Malicious campaign targets South Korean users with backdoor-laced torrents

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July 8, 2019

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Zuzana Hromcová
8 Jul 2019 - 11:30AM

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Fans of Korean TV should be on the lookout for an ongoing campaign spreading malware via torrent sites, using South Korean movies and TV shows as a guise. The malware allows the attacker to connect the compromised computer to a botnet and control it remotely.

The malware is a modified version of a publicly available backdoor named GoBot2. The modifications to the source code are mainly South Korea-specific evasion techniques, which are described in detail in this blogpost. Due to the campaign's clear focus on South Korea, we have dubbed this Win64/GoBot2 variant GoBotKR.

According to ESET telemetry, GoBotKR has been active since March 2018. The detections are in the hundreds, with South Korea being the most affected (80%), followed by China (10%) and Taiwan (5%).

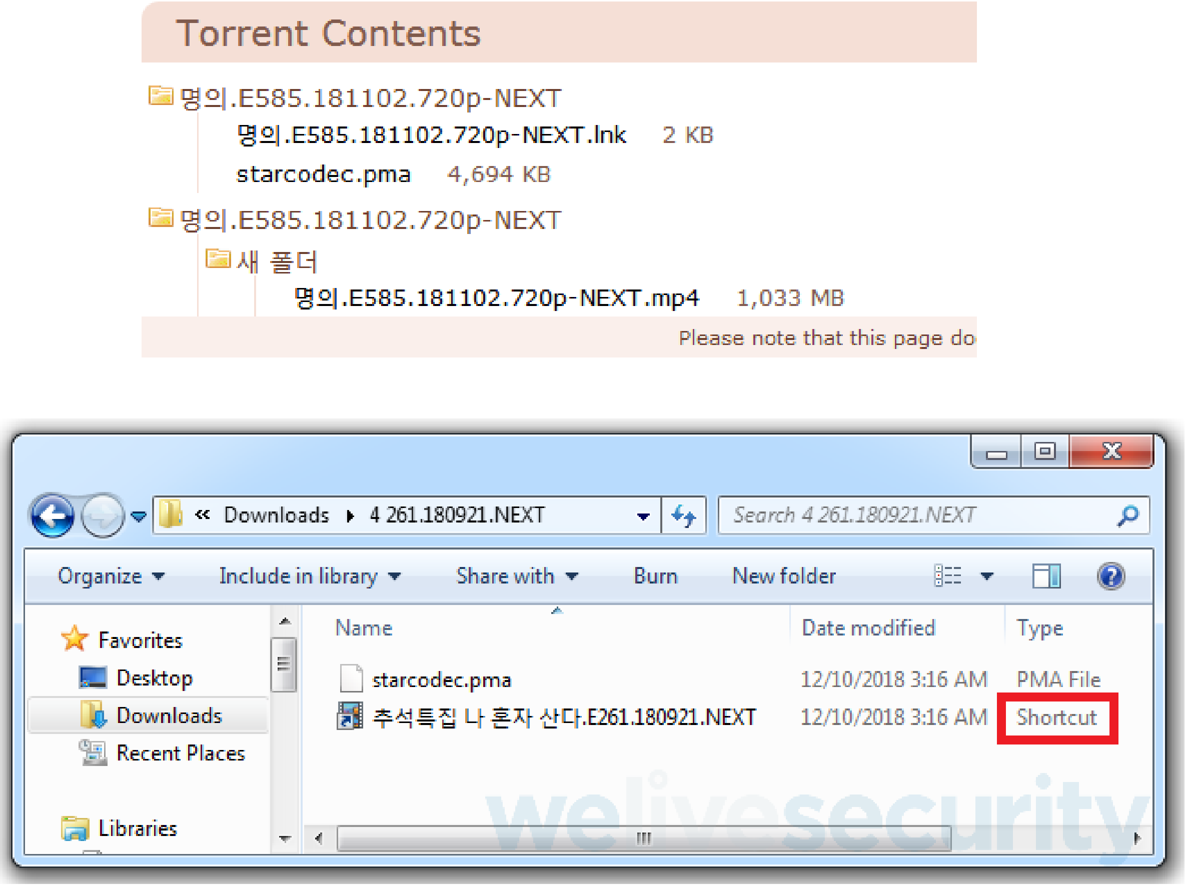
Distribution

GoBotKR has been spreading via South Korean and Chinese torrent sites, masquerading as Korean movies and TV shows, as well as some games.

