

JOINT CYBER SECURITY ADVISORY



Bundesamt für
Verfassungsschutz

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Warning of North Korean cyber threats targeting the Defense Sector



Summary

The Bundesamt für Verfassungsschutz (BfV) of the Federal Republic of Germany and the National Intelligence Service (NIS) of the Republic of Korea (ROK) are issuing a second Joint Cyber Security Advisory (CSA) to raise awareness of cyber campaigns highly likely carried out by cyber actors of North Korea against the defense sector targeting companies and research centers.

The Democratic People's Republic of Korea (DPRK) puts high emphasis on military strength and focuses on the theft of advanced defense technologies from targets around the world. The BfV and NIS assess that the regime is using the military technologies to modernize and improve the performance of conventional weapons and to develop new strategic weapon systems including ballistic missiles, reconnaissance satellites and submarines. DPRK increasingly uses cyber espionage as a cost-effective means to obtain military technologies.

This Joint CSA details DPRK's tactics, techniques and procedures (TTPs) and Indicators of Compromise (IoCs) as well as it introduces two representative cases of intrusions

into facilities of the defense sector.

The BfV and NIS attribute hacking incidents, described in this Joint CSA, individually to LAZARUS and another allegedly North Korean Cyber threat group. Though the main tradecraft of the first cyber actor is known to be spear phishing attacks against diplomatic and security experts, it recently appears to expand its targets to the defense and financial sectors. The LAZARUS group is a notorious and sophisticated cyber actor that has raised international attention for its involvement in a wide range of cyber attacks. LAZARUS is known for its advanced capabilities and involvement in high-profile incidents, including financial heists, ransomware campaigns, and cyber espionage. Successful cyber attacks in the defense sector may pave the way for DPRK to strengthening its military by obtaining sensitive and confidential data from across the globe.

Since the cyber actors frequently change their infrastructure and constantly attack entities worldwide, the BfV and the NIS anticipate a similar trajectory in the future. This Joint CSA is published with the means to strengthen the defense industry in particular but also to inform other industry sectors as well as the public.



Technical Details

In the following section two representative cases for systematic attacks against the defense sector will be outlined. Based on the TTPs used in attacks, the first case is a malicious campaign against a defense research center, and the second describes LAZARUS' procedure of using social-engineering to attack defense companies.

① Intrusion into a defense research center through a website maintenance & repair company

The DPRK recently prioritized strengthening its naval power. Therefore it constructed a new submarine in Sept. 2023. Before that, end of 2022, a North Korean cyber actor intruded systems of a research center for maritime and shipping technologies. The cyber actor executed a supply-chain attack, initially infiltrating a supplier for maintaining one of the research center's webservers to subsequently compromise the primary target.

The cyber actor further infiltrated the research facility by deploying remote-control malware through a patch management system (PMS) of the research center, and stole various account information of business portals and email contents. The authoring agencies used MITRE ATT&CK¹ to describe the attack flow.

