Monitoramento e Gerenciamento de Redes

- Switching VLANs e Access-List -

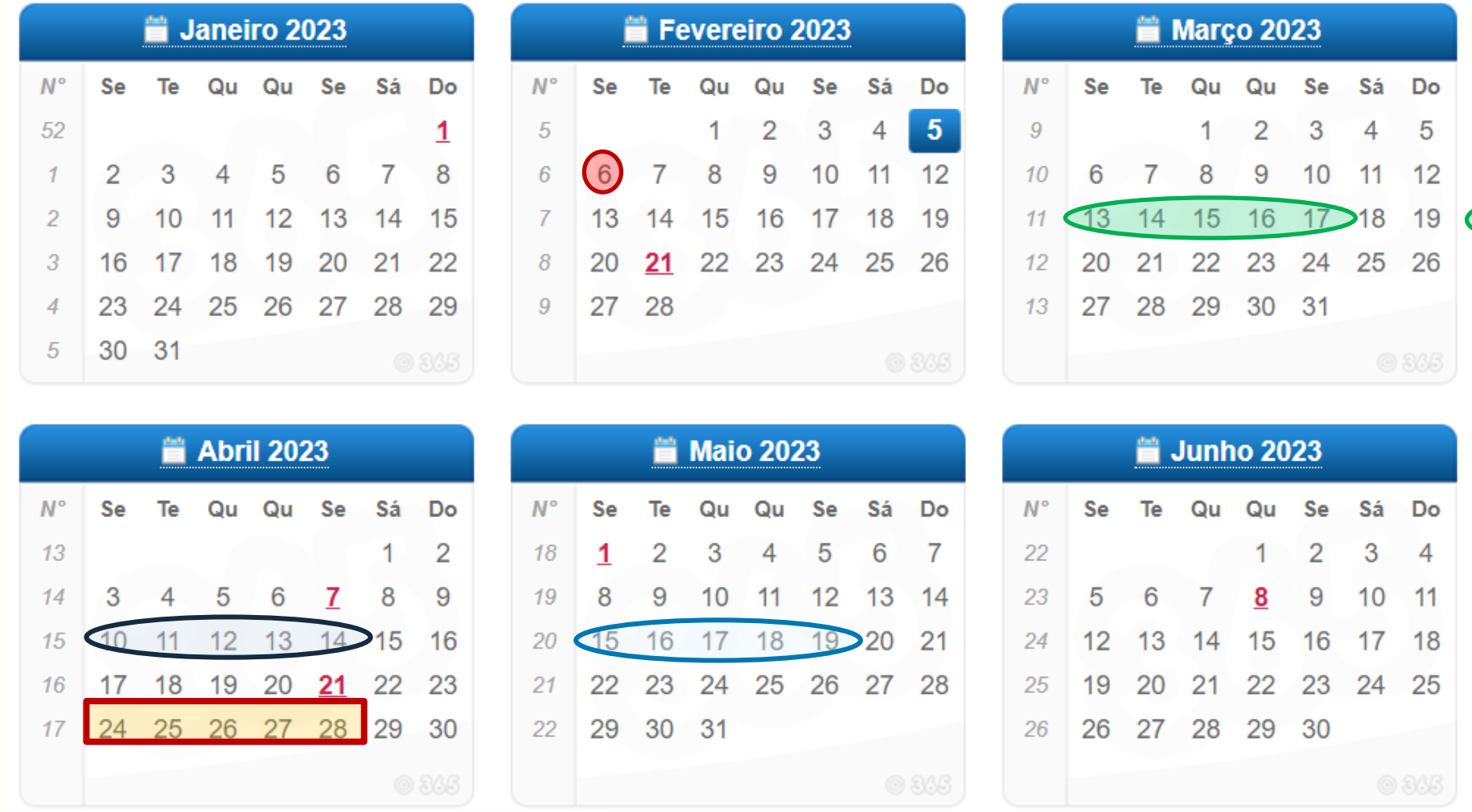
Mauro Cesar Bernardes

São Paulo, 2023

Plano de Aula

- **Objetivo**
  - Praticar o conceito de VLAN com Access-list
- **Conteúdo**
  - Switch
  - Virtual Local Area Network - VLAN
  - *Switch Trunking*
  - Subinterfaces dot1q
  - Access-control Lists
- **Metodologia**
  - Aula prática sobre os conceitos de Switch, VLAN e Trunking, com desenvolvimento de atividade prática e configuração em simulador (*Packet Tracer*).

Agenda do Primeiro semestre - 2023



Janeiro 2023

Nº	Se	Te	Qu	Qu	Se	Sá	Do
52							1
1	2	3	4	5	6	7	8
2	9	10	11	12	13	14	15
3	16	17	18	19	20	21	22
4	23	24	25	26	27	28	29
5	30	31					

Fevereiro 2023

Nº	Se	Te	Qu	Qu	Se	Sá	Do
5			1	2	3	4	5
6	6	7	8	9	10	11	12
7	13	14	15	16	17	18	19
8	20	21	22	23	24	25	26
9	27	28					

Março 2023

Nº	Se	Te	Qu	Qu	Se	Sá	Do
9			1	2	3	4	5
10	6	7	8	9	10	11	12
11	13	14	15	16	17	18	19
12	20	21	22	23	24	25	26
13	27	28	29	30	31		

Abril 2023

Nº	Se	Te	Qu	Qu	Se	Sá	Do
13						1	2
14	3	4	5	6	7	8	9
15	10	11	12	13	14	15	16
16	17	18	19	20	21	22	23
17	24	25	26	27	28	29	30

Maio 2023

Nº	Se	Te	Qu	Qu	Se	Sá	Do
18	1	2	3	4	5	6	7
19	8	9	10	11	12	13	14
20	15	16	17	18	19	20	21
21	22	23	24	25	26	27	28
22	29	30	31				

Junho 2023

Nº	Se	Te	Qu	Qu	Se	Sá	Do
22				1	2	3	4
23	5	6	7	8	9	10	11
24	12	13	14	15	16	17	18
25	19	20	21	22	23	24	25
26	26	27	28	29	30		

Início das aulas

1º Checkpoint da disciplina

2º Checkpoint da disciplina

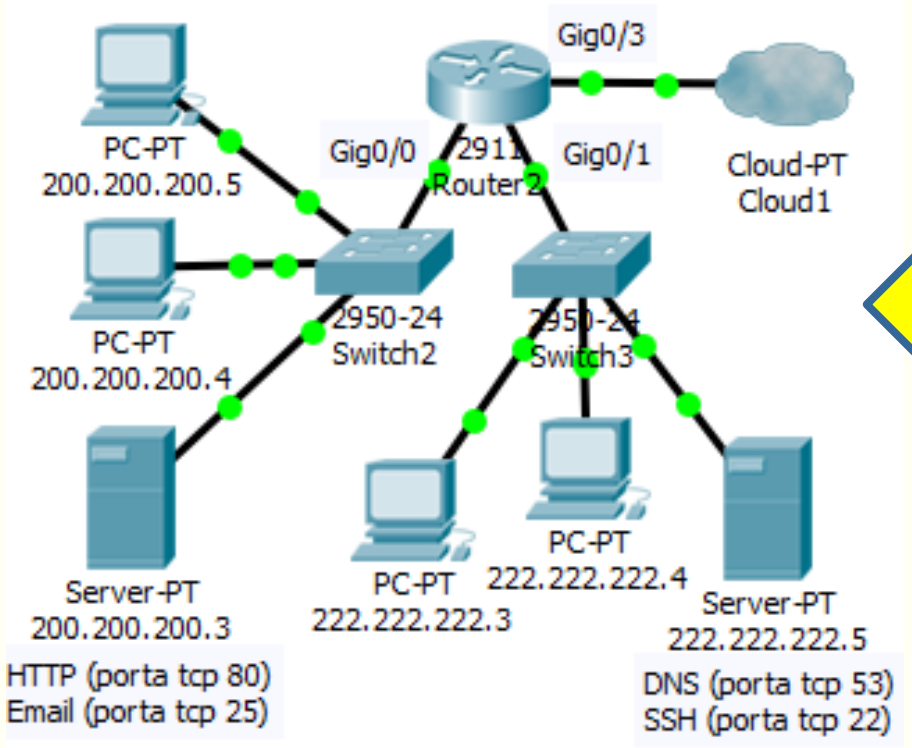
3º Checkpoint da disciplina

Aula 11 Combinando VLANs e ACLs

- Aula 11 -

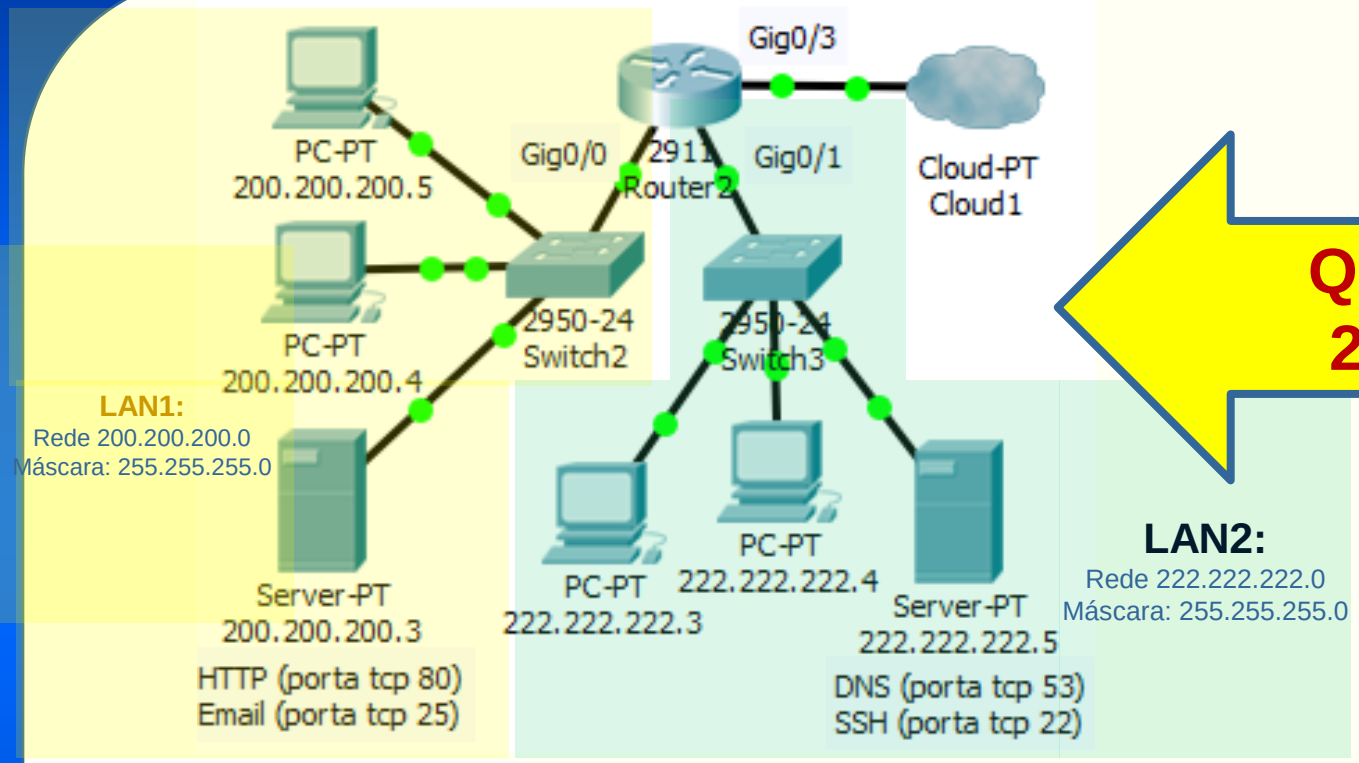
- Configurando ACLs e VLANs – Combinação de 2 conceitos importantes

Análise o Cenário a seguir



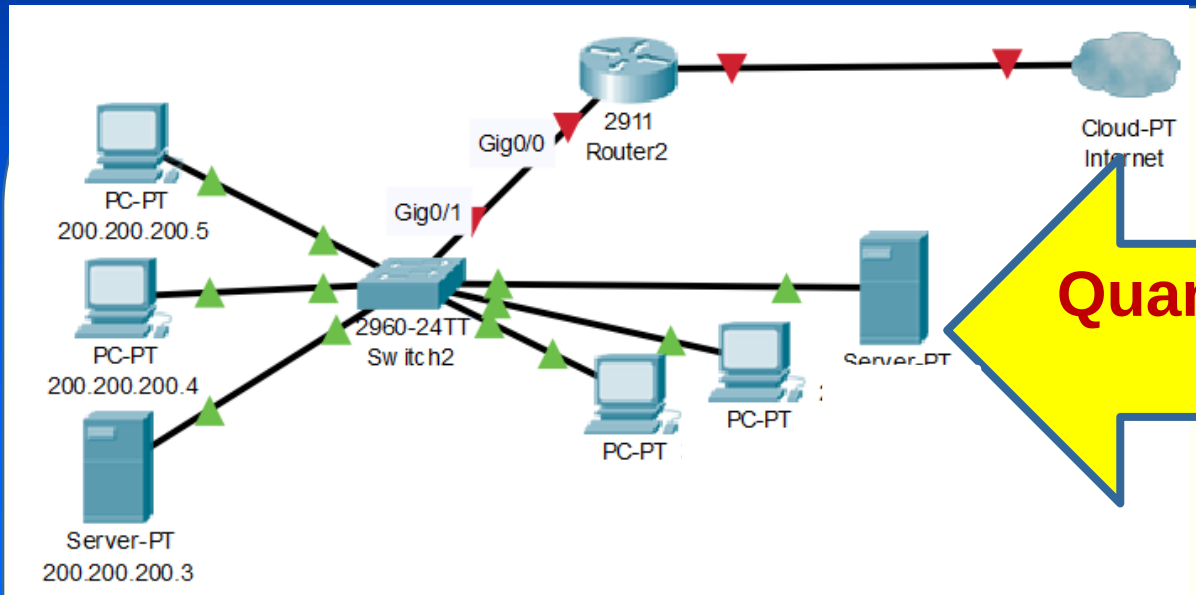
Quantas redes locais (LANs)?

Analise o cenário a seguir (3º Checkpoint): Prova 1

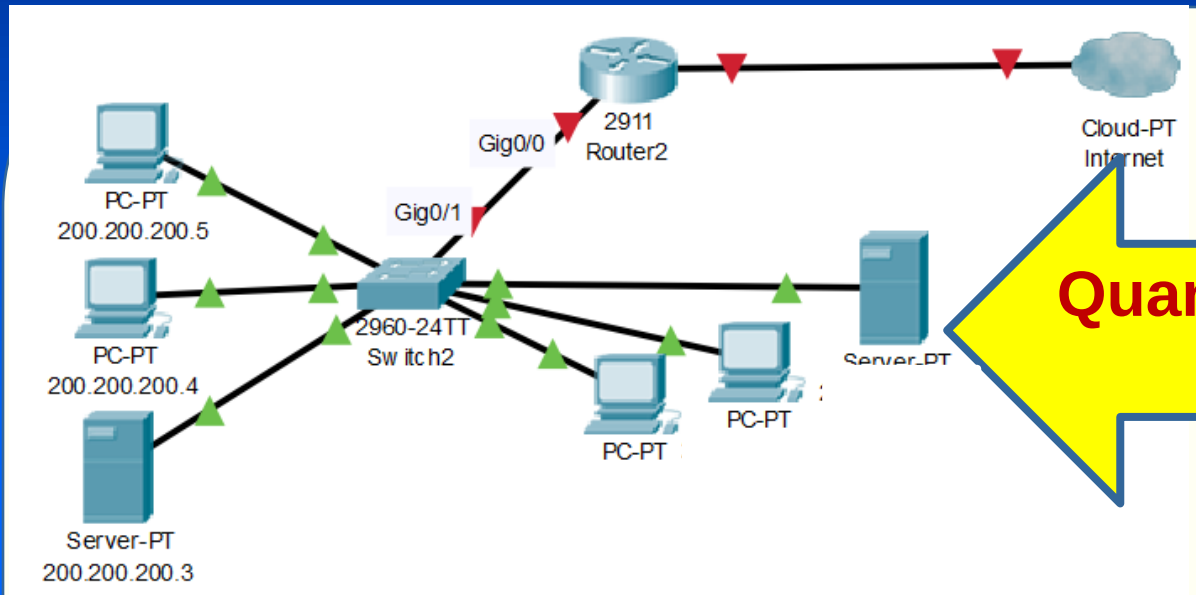


Quantas redes locais (LANs)?
2 redes locais: LAN1 e LAN2

Analise o cenário a seguir

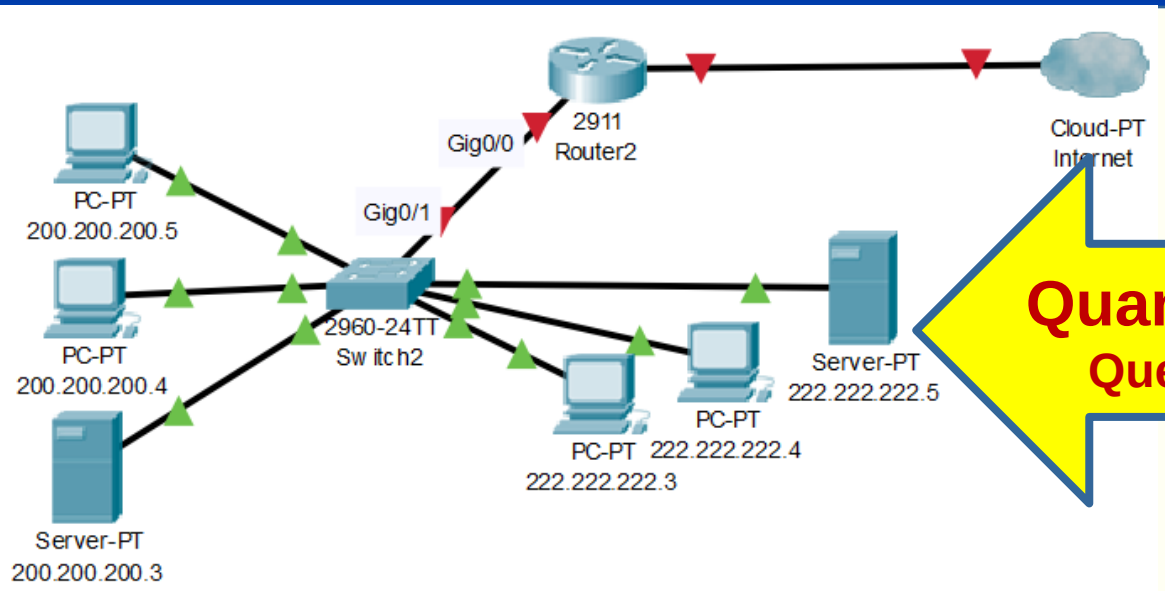


Analise o cenário a seguir



Quantas redes locais (LANs)?
Oringalmente, 1 LAN

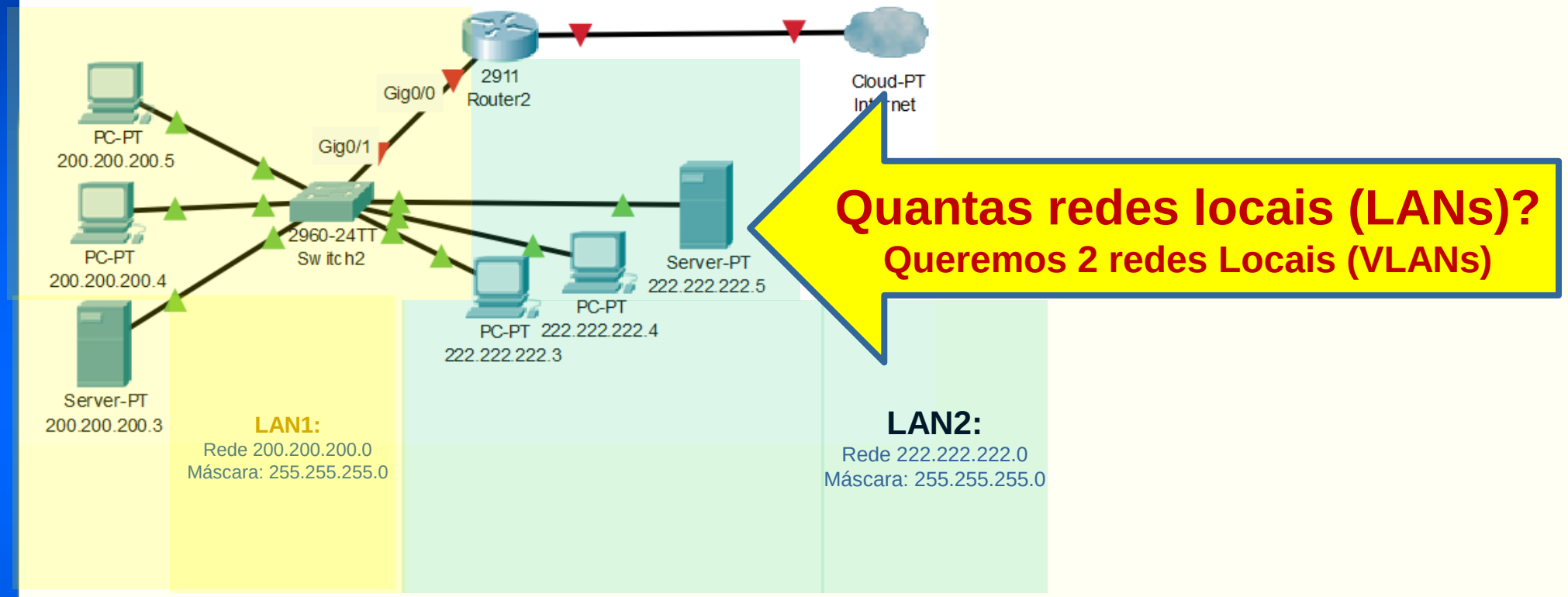
Analise o cenário a seguir



Quantas redes locais (LANs)?

Queremos 2 redes Locais (VLANs)

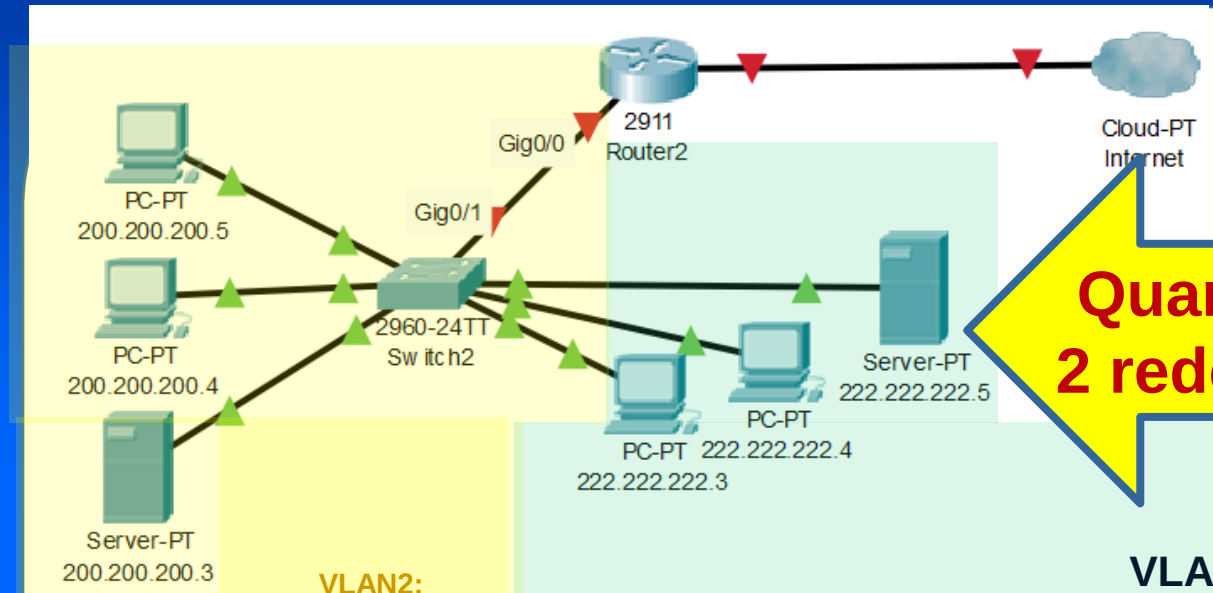
Analise o cenário a seguir



Quantas redes locais (LANs)?

Queremos 2 redes Locais (VLANs)

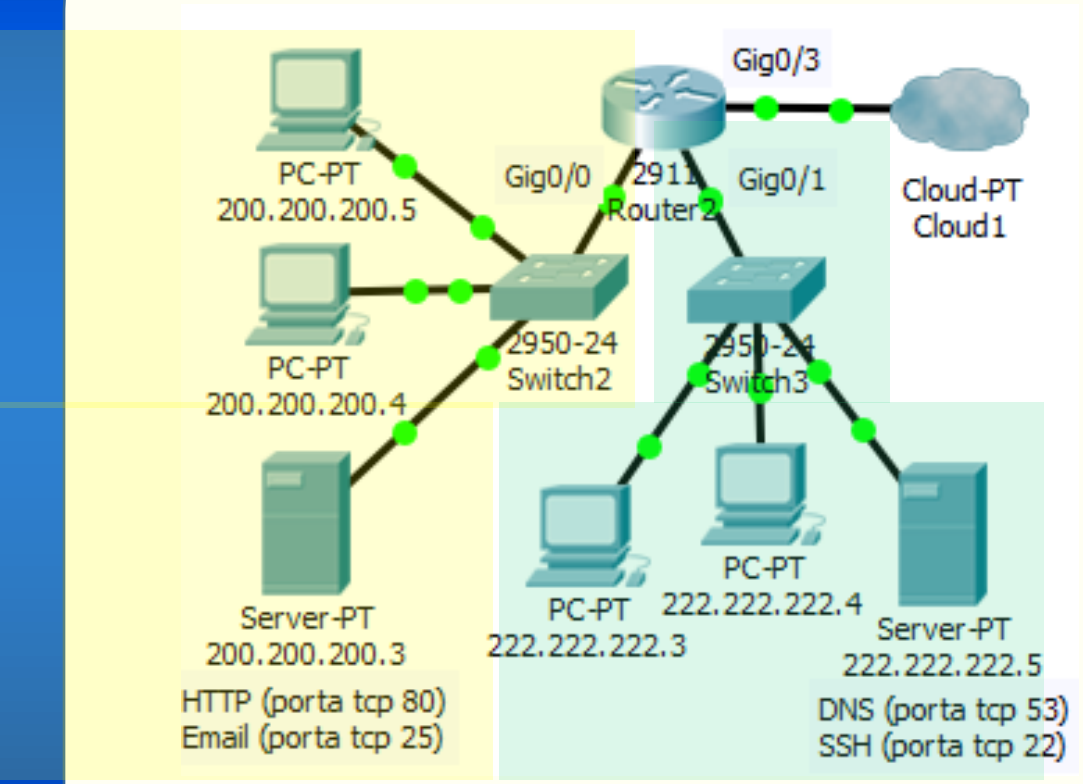
Analise o cenário a seguir



Quantas redes locais (LANs)?
2 redes locais: VLAN2 e VLAN3

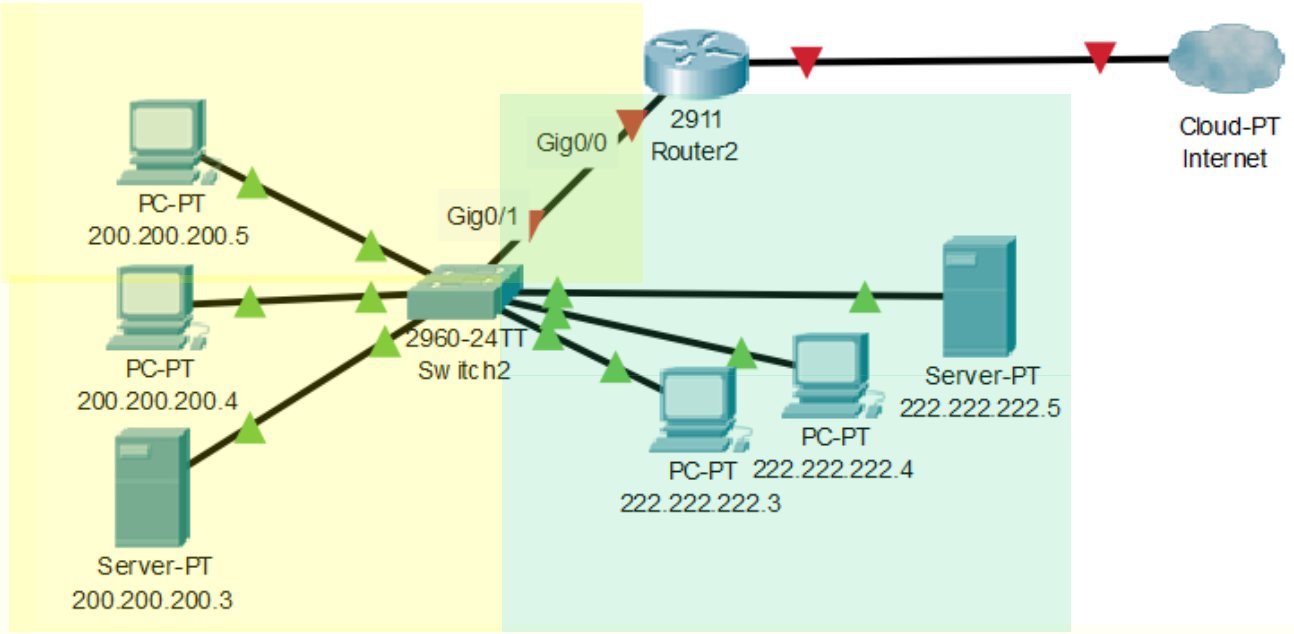
Estou utilizando VLAN2 e VLAN3
pois a VLAN1 é a VLAN default

Analise o cenário a seguir



Arquivo na área de apostilas do Portal da FIAP:

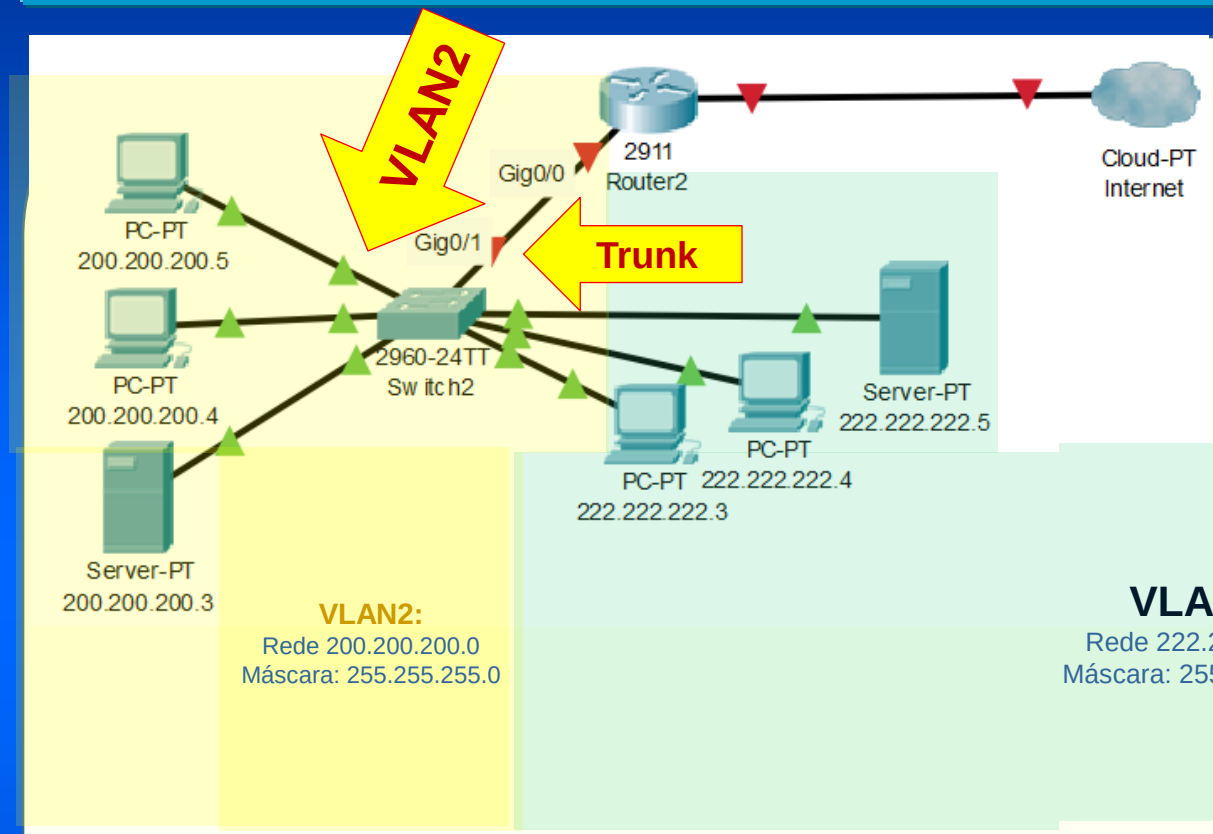
`Aula 10 2023 Checkpoint VLANs Firewall.pkt`



Arquivo na área de apostilas do Portal da FIAP:

`Aula 10 2023 Checkpoint VLANs Firewall parte II.pkt`

Configuração da VLAN2: amarela



Arquivo na área de apostilas do Portal da FIAP:

Aula 11 2023 Checkpoint VLANs Firewall parte II.pkt

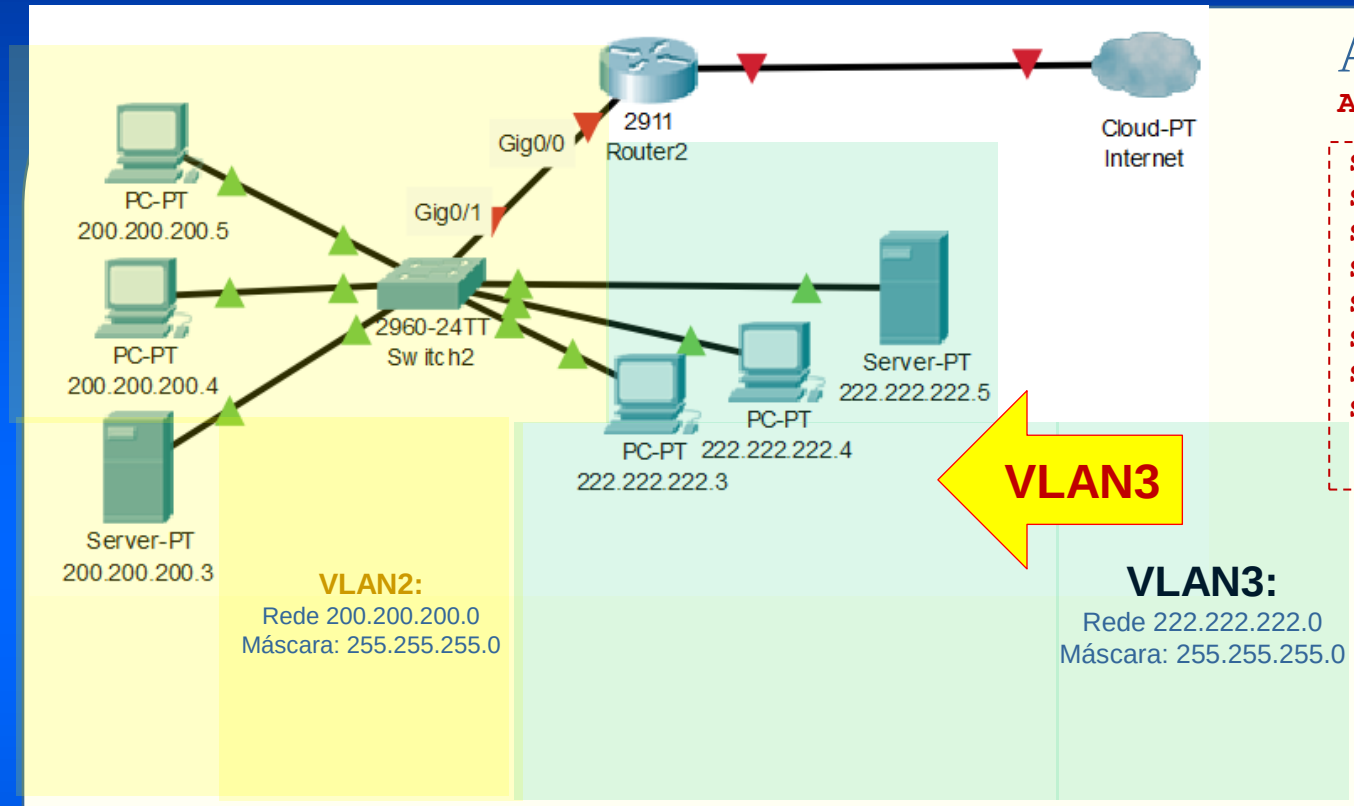
```
Switch>enable
Switch#configure terminal
Switch(config)#
Switch(config)#vlan 2
Switch(config-vlan)#name AMARELA
Switch(config-vlan)#
Switch(config-vlan)#
Switch(config-vlan)#interface range fa0/1-fa0/10
Switch(config-if-range)#switchport access vlan 2
Switch(config-if-range)#
```

