R.D.&S.H NATIONAL COLLEGE & S.WA. SCIENCE COLLEGE

Bandra, Mumbai - 400050

DEPARTMENT OF COMPUTER SCIENCE

M.Sc. Computer Science – Semester I

Software Defined Networking (SDN)
JOURNAL 2023-2024

Seat No. 1290013

R.D. & S.H. NATIONAL COLLEGE & S. W.A. SCIENCE COLLEGE,

Bandra, Mumbai – 400050.

Department of Computer Science

CERTIFICATE

This is to certify that **Mr/Ms. Gulam Gaus Thakor** of **M.Sc Part I (Sem I)** class has satisfactorily completed **9** Practicals in the subject of **Software Defined Networking (SDN)** as a part of M.Sc. Degree Course in Computer Science during the academic year 2023 – 2024.

Date of Submission:

Faculty Incharge

Co-ordinator,

Department of Computer Science

Signature of External Examiner

.SR NO	Date	Aim	PAGE NO	
1		Implement IP SLA (IP Service Level Agreement)		
2		Implement IPv4 ACLs a) Standard ACL b) Extended ACL		
3		Implement SPAN Technologies (Switch Port Analyzer)		
4		a) Implement a GRE Tunnel b) Implement VTP c) Implement NAT		
5		Implement Inter-VLAN Routing		
6		Observe STP Topology Changes and Implement RSTP		
7		a) Implement Ether Channel b) Tune and Optimize Ether Channel Operations		
8		Implement Single-Area OSPFv2		
9		a) Implement BGP Communities b) Implement MP-BGP c) Implement eBGP for IPv4 d) Implement BGP Path Manipulation		

Practical 1

Aim : Implement IP SLA (IP Service Level Agreement)

What is IP SLA?

→ IP SLA, which stands for Internet Protocol Service Level Agreement, is a feature of Cisco networking devices that allows them to measure and monitor network performance. It enables network administrators to assess the health and reliability of a network by simulating network data and monitoring various parameters.

IP SLA works by generating synthetic traffic, such as pings or other types of probes, and then measuring the performance of the network based on the responses. This can help identify issues such as latency, packet loss, and jitter. The collected data can be used for network troubleshooting, performance monitoring, and reporting.

Some common uses of IP SLA include:

1. Network Performance Monitoring: IP SLA can be configured to continuously monitor the performance of specific network paths or devices. This allows administrators to proactively identify and address potential issues before they impact users.

2. Quality of Service (QoS) Monitoring: IP SLA can be used to monitor the performance of different classes of service within a network, helping to ensure that QoS policies are being enforced effectively.

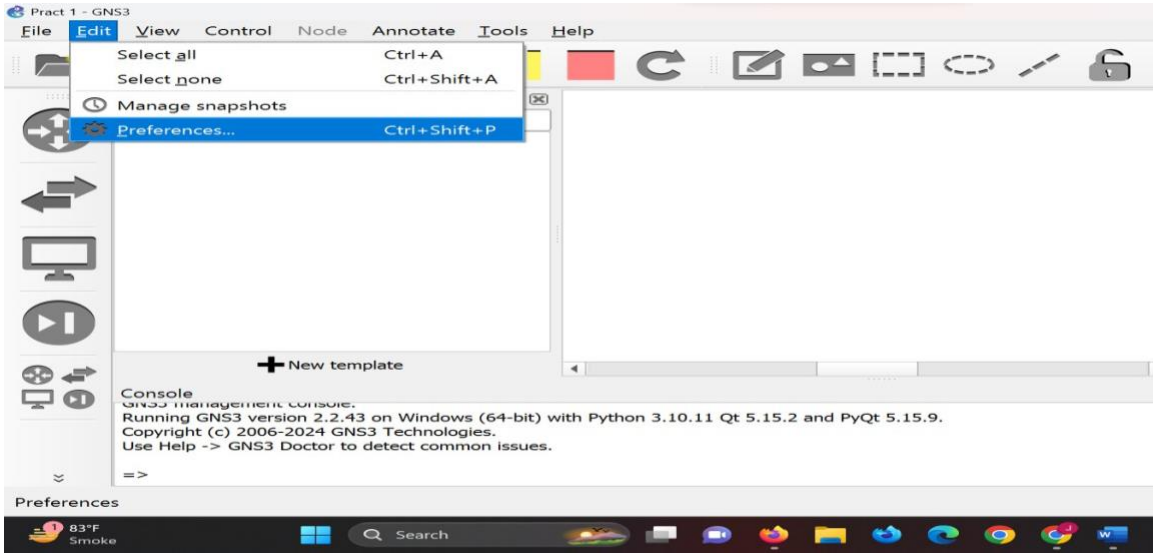
3. WAN Link Utilization: IP SLA can be employed to measure the performance of WAN (Wide Area Network) links, helping administrators to optimize bandwidth usage and detect any degradation in link quality.

