

IPv6/VSE and z/VSE

- WAVV 2011

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IPv6/VSE and z/VSE

- TCP/IP-TOOLS is now ...

IPv6/VSE

- Existing customers upgraded at
No Charge

Introducing IPv6/VSE

- Announced at WAVV 2009
- GA Build 246 May 2009
- GA Build 250 of IPv6/VSE is now available
- Large number of 3rd party vendors now working with IPv6/VSE

News Flash!

- IBM licenses IPv6/VSE from BSI
5686-BS1 is IBM IPv6/VSE
Announced April 6, 2010
Available May 28, 2010
- IPv6/VSE now provides IPv4 too!
Announced Oct 5, 2010
Available Nov 26, 2010
- IPv6/VSE APAR: PM32167
PTF: UK64554 available 3-Mar-2011

April 15, 2009

CEO/Executive Name
Organization Name
Postal Address Block

SUBJECT: Notice of Internet Protocol version 4 (IPv4) Address Depletion

Dear [Addressee],

This letter concerns the fact that Internet Protocol version 4 (IPv4) addresses are running out and calls your attention to what we are doing about it. You are receiving this letter as your organization currently utilizes IPv4 number resources. [1]

IP addresses are the numbers behind domain names and are essential to the Internet. In May 2007, the American Registry for Internet Numbers (ARIN) advised the Internet community on IP address depletion in what is called Internet Protocol version 4 (IPv4) [2]. At the current rate of consumption, IPv4 will be depleted within the next two years [3]. After that, organizations that need additional IP addresses will need to adopt IPv6, a newer version of the Internet Protocol that provides a much larger pool of address space.

Please note the following two important items:

1. You should begin planning for IPv6 adoption if you are not doing so already. One of the most important steps is to make your organization's publicly accessible resources (e.g. external web servers and e-mail servers) available via IPv6 as soon as possible. This will maintain your Internet connectivity during this transition. For more information on IPv6, please refer to ARIN's online IPv6 Information Center [4].
2. ARIN is taking additional steps to ensure the legitimacy of all IPv4 address space requests. Beginning on or after 18 May 2009, ARIN will require applications for IPv4 address space to include an attestation of accuracy from an organizational officer. This ensures that organizations submitting legitimate requests based on documented need will have ongoing access to IPv4 address space to the maximum extent possible.

Please feel free to contact ARIN if you have any questions regarding this notice. Send e-mail to hostmaster@arin.net or call the registration services helpdesk at 703-227-0660.

Sincerely,

John Curran
Chairman, Board of Trustees
American Registry for Internet Numbers

IPv4 Addresses Remaining

- No address blocks

Jan 11, 2011

Complete allocation
by May 2011

All IPv4 Addresses
allocated!



Why IPv6?

- IPv4 Addresses Running Out
- Completely Allocated by 2H 2011
- Already difficult to obtain IPv4 Address blocks
- Begin Planning for IPv6 Now
- No Drop Dead Date
 - It's not like Year 2000
- IPv6 Co-Exists with IPv4
 - IPv6 is NOT backward compatible

Introducing IPv6/VSE for z/VSE

- Internet Protocol Version 6
- IPng (IP Next Generation)
- IPv6 TCP/IP stack (April 2009)
- IPv4 TCP/IP stack (May 2000)
- IPv4 and IPv6-Enabled Application Suite
- TCP/IP-TOOLS is now IPv6/VSE!

IPv6/VSE IPv6 Applications

- FTP server, FTP client
TN3270E server and print drivers
NTP server, NTP client
System Logger client
Batch Email client
Batch LPR
Batch Remote Execution Client
Batch PING
GZIP Data Compression
PDF Generation
- And more ...

