Sixth Framework Programme

UNIVERSITÄT BERN

Feature D
"Multicast Middleware"

Architecture Overview and Demonstration

Overview

- Multicast in EUQoS
- Traditional multicast vs. overlay multicast
- Features
- Demo setup
- Functional overview
- Demo
- Multicast Middleware interfaces
- Multicast routing protocol and overlay setup
- Open tasks

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Multicast in EUQoS

- Since “native” multicast is not widely deployed in the Internet, it is necessary to emulate multicast by using unicast communication
- Overlay (peer-to-peer) networks allow data dissemination (multicasting) with an approximation of the “native” multicast efficiency using only unicast communication
- Overlay multicast infrastructures can be made transparent for end-users by tunneling “real” multicast packets trough an overlay structure

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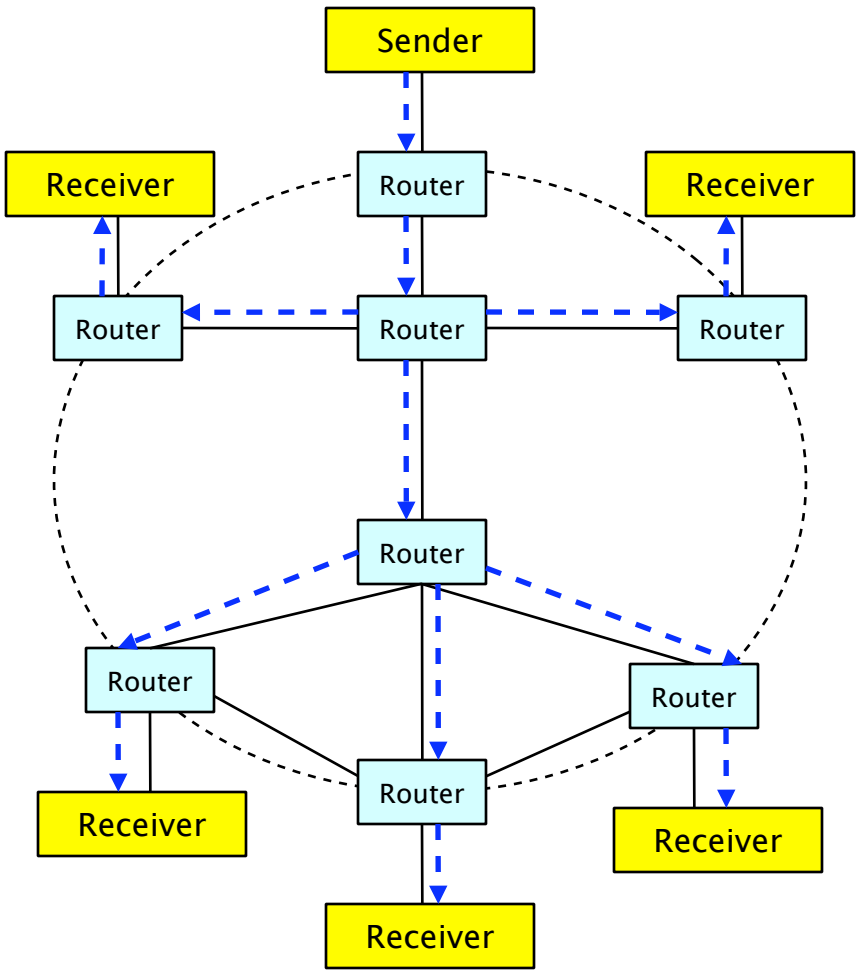
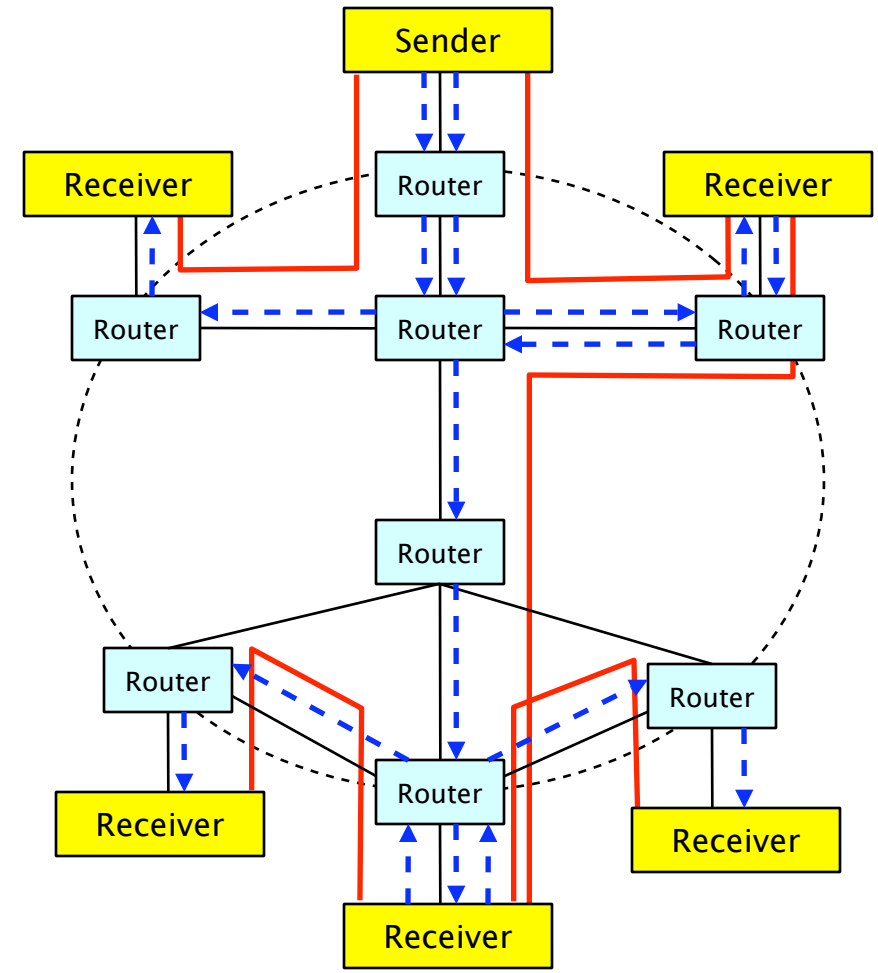
Traditional Multicast vs. Overlay Multicast





