中国科学技术大学
University of Science and Technology of China

Distributed Random Servers with Timed Labels for Synchronization over Named Data Network

Hebi Li
01/18/2014

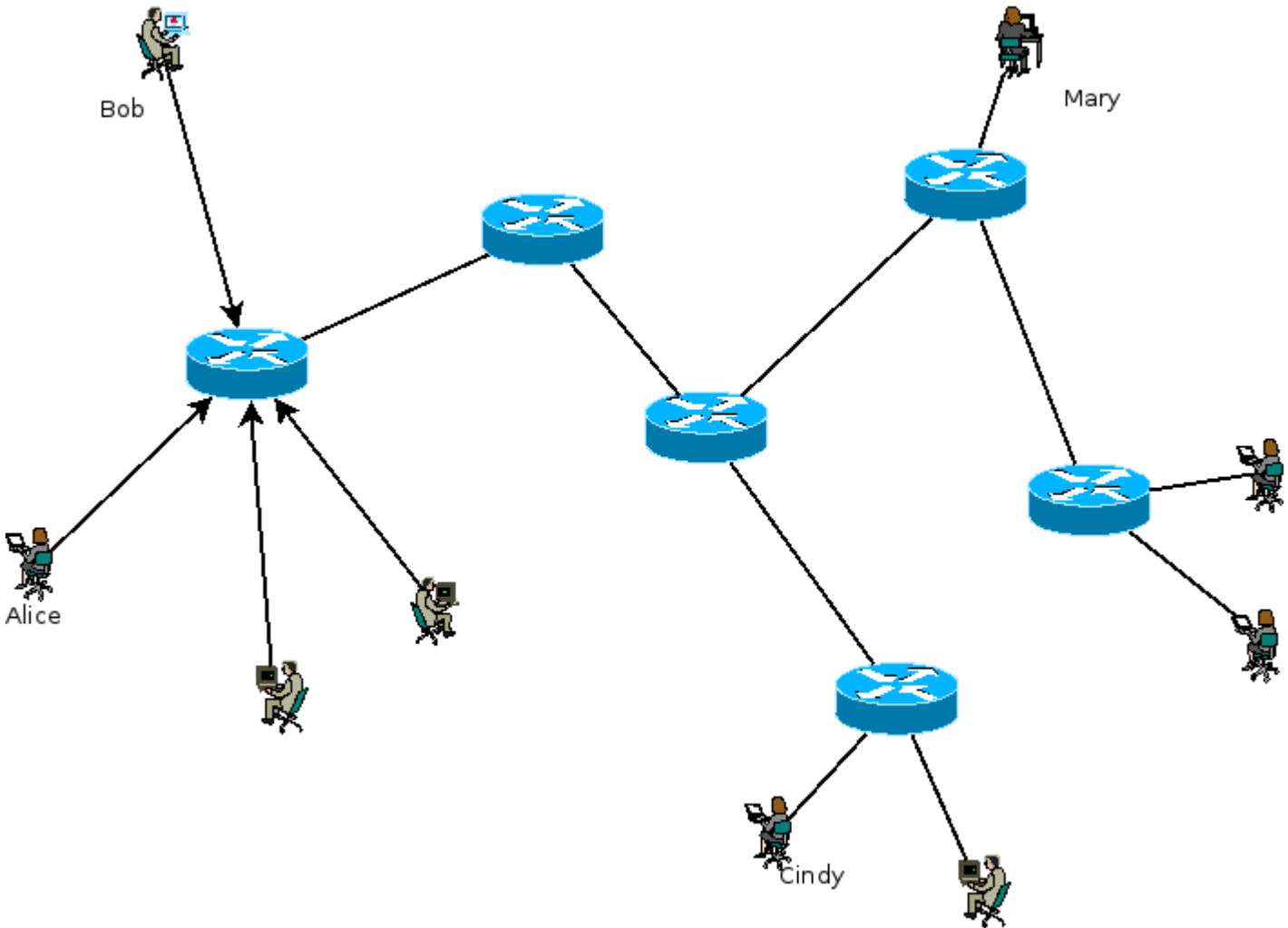
Table of Contents

1. Problem

Let all participants share the same up-to-date data.

For example:

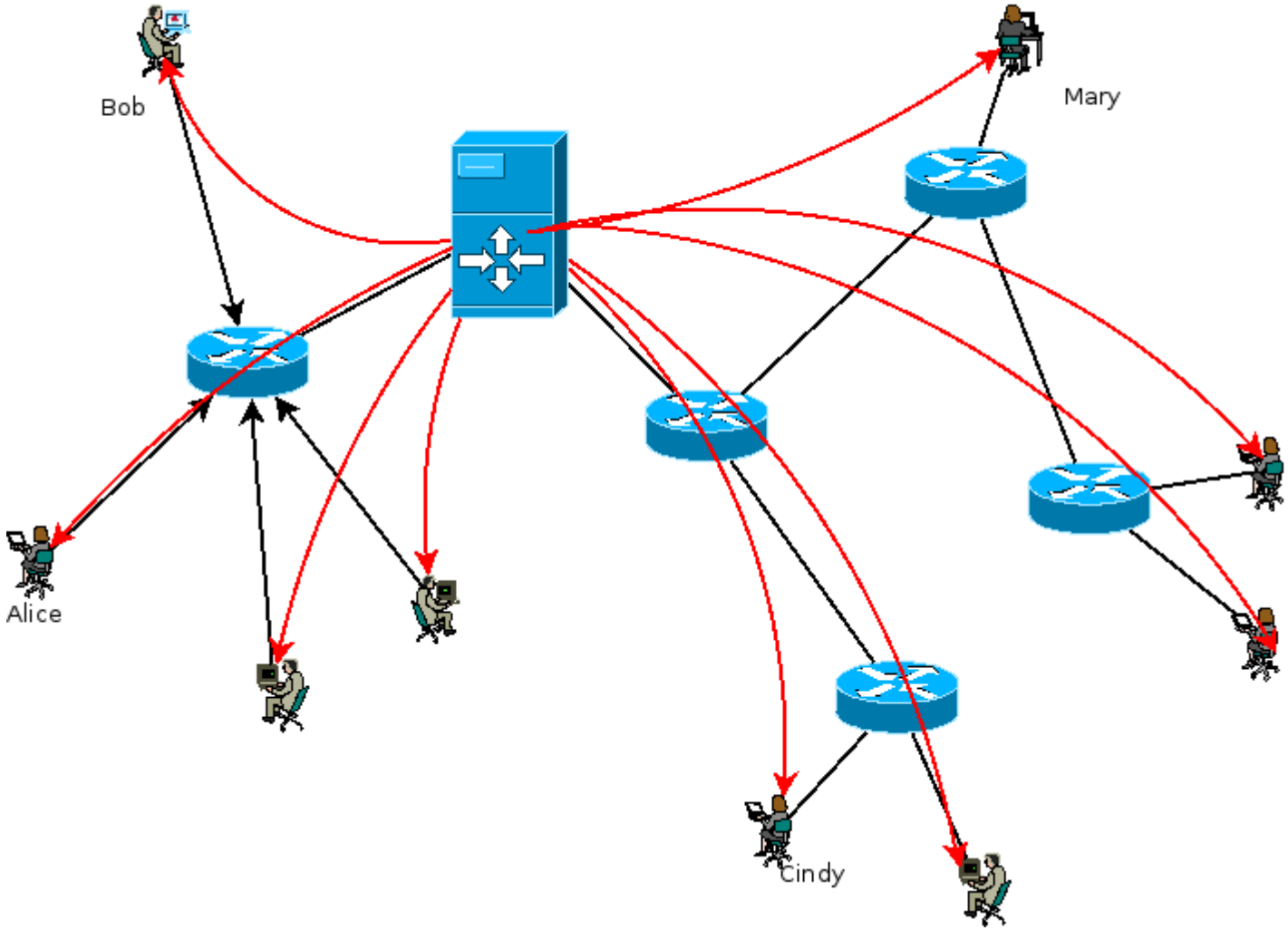
1. group chat
2. video conference



2. Background

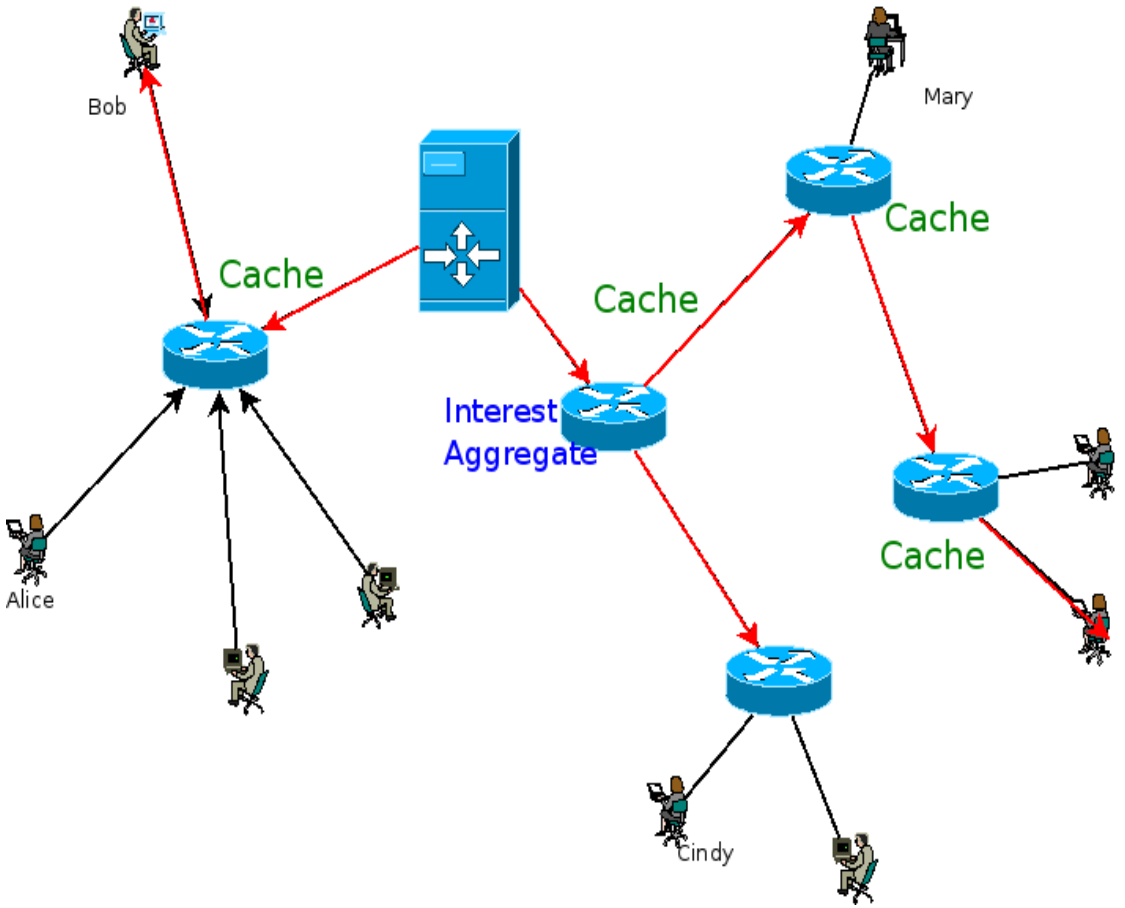
- Why this matters?
  - Traditional IP based Network

- Downsides:
  - Link Burden
  - overhead
  - Robust
  - Non Local



2. Background

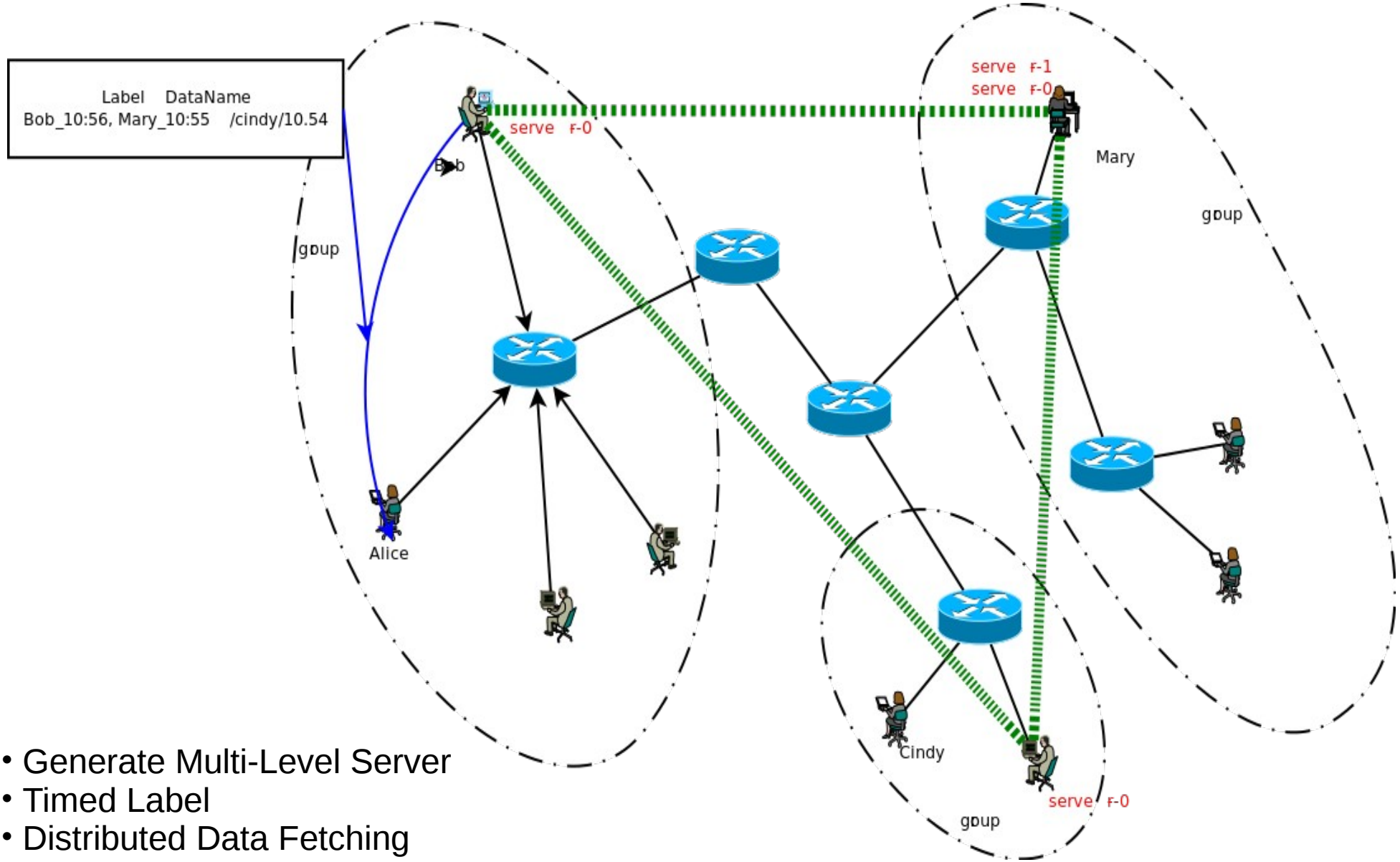
- What NDN brings to us?
  - Traditional IP based Network
  - Named Data Network
    - Cache
    - Interest Aggregate



3. Design

- 3.1 Overview
- 3.2 Server Generation
  - Anything New Interest
- 3.3 Data Structure
  - True Message(for distributed Fetching)
  - Record(Timed Label)
  - Record Container(Index of Record)
- 3.4 Synchronization
  - Anything New Interest
  - Something New Interest
  - Data Fetching Interest