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IPv6/VSE IPv4 Support

- CICS TS Web Services
- CICS TS Listener
- z/VSE Connector Client and Server
- VTAPE
- DB2 Client and Server
- 3rd Party Vendor Applications
- And Much More ...
- Many Years of Support (TCP/IP-TOOLS – 1996)

IPv6/VSE and z/VSE 5.1

- Support for 64-virtual storage
- Large TCP windows
64K is default
1MB, 2MB, 4MB or 8MB optional
- IPv6-Enabled ASM SOCKET API
Supports 64-bit virtual addresses
- EZASMI API
Support 64-bit virtual addresses

IPv6/VSE and z/VSE 5.1

- Performance Improvements.
Increased TCP transfer throughput.
30-50% increase (or more!).
- Multiple Domain Name support
Permits using multiple DNS suffixes
- VLAN Support
- Many updates and enhancements
- And more ...

IPv6/VSE Large TCP Windows

Large TCP Windows

	64K window		4MB window	
Test 1	117s 4.1MB/s		48s 10.1MB/s	
	127s 3.8MB/s		48s 10.1MB/s	
	overall 7.6MB/s		overall 20.3MB/s	+267%
Test 2	98s 4.9MB/s		44s 11.0MB/s	
	107s 4.5MB/s		29s 16.8MB/s	
	Overall 9.1MB/s		overall 22.1MB/s	+241%

IPv6

- IPv6 uses 16 byte addresses
- Presentation format is colon/hexidecimal

- For example

FEDC:BA98:7654:3210:0756:4228:1228:1641

1080:0000:0000:0000:0008:0800:200C:0417

1080:0:0:0:8:800:200C:417 (shortened)

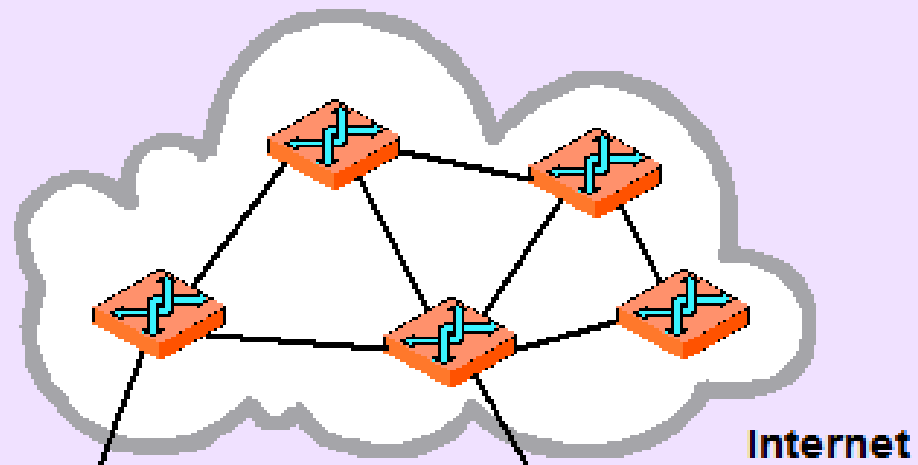
1080::8:800:200C:417 (compressed)

- ::1 is the loopback IPv6 address
- :: is the unspecified IPv6 address

IPv6

- Network interfaces have 2 IPv6 addresses
 - Assigned (global) IPv6 address
 - FD00:806:1::1:2
 - Link Local IPv6 address
 - FE80 ++ Mac Address (02000000000008)
 - FE80:0:0:0:0200:0000:0100:0008
 - FE80::200:0:100:8

Global Scope (14)

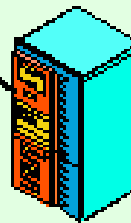
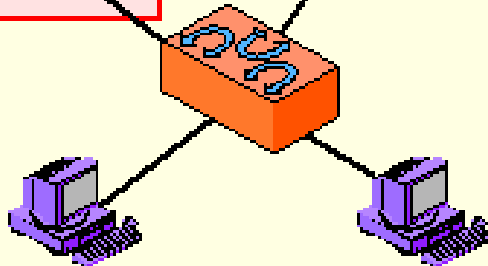


Organization-Local Scope (8)

