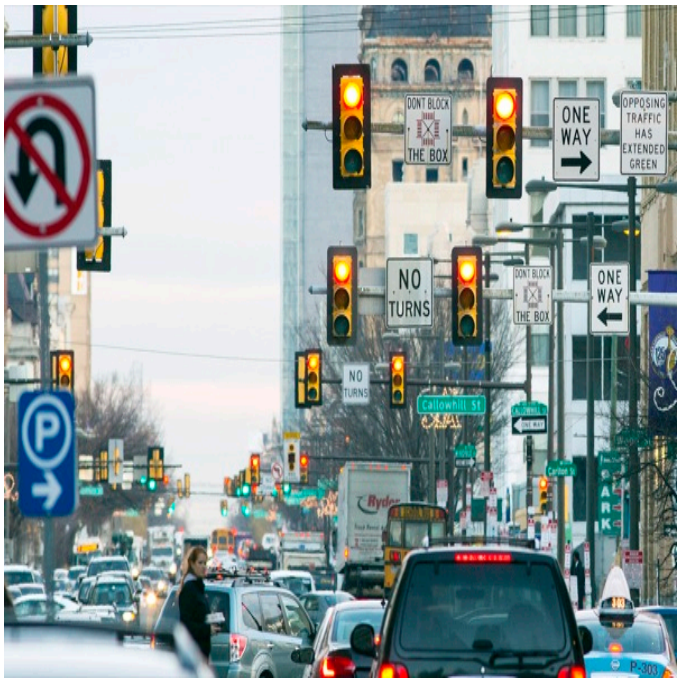
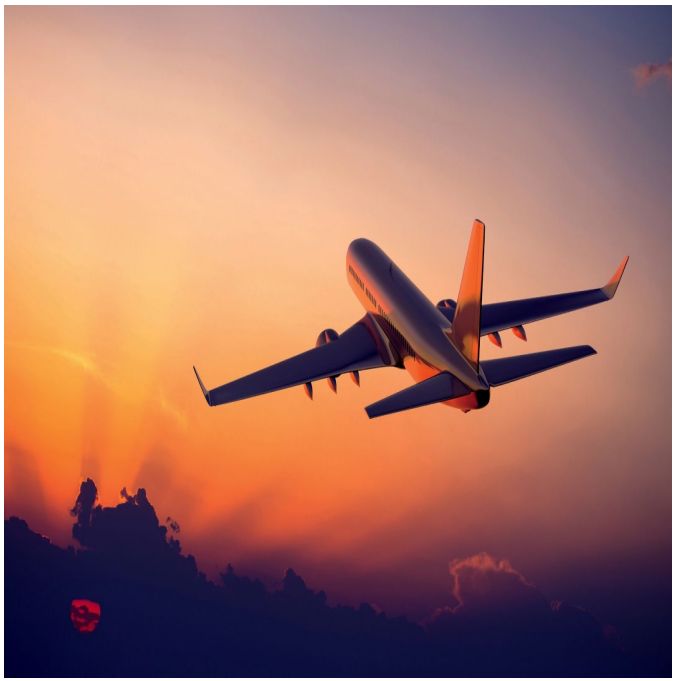
Schedulers for Hybrid Data Center Network

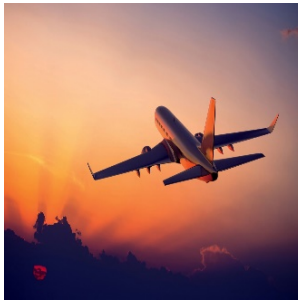
- Neelakandan Manihatty Bojan
Supervisor: Dr. Andrew Moore

