BSI Update
TCP/IP-TOOLS & IPv6/VSE

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TCP/IP-TOOLS and IPv6/VSE GA Builds

- Build 245 GA 14-Oct-2008
- Build 246 GA 15-May-2009
- Build 247 GA 08-Sep-2009
- Build 248 GA ~May 2010

- Build 246 uses updated C compiler!
  - Faster code!

News Flash!

- IBM licenses IPv6/VSE from BSI
- 5686-BS1 is IBM IPv6/VSE
- Requires z/VSE 4.2 (DY47077)
- Announced April 6, 2010
- Available May 28, 2010

Updates

- Host command '+' to '.' translation
- AUXDIR ON|OFF
- BSTTFTPS CHAP support (transfers)
- SITE UINF command
- Support for 1024 tasks (z/VSE 4.2)
- BSTTFTPC TIMEOUT command
- BSTTFTPS Initial Directory support
- BSTTVNET iSeries TN3270E support
- BSTTVNET COUPLED command

Updates

- BSTTVNET SYSIPT command
- OSA Express3 adapter number (0/1)
- GETHOSTBYLUNAME CONTROL call
- DIRECT/LPR x'35' TRN Control Code
- IPv6 support
- COUPLE command
- IPv6/VSE 6in4 Tunneling Driver
- IPv6/VSE CTCA Driver Support
- New manuals!

BSTTSLOG
syslog-ng logger

- System logging application
- Log VSE console traffic
- Data sent to Linux syslog-ng daemon
- Multi-image logging
- Linux based automation

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 After that, organizations that need additional IP addresses will need to adopt IPv6, a newer version of the Internet Protocol that provides a much larger pool of address space.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

What is IPv6?

- Internet Protocol Version 6
  - IPng (IP Next Generation)
- Design Goals
  - Address failings in IPv4
  - Scalability, Efficiency, Extensibility
- What happened to IPv5?
  - Test protocol, no longer used

IPv6

- IPv4 lacks scalability due to addressing
  - 32 bits address space (4.4 Bn addresses)
  - Most addresses allocated to US
- More addresses, please!
  - Address all mobile handsets
  - Growth of “always on” devices
  - Peer-to-Peer, ICQ, video/VoIP
  - Home networking appliances
- Devices, devices and more devices

IPv6 – Big Addresses…

- Extended address space
- 128 bits long
- Unicast, Multicast or Anycast formats

  – Written in hex notation as 16-bit integers
  E.g. 2001:630:80:0:0:0:0:1

  – 3.4 x 10^38 Addresses
  – 6.7 x 10^23 Addresses / m2 on the earth

IPv6 Addressing Model

- Addresses are assigned to interfaces
- Interfaces have multiple addresses
  - Assigned, Link Local
- Addresses have scope
  - link local, site local, global
- Addresses are formed through
  - Routing Prefix (64 bits)
    where you are connected to
  - Interface ID (64 bits)
    who you are

Autoconfiguration

- Plug ‘n’ Play Networking…
- IPv6 host requires three pieces of info
  - IPv6 Address
  - IPv6 Network
  - IPv6 Gateway
- Router Solicitation and Advertisement
  - Hosts Solicit Routers
  - Routers Advertise themselves

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

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

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
- z/VM Virtual Guest Lans are supported
- z/VM VCTCA
  Linux, z/VSE and z/OS
- 6in4 Tunneling

BSI IPv6 Support

- IPv6/VSE Product
- New TCP/IP stack
- Separate partition
- Separate stack ID
- High Performance
- Requires z/VSE 4.2
- Updated IJBOSA (DY47077)
  OSA Express interface (QDIO)
  Hipersocket interface
- CTCA and Tunneling

