DECADE Problem Statement

`draft-song-decade-problem-statement-01`

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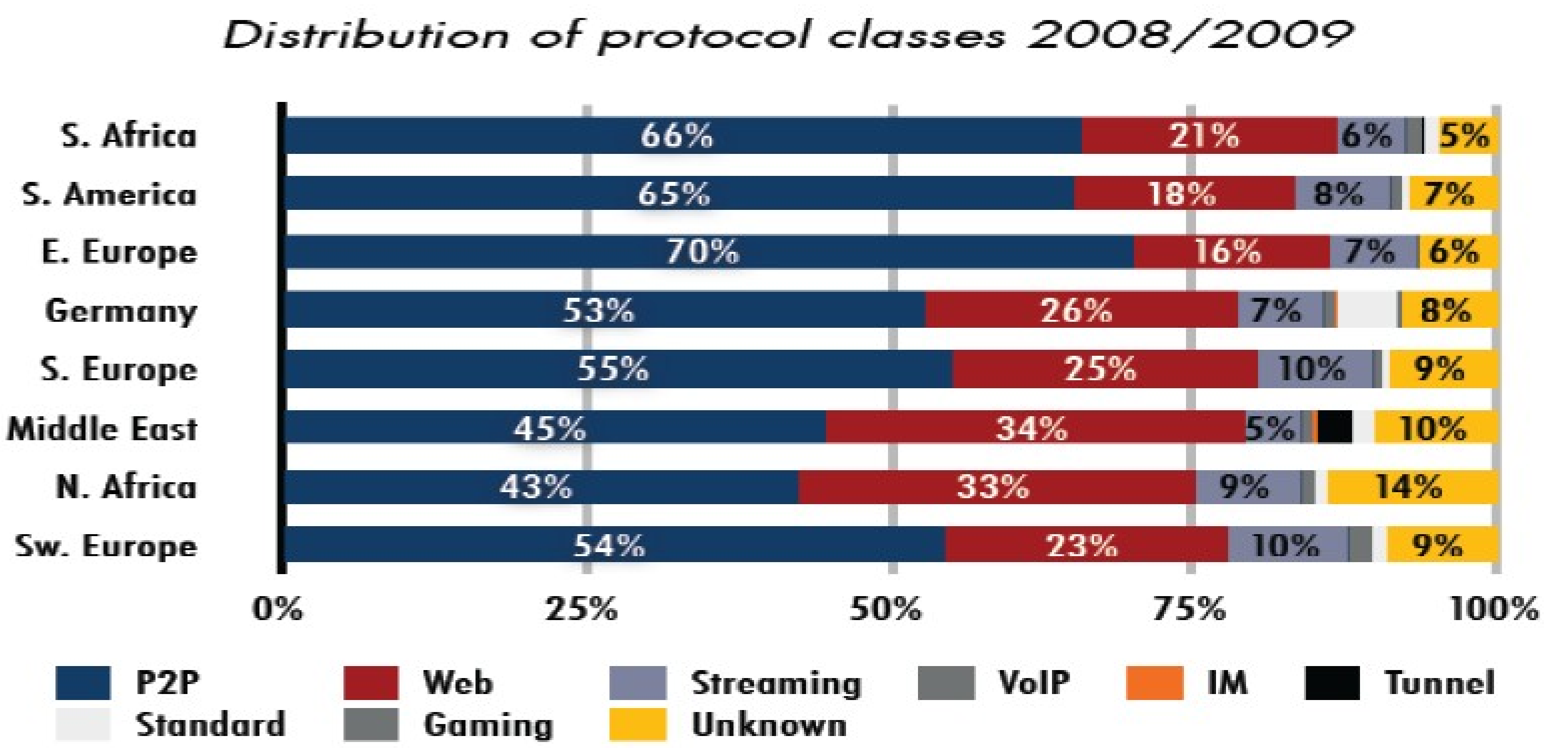
P2P Content Distribution Paradigm

- Highly-scalable
- Robust
- Space for innovation
  - Many novel techniques
  - Many players with novel ideas

