

Towards an Observatory for Network Transparency Research

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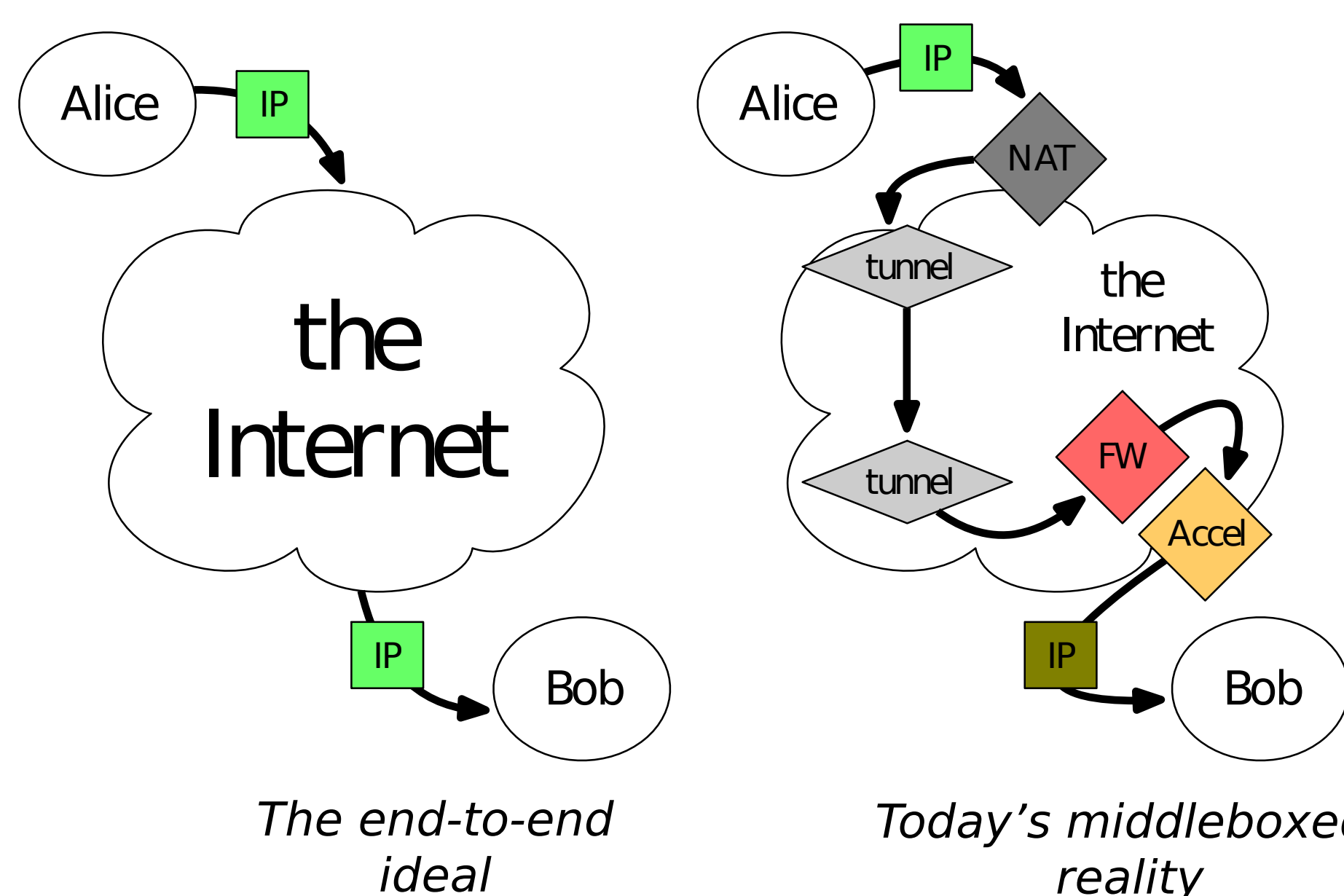
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**To understand middlebox
impairments, we must first
measure them.**

Large-scale measurements of path impairments

- using FIRE MONROE as well as RIPE Atlas, CAIDA Ark...
- UDP/TCP/SCTP connectivity, TCP options
- (e.g. TFO, MPTCP), and other protocol (ICMP, DNS, ...)



