Introduction to gobgp

Anurag Bhatia, Hurricane Electric

What is gobgp?

An open source tool which can talk BGP!

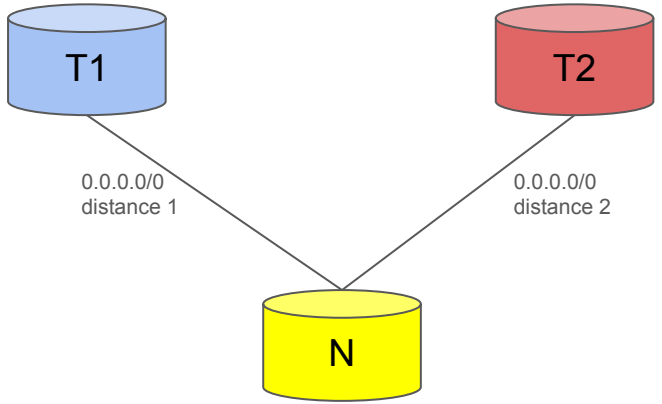
What is gobgp?

- Open source implementation for BGP in Go language.
- Can do a bunch of things including route-server, route reflector, MRT to BGP, BGP to MRT, etc
- Super fast and efficient - simple binary, no dependencies.
- Useful in BGP routing workshops, trainings to get access to full global routing table in training environment.

Multi-homed without full BGP table...

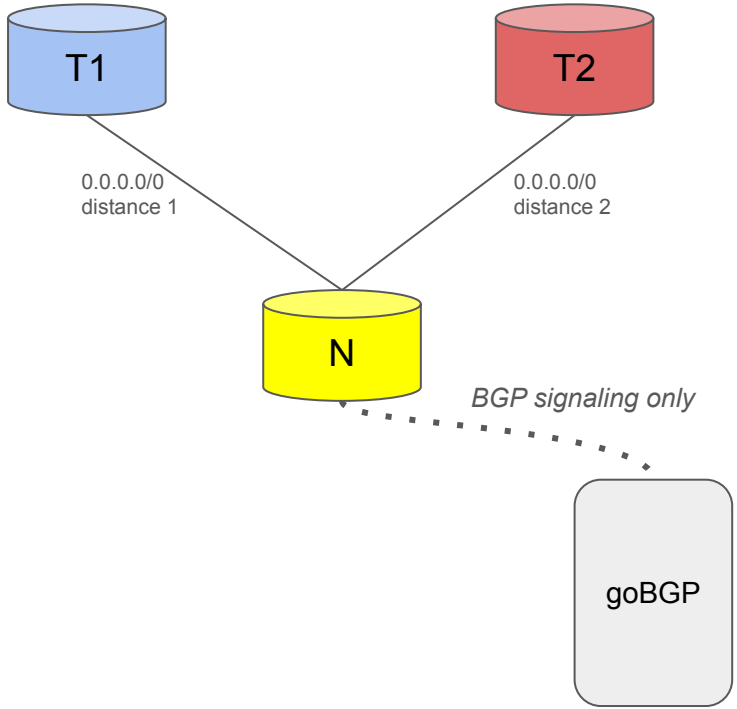
Multihomed without full table

- N is multi-homed behind transit player T1 and T2.
- N cannot get full table due to any possible reason - hardware capability, lack of support from transit, commercial issue, lack of support from transit provider etc.
- N has default to T1 with distance 1 and to T2 with distance 2. Keeps an active check on link with T1 & switches over during failure.
- Both T1 & T2 have significant of customers (onnet on their ASN as well as downstreams) and/or some networks are better reachable via T2.



Optimising outbound with goBGP

- goBGP can be used to inject limited routes from public route collector like RIPE RIS, Oregon routeviews etc.
- Specific routes can be extracted via any of the MRT parsers like BGPkit's monocle.
- Routes can be injected based on specific ASN, AS_PATHs or even BGP communities with next-hop of the transit provider.
- Routes can be injected with actual AS_PATH or without real AS_PATH depending on the use case.
- Entire process can be scripted for automation.
- Not crucial for uptime - just doing signaling & optimising routing. If goes offline, older path will be followed.
- If mission critical, run multiple for redundancy!



