

## Two-Phase Multi-criteria Server Selection for Lightweight Video Distribution Systems

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**Abstract:** The fast growth of video streaming services and the evolution of their ecosystem require continuous innovation in their architecture, protocols, and algorithms, in order to improve the overall performance and efficiency of the system, as well as the service quality. A first and essential task of a service provider is the selection of a suitable content server. This task can be formalized as a multi-criteria optimization problem that takes into account various static and dynamic attributes of the system (network, servers, clients). Multi-Criteria Decision Algorithms (MCDA) offer the service provider a simple and efficient way to solve this problem. However, these algorithms need information about server load and path load, which requires the deployment of an extensive monitoring infrastructure in the Internet. In this paper, we consider a two-phase selection process that offers more flexibility and can be carried out by lightweight service providers, able to collect only limited (e.g., static) information about the system. The selection involves both the provider and the client. The provider determines a "short list" of suitable servers using limited information (e.g., servers close to the client). Then, the client refines the selection using MCDA and additional information, which is either reported by the servers (load or accept/reject) or measured (connection throughput). The clients and the provider can use various combinations of algorithms, corresponding to different capabilities to obtain information about the system, and to different tradeoffs (performance, complexity). We implemented these selection algorithms in a simulator (using OMNeT++ as simulation engine) and compared their performance. The results show that the performance of the video streaming service improves substantially by using a two-phase selection instead of a single-phase selection done by a lightweight provider. Moreover, it becomes close to the performance achieved by a provider that runs MCDA with full information about the system load.