Supporting end-to-end resource virtualization for Web 2.0 applications using Service Oriented Architecture

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Outline

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Goal and research questions

Requirements imposed by P2P applications

Benefits to provide end-to-end resource virtualization

Proposed architecture for end-to-end resource virtualization

Conclusions and Future work

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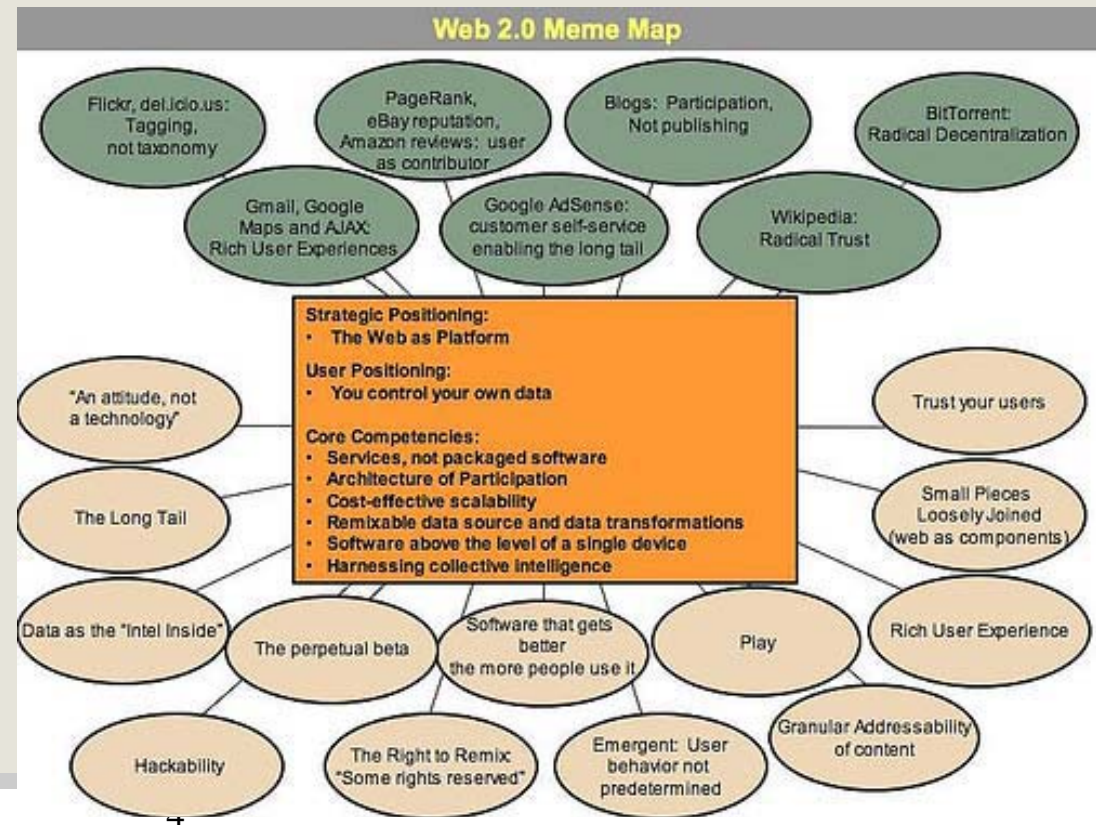Benefits to provide end-to-end resource virtualization

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Introduction (1)

- ## Web 2.0:
  - Philosophy of mutually maximizing
    - collective intelligence
    - added value for each participant by finalized and dynamic information sharing and creation

- ## Some Web 2.0 features:
  - Support of communications aiming to unify users by using common ideals
  - Platform and tools that help users create, manage and maintain shared content with a broad audience

