

DHCPv6 and DNS Test Bed Configuration in Next Generation IPv6 Networks

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INTRODUCTION

ABSTRACT

1	TOPOLOGY OF IPv6 NETWORK	4
2	DHCPv6 Installation and Configuration	5
2.1	KEA DHCP Installation	5
	Installation Steps	5
2.2	Configuration of KEA DHCP for IPv6.....	5
2.2.1	Steps for configuring KEA DHCPv6	5
	1: Navigate to Kea Configuration Directory	5
	2: Create a Configuration Backup.....	5
	3: Edit the KEA DHCPv6 Configuration.....	5
	4: Configure KEA DHCPv6	5
	6: Start KEA DHCPv6	8
	7: Enable KEA DHCPv6 Service.....	8
2.3	KEA Control and KEA Control Agent Configuration	8
2.3.1	Configuration Steps for keactrl.conf and kea-ctrl-agent.conf	8
2.3.2	Initiate KEA Servers and Control Agent.....	9
3	DNS SERVER	11
3.1	DNS Server Configuration	11
3.2	General Information.....	11
3.3	Initial Setup	11
3.4	Server Configuration	12
4	On Client Side:.....	14

ABSTRACT

This report presents a detailed account of configuring Dynamic Host Configuration Protocol version 6 (DHCPv6) and Domain Name System (DNS) servers, fundamental elements in deploying Internet Protocol version 6 (IPv6). Developed as part of a workshop conducted at the National Institute of Technology Karnataka (NITK), Surathkal, the document offers step-by-step instructions for implementing DHCPv6 for address allocation and DNS for domain name resolution. By following these guidelines, participants can gain practical insights into IPv6 network setup and management, contributing to their proficiency in modern networking technologies.

INTRODUCTION

The adoption of Internet Protocol version 6 (IPv6) is becoming increasingly essential as the depletion of available IPv4 addresses continues. As organizations transition to IPv6, understanding its deployment and configuration becomes paramount. This report serves as a comprehensive guide to setting up DHCPv6 and DNS servers, crucial components in an IPv6 network, within the context of a workshop held at the National Institute of Technology Karnataka (NITK), Surathkal.

