

# APNIC Training

## IPv6 Tutorial

20 July 2009 – Chennai, India

In conjunction with



**SANDOG**

# Introduction

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# Overview

- IPv6 Architecture
- IPv6 Addressing
- IPv6 Subnetting
- Host configuration
- Case study – IXP
- Transition to IPv6 – Tunneling
- IPv6 and DNS
- IPv6 Policies and Procedures
- How to request for IPv6 addresses
- Summary

# Introduction - IPv6 Architecture Overview

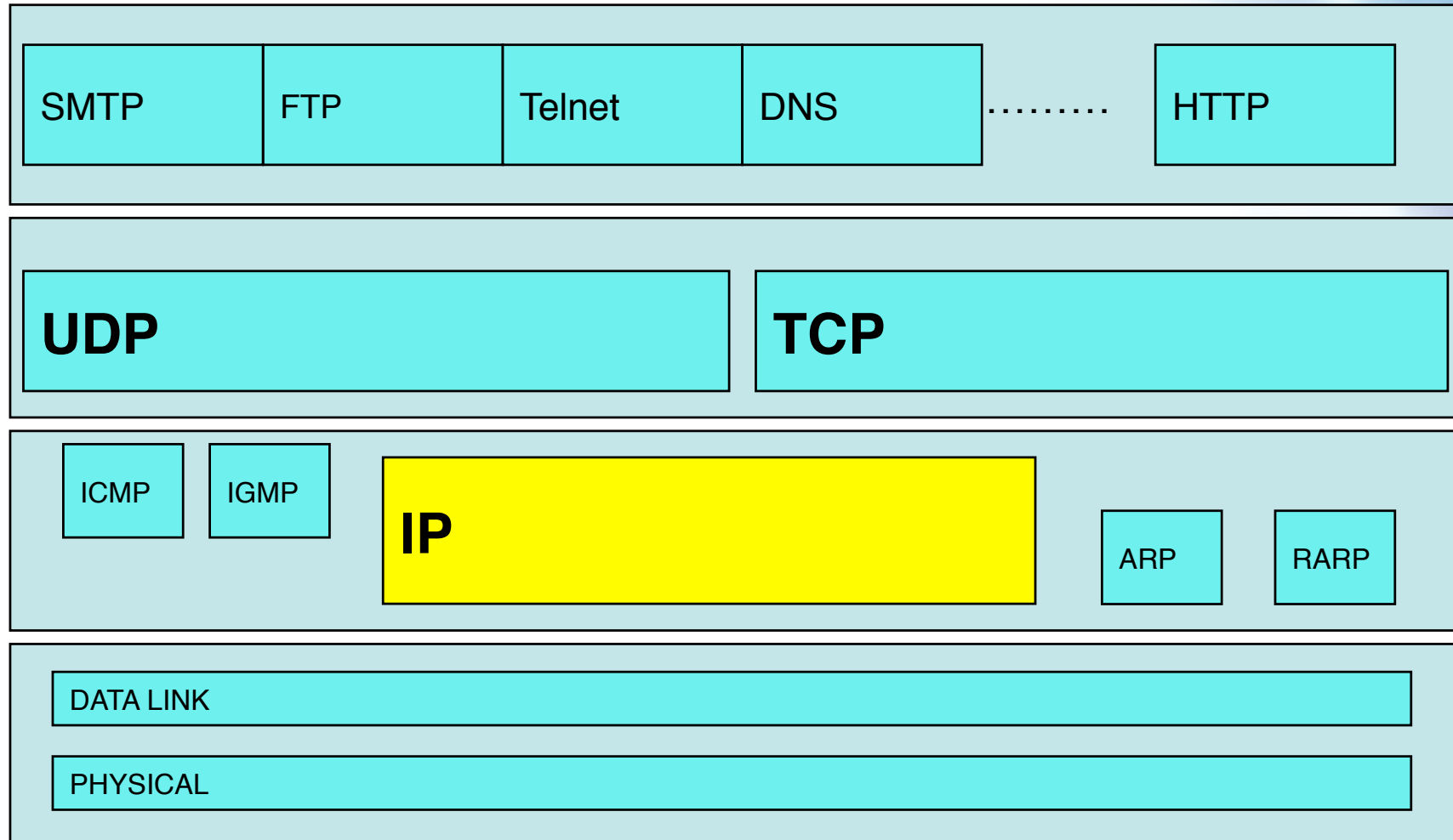


# What exactly is the Internet Protocol (IP) ?

- That protocol layer in the TCP/IP protocol stack responsible for the delivery of data to a target destination



# TCP/IP protocol structure



# IP datagram format

- Datagrams
  - That part of a packet containing the IP headers and the data from the higher layers passed to the IP layer
- IP specifies the header information for the data it requires for its tasks
  - Information needed for routing and delivery
  - E.g. source and destination IP addresses
- It has nothing to do with higher layer headers or data and can transport arbitrary data



# So, what is IPv6?





# Rationale

- Address depletion concerns
  - Squeeze on available addresses space
    - Probably will never run out, but will be harder to obtain
  - End to end connectivity no longer visible
    - Widespread use of NAT
- ➔ IPv6 provides much larger IP address space than IPv4



## Main IPv6 benefits

- Expanded addressing capabilities
- Server-less autoconfiguration (“plug-n-play”) and reconfiguration
- More efficient and robust mobility mechanisms
- Built-in, strong IP-layer encryption and authentication
- Streamlined header format and flow identification
- Improved support for options / extensions

# IPv6 Addressing and Subnetting

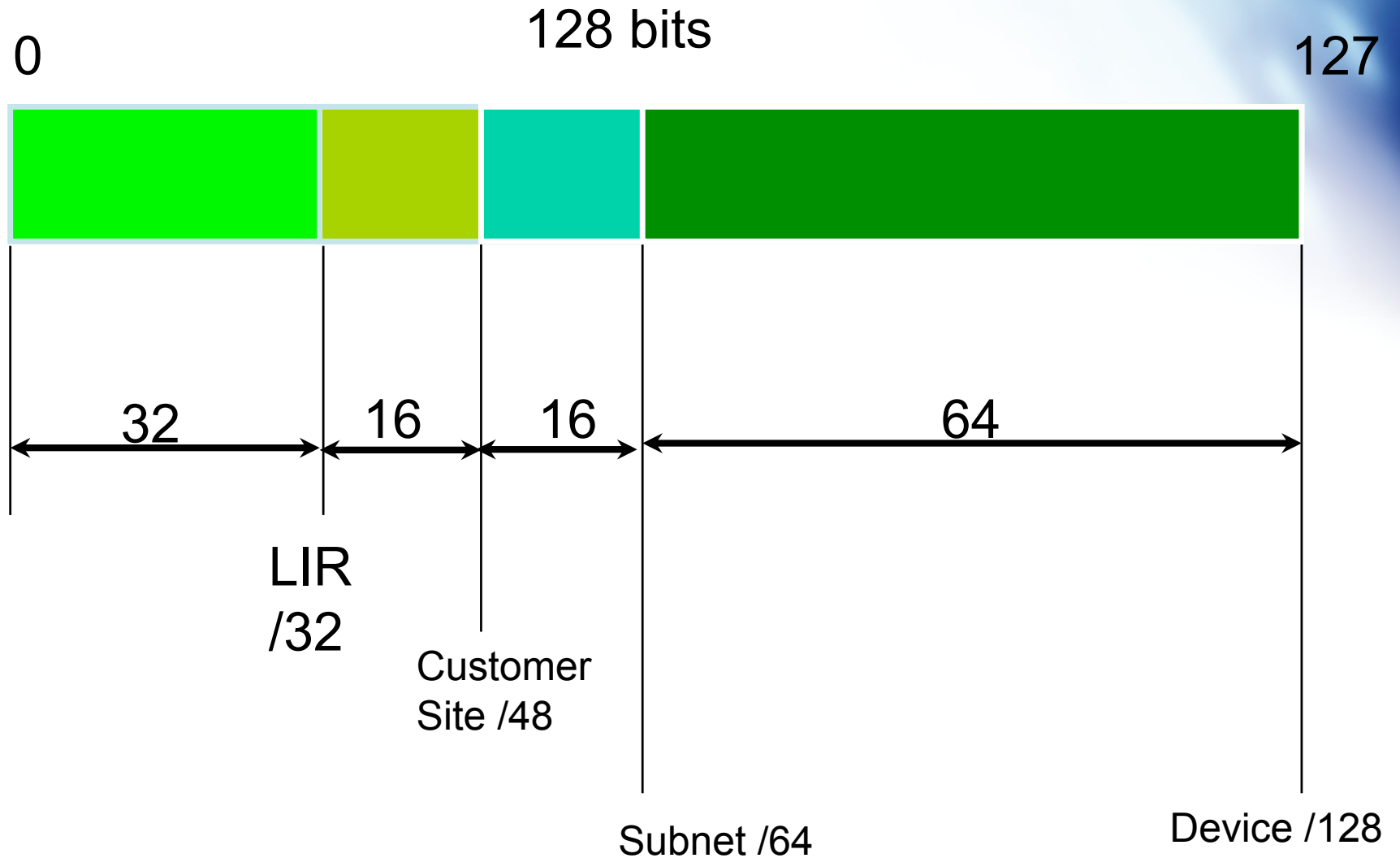
## Size of the IPv6 address space

- An IPv6 address is 16 octets (128 bits)
- This would allow every person on the planet to have their own internet as large as the current Internet
- It is difficult to foresee running out of IPv6 addresses

# IPv6 addressing

- 128 bits of address space
- Hexadecimal values of eight 16 bit fields
  - X:X:X:X:X:X:X:X (X=16 bit number, ex: A2FE)
  - 16 bit number is converted to a 4 digit hexadecimal number
- Example:
  - FE38:DCE3:124C:C1A2:BA03:6735:EF1C:683D
  - Abbreviated form of address
    - 4EED:0023:0000:0000:0000:036E:1250:2B00
    - 4EED:23:0:0:0:36E:1250:2B00
    - 4EED:23::36E:1250:2B00
  - (Null value can be used only once)

# IPv6 addressing structure



# Exercise 1: IPv6 subnetting

1. Identify the first four /64 address blocks out of 2001:AA:2000::/48

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

## Exercise 2: IPv6 subnetting

1. Identify the first four /36 address blocks out of 2001:ABC::/32

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_




## Exercise 3: IPv6 subnetting

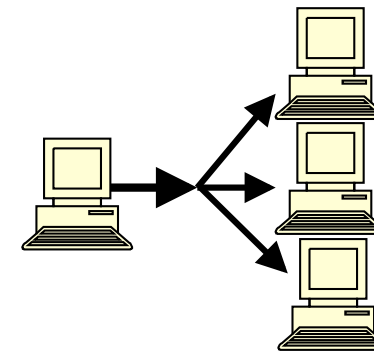
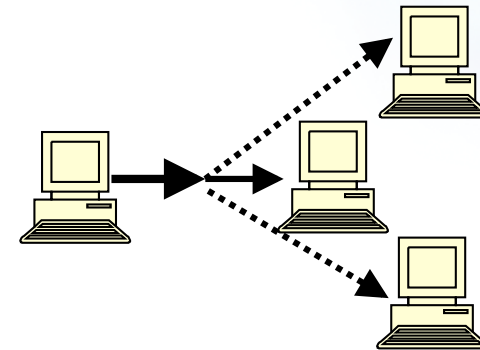
3. Identify the first six /37 address blocks out of 2001:AA::/32

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_

# IPv6 network address assignment

# IPv6 addressing model

- **IPv6 Address type** 
  - Unicast
    - An identifier for a single interface
  - Anycast
    - An identifier for a set of interfaces
  - Multicast
    - An identifier for a group of nodes

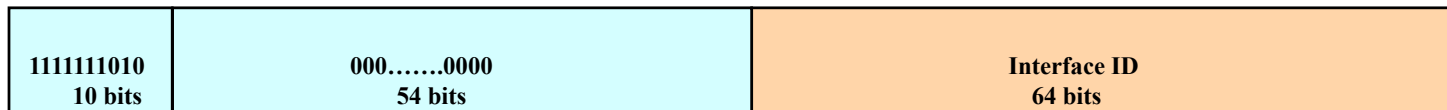


# Unicast address

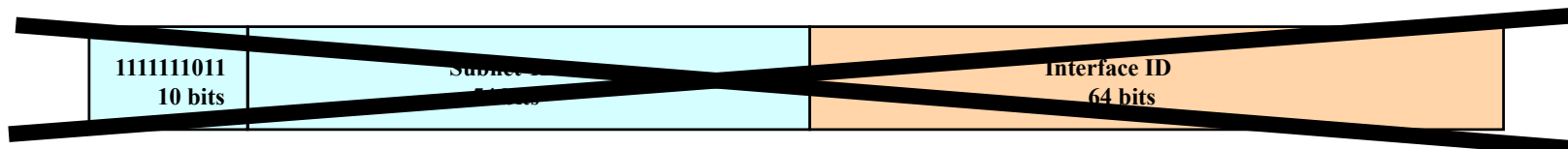
- Address given to interface for communication between host and router
  - Global unicast address currently delegated by IANA