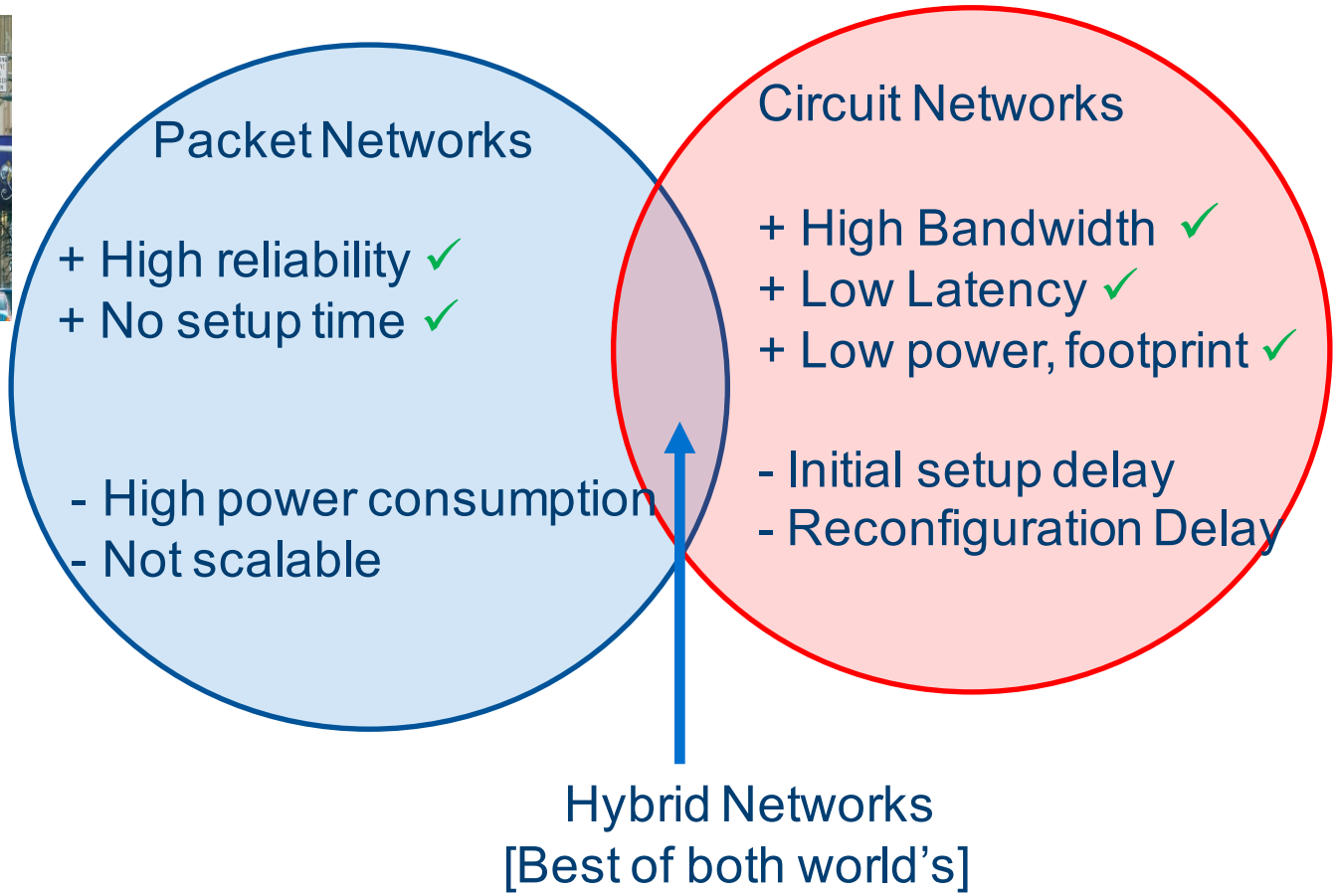




Hybrid DCN = Packet Switching + Circuit Switching

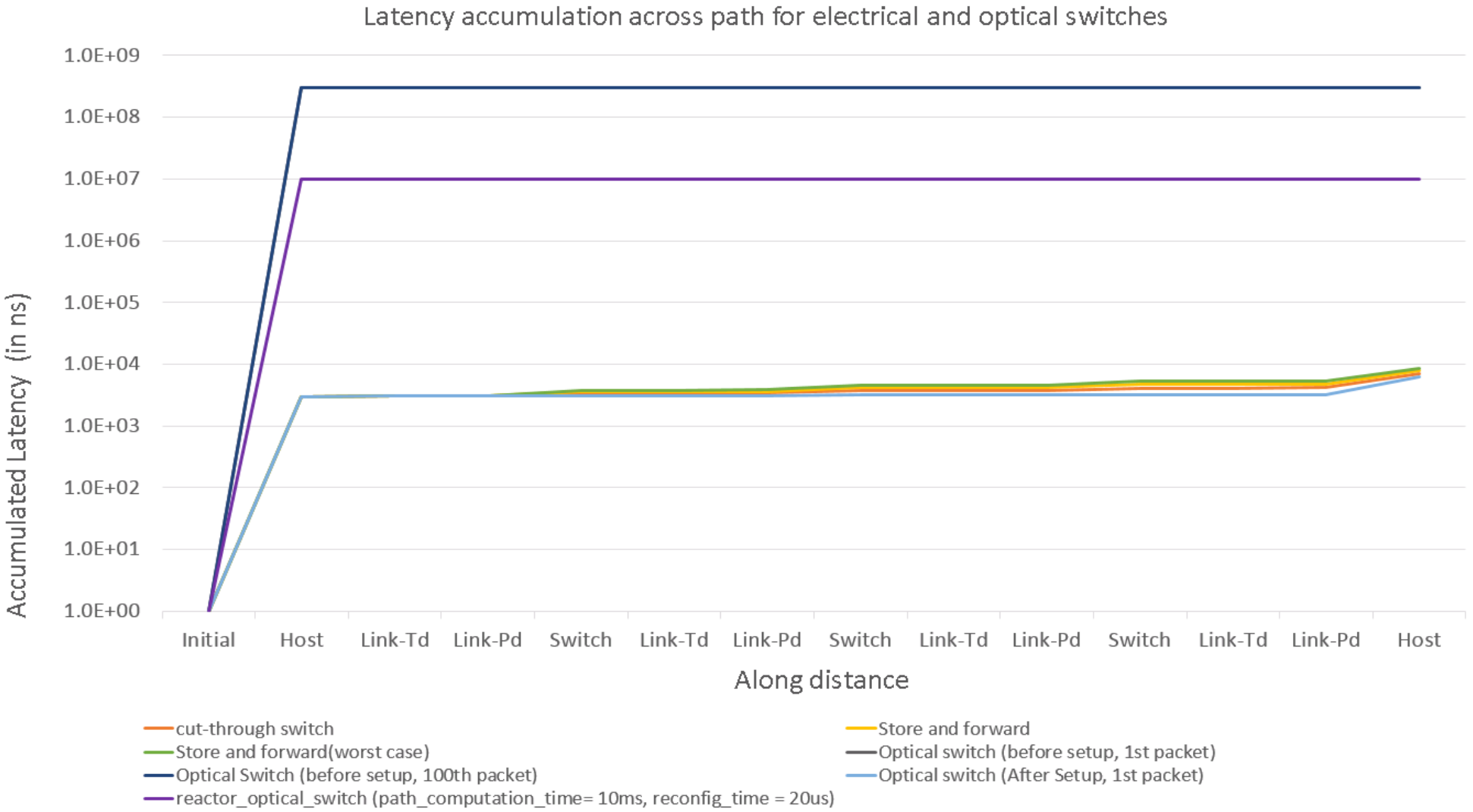
Schedulers for Hybrid Data Center Network



