

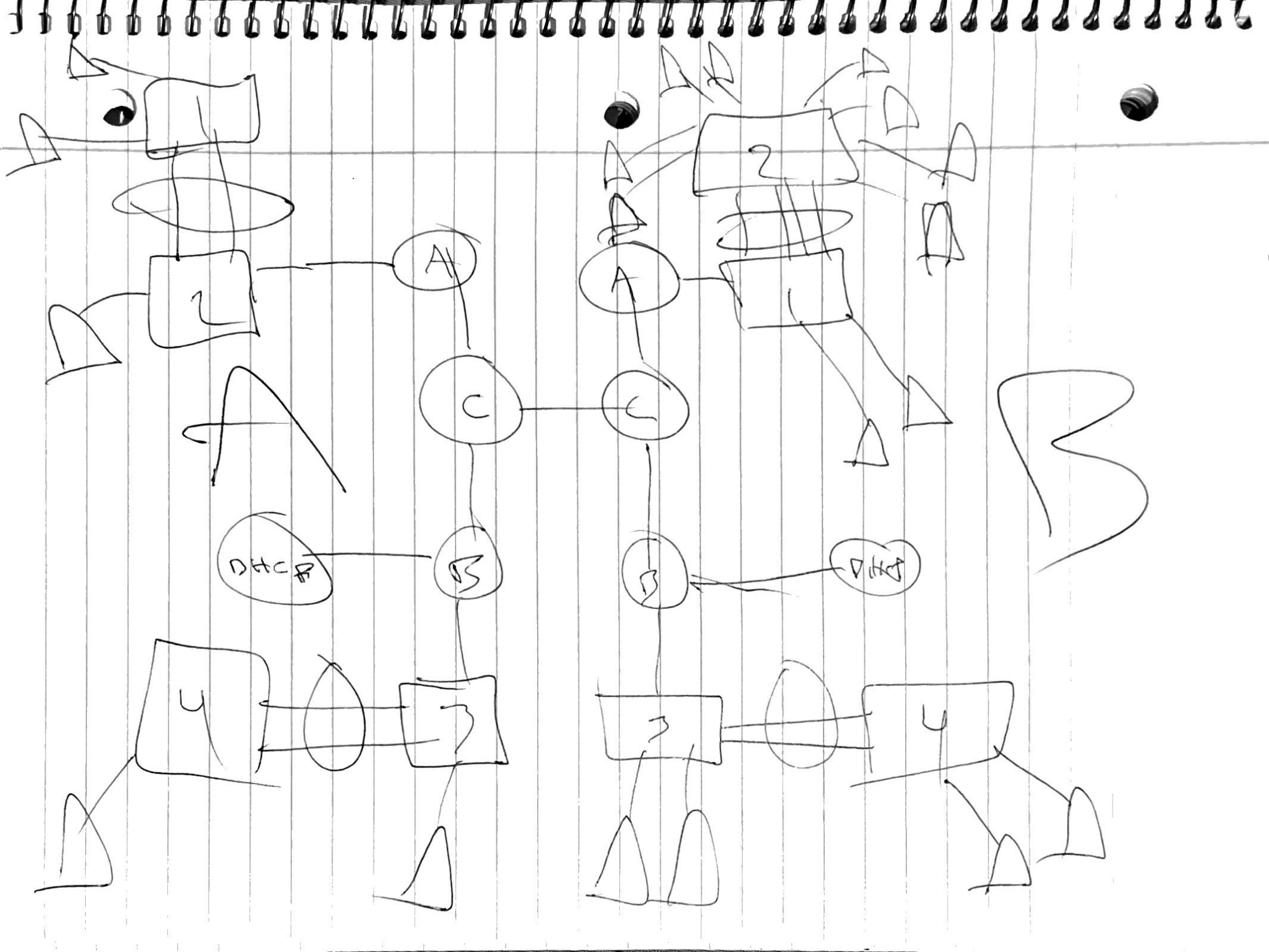
# Building A to Building B with an OSPF connection

