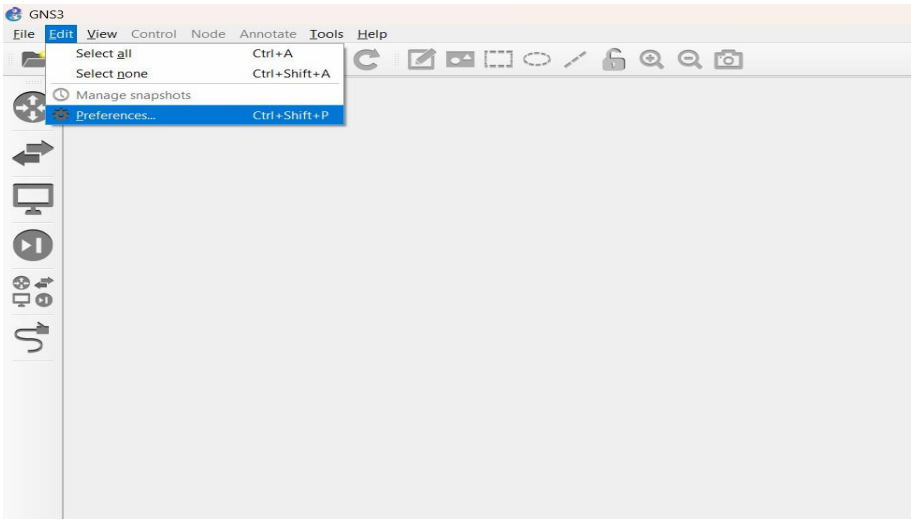
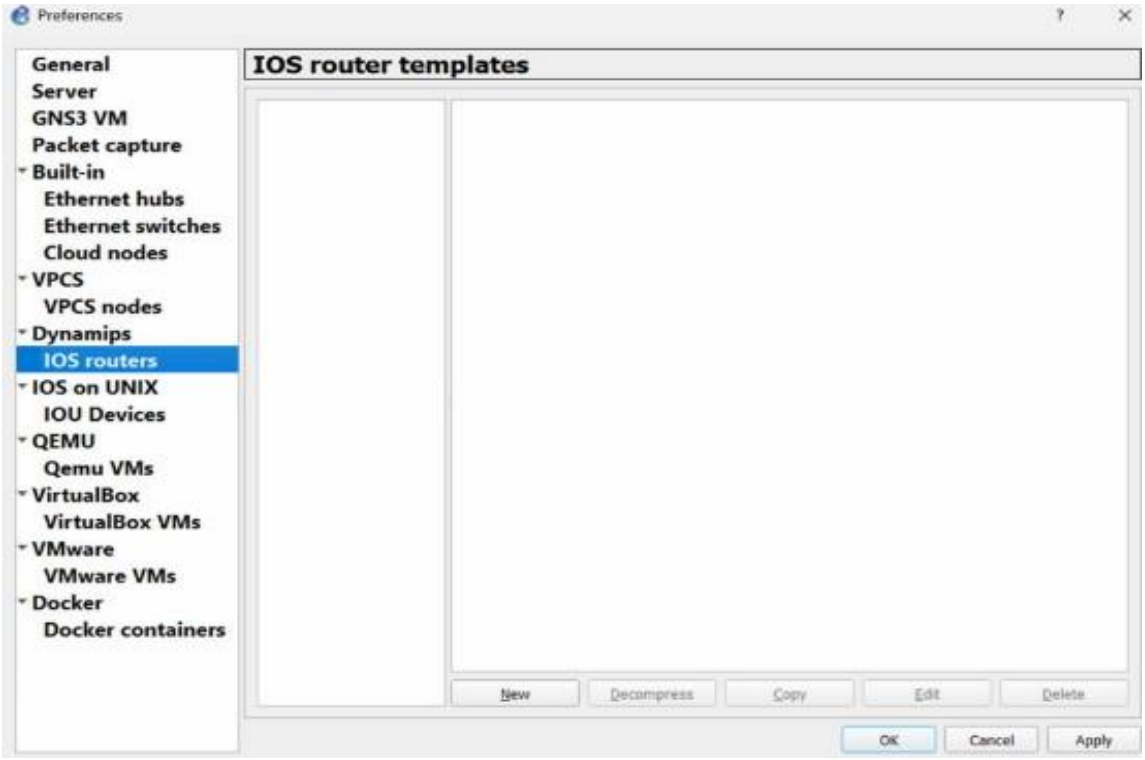
