Lab 03

Phase 1 — Enterprise Foundation

Lab 03 — Enterprise IP Addressing & Naming Design

Section A — Enterprise Build Scenario

Lab Type

Enterprise Foundation Build Lab

Difficulty

Beginner → Intermediate

Estimated Time

90–120 Minutes

Lab Objective

In this lab, you will design and deploy a structured enterprise IP addressing and device naming architecture.

You will learn how to:

- implement enterprise naming conventions,
- deploy structured IPv4 addressing,
- configure enterprise router and switch management interfaces,
- validate Layer 2 and Layer 3 communication,
- organize enterprise infrastructure logically,
- and prepare a scalable addressing foundation for future enterprise labs.

Why This Lab Matters

Enterprise networks quickly become difficult to manage without standardized naming and addressing conventions.

Poor design leads to:

- operational confusion,
- troubleshooting delays,
- inconsistent documentation,

- monitoring failures,
- automation complexity,
- and increased outage risk.

Professional enterprise engineers always standardize:

- hostnames,
- IP addressing,
- management networks,
- gateway allocation,
- and endpoint identification.

This lab introduces the operational design discipline used in real enterprise infrastructures.

Enterprise Scenario

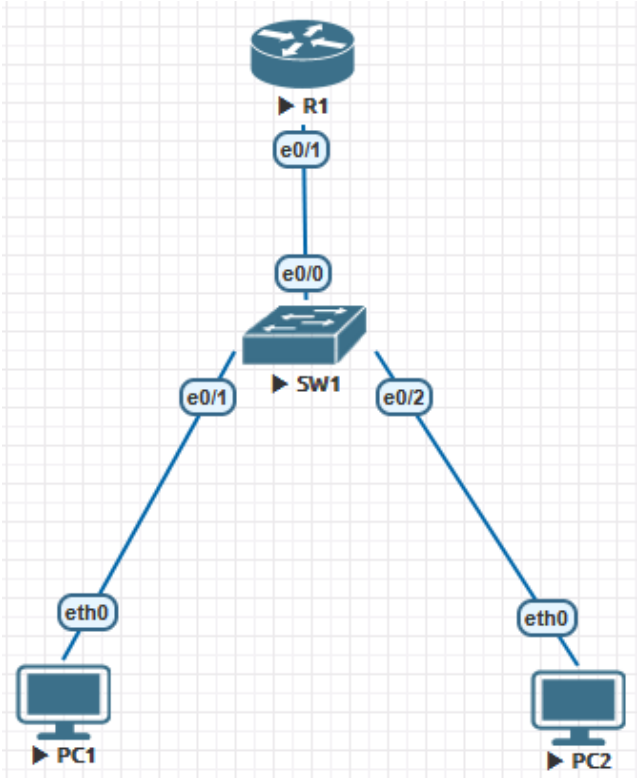
Your organization is preparing a new enterprise campus deployment.

Management requires:

- standardized device naming,
- predictable addressing,
- structured gateway allocation,
- and consistent management identification across all enterprise devices.

You are assigned to deploy the initial enterprise addressing and naming architecture before additional network services are introduced.

Topology for EVE-NG & GNS3



Connection Table

Device	Interface	Connected To	Interface
R1	Ethernet0/1	SW1	Ethernet0/0
SW1	Ethernet0/1	PC1	eth0
SW1	Ethernet0/2	PC2	eth0

IP Addressing Table

Device	Interface	IP Address	Gateway
R1	Ethernet0/1	10.10.10.1/24	N/A
SW1	VLAN 1	10.10.10.2/24	10.10.10.1
PC1	eth0	10.10.10.10/24	10.10.10.1
PC2	eth0	10.10.10.20/24	10.10.10.1

Enterprise Naming Standards

Device Type	Naming Convention
Enterprise Router	R1
Enterprise Switch	SW1
User Endpoint	PC1

User Endpoint	PC2

Required Images

Device	Purpose
Cisco IOLL3	Enterprise routing
Cisco IOLL2	Enterprise switching
VPCS	Lightweight endpoint validation

Step 1 — Deploy Nodes in EVE-NG

Goal

Deploy the enterprise addressing topology.

Add The Following Nodes

Node	Quantity
IOLL2 Router	1
IOLL2 Switch	1
VPCS Host	2

Step 2 — Connect The Enterprise Topology

Goal

Create all enterprise network connections.

