Evolution of the Internet: Securing the future

11th APNG Camp

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Director General, APNIC

Overview

- What is the Internet?
  - Where are we now?
  - Where are we going?
- What is APNIC?
- What is ISIF?
  - Background
  - Objectives of ISIF
  - How can you apply?

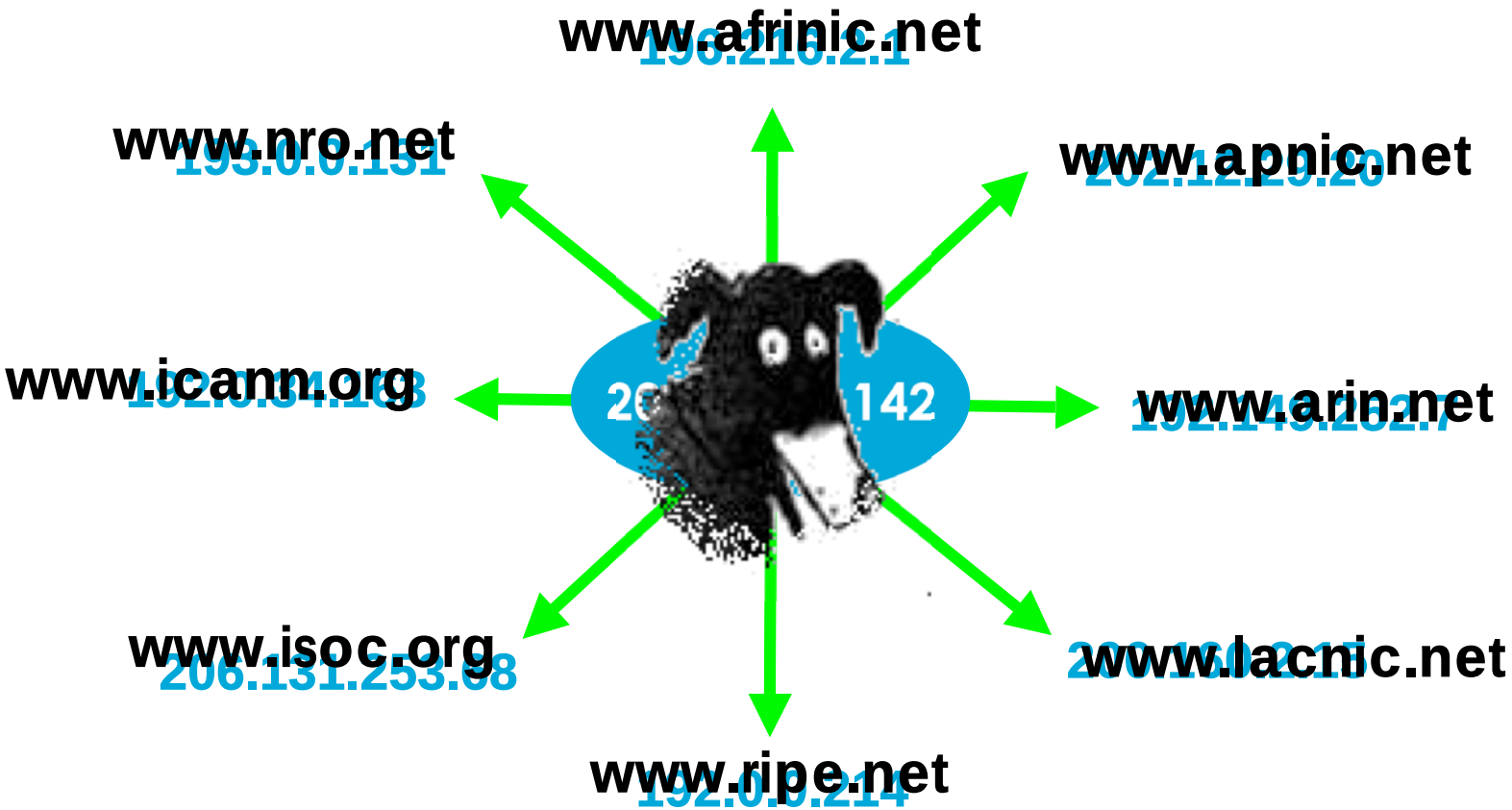
IP addresses and domain names

“On the Internet, nobody knows you’re a dog…”

"On the Internet, nobody knows you're a dog."

The New Yorker,

On the Internet, you are nothing but an IP address!



What is an IP address?

