

# Updated Bloom Filter based NRS for ICN

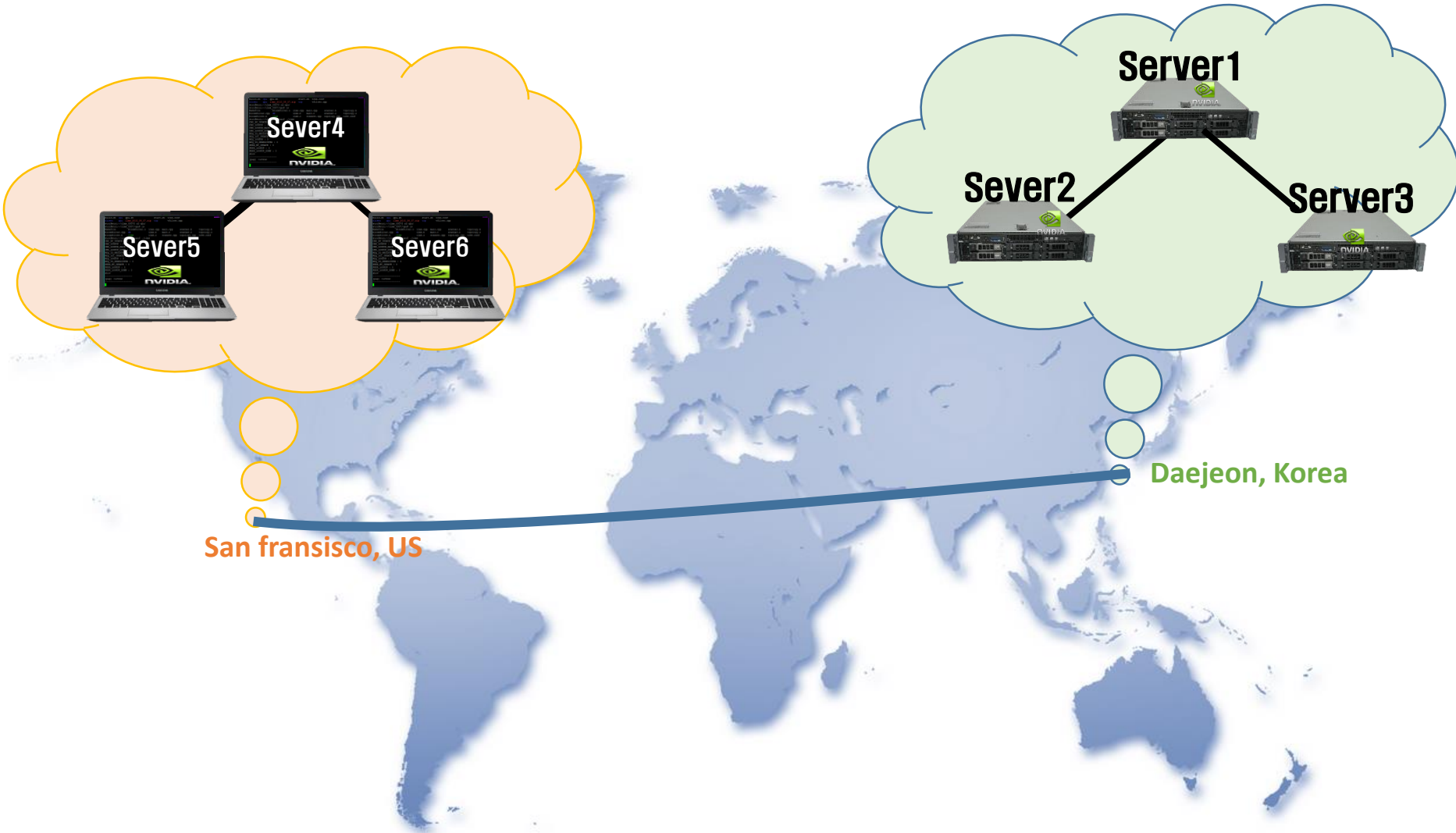
**ICNRG, Yokohama**

**Jungha Hong, Woojik Chun, and Heeyoung Jung**  
November 5, 2015

# Contents

- B-NRS implementation updates since last meeting
  - BF Refresh
    - Alternative way of BF update for name deletion
  - Retransmission
    - Communication error occurs such as server shut-down, packet loss, etc.
- Discussion on NRS (or B-NRS) as a working item
- Name based web browser for ICN
  - Introduction of our implementation

