



Internet Protocol Address  
Exhaust Is IPv6 the next Y2K?

Women in  
Telecommunications (WiT)



## Who is Intellextrace?

Intellextrace is a full service telecommunications company focused on providing Data, MPLS, Point-to-Point services and Internet to businesses. Our experienced people and flexible business model allow us to get the job done quickly and efficiently while taking accountability for an end-to-end solution.

Intellextrace offers a new breed of solutions. Not just a broker or reseller of telecom services. We customize a best-fit solution for your needs, Our commitment to you continues past the sale to make sure your network is all ways up and running while addressing issues quickly and efficiently.



## How do we do it?

- Direct Connectivity to any carrier
- Carrier-grade reliability at cost-competitive prices.
- Flexible business model
- Experienced team of telecom and IT experts.

### “Customer First” Service Guarantee

- Quick Turnaround on Provisioning
- 24x7x365 Support
- 100% invoice accuracy guarantee.



## What is IP?

- Internet Protocol version 4 (IPv4, or just “IP”)
    - First developed for the original Internet (ARPANET) in spring 1978
    - Deployed globally with growth of the Internet
    - Total of 4 billion IP addresses available
- Source ARIN



## What is IP?

IP is the protocol that runs on top of a physical network to create a base for data communications.

IP is unreliable, best-effort and connectionless packet delivery protocol.

IP a very robust network protocol. The US DoD intended to deploy a network that would still be operational if parts of the country were destroyed.

IP addresses are represented by a **32-bit** unsigned binary value, which is usually expressed in a **dotted decimal format** (e.g., 216.211.160.1) because the numeric form (e.g., 3637747713) is hard to read.



## What is IP?

The binary format of the 32-bit IP address 216.211.160.1 is:

11011000 11010011 10100000 00000001

An easier way to remember IP addresses is by assigning to them a name (e.g., [www.intellectrace.com](http://www.intellectrace.com)), which is resolved through the Domain Name System (DNS).

Usually, hosts have only one interface (thus, one IP address), whereas routers have many interfaces (thus, many IP addresses).