Multicast Packet Flow Physical Link P2P Link

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Features

- “Multicast Middleware” enables multicast (with QoS support) on end systems across the Internet using only unicast communication
- A P2P network transports multicast payload
- Transparent for the host system applications
- Requires no additional infrastructure
- Supports EUQoS QoS-signaling
- Supports measurement based “Best Effort” QoS admission control in absence of other reservation mechanisms

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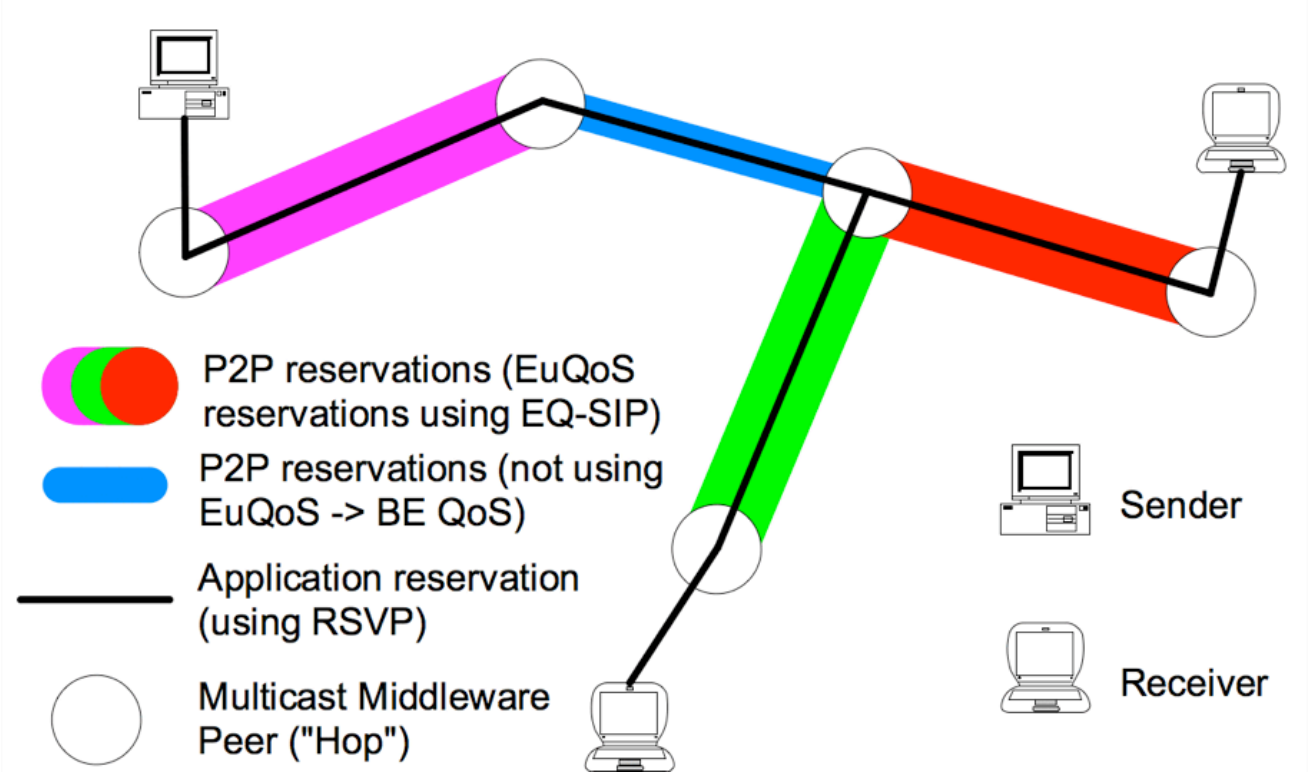
QoS Reservation

