

IPv6 Deployments in CITC

CITC Internet Operation Center

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Agenda

IPv6 Background and History

- **IPv6 Features and Global Statistics**
- **CITC IPv6 Experience**
- **IPv6 Network Implementations in CITC**
- **IPv6 and Linux**
- **Configure IPv6 on Linux**
- **IPv6 Test Programs, Supported Tools, Server Daemons and Security Programs**
- **CITC IPv6 Services**
- **Just Do It**

IPv6 Background and History

- IPv6 is the evolution of IPv4
- 1991, First signs of class B IPv4 depletion
- 1994, Designed and Developed by the Internet Engineering Task Force (IETF)
- 1995, IPv6 Specifications (RFC 1883)
- 1998, Basic Protocol published (RFC 2460)
- IPv6 will coexist with IPv4 for several years

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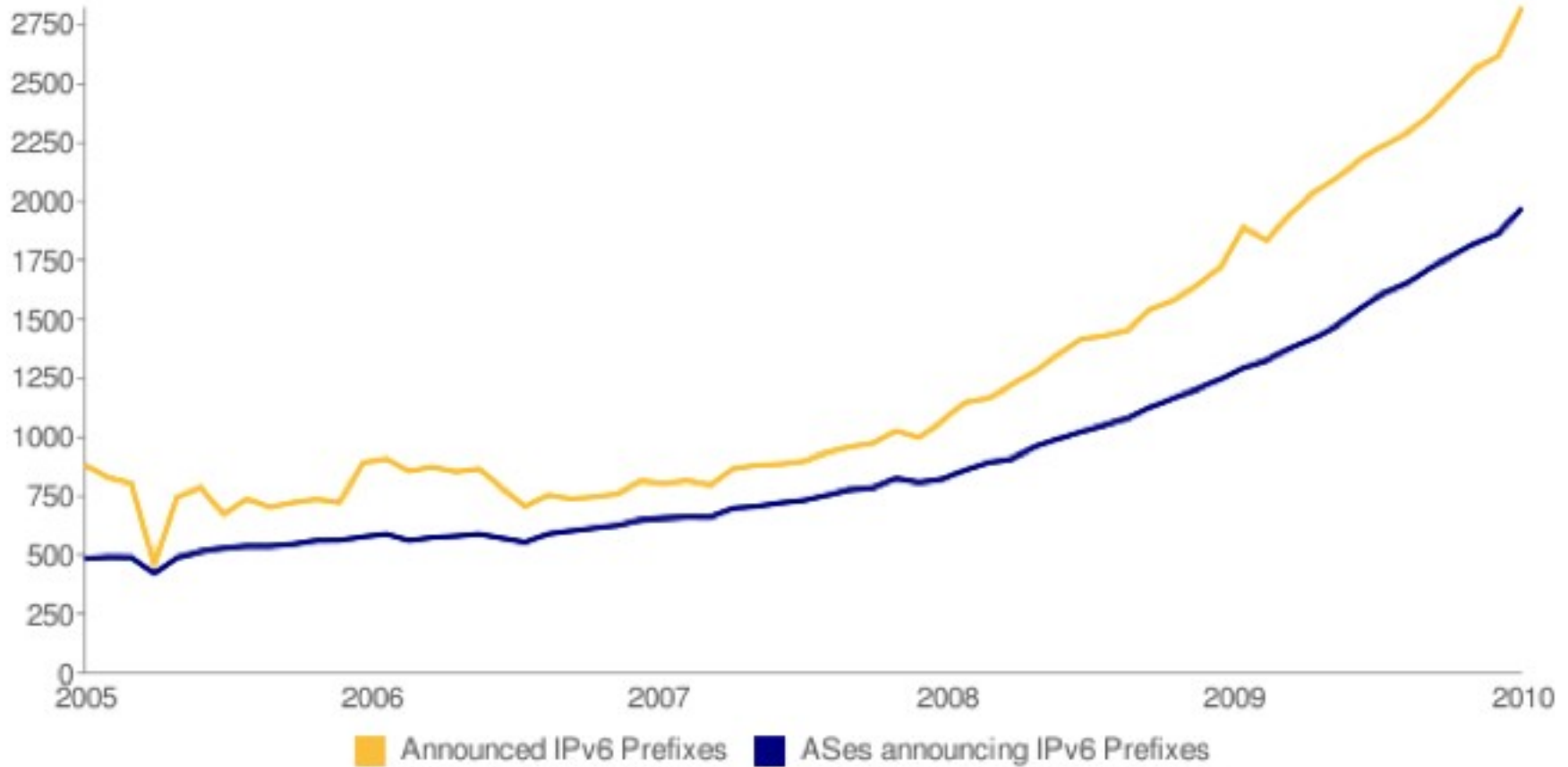
IPv6 Features

