



Towards IGF 2008:
Where next for IP Addressing?

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APNIC



Topics for today

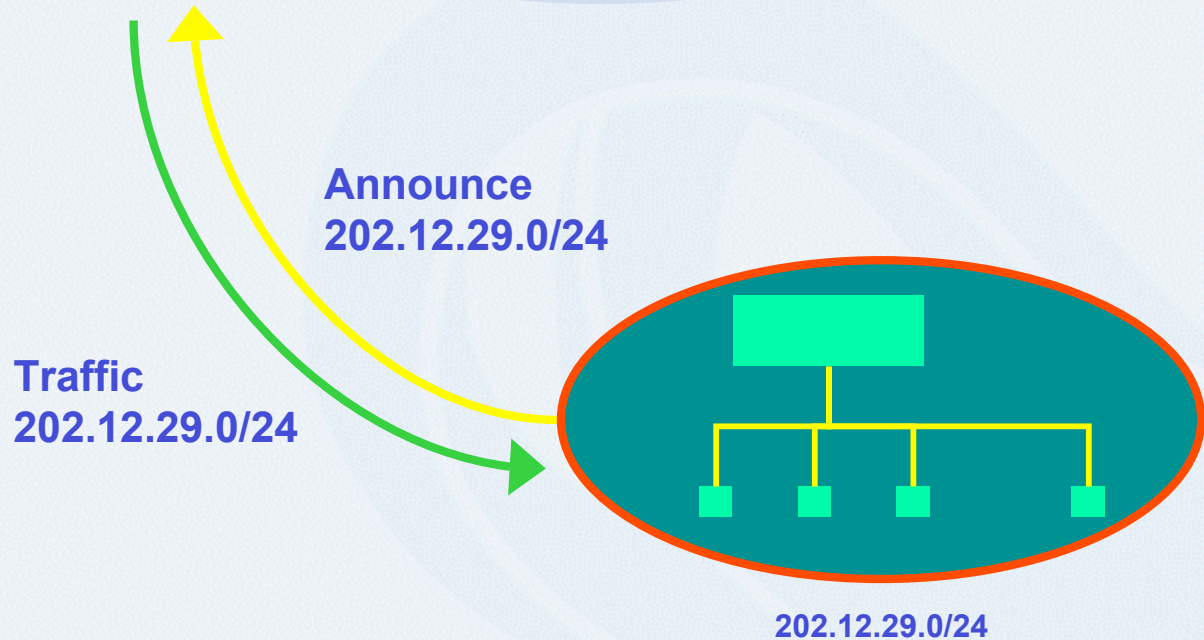
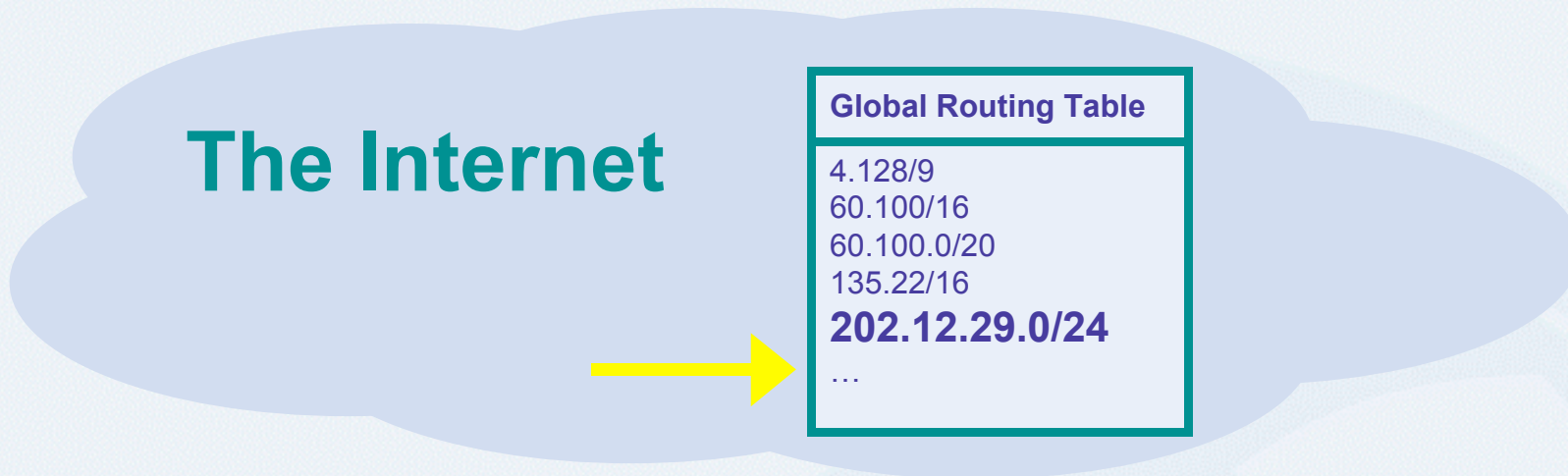
- Geography of the Internet
- How are IP addresses managed?
- The future of IP addressing
- Towards the IGF in India

What's an IP Address?

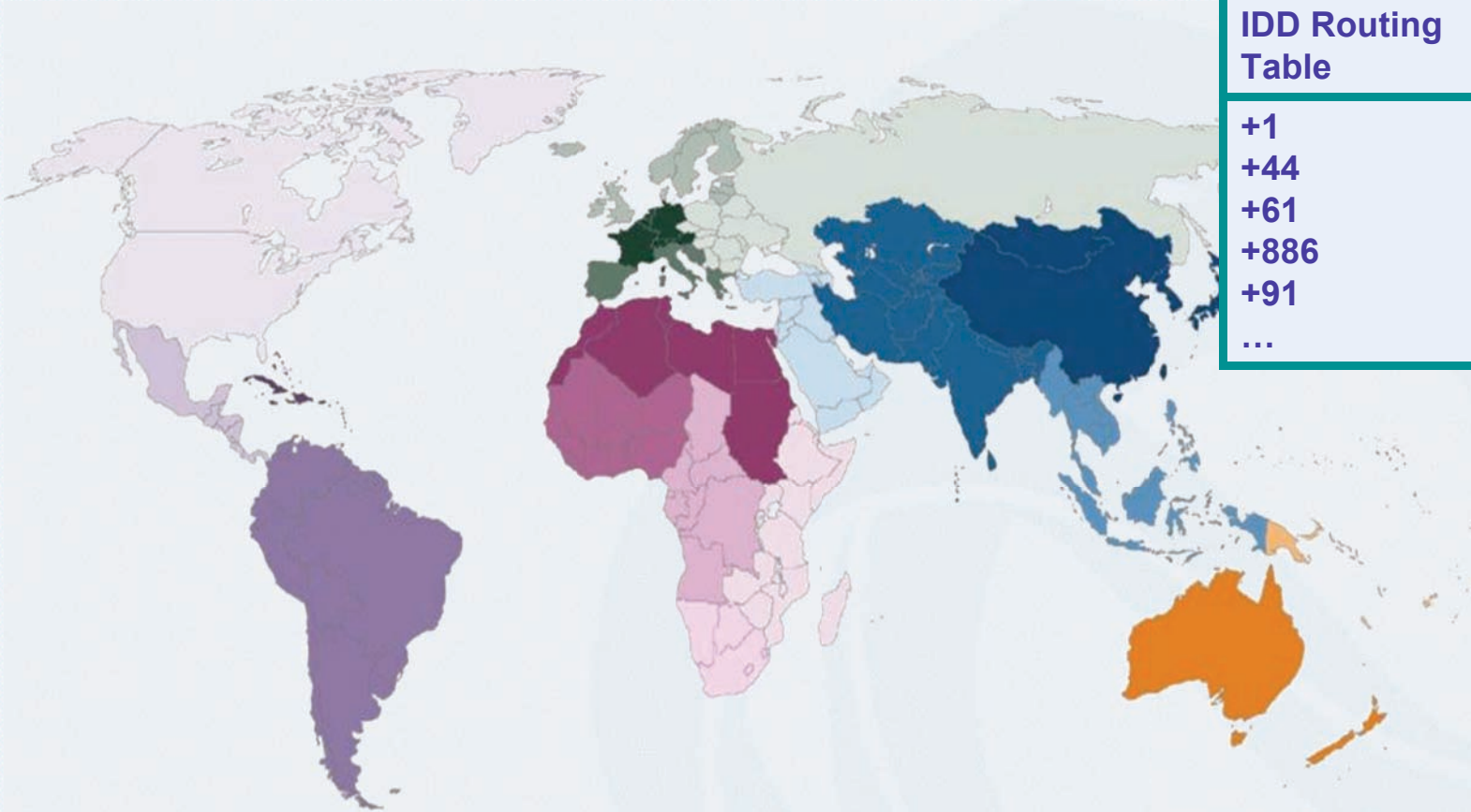
What's an IP Address?

