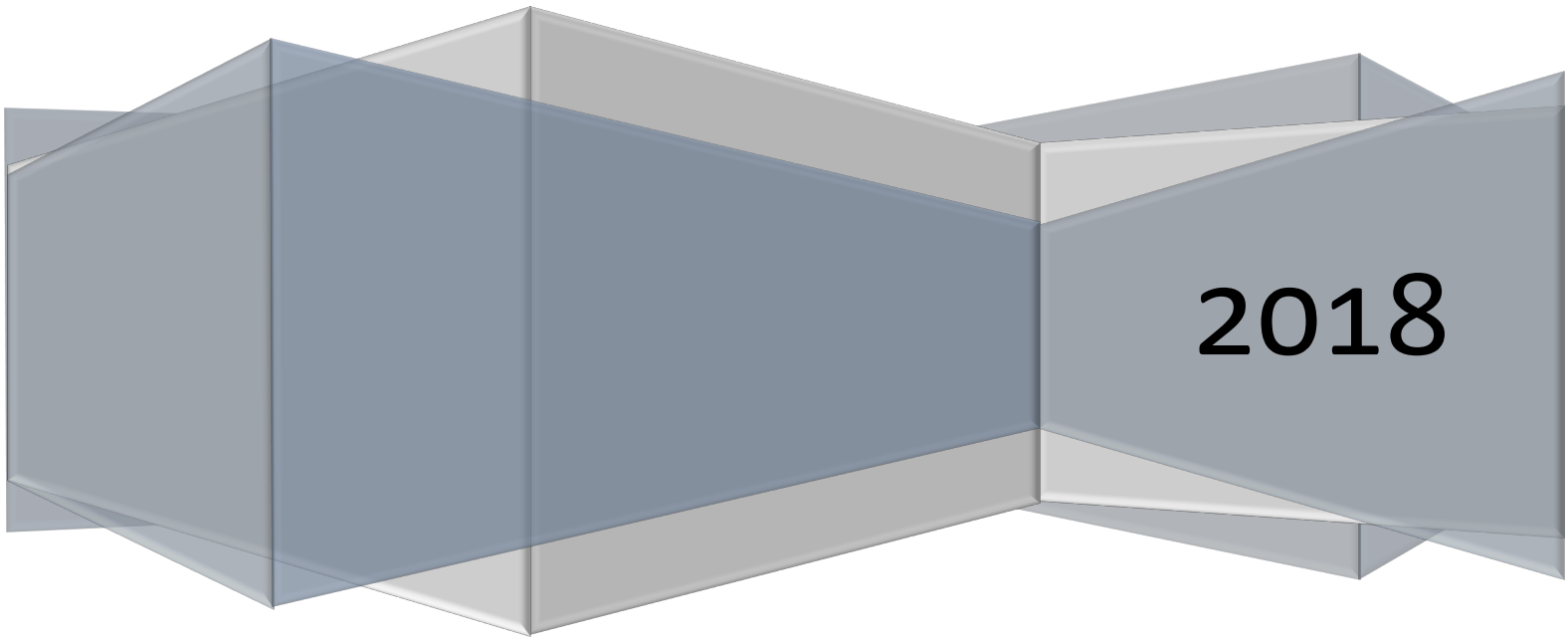
USIM Modifier

User Guide

Ming



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History

Revision	Common	Date
V1.0	Initial release	2018/12/15

Abstract

Sometimes we need to modify MCC/MNC, SPN or GID1 to verify some specific issue, so we didn't need to customized the “Test USIM” with powerful tool, that’s why to implement it.

System Requirement

- Windows/Linux/MAC platforms
- Python 3.x (not compatible with Python 2)
- GIT
- PC/SC Smart Card Reader
- Requirement Packages of Python
  - colorama
  - lxml
  - pyscard

Special Thanks

- Brian Beak: switch class

System Features

- Command Line Interactive mode
- Auto detected locale for language and expandable.
- Python logging mechanism supported.
- Design by “Plugin” architecture and extendable.

Provided Plugins

Information	➢ card_info: show the contents of ICCID, IMSI, MCC/MNC, SPN, GID1 & GID2. ➢ atr: show the value of ATR (Answer To Reset).