- Very large address space:
 - **Reduce NAT Requirements due to Addresses shortage**
 - $(2^{128} = 3.40282367 \times 10^{38})$ Addresses compared to IPv4 $(2^{32} = 4\,294\,967\,296)$ Addresses
 - Cope with IPv4 addresses depletion fact
- Efficient processing of IPv6 packets due to enhanced header designs (extension headers overhead)

IPv6 Features

- Main feature is the bigger address range
- Other features:
 - Efficient and hierarchical addressing – minimize routing tables
 - Stateful and Stateless address configuration
 - Built-in Security – IPSEC compliant
 - New protocol for neighbors interaction
 - Better QOS support
 - Extensibility

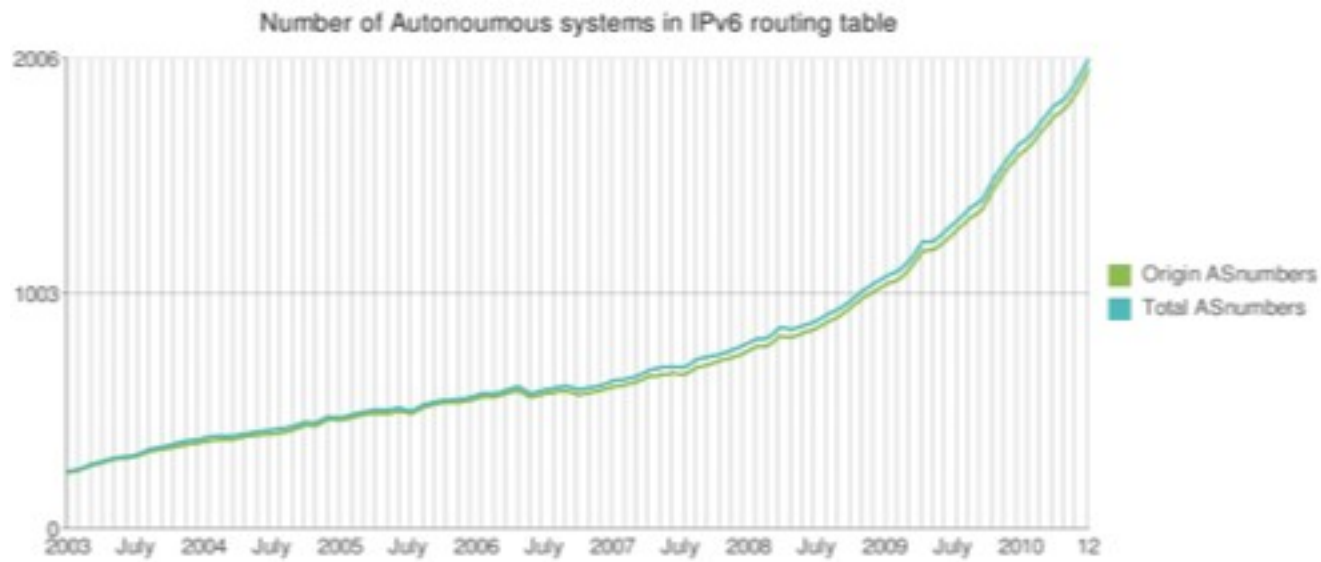
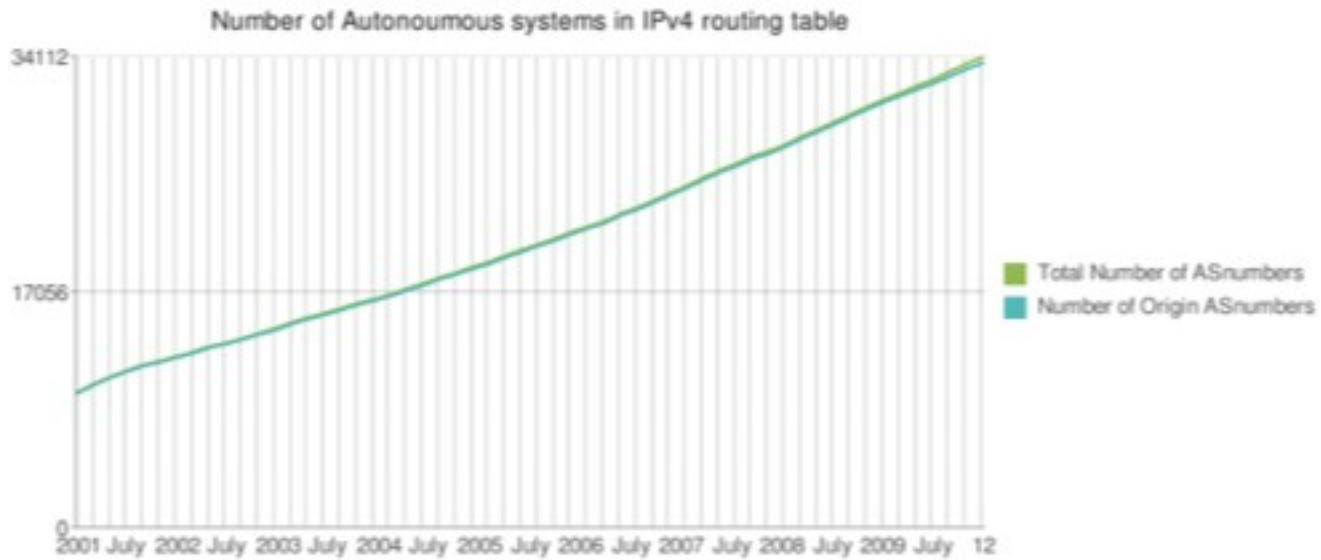
IPv6 and IPv4 Global Statistics



