



Antonio Cianfrani

Packet Tracer and initial router configuration



Packet Tracer (1/2)

■ Packet Tracer?

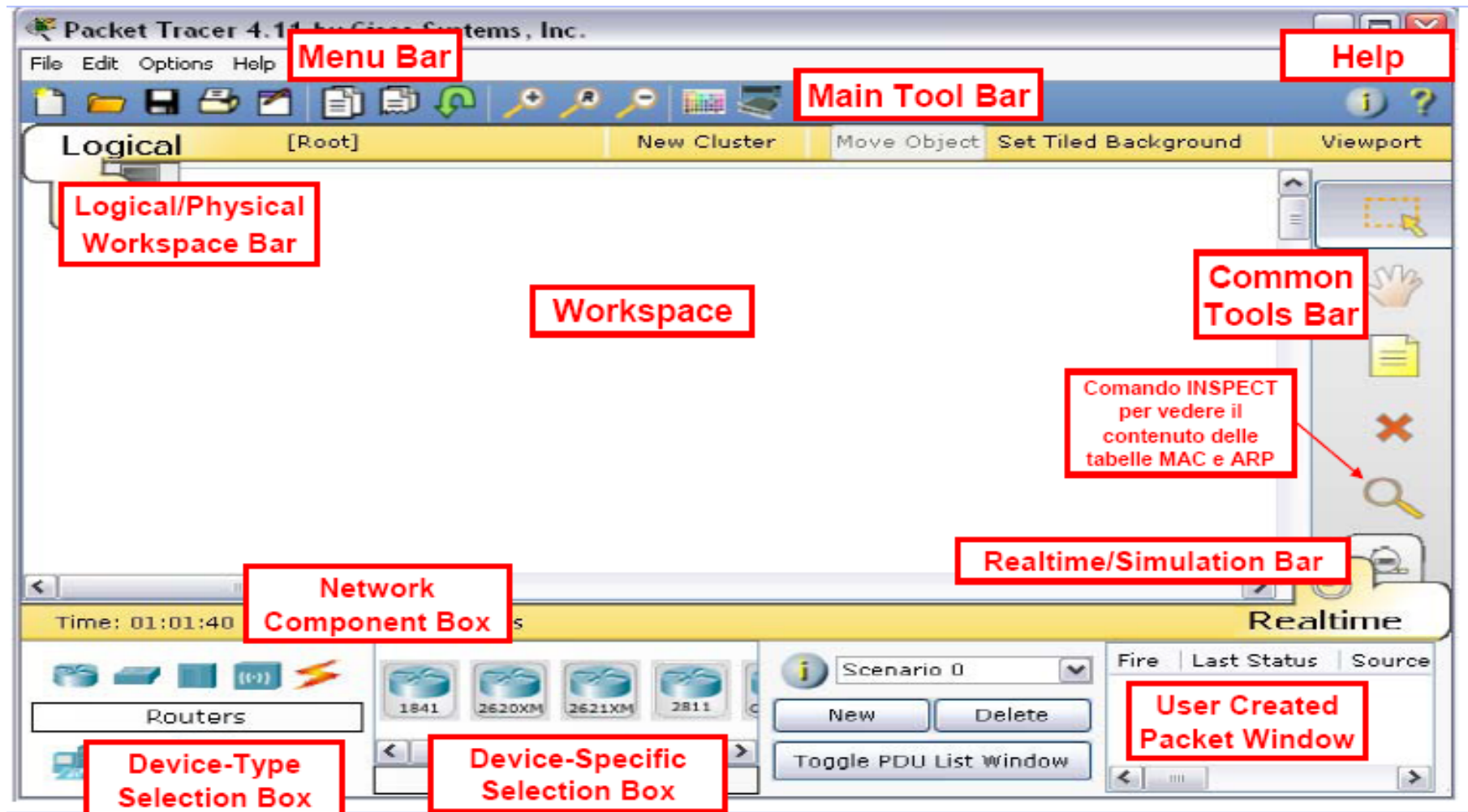
- Cisco Packet Tracer is a software able to emulate CISCO networking devices.

■ Packet Tracer features:

- Allows to create network topologies with Cisco devices and generic device.
- Emulate the Command Line Interface (CLI) of the Cisco IOS (a subset of functions).
- Allows to configure, using the CLI (or the GUI), the network devices so that to check the correctness of a network configuration .
- Dynamically evaluate the device state and the traffic packets exchanged into the network.



Packet Tracer (2/2)





Topology and available devices

- **It is possible**
 - To start from an existing topology
 - open -> Reference_Topologies
 - Or to create your own network
- **It is possible to use**
 - Cisco network devices with specific hardware features
 - Customize generic devices



How to insert a device

The screenshot displays the 'Logical' network design environment. The interface includes a top menu bar with options: 'New Cluster', 'Move Object', 'Set Tiled Background', and 'Viewport'. A central workspace shows a '2620XM Router0' device. A vertical toolbar on the right contains icons for selection, pan, zoom, and other functions. A yellow box labeled '1' points to the selection icon. At the bottom, a 'Power Cycle Devices' panel is visible, which includes a 'Routers' section. A yellow box labeled '2' points to the 'Routers' section. Within this section, a '2620XM' device is highlighted, with a yellow box labeled '3' pointing to it. Another yellow box labeled '4' points to the '2620XM Router0' device in the main workspace. The bottom right corner features a 'Realtime' panel with a 'Scenario 0' dropdown, 'New' and 'Delete' buttons, and a 'Toggle PDU List Window' button. A table with columns 'Fire', 'Last Status', 'Source', and 'Destination' is also present.