goBGP setup

```
anurag@server01 ~> mkdir gobgp
anurag@server01 ~>
anurag@server01 ~> cd gobgp/
anurag@server01 ~/gobgp> wget https://github.com/osrg/gobgp/releases/download/v3.37.0/gobgp_3.37.0_linux_amd64.tar.gz
--2025-05-26 21:06:05--  https://github.com/osrg/gobgp/releases/download/v3.37.0/gobgp_3.37.0_linux_amd64.tar.gz
Resolving github.com (github.com)... 140.82.116.4
Connecting to github.com (github.com)|140.82.116.4|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://objects.githubusercontent.com/github-production-release-asset-2e65be/24011030/ecea1b25-7d9b-41c6-8008-9ad24b02ffab?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=rele
aseassetproduction%2F20250526%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20250526T153605Z&X-Amz-Expires=300&X-Amz-Signature=dd99585575574ac83fcc4cba6e14dc1270ba11c144d415d34bfeb3233fb9a67
2&X-Amz-SignedHeaders=host&response-content-disposition=attachment%3B%20filename%3Dgobgp_3.37.0_linux_amd64.tar.gz&response-content-type=application%2Foctet-stream [following]
--2025-05-26 21:06:05--  https://objects.githubusercontent.com/github-production-release-asset-2e65be/24011030/ecea1b25-7d9b-41c6-8008-9ad24b02ffab?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-
Credential=releaseassetproduction%2F20250526%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20250526T153605Z&X-Amz-Expires=300&X-Amz-Signature=dd99585575574ac83fcc4cba6e14dc1270ba11c144d415d3
4bfeb3233fb9a672&X-Amz-SignedHeaders=host&response-content-disposition=attachment%3B%20filename%3Dgobgp_3.37.0_linux_amd64.tar.gz&response-content-type=application%2Foctet-stream
Resolving objects.githubusercontent.com (objects.githubusercontent.com)... 185.199.110.133, 185.199.111.133, 185.199.109.133, ...
Connecting to objects.githubusercontent.com (objects.githubusercontent.com)|185.199.110.133|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 14066045 (13M) [application/octet-stream]
Saving to: ‘gobgp_3.37.0_linux_amd64.tar.gz’

gobgp_3.37.0_linux_amd64.tar.gz               100%[=============================================================================================>]  13.41M  59.1MB/s    in 0.2s

2025-05-26 21:06:06 (59.1 MB/s) - ‘gobgp_3.37.0_linux_amd64.tar.gz’ saved [14066045/14066045]

anurag@server01 ~/gobgp> ls
gobgp_3.37.0_linux_amd64.tar.gz
anurag@server01 ~/gobgp> tar xvf gobgp_3.37.0_linux_amd64.tar.gz
LICENSE
README.md
gobgp
gobgpd
anurag@server01 ~/gobgp> ls
gobgp*  gobgp_3.37.0_linux_amd64.tar.gz  gobgpd*  LICENSE  README.md
anurag@server01 ~/gobgp>
```

goBGP config

```
anurag@server01 ~/gobgp> cat gobgp-conf.toml
[global.config]
as = 64512
router-id = "10.50.60.7"

[[neighbors]]
[neighbors.config]
neighbor-address = "10.50.60.1"
peer-as = 64512

[[neighbors.afi-safis]]
[neighbors.afi-safis.config]
afi-safi-name = "ipv4-unicast"

anurag@server01 ~/gobgp>
```

goBGP route injection

```
anurag@server01 ~/gobgp>
anurag@server01 ~/gobgp> ./gobgp global rib add 192.0.2.0/24 nexthop 10.50.60.2
anurag@server01 ~/gobgp>
anurag@server01 ~/gobgp>
anurag@server01 ~/gobgp> ./gobgp global rib
   Network              Next Hop             AS_PATH              Age        Attrs
*> 192.0.2.0/24         10.50.60.2                                00:00:02   [{Origin: ?}]
anurag@server01 ~/gobgp>
```

```
BGP table version is 1, local router ID is 10.50.60.1, vrf id 0
Default local pref 100, local AS 64512
Status codes:  s suppressed, d damped, h history, * valid, > best, = multipath,
               i internal, r RIB-failure, S Stale, R Removed
Nexthop codes: @NNN nexthop's vrf id, < announce-nh-self
Origin codes:  i - IGP, e - EGP, ? - incomplete
RPKI validation codes: V valid, I invalid, N Not found

   Network          Next Hop            Metric LocPrf Weight Path
*>i192.0.2.0/24     10.50.60.2                100      0 ?

Displayed  1 routes and 1 total paths
```