- Local use unicast address
  - Link-local address (starting with FE80::)



- Site-local address (starting with FEC0::)



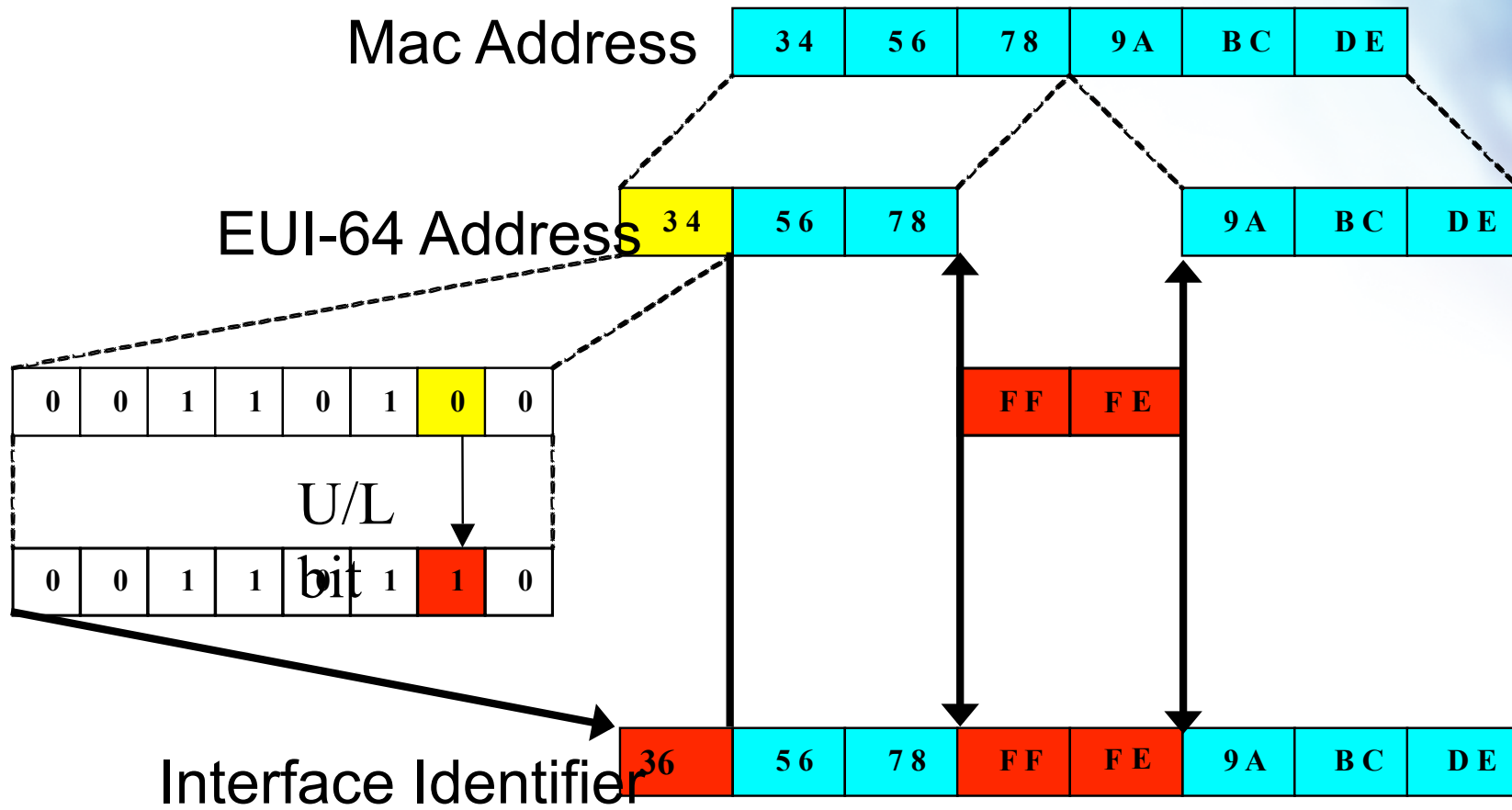
# Special addresses

- The unspecified address
  - A value of 0:0:0:0:0:0:0:0 (::)
  - It is comparable to 0.0.0.0 in IPv4
- The loopback address
  - It is represented as 0:0:0:0:0:0:0:1 (:::1)
  - Similar to 127.0.0.1 in IPv4

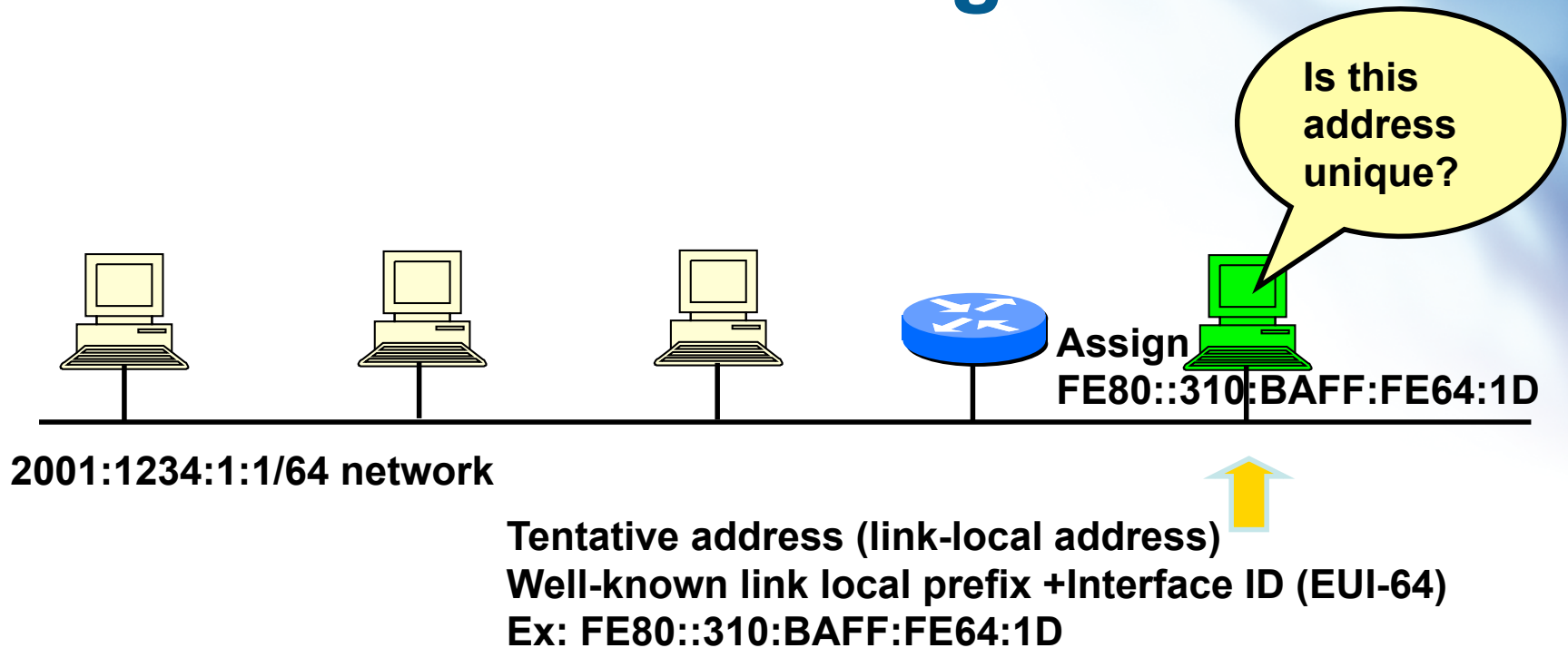
## Interface ID

- The lowest-order 64-bit field addresses may be assigned in several different ways:
  - auto-configured from a 48-bit MAC address expanded into a 64-bit EUI-64
  - assigned via DHCP
  - manually configured
  - auto-generated pseudo-random number
  - possibly other methods in the future

# EUI-64



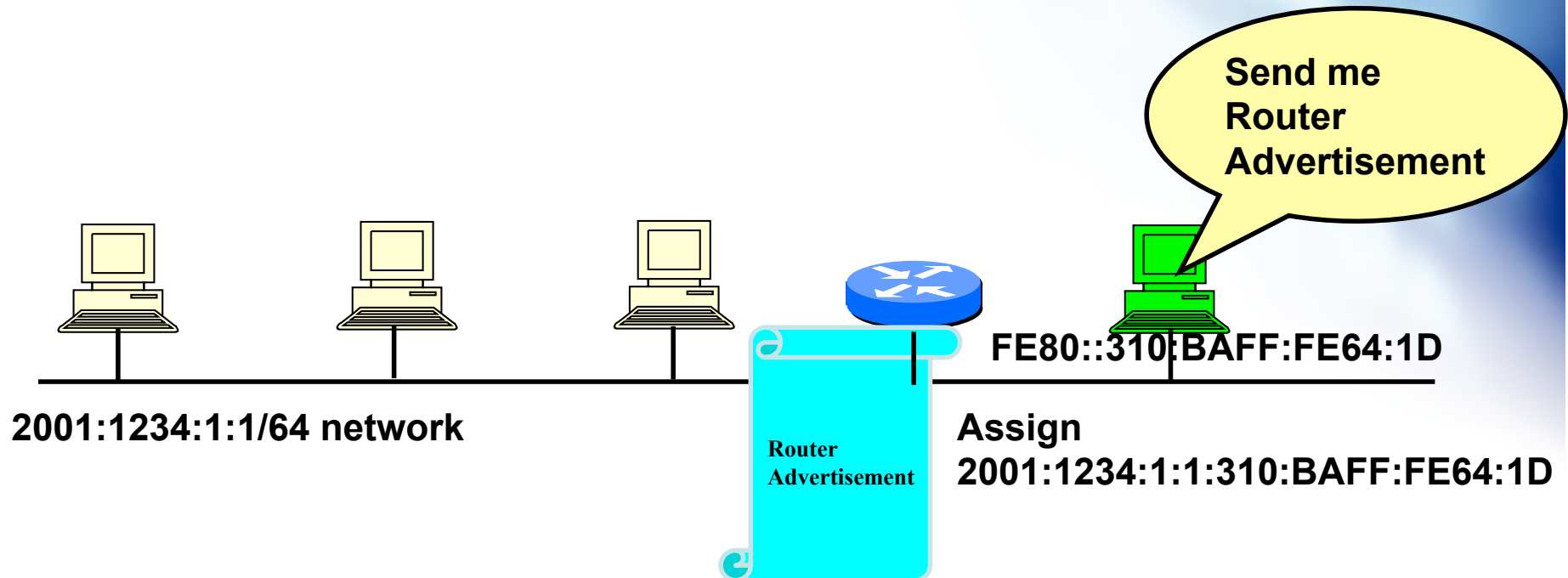
# IPv6 autoconfiguration



1. A new host is turned on.
2. Tentative address will be assigned to the new host.
3. Duplicate Address Detection (DAD) is performed. First the host transmit a Neighbor Solicitation (NS) message to all-nodes multicast address (FF02::1)
5. If no Neighbor Advertisement (NA) message comes back then the address is unique.
6. FE80::310:BAFF:FE64:1D will be assigned to the new host.



