On the impact of network address translation on locality-aware P2P live streaming systems

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More that 70% of all Internet hosts are behind network address translation (NAT) devices. In this paper, we study the impact of the NAT devices on application layer traffic optimization (ALTO) schemes. NAT brings forth difficulty if not impossible for peers to connect to one another, which may lead sever performance penalty of P2P applications. Most locality-aware P2P systems only consider network location such as autonomous system (AS) number. In this paper, we first demonstrated that peers may be expelled from the system with a high probability in P2P live streaming systems because NAT devices degrade the peer's capacity for contributing upload bandwidth. We proposed a simple model to compute the theoretical upper and lower bounds for the number of displaced peers. We also propose a simple peer selection algorithm with the NAT consideration in mind to build a non-random peer list that reduces transit traffic, increases peer connectivity and minimizes the playback start-up time for ALTO schemes. We conducted a ns2 simulation study to evaluate the performance of the proposed algorithm. Based on multiple simulation experiments, we demonstrated that the proposed algorithm decreases the number of expelled peers while it reduces the start-up delay of peers and reduces the inter-domain traffic.