Asia Pacific Network Information Centre

APNIC

Internet Technical Coordination - a Governance issue

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APNIC

Overview

- Internet standards
- Internet names and numbers
- How are names and addresses managed?
- IP Addresses - today and tomorrow
- “Governance”, WSIS and ICANN

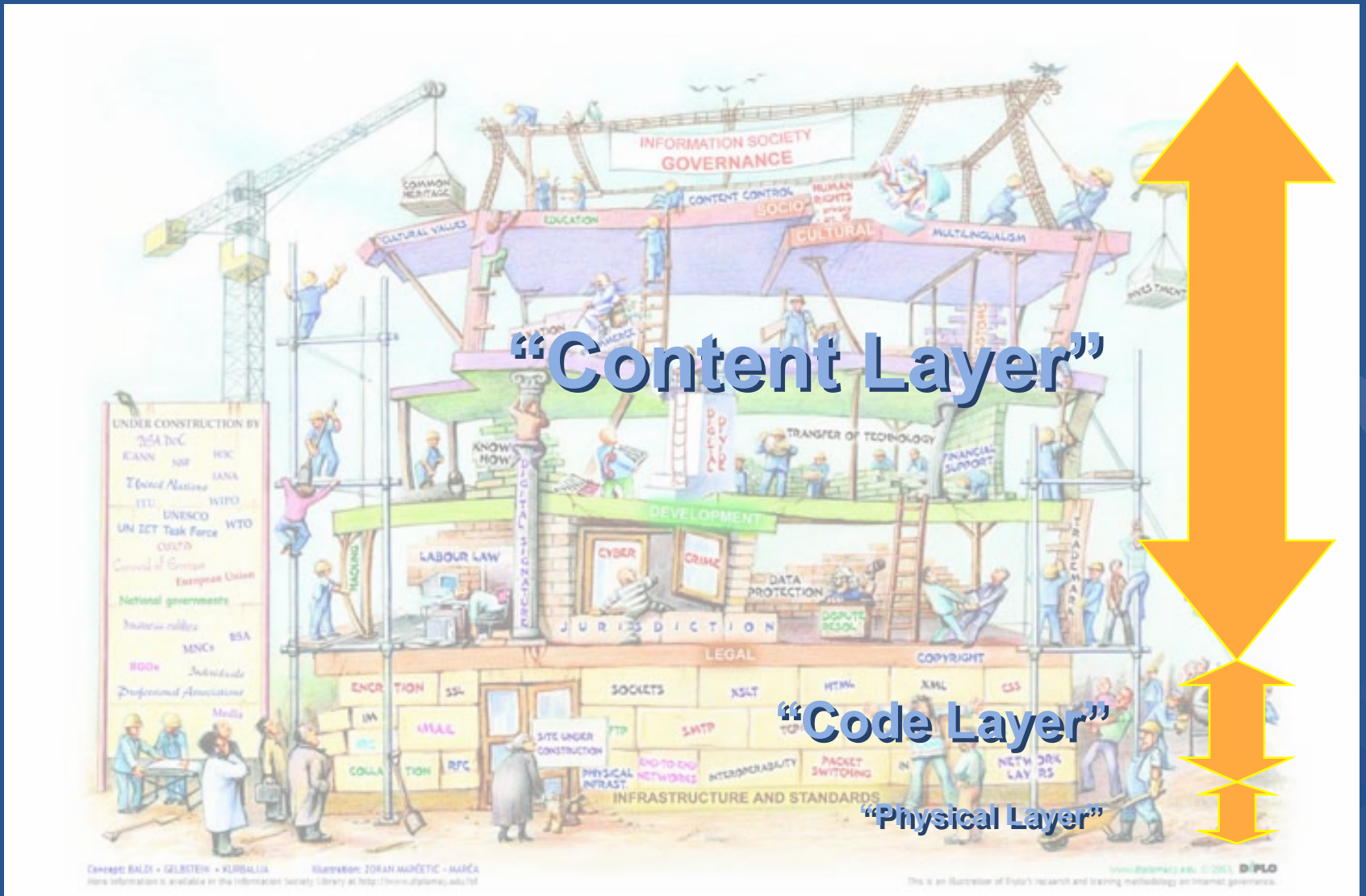
First, what is the Internet?

- Initially, research project (70-80s)
  - Open, cooperative, public domain
  - Highly collaborative environment
  - “Rough consensus and running code”
- Then, product of liberalisation (90s)
  - Also, catalyst for deregulation
  - Highly competitive environment
  - Still free to join and use
- Now, public utility and critical infrastructure (2000s)
  - Re-regulation (governance) is a recent afterthought

What is Internet Governance?

- May include any aspect of the Internet which requires regulation, coordination or oversight
  - –Cybercrime, security, spam, phishing, hacking
  - –Content regulation
  - –Commerce, trade and taxation
  - –Intellectual property
  - –Telecommunications regulation, competition policy
  - –Development and facilitation, capacity building
  - –Equity of access
  - –Technical standards and coordination
- None of these are entirely new areas

