IPV6 LABORATORY IN CENTER OF INFORMATION SYSTEM - UNIVERSITY OF MONTENEGRO

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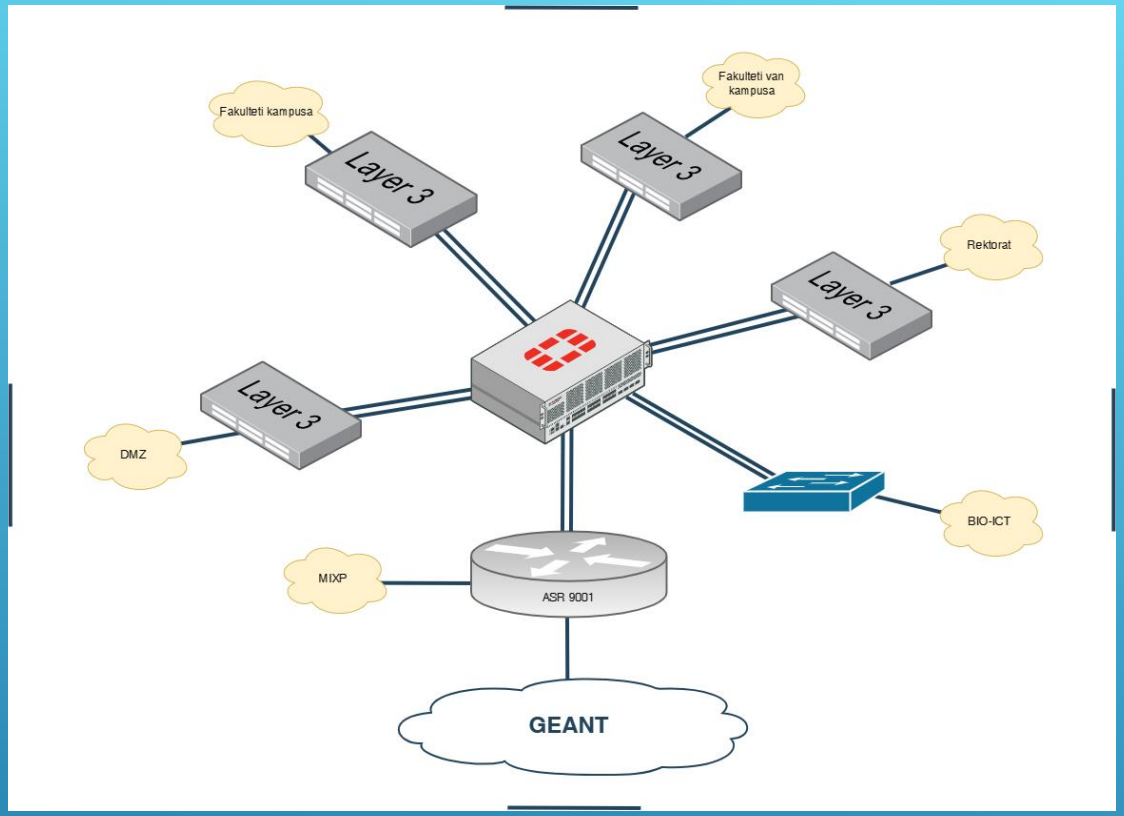
IPV6 LAB – TECHNICAL BACKGROUND

- Existing topology and main characteristics

- The Academic network has a registered ASN (Autonomous System Number) AS40981 and other address ranges: : IPv4 89.188.32.0/19 i IPv6: 2a02:4280::/32 from RIPE (Réseaux IP Européens). Besides these address ranges the University also has a registered ASN for the needs of MIXP (Montenegro Internet Exchange Point) AS200608 with the following address ranges: IPv4 185.1.44.0/24 and IPv6 2001:7f8:22::/48.

- The Academic network is connected with the European Academic Network GEANT by link of capacity of 10Gb/s. This link is divided to two virtual connections one of which is intended solely for the academic traffic inside the GEANT network, and the other solely for the Internet.



