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Çetin Doğan
T.C. İSTANBUL10. AĞIR CEZA MAHKEMESİ
2010/283

Preliminary Samsung Hard Drive Report

March 28, 2012

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I. Introduction

I am the President of Arsenal Consulting ("Arsenal") where I lead engagements involving computer forensics for law firms, corporations, and government agencies. I have more than a decade of computer forensics experience in law enforcement and the private sector. In addition, I am an adjunct professor at Bunker Hill Community College and was an instructor at the Computer Security Institute for eight years. A true and accurate copy of my CV is attached as Exhibit A to this report.

Arsenal Consulting, Inc. ("Arsenal") was retained on February 15, 2012 by Attorney Hüseyin Ersöz to provide computer forensics consulting services in connection with his representation of Çetin Doğan in a criminal matter. More specifically, Attorney Ersöz requested Arsenal's assistance in identifying anything suspicious regarding Microsoft Office documents contained on three CDs known as "CD 11", "CD 16", and "CD 17." Later, Attorney Ersöz requested that Arsenal identify anything suspicious regarding a hard drive known as the "Samsung Hard Drive."

Computer forensics practitioners obtain forensic images from electronic media to preserve all the data on that media, including "deleted space." Forensic images can be authenticated at any time in the future by calculating hash values (also known as digital fingerprints) which are associated with each forensic image. Arsenal's analysis is based on a forensic image obtained of the Samsung Hard Drive[1] on February 9, 2012 using a Tableau TD1 Forensic Duplicator[2].

II. Executive Summary

Arsenal has concluded that the Samsung Hard Drive was tampered with at least once before a forensic image was obtained from it on February 9, 2012. More specifically, Arsenal has found that (at a minimum) 120 backdated files and folders have been copied to the Samsung Hard Drive. Arsenal has serious concerns about the authenticity of all the data on the Samsung Hard Drive due to the evidence tampering that has been uncovered thus far. Our analysis of the Samsung Hard Drive is ongoing.

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[1] Arsenal authenticated these forensic images using FTK Imager v3.1.0.1514

[2] Firmware version 2.34

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III. Master File Table Analysis

The Samsung Hard Drive contains the Microsoft Windows XP ("Windows") operating system and the NTFS file system. NTFS uses the MFT (Master File Table) to keep track of files and folders used by Windows. Each NTFS volume (aka drive letter) contains its own MFT. Windows hides the MFT but it can be accessed[3] and parsed[4] by computer forensics tools. The MFT contains a significant volume of metadata related to files and folders which includes their names and a variety of associated dates and times[5]. Each MFT record is assigned a record number as well as a sequence number which identifies whether that record number has been re-used[6] over the course of time. Record numbers generally exist in the MFT in the order in which they appeared, particularly when their sequence number is "1."

The Samsung Hard Drive has two volumes - "SISTEM" and "DATA." Arsenal reviewed the MFT from the Samsung Hard Drive's "DATA" volume ("DATA MFT") and found serious discrepancies related to record numbers and dates. Exhibit B, attached to this report, contains a detailed listing of metadata extracted from the DATA MFT. Arsenal has used color coding to note discrepancies identified thus far in this Exhibit.

The date and time discrepancies Arsenal has found in the DATA MFT indicate that backdated files and folders have been written to the Samsung Hard Drive. For example, the last 120 files and folders written to the Samsung Hard Drive's DATA volume[7] were purportedly created on April 8, 2004. This is not possible, as the Samsung Hard Drive was in use through July 28, 2009[8] and files and folders written to the Samsung Hard Drive's DATA volume prior to the last 120 on "April 8, 2004" were created on July 15, 2009[9].

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[3] AccessData's Forensic Imager, Guidance Software's EnCase, etc.

[4] analyzeMFT, MyKey Technology's MFT Ripper, etc.

[5] Each file or folder is assigned two sets ("Standard" and "Filename") of File Created, Last Written, Last Accessed, and Entry Modified dates and times

[6] Record numbers assigned to deleted files can be re-assigned to new files, which will increment the sequence number

[7] See Appendix A

[8] According to Windows Shortcuts

[9] According to "File Created" in DATA MFT

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Two possibilities regarding how these files were backdated and written to the Samsung Hard Drive include the Windows clock on the Samsung Hard Drive being manipulated, and/or the Samsung Hard Drive being connected to another computer whose clock was manipulated. Arsenal reviewed Windows remnants[10] on the Samsung Hard Drive and did not find evidence of clock manipulation, particularly in July 2009 or later. Arsenal's findings regarding DATA MFT date and time discrepancies are thus consistent with files being copied to the Samsung Hard Drive from another computer whose clock was backdated. In other words, the Samsung Hard Drive appears to have been tampered with, at least once, by connecting it as a "slave" (or secondary) hard drive to another computer. Once the Samsung Hard Drive was connected as a slave to the other computer, backdated files and folders were copied to it.

