RIPE NCC
RIPE NETWORK COORDINATION CENTRE

# “A Message About IPv6”

Marco Hogewoning | April 2016 | CSA Summit

# Who Is The RIPE NCC?

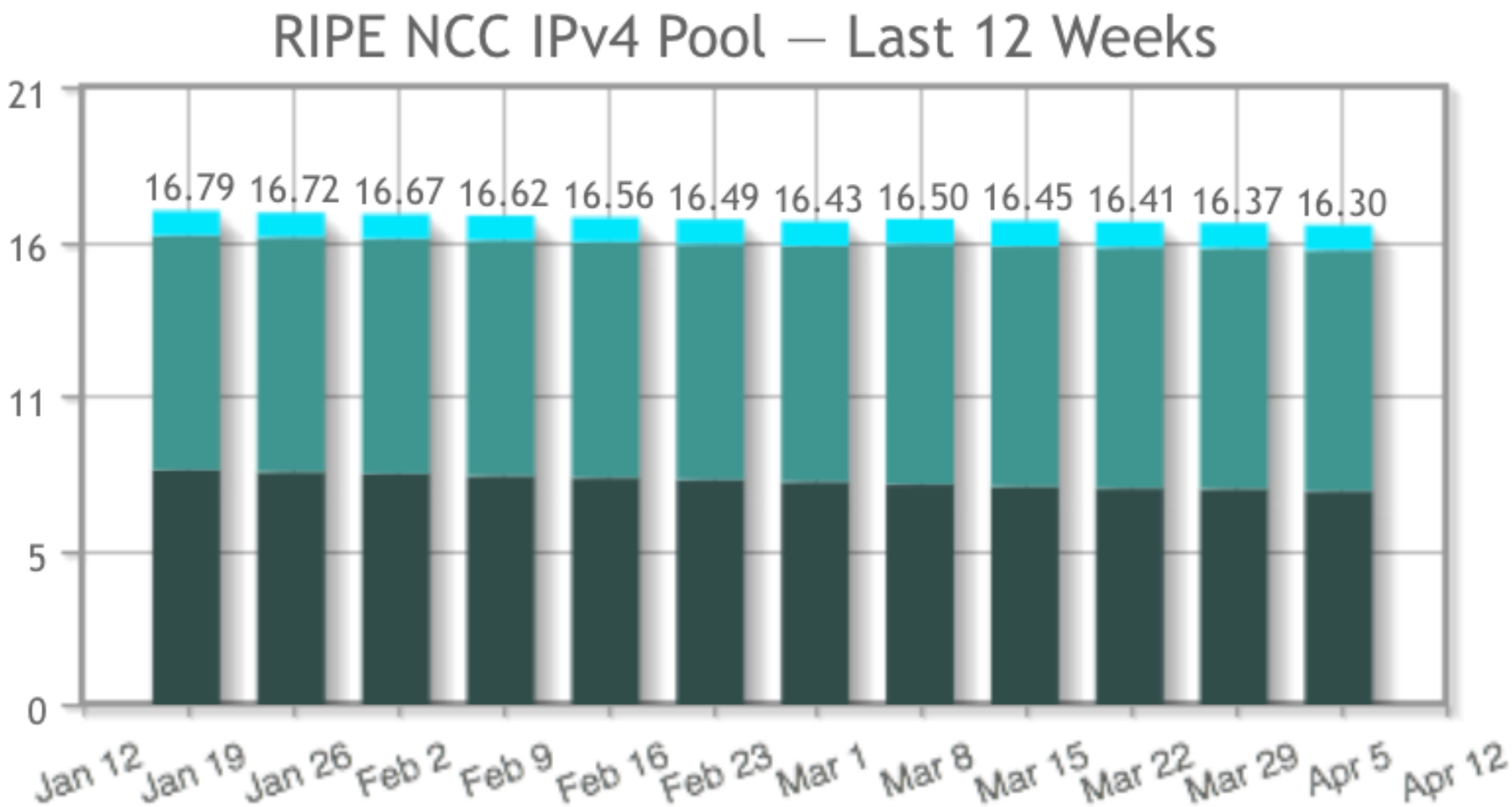
- The Regional Internet Registry for Europe, Middle East and parts of Central Asia
  - We distribute and register IPv4 addresses, IPv6 addresses and Autonomous System Numbers (ASN)
- Not-for-profit membership organisation
  - We serve over 13.000 members holding resources
- We also provide services like infrastructure data and measurements, k-root DNS service and trainings

