Situación de IPv6 y Estrategias a Futuro

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Porque IPv6?

IPv6 una necesidad?

- **IETF IPv6 WG began in early 90s, to solve addressing growth issues, but**
  - **CIDR, NAT,…were developed**
- **IPv4 32 bit address = 4 billion hosts**
  - **~40% of the IPv4 address space is still unused which is different from unallocated**
  - **The rising of Internet connected device and appliance will eventually deplete the IPv4 address space**
- **IP is everywhere**
  - **Data, voice, audio and video integration is a reality**
  - **Regional registries apply a strict allocation control**
- **So, only compelling reason: More IP addresses**

IPv6 una necesidad?

- **Internet population**
  - **~600M users in Q4 2001, ~945M by end 2004—only 10–15% of the total population**
  - **How to address the future worldwide population? (~9B in 2050)**
  - **Emerging Internet countries need address space, e.g.,**
    - **China uses nearly two class A (11/2001), ~20 class A needed if every student (320M) has to get an IP address**
- **Mobile Internet introduces new generation of Internet devices**
  - **PDA (~20M in 2004), mobile phones (~1.5B in 2003), tablet PC**
  - **Enable through several technologies, e.g., 3G, 802.11, etc.**
- **Consumer, home and industrial appliances**

IPv6 una necesidad?

- **Transportation—mobile networks**

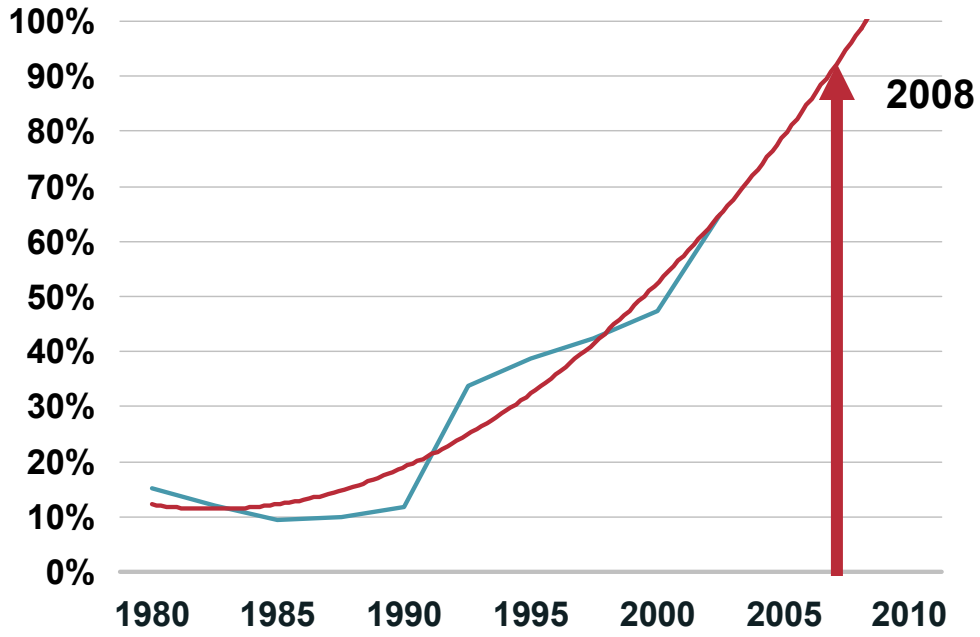
  1B automobiles forecast for 2008

  Internet access on planes, e.g. Lufthansa—train, e.g. Narita express

- **Travelers flying on Lufthansa from Frankfurt, Germany to Washington, DC were among the first to try high-speed Internet access at 35,000 feet. The Boeing 747-400 jet equipped with a broadband network is esteemed to be the model for commercial airline travel in the future.**

Historia de la asignación de direcciones IP

1981	~ IPv4 Protocol Published
1985	~ 1/16 of Total Space
1990	~ 1/8 of Total Space
1995	~ 1/3 of Total Space
2000	~ 1/2 of Total Space
2001.5	~ 2/3 of Total Space



- **This despite increasingly intense conservation efforts**
  - PPP/DHCP address sharing
  - CIDR (classless inter-domain routing
  - NAT (network address translation)
  - plus some address reclamation
- **Theoretical limit of 32-bit space: ~4 billion devices**
  Practical limit of 32-bit space: ~250 million devices (RFC 3194)

Porque no NAT?

- **Exhaustion of address space**
- **NAT breaks the end-to-end model**
- **Growth of NAT has slowed down growth of transparent applications**
- **No easy way to maintain states of NAT in case of node failures**
- **NAT break security**
- **NAT complicates mergers, double NATing is needed for devices to communicate with each other**

IP y las nuevas aplicaciones

**With Millions of New Devices Becoming IP Aware,
the Need for Increased Addressing and Plug-and-Play Networking
Is Only Met with the Implementation of IPv6**

IP Version 6

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PSDN | xDSL | Ethernet | Optical | Wireless | E-Power | CATV | Storage Channel | More to Come