VLAN2

```
Switch(config-if-range)#
Switch(config-if-range)#interface gig0/1
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan all
Switch(config-if)#
```

Trunk

Configuração da VLAN3: azul



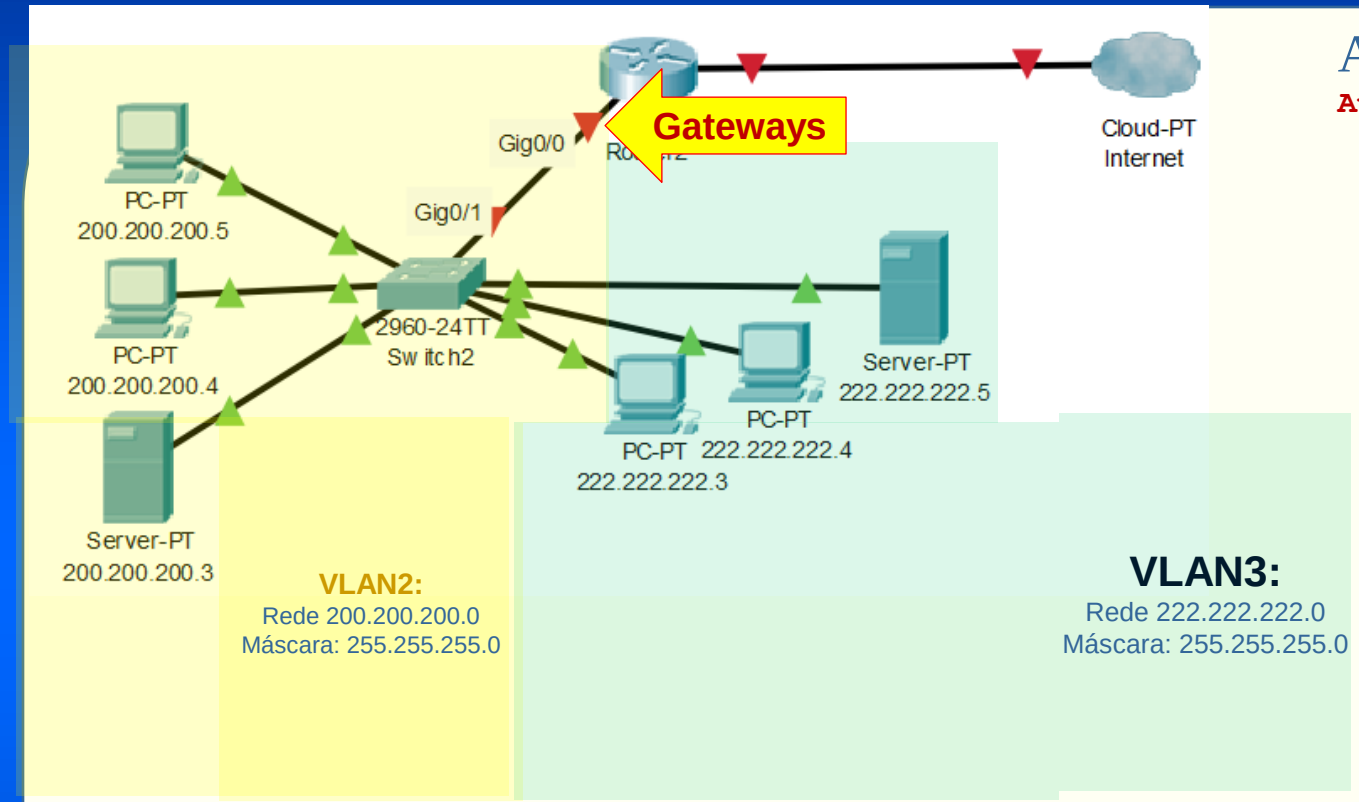
Arquivo na área de apostilas do Portal da FIAP:

Aula 11 2023 Checkpoint VLANs Firewall parte II.pkt

```
Switch>enable
Switch#configure terminal
Switch(config)#
Switch(config)#vlan 3
Switch(config-vlan)#name AZUL
Switch(config-vlan)#interface range fa0/10-fa0/24
Switch(config-if-range)#switchport access vlan 3
Switch(config-if-range)#
```

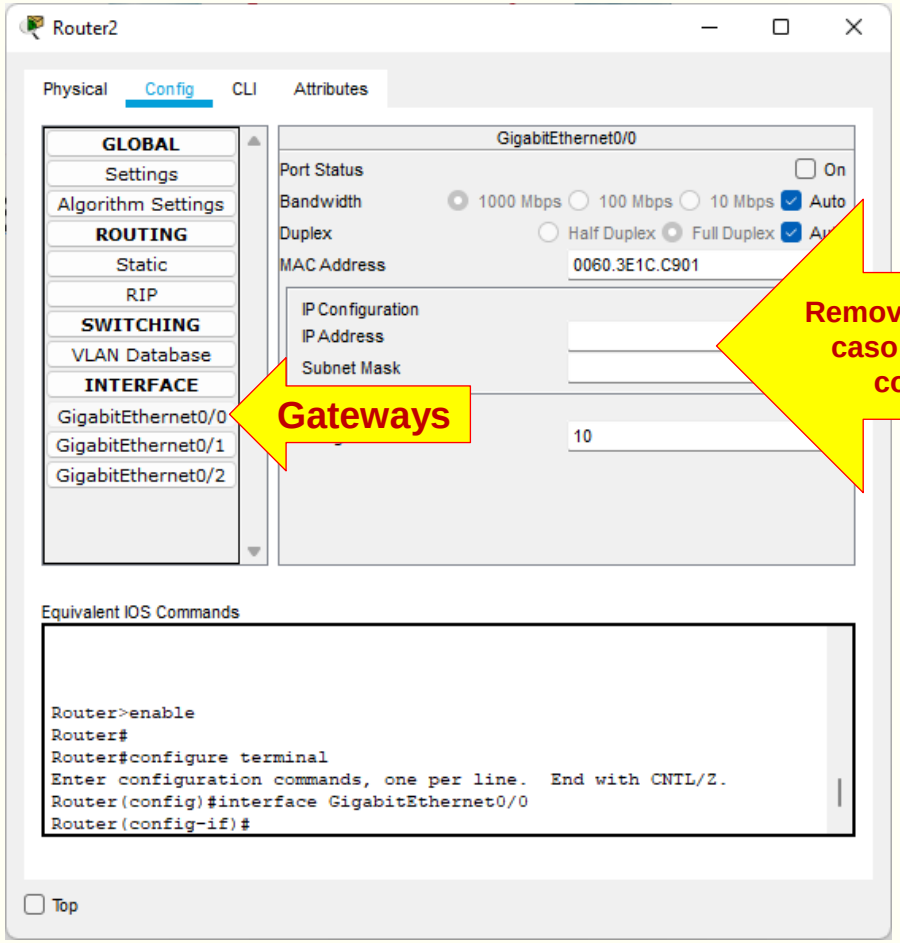
VLAN3

Configuração da subinterfaces (gateways)

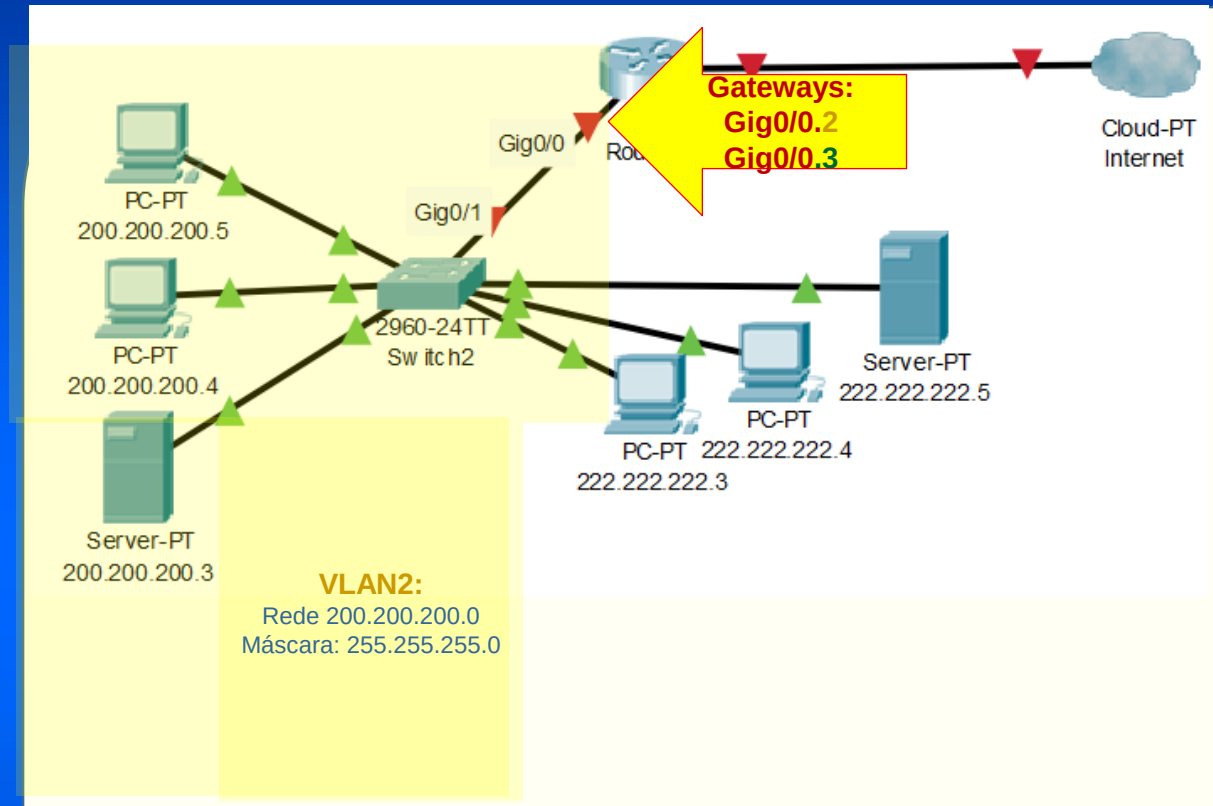


Arquivo na área de apostilas do Portal da FIAP:

Aula 11 2023 Checkpoint VLANs Firewall parte II.pkt



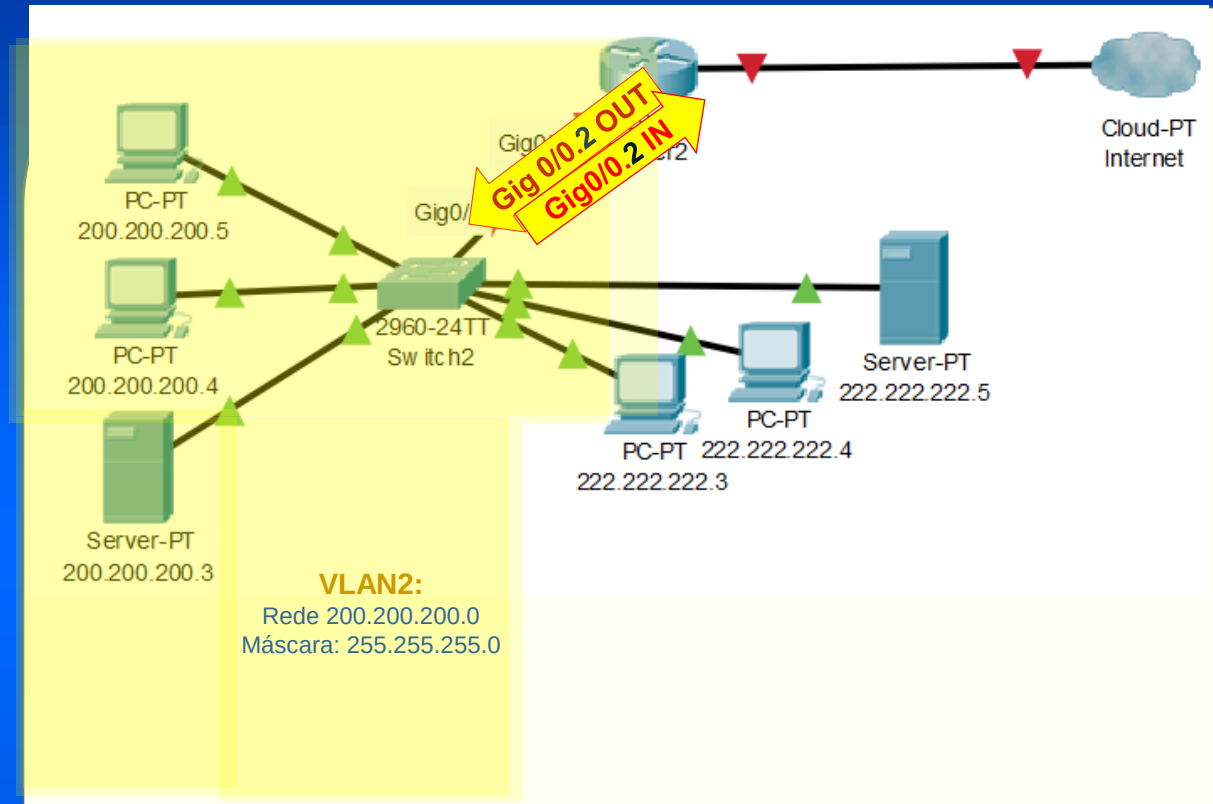
Configuração da subinterfaces (gateways)




```
Router>
Router>enable
Router#configure terminal
Router(config)#
Router(config)#interface gig0/0.2
Router(config-subif)#
Router(config-subif)#encapsulation dot1q 2
Router(config-subif)#ip address 200.200.200.1 255.255.255.0
Router(config-subif)#
```

Gateway VLAN2

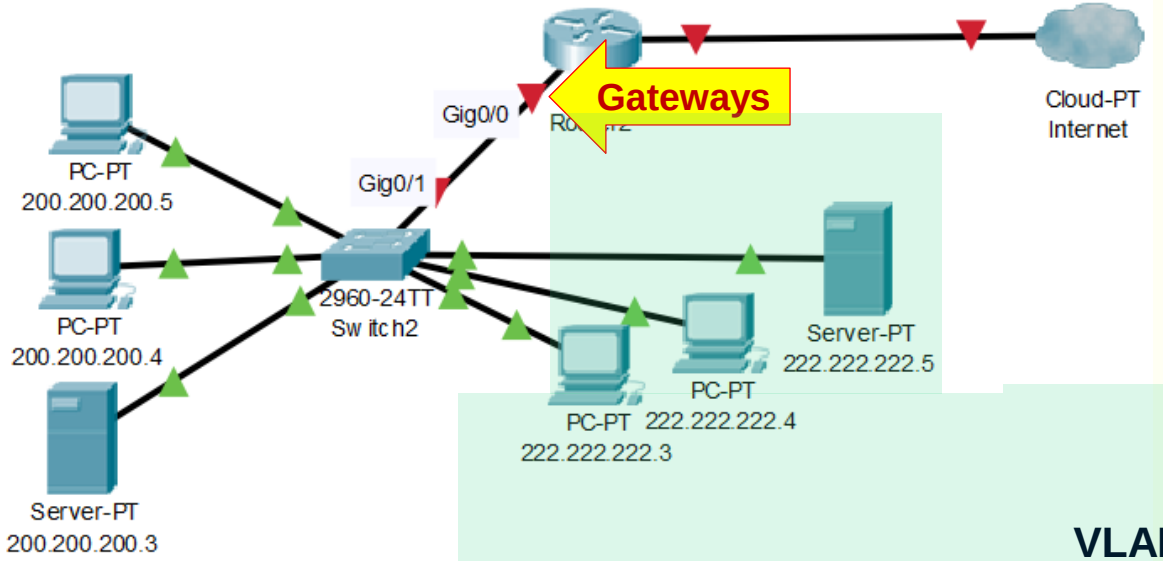
Configuração da subinterfaces (gateways)




```
Router>
Router>enable
Router#configure terminal
Router(config)#
Router(config)#interface gig0/0.2
Router(config-subif)#
Router(config-subif)#encapsulation dot1q 2
Router(config-subif)#ip address 200.200.200.1 255.255.255.0
Router(config-subif)#
```

Gateway VLAN2

Configuração da subinterfaces (gateways)

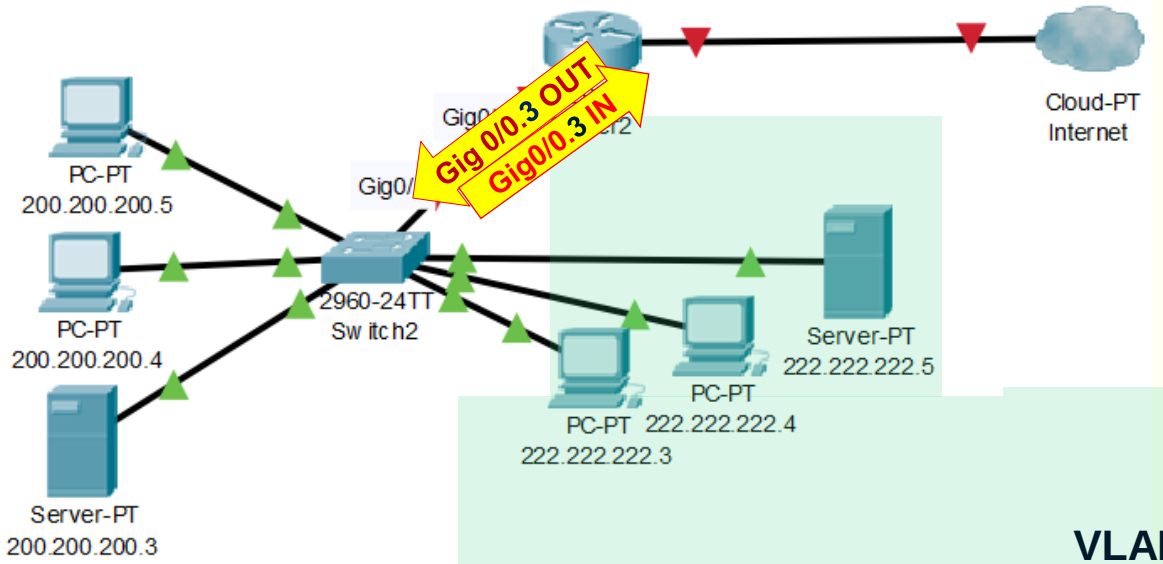


VLAN3:
Rede 222.222.222.0
Máscara: 255.255.255.0

```
Router>
Router>enable
Router#configure terminal
Router(config)#
Router(config)#interface gig0/0.2
Router(config-subif)#
Router(config-subif)#encapsulation dot1q 2
Router(config-subif)#ip address 200.200.200.1 255.255.255.0
Router(config-subif)#
Router(config-subif)#
Router(config-subif)#
Router(config-subif)#interface gig0/0.3
Router(config-subif)#encapsulation dot1q 3
Router(config-subif)#ip address 222.222.222.1 255.255.255.0
Router(config-subif)#
```

Gateway VLAN3

Configuração da subinterfaces (gateways)

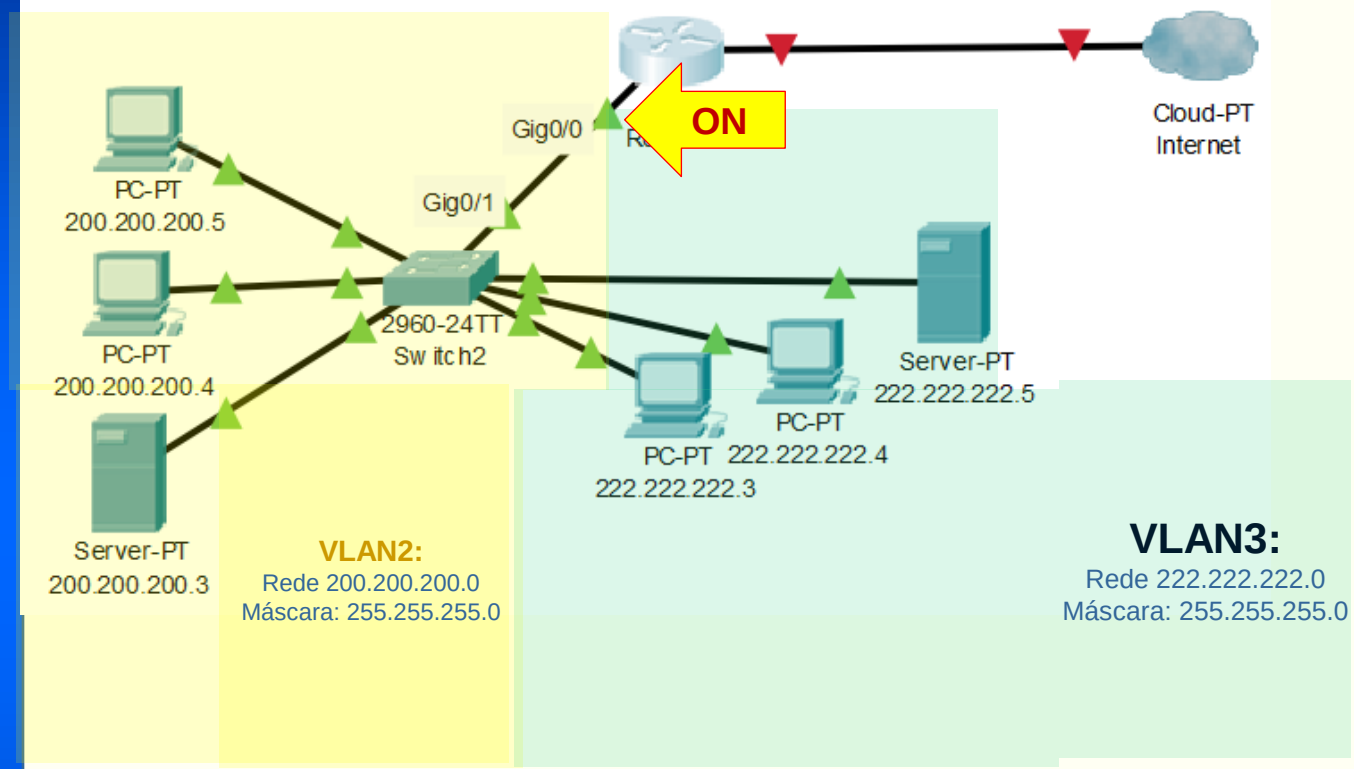


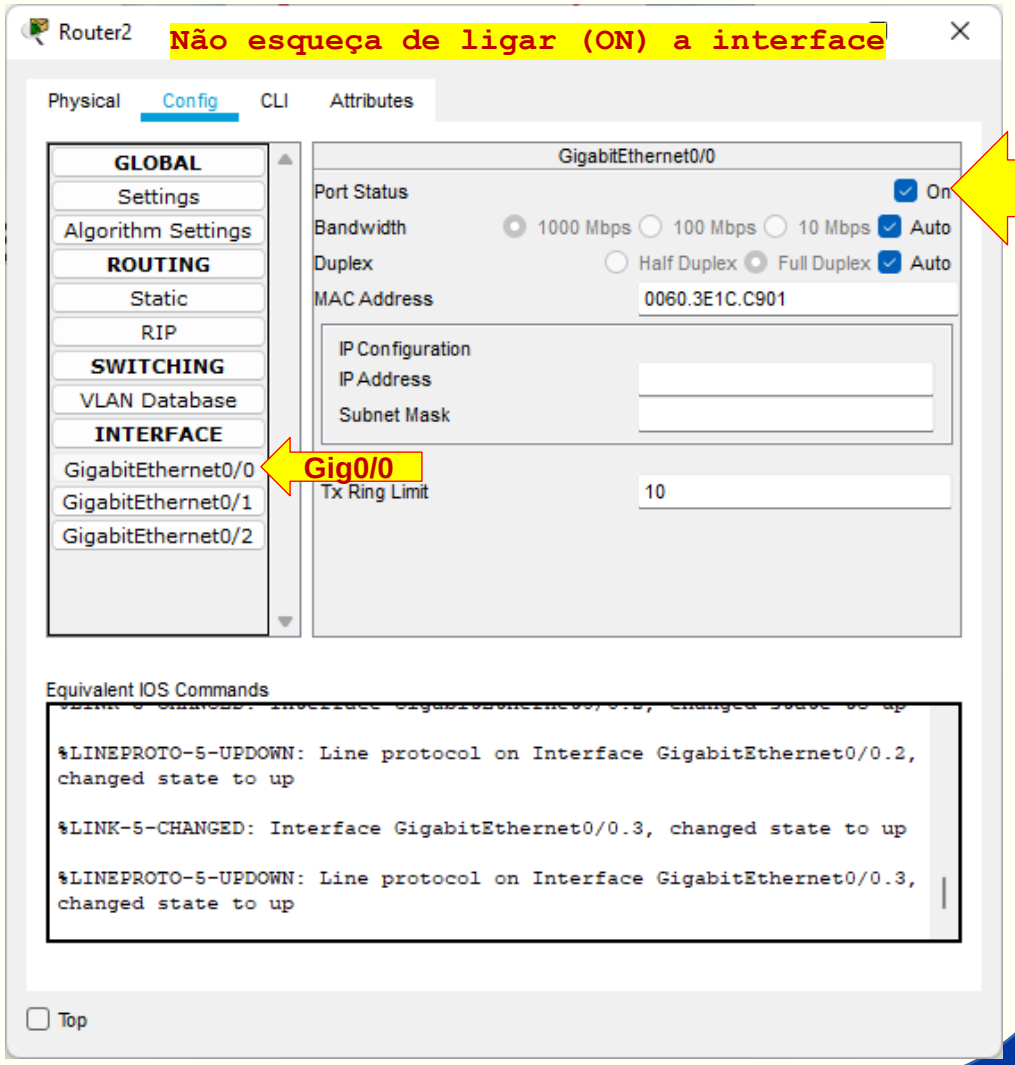
VLAN3:
Rede 222.222.222.0
Máscara: 255.255.255.0

```
Router>
Router>enable
Router#configure terminal
Router(config)#
Router(config)#interface gig0/0.2
Router(config-subif)#
Router(config-subif)#encapsulation dot1q 2
Router(config-subif)#ip address 200.200.200.1 255.255.255.0
Router(config-subif)#
Router(config-subif)#
Router(config-subif)#
Router(config-subif)#interface gig0/0.3
Router(config-subif)#encapsulation dot1q 3
Router(config-subif)#ip address 222.222.222.1 255.255.255.0
Router(config-subif)#
Router(config-subif)#
Router(config-subif)#interface gig0/0
Router(config-subif)#no shutdown
Router(config-subif)#
```

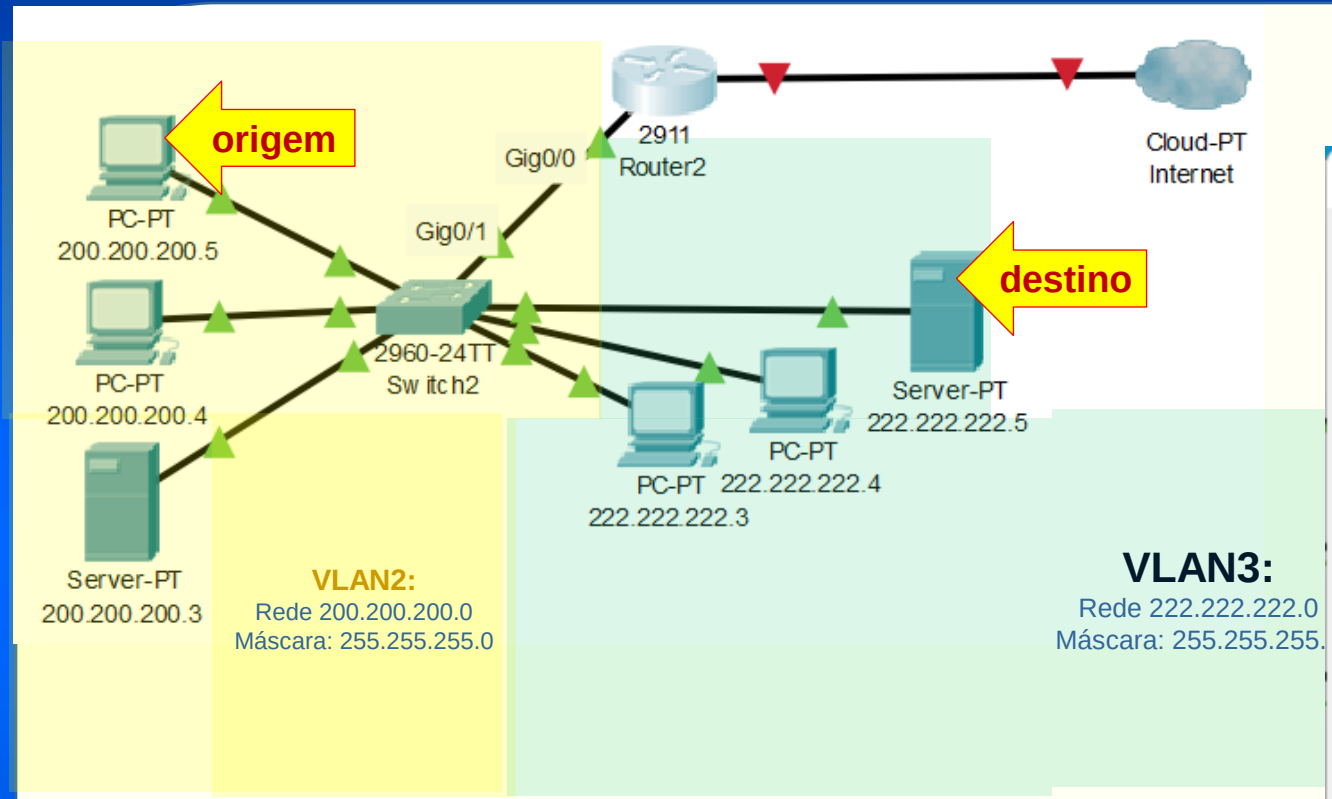
Gateway VLAN3

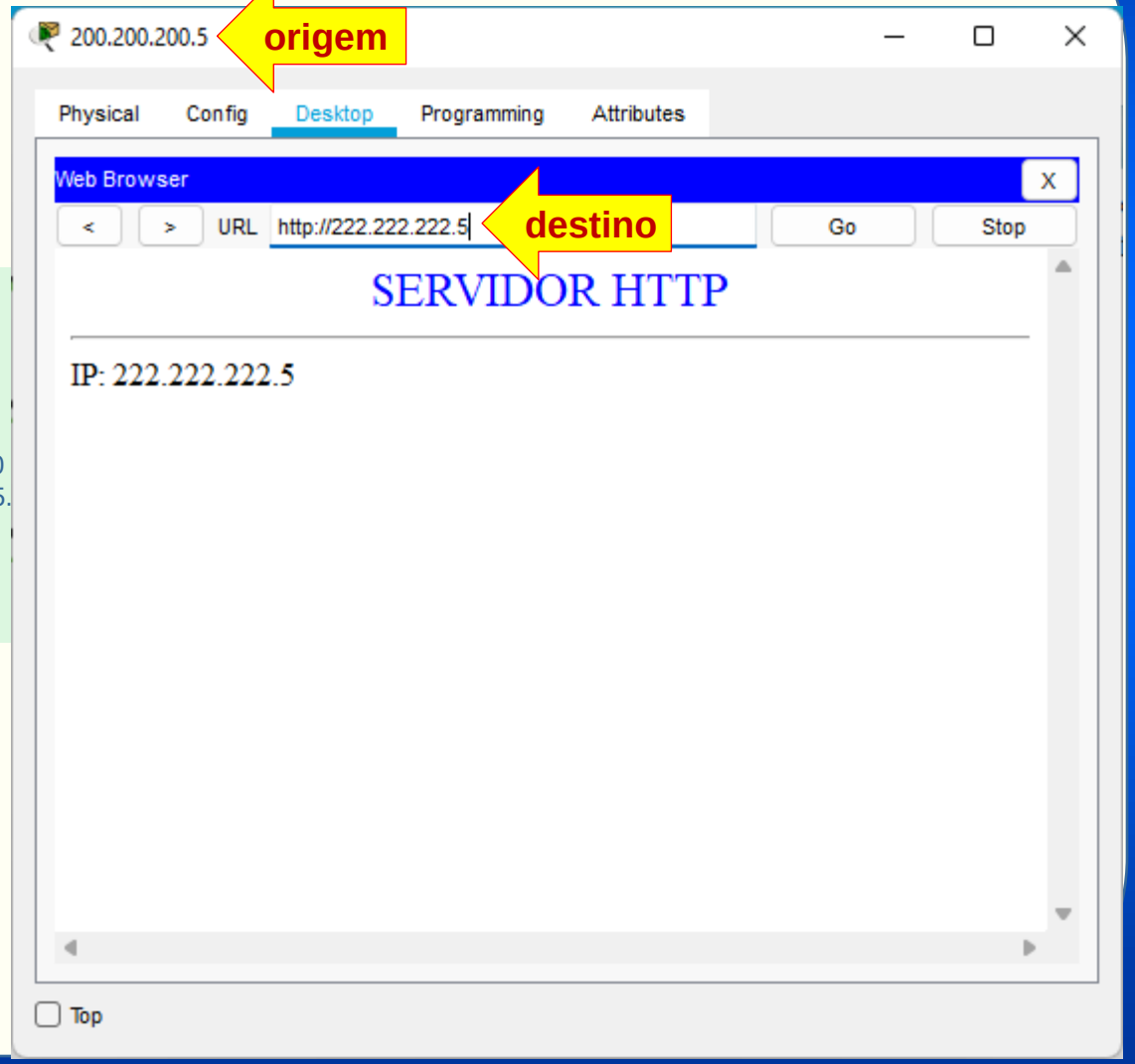
Configuração da subinterfaces (gateways)



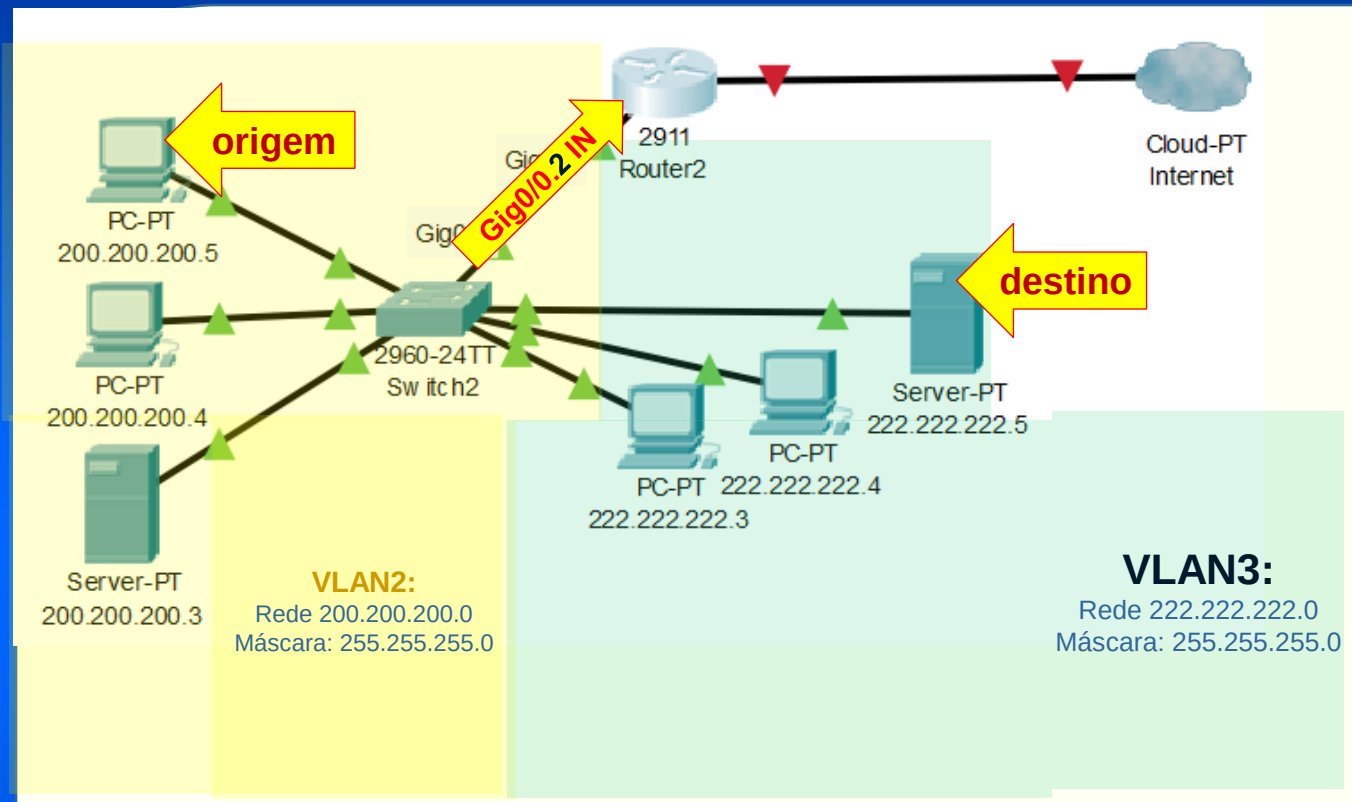


Configuração da subinterfaces (gateways)