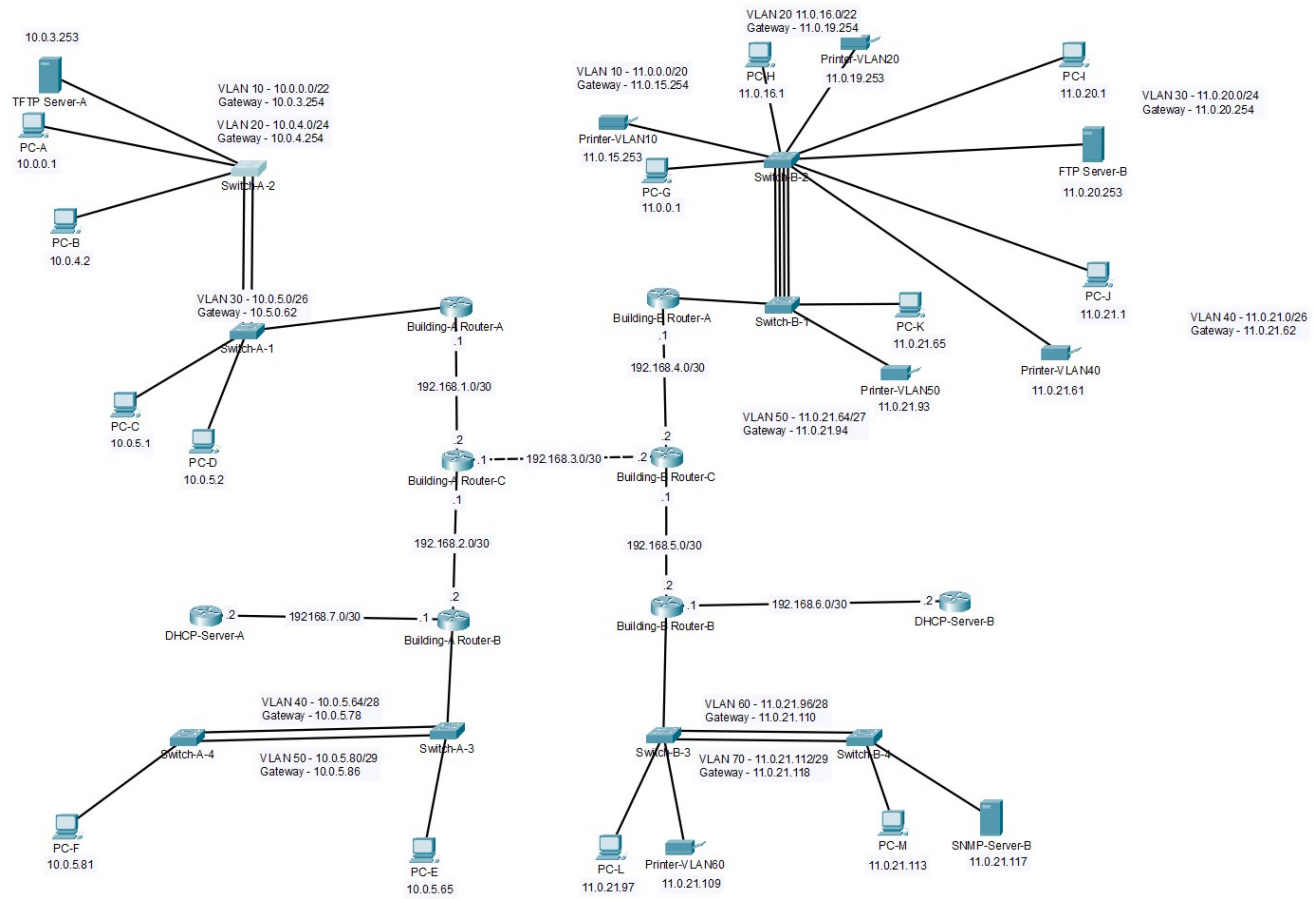
**Objective:** My objective in this Virtual lab was to simulate how it would be to connect 2 different buildings using OSPF, labeled Building A and Building B. Each building has its own pair of VLANs that contain things such as Servers and Printers. I included a DHCP Server in each network to accurately depict workflow. I excluded the last 2 addresses of most VLANs to have a static IP for Servers, Printers, and Gateways. As for the switches, I used protocol PAgP to ensure redundant links and to improve the speed of traffic. I also used ROAS with trunk links to ensure the proper tagging of traffic and Inter-VLAN routing. Lastly, I implemented ACLs to block all traffic from Building-A to every printer in Building-B, only devices within Building-B can have access to the printers.

