IPv6 in the DREN III acquisition

Ron Broersma

DREN Chief Engineer

Background

- DREN = "Defense Research and Engineering Network"
  - The DoD wide area network (WAN) supporting the R&D, T&E, HPC, M&S, and other communities and networks.
- DREN III
  - The 4th generation of DREN
  - prime contract awarded to CenturyLink (Qwest) Dec 2012, built during 2013, customer migrations over the last 9 months. A 10-year service contract.
- DREN and IPv6
  - Testbed: January 2001.
  - Full production: July 2003.

The Acquisition

- Performance Based Acquisition
  - Requirements specified in a PWS (Performance Based Work Statement).
  - PWS developed during 2010
  - RFP released January 2011
- IPv6 requirements specification based on 10 years of experience of acquiring and operating IPv6 networks and components.

Acquiring IPv6 capable products

- Vendors will say that their products support IPv6, or are IPv6-capable.
  - This means almost nothing.
- Lessons learned over 10 years:
  - All products lack IPv4/IPv6 feature parity
  - Vendors aren't "eating their own dogfood"
  - IPv6 bugs and missing features do not get resolved unless company has strong corporate commitment to IPv6, or there is airtight contractual language that requires it.

Doesn't the FAR and USGv6 help?

- The FAR and USGv6 profile are very important, but not sufficient to address the issue.
  - Contacting officers don't enforce FAR IPv6 policy.
  - The FAR IPv6 policy apparently applies to equipment and systems, not "services".
- Unless the contractual requirements specification directly addresses IPv6, and the provider is held to those requirements, you will not get fully capable IPv6 products and services.

DREN IPv6 contractual requirements

- DREN III is an IPv6 network, with legacy support for IPv4.
  - Establish the vision, set the bar.
- IPv6 must work as good as or better than IPv4.
  - this is measurable, and enforceable.
- Must not deploy anything in the network that does not comply with this requirement.
  - non-compliant components can be rejected.
- All network management functions are IPv6-only (no IPv4).
  - no cheating.

Actual language from PWS

DREN III RFP (Jan 2011)

"DREN is identified as an IPv6 network with IPv4 legacy support. Therefore, all systems, software, and equipment supporting the DREN network and its services shall handle IPv6 in an equivalent or better way than current IPv4 capabilities, performance, and security. No systems, software, or equipment shall be deployed on the DREN that does not meet this requirement. Additionally, all network management shall be enabled using IPv6."

How well did this approach work?

- During acceptance testing, lack of IPv6 support was identified in various products and services. Examples:
  - large network management product was missing IPv6 support, and had to be replaced.
  - 2-factor authentication lacking IPv6 support, will need to be replaced.
  - and many others
- All exceptions are tracked, and must be resolved, with deadlines. Many resolved already.
- All use of IPv4 addresses on the management network is tracked until removed.
- Summary: the approach works.

Other observations

- DREN III requires that all customers connect with dual-stack (IPv4 + IPv6), run BGP, support jumbo frames, and support 802.1q “tagging”.
- We thought the big problem for some customers was going to be routers and other CPE that didn’t support IPv6.
- Surprisingly, IPv6 was supported in all customer products we interfaced with.
  - even if those customers didn’t care about IPv6, nor had ever tried to make their network support IPv6, nor tried to purchase IPv6-capable products.
- Lesson: mainstream products have basic IPv6 support today.