# IPv6 autoconfiguration



1. The new host will send Router Solicitation (RS) request to the all-routers multicast group (FE02::2).
2. The router will reply Routing Advertisement (RA).
3. The new host will learn the network prefix. E.g, 2001:1234:1:1/64
4. The new host will assigned a new address Network prefix+Interface ID  
E.g, 2001:1234:1:1:310:BAFF:FE64:1D

# Exercise

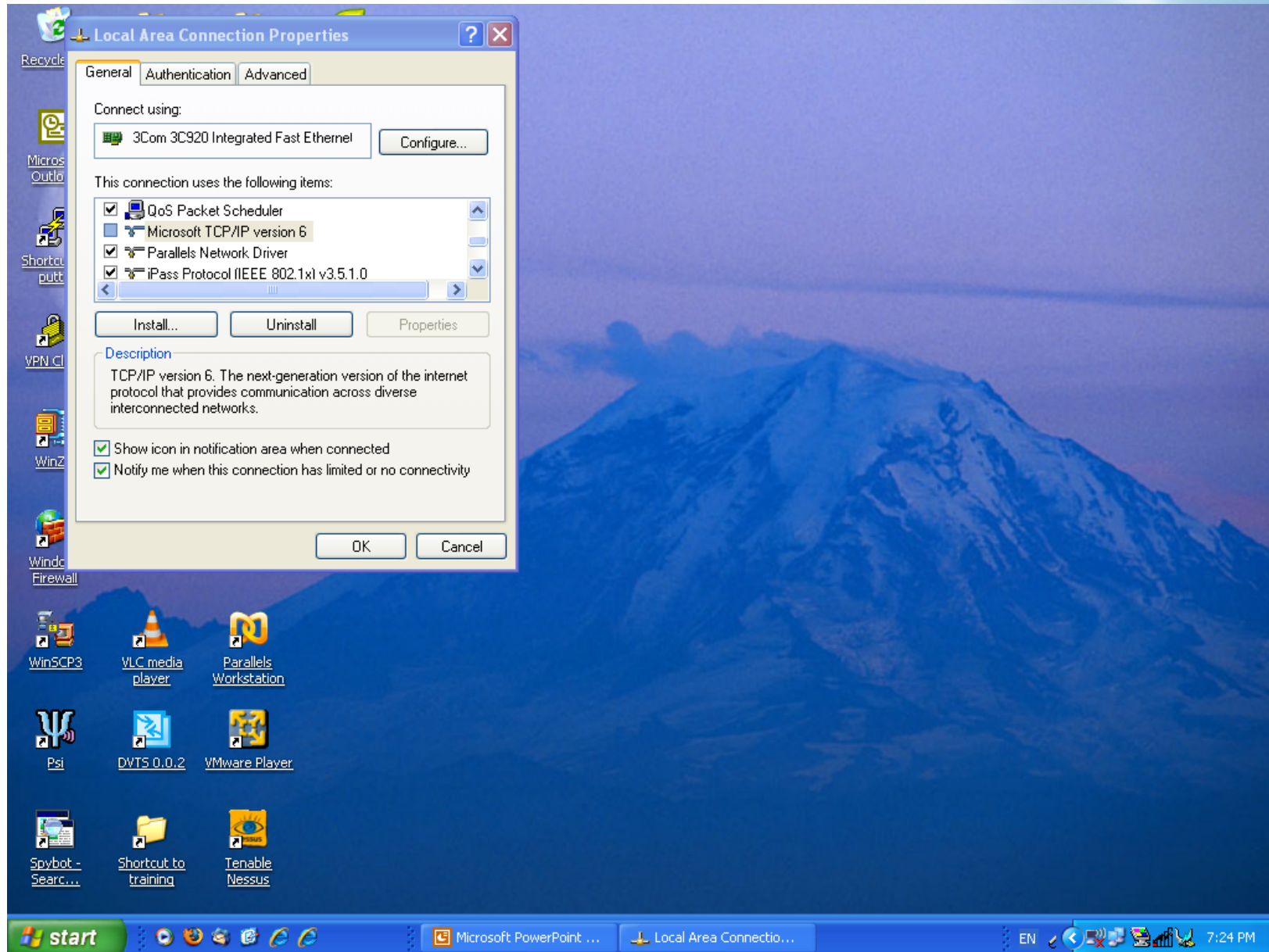
Host configuration



# Enabling IPv6 on XP

1. Log on to the computer with a user account that has privileges to change the network configuration.
  2. Click **Start**, click **Control Panel**, and then double-click **Network Connections**.
  3. Right-click any local area connection, and then click **Properties**.
  4. Click **Install**.
  5. In the **Select Network Component Type** dialog box, click **Protocol**, and then click **Add**.
  6. In the **Select Network Protocol** dialog box, click **Microsoft TCP/IP version 6**, and then click **OK**.
  7. Click **Close** to save changes to your network connection.
- Alternately, from the Windows XP desktop, click **Start**, point to **Programs**, point to **Accessories**, and then click **Command Prompt**. At the command prompt
    - Type **netsh interface ipv6 install**

# Enabling IPv6 on XP



## IPv6 on XP

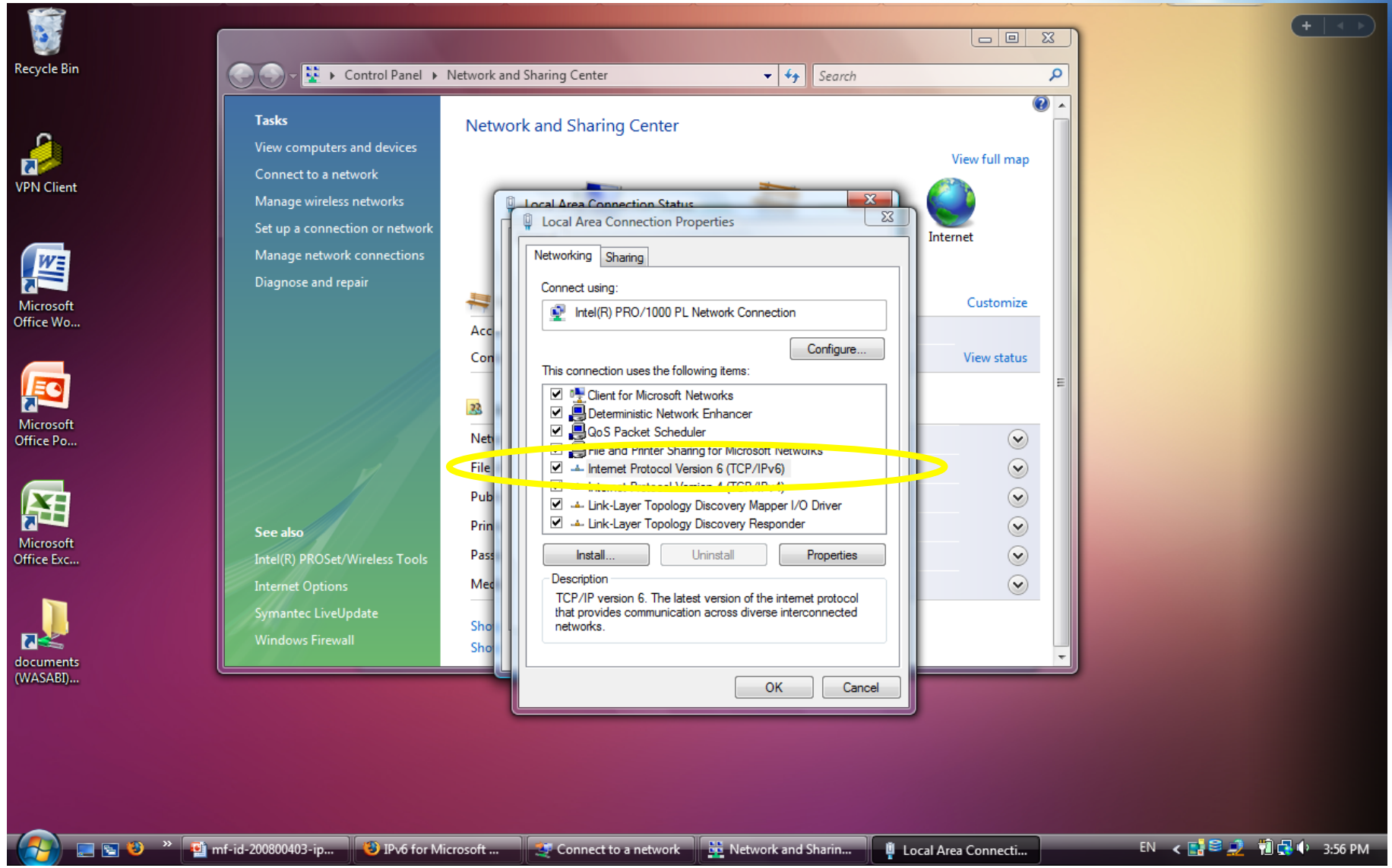
- XP is not able to operate in an IPv6-only environment
  - XP supports IPv6 in dual stack operation with IPv4
  - In reality, given the current Internet, an office network should become an IPv4/IPv6 dual network, not IPv6-only

## Vista and IPv6

- The IPv6 protocol for Windows Vista and Windows Server 2008 is installed and enabled by default.
- It appears as the **Internet Protocol Version 6 (TCP/IP)** component on the **Networking** tab when you obtain the properties of a connection (via “View Status”)
  - Available from the **Network and Sharing Center**



# Vista and IPv6



# Vista interface information

```
Windows IP Configuration

Host Name . . . . . : as-miva-1
Primary Dns Suffix . . . . . :
Node Type . . . . . : Hybrid
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No
DNS Suffix Search List. . . . . : apnic.net

Wireless LAN adapter Wireless Network Connection:

Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . . . . . :
Description . . . . . : Intel(R) Wireless WiFi Link 4965AGN
Physical Address. . . . . : 00-1D-E0-7D-1F-75
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . . : Yes

Ethernet adapter Local Area Connection:

Connection-specific DNS Suffix . . . . . : apnic.net
Description . . . . . : Intel(R) PRO/1000 PL Network Connection
Physical Address. . . . . : 00-1C-7E-57-50-24
DHCP Enabled. . . . . : Yes
Autoconfiguration Enabled . . . . . : Yes
IPv6 Address. . . . . : 2001:dc0:2001:6:b18f:3c83:f5c5:dcd8(Preferred)
Temporary IPv6 Address. . . . . : 2001:dc0:2001:6:bfff:56f1:80bb:9d(Preferred)
Link-local IPv6 Address . . . . . : fe80::b18f:3c83:f5c5:dcd8%8(Preferred)
IPv4 Address. . . . . : 202.12.29.223(Preferred)
Subnet Mask . . . . . : 255.255.255.128
Lease Obtained. . . . . : Thursday, 27 March 2008 11:50:04 AM
Lease Expires . . . . . : Thursday, 27 March 2008 1:50:04 PM
Default Gateway . . . . . : fe80::213:5fff:fe6:2c19%8
DHCP Server . . . . . : 202.12.29.254
DHCPv6 Iaid . . . . . : 201330293
DNS Servers . . . . . : 202.12.29.253
                        203.119.0.109
                        202.12.29.9
NetBIOS over Tcpip. . . . . : Enabled

Teredo Tunneling Pseudo-Interface:

Connection-specific DNS Suffix . . . . . :
Description . . . . . : Teredo Tunneling Pseudo-Interface
Physical Address. . . . . : 02-00-54-55-4E-01
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . . : Yes
IPv6 Address. . . . . : 2001:0:cf2e:308c:2889:21cc:35f3:e220(Preferred)
Link-local IPv6 Address . . . . . : fe80::2089:21cc:35f3:e220%9(Preferred)
Default Gateway . . . . . :
NetBIOS over Tcpip. . . . . : Disabled

Tunnel adapter Local Area Connection* 15:

Connection-specific DNS Suffix . . . . . : apnic.net
Description . . . . . : Microsoft ISATAP Adapter
Physical Address. . . . . : 00-00-00-00-00-00-E0
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::200:5efe:202.12.29.223%24(Preferred)
Default Gateway . . . . . :
DNS Servers . . . . . : 202.12.29.253
                        203.119.0.109
                        202.12.29.9
NetBIOS over Tcpip. . . . . : Disabled

C:\Users\niva>
```

Random interface ID  
(not EUI-64)

Temporary address  
(RFC3041)  
to provide a level of  
anonymity for  
client-initiated  
communications





# Vista interface information

```

C:\Users\niwa>ipconfig /all

Windows IP Configuration

   Host Name . . . . . : as-niwa-1
   Primary Dns Suffix . . . . . :
   Node Type . . . . . : Hybrid
   IP Routing Enabled. . . . . : No
   WINS Proxy Enabled. . . . . : No
   DNS Suffix Search List. . . . . : apnic.net

Wireless LAN adapter Wireless Network Connection:

   Media State . . . . . : Media disconnected
   Connection-specific DNS Suffix . . . . . :
   Description . . . . . : Intel(R) Wireless WiFi Link 4965AGN
   Physical Address. . . . . : 00-1C-E0-7D-1F-75
   DHCP Enabled. . . . . : Yes
   Autoconfiguration Enabled . . . . . : Yes

Ethernet adapter Local Area Connection:

   Connection-specific DNS Suffix . . . . . : apnic.net
   Description . . . . . : Intel(R) PRO/1000 PL Network Connection
   Physical Address. . . . . : 00-1C-7E-57-50-24
   DHCP Enabled. . . . . : Yes
   Autoconfiguration Enabled . . . . . : Yes
   IPv4 Address. . . . . : 202.12.29.223(Preferred)
   Subnet Mask . . . . . : 255.255.255.128
   Lease Obtained. . . . . : Thursday, 27 March 2008 11:50:04 AM
   Lease Expires . . . . . : Thursday, 27 March 2008 1:20:03 PM
   Default Gateway . . . . . : 202.12.29.254
   DHCP Server . . . . . : 202.12.29.254
   DNS Servers . . . . . : 202.12.29.253
                           203.119.0.109
                           202.12.29.9
   NetBIOS over Tcpip. . . . . : Enabled

Tunnel adapter Local Area Connection* 6:

   Connection-specific DNS Suffix . . . . . :
   Description . . . . . : Teredo Tunneling Pseudo-Interface
   Physical Address. . . . . : 02-00-54-55-4E-01
   DHCP Enabled. . . . . : No
   Autoconfiguration Enabled . . . . . : Yes
   IPv6 Address. . . . . : 2001:0:cf2e:308c:2889:21cc:35f3:e220(Pref
erred)
   Link-local IPv6 Address . . . . . : fe80::2889:21cc:35f3:e220%9(Preferred)
   Default Gateway . . . . . :
   NetBIOS over Tcpip. . . . . : Disabled

Tunnel adapter Local Area Connection* 7:

   Connection-specific DNS Suffix . . . . . : apnic.net
   Description . . . . . : Microsoft 6to4 Adapter
   Physical Address. . . . . : 00-00-00-00-00-00-E0
   DHCP Enabled. . . . . : No
   Autoconfiguration Enabled . . . . . : Yes
   Temporary IPv6 Address. . . . . : 2002:ca0c:1ddf::ca0c:1ddf(Preferred)
   Default Gateway . . . . . : 2002:c058:6301::c058:6301
   DNS Servers . . . . . : 202.12.29.253
                           203.119.0.109
                           202.12.29.9
   NetBIOS over Tcpip. . . . . : Disabled

Tunnel adapter Local Area Connection* 15:

   Connection-specific DNS Suffix . . . . . : apnic.net
   Description . . . . . : Microsoft ISATAP Adapter
   Physical Address. . . . . : 00-00-00-00-00-00-E0
   DHCP Enabled. . . . . : No
   Autoconfiguration Enabled . . . . . : Yes
   Link-local IPv6 Address . . . . . : fe80::200:5efe:202.12.29.223%24(Preferred)
   Default Gateway . . . . . :
   DNS Servers . . . . . : 202.12.29.253
                           203.119.0.109
                           202.12.29.9
   NetBIOS over Tcpip. . . . . : Disabled

C:\Users\niwa>
  
