

# BSI and IBM

## IPv6/VSE and z/VSE

- Jeffrey Barnard  
Barnard Software, Inc.
- <http://www.bsiopti.com>
- [jeff@bsiopti.com](mailto:jeff@bsiopti.com)
- 407-323-4773, 407-688-7123 (support)

# News Flash!

- IBM licenses IPv6/VSE from BSI
- 5686-BS1 is IBM IPv6/VSE
- Announced April 6, 2010
- Available May 28, 2010

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 After that, organizations that need additional IP addresses will need to adopt IPv6, a newer version of the Internet Protocol that provides a much larger pool of address space.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](mailto: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

# 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 4.2

- Internet Protocol Version 6
  - IPng (IP Next Generation)
- IPv6 TCP/IP stack
- IPv6-Enabled Application Suite
- IPv6 Assist Mode IPv4 stack
  - Not a full function IPv4 stack
  - usable by IPv6-Enabled applications only
- TCP/IP-TOOLS IPv4 Stack is full function

# 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)

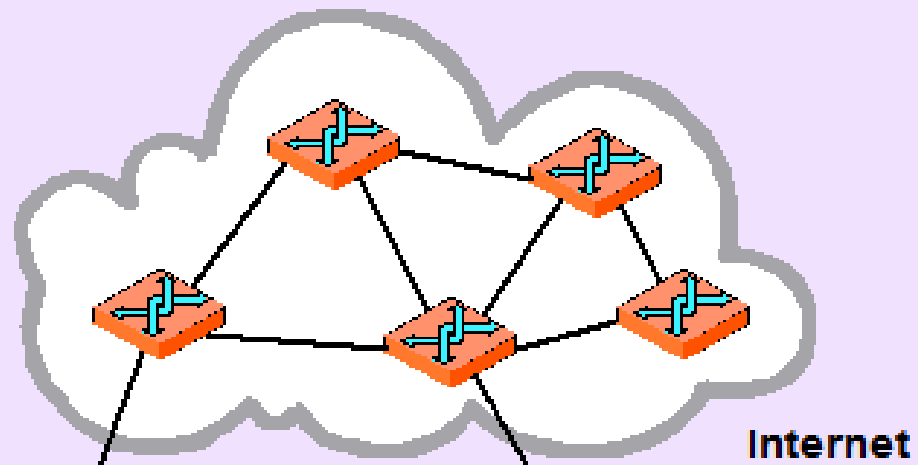
1080::8:800:200C:417 (compressed)

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

# IPv6

- Network interfaces have 2 IPv6 addresses
  - Assigned (global) IPv6 address
    - 806::1:2
  - Link Local IPv6 address
    - FE80 ++ Mac Address (020000000008)
    - FE80:0:0:0:0200:0000:0100:0008
    - FE80::200:0:100:8

# Global Scope (14)

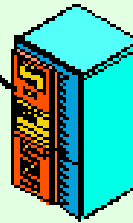
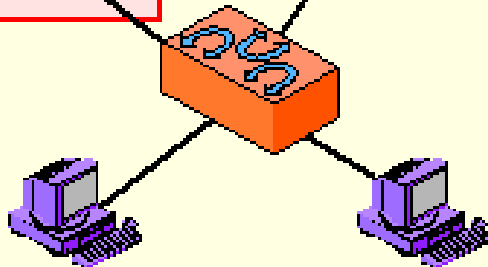


## Organization-Local Scope (8)

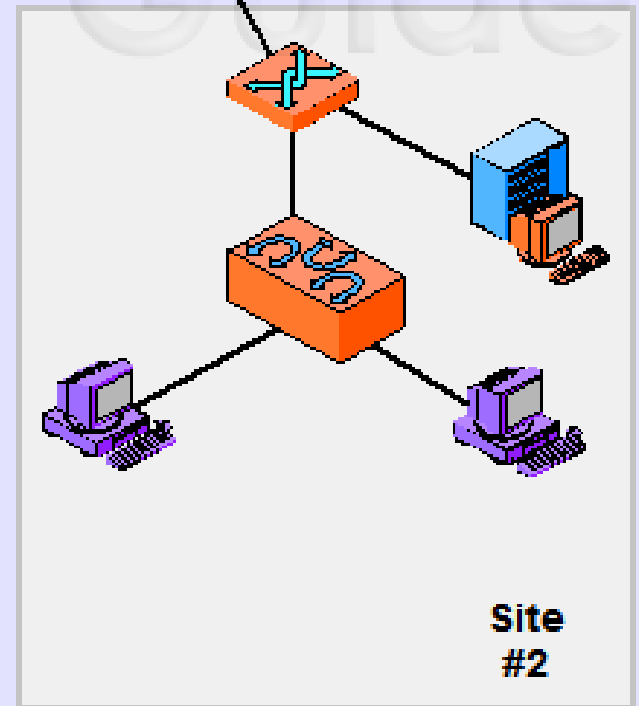
### Site-Local Scope (5)

