Routing through Hub and Switch

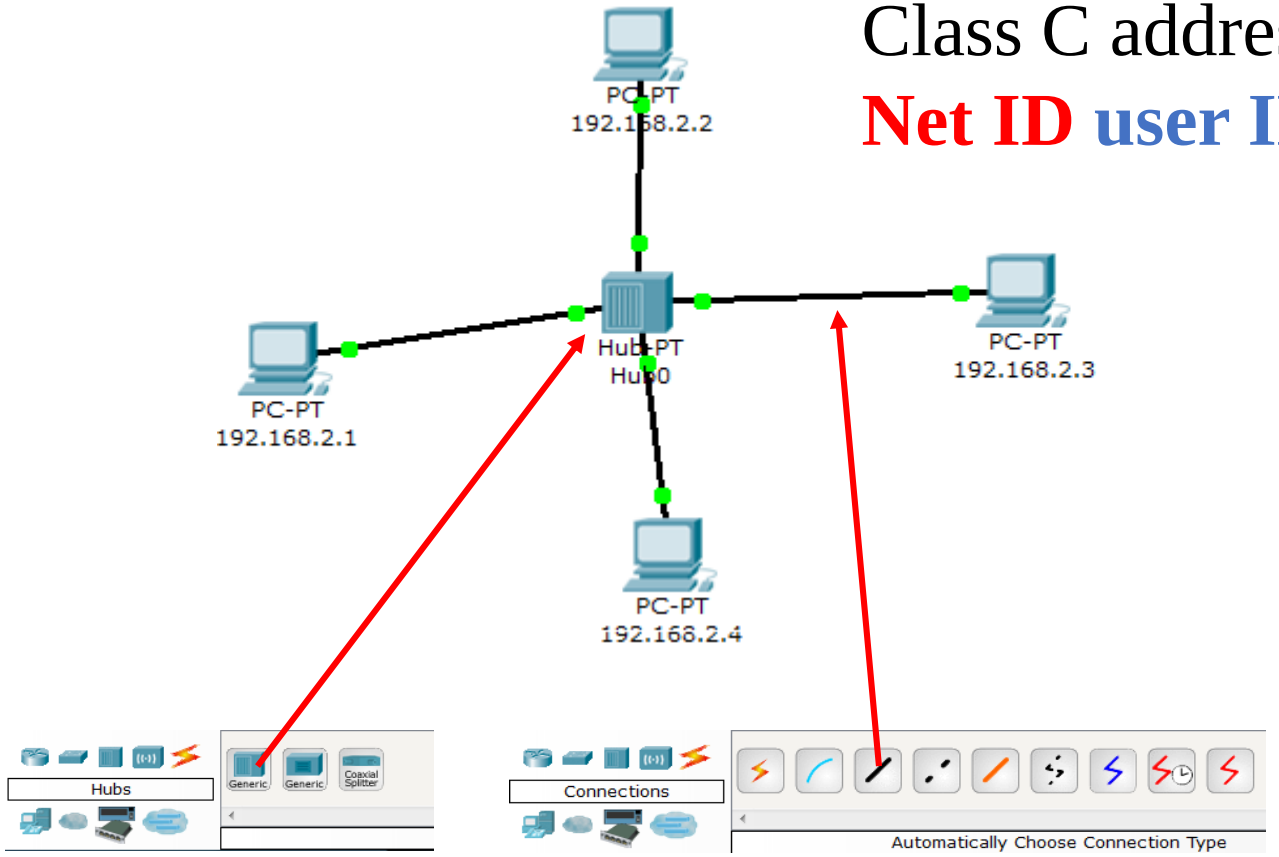
IP address in doted decimal X.Y.Z.Q

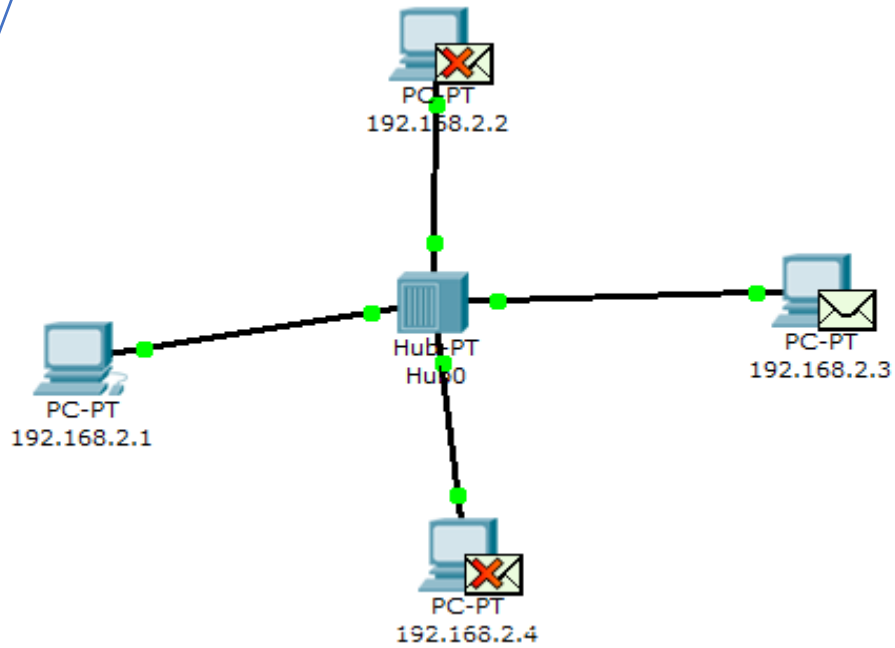
Class C address **X.Y.Z**.**Q**

Net ID user ID

192.168.25.37

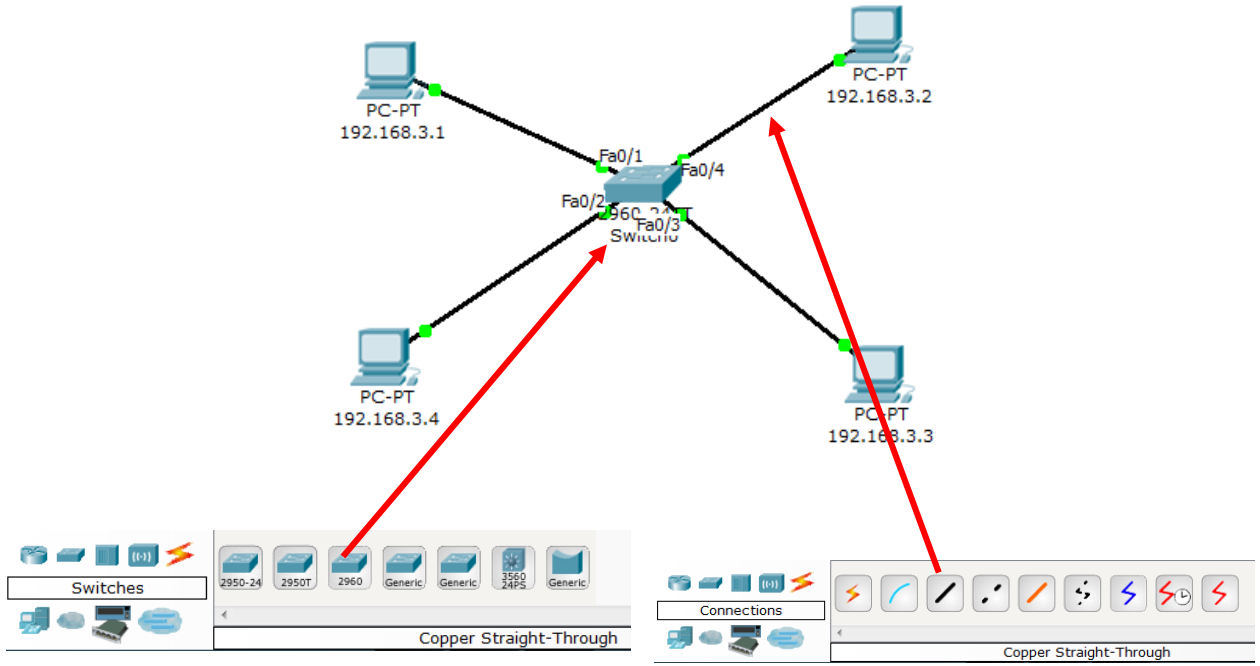
0-255

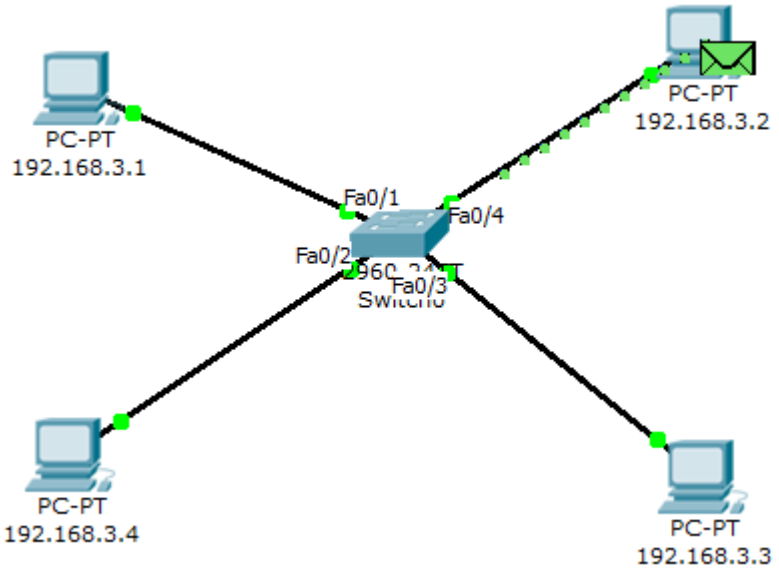


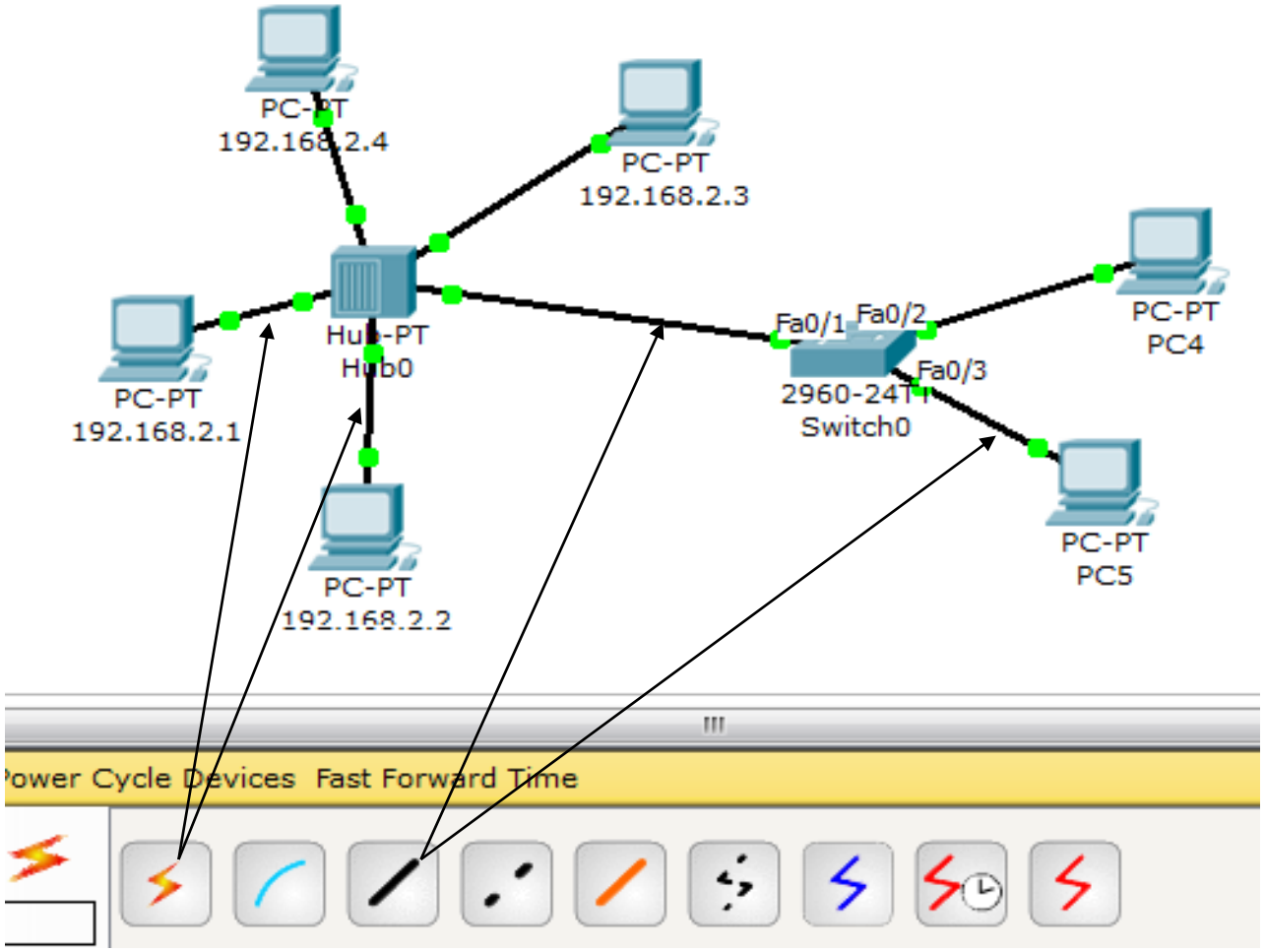


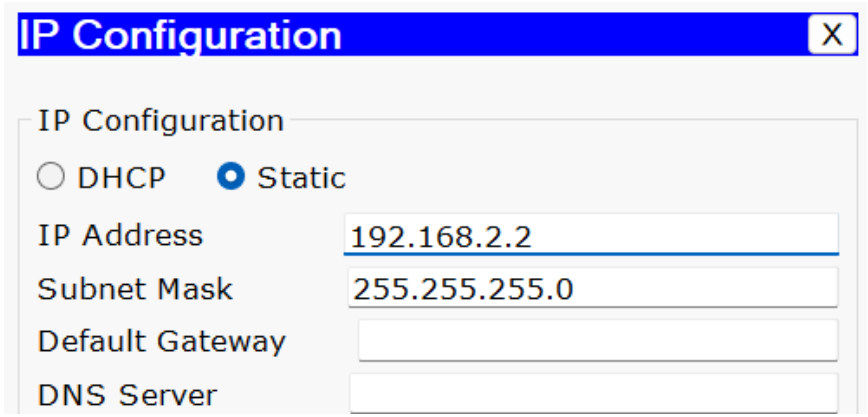
