

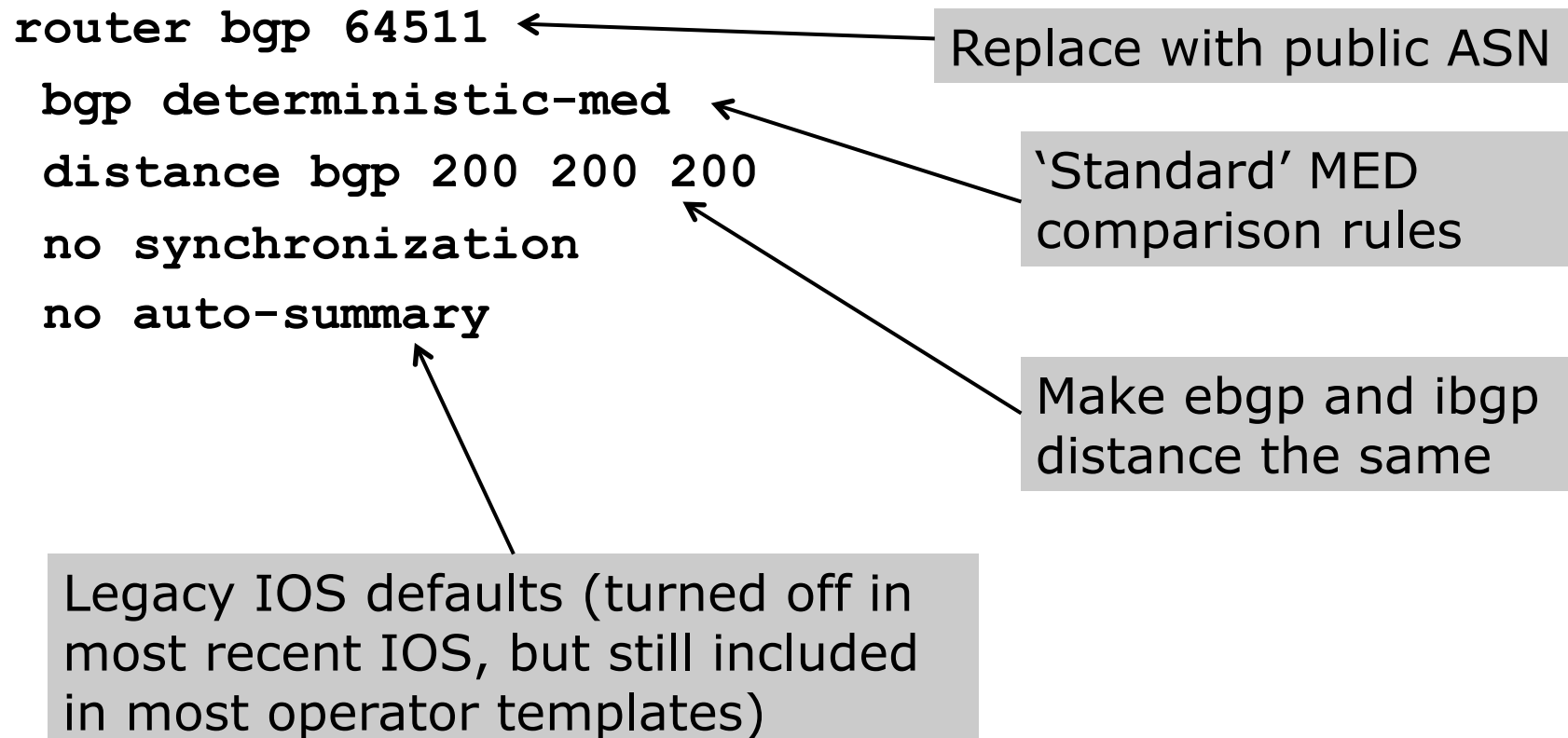
BGP on IOS: Getting Started



ISP Workshops

IOS Good Practices

- ❑ ISPs should start off with the following BGP commands as a basic template:



Cisco IOS Good Practices

- ❑ BGP in Cisco IOS is **permissive** by default
- ❑ Configuring BGP peering without using filters means:
 - All best paths on the local router are passed to the neighbour
 - All routes announced by the neighbour are received by the local router
 - Can have disastrous consequences
- ❑ **Good practice is to ensure that each eBGP neighbour has inbound and outbound filter applied:**

```
router bgp 64511
  neighbor 1.2.3.4 remote-as 64510
  neighbor 1.2.3.4 prefix-list as64510-in in
  neighbor 1.2.3.4 prefix-list as64510-out out
```

BGP Configuration

- ❑ Cisco IOS assumes that all BGP neighbours will be IPv4 unicast neighbours
 - We need to remove this assumption

```
router bgp 100
  no bgp default ipv4-unicast
```

- ❑ Failing to do this will result in all neighbours being defined as IPv4 unicast neighbours
 - Non-IPv4 neighbours will have no specific unicast IPv4 configuration
 - Cluttered configuration, confusing troubleshooting and diagnosis

BGP Configuration

IPv4 and IPv6

```
router bgp 10
  no bgp default ipv4-unicast
  neighbor 2001:db8:1:1019::1 remote-as 20
  neighbor 172.16.1.2 remote-as 30
  !
  address-family ipv4
    neighbor 172.16.1.2 activate
    neighbor 172.16.1.2 prefix-list ipv4-ebgp in
    neighbor 172.16.1.2 prefix-list v4out out
    network 172.16.0.0
  exit-address-family
  !
  address-family ipv6
    neighbor 2001:db8:1:1019::1 activate
    neighbor 2001:db8:1:1019::1 prefix-list ipv6-ebgp in
    neighbor 2001:db8:1:1019::1 prefix-list v6out out
    network 2001:db8::/32
  exit-address-family
  !
  ! Continued -->
```

