

論 文 要 旨

Thesis Abstract

(yyyy/mm/dd) 2016年 07月 01日

※報告番号	第 号	氏 名 (Name)	Chitapong WECHTAISONG
主論文題名 (Title) Exploiting awareness of network topology and relay capability for P2PTV traffic localization.			
内容の要旨 (Abstract) <p>The live video streaming application using peer to peer (P2P) multicasting called P2PTV attracts attentions as a means to delivery live streaming video to a large number of users since the server load becomes low compared with a unicast-based delivery. Most P2PTV systems select a neighbor peer in an overlay network either randomly or using RTT without considering the underlying network. They generate large volume of inter-ISP(Internet Service Providers) traffic, which is a serious problem for ISPs.</p> <p>Recently, delay insertion approach for traffic localization is in which ISPs can achieve traffic localization only by deploying functions of inducing localization at edge routers or gateway routers. The localization function installed into the router estimates geographical distance from a new viewer peer to each neighbor peer and inserts additional delay when forwarding P2PTV packets from/to non-local neighbor peers. The literatures report this scheme leads P2PTV application to preferentially select neighbor peer in the same ISP or AS(Autonomous System) as the new viewer peer and reduces inter-domain traffic. This scheme does not require dedicated server installation, collaboration between ISPs and P2PTV content provider and modification at either P2PTV servers or applications. However, it considers geographical distance or intra/inter AS, ISP network between a pair of source/destination peers. The geographical distance and intra/inter AS, ISP does not correspond with the distance along with the physical network in some cases and traffic localization is not sufficiently achieved. In addition, this scheme sometimes leads the newly joining peer to connect to a neighbor peer to which the path has small available bandwidth, and the video quality seriously degrades.</p>			

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<p>内容の要旨(Abstract)</p> <p>This dissertation presents a novel scheme to achieve P2PTV traffic localization based on delay insertion approach to overcome aforementioned problems. This dissertation mainly offers the following contributions.</p> <p>Firstly, it proposes the traffic localization scheme using finer-grain distance metric along with the physical network between source and destination peers, specifically AS hop distance. This is based on our observation that end-to-end traffic that traverses less number of different ASes is preferable in terms of reducing traffic charge between ISPs. The results of experiments conducted in the real network show the proposed scheme can lead P2PTV application of a newly joining peer to preferentially connect with neighbor peers distant with smaller AS hop distance greatly reduce cross-AS traffic compared to existing schemes.</p> <p>Secondly, it proposes the traffic localization scheme considering relay capability of neighbor peers. It estimates the minimum of either available bandwidth of path between peers or relaying performance of neighbor peer's devices by sending ICMP ping packets to each of candidate neighbor peers for the predetermined time duration. This scheme leads a newly joining peer to avoid connecting with low-relay-capability neighbor peers, such as those participating into P2PTV network via 3G mobile access though they are close to the newer peer in terms of AS hop distance. When the newly joining itself has low relay capability, the proposed scheme allows existing viewer peers in the P2PTV network to connect to the newly joining low-relay-capability. The evaluation results show that the newly joining peer can avoid connecting to a low-relay-capability peers, and show that high-relay-capability peers can smoothly upload streaming content to the new peer even when the new peer is a low-relay-capability peer, while realizing efficient traffic locality.</p>			