Survey of P2P streaming applications

draft-ietf-ppsp-survey-01

P2PRG@IETF #80

Yunfei Zhang

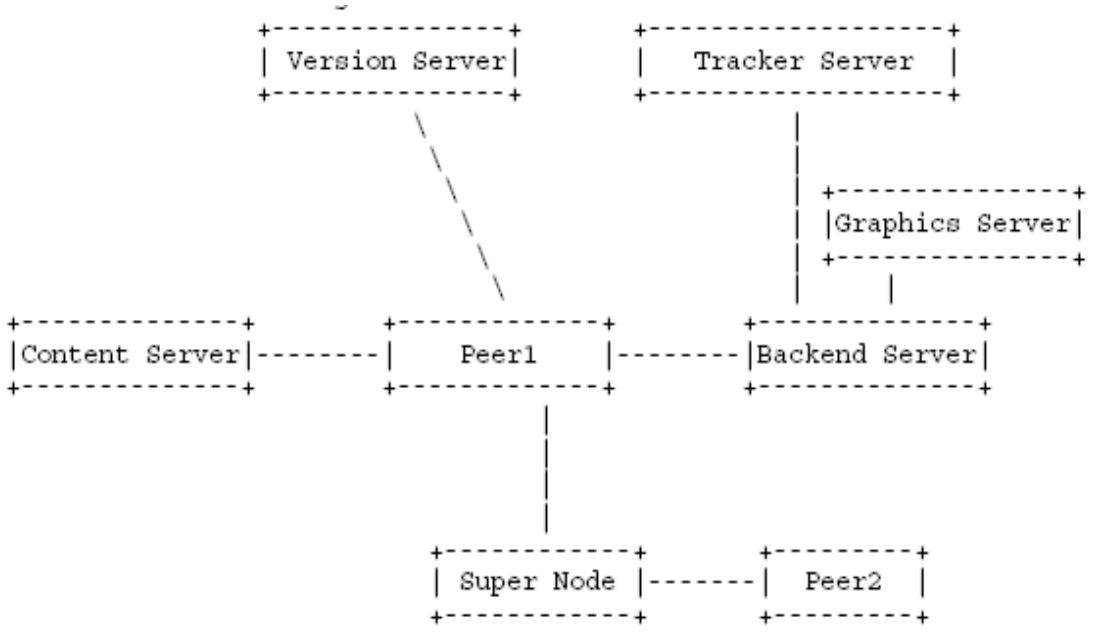
Goals

- Survey of architecture and protocols of popular P2P streaming applications.
- Summarize a common P2P streaming protocol model.
- Provide useful reference systems for PPSP protocol design.

Categories

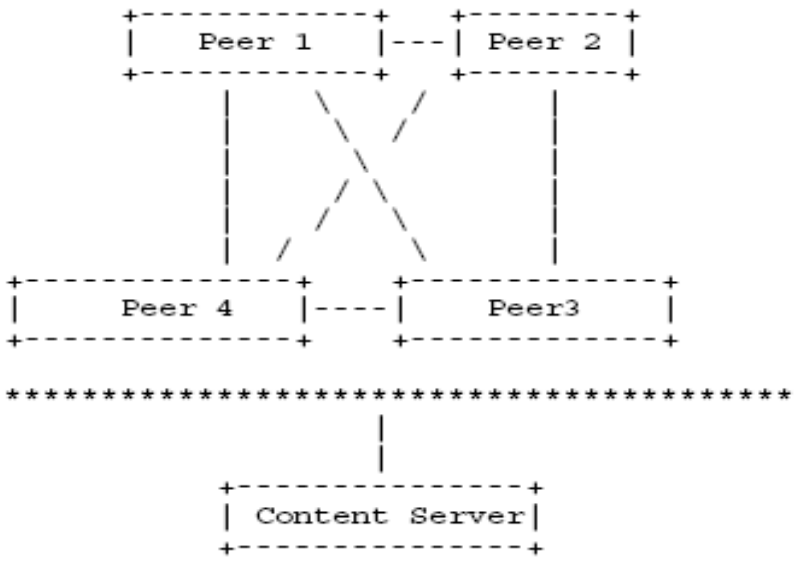
- Mesh-based
  - Joost
  - Octoshape
  - Zattoo
  - PPLive, PPStream, TVants and Sopcast
- Tree-based
  - PeerCast
  - Conviva/ESM
- Hybrid
  - New Coolstreaming

