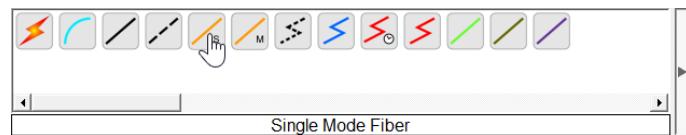
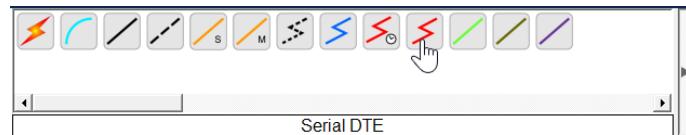


TP N° 5

1. C'est Quoi un cable **Série** et un cable **Fibre**:

Cable

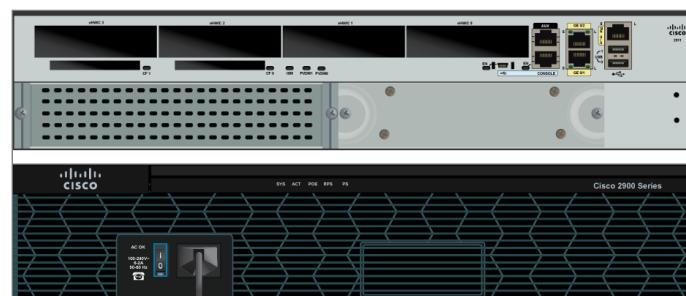
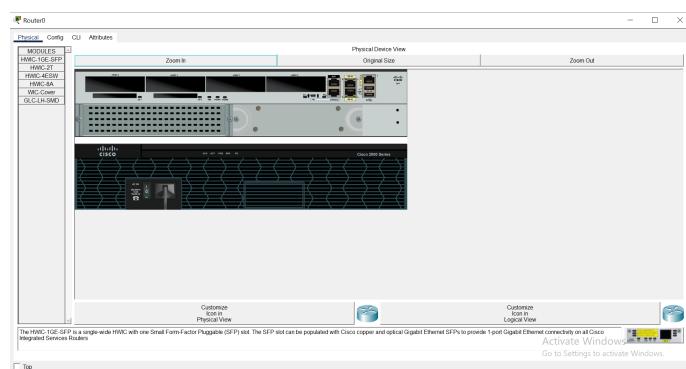
- **Série** : un cable qui simule les connections **WAN** entre routeurs.
- **Fibre** : un cable qui utilise des fils de verre pour transmettre des données sous forme de lumière.

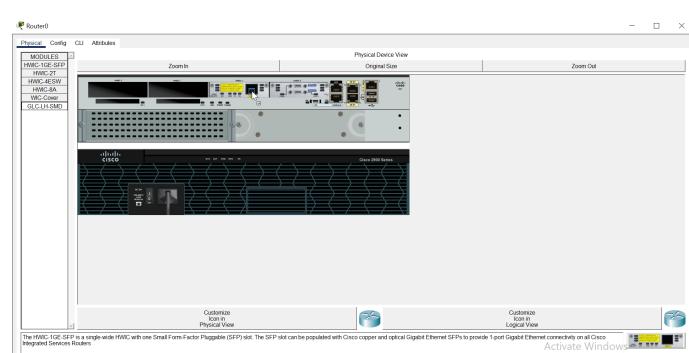
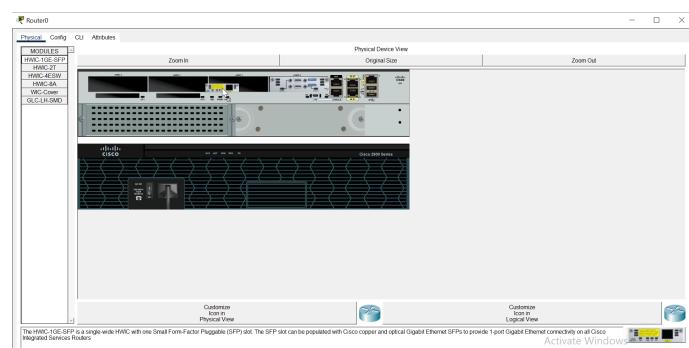


