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Supporting Mobility in a Publish Subscribe Internetwork Architecture

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Outline

- Introduction
- The PSI Architecture
- Mobility Support in PSI
- Handover Management in PSI
- Smart Cache Selection
- Conclusion

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Introduction

- End-to-end (E2E) Internet Architecture
  - Endpoint centric, based on telephony
  - Accused as the root of all evil (NAT, CDN, MIP)
- Publish/Subscribe (Pub/Sub) Internet Architecture
  - Information Centric Networking (ICN)
  - Information decoupled from location
- The PSI Architecture
  - The Pub/Sub architecture of PSIRP/PURSUIT
  - Supports multicast, anonymity and asynchrony
  - Seamlessly supports mobile nodes (MNs)

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The PSI Architecture

- Publisher: advertises availability of information items
- Subscriber: expresses interest on information items
- Information identifiers: Statistically unique pair
  - Rendezvous ID (RID): application derived
  - Scope ID (SID): access control and policies
- Rendezvous Network (RENE)
  - Consists of Rendezvous Nodes (RN)
  - Each information item handled by an RN
    - The Rendezvous Point (RVP) of the item
  - RENE matches publishers and subscribers
    - Instructs publishers where to send the data

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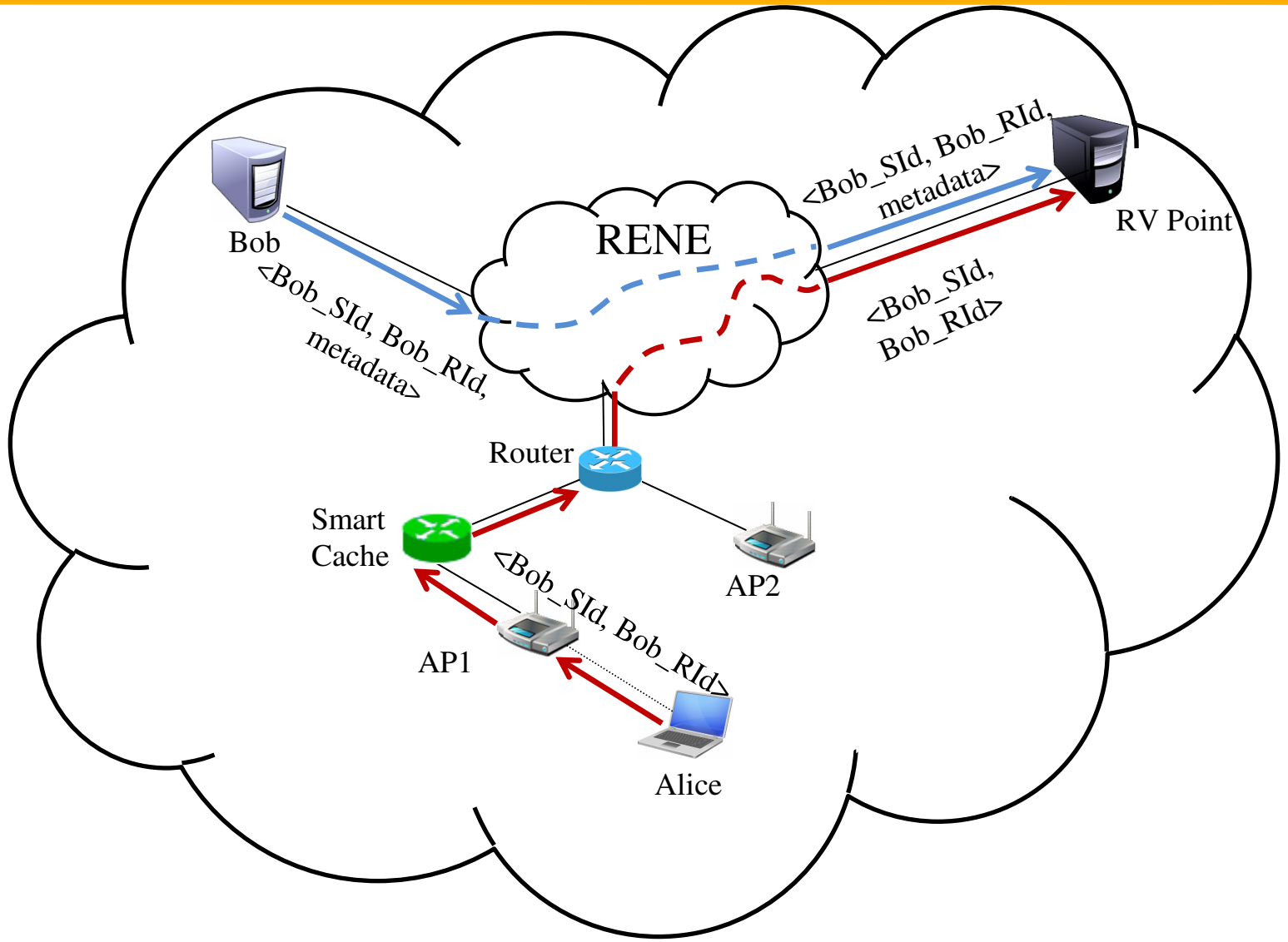
The PSI Architecture