# Why IPv6?

# IPv4 Has Run Out

- IPv4 has limited address space (32 bits)
  - Nearly all 4 billion unique addresses are in use
- Small quantities remain at the Regional Internet Registries
  - Every RIPE NCC member can request one single (additional) address block of 1024 addresses (/22)
  - Alternatively you can transfer unused addresses between members and even between some RIR regions

# Status of RIPE NCC IPv4 Pool




*(https://www.ripe.net/publications/ipv6-info-centre/about-ipv6/ipv4-exhaustion/ipv4-available-pool-graph)*

# IPv4 Address Markets

- IPv4 address blocks can be transferred between RIPE NCC members
  - Usually involves some monetary compensation
  - Several “IPv4 address brokers” active in this market
- RIPE NCC’s role is very limited
  - We are not part of the commercial transaction
  - We will update the registry to reflect transfers
  - **Keeping an accurate registry is most important**

# The Alternative: IP Version 6

- Developed in the late nineties as a solution to the imminent depletion of IPv4 addresses
- Uses 128 bit addresses instead of 32 bits
  - 340 282 366 920 938 463 463 374 607 431 768 211 456
  - Consider this address space being “unlimited”
- Protocol has been standardised since 1998
  - Requires little or no changes in other layers
  - DNS, SMTP, IMAP etc all work the same

# Deploying IPv6: The Plan

- Gradually add IPv6 capabilities next to IPv4
  - IPv4 and IPv6 are not compatible with each other
  - They can run next to each other without interference
- Dual stacked hosts can speak both protocols
  - Use IPv4 or IPv6 depending on the other party
  - Prefer to use IPv6 when it is available on both ends
- IPv4 would slowly disappear from networks
  - Before the actual depletion of IPv4 address space

# A Temporary Solution: NAT

- Network Address Translation (NAT) allows to share a single IPv4 address across devices
  - Very common in residential and enterprise networks
  - Very effective in extending the life of IPv4
- Similar solution can also be used by ISPs
  - “Carrier Grade NAT (CGN)” shares IPv4 addresses between different customers
  - Very populair in mobile networks
  - Increasingly used in fixed (wired) access networks