Use the Connection Table above.

Step 3 — Configure PC1

Commands

```
ip 10.10.10.10/24 10.10.10.1

set pcname PC1

save
```

Verification

```
PC1> show ip

NAME        : PC1[1]
IP/MASK     : 10.10.10.10/24
```

```
GATEWAY     : 10.10.10.1
DNS         :
MAC         : 00:50:79:66:68:02
LPORT       : 20000
RHOST:PORT  : 127.0.0.1:30000
MTU         : 1500
```

Expected Result

PC1 should display:

- correct IP address,
- correct subnet mask,
- correct default gateway,
- and operational interface status.

Step 4 — Configure PC2

Commands

```
ip 10.10.10.20/24 10.10.10.1

set pcname PC2

save
```

Verification

```
PC2> show ip

NAME        : PC2[1]
IP/MASK     : 10.10.10.20/24
GATEWAY     : 10.10.10.1
DNS         :
MAC         : 00:50:79:66:68:04
LPORT       : 20000
RHOST:PORT  : 127.0.0.1:30000
MTU         : 1500
```

Expected Result

PC2 should display:

- correct IP address,
- correct subnet mask,

- correct default gateway,
- and operational interface status.

Step 5 — Configure SW1

Goal

Configure enterprise switch naming and management access.

Commands

```
enable

conf t

hostname SW1

interface Ethernet0/0

no shutdown

interface Ethernet0/1

no shutdown

interface Ethernet0/2

no shutdown

interface vlan 1

ip address 10.10.10.2 255.255.255.0

no shutdown

ip default-gateway 10.10.10.1

end

write memory
```

Verification

```
SW1#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
Ethernet0/0            unassigned      YES unset  up                    up
Ethernet0/1            unassigned      YES unset  up                    up
Ethernet0/2            unassigned      YES unset  up                    up
Ethernet0/3            unassigned      YES unset  up                    up
Vlan1                  10.10.10.2      YES NVRAM  up                    up
```

```
SW1#show running-config
Building configuration...

Current configuration : 3167 bytes
!
! Last configuration change at 18:10:34 UTC Thu Jun 18 2026
!
version 17.12
service timestamps debug datetime msec
service timestamps log datetime msec
!
hostname SW1
!
boot-start-marker
boot-end-marker
!
!
no aaa new-model

!
interface Ethernet0/0
!
interface Ethernet0/1
!
interface Ethernet0/2
!
interface Ethernet0/3
!
interface Vlan1
 ip address 10.10.10.2 255.255.255.0
!
ip default-gateway 10.10.10.1
ip forward-protocol nd
!
!
ip http server
ip http secure-server
ip ssh bulk-mode 131072
!
!

control-plane
!
!
!
line con 0
 logging synchronous
line aux 0
line vty 0 4
 login
 transport input ssh
```

Expected Result

- VLAN 1 should be UP/UP
- Management IP should be reachable
- Hostname should appear as SW1

Step 6 — Configure R1

Goal

Deploy enterprise gateway addressing.

Commands

```
enable

conf t

hostname R1

interface Ethernet0/1

ip address 10.10.10.1 255.255.255.0

no shutdown

end

write memory
```

Verification

```
R1#show ip interface brief
Interface              IP-Address      OK? Method Status                Protocol
Ethernet0/0            unassigned      YES unset  administratively down down
Ethernet0/1            10.10.10.1      YES manual up                    up
Ethernet0/2            unassigned      YES unset  administratively down down
Ethernet0/3            unassigned      YES unset  administratively down down
```

Expected Result

GigabitEthernet1 should display:

- assigned IP address,
- UP/UP operational state,
- and proper enterprise gateway configuration.

Step 7 — Validate Switch Management Reachability

Goal

Validate enterprise management communication.

From SW1

```
SW1#ping 10.10.10.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.10.10.1, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/1/1 ms
```

Expected Result

The enterprise router gateway should respond successfully.

Step 8 — Validate End-to-End Connectivity

Goal

Validate enterprise endpoint communication.

From PC1

```
PC1> ping 10.10.10.20

84 bytes from 10.10.10.20 icmp_seq=1 ttl=64 time=0.764 ms
84 bytes from 10.10.10.20 icmp_seq=2 ttl=64 time=0.837 ms
```

Expected Result

PC2 should respond successfully.

