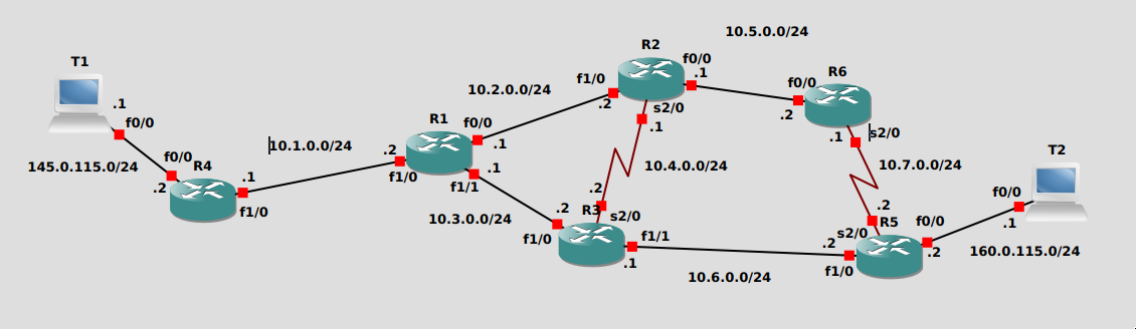
Memòria Taller #4 Core Network MPLS

TXC

Primavera 2022-2023

Nom: Sergio Sanz, Arnau Valls

1. Esquema de la xarxa desenvolupada



Les adreces de loopback seràn 10.10.0.n on n serà el número del router.

2. Relació de les línies de programació

T1:

```
!
interface FastEthernet0/0
 ip address 145.0.115.1 255.255.255.0
 duplex half
!
!
ip route 0.0.0.0 0.0.0.0 145.0.115.2
!
```

T2:

```
interface FastEthernet0/0
 ip address 160.0.115.1 255.255.255.0
 duplex half
!
!
ip route 0.0.0.0 0.0.0.0 160.0.115.2
```

R1:

```
ip cef
!
mpls label protocol ldp
mpls traffic-eng tunnels
!
interface Loopback0
 ip address 10.10.0.1 255.255.255.255
!
interface Tunnel10
 ip unnumbered Loopback0
 tunnel mode mpls traffic-eng
 tunnel destination 10.10.0.5
 tunnel mpls traffic-eng autoroute announce
 tunnel mpls traffic-eng priority 7 7
 tunnel mpls traffic-eng bandwidth 50
 tunnel mpls traffic-eng path-option 1 explicit name LP1
 no routing dynamic
!
interface FastEthernet0/0
 ip address 10.2.0.1 255.255.255.0
 duplex half
 mpls traffic-eng tunnels
 mpls ip
 ip rsvp bandwidth 100
!
interface FastEthernet1/0
 ip address 10.1.0.2 255.255.255.0
 duplex auto
 speed auto
!
interface FastEthernet1/1
 ip address 10.3.0.1 255.255.255.0
 duplex auto
 speed auto
 mpls ip
!
```

```
router ospf 1
 mpls traffic-eng router-id Loopback0
 mpls traffic-eng area 0
 network 10.1.0.0 0.0.0.255 area 0
 network 10.2.0.0 0.0.0.255 area 0
 network 10.3.0.0 0.0.0.255 area 0
 network 10.10.0.1 0.0.0.0 area 0
!
!
ip explicit-path name LP1 enable
 next-address 10.2.0.1
 next-address 10.2.0.2
 next-address 10.5.0.1
 next-address 10.5.0.2
 next-address 10.7.0.1
 next-address 10.7.0.2
 next-address 10.10.0.5
```

