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DISSERTATION TITLE: *CacheCast: a system for efficient single source multiple destination data transfer.*

Denne avhandlingen beskriver CacheCast – et system for effektiv kringkasting av data til flere Internett brukere. CacheCast betydelig reduserer trafikkmengden generert gjennom applikasjoner, slik som videokonferanser, IP radio, eller IP TV. CacheCast kan således, med denne type applikasjoner, handle mange flere klienter og tilby bedre servicekvalitet, selv om den bruker den samme nettverk infrastruktur.

This dissertation describes CacheCast – a system for efficient distribution of the same data to multiple destinations in the Internet. CacheCast significantly reduces the amount of network traffic generated by applications such as video conferencing, IP radio, or IP TV. Therefore, when using CacheCast these types of applications can serve many more clients and provide better quality of service.

At present, the Internet does not provide an efficient mechanism to transport the same data to multiple destinations scattered in the network. IP Multicast technology that was designed to fill this gap is not available for an average Internet user, due to numerous technical and security problems. Therefore, applications such as video-conferencing, IP radio and IP TV is forced to use unicast transmission and to send the same data to each client individually. This, however, is a waste of the Internet resources, since the network must transport multiple copies of the same data, often over the same network paths. CacheCast addresses this inefficiency using small caches distributed in the network that suppress redundant transfers.

CacheCast's underlying principles are simplicity and reliability. Analyses and simulations presented in this thesis demonstrate that CacheCast achieves close to optimal efficiency. The CacheCast system elements can be deployed in the Internet gradually. Thus providing incremental benefits from the deployment of the first elements. This significantly reduces initial investment costs. As a proof of concept the thesis presents a prototype running in a small network with an audio server streaming an mp3 file. The CacheCast system can serve up to thousands of clients while a standard system is unable to handle one hundred clients.

The work was initiated in the Conent NoE project and has been conducted in cooperation with Lancaster University.