



Universidad de San Carlos de Guatemala

Facultad de Ingeniería

Escuela de Ciencias y Sistemas

Redes de Computadoras 2, Práctica 2

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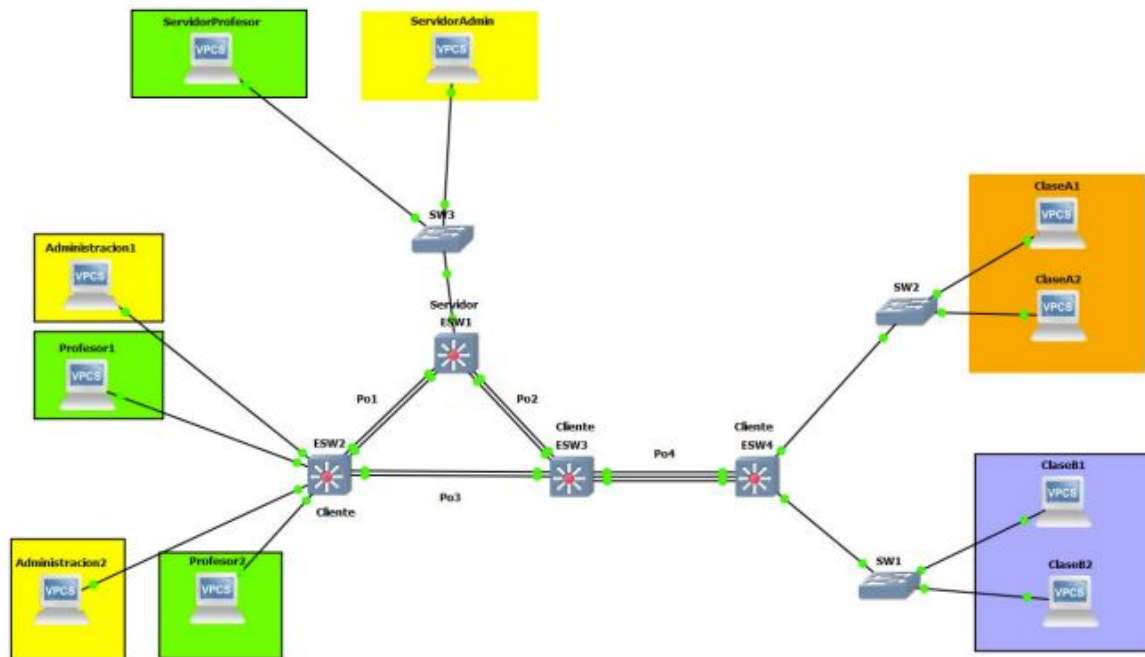
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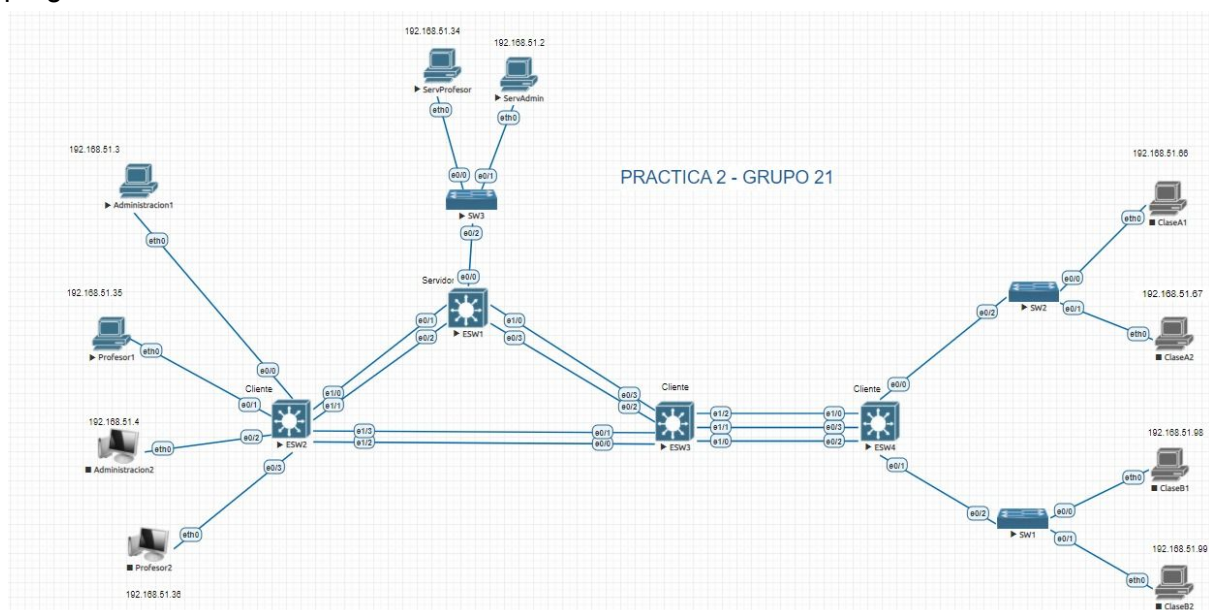
Guatemala, febrero de 2021