P2P Contributes Significant Traffic

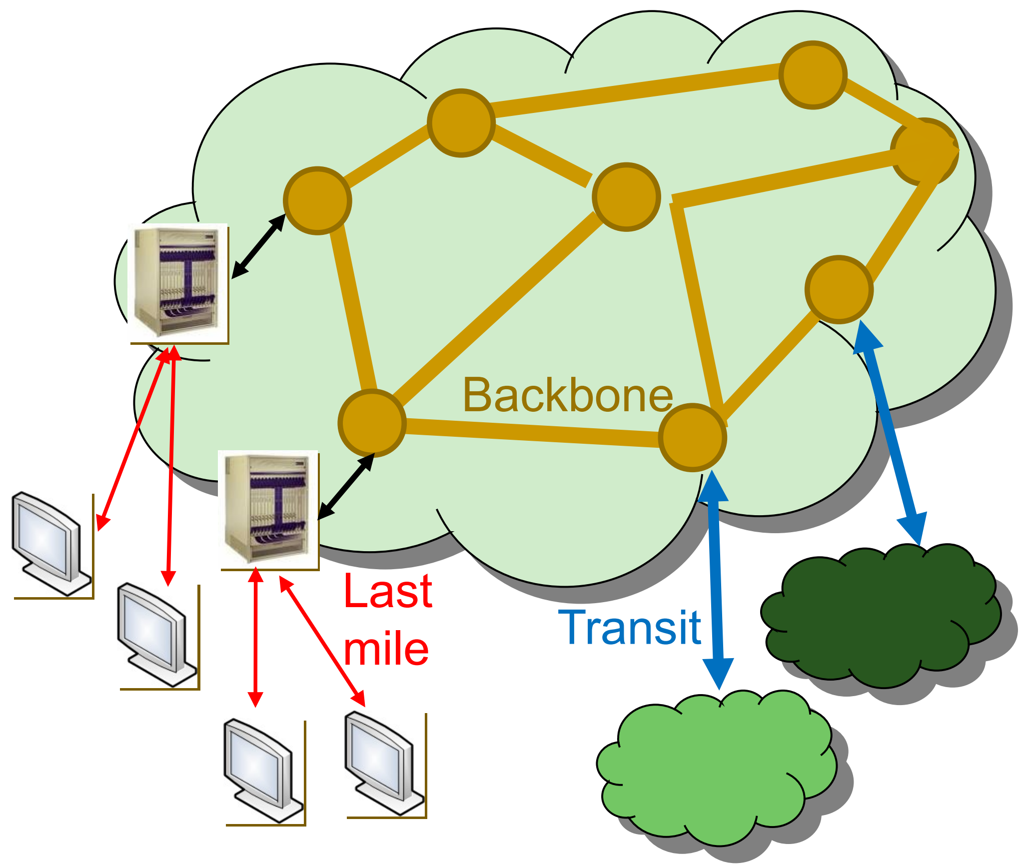
- 40-70% of total traffic in many networks