<http://www.ipv6actnow.org/info/statistics/>



<http://bgpmon.net/stat.php>



<http://bgpmon.net/stat.php>

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CITC IPv6 Experience

- CITC manage national level Internet services
 - Administration of the domain name space for the country code (ccTLD) of Saudi Arabia (.SA)
 - Overlooking Filtering Setup in Saudi Arabia

This implies:

- Multi-homing to meet reliability and availability requirements
- IPv6 ready infrastructure to cope with the latest Internet standards

CITC IPv6 Experience

- Feb 1st , 2010 CITC acquired /48 Provider Independent IPv6 prefix from RIPE
 - Request go through Local Internet Registry
 - Originally IPv6 specifications did not allow Provider Independent assignments
 - PI assignment continue until Multi-homing standard is agreed (Suggested standards to be discussed later)
- Data Service Providers whom CITC peered with are not yet ready for complete IPv6 BGP peering.
 - IPv6 Infrastructure is under development
 - Upstream providers peering issues

CITC IPv6 Experience

- Alternatively CITC has implemented external IPv6 BGP Tunnels.
 - One Tunnel provider
 - Two redundant tunnels connected to different tunneling servers (London & Frankfurt)
 - Not optimum as national IPv6 traffic would leak outside
- Dual Stacks IPv4 & IPv6 Infrastructure
 - Internet Routers
 - Firewalls
 - End Hosts

Agenda

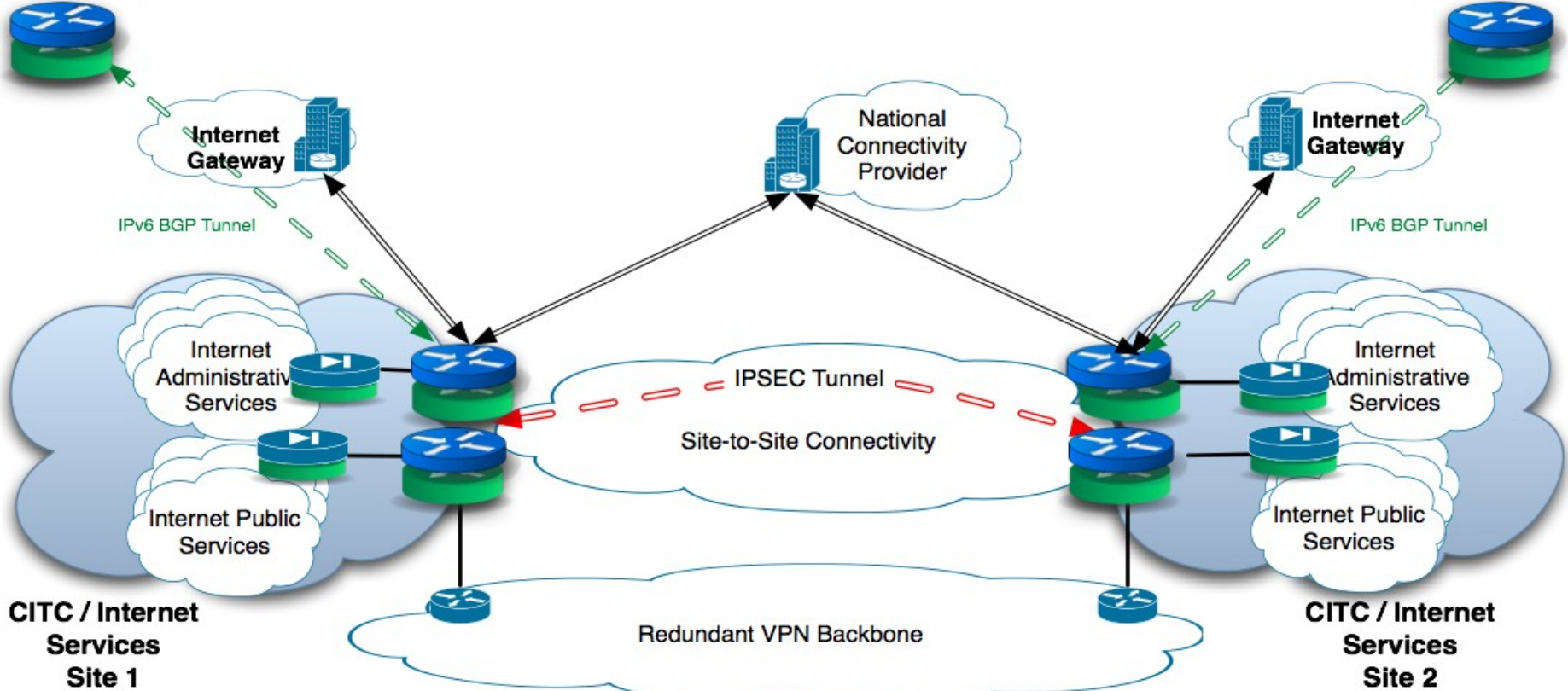
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IPv6 Network Implementations in CITC

