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Mirai_ptea Botnet利用KGUARD DVR未公开漏洞报告

2021-06-22我们检测到一个我们命名为mirai_ptea的mirai变种样本通过未知漏洞传播。经过分析，该漏洞为KGUARD DVR未公开的漏洞。从我们的分析看该漏洞存在于2016年的固件版本中。我们能找到的2017年之后的固件厂家均已经修复该漏洞

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概述

2021-06-22我们检测到一个我们命名为 `mirai_ptea` 的mirai变种样本通过未知漏洞传播。经过分析，该漏洞为KGUARD DVR未公开的漏洞。从我们的分析看该漏洞存在于2016年的固件版本中。我们能找到的2017年之后的固件厂家均已经修复该漏洞。有意思的是，一天以后，6月23日，我们收到安全社区的询问，咨询我们是否看到一种新的DDoS攻击botnet。交叉对比线索，居然就是我们刚发现的这个botnet，目前看。这个僵尸网络处于活跃的攻击状态(见最后)。

时间线

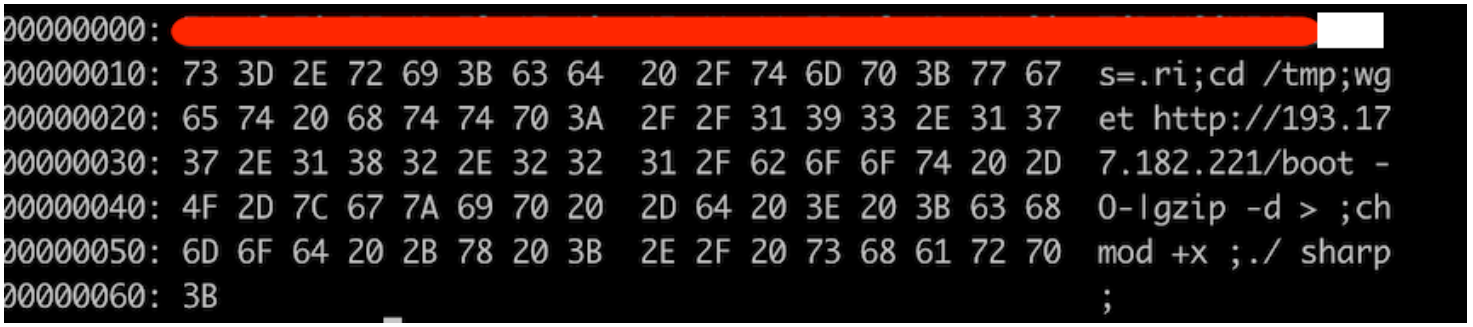
- 2021-03-22 我们历史数据首次观察到针对该漏洞的探测扫描

- 2021-06-22 我们观察到mirai_ptea样本利用该漏洞传播
- 2021-06-23 我们收到安全社区的询问是否看到一种新的DDoS攻击botnet
- 2021-06-25 我们观察到mirai_aurora样本利用该漏洞传播

漏洞分析

鉴于我们并未发现该漏洞的公开资料，为防止该漏洞被滥用，此处我们将隐藏部分关键信息。

KGUARD DVR 2016年的固件上的 `***` 程序监听在 `0.0.0.0` 的 `*****` 端口无需认证即可远程执行系统命令。 最新的固件中厂家通过修改监听地址为 `127.0.0.1` 修复了该漏洞。部分利用payload如下:



受影响设备分析

通过探测我们发现至少3千左右的在线设备依然存在该漏洞。已知仍然受影响设备如下:

DEVICETYPE	PRODUCTTYPE	HARDVERSION	DEFDEVICENAME
D1004NR	DVR4-1600	DM-268A	DVR4-1600
D1004NR	HY-DVR	DM-268	720P-HY04N
D1004NR	HY-DVR	DM-268A	720P-HY04N
D1004NR	HY-DVR	DM-274	720P-HY04N
D1004NR	HY-DVR	DM-274B	720P-HY04N
D1004NR	NHDR	DM-274	NHDR-3204AHD

DEVICETYPE	PRODUCTTYPE	HARDVERSION	DEFDEVICENAME
D1004NR	RL-AHD4n	DM-268	720P-HY04N
D1008NR	1093/508N-DVRBM08H	DM-292	720P-HY08N
D1008NR	DVR8-1600	DM-298	DVR8-1600
D1008NR	DVR8-HDA10L	DM-292	DVR8-HDA10L
D1008NR	HD881	DM-292	HD881
D1008NR	HY-DVR	DM-292	720P-HY08N
D1008NR	HY-DVR	DM-298	720P-HY08N
D1008NR	NHDR	DM-298	NHDR-3208AHD
D1008NR	RL-AHD8n	DM-292	720P-HY08N
D1016NR	DVR16-HDA10L	DM-303	DVR16-HDA10L
D1016NR	HD1681	DM-303	HD1681
D1016NR	HY-DVR	DM-303A	720P-HY16N
D1016NR	HY-DVR	DM-310	720P-HY16N
D1016NR	HY-DVR	DM-310A	720P-HY16N
D1016NR	NHDR	DM-310	NHDR-3216AHD
D1016NR	RL-MHD16n(21A)	DM-310A	720P-HY16N
D1104	HY-DVR	DM-290A	1080P-HY04
D1104	NHDR	DM-307	NHDR-5304AHD
D1104NR	HD1T4	DM-291A	1080P-04
D1104NR	HD481	DM-291	HD481
D1104NR	HRD-E430L	DM-291A	HRD-E430L
D1104NR	HY-DVR	DM-284	1080P-HY04N
D1104NR	HY-DVR	DM-291	"Panda
D1104NR	HY-DVR	DM-291	1080P-HY04N
D1104NR	HY-DVR	DM-291A	1080P-HY04N
D1104NR	HY-DVR	DM-291C	LRA3040N
D1104NR	NHDR	DM-307	NHDR-5104AHD
D1104NR	SDR-B73303	DM-291A	SDR-B73303