Logical [Root] New Cluster Move Object Set Tiled Background Viewport

2620XM Router0

1

2

3

4

Power Cycle Devices

Routers

1841 2620XM 2621XM 2811 Generic Generic

2620XM

Realtime

Scenario 0

New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination
------	-------------	--------	-------------



The Common Tools Bar

The screenshot displays the network design software interface. The top bar is yellow and contains the text "Logical" and "[Root]". Below this, there are three tabs: "New Cluster", "Move Object", and "Set Tiled Background". The main workspace shows a network diagram with three devices: "2620XM Router0", "2950-24 Switch0", and "PC-PT PC0". A yellow box highlights the "Common Tools Bar" on the right side of the workspace. This bar contains several icons: a selection tool (a dashed box with a cursor), a move tool (a hand icon), a note tool (a document icon), a delete tool (a red X icon), a search tool (a magnifying glass icon), and a "Realtime" button. Four yellow boxes with arrows point to these tools, each with a descriptive text:

- Select tool : to select topology elements
- Move tool: to move the overall network
- Note tool: to add notes
- Delete tool: to remove a link or a device

At the bottom of the interface, there is a "Power Cycle Devices" section with a "Realtime" button. Below this, there is a "Scenario 0" dropdown menu and a "Toggle PDU List Window" button. The bottom right corner features a table with columns: "Fire", "Last Status", "Source", and "Destination".

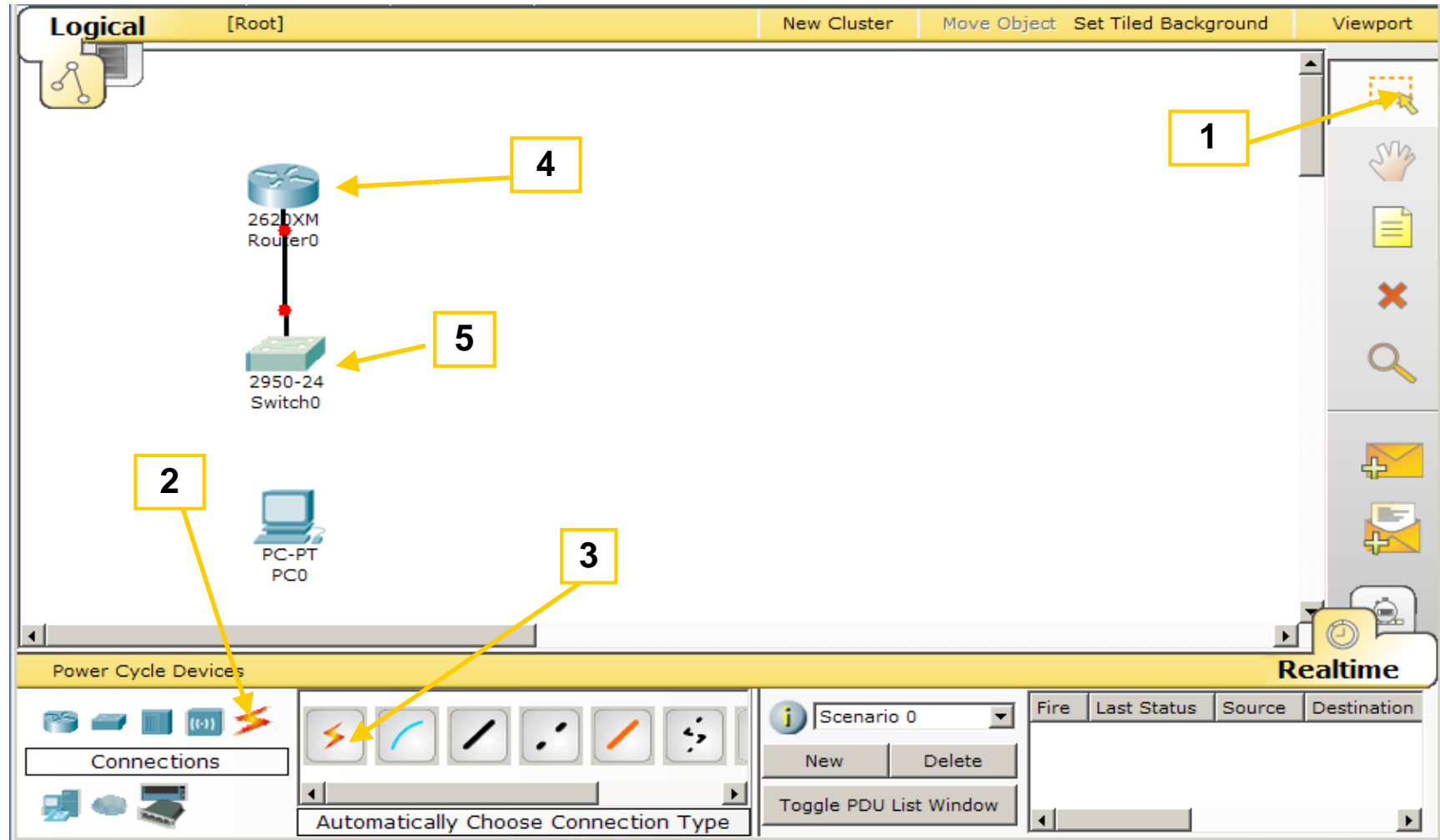


Connecting devices

- To connect two network devices, it is needed to select:
 - An adequate physical medium (wired/wireless cable)
 - The proper interfaces
- It is also possible to use the smart connection mode:
 - Packet Tracer selects on itself the cable and the interfaces to be connected