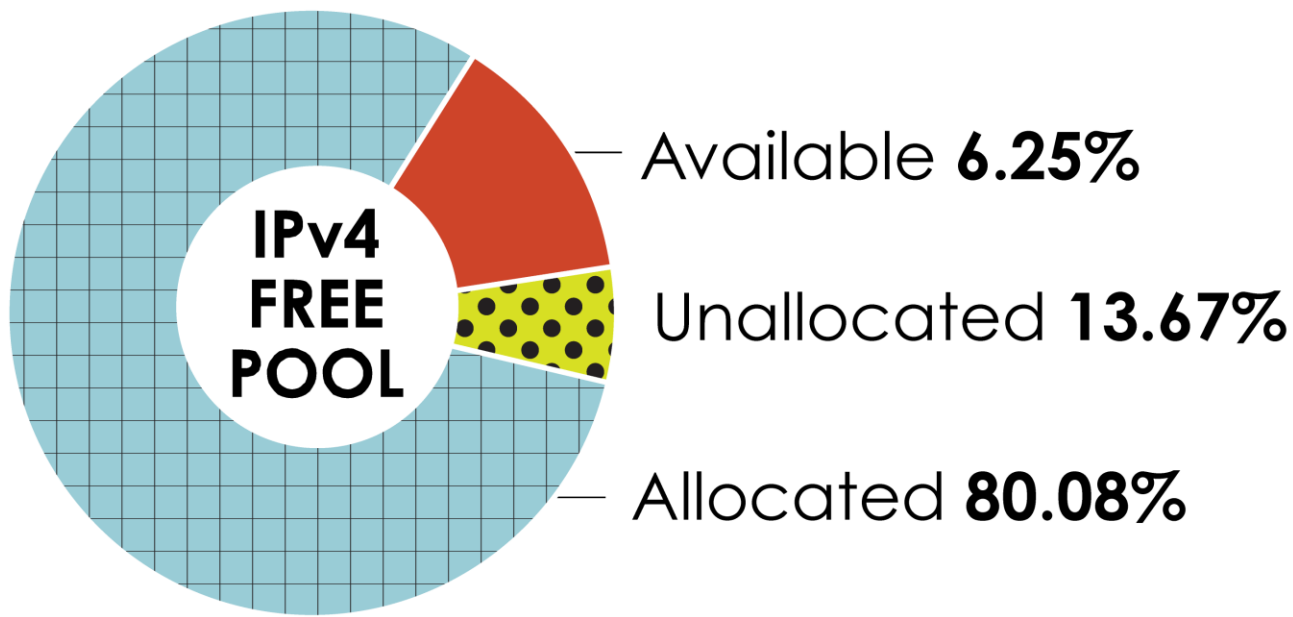


## IPV4 Problems

- IPV4 Space is Running Out

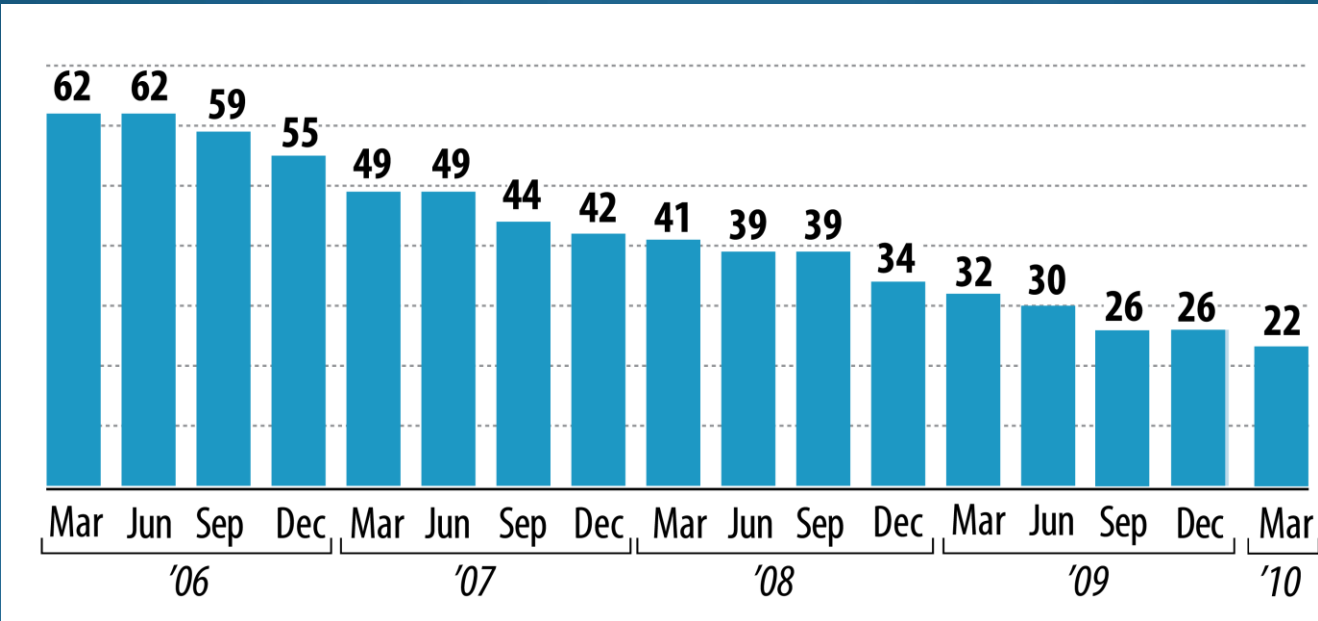
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## IPv4 Address Space Utilization