BSI IPv6/VSE

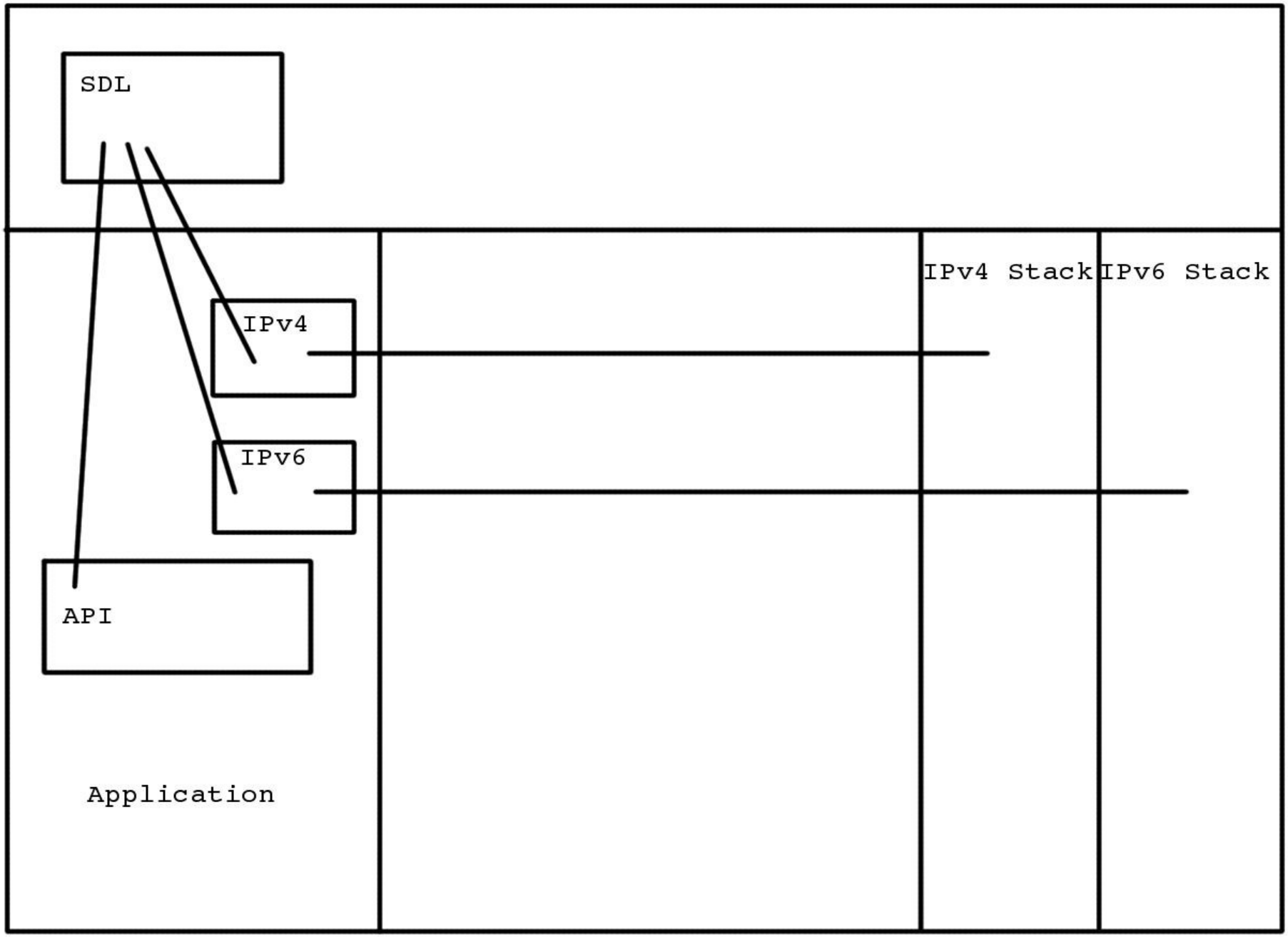
- Dual stack configuration
- Continue to run existing applications
- Introduce IPv6 applications
- Gradual transition
- Simple conversion of applications
  ASM SOCKET API
  EZASOKET, EZASMI

New BSI Documentation

- 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


SDL
IPv4 Stack
IPv6 Stack
IPv4
IPv6
API
Application

BSI IPv6 APIs

- IPv6-Enabled ASM SOCKET API
  - Fullword IPv4 address becomes
  - Pointer to SAS (Socket Address Structure)
- EZASOKET/EZASMI
  - Full z/OS compatibility
  - BSI = z/VSE 4.2.2

BSI TCP/IP Applications

- All BSI applications IPv6 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 ...

GETVENDORINFO

- Updated CONTROL Call
- SEND 'GETVENDORINFO'
- Returns ...
  - 'BSIIPv4'
  - 'BSIIPv6'
  - Any error
    - Assume IPv4

```
         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    0H
*
         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    0D
VENDBUF  DC    XL8'00'          GETVENDORINFO Buffer
HOSTBUF  DC    X164'00'         GETHOSTID Buffer
```

BSI IPv6/VSE

- EZASOKET and EZASMI API
- BSI API is … z/VSE 4.2 (DY47077)
- Full z/OS and z/VSE compatibility

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

BSI IPv6/VSE

- Questions …

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

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- Thank You!

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