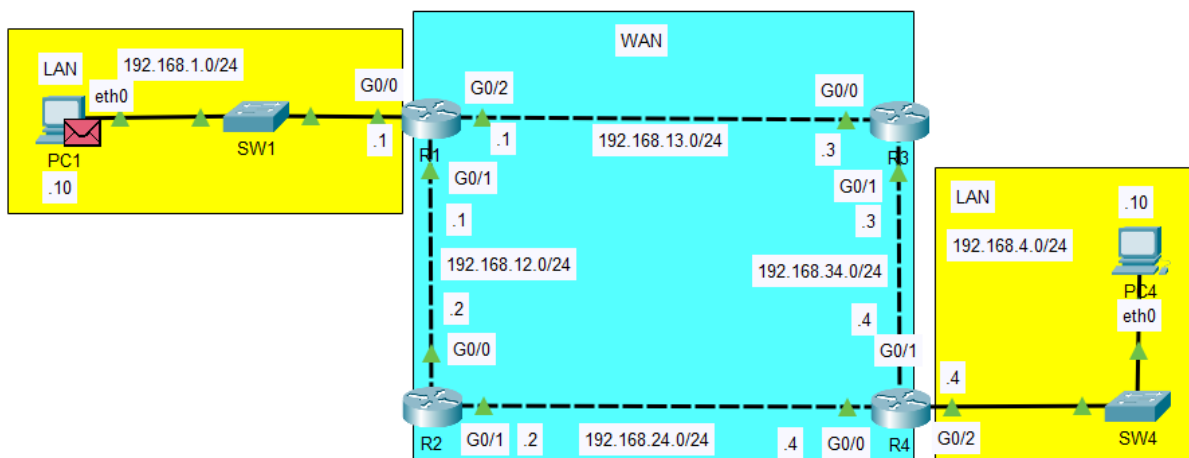


DAY 12 - Packet Life Cycle

The Life of a Packet

This is already covered in previous days, but this is more of a summary into one big picture.

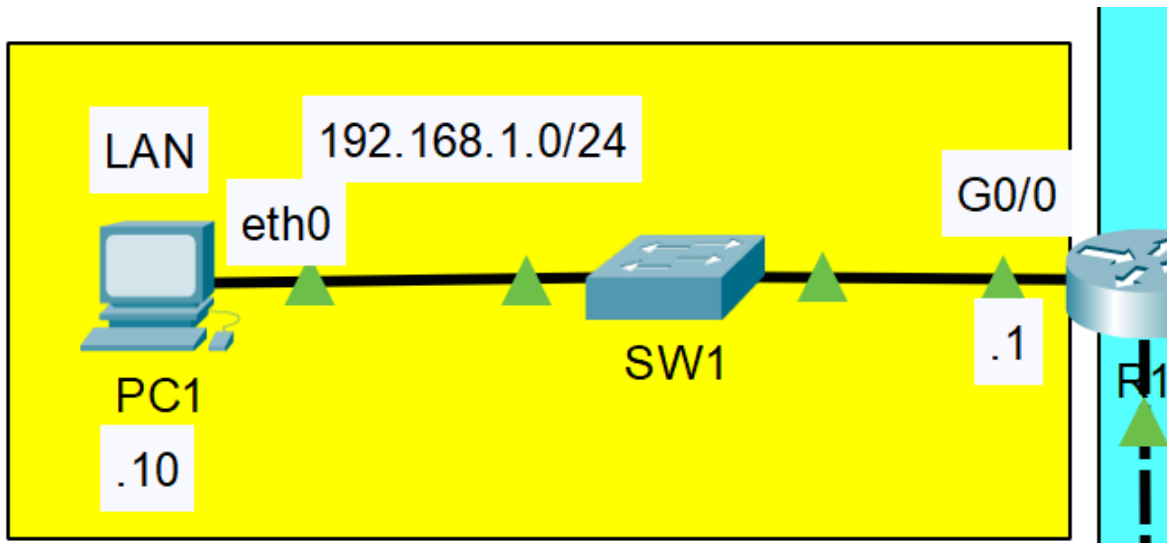
Network Topology



- Looking at the packets going from 192.168.1.10/24 to 192.168.4.10/24
- All **Static Routes** have been configured to allow 192.168.1.0/24 network to communicate with 192.168.4.0/24
- We're gonna use some **MAC Addresses** as well in addition to existing **IPs**.

