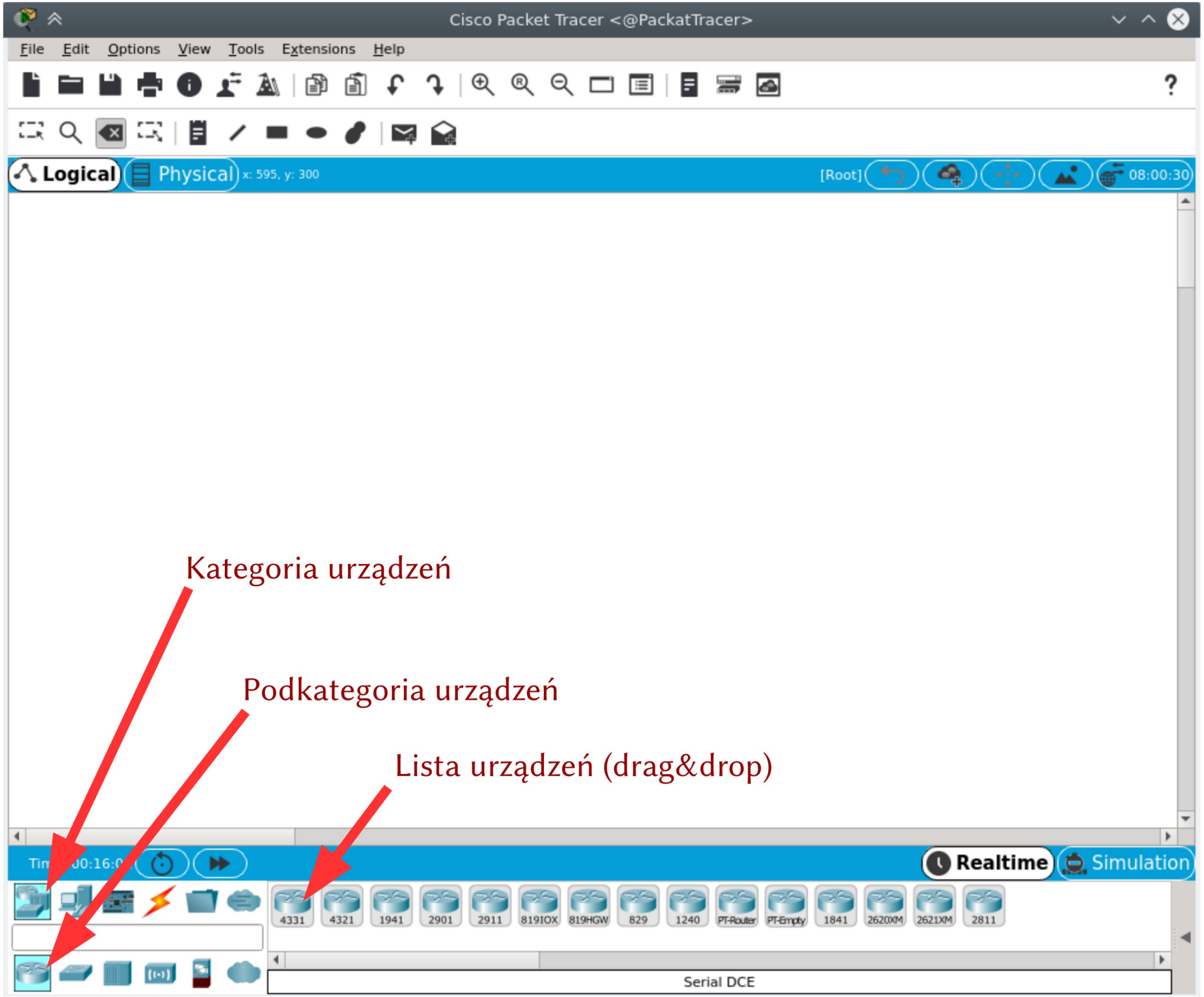
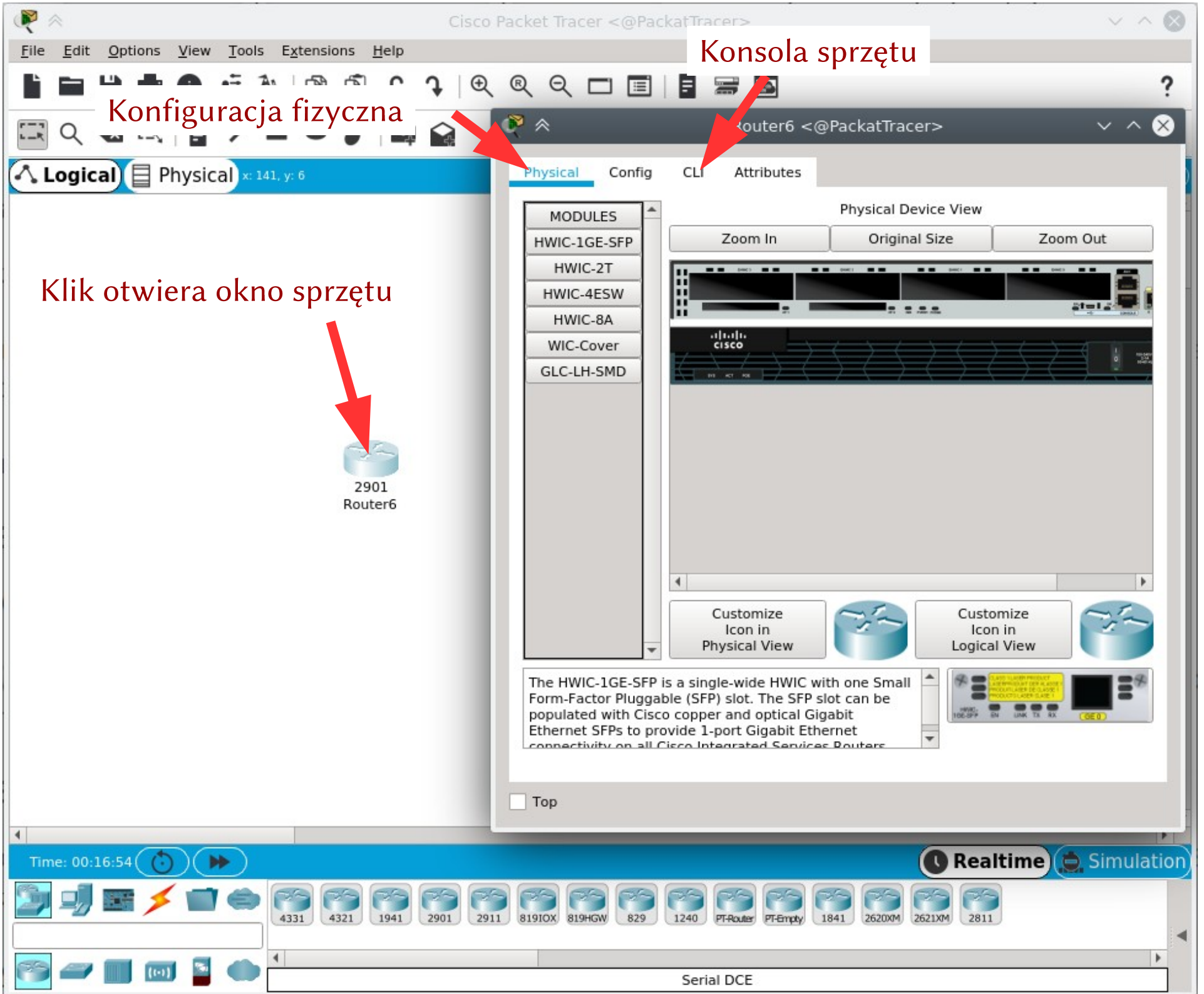
Ćwiczenie konfguracji sprzętu CISCO na komputerze

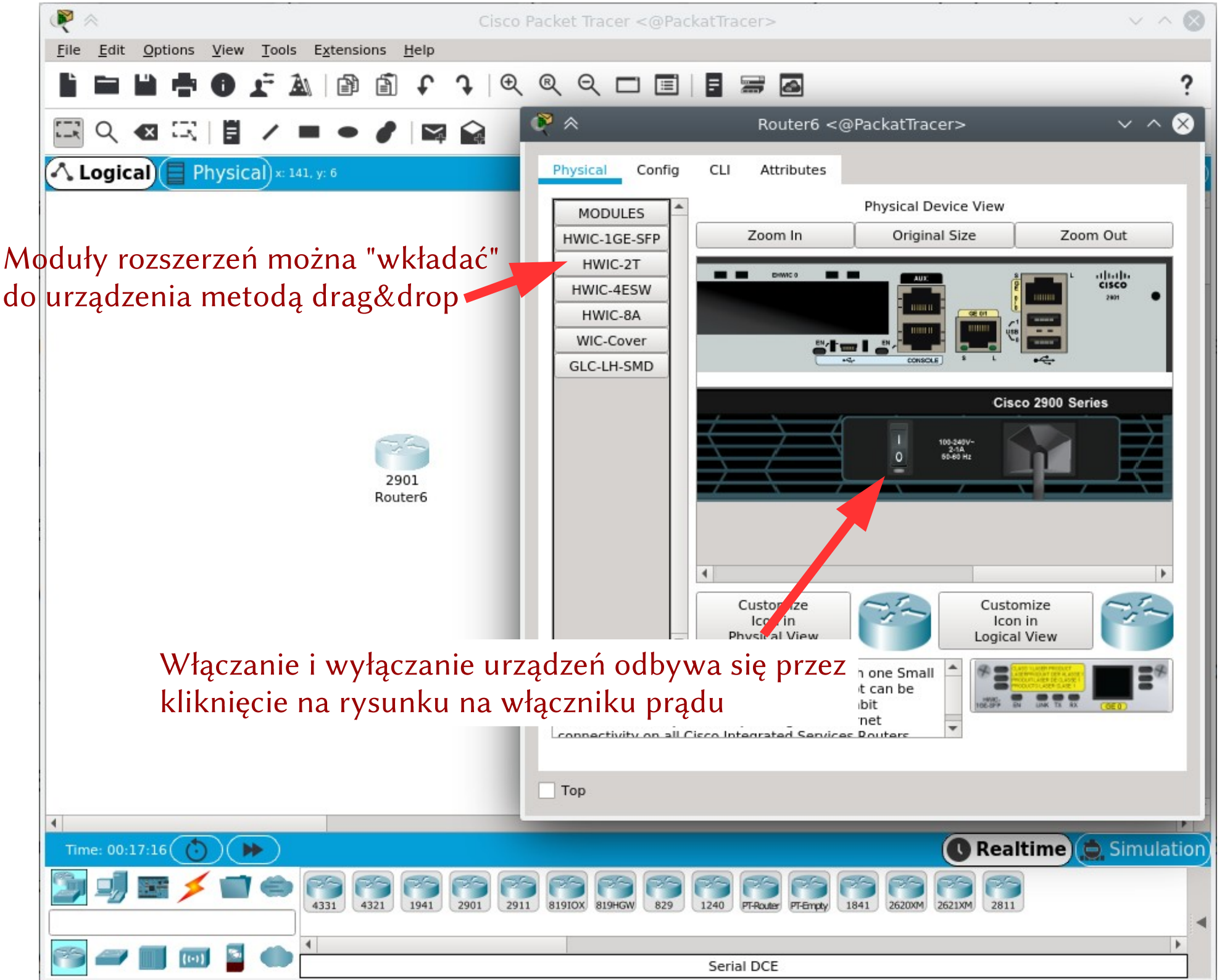
Krótke wprowadzenie do PacketTracer i GNS3

Packet Tracer

- https://www.netacad.com/courses/packet-tracer
- Stworzony przez CISCO
- Symuluje sprzęt CISCO
  (i tylko CISCO)
- Bezpłatny, wymaga założenia darmowego konta na CISCO NetAcad
- Symuluje sprzęt, wynik komend może różnić się od komend wykonanych na prawdziwym sprzęcie

