

Adapted from the Synchronization example in <http://www.cisco.com/en/US/docs/internetworking/design/guide/nd2003.html> <http://www.cisco.com/en/US/docs/internetworking/case/studies/icsbgp4.html>

When an AS provides transit service to other ASs when there are non-BGP routers in the AS, transit traffic might be dropped if the intermediate non-BGP routers have not learned routes for that traffic via an IGP. The BGP synchronization rule states that if an AS provides transit service to another AS, BGP should not advertise a route until all of the routers within the AS have learned about the route via an IGP.

The topology shown in Figure 1 demonstrates this synchronization rule.



Figure 1: Synchronization

In Figure 1, Router C sends updates about network 170.10.0.0 to Router A. Routers A and B are running IBGP, so Router B receives updates about network 170.10.0.0 via IBGP. If **synchronization** is **disabled**, Router B will install the IBGP route to 170.10.0.0 in its routing table. So when Router B wants to reach network 170.10.0.0, it sends traffic to Router E. If Router A does not redistribute network 170.10.0.0 into an IGP, Router E has no way of knowing that network 170.10.0.0 exists and will drop the packets.

If Router B advertises to AS 400 that it can reach 170.10.0.0 before Router E learns about the network via IGP, traffic coming from Router D to Router B with a destination of 170.10.0.0 will flow to Router E and be dropped.

This situation is handled by the **synchronization** rule of BGP, which states that if an AS (such as AS100 in Figure 1) passes traffic from one AS to another AS, BGP does not advertise a route before all routers within the AS (in this case, AS 100) have learned about the route via an IGP. In this case, Router B waits to hear about network 170.10.0.0 via an IGP before it sends an update to Router D.

Worked Example

In the example below, **synchronization** is **enabled** (default behaviour before Cisco IOS Software Release 12.2(8)T) but no redistribution is configured.

```
font-size: x-small;">RouterB#</span><span class="UserInput"><span style="font-size: 9pt;
mso-bidi-font-family: Tahoma;"><strong><em><span style="color: #0084d1;">show ip
bgp</span></em></strong></span></span></span></p> <p class="Console10" style="margin:
0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000;
font-size: x-small;">BGP table version is 2, local router ID is 150.10.10.33</span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span
style="font-family: Courier New; color: #000000; font-size: x-small;">Status codes: s
suppressed, d damped, h history, * valid, > best, i - internal,</span></p> <p class="Console10"
style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-size: x-small;"><span
style="color: #000000;"><span style="font-family: Courier New;"><span style="mso-spacerun:
yes;"> </span>r RIB-failure, S Stale</span></span></span></p> <p class="Console10"
style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New;
color: #000000; font-size: x-small;">Origin codes: i - IGP, e - EGP, ? - incomplete</span></p>
<p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span
style="font-family: Courier New; color: #000000; font-size: x-small;"> </span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span
style="font-size: x-small;"><span style="color: #000000;"><span style="font-family: Courier
New;"><span style="mso-spacerun: yes;"> </span>Network<span style="mso-spacerun: yes;">
</span>Next Hop<span style="mso-spacerun: yes;"> </span>Metric LocPrf Weight
Path</span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size:
x-small;">* i150.10.0.0<span style="mso-spacerun: yes;"> </span>150.10.10.1<span
style="mso-spacerun: yes;"> </span>0<span style="mso-spacerun: yes;"> </span>100<span
style="mso-spacerun: yes;"> </span>0 i</span></p> <p class="Console10" style="margin: 0cm
0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000;
font-size: x-small;">* > <span style="mso-spacerun: yes;"> </span>0.0.0.0<span
style="mso-spacerun: yes;"> </span>0<span style="mso-spacerun: yes;"> </span>32768
i</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;
tab-stops: list 0cm;"><strong style="mso-bidi-font-weight: normal;"><span
style="text-decoration: underline;"><span style="font-size: x-small;"><span style="color:
#000000;"><span style="font-family: Courier New;">* i170.10.0.0<span style="mso-spacerun:
yes;"> </span>2.2.2.1<span style="mso-spacerun: yes;"> </span>0<span
style="mso-spacerun: yes;"> </span>100<span style="mso-spacerun: yes;"> </span>0 300
l</span></span></span></span></strong></p> <p class="Console10" style="margin: 0cm 0cm
0pt; background: #e6e6e6; tab-stops: list 0cm;"><strong style="mso-bidi-font-weight:
normal;"><span style="font-size: x-small;"><span style="color: #000000;"><span
style="font-family: Courier New;">RouterB#show ip route bgp
