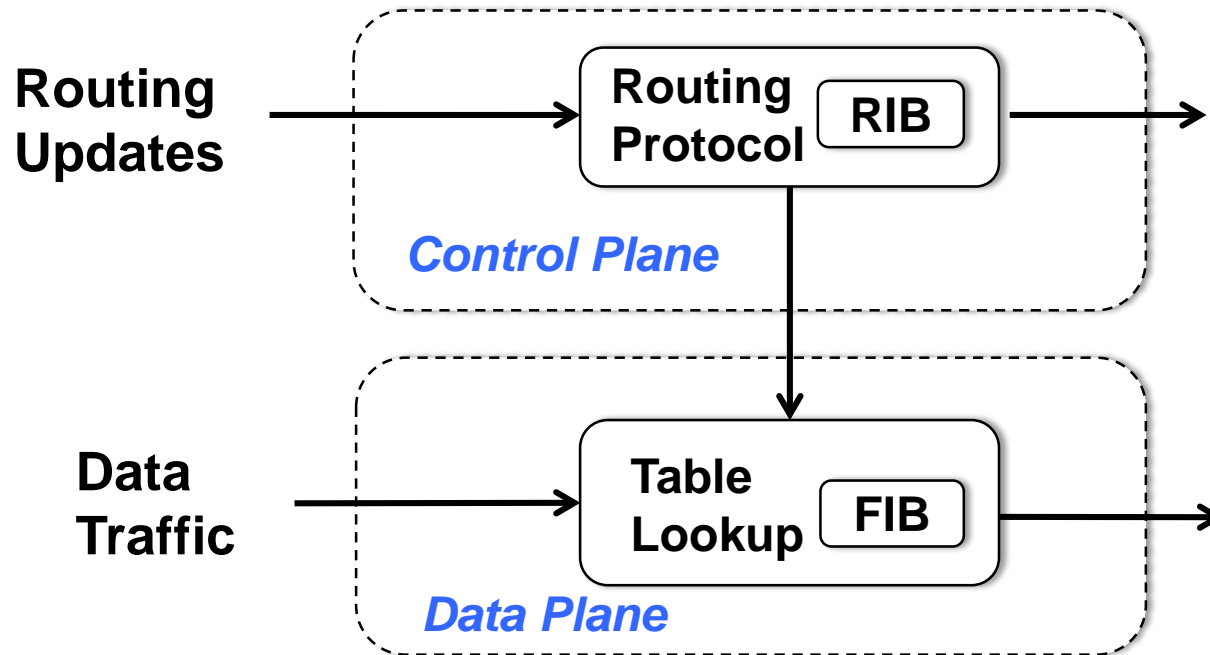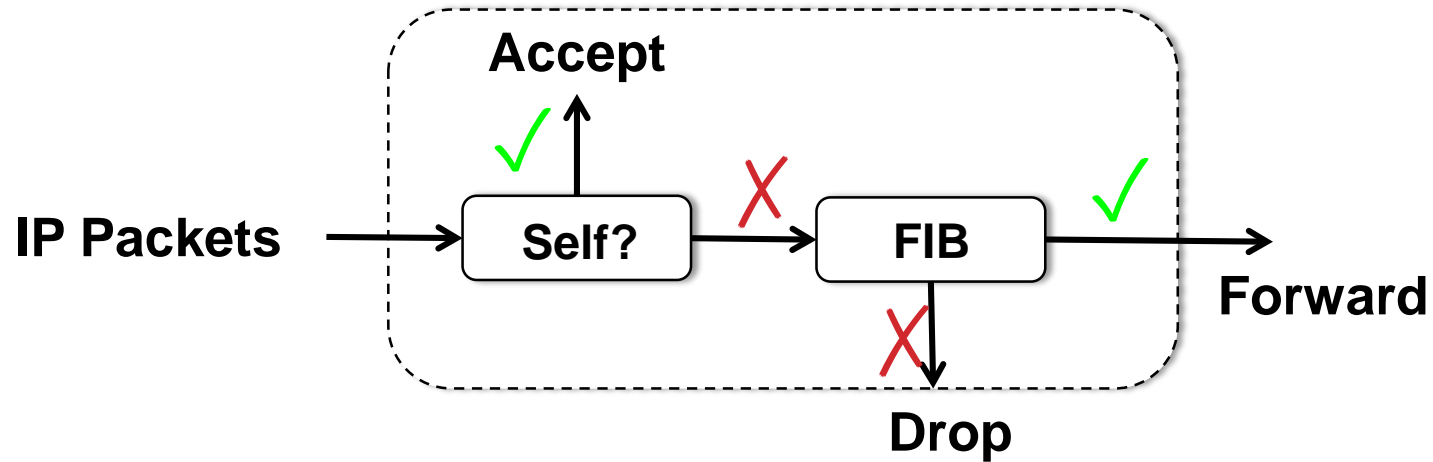# On the Role of Routing in NDN