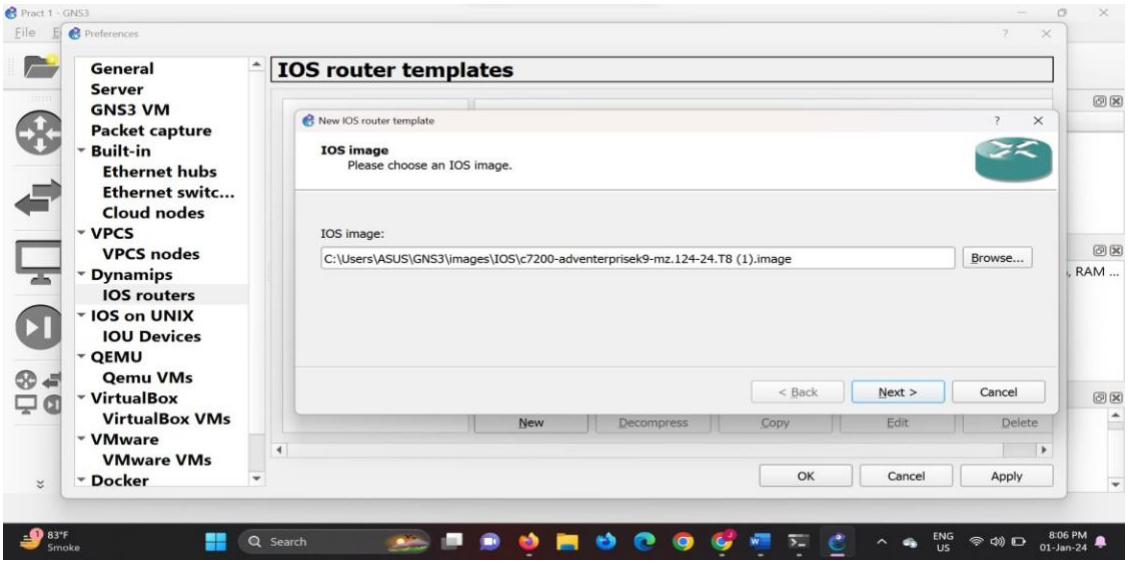
4. Failover and Redundancy Testing: IP SLA can be utilized to test the failover capabilities of redundant paths in a network. This is particularly important for ensuring high availability and minimizing downtime.