Development of new measurement tools

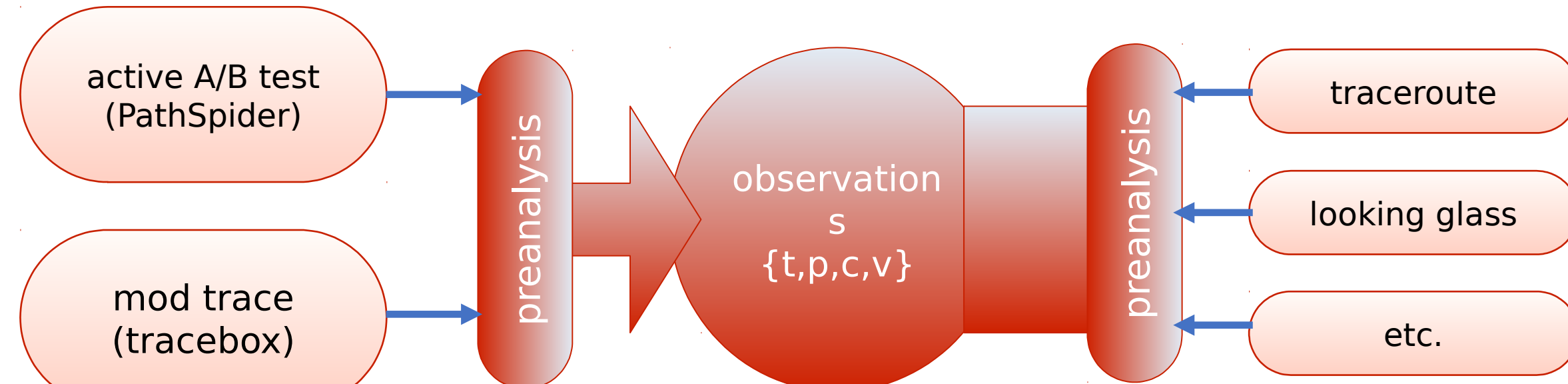
<https://github.com/mami-project/>

- **Tracebox**: tracing + impairment analysis
- **Copycat**: TCP/UDP differential on-path treatment
- **PathSpider**: A/B testing (currently on ECN support)

Path Transparency Observatory

- Active measurements by the project + external measurements
- Public query interface (end of 2016) to access path impairment data:

What is the likelihood that a certain path impairment impacts my traffic (modifications/stripping/dropping/blocking)?