Topología

Topología a implementar:



Topología implementada: A continuación se muestra la topología a ser configurada en el programa de EVE-NG.



Para esta topología se hicieron las siguientes configuraciones:

1. VTP
2. Creación de VLANS
3. Direcciones de red
4. Configuraciones STP

5. Port-channels
6. Access List

VTP

La configuración VTP se realizó en todos los ESW, con la diferencia de que el se utilizó uno como servidor y los demás como clientes:

1. ESW1:

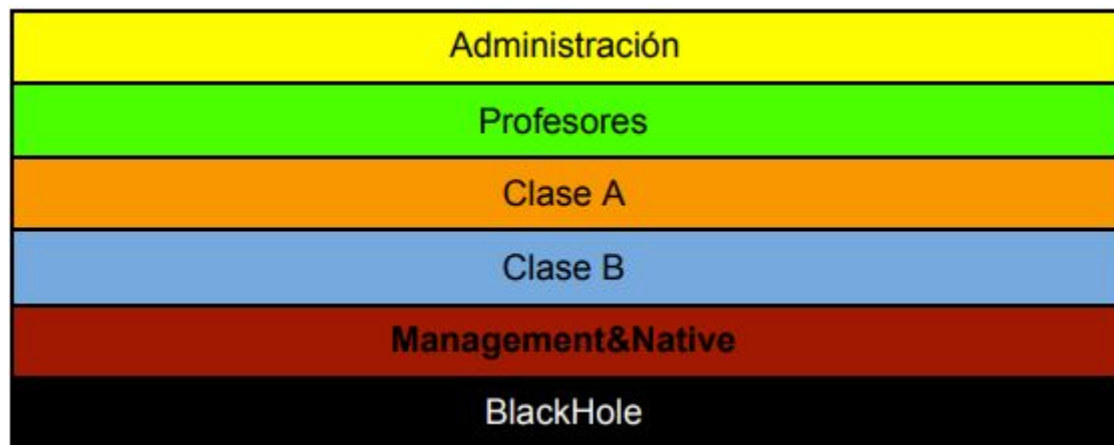
```
configure terminal
vtp domain Grupo21
vtp password Grupo21
vtp mode server
vtp version 2
exit
```

2. ESW2, ESW3, ESW4:

```
* ESW2, ESW3 , ESW4 y Switch
configure terminal
vtp domain Grupo21
vtp password Grupo21
vtp version 2
vtp mode client
exit
```

VLANS

Se deben crear las siguientes VLANS para la configuración de la topología mostrada anteriormente:



El número de cada VLAN se definió de la siguiente manera:

Administración - 10 + #GrupoAsignado
Profesores - 20 + #GrupoAsignado
Clase A - 30 + #GrupoAsignado
Clase B - 40 + #GrupoAsignado
Management&Native - 99
BlackHole - 999

Configuración en EVE-NG:

```
-- VLAN (ESW1)
configure terminal
vlan 11
name Administracion
exit
vlan 21
name Profesores
exit
vlan 31
name ClaseA
exit
vlan 41
name ClaseB
exit
vlan 99
name Management&Native
exit
vlan 999
name BlackHole
exit
exit
```

