

# Mediation between Service and Network Composition



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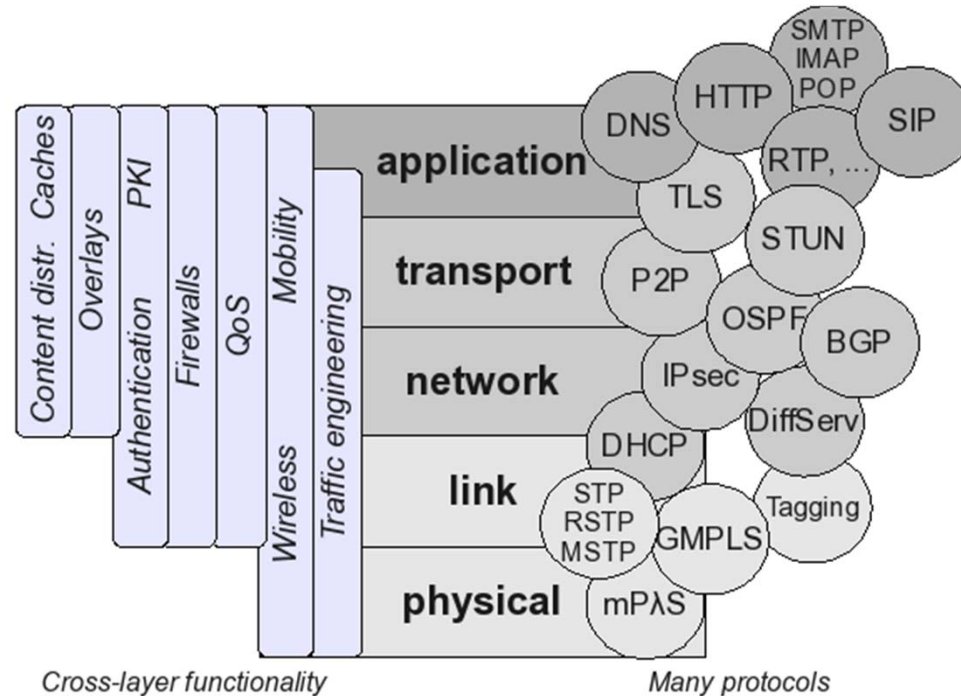
1

# Outline

- Goal & Basic Concept
- Advantages and Challenges of Mediation
- Proposed Types of Negotiation

# Goal & Basic Concept

# Architecture of the Current Internet



Original architecture is violated

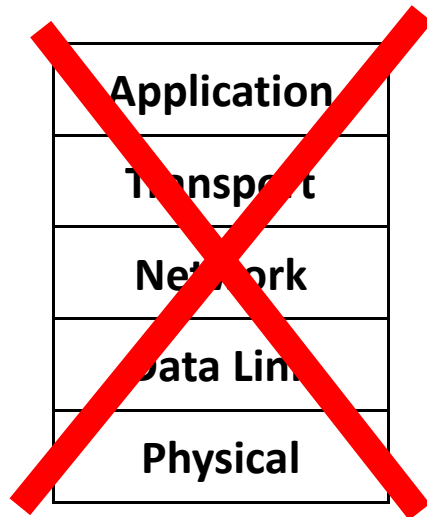
Increasing interdependencies hinder innovation

Complexity is still rising ...

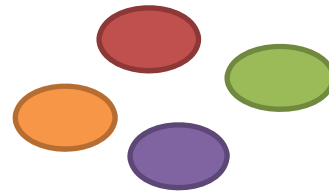
# Goal

- A future network architecture should be flexible:
  - Long term flexibility:  
Support evolution of networks
  - Short term flexibility:  
Dynamically adapt to requirements and constraints