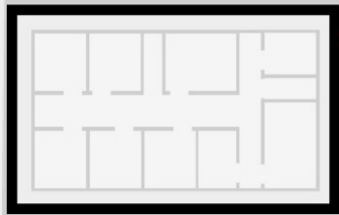
**Equipment:** (8) 2911 Routers, (8) 2960 Switches, (13) PC's, (5) Servers, and Packet Tracer

## Key Steps:

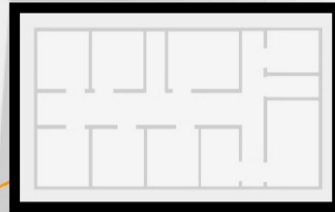
- a. Divide the network in Building A 10.0.0.0/8 using VLSM to hold 1024, 256, 64, 16, and 8 hosts
- b. Assign a VLAN to each subnet
- c. Configure PAgP on each switch with trunk links (assign the native VLAN to 90)
- d. Ensure to configure sub-interfaces on the routers for each VLAN
- e. Setup OSPF on each router so that it has full communication with the whole building
- f. Create a DHCP Server to assign IP addresses for each VLAN, exclude the last 2 addresses to have static IP addresses for the Gateway and any Servers or Printers
- g. Divide the network in Building-B 11.0.0.0/8 using VLSM to hold 4096, 1024, 256, 64, 32, 16, and 8 hosts
- h. Assign a VLAN to each subnet
- i. Configure PAgP on each switch with trunk links (assign the native VLAN to 90)
- j. Ensure to configure sub-interfaces on the routers for each VLAN
- k. Setup OSPF on each router so that it has full communication with the whole building
- l. Create a DHCP Server to assign IP addresses for each VLAN, exclude the last 2 addresses to have static IP addresses for the Gateway and any Servers or Printers
- m. Apply an ACL rule in-bound to Building-B's Router-C to block traffic towards the printers from Building-A's devices