1 TOPOLOGY OF IPV6 NETWORK

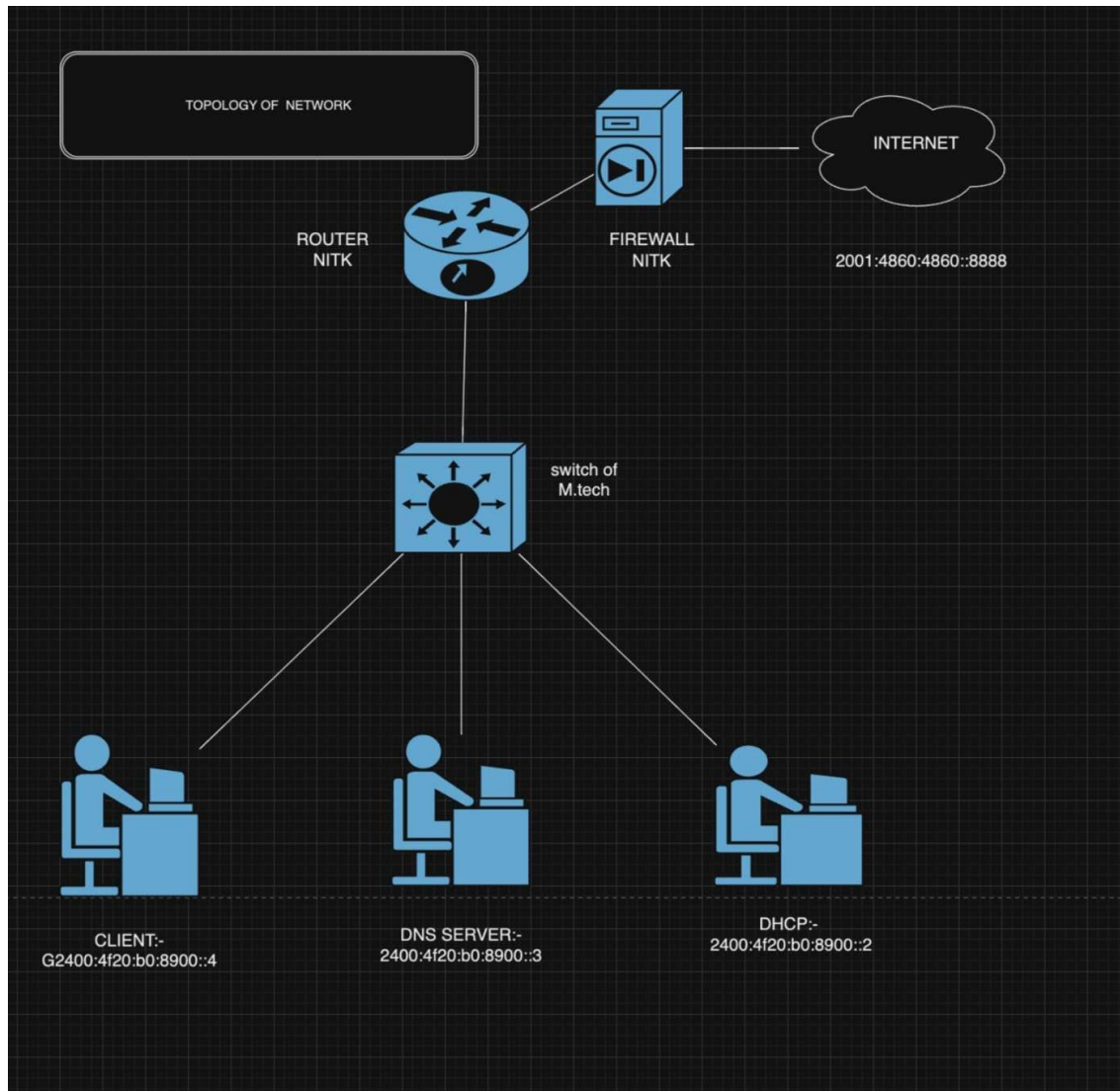


Fig: Topology of network of DNS server, DHCPv6 server and Client

2 DHCPv6 Installation and Configuration

DHCPv6 works by assigning unique IPv6 addresses to devices on a network. When a new gadget joins the network, it simply asks the DHCPv6 server for an address. The server gives it a unique address and important settings, a default gateway, and a map to find its way online. This address is leased for a while, and the device can ask to renew it or let it go when it's done. In simple terms, DHCPv6 makes it easy for devices to connect to the internet by handling the details of getting a special address and the necessary settings.

2.1 KEA DHCP Installation

Installation Steps

- Elevate Permissions:
`$ sudo su -`

- Install Package:
`# apt install kea`

2.2 Configuration of KEA DHCP for IPv6

2.2.1 Steps for configuring KEA DHCPv6

1: Navigate to Kea Configuration Directory

```
# cd /etc/kea/
```

2: Create a Configuration Backup

Before making changes, create a backup of the existing kea-dhcp6.conf file.

```
# cp kea-dhcp6.conf kea-dhcp6.conf.bak
```

3: Edit the KEA DHCPv6 Configuration

Open the kea-dhcp6.conf file for editing using your preferred text editor (e.g., nano).

```
# nano kea-dhcp6.conf
```

4: Configure KEA DHCPv6

Add the following configuration to the file:

```
{
  "Dhcp6": {
    "Valid-lifetime": 4000,
    "renew-timer": 1000,
    "rebind-timer": 2000,
    "preferred-lifetime": 3000,
    "interfaces-config": {
      "interfaces": [
        "eno1/2400:4f20:b0:8900::2/56"
```

```
]
},
"lease-database": {
  "type": "memfile",
  "persist": true,
  "name": "/var/lib/kea/dhcp6.leases"
},
"subnet6": [
  {
    "subnet": "2400:4f20:b0:8900::/56",
    "pools": [
      {
        "pool": "2400:4f20:b0:8900::10/56-2400:4f20:b0:8900::1000"
      }
    ]
  }
],
"loggers": [
  {
    "name": "kea-dhcp6",
    "output_options": [
      {
        "output": "/var/log/kea-dhcp6.log",
        "maxsize": 100000,
        "maxver": 10
      }
    ]
  },
  {
    "severity": "INFO",
    "debuglevel": 0
  }
]
}
}
```

```
Activities Terminal Mar 12 11:06 root@csdept:/etc/kea
GNU nano 6.2 kea-dhcp6.conf M
{
# DHCPv6 configuration starts on the next line
"Dhcp6": {

# First we set up global values
  "valid-lifetime": 4000,
  "renew-timer": 1000,
  "rebind-timer": 2000,
  "preferred-lifetime": 3000,

# Next we set up the interfaces to be used by the server.
  "interfaces-config": {
    "interfaces": [ "eno1" ]
  },

# And we specify the type of lease database
  "lease-database": {
    "type": "memfile",
    "persist": true,
    "name": "/var/lib/kea/dhcp6.leases"
  },

# Finally, we list the subnets from which we will be leasing addresses.
  "subnet6": [

^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute    ^C Location   M-U Undo
^X Exit      ^R Read File  ^\ Replace    ^U Paste      ^J Justify    ^/_ Go To Line M-E Redo
```

