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# **OSPF and EIGRP AS Redistribution**

Advanced Routing

daniel.juarez@iteso.mx, enrique.rios@iteso.mx, TEAM: 5

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# 1 Contextualization

Nowadays the existence of different interconnected WANs require a strong but simple level of organization to become scalable, unique, maintainable and acquire autonomy. The way the previous is achieved is by the use of an *Autonomous System Number*, which is a set of IP networks that operate under a single administrative entity (e.g. ISPs networks). The need of interconnecting AS will be covered in further sections where the main objective is to demonstrate how AS using different routing protocols are redistributed in such a way they know each other's networks and achieve multiple WANs interconnected.

## 1.1 Network Topology

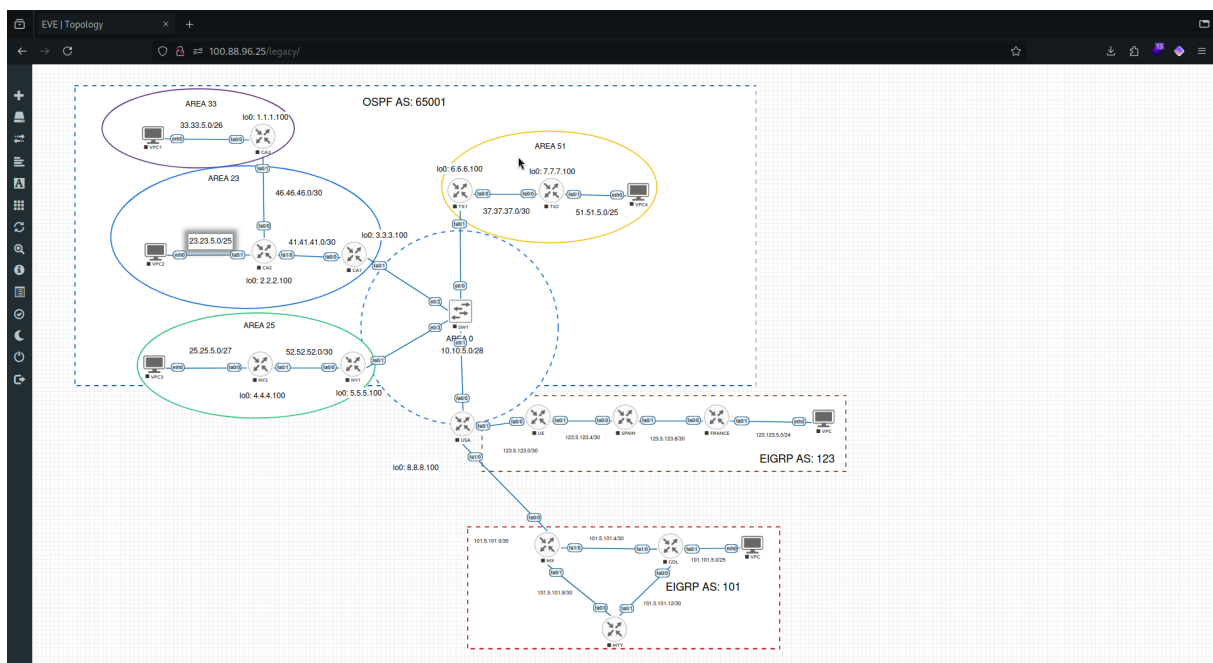


Figure 1.1: Network Topology

## 1.2 Objectives

- Interconnect three different autonomous systems.
- Configure the OSPF and EIGRP AS.
- Redistribute EIGRP and OSPF protocols among all the AS.

## 2 Methodology

**NOTE:** This technical report does not cover the configuration of the OSPF AS

### 2.1 EIGRP Configuration for 101 and 123 AS

**Asuming all network devices have already been configure with an ip address and their respective interfaces are turned on:**

- Configure EIGRP in all routers including the ASBR:

```
router eigrp {ASN}
network {IPv4} {Wildcard} # repeat for each network directly connected to the router
no auto
```

Even if summarization seems viable for both AS, consider there are networks that will not fit in the summarized network, therefore, summarization might not work.

