IPv6 Deployment - Global Perspective

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Internet Corporation for
Assigned Names & Numbers

Overview

- Internet infrastructure
  - DNS
  - Network interconnection
- ISP infrastructure
  - Core and edge
- Home and enterprise infrastructure
  - Access devices

History

- IPv6 standard completed in 1996
- Production IPv6 allocations available to ISPs in 1999
- Still very limited take up of IPv6 address space
- Even more limited IPv6 deployment

IPv6 and Naming

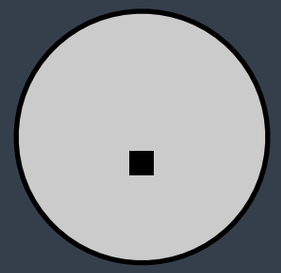
IPv6 in the DNS

- IPv6 addresses have four times as many bits as IPv4
- So the DNS records for IPv4 and IPv6 are very similar

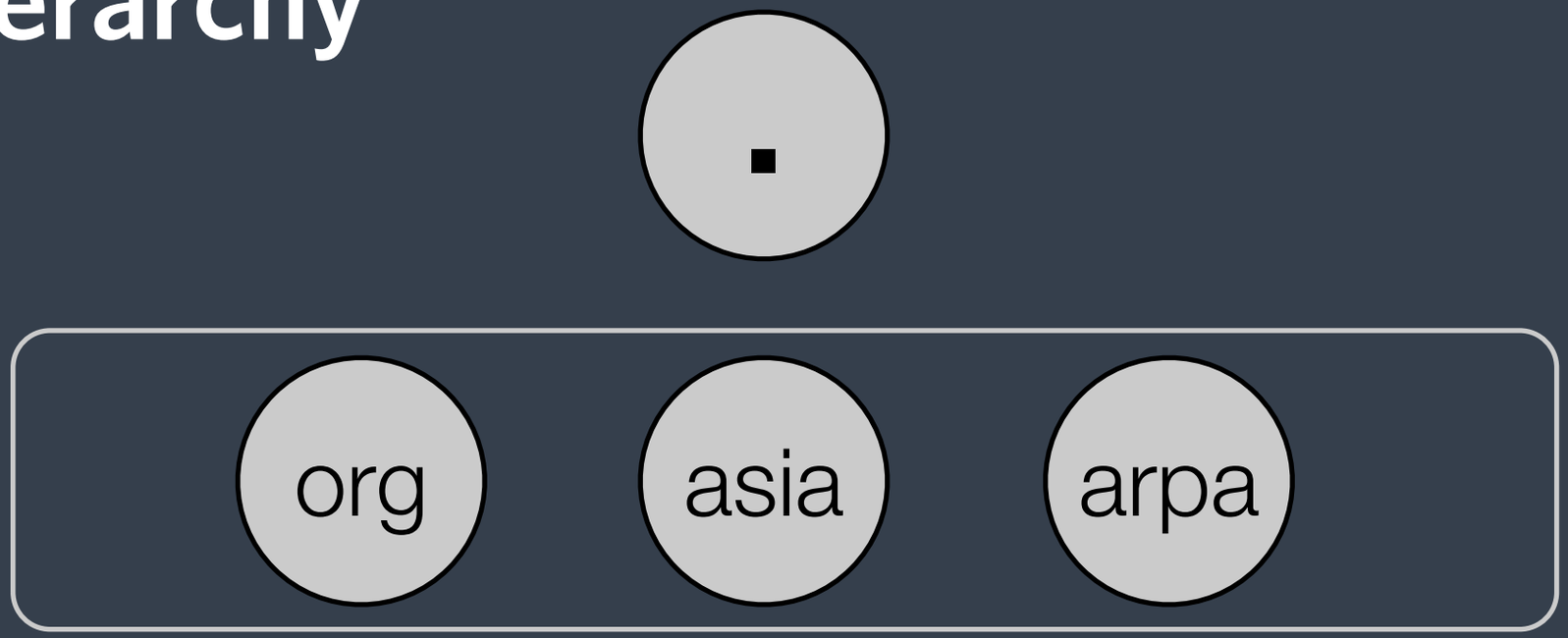
```
www.iana.org. IN   A      208.77.188.193
www.iana.org. IN   AAAA   2620:0:2d0:1::193
```

DNS Hierarchy

DNS Hierarchy



DNS Hierarchy



DNS Hierarchy

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Adding IPv6 support

- IPv6 glue for TLDs added in July 2004
- IPv6 glue for root DNS servers added in January 2008
  - 6 of 13 roots have IPv6 glue. More coming.
  - Installed capacity far exceeds demand

