Junk Hacks

[Dailydave] Junk Hacking Must Stop!

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…"Yes, we get it. Cars, boats, buses, and those singing fish plaques are all hackable and have no security. Most conferences these days have a whole track called "Junk I found around my house and how I am going to scare you by hacking it". That stuff is always going to be hackable whetherornotyouarethecalvalry.org "… - Dave Aitel

https://lists.immunityinc.com/pipermail/dailydave/2014-September/000746.html

Sometimes you find yourself performing assessments on things and ask yourself, why. Just why?
Then I say, why not?

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https://ctrlu.net/

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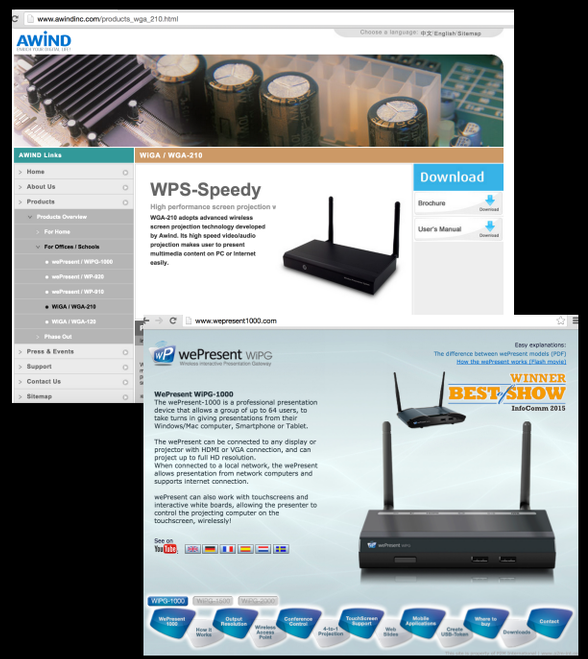


Conference rooms, classrooms, etc.

Many devices like this are manufactured by one company and re-branded by many others. This is one such case.

These little devices cost anywhere from $500 to ~$1500.

How do we get started?

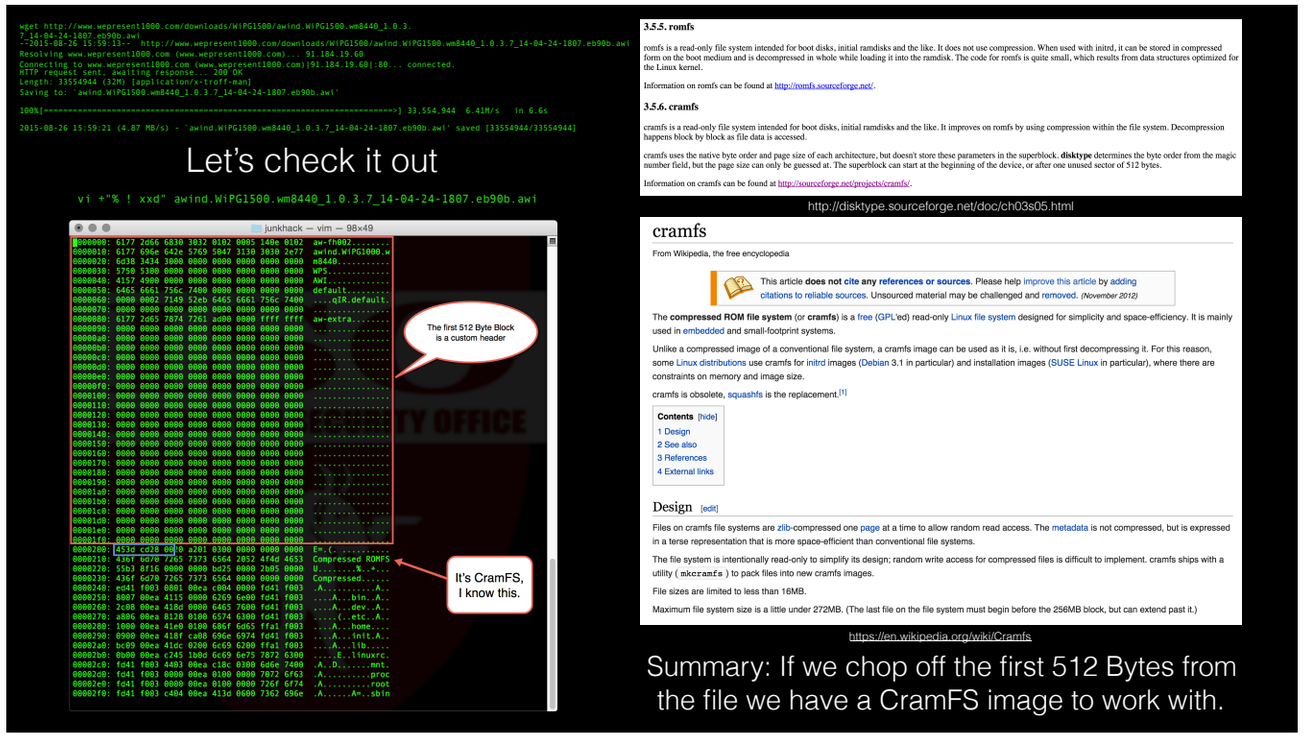
By downloading the firmware image of course.