- For the ASBR (USA router), configure both AS and add it to the OSPF AS by performing the following command:

```
router ospf {ASN}
network {IPv4} {Wildcard} area 0
```

### 2.2 AS Redistribution

The redistribution process will happen on the ASBR, since the gateway is directly connected to all three AS sections, thus participates in the three routing processes, it has the hability to redistribute networks to each AS.

In this case, the AS 123 and 101 need to know each other as well as they need to know ospf networks, and ospf networks need to know both EIGRP AS, we can achieve this by entering the following commands on the ASBR:

- Redistribute EIGRP and OSPF AS into another EIGRP AS [1]

```
router eigrp {AS}
redistribute eigrp {AS_to_redistribute}
redistribute ospf {AS_to_redistribute} metric {Bandwidth} {Delay} {Reliability} {Load} {MTU}
```

You would redistribute the 123 and 65001 AS in the 101 as follows:

```
router eigrp 101
redistribute eigrp 123
redistribute ospf 65001
```

The arguments of the **metric** parameter in the OSPF redistribution command can be automatically assigned by the router.

- Redistribute EIGRP AS into a OSPF AS [2]

```
router ospf {AS}
redistribute eigrp {AS_to_redistribute} metric 1 subnets
```

The **subnets** parameter will indicate to redistribute all subnets instead of just classful networks

## 3 PoC

### 3.1 Trace Command from the 101 AS VPC to all VPCs

```
File Edit Tabs Help
Trying 100.88.96.25...
Connected to 100.88.96.25.
Escape character is '^]'.

VPCS> show

NAME      IP/MASK      GATEWAY
VPCS1 101.101.5.2/25 101.101.5.1
      fe80::250:79ff:fe66:6815/64

VPCS> trace 33.33.5.2
trace to 33.33.5.2, 8 hops max, press Ctrl+C to stop
 1 101.101.5.1  2.750 ms  9.488 ms  9.618 ms
 2 101.5.101.5 20.072 ms 19.973 ms 19.801 ms
 3 101.5.101.1 30.276 ms 30.185 ms 40.281 ms
 4 10.10.5.1   60.762 ms 39.411 ms 40.493 ms
 5 41.41.41.1  51.762 ms 50.085 ms 49.646 ms
 6 46.46.46.1  60.724 ms 60.778 ms 81.171 ms
 7 *33.33.5.2 71.263 ms (ICMP type:3, code:3, Destination port unreachable)

VPCS> |
```

Figure 3.1: 101-VPC1

```
File Edit Tabs Help
Trying 100.88.96.25...
Connected to 100.88.96.25.
Escape character is '^J'.

VPCS> show

NAME  IP/MASK      GATEWAY      GATEWAY
VPCS1 101.101.5.2/25 101.101.5.1
      fe80::250:79ff:fe66:6815/64

VPCS> trace 23.23.5.2
trace to 23.23.5.2, 8 hops max, press Ctrl+C to stop
 1 101.101.5.1  3.903 ms  9.545 ms  6.590 ms
 2 101.5.101.5 31.160 ms 23.400 ms 28.873 ms
 3 101.5.101.1 51.598 ms 30.471 ms 41.465 ms
 4 10.10.5.1   51.893 ms 50.511 ms 52.861 ms
 5 41.41.41.1  53.455 ms 48.233 ms 50.464 ms
 6 **23.23.5.2 63.175 ms (ICMP type:3, code:3, Destination port unreachable)

VPCS> 
```