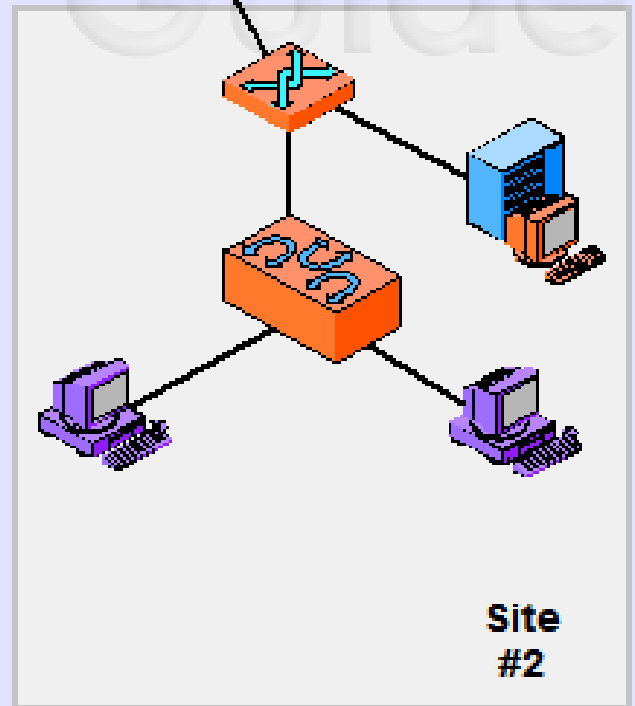
Site-Local Scope (5)

Link-Local Scope (2)

Node-Local Scope (1)



Site #1



Site #2

Deployment Issues

- Transitioning to IPv6...
- Contrary to popular belief, IPv6 is not backward compatible...

Dual IP Stacks

- Simplest method: Both stacks in parallel
- in hosts and routers
- Upgrade routers, and host OS
Host upgrade can be gradual
- Application support:
Existing applications continue to run
IPv6 applications can be introduced
- Interoperation of v4 and v6 is another issue
- Applications to be modified to handle both?
- Hmm ...

IPv6/VSE IPv6 Support in z/VSE

- Requires z/VSE 4.2 (DY47077)
z/VSE 4.2+ requires a z box
- Requires IJBOSA at DY47077 (or higher)
- OSA Express interface
QDIO mode only!
- Hipersocket interface
- CTCA Linkage to Linux on zSeries
- 6in4 Tunneling Driver
 - Useful for testing and transition

IPv6/VSE IPv4 Support

- VSE/ESA 1.4+, z/VSE 3.1+
- CTCA, CLAW, LCS, OSA, OSA/2 Devices
- QDIO Support via IJBOSA
 - OSA Express (1, 2, 3)
 - Hipersockets

IPv6 Support

- IPv6/VSE Product
- New TCP/IP stack
- Separate partition
- Separate stack ID
- Uses new C compiler
Faster code
Full ESA/390 Instruction set
- IBM IPv6/VSE GA May 2010

IPv6/VSE

- Dual stack configuration
- Continue to run existing applications
- Introduce IPv6 applications
- Gradual transition
- Simple conversion of applications
ASM SOCKET API
EZASOKET, EZASMI

IPv6/VSE Applications

- All applications IPv6-Enabled and Ready
- FTP server, FTP client
- TN3270E server and print drivers
- NTP server, NTP client
- System Logger client
- Batch Email client
- Batch LPR
- Batch Remote Execution Client
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- PDF Generation
- And more ...

