ARIN
American Registry for Internet Numbers

Planning Your IPv6 Network

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IPv6 let's grow!

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Overview

→Transitioning to IPv6 Thinking

→IPv6 Basics

→ISP or End User

→The Right Block Size

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→Putting It All Together

Transitioning to IPv6 Thinking

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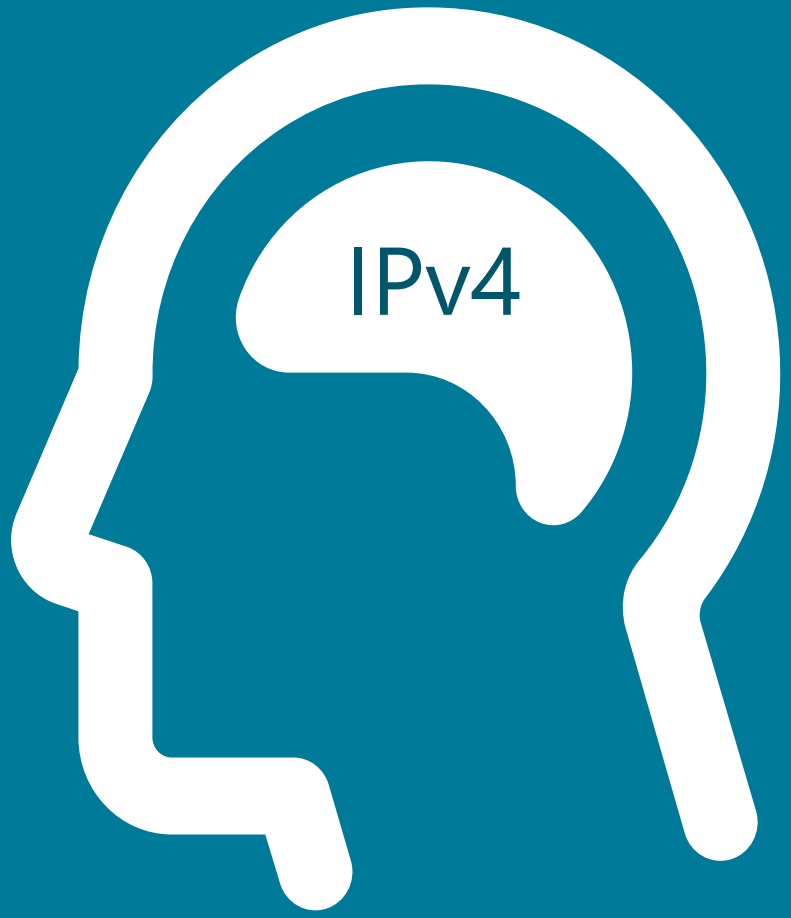
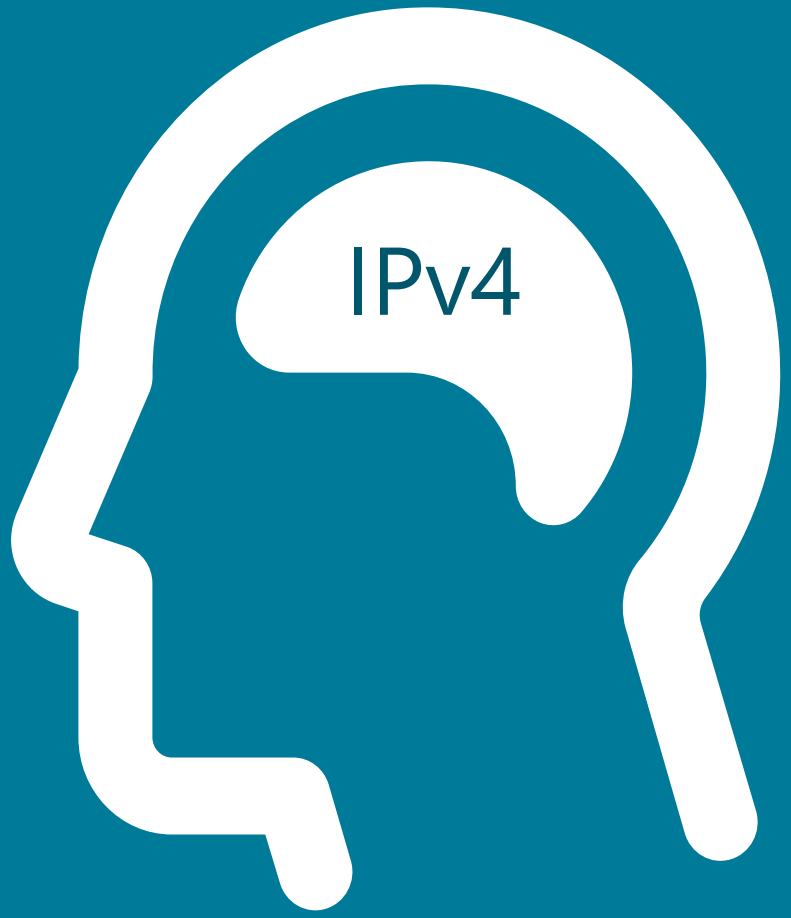
Scarcity