TOPOLOGY OF CONNECTIVITY IN THE ACADEMIC NETWORK FRAME

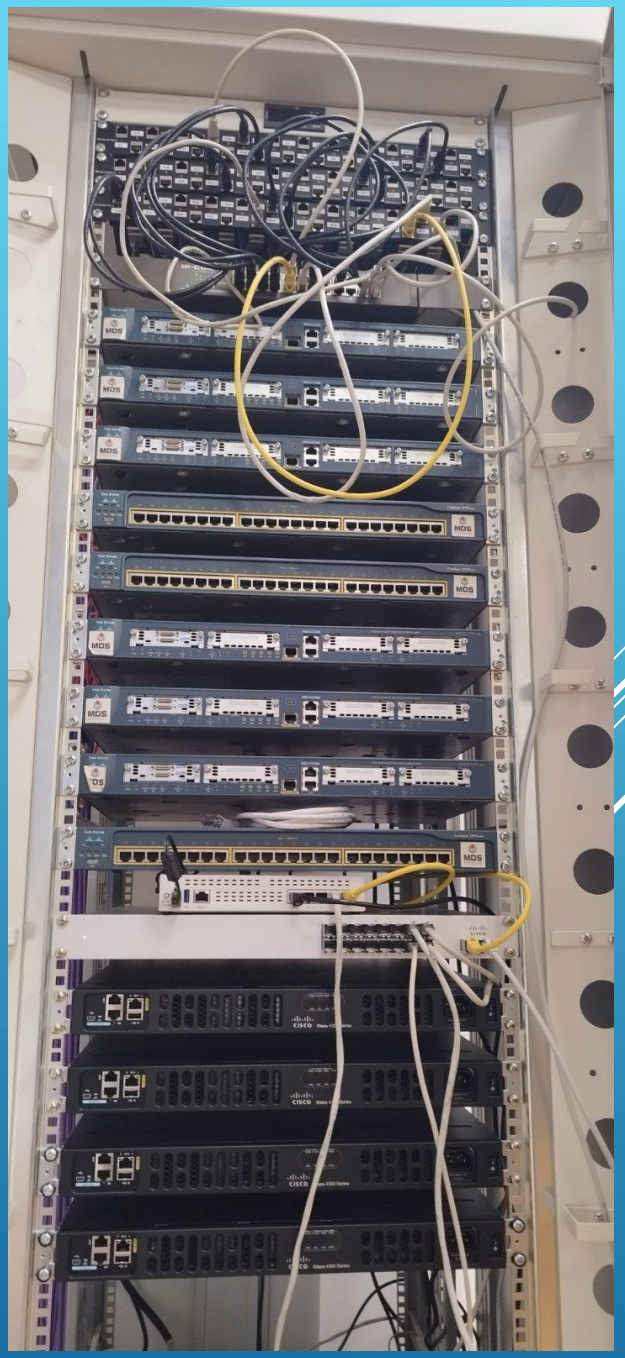
LABARATORY OF THE CENTER OF INFORMATION SYSTEM

Lab classroom is located near the data center. At the beginning of the 2021 new equipment is acquired, as well as presentation equipment (projector and smart board). Currently, there are 25 All In One personal computers

