Experiment 3a - Comparing Received Prefixes

DE-CIX Academy

Version 2.1 - Students Copy - October 22, 2026

1 Introduction

In this experiment you will receive some prefix announcements. Figure out why the one selected as “best” prefix is considered best by your router.

2 Network Setup

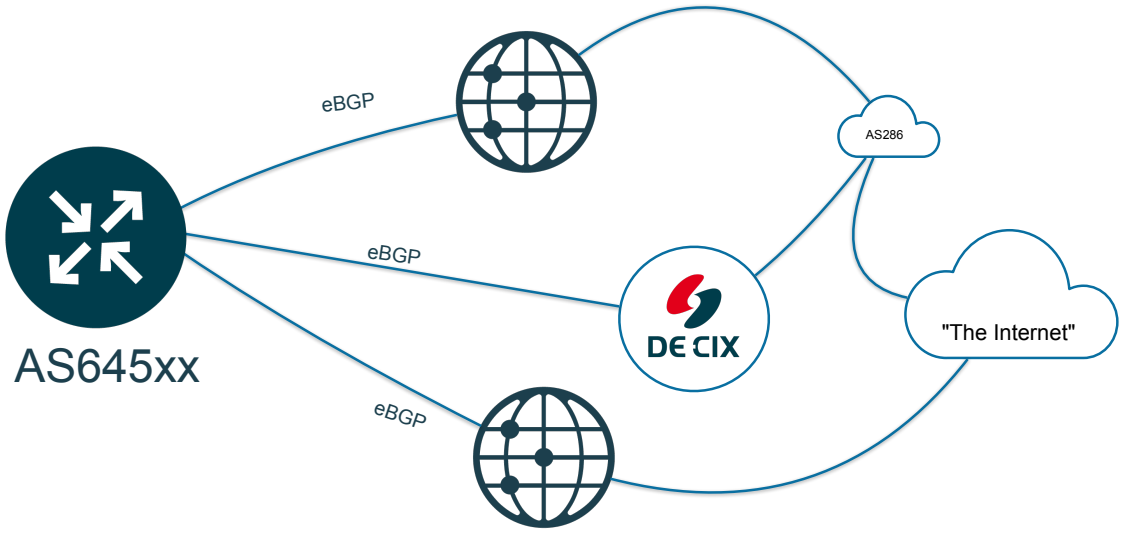


Figure 1: Network Setup

Figure 1 shows the network topology for this experiment. It is the same as for experiment 2. All participants are using AS64501 upwards and are connected to AS65550, AS64496 (and if required to AS286 for peering).

3 Experiments

You are sent various prefixes via your configured peering connections.

3.1 Tasks:

- Gather information about what you receive
- Explain why one of the announcement is selected as “best” by your router.

3.1.1 Commands you need:

show bgp ipv4 lists all prefixes in the BGP table.

show bgp ipv4 <*prefix*> lists prefix <*prefix*> including all details the router uses to make its best path selection.

show bgp ipv4 summary lists all neighbors and the number of prefixes they announce

show bgp ipv4 neighbor <*address*> routes shows the accepted prefixes from neighbor <*address*>

show bgp ipv4 neighbor <*address*> received-routes shows all prefixes from neighbor <*address*>, even the ones filtered out

Remark: The commands are the same for IPv6 - just use *ipv6* instead of *ipv4*.

3.2 Configuration commands to influence best path selection

These commands have to be entered in configuration mode ("configure") and in context of the BGP router ("router bgp 645xx").

3.2.1 AS path length

bgp bestpath as-path ignore disables the use of the AS path length as criterium for best path selection. Do not use.

3.2.2 MED

bgp always-compre-med this enables the comparison of MEDs if the first AS in the AS path is *not* the same. Use with care.

bgp bestpath missing-as-worst changes the default behavior that a missing MED attribute is treated as *best* - now a missing MED is treated as *worst*.

3.3 Multipath

Sometimes you want more than one “best prefix” in your routing table. For this you can enable “bgp multipath”.

maximum-paths *number* in address family context configures that up to *number* paths to one destination can be installed in the routing table.

bgp bestpath as-path ignore skips the comparison of as-path length in the best-path selection (and allows multiple paths with different as-path length to be used).

bgp bestpath as-path multipath-relax allows multiple paths with different neighbor ASes to be installed in the routing table.