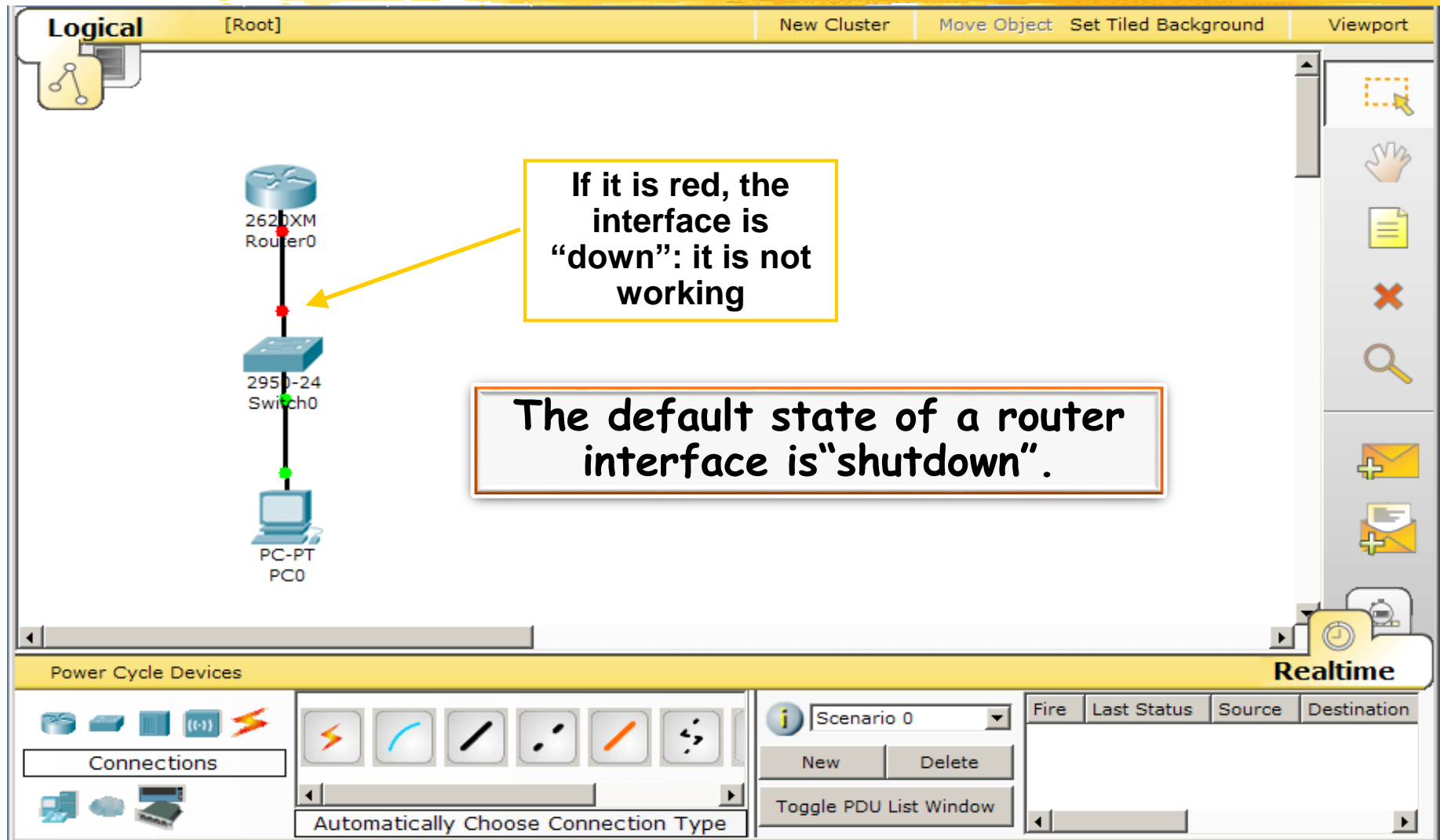


The Smart Connection mode



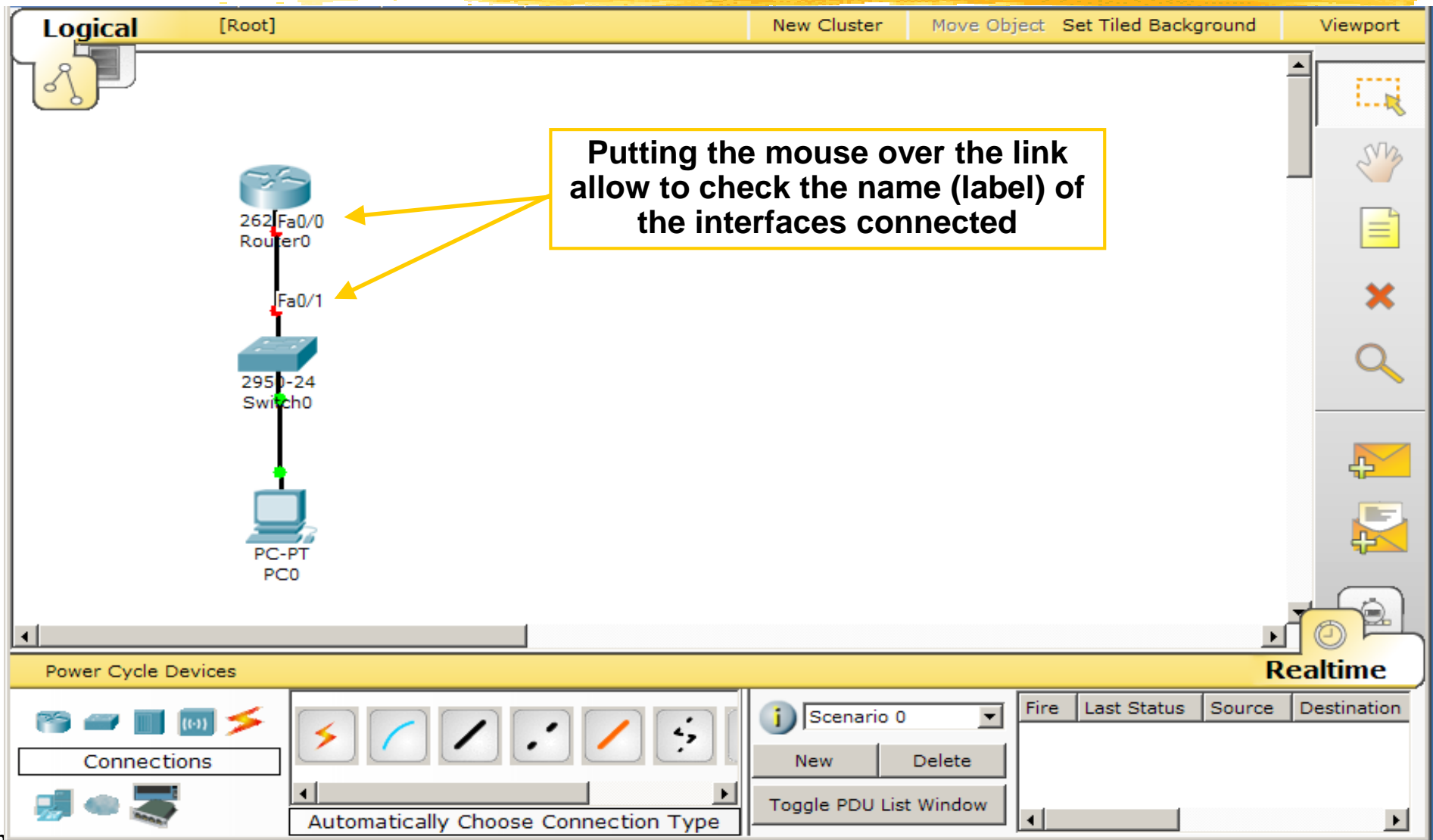


Port Status





Port Labels





Configuring a device

- Packet Tracer provides a set of basic configuration commands to be performed by means of the graphical interface (GUI- Graphic User Interface).
- On the bottom, the list of commands to be used for the CLI is shown.



Configuring the Router Hostname

The screenshot displays the Cisco Packet Tracer interface with a network topology and the configuration window for Router0.

Network Topology:

- A 2620XM router labeled "GAD" (indicated by arrow 1) is connected to a 2950-24 switch labeled "Switch0".
- The switch is connected to a PC labeled "PC0".
- Arrows indicate the configuration steps: 1 points to the router, 2 points to the "Global Settings" tab, 3 points to the router in the topology, and 4 points to the "Equivalent IOS Commands" section.

Router0 Configuration Window:

- Physical Tab:** Shows the router's physical components.
- Config Tab:** Contains the configuration settings.
- CLI Tab:** Shows the command-line interface.
- Global Settings:** The "Display Name" and "Hostname" fields are both set to "GAD".
- Equivalent IOS Commands:** Shows the commands entered in the CLI: `Router#configure terminal`, `Enter configuration commands, one per line. End with CNTL/Z.`, `Router(config)#hostname GAD`, and `GAD(config)#`.

