

# Old Mother Hubbard and the IPv4 Cupboard

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Workshop 39.  
University of Hertfordshire, April 12<sup>th</sup>-14<sup>th</sup>, 2011.



# Obligatory photo of empty cupboard

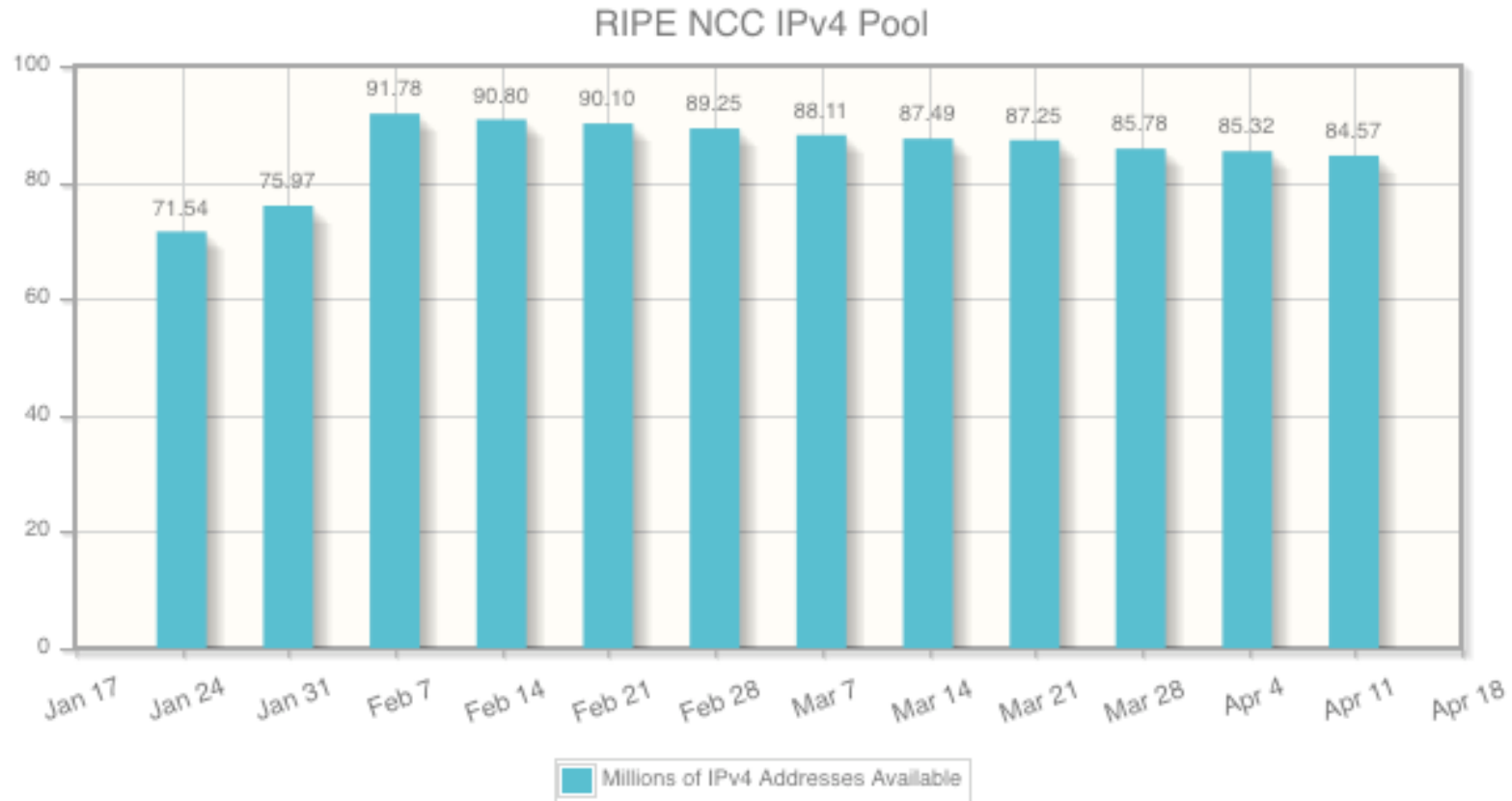


Bundesarchiv, Bild 183-11283-0005  
Foto: Rösener (Roesener) | 11. Juli 1951

## IANA Exhaustion

- End of January, seven /8s remained in IANA inventory
- APNIC allocated 39/8 and 106/8
- Each RIR given one of the remaining five
  - 102/8 to AfriNIC (Africa)
  - 103/8 to APNIC (Asia-Pacific)
  - 104/8 to ARIN (North America & Caribbean)
  - 179/8 to LACNIC (Latin America)
  - 185/8 to RIPE NCC (Europe, Middle-East, Russia)
- Special policies apply to allocations from these “final /8s”

