IXmon: Detecting DRDoS Attacks at IXPs

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Goals

Volumetric DRDoS attacks can completely overwhelm a victim network. How can we filter out DRDoS attack traffic upstream, so that the target AS's bandwidth is not exhausted?

- Build a DRDoS defense specifically designed to be deployed at IXPs
- Filter DRDoS traffic at IXPs where the victim (or its upstream providers) peers with other networks

Approach

NetFlow-based DRDoS detection system:

- Consume NetFlow stats from IXP network
- Time series analysis using EWMA
- Keep track of traffic volume trends per each (srcPort, dstAS) pair
- Raise DRDoS attack alert if anomaly is found for a (srcPort, dstAS) pair and traffic is "evenly" distributed across multiple source ASes

Ongoing Work

- Ongoing deployment at SoX
- Longitudinal analysis of DRDoS attacks
- Correlation with BGP data to infer whether any attack mitigation was deployed
- Data collection and analysis at other IXPs

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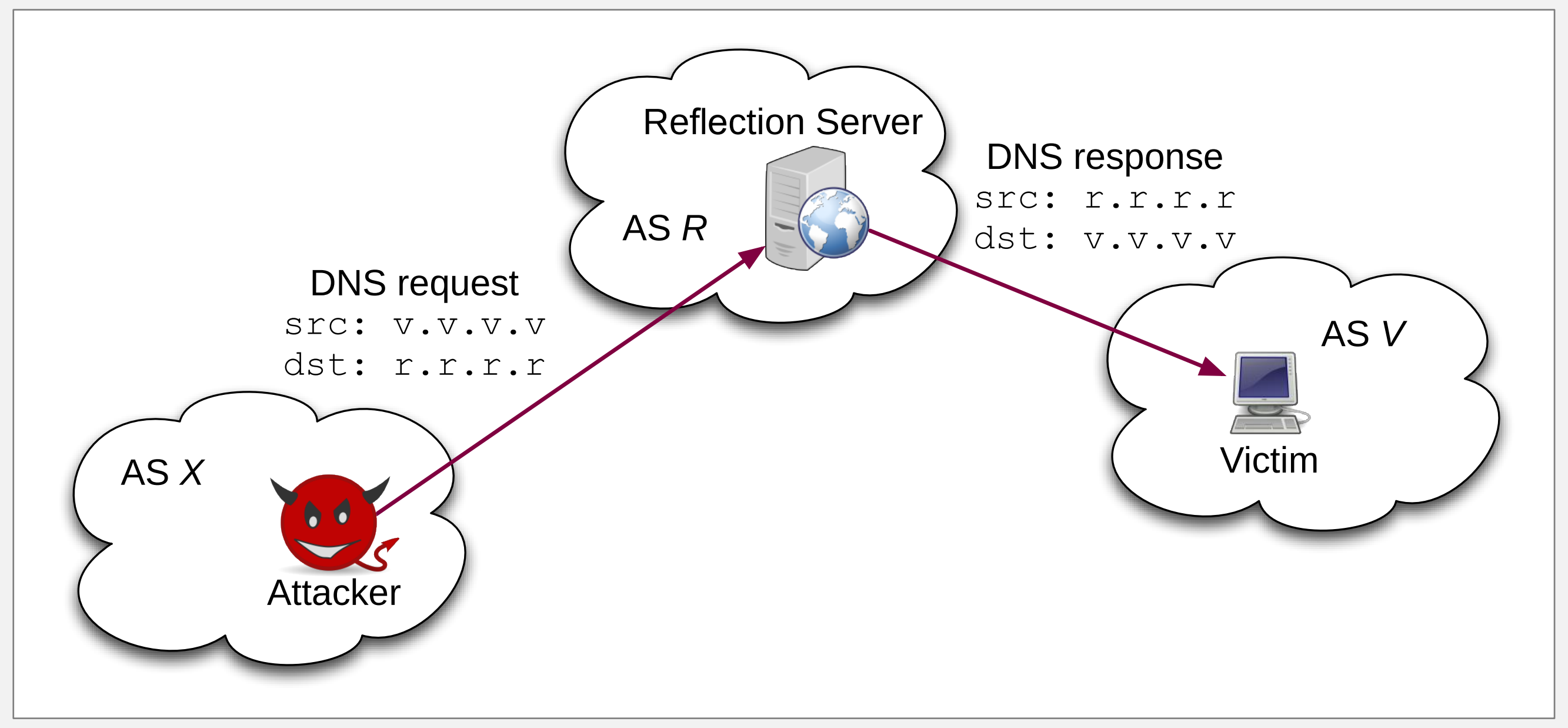
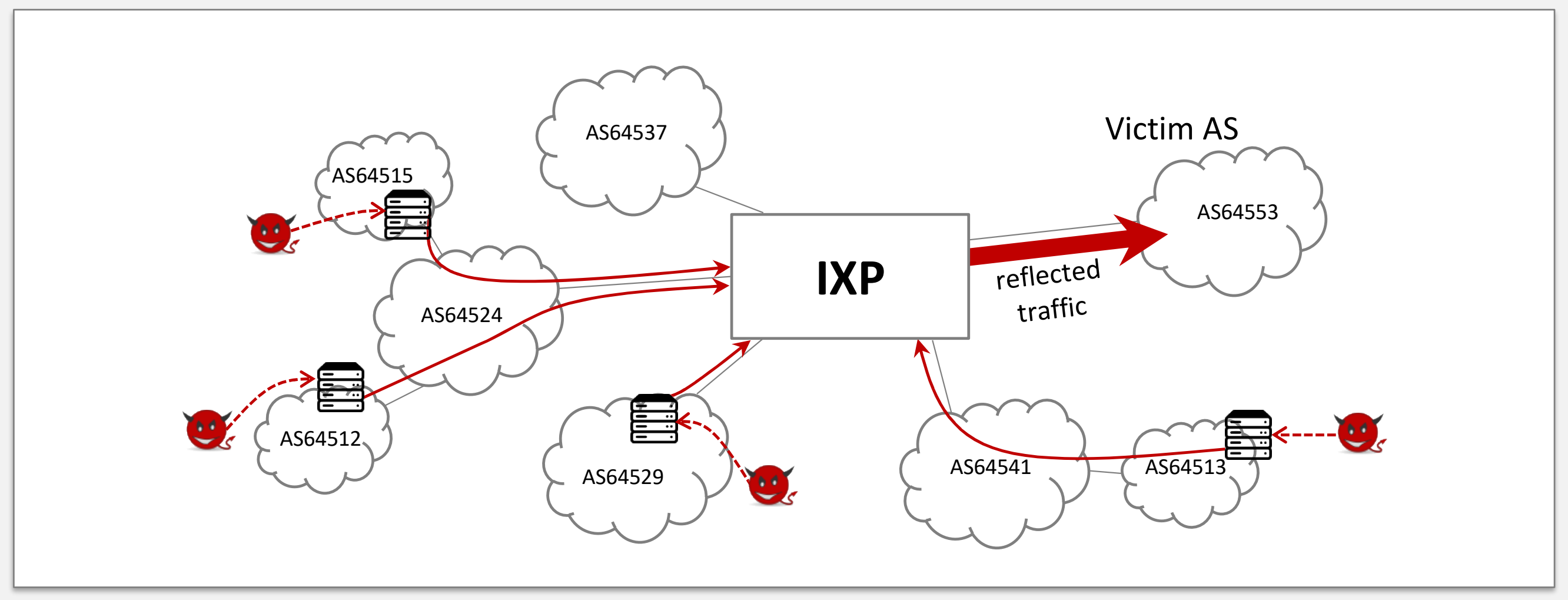
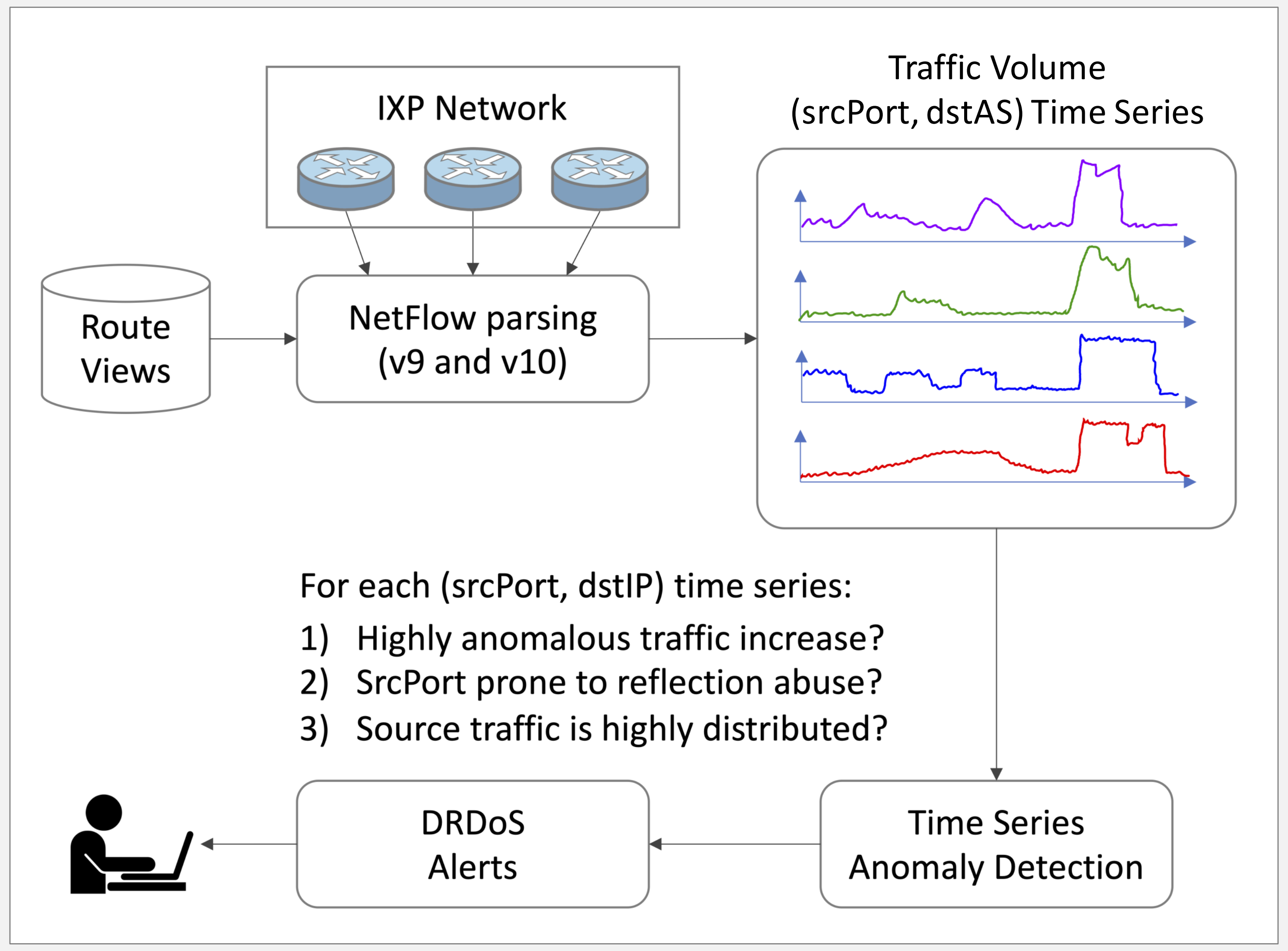
DRDoS Attacks





