Retele de calculatoare

Fie reteaua cu specificatiile:

Praga1 = 7U, Praga2 = 31U, Paris = 6U, Porto1 = 63U, Porto2 = 15U

IP-urile sunt urmatoarele:

Host	Range Address	HOST	Subnet Mask	Nr. maxim utilizatori (pt. DHCP)
Praga1	192.168.100.225 – 192.168.100.238	192.168.100.230	255.255.255.240	$7U + 2 < 2^4 = 16$; $16 - 10 =$ **6U**
Praga2	192.168.100.129 – 192.168.100.190	192.168.100.140	255.255.255.192	$31U + 2 < 2^6 = 64$; $64 - 10 =$ **54U**
Paris	192.168.100.241 – 192.168.100.246	192.168.100.246	255.255.255.248	Nu ne intereseaza la server
Porto1	192.168.100.1 – 192.168.100.126	192.168.100.10	255.255.255.128	$63 + 2 < 2^7 = 128$; $128 - 10 =$ **118U**
Porto2	192.168.100.193 – 192.168.100.222	192.168.100.200	255.255.255.224	$15 + 2 < 2^5 = 32$; $32 - 10 =$ **22U**
LAN 2.1	192.168.100.249 – 192.168.100.250	---	255.255.255.252	---
LAN 2.2	192.168.100.253 – 192.168.100.254	---	255.255.255.252	---

Configuram prima portiune de retea: C1PRAGA – SW1PRAGA – PRAGA

Obs: cand se configureaza PRAGA, trebuie configurate toate interfetele posibile din acest Router, astfel:

- Gigabitethernet 0/0: legatura cu SW1PRAGA;
- Gigabitethernet 0/1: legatura cu SW2PRAGA;
- Serial 0/0/0: legatura cu PARIS.

In plus, trebuie precizate routarile. De exemplu, serverul PRAGA va avea de invatat:

- Subreteaua corespunzatoare SERVER-ului;
- Subreteaua corespunzatoare legaturii PARIS – PORTO;
- Subreteaua corespunzatoare lui PORTO1;
- Subreteaua corespunzatoare lui PORTO2.

utilizand sintaxa: **`ip route N.A. S.M. PORT`**, unde N.A. := network address-ul subretelei in care ajungem, S.M. := subnet mask-ul subretelei in care ajungem, PORT := portul de pe care ajungem.

Obs: fiecare dintre cele 4 routere isi configureaza cate 4 subretele:

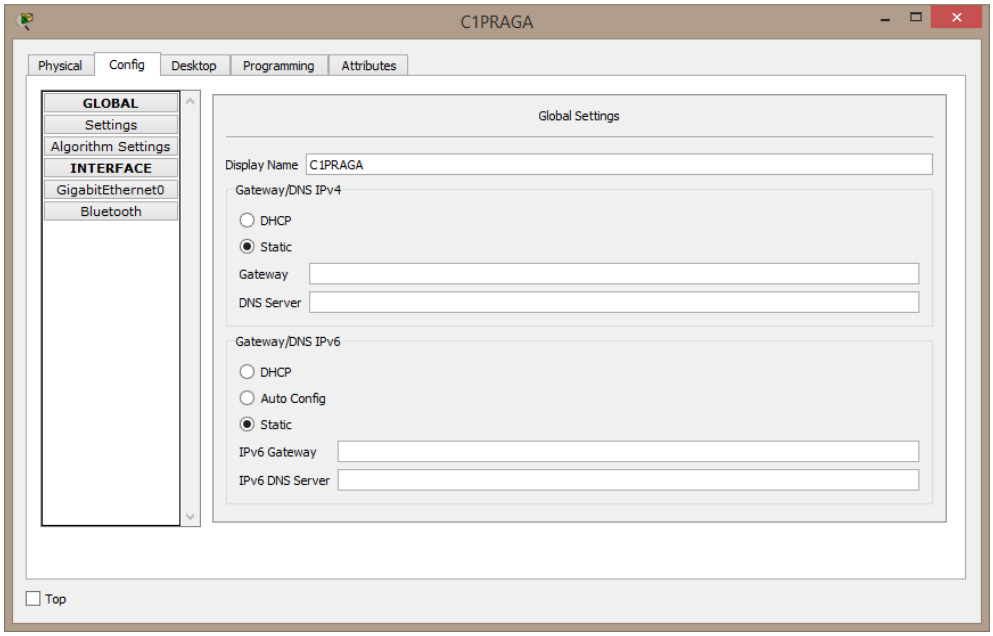
PRAGA configureaza: SERVER, PARIS – PORTO, PORTO1, PORTO2

PARIS configureaza: PRAGA1, PRAGA2, PORTO1, PORTO2

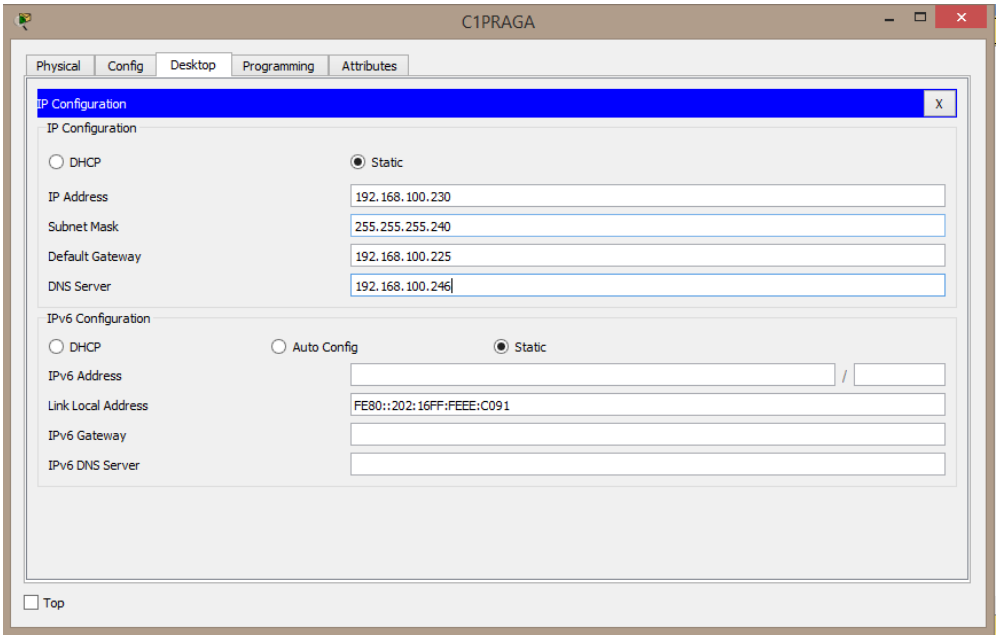
PORTO configureaza: SERVER, PARIS – PRAGA, PRAGA1, PRAGA2

