Week 9

Activity 1

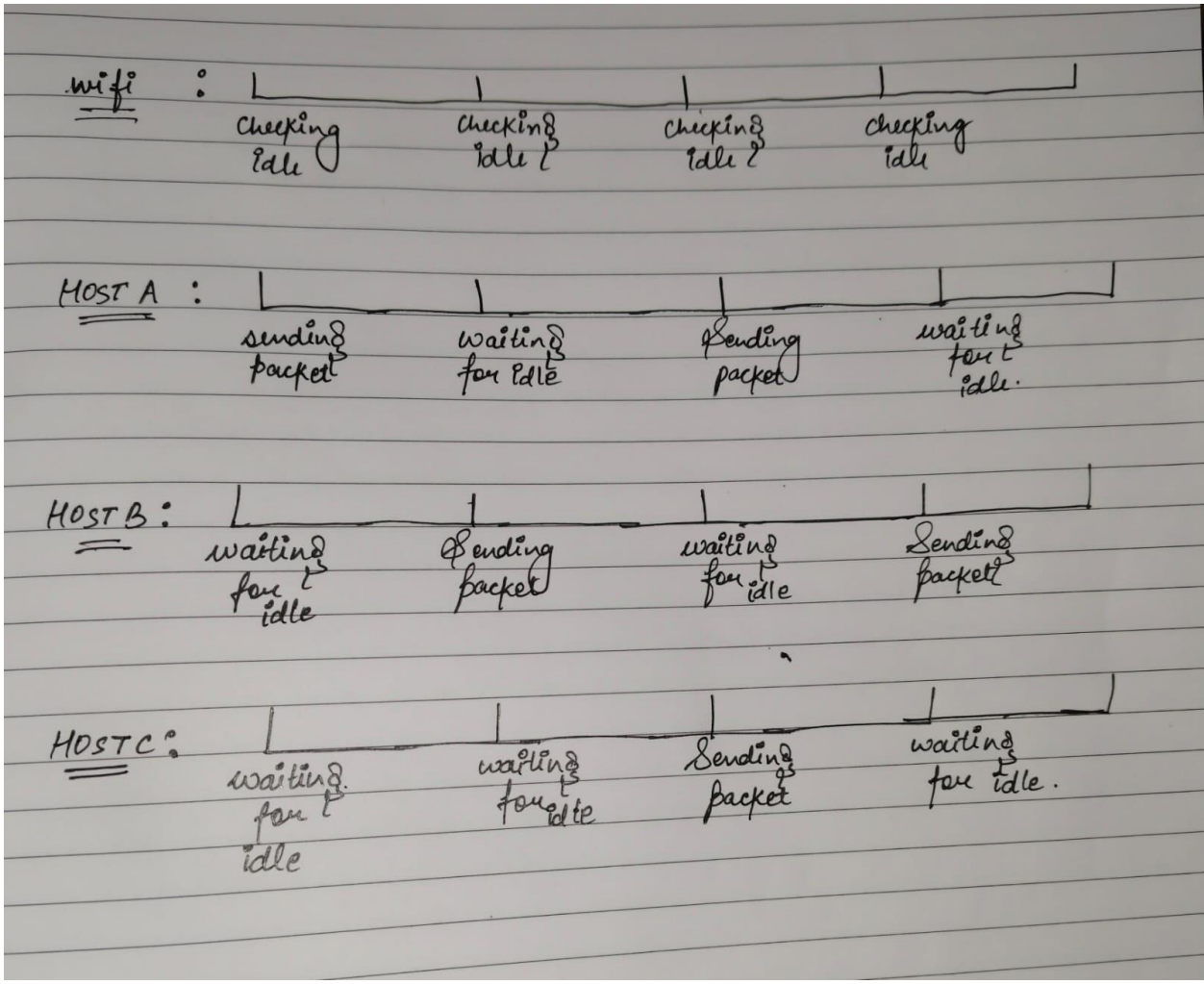
Group Members:

- **Archit**
- **Pranika**
- **Nadia**
- **Jasveena**
- **Gitanshi**

Role-Play Activity: Investigating MAC Protocol

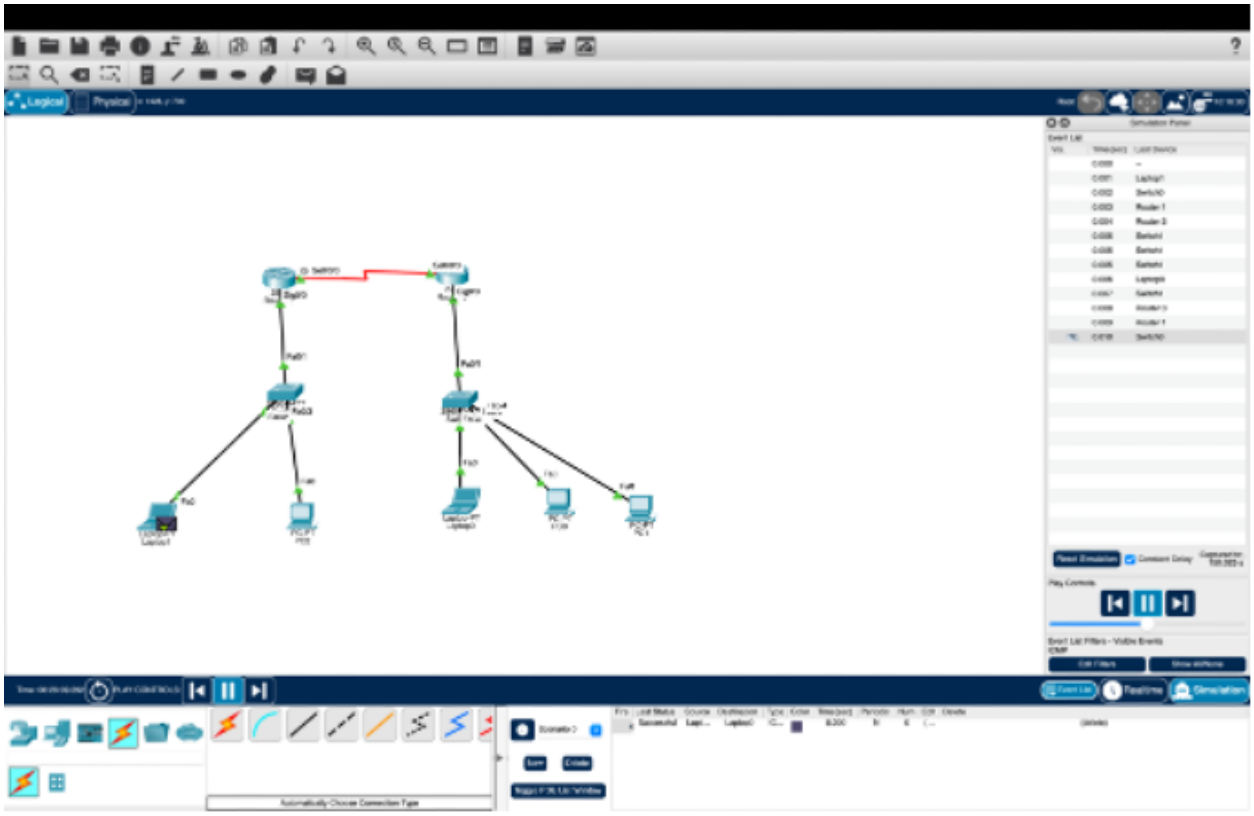
1. **Scenario**:
    - **Archit**: Acts as the **Wi-Fi AP**.
    - **Pranika, Nadia, Jasveena, Gitanshi**: Each acts as **Host A, B, C** respectively.
2. **Protocol Design**:
    - **Archit (Wi-Fi AP)** checks whether the link is idle before any host can send a packet.
    - **Hosts A, B, C** will announce their intention to send a packet by saying, “I’m sending a packet!”
    - If more than one host attempts to send a packet simultaneously, a collision occurs. Both must back off and retry after a random delay.
3. **Collision Handling**:
    - If **Pranika (Host A)** and **Nadia (Host B)** attempt to send simultaneously, both will back off, wait for a random time, and retry.
4. **Timing Diagram**:
    - **Archit (Wi-Fi AP)** continually checks the idle state.
    - **Host A** attempts to send; if no collision, the packet is sent successfully.
    - **Host B** waits for the idle state, then attempts to send.

