

Test Subnet Boundaries in Packet Tracer

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Experiment 1

1. Add a PT-Router, a PT-Switch, and two PCs.
2. Configure Router0's FastEthernet0/0 interface:
 - IP Address: 192.168.2.1
 - Subnet Mask: 255.255.255.0
 - Port Status: On

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#do show ip interf brie
Interface IP-Address OK? Method Status Protocol
FastEthernet0/0 unassigned YES unset administratively down down
FastEthernet1/0 unassigned YES unset administratively down down
Serial2/0 unassigned YES unset administratively down down
Serial3/0 unassigned YES unset administratively down down
FastEthernet4/0 unassigned YES unset administratively down down
FastEthernet5/0 unassigned YES unset administratively down down
Router(config)#interface fa0/0
Router(config-if)#ip address 192.168.2.1 255.255.255.0
Router(config-if)#no shutdown

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
```

3. Configure PC0's FastEthernet0 interface:
 - IP Address: 192.168.2.100
 - Subnet Mask: 255.255.255.0
 - Default Gateway: 192.168.2.1

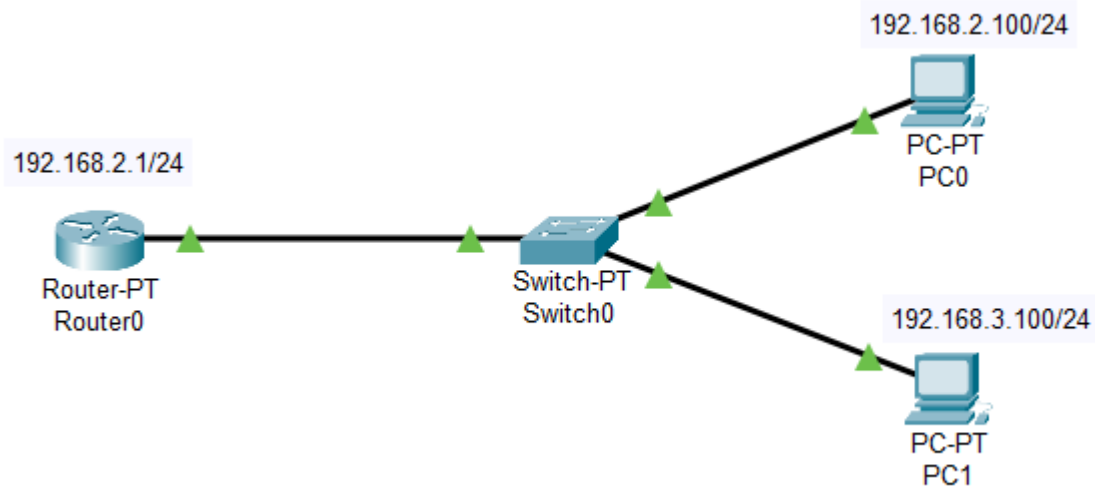
1. Click on PC0
2. Go to Desktop tab
3. Click on IP Configuration
4. In the IPv4 field enter "192.168.2.100"
5. In the subnet mask field enter "255.255.255.0"
6. In the Gateway field enter "192.168.2.1"

4. Configure PC1's FastEthernet0 interface:
 - IP Address: 192.168.3.100
 - Subnet Mask: 255.255.255.0

- Default Gateway: 192.168.2.1

1. Click on PC1
2. Go to Desktop tab
3. Click on IP Configuration
4. In the IPv4 field enter "192.168.3.100"
5. In the subnet mask field enter "255.255.255.0"
6. In the Gateway field enter "192.168.2.1"

5. Connect the PCs to the switch using Copper Straight-Through cable.
6. Connect the switch to the router using Copper Straight-Through cable.
7. Wait for all connections to show green triangles on both ends.



8. Ping the following connections to determine whether they work:
 - From PC0, ping the router. What command did you use? Did it work? Why or why not?

1. Click on PC0
2. Go to Desktop tab
3. Click on Command Prompt
4. Enter "ping 192.168.2.1"

It worked successfully because PC0 and Router0 are in the same subnet.

- From PC0, ping PC1. What command did you use? Did it work? Why or why not?

1. Click on PC0
2. Go to Desktop tab
3. Click on Command Prompt
4. Enter "ping 192.168.3.100"

It failed because PC0 and PC1 are in different subnets.

- From Router0, ping PC0. What command did you use? Did it work? Why or why not?