Crearea retelei:

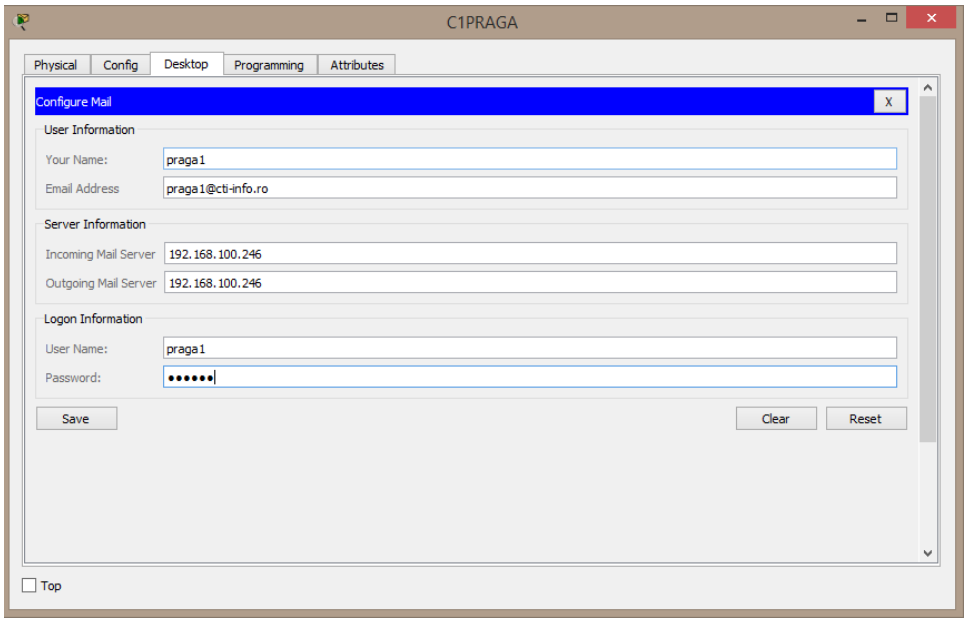
Adaugam un HOST, ii schimbam numele de la Config in C1PRAGA



apoi mergem la Physical, oprim calculatorul, schimbam placa de retea in CGE, repornim, configuram IP-urile specifice PRAGA1:



iar apoi configuram si mail-ul, punand ca username: praga1, mail: praga1@cti-info.ro, parola standard 123456, iar incoming si outgoing server vor fi tocmai DNS-ul, adica 192.168.100.246.



In cele ce urmeaza, voi schematiza tot procedeul scriind

HOST (HOSTNAME, ip, name, email, username, password)

pentru ca toate celelalte informatii se gasesc din tabelul de la inceput (subnet mask-ul e explicit, iar default gateway-ul e cel mai mic IP din range). De exemplu, pentru host-ul abia adaugat, scriu

HOST (C1PRAGA, 192.168.100.230, praga1, praga1@cti-info.ro, praga1, 123456)

Adaugam switch-ul (2960) SW1PRAGA, un laptop, si legam laptopul (RS232) de SW1PRAGA (Console). Intram in laptop -> terminal -> OK dreapta jos -> Enter si scriem setarea standard:

```
Switch>enable
Switch#configure terminal
Switch(config)#no ip domain lookup
Switch(config)#hostname SW1PRAGA
SW1PRAGA(config)#enable secret cisco12345
SW1PRAGA(config)#enable password cisco54321
SW1PRAGA(config)#service password-encryption
SW1PRAGA(config)#banner motd “Vineri la ora 14:00 mentenanta”
SW1PRAGA(config)#line console 0
SW1PRAGA(config-line)#password ciscoconpass
SW1PRAGA(config-line)#login
SW1PRAGA(config-line)#logging synchronous
SW1PRAGA(config-line)#exec-timeout 15 10
SW1PRAGA(config-line)#exit
SW1PRAGA(config)#line vty 0 15
SW1PRAGA(config-line)#password ciscovtypass
SW1PRAGA(config-line)#login
SW1PRAGA(config-line)#logging synchronous
SW1PRAGA(config-line)#exec-timeout 10 10
```

```
SW1PRAGA(config-line)#exit
SW1PRAGA(config)#exit
SW1PRAGA#copy running-config startup-config
Destination filename [startup-config]?

SW1PRAGA#clock set 11:09:00 5 MAY 2018
SW1PRAGA#configure terminal
SW1PRAGA(config)#ip domain name cti-info.ro
SW1PRAGA(config)#username admin privilege 15 secret adminpass1
SW1PRAGA(config)#line vty 0 15
SW1PRAGA(config-line)#transport input ssh
SW1PRAGA(config-line)#login local
SW1PRAGA(config-line)#exit
SW1PRAGA(config)#crypto key generate rsa
The name for the keys will be: SW1PRAGA.cti-info.ro
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.
How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable…[OK]

SW1PRAGA(config)#exit
SW1PRAGA#copy running-config startup-config
Destination filename [startup-config]?

SW1PRAGA#configure terminal
SW1PRAGA(config)#interface vlan 1
SW1PRAGA(config-if)#description “Legatura cu C1PRAGA”
SW1PRAGA(config-if)#ip address 192.168.100.226 255.255.255.240
SW1PRAGA(config-if)#no shutdown
%LINK-5-CHANGED: Interface Vlan1, changed state to up

SW1PRAGA(config-if)#exit
SW1PRAGA(config)#exit
SW1PRAGA#copy running-config startup-config
Destination filename [startup-config]?
```

