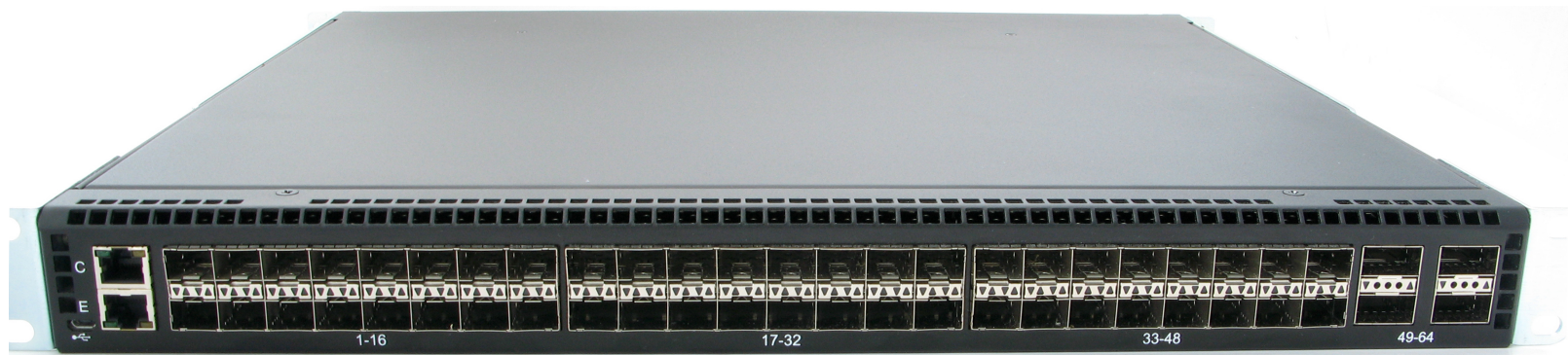# Approximating Data-plane Algorithms on the Programmable Switch
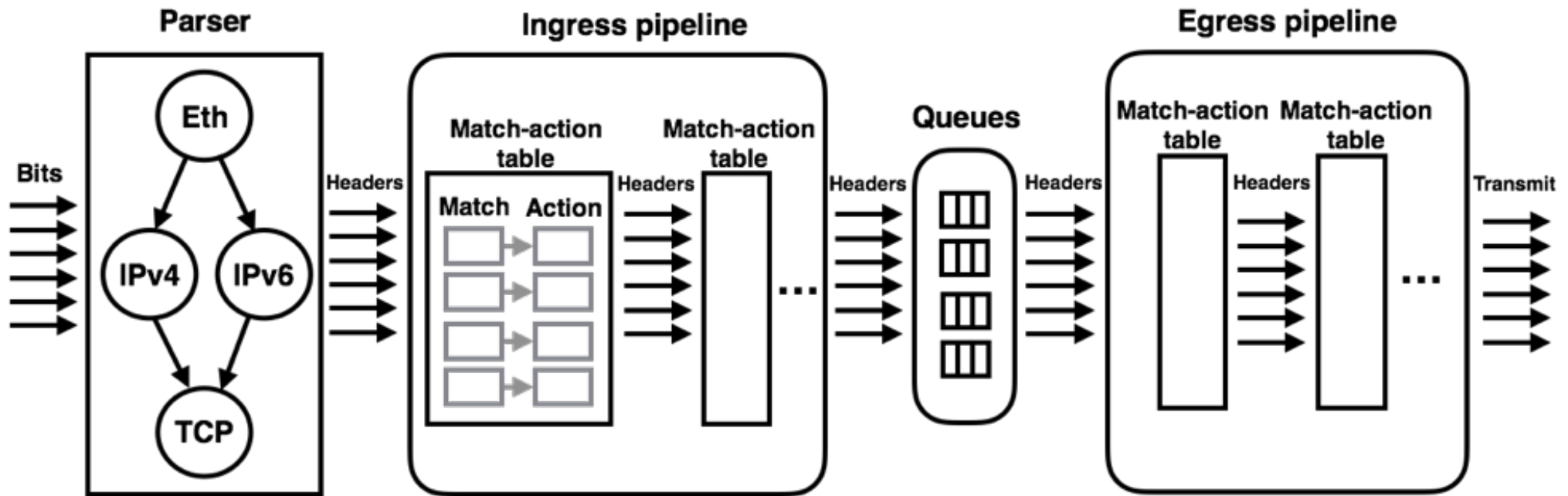
Ming Liu
