Athens University of
Economics and
Business

Mobile
Multimedia
Laboratory

Supporting Mobility in a Pub/Sub Architecture

Publish Subscribe Internet (PSI - Ψ) in mobile environments

BACKGROUND

Mobility Support in PSI

- **PSI architecture can support mobility with no adjustment/modifications**

- **Goal**: Present a scenario that supports mobility
  - With **no** adjustment/modifications
  - Applies **optimizations** for mobile agents.

Mobility Support in PSI

- **Smart Caches (SC):**
  - An Optimization
  - In-network caches

- **Study Assumptions:**
  - micro-mobility, where mobility is deteriorated, thus mobile agents are not expected to move to far distant access points
  - **Publishers and RVPs: fixed** ***Vs.*** **Subscribers: mobile**

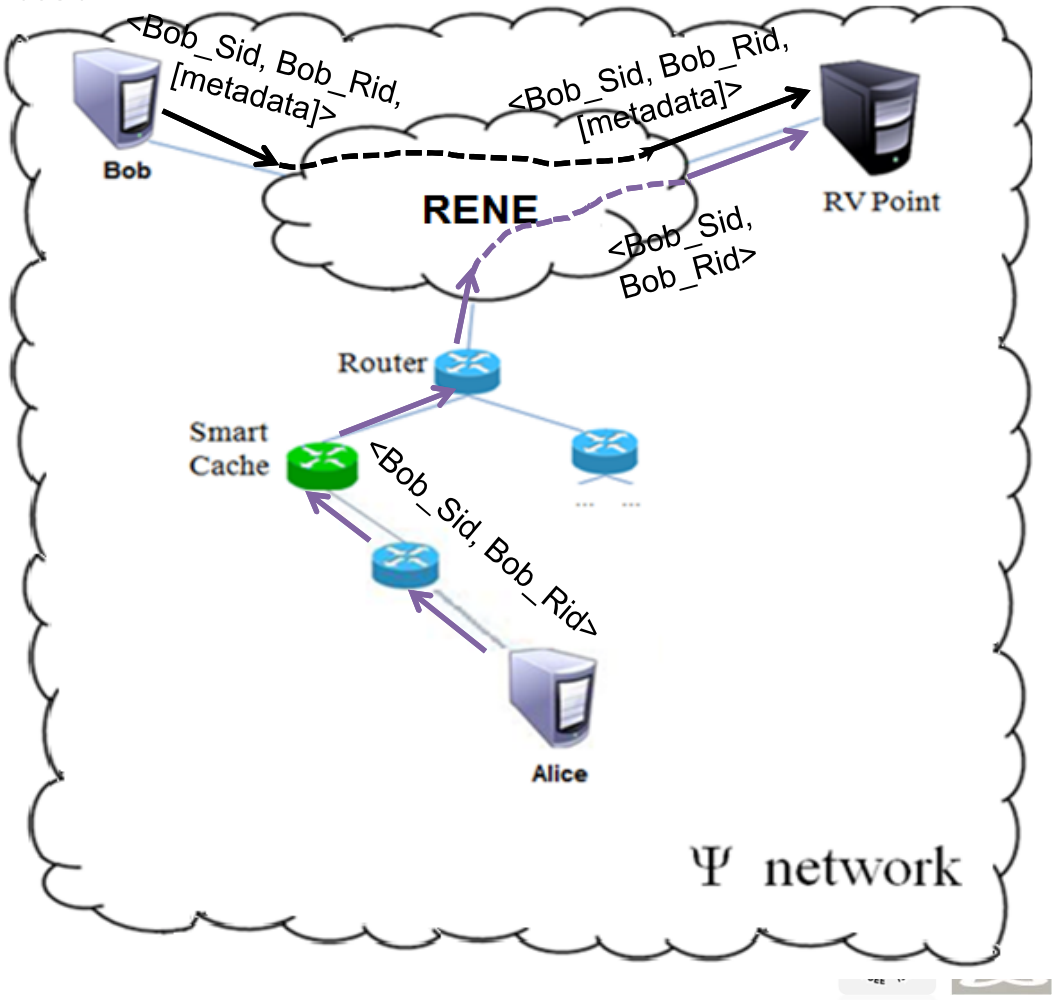
- Mobility Scenario
- Smart Cache Selection

