PROMISE:
Peer-to-Peer Media Streaming
Using CollectCast

4/7 2004
Shou-Fon Wu
Outline

• Introduction
• Overview for PROMISE
  - CollectCast
• Selecting best peers
  - 3 methods
• Simulation
• Conclusion
Introduction

- PROMISE is a p2p media streaming system based on CollectCast.
- CollectCast: one receiver collects data from multiple senders.
- The main problem is how to select, monitor, and switch sending peers for each p2p streaming session.
Introduction

• CollectCast performs 3 main functions:

  1. Inferring the information for the selection of the senders.

  2. Monitor the status of peers.

  3. Dynamically switching active senders and standby senders.
CollectCast

- **Candidate senders:**
  All the senders that we may choose.
- **Active senders:**
  The senders we really choose.
- **Standby senders:**
  The reminder senders.
- **Example:**
  Candidate senders \{P1,P2,P3,P4,P5,P6,P7\}
  Active senders \{P1,P3,P4\}
  Standby senders \{P2,P5,P6,P7\}
Senders are chosen based on the current network condition and the reliability of peers to render the best quality.
Selecting the Best Peers

(1) Random selection:
   - Randomly chooses a number of senders
   - Just to fulfill the aggregate rate requirement.
Selecting the Best Peers

In random selection, we may choose P1, P3, P4 as active senders.
Selecting the Best Peers

(2) End-to-end selection:
- Estimates the “goodness” of path from each candidate sender to the receiver.
- Based on the quality of the individual paths.
- Based on the availability of each peer.
End-to-End Selection
Selecting the Best Peers

(3) Topology-aware selection
- Infers the underlying topology and its characteristic.
- Considers the goodness of each segment of path.
- Avoid the shared segment.
Topology-Aware Selection
Example for Topology-Aware Selection

- Definition: \( G_p = A_p \prod_{i \rightarrow j \in \{P3,P5,P6\}} w_{i\rightarrow j}^{(p)} x_{i\rightarrow j} \)

  X is a binary variable
  W is weight
  A is availability

- for some active set \( \{P3,P5,P6\} \)
  \( G = 1 \times 0.8 + 1 \times 0.8 + 0.25 / 0.50 \times 0.9 = 2.09 \)
  for \( w_{5\rightarrow 3}^{(P5)} = 1 \)
Simulation
Simulation
Simulation
Simulation
Conclusion

• PROMISE matches a requesting peer with a set of supplying peers.
• To achieve the best streaming quality.
Other issues

• Compared to reputation system on p2p network.
• They both provide solution to media streaming in p2p network.
• Their algorithms are different but solve the same problem.
Other issues

• The difference between PROMISE system and reputation system:
  - PROMISE computes the goodness of each set
  - Reputation system computes the reputation score of each peer