

# IPv6 at Virginia Tech

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# Agenda

- History
- Current status
- Shout outs
- Call to action
- Common excuses and objections
- Questions

# History at VT

- Milestones

- Dec 1995: RFC 1883, IPv6 specification
- Jan 1998: First production use on VT networks
- Feb 1998: The Next Generation of the Internet: Aspects of the IPv6; Lee, Lough, Midkiff, Davis, Benchoff; IEEE Network
- May 2004: 400 IPv6 hosts on campus
- 2008: wireless, ubiquitous availability, services IPv6 enabled
- Jan 2009: Google over IPv6 enabled for VT!
- Apr 2012: IPv4 now considered legacy
- Sept 2015: ARIN legacy address exhaustion
- Mar 2016: www.vt.edu reachable via IPv6



# History at VT

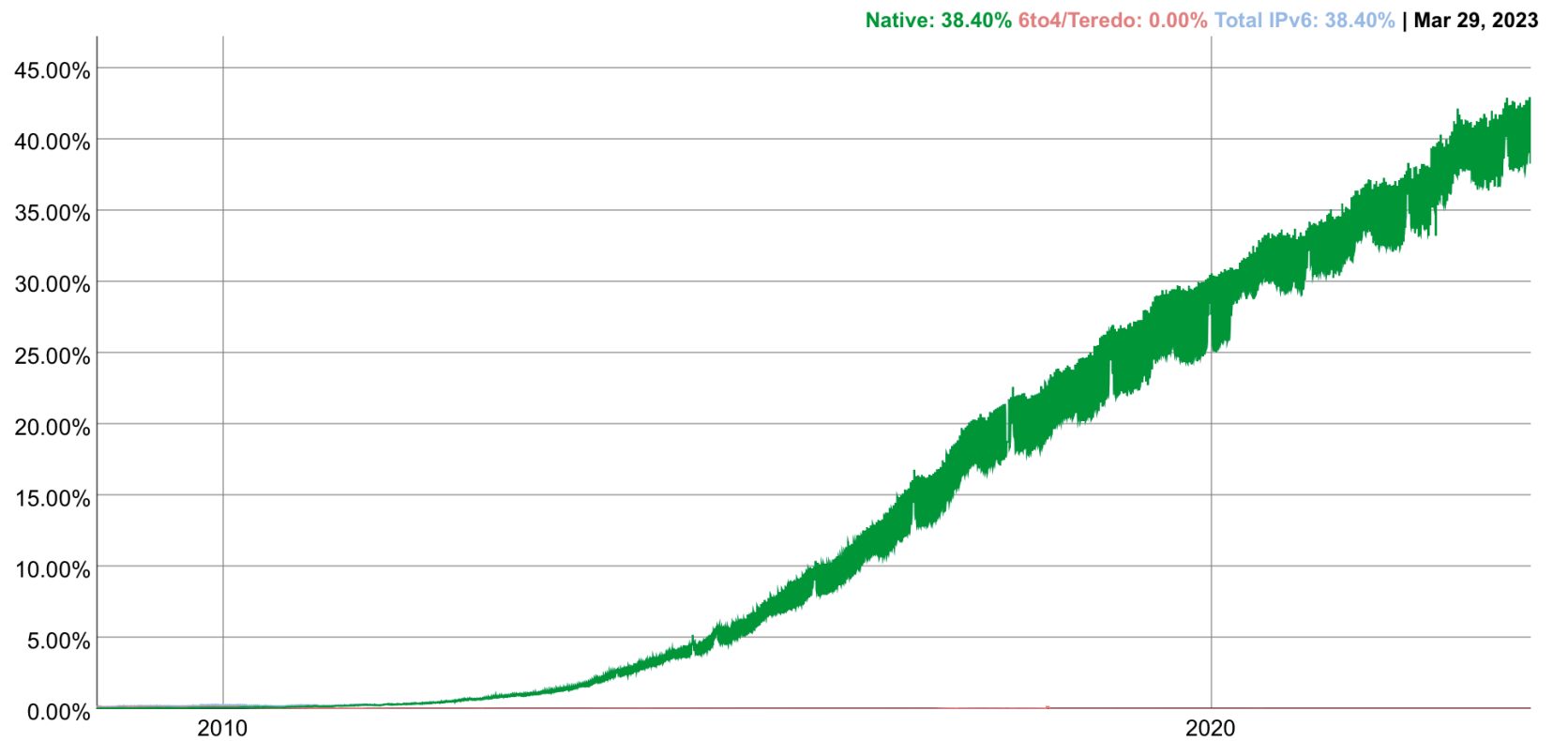
- 25<sup>th</sup> year of production IPv6
  - <https://vtx.vt.edu/articles/2023/02/moving-internet-beyond-boundaries-ipv6.html>