About route-collectors and MRT

- Few projects - RIPE RIS, Oregon routeviews, RIPE RIS etc collect routes from many ASNs over direct as well as eBGP multi-hop sessions.
- Data available for use for free in a specific format known as MRT
- Tools like monocle can parse the data

Example to get all routes of AS54456...

```
anurag@server7 ~> monocle parse --as-path 54456 https://data.ris.ripe.net/rrc05/latest-bview.gz
A|1748275200|193.203.0.213|51184|104.37.84.0/24|51184 1764 174 53292 54456|IGP|193.203.0.213|0|0|174:21001 174:22013 1764:10 1764:100 1764:20043 1764:30001 1764:40020 51184:200|false|||
A|1748275200|193.203.0.91|13237|104.37.84.0/24|13237 3257 27589 53292 54456|IGP|193.203.0.91|0|0|3257:4000 3257:8961 3257:50002 3257:50120 3257:51300 3257:51309|false|||
A|1748275200|193.203.0.19|47147|104.37.84.0/24|47147 1299 27589 53292 54456|IGP|193.203.0.19|0|0|1299:35000 47147:1502 47147:2000 47147:2100 47147:2300 47147:2400 47147:2600|false|||
A|1748275200|193.203.0.145|31510|104.37.84.0/24|31510 174 53292 54456|IGP|193.203.0.145|0|100|31510:3|false|||
A|1748275200|193.203.0.75|40994|104.37.84.0/24|40994 174 53292 54456|IGP|193.203.0.75|0|0|174:21001 174:22013 17152:1|false|||
A|1748275200|193.203.0.45|8218|104.37.84.0/24|8218 6461 174 53292 54456|IGP|193.203.0.45|0|1000|8218:103 8218:20000 8218:20210|false|||
A|1748275200|193.203.0.157|35369|104.37.84.0/24|35369 1764 174 53292 54456|IGP|193.203.0.157|0|0|174:21001 174:22013 1764:10 1764:100 1764:20043 1764:30001 1764:40020 35369:13 35369:24040
|false|||
A|1748275200|193.203.0.182|48362|104.37.84.0/24|48362 1299 27589 53292 54456|IGP|193.203.0.182|0|0||false|||
A|1748275200|193.203.0.63|6720|104.37.84.0/24|6720 1764 174 53292 54456|IGP|193.203.0.63|0|0|1120:1|false|||
A|1748275200|193.203.0.245|59890|104.37.84.0/24|59890 174 53292 54456|IGP|193.203.0.245|0|0|174:21001 174:22013 59890:301|false|||
A|1748275200|193.203.0.192|47692|104.37.84.0/24|47692 3356 3356 3356 3356 3356 174 53292 54456|IGP|193.203.0.192|0|0|3356:2 3356:22 3356:86 3356:511 3356:666 3356:903 3356:2082 47692:3000
0 47692:30120|false|||
A|1748275200|193.203.0.213|51184|104.37.85.0/24|51184 1764 174 53292 54456|IGP|193.203.0.213|0|0|174:21001 174:22013 1764:10 1764:100 1764:20043 1764:30001 1764:40020 51184:200|false|||
A|1748275200|193.203.0.91|13237|104.37.85.0/24|13237 3257 27589 53292 54456|IGP|193.203.0.91|0|0|3257:4000 3257:8961 3257:50002 3257:50120 3257:51300 3257:51309|false|||
A|1748275200|193.203.0.19|47147|104.37.85.0/24|47147 1299 27589 53292 54456|IGP|193.203.0.19|0|0|1299:35000 47147:1502 47147:2000 47147:2100 47147:2300 47147:2400 47147:2600|false|||
A|1748275200|193.203.0.145|31510|104.37.85.0/24|31510 174 53292 54456|IGP|193.203.0.145|0|100|31510:3|false|||
A|1748275200|193.203.0.75|40994|104.37.85.0/24|40994 174 53292 54456|IGP|193.203.0.75|0|0|174:21001 174:22013 17152:1|false|||
A|1748275200|193.203.0.45|8218|104.37.85.0/24|8218 6461 174 53292 54456|IGP|193.203.0.45|0|1000|8218:103 8218:20000 8218:20210|false|||
A|1748275200|193.203.0.157|35369|104.37.85.0/24|35369 1764 174 53292 54456|IGP|193.203.0.157|0|0|174:21001 174:22013 1764:10 1764:100 1764:20043 1764:30001 1764:40020 35369:13 35369:24040
|false|||
A|1748275200|193.203.0.182|48362|104.37.85.0/24|48362 1299 27589 53292 54456|IGP|193.203.0.182|0|0||false|||
A|1748275200|193.203.0.63|6720|104.37.85.0/24|6720 1764 174 53292 54456|IGP|193.203.0.63|0|0|1120:1|false|||
A|1748275200|193.203.0.245|59890|104.37.85.0/24|59890 174 53292 54456|IGP|193.203.0.245|0|0|174:21001 174:22013 59890:301|false|||
A|1748275200|193.203.0.192|47692|104.37.85.0/24|47692 3356 3356 3356 3356 3356 174 53292 54456|IGP|193.203.0.192|0|0|3356:2 3356:22 3356:86 3356:511 3356:666 3356:903 3356:2082 47692:3000
0 47692:30120|false|||
A|1748275200|193.203.0.213|51184|104.37.86.0/24|51184 1764 174 53292 54456|IGP|193.203.0.213|0|0|174:21001 174:22013 1764:10 1764:100 1764:20043 1764:30001 1764:40020 51184:200|false|||
A|1748275200|193.203.0.91|13237|104.37.86.0/24|13237 3257 27589 53292 54456|IGP|193.203.0.91|0|0|3257:4000 3257:8961 3257:50002 3257:50120 3257:51300 3257:51309|false|||
A|1748275200|193.203.0.19|47147|104.37.86.0/24|47147 1299 27589 53292 54456|IGP|193.203.0.19|0|0|1299:35000 47147:1502 47147:2000 47147:2100 47147:2300 47147:2400 47147:2600|false|||
```