</span></span></span></strong></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6; tab-stops: list 0cm;"><strong style="mso-bidi-font-weight:
normal;"><span style="font-family: Courier New; color: #000000; font-size: x-small;"><no
output></span></strong></p> </div> <p style="margin-top: 0.11cm; margin-bottom: 0.11cm;
background: none repeat scroll 0% 0% transparent; page-break-before: auto;">Now although
Router B gets the IBGP update, it will not install this route into its routing table until it sees a
valid route to 170.10.0.0, nor will it advertise the route to RouterD. A <strong>debug ip bgp
updates</strong><span style="font-weight: normal;"> will show this:</span></p> <div
style="background: #e6e6e6; margin-left: 1.45pt; margin-right: 1.45pt; mso-border-alt: solid
```

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black .25pt; mso-element: para-border-div; border: black 1pt solid; padding: 1pt;"> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6; tab-stops: list
0cm;"><span style="font-size: 9pt;"><span style="font-family: Courier New;"><span
style="color: #000000;">RouterB# </span><span style="color: #0084d1;"><span
class="UserInput"><span style="font-style: normal; font-weight: normal; mso-bidi-font-family:
Tahoma; mso-ansi-font-size: 9.0pt;">debug ip bgp
updates</span></span></span></span></span></p> <p class="Console10" style="margin:
0cm 0cm 0pt; background: #e6e6e6; tab-stops: list 0cm;"><span style="font-size: 9pt;"><span
style="color: #000000;"><span style="font-family: Courier New;">*Mar<span
style="mso-spacerun: yes;"> </span>1 06:29:56.142: %BGP-5-ADJCHANGE: neighbor 1.1.1.2
Up </span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6; tab-stops: list 0cm;"><span style="font-size: 9pt;"><span style="color:
#000000;"><span style="font-family: Courier New;">*Mar<span style="mso-spacerun: yes;">
</span>1 06:29:58.206: BGP(0): 150.10.10.1 rcvd UPDATE w/ attr: nexthop 150.10.10.1, origin
i, localpref 100, metric 0</span></span></span></span></p> <p class="Console10" style="margin:
0cm 0cm 0pt; background: #e6e6e6; tab-stops: list 0cm;"><span style="font-size: 9pt;"><span
style="color: #000000;"><span style="font-family: Courier New;">*Mar<span
style="mso-spacerun: yes;"> </span>1 06:29:58.210: BGP(0): 150.10.10.1 rcvd
150.10.0.0/16</span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6; tab-stops: list 0cm;"><span style="font-size: 9pt;"><span style="color:
#000000;"><span style="font-family: Courier New;">*Mar<span style="mso-spacerun: yes;">
</span>1 06:29:58.210: BGP(0): 150.10.10.1 rcvd UPDATE w/ attr: nexthop 2.2.2.1, origin i,
localpref 100, metric 0, path 300</span></span></span></span></p> <p class="Console10"
style="margin: 0cm 0cm 0pt; background: #e6e6e6; tab-stops: list 0cm;"><span
style="font-size: 9pt;"><span style="color: #000000;"><span style="font-family: Courier
New;">*Mar<span style="mso-spacerun: yes;"> </span>1 06:29:58.210: BGP(0): 150.10.10.1
rcvd 170.10.0.0/16</span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm
0pt; background: #e6e6e6; tab-stops: list 0cm;"><span style="font-size: 9pt;"><span
style="color: #000000;"><span style="font-family: Courier New;">*Mar<span
style="mso-spacerun: yes;"> </span>1 06:30:26.226: BGP(0): no valid path for
170.10.0.0/16</span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6; tab-stops: list 0cm;"><span style="font-size: 9pt;"><span style="color:
#000000;"><span style="font-family: Courier New;">*Mar<span style="mso-spacerun: yes;">
</span>1 06:30:26.226: BGP(0): nettable_walker 150.10.0.0/16 route sourced
locally</span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6; tab-stops: list 0cm;"><span style="font-size: 9pt;"><span style="color:
#000000;"><span style="font-family: Courier New;">*Mar<span style="mso-spacerun: yes;">
</span>1 06:30:26.226: BGP(0): nettable_walker 170.10.0.0/16 no best
path</span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6; tab-stops: list 0cm;"><span style="font-size: 9pt;"><span style="color:
#000000;"><span style="font-family: Courier New;">*Mar<span style="mso-spacerun: yes;">
</span>1 06:30:26.226: BGP(0): 1.1.1.2 send UPDATE (format) 150.10.0.0/16, next 1.1.1.1,
metric 0, path Local</span></span></span></span></p> <p class="Console10" style="margin: 0cm
0cm 0pt; background: #e6e6e6; tab-stops: list 0cm;"><span style="font-size: 9pt;"><span
style="color: #000000;"><span style="font-family: Courier New;">*Mar<span
style="mso-spacerun: yes;"> </span>1 06:30:26.230: BGP(0): 150.10.10.1 send UPDATE
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(format) 150.1150.10.10.33, metric 0, path Local

