PPING

WHAT, WHY AND HOW?

Outline

- About me
- PPing
  - What?
  - Why?
  - How?
  - Now?
  - Future?

About me

- Simon Sundberg
- Started as PhD student at Karlstad University Nov. 2020
- Working on system and performance monitoring for container based applications
- New to eBPF
- Toke Høiland-Jørgensen introduced me to Dave Taht

PPing – What?

- Passive ping
- Passivly monitor RTT
  - Timestamp outgoing packets
  - Match incoming response packets
  - Calculate and report RTT
- Reimplementing pping using eBPF
  - Original by Kathleen Nichols: https://github.com/pollere/pping

PPing – Why (am I doing this)?

- Practice project
  - For me to figure out how to use eBPF
- Main goal - reduce overhead
  - Allow it to be always-on
  - Scale well to many flows and high line rate
- Secondary goal – add some features
  - More detailed output options
  - Support additional protocols/identifiers

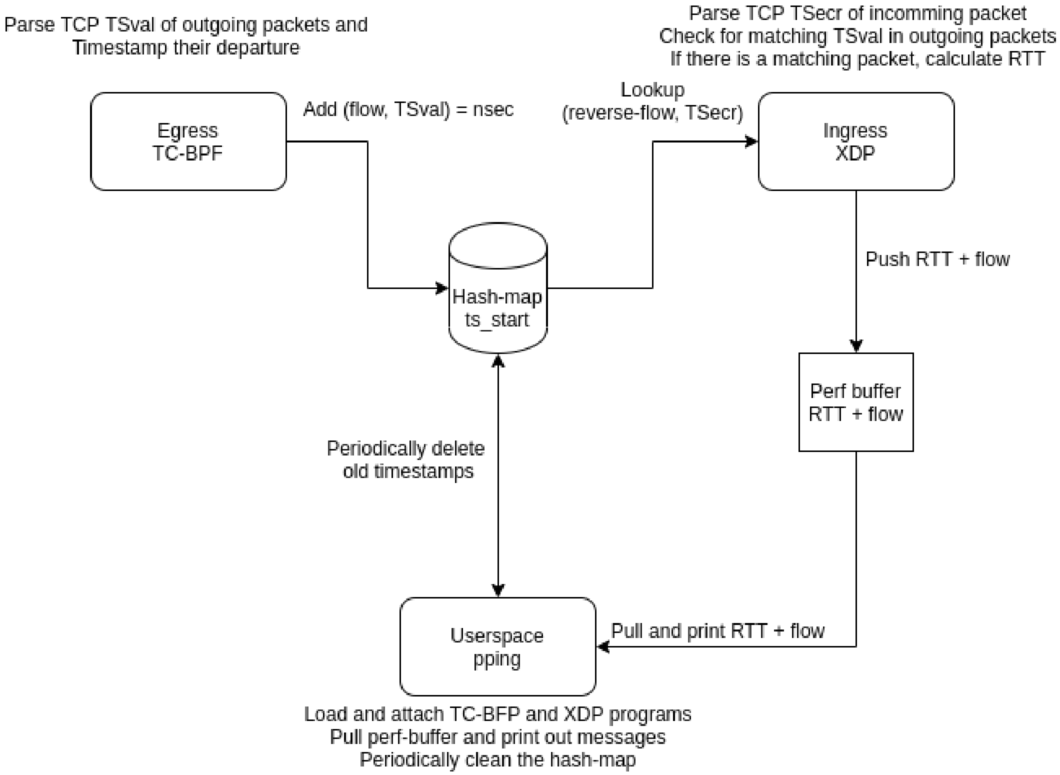
PPing – Why (use it)?

- Does not affect network (by sending additional data)
- Measures RTT experienced by real traffic
- Works on both endhosts and middleboxes

PPing – How?

- Capture outgoing TCP timestamp
- Match against incoming echoed timestamp
- Calculate RTT based on time difference

- Have added rate-limit to scale better to many flows



Parse TCP TSval of outgoing packets and
Timestamp their departure

Egress
TC-BPF

Add (flow, TSval) = nsec

Hash-map
ts_start

Lookup
(reverse-flow, TSecr)

Parse TCP TSecr of incomming packet
Check for matching TSval in outgoing packets
If there is a matching packet, calculate RTT

Ingress
XDP

Push RTT + flow

Perf buffer
RTT + flow

Periodically delete
old timestamps

Pull and print RTT + flow

Userspace
pping

Load and attach TC-BFP and XDP programs
Pull perf-buffer and print out messages
Periodically clean the hash-map

PPing - Now

- Currently WIP
  - https://github.com/xdp-project/bpf-examples/tree/master/pping
- Currently working on the output formats
  - Undergoes frequent changes as we figure out what we want/need
- Initial version hopefully done by end of month

PPing - Future

- Plan to run it on ISP router
- Hope to expand to other protocols
  - TCP Seq/ACK
  - ICMP echo
  - DNS
  - QUIC spinbit
- Skip userside process, keep info in maps

Questions?