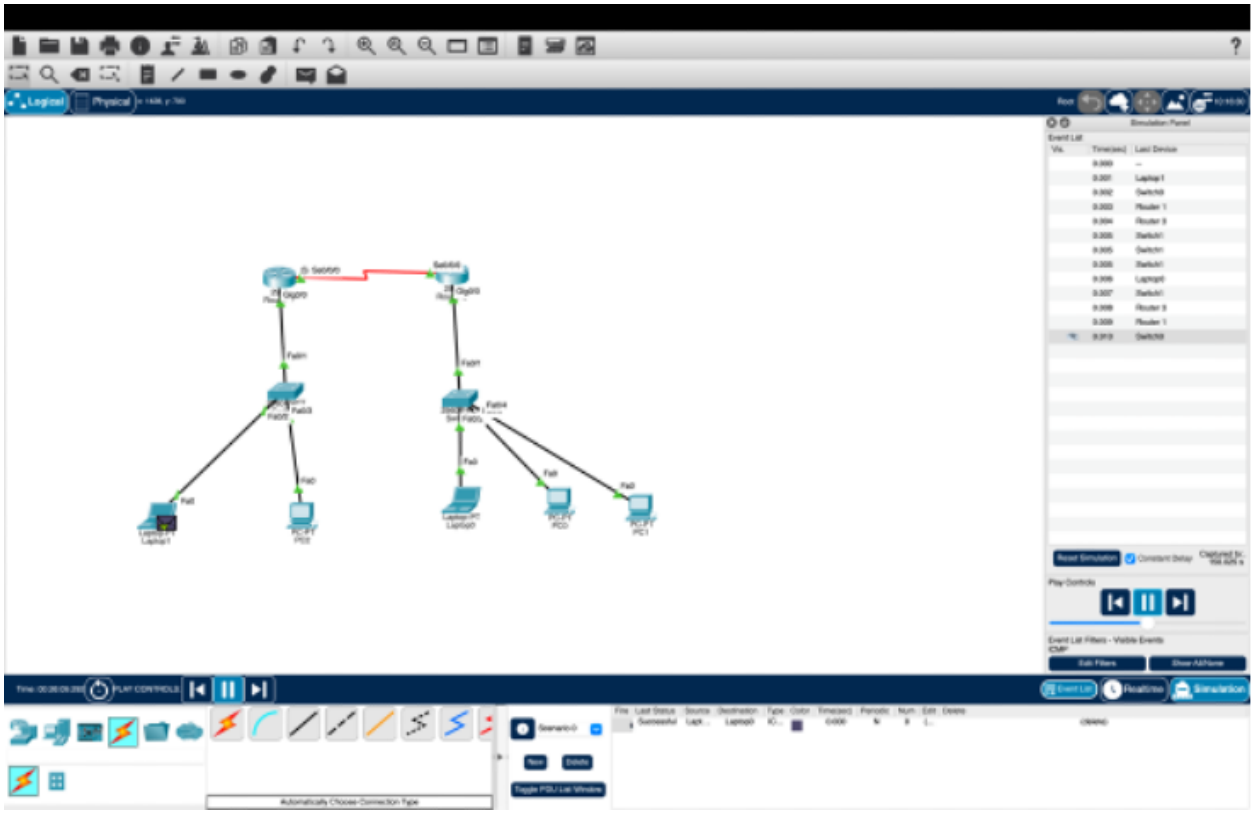
- **Host C** checks and waits if the link is busy.