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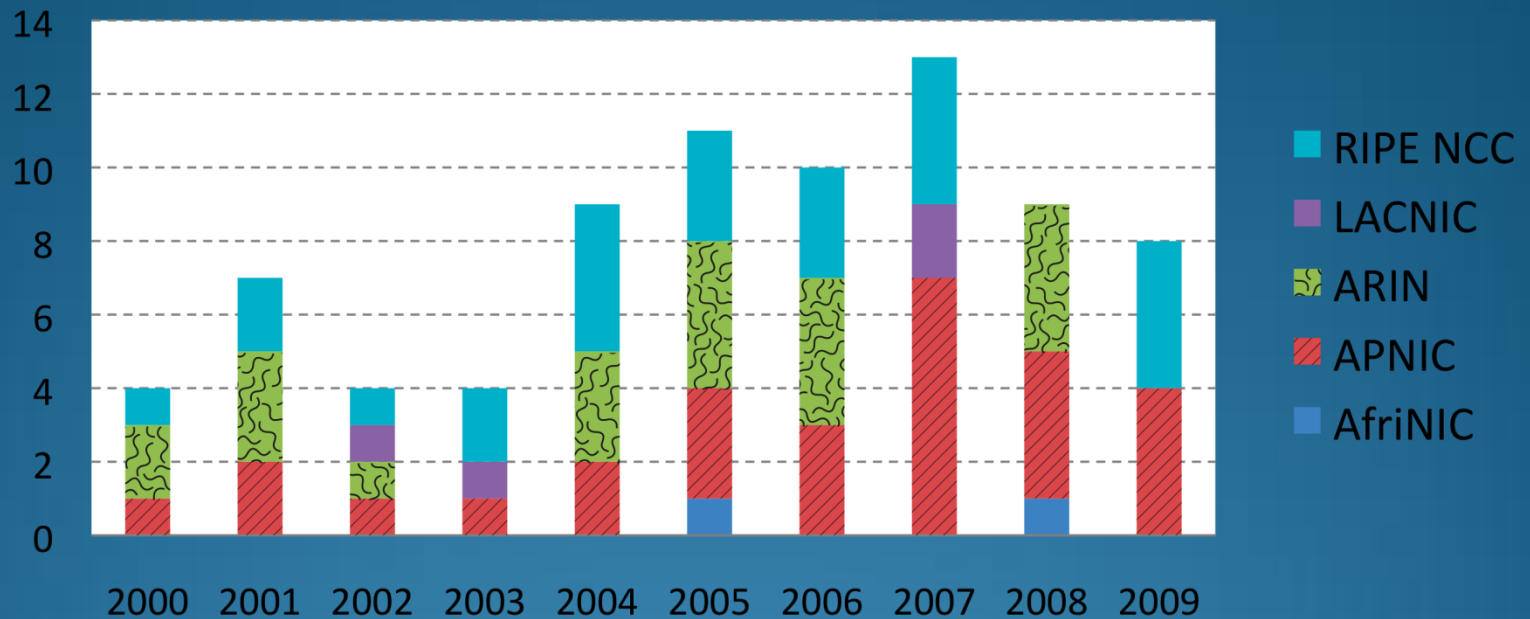
## Available IPv4 Space in /8s



As of June 2<sup>nd</sup> 2010 only sixteen /8s unallocated ( $16/256 = 6.25\%$ )

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## IPv4 Demand



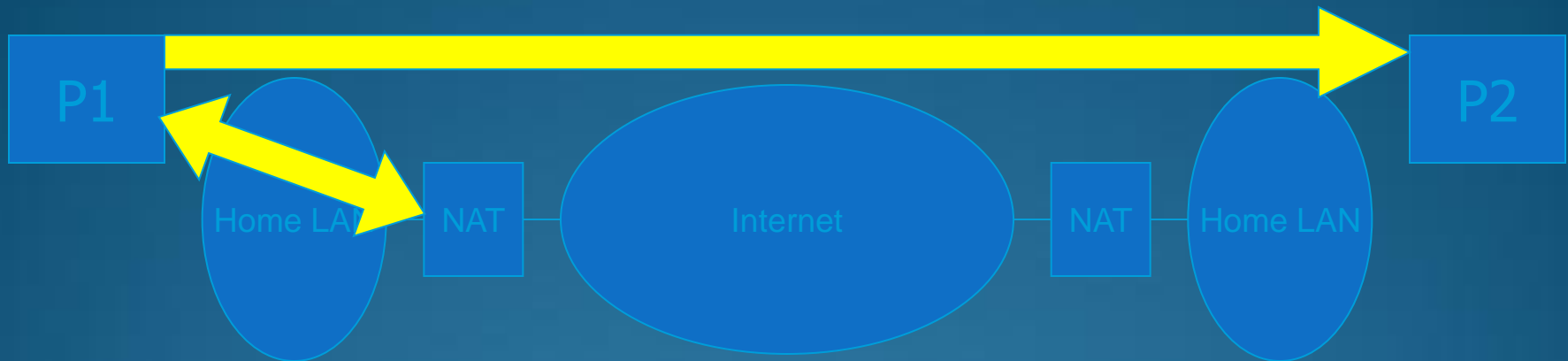
In 2010, RIRs have been allocated ten /8s blocks as of 2 June.