- Internet infrastructure addresses
- Uniquely assigned to Internet endpoints
- Public addresses are globally visible
- Addresses are a finite “Common Resource”
- Addresses are “v4” or “v6”
 - IPv4: 4 billion unique addresses
 - IPv6: 256 million trillion addresses?
- Not the same as DNS!

Internet Address Routing



Geography of Telephony

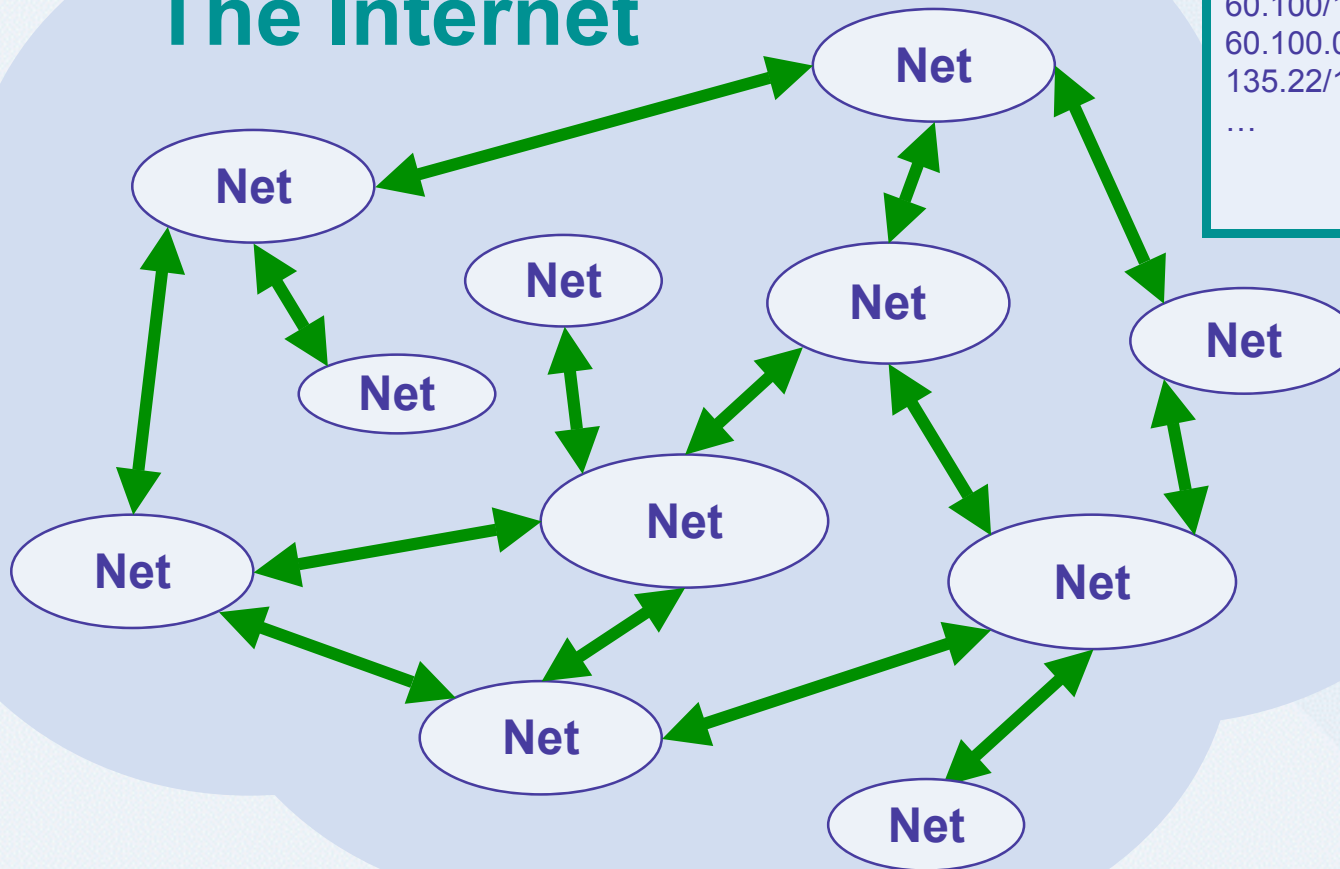


IDD Routing Table
+1
+44
+61
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...

Geography of the Internet



The Internet



Global Routing Table

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4.128/9
60.100/16
60.100.0/20
135.22/16
...
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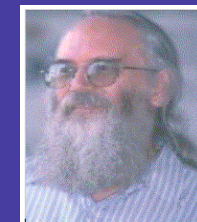
IP Addressing today