R2:

```
ip cef
!
mpls label protocol ldp
mpls traffic-eng tunnels
!
interface Loopback0
 ip address 10.10.0.2 255.255.255.255
!
interface FastEthernet0/0
 ip address 10.5.0.1 255.255.255.0
 duplex half
 mpls traffic-eng tunnels
 mpls ip
 ip rsvp bandwidth 100
!
interface FastEthernet1/0
 ip address 10.2.0.2 255.255.255.0
 duplex auto
 speed auto
 mpls traffic-eng tunnels
 mpls ip
 ip rsvp bandwidth 100
!
```

```
interface Serial2/0
 ip address 10.4.0.1 255.255.255.0
 mpls traffic-eng tunnels
 mpls ip
 serial restart-delay 0
 ip rsvp bandwidth 100
!
router ospf 1
 mpls traffic-eng router-id Loopback0
 mpls traffic-eng area 0
 network 10.2.0.0 0.0.0.255 area 0
 network 10.4.0.0 0.0.0.255 area 0
 network 10.5.0.0 0.0.0.255 area 0
 network 10.10.0.2 0.0.0.0 area 0
!
```

R3:

```
ip cef
!
mpls label protocol ldp
mpls traffic-eng tunnels
!
interface Loopback0
 ip address 10.10.0.3 255.255.255.255
!
interface FastEthernet1/0
 ip address 10.3.0.2 255.255.255.0
 duplex auto
 speed auto
 mpls ip
!
interface FastEthernet1/1
 ip address 10.6.0.1 255.255.255.0
 duplex auto
 speed auto
 mpls traffic-eng tunnels
 mpls ip
 ip rsvp bandwidth 100
!
```

```
interface Serial2/0
 ip address 10.4.0.2 255.255.255.0
 mpls traffic-eng tunnels
 mpls ip
 serial restart-delay 0
 ip rsvp bandwidth 100
!
router ospf 1
 mpls traffic-eng router-id Loopback0
 mpls traffic-eng area 0
 network 10.3.0.0 0.0.0.255 area 0
 network 10.4.0.0 0.0.0.255 area 0
 network 10.6.0.0 0.0.0.255 area 0
 network 10.10.0.3 0.0.0.0 area 0
!
```

R4:

```
ip cef
!
interface Loopback0
 ip address 10.10.0.4 255.255.255.255
!
interface FastEthernet0/0
 ip address 145.0.115.2 255.255.255.0
 duplex half
!
interface FastEthernet1/0
 ip address 10.1.0.1 255.255.255.0
 duplex auto
 speed auto
!
router ospf 1
 passive-interface FastEthernet0/0
 network 10.1.0.0 0.0.0.255 area 0
 network 10.10.0.4 0.0.0.0 area 0
 network 145.0.115.0 0.0.0.255 area 0
!
```

R5:

```
ip cef
!
mpls label protocol ldp
mpls traffic-eng tunnels
interface Loopback0
 ip address 10.10.0.5 255.255.255.255
!
interface Tunnel10
 ip unnumbered Loopback0
 tunnel mode mpls traffic-eng
 tunnel destination 10.10.0.1
 tunnel mpls traffic-eng autoroute announce
 tunnel mpls traffic-eng priority 7 7
 tunnel mpls traffic-eng bandwidth 100
 tunnel mpls traffic-eng path-option 1 explicit name LP2
 no routing dynamic
!
interface FastEthernet0/0
 ip address 160.0.115.2 255.255.255.0
 duplex half
!
interface FastEthernet1/0
 ip address 10.6.0.2 255.255.255.0
 duplex auto
 speed auto
 mpls traffic-eng tunnels
 mpls ip
 ip rsvp bandwidth 100
```

```
interface Serial2/0
 ip address 10.7.0.2 255.255.255.0
 mpls traffic-eng tunnels
 mpls ip
 serial restart-delay 0
 ip rsvp bandwidth 100
!
router ospf 1
 passive-interface FastEthernet0/0
 network 10.6.0.0 0.0.0.255 area 0
 network 10.7.0.0 0.0.0.255 area 0
 network 10.10.0.5 0.0.0.0 area 0
 network 160.0.115.0 0.0.0.255 area 0
!
ip explicit-path name LP2 enable
 next-address 10.6.0.2
 next-address 10.6.0.1
 next-address 10.4.0.2
 next-address 10.4.0.1
 next-address 10.2.0.2
 next-address 10.2.0.1
 next-address 10.10.0.1
!
```