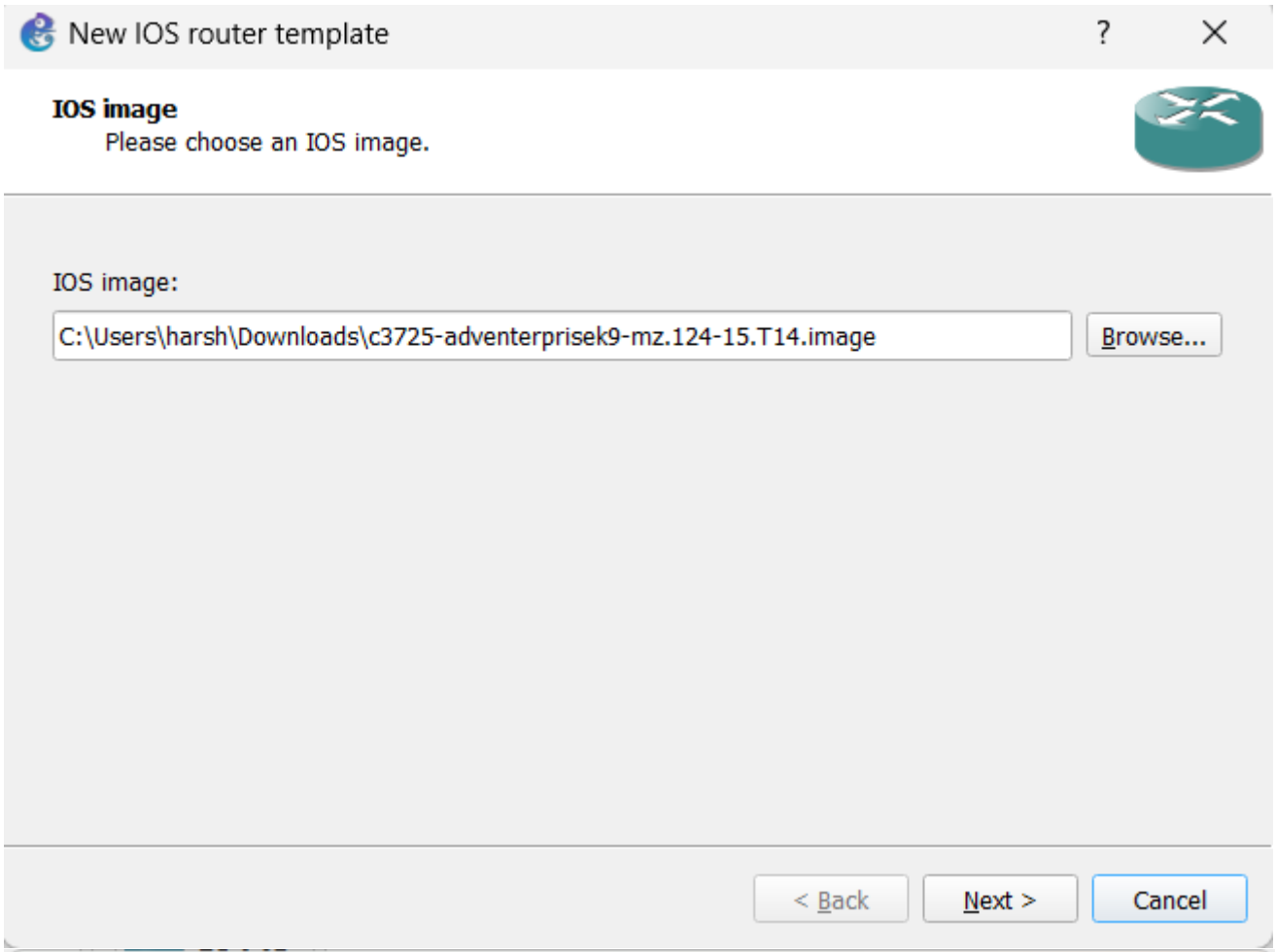
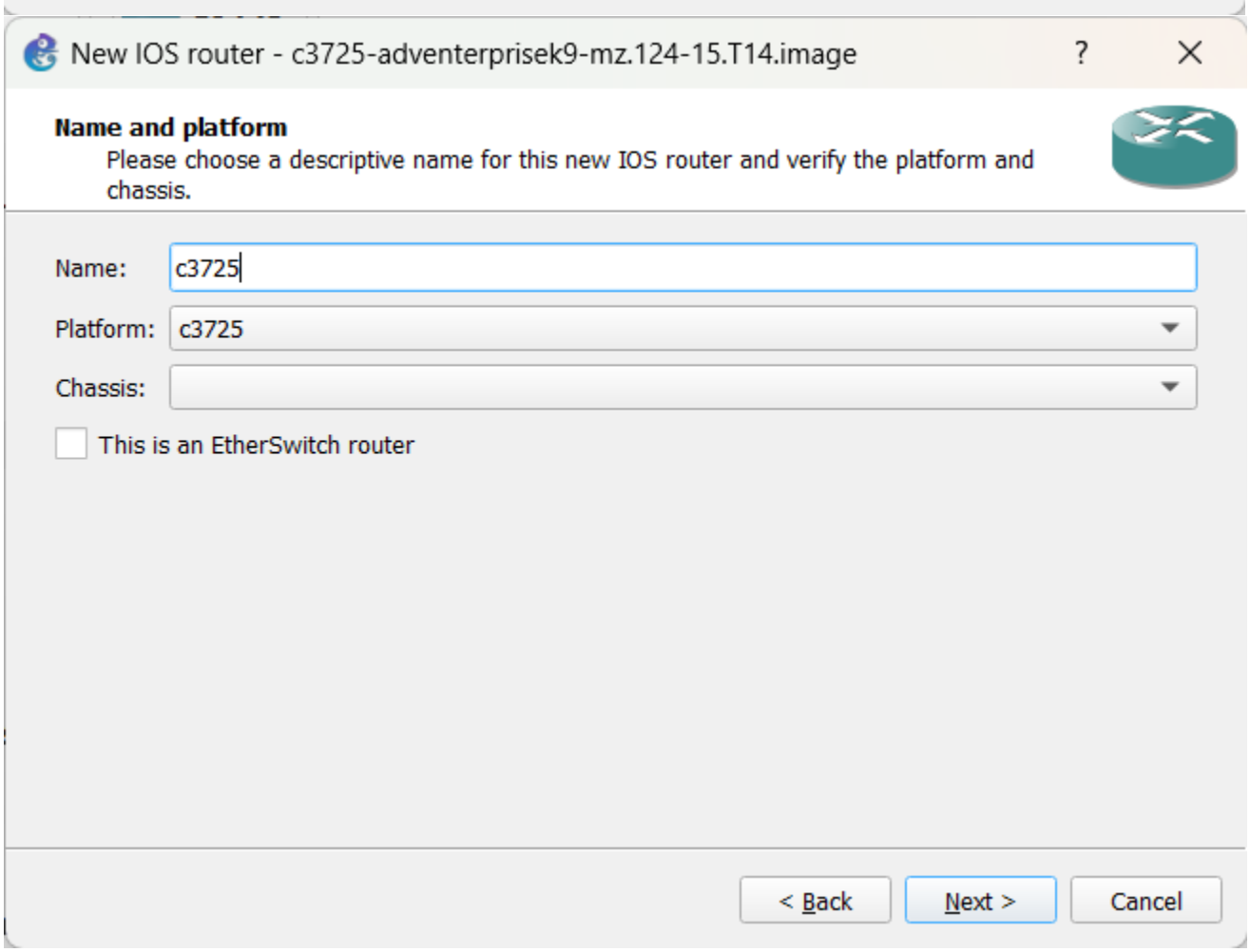
SDN-Practical No.-1

