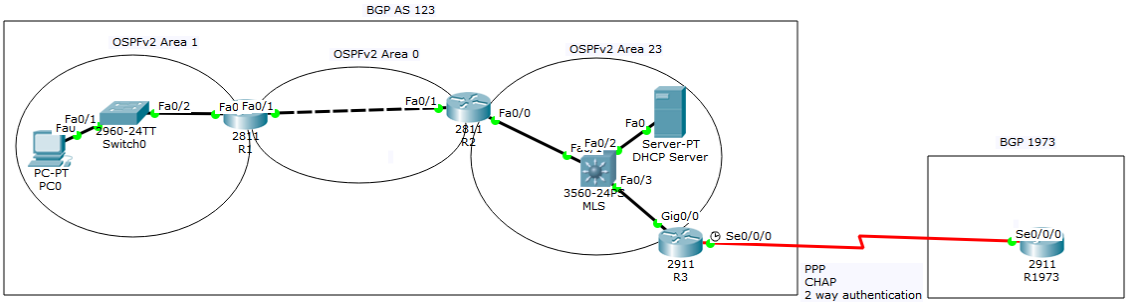
CCNA Workbook Lab 2



Task 1 Configure R1, R2, R3 & R1973 with IPv4 address as the following :

R1

int f0/0
ip add 10.1.1.1 255.255.255.0
no sh
int f0/1
ip add 10.12.12.1 255.255.255.0
no sh

R2

int f0/0
ip add 10.23.23.2 255.255.255.0
no sh
int f0/1
ip add 10.12.12.2 255.255.255.0
no sh

R3

int loopback 3
ip add 3.3.3.3 255.0.0.0
int loopback33
ip add 33.33.33.33 255.0.0.0
int g0/0
ip add 10.23.23.3 255.255.255.0
no sh
int s0/0/0
ip add 30.30.30.3 255.255.255.0
no sh

R1973

int loop1973
ip add 73.73.73.73 255.255.255.0
int s0/0/0
ip add 30.30.30.73 255.255.255.0
no sh

Task 2 Configure serial interfaces between R3 7 R1973 with PPP encapsulation protocol and make sure both routers authenticate each other with strongest possible authentication protocol….use "cisco" password if need it.

R3
int s0/0/0
encap ppp
ppp auth chap
exit
username R1973 password cisco

R1973
int s0/0/0
encap ppp
ppp auth chap
exit
username R3 password cisco

We used CHAP instead of PAP because PAP will send username/password in clear text
Notice R1 username in R1 should the same R2 hostname
Notice R1 password should be identical to password written in R2
And vice versa

Still you can make both username and password unique but this beyond CCNA R&S outlines more about that in following link:
https://learningnetwork.cisco.com/docs/DOC-25028

Task 3 configure OSPFv2 between R1,R2&R3 according to the following requirements:

- **R2 will use router-id 0.0.0.2**
- **R1 ,R2 & R3 Should advertise all connected networks**
- **Use process id number 100 for all routers**
- **R1 interface f0/0 will be connected to Area 1 , R1 interface f0/1 will be connected to Area 0**
- **R2 interface f0/0 will be connected to Area 23 , R1 interface f0/1 will be connected to Area 0**
- **R3 interface f0/0 ,interface loopback3 & loopback33 will be connected to Area 23**
- **R1 should not send hello messages out of all his current and future added interfaces expect f0/1**
- **OSPF uses designated routers on all multi-access networks (broadcast and non-broadcast multi-access [NBMA] networks types),so make sure R2 should be Always DR**
- **Configure R3 to work as default gateway for all OSPF routers to communicate with any other networks**

R1

```
router ospf 100
network 10.1.1.0 0.0.0.255 area 1
network 10.12.12.0 0.0.0.255 area 0
passive-interface def
no passive-interface f0/1
```

R2

```
router ospf 100
router-id 0.0.0.2
network 10.23.23.0 0.0.0.255 area 23
network 10.12.12.0 0.0.0.255 area 0
int f0/0
ip ospf pri 255
```