- An **Internet Protocol (IP) address** is a number that identifies a device (end-point) on the Internet
- An IP address is a number
- An IP address is not a Domain Name!
- Every device directly connected to the Internet needs a unique IP address
- There are two types of IP…
  - IPv4 and IPv6…

About IPv4 and IPv6

	Internet Protocol version 4 (IPv4)	Internet Protocol version 6 (IPv6)
Deployed	1981	1999
Address Size	32 bits	128 bits
Address Format	Dotted Decimal Notation: 192.149.252.76	Hexadecimal Notation: 2001:DB8:0234:AB00: 0123:4567:8901:ABCD
Prefix Notation	192.149.0.0/24	2001:DB8:0234::/48
Number of Addresses	2^{32} = ~4,000,000,000	2^{128} = ~340,000,000, 000,000,000,000,000, 000,000,000,000,000

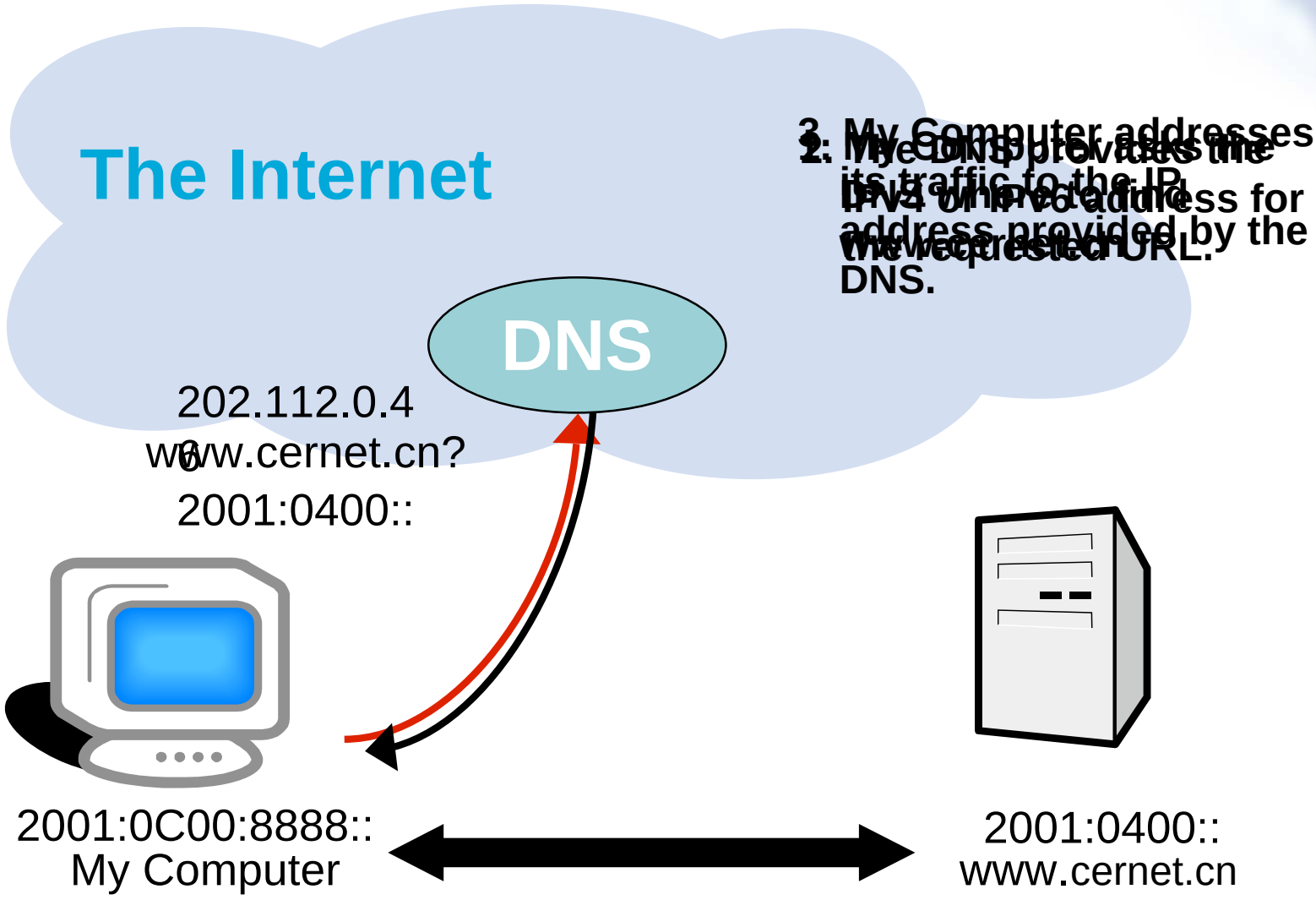
About IP addresses

- A finite common resource
  - Managed in the common interest
  - Critical to maintenance of global Internet
- **Not "owned" by address users**
  - Not property
  - Cannot be bought, sold, or traded…
  - Provided on a "license" basis
  - Returned to registry or provider when no longer required

IP addresses are not Domain Names

IP Address	Domain Name
202.12.29.20 2001:DB8:0234:AB00:0123:4567:8901:ABCD	www.apnic.net
Locator	Label
Identifies network end-point	Translates to IP Address
Computer-friendly	Human-friendly
Fundamental network address	Address lookup service
Managed regionally	Managed globally (gTLD) Or nationally (ccTLD)
Primarily technical management priorities	Primarily commercial management priorities

Using Domain Names



IP address prefix notation (IPv4)

CIDR Prefix	# of Addresses	Old Class Equivalent
/32	1	
/24	256	Class C
/22	1,024	
/20	4,096	
/16	65,536	Class B
/8	16,777,216	Class A

Asia Pacific Network Information Centre

APNIC

APNIC as a RIR

Where do IP addresses come from?

