

Fast and Reactive Measurements on Ark

With the RIPE Atlas Anchor Mesh and RPKI as Trigger. Or: “Click save and wait”

Max Gao, Ties de Kock, Alex Maennel, Lion Steger, Johannes Zirngibl



Goal

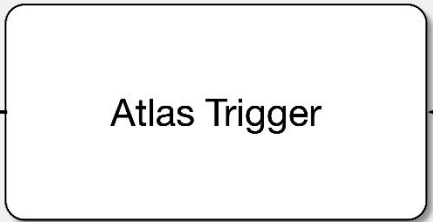
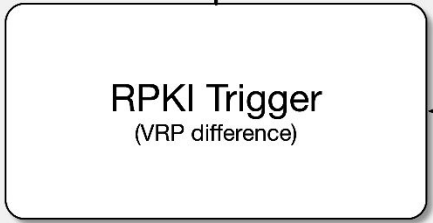
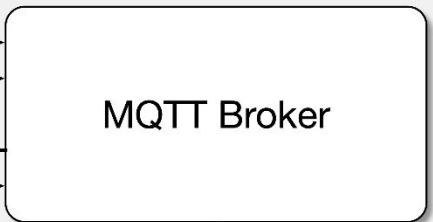
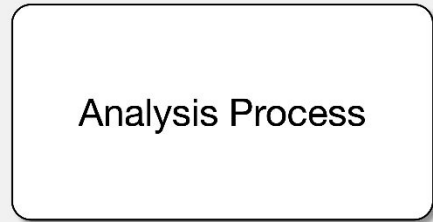
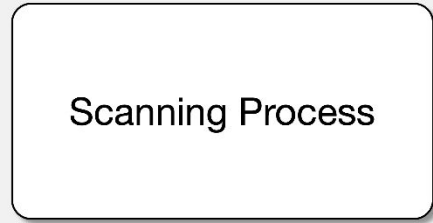
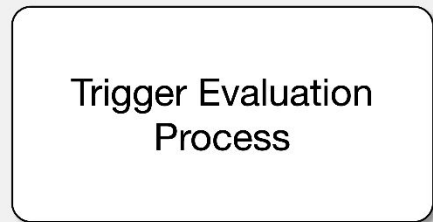
Fast and reactive probing with
ARK based on **triggers**

Develop a prototype that allows to easily
trigger Scamper measurements on ARK:

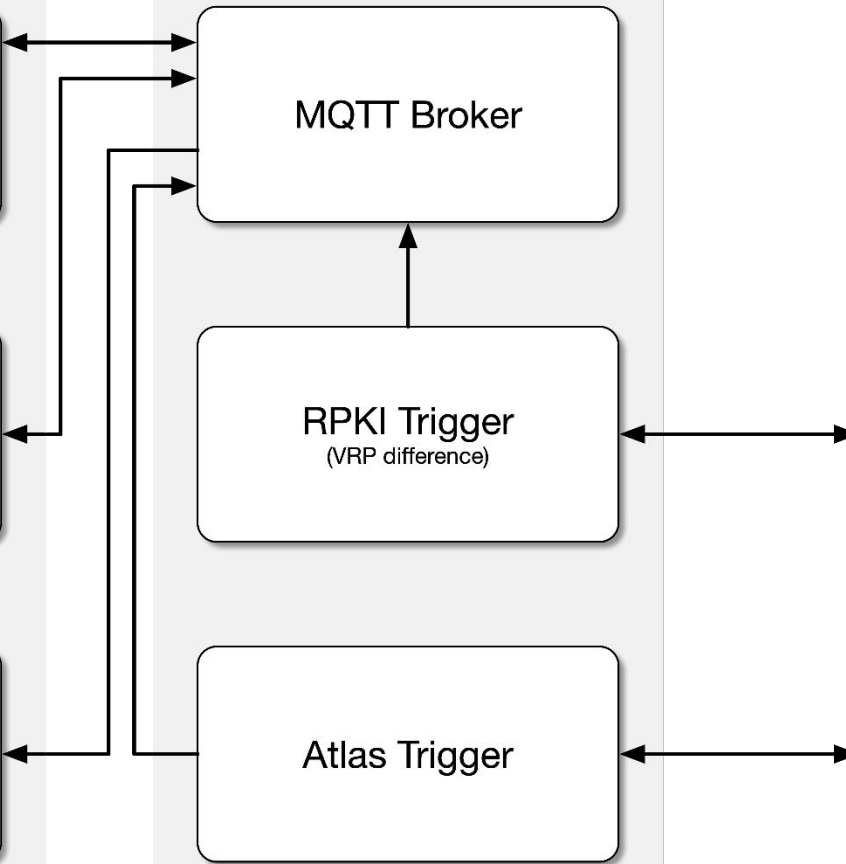
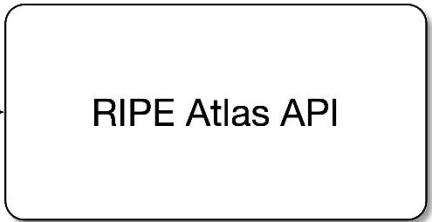
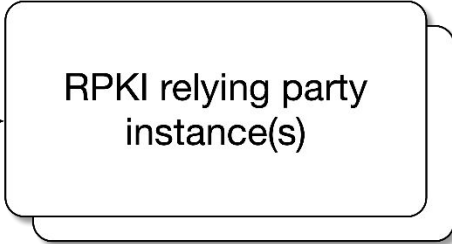
- Enable distributed workflows
- Support different triggers
- Offer control messages
- Inform about end of measurements
- Analyze the results

fireball-aims

Virtual Machine

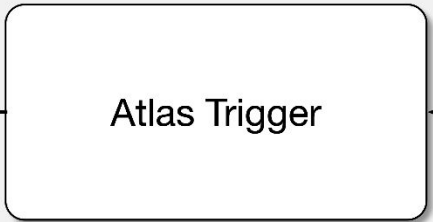
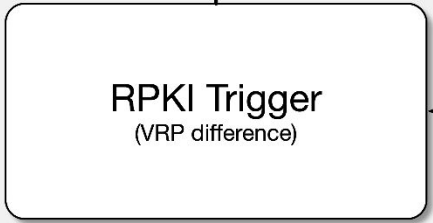
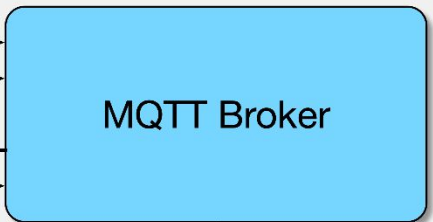
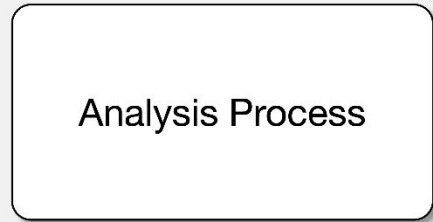
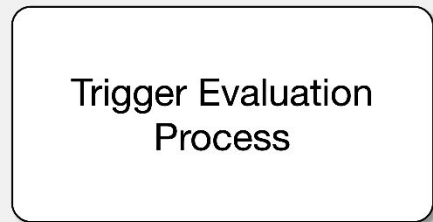