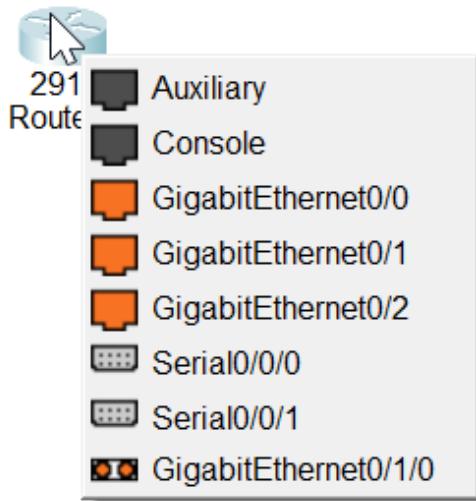
2. Comment ajouter les ports Serie et fibre dans un routeur?:

Ajouter Ports

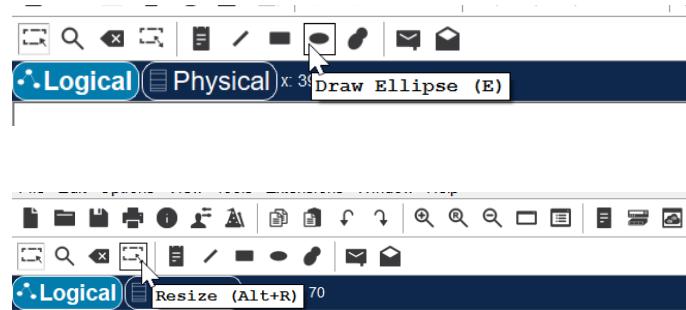
- Click sur le routeur
- Eteint le routeur
- Ajouter le module HWIC-2T pour ajouter le port **Série**
- Ajouter le module HWIC-1G-SFP
- Ajouter le module GLC-LH-SMD sur HWIC-1G-SFP pour ajouter le port **Fibre**
- Allumer le routeur.



