

# On Topology Construction in Layered P2P Live Streaming Networks

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**Abstract:** Peer-to-peer (P2P) overlay networks provide a highly effective and scalable solution to live media streaming systems that require the collective use of massively distributed network resources. A P2P media streaming architecture is typically built completely or partially upon a tree-structured network topology and the process of tree construction has a significant impact on the overall system performance. We build network cost models and formulate a specific type of topology construction problem, Maximum Average Bandwidth Spanning Tree (MABST), which aims at optimizing the system's average stream rate. We prove that MABST is NP-complete by reducing from Hamiltonian Path problem and propose an efficient heuristic algorithm. The performance superiority of the proposed algorithm is justified by experimental results using a live media streaming system deployed in real networks and is also illustrated by an extensive set of simulations on simulated networks of various sizes in comparison with other methods based on a degree constraint or a greedy strategy.