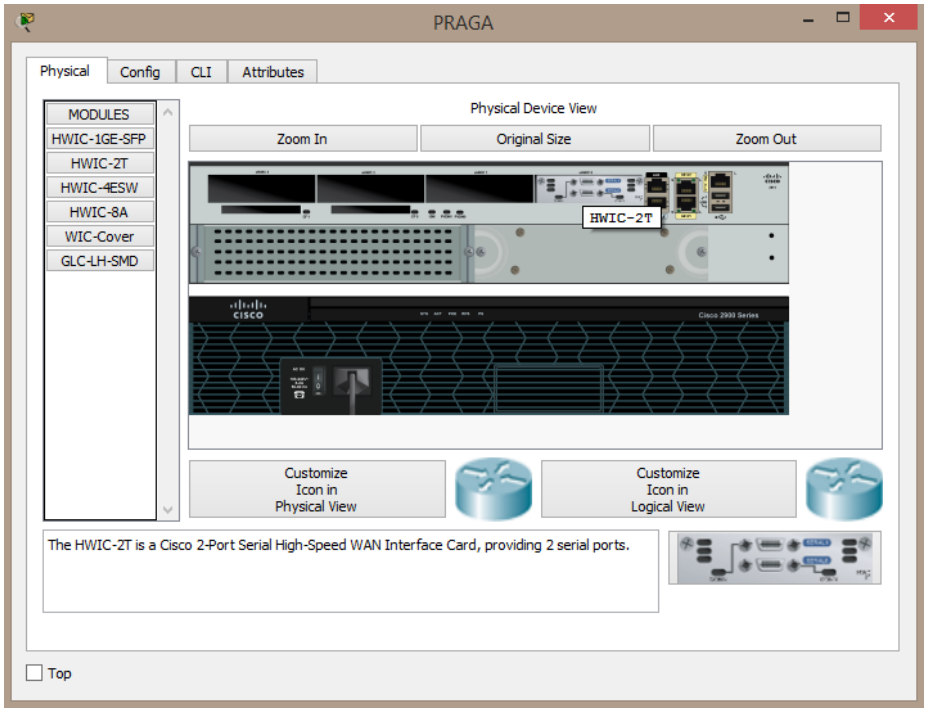
Obs: tot ce se schimba la setarea standard de switch este partea de la interface vlan 1, cand se pun IP-urile, asa ca, de acum, voi specifica operatie de configurare doar prin

SWITCH (SWNAME, legatura, ip, sm)

De exemplu, acum as fi scris:

SWITCH (SW1PRAGA, “Legatura cu C1PRAGA”, 192.168.100.226, 255.255.255.240)

Adaugam acum un Router 2911, ii schimbam numele e la Config in PRAGA, apoi intram la Physical, il inchidem, adaugam modulul HWIC-2T pe al 4-lea slot liber, repornim si conectam prin Console laptopul la Router-ul PRAGA:



Intram din nou pe laptop -> Desktop -> Terminal -> OK dreapta jos, raspundem cu “no” la prima intrebare, apoi configuram standard:

```
Router>enable
Router#configure terminal
Router(config)#no ip domain lookup
Router(config)#hostname PRAGA
PRAGA(config)#enable secret cisco12345
PRAGA(config)#enable password cisco54321
PRAGA(config)#service password-encryption
PRAGA(config)#security password min-length 10
PRAGA(config)#login block-for 120 attempts 3 within 30
PRAGA(config)#banner login "Accesul persoanelor neautorizate interzis"
PRAGA(config)#banner motd "Vineri la ora 14:00 mentenanta"
PRAGA(config)#line console 0
PRAGA(config-line)#password ciscoconpass
PRAGA(config-line)#login
PRAGA(config-line)#logging synchronous
PRAGA(config-line)#exec-timeout 15 10
PRAGA(config-line)#exit
PRAGA(config)#line vty 0 15
PRAGA(config-line)#password ciscovtypass
PRAGA(config-line)#login
```

```
PRAGA(config-line)#logging synchronous
PRAGA(config-line)#exec-timeout 10 10
PRAGA(config-line)#exit
PRAGA(config)#exit
PRAGA#copy running-config startup-config
Destination filename [startup-config]?

PRAGA#clock set 11:21:00 5 MAY 2018
PRAGA#configure terminal
PRAGA(config)#ip domain name cti-info.ro
PRAGA(config)#username admin privilege 15 secret adminpass1
PRAGA(config)#line vty 0 15
PRAGA(config-line)#transport input ssh
PRAGA(config-line)#login local
PRAGA(config-line)#exit
PRAGA(config)#crypto key generate rsa
The name for the keys will be: PRAGA.cti-info.ro
Choose the size of the key modulus in the range of 360 to 2048 for your
General Purpose Keys. Choosing a key modulus greater than 512 may take
a few minutes.

How many bits in the modulus [512]: 1024
% Generating 1024 bit RSA keys, keys will be non-exportable...[OK]

PRAGA(config)#exit
PRAGA#copy running-config startup-config
Destination filename [startup-config]?

PRAGA#configure terminal
PRAGA(config)#interface gigabitethernet 0/0
PRAGA(config-if)#description "Legatura cu SW1PRAGA"
PRAGA(config-if)#ip address 192.168.100.225 255.255.255.240
PRAGA(config-if)#ip helper-address 192.168.100.246
PRAGA(config-if)#no shutdown
PRAGA(config-if)#exit

PRAGA(config)#interface gigabitethernet 0/1
PRAGA(config-if)#description "Legatura cu SW2PRAGA"
PRAGA(config-if)#ip address 192.168.100.129 255.255.255.192
PRAGA(config-if)#ip helper-address 192.168.100.246
PRAGA(config-if)#no shutdown
PRAGA(config-if)#exit

PRAGA(config)#interface serial 0/0/0
PRAGA(config-if)#description "Legatura cu PARIS"
PRAGA(config-if)#ip address 192.168.100.249 255.255.255.252
```

```
PRAGA(config-if)#ip helper-address 192.168.100.246
PRAGA(config-if)#no shutdown
PRAGA(config-if)#exit

PRAGA(config)#ip route 192.168.100.240 255.255.255.248 serial0/0/0
PRAGA(config)#ip route 192.168.100.252 255.255.255.252 serial0/0/0
PRAGA(config)#ip route 192.168.100.0 255.255.255.128 serial0/0/0
PRAGA(config)#ip route 192.168.100.192 255.255.255.224 serial0/0/0
PRAGA(config)#exit

PRAGA#copy running-config startup-config
Destination filename [startup-config]?
```

Din nou, setarile pe Router sunt standard, asa ca este suficient sa precizez numai ce se modifica, si anume:

- Interfetele configurate, descrierea si ip-urile pe care se leaga,
- Routarile, cu forma network address, subnet mask, port.

