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# XBOX 360 FORENSICS

A Digital Forensics Guide to Examining Artifacts

Steven Bolt



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# XBOX 360 Forensics

## A Digital Forensics Guide to Examining Artifacts

**Steven Bolt**

**Samuel Liles**

*Technical Editor*



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*I would like to dedicate this work to my wife, for believing in me and pushing me to follow my dreams, and to our children, who bring so much joy to our lives. Looking into my children's eyes stirs such wondrous emotions, only a parent would understand the desire to protect that innocence and wonder. I would do anything to protect my family. And I know that same passion is shared within the law enforcement community.*

*As a former law enforcement official, I was taught that I should strive to make my part of the world better than the way I received it. My hope is that with this book, I am placing the tools and information into the hands of the officials who continue the fight and continue to strive to improve their part of the world and protect the most innocent, the children.*

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# Acknowledgments

This project was an interesting undertaking. What I mean by this is that there is little understood about the artifacts of the console, how it stores information, what format the information is stored in, and how to extract that data and make sense of it. This lack of knowledge is, of course, in comparison with the more mainstream digital storage media, such as a Windows-based PC hard drive or an Apple Mac hard drive. In any event, there was concern on my part about either overlooking an important step or inadvertently generating artifacts from a process that was run or a game that was executed.

With all these factors to be concerned about, I decided that there were several initial steps that needed to be taken. The first, of course, was that I needed to ensure I had the right forensic software to work with. For this, I reached out to several companies that decided to assist in this research. The first company was Guidance Software, the makers of EnCase. Guidance provided me with a licensed copy of EnCase to use for the research. The second company was X-Ways Forensics, which is another respected company within the forensics community. Two more companies provided their assistance to this project: Paraben Corporation provided their P2 Commander, and Wiebetech provided several write blockers so that a wide variety of the necessary forensic hardware and software was present. I want to express my gratitude to these companies for their assistance, without which this project would never have been possible.

My colleagues at the Department of Defense Cyber Investigations Training Academy (DCITA) have been supportive and have provided me with guidance when the effort seemed almost too much, and I render my heartfelt thanks to them.

This project would never have happened if not for my wife. She is my inspiration and she supports me in every endeavor I pursue. With her, all things are possible.

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# About the Author

**Steven Bolt** is a computer forensics leader employed by the Computer Sciences Corporation (CSC) with the Department of Defense Cyber Investigations Training Academy (DCITA). He serves as the network intrusions track manager, a role in which, along with his team, he is responsible for the development and delivery of course material and real-world scenarios for network intrusion analysis. Steven has presented material at many national and international conferences, including the Department of Defense Cyber Crime Conference, the High Technology Crime Investigation Association (HTCIA), and Internet Crimes Against Children (ICAC). He currently holds a CISSP, CEH, CHFI, EnCE, and ACE certificates.

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# The XBOX 360: Why We Need to Be Concerned

# 1

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## INFORMATION IN THIS CHAPTER

- Introduction
- The XBOX 360
- Criminal uses of the XBOX 360
- Poor man's virtual reality simulator

## INTRODUCTION

In this chapter, we will discuss the video game console market as well as the distribution of the Microsoft XBOX 360. This will provide the digital media analyst the needed information to understand why these gaming consoles can prove to be of interest as well as the need to understand the location of the digital artifacts, decipher their meaning and determine what can be extracted and its relevance to a case. Finally, we will explore some of the criminal activities that have been developed by the criminal element that takes advantage of social network aspects of the online gaming portal called XBOX Live.

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## THE XBOX 360

The XBOX 360 is Microsoft's second production game console and is the evolution of the original XBOX. Released to the North American retail market on November 22, 2005, the unit met with such success that it sold out almost immediately. Since its release, the console has continued to evolve to meet market demands, adding more features not only to the console but also to the associated online portal. This console is one of three that are considered to be the seventh generation of consoles, and each competes for market share. Included in this category are the Microsoft XBOX 360,



the Sony Play Station 3,<sup>1</sup> and the Nintendo Wii.<sup>2</sup> Market share is a constantly flowing dynamic, but because of the business nature, there are statistics that show the relative numbers. Table 1.1 shows some statistics that detail the market share of each console and the total sales by a yearly breakdown.

The dates covered are as follows:

2007 – (Week beginning December 31, 2006 to March 24, 2007)

2008 – (Week beginning December 30, 2007 to March 22, 2008)

2009 – (Week beginning December 28, 2008 to March 21, 2009)

2010 – (Week beginning December 27, 2009 to March 20, 2010) [1]

Although the market share displays a percentage of the total, it is not sensational if compared with the actual numbers of sales and the total number of units that have been sold. There are many figures for each retail region of the globe, but for the purposes of this book, it is important to focus on the North American region. Table 1.2 details the total number of sales within the same time frame as Table 1.1.