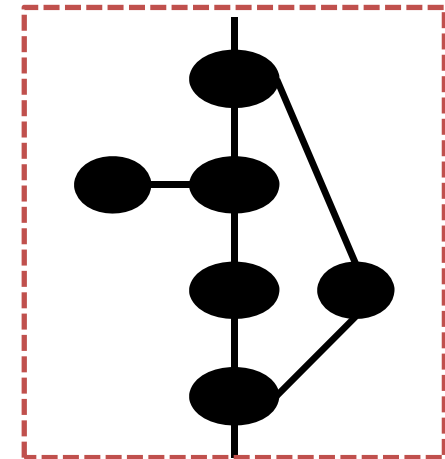
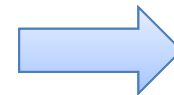
# Functional Composition



Static Layering

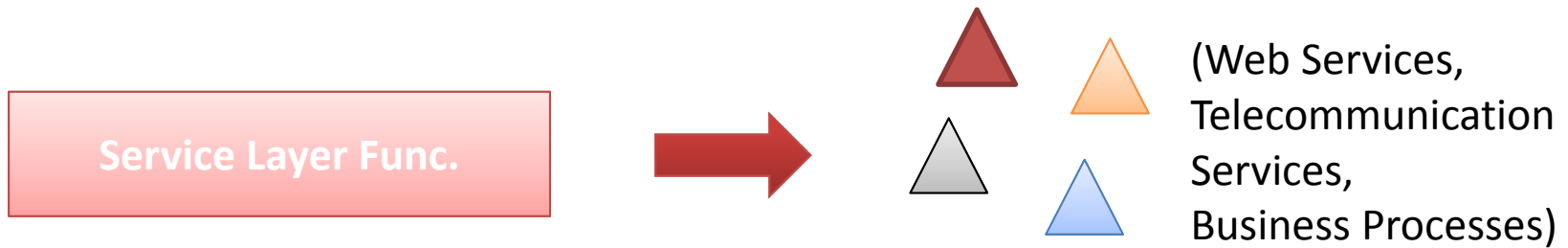


Functionalities

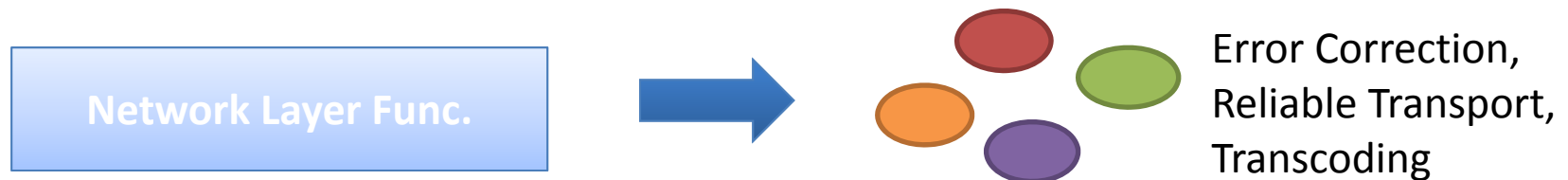


Functional Composition

# Services at Different Layers



- Similar problems, but different scope

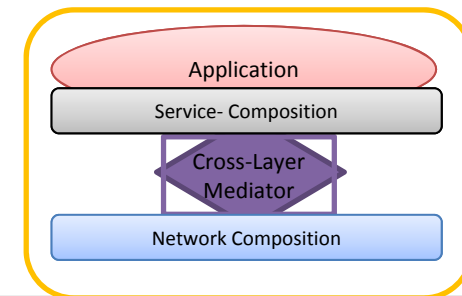


# Cross-Layer Mediation and its Advantages & Challenges



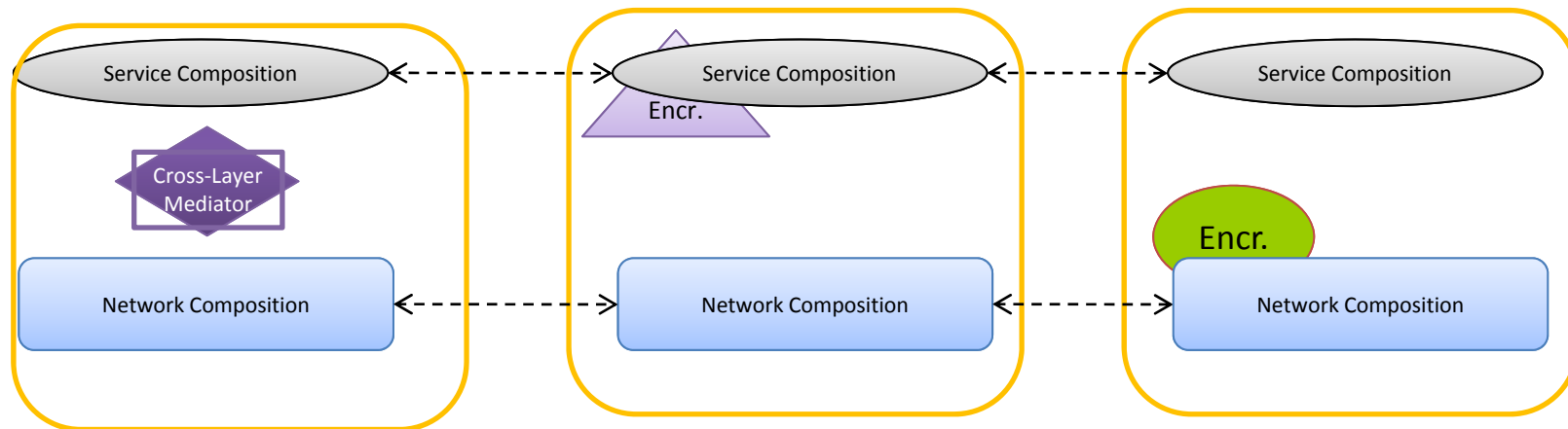
# Cross-Layer Mediation

- Intervention in a dispute in order to resolve it (oxford)
