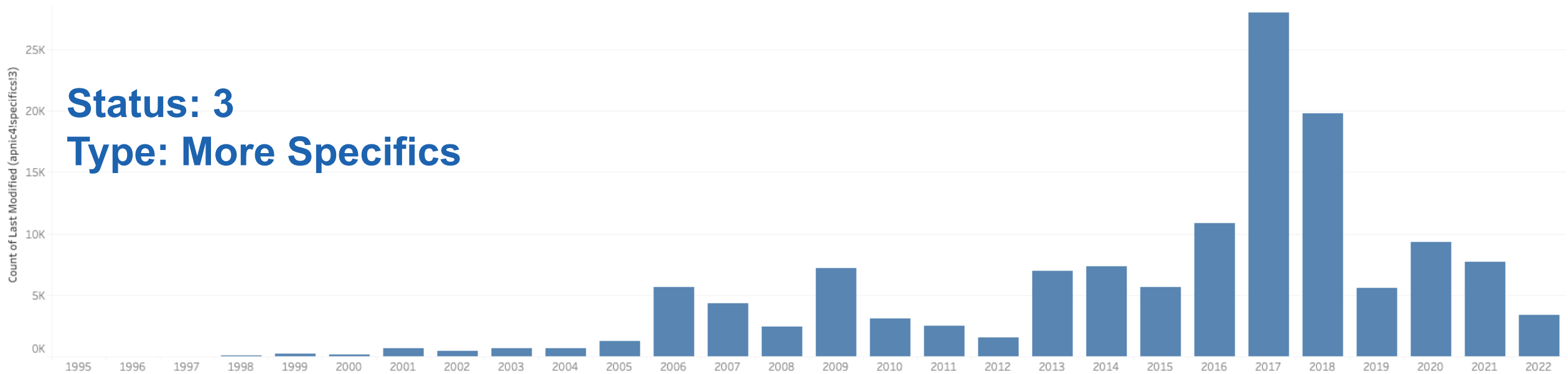


APNIC IPv4 Resource Status

Status: 2
Type: Exact Match

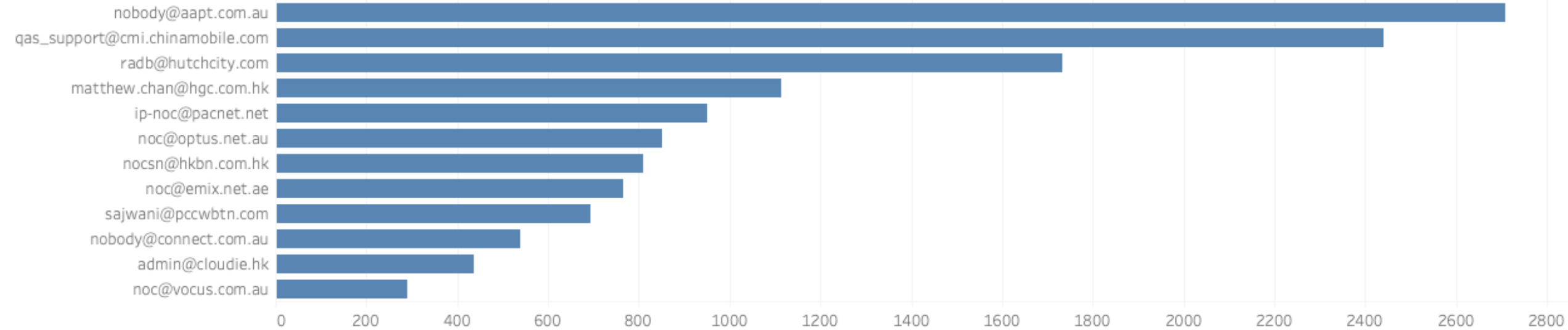


Status: 3
Type: More Specifics

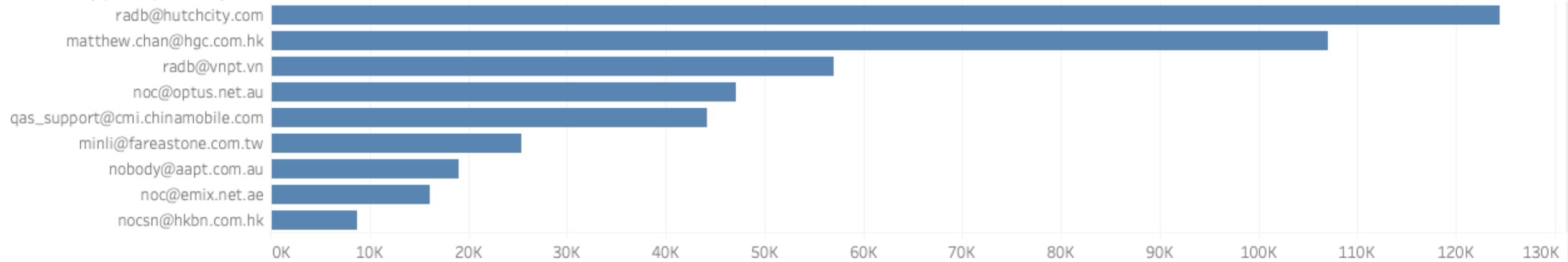


APNIC IPv4 Resource Status

Last Modified (apnic4!exacts!1) 🚩

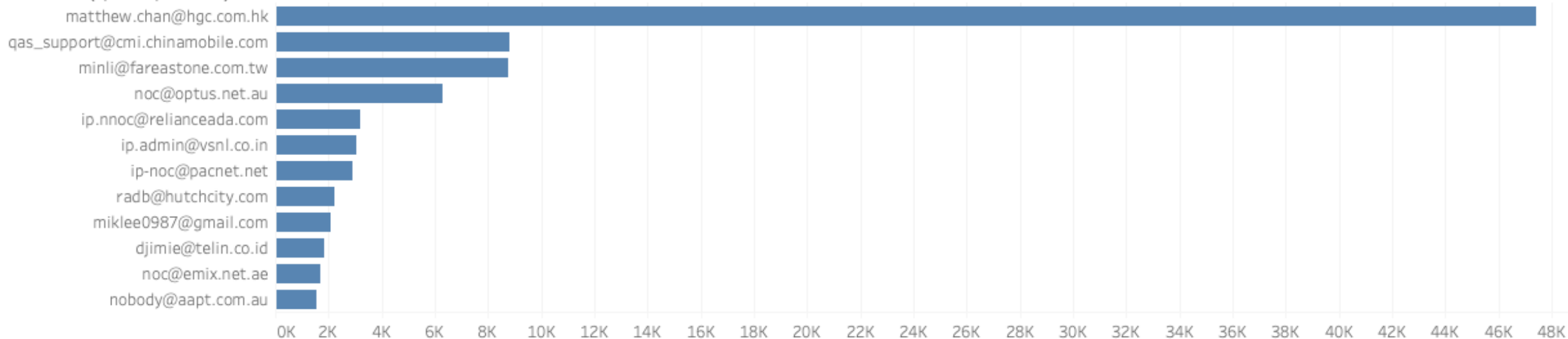


Last Modified (apnic4!specifics!1) 🚩

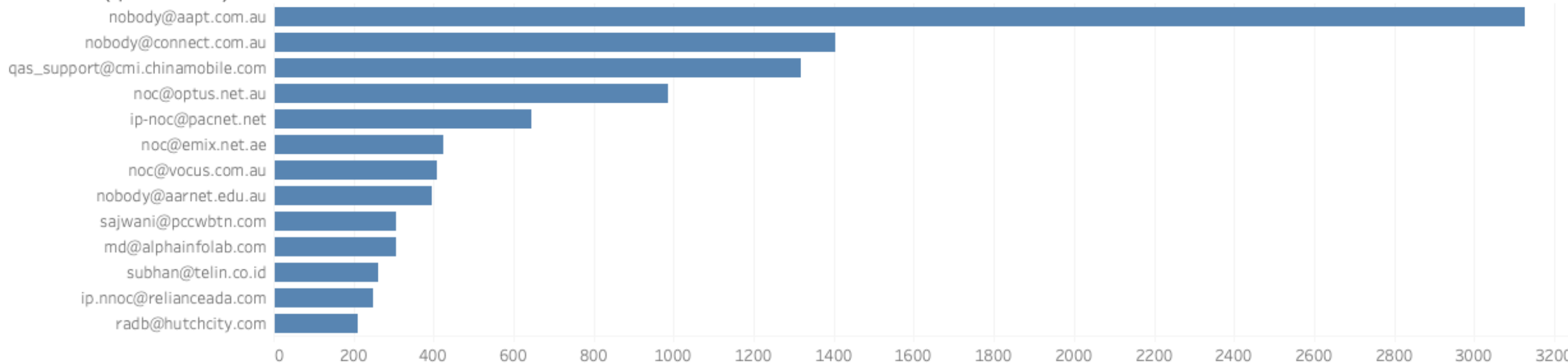


APNIC IPv4 Resource Status

Last Modified (apnic4!specifics!3) 🗑

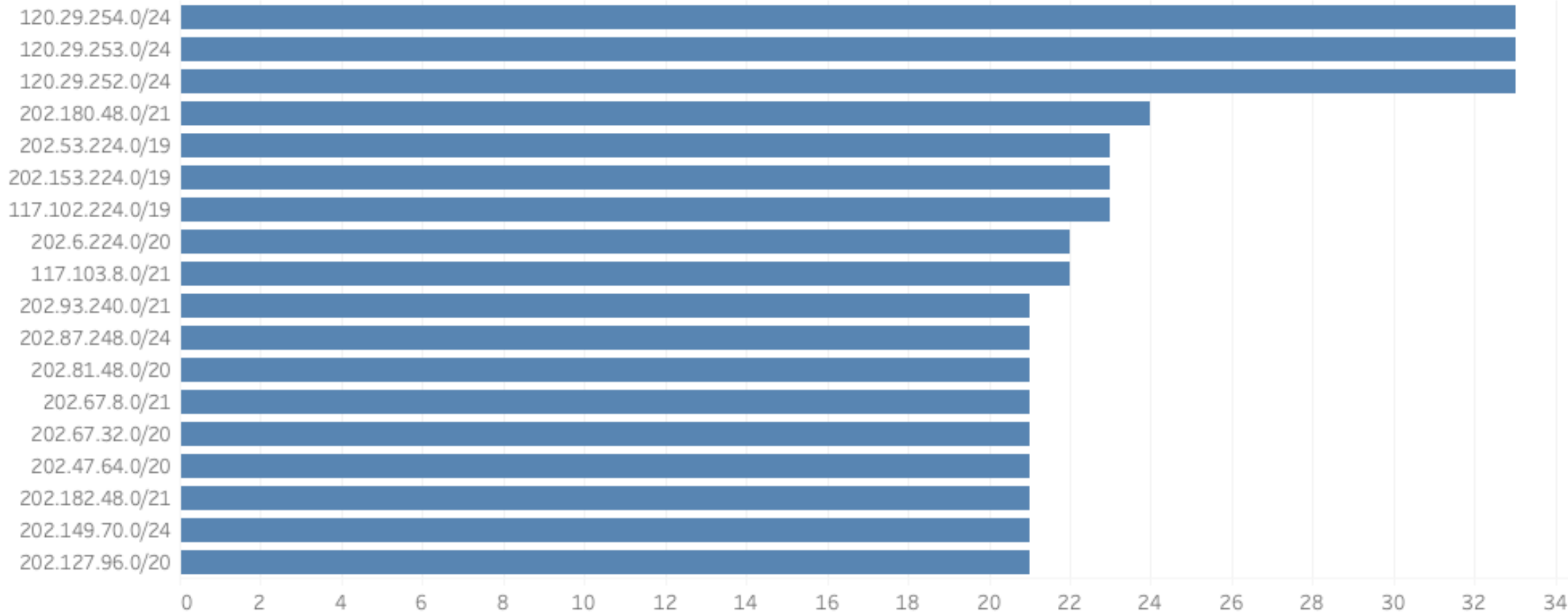


Last Modified (apnic4!exacts!2) 🗑

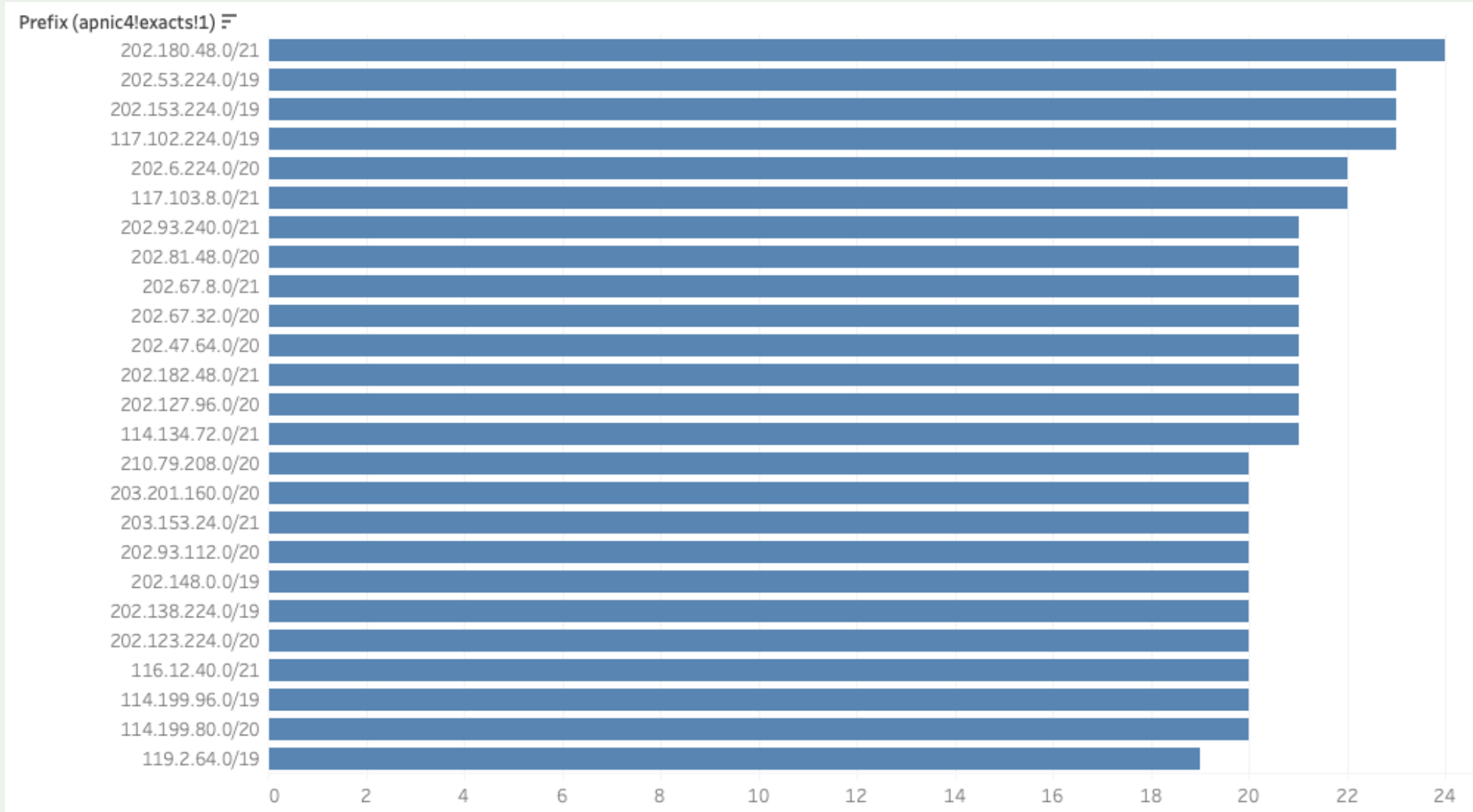