Bottom Panel:

- Power Cycle Devices:** A section for managing device power.
- Connections:** A section for managing network connections.
- Automatically Choose Connection Type:** A checkbox for automatic connection type selection.
- Buttons:** "New", "Delete", and "Toggle PDU List Window".



Router FastEthernet Interface

The screenshot displays the ealtime network configuration interface. On the left, a logical network diagram shows a hierarchy: a 2621XM GAD router at the top, connected to a 2950-24 Switch0, which is connected to a PC-PT PC0. A yellow box labeled '1' highlights the GAD router, and a yellow box labeled '4' highlights the PC-PT PC0. On the right, the configuration window for the FastEthernet0/0 interface is open. A yellow box labeled '3' highlights the interface configuration settings, and a yellow box labeled '2' highlights the 'Equivalent IOS Commands' section. The interface configuration settings include: Port Status (On), Bandwidth (Auto), Duplex (Auto), MAC Address (0007.EC69.76D3), IP Address (192.168.1.1), and Subnet Mask (255.255.255.0). The 'Equivalent IOS Commands' section shows the following commands: GAD(config-if)#, GAD(config-if)#exit, GAD(config)#interface FastEthernet0/0, and GAD(config-if)#. The bottom of the interface includes a 'Power Cycle Devices' section, a 'Connections' section, and a 'Toggle PDU List Window' button.