DEVICETYPE	PRODUCTTYPE	HARDVERSION	DEFDEVICENAME
D1104NR	SVR9204H	DM-291A	1080P-HY04N
D1108NR	1093/538P	DM-290	1080P-HY08N
D1108NR	DVR8-4575	DM-290	DVR8-4575
D1108NR	DVR8-HDA10P	DM-290	DVR8-HDA10P
D1108NR	HRD-E830L	DM-290A	HRD-E830L
D1108NR	HY-DVR	DM-290	1080P-HY08N
D1108NR	HY-DVR	DM-290A	1080P-HY08N
D1108NR	HY-DVR	DM-290A	LRA3080N
D1108NR	NHDR	DM-307	NHDR-5108AHD
D1108NR	RL-AHD8p	DM-290	1080P-HY08N
D1108NR	SDR-B74301	DM-290A	SDR-B74301
D1108NR	SDR-B74303	DM-290A	SDR-B74303
D1116	HY-DVR	DM-300	EHR-5164
D1116NR	HRD-E1630L	DM-295	HRD-E1630L
D1116NR	HY-DVR	DM-295	1080P-HY16N
D1116NR	HY-DVR	DM-295	LRA3160N
D1116NR	HY-DVR	DM-299	1080P-HY16N
D1116NR	SDR-B75303	DM-295	SDR-B75303
D1132NR	HY-DVR	DM-300	1080P-HY32
D2116NR	SDR-B85300	DM-300	SDR-B85300
D973215U	F9-DVR32	DM-195	F9-DVR32
D9804AHD	DVR	DM-210	391115
D9804NAHD	AHD7-DVR4	DM-239	AHD7-DVR4
D9804NAHD	DVR	DM-239	720P-DVR04ND
D9804NAHD	NHDR	DM-239	NHDR-3104AHD-II
D9808NRAHD	AHD7-DVR8	DM-228	AHD7-DVR8
D9808NRAHD	DVR	DM-228	
D9808NRAHD	DVR	DM-228	391116

DEVICETYPE	PRODUCTTYPE	HARDVERSION	DEFDEVICENAME
D9808NRAHD	NHDR	DM-228	NHDR-3108AHD-II
D9808NRAHD	NHDR	DM-228	NHDR3108AHDII
D9816NAHD	DVR	DM-233	720P-DVR016N
D9816NAHD	NHDR	DM-233	NHDR3116AHDII
D9816NRAHD	AHD7-DVR16	DM-229	AHD7-DVR16
D9816NRAHD	DVR	DM-229	720P-DVR016NB
D9904	D9904	DM-237	1080P-DVR04
D9904	DVR	DM-237	1080P-DVR04
D9904	NHDR	DM-237	NHDR-5204AHD
D9904NR	DVR	DM-244	1080P-DVR04N
D9904NR	DVR	DM-244	BCS-VAVR0401M
D9904NR	HY-DVR	DM-244	CVD-AF04S
D9904NR	N420	DM-244	1080P-DVR04N
D9904NR	NHDR	DM-244	NHDR-5004AHD-II
D9904NR	NHDR	DM-244	NHDR5004AHDII
D9908	DVR	DM-245	BCS-VAVR0802Q
D9908	NHDR	DM-245	NHDR-5208AHD
D9908AHD	DVR	DM-246	1080P-DVR08A
D9908NR	AHD10-DVR8	DM-237	AHD10-DVR8
D9908NR	DVR	DM-237	1080P-DVR08N
D9908NR	DVR	DM-237	SVR9008ATHD/C
D9908NR	HY-DVR	DM-237	CVD-AF08S
D9908NR	N820	DM-237	1080P-DVR08N
D9908NR	NHDR	DM-237	NHDR-5008AHD-II
D9916NR	DVR	DM-245	1080P-DVR016NAT;UI
D9916NR	DVR	DM-245	HR-31-211620;UI
D9916NR	HY-DVR	DM-245	CVD-AF16S
D9916NR	NHDR	DM-245	NHDR-5016AHD-II

DEVICETYPE	PRODUCTTYPE	HARDVERSION	DEFDEVICENAME
D9916NRAHD	DVR	DM-246	1080P-DVR016NA
D9916NRAHD	N1620	DM-246	1080P-DVR016NA
H1104W	SNR-73200W	DM-339	SNR-73200W
H1106W	LHB806	DM-291B	LHB806
H1106W	LHB906	DM-291B	LHB906

Bot规模分析

从我们的数据视野看，该botnet的活跃Bot源IP趋势如下：

Bot源IP地理位置分布如下，主要集中在美国、韩国和巴西：

样本分析

本文选取以下样本为主要分析对象

```
Verdict:mirai_ptea
MD5:c6ef442bc804fc5290d3617056492d4b
ELF 32-bit LSB executable, ARM, version 1, statically linked, stripped
Packer:No
Lib:uclibc
```

`c6ef442bc804fc5290d3617056492d4b`是一个Mirai的变种，基于其使用Tor Proxy和C2通信，以及TEA算法（Tiny Encryption Algorithm）隐藏敏感的资源信息，我们称之为`Mirai_ptea`。Mirai_ptea运行时在会Console输出字串`come at me krebs rimasuta go BRRT`，这就是有的研究人员将它称之为`Rimasuta`的原因，它在主机行为层面和Mirai很相似，并无亮点，因此这方面不再细述；在网络流量层面采用Tor Proxy，样本内嵌了大量的代理节点，而且Tor-C2被加密，下文将着重讨论加密方法和通信协议。