SMARTCACHES

Step-by-step Mobility Scenario

Issuing publications, submissions to RVP

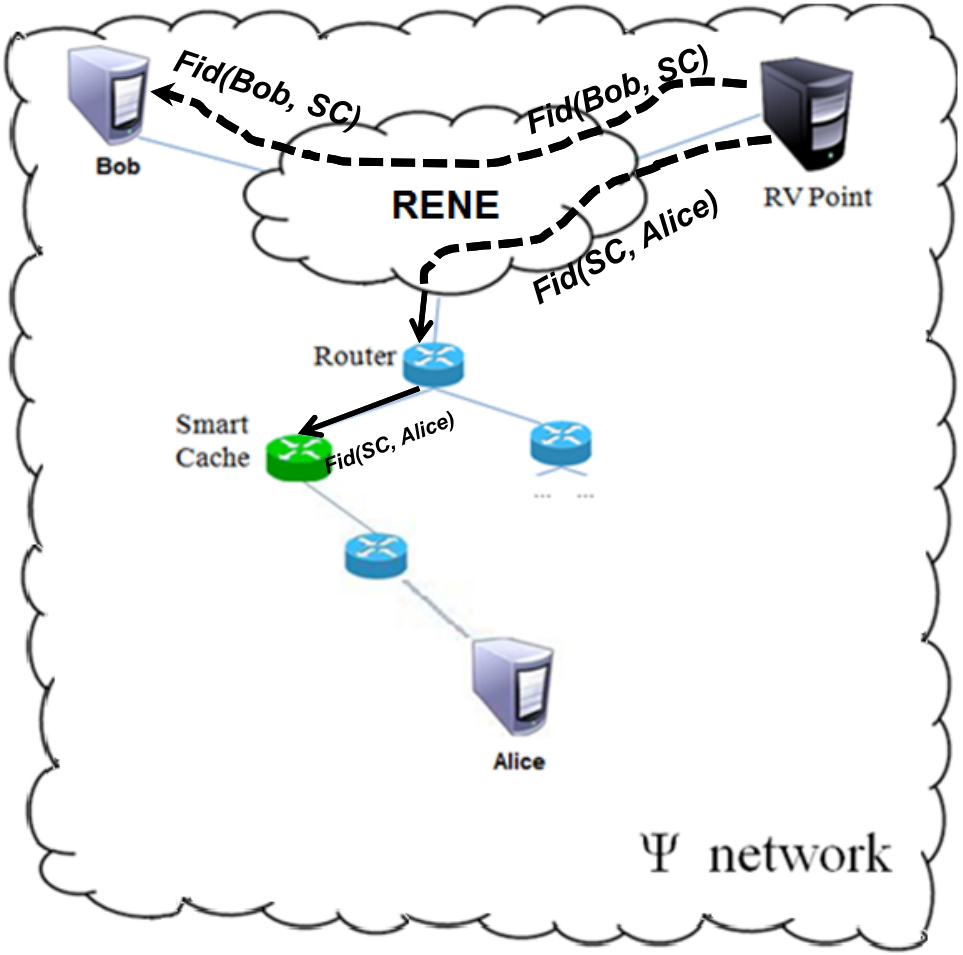
1. The publisher (Bob) issues a publication: <Bob_Sid, Bob_Rid, [metadata]>
2. RVP **records** the **publication**
3. A Subscriber (Alice) issues a subscription for <Bob_Sid, Bob_Rid>
4. **RVP matches publication** and subscription based on SID, RID



Step-by-step Mobility Scenario

Smart cache comes in

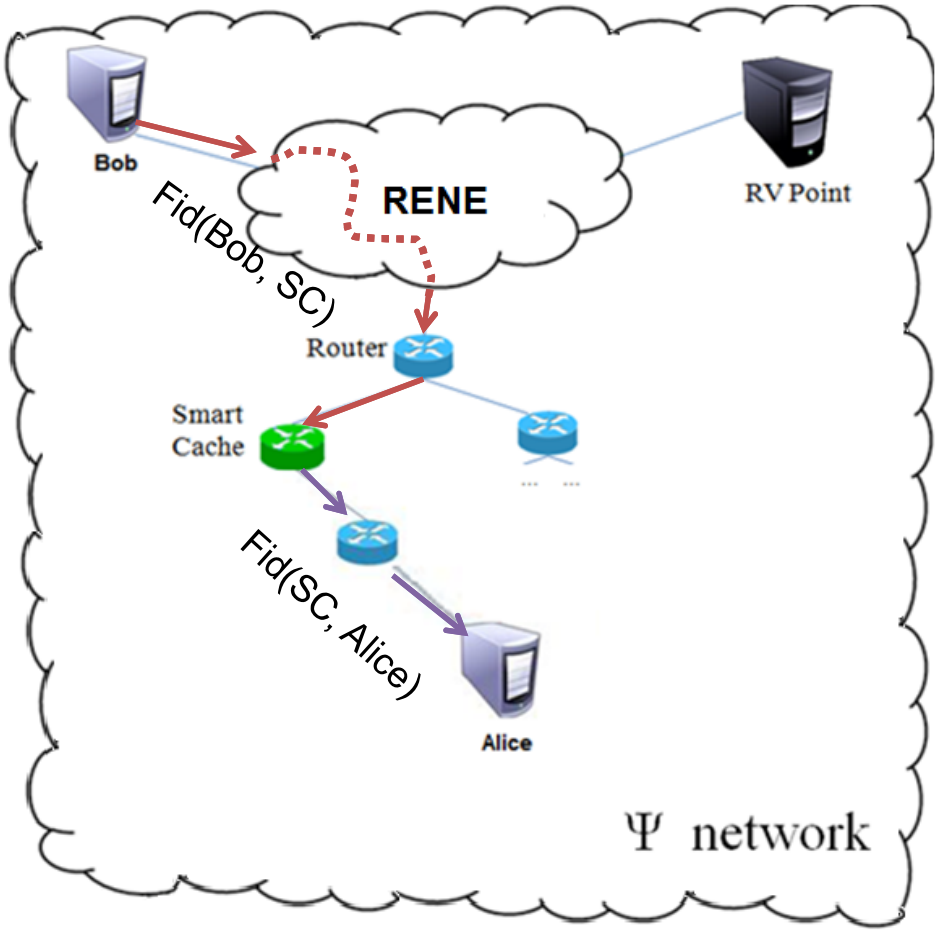
5. **RVP selects a smart cache (SC)**
   - based on topological knowledge
   - Goal: to better facilitate the delivery of data to subscribers thought SC
6. **The RVP records the SC** as both a publisher and a subscriber for Bob_Sid/Bob_Rid
7. **2 Fids used** upon a matching subscription:
   - ***Fid(Bob, SC)***
   - ***Fid(SC, Alice)***



