D-Link several default credential vulnerabilities

There are several products using default credential for management

default credential in etc/passwd or etc/shadow

Affected products

1. DXS-1100-16SC_fw_revA_1-00-B030_20200604
2. DWS-3160-24TC_fw_revA2_4-4-1-10_complete_package_20161116
3. DAP-2020_fw_reva_102rc002_ALL_en_20200322
4. DWC-2000_fw_revALL_4-7-5-1B101_complete_package_20210503
5. DAP-1360_fw_revf_615eub01_EU_en_20230114

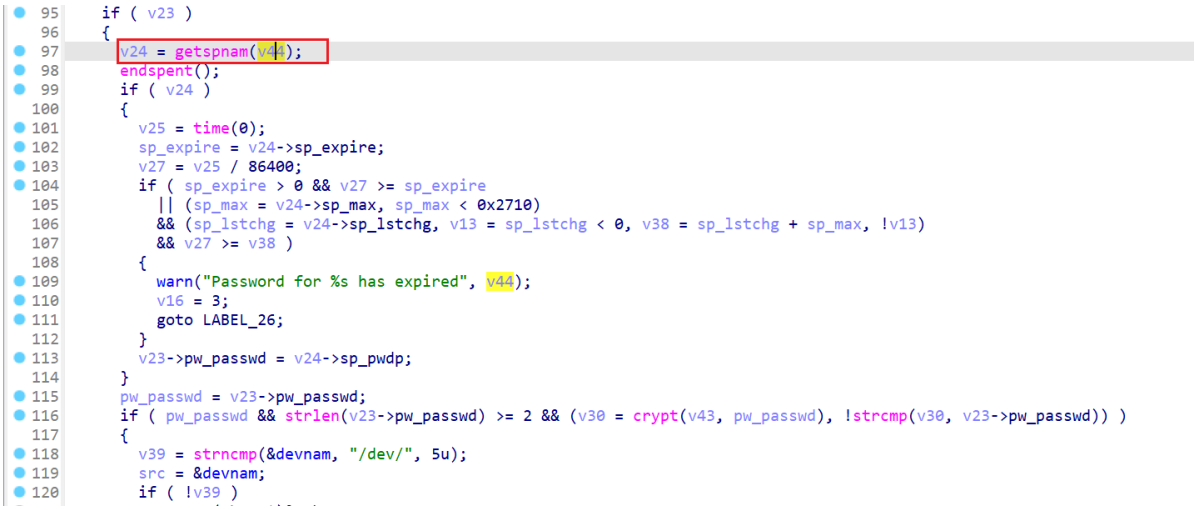
For the above products, the etc/shadow file uses the following content. Note that /etc/shadow is used for authentication for ssh services or other services

Example

Take `DWS-3160-24TC_fw_revA2_4-4-1-10_complete_package_20161116` as an example。 The etc/shadow file is shown following. There contains two default accounts, which are `root` and `Admin` with hashed values.

```
root:$1$$zdlNHiCDxYDfeF4MZL.H3/:10933:0:99999:7:::
Admin:iCDxYDfeF4MZL.H3/:10933:0:99999:7:::
bin::10933:0:99999:7:::
daemon::10933:0:99999:7:::
adm::10933:0:99999:7:::
lp:*:10933:0:99999:7:::
sync:*:10933:0:99999:7:::
shutdown:*:10933:0:99999:7:::
halt:*:10933:0:99999:7:::
uucp:*:10933:0:99999:7:::
operator:*:10933:0:99999:7:::
nobody::10933:0:99999:7:::
ap71::10933:0:99999:7:::
```

And the pppd services in this firmware uses etc/shadow for authentication.



```
95   if ( v23 )
96   {
97     v24 = getspnam(v44);
98     endspent();
99     if ( v24 )
100    {
101      v25 = time(0);
102      sp_expire = v24->sp_expire;
103      v27 = v25 / 86400;
104      if ( sp_expire > 0 && v27 >= sp_expire
105        || (sp_max = v24->sp_max, sp_max < 0x2710)
106        && (sp_lstchg = v24->sp_lstchg, v13 = sp_lstchg < 0, v38 = sp_lstchg + sp_max, !v13)
107        && v27 >= v38 )
108      {
109        warn("Password for %s has expired", v44);
110        v16 = 3;
111        goto LABEL_26;
112      }
113      v23->pw_passwd = v24->sp_pwdp;
114    }
115    pw_passwd = v23->pw_passwd;
116    if ( pw_passwd && strlen(v23->pw_passwd) >= 2 && (v30 = crypt(v43, pw_passwd), !strcmp(v30, v23->pw_passwd)) )
117    {
118      v39 = strncmp(&devnam, "/dev/", 5u);
119      src = &devnam;
120      if ( !v39 )
```

These vulnerabilities will cause unauthorized access to this device. Since we cannot decrypt these credentials, we cannot give a POC.

The rest products contains the same vulnerability

default credentials in customized files

The following products uses default credentials in customized files. These files will be loaded as default value when firmware boot.

Affected devices

1. DCS-6517_REVB_FIRMWARE_v2.00.03
2. DCS-934L_REVA_FIRMWARE_1.05.04
3. DCS-932L_REVB_FIRMWARE_v2.16.08
3. DCS-930L_REVA_FIRMWARE_1.16.04

The above devices contains default credentials in customized file like `RT2860_default_vlan`.

Example

Take `DCS-930L_REVA_FIRMWARE_1.16.04` as an example. The `nvram_daemon` binary uses the below function to load default value whensystem boots.

```
38  do
39  {
40    v10 = nvram_bufget(0, "WebInit");
41    ++v7;
42    if ( !strcmp(v10, "1") )
43      break;
44    nvram_close(0);
45    loadDefault(2860);
46  }
```

```
int __fastcall loadDefault(int a1)
{
  int result; // $v0

  result = 2860;
  if ( a1 == 2860 )
  {
    system("ralink_init clear 2860");
    return system("ralink_init renew 2860 /etc_ro/Wireless/RT2860AP/RT2860_default_vlan");
  }
  return result;
}
```

The default file RT2860_default_vlan contains the web management credential in plain-text, which corresponds to `admin:<empty>`

```
###################################
### IPCam Default Configuration ###
### Company: D-Link             ###
### Model  : DCS-930L           ###
###################################
# System #
CameraName=DCS-930L
Location=
AdminID=admin
AdminPassword=
LEDControl=0
SnapshotURLAuthentication=0
```

The rest products contains the same vulnerability. These vulnerabilities will cause unauthorized access to this device.

Security Compliance

According to the **NIST SP 800-63B** Digital Identity Guidelines, default or static passwords (even if hashed) are not allowed for initial user authentication.

https://pages.nist.gov/800-63-3/sp800-63b.html

> Memorized secrets that are randomly chosen by the CSP (e.g., at enrollment) or by the verifier (e.g., when a user requests a new PIN) SHALL be at least 6 characters in length and SHALL be generated using an approved random bit generator [SP 800-90Ar1].