The attackers behind this campaign try to trick users into executing the malware by booby-trapping the contents of the torrents with malicious files that have deceptive filenames, extensions and icons. Our analysis shows that the torrents using a movie/TV show disguise generally contain the following types of files:

1. The expected MP4 file
2. A malicious executable masked as a PMA archive file with a filename mimicking various codec installers
3. A malicious LNK file with a filename and icon mimicking the expected video file

Figure 1 shows examples of torrent contents from this malicious campaign.



Torrent Contents

명의.E585.181102.720p-NEXT
- 명의.E585.181102.720p-NEXT.lnk 2 KB
- starcodec.pma 4,694 KB

명의.E585.181102.720p-NEXT
- 새 폴더
  - 명의.E585.181102.720p-NEXT.mp4 1,033 MB

Please note that this page do

Name	Date modified	Type
starcodec.pma	12/10/2018 3:16 AM	PMA File
추석특집 나 혼자 산다.E261.180921.NEXT	12/10/2018 3:16 AM	Shortcut

Figure 1. Contents of some torrents delivering the malware (the MP4 video is not displayed on the second screenshot); the malware is executed by an LNK file with a deceptive filename and icon

So how exactly do users get compromised?

Directly opening the intended MP4 file will not result in any malicious action. The catch here is that the MP4 file is often hidden in a different directory, and users might encounter the malicious LNK file mimicking it first. Further increasing the chance of users falling for the lure is the fact that the extension of the LNK file is normally not displayed when viewed in Windows Explorer, as seen in the second screenshot in Figure 1, in the file with the Korean name.

Clicking on the deceptive LNK file executes the malware. However, it also opens the intended file (in this case a video), giving victims little reason to suspect something has gone wrong.

Renaming the malicious EXE file to a PMA file is also likely done to prevent raising suspicion of potential victims. We have also seen this technique using games as a lure, and with filenames and extensions relevant to gaming.

During our investigation, we have seen the following filenames being used for the malicious executables: starcodec.pma, WedCodec.pma and Codec.pma (movie/TV show disguise) and leak.dll (game disguise). The name “starcodec” mimics the legitimate Korean codec pack Starcodec.

Capabilities

GoBotKR was built on the basis of a backdoor named GoBot2, the source code of which has been publicly available since March 2017. Both the original and the modified version are written in GoLang, also known as Go. While still relatively rare for malware, new variants of GoLang malware are emerging, likely due to the challenges posed to analysts with the bulky nature of its compiled executables.

The functionality of GoBotKR largely overlaps with the published GoBot2 source code, with only minimal modifications. Overall, the malware is not particularly complex technically, and the implementation is rather straightforward. Most features are implemented with the use of GoLang libraries, and by executing Windows commands (such as cmd, ipconfig, netsh, shutdown, start, systeminfo, taskkill, ver, whoami, and wmic), and third-party utilities such as BitTorrent and uTorrent clients.

Collected information

Ultimately, the actors behind GoBotKR are building a network of bots that can then be used to perform DDoS attacks of various kinds (e.g. SYN Flood, UDP Flood, or Slowloris). Therefore, after being executed, GoBotKR first collects system information about the compromised computer, including network configuration, OS version information, CPU and GPU versions. In particular, it collects a list of installed antivirus software.

This information is sent to a C&C server, which helps the attackers determine which bots should be used in the respective attacks. All C&C servers that we extracted from the analyzed malware samples are hosted in South Korea and registered by the same person.