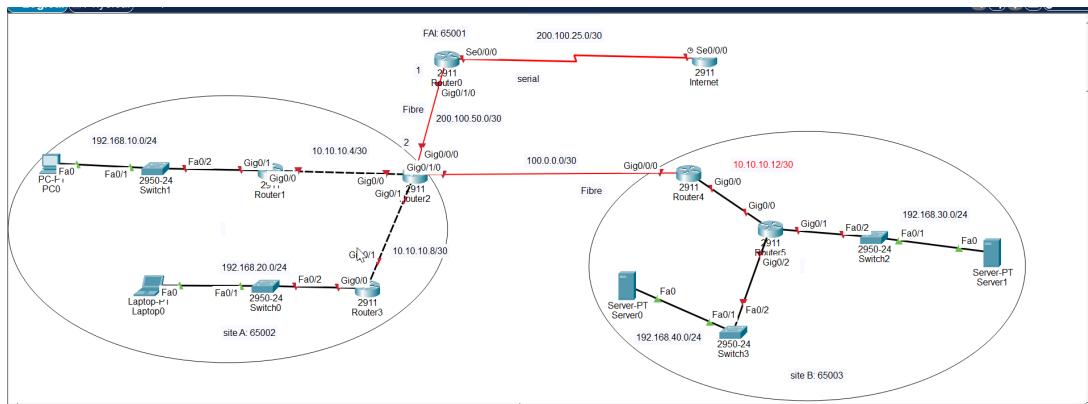




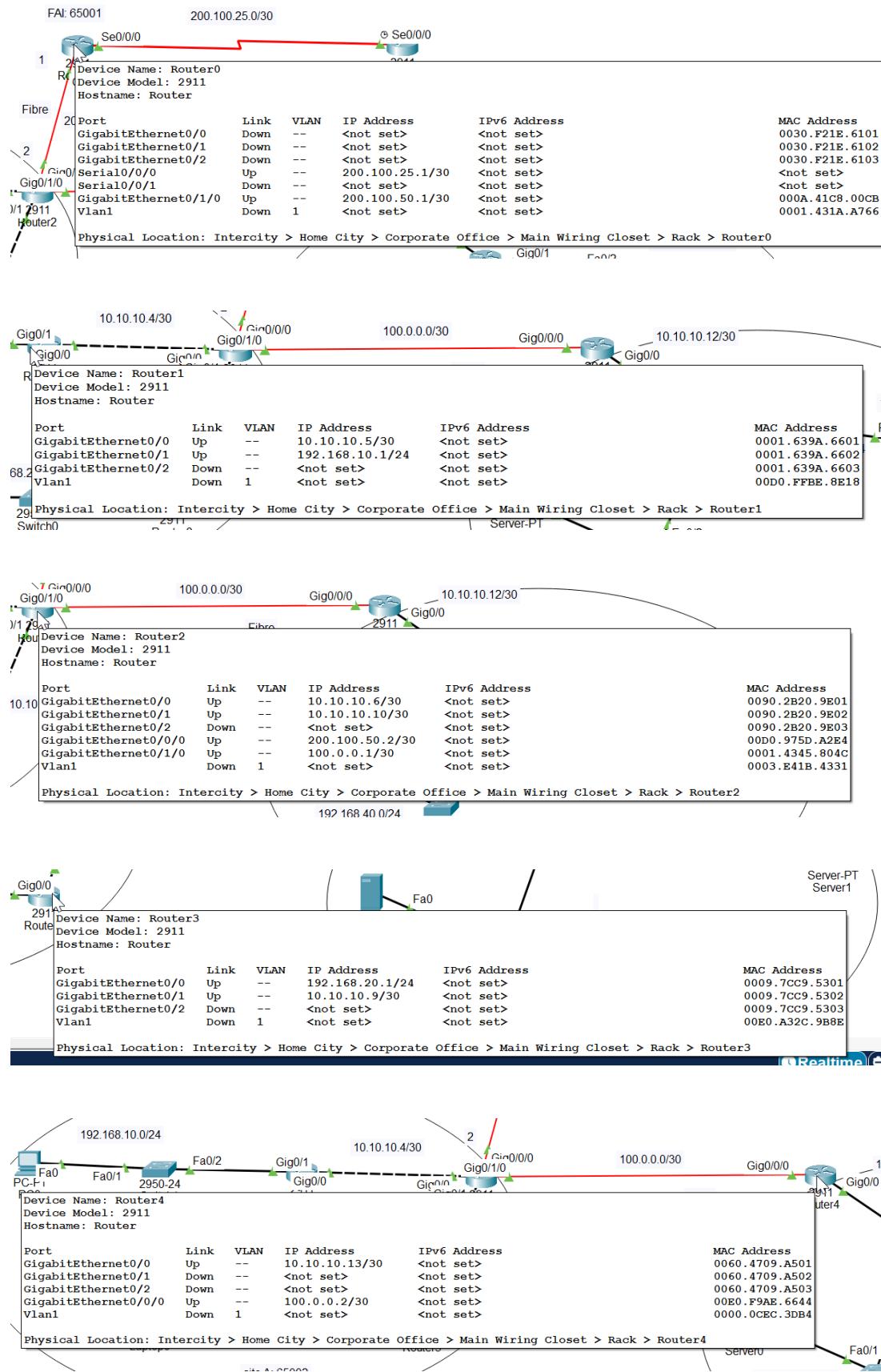
3. Comment ajouter Des ellipses et ajuster sa taille ?