ping **IP address**

ICMP → Internet Control Message protocol

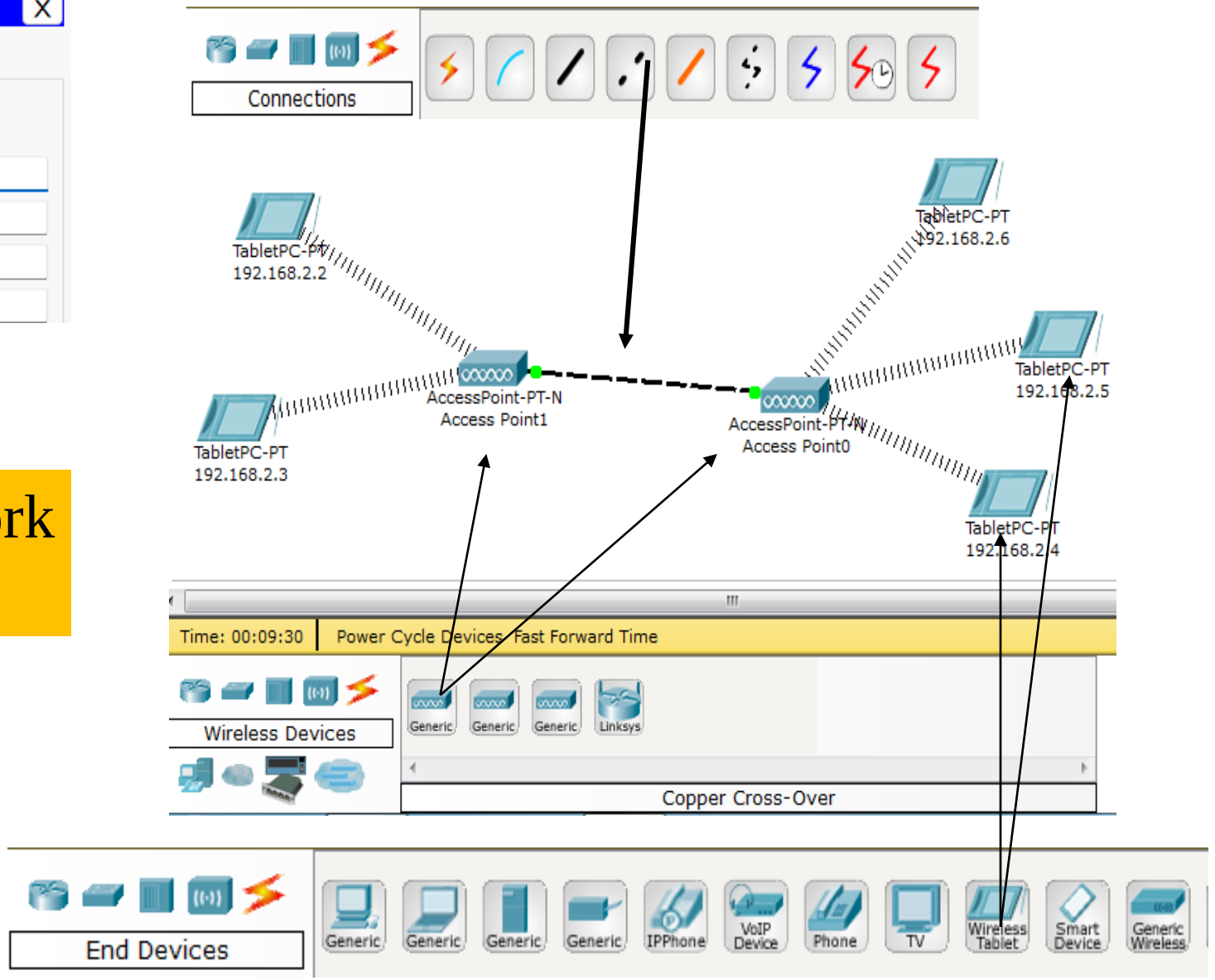

PC-PT
192.168.3.1
PC-PT
192.168.3.2
Fa0/1
Fa0/4
Fa0/2
Fa0/3
PC-PT
192.168.3.4
PC-PT
192.168.3.3
Switches
2950-24
2950T
2960
Generic
Generic
3560 24PS
Generic
Copper Straight-Through
Connections
Copper Straight-Through


PC-PT
192.168.3.1
PC-PT
192.168.3.2
Fa0/1
