A Simpler and Faster NIC Driver Model for Network Functions

Core networking can be fast, simple, and verified, by simplifying the driver model

Core network functions operate packet-by-packet: bridging, routing, NAT...
DPDK-style frameworks are too generic for these functions
Removing unnecessary flexibility leads to:
- Fewer failure cases
- Fewer instructions
- Fewer cache misses

1.25x tput of unverified driver
2.60x tput of verified driver
Same latency

1/8th verification time
Exponentially fewer paths

Open questions:
Could new hardware features help?
Could new abstractions pick a model automatically?
In what other ways can we trade flexibility for performance?
How widely applicable is this model in real-world deployments?

OSDI ’20 paper, video, code: dslab.epfl.ch/research/tinynf