Internet Governance

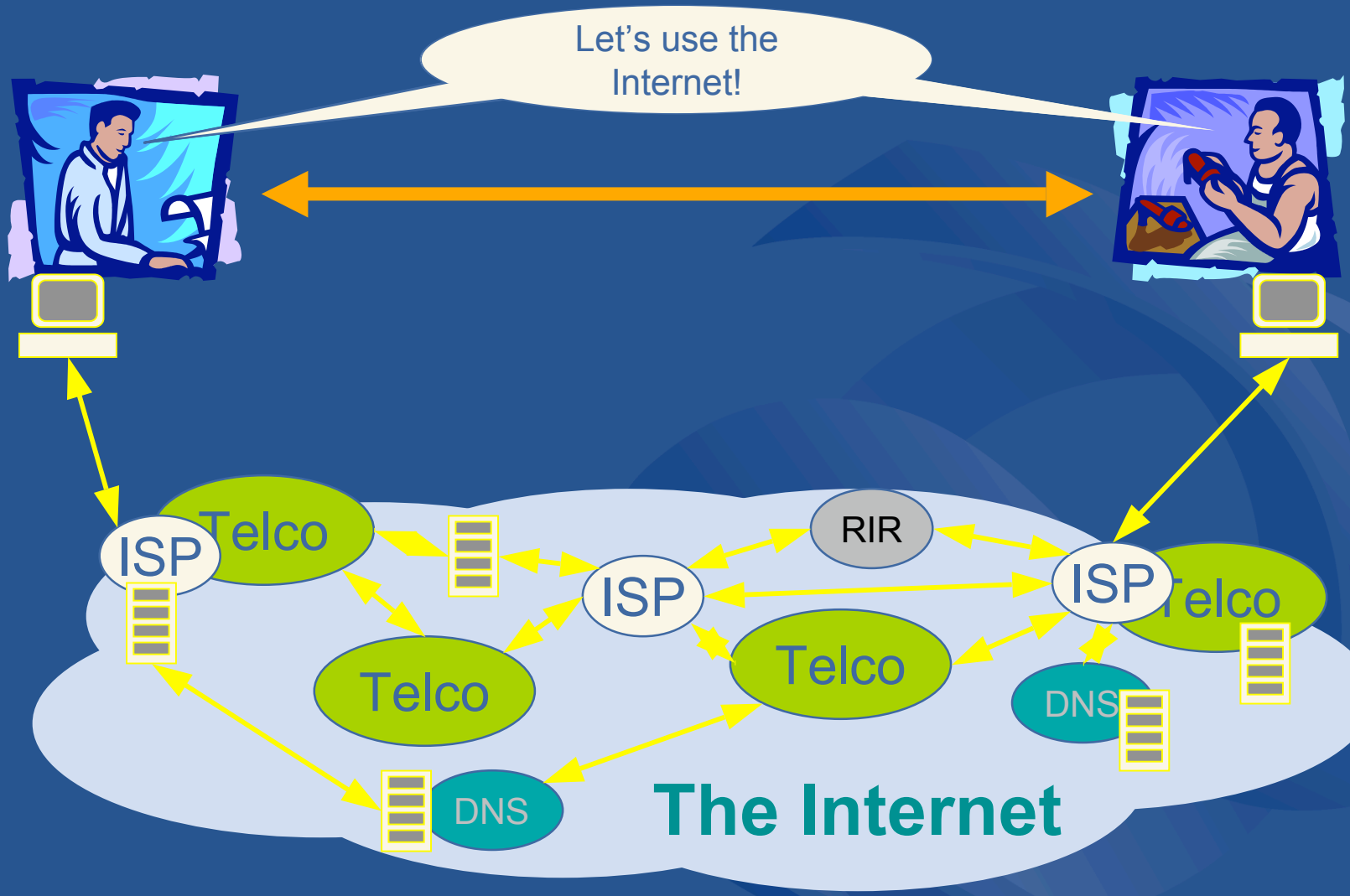


Internet technical coordination

- A.K.A. the “code layer” (Lessig)
- One aspect of Internet governance
  - Internet standards development
  - DNS administration
  - DNS infrastructure coordination
  - IP address and related resource management
- Includes activities of several types
  - Administrative
  - Operational
  - Standards and technical policy

Internet standards

Communications protocols



Communications protocols

- Let's try it…

```
traceroute to www.ietf.org (132.151.6.75), 30 hops max, 38 byte packets

 1  fxp1-basil (202.12.29.254)  0.242 ms  0.164 ms  0.146 ms
 2  fe0-0.gw1.apnic.net (202.12.29.114)  0.335 ms  0.287 ms  0.275 ms
 3  fe1-1.gw2.apnic.net (202.12.29.125)  0.556 ms  0.410 ms  0.433 ms
 4  FastEthernet3-30.cha23.Brisbane.telstra.net (139.130.97.61)  0.856 ms  0.846 ms  0.866 ms
 5  GigabitEthernet1-2.woo-core1.Brisbane.telstra.net (203.50.50.129)  1.045 ms 0.956 ms  1.006 ms
 6  Pos5-0.ken-core4.Sydney.telstra.net (203.50.6.221)  12.020 ms  12.279 ms  11.923 ms
 7  10GigabitEthernet3-0.pad-core4.Sydney.telstra.net (203.50.6.86)  12.176 ms13.834 ms  12.073 ms
 8  GigabitEthernet0-0.syd-core01.Sydney.net.reach.com (203.50.13.242)  13.631 ms  13.503 ms  13.592
 9  i-12-1.wil-core02.net.reach.com (202.84.144.65)  163.275 ms  163.446 ms  163.384 ms
10  i-2-0.dal-core01.net.reach.com (202.84.143.66)  196.954 ms  196.791 ms  196.939 ms
11  POS1-3.GW1.DFW13.ALTER.NET (65.208.15.89)  197.036 ms  197.198 ms  197.424 ms
12  0.so-0-0-0.CL1.DFW13.ALTER.NET (152.63.103.86)  196.717 ms  196.558 ms  196.715 ms
13  0.so-0-0-0.TL1.DFW9.ALTER.NET (152.63.0.193)  196.251 ms  196.193 ms  196.067 ms
14  0.so-4-2-0.TL1.DCA6.ALTER.NET (152.63.38.145)  240.699 ms  241.416 ms  240.802 ms
15  189.at-5-0-0.XR1.TCO1.ALTER.NET (152.63.39.226)  243.266 ms  243.411 ms  243.204 ms
16  193.ATM7-0.GW5.TCO1.ALTER.NET (152.63.39.85)  242.898 ms  241.967 ms  242.296 ms
17  cnrl-gw.customer.alter.net (157.130.44.142)  245.964 ms  246.573 ms  246.391 ms
18  www.ietf.org (132.151.6.75)  251.321 ms !<10>  250.003 ms !<10>  244.306 ms!<10>
```