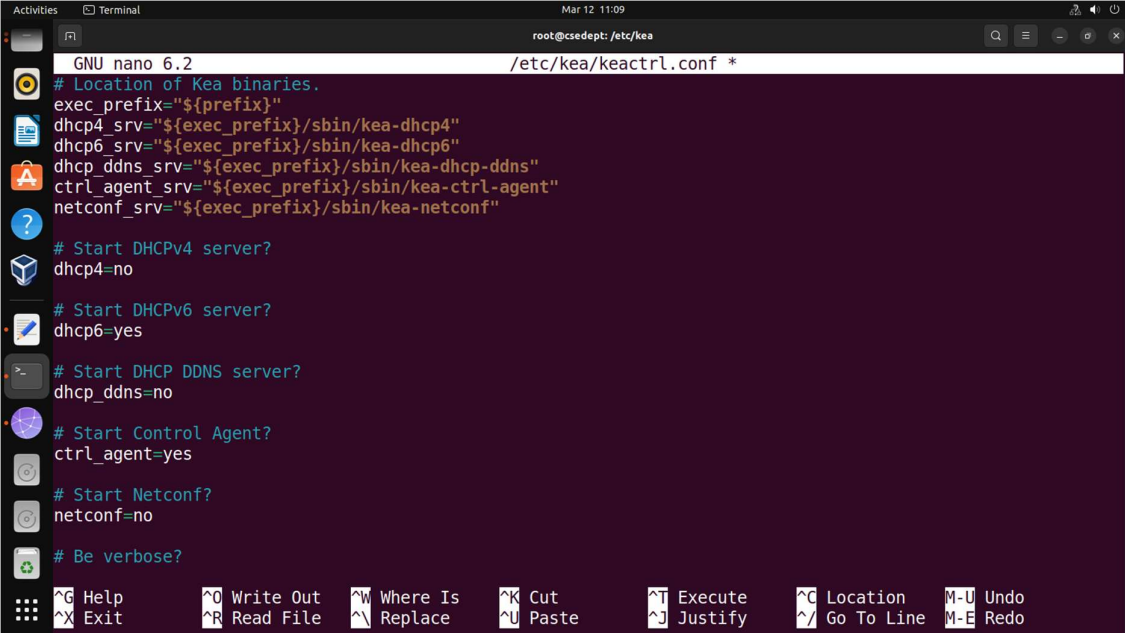
```
Activities Terminal Mar 12 11:07 root@csdept:/etc/kea
GNU nano 6.2 kea-dhcp6.conf
# Finally, we list the subnets from which we will be leasing addresses.
  "subnet6": [
    {
      "subnet": "2400:4f20:b0:8900::/56",
      "pools": [
        {
          "pool": "2400:4f20:b0:8900::4/56"
        }
      ],
      "interface": "eno1"
    }
  ],
# DHCPv6 configuration ends with the next line

"loggers": [
{
  "name": "kea-dhcp6",

  "output_options": [
    {
      "output": "/var/log/kea-dhcp6.log",
```



```
dhcp6=yes # Enable DHCPv6 server
dhcp_ddns=no # Disable DHCP DDNS server
ctrl_agent=yes # Enable Control Agent
```



```
GNU nano 6.2 /etc/kea/keactrl.conf *
# Location of Kea binaries.
exec_prefix="${prefix}"
dhcp4_srv="${exec_prefix}/sbin/kea-dhcp4"
dhcp6_srv="${exec_prefix}/sbin/kea-dhcp6"
dhcp_ddns_srv="${exec_prefix}/sbin/kea-dhcp-ddns"
ctrl_agent_srv="${exec_prefix}/sbin/kea-ctrl-agent"
netconf_srv="${exec_prefix}/sbin/kea-netconf"

# Start DHCPv4 server?
dhcp4=no

# Start DHCPv6 server?
dhcp6=yes

# Start DHCP DDNS server?
dhcp_ddns=no

# Start Control Agent?
ctrl_agent=yes

# Start Netconf?
netconf=no

# Be verbose?

^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute  ^C Location  M-U Undo
^X Exit      ^R Read File ^N Replace   ^U Paste     ^J Justify  ^/_ Go To Line M-E Redo
```

kea-ctrl-agent.conf Configuration:

1. Open the kea-ctrl-agent.conf file for editing:

```
nano /etc/kea/kea-ctrl-agent.conf
```

2. Find the part with HTTP settings and update accordingly:

```
"Control-agent": {
  "http-host": "192.168.2.100", # Set the HTTP host IP
  "http-port": 8080 # Set the HTTP port
```

2.3.2 Initiate KEA Servers and Control Agent

1. Explicitly start DHCPv6 server:

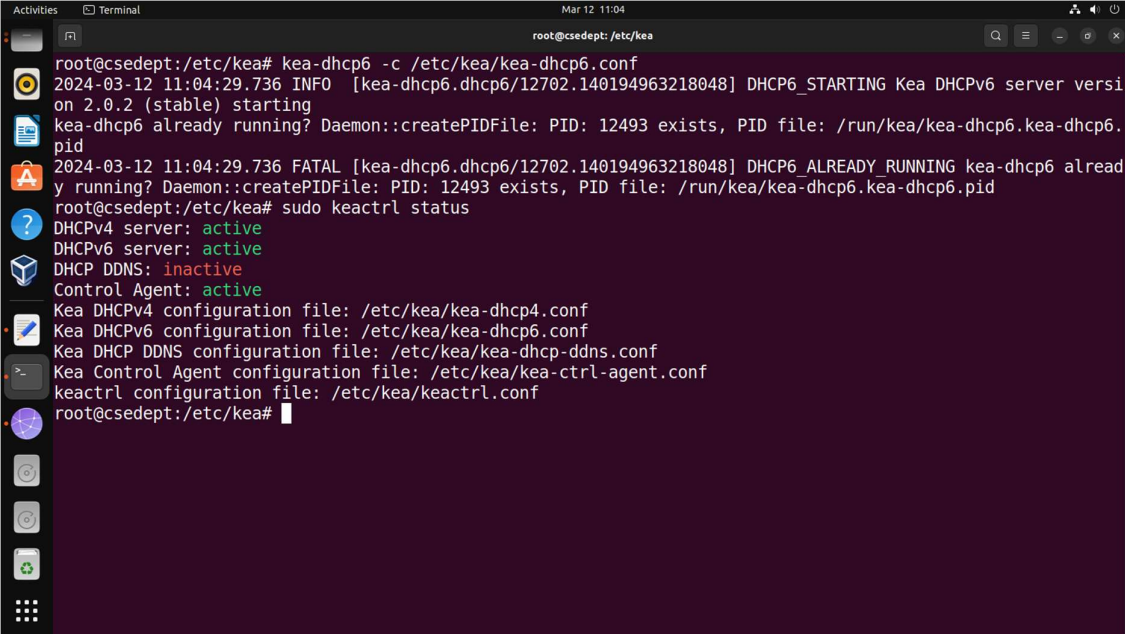
```
keactrl start -c /etc/kea/keactrl.conf -s dhcp6
```

