The End of Days

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End of Days (film)

From Wikipedia, the free encyclopedia

End of Days is a 1999 American supernatural action horror film directed by Peter Hyams and starring Arnold Schwarzenegger, Gabriel Byrne, Robin Tunney, Kevin Pollak, Rod Steiger, CCH Pounder, and Udo Kier.[2] The film follows former New York Police Department detective Jericho Cane (Schwarzenegger) after he saves a banker (Byrne) from an assassin, finds himself embroiled in a religious conflict, and must protect an innocent young woman (Tunney) who is chosen by evil forces to conceive the Antichrist with Satan.

The film was released by Universal Pictures on November 24, 1999. It has grossed $66.9 million in North America and $145.1 million elsewhere, for a worldwide total of $212 million. The film received mainly negative reviews.

End of Days

Theatrical release poster

No, not THAT "End of Days"!

- Let's look at the end of IPv4 address allocation in the APNIC Registry

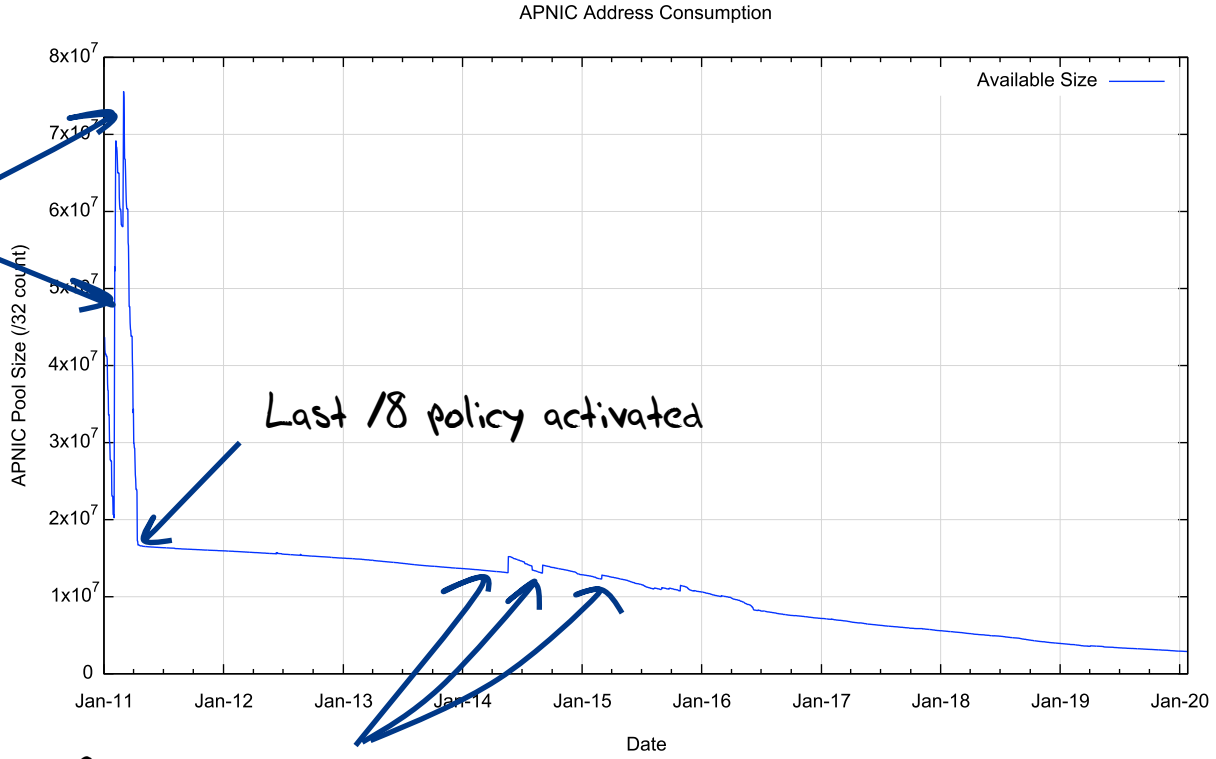
The End of the IPv4 Pool in the APNIC Registry

January 27th 2020

APNIC Address Pool:	890,748,672	/32s	(or 53.1 /8s)
Assigned:	883,440,640		(99.18%)
Available:	2,884,608		(0.32%)
Reserved:	4,423,424		(0.50%)

