IPv6 OMB Compliance & Implementation

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Business Transformation One Step at a Time

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Why does this agency need IPv6?

This specific client is, at the simplest, a colocation facility/service.

- And “customers” will, increasingly, benefit from *(or actually require)* IPv6 communications.
- The usual: growth, scalability, future-proofing, more addresses …
- Because they “are supposed to” per a couple mandates …

Special Consideration

- Any special considerations here?
  (How about your network?)
  - *Hint: Yes, almost always!*
  - Internally, this client's network is fairly modern *(Good)*
  - Proxies, Firewalls and ACLs – Oh My!
  - Note: Any commercial ISP support this client has *(or you have)*, and their support for IPv6 *(lack thereof)*, is not "in scope" / relevant …
    - **DISA is to be the sole IPv6 connectivity w/i the DoD**

When can a DoD Component do IPv6?

- "It depends!"
- Internally, progress here has been smooth *
- Externally, progress has been … glacial
  - Perhaps saying non-existent would be more accurate? *

** - some details, real soon …*

Internal Deployment

- Internal deployment has been fairly smooth
  - DISA (/DoD NIC) has allocated addresses for our usage
    - *Lots(!) of address space, even more than you might think!*
  - A well-thought-out address plan has been developed
  - Network Infrastructure has already been configured *(Routing, Switching, some proxying, DNS, etc.)*
  - Some Servers / Services & Desktops have been piloted and are live *(Note again: internal-only!)*
  - **Anyone think there could be a problem deploying internally in advance of the external / real connectivity?**

‘Positive’ take-aways

- Fairly smooth, but not perfect:
  - Most of the infrastructure was “IPv6 ready” *
  - Several devices needed to be upgraded (SW, HW)
  - Some devices don’t do certain IPv6 functions “quite right” **
  - Some devices don’t (yet) support IPv6
  - Some device won’t (ever?) support IPv6

*** Maybe we can define “ready”?**

****And maybe give an example or two?**

What is IPv6 Ready?

- What does this word – “Ready” – mean to you?
  - In the context of IPv6 Readiness, several factors:
    - Know your infrastructure *(as-is and to-be)*
    - Understand the requirements you operate under
      - NIST USGv6, DoD UCR, etc.
    - Understand functional needs of your environment
      - In terms of standards (RFCs), but also “supporting functions”
  - And the tracking of this “readiness” over time as things change …

What is IPv6 Ready?

- Context: Identify what you need:

1772	*C-7*	R	Application of the Border Gateway Protocol in the Internet	**Notes:**
1981	*R*	R	Path MTU Discovery for IPv6	**C/R-1: Meets**
2404	*R*	R	The Use of HMAC-SHA-1-96 within ESP and AH	**C/R-2: Meets**
2407	*R*	R	The Internet IP Security Domain of Interpretation for ISAKMP	**R-3: Meets or**
2408	*R*	R	Internet Security Association and Key Management Protocol (ISAKMP)	**R-4: Requiren**
2409	*R*	R	The Internet Key Exchange (IKE)	**C-5: Conditio**
2460	*R-2*	R	Internet Protocol, Version 6 (v6) Specification	**C-6: Applies**
2464	*R-3*	R	Transmission of IPv6 Packets over Ethernet Networks	**C-7: Requiren**
2473	*C-7*	R	Generic Packet Tunneling in IPv6 Specification	**C/R-8: El (soft**
2474	*R-4*	R	Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers	*** This column**
2545	*C-7*	R	Use of BGP-4 Multiprotocol Extensions for IPv6 Inter-Domain Routing	
2710	*R*	R	Multicast Listener Discovery (MLD) for IPv6	
2711	*R*	R	IPv6 Router Alert Option	
2784	*C-7*	R	Generic Router Encapsulation	
3162	*C*		RADIUS and IPv6	

- Just the RFC parts here, but customized from the base requirements to reflect this environment's needs

What is IPv6 Ready?