Web 2.0 Meme Map

Flickr, del.icio.us: Tagging, not taxonomy

PageRank, eBay reputation, Amazon reviews: user as contributor

Blogs: Participation, Not publishing

BitTorrent: Radical Decentralization

Gmail, Google Maps and AJAX: Rich User Experiences

Google AdSense: customer self-service enabling the long tail

Wikipedia: Radical Trust

Strategic Positioning:
- The Web as Platform

User Positioning:
- You control your own data

Core Competencies:
- Services, not packaged software
- Architecture of Participation
- Cost-effective scalability
- Remixable data source and data transformations
- Software above the level of a single device
- Harnessing collective intelligence

"An attitude, not a technology"

Trust your users

The Long Tail

Small Pieces Loosely Joined (web as components)

Data as the "Intel Inside"

The perpetual beta

Software that gets better the more people use it

Play

Rich User Experience

Hackability

The Right to Remix "Some rights reserved"

Emergent: User behavior not predetermined

Granular Addressability of content

Introduction (2)

- Service Oriented Architecture:
  - Philosophy or paradigm to organize and utilize services and capabilities under control of different ownership domains
  - Way of promoting reuse, growth and interoperability by enabling users and organizations to get more value from capabilities
- Some SOA features:
  - Allowance of a cross-organizational integration of services, by using common standards for description of service interfaces
  - Facilitation of inter-organizational integration of disparate services
    - accomplished using central integration layer where heterogeneous applications are encapsulated, seamlessly integrated into information technology landscape
  - Significant reduction of development time, thanks to availability of reusable application building blocks

Introduction (3)

- End-to-end virtualization
  - multiple virtual networks established end-to-end over shared physical infrastructure and resources:
    - multiplicity of end-user devices, computing, storage, communication networks, providers and service domains

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- Main goal:
  - Support end-to-end virtualization for Web 2.0 applications, P2P in particular, by using Service Oriented Architecture

- Research questions:
  - What are the requirements imposed by Web 2.0 applications, P2P in particular?
  - Is there a benefit on providing end-to-end resource virtualization?
  - Which architectures can be used to support end-to-end resource virtualization for Web 2.0 applications, P2P in particular?

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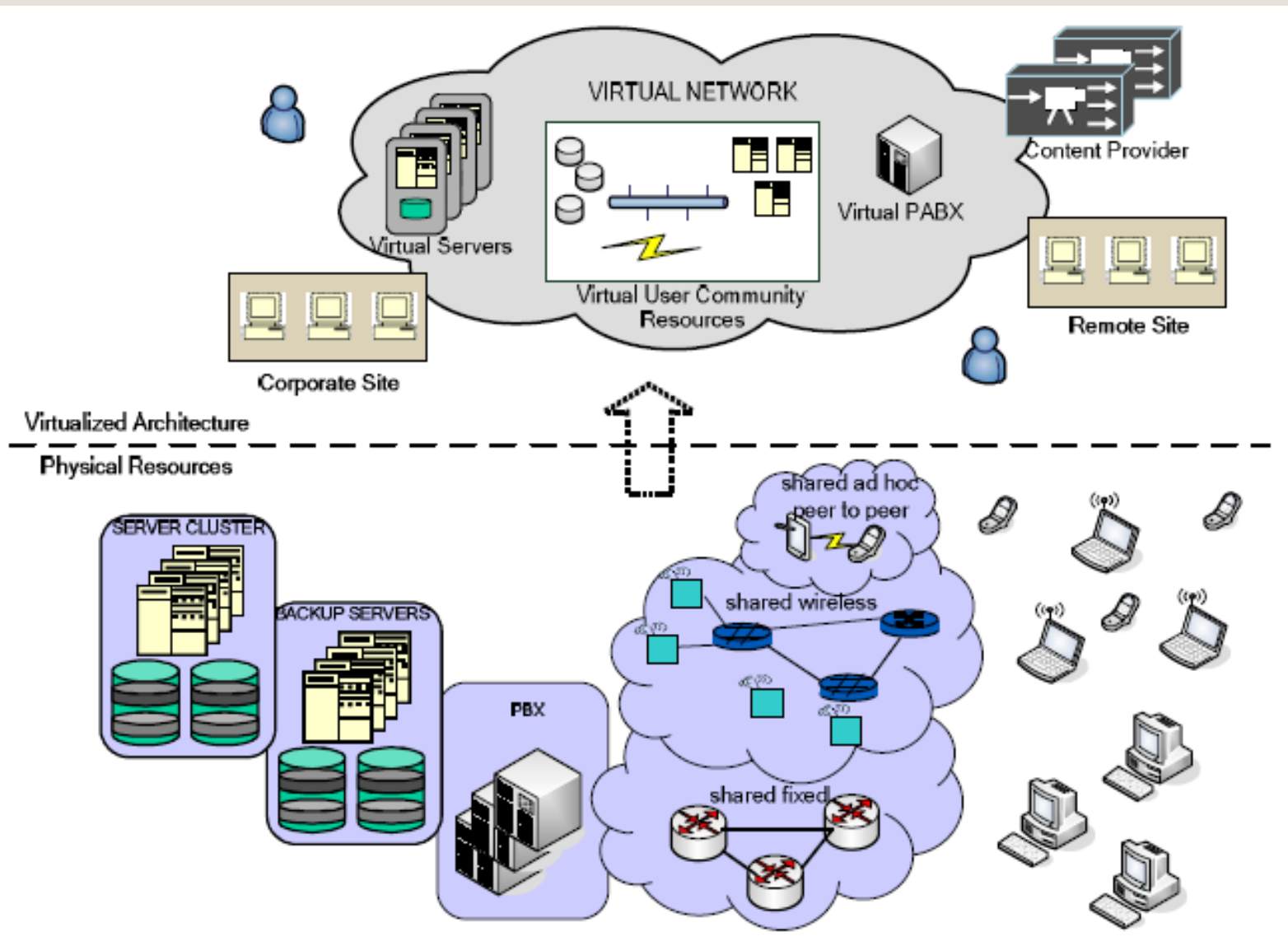
Benefits to provide end-to-end resource virtualization