APNIC IPv4 - Max No. of Route Objects (Status:1)

Prefix (apnic4!specifics!1) ▾



APNIC IPv4 - Max No. of Route Objects (Status:1)



APNIC IPv4 - Max No. of Route Objects (Status:1)

Prefix (apnic4!exacts!1)	Last Modified (apnic4!exact..)	Distinct cou..	Maintainer (ap..	Year o..		
202.174.32.0/20	nobody@aapt.com.au	1	MAINT-AS2764	2021	1	
				2016	1	
				2012	1	
			2	MAINT-AS2764	2015	2
			3	MAINT-AS2764	2013	3
	nobody@connect.com.au	1	MAINT-AS2764	2011	1	
103.8.28.0/23	nobody@aapt.com.au	1	MAINT-AS2764	2001	1	
		2	MAINT-AS2764	2014	2	
				2013	2	
			2012	2		
	damien@vocus.com.au	1	MAINT-AS4826	2013	1	
			2012	2012	1	
203.30.44.0/22	noc@vocus.com.au	1	MAINT-AS4826	2015	1	
				2012	1	
	nobody@aapt.com.au	1	MAINT-AS2764	2012	1	
		2	MAINT-AS2764	2021	2	
			2013	2		
	nobody@connect.com.au	2	MAINT-AS2764	2011	2	
203.18.102.0/23	iah@connect.com.au	1	MAINT-AS2764	2000	1	
				2015	1	
	nobody@aapt.com.au	1	MAINT-AS2764	2015	1	
		2	MAINT-AS2764	2013	2	
	routing@cwo.net.au	1	MAINT-AS7474	2001	1	
	noc@optus.net.au	1	MAINT-AS7474	2009	1	
	nobody@connect.com.au	1	MAINT-AS2764	2010	1	
	ajcheng@connect.com.au	1	MAINT-AS2764	2003	1	
aft@connect.com.au	1	MAINT-AS2764	2003	1		