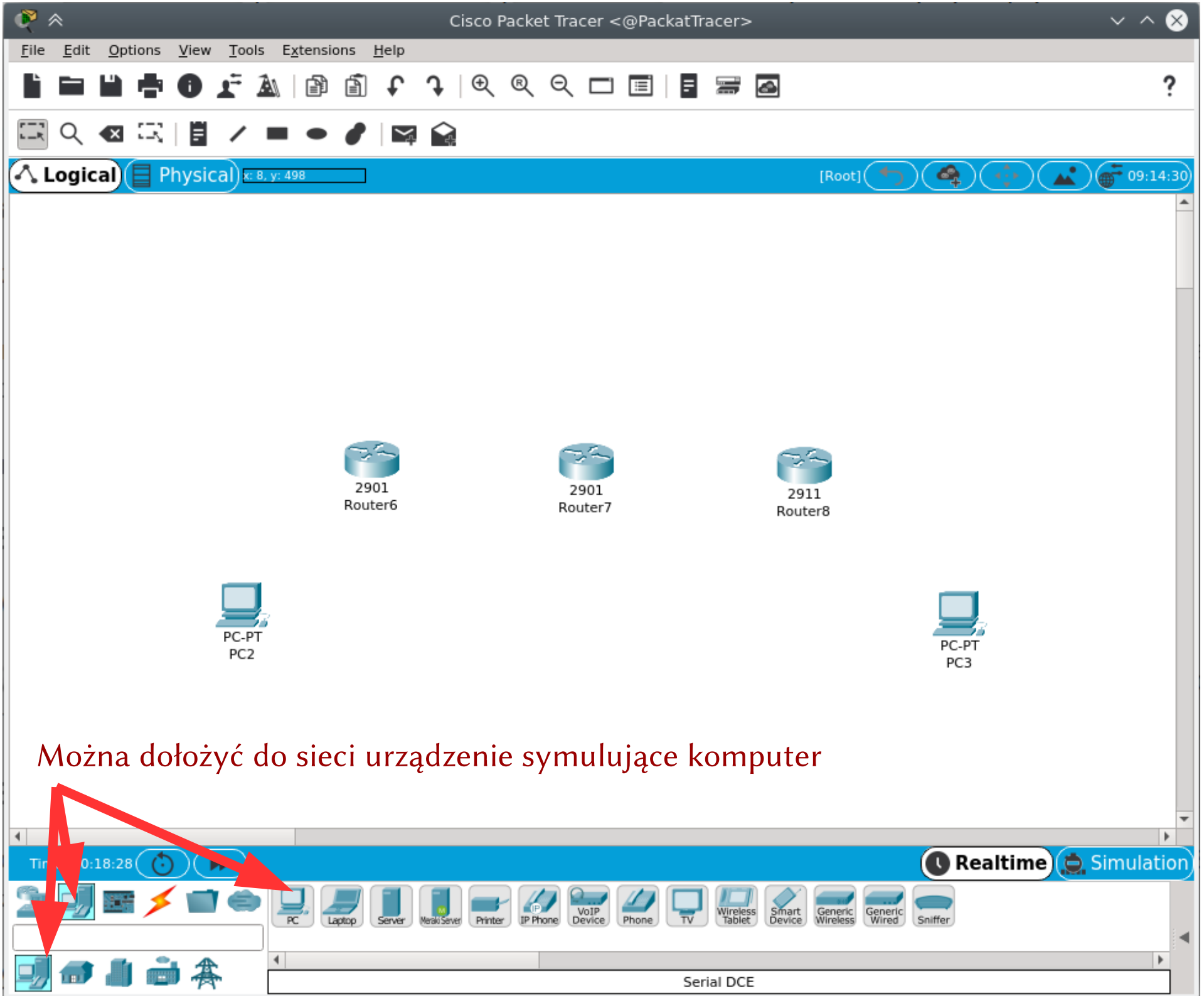

Cisco Packet Tracer <@PackatTracer>
File Edit Options View Tools Extensions Help
Logical
Physical
x: 595, y: 300
[Root]
08:00:30
Kategoria urządzeń
Podkategoria urządzeń
Lista urządzeń (drag&drop)
Realtime
Simulation
4331
4321
1941
2901
2911
819IOX
819HGW
829
1240
PT-Router
PT-Empty
1841
2620XM
2621XM
2811
Serial DCE


Cisco Packet Tracer <@PackatTracer>
File Edit Options View Tools Extensions Help
Konsola sprzętu
Konfiguracja fizyczna
Logical
Physical
x: 141, y: 6
Klik otwiera okno sprzętu
2901
Router6
outer6 <@PackatTracer>
Physical
Config
CLI
Attributes
MODULES
HWIC-1GE-SFP
HWIC-2T
HWIC-4ESW
HWIC-8A
WIC-Cover
GLC-LH-SMD
Physical Device View
Zoom In
Original Size
Zoom Out
Customize Icon in Physical View
Customize Icon in Logical View
The HWIC-1GE-SFP is a single-wide HWIC with one Small Form-Factor Pluggable (SFP) slot. The SFP slot can be populated with Cisco copper and optical Gigabit Ethernet SFPs to provide 1-port Gigabit Ethernet
Top
Time: 00:16:54
Realtime
Simulation
4331
4321
1941
2901
2911
819IOX
819HGW
829
1240
PT-Router
PT-Empty
1841
2620XM
2621XM
2811
Serial DCE



Moduły rozszerzeń można "wkładać" do urządzenia metodą drag&drop

Włączanie i wyłączanie urządzeń odbywa się przez kliknięcie na rysunku na włączniku prądu

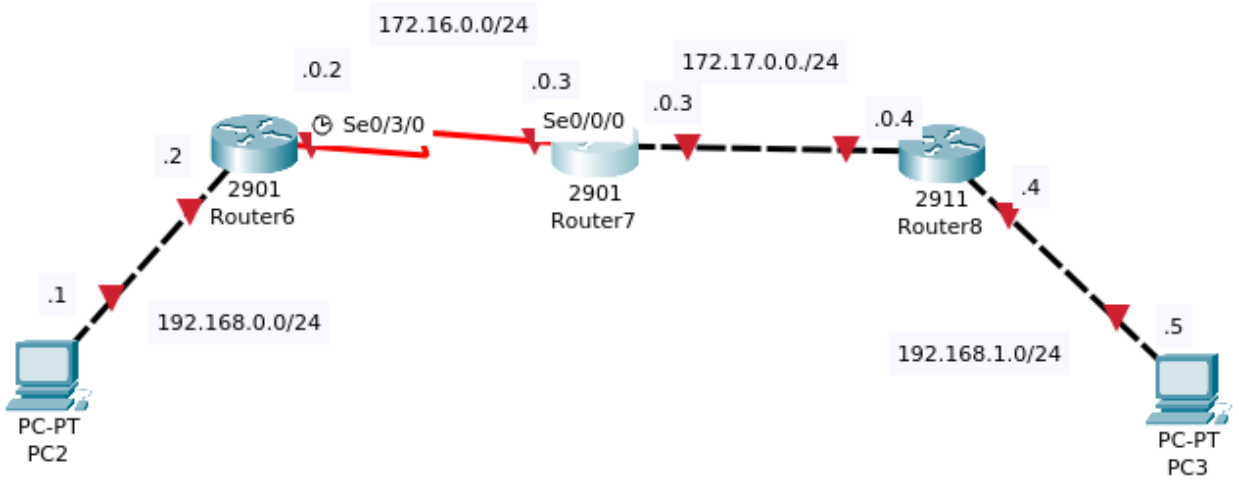


Można dołożyć do sieci urządzenie symulujące komputer

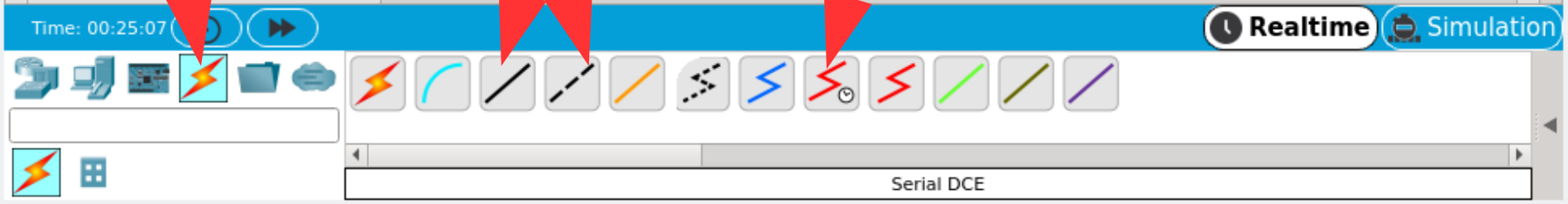
Przykładowa sieć z użyciem połączenia szeregowego (np. zgodnego z nieaktualnym już V.35 czy własnościowym standardem HSSI).

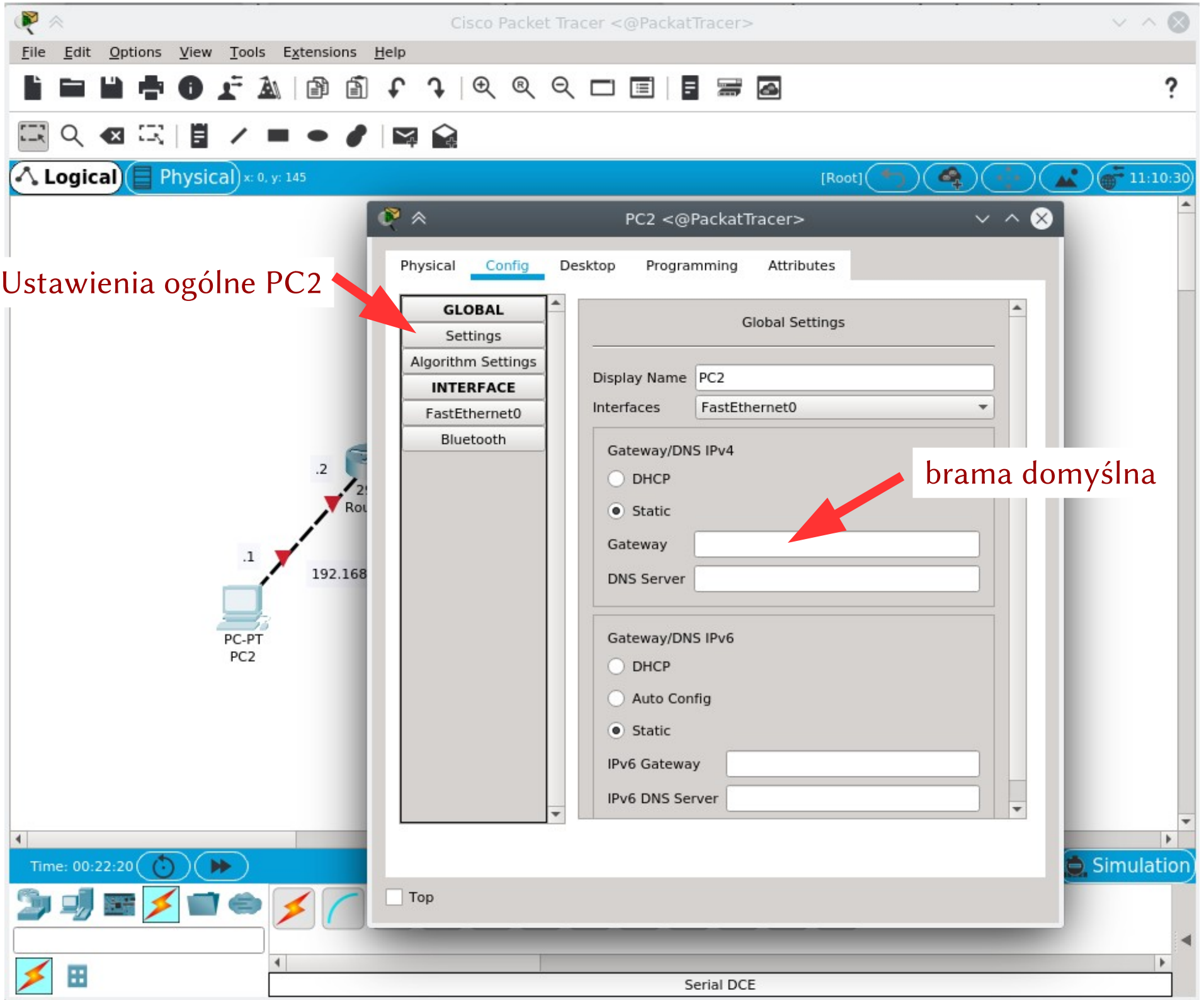
Sprzęt w lab. sieciowym PP ma po 2 interfejsy Ethernetowe i 2 interfejsy szeregowe, stąd prośba o zapoznanie się z obsługą takiego połączenia.

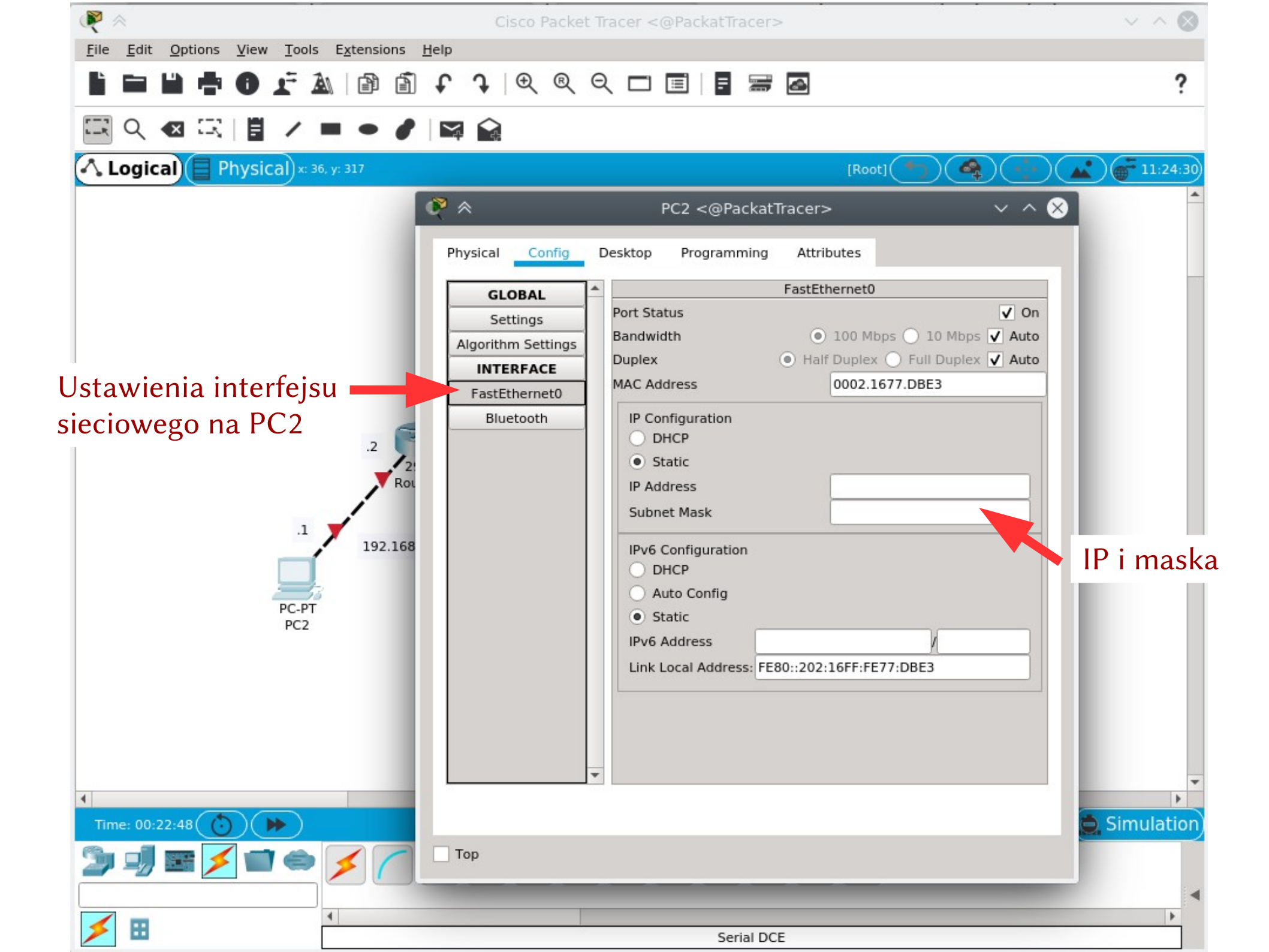
Połączenia (i złącza) szeregowe nie są symetryczne, jedna strona (DCE, sprzęt dostawcy usługi) wysyła zegar określający prędkość połączenia, druga strona (DTE, sprzęt klienta) dostosowuje prędkość do tego zegara