Lifetime sales provide yet another picture of each console and the sheer numbers of units that have been shipped and that are scattered throughout the world. Table 1.3 provides some hard figures for each of the seventh generation consoles. Pay particular attention to the lifetime sales figures showing the total number of sales for each console.

**Table 1.1** The Market Share Breakdown between the XBOX 360, Wii, and Play Station 3

Market Share (Same Periods Covered)				
	2007	2008	2009	2010
360	24.03%	21.51%	26.12%	22.75%
Wii	49.94%	50.88%	50.58%	47.36%
PS3	26.04%	27.61%	23.30%	29.89%

**Table 1.2** Total Sales of the XBOX 360, Wii, and Play Station 3

	2007	2008	2009	2009 versus 2008
360	1,292,149	1,553,430	2,323,492	49.57%
Wii	2,685,642	3,674,125	4,499,189	22.46%
PS3	1,400,391	1,993,838	2,072,718	3.96%
Total	5,378,182	7,221,393	8,895,399	23.18%

<sup>1</sup>Play Station 3 is a trademark of the Sony Corporation.

<sup>2</sup>Nintendo Wii is a trademark of the Nintendo Corporation.

**Table 1.3** Lifetime Sales of the XBOX 360, Wii, and Play Station 3

	Wii	360	PS3	Total
2007	16,387,941	7,878,345	7,621,891	31,888,177
	51.39%	24.71%	23.90%	100.00%
2008	24,425,467	11,008,653	9,687,882	45,122,002
	54.13%	24.40%	21.47%	100.00%
2009	22,520,863	10,593,216	12,739,243	45,853,322
	49.12%	23.10%	27.78%	100.00%
2010	4,495,763	2,158,998	2,837,233	9,491,994
	47.36%	22.75%	29.89%	100.00%
Lifetime	69,272,095	38,898,576	33,315,566	141,486,237
	48.96%	27.49%	23.55%	100.00%

Digital forensic analysts and high-tech crime investigators are well versed in the media analysis of all the major operating systems, network devices, and a whole host of small devices that are encountered on a regular basis. However, there is an entire class of digital media that may be overlooked because of the perception that they are merely toys. It is incumbent on those of us in the community to educate others that with the technological advances that have been made during the last several years, almost anything can and, usually, does contain a piece of electronics that can contain memory. This memory may contain artifacts that are relevant to the analysis at hand and may provide the missing link to a puzzle. Game consoles are no longer toys to be played with by social outcasts; they have developed into a multibillion dollar industry that spans racial, economic, and generational hurdles [2].

High-tech investigators need to ensure that if there is a console involved in a case, then it is seized and searched just as any other piece of digital evidence would be, considering the best practices for the seizure of media.

**TIP**

For all intents and purposes, a modern gaming console is a computer; guidelines for the seizure of a computer should be adhered to. Best practices for search and seizure of digital media should be considered before the seizure of a console, and some of these guides can be located at [www.cybercrime.gov/ssmanual/index.html](http://www.cybercrime.gov/ssmanual/index.html).

In “video game play” there is a great deal of preference between gamers and their platform of choice, and this book focuses on the XBOX 360. In time, there will be an analysis of each console as well as any other that develops and will be released to the public for wide acceptance and use.

As with any other new device or technique that is developed and released to the general public, there are perpetrators who will not only attempt to use that technology to commit crimes but also tend to develop methods and usage for the technology that the designers never dreamt their devices would be used for. The XBOX 360 and XBOX Live are no different.

## CRIMINAL USES OF THE XBOX 360

This section will discuss some of the known uses of the XBOX 360 and the XBOX Live online portal to assist in a wide range of criminal activity. In addition, there will be a discussion of hypothetical situations that may shed some light on current and future criminal uses for this machine.

### Known Criminal Uses of Video Games

There have been a few instances in which the XBOX 360 game console and, in particular, the XBOX Live service have been used as a conduit between a perpetrator and a victim. A few of the cases that have come to light all involve the use of the communication functionality within the XBOX Live service and a perpetrator contacting a victim, which later leads to an in-person meeting and illegal activity.

The case that started this research involved a 26-year-old man who, back in 2006, used the XBOX Live service to make initial contact with his victim while playing a game over the XBOX Live service [3]. Figure 1.1 provides a snapshot of the news release.