Logical [Root] | New Cluster | Move Object | Set Tiled Background | Viewport

GAD | Physical | **Config** | CLI

GLOBAL
Settings
ROUTING
Static
RIP
INTERFACE
FastEthernet0/0

FastEthernet0/0

Port Status ☒ On

Bandwidth ☒ 10 Mbps ☒ 100 Mbps

Duplex ☒ Full Duplex ☒ Half Duplex

MAC Address 0007.EC69.76D3

IP Address 192.168.1.1

Subnet Mask 255.255.255.0

Equivalent IOS Commands

```
GAD(config-if)#  
GAD(config-if)#exit  
GAD(config)#interface FastEthernet0/0  
GAD(config-if)#
```

Power Cycle Devices

Connections

Automatically Choose Connection Type

New **Delete**

Toggle PDU List Window

ealtime

Destination



Saving the configuration

Packet Tracer 4.1 by Cisco Systems, Inc. (Alpha 6)

File Edit Options Help

- New Ctrl+N
- Open... Ctrl+O
- Save Ctrl+S**
- Save As... Ctrl+Shift+S
- Print... Ctrl+P
- Activity Wizard... Ctrl+W
- Exit

Save your file by selecting File...Save

Save your router configs by clicking the NVRAM Save button.

Settings

Display Name: GAD
Hostname: GAD

NVRAM: Erase Save

Startup Config: Load... Export...
Running Config: Merge... Export...

Commands

```
GAD(config-if) #  
GAD(config-if) #exit  
GAD(config) #interface FastEthernet0/0  
GAD(config-if) #
```

Power Cycle Devices

Connections

Automatically Choose Connection Type

New Delete

Toggle PDU List Window



How to check the connectivity

- Realtime Mode: using the CLI of a router/PC and performing a ping (like in the real world....).
- Simulation Mode: it is possible to follow the packets crossing all network devices in their path



Ping from a PC

Packet Tracer 4.1 by Cisco Systems, Inc. (Alpha)

File Edit Options Help

Logical [Root]

Network 192.168.1.0/24

2621XM GAD Fa0/0 192.168.1.1

2950-24 Switch0

PC-PT GAD_Student IP: 192.168.1.2 GW: 192.168.1.1

Command Prompt

```
Packet Tracer PC Command Line 1.0
PC>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time=153ms TTL=120
Reply from 192.168.1.1: bytes=32 time=78ms TTL=120
Reply from 192.168.1.1: bytes=32 time=69ms TTL=120
Reply from 192.168.1.1: bytes=32 time=80ms TTL=120

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 69ms, Maximum = 153ms, Average = 95ms

PC>
```

Power Cycle Devices

Connections

Automatically Choose Connection Type

Realtime

Scenario 0

New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination
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Simulation Mode

Logical [Root] New Cluster Move Object Set Tiled Background Viewport

Network 192.168.1.0/24

2620XM GAD Fa0/0 192.168.1.1/24

2950-24 Switch0

PC-PT GAD_Student IP: 192.168.1.2/24

Simulation Mode.

Event List

Vis.	Time (s)	Last Device	At Device	Type	Info
------	----------	-------------	-----------	------	------

Reset Simulation ☒ Constant Delay Captured to: * (no captures)

Play Controls

Back Auto Capture / Play Capture / Forward

Event List Filters

Visible Events: ARP, CDP, DHCP, EIGRP, ICMP, RIP, TCP, UDP, VTP, STP, OSPF, DTP, TELNET, TFTP, HTTP, DNS

Edit Filters Show All

Power Cycle Devices PLAY CONTROLS: Back Auto Capture / Play Capture / Forward Event List **Simulation**

Connections

Automatically Choose Connection Type

Scenario 0

New Delete

Toggle PDU List Window

Fire	Last Status	Source	Destination
------	-------------	--------	-------------



Creating a PDU

3. Select the Destination Device.

2. Select the Source device.

1. Click the Simple PDU icon.

The screenshot displays the 'Logical' view of a network simulation. The topology consists of three devices connected in a vertical line: a '2620XM GAD' router at the top, a '2950-24 Switch0' in the middle, and a 'PC-PT GAD_Student' at the bottom. The PC-PT device is highlighted with a blue envelope icon, indicating it is the selected source device. The 'Event List' window is open on the right, showing a table with columns: Vis., Time (s), Last Device, At Device, Type, and Info. The first row shows an event at 0.000 seconds from 'GAD_Student' to 'GAD' of type 'ICMP'. Below the table are controls for 'Reset Simulation', 'Constant Delay' (checked), and 'Captured to' (0.000 s). The 'Play Controls' section includes 'Back', 'Auto Capture / Play', and 'Capture / Forward' buttons. The 'Event List Filters' section shows 'Visible Events' as a list of protocols: ARP, CDP, DHCP, EIGRP, ICMP, RIP, TCP, UDP, VTP, STP, OSPF, DTP, TELNET, TFTP, HTTP, and DNS. The bottom status bar shows 'Scenario 0' and 'In Progress'.

Vis.	Time (s)	Last Device	At Device	Type	Info
	0.000	--	GAD_Student	ICMP	

Fire	Last Status	Source	Destinat
	In Progress	GAD_Student	GAD



Event List

The Event List window records (or "captures") what happens as your PDU propagates the network.

The Event List can be filtered to show specific kinds of traffic.

The PDU List will show the PDU information.