IETF

Standards

IANA

Allocation

APNIC

APNIC

Allocation

*

ISP

Assignment

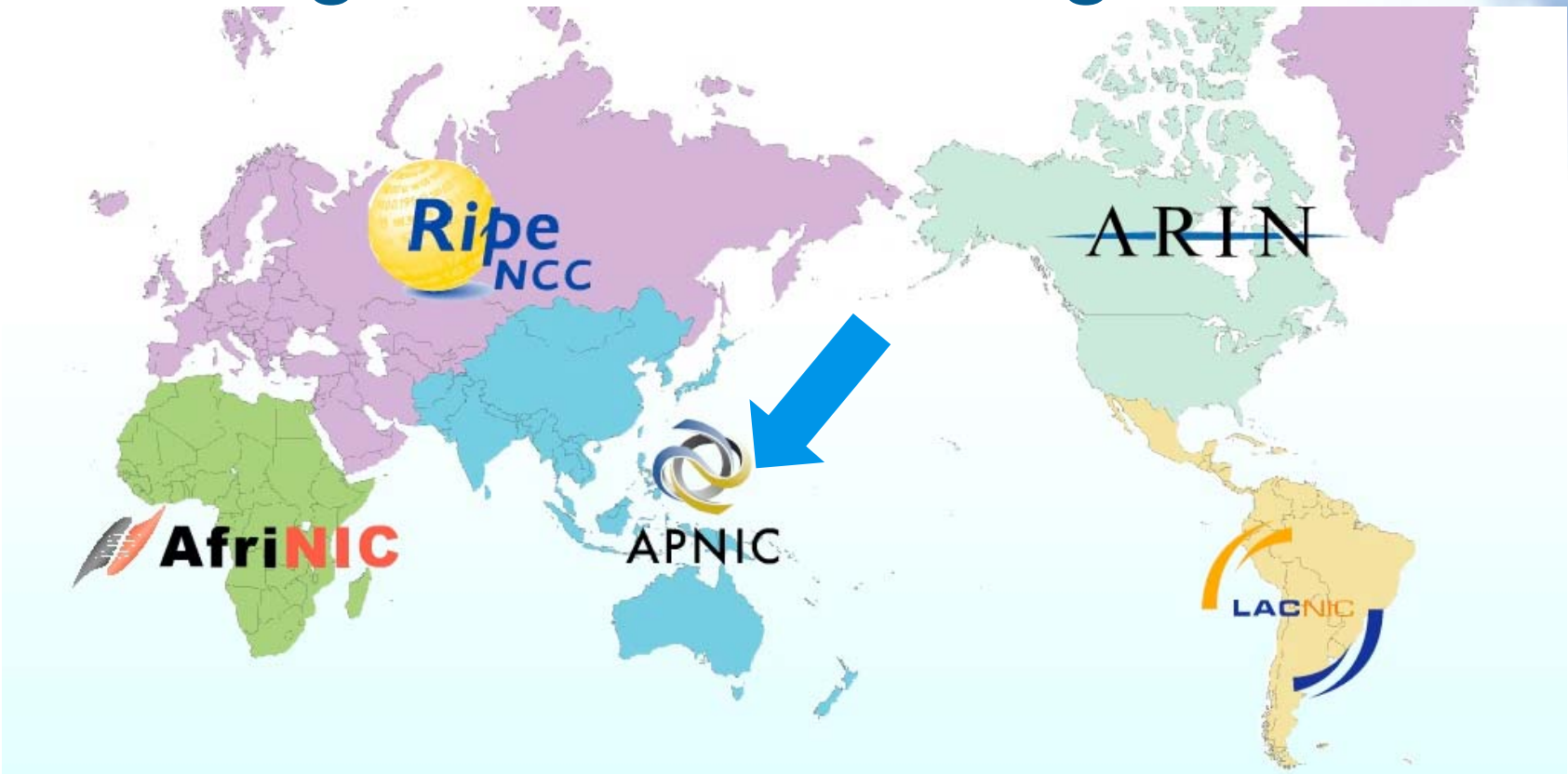
End user

Regional Internet Registries (RIR) distribute IPv4, IPv6, and AS numbers to the Internet community

RIRs maintain accurate registration of Internet resource usage for the community

* In some cases via an NIR, such as CNNIC, JPNIC etc.

