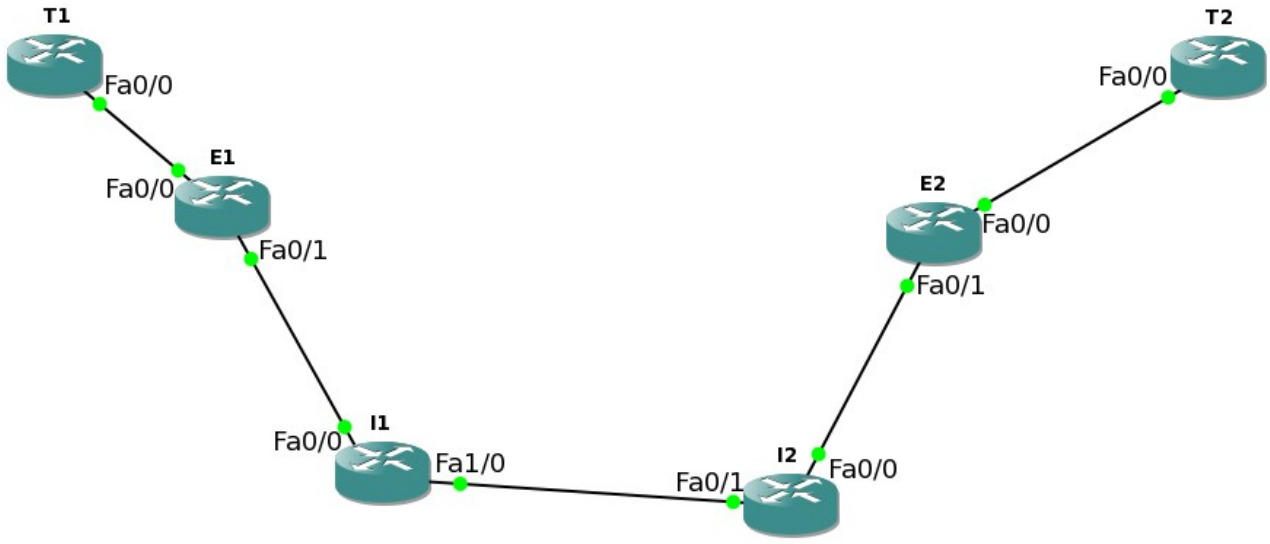
Laboratorio MPLS backbone, con peering BGP nei border router

Router coinvolti:
T1 – transit router (esterno), AS 1
T2 – transit router (esterno), AS 2
E1 – edge router verso transit 1, BGP router, AS 100
E2 – edge router verso transit 2, BGP router, AS 100
I1 – LSR (Label Switch Router), no BGP anche se è di transito (ci pensa l'MPLS)
I2 – LSR (Label Switch Router), no BGP anche se è di transito (ci pensa l'MPLS)



T1 f0/0 è connesso a E1 f0/0 E1 f0/1 è connesso a I1 f0/0 f0/0 è connesso a T1 f0/0 I1 f1/0 è connesso a I2 f0/1 f0/0 è connesso a E1 f0/1 I2 f0/1 è connesso a I1 f1/0 f0/0 è connesso a E2 f0/1 E2 f0/1 è connesso a I2 f0/0 f0/0 è connesso a T2 f0/0 T2 f0/0 è connesso a E2 f0/0	Indirizzamento IP: **AS1**: 10.1.0.0/16 **AS2**: 10.2.0.0/16 **AS100**: 172.16.0.0/16 Link: **T1 – E1**: 10.1.0.0/30 (.1 - .2) **E1 – I1**: 172.16.1.0/30 (.1 - .2) **I1 – I2**: 172.16.12.0/30 (.1 - .2) **E2 – I2**: 172.16.2.0/30 (.1 - .2) **T2 – E2**: 10.2.0.0/30 (.1 - .2) Loopback: **T1**: 10.1.1.1/32 **T2**: 10.2.1.1/32 **E1**: 172.16.255.1/32 **E2**: 172.16.255.2/32 **I1**: 172.16.255.11/32 **I2**: 172.16.255.12/32

Tutto l'AS100 è OSPF Area 0.0.0.0

CONFIGURAZIONI:

T1:

```
version 12.4
!
hostname T1
!
ip cef
!
interface Loopback0
 ip address 10.1.1.1 255.255.255.255
!
interface FastEthernet0/0
 ip address 10.1.0.1 255.255.255.252
!
router bgp 1
 bgp log-neighbor-changes
 neighbor 10.1.0.2 remote-as 100
 !
 address-family ipv4
 neighbor 10.1.0.2 activate
 neighbor 10.1.0.2 soft-reconfiguration inbound
 no auto-summary
 no synchronization
 network 10.1.0.0 mask 255.255.0.0
 exit-address-family
!
ip route 10.1.0.0 255.255.0.0 Null0
```