```
Router>ping 192.168.2.100
```

```
Type escape sequence to abort.
```

```
Sending 5, 100-byte ICMP Echos to 192.168.2.100, timeout is 2 seconds:  
!!!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 0/0/0 ms
```

It worked successfully because PC0 and Router0 are in the same subnet.

- From Router0, ping PC1. What command did you use? Did it work? Why or why not?

```
Router>ping 192.168.3.100
```

```
Sending 5, 100-byte ICMP Echos to 192.168.3.100, timeout is 2 seconds:  
.....
```

```
Success rate is 0 percent (0/5)
```

It failed because PC0 and PC1 are in different subnets.

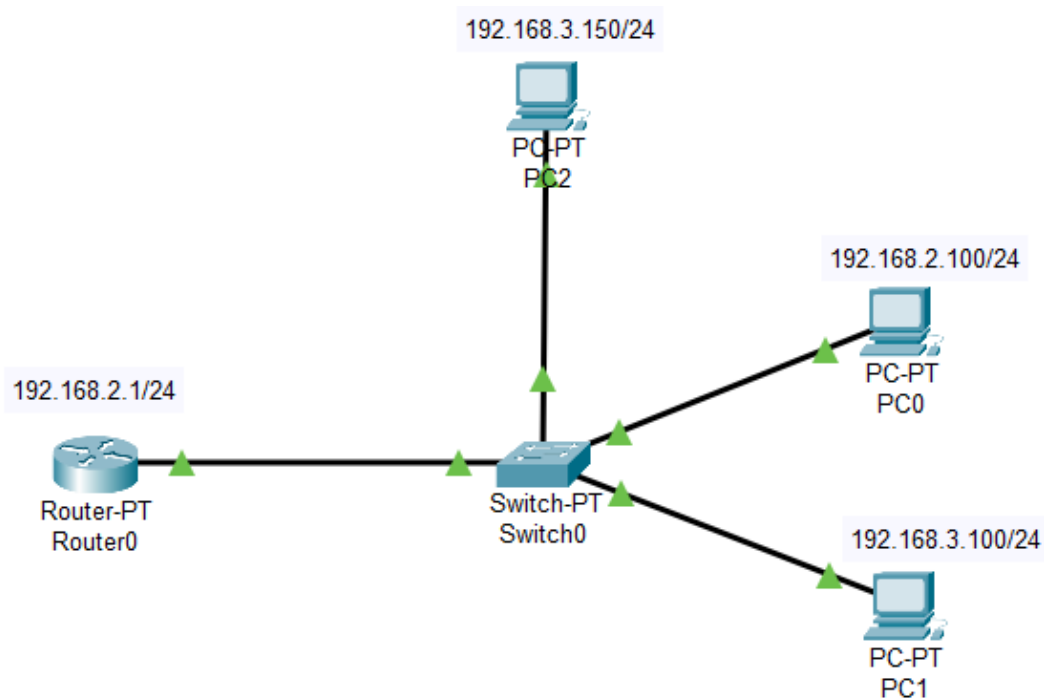
As you can see, only devices within the router's own subnet can communicate with the router. However, can devices on a different subnet from the router but connected to the same switch communicate with each other?

Experiment 2

1. Add a new PC to the workspace
2. Configure PC2's FastEthernet0 interface:
 - a. IP Address: 192.168.3.150
 - b. Subnet Mask: 255.255.255.0
 - c. Default Gateway: 192.168.2.1

1. Click on PC1
2. Go to Desktop tab
3. Click on IP Configuration
4. In the IPv4 field enter "192.168.3.150"
5. In the subnet mask field enter "255.255.255.0"
6. In the Gateway field enter "192.168.2.1"

