APNIC

LAB1: SLAAC (Stateless Address Autoconfig)

Lab Environment

Open the GNS3 project file:

```
btnog5_SLAAC.gns3
```

- The lab topology has:

  - 1x7206VXR router
  - 1xCisco IOU switch
  - 2xUbuntu VMs

- Basic GNS3 setup:

  - For OS X (Mac), since we are running GNS3 1.5.3, you need to type your admin password to set the permission on uBridge only (to avoid running everything as root).

  - start the devices one by one (not to overwhelm your host machines)

    - start with router R1 and configure as below.
    - then start IOU switch and configure as below.
    - and finally start the client PCs (Ubuntu VMs)

Configure the router:

** When you start the router, it might ask you
`Would you like to enter the initial config dialog? [yes/no]` . Please type `no` and proceed.

1. Enable IPv6 routing on the router R1

   ```
   ipv6 unicast-routing
   ```

2. Configure the router interface (on which clients connect to) to advertise IPv6 prefix in RA (router advertisement) messages.

- the A (auto-config) flag is set by default in the RA messages
- we either do that by advertising a specific IPv6 prefix, or
- just by configuring an IPv6 address on the interface

First enable the physical interface (we will use RoAS):

```
interface FastEthernet0/0
 description link to IOU-SW
 no shutdown
```

Then configure the correct sub-interface using either of the following option (preferably the second option)

```
interface FastEthernet0/0.100
 description subinterface for VLAN100
 encapsulation dot1Q 100
 ipv6 nd prefix 2406:6400:0:100::/64
```

OR

```
interface FastEthernet0/0.100
 description subinterface for VLAN100
 encapsulation dot1Q 100
 ipv6 address 2406:6400:0:100::1/64
```

3. We will also configure Loopback0 to test connectivity

```
interface Loopback0
 ipv6 address 2406:6400::1/128
```

4. Verify your configuration with the following outputs:

```
show ipv6 interface ! look at ND stats and different multicast groups joined
show ipv6 route     ! shows the ipv6 routing table
show ipv6 neighbors ! the neighbor cache/table
```

5. Enable ICMPv6 ND messages debugging (to see ND messages)

```
debug ipv6 nd
```

6. Save your configurations

```
wr
```

Configure the switch:

1. The switch configuration is very basic (only to connect the user LAN to the router)

   - IOS on Unix (IOU) has all interfaces in half-duplex
   - interfaces are not Layer2 by default

     ```
     interface range eth0/0-2
      switchport              !forcing it to be a L2 port
      duplex full             !full duplex
     ```

   - Configure the port connecting to the router R1 as trunk (eth0/0)

     ```
     interface eth0/0
       description link to R1
       switchport trunk encapsulation dot1q
       switchport mode trunk
       switchport nonegotiate    !disable DTP negotiation
     ```

   - Configure the ports where clients are connected as access ports (VLAN100)

     ```
     interface range eth0/1-2
       switchport mode access
       switchport access vlan 100
     ```

   - Save your config

     ```
     wr
     ```

   - verify the switch configuration

     ```
     sh interfaces trunk     !make sure the trunk carries all VLANs and are in
     forwarding state
     sh vlan brief           !check the vlan database
     ```

The Client VMs (Ubuntu)

1. Turn ON (start) both the VMs (Ubuntu_1 and 2). You should be logged in automatically (username and password below)

   ```
   username: apnic
   password: training
   ```

2. Verify that the interface enp0s3 is UP and has computed the IPv6 address using SLAAC

```
ifconfig

#the address should look something like 2406:6400:0:100:x:x:x:x
#where the x:x:x:x (64-bit interface ID) is generated randomly (RFC4941)
#you will see two globally scoped addresses - secured and temporary address (R
FC7217 compliant)
#secured wont change even after reboot, while temporary (outgoing) will
```

3. You can also see it from the `Connection Information` dropdown menu
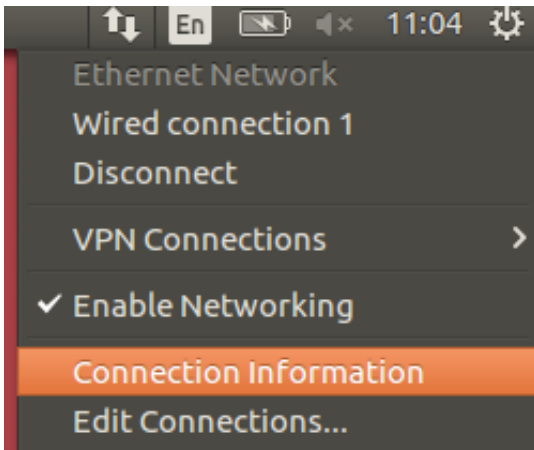
4. In case the interface is not listed or you dont see an IPv6 address, toogle the interface

```
ifconfig enp0s3 down/up
```

Verification:

- Since you had enabled IPv6 ND debugging on the router, you should see ICMPv6 ND messages being exchanged between the router and the IPv6 clients.

- You should see something similar to below (analyse and understand the messages! Ask your instructors if you dont understand).

```
*ICMPv6-ND: Received RS on FastEthernet0/0.100 from FE80::A00:27FF:FE15:F258
*ICMPv6-ND: Glean FE80::A00:27FF:FE15:F258 on FastEthernet0/0.100
*ICMPv6-ND: Neighbour FE80::A00:27FF:FE15:F258 on FastEthernet0/0.100 : LLA 08
00.2715.f258
*ICMPv6-ND: INCMP -> STALE: FE80::A00:27FF:FE15:F258
*ICMPv6-ND: Sending solicited RA on FastEthernet0/0.100
*ICMPv6-ND: Request to send RA for FE80::C801:6FF:FEE1:0
*ICMPv6-ND: Setup RA from FE80::C801:6FF:FEE1:0 to FF02::1 on FastEthernet0/0.
100
*ICMPv6-ND:  MTU = 1500
*ICMPv6-ND:     prefix = 2406:6400:0:100::/64 onlink autoconfig
*ICMPv6-ND:         2592000/604800 (valid/preferred)
```

- Ping each other and also ping the router Loopback0 from the client machines.

```
ping6 2406:6400::1
```