- EUQoS QoS reservation combined with "BE"-QoS (measurement based) reservation



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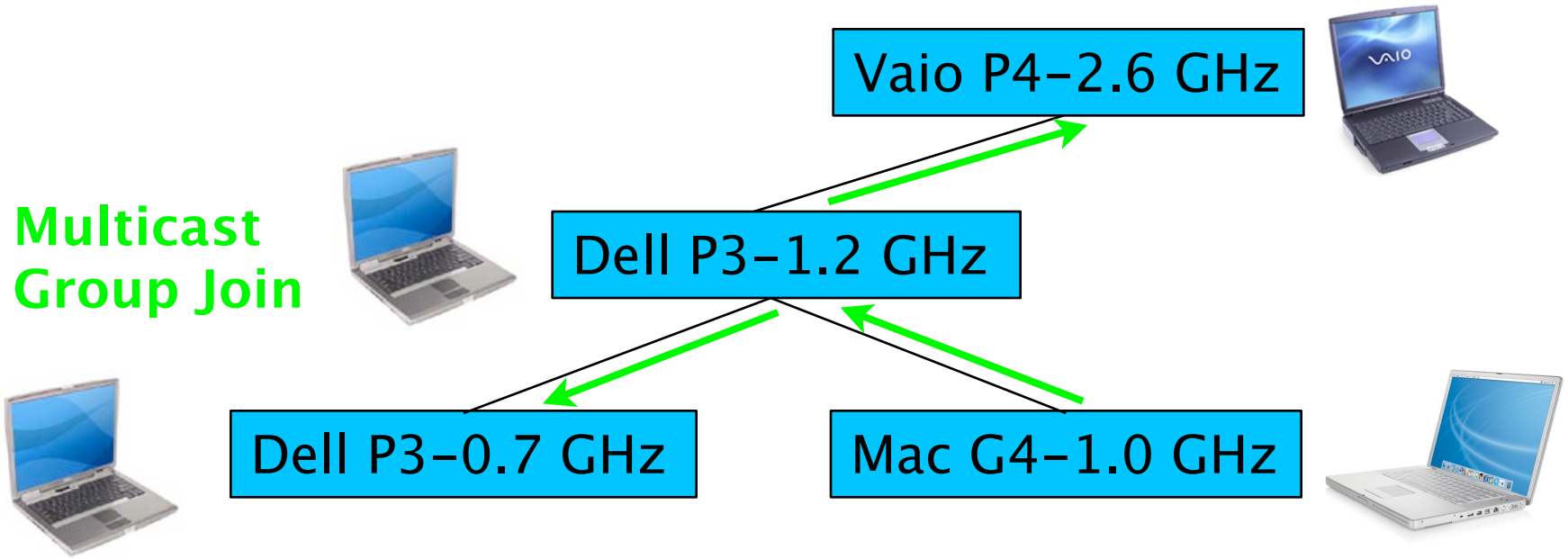
Demo Setup



- Media: VCD MPEG-TS 1.4 Mbit/s
- Applications: VLC (built-in multicast support)
- Technologies: Java 1.5, tun/tap
- Protocols: UDP, TCP, IGMP, SAP

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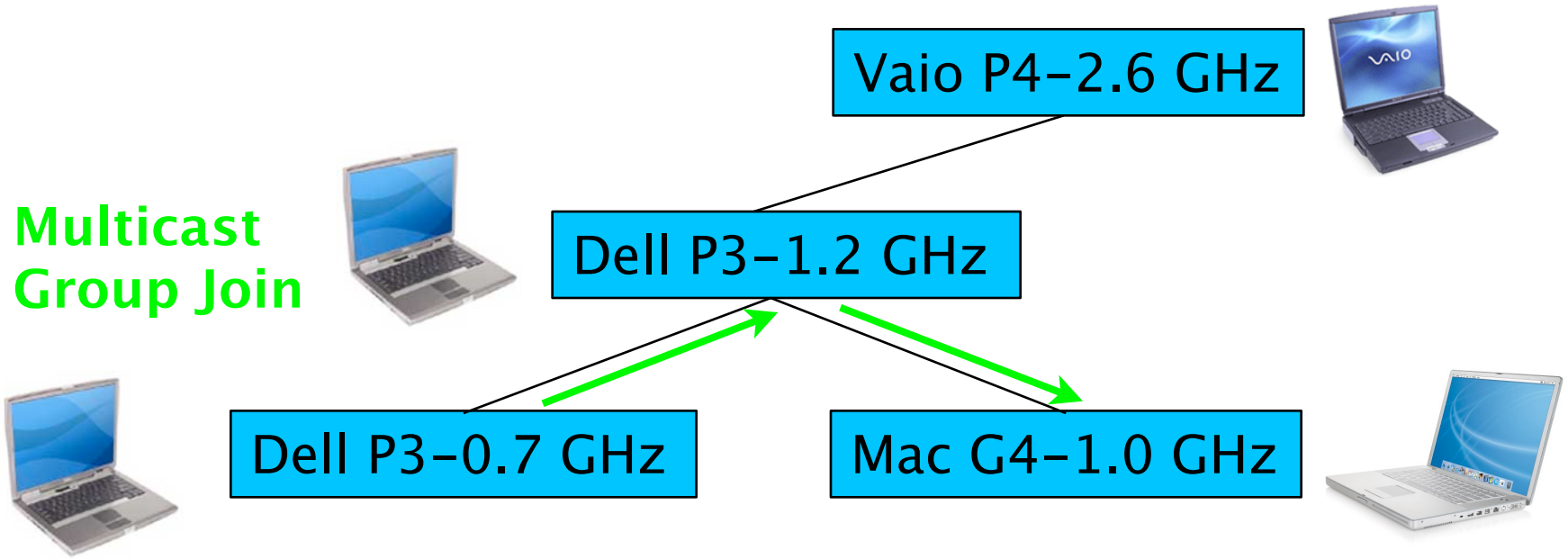
Demo Setup



