

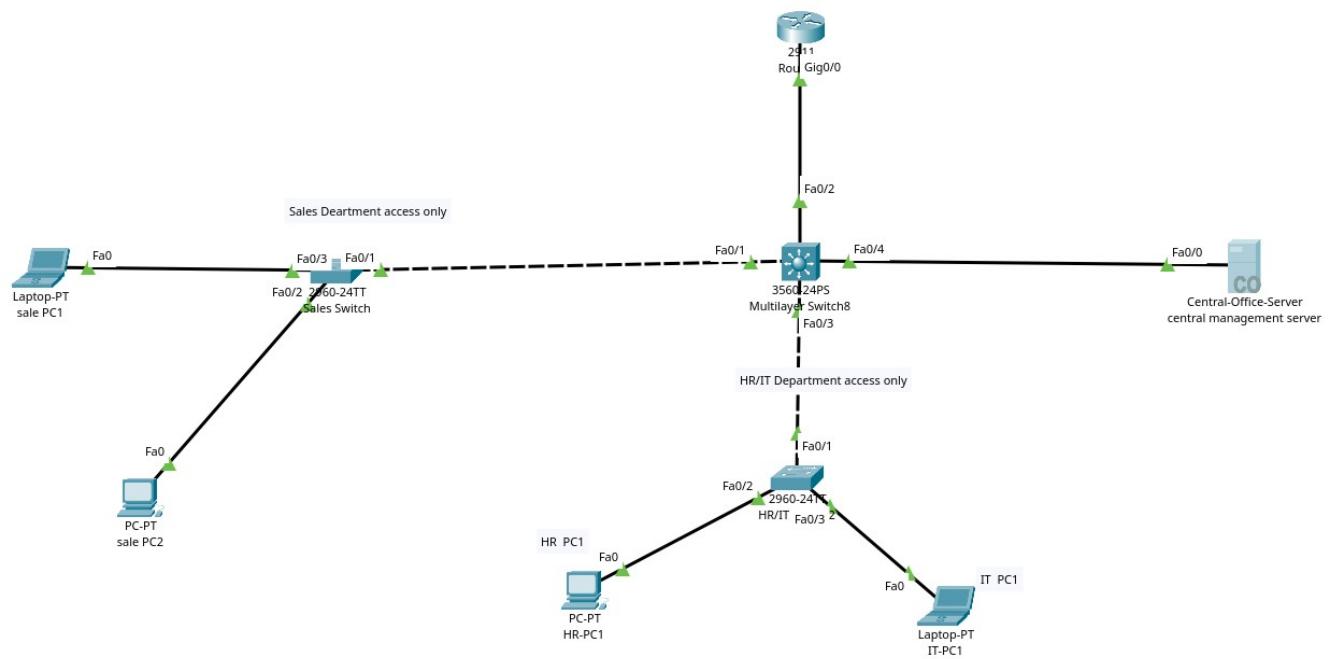
Excellent! I will provide you with a **comprehensive, step-by-step guide** for all five labs, including detailed topology diagrams, device lists, configurations, verification commands, and troubleshooting tips.

LAB 1: BASIC ENTERPRISE NETWORK

Objective

Build a foundational corporate network with department segmentation, automatic IP assignment, and internet connectivity.

Topology Diagram



Device List

Device	Model	Host name	IP Address	Role
Router0	2911	Router3	192.168.10.1/24	Core Router
Switch0	3560-24PS	Core-SW	VLANs: 10,20,30,99	Core Switch
Switch1	2960-24TT	Access-SW1	192.168.10.0/24	Sales Access
Switch2	2960-24TT	Access-SW2	192.168.20.0/24	HR/IT Access
Server0	Server-PT	DHCP-Server	192.168.30.10/24	DHCP/DNS Server
PC1	PC-PT	Sales-PC1	DHCP	Sales Department
PC2	PC-PT	Sales-PC2	DHCP	Sales Department
PC3	PC-PT	HR-PC1	DHCP	HR Department
PC4	PC-PT	IT-PC1	DHCP	IT Department