Regional Internet Registries



The Internet community established the RIRs to provide fair and consistent resource distribution and accurate resource registration throughout the world.
(RFC 1338 and RFC 1366)


APNIC
Asia Pacific Network Information Centre
South Asia
Afghanistan
Bangladesh
Bhutan
British Indian Ocean Territory
India
Maldives
Nepal
Pakistan
Sri Lanka
Eastern Asia
China
Dem. People's Rep. of Korea
Hong Kong SAR
Japan
Macau
Mongolia
Republic of Korea
Taiwan
Polynesia
American Samoa
Cook Islands
French Polynesia
Niue
Pitcairn
Samoa
Tokelau
Tonga
Tuvalu
Wallis and Futuna Islands
South-eastern Asia
Brunei Darussalam
Cambodia
Christmas Island
Cocos (Keeling) Islands
Indonesia
Lao People's Dem. Republic
Malaysia
Myanmar
Philippines
Singapore
Thailand
Timor-Leste
Vietnam
Micronesia
Fed. States of Micronesia
Guam
Kiribati
Marshall Islands
Nauru
Northern Mariana Islands
Palau
Melanesia
Fiji
New Caledonia
Papua New Guinea
Solomon Islands
Vanuatu
Australia & New Zealand
Australia
New Zealand
Norfolk Island
Antarctic
French Southern Territories

APNIC's mission

"Addressing the Challenge of Responsible Resource Distribution in the Asia Pacific Region"

- To provide Internet resource allocation and registration services
- To assist the Asia Pacific community to achieve effective resource management
- To provide educational opportunities
- To develop public policies and public positions
- To liaise with multi-stakeholders in the Internet community

APNIC's services

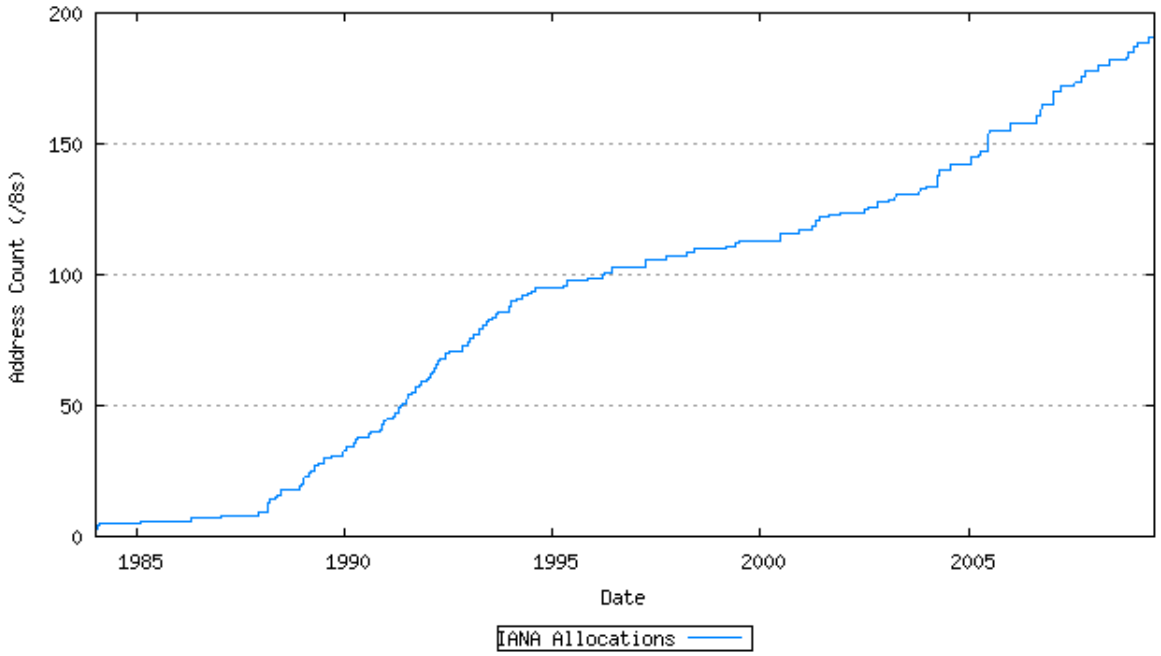
- Resource registration services
  - Including IRR
- Resource certification
  - A robust security framework for verifying the association between resource holders and their Internet resources
- Training and education
- Policy coordination
- Research and Development
- Operational support
  - DNS Root Servers, network Monitoring

Evolution of the Internet

IPv4 address consumption

- IPv4 addresses are a finite 32-bit numeric asset
  - 2^{32} addresses = about 4.2 billion addresses
- Has been in use since the early days of the Internet