Beichuan Zhang

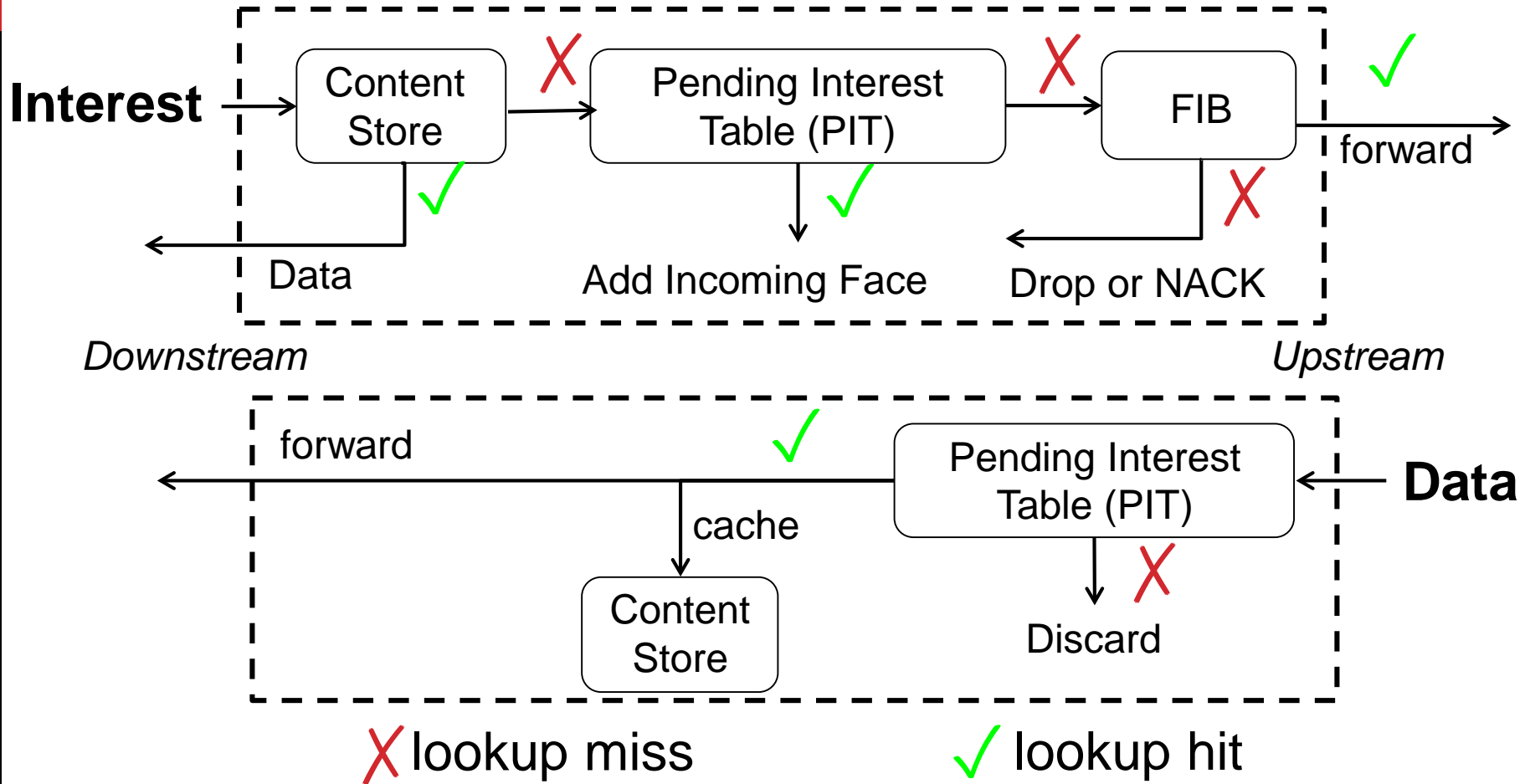**The University Of Arizona**

Control Plan and Data Plane

IP

Data plane is stateless and dumb.