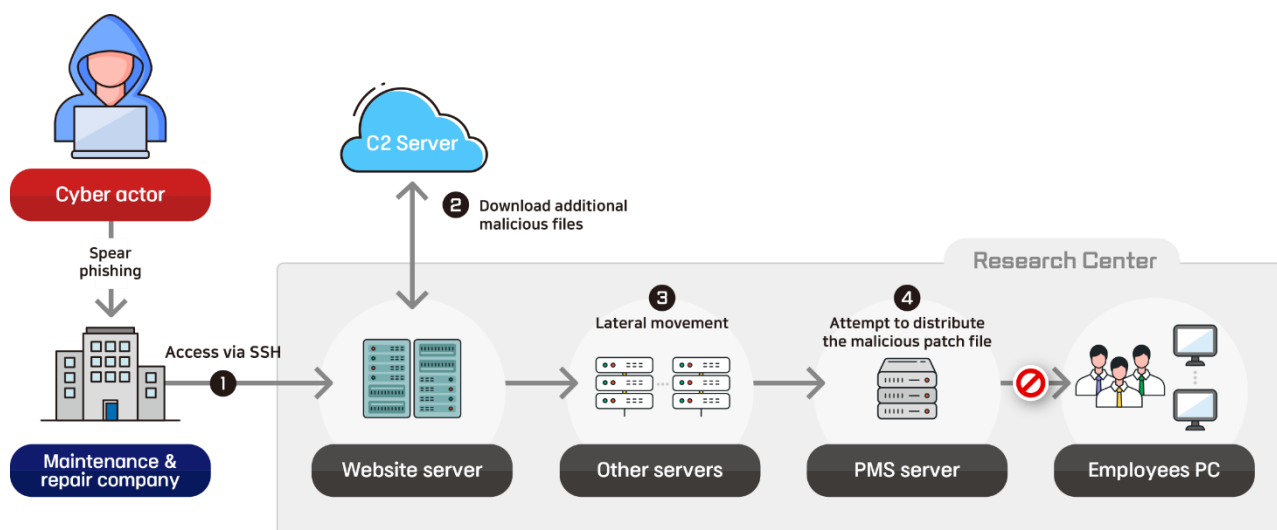


Figure 1 - Overview of supply chain attack flow

¹ MITRE ATT&CK is a globally-accessible knowledge base of adversary tactics and techniques based of real-world observations.

Attack Flow

1. The cyber actor breached a company for maintaining web servers of its target and stole SSH access credentials. Then the actor remotely accessed the web server (Linux) of the research center (T1133).
2. The actor used legitimate tools including curl, to download additional malicious files from C2 servers such as a tunnelling tool for remote access (Ngrok) and a Base64-encoded Python script functioning as a downloader.
3. For lateral movement, the cyber actor established an SSH connection to other servers related to the website; collected packets by running tcpdump at the servers; obtained additional information about the network; and stole account credentials of the target's employees (T1040, T1046, T1021).
4. The cyber actor then used the account information of a security manager and gained access to the email account in order to obtain information regarding an operating procedure of the PMS. The actor impersonated the security manager and sent an email to the PMS service provider requesting to create a patch file with malicious functions. Though the file with malicious code masqueraded as a legitimate file, the genuine security manager detected and successfully blocked the attempt to distribute the malicious patch file through PMS. The malicious code had functions to upload and download files, execute code, and to collect system information etc (T1041, T1001, T1071).

5. Even after the research center strengthened the security, the cyber actor continued malicious attempts by exploiting a file-upload vulnerability of the website and uploading a web shell as well as sending spear phishing emails.

MITRE ATT&CK Matrix for Enterprise Linux platform(v14)

Tactics	Techniques	Description
Initial Access (TA0001)	External Remote Service (T1133)	SSH
Execution (TA0002)	Command and scripting interpreter (T1059)	tcpdump, ngrok and curl
Persistence (TA0003)	Valid Accounts (T1078)	Server admin account, Email account, SSL-VPN account
Defense Evasion (TA0004)	Indicator removal (T1070) Obfuscated Files or Information (T1140)	Files delete, File encryption and decoding
Credential Access (TA0006)	Network Sniffing (T1040)	tcpdump
Discovery (TA0007)	Network Sniffing (T1040) & Network Service Discovery (T1046)	tcpdump
Lateral movement (TA0008)	Remote Services (T1021)	SSH
Collection (TA0009)	Data from Information Repositories (T1213)	Website source code, Server configuration information
Command and control (TA0011)	Data Obfuscation (T1001) Application Layer Protocol (T1071) Protocol Tunneling (T1572)	AES-256, Use of HTTP protocol, ngrok
Exfiltration (TA0010)	Exfiltration Over C2 Channel (T1041)	HTTP C2 server

Key findings

Rather than a direct compromise of a target system, the cyber actor first conducted attacks against one of the research center's vendors. As it became difficult during the COVID pandemic to have onsite maintenance & repair services for server infrastructure, remote services were provided instead. However, lacking security measures allowed unattended access to servers without access control.