BGP Configuration

IPv4 and IPv6

```
ip prefix-list ipv4-ebgp permit 0.0.0.0/0 le 32
!  
ip prefix-list v4out permit 172.16.0.0/16
!  
ipv6 prefix-list ipv6-ebgp permit ::/0 le 128
!  
ipv6 prefix-list v6out permit 2001:db8::/32
!
```

- Compare IPv4 prefix filters with IPv6 prefix filters

```
ip prefix-list <name> permit|deny <ipv4 address>
ipv6 prefix-list <name> permit|deny <ipv6 address>
```

BGP Configuration

IPv4 and IPv6

- When configuring the router, recommendation is:
 - Put all IPv6 configuration directly into IPv6 address family
 - Put all IPv4 configuration directly into IPv4 address family
- Router will sort generic from specific address family configuration when the configuration is saved to NVRAM or displayed on the console
- Example follows...
 - Notice how activate is added by the router to indicate that the peering is activated for the particular address family

BGP Address Families

Applied Configuration

```
router bgp 10
  no bgp default ipv4-unicast
  !
  address family ipv4
    neighbor 172.16.1.2 remote-as 30
    neighbor 172.16.1.2 prefix-list ipv4-ebgp in
    neighbor 172.16.1.2 prefix-list v4out out
    network 172.16.0.0
  !
  address-family ipv6
    neighbor 2001:db8:1:1019::1 remote-as 20
    neighbor 2001:db8:1:1019::1 prefix-list ipv6-ebgp in
    neighbor 2001:db8:1:1019::1 prefix-list v6out out
    network 2001:db8::/32
  !
  ip prefix-list ipv4-ebgp permit 0.0.0.0/0 le 32
  ip prefix-list v4out permit 172.16.0.0/16
  !
  ipv6 prefix-list ipv6-ebgp permit ::/0 le 128
  ipv6 prefix-list v6out permit 2001:db8::/32
```

Generic Configuration

Specific Configuration

BGP Address Families

End result

```
router bgp 10
  no bgp default ipv4-unicast
  neighbor 2001:db8:1:1019::1 remote-as 20
  neighbor 172.16.1.2 remote-as 30
  !
  address-family ipv4
    neighbor 172.16.1.2 activate
    neighbor 172.16.1.2 prefix-list ipv4-ebgp in
    neighbor 172.16.1.2 prefix-list v4out out
    network 172.16.0.0
  exit-address-family
  !
  address-family ipv6
    neighbor 2001:db8:1:1019::1 activate
    neighbor 2001:db8:1:1019::1 prefix-list ipv6-ebgp in
    neighbor 2001:db8:1:1019::1 prefix-list v6out out
    network 2001:db8::/32
  exit-address-family
  !
  ip prefix-list ipv4-ebgp permit 0.0.0.0/0 le 32
  ip prefix-list v4out permit 172.16.0.0/16
  !
  ipv6 prefix-list ipv6-ebgp permit ::/0 le 128
  ipv6 prefix-list v6out permit 2001:db8::/32
```

Generic Configuration

Specific Configuration

BGP Status Commands (IPv4)

- Display summary information regarding the state of the BGP neighbours

```
show ip bgp summary
```

```
Router1#sh ip bgp sum
BGP router identifier 10.10.15.224, local AS number 10
BGP table version is 22, main routing table version 22
17 network entries using 2448 bytes of memory
26 path entries using 2080 bytes of memory
9/8 BGP path/bestpath attribute entries using 1224 bytes of memory
4 BGP AS-PATH entries using 96 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
BGP using 5848 total bytes of memory
BGP activity 32/0 prefixes, 49/0 paths, scan interval 60 secs

Neighbor          V    AS MsgRcvd MsgSent   TblVer  InQ  OutQ Up/Down  State/PfxRcd
10.10.15.14       4    40     13     16      28    0    0 00:04:22      9
10.10.15.225     4    10     15     12      28    0    0 00:04:16     16
10.10.15.226     4    10     11     12      28    0    0 00:04:16     11
```

↑
Neighbour Information

↑
BGP Messages Activity

BGP Status Commands (IPv6)

- Display summary information regarding the state of the BGP neighbours

```
show bgp ipv6 unicast summary
```

```
Router1>sh bgp ipv6 uni sum
BGP router identifier 10.10.15.224, local AS number 10
BGP table version is 28, main routing table version 28
18 network entries using 2880 bytes of memory
38 path entries using 3040 bytes of memory
9/6 BGP path/bestpath attribute entries using 1152 bytes of memory
4 BGP AS-PATH entries using 96 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
BGP using 7168 total bytes of memory
BGP activity 37/1 prefixes, 95/19 paths, scan interval 60 secs
```

Neighbor	V	AS	MsgRcvd	MsgSent	TblVer	InQ	OutQ	Up/Down	State/PfxRcd
2001:DB8::2	4	10	185	182	28	0	0	02:36:11	16
2001:DB8::3	4	10	180	181	28	0	0	02:36:08	11
2001:DB8:0:4::1	4	40	153	152	28	0	0	02:05:39	9

↑
Neighbour Information

↑
BGP Messages Activity

BGP on IOS: Getting Started



ISP Workshops