University of Washington
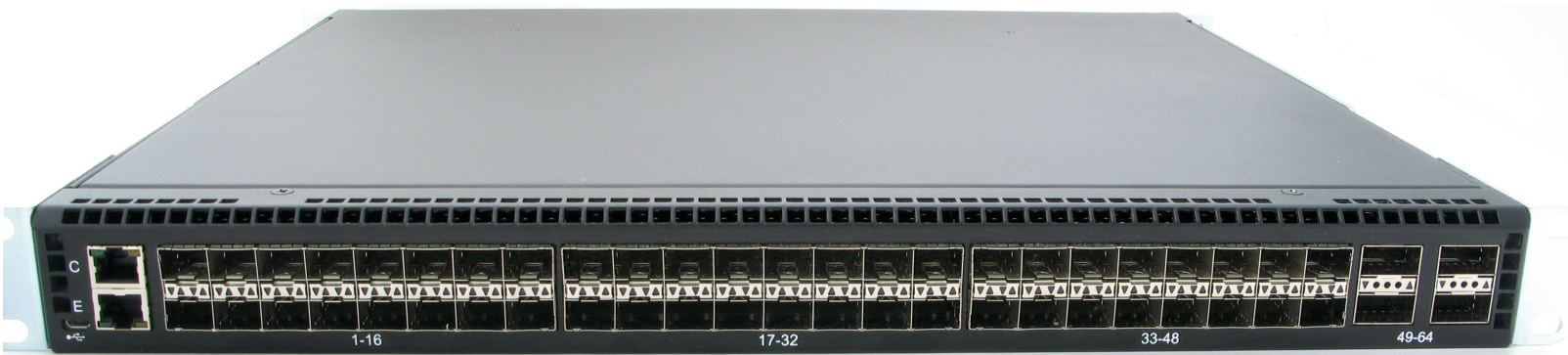with *Naveen Kr. Sharma, Jacob Nelson,*
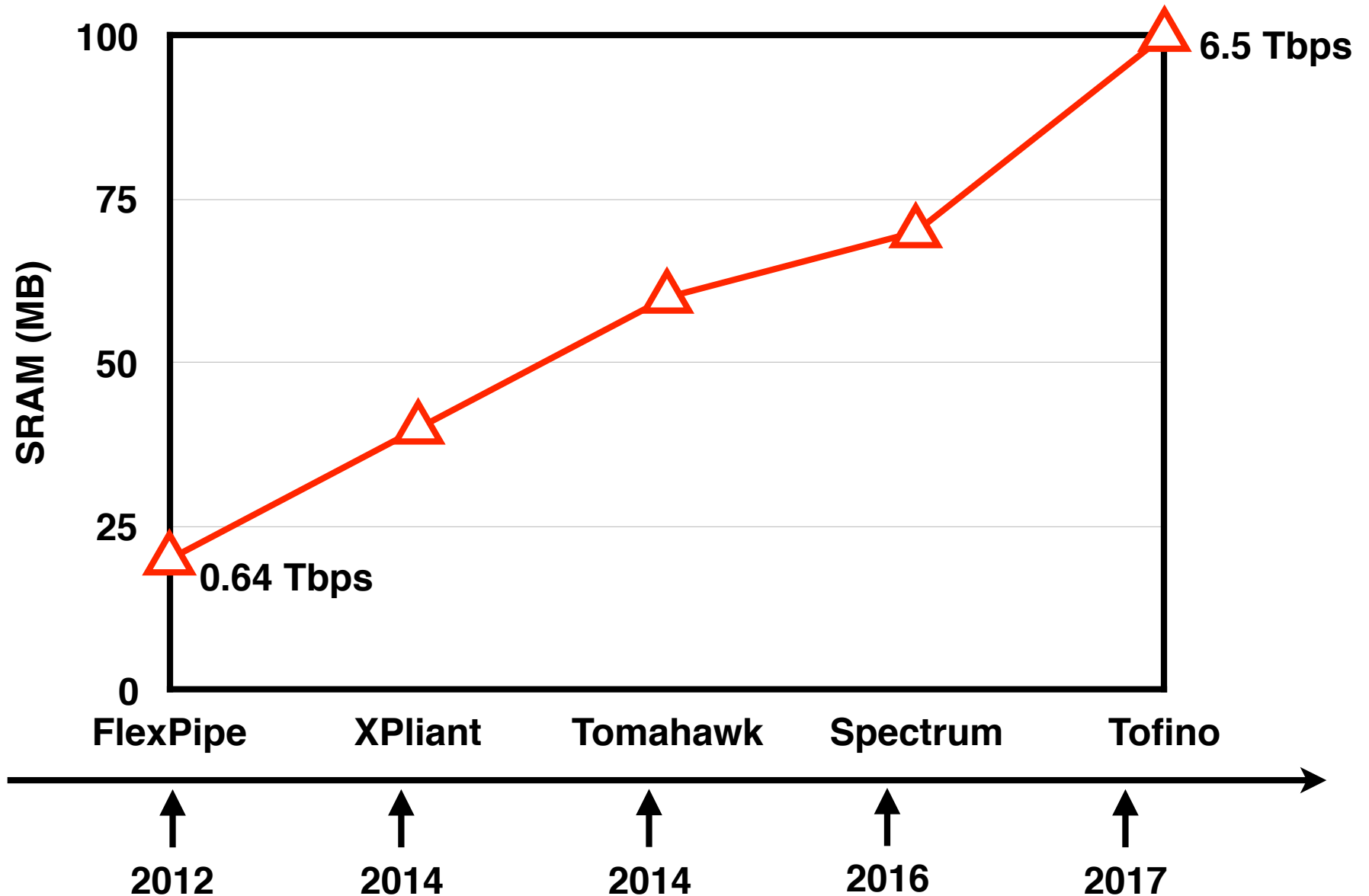*Arvind Krishnamurthy, Luis Ceze*