wget http://www.wepresent1000.com/downloads/WiPG1500/awind.WiPG1500.wm8440_1.0.3.7_14-04-24-1807.eb90b.awi

http://www.wepresent1000.com/1500/downloads1500.html (since changed to http://www.wepresentwifi.com/wipg1000.html)

The firmware is available for free.

Many of the issues we are going to talk about have been resolved in some of the newer versions for this reason I downloaded a slightly older version of the firmware. [1.0.3.7]



After downloading the firmware, I checked the file header to determine if it was a common file format.

Here we get really lucky and find the magic number for cramfs. [453dcd2800]

https://en.wikipedia.org/wiki/Magic_number_(programming)
Magic Number: A constant numerical or text value used to identify a file format or protocol.

Here's a neat little vi trick using xxd to convert a binary file on the fly. vi +"% ! xxd" also use xxd -r to revert back to binary.

CramFS does not require the information within the Superblock: [contains information about the filesystem as a whole, such as its size (the exact information here depends on the filesystem).]

There may be a better way but I used, trial, error, and an assumption combined with hexdump

```
hexdump -C -v -s 512 -n 96 awind.WiPG1500.wm8440_1.0.3.7_14-04-24-1807.eb90b.awi
00000200  45 3d cd 28 00 20 a2 01  03 00 00 00 00 00 00 00  |E=.(. ..........|
00000210  43 6f 6d 70 72 65 73 73  65 64 20 52 4f 4d 46 53  |Compressed ROMFS|
00000220  55 b3 8f 16 00 00 00 00  bd 25 00 00 2b 05 00 00  |U........%..+...|
00000230  43 6f 6d 70 72 65 73 73  65 64 00 00 00 00 00 00  |Compressed......|
00000240  ed 41 f0 03 08 01 00 ea  c0 04 00 00 fd 41 f0 03  |.A...........A..|
00000250  80 07 00 ea 41 15 00 00  62 69 6e 00 fd 41 f0 03  |....A...bin..A..|
00000260
```

Let's get this image ready to mount!

```
dd if=awind.WiPG1500.wm8440_1.0.3.7_14-04-24-1807.eb90b.awi of=awind.romfs bs=512 skip=1
```

bs=n *Set both input and output block size to n bytes, superseding the ibs and obs operands. If no conversion values other than noerror, notrunc or sync are specified, then each input block is copied to the output as a single block without any aggregation of short blocks.*

```
mkdir /mnt/target/
sudo mount -t cramfs awind.romfs  /mnt/target/

ls /mnt/target
bin  dev  etc  home  init  lib  linuxrc  mnt  proc  root  sbin  sys  tmp  tools  usr  var
```

Much Success!