加密算法

Mirai_ptea将所有的敏感资源信息加密并按一定的顺序存储，在IDA打开样本看到的字串信息如下所示，几乎没有可读的信息。

下面的代码片段来自样本中解密相关函数，通过`红框中的常量`可以判定它使用的是TEA算法，

```
do
{
  v5 = v3 + 8 * v4;
  v14 = _byteswap_ulong(*(_DWORD *)(v3 + 8 * v4));
  v6 = *(unsigned __int8 *)(v5 + 6);
  v15 = _byteswap_ulong(*(_DWORD *)(v3 + 8 * v4 + 4));
  result = 0xC6EF3720;
  v7 = v14;
  v8 = v15;
  do
  {
    v8 -= (dword_19CA8 + 16 * v7) ^ (v7 + result) ^ (dword_19CAC + (v7 >> 5));
    v9 = (dword_19CA0 + 16 * v8) ^ (v8 + result);
    result += 0x61C88647;
    v7 -= v9 ^ (dword_19CA4 + (v8 >> 5));
  }
  while ( result );
```

TEA KEY

```
dword_19CA0     DCD 0xC26F6A52
dword_19CA4     DCD 0x24AA0006
dword_19CA8     DCD 0x8E1BF2C5
dword_19CAC     DCD 0x4BA51F8C
```

密钥为：

```
0xC26F6A52 0x24AA0006 0x8E1BF2C5 0x4BA51F8C
```

基于逆向分析，我们实现了附录的解密脚本，通过它可以获得所有的解密后的敏感资源以及它们的表项信息，部分资源信息如下所示：

```
------------------dec start-----------------------
index 0, value = /proc/
index 1, value = /exe
index 2, value = /fd
index 3, value = /proc/net/tcp
index 4, value = /cmdline
index 5, value =  00000000:0000 0A
index 6, value = 0100007F
index 7, value = /status
index 8, value = /maps
index 9, value = .
index a, value = /dev/watchdog
index b, value = /dev/misc/watchdog
index c, value = abcdefghijklmnopqrstuvwxyz0123456789
index d, value = rkz2f5u57cvs3kdt6amdku2uhly2esj7m2336dttvcygloivcgsmxjjnuickasbuatxajrovi4lvd2zjuejivzrb3vobuoezbc6z3gtu6b3r5tce.onion
index e, value = /dev
index f, value = /dev/misc
index 10, value = /bin/busybox
index 11, value = come at me krebs rimasuta go BRRT
index 12, value = watchdog
index 13, value = CZ5mNqWf2SWYnk9w
index 14, value = >��^7Ga 1e374761
index 15, value = ?/��`��cecb89e1
index 16, value = :14?3134
index 17, value = 2e7i74u6s5wzxjmw.onion
index 18, value = /boaform/admin/formPing
index 19, value = Hello, World
index 1a, value = L33T HaxErS
index 1b, value = /dev/watchdog
index 1c, value = [killer]
index 1d, value = TSource
index 1e, value = /cdn-cgi/
index 1f, value = Mozilla
index 20, value = abcdefghijklmnopqrstuvw012345678
index 21, value = /tmp/
index 22, value = (deleted)
index 23, value = arm
index 24, value = mips
index 25, value = dropbear
index 26, value = sda
index 27, value = mpsl
index 28, value = lolnogtfokrebs42
index 29, value = abcdefghijklmnopqrstuvwxyzABCDEFGHIJKLMNOPQRSTUVWXYZ0123456789+/
index 2a, value = U@&
index 2b, value = U N@?G?S?*?P?◀?3D%~???_?    R+?E
????? ;q?ú???
```

Mirai_ptea在使用加密资源时有2种操作方式

- **传统的Mirai方式**，解密一个加密项，取值，加密一个解密后的项，即 `var_unlock-->var_get-->var_lock` 。例如在获取输出在Console上的信息时，就是通过这种方式。

表项0x11的值正是 `come at me krebs rimasuta go BRRT` 。

- **Mirai_ptea的方式**，解密多个加密项，取值，重新加密已解密的项，即 `rangeVar_unlock-->var_get-->rangeVar_lock` 。例如在获取伪装进程名时，就是通过这种方式。

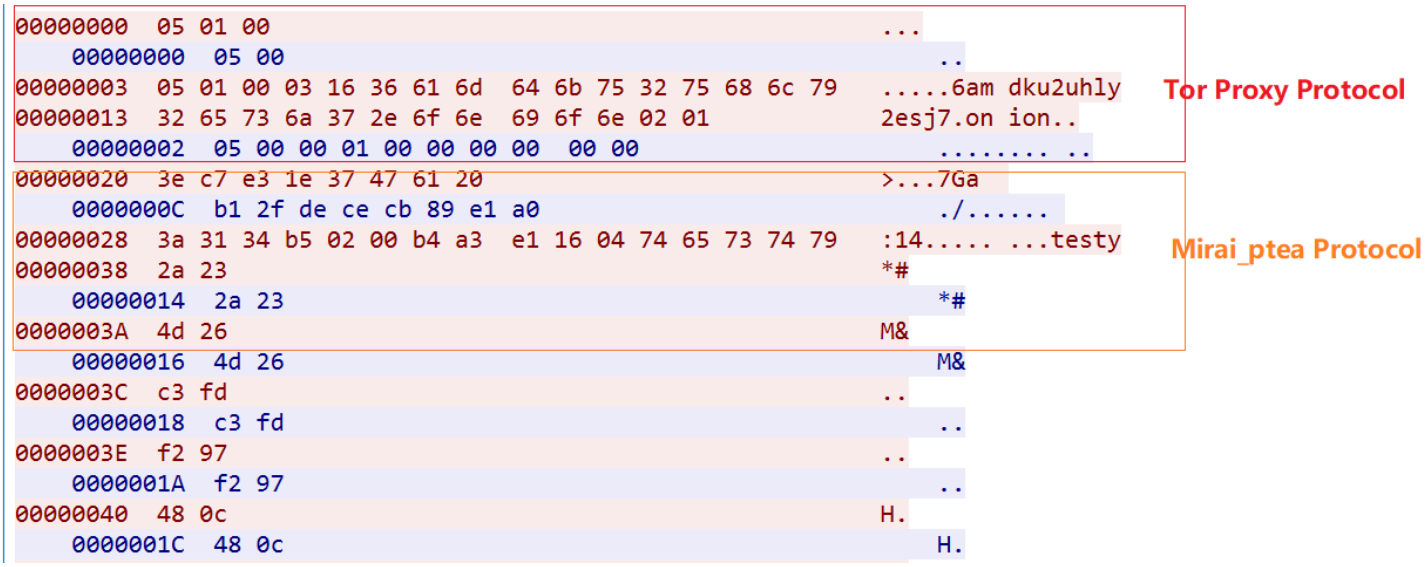
表项0x2c到0x2c+10的值如下所示，正是11个供选择的伪装进程名：

```
index 0x2c, value = /bin/sh
index 0x2d, value = telnetd
index 0x2e, value = upnpc-static
index 0x2f, value = wsdd
```

```
index 0x30, value = proftpd
index 0x31, value = mini_httpd
index 0x32, value = udevd
index 0x33, value = /sbin/udhcpc
index 0x34, value = boa
index 0x35, value = /usr/sbin/inetd
index 0x36, value = dnsmasq
```