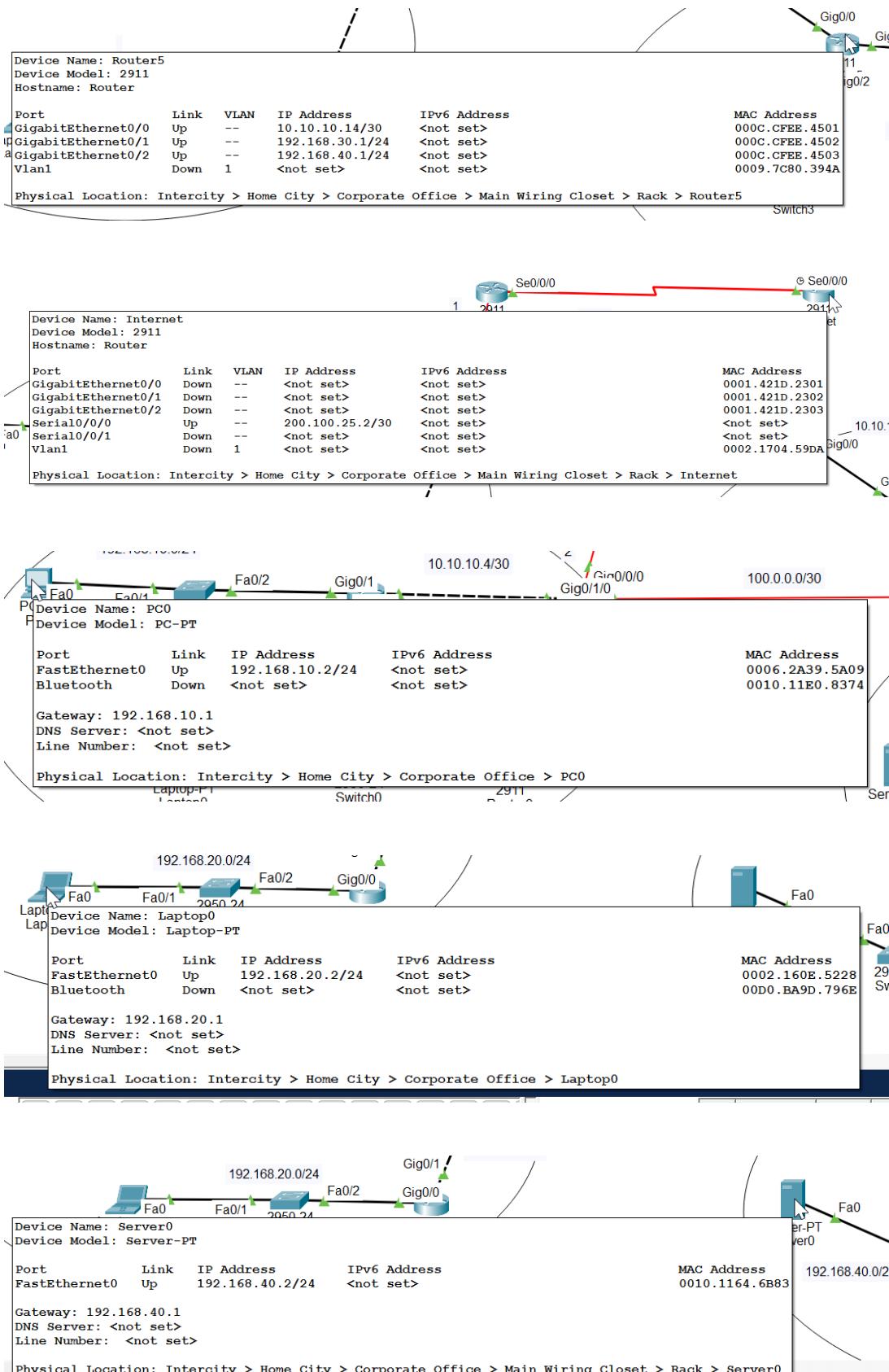


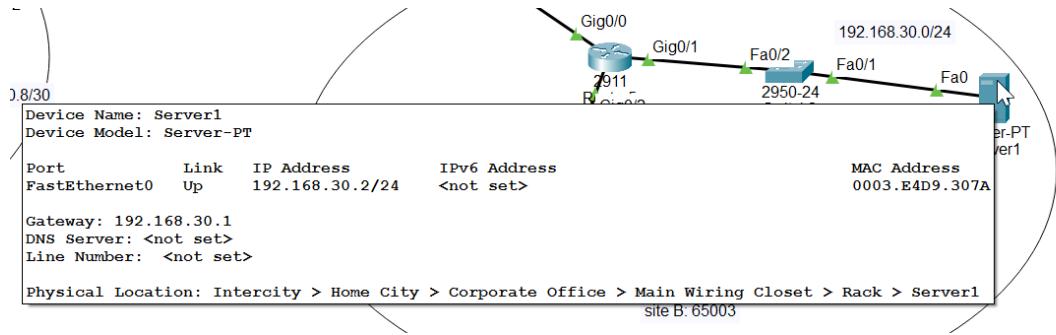
4. Faite la topologie suivants:



5. Faite l'adressage:







6. Configurez l'OSPF (en mode interface) au niveau des sites A et B:

Router1

```
Router(config)#int g0/0
Router(config-if)#ip ospf 1 area 0
Router(config-if)#int g0/1
Router(config-if)#ip ospf 1 area 0
```

Router2

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int g0/0
Router(config-if)#ip ospf 1 area 0
Router(config-if)#end