Device	PC1	R1	R1	R2	R2	R4	R4	PC4
Interface	-	G0/0	G0/1	G0/0	G0/1	G0/0	G0/2	-
MAC	1111	aaaa	bbbb	cccc	dddd	eeee	fffe	4444

Life Cycle



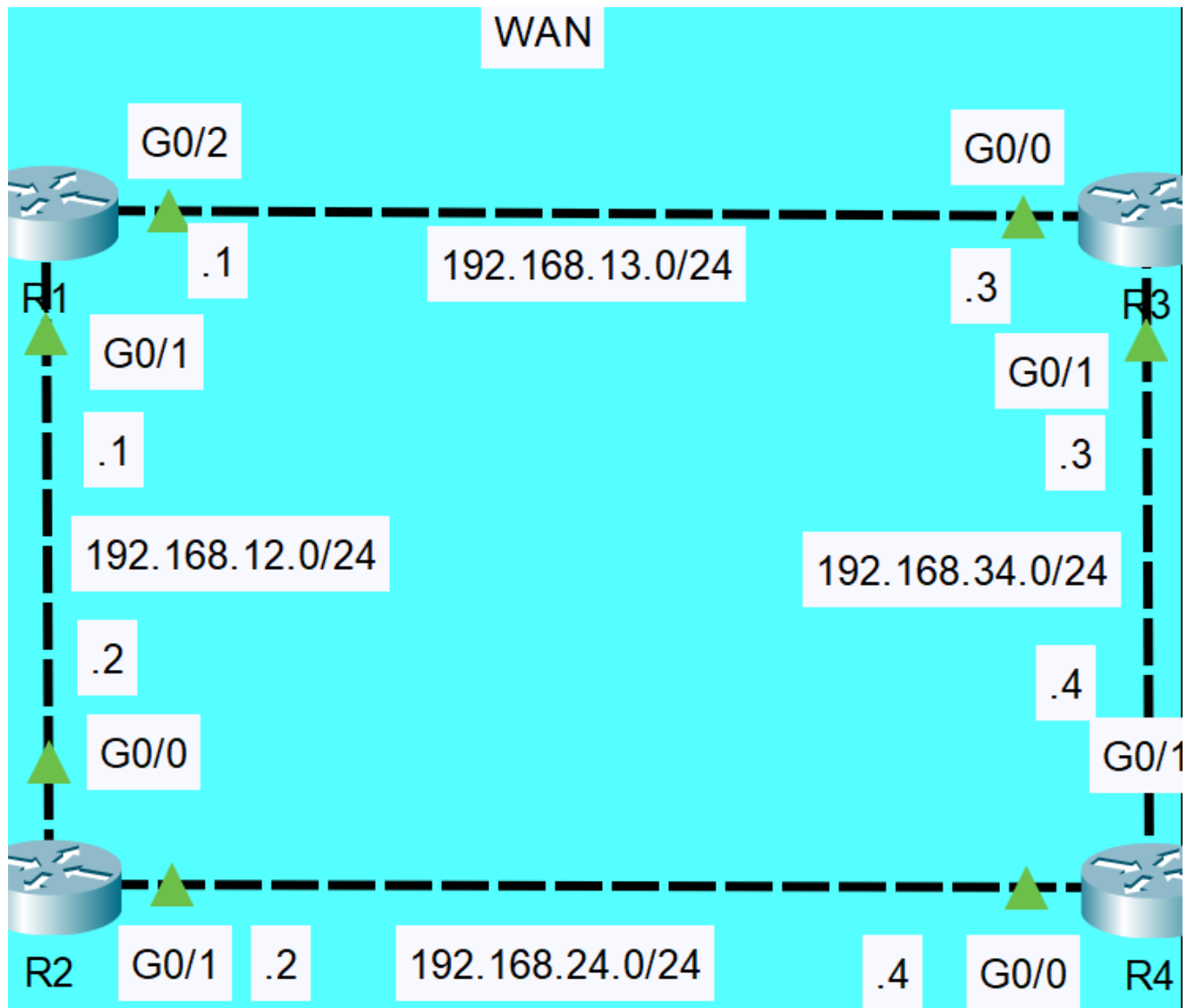
To R1:

1. **PC1** creates a packet with this IP header to **PC4**:
 1. **SRC**: 192.168.1.10
 2. **DST**: 192.168.4.10
2. **PC1** sees that the **Destination** is in a different network.
 1. It sends the packet to its **Default Gateway (R1)**
3. **PC1** does not know the **MAC Address** of R1.
 1. It will use **ARP (Address Resolution Protocol)**
4. **PC1** creates an **ARP Request Packet**:
 1. **SRC IP**: 192.168.1.10
 2. **DST IP**: 192.168.1.1
 3. **DST MAC**: FFFF.FFFF.FFFF (**Broadcast MAC**)
 4. **SRC MAC**: xxxx.xxxx.1111 (Kept last 4 digits for simplicity)
5. **SW1** floods the frame on all port except the source port. (To R1's G0/0)
6. **R1's g0/0** matches the request frame with its own IP, and creates an **ARP Reply**:
 1. **SRC IP**: 192.168.1.1
 2. **DST IP**: 192.168.1.10
 3. **DST MAC**: 1111 (**Unicast MAC**)
 4. **SRC MAC**: aaaa
7. **PC1** now *encapsulate* the original packet with the Ethernet header to **R1's**:
 1. **IPv4 Header**:
 1. **SRC**: 192.168.1.10 (**PC1**)
 2. **DST**: 192.168.4.10 (**PC4**)