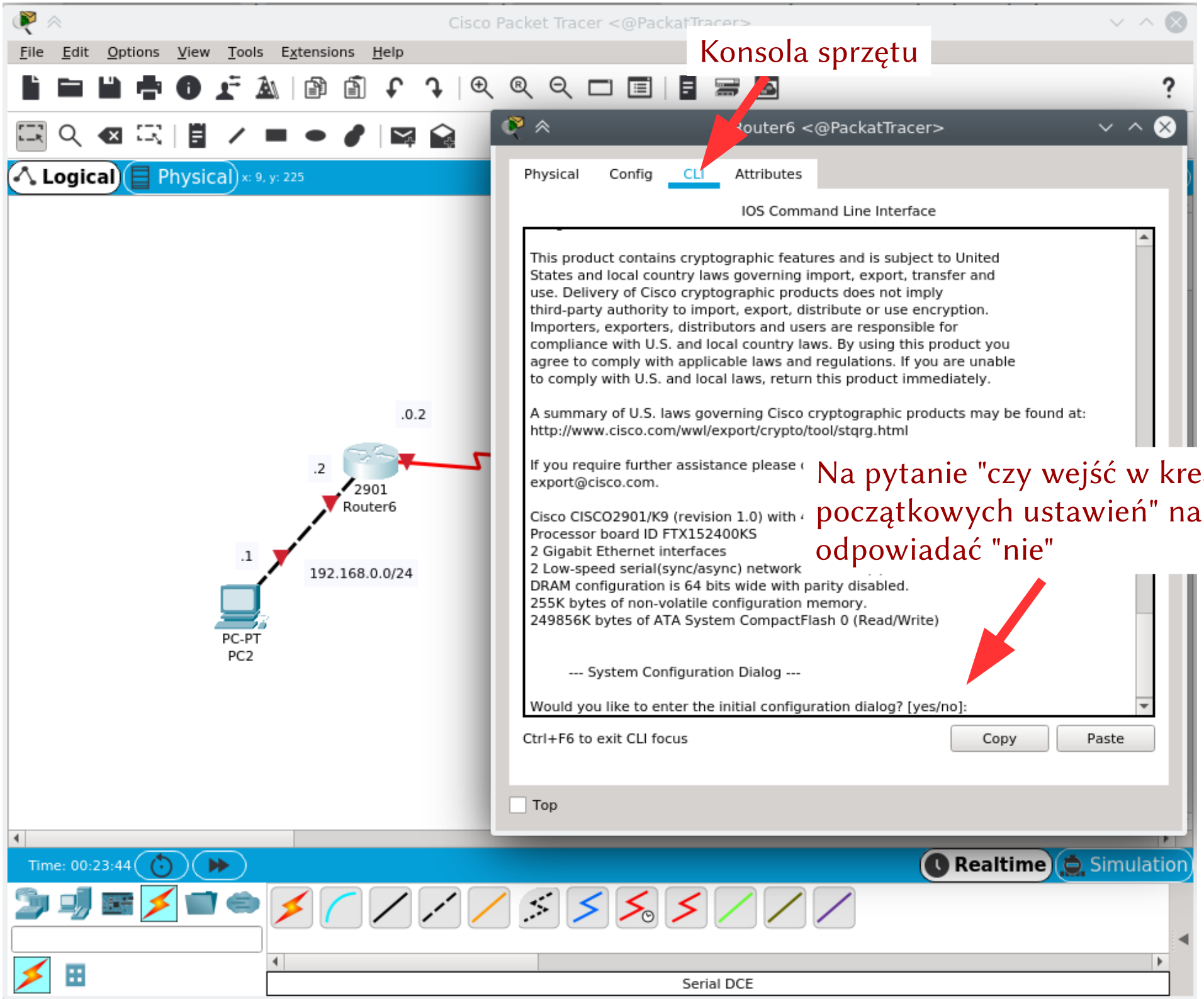


Połączenia Ethernetowe Szeregowe

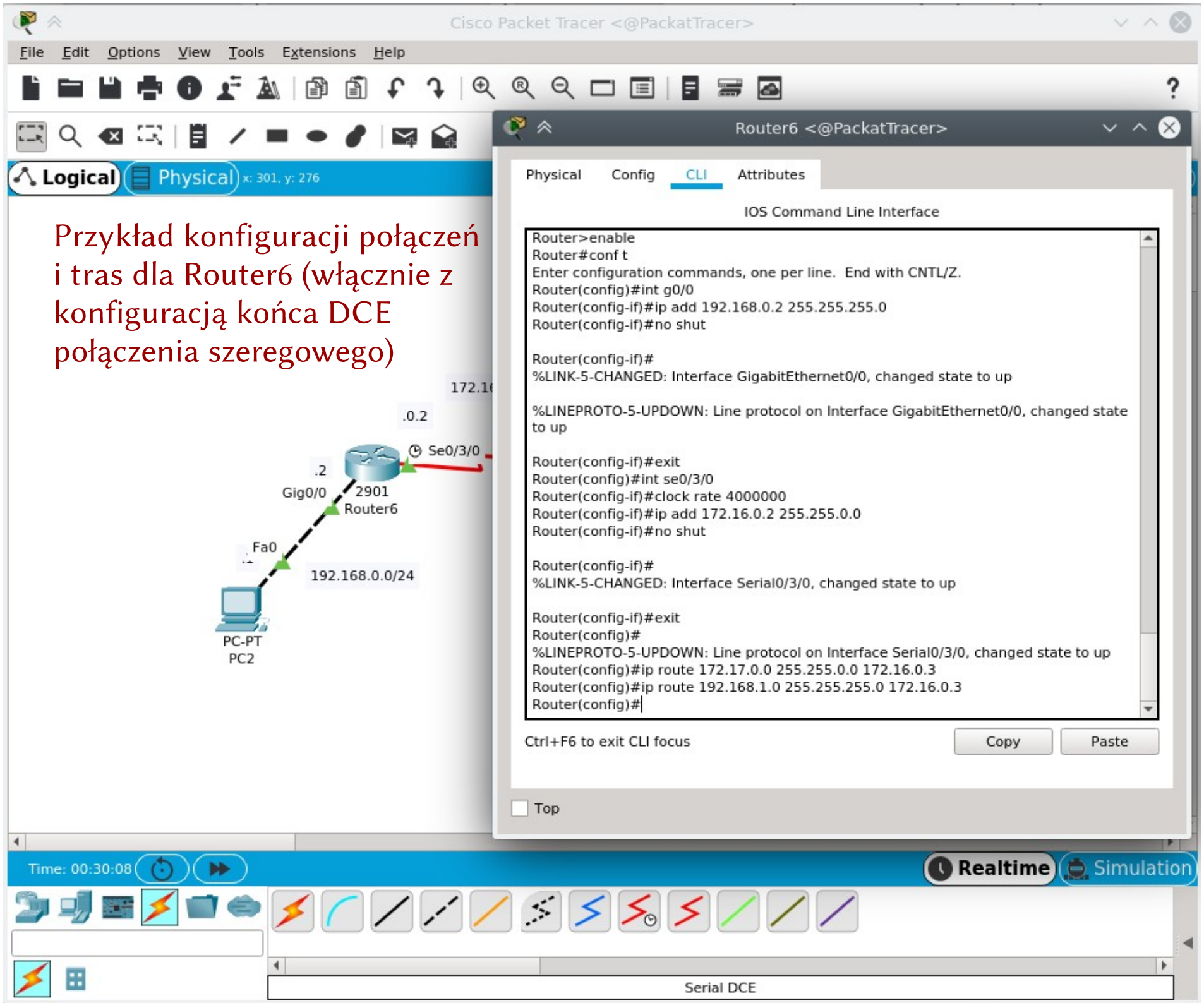


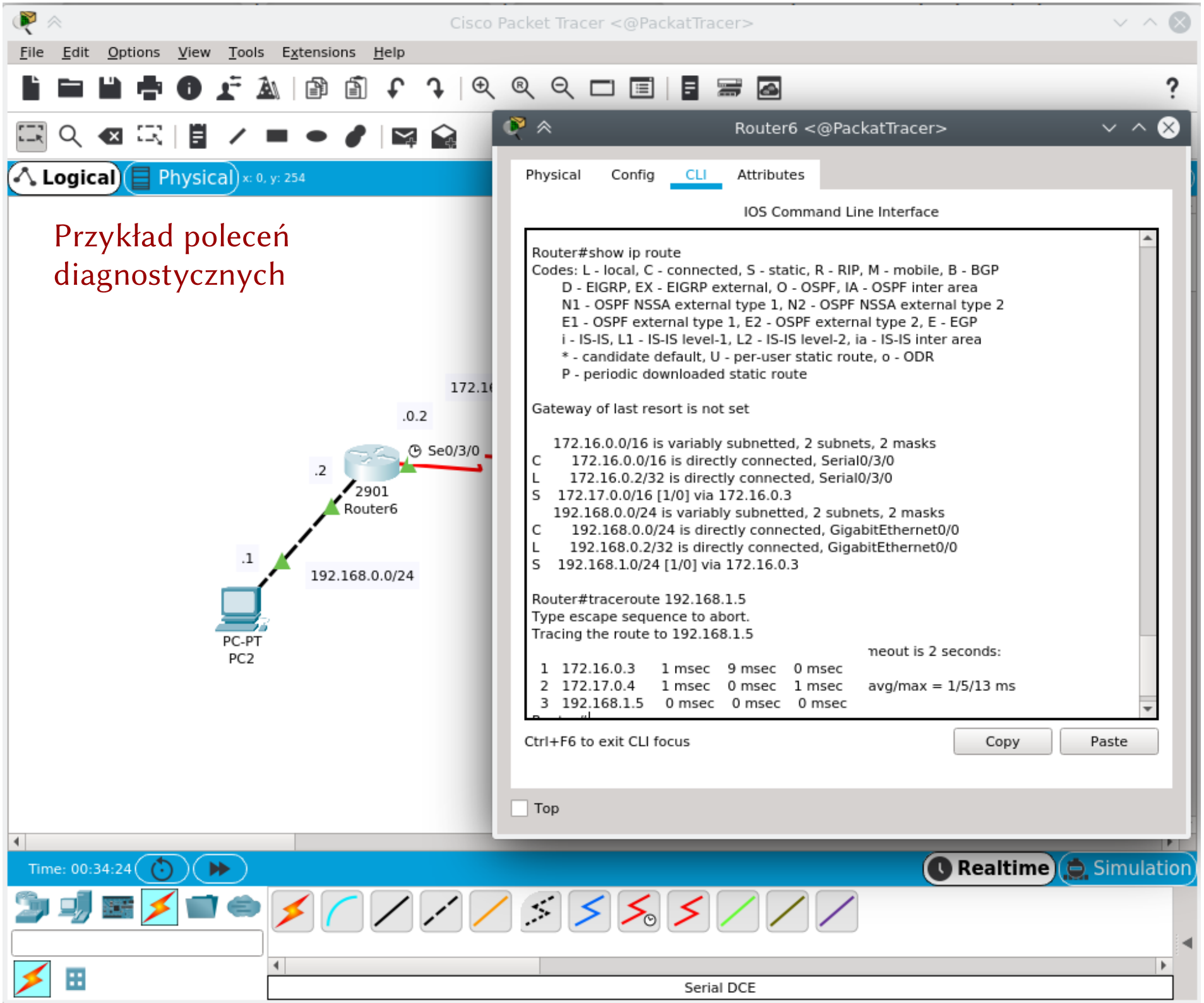

Cisco Packet Tracer <@PackatTracer>
File Edit Options View Tools Extensions Help
Logical
Physical
x: 0, y: 145
[Root]
11:10:30
Ustawienia ogólne PC2
PC2 <@PackatTracer>
Physical
Config
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
Global Settings
Display Name
PC2
Interfaces
FastEthernet0
Gateway/DNS IPv4
DHCP
Static
Gateway
DNS Server
brama domyślna
Gateway/DNS IPv6
DHCP
Auto Config
Static
IPv6 Gateway
IPv6 DNS Server
Top
.2
.1
192.168
PC-PT
PC2
Time: 00:22:20
Simulation
Serial DCE