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Requirements imposed by P2P applications

- A distributed service architecture allowing for network wide control and management of shared resources
- Transparent resource provisioning, for facilitating effortless end-user control over virtual resources
- Scalability
- Connectivity
- Dynamic and distributed discovery
- Security
- Resource availability and failure management
- Location Awareness
- Group support

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Benefits to provide end-to-end resource virtualization (1)

- By using end-to-end virtualization:
  - each virtual network appears to have its own unique set of properties and performance characteristics:
    - isolation of traffic maintains privacy
    - decoupling of physical resources from network topology allows resilience and redundancy
    - confinement of service requirements within virtual networks makes possible to address complexity and scalability
  - communities of users can cooperate to make efficient use of computing and communication resources across the network
  - enable operators to provide network resources tailored to P2P (Web 2.0) user communities:
    - improve quality of P2P (Web 2.0) network services
    - generate operator revenues from these services

Benefits to provide end-to-end resource virtualization (2)

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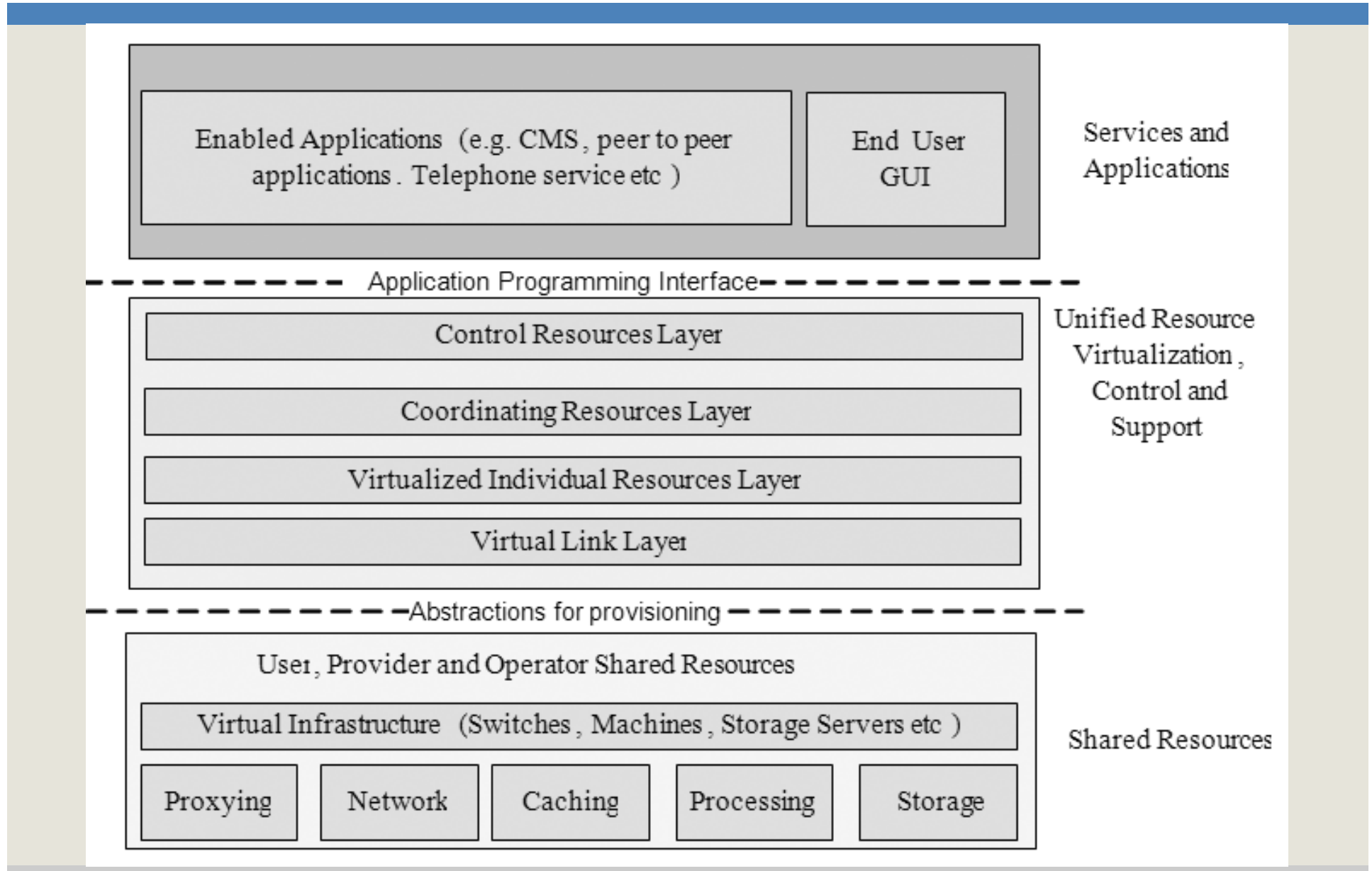Benefits to provide end-to-end resource virtualization