I - Available Pool Consumption

Available Pool 2011 - 2020

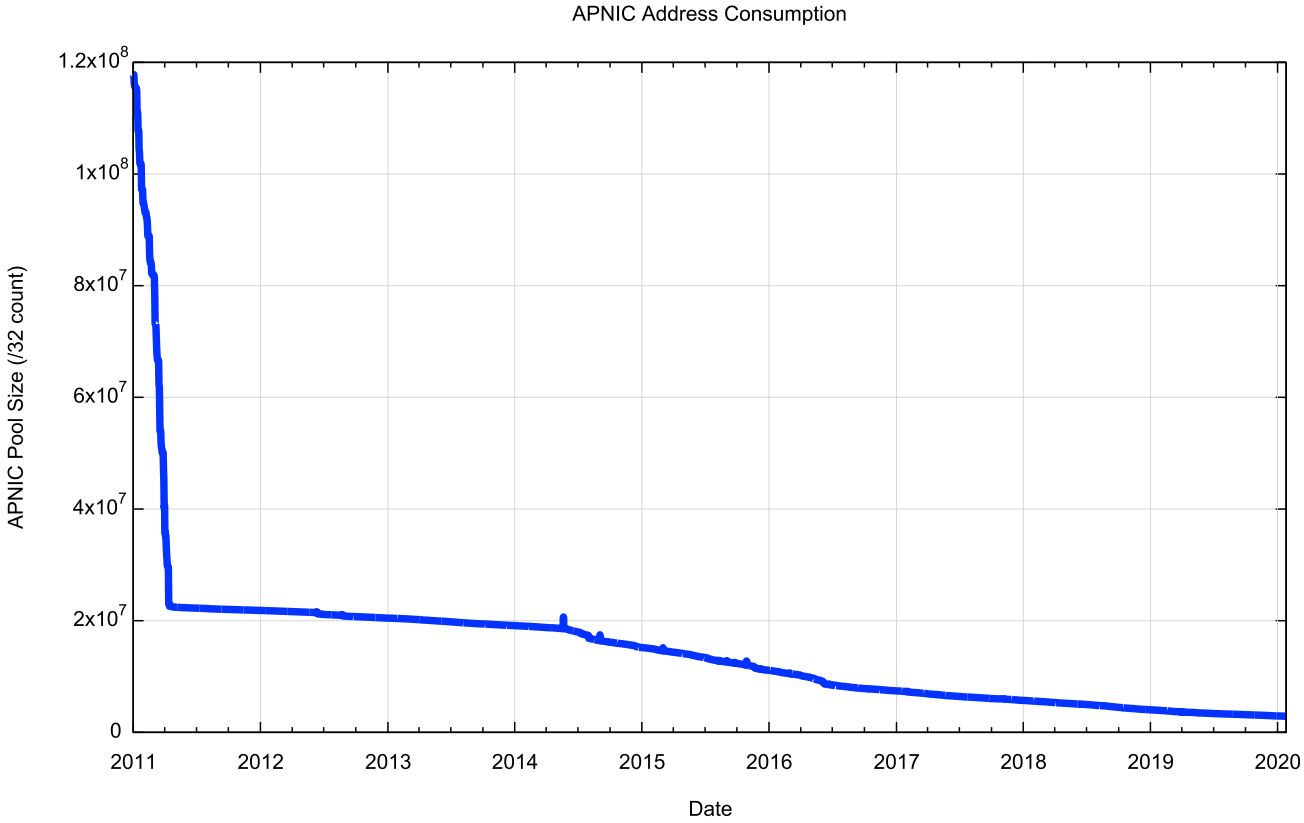


Final IANA /8 allocations

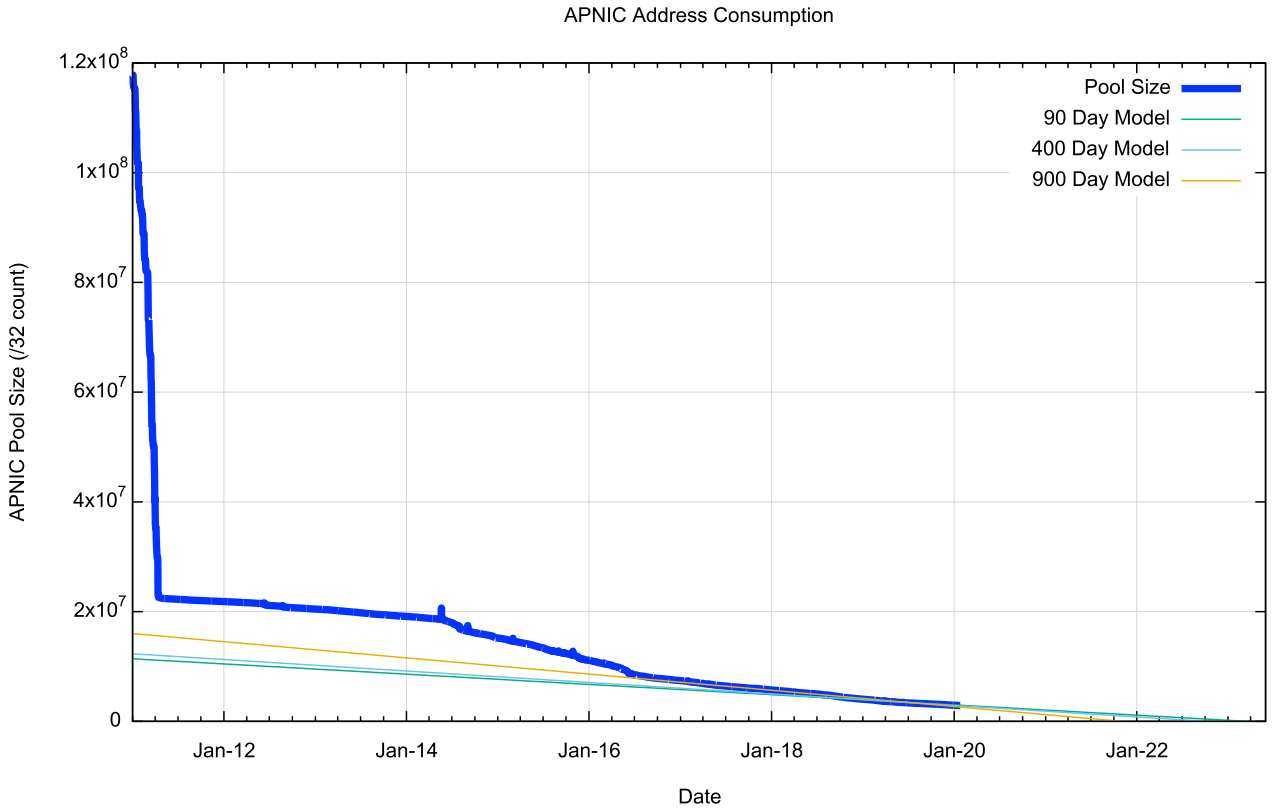
Last /8 policy activated

IANA redistribution of returned legacy addresses

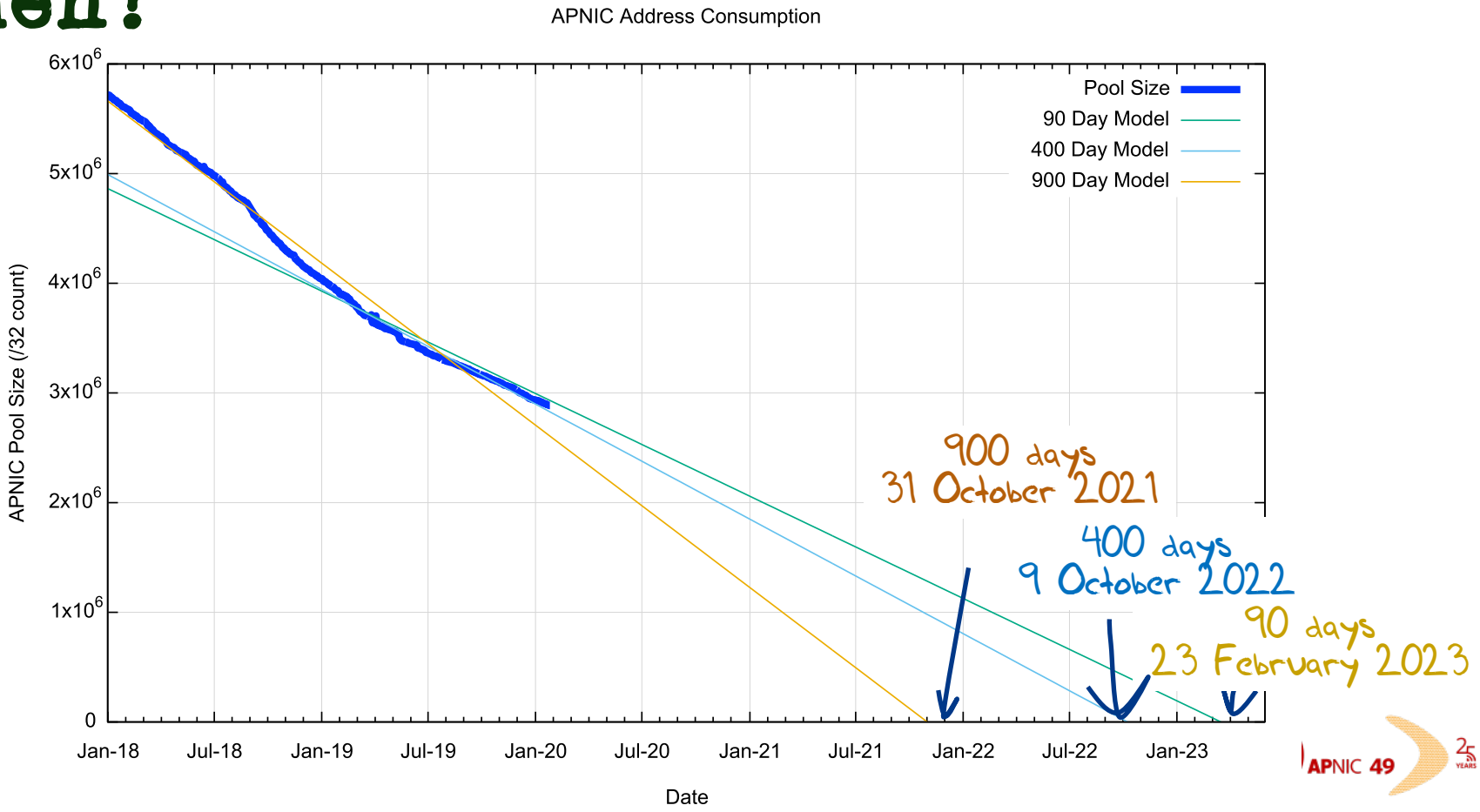
Consumption - 2011 - 2020



Consumption Projections