R3

```
router ospf 100
network 10.23.23.0 0.0.0.255 area 23
network 3.0.0.0 0.255.255.255 area 23
network 33.0.0.0 0.255.255.255  area 23
default-information originate     < Read the last page for details about this command
 exit
 ip route 0.0.0.0 0.0.0.0 30.30.30.3
```

```
R1#sh ip route ospf | include O*E2
O*E2 0.0.0.0/0 [110/1] via 10.12.12.2, 00:19:11, FastEthernet0/1
```

```
R2#sh ip route ospf | include O*E2
O*E2 0.0.0.0/0 [110/1] via 10.23.23.3, 00:20:29, FastEthernet0/0
```

Task 4 Configure BGP between R3 & R1973 according to the following requirements:

- **all OSPF routers are exists in BGPAS#3 , R3 should establish external BGP neighbor relationship with R1973**
- **R1973 is exist in BGP AS#1973 and should advertise his loopback interface to R3**
- **R1973 should have default route point to R3**

R3

router bgp 123
nei 30.30.30.73 remote 1973

R1973

router bgp 1973
nei 30.30.30.3 remote 123
network 73.73.73.0 mask 255.255.255.0

ip route 0.0.0.0 0.0.0.0 30.30.30.3

```
R3#sh ip bgp summary
BGP router identifier 33.33.33.33, local AS number 123
BGP table version is 2, main routing table version 6
1 network entries using 132 bytes of memory
1 path entries using 52 bytes of memory
1/1 BGP path/bestpath attribute entries using 184 bytes of memory
1 BGP AS-PATH entries using 24 bytes of memory
0 BGP route-map cache entries using 0 bytes of memory
0 BGP filter-list cache entries using 0 bytes of memory
Bitfield cache entries: current 1 (at peak 1) using 32 bytes of memory
BGP using 424 total bytes of memory
BGP activity 1/0 prefixes, 1/0 paths, scan interval 60 secs

Neighbor        V    AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
30.30.30.73     4  1973      24      23        2    0    0 00:21:38        4


R3#sh ip bgp
BGP table version is 2, local router ID is 33.33.33.33
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network          Next Hop            Metric LocPrf Weight Path
*> 73.73.73.0/24     30.30.30.73              0     0      0 1973 i
```

Task 5 make sure R3 IOS is supporting all VOIP commands and advanced security configuration, use evaluation license for that.

R3
license boot module c2900 technology-package uck9
ACCEPT? [yes/no]: yes
license boot module c2900 technology-package securityk9
ACCEPT? [yes/no]: yes
do wr
do reload

more about IOS licenses :
https://learningnetwork.cisco.com/docs/DOC-20321

Task 6 configure R1 to act as DHCP Relay Agent and make sure PC0 can get IPv4 address from DHCP server which have IPv4 address 10.23.23.100

R1
int f0/0
ip helper-address 10.23.23.100

Task 7 configure R1, R2, R3, R1973 with IPv6 address as the following

- **Also make sure IPV6 routing capability is enabled on all router**
- **Make sure R1 int f0/0 is using fe80::1 link local address**
- **Make sure the R1 is using EUI-64 feature for his global address at f0/0 interface**

R1

```
ipv6 unicast-routing
int f0/0
ipv6 add fe80::1 link-local
ipv6 add 2001:10:10:10::/64 eui-64
int f0/1
ipv6 add 2001:11:11:11::1/64
```

R2

```
ipv6 unicast-routing
int f0/0
ipv6 add 2001:12:12:12::2/64
int f0/1
ipv6 add 2001:11:11:11::2/64
```

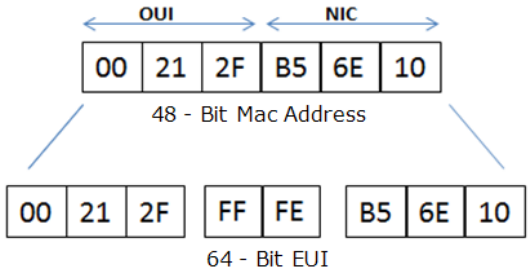
R3

```
ipv6 unicast-routing
int g0/0
ipv6 add 2001:12:12:12::2/64
int s0/0/0
ipv6 add 2001:30:30:30::3/64
```

R1973

```
int loopback 3
ipv6 add 2001:1973:1973:1973::1973/64
int f0/0
ipv6 add 2001:30:30:30::1973/64
```

The IPv6 EUI-64 format address is obtained through the 48-bit MAC address. The MAC address is first separated into two 24-bits, with one being OUI (Organizationally Unique Identifier) and the other being NIC specific. The 16-bit 0xFFFE is then inserted between these two 24-bits for the 64-bit EUI address. IEEE has chosen FFFE as a reserved value which can only appear in EUI-64 generated from the an EUI-48 MAC address.