Diverse network positions

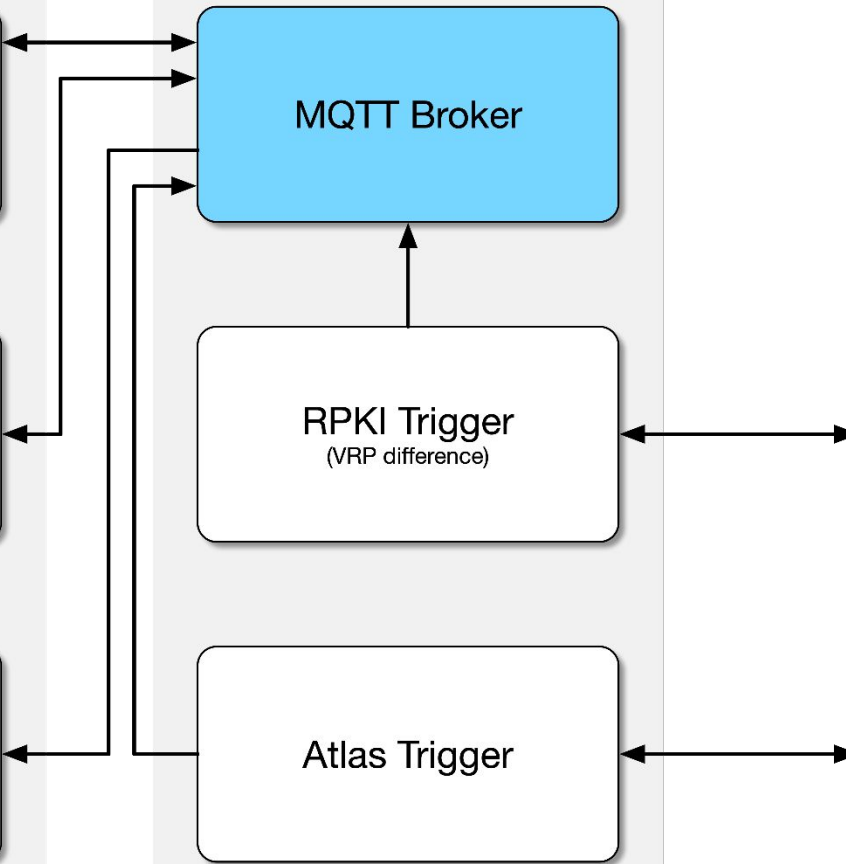
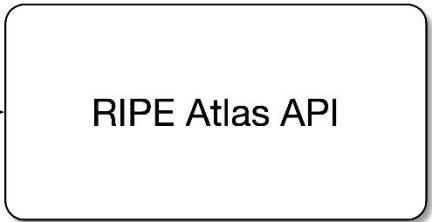
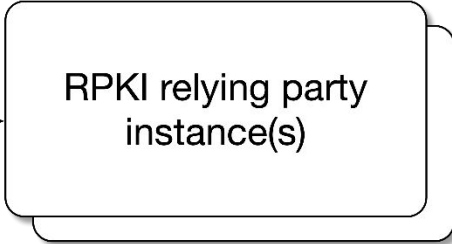


fireball-aims

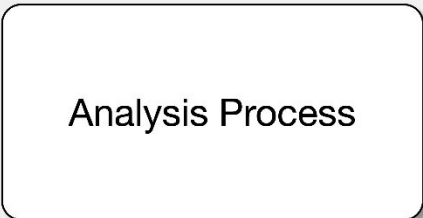
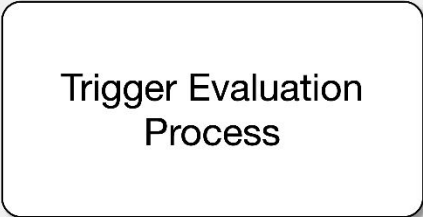
Virtual Machine



