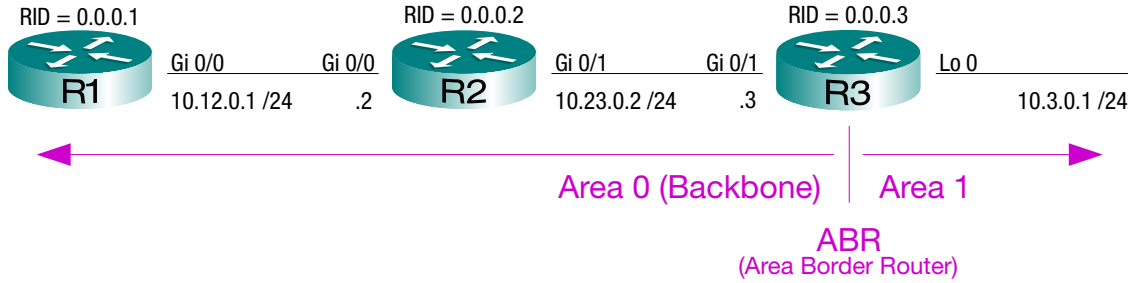
8b. Multi-Area OSPF

CONFIGURATION & VERIFICATION

ABR (Area Border Router)—A router whose network commands place interfaces into more than one OSPF area. One of those areas will need to be area 0, since all OSPF areas must either connect to area 0 or be area 0. ABRs are possible because *networks* are in areas, not routers. It's simple for networks from more than one area to attach to the same router, literally making it an Area Border Router.

Multi-Area OSPF configuration is no more difficult than single-area. Every network statement already required you to specify its area, now it just won't always be 0.




```
R3(config-if)# router ospf 30
R3(config-router)# router-id 0.0.0.3
R3(config-router)# network 10.23.0.0 0.0.0.255 area 0
R3(config-router)# network 10.3.0.0 0.0.0.255 area 1
```

Show IP Route

"IA" routes are external to our OSPF area. In this case, we're on R1, so line 17 shows a normal OSPF-learned route in area 0, while line 14 shows a network from area 1, which was summarized by R3 and shared over OSPF as if it was directly connected to R3 (which in this case, it was anyway).

An interface can only be in one area, so if we make the mistake of declaring that interface to be area 0 on the ABR and 1 on the other end, we'll lose the ABR-ness of that router along with the inter-area (area 1) routes like 10.3.0.1/24 on the area 0 end.

```
1  R1# show ip route
2  Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
3         D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
4         N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
5         E1 - OSPF external type 1, E2 - OSPF external type 2
6         i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
7         ia - IS-IS inter area, * - candidate default, U - per-user static route
8         o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
9         + - replicated route, % - next hop override
10
11 Gateway of last resort is not set
12
13       10.0.0.0/8 is variably subnetted, 4 subnets, 2 masks
14 O IA     10.3.0.1/32 [110/3] via 10.12.0.2, 00:13:26, GigabitEthernet0/0
15 C        10.12.0.0/24 is directly connected, GigabitEthernet0/0
16 L        10.12.0.1/32 is directly connected, GigabitEthernet0/0
17 O        10.23.0.0/24 [110/2] via 10.12.0.2, 00:13:36, GigabitEthernet0/0
```

Show IP OSPF Interface Brief

On an ABR, this will tell if all the interfaces are in their correct OSPF areas. The "State" column refers to our own DR/BDR/DROTHER state on an interface. To find out who the DR and BDR are on an interface's LAN, drop the brief and (optionally) specify an interface.

```
R3# show ip ospf interface brief
Interface    PID   Area            IP Address/Mask    Cost  State Nbrs F/C
Gi0/1        30    0               10.23.0.3/24       1     DR    1/1
Lo0          30    1               10.3.0.1/24        1     LOOP  0/0
```