

9. Small office configuration scenario with VLAN and internet access nr. 3

New network scenario consist of one branch router with default routing to ISP. WAN internet access use PPP serial link with old PAP authentication. Office hosts are separated in 3 VLAN. Vlan 1 remain default, VLAN 2 is staff and for guests is reserved guest VLAN 3. Administrator use Admin Laptop for direct console CLI access. Switched network remain very simple, there is only one switch extended with old hub Hub0 (clients C and D share same subnet but also same collision domain).

- *Serial link with PPP encapsulation and PAP authentication:*

On Office router:

```
username ISP password 0 cisco
```

```
interface Serial0/0/0
ip address 209.165.200.225 255.255.255.252
encapsulation ppp
ppp authentication pap
ppp pap sent-username Office password 0
```

cisco

On ISP router:

```
username Office password 0 cisco
```

```
interface Serial0/0/0
ip address 209.165.200.226 255.255.255.252
encapsulation ppp
ppp authentication pap
ppp pap sent-username ISP password 0 cisco
clock rate 64000
```

- *loop back interface on ISP router for testing remote*

connectivity

```
interface Loopback0
ip address 198.160.131.1 255.255.255.0
```

- *static route in ISP pointing to Office inside global (public) address*

```
ip route 209.165.201.0 255.255.255.224 Serial0/0/0
```

- *default routing to ISP*

```
ip route 0.0.0.0 0.0.0.0 Serial0/0/0
```

- *static NAT and NAT with interface serial 0/0/0 overload PAT for local hosts internet connectivity*

```
ip nat inside source list NAT interface Serial0/0/0
overload
```

```
ip nat inside source static 10.0.4.254
209.165.201.1
```

```
ip access-list standard NAT
```

```
permit 10.0.0.0 0.0.255.255
```

- *DHCP address assignment for all VLAN clients*

```
ip dhcp excluded-address 10.0.1.1 10.0.1.9
```

```
ip dhcp excluded-address 10.0.2.1 10.0.2.9
```

```
ip dhcp excluded-address 10.0.3.1 10.0.3.9
```

```
!
```

```
ip dhcp pool VLAN1
```

```
network 10.0.1.0 255.255.255.0
```

```
default-router 10.0.1.1
```

```
dns-server 10.0.4.254
```

```
ip dhcp pool VLAN2
```

```
network 10.0.2.0 255.255.255.0
```

```
default-router 10.0.2.1
```

```
dns-server 10.0.4.254
```

```
ip dhcp pool VLAN3
```

```
network 10.0.3.0 255.255.255.0
```

```
default-router 10.0.3.1
```