R6:

```
ip cef
!
mpls label protocol ldp
mpls traffic-eng tunnels
!
interface Loopback0
 ip address 10.10.0.6 255.255.255.255
!
interface FastEthernet0/0
 ip address 10.5.0.2 255.255.255.0
 duplex half
 mpls traffic-eng tunnels
 mpls ip
 ip rsvp bandwidth 100
!
interface Serial2/0
 ip address 10.7.0.1 255.255.255.0
 mpls traffic-eng tunnels
 mpls ip
 serial restart-delay 0
 ip rsvp bandwidth 100
!
router ospf 1
 mpls traffic-eng router-id Loopback0
 mpls traffic-eng area 0
 network 10.5.0.0 0.0.0.255 area 0
 network 10.7.0.0 0.0.0.255 area 0
 network 10.10.0.6 0.0.0.0 area 0
!
```

Utilitzeu "show run" per obtenir la programació dels routers. Podeu fer captura d'imatges si voleu. Suprimiu tot allò que surt per defecte i deixeu només el que heu programat vosaltres. Indiqueu la programació dels terminals i dels routers. Compacteu el resultat en format document.

3. Comentaris

- Hem tingut problemes amb la imatge inicial que vam agafar ja que no arribavem a conseguir una connexió telnet amb els routers, la vam cambiar i va funcionar.
- Hem hagut de consultar la documentació de PI i la de Cisco per enrecordar-nos de com configurar OSPF.

Indiqueu els comentaris que considereu oportuns sobre els problemes i dificultats que heu tingut a la programació i com els heu resolt.

4. Resultats

Poseu la imatge de la captura de pantalla del Traceroute entre T1-T2 i viceversa.

T1-T2

```
T1#traceroute 160.0.115.1
Type escape sequence to abort.
Tracing the route to 160.0.115.1
VRF info: (vrf in name/id, vrf out name/id)
  1 145.0.115.2 24 msec 20 msec 32 msec
  2 10.1.0.2 56 msec 60 msec 56 msec
  3 10.2.0.2 [MPLS: Label 17 Exp 0] 84 msec 76 msec 60 msec
  4 10.5.0.2 [MPLS: Label 16 Exp 0] 72 msec 68 msec 64 msec
  5 10.7.0.2 84 msec 68 msec 80 msec
  6 160.0.115.1 152 msec 152 msec 148 msec
```

T2-T1

```
T2#traceroute 145.0.115.1
Type escape sequence to abort.
Tracing the route to 145.0.115.1
VRF info: (vrf in name/id, vrf out name/id)
  1 160.0.115.2 46 msec 18 msec 20 msec
  2 10.6.0.1 [MPLS: Label 30 Exp 0] 132 msec 116 msec 124 msec
  3 10.4.0.1 [MPLS: Label 31 Exp 0] 73 msec 62 msec 63 msec
  4 10.2.0.1 66 msec 70 msec 69 msec
  5 10.1.0.1 116 msec 124 msec 124 msec
  6 145.0.115.1 140 msec 148 msec 152 msec
```

5. Referències

Especifiqueu totes les referències, llibres, documents o url's, que heu necessitat consultar per fer el laboratori i el motiu de la consulta.

Per mirar com es programa OSPF:
https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/iproute_ospf/configuration/xe-16/iro-xe-16-book/iro-cfg.html

Per mirar com es configura MPLS:
https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/mp_basic/configuration/xe-16/mp-basic-xe-16-book/multiprotocol-label-switching-mpls-on-cisco-routers.html

https://community.cisco.com/t5/mpls/mpls-te-ip-explicit-path/td-p/795603

https://networklessons.com/mpls/mpls-te-path-options-explicit

https://www.cisco.com/c/en/us/support/docs/multiprotocol-label-switching-mpls/mpls/13737-mplsteisis.html

Podeu utilitzar un màxim de 6 pàgines