Step by Step Configuration

Step 1: VLAN Configuration on Core Switch and changing the switch name to MAIN-SWITCH

```
IOS Command Line Interface

Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname MAIN-SWITCH
MAIN-SWITCH(config)#
MAIN-SWITCH(config)#vlan 10
MAIN-SWITCH(config-vlan)#name sales
MAIN-SWITCH(config-vlan)#ex
MAIN-SWITCH(config)#
MAIN-SWITCH(config)#vlan 20
MAIN-SWITCH(config-vlan)#name HR
MAIN-SWITCH(config-vlan)#ex
MAIN-SWITCH(config)#
MAIN-SWITCH(config)#vlan 30
MAIN-SWITCH(config-vlan)#name IT
MAIN-SWITCH(config-vlan)#ex
MAIN-SWITCH(config)#
MAIN-SWITCH(config)#vlan 99
MAIN-SWITCH(config-vlan)#name NATIVE
MAIN-SWITCH(config-vlan)#ex
MAIN-SWITCH(config)#

```

Step 2: Access Switch Configuration by entering each vlans and assign it an ip address

IOS Command Line Interface

```

MAIN-SWITCH(config)#
MAIN-SWITCH(config)#int vlan 20
MAIN-SWITCH(config-if)#
%LINK-5-CHANGED: Interface vlan20, changed state to up

MAIN-SWITCH(config-if)#ip add 192.168.20.0 255.255.255.0
Bad mask /24 for address 192.168.20.0
MAIN-SWITCH(config-if)#no sh
MAIN-SWITCH(config-if)#
MAIN-SWITCH(config-if)#ex
MAIN-SWITCH(config)#
MAIN-SWITCH(config)#int 30
                           ^
% Invalid input detected at '^' marker.

MAIN-SWITCH(config)#int vlan 30
MAIN-SWITCH(config-if)#
%LINK-5-CHANGED: Interface Vlan30, changed state to up

MAIN-SWITCH(config-if)#ip add 192.168.30.10 255.255.255.0
MAIN-SWITCH(config-if)#no sh
MAIN-SWITCH(config-if)#ex
MAIN-SWITCH(config)#
MAIN-SWITCH(config)#int vlan 99
MAIN-SWITCH(config-if)#
%LINK-5-CHANGED: Interface Vlan99, changed state to up

MAIN-SWITCH(config-if)#ip add 192.168.99.5 255.255.255.0
MAIN-SWITCH(config-if)#no sh
MAIN-SWITCH(config-if)#ex
MAIN-SWITCH(config)#

```

Step 3: creating the pipeline or root to allow the vlans to be accessed and routed by the router via a specific port for specific computer under their departments

```
MAIN-SWITCH(config)#
MAIN-SWITCH(config)#int f0/2
MAIN-SWITCH(config-if)#swit
MAIN-SWITCH(config-if)#switchport mode access
MAIN-SWITCH(config-if)#switchport trunk
% Incomplete command.
MAIN-SWITCH(config-if)#switchport mode trunk
MAIN-SWITCH(config-if)#switchport trunk native vlan 99
MAIN-SWITCH(config-if)#switchport trunk allowed vlan 10,20,30,99
MAIN-SWITCH(config-if)#no sh
MAIN-SWITCH(config-if)#
MAIN-SWITCH(config-if)#ex
MAIN-SWITCH(config)#do wr
Building configuration...
[OK]
MAIN-SWITCH(config)#

```

Step 3: Router Configuration (Router-on-a-Stick)

IOS Command Line Interface

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int gig0/0
Router(config-if)#no sh

Router(config-if)#
%LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up

Router(config-if)#ex
Router(config)#
Router(config)#int gig0/0.10
Router(config-subif)#
%LINK-3-UPDOWN: Interface GigabitEthernet0/0.10, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.10, changed state to up

Router(config-subif)#encap
Router(config-subif)#encapsulation dot
Router(config-subif)#encapsulation dot1Q 10
Router(config-subif)#ip add 192.168.10.1 255.255.255.0
Router(config-subif)#no sh
Router(config-subif)#ex
Router(config)#
Router(config)#int gig0/0.20
Router(config-subif)#
%LINK-3-UPDOWN: Interface GigabitEthernet0/0.20, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0.20, changed state to up

Router(config-subif)#encapsulation dot1Q 20
Router(config-subif)#ip add 192.168.20.1 255.255.255.0
Router(config-subif)#no sh
Router(config-subif)#ex
Router(config)#

```

Step 5: configuring DHCP for each vlan so that each device under it can get a unique ip address automatically

Step: 4 configuring other switches A. sales