```

## IPv6 disabled

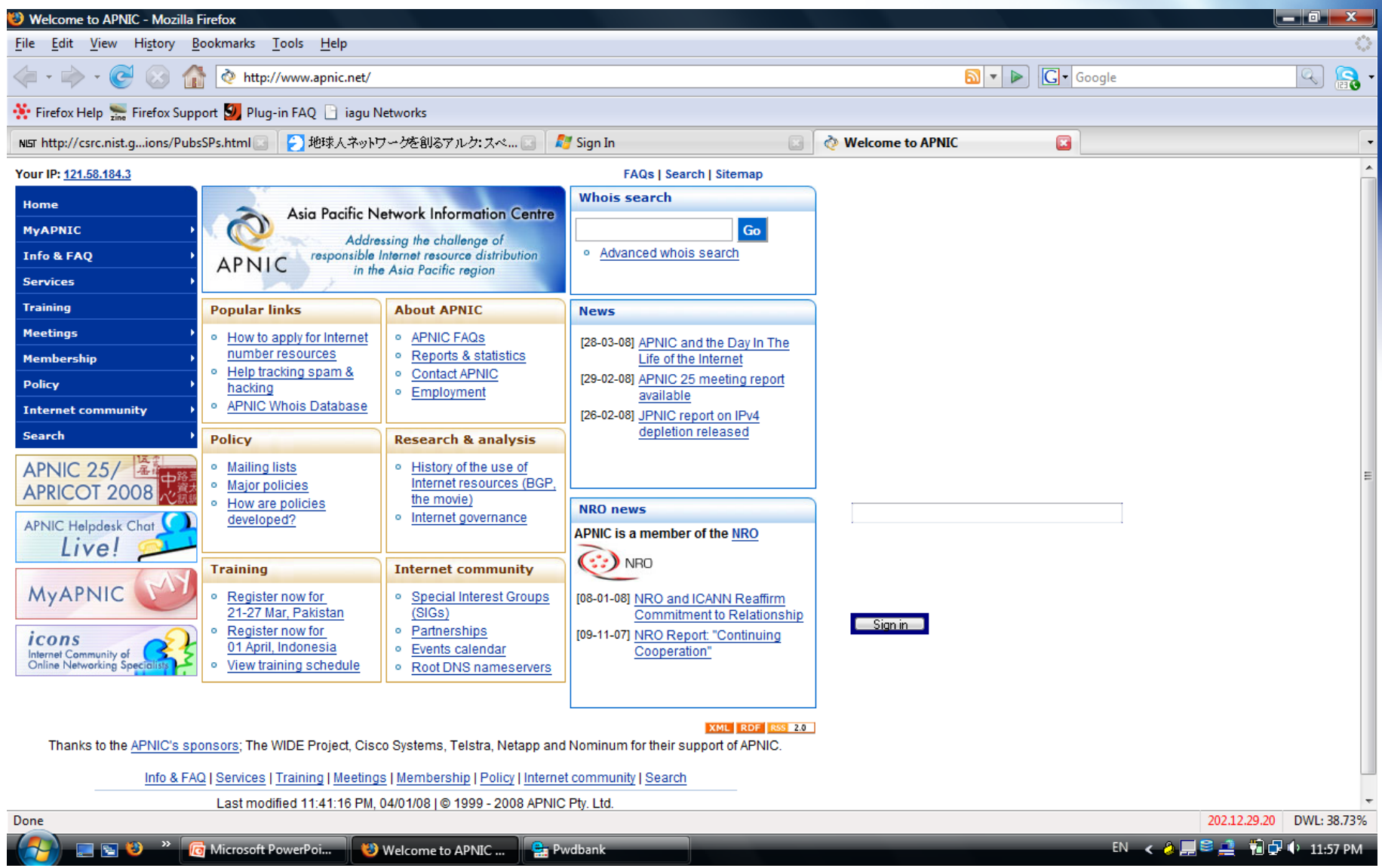
Q.How do I disable IPv6 in Windows Vista and Windows Server 2008?

A.Unlike Windows XP and Windows Server 2003, IPv6 in Windows Vista and Windows Server 2008 cannot be uninstalled.

However, you can disable IPv6 in Windows Vista and Windows Server 2008 by doing one of the following:

- In the Network Connections folder, obtain properties on all of your connections and adapters and clear the check box next to the **Internet Protocol version 6 (TCP/IPv6)** component in the list under **This connection uses the following items**.
- This method disables IPv6 on your LAN interfaces and connections, but does not disable IPv6 on tunnel interfaces or the IPv6 loopback interface.

# If your host is IPv6 enabled then...



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Internet Community of  
Online Networking Specialists

Asia Pacific Network Information Centre  
Addressing the challenge of responsible Internet resource distribution in the Asia Pacific region

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[29-02-08] APNIC 25 meeting report available  
[26-02-08] JPNIC report on IPv4 depletion released

Policy  
Mailing lists  
Major policies  
How are policies developed?

Research & analysis  
History of the use of Internet resources (BGP, the movie)  
Internet governance

Training  
Register now for 21-27 Mar, Pakistan  
Register now for 01 April, Indonesia  
View training schedule

Internet community  
Special Interest Groups (SIGs)  
Partnerships  
Events calendar  
Root DNS nameservers

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Done 202.12.29.20 DWL: 38.73%

Microsoft PowerPoi... Welcome to APNIC ... Pwdbank

EN 11:57 PM

# If your host is IPv6 enabled then...

Welcome to APNIC - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://www.apnic.net/index.html

Firefox Help Firefox Support Plug-in FAQ iagu Networks

del\_mem\_20080328\_063801.pdf (ap... 地球人ネットワークを創るアルケ:スベ... unix service pad - Google Search Welcome to APNIC

**Via v6**  
Your IP: 2001:dc0:2001:6:c902:13b4:188f:1e1f

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Whois search

Go

Advanced whois search

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NRO

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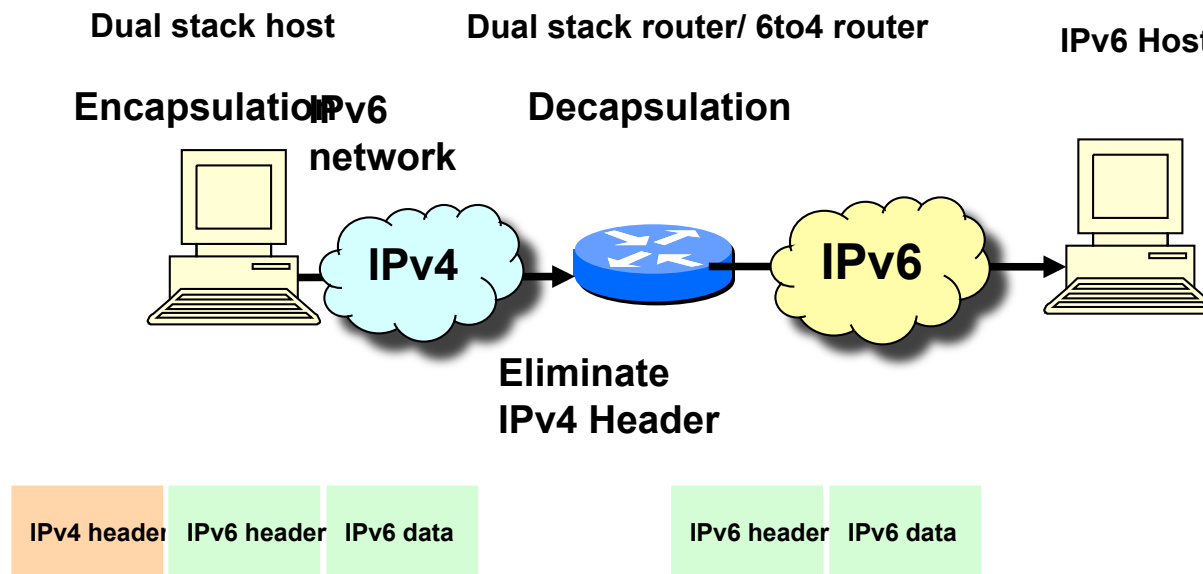
2001:dc0:2001:0:4608:20::+1    DWL: 38.57%

