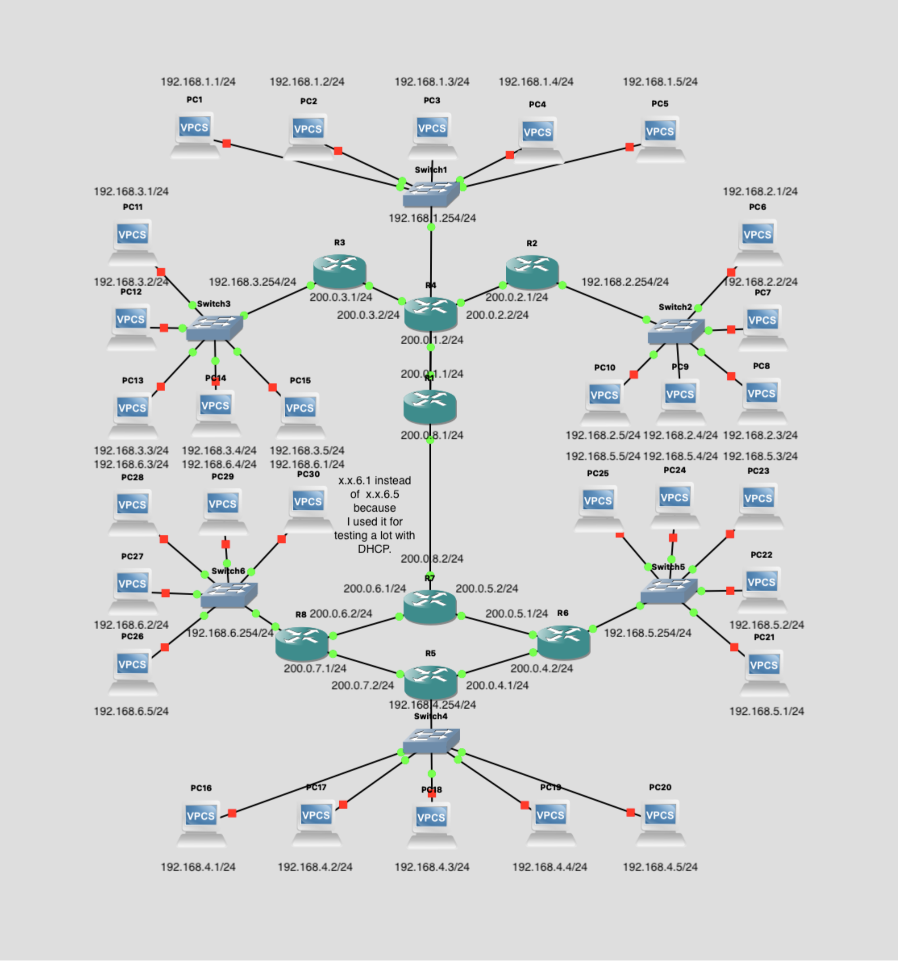
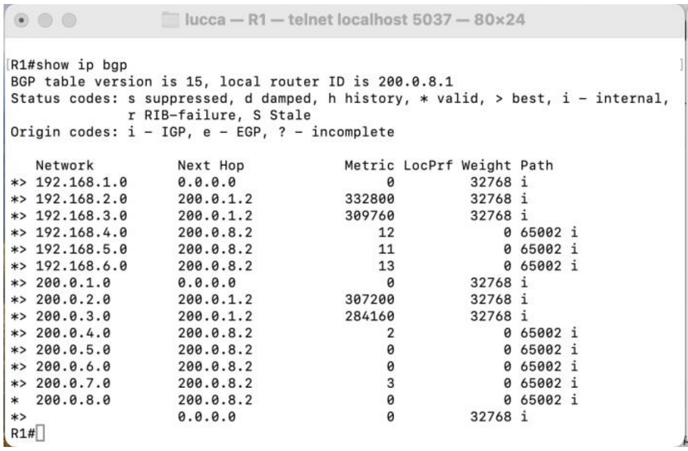
F29DC Lab 6

Topology AB:

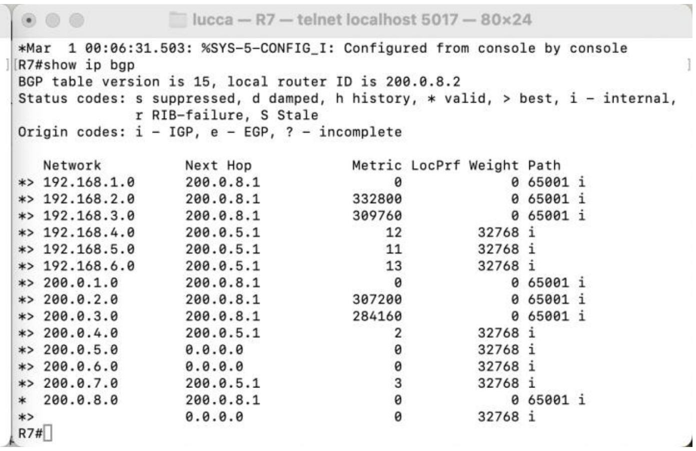


x.x.6.1 instead of x.x.6.5 because I used it for testing a lot with DHCP.

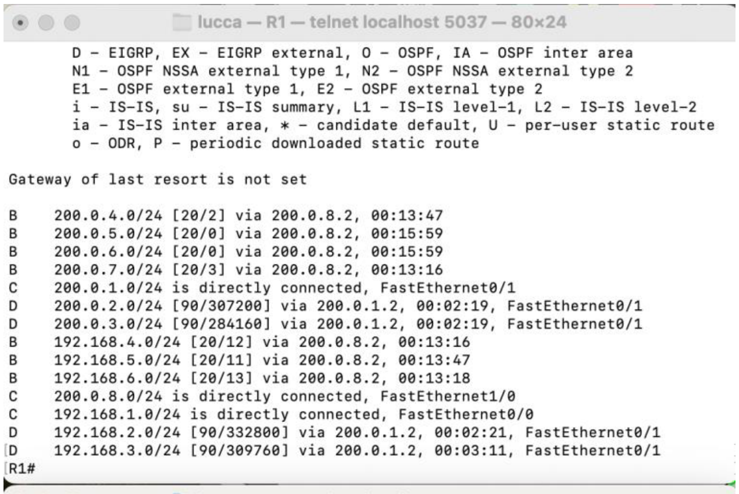
BGP Routing Proof:



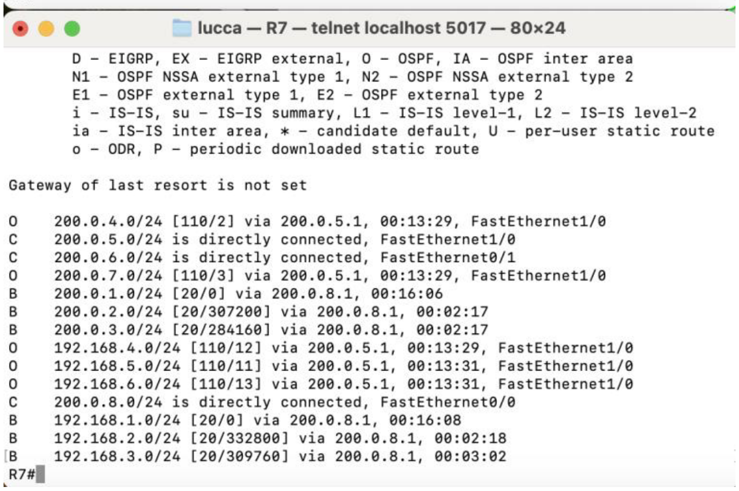
```
R1#show ip bgp
BGP table version is 15, local router ID is 200.0.8.1
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale
Origin codes: i - IGP, e - EGP, ? - incomplete

   Network          Next Hop            Metric LocPrf Weight Path
*> 192.168.1.0      0.0.0.0                  0         32768 i
*> 192.168.2.0      200.0.1.2           332800         32768 i
*> 192.168.3.0      200.0.1.2           309760         32768 i
*> 192.168.4.0      200.0.8.2               12             0 65002 i
*> 192.168.5.0      200.0.8.2               11             0 65002 i
*> 192.168.6.0      200.0.8.2               13             0 65002 i
*> 200.0.1.0        0.0.0.0                  0         32768 i
*> 200.0.2.0        200.0.1.2           307200         32768 i
*> 200.0.3.0        200.0.1.2           284160         32768 i
*> 200.0.4.0        200.0.8.2                2             0 65002 i
*> 200.0.5.0        200.0.8.2                0             0 65002 i
*> 200.0.6.0        200.0.8.2                0             0 65002 i
*> 200.0.7.0        200.0.8.2                3             0 65002 i
*  200.0.8.0        200.0.8.2                0             0 65002 i
*>                  0.0.0.0                  0         32768 i
R1#
```



```
*Mar  1 00:06:31.503: %SYS-5-CONFIG_I: Configured from console by console
R7#show ip bgp
BGP table version is 15, local router ID is 200.0.8.2
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
*> 192.168.1.0      200.0.8.1                0             0 65001 i
*> 192.168.2.0      200.0.8.1           332800             0 65001 i
*> 192.168.3.0      200.0.8.1           309760             0 65001 i
*> 192.168.4.0      200.0.5.1               12         32768 i
*> 192.168.5.0      200.0.5.1               11         32768 i
*> 192.168.6.0      200.0.5.1               13         32768 i
*> 200.0.1.0        200.0.8.1                0             0 65001 i
*> 200.0.2.0        200.0.8.1           307200             0 65001 i
*> 200.0.3.0        200.0.8.1           284160             0 65001 i
*> 200.0.4.0        200.0.5.1                2         32768 i
*> 200.0.5.0        0.0.0.0                  0         32768 i
*> 200.0.6.0        0.0.0.0                  0         32768 i
*> 200.0.7.0        200.0.5.1                3         32768 i
*  200.0.8.0        200.0.8.1                0             0 65001 i
*>                  0.0.0.0                  0         32768 i
R7#
```