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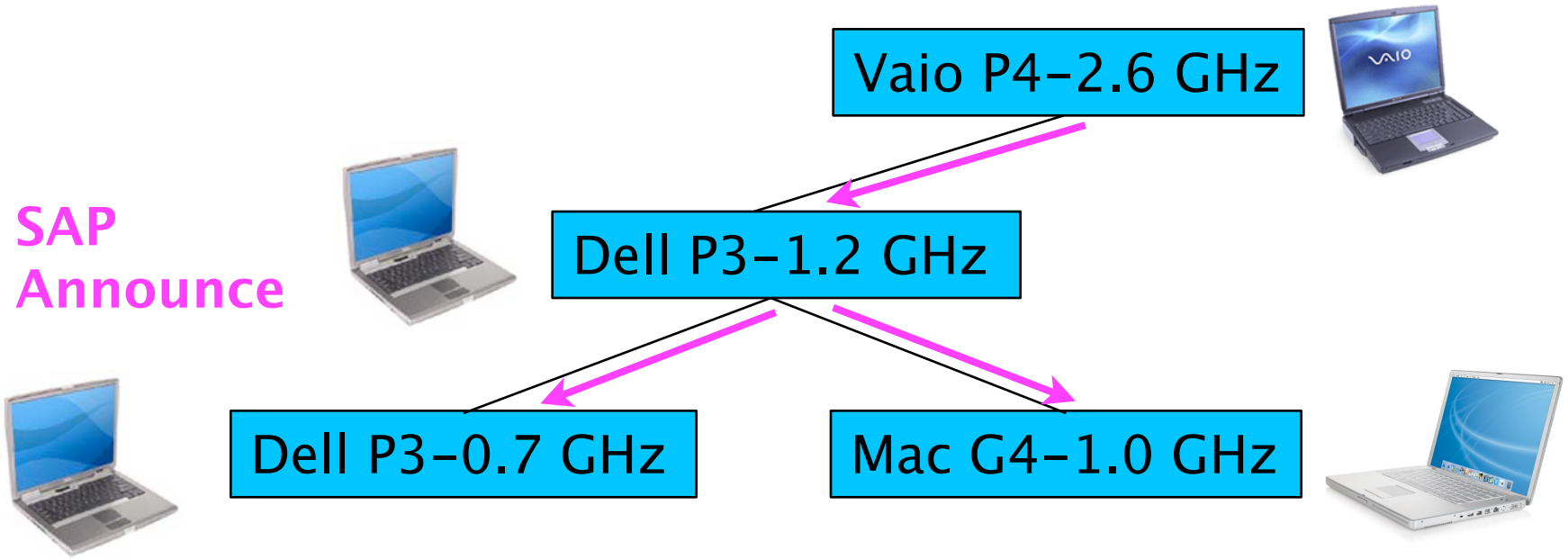

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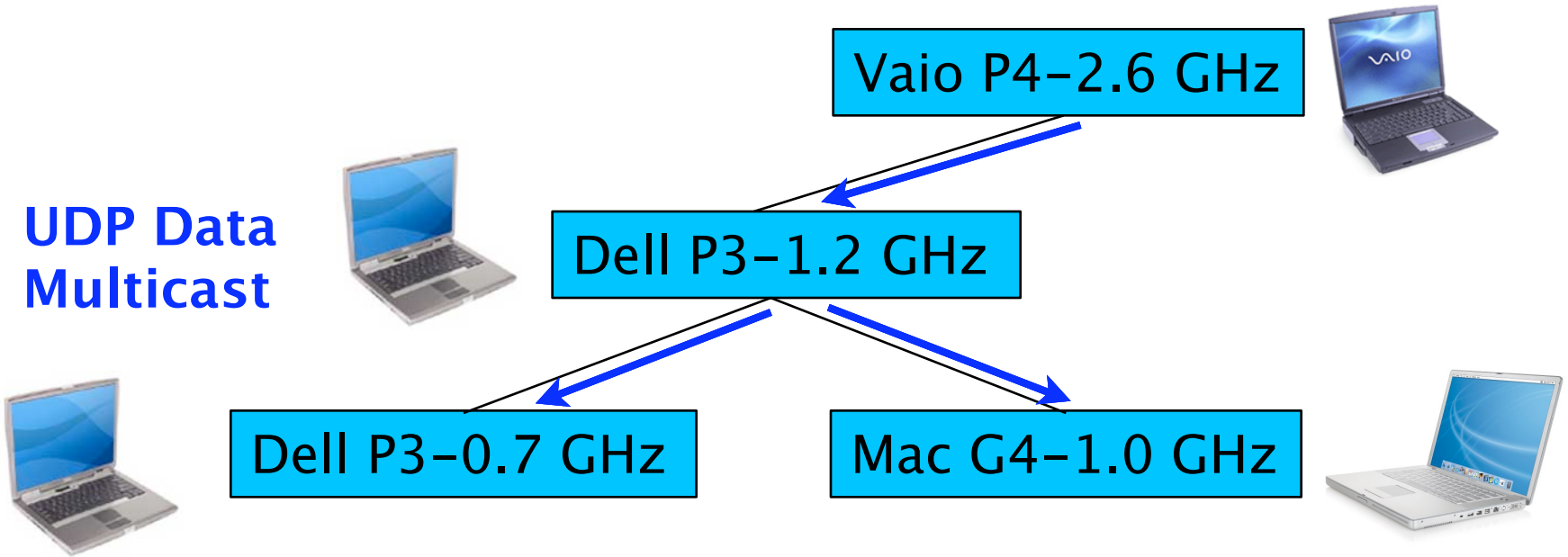