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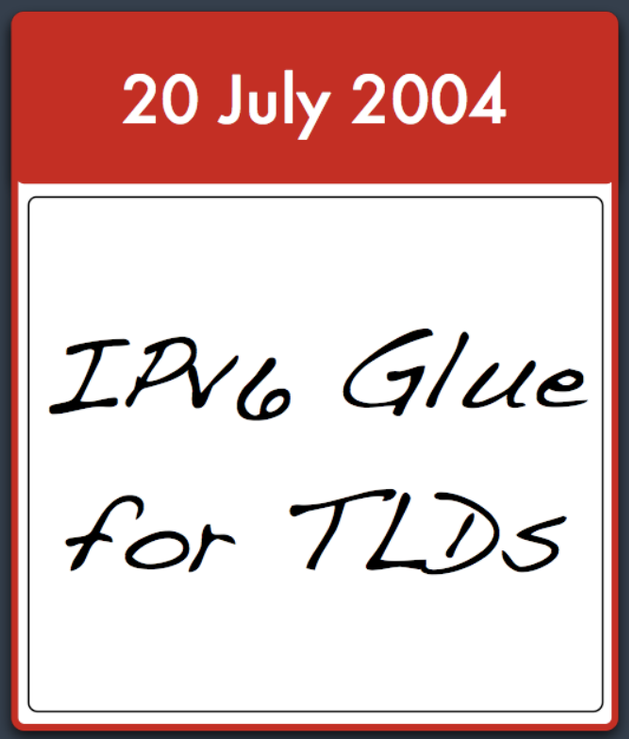

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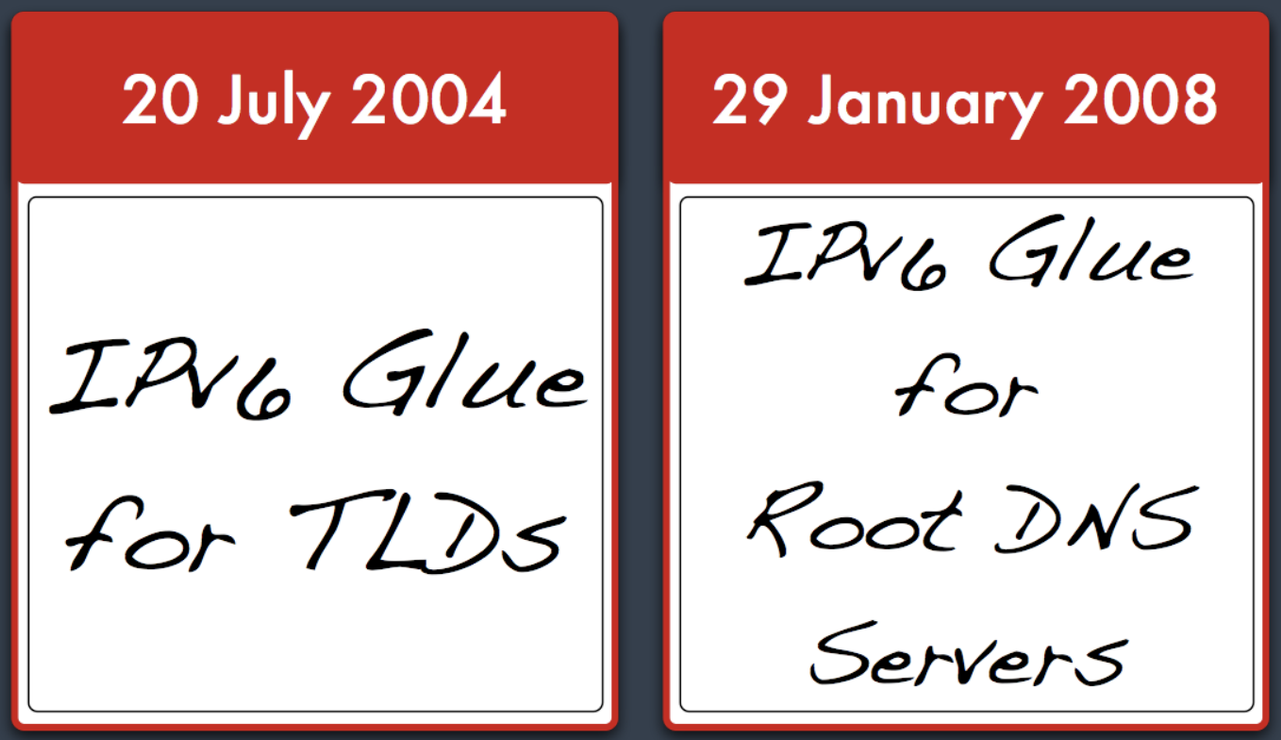