Cisco Packet Tracer <@PackatTracer>
File Edit Options View Tools Extensions Help
Logical
Physical
x: 36, y: 317
[Root]
11:24:30
PC2 <@PackatTracer>
Physical
Config
Desktop
Programming
Attributes
GLOBAL
Settings
Algorithm Settings
INTERFACE
FastEthernet0
Bluetooth
FastEthernet0
Port Status
On
Bandwidth
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0002.1677.DBE3
IP Configuration
DHCP
Static
IP Address
Subnet Mask
IPv6 Configuration
DHCP
Auto Config
Static
IPv6 Address
Link Local Address:
FE80::202:16FF:FE77:DBE3
Top
Ustawienia interfejsu sieciowego na PC2
IP i maska
.2
.1
192.168
PC-PT
PC2
Time: 00:22:48
Simulation
Serial DCE


Konsola sprzętu
File Edit Options View Tools Extensions Help
Logical
Physical
x: 9, y: 225
.0.2
.2
2901
Router6
.1
192.168.0.0/24
PC-PT
PC2
Router6 <@PackatTracer>
Physical
Config
CLI
Attributes
IOS Command Line Interface
This product contains cryptographic features and is subject to United
States and local country laws governing import, export, transfer and
use. Delivery of Cisco cryptographic products does not imply
third-party authority to import, export, distribute or use encryption.
Importers, exporters, distributors and users are responsible for
compliance with U.S. and local country laws. By using this product you
agree to comply with applicable laws and regulations. If you are unable
to comply with U.S. and local laws, return this product immediately.
A summary of U.S. laws governing Cisco cryptographic products may be found at:
http://www.cisco.com/wwl/export/crypto/tool/stqrg.html
If you require further assistance please
export@cisco.com.
Cisco CISCO2901/K9 (revision 1.0) with
Processor board ID FTX152400KS
2 Gigabit Ethernet interfaces
2 Low-speed serial(sync/async) network
DRAM configuration is 64 bits wide with parity disabled.
255K bytes of non-volatile configuration memory.
249856K bytes of ATA System CompactFlash 0 (Read/Write)
--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]:
Na pytanie "czy wejść w kreator początkowych ustawień" należy odpowiadać "nie"
Ctrl+F6 to exit CLI focus
Copy
Paste
Top
Time: 00:23:44
Realtime
Simulation
Serial DCE

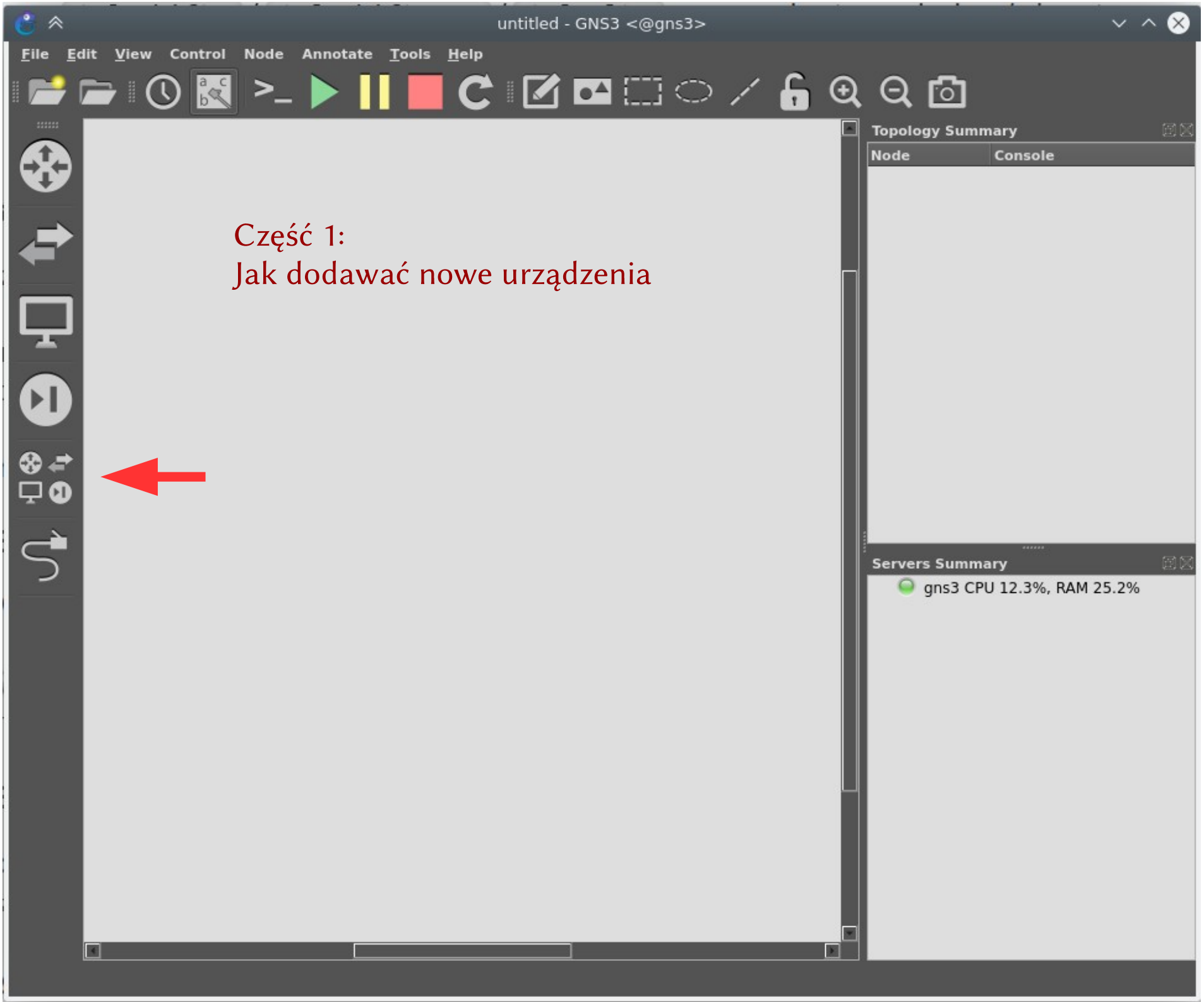
Przykład konfiguracji połączeń i tras dla Router6 (włącznie z konfiguracją końca DCE połączenia szeregowego)

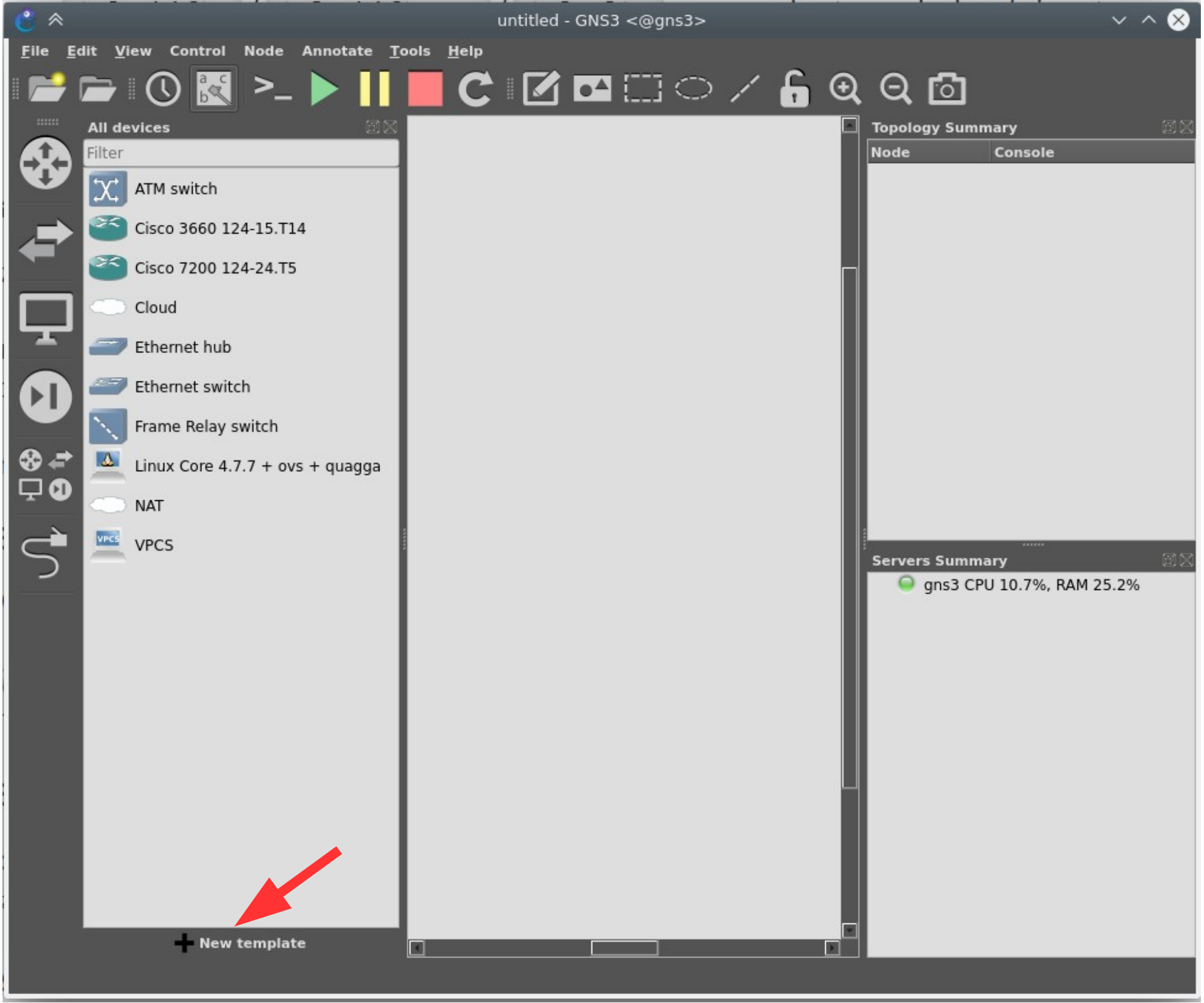


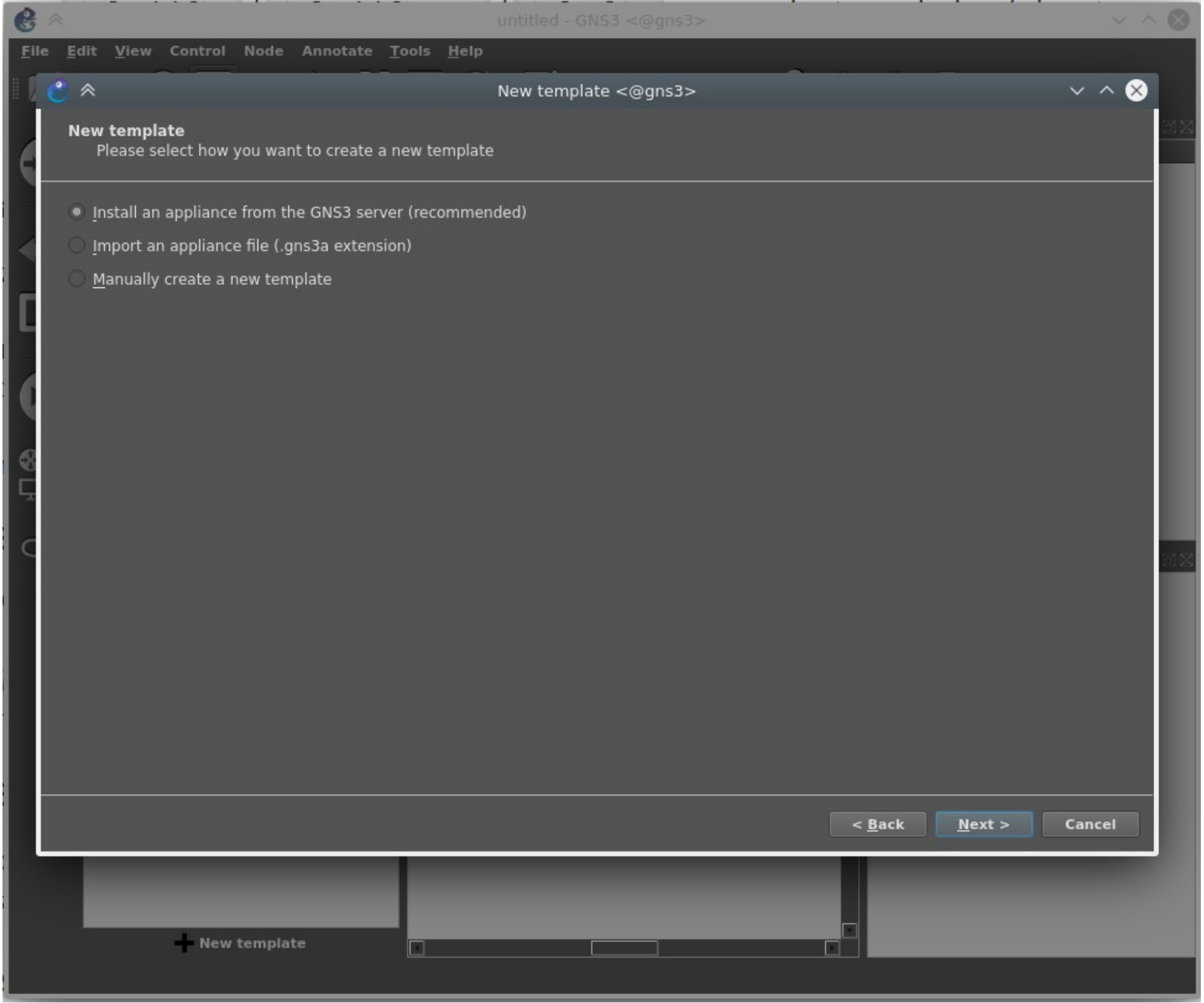

Cisco Packet Tracer <@PackatTracer>
File Edit Options View Tools Extensions Help
Logical
Physical
x: 0, y: 254
Przykład poleceń diagnostycznych
.0.2
Se0/3/0
.2
2901
Router6
.1
192.168.0.0/24
PC-PT
PC2
Router6 <@PackatTracer>
Physical
Config
CLI
Attributes
IOS Command Line Interface
Router#show ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
* - candidate default, U - per-user static route, o - ODR
P - periodic downloaded static route
Gateway of last resort is not set
172.16.0.0/16 is variably subnetted, 2 subnets, 2 masks
C 172.16.0.0/16 is directly connected, Serial0/3/0
L 172.16.0.2/32 is directly connected, Serial0/3/0
S 172.17.0.0/16 [1/0] via 172.16.0.3
192.168.0.0/24 is variably subnetted, 2 subnets, 2 masks
C 192.168.0.0/24 is directly connected, GigabitEthernet0/0
L 192.168.0.2/32 is directly connected, GigabitEthernet0/0
S 192.168.1.0/24 [1/0] via 172.16.0.3
Router#traceroute 192.168.1.5
Type escape sequence to abort.
Tracing the route to 192.168.1.5
neout is 2 seconds:
1 172.16.0.3 1 msec 9 msec 0 msec
2 172.17.0.4 1 msec 0 msec 1 msec avg/max = 1/5/13 ms
3 192.168.1.5 0 msec 0 msec 0 msec
Ctrl+F6 to exit CLI focus
Copy
Paste
Top
Time: 00:34:24
Realtime
Simulation
Serial DCE