Another example provides information that the FBI is aware of the game consoles being used for the exploitation of children and has investigated some cases. The article suggests that the XBOX Live service is being used by pedophiles to lurk and seek out individuals to victimize. Figure 1.2 provides a snapshot of the new article.

Although not comprehensive, these examples provide some insight into the way the game console has been used to commit crimes. Expanding on these examples, it is not a stretch to consider that the console and its associated network functionality will continue to be of concern to the forensic community.

#### Justice Files: Accused Molester Met Victim Thru Xbox Live

**T**he Associated Press is reporting that police have arrested a 26-year-old California man on charges he molested a 14-year-old boy he met through Microsoft's popular [Xbox Live](#) service. Xbox Live is the exclusive host for online game play involving the Xbox and Xbox 360 systems.

Ronnie Brendan Watts of Placerville did not enter a plea during a Wednesday court appearance. He will appear before a Sonoma County judge on January 20th. Watts was arrested by the Santa Rosa P.D. last month after the teenage victim told his mother about the molestation. According to a [press release](#) on the police department's website, Watts is being charged with the following California statutes: Sending Harmful Matter to Seduce Minors; Lewd Act upon a Child; and Using Minor for Sex Acts.

Watts made contact with the boy on Xbox Live in October or November. Their contacts ultimately included e-mails and pornographic videos sent by Watts. The boy eventually gave the suspect his contact information, leading to a meeting in a Santa Rosa park where the alleged molestation took place.

After learning of the complaint, investigators searched Watts' home, seizing his Xbox and a laptop PC, along with a variety of cameras. Watts is currently free on bail.

**FIGURE 1.1**

News release from <http://gamepolitics.livejournal.com/171996.html> detailing one case of XBOX Live criminal use. Note the highlighted area.

## Sexual Predators Exploit Xbox 360 to Target Children

By: [MY BASEPAGE](#)

Feb. 13th, 2008 8:56 am

 Share This Article

ChannelCincinnati.com reports that Xbox Live has become sexual predators' new playground as the online gaming service for the Xbox 360 allows pedophiles to lurk online and communicate with children through headsets and instant messages. WLWT Cincinnati reports:

The FBI has investigated cases in southern Ohio, where sexual predators have used game systems such as Xbox 360 to target children.

"A pedophile is talking to a child, they are gaining their trust and understanding, and then tries to engage in that next level, which is taking them from the cyber world to the physical world," said Douglas Roden, an FBI forensic examiner.

Investigators said a 30-year-old Dayton woman used an Xbox 360 game system to send nude photos of herself to a 16-year-old Arizona boy, and then convinced him to send her nude photos of himself.

Authorities said the risk is not limited to Xbox 360, because Nintendo Wii and Playstation 3 also contain some online capabilities.



**FIGURE 1.2**

Yet another news article that discusses a way in which the XBOX Live service has been used for a crime.

*The article can be located at <http://news.teamxbox.com/xbox/15701/Sexual-Predators-Exploit-Xbox-360-to-Target-Children/>*

## Ways the XBOX 360 Is Used by Criminals

Criminal use of technology and, specifically, networked communications through the Internet is not new; however, the device that gets connected is ever changing. The digital forensic community is constantly trying to understand each device and how it stores data once these devices are released to the public, from the Apple iPhone to new network devices and game consoles.

The criminal element uses technology much in the same way that the rest of society does. They use their computers to surf the Internet for directions from their home to a drug deal, robbery location, family member's house, fence stolen property, locate information on how to make drugs, weapons, hide evidence, destroy evidence, and chat with their social network, including other criminals. Other ways in which the dual-use technology can be used by the criminal element includes the following:

- Regular usage
  - Send and receive e-mails, chat with criminal members, and surf the Web for information.
- Play games
  - Many criminals pass the time as the rest of society does, by playing video games.

- Engage in other activities
  - Research methods on how to make drugs, sell drugs, launder money, or commit counterintelligence against law enforcement officials.
  - Research information on law enforcement units and its members who are pursuing them.
- Use the machine as a conduit for streaming illicit material
  - The XBOX is designed to be the center of home entertainment, no matter what that entertainment is. In some cases, it is family photos or slide shows; in others, more illicit activities, which might include the streaming of contraband material and child exploitation. The console is simply designed to stream the media, and there is no filter preventing an end user from streaming such horrible media as described.
- How law enforcement investigators have apprehended suspects gaming with a stolen machine.
  - If a console is stolen and the thief uses the console to log onto the XBOX Live service, Microsoft maintains a record of the connections. An investigator can obtain those records from Microsoft and determine the ISP, which in turn could provide the subscriber information for that connection.
  - Contact Microsoft to get subscriber information. The subscriber information is maintained at Microsoft for a period of time. Because each Gamertag is unique, similar to an e-mail account, the information is unique to an individual and, therefore, the information provided might provide the vector back to a person.