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**Tunnel Broker
(London)**

**Tunnel Broker
(Frankfurt)**

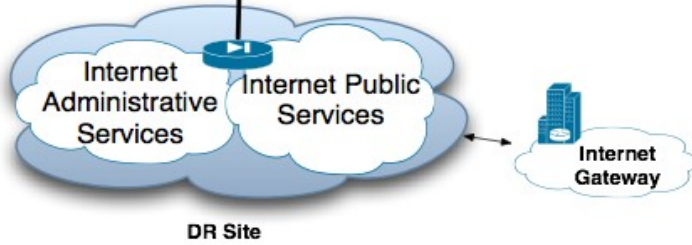


**CITC / Internet
Services
Site 1**





**CITC / Internet
Services
Site 2**

CITC Internet Services WAN Implementations

Public ASN 30857
86.111.192.0/21
2001:67c::130::/48



DR Site

- IPv4/IPv6 Dual Stacks Router 
- IPv4/IPv6 Dual Stacks Firewall 
- IPv4 Firewall 
- IPv4 Router 

Implementing IPv6 is Easy

- Contact your service provider
 - Get Provider Aggregate (PA) IPv6 prefix if single homed
 - If Multi-homed acquire Provider Independent (PI) IPv6 prefix from RIPE until multi-homing in IPv6 is standardized
- Make sure Network devices platforms are updated to support IPv6
- Plan IPv6 topology and addressing
 - Consider Scalability
- You can always implement IPv4 / IPv6 Dual-Stack for transparent transition

Configure your IPv6 tunnel

- Define Tunnel Source IPv4 Address
- Define Tunnel Destination IPv4 Address (Provided by Tunnel provider)
- Configure Tunnel Mode to IPv6IP (Cisco IOS)
- Define Tunnel IPv6 Address (Provided by the Tunnel provider)
- Define IPv6 Static Route via Tunnel interface (Optional)
- Configure IPv6 Access lists on Tunnel interface to block non-required IPV6 traffic

Cisco

```
configure terminal
interface Tunnel0
description IPv6 Tunnel Broker
no ip address
ipv6 enable
ipv6 address X.X.X.X::X/X <Broker provided IPv6 Address>
tunnel source y.y.y.y <Subscriber-End Router IPv4 Address>
tunnel destination z.z.z.z <Broker-End Router IPv4 Address>
tunnel mode ipv6ip
ipv6 route ::/0 Tunnel0
```

Juniper

```
interfaces {
  ip-0/1/0 {
    unit 0 {
      tunnel {
        source y.y.y.y; <Subscriber-End Router IPv4 Address>
        destination z.z.z.z; <Broker-End Router IPv4 Address>
      }
      family inet6 {
        address M.M.M.M::M/M; <Tunnel Broker Provided IPv6 Address>
      }
    }
  }
}
routing-options {
  rib inet6.0 {
    static {
      route ::/0 next-hop M.M.M.M::N; <Broker-End IPv6 Address>
    }
  }
}
forwarding-options {
  family {
    inet6 {
      mode packet-based;
    }
  }
}
```

IPv6 BGP Configuration

- Prepare required information
 - BGP Peer IPv6 Address
 - BGP Peer AS Number
 - IPv6 Prefix to be announced
 - Outbound IPv6 Prefix Filters
 - Inbound IPv6 Prefix Filters
- Cisco IOS
 - Enable IPv6 MBGP by defining IPv6 Address Family
 - Define neighbor prefix filtering policies
 - Define Blackhole Route
 - IPv6 route <Prefix to be announced>*
 - Null0*
- JUNOS
 - Define new neighbor group
 - Define neighbor policy options
 - Setup Blackhole Route
 - Set routing-options rib inet6.0 static*
 - route <Prefix to be announced> discard*
 - install readvertise;*