Router(config)#int g0
Router(config-if)#
% Invalid input detected at '^' marker.
Router(config)#int g0/1
Router(config-if)#ip ospf 1 area 0
```

Router3

```
Router(config)#int g0/1
Router(config-if)#ip ospf 1 area 0
Router(config-if)#int g0/0
Router(config-if)#ip ospf 1 area 0
```

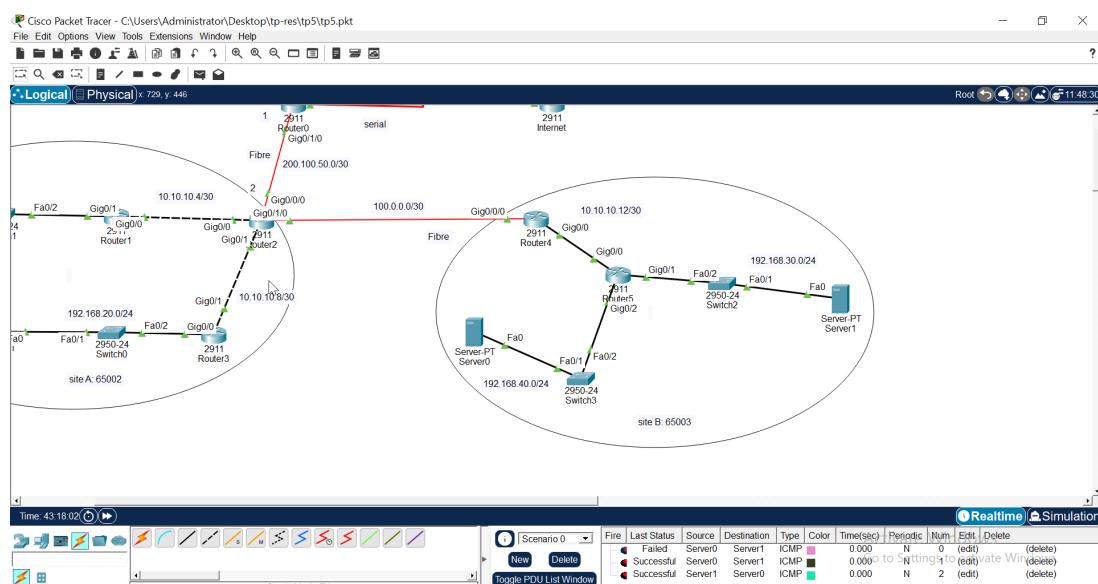
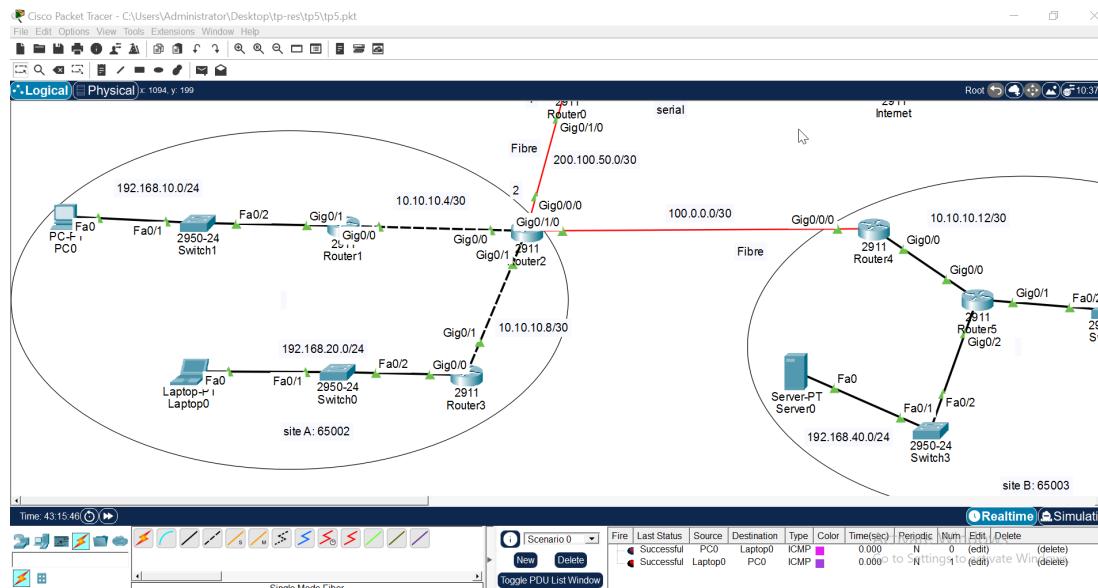
Router4

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int g0/0
Router(config-if)#ip ospf 1 area 0
```