4 Slides

BGP Best Path Selection: Local Preference

1. **Local Preference: Higher wins**
2. AS-Path length: Shorter wins
3. Origin Type: *IGP* over *EGP* over *Incomplete*
4. MED: Lower wins
5. eBGP, iBGP: eBGP wins
6. Age of route: Older wins
7. Router ID: Lowest wins
8. Neighbor IP address: Lowest wins

80.81.192.1	Peer
10.230.xx.1	Upstream
10.200.xx.1	Upstream

Show commands:

- show bgp ipv4 summary
- show bgp ipv4
- show bgp ipv4 129.13.0.0

BGP Best Path Selection: AS path length

1. Local Preference: Higher wins
2. **AS-Path length: Shorter wins**
3. Origin Type: *IGP* over *EGP* over *Incomplete*
4. MED: Lower wins
5. eBGP, iBGP: eBGP wins
6. Age of route: Older wins
7. Router ID: Lowest wins
8. Neighbor IP address: Lowest wins

Show commands:

- show bgp ipv4 summary
- show bgp ipv4
- show bgp ipv4 129.13.0.0

BGP Best Path Selection: Origin Type

1. Local Preference: Higher wins
2. AS-Path length: Shorter wins
3. **Origin Type: *IGP* over *EGP* over *Incomplete***
4. MED: Lower wins
5. eBGP, iBGP: eBGP wins
6. Age of route: Older wins
7. Router ID: Lowest wins
8. Neighbor IP address: Lowest wins

i	IGP	Injected using *network* statement
e	EGP	Injected from EGP (obsolete)
?	Incomplete	Injected using *redistribute* from other routing protocol

Show commands:

- show bgp ipv4 summary
- show bgp ipv4
- show bgp ipv4 129.13.0.0

BGP Best Path Selection: Multi Exit Discriminator (MED)

1. Local Preference: Higher wins
2. AS-Path length: Shorter wins
3. Origin Type: *IGP* over *EGP* over *Incomplete*
4. **MED: Lower wins**
5. eBGP, iBGP: eBGP wins
6. Age of route: Older wins
7. Router ID: Lowest wins
8. Neighbor IP address: Lowest wins

MED is only compared if the first AS in the path is the same!

Show commands:

- show bgp ipv4 summary
- show bgp ipv4
- show bgp ipv4 193.141.4.0

BGP Best Path Selection: Older (more stable) prefix wins

1. Local Preference: Higher wins
2. AS-Path length: Shorter wins
3. Origin Type: *IGP* over *EGP* over *Incomplete*
4. MED: Lower wins
5. eBGP, iBGP: eBGP wins
6. **Age of route: Older wins**
7. Router ID: Lowest wins
8. Neighbor IP address: Lowest wins

Show commands:

- show bgp ipv4 summary
- show bgp ipv4
- show bgp ipv4 193.141.4.0

BGP Best Path Selection: If own AS is in path, discard

1. Local Preference: Higher wins
2. AS-Path length: Shorter wins
3. Origin Type: *IGP* over *EGP* over *Incomplete*
4. MED: Lower wins
5. eBGP, iBGP: eBGP wins
6. Age of route: Older wins
7. Router ID: Lowest wins
8. Neighbor IP address: Lowest wins

Show commands:

- show bgp ipv4 summary
- show bgp ipv4
- show bgp ipv4 neighbor 10.200.xx.1 received-routes
- show bgp ipv4 neighbor 10.200.xx.1 routes

BGP Best Path Selection: General routing rules still take priority

1. Local Preference: Higher wins
2. AS-Path length: Shorter wins
3. Origin Type: *IGP* over *EGP* over *Incomplete*
4. MED: Lower wins
5. eBGP, iBGP: eBGP wins
6. Age of route: Older wins
7. Router ID: Lowest wins
8. Neighbor IP address: Lowest wins

0. More specific wins

Show commands:

- show bgp ipv4 summary
- show bgp ipv4

BGP Multipath:
allow multiple paths into the BGP table

```
router bgp 645xx
 bgp bestpath as-path ignore
 bgp bestpath as-path multipath-relax
 address-family ipv4 unicast
   maximum-paths 2
 exit-address-family
 address-family ipv6 unicast
   maximum-paths 2
 exit-address-family
```

Show commands:

- show bgp ipv4 summary
- show bgp ipv4