



Open Issues In P2P Multimedia Streaming

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- Background
 - P2P technology
 - Multimedia transmission
- Multimedia transmission over IP networks
- Related works
- Key elements for P2P Multimedia communication
 - Network Architecture
 - Coding Schema
- Issues related to P2P multimedia Streaming
- Conclusion

2P: The Big Picture (1/2)



- The most important part of the Internet Traffic

- New architectural design capturing a lot of interest
 - Overlay networks on the top of the physical network.
 - flows back and towards end-users
 - Exploit abundant resources at the network edge

- P2P networks are a distributed system
 - Centralized: Napster
 - Fully distributed: Gnutella V1
 - Semi decentralized: Kazaa, eDonkey



→ Several applications

- **File sharing: eDonkey**
- **Content distribution: BitTorrent.**
- **VoIP: Skype**
- **IPTV: PPLIVE**

→ Challenging problems

- **Efficient resources sharing**
- **Incentive**
- **Security**



→ Requirements

- Packet loss: Loss and error management
- Bandwidth management: Adaptive coding
- Delay variation (Jitter): Buffering
- Delay transfer: Network QoS

→ Current solutions: CDN (Content Delivery Network)

- Centralized client-server communication
- Cost infrastructure
- Server bottleneck: Scalability issues

→ Peer To Peer Paradigm can fully overcome these limitations

But still a lot of new challenges



- At the glance
 - Transmission of an **encoded media** stream using a specific **P2P network architecture**

- Two main components
 - Network architecture.
 - Media encoding format.



→ Success story: TV over the Internet

- CoolStream: 15 mn to reach a stable state
- PPLive: 2 mn to reach a stable state
- PPstream, TVAnts, Sopcast, QQlive . Feidian (Aka Boiling Point), PDbox, Pcast, PPTVS, Mysee ...