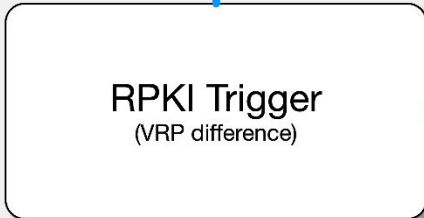
Diverse network positions



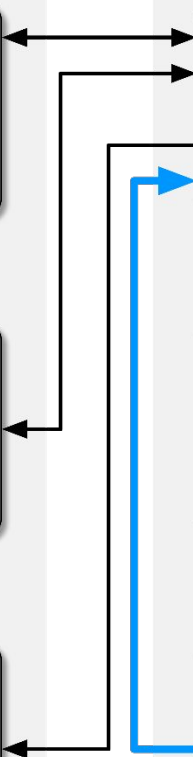
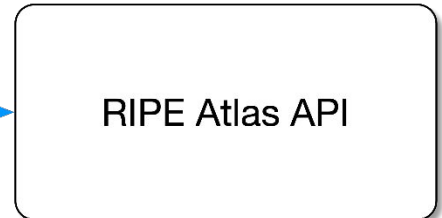
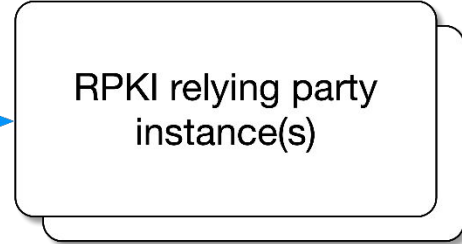
fireball-aims