Address management: 1981–1992

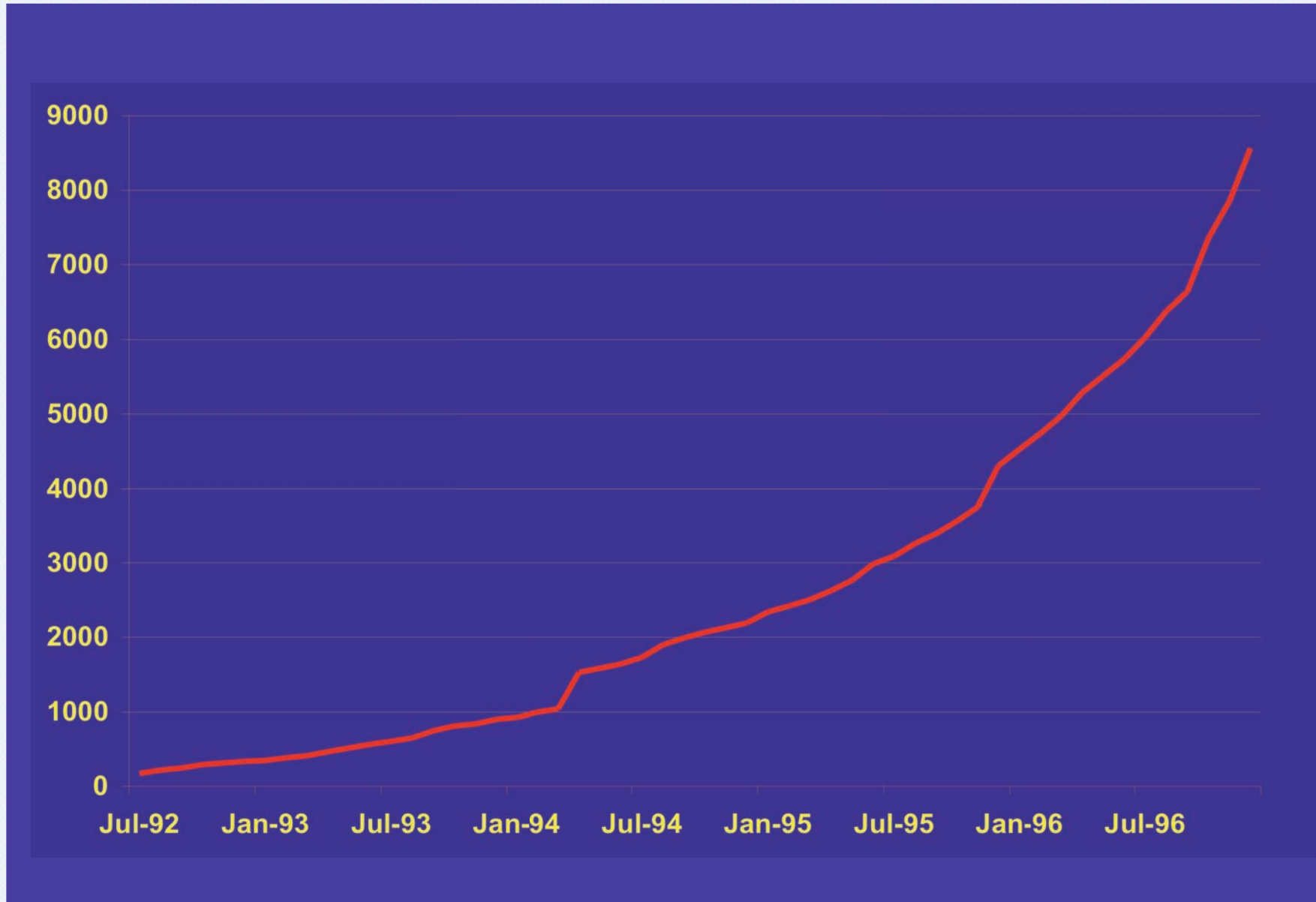


1981:

“The assignment of numbers is also 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.**” (RFC 790)