Mesh-based System – Joost



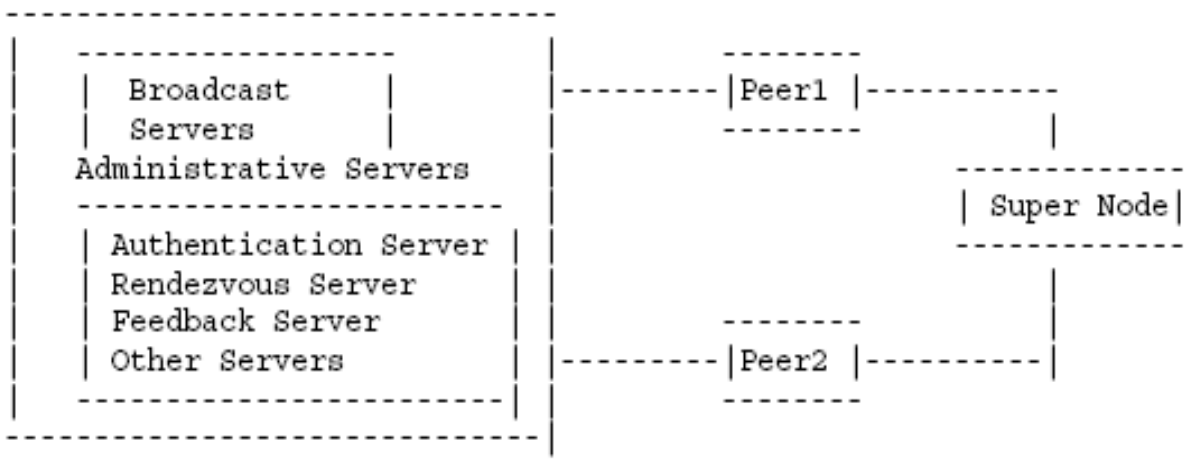
- For a newcomer, the tracker server provides several super node addresses and possibly some content server addresses.
- Peer gets peer list through super node. Super node is also responsible for redirecting peer to content servers or new peers when peer performs channel switching.
- Peer negotiates with peers in the list to find out what chunks they have, and make decision about where to get chunks.

Mesh-based System – Octoshape



- No tracker server. A new peer notifies other peers so that other peers add it into the address book. Each peer has an address book of other peers in the same swarm - hence construct a full-mesh like topology.
- The peer continues to send requests to some selected peers in its address book, until it finds enough peers to provide the needed data streams.
- A standby list is set up based on the address book. The peer periodically probes/asks the peers in the standby list to be sure that they are ready to take over if one of the current senders stops or gets congested.

Mesh-based System – Zattoo



- Users contact Rendezvous Server (i.e. Tracker Server) to identify interested channel. In return, the Rendezvous Server sends back a list peers carrying the channel.
- Zattoo relies on Bandwidth Estimation Server to initially estimate the amount of available uplink bandwidth at a peer. Once a peer starts to forward sub-stream to other peers, it receives QoS feedback from other receivers if the quality of sub-stream drops below a threshold.