Filter:
AS2764
AS4637
AS7474
AS4826



APNIC IPv4 - Max No. of Route Objects (Status:1)

Prefix (apnic4!specific!..	Last Modified (apnic4!specific!3)	Maintainer (apnic4..	Origin (apnic4!specific!3)	Year of Date	
110.93.22.0/23	damien@vocus.com.au	MAINT-AS4826	AS17819	2012	
	nobody@aapt.com.au	MAINT-AS2764	AS7545	2013	
			AS10143	2012	
			AS24130	2013	
			AS131270	2017	
			AS133786	2016	
	nobody@connect.com.au	MAINT-AS2764	AS55772	2010	
	noc@vocus.com.au	MAINT-AS4826	AS38835	2018	
	reece.anderson@vocus.com.au	MAINT-AS4826	AS45763	2012	
	203.18.213.0/24	nobody@aapt.com.au	MAINT-AS2764	AS9328	2015
AS9822				2012	
AS10203				2015	
nobody@connect.com.au		MAINT-AS2764	AS4802	2011	
			AS7498	1999	
			AS9280	2000	
			AS9820	2001	
noc@vocus.com.au		MAINT-AS4826	AS45167	2015	
210.8.66.0/24		aisher@connect.com.au	MAINT-AS2764	AS9725	2000
		cdry@connect.com.au	MAINT-AS2764	AS17982	2002
	nobody@aapt.com.au	MAINT-AS2764	AS7545	2013	
			AS24130	2013	
	nobody@connect.com.au	MAINT-AS2764	AS2764	1999	
	noc@optus.net.au	MAINT-AS7474	AS9313	2006	
	routing@optus.net.au	MAINT-AS7474	AS9837	2002	

Filter:
[AS2764](#)
[AS4637](#)
[AS7474](#)
[AS4826](#)



Who is creating these objects?



Last Modified (apnic4!exacts!1)	Maintainer (apnic4!exacts!1)	Distinct count of Origin
ip-noc@pacnet.net	MAINT-AS4637	470
nobody@aapt.com.au	MAINT-AS2764	241
noc@vocus.com.au	MAINT-AS4826	164
nobody@connect.com.au	MAINT-AS2764	155
noc@optus.net.au	MAINT-AS7474	145
support@vocus.com.au	MAINT-AS4826	49
damien@vocus.com.au	MAINT-AS4826	41
phil@vocus.com.au	MAINT-AS4826	25
routing@optus.net.au	MAINT-AS7474	19
routing@cwo.net.au	MAINT-AS7474	18
tim@vocus.com.au	MAINT-AS4826	17
jack.kanimea@vocus.co.nz	MAINT-AS4826	14
afort@connect.com.au	MAINT-AS2764	11
cdry@connect.com.au	MAINT-AS2764	10

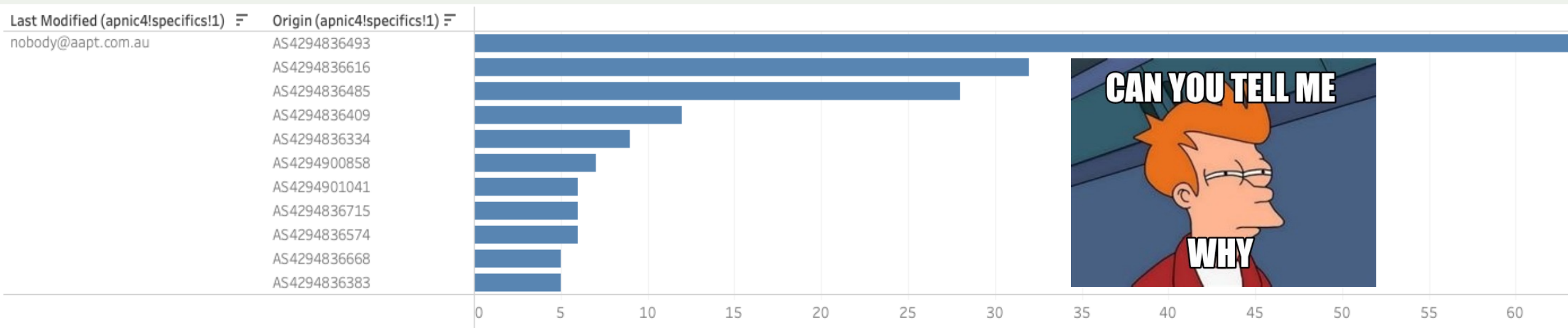
Status: 1
Type: Exact Match

Last Modified (apnic4!specifics!1)	Maintainer (apnic4!specifics!1)	Distinct count of Origin
ip-noc@pacnet.net	MAINT-AS4637	897
nobody@aapt.com.au	MAINT-AS2764	491
nobody@connect.com.au	MAINT-AS2764	273
noc@vocus.com.au	MAINT-AS4826	260
noc@optus.net.au	MAINT-AS7474	227
support@vocus.com.au	MAINT-AS4826	83
damien@vocus.com.au	MAINT-AS4826	60
phil@vocus.com.au	MAINT-AS4826	59
routing@optus.net.au	MAINT-AS7474	39
routing@cwo.net.au	MAINT-AS7474	37
core-neteng-support@tpg.com.au	MAINT-AS7545	31
tim@vocus.com.au	MAINT-AS4826	27
afort@connect.com.au	MAINT-AS2764	26
jack.kanimea@vocus.co.nz	MAINT-AS4826	25
cdry@connect.com.au	MAINT-AS2764	25

Status: 1
Type: More Specifics



Who is creating these objects?