3.1 Overview



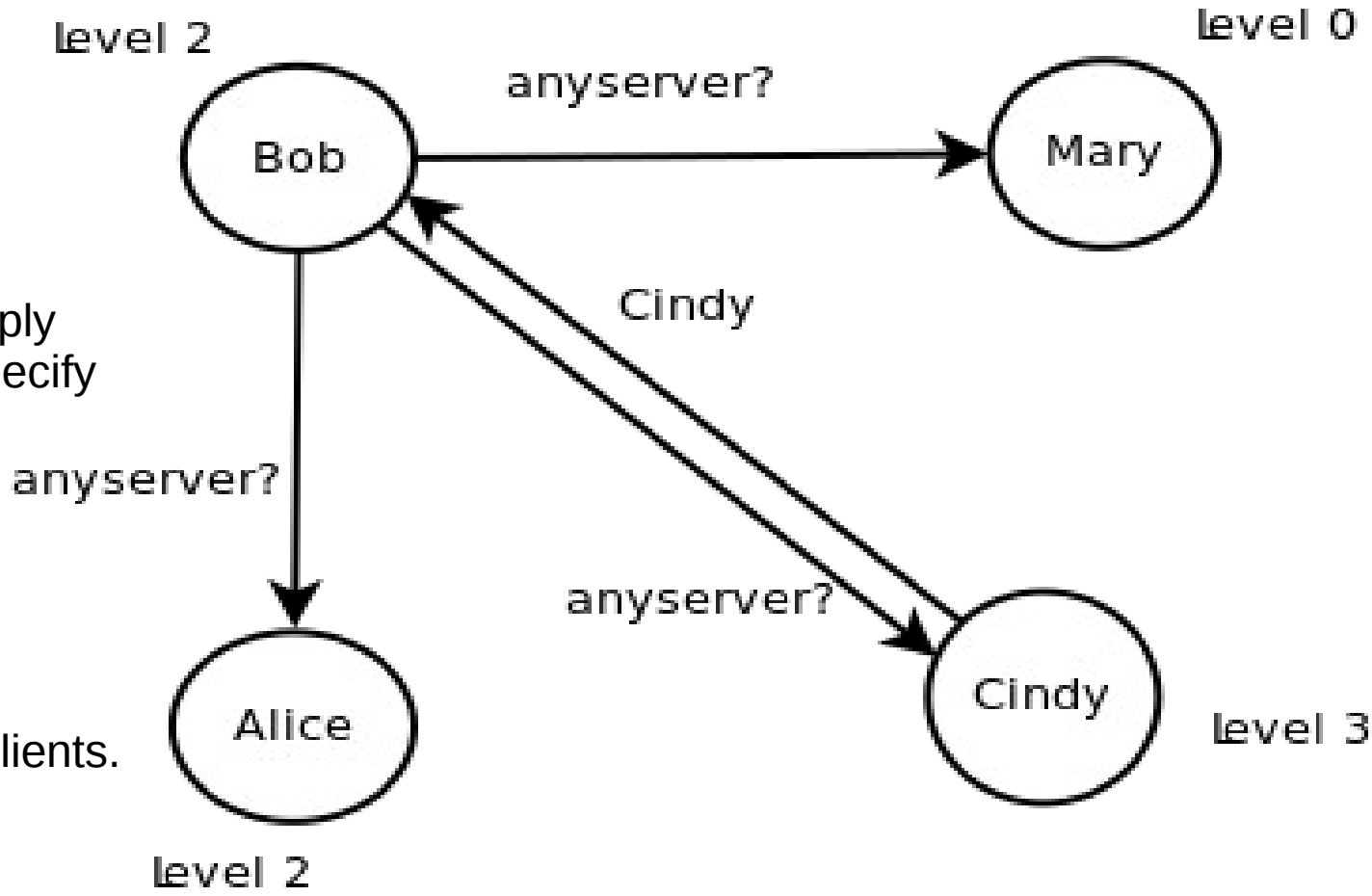
- Generate Multi-Level Server
- Timed Label
- Distributed Data Fetching

3.2 Server Generation

Alogorithm:

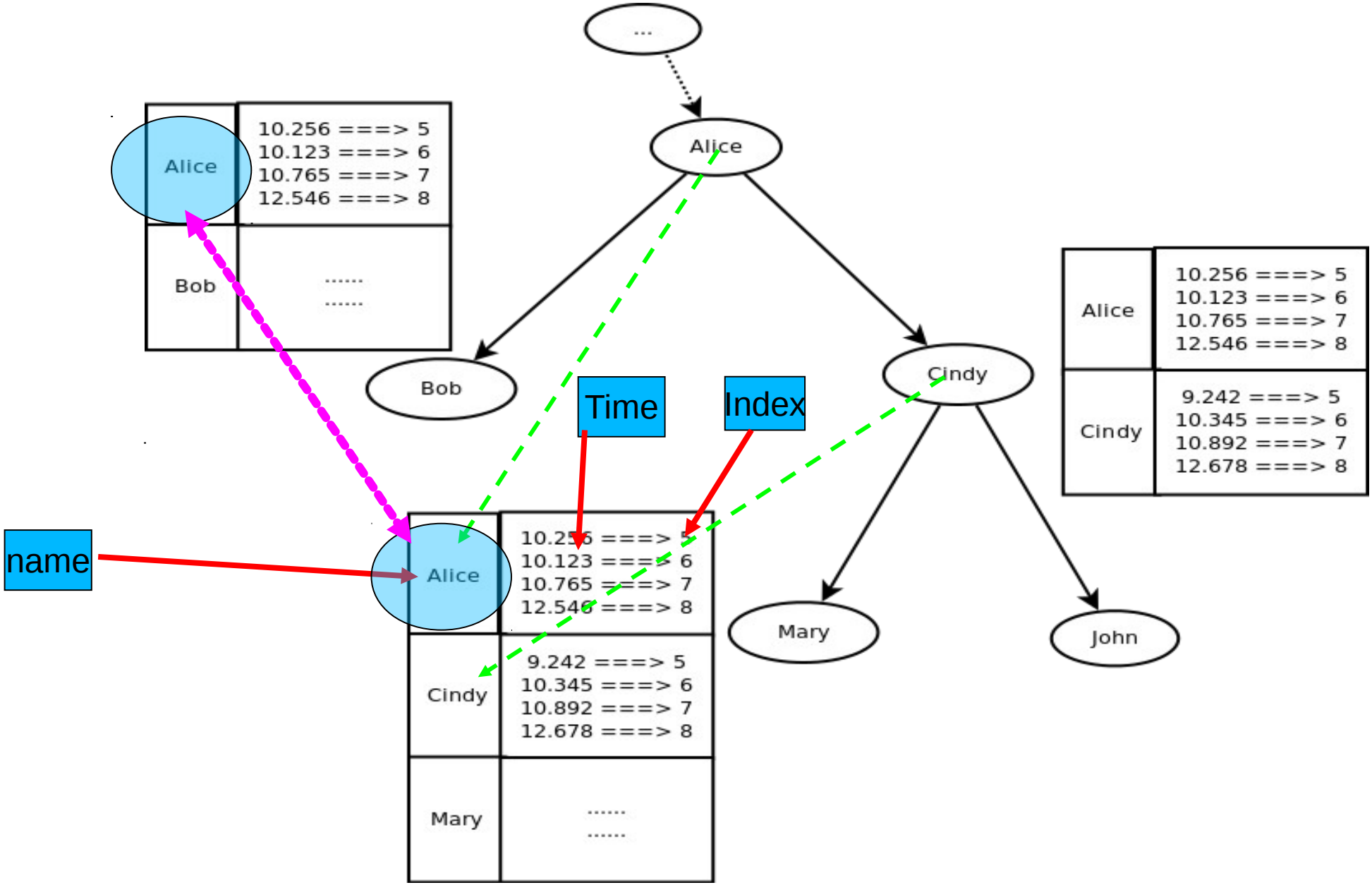
- Wait for random time
- Send Anyserver Request
  - Positive: set server
  - Negative: ready to reply
- Use different time-out to specify different levels.

- When a server fails:
  - Select one from his clients.

