From IPv4 to IPv6…

How far have we come?
How far to go?

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Overview

- Why IPv6?
- How much IPv4 is left?
- How much IPv6 is being used?
- Do we have a problem?
- What next?

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Why IPv6?

- Just one reason: More addresses
  - Billions… Trillions… Gazillions…?
  - Suffice to say, “Enough for a long time”
- Benefits of ample address supply…
  - Simpler, faster, cheaper network
  - No more NAT: “Restore Internet transparency”
  - Better for everyone
- Other benefits of IPv6…
  - Security, QoS, autoconfiguration, mobility, etc?
  - All are “built-in” to IPv6
  - But they are not new: all available in IPv4

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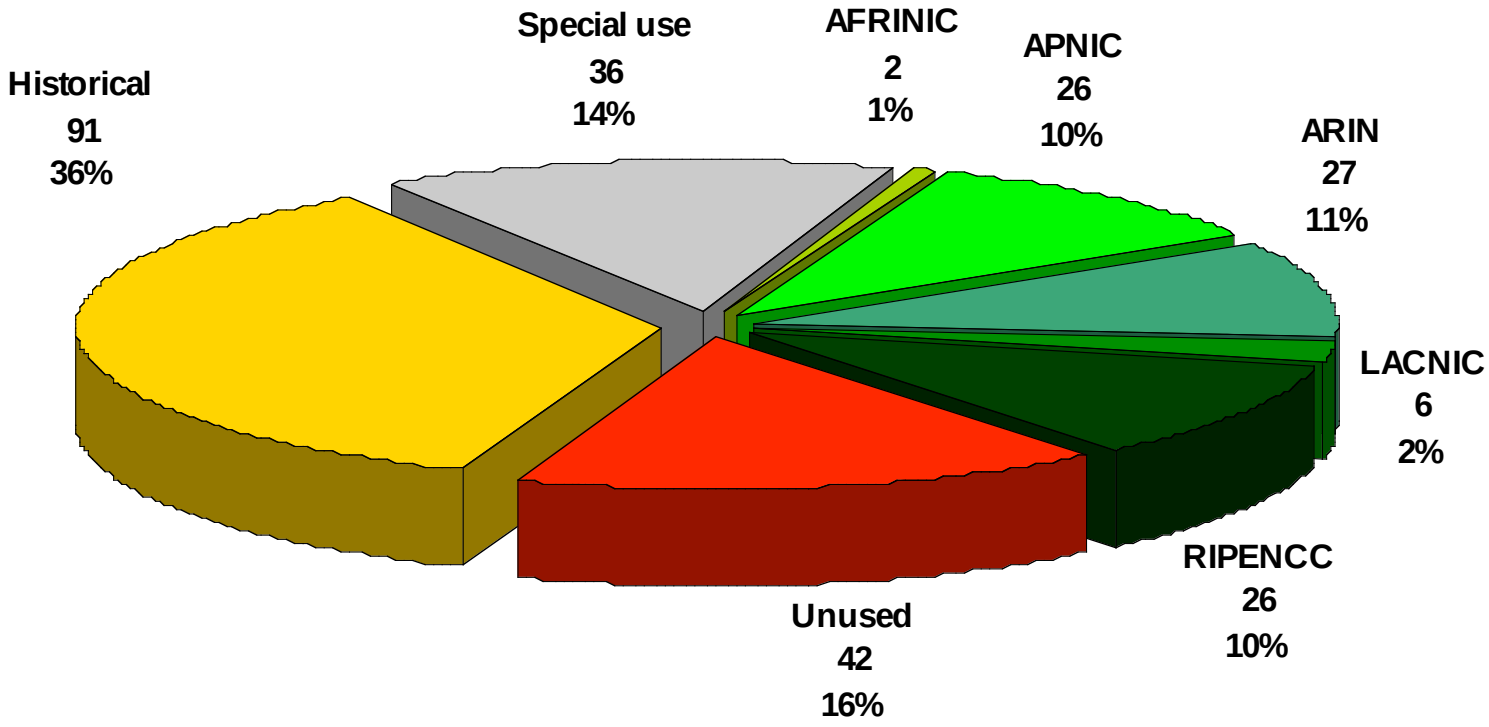
How much IPv4 is left?