Am adaugat pe fiecare interfata din router si linia `ip helper-address DNS`, utila in configurarea DHCP-ului. Astfel, vom avea:

ROUTER (RTNAME, interfata1 (descriere1, ip1, sm1), interfata2 (descriere2, ip2, sm2) …, interfata_n(descriere_n, ip_n, sm_n) ip_route(na1, sm1, port1), …, ip_route(na_m, sm_m, port_m))

De exemplu, pentru router-ul de mai sus, as fi scris:

ROUTER (

PRAGA,

gigabitethernet0/0 (“Legatura cu SW1PRAGA”, 192.168.100.225, 255.255.255.240),

gigabitethernet0/1 (“Legatura cu SW2PRAGA”, 192.168.100.129, 255.255.255.192),

serial0/0/0 (“Legatura cu PARIS”, 192.168.100.249, 255.255.255.252),

ip_route (192.168.100.240, 255.255.255.248, serial0/0/0),

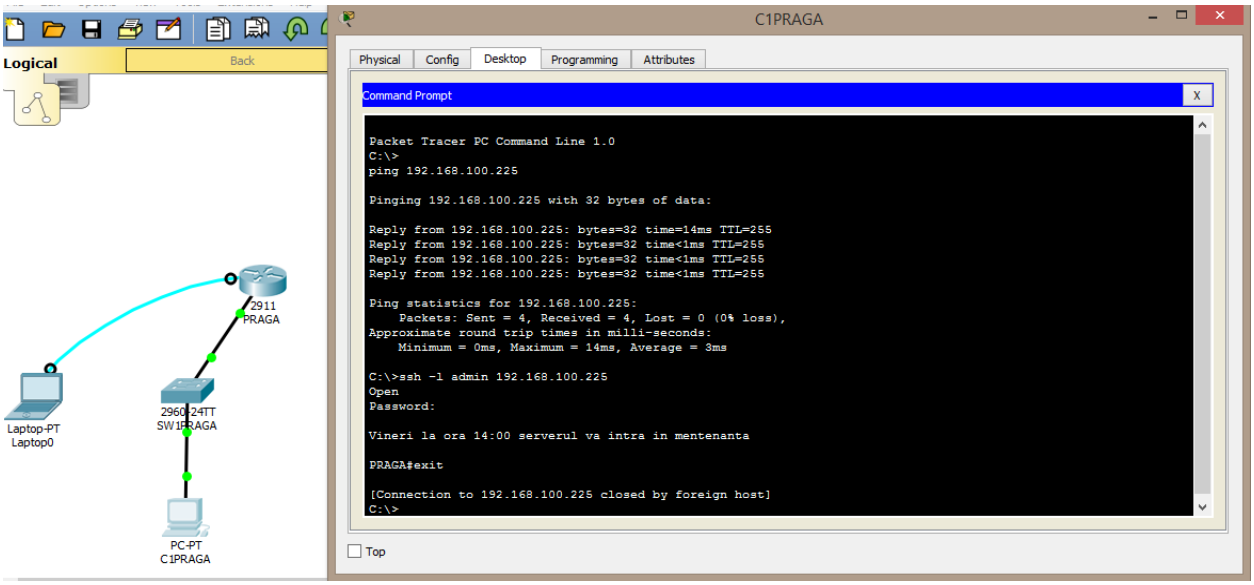
ip_route (192.168.100.252, 255.255.255.252, serial0/0/0),

ip_route (192.168.100.0, 255.255.255.128, serial0/0/0),

ip_route (192.168.100.192, 255.255.255.224, serial0/0/0)

)

Acum, conectam subreteaua formata (C1PRAGA (ge0) ---- (ge0/2) SW1PRAGA (ge0/1) ---- (ge0/0) PRAGA) si verificam din C1PRAGA in PRAGA ping si ssh:



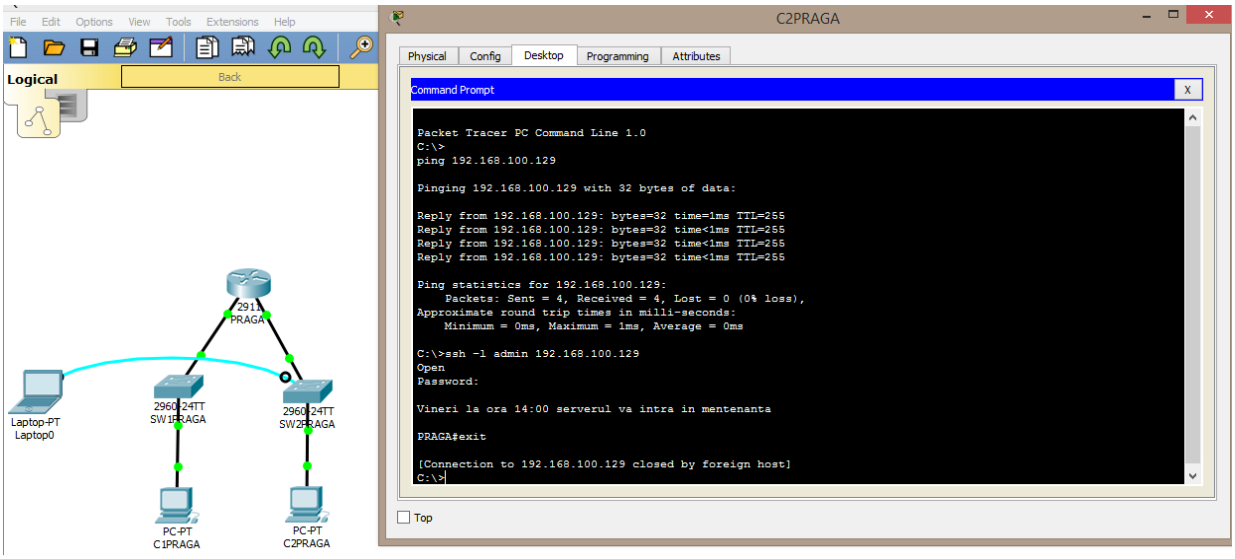
Adaugam acum SW2PRAGA si il setam standard

SWITCH (SW1PRAGA, “Legatura cu C2PRAGA”, 192.168.100.130, 255.255.255.192)

Iar acum adaugam HOST-ul C2PRAGA

HOST (C2PRAGA, 192.168.100.140, praga2, praga2@cti-info.ro, praga2, 123456)

Conectam din nou reteaua sub forma C2PRAGA (ge0) ---- (ge0/2) SW2PRAGA (ge0/1) ---- (ge0/1) PRAGA si verificam ping si ssh:



Adaugam acum Routerul 2911 PARIS, pe care il vom configura standard, nu inainte de a-i schimba numele (de la Config) si de a-i adauga modulul HWIC-2T (analog routerului creat anterior).

