C10 An Analysis of Apple® iOS® Version Effects on Format and Metadata Structure of Audio Files Recorded Using the Native "Voice Memos" App

Jeff M. Smith, MS, National Center for Media Forensics - CU Denver, 1150 10th Street, Ste 177, Denver, CO 80217; Douglas S. Lacey, BS*, BEK TEK LLC, 9 Kingsland Drive, Ste 111, Stafford, VA 22556-1353; Catalin Grigoras, PhD, 1020 15th Street, Ste 8I, Denver, CO 80202; and Bruce E. Koenig, MFS, BEK TEK LLC, 12115 Sangsters Court, Clifton, VA 20124-1947*

After attending this presentation, attendees will better understand the critical aspects of audio format and metadata analysis that can inform audio authentication examination of recordings made with Apple® iOS® Voice Memos app and how a similar approach can be applied to other recording devices. A preliminary determination of an iPhone® Voice Memos recording's originality and integrity can be assessed through the use of a decision tree that takes into account how different editing processes and recording interruptions affect the resulting audio file.

This presentation will impact the forensic science community by disseminating a decision tree for authenticity analysis of audio recordings from iOS® Voice Memos. This procedure demonstrates the initial results of a large study into changes in the format and metadata structure of audio files recorded using the native Voice Memos app. This presentation will also impact the forensic science community by shedding light on how certain recorder operations and interruptions modify the native format and structure of embedded metadata within the Voice Memos recordings.

This presentation will describe the ongoing study into the authentication of audio recordings originating from an Apple® iPhone® using the Voice Memos app, which comes built-into the iOS® operating system. The data collection procedure for producing test recordings from iPhones® will be described. These test recordings will account for various capture, editing, and interruption scenarios, based on the inherent functionality of the Voice Memos app. Metadata analyses of these test recordings were conducted, and any modifications to the format and structure as a result of an editing process or recording interruption were documented. For example, the bitrate of the recorded audio information may change as a result of an editing process having been applied to the original recording or due to an interruption in the recording caused by an incoming call. Based on the collected data and metadata analyses, a decision tree, aimed at helping guide authentication examinations involving recordings purported to have originated from the iPhone® Voice Memos app, was developed and will be shared during the presentation. Additionally, a study based on the practical application of the decision tree to real-world examples was undertaken and will be discussed.

The materials used during this study involved 20 recordings made with various iPhones® running on various versions of the iOS® operating system. The materials were prepped for testing employing the various types of editing processes and record interruptions that can be conducted directly on the phone on some recordings, while leaving others in their original, unaltered state. These materials were then disseminated to test subjects and examiners, who each worked in blind testing the recordings for authenticity against the proposed decision tree. In order to assess the efficacy of the decision tree, the accuracy of examiner decisions made in blind were tabulated. Results will be shared at the presentation and recommendations for further research will be discussed.

Audio Forensics, iPhone® Forensics, Digital Evidence