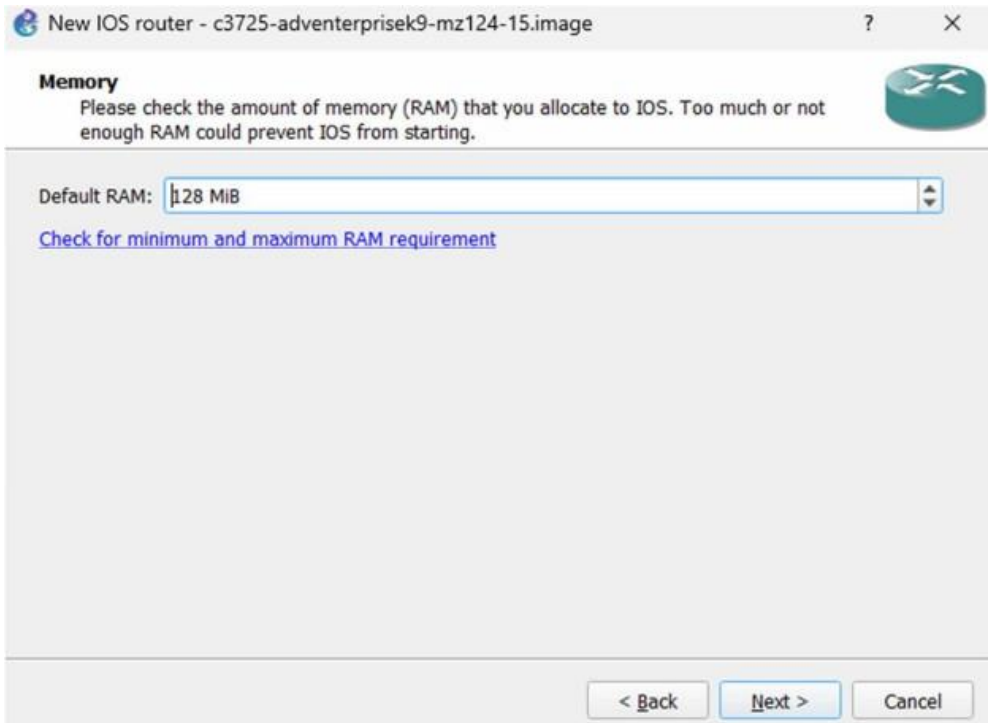
To implement IP SLA (IP service Level Agreement)