# We don't get addresses from IANA...



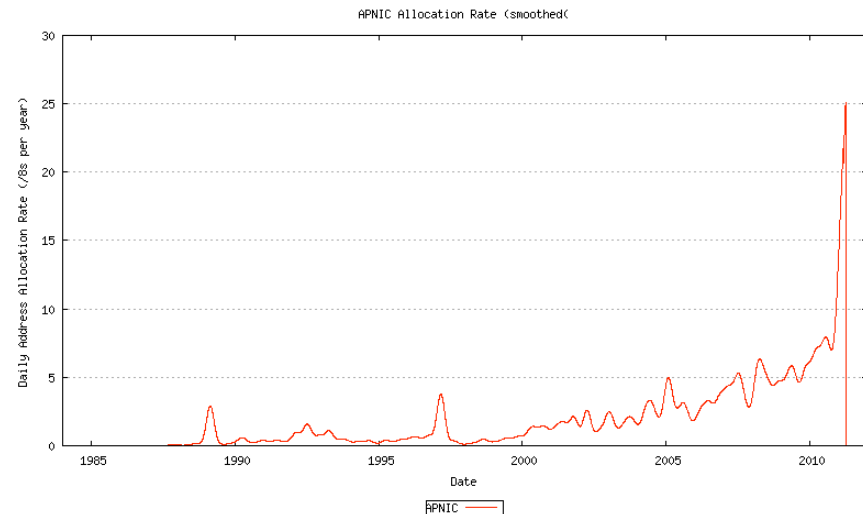
Graph courtesy of RIPE NCC

## 84 Million? That is LOADS!

- Subtract 16 million for the final /8.
  - Each RIPE NCC member is only allowed a single /21 from that
- Surely 68 million is enough for anybody?
  - Equivalent to 4 /8s
  - Current run rate is about 6 /8s per year
  - Assuming no “land-grab” as the pool runs dry
    - Speaking of which...

# Remember those guys over at APNIC?

- Serve countries such as China and India
  - Quite a few people then
- Currently have 1.4 /8s free
- Run rate recently approaching 20 /8s per year
  - Definite evidence of rush for last addresses
- Unlikely to last until the end of the month
- Multi-nationals may start shopping around the regions for IP addresses



Graph courtesy of Geoff Huston

## Stop Press!

- Previous slide was written on Monday, April 11<sup>th</sup>.
- Tuesday, April 12<sup>th</sup>, large allocations by APNIC to Chinanet
- Could now be out before the end of the week...

# You don't get addresses from the RIPE NCC

- You get them from JANET
  - ...and you've been pretty frugal over the last few years
    - NAT
    - Institutions that already have “sufficient” address space
- 212.219.0.0/16 has lasted us for seven years
- Just started allocating out of 81.87.0.0/16
  - Could be the last allocation we get
  - If there is a land-grab in the community, it may not last long



# IP Allocation Rules are Changing

- Allocations used to be based on projected use two years from application.
  - ...then one year
  - ...now six months
  - ...changes again to three months on July 1<sup>st</sup>

## What is the answer?

- IPv6 of course, but more on that later...
- What about **when** the JANET pool runs dry and you want more IPv4 addresses?

## Microsoft/Nortel

- Nortel went bankrupt
- Liquidator has been looking to sell off addresses held by Nortel
  - Microsoft offered just over £4.5M for 666,624 addresses
  - £7 per IP address
  - £1,800 per /24
  - £450,000 per /16
- ARIN challenging sale in courts
  - Unclear which addresses are involved
- Does not yet set a precedent

## Closer to home...

- RIPE Policy allows transfer between registries (such as JANET and other ISPs)
  - Needs-based and overseen by the RIPE NCC
- What about the “legacy” addresses?
  - Allocated directly to sites before the regional internet registry hierarchy was established

# Legacy Address ~~Transfer~~ Sale for £££

- Risks
  - Reputation
    - Still seen by many as “the wrong thing to do”
  - Routing deaggregation
    - Sell a /24 from a /16 and there are now 9 routes in the routing table rather than 1
  - Legal Challenge
    - Do you want to be (can you afford to be) the first to prove in court the addresses you aren't using are yours to sell?

## Something for the BoF later

- JANET as a “trusted broker?”
  - Register spare/free legacy space
  - Applications come to us, still need to justify need
  - Keeps address space in R&E, less opportunity for external criticism
  - We aggregate on the border, keep the deaggregation internal
- Just a sticking plaster, address space is finite
  - ...and there just isn't enough of it, even if multi-layered NAT is acceptable to you

## Resource Certification

- I have a 30 minute presentation on this, but briefly...
- Uses X.509 certificates to prove holder of address space is genuine
- Only for addresses allocated via the RIPE NCC as yet
  - Not legacy addresses
- Intended to help secure the routing system
- Can also be used in address transfers to check legitimacy of holder

# IPv6 Deployment

- There is this new thing to succeed IPv4
- You may have heard me mention it before
- Where are we?