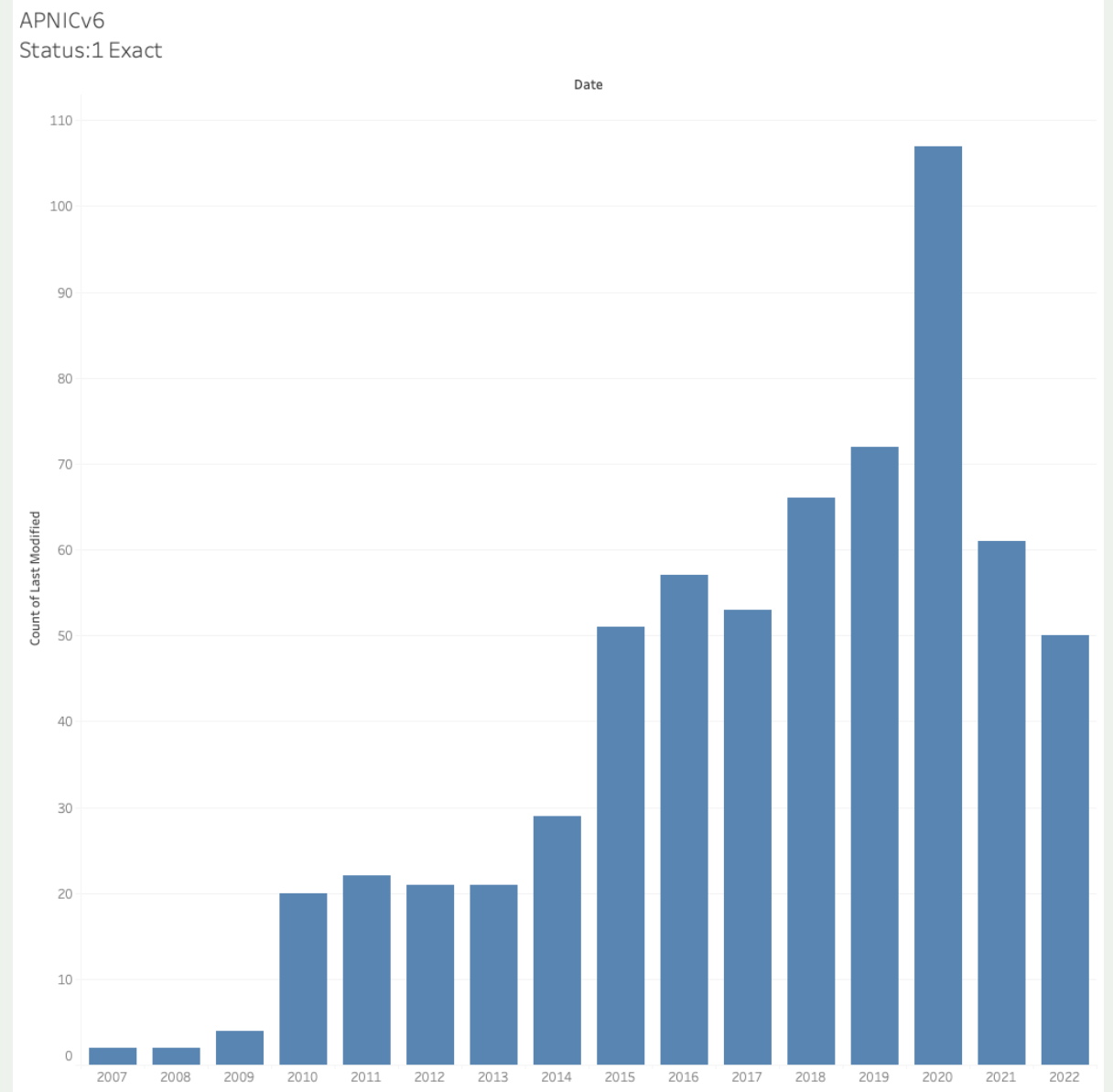
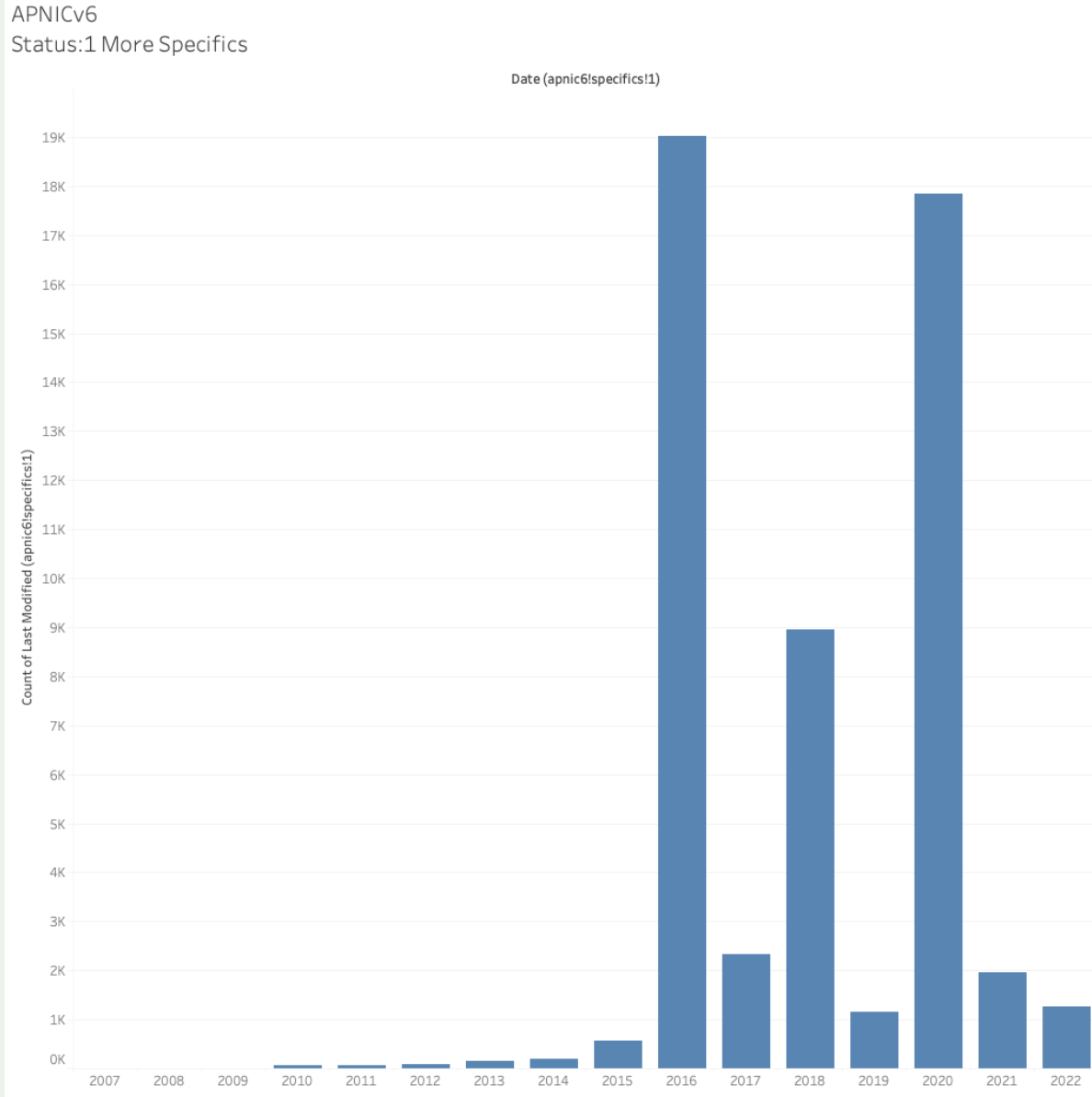


```
route: 14.202.136.224/28
descr: Proxy route object registered by AS2764
origin: AS4294836635
remarks: This route object was created by AAPT on behalf of a customer.
remarks: As some of AAPT's upstream networks filter based on IRR objects,
remarks: this route object has been created to ensure that the advertisement
remarks: of this prefix is not rejected.
notify: routing.shared@aapt.com.au
mnt-by: MAINT-AS2764
changed: nobody@aapt.com.au 20190926
source: RADB
```