ROUTER (

PARIS,

serial0/0/0 (“Legatura cu PRAGA”, 192.168.100.250, 255.255.255.252),

serial0/0/1 (“Legatura cu PORTO”, 192.168.100.253, 255.255.255.252),

gigabitethernet0/0 (“Legatura cu SWPARIS”, 192.168.100.241, 255.255.255.248),

ip_route (192.168.100.224, 255.255.255.240, serial0/0/0),

ip_route (192.168.100.128, 255.255.255.192, serial0/0/0),

ip_route (192.168.100.0, 255.255.255.128, serial0/0/0),

ip_route (192.168.100.192, 255.255.255.224, serial0/0/0)

)

Acum, conectam cu cablul Serial DTE (cel rosu FARA ceas) routerele PRAGA (s0/0/0) ---- (s0/0/0) PARIS.

Adaugam SWPARIS dat de

SWITCH (SWPARIS, “Legatura cu Server”, 192.168.100.242, 255.255.255.248)

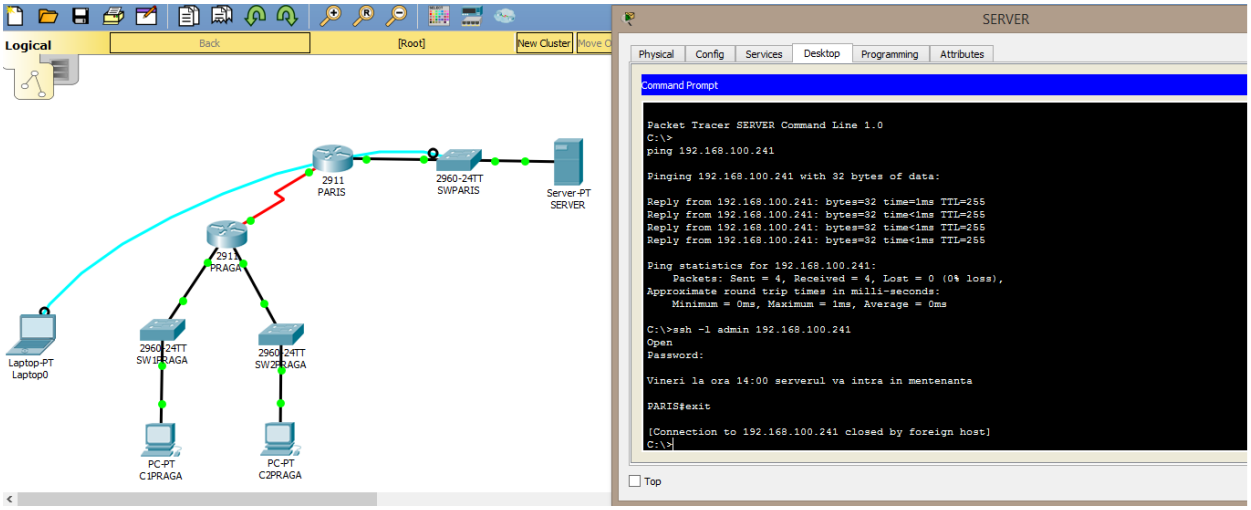
Adaugam acum SERVER, dat de

HOST (SERVER, 192.168.100.246, server, server@cti-info.ro, server, 123456)

Nu uitam ca inainte trebuie sa schimbam placa de retea pe slot-ul de sus (tot cu CGE), dupa ce am oprit serverul. Repornim si configuram din Desktop (IpConfiguration si Email) conform informatiilor date in tableul de la inceput si in linia de mai sus. (DNS-ul pentru server este 192.168.100.246, adica tocmai adresa lui IP, cea care va fi setata si la mail la incoming si outgoing)

Conectam subreteaua curenta, prin PARIS (ge0/0) ---- (ge0/1) SWPARIS (ge0/2) ---- (ge0) SERVER.

Verificam ping si ssh de pe SERVER



Iar acum incepem sa configuram serviciile cerute (MAIL, DHCP, DNS, WEB).

Configuram DNS astfel:

Intram in SERVER -> Services (tab sus) -> DNS (meniu stanga), alegem DNS on si completam

Name: cti-info.ro

Address: 192.168.100.246 (DNS-ul pe care l-am pus in toata reteaua) si dam click pe “Add”.

Configuram DHCP astfel:

In meniul din stanga alegem acum DHCP.

Vom configura, pentru fiecare HOST, cate un nou DHCP (pentru Praga1, Praga2, Porto1, Porto2). Setarea se face astfel:

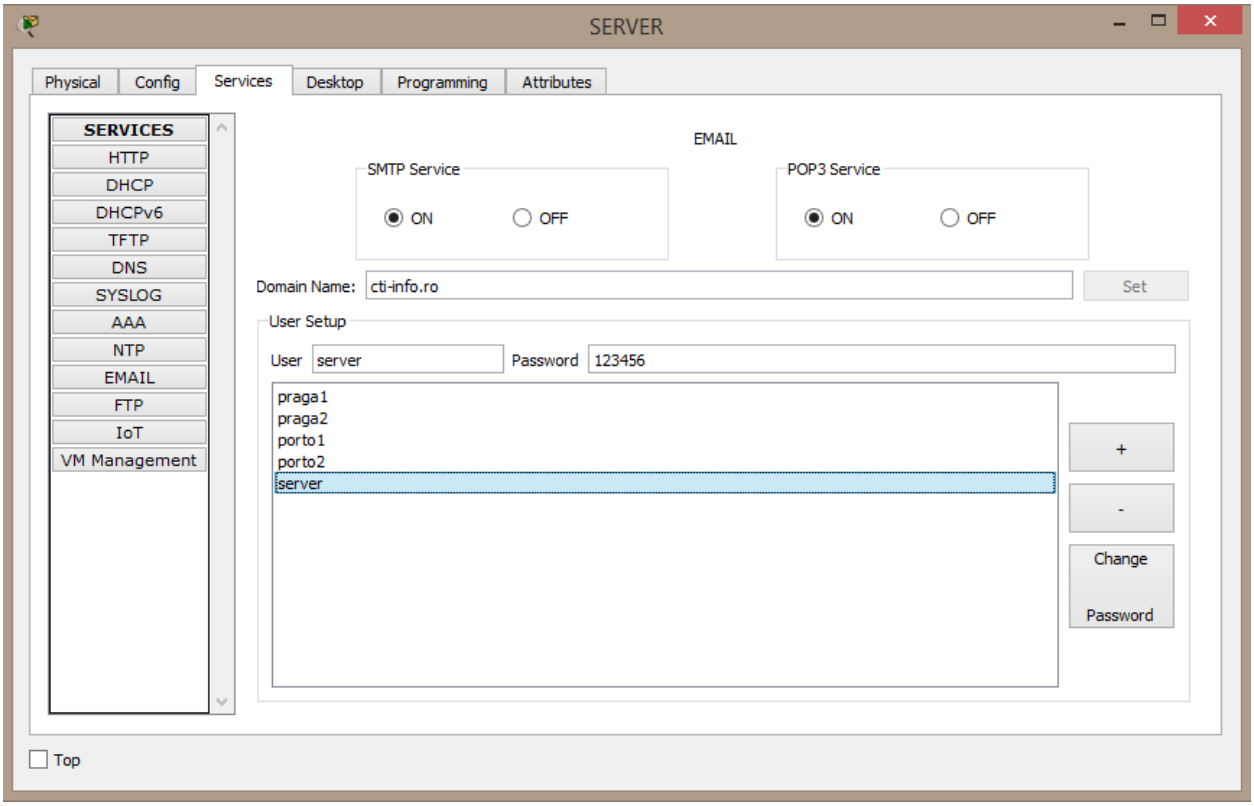
- Selectam *Service: ON*,
- *Pool Name:* unul dintre *Praga1*, Praga2, Porto1, Porto2, acum alegem *Praga1*,
- *Default gateway:* este DGw din Praga1, adica *192.168.100.225*,
- *DNS server: 192.168.100.246*, cel din toata reteaua,
- *Start IP address:* IP-ul hostului din Praga1 (vezi tabelul de la inceput): *192.168.100.230,*
- *Subnet Mask:* SM-ul din Praga1 (vezi tot tabelul de la inceput): *255.255.255.240*
- *Maximum number of users* – cel trecut in tabelul de la inceput: *6*, iar acum dam “Add”.

Analog vom proceda si cu Praga2, Porto1, Porto2 si vom avea:

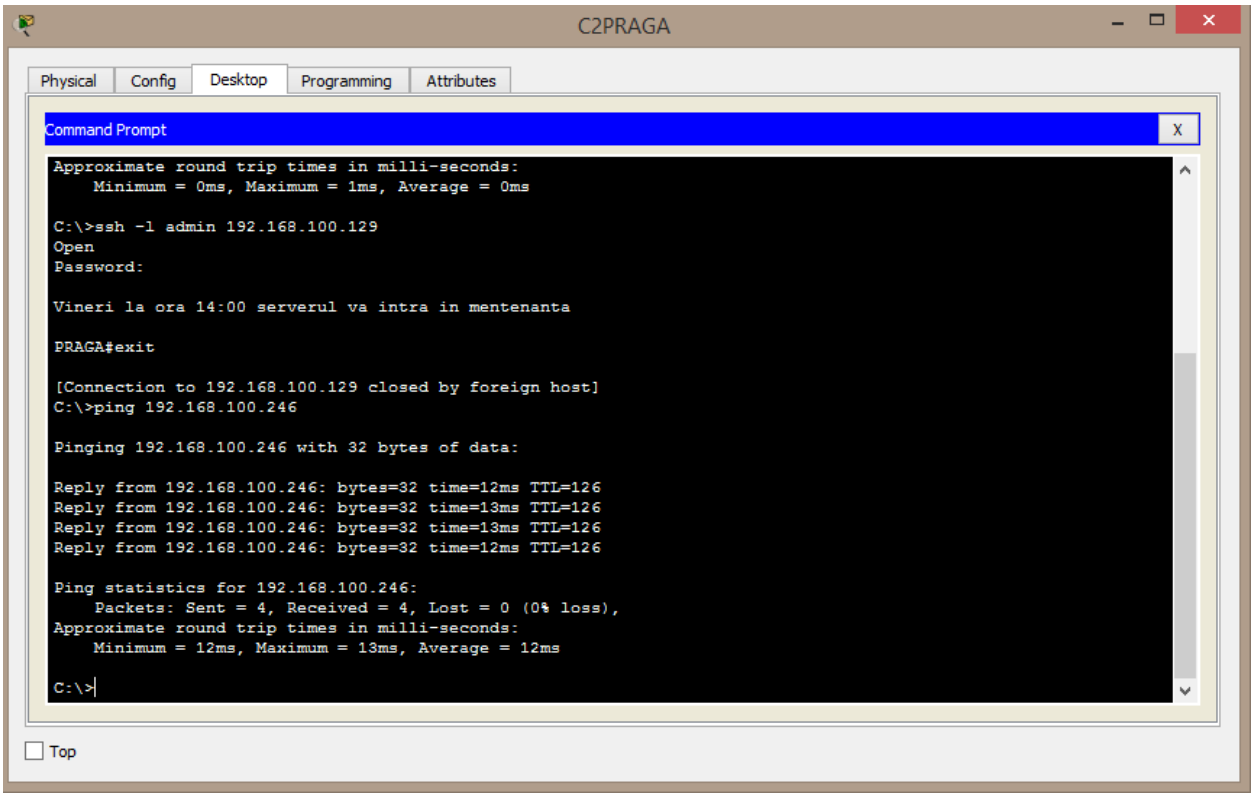
Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
Porto2	192.168.100.193	192.168.100.246	192.168.100.200	255.255.255.224	22	0.0.0.0	0.0.0.0
Porto1	192.168.100.1	192.168.100.246	192.168.100.10	255.255.255.128	118	0.0.0.0	0.0.0.0
Praga2	192.168.100.129	192.168.100.246	192.168.100.140	255.255.255.192	52	0.0.0.0	0.0.0.0
Praga1	192.168.100.225	192.168.100.246	192.168.100.230	255.255.255.240	6	0.0.0.0	0.0.0.0
serverPool	0.0.0.0	0.0.0.0	192.168.100.240	255.255.255.248	7	0.0.0.0	0.0.0.0