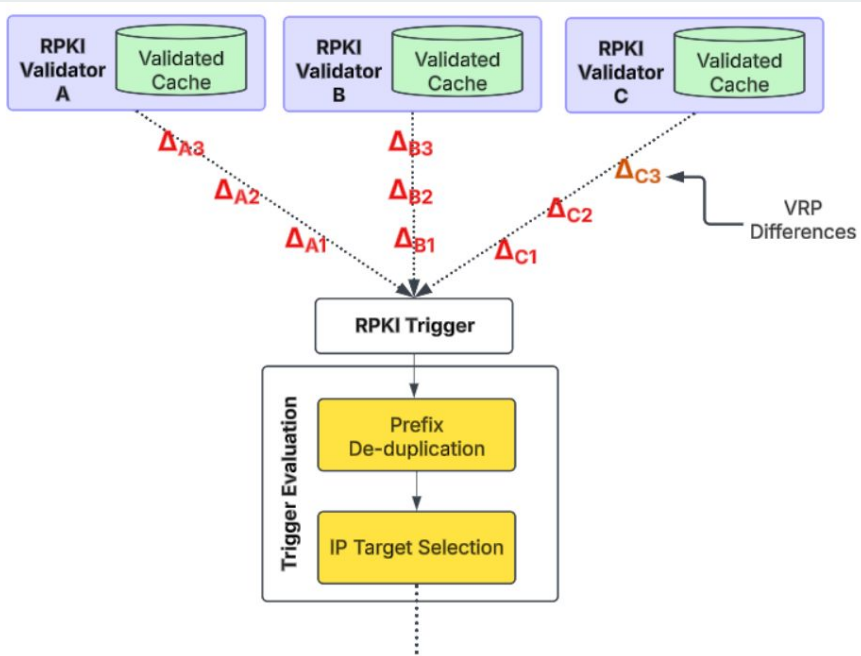
Virtual Machine



Diverse network positions

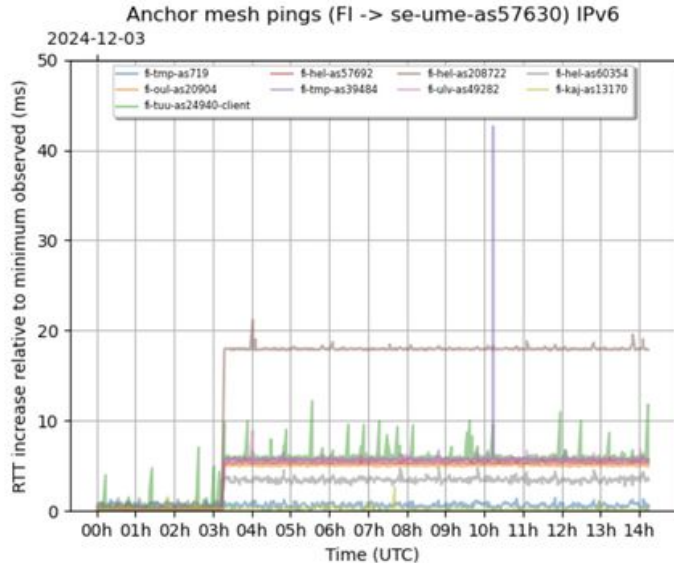


RPKI Trigger



- Trigger measurements to prefixes *likely affected* by changes in VRPs
- Avoid triggering unnecessary measurements
 - De-duplicate redundant VRP changes across validators
 - Apply IP selection strategy to VRP prefixes
 - Limit repeat measurements to the same VRP prefix

RIPE Atlas Trigger



We utilize the RIPE Atlas Anchor Mesh measurements.

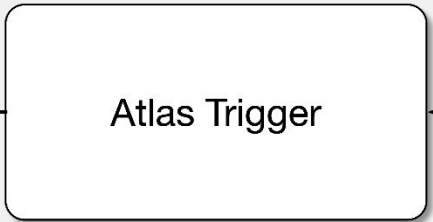
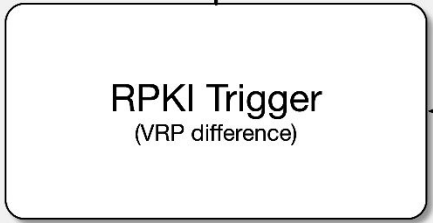
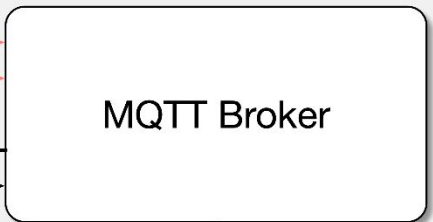
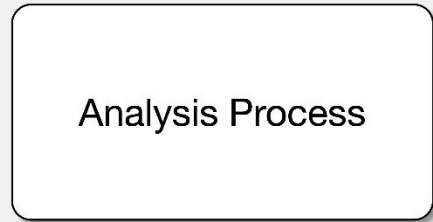
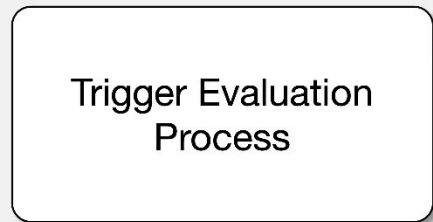
If sufficient change in an Anchor2Anchor ping is detected, **both anchors will be probed**.

A **tradeoff** between high false positive rates and late reactive measurements is required.