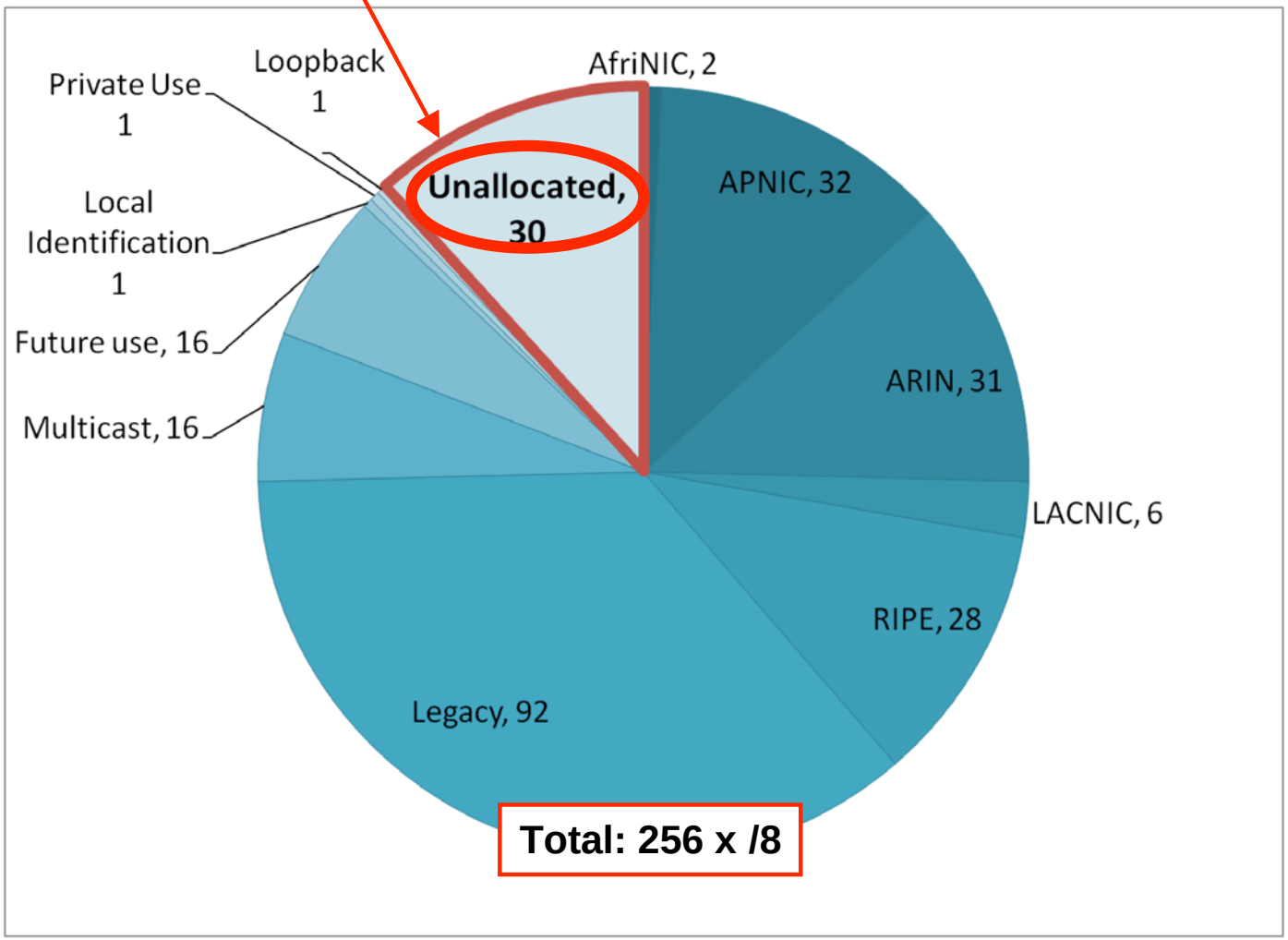
Time Series of IANA Allocations



http://www.potaroo.net/tools/ipv4/index.html/ as of 26/06/2009

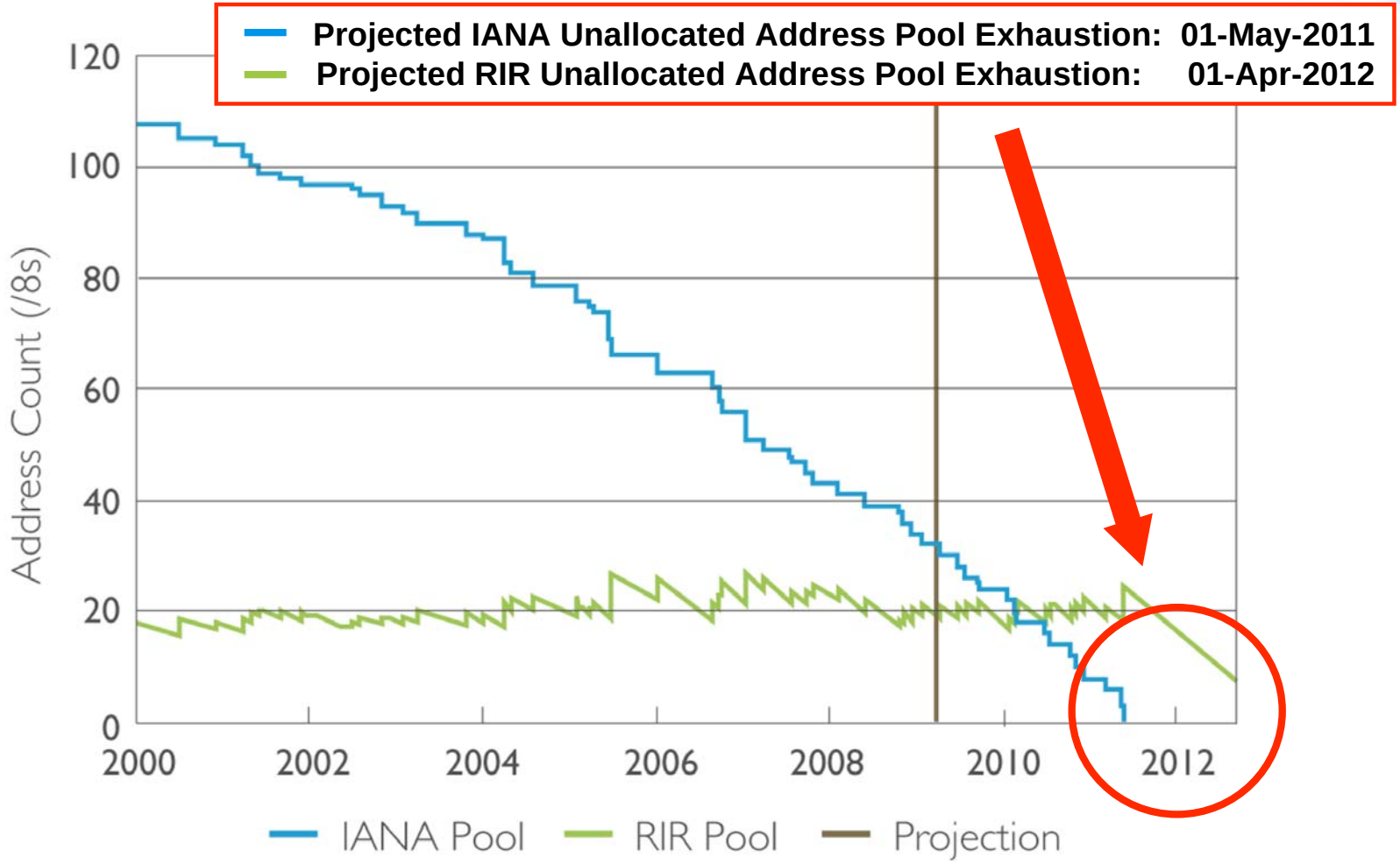
Remaining IPv4 /8s at IANA

Remaining at IANA 30 x /8