3. Use a Copper Straight-Through cable to connect PC2 to the switch.
4. Wait for the connection to show green triangles on both ends.



5. Ping the following connections to determine whether they work:

- a. From PC2, ping PC0. What command did you use? Did it work? Why or why not?

1. Click on PC2
2. Go to Desktop tab
3. Click on Command Prompt
4. Enter "ping 192.168.2.100"

It failed because PC2 and PC1 are in different subnets.

- b. From PC2, ping PC1. What command did you use? Did it work? Why or why not?

1. Click on PC2
2. Go to Desktop tab
3. Click on Command Prompt
4. Enter "ping 192.168.3.100"

It worked successfully because PC2 and PC1 are in the same subnets.

- c. From PC2, ping the router. What command did you use? Did it work? Why or why not?

1. Click on PC2
2. Go to Desktop tab
3. Click on Command Prompt
4. Enter "ping 192.168.2.1"

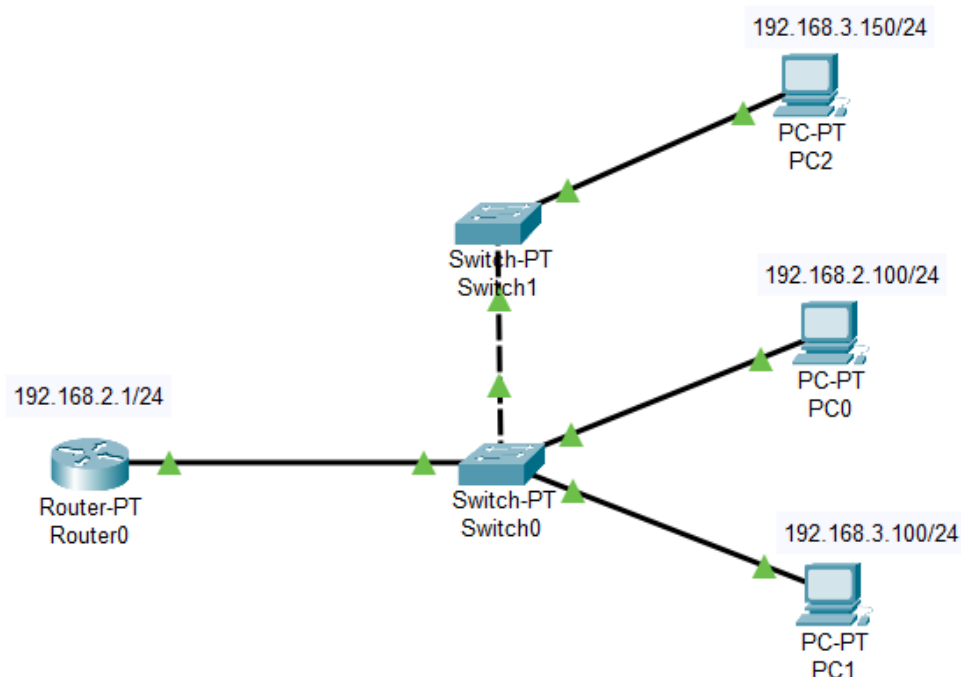
It failed because PC2 and Router0 are in different subnets.

All devices on a router's interface must be configured to use the same subnet as the router in order to reach that router and send messages outside the LAN.

What happens when you daisy-chain multiple switches on a single router interface?

Experiment 3

1. Delete the connection between PC2 and Switch0.
2. Add a new PT-Switch to the workspace.