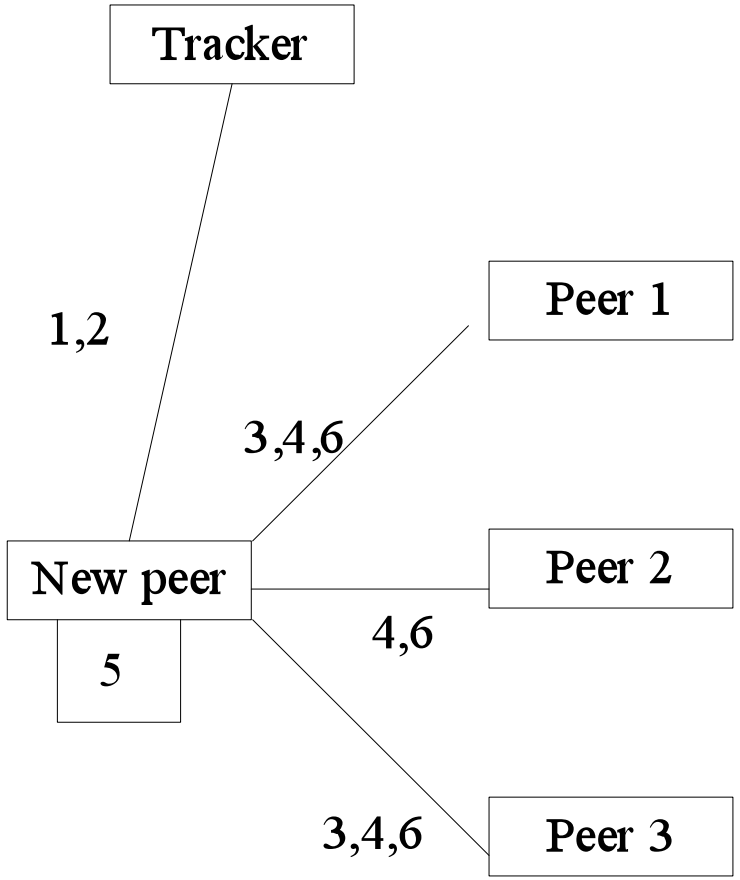
Mesh-based PPLive, PPStream, TVants and Sopcast

Common procedure:

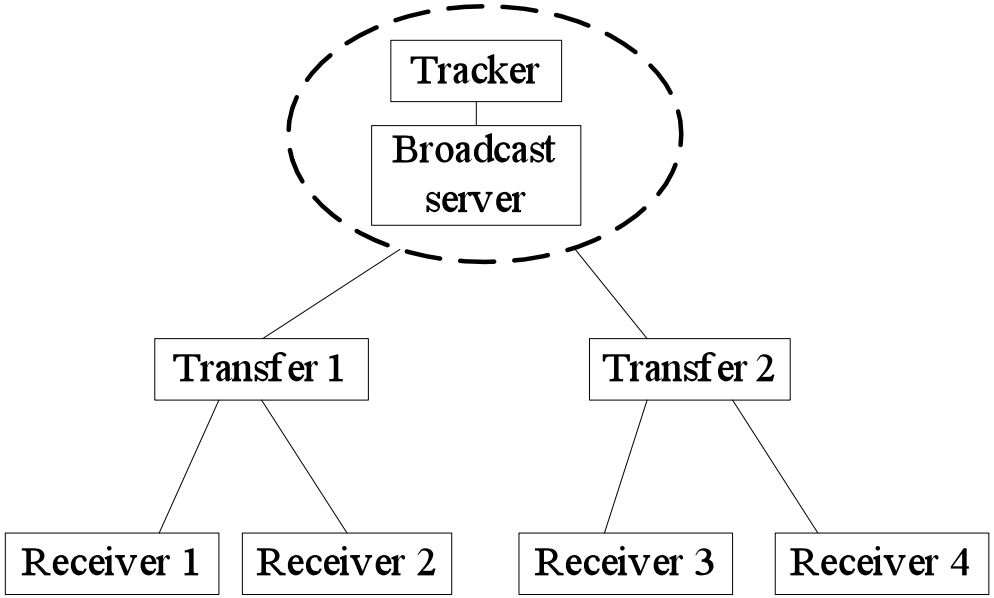
- Peer registration
- Tracker returns peer list
- Generate peer list by gossiping
- Randomly select some peers to connect
- Decide what data should be requested in which order/priority