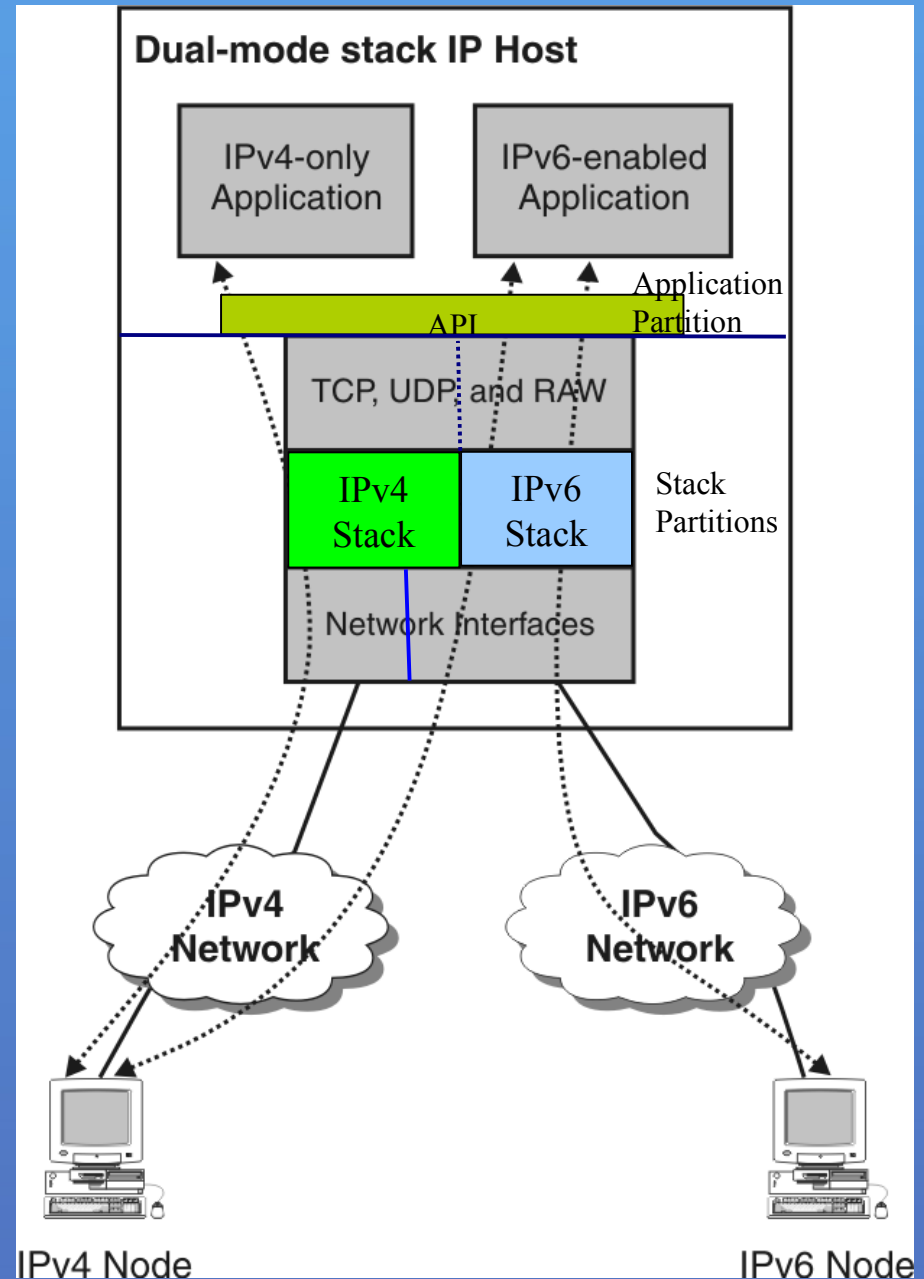
IPv6/VSE Manuals

- IPv6/VSE IPv4 Installation Guide
- IPv6/VSE IPv4 Users Guide
- IPv6/VSE IPv6 Installation Guide
- IPv6/VSE IPv6 Users Guide
- IPv6/VSE Programming Guide
- IPv6/VSE Design and Flow
- Messages and Codes
- Debugging Guide

BSI Pseudo-Dual-Mode Stack Implementation

Although there are actually two stacks running in two separate partitions, the Application Programming Interface (API) phase (located in the application partition) controls which stack is used for a specific request.

The application thinks it is talking to a single dual-mode stack, yet the stacks are isolated from each other for enhanced performance and reliability.



