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BGP Configuration Examples
→ All examples are for Cisco IOS
→ Translation to other systems should not be too hard - ask your local network engineer

Network Diagram for all examples
Interface addresses

- A Loopback interface is needed (it never goes down)
- IP addresses of all interfaces have to be redistributed by a routing protocol
- In this example we are using OSPF for that
- Config shown is for R2, other routers are similar

```plaintext
! Config for R2
interface Loopback0
  ip address 192.168.1.2 255.255.255.255
!
interface GigabitEthernet1/0
  ip address 192.168.2.14 255.255.255.252
!
interface GigabitEthernet2/0
  ip address 192.168.2.1 255.255.255.252
!
router ospf 65501
  redistribute connected subnets tag 2
  network 192.168.2.0 0.0.0.255 area 0
```

iBGP

- A peer group is used for common config statements
- Best is to use an interface which cannot go "down" to tie iBGP on: Loopback0
- Then only one line of config is needed for each iBGP peer
- Remember: iBGP needs to be fully meshed.

```plaintext
! Config for R2
router bgp 65501
  neighbor internal peer-group
  neighbor internal remote-as 65501
  neighbor internal send-community both
  neighbor internal update-source Loopback0
  neighbor 192.168.1.1 peer-group internal
  neighbor 192.168.1.3 peer-group internal
  neighbor 192.168.1.4 peer-group internal
```
Adding routes to BGP

**General**

- Control what you announce❗
- Do not allow any prefixes uncontrolled into BGP‼
- You need to have the route in your routing table
- Easiest is a static route which will never go away - just route it to the Null0 interface
- You can do this on one or on all iBGP routers.

```
ip route 10.2.0.0 255.255.0.0 Null0
```

**Using a "network" statement**

- This tells BGP to announce this prefix **if it is in the routing table**

```
router bgp 65501
    network 10.2.0.0 mask 255.255.0.0
```

**Using a "redistribute" statement**

- Again, route needs to be in the routing table
- Also create an access list with all prefixes and matching netmask you want in BGP
- Use a route-map with the access list to filter

```
ip prefix-list customer-routes seq 5 permit 10.2.0.0/16
ip prefix-list customer-routes seq 99999 deny 0.0.0.0/0
!
route-map static-to-bgp permit 10
    match ip address prefix-list customer-routes
!
router bgp 65501
    redistribute static route-map static-to-bgp
```

eBGP

- Use peer groups whenever possible
  - Configure common statements inside the group config
  - Add individual information like AS number with the peer
- Use Route-Maps
Appendix - Router configurations

Find below initial router configurations for GNS3 network emulator

In this example, all routers are Cisco 72xx style routers with 1-3 (Gig)Ethernet interfaces. Only relevant parts of the configurations are listed.

Router R1

```bash
! hostname R1
ip bgp-community new-format
!
interface Loopback0
 ip address 192.168.1.1 255.255.255.255
!
interface GigabitEthernet1/0
 ip address 192.168.2.13 255.255.255.252
 negotiation auto
!
interface GigabitEthernet2/0
 ip address 192.168.2.9 255.255.255.252
 negotiation auto
!
router ospf 65501
 redistribute connected subnets tag 1
 network 192.168.2.0 0.0.0.255 area 0
!
router bgp 65501
 bgp log-neighbor-changes
 neighbor internal peer-group
 neighbor internal remote-as 65501
 neighbor internal send-community both
 neighbor internal update-source Loopback0
 neighbor 192.168.1.2 peer-group internal
 neighbor 192.168.1.3 peer-group internal
 neighbor 192.168.1.4 peer-group internal
!
end
```
Router R2 (this one will be changed)

!
hostname R2
!
interface GigabitEthernet0/0
  ip address 192.168.3.1 255.255.255.252
  negotiation auto
!
interface GigabitEthernet1/0
  ip address 192.168.2.14 255.255.255.252
  negotiation auto
!
interface GigabitEthernet2/0
  ip address 192.168.2.1 255.255.255.252
  negotiation auto
!
end

Router R3

!
hostname R3
!
interface Loopback0
  ip address 192.168.1.3 255.255.255.255
!
interface GigabitEthernet1/0
  ip address 192.168.2.14 255.255.255.252
  negotiation auto
!
interface GigabitEthernet2/0
  ip address 192.168.2.10 255.255.255.252
  negotiation auto
!
router ospf 65501
  redistribute connected subnets tag 3
  network 192.168.2.0 0.0.0.255 area 0
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Links and Examples

! router bgp 65501
  bgp log-neighbor-changes
  neighbor internal peer-group
  neighbor internal remote-as 65501
  neighbor internal update-source Loopback0
  neighbor internal send-community both
  neighbor 192.168.1.1 peer-group internal
  neighbor 192.168.1.2 peer-group internal
  neighbor 192.168.1.4 peer-group internal
  ip bgp-community new-format
  end

Router R4

! hostname R4
!
interface Loopback0
  ip address 192.168.1.4 255.255.255.255
!
interface GigabitEthernet1/0
  ip address 192.168.2.6 255.255.255.252
  negotiation auto
!
interface GigabitEthernet2/0
  ip address 192.168.2.2 255.255.255.252
  negotiation auto
!
router ospf 65501
  redistribute connected subnets tag 4
  network 192.168.2.0 0.0.0.255 area 0
!
router bgp 65501
  bgp log-neighbor-changes
  neighbor internal peer-group
  neighbor internal remote-as 65501
  neighbor internal update-source Loopback0
  neighbor internal send-community both
neighbor 192.168.1.1 peer-group internal
neighbor 192.168.1.2 peer-group internal
neighbor 192.168.1.3 peer-group internal
!
ip bgp-community new-format
!
end

Router R5 (this one will be changed)
!
hostname R5
!
interface Loopback0
  ip address 172.16.1.1 255.255.255.255
!
interface GigabitEthernet0/0
  ip address 192.168.3.2 255.255.255.252
  negotiation auto
!
router bgp 65000
  no bgp enforce-first-as
  bgp log-neighbor-changes
  redistribute static route-map static-to-bgp
  neighbor upstream peer-group
  neighbor upstream send-community both
  neighbor upstream soft-reconfiguration inbound
  neighbor upstream route-map upstream-in in
  neighbor upstream route-map upstream-out out
  neighbor 192.168.3.1 remote-as 65501
  neighbor 192.168.3.1 peer-group upstream
!
ip bgp-community new-format
!
ip community-list expanded announce-to-upstream permit 65000:5(1|3|7).*
ip community-list expanded scrub-incoming permit 65000:.*
ip community-list expanded announce-to-peering permit 65000:5(2|3|7).*
!
ip route 172.16.0.0 255.255.0.0 Null0
!
!
ip prefix-list customer-routes seq 5 permit 172.16.0.0/16
ip prefix-list customer-routes seq 99999 deny 0.0.0.0/0
!
route-map upstream-in permit 10
  set comm-list scrub-incoming delete
!
route-map upstream-out permit 10
  match community announce-to-upstream
  set extcommunity rt 6695:4200000000 4200000000:6695
!
route-map static-to-bgp permit 10
  description customer routes
  match ip address prefix-list customer-routes
  set community 65000:53001
!
end