Router5

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int g0/0
Router(config-if)#ip ospf 1 area 0
Router(config-if)#int g0/1
Router(config-if)#ip ospf 1 area 0
Router(config-if)#int g0/2
Router(config-if)#ip ospf 1 area 0
```

7. Faire un ping entre machines du même Site (Entre Machine Site A puis Entre Machine Site B) :



8. Configurez la route par défaut sur le routeur Router0 vers internet:

```

Router>enable
Router#config t
Router(config)#ip route 0.0.0.0 0.0.0.0 200.100.25.2
Router(config)#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 external type 1, N2 - OSPF external type 2
      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 200.100.25.2 to network 0.0.0.0

  200.100.25.0/24 is variably subnetted, 3 subnets, 2 masks
  C    200.100.25.0/32 is directly connected, Serial1/0/0
  L    200.100.25.1/32 is directly connected, Serial1/0/0
  C    200.100.50.0/30 is directly connected, GigabitEthernet0/1/0
  L    200.100.50.1/32 is directly connected, GigabitEthernet0/1/0
S*   0.0.0.0/0 [1/0] via 200.100.25.2

```

9. C'est Quoi un systeme autonome?:

Système Autonome

Un système autonome est un système réseau qui dispose de **edge routers** qui configurent **BGP** pour permettre la communication avec des systèmes autonomes externes.

10. C'est Quoi le protocole **BGP**?

BGP

BGP est un protocole de routage dynamique qui permet la communication entre les systèmes autonomes, ce dernier est configuré sur les routesur edges qui vont partager leur réseaux **LAN** avec ces voisins (edges routers d'autres systèmes autonomes).

11. Comment Configurer BGP?

Configurer BGP

- On doit etre au niveau 3 pour activer le **BGP** avec l'ID du system autonome du routeur avec la commande : `router bgp <Current_SA_ID>`
 - Apres la commande precedente on passe au niveau 4 (**config-router**)
 - Pour creer une session avec un voisin on utilise la commande suivant :
`neighbor <@Neighbor> remote as <Neighbor_SA_ID>`
 - Pour propager les reseaux **LAN** au voisin on utilise la commande suivant :
`network <@LAN> mask <mask>`

12. Configurez le **BGP** sur les edge routers (router0 , router2, router4)