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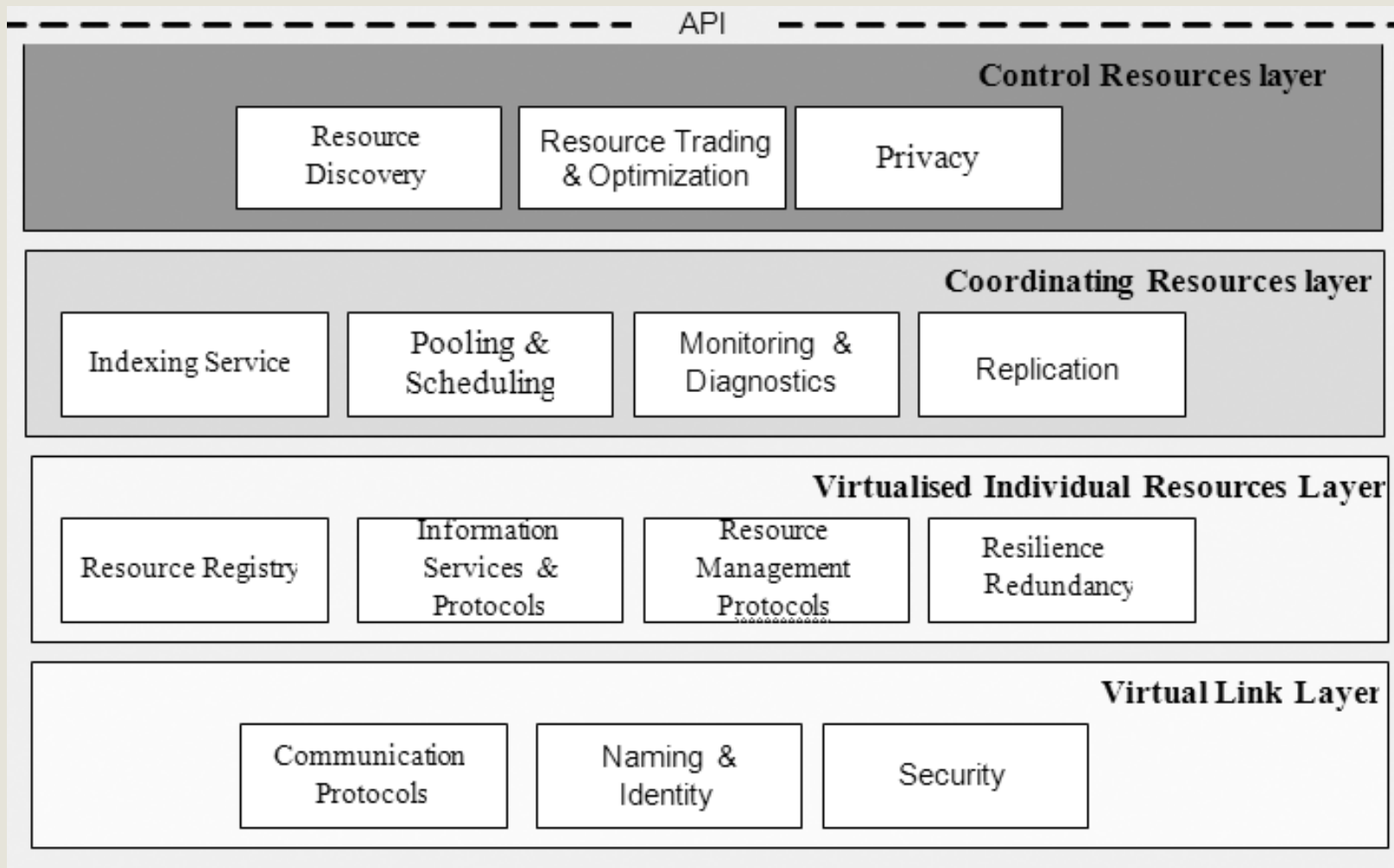# Proposed architecture for end-to-end resource virtualization (1)

- Provision end-to-end virtualization using SOA and Web 2.0 principles is possible:
  - Service and Applications tier:
    - web 2.0 applications
  - Unified Resource Virtualization and Control support tier:
    - uses SOA principles
  - Shared resources tier:
    - based on OGSA (grid solutions)

Proposed architecture for end-to-end resource virtualization (2)

Proposed architecture for end-to-end resource virtualization (3)

Unified Resource Virtualization, Control and Support layer

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Conclusions and Future work

- Emphasized requirements of P2P applications on end-to-end virtualization

- Emphasized the benefits of using end-to-end virtualization:
  - communities of users can cooperate to make efficient use of computing and communication resources across the network
  - enable operators to provide network resources tailored to P2P (Web 2.0) user communities, improving quality of network services and generating new operator revenues

Conclusions and Future work

- Architecture able to provide end-to-end virtualization using SOA and Web 2.0 principles is possible:
  - Service and Applications tier:
    - web 2.0 applications
  - Unified Resource Virtualization and Control support tier:
    - uses SOA principles
  - Shared resources tier:
    - based on OGSA (grid solutions)

- Future work focuses on implementation and evaluation of the architecture