PCAP BGP Parser

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IXPs' Route Servers

- » They exist (yees!)
- » Process a significant amount of data
- » Crucial information for IXPs

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Route Server as BGP Speaker at IXPs

Customer debugging assistance

Historic analysis (new routes, new peaks)

Incidents (route hijacks, route leaks)

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BIRD's Information Export Limitations

» Limited long term export of BGP information

» No continuous export of MRT for BIRD

» No simple filtering before MRT exports

» No insights into incoming BGP advertisements

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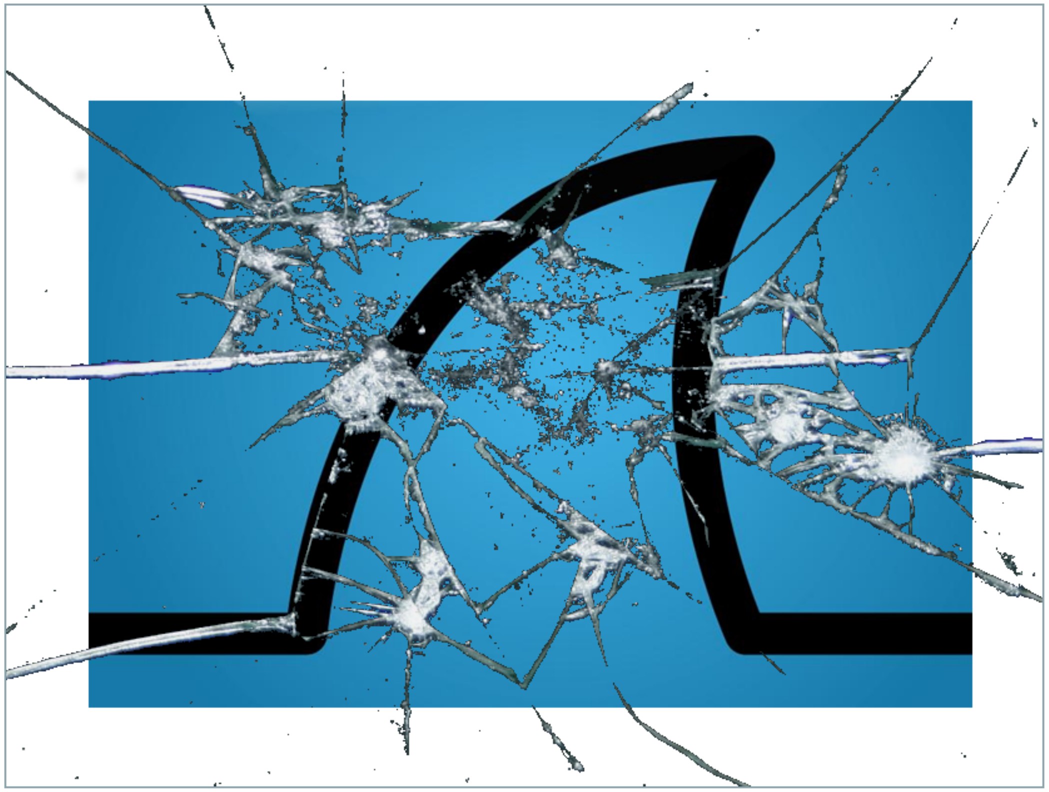
Solution? - tcpdump & tshark!(?)

- » Complex / cumbersome
- » Output hard to process in automated fashion
- » Not build for BGP



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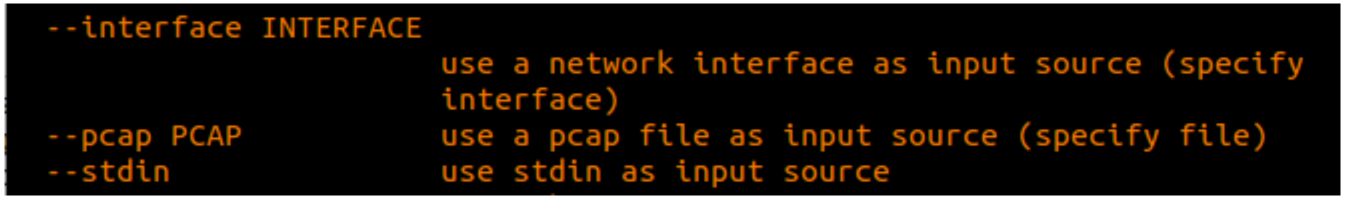
PCAP BGP Parser

- Python 2.7 and 3.x
- Open Source (github.com/de-cix/pbgp-parser)
- License Apache 2.0

Features - Input

- » Reads PCAP files (not PCAPng yet - would be easy to implement)
- » BGP parser can read from stdin (PCAP format)
- » Live reading from network interface not fully implemented yet
- » Extending is possible, as long as it relies on raw packet data



```
  --interface INTERFACE
                        use a network interface as input source (specify
                        interface)
  --pcap PCAP           use a pcap file as input source (specify file)
  --stdin               use stdin as input source
```