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<p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6; tab-stops: list 0cm;"><span style="font-size: 9pt;"><span style="color: #000000;"><span style="font-family: Courier New;">RouterB#</span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6; tab-stops: list 0cm;"><strong style="mso-bidi-font-weight: normal;"><span style="font-size: 9pt;"><span style="color: #000000;"><span style="font-family: Courier New;">*Mar<span style="mso-spacerun: yes;"> </span>1 06:30:33.738: BGP(0): no valid path for 170.10.0.0/16</span></span></span></strong></p> </div> <p style="margin-top: 0.11cm; margin-bottom: 0.11cm; background: none repeat scroll 0% 0% transparent; page-break-before: auto;">If Router B wants to reach network 170.10.0.0, it would have no path to follow and would drop the packets. If Router A does not redistribute network 170.10.0.0 into an IGP, neither Router D or Router E has a way of knowing that network 170.10.0.0 exists and will drop the packets. This is what <strong>synchronization</strong><span style="font-weight: normal;">is all about ♦ not installing IBGP routes into the routing table before being </span><strong>synchronised</strong><span style="font-weight: normal;"> to the IGP.</span></p> <h2 class="western">Disabling Synchronization</h2> <p style="margin-top: 0.11cm; margin-bottom: 0.11cm; background: none repeat scroll 0% 0% transparent; page-break-before: auto;"><span style="font-weight: normal;">In the following example, </span><strong>synchronization</strong><span style="font-weight: normal;"> has been </span><strong>disabled</strong><span style="font-weight: normal;"> on Router A & Router B.</span></p> <p><span style="font-weight: normal;"> <div style="background: #e6e6e6; margin-left: 1.45pt; margin-right: 1.45pt; mso-border-alt: solid black .25pt; mso-element: para-border-div; border: black 1pt solid; padding: 1pt;"> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-size: x-small;"><span style="font-family: Courier New;"><span style="color: #000000;">RouterA(config)#</span><span class="UserInput"><span style="font-style: normal; font-weight: normal; mso-bidi-font-family: Tahoma;"><span style="color: #0084d1;">router bgp 100</span></span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-size: x-small;"><span style="font-family: Courier New;"><span style="color: #000000;">RouterA(config-router)#</span><span class="UserInput"><span style="font-style: normal; font-weight: normal; mso-bidi-font-family: Tahoma;"><span style="color: #0084d1;">no synchronization</span></span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;"> </span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-size: x-small;"><span style="font-family: Courier New;"><span style="color: #000000;">RouterB(config)#</span><span class="UserInput"><span style="font-style: normal; font-weight: normal; mso-bidi-font-family: Tahoma;"><span style="color: #0084d1;">router bgp 100</span></span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6; tab-stops: list 0cm;"><span style="font-size: x-small;"><span style="font-family: Courier New;"><span style="color: #000000;">RouterB(config-router)#</span><span class="UserInput"><span style="font-style: normal; font-weight: normal; mso-bidi-font-family: Tahoma;"><span style="color: #0084d1;">no synchronization</span></span></span></span></span></p> </div> </p> <p style="margin-top: 0.11cm; margin-bottom: 0.11cm; background: none repeat scroll 0% 0%
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transparent; page-break-before: auto;"/>Router B receives
the IBGP update as before, but installs it into its routing table:
</span></p> <p><span
style="font-style: normal;"/> <div style="background: #e6e6e6; margin-left: 1.45pt; margin-right:
1.45pt; mso-border-alt: solid black .25pt; mso-element: para-border-div; border: black 1pt solid;
padding: 1pt;"/> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"/><span style="font-size: 6pt;"/><span style="font-family: Courier New; color:
#000000;"/>RouterB#</span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6;"/><span style="font-size: 6pt;"/><span style="color: #000000;"/><span
style="font-family: Courier New;"/>*Mar<span style="mso-spacerun: yes;"/> </span>1
06:55:46.606: BGP(0): 1.1.1.2 send UPDATE (format) 150.10.0.0/16, next 1.1.1.1, metric 0,
path Local</span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6;"/><span style="font-size: 6pt;"/><span style="color: #000000;"/><span
style="font-family: Courier New;"/>*Mar<span style="mso-spacerun: yes;"/> </span>1
06:55:46.610: BGP(0): 150.10.10.1 send UPDATE (format) 150.10.0.0/16, next 150.10.10.33,
metric 0, path Local</span></span></span></p> <p class="Console10" style="margin: 0cm
0cm 0pt; background: #e6e6e6;"/><span style="font-size: 6pt;"/><span style="color:
#000000;"/><span style="font-family: Courier New;"/>RouterB#</span></span></span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span
style="font-size: 6pt;"/><span style="color: #000000;"/><span style="font-family: Courier
New;"/>*Mar<span style="mso-spacerun: yes;"/> </span>1 06:55:51.530: BGP(0): 150.10.10.1
rcvd UPDATE w/ attr: nexthop 150.10.10.1, origin i, localpref 100, metric
