

Robust and Efficient Authentication of Satellite Broadcasted Video Streams

Gabriele Oligeri

Computer systems architectures

(year 2007; tutors: Prof. Francesco Marcelloni; Prof. Beatrice Lazzerini; Dott. Erina Ferro (ISTI, CNR, Pisa))

Abstract

Every day large amounts of video data are distributed throughout satellite multi-cast networks. However, popular video editing software versions permit today to easily tamper with video contents, thus making video authenticity no more reliable. For this reason, several methods have been designed for verifying the originality of video contents and preventing forgery. In order to be effective, authentication methods should guarantee both source authentication, which allows for a recipient to verify the origin of the contents, and non repudiation of the origin, which allows for the recipient to prove the origin of the data to a third party.

A novel authentication scheme that leverages satellite link characteristics such as low bit error rate and no packet reordering is presented. The approach combines digital watermarking of video stream and signature amortization. In particular, received video pictures can be authenticated on the fly and no storage is required on the receiver side, the computation overhead experienced on receiver sums up to two hash per block of pictures, and only one digital signature verification for the whole received stream. There is no bandwidth overhead, since authentication information is embedded in the video stream by means of a watermarking technique that introduces negligible quality perturbations on the original video stream.

The proposed authentication procedure is validated by means of an extensive simulation campaign, using well known video samples, in which we considered the trade off between video quality degradation (PSNR) and MPEG-2 coding decoding robustness. Simulation results show the effectiveness of the proposal.

Keywords: video streaming authentication; watermarking; signature amortization.

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