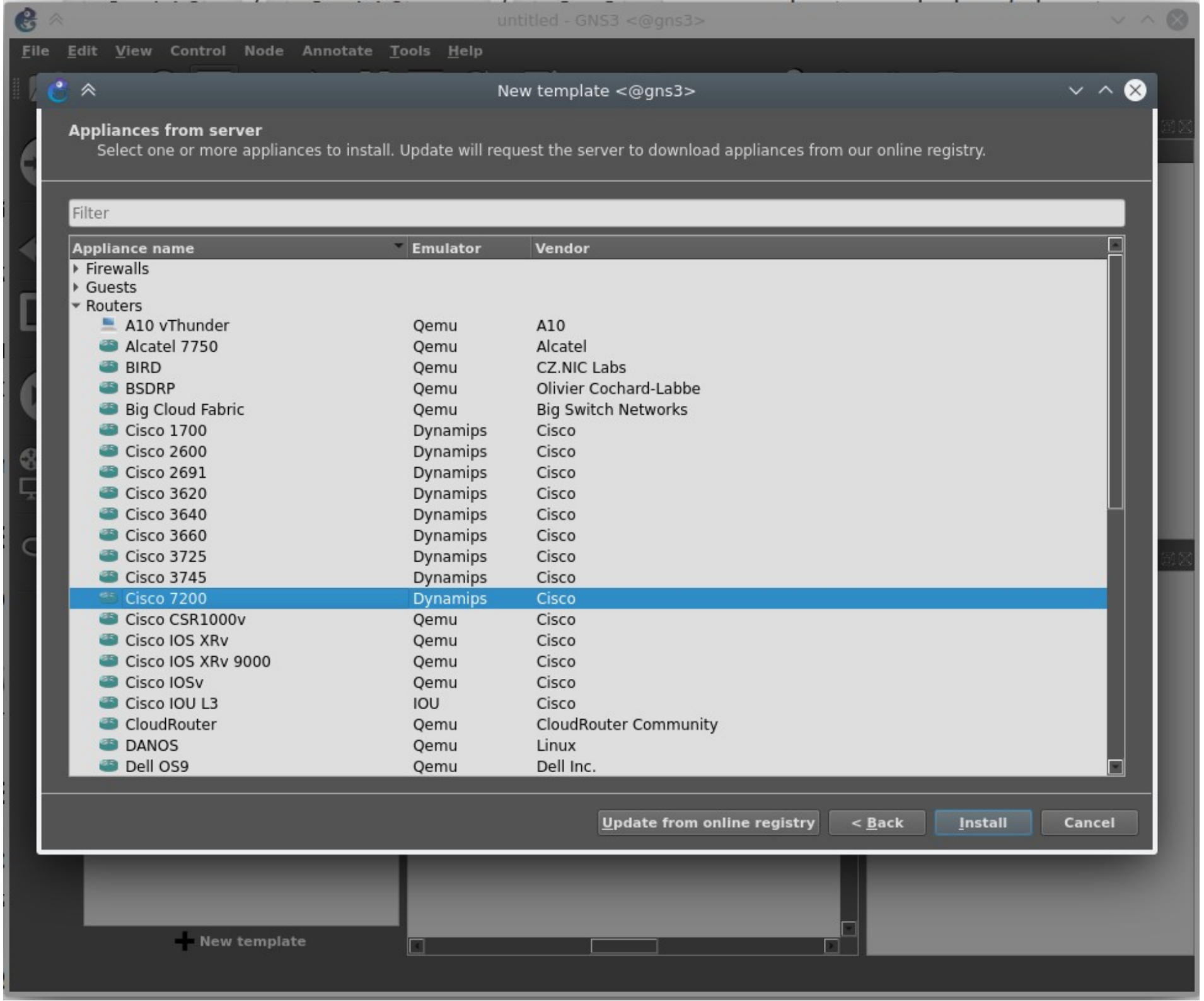
GNS3

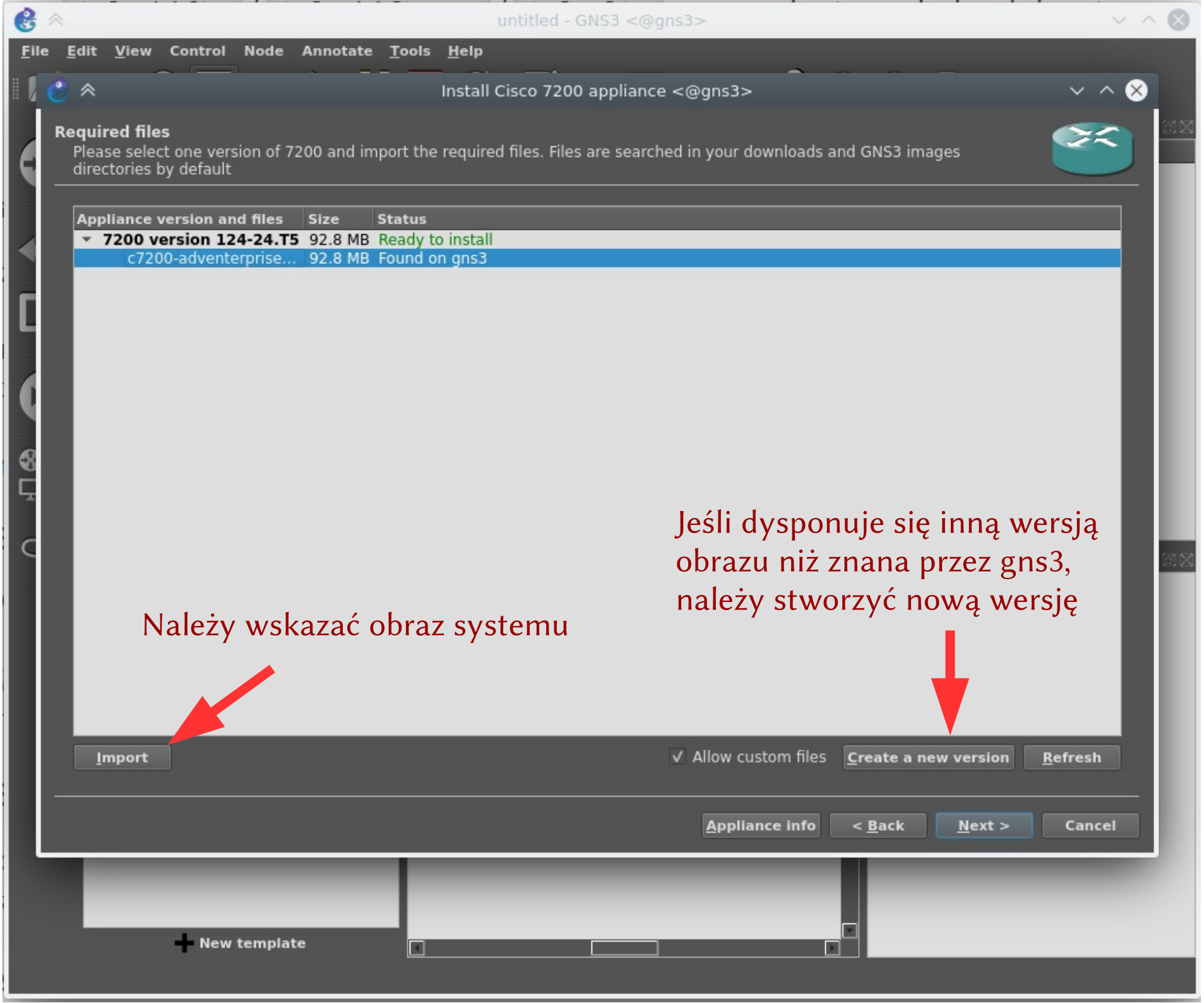
- https://www.gns3.com/
- Gotowy obraz urządzenia VirtualBoxa z GNS3 można pobrać ze strony Tadeusza Kobusa
- Darmowe oprogramowanie emulujące sieć urządzeń na bazie obrazów systemów opearcyjnych
- Może uruchamiać obrazy systemów operacyjnych pracujących na sprzęcie CISCO

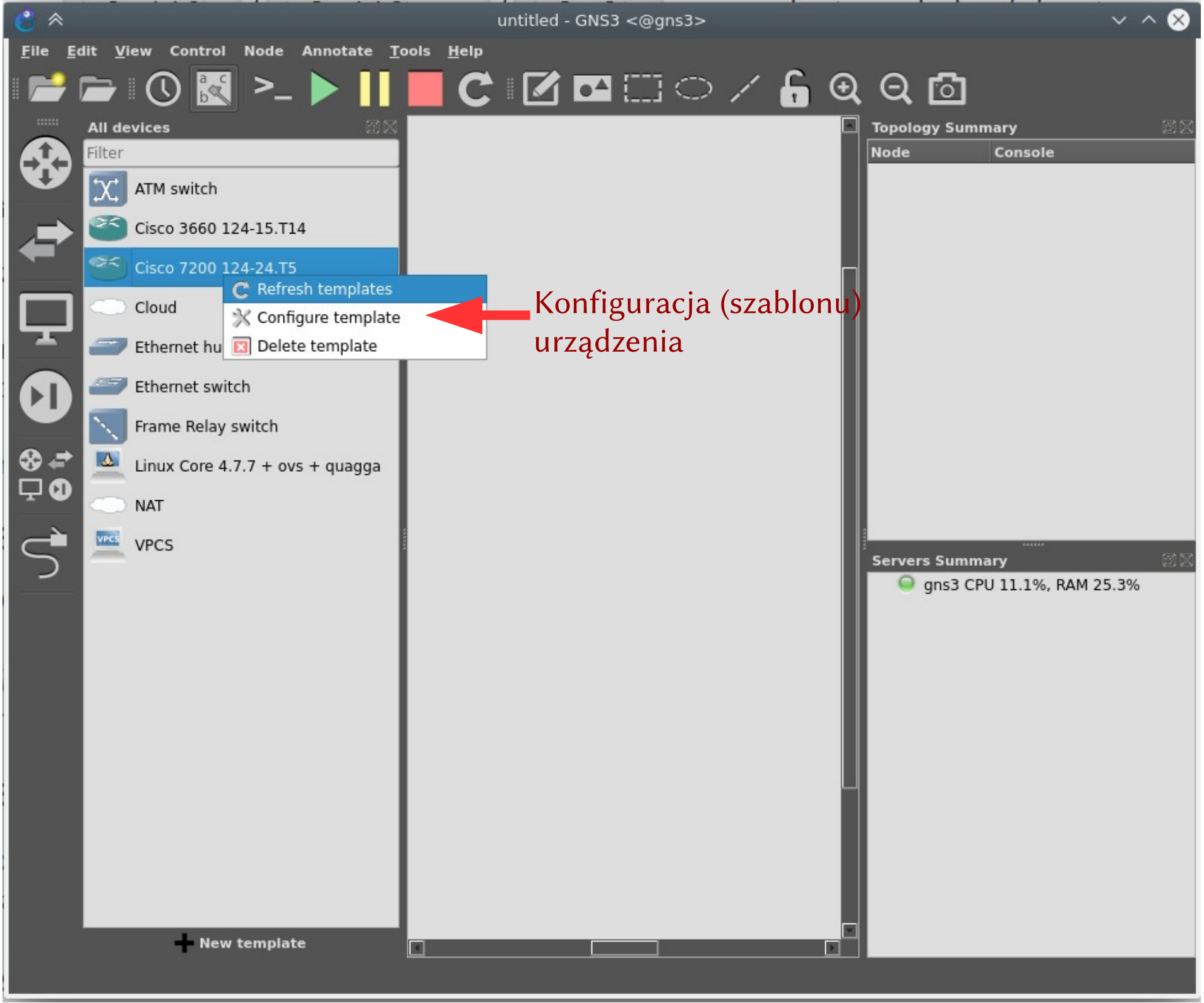

untitled - GNS3 <@gns3>
File Edit View Control Node Annotate Tools Help
Topology Summary
Node Console
Servers Summary
gns3 CPU 12.3%, RAM 25.2%
Część 1:
Jak dodawać nowe urządzenia