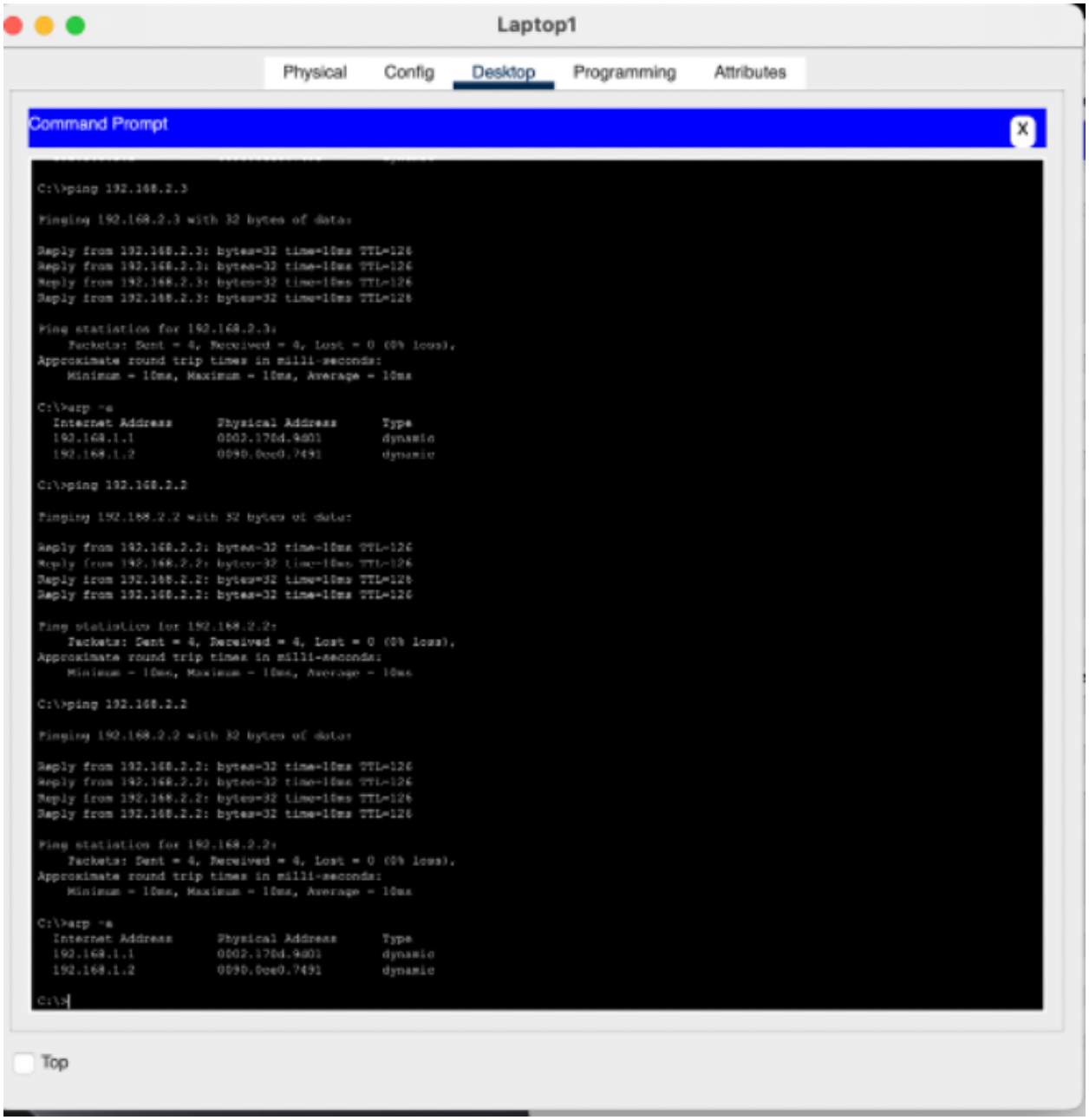


5. **Discussion**:
   - The **Medium Access Control (MAC) protocol** commonly used in Wi-Fi is **CSMA/CA (Carrier Sense Multiple Access with Collision Avoidance)**.
   - This protocol minimizes collisions by checking the channel's state and avoiding simultaneous transmissions.

