


Rovnix new “evolution”

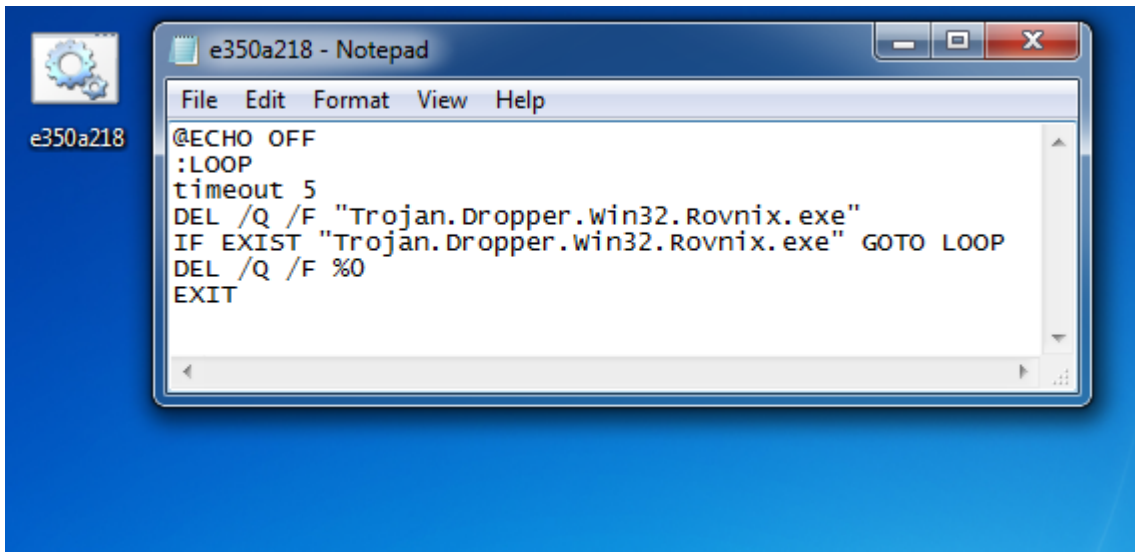
By Marcus Hutchins

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<p>Rovnix is an advanced VBR (Volume Boot Record) rootkit best known for being the bootkit component of Carberp. The kit operates in kernel mode, uses a custom TCP/IP stack to bypass firewalls, and stores components on a virtual filesystem outside of the partition. Yesterday Microsoft posted an update explaining a new “evolution” to rovnix that had been found.</p>	
	“evolution”

The so-called Evolution

I’m Melting The first thing i noticed was the file “melts” (delete’s itself once run (well, tries to)), this is done by a lot of malware to prevent future forensics, but how this sample does it is a little less than elegant. |



||—|| So

advanced |

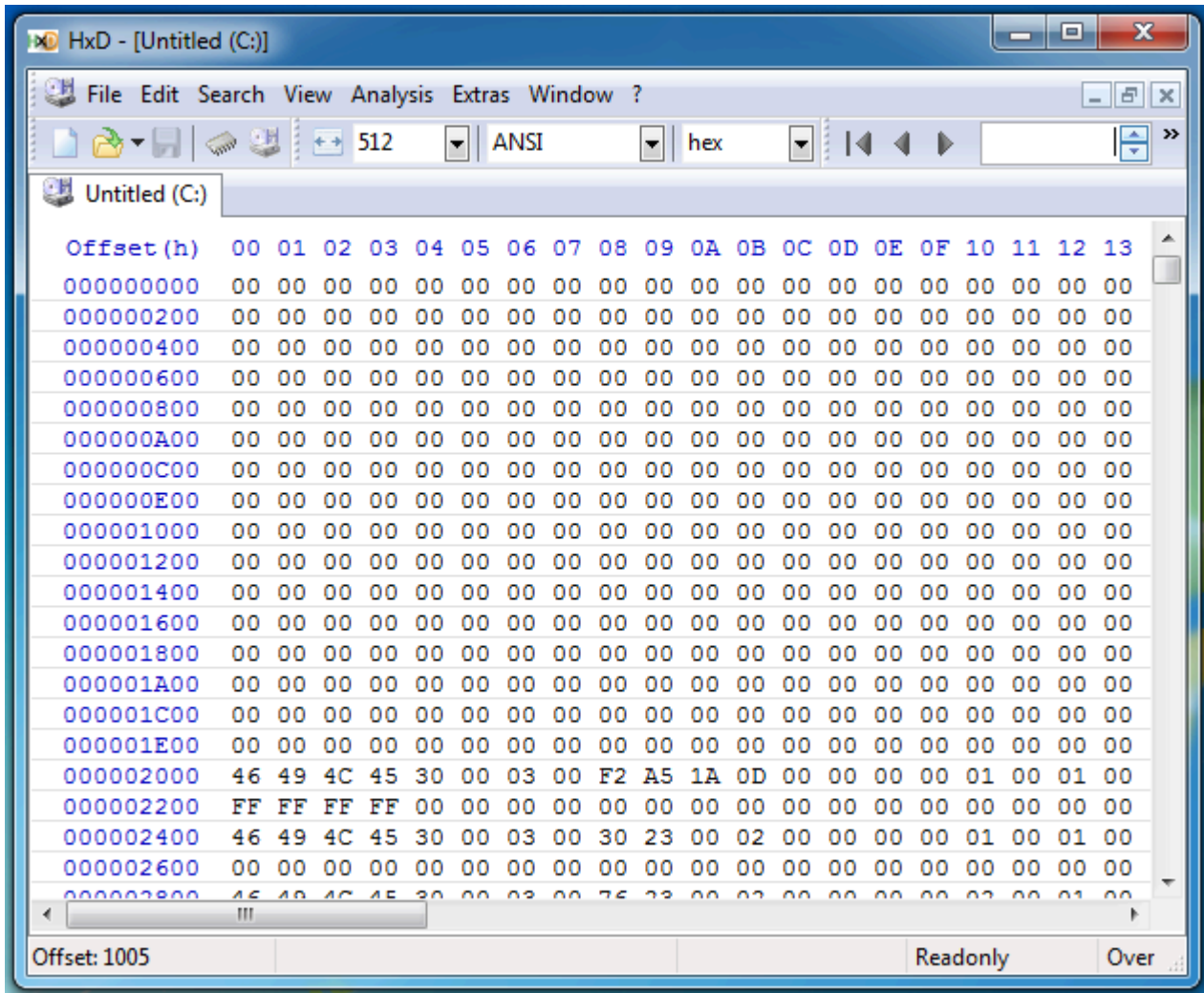
The bot drops a non-hidden batch file to the location it’s run from (in my case the desktop), the batch file just uses the “DEL” command on an infinite loop, which uses all of the CPU, until the file is deleted. On my test system, the batch file actually fails because the executable locks the file, meaning it can only be deleted once the executable stops (the system reboots), when the system reboots windows stops the batch file before the executable, thus it’s never deleted.