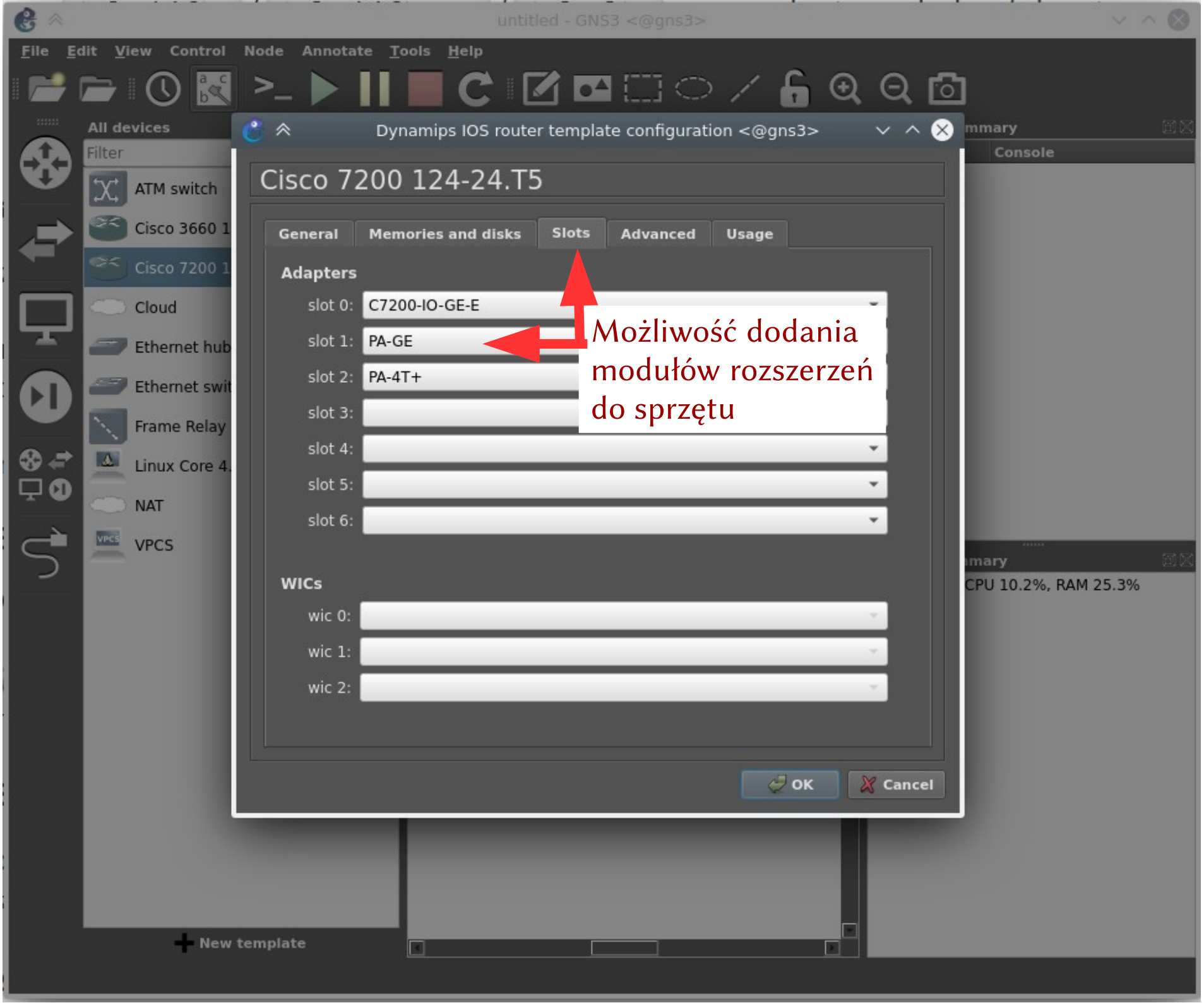

untitled - GNS3 <@gns3>
File Edit View Control Node Annotate Tools Help
All devices
Filter
ATM switch
Cisco 3660 124-15.T14
Cisco 7200 124-24.T5
Cloud
Ethernet hub
Ethernet switch
Frame Relay switch
Linux Core 4.7.7 + ovs + quagga
NAT
VPCS
New template
Topology Summary
Node
Console
Servers Summary
gns3 CPU 10.7%, RAM 25.2%

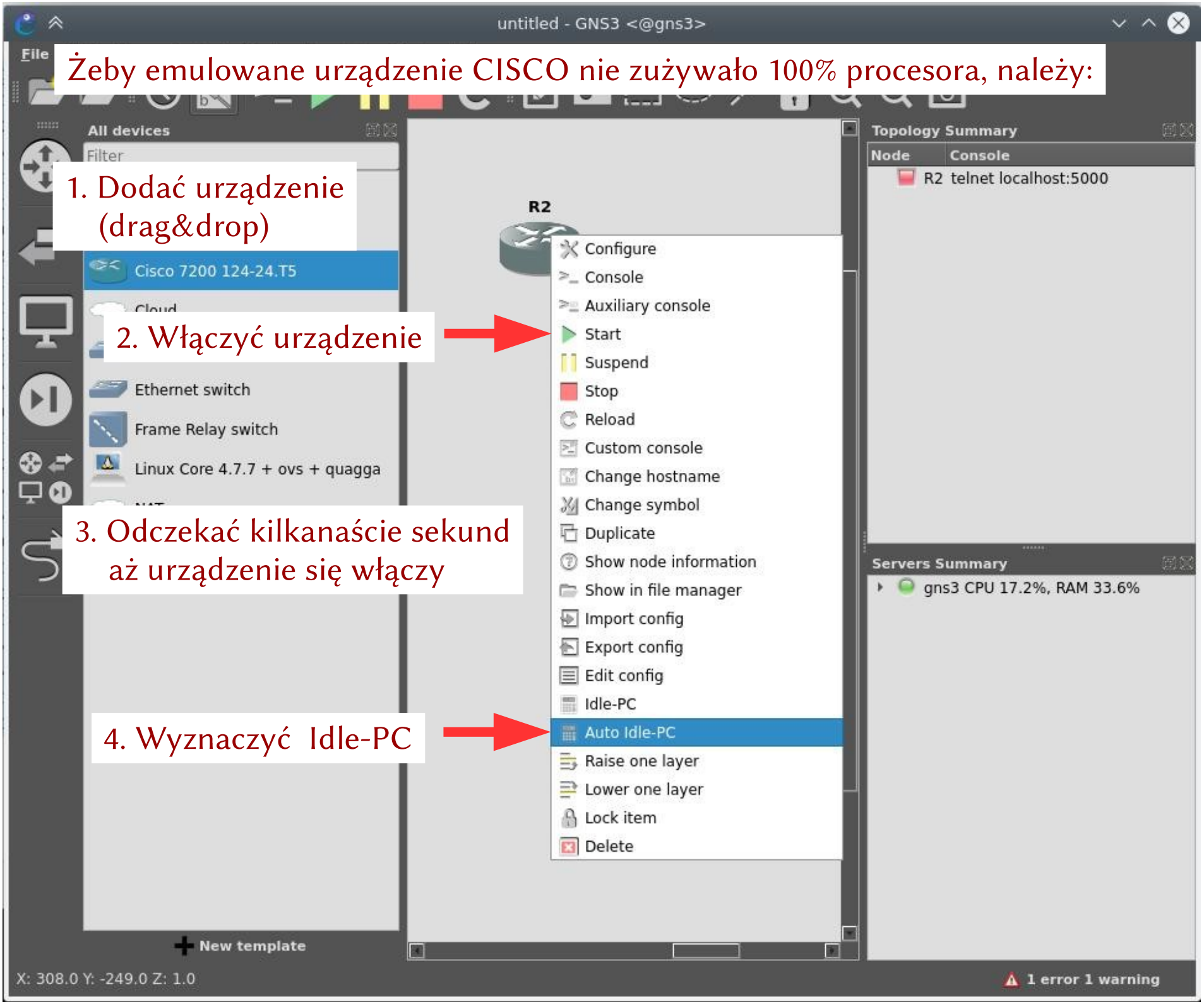

untitled - GNS3 <@gns3>
File Edit View Control Node Annotate Tools Help
New template <@gns3>
New template
Please select how you want to create a new template
Install an appliance from the GNS3 server (recommended)
Import an appliance file (.gns3a extension)
Manually create a new template
< Back
Next >
Cancel
New template

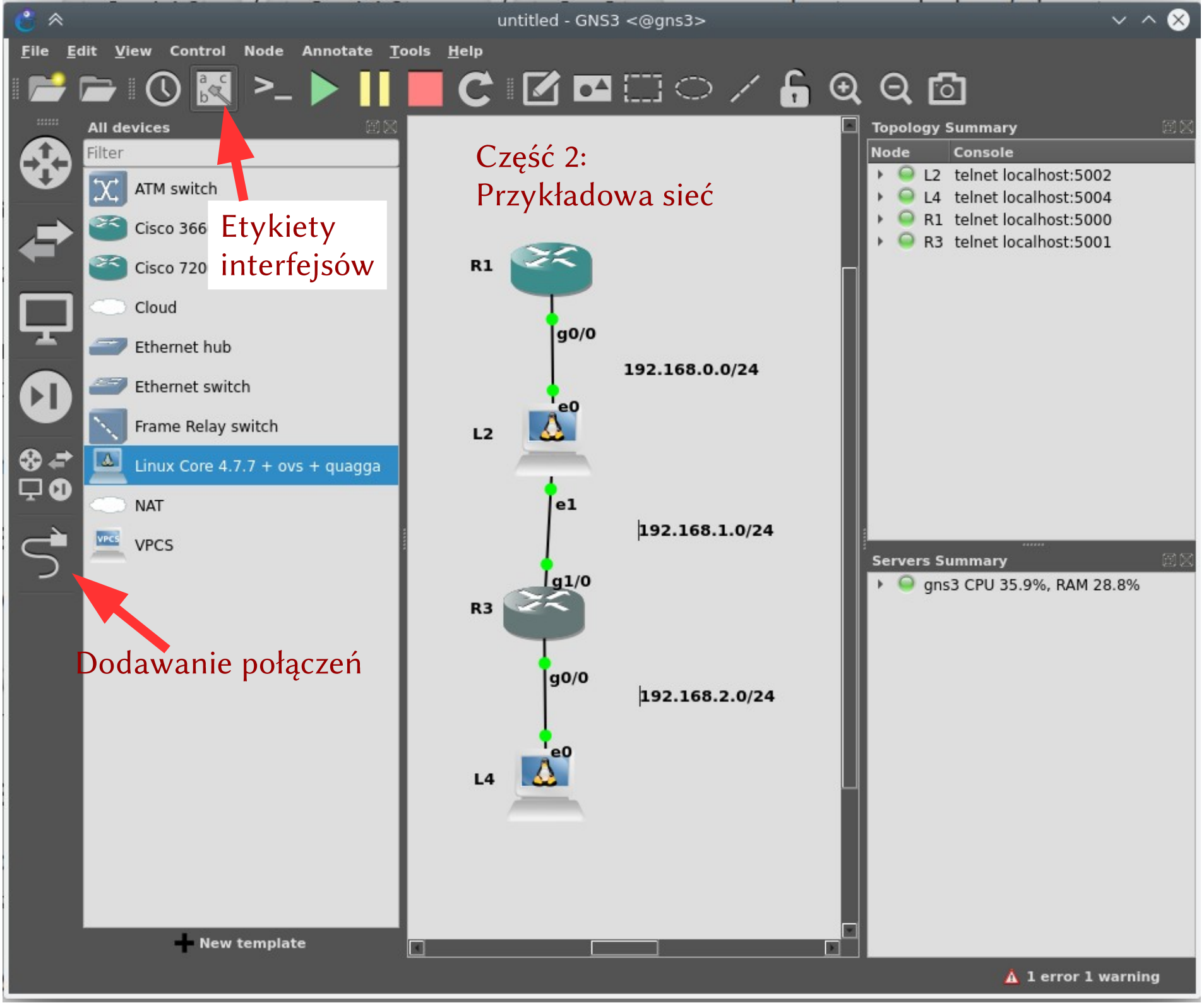

untitled - GNS3 <@gns3>
File Edit View Control Node Annotate Tools Help
New template <@gns3>
Appliances from server
Select one or more appliances to install. Update will request the server to download appliances from our online registry.
Filter
Appliance name
Emulator
Vendor
Firewalls
Guests
Routers
A10 vThunder Qemu A10
Alcatel 7750 Qemu Alcatel
BIRD Qemu CZ.NIC Labs
BSDRP Qemu Olivier Cochard-Labbe
Big Cloud Fabric Qemu Big Switch Networks
Cisco 1700 Dynamips Cisco
Cisco 2600 Dynamips Cisco
Cisco 2691 Dynamips Cisco
Cisco 3620 Dynamips Cisco
Cisco 3640 Dynamips Cisco
Cisco 3660 Dynamips Cisco
Cisco 3725 Dynamips Cisco
Cisco 3745 Dynamips Cisco
Cisco 7200 Dynamips Cisco
Cisco CSR1000v Qemu Cisco
Cisco IOS XRv Qemu Cisco
Cisco IOS XRv 9000 Qemu Cisco
Cisco IOSv Qemu Cisco
Cisco IOU L3 IOU Cisco
CloudRouter Qemu CloudRouter Community
DANOS Qemu Linux
Dell OS9 Qemu Dell Inc.
Update from online registry
< Back
Install
Cancel
New template