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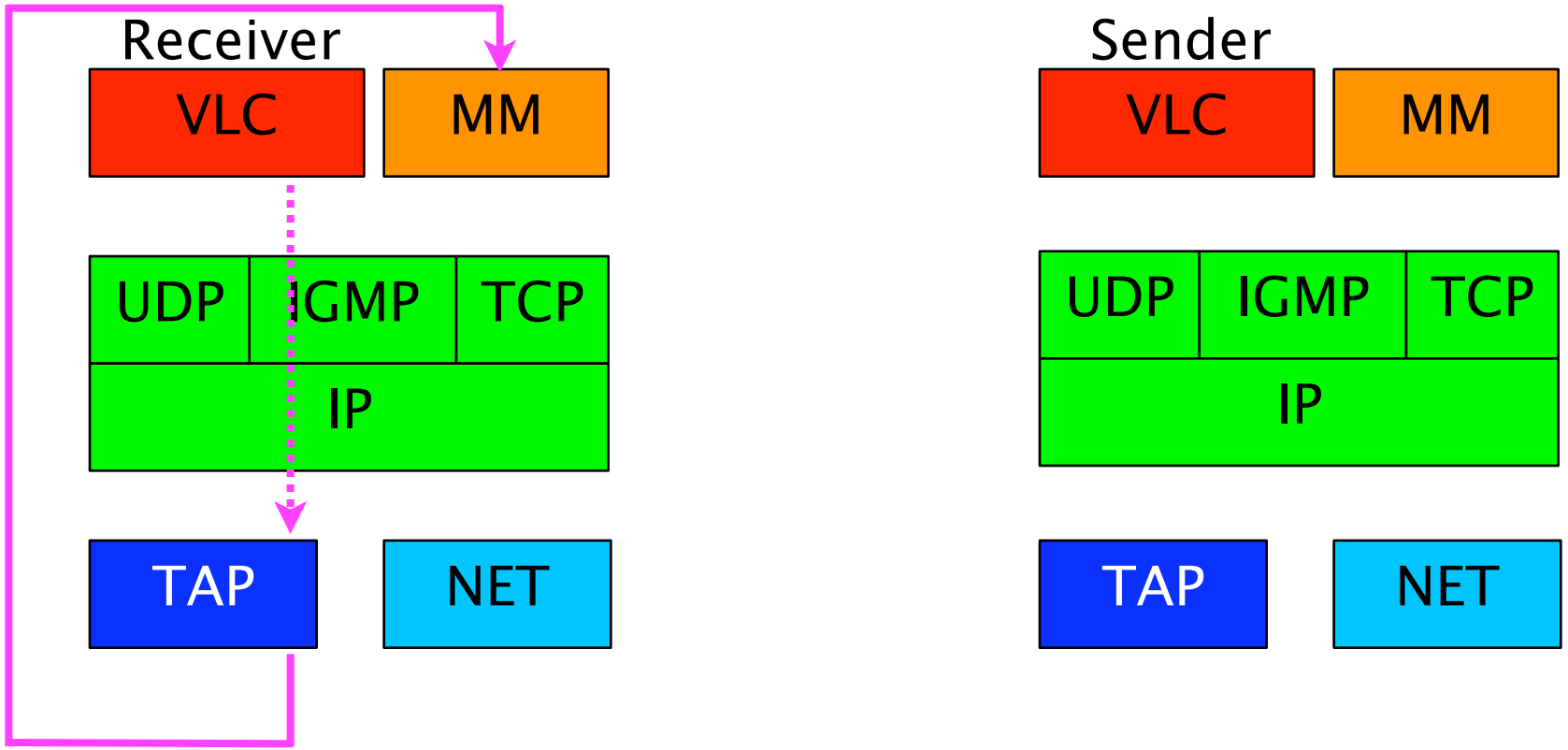
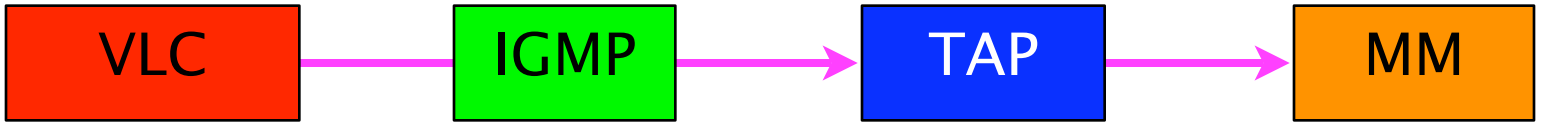
Functional Overview



- 1a. IGMP



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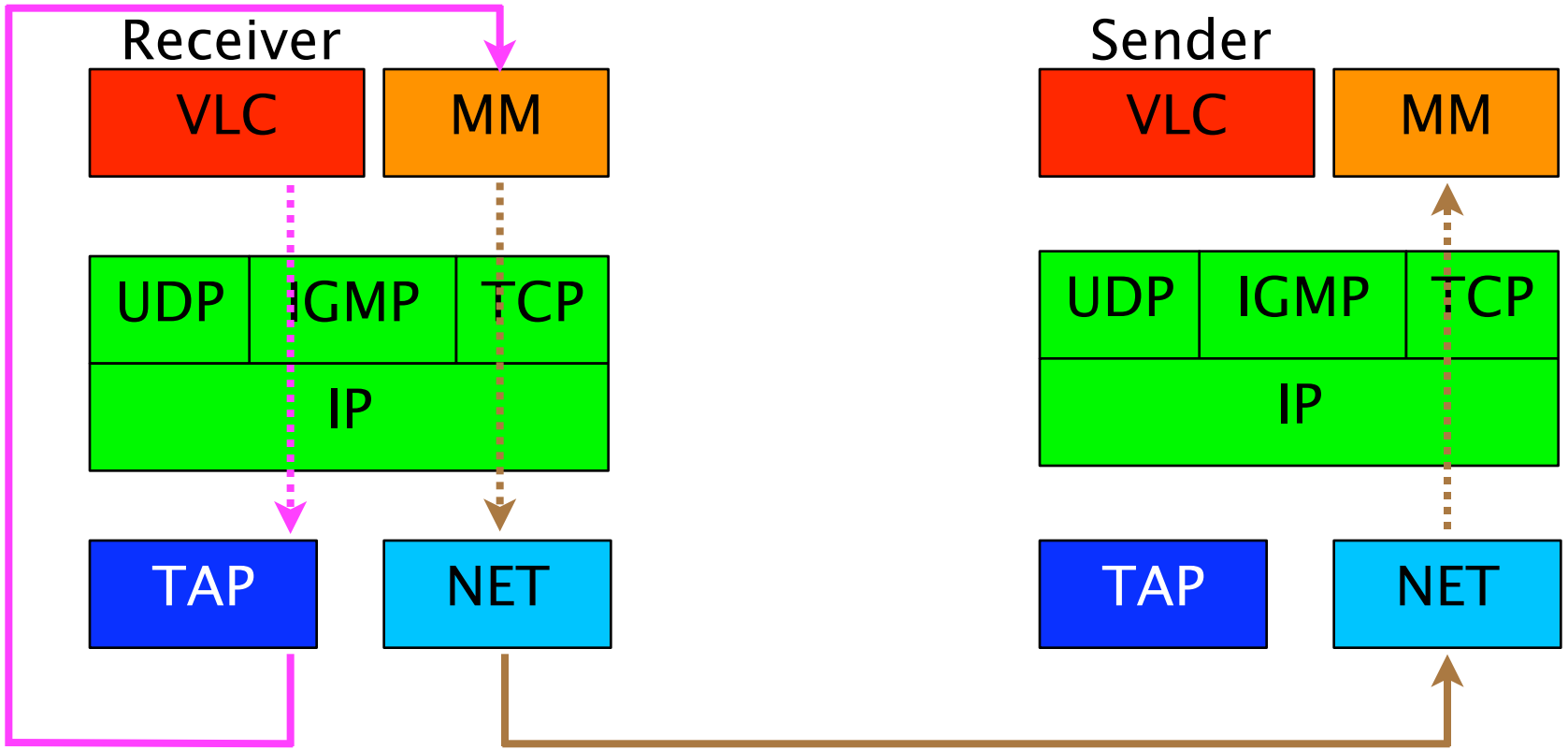
Functional Overview