Step-by-step Mobility Scenario

data delivering

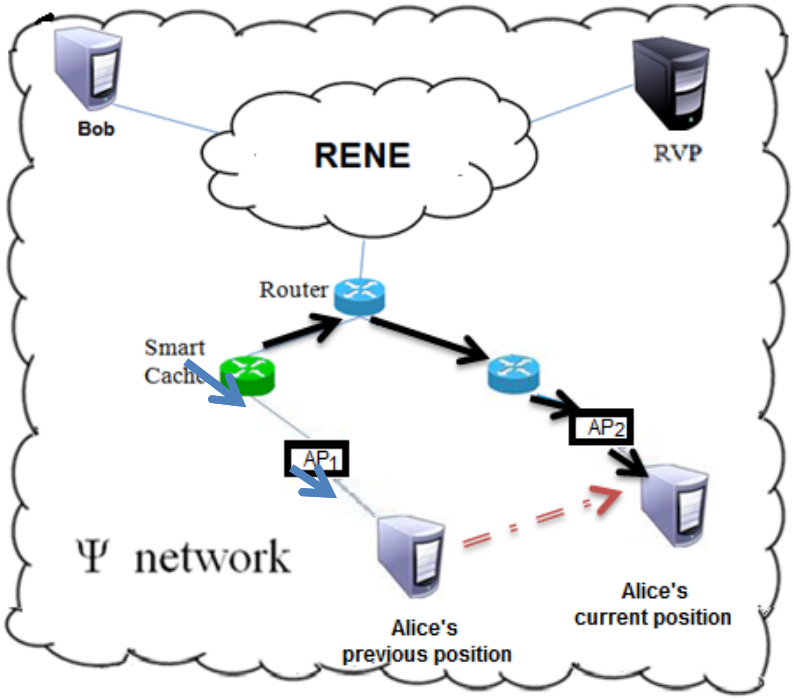
8. Data sent
   - SC caches data for at least as much time as the time required for Alice to move to another access point AP



Step-by-step Mobility Scenario

Alice moves.. while receiving data

9. Alice sends a new subscription <Bob_Sid, Bob_Rid> from the new position
10. 2 different matching publications in RVP.
    - One corresponding to Bob
    - One corresponding to the SC
    - RVP selects the best suited publisher (anycast), e.g., the closer one to Alice
        - **in this case most probably the SC**



Smart Cache Selection

1st case: Based on topological knowledge

- **RVP forecasting (RVPf)**
  - Forecast the next possible positions of mobile agent Alice (micromobility)
  - Possible to even assign a SC before Alice “handovers” to another AP.
    - Data sent via multicast tree to all the SCs.

Smart Cache Selection

2nd case

- The AP detects Alice's movement
- Sends a control message to RVP
  - Triggers the creation of an new SC, suitable for the prospective new AP for Alice
- initiates the assignment of SC before Alice is detached from the current AP (smooth handover)
- Cost
  - additional control message (small overhead).
  - Yet, it mitigates the load at RVP.

CONCLUSION

Conclusions

- Ψ architecture supports mobility in any case
  - Asynchrony,
  - ID are independent from the current location
- Optimization for mobility of subscribers
  - Without modifying the PSI architecture
- By products:
  - **Smart Cashes SCs** enhance anonymity as intermediates/proxies
  - SCs could also be used for transport layer reliability
  - Acts as a local rendezvous point
    - useful for new coming subscribers who can receive data by anycast immediately
- SCs feeding other SCs: Multicast trees.

Bibliography

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[2] V.A. Siris, X. Vasilakos, and G. C. Polyzos. "A Selective Neighbor Caching Approach for Supporting Mobility in Publish/Subscribe Networks." In *FIFTH ERCIM WORKSHOP ON EMOBILITY*, p. 63. 2011.