- Mediation, a form of alternative/appropriate dispute resolution (ADR), is a way of resolving disputes between two parties. To help the parties come to a final decision based on the facts given through the discussions. (wikipedia)
- Use a mediation approach for negotiation between service and network layer in a functional composition approach



9

# Overlapping (Redundancy) Functionality



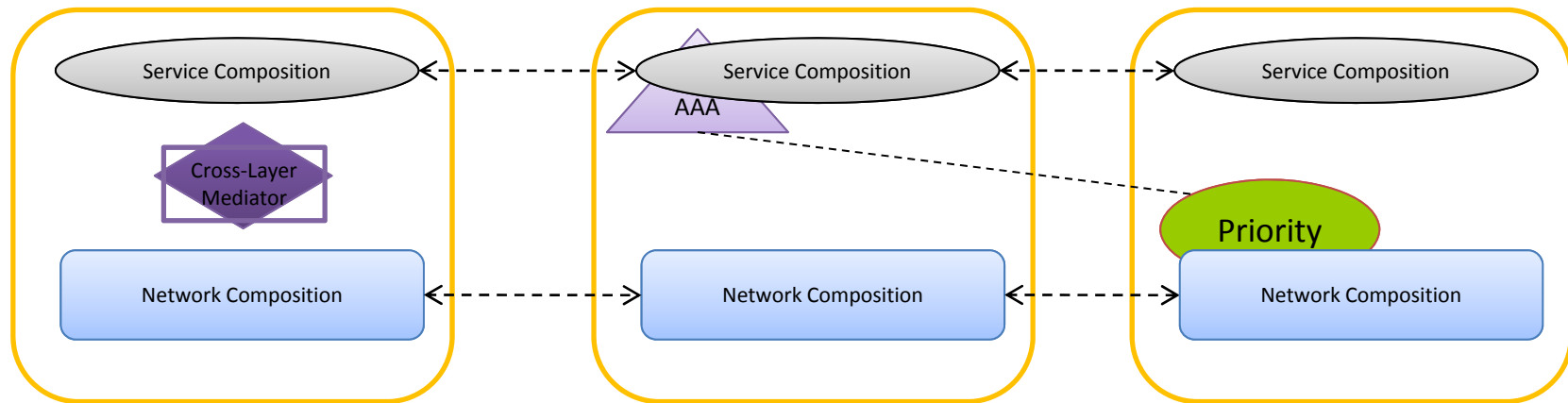
AAA → Authentication, Autorisation , Accounting

There may be similar functionality provided on application level and on network level e.g. both may implement user authentication.