2. Commence all servers, including DHCPv6, using default parameters:

```
keactrl start
```

3. Verify the status of KEA servers:

keactrl status

A terminal window titled 'Terminal' with a dark background. The prompt is 'root@csdept:/etc/kea'. The user enters 'kea-dhcp6 -c /etc/kea/kea-dhcp6.conf', which results in two log messages: an INFO message about starting the DHCPv6 server and a FATAL message indicating it's already running. Then, the user enters 'sudo keactrl status', which displays the status of various services: DHCPv4 server (active), DHCPv6 server (active), DHCP DDNS (inactive), and Control Agent (active). Below these, it lists the configuration files for each component.

```
root@csdept:/etc/kea# kea-dhcp6 -c /etc/kea/kea-dhcp6.conf
2024-03-12 11:04:29.736 INFO [kea-dhcp6.dhcp6/12702.140194963218048] DHCP6_STARTING Kea DHCPv6 server versi
on 2.0.2 (stable) starting
kea-dhcp6 already running? Daemon::createPIDFile: PID: 12493 exists, PID file: /run/kea/kea-dhcp6.kea-dhcp6.
pid
2024-03-12 11:04:29.736 FATAL [kea-dhcp6.dhcp6/12702.140194963218048] DHCP6_ALREADY_RUNNING kea-dhcp6 alread
y running? Daemon::createPIDFile: PID: 12493 exists, PID file: /run/kea/kea-dhcp6.kea-dhcp6.pid
root@csdept:/etc/kea# sudo keactrl status
DHCPv4 server: active
DHCPv6 server: active
DHCP DDNS: inactive
Control Agent: active
Kea DHCPv4 configuration file: /etc/kea/kea-dhcp4.conf
Kea DHCPv6 configuration file: /etc/kea/kea-dhcp6.conf
Kea DHCP DDNS configuration file: /etc/kea/kea-dhcp-ddns.conf
Kea Control Agent configuration file: /etc/kea/kea-ctrl-agent.conf
keactrl configuration file: /etc/kea/keactrl.conf
root@csdept:/etc/kea#
```

3 DNS SERVER

A DNS (Domain Name System) server is like the internet's phonebook. Instead of remembering complex numerical IP addresses for websites, your device asks the DNS server to translate easy-to-remember domain names (like `www.google.com`) into the actual numerical addresses that computers use to find each other on the internet. It acts like a guide for your device on the internet. When you want to visit a website, it helps by providing the right address and turning easy-to-remember names into the actual locations your device needs to reach online.

3.1 DNS Server Configuration

This section outlines the steps taken to configure a DNS server on the testbed. The configuration guide was used to set up a BIND9 recursive server with only an IPv6 interface. Note that the configuration detailed in this section does not create an authoritative nameserver to serve AAAA records.

3.2 General Information

- Installation:

```
$ sudo apt update
$ sudo apt install bind9
```

- Check BIND Version:

```
$ named -v
Output:
BIND 9.18.18-0ubuntu0.22.04.2-Ubuntu (Extended Support Version) <id:>
```

Note that the exact output may vary depending on the version installed.

3.3 Initial Setup

- Check that the BIND9 server is up and running:

```
$ sudo systemctl status named
```

```
Activities Terminal Mar 11 16:26 ip6v@csedept: -
named-resolvconf.service is a disabled or a static unit, not starting it.
Created symlink /etc/systemd/system/bind9.service → /lib/systemd/system/named.service.
Created symlink /etc/systemd/system/multi-user.target.wants/named.service → /lib/systemd/system/named.service.
Setting up bind9-host (1:9.18-0ubuntu0.22.04.2) ...
Setting up bind9-dnsutils (1:9.18-0ubuntu0.22.04.2) ...
Processing triggers for ufw (0.36.1-0ubuntu0.1) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.0) ...
ip6v@csedept:~$ named -v
BIND 9.18.18-0ubuntu0.22.04.2-Ubuntu (Extended Support Version) <id>
ip6v@csedept:~$ sudo systemctl status named
● named.service - BIND Domain Name Server
   Loaded: loaded (/lib/systemd/system/named.service; enabled; vendor preset: enabled)
   Active: active (running) since Mon 2024-03-11 12:28:07 IST; 1min 17s ago
     Docs: man:named(8)
    Process: 13533 ExecStart=/usr/sbin/named $OPTIONS (code=exited, status=0/SUCCESS)
    Main PID: 13534 (named)
      Tasks: 38 (limit: 18738)
     Memory: 10.6M
        CPU: 47ms
    CGroup: /system.slice/named.service
            └─13534 /usr/sbin/named -u bind

Mar 11 12:28:07 csedept named[13534]: managed-keys-zone: loaded serial 0
Mar 11 12:28:07 csedept named[13534]: zone 0.in-addr.arpa/IN: loaded serial 1
Mar 11 12:28:07 csedept named[13534]: zone 127.in-addr.arpa/IN: loaded serial 1
Mar 11 12:28:07 csedept named[13534]: zone 255.in-addr.arpa/IN: loaded serial 1
Mar 11 12:28:07 csedept named[13534]: zone localhost/IN: loaded serial 2
Mar 11 12:28:07 csedept named[13534]: all zones loaded
Mar 11 12:28:07 csedept named[13534]: running
Mar 11 12:28:07 csedept systemd[1]: Started BIND Domain Name Server.
Mar 11 12:28:17 csedept named[13534]: managed-keys-zone: Unable to fetch DNSKEY set '': timed out
Mar 11 12:28:17 csedept named[13534]: resolver priming query complete: timed out
ip6v@csedept:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eno1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether c0:18:03:c1:7e:5a brd ff:ff:ff:ff:ff:ff
    altname enp0s31f6
    inet 10.100.13.125/22 brd 10.100.15.255 scope global dynamic noprefixroute eno1
        valid_lft 21442sec preferred_lft 21442sec
    inet6 2400:d720:b0:000::1/56 scope global noprefixroute
```