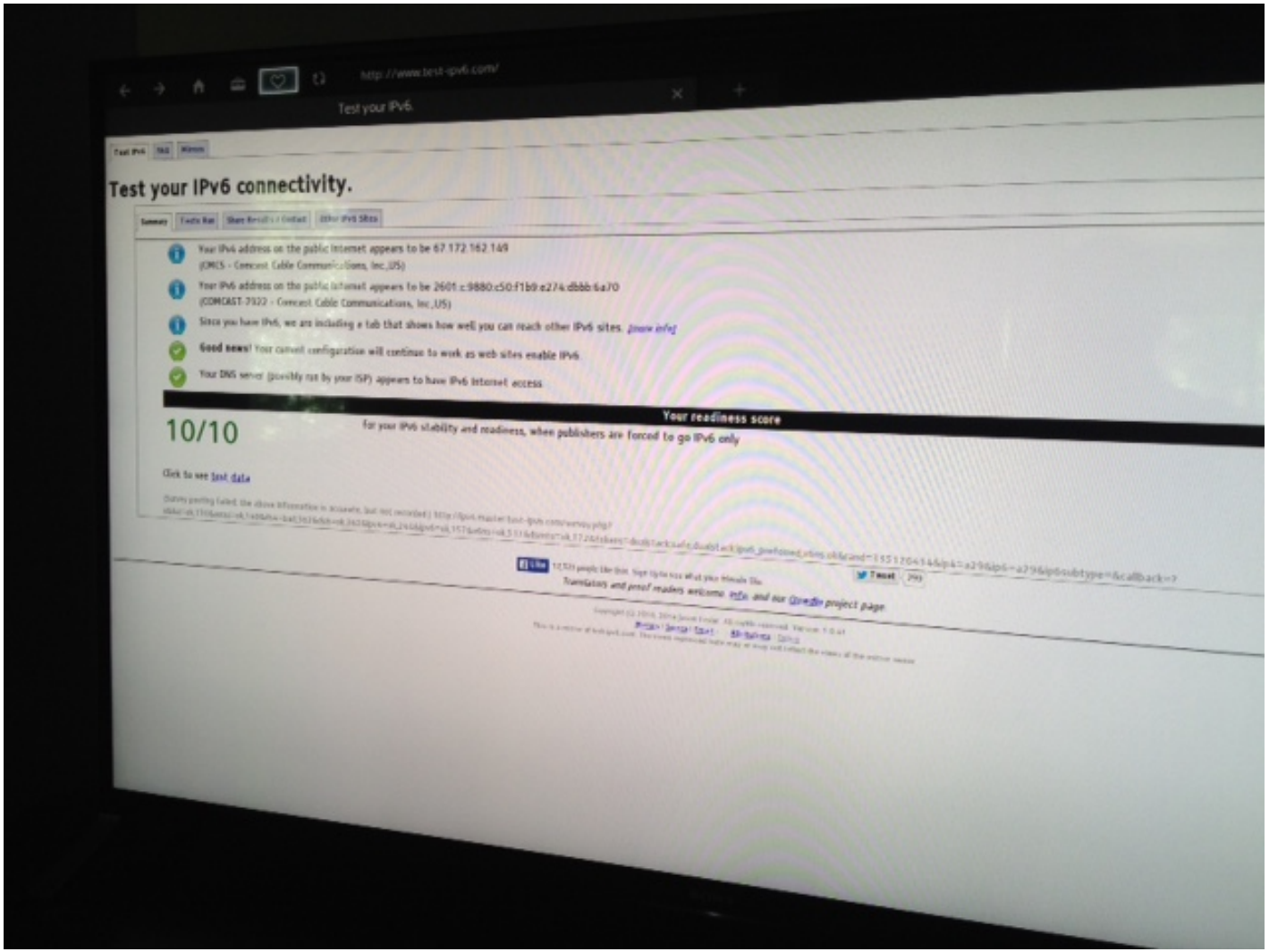
Evaluating new products

- Our #1 rule:
  - if we can't get to the company or product website via IPv6, we won't consider such products.
- Why this hard line?
  - we learned the hard way that without strong corporate commitment to IPv6 support, it will take forever to get IPv6 bugs fixed or features added.
  - we learned that the corporate website being IPv6-enabled was a good indicator of corporate commitment to IPv6.
  - this has been tested many times, and it works.
  - in the process, we encourage industry to IPv6-enable their public facing services.
- Examples
- #2 rule:
  - Test products in production in your network.

Summary

- Basic IPv6 capabilities are in all mainstream products today.
- If you want full-featured IPv6, you need clear, measurable, binding contract language.
- Don't rely on the FAR or contract officer to get you want you want.
- Don't deal with companies that lack strong corporate commitment to IPv6, or aren't eating their own dogfood.

Final Anecdote



End

Contact me:

ron@dren.hpc.mil