Global routing table: 1988 – 1992

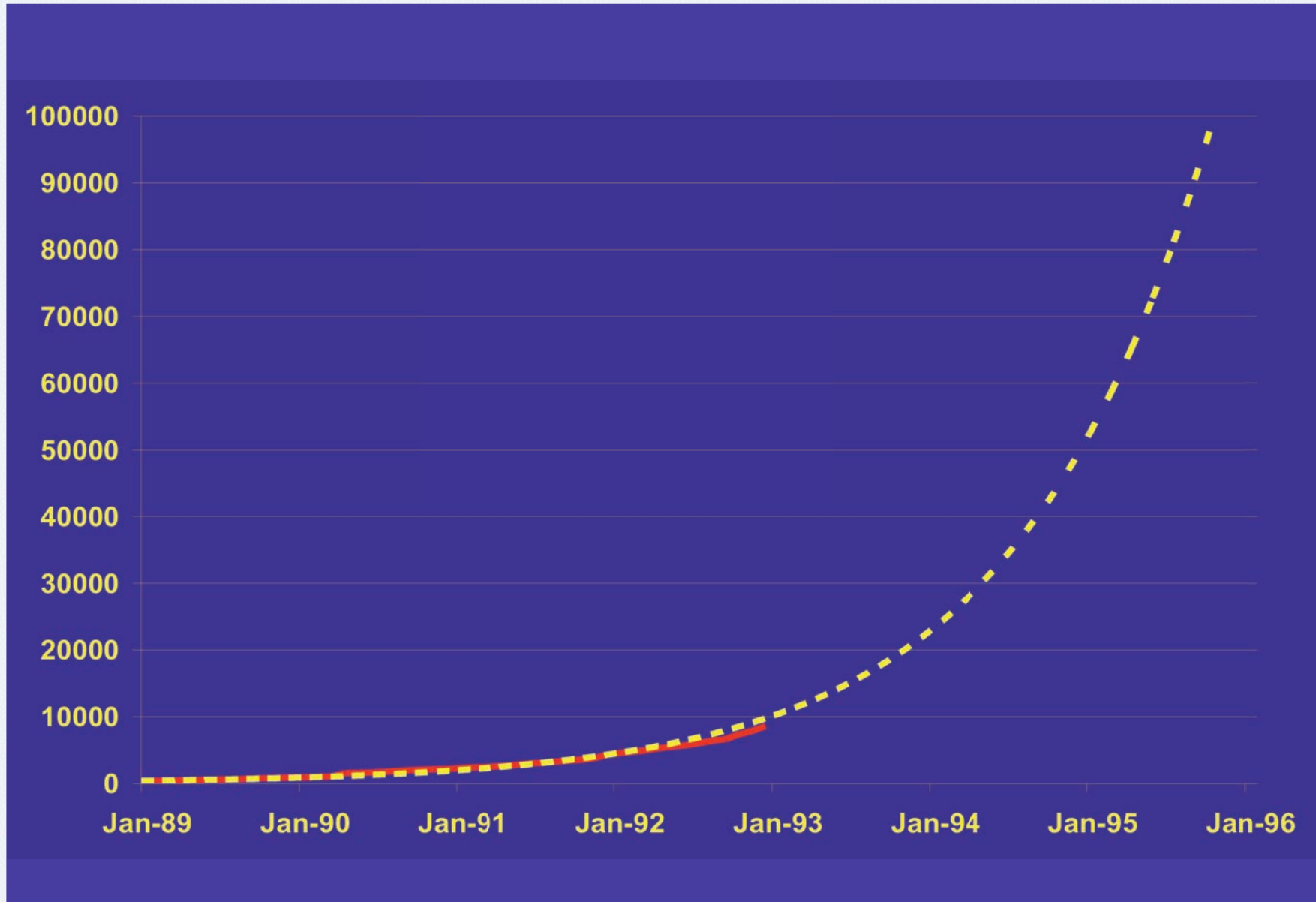


Global routing table: Projection

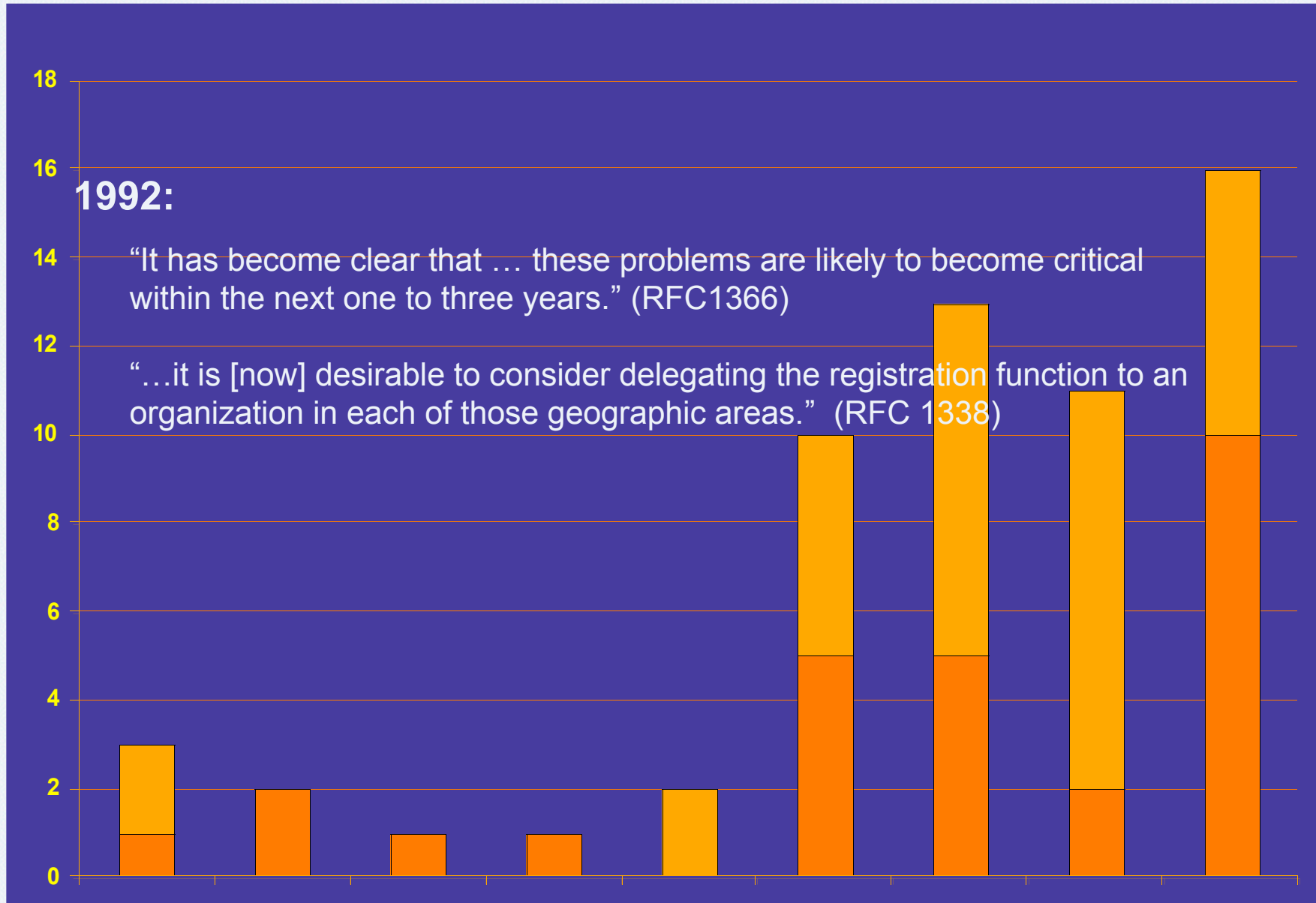


Asia Pacific Network Information Centre

APNIC



Global Allocations: 1983 – 1991



1992:

“It has become clear that ... these problems are likely to become critical within the next one to three years.” (RFC1366)

“...it is [now] desirable to consider delegating the registration function to an organization in each of those geographic areas.” (RFC 1338)