EN    4:39 PM

# IPv6 Configuration – Building an IPv6 Tunnel

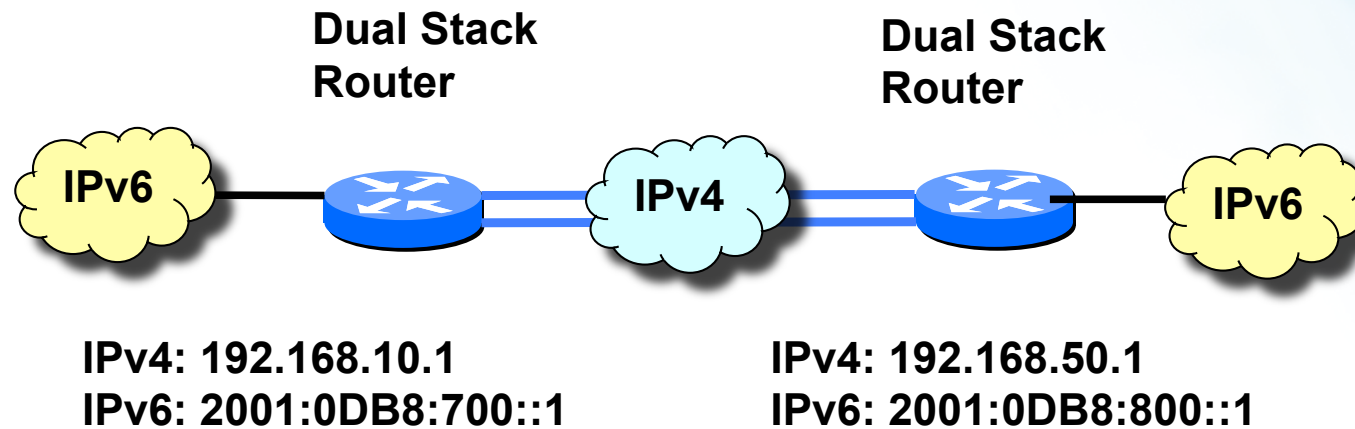
# Tunneling – general concept

- Tunneling can be used by routers and hosts
  - IPv6-over-IPv4 tunneling





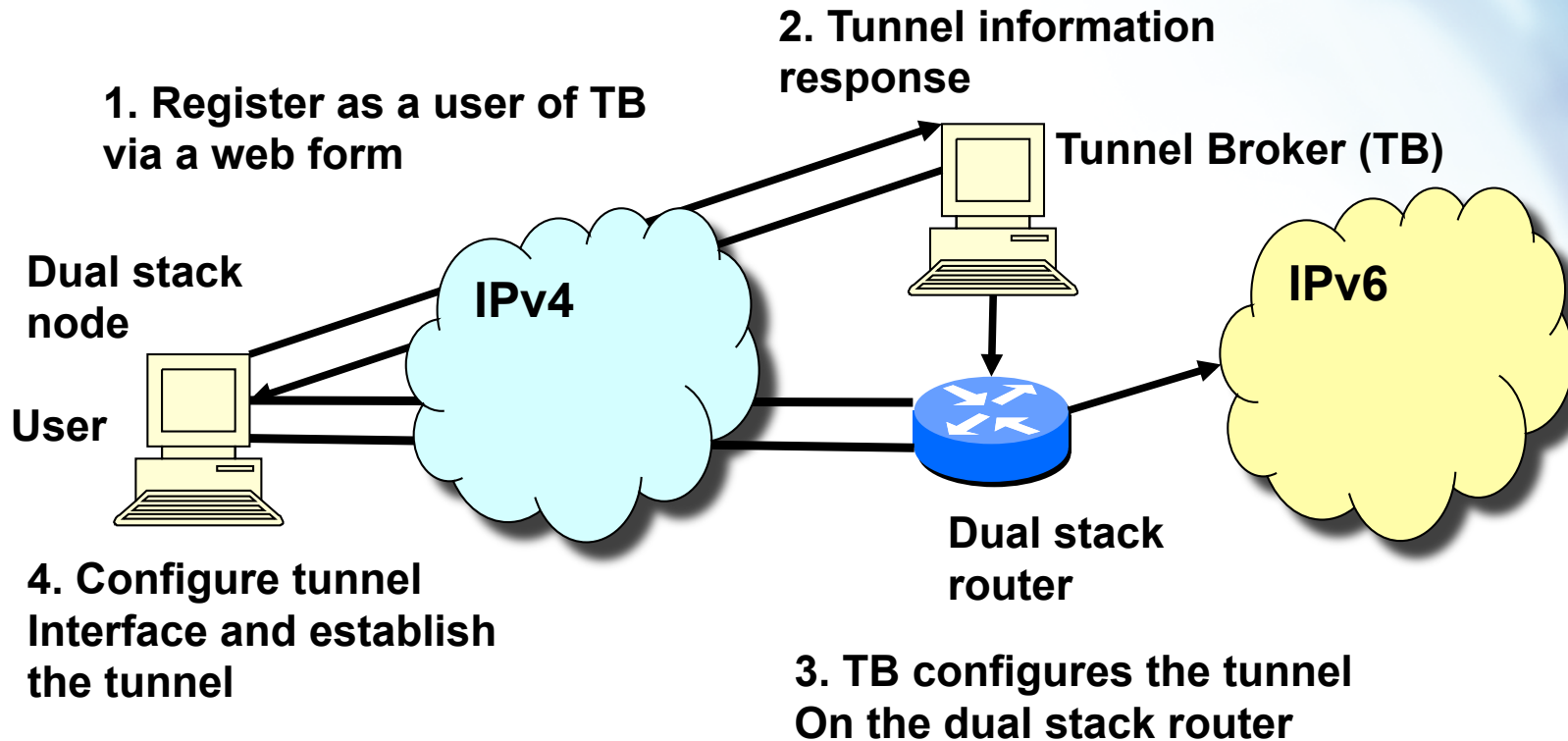
# Manual configuration



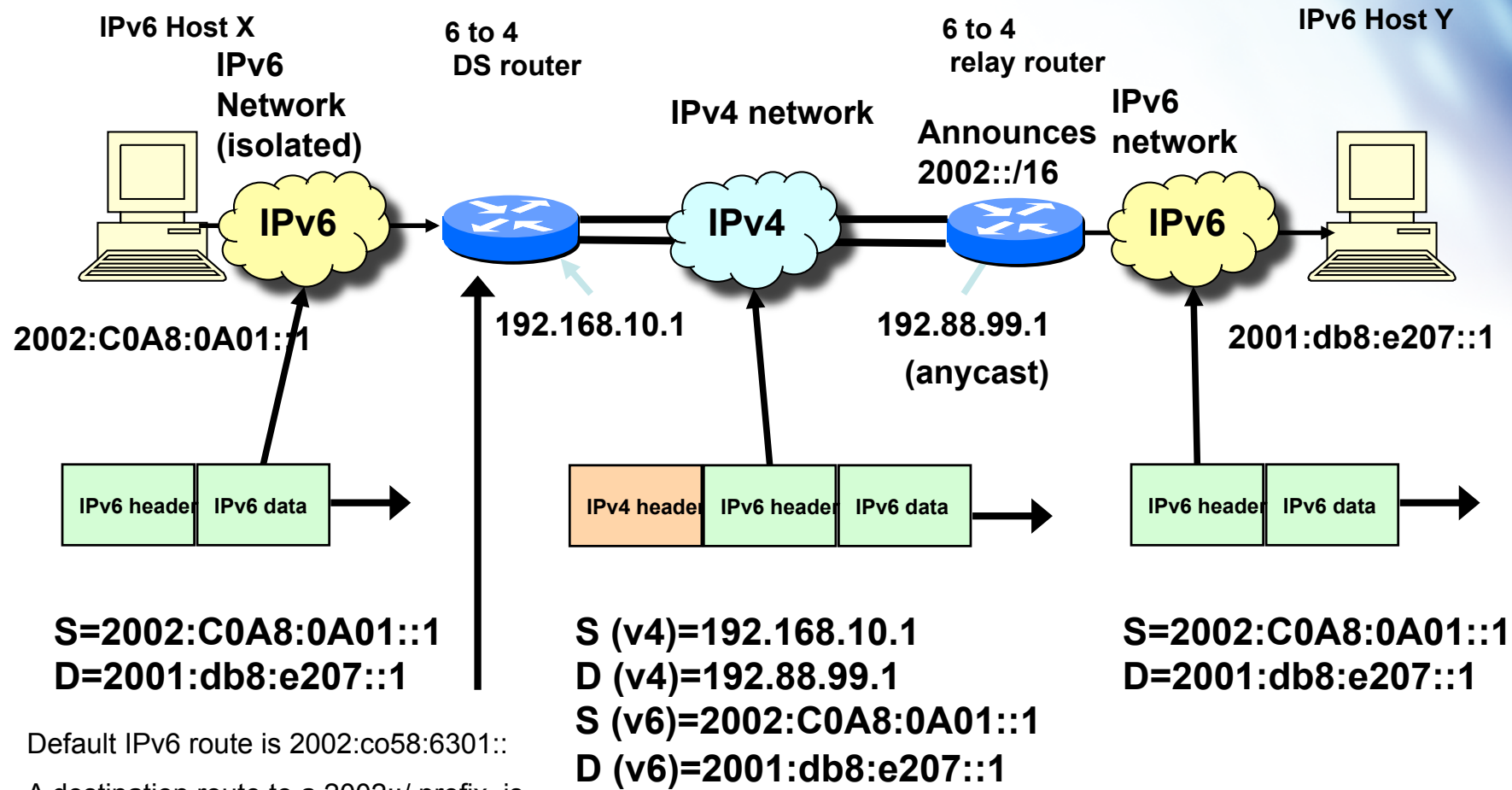
Manually configured tunnels require:

- Dual stack end points
- Explicit configuration with both IPv4 and IPv6 addresses at each end

# Tunnel broker



# Automatic tunneling –

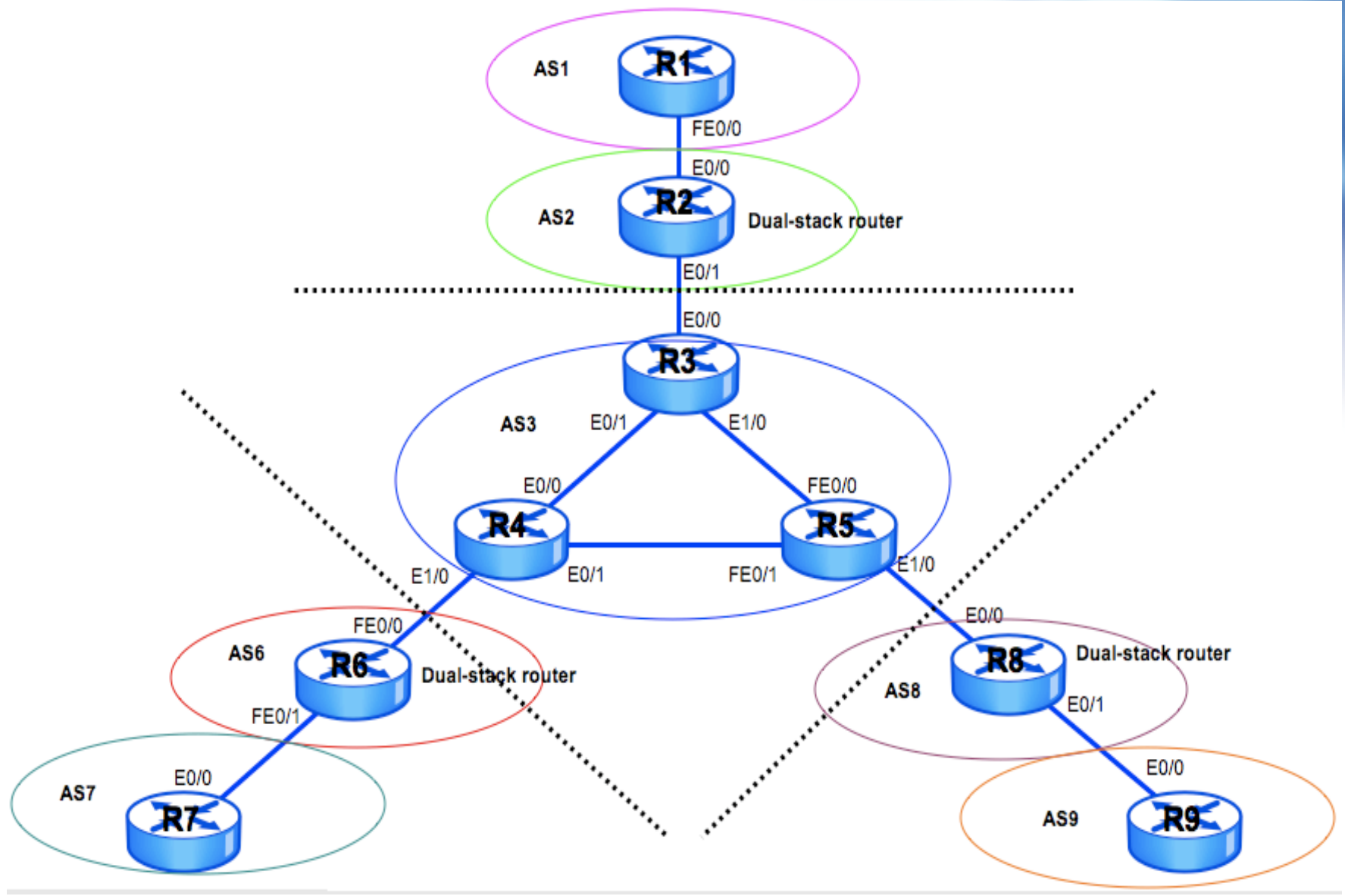


Default IPv6 route is 2002:co58:6301::

A destination route to a 2002::/ prefix is encapsulated in IPv4 and bits 17 – 48 used as the next hop. I.e 192.88.99.1 anycast



# Configuring a manual tunnel



- Create the appropriate interface for the tunnel.

***Router # configure terminal***

***Router(config)# interface tunnel [tunnel interface number]***

- *Example (for router 2):*
- ***Router2 # configure terminal***
- ***Router2(config) # interface tunnel 1***



- Configure the IPv6 address of the interface created “tunnel 1” with a /64 subnet.

