

TLEN5370 - Lab 2

Logistics

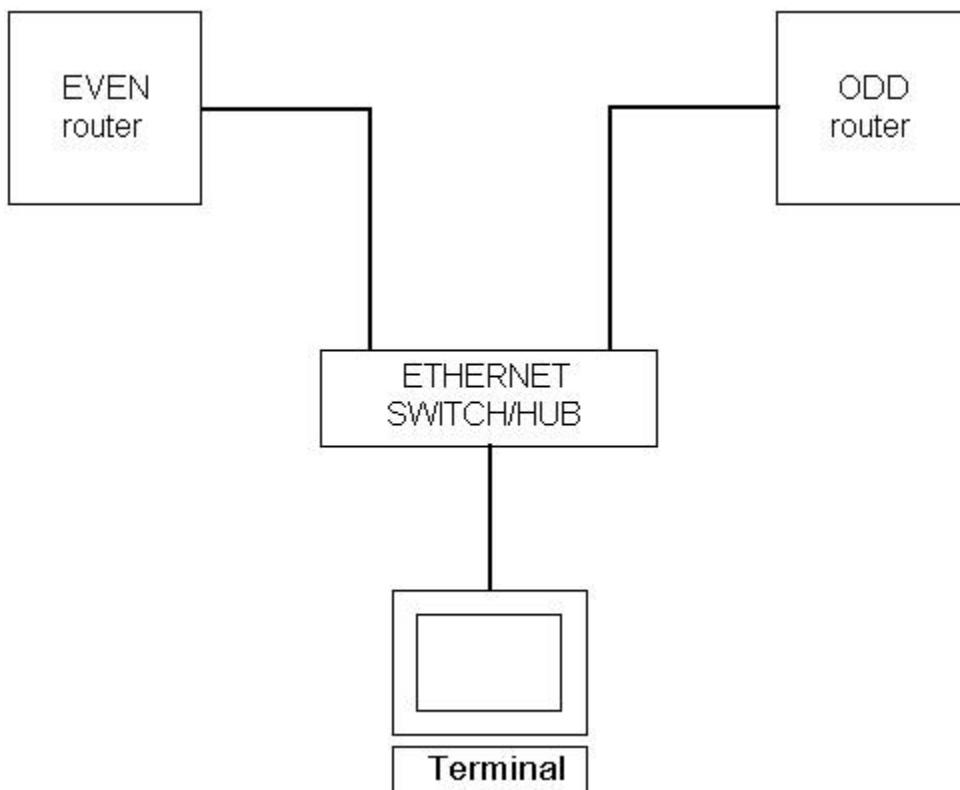
Choose a console and two routers which will be referred to as odd and even for the remainder of the lab.

Write erase the routers and start from scratch with a default config.

Connect your routers with an ethernet switch and be able to telnet from your terminal to each router. (no console cable after initial setup!)

No matter what the Halabi tutorial has in it -- do *NOT* use any 'access-list' or 'distribute-list'

Make your life easier and use 'ip prefix-list' configurations instead.



Objectives

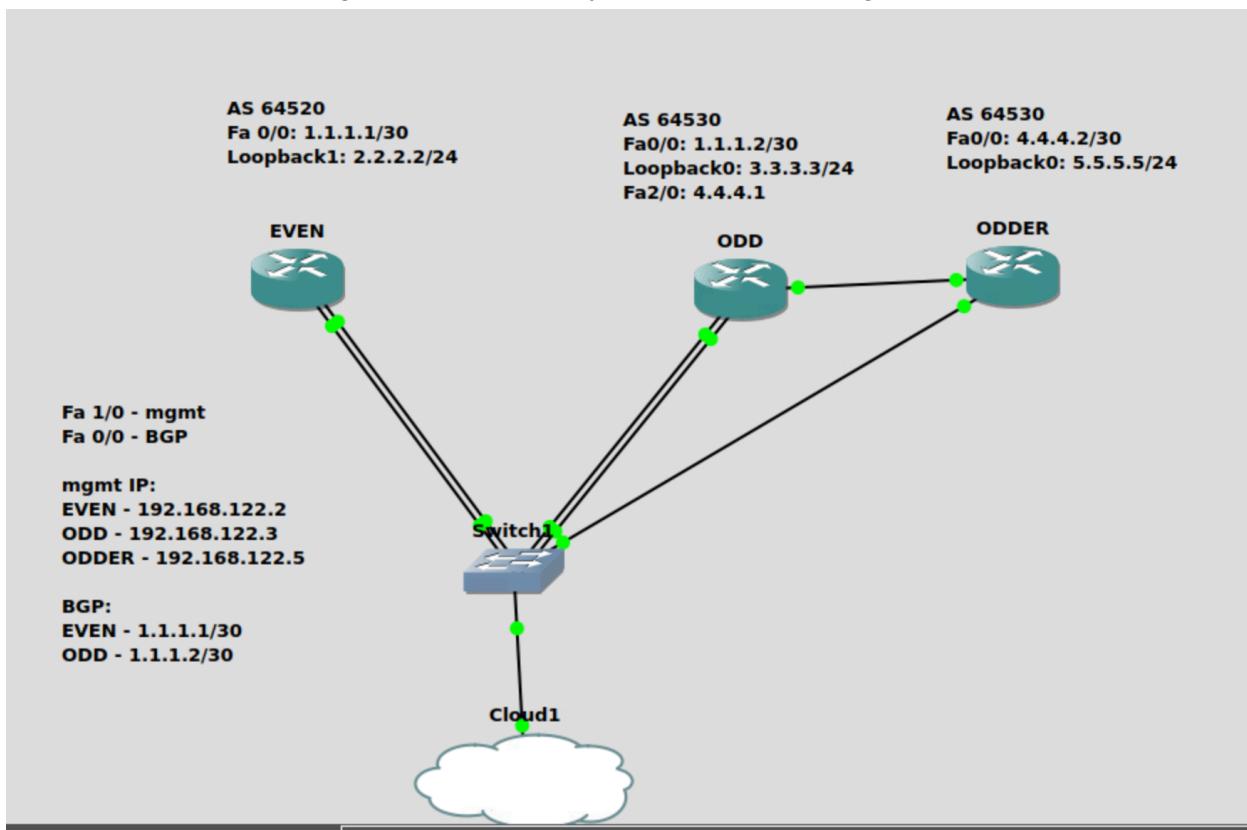
- Form an eBGP session between two routers.
- Form an eBGP session between the loopbacks of two routers.
- Match and Set BGP Attributes Outbound on Cisco
- Match and Set BGP Attributes Inbound on Cisco
- Fully understand next-hop, next-hop-self, and glue networks.
- Use a route-map on a static pullup and outbound policy.
- Match and Set BGP Attributes Outbound on Juniper
- Match and Set BGP Attributes Inbound on Juniper

Useful Cisco Commands

- show ip bgp summary
- show ip bgp a.b.c.d
- show ip bgp neighbor a.b.c.d advertised-routes
- show ip bgp neighbor a.b.c.d received-routes
- show ip bgp neighbor a.b.c.d routes
- show ip route
- show ip route a.b.c.d
- clear ip bgp a.b.c.d
- clear ip bgp a.b.c.d soft
- show running-config

Objective 1

Establish an eBGP peering session between your two routers using the ethernet0 IPs.