Regional Internet Registries

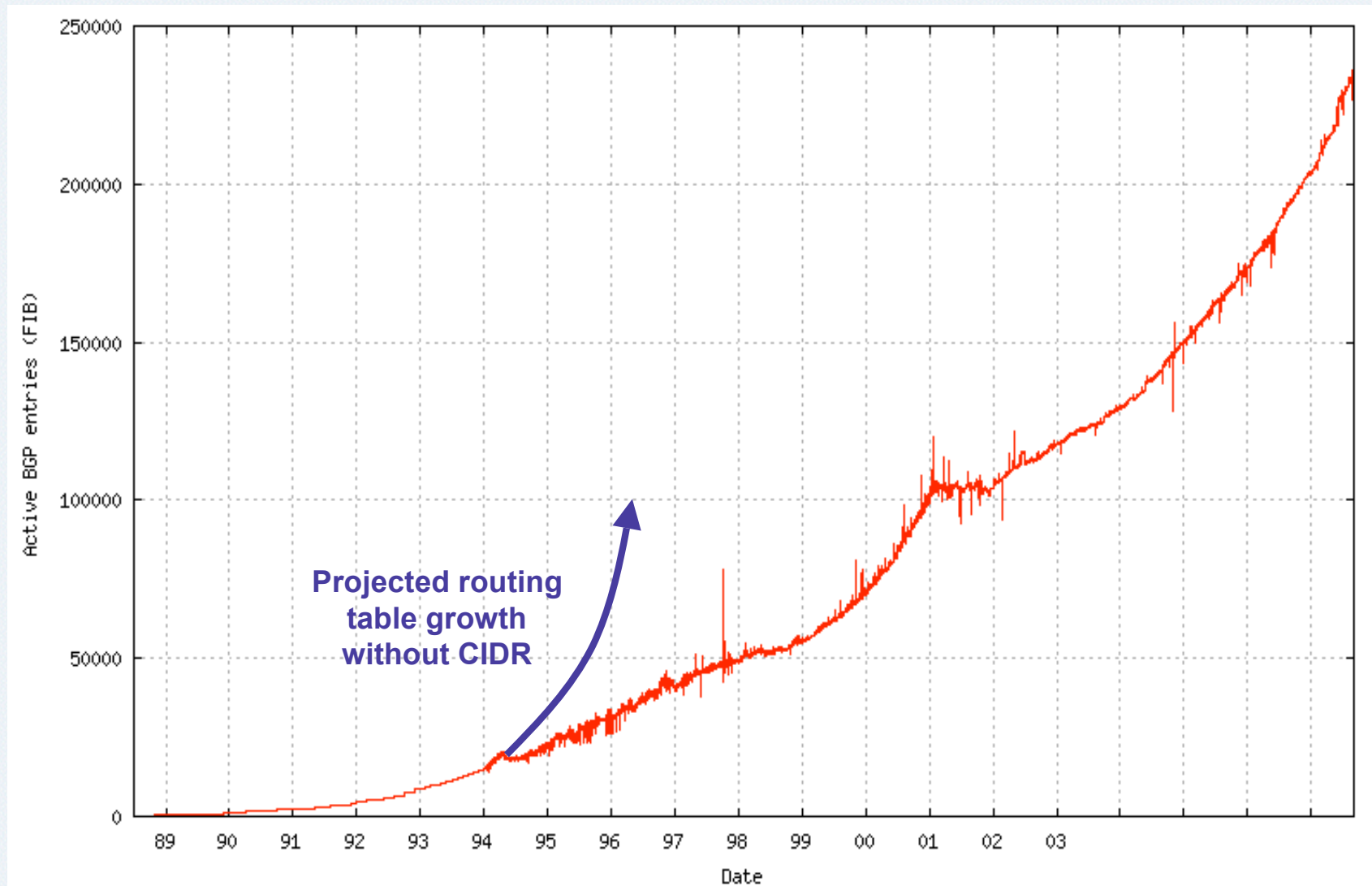




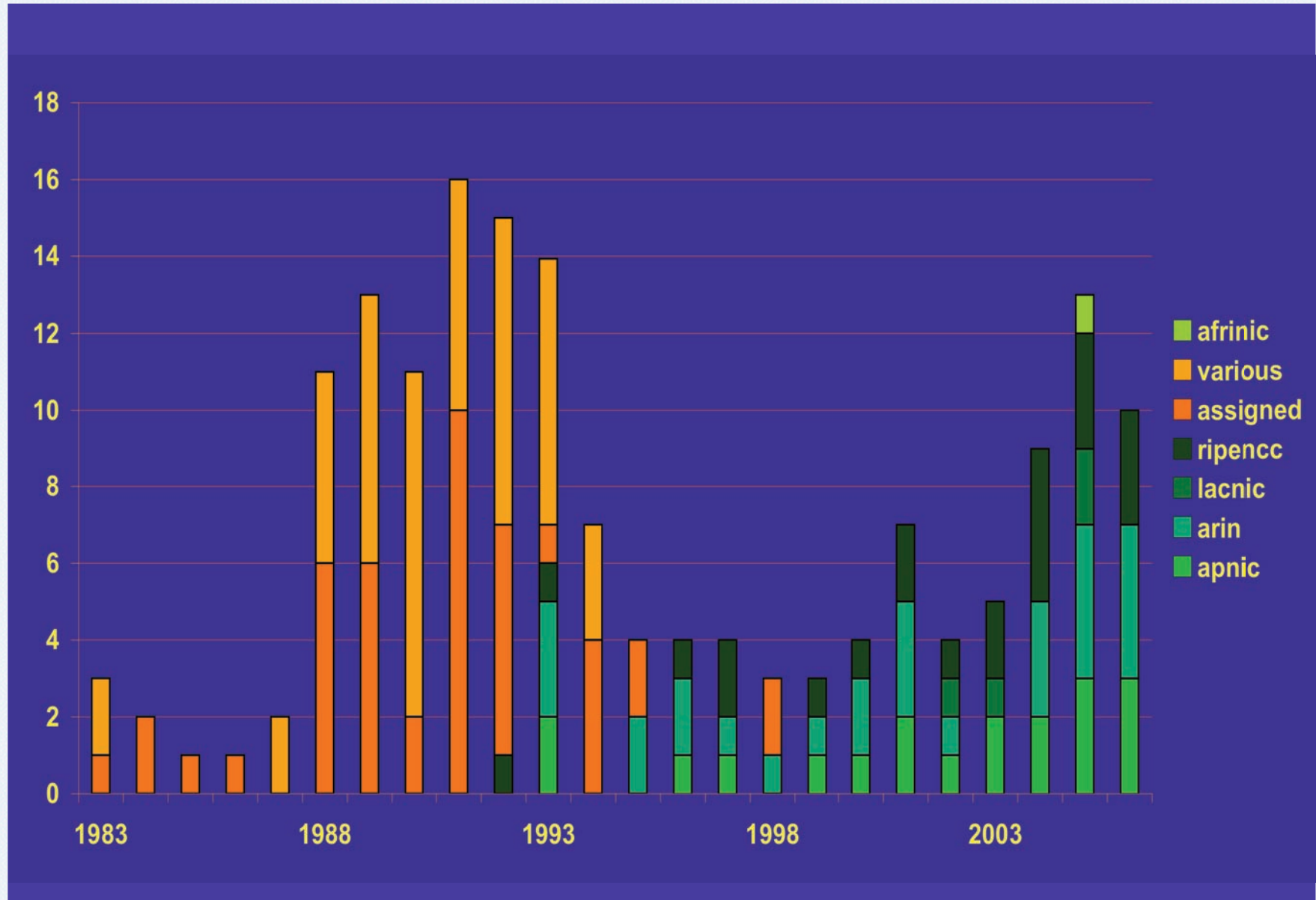
Regional Internet Registries

- Industry self-regulatory bodies
 - Open membership-based structures
 - Non-profit, neutral and independent
 - ...in the “Internet Tradition”, since 1993.
- Functions
 - Allocation and registration services
 - Training and education
 - Open policy meetings and processes
- Proven success
 - “Best practice” in Internet Governance