IXmon System Design

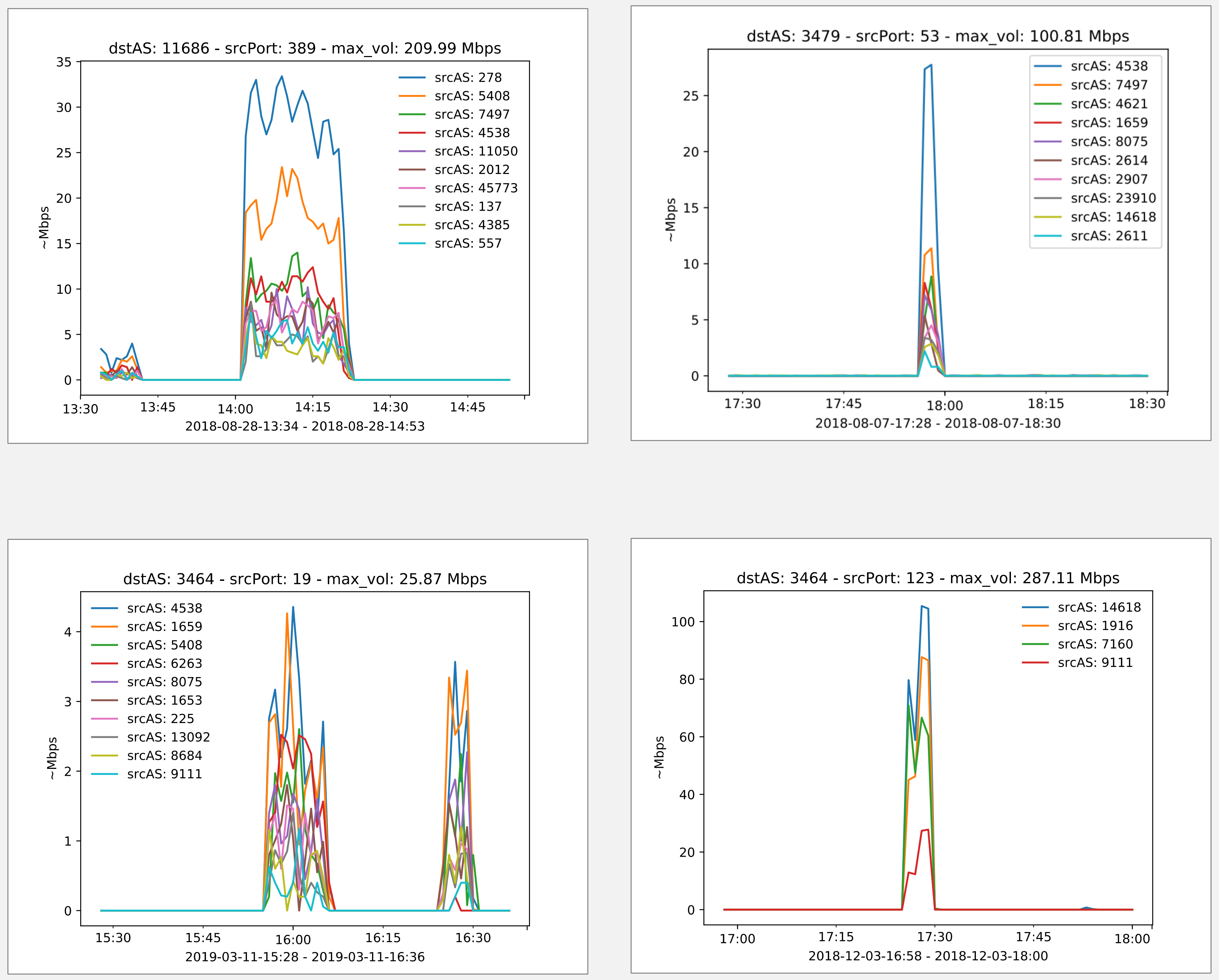


For each (srcPort, dstIP) time series:

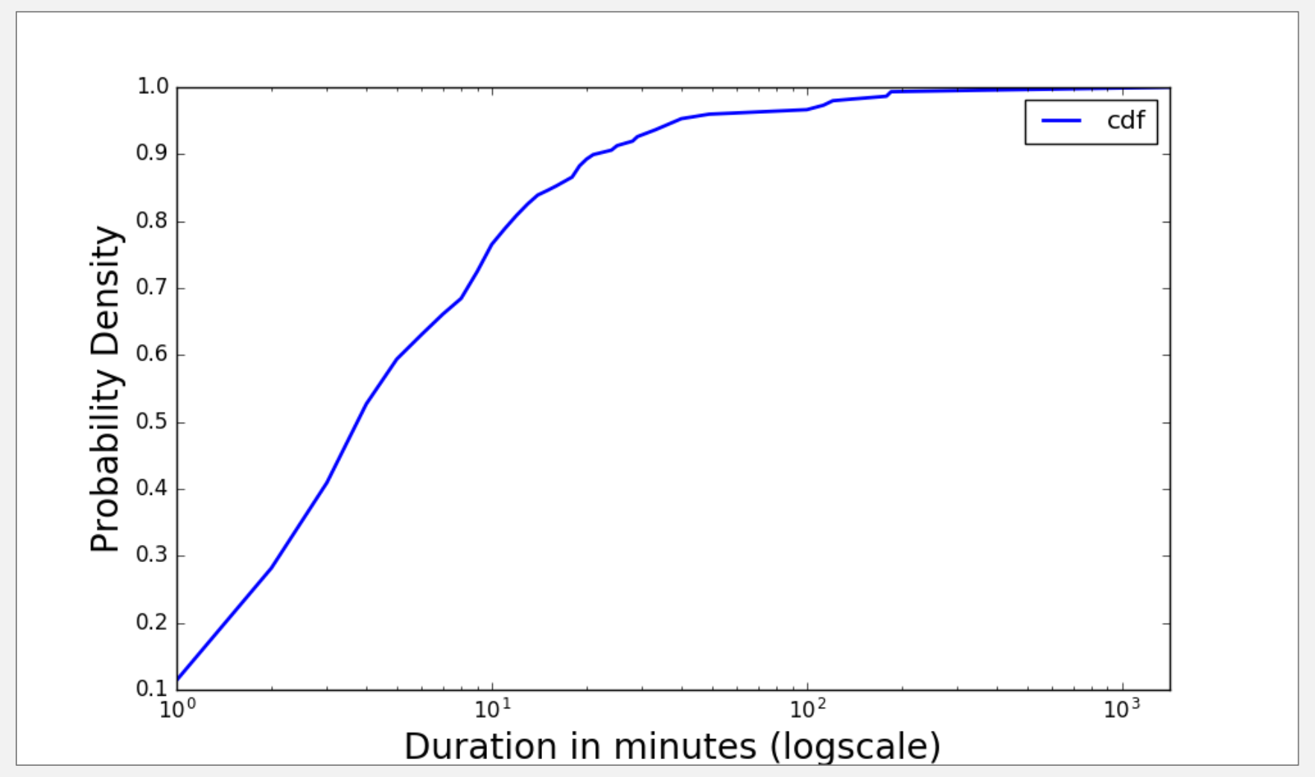
1) Highly anomalous traffic increase?
2) SrcPort prone to reflection abuse?
3) Source traffic is highly distributed?

Preliminary Results

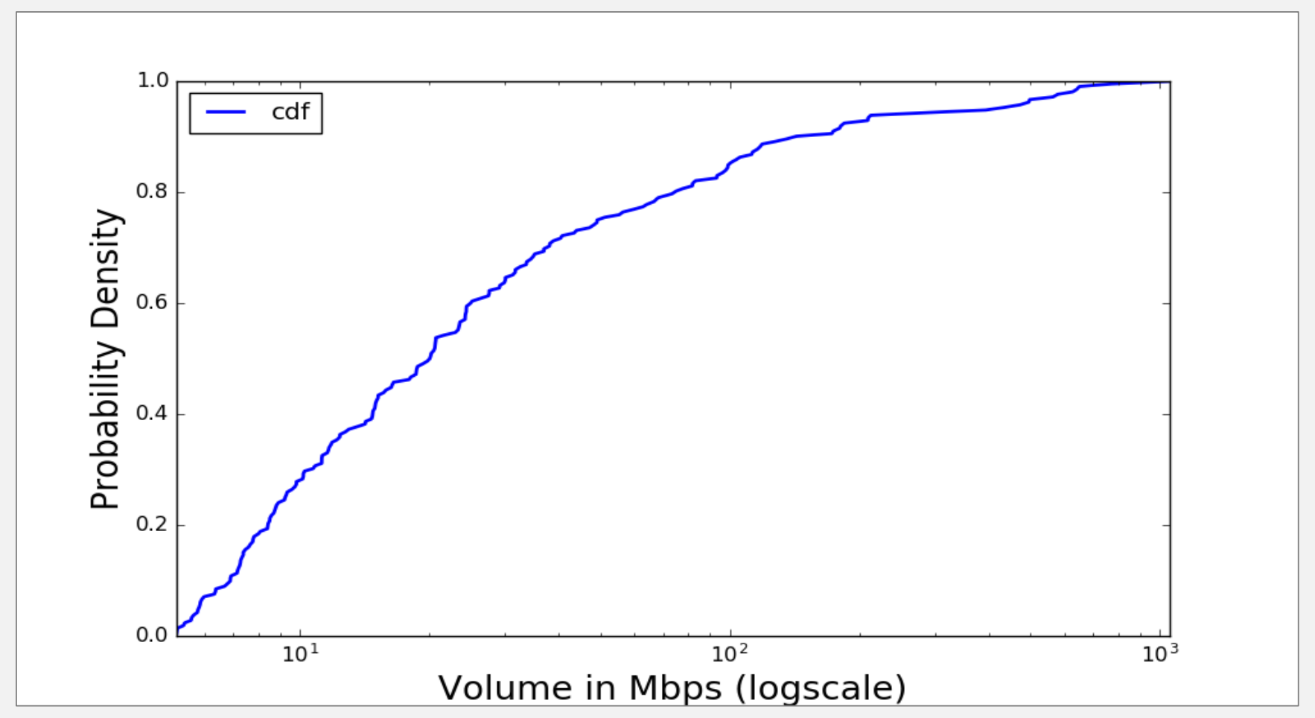
Examples of interesting in-the-wild DRDoS attacks