Programmable Network Switch

Parser

Bits

Eth

IPv4   IPv6

TCP

Ingress pipeline

Headers

Match-action table

Match   Action

Match-action table

Headers

Queues

Headers

Egress pipeline

Match-action table

Match-action table

Headers

Transmit

Programmable Network Switch

1-16   17-32   33-48   49-64
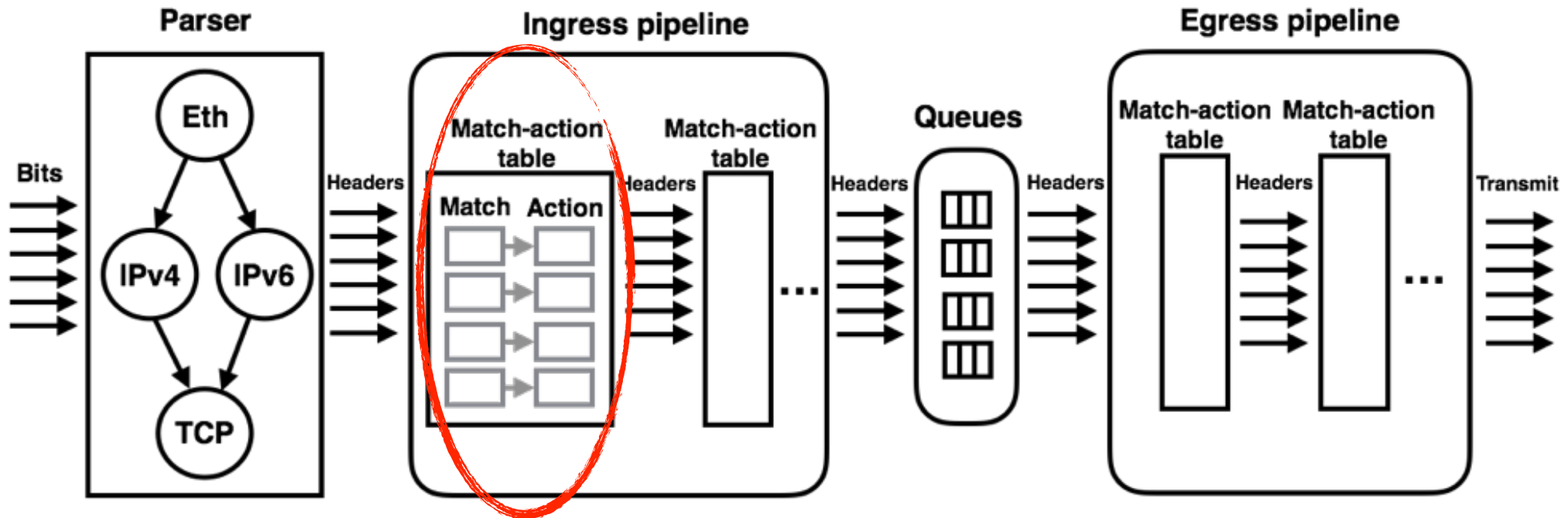
C
E

❖ Challenge 1: Switch SRAM size is increasing slower than the switch capacity.

❖ Challenge 2: The switch only supports limited line-rate arithmetic and stateful computations.

- Simple ALU computing;
- Restricted SRAM read/write;
- ... ...

Data-plane Approximation

Data-plane algorithms:
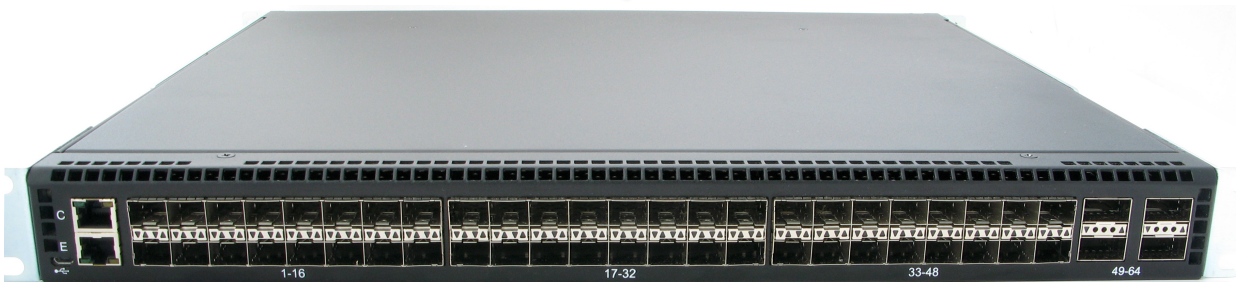✓ Heavy Hitters
✓ Flowlets
✓ Adaptive Virtual Queue
✓ … …

Network protocols:
✓ RCP
✓ CONGA
✓ … …

+

Key ideas:
❖ **Approximate arithmetic computations via on-switch line-rate action units;**
❖ **Approximate port/flow statistics in the SRAM;**

1-16   17-32   33-48   49-64

= **New Network protocols !**

Programmable Network Switch