ESnet Production SDN Solution
Yatish Kumar, Chin Guok, Richard Cziva
This is our hardware solution

2 x 40G Ports
Capable of full line rate telemetry of 100G router port

10 ns Timestamps
Fully programmable header parsing:
- TCP extraction / MPLS segment routing headers / ACLs

Fully programmable telemetry generator:
ESnet6 Custom Telemetry Packet:
We place these cards EVERYWHERE.

That is a LOT of SDN for $60k
We place these cards EVERYWHERE.

$. 600 MSRP
400 NICs
$240,000

Let's do it again !!! 4 NICs for all.

We can keep going...
This is production not a testbed

We can build real operational use cases without fear of scale.

The hardware is in place day 1.

Software will not be built as a “Proof of Concept”. But rather as an operational quality 24/7 service.
What can we do with it?

Stateful tracking of TCP flow rate

\[
\frac{\text{packet_len}}{\text{Delta Timestamps}}
\]

Octets / ns which gives us Gbits / s

For EVERY flow on ESnet in real time..

Fine Print: whilst we could do EVERY flow, that would be daft. Every interesting flow is a what we really plan to do.
Here’s what we see when we zoom in

4! microseconds of a TCP buildup of a 10 Gbit/s flow
~12 Gbit/s

Dare I say it?
ML can be applied here.
Coming soon…

Not Just 40G

800G (4 x 200G QSFP-DD)  (NOW)
1600G (4 x 400G QSFP-DD)  (2020)