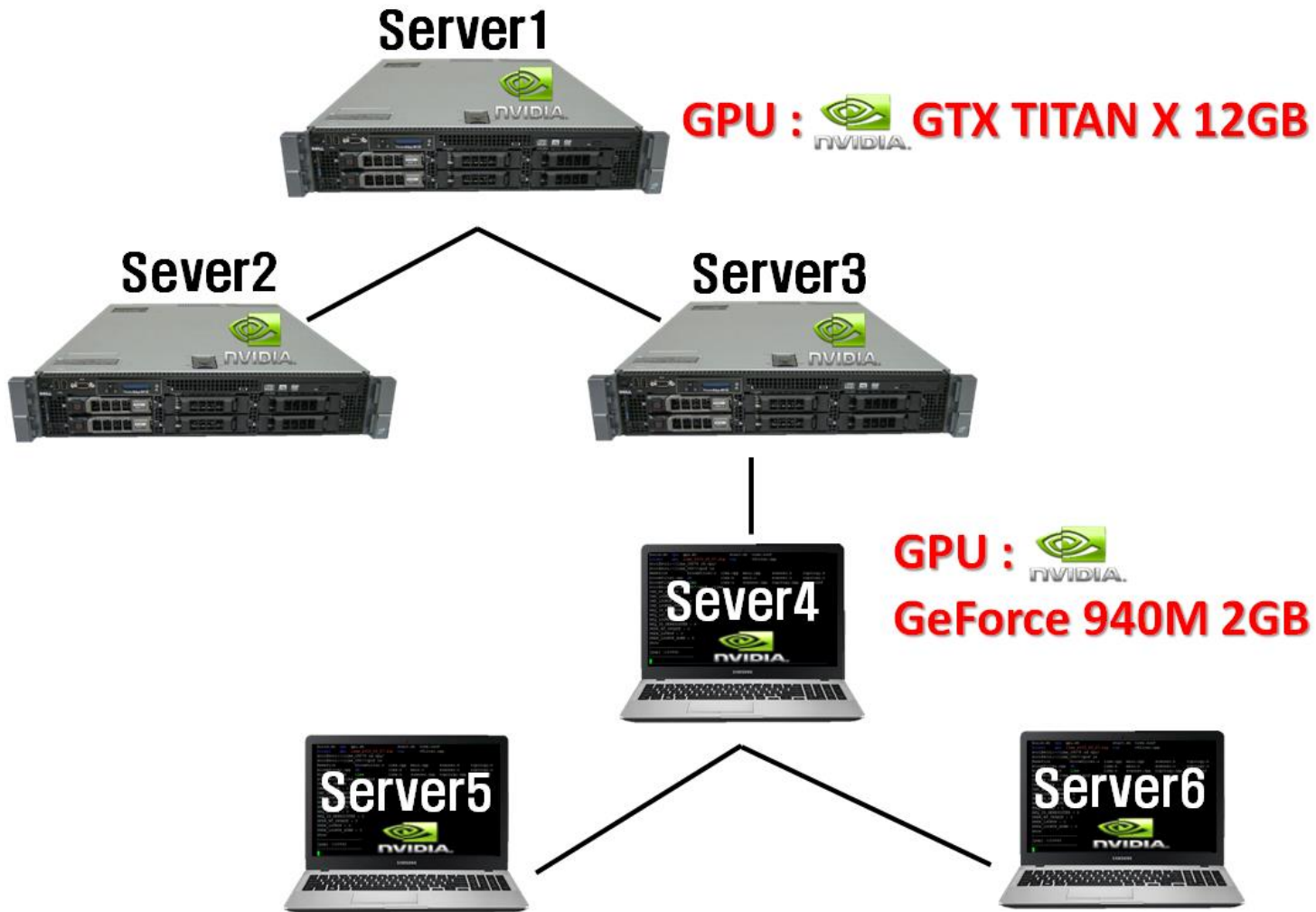
# B-NRS demo at ACM ICN 2015



San francisco, US

Daejeon, Korea

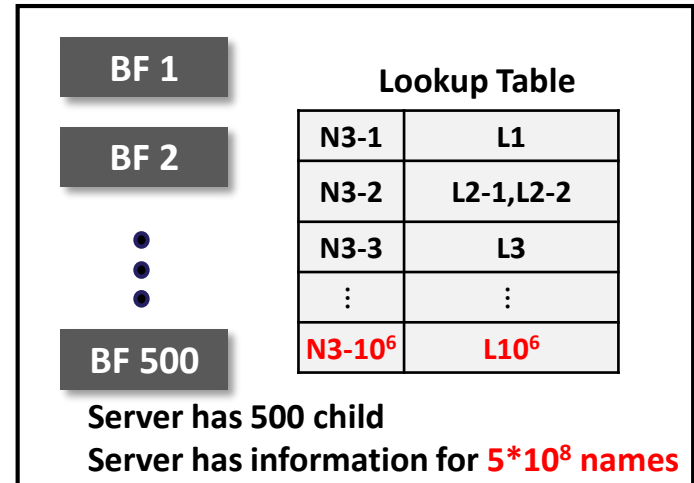
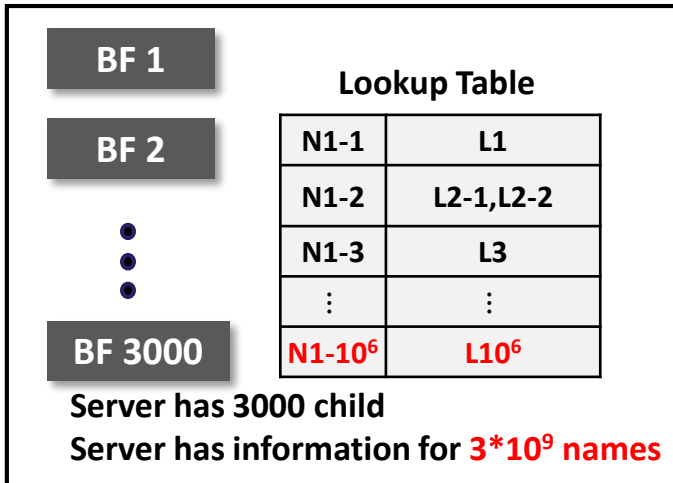
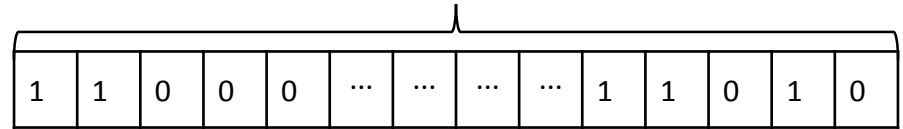
# Configuration