**Figure 3.2:** 101-VPC2

```
File Edit Tabs Help
Trying 100.88.96.25...
Connected to 100.88.96.25.
Escape character is '^J'.

VPCS>
VPCS> show

NAME  IP/MASK      GATEWAY      GATEWAY
VPCS1 101.101.5.2/25 101.101.5.1
      fe80::250:79ff:fe66:6815/64

VPCS> trace 25.25.5.2
trace to 25.25.5.2, 8 hops max, press Ctrl+C to stop
 1 101.101.5.1  6.432 ms  9.796 ms  9.965 ms
 2 101.5.101.5 19.753 ms 20.601 ms 20.208 ms
 3 101.5.101.1 40.618 ms 31.776 ms 42.404 ms
 4 10.10.5.2   50.371 ms 40.026 ms 50.109 ms
 5 52.52.52.1  59.831 ms 50.220 ms 61.243 ms
 6 **25.25.5.2 77.879 ms (ICMP type:3, code:3, Destination port unreachable)

VPCS> 
```

**Figure 3.3:** 101-VPC3



```
File Edit Tabs Help
Trying 100.88.96.25...
Connected to 100.88.96.25.
Escape character is '^J'.

VPCS>
VPCS> show

NAME      IP/MASK      GATEWAY      GATEWAY
VPCS1    101.101.5.2/25  101.101.5.1
         fe80::250:79ff:fe66:6815/64

VPCS> trace 51.51.5.2
trace to 51.51.5.2, 8 hops max, press Ctrl+C to stop
 1 101.101.5.1  9.669 ms  10.327 ms  9.794 ms
 2 101.5.101.5  30.946 ms  21.300 ms  20.599 ms
 3 101.5.101.1  40.649 ms  30.242 ms  40.005 ms
 4 10.10.5.4    50.592 ms  51.298 ms  60.181 ms
 5 37.37.37.2   80.322 ms  71.834 ms  50.878 ms
 6 *51.51.5.2  70.618 ms (ICMP type:3, code:3, Destination port unreachable)

VPCS> |
```

**Figure 3.4:** 101-VPC4

```
File Edit Tabs Help
Trying 100.88.96.25...
Connected to 100.88.96.25.
Escape character is '^J'.

VPCS> trace 123.123.5.2
trace to 123.123.5.2, 8 hops max, press Ctrl+C to stop
 1 101.101.5.1  7.452 ms  9.282 ms  10.410 ms
 2 101.5.101.5  20.370 ms  19.564 ms  20.381 ms
 3 101.5.101.1  29.766 ms  29.943 ms  29.847 ms
 4 123.5.123.2  40.756 ms  39.749 ms  39.792 ms
 5 123.5.123.6  51.413 ms  71.262 ms  60.500 ms
 6 123.5.123.10 80.718 ms  71.937 ms  70.645 ms
 7 *123.123.5.2 81.171 ms (ICMP type:3, code:3, Destination port unreachable)

VPCS> |
```

**Figure 3.5:** 101-123

### 3.2 ASBR (USA) configuration and routing table

```
File Edit Tabs Help
Interface FastEthernet1/0
ip address 101.5.101.1 255.255.255.252
speed 100
full-duplex
!
Interface FastEthernet2/0
no ip address
shutdown
duplex auto
speed auto
!
router eigrp 123
 redistribute ospf 65001 metric 1000 100 255 1 1500
 redistribute eigrp 101
 network 123.5.123.0 0.0.0.3
 auto-summary
!
router eigrp 101
 redistribute eigrp 123
 redistribute ospf 65001
 network 101.5.101.0 0.0.0.3
 auto-summary
!
router ospf 65001
 log-adjacency-changes
 redistribute eigrp 123 metric 1 subnets
 redistribute eigrp 101 metric 1 subnets
 network 10.10.5.0 0.0.0.15 area 0
!
ip forward-protocol nd
!
!
ip http server
no ip http secure-server
!
!
control-plane
```