Fa0/4
Fa0/2
Fa0/3
PC-PT
192.168.3.4
PC-PT
192.168.3.3

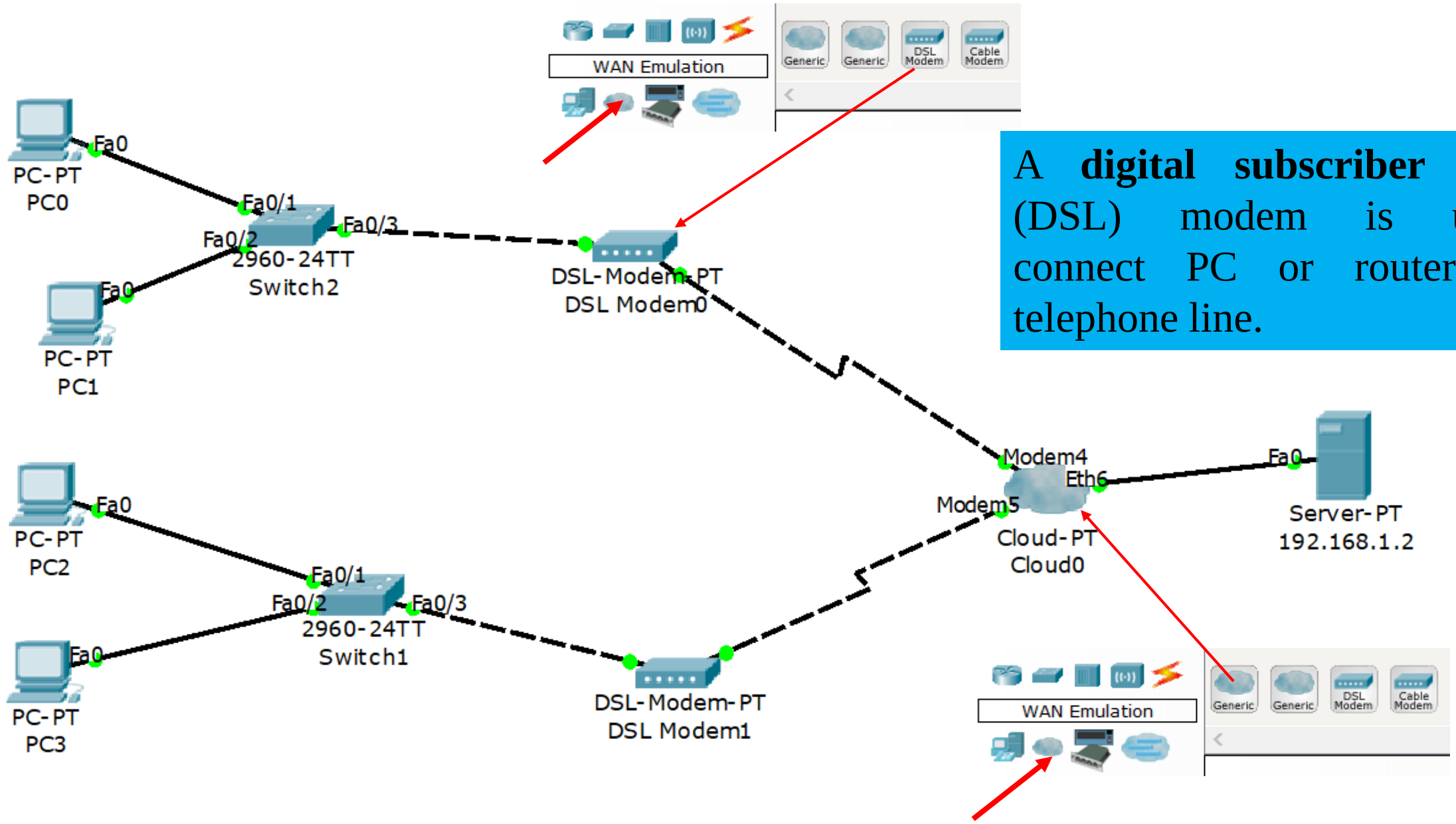

PC-PT
192.168.2.4
PC-PT
192.168.2.3
PC-PT
192.168.2.1
Hub-PT
Hub0
Fa0/1
Fa0/2
Fa0/3
2960-24TT
Switch0
PC-PT
PC4
PC-PT
PC5
PC-PT
192.168.2.2
Power Cycle Devices
Fast Forward Time



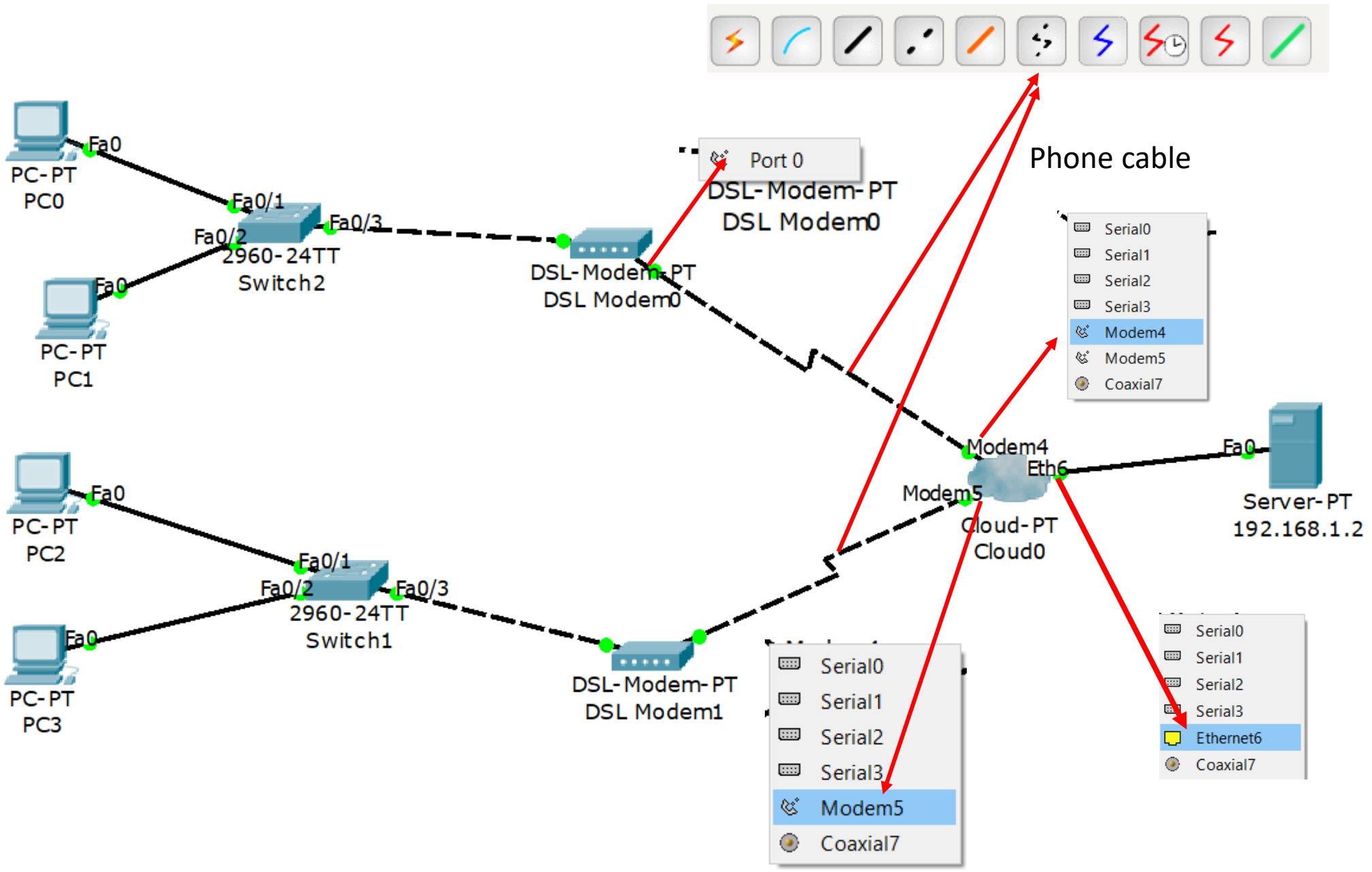
Use static IP, since the network does not have DHCP server.

