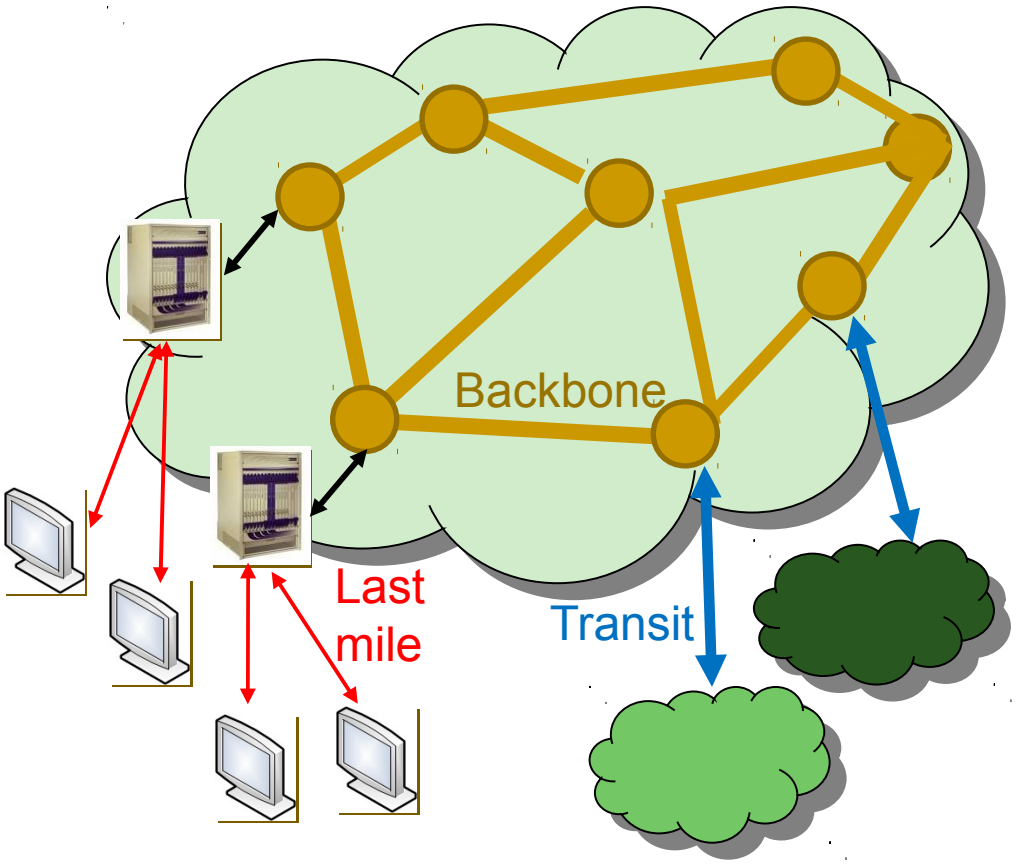
DECADE
Overview and Architecture

Richard Alimi

P2P Stress on Infrastructure

- Pure overlay distribution is inefficient
  - Transit
  - Backbone
  - Last mile