**Figure 3.6:** Running config router processes and redistribution

```

File Edit Tabs Help
USA#
USA#
USA#
USA#
USA#
USA#sh ip rou
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
       i - IS-IS, su - IS-IS summary, 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

51.0.0.0/25 is subnetted, 1 subnets
O IA 51.51.5.0 [110/30] via 10.10.5.4, 01:44:18, FastEthernet0/0
33.0.0.0/26 is subnetted, 1 subnets
O IA 33.5.0 [110/31] via 10.10.5.1, 01:44:18, FastEthernet0/0
101.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
D 101.5.101.4/30 [90/30720] via 101.5.101.2, 01:44:41, FastEthernet1/0
D 101.101.5.0/25 [90/286720] via 101.5.101.2, 00:07:25, FastEthernet1/0
C 101.5.101.0/30 is directly connected, FastEthernet1/0
D 101.5.101.12/30 [90/286720] via 101.5.101.2, 00:07:27, FastEthernet1/0
D 101.5.101.8/30 [90/284160] via 101.5.101.2, 01:44:42, FastEthernet1/0
23.0.0.0/25 is subnetted, 1 subnets
O IA 23.23.5.0 [110/21] via 10.10.5.1, 01:44:19, FastEthernet0/0
52.0.0.0/30 is subnetted, 1 subnets
O IA 52.52.52.0 [110/20] via 10.10.5.2, 01:44:20, FastEthernet0/0
37.0.0.0/30 is subnetted, 1 subnets
O IA 37.37.37.0 [110/20] via 10.10.5.4, 01:44:20, FastEthernet0/0
25.0.0.0/27 is subnetted, 1 subnets
O IA 25.25.5.0 [110/30] via 10.10.5.2, 01:44:20, FastEthernet0/0
10.0.0.0/28 is subnetted, 1 subnets
C 10.10.5.0 is directly connected, FastEthernet0/0
41.0.0.0/30 is subnetted, 1 subnets
O IA 41.41.41.0 [110/11] via 10.10.5.1, 01:44:20, FastEthernet0/0
123.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
D 123.5.123.4/30 [90/307200] via 123.5.123.2, 01:43:14, FastEthernet0/1
D 123.123.5.0/24 [90/358400] via 123.5.123.2, 01:43:14, FastEthernet0/1
C 123.5.123.0/30 is directly connected, FastEthernet0/1
D 123.5.123.8/30 [90/332800] via 123.5.123.2, 01:43:14, FastEthernet0/1
46.0.0.0/30 is subnetted, 1 subnets
O IA 46.46.46.0 [110/21] via 10.10.5.1, 01:44:20, FastEthernet0/0

```

**Figure 3.7:** Routing table

### 3.3 France, GDL and Ca3 routing tables

```

File Edit Tabs Help

*Mar 1 02:11:28.403: %SYS-5-CONFIG_I: Configured from console by console
FRANCE>
FRANCE>en
FRANCE>sh ip rou
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
        I - IS-IS, su - IS-IS summary, 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

  51.0.0.0/25 is subnetted, 1 subnets
D EX  51.51.5.0 [170/2662400] via 123.5.123.9, 01:09:25, FastEthernet0/0
  33.0.0.0/26 is subnetted, 1 subnets
D EX  33.33.5.0 [170/2662400] via 123.5.123.9, 01:09:25, FastEthernet0/0
  101.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
D EX  101.5.101.4/30 [170/337920] via 123.5.123.9, 00:57:40, FastEthernet0/0
D EX  101.101.5.0/25 [170/363520] via 123.5.123.9, 00:04:44, FastEthernet0/0
D EX  101.5.101.0/30 [170/335360] via 123.5.123.9, 00:57:40, FastEthernet0/0
D EX  101.5.101.12/30
      [170/363520] via 123.5.123.9, 00:04:47, FastEthernet0/0
D EX  101.5.101.8/30 [170/360960] via 123.5.123.9, 00:57:42, FastEthernet0/0
  23.0.0.0/25 is subnetted, 1 subnets
D EX  23.23.5.0 [170/2662400] via 123.5.123.9, 01:09:27, FastEthernet0/0
  52.0.0.0/30 is subnetted, 1 subnets
D EX  52.52.52.0 [170/2662400] via 123.5.123.9, 01:09:29, FastEthernet0/0
  37.0.0.0/30 is subnetted, 1 subnets
D EX  37.37.37.0 [170/2662400] via 123.5.123.9, 01:09:29, FastEthernet0/0
  25.0.0.0/27 is subnetted, 1 subnets
D EX  25.25.5.0 [170/2662400] via 123.5.123.9, 01:09:29, FastEthernet0/0
  10.0.0.0/28 is subnetted, 1 subnets
D EX  10.10.5.0 [170/2662400] via 123.5.123.9, 01:09:29, FastEthernet0/0
  41.0.0.0/30 is subnetted, 1 subnets
D EX  41.41.41.0 [170/2662400] via 123.5.123.9, 01:09:29, FastEthernet0/0
  123.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
D   123.5.123.4/30 [90/307200] via 123.5.123.9, 01:12:27, FastEthernet0/0
C   123.123.5.0/24 is directly connected, FastEthernet0/1
D   123.5.123.0/30 [90/332800] via 123.5.123.9, 01:12:27, FastEthernet0/0
C   123.5.123.8/30 is directly connected, FastEthernet0/0
  46.0.0.0/30 is subnetted, 1 subnets
D EX  46.46.46.0 [170/2662400] via 123.5.123.9, 01:09:31, FastEthernet0/0
FRANCE#

