# 2. Packet and frame delivery

When data segment is encapsulated into packet appropriate PC must examine destination address when preparing frame creation. If destination IP is on same network as sending PC data are send to to appropriate host. Else data are sent to network interface that act as a default gateway.

This process use and-ing destination IP in binary format with binary format of network mask and next make comparation with configured network address. If they are unequal data are send to default gateway (MAC address of default gateway is set as destination address of frame). In this scenario you are encouraged to create PDU in simulation mode and examine packet delivery. Interesting are also PDU at appropriate protocol stack (Transport, network and data link layer).

Topology of our scenario is

Packet and frame delivery accross network
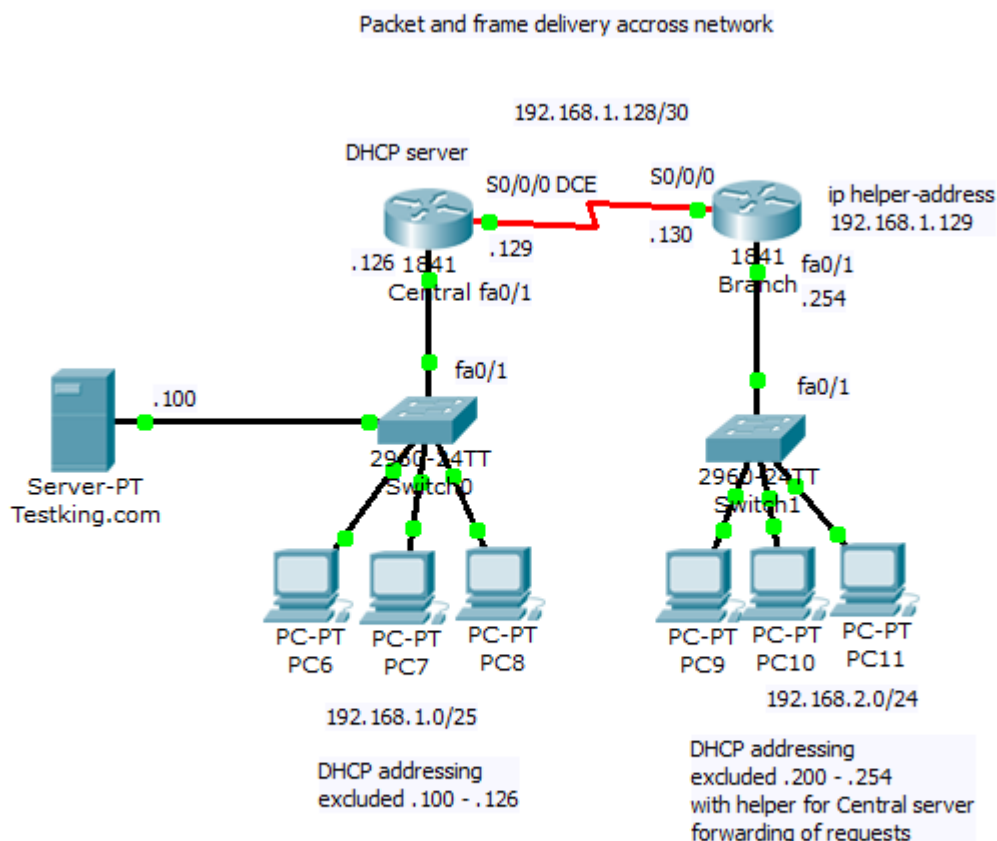
Preconfigured scenario (PKT 5.2 or above).