http://www.iana.org/assignments/ipv4-address-space/ as of 24/06/2009

IPv4 consumption – Projection



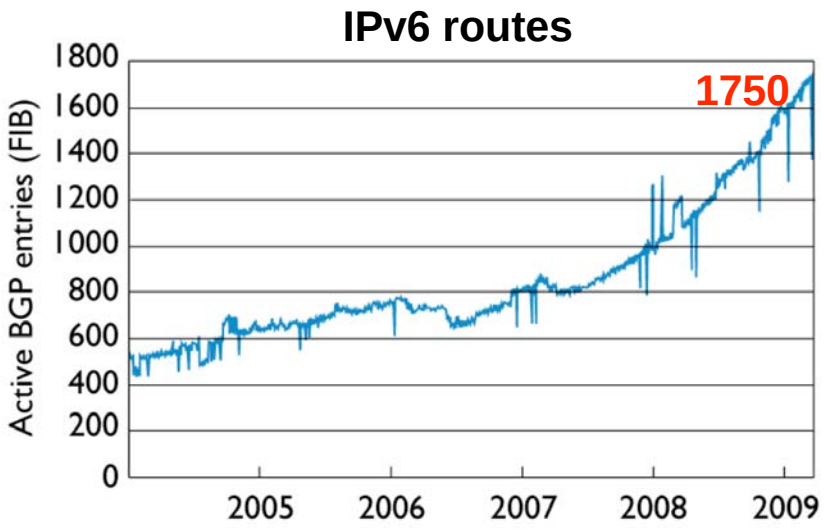
http://www.potaroo.net/tools/ipv4/index.html as of 25/06/2009

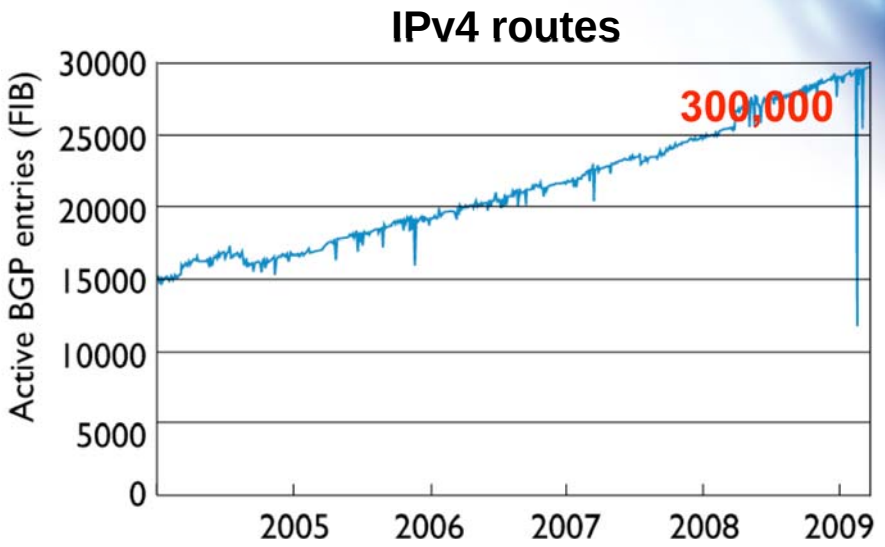
But we haven’t started yet !