- Different policies can be deployed
  - As application will have first say, it can decide for service at service layer depends on different characteristics (e.g. trustworthy, nearer to application,)
  - At Network Layer (e.g. efficiency , widely availability)

10

# Interdependency of Functionality



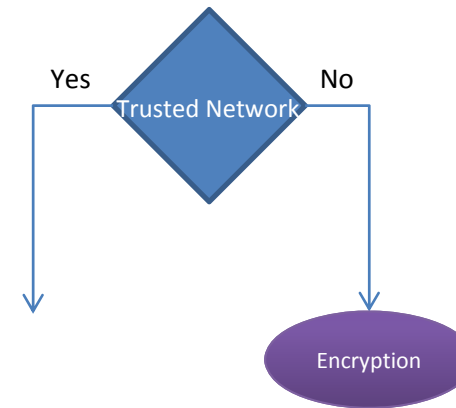
Functionality on application and network level may need interaction

- priority only for authenticated users
- HD traffic only for users with reliable/high bandwidth connection

Mediation can help to resolve the issue with cross-layer information exchange.

# Exclusion & Inclusion of Functionality

Application may have constraints which may trigger the need of exclusion or inclusion of a functionality.

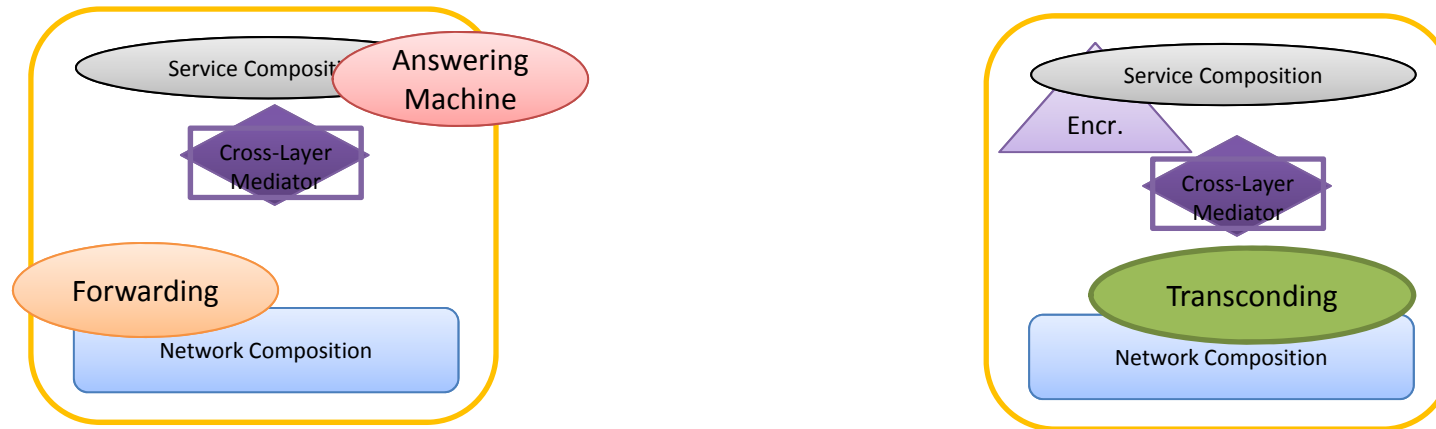


Inclusion & Exclusion

if delay >10 ms use caching

if network trusted exclude encryption

# Conflict of Functionality



A conflict may occur among network and service layer functionality.

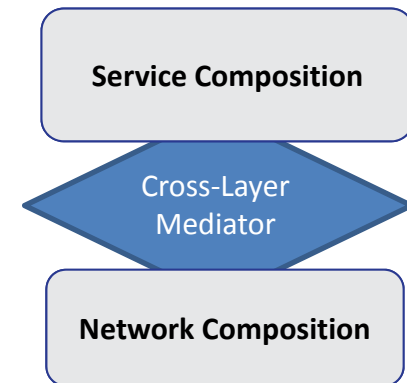
- Two functionality can not work together(e.g. an answering machine service and a forwarding service( feature interaction))
- Blocking of a functionality (e.g. an encryption service at service layer and a transcoding service in the network).