In-Network Storage

Effective technique to increase efficiency is to introduce *in-network storage*

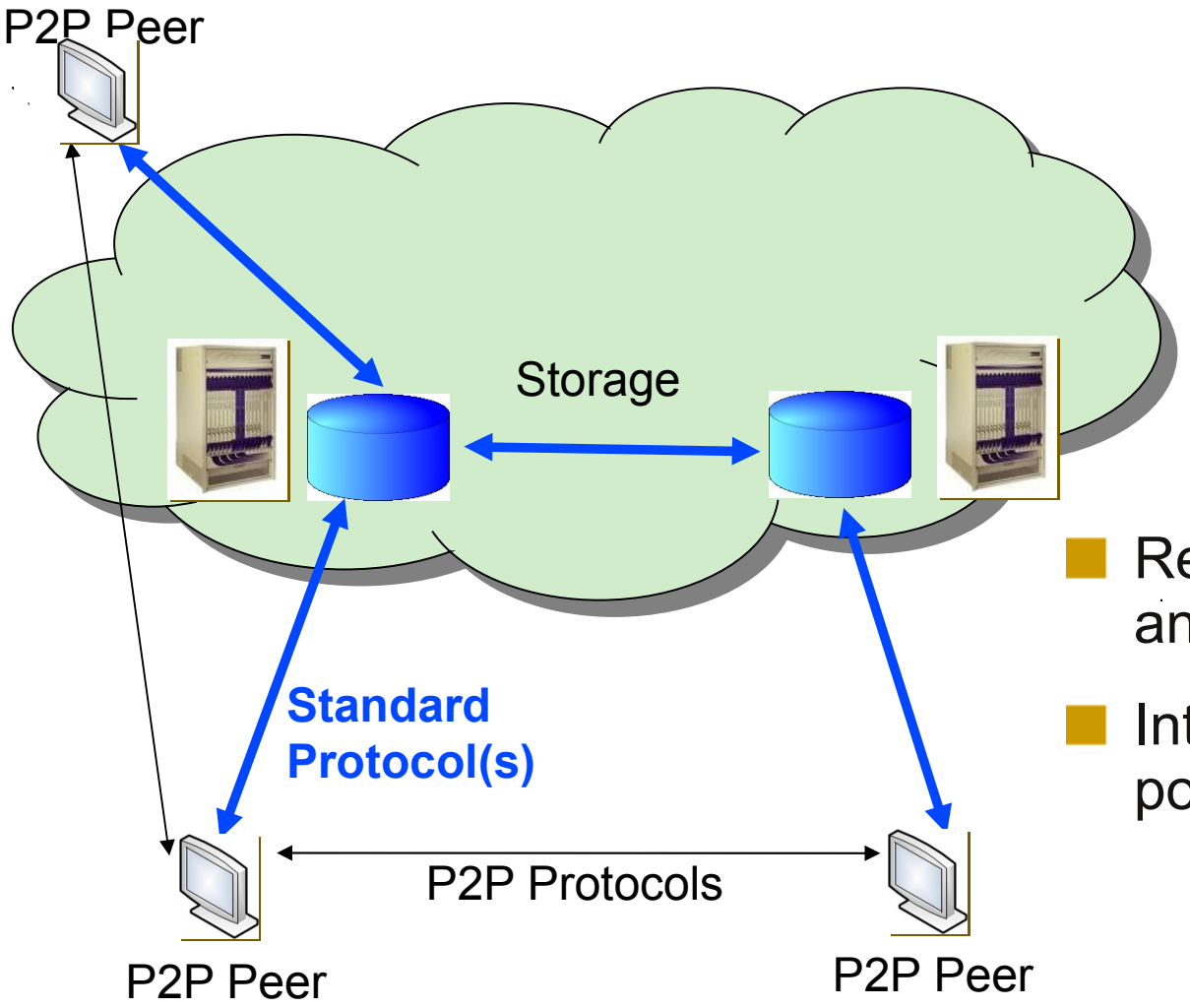
Problem 1: Weaknesses of Existing P2P Caches

- Tight coupling with P2P application protocol
  - *Cache must implement specific protocol for each application*
  - Large number of widely-used, evolving P2P protocols
    - File sharing: BitTorrent, eMule, Pando, …
    - Streaming: PPLive, PPStream, UUSee, Zattoo, Kontiki, TVAnts, Sopcast, Abacast, Solid State Networks, OctoShape, …
- *Implication*
  - *Cache vendor and ISP create and support complex production software*

Problem 2: Weak/No Integration with Applications

- Caches only consider policy from ISP perspective
  - *Application is out of the loop*
  - However, some P2P applications rely on resource (e.g., bandwidth) allocation amongst peers
- *Implication*
  - *Application requirements/policies not be reflected by caches*