2. Ethernet Header:

1. **DST:** `aaaa` (PC1)
2. **SRC:** `1111` (R1's g0/0)

From R1 to R2:



1. **R1** receives the frame from PC1 and *remove* the **Ethernet Header** (The *IPv4 Header* stays the same).
2. **R1** looks up its routing table for `192.168.4.10` :
 1. The most specific match is for **Destination:** `192.168.4.0/24` with the **Next Hop:** `192.168.12.2` :

Routing Table for R1				
Type	Network	Port	Next Hop IP	Metric
S	192.168.4.0/24	---	192.168.12.2	1/0

3. **R1** will now encapsulate the packet with the ethernet header for

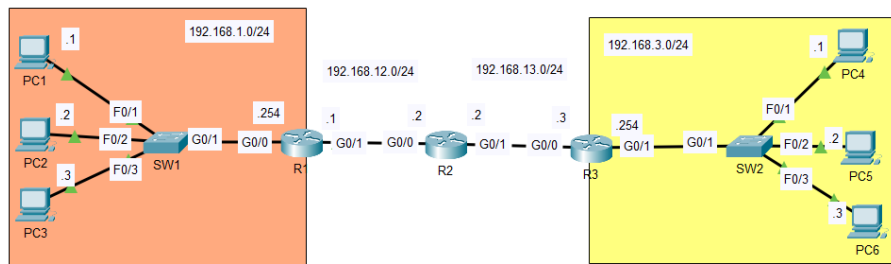
192.168.12.2's **MAC Address**:

1. **R1** performs **ARP** for **R2's** MAC Address.
 1. **SRC IP**: 192.168.12.1 (R1's g0/1)
 2. **DST IP**: 192.168.12.2 (R2's g0/0)
 3. **DST MAC**: *FFFF.FFFF.FFFF*
 4. **SRC MAC**: *bbbb*
4. **R2's g0/0** receives the **ARP Request**, it replies with its own **MAC Address** to **R1's g0/1**:
 1. **SRC IP**: 192.168.12.1 (R1's g0/1)
 2. **DST IP**: 192.168.12.2 (R2's g0/0)
 3. **DST MAC**: *bbbb*
 4. **SRC MAC**: *cccc*
5. **R1** encapsulates the still-the-same IPv4 header with the new Ethernet Header, with **R2's g0/0** MAC Address being the destination MAC Address.

The same pattern is used for **R2 to R4** and **R4 to PC4** with the **ARP Request/Reply** for the MAC address of the next hop, **De-Encapsulation** of the Ethernet Header at each hop while the IPv4 Packet stays the same the entire time.

LAB:

DAY 12 - Packet Life Cycle



1. PC1 pings PC4.
Identify the src/dst MAC address at each specified point in the route to PC4.
Identify the MAC address by the device and interface (ie. the MAC of R1 G0/0)
- A. Source/Destination MAC at PC1 → SW1 segment
- B. Source/Destination MAC at SW1 → R1 segment
- C. Source/Destination MAC at R1 → R2 segment
- D. Source/Destination MAC at R2 → R3 segment
- E. Source/Destination MAC at R3 → SW2 segment
- F. Source/Destination MAC at SW2 → PC4 segment

Use the CLI and Packet Tracer's simulation mode to verify your answers.
(Before you enter simulation mode, ping once to complete ARP/the MAC learning process.)

2. PC1 pings PC3.
Identify the src/dst MAC address at each specified point in the route to PC3.
Identify the MAC address by the device and interface (ie. the MAC of R1 G0/0)
- A. Source/Destination MAC at PC1 → SW1
- B. Source/Destination MAC at SW1 → PC3

Use the CLI and Packet Tracer's simulation mode to verify your answers.
(Before you enter simulation mode, ping once to complete ARP/the MAC learning process.)

3. PC4 pings PC1.
Identify the src/dst MAC address at each specified point in the route to PC1.
Identify the MAC address by the device and interface (ie. the MAC of R1 G0/0).

WRITE YOUR ANSWERS IN THE COMMENT SECTION OF THE VIDEO :)