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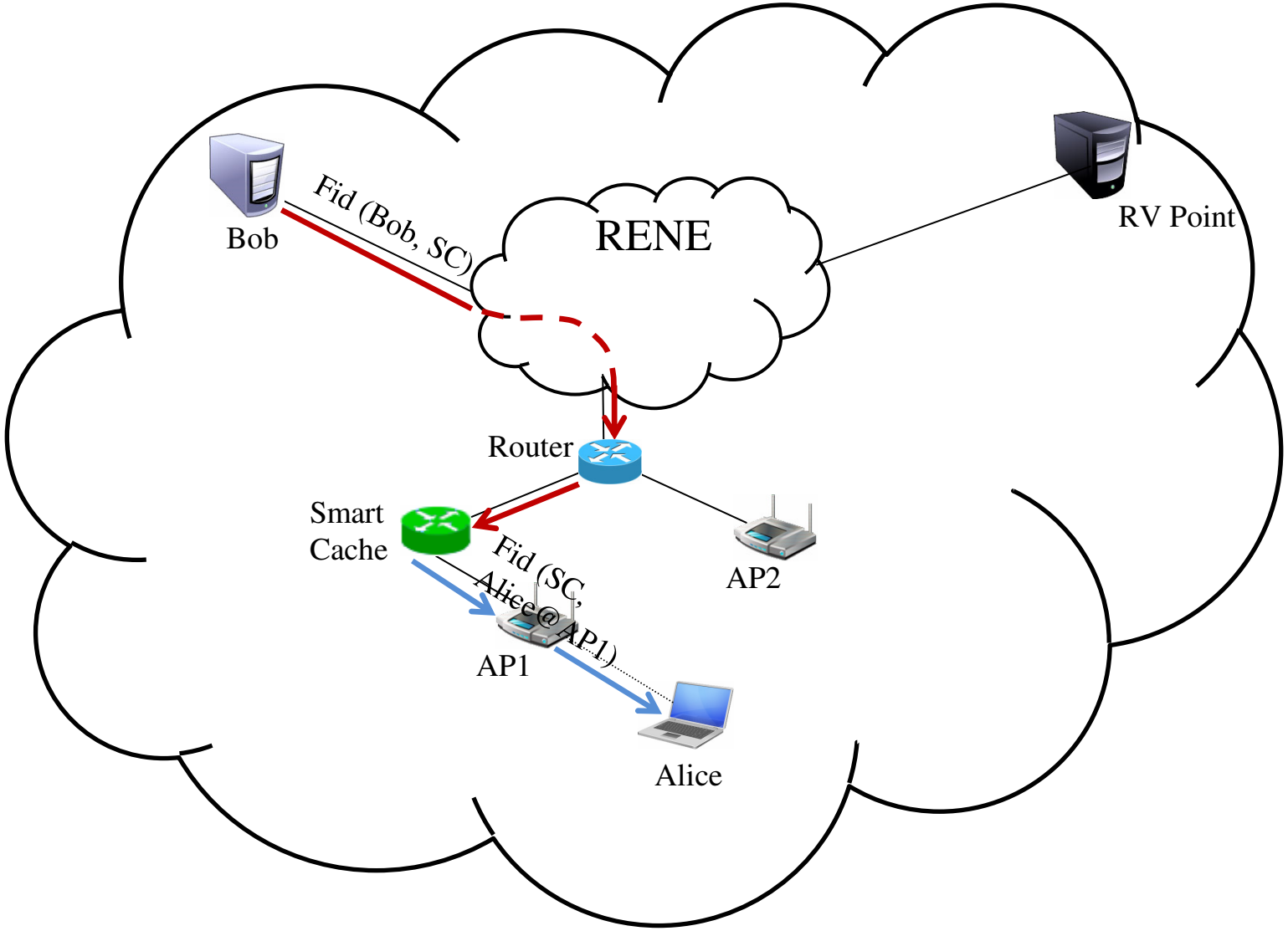
Mobility Support in PSI

- Forwarding ID (FID): sent by RVP to the publisher
  - Source routing path to subscribers (multicast)
    - Expressed as a Bloom filter of path links
  - Publishers do not know subscribers (anonymity)
  - Pub/Sub decoupled in time (asynchrony)
- Caches and Smart Caches (SC)
  - In PSI caches are just alternative publishers
  - SCs enhance mobility management
    - Selected to reflect current and future MN position
  - Information explicitly delivered in two stages
    - One FID towards the SC and another towards the MN