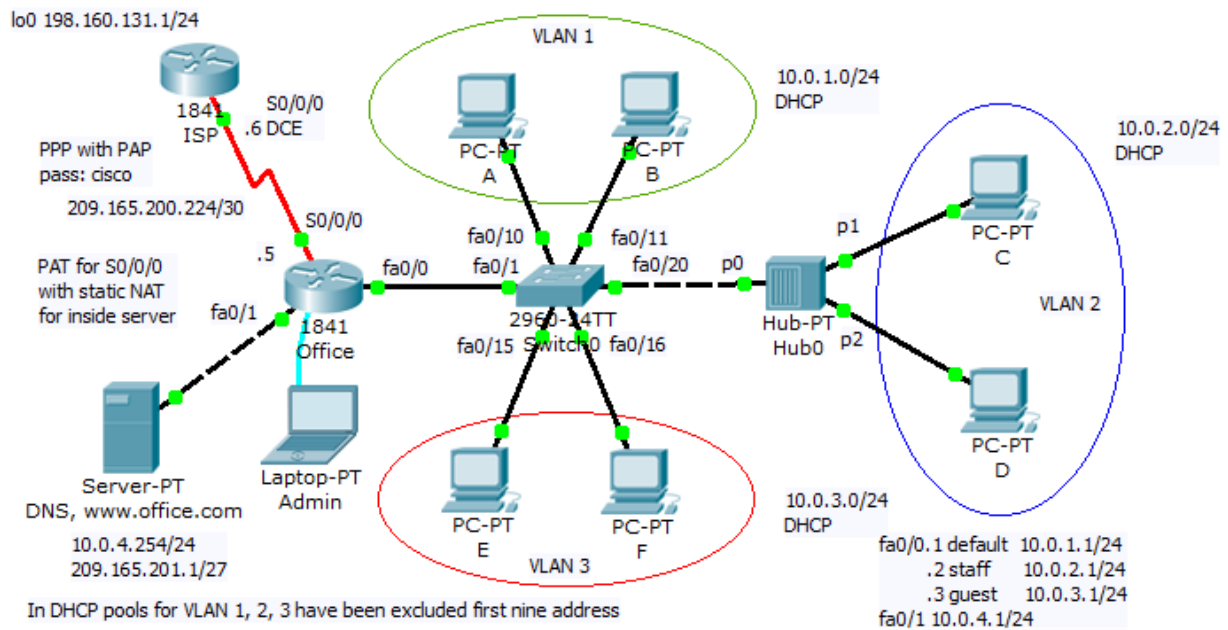
```
dns-server 10.0.4.254
```

- *inter VLAN routing with router-on-a-stick*

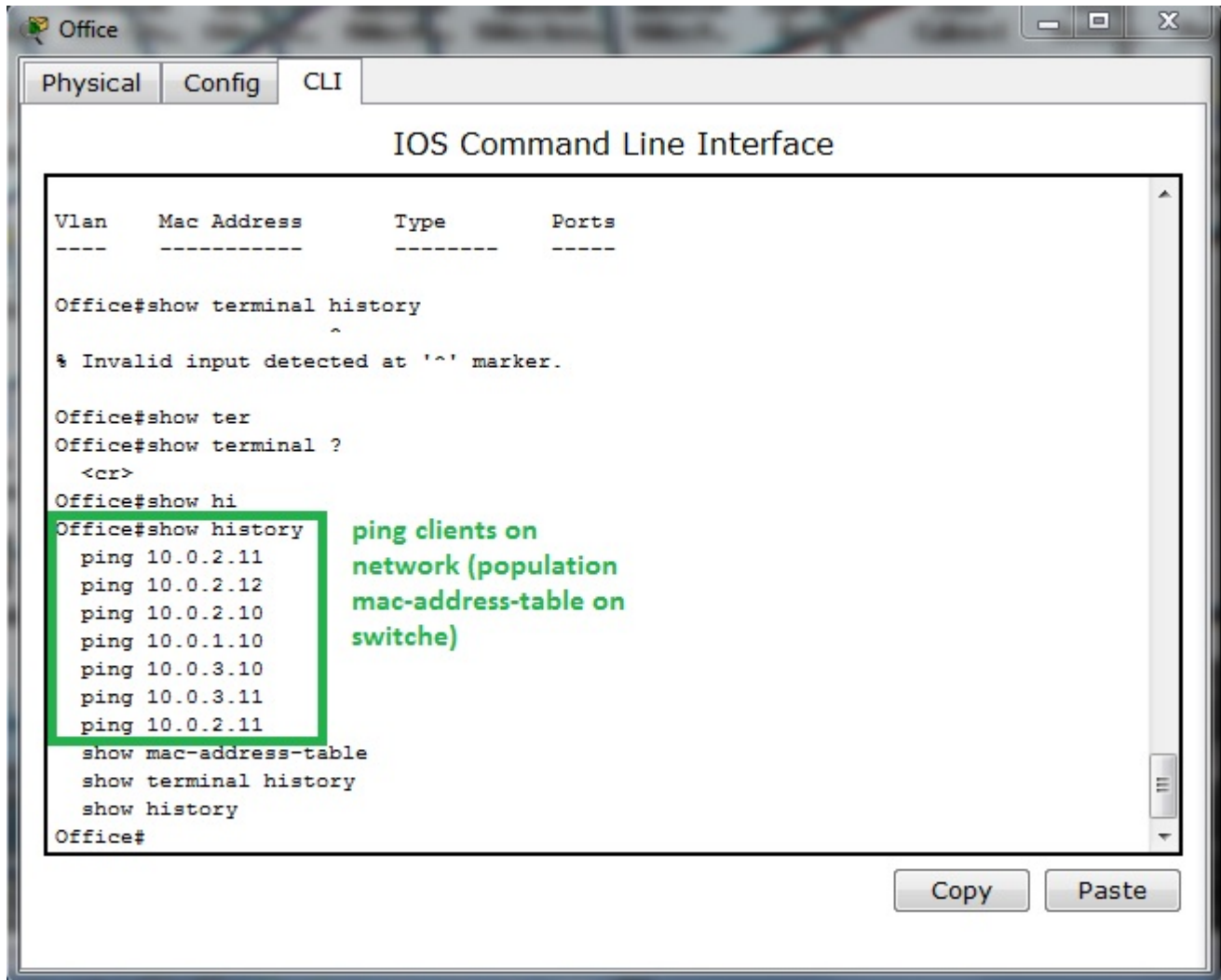
```
interface FastEthernet0/0
no ip address
duplex auto
speed auto
!
interface FastEthernet0/0.1
encapsulation dot1Q 1 native
ip address 10.0.1.1 255.255.255.0
ip nat inside
!
interface FastEthernet0/0.2
encapsulation dot1Q 2
ip address 10.0.2.1 255.255.255.0
ip nat inside
!
interface FastEthernet0/0.3
encapsulation dot1Q 3
ip address 10.0.3.1 255.255.255.0
ip nat inside
```