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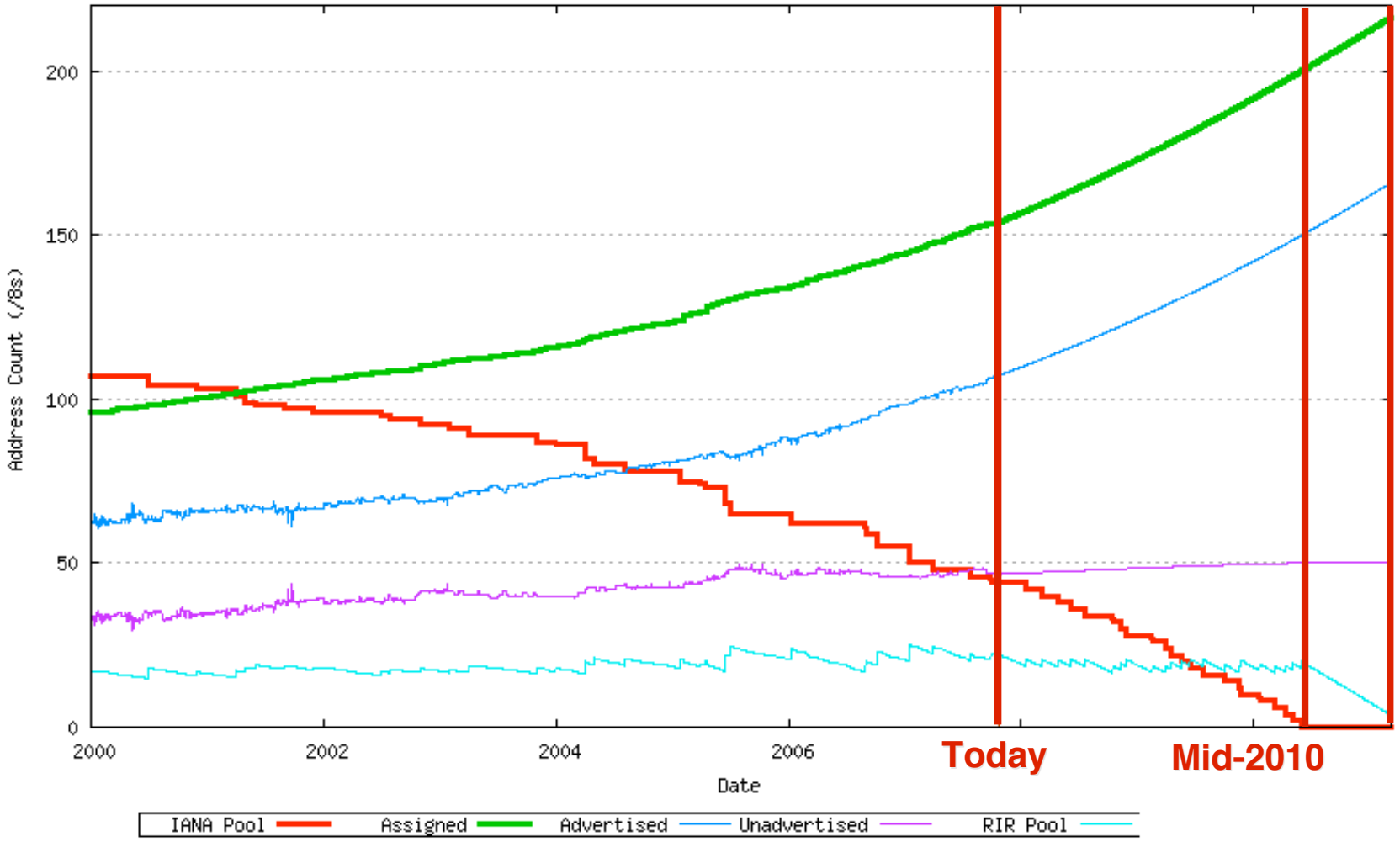
How much IPv4 is left?