Example to get all routes of AS54456...

```
anurag@server7 ~> monocle parse --as-path 54456 https://data.ris.ripe.net/rrc05/latest-bview.gz | awk -F '|' '{print $5}' | sort -u
104.37.84.0/24
104.37.85.0/24
104.37.86.0/24
104.37.87.0/24
199.116.76.0/24
199.116.77.0/24
199.116.78.0/24
199.116.79.0/24
2607:1b00:10::/48
2607:1b00:1::/48
2607:1b00:2::/48
2607:1b00:3::/48
2607:1b00:93b2::/48
anurag@server7 ~>
```

Injecting AS9498 routes...

Injecting AS9498 routes via goBGP...

```
#!/bin/bash


echo "Find Airtel routes from route collector"
monocle parse --peer-asn 6453 --as-path "9498" https://data.ris.ripe.net/rrc03/latest-bview.gz | awk -F '|' '{OFS="|"; print $5,$6}' > prefix.txt


echo "Remove any old existing routes"
./gobgp global rib | tail -n +2 | awk -F '> ' '{print $2}' | awk -F ' ' '{print $1}' | while read prefix; do ./gobgp global rib del $prefix; done


echo "Inject Airtel routes via 10.50.60.2"
cat prefix.txt | grep -v "::" | while read data
        do
         prefix=`echo $data | awk -F '|' '{print $1}'`
         aspath=`echo $data | awk -F '|' '{print $2}'`

         echo "Working on $prefix - $aspath"
        ./gobgp global rib add $prefix nexthop 10.50.60.2 aspath "$aspath"

        done
```

References

1. gobgp - https://github.com/osrg/gobgp
2. Monocle - https://github.com/bgpkit/monocle
3. RIPE RIS - https://www.ripe.net/analyse/archived-projects/ris-tools-web-interfaces/
4. Oregon Routeviews - https://www.routeviews.org/routeviews
5. Video demo link - http://cdn.anuragbhatia.com/public-share/2025/Anurag-Bhatia-video-demo-gobgp.mp4

Pre-recorded video demo...

Questions?

anurag@he.net