Customization	➢ iccid: display/modify the value of EF_ICCID. ➢ imsi: display/modify the value of EF_IMSI. ➢ mccmnc: display/modify the MCC/MNC (included MNC digits of EF_AD). ➢ gid: display/modify the value of EF_GID1 & EF_GID2. ➢ spn: display/modify the value of EF_SPN. ➢ msisdn: display/modify the value of EF_MSISDN.
Security	➢ pin_cache: store the PIN1/ADM code for verify automatically.
Expert	➢ dir: show all records of EF_DIR. ➢ arr: show all records of EF_ARR (Under MF or ADF) ➢ send: send the APDU command directly

Install “USIM Modifier”

```
git clone https://github.com/minghsu/usim_modifier.git
```

Upgrade “USIM Modifier”

```
git pull
```

Install Requirement Packages

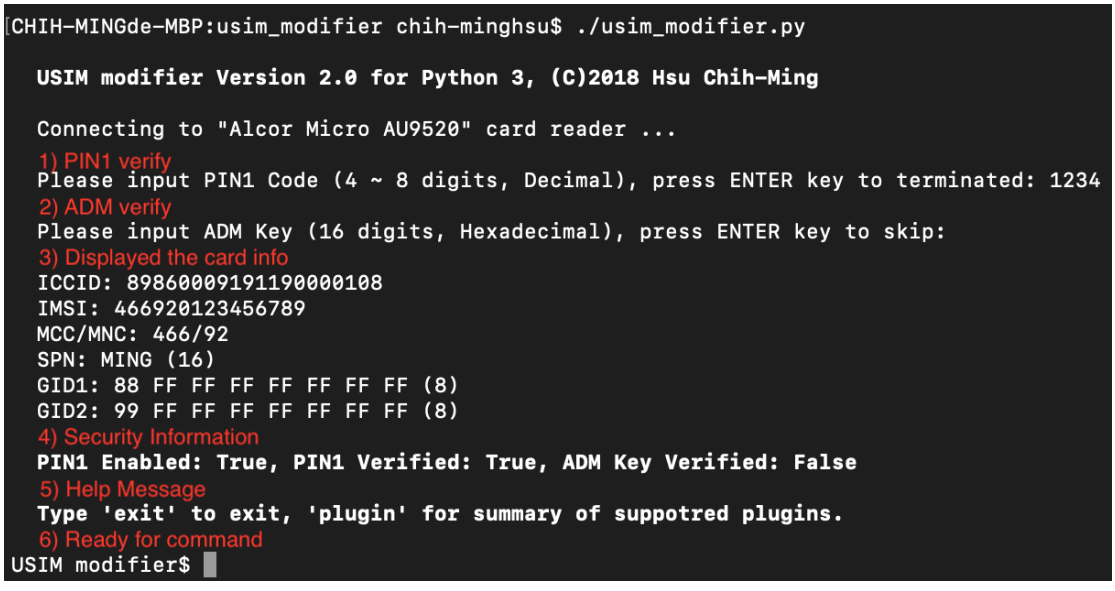
Platform	Steps
Linux	linux@ubuntu:/$ pip3 install colorama linux@ubuntu:/$ sudo apt-get install swig linux@ubuntu:/$ sudo apt-get install libpcsclite-dev linux@ubuntu:/$ sudo pip3 install pyscard
Windows	TBD
Mac OS	TBD

Environment Check

After installed all requirement packages, you can use “env_check.py” to verify your system environment, if you get the same output with below picture, you can using “USIM Modifier” to customize your “Test USIM” card.

Start to using “USIM Modifier”

Please type “./usim_modifier.py” (or type “python3 usim_modifier.py”) on the command window and should get the similar message with below example.



Let us to step by step to describe above example.

1. **PIN1 verify**: Will appear this step when the “Test USIM” enabled the PIN1 and we must input correct PIN1 to verify, most USIM fields were require PIN1 verified to read it.

2. **ADM verify**: Most USIM fields were requirement ADK verified to update content, we can skip it but will lost the “UPDATE” capabiliry for “Test USIM”.
3. **Card Info:** Just auto executed the “card_info” plugin.
4. **Security Info:** Show the “PIN1/ADM” information.
5. **Help Message:** Yes, just provide “exit” & “plugin” commands.
6. **Ready:** When you saw the “USIM modifier$” indication, mean the “USIM modifier” was ready.

Plugins

In this chapter, we will describe how to use the plugins, but you can type “plugin” command first to get list of supported plugins.

```
USIM modifier$ plugin
   Plugin Name   Version  Summary
         iccid 1.00 > Display or modify the value of ICCID.
           spn 1.00 > Display or modify the value of SPN.
           dir 1.00 > Displayed all contents of EF_DIR file.
     card_info 1.00 > Displayed the current status of USIM.
          send 1.00 > Send the APDU command to USIM directly
        mccmnc 1.00 > Display or modify the value of MCC/MNC.
           atr 1.00 > Displayed the value of Answer To Reset (ATR).
     pin_cache 1.00 > Cache the PIN1/ADM code to xml file for future verify automatically.
           arr 1.00 > Displayed all contents of EF_ARR file.
           gid 1.00 > Display or modify the value of GID1/GID2.
        msisdn 1.00 > Display or modify the value of MSISDN.
          imsi 1.00 > Display or modify the value of IMSI.

  Type '[plugin name] help' for more information about the plugin.

USIM modifier$
```

