Experimental report

Experiment name: Experiment 3.4.4: VLAN expansion across Ethernet switches
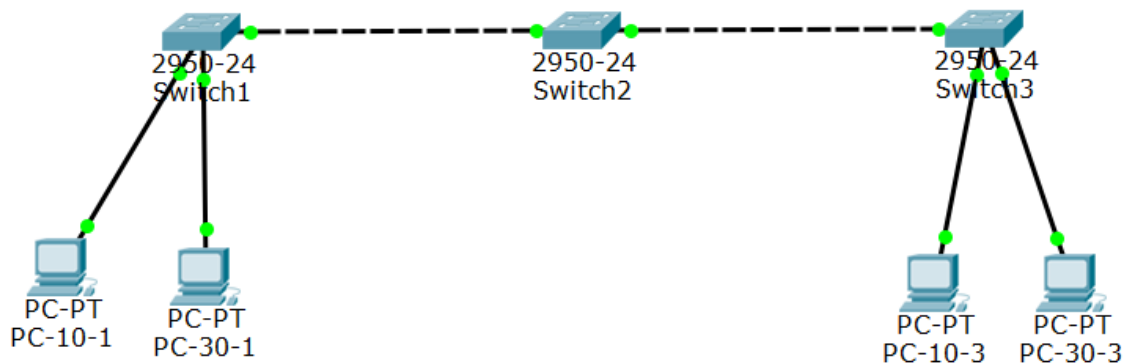
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Class: Computer Networks

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1. Topology

Topology made with Cisco Packet Tracer (simulations are also conducted through this program)

PC-10-* connected to VLAN 10 and PC-30-* connected to VLAN 30

```
Switch>enable
Switch#conf t
Enter configuration commands, one per line.  End with
CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name VLAN10
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name VLAN30
Switch(config-vlan)#exit
```

```
Switch(config)#interface FastEthernet0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit

Switch(config)#interface FastEthernet0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#exit
```

For the switch 2 we need set mode trunk. switchport mode trunk

Access Mode:

> Access mode is used when a switch port is connected to an end device, such as a PC or printer.

> In access mode, the switch port belongs to a single VLAN, and it forwards traffic only for that VLAN.

> The VLAN membership of an access port is configured statically.

Trunk Mode:

> Trunk mode is used when a switch port needs to carry traffic for multiple VLANs.

> In trunk mode, the switch port can carry traffic for multiple VLANs simultaneously by adding VLAN tags to Ethernet frames.

> Trunk ports are typically used to interconnect switches, routers, or other network devices that need to exchange traffic for multiple VLANs.

> VLAN tags provide a way for devices on either end of the trunk link to distinguish which VLAN each frame belongs to.

2. PC-10-1 successfully pings PC-10-3

```
Pinging 170.0.0.3 with 32 bytes of data:

Reply from 170.0.0.3: bytes=32 time=1ms TTL=128
Reply from 170.0.0.3: bytes=32 time=0ms TTL=128
Reply from 170.0.0.3: bytes=32 time=1ms TTL=128
Reply from 170.0.0.3: bytes=32 time=0ms TTL=128

Ping statistics for 170.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0%
loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

3. PC-30-1 successfully pings PC-30-3

```
Pinging 170.0.0.4 with 32 bytes of data:

Reply from 170.0.0.4: bytes=32 time=0ms TTL=128
Reply from 170.0.0.4: bytes=32 time=0ms TTL=128
Reply from 170.0.0.4: bytes=32 time=0ms TTL=128
Reply from 170.0.0.4: bytes=32 time=0ms TTL=128

Ping statistics for 170.0.0.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms
```

4. Configuration for Switch 3

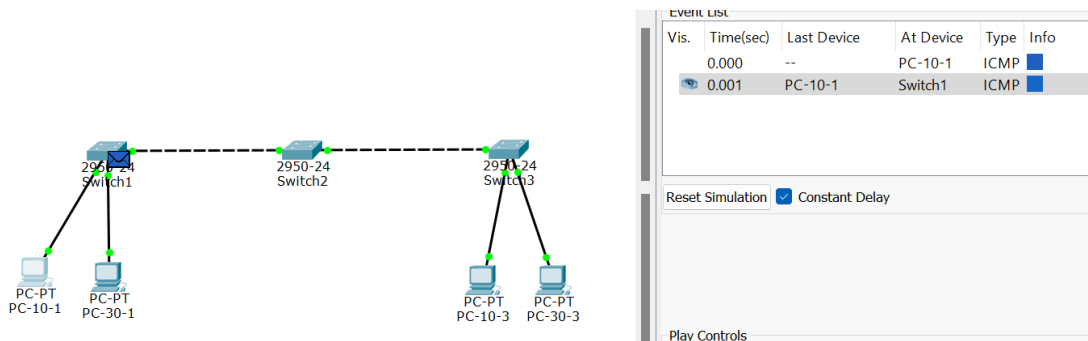As we said before we configured switch 3 like this:

```
Switch>enable
Switch#conf t
Enter configuration commands, one per line.  End with
CNTL/Z.
Switch(config)#vlan 10
Switch(config-vlan)#name VLAN10
Switch(config-vlan)#exit
Switch(config)#vlan 30
Switch(config-vlan)#name VLAN30
Switch(config-vlan)#exit

Switch(config)#interface FastEthernet0/2
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 10
Switch(config-if)#exit

Switch(config)#interface FastEthernet0/3
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 30
Switch(config-if)#exit
```

5. Capturing frame from Switch 1 VLAN 10

PDU Information at Device: Switch1

Inbound PDU Details   Outbound PDU Details

PDU Formats

Ethernet 802.1q

| PREAMBLE : | S F | DEST ADDR: | SRC ADDR: |
| TP ID | TYPE: | DATA (VARIABLE | FCS : |

IP

4	IHL	DSCP:	TL: 128	
ID: 0x25	0x	0x0	
TTL: 128	PRO: 0x1	CHKSUM	
SRC IP: 170.0.0.1			
DST IP: 170.0.0.3			
OPT: 0x0		0x0	
DATA (VARIABLE LENGTH)			

ICMP

| TYPE: | CODE: | CHECKSUM |
| ID: 0xc | | SEQ NUMBER: |

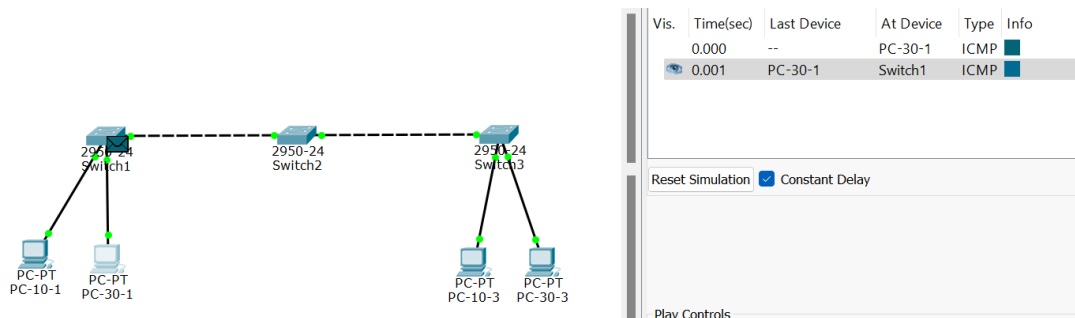VLAN id is in the layer 2 header. (Ethernet 802.1q tag)

The inscription is not clearly visible here, but:

TCI: 0xa

We have marked frame. Unmarked: VLAN id = 0

TCI (Tag Control Information): This field contains information about the VLAN, including the VLAN ID (VID) and priority bits. In your example, the TCI value "0xa" indicates that the frame belongs to VLAN 10.

6. Capturing frame from Switch 1 VLAN 30

PDU Information at Device: Switch1

Inbound PDU Details   Outbound PDU Details

PDU Formats

Ethernet 802.1q

| PREAMBLE: | S F | DEST ADDR: | SRC ADDR: |
| TP ID | TYPE: | DATA (VARIABLE | FCS: |

IP

4	IHL	DSCP:	TL: 128
ID: 0x5	0x	0x0
TTL: 128	PRO: 0x1	CHKSUM
SRC IP: 170.0.0.2