- 1b. P2P Add Route Message

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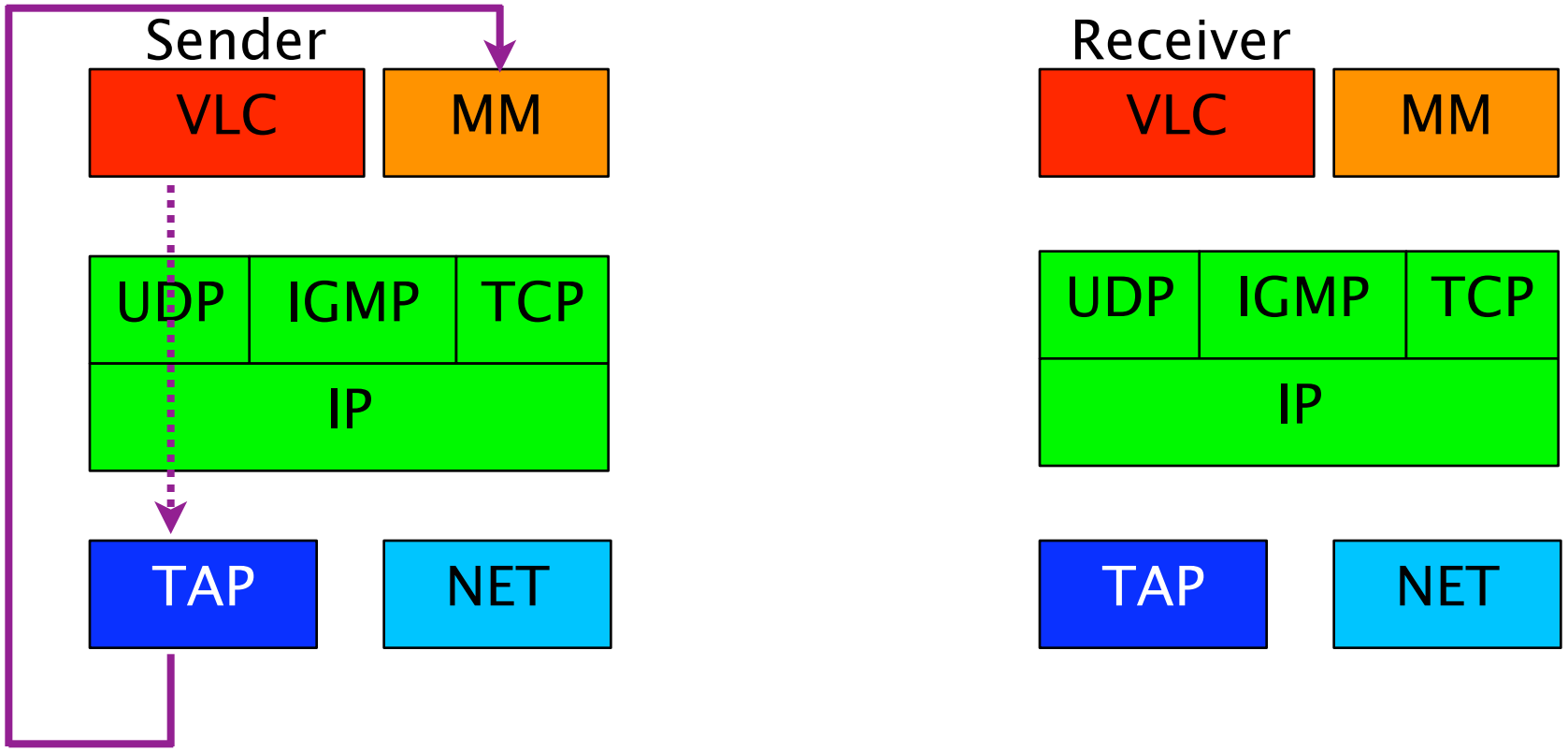
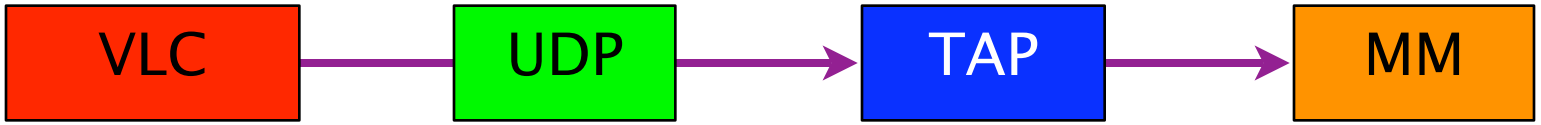
Functional Overview