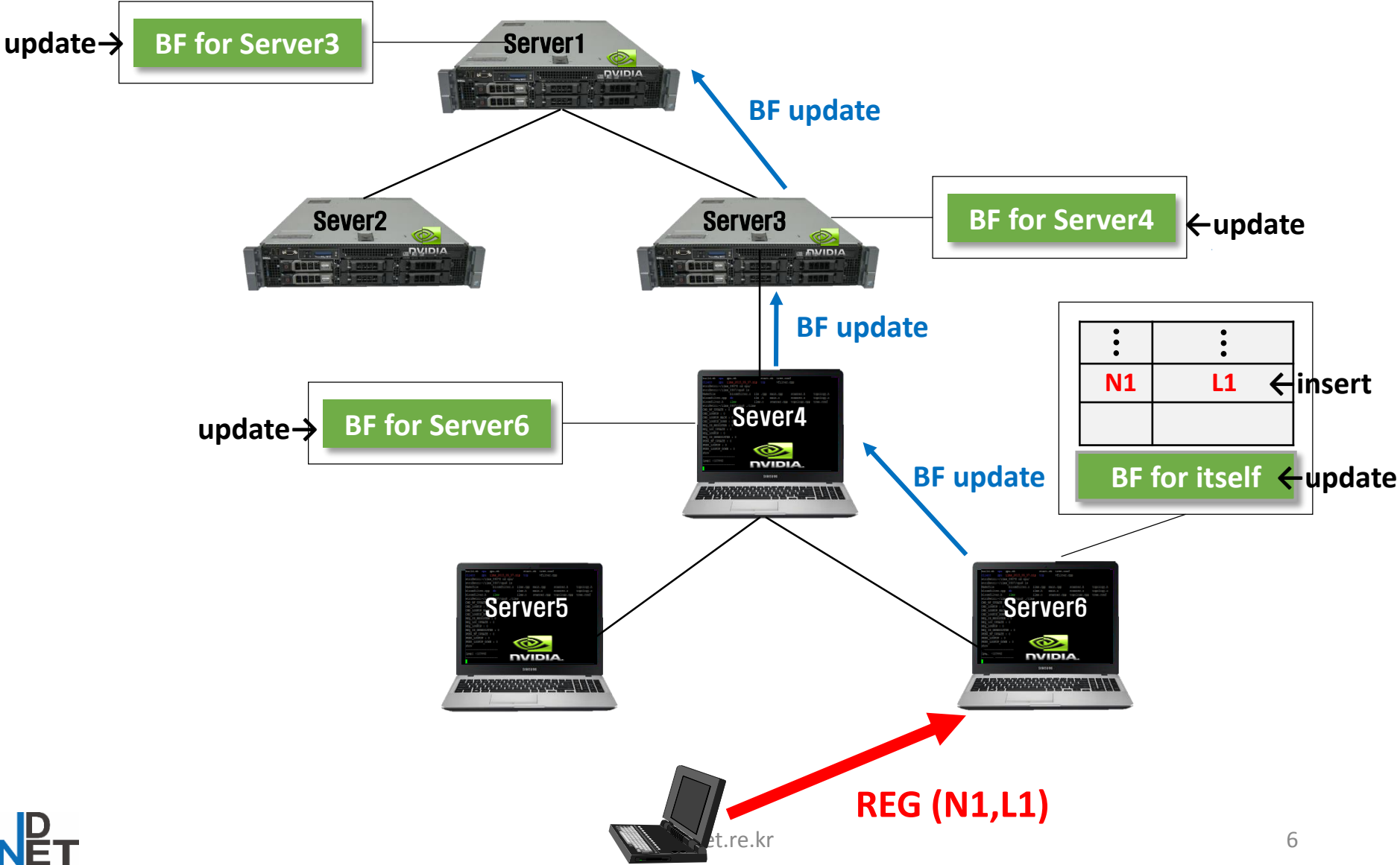
# Setup

- Name : 24 byte flat name
- Locator : variable length string
- Number of hash functions : 11
- False positive probability  $\leq 4.586 * 10^{-4}$

