FEITIAN
WE BUILD SECURITY

BR500 and BR301BLE Bluetooth NFC Reader

USER'S MANUAL

Made by: Feitian Technologies

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Revision Sheet

Release No.	Date	Revision Description
Rev 1. 0	20/1/16	User's Manual Created
Rev 1.1	9/3/16	Add BR301BLE support
Rev 1.2	24/6/16	Change BR301BLE and BR500 product picture
Rev 1.3	18/9/16	Add UID tool and update tool operation step into user manual.
Rev 1.4	19/4/17	Update software environments contents
Rev 1.5	08/06/17	Update charging battery contents, check chapter 3.6
Rev 1.6	28/07/17	Add FAQ contents – explanation low power feature

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USER'S MANUAL

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1.0 GENERAL INFORMATION

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1.1 Product Introduction

FEITIAN provide BR500 and BR301BLE BLUETOOTH NFC READER which is CCID and PCSC standard product, it supports IOS, Android, PC platform. The product is compact, light and easy to operate, according with Bluetooth low power consumption design to save batteries and using support latest contactless and contact technology, support the world wide range of commonly used NFC card and IC chip card.

The BR500 and BR301BLE is card reader hardware which need work with application, and FEITIAN provide second development library and graphical user interface that allow user to all functions. And for customer can develop their own application based on FEITIAN SDK on mobile platform. For PC platform, it is fully compatible with traditional USB card reader (Micro USB provide with product), if you want using BR500 and BR301BLE with Bluetooth connection on PC platform, will need install extra BR500&BR301BLE BLUETOOTH CCID driver on PC platform.

BR500 and BR301BLE suites customers where security concerns are the most salient and satisfies the demand for a flexible solution for ID authentication, e-commerce, e-payment, information security and access control.

1.2 Acronyms and Abbreviations

BLE - (Bluetooth low energy)
CCID – (Chip Card Interface Device) Integrated Circuit(s)Card Interface Devices Specification
PCSC – (Short for "Personal Computer/Smart Card") is a specification for smart-card integration into computing environments.

1.3 Keywords and Features

Keywords: Contactless Smart Card Reader, Bluetooth 4.0/4.1 BLE, CCID, USB, ISO 14443 Type A and B, Mifare, Tag, ISO 7816, T0, T1

Features:

1. Wireless your work, fully support BLE (Bluetooth 4.0 Low Energy)
2. The world’s lightest Bluetooth reader with the compact design, the BLE reader can be hung on the neck easily as an employee badge
3. Throw away the cable! The market first CCID Bluetooth driver on Windows, Enabling you BLE reader work with PC wirelessly
4. Security: High security hardware design
5. Certification: We are certified worldwide with the certification, our reader is totally a universal product on both functionality and performance
6. The reader integrated with low power feature, for example, with reader battery without any data communication, reader will turn off after 3mins

2.0 Specification

2.0 PRODUCT INFORMATION

Overview:

Wireless your work, fully support BLE (Bluetooth 4.0 Low Energy)

General Parameters:

- Communication interface:
  - ✓ Communication for PC: USB 1.1/2.0/3.0 full speed(12Mbps) and Bluetooth
  - ✓ For mobile: Bluetooth 4.0/4.1 LE
- Power supply mode:
  - ✓ USB DC 5V
  - ✓ 3.7V Li battery (Capacity up to 350Ma)
- Open UID (User ID control) Function
- Support 255 bytes' flash memory for customer
- Support firmware upgrade
- The unique device ID
- Throw away the cable! The market first CCID Bluetooth driver on Windows, Enabling you BLE reader work with PC wirelessly
- The world's lightest Bluetooth reader with the compact design, the BLE reader can be hung on the neck easily as an employee badge

BR301BLE CONTACT CARD READER:

- Work frequency(Hz): 4-12M
- Contactless card support:
  - ✓ Support ISO 7816 standard, T0, T1, CLASSB, CLASSC, CLASSBC

BR500 CONTACTLESS CARD READER:

- Work frequency(Hz): 13.56M
- Contactless card support:
  - ✓ Support ISO 14443 Type A and Type B, Mifare standard card