Main different points:

- Chunk download policy
- Peer list maintenance
- Data transfer protocol (e.g. TCP/ UCP)

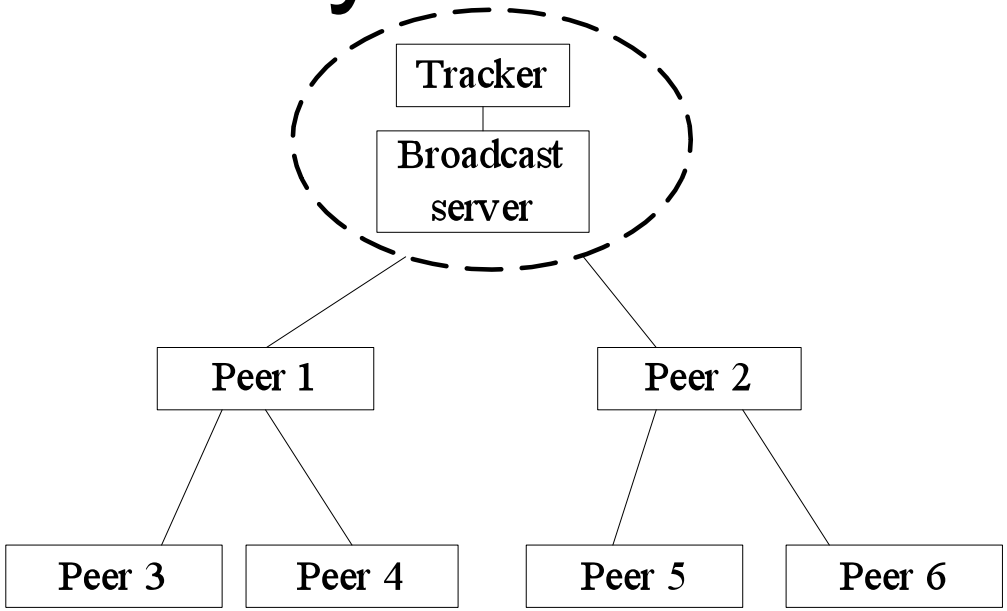


Tree-based System – PeerCast



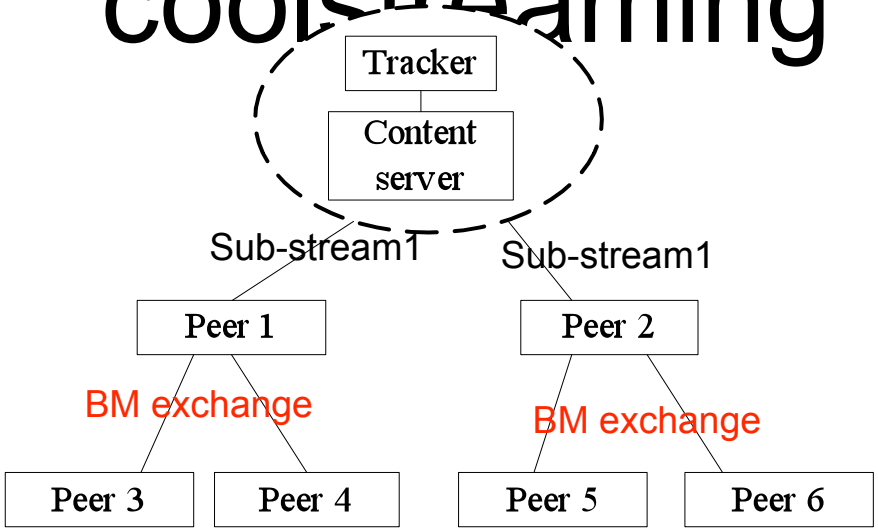
1. Peer joins a channel and gets the broadcast server address.
2. Peer requests the broadcast server and the server designate potential parents for it (in this sense, the broadcast server acts as tracker). Peer then finds a parent that can serve it.
3. A node in the tree will notify its status to its parent periodically, and the latter will update its child-list according to the received notifications.

