

Simple Economic Management Approaches of  
Overlay Traffic in Heterogeneous Internet Topologies

## Allow the Exchange of Information between Layers and Players

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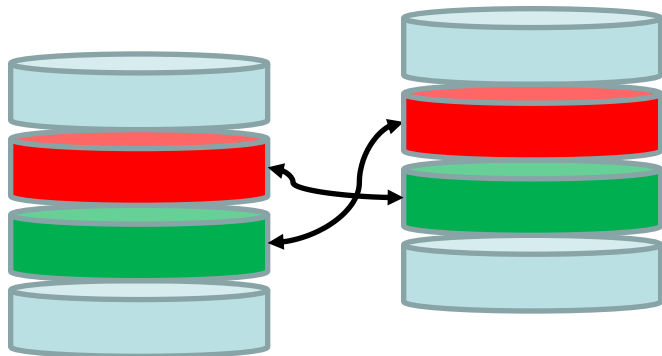
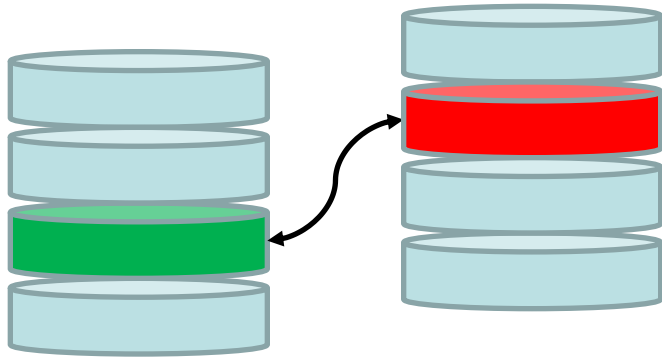
# The Internet Ecosystem: Current and Future

- Many players acting simultaneously with conflicting interests → leading to *tussles*
  - Customers/Users
  - Providers: ISPs, Application providers, Over-the-top providers, Content providers
- Targets:
  - To address the information asymmetry between players (and layers)
  - To allow for variation in the outcome

# Layers and Players

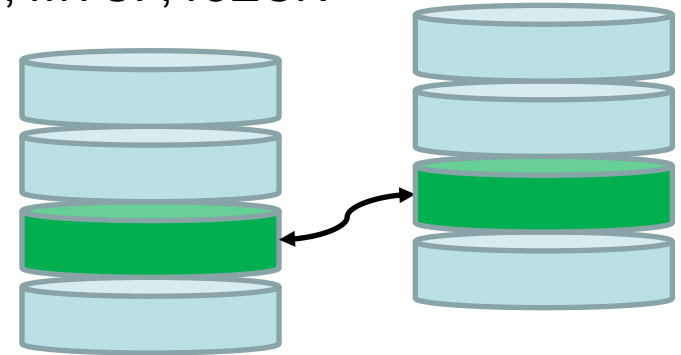
## Different layers of different players

e.g., overlay traffic management



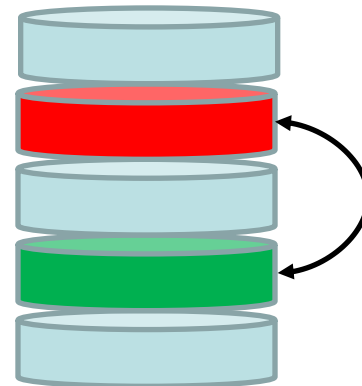
## Different players at the same layer

e.g., mTCP, reECN



## Different layers of the same player

e.g., DPI, mTCP



# Motivation

- Allow layers and players express their preferences/choices
- Address information asymmetry between layers and players

## Principle

***Optional exchange of information, if serving the incentives of layers and players.***

– Can lead to **“all-win”**

# Constituent elements

- Exposure of information
- Collection of information
- Assessment of information
- Decision making
- Abstracting/aggregating information
  - Do not expose ***critical*** information

# Examples

- Overlay traffic management
  - The overlay asks underlay for advice on resource selection
- Multipath TCP
  - Congestion information is carried by flows; the end-host makes decision on how to shift load among flows
- Re-ECN
  - Congestion information is made available to any node of the network

# No contradiction to the “end-to-end” principle?

Different possibilities for means of information exchange:

- Information is exchanged in packets
  - No impact on routing
- If information is carried in the fields of the protocol headers
  - Limited impact on routing
- Complexity mostly to reside at the edges

**Thank you for your attention!**