2.1 Technical Parameter Table

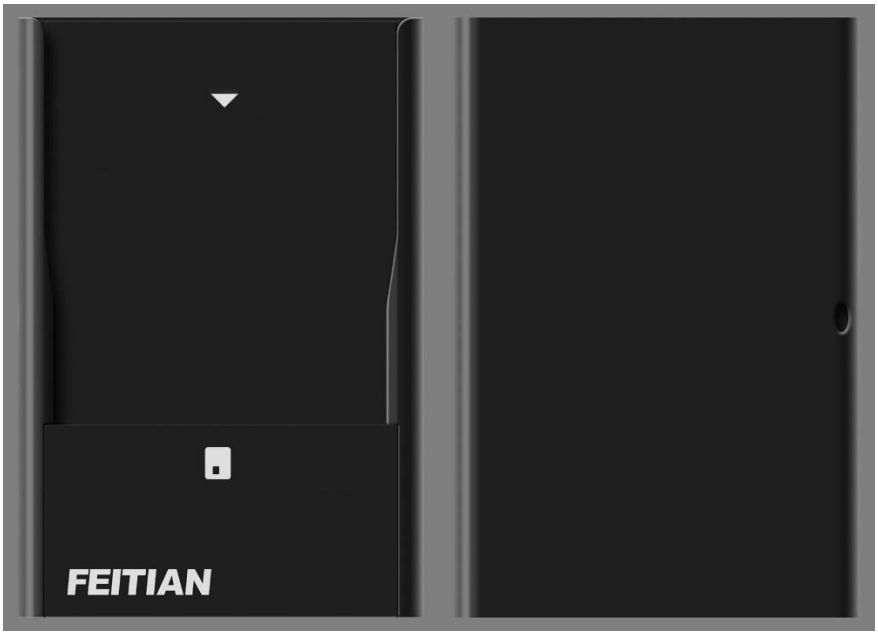
Interface	PC interface: USB1.1/2.0/3.0 Full speed (12Mbps)
	For mobile device: Bluetooth 4.0/4.1 LE
Power Supply	USB DC 5V
	3.7V Li battery (capacity is 350mA)
Contactless Standard	ISO14443Type A and Type B, Mifare standard
	Work frequency (Hz): 13.56M
Chip Card Standard	Support ISO 7816 standard, T0, T1, CLASS B, CLASS C, CLASS BC
	Work frequency (Hz): 4-12M – Support Auto PPS
Power Consumption	Power off: 5μA
	Standby: <50mA
	Full speed current: <180mA
Physical Parameter	Dimension: 93mm*63mm*8mm
	Weight: 31g
	Material: PC
	Color: Black
Working conditions	Operating Temperature: 0°C~60 °C
	Storage Temperature: - 20°C~85°C
	Humidity ≤90% (No condensation)
Standard	According with PC/SC, CCID, CE, FCC, RoHS， Compliant with EMV 2000 Level 1/ PBOC 2.0 Level1, Bluetooth® Smart
Support OS	IOS4.3+ Android 4.0+ Windows XP+ Linux Mac OS X

2.2 Key Application

2.2 Product photo

BR301BLE and BR500 using same casing/shell, the only different is reader module and printing on Casing/shell.

BR301BLE – It has chip card symbol/logo:



BR500 – It has contactless symbol/logo:

3.0 HARDWARE CONFIGURATION

3.0 HARDWARE CONFIGURATION

3.1 Operating Environment

Reader bR500 and BR301BLE supports contact smart cards and it can be used in various operating environments, including hardware and software operating environments, thus expanding the scope of use of reader bR500 and BR301BLE.

3.2 Hardware Operating Environment

Reader bR500 and BR301BLE providing user with USB or Bluetooth interface, it helps to make connection between PC, Mobile or other equipment more convenient. The card can be operated by local PC or mobile device via bR500 and BR301BLE.

