Proposition de recherche doctorale

Distributed Video Processing

Mots clés :

● Directeur de thèse : JEAN-LOUIS ROUGIER
● Co-encadrant(s) :
● Unité de recherche : Laboratoire Traitement et Communication de l'Information
● Ecole doctorale : École Doctorale Informatique, Télécommunications, Électronique de Paris
● Domaine scientifique principal: Divers

Résumé du projet de recherche (Langue 1)

Nowadays video conferencing in enterprises is organized primarily using central Multipoint Control Unit. MCU is responsible for controlling the conference as well as for video mixing. MCUs are very expensive as they are usually designed in the form of specialized hardware. Software based MCUs do also exist but consume considerable resources, due to operations with media streams. At the same time, so-called Overlay Network video distribution approaches have emerged in the past decade, with research on Application Layer Multicast and Peer-To-Peer. In the “overlay” approaches, content distribution is handled by cooperation between user equipment, without relying on network equipment (hence its designation). They have been introduced in particular for efficient video distribution over the Internet, bypassing current network limitations (e.g. lack of multicasting support and quality of service insurance). These fully distributed approaches have proven to be efficient and robust means for video distribution over the Internet. However, in the context of video conferencing, video mixing needs to be done at endpoints, which is currently not possible for most mobile terminals (smart phones, tablets). In other words, if the endpoint is not capable to mix several video streams due to hardware/software constraints, its user will not obtain modern telepresence experience. So the problem considered is to deliver rich video experience, available today through dedicated MCUs, without using dedicated hardware and without overloading communications servers with media processing operations. In order to achieve this, we need to design a novel architecture for distributed video processing (mixing, trans-coding, trans-scaling) and distribution mechanisms. The concept is thus to go beyond the current overlay network approach (dedicated solely on distribution) by integrating the distributed processing aspect.

Résumé du projet de recherche (Langue 2)

The proposal is to create a relay network for distributed video processing satisfying the requirements: Network architecture is applicable to typical enterprise topology containing sites with fast LAN connected by potentially slow Internet connections. Network nodes are end user devices (PCs, tablets, desk phones, mobiles) or media server itself, with heterogeneous characteristics and capabilities Several topics related to our project were investigated. Generally, there exist a large literature on overlay network approaches. In particular, the structure and efficiency of Application Level Multicast trees for video distribution are well elaborated in the literature. However, the issue of distributed video processing has not been investigated in depth. In the context, of Peer-to-Peer networking, P2P tele-conferencing system has been considered. Nevertheless, again, neither video mixing nor media negotiation is analyzed.

Informations complémentaires (Langue 2)

Thèse en collaboration avec Alcatel Lucent Entreprise