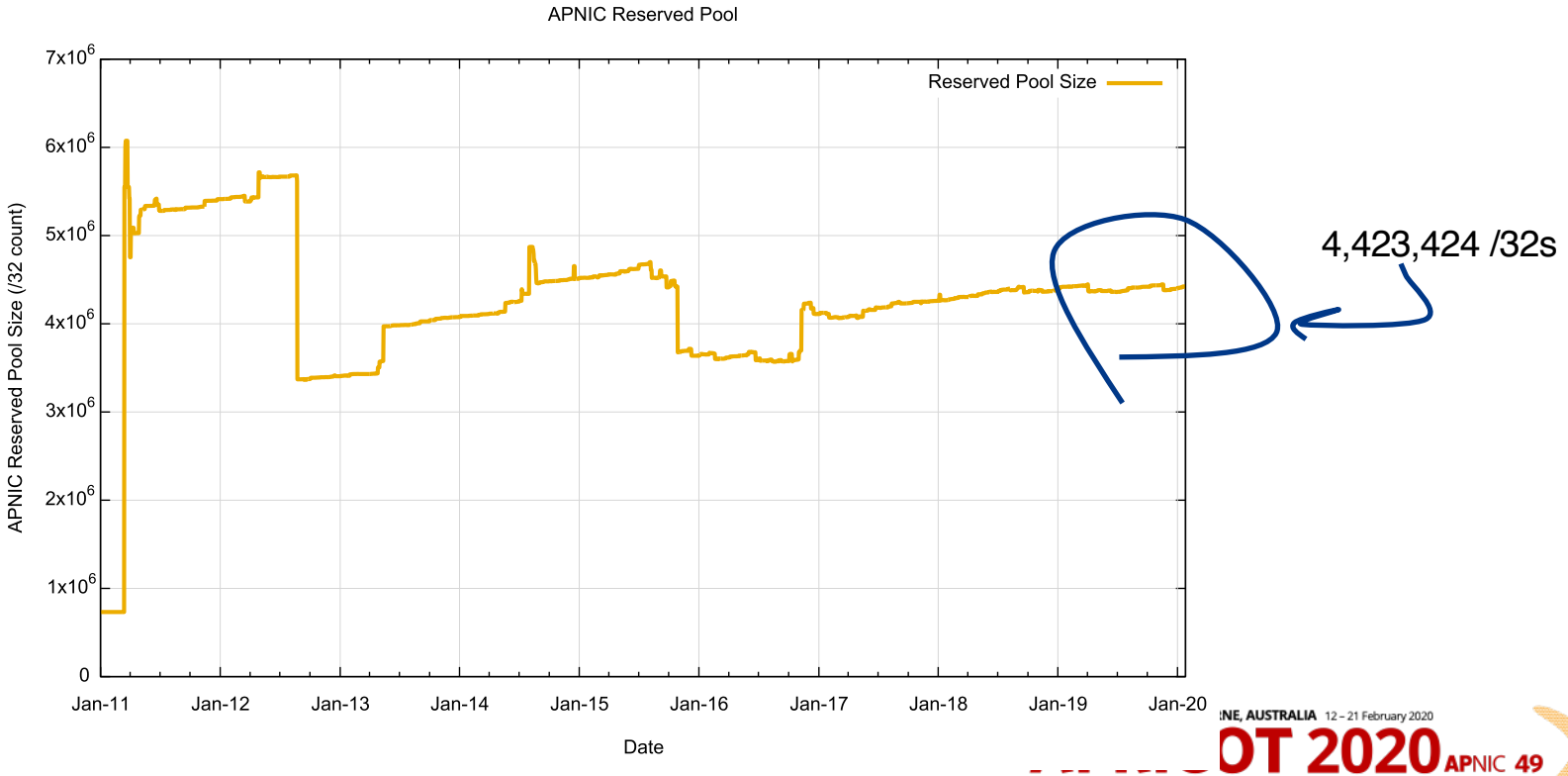


When?


APNIC Address Consumption
APNIC Pool Size (/32 count)
6x10^6
5x10^6
4x10^6
3x10^6
2x10^6
1x10^6
0
Jan-18
Jul-18
Jan-19
Jul-19
Jan-20
Jul-20
Jan-21
Jul-21
Jan-22
Jul-22
Jan-23
Date
Pool Size
90 Day Model
400 Day Model
900 Day Model
900 days
31 October 2021
400 days
9 October 2022
90 days
23 February 2023

