

The data for these exercises is located in `shared-data/haw/bgp`. If you load the data into a `DataFrame` you can convert a column to time using `pd.to_datetime`. `group_by` works on time as well using a `Grouper` object.

## 1. AS Peers

We want to discover peers of our upstream provider.

*Tools:* `pandas`, `pysubnettree`<sup>1</sup>

*Data:* RIB from Routeviews route collectors at 4PM on December 6, 2020:  
`ribs.routeviews.06-12-2020.csv`.

- (a) First, find out your public IP address. While this should be easy for our servers, just as a thought experiment consider how you could do the same for your home computer, which is likely behind a NAT.
- (b) `mobi8` should be reachable via `141.22.28.18`. Analyze the table dump noted under *Data*. Explain and implement one approach to figure out to which origin AS this IP address belongs to.
- (c) List the autonomous systems that peer with our ISP (based on your data set). Explain why this view is very likely incomplete.

*Note that you can resolve the AS numbers via `whois` or `https://www.potaroo.net/bgp/iana/asn-ctl.txt`.*

## 2. RIPE RIS BGP Beacons Timing

We want to measure the timing behavior of the RIPE RIS BGP beacons<sup>2</sup>.

*Tools:* `pandas`, `matplotlib`

*Data:* Updates from RIPE RIS route collectors RRC00 and RRC23 for April 20, 2019:  
`update.ris.rrc{00,23}.20-04-2019.csv.gz`.

- (a) Visualize the update patterns of the BGP beacons `84.205.64.0/24` and `93.175.151.0/24`.
- (b) Do the update patterns comply with the publicly documented announcement and withdrawal schedule?
- (c) Which time offsets do you observe between updates in the BGP dumps compared to the schedule? (Offsets are peer-specific.)

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<sup>1</sup><https://github.com/zeek/pysubnettree>

<sup>2</sup><https://www.ripe.net/analyse/internet-measurements/routing-information-service-ris/current-ris-routing-beacons>

### 3. BGP Zombies

When an IP prefix is withdrawn from its origin AS it should disappear from all routing tables—sooner or later.

*Tools:* pandas

*Data:* RIBs from RIPE RIS route collectors on December 6,  
`ribs.ris.rrc00.06-12-2020.csv.gz`.

- (a) Explain the term *BGP zombie*.
- (b) Design a measurement method to reveal BGP zombies.
- (c) Apply your measurement methodology on the data set. Do you see BGP zombies for prefix announced by RRC00?