



# IPv6 Best Practices

ESnet Site Coordinators Committee

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# Overview

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- Addressing
- Implementation
- Hardware issues
- Software Issues
- What to implement now
- What to avoid

**But first...**

**The “best practice” that is critical is:**

**DEPLOY IPv6!**

You must make your routing infrastructure IPv6 capable.

This is the EASY part as it is fairly well supported by most vendors.

If your network can't move IPv6 packets as a general and supported capability, There is little point in proceeding

# And to deploy IPv6 you need

## Address space

- From ESnet
  - We have address space ready to assign
  - Only for traffic routed by ESnet
  - Site coordinators may contact us with mail to:  
**routing@es.net**
- From ARIN
  - Needed for multi-homing
  - My be justified to ARIN by showing proper use of an existing multi-homed space
  - Does not require and RSA for existing space
  - Will Require RSA for IPv6 space
    - And now a brief digression...

# You will also need...

## An addressing plan

- Many approaches available
- Assignments from ARIN or ESnet are /48s
  - “Official” minimum network size is /64
  - Real minimum is /126
  - /64 required for EUI-64 based auto-configuration
  - If no auto-configuration is required, longer prefixes are fine
    - Static addresses
    - DHCP assigned addresses
- If you missed “Campus IPv6 Addressing Plan” from the plenary, look at the slides
- Expect to be wrong

Campus IPv6 Addressing Plan

# Hardware Limitations

- Many popular routers have limited TCAM for 128 bits
  - IPv6 entries include 128 bit address + port
    - Oops! That doesn't fit!
    - May cause packet to be processor switched or dropped
- Many older system and many newer security device and network appliances don't have IPv6 capability
  - Most likely in firmware, so fixable
  - May or may not be fixed in the near future

# Software Limitations

- Many applications are NOT IPv6 ready
- Many that are have fairly buggy code as use has been fairly limited
- Many management and security tools lack any IPv6 capability
  - Did you know that most routers won't do SNMP over IPv6?
  - Many feature taken for granted over IPv4 are not available on IPv6
  - Talk to vendors
  - Don't believe them too much

## What to Implement Now (1/2)

- DNS
  - Needed for good operation
  - BIND fully supports IPv6, but must be enabled in `named.conf`
  - Reverse DNS is a bit of a pain
    - If you don't have DNS management tools that support IPv6, a few simple Perl or Python scripts can do the ugly part
- DHCPv6
  - Not the same protocol as DHCPv4!
  - Becoming much more widely supported

## What to Implement Now

- NTP
  - Supported “out of the box”
  - Works flawlessly
- Web services
  - Apache and Microsoft servers support IPv6 in **current versions**
  - Easy to add IPv6
- SSH (it already is IPv6)
- Network security
  - Firewalls and ACLs should be similar to those used for similar IPv4 functions
  - IDSes need IPv6 support
  - IPv6 is probably buggier and less secure!

## What to Avoid

- Enabling IPv6 on critical production services without testing
  - You can start web services by duplicating IPv4 web servers on small, slow system and make them serve IPv6 only
  - When you are confident that they work, move the IPv6 capability to the production system
- Being afraid of IPv6
  - It has it's differences from IPv4, but if you don't work with it, you will never be ready
  - It is mostly very straight forward and not a big problem if you plan carefully

# Where do we go from here?

- Start using IPv6 soon
- Don't be afraid of IPv6
- Ask for help if you have problems
  - I don't do Windows, but others do
  - Most everything will work in a dual-stack environment

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# **Questions and Discussion**