```
Router2 Physical Config CLI Attributes
IOS Command Line Interface

Router#en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router bgp 65002
Router(config-router)#
Router(config-router)#neighbor 200.100.50.1 as
Router(config-router)#neighbor 200.100.50.1 remote-as
Router(config-router)#neighbor 200.100.50.1 remote-as 65001
Router(config-router)#BGP-5-ADCHANGE: neighbor 200.100.50.1 Up

Router(config-router)#neighbor 100.0.0.2 remote-as 65003
Router(config-router)#neighbor 100.0.0.1 remote-as 255.255.255.0
Router(config-router)#neighbor 192.168.0.1 remote-as 255.255.255.0
```

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router bgp 65003
Router(config-router)#
Router(config-router)#neighbor 100.0.0.1 rem
Router(config-router)#neighbor 100.0.0.1 remote-as 65002
Router(config-router)##BGP-5-ADJCHANGE: neighbor 100.0.0.1 Up

Router(config-router)#network 192.168.30.0 mask 255.255.255.0
Router(config-router)#network 192.168.40.0 mask 255.255.255.0
```

13. Configurez la route par défaut sur le routeur Router2, Router4 et la propagation OSPF:

Router2

Physical Config CLI Attributes

IOS Command Line Interface

```
Router(config-router)#exit
Router(config)#ip route 0.0.0.0 0.0.0.0 200.100.50.1
Router(config)#router ospf 1
Router(config-router)#area 0
Router(config-router)#default-information originate
Router(config-router)#default-information originate
```

Router4

Physical Config CLI Attributes

IOS Command Line Interface

```
[Router4]#config terminal
Router4(config-router)#exit
Router4(config)#ip route 0.0.0.0 0.0.0.0 100.0.0.1
Router4(config)#router ospf 1
Router4(config-router)#area 0
Router4(config-router)#default-information originate
Router4(config-router)#default-information originate
```

14. Affichez les tables de routage des différents routeurs :

```
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
      * - candidate default, + - per-user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is 200.100.25.2 to network 0.0.0.0

B  192.168.10.0/24 [20/0] via 200.100.50.2, 00:00:00
B  192.168.20.0/24 [20/0] via 200.100.50.2, 00:00:00
B  192.168.30.0/24 [20/0] via 200.100.50.2, 00:00:00
B  192.168.40.0/24 [20/0] via 200.100.50.2, 00:00:00
B  200.100.25.0/24 is variably subnetted, 2 subnets, 2 masks
C    200.100.25.0/30 is directly connected, Serial0/0/0
L    200.100.25.1/32 is directly connected, Serial0/0/0
C    200.100.50.0/24 is variably subnetted, 2 subnets, 2 masks
C    200.100.50.1/32 is directly connected, GigabitEthernet0/1/0
L    200.100.50.1/32 is directly connected, GigabitEthernet0/1/0
S*  0.0.0.0/0 [1/0] via 200.100.25.2
```

```
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, * - candidate default, 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 10.10.10.6 to network 0.0.0.0

  10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
    10.0.0.0/8 is directly connected, GigabitEthernet0/0
    10.10.10.3/32 is directly connected, GigabitEthernet0/0
  10.10.10.8/30 [110/2] via 10.10.10.6, 00:12:11, GigabitEthernet0/0
  192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
    192.168.10.0/24 is directly connected, GigabitEthernet0/0
    192.168.10.1/32 is directly connected, GigabitEthernet0/0
  192.168.20.0/24 [110/3] via 10.10.10.6, 00:12:11, GigabitEthernet0/0
  0.0.0.0/0 [110/1] via 10.10.10.6, 00:12:11, GigabitEthernet0/0
```

```
Router>en
Router>show ip route
Codes: 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, ? - candidate user static route, o - ODR
      P - periodic downloaded static route

Gateway of last resort is 200.100.50.1 to network 0.0.0.0

  10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
C       10.10.10.4/30 is directly connected, GigabitEthernet0/0
C       10.10.10.6/32 is directly connected, GigabitEthernet0/0
C       10.10.10.8/32 is directly connected, GigabitEthernet0/1
L       10.10.10.10/32 is directly connected, GigabitEthernet0/1
  100.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       100.0.0.0/30 is directly connected, GigabitEthernet0/1/0
P       100.0.0.1/30 is directly connected, GigabitEthernet0/1/0
O       192.168.20.0/24 [110/2] via 10.10.10.9, 0:0:12:41: GigabitEthernet0/0
O       192.168.20.0/24 [110/2] via 10.10.10.9, 0:0:12:41: GigabitEthernet0/1
B       192.168.30.0/24 [20/0] via 100.0.0.2, 0:0:0:0:0
B       192.168.40.0/24 [20/0] via 100.0.0.2, 0:0:0:0:0
  200.100.50.0/30 is variably subnetted, 2 subnets, 2 masks
C       200.100.50.50/30 is directly connected, GigabitEthernet0/0/0
L       200.100.50.2/32 is directly connected, GigabitEthernet0/0/0
S*     0.0.0.0/0 [1/0] via 200.100.50.1
```