Tree-based System – Conviva/ESM



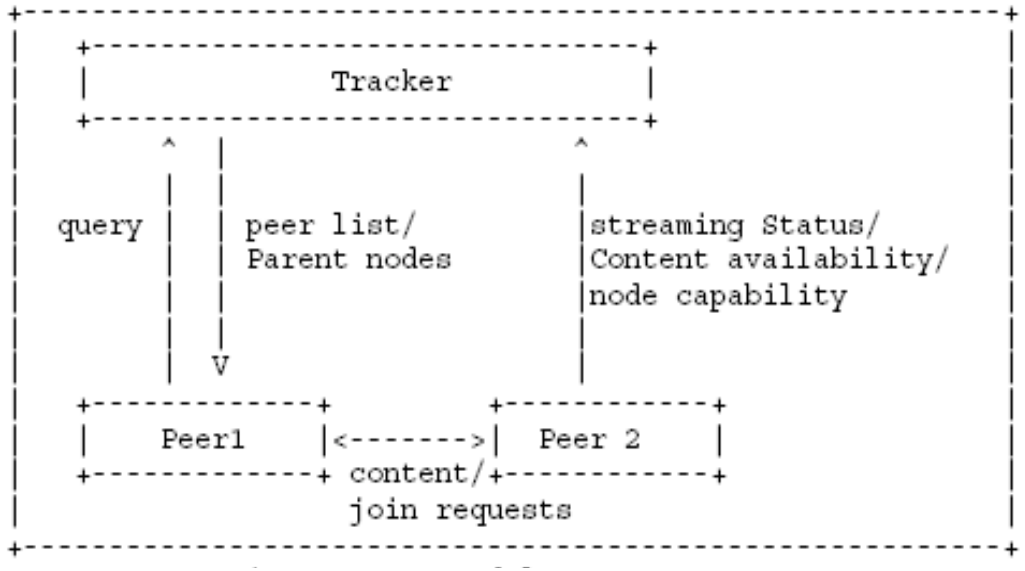
1. Joining peer gets a subset of group membership from root node.
2. Peer finds parents using parent selection algorithm – e.g. a light-weight probing heuristics to a subset of members it knows, and evaluates remote nodes and chooses a candidate parent.
3. A separate control structure decoupled from tree, where a gossip-like algorithm is used for each member to know a small random subset of group members.

Hybrid System-New coolstreaming



1. Joining peer gets a subset of peerlist from root node.
2. Joining peer selects nodes randomly to forms parent-children relationship.
3. A peer node subscribes to a sub-stream by connecting to one of its partners via a single request (pull) in Buffermap exchange and get the certain data according to the scheduling algorithm.
4. The parent node pushes all the rest of the video content.

A Common P2P streaming protocol model: PPSP



- Tracker-based architecture
- Tracker protocol:
  - A request/response protocol between peers and trackers
  - handle the initial and periodic exchange of meta information such as peer lists and content information.
- Peer protocol:
  - gossip-like protocol with periodic, pairwise exchanges of neighbor and media chunk availability information.

Plans in P2PRG

- Build close cooperation between PPSP and P2PRG
- Create a new WI for P2P streaming research survey beneficial to PPSP system deployment
- Research on items like
  - Scheduling algorithms
  - Network coding
  - Protocols not addressed in PPSP
- Team member recruitment
  - AL: Moritz
  - RayV:Omer
  - Adobe: Matthew
    - RTMFP (Real Time Media Flow Protocol)
    - Focusing on both transfer and signaling
    - Signaling quite different things compared with PPSP: ALM Group management

Thank for your attentions

Q&A?