

MWR InfoSecurity Security
Advisory

OpenSC - "Get Serial
Number" Stack-based Buffer
Overflow

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MWR  INFOSECURITY

OpenSC – “Get Serial Number” Stack-based Buffer Overflow

Package Name:	OpenSC
Date Reported	3 rd November 2010
Affected Versions:	Confirmed in Version 0.11.13 and earlier

CVE Reference	Not Yet Assigned
Author	Rafael Dominguez Vega
Severity	Medium Risk
Vulnerability Class	Stack-based buffer overflow
Vendor	OpenSC - http://www.opensc-project.org
Vendor Response	The vendor has implemented a fix. https://www.opensc-project.org/opensc/changeset/4913
Exploit Details Included	No

Overview

MWR InfoSecurity identified a vulnerability in OpenSC. The vulnerability can be triggered using a malicious smart card.

Impact

An attacker could use this vulnerability to execute arbitrary code in the target system. To successfully exploit this vulnerability the attacker will be required to insert a specially crafted smart card in the target system.

Cause

A buffer overflow vulnerability was identified in the code handling the smart card’s serial number in the following drivers:

- card-atrust-acos.c
- card-acos5.c
- card-starcos.c

Interim Workaround

The interim work around for this issue will require the affected drivers to be removed from OpenSC and this to be recompiled.

Solution

The vendor has implemented a fix. Users should upgrade to the latest version of OpenSC. <https://www.opensc-project.org/opensc/changeset/4913>

Dependencies

In order to successfully exploit the vulnerability described in this advisory, an attacker would

need to have physical access to the affected system in order to be able to plug in a malicious smart card.

Detailed Vulnerability Description

The issue is a stack-based buffer overflow affecting the following drivers, in the "Get Serial Number" function.

- card-atrust-acos.c
- card-acos5.c
- card-starcos.c

The affected code is included here. The vulnerability is in the memcpy shown below, as the serial number that the card sends can be larger (up to 258 bytes) than the buffer where the data is being copied to (32 bytes).

```
#define SC_MAX_SERIALNR          32

#define SC_MAX_APDU_BUFFER_SIZE 258

u8  rbuf[SC_MAX_APDU_BUFFER_SIZE];
...
apdu.resp = rbuf;
apdu.resplen = sizeof(rbuf);
...
memcpy(card->serialnr.value, apdu.resp, apdu.resplen);
```

During the investigation of this vulnerability a Proof-of-Concept smart-card was created. The malicious smart card was specially developed to trigger this issue and overwrite the value of the instruction pointer.

```
(gdb) r
Starting program: /usr/local/bin/opensc-tool --serial
[Thread debugging using libthread_db enabled]
41 31 41 32 41 33 41 34 42 31 42 32 42 33 42 34 A1A2A3A4B1B2B3B4
43 31 43 32 43 33 43 34 44 31 44 32 44 33 44 34 C1C2C3C4D1D2D3D4
DA 00 00 00 A0 12 E8 B7 D2 89 04 08 20 4C D1 B7 ..... L..
54 84 04 08 01 00 00 00 F4 6F F5 B7 2E 4E 3D F6 T.....o...N=.
28 78 F5 B7 30 6F F5 BF BF 32 F4 B7 20 6F F5 BF (x..0o...2.. o..
54 84 04 08 14 6F F5 BF CC 77 F5 B7 00 00 00 00 T...o...w.....
88 C7 B6 B7 01 00 00 00 00 00 00 00 00 00 01 00 00 00 .....
58 76 F5 B7 00 00 00 00 20 67 E8 B7 00 00 00 80 Xv..... g.....
20 10 D1 B7 A0 12 E8 B7 20 6F F5 BF 14 6F F5 BF ..... o...o..
F4 6F F5 B7 C8 8A B7 B7 C8 1A E8 B7 60 6F F5 BF .o.....`o..
70 76 F5 B7 D2 89 04 08 D8 CD B6 B7 00 00 00 00 pv.....
00 00 00 00 00 00 00 00 AF 5F B8 B7 15 00 00 00 .....
00 D0 B6 B7 48 B0 13 00 01 00 00 00 F5 62 D3 B7 ....H.....b..
16 27 C8 B7 C8 1A E8 B7 07 00 .....
[V4W1W2-tool] reader-pcsc.c:678:pcsc_unlock: SCardEndTransaction failed: Reader is
unavailable.
[New Thread 0xb7b53a00 (LWP 4126)]

Program received signal SIGSEGV, Segmentation fault.
[Switching to Thread 0xb7b53a00 (LWP 4126)]
0x41414141 in ?? ()
(gdb) i r
```

```
eax      0x41414141    1094795585
ecx      0x0         0
edx      0x8c93008     147402760
ebx      0xb7f25ff4   -1208852492
esp      0xbff56b1c   0xbff56b1c
ebp      0xbff56b48   0xbff56b48
esi      0x8c93138   147403064
edi      0x8c93008     147402760
eip      0x41414141    0x41414141
eflags   0x210206         [ PF IF RF ID ]
cs       0x73        115
ss       0x7b        123
ds       0x7b        123
es       0x7b        123
fs       0x0         0
gs       0x33        51
```

Acknowledgement

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