Preconfigured scenario you can download from [here](#) (PKT 5.2 and above). Network topology show next picture

Small business office with vlan and internet access 3



Interesting part of this scenario is shared network segment using hub for extension switched LAN. Our interests is in switching table of Switch0. We can ask: how will be mac-address-table finally populated? At first we must ping devices on network that will populate switching (mac.address-table). Example of ping from Office router to all network device:



Our Switch0 mac-address-table look like this

Switch0

Physical Config CLI

IOS Command Line Interface

```

Switch#ping 10.0.2.11
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.0.2.11, timeout is 2 seconds:
.....
Success rate is 0 percent (0/5)

Switch#show mac
Switch#show mac-address-table
      Mac Address Table
-----

```

| Vlan | Mac Address | Type | Ports |
|------|----------------|---------|--------|
| 1 | 0040.0bd5.7809 | DYNAMIC | Fa0/11 |
| 1 | 00d0.ba84.dc01 | DYNAMIC | Fa0/1 |
| 2 | 0010.111b.2670 | DYNAMIC | Fa0/20 |
| 2 | 0060.3ee0.e044 | DYNAMIC | Fa0/20 |
| 2 | 00d0.ba84.dc01 | DYNAMIC | Fa0/1 |
| 3 | 0030.a34e.94b5 | DYNAMIC | Fa0/16 |
| 3 | 0090.0c50.6657 | DYNAMIC | Fa0/15 |
| 3 | 00d0.ba84.dc01 | DYNAMIC | Fa0/1 |

Switch#

two PC connected on same switch port - shared network segment with switch or hub (refer duplex or CDP commands output)

fa0/1 trunk link belong to all VLAN and connect switch to router on stick

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Two or more PC assigned to one switch port in address table (switching table) is example of shared network segment connected on port fa0/20. But we can not examine from this that this is next switch or hub (you must use CDP show cdp neighbors or show interface fa0/20 that is in full or half duplex mode).

Switch port assignment to appropriate VLAN examine show vlan brief command issued on switch0

Switch0
Physical
Config
CLI

IOS Command Line Interface

1 00d0.ba84.dc01 DYNAMIC Fa0/1
2 0010.111b.2670 DYNAMIC Fa0/20
2 0060.3ee0.e044 DYNAMIC Fa0/20
2 00d0.ba84.dc01 DYNAMIC Fa0/1
3 0030.a34e.94b5 DYNAMIC Fa0/16
3 0090.0c50.6657 DYNAMIC Fa0/15
3 00d0.ba84.dc01 DYNAMIC Fa0/1