3.3 Software Environment

Reader bR500 and BR301BLE has rich software environment. It has USB and Bluetooth both, the end user can choose which one they prefer using.
For USB communication, it supports all windows platform without install any driver. If using it under Android will need OTG cable. For Linux and macOS, you will need install CCID driver,
The driver for macOS can found https://github.com/martinpaljak/osx-ccid-installer/releases
The driver for Linux can found https://github.com/LudovicRousseau/CCID

For Bluetooth communication, support Android (Bluetooth), iOS, Windows 8, 8.1, 10. Using Bluetooth with wireless communication will need install extra driver under Windows, the driver can found in SDK, more information, and check section 5.5. And for mobile platform, the customer can find demo code in SDK.

3.4 Hardware Configuration

In order to help user to understand interaction between reader, device and card, the bR500 and BR301BLE hardware has various status of prompt information. Three LED status indicator lights is provided for the user: red, green and blue, each of them representing work and charging indicator light, card detection indicator light and data communication indicator. For details, please refer to the following table

Name of indicator light	Color	Prompt state
Work indicator	Red	After turning on, the light is flashing (light 0.5 sec. go out 1 sec.)
		Constant light means the battery voltage is low
Card detection indicator	Green	After detection of the presence of the card, the light is flashing (light 0.5 sec. go out 0.8 sec.)
		After card is disappeared, the light is extinguished
Data communication indicator	Blue	After device receives the data from the host computer, the light is on
		After device respond data, the light is extinguished
Charging indicator	Red	Constant light while charging
		After charging is completed, the light is extinguished

Note: When the program is upgraded, the indicator light (except for the charge) is flashing.

3.5 Turning-on-and-off description

Power supply mode	Turning on description	Turning off description
USB power supply on PC	Turning on automatically	Turning off automatically after USB is unplugged. Switch button can't be controlled.
Adapter power supply	Turning on automatically	Turning off automatically after charging wire is unplugged. Switch button can't be controlled.
Internal battery power supply	Press button to turn on	Press switch button to turn reader on, then press switch button for 2 sec. to turn the power off. When there is no data interaction for 2 minutes, the reader turning off automatically

3.6 Bluetooth Instructions

Bluetooth can only be used in the case of adapter or battery power supply.
Bluetooth will turn off automatically while USB connection with your PC computer, it won't disconnect when using Charger/adapter. When the Bluetooth is not connected, the contactless signal will close

4.0 BR500 AND BR301BLE RELATED TOOL

4.0 BR500 AND BR301BLE FIRMWARE UPDATE TOOL

4.1 Introduction of Update tool

Firmware update tool using to upgrade BR500 and BR301BLE firmware, it is for maintain in future. BR500 and BR301BLE apply dual encrypted mechanism. The firmware will have encrypted by UID (User ID), only the right UID firmware can be update by right reader. We will explain UID function later. To using update tool, please check BR500 and BR301BLE SDK.

*The related files of update application

Name	Date modified	Type	Size
bR301FC4_Update_20160530_1.06.meta	2016/5/30 15:46	META File	226 KB
HIDDLL.dll	2016/3/22 10:56	Application extens...	64 KB
ISPDLL.dll	2016/5/26 15:44	Application extens...	1,630 KB
ISPDLL1.dll	2016/3/22 10:56	Application extens...	1,635 KB
Update_Tool.exe	2016/3/22 10:56	Application	4,904 KB

