

# Where to Start

- Like any other problem, building a v6 trial can seem overwhelming
- Don't look at it monolithically, instead break the problem into small pieces
- There are a few common activities everyone should start with



# Lab

- **Build a lab**
- **Stock it with the identical equipment you have in the field**
- **Replicate identical configurations and software versions of what is in the field**
- **Can't afford to buy all that equipment?**
  - Make a vendor do it
  - Hire a consulting firm

# Get IPv6 Space

- **If you can**
  - Use an upstream provider
  - Regional Internet registry (ARIN, etc.)
  - Get it from a tunnel broker
    - [gogonet.gogo6.com](http://gogonet.gogo6.com).
    - [tunnelbroker.net](http://tunnelbroker.net)
    - [sixxs.net](http://sixxs.net)

# Connection to the World

- **Check with your upstream provider**
- **Get a tunnel (tunnelbroker.net, etc.)**
- **Run lab testing without an outside connection?**



# What to Test?

- **Start by identifying where you would like to deliver v6 service first**
- **Depends on:**
  - Type of network and type of business
  - Goals of the v6 trial
    - Public facing, “Look at me, I’m doing v6 and my competitors aren’t!”
    - Internal service for employees
    - IPv6 Internet access for ISP clients
    - Holy crap! I’m out of addresses!!

# Public Facing

- **“I want the world to reach my web site over v6”**
- **Users of my web site that have v6 will get better performance**
- **Probably one of the easiest trials to start with**



# Public Facing

- **Identify the elements needed for the trial**
  - Several manufacturers make load balancers that can translate your v4 web site into v6
    - Your existing load balancer may already be capable of this!
    - Very little, if anything, needs to change on the web site itself - the load balancer does all the work
  - IPv6 transit link from an upstream provider
  - At least one router that can route v6
- **Can't do all of that?**
  - Check out free service from CloudFlare

# Public Facing

- **Put all that in your lab and poke at it**
- **Once everything works well, a parallel trial is appropriate**
- **Low risk if you use a separate link from the upstream provider and a separate router**
- **Control your experiment by publishing (or removing) AAAA records**

# Internal Service

- **Parts:**

- Desktops that support v6
  - Good news, most modern ones do out of the box
- DHCPv6 server
  - Optional, but necessary if you want to deliver DNS over IPv6
- DNS server that understands AAAA requests
  - Many do, out of the box
- IPv6 transport
  - Probably don't want to use tunnels
  - As before, start small, pick somewhere easy

# Internal Service

- **Again, put it in the lab and try to break it**
- **Trial considerations**
  - Opt in
    - Configure all users' machines without v6 using administrative tools
    - Provide instructions to users for how to turn it on if they want it
  - Opt out
    - Same, just opposite
  - Blind trial
    - Turn it on by default for some users and not for others
    - Track the trouble tickets you get from each

# Internal Service

- **Grow the service over time, slowly and continue to track issues**
- **Need to back off? Easily move all users on a subnet off of v6 by shutting down router advertisements (RA)**

# ISP Clients

- **Similar to internal employees**
- **But you have no control over their devices**
- **Considerations**
  - CPE support
  - RAS/aggregation device support
- ***Just because it's in the specs, doesn't mean it will perform the way you need it to***

# ISP Clients

- **Opt-in Beta**

- Start by enabling some part of the backbone for v6
  - This may mean building separate logical infrastructure in cases where not-so-capable equipment needs to be bypassed
  - For a beta, it's best to keep trial traffic somewhat separate from the rest
  - Ship a new CPE configured for v6 use (if necessary) or configure opt-in users with the appropriate profile
  - Supply instructions to users on how to disable v6 if they have a problem
- Comcast has been a leader in opt-in v6 trials in North America
- Most importantly, set up your support organization so they can carefully track problems related to clients who are in the trial

- **Opt-out Beta Not Recommended**

# ISP Clients

- **Field trial**

- Opt-in beta going well? Time to inflict v6 on the unsuspecting
- Create a “Big red switch” so you can disable v6 for all of your clients quickly if necessary
  - Remember, miscreants will be looking for vulnerabilities in v6. We don't know what they all are yet. In the event of a disaster, being able to shut it off will be critical.
- Your support organization is the key to measuring your success

# Out of Addresses

- Don't get here
- Don't get here
- Don't get here
- Don't get here
- Don't get here
- Don't get here
- Don't get here



# Out of Addresses

- Really, just don't



# Out of Addresses

- **Are you seriously still not listening?**



# Out of Addresses

- **Okay, fine, you are out of addresses**
- **If you are an enterprise, you probably already use NAT - do more of that**
- **If you are a service provider, now is the time to try Carrier-grade NAT (CGN)**

# Out of Addresses

- **Unlikely to find takers for an opt-in NAT trial unless you offer an incentive**
  - \$10 off their bill? Free iPad?
- **Set up the trial. Depending on your existing infrastructure, consider**
  - DS-Lite
  - Dual stack with v4 going via CGN
- **Fallback?**
  - Errr, um, what fallback?

# Summary

- **Break the problem into small pieces, just like any other**
- **Test, test, test, test, test. You need a lab!**
- **Target trial mechanisms that can be easily rolled back, like discontinuing RAS or redirecting DNS**
- **Start now so that you don't get stuck!**



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