## IPV4 Problems

- IPV4 Space is Running Out
- Tools used to preserve IPV4 Space are causing problems

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## With NAT:

Need to learn the address “outside the NAT”

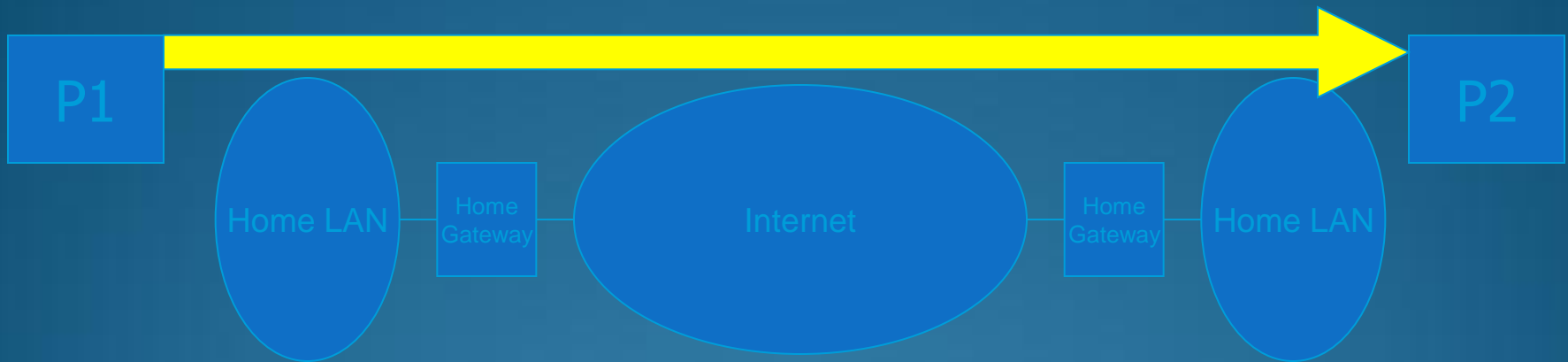
Provide that address to peer

Need either NAT-aware application, or application-aware NAT

May need a third party registration server to facilitate finding peers

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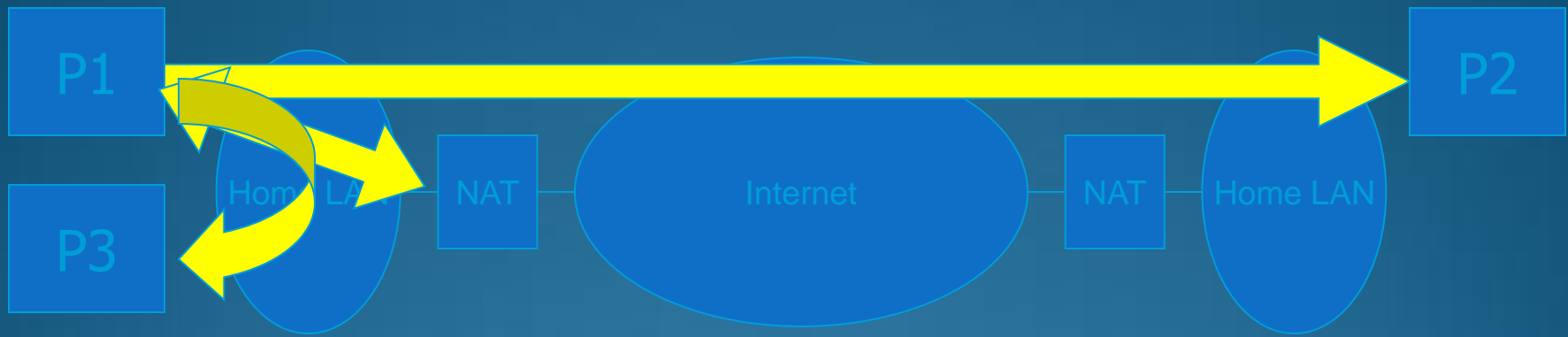
## Solution 1: Peer-to-peer audio example