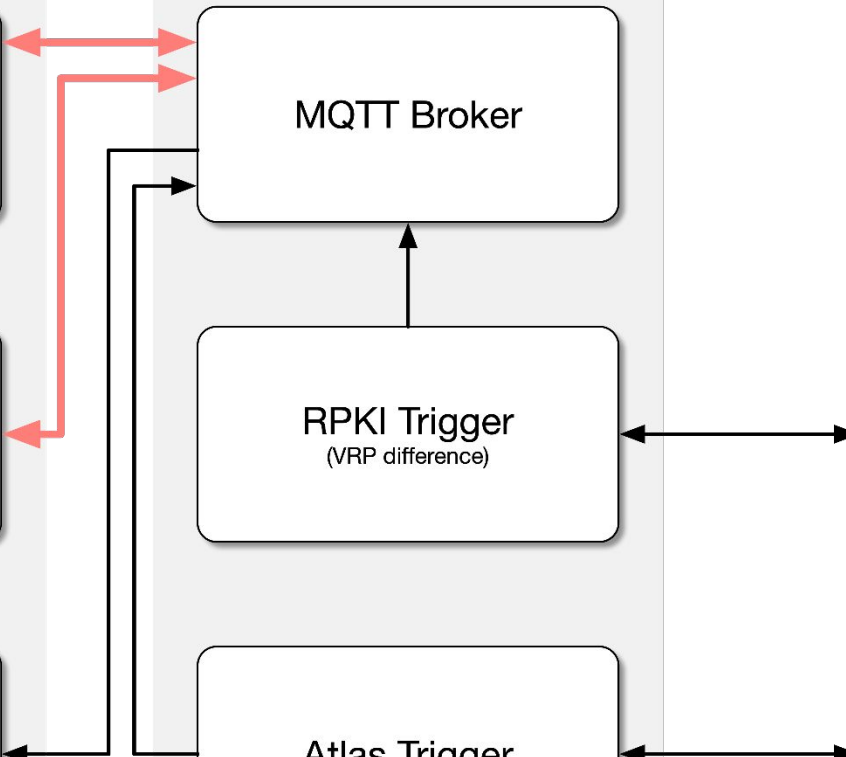
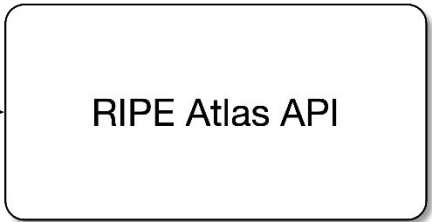
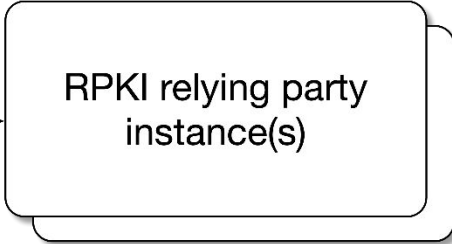
Currently, the trigger will react **4 minutes** after an event impacts a connection.

fireball-aims

Virtual Machine



Diverse network positions





Scanning Process

```
{  
  "target": "<IP-Address>",  
  "uuid": "<uuid>",  
  "trigger": "<trigger-name>",  
  "duration": <number>,  
  "interval": <number>,  
}
```

The scanning process **receives targets from the triggers.**

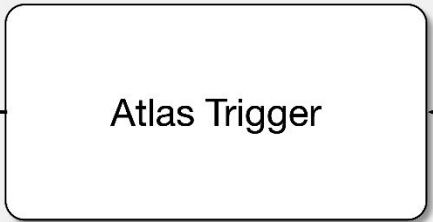
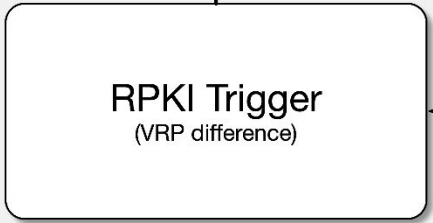
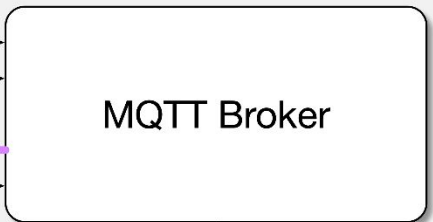
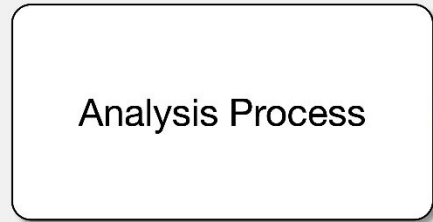
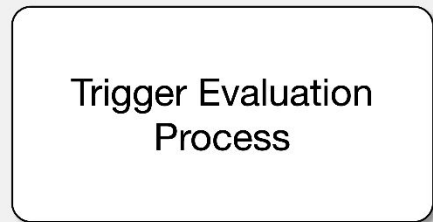
It performs traceroute via Ark to a **target in an interval specified by the trigger.**

The results are written to a .warts file.