***Router(config-if)# ipv6 address ipv6 address/prefix size in CIDR***

- Example for Router 2:
  - ***Router(config-if) # ipv6 address 2001:2:1::1/64***
- NOTE: The other side of the tunnel should be in the same subnet
  - Eg. 2001:2:1::2/64

- Enable IPv6 on the tunnel interface.
  - Example for Tunnel1:
    - ***Router2(config-if) # ipv6 enable***



- Configure the interface with “tunnel source interface” or the “tunnel source IP address”.
- Example for Router 2:

***Router2(config-if) # tunnel source 192.168.0.2***

- Configure the interface with tunnel destination IP address.
  - Example for Router2 tunnel with Router8:

```
Router2(config-if) # tunnel destination  
192.168.0.8
```



- Configure the tunnel interface mode (determining how the packet will be transferred to the other dual-stack router)
- ***Router2(config-if) # tunnel mode ipv6ip***  
*(for manual tunnel)*

- Create a static route to a the destination IPv6 network, Define the whole /48 subnet
- ***Router2(config)ipv6 route destination network/prefix <outbound interface or next hop IP address>***
- Example for Router 2: (To reach Router8 customer network via tunnel interface 1)
  - ***Router2(config)#ipv6 route 2001:8::/48 tunnel 1 (outbound interface)***
- ***Or***
  - ***Router(config)#ipv6 route 2001:8::/48 2001:2:1::2 (next-hop IP- the other end of the tunnel)***

# Deploying IPv6 – configuring DNS for IPv6

# IPv6 representation in the DNS

- Forward lookup support: Multiple RR records for name to number
  - AAAA (Similar to A RR for IPv4 )
- Reverse lookup support:
  - Reverse nibble format for zone ip6.arpa

# IPv6 forward lookups

- Multiple addresses possible for any given name
  - Ex: in a multi-homed situation
- Can assign A records and AAAA records to a given name/domain
- Can also assign separate domains for IPv6 and IPv4

# Sample forward lookup file

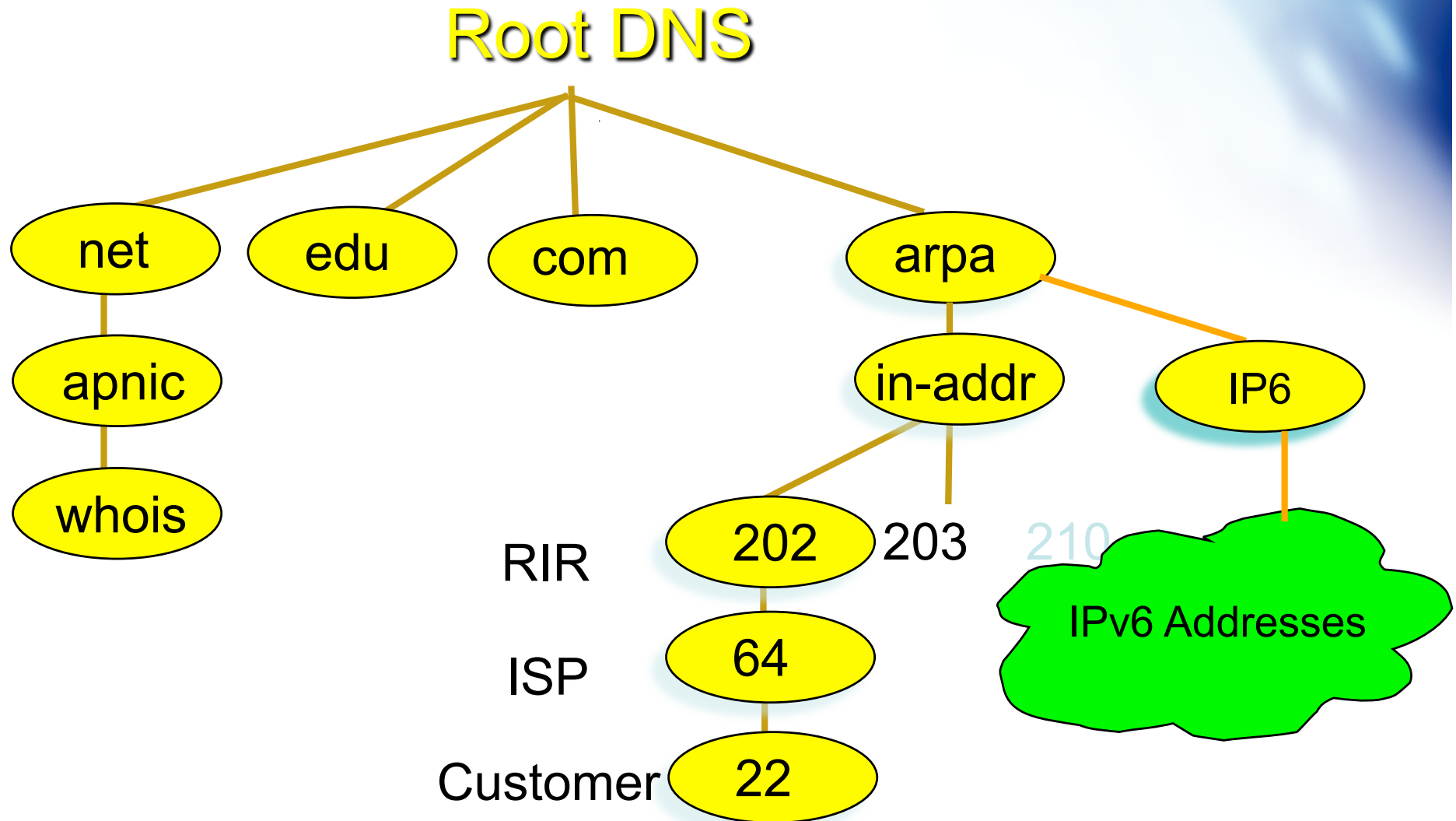
```
;; domain.edu
$TTL      1d
@         IN      SOA      ns1.domain.edu. root.domain.edu. (
                2009041400 ; serial - YYYYMMDDXX
                6h         ; refresh - 6 hours
                20m        ; retry - 20 minutes
                3600000    ; expire - long time
                1d)        ; negative cache - 24 hours

;; Nameservers
                IN      NS      ns1.domain.edu.
                IN      NS      ns2.domain.edu.

;; Hosts with just A records
host1      IN      A      1.0.0.1

;; Hosts with both A and AAAA records
host2      IN      A      1.0.0.2
                IN      AAAA   2001:468:100::2
```

# The reverse DNS tree – with IPv6



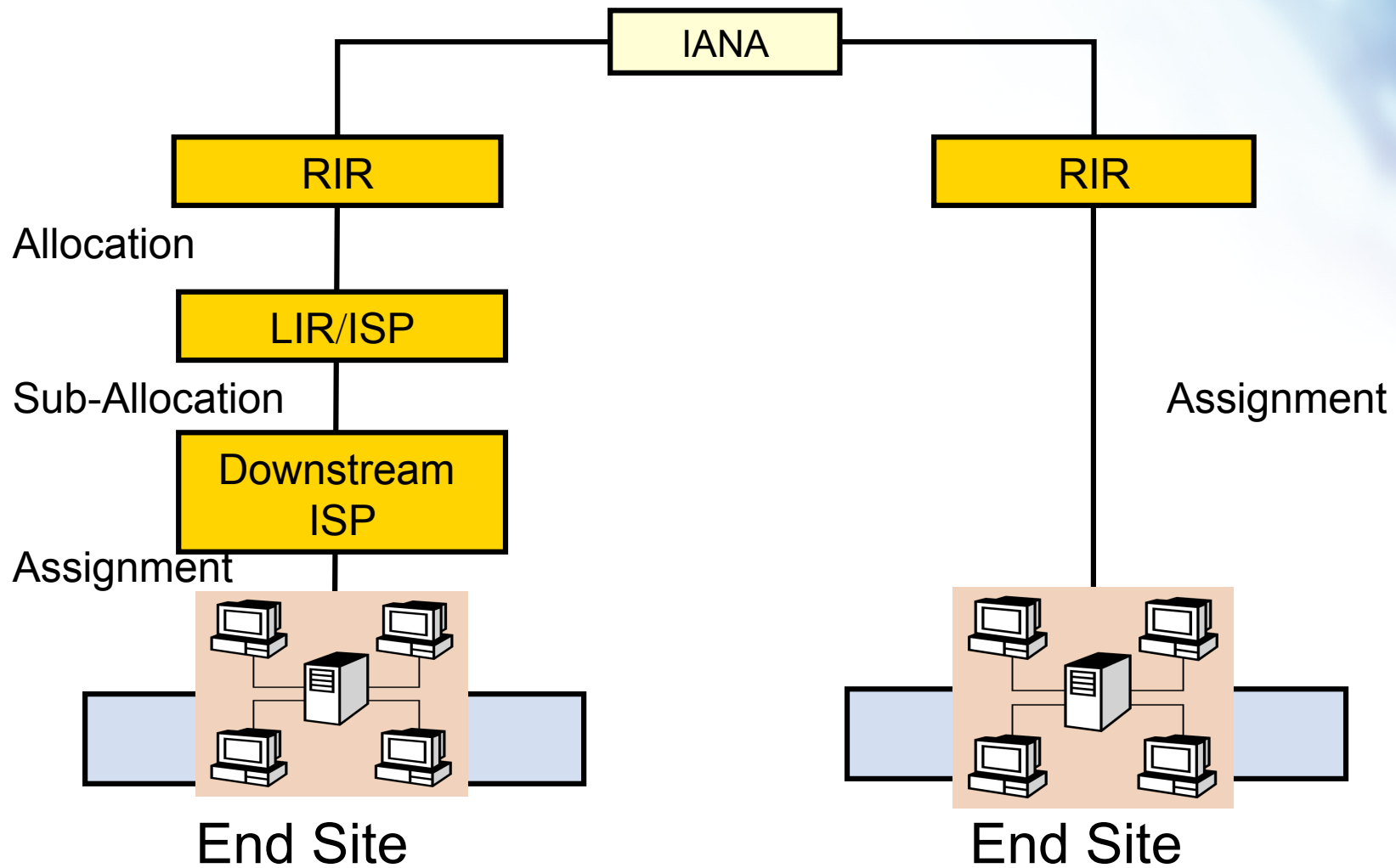






# IPv6 – current facts, figures and policies

# IPv6 address management hierarchy





# IPv6 address policy goals

- Efficient address usage
  - Avoid wasteful practices
- Aggregation
  - Hierarchical distribution
  - Aggregation of routing information
  - Limiting number of routing entries advertised
- Minimise overhead
  - Associated with obtaining address space
- Registration, Uniqueness, Fairness & consistency



# IPv6 initial allocation

- To qualify for an initial allocation of IPv6 address space, an organization must:
  - 1. Be an LIR
  - 2. Not be an end site
  - 3. Plan to provide IPv6 connectivity to organizations to which it will make assignments, by advertising that connectivity through its single aggregated address allocation
  - 4. Meet one of the two following criteria:
    - Have a plan for making at least 200 assignments to other organizations within two years OR
    - Be an existing LIR with IPv4 allocations from an APNIC or an NIR, which will make IPv6 assignments or sub-allocations to other organizations and announce the allocation in the inter-domain routing system within two years

## IPv6 initial allocation

- Private networks (those not connected to the public Internet) may also be eligible for an IPv6 address space allocation provided they meet equivalent criteria to those listed above.
- Initial allocation size is /32
  - Default allocation (“slow start”)





## IPv6 initial allocation

- Initial allocations larger than /32 may be justified if:
  - 1. The organization provides comprehensive documentation of planned IPv6 infrastructure which would require a larger allocation; or
  - 2. The organization provides comprehensive documentation of all of the following:
    - its existing IPv4 infrastructure and customer base,
    - its intention to provide its existing IPv4 services via IPv6, and
    - its intention to move some of its existing IPv4 customers to IPv6 within two years.

# End site assignment policy for IPv6

- Any size longer than /48
  - Decision is up to LIRs or ISPs
    - Implication: any size between /64 - /48
  - Global coordination is required
  - Assuming the HD ratio changes to a larger value
    - HD ratio measurement unit: /48 => /56
      - Implication: Register all assignments shorter than /56?
    - HD ratio: 0.8 => 0.94

# IPv6 utilisation

- Utilisation determined from end site assignments
  - LIR responsible for registration of all /48 assignments
  - Intermediate allocation hierarchy not considered
- Utilisation of IPv6 address space is measured differently from IPv4
  - Use HD ratio to measure
- Subsequent allocation may be requested when IPv6 utilisation requirement is met

# Amend IPv6 assignment and utilisation requirement

- IPv6 assignment and utilisation requirement policy
  - HD ratio: 0.8 => 0.94
  - Measurement unit: /48 => /56
- The HD ratio threshold is
  - $HD = \log(/56 \text{ units assigned}) / \log(16,777,216)$
  - $0.94 = 6,183,533 \times /56 \text{ units}$
- Calculation of the HD ratio
  - Convert the assignment size into equivalent /56 units
    - Each /48 end site =  $256 \times /56 \text{ units}$
    - Each /52 end site =  $16 \times /56 \text{ units}$
    - Each /56 end site =  $1 \times /56 \text{ units}$
    - Each /60 end site =  $1/16 \times /56 \text{ units}$
    - Each /64 end site =  $1/256 \times /56 \text{ units}$

# IPv6 utilisation (HD = 0.94)

- Percentage utilisation calculation

IPv6 Prefix	Site Address Bits	Total site address in /56s	Threshold (HD ratio 0.94)	Utilisation %
/42	14	16,384	9,153	55.9%
/36	20	1,048,576	456,419	43.5%
/35	21	2,097,152	875,653	41.8 %
/32	24	16,777,216	6,185,533	36.9%
/29	27	134,217,728	43,665,787	32.5 %
/24	32	4,294,967,296	1,134,964,479	26.4 %
/16	40	1,099,511,627,776	208,318,498,661	18.9 %

RFC 3194

“In a hierarchical address plan, as the size of the allocation increases, the density of assignments will decrease.”