Initial Infection After executing the packed binary it unpacks itself and continues running, the above batch file is deployed to delete the dropper after run. For stealth reasons, the kit sits idle for an undefined amount of time (I’m yet to find out how this is done), then the system is automatically rebooted. NtShutdownSystem is hooked to receive notifications of shutdowns / reboots, so rebooting the computer will result in intimidate infection and save

you a wait. Amusingly the packed dropper doesn't exit until reboot and the delay is long enough to attach a debugger, dump the unpacked code from memory, then move it to another computer.

The entire kit is packed inside the dropper, about 13 files total (32-bit and 64-bit) and during the reboot delay everything exists in one continuous block of memory and once dumped; the components can be split up by byte signature "0x4D 0x5A 0x90" (DOS header).

No VBR The first thing i noticed after infection is that the first 16 sectors of the disk are blank (where the VBR should be located). To anyone familiar with rovnix this is a common sign of infection, as it uses the kernel driver to hide infected sectors (which is probably just as suspicious as showing them). |



—| Ermahgerd |

Stability The kit appears to run ok on Windows XP 32-bit, but on Windows 7 64-bit it causes the PC to BSOD about every 20 minutes (Sometimes the system can even get stuck in an infinite BSOD loop).

Anti Reversing I can't tell if I'm going crazy or the anti reversing protection is what I think it is. The driver appears to check for a wide variety of reversing tools (vbox, vmaware, wireshark, ollydbg, ida, lordpe, etc), then disregards the results and exits the thread. My tests appear to confirm this as I've infected a VM with multiple

- NtSetInformationFile – Prevents rename / delete.
- NtDeleteFile – Prevents delete.
- NtQueryInformationFile – Hides the file.

Additionally the rootkit also hooks some registry functions to hide keys, I can't see any sane reason why. |

```
typedef struct HOOK_ARRAY
{
    CHAR *FunctionName;
    LPVOID *HookProcedure;
    LPVOID *OriginalProcedure;
    DWORD SSDTOrdinal;
};

char __stdcall HookFunctions(HOOK_ARRAY *Hooks)
{
    BOOL Result;
    int i;

    if ( Hooks )
    {
        for ( i = 0; Hooks->FunctionName != NULL; ++i )
        {
            Hooks->OriginalProcedure = NULL;
            Hooks->OriginalProcedure = NULL;

            if ( !HookFunction(Hooks->FunctionName, Hooks->HookProcedure, &Hooks->OriginalProcedure) )
            {
                return FALSE;
            }
        }

        ResolveSSDTOrdinals(Hooks);
        result = TRUE;
    }else{
        result = FALSE;
    }
    return result;
}
```

|—| Each hook entry is an array of 16 bytes (4 double words) |

Although this won't protect against antiviruses, it may stop usermode malware and beginner security researchers from tampering with the filesystem. **Usermode Component** This entire bootkit + kernel mode rootkit all serves to protect a small trojan which appears to run as a service and do nothing other than log keys and ammy id's to a command and control server. The MD5 has is: 5e5f3ced234c6f7c91457a875cf4a570.

Conclusion

This isn't the work of common scriptkiddies, it's likely the coder has a moderate knowledge of kernel mode programming; however, the code is not experience with malware (using SSDT hooks and filters in a bootkit, having to move the virtual filesystem into a real file to access it from usermode, using batch file to delete melt exe). This clearly isn't an "evolution" of rovnix as Microsoft claim, it's just some random coders trying to make the bootkit compatible with their bot.

Thanks to Poopsmith for bringing the sample to my attention and Xylitol for retrieving it for me. |

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requesting does not exist
or is no longer available.

imgur.com

| |—| | Finally, something to reverse. |

Source: <http://www.malwaretech.com/2014/05/rovnix-new-evolution.html>