Usually the cyber actor stops its activity, when detected. However, in this case, even after PMS distribution and SSH remote access were blocked, the cyber actor made various attempts to maintain persistence, by uploading a web shell to the web page and sending spear phishing emails to the target's employees.

Furthermore, the actor avoided carrying out a direct attack against its target, which maintained a high level of security, but rather made an initial attack against its vendor, the maintenance & repair company. This indicates that the actor took advantage of the trustful relationship between the two entities.

Please refer to the Article 26 (Security of Service Providers) of the Basic Guidelines for National Intelligence Security of the Republic of Korea for details about recommendations for Korean national and public organizations receiving remote maintenance and repair services from vendors. German national and public organizations can refer to the guidelines OPS.2.1 and OPS.1.2.5 provided by the Federal Office for Information Security (BSI).

② North Korea's Social Engineering Attacks

In this second case the LAZARUS group's distinctive skills in social engineering will be outlined. Since at least mid-2020 the DPRK took advantage of this attack vector to infiltrate defense companies. Due to the fact that in all observed cases the targeted employees of the companies received malicious files obfuscated in relation to job offers, the campaign soon was referred to as "Operation Dream Job". Meanwhile for more than three years LAZARUS conducted this kind of attack against the defense sector and has proven to be an elusive and well-organized actor that poses a hazardous threat to not only cyber- but global security.

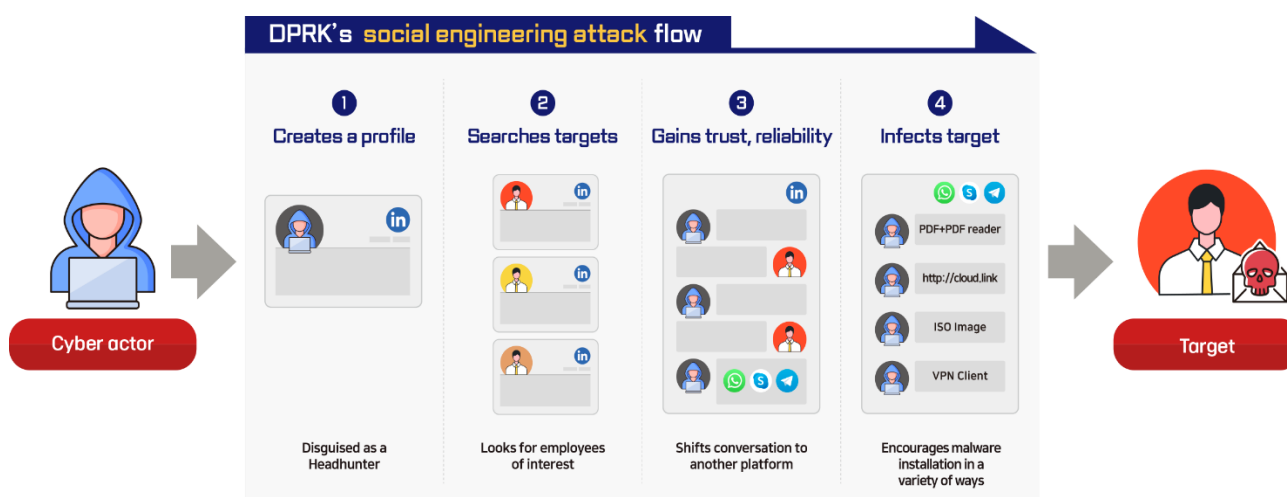


Figure 2 - Overview of social engineering attack flow

Attack Flow

In connection with cyber attacks, social engineering is a non-technical method that leverages human trust, curiosity, fear, or urgency to achieve malevolent goals. Over time it substantiated as a highly effective way to exploit human psychology and manipulating individuals into taking actions that could lead to

security compromises. The pervading tendency of social engineering attacks could emanate from the fact, that the security measures security operation centers (SOCs) nowadays apply, present an almost impregnable barrier for cyber actors. Although the LAZARUS group's technical tactics changed, the social engineering strategy remained the same.