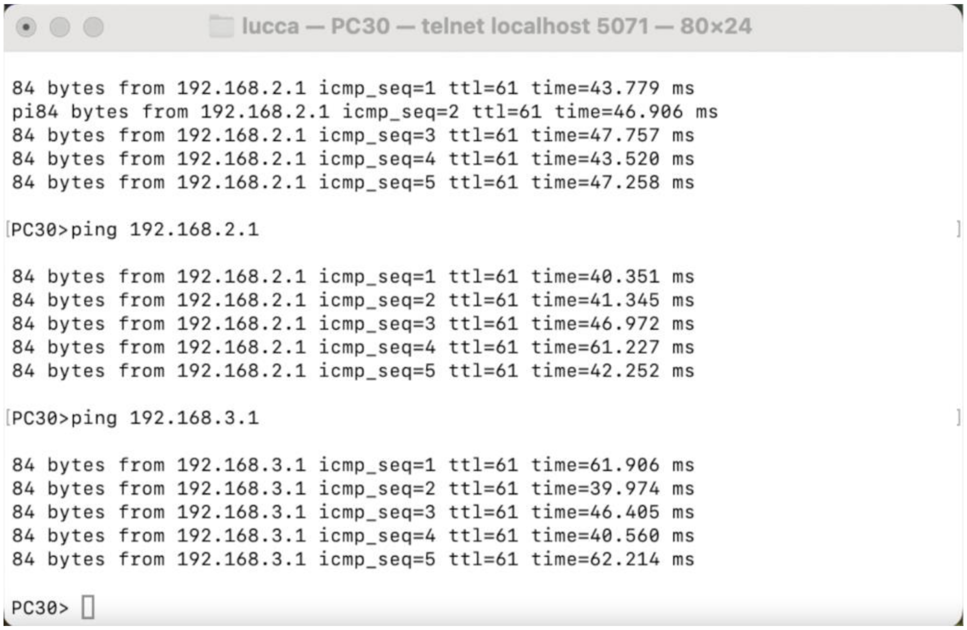


```
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

B    200.0.4.0/24 [20/2] via 200.0.8.2, 00:13:47
B    200.0.5.0/24 [20/0] via 200.0.8.2, 00:15:59
B    200.0.6.0/24 [20/0] via 200.0.8.2, 00:15:59
B    200.0.7.0/24 [20/3] via 200.0.8.2, 00:13:16
C    200.0.1.0/24 is directly connected, FastEthernet0/1
D    200.0.2.0/24 [90/307200] via 200.0.1.2, 00:02:19, FastEthernet0/1
D    200.0.3.0/24 [90/284160] via 200.0.1.2, 00:02:19, FastEthernet0/1
B    192.168.4.0/24 [20/12] via 200.0.8.2, 00:13:16
B    192.168.5.0/24 [20/11] via 200.0.8.2, 00:13:47
B    192.168.6.0/24 [20/13] via 200.0.8.2, 00:13:18
C    200.0.8.0/24 is directly connected, FastEthernet1/0
C    192.168.1.0/24 is directly connected, FastEthernet0/0
D    192.168.2.0/24 [90/332800] via 200.0.1.2, 00:02:21, FastEthernet0/1
[D    192.168.3.0/24 [90/309760] via 200.0.1.2, 00:03:11, FastEthernet0/1
[R1#
```