Bot commands

Once communication with the C&C server is established, the server instructs the compromised computer with backdoor commands. GoBotKR supports fairly standard botnet functions, which mostly serve three main purposes:

- allowing misuse of the compromised computer
- allowing the botnet operators to control, or further extend, the botnet
- evading detection or hiding from the user

These are the supported commands:

- carry out a DDoS attack on a specified victim
- access a URL
- execute a file, a command, a script
- update, terminate or uninstall itself
- shutdown/reboot/log off the computer

- change homepage in IE
- change desktop background
- seed torrents
- copy itself to connected removable media, and setup AutoRun function
- copy itself to public folders of cloud storage services (Dropbox, OneDrive, Google Drive)
- run a reverse proxy server
- run an HTTP server
- change firewall settings, edit hosts file, open a port
- enable/disable Task Manager
- enable/disable Windows registry editors
- enable/disable Command Prompt
- kill a process
- hide a process window

Of particular interest are two commands – seeding torrents and DDoS capability.

The “seed torrents” command allows the attackers to misuse the victimized machines for seeding arbitrary files using the BitTorrent and uTorrent programs, even if these are not already installed on the system. This may be used as a mechanism to distribute the malware further.

The “carry out a DDoS attack” command lets attackers abuse the victim’s network bandwidth to block the availability of targeted services, such as websites. According to our analysis, this is most likely the main purpose of the GoBotKR botnet.

Evasion techniques

In this section, we explore the evasion techniques used by the GoBotKR backdoor. While many techniques were already present in the publicly available source code, the authors of GoBotKR further expanded them with South Korea-specific features. This shows us that the attackers customized the malware for a specific audience, while taking extra effort to remain undetected in their campaign.

Techniques taken from GoBot2

The following detection evasion and anti-analysis techniques used by GoBotKR have been adopted from GoBot2 source code:

- The malware installs two instances of itself on the system. The second instance (watchdog) monitors whether the first instance is still active and reinstalls it if it has been removed from the system.

- The malware employs antivirus bypass techniques (it allocates large chunks of memory and delays execution of the malicious payload to prevent antivirus engines from emulating the code due to resource constraints).
- The malware can detect selected security and analytical tools, such as debuggers. If detected, it terminates itself.
- The malware terminates itself if IP information of the victim suggests one of several blacklisted organizations (e.g. Amazon, BitDefender, Cisco, ESET). It uses external legitimate websites for querying IP information and searches for hardcoded strings in this information (e.g. “cloud”, “Cisco”, “Microsoft”), rather than using API functions.
- The malware terminates itself if its file name consists of 32 hexadecimal characters, which prevents the payload from being executed in some automated sandboxes.

South Korea-specific modifications in GoBotKR

The authors of GoBotKR added three new evasion techniques, related to their focus on South Korea:

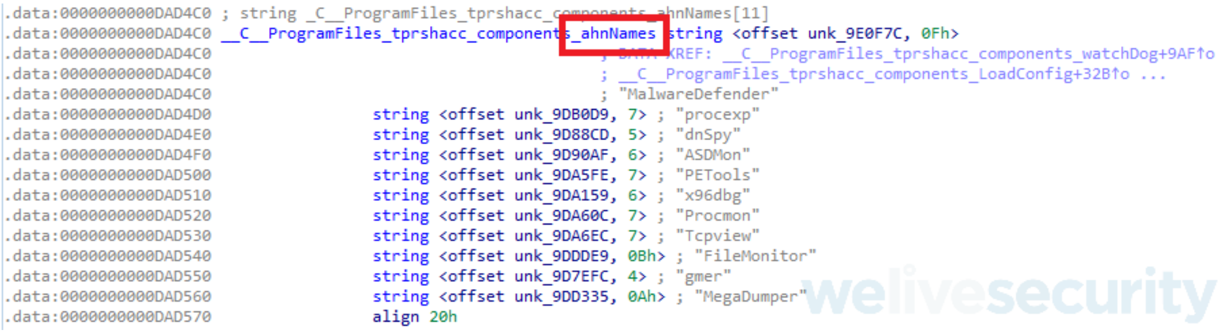
- As explained in the previous section, the malware uses IP information of the compromised computer to detect whether it is running in one of the blacklisted organizations. In GoBot2, the IP address of the victim is determined by accessing Amazon Web Services or dnsDynamic and parsing the reply.
  In the samples of GoBotKR we analyzed, these URLs are replaced with South Korean online platforms Naver and Daum.
- GoBotKR features a new evasion technique that scans running processes on the compromised system to detect selected antivirus products (listed in Table 1). If any of the products are detected, the malware terminates itself and removes some traces of its activity from the host. The list of detected processes includes products by AhnLab, a South Korean security company.