The screenshot displays the network simulation software interface. The main workspace shows a network topology with a router (2620XM GAD) and a PC (PC-PT GAD_Student). The Event List window is open, showing a table of captured events. The table has columns: Vis., Time (s), Last Device, At Device, Type, and Info. The first row shows an event at Time 0.000, Last Device --, At Device GAD_Student, Type ICMP, and Info (highlighted in blue). Below the table are buttons for 'Reset Simulation', a checked 'Constant Delay' checkbox, and 'Captured to: * 0.000 s'. The Play Controls section includes 'Back', 'Auto Capture / Play', and 'Capture / Forward' buttons, along with a progress slider. The Event List Filters section shows 'Visible Events: ARP, CDP, DHCP, EIGRP, ICMP, RIP, TCP, UDP, VTP, STP, OSPF, DTP, TELNET, TFTP, HTTP, DNS' and buttons for 'Edit Filters' and 'Show All'. The bottom status bar includes 'Power Cycle Devices', 'PLAY CONTROLS: Back Auto Capture / Play Capture / Forward', 'Event List', and 'Simulation'. The PDU List window is also open, showing a table with columns: Fire, Last Status, Source, and Destination. The first row shows 'Fire' as a red dot, 'Last Status' as 'In Progress', 'Source' as 'GAD_Student', and 'Destination' as 'GAD'. The bottom toolbar includes icons for connections, a progress slider, and buttons for 'New', 'Delete', and 'Toggle PDU List Window'.

Vis.	Time (s)	Last Device	At Device	Type	Info
	0.000	--	GAD_Student	ICMP	

Reset Simulation ☒ Constant Delay Captured to: * 0.000 s

Play Controls: Back Auto Capture / Play Capture / Forward

Event List Filters: Visible Events: ARP, CDP, DHCP, EIGRP, ICMP, RIP, TCP, UDP, VTP, STP, OSPF, DTP, TELNET, TFTP, HTTP, DNS

Edit Filters Show All

Fire	Last Status	Source	Destination
	In Progress	GAD_Student	GAD



Playing the Simulation

Click the Auto Capture/Play button to begin the simulation.

The screenshot shows the GNS3 simulation interface. On the left, a network topology is displayed with a '2950-24 Switch0' connected to a 'PC-PT GAD_Student'. The main panel on the right contains the 'Event List' and 'Play Controls'. The 'Event List' table is as follows:

Vis.	Time (s)	Last Device	At Device	Type	Info
	0.000	--	GAD_Student	ICMP	

Below the Event List, the 'Play Controls' section includes buttons for 'Reset Simulation', 'Constant Delay' (checked), 'Back', 'Auto Capture / Play', and 'Capture / Forward'. A yellow arrow points from the text box to the 'Auto Capture / Play' button. The 'Event List Filters' section shows 'Visible Events' as ARP, CDP, DHCP, EIGRP, ICMP, RIP, TCP, UDP, VTP, STP, OSPF, DTP, TELNET, TFTP, HTTP, and DNS. The bottom status bar shows 'PLAY CONTROLS: Back Auto Capture / Play Capture / Forward' and 'Simulation'.



Results

As the simulation runs, events will be added to the list. These events show the packet's state at each step along the path.

A successful ping will show a green check mark.

The screenshot displays the Packet Tracer simulation environment. On the left, a network topology is shown with a 2620XM GAD router connected to a 2950-24 Switch0, which is connected to a PC-PT GAD_Student. A green checkmark is visible next to the PC-PT icon, indicating a successful ping. The Event List window is open, showing a table of events:

Vis.	Time (s)	Last Device	At Device	Type	Info
	0.000	--	GAD_Student	ICMP	
	0.001	GAD_Student	Switch0	ICMP	
	0.002	Switch0	GAD	ICMP	
	0.003	GAD	Switch0	ICMP	
👁	0.004	Switch0	GAD_Student	ICMP	

Below the Event List, the 'Reset Simulation' button is visible, along with a checked 'Constant Delay' option and a 'Captured to: * 0.004 s' field. The 'Play Controls' section includes buttons for 'e / Play' and 'Capture / Forward'. The 'Visible Events' list includes ARP, CDP, DHCP, EIGRP, ICMP, RIP, TCP, UDP, VTP, STP, OSPF, DTP, TELNET, TFTP, HTTP, and DNS. The bottom status bar shows 'Power Cycle Devices', 'PLAY CONTROLS: Back Auto Capture / Play Capture / Forward', and 'Event List Simulation'. The 'Simulation' window at the bottom right shows a table with columns 'Fire', 'Last Status', 'Source', and 'Destinat':

Fire	Last Status	Source	Destinat
🔴	Successful	GAD_Student	GAD



PDU Information

Packet Tracer 4.1 by Cisco Systems, Inc. (Alpha 6) - C:/Program Files/Packet Tracer 4.1/saves/Novice.pkt

PDU Information at Device: GAD

OSI Model | Inbound PDU Details | Outbound PDU Details

At Device: GAD
Source: GAD_Student
Destination: GAD

In Layers	Out Layers
Layer7	Layer7
Layer6	Layer6
Layer5	Layer5
Layer4	Layer4
Layer 3: IP Header Src. IP: 192.168.1.2, Dest. IP: 192.168.1.1	Layer 3: IP Header Src. IP: 192.168.1.1, Dest. IP: 192.168.1.2
Layer 2: Ethernet II Header 00E0.B043.9EE8 >> 0007.EC69.76D3	Layer 2: Ethernet II Header 0007.EC69.76D3 >> 00E0.B043.9EE8
Layer 1: Port FastEthernet0/0	Layer 1: Port(s): FastEthernet0/0