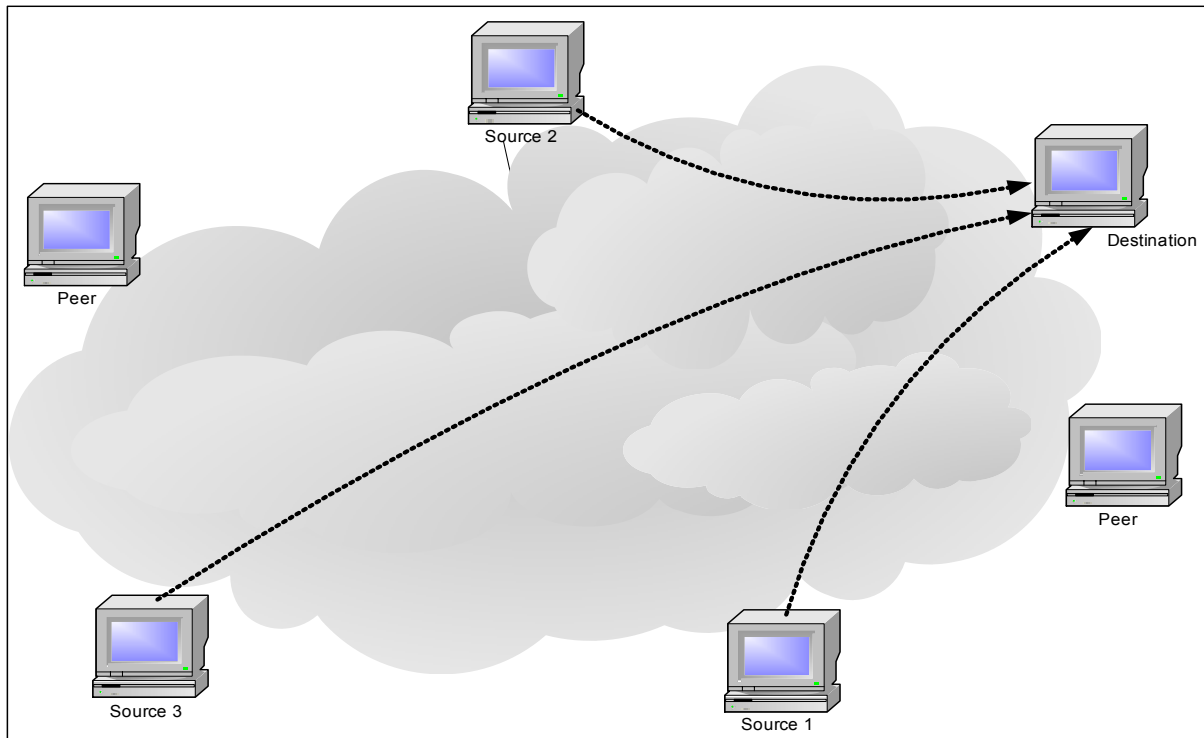
→ Theoretical studies

- Promise
 - P2P system for Multimedia transmission
- Mubasher et al
 - Adaptive transmission based of Active RTT measurment
- Ross et Al
 - Modeling optimal Peer selection system for downloading and streaming.
- PALS
 - Adaptive layered streaming

Network Architecture (1/2)



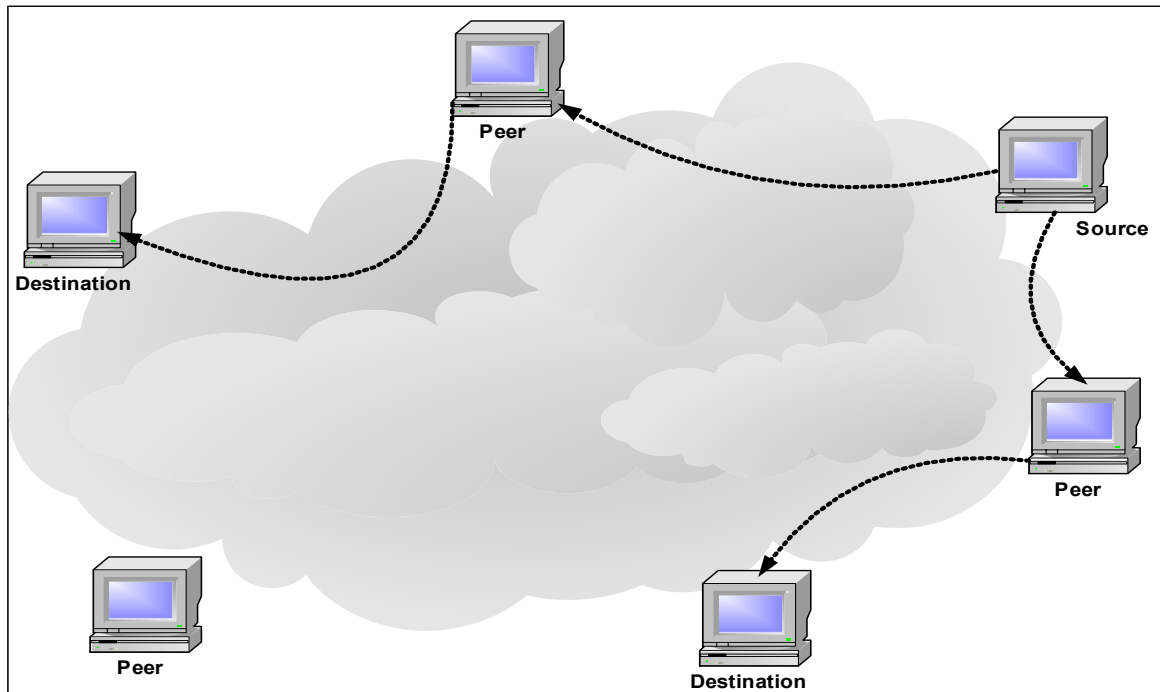
→ Multiple sources



Network Architecture (2/2)



→ Single source





- Proposed to alleviate Packet loss and error propagation occurring frequently over current IP
- Layered Coding
 - Two type of Layers : "base layer" and "enhancement layer"
 - Enhancement layers cannot be decodable independently of base layer.
- Multiple Description Coding
 - Each description can be decoded individually to get the base quality.
 - The video distortion is aligned to the number of acquired description

Requirements for efficient P2P system



- Monitoring network resources
- Overlay network architecture
 - Leverage the underlay topology
 - Media Aware
- Appropriate coding scheme
 - Meet variations on network conditions
- Choice of the best peers
 - Managing Peers heterogeneity
 - Managing Peers dynamicity
- Incentives