Process name substring	Associated company/product
V3Lite	AhnLab, V3 Internet Security
V3Clinic	AhnLab, V3 Internet Security
RwVnSvc	AhnLab Anti-Ransomware Tool
Ksde	Kaspersky
kavsvc	Kaspersky
avp	Kaspersky
Avast	Avast
McUICnt	McAfee

Process name substring	Associated company/product
360	360 Total Security
kxe	Kingsoft Antivirus
kwsprotect	Kingsoft Internet Security
BitDefender	BitDefender
Avira	Avira
ByteFence	ByteFence

Table 1. List of security products detected by GoBotKR

> The malware tries to detect analytical tools running on the system. It terminates itself if any of them are detected. The list is internally named “ahnNames”, which might be another reference to AhnLab.



```
.data:0000000000DAD4C0 ; string _C__ProgramFiles_tprshacc_components_ahnNames[11]
.data:0000000000DAD4C0 __C__ProgramFiles_tprshacc_components_ahnNames string <offset unk_9E0F7C, 0Fh>
.data:0000000000DAD4C0                                         ; DATA XREF: __C__ProgramFiles_tprshacc_components_watchDog+9AF↑o
.data:0000000000DAD4C0                                         ; __C__ProgramFiles_tprshacc_components_LoadConfig+32B↑o ...
.data:0000000000DAD4C0                                         ; "MalwareDefender"
.data:0000000000DAD4D0                 string <offset unk_9DB0D9, 7> ; "procexp"
.data:0000000000DAD4E0                 string <offset unk_9D88CD, 5> ; "dnSpy"
.data:0000000000DAD4F0                 string <offset unk_9D90AF, 6> ; "ASDMon"
.data:0000000000DAD500                 string <offset unk_9DA5FE, 7> ; "PETools"
.data:0000000000DAD510                 string <offset unk_9DA159, 6> ; "x96dbg"
.data:0000000000DAD520                 string <offset unk_9DA60C, 7> ; "Procmon"
.data:0000000000DAD530                 string <offset unk_9DA6EC, 7> ; "Tcpview"
.data:0000000000DAD540                 string <offset unk_9DDDE9, 0Bh> ; "FileMonitor"
.data:0000000000DAD550                 string <offset unk_9D7EFC, 4> ; "gmer"
.data:0000000000DAD560                 string <offset unk_9DD335, 0Ah> ; "MegaDumper"
.data:0000000000DAD570                 align 20h
```

Figure 2. The malware’s blacklist of running processes is internally named “ahnNames”

In addition to the AhnLab references, the defensive techniques described in the second and third points were added into the source code as a file named AhnLab.go, according to the metadata we obtained from the malware.

Timeline

Because the malware is spreading via torrents, a lot of the samples are broken or incomplete. We were, however, able to recover C&C servers and internal version information.

Since the malware was first seen, we have detected samples with internal versions 2.0, 2.3, 2.4, and 2.5. Each of these versions comes with some minor technical improvements or differences in implementation. The versioning differs from that used in the GoBot2 source code, where an internal name “ArchDuke” is used.

Table 2 lists the different versions of GoBotKR detected by ESET systems from May 2018 to the time of writing. The timeline features the malware's internal versioning and detection dates, as PE timestamps have been cleared from the samples.