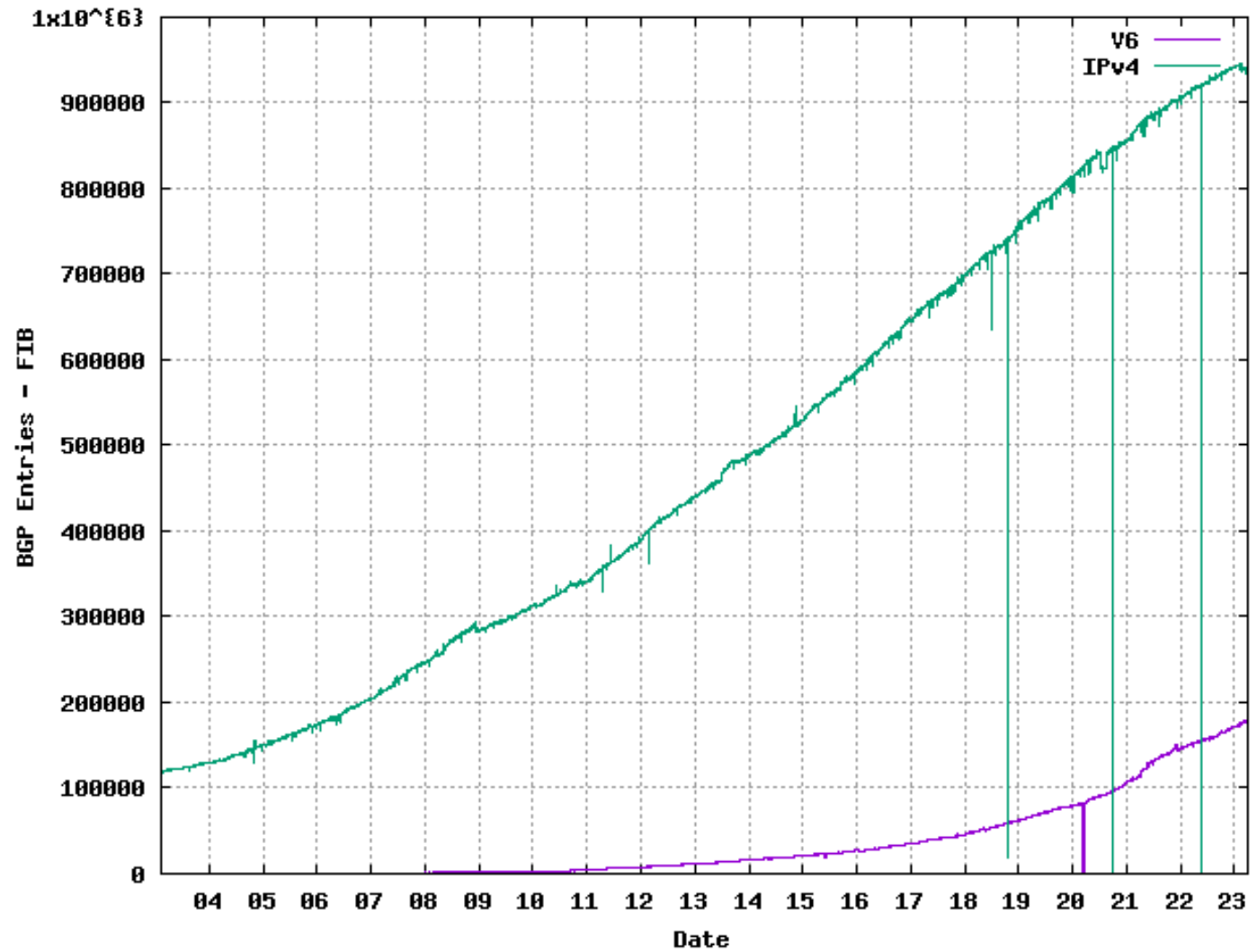
Current status:  
global  
adoption

### IPv6 Adoption

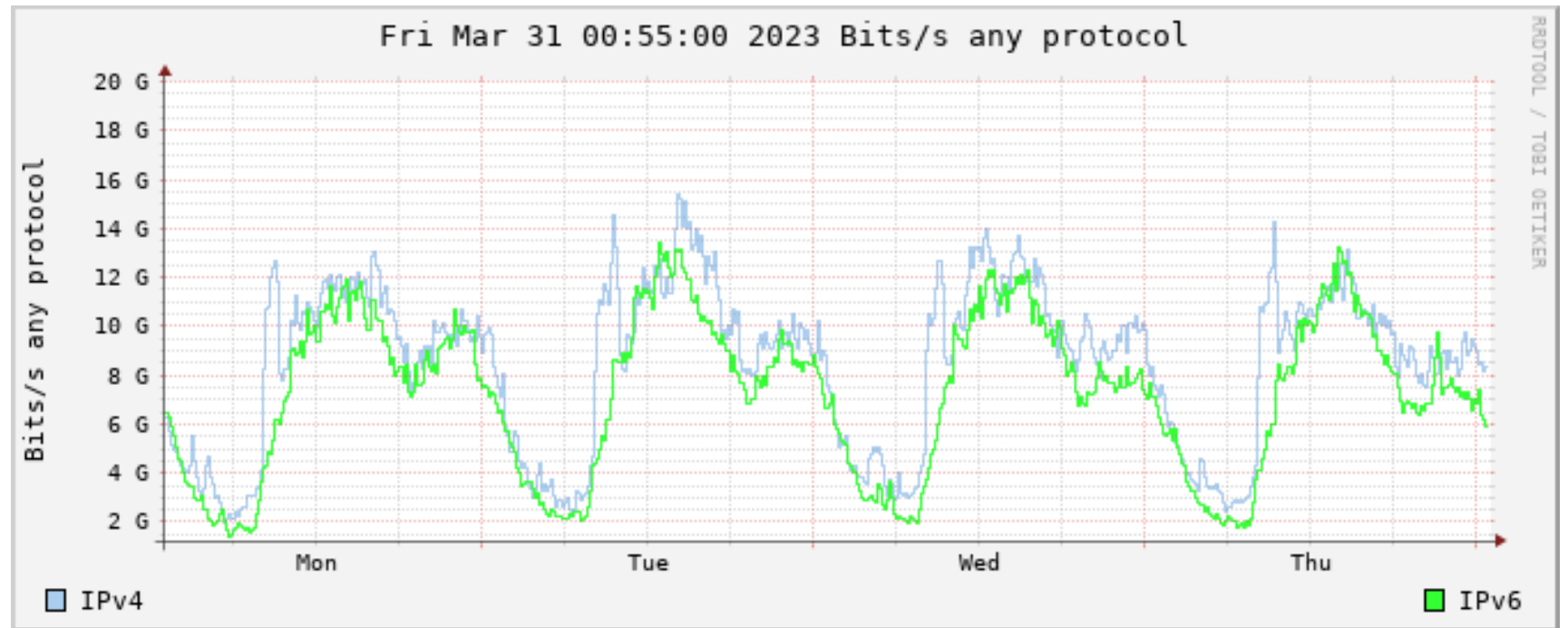
We are continuously measuring the availability of IPv6 connectivity among Google users. The graph shows the percentage of users that access Google over IPv6.



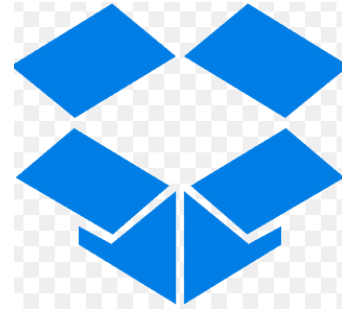
Current status:  
global routing  
table



Current status:  
bulk utilization  
at VT



# Current status



- What sites use IPv6?
  - Google, Akamai, Facebook, Apple, Amazon, Netflix, Nat Lib of Medicine, Microsoft, Valve, Dropbox
- All client operating systems do IPv6 by default (don't stop them)
  - OS Vendors have turned it on, on your behalf. Did you notice?
  - Transition technologies for clients are well deployed and well tested



