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Centre d'Études Doctorales en Sciences des Technologies de l'Information et de l'Ingénieur

## **AVIS DE SOUTENANCE DE THÈSE DE DOCTORAT**

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**Intitulé de la thèse**

**ADAPTATION DU FLUX MULTIMÉDIA EN TEMPS RÉEL DANS UN  
RÉSEAU P2P IMS (PEER TO PEER INTERNET MULTIMEDIA SUBSYSTEM)**

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## ADAPTATION DU FLUX MULTIMÉDIA EN TEMPS RÉEL DANS UN RÉSEAU P2P IMS (PEER TO PEER INTERNET MULTIMEDIA SUBSYSTEM)

**Abstract:** Multimedia services occupy a large part of network traffic, the majority of internet traffic will be video content delivered by the P2P network or in streaming from servers, given the different multimedia applications currently requested by users with multimedia terminals, we can see the presence of several multimedia applications such as: (Video streaming, Video on demand, IPTV, videoconference, teleconference, ...).

When we talk about a multimedia service, it is essential to talk about the network carrying multimedia data, in reality, there are a variety of networks, and access networks using each different technologies and also different languages and protocols, and all these types of networks do not allow the satisfaction of user requests in terms of quality of service expected in general and in terms of multimedia quality of service more precisely, and especially in the case of heterogeneous networks containing several users with different terminals.

The first contribution is interested in the study of signaling in the IMS network through the implementation of a Framework, allowing the study of the signaling part in the IMS network, and by focusing on all points in relationship with the multimedia sessions in this network, in order to guarantee the quality of services to our proposed architectures in this thesis.

The second contribution consists in adapting the quality of the videos coded in SVC for heterogeneous peers by taking into account their performances (hardware and network) in an IMS P2P network, the constraint of heterogeneity of the peers is carried out by managing their performance (CPU, RAM, Bandwidth, battery life), and also by managing the change of their types of access from one network to another, this through a proposed architecture and a model that allow adaptation of the video quality and which ensures continuity of service in an IMS Peer to Peer network based on multilayer and evolutionary coding (SVC), while showing that the values of quality of service and quality of experience obtained are satisfactory.

The third contribution consists in adapting the quality of SVC video in an environment containing a large population of heterogeneous peers with different performances and who download large files and who are probably to change their network accesses from one type of access to another, this contribution is mainly based on the integration of chunk management into our architecture and our quality adaptation model which are already present in the second contribution, in order to improve the quality of service values as much as possible, in an architecture combining the

IMS network, a peer-to-peer network managed by the Bittorrent protocol and based on SVC coding. The results obtained show a marked improvement in quality by comparing to the previous contribution.

The fourth contribution consists in using an adaptation of video streaming with an architecture based on 5G technology to both distribute the load between the elements of the P2P IMS architecture, Reduce the response time for procedures (authentication user, time required for a peer to join the network), download time for chunks (reduce latency in the network).

**Keywords:** IMS, Peer to Peer, Streaming video, Adaptation de qualité, H.264/SVC , QOS , QOE.