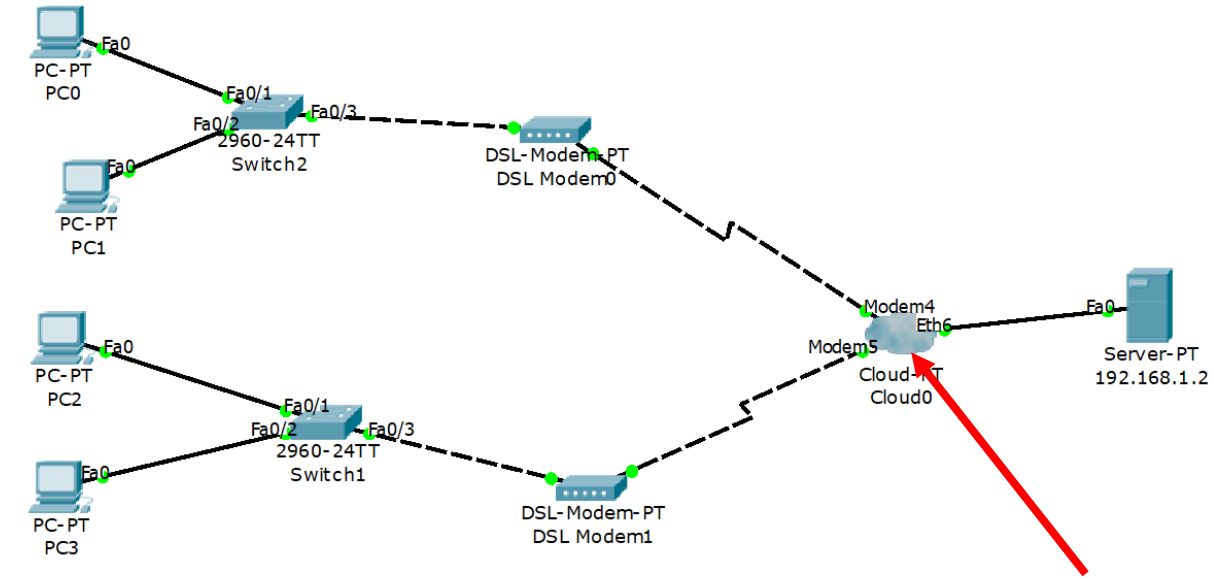


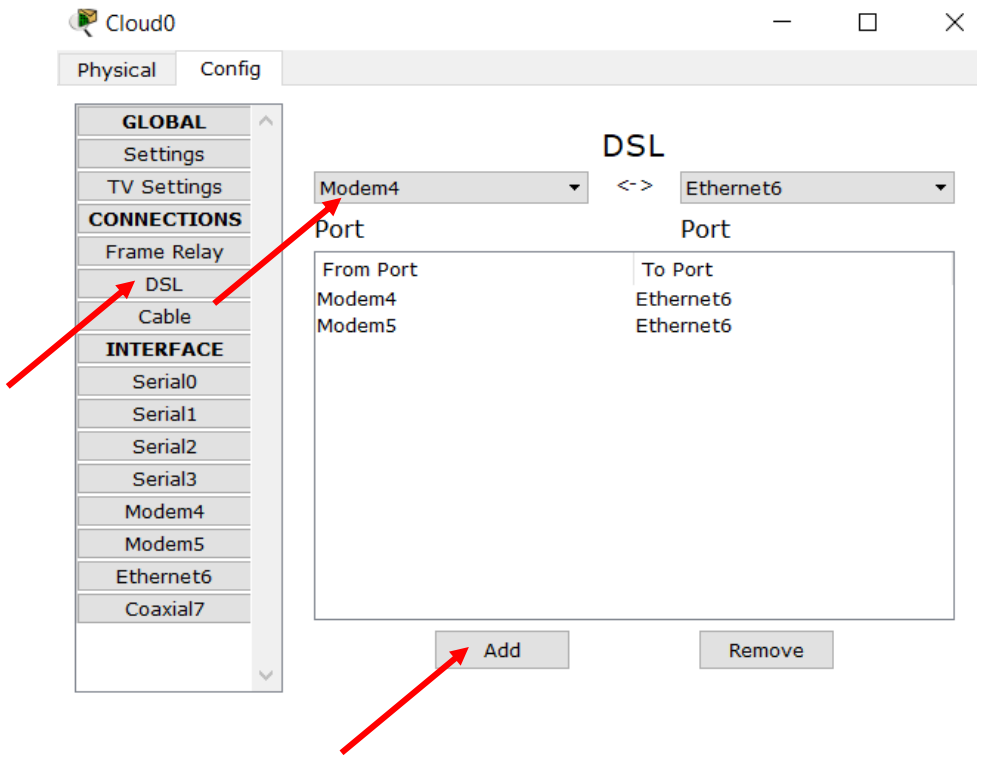
DSL Modem in WAN

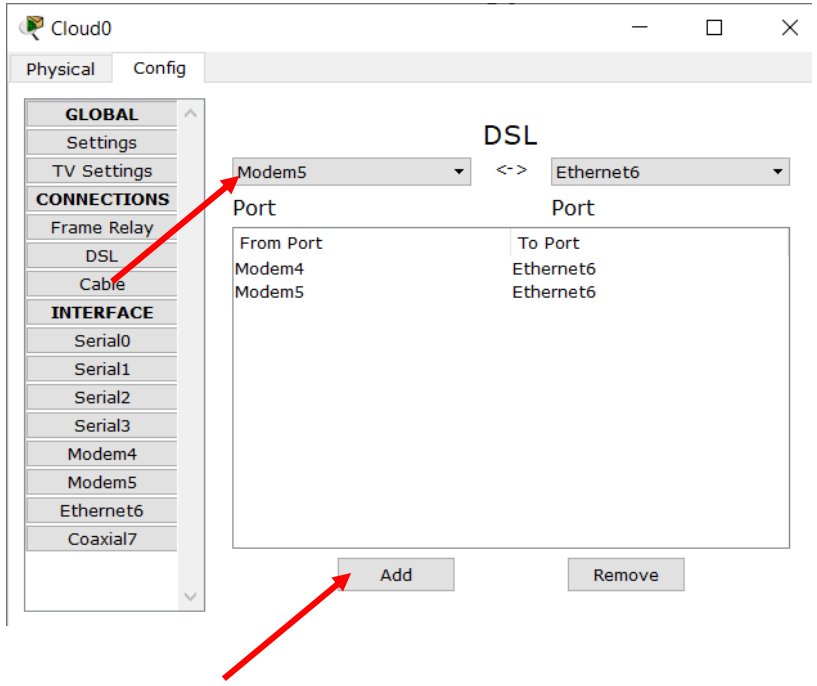


A **digital subscriber line** (DSL) modem is used connect PC or router to telephone line.