```

Figure 3.8: France routing table

```

File Edit Tabs Help

*Mar 1 02:41:00.675: %DUAL-5-NBRCHANGE: IP-EIGRP(0) 101: Neighbor 101.5.101.5 (FastEthernet1/0) is up: new adjacency
GDL(config-if)#
GDL(config-if)#
GDL(config-if)#
GDL(config-if)#
GDL(config-if)#do sh ip rou
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
        I - IS-IS, su - IS-IS summary, 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

  51.0.0.0/25 is subnetted, 1 subnets
D EX  51.51.5.0 [170/2590720] via 101.5.101.5, 00:09:52, FastEthernet1/0
  33.0.0.0/26 is subnetted, 1 subnets
D EX  33.33.5.0 [170/2590720] via 101.5.101.5, 00:09:52, FastEthernet1/0
  101.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
C   101.5.101.4/30 is directly connected, FastEthernet1/0
C   101.101.5.0/25 is directly connected, FastEthernet0/1
D   101.5.101.0/30 [90/30720] via 101.5.101.5, 00:09:52, FastEthernet1/0
C   101.5.101.12/30 is directly connected, FastEthernet0/0
D   101.5.101.8/30 [90/284160] via 101.5.101.5, 00:09:53, FastEthernet1/0
  23.0.0.0/25 is subnetted, 1 subnets
D EX  23.23.5.0 [170/2590720] via 101.5.101.5, 00:09:53, FastEthernet1/0
  52.0.0.0/30 is subnetted, 1 subnets
D EX  52.52.52.0 [170/2590720] via 101.5.101.5, 00:09:54, FastEthernet1/0
  37.0.0.0/30 is subnetted, 1 subnets
D EX  37.37.37.0 [170/2590720] via 101.5.101.5, 00:09:54, FastEthernet1/0
  25.0.0.0/27 is subnetted, 1 subnets
D EX  25.25.5.0 [170/2590720] via 101.5.101.5, 00:09:54, FastEthernet1/0
  10.0.0.0/28 is subnetted, 1 subnets
D EX  10.10.5.0 [170/2590720] via 101.5.101.5, 00:09:54, FastEthernet1/0
  41.0.0.0/30 is subnetted, 1 subnets
D EX  41.41.41.0 [170/2590720] via 101.5.101.5, 00:09:54, FastEthernet1/0
  123.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
D EX  123.5.123.4/30 [170/312320] via 101.5.101.5, 00:09:54, FastEthernet1/0
D EX  123.123.5.0/24 [170/363520] via 101.5.101.5, 00:09:54, FastEthernet1/0
D EX  123.5.123.0/30 [170/286720] via 101.5.101.5, 00:09:54, FastEthernet1/0
D EX  123.5.123.8/30 [170/337920] via 101.5.101.5, 00:09:54, FastEthernet1/0
  46.0.0.0/30 is subnetted, 1 subnets
D EX  46.46.46.0 [170/2590720] via 101.5.101.5, 00:09:55, FastEthernet1/0
GDL(config-if)#