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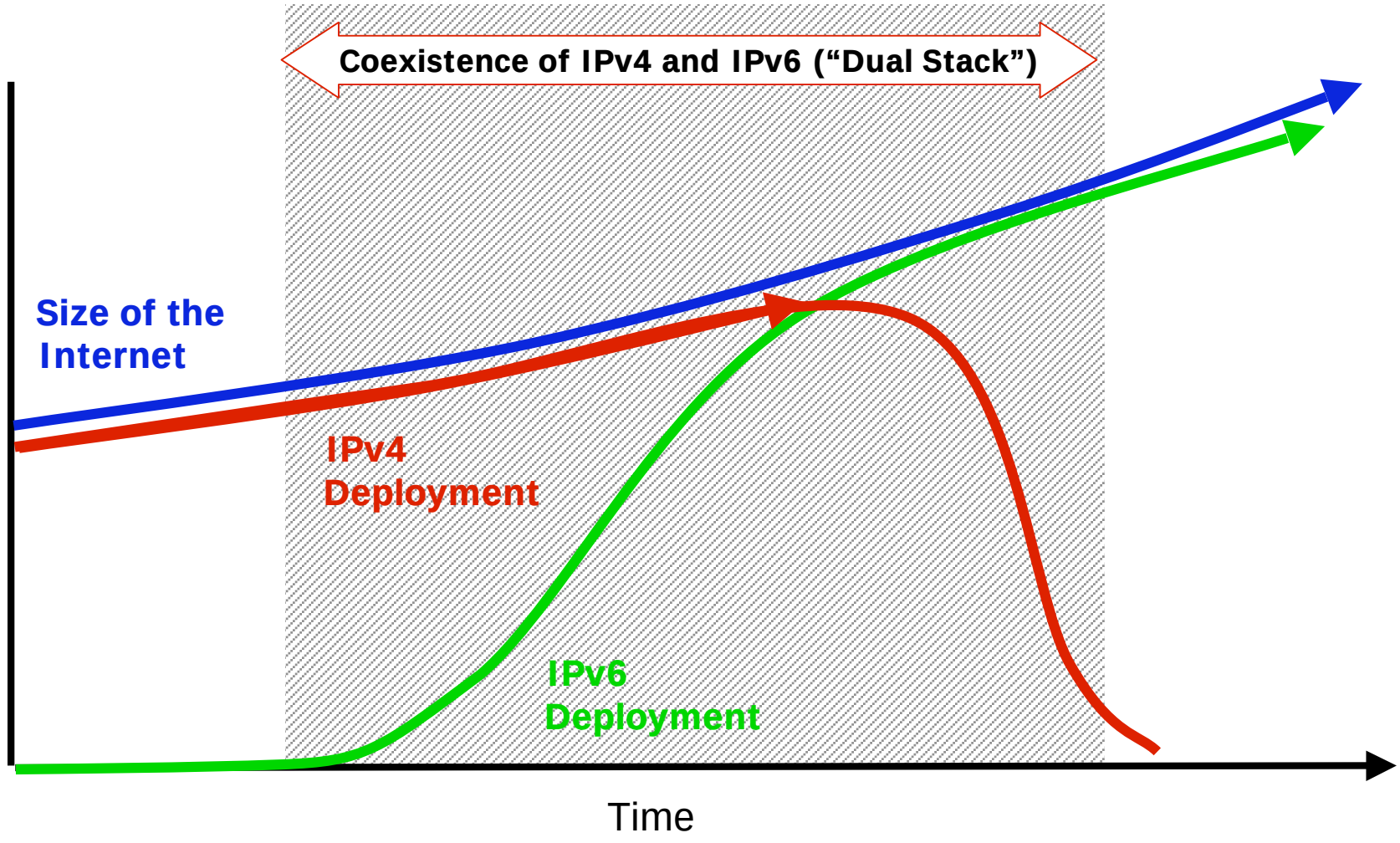
The Transition Plan…



