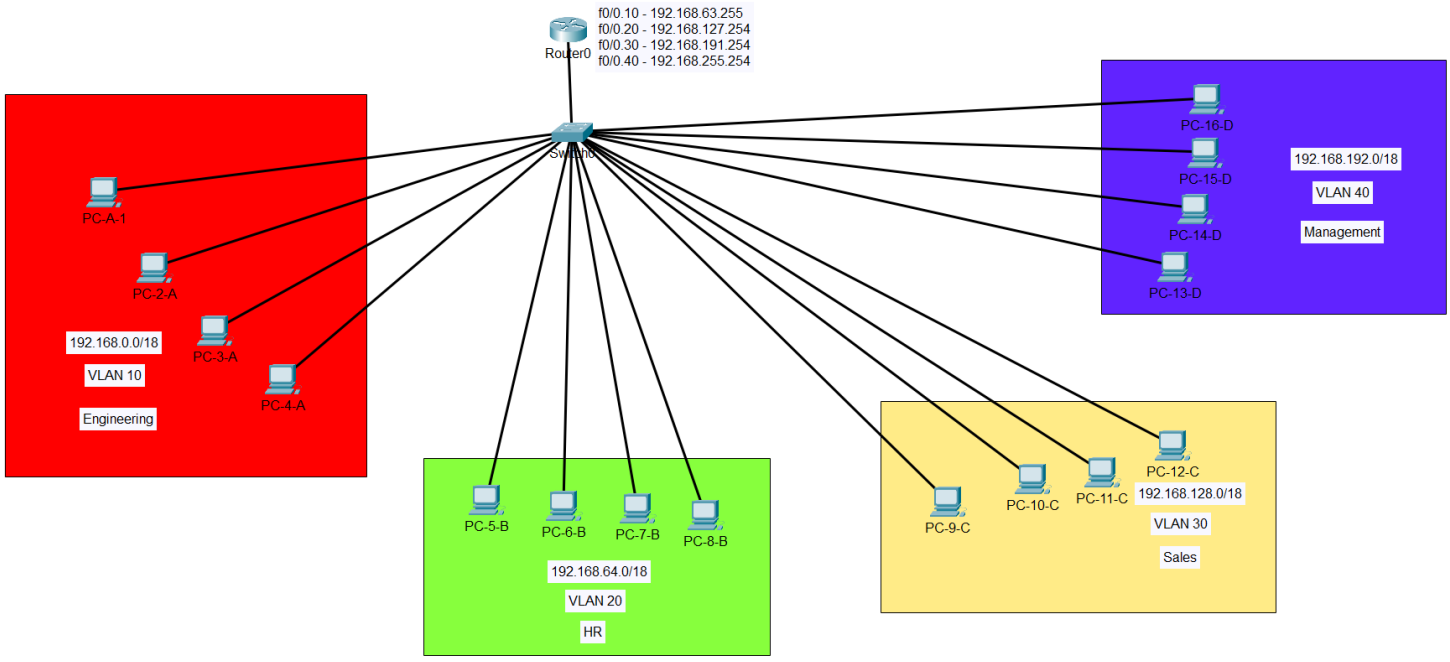
VLAN ROAS & ACL Lab

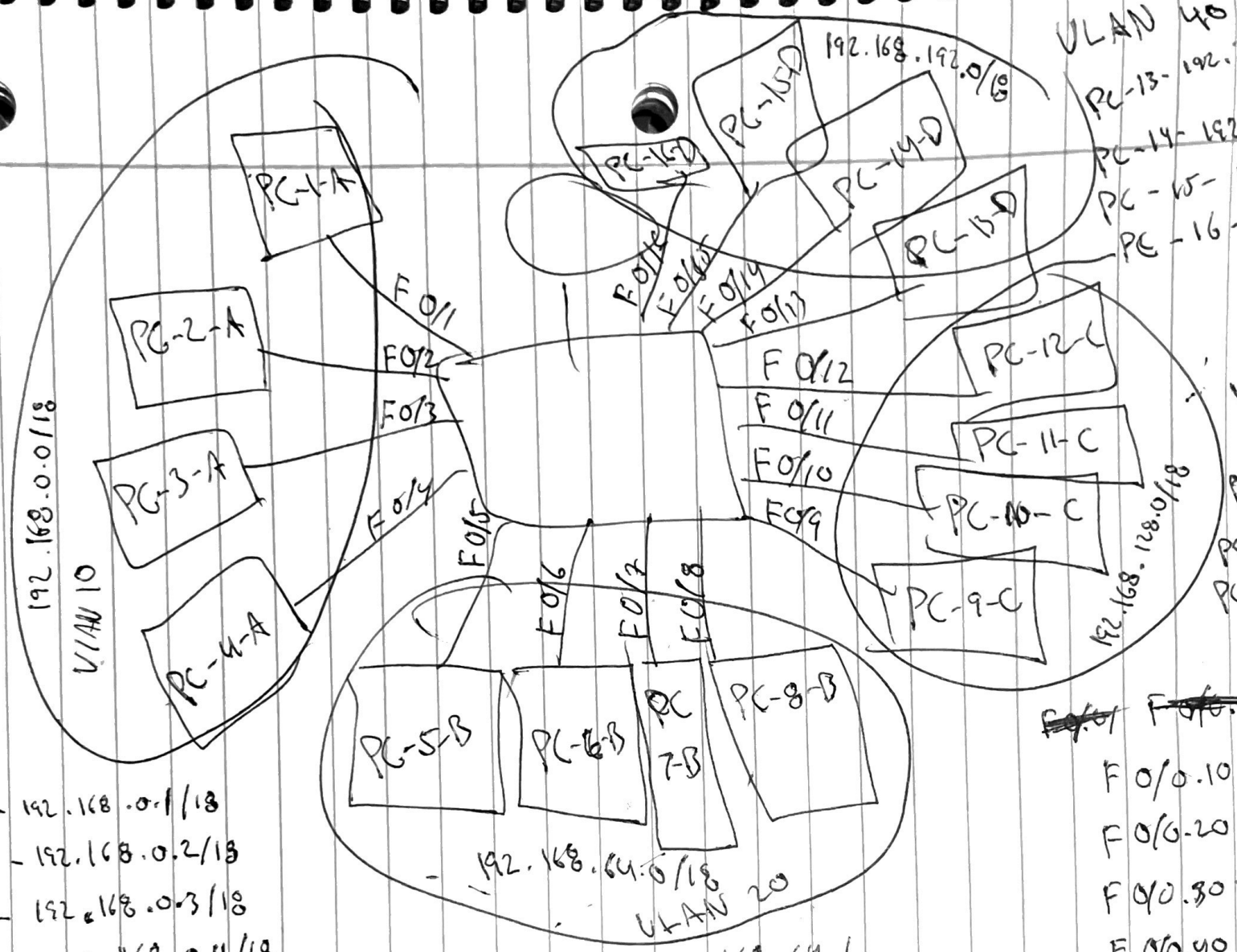
Objective: My goal for this home lab was to simulate a budget-friendly workplace network. I used a Catalyst 2960 switch and a Cisco 2811 router, dividing the first 16 switch ports into four VLANs (Engineering, HR, Sales, and Management) with four interfaces each. Since inter-VLAN routing wasn't available, I configured ROAS on the router. To enforce access control, I set ACL rules allowing only Management (192.168.192.0) to access all VLANs while restricting others. *(In the virtual simulation, I added extra PCs to better reflect a real-world setup)*