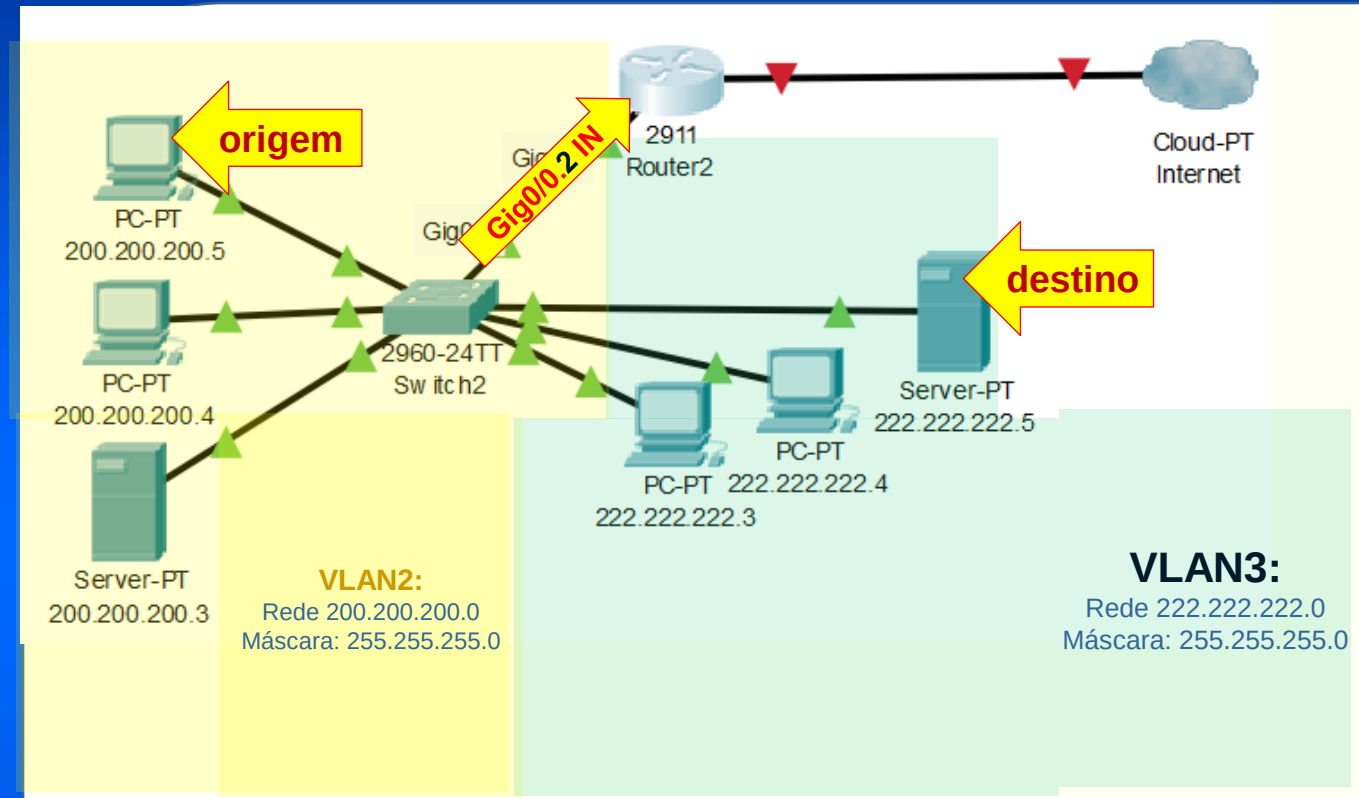
Configuração da subinterfaces (gateways)

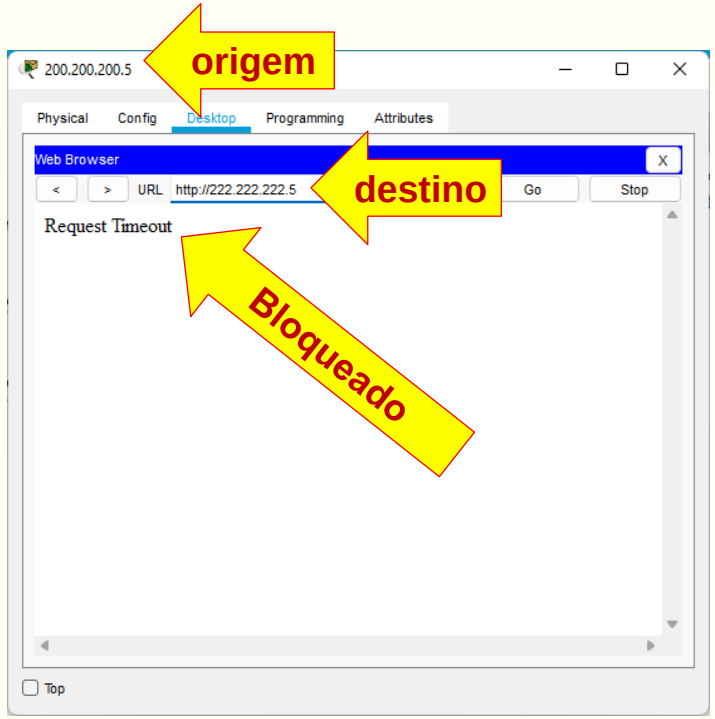


Política de Segurança: Bloquear acesso do host 200.200.200.5 ao serviço HTTP (porta TCP 80) no servidor 222.222.222.5. Todos os demais acessos Deverão ficar liberados.

```
Router>
Router>enable
Router#configure terminal
Router(config)#access-list 100 deny tcp host 200.200.200.5 host 222.222.222.5 eq 80
Router(config)#access-list 100 permit ip any any
Router(config)#
Router(config)#interface gig0/0.2
Router(config)#ip access-group 100 in
```

Configuração da subinterfaces (gateways)





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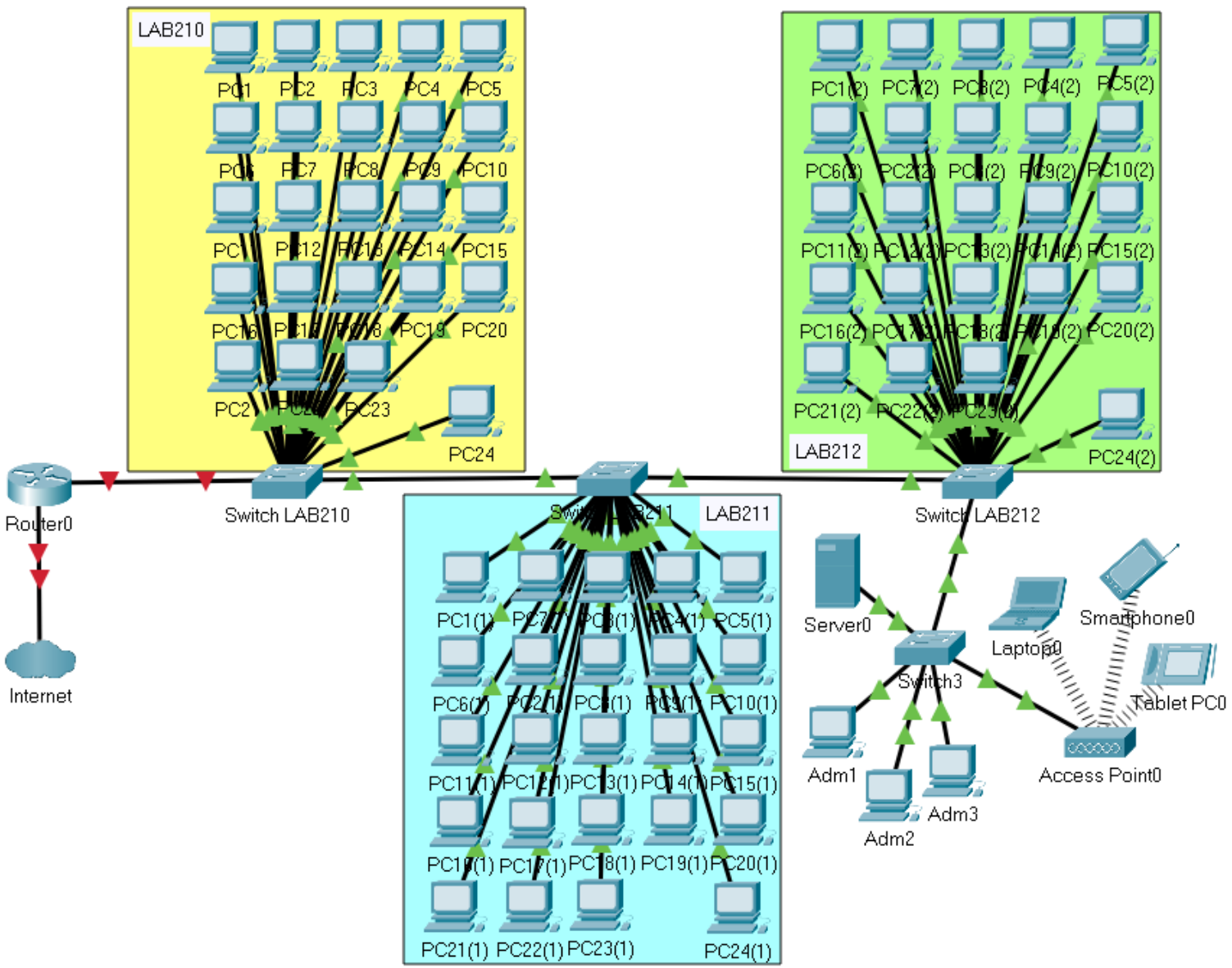
Router(config)#access-list 100 permit ip any any
Router(config)#
Router(config)#interface gig0/0.2
Router(config)#ip access-group 100 in
```

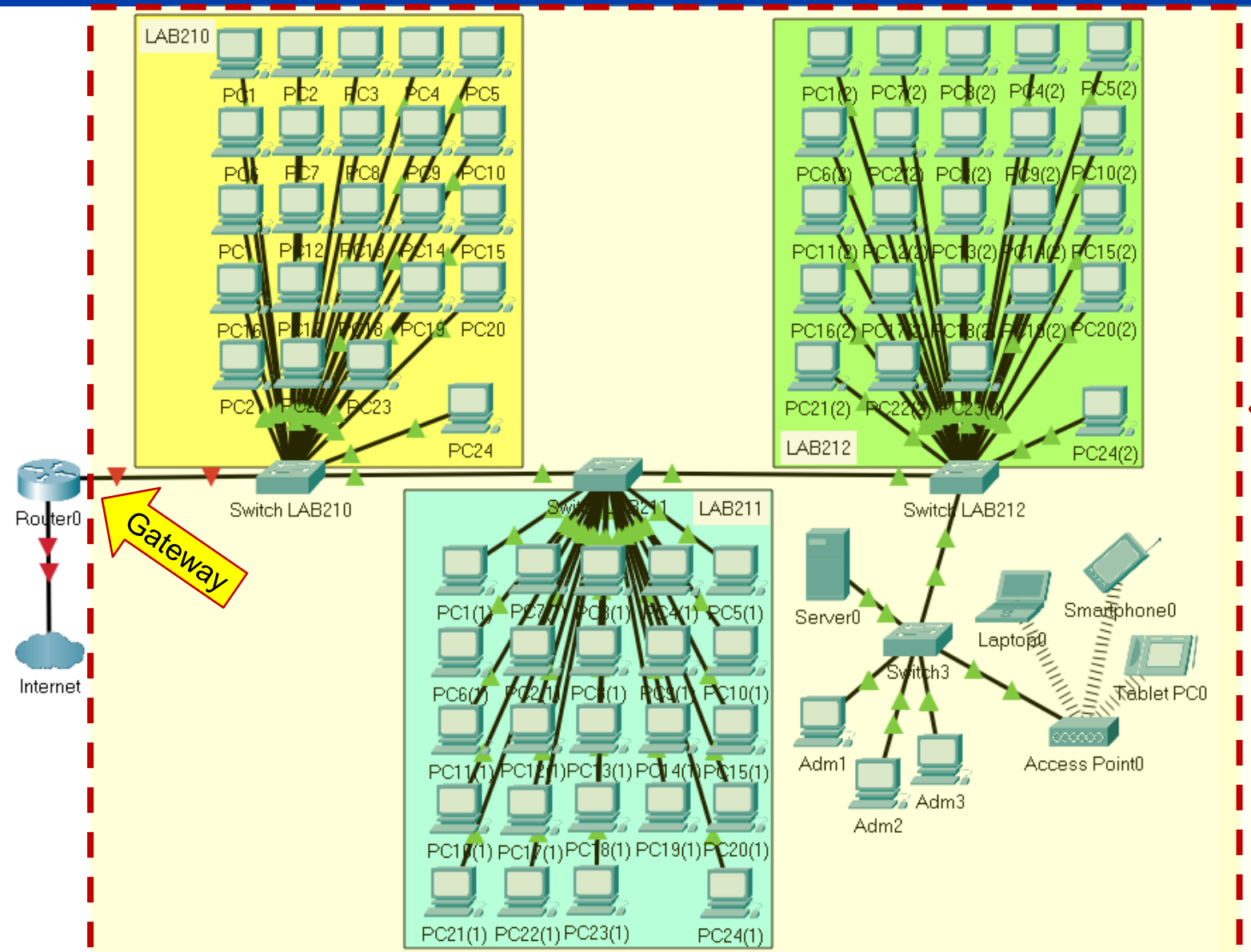
- REVISÃO VLAN -

Cenário Proposto: Aula 03 PráticacomSwitcheseVlan 2021.pkt



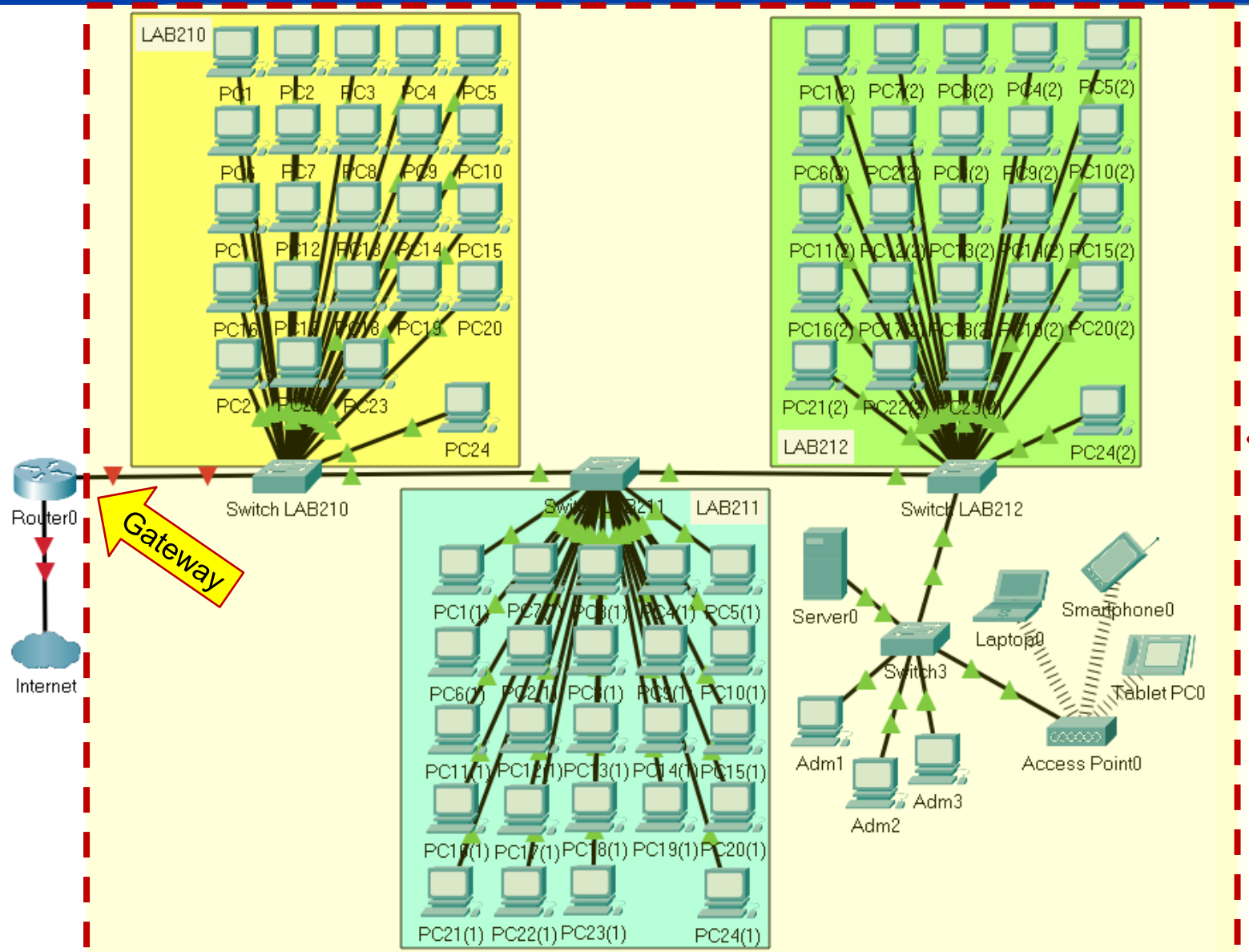
- Neste cenário temos 3 laboratórios de uma instituição de ensino com 24 equipamentos desktops cada uma: 23 para alunos e 1 para o professor (PC24);
- Há um setor administrativo com 3 desktops
- No servidor existente na organização estão os sistemas financeiros e acadêmicos
- Um Access-point permite o acesso à rede por meio de tecnologia Wi-fi.
- Não foi realizada nenhuma configuração neste cenário: os equipamentos estão da mesma forma como entregues pelo fornecedor.

Cenário Proposto: Aula 10 PráticacomSwitcheseVlan 2023.pkt



A topologia física apresenta uma **única rede com um único domínio de broadcast**

Cenário Proposto: Aula 10 PráticacomSwitcheseVlan 2023.pkt

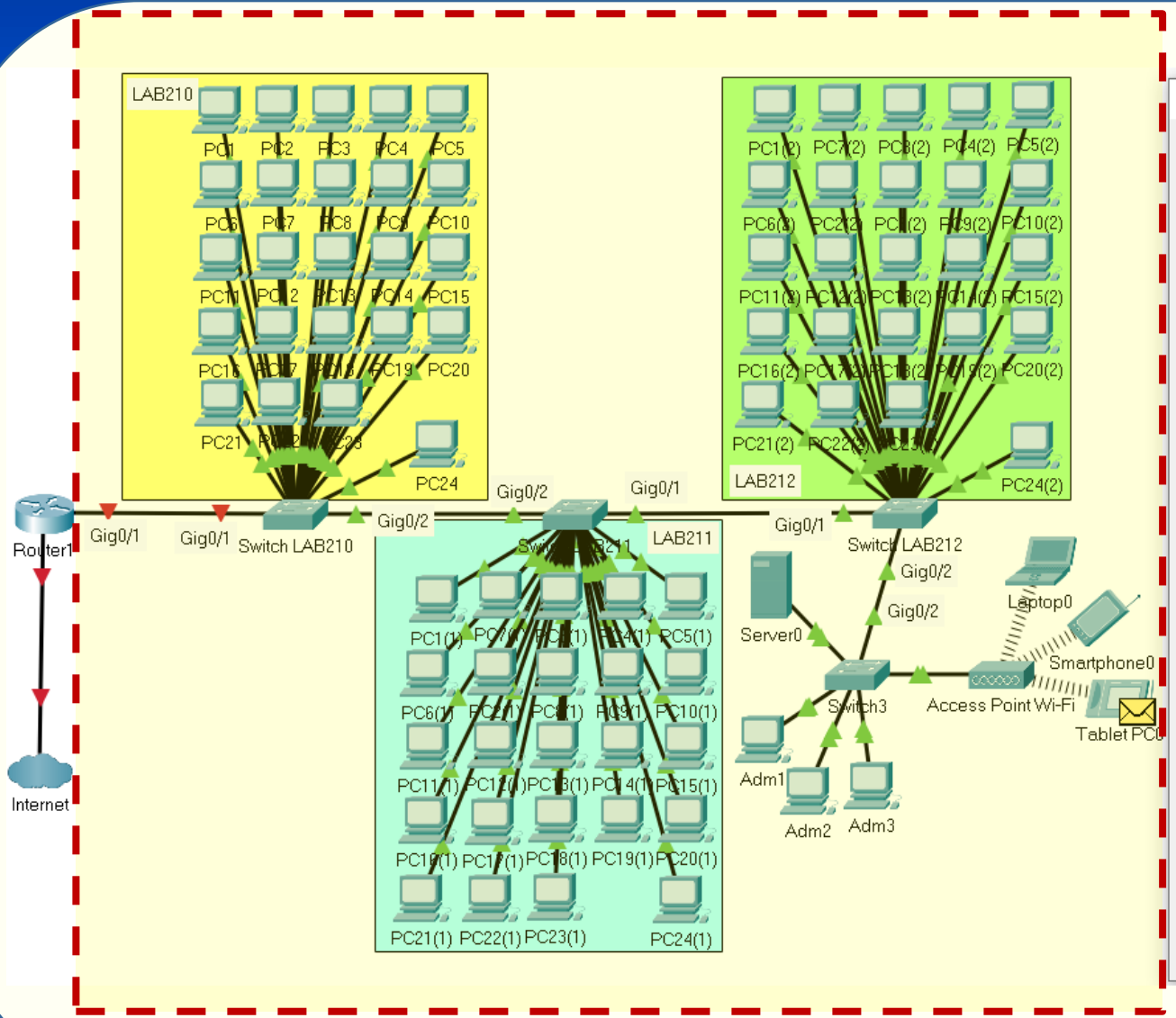


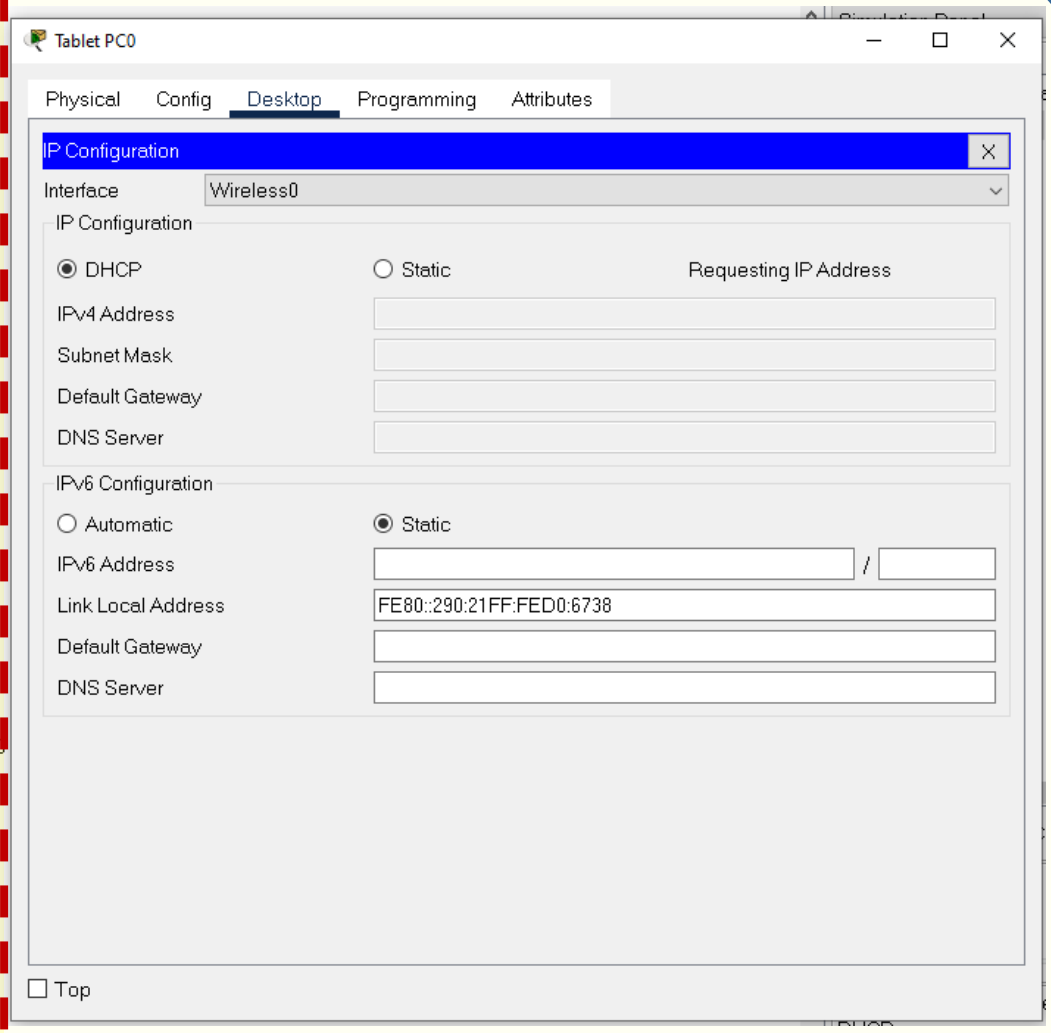
Problemas a considerar:

Desempenho: Todos os dispositivos serão impactados por broadcasts gerados na rede local

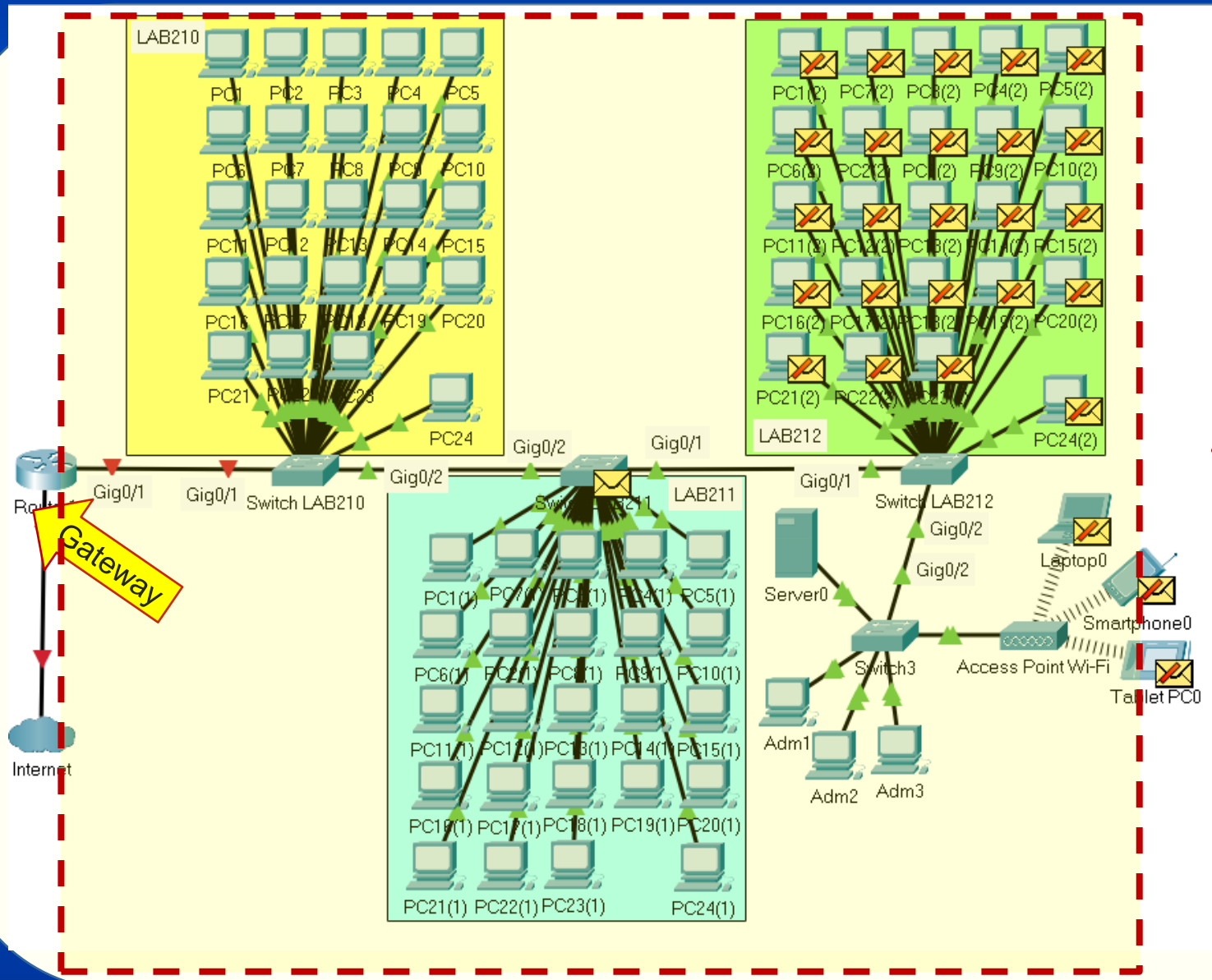
Segurança: Todos os equipamentos conseguem trocar informações uns com os outros sem uma barreira de proteção (*Firewall*) entre eles.

Cenário Proposto: Aula 10 PráticacomSwitcheseVlan 2023.pkt



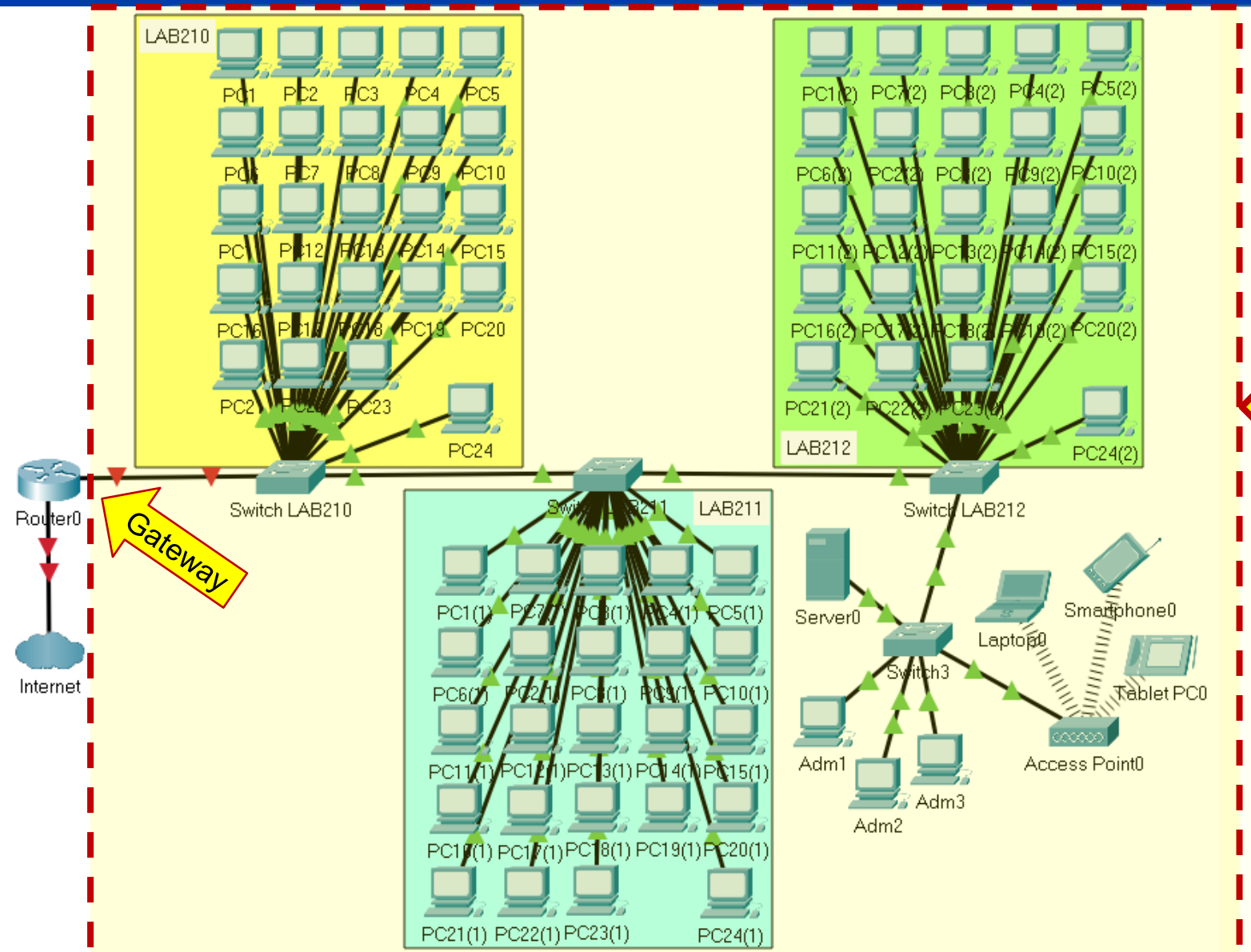


Cenário Proposto: Aula 10 PráticacomSwitcheseVlan 2023.pkt



Broadcasts alcançarão todos os equipamentos da Topologia.
Isso poderá comprometer o desempenho.

Cenário Proposto: Aula 10 PráticacomSwitcheseVlan 2023.pkt



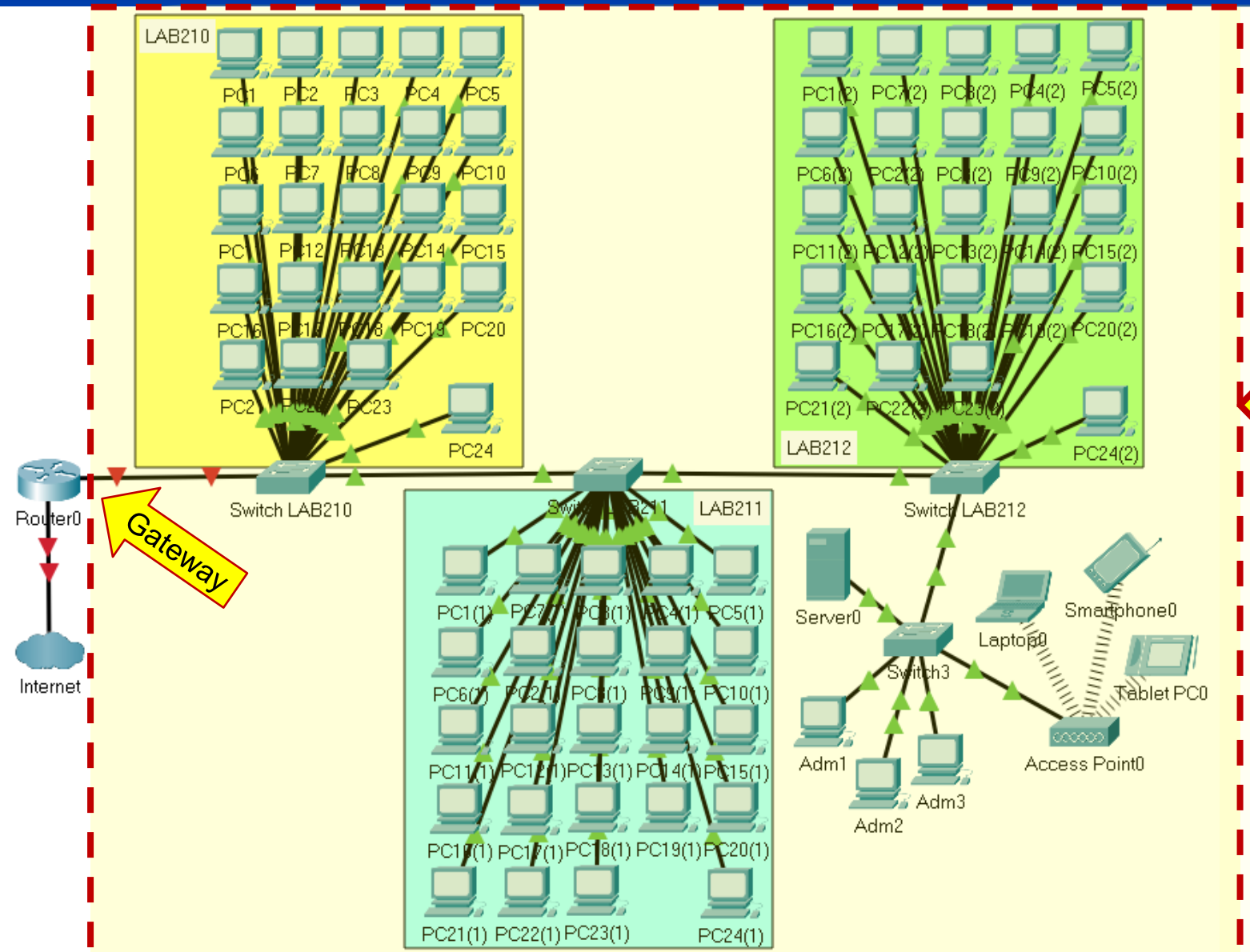
Proposta para divisão em redes Virtuais (VLANs):

- 1 VLAN para cada laboratório: LAB210. LAB211, LAB212
- 1 VLAN para os 3 PCs de professores nos laboratórios
- 1 VLAN para o Servidor
- 1 VLAN para os PCs do Administrativo
- 1 VLAN para a rede Wireless

No total teremos 7 VLANs, ou seja:

- 7 redes
- 7 domínios de broadcast

Cenário Proposto: Aula 10 PráticacomSwitcheseVlan 2023.pkt



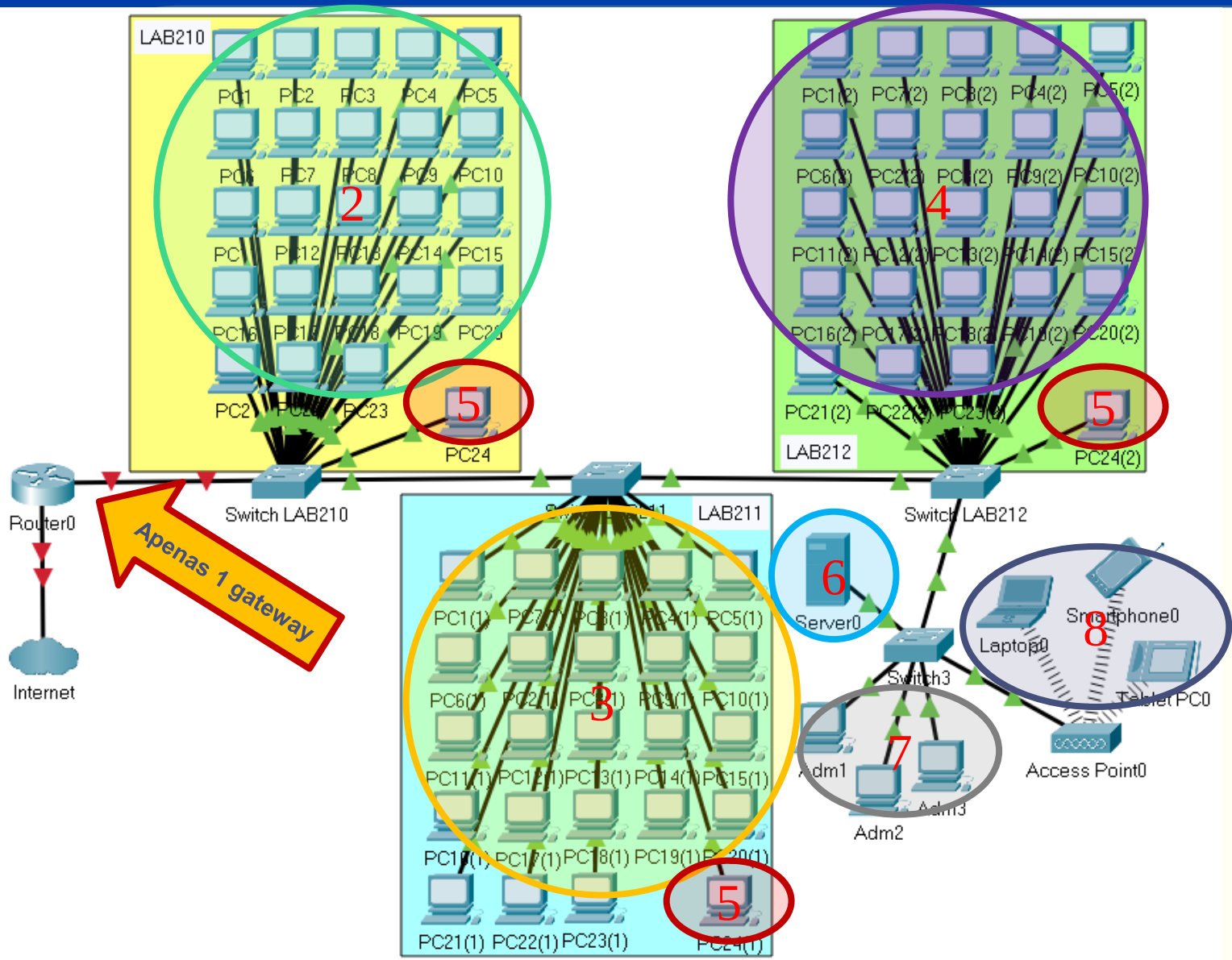
Proposta para divisão em redes Virtuais (VLANs):

- **VLAN1: DEFAULT** (Por padrão, **JÁ EXISTENTE!!!**)
- **VLAN2: LAB210**
- **VLAN3: LAB211**
- **VLAN4: LAB212**
- **VLAN5: PROFE**
- **VLAN6: SERVER**
- **VLAN7: ADM**
- **VLAN8: WIFI**

No total serão configuradas 7 VLANs, ou seja:

- **7 redes**
- **7 domínios de broadcast**

Cenário Proposto: Aula 10 PráticacomSwitcheseVlan 2023.pkt



Proposta para divisão em redes Virtuais (VLANs):

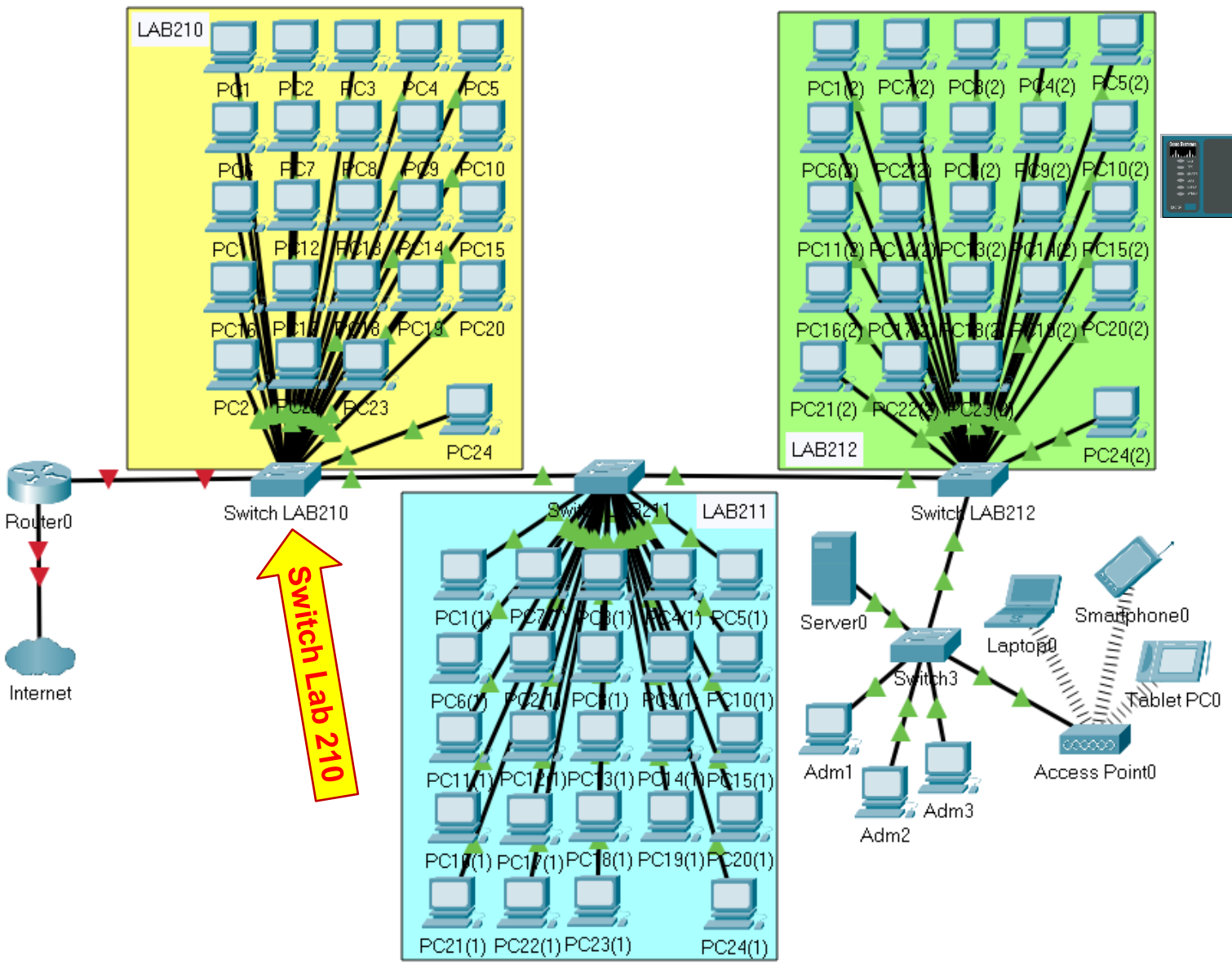
- **VLAN1: DEFAULT** (Por padrão, JÁ EXISTENTE!!!)
- **VLAN2: LAB210**
- **VLAN3: LAB211**
- **VLAN4: LAB212**
- **VLAN5: PROFE**
- **VLAN6: SERVER**
- **VLAN7: ADM**
- **VLAN8: WIFI**
- **Vlan99: Native (VLAN de gerência)**

No total serão configuradas 7 VLANs a divisão em:

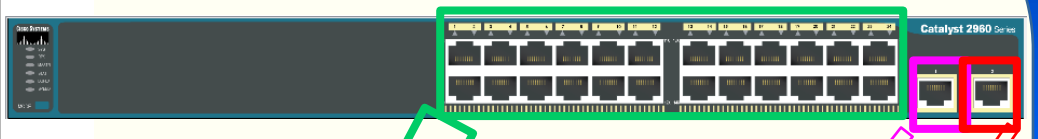
- **7 redes**
- **7 domínios de broadcast**

Switch LAB210

Análise 1: Switch LAB210



Switch LAB210



interface GigaEthernet:

- `Gig0/1` -> Roteador

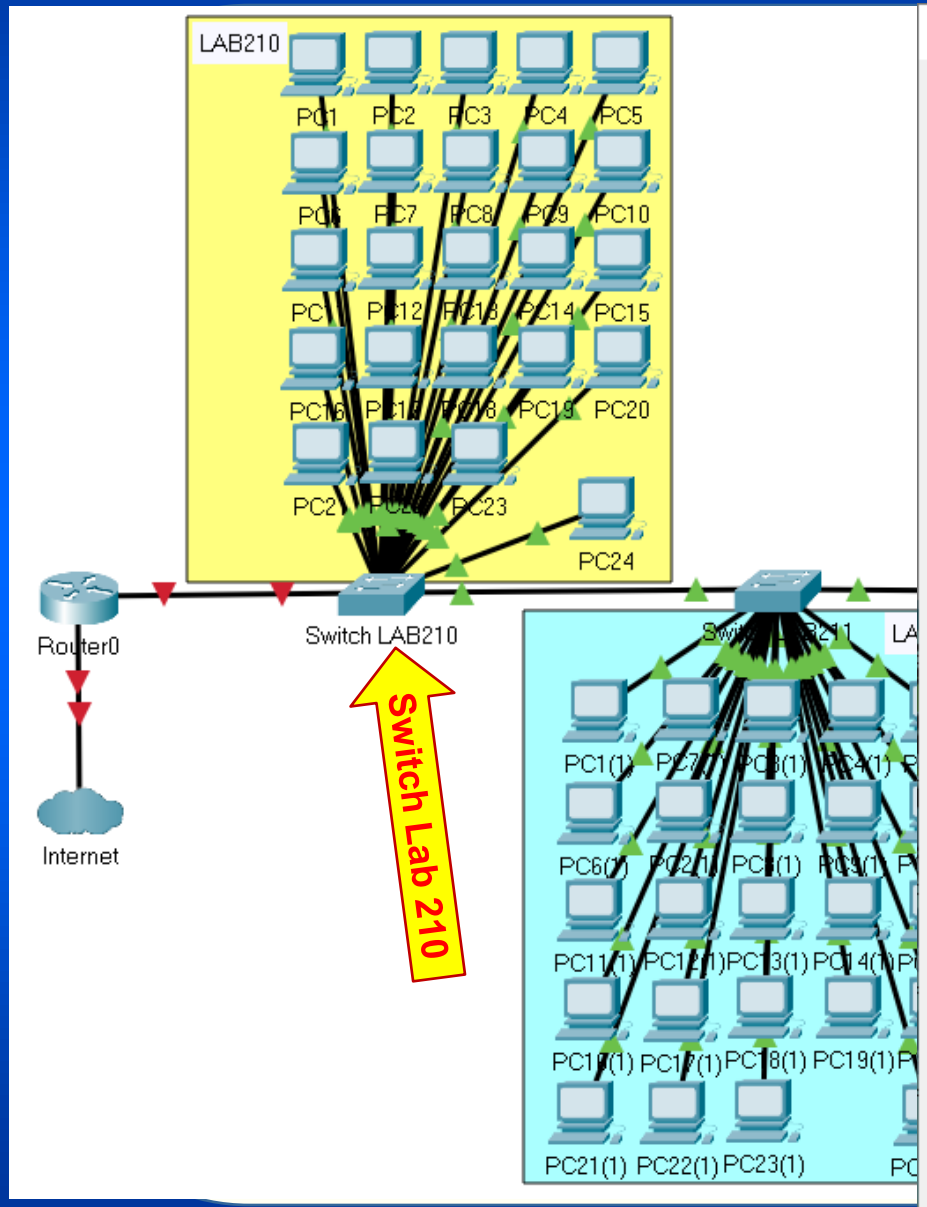
24 interfaces FastEthernet:

- `Fa0/1` -> PC1
- `Fa0/2` -> PC2
- `Fa0/3` -> PC3
- ...
- `Fa0/24` -> PC24

interface GigaEthernet:

- `Gig0/2` -> Switch Lab211

Análise 2: Switch LAB210



Switch LAB210

Switch LAB210

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
Switch>
Switch>enable
Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                 Gig0/1, Gig0/2
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
1003 tr    101003     1500  -      -      -        -    -        0      0
1004 fdnet 101004     1500  -      -      -        ieee -        0      0
1005 trnet 101005     1500  -      -      -        ibm  -        0      0
 --More--
```