Task 8 Configure OSPFv3 between R1,R2&R3 according to the following requirements:
• R1 will use router-id 0.0.0.1 , R2 will use router-id 0.0.0.2 , R3 will use router-id 0.0.0.3
•R1 ,R2 & R3 Should advertise all IPv6 connected networks
•Use process id number 100 for all routers
•R1 interface f0/0 will be connected to Area 1 , R1 interface f0/1 will be connected to Area 0
•R2 interface f0/0 will be connected to Area 23 , R1 interface f0/1 will be connected to Area 0
•R3 interface g0/0 will be connected to Area 23
•R1 should not send hello messages out of all his current and future added interfaces expect f0/1
•Configure R3 to work as default gateway for all OSPF routers to communicate with any other networks

R1
ipv6 router ospf 100
router-id 0.0.0.1
passive-interface def
no passive-interface f0/1
int f0/0
ipv6 ospf 100 area 1
int f0/1
ipv6 ospf 100 area 0

R2
ipv6 router ospf 100
router-id 0.0.0.2
int f0/0
ipv6 ospf 100 area 23
int f0/1
ipv6 ospf 100 area 0

R3
ipv6 router ospf 100
router-id 0.0.0.3
default-information originate
int g0/0
ipv6 ospf 100 area 23
int loopback3
ipv6 ospf 100 area 23
exit
ipv6 route ::/0 2001:30:30:30::1973

Task 9

Configure EIGRPv6 between R3&R1973 according to the following requirements:

- **AS number is 100**
- **R3 will use router-id 0.0.0.3 , R1973 will use router-id 0.0.0.73**
- **R1973 should advertise his loopback to R3 through eigrpv6**
- **Configure R1973 with IPv6 default route point to R3 as next hop to communicate with any other networks**

R3

```
ipv6 router eigrp 100
eigrp router-id 0.0.0.3
no shutdown
exit
int s0/0/0
ipv6 eigrp 100
```

R1973

```
ipv6 router eigrp 100
eigrp router-id 0.0.0.73
no shutdown
exit
int s0/0/0
ipv6 eigrp 100
int loopback 3
ipv6 eigrp 100
ipv6 route ::/0 2001:30:30:30::3
```

Without “no shutdown” EIGRPv6 will not really work and function

Ok Redistribution commands is CCNP R&S topic , the main benefits of it is how we can make Different networks with different IGP protocols running talk to each other .

But as CCNA R&S you should be able to do it without even using these advanced commands.
To do so we will use two commands:

ip default-network command

you can use ip default-network when ip routing such as RIP or EIGRP (but Not IS-IS & OSPF) is enabled on the Cisco router.
When you configure ip default-network the router considers routes to that network for installation as the gateway of last resort on the router.
the network specified in the ip default-network command need not be explicitly advertised under RIP.

default-information originate command & **default-information originate always** command

Used in OSPF , There are two ways to inject a default route into a normal area.

If the ASBR already has the default route in its routing table, you can advertise the existing 0.0.0.0/0 into the OSPF domain with the default-information originate router configuration command.

If the ASBR doesn't have a default route, you can add the keyword [always] to the default-information originate command (default-information originate always).

This command will advertise a default route into the OSPF domain, regardless of whether it has a route to 0.0.0.0.
Another benefit of adding always keyword is that it can add stability to the internetwork.

For example, if the ASBR is learning a default route from another routing domain such as RIP and this route is flapping, then without the [always] keyword, each time the route flaps, the ASBR will send a new Type 5 LSA into the OSPF domain causing some instability inside the OSPF domain.
With the [always] keyword, the ASBR will advertise the default inside the OSPF domain always, and thus the flapping of the default route from the RIP domain will not cause any instability inside the OSPF domain.

Let's do a lab using Packet Tracer 7 , later if you want to learn Redistribution commands explained for CCNP & CCIE R&S level , you can check my guide here :
https://learningnetwork.cisco.com/docs/DOC-24176

Good Luck
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