First seen	Internal version	Functionality linked to South Korea	C&C server
May 2018	2.0	No	https://jtbcsupport[.]site:7777/
Jul 2018	2.0	Yes	https://jtbcsupport[.]site:7777/
Aug 2018	2.0	Yes	https://higamebit[.]com:6446/
Sep 2018	2.3	Yes	https://kingdomain[.]site:6556/
Sep 2018	2.3	Yes	https://bitgamego[.]com:6446/
Sep 2018	2.3	Yes	https://higamebit[.]com:6446/
Sep 2018	2.3	Yes	https://helloking[.]site:6446/
Jan 2019	2.4	Yes	https://kingdomain[.]site:6556/
Jan 2019	2.5	Yes	https://kingdomain[.]site:6556/

Table 2. GoBotKR version timeline

As seen in the table, the first malware samples detected in May 2018 were not yet customized for South Korean targets and were thus almost identical to the GoBot2 source code. However, we were able to link them to newer samples because they used the same C&C server.

How to stay safe

If you suspect you might have fallen victim to this malware campaign, we recommend you scan your computer with a reliable security solution. ESET products detect and block this malware under the detection name Win64/GoBot2. You can use ESET's Free Online Scanner to check your computer for the presence of this threat and remove anything that is detected. Existing ESET customers are protected automatically.

Pirated content distributed via torrent sites is a well-known vector for spreading all kinds of malware. To steer clear of similar attacks in the future, stick to official sources when downloading content. Before launching downloaded files, pay attention to whether their extensions match the intended filetypes. To keep your computer protected, we advise you to patch regularly and use reputable security software.

Indicators of Compromise (IoCs)

ESET detection name

Win64/GoBot2

C&C servers

jtbcsupport[.]site
kingdomain[.]site
higamebit[.]com
bitgamego[.]com
helloking[.]site

SHA-1

Note that some malware samples may be corrupted due to the nature of its distribution mechanism (torrents).

Version 2.0

038C69021F4091F0B1BE3F059FCDC1C4FA8885D2
092A4F085A01E0D61418114726B9F9EF9F4683C3
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C31955C4D3C38591BBC8A2089F23B5558146267B
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E0046D91BED1B3A09243C43760599DC9D8F99953
E00F1BB85A277A8C1ED081642EF76413B2FF7EA9
EA968D757281E6BB5D9334E7F2C9ECDA69EA15A9
F9C40789C780174F6BB377AE46F49B94E402AE77
FFF263FA9E16F7945BCE21D0F6C11C75DAA241D8

Version 2.3

018927A35B2CEC08D5493CB75BAA62D6956D0109
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D1D603E24FD82B6BE32B99A25A86F6CD46F3A8AF
D7423A1F56FFF460031419856FE4F7C557E1A2BF
D8ACB99F04A5EC3E355B947885E02977D6C37AF0
DA6603AC6CB47A3C448CB232EB0116BD62C7B7E4
DD1E3544F8363517556A91EBA40E85EE3638528E
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DFF022EC8223676E0D792DD126EE91B0D3059C4C
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E31ABA7D0BBE49F7E66BD04379BC4837A7C91E46
E3204213E526C6ED3F8BE49D8E493DB5E92EC52A
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E6AB36FE3BBDE63B28BFDF27D8890048FEA1E66D
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FA22EB25A1FCBD26D5E6B88B464B61BCC4B303C2
FAEE079AABB92B4C887BA3FBEE4D1D63732D72A3
FD37E55481C7941B420950B0979586BDE2BA6B8A
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```

Version 2.4

896FB40BACBF8B51A06AAF49523DE720D1C21D53
A997A5316D4936F70CDF697DF7E65796CE11B607

Version 2.5

27ED3426EA5DB2843B312E476FFFCF41BA4FDD31
C4074FCC7A600707ADCAF3DD5C0931E6CBF01B48

Registry values

The registry key used by GoBotKR is a subkey under [HKCU\SOFTWARE] with a variable name from a hardcoded list, mostly mimicking legitimate software names.

The following registry values are used:

ID
INSTALL
NAME
VERSION
REMASTER
LAST
WATCHDOC

MITRE ATT&CK techniques

Tactic	ID	Name	Description
Initial Access	T1189	Drive-by Compromise	GoBotKR has been distributed through torrent file-sharing websites to South Korean victims, using games or Korean movie/TV series as a lure.
Execution	T1059	Command-Line Interface	GoBotKR uses cmd.exe to execute commands.
T1064	Scripting	GoBotKR can download and execute scripts .	