Source: ipoque Internet study 2008/2009

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

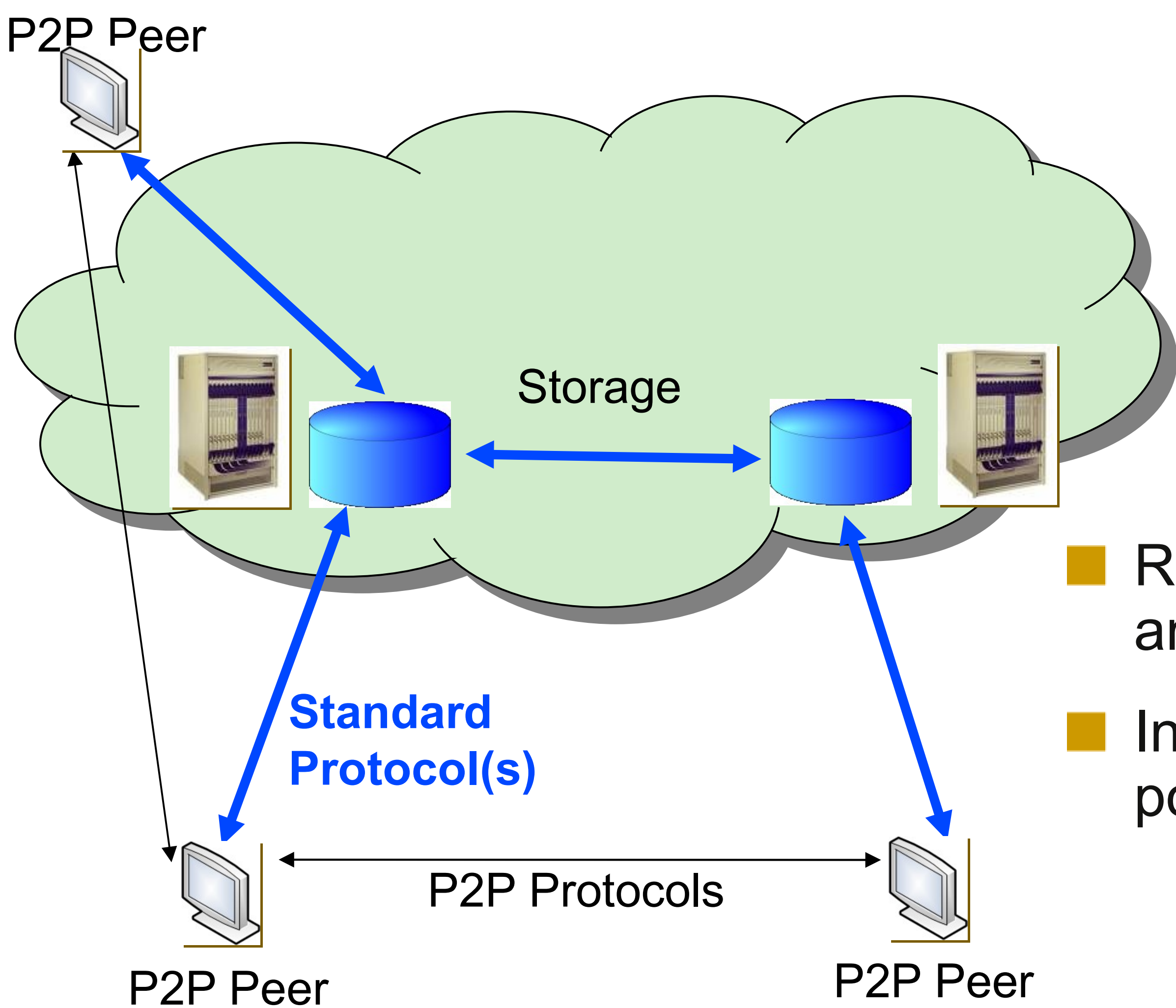
- Tight coupling with P2P application protocol
  - *Cache must implement specific protocol for each application*
  - Large number of widely-used, evolving P2P protocols
    - File sharing: BitTorrent, eMule, Pando, …
    - Streaming: PPLive, PPStream, UUSee, Zattoo, Kontiki, TVAnts, Sopcast, Abacast, 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*