Success: Global routing table



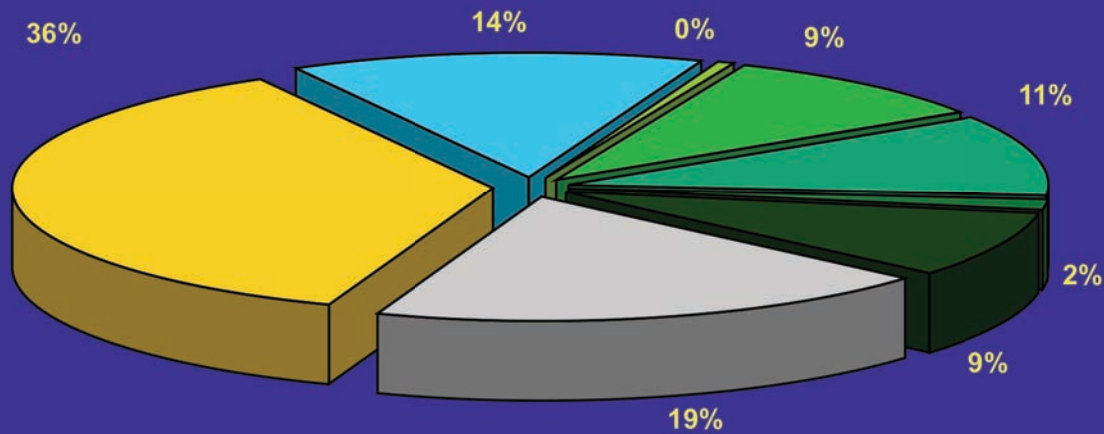
Success: Global allocations



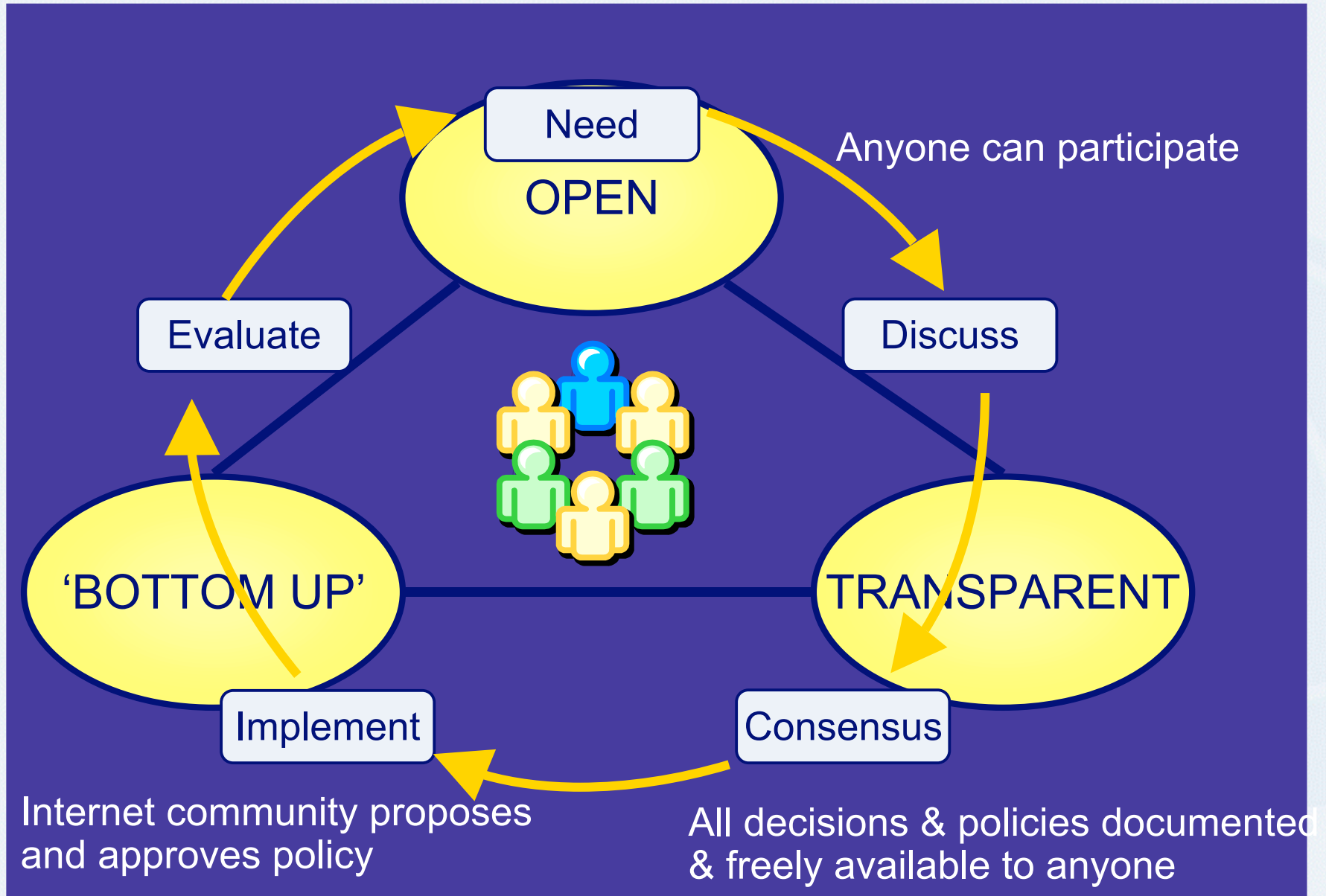
Success: Global allocations



- Historical
- Reserved
- AFRINIC
- APNIC
- ARIN
- LACNIC
- RIPENCC
- Unused

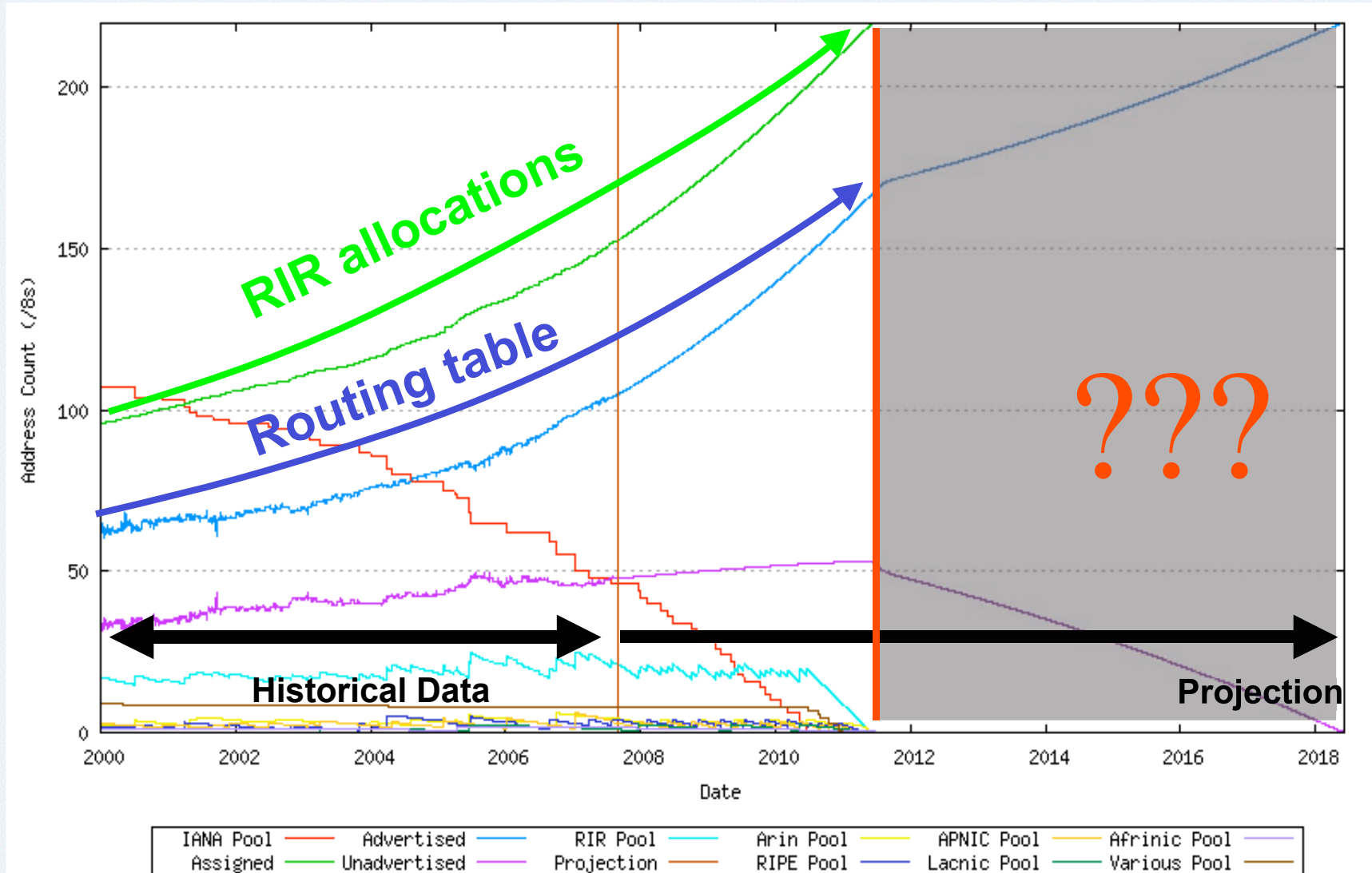


Success: What's the secret?