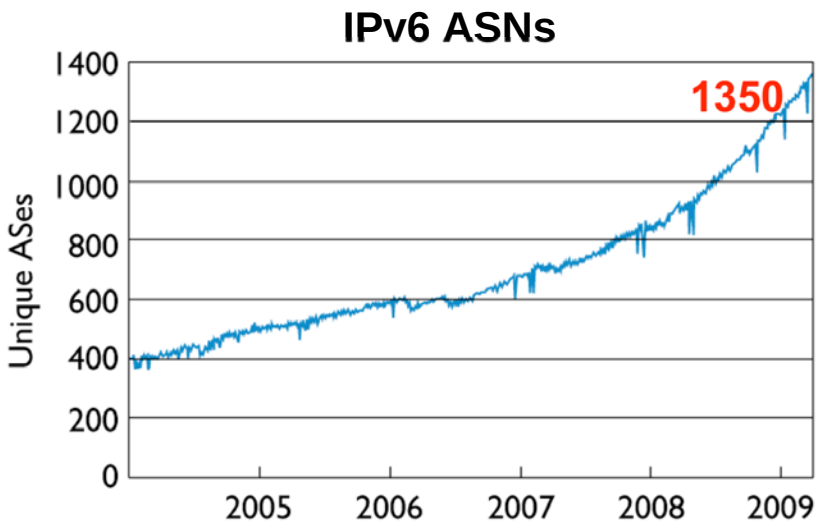
What are the solutions?

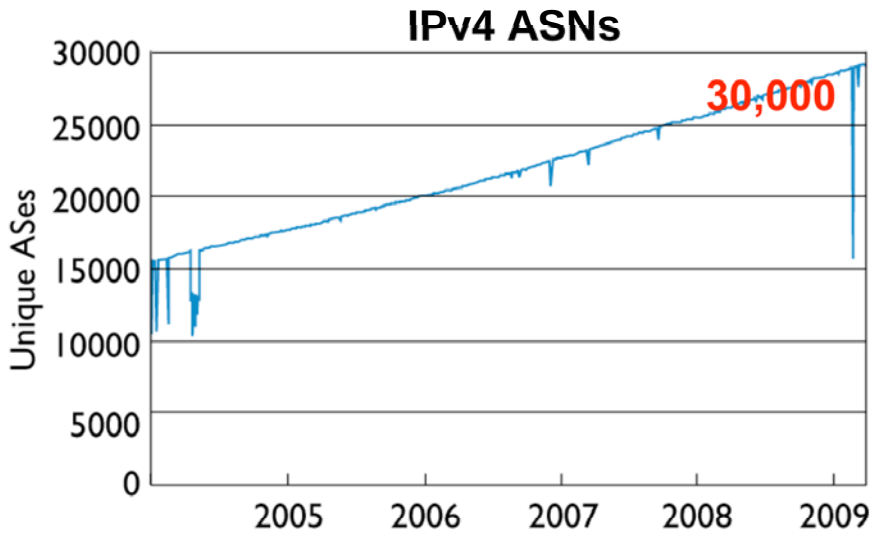
- How can we continue to expand the Internet after IPv4 address exhaustion?
- IPv6 is the optimal solution
  - The IPv6 address space has 2^{128} addresses
  - This is **HUGE** compared to IPv4
- APNIC urges all network operators to support IPv6 by 2010
  - ISPs, IXPs, ASPs, content providers, users

How much IPv6 is deployed?