- Check network interface configuration and IPv6 addresses:

\$ ip a

The interface and IP address information obtained as output will be used to configure the DNS server.

```
Activities Terminal Mar 11 16:26 ip6v@csedept: -
named-resolvconf.service is a disabled or a static unit, not starting it.
Created symlink /etc/systemd/system/bind9.service → /lib/systemd/system/named.service.
Created symlink /etc/systemd/system/multi-user.target.wants/named.service → /lib/systemd/system/named.service.
Setting up bind9-host (1:9.18-0ubuntu0.22.04.2) ...
Setting up bind9-dnsutils (1:9.18-0ubuntu0.22.04.2) ...
Processing triggers for ufw (0.36.1-0ubuntu0.1) ...
Processing triggers for man-db (2.10.2-1) ...
Processing triggers for libc-bin (2.35-0ubuntu3.0) ...
ip6v@csedept:~$ named -v
BIND 9.18.18-0ubuntu0.22.04.2-Ubuntu (Extended Support Version) <id>
ip6v@csedept:~$ sudo systemctl status named
● named.service - BIND Domain Name Server
   Loaded: loaded (/lib/systemd/system/named.service; enabled; vendor preset: enabled)
   Active: active (running) since Mon 2024-03-11 12:28:07 IST; 1min 17s ago
     Docs: man:named(8)
    Process: 13533 ExecStart=/usr/sbin/named $OPTIONS (code=exited, status=0/SUCCESS)
    Main PID: 13534 (named)
      Tasks: 38 (limit: 18738)
     Memory: 10.6M
        CPU: 47ms
    CGroup: /system.slice/named.service
            └─13534 /usr/sbin/named -u bind

Mar 11 12:28:07 csedept named[13534]: managed-keys-zone: loaded serial 0
Mar 11 12:28:07 csedept named[13534]: zone 0.in-addr.arpa/IN: loaded serial 1
Mar 11 12:28:07 csedept named[13534]: zone 127.in-addr.arpa/IN: loaded serial 1
Mar 11 12:28:07 csedept named[13534]: zone 255.in-addr.arpa/IN: loaded serial 1
Mar 11 12:28:07 csedept named[13534]: zone localhost/IN: loaded serial 2
Mar 11 12:28:07 csedept named[13534]: all zones loaded
Mar 11 12:28:07 csedept named[13534]: running
Mar 11 12:28:07 csedept systemd[1]: Started BIND Domain Name Server.
Mar 11 12:28:17 csedept named[13534]: managed-keys-zone: Unable to fetch DNSKEY set '': timed out
Mar 11 12:28:17 csedept named[13534]: resolver priming query complete: timed out
ip6v@csedept:~$ ip a
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default qlen 1000
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
        valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
        valid_lft forever preferred_lft forever
2: eno1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default qlen 1000
    link/ether c0:18:03:c1:7e:5a brd ff:ff:ff:ff:ff:ff
    altname enp0s31f6
    inet 10.100.13.125/22 brd 10.100.15.255 scope global dynamic noprefixroute eno1
        valid_lft 21442sec preferred_lft 21442sec
    inet6 2400:d720:b0:000::1/56 scope global noprefixroute
```

3.4 Server Configuration

The DNS server configured on the testbed is a recursive resolver. When it does not find an answer in its local database, it queries other DNS servers to resolve the query.

The main configuration file is `/etc/bind/named.conf`, which contains the following lines:

```
// This is the primary configuration file for the BIND DNS server named.
// Please read /usr/share/doc/bind9/README.Debian.gz for information on the
// structure of BIND configuration files in Debian, *BEFORE* you customize
// this configuration file.
// If you are just adding zones, please do that in /etc/bind/named.conf.local

//include "/etc/bind/named.conf.options";
//include "/etc/bind/named.conf.local";
include "/etc/bind/named.conf.default-zones";

acl my_ipv6_net {
    2401:4f20:b0:8900::56;
};

options {
    directory "/var/cache/bind";
    listen-on-v6 {2400:4f29:b0:8900::3};
    query-source-v6 address 2400:4f20:b0:8900::5;
    recursion yes;
    forwarders { 2001:4860:4860::8888; };
    forward only;
    allow-recursion {my_ipv6_net;};
    allow-query {any;};
};
```

```
Activities Terminal Mar 11 16:27
ip6@csedept: ~
GNU nano 6.2 /etc/bind/named.conf
// This is the primary configuration file for the BIND DNS server named.
// Please read /usr/share/doc/bind9/README.Debian.gz for information on the
// structure of BIND configuration files in Debian, *BEFORE* you customize
// this configuration file.
// If you are just adding zones, please do that in /etc/bind/named.conf.local

//include "/etc/bind/named.conf.options";
//include "/etc/bind/named.conf.local";
include "/etc/bind/named.conf.default-zones";

acl my_ipv6_net {
    2400:4f20:b0:8900::56;
};

options {
    directory "/var/cache/bind";
    listen-on-v6 {2400:4f20:b0:8900::3};
    query-source-v6 address 2400:4f20:b0:8900::5;
    recursion yes;
    forwarders { 2001:4860:4860::8888; };
    forward only;
    allow-recursion { my_ipv6_net; };
    allow-query {any;};
};

Read 28 lines
Help Write Out Where Is Cut Execute Location M-U Undo M-A Set Mark M-] To Bracket M-0 Previous
Exit Read File Replace Paste Justify Go To Line M-B Redo M-C Copy M-^ Where Was M-X Next
```