IPv6/VSE

- Updated CONTROL Call
GETVENDORINFO
- Returns ...
 - 'BSIIPv4' for IPv4 interface
 - 'BSIIPv6' for IPv6 interface
- If error then assume IPv4

IPv6/VSE

- IPv6-Enabled ASM SOCKET API
- Simple change to ASM SOCKET API
- Enabled by moving a C'6' to the 1st byte of the ECB (SRBLOK) Field
- IPv4 uses Fullword IP address
- IPv6 uses Address of SAS
 - SAS is Socket Address Structure
- See IPv6/VSE Programming Guide

BSI and IBM IPv6/VSE and z/VSE

- EZASOCKET and EZASMI API
- BSI API is ... z/VSE 4.2 (DY47077)
- Full z/OS 1.9 and z/VSE compatibility
- API's support both IPv4 and IPv6
- Other APIs to come as needed
BSD/C, LE/C, etc.
BSI simply maps these calls into EZA

Getting Started ...

- IPv6/VSE ... Check
- z/VSE 4.2.2 ... Check
- zSeries machine to run it ... Check
- Network Interface ... Check
 - OSA Express in QDIO mode
 - Hipersockets
- Cool! I'm ready to go ... Right?

What Else is There?

- The OSA Adapter connects to ...
- Switches and Hubs!
- Do they support IPv6 Ethernet Frames?
- Check every single Switch/Hub
 - Some Switches do not support IPv6

What Else ...

- The Switch connects to ...
- A Router!
- Does the Router support IPv6?
- Extra Charge Item?

One More Step ...

- The Router connects to ...
- A Firewall
- Does the Firewall support IPv6?
- Many do not. May need to upgrade.

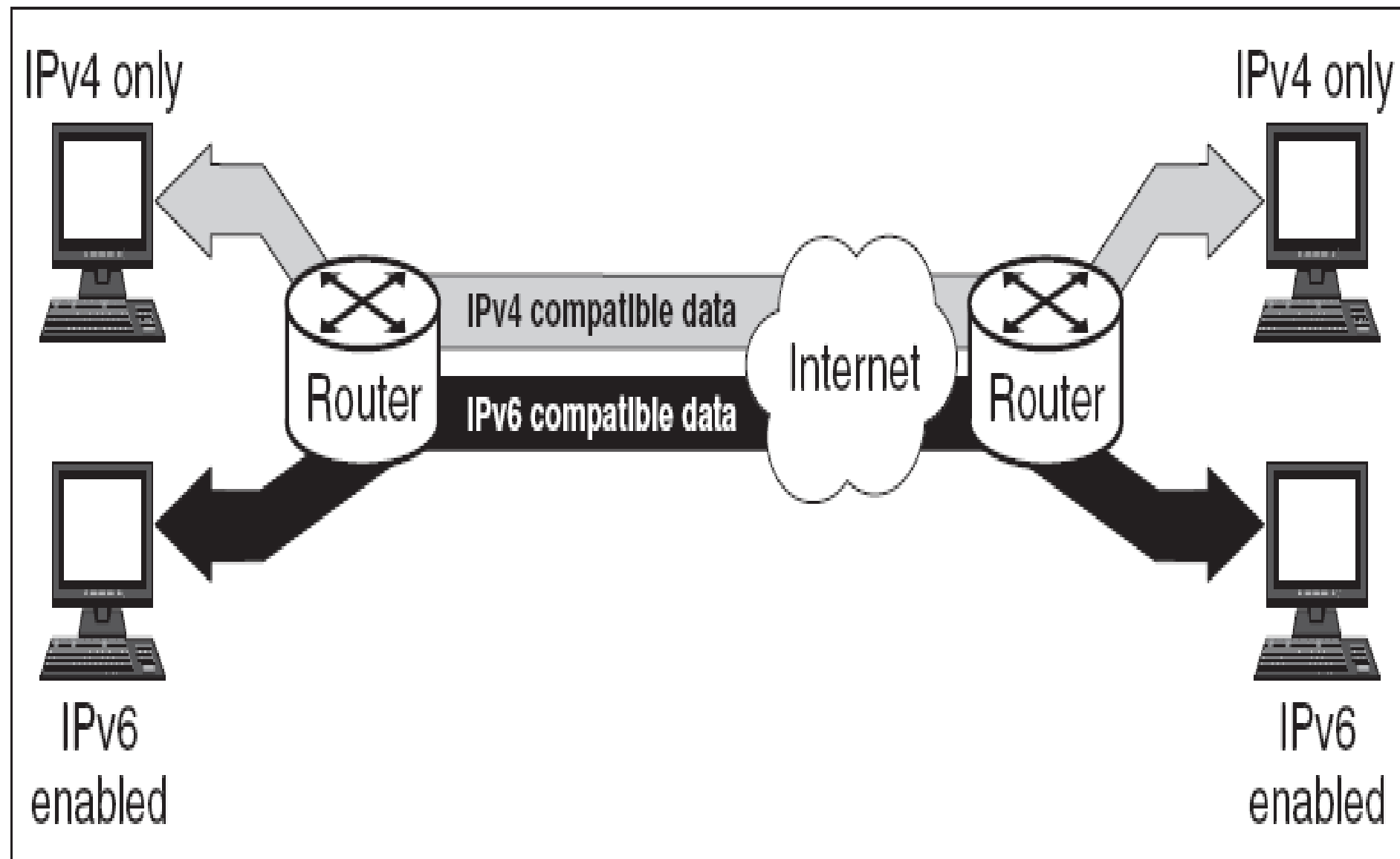
OK, Go On ...