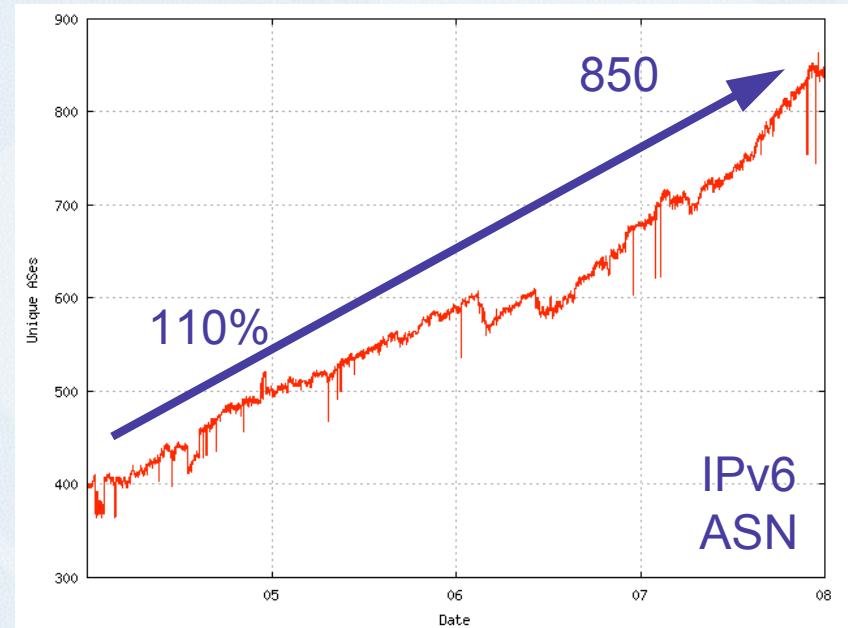
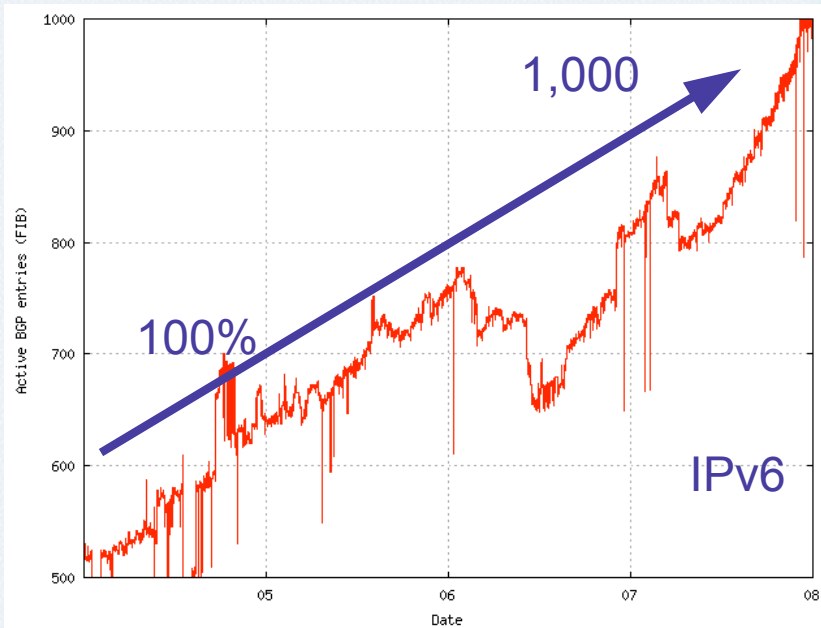
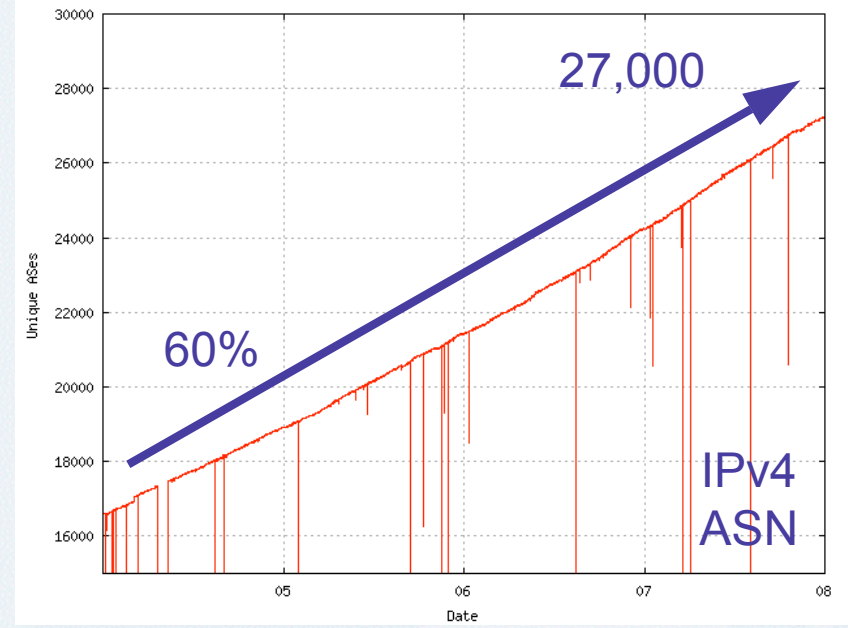
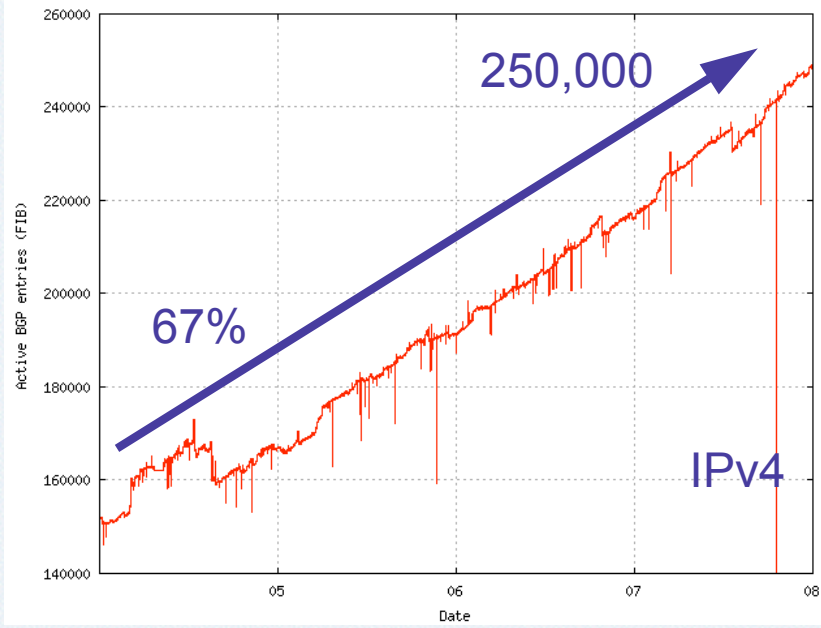
IP Addressing Tomorrow...

IPv4 lifetime



Why IPv6?

- IPv4 address space consumption
 - Now 2-4 years space remaining
 - More if unused addresses can be reclaimed
 - There has to be a replacement
- Loss of “end to end” connectivity
 - Widespread use of NAT due to ISP policies and marketing
 - Additional complexity and performance costs
 - “Fog on the Internet”
- Other reasons?
 - Not many.



Why not IPv6?

- So far, industry is not too interested...
 - We are less optimistic than we used to be
- Conservative consolidation replaced explosive growth
 - Investments must show returns
 - Less risk means less innovation
- Less emphasis on new services
 - ...and more on returns from existing investments (value-adding, bundling etc)
- But this is changing we hope...

What's needed?

- IPv4 address management
 - Numerous policy measures under discussion for management of remaining space
 - Hard landing vs soft landing
 - Rationing, reserves, limiting demand
 - Discussions about reclamation of IPv4 space
 - Transfer/trading (market) for address management
- IPv6 network deployment
 - Address policies are established
 - Increasing promotion and awareness
 - Putting preparations in place
 - The time is now right!