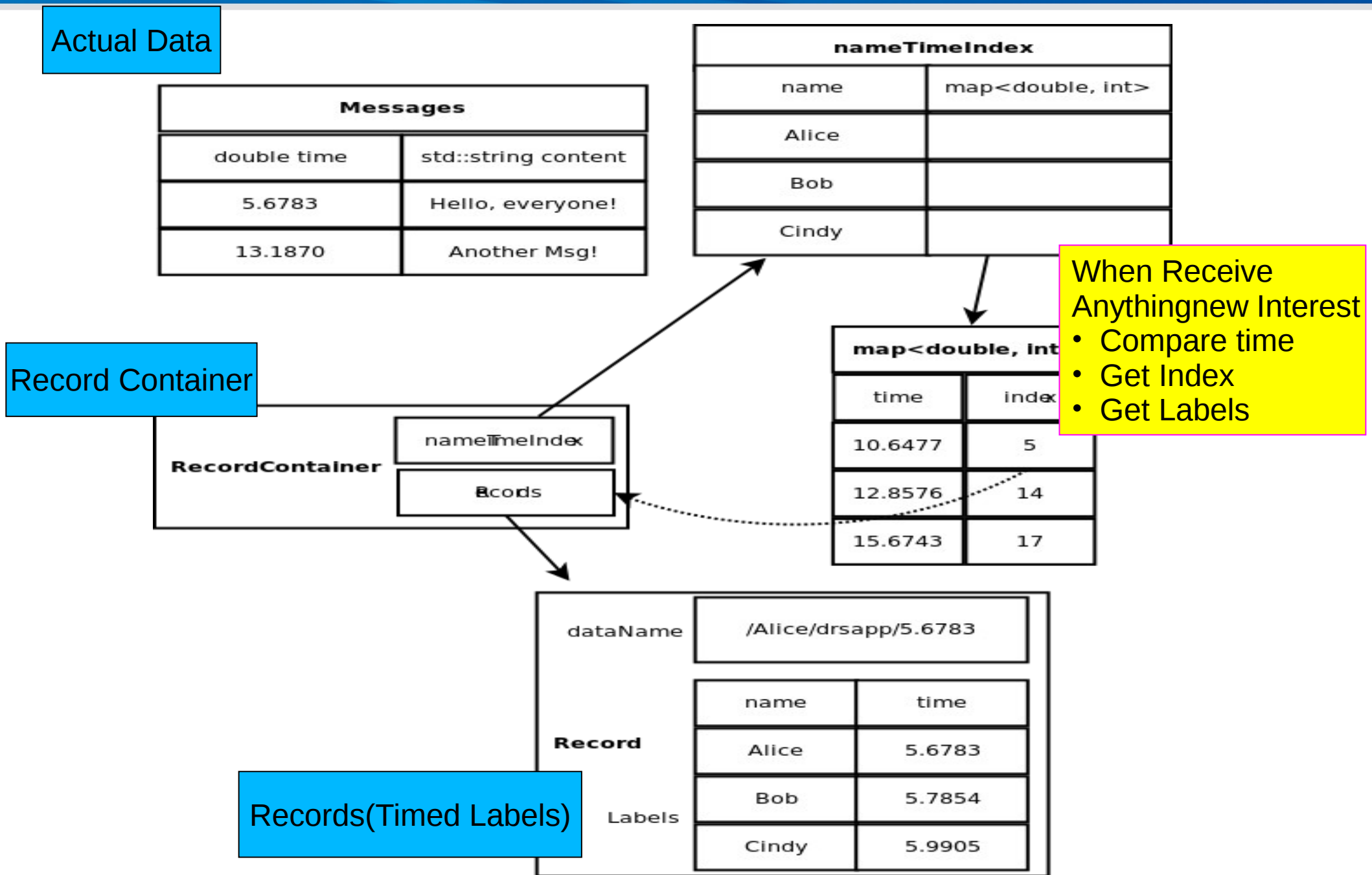


3.3 Data Structure

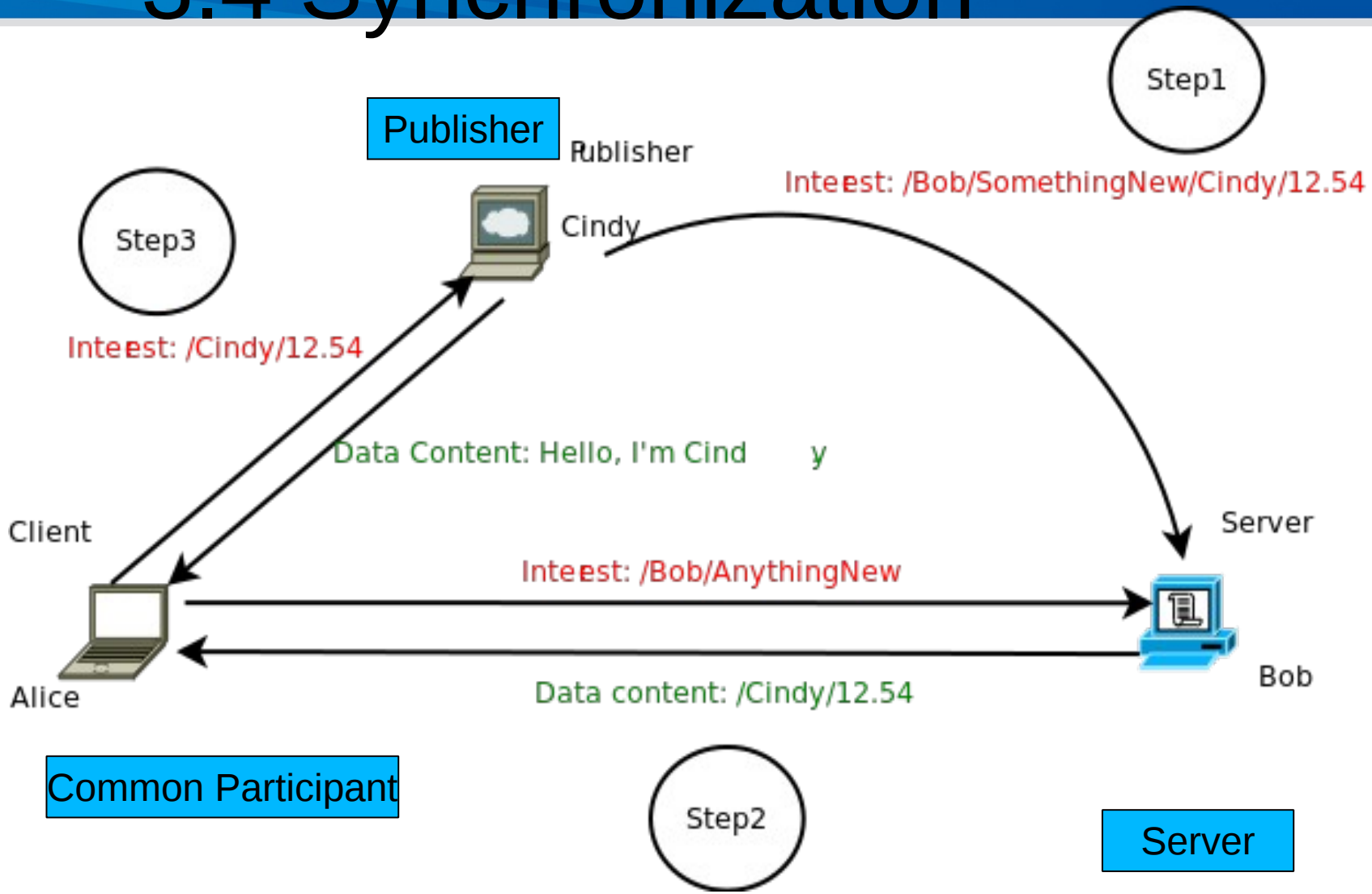
Timed Labels



3.3 Data Structure

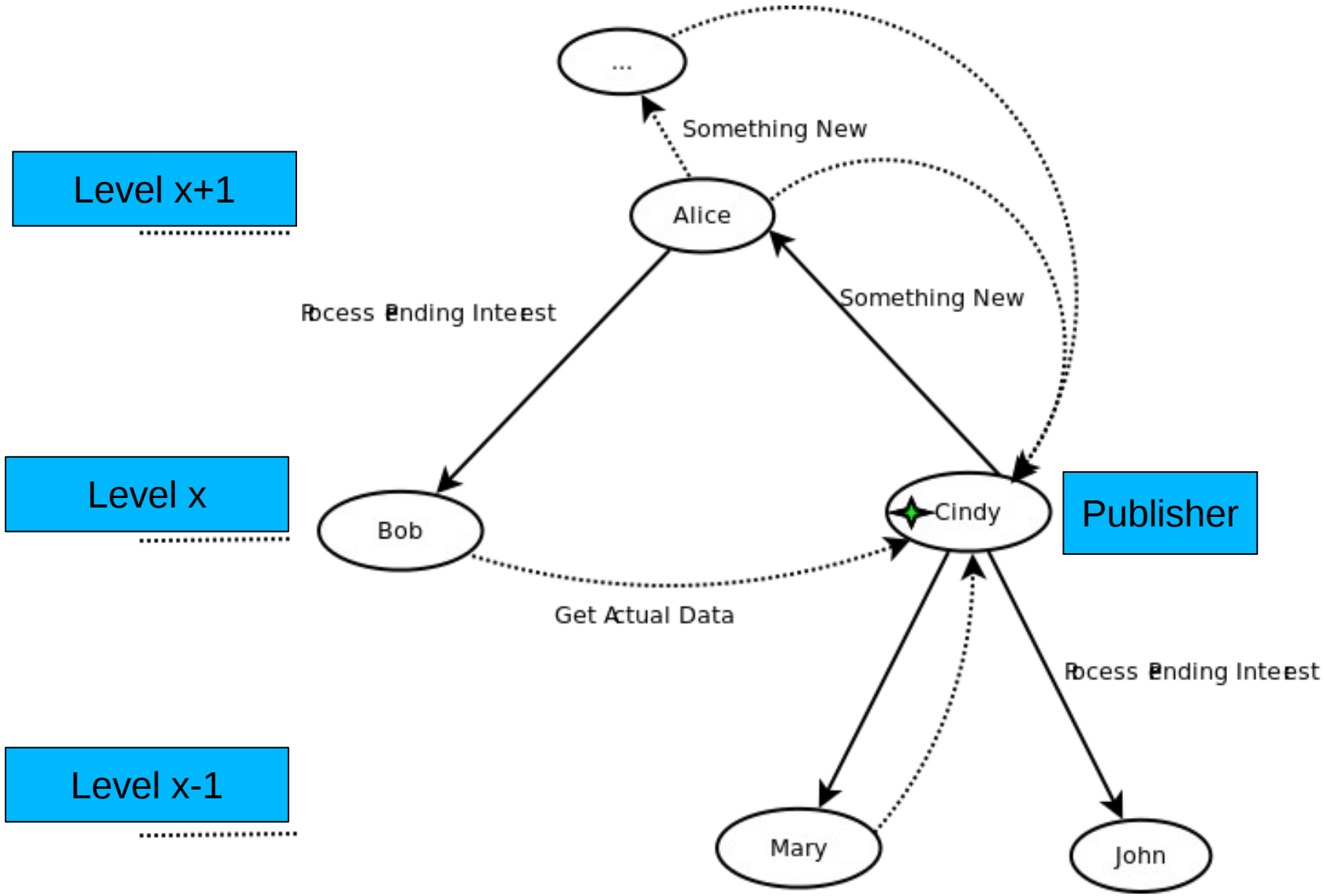


3.4 Synchronization



STEP1: Publisher to Server: Something New
STEP2: Server to Client: Satisfy Pending Interest
STEP3: Client to Publisher: Distributed Data Fetching

