Evaluating RPKI ROV Identification Methodologies in Automatically Generated Mininet Topologies

Nils Rodday[1,4], Ruben van Baaren[2], Luuk Hendriks[3], Roland van Rijswijk-Deij[3,4], Aiko Pras[4], and Gabi Dreo[1]
[1]Research Institute CODE, [2]Radboud University, [3]NLNet Labs, [4]University of Twente

Abstract

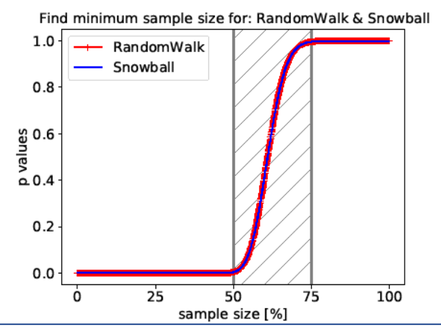
- Evaluation testbed creation is cumbersome, error-prone and time-consuming.
- We aim at creating a topology generator that automatically creates Mininet testbeds for BGP-related evaluations.
- Our use-case will be RPKI Route-Origin-Validation measurements to validate the generated topologies.

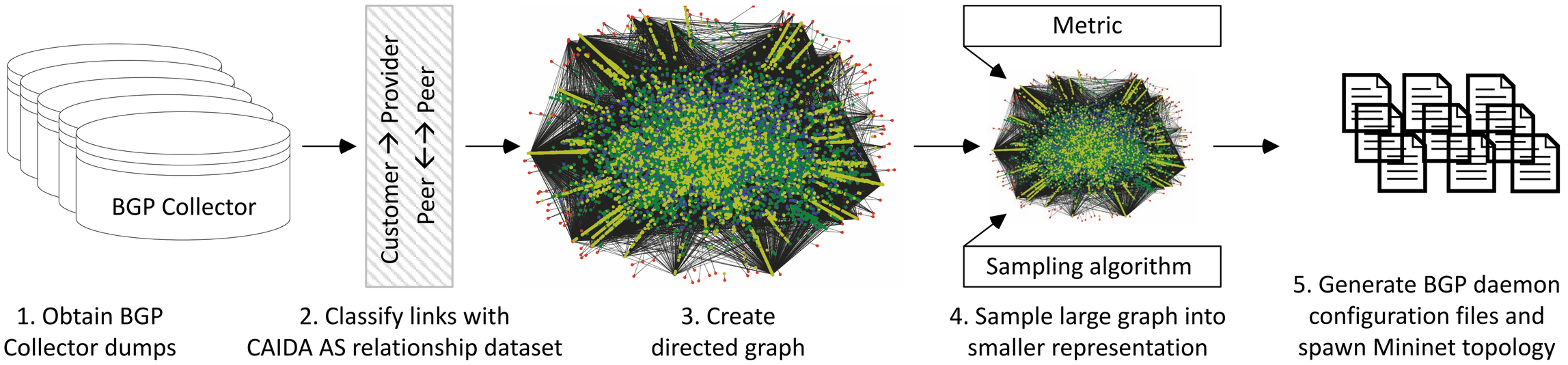
Topology extraction (1-3)

- Data collection: BGP collector data from RIPE RIS and Routeviews via BGPStream.
- Relationship extraction & classification: The as_path attribute is extracted and relationships between neighboring ASs inferred. Links (customer-to-provider, peer-to-peer) are classified using the CAIDA AS relationship dataset. This is a limiting factor as links that could not be found will be discarded.
- Graph creation: A directed graph is created with the help of NetworkX [1]. ASs are represented by nodes, relationships by links between nodes.

Graph sampling (4)

- Sampling: Since a large graph cannot be emulated in the Mininet testbed [2], a smaller sample must be created.
- Metric: A metric is selected to compare features of the original and the abstracted graph (e.g. PageRank).
- Sampling algorithm: A sampling algorithm is chosen to select nodes that should appear in the graph representation (e.g. RandomWalk) [3].
- Comparison: The KS test tells us whether the created sample exhibits the same distribution.





Topology generator (5)

- Input: A sampled, smaller and directed graph is now available for topology creation.
- Generation: Based on the graph we create BGP daemon configuration files (e.g. Bird) that follow well-known BGP route selection and export policies [4].
- Spawn testbed: Mininet will spawn the testbed based on the previously generated configuration files which is used for the evaluation.

Evaluation of RPKI ROV methodologies

- Methodologies: Many RPKI ROV measurement methodologies exist, but comparison is hard.
- Evaluation: With the help of the topology generator, we plan to generate an evaluation testbed on the fly that allows to implement different RPKI ROV measurement approaches.
- Applicability: The generated testbeds are independent of the use case evaluated within the testbed. They can therefore be used for any BGP-related evaluation.

Conclusion

- The Mininet topology generator allows to quickly spawn evaluation testbeds for BGP-related research fields.
- We plan to utilize the generator to evaluate different RPKI ROV measurement approaches.

Contact

Nils Rodday
Research Institute CODE
Bundeswehr Universität München, Germany
nils.rodday@unibw.de

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