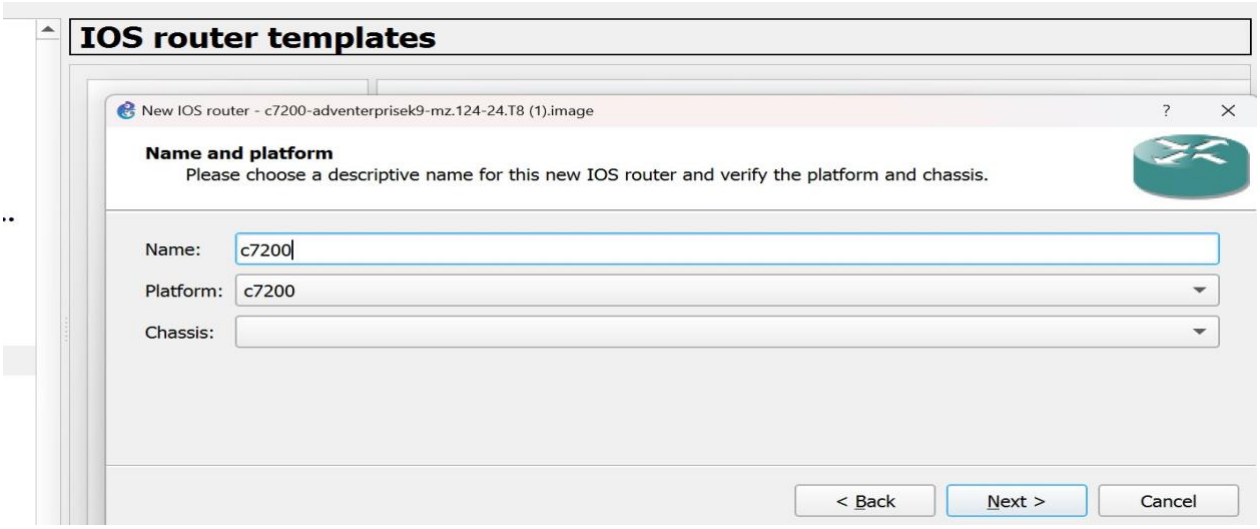
5. VoIP (Voice over IP) Monitoring: In VoIP networks, IP SLA can be used to monitor key performance metrics, such as jitter and latency, to ensure high-quality voice communications.

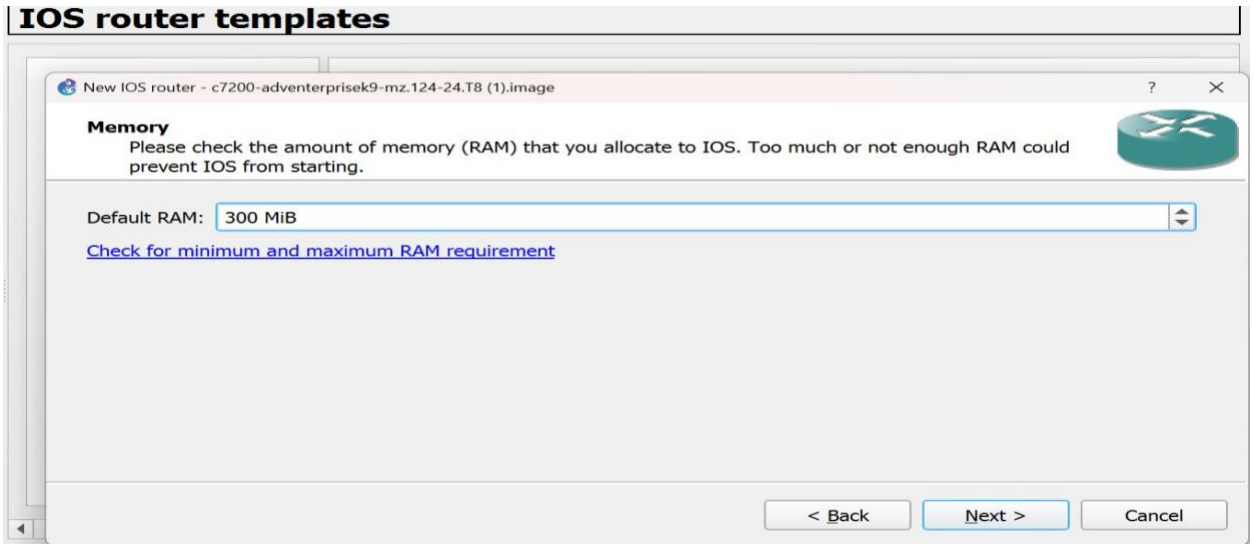
It's important to note that while IP SLA is a Cisco-specific feature, similar functionality may be available in other network equipment from different vendors, often under different names or acronyms.