- The Firewall connects to ...
- A modem (DSL, Cable, T1, etc.)
- Does it support IPv6?
- Lots do not

Finally, The Outside World

- The Modem connects to ...
- Your ISP!
- Does your ISP support IPv6?
- Want to bet?
 - Europe is ahead of the US
 - Comcast just started field testing

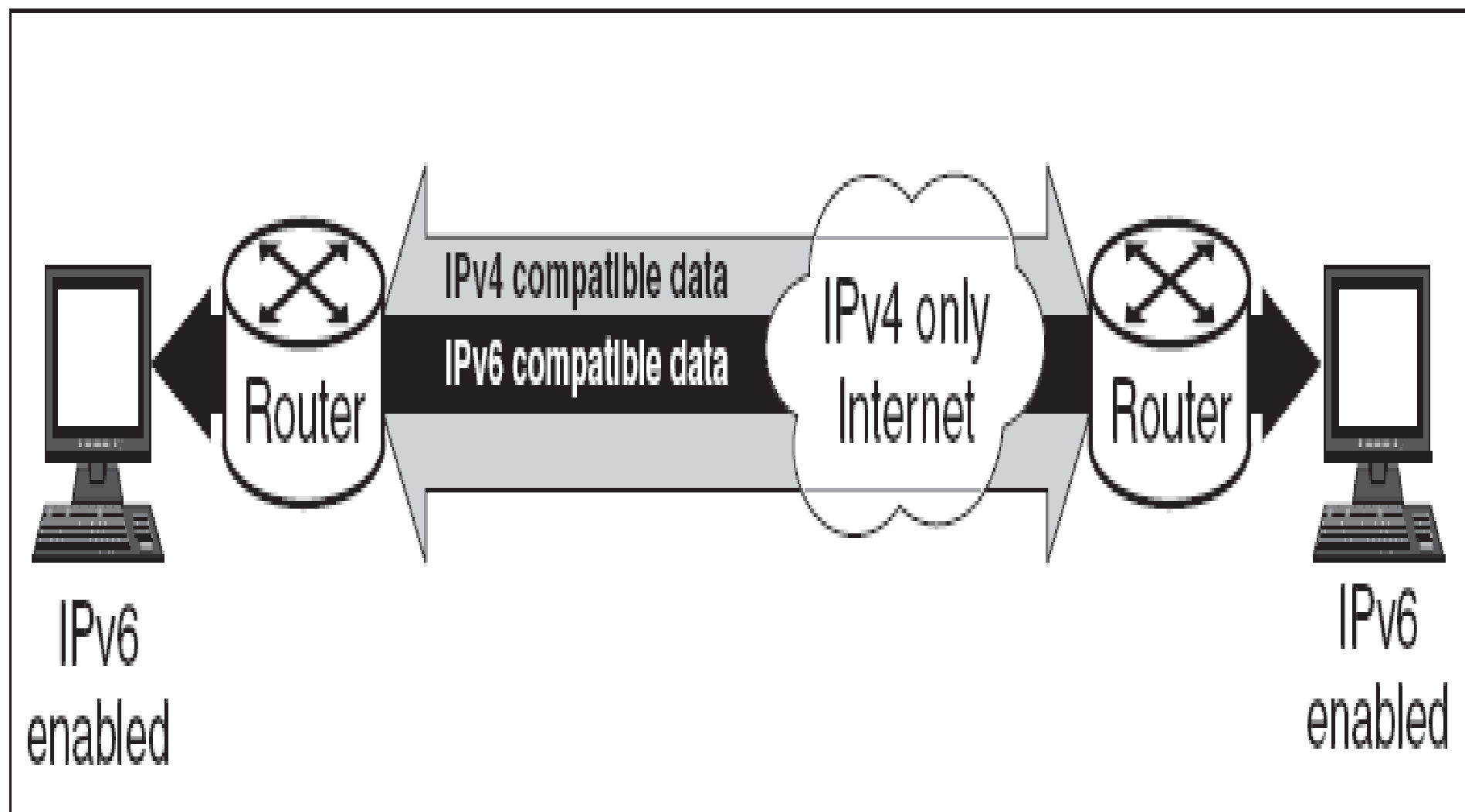
Figure 6: Example of a Dual Stack Network