VLAN port assignment

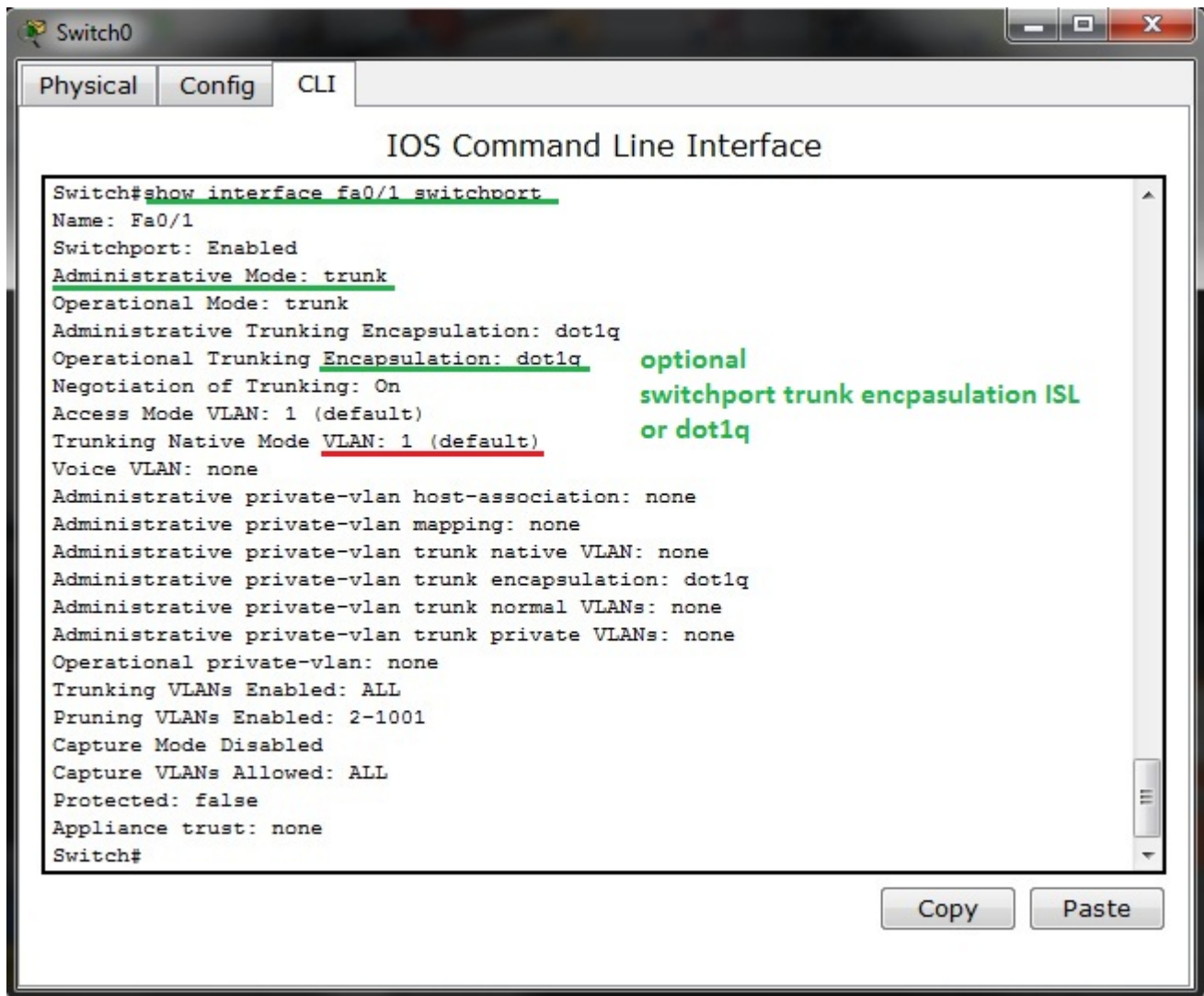
```
Switch#show vlan br
```

| VLAN | Name | Status | Ports |
|------|--------------------|--------|--|
| 1 | default | active | 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, Gig1/1, Gig1/2 |
| 2 | staff | active | Fa0/20, Fa0/21, Fa0/22, Fa0/23 Fa0/24 |
| 3 | guest | active | Fa0/15, Fa0/16, Fa0/17, Fa0/18 Fa0/19 |
| 1002 | fddi-default | active | |
| 1003 | token-ring-default | active | |
| 1004 | fddinet-default | active | |
| 1005 | trnet-default | active | |

```
Switch#
```