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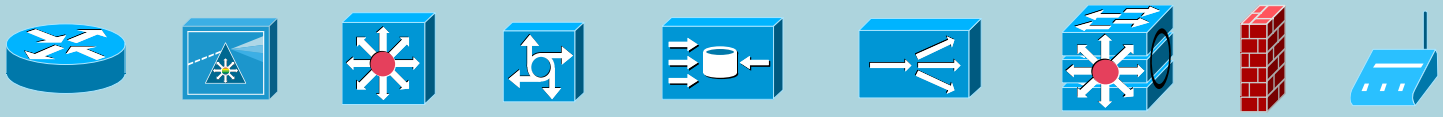
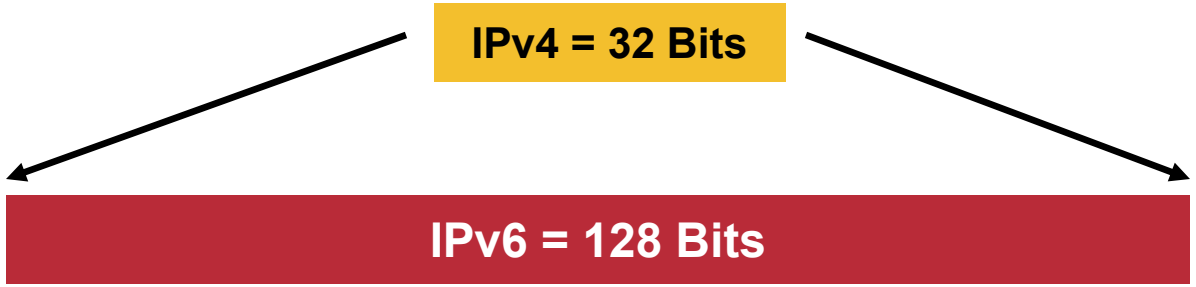


Mayor espacio de direccionamiento



- **IPv4**

  32 bits

  =~ 4,200,000,000 possible addressable nodes

- **IPv6**

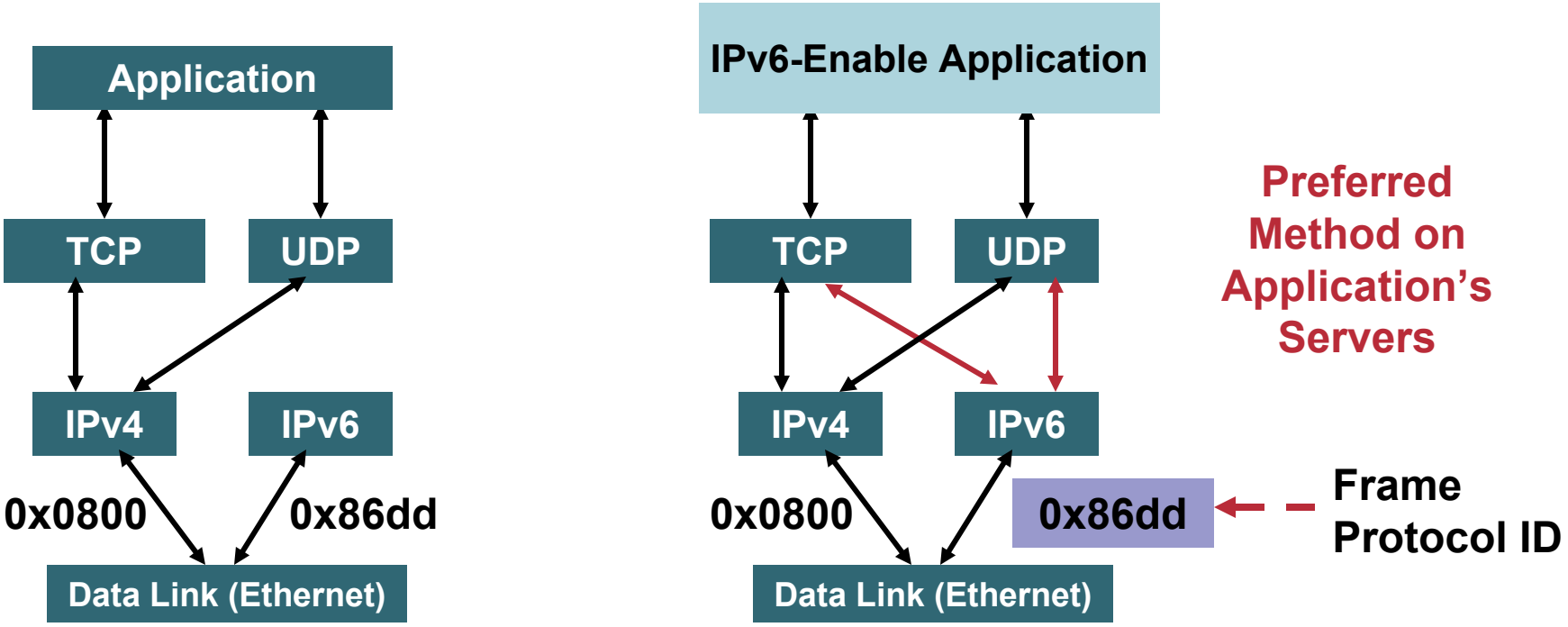
  128 bits

  = 340,282,366,920,938,463,463,374,607,431,768,211,456 nodes

Transición/Coexistencia IPv4-IPv6

- A wide range of techniques have been identified and implemented, basically falling into three categories:
  1. Dual-stack techniques, to allow IPv4 and IPv6 to co-exist in the same devices and networks
  2. Tunneling techniques, to avoid order dependencies when upgrading hosts, routers, or regions
  3. Translation techniques, to allow IPv6-only devices to communicate with IPv4-only devices
- Expect all of these to be used, in combination

Estrategia de Stack Dual



Dual Stack Node Means:

- Both IPv4 and IPv6 stacks enabled
- Applications can talk to both
- Choice of the IP version is based on name lookup and application preference

Q and A