0</span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"/><span style="font-size: 6pt;"/><span style="color: #000000;"/><span
style="font-family: Courier New;"/>*Mar<span style="mso-spacerun: yes;"/> </span>1
06:55:51.534: BGP(0): 150.10.10.1 rcvd 150.10.0.0/16</span></span></span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span
style="font-size: 6pt;"/><span style="color: #000000;"/><span style="font-family: Courier
New;"/>*Mar<span style="mso-spacerun: yes;"/> </span>1 06:55:51.554: BGP(0): 150.10.10.1
rcvd UPDATE w/ attr: nexthop 2.2.2.1, origin i, localpref 100, metric 0, path
300</span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6;"/><span style="font-size: 6pt;"/><span style="color: #000000;"/><span
style="font-family: Courier New;"/>*Mar<span style="mso-spacerun: yes;"/> </span>1
06:55:51.558: BGP(0): 150.10.10.1 rcvd 170.10.0.0/16</span></span></span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span
style="font-size: 6pt;"/><span style="color: #000000;"/><span style="font-family: Courier
New;"/>*Mar<span style="mso-spacerun: yes;"/> </span>1 06:55:51.566: BGP(0): Revise route
installing 1 of 1 routes for 170.10.0.0/16 -> 2.2.2.1(main) to main IP
table</span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6;"/><span style="font-size: 6pt;"/><span style="color: #000000;"/><span
style="font-family: Courier New;"/>RouterB#</span></span></span></p> <p class="Console10"
style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span style="font-size: 6pt;"/><span
style="color: #000000;"/><span style="font-family: Courier New;"/>*Mar<span
style="mso-spacerun: yes;"/> </span>1 06:56:16.714: BGP(0): 1.1.1.2 send UPDATE (format)
170.10.0.0/16, next 1.1.1.1, metric 0, path 300</span></span></span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span
style="font-family: Courier New; color: #000000; font-size: x-small;"/> </span></p> <p
```

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class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-size: x-small;"><span style="font-family: Courier New;"><span style="color: #000000;">RouterB#</span><span style="color: #0084d1;"><span class="UserInput"><span style="font-style: normal; font-weight: normal; mso-bidi-font-family: Tahoma;">show</span></span><strong style="mso-bidi-font-weight: normal;"><em style="mso-bidi-font-style: normal;"><span style="color: #0084d1;"> ip bgp</span></em></strong></span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">BBGP table version is 3, local router ID is 150.10.10.33</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-size: x-small;"><span style="color: #000000;"><span style="font-family: Courier New;"><span style="mso-spacerun: yes;"> </span>r RIB-failure, S Stale</span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">Origin codes: i - IGP, e - EGP, ? - incomplete</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;"> </span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-size: x-small;"><span style="color: #000000;"><span style="font-family: Courier New;"><span style="mso-spacerun: yes;"> </span>Network<span style="mso-spacerun: yes;"> </span>Next Hop<span style="mso-spacerun: yes;"> </span>Metric LocPrf Weight Path</span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">* i150.10.0.0<span style="mso-spacerun: yes;"> </span>150.10.10.1<span style="mso-spacerun: yes;"> </span>0<span style="mso-spacerun: yes;"> </span>100<span style="mso-spacerun: yes;"> </span>0 i</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">><span style="mso-spacerun: yes;"> </span>0.0.0.0<span style="mso-spacerun: yes;"> </span>0<span style="mso-spacerun: yes;"> </span>0<span style="mso-spacerun: yes;"> </span>32768 i</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><strong style="mso-bidi-font-weight: normal;"><span style="text-decoration: underline;"><span style="font-size: x-small;"><span style="color: #000000;"><span style="font-family: Courier New;"><span style="background: yellow; mso-highlight: yellow;">*>i170.10.0.0</span><span style="mso-spacerun: yes;"> </span>2.2.2.1<span style="mso-spacerun: yes;"> </span>0<span style="mso-spacerun: yes;"> </span>100<span style="mso-spacerun: yes;"> </span>0 300 i</span></span></span></span></strong></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">RouterB#show ip route bgp </span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><strong style="mso-bidi-font-weight: normal;"><span style="text-decoration: underline;"><span style="font-size: x-small;"><span style="color: #000000;"><span style="font-family: Courier New;">B<span style="mso-spacerun: yes;"> </span>170.10.0.0/16 [200/0] via 2.2.2.1, 02:31:24</span></span></span></span></strong></p> </div> </span></p> <p
