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بالرسالة صفحات

لم ترد بالاصل

SECURED VIDEO STREAM ACROSS WIRELESS NETWORKS

BY

Eng. Mohamed Aly Elsharkawy

A dissertation submitted to the
Faculty of Computers and Information
Cairo University
In Partial Fulfillment of the requirements for the
DEGREE OF DOCTOR OF PHILOSOPHY
in
Information Technology

Under the supervision of

Prof. Dr. Imane Aly Saroit Ismail

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FACULITY OF COMPUTERS AND INFORMATION

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I certify that this work has not been accepted in substance for any academic degree and is not being concurrently submitted in candidature for any other degree.

Any portions of this dissertation for which I am indebted to other sources are mentioned and explicit references are given.

Mohamed Aly Elsharkawy

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ABSTRACT

Recent advances in digital media technologies have created a large number of secured multimedia applications. Those applications and services are often deployed in a wireless network environment. Generally, three main contexts play the main roles in streaming secured video stream across wireless network. These contexts include video compression techniques, adaptation of transmitted video stream according to the available bandwidth, and the applied security techniques.

There are several video coding techniques that compress video sequences to bit streams. These coding techniques exploit spatial and temporal redundancy to achieve high compression ratios. However, they are usually unaware about the channel conditions and client resources. Thus, transcoding of video contents was introduced as a key technology to make this possible. The role of the transcoder is to adapt the contents of a video stream to fit the client capabilities. Additionally, Transcoding is performed according to the change in the available resources. Transcoders are introduced to tailor the same media contents to different derived users. However, transmitting the multimedia contents across wireless network makes them vulnerable to malicious attacks. Thus, the security concerns, if not addressed appropriately, will potentially prevent or delay the wide dissemination of the multimedia applications.

Most of transcoders are focused on how to perform the adaptation more efficiently without considering the real time constrains and the involved security issues. Although, there are some recent works on multimedia security, there is a leak between the comprehensive treatment of the design, the implementation of security functions, and the transcoder functionalities.

This dissertation presents a new model for the three tier transcoding architecture known as Two-Way Secure Scalable Stream (TW-SSS). The objective of that model is to minimize the transcoding process while upholding the security aspect of the stream. In addition, a novel security technique is proposed. This technique is mainly designed to provide more security on higher levels of applications (for examples; pay TV and military applications). A novel and simple scrambling method was proposed too. Both of the proposed security technique and the scrambling method are based on the scalability. The scalability is introduced as the only solution used to prepare the pre-compressed stream of

each movie frame in the separate layers that are suited for adaptation. Several methods are established in order to achieve this scalability concept.

In the dissertation a new method to represent each frame in scalable layers is proposed. Moreover, this dissertation includes the comparison results between the TW-SSS and other used techniques. In addition, the results of implementing the developed security techniques according to the selective encryption equation of the off-line-scenario are deployed and analyzed.

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