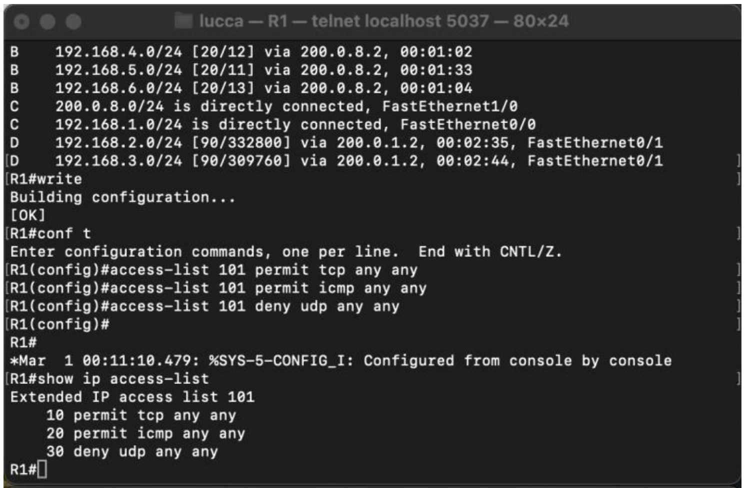
```
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

O    200.0.4.0/24 [110/2] via 200.0.5.1, 00:13:29, FastEthernet1/0
C    200.0.5.0/24 is directly connected, FastEthernet1/0
C    200.0.6.0/24 is directly connected, FastEthernet0/1
O    200.0.7.0/24 [110/3] via 200.0.5.1, 00:13:29, FastEthernet1/0
B    200.0.1.0/24 [20/0] via 200.0.8.1, 00:16:06
B    200.0.2.0/24 [20/307200] via 200.0.8.1, 00:02:17
B    200.0.3.0/24 [20/284160] via 200.0.8.1, 00:02:17
O    192.168.4.0/24 [110/12] via 200.0.5.1, 00:13:29, FastEthernet1/0
O    192.168.5.0/24 [110/11] via 200.0.5.1, 00:13:31, FastEthernet1/0
O    192.168.6.0/24 [110/13] via 200.0.5.1, 00:13:31, FastEthernet1/0
C    200.0.8.0/24 is directly connected, FastEthernet0/0
B    192.168.1.0/24 [20/0] via 200.0.8.1, 00:16:08
B    192.168.2.0/24 [20/332800] via 200.0.8.1, 00:02:18
[B    192.168.3.0/24 [20/309760] via 200.0.8.1, 00:03:02
R7#
```

BGP Pinging Proof:

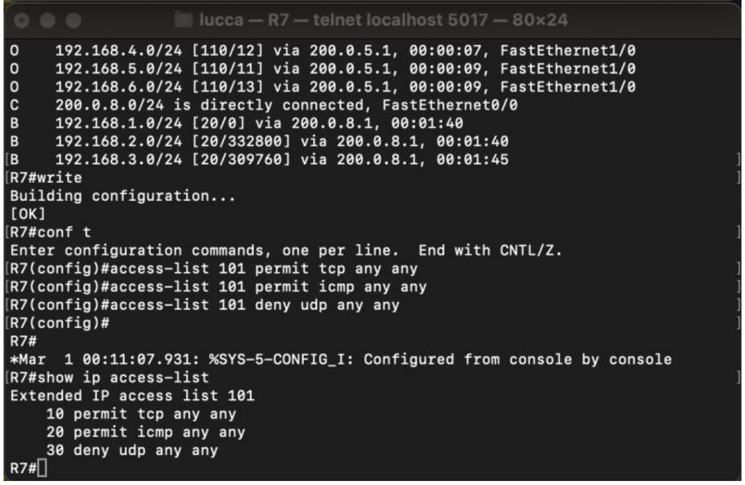


```
84 bytes from 192.168.2.1 icmp_seq=1 ttl=61 time=43.779 ms
pi84 bytes from 192.168.2.1 icmp_seq=2 ttl=61 time=46.906 ms
84 bytes from 192.168.2.1 icmp_seq=3 ttl=61 time=47.757 ms
84 bytes from 192.168.2.1 icmp_seq=4 ttl=61 time=43.520 ms
84 bytes from 192.168.2.1 icmp_seq=5 ttl=61 time=47.258 ms

[PC30>ping 192.168.2.1

84 bytes from 192.168.2.1 icmp_seq=1 ttl=61 time=40.351 ms
84 bytes from 192.168.2.1 icmp_seq=2 ttl=61 time=41.345 ms
84 bytes from 192.168.2.1 icmp_seq=3 ttl=61 time=46.972 ms
84 bytes from 192.168.2.1 icmp_seq=4 ttl=61 time=61.227 ms
84 bytes from 192.168.2.1 icmp_seq=5 ttl=61 time=42.252 ms

[PC30>ping 192.168.3.1

84 bytes from 192.168.3.1 icmp_seq=1 ttl=61 time=61.906 ms
84 bytes from 192.168.3.1 icmp_seq=2 ttl=61 time=39.974 ms
84 bytes from 192.168.3.1 icmp_seq=3 ttl=61 time=46.405 ms
84 bytes from 192.168.3.1 icmp_seq=4 ttl=61 time=40.560 ms
84 bytes from 192.168.3.1 icmp_seq=5 ttl=61 time=62.214 ms

PC30> 
```

ACL Setup Proof:

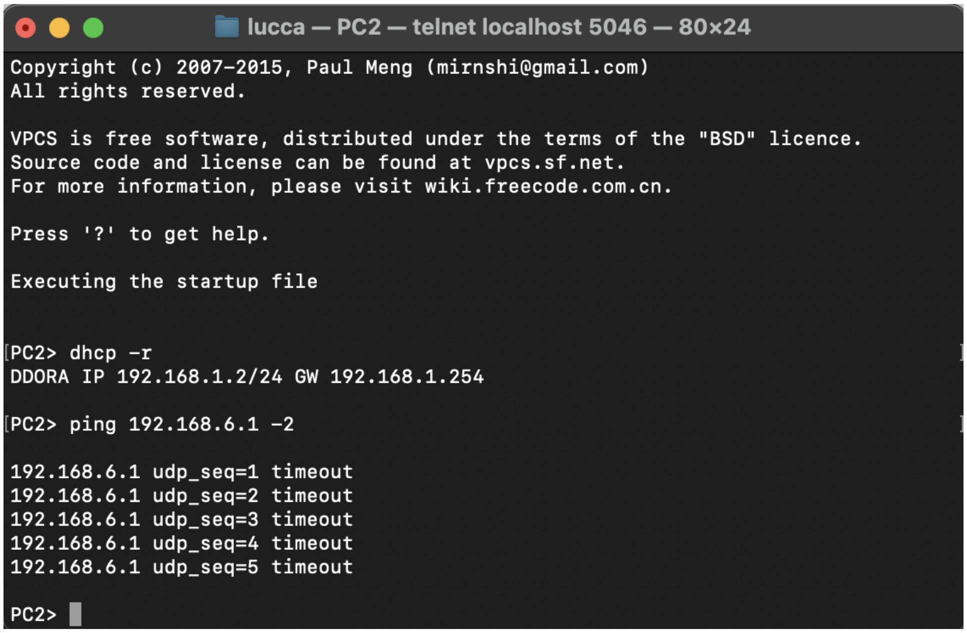


```
B     192.168.4.0/24 [20/12] via 200.0.8.2, 00:01:02
B     192.168.5.0/24 [20/11] via 200.0.8.2, 00:01:33
B     192.168.6.0/24 [20/13] via 200.0.8.2, 00:01:04
C     200.0.8.0/24 is directly connected, FastEthernet1/0
C     192.168.1.0/24 is directly connected, FastEthernet0/0
D     192.168.2.0/24 [90/332800] via 200.0.1.2, 00:02:35, FastEthernet0/1
[D    192.168.3.0/24 [90/309760] via 200.0.1.2, 00:02:44, FastEthernet0/1
[R1#write
Building configuration...
[OK]
[R1#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
[R1(config)#access-list 101 permit tcp any any
[R1(config)#access-list 101 permit icmp any any
[R1(config)#access-list 101 deny udp any any
[R1(config)#
R1#
*Mar  1 00:11:10.479: %SYS-5-CONFIG_I: Configured from console by console
[R1#show ip access-list
Extended IP access list 101
    10 permit tcp any any
    20 permit icmp any any
    30 deny udp any any
R1#
```



```
O     192.168.4.0/24 [110/12] via 200.0.5.1, 00:00:07, FastEthernet1/0
O     192.168.5.0/24 [110/11] via 200.0.5.1, 00:00:09, FastEthernet1/0
O     192.168.6.0/24 [110/13] via 200.0.5.1, 00:00:09, FastEthernet1/0
C     200.0.8.0/24 is directly connected, FastEthernet0/0
B     192.168.1.0/24 [20/0] via 200.0.8.1, 00:01:40
B     192.168.2.0/24 [20/332800] via 200.0.8.1, 00:01:40
[B    192.168.3.0/24 [20/309760] via 200.0.8.1, 00:01:45
[R7#write
Building configuration...
[OK]
[R7#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
[R7(config)#access-list 101 permit tcp any any
[R7(config)#access-list 101 permit icmp any any
[R7(config)#access-list 101 deny udp any any
[R7(config)#
R7#
*Mar  1 00:11:07.931: %SYS-5-CONFIG_I: Configured from console by console
[R7#show ip access-list
Extended IP access list 101
    10 permit tcp any any
    20 permit icmp any any
    30 deny udp any any
R7#
```