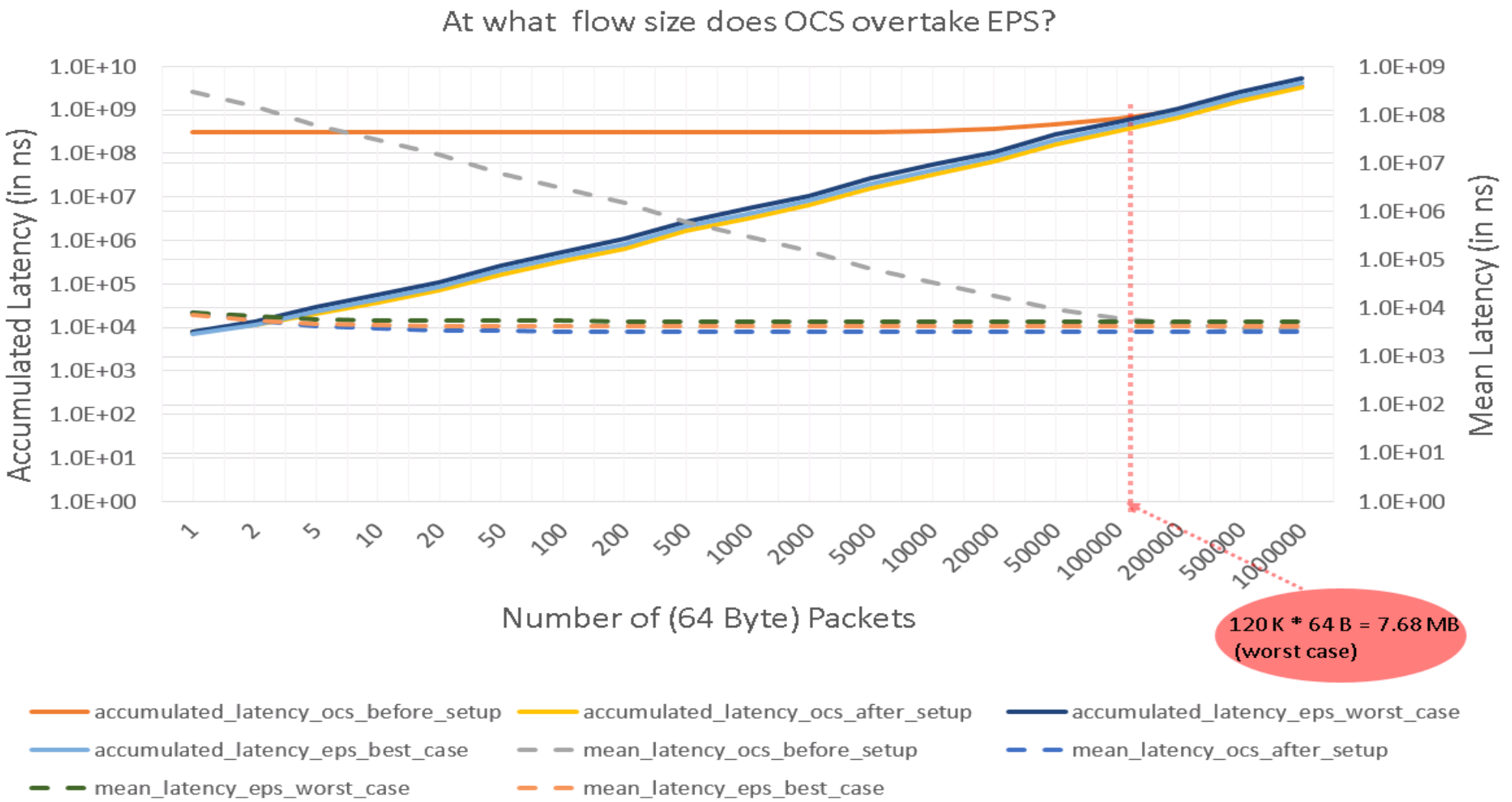


Need **Hybrid scheduler** to co-ordinate the packet and circuit switched network

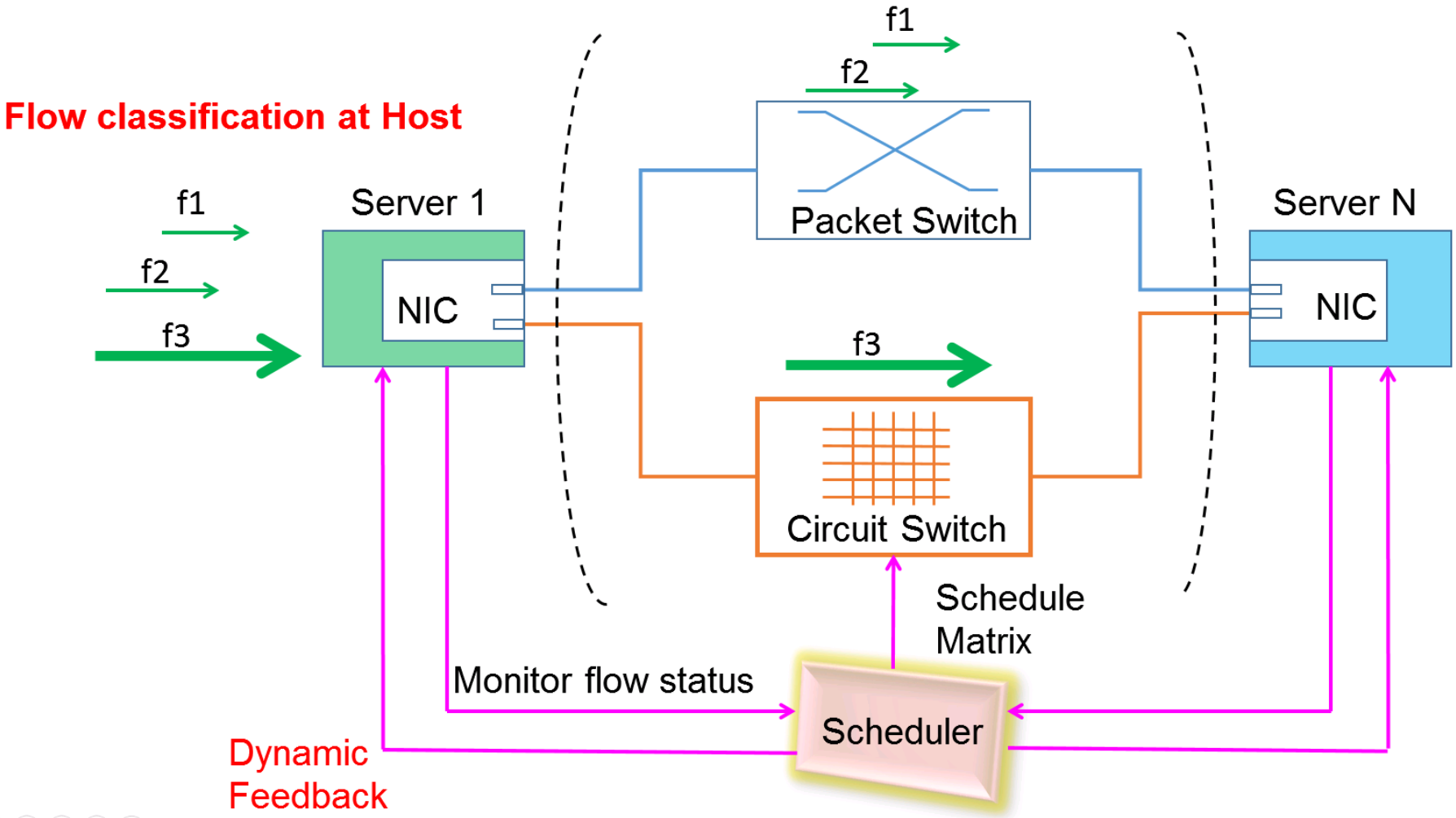
64 B packet latency across a Circuit & a packet switch