#### 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 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

# BSI 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 Available June 2010

# BSI IPv6/VSE

- Dual stack configuration
- Continue to run existing applications
- Introduce IPv6 applications
- Gradual transition
- Simple conversion of applications

ASM SOCKET API

EZASOKET, EZASMI

# ICMPv6

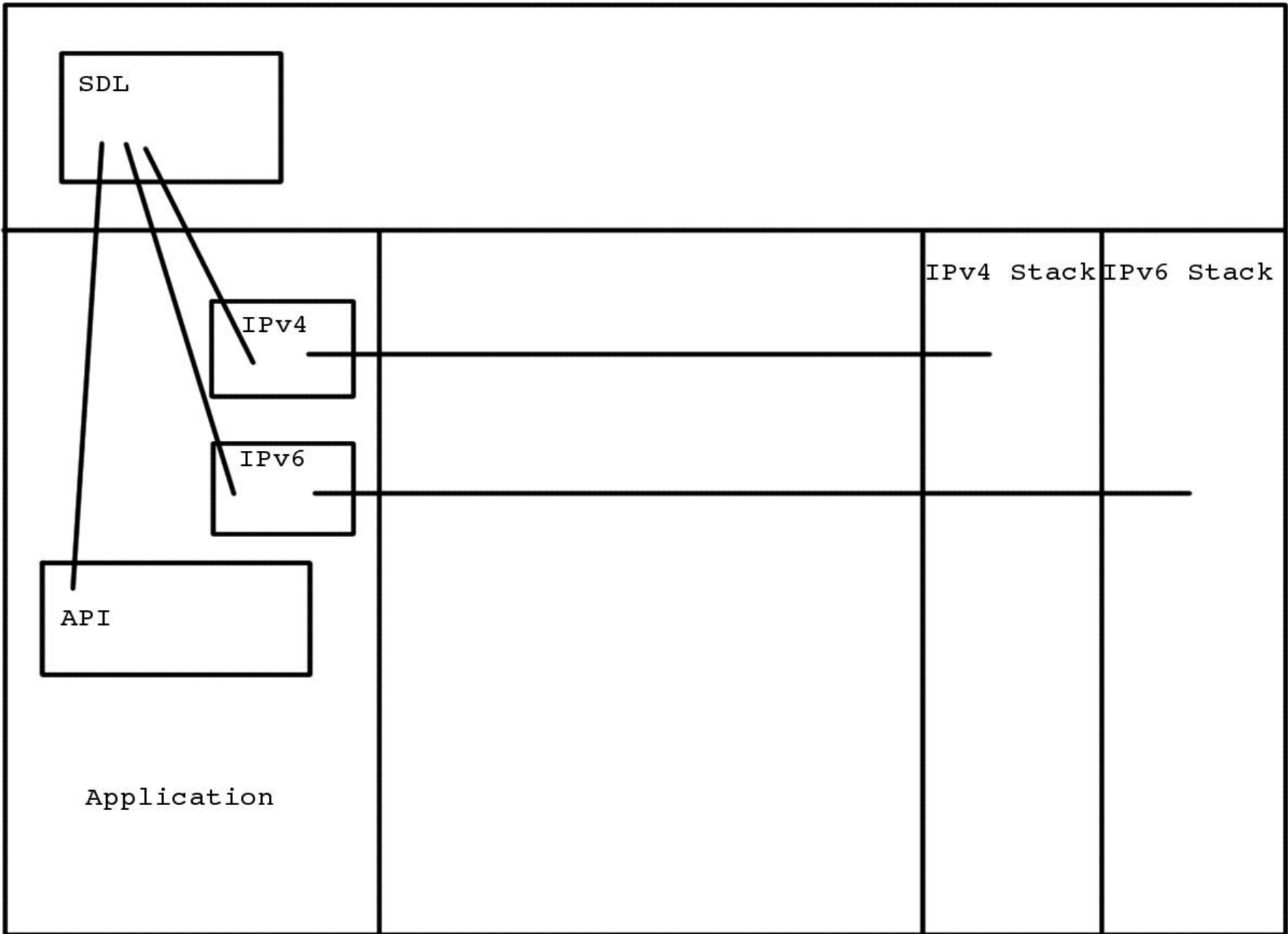
- Neighbor Discovery
  - Replaces ARP processing
  - Adds Auto-configuration
- ND Router Solicit
- ND Router Advert
- ND Neighbor Solicit
- ND Neighbor Advert
- ND Redirect/DestUnreach/TimeExpired
- ICMPv6 Echo Request
- ICMPv6 Echo Reply
- Multicast Listener Discovery (MLD)