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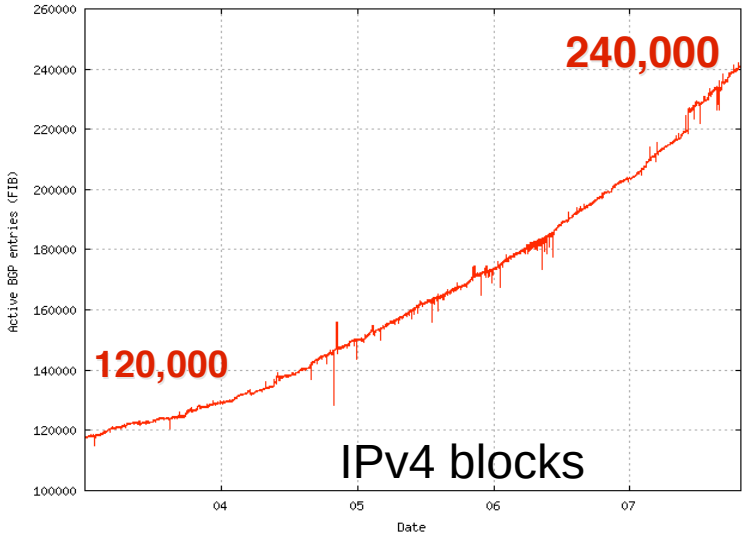
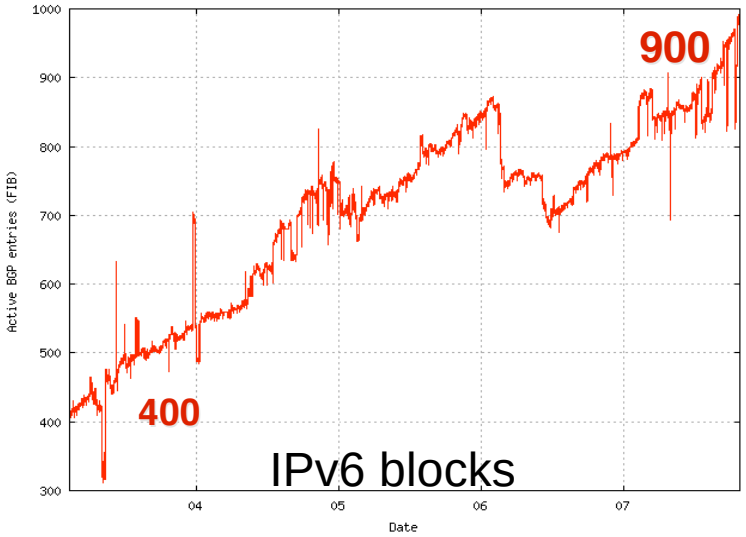