- Context:
  Identify deficiencies, plan upgrades, track changes in this "Readiness"
- Note: This process *can* be very labor intensive; depends on homogeneity of the network …

OS					
		Apple	OS X	10.6	
		Sun	Solaris 10	10	x
		Sun	Solaris 9	9	x
		RH	Red Hat 6	6	x
		RH	Red Hat 5	5	x
		EMC	RSA Linux	Kernal 2.6.29.3-[illegible]	x
		MSFT	Windows Server	2003	
		MSFT	Windows Server	2008	x
		MSFT	Windows	7	x
Router					
		Cisco	ASR 1004 (RP-1)	15.2(1)S2	x
		Cisco	Cisco 7204VXR (NPE-G1)	15.1(4)M4	x
		Cisco	Cisco 7206VXR (NPE-G2)	15.1(4)M4	x
		Cisco	Cisco 7206VXR (NPE400)	12.4(25f)	x
RSA					
		EMC	RSA Service	3.0.4.14	
Switch					
		Cisco	WS-C3560E	12.2(58)SE2	x
		Cisco	WS-C3560G	12.2(58)SE2	x
		Cisco	WS-C6509E (Sup 720-3B)	12.2(33)SXJ3	x
		Cisco	/S-C4510R (SUP-2PLUS-10GI	15.0(2)SG4	x
		Cisco	/S-C4507R (SUP-2PLUS-10G	15.0(2)SG4	x
		Cisco	Nexus 5010	5.0(3)N1(1b)	x
		Cisco	Nexus 5020	5.0(3)N1(1b)	x
		Cisco	Nexus C2148T (FEX)		x
		Cisco	NexusC2248TP (FEX)		x
		Cisco	Nexus7K		x
Firewall					
		Cisco	ASA5540	8.2(5)33	x
		McAfee	Sidewinder FW-1100F	8.x	
/ Analytics					
		Splunk	Splunk	5	
		Gigamon	Gigamon		x
		WebTrends	WebTrends		
		Sourcefire	Sourcefire	5.1	x
Mail					
		Sun	Sendmail	8.12	x
		MSFT	Exchange	2003	
		MSFT	Exchange	2010	x
		McAfee	Ironmail	6.7.2	x
DNS					

Deployment Ready

- For the components that were “Ready”
  - Deploy!
    - Mitigate identified / expected problems
      - You identify these by doing your inventory, assessment & supporting vendor research!
      - *(Gratuitous Plug: “Or by having us do it for you” …)*
    - Identify *(+mitigate?)* unexpected problems during the deployment
      - Channeling Ron Broersma here:
        “Break some glass”
        - » But within reason.
          In other words: Testing your deployment on your Production network may be, shall we say, sub-optimal.

Infrastructure Issues

- Problems
  - Several devices don't do certain IPv6 functions "quite right"
    - Link Local Addresses (LLAs) seem to be a not-uncommon problem area – not using them, or not using them properly.
  - A few devices don't (yet) support IPv6
    - Where is that code upgrade? *Q4-2012 has come and gone!*
  - A couple devices / services won't support IPv6
    - *Period. Fail. Do they know it is 2013??*
    - These will all remain IPv4-only until replacement. *Soon!?*

Biggest Problem

- External connectivity is dependent upon DISA
- DISA currently provides the following IPv6 connectivity options:

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Sorry, but seriously: DISA requires that we use only them for IPv6 connectivity - but they cannot provide (anyone) this connectivity yet.

And they may make us renumber. #*Venting*

Final Thoughts

- *One last thing …*
- Consider setting the following (high-level) goals:
  - Get external facing + external reaching components dual-stacked as soon as feasible
    - *AKA: "meet the mandates" (OMB 2012, 2014)*
      - *Even if you already missed 2012, you should ("must") meet both!*
  - Get as much of the internal-only 'stuff' transitioned to IPv6-only as soon as feasible
    - *AKA: "minimize the dual-stack headache"*
      - *Yes, I said IPv6-only. And I am not joking …*

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