通信协议

Mirai_ptea的网络流量概览如下图所示：



整个过程可以分成以下3个步骤：

1：和代理节点建立连接

2：和Tor C2建立连接

3：通过ptea自定义的协议和C2通信，接收C2下发的攻击指令。

0x1. 和代理建立连接

Mirai_ptea样本中内置了2组代理，它们在加密资源中的表项分别为0x2a,0x2b。Bot样本运行时，会在2组代理中随机选一组，然后在选中的组中随机选一个通过下面代码片段建立连接。

```
v77.sin_addr.s_addr = ip;
v77.sin_family = 2;
v77.sin_port = _byteswap_ushort(port);
if ( !getsockopt(dword_199E4, 1, 4, &v88, &v91) || (dword_199E4 = _GI_socket(2, 1, 0)
{
  v50 = dword_199E4;
  v51 = _GI___libc_fcntl(dword_199E4, 3, 0);
  _GI___libc_fcntl(v50, 4, v51 | 0x800);
  _libc_connect(dword_199E4, &v77, 16);
}
```

connect with proxy

其中 `0x2a` 中一共有38个代理节点，格式为 `ip:port`

```
var_unlock(0x2Au);
v47 = var_get(0x2A);
wrap_strncpy((int)&v92, v47 + 2, 2);
v48 = random_next();
LOWORD(dword_19E20) = mod_proc(v48, (unsigned __int8)v92 | (HIBYTE(v92) << 8));
dword_19E20 = (unsigned __int16)dword_19E20;
v49 = var_get(0x2A);
wrap_strncpy((int)&v71, v49 + 4, 6 * ((unsigned __int8)v92 | (HIBYTE(v92) << 8)));
wrap_strncpy((int)&ip, (int)&v71 + 6 * dword_19E20, 4);
wrap_strncpy((int)&port, (int)&v71 + 6 * dword_19E20 + 4, 2);
var_lock(0x2A);
```

proxys in index 0x2a

而 `0x2b` 中一共有个334个代理节点，格式为 `ip` ，这组代理的端口为固定的9050。

```
v55 = var_get(0x2B);
wrap_strncpy((int)&v71, v55 + 4, 4 * ((unsigned __int8)v92 | (HIBYTE(v92) << 8)));
v56 = 4 * dword_19E20++;
wrap_strncpy((int)&ip, (int)&v71 + v56, 4);
var_lock(0x2B);
port = 9050;
```

proxys in index 0x2b

详细的代理列表见附录。

0x2. 通过Tor-Proxy协议和C2建立连接

可以看出C2在加密资源中的表项为 `0xD` ，解密后得到下面字串：

```
rkz2f5u57cvs3kdt6amdku2uhly2esj7m2336dttvcygloivcgsmxjjnuickasbuatxajrovi4lvd2zjuejiv
```

将上面字串排除尾部的“.onion”后以长度16分割，然后和尾部的 `.onion` 字串进行拼接，就得到了以下7个C2。

```
rkz2f5u57cvs3kdt.onion
6amdku2uhly2esj7.onion
m2336dttvcygloiv.onion
cgsmxjjnuickasbu.onion
atxajrovi4lvd2zj.onion
uejivzrb3vobuoez.onion
bc6z3gtu6b3r5tce.onion
```

0x3. 通过自定义的协议和C2进行通信，具体的上线，心跳，攻击如下所示

- 上线

```
00000020  3e c7 e3 1e 37 47 61 20                           >...7Ga
    0000000C  b1 2f de ce cb 89 e1 a0                           ./......
00000028  3a 31 34 b5 02 00 b4 a3  e1 16 04 74 65 73 74 79   :14..... ...testy
```

```
msg parsing
--------------------------------------------------------------
3e c7 e3 1e 37 47 61 20                                  ----->hardcoded msg
b1 2f de ce cb 89 e1 a0                                  ----->cmd from C2,as
3a 31 34 b5 02 00                                               ----->hardco
b4 a3 e1 16                                                           ----
04
74 65 73 74                                                                ----->gr
79                                                  ----->padding
```

- 心跳

```
00000038  2a 23                                                  *#
    00000014  2a 23                                                  *#
0000003A  4d 26                                                  M&
    00000016  4d 26                                                  M&
```