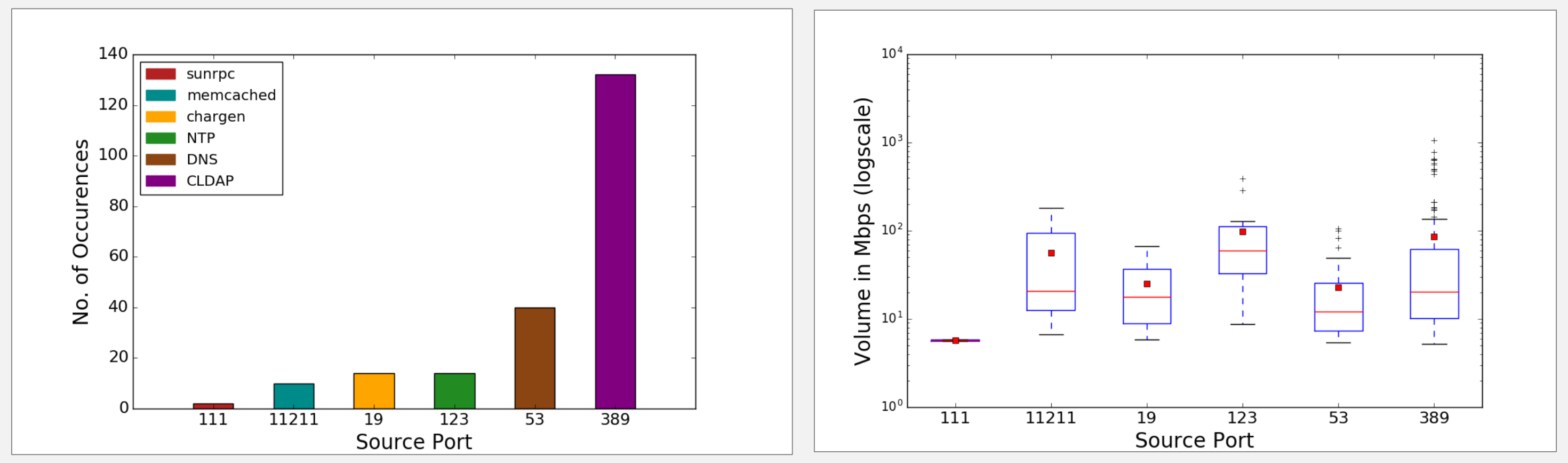
Distribution of DRDoS attack durations (CDF)



Distribution of DRDoS attack volumes (CDF)



Reflection UDP Ports


No. of Occurences
sunrpc
memcached
chargen
NTP
DNS
CLDAP
Source Port
Volume in Mbps (logscale)
10^0
10^1
10^2
10^3
10^4
Source Port