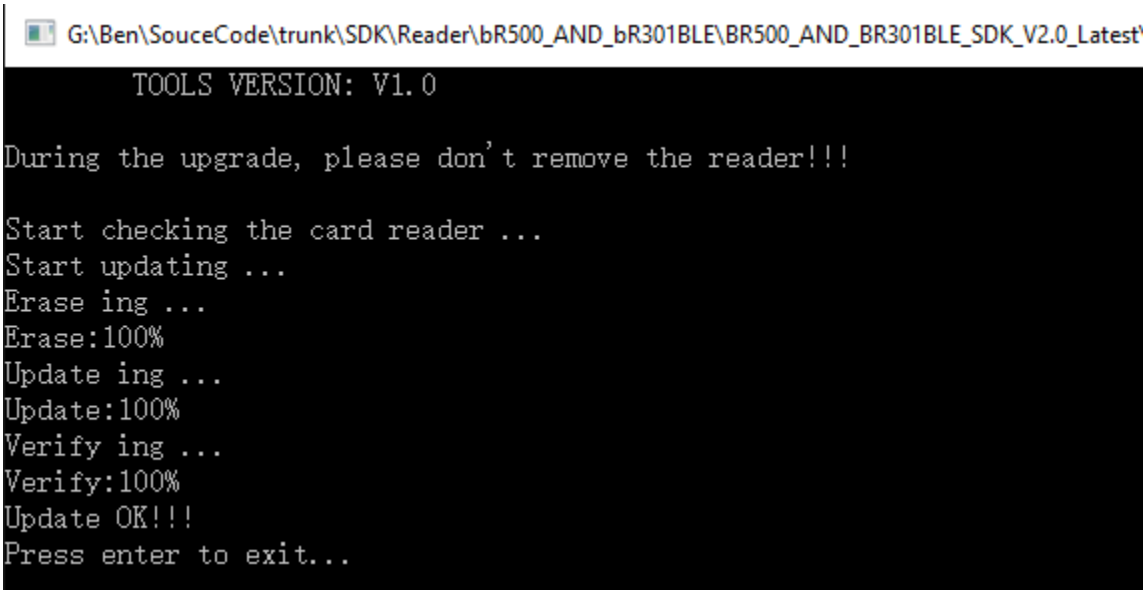
➔ Update_Tool.exe is execute file
➔ *. meta file is firmware BIN file, please don't rename this file

4.2 The operation of Update tool

The update tool is easy, convenient and safe too. We will introduce how to using this tool to update your reader.

Step #1: Insert reader to PC and double click "Update_Tool.exe" by **administrator**. If you are first running this tool, the tool will inform to re-plug reader.

Step #2: After re-plug reader, open update tool application again and then starts updating.
The whole progress will cost around 30s. **please not remove reader while in updating.** If something happens while in updating progress, please open tool and re-updating reader again.

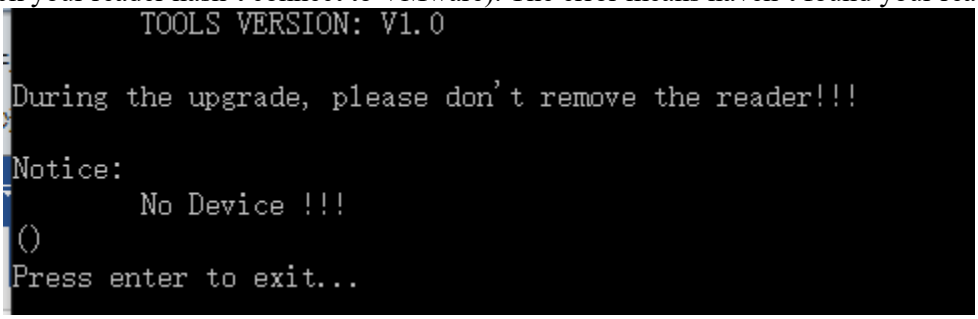


4.3 Errors and solutions

1. If the update tool happens below error, please do re-plug reader.

2. If occurs error while in updating, please re-plug reader and running application do updating again

3. If it shows below error, please check your reader has connected to PC with USB port correctly (or check your reader hasn't connect to VMware). The error means haven't found your reader.



5.0 BR500 AND BR301BLE UID TOOL

5.1 Introduction of UID Tool

UID(User) Tool is security mechanism for distributor or people who want the reader only can be distinguish by their application, The UID is generate by seed code, user can input their privacy seed code, using UID Tool write code into reader, reader generate 8bytes ID, called user ID. And FEITIAN provide API to read this UID from different platform. Then user only need keep their seed won't be stolen, and do bind their application with this UID, to keep their customer only can be using specified reader.

The operation API include in BR500 and BR301BLE SDK, also we provide windows tool for customer do operation on Windows. For mobile platform, also have such API for call (check developer guide).

