



# IPv6Now

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Can IPv6 be easier than IPv4?



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# VIC6 – an IPv6 testbed

- A working IPv6 network
- Help industry get into IPv6
- Built by IPv6Now & Ai Group
- Victorian Govt seed money
- Sponsors providing the rest
- [www.vic6.net](http://www.vic6.net)



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## Victorian Industry Collaboration IPv6 Testbed Network

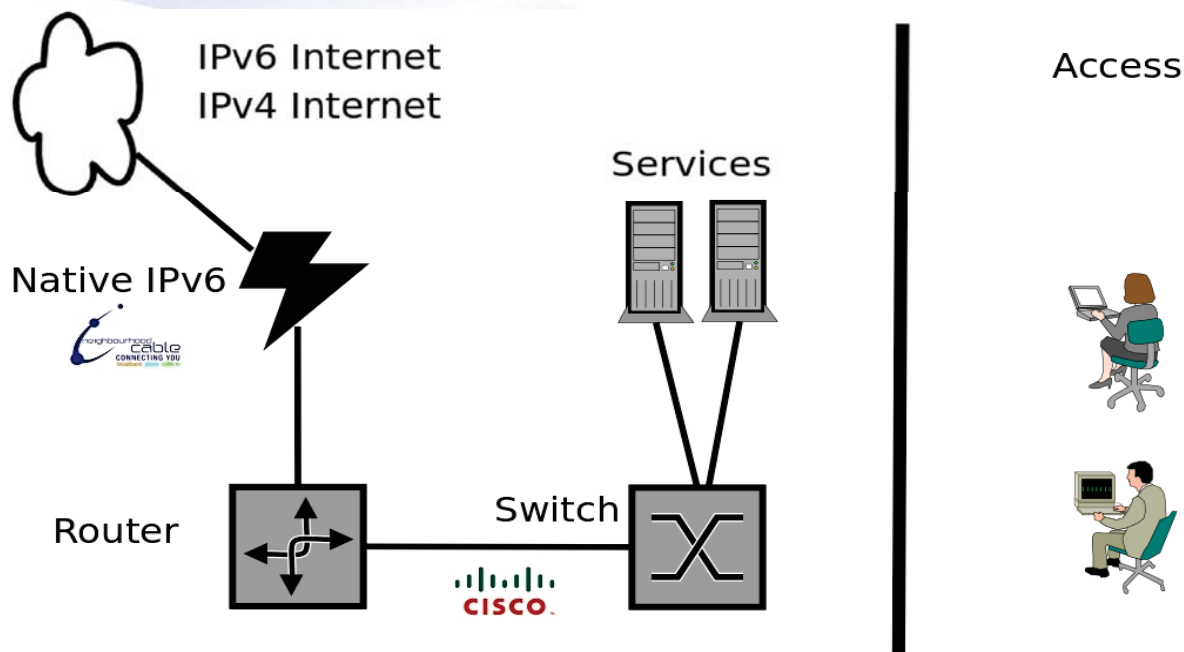
- A node is a router and a switch
- Plus native IPv6/IPv4 connectivity
- Plus some space in a rack
- Plus some space in a room



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# A VIC6 node



IPv6  
Now

# VIC6 Router

- various virtual interfaces with VLANs
- does prefix advertisement
- native IPv6 to IPv6 Internet
- IPv4 via NAT
- trunks all VLANs to the switch
- ACLs and CBAC filtering

IPv6  
Now

# VIC6 VLANs

- VLANs for various purposes
  - open (no filtering)
  - protected (only ssh, http)
  - no Internet (no Internet access at all)
  - isolated (no access, not even internal)
  - services (local services live here)
- Can easily add others



# Services VLAN

- services1
  - DHCPv4, DHCPv6, DNS auth
- services2
  - DHCPv4, DHCPv6, DNS caching
- springboard
  - ssh accounts
  - test DHCP, test DNS



## Other goodies

- Matrium/Spirent test kit
- Fortigate firewall hardware
- Polycom videoconferencing kit
- Space in datacentre rack
- Desk space next door



## Extras

- a mailing list
- a wiki ([wiki.vic6.net](http://wiki.vic6.net))
- a web site ([www.vic6.net](http://www.vic6.net))
- access to sponsors
- access to a helping hand



# Access to VIC6

- sit in the ops room and plug in
- get us to put your kit in the rack
- use your own IPv6 connectivity
- use an IPv6Now tunnel (/60)
- reach springboard via IPv4



# What does it all mean?

- people can come along and test stuff
- against a known good network
- in a safe environment
- with all the basics in place
- test software, hardware, combinations
- at a fraction of the cost of DIY



# Industry outreach

We stayed

- simple
- flexible
- accessible
- neutral
- standard



# Case study - AHML

- Australian Health Messaging Labs

Australian Healthcare Messaging Laboratory



- does it work with v6?
- attach a server to VIC6
- try it out!