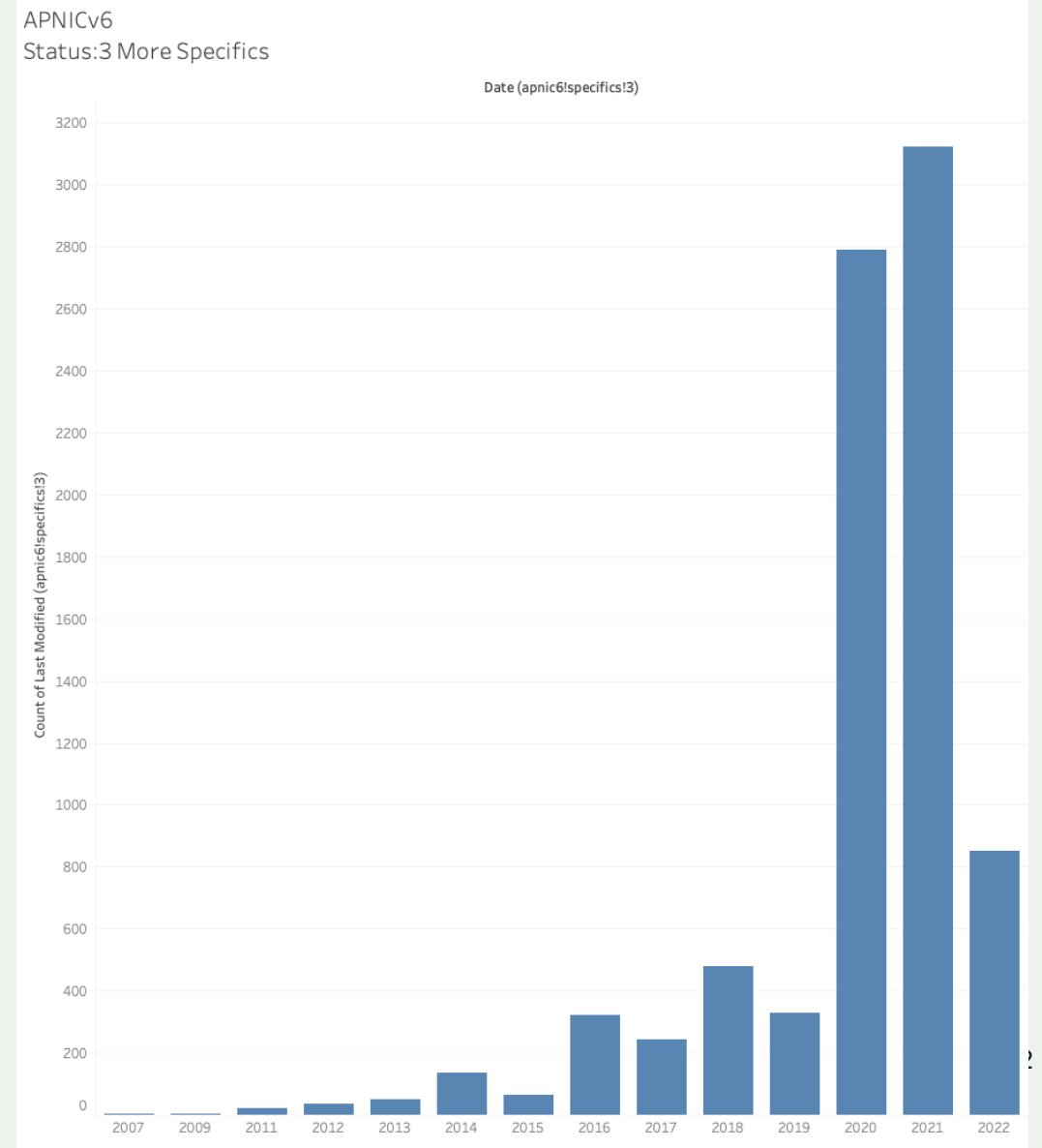
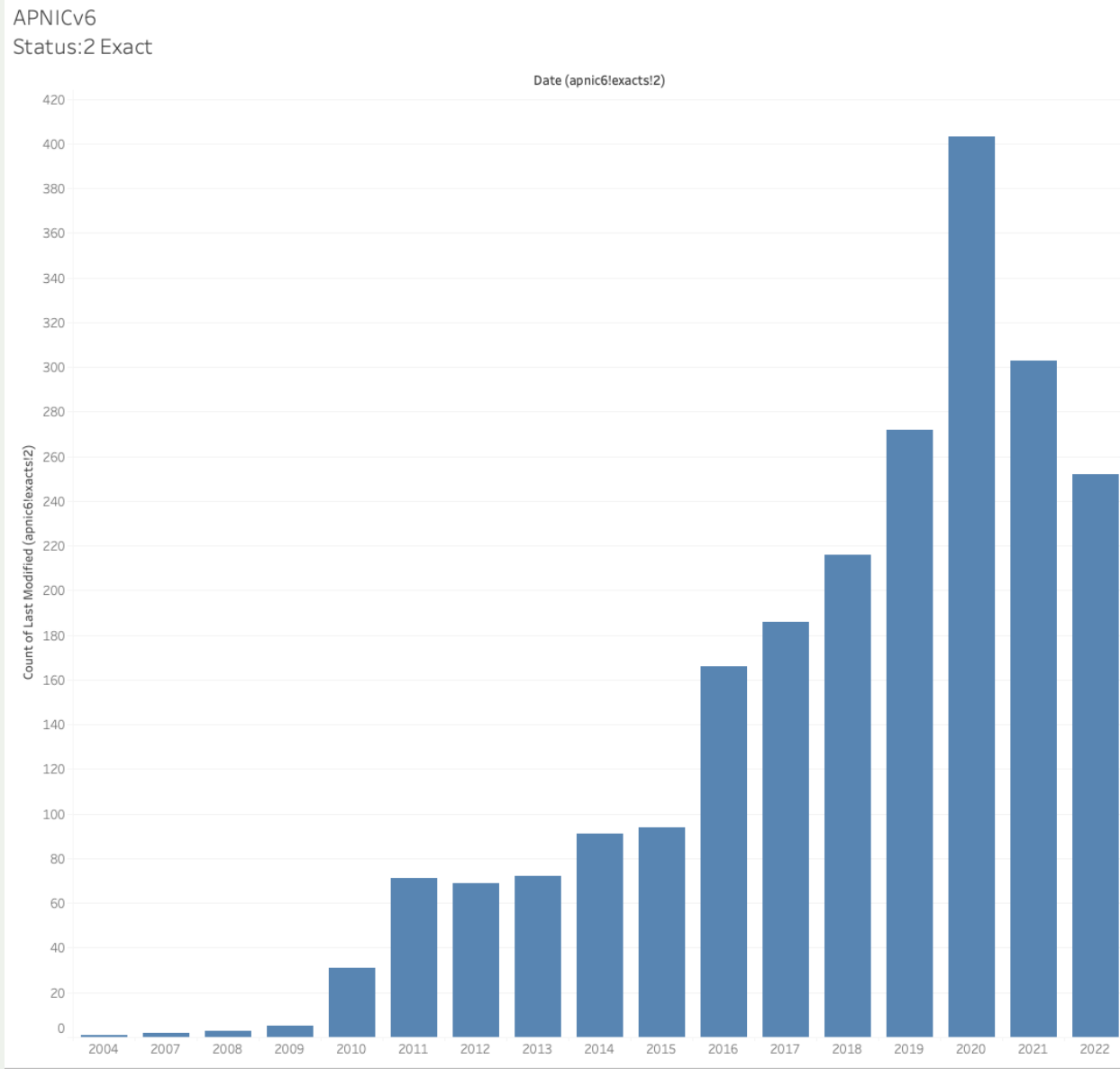
```
route: 59.100.131.160/28
descr: Proxy route object registered by AS2764
origin: AS4294836493
remarks: This route object was created by AAPT on behalf of a customer.
remarks: As some of AAPT's upstream networks filter based on IRR objects,
remarks: this route object has been created to ensure that the advertisement
remarks: of this prefix is not rejected.
notify: routing.shared@aapt.com.au
mnt-by: MAINT-AS2764
changed: nobody@aapt.com.au 20180625
source: RADB
```