1. As the first step for being able to use social engineering the actor creates a profile on an online job portal. The profiles observed so far have been either a stolen profile of an existing person or a profile created with fake data. In both cases the profile is designated to look like a headhunter's profile with a wide spread network of contacts to people working in the defense sector. Once the profile looks legit the actor continues with the next step.
2. The actor searches for possible targets by looking at the profiles of people working for one of the companies of interest. Among these people the actor is looking for those who might have access to valuable assets like internal systems.
3. Once the actor found an employee suitable as a target, it might add contacts of the target's social circle to gain trust and reliability. Afterwards a connection to the employee is established via the job portal's messaging service. The conversation with the target is initiated and in most cases held in English. The business small talk with the employee could last from days to weeks or even months and is supposed to establish trust. During this time the target is offered a job. Even if the targeted employee is not interested the attacker takes the time to persuade the employee, for example by highlighting the generous salary of the

offered position. Pretending to start a discrete recruitment process the target is asked to shift the communication to another channel (i.e. WhatsApp, Telegram, Skype, Discord or other).

4. If the actor has successfully lured the targeted employee to another communication channel, the actor evolved different approaches to circumvent security measures of the target's employing company.
 - a. The actor sends a pdf file with a lucrative job offer tailored to the interests of the targeted employee and a pdf reader which contains disguised malware.
 - b. The actor sends a file with superficial information about the position. Successively if the employee wants to know further details the attacker sends a link to a file with in-depth information on the position to the corporate email address and makes sure the employee is at work at the time the link is provided. The linked file is stored on a cloud-based service and contains the first stage of malware.
 - c. More recently the job offers have been directed to programmers where the actor sends zip files containing an iso image with a coding challenge which has to be solved as part of the recruitment process. As soon as the programmer executes the challenge, the machine gets infected with the first stage malware.
 - d. Another way the LAZARUS group attempts to get access to the company's network is by sending a malicious vpn client in a zip file.

Key findings

Universally the circumstance that employees usually do not talk to their colleagues or employer about job offers, plays into the hands of the attacker. The LAZARUS group changed its tools throughout the campaign and demonstrated more than once that it is capable of developing whatever is necessary to suit the situation.



Mitigation

Following prevention guidelines in the Joint CSA are based on the observations made by the BfV and NIS.

Brief your employees on a regular basis about the latest tendencies in cyber attacks. This may deepen their understanding of cyber actors' modus operandi which constantly evolves and ensure employees' proper management when an actual intrusion happens.

Since most of the attacks by North Korea's cyber units are carried out through social engineering and supply-chain attacks, the following precautions shall be taken as applicable.

Precautions against indirect attacks through a vendor

- Limit access only to necessary systems when receiving remote maintenance and repair services, and authentication shall be performed before user permissions and privileges are granted.
- Store and maintain audit logs including system access records, and monitor them

on a regular basis to detect an anomalous access.

- Adopt a proper PMS procedure in order to verify user authentication, and implement an adequate verification and confirmation process for the final stage of distribution, as it can be easily targeted by malicious cyber actors for supply chain attacks.
- Always implement SSL/TLS when creating a website in order to prevent breaches of critical data including account information, even in a situation where logs are captured by a cyber actor.
- In case employees are using a VPN to work from home, a multi-factor authentication along with user ID and password authentication is highly recommended. In this case it is required to protect critical information including one time password (OTP) authentication keys from disclosure to a third party.
- Please refer to section “Mitigations” of the first BfV-NIS Joint CSA published in March 2023 for details about spear phishing prevention guidelines.

Social Engineering Attacks: Prevention and Best Practices

- The best preventive measure to avoid social engineering attacks starts by educating personnel about some of the common social engineering tactics. This includes vigilance against suspicious password-locked doc files or links and establishing an error culture in which employees are encouraged to report security incidents without fearing consequences for being a victim of social engineering attacks.