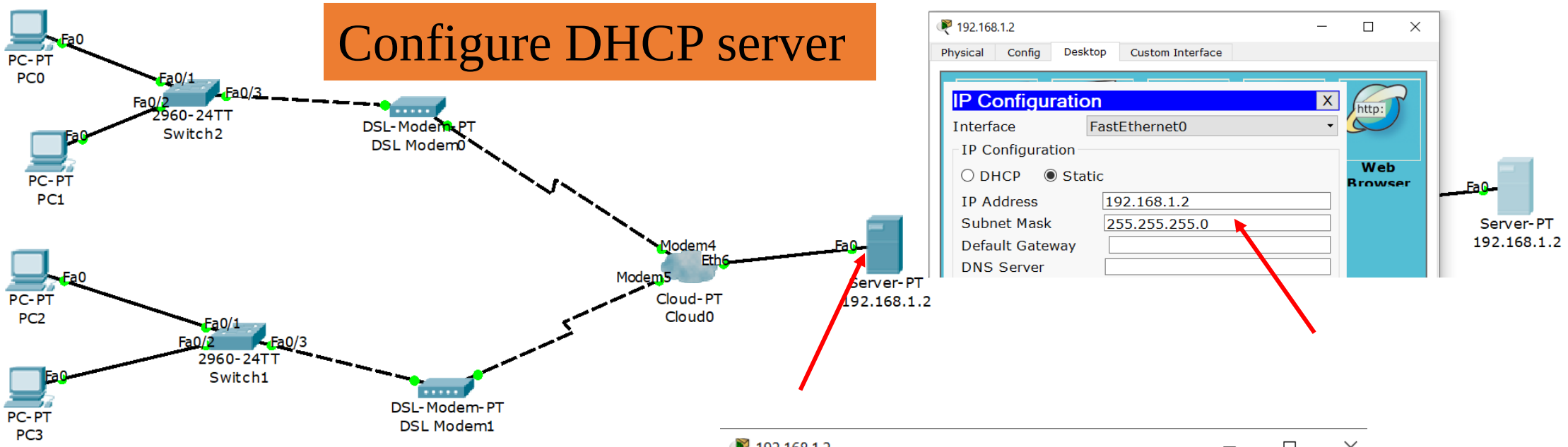

Phone cable
PC-PT
PC0
Fa0
Fa0/1
Fa0/2
2960-24TT
Switch2
Fa0/3
Fa0
PC-PT
PC1
Port 0
DSL-Modem-PT
DSL Modem0
DSL-Modem-PT
DSL Modem0
Serial0
Serial1
Serial2
Serial3
Modem4
Modem5
Coaxial7
Modem4
Eth6
Modem5
Cloud-PT
Cloud0
Fa0
Server-PT
192.168.1.2
PC-PT
PC2
Fa0
Fa0/1
Fa0/2
2960-24TT
Switch1
Fa0/3
Fa0
PC-PT
PC3
DSL-Modem-PT
DSL Modem1
Serial0
Serial1
Serial2
Serial3
Modem5
Coaxial7
Serial0
Serial1
Serial2
Serial3
Ethernet6
Coaxial7

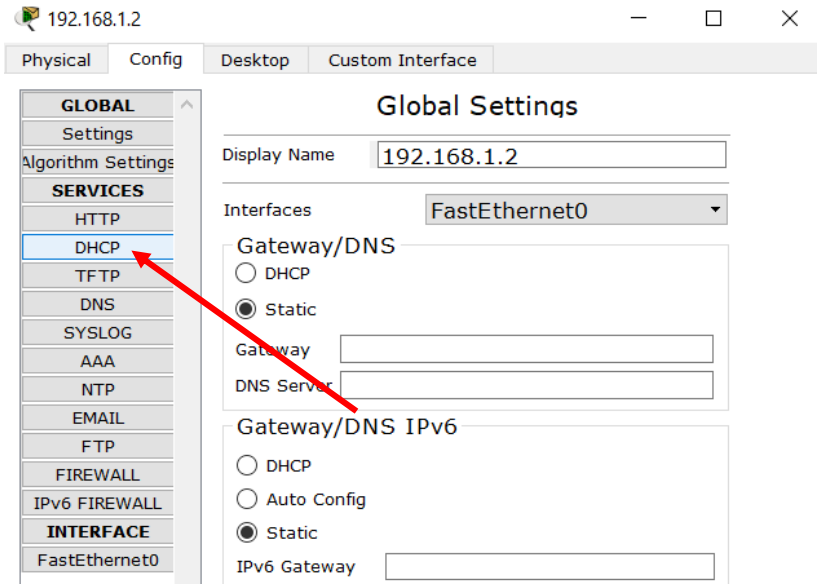

PC-PT
PC0
Fa0
Fa0/1
Fa0/2
2960-24TT
Switch2
Fa0/3
DSL-Modem-PT
DSL Modem0
PC-PT
PC1
Fa0
PC-PT
PC2
Fa0
Fa0/1
Fa0/2
2960-24TT
Switch1
Fa0/3
PC-PT
PC3
Fa0
DSL-Modem-PT
DSL Modem1
Modem4
Eth6
Modem5
Cloud-PT
Cloud0
Fa0
Server-PT
192.168.1.2

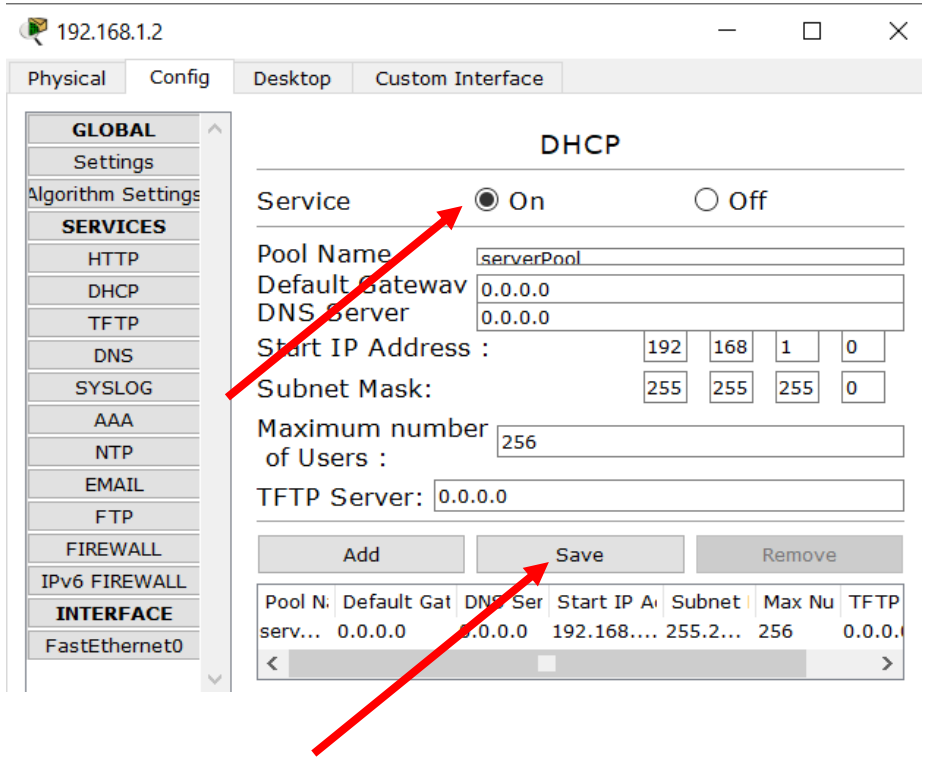

Cloud0
Physical
Config
GLOBAL
Settings
TV Settings
CONNECTIONS
Frame Relay
DSL
Cable
INTERFACE
Serial0
Serial1
Serial2
Serial3
Modem4
Modem5
Ethernet6
Coaxial7
DSL
Modem4
<->
Ethernet6
Port
Port
From Port
To Port
Modem4
Ethernet6
Modem5
Ethernet6
Add
Remove