```

Switch>en
Switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#hostname sales-switch
sales-switch(config)#
sales-switch(config)#vlan 10
sales-switch(config-vlan)#name sales
sales-switch(config-vlan)#ex
sales-switch(config)#
sales-switch(config)#int range f0/2-3
sales-switch(config-if-range)#switchport mode access
sales-switch(config-if-range)#switchport access vlan 10
sales-switch(config-if-range)#ex
sales-switch(config)#
sales-switch(config)#int f0/1
sales-switch(config-if)#switchport mode trunk

sales-switch(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up

sales-switch(config-if)#switchport trunk NATIVE vlan 99
sales-switch(config-if)#switchport trunk allowed vlan 10,99
sales-switch(config-if)#ex
sales-switch(config)#do wr
Building configuration...
[OK]
sales-switch(config)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/1 (99), with
MAIN-SWITCH FastEthernet0/1 (1).

```

B. IT AND HR SWITCH

```
switch#en
switch#conf t
Enter configuration commands, one per line. End with CNTL/Z.
switch(config)#hostname HR-IT_SWITCH
HR-IT_SWITCH(config)#vlan 20
HR-IT_SWITCH(config-vlan)#name HR
HR-IT_SWITCH(config-vlan)#ex
HR-IT_SWITCH(config)#
HR-IT_SWITCH(config)#vlan 30
HR-IT_SWITCH(config-vlan)#name IT
HR-IT_SWITCH(config-vlan)#ex
HR-IT_SWITCH(config)#
HR-IT_SWITCH(config)#vlan 99
HR-IT_SWITCH(config-vlan)#name NATIVE
HR-IT_SWITCH(config-vlan)#ex
HR-IT_SWITCH(config)#
HR-IT_SWITCH(config)#switchport mode access
^
% Invalid input detected at '^' marker.

HR-IT_SWITCH(config)#int f0/2
HR-IT_SWITCH(config-if)#switchport mode access
HR-IT_SWITCH(config-if)#switchport access vlan 20
HR-IT_SWITCH(config-if)#ex
HR-IT_SWITCH(config)#
HR-IT_SWITCH(config)#int f0/3
HR-IT_SWITCH(config-if)#switchport mode access
HR-IT_SWITCH(config-if)#switchport access vlan 30
HR-IT_SWITCH(config-if)#ex
HR-IT_SWITCH(config)#
HR-IT_SWITCH(config)#int f0/1
HR-IT_SWITCH(config-if)#switchport mode trunk

HR-IT_SWITCH(config-if)#
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to down
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/1, changed state to up
```

Step 4: Server

The screenshot shows a network configuration interface with a sidebar and a main content area.

Sidebar:

- GLOBAL
- Settings
- Algorithm Settings
- INTERFACE**
- Backbone
- Cell Tower

Main Content Area:

Backbone Settings

IP Configuration: DHCP Static

IPv4 Address	192.168.30.3
Subnet Mask	255.255.255.0
Default Gateway	192.168.30.1
DNS Server	192.168.30.10

IPv6 Configuration: Automatic

Installing tower interface

Physical Config Services Attributes

GLOBAL Settings Algorithm Settings INTERFACE Backbone Cell Tower	<h3 style="text-align: center;">Tower Interface</h3> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> IP Configuration IPv4 Address: <input type="text" value="172.167.60.1"/> Subnet Mask: <input type="text" value="255.255.0.0"/> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> IPv6 Configuration IPv6 Address: <input type="text"/> / <input type="text"/> Link Local Address: <input type="text" value="FE80::2E0:F7FF:FE85:54D5"/> </div>
--	--

Physical Config **Services** Attributes

SERVICES CELL TOWER DHCP DHCPv6 PAP/CHAP	<h3 style="text-align: center;">DHCP</h3> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> IP Address: <input type="text" value="172.167.60.1"/> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> Subnet Mask: <input type="text" value="255.255.0.0"/> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> Start IP Address : <input type="text" value="172"/> <input type="text" value="167"/> <input type="text" value="0"/> <input type="text" value="100"/> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> Maximum Number of Users : <input type="text" value="50"/> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> IP Address Range <input type="text" value="172"/> <input type="text" value="167"/> <input type="text" value="0"/> <input type="text" value="100"/> -- <input type="text" value="149"/> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> DNS Server: <input type="text" value="0.0.0.0"/> </div> <div style="text-align: right; margin-top: 10px;"> <input type="button" value="Save"/> <input type="button" value="Cancel"/> </div>
--	--

checking vlans