# BSI TCP/IP Applications

- All BSI 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
- Batch PING
- And more ...

# BSI IPv6/VSE Manuals

- TCP/IP-TOOLS Installation Guide
- TCP/IP-TOOLS Users Guide
  
- IPv6/VSE Installation Guide
- IPv6/VSE Design and Flow
- IPv6/VSE Users Guide
- IPv6/VSE Programming Guide
  
- Messages and Codes
- ITAM Supplement Guide



# BSI IPv6/VSE

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

# BSI IPv6/VSE

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

```

MVC      IPFLAG,VENDBUF+6  SET IP FLAG
*
MVC      IPADDR,HOSTBUF    SET IPv4 Address
MVC      IPADDR6,HOSTBUF   SET IPv6 Address
L        R9,IPADDR         r9 ← IPv4 address
CLI      IPFLAG,IPV6A      IPV6?
BNE      IPV4              No.
LA       R1,IPADDR6       R1 ← A(IPv6)
ST       R1,IPADDR        SET ADDR of IPv6 Address
MVC      IPSAFM,-H'19'     SET SAS FAMILY
MVC      IPSAIP,IPADDR6    SET IPV6 ADDRESS
MVI      WKECB,C'6'       SET IPv6 enabled flag
LA       R9,IPSAS         r9 ← SAS
IPV4
DS       OH

```

```

SOCKET OPEN,TCP,
LOCAL=NO,
ACTIVE=YES,
PASSIVE=NO,
FOPORT=WKPORT,
FOIP=(9),
DESC=WKDESC,
ECB=WKECB

```

```

*
...
*
WKPORT   DC      H'1642'      Port number
IPADDR   DC      F'0'        IPv4 address
IPADDR6  DC      16X'00'     IPv6 address
IPSAS    DC      0XL40'00'    SAS
IPSAFM   DC      H'0'        Family
          DC      H'0'        Port
          DC      XL4'00'     ...
IPSAIP   DC      XL16'00'    IPv6 address
          DC      XL16'00'    ..
*
WKDESC   DC      F'0'        Socket Descriptor
WKECB    DC      14F'0'     Socket ECB
*
IPFLAG   DC      X'00'      IP Flag
IPV6A    EQU     C'6'       IPv6 Active
IPV4A    EQU     C'4'       IPv4 Active
*
          DS      OD
VENDBUF  DC      XL8'00'     GETVENDORINFO Buffer
HOSTBUF  DC      X164'00'    GETHOSTID Buffer

```

# 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
- Other APIs to come as needed  
BSD/C, LE/C, etc.  
BSI simply maps these calls into EZA

# BSI and IBM IPv6/VSE and z/VSE

- Questions ...
- EZA Programming 106 for IPv6  
Mon 10:30am  
Tony Thigpen

# BSI and IBM IPv6/VSE and z/VSE

- Thank you!
- Jeffrey Barnard  
Barnard Software, Inc.

<http://www.bsiopti.com>

[jeff@bsiopti.com](mailto:jeff@bsiopti.com)

407-323-4773, 407-688-7123 (support)