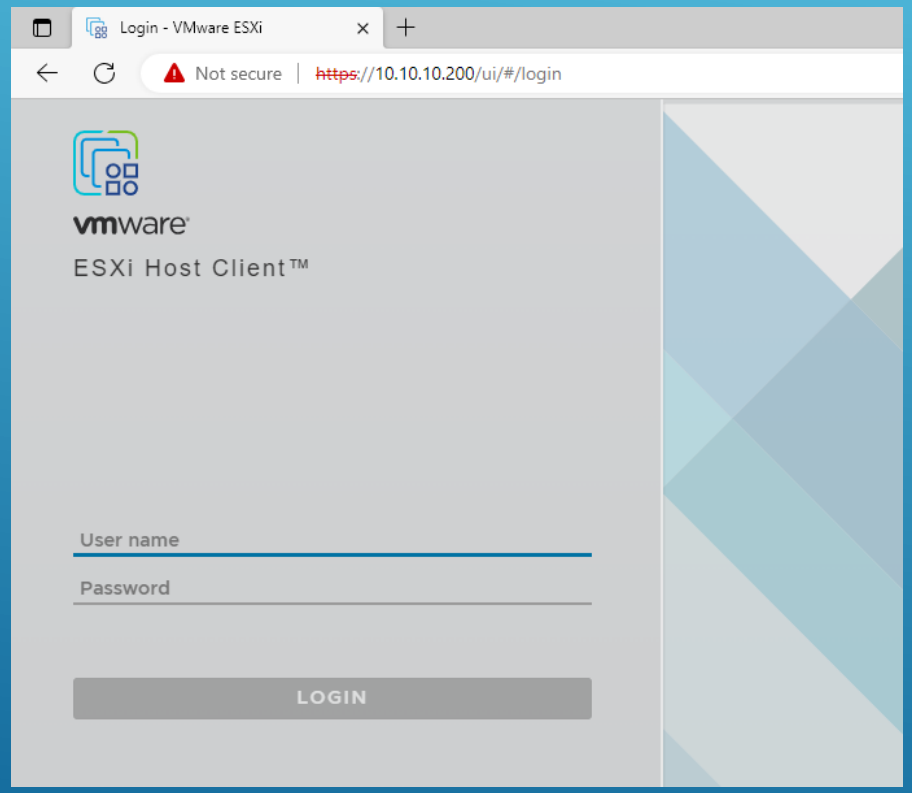
In the rack there are existing equipment for Cisco Network Academy program, and it consist of 6 Cisco 1760 routers, and 3 catalist 2900 switches. As this is older equipment and it does not support IPv6, this equipment cannot be used for IPv6 labs, merely only for IPv4 part of the lab.

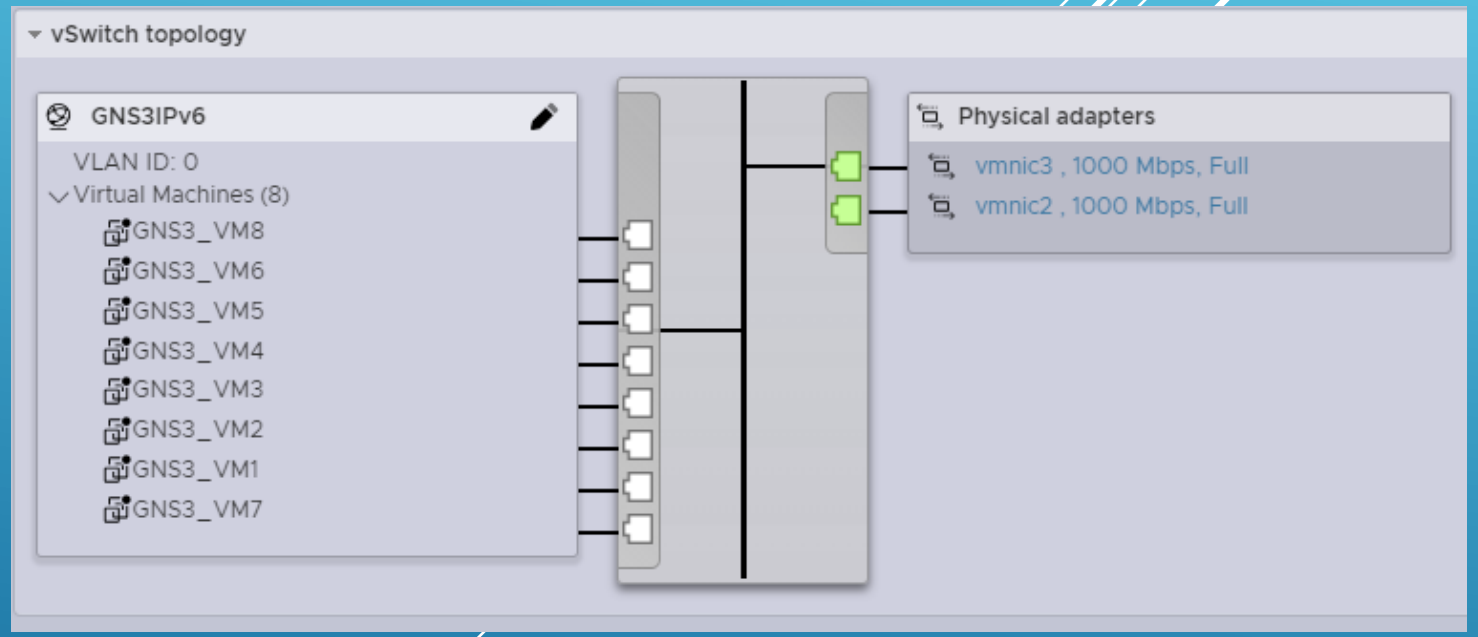
From the International Telecommunication Union donation, the following equipment has been installed in the rack:

- 4 CISCO ISR 4300 routers
- CISCO Meraki MS410-16 aggregation switch
- HPE ProLiant DL360 Gen10 server with two Intel Xeon-Gold 5318Y processors and and sixteen 32GB memory modules
- Fortinet FortiGate 40F firewall
- The total donation was about 52K euros.



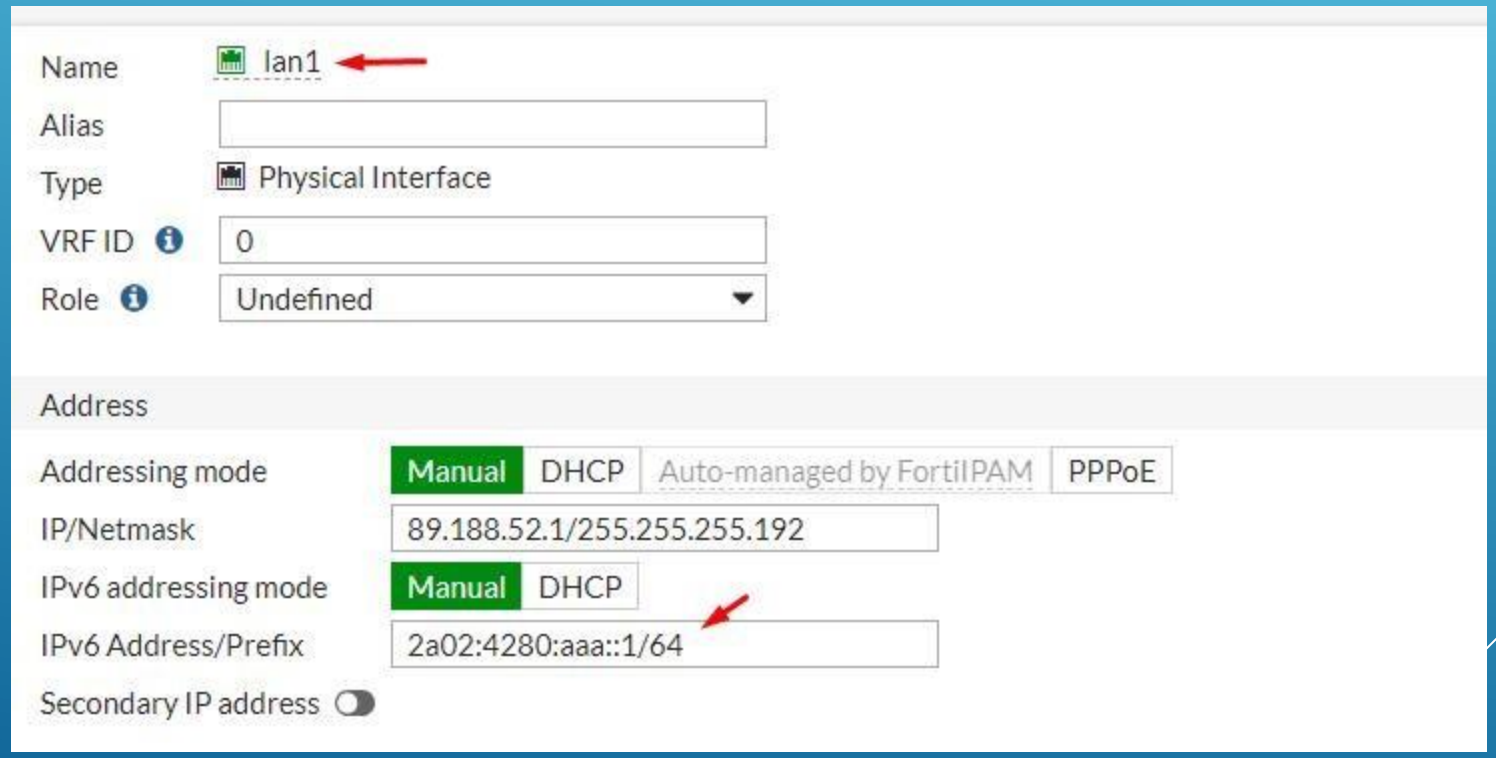
We installed VMware infrastructure on the server and more virtual machines on it, so that each student can work on his own environment.