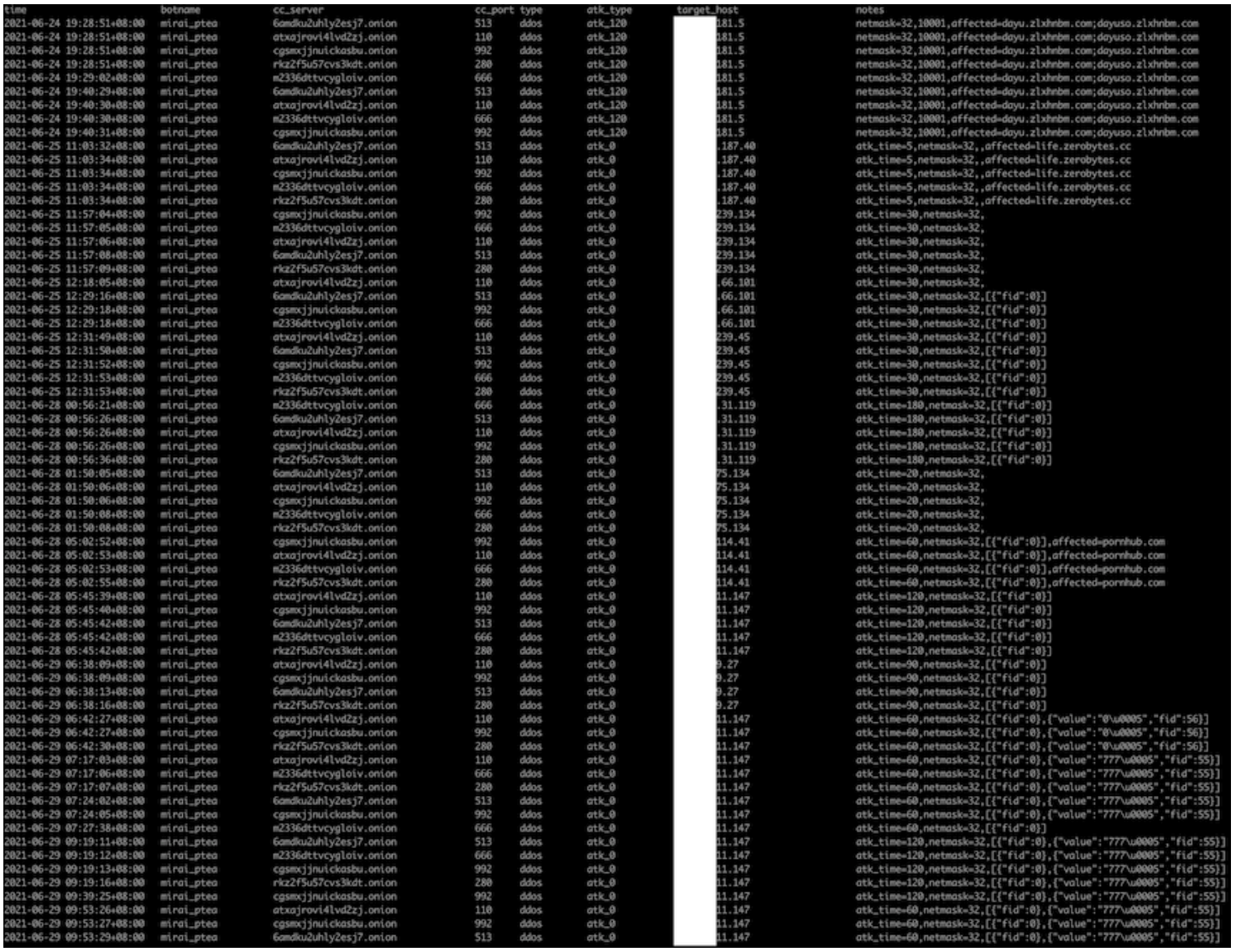
```
msg parsing
--------------------------------------------------------------
2a 23                                       -----> random 2 bytes msg from Bot
2a 23                                       -----> random 2 bytes msg from C2
```

- 攻击指令，前4字节`AD AF FE 7F`为固定的幻数，剩余部分与mirai的攻击指令格式类似

```
00000000: AD AF FE 7F 1E 00 00 00  00 01 B9 98 42 65 20 00  ............Be .
00000010: 42 65 20 00
```

