

Abstract

Mobile devices such as smart-phones and tablets are increasingly becoming the most important channel for delivering end-user Internet traffic especially multimedia content. One of the most popular use of these terminals is video streaming. In this type of application, video decoding is considered as the most compute and energy intensive part. Some specific processing units, such as dedicated Digital Signal Processors (DSPs), are added to those devices in order to optimize the performance and energy consumption. In this context, the objective of this paper is to give a comprehensive and comparative study of the performance and energy consumption of video decoding application on embedded heterogeneous platforms containing a GPP and a DSP. To achieve this goal, a performance and energy characterization methodology for H.264/AVC video decoding is proposed. This methodology considers a large set of video coding parameters and operating clock frequencies to reflect different execution scenarios ranging from low-quality video decoding on low-end mobile phones to high-quality video decoding on tablets. The obtained results revealed that the best performance-energy trade-off highly depends on the required video bit-rate and resolution. For instance, the GPP can be the best choice in many cases due to a significant overhead in DSP decoding which may represent 30% of the total decoding energy in some cases. Some explanations about the obtained performance and overheads are given. Finally, guidelines on which processing element to choose according to video properties are also proposed