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style="margin-top: 0.11 cm; margin-bottom: 0.11 cm; background: none repeat scroll 0% 0% transparent; font-weight: normal; text-decoration: none; page-break-before: auto; ">Notice that bgp entry for the 170.10.0.0 network above has been tagged as both valid (*) and best (>), whereas before when synchronization was required, it was shown only as valid (*). And we can see from the output of the show ip route bgp that the route to 170.10.0.0 has been added to the routing table.</p><p style="margin-top: 0.11 cm; margin-bottom: 0.11 cm; background: none repeat scroll 0% 0% transparent; page-break-before: auto; ">So now Router B is advertising to AS 400 that it can reach 170.10.0.0 before it or Router E has learnt about the network via IGP. This will result in traffic coming from Router D to Router B with a destination of 170.10.0.0 will flow to Router E and be dropped.</p><div style="background: #e6e6e6; margin-left: 1.45pt; margin-right: 1.45pt; mso-border-alt: solid black .25pt; mso-element: para-border-div; border: black 1pt solid; padding: 1pt; "><p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6; ">RouterD#<strong style="mso-bidi-font-weight: normal; "><em style="mso-bidi-font-style: normal; ">show ip bgp</p><p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6; ">BGP table version is 3, local router ID is 4.4.4.4</p><p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6; ">Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,</p><p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6; "> r RIB-failure, S Stale</p><p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6; ">Origin codes: i - IGP, e - EGP, ? - incomplete</p><p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6; "> </p><p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6; "> Network Next Hop Metric LocPrf Weight Path</p><p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6; ">*> 150.10.0.0 1.1.1.1 0 0 100 i</p><p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6; "><strong style="mso-bidi-font-weight: normal; "><span

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style="font-family: Courier New;"/>* > 170.10.0.0<span style="mso-spacerun: yes;"/>
</span>1.1.1.1<span style="mso-spacerun: yes;"/> </span>0 100 300
l</span></span></span></span></strong></p> <p class="Console10" style="margin: 0cm 0cm
0pt; background: #e6e6e6;"/><span style="font-size: x-small;"/><span style="font-family: Courier
New;"/><span style="color: #000000;"/>RouterD#</span><span class="UserInput"><span
style="font-style: normal; font-weight: normal; mso-bidi-font-family: Tahoma;"/><span
style="color: #0084d1;"/>show ip route bgp</span></span></span></span></span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><strong
style="mso-bidi-font-weight: normal;"/><span style="text-decoration: underline;"/><span
style="color: #000000;"/><span style="font-size: x-small;"/><span style="font-family: Courier
New;"/>B<span style="mso-spacerun: yes;"/> </span>170.10.0.0/16 [20/0] via 1.1.1.1,
02:49:08</span></span></span></span></strong></p> <p class="Console10" style="margin:
0cm 0cm 0pt; background: #e6e6e6;"/><span style="font-family: Courier New; color: #000000;
font-size: x-small;"/>B<span style="mso-spacerun: yes;"/> </span>150.10.0.0/16 [20/0] via
1.1.1.1, 02:49:38</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"/><span style="font-size: x-small;"/><span style="font-family: Courier New;"/><span
style="color: #000000;"/>RouterD#</span><span class="UserInput"><span style="font-style:
normal; font-weight: normal; mso-bidi-font-family: Tahoma;"/><span style="color:
#0084d1;"/>traceroute 170.10.10.1</span></span></span></span></span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span
style="font-family: Courier New; color: #000000; font-size: x-small;"/> </span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span
style="font-family: Courier New; color: #000000; font-size: x-small;"/>Type escape sequence to
abort.</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"/><span style="font-family: Courier New; color: #000000; font-size: x-small;"/>Tracing
the route to 170.10.10.1</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6;"/><span style="font-family: Courier New; color: #000000; font-size:
x-small;"/> </span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"/><span style="font-size: x-small;"/><span style="color: #000000;"/><span
style="font-family: Courier New;"/><span style="mso-spacerun: yes;"/> </span>1 1.1.1.1 16 msec
24 msec 16 msec</span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm
0pt; background: #e6e6e6;"/><span style="font-size: x-small;"/><span style="color:
#000000;"/><span style="font-family: Courier
New;"/><span style="mso-spacerun: yes;"/>
</span>2 150.10.10.25 [AS 100] 20 msec 12 msec 12 msec</span></span></span></span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span
style="font-size: x-small;"/><span style="color: #000000;"/><span style="font-family: Courier
New;"/><span style="mso-spacerun: yes;"/> </span>3 150.10.10.25 [AS 100] !H<span
style="mso-spacerun: yes;"/> </span>*<span style="mso-spacerun: yes;"/> </span>!H