Ctrl+F6 to exit CLI focus

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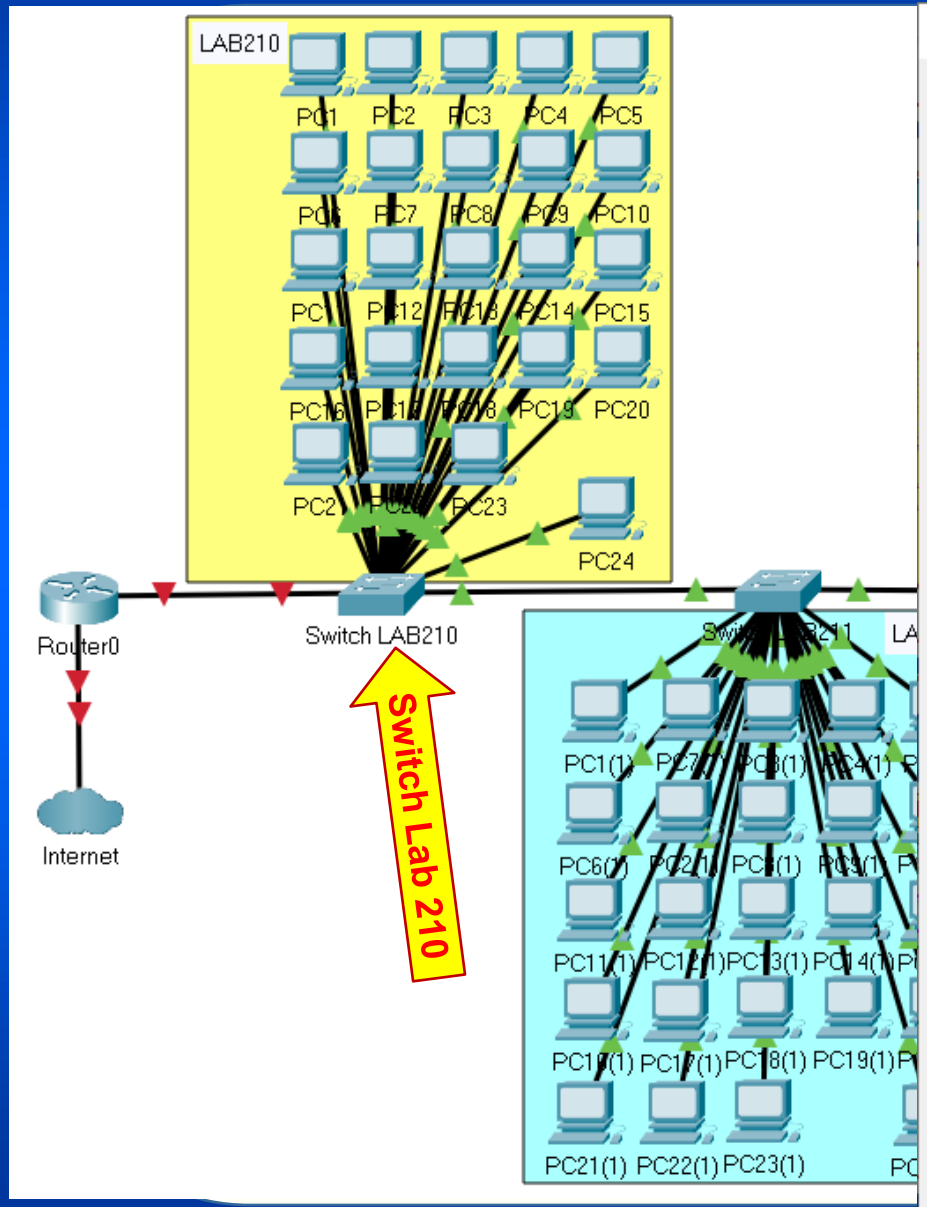
Configuração 1: Configurar VLANs no Switch LAB210



Switch LAB210

Switch LAB210

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
Switch#
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name lab210
Switch(config-vlan)#
Switch(config-vlan)#vlan 3
Switch(config-vlan)#name lab211
Switch(config-vlan)#
Switch(config-vlan)#vlan 4
Switch(config-vlan)#name lab212
Switch(config-vlan)#
Switch(config-vlan)#vlan 5
Switch(config-vlan)#name profe
Switch(config-vlan)#
Switch(config-vlan)#vlan 6
Switch(config-vlan)#name server
Switch(config-vlan)#
Switch(config-vlan)#vlan 7
Switch(config-vlan)#name ADM
Switch(config-vlan)#
Switch(config-vlan)#vlan 8
Switch(config-vlan)#name wifi
Switch(config-vlan)#
Switch(config-vlan)#vlan 99
Switch(config-vlan)#name native
Switch(config-vlan)#
```

Ctrl+F6 to exit CLI focus

Copy | Paste

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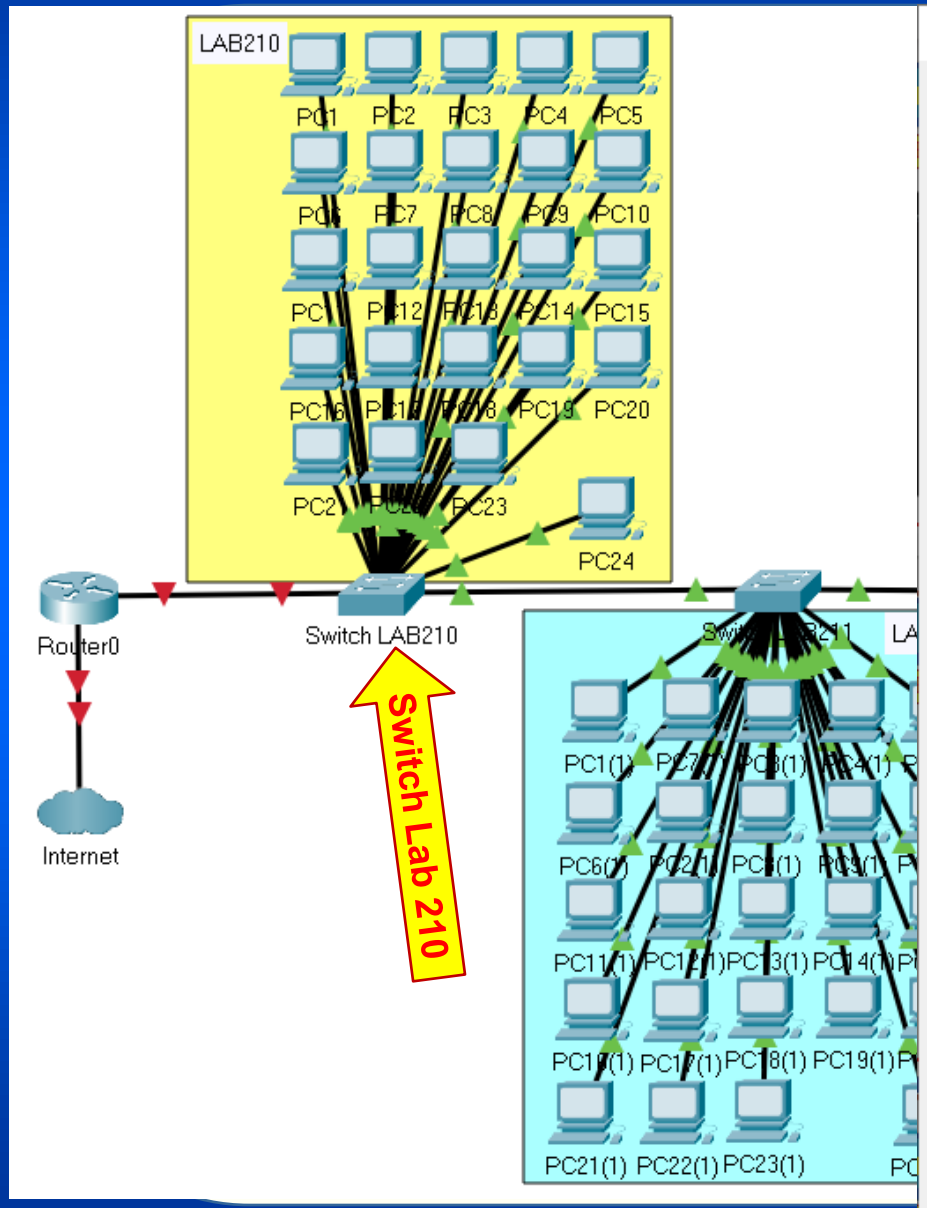
Análise 3: Switch LAB210



Switch LAB210

Switch LAB210

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                 Gig0/1, Gig0/2
2    lab210                            active
3    lab211                            active
4    lab212                            active
5    profe                             active
6    server                            active
7    ADM                               active
8    wifi                              active
99   native                            active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
 --More--
```

Ctrl+F6 to exit CLI focus

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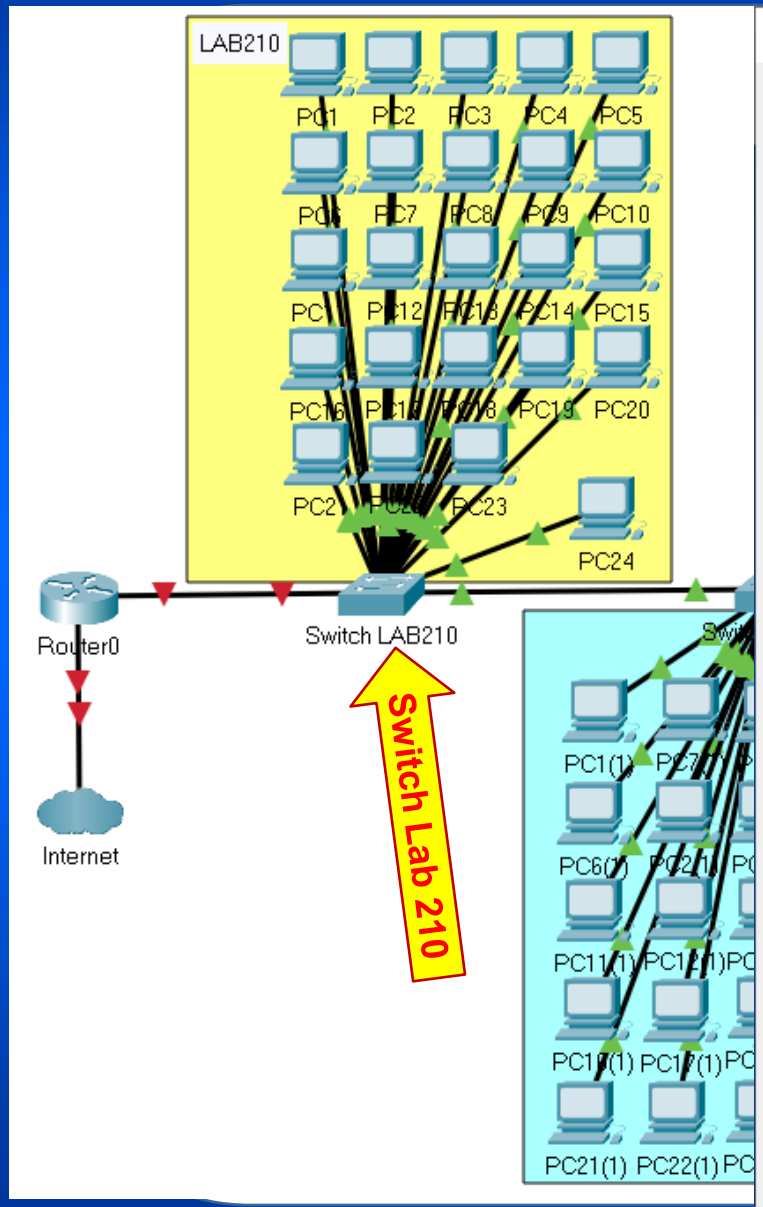
Configuração 2: Configurar interfaces no Switch LAB210



Switch LAB210

Switch LAB210

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
Switch>
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#
Switch(config)#interface range fa0/1-23
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 2
Switch(config-if-range)#
Switch(config-if-range)#interface fa0/24
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 5
Switch(config-if)#^Z
```

Ctrl+F6 to exit CLI focus

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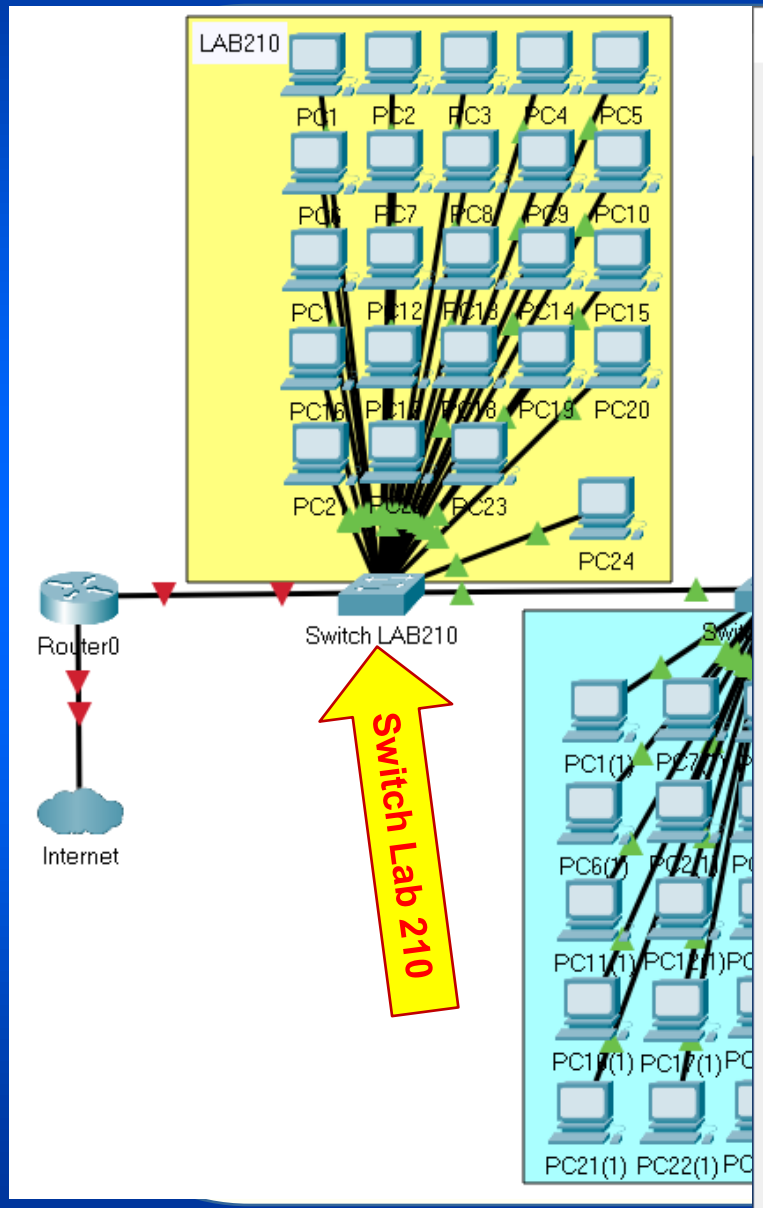
Análise 3: Switch LAB210



Switch LAB210

Switch LAB210

Physical Config CLI Attributes

IOS Command Line Interface

```
%SYS-5-CONFIG_I: Configured from console by console
^Z
Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Gig0/1, Gig0/2
2    lab210                            active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23
3    lab211                            active
4    lab212                            active
5    profe                             active    Fa0/24
6    server                            active
7    ADM                               active
8    wifi                              active
99   native                            active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active

 --More--
```

Ctrl+F6 to exit CLI focus

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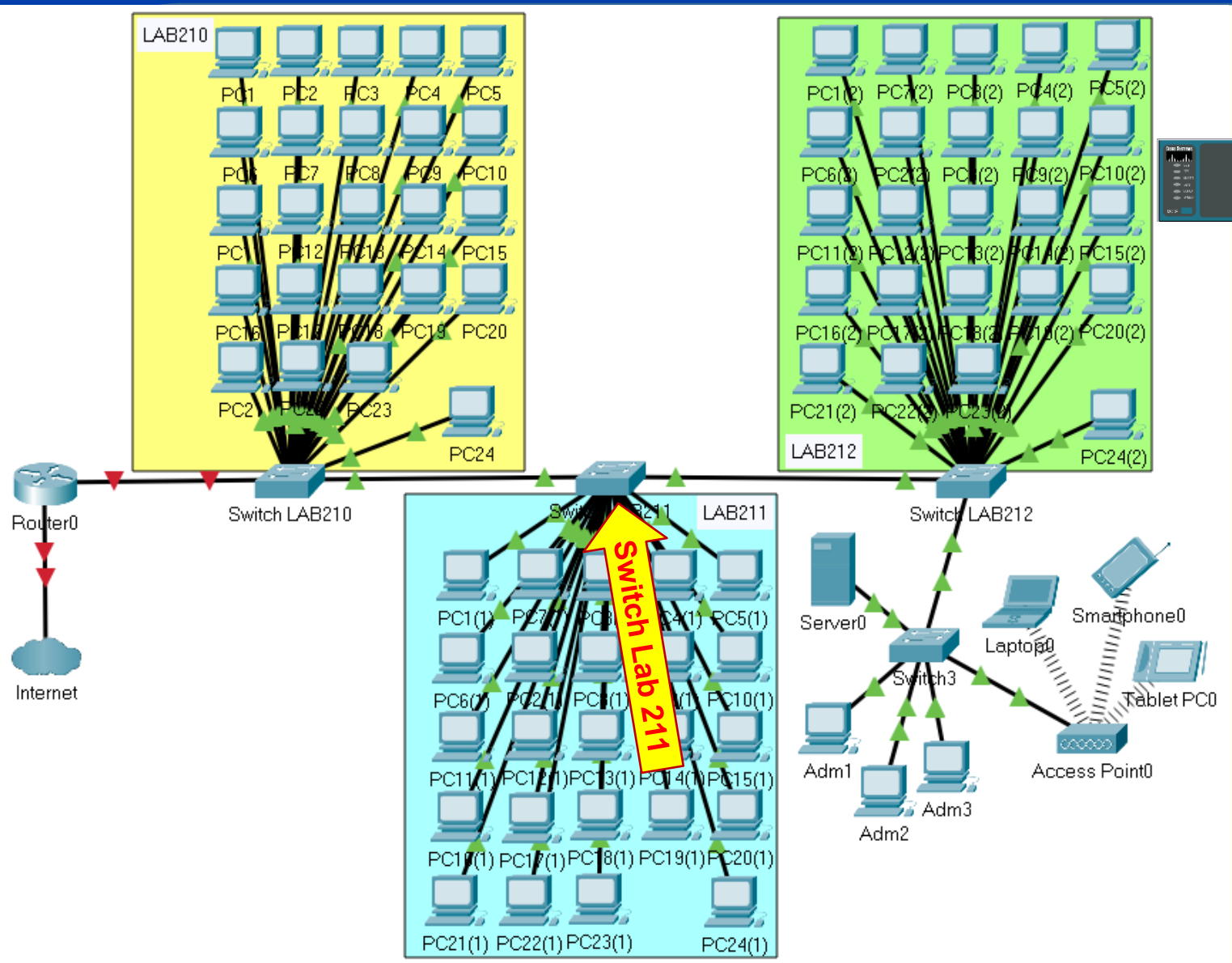
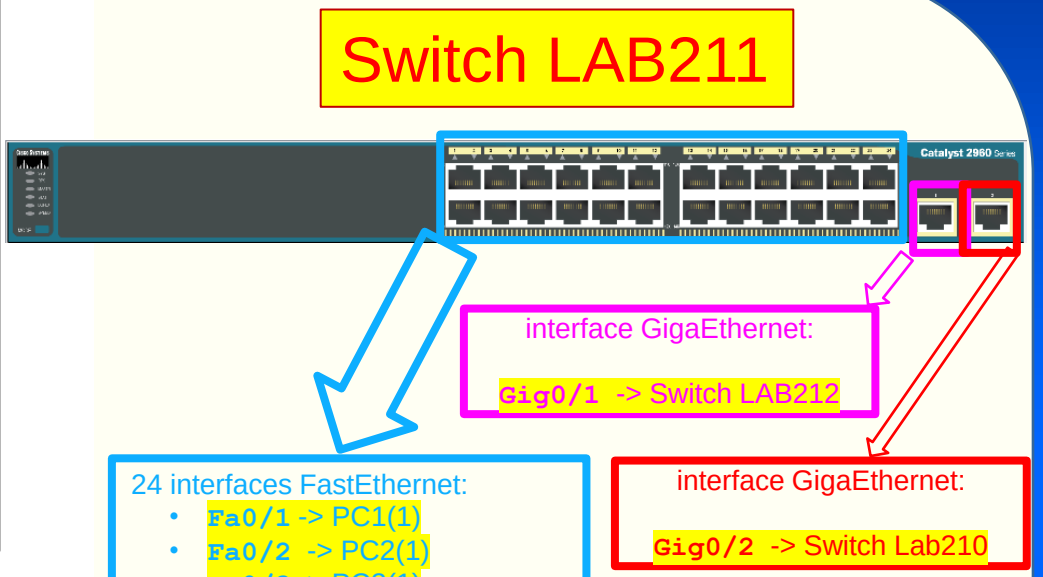
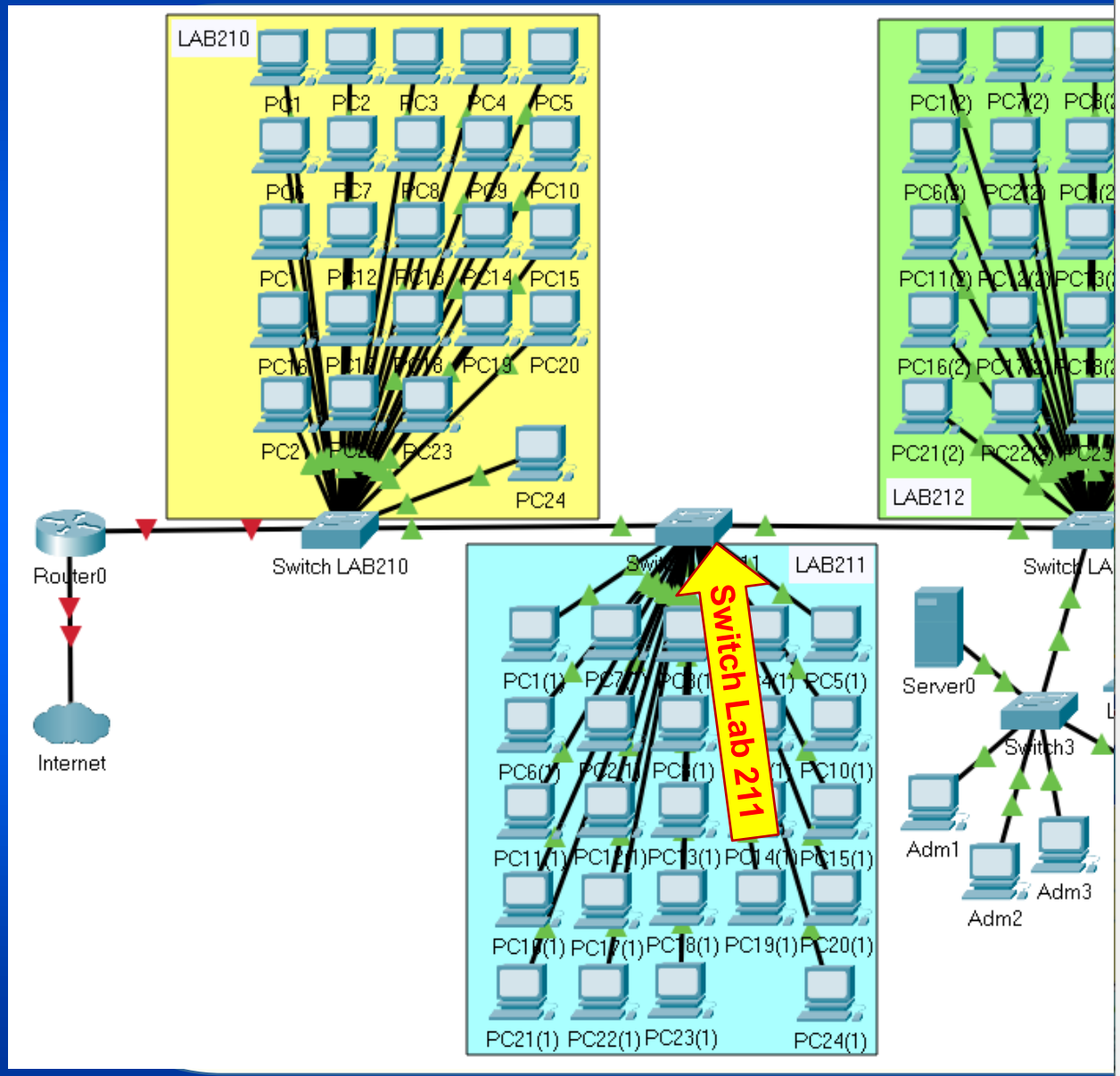
Switch LAB211

Análise 1: Switch LAB211





Configuração 2: Configurar VLANs no Switch LAB211



Switch LAB211

Switch LAB211

Physical | Config | CLI | Attribu

IOS Command Line Interface