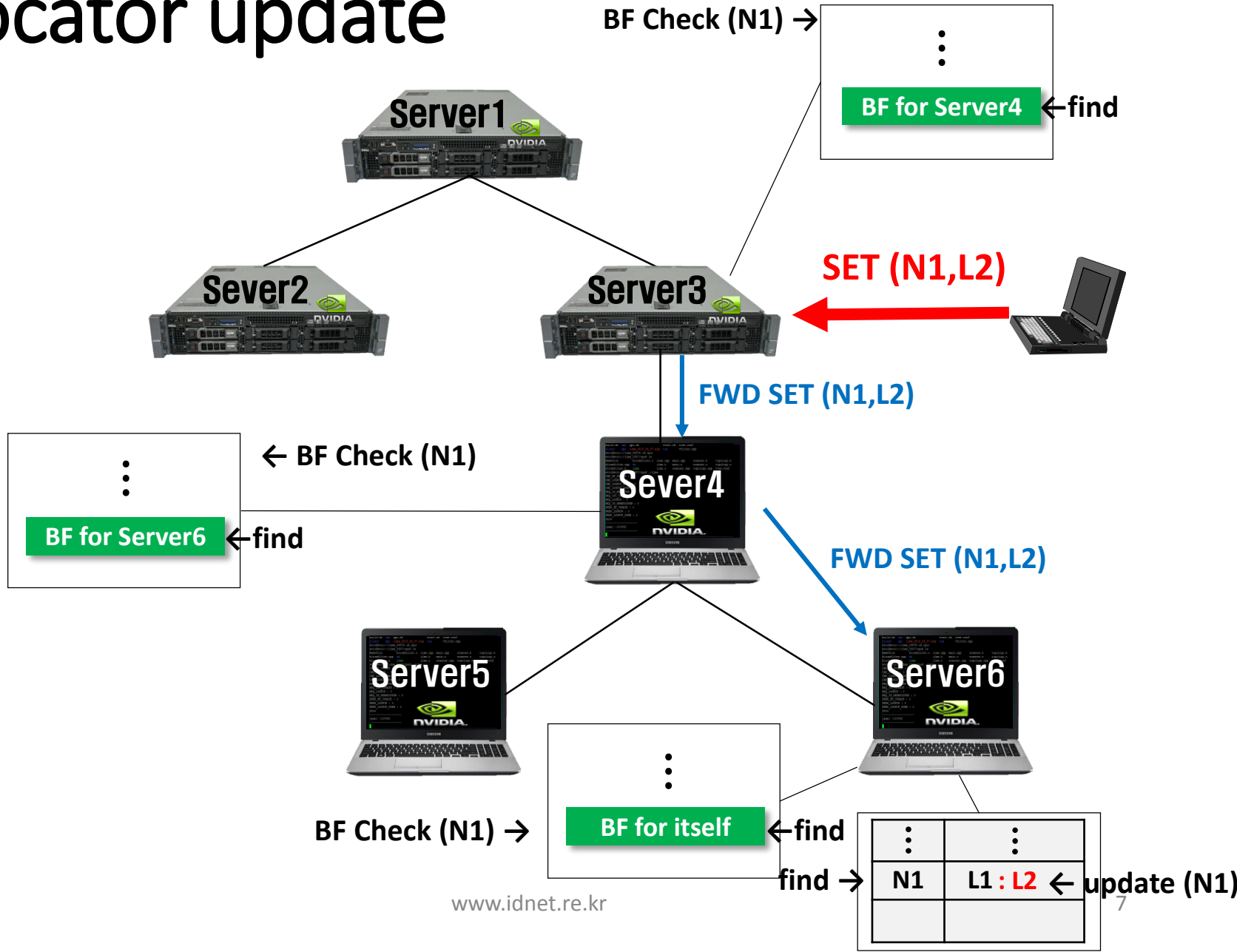
Bloom Filter (BF) : **2MB**



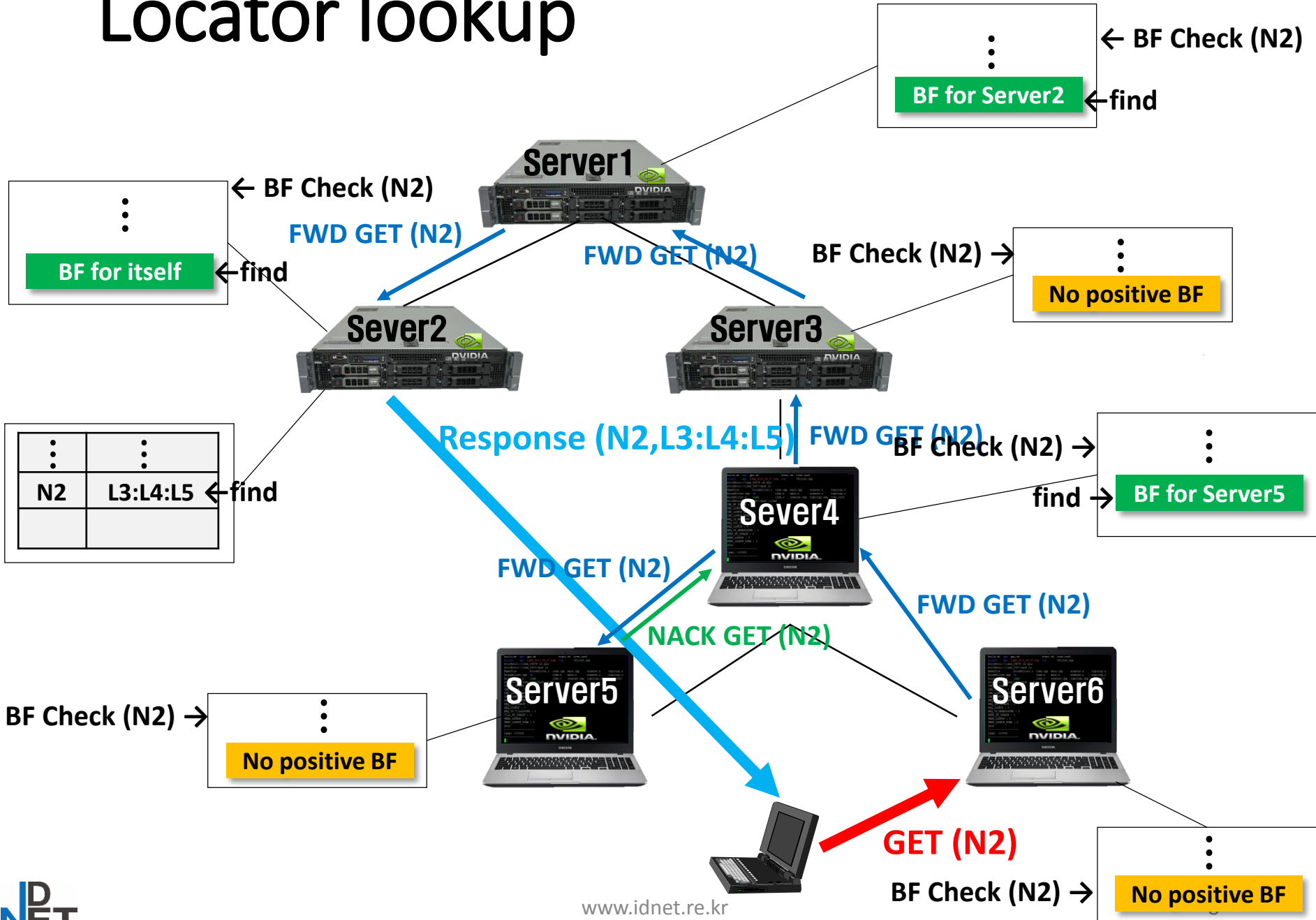
# Registration



# Locator update

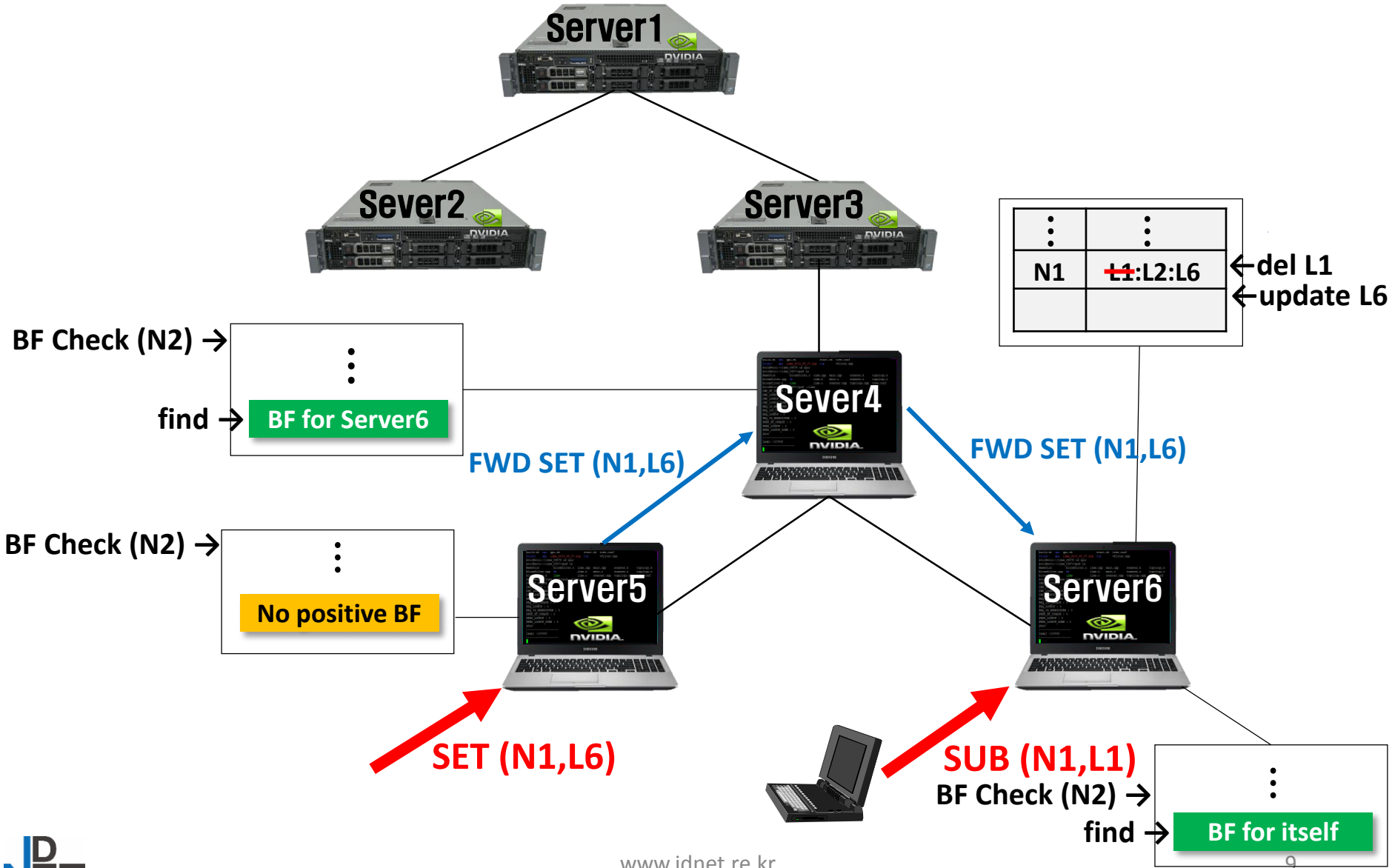