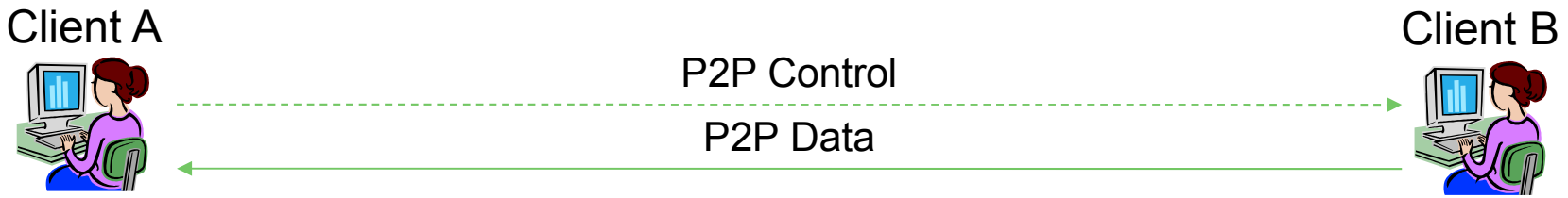
DECADE Overview



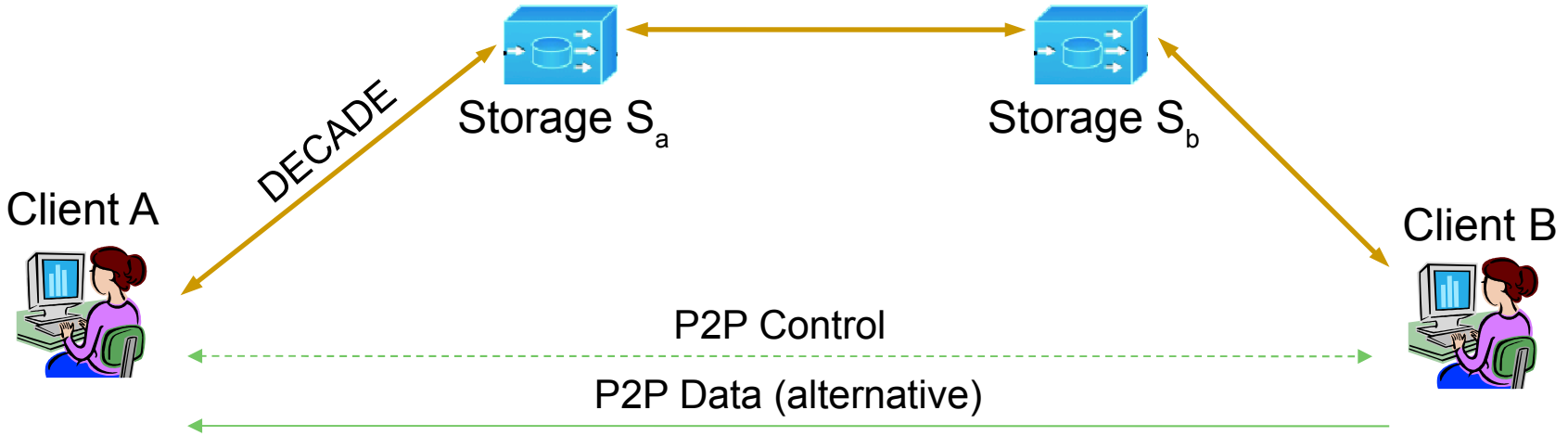
- Reduce production complexity and provide open access
- Integrate with application policies