- Be sure to turn on 'no synchronization'

```

EVEN#sh run | s router bgp
router bgp 64520
  bgp log-neighbor-changes
  neighbor 1.1.1.2 remote-as 64530
  neighbor 1.1.1.2 password CUBoulder
EVEN#

```

- Question 1.1 - How do you know your BGP session is established? Where do you look for this?

```

[ODD]#show ip bgp summ
BGP router identifier 192.168.122.3, local AS number 64530
BGP table version is 1, main routing table version 1

Neighbor      V      AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down  State/PfxRcd
1.1.1.1        4      64520    6       6       1       0     0 00:02:14      0
ODD#

```

- [ODD]#show ip bgp nei
[ODD]#show ip bgp neighbors
BGP neighbor is 1.1.1.1, remote AS 64520, external link
 BGP version 4, remote router ID 192.168.122.2
 BGP state = Established, up for 00:03:33
 Last read 00:00:49, last write 00:00:05, hold time is 180, keepalive interval is 60 seconds
 Neighbor sessions:
 1 active, is not multisession capable (disabled)
 Neighbor capabilities:
 Route refresh: advertised and received(new)
 Four-octets ASN Capability: advertised and received
 Address family IPv4 Unicast: advertised and received
 Enhanced Refresh Capability: advertised and received
 Multisession Capability:
 Stateful switchover support enabled: NO for session 1
 Message statistics:
 InQ depth is 0
 OutQ depth is 0

 Sent Rcvd
 Opens: 1 1
 Notifications: 0 0
 Updates: 1 1
 Keepalives: 6 5
 Route Refresh: 0 0
 Total: 8 7
Default minimum time between advertisement runs is 30 seconds

- Using show ip bgp neighbors. It shows: "BGP state = Established"
- Question 1.2 - Do you see any routes being exchanged? Where do you look for this?
 - We do not see any routes being exchanged. It would be in the show ip bgp.
- Run the following commands on your 'odd' router then reset/clear the session.
 - debug ip bgp events
 - debut ip bgp keepalives
 - debug ip bgp updates
 - term mon
- To turn off debug you would type 'no debug all'

```

|ODD#
|ODD#clear ip bgp 64520
ODD#
*Apr 11 21:15:21.315: BGP: tbl IPv4 Unicast:base Service reset requests
*Apr 11 21:15:21.315: BGP: tbl IPv4 Multicast:base Service reset requests
*Apr 11 21:15:21.315: BGP: tbl MVPNv4 Unicast:base Service reset requests
*Apr 11 21:15:21.315: BGP: 1.1.1.1 reset due to User reset
*Apr 11 21:15:21.315: BGP: neighbor 1.1.1.1 Down User reset
*Apr 11 21:15:21.315: %BGP_SESSION-5-ADJCHANGE: neighbor 1.1.1.1 IPv4 Unicast topology base removed from session User reset
*Apr 11 21:15:21.583: BGP: 1.1.1.1 active KEEPALIVE write request serviced in BGP_IO
*Apr 11 21:15:21.583: BGP: 1.1.1.1 active service 2 read request in BGP_IO
*Apr 11 21:15:21.631: BGP: 1.1.1.1 active KEEPALIVE write request serviced in BGP_IO
*Apr 11 21:15:21.631: BGP: 1.1.1.1 active service 2 read request in BGP_IO
*Apr 11 21:15:21.631: BGP: 1.1.1.1 active service 2 read request in BGP_IO
*Apr 11 21:15:21.631: BGP: 1.1.1.1 active KEEPALIVE requested (rcv_open)
*Apr 11 21:15:21.635: BGP: ses global 1.1.1.1 (0x69222DD8:0) act service keepalive IO request.
*Apr 11 21:15:21.635: BGP: 1.1.1.1 active received KEEPALIVE, length (excl. header) 0
*Apr 11 21:15:21.635: BGP: nopeerup-delay post-boot, set to default, 60s
*Apr 11 21:15:21.635: %BGP-5-ADJCHANGE: neighbor 1.1.1.1 Up
*Apr 11 21:15:21.635: BGP: 1.1.1.1 KEEPALIVE write request serviced in BGP_IO
*Apr 11 21:15:21.635: BGP: 1.1.1.1 service 1 read request in BGP_IO
*Apr 11 21:15:21.635: BGP: 1.1.1.1 KEEPALIVE requested (bgp_tx_converged)
*Apr 11 21:15:21.635: BGP: ses global 1.1.1.1 (0x69222DD8:1) service keepalive IO request.
*Apr 11 21:15:21.635: BGP: 1.1.1.1 KEEPALIVE write request serviced in BGP_IO
*Apr 11 21:15:21.675: BGP: 1.1.1.1 received KEEPALIVE, length (excl. header) 0