U.S. National Library of Medicine

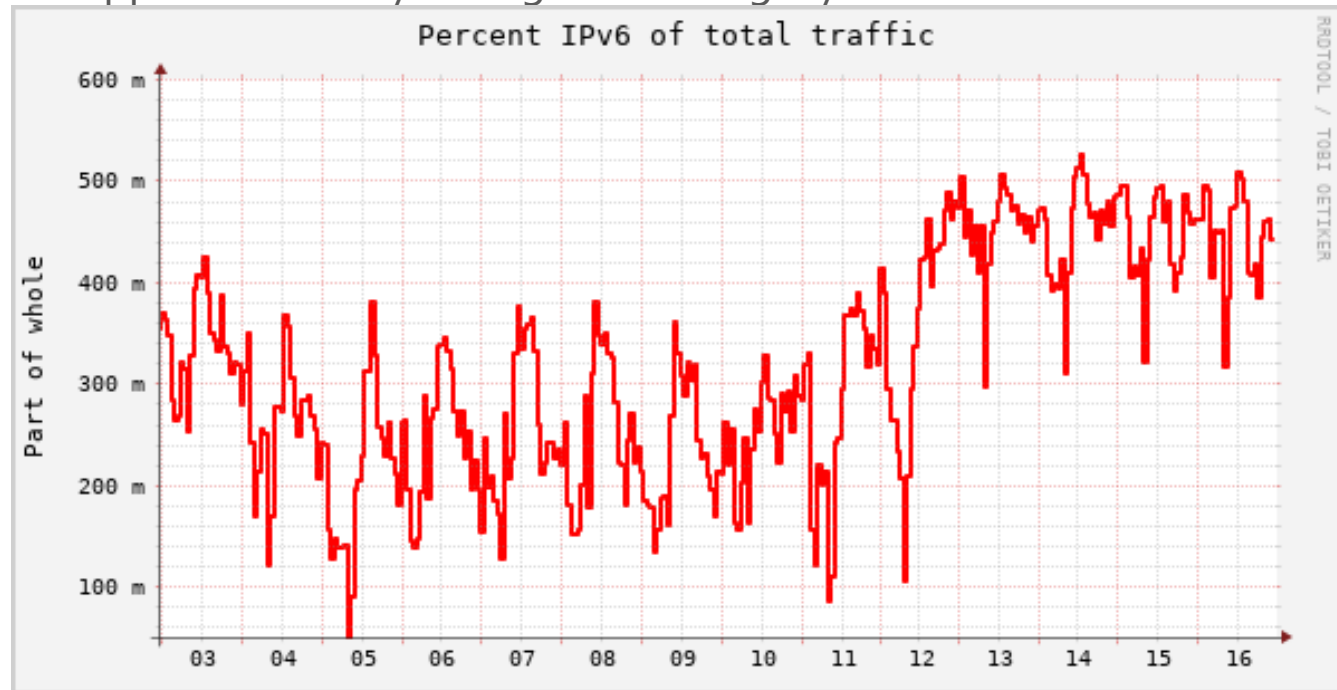


# Shout out to users who have embraced IPv6

- VTTI
- OVPR&I
- WUVT
- OIS
- Library
- Others, apologies that I missed you

# Call to action: in-session versus break

- Interpretations
  - Ongoing legacy scanning activity (>10k connections per second continuous)
  - Backend processes running legacy
  - Applications only configured for legacy



Spring Break vs. the week after

# Call to action

- Don't turn off IPv6: don't view problems as an excuse to avoid change
- Ask your vendors for IPv6 support
  - Don't take 'no' for an answer, it's a lie -> they're avoiding and deflecting
  - Factor the cost of not supporting IPv6 into the cost of ownership
  - Consider a vendor's commitment to IPv6 if `www.<vendor>.com` has no AAAA record

## Call to action: make your application reachable

- Get a unique IID <- centralized address allocation is a thing of the past
- Configure a static IP with your network prefix plus your unique IID
- Register a domain record for your static
  - Soft start: only configure <your domain>.ipv6.vt.edu for testing
- Make sure your certificates include both ipv6 and ipv4 specific domains
- Configure your system to source connections from temporary addresses
- If your application is only reachable from campus for legacy, equivalent policies can be configured for IPv6
- <https://hostmaster.cns.vt.edu/node2/#ipv6>

# Common excuses and objections

- Not my problem
  - You may not retire before legacy goes away
  - Do you really want to burden your successor with implementing under the gun?
- Why do we need IPv6
  - Internet works because the protocols and infrastructure are free to use
  - Addressing should be a common good, like air.
  - Legacy address scarcity separates the world into haves and have-nots and creates perverse economies that prey on the have-nots
  - Innovation is stifled in an economy of scarcity
- IPv6 is soooooo much harder, why does the address look funny?
  - Why do you care what the addresses look like?
- 'NAT' with fix this
  - Not even close
- 'Network security'
  - Network filtering and firewalling is at best only a secondary control. IPv6 is no worse than legacy to secure. (It's probably better.)

# Questions and link dump

- <https://vtx.vt.edu/articles/2023/02/moving-internet-beyond-boundaries-ipv6.html>
- <https://hostmaster.cns.vt.edu/node2/#ipv6>
- vt-ipv6-g@vt.edu
- eric.brown@vt.edu