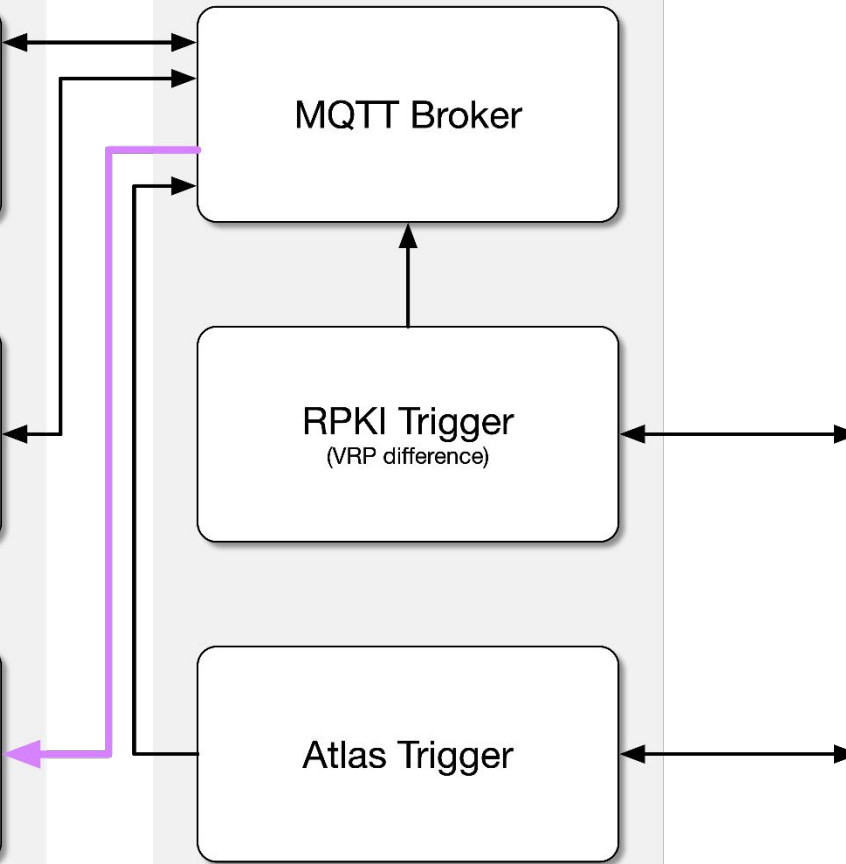
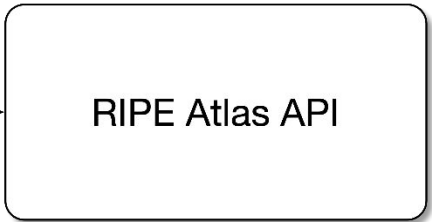
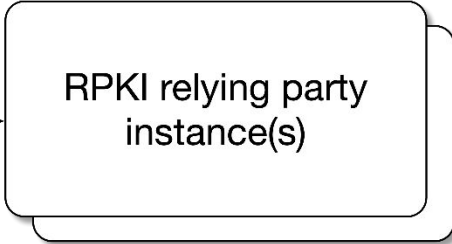
Once a measurement is finished, a **notification is sent via MQTT.**

fireball-aims

Virtual Machine



Diverse network positions





Analysis Process

- CAIDA IPv4 Routed Dataset used as baseline
- Every traceroute result is mapped to baseline based on monitor
- Difference in AS Path or RTTs is evaluated



Future Work

It works, it's fast, it's a prototype!

- Buffer messages
- Allow different measurements
- Add monitoring
- Add resilience
- Improve triggers

TL;DR

- Evaluate results
- Write paper
- Present at next CAIDA workshop

~~TIME_TO_RIPENESS~~

Appx. A: RPKI
Trigger Evaluation
Variable Naming

~~CACHE_EXPIRY_TIME~~

What variable name should we use to denote the minimum amount of time that must elapse before a measurement to a given prefix can be reissued?

~~T_k~~

~~∞~~

~~∞~~



I would use x.