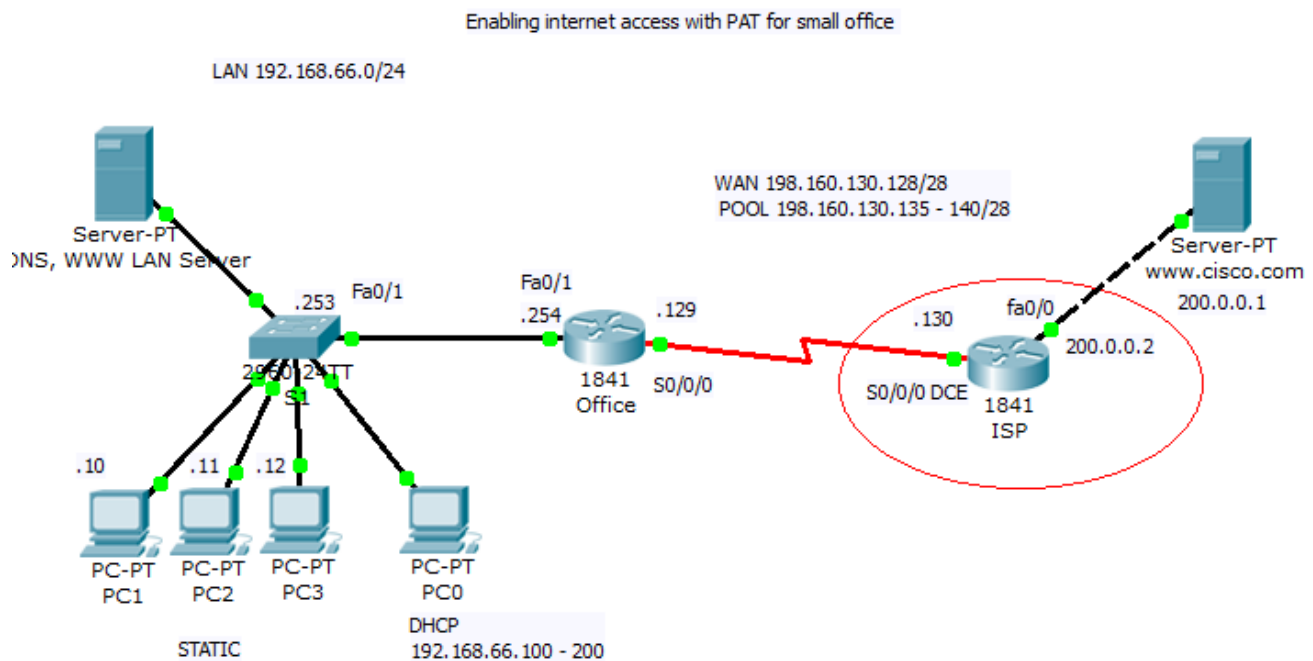When you toggle betw. realtime and simulation mode, interface will change to next picture
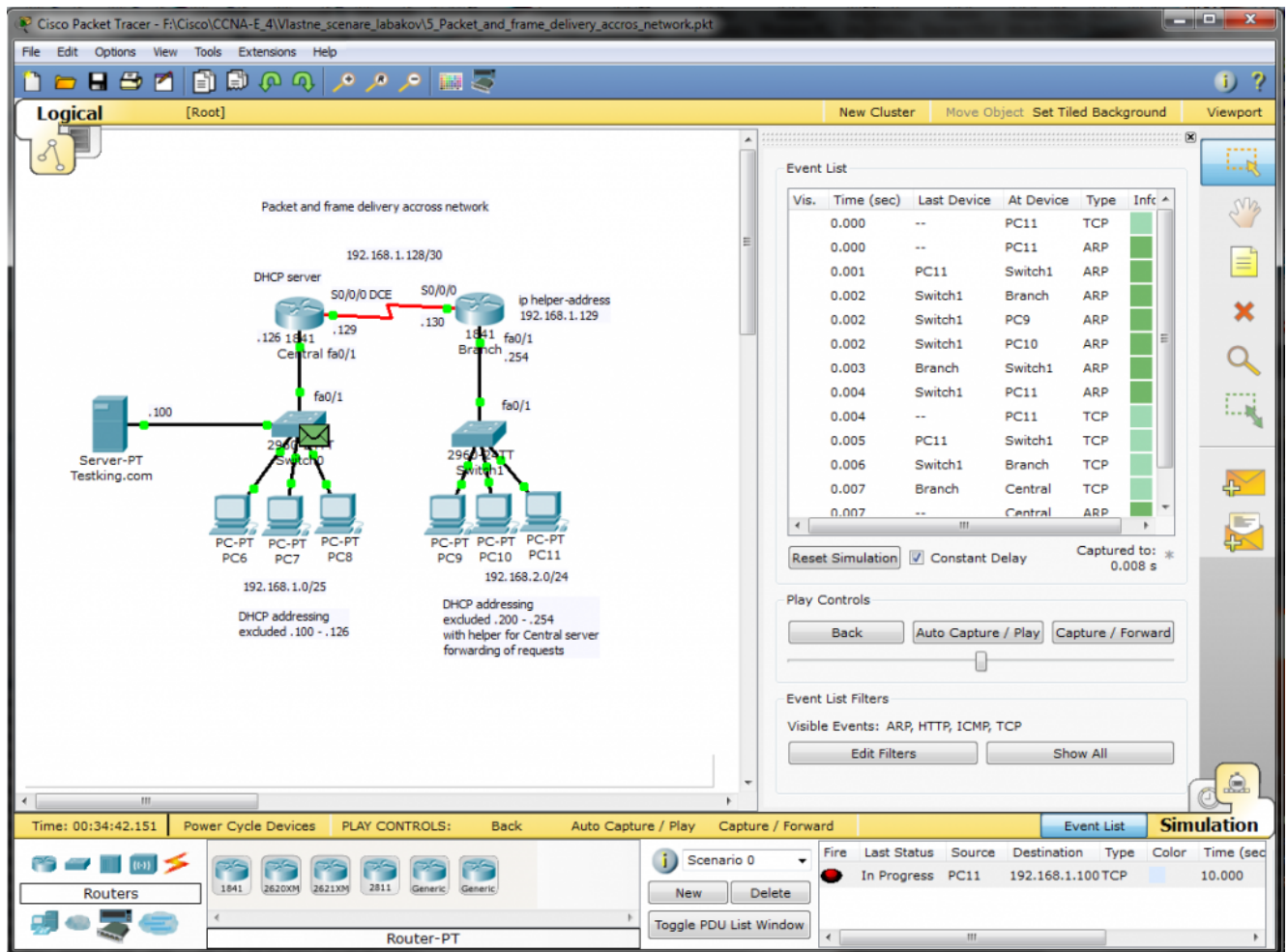
After appropriate time used for PDU propagation across network (and ARP caching for L2 encapsulation), PC11 