ROUTER-ON-A-STICK (ROAS) LAB CONFIGURATION GUIDE

Cisco CCNA 200-301 Hands-On Series | Sub-Interfaces & 802.1Q Trunking

1. LAB TOPOLOGY & ADDRESSING TABLE

Device / Host	Interface / Port	VLAN Domain	IP Address	Subnet Mask	Default Gateway
Router (R1)	Gig0/0.10	VLAN 10 (SALES)	192.168.10.1	255.255.255.0	N/A (Sub-interface Gateway)
Router (R1)	Gig0/0.20	VLAN 20 (MRKT)	192.168.20.1	255.255.255.0	N/A (Sub-interface Gateway)
PC 1	Switch Fa0/1	VLAN 10 (SALES)	192.168.10.10	255.255.255.0	192.168.10.1
PC 2	Switch Fa0/2	VLAN 10 (SALES)	192.168.10.11	255.255.255.0	192.168.10.1
PC 3	Switch Fa0/3	VLAN 20 (MRKT)	192.168.20.10	255.255.255.0	192.168.20.1
PC 4	Switch Fa0/4	VLAN 20 (MRKT)	192.168.20.11	255.255.255.0	192.168.20.1

2. SWITCH CONFIGURATION (TASKS 5.1 – 5.3)

Task 5.1: Create Departmental VLANs

```
SW> enable
SW# configure terminal
SW(config)# vlan 10
SW(config-vlan)# name SALES
SW(config-vlan)# exit
SW(config)# vlan 20
SW(config-vlan)# name MRKT
SW(config-vlan)# exit
```

Task 5.2: Assign Access Ports to VLANs

```
! Sales Department Interfaces (Fa0/1 - Fa0/2)
SW(config)# interface range fastEthernet 0/1 - 2
SW(config-if-range)# switchport mode access
SW(config-if-range)# switchport access vlan 10
SW(config-if-range)# exit

! Marketing Department Interfaces (Fa0/3 - Fa0/4)
SW(config)# interface range fastEthernet 0/3 - 4
SW(config-if-range)# switchport mode access
SW(config-if-range)# switchport access vlan 20
SW(config-if-range)# exit
```

Task 5.3: Configure 802.1Q Trunk Uplink to Router

```
SW(config)# interface gigabitEthernet 0/1
SW(config-if)# switchport mode trunk
SW(config-if)# no shutdown
SW(config-if)# exit
```

3. ROUTER CONFIGURATION (TASK 5.4)

Configure Sub-Interfaces on Port Gig0/0

```
Router> enable
Router# configure terminal

! Enable Physical Parent Interface (Do not assign an IP address here)
Router(config)# interface gigabitEthernet 0/0
Router(config-if)# no shutdown
Router(config-if)# exit

! Sales Sub-Interface Gateway (VLAN 10)
Router(config)# interface gigabitEthernet 0/0.10
Router(config-subif)# encapsulation dot1Q 10
Router(config-subif)# ip address 192.168.10.1 255.255.255.0
Router(config-subif)# exit

! Marketing Sub-Interface Gateway (VLAN 20)
Router(config)# interface gigabitEthernet 0/0.20
Router(config-subif)# encapsulation dot1Q 20
Router(config-subif)# ip address 192.168.20.1 255.255.255.0
Router(config-subif)# exit
Router(config)# end
Router# write memory
```

> **Exam Tip:** You must configure `encapsulation dot1Q <vlan-id>` before assigning the IP address on a sub-interface, or Cisco IOS will reject the command.

4. LAB VERIFICATION COMMANDS

Switch Verification

```
! Confirm VLAN assignments
SW# show vlan brief

! Confirm trunk operational status on Gig0/1
SW# show interfaces trunk
```

Router Verification

```
! Check sub-interface status (Must be up/up)
Router# show ip interface brief

! Check routing table (Must display directly connected 'C' subnets)
Router# show ip route
C    192.168.10.0/24 is directly connected, GigabitEthernet0/0.10
C    192.168.20.0/24 is directly connected, GigabitEthernet0/0.20
```

Host Verification (PC 1 Command Prompt)

```
! Intra-VLAN Ping (Local Layer 2 Switching)
PC1> ping 192.168.10.11
! (Success: Reply from 192.168.10.11: bytes=32 time<1ms TTL=128)

! Gateway Reachability (Trunk & Sub-interface Test)
PC1> ping 192.168.10.1
! (Success: Reply from 192.168.10.1: bytes=32 time<1ms TTL=255)

! Inter-VLAN Ping (Full Layer 3 Router Transit)
PC1> ping 192.168.20.10
! (Success: Initial ARP timeout, then replies with TTL=127)
```

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