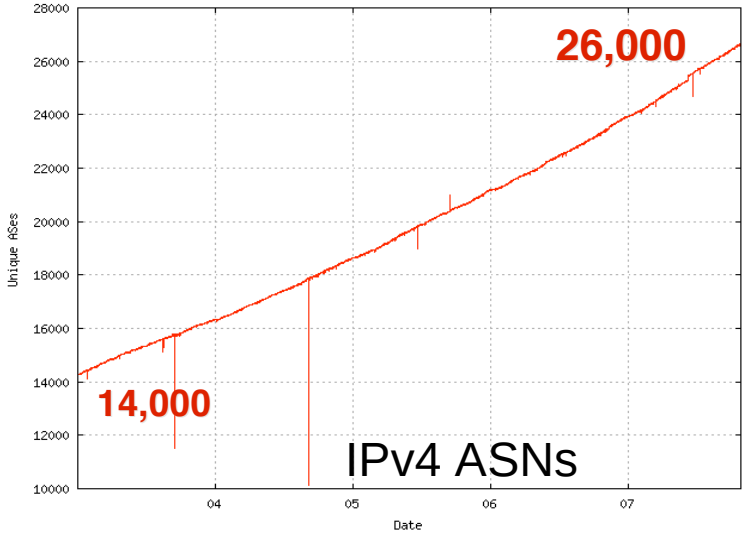
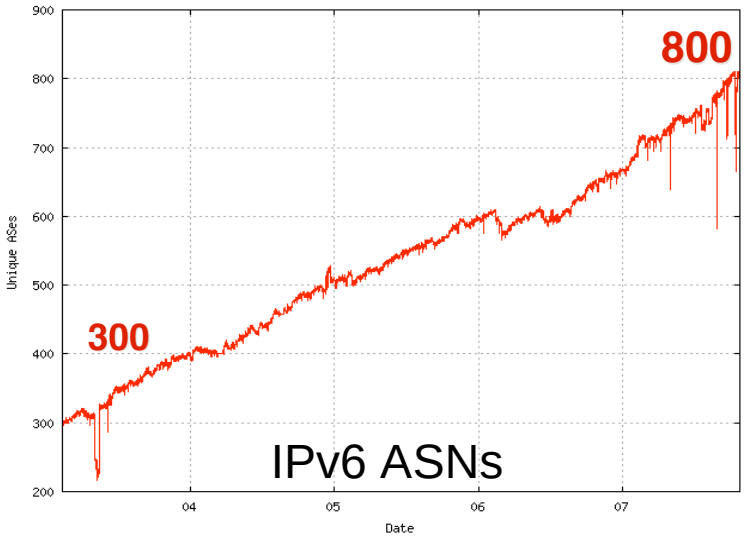
How much IPv6 so far?









