

# 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 PPPencapsulation 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
```

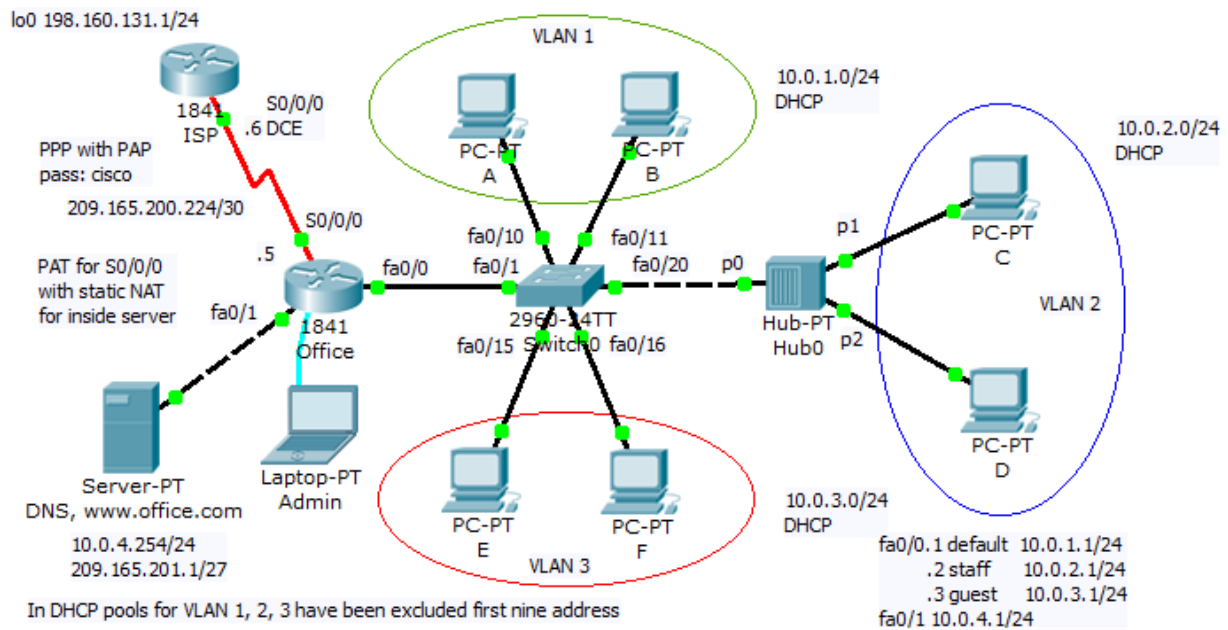
```
dns-server 10.0.4.254
```

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

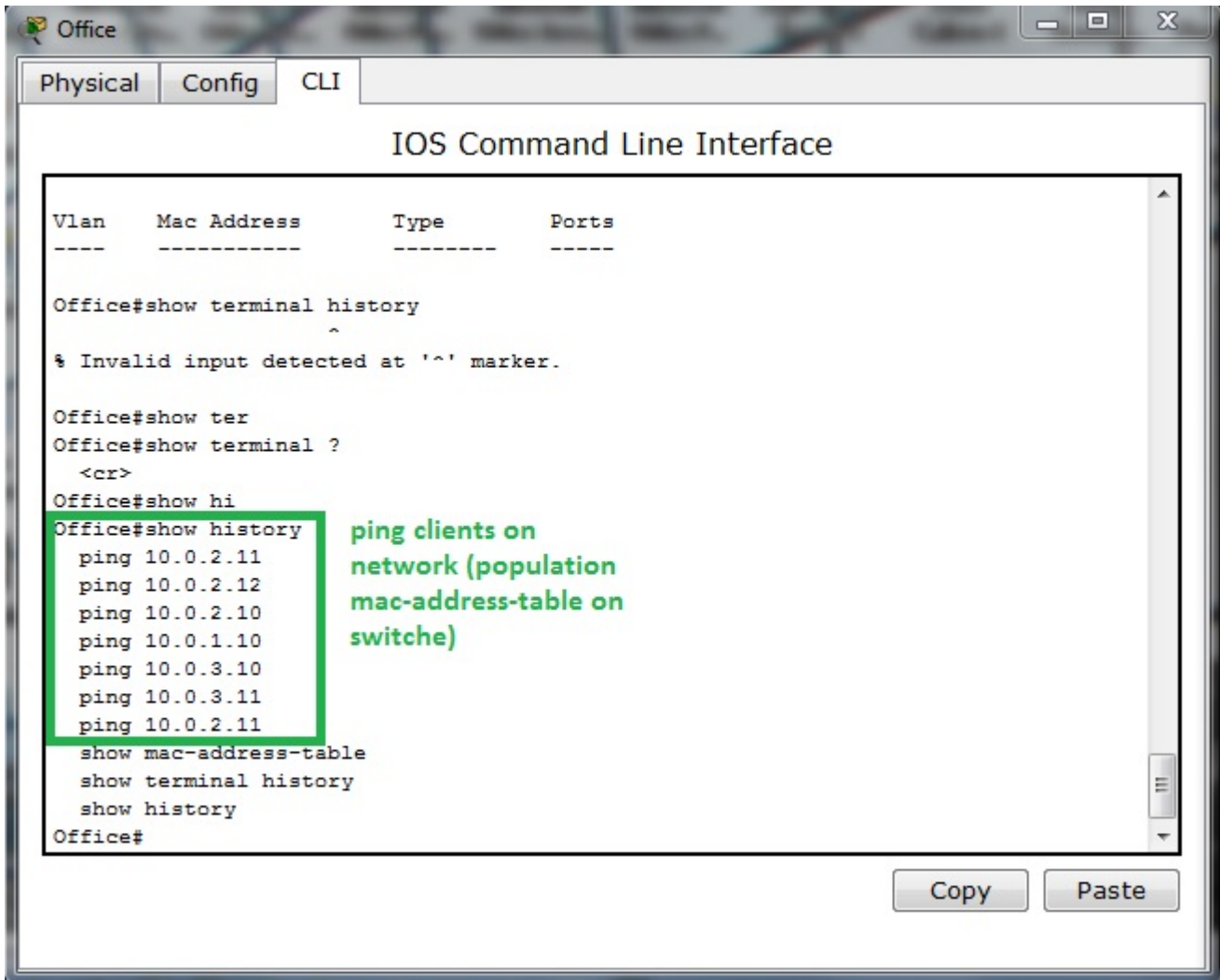
```
interface FastEthernet0/0
no ip address
duplex auto
speed auto
!
interface FastEthernet0/0.1
encapsulation dot1Q 1 native
ip address 10.0.1.1 255.255.255.0
ip nat inside
!
interface FastEthernet0/0.2
