

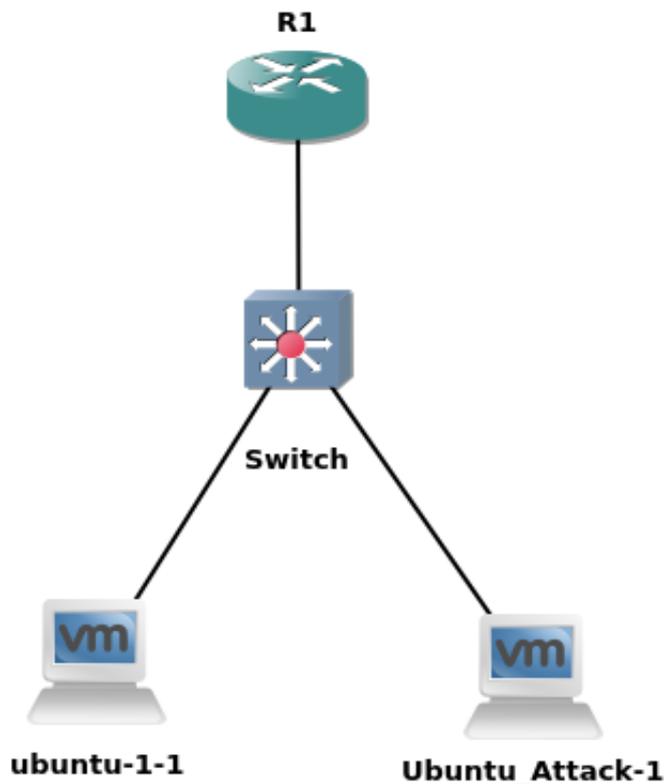
## LAB: IPv6 SLAAC (Stateless Address Autoconfig)

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### Lab Environment

Open the GNS3 project file: `IPv6_SLAAC.gns3`

- The lab topology has:
  - 1xRouter
  - 1xSwitch
  - 1xUbuntu (Desktop) client VM
  - 1xUbuntu (Server) attacker VM, with THC-IPv6 toolset already installed (we will not be using the toolkit for this lab)



- Lab setup:
  - start the devices one by one (not to overwhelm your host machines)
  - start the router R1 and configure as below.
  - then start switch and configure as below.

- then start the client VM (verify the correct address configuration)
  - and finally start the attacker VM and follow the instructions below.
- Confirm interface name:

- On the ubuntu attacker VM, check the IP configuration to see the interface name:

```
ifconfig
```

OR

```
ip route show | grep " src " | cut -d " " -f 3,12
```

- In this guide the interface name is `ens32` for *ubuntu1* and `ens34` for *UbuntuAttack*. Depending on the version of Ubuntu the interface name may be `enp0s3` or something different. Where `ens32` or `ens34` is used in this guide replace it with your interface name.

## Configure the router:

*NOTE: 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 Router 1

```
ipv6 unicast-routing
```

2. Configure the router interface (on which the clients connect) to advertise IPv6 prefix in the router advertisement (RA) messages.
  - the `A` (auto-config) flag is set by default in the RA messages

First, enable the physical interface by configuring Router on a stick (RoAS)

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

Then, configure the correct sub-interface using either of the following options (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. Configure the Loopback0 to test connectivity

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

### 4. Verify the configuration with the following commands

```
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 Neighbor Discovery (ND) messages debugging

```
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)

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

- The switch has all interfaces in half-duplex and are not Layer2 by default

### 2. 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
```

### 3. Configure the ports where clients are connected as access ports (VLAN100)

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

### 4. Save your config

```
wr
```

### 5. Verify the switch configuration

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

## The Client VM (Ubuntu Desktop)

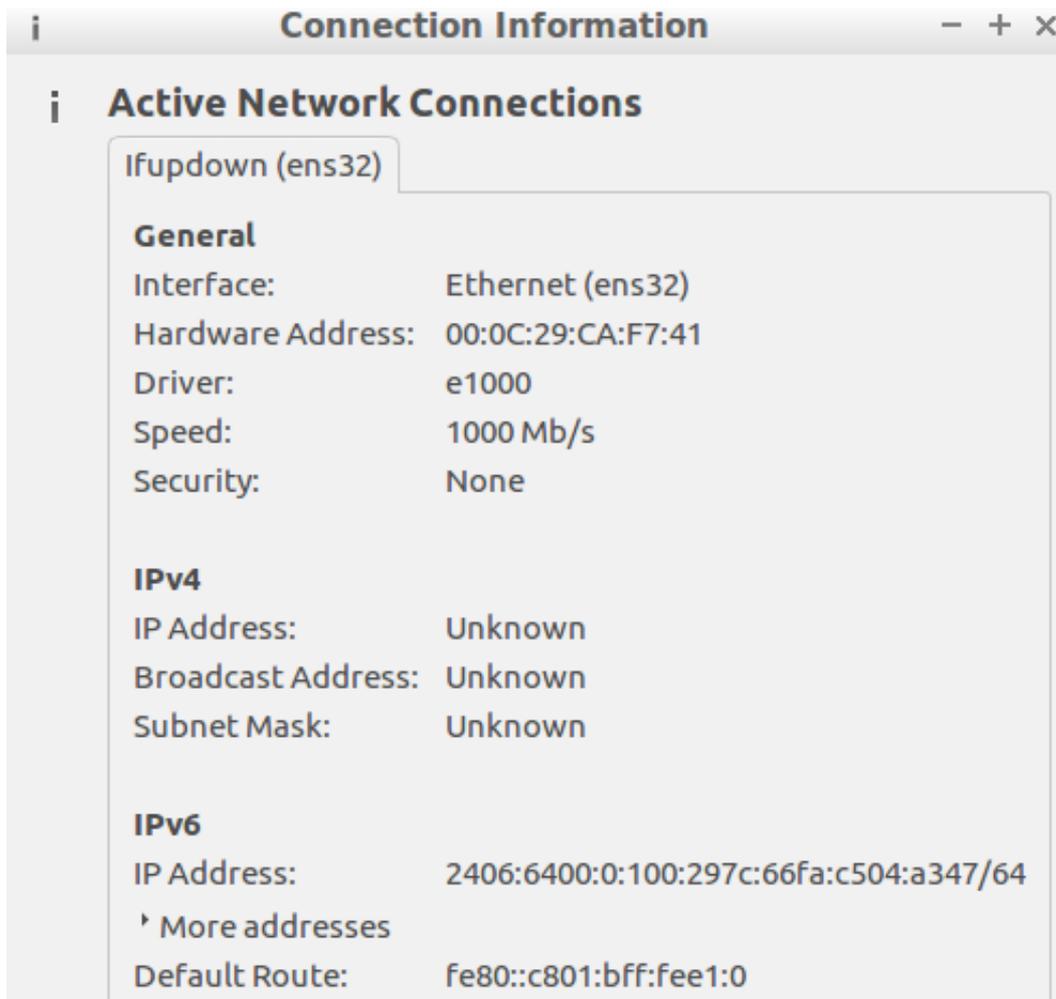
1. Turn ON (start) both the VMs (*ubuntu1* and *UbuntuAttack*). You should be logged in automatically (username and password below)

```
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 (RFC7217 com
pliant)
# secured won't 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 don't see an IPv6 address, toggle the interface

```
ifconfig ens32 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 don't 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 -c 4
```