- It works!
- But how does it work…

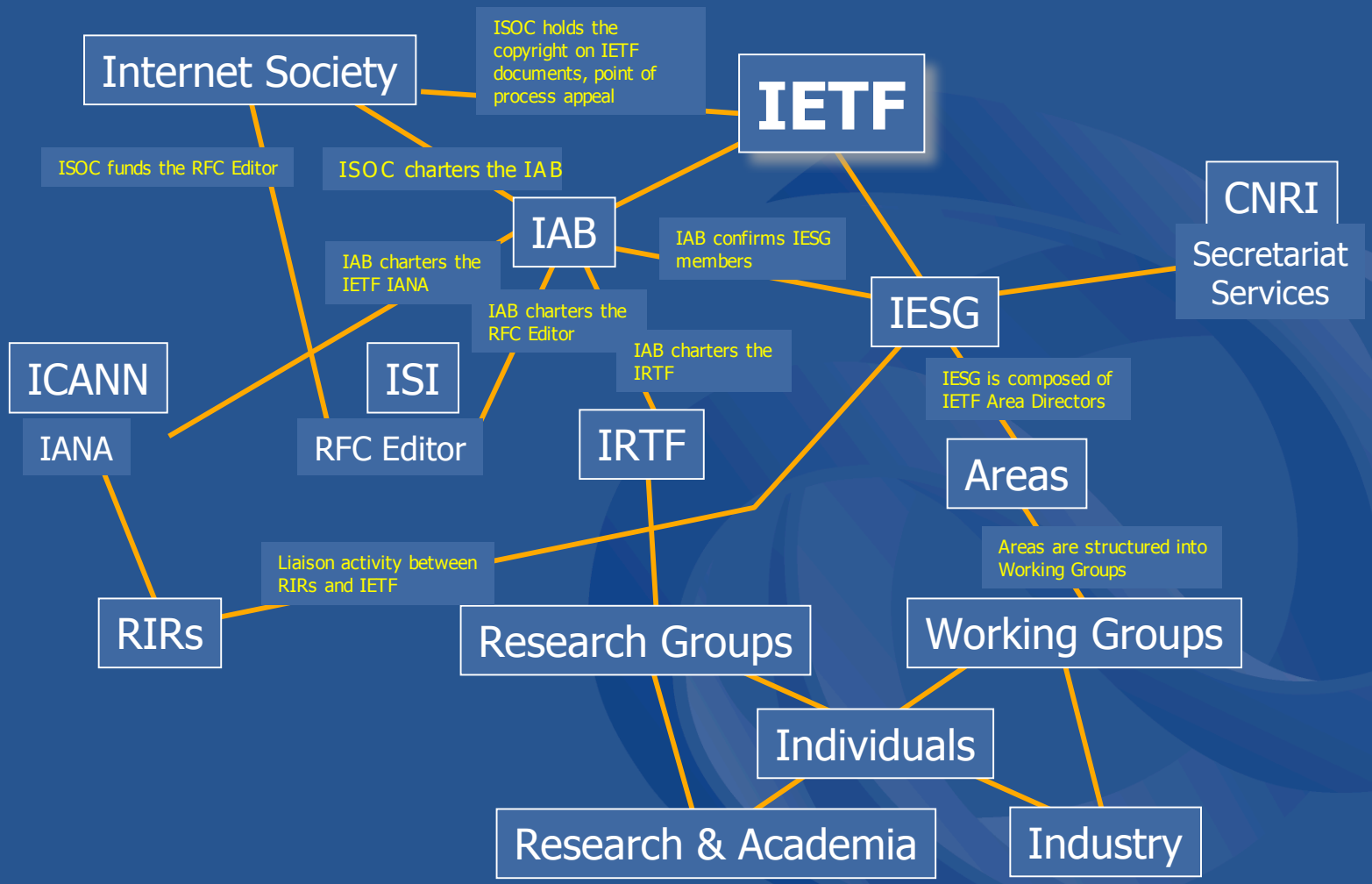
The IETF…

- The Internet Engineering Task Force is a standards body that undertakes the development of open standards in support of the Internet
- The IETF is not like other industry-based standards bodies…
  - The IETF is an open collaborative effort undertaken by a number of groups and individuals, each undertaking particular roles within the overall IETF framework
  - The IETF uses individual contributions and a process of development of consensus to achieve interoperable and relevant technical specifications of Internet technologies

- "*We reject kings, presidents and voting.*
  We believe in rough consensus and running code."