```

- Question 1.3 - Observe and log the debug messages for 1 minute then shutdown the session 'neighbor a.b.c.d shut' on the 'even' router. Turn in the log and a description of what each debug message means in your own words.

```

ODD(config-router)#neighbor
*Apr 11 21:18:00.003: BGP: nbr_topo global 1.1.1.1 IPv4 Unicast:base (0x69222DD8:1) Not scheduling for GR processing [Peer did not advertise GR cap]
*Apr 11 21:18:00.003: %BGP-5-NBR_RESET: Neighbor 1.1.1.1 reset (Peer closed the session)
*Apr 11 21:18:00.003: BGP: tbl IPv4 Unicast:base Service reset requests
*Apr 11 21:18:00.003: BGP:tbl IPv4 Multicast:base Service reset requests
*Apr 11 21:18:00.003: BGP:tbl MVPNv4 Unicast:base Service reset requests
*Apr 11 21:18:00.003: BGP: 1.1.1.1 reset due to Peer closed the session
*Apr 11 21:18:00.003: %BGP-5-ADJCHANGE: neighbor 1.1.1.1 Down Peer closed the session
*Apr 11 21:18:00.003: %BGP_SESSION-5-ADJCHANGE: neighbor 1.1.1.1 IPv4 Unicast topology base removed from session Peer closed the session
*Apr 11 21:18:00.591: BGP: Regular scanner timer event
*Apr 11 21:18:00.591: BGP: Performing BGP general scanning
*Apr 11 21:18:00.591: BGP:tbl IPv4 Unicast:base Performing BGP Nexthop scanning for general scan
*Apr 11 21:18:00.591: BGP(0): Future scanner version: 31, current scanner version: 30
*Apr 11 21:18:00.591: BGP:tbl IPv4 Multicast:base Performing BGP Nexthop scanning for general scan
*Apr 11 21:18:00.591: BGP(6): Future scanner version: 31, current scanner version: 30
*Apr 11 21:18:00.591: BGP:tbl MVPNv4 Unicast:base Performing BGP Nexthop scanning for general scan
*Apr 11 21:18:00.591: BGP(14): Future scanner version: 31, current scanner version: 30
|ODD#end
^
% Invalid input detected at '^' marker.

ODD#
*Apr 11 21:18:03.327: %SYS-5-CONFIG_I: Configured from console by admin on vty0 (192.168.122.1)
*Apr 11 21:18:08.483: BGP:tbl IPv4 Unicast:base Service reset requests
*Apr 11 21:18:08.483: BGP:tbl IPv4 Multicast:base Service reset requests
*Apr 11 21:18:08.483: BGP:tbl MVPNv4 Unicast:base Service reset requests
ODD#show i
*Apr 11 21:18:21.803: BGP:tbl IPv4 Unicast:base Service reset requests
*Apr 11 21:18:21.803: BGP:tbl IPv4 Multicast:base Service reset requests
*Apr 11 21:18:21.803: BGP:tbl MVPNv4 Unicast:base Service reset requests
BGP router identifier 192.168.122.3, local AS number 64530
BGP table version is 1, main routing table version 1

Neighbor      V        AS MsgRcvd MsgSent   TblVer  Inq OutQ Up/Down State/PfxRcd
1.1.1.1        4       64520      0     0      1    0    0 00:00:24 Idle
ODD#

```

- It shows that the peer or the even router closed the session. The session was reset due to even shutting down. Odd removed it from the session. It did a scan for a next hop IP for the even router but because the session was shutdown the state went into 'Idle'.
- Question 1.4 - Do the same thing but instead of shutting the connection...unplug the even router (power or ethernet.) What happens? What is different from just shutting the session?

```

EVEN#config t
Enter configuration commands, one per line. End with CNTL/Z.
EVEN(config)#int fa 0/0
EVEN(config-if)#shut
EVEN(config-if)#end
EVEN#sh ip bgp summary
BGP router identifier 192.168.122.2, local AS number 64520
BGP table version is 1, main routing table version 1

Neighbor      V          AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down State/PfxRcd
1.1.1.2        4          64530    0       0         1     0     0 00:00:05 Idle

● ODD#
*Apr 11 21:23:52.539: BGP: ses global 1.1.1.1 (0x65B8CB14:1) Keep alive timer fired.
*Apr 11 21:23:52.539: BGP: 1.1.1.1 KEEPALIVE requested (bgp_keepalive_timer_expired)
*Apr 11 21:23:52.539: BGP: ses global 1.1.1.1 (0x65B8CB14:1) service keepalive IO request.
*Apr 11 21:23:52.539: BGP: 1.1.1.1 KEEPALIVE write request serviced in BGP_IO
*Apr 11 21:24:00.639: BGP: Regular scanner timer event
*Apr 11 21:24:00.639: BGP: Performing BGP general scanning
*Apr 11 21:24:00.639: BGP: tbl IPv4 Unicast:base Performing BGP Nexthop scanning for general scan
*Apr 11 21:24:00.639: BGP(0): Future scanner version: 37, current scanner version: 36
*Apr 11 21:24:00.639: BGP: tbl IPv4 Multicast:base Performing BGP Nexthop scanning for general scan
*Apr 11 21:24:00.639: BGP(6): Future scanner version: 37, current scanner version: 36
*Apr 11 21:24:00.639: BGP: tbl MVPNv4 Unicast:base Performing BGP Nexthop scanning for general scan
|*Apr 11 21:24:00.639: BGP(14): Future scanner version: 37, current scanner version: 36
BGP router identifier 192.168.122.3, local AS number 64530
BGP table version is 1, main routing table version 1

Neighbor      V          AS MsgRcvd MsgSent   TblVer  InQ OutQ Up/Down State/PfxRcd
1.1.1.1        4          64520    5       6         1     0     0 00:01:58      0
ODD#

```

- What was different is that the keepalive timer notified 'odd' about the down connection and the state did not change.
- Question 1.5 - Why would you never turn on 'debug ip bgp updates' on a router receiving full internet routers?
 - Everytime there is a route update, it will show the debug message for millions of internet routes. This will increase RAM and CPU usage and eventually lead to it crashing.
- Create a loopback on your 'odd' router that is a different subnet from your ethernet interface.
- Question 1.6 - Can you reach it (ping a.b.c.d) from your 'even' router? Why not?
 - We cannot reach the loopback because the network is not advertised.

```

EVEN#ping 3.3.3.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 3.3.3.3, timeout is 2 seconds:
● ....

```

- Question 1.7 - What should you do to make this reachable? No IGP or Static allowed!

```

Gateway of last resort is not set

      1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C          1.1.1.0/30 is directly connected, FastEthernet0/0
L          1.1.1.1/32 is directly connected, FastEthernet0/0
      3.0.0.0/24 is subnetted, 1 subnets
B          3.3.3.0 [20/0] via 1.1.1.2, 00:00:37
      192.168.122.0/24 is variably subnetted, 2 subnets, 2 masks
C          192.168.122.0/24 is directly connected, FastEthernet1/0
L          192.168.122.2/32 is directly connected, FastEthernet1/0
EVEN#
```

-

```

EVEN#ping 3.3.3.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 3.3.3.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/15/28 ms
EVEN#
```

-

```

!
router bgp 64530
  bgp log-neighbor-changes
  network 3.3.3.0 mask 255.255.255.0
  neighbor 1.1.1.1 remote-as 64520
  neighbor 1.1.1.1 password CUBoulder
!
*Apr 11 00:12:11.011: %RELAYIVE write request serviced in bgp
BGP table version is 2, local router ID is 192.168.122.3
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
              x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop            Metric LocPrf Weight Path
  *>  3.3.3.0/24        0.0.0.0                  0          32768 i
ODD#
```