can send frame to Branch fa0/1 interface that act as a default gateway. You can scroll event list and look at PDU emitted by PC11 after ARP process as it show next picture.
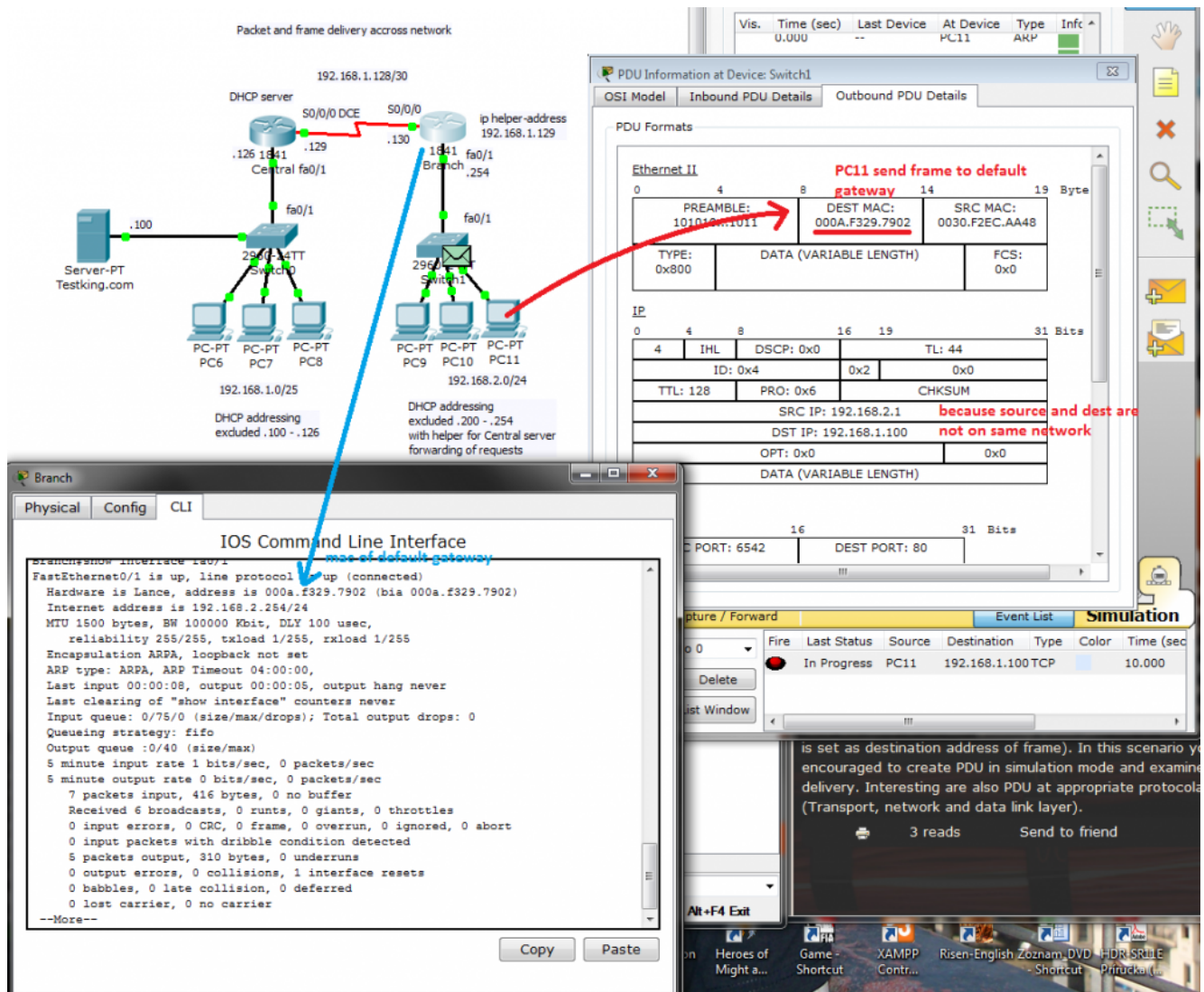
1. Enabling internet access with PAT for small office