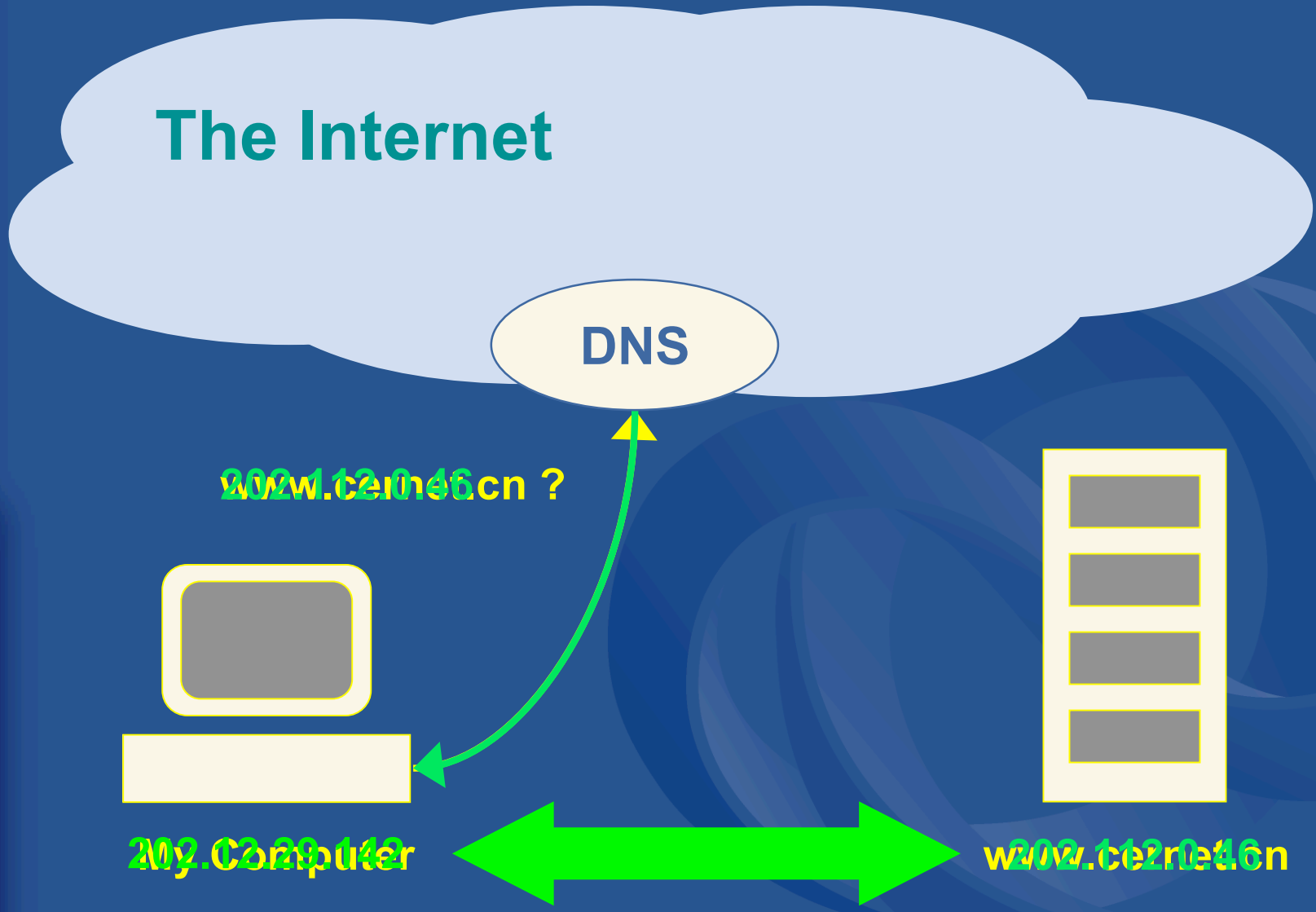
IETF Roles and Relationships

IETF Roles and Relationships



Internet names and numbers

IP addresses are not domain names…



What is an IP address?

- Internet infrastructure address
  - Critical Internet identifier
  - Globally unique
- A finite Common Resource
  - IPv4: 32-bit number
    - 4 billion addresses available
  - IPv6: 128-bit number
    - 340 billion billion billion billion available
- Managed under the RIR System
  - According to technical policies
- Not “owned” by address users
- IP does not mean “Intellectual Property”

What is a Domain Name?

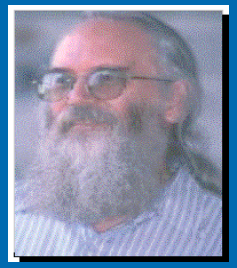
- Internet naming service
  - "User-friendly" label for an IP address
  - Globally unique
  - Provided by the DNS
  - Hierarchical structure, with delegated management
- A "infinite" Common Resource
  - Providing that the name space expands
  - Eg new gTLDs such as .info, .biz etc
- "Owned" by name holders
  - Names often imply Intellectual Property

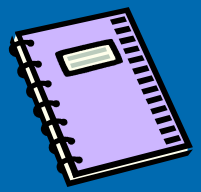
How are IP addresses managed?

and how did we get here?

1981 - 1992

1981: RFC 790
1987: RFC 1020
1991: RFC 1261



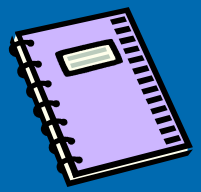


RFC 790

"The assignment of numbers is ... handled by Jon. If you are developing a protocol or application that will require the use of a link, socket, port, protocol, or network number **please contact Jon to receive a number assignment**."

1993 - 1996

1992: RFC 1338
RFC 1366
1993: RFC 1466
1996: RFC 2050



RFC 1366

"Based on the growth and the maturity of the Internet in Europe, Central/South America and the Pacific Rim areas, it is desirable to consider **delegating the registration function to an organization in each of those geographic areas**. "

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ARIN
American Registry for Internet Numbers

LACNIC

Ripe NCC

1997 - 2001

1998: IAB asks RIRs to prepare for IPv6 allocations

1999: ICANN

2002 - 2004

2003: NRO

NRO

What are RIRs?

- Service organisations
- Representative of ISPs globally
  - Industry self-regulatory structures
  - Non-profit, neutral and independent
  - Open membership-based bodies
- First established in early 1990's
  - Voluntarily by consensus of community
  - To satisfy emerging technical/admin needs
- In the "Internet Tradition"
  - Consensus-based, open and transparent