Oh, No ISP support!

- Tunneling is an Option
- Used for Testing and Transition
- What is Tunneling?
 - IPv6 packets carried in IPv4 packets
 - IPv4 Protocol 41 IP packets
- 6in4 via Tunnel Broker
- 6to4 via Automatic

Figure 7: Example of Tunneling IPv6 Traffic inside an IPv4-Only Internet



Source: GAO.

Static Tunneling

- 6in4 via Tunnel Broker
- Free
- Broker provides prefix
- Broker handles routing
- Dlink DIR-825

Automatic Tunneling

- 6to4 Automatic Tunneling
- Easy to use
- Packets sent to 192.88.99.1
- 192.88.99.1 is relay anycast address
- ISP sends packets to Relay Router
- 2002:IPv4:IPv4::/48 Prefix
 - E.g., 2002:C0A8:0101::1

OK, I have Connectivity

- What about my PC's?
- Simple question, right? Wrong!
- Linux is pretty easy. Years of support.
- Unix is pretty easy too.
- Solaris? Yes.
- Check vendor support pages.

What about Windows?

- Check Microsoft support
- Good Knowledge Base articles
- Windows 95/98/98SE/NT/2000 ... Forget it
- Windows XP ... NO!
Windows XP SP3 has manual IPv6 support
- Windows Vista ... Yes but limited
- Windows 7 ... Yes and its pretty good.

Transitioning to IPv6

- * Routers
- o Backbones
- o Exchange Points
- o Regional ISPs
- o Local Networks
- + Authentication and session set up

Transitioning to IPv6

- * Servers
 - o Server farms
 - o Local Networks
 - + Authentication and session set up
- * DNS
 - o Root Servers

Transitioning to IPv6

- * Home CPE
 - o DSL Modems
 - o Cable Modems - DOCSIS
 - o Fiber Modems
 - o Mobile hand units (mobile phones)

Transitioning to IPv6

- * Applications
 - Telephony
 - Firewalls & Security
 - Databases
 - Email

IPv6/VSE and z/VSE

- Barnard Software, Inc.
<http://www.bsiopti.com>

The Barnard Software, Inc. Blog ...
Thoughts, hints and tips for using BSI
products and z/VSE.

<http://bsiopti.blogspot.com>

IPv6/VSE and z/VSE

- Questions?

IPv6/VSE and z/VSE

- Thank you!

WAVV 2011

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