- With IPv6:
  - Just use IPv6 address

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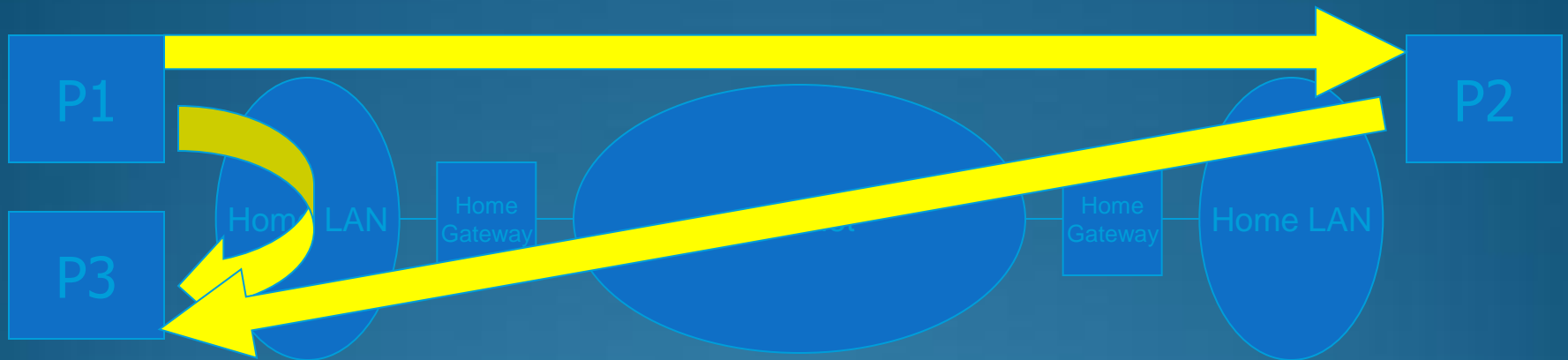
## Problem 2: Multiparty Conference Example



- With NAT, complex and brittle software:
  - 2 Addresses, inside and outside
  - P1 provides “inside address” to P3, “outside address” to P2
  - Need to recognize inside, outside
  - P1 does not know outside address of P3 to inform P2

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## Solution 2: Multiparty IPv6Conference Example



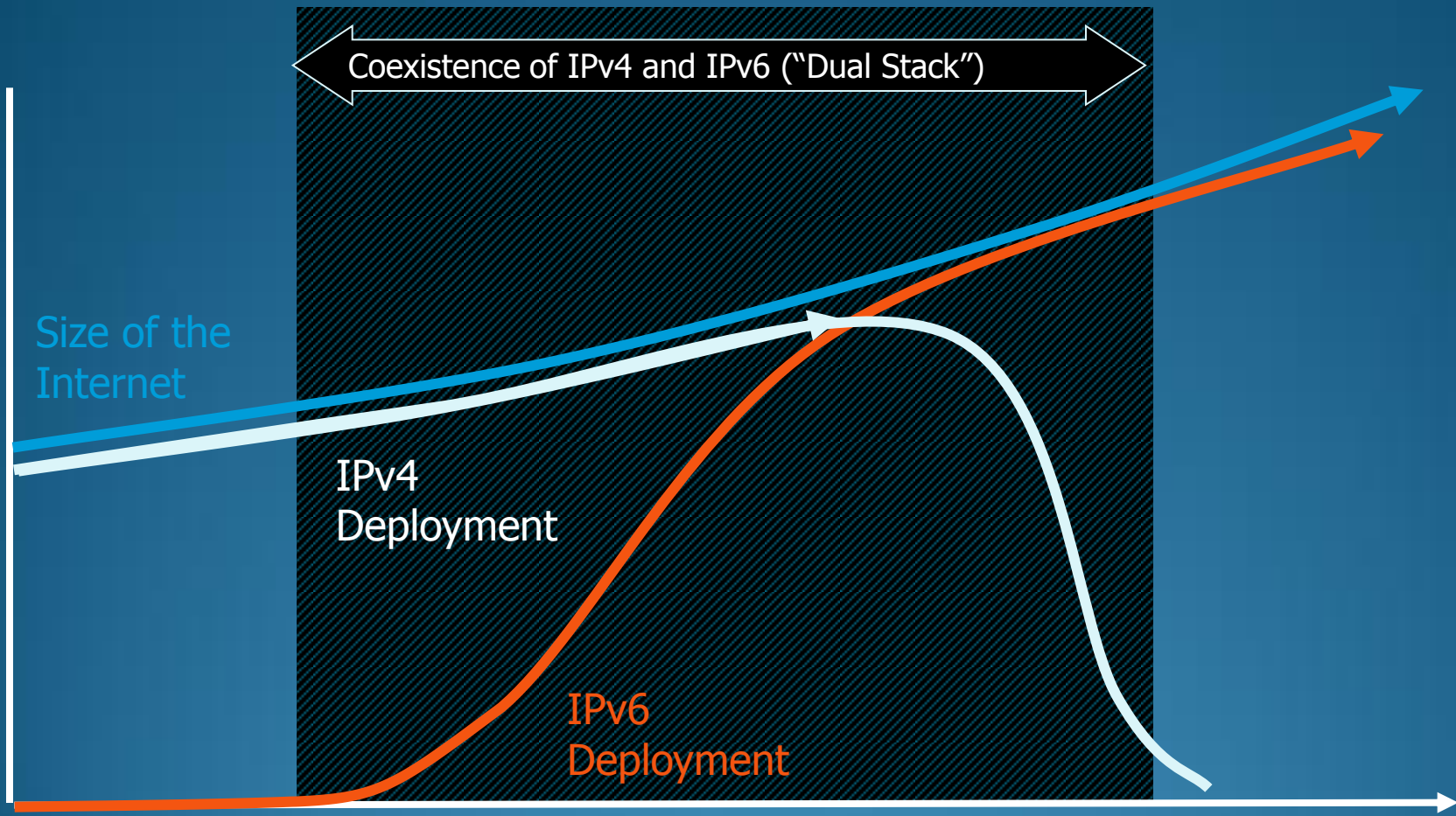
- With IPv6:
  - Just use IPv6 addresses