Control plane has all the intelligence, needs to be correct all the time.
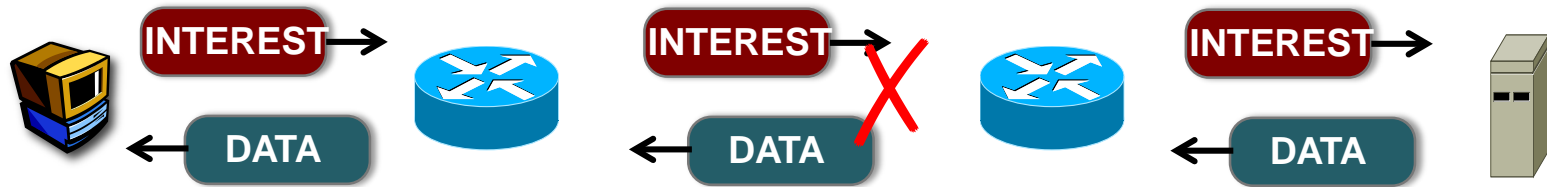
NDN

Stateful data plane with explicit storage

The question

What's the implication of having a stateful data plane? Especially to the control plane?
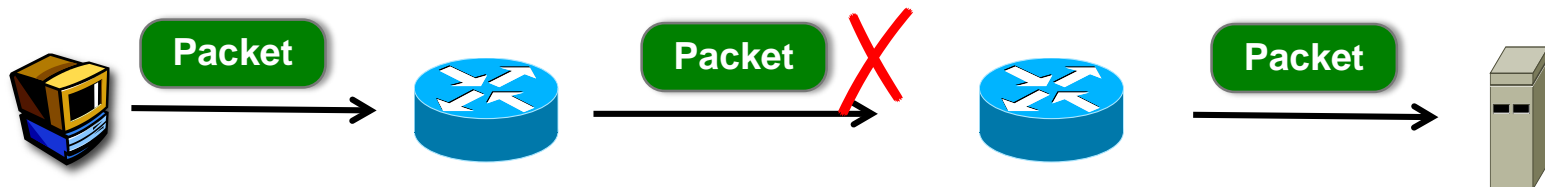
- If we can handle transient failures at the the data plane, it would make control plane simpler and more scalable.

Fault Detection

NDN

Data plane is able to detect failures by observing the Interest-Data exchange at each hop.
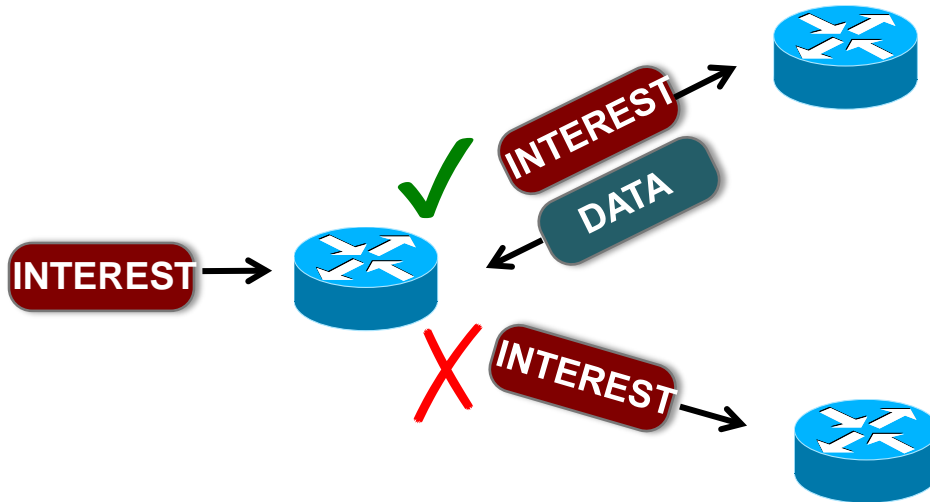
IP