Small office need acces to internet. Internal office network use 192.168.66.0/24 network rane and contain four clients with static preconfigured IP and DHCP range 192.168.66.100-200 (ip dhcp excluded-address 192.168.66.1 — .99 and 201. — 254). Switching topology is without redundancy with Office 1841 router ast in router on a stick scenario. ISP is simulated by ISP router with remote www.cisco.com server.

Network topology:

Enabling internet access with PAT for small office

LAN 192.168.66.0/24

WAN 198.160.130.128/28
POOL 198.160.130.135 - 140/28

Server-PT
DNS, WWW LAN Server

.253 Fa0/1

Fa0/1
.254

.129

1841
Office S0/0/0

.130 fa0/0

S0/0/0 DCE 1841
ISP

Server-PT
www.cisco.com
200.0.0.1

200.0.0.2

.10 .11 .12

PC-PT
PC1

PC-PT
PC2

PC-PT
PC3

PC-PT
PC0

STATIC

DHCP
192.168.66.100 - 200

Office server dns configuration that resolve name www.testking.com and www.cisco.com is configured:
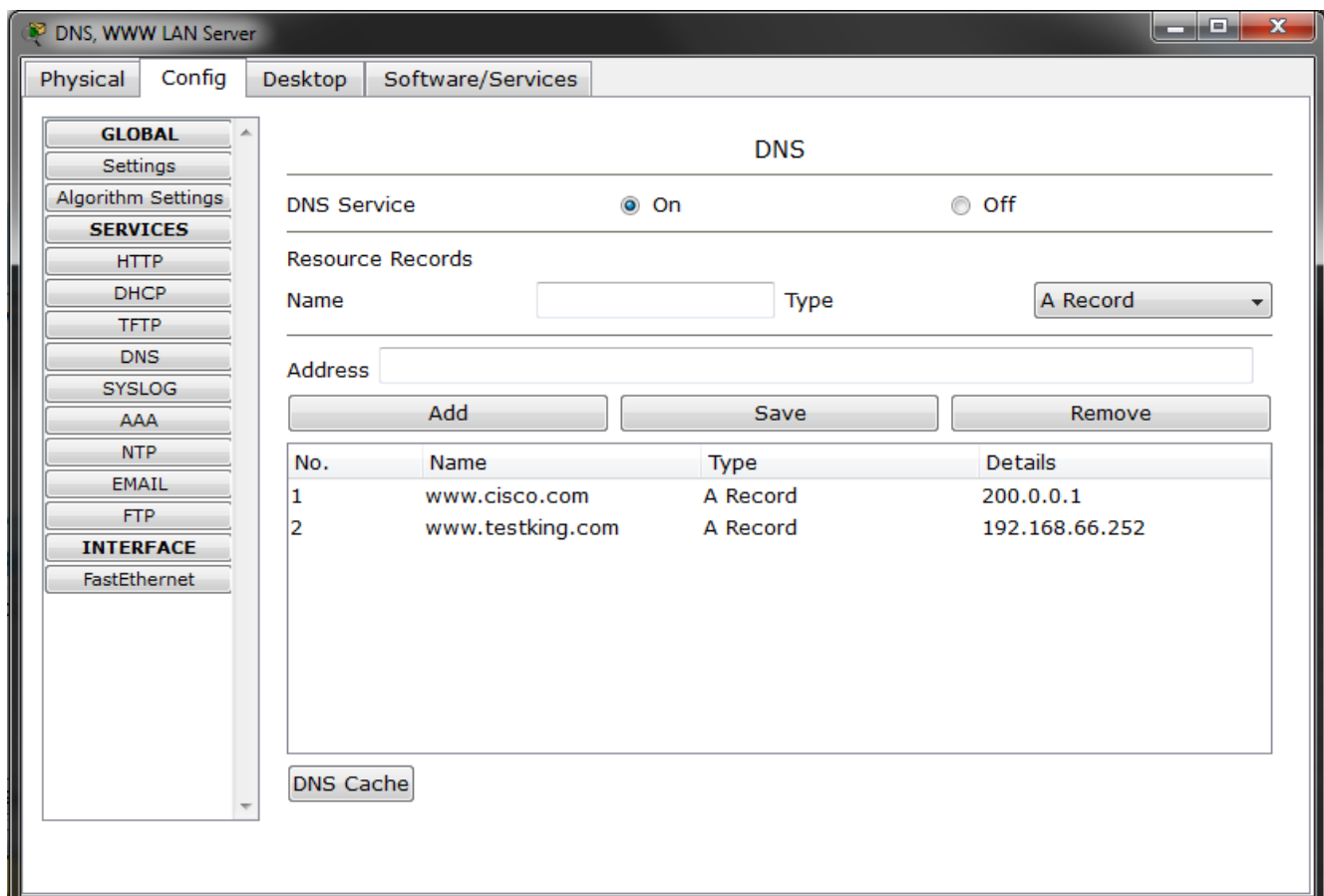
Pc with static ip are configured:
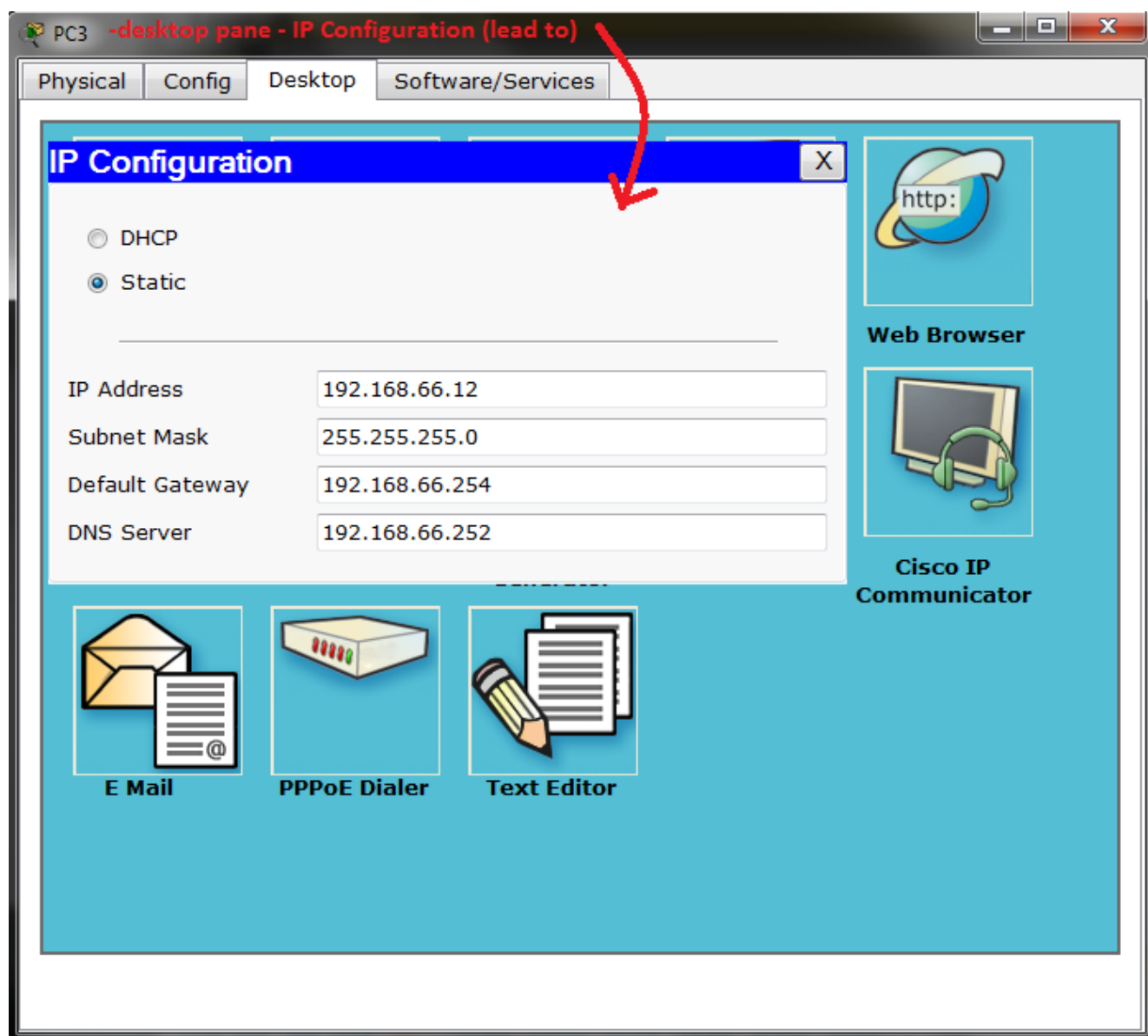
Device configs are: (!!! Some ! was ommited from config!!!)