## IPV4 Problems

- IPV4 Space is Running Out
- Tools used to preserve IPV4 Space are causing problems
- IPV4 Must be ran Simultaneously to convert to IPV6 “ Dual Stack”

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Time

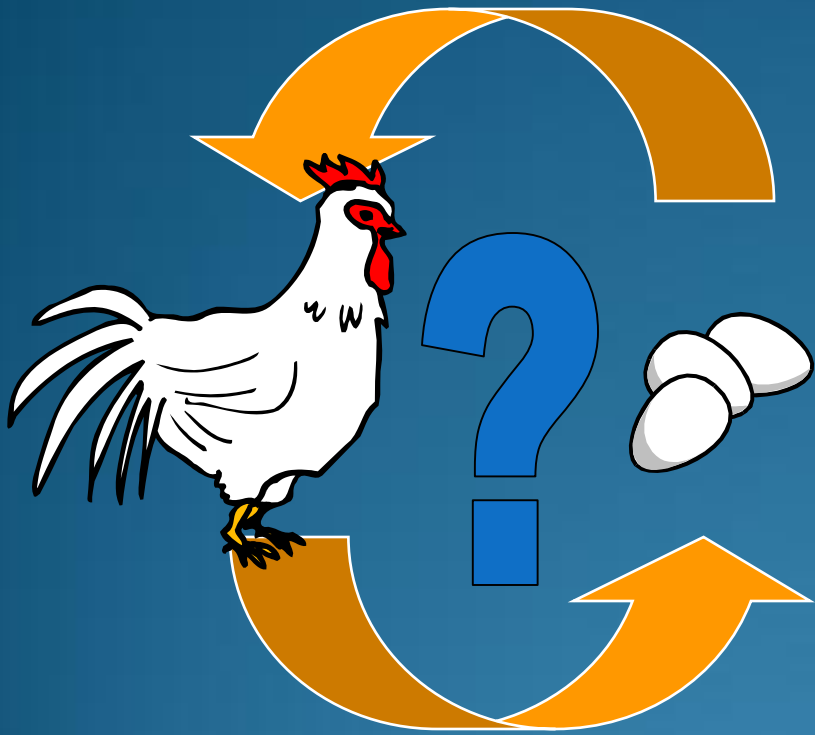
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## IPV4 Problems

- IPV4 Space is Running Out
- Tools used to preserve IPV4 Space are causing problems
- IPV4 Must be ran Simultaneously to convert to IPV6 “ Dual Stack”
- Well entrenched and used by every ISP and hosting company to connect customers to the Internet

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- Applications
  - Need upfront investment, stacks, etc.
  - Similar to Y2K, 32 bit vs. “clean address type”
- Network
  - Need to ramp-up investment
  - No “push-button” transition



## Who Has Failed ?

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



Thank You

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