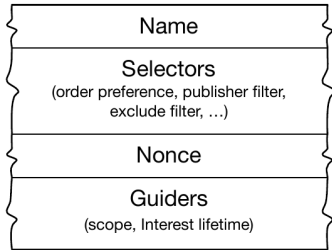


Problems in the NDN Data Plane and How to Avoid Them

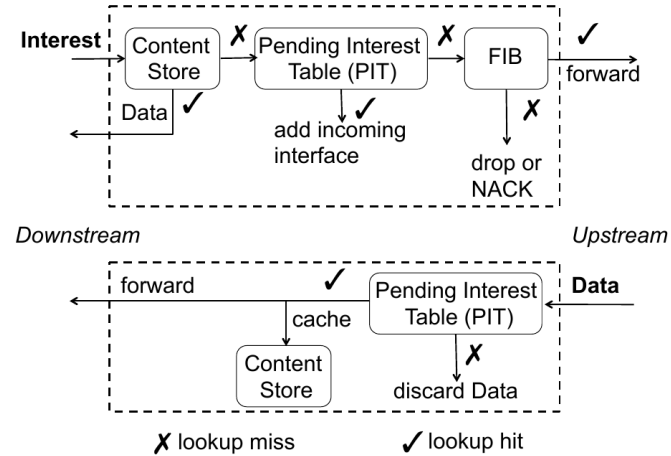
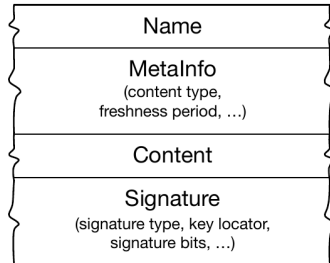
Maziar Mirzazad-Barijough
University of California Santa Cruz

Named Data Networking

Interest Packet

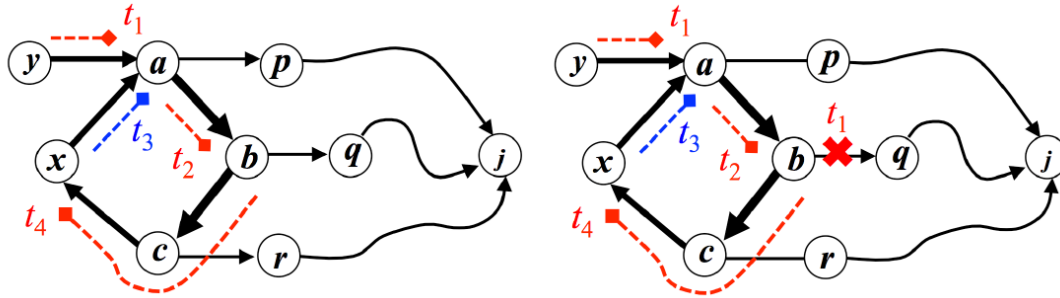


Data Packet

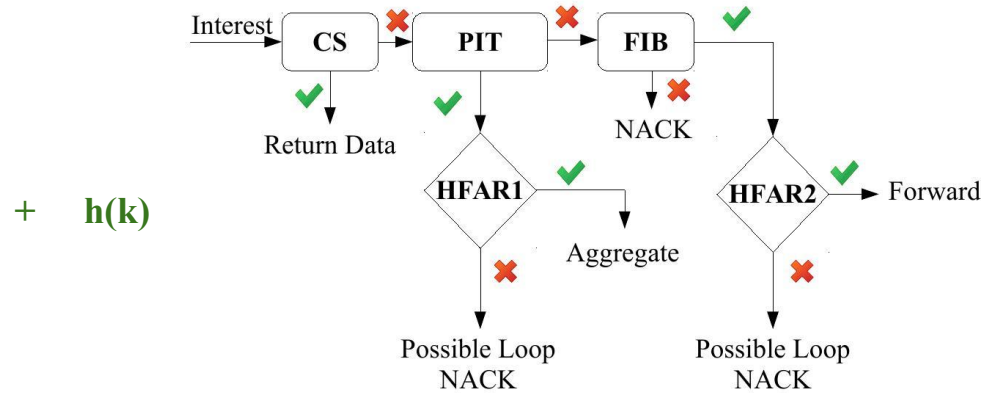
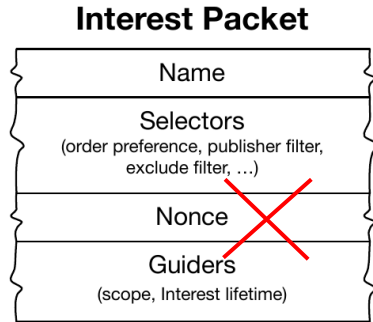