# Challenges of Mediation

- Redundancy of functionality
- Conflict of functionalities
- Functionality Dependency
- Placement of a functionality resolution
- Comparison of Functionality (between two layers)
- Inclusion of Functionality only if certain conditions satisfy (when other functionality will be included too)
- Finding intermediate way between two extremes ( In case best effort functionality can not be provided and low effort functionality can not be accepted)

# Mediator

- Mediator between Network Composition and
  - Service Composition (Service Broker)
  - Application - in case no broker required
- Information Exchange between Network and Service Level
  - Translation of Network Capabilities and Requirements
  - Requirements transport to the network
  - Feedback of the network to application
- Helps to decide where service is executed (e.g. encryption, transcoding, virus scan)

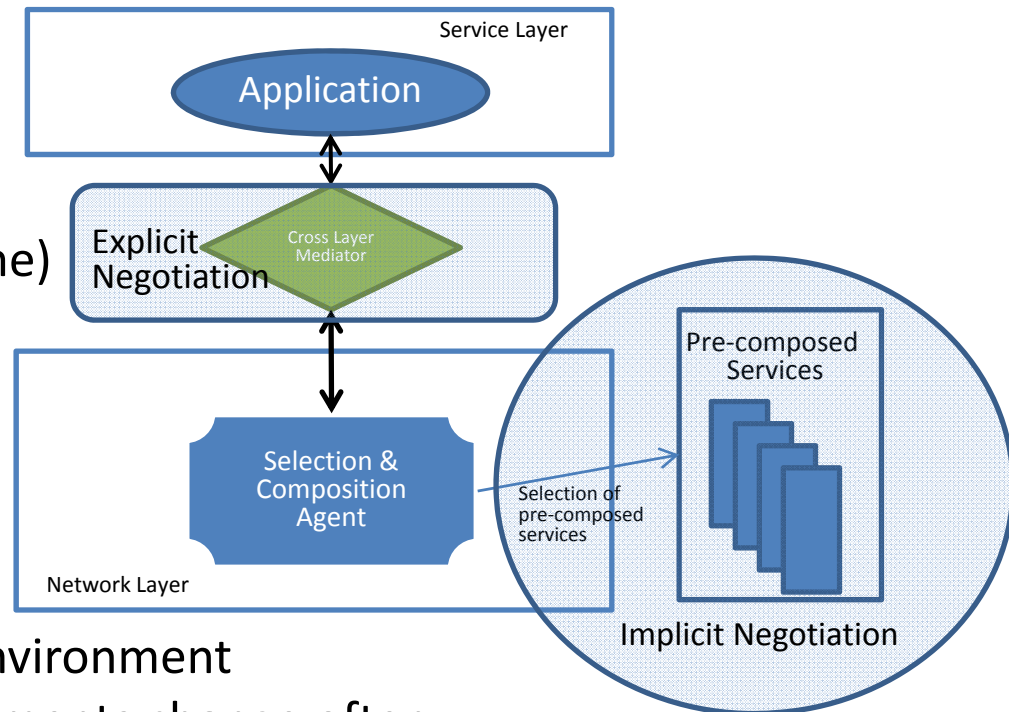


# Types of Negotiation



# Negotiation Schemes

- Implicit
  - Previous experience
  - Usage of pre-composed functionality (e.g. at design time)
  - Efficient
- Explicit
  - Best suitable for dynamic environment where constraints and requirements change often
  - Overhead



# Advantages & Disadvantages of Mediation

- In-dependency: A mediation helps two layers (i.e. service and network layer) work independently.
- Flexibility: A mediation helps an architecture to exploit the flexibility of a composition process.
- Fairness Between Parties
- Load Balancing
- Performance Drain: Additional overhead in terms of negotiation has an impact of on overall performance of the architecture.

# Current Focus

- Service Description and Composition
- Application Requirement Description
- Mediation schemes and API

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