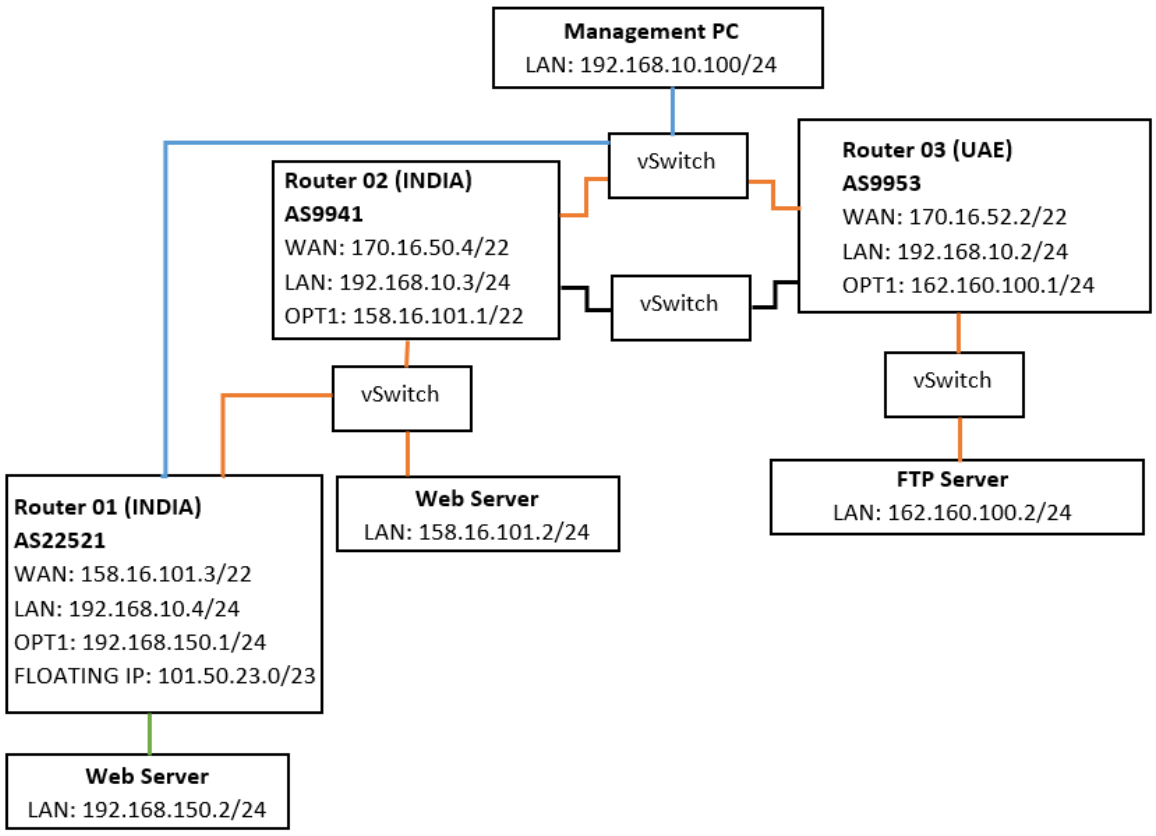
Assignment IX: Network Setup & Routing
Routing (BGP) IPv4 & IPv6 – PART B
CS3093D Networks Lab
S6 CSED NIT Calicut
Evaluation / Demo Due date before: April 01, 2025 05:00 PM

This assignment has to be done individually. Each of you could setup the network in your laptop. The assessment evaluation would be done individually, on one to one basis. For assessment, you have to complete the setup, book a slot and demonstrate it along with the viva along with Part A. You have to record the video with your own voice comments and submit that. In viva, the questions relating to the assignment will be asked. There is no written material to be returned with this assessment. The video has to be shared via google drive, by attaching it in the eduserver submission link. Make sure that the video like is accessible to me & TAs.

After completing this assignment, you will get a feeling on how the ISPs are routing packets between AS using BGP Protocol. You have to use **Internal Network (intnet)**, for setting up this network. Any updates/package download to the VMs has to be done using Bridge / NAT setting. You may use older versions of Operating Systems to setup the given Network if your laptop doesn't have enough RAM.

For this lab, you will use the firewall software PFsense / OPNsense to setup the ISP Router. You can use the same VMs you created in Part A of this assignment. The networking protocols including NAT and BGP is available as a package. You may use FRR to enable routing as said in Part A.

What you have to do (IPv4 & IPv6 Address given is only representative: Please do proper subnetting while implementing)



Part I

- Create a VM with 3 LAN card using virtual box and allot 512 MB of RAM for that. Install the PFSense/OPNSense software. Connect it to internet by keeping the WAN interface to NAT Configuration.
- Create a VM & Install another Linux machine with 1Gb or less RAM as management machine. Make sure that the first machine's LAN & the second machine's network card is connected to the same virtual switch (vSwitch). Access the firewall from the Management machine and configure the firewall. Make sure that you install all the required packages in the firewall.
- Create a VM & Install another Linux machine with 1Gb or less RAM as management machine. Make sure that the first machine's OPT & the third (current) machine's network card is connected to the same virtual switch (vSwitch).
- Complete all the required configurations in the firewall so that you will be getting internet in the third VM.
- Now clone the First VM to create 3 ISP Routers. Make sure that you keep the copy of the VM, so that you would be able to take copies if required.
- Now reconfigure each of the VM as given in the network diagram.

Part II

- The above devices are compatible with IPv6 and could be configured with IPv6 public IP Address, which are routable in internet. The above routers are being used by an ISP with AS number.
- Top level ISP have assigned an IPv6 address 2001:5591:DEE6:A00::/56 to the organisation of Router 02.
- Top level ISP have planned to assign an IPv6 (/64) address to the organisation of Router 01. This IPv6 Series is within the IPv6 address 2001:5591:DEE6:A00::/56 allotted to organisation of Router 02.
- Top level ISP have assigned an IPv6 address 2001:585C:FEEC:595A::/64 to the organisation of Router 03.
- Organisation of Router 01 have purchased a series of floating IP Address directly from IRRIN/APNIC. The series allotted is 2001:0EF9:BDA8::/48. They have to use FRR package(BGP) to float the segment, so that the servers hosted in the floating series would be accessible from public.
- The IPv6 Address used in the gateway routers are ending with :2 (or ::2) in the given series. So you may allot it accordingly.
- Please note that you should have a clear understanding of IPv6 and its allotment process.

Firewall Software PFSense & OPNSense for setting up internet Router

- https://www.pfsense.org/download/
- https://opnsense.org/download/

Ubuntu (Older versions like 8/9/…/14)

https://old-releases.ubuntu.com/releases/

Redhat Linux 09

- https://ftp.kh.edu.tw/Linux/Redhat/iso/9.0/
- http://ftp.scientificlinux.org/linux/redhat/9/iso/

Installing Redhat Linux 09/old Linux versions in Virtual Box

Please make sure to select the Linux Version as listed below once you are installing as Virtual Machine.