Some lessons from an experience with active video flow regulation

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Extented Abstract

People are paying more and more attention to network infrastructures which are capable of dynamic code deployment and reconfiguration, in order to deal with the increase of network complexity both on scale and on heterogeneity. The concept of *active network* has been one of the pioneer ideas. As a starting point, we present an experience we got through the design and implementation of an active network technology based mechanism for video flow regulation. This mechanism makes use of several typical active networking features to perform real-time video flows analysis and provide consequently responsive feedback control to video codec. The main goal here is to adapt quickly the video stream bitrate to the current available bandwidth. From the end-user's view point, the effect of adaptation is to spread the bitrate reduction (relatively) uniformly to all the stream, avoiding in this way abrupt image deterioration (mosaics) due to packet loss. Tests show visible improvements obtained by our mechanism vs the classical RTCP-based control scheme. This work has been jointly done with Rim Hammi. We then discuss some extensions of our mechanism, which is in fact a generic network observer and decision maker.

A more fundamental issue that we identified from this experience is related to the setting of the criteria for code acceptation. This is in fact a rather generic problem, and one can address it in various way. For instance, one can decide to accept a code based on some authentication rule. We are particularly interested by the issue of resources consummation. Indeed, as an example, the network observer module we designed can be configured to get a more or less fine time granularity, and consequently consume more or less CPU. So, one question is how to prevent abusive (either erroneous or malicious) resource consummation. There is few tentative which try to deal with the resource requirement (bandwidth, CPU, memory, etc.) of a code. The problem is rather complex and hard. It should at least include the monitoring of resource consummation. It requires also a kind of virtual resource model for coding purpose. This issue is, in our opinion, very important. Indeed, we do need a control framework to guarantee not only the correct functionality but also the adequate resource consummation of various codes, in order to be able to deal with future's flexible and/or autonomic networks in a secure and trustable way. Our current research effort on this issue is carried on within the french RNRT/Amarillo project.

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