- 2a. UDP Data



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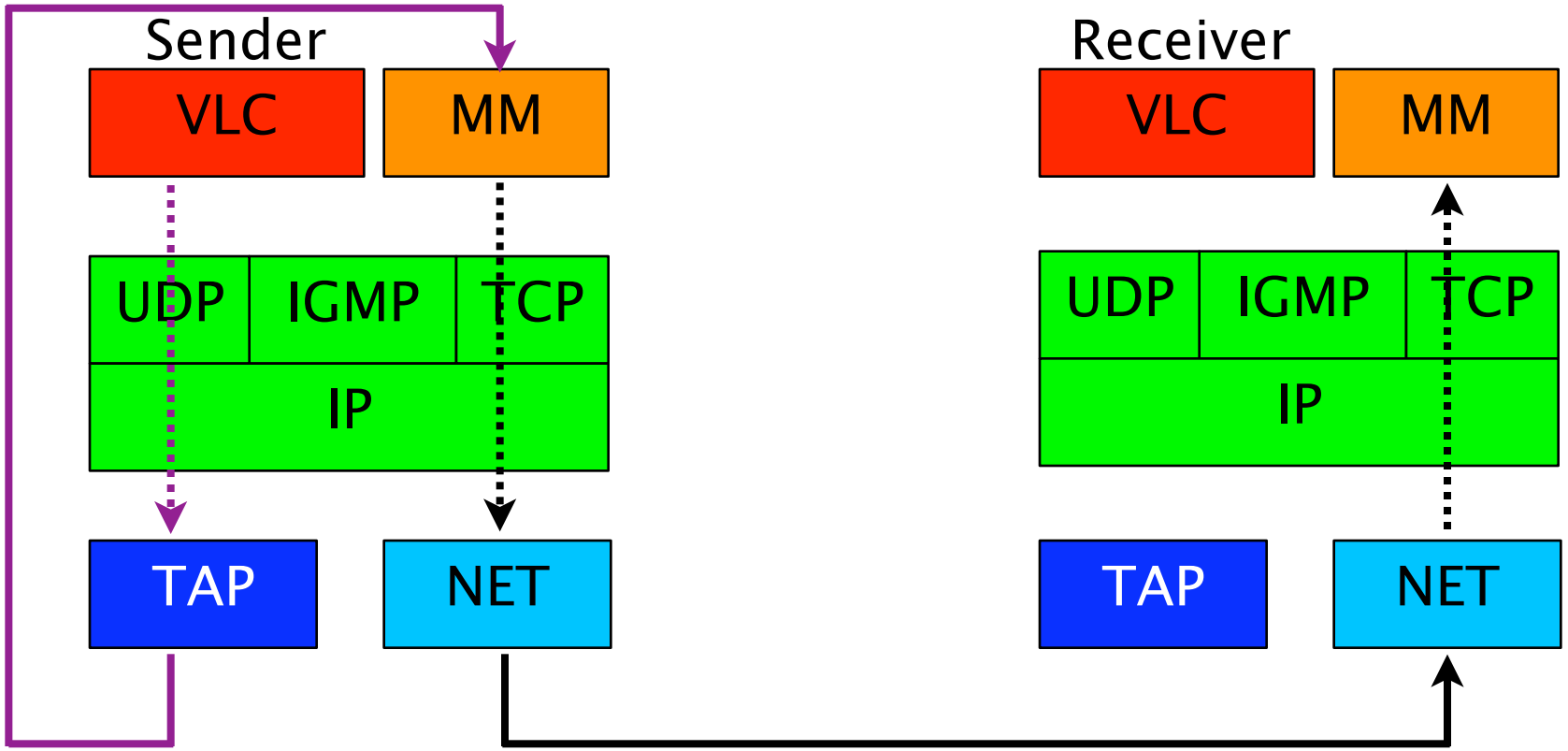
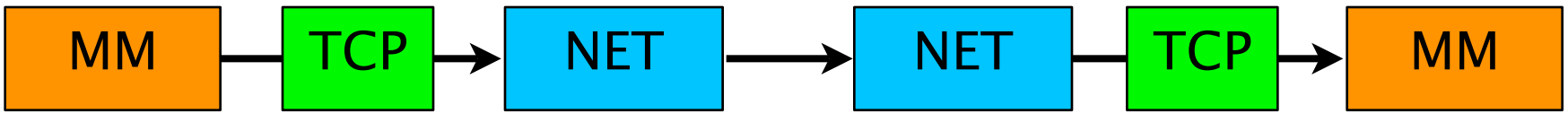
Functional Overview