3. Use a Copper Cross-Over cable to connect the two switches.
4. Use a Copper Straight-Through cable to connect PC2 to Switch1.
5. Wait for the connections to show green triangles on both ends.



6. Ping the following connections to determine whether they work:
 - a. From PC0, ping PC2. What command did you use? Did it work? Why or why not?

1. Click on PC0
2. Go to Desktop tab
3. Click on Command Prompt
4. Enter "ping 192.168.3.150"

It failed because PC2 and PC0 are in different subnets.

b. From PC1, ping PC2. What command did you use? Did it work? Why or why not?

1. Click on PC1
2. Go to Desktop tab
3. Click on Command Prompt
4. Enter "ping 192.168.3.150"

It worked successfully because PC2 and PC1 are in the same subnet.

Even with multiple switches, the same limitations apply: Only devices within the same subnet can communicate with each other.

What happens if you move one switch to a different router interface? Will devices on the same subnet across both switches continue to be able to communicate with each other?

Experiment 4

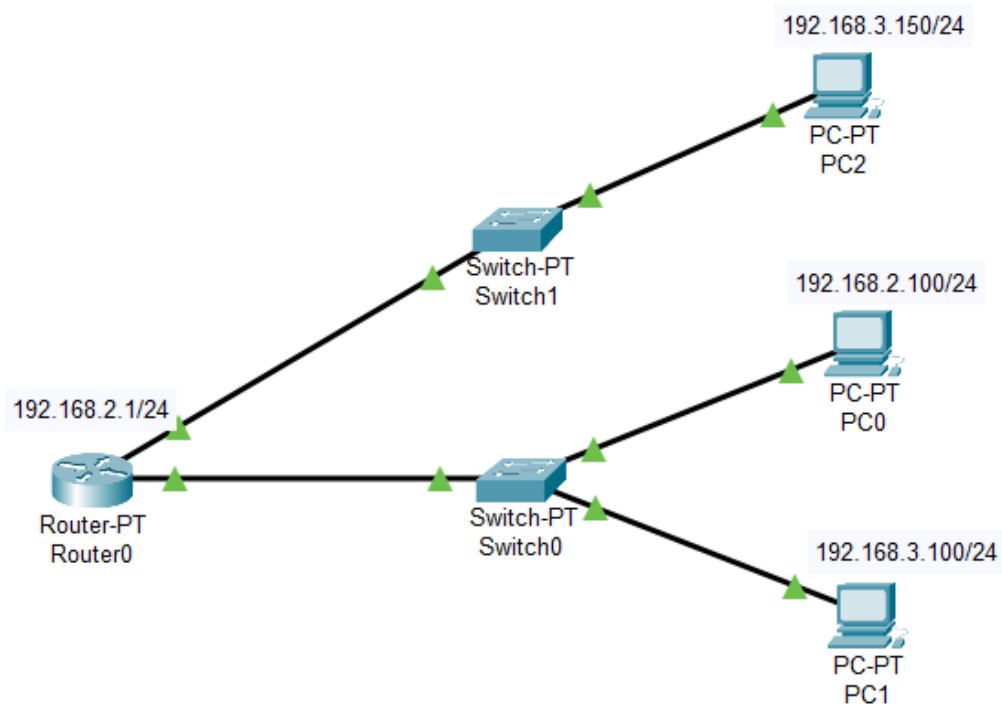
1. Delete the connection between the two switches.
2. Configure Router0's FastEthernet1/0 interface:
 - a. IP Address: 192.168.3.1
 - b. Subnet Mask: 255.255.255.0
 - c. Port Status: On