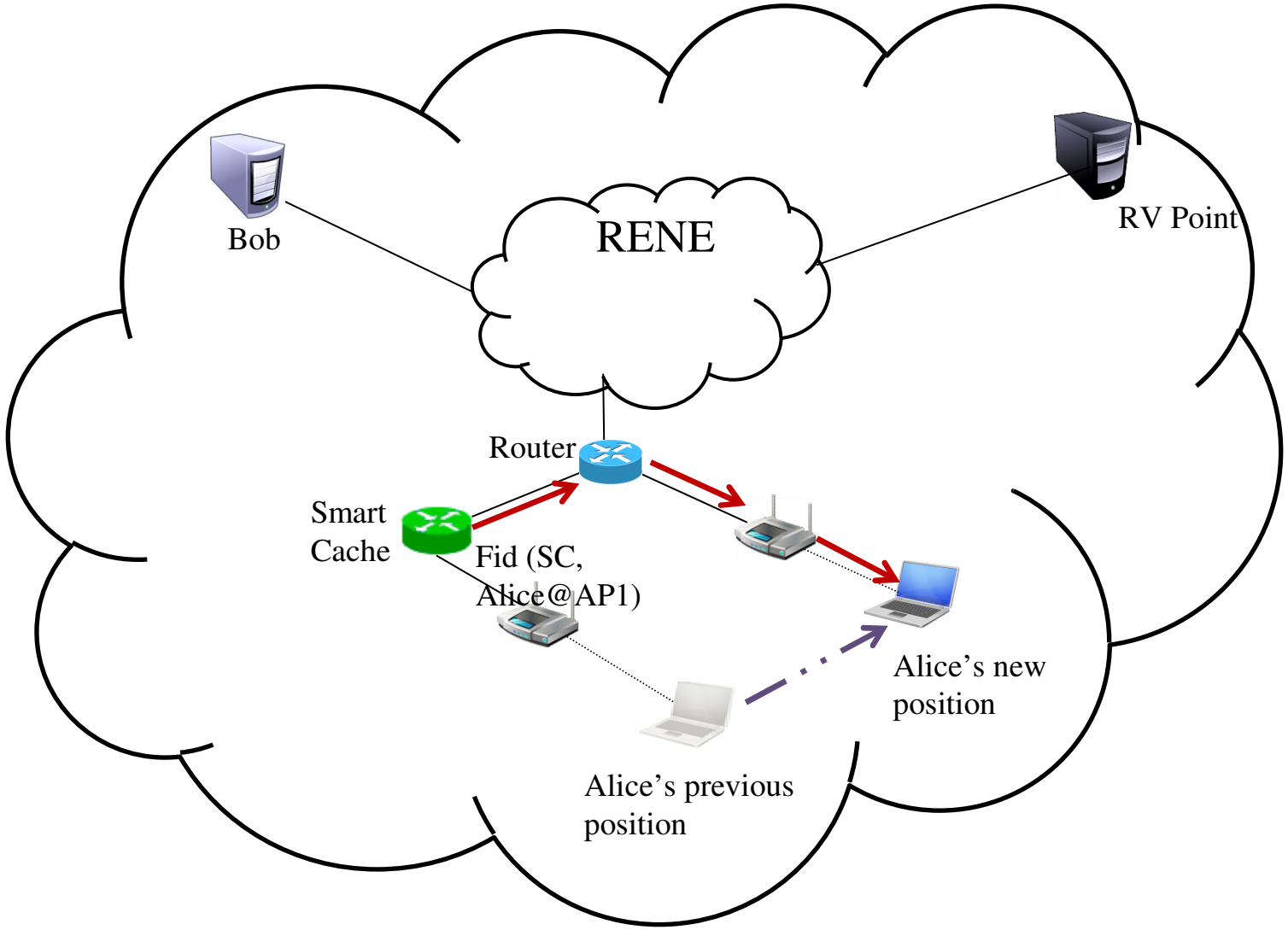
Mobility Support in PSI



Handover Management in PSI

- What happens when the MN moves?
  - A new subscription is issued
  - The RENE may serve it from the SC
    - Sends a new FID to the SC
  - The SC adds the FID to its multicast tree
    - Multiple MNs are served transparently
  - The FID to the SC does not change
    - Rerouting is a local procedure
- Smart Caches are not an extension to PSI
  - SCs are simply alternative publishers
  - MNs benefit by a built-in feature of PSI

Handover Management in PSI



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Smart Cache Selection

- RVP forecasting (RVPf)
  - RVP is aware of topology around the MN
  - The RVP forecasts future MN positions
  - SCs are designated in advance by the RVP
- AP based (APb)
  - APs forecast handovers via signal strength
    - Works only for wireless networks
  - The AP notifies the RVP about the handover
    - The AP sends information about nearby APs
  - Extra control messaging compared to RVPf
  - Helps RVP to make SC selection

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Conclusion

- Mobility handling in PSI
  - Based on multicast, anonymity, asynchrony
  - Exploits embedded support for caching
  - Does not require new mechanisms
  - Relies only on mobility support policies
- Future work
  - Investigation of correctness and effectiveness
  - Comparison of SC selection policies
  - Investigation of other SC uses
    - Transport protocol mediators
    - Node anonymity enhancers