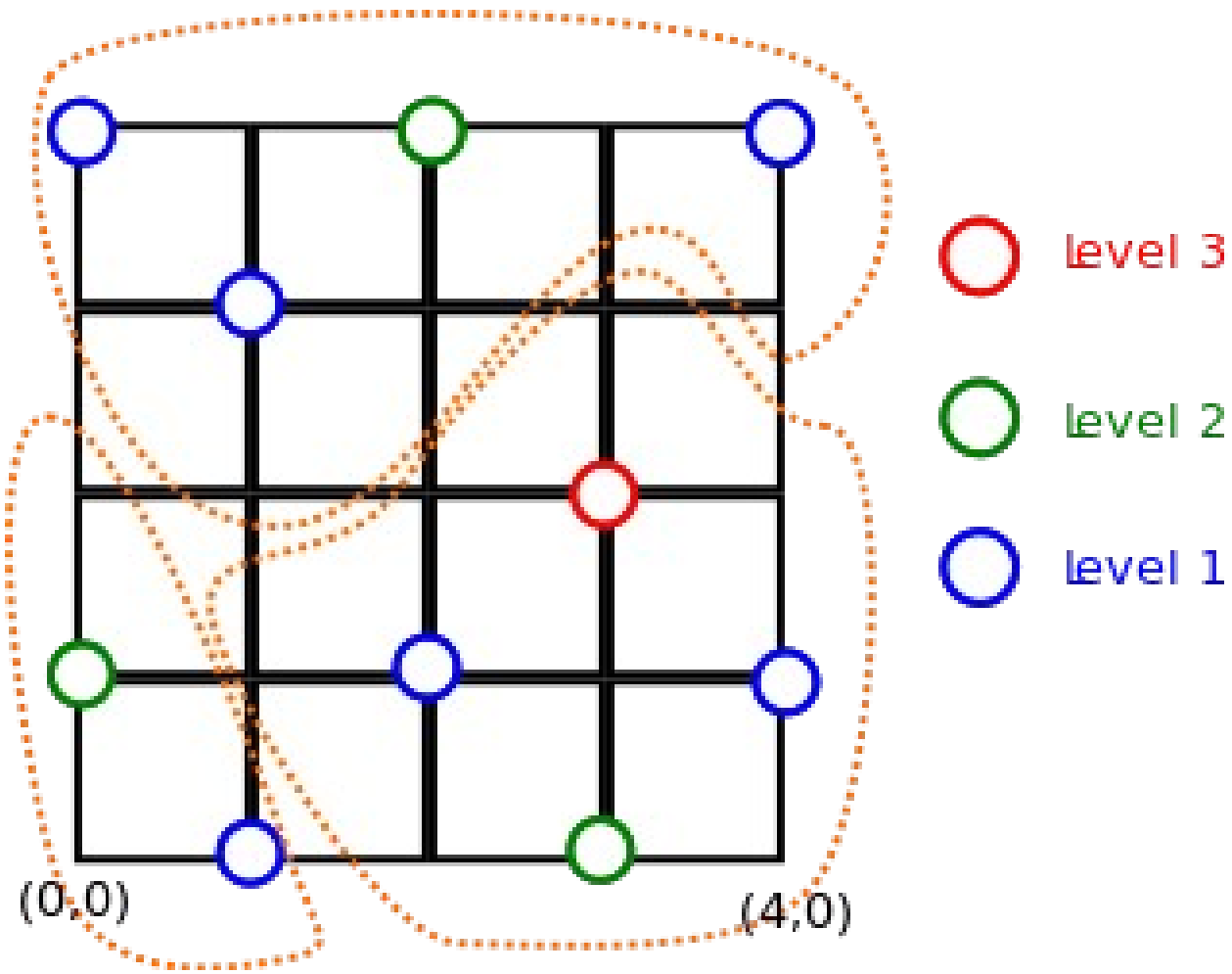
3.4. Synchronization--Multi-Level



4. Evaluation
Topology && Server Generation

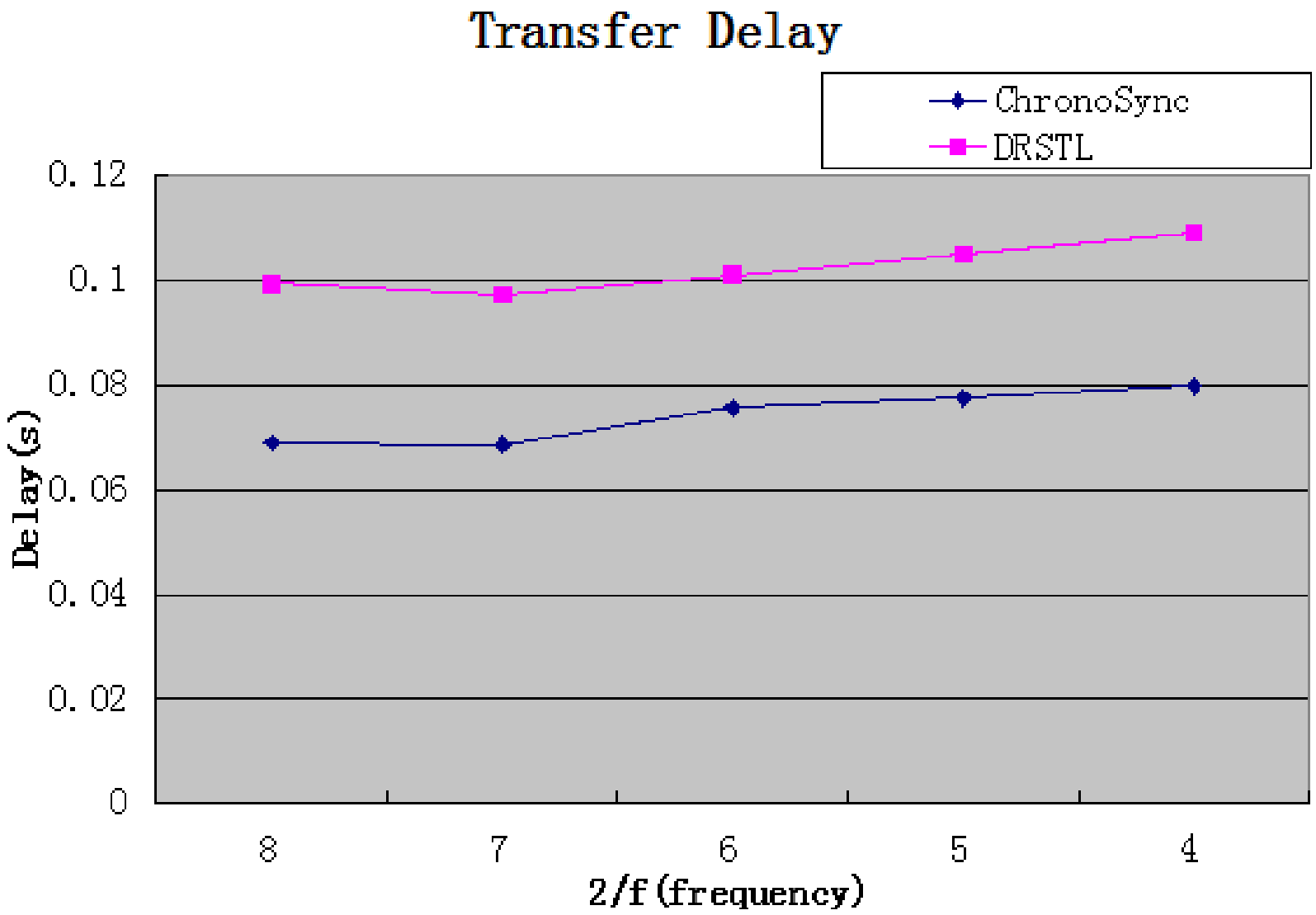
TOPOLOGY:
- 5x5 grid topology.
- Every node contains a participant.

Function Correctness:
- Server Generated as expect.
- All participant received all Data.



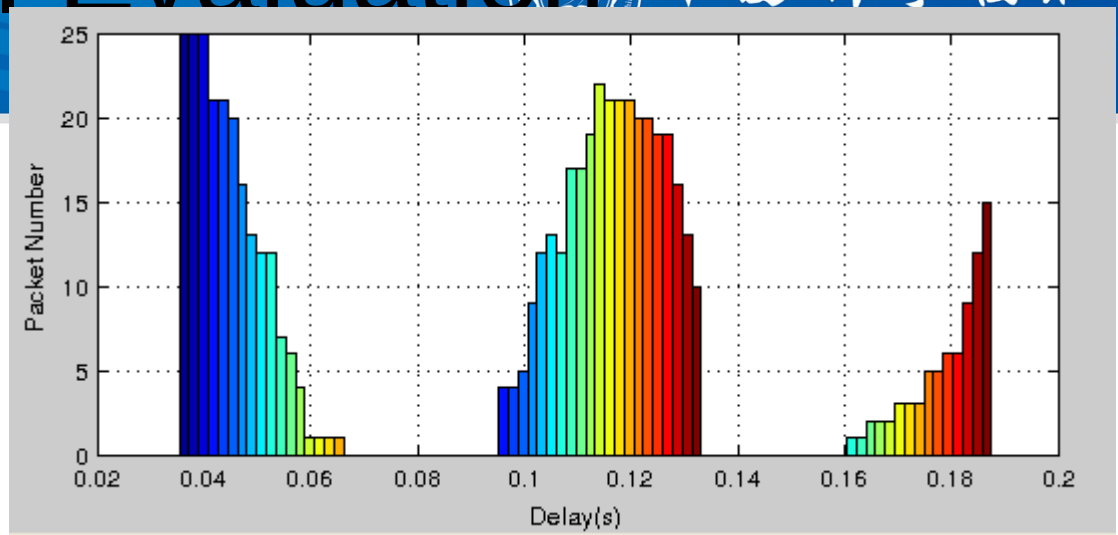