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* Routing table statistics since 2003, from: http://www.potaroo.net

Why not IPv6? (so far)

- Internet is now engineered for IPv4+NAT
  - Many vendors and (de facto) standards
  - Applications written for NAT
  - Services built around NAT
- Who bears the cost of NAT?
  - End users pay for their “home gateways/routers”
  - Application and service developers do the hard work
  - ISP costs are externalised
    - And there is no business case to change this
- It all seems to work
  - And nobody is demanding anything different…

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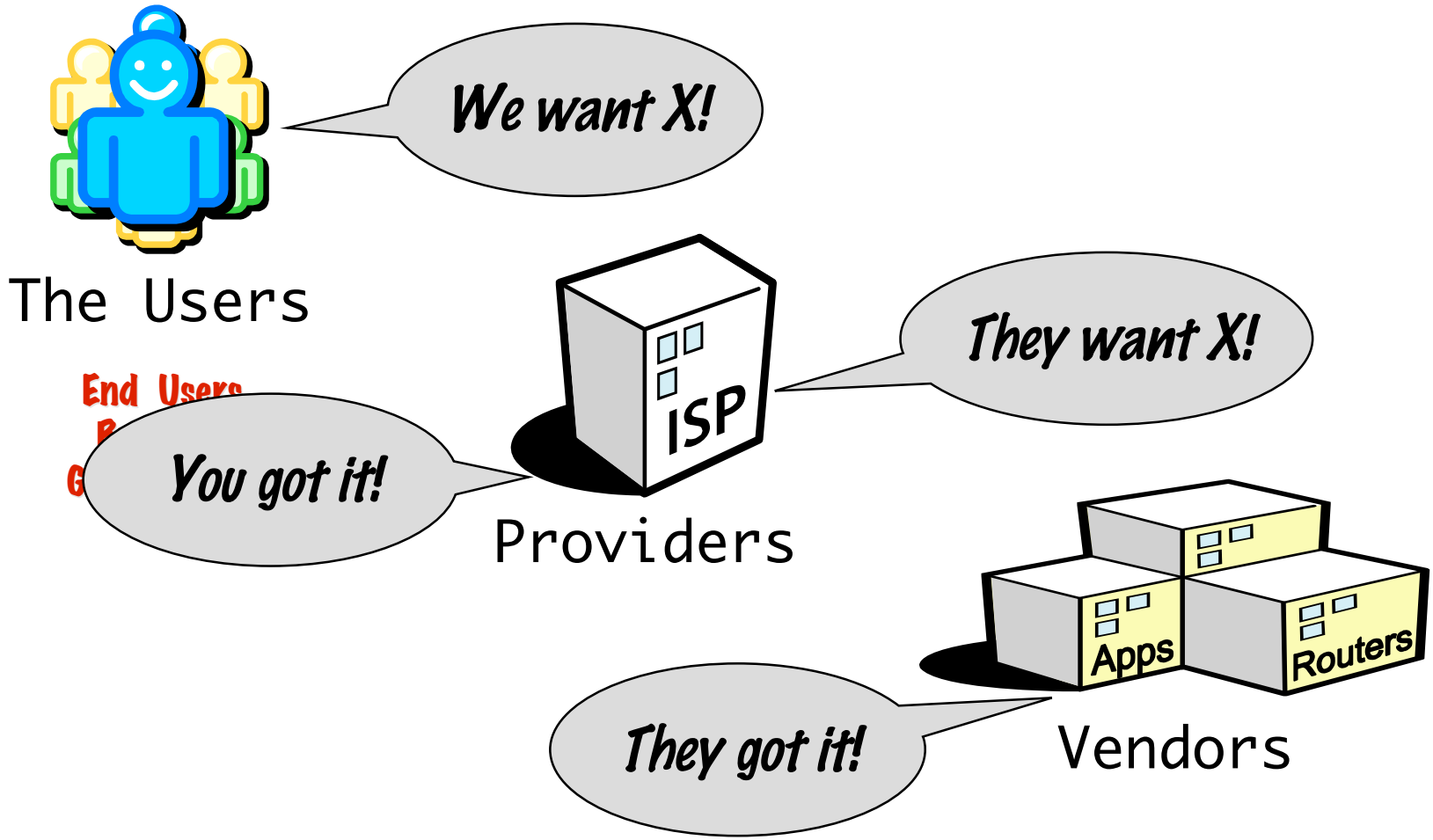
A question of demand…