- On the odd router above we did the network command.
- Question 1.8 - Observing the debug output. Make this route inaccessible and accessible several times while logging the debug output. Turn in the log and a description of what each debug message corresponding to the route installation/withdrawal means.

```

[ODD(config-router)]#no network 3.3.3.0 mask 255.255.255.0
[ODD(config-router)]#no network 3.3.3.0 mask 255.255.255.0
ODD(config-router)#
*Apr 11 21:50:14.091: BGP(0): nettable_scan: invalidate local path for 3.3.3.0/24
*Apr 11 21:50:14.095: BGP(0): invalidate sourced path for 3.3.3.0/24
*Apr 11 21:50:14.099: BGP(0): treating modify event for route 3.3.3.0/24 not appearing in BGP table as up event
*Apr 11 21:50:14.103: BGP(0): route 3.3.3.0/24 up but not redist, deleting
*Apr 11 21:50:14.103: BGP(0): no valid path for 3.3.3.0/24
*Apr 11 21:50:14.103: BGP: topo global:IPv4 Unicast:base Remove_fwdroute for 3.3.3.0/24
*Apr 11 21:50:14.107: BGP(0): (base) 1.1.1.1 send unreachable (format) 3.3.3.0/24network 3.3.3.0 mask 255.255.255.0
ODD(config-router)#
*Apr 11 21:50:23.815: BGP: topo global:IPv4 Unicast:base Remove_fwdroute for 3.3.3.0/24
*Apr 11 21:50:23.815: BGP(0): redistributedlocal route 3.3.3.0/24 modifiednetwork 3.3.3.0 mask 255.255.255.0
ODD(config-router)#
*Apr 11 21:50:37.079: BGP: 1.1.1.1 received KEEPALIVE, length (excl. header) 0
*Apr 11 21:50:44.659: BGP: aggregate timer expired
*Apr 11 21:50:44.659: BGP(0): (base) 1.1.1.1 send UPDATE (format) 3.3.3.0/24, next 1.1.1.2, metric 0, path Local
*Apr 11 21:51:00.875: BGP: Regular scanner timer event
*Apr 11 21:51:00.875: BGP: Performing BGP general scanning
*Apr 11 21:51:00.875: BGP:tbl IPv4 Unicast:base Performing BGP Nexthop scanning for general scan
*Apr 11 21:51:00.875: BGP(0): Future scanner version: 64, current scanner version: 63
*Apr 11 21:51:00.875: BGP:tbl IPv4 Multicast:base Performing BGP Nexthop scanning for general scan
*Apr 11 21:51:00.875: BGP(6): Future scanner version: 64, current scanner version: 63
*Apr 11 21:51:00.875: BGP:tbl MVPNv4 Unicast:base Performing BGP Nexthop scanning for general scan
*Apr 11 21:51:00.875: BGP(14): Future scanner version: 64, current scanner version: 63
*Apr 11 21:51:15.379: BGP: aggregate timer expired
*Apr 11 21:51:27.247: BGP: 1.1.1.1 received KEEPALIVE, length (excl. header) 0

```

- It identifies the invalid source path for the loopback network and stops advertising it. It constructs the message to remove_fwdroute for 3.3.3.0/24. When we put it back up it sent a BGP update to include this network in the route table for other routers.

```

EVEN#sh ip route
Codes: L - local, 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, H - NHRP, l - LISP
      + - replicated route, % - next hop override

Gateway of last resort is not set

      1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        1.1.1.0/30 is directly connected, FastEthernet0/0
L        1.1.1.1/32 is directly connected, FastEthernet0/0
      192.168.122.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.122.0/24 is directly connected, FastEthernet1/0
L        192.168.122.2/32 is directly connected, FastEthernet1/0
EVEN#

```

- ~~A 2 i~~
- Type 'no router bgp MY-AS' and 'no debug all' on both routers.

OBJECTIVE 2

Establish an eBGP peering session between your two routers using loopbacks.

- Create a loopback on the 'even' router using the same instructions from objective 1.

```

: interface Loopback1
:   ip address 2.2.2.2 255.255.255.0
:

```

- Establish an eBGP peering session between the router loopbacks.

```
router bgp 64520
  bgp log-neighbor-changes
  neighbor 3.3.3.3 remote-as 64530
  neighbor 3.3.3.3 password CUBoulder
  neighbor 3.3.3.3 ebgp-multihop 2
  neighbor 3.3.3.3 update-source Loopback1
!
```

-
- Question 2.1 - What 2 BGP commands do you need to add that weren't needed in Objective 1?
 - The two new commands:
 - neighbor 2.2.2.2 ebgp-multihop 2
 - neighbor 2.2.2.2 update-source Loopback1
- Question 2.2 - What other command do you need? (think reachability)
 - We needed a static route between the two
 - ip route 2.2.2.0 255.255.255.0 1.1.1.1
 - ip route 3.3.3.0 255.255.255.0 1.1.1.2
- Question 2.3 - Turn in a log file showing the established session and **relevant** configuration.

```
!
router bgp 64530
  bgp log-neighbor-changes
  neighbor 2.2.2.2 remote-as 64520
  neighbor 2.2.2.2 password CUBoulder
  neighbor 2.2.2.2 ebgp-multihop 2
  neighbor 2.2.2.2 update-source Loopback1
!
ip forward-protocol nd
!
!
no ip http server
no ip http secure-server
ip route 2.2.2.0 255.255.255.0 1.1.1.1
!
```

```
!
router bgp 64520
  bgp log-neighbor-changes
  neighbor 3.3.3.3 remote-as 64530
  neighbor 3.3.3.3 password CUBoulder
  neighbor 3.3.3.3 ebgp-multipath 2
  neighbor 3.3.3.3 update-source Loopback1
!
ip forward-protocol nd
!
!
no ip http server
no ip http secure-server
ip route 3.3.3.0 255.255.255.0 1.1.1.2
!
```

- ODD(config-router)#
[*Apr 11 22:25:54.971: %BGP-5-ADJCHANGE: neighbor 2.2.2.2 Up
- [ODD(config-router)]#

```
[ODD#show ip bgp neighbors
BGP neighbor is 2.2.2.2, remote AS 64520, external link
  BGP version 4, remote router ID 2.2.2.2
  BGP state = Established, up for 00:02:18
  Last read 00:00:32, last write 00:00:38, hold time is 180, keepalive interval is 60 seconds
  Neighbor sessions:
    1 active, is not multisession capable (disabled)
  Neighbor capabilities:
    Route refresh: advertised and received(new)
    Four-octets ASN Capability: advertised and received
    Address family IPv4 Unicast: advertised and received
    Enhanced Refresh Capability: advertised and received
    Multisession Capability:
      Stateful switchover support enabled: NO for session 1
  Message statistics:
    InQ depth is 0
    OutQ depth is 0
```

- Question 2.4 - Why would you ever do eBGP multihop on an eBGP session?
 - Because it needs multiple hops to establish a connection.
- Type 'no router bgp MY-AS'

OBJECTIVE 3

Match and set outbound route attributes using a single route-map.