Example Operation

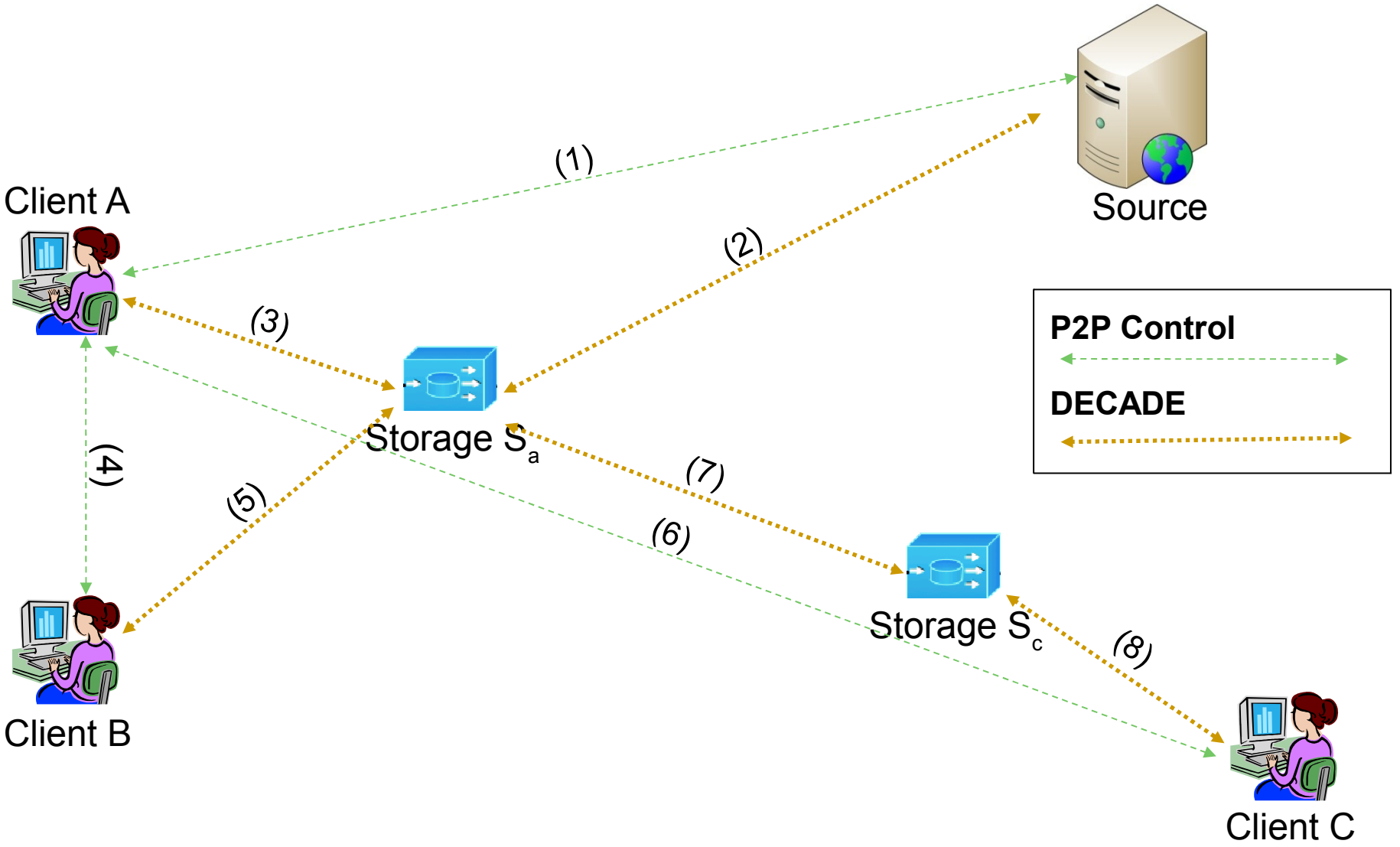
Native P2P Clients



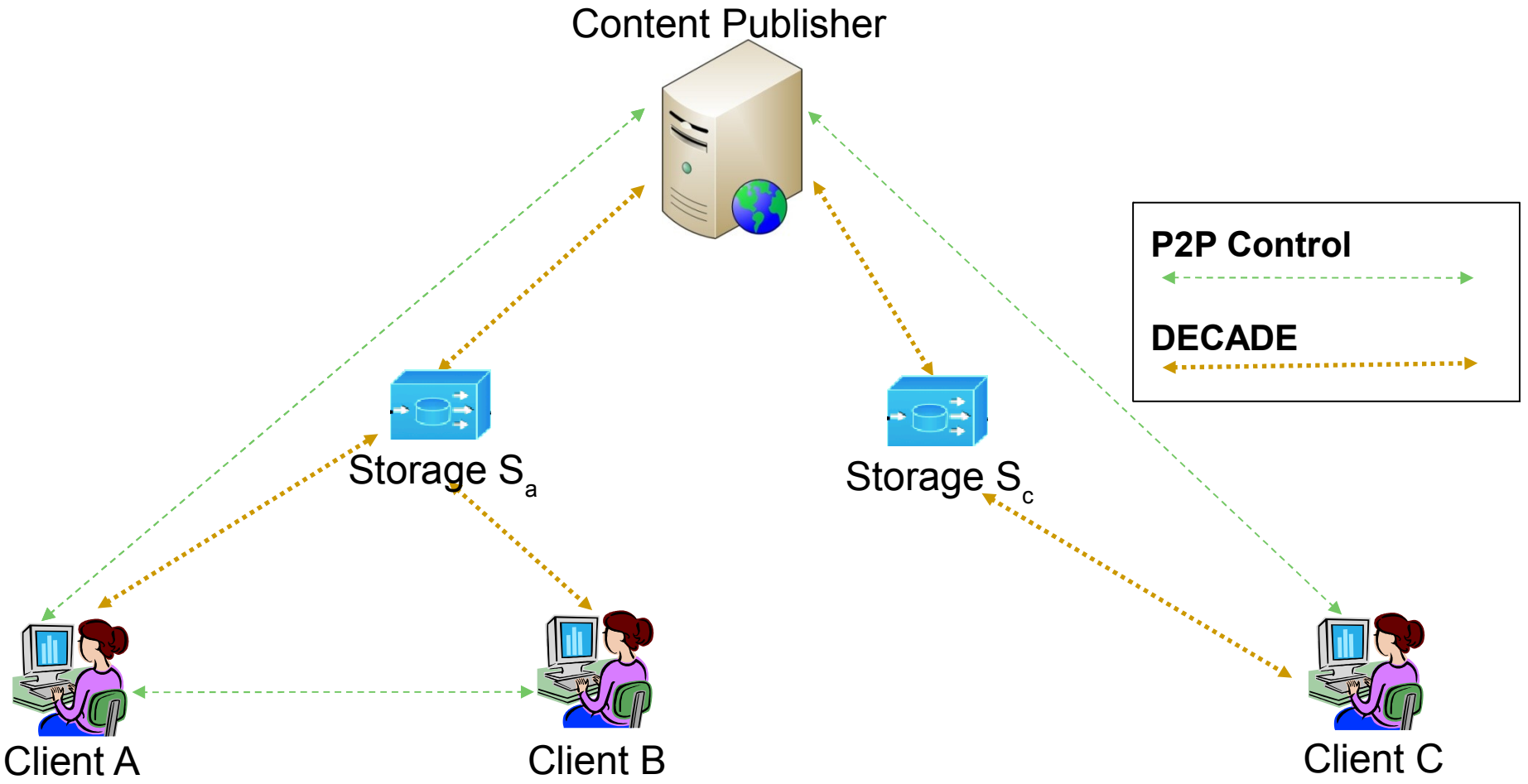
DECADE-enabled P2P Clients



Use Case 1: P2P Users Sharing Content