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What if it takes longer?

- IPv4 will live on
  - No effect on existing infrastructure
  - New infrastructure requires addresses
- IPv4 address management
  - Recovery of unused address space
  - Incentives for higher efficiency of utilisation
  - Transfers under approved policy framework
- NAT will live on
  - With all its limitations and costs
- A question of costs…
  - Cost of IPv4 vs cost of IPv6 deployment
  - Business will tend to decide

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The Blame Game…

- Industry – “Market failure”?
  - Markets are oblivious to long-term risks when short term priorities override
- IETF – “Technical community failure”?
  - Standards are mostly well developed
  - But they need “running code”
- Governments – “Countries have failed”?
  - Individual countries can and do influence their own industries and populace

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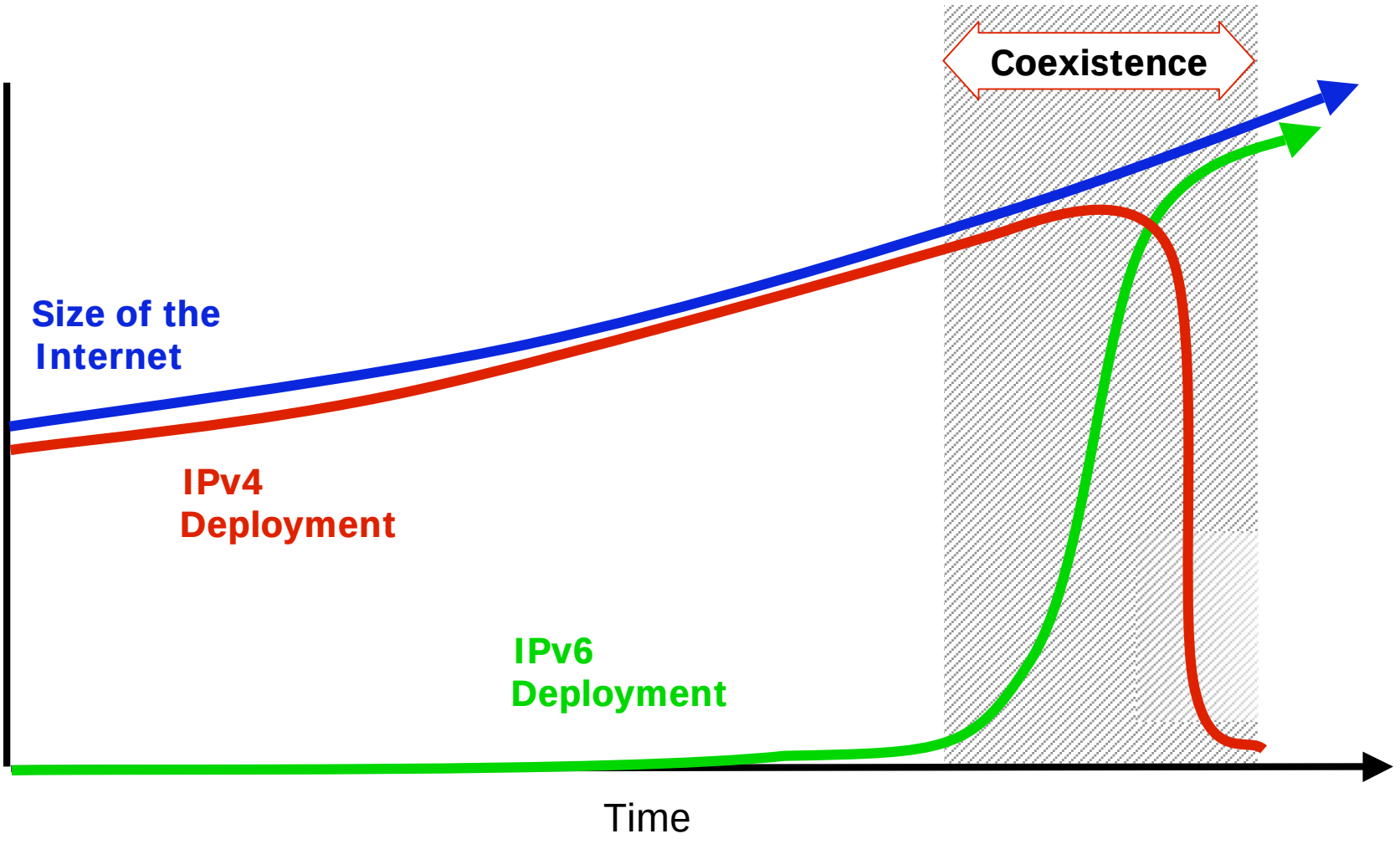
The new plan…



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In conclusion…

- No one has “failed”
  - IPv6 deployment is happening
- All players need to work and act together
  - Technical standards, implementation by vendors, deployment by operators, use by users
- There is no “flag date” for transition
  - All stakeholders are free to make decisions and demands in accord with their own interests
  - As elements are in place transition will progress
- Best advice: sooner rather than later
  - Start the planning process now