DDoS攻击活动

从我们的DDoS跟踪系统看，该僵尸网络已经发起实际的DDoS攻击，下图为我们观察到的该僵尸网络的一些DDoS攻击指令：



time	botname	cc_server	cc_port	type	atk_type	target_host	notes
2021-06-24 19:28:51+08:00	mirai_ptea	6amdku2uhly2esj7.onion	513	ddos	atk_120	181.5	netmask=32,10001,affected=dayu.zlxhnbm.com;dayuso.zlxhnbm.com
2021-06-24 19:28:51+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_120	181.5	netmask=32,10001,affected=dayu.zlxhnbm.com;dayuso.zlxhnbm.com
2021-06-24 19:28:51+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_120	181.5	netmask=32,10001,affected=dayu.zlxhnbm.com;dayuso.zlxhnbm.com
2021-06-24 19:28:51+08:00	mirai_ptea	rkz2f5u57cvs3kdt.onion	280	ddos	atk_120	181.5	netmask=32,10001,affected=dayu.zlxhnbm.com;dayuso.zlxhnbm.com
2021-06-24 19:29:02+08:00	mirai_ptea	m2336dttvcygloiv.onion	666	ddos	atk_120	181.5	netmask=32,10001,affected=dayu.zlxhnbm.com;dayuso.zlxhnbm.com
2021-06-24 19:40:29+08:00	mirai_ptea	6amdku2uhly2esj7.onion	513	ddos	atk_120	181.5	netmask=32,10001,affected=dayu.zlxhnbm.com;dayuso.zlxhnbm.com
2021-06-24 19:40:30+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_120	181.5	netmask=32,10001,affected=dayu.zlxhnbm.com;dayuso.zlxhnbm.com
2021-06-24 19:40:30+08:00	mirai_ptea	m2336dttvcygloiv.onion	666	ddos	atk_120	181.5	netmask=32,10001,affected=dayu.zlxhnbm.com;dayuso.zlxhnbm.com
2021-06-24 19:40:31+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_120	181.5	netmask=32,10001,affected=dayu.zlxhnbm.com;dayuso.zlxhnbm.com
2021-06-25 11:03:32+08:00	mirai_ptea	6amdku2uhly2esj7.onion	513	ddos	atk_0	.187.40	atk_time=5,netmask=32,,affected=life.zerobytes.cc
2021-06-25 11:03:34+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_0	.187.40	atk_time=5,netmask=32,,affected=life.zerobytes.cc
2021-06-25 11:03:34+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	.187.40	atk_time=5,netmask=32,,affected=life.zerobytes.cc
2021-06-25 11:03:34+08:00	mirai_ptea	m2336dttvcygloiv.onion	666	ddos	atk_0	.187.40	atk_time=5,netmask=32,,affected=life.zerobytes.cc
2021-06-25 11:03:34+08:00	mirai_ptea	rkz2f5u57cvs3kdt.onion	280	ddos	atk_0	.187.40	atk_time=5,netmask=32,,affected=life.zerobytes.cc
2021-06-25 11:57:04+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	239.134	atk_time=30,netmask=32,
2021-06-25 11:57:05+08:00	mirai_ptea	m2336dttvcygloiv.onion	666	ddos	atk_0	239.134	atk_time=30,netmask=32,
2021-06-25 11:57:06+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_0	239.134	atk_time=30,netmask=32,
2021-06-25 11:57:08+08:00	mirai_ptea	6amdku2uhly2esj7.onion	513	ddos	atk_0	239.134	atk_time=30,netmask=32,
2021-06-25 11:57:09+08:00	mirai_ptea	rkz2f5u57cvs3kdt.onion	280	ddos	atk_0	239.134	atk_time=30,netmask=32,
2021-06-25 12:18:05+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_0	.66.101	atk_time=30,netmask=32,
2021-06-25 12:29:16+08:00	mirai_ptea	6amdku2uhly2esj7.onion	513	ddos	atk_0	.66.101	atk_time=30,netmask=32,[{"fid":0}]
2021-06-25 12:29:18+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	.66.101	atk_time=30,netmask=32,[{"fid":0}]
2021-06-25 12:29:18+08:00	mirai_ptea	m2336dttvcygloiv.onion	666	ddos	atk_0	.66.101	atk_time=30,netmask=32,[{"fid":0}]
2021-06-25 12:31:49+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_0	239.45	atk_time=30,netmask=32,[{"fid":0}]
2021-06-25 12:31:50+08:00	mirai_ptea	6amdku2uhly2esj7.onion	513	ddos	atk_0	239.45	atk_time=30,netmask=32,[{"fid":0}]
2021-06-25 12:31:52+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	239.45	atk_time=30,netmask=32,[{"fid":0}]
2021-06-25 12:31:53+08:00	mirai_ptea	m2336dttvcygloiv.onion	666	ddos	atk_0	239.45	atk_time=30,netmask=32,[{"fid":0}]
2021-06-25 12:31:53+08:00	mirai_ptea	rkz2f5u57cvs3kdt.onion	280	ddos	atk_0	239.45	atk_time=30,netmask=32,[{"fid":0}]
2021-06-28 00:56:21+08:00	mirai_ptea	m2336dttvcygloiv.onion	666	ddos	atk_0	.31.119	atk_time=180,netmask=32,[{"fid":0}]
2021-06-28 00:56:26+08:00	mirai_ptea	6amdku2uhly2esj7.onion	513	ddos	atk_0	.31.119	atk_time=180,netmask=32,[{"fid":0}]
2021-06-28 00:56:26+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_0	.31.119	atk_time=180,netmask=32,[{"fid":0}]
2021-06-28 00:56:26+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	.31.119	atk_time=180,netmask=32,[{"fid":0}]
2021-06-28 00:56:36+08:00	mirai_ptea	rkz2f5u57cvs3kdt.onion	280	ddos	atk_0	.31.119	atk_time=180,netmask=32,[{"fid":0}]
2021-06-28 01:50:05+08:00	mirai_ptea	6amdku2uhly2esj7.onion	513	ddos	atk_0	75.134	atk_time=20,netmask=32,
2021-06-28 01:50:06+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_0	75.134	atk_time=20,netmask=32,