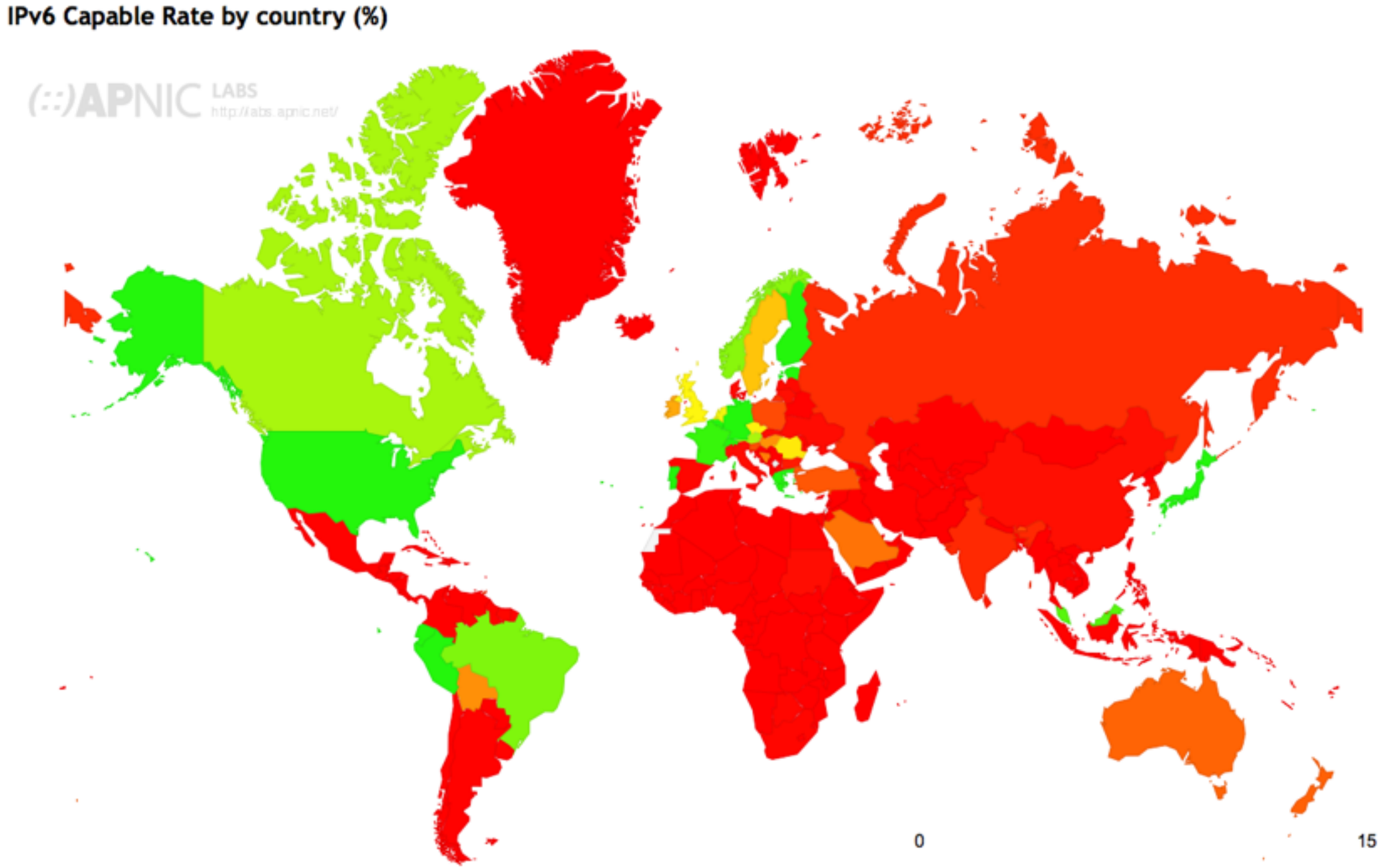
# Hidden Costs of NAT

- Sharing an address has side effects
  - Single black list entry can block thousands of users
  - Single white list entry can open up to a whole ISP
- NAT hinders innovation
  - Needs to understand new protocols and applications
  - Applications need to try and predict NAT behaviour
- Privacy and security risks
  - All traffic is passing through a single point
  - **A NAT sees and can record everything you do**