Configuram MAIL astfel:

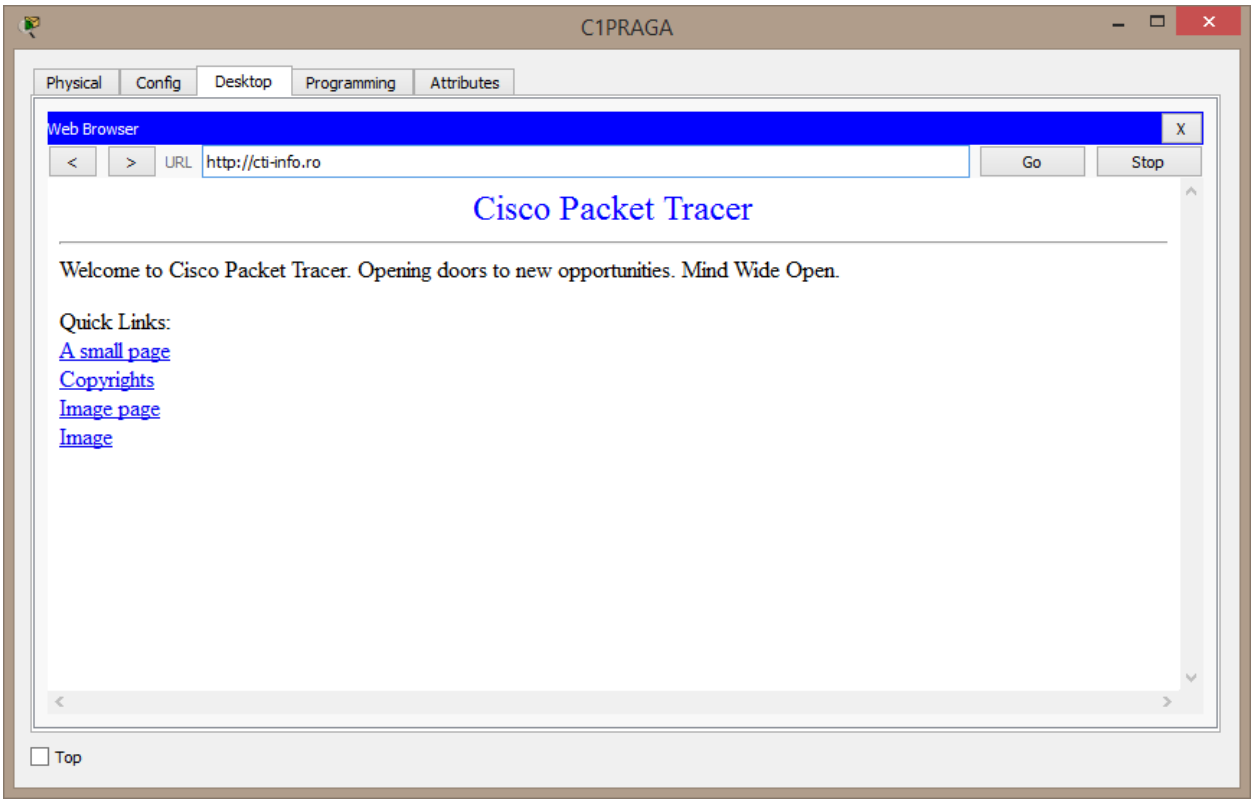
- Alegem acum din stanga EMAIL,
- Setam *Domain Name: cti-info.ro* si apasam “Set”,
- Adaugam pe rand userii si parolele, asa cum am setat, adica mereu (praga1, 123456), (praga2, 123456), iar pentru Porto inca nu am setat, dar am avea (porto1, 123456), (porto2, 123456). Adaugam si utilizatorul server cu parola 123456:



In momentul acesta, daca vom intra pe oricare dintre cele doua HOST-uri, sa spunem C2PRAGA, si vom intra in Desktop -> Command Prompt, dand un ping 192.168.100.246 (la DNS) vom obtine raspuns:



Analog se intampla si din C1PRAGA. Verificam acum si web-ul, intrand in C1PRAGA -> Desktop -> Web Browser, iar ca link scriem cti-info.ro. Vom obtine:



Analog se intampla si din C2PRAGA. Acum avem de testat mailul:

- Intram in C1PRAGA, Desktop -> Email -> Compose si scriem:

  To: server@cti-info.ro

  Subject: test

  In mesaj scriem tot "*test*" si dam "Send". Intram acum in SERVER, Desktop -> Email -> Receive, si vedem ca am primit mail de la praga1@cti-info.ro. Putem verifica analog in toata reteaua, intre oricare doua HOST-uri.

Ramane doar sa testam DHCP-ul. Intram pe C1PRAGA, Desktop -> Ip configuration si selectam DHCP. Vom vedea ca s-a configurat DHCP-ul incepand de la 192.168.100.230, si primim mesajul "DHCP request successful". Analog procedam si in C2PRAGA.

Acum ne ramane doar sa configuram subreteaua data de PORTO, prin setarile standard de ROUTER, SWITCH si HOST. Pentru HOST putem sa selectam DHCP inca din prima la IP Configuration, pentru ca avem DHCP-ul deja setat din SERVER.

Adaugam un nou Router 2911 pe care il vom seta standard dupa ce ii vom adauga modulul HWIC-2T (de la zona Physical, pe al 4-lea slot liber, ca la celelalte doua anterioare).