ESW1										
VLAN	Name	Status	Ports							
1	default	active								
11	Administracion	active								
21	Profesores	active								
31	ClaseA	active								
41	ClaseB	active								
99	Management&Native	active								
999	BlackHole	active	Et1/1, Et1/2, Et1/3							
1002	fddi-default	act/unsup								
1003	trcrf-default	act/unsup								
1004	fddinet-default	act/unsup								
1005	trbrf-default	act/unsup								
VLAN	Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2
1	enet	100001	1500	-	-	-	-	-	0	0
11	enet	100011	1500	-	-	-	-	-	0	0
21	enet	100021	1500	-	-	-	-	-	0	0
31	enet	100031	1500	-	-	-	-	-	0	0
41	enet	100041	1500	-	-	-	-	-	0	0
99	enet	100099	1500	-	-	-	-	-	0	0
--More--										

Direcciones de Red

Tabla Subredes

VLAN	Dirección de Red	Primera dirección asignable	Última dirección asignable	Dirección de broadcast	Máscara de subred
11	192.168.51.0	192.168.51.1	192.168.51.30	192.168.51.31	225.255.255.224
21	192.168.51.32	192.168.51.33	192.168.51.62	192.168.51.63	225.255.255.224
31	192.168.51.64	192.168.51.65	192.168.51.94	192.168.51.95	225.255.255.224
41	192.168.51.96	192.168.51.97	192.168.51.126	192.168.51.127	225.255.255.224
99					
999					

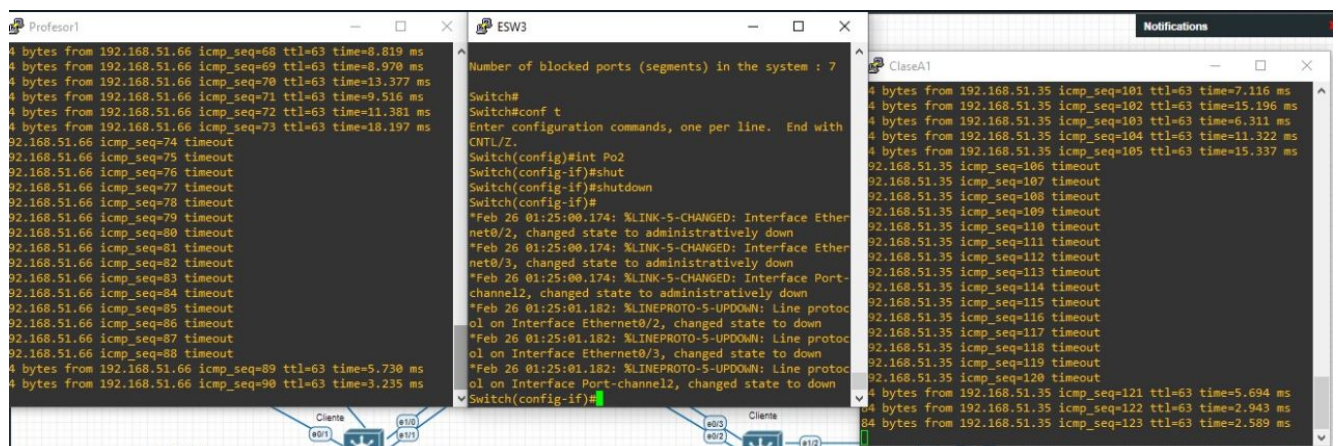
Configuración en EVE-NG

```

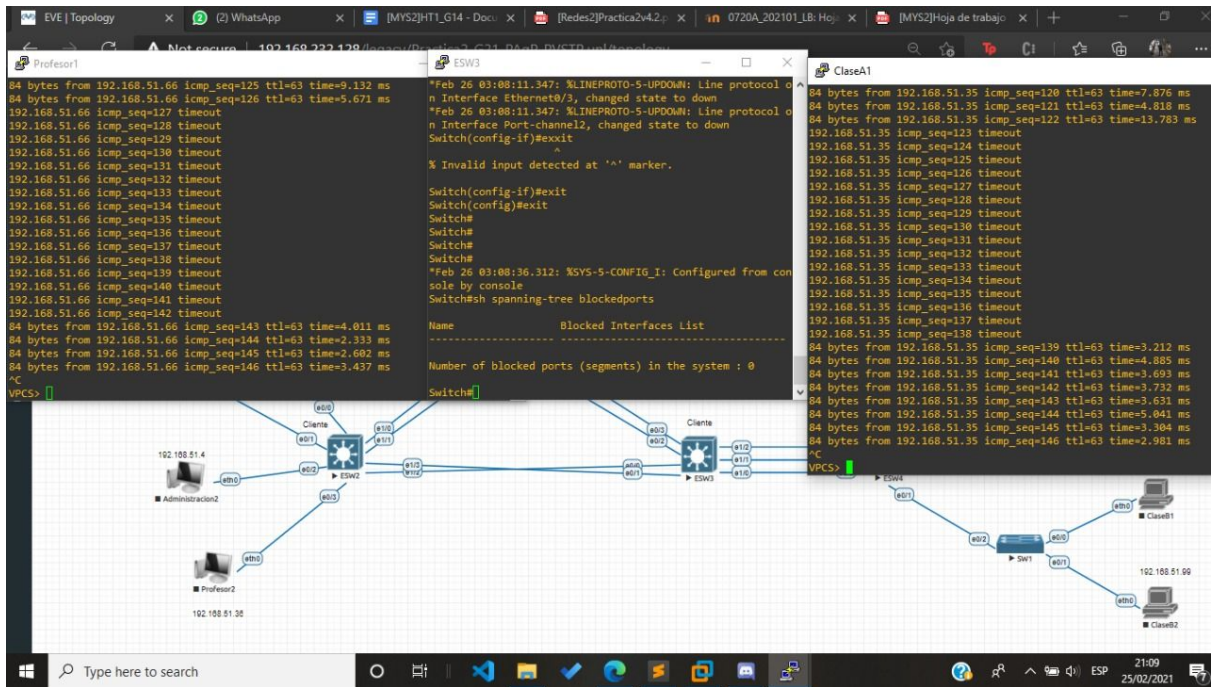
-- Subinterfaces VLAN (Nucleo)
configure terminal
interface vlan 11
ip address 192.168.51.1 255.255.255.224
no shu
exit
interface vlan 21
ip address 192.168.51.33 255.255.255.224
no shu
exit
interface vlan 31
ip address 192.168.51.65 255.255.255.224
no shu
exit
interface vlan 41
ip address 192.168.51.97 255.255.255.224
no shu
exit
interface vlan 99
ip address 192.168.51.129 255.255.255.224
no shu
exit
interface vlan 999
ip address 192.168.51.161 255.255.255.224
no shu
exit
exit