IV. Examples of Backdating

Examples of backdated documents, written to the Samsung Hard Drive on or after July 15, 2009, include the following:

Full Path	File Created
D\İKK\2004\YEDEK\PLAN Hazırlık\SUGA\SUGA HAREKAT PLANI.doc	04/08/04 07:35:27 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\SUGA\EK-A.doc	04/08/04 07:35:27 PM
D\İKK\2004\YEDEK\Çalışma\GELEN\sıkıyön..doc	04/08/04 07:35:27 PM
D\İKK\2004\YEDEK\Çalışma\tevkif tebliği.doc	04/08/04 07:35:27 PM
D\İKK\2004\YEDEK\Çalışma\GELEN\HassasKontrol.doc	04/08/04 07:35:27 PM

The folder "2004" mentioned above (within the DATA volume's İKK folder) is particularly interesting:

Folder Name	Entry Modified	Last Accessed	Last Written	File Created
2004	04/08/04 07:38:19 PM	04/08/04 07:38:19 PM	04/08/04 07:38:19 PM	08/18/04 08:03:04 AM

This folder is purportedly created on the Samsung Hard Drive on August 18, 2004 and somehow last written to on April 8, 2004. We know from the way NTFS works[11] that

[10] Event Logs, Shortcuts, Registry, etc.

[11] When folders are copied to an NTFS volume their "File Created" and "Last Written" dates are both set to the date the copy occurred

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a folder first introduced (File Created) to the Samsung Hard Drive on August 18, 2004 could not have been last written to four months earlier. We also know that the DATA MFT record for the "2004" folder could not have been updated (Entry Modified) before the folder existed on the Samsung Hard Drive. Finally, DATA MFT record and sequence numbers indicate that files and folders created on August 18, 2004 were introduced to the Samsung Hard Drive before those created on April 8, 2004. This information suggests that the backdating which occurred on "August 18, 2004" in reality happened before the backdating on "April 8, 2004." Basically, it is clear that the folder "2004", as well as all the files and folders within it, have been backdated.

V. Conclusion

Arsenal has concluded that the Samsung Hard Drive was tampered with at least once before it was forensically imaged on February 9, 2012. More specifically, Arsenal has found that (at a minimum) 120 backdated files and folders have been copied to the Samsung Hard Drive. Among the discrepancies that Arsenal found in the DATA MFT are dates and times which indicate that the last 120 files and folders written to the Samsung Hard Drive were created on April 8, 2004. This is not possible, because the Samsung Hard Drive was in use through July 28, 2009. Arsenal has serious concerns about the authenticity of all the data on the Samsung Hard Drive due to the evidence tampering that has been uncovered thus far. Our analysis of the Samsung Hard Drive is ongoing.

Printed Name

Mark Spencer

Signature

Mark Spencer

Title

President

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Appendix A

Full Path	File Created
D\İKK\2004\YEDEK	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\EGAYDAAK\konu teklif EKA.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\EGAYDAAK	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İstanbul\görevlendirilecek öğrenci listesi.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İstanbul\istanbul EKİ.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\EGAYDAAK\egeaydaak çalışmagrubu.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\ANKARA\müzahirPerEK-A.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\BeyazKANAT.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\EGAYDAAK\EGAYDAAK ÇG. (Bilnotu).doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İstanbul\görevlendirilebilecek liste.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İstanbul\DHO-YASSIADA.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\EGAYDAAK\Bilgi.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\sonuç1.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\çalışmaliste.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\rapor03.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İstanbul\DHOdurum.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İstanbul\EK_müzhiröğc.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\1.Toplantı.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\ANKARA\EK.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\GNKUR_direktif.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İstanbul\kpaşalılar.xls	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İzmir\takip.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\EGAYDAAK\EGAYDAAK ÇG Liste.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\çalışma rapor1_03.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\5 KMD muzahır personel listesi.xls	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\Ç.Grubu Görevlendirme Listesi.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İzmir\şenol kas rap.doc	04/08/04 07:35:26 PM

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Full Path	File Created
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D\İKK\2004\YEDEK\PLAN Hazırlık\çalışma.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İzmir\kasım raporu.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\ANKARA\Müzahir Y.Dışı.xls	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İstanbul\mahkeme_K.PAŞA.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\ANKARA\CANER BEN_1.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\KritikPer.EK.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\ankara kol.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\EGAYDAAK\egedaydaak çalışmagrup konu teklif.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\ANKARA	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\sonuçlar.ppt	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\EK-A.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İzmir	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İzmir\AKSAZ GEMİ.xls	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\EGAYDAAK\EKA Toplantı Sonuç Raporu.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İstanbul\istanbul.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\salihreis kritik personel bildirimi.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\toplantı sonuç.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\EGAYDAAK\AmfibiTim Hazırlık.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\ANKARA\ödenek.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\EGAYDAAK\EKA.DOC	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\Gelenler\İzmir\ekim raporu.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\SKY TEŞKİLAT.doc	04/08/04 07:35:26 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\malzeme durum raporu.doc	04/08/04 07:35:26 PM
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D\İKK\2004\YEDEK\Çalışma\BILGI NOTU\EK-A.doc	04/08/04 07:35:27 PM
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D\İKK\2004\YEDEK\Çalışma\BILGI NOTU\BİLGİ NOTU.doc	04/08/04 07:35:27 PM

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Full Path	File Created
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D\İKK\2004\YEDEK\PLAN Hazırlık\EGAYDAAK\ÇGrubuPer.doc	04/08/04 07:35:27 PM
D\İKK\2004\YEDEK\PLAN Hazırlık\MY 228-3 ÇG\228-3 Çalışma_Grubu_EKliste.doc	04/08/04 07:35:27 PM
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Full Path	File Created
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D\İKK\2004\YEDEK\Çalışma\GELEN\malzeme listesi.doc	04/08/04 07:35:27 PM
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