# Case study - CERA

- Centre for Eye Research Australia



- connected to VIC6 via a tunnel
- seeing what works
- an "industry node"



## So – is IPv6 easier?

- easier to subnet
- easier to get a host up and running
- easier to set up DHCPv6
- as easy to set up VLANs etc
- as easy to set up ACL, CBAC etc
- as easy to do DNS





# Really...?

- it's not all a bed of roses
- some stuff is still at an early stage
- especially high-level tools
- but lots of important stuff *is* easier
- and lots of stuff is *at least as* easy
- “easier” is not the same as “easy”



# WAY easier to subnet

- no more teeny weeny subnets!
- no more slicing and dicing
- no more begging for address space
- all subnets are the same
- all masks (prefix lengths) are the same



## Easier to attach hosts

- autoconf just works
- especially noticeable with servers
- just plug in the cable
- and add DNS entries
- autoconf address will not change!



## Easier DHCP

- all subnets are the same
- no more running out of addresses
- no more failover (yay!)
- no more address conflicts
- lifetime can be optimised for flexibility



# DHCPv6 – a Digression

We have autoconf!  
It is beautiful!

Why do we still need DHCP?



# DHCP – a Digression

- Autoconf:
  - requires /64 subnets
  - has no hooks for control
  - has no logging
  - needs prefix advertisements
  - exposes MAC addresses



# DHCPv6 – still needed

- Allows *control* of addresses
- Can distribute DNS info
- Can do dynamic DNS for you
- Not limited to /64 subnets
- Can allocate multiple addresses at once
- Can delegate prefixes



# More stable networks

- Because there is less slicing and dicing
- Because subnets are always big enough
- There will be fewer changes needed
  
- So your network is more stable
- Reduces risk of error
- Reduces cost



## Easier to change

- Make a network bigger
- Make a network smaller
- Split a network
- Merge networks

All easier with IPv6



## Change-related features

- router renumber command (RFC2894)
- valid vs preferred lifetime
- multiple addresses on an interface
  
- won't help you with DNS, DHCP, ACLs...
- So consider those in your network design
- *Plan to renumber*



## v4-Think

- IPv6 is not bad, just different
- easy to carry over bad assumptions
- working against a lifetime of IPv4!
- takes conscious effort and thought
- it helps to participate in discussions
- e.g. NANOG, AUSNOG



## v4-Think – IPv4 is available

- Not necessarily!
- and ever less likely to be true
- monitor each protocol separately



# v4-Think – IPv4 is NOT available

- check dual-stack is not being *too* helpful
- don't treat IPv4 as out-of-band access
- watch out for IPv4 “back doors”



# v4-Think: IPv4 = truth

- IPv6 is a separate protocol
- IPv6 goes it's own way
- different routes
- different access controls
- different tools
- different options



## v4-Think: Only one way

- tempting to duplicate the IPv4 world
- especially “conveniences” like NAT
- the Model-T Ford looked like a horse-drawn cart
- many things in the IPv4 world (like NAT) arose out of a defect



## v4-Think: It'll just work

- Er, sadly no
- it takes two to tango
- syslog, NTP, DNS, ssh, SMTP, POP...
- often not listening on IPv6
- usually just a case of “turn it on”
- sometimes just need the latest version
- but don't assume





## v4-Think: Addresses are scarce

- no need for parsimony
- no point in profligacy
- so /64 everywhere
- use smaller if you control end to end
- feels wrong to use a /64 for a link?
- but you have 65536 of them in one /48!



## Addresses in perspective

- One IPv4 /16 ("B-class")  
= 256 subnets, each 254 hosts
- One IPv6 /48  
= 65536 subnets, each *billions* of hosts



## v4-Think: Autoconf = change

- autoconf addresses don't change
- less need for DHCP reservations
- so *use* autoconf addresses
  - in DNS
  - in access control
  - wherever!

- (PS: But DHCP still rocks)



## IPv4-Think: Secure the edge

- edge security is still needed
- but IPv6 pushes security towards the host
- it was never a good idea to feel safe behind NAT
- most expensive threats come from within
- IPv6 allows easier tracking of threats back to their originators



# v4-Think: Only consume

- Your hosts are accessible if you want them to be
- So are everybody else's
- Every host can be a producer
- Don't throw that away unnecessarily...



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# Thank you!

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