# IPv6 Deployment

## Statistics

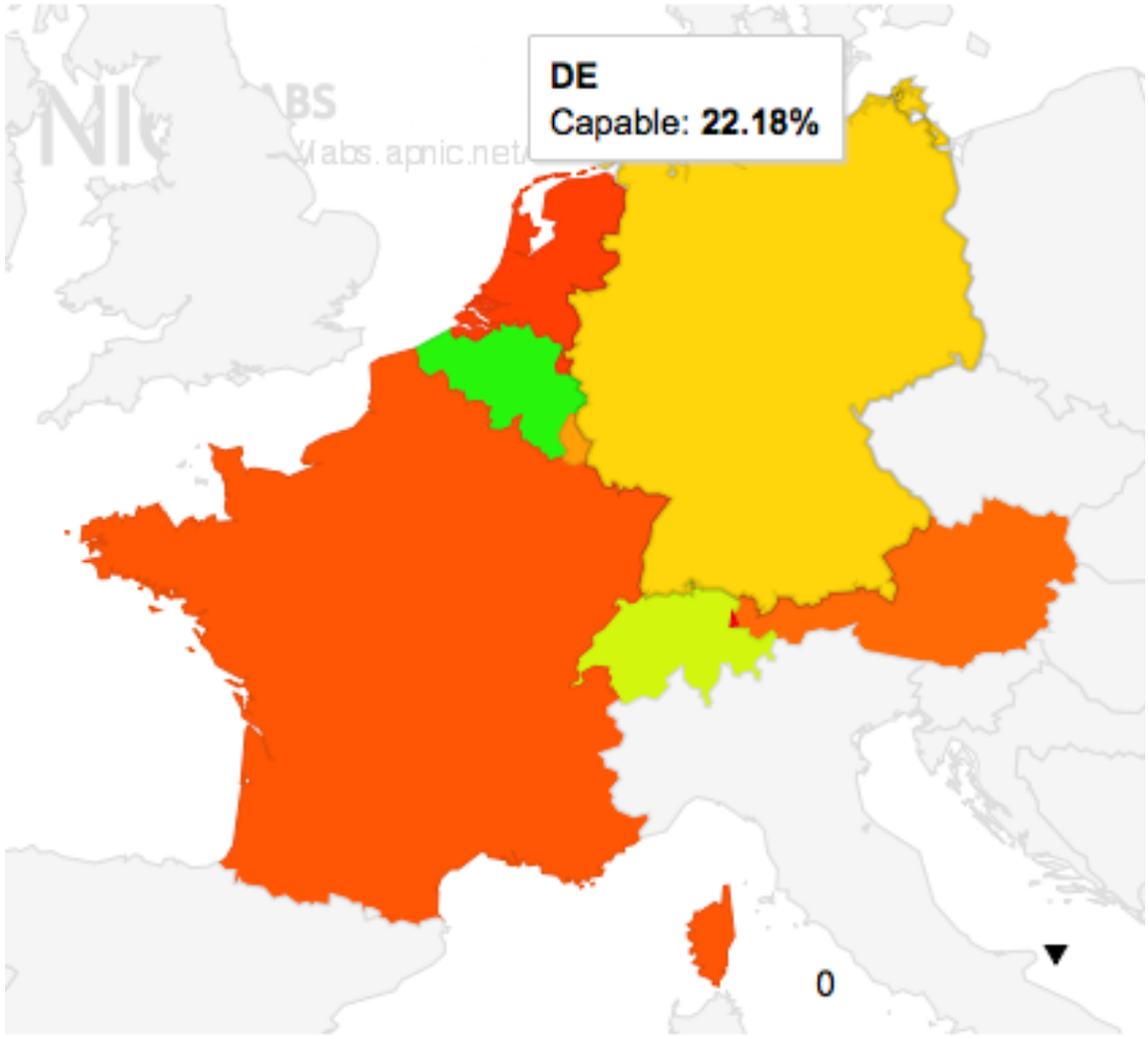
# IPv6 at End Users




*http://stats.labs.apnic.net/ipv6/*

# IPv6 Leaders in Access Market

- Belgium 50,6%
- Switzerland 30,7%
- Germany 22,2%
- Luxembourg 16,5%
- Austria 10,9%




*IPv6 Deployment in North West Europe*

- Others include:
  PT (28%), GR (25%), FI (21%), UK (7%), US (30%) and BR (11%)

# IPv6 Enabled Content

- Big players include Google, Facebook and Netflix offering all services over IPv6
- Regular hosting is lacking behind
  - Lot more parties involved in the value chain
  - IPv6 often needs code changes in websites
  - Perceived as higher risk
- Noticeable parties in Germany offering IPv6 include: 1&1, Hetzner, Hosting.de and Strato

# Email Over IPv6?

- Out of top 10 providers only Freenet and Gmail offer MX records on an IPv6 address
  - Could still involve a lot of messages on a single MX
- Decisions involving mail over IPv6
  - You only need a few IPv4 addresses for MXes
  - Perceived as even higher risk than hosting
  - Concerns about spam filtering and security

# Benefits of IPv6

# Larger address space, more addresses!

# Benefits Of Not Doing IPv4

- There is absolutely no need to share addresses
  - You can use a new IPv6 address for every email you send
- Reducing the risk of having a tainted address
  - IPv4 addresses are being “recycled”
  - Old reputation profiles and blacklists can work against you
- Reducing costs
  - IPv4 addresses now represent a value
  - Acquiring additional IPv4 has a cost
  - Sharing addresses also can be costly

# IPv6 Black and White Listing

- The large IPv6 space has its benefits
  - Allows to create hierarchical addressing plans
  - Creating different “zones” becomes easy
  - Requires less maintenance
- You need to aggregate IPv6 addresses
  - The space is too large for individual entries
  - The “natural” boundary is at 64 bits
  - An IPv6 /64 subnet equals a single IPv4 address

# Aggregation in the RIPE Database

```
inet6num:        2001:980:1000::/36
netname:         NL-XS4ALL-BROADBANDPOOL-1
descr:           XS4ALL BROADBAND POOL # 1
country:         NL
admin-c:         XS42-RIPE
tech-c:          XS42-RIPE
notify:          netmaster@xs4all.nl
mnt-by:          XS4ALL-MNT
status:          AGGREGATED-BY-LIR
assignment-size: 48
remarks:         Please send email to "abuse@xs4all.nl" for
complaints
remarks:         regarding portscans, DoS attacks and spam.
created:         2011-02-16T14:28:03Z
last-modified:   2011-02-16T14:41:14Z
source:          RIPE
```

*“Every customer in this range gets a /48 subnet”*

# Teaser: RIPE NCC Training

- RIPE NCC offers a number of IPv6 courses
  - One day basic to start planning your deployment
  - Two day advanced technical training
- RIPE NCC Academy IPv6 e-learning
  - Online training in interactive environment
  - Certificate when completing the course

https://www.ripe.net/training

# Come and Meet Our Community


https://ripe72.ripe.net

# Questions

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