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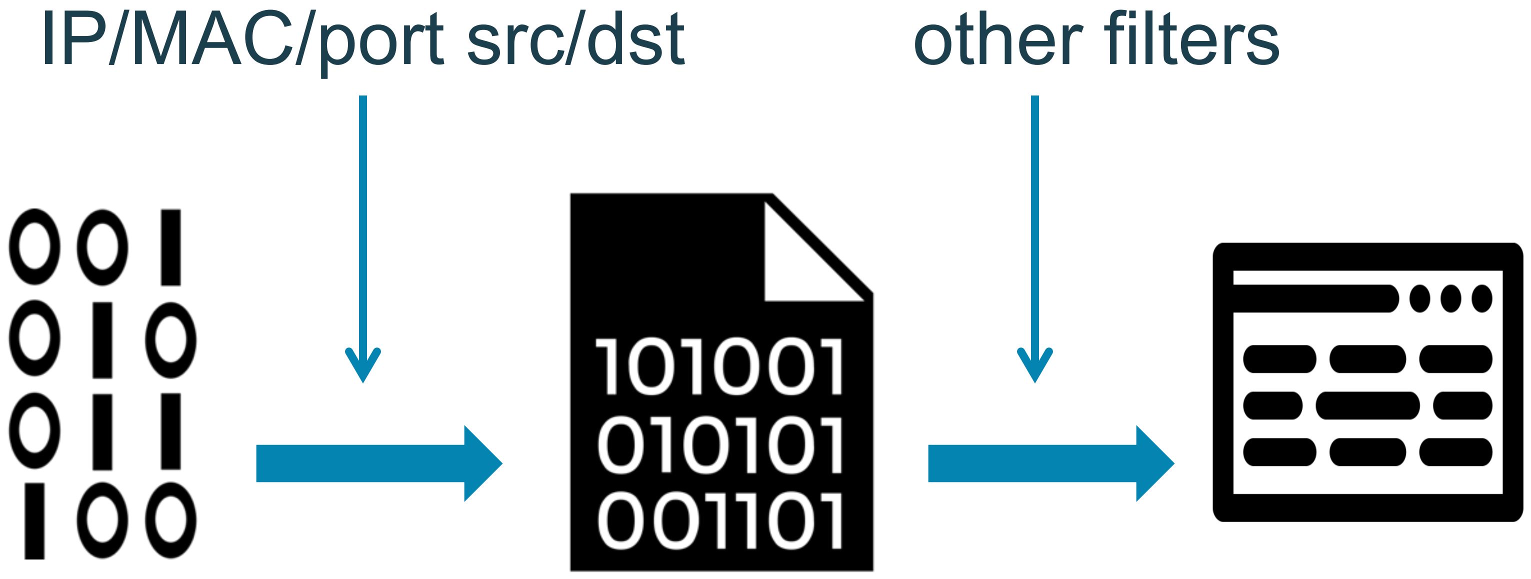
Features - Filtering

» Filtering before and after parsing



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Features – Filtering

Filter field	Values; Description
Message type	OPEN, UPDATE, NOTIFICATION, ROUTE-REFRESH, KEEPALIVE
NLRI	Prefix, e.g., 80.81.82.0/24
Withdrawn route	Prefix, e.g., 80.81.82.0/24
Next hop	IP, e.g., 80.81.82.1
ASN in AS path	ASN, e.g., 6339
Last ASN in AS path	ASN of the neighbor AS
Community ASN	BGP Community, e.g., 6993:666
Source IP	Neighbor router's IP
Destination IP	Neighbor router's IP
Source MAC	Neighbor router's MAC
Destination MAC	Neighbor router's MAC
…	…

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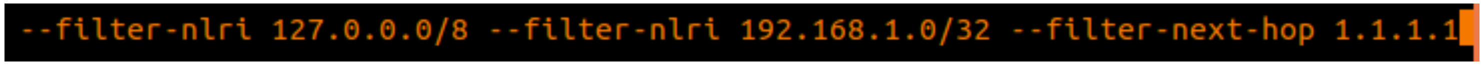
Features - Filtering

» Filtering to display specific BGP messages – only messages that apply are displayed

» Combine any filters as desired

» Different values for same filter are chained with a logical *OR*

» Different filters are chained with a logical *AND*



```
--filter-nlri 127.0.0.0/8 --filter-nlri 192.168.1.0/32 --filter-next-hop 1.1.1.1
```

» NLRI must contain either *127.0.0.0/8 OR 192.168.1.0/32 AND* next hop must be *1.1.1.1*

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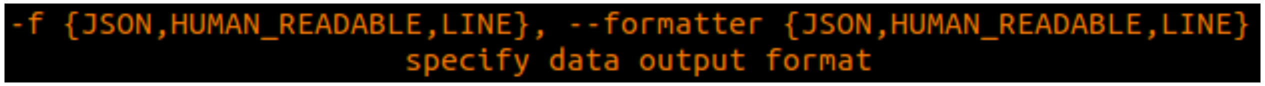
Features - Output



```
-f {JSON,HUMAN_READABLE,LINE}, --formatter {JSON,HUMAN_READABLE,LINE}
                        specify data output format
```

» Human readable
  » Basic information about BGP msgs
  » Easy to read
  » Includes all important fields such as NEXT_HOP, AS_PATH, NLRI and/or WITHDRAWALS, etc.