2021-06-28 01:50:06+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	75.134	atk_time=20,netmask=32,
2021-06-28 01:50:08+08:00	mirai_ptea	m2336dttvcygloiv.onion	666	ddos	atk_0	75.134	atk_time=20,netmask=32,
2021-06-28 01:50:08+08:00	mirai_ptea	rkz2f5u57cvs3kdt.onion	280	ddos	atk_0	75.134	atk_time=20,netmask=32,
2021-06-28 05:02:52+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	114.41	atk_time=60,netmask=32,[{"fid":0}],affected=pornhub.com
2021-06-28 05:02:53+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_0	114.41	atk_time=60,netmask=32,[{"fid":0}],affected=pornhub.com
2021-06-28 05:02:53+08:00	mirai_ptea	m2336dttvcygloiv.onion	666	ddos	atk_0	114.41	atk_time=60,netmask=32,[{"fid":0}],affected=pornhub.com
2021-06-28 05:02:55+08:00	mirai_ptea	rkz2f5u57cvs3kdt.onion	280	ddos	atk_0	114.41	atk_time=60,netmask=32,[{"fid":0}],affected=pornhub.com
2021-06-28 05:45:39+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_0	11.147	atk_time=120,netmask=32,[{"fid":0}]
2021-06-28 05:45:40+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	11.147	atk_time=120,netmask=32,[{"fid":0}]
2021-06-28 05:45:42+08:00	mirai_ptea	6amdku2uhly2esj7.onion	513	ddos	atk_0	11.147	atk_time=120,netmask=32,[{"fid":0}]
2021-06-28 05:45:42+08:00	mirai_ptea	m2336dttvcygloiv.onion	666	ddos	atk_0	11.147	atk_time=120,netmask=32,[{"fid":0}]
2021-06-28 05:45:42+08:00	mirai_ptea	rkz2f5u57cvs3kdt.onion	280	ddos	atk_0	11.147	atk_time=120,netmask=32,[{"fid":0}]
2021-06-29 06:38:09+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_0	9.27	atk_time=90,netmask=32,[{"fid":0}]
2021-06-29 06:38:09+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	9.27	atk_time=90,netmask=32,[{"fid":0}]
2021-06-29 06:38:13+08:00	mirai_ptea	6amdku2uhly2esj7.onion	513	ddos	atk_0	9.27	atk_time=90,netmask=32,[{"fid":0}]
2021-06-29 06:38:16+08:00	mirai_ptea	rkz2f5u57cvs3kdt.onion	280	ddos	atk_0	9.27	atk_time=90,netmask=32,[{"fid":0}]
2021-06-29 06:42:27+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_0	11.147	atk_time=60,netmask=32,[{"fid":0},{"value":"0\u0005","fid":56}]
2021-06-29 06:42:27+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	11.147	atk_time=60,netmask=32,[{"fid":0},{"value":"0\u0005","fid":56}]
2021-06-29 06:42:30+08:00	mirai_ptea	rkz2f5u57cvs3kdt.onion	280	ddos	atk_0	11.147	atk_time=60,netmask=32,[{"fid":0},{"value":"0\u0005","fid":56}]
2021-06-29 07:17:03+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_0	11.147	atk_time=60,netmask=32,[{"fid":0},{"value":"777\u0005","fid":55}]
2021-06-29 07:17:06+08:00	mirai_ptea	m2336dttvcygloiv.onion	666	ddos	atk_0	11.147	atk_time=60,netmask=32,[{"fid":0},{"value":"777\u0005","fid":55}]
2021-06-29 07:17:07+08:00	mirai_ptea	rkz2f5u57cvs3kdt.onion	280	ddos	atk_0	11.147	atk_time=60,netmask=32,[{"fid":0},{"value":"777\u0005","fid":55}]
2021-06-29 07:24:02+08:00	mirai_ptea	6amdku2uhly2esj7.onion	513	ddos	atk_0	11.147	atk_time=60,netmask=32,[{"fid":0},{"value":"777\u0005","fid":55}]
2021-06-29 07:24:05+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	11.147	atk_time=60,netmask=32,[{"fid":0},{"value":"777\u0005","fid":55}]
2021-06-29 07:27:38+08:00	mirai_ptea	m2336dttvcygloiv.onion	666	ddos	atk_0	11.147	atk_time=60,netmask=32,[{"fid":0}]
2021-06-29 09:19:11+08:00	mirai_ptea	6amdku2uhly2esj7.onion	513	ddos	atk_0	11.147	atk_time=120,netmask=32,[{"fid":0},{"value":"777\u0005","fid":55}]
2021-06-29 09:19:12+08:00	mirai_ptea	m2336dttvcygloiv.onion	666	ddos	atk_0	11.147	atk_time=120,netmask=32,[{"fid":0},{"value":"777\u0005","fid":55}]
2021-06-29 09:19:13+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	11.147	atk_time=120,netmask=32,[{"fid":0},{"value":"777\u0005","fid":55}]
2021-06-29 09:19:16+08:00	mirai_ptea	rkz2f5u57cvs3kdt.onion	280	ddos	atk_0	11.147	atk_time=120,netmask=32,[{"fid":0},{"value":"777\u0005","fid":55}]
2021-06-29 09:39:25+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	11.147	atk_time=120,netmask=32,[{"fid":0},{"value":"777\u0005","fid":55}]
2021-06-29 09:53:26+08:00	mirai_ptea	atxajrovi4lvd2zj.onion	110	ddos	atk_0	11.147	atk_time=60,netmask=32,[{"fid":0},{"value":"777\u0005","fid":55}]
2021-06-29 09:53:27+08:00	mirai_ptea	cgsmxjjnuickasbu.onion	992	ddos	atk_0	11.147	atk_time=60,netmask=32,[{"fid":0},{"value":"777\u0005","fid":55}]
2021-06-29 09:53:29+08:00	mirai_ptea	6amdku2uhly2esj7.onion	513	ddos	atk_0	11.147	atk_time=60,netmask=32,[{"fid":0},{"value":"777\u0005","fid":55}]