- Create 4 additional /32 loopbacks on your 'odd' router.

```
interface Loopback2
    ip address 5.5.5.5 255.255.255.255
!
interface Loopback3
    ip address 6.6.6.6 255.255.255.255
!
interface Loopback4
    ip address 7.7.7.7 255.255.255.255
!
interface Loopback5
    ip address 8.8.8.8 255.255.255.255
!
```

- Bring up a BGP session using the ethernet addresses. Make sure the 'even' router can get to all loopbacks of the 'odd' router.

```
EVEN#sh ip route
Codes: L - local, 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, H - NHRP, l - LISP
      + - replicated route, % - next hop override

Gateway of last resort is not set

      1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        1.1.1.0/30 is directly connected, FastEthernet0/0
L        1.1.1.1/32 is directly connected, FastEthernet0/0
      2.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        2.2.2.0/24 is directly connected, Loopback1
L        2.2.2.2/32 is directly connected, Loopback1
      3.0.0.0/24 is subnetted, 1 subnets
S          3.3.3.0 [1/0] via 1.1.1.2
      5.0.0.0/32 is subnetted, 1 subnets
B          5.5.5.5 [20/0] via 1.1.1.2, 00:00:42
      6.0.0.0/32 is subnetted, 1 subnets
B          6.6.6.6 [20/0] via 1.1.1.2, 00:00:12
      7.0.0.0/32 is subnetted, 1 subnets
B          7.7.7.7 [20/0] via 1.1.1.2, 00:00:12
      8.0.0.0/32 is subnetted, 1 subnets
B          8.8.8.8 [20/0] via 1.1.1.2, 00:00:12
      192.168.122.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.122.0/24 is directly connected, FastEthernet1/0
L        192.168.122.2/32 is directly connected, FastEthernet1/0
```

```
router bgp 64530
  bgp log-neighbor-changes
  network 5.5.5.5 mask 255.255.255.255
  network 6.6.6.6 mask 255.255.255.255
  network 7.7.7.7 mask 255.255.255.255
  network 8.8.8.8 mask 255.255.255.255
  neighbor 1.1.1.1 remote-as 64520
  neighbor 1.1.1.1 password CUBoulder
```

- Using a single route-map set the following attributes outbound:
 - Match loopback1 and set as-path to prepend ODD-AS twice.

```
[EVEN#]sh ip bgp 3.3.3.3
BGP routing table entry for 3.3.3.0/24, version 44
Paths: (1 available, best #1, table default)
  Not advertised to any peer
  Refresh Epoch 4
  64530 64530 64530
    1.1.1.2 from 1.1.1.2 (8.8.8.8)
      Origin IGP, metric 0, localpref 100, valid, external, best
      rx pathid: 0, tx pathid: 0x0
```

- [EVEN#]
 - Match loopback2 and set community to MY-AS:1 (be sure you are sending communities)

```
[EVEN#]sh ip bgp 5.5.5.5
BGP routing table entry for 5.5.5.5/32, version 48
Paths: (1 available, best #1, table default)
  Not advertised to any peer
  Refresh Epoch 4
  64530
    1.1.1.2 from 1.1.1.2 (8.8.8.8)
      Origin IGP, metric 0, localpref 100, valid, external, best
      Community: 4229038081
      rx pathid: 0, tx pathid: 0x0
```

- [EVEN#]
 - Match loopback3 and set as-path to prepend ODD-AS three times.

```
[EVEN#]sh ip bgp 6.6.6.6
BGP routing table entry for 6.6.6.6/32, version 47
Paths: (1 available, best #1, table default)
  Not advertised to any peer
  Refresh Epoch 4
  64530 64530 64530 64530
    1.1.1.2 from 1.1.1.2 (8.8.8.8)
      Origin IGP, metric 0, localpref 100, valid, external, best
      rx pathid: 0, tx pathid: 0x0
```

- [EVEN#]
 - Match loopback4 and set metric to 50.

```
[EVEN#sh ip bgp 7.7.7.7
BGP routing table entry for 7.7.7.7/32, version 46
Paths: (1 available, best #1, table default)
    Not advertised to any peer
    Refresh Epoch 4
    64530
        1.1.1.2 from 1.1.1.2 (8.8.8.8)
            Origin IGP, metric 50, localpref 100, valid, external, best
            rx pathid: 0, tx pathid: 0x0
[EVEN#]
```

- Match loopback5 and deny the route.

```
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
*-> 2.2.2.0/24      0.0.0.0            0        32768 i
*-> 3.3.3.0/24      1.1.1.2            0        0 64530 64530 64530 i
*-> 5.5.5.5/32      1.1.1.2            0        0 64530 i
*-> 6.6.6.6/32      1.1.1.2            0        0 64530 64530 64530 64530 i
*-> 7.7.7.7/32      1.1.1.2            50       0 64530 i
[EVEN#]
```

- 8.8.8.8 is not in the route list
- Match any prefix and accept.

```
*-> 2.2.2.0/24      0.0.0.0            0        32768 i
[EVEN#sh ip bgp
BGP table version is 57, local router ID is 2.2.2.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
              r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
              x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
*-> 2.2.2.0/24      0.0.0.0            0        32768 i
*-> 3.3.3.0/24      1.1.1.2            0        0 64530 64530 64530 i
*-> 5.5.5.5/32      1.1.1.2            0        0 64530 i
*-> 6.6.6.6/32      1.1.1.2            0        0 64530 64530 64530 64530 i
*-> 7.7.7.7/32      1.1.1.2            50       0 64530 i
*-> 9.9.9.9/32      1.1.1.2            0        0 64530 i
[EVEN#sh ip bgp 9.9.9.9
BGP routing table entry for 9.9.9.9/32, version 53
Paths: (1 available, best #1, table default)
Flag: 0x820
    Not advertised to any peer
    Refresh Epoch 1
    64530
        1.1.1.2 from 1.1.1.2 (8.8.8.8)
            Origin IGP, metric 0, localpref 100, valid, external, best
            rx pathid: 0, tx pathid: 0x0
[EVEN#]
```