Equipment: Cisco 2811, Cisco 2960, PC-1, PC-2, (14) Virtual PC's

Key Steps:

a. Split up 192.168.0.0/16 into 4 equal subnets
b. Assign each subnet a VLAN
c. Assign the first 4 useable addresses in each subnet to each PC in every VLAN
d. Create a trunk link between the router and the switch to carry VLAN 10,20,30, and 40
e. On the router interface make sub-interfaces and assign the last usable address to each sub-interface and with dot1q encapsulation relative to each VLAN
f. Ensure full communication between each VLAN and checking on wireshark that each packet has a TPID respectively to their VLAN number
g. Apply ACL rules on each outbound sub-interface to only allow VLAN 40 traffic and deny every other traffic


f0/0.10 - 192.168.63.255
f0/0.20 - 192.168.127.254
f0/0.30 - 192.168.191.254
f0/0.40 - 192.168.255.254
Router0
Switch0
PC-A-1
PC-2-A
PC-3-A
PC-4-A
192.168.0.0/18
VLAN 10
Engineering
PC-16-D
PC-15-D
PC-14-D
PC-13-D
192.168.192.0/18
VLAN 40
Management
PC-5-B
PC-6-B
PC-7-B
PC-8-B
192.168.64.0/18
VLAN 20
HR
PC-9-C
PC-10-C
PC-11-C
PC-12-C
192.168.128.0/18
VLAN 30
Sales



VLAN 40
PC-13- 192.168.192.1
PC-14- 192.168.192.2
PC-15- 192.168.192.3
PC-16 - 192.168.192.4

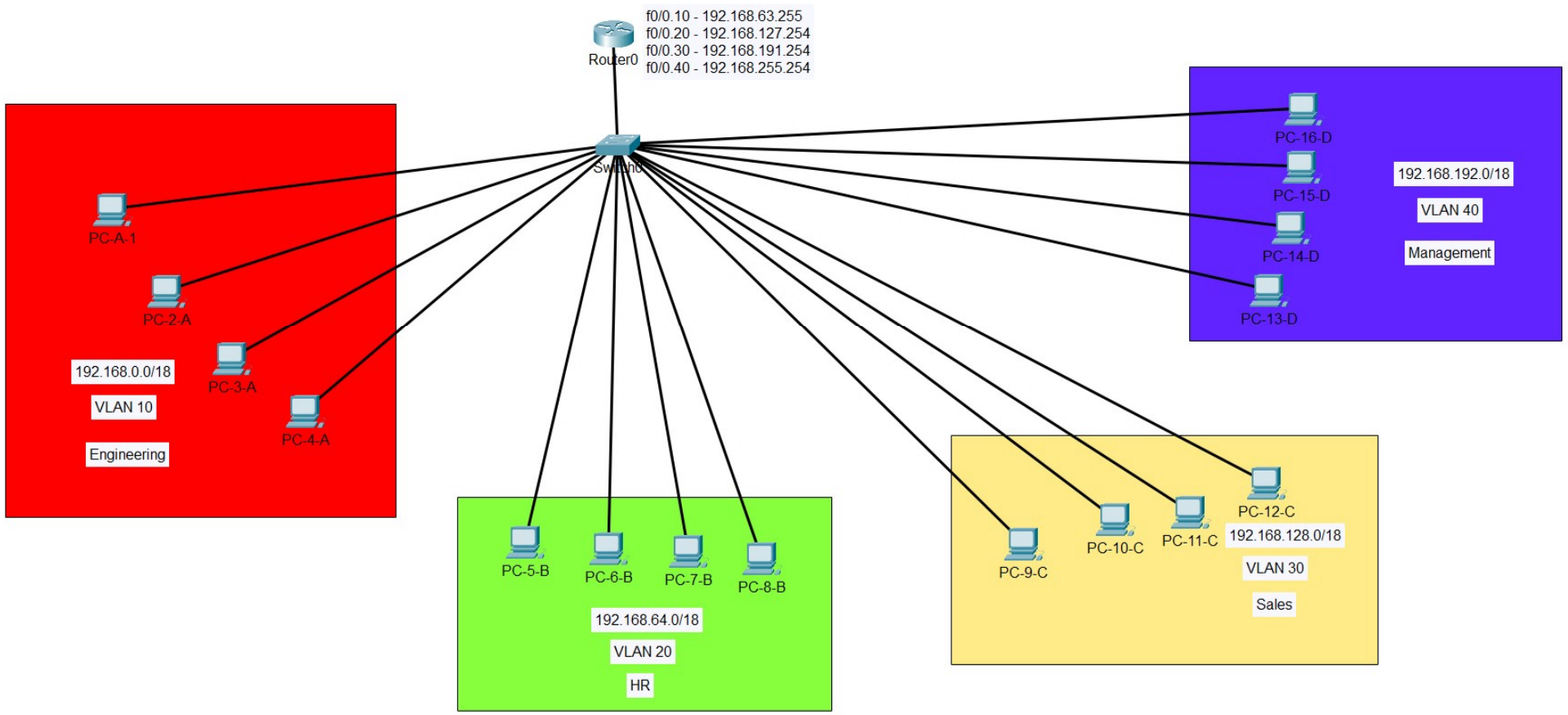
VLAN 30
PC-9- 192.168.128.1
PC-10- 192.168.128.2
PC-11- 192.168.128.3
PC-12- 192.168.128.4

