THE OFFICE OF
ENTERPRISE TECHNOLOGY
STATE OF MINNESOTA

IPv6 for Counties

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Topics

- What is IPv6?
- Why Do It?
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What is IPv6?

- It’s a new, network-level protocol originally based on IPv4
- IPv4 addresses look like 192.168.4.12
- IPv6 addresses look like 2607:f830:3400:0001::1
- Still uses /## for network, but ## can go up to 128
- It only replaces IP: TCP and UDP are the old familiar faces

What is IPv6? (continued)

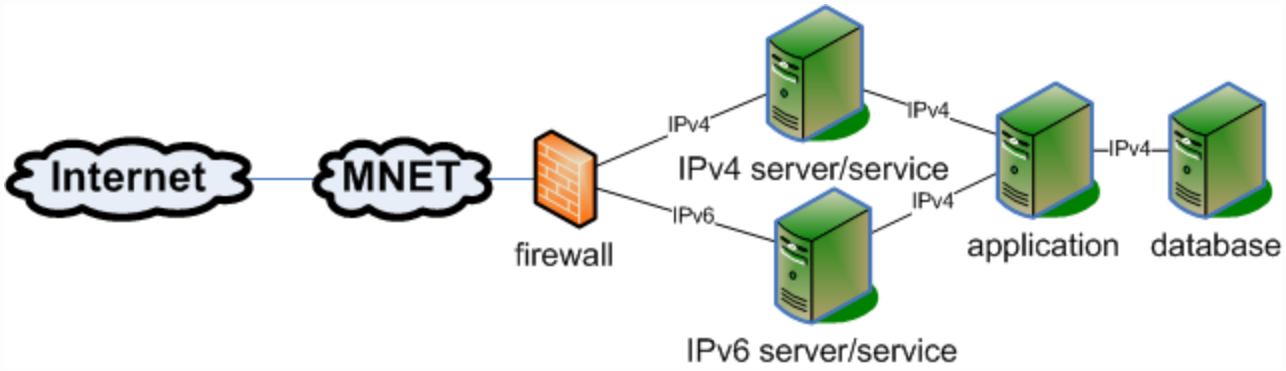
- But v6 != v4...it's different!
- No broadcast...it's all multicast
- Much of layer 2 (ARP, BOOTP, DHCP) are now layer 3
- IPSEC is required in all implementations
- ICMP is now much more than "ping:"
  - Some parts are required for IPv6 operation
  - Some parts (like "ping") are still optional
  - Some parts you should <u>never</u> allow

Why Do It?

- The world is running out of IPv4 addresses
- MNet is safe! we have enough IPv4 IP addresses to meet the foreseeable demand, so you can keep getting IPv4 addresses as needed for your clients and servers
- That's assuming that there isn't a disruptive new application…
- At some point in the next year, there will be customers – such as citizens – coming at you who only have IPv6 addresses
- <u>That's</u> the problem that we need to address

What Exactly Needs Doing?

- Adopting IPv6 means adding it to existing services
- IPv4 will be with us for a long time; both will coexist for years
- Key need is on public-facing systems (*e.g.*, web servers)
- Internal and back end can be done later (or maybe never)



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What Exactly: Applications

- Converting any one application is easy, much easier than the conversion from, say Novell IPX to TCP/IP
- However, there are LOTS of applications
- This is very much like the Y2K problem: you have to look through the application to find where they make assumptions and fix them
- In specific cases, you <u>may</u> be able to do IPv6->IPv4 address conversion: this is not a solution that will work in all – or even most – cases

What Exactly: Typical Assumptions

	IPv4	IPv6
length (bits)	32	128
length (chars)	15	39
contains	0-9, .	0-9, a-f, :
largest mask	32	128
typical #IPs	1	up to 6
client IP change	rare	often
client name in DNS	sometimes	rare
client IP in DNS	often	rare
public server in DNS	yes	yes – unchanged
public server static IP	yes	yes – unchanged

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What Exactly: Security Issue Highlights

- Hosts have lots of addresses and they can change...do filters at the network, not IP level
- Static assignment for servers, dynamic for clients
- You'll need to turn on (some) ICMP
- You'll need to block (some) multicast

OET's Approach

- Two pronged: network and application

OET's Approach: Network

- Establish tools and procedures for assigning network numbers.
- Deploy across the backbone links
- Connect to the greater Internet
- Create standards for deploying to client networks
- Deploy in "safe" mode across our entire network
- Deploy live to test client networks
- Finish documentation and procedures for deploying to the rest of the network as requested

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OET's Approach: Applications

- Identify key services needed by citizens
- Sort those by a combination of importance and readiness for IPv6
- Work down the list, turning on IPv6 support for each as soon as practical
- Get at least one operational by March 2012

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OET's Accomplishments

- OET/MnSCU IPv6 running on network is "test" mode
  - Over two years
  - Temp assigned addresses
- State IPv6 block assigned (2607:f830/32)
- State backbone hardware validated and being upgraded
- State backbone software identified and being upgraded
- DNS IPv6 capable

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County Specifics

- Try it out
- Get real addresses
- Firewalls
- The site http://test-ipv6.com will help you test your connectivity
- You're done!