APNIC IPv6 – Status 1

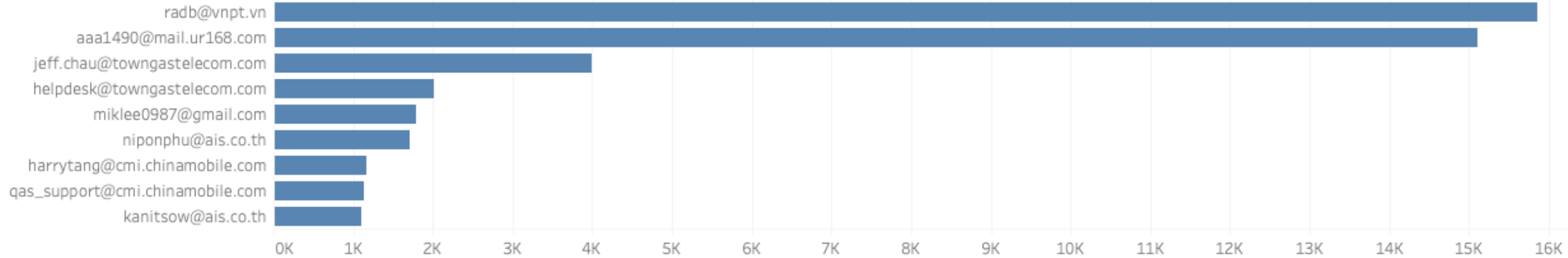


APNIC IPv6 – Status 2 - 3

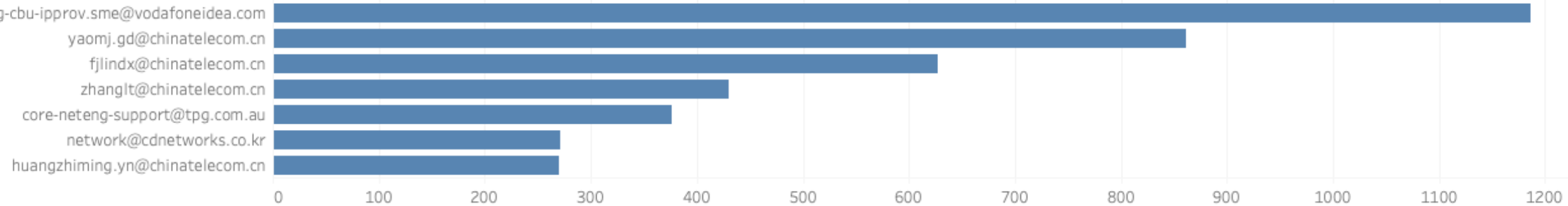


APNIC IPv6 Resource Status

Last Modified (apnic6!specifics!1) 🗑

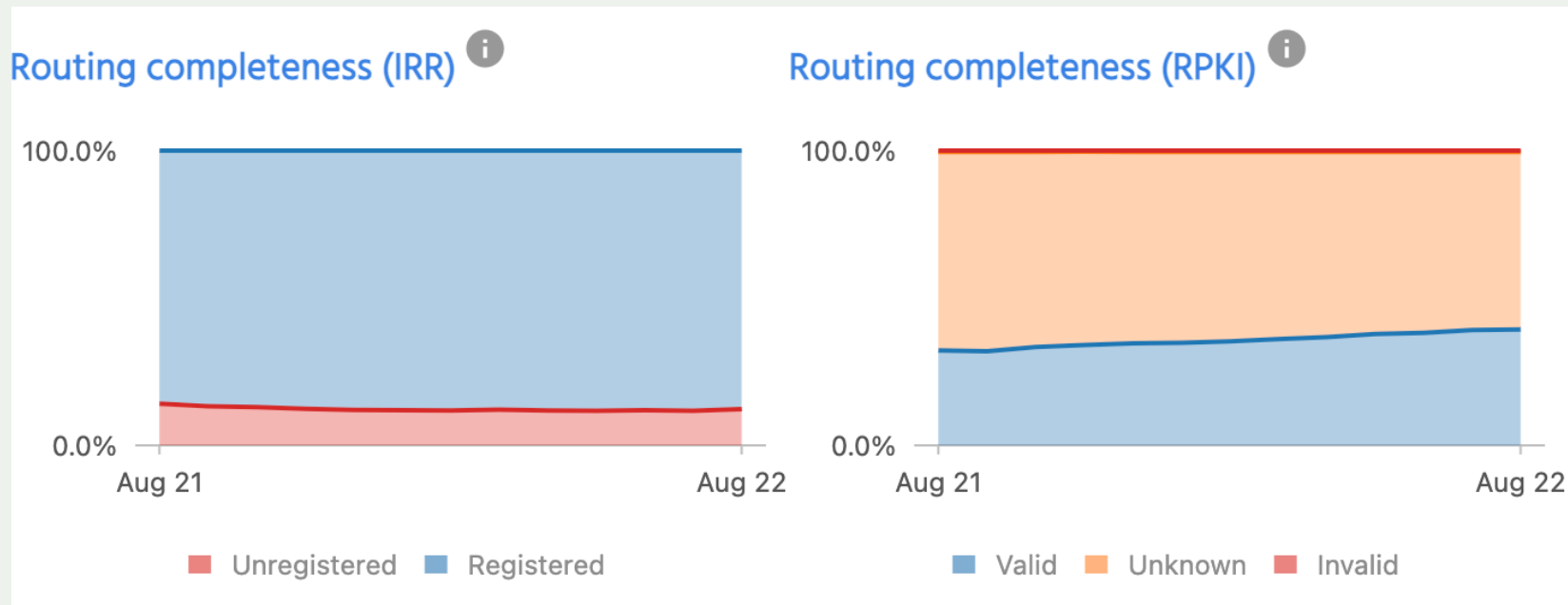


Last Modified (apnic6!specifics!3) 🗑



So, what is the problem?

- IRR data allows you to make informed routing decisions
- RPKI uptake is still not good enough to replace IRR
- Incorrect data in RADb means routing security loophole
- There are just too many incorrect/stale objects to clean up in 3rd party IRR db



So, what is the solution?

- Don't rely on 3rd party IRR db such as RADb, ALTDB etc and only use IRR services by RIR
- Legacy resources holders must be allowed by RIRs to use IRR services to avoid using 3rd party IRR db
- Any operator running local IRR db must not sync with 3rd party IRR db
- Encourage operators to use RPKI (create ROAs – drop invalids)
- Political and administrative barrier should be removed for legacy resource holders to use RPKI
- **Will you be interested in getting monthly reports of your resources?**



Please help us identify more data points

<http://103.162.143.30/route-check/data/>



Thank you.