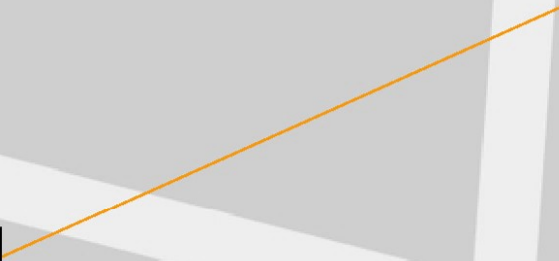




Corporate Office Building-A



Corporate Office Building-B



## Building A to Building B with OSPF (interfaces)

Building A- Router C	G0/0	Building A- Router-C	G0/0
Building A- Router C	G0/1	Building A – Router-A	G0/1
Building A- Router C	G0/2	Building A – Router-B	G0/1
Building A – Router A	G0/1	Building A – Router-C	G0/1
Building A – Router A	G0/2	Building A – Switch-1	F0/1
Building A – Router B	G0/1	Building A – Router-C	G0/2
Building A – Router B	G0/2	Building A – Switch-3	F0/1
DHCP Server-A	G0/0	Building A – Router-B	G0/0
Building A – Switch-1	F0/1	Building A – Router-A	G0/2
Port-Channel 1	F0/2-3	Building A – Switch-2	F0/1-2
Building A – Switch-1	F0/4	PC-C	DHCP
Building A – Switch-1	F0/5	PC-D	DHCP
Building A – Switch-1	F0/4-24	VLAN 30 Gateway	10.0.5.62
Port-Channel 1	F0/1-2	Building A – Switch-1	F0/2-3
Building A – Switch-2	F0/3	PC-A	DHCP
Building A – Switch-2	F0/13	PC-B	DHCP
Building A – Switch-2	F0/4	TFTP Server	10.0.3.253
Building A – Switch-2	F0/3-12	VLAN 10 Gateway	10.0.3.254
Building A – Switch-2	F0/13-24	VLAN 20	10.0.4.254
Building A – Switch-3	F0/1	Building A – Router-C	G0/2
Port-Channel 1	F0/2-3	Building A – Switch-4	F0/1-2
Building A – Switch-3	F0/4	PC-E	DHCP
Building A – Switch-3	F0/4-12	VLAN 40 Gateway	10.0.5.78
Building A – Switch-3	F0/13-24	VLAN 50	10.0.5.86
Building A – Switch-4	F0/1-2	Building A – Switch 3	F0/2-3
Building A – Switch-4	F0/13	PC-F	DHCP
Building A – Switch-4	F0/3-12	VLAN 50 Gateway	10.0.5.86
Building A – Switch-4	F0/13-24	VLAN 40 Gateway	10.0.5.78

Building-B Router-C	G0/0	Building A -Router-A	G0/0
Building-B Router-C	G0/1	Building-B Router-A	G0/1
Building-B Router-C	G0/2	Building-B Router-B	G0/1
Building B – Router A	G0/2	Building-B Switch-1	F0/1
Building B – Router A	G0/1	Building-B Router-C	G0/1
Building B – Router B	G0/1	Building-B Router-C	G0/2
Building B – Router B	G0/2	Building-B Switch-3	F0/1
DHCP-Server-B	G0/0	Building-B Router-B	G0/0
Building B – Switch-1	F0/1	Building -B Router-C	G0/2
Port-Channel 1	F0/2-5	Building-B Switch-2	F0/1-4
Building B – Switch-1	F0/6	PC-K	DHCP
Building B – Switch-1	F0/7	Printer-50	11.0.21.93
Building B – Switch-1	F0/6-24	VLAN 50 Gateway	11.0.21.94
Port-Channel 1	F0/1-4	Building-B Switch-1	F0/2-5
Building B – Switch-2	F0/5	PC-G	DHCP
Building B – Switch-2	F0/6	Printer-10	11.0.15.253
Building B – Switch-2	F0/10	PC-H	DHCP
Building B – Switch-2	F0/11	Printer-20	11.0.19.253
Building B – Switch-2	F0/15	PC-I	DHCP
Building B – Switch-2	F0/16	FTP-Server	11.0.20.253
Building B – Switch-2	F0/20	PC-J	DHCP
Building B – Switch-2	F0/22	Printer-40	11.0.21.61
Building B – Switch-2	F0/5-9	VLAN 10 Gateway	11.0.15.254
Building B – Switch-2	F0/10-14	VLAN 20 Gateway	11.0.19.254
Building B – Switch-2	F0/15-19	VLAN 30 Gateway	11.0.20.254
Building B – Switch-2	F0/20-24	VLAN 40 Gateway	11.0.21.61
Building B – Switch-3	F0/1	Building-B Router-B	G0/2
Port-Channel 1	F0/2-3	Building-B Switch-4	F0/1-2
Building B – Switch-3	F0/4	PC-L	DHCP
Building B – Switch-3	F0/5	Printer-60	11.0.21.109
Building B – Switch-3	F0/4-12	VLAN 60 Gateway	11.0.21.110
Building B – Switch-3	F0/13-24	VLAN 70 Gateway	11.0.21.118
Port-Channel 1	F0/1-2	Building-B Switch-3	F0/2-3
Building B – Switch-4	F0/3	PC-M	DHCP
Building B – Switch-4	F0/4	SNMP-Server	11.0.21.117
Building B – Switch-4	F0/3-12	VLAN 70 Gateway	11.0.21.118
Building B – Switch-4	F0/13-24	VLAN 60 Gateway	11.0.21.110