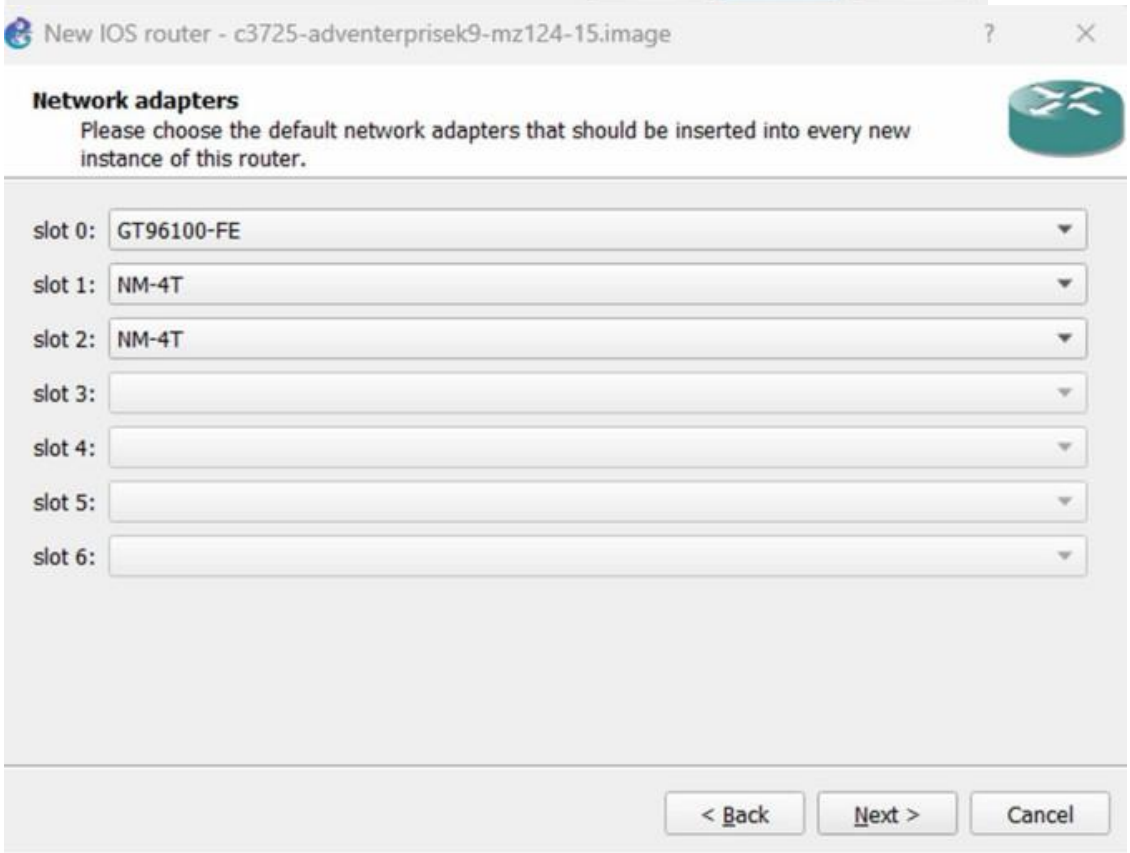


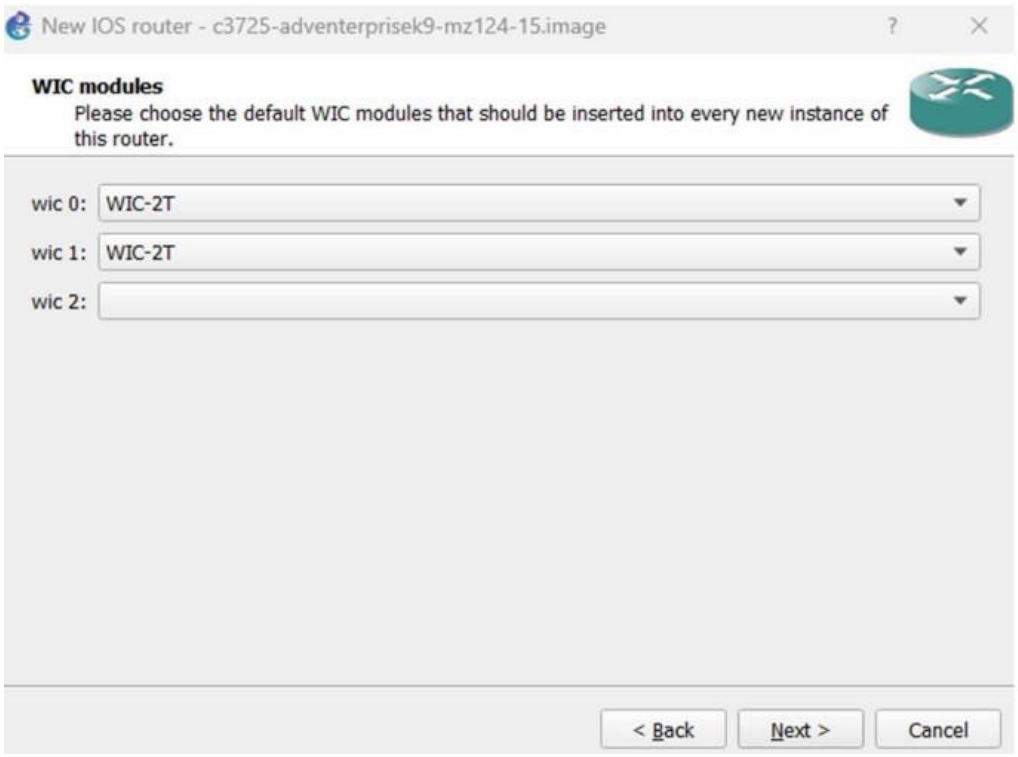


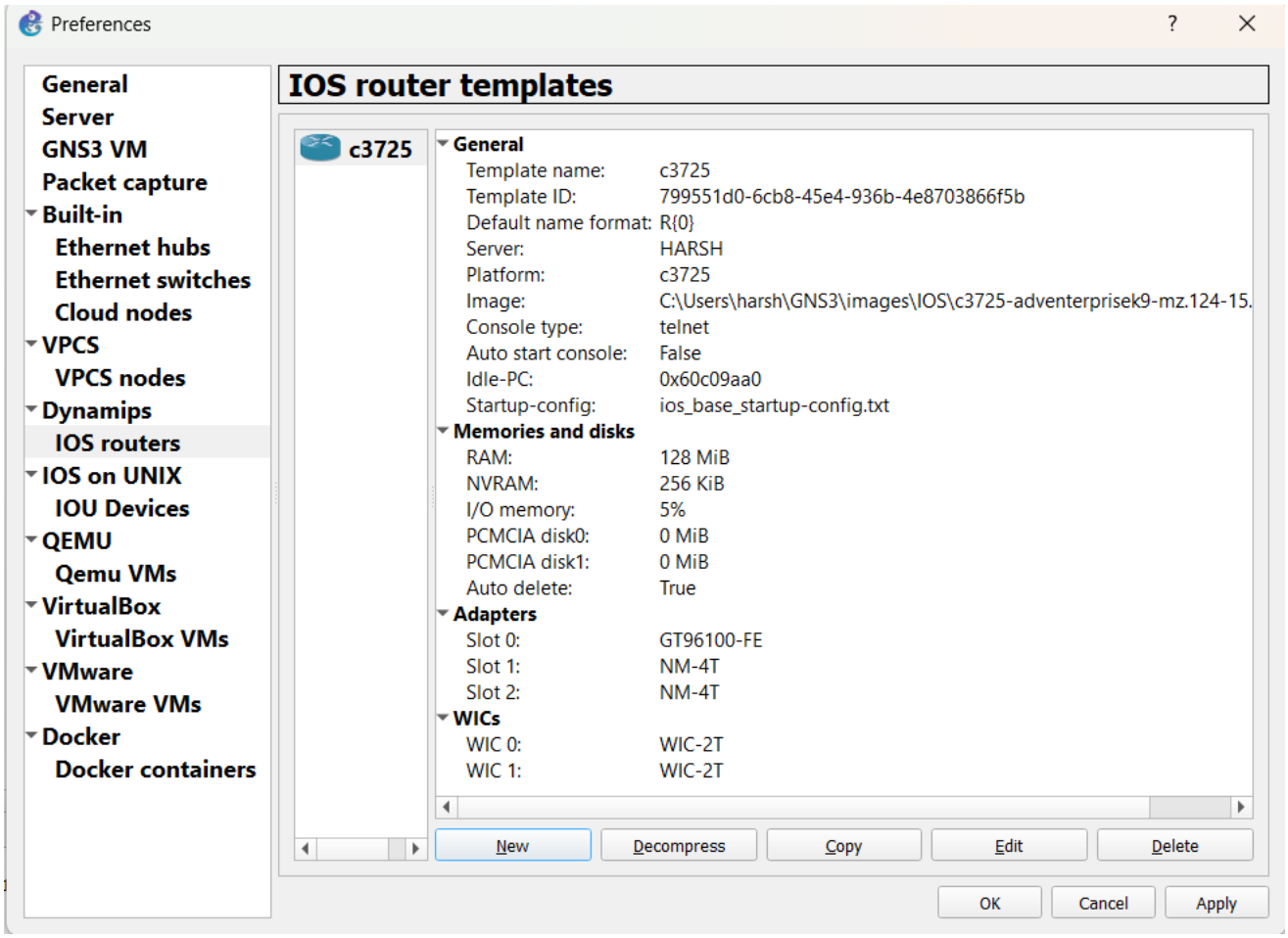

New IOS router template
IOS image
Please choose an IOS image.
IOS image:
C:\Users\harsh\Downloads\c3725-adventerprisek9-mz.124-15.T14.image
Browse...
< Back
Next >
Cancel


New IOS router - c3725-adventerprisek9-mz.124-15.T14.image
Name and platform
Please choose a descriptive name for this new IOS router and verify the platform and chassis.
Name:
c3725
Platform:
c3725
Chassis:
This is an EtherSwitch router
< Back
Next >
Cancel