Use Case 2: Content Publisher Distributing Content



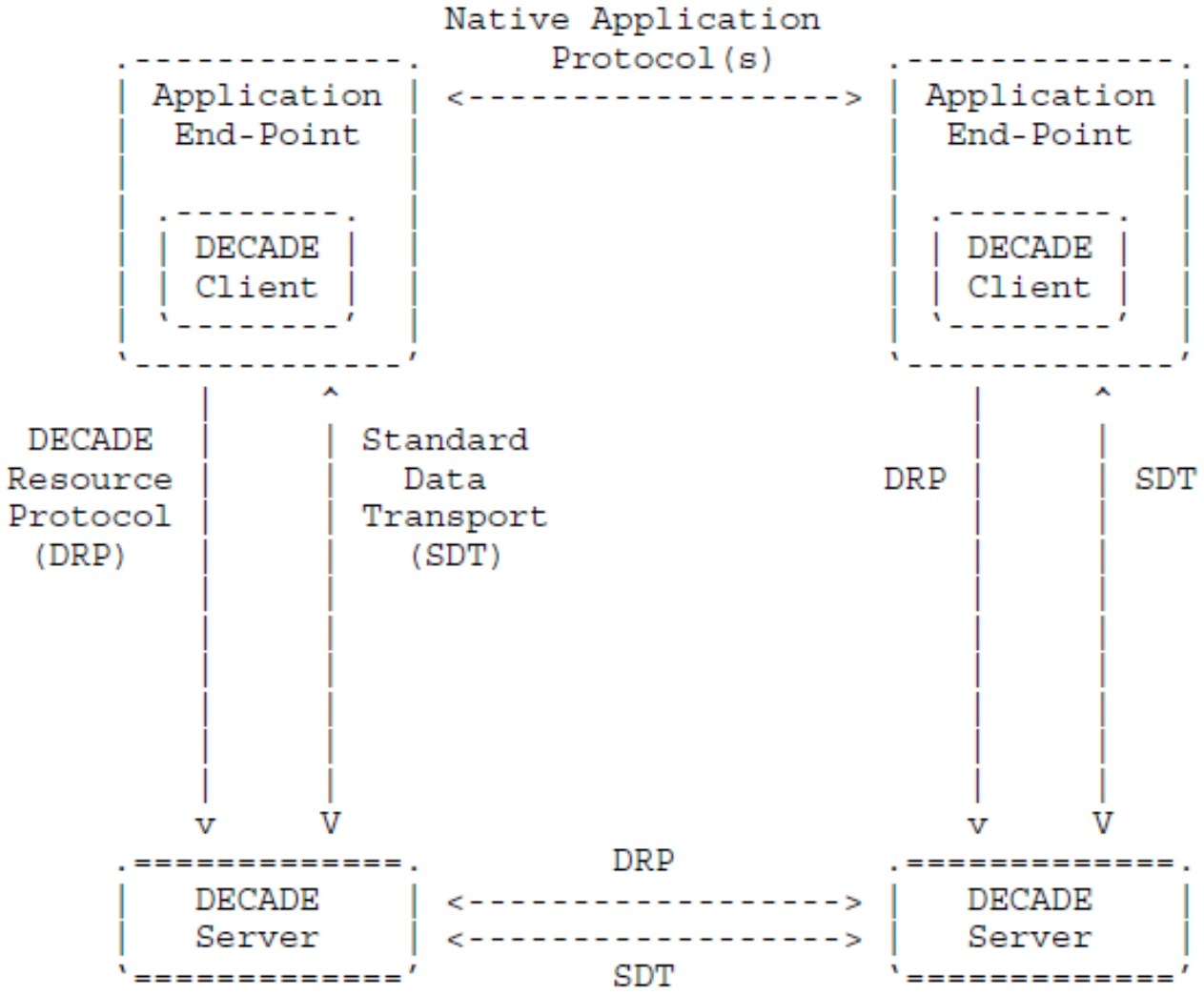
Key Benefits

- Reduced complexity compared with existing P2P caching
- Integration with application policies
- Robustness and Incremental deployment
  - P2P applications may still use existing mechanisms
- Open access to applications
- Open innovation by applications