- 2b. P2P Data Message



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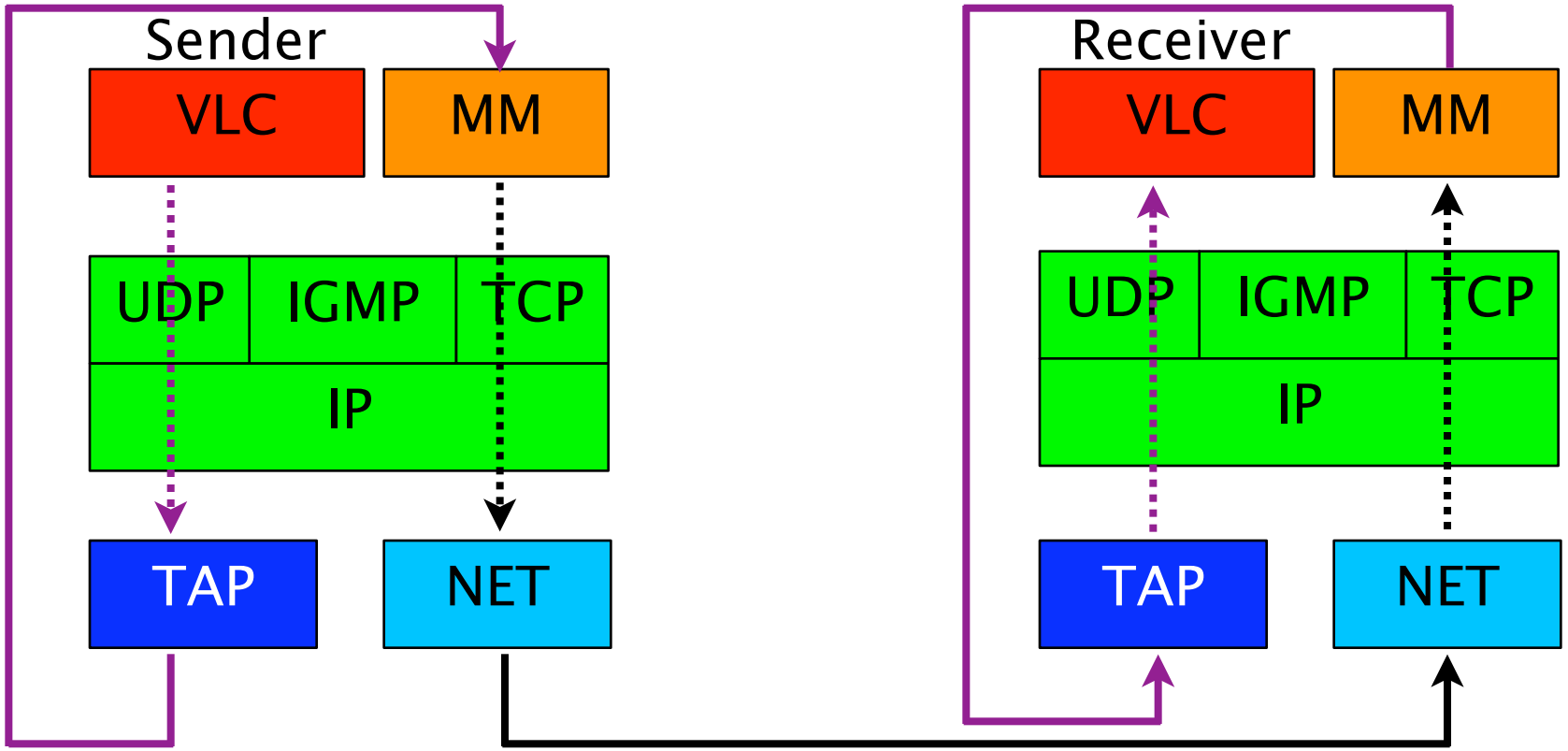
Functional Overview



- 2c. UDP Data

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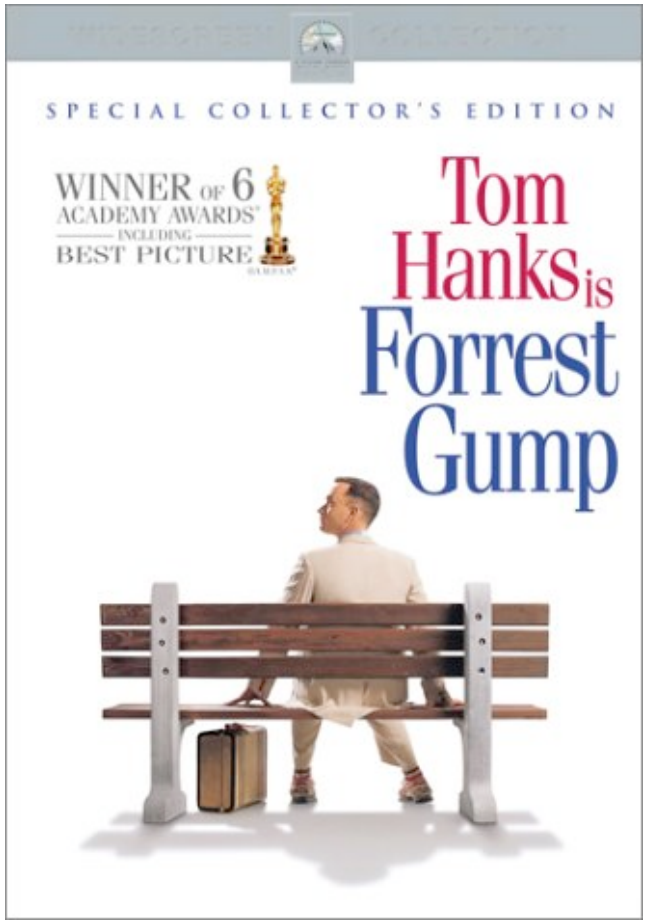
Demo



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Multicast Middleware Interfaces

- Transparent interface for the multicast applications using a tun/tap device
- RSVP based reservation QoS signaling for legacy applications
- Web-based user interface for management
- Webservices-based reservation interface for EUQoS-aware local applications
- Webservices-based management facility for EUQoS modules
- Webservices-based MMFM functionality

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Multicast Routing Protocol and Overlay Setup

- Current routing protocol
  - Sets pro-actively routes towards all receivers (in worst case: flooding of the overlay network for every group join)
  - Does not scale well
  - Found routes are optimal regarding hop count
  - Sufficient approach for current implementation
  - It works only with acyclic, tree-like topologies
- Overlay setup
  - Manual (configuration file) setup of P2P-links
  - Should be replaced by a more intelligent P2P setup algorithm based on net conditions / measurements

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Open Tasks

- Improving the multicast routing protocol
- Improving the overlay bootstrapping and construction protocol
- Implementing native (OS-specific) forwarders to improve performance
- Implementing the reservation signaling and reservation of the unicast P2P-links
- Implementing the Web-based user interface
- Implementing the Webservice-based interfaces for EUQoS aware applications and modules

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