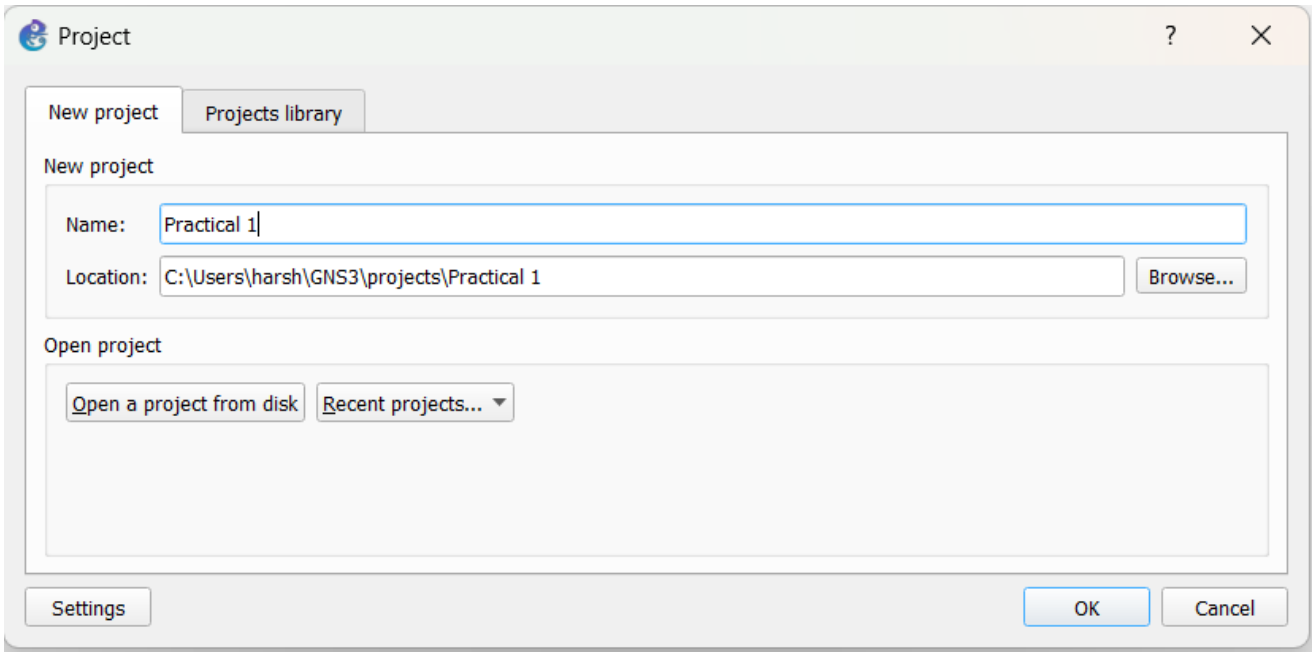

New IOS router - c3725-adventerprisek9-mz124-15.image
Memory
Please check the amount of memory (RAM) that you allocate to IOS. Too much or not enough RAM could prevent IOS from starting.
Default RAM:
128 MiB
Check for minimum and maximum RAM requirement
< Back
Next >
Cancel