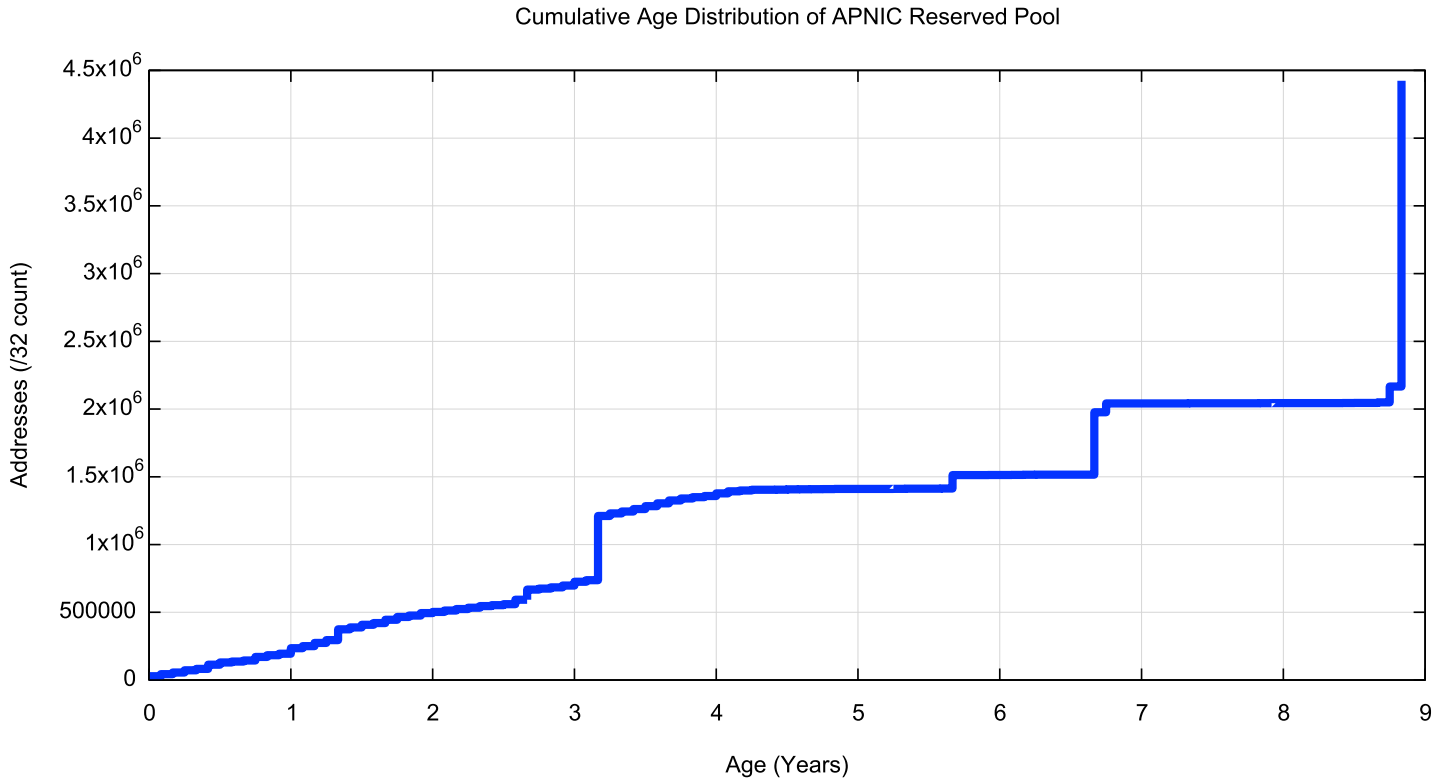
II - APNIC Reservations

APNIC Reserved Address Pool Size

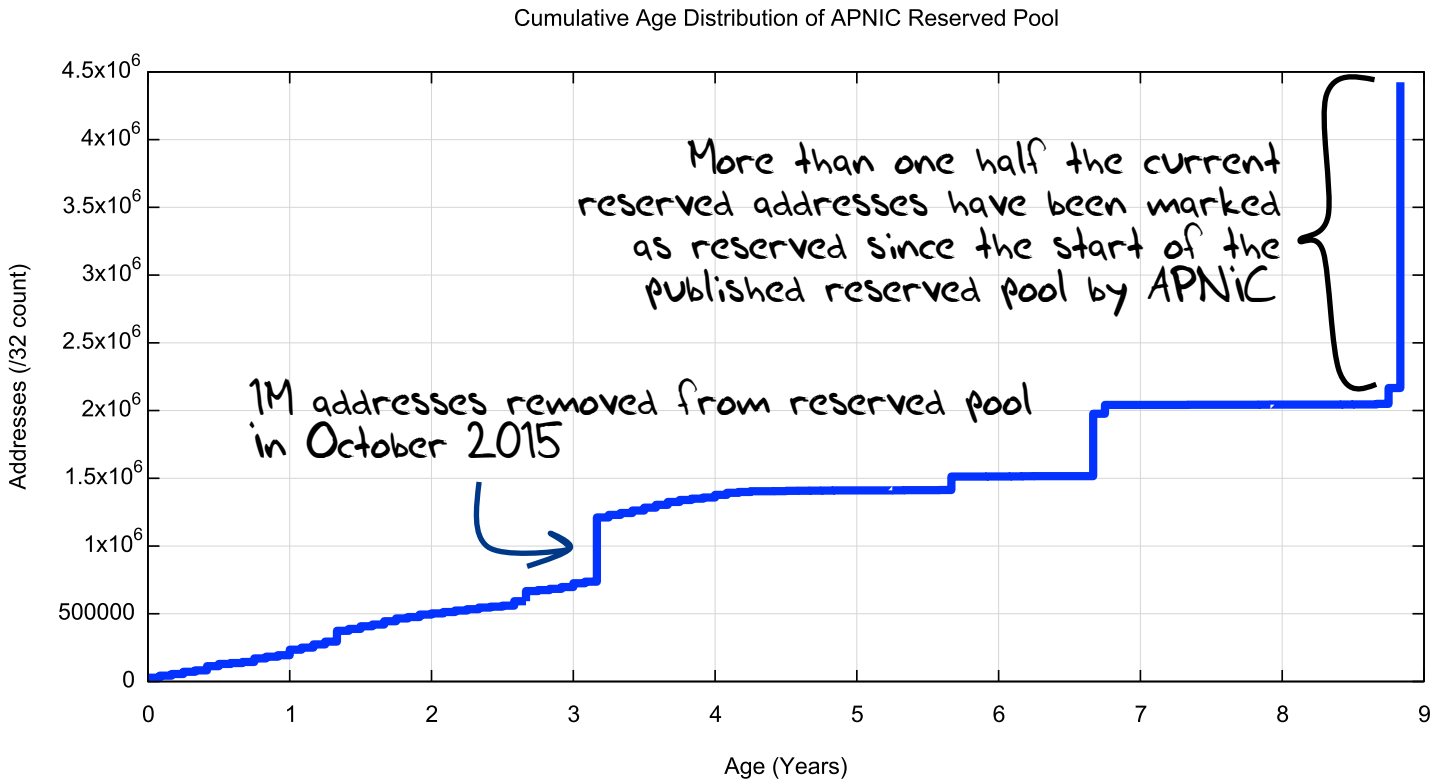


APNIC Reserved Address Age

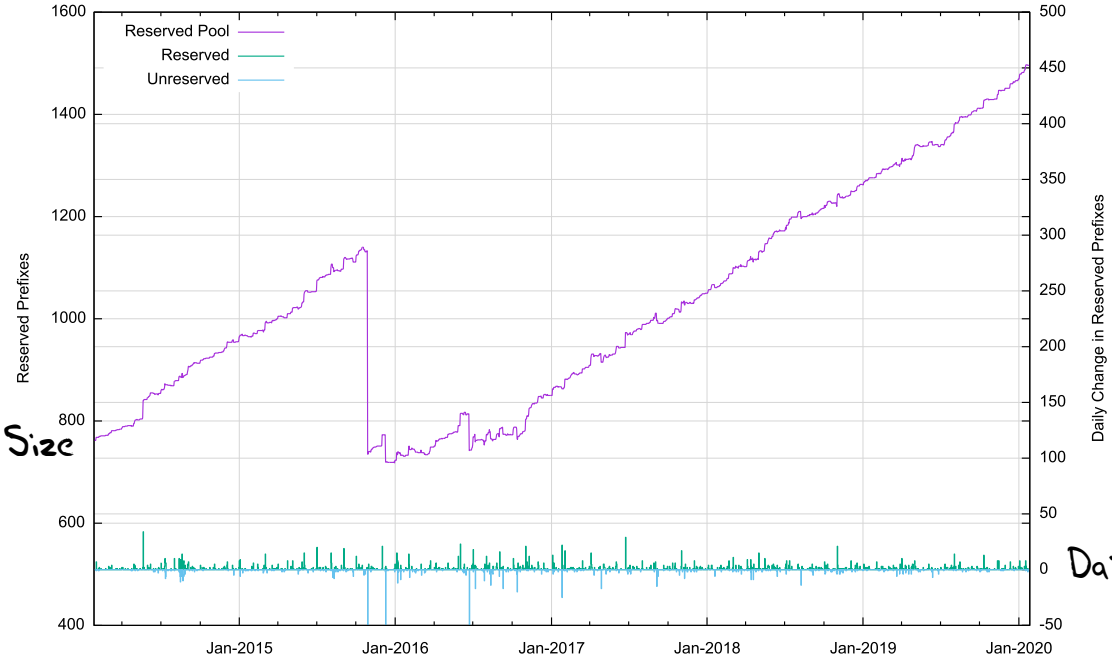
Looks at the start date for each currently reserved prefix to find when it was first marked “reserved”
Public records go back to the start of 2010 for APNIC



