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# DREN IPv6 Update

Internet2 Joint Techs, Summer 2011

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Fairbanks, AK

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# Topics today

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- The big issues (for us)
- Network Management over IPv6
- World IPv6 Day observations



# The major issues for us

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- Lack of IPv6/IPv4 feature parity
  - taking too long to get there
- Vendors not eating own dogfood
  - but starting to turn around
- Privacy Addresses (RFC4941)
  - no good solution yet
- MacOSX 10.6
  - but starting to get much better (10.6.8, 10.7)
- Network Management over IPv6



# Network Management

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- Most products cannot be managed over IPv6
- We've been trying to do ALL network management using IPv6, so we can remove IPv4 from the management networks.
- We think we can succeed by Sept 2011
  - But we've had to remove various vendors' products from our networks



# Mgmt LAN over IPv6

- Goal – Management LAN IPv6-only (see previous talks)
- Status:
  - Switches: removed all IPv4 configuration from all (over 500) switches at one campus.
    - other campuses in process of doing same
  - Routers: using only IPv6 for most functions, but awaiting fixes or features
  - monitoring: went with Gigamon instead of Anue
  - sensors: all IPv6, including the DRAC ports
  - UPSs: replaced all APC hardware, now all managed over IPv6
  - management/admin tools (apps): still dual stack to accommodate remaining few IPv4-only devices.
  - replacing some old hardware that will never get IPv6 support
- Upcoming milestone:
  - remove all remaining IPv4 configurations (no more lifeline).
  - Sept 2011?
- Remaining issues
  - Lack of unified IP MIB support (RFC 4293) in most products



# Management over IPv6 in some mainstream products

|         | SSH<br>HTTPS | DNS   | Syslog | SNMP  | NTP   | RADIUS | Unified MIB<br>RFC4293 | Flow export | TFTP<br>FTP | CDP<br>LLDP |
|---------|--------------|-------|--------|-------|-------|--------|------------------------|-------------|-------------|-------------|
| Cisco   | Green        | Green | Green  | Green | Red   | Red    | Red                    | Red         | Green       | Red         |
| Brocade | Green        | Green | Green  | 1     | Green | Green  | Green                  | 2           | 3           | 4           |
| Juniper | Green        | Green | Green  | Green | Green | Green  | Red                    | 5           | Green       | Red         |

1. Lack IPv6 ACL support
2. Can't specify router-ID as IPv6 on MLX product
3. firmware bug in FastIron products
4. but not in MLX
5. not in all products.



# Incentives

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- DREN3 RFP (Jan 2011)
  - “DREN is identified as an IPv6 network with IPv4 legacy support”
  - “Additionally, all network management shall be enabled using IPv6”



# World IPv6 day

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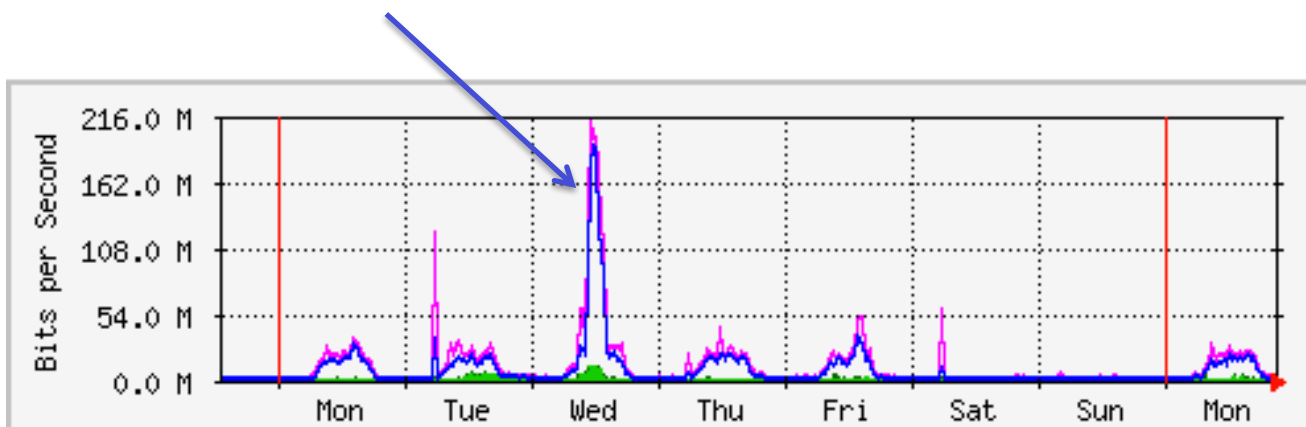
- For DREN and SPAWAR, nothing new to turn on for the day
  - every day is IPv6 day for us
- What does it look like from an enterprise perspective, where ALL clients (users) are dual-stack?
  - well, 99% actually