We can saw the “name”, “version” & “summary” of the plugin, and the bottom message indicated we can type “[plugin name] help” to get some help message of this plugin, below screenshot are using “**mccmnc**” & “**iccid**” plugins for example.

```
USIM modifier$ mccmnc help

  Usage:
    - mccmnc [mcc=xxx] [mnc=xxx]
  Example:
    - mccmnc
      > MCC/MNC: 466/92
    - mccmnc mcc=320
      > MCC/MNC: 320/92
    - mccmnc mnc=01
      > MCC/MNC: 466/01
    - mccmnc mcc=001 mnc=01
      > MCC/MNC: 001/01

USIM modifier$ iccid help

  Usage:
    - iccid [set=iccid] [format=raw]

  Example:
    Original: 89860009191190000108
    - iccid
      > ICCID: 89860009191190000108
    - iccid format=raw
      > ICCID: 98 68 00 90 91 11 09 00 10 80
    - iccid set=1234
      > ICCID: 12340009191190000108
    - iccid set=123400091911900004321
      > ICCID: 12340009191190004321

  PS. Suggest to verify ICCID  with Luhn algorithm by https://planetcalc.com/2464/ first
```

atr

It's a very simple plugin to display the ATR (Answer to Reset), that's a message output by a contact Smart Card conforming to ISO/IEC 7816 standards.

```
USIM modifier$ atr

  ATR: 3B 9F 94 80 1F C7 80 31 E0 73 FE 21 13 57 86 85 03 86 98 42 18 AE

USIM modifier$
```

card_info

Displayed all contents of EF_ICCID, EF_IMSI, MCC/MNC, EF_SPN, EF_GID1 & EF_GID2 fields.

```
USIM modifier$ card_info

  ICCID: 89860009191190000108
  IMSI: 466920123456789
  MCC/MNC: 466/92
  SPN: MING (16)
  GID1: 88 FF FF FF FF FF FF FF (8)
  GID2: 99 FF FF FF FF FF FF FF (8)

USIM modifier$
```

The “card_info” plugin just called the “iccid”, “imsi”, “mccmnc”, “spn” & “gid” plugins and sort the return message.

iccid

The “iccid” plugin can displayed the contents of EF_ICCID with two format type, and update the content by partially or fully.

```
USIM modifier$ iccid help

  Usage:
    - iccid [set=iccid] [format=raw]

  Example:
    Original: 89860009191190000108
    - iccid
      > ICCID: 89860009191190000108          << Human Readable Format
    - iccid format=raw
      > ICCID: 98 68 00 90 91 11 09 00 10 80 << Raw Format
    - iccid set=1234
      > ICCID: 12340009191190000108          << Partially Update (4 digits)
    - iccid set=12340009191190004321
      > ICCID: 12340009191190004321          << Fully Update

  PS. Suggest to verify ICCID  with Luhn algorithm by https://planetcalc.com/2464/ first
```

If you want to modify the EF_ICCID, please pay attend the **valid ICCID** is need to meet “**Luhn algorithm”**, you can pre-check with [planetcalc](https://planetcalc.com/2464/) website.

imsi

The “imsi” plugin have the same operation with “iccid” plugin, the plugin will only update EF_IMSI field and didn’t consider the length of MNC, if you need to update “MCC/MNC”, use “mccmnc” plugin to modify.

```
USIM modifier$ imsi help

  Usage:
    - imsi [set=imsi] [format=raw]
  Example:
    Original: 001010123456789
    - imsi
      > IMSI: 001010123456789
    - imsi format=raw
      > IMSI: 08 09 10 10 10 32 54 76 98
    - imsi set=12345
      > IMSI: 123450123456789
    - imsi 466979876543210
      > IMSI: 466979876543210
```

mccmnc

The “mccmnc” plugin can modify the MCC/MNC values, and update correct length of MNC to EF_AD field.

```
USIM modifier$ mccmnc help

  Usage:
    - mccmnc [mcc=xxx] [mnc=xxx]
  Example:
    - mccmnc
      > MCC/MNC: 466/92
    - mccmnc mcc=320
      > MCC/MNC: 320/92
    - mccmnc mnc=01
      > MCC/MNC: 466/01
    - mccmnc mcc=001 mnc=01
      > MCC/MNC: 001/01
```

spn

Show the current content and maximum length of EF_SPN.