# Locator lookup

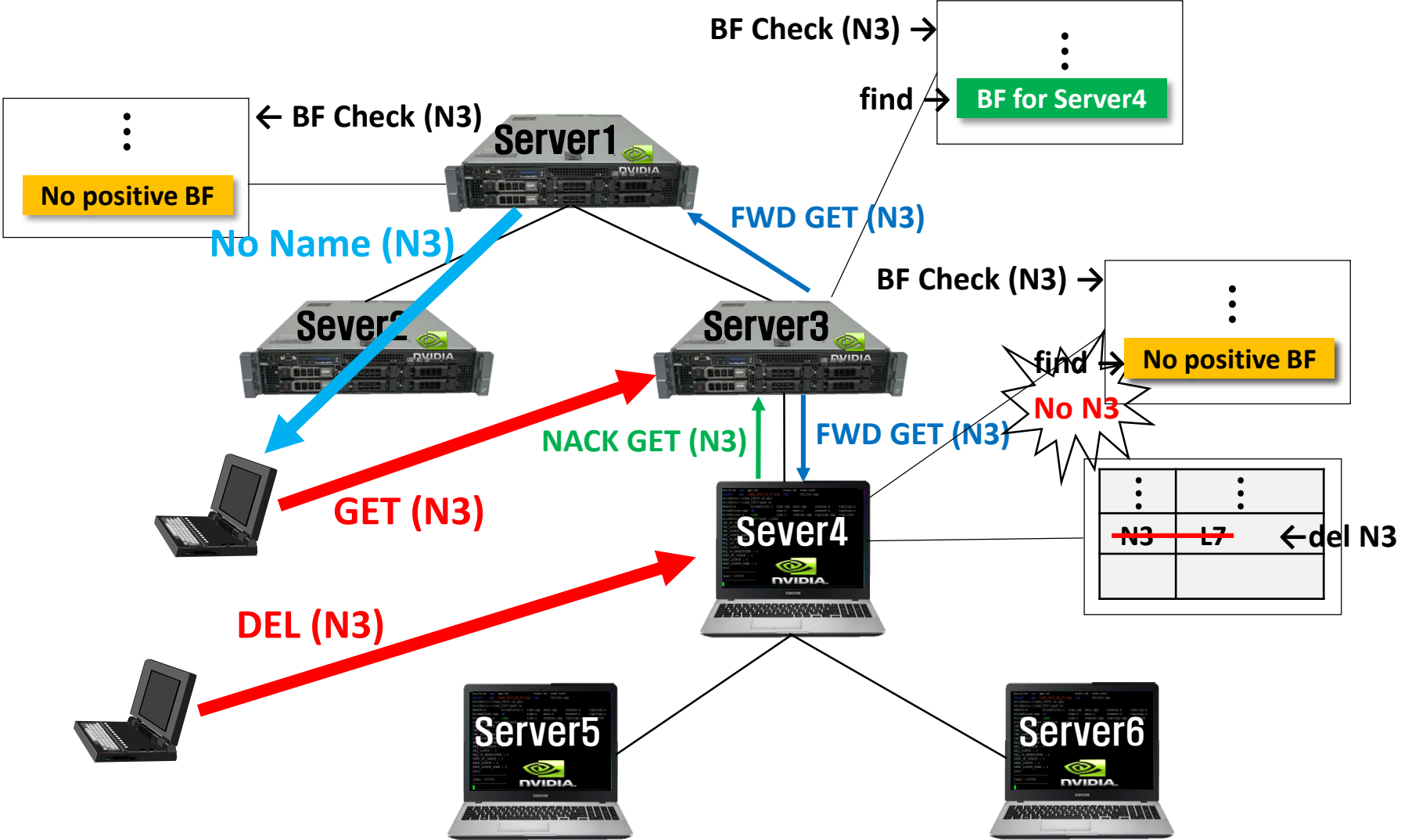




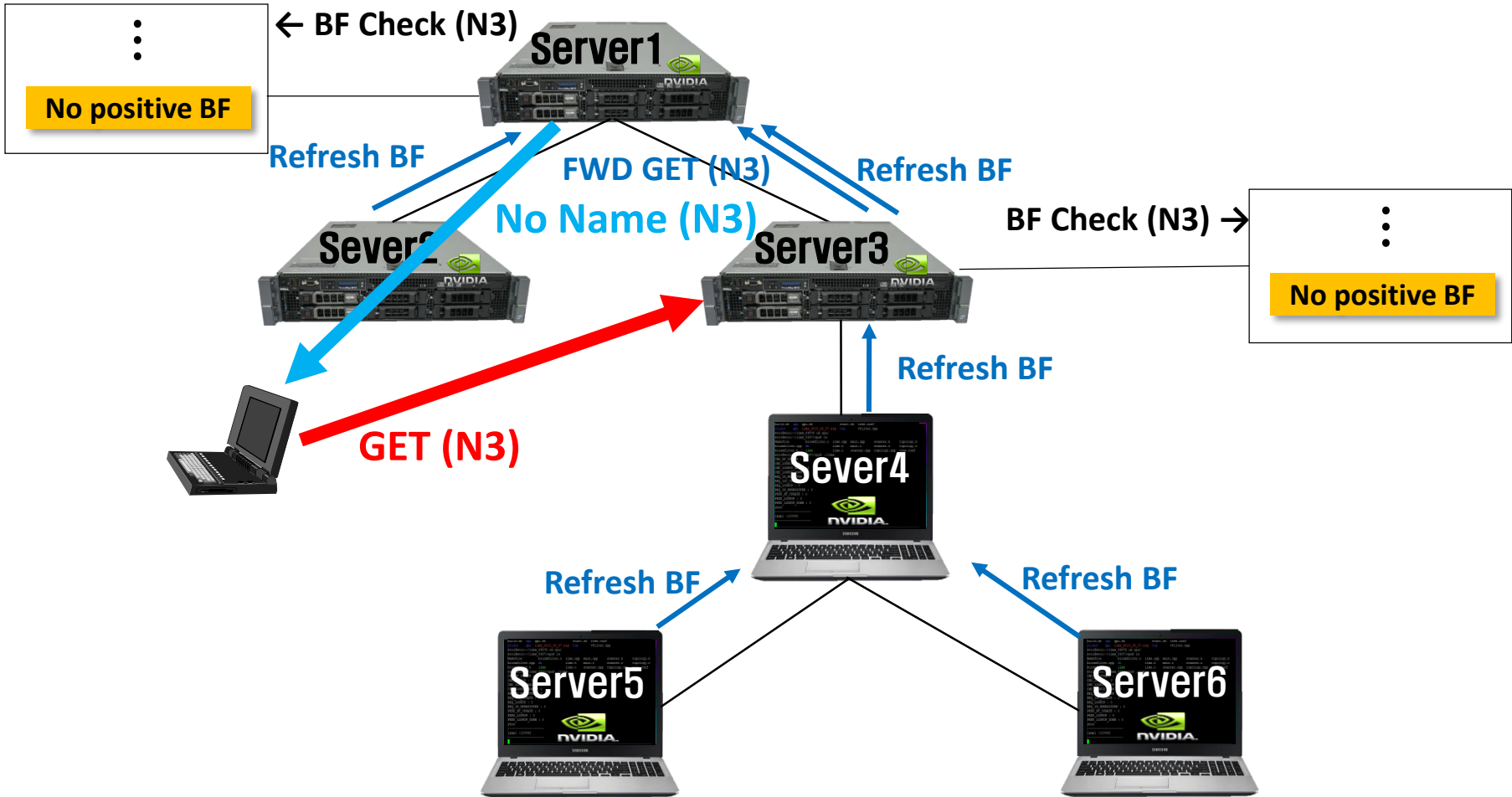
# Mobility support



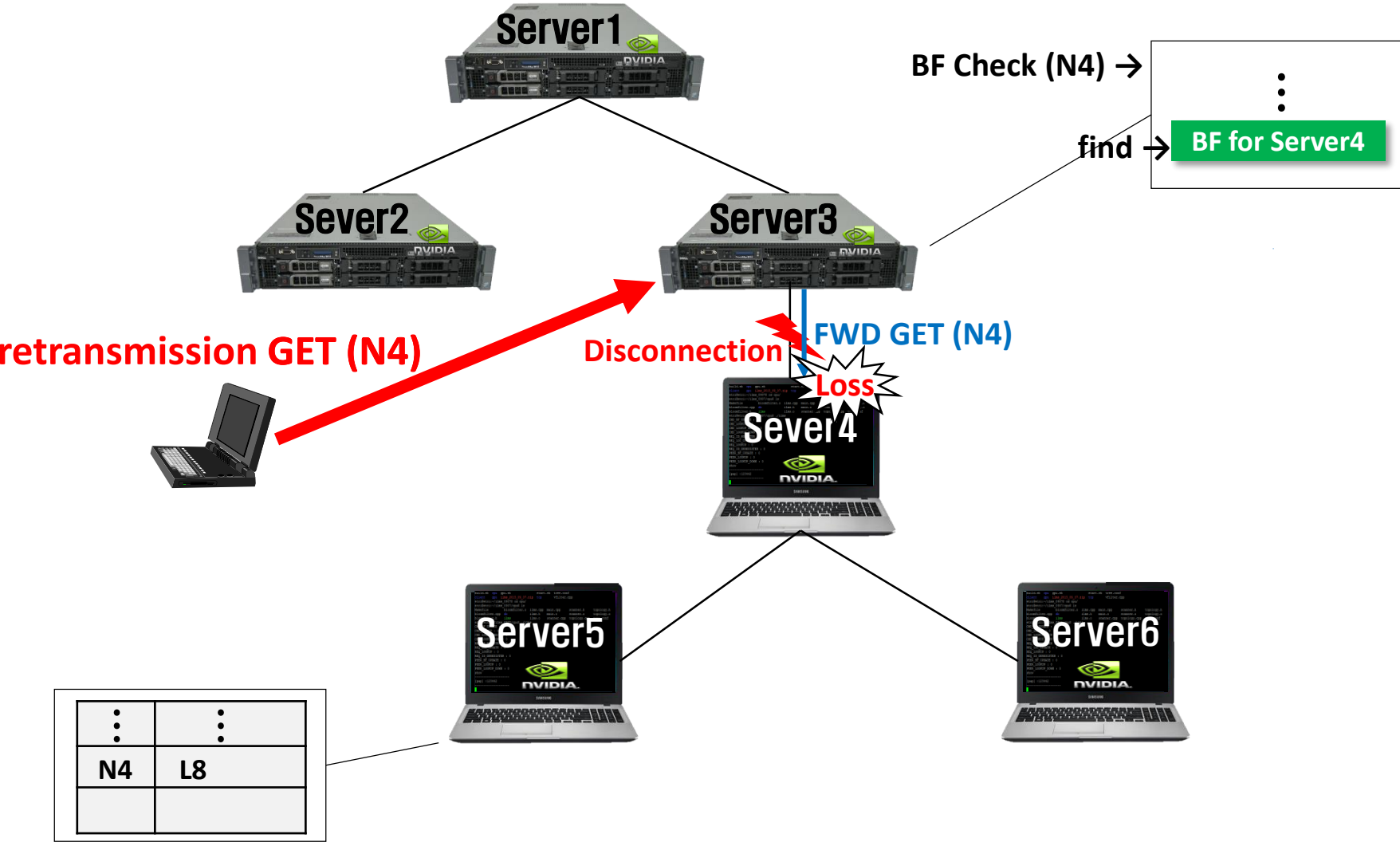