- 9.9.9.9 is matching our any_prefix list that matches for any ip (0.0.0.0 < /32).
- Question 3.1-5 - Using 'show ip bgp a.b.c.d' show on your 'even' router that each attribute has been modified as desired.
 - Screenshots are shown above respective to loopback number.
- Question 3.6 - Turn-in a copy of your route-map and associated lists.

```

ip prefix-list Any_prefix seq 5 permit 0.0.0.0/0 le 32
!
ip prefix-list Loopback_1 seq 5 permit 3.3.3.0/24
!
ip prefix-list Loopback_2 seq 5 permit 5.5.5.5/32
!
ip prefix-list Loopback_3 seq 5 permit 6.6.6.6/32
!
ip prefix-list Loopback_4 seq 5 permit 7.7.7.7/32
!
ip prefix-list Loopback_5 seq 5 permit 8.8.8.8/32
!
route-map Outbound permit 10
  match ip address prefix-list Loopback_1
  set as-path prepend 64530 64530
!
route-map Outbound permit 20
  match ip address prefix-list Loopback_2
  set community 4229038081
!
route-map Outbound permit 30
  match ip address prefix-list Loopback_3
  set as-path prepend 64530 64530 64530
!
route-map Outbound permit 40
  match ip address prefix-list Loopback_4
  set metric 50
!
route-map Outbound deny 50
  match ip address prefix-list Loopback_5
  match interface Loopback5
!
route-map Outbound permit 60
  match ip address prefix-list Any_prefix
!
```

```

ODD#show route-map
ODD#show route-map
route-map Outbound, permit, sequence 10
  Match clauses:
    ip address prefix-lists: Loopback_1
  Set clauses:
    as-path prepend 64530 64530
  Policy routing matches: 0 packets, 0 bytes
route-map Outbound, permit, sequence 20
  Match clauses:
    ip address prefix-lists: Loopback_2
  Set clauses:
    community 4229038081
  Policy routing matches: 0 packets, 0 bytes
route-map Outbound, permit, sequence 30
  Match clauses:
    ip address prefix-lists: Loopback_3
  Set clauses:
    as-path prepend 64530 64530 64530
  Policy routing matches: 0 packets, 0 bytes
route-map Outbound, permit, sequence 40
  Match clauses:
    ip address prefix-lists: Loopback_4
  Set clauses:
    metric 50
  Policy routing matches: 0 packets, 0 bytes
route-map Outbound, deny, sequence 50
  Match clauses:
    ip address prefix-lists: Loopback_5
    interface Loopback5
  Set clauses:
    Policy routing matches: 0 packets, 0 bytes
route-map Outbound, permit, sequence 60
  Match clauses:
    ip address prefix-lists: Any_prefix
  Set clauses:
    Policy routing matches: 0 packets, 0 bytes
ODD#
```

OBJECTIVE 4

Match and set inbound route attributes using a single route-map.

- Now set the attributes of the inbound routes on your 'even' router.
- Using a single route-map set the following attributes inbound:
 - Match as-path ODD-AS_ODD-AS_ODD-AS and set the weight to 150.

```
EVEN#sh ip bgp 3.3.3.3
BGP routing table entry for 3.3.3.0/24, version 2
Paths: (1 available, best #1, table default)
  Not advertised to any peer
  Refresh Epoch 1
  64530 64530 64530
    1.1.1.2 from 1.1.1.2 (8.8.8.8)
      Origin IGP, metric 0, localpref 100, weight 150, valid, external, best
        rx pathid: 0, tx pathid: 0x0
EVEN#
```

- Match the community ODD-AS:1 and set the local-pref to 200.

```
rx pathid: 0, tx pathid: 0x0
EVEN#sh ip bgp 5.5.5.5
BGP routing table entry for 5.5.5.5/32, version 3
Paths: (1 available, best #1, table default)
  Not advertised to any peer
  Refresh Epoch 1
  64530
    1.1.1.2 from 1.1.1.2 (8.8.8.8)
      Origin IGP, metric 0, localpref 200, valid, external, best
      Community: 4229038081
        rx pathid: 0, tx pathid: 0x0
EVEN#
```

- Match the as-path ODD-AS_ODD-AS_ODD-AS_ODD-AS and set the metric to 50.

```
EVEN#sh ip bgp 6.6.6.6
BGP routing table entry for 6.6.6.6/32, version 4
Paths: (1 available, best #1, table default)
  Not advertised to any peer
  Refresh Epoch 1
  64530 64530 64530 64530
    1.1.1.2 from 1.1.1.2 (8.8.8.8)
      Origin IGP, metric 50, localpref 100, valid, external, best
        rx pathid: 0, tx pathid: 0x0
EVEN#
```

- Match the route from loopback4 and deny the route.

```

rx pathid: 0, tx pa
EVEN#sh ip bgp 7.7.7.7
% Network not in table

```

- Match any prefix and accept.

```

EVEN#sh ip bgp
BGP table version is 6, local router ID is 2.2.2.2
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop          Metric LocPrf Weight Path
*-> 2.2.2.0/24        0.0.0.0            0        32768 i
*-> 3.3.3.0/24        1.1.1.2            0        150 64530 64530 64530 i
*-> 5.5.5.5/32        1.1.1.2            0        200    0 64530 i
*-> 6.6.6.6/32        1.1.1.2            50       0 64530 64530 64530 64530 i
*-> 9.9.9.9/32        1.1.1.2            0        0 64530 i
EVEN#

```

9.9.9.9 is matching the any_prefix list.