</span></span></span></span></p> </div> <p style="margin-top: 0.11cm; margin-bottom: 0.11cm;
background: none repeat scroll 0% 0% transparent; page-break-before: auto;"/>The trace only
gets as far as Router E! So even with synchronization<strong> disabled</strong><span
style="font-weight: normal;"/>, in this situation, it breaks the network.</span></p> <p
style="margin-top: 0.11cm; margin-bottom: 0.11cm; background: none repeat scroll 0% 0%
transparent; page-break-before: auto;"/><span style="font-weight: normal;"/>For this example,
redistribution of the bgp routes into an IGP is essential for proper operation of the
network.</span></p> <p><span style="font-weight: normal;"/> <div style="background:
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#e6e6e6; margin-left: 1.45pt; margin-right: 1.45pt; mso-border-alt: solid black .25pt;
mso-element: para-border-div; border: black 1pt solid; padding: 1pt;"> <p class="Console10"
style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-size: x-small;"><span
style="font-family: Courier New;"><span style="color:
#000000;">RouterA(config)#</span><span class="UserInput"><span style="font-style: normal;
font-weight: normal; mso-bidi-font-family: Tahoma;"><span style="color: #0084d1;">router
rip</span></span></span><span style="color: #000000;"><span style="mso-spacerun: yes;">
</span><span style="mso-spacerun: yes;"> </span></span></span></span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span
style="font-size: x-small;"><span style="font-family: Courier New;"><span style="color:
#000000;">RouterA(config-router)#</span><span class="UserInput"><span style="font-style:
normal; font-weight: normal; mso-bidi-font-family: Tahoma;"><span style="color:
#0084d1;">redistribute bgp 100 metric transparent</span></span></span><span style="color:
#000000;"> </span></span></span></p> </div> <p class="Body" style="margin: 3.1pt
0cm;"><span style="font-family: Arial; color: #000000; font-size: small;"> </span></p> <div
style="background: #e6e6e6; margin-left: 1.45pt; margin-right: 1.45pt; mso-border-alt: solid
black .25pt; mso-element: para-border-div; border: black 1pt solid; padding: 1pt;"> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span
style="font-size: x-small;"><span style="font-family: Courier New;"><span style="color:
#000000;">RouterD#</span><span class="UserInput"><span style="font-style: normal;
font-weight: normal; mso-bidi-font-family: Tahoma;"><span style="color: #0084d1;">ping
170.10.10.1</span></span></span></span></span></p> <p class="Console10" style="margin:
0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000;
font-size: x-small;"> </span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size:
x-small;">Type escape sequence to abort.</span></p> <p class="Console10" style="margin:
0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000;
font-size: x-small;">Sending 5, 100-byte ICMP Echos to 170.10.10.1, timeout is 2
seconds:</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size:
x-small;">!!!!</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">Success
rate is 100 percent (5/5), round-trip min/avg/max = 12/28/48 ms</span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span
style="font-size: x-small;"><span style="font-family: Courier New;"><span style="color:
#000000;">RouterD#</span><span class="UserInput"><span style="font-style: normal;
font-weight: normal; mso-bidi-font-family: Tahoma;"><span style="color: #0084d1;">traceroute
170.10.10.1</span></span></span></span></span></p> <p class="Console10" style="margin:
0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000;
font-size: x-small;"> </span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size:
x-small;">Type escape sequence to abort.</span></p> <p class="Console10" style="margin:
0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000;
font-size: x-small;">Tracing the route to 170.10.10.1</span></p> <p class="Console10"
style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New;
color: #000000; font-size: x-small;"> </span></p> <p class="Console10" style="margin: 0cm
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0cm 0pt; background: #e6e6e6;"><span style="font-size: x-small;"><span style="color:
#000000;"><span style="font-family: Courier New;"><span style="mso-spacerun: yes;">
</span>1 1.1.1.1 12 msec 8 msec 20 msec</span></span></span></p> <p class="Console10"
style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-size: x-small;"><span
style="color: #000000;"><span style="font-family: Courier New;"><span style="mso-spacerun:
yes;"> </span>2 150.10.10.25 [AS 100] 16 msec 8 msec 36 msec</span></span></span></p>
<p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span
style="font-size: x-small;"><span style="color: #000000;"><span style="font-family: Courier
New;"><span style="mso-spacerun: yes;"> </span>3 150.10.10.9 [AS 100] 4 msec 48 msec 20