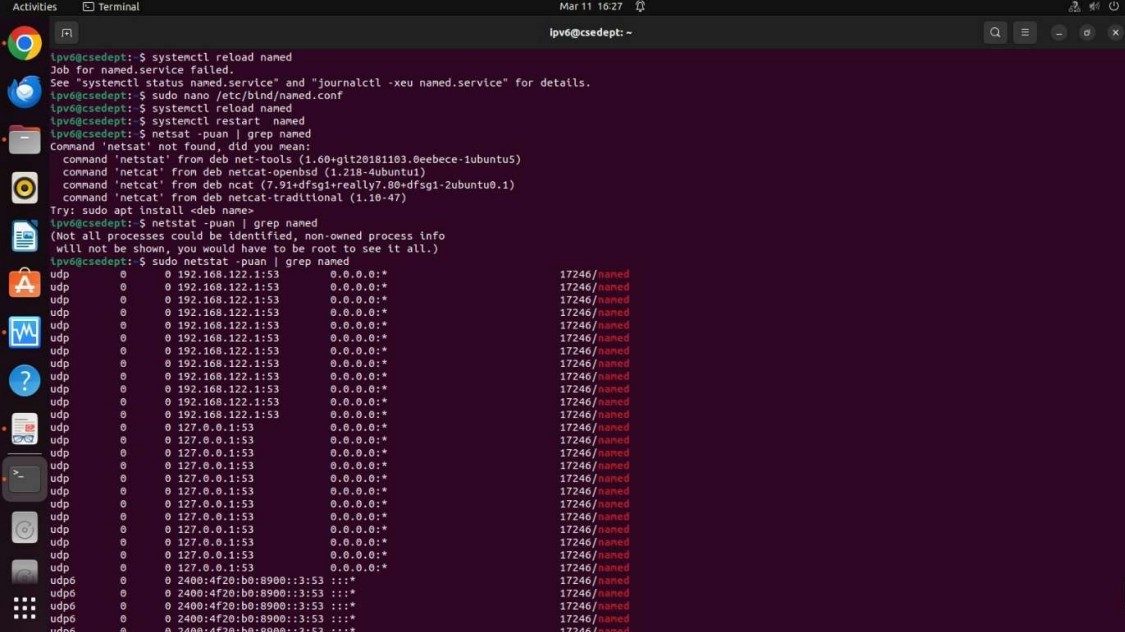
Note: The IPv6 addresses in the `/etc/bind/named.conf` file are specific to the testbed at NITK, and are to be changed as per the configurations available to the reader.

- Apply changes:
systemctl reload named

```
# systemctl restart named
```

- Validate that BIND9 is listening on IPv6:

```
# netstat -puan | grep named
```



```
Activities Terminal Mar 11 16:27 ipv6@csedept: ~
ipv6@csedept: $ systemctl reload named
Job for named.service failed.
See "systemctl status named.service" and "journalctl -xeu named.service" for details.
ipv6@csedept: $ sudo nano /etc/bind/named.conf
ipv6@csedept: $ systemctl reload named
ipv6@csedept: $ systemctl restart named
ipv6@csedept: $ netstat -puan | grep named
command 'netstat' not found, did you mean:
  command 'netstat' from deb net-tools (1.60+git20181103.0eebece-1ubuntu5)
  command 'netcat' from deb netcat-openbsd (1.218-4ubuntu1)
  command 'netcat' from deb ncat (7.91+dfsg1+really7.80+dfsg1-2ubuntu0.1)
  command 'netcat' from deb netcat-traditional (1.10-47)
Try: sudo apt install <deb name>
ipv6@csedept: $ netstat -puan | grep named
(Not all processes could be identified, non-owned process info
will not be shown, you would have to be root to see it all.)
ipv6@csedept: $ sudo netstat -puan | grep named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp        0      0  0 192.168.122.1:53      0.0.0.0:*               17246/named
udp6       0      0  0 2400::4f20:b0:8900::3:53 :::*                    17246/named
udp6       0      0  0 2400::4f20:b0:8900::3:53 :::*                    17246/named
udp6       0      0  0 2400::4f20:b0:8900::3:53 :::*                    17246/named
udp6       0      0  0 2400::4f20:b0:8900::3:53 :::*                    17246/named
udp6       0      0  0 2400::4f20:b0:8900::3:53 :::*                    17246/named
```

4 On Client Side:

Edit the network interface configuration file on the client to use DHCPv6:

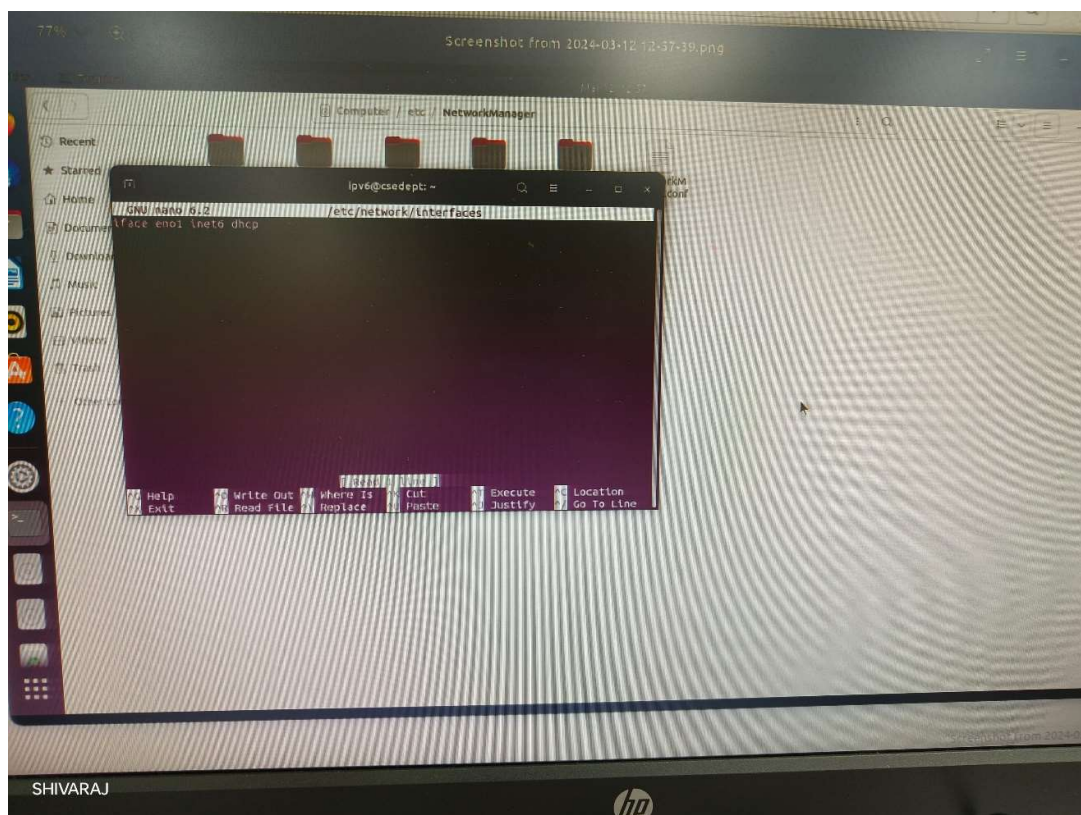
```
$sudo nano /etc/network/interface
```

This completes the configuration of KEA DHCPv6 on your system. Ensure the client's network interface configuration is set to obtain IPv6 addresses via DHCPv6.


```
Activities Terminal Mar 11 16:28 ipv6@csdept:~$ sudo
usage: sudo -h | -K | -k | -V
usage: sudo -v [-ABkns] [-g group] [-h host] [-p prompt] [-u user]
usage: sudo -l [-ABkns] [-g group] [-h host] [-p prompt] [-u user] [-u user]
[command]
usage: sudo [-ABEHknPS] [-r role] [-t type] [-C num] [-D directory] [-g group]
[-h host] [-p prompt] [-R directory] [-T timeout] [-u user]
[VAR=value] [-i|-s] [<command>]
usage: sudo -e [-ABkns] [-r role] [-t type] [-C num] [-p prompt] [-g group]
[-h host] [-p prompt] [-R directory] [-T timeout] [-u user] file ...

ipv6@csdept:~$ sudo gedit /etc/network
network/
ipv6@csdept:~$ sudo gedit /etc/network/interfaces
[sudo] password for ipv6:

(gedit:67662): dconf-WARNING **: 15:31:50.809: failed to commit changes to dconf: Failed to execute child process "dbus-launch" (No such file or directory)
(gedit:67662): dconf-WARNING **: 15:31:50.891: failed to commit changes to dconf: Failed to execute child process "dbus-launch" (No such file or directory)
(gedit:67662): dconf-WARNING **: 15:31:50.847: failed to commit changes to dconf: Failed to execute child process "dbus-launch" (No such file or directory)
(gedit:67662): dconf-WARNING **: 15:31:50.847: failed to commit changes to dconf: Failed to execute child process "dbus-launch" (No such file or directory)
(gedit:67662): dconf-WARNING **: 15:31:50.847: failed to commit changes to dconf: Failed to execute child process "dbus-launch" (No such file or directory)
** (gedit:67662): WARNING **: 15:32:23.293: Set document metadata failed: Setting attribute metadata::gedit-spell-language not supported
** (gedit:67662): WARNING **: 15:32:23.293: Set document metadata failed: Setting attribute metadata::gedit-encoding not supported
** (gedit:67662): WARNING **: 15:32:28.311: Set document metadata failed: Setting attribute metadata::gedit-position not supported
(gedit:67662): dconf-WARNING **: 15:32:28.318: failed to commit changes to dconf: Failed to execute child process "dbus-launch" (No such file or directory)
ipv6@csdept:~$
```