Cisco

```
router bgp <AS Number>
  bgp log-neighbor-changes
  neighbor M.M.M.M::M remote-as <Peers ASN>
  !
  address-family ipv4
  no neighbor M.M.M.M::M activate
  network <IPv4 Network> mask <Mask>
  exit-address-family
  !
  address-family ipv6
  neighbor M.M.M.M::M activate
  neighbor M.M.M.M::N prefix-list <Filter Name> out
  network <IPv6 Prefix to be advertised>
  exit-address-family
```

Juniper

```
protocols {
  bgp {
    group TunnelProvider {
      type external;
      description "IPv6 BGP Tunnel"
      family inet6 {
        any;
      }
      peer-as <Provider AS Number>;
      neighbor M:M:M:M:M;
    }
  }
  policy-options {
    policy-statement ToTunnelProvider {
      term accept-aggregate {
        from {
          route-filter <IPv6 Prefix to be advertised> exact;
        }
        then accept;
      }
      term reject {
        then reject;
      }
    }
  }
}
```

IPv6 Interface Addressing

- CISCO IOS

```
Interface <ifcname>  
    IPv6 enable  
    IPv6 address X.X.X.X::X/X
```

- JUNOS

```
interfaces {  
    <ifname> {  
        unit 0 {  
            family inet6 {  
                address X:X:X:X::X/X;  
            }  
        }  
    }  
}
```

Configure IPv6 in your Firewall Appliances

- IPv6 Interfaces
- IPv6 Static Routes
- IPv6 Access Lists

Possible Challenges - Multihoming

- No Agreed standard yet for IPv6 multihoming
 - Traffic engineering limitations
- There are several suggestions to allow traffic engineering and control the size of Internet routing table
 - CIDR Prefix boundaries between /49 and /51
 - Multihoming BGP Community Codes
 - Published Lists of multihomed prefixes
 - SHIM6 (RFCs 5533, 5534, 5535) published 2009

But Still Possible

- Request /48 prefix for every IPv4 prefix being announced
- /48 prefixes are not filtered
- Traffic engineering is possible then..

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IPv6 and Linux

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History of IPv6 on Linux

- The first IPv6 related network code was added to the Linux kernel 2.1.8 in November 1996 by Pedro Roque
- In 2000 Started USAGI (Universal Playground for IPv6) project in Japan, to implement missing ipv6 support in linux
- 2.5.x vanilla kernel series inserted all USAGI IPv6 extension in to the kernel sources.
- 2.6.x vanilla kernel series include almost all of the developed IPv6 extensions

IPv6 Ready?

- Latest Linux distributions already contains IPv6 modules in kernel
- Recommended to use 2.6.x series kernel for IPv6
- Check `/proc/net/if_inet6` to confirm your kernel support IPv6

```
$ ls /proc/net/if_inet6  
/proc/net/if_inet6
```

- Load the IPv6 kernel module, incase not loaded
`# modprobe ipv6`
- Check net-tools like `ifconfig`, `route` supports `ipv6`

```
sh-3.2$ /sbin/ifconfig | grep inet6  
inet6 addr: fe80::20c:29ff:fe30:603e/64 Scope:Link  
inet6 addr: ::1/128 Scope:Host
```

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Configure IPv6 on Linux

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Configure IPv6 on Linux

- Make sure IPv6 module is loaded in kernel
 - \$ lsmod | grep ipv6
 - Also check /etc/modprobe.conf
- Enable IPv6 networking
 - Edit /etc/sysconfig/network and add
NETWORKING_IPV6=yes
- Configure the interface
 - Add ipv6 details

```
$cat >>  
/etc/sysconfig/network-  
scripts/ifcfg-ethX  
  
IPV6INIT=yes  
  
IPV6ADDR=2001:67c:111::2/61  
  
IPV6ADDR_SECONDARIES=200  
1:67c:111::3/61  
  
IPV6_DEFAULTGW=2001:67C:11  
1::1  
  
IPV6_AUTOCONF=no
```

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IPv6 Test Programs

- IPv6 Ping

*\$ ping6 <ipv6host/address> or \$ ping6 -I <device>
<ipv6host/address>*

\$ ping6 -c 1 ::1

- IPv6 traceroute

\$ traceroute6 ipv6.google.com

- IPv6 tcpdump - icmp6, ip6, proto ipv6

- Netstat

and more...

IPv6 Supported Tools

`$ host -t AAAA <host/ip6>`

```
$ host -t AAAA www.nic.net.sa
www.nic.net.sa is an alias for nic.net.sa.
nic.net.sa has AAAA address 2001:67c:130:410::10
```

`$ telnet ipv6.google.com 80`

```
$ telnet ipv6.org.sa 80
Trying 2001:67c:130:20::4...
Connected to ipv6.org.sa (2001:67c:130:20::4).
Escape character is '^'.
```

`$ ssh -6 <host/ip6>`

```
$ ssh -6 ::1
The authenticity of host '::1 (::1)' can't be established.
```

`$ whois -h <ipv6_address> <domain_name>`

```
$ whois -h 2001:67c:130:410::10 internet.gov.sa
[Querying 2001:67c:130:410::10]
[2001:67c:130:410::10]
```

And more...