```

MAIN-SWITCH>
MAIN-SWITCH>sh vlan
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/3 (1), with HR-IT_SWITCH

VLAN Name                      Status    Ports
----- -----
1   default                     active    Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                         Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                         Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                         Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                         Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                         Gige0/1, Gige0/2
10  sales                       active
20  HR                          active
30  IT                          active    Fa0/4
99  NATIVE                      active
1002 fddi-default               active
1003 token-ring-default         active
1004 fddinet-default            active
1005 trnet-default              active

VLAN Type  SAID      MTU  Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
----- -----
1   enet    100001    1500  -     -     -     -     0     0
10  enet    100010    1500  -     -     -     -     0     0
--More-- 1

```

checking trunk root

```
1005 Ethernet 101005 1000 - - - 1000 - 0 0
VLAN Type SAID MTU Parent RingNo BridgeNo Stp BrdgMode Trans1 Trans2
-----
Remote SPAN VLANS
-----
Primary Secondary Type Ports
-----
MAIN-SWITCH>
MAIN-SWITCH>
MAIN-SWITCH>
MAIN-SWITCH>s
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on FastEthernet0/1 (1), with
sales-switch FastEthernet0/1 (99).
h
% Incomplete command.
MAIN-SWITCH>sh int trunk
Port Mode Encapsulation Status Native vlan
Fa0/1 auto n-802.1q trunking 1
Fa0/2 on 802.1q trunking 99
Fa0/3 auto n-802.1q trunking 1

Port Vlans allowed on trunk
Fa0/1 1-1005
Fa0/2 10,20,30,99
Fa0/3 1-1005

Port Vlans allowed and active in management domain
Fa0/1 1,10,20,30,99
Fa0/2 10,20,30,99
Fa0/3 1,10,20,30,99

Port Vlans in spanning tree forwarding state and not pruned
Fa0/1 10,20,30
Fa0/2 10,20,30,99
Fa0/3 10,20,30

MAIN-SWITCH>
```

Check DHCP bindings

```
ROUTER#sh ip dhcp binding
IP address Client-ID/ Lease expiration Type
      Hardware address
192.168.10.2 00D0.FF1A.C97E -- Automatic
192.168.10.3 0002.16B5.CA5E -- Automatic
192.168.20.2 0030.F2C1.6A0D -- Automatic
192.168.30.2 00D0.BA8A.DA28 -- Automatic
ROUTER#
```

Enabling the DHCP on the computers to get it's IP address(sales)

IP Configuration

Interface	FastEthernet0
IP Configuration	
<input checked="" type="radio"/> DHCP	<input type="radio"/> Static
IPv4 Address	192.168.10.2
Subnet Mask	255.255.255.0
Default Gateway	192.168.10.1
DNS Server	192.168.30.10

HR

IP Configuration

Interface	FastEthernet0
IP Configuration	
<input checked="" type="radio"/> DHCP	<input type="radio"/> Static
IPv4 Address	192.168.20.2
Subnet Mask	255.255.255.0
Default Gateway	192.168.20.1
DNS Server	192.168.30.10

IT

IP Configuration

Interface	FastEthernet0
IP Configuration	
<input checked="" type="radio"/> DHCP	<input type="radio"/> Static
IPv4 Address	192.168.30.2
Subnet Mask	255.255.255.0
Default Gateway	192.168.30.1
DNS Server	192.168.30.10

Test connectivity for sales and the dns gateway

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.10.1

Pinging 192.168.10.1 with 32 bytes of data:

Reply from 192.168.10.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.10.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.10.3

Pinging 192.168.10.3 with 32 bytes of data:

Reply from 192.168.10.3: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.10.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.30.1

Pinging 192.168.30.1 with 32 bytes of data:

Reply from 192.168.30.1: bytes=32 time<1ms TTL=255
Reply from 192.168.30.1: bytes=32 time=20ms TTL=255
Reply from 192.168.30.1: bytes=32 time<1ms TTL=255
Reply from 192.168.30.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.30.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 20ms, Average = 5ms

C:\>
```

Check my other configuration documentation

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