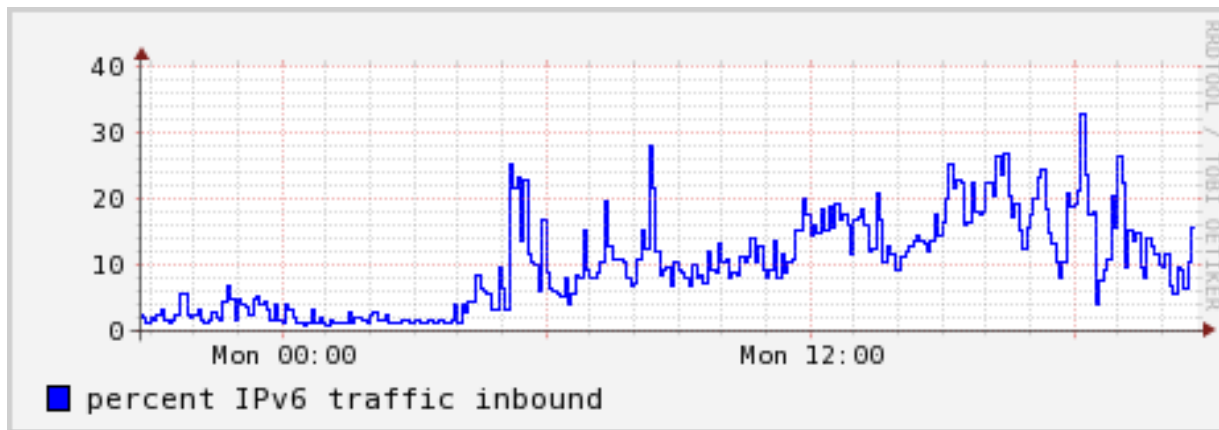
# Percentage of Internet traffic over IPv6

- 1% (2009, before Google whitelisting)
- 2.5% (Google whitelisted)
- 10% (late Jan 2010, Youtube added)
- World IPv6 day... (peak at 68%)



# After IPv6 day

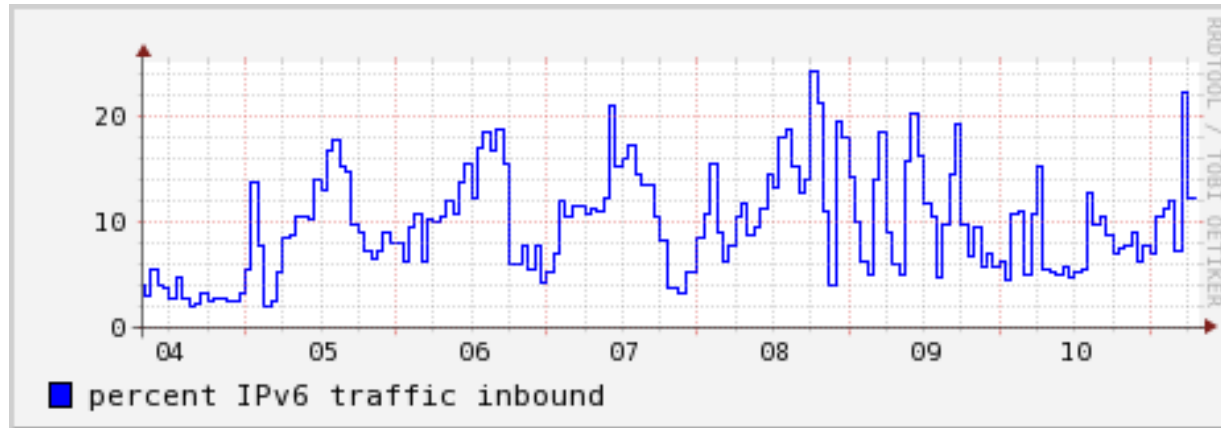
- Percentages across a day (5 min averages):