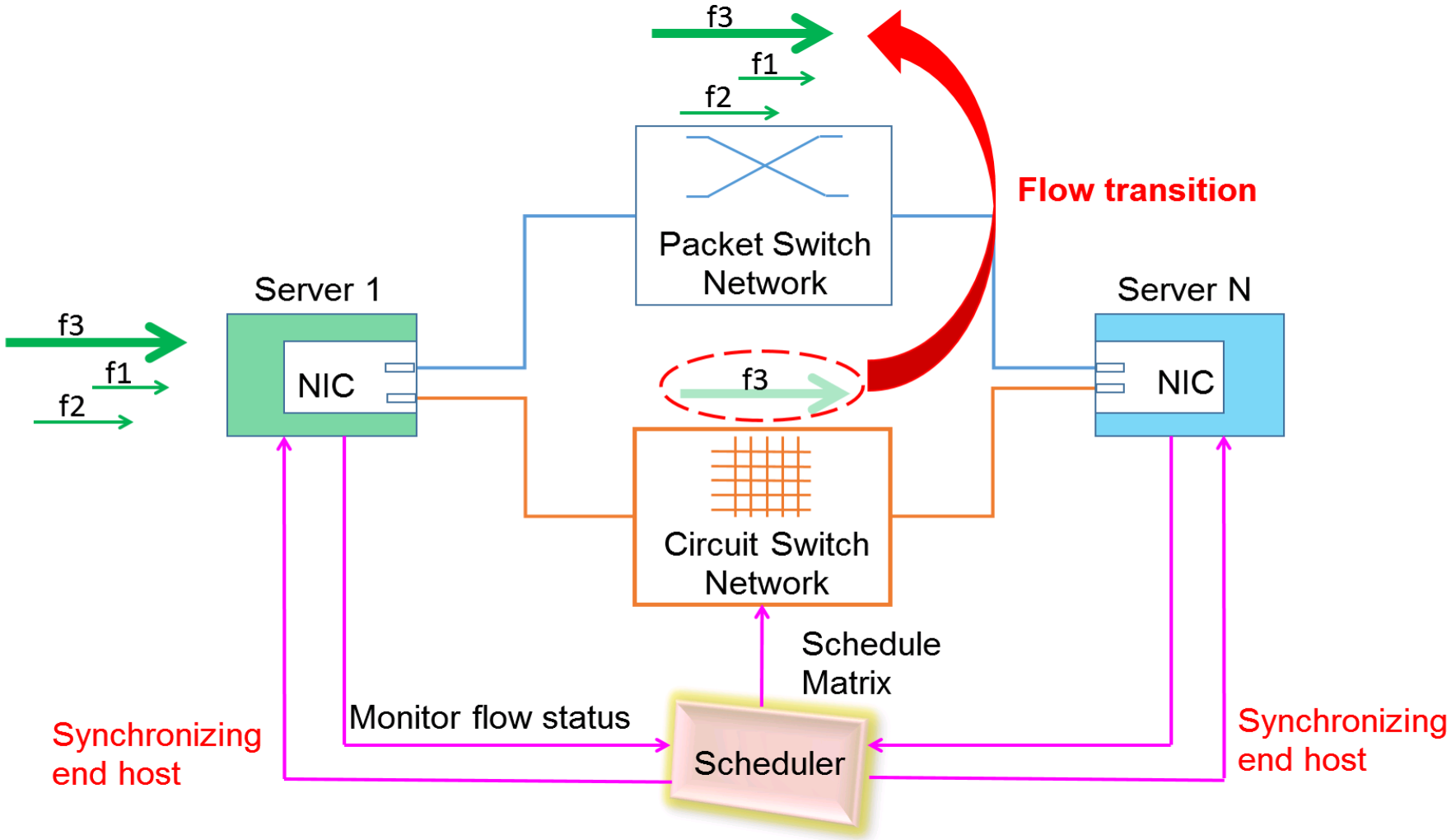
At what flow size does OCS overtake EPS



Our Approach: Flow classification at Host



Flow transition



Summary

- Hybrid networks are essential to meet emerging DCN reqirements.
- Need dynamic schedulers for hybrid networks.
- Ideas for the dynamic hybrid scheduler:
  - Flow classification at host
  - Flow transition
- Evaluation through simulation and implementation (NetFPGA).