```

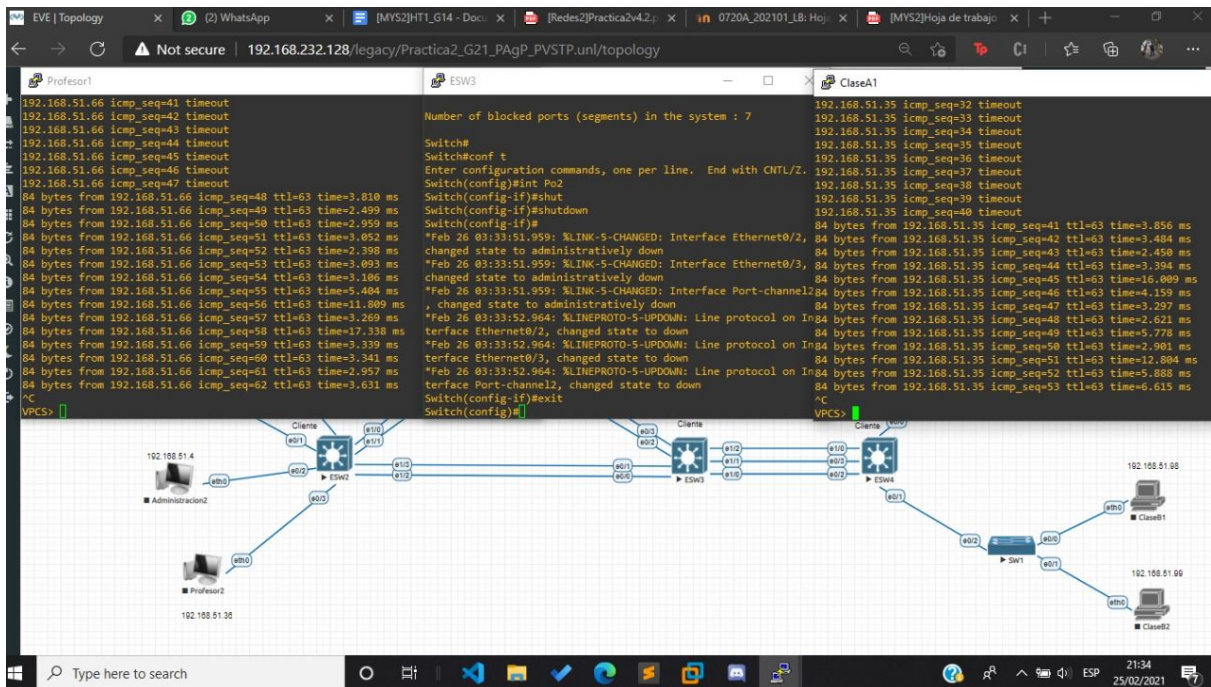
Configuraciones STP



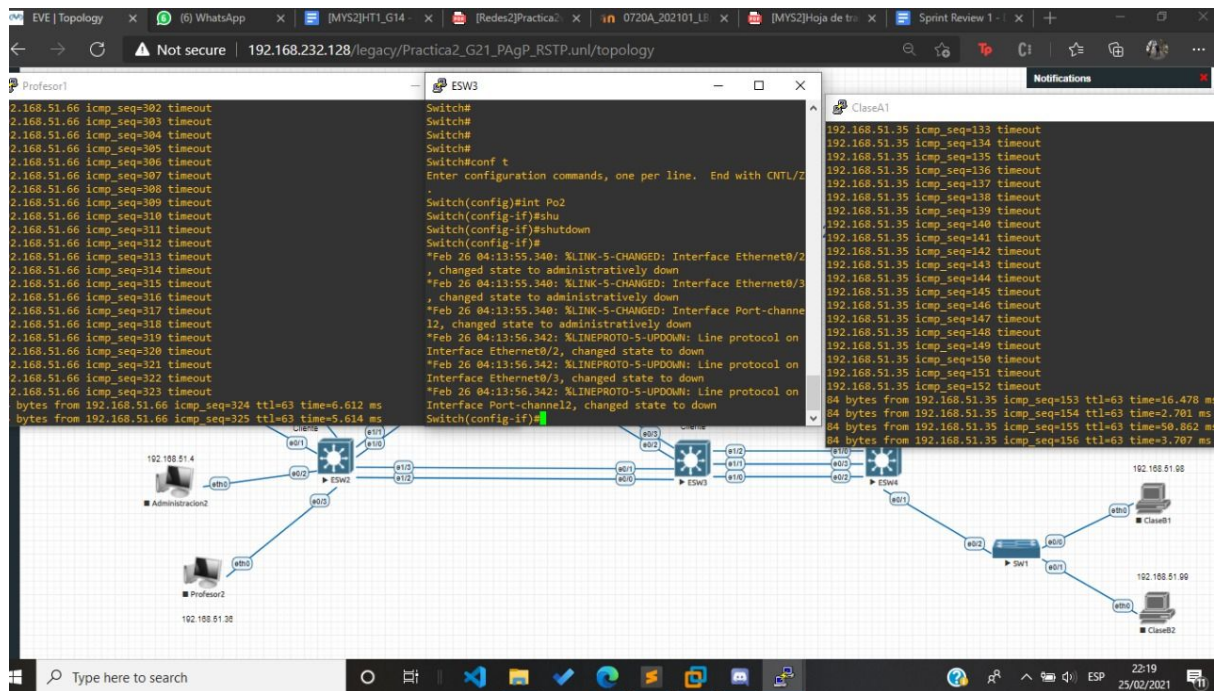
Escenario 1 - Port Channel LACP | STP



Escenario 4 - Port Channel PagP | STP



Escenario 5 - Port Channel PagP | PVSTP



Escenario 6 - Port Channel PAgP | PVSTP

Escenario	Tipo de port channel	Protocolo spanning-tree	Tiempo de convergencia
1	LACP	STP	32s
2	LACP	RSTP	302s
3	LACP	PVSTP	30s
4	PAgP	STP	32s
5	PAgP	RSTP	30s
6	PAgP	PVSTP	180s