encapsulation dot1Q 2
ip address 10.0.2.1 255.255.255.0
ip nat inside
!
interface FastEthernet0/0.3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

```

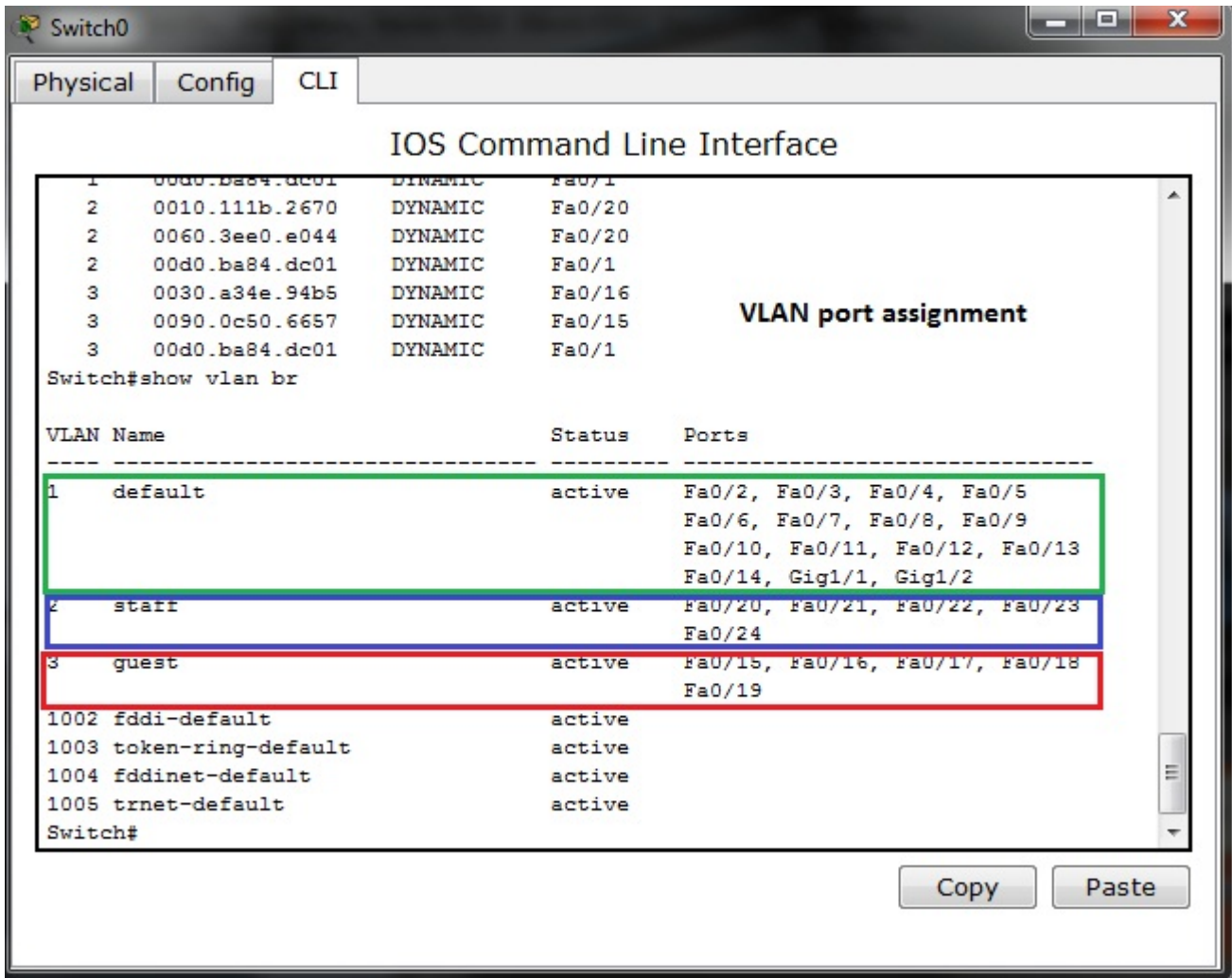
two PC connected on same switch port - shared network segment with switch or hub (refer duplex or CDP commands output)

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

Copy Paste

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



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