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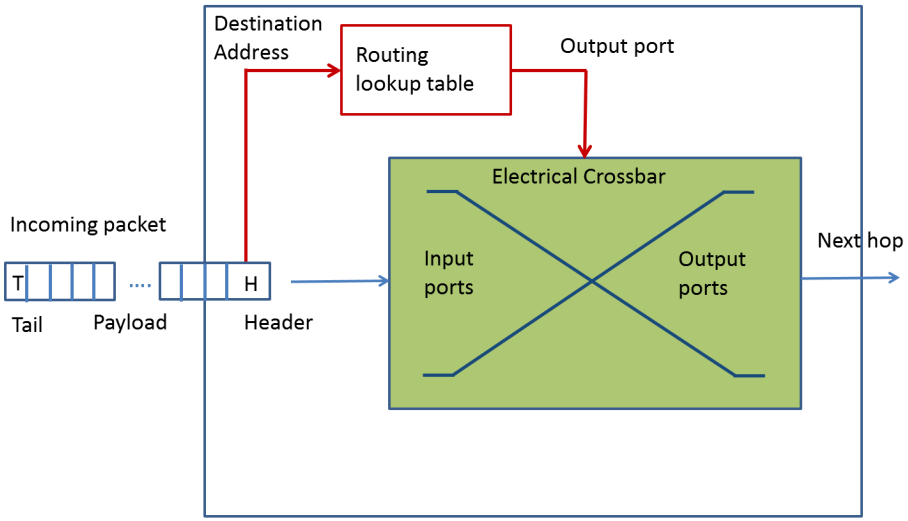
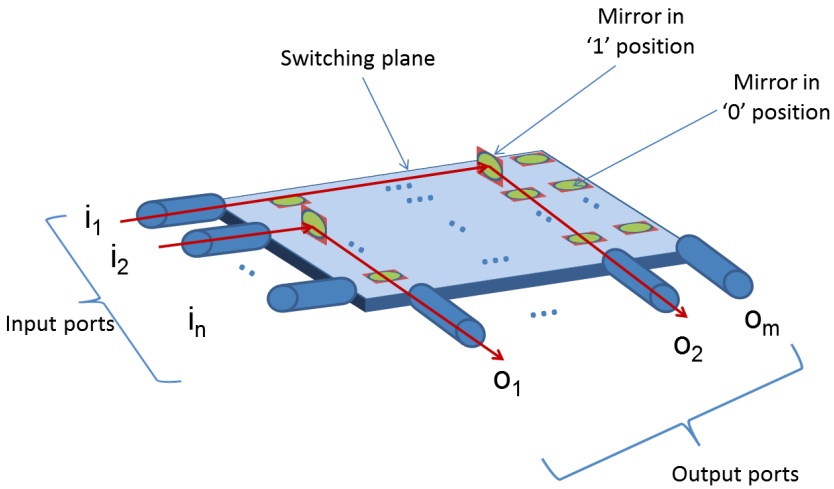
Backup slides

EPS Vs OCS





Has buffers, TCAM

Arista ToR switch (48x10G and 4x40G) has a power consumption of 400 W.

There is packet processing

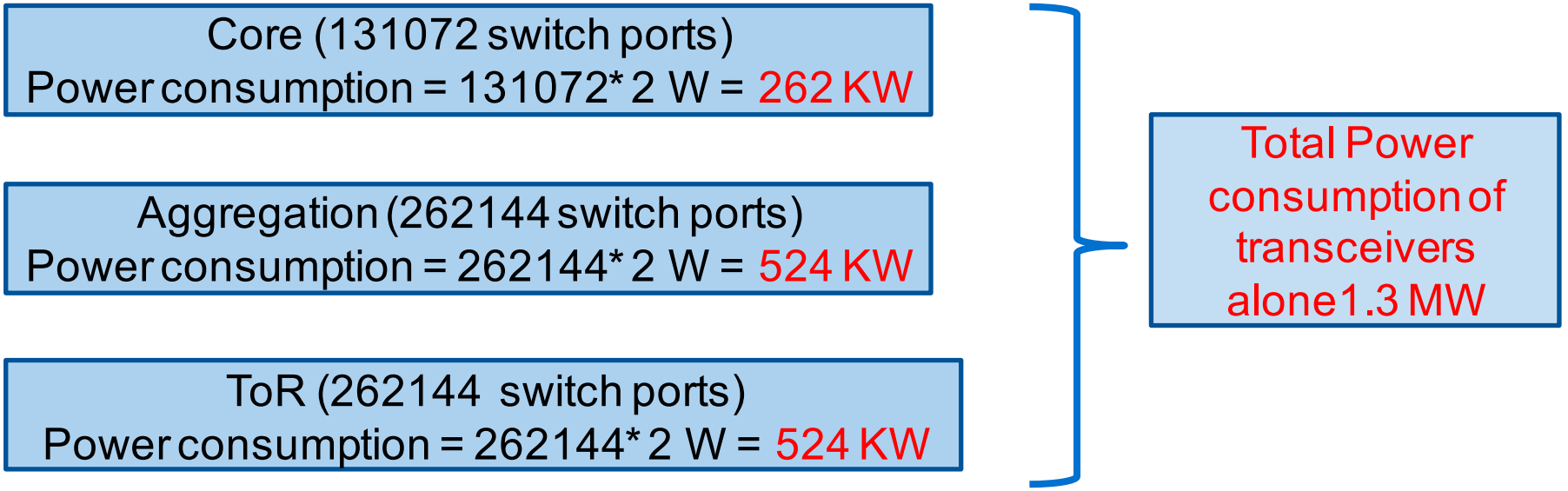
No buffers

Glimmerglass OCS with 192x192 optical cross-connect has a power consumption of 85 W.

No packet processing

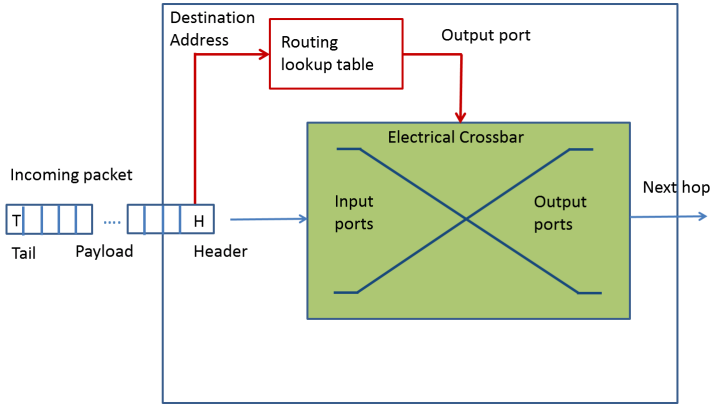
Case for hybrid switching

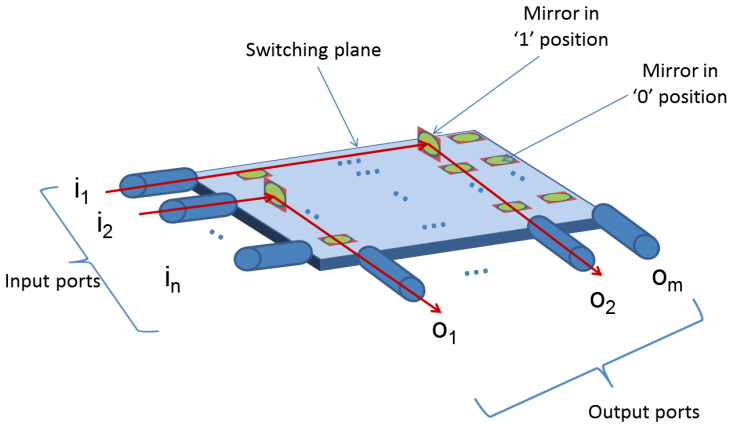
- Consider 130,000 node data center using EPS with folded Clos topology.