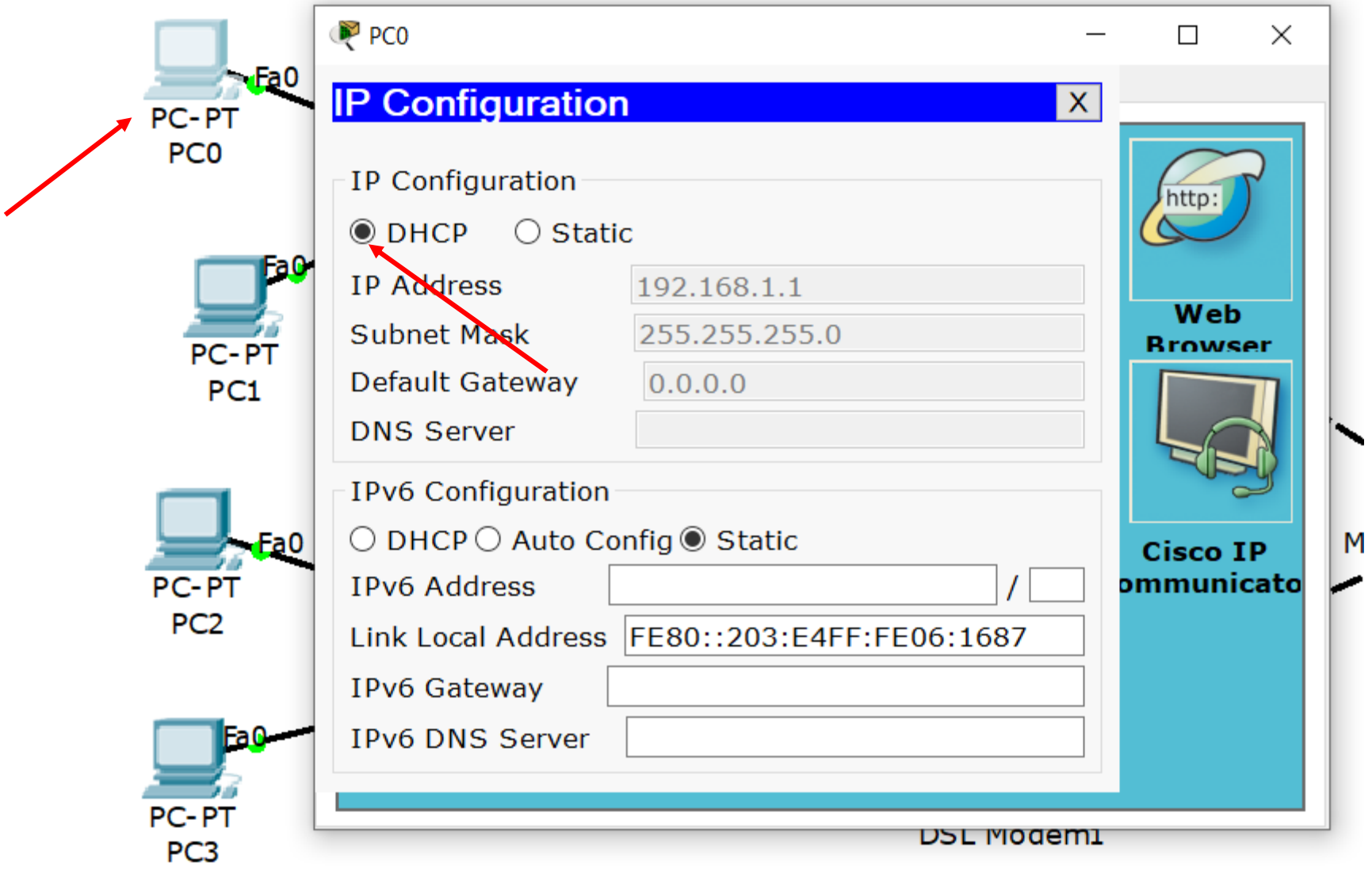

Cloud0
Physical
Config
GLOBAL
Settings
TV Settings
CONNECTIONS
Frame Relay
DSL
Cable
INTERFACE
Serial0
Serial1
Serial2
Serial3
Modem4
Modem5
Ethernet6
Coaxial7
DSL
Modem5
<->
Ethernet6
Port
Port
From Port
To Port
Modem4
Ethernet6
Modem5
Ethernet6
Add
Remove