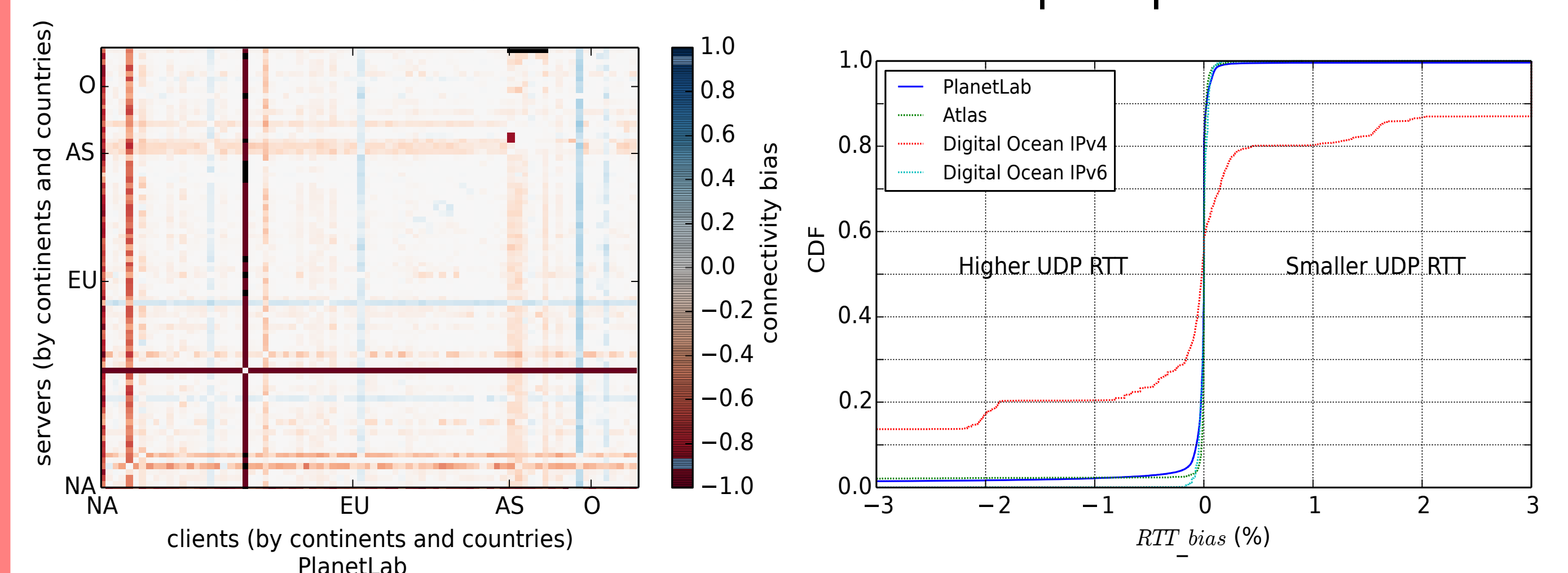


- Common data model for all observations of path conditions
- **t**: time of observation
- **p**: path to which observation applies
- **c**: condition observed, e.g. "feature X ⇒ packet loss"
- **v**: vector of condition-specific values

Use Case: Internet-Over-UDP

Copycat

- Runs simultaneously pairs of TCP and TCP-controlled UDP flows between two endpoints
- Evaluates differences in connectivity and QoS due to differential treatment based on transport protocol.



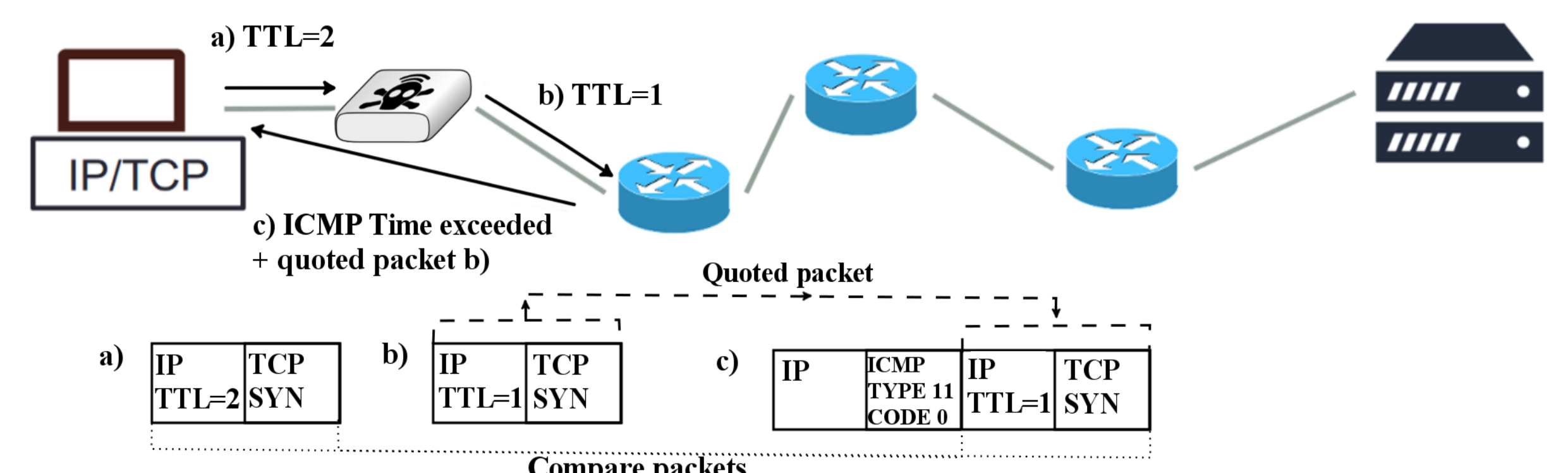
Main Conclusions

- No path-dependent impairments
- Endpoint-based blocking
- Between 1% and 5% of UDP flows are blocked (red dots)
- Absence of UDP/TCP initial RTT bias

Use Case: Presence of Middleboxes Over Time

Tracebox

- Traceroute-like middlebox detection tool
- Detect and localize middleboxes impairments



Future Work

- Characterize middleboxes evolution over time

Learn more, and follow our progress: <https://mami-project.eu>

measurement

architecture

experimentation