ACL Pinging Proof:



```
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For more information, please visit wiki.freecode.com.cn.

Press '?' to get help.

Executing the startup file


[PC2> dhcp -r
DDORA IP 192.168.1.2/24 GW 192.168.1.254

[PC2> ping 192.168.6.1 -2

192.168.6.1 udp_seq=1 timeout
192.168.6.1 udp_seq=2 timeout
192.168.6.1 udp_seq=3 timeout
192.168.6.1 udp_seq=4 timeout
192.168.6.1 udp_seq=5 timeout

PC2>
```

Notes on BGP Implementation:

My screenshots above show my network after I implemented BGP. The first one shows my BGP routing table, meaning that all the subnetworks in the topology can be seen and accessed by each other though R1/R7. The second screenshot shows the regular routing table, which gives insight into which protocols each subnetwork is accessed by the "border" routers through. These include EIGRP, BGP and OSPF. The third screenshot shows proof of a PC from a subnetwork on one side of the "bridge" pinging a PC on the other side of the bridge.

The process I used to set this all up was the following: firstly, I set R1's BGP AS to a different value than I set R7's BGP AS. Then, I made sure to run the "bgp log-neighbor-changes" command. This action helped me troubleshoot issues that I had with the topology when testing. After that, I set the network of the BGP connection to that of the subnet linking the 2 former topologies A and B using the "network" command on both R1 and R7. Afterwards, I used the "network" command on both the aforementioned routers to advertise all subnetworks on their sides of the network to the other BGP router. For the opposite BGP routers to see these advertised networks, I ran the "neighbor" command, specifying the BGP AS number of each side of the bridging link. After that, I only had to redistribute all EIGRP and OSPF routes into BGP routes using the "redistribute" command.

Sources:

Incorporated, Cisco Systems (2019) *IP routing: BGP Configuration Guide - configuring a basic BGP network [CISCO ASR 1000 series aggregation services routers]*, *Cisco*. Available at: https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/iproute_bgp/configuration/xe-16/irg-xe-16-book/configuring-a-basic-bgp-network.html (Accessed: 08 November 2023).

Notes on ACL Implementation:

My screenshots above show my network after I implemented ACL. The first one shows me setting which protocols are allowed to be passed through the routers on either side of the BGP bridging link. I deliberately told the routers to deny UDP connections for testing purposes. The next image shows me pinging a PC that needs to be reached using the bridging link. The important part is that I ping using UDP, and it doesn't go through and times out. This means that the ACL setup works as intended.

Sources:

Incorporated, Cisco Systems. (2022) *Configure and filter IP access lists*, *Cisco*. Available at: https://www.cisco.com/c/en/us/support/docs/security/ios-firewall/23602-confaccesslists.html (Accessed: 08 November 2023).