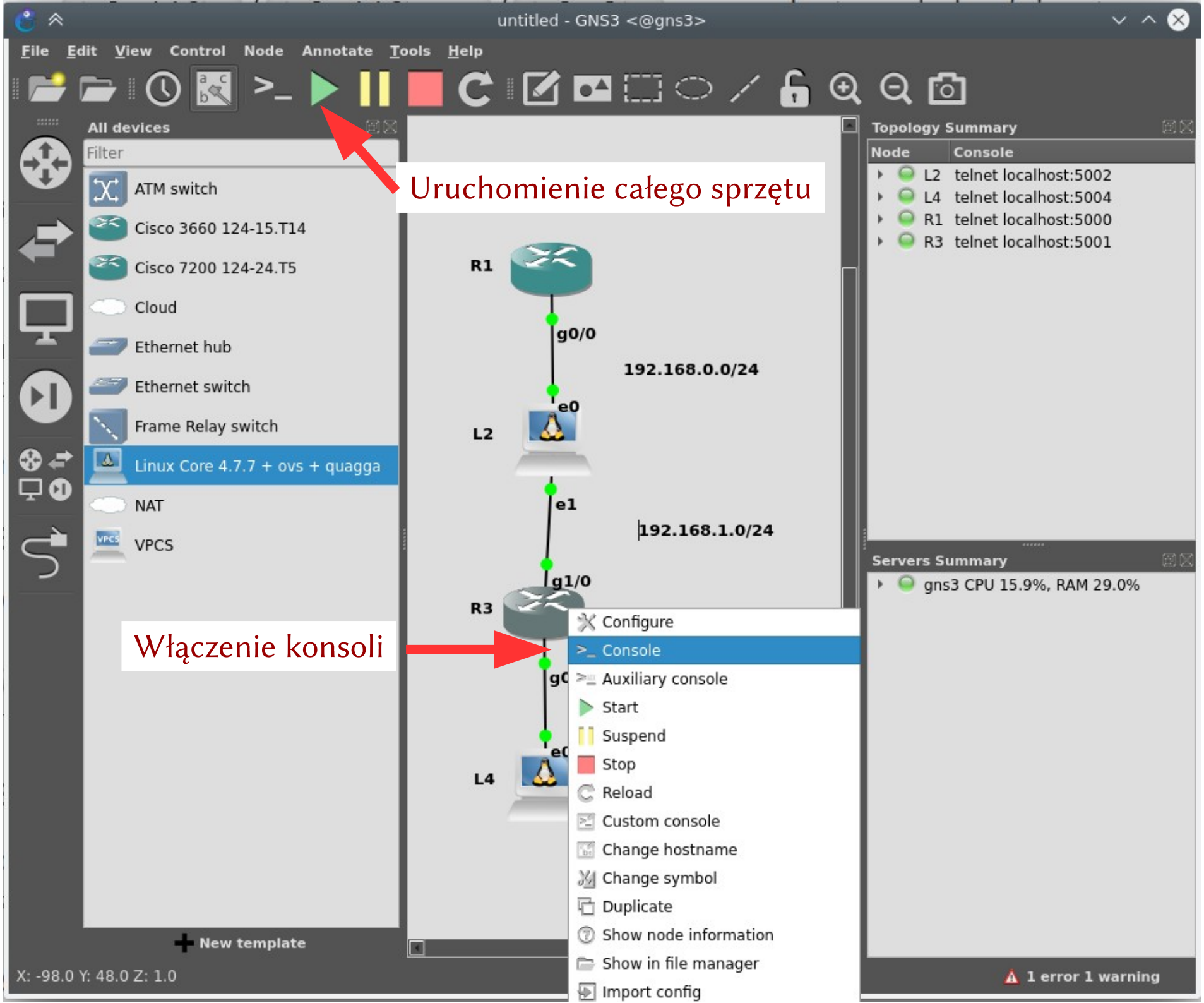

untitled - GNS3 <@gns3>
File Edit View Control Node Annotate Tools Help
Install Cisco 7200 appliance <@gns3>
Required files
Please select one version of 7200 and import the required files. Files are searched in your downloads and GNS3 images directories by default
Appliance version and files
Size
Status
7200 version 124-24.T5
92.8 MB
Ready to install
c7200-adventerprise...
92.8 MB
Found on gns3
Jeśli dysponuje się inną wersją obrazu niż znana przez gns3, należy stworzyć nową wersję
Należy wskazać obraz systemu
Import
Allow custom files
Create a new version
Refresh
Appliance info
< Back
Next >
Cancel
New template

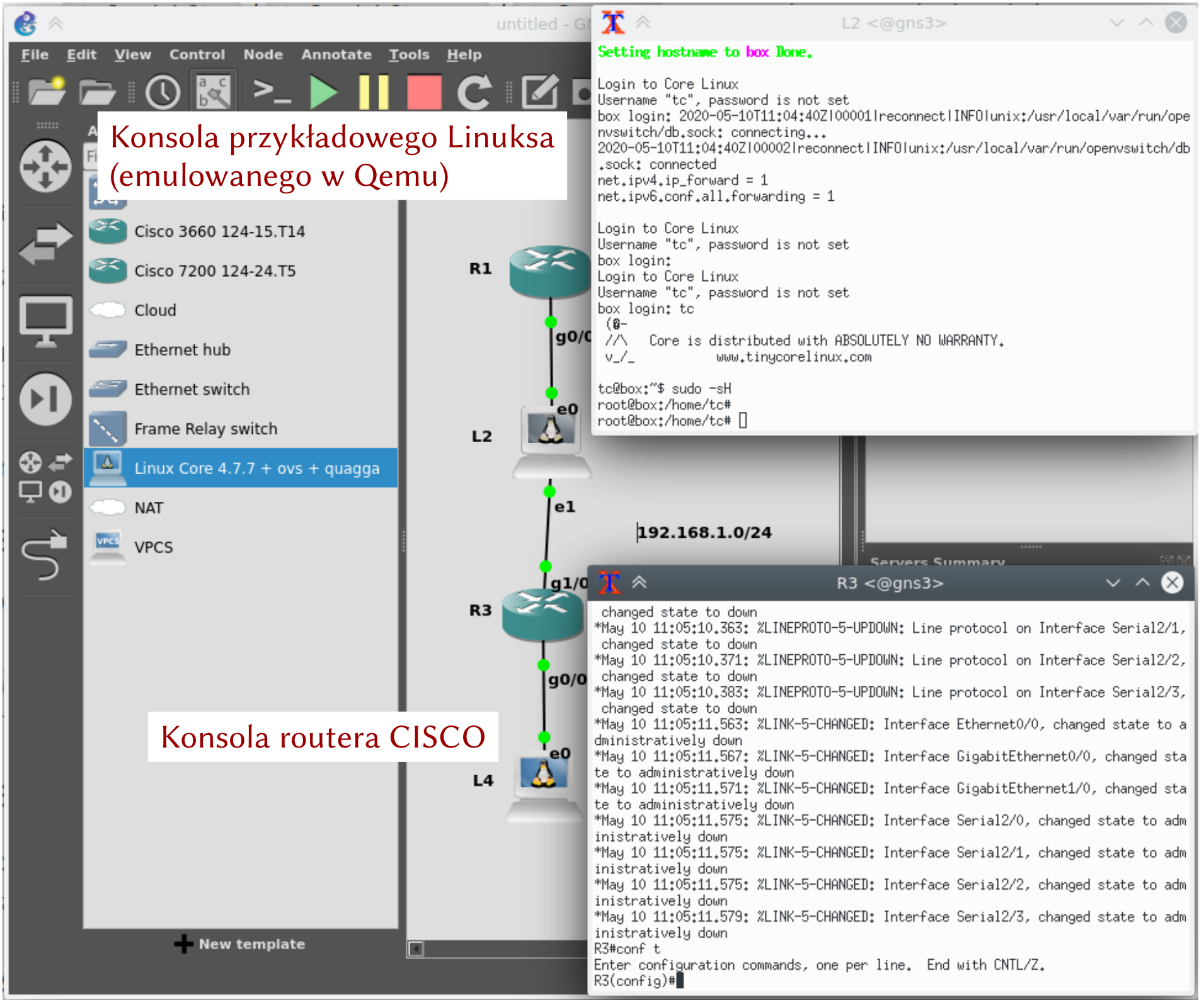

untitled - GNS3 <@gns3>
File Edit View Control Node Annotate Tools Help
All devices
Filter
ATM switch
Cisco 3660 124-15.T14
Cisco 7200 124-24.T5
Cloud
Ethernet hu
Ethernet switch
Frame Relay switch
Linux Core 4.7.7 + ovs + quagga
NAT
VPCS
New template
Refresh templates
Configure template
Delete template
Konfiguracja (szablonu) urządzenia
Topology Summary
Node
Console
Servers Summary
gns3 CPU 11.1%, RAM 25.3%

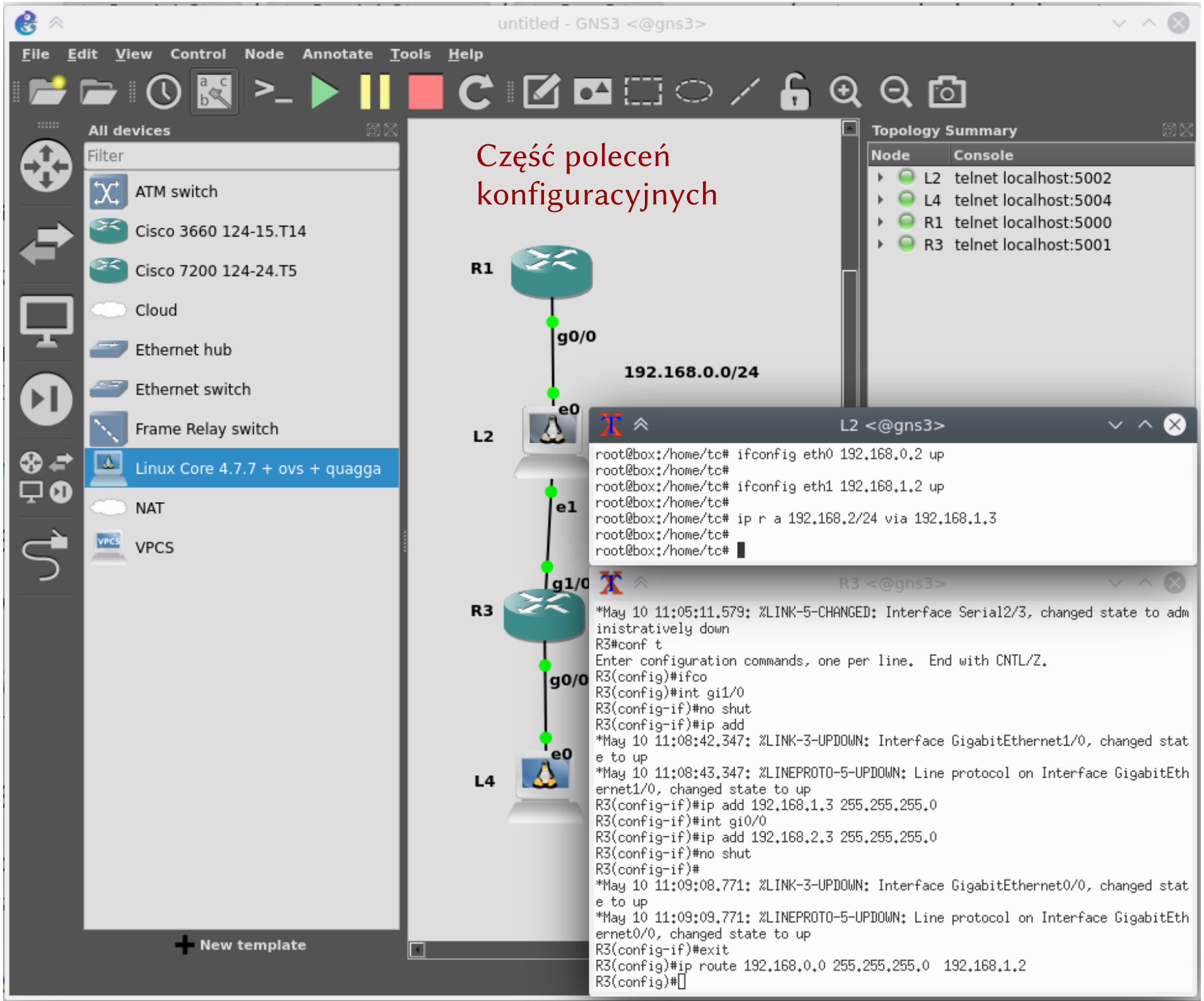

untitled - GNS3 <@gns3>
File Edit View Control Node Annotate Tools Help
All devices
Filter
ATM switch
Cisco 3660 1
Cisco 7200 1
Cloud
Ethernet hub
Ethernet swit
Frame Relay
Linux Core 4.
NAT
VPCS
New template
Dynamips IOS router template configuration <@gns3>
Cisco 7200 124-24.T5
General
Memories and disks
Slots
Advanced
Usage
Adapters
slot 0: C7200-IO-GE-E
slot 1: PA-GE
slot 2: PA-4T+
slot 3:
slot 4:
slot 5:
slot 6:
WICs
wic 0:
wic 1:
wic 2:
OK
Cancel
Możliwość dodania modułów rozszerzeń do sprzętu
Console
CPU 10.2%, RAM 25.3%

