Dynamic Detection of Vulnerability Exploitation in Windows

Dynamisk detektion af udnyttelse af sårbarheder i Windows

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Abstract

Write something very clever here and read it through 10000 times

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Introduce something here

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Thesis overview

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Purpose

Tracing and logging

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Vulnerability analysis

3.1 CVE-2020-24086

According to Microsoft[1] CVE-2021-24086 is a denial of service vulnerability with a CVSS:3.0 score of 7.5 / 6.5, that is a base score metrics of 7.5 and a temporal score metrics of 6.5. The vulnerability affects all supported versions of Windows and Windows Server. According to an accompanied blog post published by Microsoft [2] at the same time as the patch was released, details that the vulnerable component is the Windows TCP/IP implementation, and that the vulnerability revolves around IPv6 fragmentation. The Security Update guide and the blog post also present a workaround that can be used to temporarily mitigate the vulnerability by disabling IPv6 fragmentation

3.1.1 Public information

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Detection

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Conclude something please

Abbreviations

ETW Event Tracing for Windows. 3, 5

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Bibliography

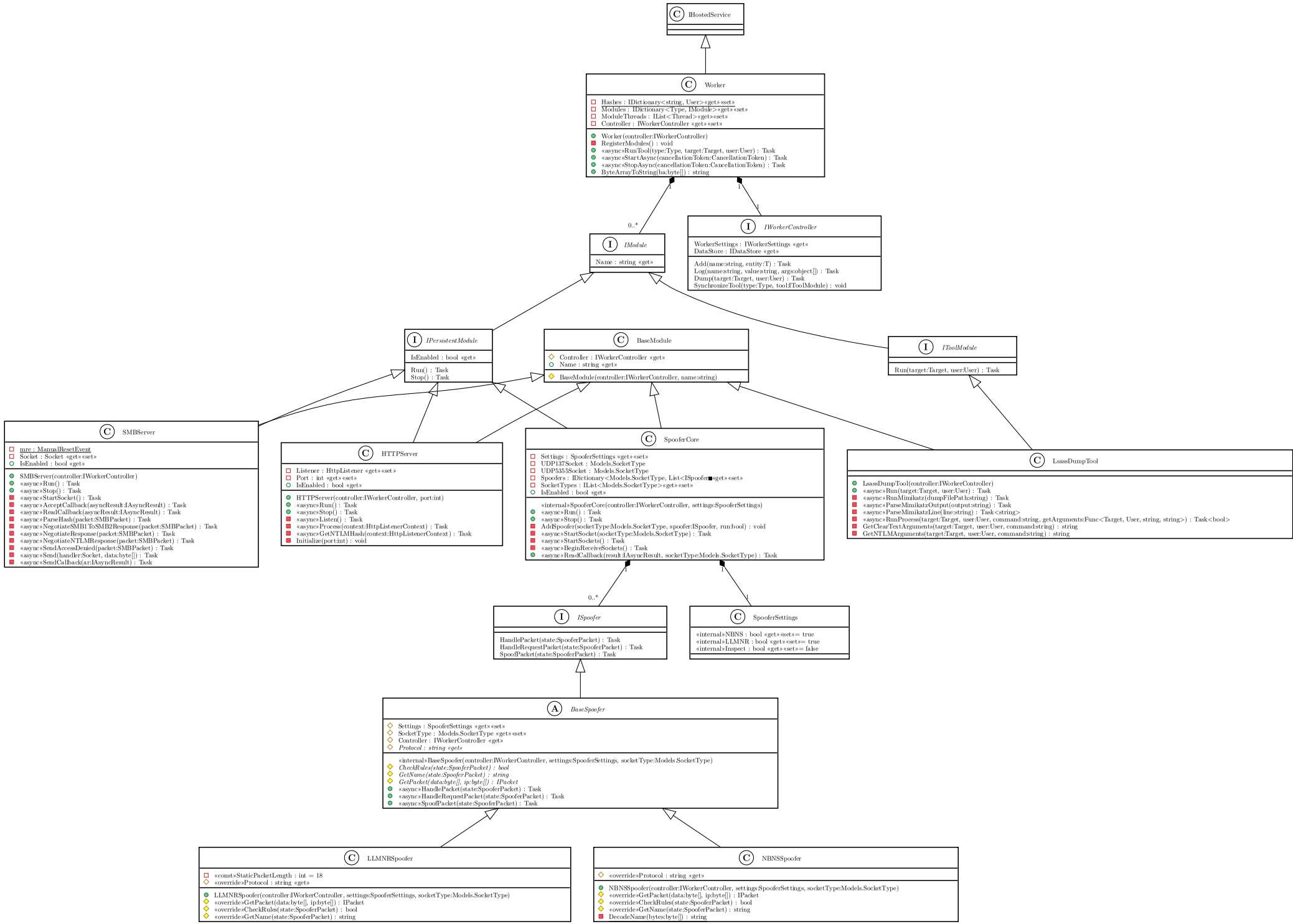
[1] Microsoft. *CVE-2021-24086 - Security Update Guide - Microsoft - Windows TCP/IP Denial of Service Vulnerability*. URL: `https://msrc.microsoft.com/update-guide/vulnerability/CVE-2021-24086` (visited on 02/09/2021).

[2] Microsoft. *Multiple Security Updates Affecting TCP/IP: CVE-2021-24074, CVE-2021-24094, and CVE-2021-24086 - Microsoft Security Response Center*. URL: `https://msrc-blog.microsoft.com/2021/02/09/multiple-security-updates-affecting-tcp-ip/` (visited on 02/09/2021).