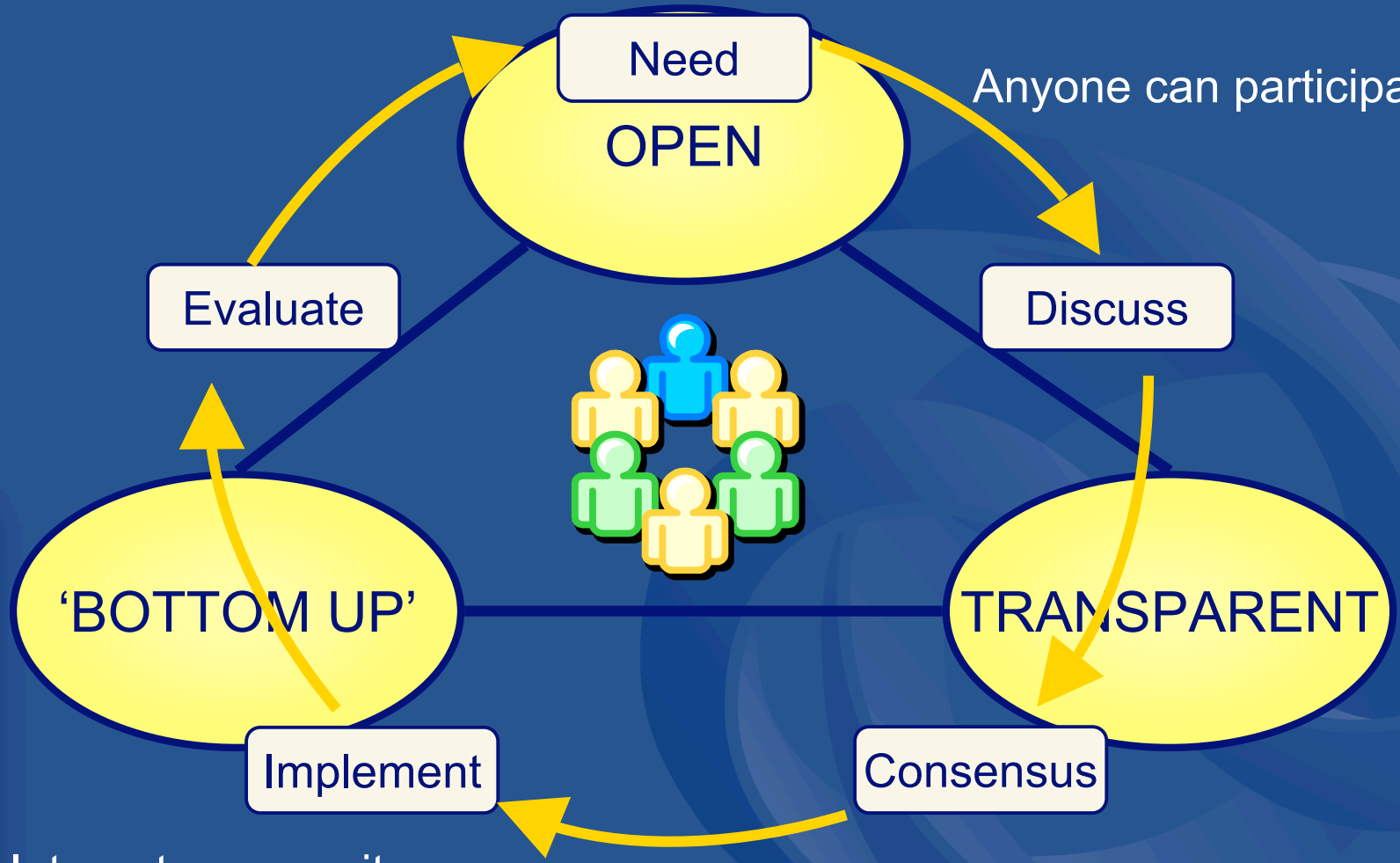
What do RIRs do?

- Internet resource allocation
  - Primarily, IP addresses – IPv4 and IPv6
  - Receive resources from IANA/ICANN, and redistribute to ISPs on a regional basis
  - Registration services (“whois”)
- Policy development and coordination
  - Open Policy Meetings and processes
- Training and outreach
  - Training courses, seminars, conferences…
  - Liaison: IETF, ITU, APT, PITA, APEC…
- Publications
  - Newsletters, reports, web site…

How do RIRs do it?

- Open and transparent processes
  - Decision-making
  - Policy development
- Open participation
  - Democratic, bottom-up processes
- Membership structure
  - 100% Self-funded through membership fees
  - National Internet Registries (APNIC)
- Community support (APNIC)
  - HRD
  - R&D fund
  - Fellowships – received and given
  - Open source software development