Activity 2






Laptop1
Physical
Config
Desktop
Programming
Attributes
Command Prompt
C:\>ping 192.168.2.3
Pinging 192.168.2.3 with 32 bytes of data:
Reply from 192.168.2.3: bytes=32 time=10ms TTL=126
Reply from 192.168.2.3: bytes=32 time=10ms TTL=126
Reply from 192.168.2.3: bytes=32 time=10ms TTL=126
Reply from 192.168.2.3: bytes=32 time=10ms TTL=126
Ping statistics for 192.168.2.3:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 10ms, Maximum = 10ms, Average = 10ms
C:\>arp -a
Internet Address
Physical Address
Type
192.168.1.1
0002.170d.9401
dynamic
192.168.1.2
0090.0ce0.7491
dynamic
C:\>ping 192.168.2.2
Pinging 192.168.2.2 with 32 bytes of data:
Reply from 192.168.2.2: bytes=32 time=10ms TTL=126
Reply from 192.168.2.2: bytes=32 time=10ms TTL=126
Reply from 192.168.2.2: bytes=32 time=10ms TTL=126
Reply from 192.168.2.2: bytes=32 time=10ms TTL=126
Ping statistics for 192.168.2.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 10ms, Maximum = 10ms, Average = 10ms
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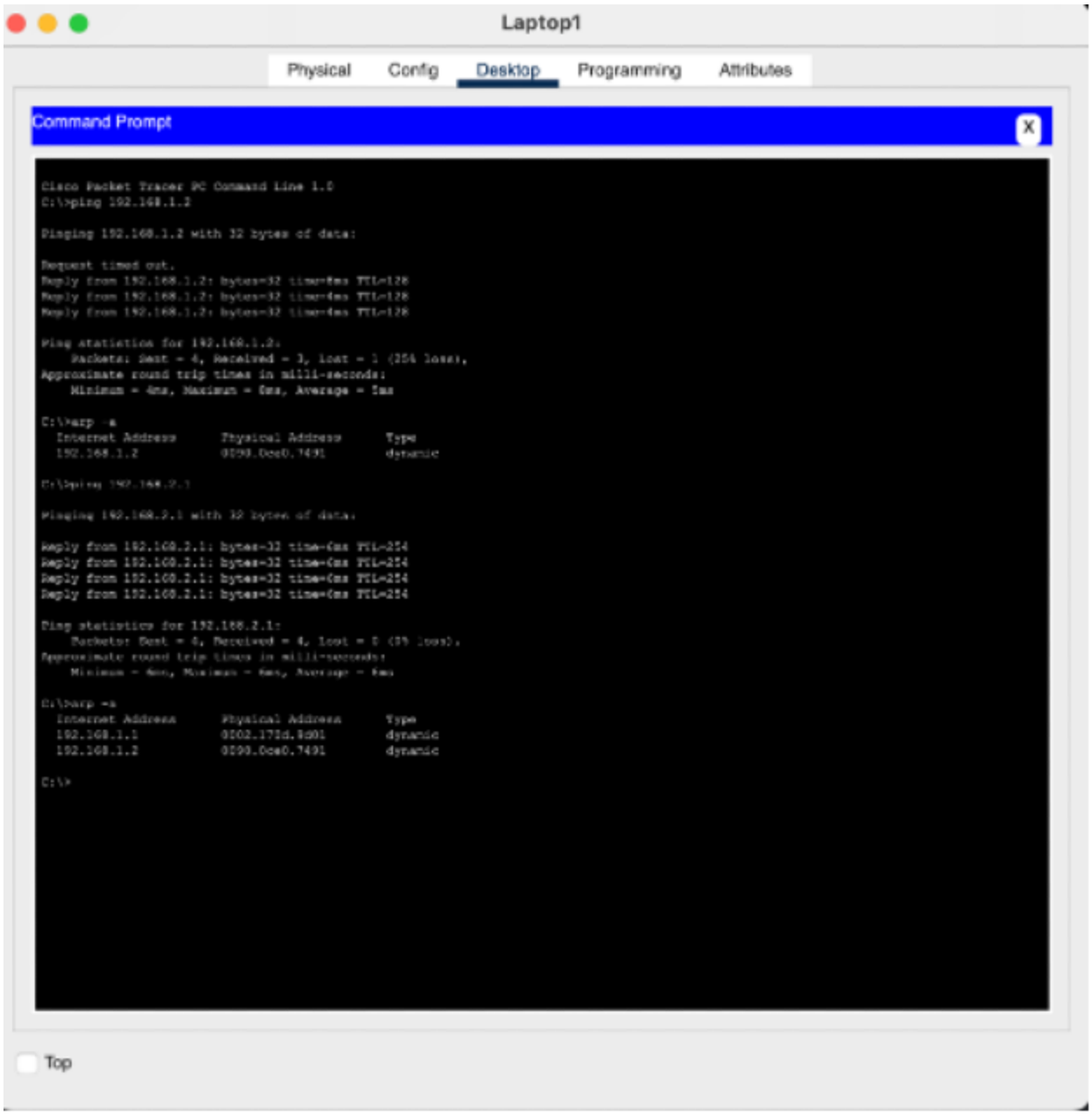
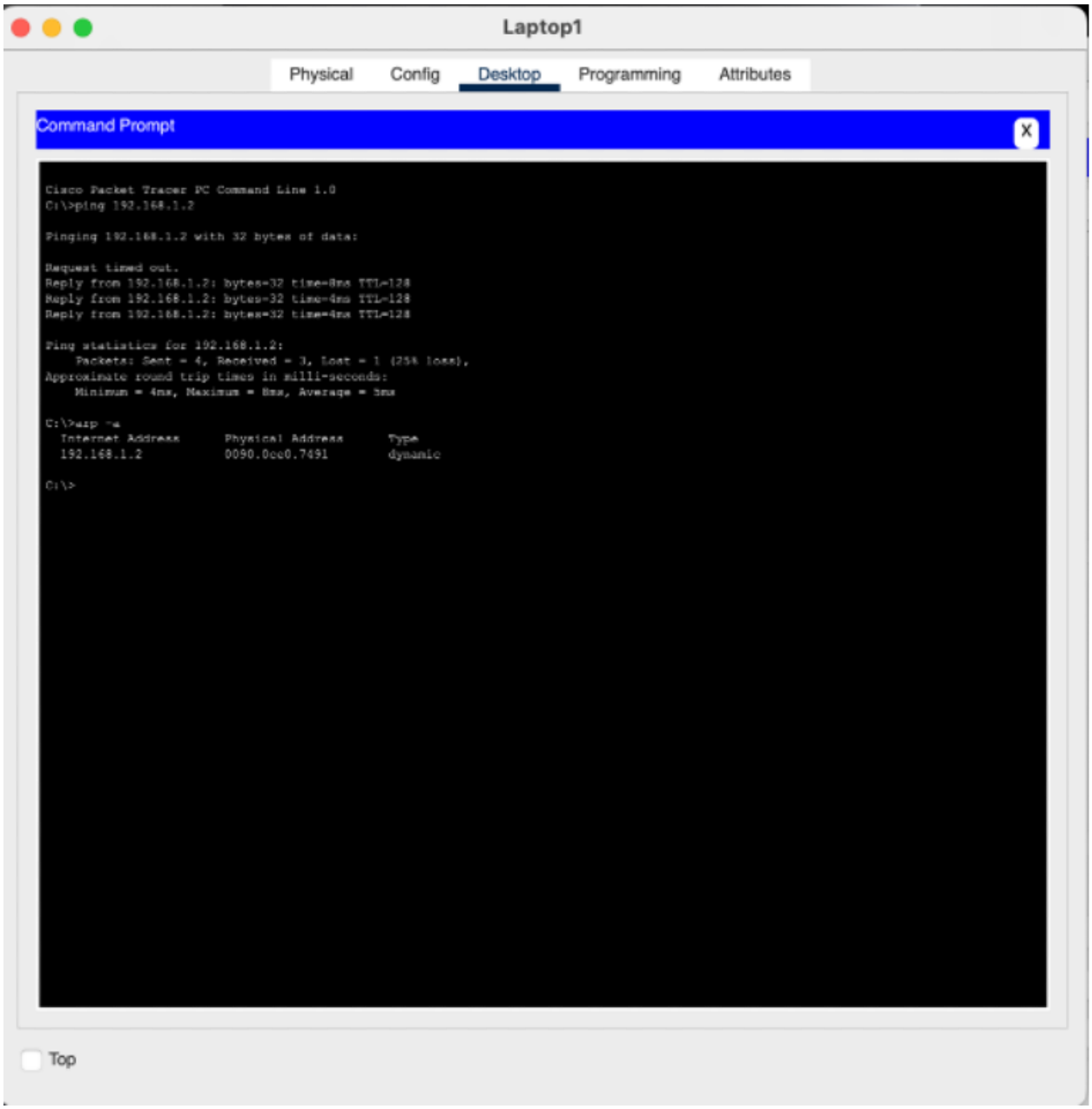
Pinging 192.168.2.2 with 32 bytes of data:
Reply from 192.168.2.2: bytes=32 time=10ms TTL=126
Reply from 192.168.2.2: bytes=32 time=10ms TTL=126
Reply from 192.168.2.2: bytes=32 time=10ms TTL=126
Reply from 192.168.2.2: bytes=32 time=10ms TTL=126
Ping statistics for 192.168.2.2:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 10ms, Maximum = 10ms, Average = 10ms
C:\>arp -a
Internet Address
Physical Address
Type
192.168.1.1
0002.170d.9401
dynamic
192.168.1.2
0090.0ce0.7491
dynamic
C:\>
Top