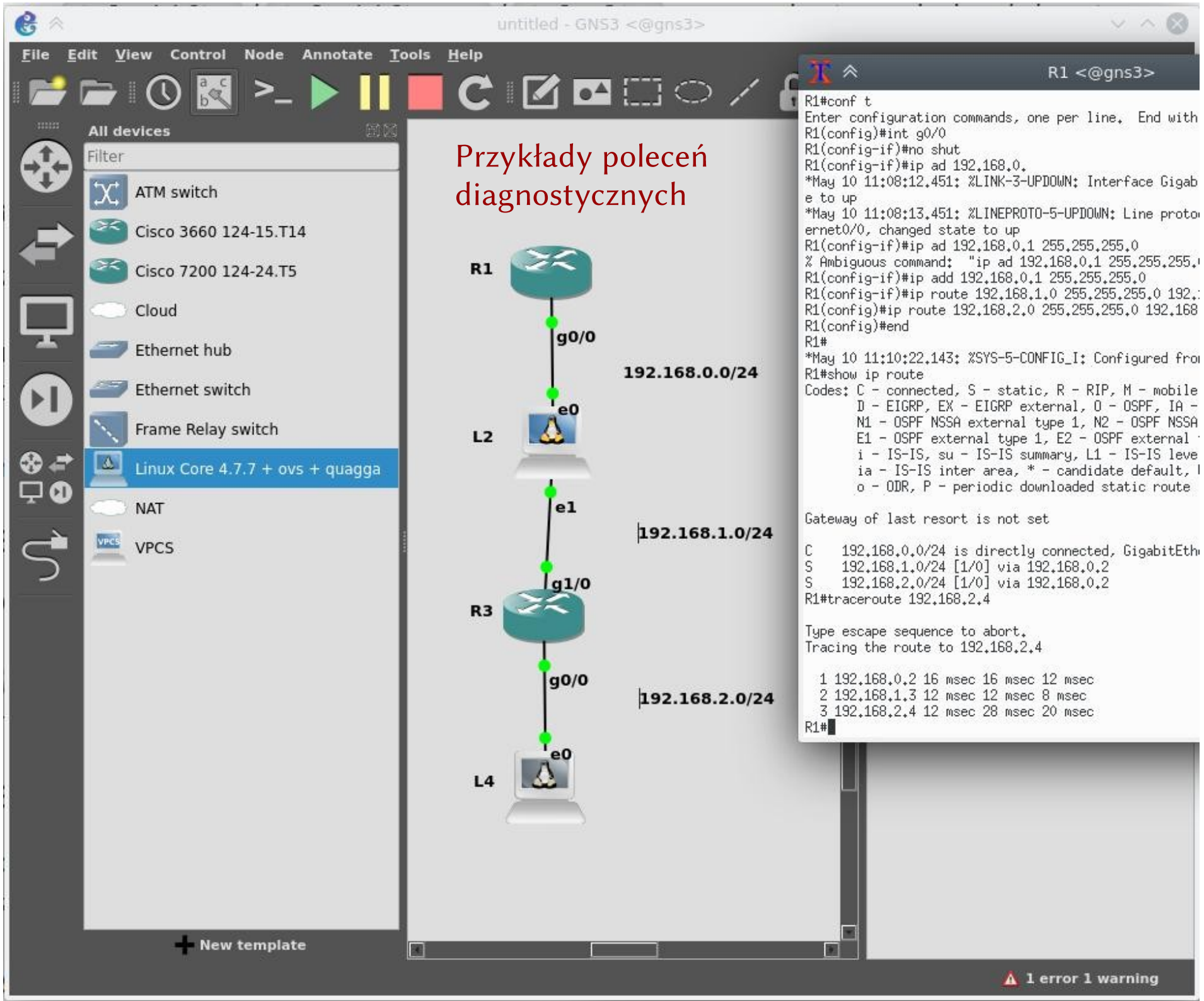

untitled - GNS3 <@gns3>
File
Żeby emulowane urządzenie CISCO nie zużywało 100% procesora, należy:
All devices
Filter
1. Dodać urządzenie (drag&drop)
Cisco 7200 124-24.T5
Cloud
2. Włączyć urządzenie
Ethernet switch
Frame Relay switch
Linux Core 4.7.7 + ovs + quagga
3. Odczekać kilkanaście sekund aż urządzenie się włączy
4. Wyznaczyć Idle-PC
New template
R2
Configure
Console
Auxiliary console
Start
Suspend
Stop
Reload
Custom console
Change hostname
Change symbol
Duplicate
Show node information
Show in file manager
Import config
Export config
Edit config
Idle-PC
Auto Idle-PC
Raise one layer
Lower one layer
Lock item
Delete
Topology Summary
Node
Console
R2 telnet localhost:5000
Servers Summary
gns3 CPU 17.2%, RAM 33.6%
X: 308.0 Y: -249.0 Z: 1.0
1 error 1 warning

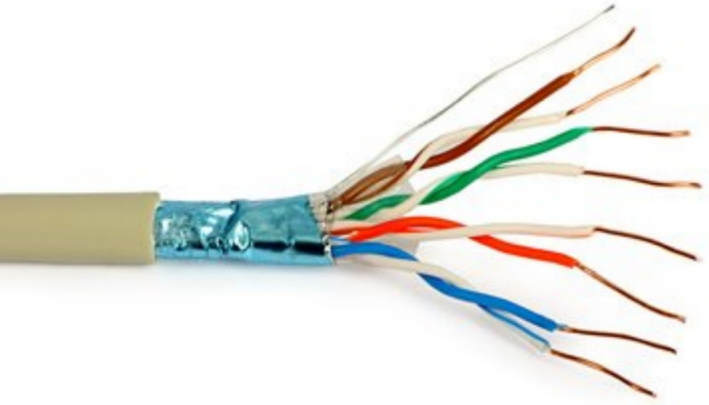

untitled - GNS3 <@gns3>
File Edit View Control Node Annotate Tools Help
All devices
Filter
ATM switch
Cisco 366
Cisco 720
Cloud
Ethernet hub
Ethernet switch
Frame Relay switch
Linux Core 4.7.7 + ovs + quagga
NAT
VPCS
New template
Etykiety interfejsów
Dodawanie połączeń
Część 2:
Przykładowa sieć
R1
g0/0
192.168.0.0/24
e0
L2
e1
192.168.1.0/24
g1/0
R3
g0/0
192.168.2.0/24
e0
L4
Topology Summary
Node
Console
L2 telnet localhost:5002
L4 telnet localhost:5004
R1 telnet localhost:5000
R3 telnet localhost:5001
Servers Summary
gns3 CPU 35.9%, RAM 28.8%
1 error 1 warning


untitled - GNS3 <@gns3>
File Edit View Control Node Annotate Tools Help
All devices
Filter
ATM switch
Cisco 3660 124-15.T14
Cisco 7200 124-24.T5
Cloud
Ethernet hub
Ethernet switch
Frame Relay switch
Linux Core 4.7.7 + ovs + quagga
NAT
VPCS
New template
Uruchomienie całego sprzętu
Włączenie konsoli
R1
g0/0
192.168.0.0/24
e0
L2
e1
192.168.1.0/24
g1/0
R3
L4
Configure
Console
Auxiliary console
Start
Suspend
Stop
Reload
Custom console
Change hostname
Change symbol
Duplicate
Show node information
Show in file manager
Import config
Topology Summary
Node Console
L2 telnet localhost:5002
L4 telnet localhost:5004
R1 telnet localhost:5000
R3 telnet localhost:5001
Servers Summary
gns3 CPU 15.9%, RAM 29.0%
1 error 1 warning
X: -98.0 Y: 48.0 Z: 1.0


Konsola przykładowego Linuksa (emulowanego w Qemu)
File Edit View Control Node Annotate Tools Help
Cisco 3660 124-15.T14
Cisco 7200 124-24.T5
Cloud
Ethernet hub
Ethernet switch
Frame Relay switch
Linux Core 4.7.7 + ovs + quagga
NAT
VPCS
New template
R1
L2
R3
L4
e0
e1
g0/0
g1/0
192.168.1.0/24
L2 <@gns3>
Setting hostname to box Done.
Login to Core Linux
Username "tc", password is not set
box login: 2020-05-10T11:04:40Z|00001|reconnect|INFO|unix:/usr/local/var/run/openvswitch/db.sock: connecting...
2020-05-10T11:04:40Z|00002|reconnect|INFO|unix:/usr/local/var/run/openvswitch/db.sock: connected
net.ipv4.ip_forward = 1
net.ipv6.conf.all.forwarding = 1
Login to Core Linux
Username "tc", password is not set
box login:
Login to Core Linux
Username "tc", password is not set
box login: tc
(@-
//\ Core is distributed with ABSOLUTELY NO WARRANTY.
v_/_ www.tinycorelinux.com
tc@box:~$ sudo -sH
root@box:/home/tc#
root@box:/home/tc#
R3 <@gns3>
changed state to down
*May 10 11:05:10.363: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/1, changed state to down
*May 10 11:05:10.371: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/2, changed state to down
*May 10 11:05:10.383: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/3, changed state to down
*May 10 11:05:11.563: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to administratively down
*May 10 11:05:11.567: %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to administratively down
*May 10 11:05:11.571: %LINK-5-CHANGED: Interface GigabitEthernet1/0, changed state to administratively down
*May 10 11:05:11.575: %LINK-5-CHANGED: Interface Serial2/0, changed state to administratively down
*May 10 11:05:11.575: %LINK-5-CHANGED: Interface Serial2/1, changed state to administratively down
*May 10 11:05:11.575: %LINK-5-CHANGED: Interface Serial2/2, changed state to administratively down
*May 10 11:05:11.579: %LINK-5-CHANGED: Interface Serial2/3, changed state to administratively down
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#
Konsola routera CISCO


untitled - GNS3 <@gns3>
File Edit View Control Node Annotate Tools Help
All devices
Filter
ATM switch
Cisco 3660 124-15.T14
Cisco 7200 124-24.T5
Cloud
Ethernet hub
Ethernet switch
Frame Relay switch
Linux Core 4.7.7 + ovs + quagga
NAT
VPCS
New template
Część poleceń konfiguracyjnych
R1
g0/0
192.168.0.0/24
e0
L2
e1
g1/0
R3
g0/0
e0
L4
Topology Summary
Node Console
L2 telnet localhost:5002
L4 telnet localhost:5004
R1 telnet localhost:5000
R3 telnet localhost:5001
L2 <@gns3>
root@box:/home/tc# ifconfig eth0 192.168.0.2 up
root@box:/home/tc#
root@box:/home/tc# ifconfig eth1 192.168.1.2 up
root@box:/home/tc#
root@box:/home/tc# ip r a 192.168.2/24 via 192.168.1.3
root@box:/home/tc#
root@box:/home/tc#
R3 <@gns3>
*May 10 11:05:11.579: %LINK-5-CHANGED: Interface Serial2/3, changed state to administratively down
R3#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R3(config)#ifco
R3(config)#int gi1/0
R3(config-if)#no shut
R3(config-if)#ip add
*May 10 11:08:42.347: %LINK-3-UPDOWN: Interface GigabitEthernet1/0, changed state to up
*May 10 11:08:43.347: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0, changed state to up
R3(config-if)#ip add 192.168.1.3 255.255.255.0
R3(config-if)#int gi0/0
R3(config-if)#ip add 192.168.2.3 255.255.255.0
R3(config-if)#no shut
R3(config-if)#
*May 10 11:09:08.771: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to up
*May 10 11:09:09.771: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, changed state to up
R3(config-if)#exit
R3(config)#ip route 192.168.0.0 255.255.255.0 192.168.1.2
R3(config)#


untitled - GNS3 <@gns3>
File Edit View Control Node Annotate Tools Help
All devices
Filter
ATM switch
Cisco 3660 124-15.T14
Cisco 7200 124-24.T5
Cloud
Ethernet hub
Ethernet switch
Frame Relay switch
Linux Core 4.7.7 + ovs + quagga
NAT
VPCS
New template
Przykłady poleceń diagnostycznych
R1
g0/0
192.168.0.0/24
e0
L2
e1
192.168.1.0/24
g1/0
R3
g0/0
192.168.2.0/24
e0
L4
R1 <@gns3>
R1#conf t
Enter configuration commands, one per line. End with
R1(config)#int g0/0
R1(config-if)#no shut
R1(config-if)#ip ad 192.168.0.
*May 10 11:08:12.451: %LINK-3-UPDOWN: Interface Gigab
e to up
*May 10 11:08:13.451: %LINEPROTO-5-UPDOWN: Line proto
ernet0/0, changed state to up
R1(config-if)#ip ad 192.168.0.1 255.255.255.0
% Ambiguous command: "ip ad 192.168.0.1 255.255.255.
R1(config-if)#ip add 192.168.0.1 255.255.255.0
R1(config-if)#ip route 192.168.1.0 255.255.255.0 192.
R1(config)#ip route 192.168.2.0 255.255.255.0 192.168
R1(config)#end
R1#
*May 10 11:10:22.143: %SYS-5-CONFIG_I: Configured fro
R1#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile
D - EIGRP, EX - EIGRP external, O - OSPF, IA -
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA
E1 - OSPF external type 1, E2 - OSPF external
i - IS-IS, su - IS-IS summary, L1 - IS-IS leve
ia - IS-IS inter area, * - candidate default,
o - ODR, P - periodic downloaded static route
Gateway of last resort is not set
C 192.168.0.0/24 is directly connected, GigabitEth
S 192.168.1.0/24 [1/0] via 192.168.0.2
S 192.168.2.0/24 [1/0] via 192.168.0.2
R1#traceroute 192.168.2.4
Type escape sequence to abort.
Tracing the route to 192.168.2.4
1 192.168.0.2 16 msec 16 msec 12 msec
2 192.168.1.3 12 msec 12 msec 8 msec
3 192.168.2.4 12 msec 28 msec 20 msec
R1#
1 error 1 warning



Koniec