Configure DHCP server

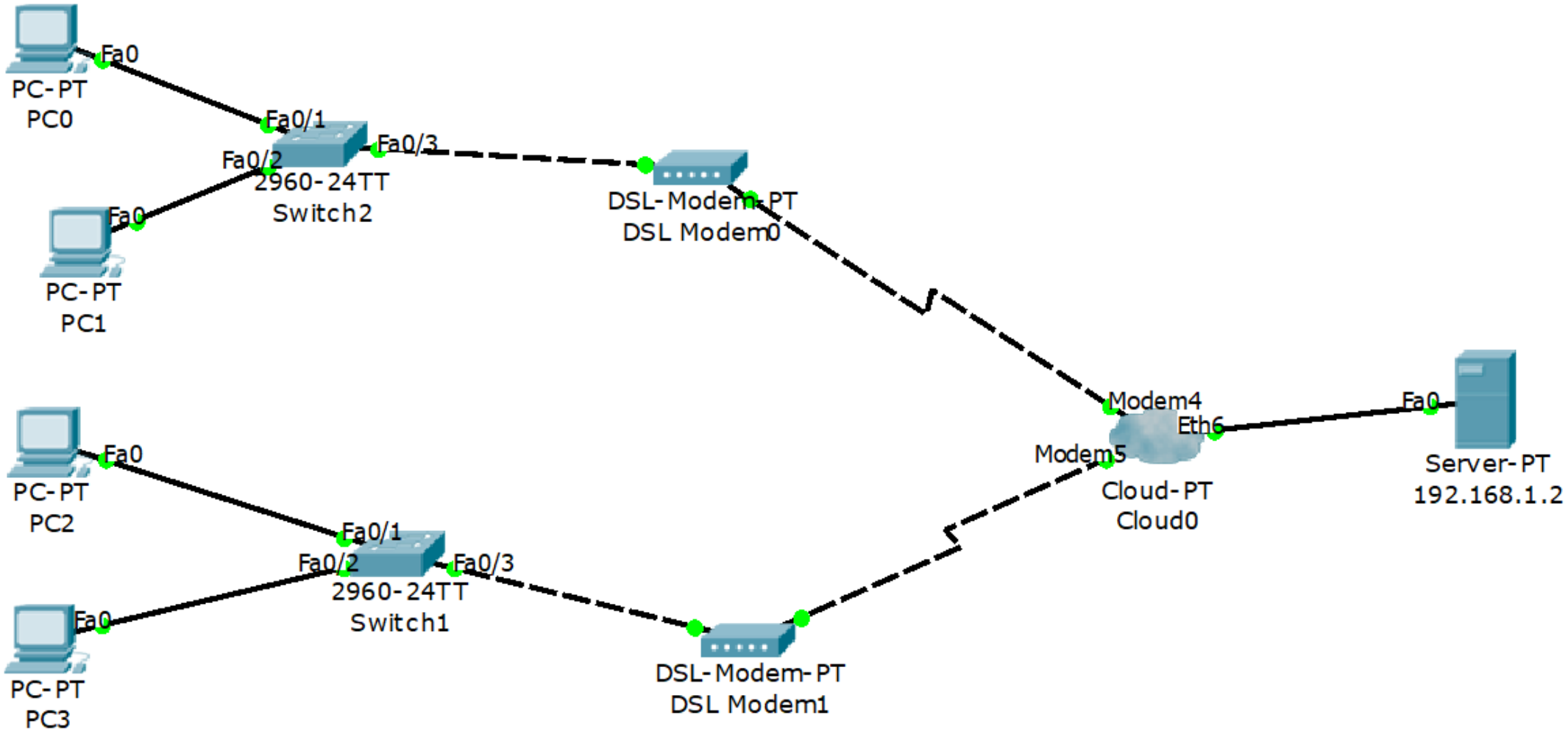






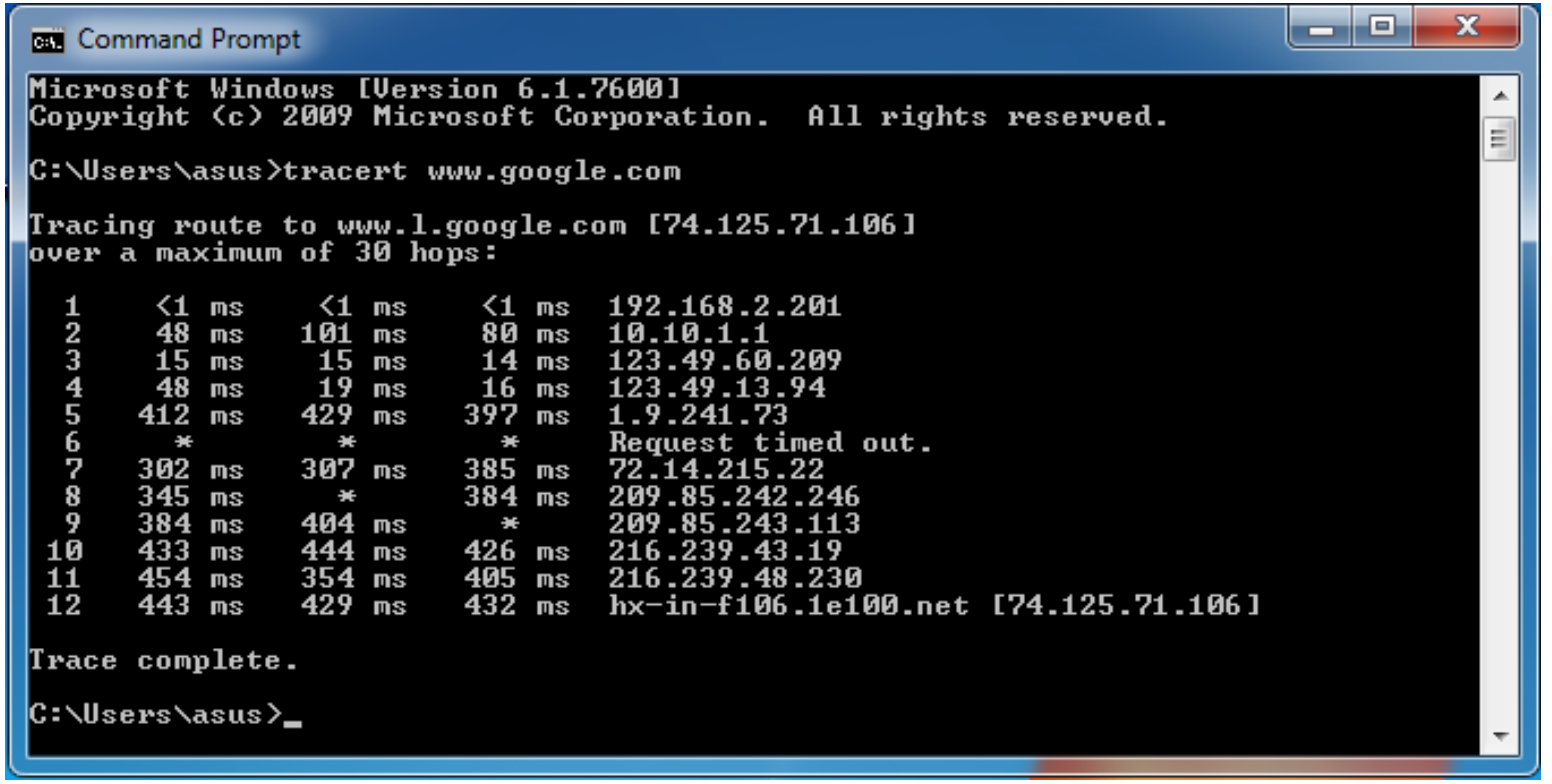

PC0
IP Configuration
X
IP Configuration
DHCP
Static
IP Address
192.168.1.1
Subnet Mask
255.255.255.0
Default Gateway
0.0.0.0
DNS Server
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
/
Link Local Address
FE80::203:E4FF:FE06:1687
IPv6 Gateway
IPv6 DNS Server
http:
Web Browser
Cisco IP
ommunicato
Fa0
PC-PT
PC0
PC-PT
PC1
PC-PT
PC2
PC-PT
PC3
DSL Modem1

Check ICMP packet flow from PC to DHCP server



Verification of Some Fundamental Command of Network Connections

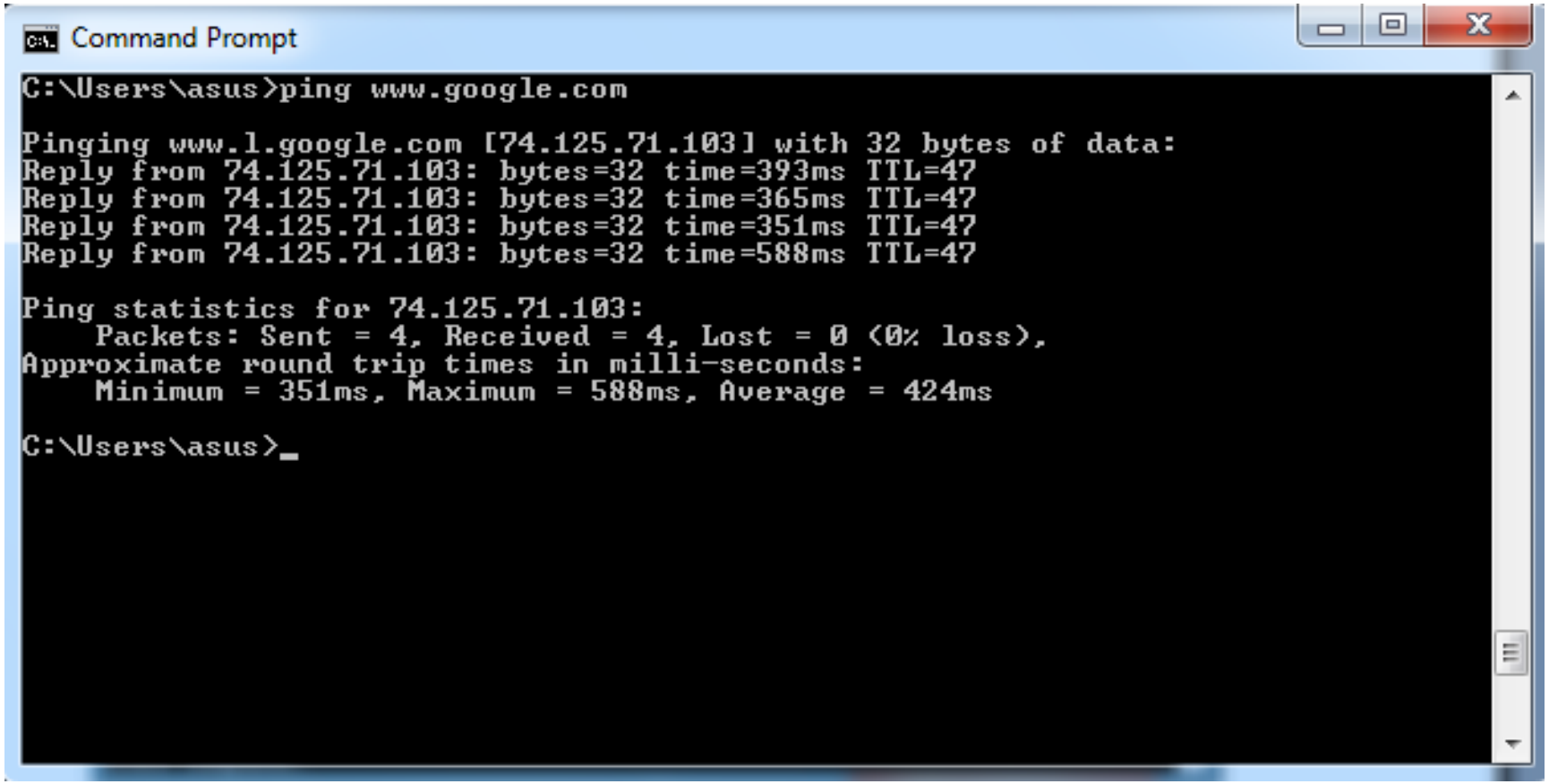
Using the command '*tracert IP address/DNS name*' on DOS prompt of a machine we can send an ICMP echo packet to the named host. Each hop is tested 3 times (by default) and the corresponding reply time is shown on the DOS prompt of the sender. Figure below shows the time table to reach www.google.com.



Let us observe the line 2 as an example where the first attempt took 48ms, the second one took 101 ms, and the third one took 80ms. This variation depends on traffic condition of the link. Some time timeout may occur for a certain router, for example the line 6 of above case. In this case alternate router is selected (72.14.215.22) visualized from line 7. To get details about the command we can use '*tracert /?*'

To test the connection between two nodes of a network we can use *ping* command. The details of the command are shown below. Four test packets each of 32 bytes are sent. Ping provides results as the amount of time spent (in milliseconds) between the sending of test packets and receipt of responses. The statistics of time and success rate are also mention at the bottom of the time table.

The result of ping www.google.com is shown below.



HUB, Bridge Switch and Router

Hub

- ✓ A hub is the simplest of these devices. Any data packet coming from one port is sent to all other ports. It is then up to the receiving computer to decide if the packet is for it or not.

- ✓ The biggest problem with hubs is their simplicity. Since every packet is sent out to every computer on the network, there is a lot of wasted transmission. This means that the network can easily become flooded. Hubs are typically used on small networks where the amount of data going across the network is never very high.

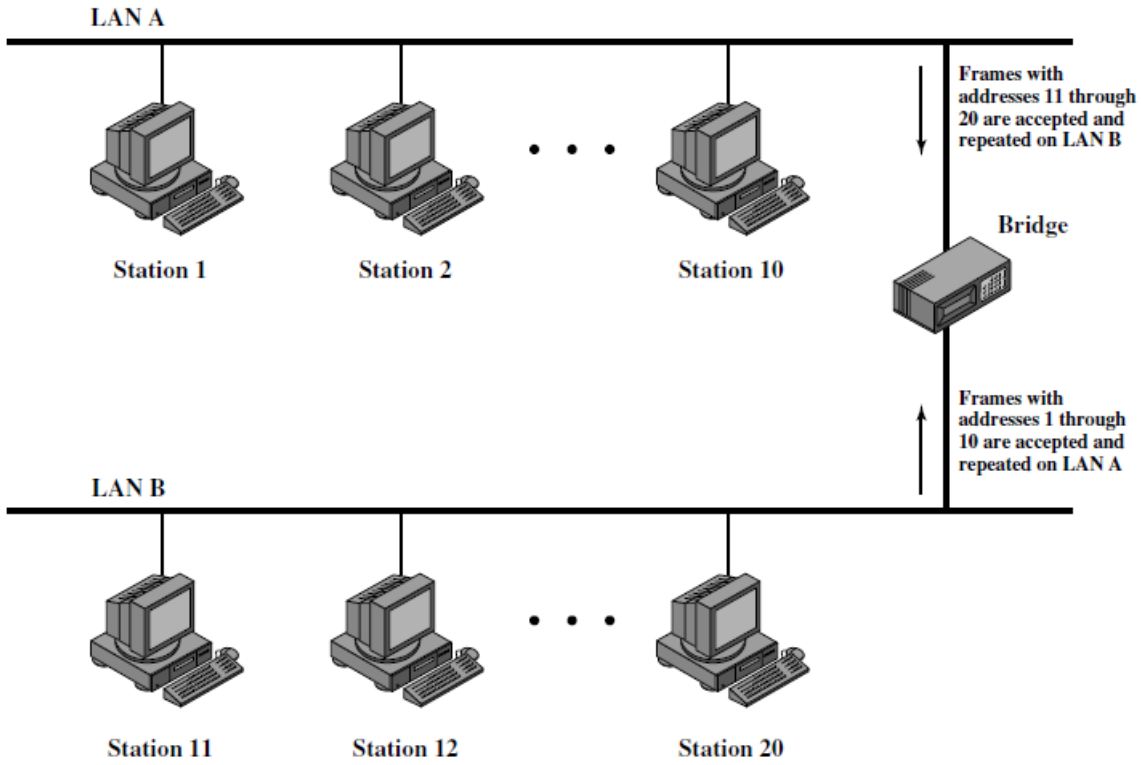
There are mainly two types of hubs:
1. Passive: The signal is forwarded as it is (so it doesn’t need power supply).