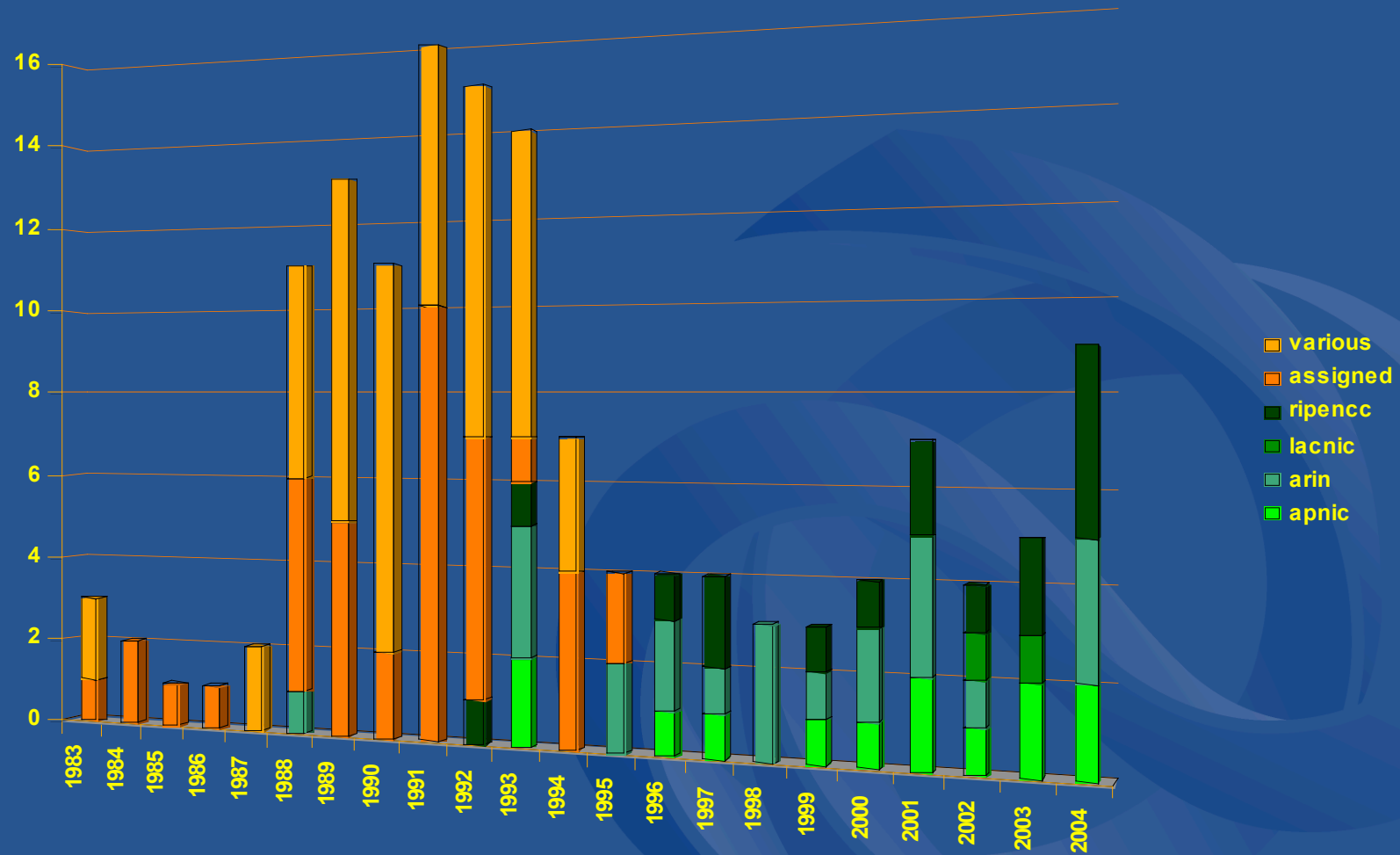
RIR Policy Coordination



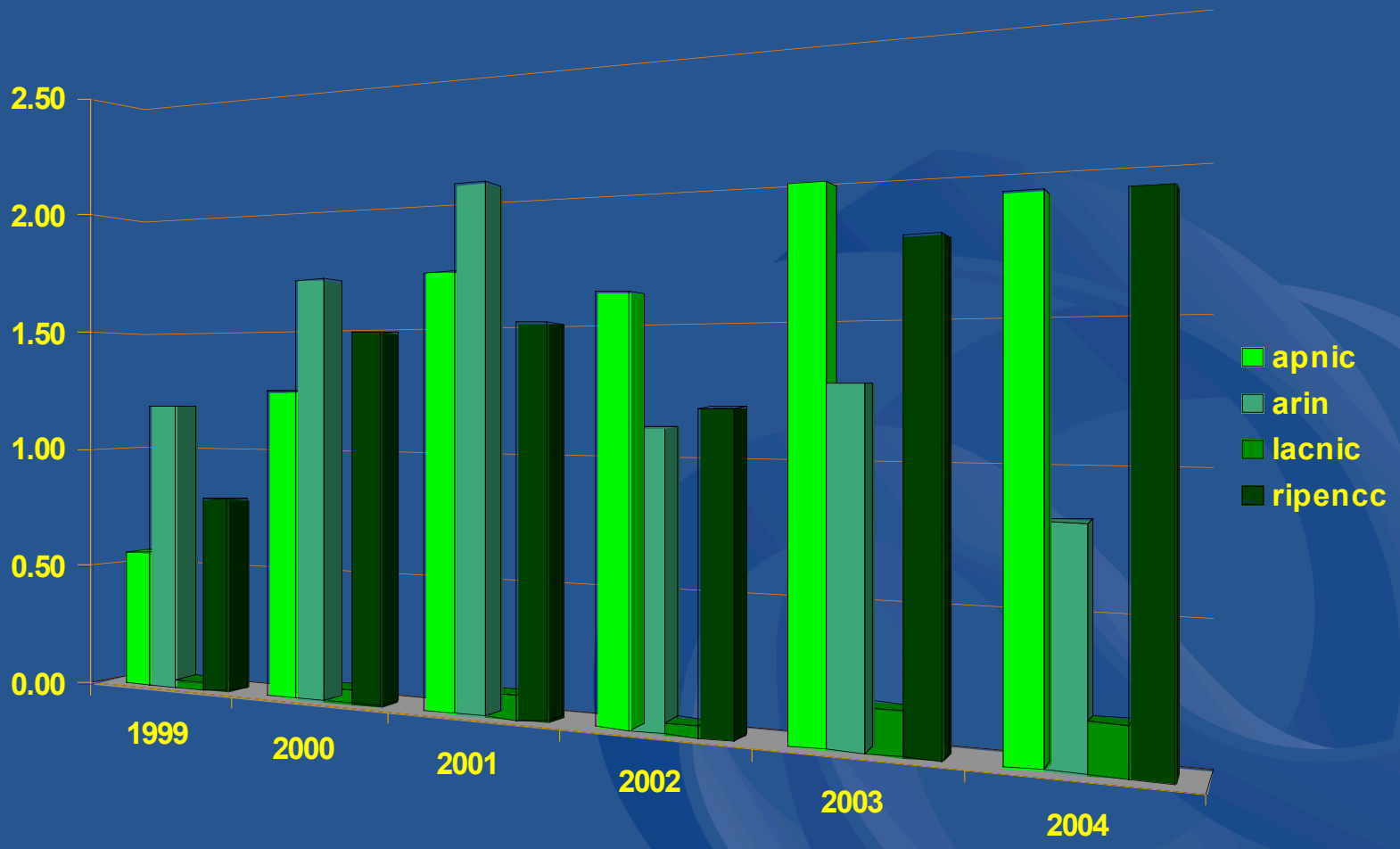
IP Addresses Today

Where are all the addresses?