1. FastEthernet0/0 receives the frame.

Challenge Me << Previous Layer Next Layer >>

Event List

Vis.	Time (s)	Last Device	At Device	Type	Info
	0.000	--	GAD_Student	ICMP	
	0.001	GAD_Student	Switch0	ICMP	
	0.002	Switch0	GAD	ICMP	
	0.003	GAD	Switch0	ICMP	
	0.004	Switch0	GAD_Student	ICMP	

Reset Simulation ☒ Constant Delay Captured to: 0.004 s

Play Controls: Back Auto Capture / Play Capture / Forward

Event List Filters

Visible Events: ARP, CDP, DHCP, EIGRP, ICMP, RIP, TCP, UDP, VTP, STP, OSPF, DTP, TELNET, TFTP, HTTP, DNS

Edit Filters Show All

Play Capture / Forward Event List Simulation

Scenario 0

Fire	Last Status	Source	Destination
	Successful	GAD_Student	GAD

New Delete Toggle PDU List Window

Connections

Automatically Choose Connection Type



Configuring a Cisco Router



CLI (1/2)

- To configure a router/switch we need to learn how the Command Line Interface (CLI) is organized
- How to reach the CLI?
 - Console Session
 - Telnet Session



CLI (2/3)

- **II CLI has a hierarchical structure**
 - Different modes with different configuration levels
 - User EXEC mode
 - Privileged EXEC mode or enable mode
 - Global Configuration mode



CLI (3/3)

- **The User EXEC only allows for basic monitoring functions ("view only" mode)**
 - It is not possible to perform configuration actions
 - It is identified by the prompt ">".
- **The Privileged EXEC mode allows for more operational functions**
 - It is possible to secure with a password
 - It is identified by the prompt "#"
- **To move from User mode to Privileged mode**
 - "enable" command



Moving among modes

- To come back to Privileged mode from global configuration: "exit" or "Ctrl-Z"

```
Router

Router con0 is now available.

Press RETURN to get started.

User Access Verification
Password:
Router> ← User-Mode Prompt
Router>enable
Password:
Router# ← Privileged-Mode Prompt
Router#disable
Router>
Router>exit
```



Configuration mode

- The global configuration mode allows to perform configuration commands
- To move from the Privileged mode to the Global Configuration one:

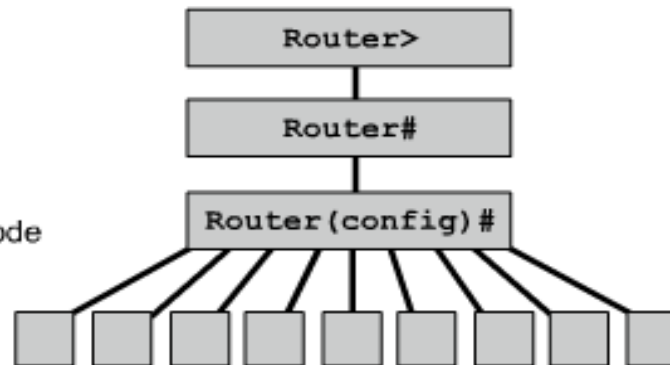
```
Router#configure terminal  
Router(config) #
```

- From the Global Configuration mode it is possible to configure: interfaces, routing protocols, etc..



Summary

- User EXEC mode
- Privileged EXEC mode
- Global configuration mode
- Specific configuration modes



Configuration Mode	Prompt
Interface	Router(config-if)#
Subinterface	Router(config-subif)#
Controller	Router(config-controller)#
Map-list	Router(config-map-list)#
Map-class	Router(config-map-class)#
Line	Router(config-line)#
Router	Router(config-router)#
IPX-router	Router(config-ipx-router)#
Route-map	Router(config-route-map)#



CLI Help

- The Question Mark (?) is used to list the set of available commands
 - After “—More—” other commands
 - “Enter” to see line by line
 - “Space” to see the whole next page
- It is possible to cut off a word (“ena” instead of enable)
- “Ctrl-P” o “Up Arrow” to recall the last commands
- The ^ symbol show the wrong command part



Router name

- Each route has a nome (Router is the default name)

- TO assign a different name:

- From Global configuration mode

```
Router (config) #hostname Tokyo  
Tokyo (config) #
```



Securing router access (1/4)

- It is possible to configure a password for router access
- The password can be defined for different access ways:
 1. Console port
 2. Telnet access, referred to as Virtual Terminal Line (vty) in the CLI
 3. Privileged EXEC mode



Securing router access (2/4)

- Password for the console port:

```
Router(config)#line console 0
Router(config-line)#password <password>
Router(config-line)#login
```

- Password for the telnet access (virtual terminal line):

```
Router(config)#line vty 0 4
Router(config-line)#password <password>
Router(config-line)#login
```



Securing router access (3/4)

- Two possibilities to configure a password for the Privileged mode:

1. "enable password" command

Router(config)#enable password <password>

- The password is shown (not encrypted) in the configuration files (more later when introducing commands "show running-config" o "show startup-config")
- It is possible to encrypt the password (all the passwords) using the command:

Router(config)#service password-encryption



Securing router access (4/4)

2. "enable secret" command

Router (config) #enable secret <password>

- The algorithm used by the *enable secret* command is more robust than the one used by the *service password-encryption* command



The "show" command (1/2)