» JSON

» All BGP msgs + meta information (capture specific data such as timestamp, source/dest ip/mac/port)
  » RFC 7159 (see Python internal json-package)
  » One JSON string per line

» Line based
  » User can specify fields to be displayed
  » Not all fields supported, yet
  » Available fields for line based output are:
    » NLRI, AS_PATH, NEXT_HOP, Communities, Source/Destination IP, Timestamp, Message Types

Evaluation Correctness

» Compared results of PBGP and tshark
  » E.g., no. of packets after filtering, timestamps
  » DE-CIX RS dump of several hours

Correct, but we keep looking

Limitations

- Kafka support with Python 2.7
- Packet reordering issue
- Not all features implemented yet

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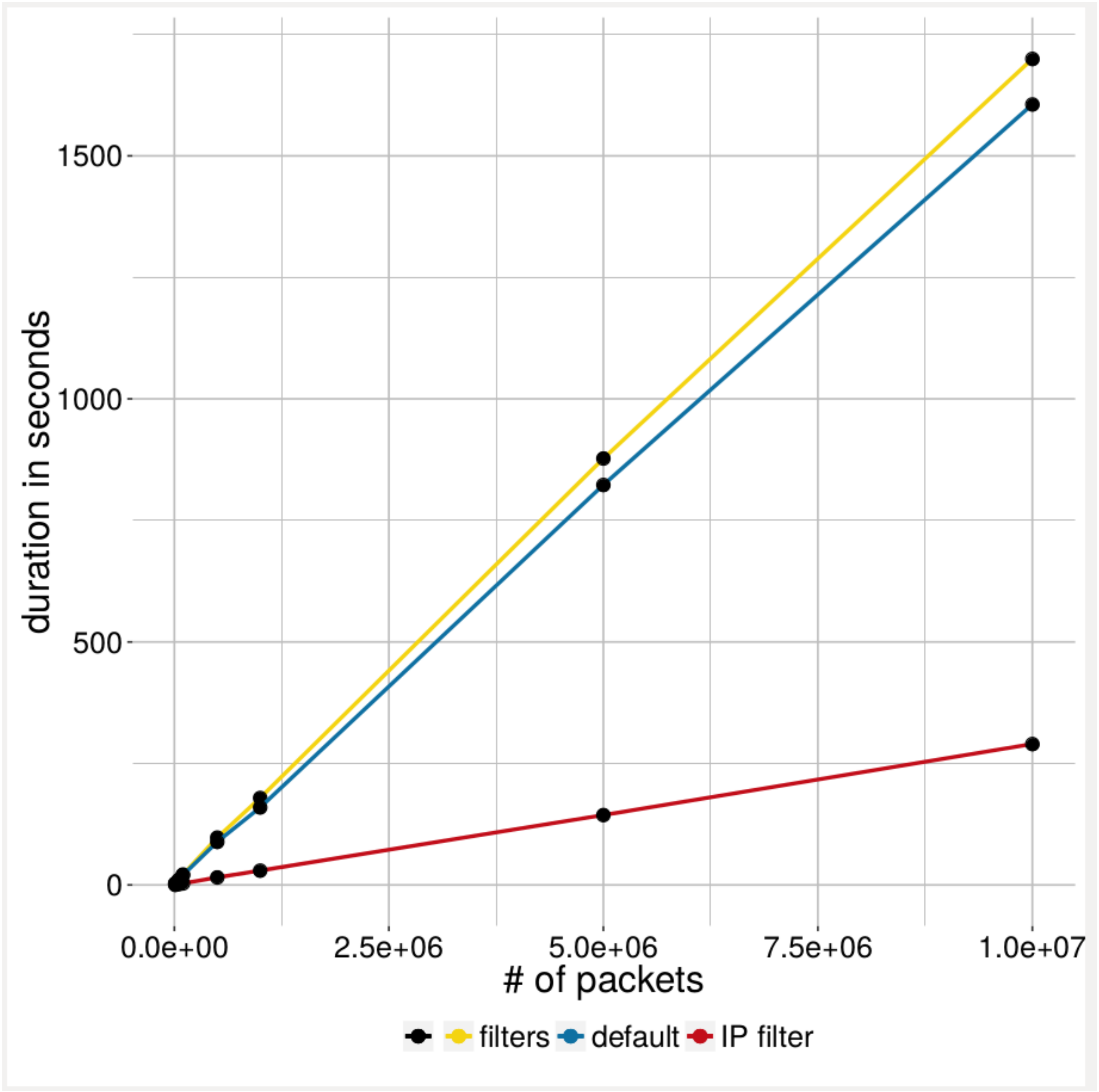
Evaluation Performance



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Conclusion / Contribution

» Open source PCAP BGP Parser

» Apache 2.0 license

» Wide range of flexible input/output parameters

» Strong filtering capabilities

» Nice to integrate in shell/bash/python toolchain

» Fast enough perform “live” parsing for RS dump from large IXP

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github.com/de-cix/pbgp-parser

pbgpp