msec</span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6;"><span style="font-size: x-small;"><span style="color: #000000;"><span
style="font-family: Courier New;"><span style="mso-spacerun: yes;"> </span>4 2.2.2.1 40 msec
* <span style="mso-spacerun: yes;"> </span>32 msec</span></span></span></p> </div>
</span></p> <h2 class="western"><span style="font-weight: normal;">When to disable
synchronization</span></h2> <p style="margin-top: 0.11cm; margin-bottom: 0.11cm;
background: none repeat scroll 0% 0% transparent; page-break-before: auto;">The BGP
synchronization rule states that if an AS provides transit service to another AS, BGP should not
advertise a route until all of the routers within the AS have learned about the route via an
IGP.</p> <p style="margin-top: 0.11cm; margin-bottom: 0.11cm; background: none repeat
scroll 0% 0% transparent; page-break-before: auto;">You can disable synchronization if one of
the following conditions is true</p> <ul> <li> <p class="list-1-western">Your AS does not pass
traffic from one AS to another AS.</p> </li> <li> <p class="list-1-western">All the transit
routers in your AS run BGP.</p> </li> </ul> <p class="list-1-western">Figure 2 shows a
topology in which it is desirable to disable synchronization.</p> <p></p> <p
style="margin-top: 0.21cm;"><span style="font-size: small;"><em>Figure 2: Disabled
Synchronization</em></span></p> <p>The following commands configure Routers A, B, and
C:</p> <div style="background: #e6e6e6; margin-left: 1.45pt; margin-right: 1.45pt;
mso-border-alt: solid black .25pt; mso-element: para-border-div; border: black 1pt solid;
padding: 1pt;"> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">!Router
A</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">router
bgp 100</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">network
150.10.0.0</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">neighbor
3.3.3.4 remote-as 100</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size:
x-small;">neighbor 2.2.2.1 remote-as 300</span></p> <p class="Console10" style="margin:
0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000;
font-size: x-small;">no synchronization</span></p> </div> <p class="Body" style="margin:
3.1pt 0cm;"><span style="font-family: Arial; color: #000000; font-size: small;"> </span></p>
<div style="background: #e6e6e6; margin-left: 1.45pt; margin-right: 1.45pt; mso-border-alt: solid
black .25pt; mso-element: para-border-div; border: black 1pt solid; padding: 1pt;"> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span
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style="font-family: Courier New; color: #000000; font-size: x-small;"/>!Router B</span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span
style="font-family: Courier New; color: #000000; font-size: x-small;"/>router bgp 100</span></p>
<p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span
style="font-family: Courier New; color: #000000; font-size: x-small;"/>network
150.10.0.0</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"/><span style="font-family: Courier New; color: #000000; font-size: x-small;"/>neighbor
1.1.1.2 remote-as 400</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6;"/><span style="font-family: Courier New; color: #000000; font-size:
x-small;"/>neighbor 3.3.3.3 remote-as 100</span></p> <p class="Console10" style="margin:
0cm 0cm 0pt; background: #e6e6e6;"/><span style="font-family: Courier New; color: #000000;
font-size: x-small;"/>no synchronization</span></p> </div> <p class="Body" style="margin:
3.1pt 0cm;"/><span style="font-family: Arial; color: #000000; font-size: small;"/> </span></p>
<div style="background: #e6e6e6; margin-left: 1.45pt; margin-right: 1.45pt; mso-border-alt: solid
black .25pt; mso-element: para-border-div; border: black 1pt solid; padding: 1pt;"/> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span
style="font-family: Courier New; color: #000000; font-size: x-small;"/>!Router D</span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span
style="font-family: Courier New; color: #000000; font-size: x-small;"/>outer bgp 400</span></p>
<p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span
style="font-family: Courier New; color: #000000; font-size: x-small;"/>neighbor 1.1.1.1 remote-as
100</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"/><span style="font-family: Courier New; color: #000000; font-size: x-small;"/>network
175.10.0.0</span></p> </div> <p>The <strong>no synchronization</strong> router
configuration command causes Router B to put 170.10.0.0 in its IP routing table and advertise it
to Router D without learning network 170.10.0.0 via an IGP.</p> <div style="background:
#e6e6e6; margin-left: 1.45pt; margin-right: 1.45pt; mso-border-alt: solid black .25pt;
mso-element: para-border-div; border: black 1pt solid; padding: 1pt;"/> <p class="Console10"
style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span style="font-size: x-small;"/><span