Appendices

.1 Class Diagrams

.1.1 Worker class diagram


IHostedService
Worker
- Hashes : IDictionary<string, User>«get»«set»
- Modules : IDictionary<Type, IModule>«get»«set»
- ModuleThreads : IList<Thread>«get»«set»
- Controller : IWorkerController «get»«set»
+ Worker(controller:IWorkerController)
- RegisterModules() : void
+ «async»RunTool(type:Type, target:Target, user:User) : Task
+ «async»StartAsync(cancellationToken:CancellationToken) : Task
+ «async»StopAsync(cancellationToken:CancellationToken) : Task
+ ByteArrayToString(ba:byte[]) : string
1
1
0..*
IModule
Name : string «get»
IWorkerController
WorkerSettings : IWorkerSettings «get»
DataStore : IDataStore «get»
Add(name:string, entity:T) : Task
Log(name:string, value:string, args:object[]) : Task
Dump(target:Target, user:User) : Task
SynchronizeTool(type:Type, tool:IToolModule) : void
IPersistentModule
IsEnabled : bool «get»
Run() : Task
Stop() : Task
BaseModule
- Controller : IWorkerController «get»
+ Name : string «get»
+ BaseModule(controller:IWorkerController, name:string)
IToolModule
Run(target:Target, user:User) : Task
SMBServer
- mre : ManualResetEvent
- Socket : Socket «get»«set»
+ IsEnabled : bool «get»
+ SMBServer(controller:IWorkerController)
+ «async»Run() : Task
+ «async»Stop() : Task
- «async»StartSocket() : Task
- «async»AcceptCallback(asyncResult:IAsyncResult) : Task
- «async»ReadCallback(asyncResult:IAsyncResult) : Task
- «async»ParseHash(packet:SMBPacket) : Task
- «async»NegotiateSMB1ToSMB2Response(packet:SMBPacket) : Task
- «async»NegotiateResponse(packet:SMBPacket) : Task
- «async»NegotiateNTLMResponse(packet:SMBPacket) : Task
- «async»SendAccessDenied(packet:SMBPacket) : Task
- «async»Send(handler:Socket, data:byte[]) : Task
- «async»SendCallback(ar:IAsyncResult) : Task
HTTPServer
- Listener : HttpListener «get»«set»
- Port : int «get»«set»
+ IsEnabled : bool «get»
+ HTTPServer(controller:IWorkerController, port:int)
+ «async»Run() : Task
+ «async»Stop() : Task
- «async»Listen() : Task
- «async»Process(context:HttpListenerContext) : Task
- «async»GetNTLMHash(context:HttpListenerContext) : Task
- Initialize(port:int) : void
SpooferCore
- Settings : SpooferSettings «get»«set»
- UDP137Socket : Models.SocketType
- UDP5355Socket : Models.SocketType
- Spoofers : IDictionary<Models.SocketType, List<ISpoofer■«get»«set»
- SocketTypes : IList<Models.SocketType>«get»«set»
+ IsEnabled : bool «get»
«internal»SpooferCore(controller:IWorkerController, settings:SpooferSettings)
+ «async»Run() : Task
+ «async»Stop() : Task
- AddSpoofer(socketType:Models.SocketType, spoofer:ISpoofer, run:bool) : void
- «async»StartSocket(socketType:Models.SocketType) : Task
- «async»StartSockets() : Task
- «async»BeginReceiveSockets() : Task
+ «async»ReadCallback(result:IAsyncResult, socketType:Models.SocketType) : Task
LsassDumpTool
+ LsassDumpTool(controller:IWorkerController)
+ «async»Run(target:Target, user:User) : Task
- «async»RunMimikatz(dumpFilePath:string) : Task
- «async»ParseMimikatzOutput(output:string) : Task
- «async»ParseMimikatzLine(line:string) : Task<string>
- «async»RunProcess(target:Target, user:User, command:string, getArguments:Func<Target, User, string, string>) : Task<bool>
- GetClearTextArguments(target:Target, user:User, command:string) : string
- GetNTLMArguments(target:Target, user:User, command:string) : string
1
1
0..*
ISpoofer
HandlePacket(state:SpooferPacket) : Task
HandleRequestPacket(state:SpooferPacket) : Task
SpoofPacket(state:SpooferPacket) : Task
SpooferSettings
«internal»NBNS : bool «get»«set»= true
«internal»LLMNR : bool «get»«set»= true
«internal»Inspect : bool «get»«set»= false
BaseSpoofer
- Settings : SpooferSettings «get»«set»
- SocketType : Models.SocketType «get»«set»
- Controller : IWorkerController «get»
- Protocol : string «get»
«internal»BaseSpoofer(controller:IWorkerController, settings:SpooferSettings, socketType:Models.SocketType)
CheckRules(state:SpooferPacket) : bool
GetName(state:SpooferPacket) : string
GetPacket(data:byte[], ip:byte[]) : IPacket
+ «async»HandlePacket(state:SpooferPacket) : Task
+ «async»HandleRequestPacket(state:SpooferPacket) : Task
+ «async»SpoofPacket(state:SpooferPacket) : Task
LLMNRSpoofer
- «const»StaticPacketLength : int = 18
- «override»Protocol : string «get»
+ LLMNRSpoofer(controller:IWorkerController, settings:SpooferSettings, socketType:Models.SocketType)
- «override»GetPacket(data:byte[], ip:byte[]) : IPacket
- «override»CheckRules(state:SpooferPacket) : bool
- «override»GetName(state:SpooferPacket) : string
NBNSSpoofer
- «override»Protocol : string «get»
+ NBNSSpoofer(controller:IWorkerController, settings:SpooferSettings, socketType:Models.SocketType)
- «override»GetPacket(data:byte[], ip:byte[]) : IPacket
- «override»CheckRules(state:SpooferPacket) : bool
- «override»GetName(state:SpooferPacket) : string
- DecodeName(bytes:byte[]) : string