1) Switch S1


```
hostname S1
!
!
!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
```

```
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
```

```
interface FastEthernet0/24
!
interface GigabitEthernet1/1
!
interface GigabitEthernet1/2
!
interface Vlan1
 no ip address
 shutdown
!
interface Vlan99
 ip address 192.168.66.253 255.255.255.0
ip default-gateway 192.168.66.254
line con 0
line vty 0 4
 login
line vty 5 15
 login
end
```

There are no VLAN configured – convinient only in very small
network with full trustworthy environment.

2) Router Office

```
hostname Office
ip dhcp excluded-address 192.168.66.1 192.168.66.99
ip dhcp excluded-address 192.168.66.201 192.168.66.254
ip dhcp pool Office_LAN
 network 192.168.66.0 255.255.255.0
 default-router 192.168.66.254
 dns-server 192.168.66.252
username ISP password 0 pppcisco
interface FastEthernet0/0
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface FastEthernet0/1
 ip address 192.168.66.254 255.255.255.0
 duplex auto
```

```
 speed auto
!
interface Serial0/0/0
 ip address 198.160.130.129 255.255.255.240
 encapsulation ppp
 ppp authentication pap
 ppp pap sent-username Office password 0 pppcisco
!
interface Serial0/0/1
 no ip address
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
ip nat pool PATforLAN 198.160.130.135 198.160.130.140 netmask
255.255.255.240
ip nat inside source list PATenabled pool PATforLAN overload
ip classless
ip route 0.0.0.0 0.0.0.0 Serial0/0/0
!
ip access-list standard PATenabled
 permit 192.168.66.0 0.0.0.255
 deny any
!
line con 0
line vty 0 4
 login
!
end

3) ISP router

hostname ISP
!
username Office password 0 pppcisco
!
interface FastEthernet0/0
 ip address 200.0.0.2 255.255.255.252
 duplex auto
```

```
 speed auto
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Serial0/0/0
 ip address 198.160.130.130 255.255.255.240
 encapsulation ppp
 ppp authentication pap
 ppp pap sent-username ISP password 0 pppcisco
 clock rate 250000
!
interface Serial0/0/1
 no ip address
 shutdown
!
interface Vlan1
 no ip address
 shutdown
!
ip classless
ip route 192.168.66.0 255.255.255.0 Serial0/0/0
!
line con 0
line vty 0 4
 login
!
end
```

Link between ISP and Office router is serial PPP line with older PAP authentication.

(!!! Some ! was ommited from config!!!)