```
Switch>
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name lab210
Switch(config-vlan)#
Switch(config-vlan)#vlan 3
Switch(config-vlan)#name lab211
Switch(config-vlan)#
Switch(config-vlan)#vlan 4
Switch(config-vlan)#name lab212
Switch(config-vlan)#
Switch(config-vlan)#vlan 5
Switch(config-vlan)#name profe
Switch(config-vlan)#
Switch(config-vlan)#vlan 6
Switch(config-vlan)#name server
Switch(config-vlan)#
Switch(config-vlan)#vlan 7
Switch(config-vlan)#name adm
Switch(config-vlan)#
Switch(config-vlan)#vlan 8
Switch(config-vlan)#name wifi
Switch(config-vlan)#
Switch(config-vlan)#vlan 99
Switch(config-vlan)#name native
```

Ctrl+F6 to exit CLI focus

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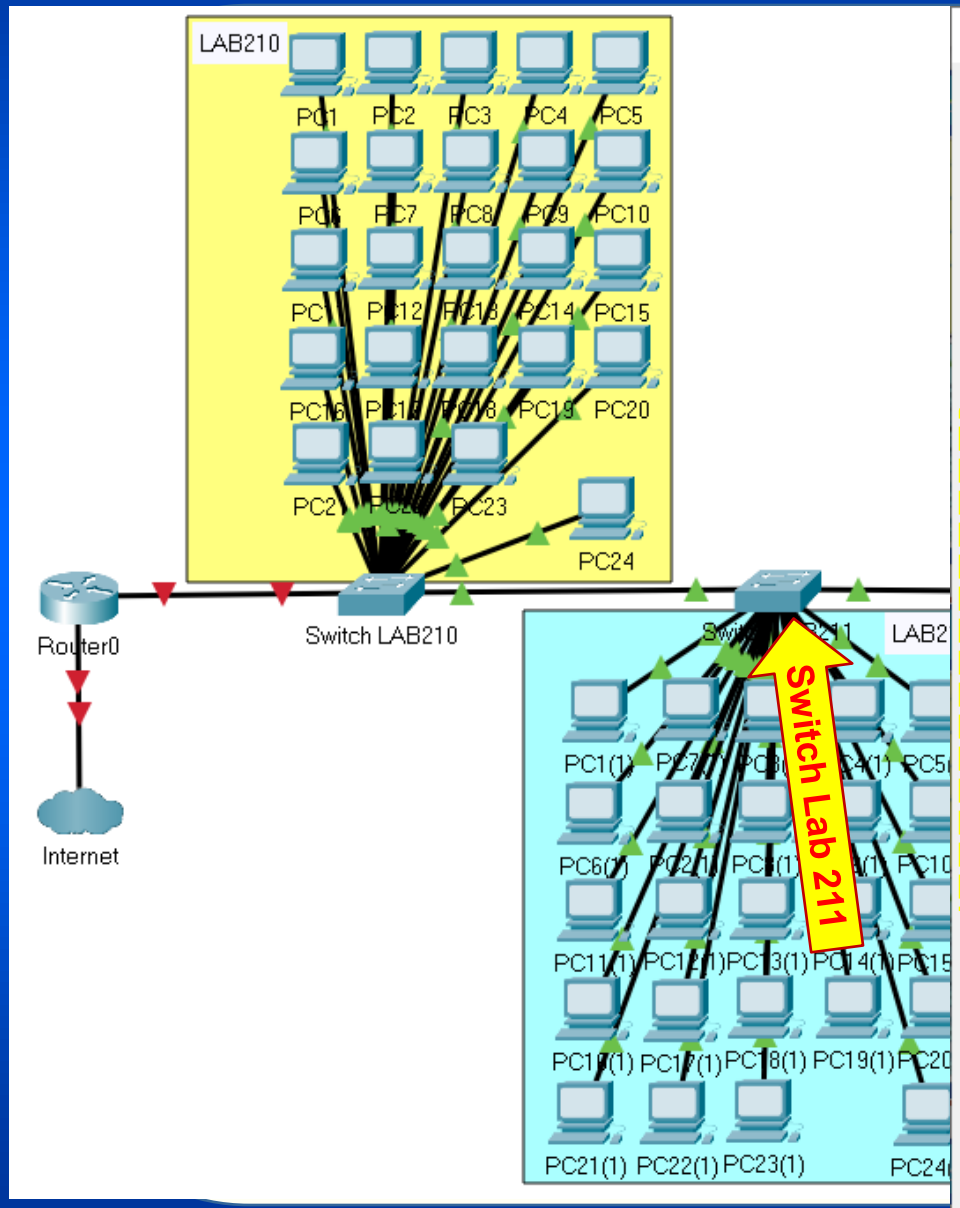
Análise 2: Switch LAB211



Switch LAB211

Switch LAB211

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
Switch#
Switch#
Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                 Gig0/1, Gig0/2
2    lab210                            active
3    lab211                            active
4    lab212                            active
5    profe                             active
6    server                            active
7    adm                               active
8    wifi                              active
99   native                            active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
 --More--
```

Ctrl+F6 to exit CLI focus

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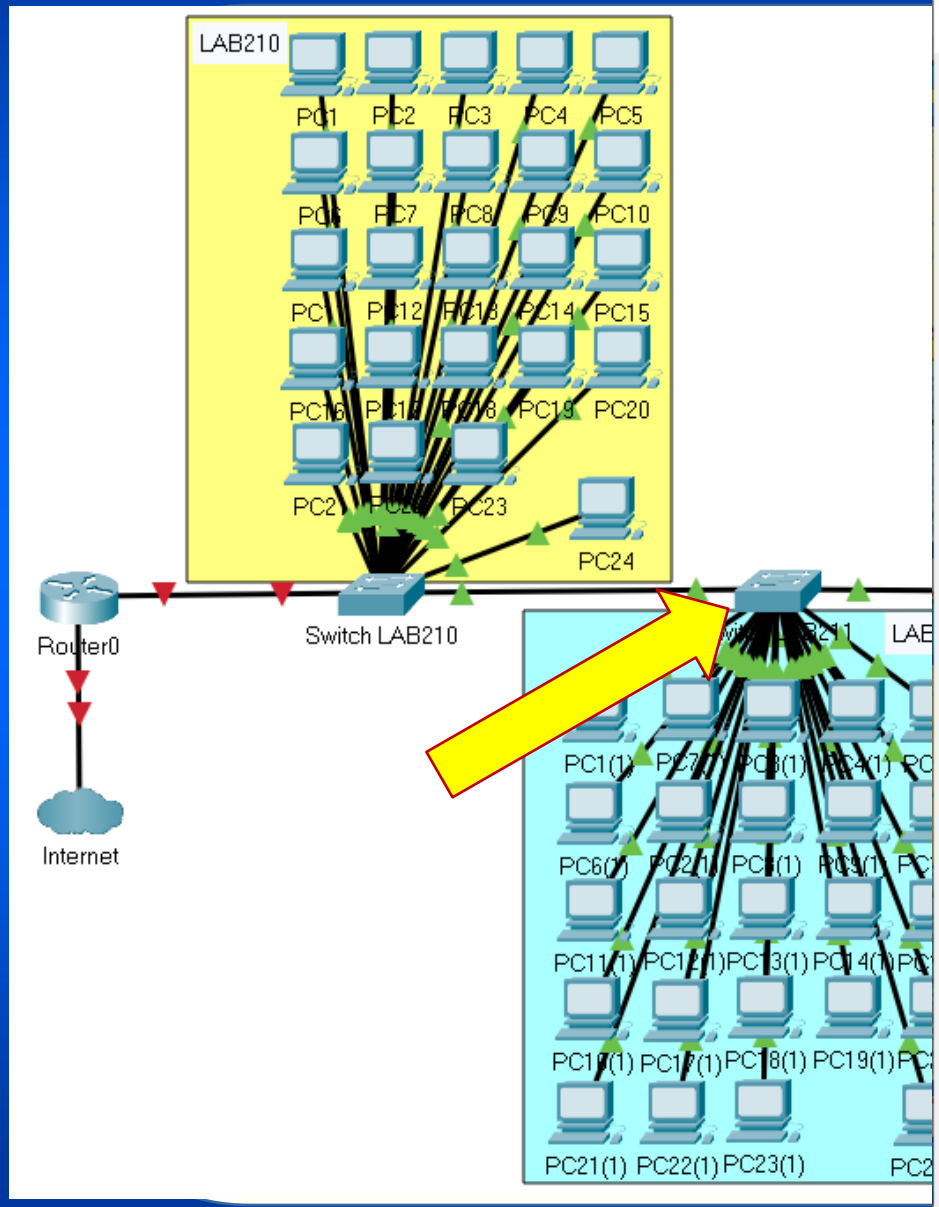
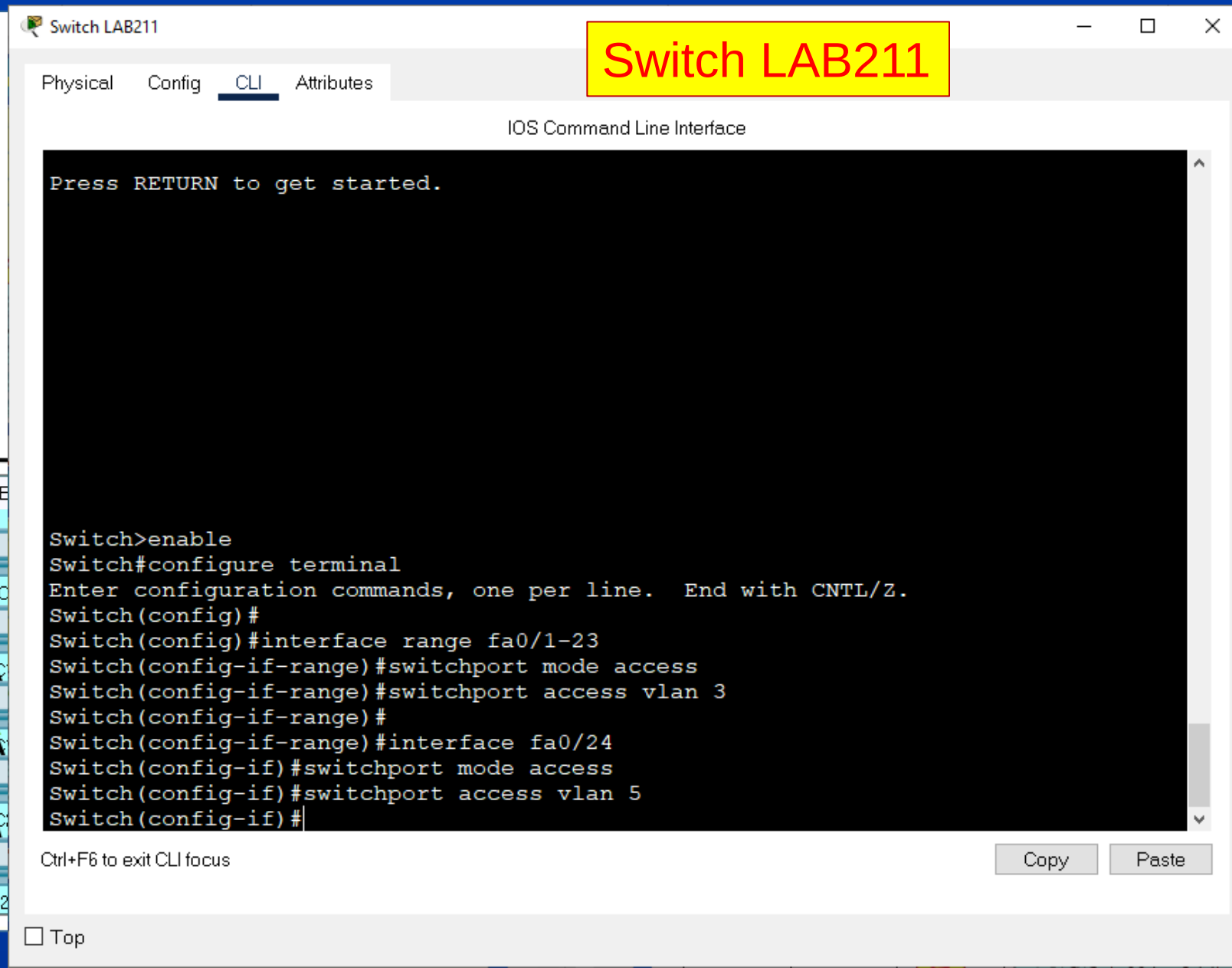
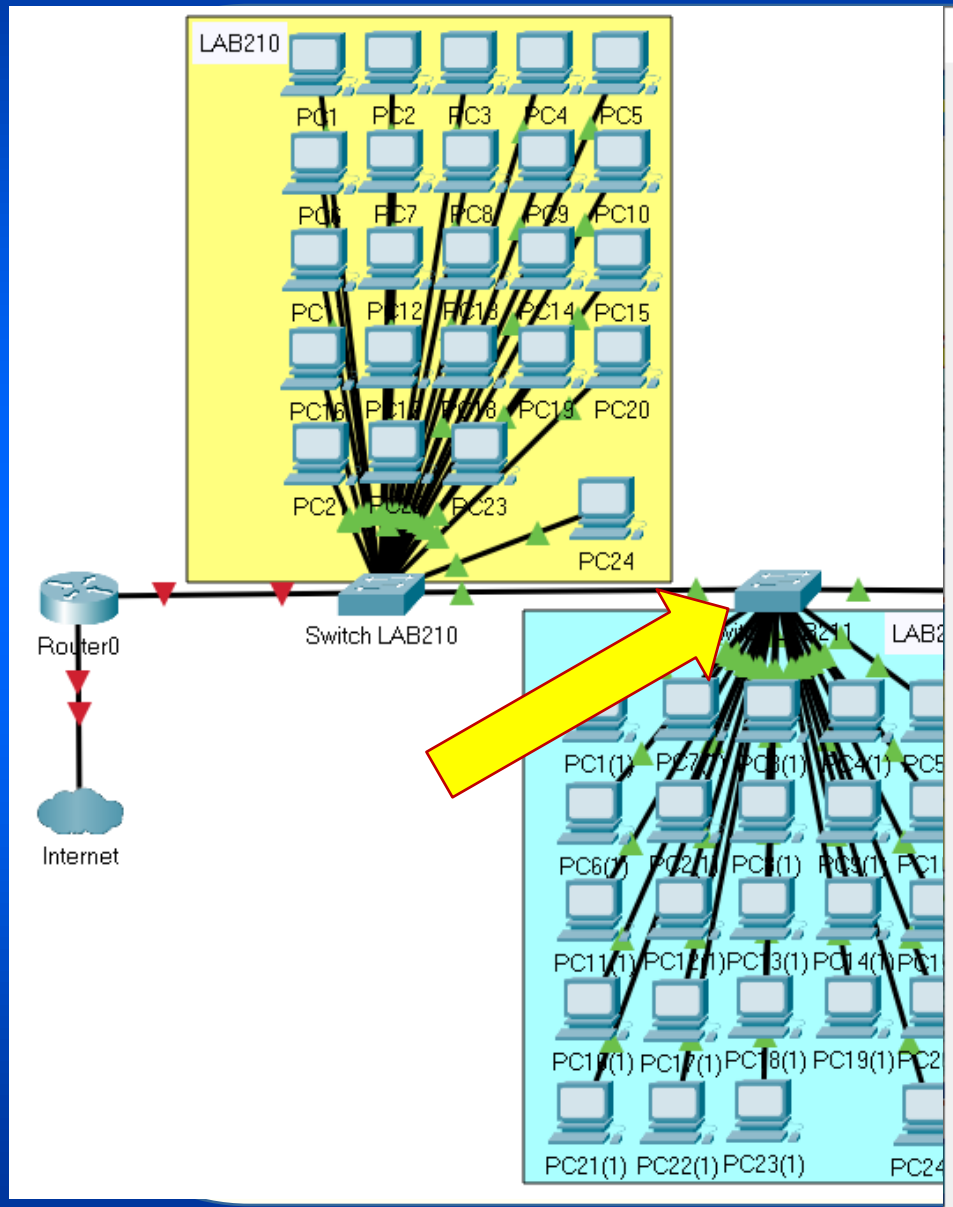
Configuração 2: Configurar interfaces no Switch LAB211





Análise 3: Switch LAB211



Switch LAB211

Switch LAB211

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Gig0/1, Gig0/2
2    lab210                            active
3    lab211                            active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                  Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                  Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                  Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                  Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                  Fa0/21, Fa0/22, Fa0/23
4    lab212                            active
5    profe                             active    Fa0/24
6    server                            active
7    adm                               active
8    wifi                              active
99   native                            active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active

 --More--
```

Ctrl+F6 to exit CLI focus

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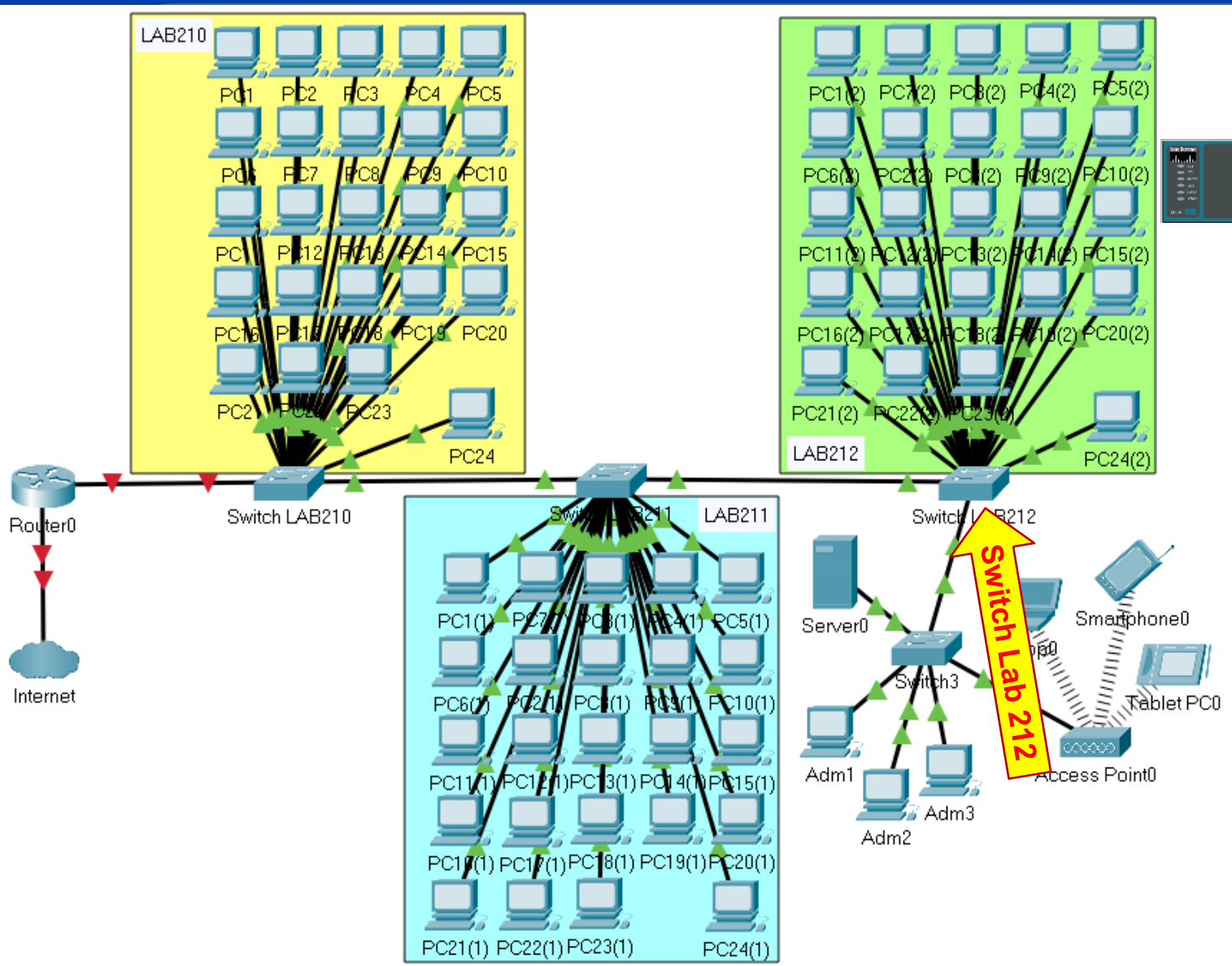
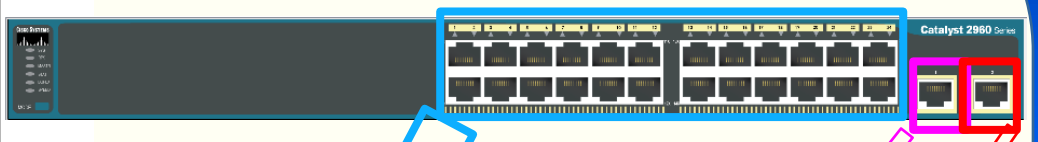
Switch LAB212

Análise 1: Switch LAB212



Switch LAB212



interface GigaEthernet:

`Gig0/1` -> Switch LAB211

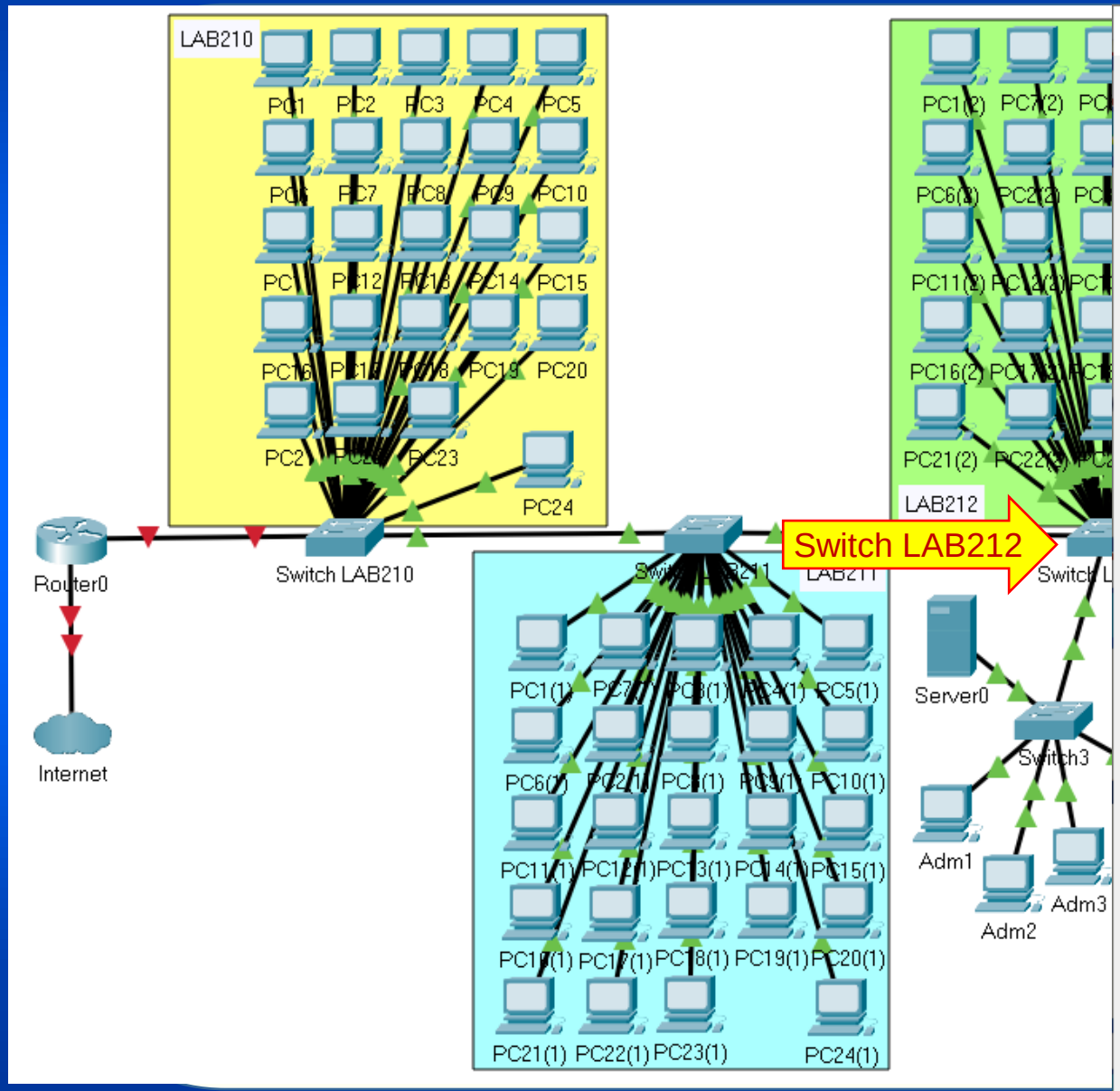
24 interfaces FastEthernet:

- `Fa0/1` -> PC1(2)
- `Fa0/2` -> PC2(2)
- `Fa0/3` -> PC3(2)
- ...
- `Fa0/24` -> PC24(2)

interface GigaEthernet:

`Gig0/2` -> Switch3

Configuração 3: Configurar VLANs no Switch LAB212



Switch LAB212

Switch LAB212

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#
Switch(config)#vlan 2
Switch(config-vlan)#name lab210
Switch(config-vlan)#
Switch(config-vlan)#vlan 3
Switch(config-vlan)#name lab211
Switch(config-vlan)#
Switch(config-vlan)#vlan 4
Switch(config-vlan)#name lab212
Switch(config-vlan)#
Switch(config-vlan)#vlan 5
Switch(config-vlan)#name profe
Switch(config-vlan)#
Switch(config-vlan)#vlan 6
Switch(config-vlan)#name server
Switch(config-vlan)#
Switch(config-vlan)#vlan 7
Switch(config-vlan)#name ADM
Switch(config-vlan)#
Switch(config-vlan)#vlan 8
Switch(config-vlan)#name wifi
Switch(config-vlan)#
Switch(config-vlan)#vlan 99
Switch(config-vlan)#name native
```

Ctrl+F6 to exit CLI focus

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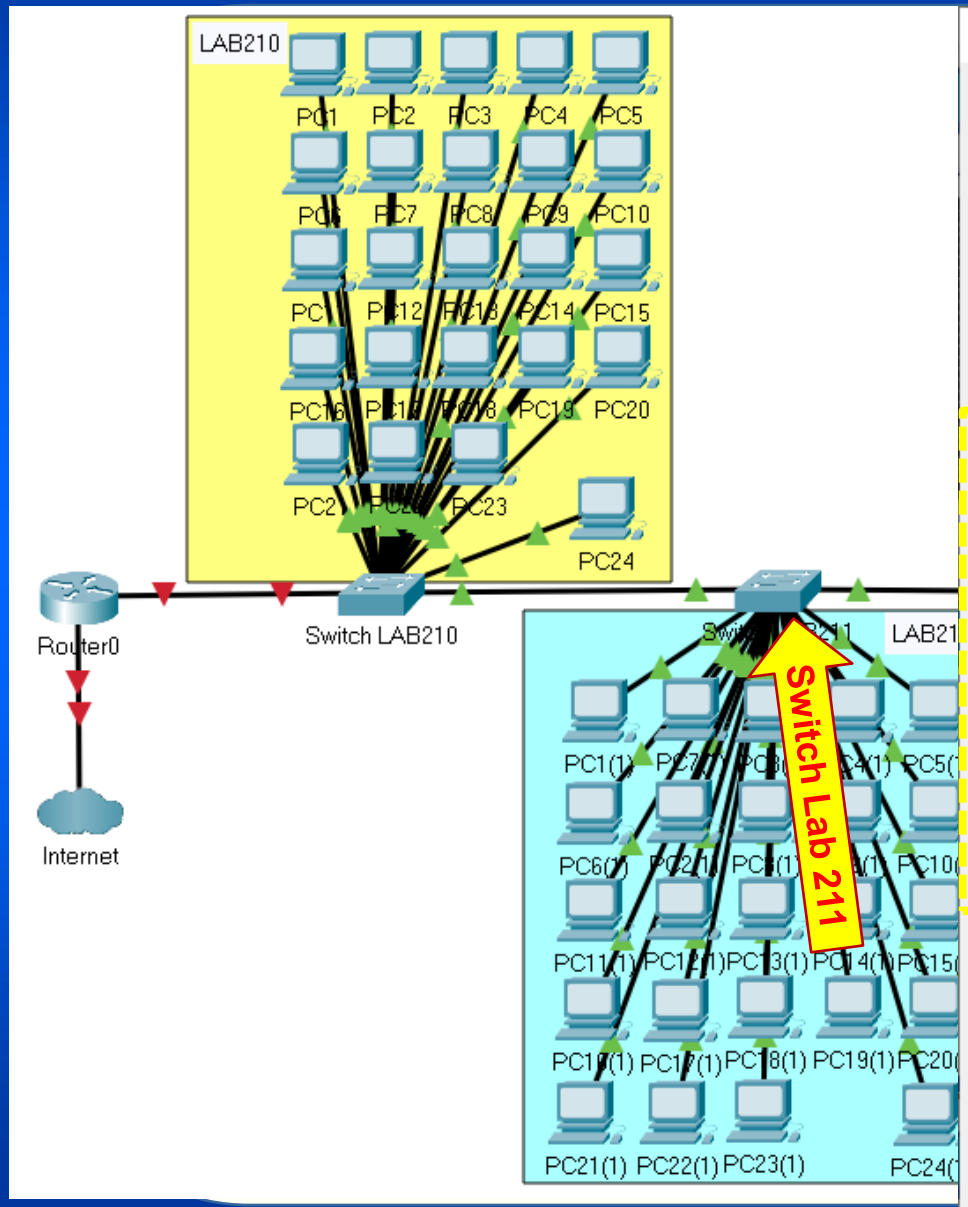
Análise 2: Switch LAB212



Switch LAB212

Switch LAB212

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
%SYS-5-CONFIG_I: Configured from console by console

Switch#
Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                 Gig0/1, Gig0/2
2    lab210                            active
3    lab211                            active
4    lab212                            active
5    profe                             active
6    server                            active
7    ADM                               active
8    wifi                              active
99   native                            active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
 --More--
```

Ctrl+F6 to exit CLI focus

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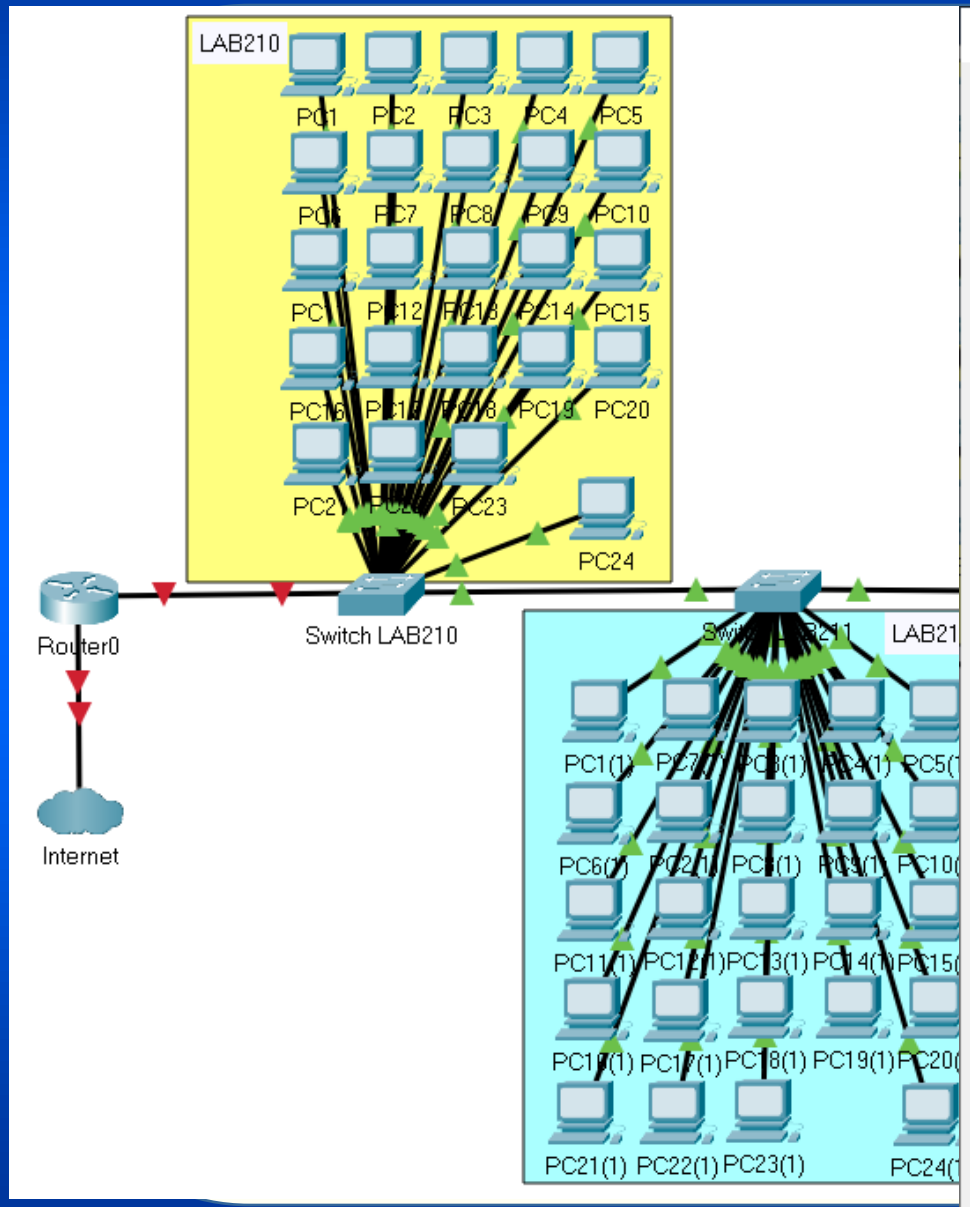
Configuração 2: Configurar interfaces no Switch LAB212



Switch LAB212

Switch LAB212

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
Switch>
Switch>
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#
Switch(config)#interface range fa0/1-23
Switch(config-if-range)#switchport mode access
Switch(config-if-range)#switchport access vlan 4
Switch(config-if-range)#
Switch(config-if-range)#interface fa0/24
Switch(config-if)#switchport mode access
Switch(config-if)#swithcport access vlan 5
                  ^
% Invalid input detected at '^' marker.

Switch(config-if)#switchport access vlan 5
Switch(config-if)#
```