IPv6 supported Server Daemons - BIND

- BIND(Berkeley Internet Name Domain) Configuration support IPv6
- Can listen IPv6 address
- IPv6 Enabled access lists
- Query source, notify source, transfer source binding
- Serve IPv6 related data - AAAA
- IPv4-mapped IPv6 address to bind to ipv4 addresses
- *allow-transfer { ::ffff:ipv4_address; };*
- *Successful IPv6 Query:*

```
$ host -t AAAA www.nic.net.sa
www.nic.net.sa is an alias for nic.net.sa.
nic.net.sa has IPv6 address 2001:67c:130:410::10
```

IPv6 supported Server Daemons - Apache

- Supports IPv6 by default since 2.0.14 version
- Listen on IPv6 address – Listen [2001:111:110::1]:80
- Virtual host supports IPv6
<VirtualHost [2001:111:110::1]:80>
- IPv6 and IPv4 together :
<VirtualHost [2001:111:110::1]:80 1.2.3.4:80>
- Not much modifications required

IPV6 supported Server Daemons

- Most of the linux server daemons supports IPV6 like:
 - FTP
 - XINETD
 - MTA's
 - NTP etc.

IPv6 and Security Programs

- Netfilter6 supports IPv6 firewall rules
- Stateless/stateful packet filtering
- No NAT support
- Rules are almost similar to IPv4 except it support 128 bit addresses

```
# ip6tables -A INPUT -i eth0 -p tcp -s 2001:1111:111::1/128 --dport 80  
-j ACCEPT
```

- tcp_wrapper support IPv6
- Filtering against source address and users
- Access logging for IPv6
- Other security scanning tools support IPv6
- nmap (nmap -6), netcat (nc6), strobe

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CITC IPv6 Services

- **Just Do It**

Challenges

- Issues with dns zone transfer
- Firewalls and access restrictions
- Not much at the end...



CITC IPv6 services

- **Internet.gov.sa Website**
www.internet.gov.sa

- Internet filtering website for submitting block and unblock request

- IPv6 address is assigned to the server interfaces

- Webservers are configured to listen IPv6 interface

- IPv6 supported firewall and access rules

- www.internet.gov.sa Is configured with two AAAA records

```
$ host -t AAAA www.internet.gov.sa
www.internet.gov.sa has IPv6 address 2001:67c:130:10::4
www.internet.gov.sa has IPv6 address 2001:67c:130:410::4
```

access over IPv6 [2001:67c:130:410::10]



CITC IPv6 services

- **SaudiNIC websites**

www.nic.net.sa www.arabic-domains.org
www.arabic-domains.org.sa

www.nic.net.sa over IPv6 2001:67c:130:410::10



- .sa ccTLD websites

- IPv6 address is assigned to the server interface

- Webservers are configured to listen on IPv6

- IPv6 supported firewall and access rules

- Configured AAAA records in DNS

```
$ host -t AAAA www.nic.net.sa
www.nic.net.sa is an alias for nic.net.sa.
nic.net.sa has IPv6 address 2001:67c:130:410::10
```

```
$ host -t AAAA www.arabic-domains.org
www.arabic-domains.org is an alias for arabic-domains.org.
arabic-domains.org has IPv6 address 2001:67c:130:20::4
```

CITC IPv6 services

- IPv6 task force website
www.ipv6.org.sa

- Connected to IPv6 network
- Assigned IPv6 address to the server interface
- Webserver is configured to listen IPv6 address
- IPv6 supported firewalls and access rules
- Configured with AAAA record in DNS

```
$ host -t AAAA ipv6.org.sa
ipv6.org.sa has IPv6 address 2001:67c:130:20::4
```

Saudi Arabia IPv6 Task Force

http://ipv6.org.sa/

Home About Strategy Documents Contact Us

Secondary links

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- IPv6 Strategy
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- Related Links

IPv6 Indicator

IPv6 Client :)
Your IP:
2001:470:1f0a:1053::2

IPv6 - IPv6

About IPv6 Task Force

The IPv6 Task Force Forum came as the outcome of the IPv6 Project that was introduced by the Communications and Information Technology Commission as part of the Internet Services Development Projects undertaken by the CITC. The Commission sponsored the establishment of the Task Force that convened its first meeting on July 30, 2008.

Currently, the Task Force members, in addition to the CITC, include ICT Service Providers and the consulting arm of the Task Force Devoteam.

IPv6 Task Force 8th Meeting Rescheduled to 17th March 2010

Submitted by webmaster on Sat, 02/06/2010 - 15:31

Due to conflicting with Saudi schools midyear vacation, we have rescheduled

ITALTEL
Italtel Logo

IPv6 task force 8th meeting from February 15th 2010 to March 17th 2010. The meeting will be held in "Holiday Inn U Qasr", Riyadh.