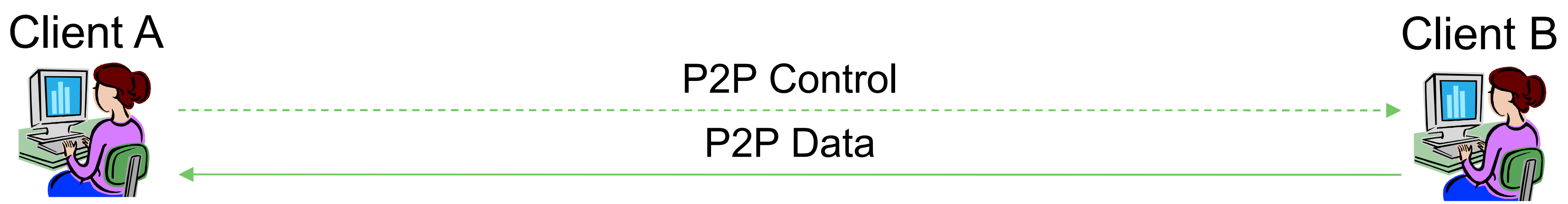
DECADE Overview



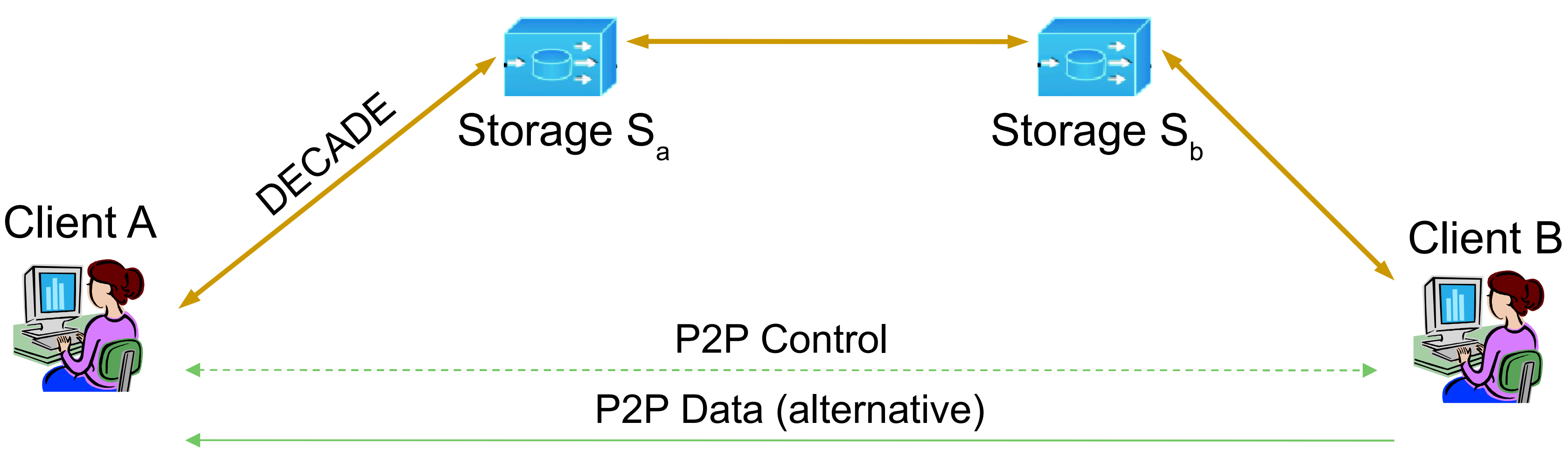
- Reduce production complexity and provide open access
- Integrate with application policies