We can see in the hex that there is a chunk of data before the file header. We can skip this first chunk by using skip=1 bs=512 with dd this makes a direct copy of the file without the first chunk of data. How did I know to use 512. Someone with more skill probably has a better way to do the count but I tried skipping the first chunk with hexdump + trial and error.

We have a mounted file system! There are some classic locations that most people like to check first.

While we are here…

```
cat /mnt/target/etc/passwd /mnt/target/etc/shadow

root:x:0:0:root:/home:/bin/sh
abarco:x:1000:0:Awind-Barco User,,,:/home:/bin/sh
root:$1$x1mFoD3w$uuvn.Z0p.XagX29uN3/Oa.:0:0:99999:7:::
abarco:$1$JB0Pn5dA$sROUF.bZVoQSjVrV06fIx1:0:0:99999:7:::

.002 seconds after launching cudaHashcat…

$1$x1mFoD3w$uuvn.Z0p.XagX29uN3/Oa.:awind5885
$1$JB0Pn5dA$sROUF.bZVoQSjVrV06fIx1:mistral5885
```

I personally like grabbing account hashes when they are available.
Lucky for me my password cracking rig made short work of the hashes. WHEN we get shell it’s nice to have full credentials available to us.

Boa, CGI, RDTool

```
/mnt/target/home/boa/cgi-bin$ ls
AwATE.html                  AwLoginAdmin.html           AwRLModule.html      AwWelcome.html      logout.cgi
AwAlert.html                AwLoginAdmin_HoungHe.html   AwRdATE.html         ajax.cgi            rdfs.cgi
AwApClient_win.html         AwLoginBS.html              AwRdEncrypt.html     bs_ajax.cgi         rdtool.cgi
AwBSSetup.html              AwLoginDownload.html        AwRdToolFN0.html     conference.cgi      rdupgrade.cgi
AwBrowserSlide.html         AwLoginDownloadM.html       AwRdToolFN1.html     conferenceXML.cgi   rdupload.cgi
AwConference.html           AwLoginDownload_MAC.html    AwRdToolFN2.html     conferenceXML2.cgi  reboot.cgi
AwConference_win.html       AwLoginRdtool.html          AwRdUpload.html      conferencech.cgi    return_test.cgi
AwConferencech.html         AwLoginTrainer.html         AwRdupgrade.html     factory.cgi         rlmodule.cgi
AwConferencech_win.html     AwLoginTrainer_win.html     AwRdupgrading.html   index.cgi           upgrade.cgi
AwDevice.html               AwOperating.html            AwReboot.html        login_admin.cgi     web_index.cgi
AwDownloadClient.html       AwOsdTool.html              AwSystem.html        login_download.cgi
AwFactory.html              AwOsdToolTWP1500.html       AwUpgrade.html       login_rdtool.cgi
AwIndex.html                AwPassword.html             AwUpgrading.html     login_trainer.cgi
```

I'll save you some time and skip ahead

A few interesting strings in the rdtool.cgi binary

```
/etc/init.d/S41telnetd
/etc/init.d/S41telnetd killps
```

Looks like we can start a telnetd service from a web page!

```
/mnt/target/etc/init.d$ ls
S10con       S32mrua     S40network          S42wpsd       S54web         S62dhcp             S70ntpdata
S10ramdisk   S33media    S41apclient         S42wpsd_dlna  S56other       S62dhcp.new         rcS
S20urandom   S34wifi     S41apclient.script  S50daemon     S57usbipd      S64upgrade          rcS.cram
S30init      S36minigui  S41telnetd          S51hotplug    S58snmpd       S65apclient_polling  rcS.loop
S32mptest    S36mptools  S41wireless         S52uart       S60gatekeeper  S66nmbd             rcS.nfs
```

For this presentation we will skip right to the juicy part and just show you the most egregious vulnerability I found. In reality I spent a good amount of time going through the file system and reverse engineering the .cgi binaries and found a lot of bugs.

Two files of note: login_rdtool.cgi and S41telnetd.