Laptop1
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.2
Pinging 192.168.1.2 with 32 bytes of data:
Request timed out.
Reply from 192.168.1.2: bytes=32 time=8ms TTL=128
Reply from 192.168.1.2: bytes=32 time=4ms TTL=128
Reply from 192.168.1.2: bytes=32 time=4ms TTL=128
Ping statistics for 192.168.1.2:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 8ms, Average = 5ms
C:\>arp -a
Internet Address
Physical Address
Type
192.168.1.2
0090.0ce0.7491
dynamic
Pinging 192.168.2.1 with 32 bytes of data:
Reply from 192.168.2.1: bytes=32 time<1ms TTL=254
Reply from 192.168.2.1: bytes=32 time<1ms TTL=254
Reply from 192.168.2.1: bytes=32 time<1ms TTL=254
Reply from 192.168.2.1: bytes=32 time<1ms TTL=254
Ping statistics for 192.168.2.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 0ms, Average = 0ms
C:\>arp -a
Internet Address
Physical Address
Type
192.168.1.1
0002.171d.9d01
dynamic
192.168.1.2
0090.0ce0.7491
dynamic
C:\>
Top



Pinging from Laptop1 to PC2 (192.168.1.2):

ARP Request: Laptop1 broadcasts an ARP request for PC2's MAC address.

ARP Reply: PC2 replies with its MAC address.

Ping Success: ICMP echo requests/replies confirm successful communication.

Pinging from Laptop1 to Router1 (192.168.2.1):

ARP Resolution: Laptop1 sends an ARP request, and Router1 responds with its MAC address.

Ping Success: Communication between Laptop1 and Router1 is established.

Pinging from Laptop1 to Router2 (192.168.2.3):

ARP Resolution: Laptop1 resolves Router2's MAC address.

Ping Success: Communication between Laptop1 and Router2 is established.

ARP Table Analysis:

Laptop1 ARP Table: Shows IP-to-MAC mappings for PC2, Router1, and Router2.

PC2 and Router ARP Tables: Contain entries for communicating devices.

Observations:

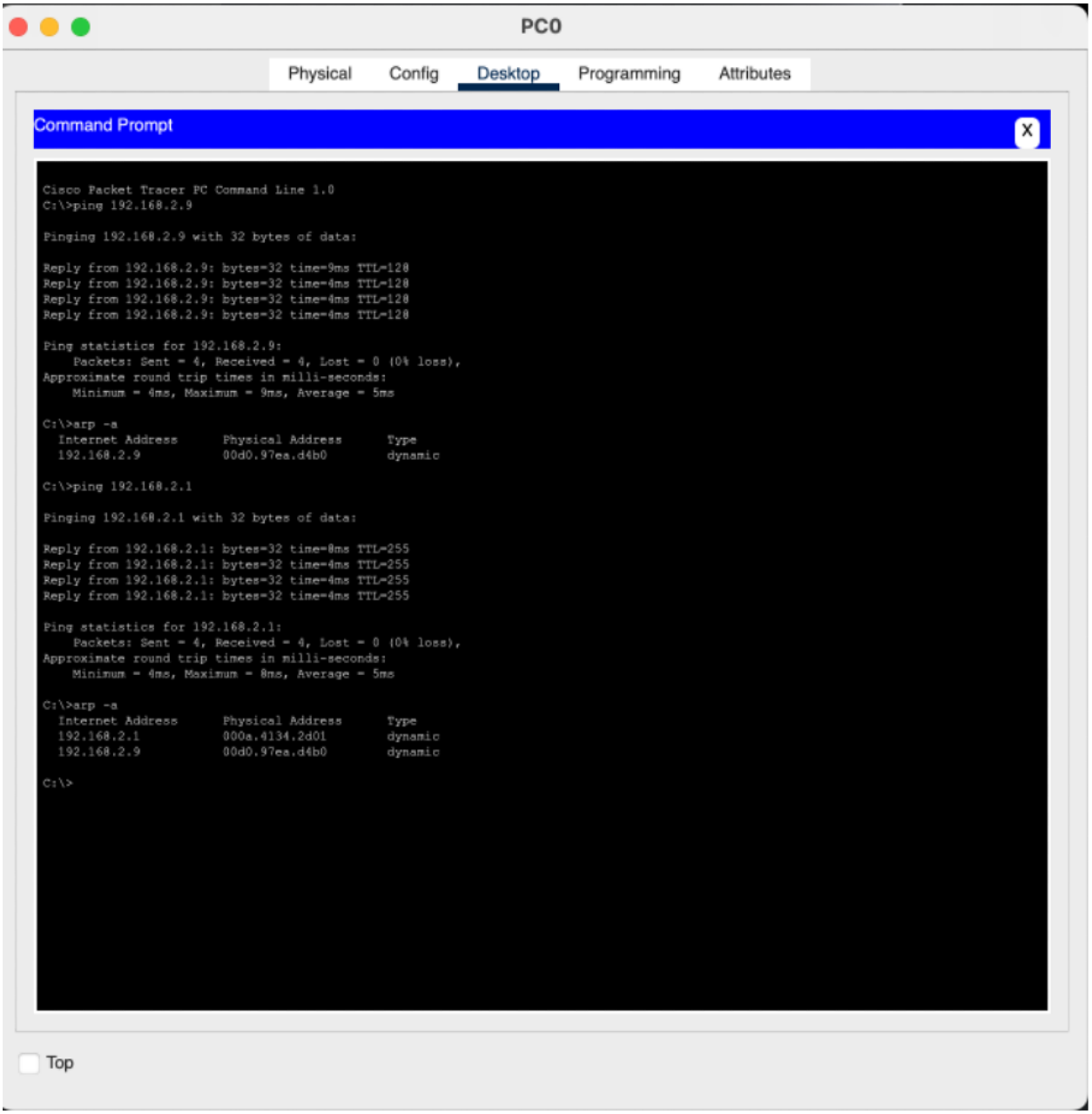
ARP resolves IP-to-MAC mappings efficiently, enabling communication across subnets.