```
Switch0
Physical Config CLI
IOS Command Line Interface

Switch#show interface fa0/1 switchport
Name: Fa0/1
Switchport: Enabled
Administrative Mode: trunk
Operational Mode: trunk
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: dot1q
Negotiation of Trunking: On
Access Mode VLAN: 1 (default)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Protected: false
Appliance trust: none
Switch#
```

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:



The screenshot shows a window titled "Switch0" with three tabs: "Physical", "Config", and "CLI". The "CLI" tab is active, displaying the "IOS Command Line Interface". The command entered is "Switch#show interface fa0/20 switchport". The output shows the following configuration for interface Fa0/20:

```
Switch#show interface fa0/20 switchport
Name: Fa0/20
Switchport: Enabled
Administrative Mode: dynamic auto
Operational Mode: static access
Administrative Trunking Encapsulation: dot1q
Operational Trunking Encapsulation: native
Negotiation of Trunking: On
Access Mode VLAN: 2 (staff)
Trunking Native Mode VLAN: 1 (default)
Voice VLAN: none
Administrative private-vlan host-association: none
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Protected: false
Appliance trust: none
Switch#
```

At the bottom right of the CLI window, there are "Copy" and "Paste" buttons.

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

Switch0

Physical Config CLI

### IOS Command Line Interface

```
Administrative private-vlan mapping: none
Administrative private-vlan trunk native VLAN: none
Administrative private-vlan trunk encapsulation: dot1q
Administrative private-vlan trunk normal VLANs: none
Administrative private-vlan trunk private VLANs: none
Operational private-vlan: none
Trunking VLANs Enabled: ALL
Pruning VLANs Enabled: 2-1001
Capture Mode Disabled
Capture VLANs Allowed: ALL
Protected: false
Appliance trust: none
Switch#show interface trunk
```

Port	Mode	Encapsulation	Status	Native vlan
<u>Fa0/1</u>	<u>on</u>	<u>802.1q</u>	trunking	<u>1</u>

```
Port          Vlans allowed on trunk
Fa0/1         1-1005

Port          Vlans allowed and active in management domain
Fa0/1         1,2,3

Port          Vlans in spanning tree forwarding state and not pruned
Fa0/1         1,2,3
Switch#
```

Copy Paste