Ctrl+F6 to exit CLI focus

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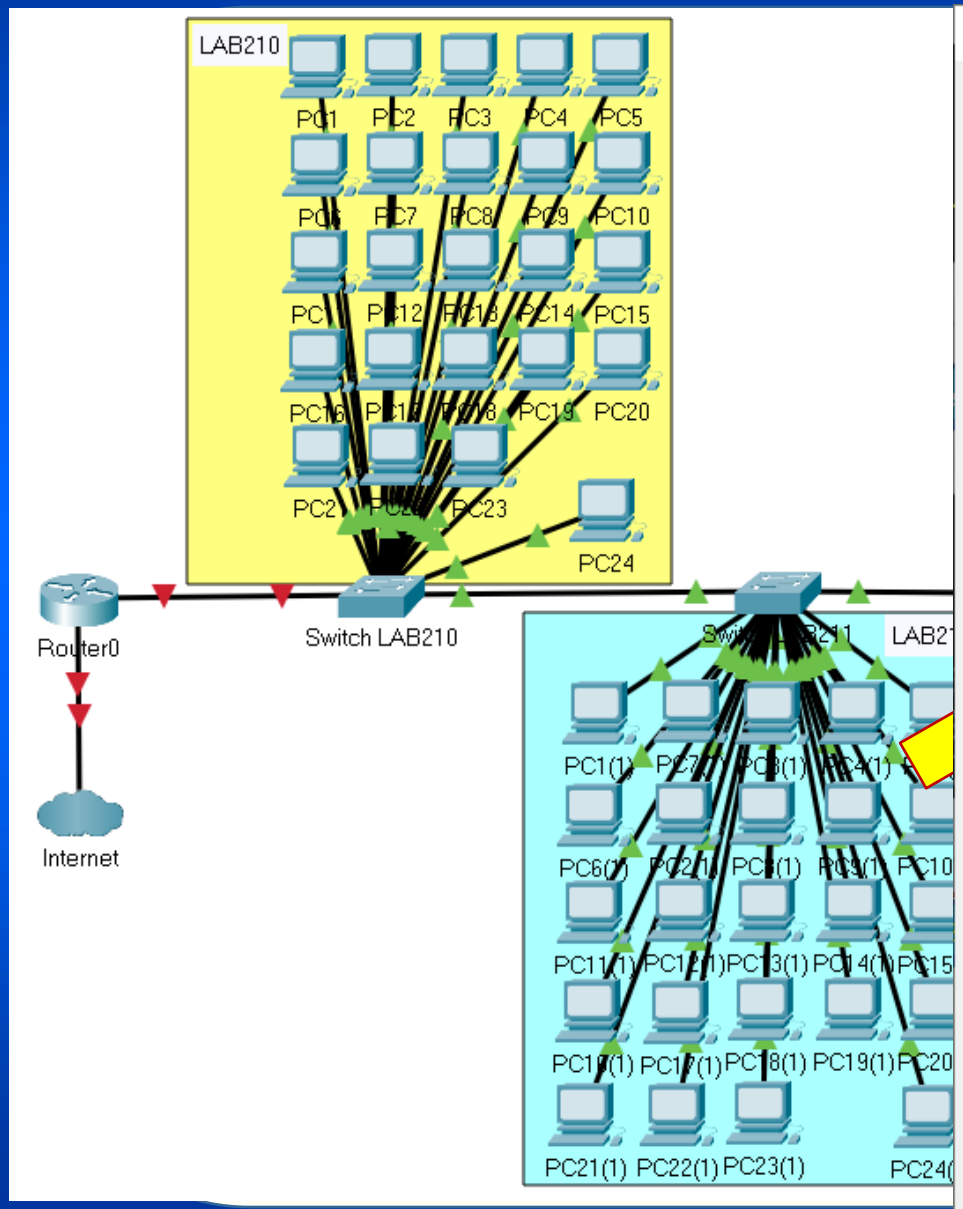
Análise 3: Switch LAB212



Switch LAB212

Switch LAB212

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
Switch#
Switch#
Switch#
Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Gig0/1, Gig0/2
2    lab210                            active
3    lab211                            active
4    lab212                            active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                  Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                  Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                  Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                  Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                  Fa0/21, Fa0/22, Fa0/23
5    profe                             active    Fa0/24
6    server                            active
7    ADM                               active
8    wifi                              active
99   native                            active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active

 --More--
```

Ctrl+F6 to exit CLI focus

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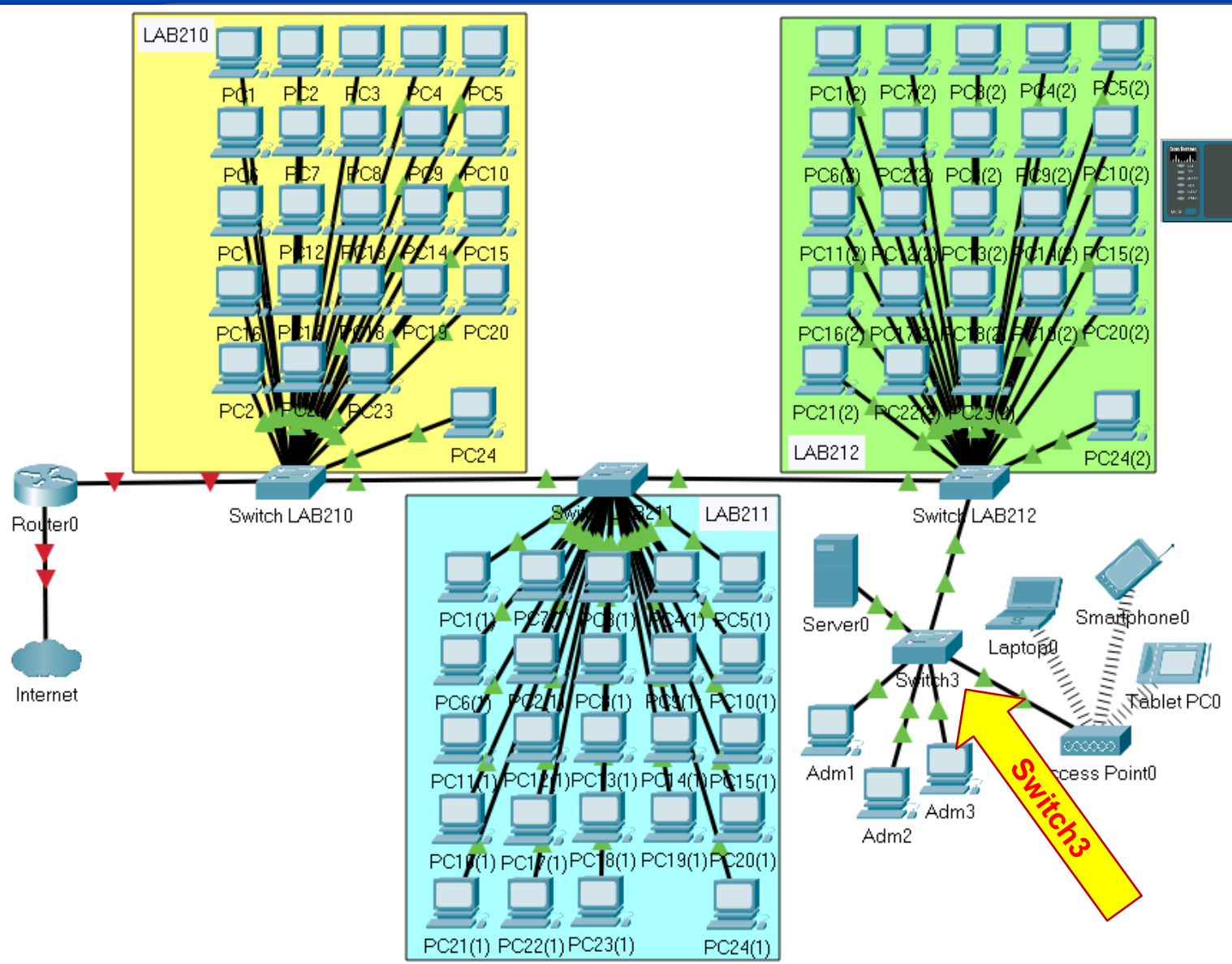
Switch
SWITCH3

Análise 1: Switch Switch3



interface GigaEthernet:

`Gig0/2` -> Switch LAB212

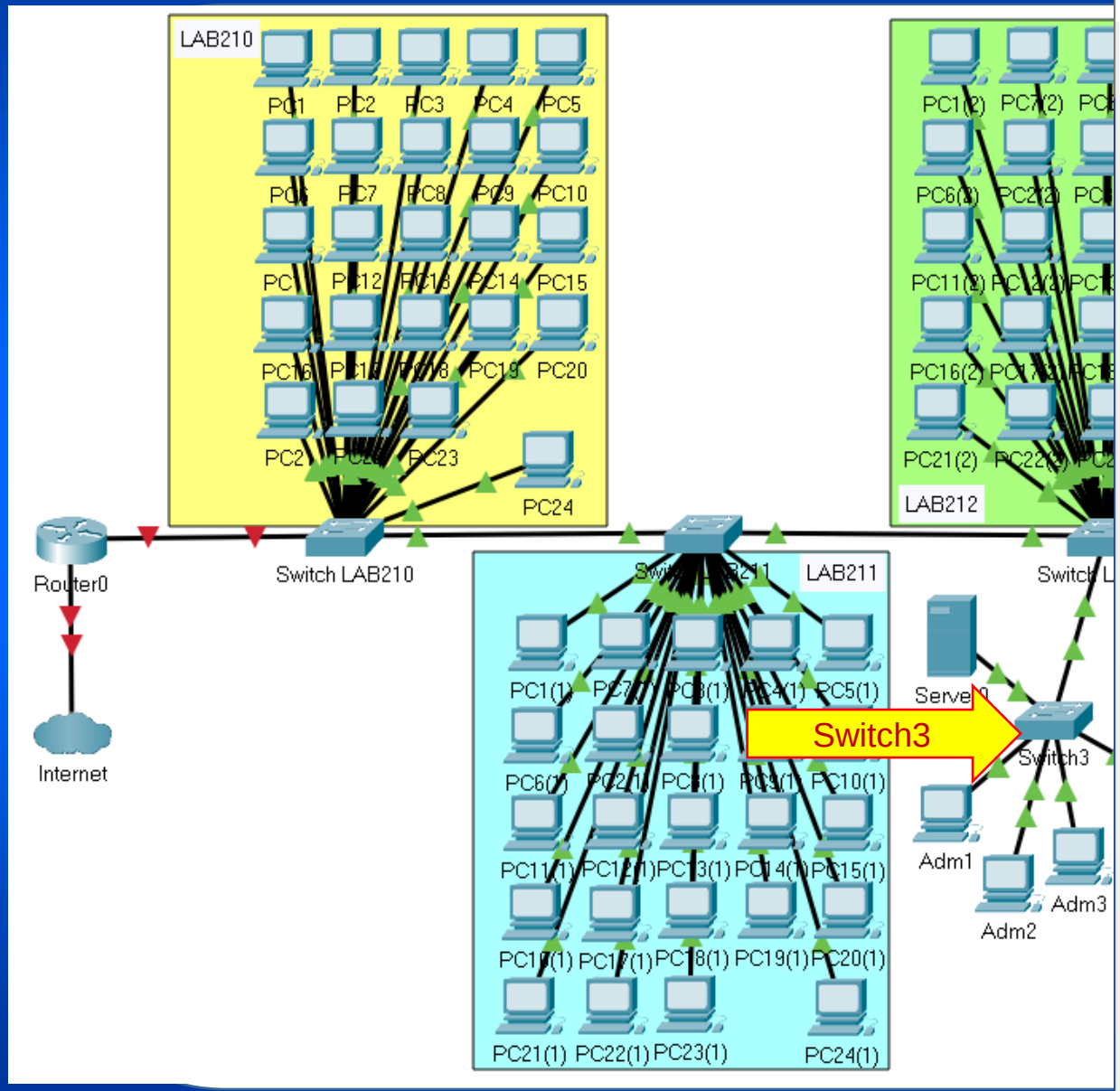
24 interfaces FastEthernet:

- `Fa0/1` -> ADM1
- `Fa0/2` -> ADM2
- `Fa0/3` -> ADM3
- ...
- `Fa0/11` -> Acccess-Point

interface GigaEthernet:

`Gig0/1` -> SERVER

Configuração 1: Configurar VLANs no Switch Switch3



Switch3

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#
Switch(config)#vlan 2
Switch(config-vlan)#name lab210
Switch(config-vlan)#
Switch(config-vlan)#vlan 3
Switch(config-vlan)#name lab211
Switch(config-vlan)#
Switch(config-vlan)#vlan 4
Switch(config-vlan)#name lab212
Switch(config-vlan)#
Switch(config-vlan)#vlan 5
Switch(config-vlan)#name profe
Switch(config-vlan)#
Switch(config-vlan)#vlan 6
Switch(config-vlan)#name server
Switch(config-vlan)#
Switch(config-vlan)#vlan 7
Switch(config-vlan)#name adm
Switch(config-vlan)#
Switch(config-vlan)#vlan 8
Switch(config-vlan)#name wifi
Switch(config-vlan)#
Switch(config-vlan)#vlan 99
Switch(config-vlan)#name native
```

Ctrl+F6 to exit CLI focus

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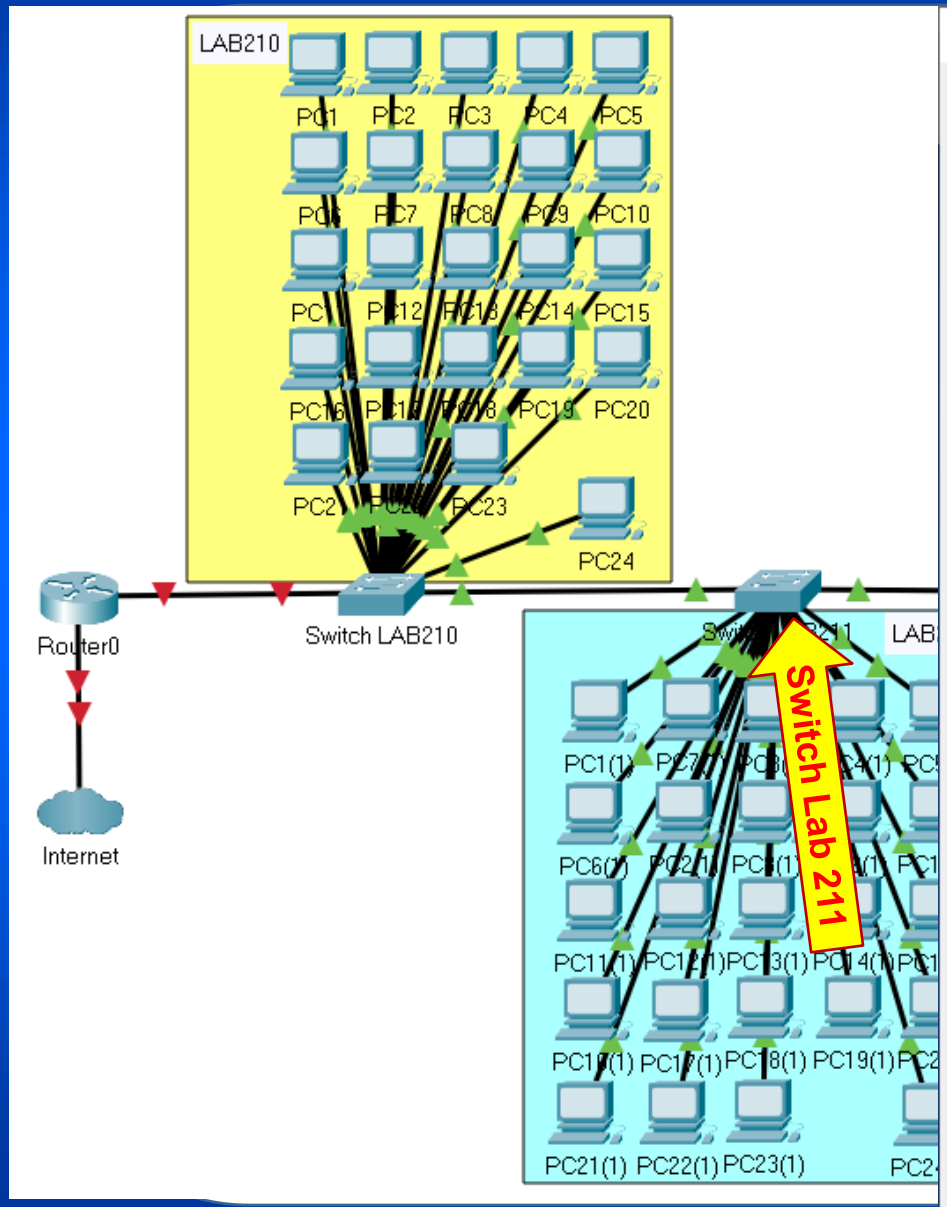
Análise 2: Switch Switch3



Switch3

Switch3

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
%SYS-5-CONFIG_I: Configured from console by console

Switch#
Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
                                                 Gig0/1, Gig0/2
2    lab210                            active
3    lab211                            active
4    lab212                            active
5    profe                             active
6    server                            active
7    adm                               active
8    wifi                              active
99   native                            active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active
 --More--
```

Ctrl+F6 to exit CLI focus

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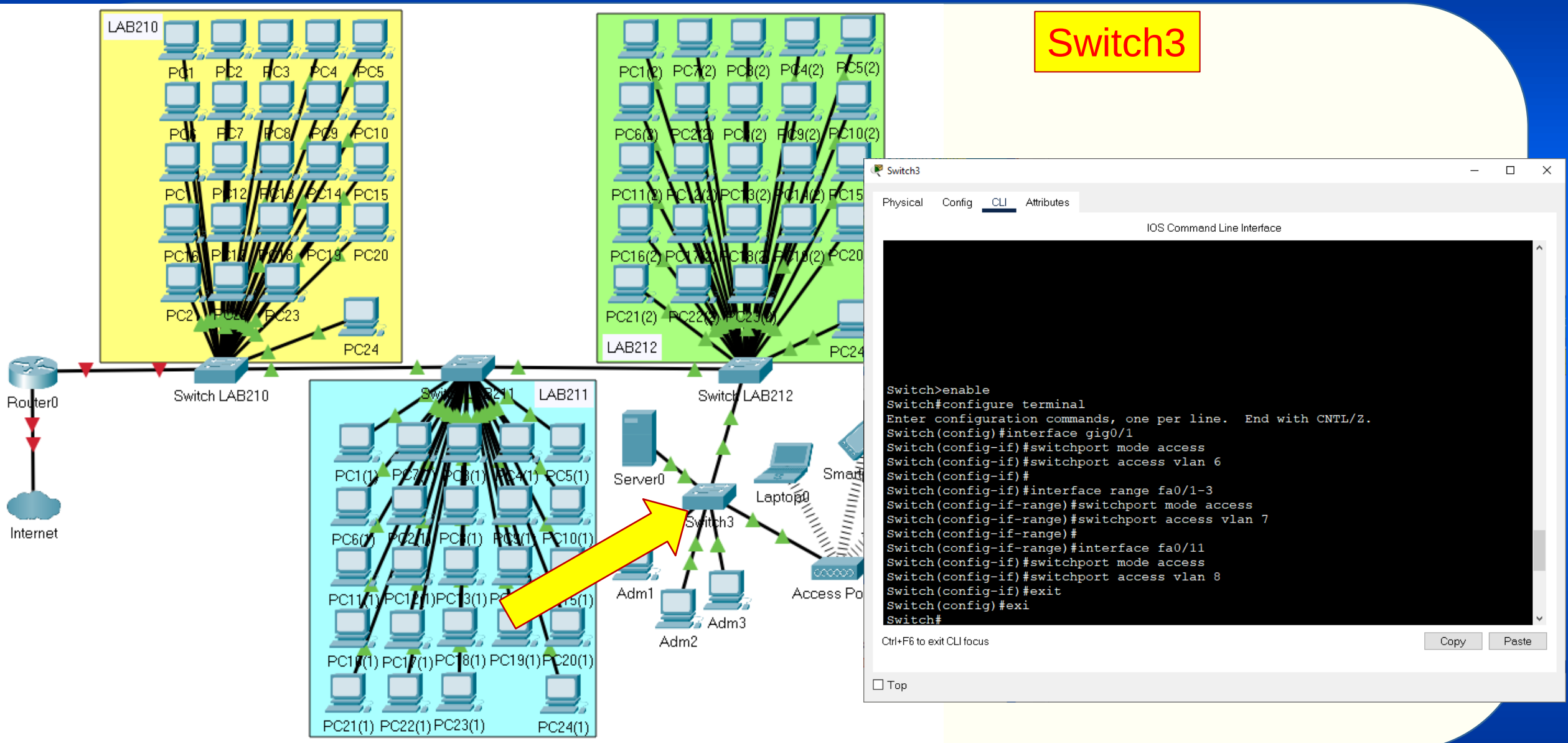
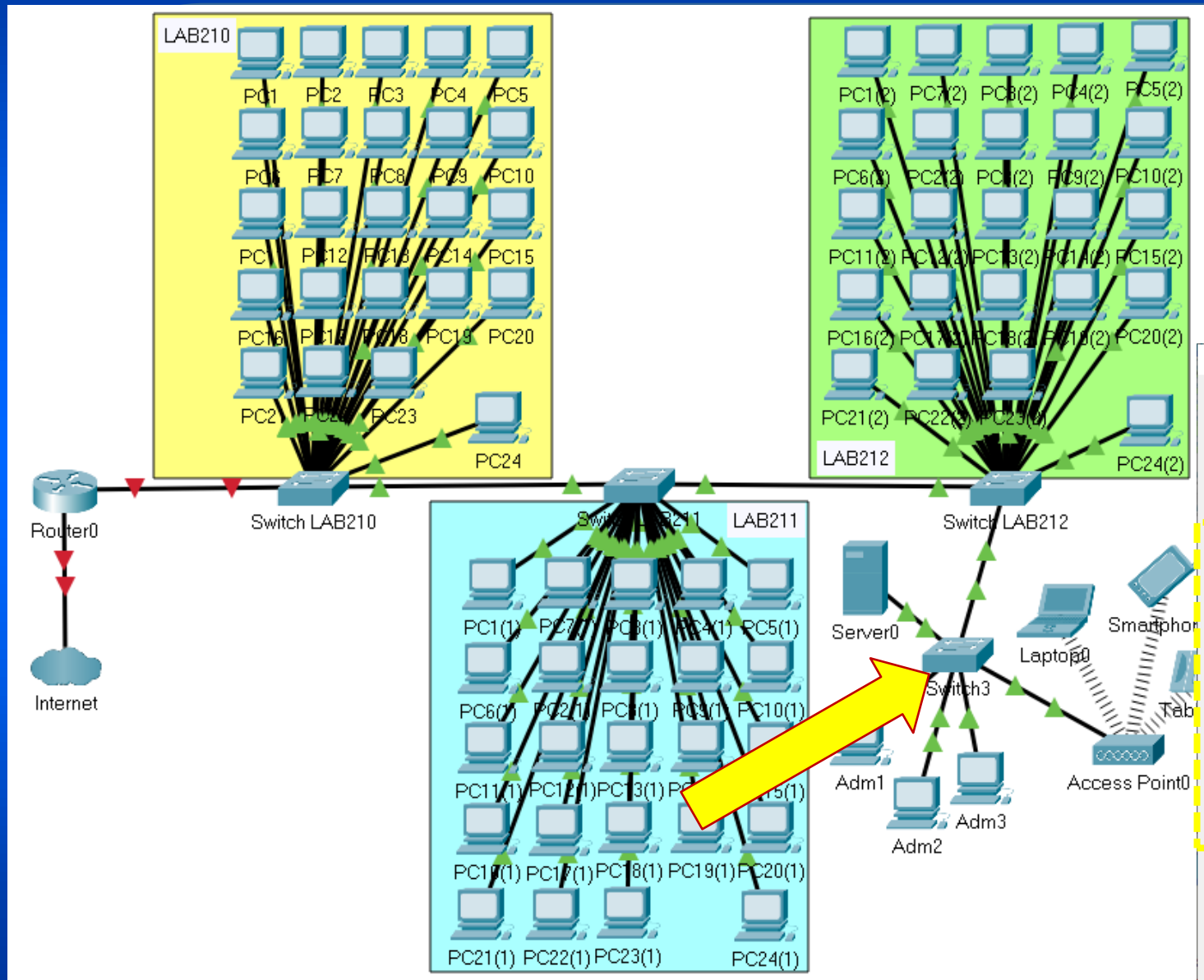
Configuração 2: Configurar interfaces no Switch Switch3



Análise 3: Switch Switch3



Switch3

Switch3

Physical Config CLI Attributes

IOS Command Line Interface

```
%SYS-5-CONFIG_I: Configured from console by console

Switch#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------------
1    default                           active    Fa0/4, Fa0/5, Fa0/6, Fa0/7
                                                 Fa0/8, Fa0/9, Fa0/10, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15, Fa0/16
                                                 Fa0/17, Fa0/18, Fa0/19, Fa0/20
                                                 Fa0/21, Fa0/22, Fa0/23, Fa0/24
2    lab210                            active
3    lab211                            active
4    lab212                            active
5    profe                             active
6    server                            active    Gig0/1
7    adm                               active    Fa0/1, Fa0/2, Fa0/3
8    wifi                              active    Fa0/11
99   native                            active
1002 fddi-default                      active
1003 token-ring-default                active
1004 fddinet-default                   active
1005 trnet-default                     active