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IoC

Tor-C2

```
bc6z3gtu6b3r5tce.onion:3742
cgsmxjjnuickasbu.onion:992
uejivzrb3vobuoez.onion:5353
rkz2f5u57cvs3kdt.onion:280
atxajrovi4lvd2zj.onion:110
6amdku2uhly2esj7.onion:513
m2336dttvcygloiv.onion:666
```

Sample MD5

```
c6ef442bc804fc5290d3617056492d4b
f849fdd79d433e2828473f258ffddaab
```

Downloader URL

```
http://193[.177.182.221/boot
```

Scanner IP

```
205.185.117.21  AS53667|FranTech_Solutions      United_States|Nevada|Las_Vegas
205.185.114.55  AS53667|FranTech_Solutions      United_States|Nevada|Las_Vegas
68.183.109.6    AS14061|DigitalOcean,_LLC       United_States|New_York|New_York_City
67.205.163.141  AS14061|DigitalOcean,_LLC       United_States|New_York|New_York_City
165.227.88.215  AS14061|DigitalOcean,_LLC       United_States|New_York|New_York_City
```

Proxys

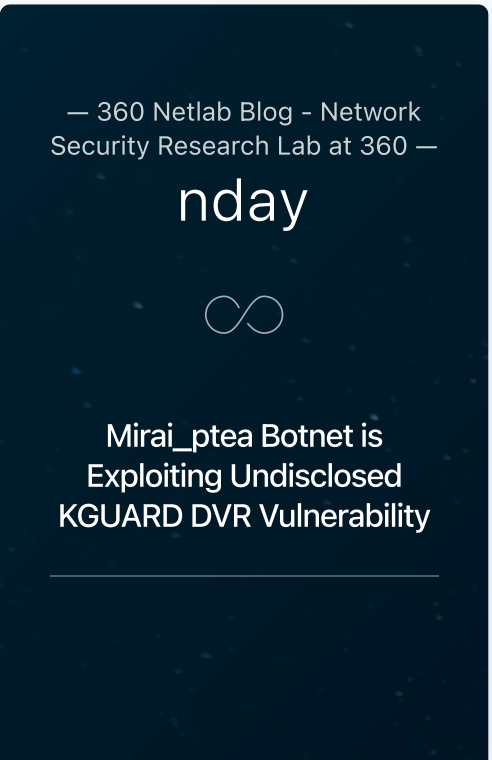
```
---------proxys at index 0x2a, count=38---------
149.202.9.7:9898
91.134.216.103:16358
84.32.188.34:1157
51.178.185.237:32
65.21.16.80:23560
149.202.9.14:19765
146.59.11.109:5089
195.189.96.61:29582
84.32.188.37:1454
51.195.209.80:26848
5.199.174.242:27931
95.179.158.147:22413
146.59.11.103:1701
185.150.117.10:29086
149.56.154.210:24709
135.148.11.151:3563
51.195.152.255:25107
45.79.193.124:7158
135.148.11.150:5560
185.150.117.41:20790
135.125.250.120:14498
172.106.70.135:692
195.189.96.60:9700
172.106.70.134:25054
149.56.154.211:21299
108.61.218.205:29240
51.178.185.236:21685
51.81.139.251:6255
51.255.237.164:963
51.81.139.249:32380
139.162.45.218:5165
65.21.16.94:28056
207.148.74.163:32389
172.104.100.78:1039
45.32.8.100:19759
141.164.46.133:2205
172.105.36.167:10843
172.105.180.239:19531

---------proxys at index 0x2b, count=334, port=9050---------
Too many, not list here, you can get them via the IDA script
```

附录（IDA解密脚本）

```
# IDAPYTHON SCRIPT for md5 c6ef442bc804fc5290d3617056492d4b only.
# Tested at ida 7.0
from ctypes import *
import struct
print "--------------------decryption start------------------------"

key=[0xC26F6A52,0x24AA0006,0x8E1BF2C5,0x4BA51F8C]
def tea_dec(buf,key):
    rbuf=""
    fmt = '>' + str(len(buf)/4) + 'I'
    tbuf= struct.unpack_from(fmt,buf)
    j=0
    for i in range(0,len(tbuf)/2):

        v1=c_uint32(tbuf[i+j])
        v2=c_uint32(tbuf[i+1+j])

        sum=c_uint32(0xC6EF3720)
        while(sum.value):
            v2.value -= ((v1.value>>5)+key[3])    ^(v1.value+sum.value)^  ((v1.value<
            v1.value -= ((v2.value>>5)+key[1])   ^(v2.value+sum.value)^ ((v2.value<<4
            sum.value+=0x61C88647
        rbuf +=struct.pack(">I",v1.value)+struct.pack(">I",v2.value)
        j+=1
    return rbuf
def getbuff(addr):
    buf = ""
    while idc.get_bytes(addr, 2) != "\x00\x00":
        buf += idc.get_bytes(addr, 1)
        addr += 1

    return buf



# pay attention to function at 0x0000D074
a=getbuff(idc.get_wide_dword(0x00019C9C))



buf=[]
#0x19c9c-0x199f0 --> 684
for i in range(0,684,12):
    offset=idc.get_wide_word(0x000199F4+i)
    length=idc.get_wide_word(0x000199F4+i+2)

    buf.append(a[offset:offset+length])

c2=[]
#684/12 --> 57
for i in range(57):
    decbuf=tea_dec(buf[i],key)
```

```
    if(".onion" in decbuf):
        c2.append(decbuf)
    print "index %x, value = %s" %(i,decbuf)
print "------------------decryption end--------------"

proxya=tea_dec(buf[0x2a],key)
pacnt=struct.unpack("<H",proxya[2:4])


proxy=[]
port=[]
tmp=proxya[4:4+6*(pacnt[0])]
print "------------proxys at index 0x2A, count= %d------------" %(pacnt[0])
for i in range(0,len(tmp),6):
    proxy.append(struct.unpack(">I",tmp[i:i+4])[0])
    port.append(struct.unpack("<H",tmp[i+4:i+6])[0])
for i in range(pacnt[0]):
    a=struct.pack(">I",proxy[i])
    ip=""
    for j in range(4):
        ip+=str(ord(a[j]))
        if j!=3:
            ip+="."

    print"%s:%d" %(ip,port[i])



proxyb=tea_dec(buf[0x2b],key)
pbcnt=struct.unpack("<H",proxyb[2:4])
fmt = '>' + str(pbcnt[0]) + 'I'
tmp=proxyb[4:4*(pbcnt[0]+1)]
print "------------proxys at index 0x2B, count= %d------------" %(pbcnt[0])
xxxxx=struct.unpack(fmt,tmp)
for i in xxxxx:
    a=struct.pack(">I",i)
    ip=""
    for i in range(4):
        ip+=str(ord(a[i]))
        if i!=3:
            ip+="."
    print ip


print "-------------------------onion info--------------"
if len(c2)!=0:
    for i in c2:

        pos=i.find(".onion")

        for j in range(0,pos,16):
            print i[j:16+j]+".onion"
```

```
else:
    print "Don't find the onion c2"
```

nday

Mirai_ptea Botnet is Exploiting Undisclosed KGUARD DVR Vulnerability

PassiveDNS

被拦截的伊朗域名的快速分析

伊朗新闻网站被美国阻断的事成为了最近的新闻热点，报道...

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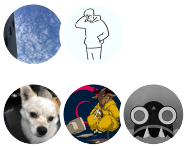
Overview On 2021-06-22 we detected a sample of a mirai variant that we named mirai_ptea propagating through a new vulnerability targeting KGUARD DVR. Coincidently, a day later, on June 23, we received an inquiry from the security community asking if we had seen a new DDoS botnet, cross-referencing some



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