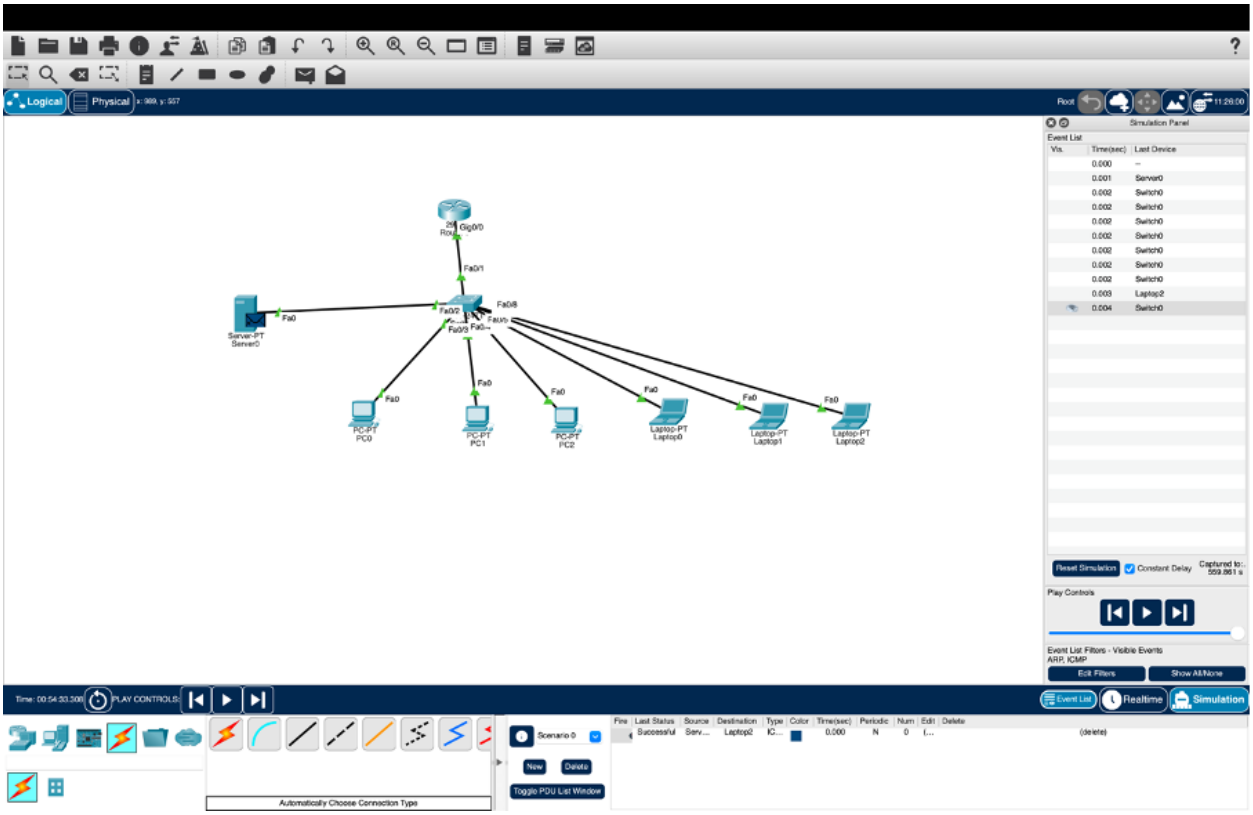
Devices update their ARP tables upon receiving ARP replies, facilitating future communication.

```
Switch>enable
Switch#show mac address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    000a.4134.2d01    DYNAMIC     Fa0/1
   1    0040.0b5d.931a    DYNAMIC     Fa0/3
Switch#
```

Activity 3

```
Switch>enable
Switch#show mac address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----

   1    000a.4134.2d01    DYNAMIC     Fa0/1
   1    0040.0b5d.931a    DYNAMIC     Fa0/3
   1    00d0.97ea.d4b0    DYNAMIC     Fa0/2
   1    00e0.f7ea.939c    DYNAMIC     Fa0/4
Switch#
```


PC0
Physical
Config
Desktop
Programming
Attributes
Command Prompt
X
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.2.9
Pinging 192.168.2.9 with 32 bytes of data:
Reply from 192.168.2.9: bytes=32 time=9ms TTL=128
Reply from 192.168.2.9: bytes=32 time=4ms TTL=128
Reply from 192.168.2.9: bytes=32 time=4ms TTL=128
Reply from 192.168.2.9: bytes=32 time=4ms TTL=128
Ping statistics for 192.168.2.9:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 9ms, Average = 5ms
C:\>arp -a
Internet Address Physical Address Type
192.168.2.9 00d0.97ea.d4b0 dynamic
C:\>ping 192.168.2.1
Pinging 192.168.2.1 with 32 bytes of data:
Reply from 192.168.2.1: bytes=32 time=8ms TTL=255
Reply from 192.168.2.1: bytes=32 time=4ms TTL=255
Reply from 192.168.2.1: bytes=32 time=4ms TTL=255
Reply from 192.168.2.1: bytes=32 time=4ms TTL=255
Ping statistics for 192.168.2.1:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 4ms, Maximum = 8ms, Average = 5ms
C:\>arp -a
Internet Address Physical Address Type
192.168.2.1 000a.4134.2d01 dynamic
192.168.2.9 00d0.97ea.d4b0 dynamic
C:\>
Top



1. Initial MAC Address Table:

- Ports Fa0/1, Fa0/2, Fa0/3, and Fa0/4 were associated with the MAC addresses 000a.4134.2d01, 00d0.97ea.d4b0, 0040.0b5d.931a, and 00e0.f7ea.939c respectively.

2. After Clearing and Pinging:

- The MAC addresses for Fa0/1 (000a.4134.2d01) and Fa0/3 (0040.0b5d.931a) were re-learned, indicating active communication from devices on these ports.

3. ARP Table on PC0:

- After pinging, PC0 resolved the IPs 192.168.2.9 and 192.168.2.1 to MAC addresses 00d0.97ea.d4b0 and 000a.4134.2d01 respectively, confirming successful network communication.

Conclusion:

- The switch's MAC address table dynamically updates based on active device communication, while the ARP table on PCs maps IP addresses to MAC addresses, ensuring correct packet routing within the network.