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From IPv4 to IPv6…

NRO perspectives

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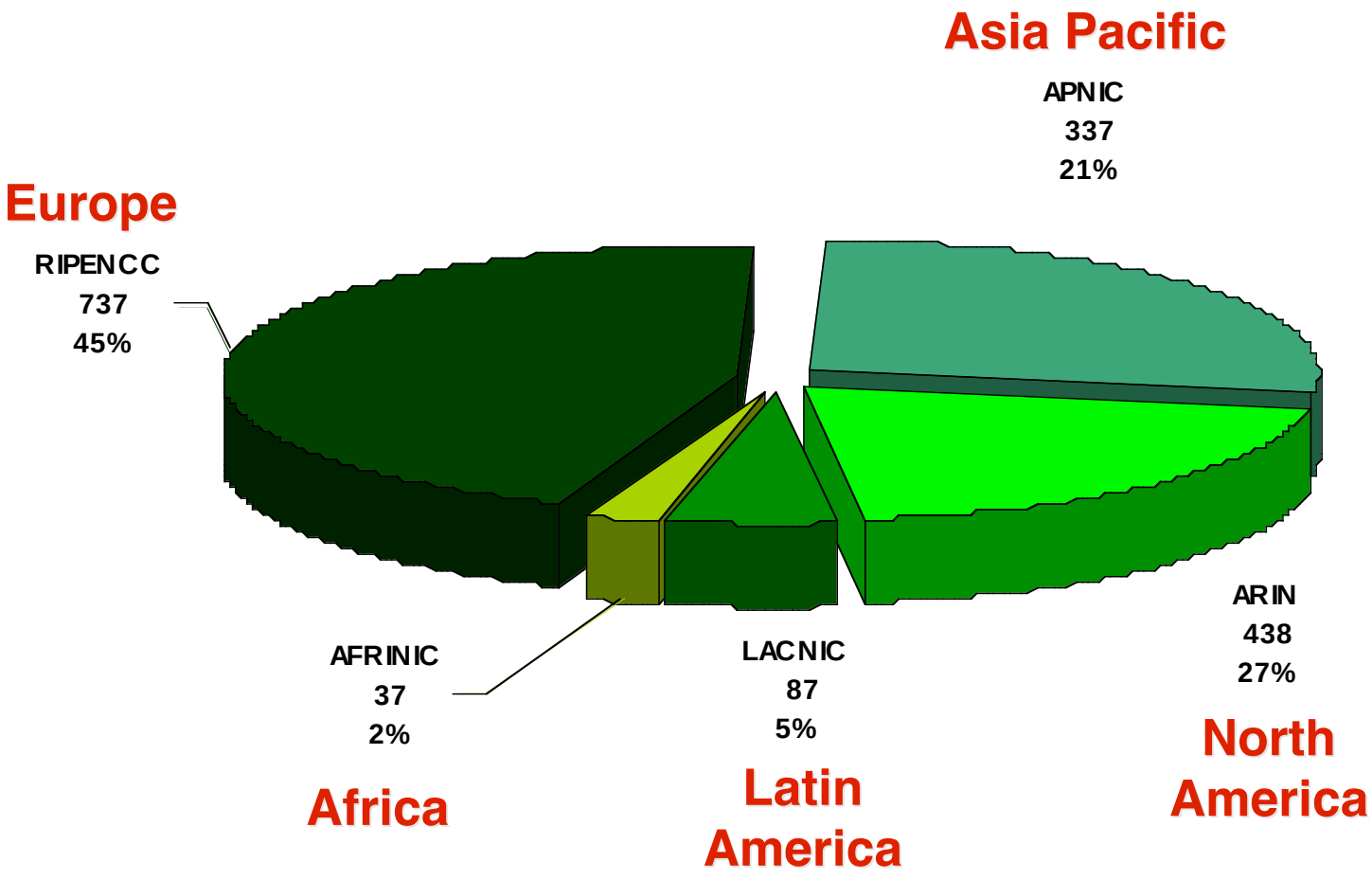
IPv6 – Global allocations by RIR



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Unit: IPv6 prefix

IPv4 – RIR activities

- Research and publication
  - Statistics and other reporting
  - Outreach and educational activities
  - Information will support informed outcomes
- IPv4 management policies
  - Policy discussions, panels, roundtables
  - Informed debates
  - Global policies regarding IANA allocations
  - Regional open policy processes
- Voluntary restraint
  - RIR agreement on IANA allocation process

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IPv6 – RIR activities

- Promotion, Training and education
  - Support for events including IPv6 Summits
  - Special sessions during policy meetings
  - Workshops, eLearning and online information
  - Case-studies, factsheets, operator experiences
- IPv6 management policies
  - Well established since 1999
  - Regular review - Open policy processes
- No barriers
  - Streamlined application processes
  - Fees waived or cross-subsidised

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RIR Statements

- *AfriNIC board: "resolves that efforts [supporting] IPv6 be intensified, and instructs the staff to take appropriate action"*
- *APNIC community: "focus our efforts towards comprehensive deployment of IPv6 in the Asia Pacific region."*
- *ARIN board: "advises the Internet community that migration to IPv6 numbering resources is necessary"*
- *LACNIC CEO: "recommend preparing regional networks as soon as possible for using IPv6"*
- *RIPE-NCC community: "recognise that the widespread deployment of IPv6 will be essential to sustain future growth of the Internet."*

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Thanks

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