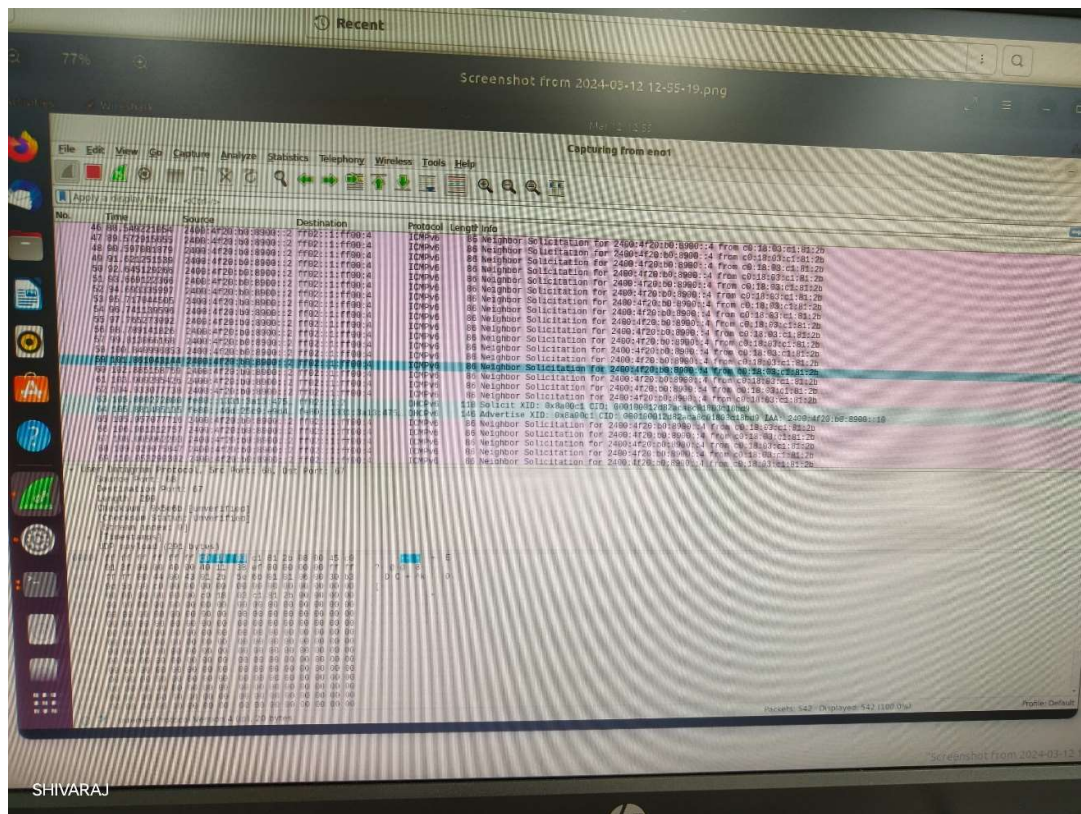
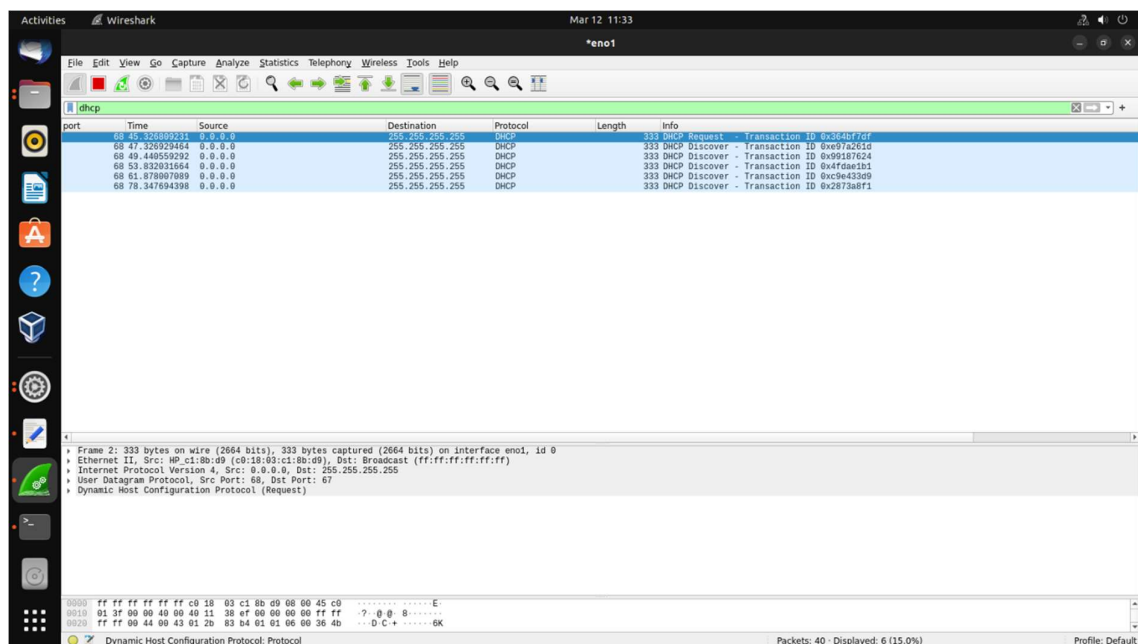


Fig 1: wireshark data captures from client side



CONCLUSION

In conclusion, the workshop on IPv6 deployment, focusing on DHCPv6 and DNS server configuration, held at the National Institute of Technology Karnataka (NITK), Surathkal, has provided attendees with invaluable knowledge and practical experience in modern networking technologies. Participants have gained proficiency in setting up and configuring DHCPv6 for address allocation and DNS for domain name resolution, crucial components in the transition to IPv6.

Through hands-on exercises and step-by-step guidance outlined in this report, workshop participants have acquired the necessary skills to deploy IPv6 networks effectively. As organizations worldwide continue to migrate from IPv4 to IPv6, the insights gained from this workshop will empower attendees to contribute actively to the advancement and adoption of IPv6 technologies, ensuring the seamless integration of next-generation networking protocols into their respective environments.

Overall, the workshop has equipped participants with the tools and expertise needed to navigate the complexities of IPv6 deployment, positioning them as proficient practitioners in the ever-evolving landscape of network infrastructure. The knowledge gained from this workshop will undoubtedly serve as a solid foundation for attendees as they continue to explore and implement IPv6 solutions in their professional endeavors.