## Building A to Building B with OSPF (IP Addresses)

Building-A Router-A	G0/1	192.168.1.1/30
Building-A Router-A	G0/2.10	10.0.3.254/22
Building-A Router-A	G0/2.20	10.0.4.254/24
Building-A Router-A	G0/2.30	10.0.5.62/26
Building-A Router-B	G0/0	192.168.7.1/30
Building-A Router-B	G0/1	192.168.2.2/30
Building-A Router-B	G0/2.40	10.0.5.78/28
Building-A Router-B	G0/2.50	10.0.5.85/29
Building-A Router-C	G0/0	192.168.3.1/30
Building-A Router-C	G0/1	192.168.1.2/30
Building-A Router-C	G0/2	192.168.2.1/30
Building-B Router-C	G0/0	192.168.3.2/30
Building-B Router-C	G0/1	192.168.4.2/30
Building-B Router-C	G0/2	192.168.5.1/30
Building-B Router-A	G0/1	192.168.4.1/30
Building-B Router-A	G0/2.10	11.0.15.254/20
Building-B Router-A	G0/2.20	11.0.19.254/22
Building-B Router-A	G0/2.30	11.0.20.254/24
Building-B Router-A	G0/2.40	11.0.21.62/26
Building-B Router-A	G0/2.50	11.0.21.94/27
Building-B Router-B	G0/0	192.168.6.1/30
Building-B Router-B	G0/1	192.168.5.2/30
Building-B Router-B	G0.2.60	11.0.21.110/28
Building-B Router-B	G0/2.70	11.0.21.118/29
DHCP-Server-A	G0/0	192.168.7.2/30
DHCP-Server-B	G0/0	192.168.6.2/30

PC-A

Physical Config Desktop Programming Attributes

Command Prompt

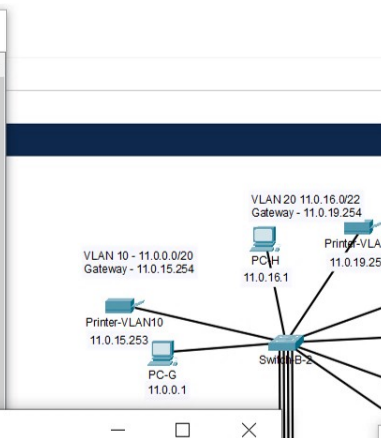
```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 11.0.15.253

Pinging 11.0.15.253 with 32 bytes of data:

Reply from 192.168.3.2: Destination host unreachable.
Reply from 192.168.3.2: Destination host unreachable.
Reply from 192.168.3.2: Destination host unreachable.
Reply from 192.168.3.2: Destination host unreachable.

Ping statistics for 11.0.15.253:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```



Switch-B-2

```
SwitchB-2#sh int tr
Port      Mode          Encapsulation  Status      Native vlan
Po1       on            802.1q         trunking    90

Port      Vlans allowed on trunk
Po1       10,20,30,40

Port      Vlans allowed and active in management domain
Po1       10,20,30,40

Port      Vlans in spanning tree forwarding state and not pruned
Po1       10,20,30,40

SwitchB-2#
```

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PC-E

```
Pinging 11.0.0.1 with 32 bytes of data:

Reply from 11.0.0.1: bytes=32 time=1ms TTL=124
Reply from 11.0.0.1: bytes=32 time=23ms TTL=124
Reply from 11.0.0.1: bytes=32 time=11ms TTL=124
Reply from 11.0.0.1: bytes=32 time=11ms TTL=124