Example Operation

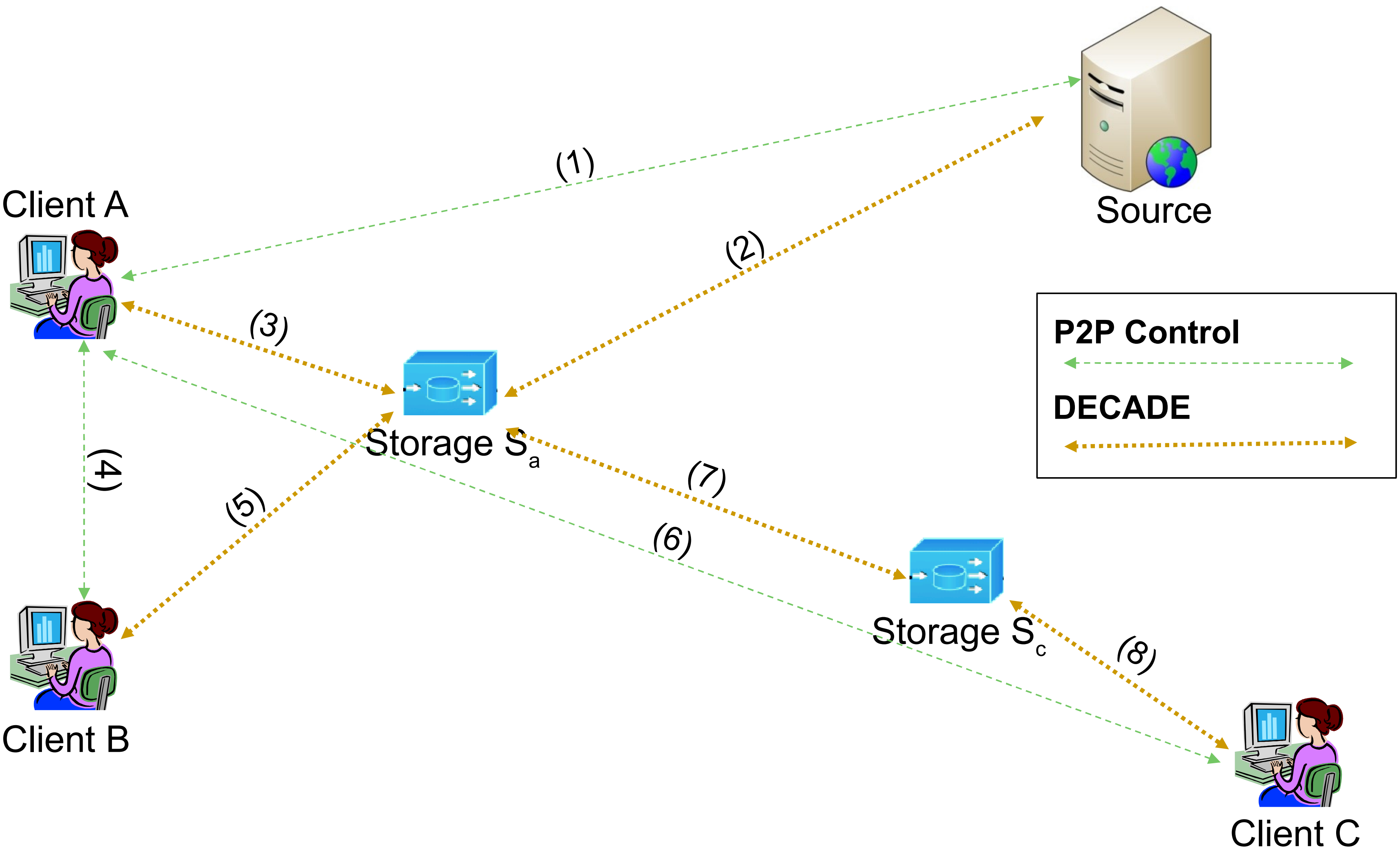
Native P2P Clients



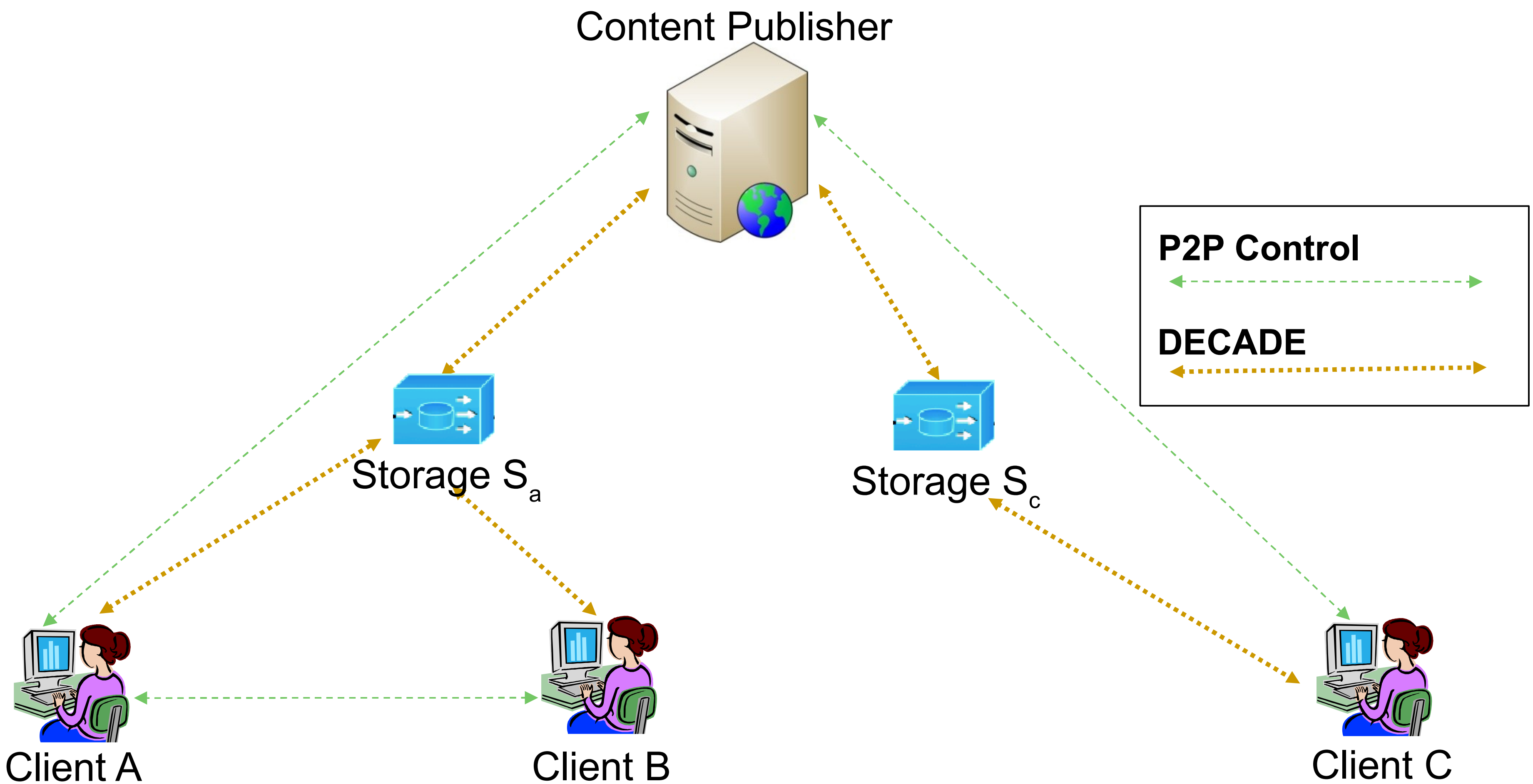
DECADE-enabled P2P Clients



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

Working Group Goal

Design architecture for P2P content distribution applications to utilize in-network storage

Scope

- In-scope
  - Requirements and Architecture for P2P applications to utilize in-network storage
    - *Seek rechartering if protocol development needed*
  - Consideration for additional content distribution applications
    - Impact to DECADE complexity MUST be considered
  - Integration examples with one or two applications
- Out of scope
  - Details of integration with specific applications
  - Implementation of policies regarding copyright-protected/illegal content
  - Locating the “best” in-network storage
  - Development of a new data transport protocol

Comments and questions?

Backup Slides

Key Components of In-network Storage

- Content Storage Mechanism
  - How are P2P contents detected and stored to in-network storage?
- Content Retrieval Mechanism
  - How are P2P contents discovered and read from in-network storage?
- Communication Protocol
  - What is the protocol to communicate with in-network storage?

Existing Solution 1: Transparent P2P Cache

- Content Storage Mechanism
  - DPI detects content; content written to cache
- Content Retrieval Mechanism
  - Cache masquerades as peer
- Communication Protocol
  - Existing P2P protocols

Existing Solution 2: Non-Transparent P2P Cache

- Content Storage Mechanism
  - Cache acts as a peer; content uploaded to it is cached
- Content Retrieval Mechanism
  - Cache acts as a peer; clients download as they would from any other peer
- Communication Protocol
  - Existing P2P protocols