```

Figure 3.9: GDL routing table

```

File Edit Tabs Help
CA3>
CA3>
CA3#sh
CA3#sh ip rou
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
        i - IS-IS, su - IS-IS summary, 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

  51.0.0.0/25 is subnetted, 1 subnets
O IA  51.51.5.0 [110/41] via 46.46.46.2, 02:08:52, FastEthernet0/1
  1.0.0.0/32 is subnetted, 1 subnets
C     1.1.1.100 is directly connected, Loopback0
  33.0.0.0/26 is subnetted, 1 subnets
C     33.33.5.0 is directly connected, FastEthernet0/0
 101.0.0.0/8 is variably subnetted, 5 subnets, 2 masks
O E2  101.5.101.4/30 [110/1] via 46.46.46.2, 01:47:09, FastEthernet0/1
O E2  101.101.5.0/25 [110/1] via 46.46.46.2, 00:10:27, FastEthernet0/1
O E2  101.5.101.0/30 [110/1] via 46.46.46.2, 01:47:10, FastEthernet0/1
O E2  101.5.101.12/30 [110/1] via 46.46.46.2, 00:10:29, FastEthernet0/1
O E2  101.5.101.8/30 [110/1] via 46.46.46.2, 01:47:10, FastEthernet0/1
  23.0.0.0/25 is subnetted, 1 subnets
O     23.23.5.0 [110/20] via 46.46.46.2, 02:09:41, FastEthernet0/1
  52.0.0.0/30 is subnetted, 1 subnets
O IA  52.52.52.0 [110/31] via 46.46.46.2, 02:08:54, FastEthernet0/1
  37.0.0.0/30 is subnetted, 1 subnets
O IA  37.37.37.0 [110/31] via 46.46.46.2, 02:08:54, FastEthernet0/1
  25.0.0.0/27 is subnetted, 1 subnets
O IA  25.25.5.0 [110/41] via 46.46.46.2, 02:08:54, FastEthernet0/1
  10.0.0.0/28 is subnetted, 1 subnets
O     10.10.5.0 [110/21] via 46.46.46.2, 02:00:10, FastEthernet0/1
  41.0.0.0/30 is subnetted, 1 subnets
O     41.41.41.0 [110/11] via 46.46.46.2, 02:09:41, FastEthernet0/1
 123.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
O E2  123.5.123.4/30 [110/1] via 46.46.46.2, 01:46:16, FastEthernet0/1
O E2  123.123.5.0/24 [110/1] via 46.46.46.2, 01:46:16, FastEthernet0/1
O E2  123.5.123.0/30 [110/1] via 46.46.46.2, 01:46:15, FastEthernet0/1
O E2  123.5.123.8/30 [110/1] via 46.46.46.2, 01:46:16, FastEthernet0/1
  46.0.0.0/30 is subnetted, 1 subnets
C     46.46.46.0 is directly connected, FastEthernet0/1
CA3#

```

Figure 3.10: CA3 routing table

## 4 Team Findings and Member's conclusions

**Rios Gomez Jose Enrique** In conclusion, the practice was very cool in combination with the ospf practice because we are already creating much bigger networks than in the last semester and there are more requirements, but also on the other hand it becomes a little complicated if you didn't understand something because in the internet is a little complicated to find the solution to that doubt.

**Juarez Mota Daniel Alejandro:** Trough the practice I reviewed the concept of redistribution studied during Introduction to Networks in first semester. I learned what redistribution is, how it works and why it is necessary. I also learned about the ASN and its importance in the real world, I recapitulated about summarization as well when configuring routing procesess as I was not understanding at all why no auto summarization could be benefical in the majority of scenarios. I did not present any complications related to the configuration and reporting process, however our team experimented some with our EVE-NG instance as it removed all configurations with no advertisement (even if we saved the configurations in the running config file).

## 5 References

[1]

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