TLDs with IPv6 support

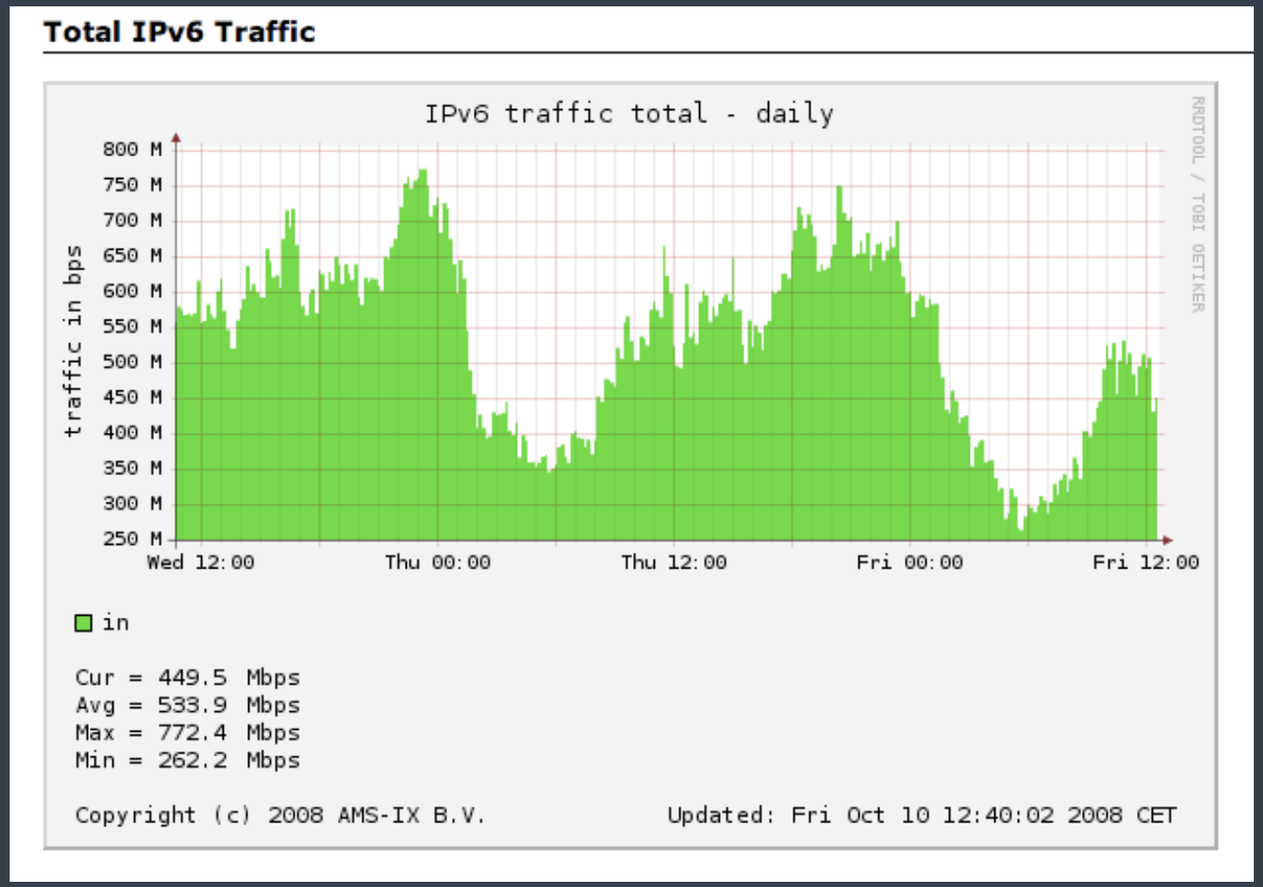
- 126 TLDs with IPv6 glue as of mid- September
- 151 IPv6 glue records compared with 1032 IPv4
- 57% of gTLDs have IPv6 glue
- co.za IPv6 deployment experience

  http://www.afrinic.net/meeting/afrinic-8/presentations/IPV6%20Implementation%20-%20Afrinic8.pdf