From PC2

```
PC2> ping 10.10.10.10

84 bytes from 10.10.10.10 icmp_seq=1 ttl=64 time=1.275 ms
84 bytes from 10.10.10.10 icmp_seq=2 ttl=64 time=0.934 ms
```

Expected Result

PC1 should respond successfully.

Step 9 — Enterprise Naming Validation

Goal

Validate operational enterprise naming standards.

Router Verification

```
R1#show running-config | include hostname
hostname R1
```

Switch Verification

```
SW1#show running-config | include hostname
hostname SW1
```

Expected Result

Devices should display:

- hostname R1
- hostname SW1

Step 10 — Validate ARP Learning

Goal

Validate enterprise Layer 2 discovery operations.

Router Verification

```
R1#show arp
Protocol  Address          Age (min)  Hardware Addr   Type   Interface
Internet  10.10.10.1               -   aabb.cc00.1010  ARPA   Ethernet0/1
Internet  10.10.10.2               1   aabb.cc80.3000  ARPA   Ethernet0/1
```

Switch Verification

show mac address-table

Expected Result

- MAC addresses should populate dynamically
- ARP entries should appear
- Endpoints should be learned correctly

Step 11 — Enterprise Operational Verification

R1 Verification

```
show ip interface brief

show arp

show running-config
```

SW1 Verification

```
show ip interface brief

show mac address-table

show running-config
```

PC1 Verification

```
show ip

ping 10.10.10.1
```

PC2 Verification

```
show ip

ping 10.10.10.1
```

Common Mistakes

Problem	Cause
Switch unreachable	Missing default gateway
Ping failure	Incorrect subnet mask
VLAN interface DOWN	No active access ports
Wrong hostname	Naming standard ignored
Missing ARP entries	Layer 2 connectivity issue

Enterprise Engineering Notes

- Enterprise naming standards simplify automation workflows.
- Consistent addressing reduces troubleshooting time.

- Management interfaces should always use structured addressing.
- Predictable gateway allocation improves operational visibility.
- Enterprise monitoring systems depend heavily on naming consistency.

Step 12 — Save Configurations

Router (R1)

```
write memory
```

Switch (SW1)

```
write memory
```

Step 13 — Backup Enterprise Documentation

Goal

Document enterprise addressing assignments.

Suggested Documentation

R1 → 10.10.10.1

SW1 → 10.10.10.2

PC1 → 10.10.10.10

PC2 → 10.10.10.20

What You Learned

In this lab you learned:

- enterprise IP addressing design,
- enterprise naming standards,
- switch management configuration,
- gateway allocation principles,
- endpoint communication validation,
- ARP and MAC learning verification,
- and enterprise operational documentation workflows.

Verification Score

Task	Status
Router configured	☐
Switch configured	☐
Hostnames configured	☐
Endpoints addressed	☐
Connectivity verified	☐
ARP learning validated	☐
Configurations saved	☐

Section B — Enterprise Troubleshooting Scenario

Incident Scenario

Users report that enterprise endpoints cannot communicate with the switch management interface.

Your task:

- investigate the issue,
- identify the root cause,
- and restore enterprise management connectivity.

Step 1 — Introduce Failure

On SW1

```
enable

conf t

interface vlan 1

shutdown

end
```

Step 2 — Verify Failure Symptoms

From PC1

```
ping 10.10.10.2
```

Expected Result

Switch management IP should fail to respond.

Step 3 — Begin Investigation

Verification Commands

show ip interface brief

Expected Result

VLAN 1 should appear administratively DOWN.

Root Cause Analysis

The switch management SVI was shut down.

Without an operational SVI:

- management access fails,
- monitoring systems lose connectivity,
- and enterprise administration becomes unavailable.

Step 4 — Restore Enterprise Connectivity

Commands

```
enable

conf t

interface vlan 1

no shutdown

end
```

Step 5 — Validate Recovery

From PC1

```
ping 10.10.10.2
```

Expected Result

Switch management communication should be restored successfully.

Final Enterprise Validation

Router

```
show ip interface brief
```

Switch

```
show ip interface brief
```

PC1

```
ping 10.10.10.2
```

Final Engineering Note

Enterprise troubleshooting should always follow a structured methodology:

1. Verify physical connectivity
2. Verify interface state
3. Verify Layer 2 operation
4. Verify IP addressing
5. Verify gateway operation
6. Restore service
7. Validate end-to-end recovery