We would like to invite you all to speak and participate in the meeting about your IPv6 experience. Please don't hesitate to contact us to add your talk to the meeting agenda.

Read more

Poll

How important to you to get an Internet connection with IPv6 support?:

- Important
- It would be good to have
- Never thought about it

Vote

IPv4 Exhaustion

IPv4 Exhaustion Counter

Present status

Reserved blocks(ANA)

8%

22/256 blocks
X-day (estimation)

Sep 29, 2011
Until X-day (estimation)

563 days
Num of IPv4 Address

348,142,028

NetCore

CITC IPv6 services

- **internet.gov.sa name servers**

ns1.internet.gov.sa
ns2.internet.gov.sa

- DNS server is configured to listen IPv6
- Access rules and authorization configured for IPV6 sources
- Name server configured with AAAA record
- IPv6 address records AAAA in zone files
- Zone transfer over IPv6

Querying IPv6 name server

```
$ dig @2001:67c:130:410::7 AAAA www.internet.gov.sa
; <<>> DiG 9.3.4-P1 <<>> @2001:67c:130:410::7 AAAA www.internet.gov.sa
; (1 server found)
; global options: printcmd
; Got answer:
; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 55851
; flags: qr aa rd ra; QUERY: 1, ANSWER: 2, AUTHORITY: 2, ADDITIONAL: 4

;; QUESTION SECTION:
;www.internet.gov.sa.          IN      AAAA

;; ANSWER SECTION:
www.internet.gov.sa.         43200  IN      AAAA    2001:67c:130:10::4
www.internet.gov.sa.         43200  IN      AAAA    2001:67c:130:410::4

;; AUTHORITY SECTION:
internet.gov.sa.             86400  IN      NS      ns1.internet.gov.sa.
internet.gov.sa.             86400  IN      NS      ns2.internet.gov.sa.

;; ADDITIONAL SECTION:
ns1.internet.gov.sa.         43200  IN      A       86.111.192.7
ns1.internet.gov.sa.         43200  IN      AAAA    2001:67c:130:410::7
ns2.internet.gov.sa.         43200  IN      A       86.111.196.7
ns2.internet.gov.sa.         43200  IN      AAAA    2001:67c:130:10::7

;; Query time: 5 msec
;; SERVER: 2001:67c:130:410::7#53(2001:67c:130:410::7)
;; WHEN: Sun Mar 14 18:40:36 2010
;; MSG SIZE rcvd: 217
```

AAAA responses

CITC IPv6 services

- .sa ccTLD servers**

ns1.nic.net.sa

ns2.nic.net.sa

- DNS server is configured to listen IPv6
- Access rules and authorization configured for IPV6 sources
- ccTLD name server configured with AAAA record
- IPv6 address records AAAA in ccTLD zones
- SaudiNIC ccTLD servers accept request from IPV6 networks

Querying IPv6 ccTLD server

```
$ dig @2001:67c:130:410::9 AAAA www.nic.net.sa
; <<>> DiG 9.3.4-P1 <<>> @2001:67c:130:410::9 AAAA www.nic.net.sa
; (1 server found)
;; global options: printcmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 1567
;; flags: qr aa rd; QUERY: 1, ANSWER: 2, AUTHORITY: 2, ADDITIONAL: 4
;; QUESTION SECTION:
;www.nic.net.sa.                IN      AAAA
;; ANSWER SECTION:
www.nic.net.sa.                5400    IN      CNAME   nic.net.sa.
nic.net.sa.                    5400    IN      AAAA    2001:67c:130:410::10
;; AUTHORITY SECTION:
nic.net.sa.                    5400    IN      NS      ns2.nic.net.sa.
nic.net.sa.                    5400    IN      NS      ns1.nic.net.sa.
;; ADDITIONAL SECTION:
ns1.nic.net.sa.                86400   IN      A       86.111.192.9
ns1.nic.net.sa.                86400   IN      AAAA    2001:67c:130:410::9
ns2.nic.net.sa.                86400   IN      A       86.111.196.9
ns2.nic.net.sa.                86400   IN      AAAA    2001:67c:130:10::9
;; Query time: 4 msec
;; SERVER: 2001:67c:130:410::9#53(2001:67c:130:410::9)
;; WHEN: Sun Mar 14 18:59:45 2010
;; MSG SIZE rcvd: 198
```

ccTLD AAAA addresses

CITC IPv6 services

- **Filtering download servers:**
 - Filtering control list download server for DSPs
- **SaudiNIC Whois service (whois.nic.net.sa)**