Port-Channels

Se requiere que exista un ancho de banda considerable para poder intercambiar grandes cantidades de información entre los pcs de los profesores y los alumnos, por lo que se configuraron los siguientes port-channels

```
Switch#
Switch#
Switch#sh int por
Switch#sh int port-c
Switch#sh int port-channel ?
    <1-64> Port-channel interface number

Switch#sh int port-channel 1
Port-channel1 is up, line protocol is up (connected)
  Hardware is Ethernet, address is aabb.cc00.1020 (bia aabb.cc00.1020)
  MTU 1500 bytes, BW 20000 Kbit/sec, DLY 1000 usec,
    reliability 255/255, txload 5/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Auto-duplex, Auto-speed, media type is unknown
  input flow-control is off, output flow-control is unsupported
  Members in this channel: Et0/1 Et0/2
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:19, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/2000/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 399000 bits/sec, 763 packets/sec
    373 packets input, 48198 bytes, 0 no buffer
    Received 191 broadcasts (0 multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
  966457 packets output, 61903236 bytes, 0 underruns
--More--
```

Port-Channel 1 - 2 Enlaces entre ESW1 y ESW2

```
Switch#
Switch#
Switch#
Switch#
Switch#
Switch#
Switch#
Switch#
Switch#sh int port-channel 2
Port-channel2 is up, line protocol is up (connected)
  Hardware is Ethernet, address is aabb.cc00.1001 (bia aabb.cc00.1001)
  MTU 1500 bytes, BW 20000 Kbit/sec, DLY 1000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Auto-duplex, Auto-speed, media type is unknown
  input flow-control is off, output flow-control is unsupported
  Members in this channel: Et0/3 Et1/0
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:14, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/2000/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 2000 bits/sec, 4 packets/sec
    350 packets input, 45286 bytes, 0 no buffer
    Received 178 broadcasts (0 multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
  6942 packets output, 490659 bytes, 0 underruns
--More--
```

Port-Channel 2 - 2 Enlaces entre ESW1 y ESW2

```
Switch#sh int port-channel 3
Port-channel3 is up, line protocol is up (connected)
  Hardware is Ethernet, address is aabb.cc00.2031 (bia aabb.cc00.2031)
  MTU 1500 bytes, BW 20000 Kbit/sec, DLY 1000 usec,
    reliability 255/255, txload 5/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Auto-duplex, Auto-speed, media type is unknown
  input flow-control is off, output flow-control is unsupported
  Members in this channel: Et1/2 Et1/3
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:08, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/2000/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 427000 bits/sec, 812 packets/sec
    280 packets input, 39378 bytes, 0 no buffer
    Received 119 broadcasts (0 multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
--More--
```

Port-Channel 3 - 2 Enlaces entre ESW2 y ESW3

```
Switch#sh int port-channel 4
Port-channel4 is up, line protocol is up (connected)
  Hardware is Ethernet, address is aabb.cc00.3021 (bia aabb.cc00.3021)
  MTU 1500 bytes, BW 30000 Kbit/sec, DLY 1000 usec,
    reliability 255/255, txload 3/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Auto-duplex, Auto-speed, media type is unknown
  input flow-control is off, output flow-control is unsupported
  Members in this channel: Et1/0 Et1/1 Et1/2
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:06, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/2000/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 444000 bits/sec, 845 packets/sec
    360 packets input, 50806 bytes, 0 no buffer
    Received 153 broadcasts (0 multicasts)
    0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
--More--
```

Port-Channel 4 - 3 Enlaces entre ESW3 y ESW4

Access-Lists

LISTA ADMINISTRACION

```
configure terminal
access-list 111 permit icmp 192.168.51.0 0.0.0.31 192.168.51.0 0.0.0.31
access-list 111 permit icmp 192.168.51.0 0.0.0.31 192.168.51.32 0.0.0.31
exit
```