PC-1 - 192.168.0.1/18
PC-2 - 192.168.0.2/18
PC-3- 192.168.0.3/18
PC-4 - 192.168.0.4/18

PC-5- 192.168.64.1
PC-6- 192.168.64.2
PC-7 - 192.168.64.3
PC-8 - 192.168.64.4

~~F0/0~~ ~~F0/0.1~~

F0/0.10 - 192.168.63.254
F0/0.20 - 192.168.127.254
F0/0.30 - 192.168.191.254
F0/0.40 - 192.168.255.254


f0/0.10 - 192.168.63.255
f0/0.20 - 192.168.127.254
f0/0.30 - 192.168.191.254
f0/0.40 - 192.168.255.254
Router0
Switch0
PC-A-1
PC-2-A
PC-3-A
PC-4-A
192.168.0.0/18
VLAN 10
Engineering
PC-16-D
PC-15-D
PC-14-D
PC-13-D
192.168.192.0/18
VLAN 40
Management
PC-5-B
PC-6-B
PC-7-B
PC-8-B
192.168.64.0/18
VLAN 20
HR
PC-9-C
PC-10-C
PC-11-C
PC-12-C
192.168.128.0/18
VLAN 30
Sales


cisco

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FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::210:11FF:FEA5:568D
   IPv6 Address.....: ::
   IPv4 Address.....: 192.168.0.2
   Subnet Mask.....: 255.255.192.0
   Default Gateway.....: ::
                                 192.168.63.254

Bluetooth Connection:

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: ::
   IPv6 Address.....: ::
   IPv4 Address.....: 0.0.0.0
   Subnet Mask.....: 0.0.0.0
   Default Gateway.....: ::
                                 0.0.0.0

C:\>ping 192.168.64.1

Pinging 192.168.64.1 with 32 bytes of data:

Reply from 192.168.63.254: Destination host unreachable.
Reply from 192.168.63.254: Destination host unreachable.
Reply from 192.168.63.254: Destination host unreachable.
Reply from 192.168.63.254: Destination host unreachable.

Ping statistics for 192.168.64.1:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
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FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: FE80::210:11FF:FE6D:82D7
   IPv6 Address.....: ::
   IPv4 Address.....: 192.168.192.4
   Subnet Mask.....: 255.255.192.0
   Default Gateway.....: ::
                                 192.168.255.254

Bluetooth Connection:

   Connection-specific DNS Suffix..:
   Link-local IPv6 Address.....: ::
   IPv6 Address.....: ::
   IPv4 Address.....: 0.0.0.0
   Subnet Mask.....: 0.0.0.0
   Default Gateway.....: ::
                                 0.0.0.0

C:\>ping 192.168.0.1

Pinging 192.168.0.1 with 32 bytes of data:

Reply from 192.168.0.1: bytes=32 time<1ms TTL=127
Reply from 192.168.0.1: bytes=32 time=2ms TTL=127
Reply from 192.168.0.1: bytes=32 time<1ms TTL=127
Reply from 192.168.0.1: bytes=32 time=1ms TTL=127

Ping statistics for 192.168.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 2ms, Average = 0ms
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