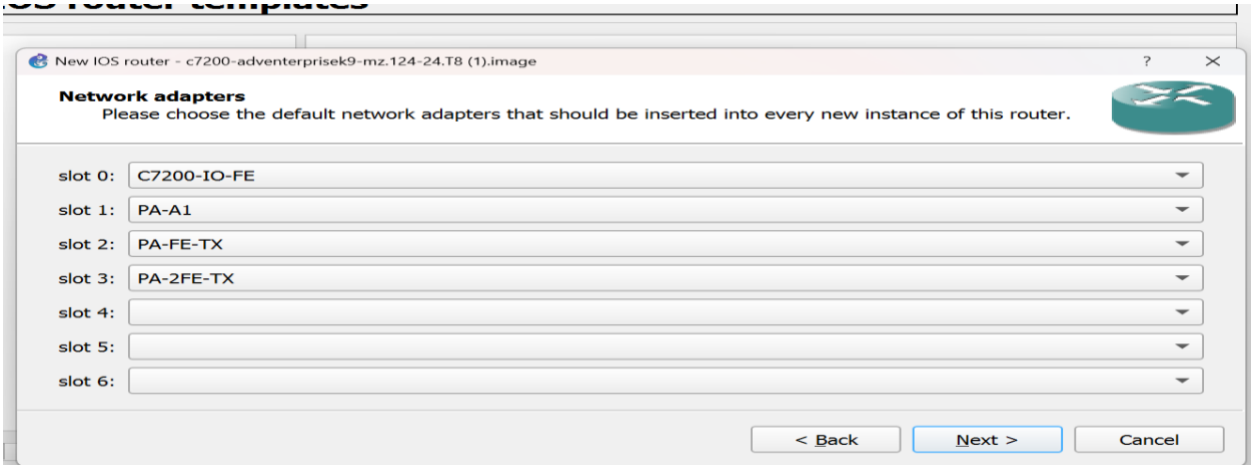
Step 1 : Download and Load Image File :



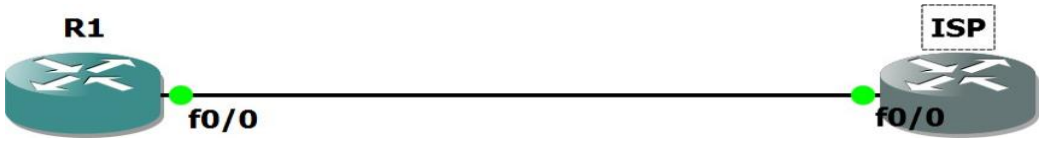








Step 2 : Build the Network



Step 3 : Configure Router

Router 1 :

```
R1#
R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#int
R1(config)#interface fast
R1(config)#interface fastEthernet 0/0
R1(config-if)#ip address 209.165.200.9 255.255.255.252
R1(config-if)#no shutdown
R1(config-if)#
*Jan  1 20:24:22.135: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
*Jan  1 20:24:23.135: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/
0, changed state to up
R1(config-if)#exit
R1(config)#
```

```
R1(config)#do sh ip int bri
Interface                  IP-Address      OK? Method Status                Protocol
FastEthernet0/0            209.165.200.9   YES manual up                    up
ATM1/0                     unassigned      YES unset  administratively down down
FastEthernet2/0            unassigned      YES unset  administratively down down
FastEthernet3/0            unassigned      YES unset  administratively down down
FastEthernet3/1            unassigned      YES unset  administratively down down
R1(config)#
```

Router 2 :

```
ISP#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
ISP(config)#interface fas
ISP(config)#interface fastEthernet 0/0
ISP(config-if)#ip addr
ISP(config-if)#ip address 209.165.200.10 255.255.255.252
ISP(config-if)#mp shu
ISP(config-if)#no shut
ISP(config-if)#no shutdown
ISP(config-if)#
*Jan  1 20:28:22.423: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
*Jan  1 20:28:23.423: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0
, changed state to up
ISP(config-if)#exit
ISP(config)#
```

```
ISP(config)#inter
ISP(config)#interface loop
ISP(config)#interface loopback 0
ISP(config-if)#
*Jan  1 20:29:09.091: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, cha
nged state to up
ISP(config-if)#ip add
ISP(config-if)#ip address 198.133.219.1 255.255.255.255
ISP(config-if)#no shu
ISP(config-if)#no shutdown
ISP(config-if)#exit
ISP(config)#
```

```
R1#
*Jan  1 20:30:58.807: %SYS-5-CONFIG_I: Configured from console by console
R1#
R1#ping 209.165.200.10

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.10, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 20/31/40 ms
```

```
ISP#wr
Building configuration...
[OK]
ISP#
ISP#copy run
ISP#copy running-config star
ISP#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
ISP#
```

```
#show ip sla statistics
```