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Trans1 Trans2
 --More--
```

Ctrl+F6 to exit CLI focus

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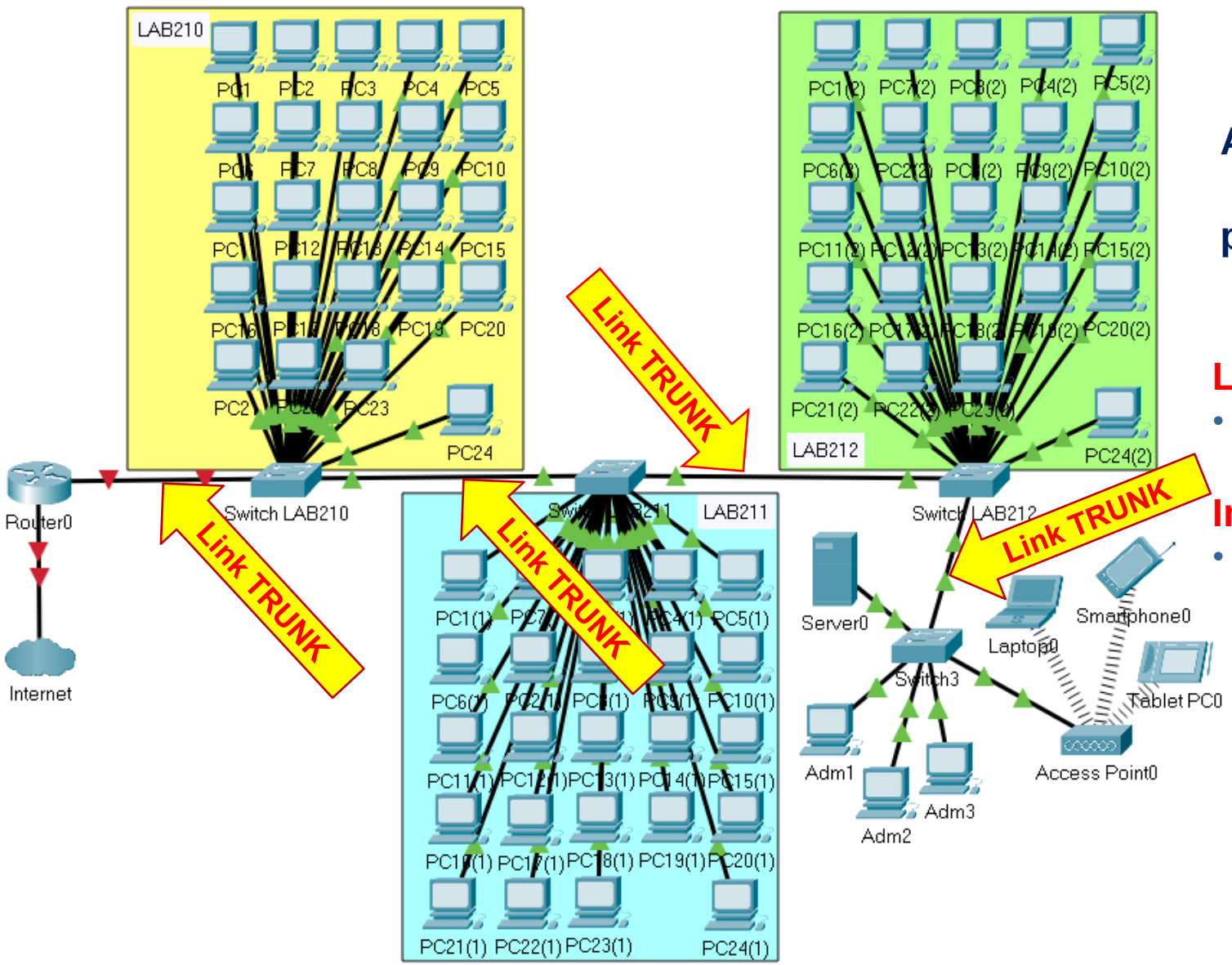
Portas (interfaces) e links

TRUNK

Análise 1: TRUNK



Agora que as VLANs foram criadas e as interfaces associadas a cada VLAN, precisaremos configurar as interfaces e links Trunk

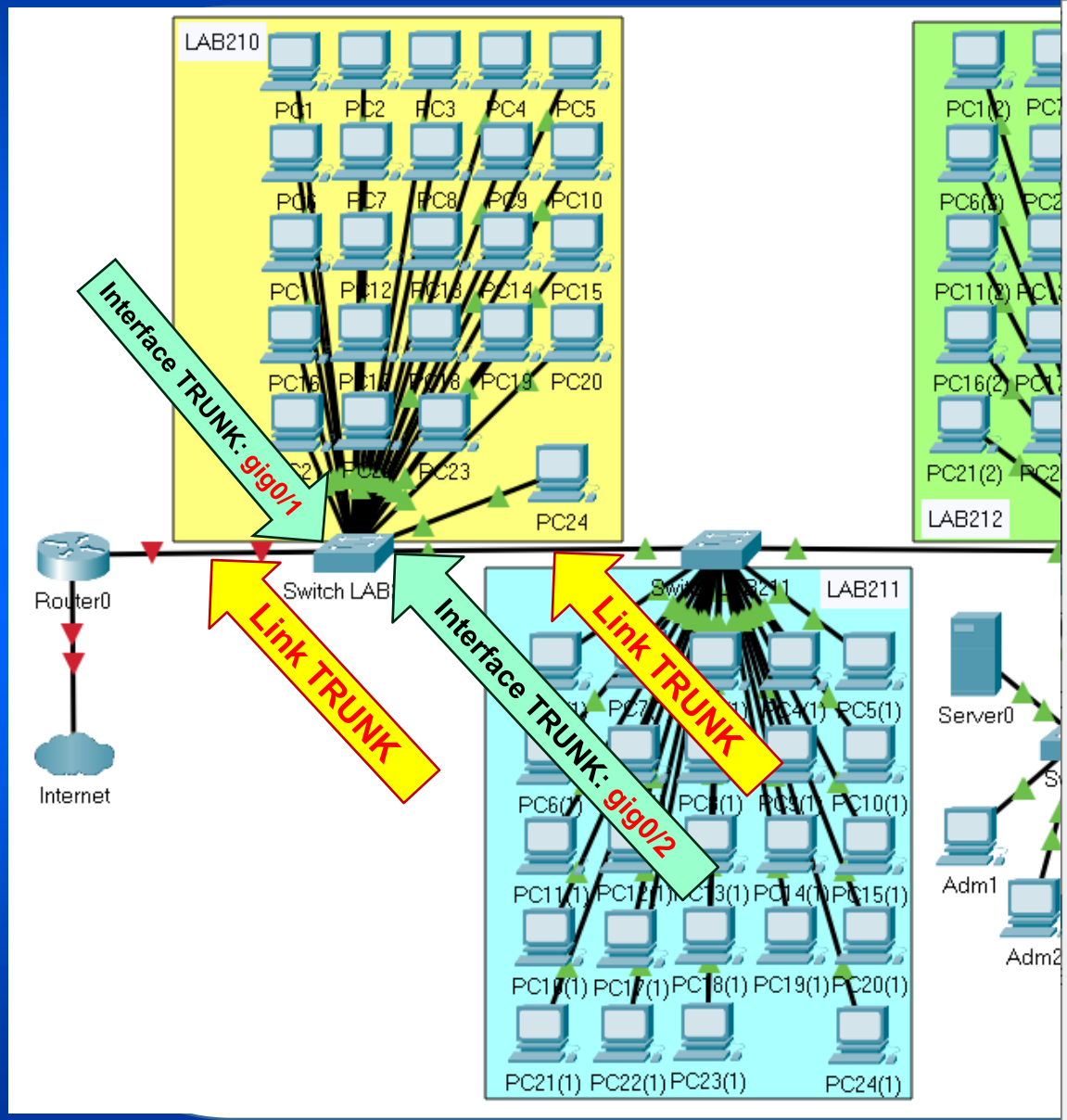
Link *Trunk*:

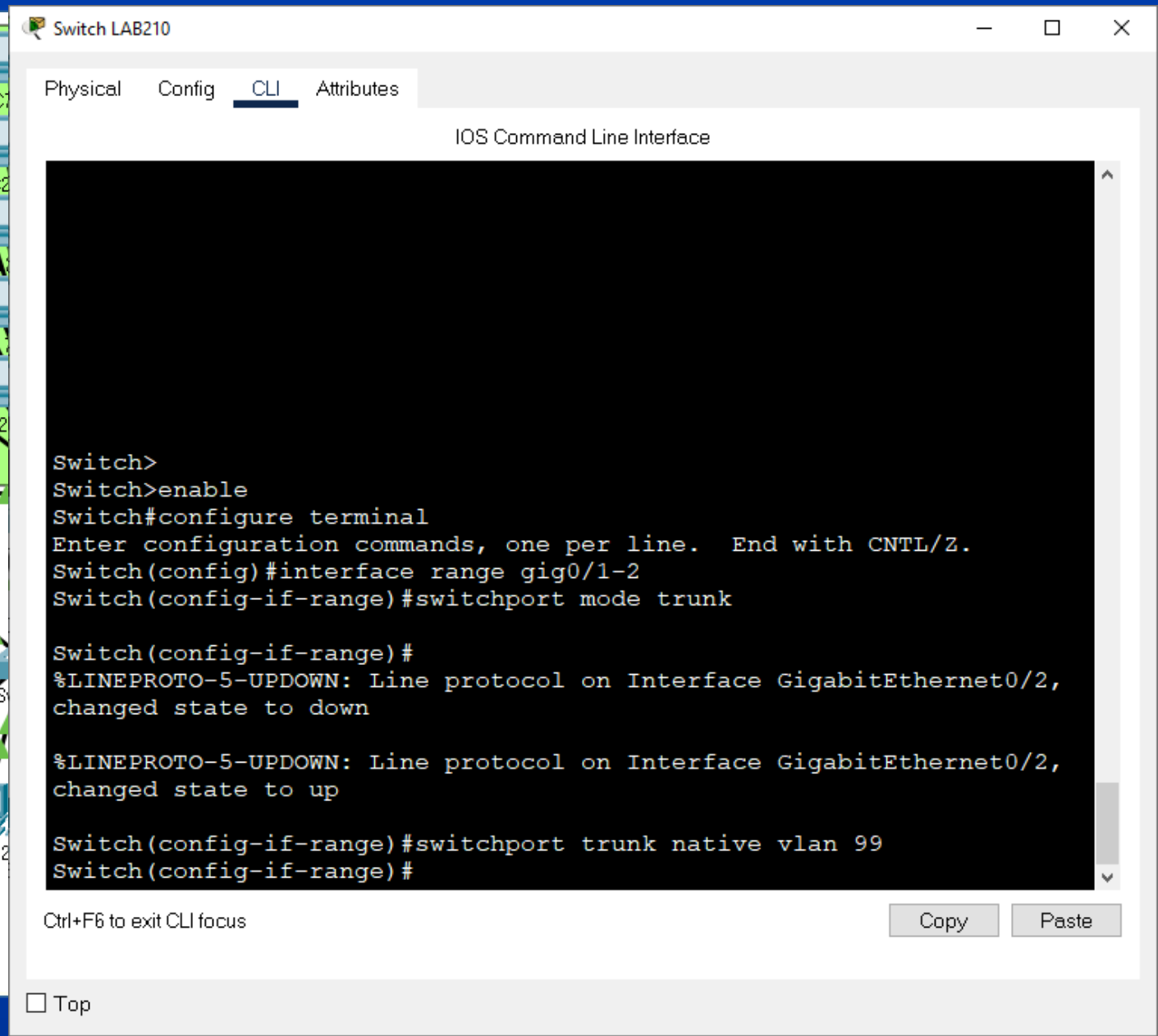
- Carrega o tráfego de múltiplas VLANs;

Interface *Trunk*:

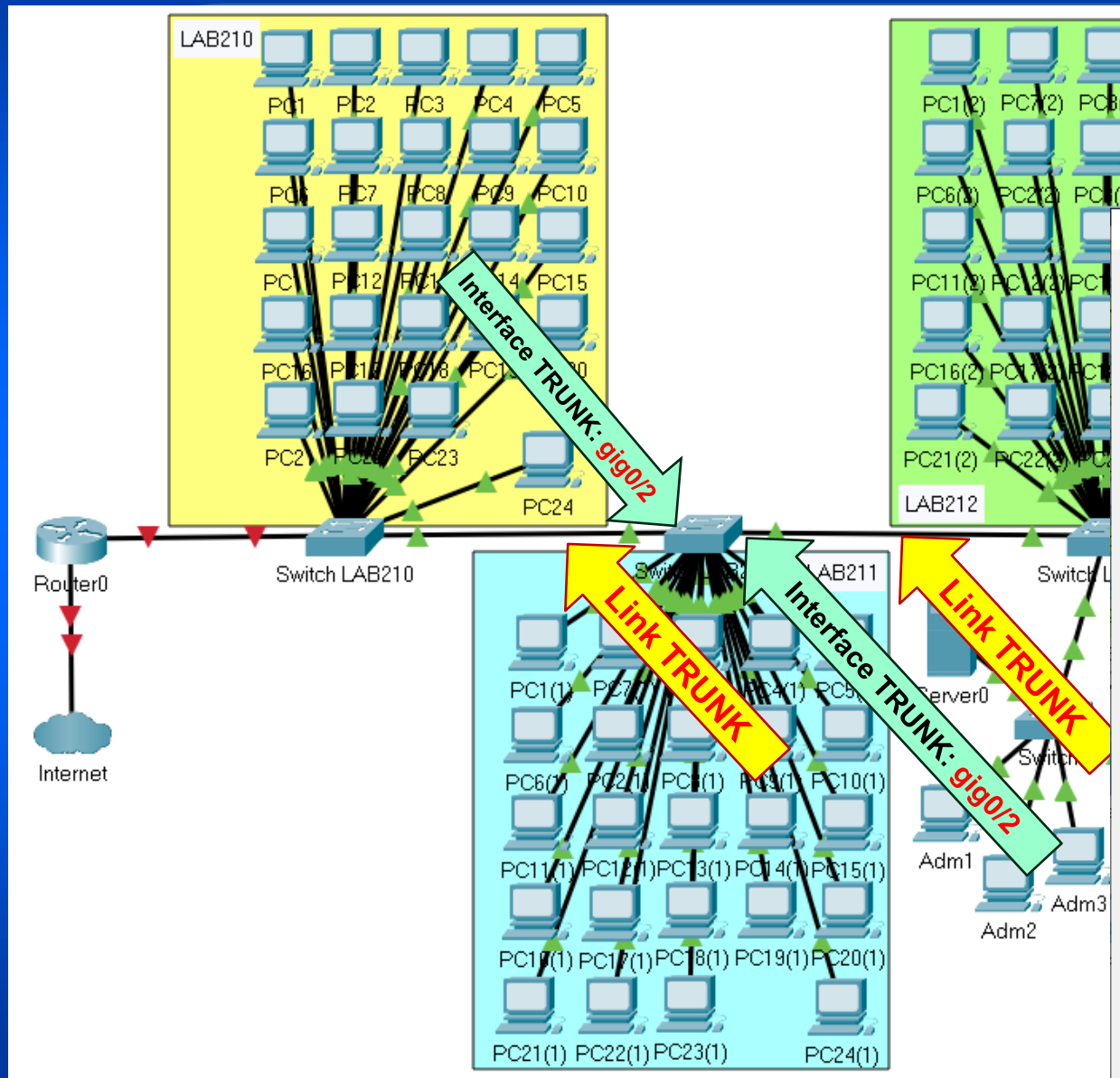
- A(s) interface(s) do switch conectada(s) pelo *link trunk* precisam pertencer a todas as VLANs do switch.

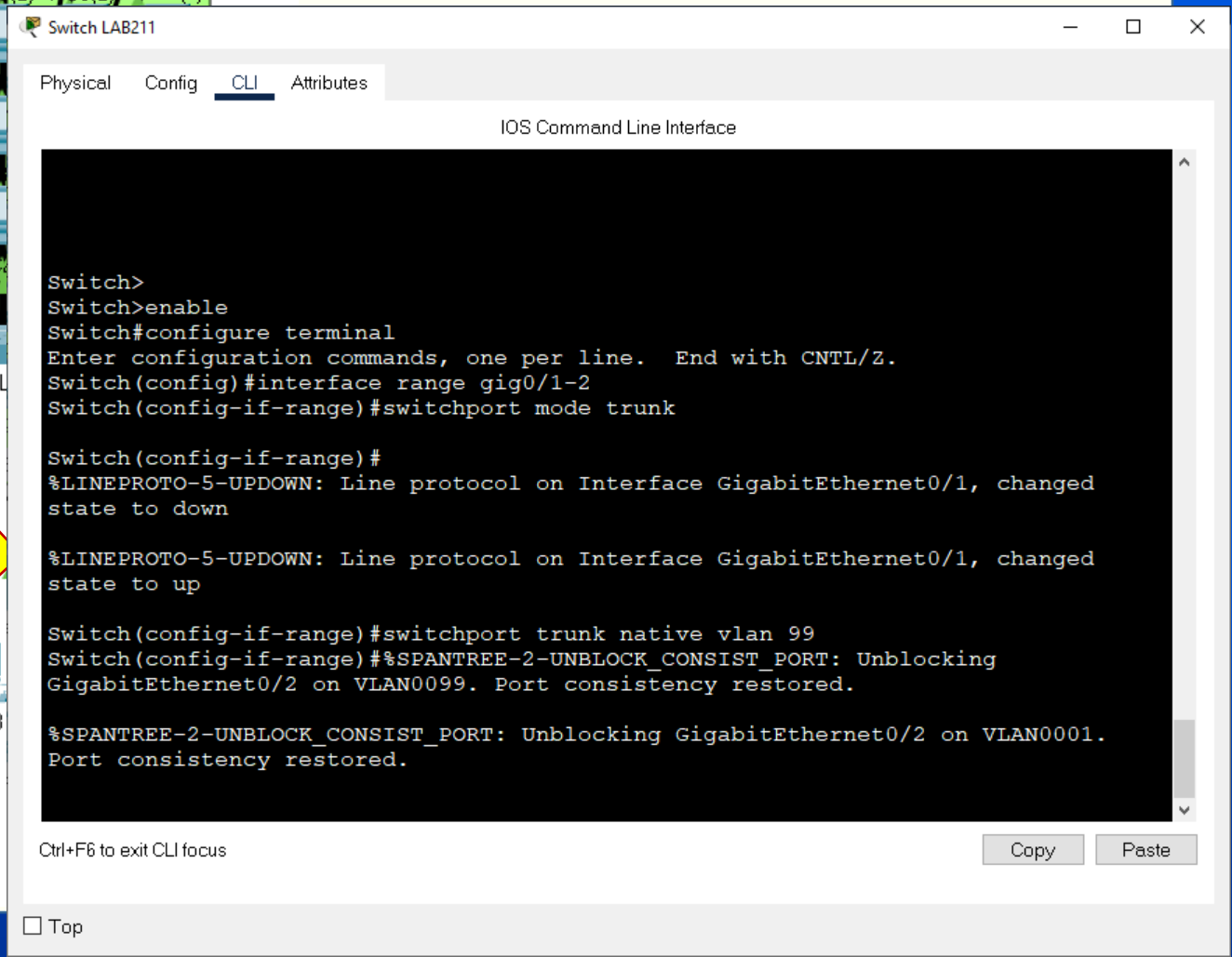
Configuração 1: TRUNK no Switch LAB210



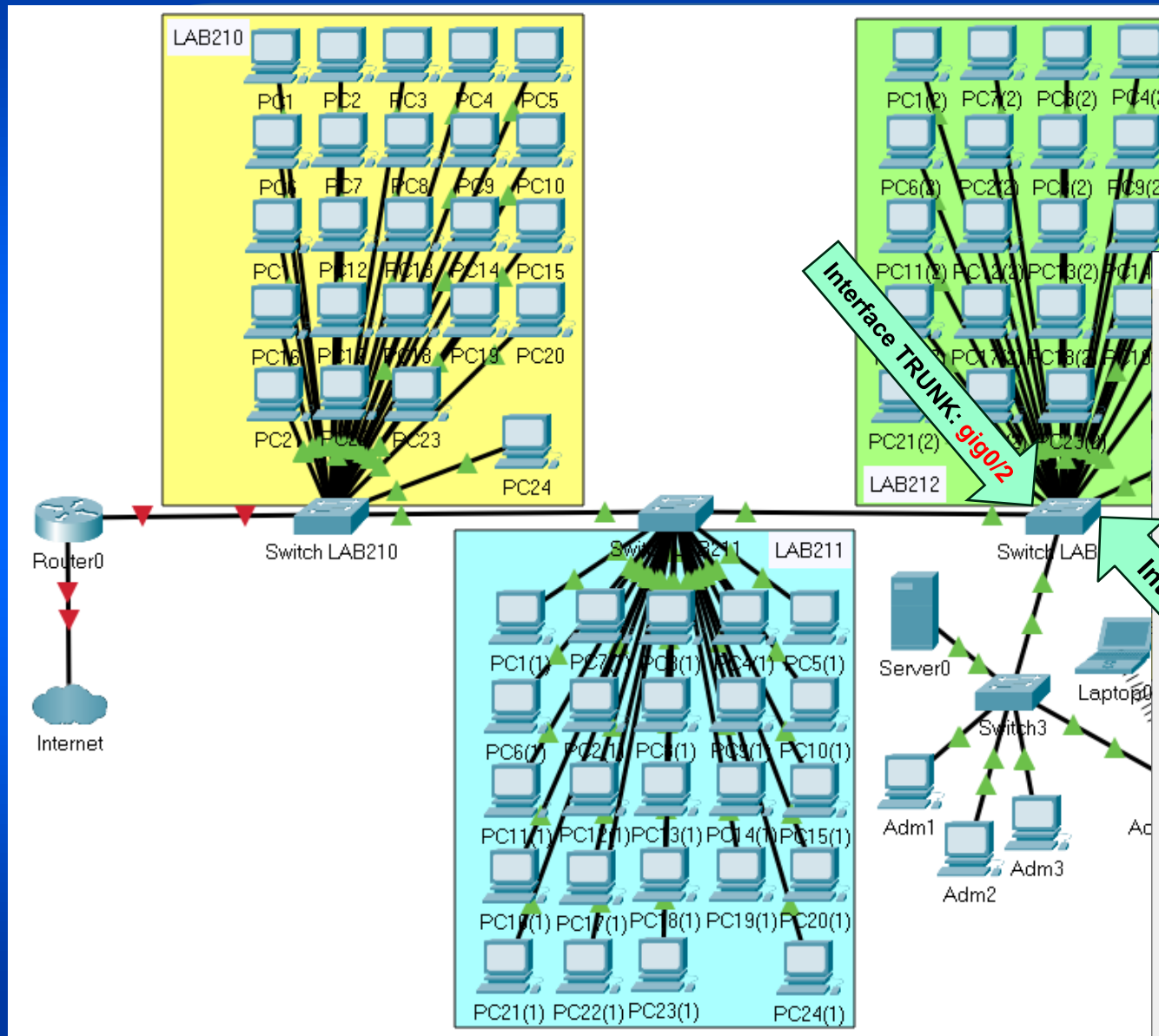


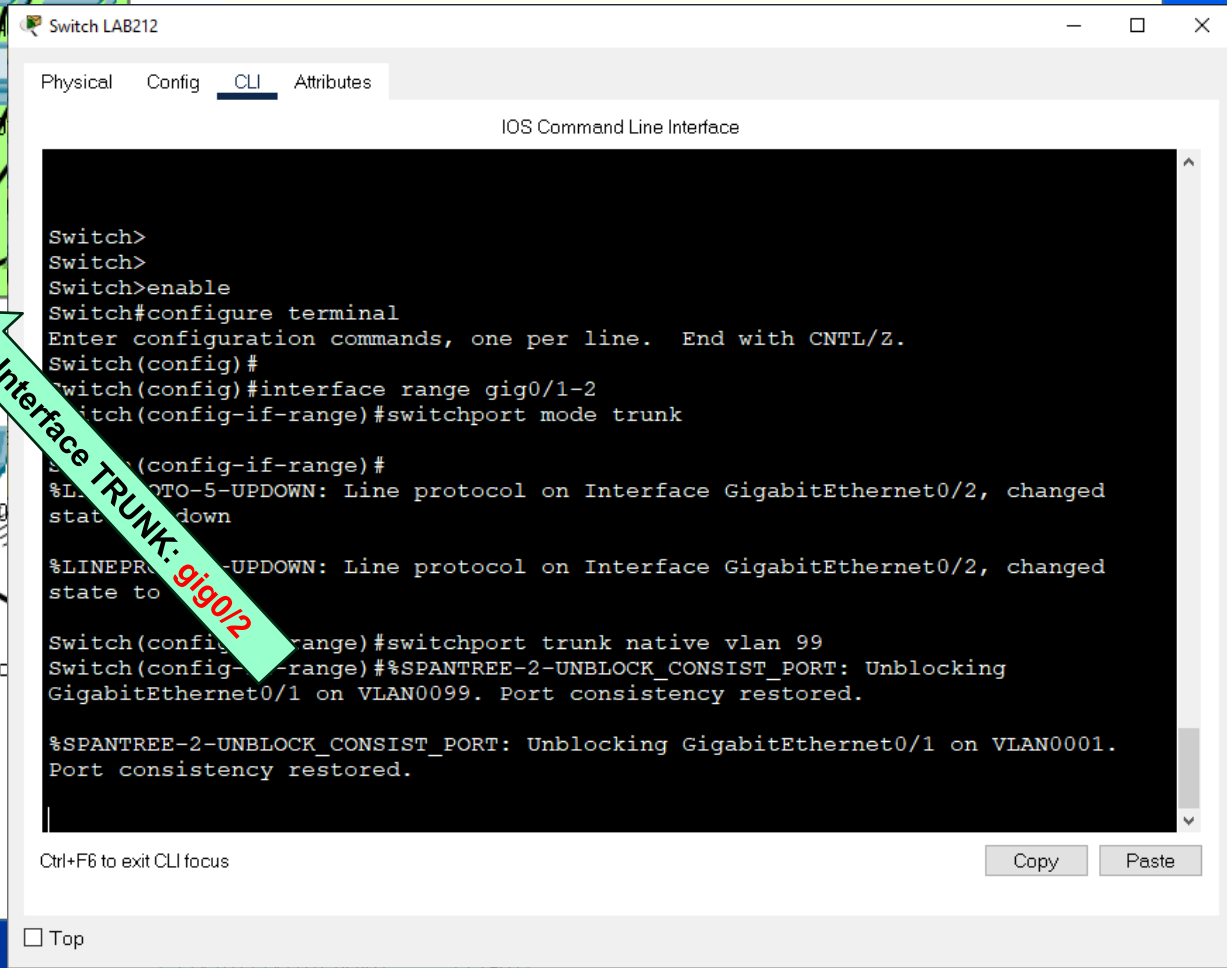
Configuração 2: TRUNK no Switch LAB211



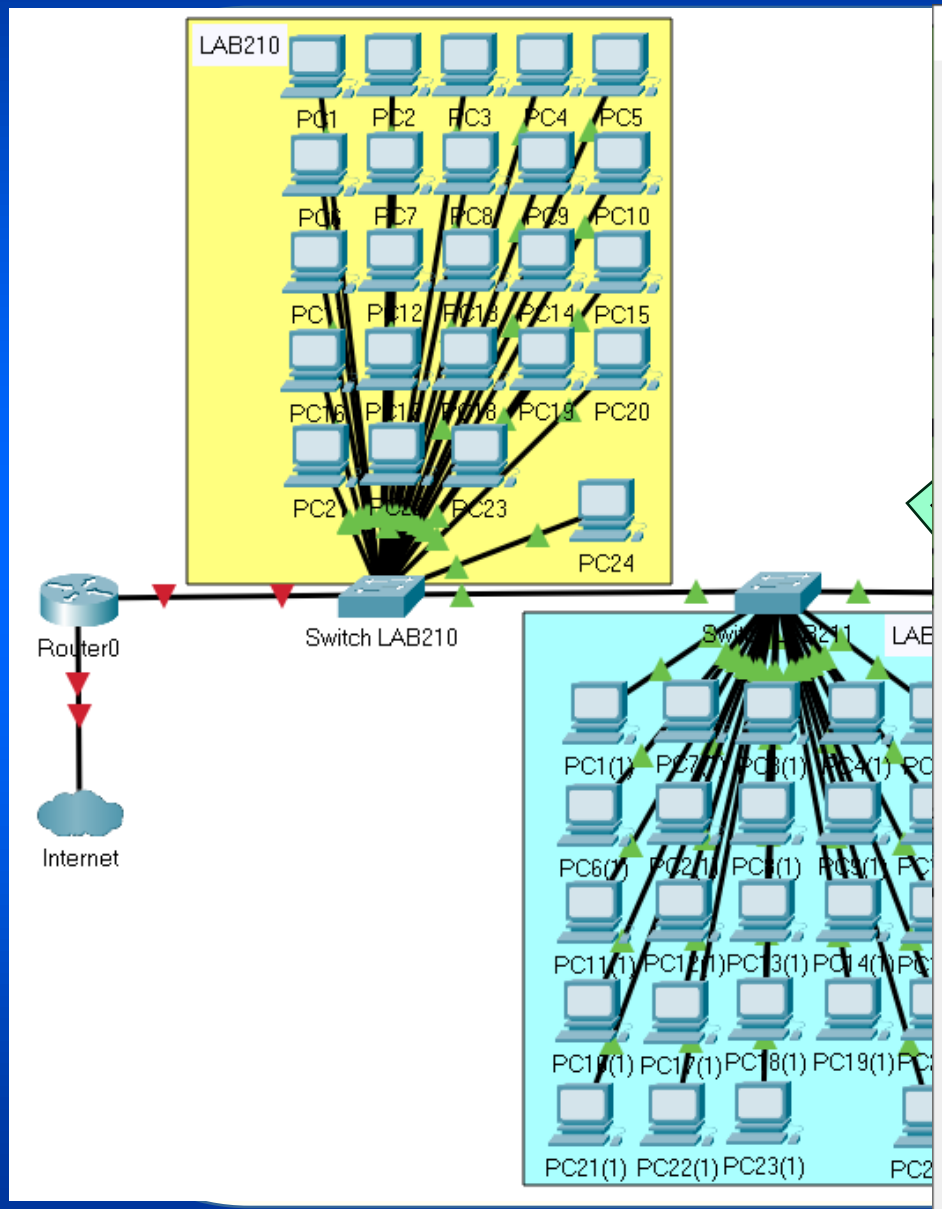


Configuração 3: TRUNK no Switch LAB211





Configuração 4: TRUNK no Switch3



Switch3

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
GigabitEthernet0/2 VLAN1.

%SPANTREE-2-BLOCK_PVID_LOCAL: Blocking GigabitEthernet0/2 on VLAN0001.
Inconsistent local vlan.



Switch>
Switch>
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface gig0/2
Switch(config-if)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on
GigabitEthernet0/2 (1), with Switch GigabitEthernet0/2 (99).

Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk native vlan 99
Switch(config-if)#%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking
GigabitEthernet0/2 on VLAN0099. Port consistency restored.

%SPANTREE-2-UNBLOCK_CONSIST_PORT: Unblocking GigabitEthernet0/2 on VLAN0001.
Port consistency restored.


Switch(config-if)#
```

Ctrl+F6 to exit CLI focus

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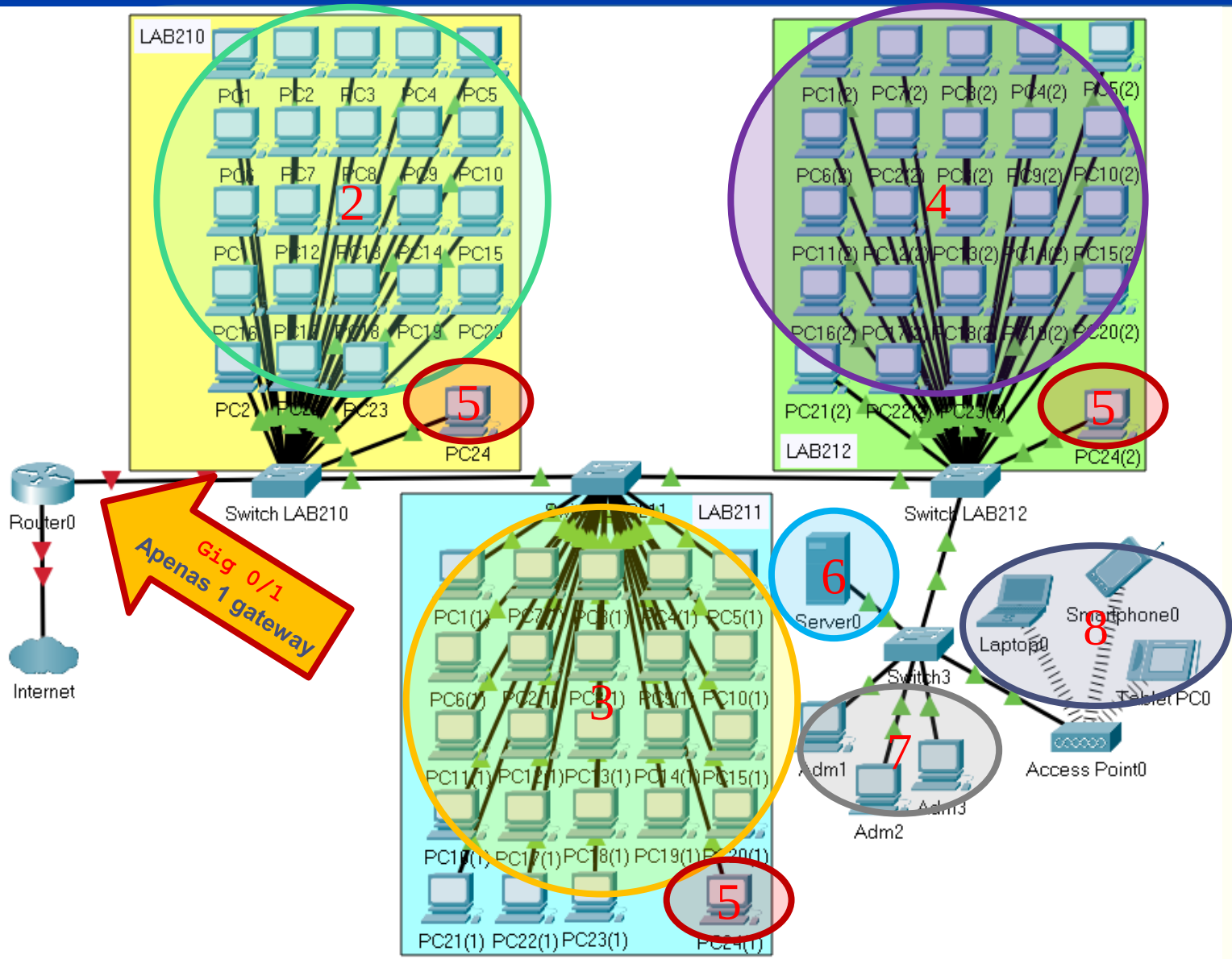
Configuração de endereçamento IP (1ª Parte)

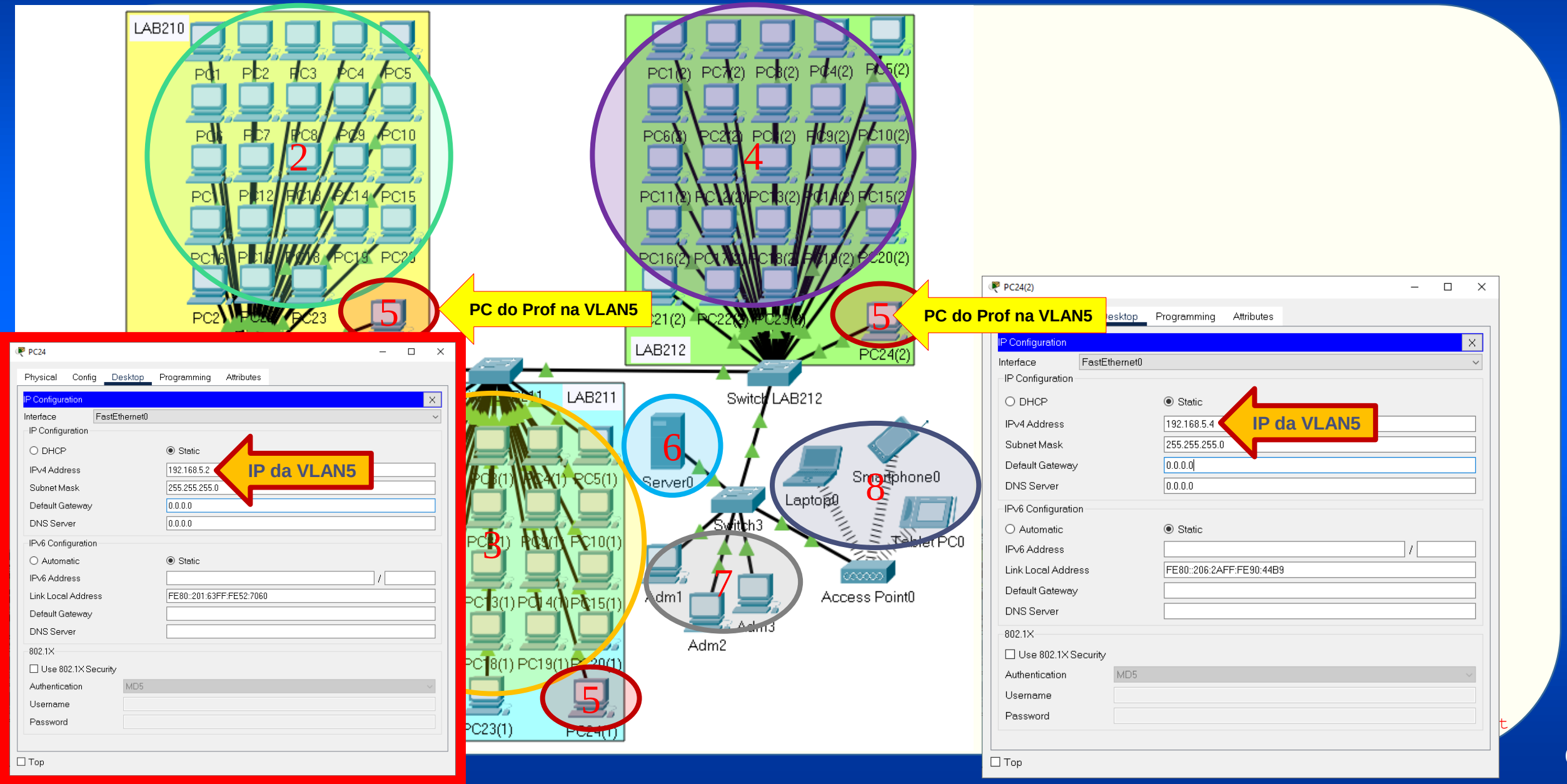
Análise 1: Endereçamento IP e Gateway



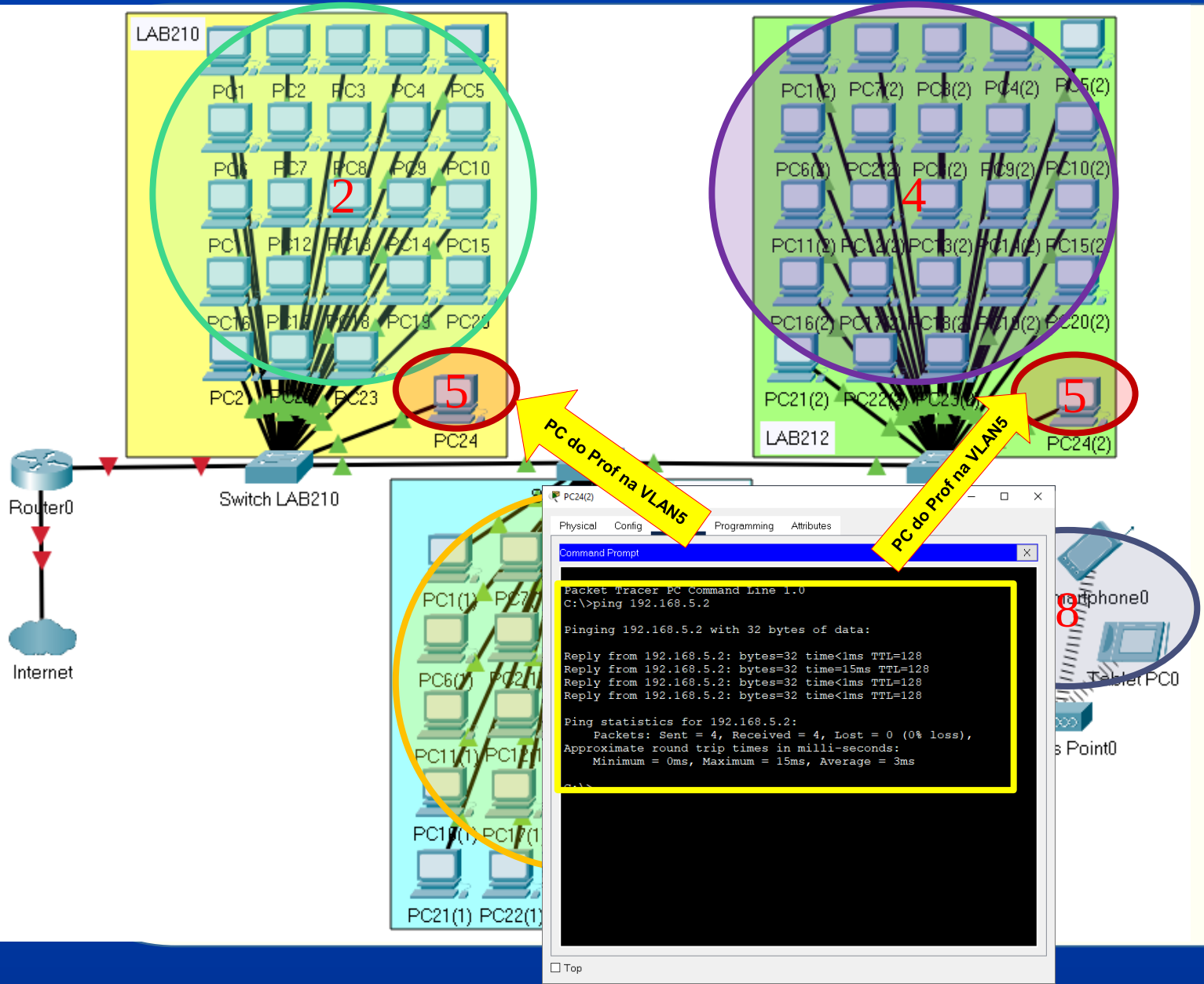
Como fica o endereçamento IP?

- Temos 7 VLANs diferentes!
- Cada VLAN é uma rede diferente (*e um domínio de broadcast diferente*) que exige um endereço de rede ÚNICO e exclusivo
- Cada VLAN precisará ter seu próprio GATEWAY.
- Vamos utilizar o seguinte esquema de endereçamento:
  - Vlan2: `192.168.2.0 /24`
  - Vlan3: `192.168.3.0 /24`
  - Vlan4: `192.168.4.0 /24`
  - Vlan5: `192.168.5.0 /24`
  - Vlan6: `192.168.6.0 /24`
  - Vlan7: `192.168.7.0 /24`
  - Vlan8: `192.168.8.0 /24`
- Precisaremos 'virtualizar' o gateway (interface `Gig 0/1`), dividindo ele em 7 sub-interfaces (7 gateways virtuais)

Análise 2: Endereçamento IP e Gateway

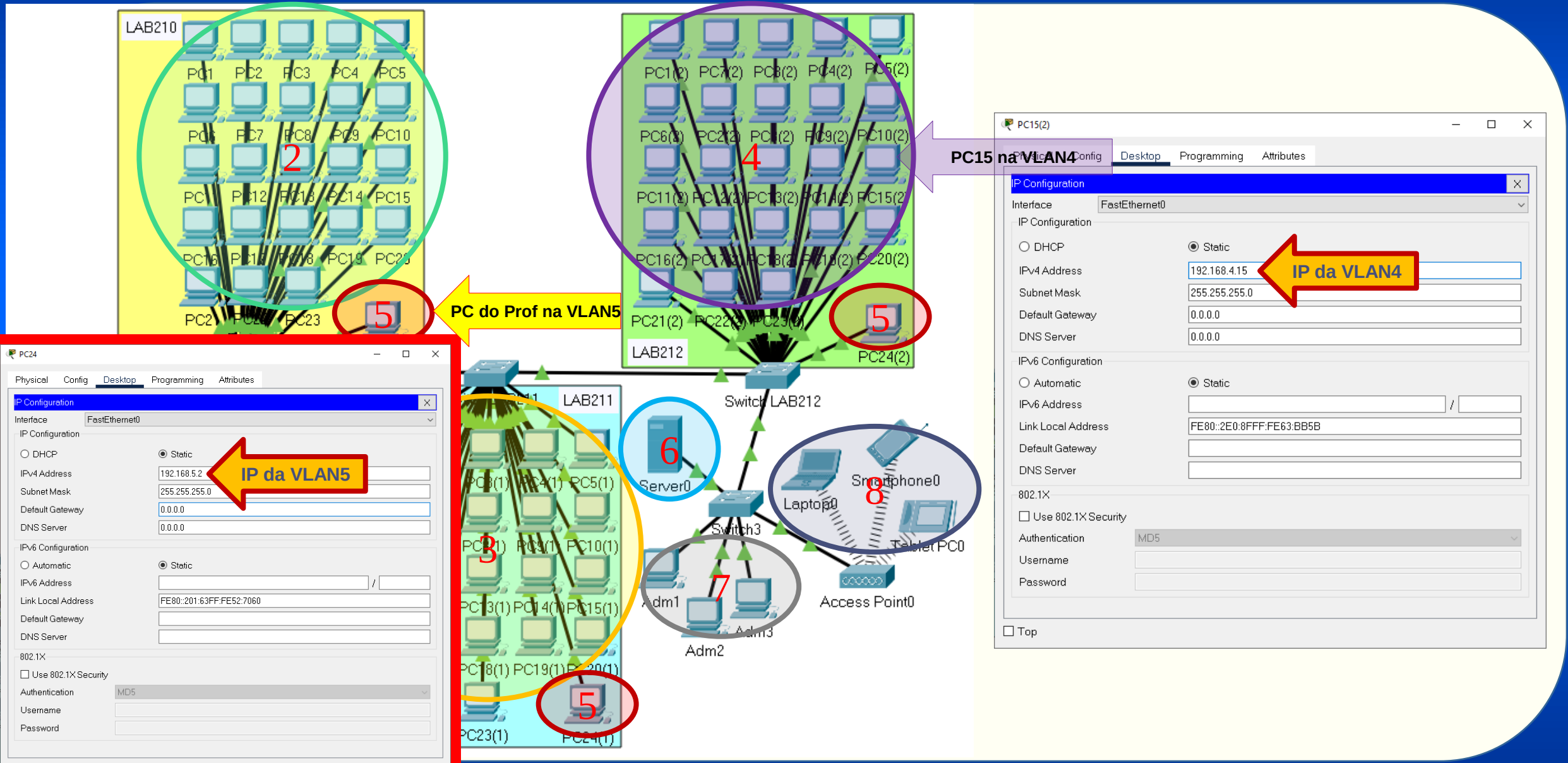


Análise 3: Endereçamento IP e Gateway

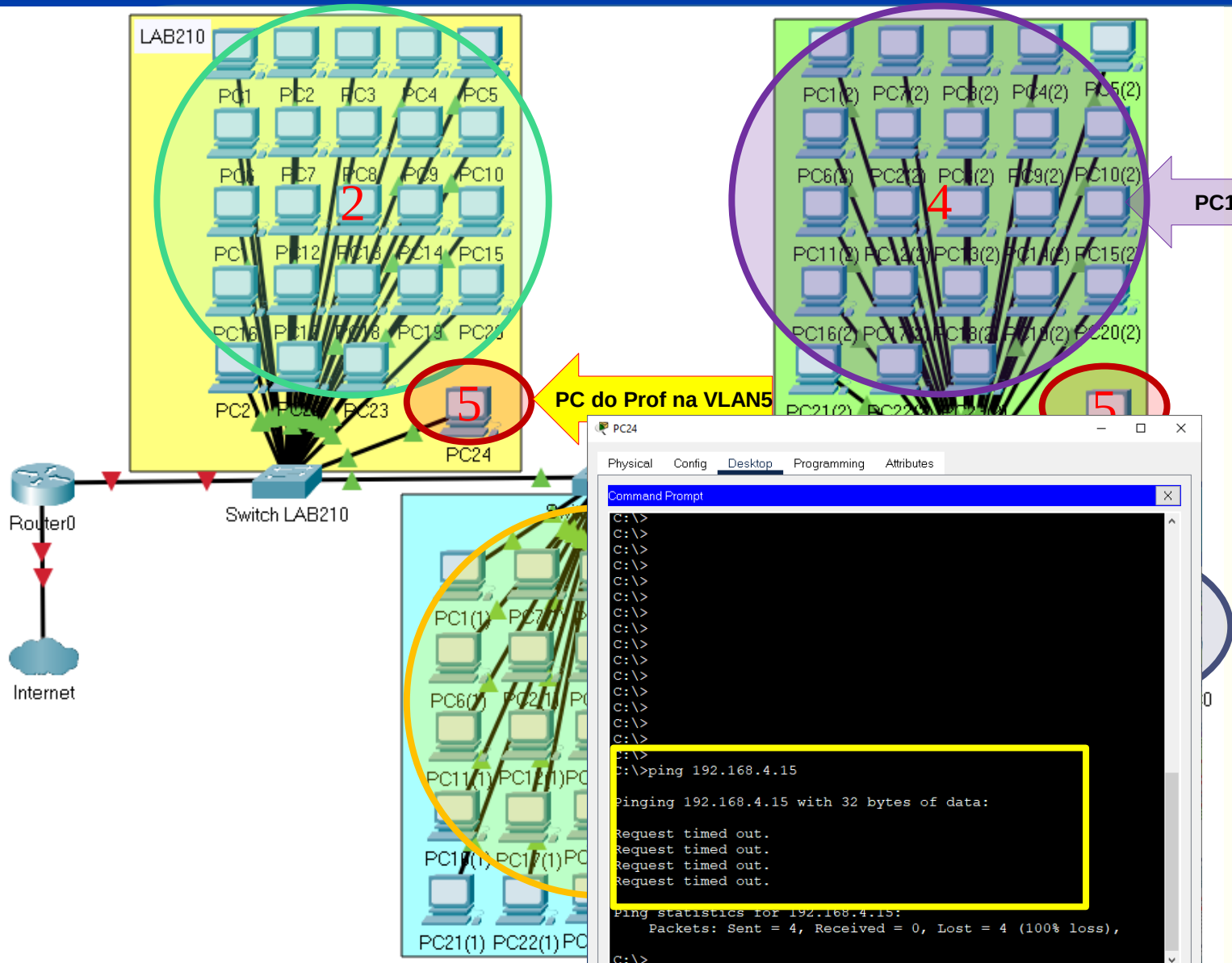


Observe que É POSSÍVEL estabelecer comunicação entre equipamentos que estão NA MESMA VLAN (ou seja, na mesma rede)