IPv6 in the Backbone Network

Network Interconnection

- Internet Exchange Points
  - Easy to enable IPv6
  - AMS-IX IPv6 Traffic



http://www.ams-ix.net/technical/stats/sflow/

- Private Interconnects

African IXPs offering IPv6 support

- Kenya Internet Exchange
- Tanzania Internet Exchange

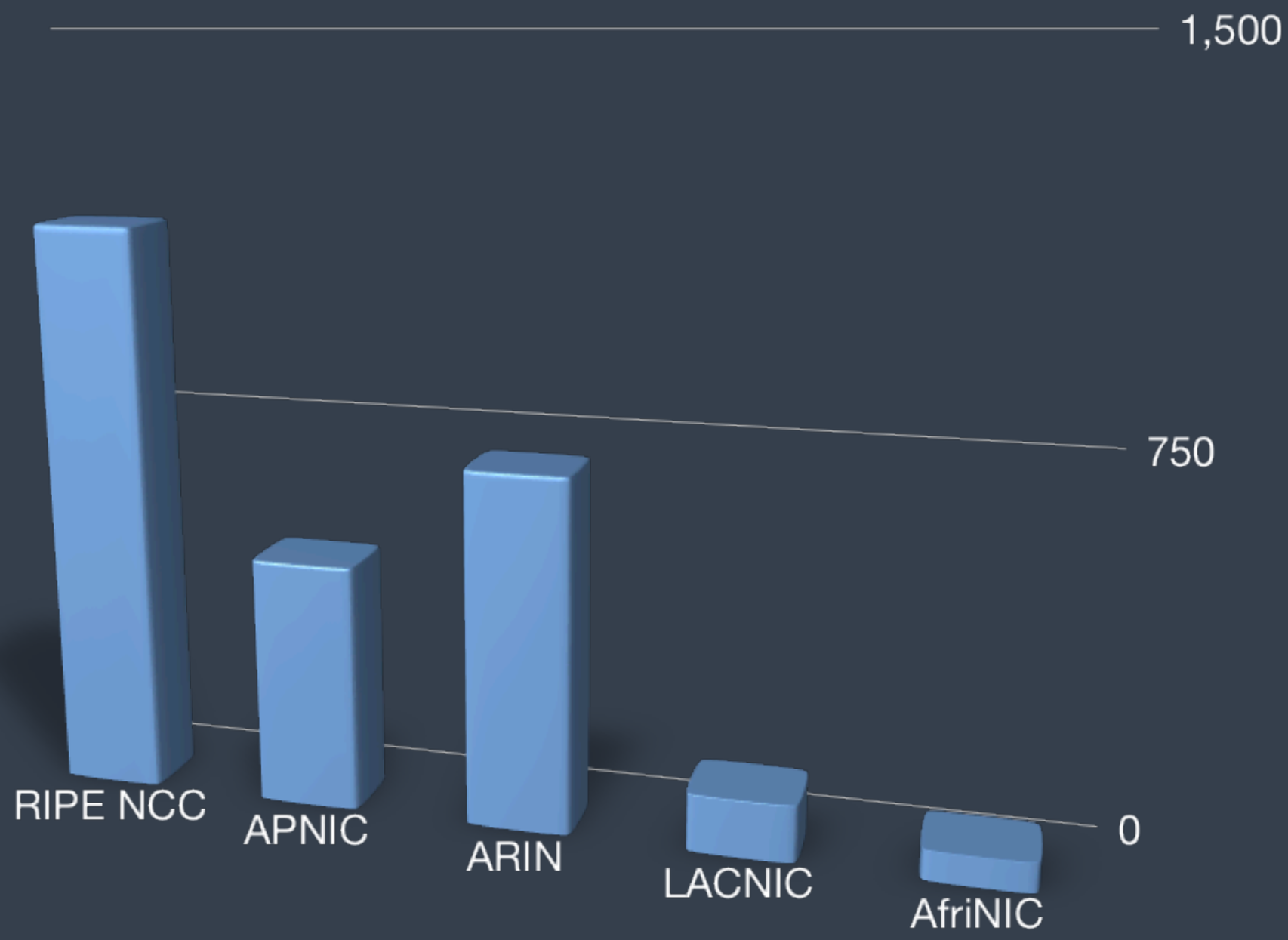
  http://www.tix.or.tz/ipv6/
- JINX, South Africa