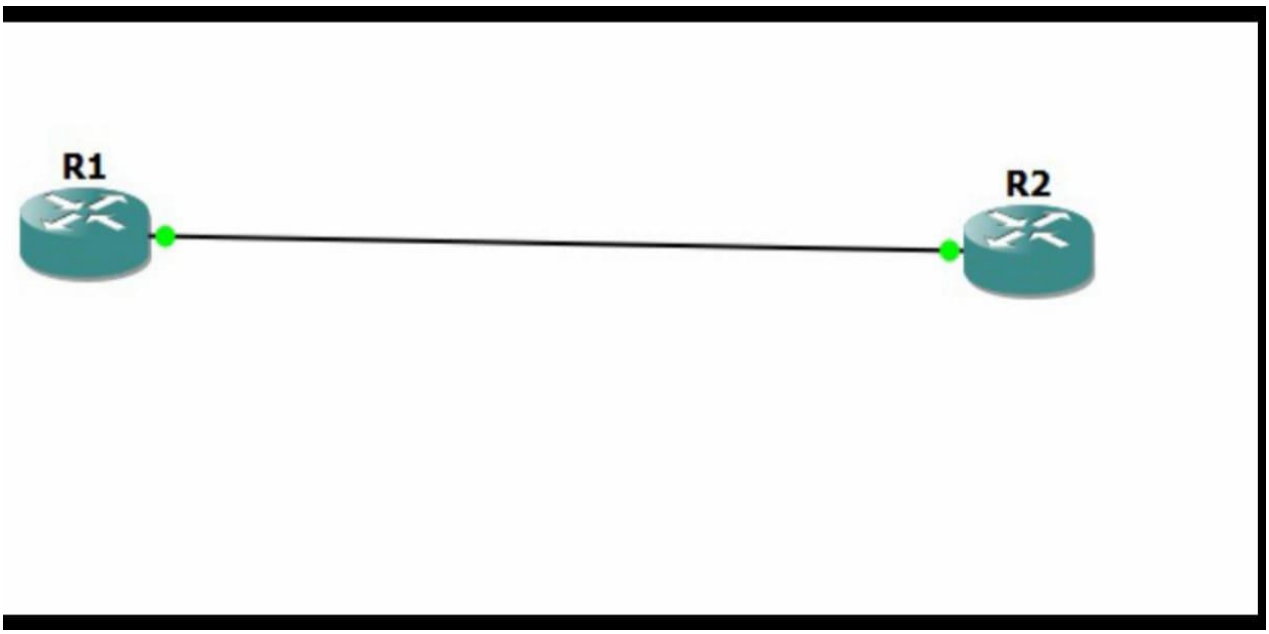

New IOS router - c3725-adventerprisek9-mz124-15.image
Network adapters
Please choose the default network adapters that should be inserted into every new instance of this router.
slot 0:
GT96100-FE
slot 1:
NM-4T
slot 2:
NM-4T
slot 3:
slot 4:
slot 5:
slot 6:
< Back
Next >
Cancel


New IOS router - c3725-adventerprisek9-mz124-15.image
WIC modules
Please choose the default WIC modules that should be inserted into every new instance of this router.
wic 0: WIC-2T
wic 1: WIC-2T
wic 2:
< Back
Next >
Cancel


Preferences
General
Server
GNS3 VM
Packet capture
Built-in
Ethernet hubs
Ethernet switches
Cloud nodes
VPCS
VPCS nodes
Dynamips
IOS routers
IOS on UNIX
IOU Devices
QEMU
Qemu VMs
VirtualBox
VirtualBox VMs
VMware
VMware VMs
Docker
Docker containers
IOS router templates
c3725
General
Template name: c3725
Template ID: 799551d0-6cb8-45e4-936b-4e8703866f5b
Default name format: R{0}
Server: HARSH
Platform: c3725
Image: C:\Users\harsh\GNS3\images\IOS\c3725-adventerprisek9-mz.124-15.
Console type: telnet
Auto start console: False
Idle-PC: 0x60c09aa0
Startup-config: ios_base_startup-config.txt
Memories and disks
RAM: 128 MiB
NVRAM: 256 KiB
I/O memory: 5%
PCMCIA disk0: 0 MiB
PCMCIA disk1: 0 MiB
Auto delete: True
Adapters
Slot 0: GT96100-FE
Slot 1: NM-4T
Slot 2: NM-4T
WICs
WIC 0: WIC-2T
WIC 1: WIC-2T
New
Decompress
Copy
Edit
Delete
OK
Cancel
Apply

New Project-


Project
New project
Projects library
New project
Name:
Practical 1
Location:
C:\Users\harsh\GNS3\projects\Practical 1
Browse...
Open project
Open a project from disk
Recent projects...
Settings
OK
Cancel


R1
R2

R1 and R2 Router-

Configuring R1 Router –

```
R1#config
Configuring from terminal, memory, or network [terminal]? terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#interface FastEthernet 0/0
R1(config-if)#ip address 1.1.1.1 255.255.255.0
R1(config-if)#no shutdown
R1(config-if)#
*Mar  1 00:02:40.595: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
*Mar  1 00:02:41.595: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
R1(config-if)#exit
R1(config)#exit
R1#
*Mar  1 00:02:51.287: %SYS-5-CONFIG_I: Configured from console by console
R1#
R1#ping 1.1.1.2

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 1.1.1.2, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
```

Now try ping 8.8.8.8 –

```
R1#
R1#config
Configuring from terminal, memory, or network [terminal]? terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip route 0.0.0.0 0.0.0.0 1.1.1.2
R1(config)#do ping 8.8.8.8

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 8.8.8.8, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)
R1(config)#ip sla monitor 1
```

Configuring IP SLA

```
R1(config)#ip sla monitor 4
R1(config-rtr)#exit
R1(config)#ip sla 4
R1(config-ip-sla)#type echo protocol?
% Unrecognized command
R1(config-ip-sla)#type echo protocol ?
% Unrecognized command
R1(config-ip-sla)#Icmp-echo 1.1.1.2
R1(config-ip-sla-echo)#frequency 10
R1(config-ip-sla-echo)#threshold 300
R1(config-ip-sla-echo)#exit
R1(config)#ip sla schedule 4 life forever start-time now
R1(config)#exit
R1#
*Mar  1 00:09:07.411: %SYS-5-CONFIG_I: Configured from console by console
R1#show ip sla statistics 4

Round Trip Time (RTT) for       Index 4
        Latest RTT: NoConnection/Busy/Timeout
Latest operation start time: *00:09:19.579 UTC Fri Mar 1 2002
Latest operation return code: Timeout
Number of successes: 0
Number of failures: 3
Operation time to live: Forever
```