2. Active: The signal is amplified, so they work as repeaters. In fact they have been called multiport repeaters (use power supply). Hubs can be connected to other hubs using an uplink port to extend the network.

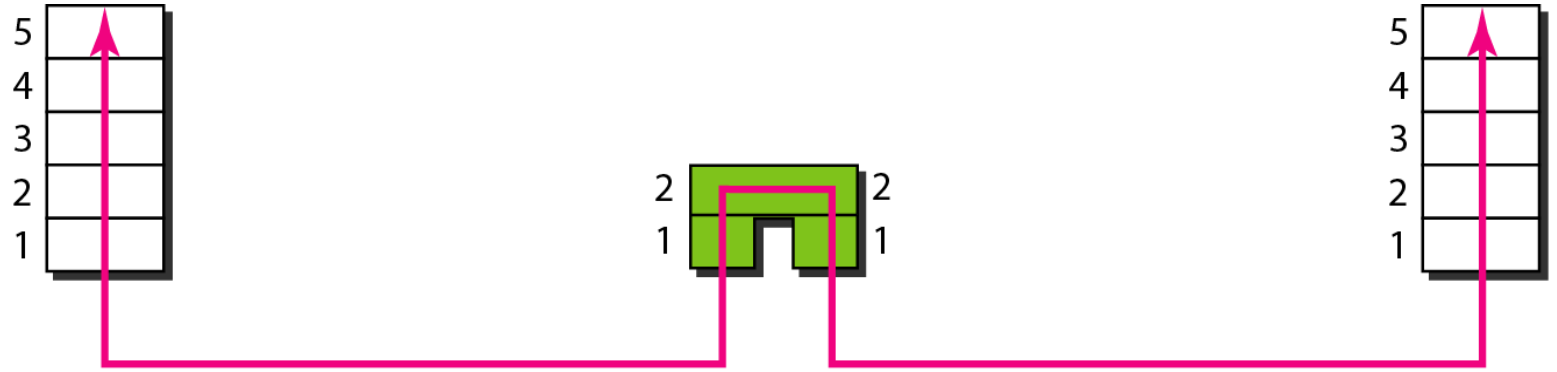
OSI Model: Active Hubs work on the physical layer (lowest layer). That’s the reason they can’t deal with addressing or data filtering. The passive Hub is at layer 0.

Bridge

A bridge goes one step up on a hub in that it looks at the destination of the packet before sending. If the destination address is not on the other side of the bridge it will not transmit the data. It uses MAC address of 48 bits.

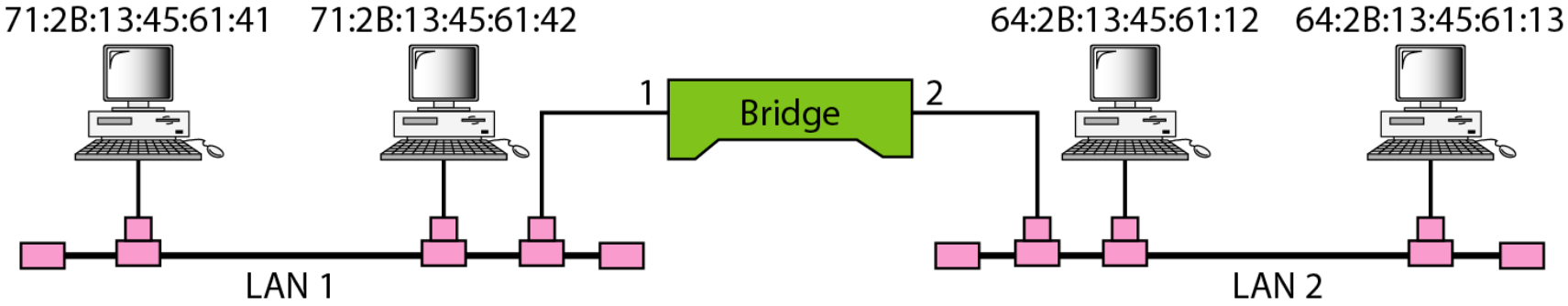


A bridge connecting two LANs



Address	Port
71:2B:13:45:61:41	1
71:2B:13:45:61:42	1
64:2B:13:45:61:12	2
64:2B:13:45:61:13	2

Bridge Table



Switch

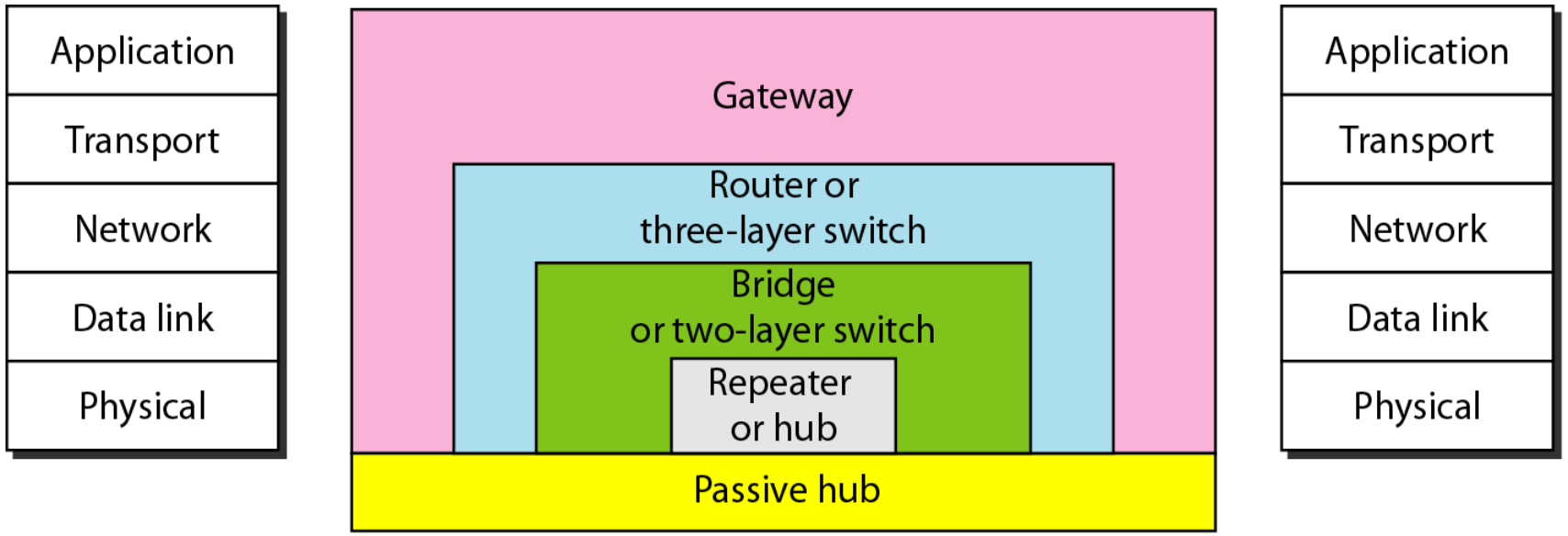
Instead of broadcasting the frames everywhere, a switch actually checks for the destination MAC address and forward it to the relevant port to reach that computer only.

Router

A router is similar in a switch in that it forwards packets based on address. But, instead of the MAC address that a switch uses, a router can use the IP address. This allows the network to send packet among different network ID.

Gateway

Gateways are very intelligent devices or else can be a computer running the appropriate software to connect and translate data between networks with different protocols or architecture, so their work is much more complex than a normal router. For instance, allowing communication between TCP/IP clients and IPX/SPX or AppleTalk.



Five categories of connecting devices