Rely on routing to detect "hard" failures and end-host for "soft" failures
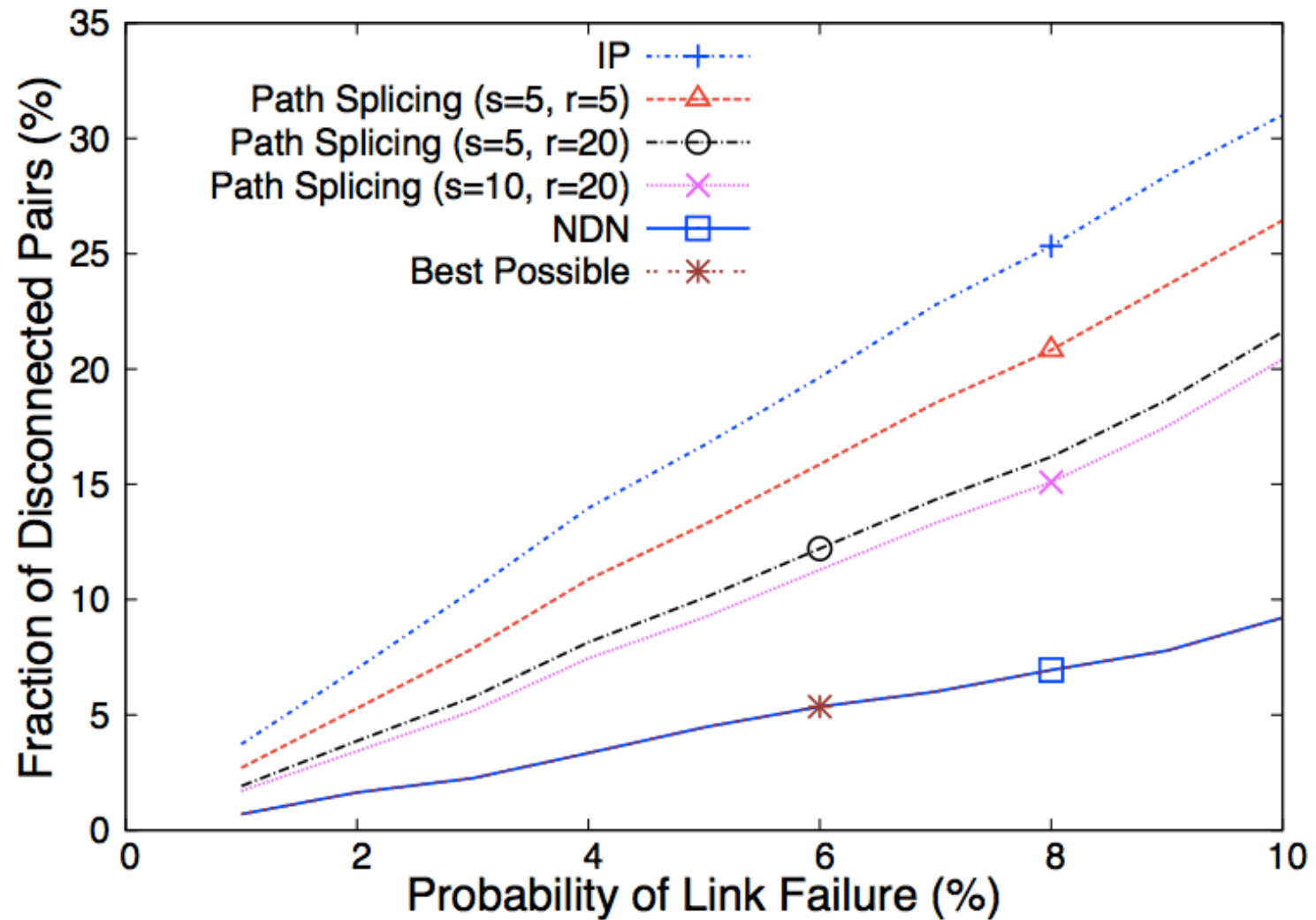
Fault Recovery

Explore alternatives, i.e., strategies

- will know whether a nexthop works or not
    - Data vs. NACK/Timeout

Link Failures

Impact on routing protocol

Take OSPF as an example, vary hello interval.

Hello Interval	1s	10s	60s
IP Delivery	97.9%	90.5%	71.8%
NDN Delivery	98.9%	98.9%	98.5%
# HELLO	502026	51200	8576
# LSA	33696	22893	9716
# SPF	13544	8817	2750

The role of routing in NDN

When data plane can handle transient failures, requirements on control plane is relaxed.

- Routing focuses on disseminate long-term topology and policy information, less on handling churns.

Benefits for routing design

- Better stability and scalability
  - Mask short-lived failures from routing protocols
- Enable routing schemes that don't work well in IP