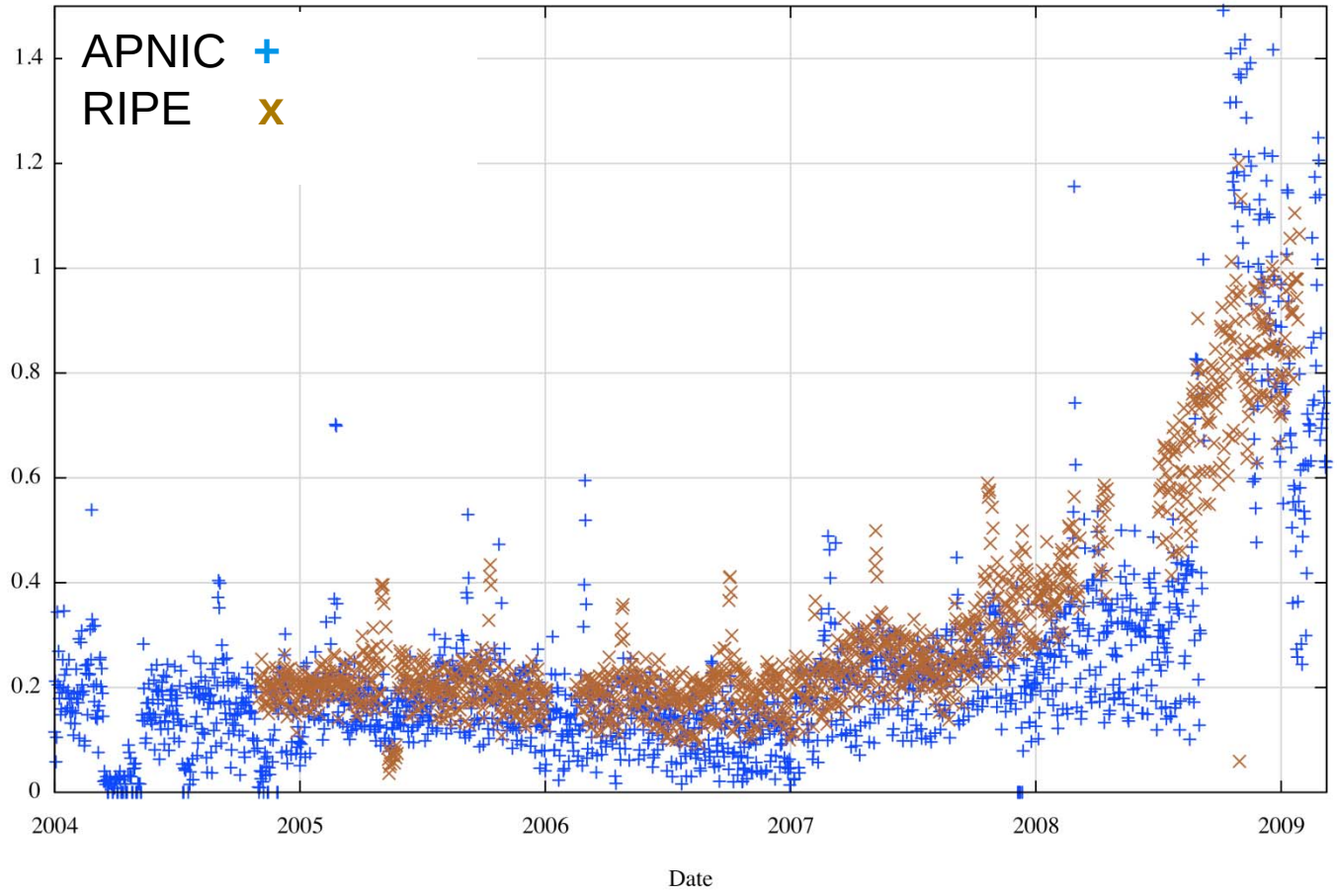






http://bgp.potaroo.net/ as of 26/03/2009

Are people using IPv6?



APNIC R&D data as of 01/06/2009

How can you contribute?

- Your generation will be benefited further more with expanding Internet
  - What benefits can you create by deploying IPv6 in your home, office, school, business?
- Great opportunity to be part of history!
  - Contribute the Internet community through your research and development efforts
  - Unique research and development for new applications with IPv6
- APNIC supports such efforts…
  - Let's talk about ISIF

information society innovation fund

ISIF

isif asia

information society innovation fund

What is ISIF?

- Information Society Innovation Fund
  - A small grants program for
    - Stimulating creative solutions to ICT development needs in the Asia Pacific region
  - Emphasising the role of the Internet
    - In social and economic development in the region,
    - Towards the effective development of the Information Society

isif asia

Background

- Challenges of Internet development
  - Access to technical skills and knowledge
  - Reliability of infrastructures and services
  - Business and policy environment
  - Local economic and social issues
- Overcoming these challenges
  - Innovative solutions and the involvement of local actors
  - Local knowledge promotes creative solutions

Objectives of ISIF

- Encourage innovative approaches
  - To Internet infrastructure and services in the AP region
- Address issues of Internet sustainability and business models in challenging market circumstances
- Foster innovation and creative solutions
  - By supporting creative use of ICT applications
- Help development and public agencies
  - To identify new trends and enablers in regional ICT development
- Generate awareness and foster sharing of innovative approaches to development challenges

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ISIF Partners and Sponsor

- International Development Research Centre (IDRC)
- Internet Society (ISOC)
- Asia Pacific Network Information Centre - (APNIC)
- The DotAsia Organization

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Why APNIC is investing in ISIF?

- To give back to the Internet community by investing in ICT research & development.
- To support research that can help Internet growth in our region
  - IPv6 is one of their interests
- To facilitate networking and information building throughout the Internet community

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In 2009…

- **Around 370.000 USD were granted to 11 projects**
- **Where?** Thailand (1), India (2), Sri Lanka (3), Pakistan (1), Vietnam (1), Indonesia (1), Nepal (1), The Philippines (1)
- **Who?** Universities (5), research institutes (2), NGOs (1), networks (1), foundations (1) and private company (1)
- **What?** Emergency response, telehealth, digital forensic research, wireless applications and deployments, high-speed infrastructure, tools for telecentres

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How can you apply?

- Access the ISIF website and read the terms and conditions to apply at www.isif.asia
- **Identify areas where your organization wants to test innovative approaches to solve development problems via ICTs**
- Prepare your application using the template provided and upload it using the online application form before **July 31st 2009**

Any questions please feel free to contact
info@isif.asia

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How can you support ISIF?

- **Promote** the ISIF 2010 program
  - Deadline: July 31st 2009
  - AUD 40,000.00 max
  - 12 months max
- Help us identify possible **sponsors** for future rounds of funding

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Thank you!

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