In addition to the known ways in which the consoles can be used to assist in the commission of other crimes, there are also many ways in which this machine and its associated online portal can be used directly in crimes, but no proof has been located because of the unique nature of the media.

### **Covert Channel of Communication**

The XBOX 360 is designed as a gaming device; however, the functionality of the machine has evolved to the point that it is a conduit for communication that many investigators may not be aware of. It is the network connections and associated communications channels that may not be common knowledge. The console and its associated portal have social networking, e-mail, voice mail, and streaming media capabilities that may be overlooked. E-mails are accessed through the console, but the end user is provided with a notification that there is an e-mail through the online portal. Streaming video chats require a camera, so the investigator must take an assessment of the console and surrounding media to make a determination of the capabilities that may be utilized by the end user. Social media is a trend that links many people together and can be a gold mine for certain investigations. The XBOX 360 Live online portal provides a functionality for the linkage to several social media Web sites, which may provide logs of communication.

---

## POOR MAN'S VIRTUAL REALITY SIMULATOR

Virtual reality is a reality in the modern technological world. Governments are utilizing this concept and associated software and hardware to provide training to their military members to better pilot airplanes, deal with situations, and train their soldiers in a safe environment. With the advent of the gaming console, the ability to provide training of this nature in a variety of ways is now in the hands of the common consumer. Although the quality of the training would be dramatically different, the end result is the same; a user is placed into a situation that is attempting to mimic a real-world situation so that training can occur. Combining the first-person shooter games with the video streaming and chat capabilities of the XBOX Live service, a group of people could easily “train” on group move and shoot tactics common to the military and law enforcement communities. The information could be easily located online and practiced in the virtual world, providing a covert training facility to these small groups that could be overlooked.

### SUMMARY

This chapter provided an introduction to the XBOX 360 console and the way in which it has been and could be used as a device for criminal behavior. Gaming consoles are a part of modern life and are, in fact, application-specific computers, meaning that they are computers that are designed for a specific task. Given the market penetration that game consoles have been blessed with, it is only a matter of time before a forensic examiner is provided with a gaming console for a forensic exam. In many cases, a game console may be the only computer in a household, and with the network functionality, the console may be the only computer needed.

---

### References

- [1] Williams, Brent. “2010 Year on Year Sales and Market Share Update to March 20th.” <http://gamrfeed.vgchartz.com/story/7595/2010-year-on-year-sales-and-market-share-update-to-march-20th/> (accessed 14.10.10).
- [2] <http://industrygamers.com/news/npd-video-game-and-pc-game-industry-totals-20.2-billion-in-09/> (accessed 7.10.10).
- [3] <http://gamepolitics.livejournal.com/171996.html> (accessed 7.10.10).

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# XBOX 360 Hardware

# 2

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## INFORMATION IN THIS CHAPTER

- Getting started with the XBOX 360
- Technical specifications
- Hard drive disassembly

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## GETTING STARTED WITH THE XBOX 360

The XBOX 360 is available in several different retail packages that are categorized by the size or lack of a hard drive. Upon its initial release in November 2005, the XBOX 360 was available in two retail packages. The first model was called the Arcade or Core, as seen in Figure 2.1; it was provided with no removable hard disk drive and touted the ability to play the games locally, but if the end user wanted to go online with XBOX Live, then they needed to purchase a hard drive or a memory card. The Arcade version dropped off the market for a time and has reemerged as a retail option.

The next retail model was the Pro or Premium model. Initially included with this model was a detachable 20GB hard drive that was housed in its own custom case with its own custom interface to the XBOX 360 console. Later models of the Pro version included an upgrade in hard drive space to 60GB. Figures 2.2 and 2.3 provide images of the Pro model and the detachable hard drive, respectively.

The hard drive is designed to be easily removed from the console and is also standardized so that it can be interchangeable between consoles; if, for instance, a user purchased a console with a 20GB unit, they could purchase an upgraded hard drive, available as a separate retail package, and connect it to their console, giving themselves more storage. It should be noted to avoid confusion that only one Microsoft XBOX 360 hard drive can be connected at a time. This interchangeability is for functionality purposes to enable a user to take game saves as well as Gamertag identification (a unique identifier on the XBOX Live Network) from one console to another. We shall see that there are digital artifacts that can provide indications that a console was not bundled with a hard drive or the subject of an investigation has used multiple hard drives on the system.



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