Note: Only support ACSII coding, others are not support.

```
USIM modifier$ spn help

  Usage:
    - spn [set=XXXXXX] [format=raw]

  Example:
    - spn
      > SPN: MAI TEST (16)
   - spn format=raw
      > SPN: 01 4D 41 49 20 54 45 53 54 FF FF FF FF FF FF FF FF
    - spn set=Orange
      > SPN: Orange
    - spn set="My SIM"
      > SPN: My SIM
```

msisdn

We can’t easy found the “MSISDN” editor on current smart phone device, and we can use this plugin to modify.

To update EF_MSISDN field didn’t need “ADM” key verify, mean we can modify the operator’s USIM card if “PIN1” verified.

```
USIM modifier$ msisdn help

  Usage:
    - msisdn [id=XX] [name=XXXXXX] [num=XXXXXX] [format=raw]

  Example:
    - msisdn
     > EF_MSISDN #1 - Name: [Empty Content] (14), Number: 0928000000
     > EF_MSISDN #2 - Name: [Empty Content] (14), Number: 0928000000
    - msisdn format=raw
     > EF_MSISDN #1 - FF FF FF FF FF FF FF FF FF FF FF FF FF FF 06 81 90 82 00 00 00 FF FF FF FF FF FF FF
     > EF_MSISDN #2 - FF FF FF FF FF FF FF FF FF FF FF FF FF FF 06 81 90 82 00 00 00 FF FF FF FF FF FF FF
    - msisdn id=1 name=Orange num=+886919001122
     > EF_MSISDN #1 - Name: Orange (14), Number: +886919001122
     > EF_MSISDN #2 - Name: [Empty Content] (14), Number: 0928000000
    - msisdn id=2 name="My Test SIM"
     > EF_MSISDN #1 - Name: Orange (14), Number: +886919001122
     > EF_MSISDN #2- Name: My Test SIM (14), Number: 0928000000

  PS. For update MSISDN record, the "id" is a mandatory argument

USIM modifier$
```

gid

Both GID1/GID2 can be read and update by this plugin.

```
USIM modifier$ gid help

  Usage:
    - gid [gid1=xxxxxx] [gid1=xxxxxx]
  Example:
    - gid
      > GID1: FF FF FF FF FF FF FF FF
      > GID2: FF FF FF FF FF FF FF FF
    - gid gid1=12
      > GID1: 12 FF FF FF FF FF FF FF
      > GID2: FF FF FF FF FF FF FF FF
    - gid gid2=1234567890ABCDEF
      > GID1: FF FF FF FF FF FF FF FF
      > GID2: 12 34 56 78 90 AB CD EF

USIM modifier$
```

pin_cache

The feature will store the “PIN1” & “ADM” key to a xml file, you can found the .xml file was stored under “cache_file” folder, and file name will follow by ICCID.

After created the pin cache file, system will auto verify the “PIN1” & “ADM” key from next time.

Note: Some “Test USIM” was configured same value of EF_ICCID.

```
USIM modifier$ pin_cache help

  Usage:
   pin_cache pin1=xxxxxxxx adm=xxxxxxxxxxxxxxxx
    - pin1: 4 ~ 8 digits
    - adm: 16 HEX digits

  Example:
    pin_cache pin1=1234 adm=5555555555555555

   PS. Using the ICCID as main file name.
```

send

System will send the raw “APDU” command to “Test USIM” directly.

```
USIM modifier$ send help

  Usage:
    - send XXXXXX

  Example of 'SELECT MF':
    - send 00A40004023F00
   > , 61 1F

USIM modifier$
```

dir

Just show the contents of EF_DIR field.

```
USIM modifier$ dir help

  Usage:
    - dir [format=raw]

  Example:
    - dir
      > #1 - AID: A0000000871002FF86FFFF89FFFFFFFF, Label: UniverSIM
    - dir format=raw
      > #1 - AID: 61 1D 4F 10 A0 00 00 00 87 10 02 FF 86 FF FF 89 FF FF FF FF 50 09 55 6E 69 76 65 72 53 49 4D FF
```

arr

The “arr” plugin is for expert only, most people are didn’t to use this plugin, it will show all contents of “access rule reference”.

```
USIM modifier$ arr help

  Usage:
    - arr type=[mf or adf]

  Example:
    - arr type=mf
      MF #1 - 80 01 01 90 00 80 01 1A A4 06 83 01 0A 95 01 08 FF FF FF FF FF FF FF FF FF FF
      MF #2 - 80 01 01 90 00 80 01 02 A4 06 83 01 01 95 01 08 80 01 18 A4 06 83 01 0A 95 01 08
    - arr type=adf
      ADF #1 - 80 01 01 90 00 80 01 1A A4 06 83 01 0A 95 01 08 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF
      ADF #2 - 80 01 01 A4 06 83 01 01 95 01 08 80 01 1A A4 06 83 01 0A 95 01 08 FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF FF

USIM modifier$
```