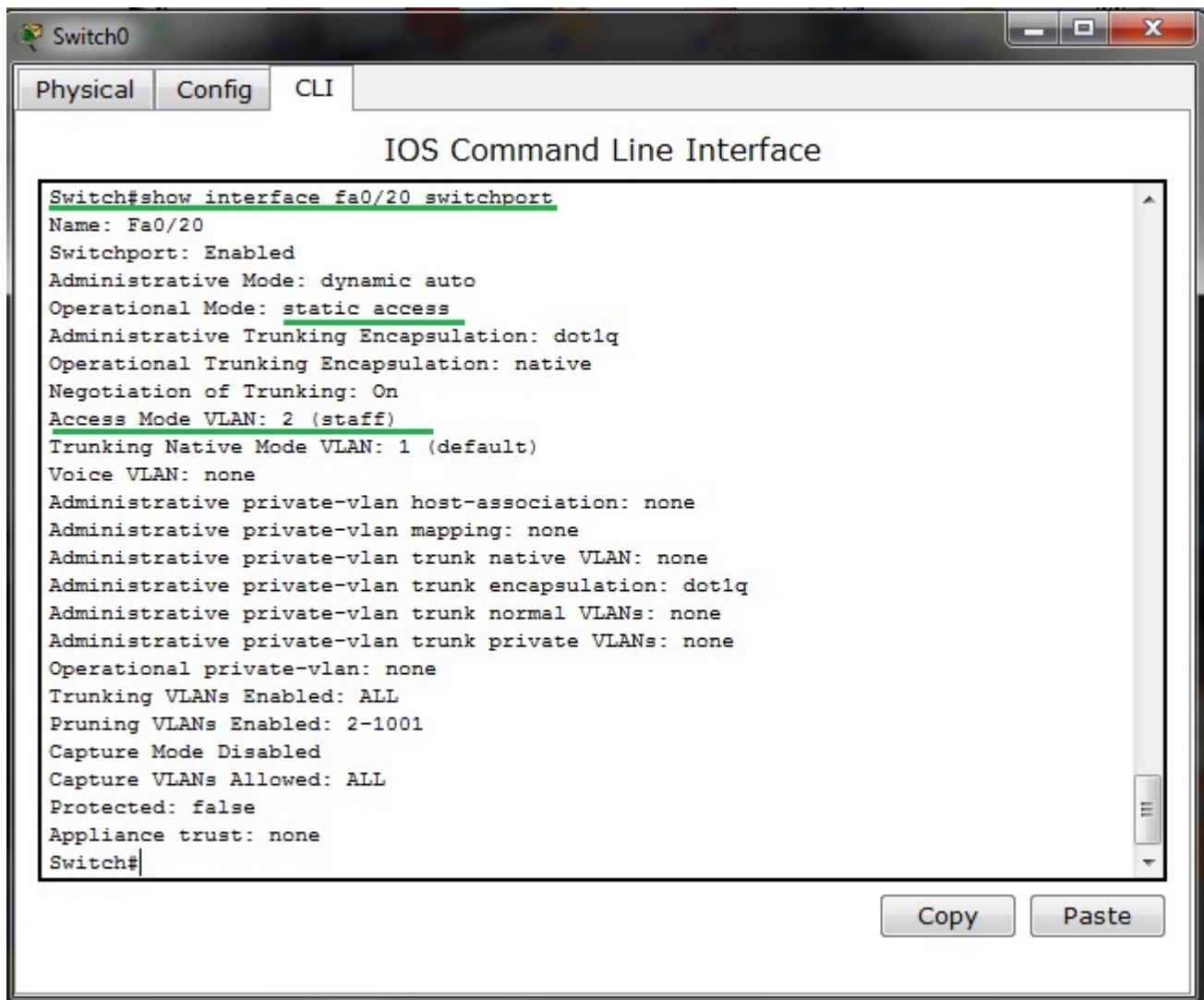
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Switch port fa0/1 is excluded from list because is trunk port connecting switch and Office router in router-on-a-stick inter vlan. For port fa0/1 state examination we can use show interface fa0/1 switch port CLI command



Native (default) VLAN is 1 that is default switch out of box configuration and trunk encapsulation is dot1q.

Same command issued on access port fa0/20 result in output:



Port is bounded with VLAN 2 as you can see on topology diagram and from show vlan brief CLI command output.

Please remember that there is also one show command for trunk ports examination – it is show interface trunk