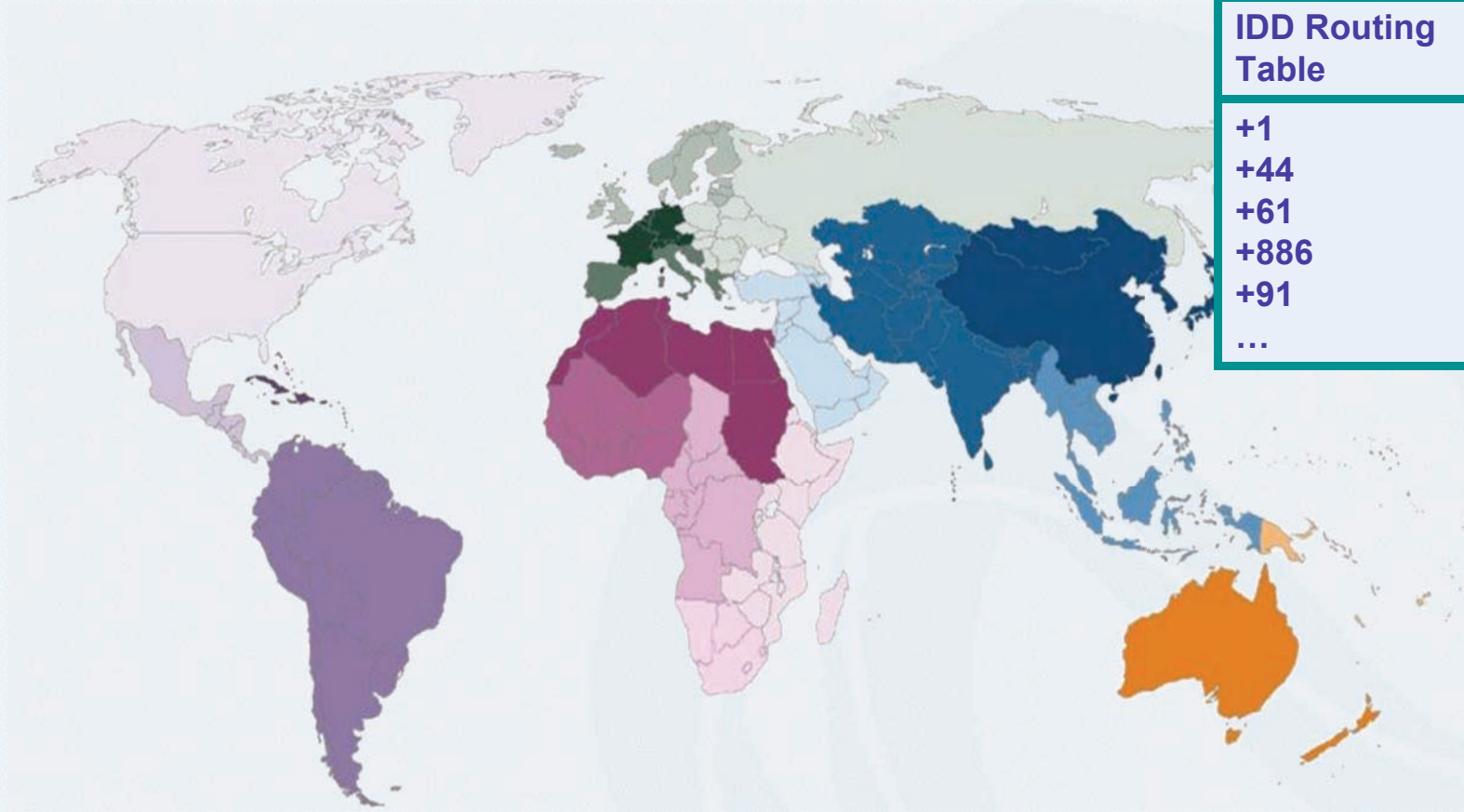
Addressing IGF...

IGF addressing issues

- What are “Critical resources”?
 - More than just IP addresses
 - IXPs, undersea cables, broadband, wireless, remote access, content, search engines...
- IP addressing issues
 - RIR system is now better understood
 - Proven history of success
- Proposals to allocate or reserve for countries
 - Reservation: may be reasonable
 - Allocation: nationalise the Internet architecture
- A familiar challenge: “Old” versus “New”

Geography of Telephony

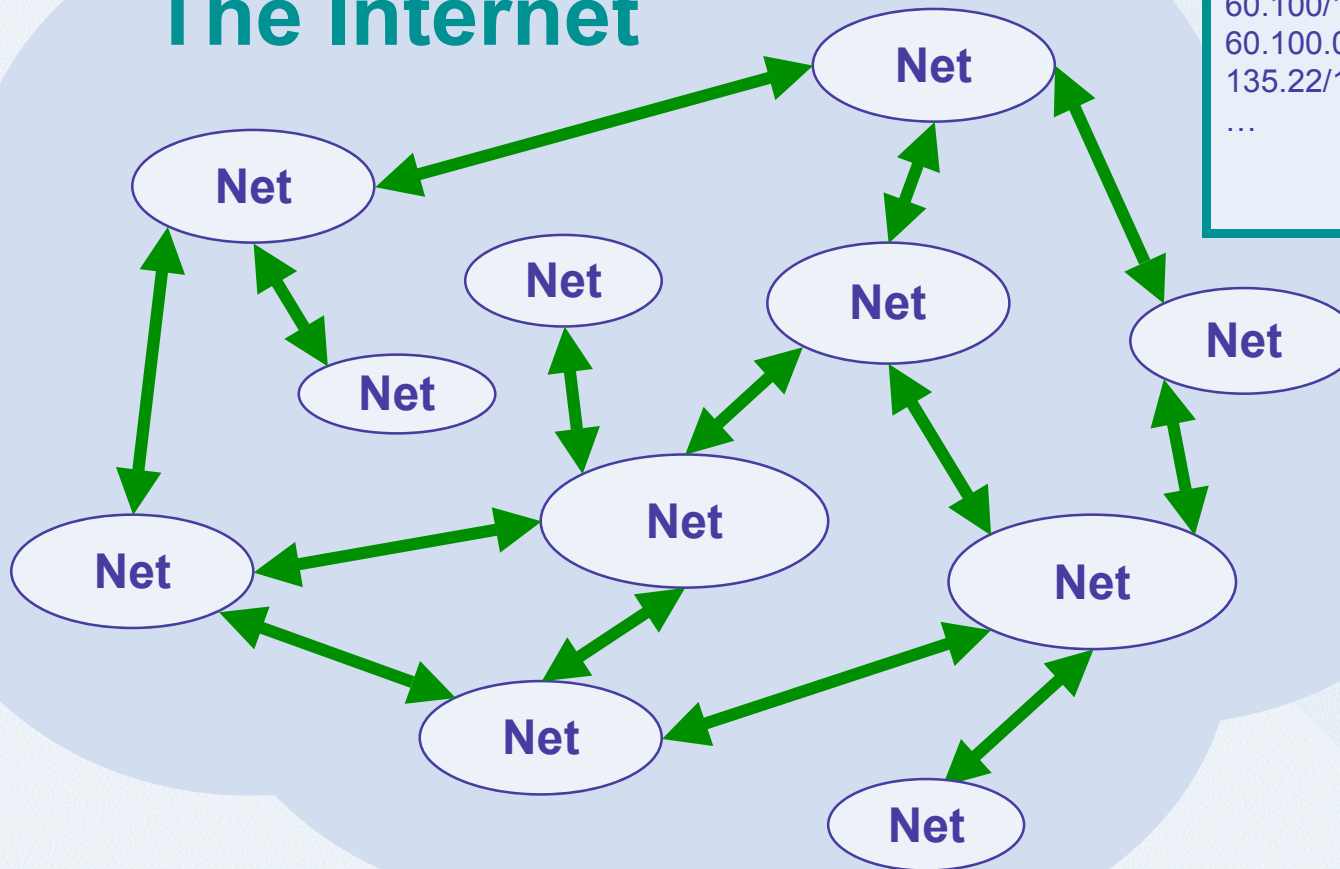
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Internet Geography

- “Nations” of the Internet are networks
 - “Frontiers” are border routers
 - “Treaties” are peering relationships between networks
- It’s a very dynamic world...
 - New nations are formed daily
 - New borders are established hourly
 - Routing tables change by the minute
 - Driven almost entirely by industry
 - No centralised control
- Very different from “traditional” networks
 - Requires different thinking...

IGF's role

- Promote awareness of the situation
 - IPv4's limitations, IPv6's challenges
- Promote solutions
 - Support for IPv6 deployment
- Promote dialogue
 - Towards understanding and cooperation
 - Maintain and improve multistakeholder participation
 - Support established and successful bodies
- Athens and Rio created a good start
 - Let's continue in India and beyond!



See you at IGF in Hyderabad!

(not New Delhi)

3-6 December 2008

<http://www.intgovforum.org>

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