- It is used to provide information about router features (both hardware and software)
- It is available both in the User EXEC and Privileged EXEC modes (with different information provided)
- Esempi:
 - "show interfaces" - statistics about interfaces
 - "show controllers serial" - hardware level information about interfaces
 - "show clock" - router clock
 - "show hosts" - list of devices (hostname and IP address) known by the router



The "show" command (2/2)

- "show users" - users connected to the router
- "show history" - list of commands used in the past
- "show flash" - information about flash memory and available IOS image files
- "show version" - hardware level features of the router and running IOS
- "show ARP" - ARP table of the router
- "show protocol" - Layer 3 protocols configured at router level and at interface level
- "show startup-configuration" - startup configuration file (saved into the NVRAM)
- "show running-configuration" - running configuration file (saved into the RAM)



The configuration files (1/2)

- The *running-config* file stores the actual configuration of the router
- The *startup-config* file stores the last configuration saved (that will be loaded on router re-start)
- To save the actual configuration in the NVRAM:

```
Router# copy running-config startup-config
```



The configuration files (2/2)

- If a command accepted by the router was not the one to be used it is possible to come back:
 - Execute "no command name"
 - If all the commands executed from router startup must be removed from the configuration:
 - Reload the startup configuration file from NVRAM
- Router# copy startup-config running-config**



Serial interface configuration (1/2)

```
Router(config)#interface serial 0/0
```

```
Router(config-if)#ip address <ip address>  
<netmask>
```

```
Router(config-if)#clock rate 56000
```

```
Router(config-if)#no shutdown
```

- The serial interfaces require a clock for synchronization purposes
- All un router interfaces are "physically down" (powered off): the powering up command is "no shutdown"



Ethernet interface configuration

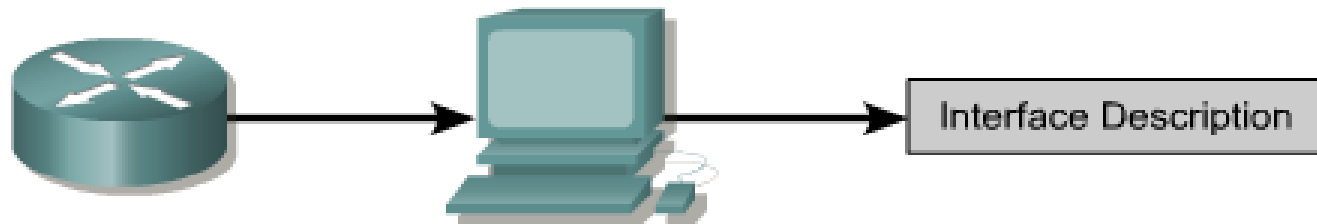
- Similar to the serial interface one.
- No need to configure a clock

Router

```
Router(config)#interface e0
Router(config-if)#ip address 183.8.126.2 255.255.255.128
Router(config-if)#no shutdown
```



Interface description (2/2)



```
Tokyo(config)#interface e 0
```

```
Tokyo(config-if)#description Engineering LAN, Bldg. 18
```



Static routing



Static routing and dynamic routing (1/2)

- The routing table of a router can be updated in two different ways:
 - Using information exchanged with different routers (Dynamic routing - Routing protocols);
 - By means of configuration commands executed by the network administrator (Static Routing)



Static routing and dynamic routing (2/2)

- The static routing is not scalable:
 - A static route must be configured manually;
 - In the case of a topology change, the network administrator must modify the proper static routes;
 - It has an high management complexity in case of big networks.
- Usually both static and dynamic routing are used



Static route configuration

- The command to configure a static route is

```
R1 (config)#ip route Dest_IP_Add SubNet_Mask A/B
```

- Two options for the forwarding part:
 - Option A: the output interface (it is possible only in the case of a point-to-point link)
 - Option B: the next-hop router IP address
- The default route can be configured statically:

```
ip route 0.0.0.0 0.0.0.0 A/B
```



The administrative distance

- The administrative distance (AD) is a measure of the reliability degree of a route
 - Low value of AD → high reliability
- Static routes are reliable by default (AD = 1)
- It is possible to increase the administrative distance:

```
ip route Dest_IP_Add SubNet_Mask A/B AD
```





Routing table (1/2)

Edit Router C

Physical Config CLI

IOS Command Line Interface

```
Router C#show ip route
Codes: C - connected, S - static, I - IGRP, I - RIP, M - mobile, B
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter a
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external typ
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - E
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is 172.8.1.1 to network 0.0.0.0

172.8.0.0/24 is subnetted, 1 subnets
C    172.8.1.0 is directly connected, Serial2/0
172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
R    172.16.0.0/16 [120/1] via 200.1.1.1, 00:00:27, Serial3/0
S    172.16.1.0/24 [1/0] via 200.1.1.1
172.64.0.0/24 is subnetted, 1 subnets
C    172.64.1.0 is directly connected, FastEthernet0/0
C    200.1.1.0/24 is directly connected, Serial3/0
S*   0.0.0.0/0 [1/0] via 172.8.1.1
Router C#
```

Copy Paste

Directly Connected Route

Dynamically Updated Route

Static Route

Default Route



Routing table (2/2)

- The rows (route) of a routing table have different sources:
 - Directly connected routes (C)
 - Statics routes (S,S*)
 - Dynamic Routes (RIP→R, OSPF→O, etc...)
- The administrative distance is a measure of the route reliability (depends on the source)
- To check reachability: ping and tracert



Practical activity