# IPv6 Deployment

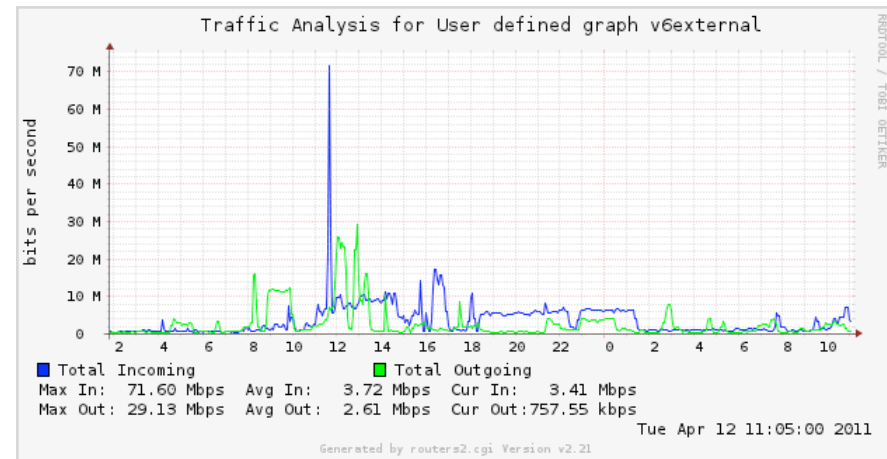
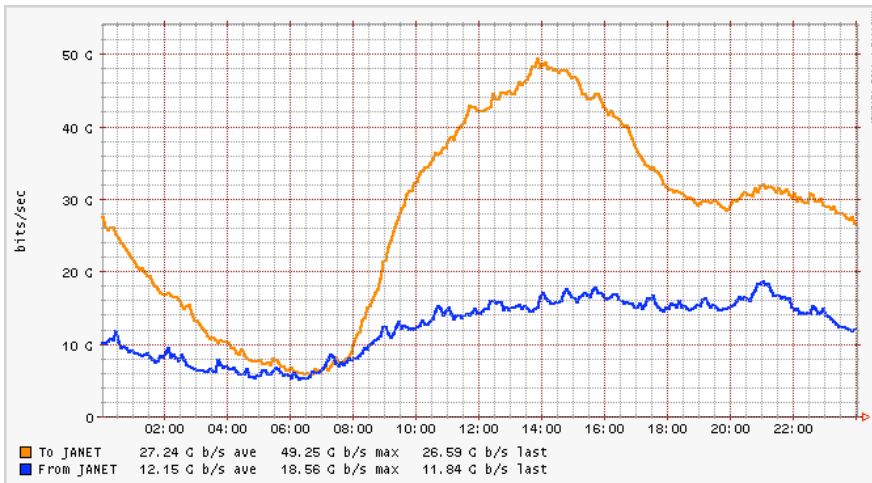
- Backbone, regional networks, etc...
- Sites?
- Traffic?



## Peak traffic, Monday April 11<sup>th</sup>

- IPv4 inbound from external peers: 50Gbit/s
  - Less than normal, start of Easter holidays
- IPv6 inbound from external peers: 70Mbit/s
- 0.14% of traffic.
  - ...and that was just a brief peak, more accurate figure for comparison was 30Mbit/s, or 0.06%.

# IPv4 and IPv6 Traffic. April 11<sup>th</sup>, 2011



## Something else for the BoF

- What does JANET(UK) need to do?
- Training Courses
  - <http://www.ja.net/services/training/courses/ipv6.html>
- Documentation
  - <http://www.ja.net/services/publications/technical-guides.html>
  - IPv6 Technical Guide
  - Revisions of IPv6 Factsheet and IPv6 Technical Guide for Managers coming soon
- More publicity? To whom?

## World IPv6 Day

- June 8<sup>th</sup>, 2011
  - 6/6 is a Monday, not a great day for changes
- Content providers add a “AAAA” record to their services and see what happens
- You want to be aware of this
  - Helpdesk calls if there is broken (6to4, Teredo) connectivity on LANs, rogue router advertisements
  - Measure amount of IPv6 traffic?
  - Add AAAAs for your web and mail servers and watch the logs?
- Removal of AAAA on June 9<sup>th</sup> is optional!

# World IPv6 Day

- Some big names
  - Google
  - Facebook
  - Yahoo!
  - Content Delivery Networks
    - Akamai
    - Limelight Networks
- URL: <http://isoc.org/wp/worldipv6day/>
- Test your IPv6 connectivity: <http://test-ipv6.com/>
  - Simple version: <http://omgipv6day.com/>

Questions & Discussion  
*Don't forget the BoF at 17:45!*