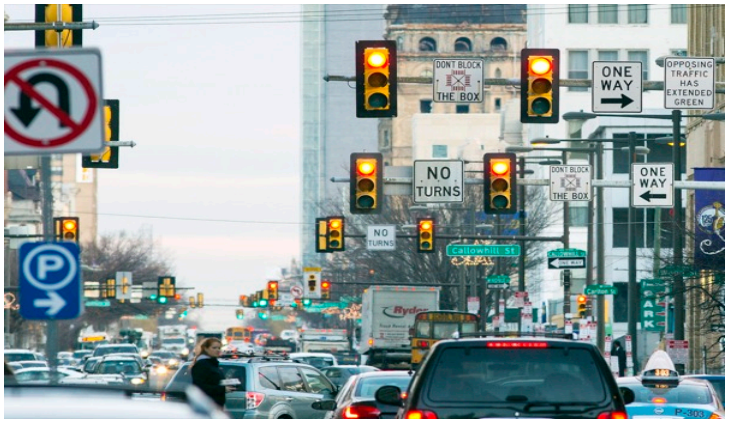


- Increase maintenance and

Packet Switching & Circuit Switching

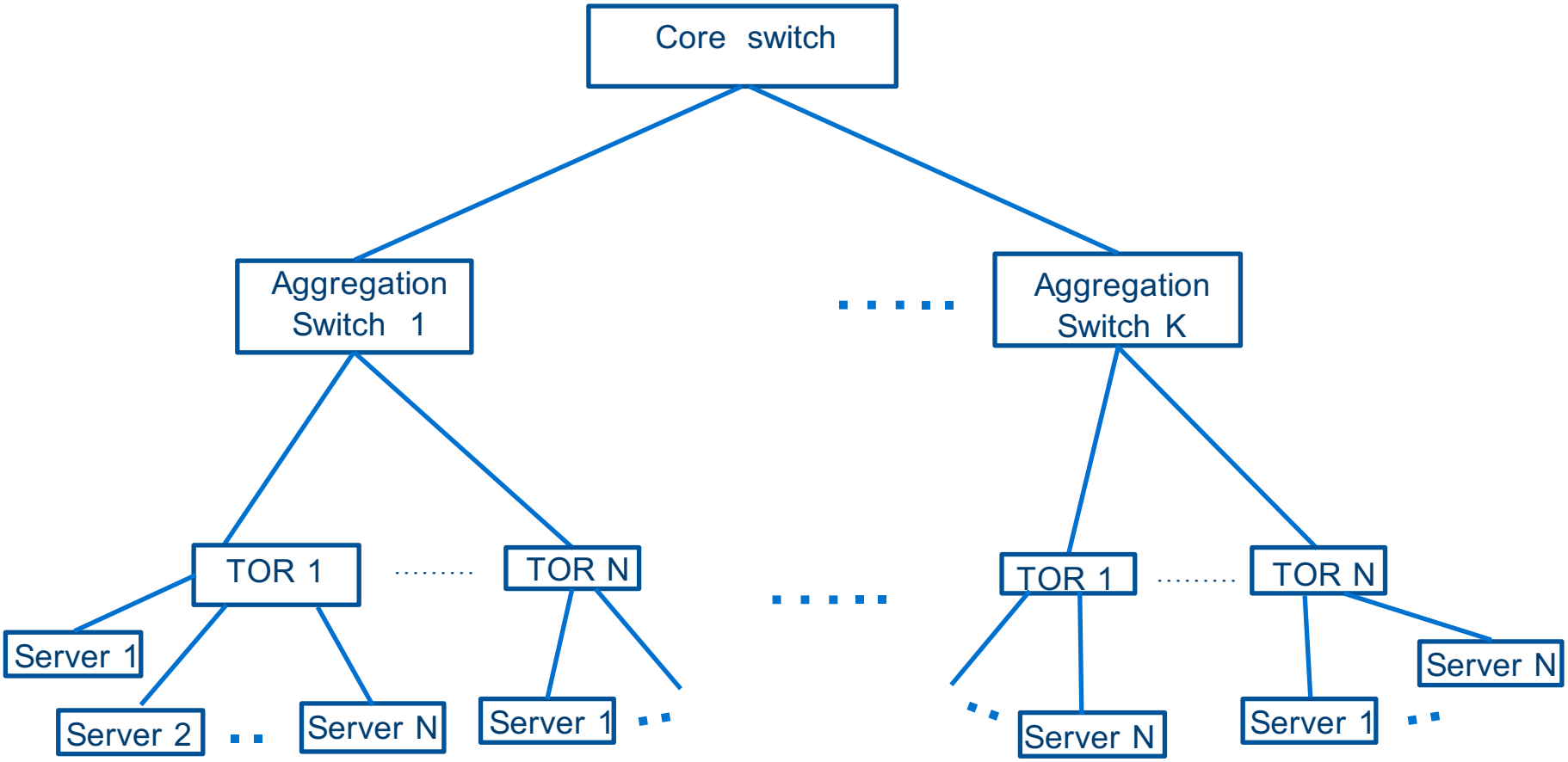




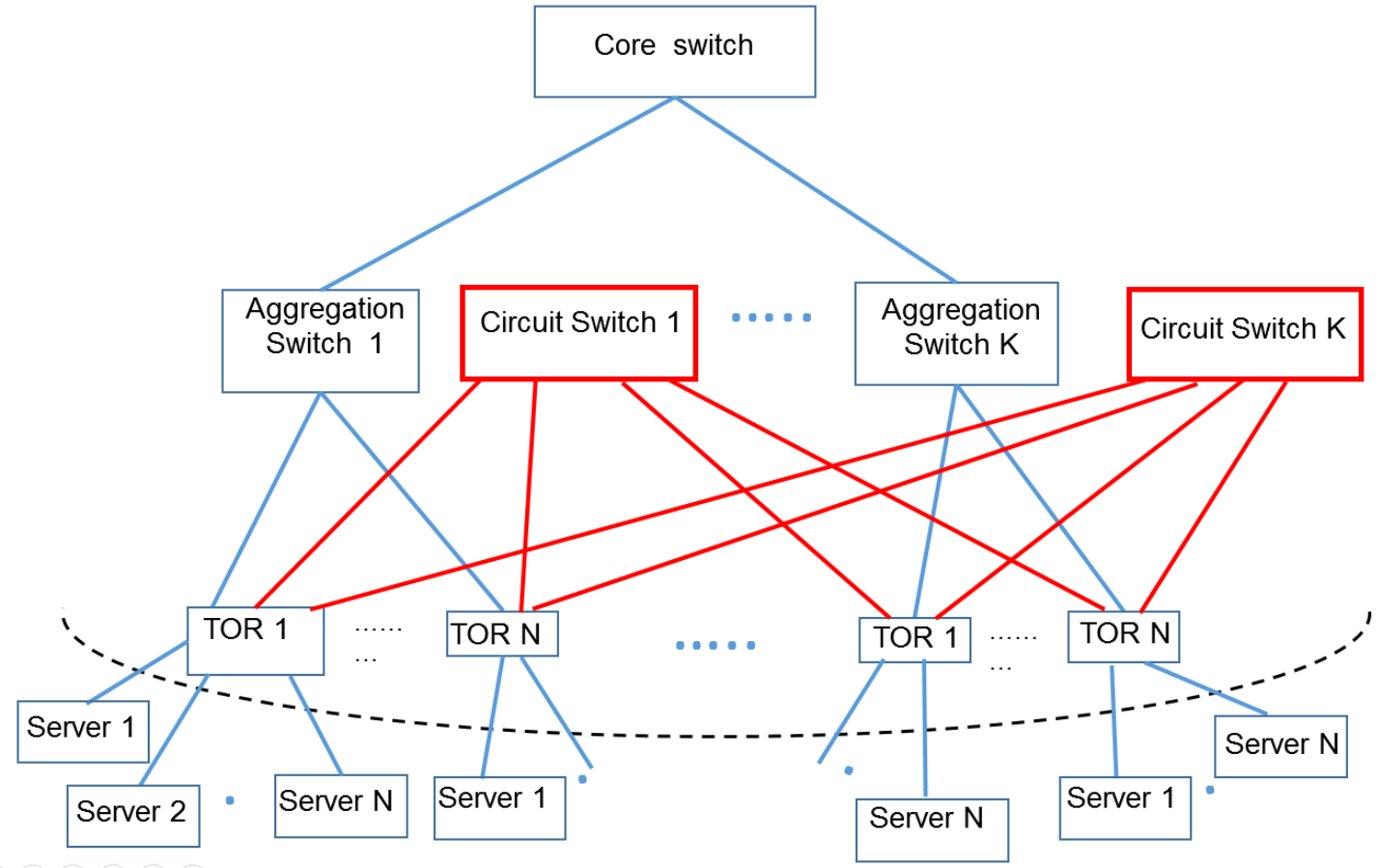


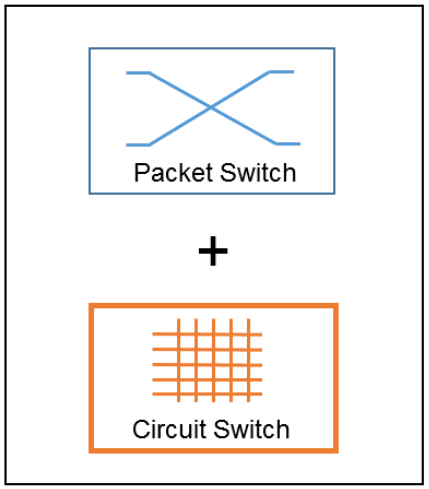
Hybrid DCN = Packet Switching + Circuit Switching

Traditional Fat Tree topology



Hybrid Network





hybrid switching network
(A Big Switch)