A telnet server you say?

```
cat /mnt/target/etc/init.d/S41telnetd
#! /bin/sh
#mount -t devpts devpts /dev/pts
#sync

. /tmp/info

killpname()
{
    pid=$(ps | grep telnet | grep 5885 | tr -d ' ' | cut -d 'r' -f 1)

    if [ "$pid" != "" ]; then
        echo "kill telnet process"
        kill -9 $pid
    fi
}

runprocess()
{
    if [ "$rd_debug_mode" = "1" ]; then
        mp=`mount | grep '^devpts'`
        [ "$mp" == "" ] && mount -t devpts devpts /dev/pts && sync
        echo "telnetd running"
        nice -n 8 /usr/sbin/telnetd -p 5885
    fi
}

case $1 in

    "killps")
        killpname
        ;;
    *)
        killpname
        runprocess
        ;;
esac
```

```
$1$x1mFoD3w$uuvn.Z0p.XagX29uN3/Oa.:awind5885
$1$JB0Pn5dA$sROUF.bZVoQSjVrV06fIx1:mistral5885
```

Checking out S41telnetd we can see that there is a telnetd instance that can be initiated on nonstandard port 5885.
If you remember the passwords we cracked earlier they both end in 5885 so this is a nice hint for me that we’re getting shell.

How do we start it?

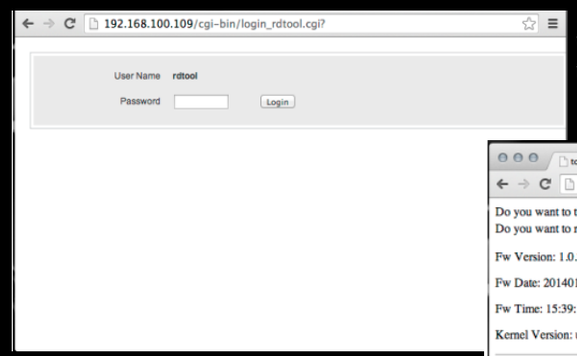
```
I say let's begin with /mnt/target/home/boa/cgi-bin/login_rdtool.cgi

strings login_rdtool.cgi
…
varAlertMessage=strAlertPasswordError
login_rdtool.cgi
mistral5885
```

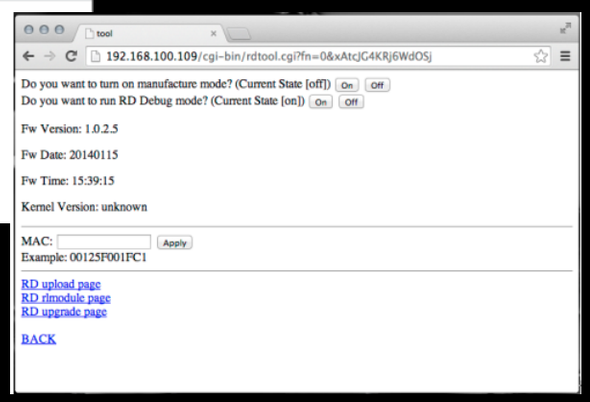
That last string looks familiar…
They wouldn't hardcode a password would they?

In reality, I spent a good amount of time going through the binary in IDA Pro and evaluating the login functionality to determine if the credential was protected in some form. During this time I found that the string that was compared was static in the code.

Looks like they did



When [Debug] mode is enabled it runs the init.d/S41telnetd script which starts telnetd on port 5885.



Here we see the tools' login page and have a successful login using the static password we pulled out of the binary.
This is where we find the RD Debug mode option. Once again, the short version is that it enables the telnet server on 5885. The reality is I spent a lot more time going through the rdtool.cgi binary and validated the exec calls within the binary start the init.d script for starting the telnet server.

And then there was Shell

We already know the root password from the hash in the shadow file

So in any case, enough with the Junk Hacking, and enough with being amazed when people hack their junk. - Dave Aitel

Time:
ssh server for encrypted communication
changed hard coded credential
removed login binary