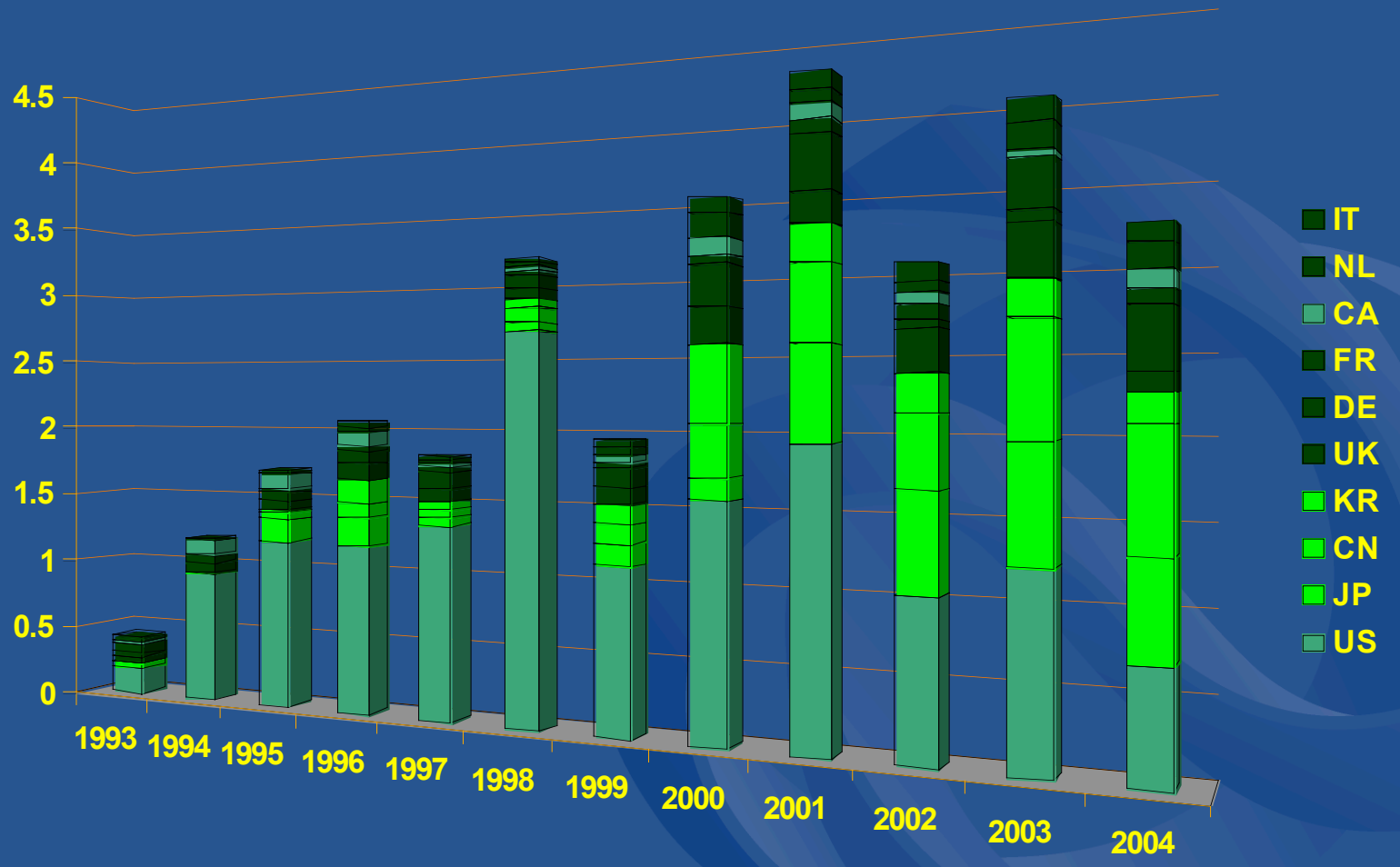
IPv4 Distribution – Global



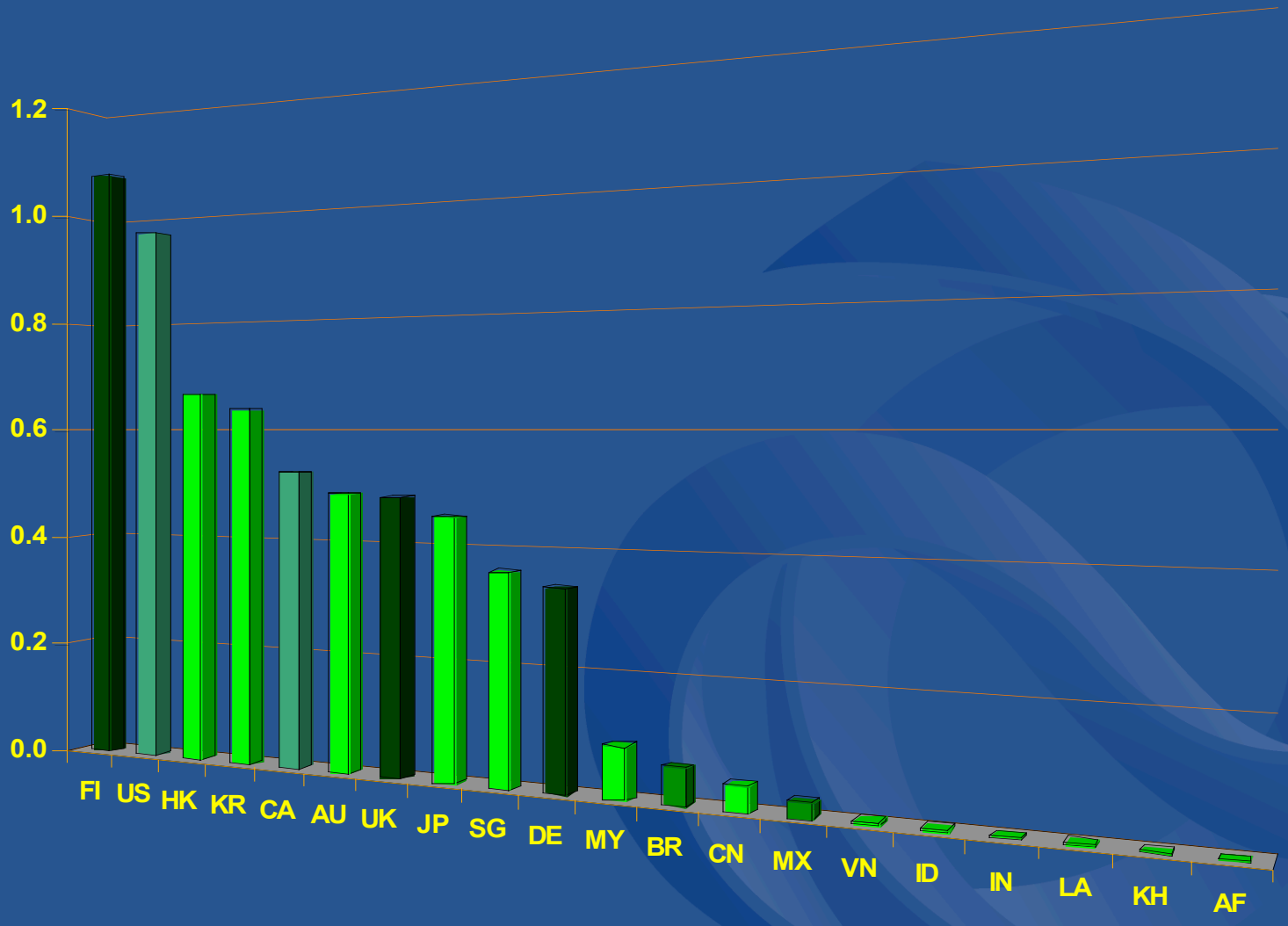
IPv4 Allocations – Regional



IPv4 Allocations – Global top 10



IPv4 Addresses per Head *

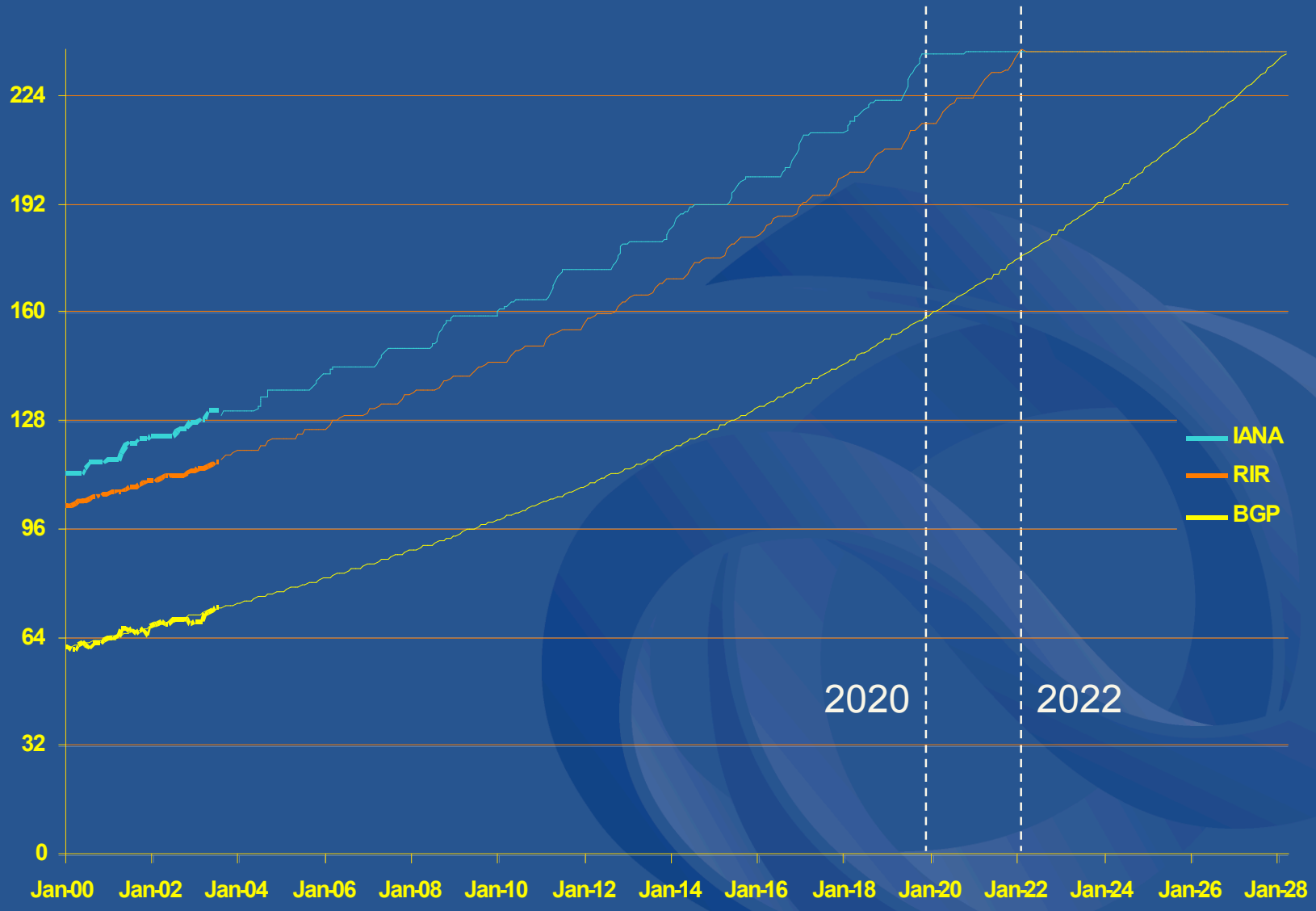


* RIR Allocations only

IP Addresses Tomorrow

What is the future?

IPv4 Address Lifetime



IPv6 - Internet for everything!

IPv6 – Issues

- The good news: IPv6 is available
  - Technologies now available
  - Addresses are very easy to get
- The reality: No demand yet
  - Do users want it? ISPs?
  - "Chicken and Egg"
- The future: Long, complex, transition
  - "Changing engines in flight"
  - Long process – 10+ years
  - Start now!

Internet Governance

RIRs, NRO and ICANN

- RIRs predate ICANN by many years
  - 1993: RIRs established
  - 1999: ICANN established
  - 2004: Negotiations continue…
  - RIRs support “Internet Model” as well as “ICANN”
- RIR system is established and respected
  - Well understood, open and transparent
  - Multilateral, transparent, democratic, open
- RIRs have a very limited role in “Internet Governance”
  - Administrative coordination only
- NRO now represents RIRs globally

NRO statement on ICANN

- *… The principle of these issues within the WSIS context is that of the independence and genuine internationalization of ICANN.*
- *Therefore the NRO calls on ICANN to continue its work in this area, not by building a multinational organization, but rather by including and gaining the genuine support of its significant base of core stakeholders, namely those in the DNS, IP address, and protocol communities.*
- *Furthermore, the NRO calls on ICANN to work with the US Government to demonstrate a genuine and unambiguous plan for its independence and to commit to this plan before the conclusion of the second phase of the WSIS.*

- ICANN meeting, Rome, 24 March 2004

In conclusion

Internet Governance

- The Internet works
  - The “dot com boom” seems to prove it
  - As some have said
    - “If it’s not broken, don’t fix it”, “do no harm”, “let’s no reinvent the wheel”
  - Improvement may be needed, of course
- What are the problems?
  - Often, specific issue or problem are unclear
  - Many problems have different solutions
- Some candidates…
  - History – but we can’t change that
  - Internationalisation – technical and administrative
  - Participation by all affected sectors
  - Education and HRD

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Thank You

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