# Deregistration



# Refresh

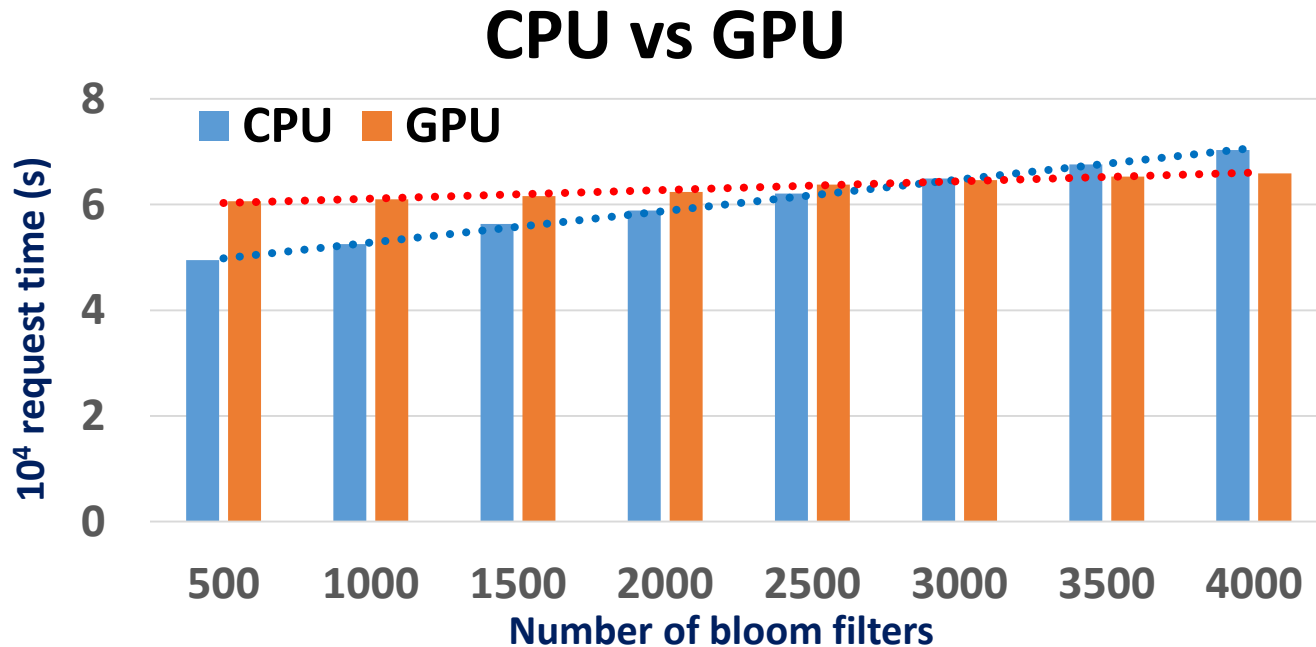


# Server Disconnection



# Experimental Results with GPU (1)

Number of BFs	500	1000	1500	2000	2500	3000
Total BF search time ( $\mu s$ )	40	42	38	39	43	41
Number of names inserted in a BF	$10^3$	$10^4$	$5 \cdot 10^4$	$10^5$	$5 \cdot 10^5$	$10^6$
A BF search time ( $\mu s$ )	45	46	44	47	45	46