4. Evaluation

Zhu, Z., & Afanasyev, A. (2013). Lets ChronoSync: Decentralized Dataset State Synchronization in Named Data Networking. In Proceedings of the 21st IEEE International Conference on Network Protocols(ICNP 2013)

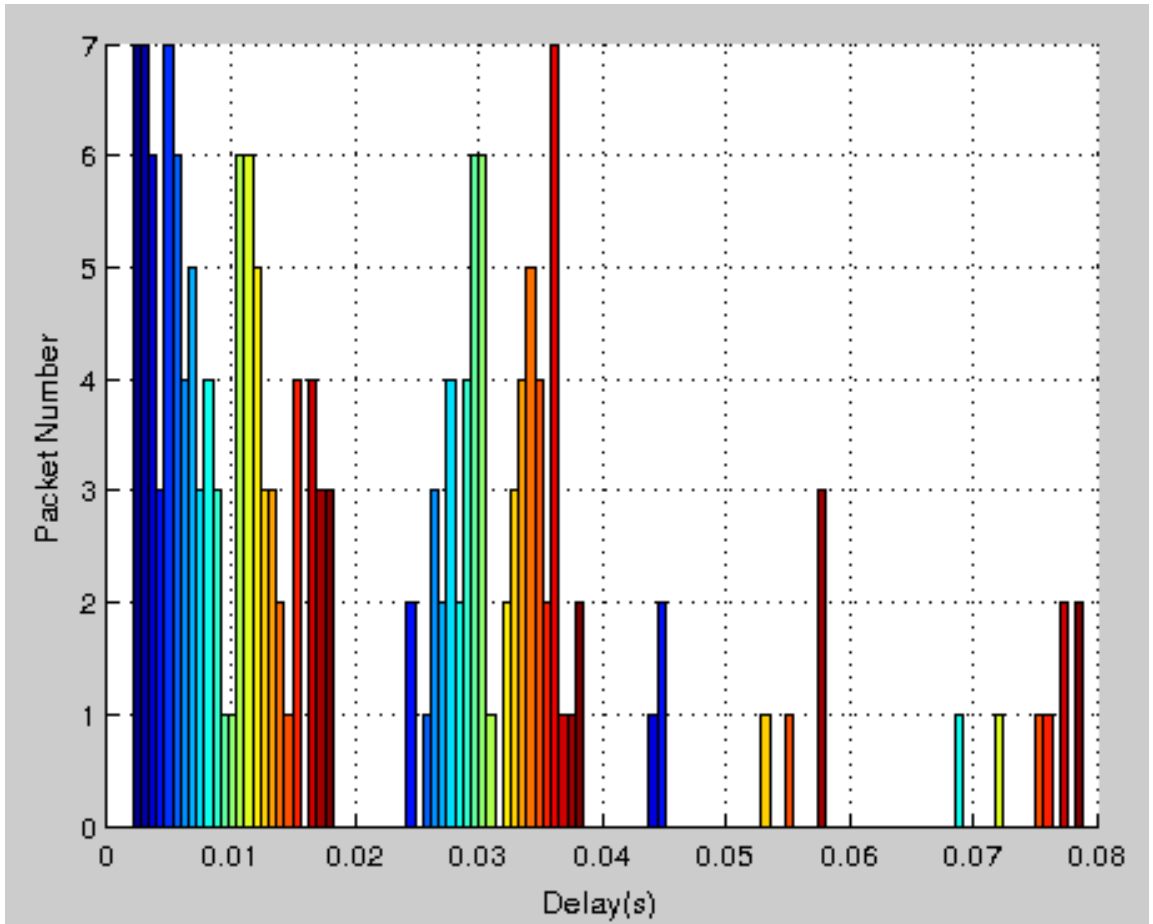


4. Evaluation

Total Delay
(Control Message + Data Fetching)