# Subsequent allocation

- Must meet  $HD = 0.94$  utilisation requirement of previous allocation (subject to change)
- Other criteria to be met
  - Correct registrations (all /48s registered)
  - Correct assignment practices etc
- Subsequent allocation results in a doubling of the address space allocated to it
  - Resulting in total IPv6 prefix is 1 bit shorter
  - Or sufficient for 2 years requirement



# IXP IPv6 assignment policy

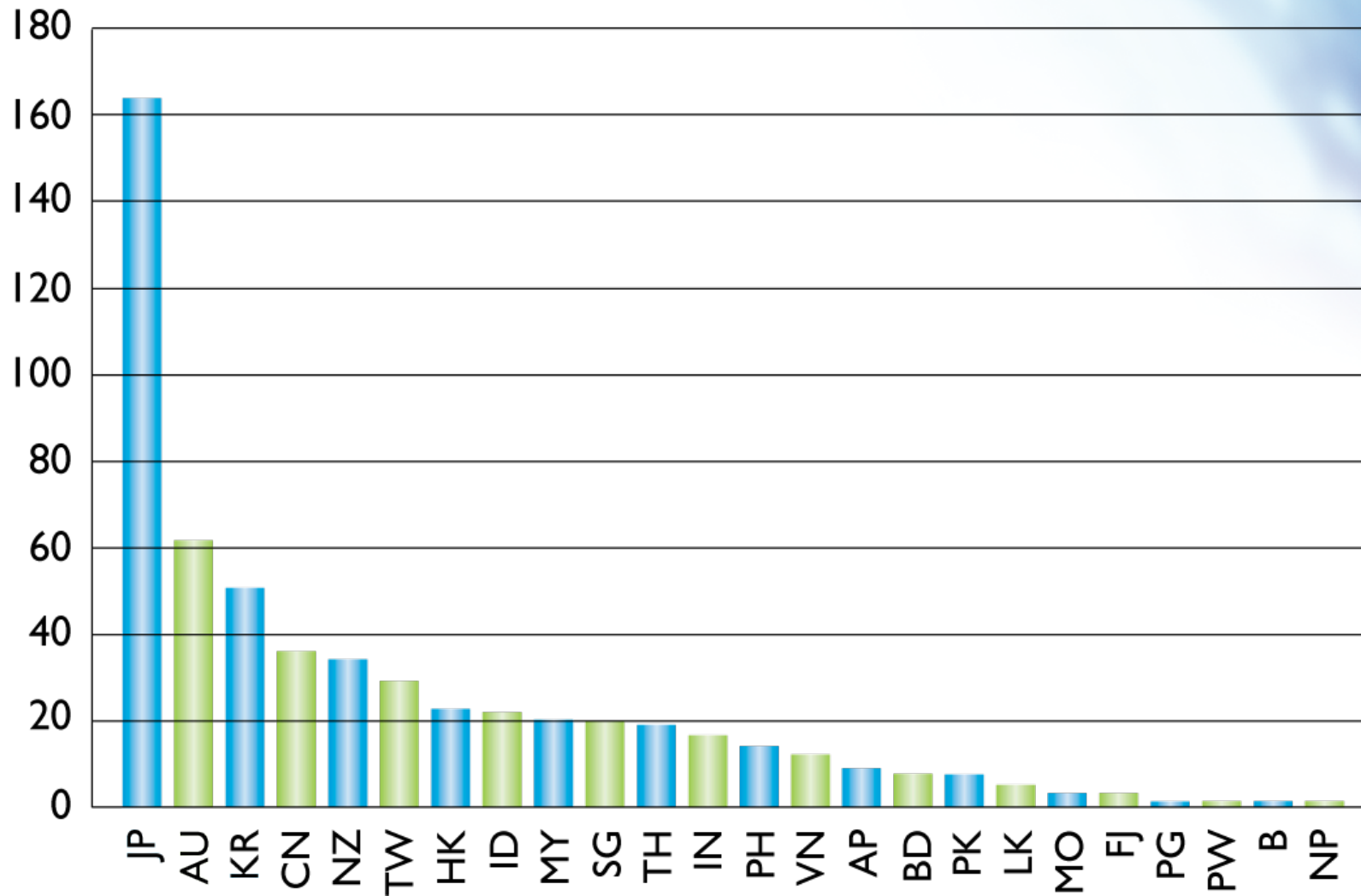
- Criteria
  - Demonstrate ‘open peering policy’
  - 3 or more peers
- Portable assignment size: /48
  - All other needs should be met through normal processes
  - /64 holders can “upgrade” to /48
    - Through NIRs/ APNIC
    - Need to return /64



# IPv6 portable assignment for multihoming

- The current policy did not allow IPv6 portable assignment to end-sites
  - Obstructs setting redundancy connectivity for stable network operation
  - Size: /48, or a shorter prefix if the end site can justify it
  - To be multihomed within 3 months
  - Assignment from a specified block separately from portable allocations address space

# APNIC IPv6 delegation by economy



# Need IPv6 addresses?

The screenshot shows a Microsoft Internet Explorer browser window displaying the APNIC Member Services Helpdesk. A live chat window is open, showing a conversation between a user named 'miwa' and a helpdesk agent named 'George'. The chat window title is 'http://livehelp.apnic.net - miwa: Support Request - Mic...'. The chat content shows 'miwa' starting a conversation and 'George' responding: 'Hello miwa, You are chatting to APNIC helpdesk. This is...'. The background website features the APNIC logo, navigation links, and a section for 'APNIC Helpdesk chat' with a 'Click here for help' button. Below this, it lists office hours: 'Available during office hours except: (UTC + 10 hours)' with dates 'Monday 26 - Tuesday 27 December 2005', '2 January 2006', and 'Wednesdays, 14:30 - 15:30'. A 'Contact details' section provides phone (+61 7 3858...), fax (+61 7 3858 3...), and email (helpdesk@a...) information. A 'See also:' section lists links for 'APNIC resource services', 'Help for APNIC forms', 'APNIC membership information', and 'Contact APNIC'. A red rounded rectangle is overlaid on the page, containing the text: 'Contact APNIC Helpdesk', 'helpdesk@apnic.net', and 'Helpdesk chat'.

**Contact APNIC Helpdesk**  
[helpdesk@apnic.net](mailto:helpdesk@apnic.net)  
**Helpdesk chat**



# How do I apply for IPv6 addresses?

Check your eligibility for IPv6 addresses

Read IPv6 policies

<http://www.apnic.net/docs/policy/ipv6-address-policy.html>

Read IPv6 guideline

<http://www.apnic.net/docs/policy/ipv6-guidelines.html>

Do you have an APNIC account?

If not, become an APNIC member or open a non-member account

Complete an IPv6 address request form

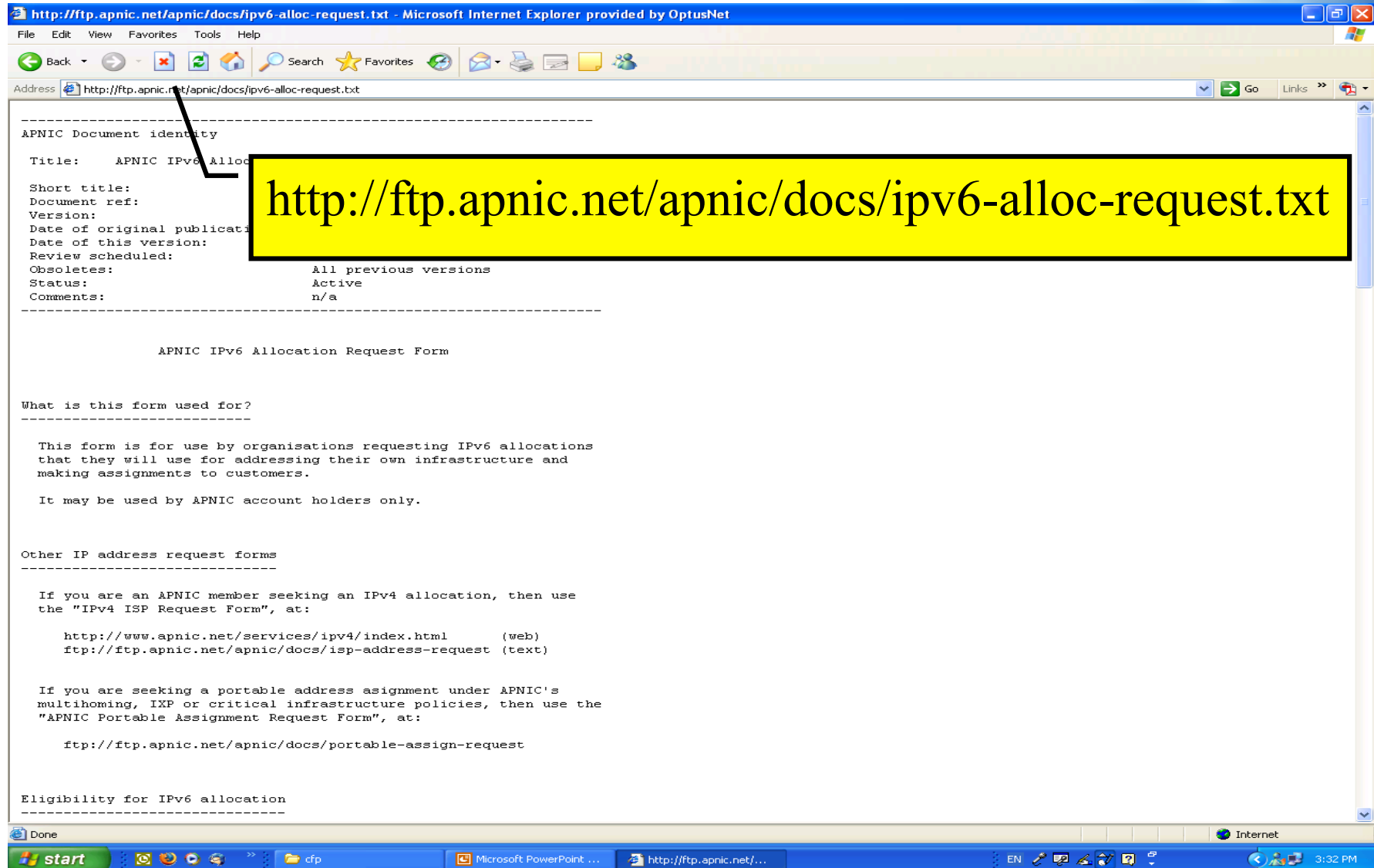
Submit the form [hostmaster@apnic.net](mailto:hostmaster@apnic.net)

Questions:

email: [helpdesk@apnic.net](mailto:helpdesk@apnic.net)

Helpdesk chat: <http://www.apnic.net/helpdesk>

# IPv6 address request form



http://ftp.apnic.net/apnic/docs/ipv6-alloc-request.txt

-----  
APNIC Document identity  
-----  
Title: APNIC IPv6 Alloc  
Short title:  
Document ref:  
Version:  
Date of original publication:  
Date of this version:  
Review scheduled:  
Obsoletes: All previous versions  
Status: Active  
Comments: n/a  
-----

APNIC IPv6 Allocation Request Form

What is this form used for?  
-----  
This form is for use by organisations requesting IPv6 allocations that they will use for addressing their own infrastructure and making assignments to customers.  
It may be used by APNIC account holders only.

Other IP address request forms  
-----  
If you are an APNIC member seeking an IPv4 allocation, then use the "IPv4 ISP Request Form", at:  
  
http://www.apnic.net/services/ipv4/index.html (web)  
ftp://ftp.apnic.net/apnic/docs/isp-address-request (text)  
  
If you are seeking a portable address assignment under APNIC's multihoming, IXP or critical infrastructure policies, then use the "APNIC Portable Assignment Request Form", at:  
  
ftp://ftp.apnic.net/apnic/docs/portable-assign-request

Eligibility for IPv6 allocation  
-----



# IPv6 address request form

- Requester template
  - Name, email, acct-name, org-relationship:
- Network template
  - Netname, descr, country, admin-c, tech-c, remarks, changed, mnt-lower
- IPv6 usage template
  - Services, cust-types, cust-network, infrastructure, network-plan
- Additional information

## Sample form

```
#[REQUESTOR TEMPLATE]#
```

```
name: Ahmad Rahman
```

```
email: ar@skynet.net.in
```

```
acct-name: SKYNET-IN
```

```
org-relationship: Manager
```



## Sample form

```
#[NETWORK TEMPLATE]#  
netname: SKYNET-IN  
descr: SKYNET LIMITED  
descr: Internet Service Provider  
country: IN  
admin-c: AR100-AP  
tech-c: AR100-AP  
remarks: IPv6 Network of SKYNET  
changed: ar@skynet.net.in  
mnt-lower: MAINT-SKYNET-IN
```

# Sample form

## #[IPV6 USAGE TEMPLATE]#

services: ADSL services, VPN and Application Hosting

cust-types: Residential, SOHO, Enterprise, ISPs

infrastructure: /48 /64,/64,/48 20 Mail server segments

infrastructure: /48 /64,/64,/48 20 Web server segments

infrastructure: /48 /64,/64,/48 10 DNS server segments

network plan: /48 /54,/54,/48 100 Corp Head Office LAN New Delhi  
(customer support, marketing and back-office)

network-plan: /48 /54,/54,/48 50 Bangkok branch LAN (customer  
support)

network-plan: /48 /54,/54,/48 30 Chennai Office LAN (customer  
support and R&D)

# Sample form

## #[ADDITIONAL INFORMATION]#

1. Your proposed IPv6 deployment plan
  - Deployment schedule
  - Implementation plan
    - What transition method do you use?
    - Who are the upstream ISP you will connect?
    - What equipment are you using?
    - What services are you planning to provide?