APNIC Reserved Address Age



Reservations 2014 - 2020

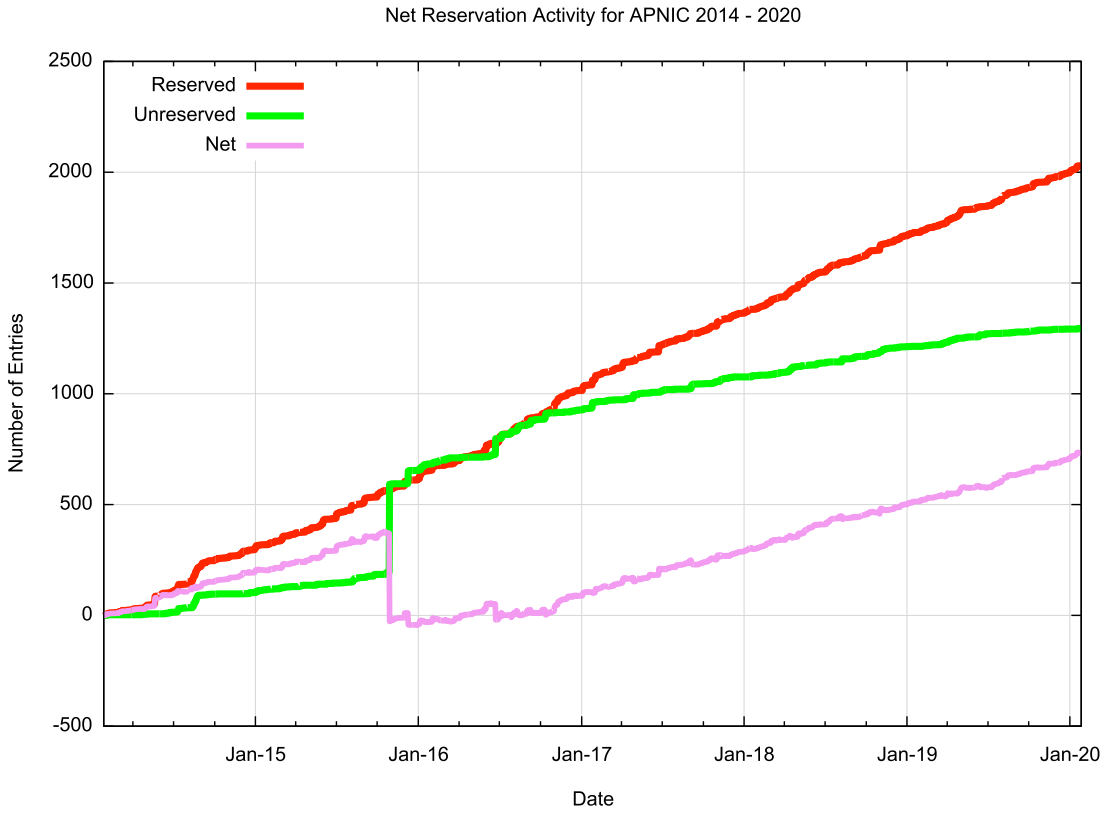


Pool Size

Daily Activity

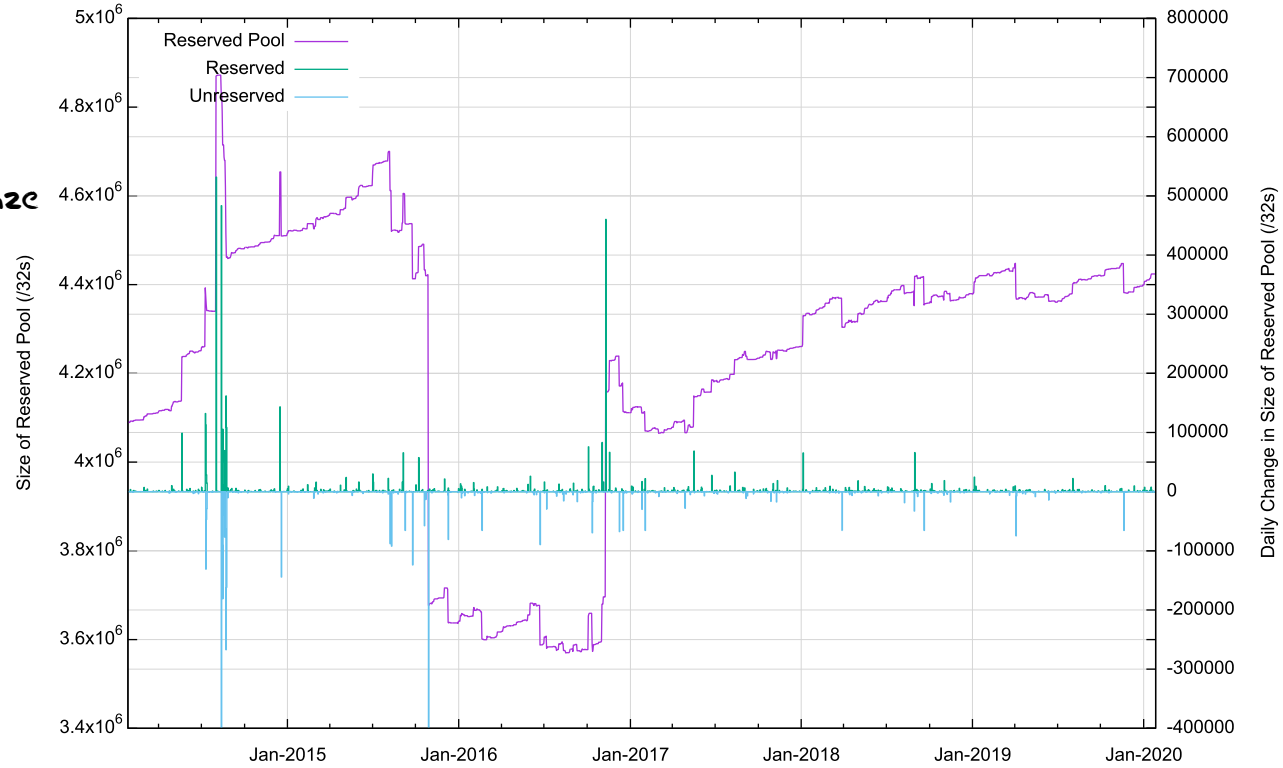
Since 2017 the number of reserved address prefixes is growing by some 200 per year

Reservations 2014 - 2020



Reservations and UnReservations

Pool Size

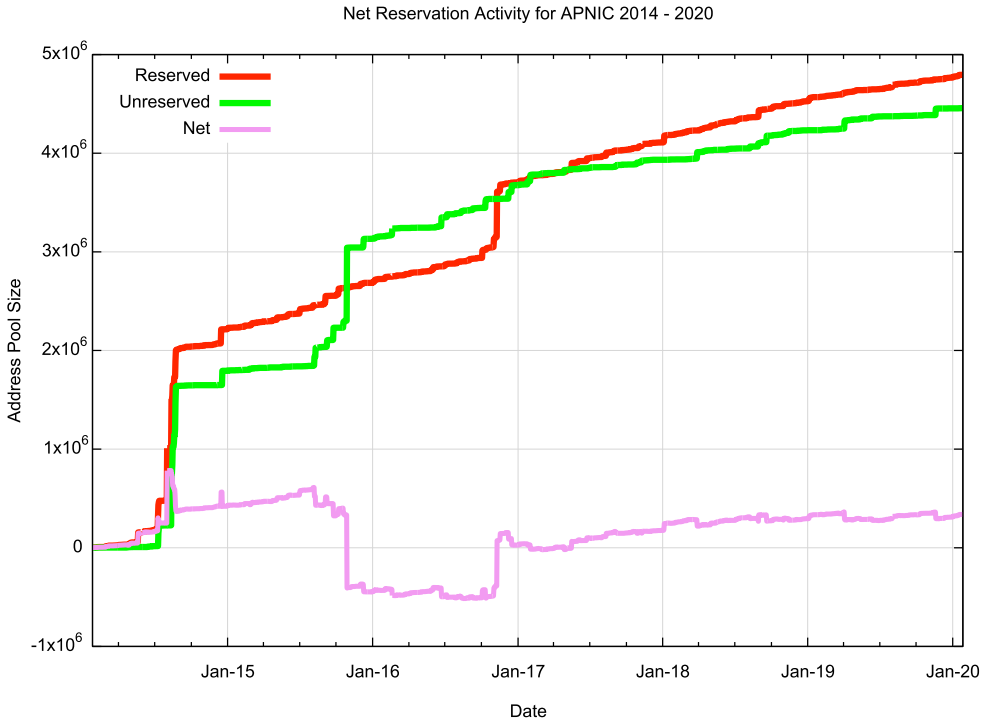


"long term" pool of some 4M addresses

Short term recent growth by some 100K /32s per year net

Daily Activity

Reservations and UnReservations



Reserved Addresses

What is the story here?

- What is a reasonable expectation of ‘release’ from reserved status?
  - Of the 1,399 address prefixes marked as “reserved” in the past 24 months the average (*) period of reservation is 26 months
  - The prefix-size weighted reservation average period is 40 months

* This does not include the 2.2M addresses (300 prefixes) that have been marked as reserved before 2011

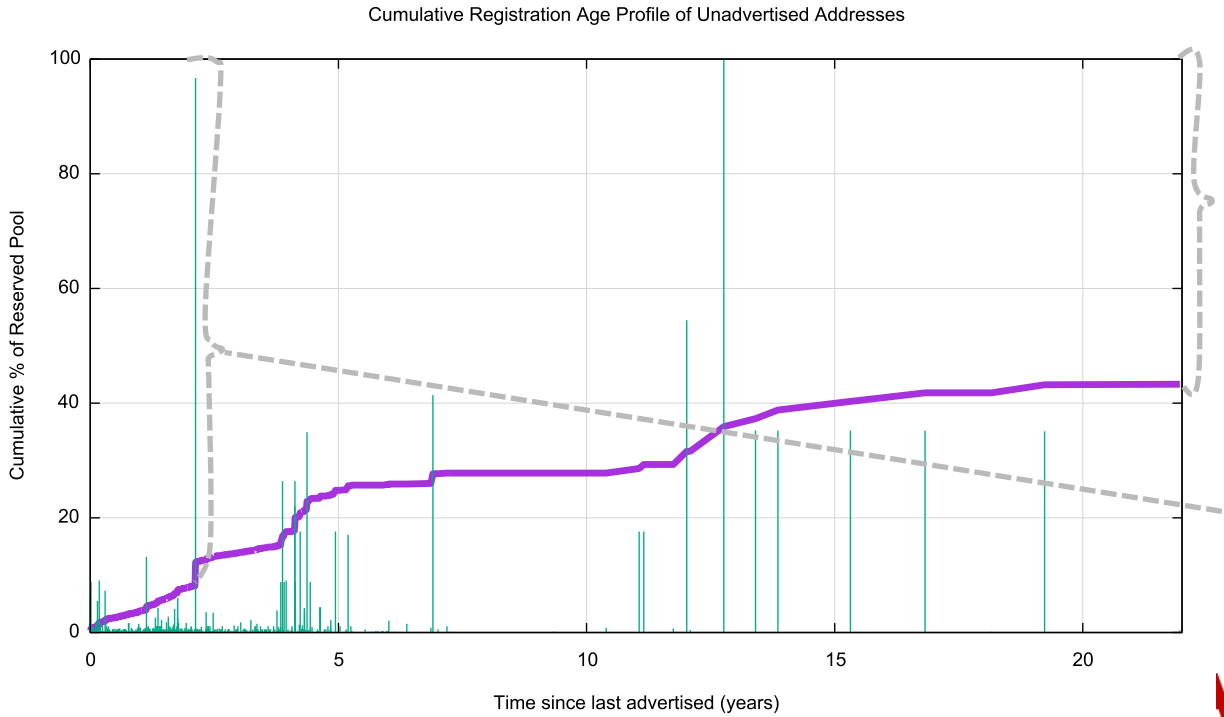
Assumptions for Reserved Addresses

- The experience since 2017 points to a small number larger old blocks being removed from the reserved pool and a larger number of smaller blocks being listed as ‘Reserved’
- The ‘Reserved’ listing lasts on average for two years for recent reservations
- Unless release this 3.6M address pool of “old” reservation blocks, recovery of reservations will have little impact on the IPv4 address pool