- Another key element to mitigate the risk of social engineering attacks is limiting privileges and access to sensitive data only to authorized users.
- In order to remove vulnerabilities in network systems a strict update and patch routine should be established.
- These prevention guidelines are recommended to be applied to all domestic and overseas branches of your organization, including those which may be seen as distant from the mainstream.

Contact

Report cyber security incidents or anomalous activity related to state-sponsored cyber actors to following organizations.

ROK organization:

National Intelligence Service (Visit www.nis.go.kr or call +82 111)

German organization:

Bundesamt für Verfassungsschutz (Visit www.verfassungsschutz.de, or call +49 (0) 30-18 / 792-3322)

Indicators of Compromise (IoCs)

IoCs of the cyber campaign targeting a website maintenance & repair company of the defense sector

Section	IoC	Note
C2	connection.lockscreen.kro[.]kr/index.php	C2 URL
	updating.dothome.co[.]kr/microsoft/app/google	C2 URL
MD5	3c2aa3687ac9f466ce909e2cb12b07a5	Remote control (EncryptModule_Patch.exe)
	4631ef8db9c36b0f2534ac7193f2587e	Malicious script (JSE)
	607a2a8d2863c3144b8e901a16a76c33	Webshell (_banner.jsp)

IoCs of the social engineering campaign against the defense sector

Section	IoC	Note
Domain	chrysalisc[.]com	Domain
	sifucanva[.]com	Domain
	thefrostery.co[.]uk	Domain
	rginfotechnology[.]com	Domain
	job4writers[.]com	Domain
	contact.rgssm[.]in	Domain
SHA-1	7da62cdb447a7ae3ae7b5f67a511e7cf2b26c7df	Boeing_Asia_ERP_IT_SA.zip
	2e0d374f1e706ae1fa24558b54c5a1630302eab1	Boeing_Asia-ERP_IT_SA.iso
	294706ae0585abaf4e6c5e66a7f5141ac4281d57	Amazon VNC.exe
	127ced578e041f53b5988a7fefaa6e09e64f4bf9	AmazonVNC Viewer.exe
	3bc8acdd07c6d91652101d9c8b3326bee372a007	

	7906270679014234b70aa63dd89e8282a945919c	
	7b4d0d8e3bfcd634bc7d7a17fb546b7e8316a681	Amazon VNC.zip
	d5c8edb84e4ff33aea8865676ffe801ff0a71701	AMAZON_BSA_SKILL_ASSESSMENT_V2.ZIP
	ac9021eb798de8323702a5aeb7c590f1ebaa3786	
	d5c8edb84e4ff33aea8865676ffe801ff0a71701	Amazon_BSA_SA_v2.iso
SHA-256	F3482A38BEFDCD7D0B87D86F24CDB209028BD8471BAA6610548FB721086F5B85	Accenture_IT_SA.zip
	47999FA014B6CC5A2A71BE590C93830371E259242DFDBA7FFA2698F1900919EC	Accenture_IT_SA.iso

Yara² rule for detecting Operation Dream Job Files

The following YARA rule resulted from the examination of an Amazon VNC Viewer file’s behavior and will detect at least the three different Amazon VNC Viewer samples with the above provided hash values. The rule demonstrates how the provided IoCs could be used to detect cyber threats, if they are properly implemented.

² YARA is a framework to help identifying and classifying malware samples based on patterns.

(The square brackets of the URL have to be removed in order for the rule to work. Those have been added to prevent anyone from accidentally clicking on a malicious link.)

```
rule operation_DREAMJOB_AMAZON_VNC {
meta:
    target_entity = "file"
condition:
    for any vt_behaviour_command_executions in
    vt.behaviour.command_executions:
        ( vt_behaviour_command_executions ==
        "C:\\Windows\\System32\\wuapihost.exe -Embedding"
    or
    vt_behaviour_command_executions == "\"%SAMPLEPATH%\\AmazonVNC
    Viewer.exe\" ")
    and
    for any vt_behaviour_http_conversations in vt.behaviour.http_conversations: (
        vt_behaviour_http_conversations.url == https://sifucanva[.]com/wp-
        includes/fonts/public/common.php)
}
```