style="font-family: Courier New;"/><span style="color: #000000;"/>RouterD#</span><span
class="UserInput"><span style="font-style: normal; font-weight: normal; mso-bidi-font-family:
Tahoma;"/><span style="color: #0084d1;"/>sh ip
route</span></span></span></span></span></p> <p class="Console10" style="margin: 0cm
0cm 0pt; background: #e6e6e6;"/><span style="font-family: Courier New; color: #000000;
font-size: x-small;"/>Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP</span></p>
<p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span style="color:
#000000;"/><span style="font-size: x-small;"/><span style="font-family: Courier New;"/><span
style="mso-spacerun: yes;"/> </span>D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF
inter area </span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt;
background: #e6e6e6;"/><span style="color: #000000;"/><span style="font-size: x-small;"/><span
style="font-family: Courier New;"/><span style="mso-spacerun: yes;"/> </span>N1 - OSPF NSSA
external type 1, N2 - OSPF NSSA external type 2</span></span></span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"/><span style="color:
#000000;"/><span style="font-size: x-small;"/><span style="font-family: Courier New;"/><span
style="mso-spacerun: yes;"/> </span>E1 - OSPF external type 1, E2 - OSPF external type
2</span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
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#e6e6e6;"><span style="color: #000000;"><span style="font-size: x-small;"><span style="font-family: Courier New;"><span style="mso-spacerun: yes;"> </span>i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2</span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="color: #000000;"><span style="font-size: x-small;"><span style="font-family: Courier New;"><span style="mso-spacerun: yes;"> </span>ia - IS-IS inter area, * - candidate default, U - per-user static route</span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="color: #000000;"><span style="font-size: x-small;"><span style="font-family: Courier New;"><span style="mso-spacerun: yes;"> </span>o - ODR, P - periodic downloaded static route</span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;"> </span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">Gateway of last resort is not set</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;"> </span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><strong style="mso-bidi-font-weight: normal;"><span style="text-decoration: underline;"><span style="color: #000000;"><span style="font-size: x-small;"><span style="font-family: Courier New;">B<span style="mso-spacerun: yes;"> </span>170.10.0.0/16 [20/0] via 1.1.1.1, 00:01:20</span></span></span></span></strong></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="color: #000000;"><span style="font-size: x-small;"><span style="font-family: Courier New;"><span style="mso-spacerun: yes;"> </span>1.0.0.0/24 is subnetted, 1 subnets</span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">C<span style="mso-spacerun: yes;"> </span>1.1.1.0 is directly connected, FastEthernet0/0</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="color: #000000;"><span style="font-size: x-small;"><span style="font-family: Courier New;"><span style="mso-spacerun: yes;"> </span>4.0.0.0/24 is subnetted, 1 subnets</span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">C<span style="mso-spacerun: yes;"> </span>4.4.4.0 is directly connected, Loopback0</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">B<span style="mso-spacerun: yes;"> </span>150.10.0.0/16 [20/0] via 1.1.1.1, 00:10:28</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;"> </span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-size: x-small;"><span style="font-family: Courier New;"><span style="color: #000000;">RouterD#</span><span class="UserInput"><span style="font-style: normal; font-weight: normal; mso-bidi-font-family: Tahoma;"><span style="color: #0084d1;">ping 170.10.10.1</span></span></span></span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;"> </span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">Type escape sequence to
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abort.</span></p> <p class="Console10" style="margin: 0cm 0cm 0pt; background:
#e6e6e6;"><span style="font-family: Courier New; color: #000000; font-size: x-small;">Sending
5, 100-byte ICMP Echos to 170.10.10.1, timeout is 2 seconds:</span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span
style="font-family: Courier New; color: #000000; font-size: x-small;">!!!!</span></p> <p
class="Console10" style="margin: 0cm 0cm 0pt; background: #e6e6e6;"><span
style="font-family: Courier New; color: #000000; font-size: x-small;">Success rate is 100
percent (5/5), round-trip min/avg/max = 12/23/32 ms</span></p> </div> <p>◆</p>
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