```
Router>en
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#do show ip inter brie
```

Interface	IP-Address	OK?	Method	Status	Protocol
FastEthernet0/0	192.168.2.1	YES	manual	up	up
FastEthernet1/0	unassigned	YES	unset	administratively down	down
Serial2/0	unassigned	YES	unset	administratively down	down
Serial3/0	unassigned	YES	unset	administratively down	down
FastEthernet4/0	unassigned	YES	unset	administratively down	down
FastEthernet5/0	unassigned	YES	unset	administratively down	down

```
Router(config)#interface fa1/0
Router(config-if)#ip add 192.168.3.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/0, changed state to up
Router(config-if)#
%SYS-5-CONFIG_I: Configured from console by console
```

3. Use a Copper Straight-Through cable to connect Switch1 to the router's FastEthernet1/0 interface.
4. Wait for the connections to show green triangles on both ends.



5. On the router's CLI tab, enter the exit command twice and then enter the command show ip route.
- Which two networks is the router aware of?

```
Router#show ip route
```

```
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
```

```
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
```

```
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
```

```
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
```

```
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
```

```
* - candidate default, U - per-user static route, o - ODR
```

```
P - periodic downloaded static route
```

```
Gateway of last resort is not set
```

```
C    192.168.2.0/24 is directly connected, FastEthernet0/0
```

```
C    192.168.3.0/24 is directly connected, FastEthernet1/0
```

6. Ping the following connections to determine whether they work:
- From PC2, ping the router's FastEthernet1/0 interface. What command did you use? Did it work? Why or why not?

1. Click on PC2
2. Go to Desktop tab
3. Click on Command Prompt
4. Enter "ping 192.168.3.1"

It worked successfully because PC2 and PC0 are in the same subnets.

- From PC2, ping PC0. What command did you use? Did it work? Why or why not?

1. Click on PC2
2. Go to Desktop tab
3. Click on Command Prompt
4. Enter "ping 192.168.2.100"

Failed

- From PC2, ping PC1. What command did you use? Did it work? Why or why not?

1. Click on PC2
2. Go to Desktop tab
3. Click on Command Prompt
4. Enter "ping 192.168.3.100"

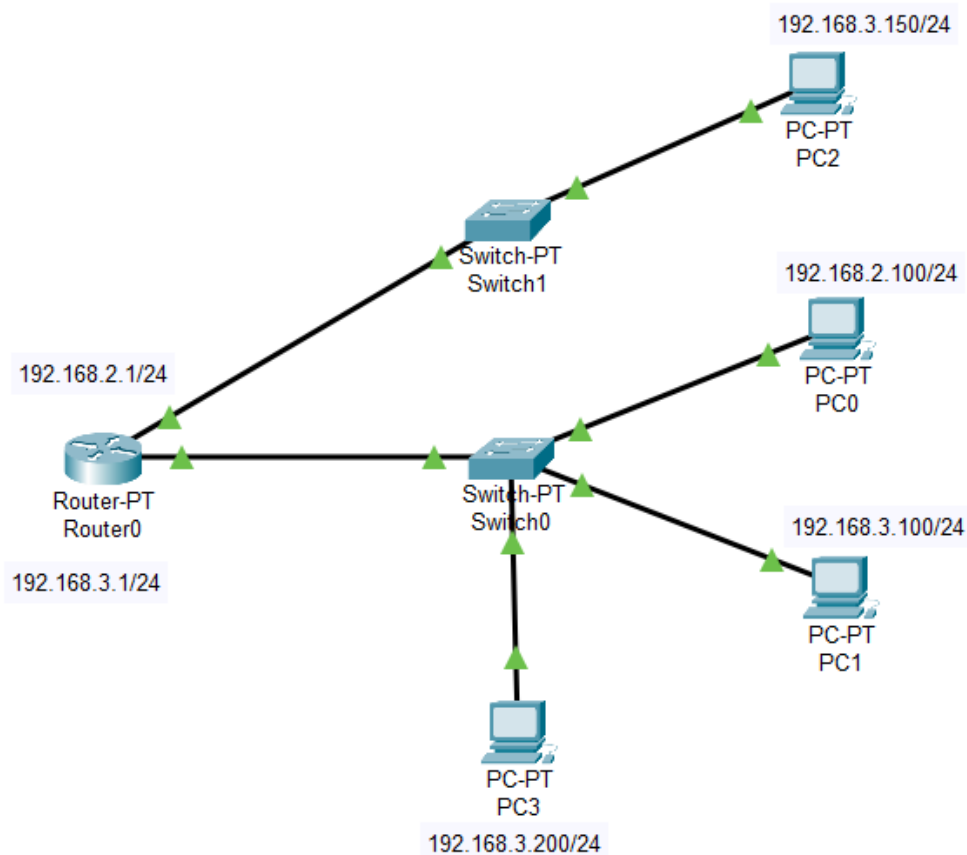
Failed

The router can only "see" one subnet per router interface. PC1 is hidden in an unreachable subnet on the other side of Router0's FastEthernet0/0 interface.

Experiment 5

1. Add a new PC to the workspace.
2. Configure PC3's FastEthernet0 interface:

- a. IP Address: 192.168.3.200
 - b. Subnet Mask: 255.255.255.0
 - c. Default Gateway: 192.168.2.1
3. Use a Copper Straight-Through cable to connect PC3 to Switch0.
4. Wait for the connection to show green triangles on both ends before continuing with the next step.



5. In the lower right corner, click Simulation.
6. From PC1, ping PC3. In the Simulation Panel, click the Play (Alt + P) button. After the first message passes through the switch, click the Play (Alt + P) button again to pause the simulation. What did the switch do with the ping request? Continue the ping simulation to see that PC3 is able to respond to the ping because subnets alone do not limit broadcast domains.