# Experimental Results (2)

- Scalability
  - BF search time with GPU assisted implementation is almost constant independently of the number of names and BFs
- Low latency
  - Using GPU improves the latency compared to CPU
- Locality
  - Name can be registered in any B-NRS server

# Questions or Comments

[www.idnet.re.kr](http://www.idnet.re.kr)

# Further discussion

- NRS is a requirement for lookup-by-name scheme in ICN
- What about NRS (or B-NRS) as a working item in ICNIRG?
- Any contributions are welcomed



# Name based Web Browser for ICN

Implemented by Hae Sook Jeon

# Background

- Current URL based web browser
  - Contents/web pages can not be found if
    - the server is not working properly
    - contents move to another location
    - network error such as link/port failure occurs
- ICN provides in-network caching
  - Contents/web pages can be always found as long as available in network
    - All cached copies for a content share the same name(ID)
  - Needs a new web browser for ICN

# Name based web browser for ICN

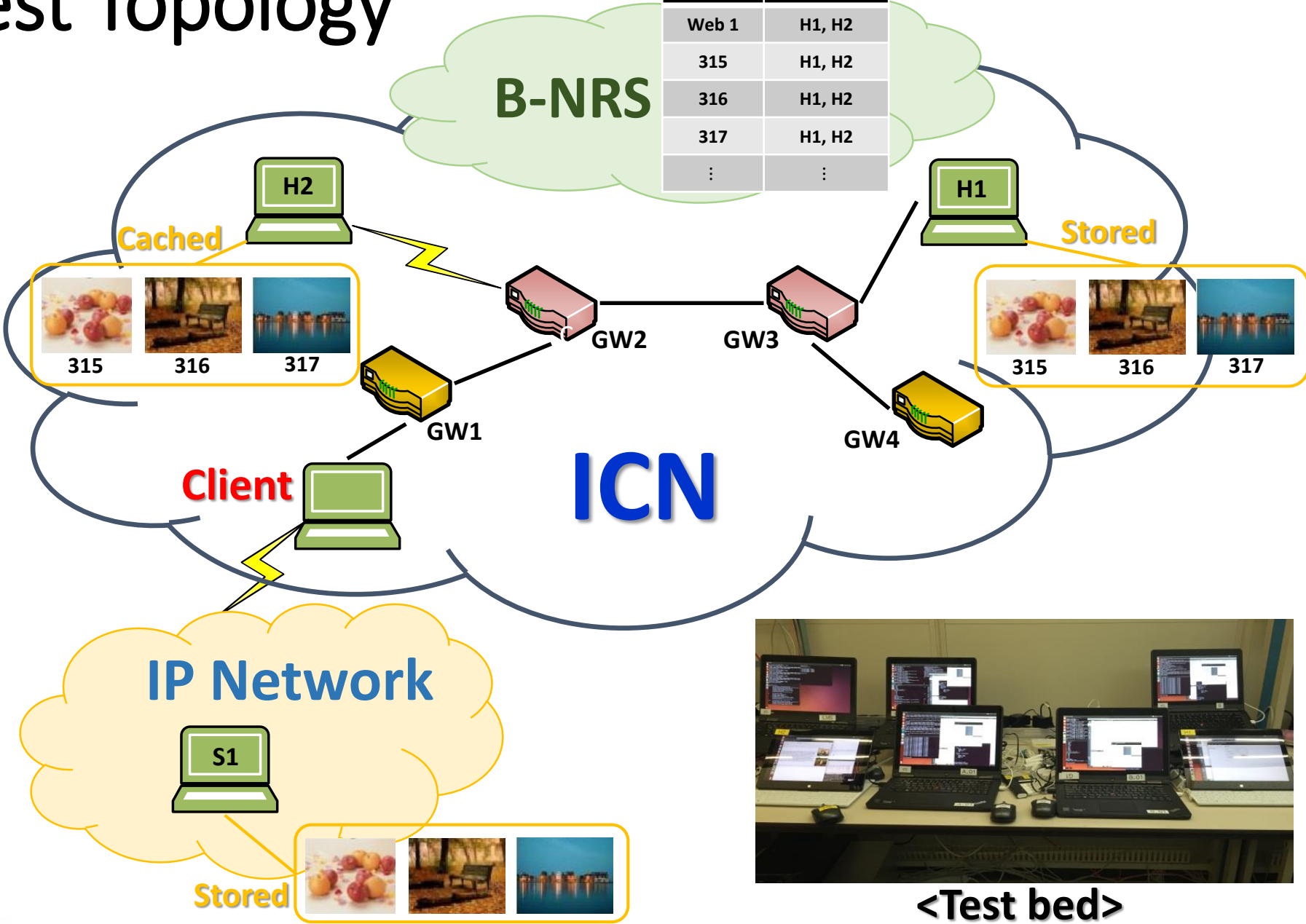
- We implemented the following functional entities
  - Name based web browser
    - Name based web browser login/request/response
    - Name based video plugin
  - Name based web server
    - Named file registration
    - Named file provision
  - Named file caching
    - Named file local caching
    - Cached file name list management
  - Name based communication
    - GW interworking based on name

# Development Environment

- OS : Ubuntu 14.04 LTS/ Android
- Developing Tools
  - QT 5.3.2 Desktop
  - QT 5.3.2 Android
- Language : C/C++
  
- 24 bytes flat name and B-NRS are used

# Test Topology

Name	Locator
Web 1	H1, H2
315	H1, H2
316	H1, H2
317	H1, H2
⋮	⋮



<Test bed>

# Implementation results

- When link failure occurs,
  - File/web page was not found with HTTP
  - File/web page was found by in-network cache with IDP



# Questions or Comments

[www.idnet.re.kr](http://www.idnet.re.kr)