- Question 4.1-5 - Using 'show ip bgp a.b.c.d' show on your 'even' router that each attribute has been modified as desired.
 - Screenshots are shown above respective to task.
- Question 4.6 - Turn in a copy of your route-map and associated lists.

```

EVEN#show route-map
EVEN#show route-map
route-map Inbound, permit, sequence 10
  Match clauses:
    as-path (as-path filter): 10
  Set clauses:
    weight 150
  Policy routing matches: 0 packets, 0 bytes
route-map Inbound, permit, sequence 20
  Match clauses:
    community (community-list filter): loopback2
  Set clauses:
    local-preference 200
  Policy routing matches: 0 packets, 0 bytes
route-map Inbound, permit, sequence 30
  Match clauses:
    as-path (as-path filter): 30
  Set clauses:
    metric 50
  Policy routing matches: 0 packets, 0 bytes
route-map Inbound, deny, sequence 40
  Match clauses:
    ip address prefix-lists: Loopback_4
  Set clauses:
    Policy routing matches: 0 packets, 0 bytes
route-map Inbound, permit, sequence 50
  Match clauses:
    ip address prefix-lists: Any_prefix
  Set clauses:
    Policy routing matches: 0 packets, 0 bytes
EVEN#
!
```

```

!
router bgp 64520
bgp log-neighbor-changes
network 2.2.2.0 mask 255.255.255.0
neighbor 1.1.1.2 remote-as 64530
neighbor 1.1.1.2 password CU Boulder
neighbor 1.1.1.2 route-map Inbound in
!
ip forward-protocol nd
!
ip community-list standard loopback2 permit 4229038081
ip as-path access-list 10 permit ^64530_64530_64530$^
ip as-path access-list 30 permit ^64530_64530_64530$^
!
no ip http server
no ip http secure-server
!
!
ip prefix-list Any_prefix seq 5 permit 0.0.0.0/0 le 32
!
ip prefix-list Loopback_4 seq 5 permit 7.7.7.7/32
!
route-map Inbound permit 10
  match as-path 10
  set weight 150
!
route-map Inbound permit 20
  match community loopback2
  set local-preference 200
!
route-map Inbound permit 30
  match as-path 30
  set metric 50
!
route-map Inbound deny 40
  match ip address prefix-list Loopback_4
!
route-map Inbound permit 50
  match ip address prefix-list Any_prefix
!
!
```

OBJECTIVE 5

Fully understand next-hop, next-hop-self, and glue networks.

- Remove the extra loopbacks from objectives 3 and 4.
- Configure a new router attached to ODD via a point to point link (for lab purposes we can name it 'ODDER')
- Configure eBGP between the interfaces of EVEN and ODD.
- Configure iBGP between the loopbacks of ODD and ODDER. You will need an IGP of some sort running as well.
- Pull up a route with a network statement on EVEN. Verify this is advertised to ODD.

```

Gateway of last resort is not set

      1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        1.1.1.0/30 is directly connected, FastEthernet0/0
L        1.1.1.2/32 is directly connected, FastEthernet0/0
      2.0.0.0/24 is subnetted, 1 subnets
B        2.2.2.0 [20/0] via 1.1.1.1, 00:37:14
      3.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        3.3.3.0/24 is directly connected, Loopback1
L        3.3.3.3/32 is directly connected, Loopback1
      4.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        4.4.4.0/30 is directly connected, FastEthernet2/0
L        4.4.4.1/32 is directly connected, FastEthernet2/0
      5.0.0.0/24 is subnetted, 1 subnets
S        5.5.5.0 [1/0] via 4.4.4.2
      192.168.122.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.122.0/24 is directly connected, FastEthernet1/0
L        192.168.122.3/32 is directly connected, FastEthernet1/0
copy

```

```

EVEN#show run | sec network 2
network 2.2.2.0 mask 255.255.255.0

```

- Question 5.1 - Is the route from EVEN advertised to ODDER? Show this.
 - It is advertised to ODDER because next-hop is not reachable to accept a route it is not in the routing table, but it is shown in the ip neighbor routes and not in the actual route table.

```

ODDER#show ip bgp neighbors 3.3.3.3 routes
BGP table version is 1, local router ID is 5.5.5.5
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, m multipath, b backup-path, f RT-Filter,
               x best-external, a additional-path, c RIB-compressed,
Origin codes: i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

      Network          Next Hop           Metric LocPrf Weight Path
* i 2.2.2.0/24       1.1.1.1                  0     100      0 64520 i

Total number of prefixes 1
ODDER#

```

- Question 5.2 - Is the route from EVEN usable on ODD? Why or why not?
 - It is usable on odd because it is being advertised via eBGP and has the capacity to advertise the loopback. And next-hop is reachable so it is usable.

```

% NO such neighbor or address family
ODD#ping 2.2.2.2
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 2.2.2.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 16/19/20 ms
ODD#show ip route
Codes: L - local, C - connected, 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, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

      1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        1.1.1.0/30 is directly connected, FastEthernet0/0
L        1.1.1.2/32 is directly connected, FastEthernet0/0
      2.0.0.0/24 is subnetted, 1 subnets
B        2.2.2.0 [20/0] via 1.1.1.1, 00:32:27
      3.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        3.3.3.0/24 is directly connected, Loopback1
L        3.3.3.3/32 is directly connected, Loopback1
      4.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C        4.4.4.0/30 is directly connected, FastEthernet2/0
L        4.4.4.1/32 is directly connected, FastEthernet2/0
      5.0.0.0/32 is subnetted, 1 subnets
O        5.5.5.5 [110/2] via 4.4.4.2, 00:14:20, FastEthernet2/0
      192.168.122.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.122.0/24 is directly connected, FastEthernet1/0
L        192.168.122.3/32 is directly connected, FastEthernet1/0
ODD#

```

- Question 5.3 - Is the route from EVEN usable on ODDER? Why or why not?

- It is not usable because there is no next-hop route in the route table to EVEN from ODDER. ODD is not advertising any next hop of even to ODDER so it is not in the table.
- Add the glue network between EVEN and ODD to the IGP of ODD.
- Question 5.4 - Any special considerations for the ODD interface facing EVEN?
 - As the EVEN router doesn't know how to reach the odder router so we need to have a default route on the even router with next hop as an odd interface.
- Question 5.5 - Does this solve anything? Why or why not?
 - It allows for ODDER to see the routes of ODD facing EVEN. And also now even as default route it will send it to Odd router which has route to odder. So odder is reachable
- Question 5.6 - If you had 5000 point to point customer links what should you consider?
 - From the customer side we will have a default route to ISP because ISP provides access to all other routes. Inside ISP we will use iBGP because it is more scalable than OSPF.
- Remove the glue network between EVEN and ODD from the IGP of ODD.
- Configure the iBGP between ODD and ODDER to next-hop-self.

```
ODD#sh run | s bgp
router bgp 64530
  bgp log-neighbor-changes
  neighbor 1.1.1.1 remote-as 64520
  neighbor 1.1.1.1 password CUBoulder
  neighbor 1.1.1.1 send-community
  neighbor 5.5.5.5 remote-as 64530
  neighbor 5.5.5.5 update-source Loopback1
  neighbor 5.5.5.5 next-hop-self
  ip bgp-community new-format
ODD#
```

- Question 5.7 - Does this solve anything? Why or why not?
 - This does not solve anything. While the next hop shows the odd loopback interface for Even network, there is no route back to ODDER through EVEN unless a default or more specific route is available on EVEN router. This can be useful to allow for iBGP devices to have almost a 'default-route' for its customer networks and communicate internally without having a default route on those routers. EVEN is acting as a customer that wants to reach a destination that is not in their route table.
- Question 5.8 - Did this break anything? (consider forwarding ability vs reachability)
 - It doesn't break anything in this scenario as long as there is a default route or more specifically on the EVEN router side. It just changes the nexthop from EVEN router to odd router address.