Ping statistics for 11.0.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 1ms, Maximum = 23ms, Average = 11ms

C:\>
```

PC-F

```
Command Prompt

C:\>ipconfig /all

FastEthernet0 Connection:(default port)

Connection-specific DNS Suffix...: 
Physical Address...: 0060.470D.74DC
Link-local IPv6 Address...: FE80::260:47FF:FE0D:74DC
IPv6 Address...: ::
IPv4 Address...: 10.0.5.81
Subnet Mask...: 255.255.255.248
Default Gateway...: ::

DHCP Servers...: 192.168.7.2
DHCPv6 IAID...: 
DHCPv6 Client DUID...: 
00-01-00-01-0C-0D-71-00-00-60-47-0D-74-DC
DNS Servers...: ::
0.0.0.0
```

Building-A Router-C

Physical Config CLI Attributes

IOS Command Line Interface

```
10.0.0.0/8 is variably subnetted, 5 subnets, 5 masks
O   10.0.0.0/22 [110/2] via 192.168.1.1, 00:52:44, GigabitEthernet0/1
O   10.0.4.0/24 [110/2] via 192.168.1.1, 00:52:44, GigabitEthernet0/1
O   10.0.5.0/26 [110/2] via 192.168.1.1, 00:52:44, GigabitEthernet0/1
O   10.0.5.64/28 [110/2] via 192.168.2.2, 00:52:44, GigabitEthernet0/2
O   10.0.5.80/29 [110/2] via 192.168.2.2, 00:52:44, GigabitEthernet0/2
11.0.0.0/8 is variably subnetted, 7 subnets, 7 masks
O   11.0.0.0/20 [110/3] via 192.168.3.2, 00:52:44, GigabitEthernet0/0
O   11.0.16.0/22 [110/3] via 192.168.3.2, 00:52:44, GigabitEthernet0/0
O   11.0.20.0/24 [110/3] via 192.168.3.2, 00:52:44, GigabitEthernet0/0
O   11.0.21.0/26 [110/3] via 192.168.3.2, 00:52:44, GigabitEthernet0/0
O   11.0.21.64/27 [110/3] via 192.168.3.2, 00:52:44, GigabitEthernet0/0
O   11.0.21.96/28 [110/3] via 192.168.3.2, 00:52:44, GigabitEthernet0/0
O   11.0.21.112/29 [110/3] via 192.168.3.2, 00:52:44, GigabitEthernet0/0
C   192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
L   192.168.1.0/30 is directly connected, GigabitEthernet0/1
L   192.168.1.2/32 is directly connected, GigabitEthernet0/1
C   192.168.2.0/24 is variably subnetted, 2 subnets, 2 masks
L   192.168.2.0/30 is directly connected, GigabitEthernet0/2
L   192.168.2.1/32 is directly connected, GigabitEthernet0/2
C   192.168.3.0/24 is variably subnetted, 2 subnets, 2 masks
L   192.168.3.0/30 is directly connected, GigabitEthernet0/0
L   192.168.3.1/32 is directly connected, GigabitEthernet0/0
O   192.168.4.0/30 is subnetted, 1 subnets
O   192.168.4.0/30 [110/2] via 192.168.3.2, 00:52:44, GigabitEthernet0/0
O   192.168.5.0/30 is subnetted, 1 subnets
O   192.168.5.0/30 [110/2] via 192.168.3.2, 00:52:44, GigabitEthernet0/0
O   192.168.6.0/30 is subnetted, 1 subnets
O   192.168.6.0/30 [110/3] via 192.168.3.2, 00:52:44, GigabitEthernet0/0
O   192.168.7.0/30 is subnetted, 1 subnets
O   192.168.7.0/30 [110/2] via 192.168.2.2, 00:52:44, GigabitEthernet0/2
```

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Time: 00:55:38

Scenario 0

New Delete

Toggle PDU List Window

2811 IOS15