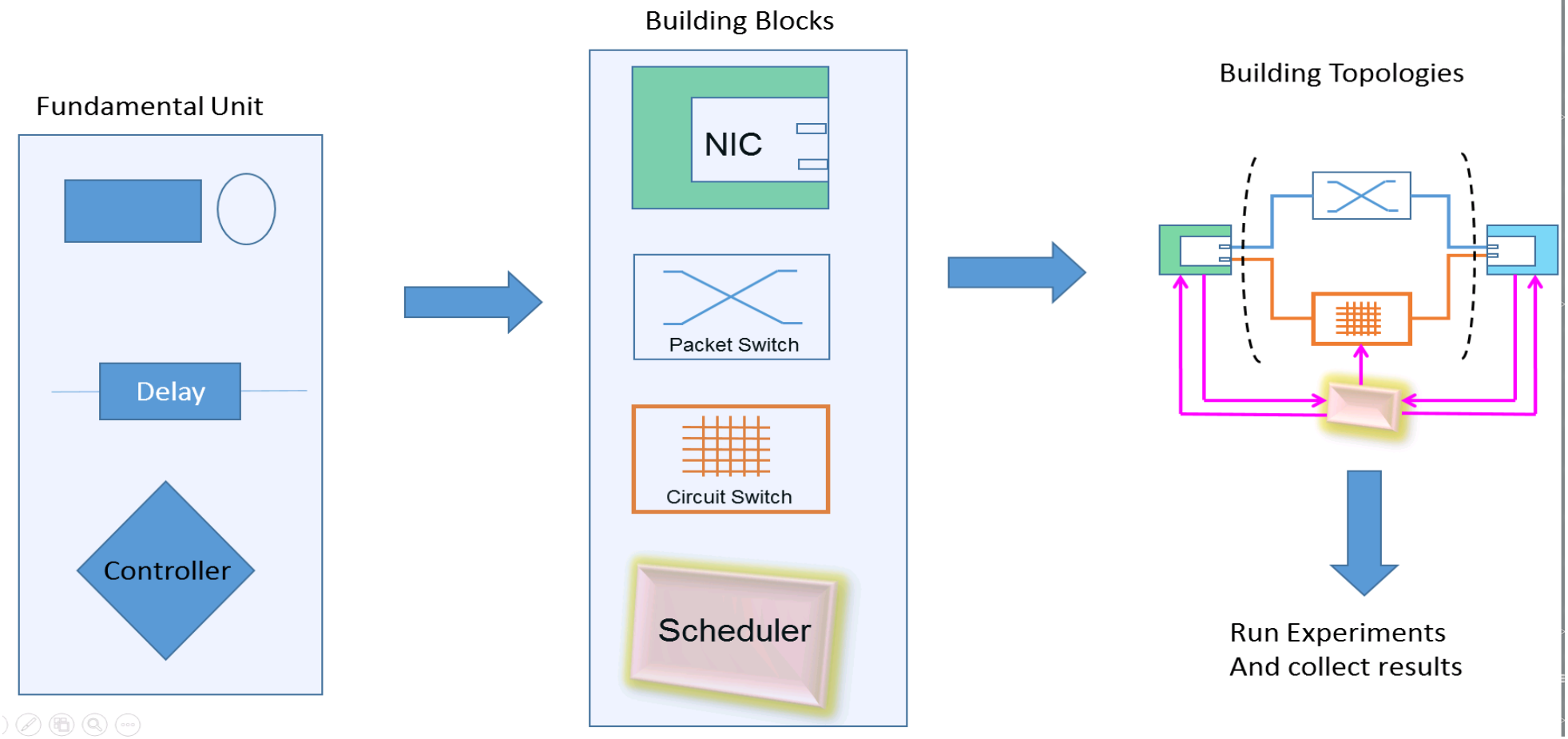
HyNS: Hybrid Network Simulator

- Event-driven, accurate network topology simulator (not a protocol simulator)
- Scaling upto millions of hosts
- Reflects property close to real hardware devices.
- Simulator is not limited to just hybrid networks.

Platform	Sim/Emu	Accuracy	Code Integration complexity	Scalability	Traffic Models
NS 2 (C-through)	Sim	ms	Medium	High	Trace
ReacToR	Sim	us	Low	Low	Fixed packets
OCSEMU	Emu	us	High	Low	Real application traffic
HyNS	Sim	us	Low	High	Fixed packets (WIP*)

* we are working towards developing other traffic stimulus (CDF based, trace driven ..)

HyNS – A brief Overview



UNIVERSITY OF CAMBRIDGE

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Neelakandan Manihatty Bojan

2nd Year PhD Student

Advisor: Dr. Andrew W. Moore

Multiservice Networks 2016, 7th July 2016

Schedulers for Hybrid Data Center Network

Problem:

- Designing scalable and cost effective Data Center Networks (DCN) for future.

Motivation:

- DCN require more Bandwidth, better energy efficiency.
- Hybrid DCNs (with dynamic Hybrid schedulers) are needed.

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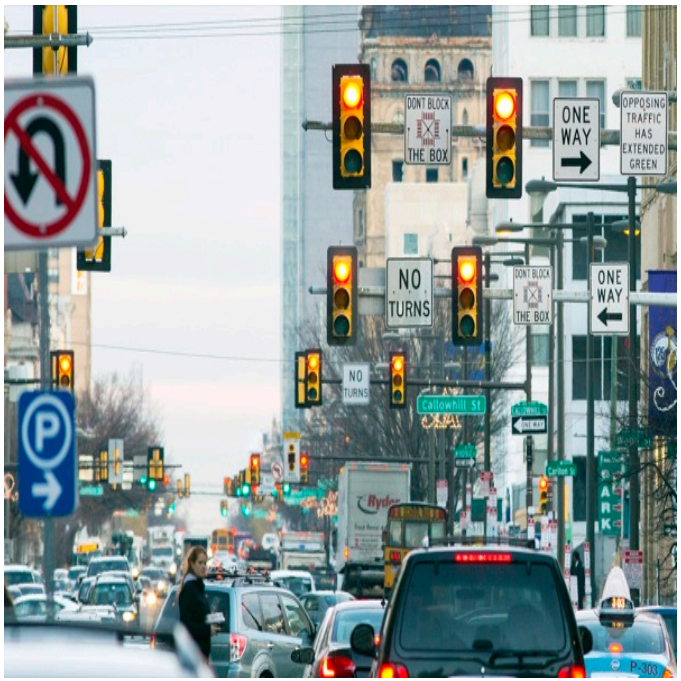

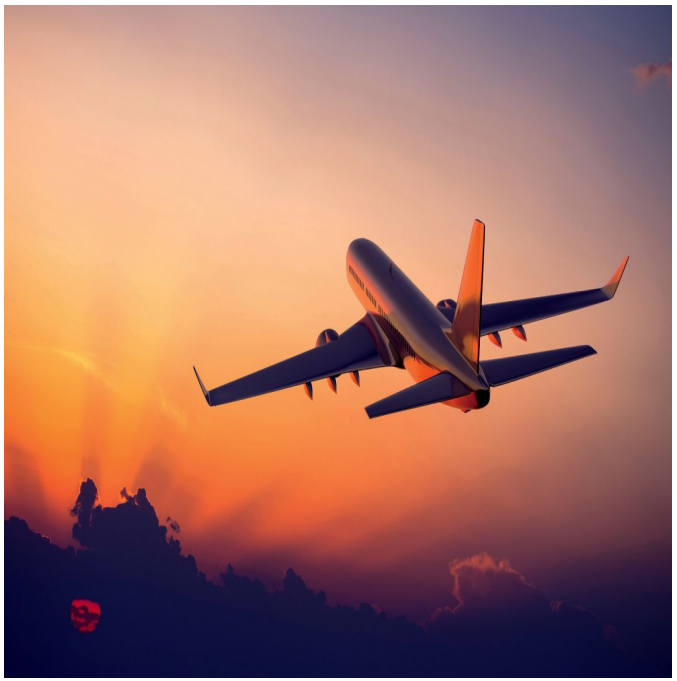

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