Data Fetching Delay

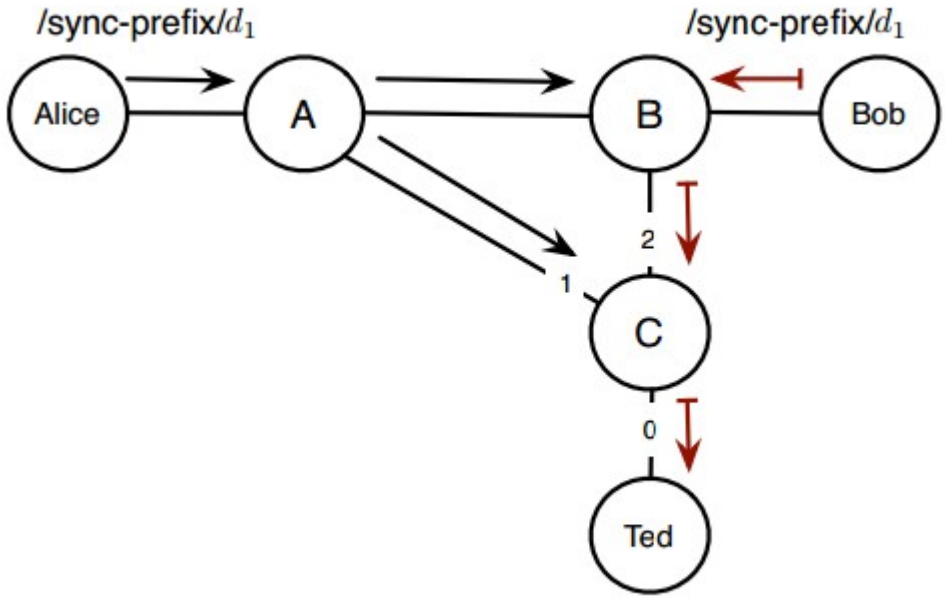


ChronoSync's Fatal Downside

When Simultaneous Happens:

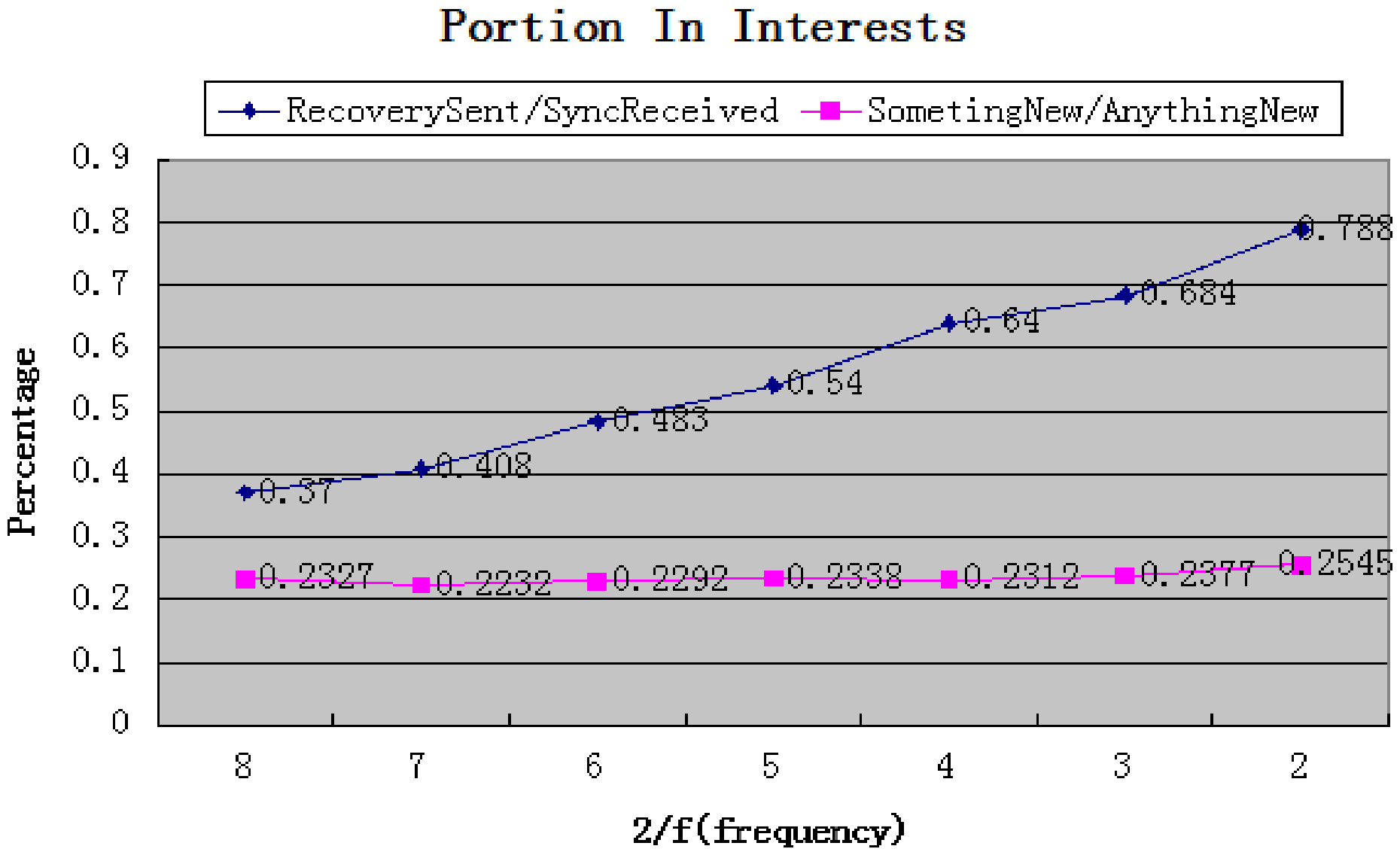
- Only one will get to the receiver!
- They are divided to different groups
- Recovery Interest has to be sent