Análise 4: Endereçamento IP e Gateway



Análise 5: Endereçamento IP e Gateway



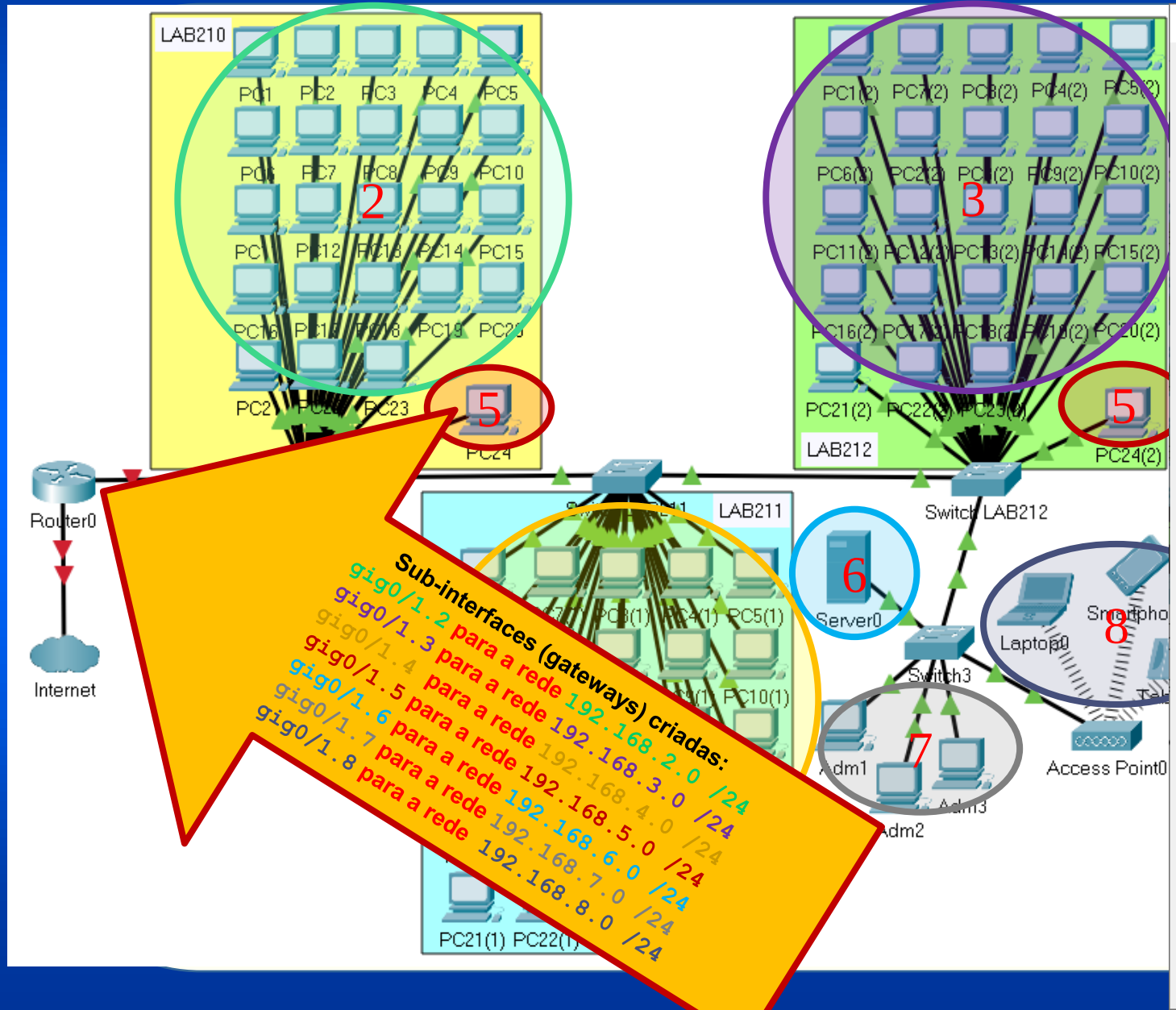
Observe que NÃO É POSSÍVEL estabelecer comunicação entre equipamentos que estão em VLANs diferentes (ou seja, em redes diferntes)

Para estabelecer a comunicação será necessário o uso do Roteador

(Roteador: equipamento que permite a comunicação entre redes diferentes)

Configuração sub-interfaces (gateways virtuais) no roteador

Configuração 1: Endereçamento IP e Gateway



Router2

Physical | Config | CLI | Attributes

IOS Command Line Interface

```
Router#
Router#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#interface gig0/1.2
Router(config-subif)#encapsulation dot1q 2
Router(config-subif)#ip address 192.168.2.1 255.255.255.0
Router(config-subif)#
Router(config-subif)#interface gig0/1.3
Router(config-subif)#encapsulation dot1q 3
Router(config-subif)#ip address 192.168.3.1 255.255.255.0
Router(config-subif)#
Router(config-subif)#interface gig0/1.4
Router(config-subif)#encapsulation dot1q 4
Router(config-subif)#ip address 192.168.4.1 255.255.255.0
Router(config-subif)#
Router(config-subif)#interface gig0/1.5
Router(config-subif)#encapsulation dot1q 5
Router(config-subif)#ip address 192.168.5.1 255.255.255.0
Router(config-subif)#
Router(config-subif)#interface gig0/1.6
Router(config-subif)#encapsulation dot1q 6
Router(config-subif)#ip address 192.168.6.1 255.255.255.0
Router(config-subif)#
Router(config-subif)#interface gig0/1.7
Router(config-subif)#encapsulation dot1q 7
Router(config-subif)#ip address 192.168.7.1 255.255.255.0
Router(config-subif)#
Router(config-subif)#interface gig0/1.8
Router(config-subif)#encapsulation dot1q 8
Router(config-subif)#ip address 192.168.8.1 255.255.255.0
Router(config-subif)#exit
Router(config)#interface gig0/1
Router(config-if)#no shutdown
```

Ctrl+F6 to exit CLI focus

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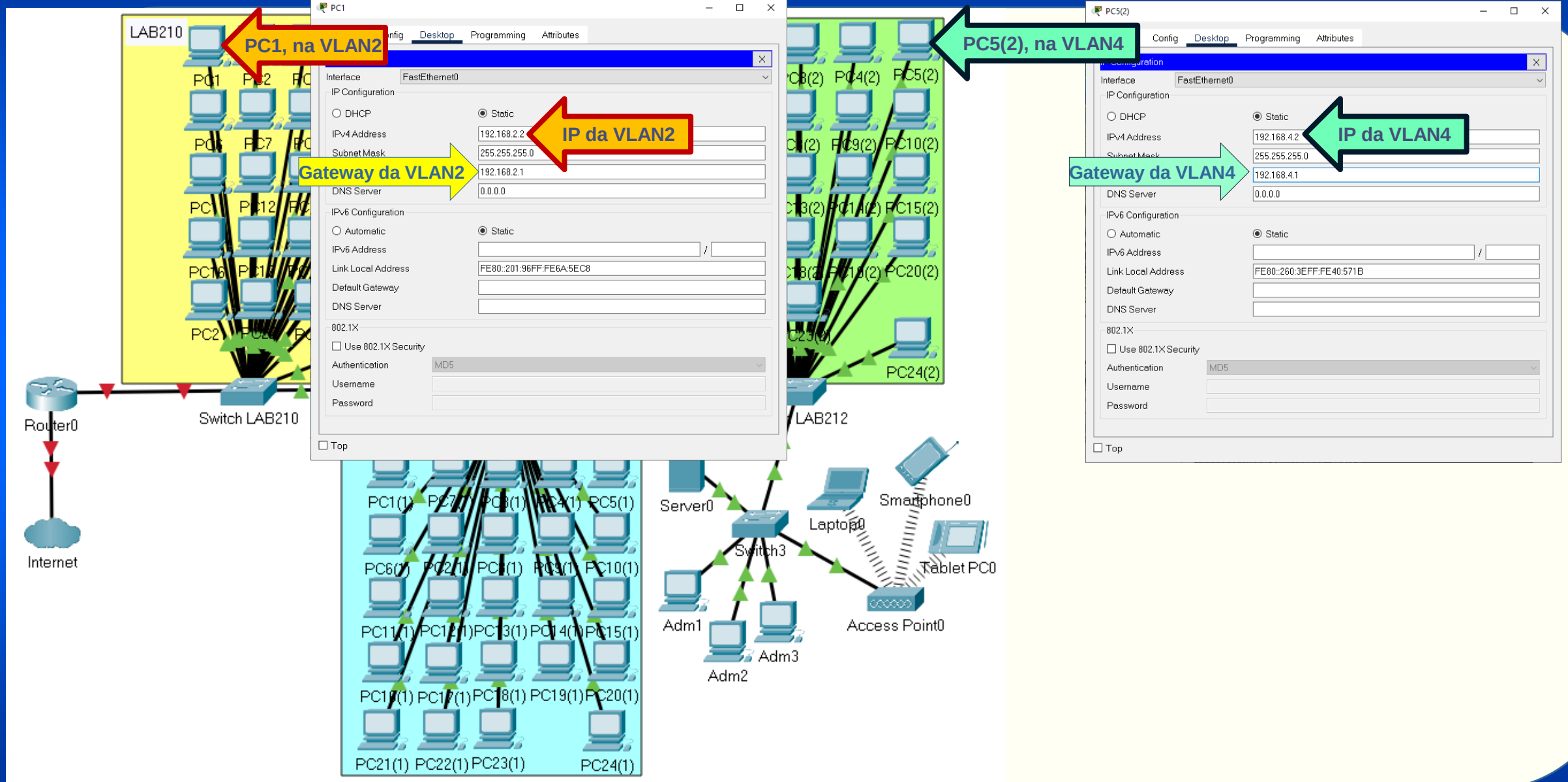
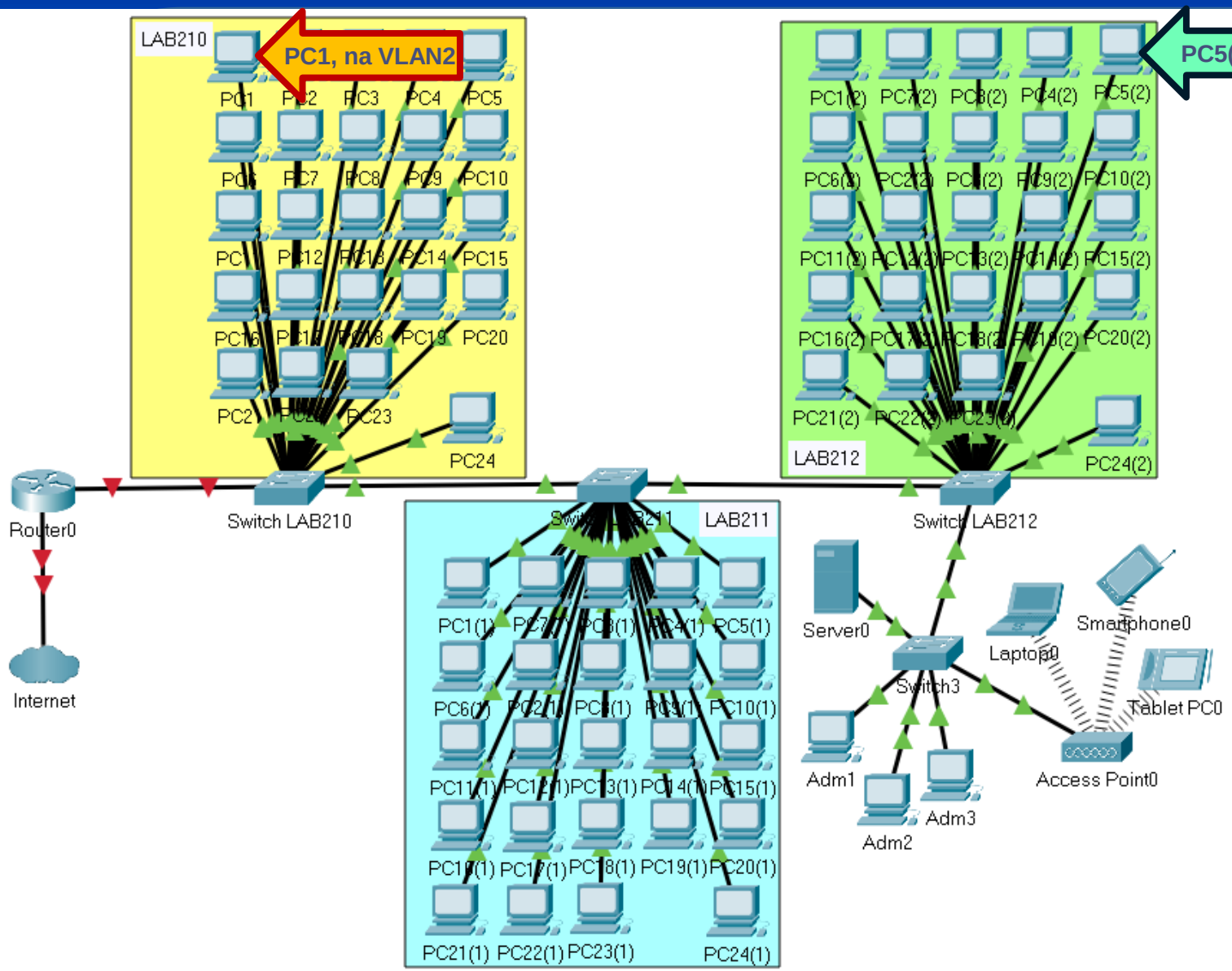
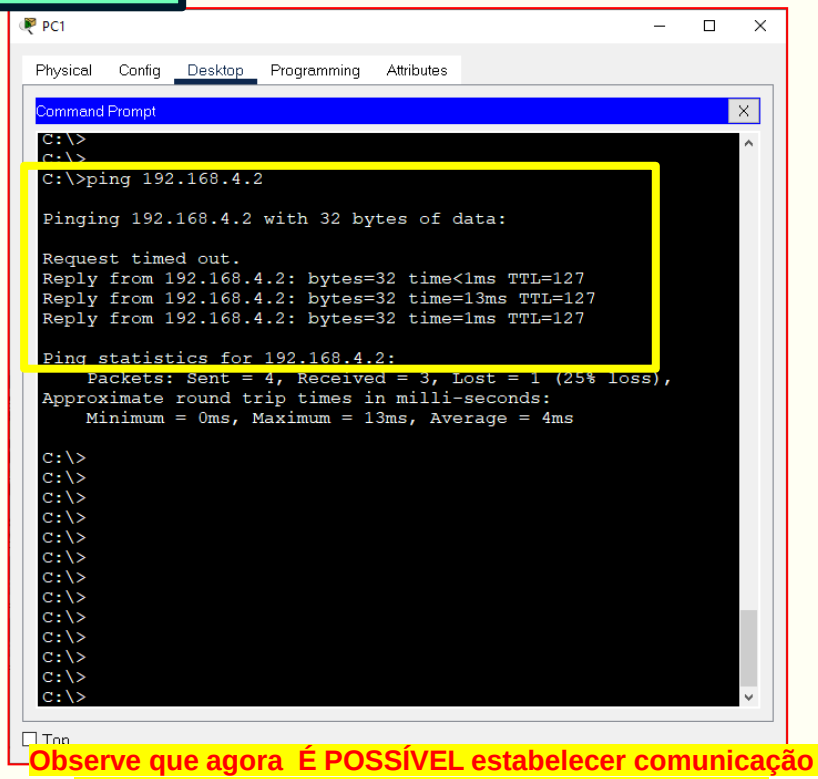
Configuração 2: Endereçamento IP e Gateway



Análise: Endereçamento IP e Gateway





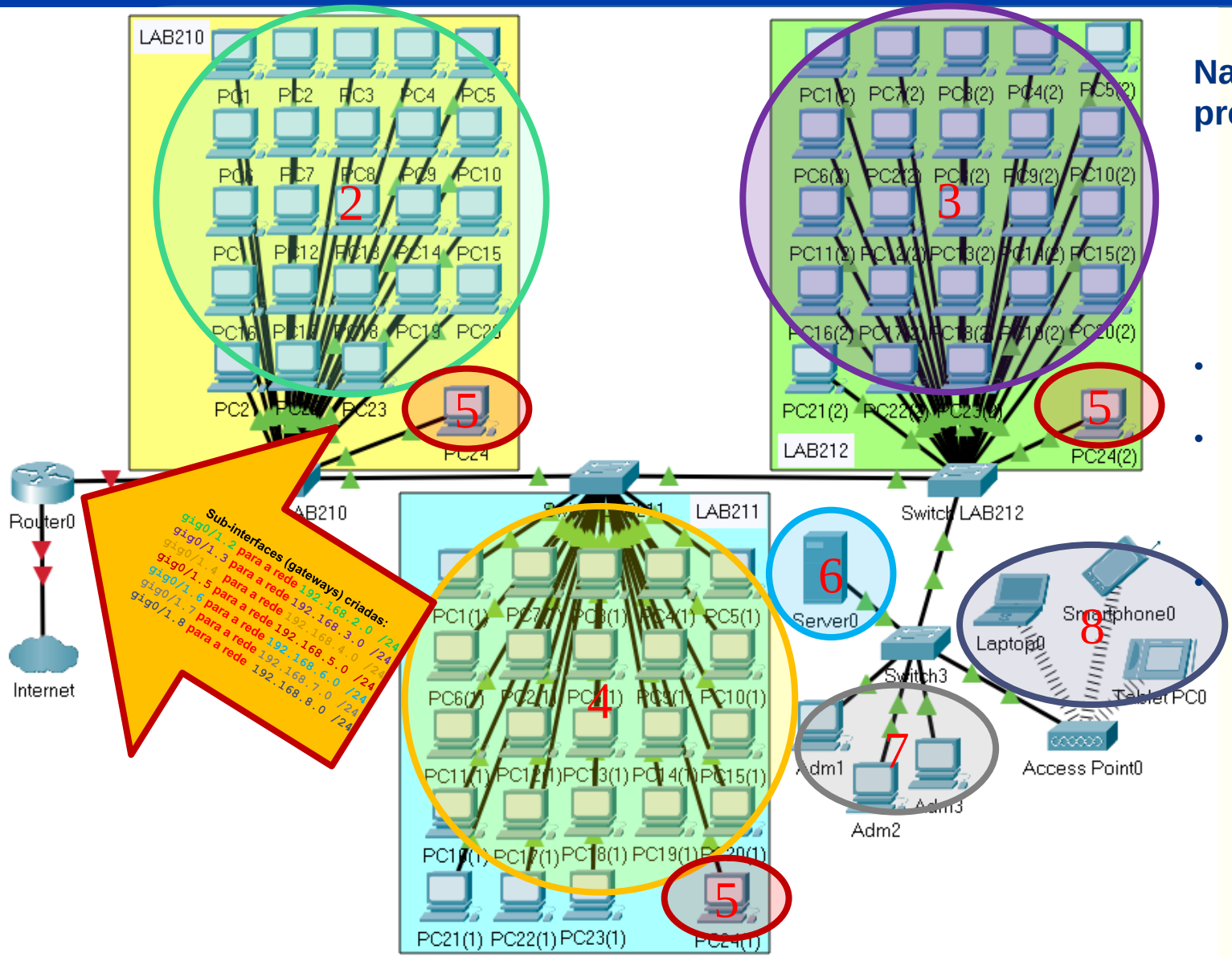
Observe que agora É POSSÍVEL estabelecer comunicação entre equipamentos que estão em VLANs diferentes (ou seja, em redes diferntes)

Para estabelecer a comunicação é necessário o uso do Roteador

(Roteador: equipamento que permite a comunicação entre redes diferentes)

Configuração de endereçamento IP (1ª Parte)

Análise : Endereçamento IP e Gateway



Na topologia temos 103 dispositivos finais que precisarão de endereço IP:

- **75 PCs**
- **1 servidor**
- **1 notebook**
- **1 smartphone**
- **1 tablet**

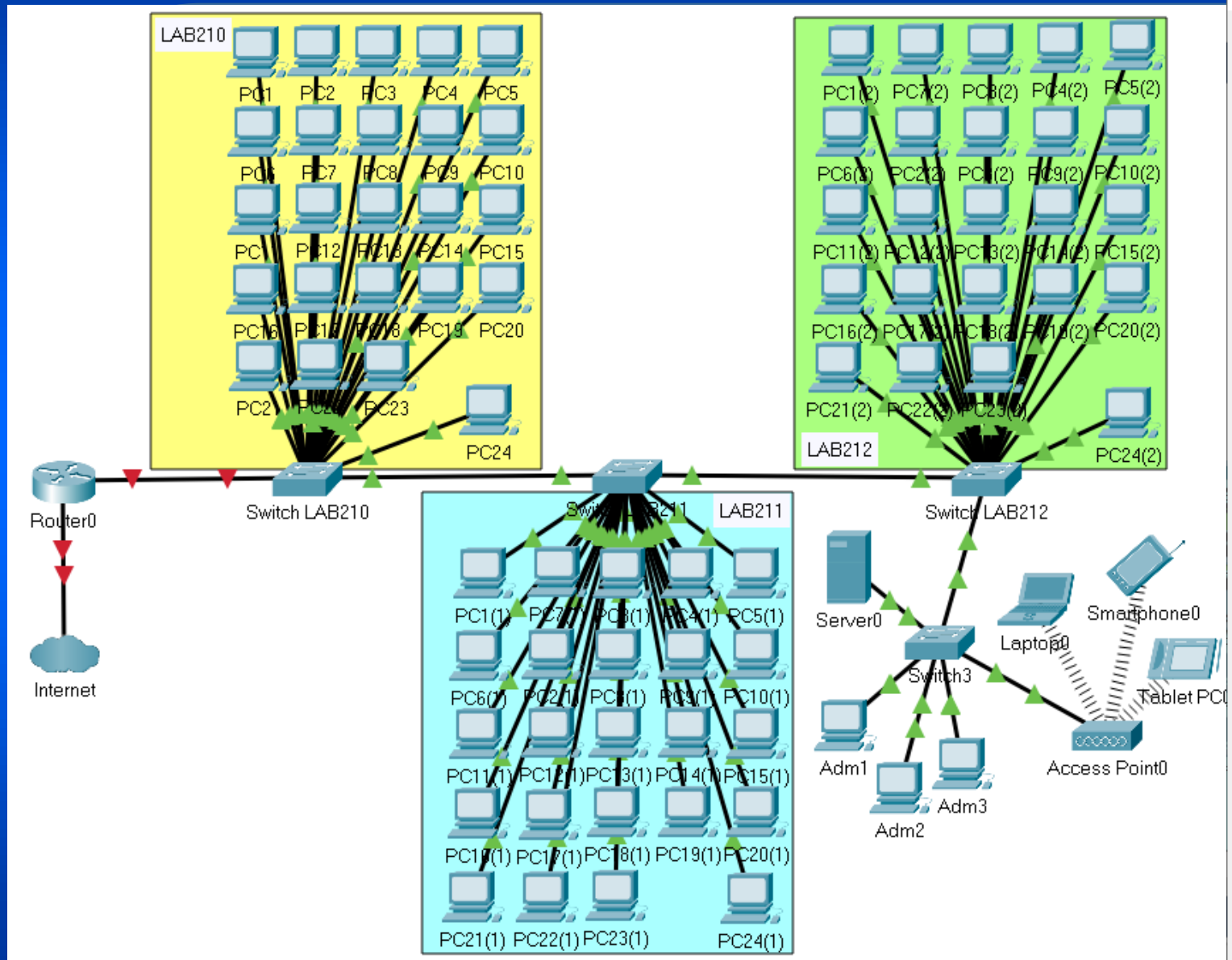
- **Faremos uso de DHCP ou configuração manual?**

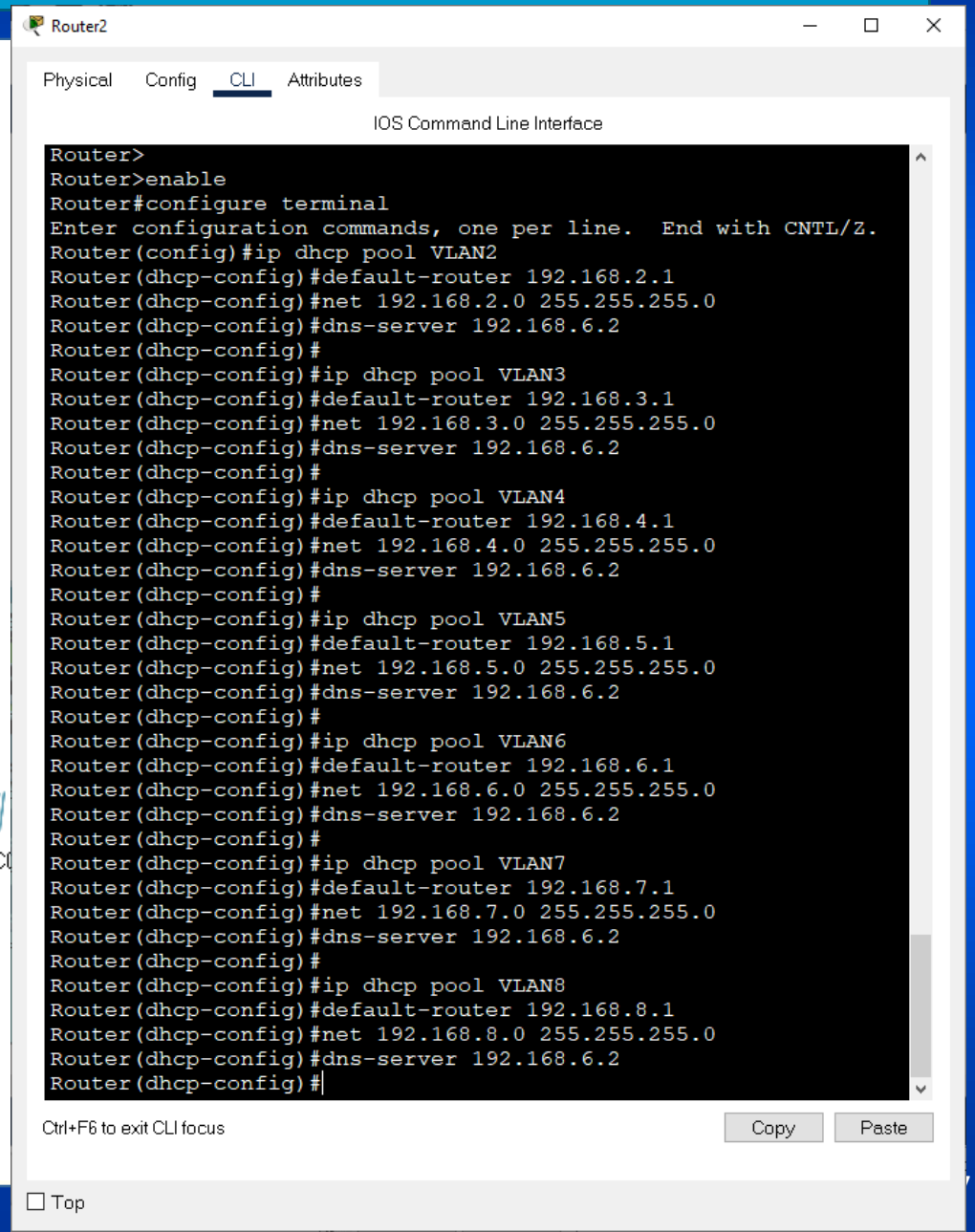
- **Lembre-se que um servidor DHCP só existe no escopo da rede local. Então cada VLAN (cada rede) precisará ter seu próprio DHCP.**

Podemos configurar um serviço DHCP em cada das subinterfaces do roteador (gateways)

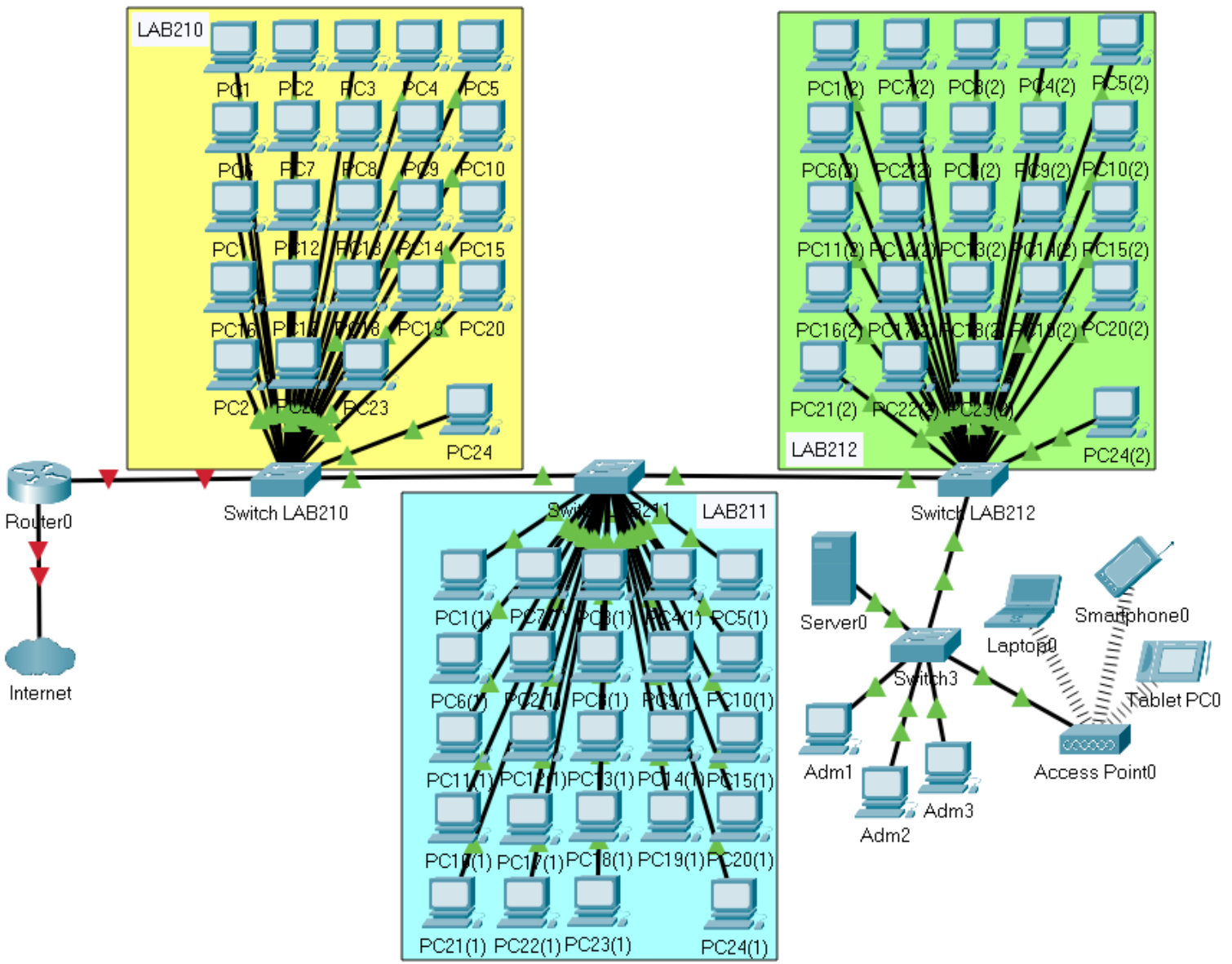
- **7 VLANs Redes = 7 subinterfaces = 7 serviços DHCP**

Configuração: Serviço DHCP no Roteador





Configuração: Serviço DHCP no Roteador



VLAN

Resumo de configuração

Resumo da Configuração de VLAN

Criar VLAN

```
Switch(vlan)#vlan 2
Switch(vlan)#name marketing
Switch(vlan)#exit
```

Definir a VLAN de uma porta em modo acesso

```
Switch(config)#interface fastethernet f0/9
Switch(config-if)#switchport mode access
Switch(config-if)#switchport access vlan 2
```

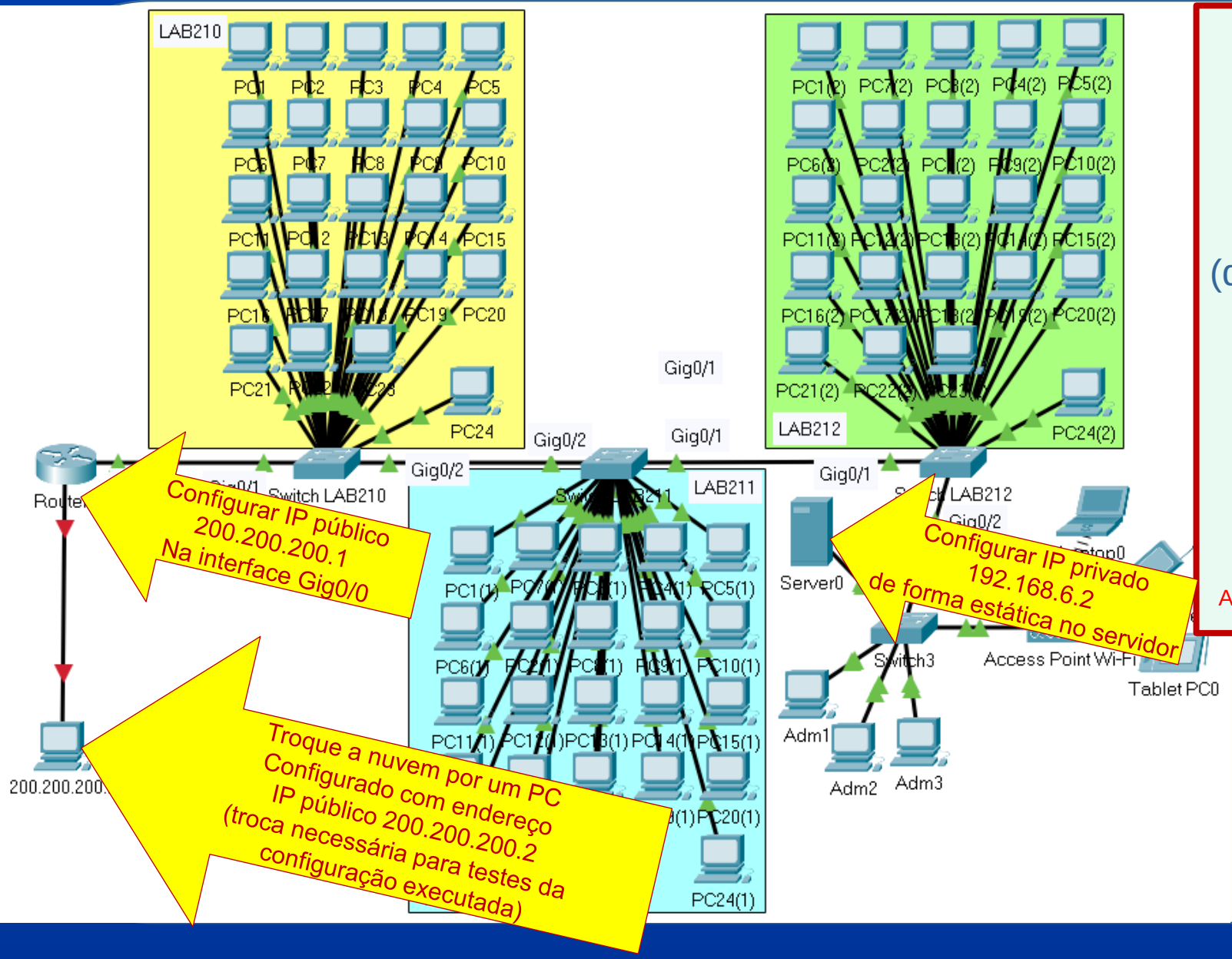
Definir a VLAN de uma porta em modo tronco (*trunk*)

```
Switch(config-if)#interface ethernet f0/7
Switch(config-if)#switchport mode trunk
Switch(config-if)#switchport trunk allowed vlan all
```

Desafio NAT

Acrescente uma configuração NAT

Configuração: NAT no Router0



Atividade Final:

Realizar as configurações apontadas nas setas e configurar NAT (do tipo PAT) no Router2 associando o IP Público 200.200.200.1 (para a porta TCP 80) ao endereço IP privado no Server0 (para a porta TCP 80)

Dica:
Veja o roteiro de configuração no arquivo
Aula11_2023 Configuração NAT Estático, Dinâmico e PAT.pdf

Para estudo:

https://www.netacad.com/

Referências Bibliográficas

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Tanenbaum, Andrew S; Wetherall, David. Redes de Computadores. São Paulo: Pearson Prentice Hall, 2011. 5ª edição americana. ISBN 978-85-7605-924-0.

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