Router3

```
Physical Config CLU Attributes
IOS Command Line Interface

Router>en
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 10.10.10.10 to network 0.0.0.0

  10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
O  10.10.10.4/30 [110/2] via 10.10.10.10, 00:17:29, GigabitEthernet0/1
C  10.10.10.9/32 is directly connected, GigabitEthernet0/1
L  10.10.10.9/32 is directly connected, GigabitEthernet0/1
O  192.168.10.0/24 [110/3] via 10.10.10.10, 00:17:19, GigabitEthernet0/1
  192.168.10.0/24 is variably subnetted, 2 subnets, 2 masks
C  132.168.20.1/32 is directly connected, GigabitEthernet0/0
L  192.168.20.1/32 is directly connected, GigabitEthernet0/0
O* 0.0.0.0/0 [110/1] via 10.10.10.10, 00:17:29, GigabitEthernet0/1
```

Router4

```
Physical Config CLU Attributes
IOS Command Line Interface

Router>en
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 100.0.0.1 to network 0.0.0.0

  10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C  10.10.10.12/30 is directly connected, GigabitEthernet0/0
L  10.10.10.13/32 is directly connected, GigabitEthernet0/0
  100.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C  100.0.0.1/32 is directly connected, GigabitEthernet0/0
L  100.0.0.2/32 is directly connected, GigabitEthernet0/0
B  192.168.10.0/24 [20/0] via 100.0.0.1, 00:00:00
B  192.168.20.0/24 [20/0] via 100.0.0.1, 00:00:00
O  192.168.30.0/24 [110/1] via 10.10.10.14, 00:13:28, GigabitEthernet0/0
O  192.168.40.0/24 [110/1] via 10.10.10.14, 00:13:28, GigabitEthernet0/0
S*  0.0.0.0/0 [1/0] via 100.0.0.1
```

Router5

```
Physical Config CLU Attributes
IOS Command Line Interface

Router>en
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 10.10.10.13 to network 0.0.0.0

  10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
C  10.10.10.12/30 is directly connected, GigabitEthernet0/0
L  10.10.10.13/32 is directly connected, GigabitEthernet0/0
  192.168.30.0/24 is variably subnetted, 2 subnets, 2 masks
C  192.168.30.0/24 is directly connected, GigabitEthernet0/1
L  192.168.30.1/32 is directly connected, GigabitEthernet0/1
  192.168.40.0/24 is variably subnetted, 2 subnets, 2 masks
C  192.168.40.0/24 is directly connected, GigabitEthernet0/2
L  192.168.40.1/32 is directly connected, GigabitEthernet0/2
O* 0.0.0.0/0 [110/1] via 10.10.10.13, 00:14:09, GigabitEthernet0/0
```

Remarque

On remarque que dans la table de routage des routeurs internes (pas les edge routers) qu'ils sont une route **O*E** qui veut dire une route **OSPF** extenre a son systeme autonome c'est la route qui mene vers son edge router pour quitter le systeme autonome.

15. Vérifiez la communication entre les différents équipements :