1) Write -

```
R1#write
Building configuration...
[OK]
R1#
```

2) copy running-config startup-config -

```
R1#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
R1#
```

Configuring Router R2 -

```
R2#config
Configuring from terminal, memory, or network [terminal]? terminal
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#hostname ISP
ISP(config)#interface loopback 1
ISP(config-if)#
*Mar  1 00:12:50.191: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up
ISP(config-if)#ip address 8.8.8.8 255.255.255.0
ISP(config-if)#exit
ISP(config)#
ISP(config)#interface fastEthernet 0/0
ISP(config-if)#ip address 1.1.1.2 255.255.255.0
ISP(config-if)#no shutdown
ISP(config-if)#
*Mar  1 00:14:31.215: %LINK-3-UPDOWN: Interface FastEthernet0/0, changed state to up
*Mar  1 00:14:32.215: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up
ISP(config-if)#
```

1) Write -

```
ISP#write
Building configuration...
[OK]
```

2)Copy running-config startup-config-

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

OUTPUT-

1) Ip sla monitor collection-statistics-

```
R1#show ip sla collection-statistics
Entry number: 4
Start Time Index: *00:09:04.579 UTC Fri Mar 1 2002
Number of successful operations: 7
Number of operations over threshold: 0
Number of failed operations due to a Disconnect: 0
Number of failed operations due to a Timeout: 34
Number of failed operations due to a Busy: 0
Number of failed operations due to a No Connection: 0
Number of failed operations due to an Internal Error: 0
Number of failed operations due to a Sequence Error: 0
Number of failed operations due to a Verify Error: 0
RTT Values:
RTTAvg: 39      RTTMin: 19      RTTMax: 87
NumOfRTT: 7     RTTSum: 274     RTTSum2: 13754
```

2) Ip sla monitor distribution-statistics-

```
R1#show ip sla distribution-statistics
        Captured Statistics
Entry    = Entry number
StartT   = Start time of entry (hundredths of seconds)
Pth      = Path index
Hop      = Hop in path index
Dst      = Time distribution index
Comps    = Operations completed
OvrTh    = Operations completed over thresholds
SumCmp   = Sum of RTT (milliseconds/microseconds)
SumCmp2L = Sum of RTT squared low 32 bits (milliseconds/microseconds)
SumCmp2H = Sum of RTT squared high 32 bits (milliseconds/microseconds)
TMax     = RTT maximum (milliseconds/microseconds)
TMin     = RTT minimum (milliseconds/microseconds)

Note: SumCmp, SumCmp2L, SumCmp2H, TMax and TMin values will be
      in microseconds if microsecond precision is configured.
      The microsecond precision is applicable only for udp jitter
      operation.

Entry StartT     Pth Hop Dst Comps      OvrTh      SumCmp     SumCmp2L   SumCmp2H   TMax       TMin
4     54458      1   1   1   16         0          497        19579      0          87         16
```

3) Ip sla monitor operational-state:

```
R1#show ip sla operational-state
Entry number: 4
Modification time: *00:08:59.579 UTC Fri Mar 1 2002
Number of Octets Used by this Entry: 2344
Number of operations attempted: 60
Number of operations skipped: 0
Current seconds left in Life: Forever
Operational state of entry: Active
Last time this entry was reset: Never
Connection loss occurred: FALSE
Timeout occurred: FALSE
Over thresholds occurred: FALSE
Latest RTT (milliseconds): 24
Latest operation start time: *00:18:49.579 UTC Fri Mar 1 2002
Latest operation return code: OK
```

4) Ip sla monitor configuration:

```
R1#show ip sla configuration
IP SLAs Infrastructure Engine-II
Entry number: 4
Owner:
Tag:
Type of operation to perform: icmp-echo
Target address/Source address: 1.1.1.2/0.0.0.0
Operation timeout (milliseconds): 5000
Type Of Service parameters: 0x0
Vrf Name:
Request size (ARR data portion): 28
Verify data: No
Schedule:
   Operation frequency (seconds): 10  (not considered if randomly scheduled)
   Next Scheduled Start Time: Start Time already passed
   Group Scheduled : FALSE
   Randomly Scheduled : FALSE
   Life (seconds): Forever
   Entry Ageout (seconds): never
   Recurring (Starting Everyday): FALSE
   Status of entry (SNMP RowStatus): Active
Threshold (milliseconds): 300
Distribution Statistics:
   Number of statistic hours kept: 2
   Number of statistic distribution buckets kept: 1
   Statistic distribution interval (milliseconds): 4294967295
History Statistics:
   Number of history Lives kept: 0
   Number of history Buckets kept: 15
   History Filter Type: None
Enhanced History:
```

5) Ip sla monitor statistics:

```
R1#show ip sla statistics

Round Trip Time (RTT) for       Index 4
        Latest RTT: 32 milliseconds
Latest operation start time: *00:21:09.579 UTC Fri Mar 1 2002
Latest operation return code: OK
Number of successes: 40
Number of failures: 34
Operation time to live: Forever
```