ROUTER (

PORTO,

serial0/0/1 (“Legatura cu PARIS”, 192.168.100.254, 255.255.255.252),

gigabitethernet0/0 (“Legatura cu SW1PORTO”, 192.168.100.1, 255.255.255.128),

gigabitethernet0/1 (“Legatura cu SW2PORTO”, 192.168.100.193, 255.255.255.224),

ip_route (192.168.100.240, 255.255.255.248, serial0/0/1),

ip_route (192.168.100.248, 255.255.255.252, serial0/0/1),

ip_route (192.168.100.224, 255.255.255.240, serial0/0/1),

ip_route (192.168.100.128, 255.255.255.192, serial0/0/1)

)

Adaugam acum SW1PORTO, cu informatiile date de

SWITCH (SW1PORTO, “Legatura cu C1PORTO”, 192.168.100.2, 255.255.255.128)

Adaugam si un HOST C1PORTO pe care momentan nu vom configura nimic, doar schimbam placa de retea in CGE.

Acum, incepem sa legam toata subreteaua, mai intai Routerele PARIS (s0/0/1) ---- (s0/0/1) PORTO, prin acelasi cablu Serial DTE (cel rosu fara ceas). Urmeaza PORTO (ge0/0) ---- (ge0/1) SW1PORTO (ge0/2) ---- (ge0) C1PORTO. Dupa ce toata conexiunea e cu verde, intram pe C1PORTO -> Desktop -> IP Configuration si alegem DHCP, si urmeaza doar sa ne setam mail-ul cu datele porto1, porto1@cti-info.ro, parola 123456, iar incoming/outgoing va fi 192.168.100.246 (DNS-ul).

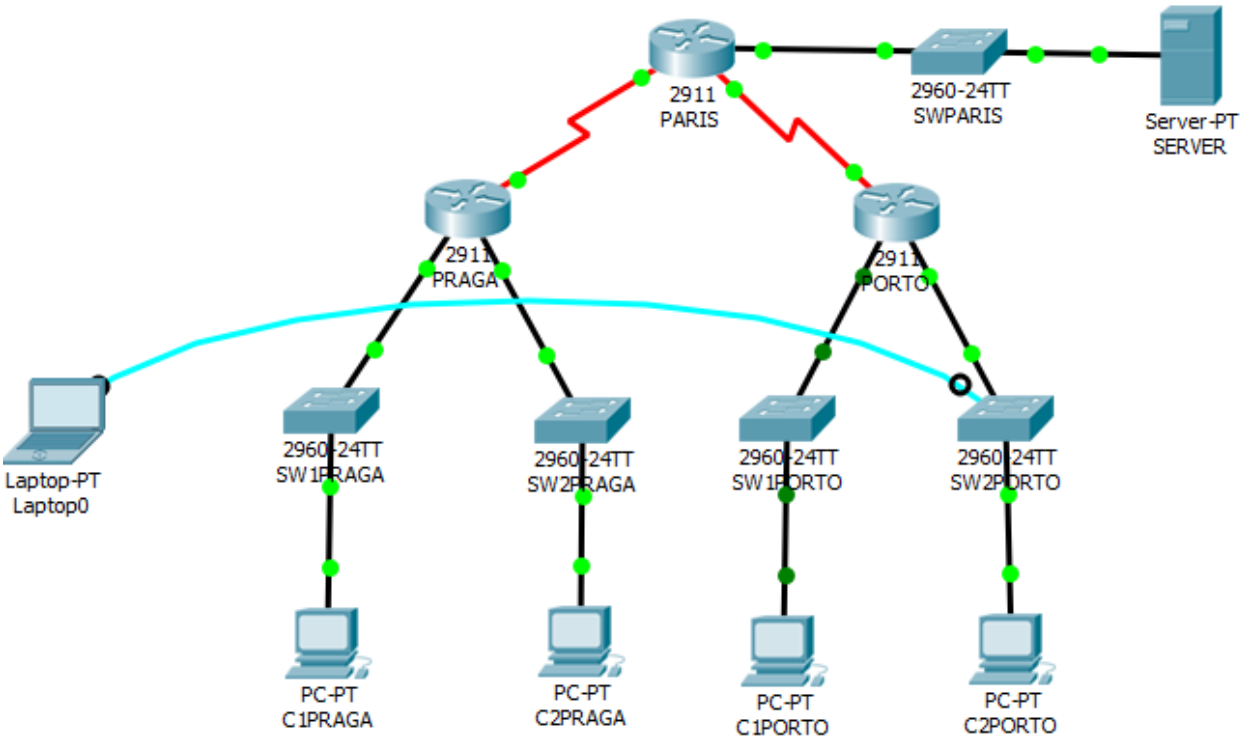
Verificam ping si ssh la 192.168.100.1 si doar ping la 192.168.100.246, si vom vedea ca primim un raspus cu succes. Incercam si sa trimitem un mail la SERVER, si observam dupa ca putem trimite si la C1PRAGA, C2PRAGA, bidirectional. La fel, putem verifica web-ul, conectandu-ne pe web browser la cti-info.ro.

Ne ramane doar sa configuram si ultimul SWITCH, SW2PORTO:

SWITCH (SW2PORTO, “Legatura cu C2PORTO”, 192.168.100.194, 255.255.255.224)

Adaugam un nou HOST, C2PORTO, ii schimbam placa de retea in CGE, legam subreteaua formata acum de PORTO (ge0/1) ---- (ge0/1) SW2PORTO (ge0/2) ---- (ge0) C2PORTO. Dupa ce toate conexiunile sunt cu verde, intram pe C2PORTO, Desktop -> Ip Configuration si selectam iarasi DHCP. Configuram mail-ul standard (porto2, porto2@cti-info.ro, in si out 192.168.100.246, porto2, 123456).

In momentul acesta toata reteaua este functionala, putem verifica ping si ssh la 192.168.100.193, ping la DNS, 192.168.100.246, web pe cti-info.ro si mail in toata reteaua.


2911
PARIS
2960-24TT
SWPARIS
Server-PT
SERVER
2911
PRAGA
2911
PORTO
Laptop-PT
Laptop0
2960-24TT
SW1PRAGA
2960-24TT
SW2PRAGA
2960-24TT
SW1PORTO
2960-24TT
SW2PORTO
PC-PT
C1PRAGA
PC-PT
C2PRAGA
PC-PT
C1PORTO
PC-PT
C2PORTO