Advertising APNIC Reserved Prefixes

- In the APNIC Registry 1,501 prefix blocks are marked as reserved
- 34 of these blocks contain advertised prefixes
  - These blocks advertise 14,336 addresses
- The remaining 1,467 reserved blocks are not visible in the BGP routing table
  - These unadvertised blocks contain 4,414,9766 addresses

Advertising APNIC Reserved Prefixes

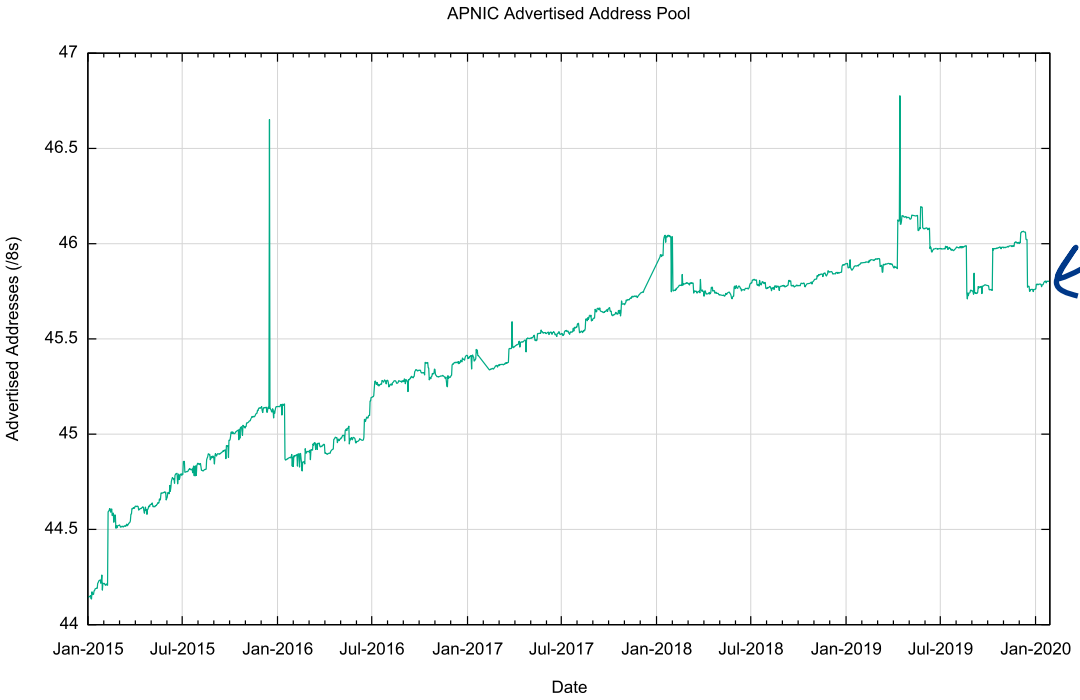


57% of all reserved addresses have not been seen in logs of advertised addresses since 1997

90% of all reserved addresses have not been seen in logs of advertised addresses for the past 2 years

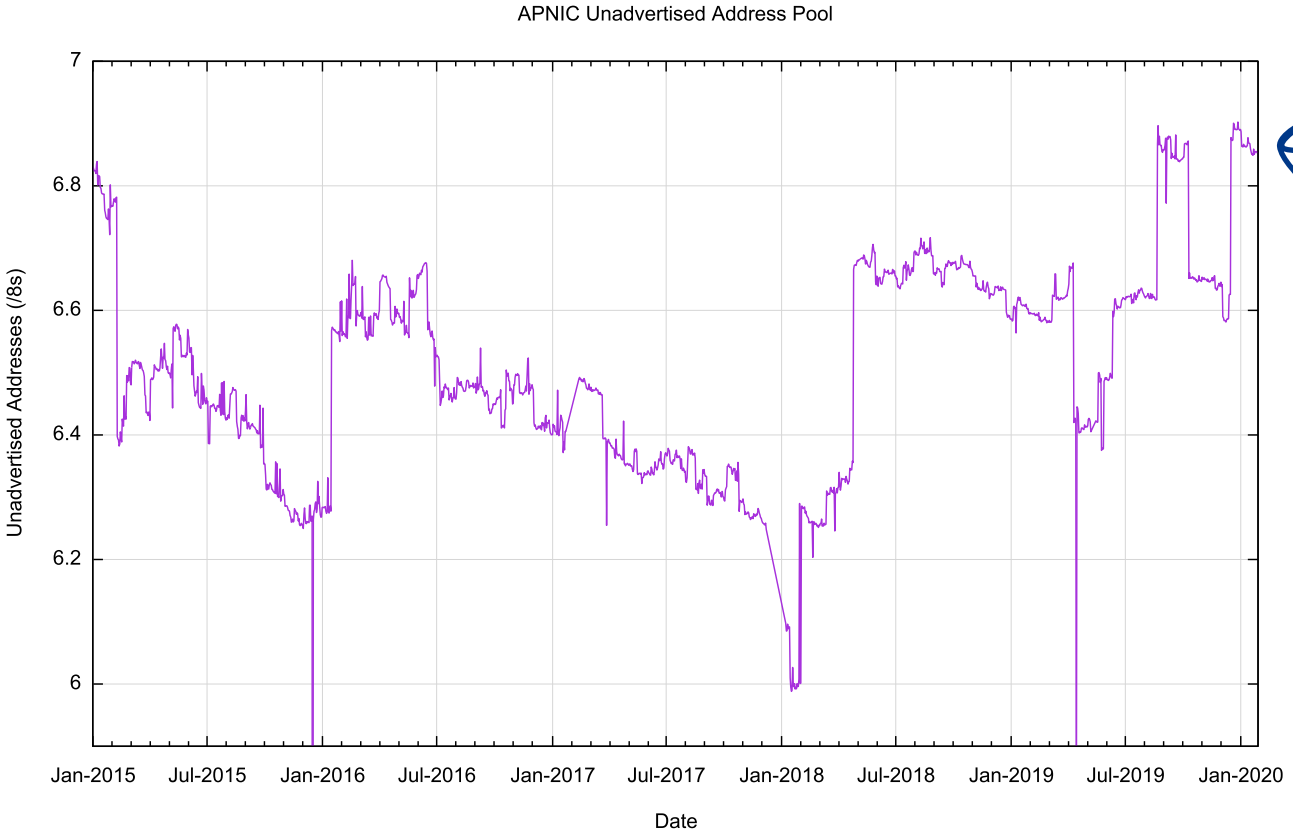
III - Advertised and Unadvertised Addresses