Problem with Current Forwarding Strategies

Undetected Interest Loops



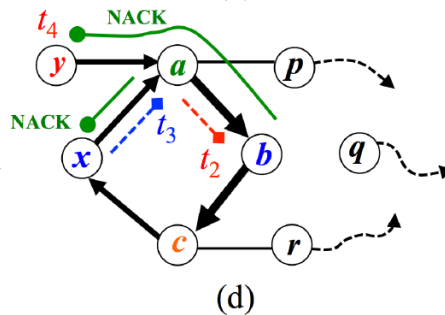
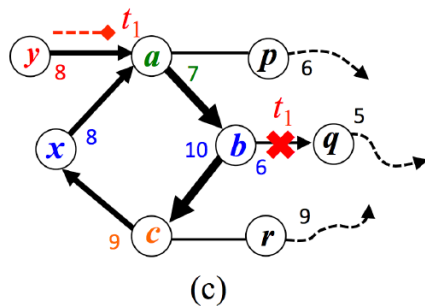
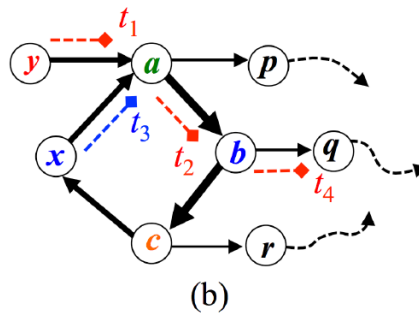
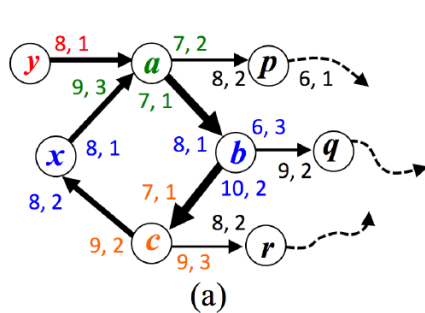
Strategy for Interest Forwarding and Aggregation with Hop-Counts (SIFAH)



$$\mathbf{HFAR1:} \quad n(j) \in PIT^i \wedge h^I(k) > h^I(i)$$

$$\mathbf{HFAR2:} \quad n(j) \notin PIT^i \wedge \exists v (v \in S_{n(j)^*}^i \wedge h^I(k) > h(i, n(j)^*, v))$$

Loop Detection in SIFAH



Correctness of SIFAH

- Theorem: Interest loops cannot occur and be undetected in a network in which SIFAH is used
- Theorem: SIFAH ensures that an NDO message for name $n(j)$ or a NACK is received within a finite time by any consumer who issues an Interest for NDO with name $n(j)$

Performance Comparison

Storage Complexity:

- PIT Storage Size for NDN

$$SS_{NDN} = O((INT + |id|I) |PIT^i|_{NDN})$$

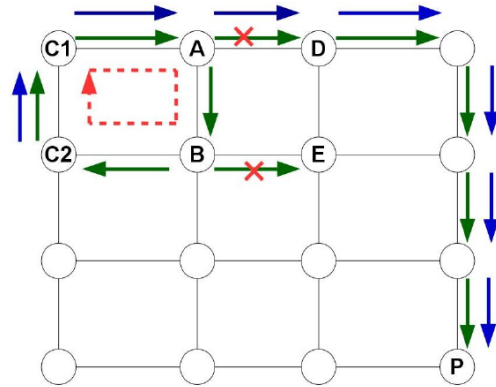
- PIT Storage Size for SIFAH

$$SS_{SIFAH} = O((INT + |mh|)|PIT^i|_{SIFAH})$$

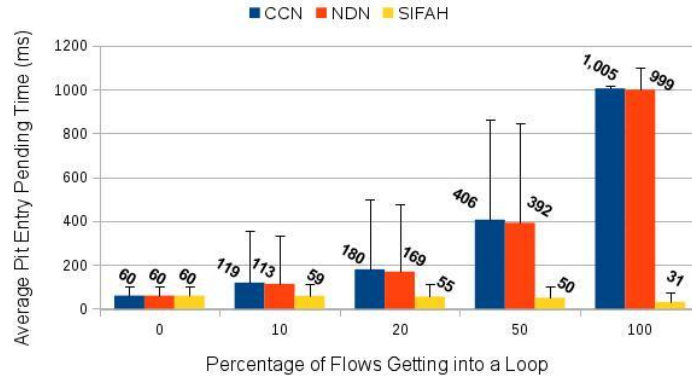
Performance Comparison

Undetected loops

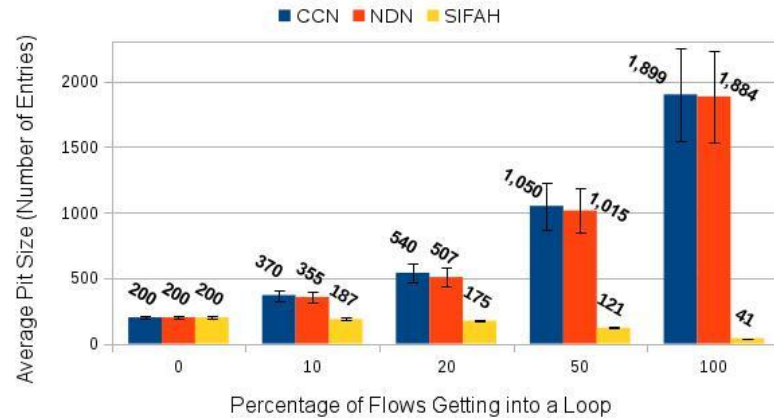
Custom Loop Scenario



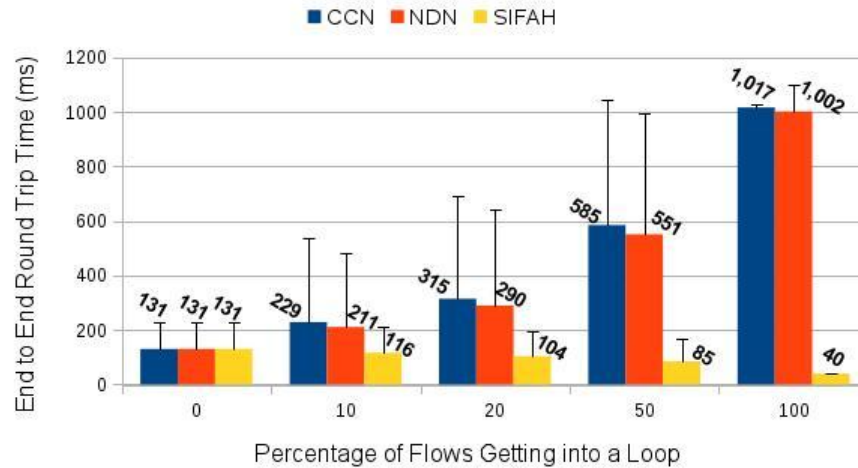
Average PIT Entry Pending Times



Average PIT Table Sizes



Average Round Trip Times



Summary

- NDN and CCN may fail to detect interest loops
- SIFAH can detect any loops using Hop Count info
- Less storage overhead
- In contrast to NDN and CCN, in presence of loops, PIT size, PIT entry pending time and RTTs are not affected using SIFAH.

Future Work

- Retransmission Strategies
- Decrease Storage Complexity of Routers
- Multipath Forwarding of Interests and Data

Questions