T2:

```
version 12.4
!
hostname T2
!
ip cef
!
interface Loopback0
 ip address 10.2.1.1 255.255.255.255
!
interface FastEthernet0/0
 ip address 10.2.0.1 255.255.255.252
 duplex auto
 speed auto
!
router bgp 2
 bgp log-neighbor-changes
 neighbor 10.2.0.2 remote-as 100
 !
 address-family ipv4
 neighbor 10.2.0.2 activate
 neighbor 10.2.0.2 soft-reconfiguration inbound
 no auto-summary
 no synchronization
 network 10.2.0.0 mask 255.255.0.0
 exit-address-family
!
ip route 10.2.0.0 255.255.0.0 Null0
```

E1:

```
version 12.4
!
hostname E1
!
ip cef
!
mpls label protocol ldp
!
interface Loopback0
 ip address 172.16.255.1 255.255.255.255
!
interface FastEthernet0/0
 ip address 10.1.0.2 255.255.255.252
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 172.16.1.1 255.255.255.252
 duplex auto
 speed auto
 mpls ip
!
router ospf 100
 mpls ldp autoconfig
 log-adjacency-changes
 network 172.16.1.0 0.0.0.3 area 0
 network 172.16.255.1 0.0.0.0 area 0
!
router bgp 100
 bgp log-neighbor-changes
 neighbor 10.1.0.1 remote-as 1
 neighbor 172.16.255.2 remote-as 100
 neighbor 172.16.255.2 update-source Loopback0
 !
 address-family ipv4
 neighbor 10.1.0.1 activate
 neighbor 10.1.0.1 soft-reconfiguration inbound
 neighbor 172.16.255.2 activate
 neighbor 172.16.255.2 next-hop-self
 neighbor 172.16.255.2 soft-reconfiguration inbound
 no auto-summary
 no synchronization
 network 172.16.0.0
 exit-address-family
!
ip route 172.16.0.0 255.255.0.0 Null0
```

E2:

```
version 12.4
!
hostname E2
!
ip cef
!
mpls label protocol ldp
!
interface Loopback0
 ip address 172.16.255.2 255.255.255.255
!
```

```
interface FastEthernet0/0
 ip address 10.2.0.2 255.255.255.252
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 172.16.2.2 255.255.255.252
 duplex auto
 speed auto
 mpls ip
!
router ospf 100
 mpls ldp autoconfig
 log-adjacency-changes
 network 172.16.2.0 0.0.0.3 area 0
 network 172.16.255.2 0.0.0.0 area 0
!
router bgp 100
 bgp log-neighbor-changes
 neighbor 10.2.0.1 remote-as 2
 neighbor 172.16.255.1 remote-as 100
 neighbor 172.16.255.1 update-source Loopback0
 !
 address-family ipv4
 neighbor 10.2.0.1 activate
 neighbor 10.2.0.1 soft-reconfiguration inbound
 neighbor 172.16.255.1 activate
 neighbor 172.16.255.1 next-hop-self
 neighbor 172.16.255.1 soft-reconfiguration inbound
 no auto-summary
 no synchronization
 network 172.16.0.0
 exit-address-family
!
ip route 172.16.0.0 255.255.0.0 Null0
```

I1:

```
version 12.4
!
hostname I1
!
ip cef
!
mpls label protocol ldp
!
interface Loopback0
 ip address 172.16.255.11 255.255.255.255
!
interface FastEthernet0/0
 ip address 172.16.1.2 255.255.255.252
 duplex auto
 speed auto
 mpls ip
!
interface FastEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
```

```
!
interface FastEthernet1/0
 ip address 172.16.12.1 255.255.255.252
 duplex auto
 speed auto
 mpls ip
!
router ospf 100
 mpls ldp autoconfig
 log-adjacency-changes
 network 172.16.1.0 0.0.0.3 area 0
 network 172.16.12.0 0.0.0.3 area 0
 network 172.16.255.11 0.0.0.0 area 0
```

I2:

```
version 12.4
!
hostname I2
!
ip cef
!
mpls label protocol ldp
!
interface Loopback0
 ip address 172.16.255.12 255.255.255.255
!
interface FastEthernet0/0
 ip address 172.16.2.1 255.255.255.252
 duplex auto
 speed auto
 mpls ip
!
interface FastEthernet0/1
 ip address 172.16.12.2 255.255.255.252
 duplex auto
 speed auto
 mpls ip
!
router ospf 100
 mpls ldp autoconfig
 log-adjacency-changes
 network 172.16.2.0 0.0.0.3 area 0
 network 172.16.12.0 0.0.0.3 area 0
 network 172.16.255.12 0.0.0.0 area 0
```

Ora un piccolo test... (10.1.1.1 è la loopback di **T1**)

```
T2#traceroute 10.1.1.1

Type escape sequence to abort.
Tracing the route to 10.1.1.1

  1 10.2.0.2 8 msec 20 msec 12 msec
  2 172.16.2.1 [AS 100] [MPLS: Label 17 Exp 0] 88 msec 52 msec 80 msec
  3 172.16.12.1 [AS 100] [MPLS: Label 16 Exp 0] 76 msec 96 msec 68 msec
  4 172.16.1.1 [AS 100] 60 msec 100 msec 96 msec
  5 10.1.0.1 [AS 1] 96 msec 108 msec *
```