Advertised Addresses



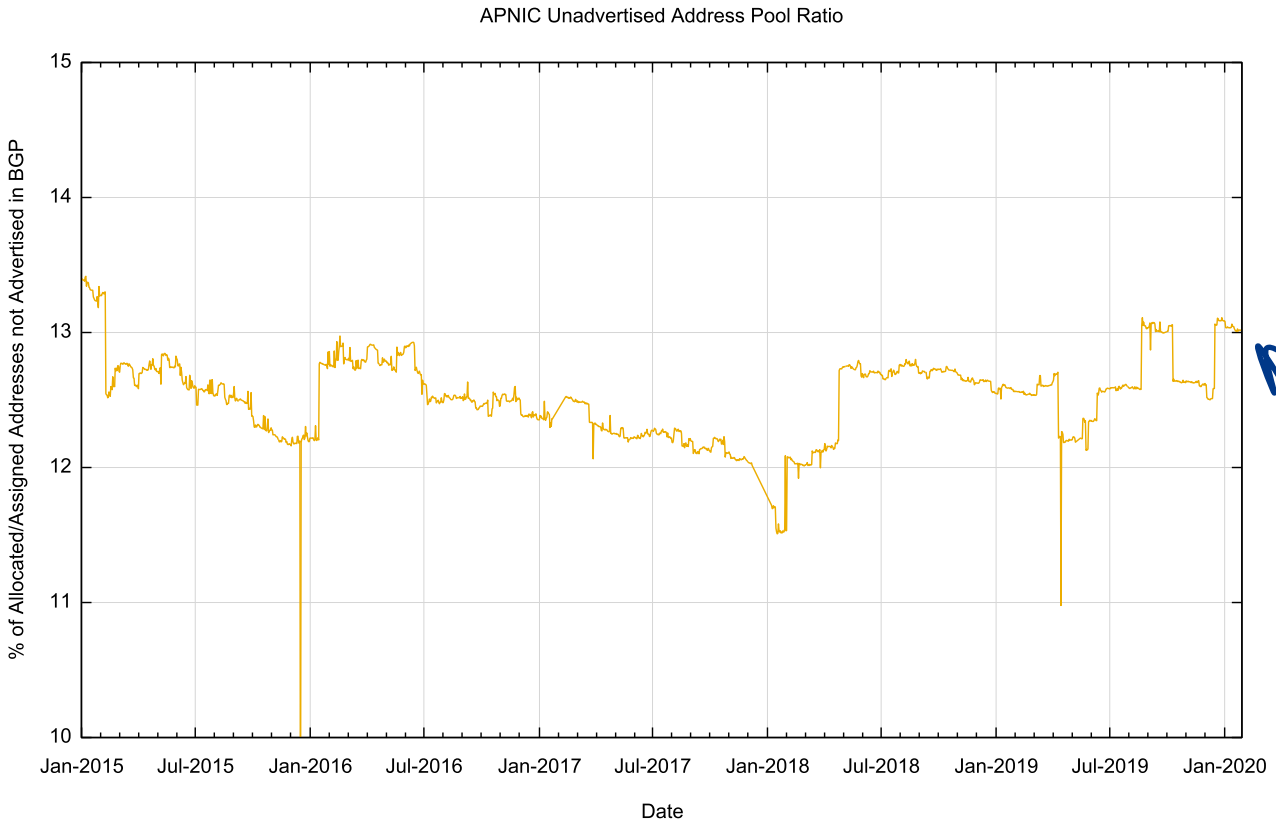
768,477,696 addresses advertised from a total pool of 883,441,664 addresses

Unadvertised Addresses



114,963,968 addresses not advertised from a total pool of 883,441,664 addresses

APNIC Unadvertised Address Ratio



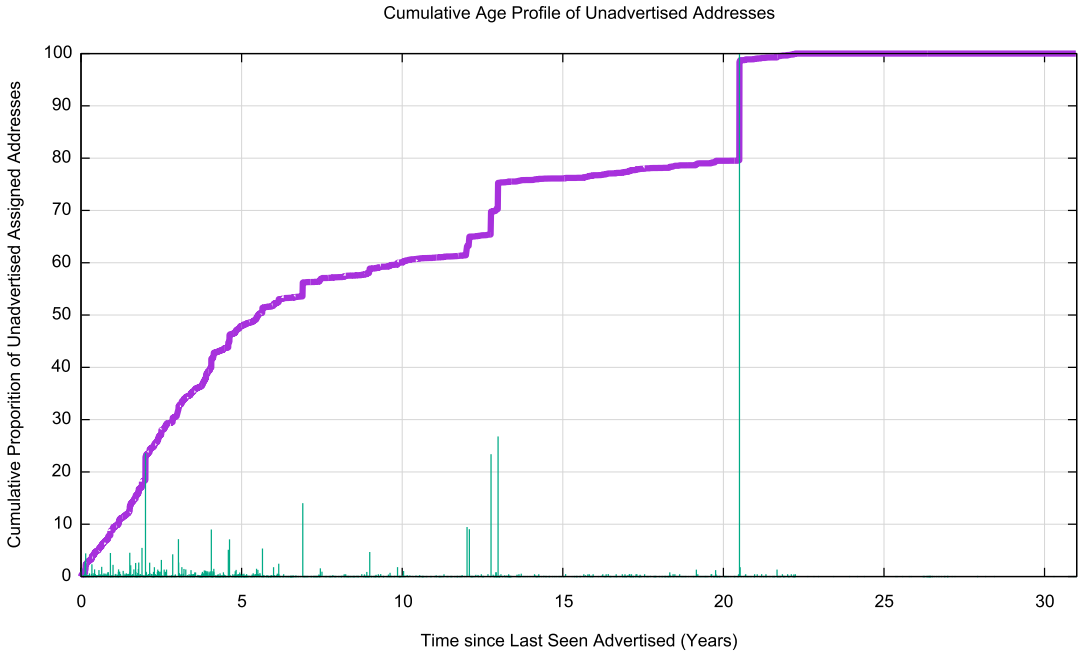
114,963,968 addresses are unadvertised from a total pool of 883,441,664 addresses

That's 13% of the assigned address pool

Unadvertised Address Age Profile

- Lets take the entire sequence of BGP dumps in Route Views archive from 1997 onward, using one dump per day
- Parse each dump file (8,000 of them!) and assemble the “last seen” date for every /24 in the IPv4 address space that is ‘visible

Unadvertised Address Age Profile

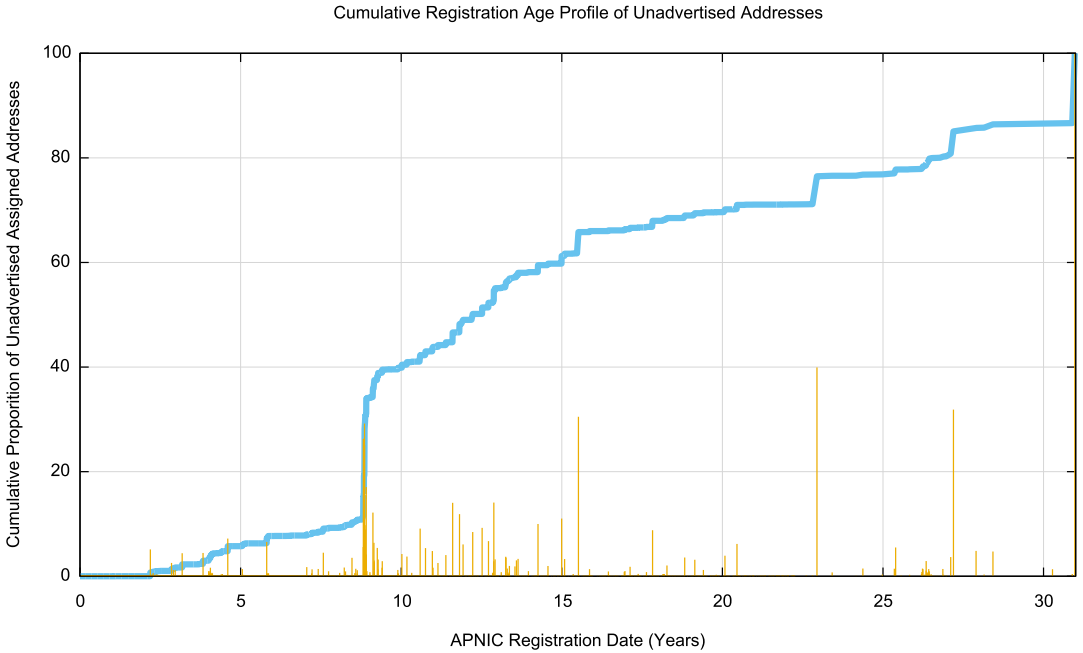


78,046,208 addresses (68%) of all unadvertised addresses have been seen in the routing table at some point in the past

This is the cumulative profile of ages since these prefixes were last seen

36,852,224 (32%) have not been observed in the routing table since 1997 (the start of the Route Views archive)