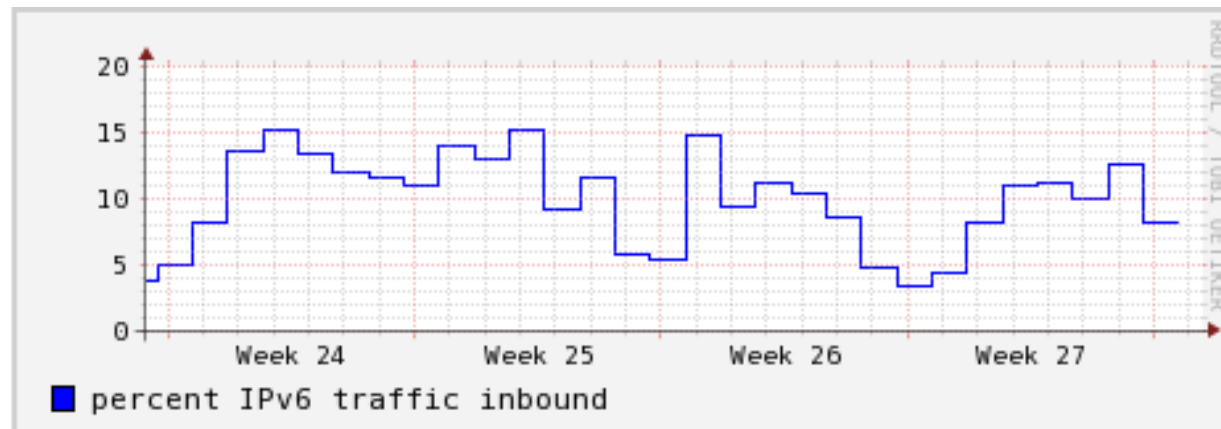
- Why higher during the work day?

# After IPv6 day

- Past week (hourly averages):

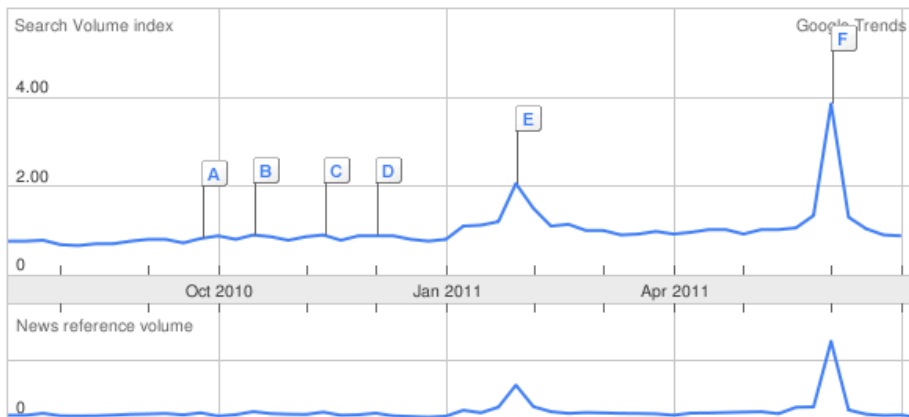


- Month (daily averages):





# From Google Trends



- A [Too Little, Too Late: The Feds call for IPv6](#)  
ZDNet - Sep 29 2010
- B [Blue Coat Chief Scientist to Discuss Internet Security and IPv6 at Australian IPv6 Summit](#)  
MarketWatch - Oct 18 2010
- C [Cisco Extends Market Leadership in IPv6 With Industry and Government Certifications](#)  
MarketWatch - Nov 17 2010
- D [Verizon Launches IPv6 Transition Services](#)  
PC World - Dec 8 2010
- E [Net powers: IPv4 is over. All hail IPv6!](#)  
CNET - Feb 3 2011
- F [Happy World IPv6 Day!](#)  
CANOE - Jun 8 2011



# Other observations

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- DoD
- NIST
- Proxy/Translators
  - how do we make sure they are only temporary?