DST IP: 170.0.0.4
OPT: 0x0	0x0
DATA (VARIABLE LENGTH)

ICMP

| TYPE: | CODE: | CHECKSUM |
| ID: 0x3 | SEQ NUMBER: 5 |

VLAN id is in the layer 2 header. (Ethernet 802.1q tag)

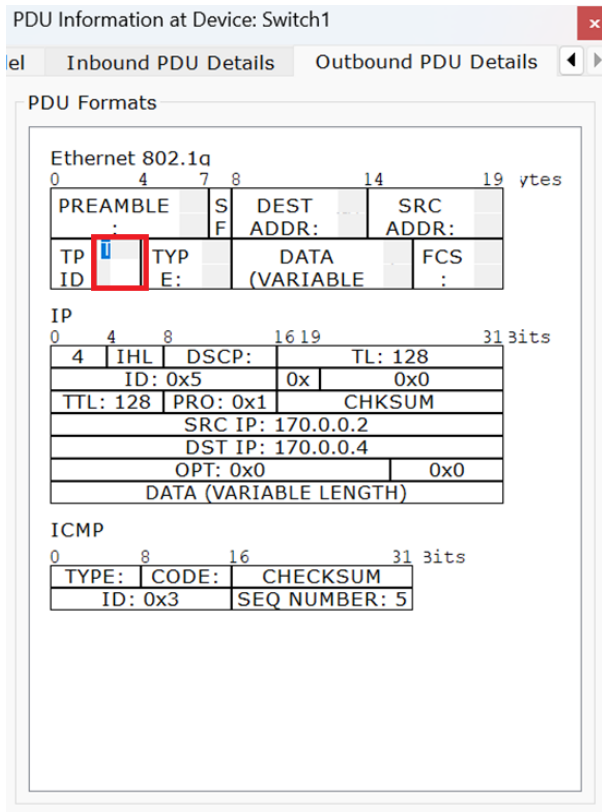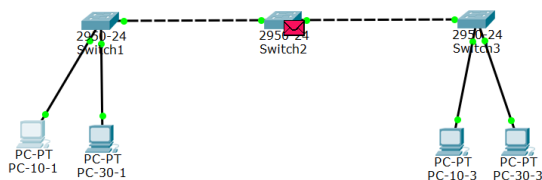The inscription is not clearly visible here, but:

TCI: 0x1e
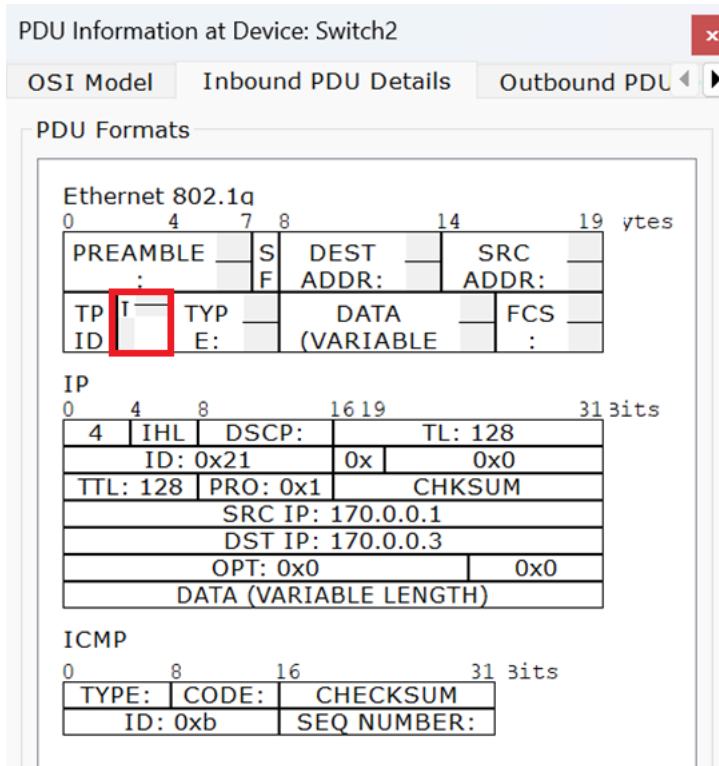
We have marked frame. Unmarked: VLAN id = 0

TCI (Tag Control Information): This field contains information about the VLAN, including the VLAN ID (VID) and priority bits. In your example, the TCI value "0x1e" indicates that the frame belongs to VLAN 30.

7. Capturing frame from Switch 2

Vis.	Time(sec)	Last Device	At Device	Type	Info
	0.000	--	PC-10-1	ICMP	
	0.001	PC-10-1	Switch1	ICMP	
	0.002	Switch1	Switch2	ICMP	

Reset Simulation ☑ Constant Delay

PDU Information at Device: Switch2

OSI Model   Inbound PDU Details   Outbound PDU

PDU Formats

Ethernet 802.1q
| 0 | 4 | 7 | 8 | 14 | 19 | ytes |

| PREAMBLE : | SF | DEST ADDR: | SRC ADDR: | |
| TP ID | T | TYP E: | DATA (VARIABLE | FCS : |

IP
| 0 | 4 | 8 | 16 19 | 31 | 3its |

4	IHL	DSCP:	TL: 128
ID: 0x21	0x	0x0
TTL: 128	PRO: 0x1	CHKSUM
SRC IP: 170.0.0.1
DST IP: 170.0.0.3
OPT: 0x0	0x0
DATA (VARIABLE LENGTH)

ICMP
| 0 | 8 | 16 | 31 | 3its |

| TYPE: | CODE: | CHECKSUM |
| ID: 0xb | SEQ NUMBER: |

VLAN id is in the layer 2 header. (Ethernet 802.1q tag)

The inscription is not clearly visible here, but:

TCI: 0xa

We have marked frame. Unmarked: VLAN id = 0

TCI (Tag Control Information): This field contains information about the VLAN, including the VLAN ID (VID) and priority bits. In your example, the TCI value "0xa" indicates that the frame belongs to VLAN 10.