OBJECTIVE 6

Use a route-map on a static pullup and outbound policy.

- Pull up two /8 routes with network statements on ODDER. Verify these are advertised to EVEN.

```
Gateway of last resort is not set

      1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C          1.1.1.0/30 is directly connected, FastEthernet0/0
L          1.1.1.1/32 is directly connected, FastEthernet0/0
      2.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C          2.2.2.0/24 is directly connected, Loopback1
L          2.2.2.2/32 is directly connected, Loopback1
B          11.0.0.0/8 [20/0] via 1.1.1.2, 00:00:37
B          12.0.0.0/8 [20/0] via 1.1.1.2, 00:00:07
      192.168.122.0/24 is variably subnetted, 2 subnets, 2 masks
C          192.168.122.0/24 is directly connected, FastEthernet1/0
L          192.168.122.2/32 is directly connected, FastEthernet1/0
EVEN#
```

- Question 6.1 - Show the config needed to pullup these routes in BGP statically.

```
!
interface Loopback11
  ip address 11.0.0.1 255.0.0.0
!
interface Loopback12
  ip address 12.0.0.1 255.0.0.0
!
interface FastEthernet0/0
  ip address 4.4.4.2 255.255.255.252
  duplex full
!
interface FastEthernet1/0
  ip address 192.168.122.5 255.255.255.0
  duplex full
!
router ospf 1
  network 4.4.4.0 0.0.0.3 area 0
  network 5.5.5.0 0.0.0.255 area 0
!
router bgp 64530
  bgp log-neighbor-changes
  redistribute connected
```

- Question 6.2 - Show the config needed to tag the first route with a community ODD-AS:123 and set the origin to Internal/IGP.s

```

!
router bgp 64530
  bgp log-neighbor-changes
  redistribute connected
  neighbor 3.3.3.3 remote-as 64530
  neighbor 3.3.3.3 update-source Loopback1
  neighbor 3.3.3.3 send-community
  neighbor 3.3.3.3 route-map Inbound out
!
ip forward-protocol nd
!
!
no ip http server
no ip http secure-server
!
!
ip prefix-list 11Network seq 5 permit 11.0.0.0/8
!
route-map Inbound permit 11
  match ip address prefix-list 11Network
  set origin igp
  set community 4229038203
!

```

- Question 6.3 - Show the config needed to tag the second route with a community ODD-AS:666 and set the origin to Internal/IGP.

```

!
router bgp 64530
  bgp log-neighbor-changes
  redistribute connected
  neighbor 3.3.3.3 remote-as 64530
  neighbor 3.3.3.3 update-source Loopback1
  neighbor 3.3.3.3 send-community
  neighbor 3.3.3.3 route-map Inbound out
!
ip forward-protocol nd
!
!
no ip http server
no ip http secure-server
!
!
ip prefix-list 11Network seq 5 permit 11.0.0.0/8
!
ip prefix-list 12Network seq 5 permit 12.0.0.0/8
!
route-map Inbound permit 11
  match ip address prefix-list 11Network
  set origin igp
  set community 4229038203
!
route-map Inbound permit 12
  match ip address prefix-list 12Network
  set origin igp
  set community 4229038746
!
```

- Question 6.4 - Show the config to create an export (outbound) policy on ODD towards EVEN to advertise routes tagged with ODD-AS:123 and no others.

```
!
router bgp 64530
bgp log-neighbor-changes
neighbor 1.1.1.1 remote-as 64520
neighbor 1.1.1.1 password CUBoulder
neighbor 1.1.1.1 send-community
neighbor 1.1.1.1 route-map Outbound out
neighbor 5.5.5.5 remote-as 64530
neighbor 5.5.5.5 update-source Loopback1
neighbor 5.5.5.5 next-hop-self
!
ip forward-protocol nd
!
[no ip http server
[no ip http secure-server
!
!
ip prefix-list Any_prefix seq 5 permit 0.0.0.0/0 le 32
!
ip prefix-list Loopback_1 seq 5 permit 3.3.3.0/24
!
[route-map Outbound permit 11
[match community 11Network
!
!
```

OBJECTIVE 7 - OPTIONAL BUT ENCOURAGED

Juniper Outbound Policy

- Replace one of your routers with a Juniper
 - Create 5 /32 loopbacks on your Juniper router (i.e. same as objective 3)
 - Bring up a BGP session using the ethernet addresses. Make sure the cisco router can get to all loopbacks of the juniper router.
 - Using a single route-map set the following attributes outbound:
 - Match loopback1 and set as-path to prepend ODD-AS twice.
 - Match loopback2 and set community to MY-AS:1 (be sure you are sending communities)
 - Match loopback3 and set as-path to prepend ODD-AS three times.
 - Match loopback4 and set metric to 50.
 - Match loopback5 and deny the route.
 - Match any prefix and accept.
 - Question 7.1-5 - Using 'show ip bgp a.b.c.d' show on your cisco router that each attribute has been modified as desired.
 - Question 7.6 - Turn-in a copy of your policy-statement and associated lists.

OBJECTIVE 8 - OPTIONAL BUT ENCOURAGED

Juniper Inbound Policy

- Turn things around and advertise routes to your Juniper now (use the cisco configs from objective 4)
 - Using policy-statements under policy options set the following attributes inbound:
 - Match as-path ODD-AS_ODD-AS_ODD-AS and set the weight to 150.

- Match the community ODD-AS:1 and set the local-pref to 200.
 - Match the as-path ODD-AS_ODD-AS_ODD-AS_ODD-AS and set the metric to 50.
 - Match the route from loopback4 and deny the route.
 - Match any prefix and accept.
- Question 8.1-5 - Using 'show ip bgp a.b.c.d' shows on your juniper router that each attribute has been modified as desired.
- Question 8.6 - Turn in a copy of your route-map and associated lists.

OBJECTIVE 9

Wrap up

- Question 9.1 - What did you learn from this lab?

It's all about BGP we learned about next-hop, route-maps and how BGP works in general, eBGP, iBGP, Prefix lists and Communities

- Question 9.2 - What was the least useful part of this lab?

The least useful part of this lab was nothing! We learned a lot!

- Question 9.3 - What was the most useful part of this lab?

The most useful parts of this lab was learning about route-maps and next-hop functionality/reachability