County Specifics: Try It Out

- Configure IPv6 up on a couple of clients. You can use the ec00::/10 network for this purpose (it's sort of like the 10/8 network block)
- Get it working on a server in a test area
- At some point, get your "real" addresses from OET
- There's no IPv6 NAT, so you'll need to readdress, but it's easier in IPv6 than IPv4
- Reconfigure and turn IPv6 on in your production servers so that your customers who only have IPv6 addresses can reach you

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County Specifics: Getting Addresses

- You'll get a network block from us (typically, it will be a /48)
- This gives you 65,000 *networks* that you can assign
- That's a lot, we'll help you organize this; for example, see http://www.mnet.state.mn.us, click "Data Networking" on the top: there are some IPv6 pages

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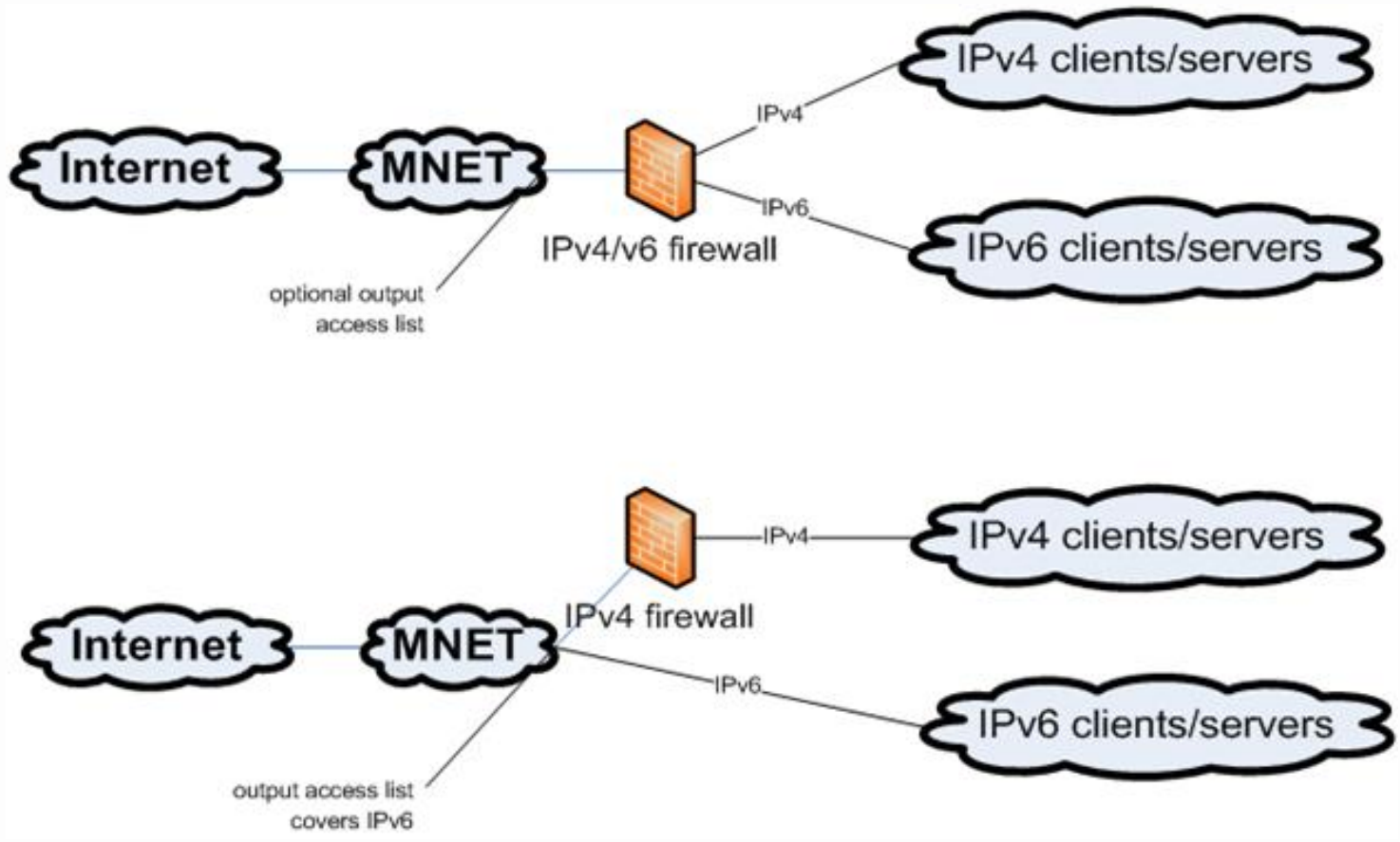
County Specifics: Firewalls



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County Specifics: Servers

- Lots of references on the Internet, list at http://www.mnet.state.mn.us under “Data Networking”

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Deployment Review

- We are doing:
  - Establishing tools and procedures for assigning network numbers
  - Deploying across the backbone links
  - Connecting to the greater Internet
- We are looking to December-March range for turning IPv6 on the network
- Customers who are ready may be turned up earlier

Questions?

- Now
- If you have questions later, contact your Account Manager

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