Unadvertised Address Registration Age Profile

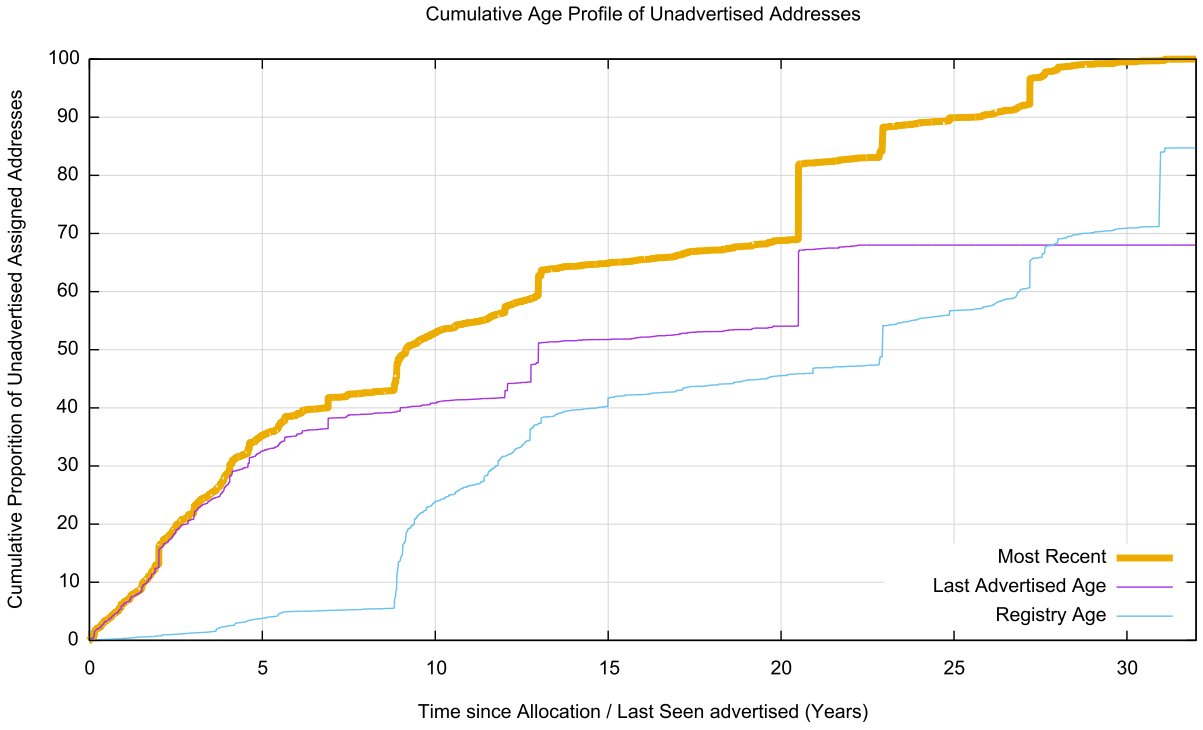


114,963,968 addresses not advertised from a total pool of 883,441,664 addresses

This plot shows the age profile of these unadvertised addresses using the APNIC Registration date

90% of these addresses were assigned prior to 2012

Unadvertised Address Age Profile



This plot combines the registration and last seen profiles

Some 58% of unadvertised addresses are “older” than 8 years

Some 30% of unadvertised addresses are “older” than 22 years

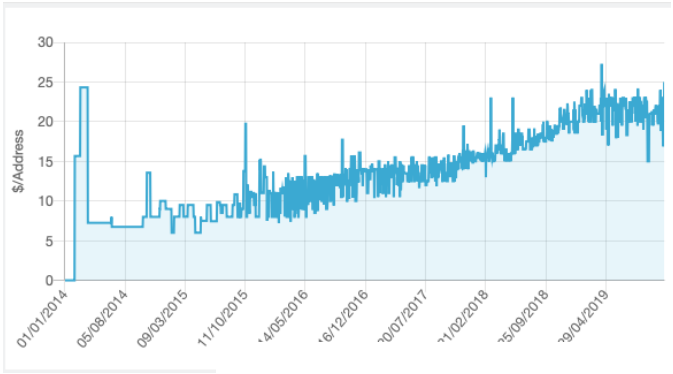
Where are these Unadvertised Allocated Addresses?

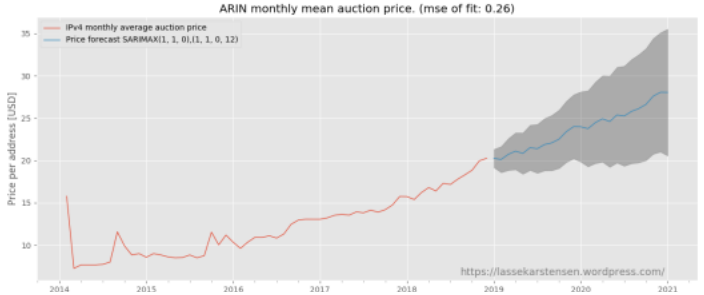
Rank	Addresses	CC Name
1	38,793,984	China
2	36,105,984	Japan
3	10,121,984	India
4	6,676,736	Republic of Korea
5	6,654,720	Australia
6	6,160,384	Singapore
7	1,966,592	Taiwan
8	1,840,640	Indonesia
9	1,656,064	New Zealand
10	1,014,528	Malaysia
11	899,584	Hong Kong
12	828,416	Thailand
13	750,336	Vietnam
14	711,424	Philippines
15	201,472	Bangladesh
16	13,6704	Pakistan
17	68,096	Brunei Darussalam
18	50,432	Afghanistan
19	48,384	USA
20	48,384	Myanmar
21	29,696	UK
22	27,648	Mongolia

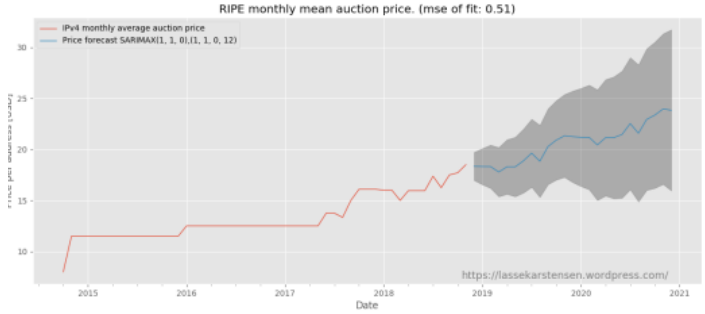
Observations

- It would be useful to understand the conditions or caveats that apply to the pool of reserved addresses, particularly the large pool of ‘old’ reservations
  - Releasing this reserved address pool of 4.4 M addresses would extend the availability of the IPv4 address pool by a further 3 years at current address consumption rates
- The unadavertised allocated address pool (115M) is far larger than the reserved pool (4.4M)
  - One line of thought is that a rising market price for IPv4 addresses would release these addresses for reuse through the transfer market

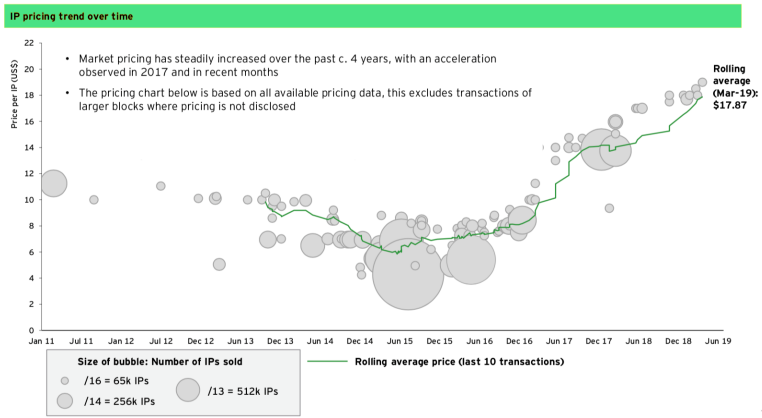
Market Signals







https://lassekarstensen.wordpress.com/2019/01/03/some-ipv4-address-price-forecasting/



http://ipv4marketgroup.com/ipv4-price-trends/

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  - Releasing this reserved address pool of 4.4 M addresses would extend the availability of the IPv4 address pool by a further 3 years at current address consumption rates
- The unadavertised allocated address pool (115M) is far larger than the reserved pool (4.4M)
  - One line of thought is that a rising market price for IPv4 addresses would release these addresses for reuse through the transfer market
  - It *may* be the case that up to 30M addresses in the registry are buried in legacy records and have never been advertised since the late 90’s and current market prices may not flush them out

Questions?

25 YEARS
2020
APRICOT
APNIC 49
MELBOURNE
AUSTRALIA
12 – 21 February 2020
#apricot2020