It is a fully distributed protocol.
Lack of Control Ability

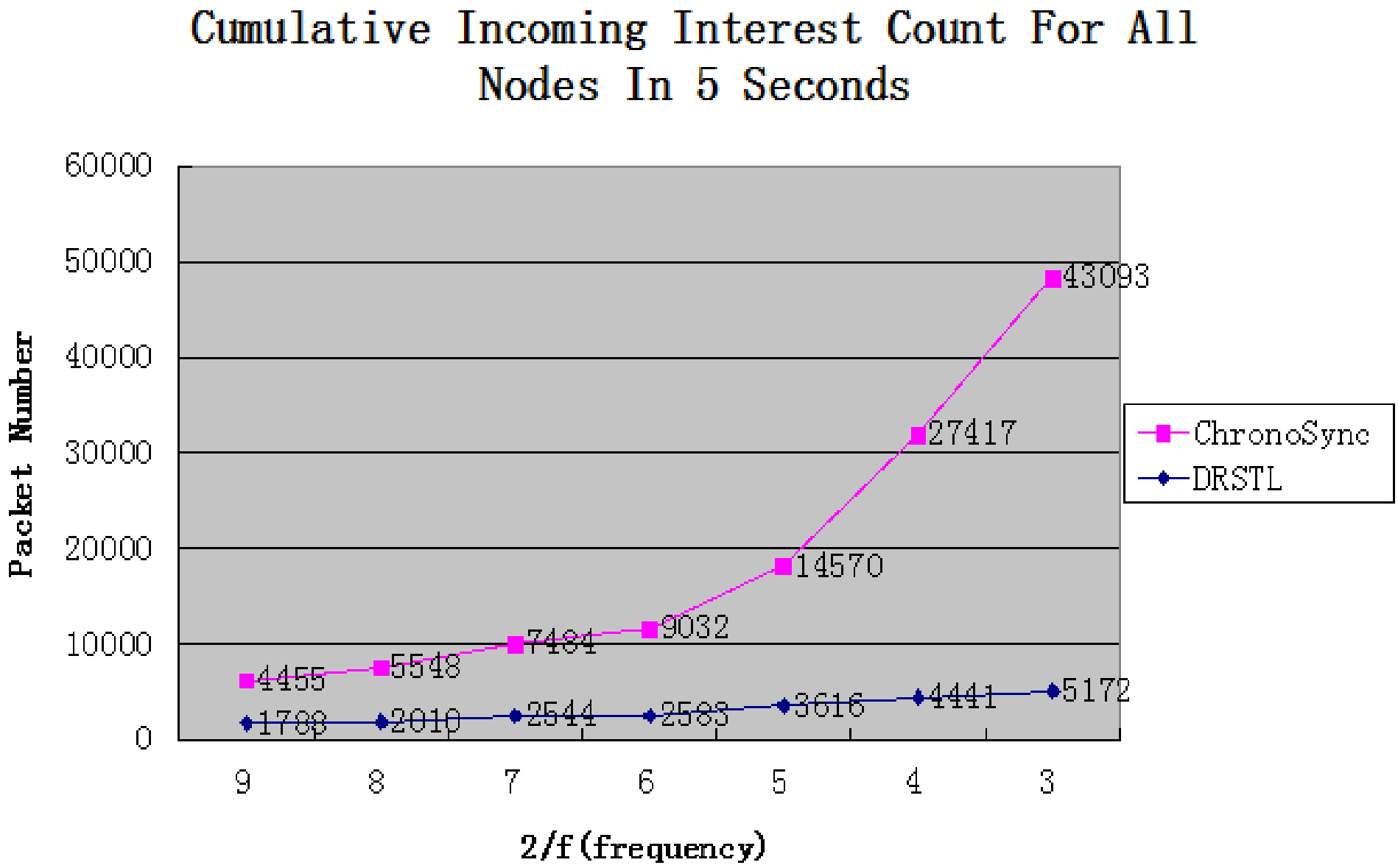


. 6: An example of simultaneous data generation

4. Evaluation



4. Evaluation



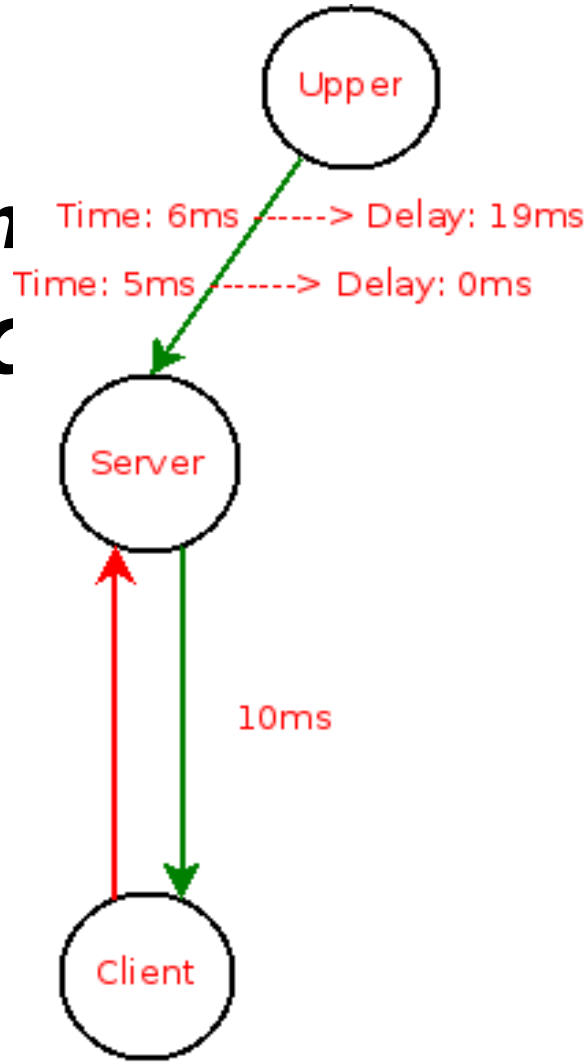
5. Future Work
--- Inter-Level Delay

- Why delay increases when frequency increases

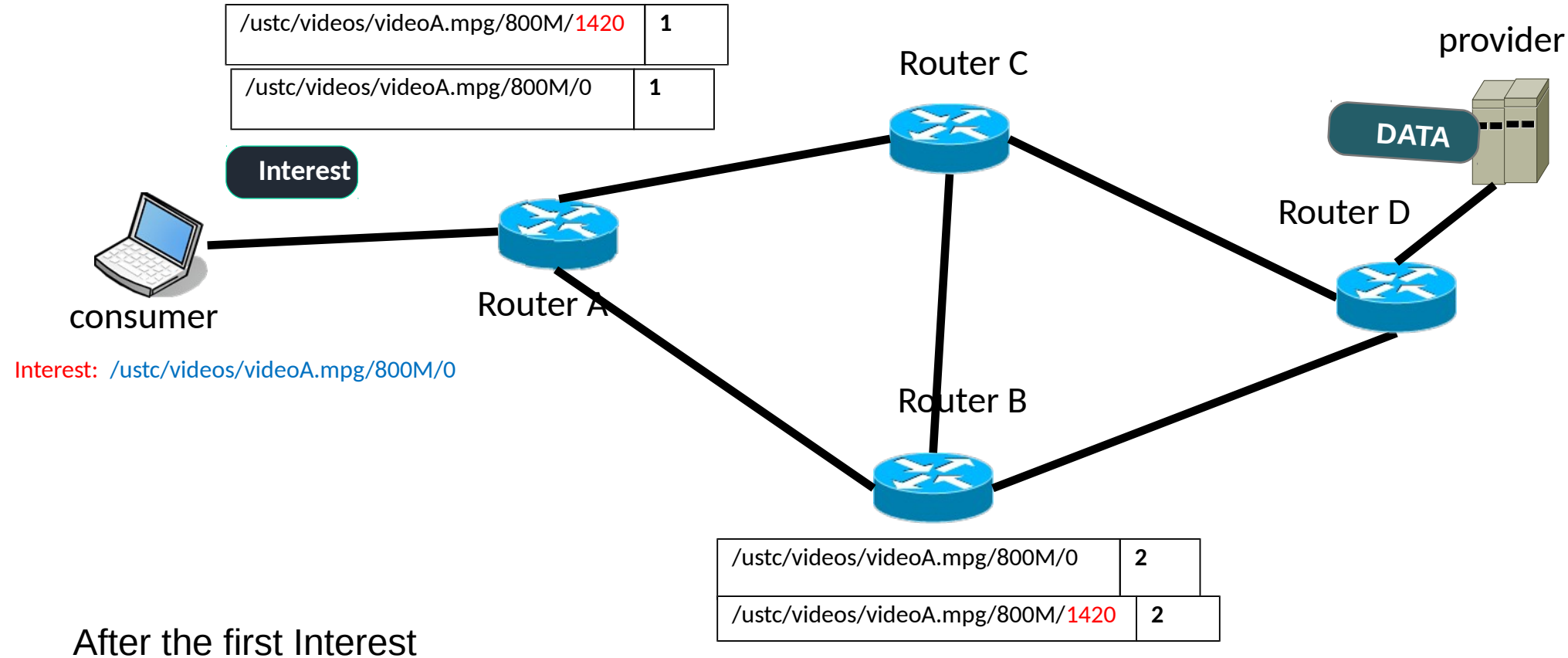
- Desired Solution:

  ❖ ***A Novel Flow-based Contin***

Data Replying Mechanism in IC



A Novel Flow-based Continuous Data Replying Mechanism in ICN



Interest: /ustc/videos/videoA.mpg/800M/0

After the first Interest

- the consumer is **ready for receiving many data**
- The Provider is will **continuously put data**
- Routers will hold on the record, and **forward every data back**

5. Future Work
--- Server Generation Algorithm

- Best fit for every given topology
- Robust
- Infrastructure
  - ❖ A controler who holds information of the whole topology. Like SDN.