FOR IPV6 LABORATORY WE ASSIGNED A RANGE 2A02:4280:AAA::/48, WHILE THE CONNECTION TO OUR ASR ROUTER IS 2A02:4280:F0F::/64.

IPV6 IS CONFIGURED ON THE FORTIGATE DEVICE. AS YOU CAN SEE IN THE PICTURE, THE LAN PORT ON THE DEVICE IS ASSIGNED AN IPV6 ADDRESS.

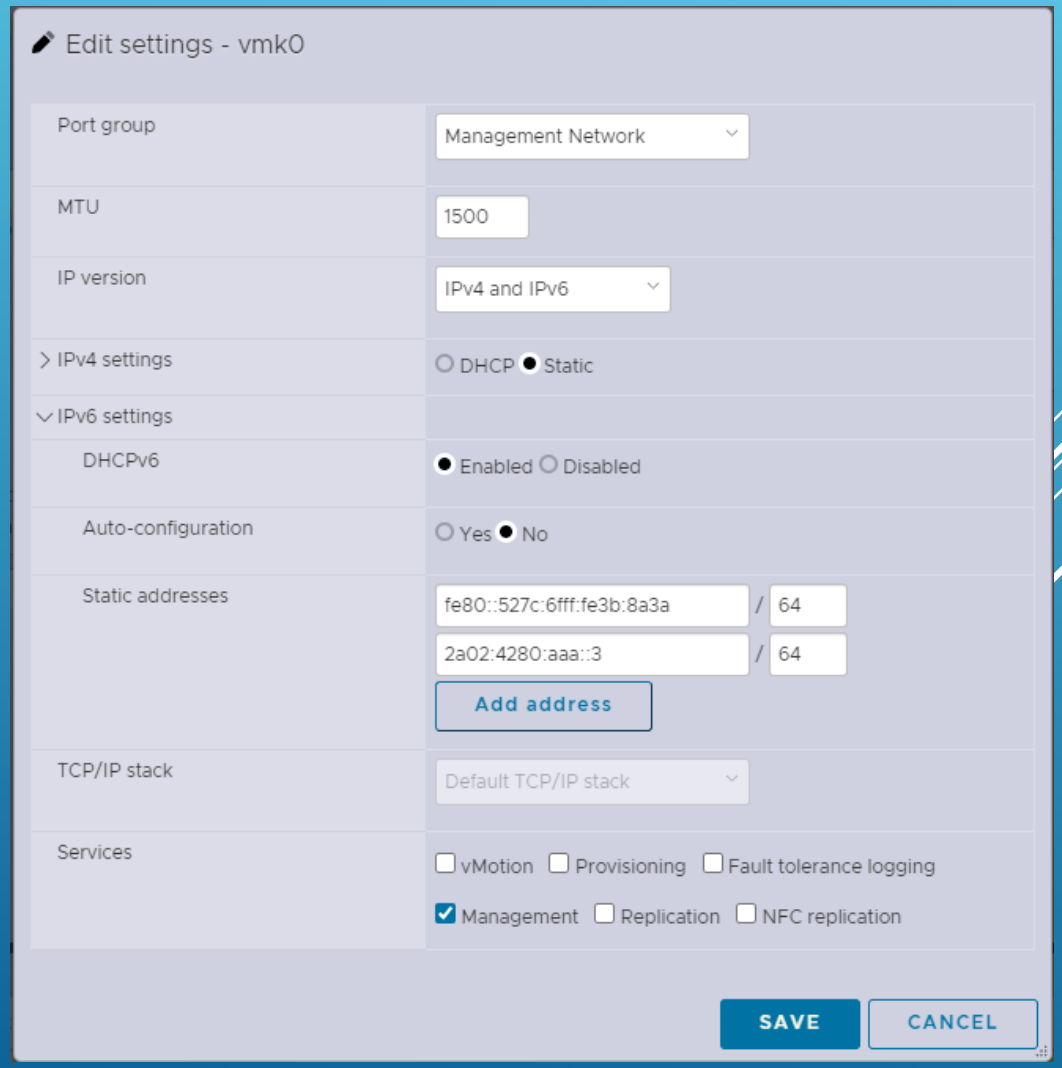


ALSO IPV6 DHCP SERVER ON FORTIGATE IS ENABLED.

```
FortiGate-40F # show system dhcp6 server
config system dhcp6 server
    edit 1
        set subnet 2a02:4280:aaa::/64
        set interface "lan1"
        config ip-range
            edit 1
                set start-ip 2a02:4280:aaa::2
                set end-ip 2a02:4280:aaa::ffff
            next
        end
        set dns-server1 2001:4860:4860::8888
    next
end

FortiGate-40F #
```

WE HAVE ALSO ENABLED IPV6 TO WORK ON HPE PROLIANT DL360 SERVER. AFTER THAT, THE SERVER SUCCESSFULLY PICKED UP THE IPV6 ADDRESS.



THEN WE TESTED THE PING FROM THE SERVER TO THE FORTIGATE'S IPV6 ADDRESS AND IT PASSED, WHICH SHOWS THAT IPV6 IS WORKING SUCCESSFULLY ON BOTH DEVICES.

```
[root@localhost:~] ping 2a02:4280:aaa::1
requested IPv4 option but provided IPv6 address.
PING 2a02:4280:aaa::1 (2a02:4280:aaa::1): 56 data bytes
64 bytes from 2a02:4280:aaa::1: icmp_seq=0 time=0.904 ms
64 bytes from 2a02:4280:aaa::1: icmp_seq=1 time=0.469 ms
64 bytes from 2a02:4280:aaa::1: icmp_seq=2 time=0.494 ms

--- 2a02:4280:aaa::1 ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
round-trip min/avg/max = 0.469/0.622/0.904 ms
```

ON OCTOBER 30 AND 31 ADVANCED IPV6 TRAINING WILL BE HELD IN THE IPV6 LABORATORY IN CENTER OF INFORMATION SYSTEM - UNIVERSITY OF MONTENEGRO BI RIPE NCC.

RIPE NCC
RIPE NETWORK COORDINATION CENTRE

THANK YOU FOR ATTENTION