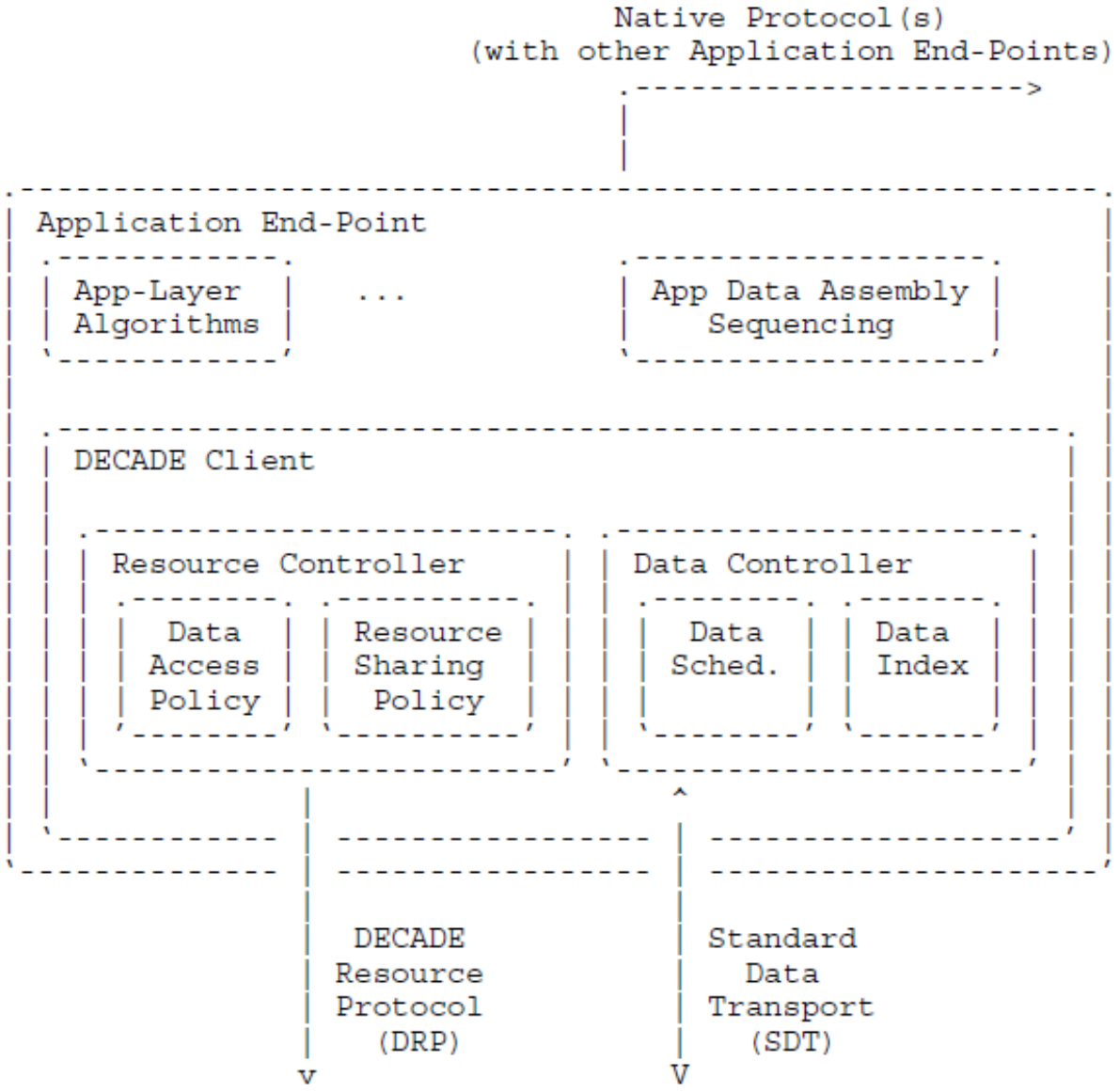
Architectural Principles

- Immutable data objects
  - Simplifies distribution and caching
- Content hash identifies data object
  - Simplifies conflict resolution, caching, and validation
  - Apps using DECADE may have own sequencing and naming
- Explicit control
  - Endpoints control content of storage (this is not a cache)
- Delegation of resources and access control
  - User managing storage may delegate to third-parties (e.g., users, peers)
  - Access (read/write) and resources (storage, bandwidth)
  - Token-based scheme

DECADE Protocols



Client Components



Server Protocols