LISTA PROFESORES

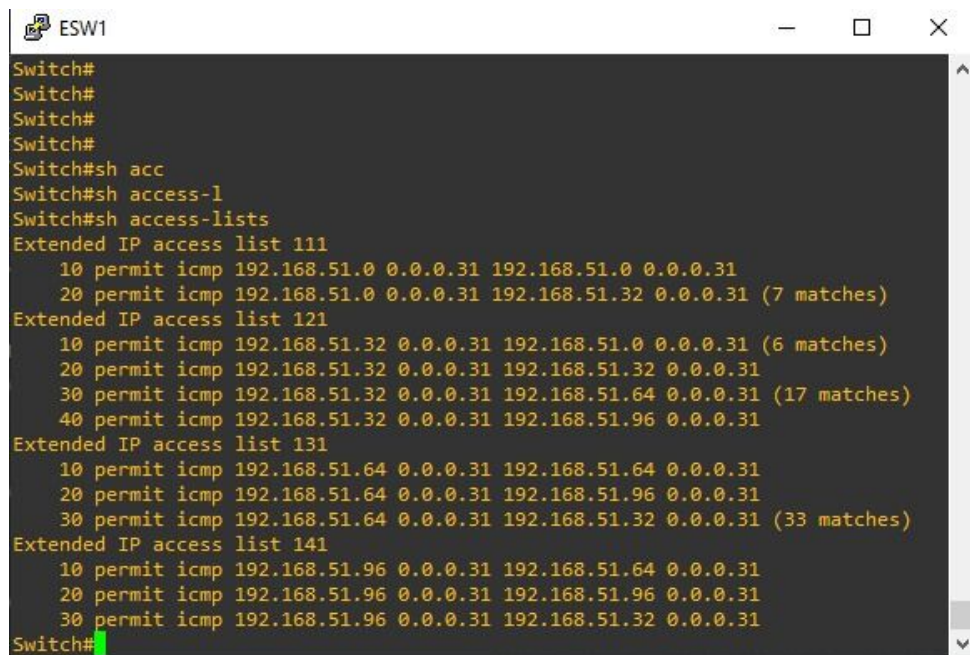
```
configure terminal
access-list 121 permit icmp 192.168.51.32 0.0.0.31 192.168.51.0 0.0.0.31
access-list 121 permit icmp 192.168.51.32 0.0.0.31 192.168.51.32 0.0.0.31
access-list 121 permit icmp 192.168.51.32 0.0.0.31 192.168.51.64 0.0.0.31
access-list 121 permit icmp 192.168.51.32 0.0.0.31 192.168.51.96 0.0.0.31
exit
```

LISTA CLASE A

```
configure terminal
access-list 131 permit icmp 192.168.51.64 0.0.0.31 192.168.51.64 0.0.0.31
access-list 131 permit icmp 192.168.51.64 0.0.0.31 192.168.51.96 0.0.0.31
access-list 131 permit icmp 192.168.51.64 0.0.0.31 192.168.51.32 0.0.0.31
exit
```

LISTA CLASE B

```
configure terminal
access-list 141 permit icmp 192.168.51.96 0.0.0.31 192.168.51.64 0.0.0.31
access-list 141 permit icmp 192.168.51.96 0.0.0.31 192.168.51.96 0.0.0.31
access-list 141 permit icmp 192.168.51.96 0.0.0.31 192.168.51.32 0.0.0.31
exit
```



```
Switch#
Switch#
Switch#
Switch#
Switch#sh acc
Switch#sh access-l
Switch#sh access-lists
Extended IP access list 111
  10 permit icmp 192.168.51.0 0.0.0.31 192.168.51.0 0.0.0.31
  20 permit icmp 192.168.51.0 0.0.0.31 192.168.51.32 0.0.0.31 (7 matches)
Extended IP access list 121
  10 permit icmp 192.168.51.32 0.0.0.31 192.168.51.0 0.0.0.31 (6 matches)
  20 permit icmp 192.168.51.32 0.0.0.31 192.168.51.32 0.0.0.31
  30 permit icmp 192.168.51.32 0.0.0.31 192.168.51.64 0.0.0.31 (17 matches)
  40 permit icmp 192.168.51.32 0.0.0.31 192.168.51.96 0.0.0.31
Extended IP access list 131
  10 permit icmp 192.168.51.64 0.0.0.31 192.168.51.64 0.0.0.31
  20 permit icmp 192.168.51.64 0.0.0.31 192.168.51.96 0.0.0.31
  30 permit icmp 192.168.51.64 0.0.0.31 192.168.51.32 0.0.0.31 (33 matches)
Extended IP access list 141
  10 permit icmp 192.168.51.96 0.0.0.31 192.168.51.64 0.0.0.31
  20 permit icmp 192.168.51.96 0.0.0.31 192.168.51.96 0.0.0.31
  30 permit icmp 192.168.51.96 0.0.0.31 192.168.51.32 0.0.0.31
Switch#
```