  http://www.ispa.org.za/jinx/ipv6.shtml

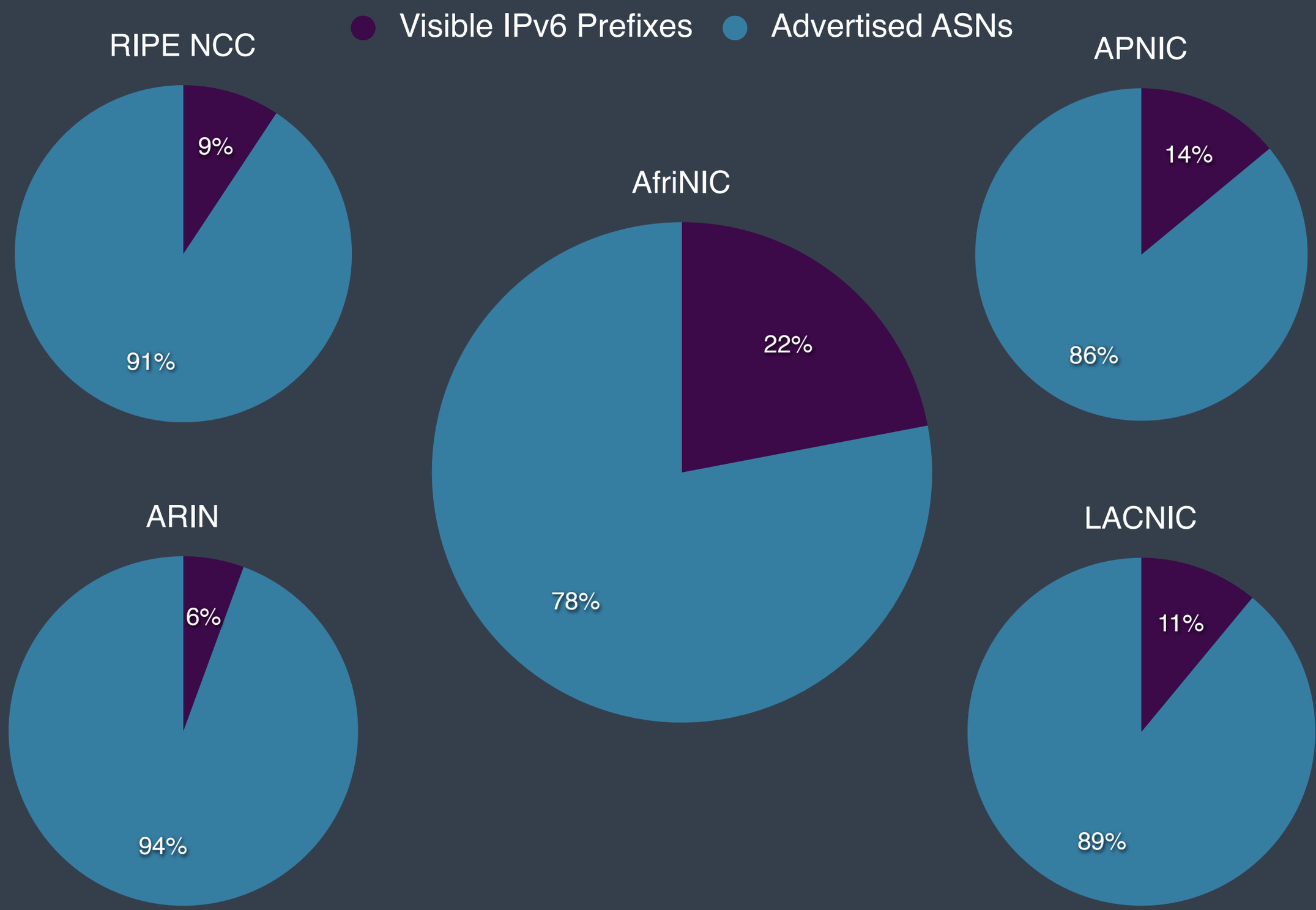
Measuring IPv6 Deployment by Region

- Many measurement points can be used
  - IPv6 allocations and assignments
  - BGP announcements
  - Traffic load

Number of Routed Prefixes by Region



IPv6 ASNs by Region



IPv6 Traffic Measurements

- Most traffic seems to be tunneled inside IPv4
  - Few ISPs offer native IPv6 connections
  - Hard to measure in ISP or IXP networks
- Measuring from an end point tells you about the end point and not the broad network

Homes and Offices

Homes

- Tend to have
  - Just 1 connection
  - Cheap, commodity access device
    - Very standard computer and software
- Just need native IPv6 from their ISP and a new router or modem

Offices

- Often have multiple ISPs
- Often use bespoke software
- Often need an SLA
- Some issues with firewalls and other network kit

  http://www.icann.org/en/committees/security/sac021.pdf

ISPs

- Often need to install new access network equipment
- Most core and edge network equipment should be IPv6 capable
- Don’t have an incentive to launch production, native IPv6 services until there is IPv6 content and a selection of home and office routers and modems

Thank You

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