- We knew in the mid-1990s IPv4 would run out
- This led to a scarcity mindset
  - Go to ARIN multiple times a year
  - (Probably) get less than you wanted
  - Divide it into small chunks and distribute where needed
- This mindset does not work for IPv6



IPv4 mindset doesn't work for IPv6

- The biggest risk is an IPv4 mindset
  - "Only get as much as you need now"
  - "Only give each customer/site what is needed now"
  - "Add additional space as needed"
- This will hinder your IPv6 deployment



IPv6 = Abundance

- Get a very large block from ARIN (more than you think you need!)
- Give every customer/site a very large block
- At each level of your hierarchy, use the same block size based on the largest block needed

IPv6 Basics

Comparison

IPv4		IPv6
/32 (single IPv4 address)	**Counting Unit**	/64 (subnet with a near infinite number of IPv6 addresses)
/24 (contains 256 IPv4 addresses)	**Smallest Routable Block**	/48 (contains 65,536 /64 subnets)
/24	**Typical Initial Block Size**	/32 (contains 65,536 /48 blocks to assign to customers/sites)

IPv6 Address Structure

2001:0DB8:0234:AB00:0123:4567:8901:ABCD

/32 assigned to you

/48 assigned to customer/site

/64 subnet

64 bits device autoconfiguration

ISP or End User?

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BEFORE … In IPv4

An ISP is a business whose primary service is providing Internet access

Education, government, etc. were end users

This worked for IPv4 because ISPs and end users got the same block sizes

NOW … in IPv6

If you assign blocks to users of your services, you are an ISP

End users will never make assignments to users of services

The Right Block Size

End User Block Size

Remember —

If you assign addresses to users, request as an ISP!

If you're sure you will never do that, the end user block size is based on # sites in your network

- Site = any location at which you operate
  - Datacenters, offices, warehouses, etc.
- But not people working from home

End User Block Size Chart

Number of Sites	Block Size
1	/48
2-12	/44
13-192	/40
193-3,072	/36
3,073-49,152	/32

ISP Block Size

Know Your Three Numbers

1. Block size to assign to users
   - /48 is industry standard
2. # serving sites in your network
   - Sites at which you aggregate customer connections
   - Fiber hubs? Dorms? Buildings?
3. Largest # customers at a single serving site

1

Block Size to Assign to Users

What is the right size for your organization and its users?

/48 is the industry standard

2

Block Size per Serving Site

1. **Which site has the largest number of customers?**

2. **Identify a nibble-aligned block that can hold that many /48s without going over 75% usage.**

Example:

My largest wireless tower serves 3,567 customers, so…

/36 (4,096 /48s) too small — 87% usage
/32 (65,536 /48s) is the right choice

3

Overall Block Size

1. **Identify block that can hold enough for every serving site without going over 75% usage**

2. **Identify a nibble-aligned block that can hold that many /48s without going over 75% usage.**

Example:

- I need a /32 for each of my wireless towers since the largest needs a /32
- I have 13 wireless towers
- /28 (16 /32s) too small — 81% used

- **/24 (256 /32s) is the right choice**

Supporting IPv4

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IPv4 Will Be Around for a While

Networks are paying significant sums per IPv4 address or spending years on ARIN's IPv4 Waiting List

Plan to speak both IPv4 and IPv6 for the foreseeable future

But how?

IPv6/IPv4 Translation

Get one /24 for dual-stacking internal infrastructure

Ask for an additional /24 as frequently as every six months until the pool is large enough

Note: ARIN has 16,384 IPv4 /24s reserved to help IPv6 networks talk to IPv4 networks and **90%** of these are still available, (Number Resource Policy Manual/NRPM 4.10)

Putting It All Together

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ISP or End User?

Generally, apply for a /32 as an ISP/LIR unless:

- You're sure you will not assign addresses to users
- You're sure a /40 or /36 will provide enough for your network's lifetime

Apply as an end user if you do not assign addresses to users/customers and do not provide connectivity to any users/customers

Know Your Numbers

End User	ISP
# sites in your network	1. Block size to be assigned to customers 2. # serving sites in your network 3. # customers served by the largest site

Start the Process Today

Fill out request

Analysts assist you

Pay and sign

Receive your IPv6 block

Request IPv4 Transition Space

After receiving your IPv6 block,

request an IPv4 /24 for transition support

Permitted uses:

- dual-stacking nameservers,
- IPv6/IPv4 translation pools

If your pools are oversubscribed, you may request an additional /24 in six months

Note: Under NRPM 4.10

ANY QUESTIONS

Thank You

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