Tactic	ID	Name	Description
T1204	User Execution	GoBotKR makes their malware look like the torrent content that the user intended to download, in order to entice a user to click on it.	
Persistence	T1060	Registry Run Keys / Startup Folder	GoBotKR installs itself under registry run keys to establish persistence.
T1053	Scheduled Task	GoBotKR schedules a task that adds a registry run key to establish malware persistence.	
Privilege Escalation	T1088	Bypass User Account Control	GoBotKR attempts to bypass UAC using Registry Hijacking.
Defense Evasion	T1140	Deobfuscate/Decode Files or Information	GoBotKR has used base64 to obfuscate strings, commands and files.
T1089	Disabling Security Tools	GoBotKR may use netsh to add local firewall rule exceptions.	
T1158	Hidden Files and Directories	GoBotKR stores itself in a file with Hidden and System attributes.	
T1070	Indicator Removal on Host	GoBotKR removes the Zone identifier from the ADS (Alternate Data Streams) of the file, to conceal the fact the file has been downloaded from the internet.	

Tactic	ID	Name	Description
T1036	Masquerading	GoBotKR uses filenames and registry key names associated with legitimate software.	
T1112	Modify Registry	GoBotKR stores its configuration data in registry keys. GoBotKR can modify registry keys to disable Task Manager, Registry Editor and Command Prompt.	
T1027	Obfuscated Files or Information	GoBotKR uses base64 to obfuscate strings, commands and files.	
T1108	Redundant Access	GoBotKR installs a second copy of itself on the system, which monitors and reinstalls the primary copy if it has been removed.	
T1497	Virtualization/Sandbox Evasion	GoBotKR performs several checks on the compromised machine to avoid being emulated or executed in a sandbox.	
Discovery	T1063	Security Software Discovery	GoBotKR checks for processes associated with security products and debugging tools, and terminates itself if any are detected. It can enumerate installed antivirus software using the wmic command.

Tactic	ID	Name	Description
T1082	System Information Discovery	GoBotKR uses wmic, systeminfo and ver commands to collect information about the system and the installed software.	
T1016	System Network Configuration Discovery	GoBotKR uses netsh and ipconfig to collect information about the network configuration. It has used Naver and Daum portals to obtain the client IP address.	
T1033	System Owner/User Discovery	GoBotKR uses whoami to obtain information about the victimized user. It runs tests to determine the privilege level of the compromised user.	
T1124	System Time Discovery	GoBotKR can obtain the date and time of the compromised system.	
Lateral Movement	T1105	Remote File Copy	GoBotKR attempts to copy itself into public folders of cloud storage services (Google Drive, Dropbox, OneDrive). It is also able to spread itself by instructing the compromised machine to seed torrents with the malicious file.

Tactic	ID	Name	Description
T1091	Replication Through Removable Media	GoBotKR can drop itself onto removable media and relies on Autorun to execute the malicious file when a user opens the removable media on another system.	
Collection	T1113	Screen Capture	GoBotKR is capable of capturing screenshots.
Command and Control	T1090	Connection Proxy	GoBotKR can be used as a proxy server.
T1132	Data Encoding	The communication with the C&C server is base64 encoded.	
T1105	Remote File Copy	GoBotKR can download additional files and update itself.	
T1071	Standard Application Layer Protocol	GoBotKR uses HTTP or HTTPS for C&C.	
T1065	Uncommonly Used Port	GoBotKR uses non-standard ports, such as 6446, 6556 and 7777, for C&C.	
Impact	T1499	Endpoint Denial of Service	GoBotKR has been used to execute endpoint DDoS attacks – for example, TCP Flood or SYN Flood.
T1498	Network Denial of Service	GoBotKR has been used to execute network DDoS.	
T1496	Resource Hijacking	GoBotKR can use the compromised computer's network bandwidth to seed torrents or execute DDoS.	

8 Jul 2019 - 11:30AM

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