Querying IPv6 .sa whois server

```
$ whois -h 2001:67c:130:410::10 nic.net.sa
[Querying 2001:67c:130:410::10]
[2001:67c:130:410::10]
% SaudiNIC Whois server.
% Rights restricted by copyright.
% http://www.nic.net.sa/tools/copyright.php

domain:          nic.net.sa
organization:    Saudi Network Information Center (SaudiNIC) - CITC
address:         Riyadh
address:         Saudi Arabia
admin-c:         ZOMAN-SA
tech-c:          RAED-SA
reg-c:           MSA-SA
nserver:         ns1.nic.net.sa
nserver:         ns2.nic.net.sa
req-date:        1999-05-26
reg-date:        1999-05-26
source:          SaudiNIC
```

- .sa WHOIS server bind to IPv6 address
- IPV6 firewall and access rules in place

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Just Do It

Just do it

- Request native IPv6 connectivity from your service provider
- If the service provider unable to deliver IPV6 support get an IPv6 tunnel from a tunnel brokers.
- Create account in tunnel broker website and enter your IPv4 address (public ip)

Setup Regular IPv6 Tunnel

You currently have 2 of 5 allowed tunnels configured.

- If you are trying to reclaim a tunnel simply enter your last IPv4 address here. If you have any issues please email ipv6@he.net.
- If you have an official ASN and wish to setup a full BGP feed, please use [this form](#) instead.

IPv4 endpoint:
(your side of the tunnel)

You are viewing from IP: 2001:470:1f0a:1053::2

We recommend you use:

Which Server Is Closest to you?:

Asia

- Tokyo, JP [74.82.46.6]
- Hong Kong, HK [216.218.221.6]

Europe

- Amsterdam, NL [216.66.84.46]
- Stockholm, SE [216.66.80.90]
- Paris, FR [216.66.84.42]
- Zurich, CH [216.66.80.98]
- London, UK [216.66.80.26]
- Frankfurt, DE [216.66.80.30]

North America

- Chicago, IL, US [209.51.181.2]
- Dallas, TX, US [216.218.224.42]
- Toronto, ON, CA [216.66.38.58]
- Los Angeles, CA, US [66.220.18.42]
- New York, NY, US [209.51.161.14]
- Seattle, WA, US [216.218.226.238]
- Fremont, CA, US [72.52.104.74]
- Ashburn, VA, US [216.66.22.2]
- Miami, FL, US [209.51.161.58]

Submit

Just do it

- Configure your machine (example for MAC OS X)

- Configure the tunnel

```
$ sudo ifconfig gif0 tunnel <host_ip> <tunnel_broker_ipv4_ip>
```

If your machine has direct public ip assigned just use it, otherwise use the private address to create tunnel

- **Setup the tunnel end points**

```
$ sudo ifconfig gif0 inet6 host_ipv6_address tunnel_broker_ipv6_address  
prefixlen 128
```

The IPv6 address will be assigned by the tunnel broke

- Add the default route for ipv6 traffic

```
$ sudo route -n add -inet6 default tunnel_broker_ipv6_address
```

- **Test your connectivity**

```
$ telnet ipv6.google.com 80  
Trying 2a00:1450:8006::93...  
Connected to ipv6.l.google.com.  
Escape character is '^]'.  
^C
```

```
$ ping6 -c2 ipv6.google.com Before v6
ping6: nodename nor servname provided, or not known

$ ifconfig en1 | grep inet Get the v4 address to make tunnel
    inet 10.3.10.187 netmask 0xfffff00 broadcast 10.3.10.255

$ sudo ifconfig gif0 tunnel 10.3.10.187 216 [REDACTED] Configure tunnel

Configure v6 end points
$ sudo ifconfig gif0 inet6 2001:470:[REDACTED]:2 2001:470:[REDACTED]:1 prefixlen 128

Add v6 default route
$ sudo route -n add -inet6 default 2001:470:[REDACTED]:1
add net default: gateway 2001:470:[REDACTED]:1

$ ping6 -c2 ipv6.google.com
PING6(56=40+8+8 bytes) 2001:470:[REDACTED]:2 --> 2a00:1450:8001::93
16 bytes from 2a00:1450:8001::93, icmp_seq=0 hlim=56 time=143.413 ms
16 bytes from 2a00:1450:8001::93, icmp_seq=1 hlim=56 time=144.274 ms

--- ipv6.1.google.com ping6 statistics ---
2 packets transmitted, 2 packets received, 0% packet loss
round-trip min/avg/max = 143.413/143.844/144.274 ms
```



References

<http://tldp.org/HOWTO/Linux+IPv6-HOWTO/>

<http://bgpmon.net/stat.php>

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<http://www.ripe.net/ripe/docs/ripe-466.html#PIAssignments>

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<http://www.ipv6.com/articles/general/timeline-of-ipv6.htm>

<http://www.ipv6actnow.org/info/statistics/>

<http://www.nro.net/documents/pdf/MultihomeIPv6procon.pdf>

Thank You!!!