# Sample form

#[ADDITIONAL INFORMATION]#

2. Network diagram showing your planned IPv6 network
3. If requesting more than /32, provide details of your existing IPv4 network
4. Additional comments

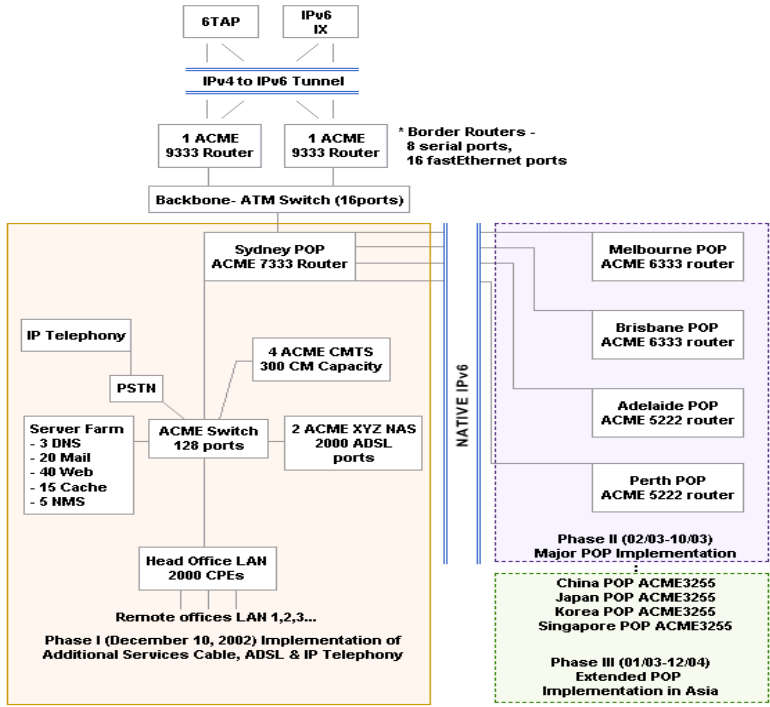
# Sample form

Guide to the APNIC IPv6 Allocation Request Form (text version) - Microsoft Internet Explorer provided by OptusNet

Address: <http://www.apnic.net/services/help/ipv6-alloc-txt/add-info.html#diagram>

MyAPNIC  
 Info & FAQ  
 Resource services  
 Training  
 Meetings  
 Membership  
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 Home

**Example of a network diagram:**



```

    graph TD
        6TAP --- Tunnel[IPv4 to IPv6 Tunnel]
        IPv6_IX[IPv6 IX] --- Tunnel
        Tunnel --- ACME1[1 ACME 9333 Router]
        Tunnel --- ACME2[1 ACME 9333 Router]
        ACME1 --- ATM[Backbone- ATM Switch 16ports]
        ACME2 --- ATM
        ATM --- Sydney[Sydney POP ACME 7333 Router]
        Sydney --- IP_Tel[IP Telephony]
        Sydney --- PSTN[PSTN]
        Sydney --- CMTS[4 ACME CMTS 300 CM Capacity]
        Sydney --- Switch[ACME Switch 128 ports]
        Sydney --- HAS[2 ACME XYZ HAS 2000 ADSL ports]
        Switch --- Server[Server Farm - 3 DNS, 20 Mail, 40 Web, 15 Cache, 5 NMS]
        Switch --- LAN[Head Office LAN 2000 CPEs]
        Switch --- Remote[Remote offices LAN 1,2,3...]
        Sydney --- NATIVE[NATIVE IPv6]
        NATIVE --- Melbourne[Melbourne POP ACME 6333 router]
        NATIVE --- Brisbane[Brisbane POP ACME 6333 router]
        NATIVE --- Adelaide[Adelaide POP ACME 5222 router]
        NATIVE --- Perth[Perth POP ACME 5222 router]
        NATIVE --- PhaseII[Phase II 02/03-10/03 Major POP Implementation]
        NATIVE --- PhaseIII[Phase III 01/03-12/04 Extended POP Implementation in Asia]
        PhaseIII --- China[China POP ACME3255]
        PhaseIII --- Japan[Japan POP ACME3255]
        PhaseIII --- Korea[Korea POP ACME3255]
        PhaseIII --- Singapore[Singapore POP ACME3255]
    
```

**Phase I (December 10, 2002) Implementation of Additional Services Cable, ADSL & IP Telephony**

**Phase II (02/03-10/03) Major POP Implementation**

**Phase III (01/03-12/04) Extended POP Implementation in Asia**

**\* Border Routers - 8 serial ports, 16 fastEthernet ports**

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# Sample form

Guide to the APNIC IPv6 Allocation Request Form (text version) - Microsoft Internet Explorer provided by OptusNet

File Edit View Favorites Tools Help

Back Forward Stop Home Search Favorites Refresh Print Mail Print Mail Print Mail

Address <http://www.apnic.net/services/help/ipv6-alloc-txt/add-info.html#diagram> Go Links

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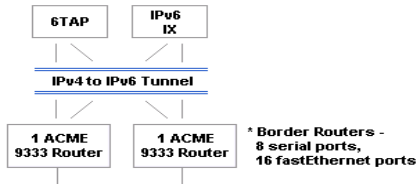
Documents

Internet community

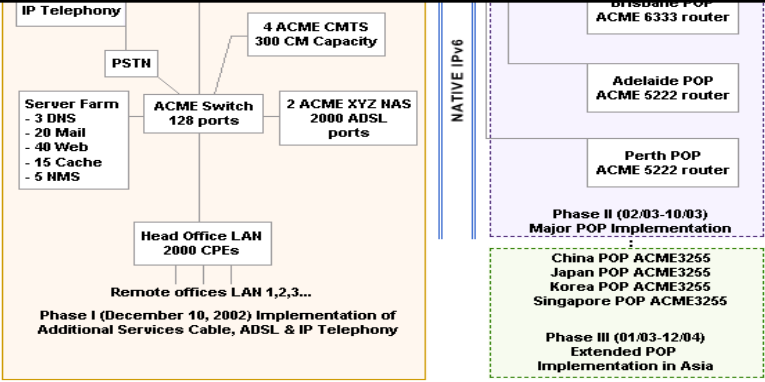
Search

Home

Example of a network diagram:



<http://www.apnic.net/services/help/ipv6-alloc-txt/add-info.html#diagram>



[Top](#) | [Guide to the APNIC IPv6 Allocation Request Form](#)

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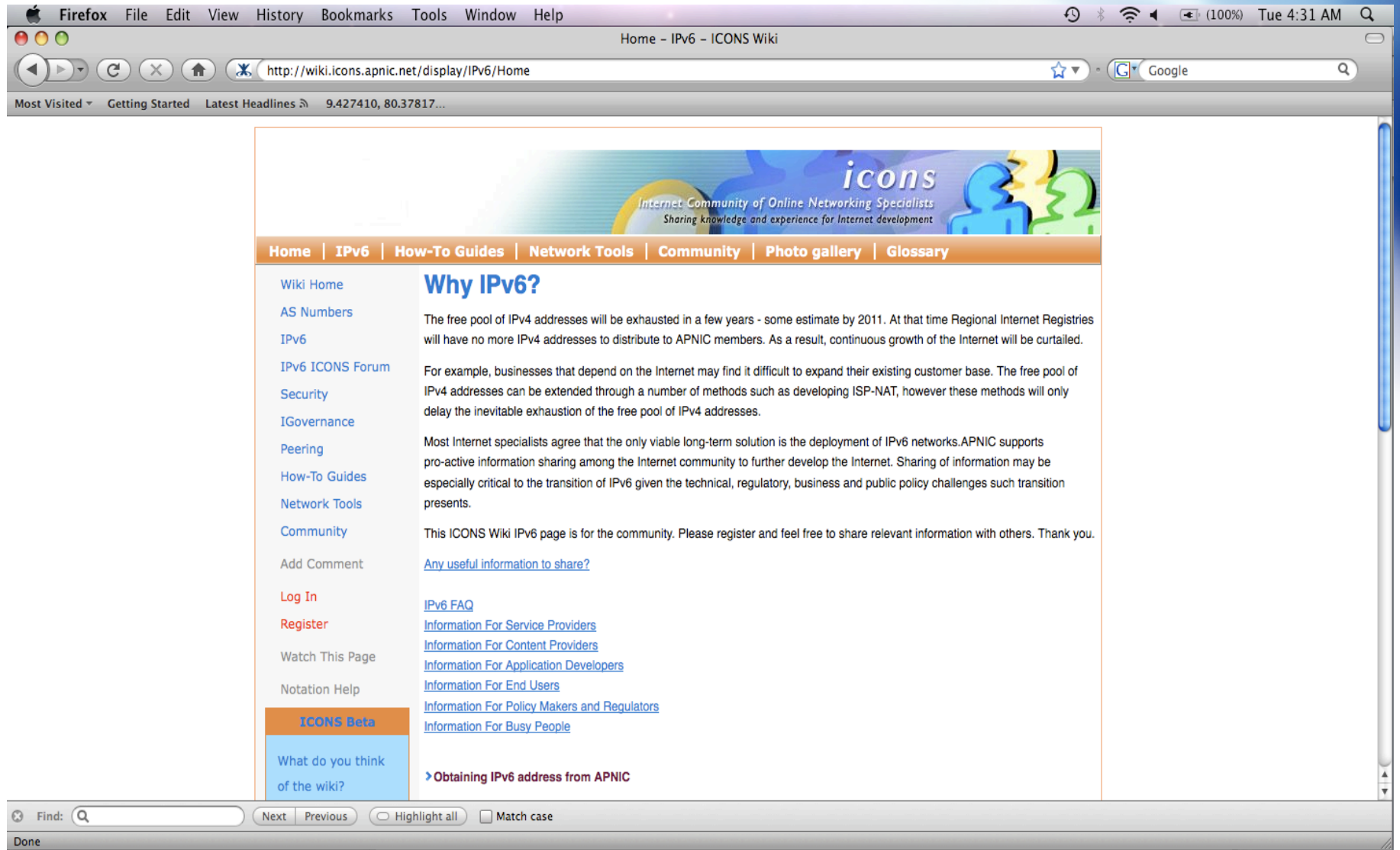
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# Discuss IPv6 Transition – IPv6 Wiki




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## Why IPv6?

The free pool of IPv4 addresses will be exhausted in a few years - some estimate by 2011. At that time Regional Internet Registries will have no more IPv4 addresses to distribute to APNIC members. As a result, continuous growth of the Internet will be curtailed.

For example, businesses that depend on the Internet may find it difficult to expand their existing customer base. The free pool of IPv4 addresses can be extended through a number of methods such as developing ISP-NAT, however these methods will only delay the inevitable exhaustion of the free pool of IPv4 addresses.

Most Internet specialists agree that the only viable long-term solution is the deployment of IPv6 networks. APNIC supports pro-active information sharing among the Internet community to further develop the Internet. Sharing of information may be especially critical to the transition of IPv6 given the technical, regulatory, business and public policy challenges such transition presents.

This ICONS Wiki IPv6 page is for the community. Please register and feel free to share relevant information with others. Thank you.

[Any useful information to share?](#)

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[> Obtaining IPv6 address from APNIC](#)

Find:  [Next](#) [Previous](#)  Highlight all  Match case

Done



# IPv6 policy – have your say!

- Limited experience of policy in action
  - Your feedback very important
  - Policy always subject to change and refinement
- Open discussion list
  - [global-v6@lists.apnic.net](mailto:global-v6@lists.apnic.net) (all regions)
  - SIG Policy mailing list (APNIC region)
- Documentation
  - FAQ information and more!
    - [http://www.apnic.net/services/ipv6\\_guide.html](http://www.apnic.net/services/ipv6_guide.html)
  - Guidelines document under development
    - To assist new requestors with policy



# APNIC 28 – 24-28 August 2009

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http://www.apnic.net/meetings/28/

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APNIC 28  
Beijing 2009

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**Join us in Beijing for APNIC 28!**

APNIC and CNNIC invite Internet and networking experts, government representatives, industry leaders, and others to meet in Beijing to learn, discuss, and make decisions about important issues facing the Asia Pacific Internet community.

**Why should I attend?**

What are APNIC meetings and why should my organization attend?

**Program**

See the highlights from social, technical, and policy programs

**Elections**

Nominate and elect your representative for the APNIC NC election

**When and where**

Grand Hyatt Beijing, China  
24-28 August 2009

**Getting to Beijing**

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**Sponsorship**

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**Questions?**



**Thank you! 😊**