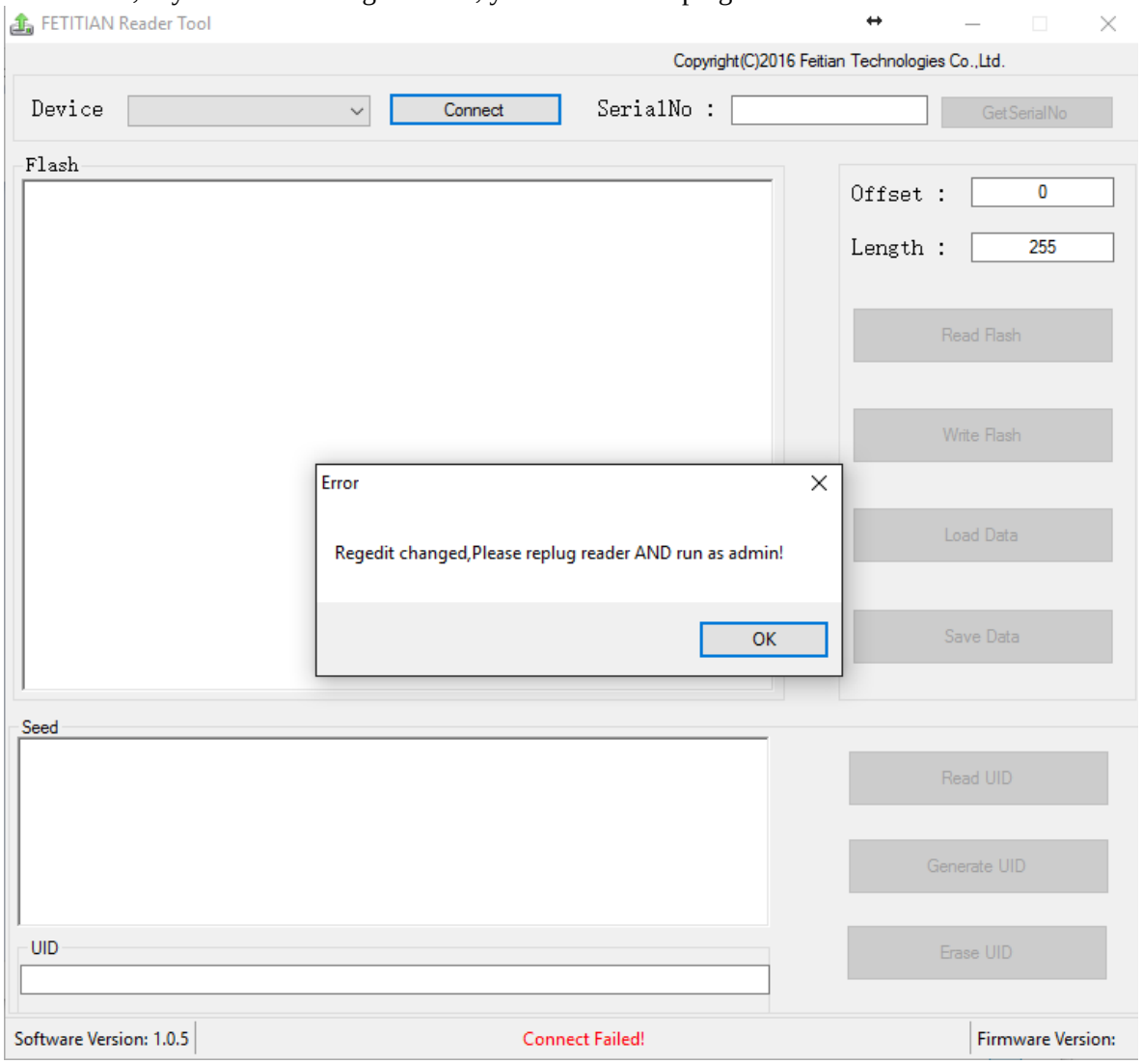
*The related files of update application

Name	Date modified	Type	Size
Changelog.txt	2016/9/18 12:01	Text Document	1 KB
FeiTianUID.exe	2016/4/20 11:04	Application	101 KB
FeiTianUID.exe.config	2016/4/20 11:04	XML Configuratio...	1 KB
libGetReader.so	2016/4/20 11:04	SO File	43 KB
Readme.txt	2016/9/18 12:01	Text Document	1 KB

➔ FeiTianUID.exe is execute file
➔ *. meta file is firmware BIN file, please don't rename this file
➔ LibGetReader.so is packaged lib

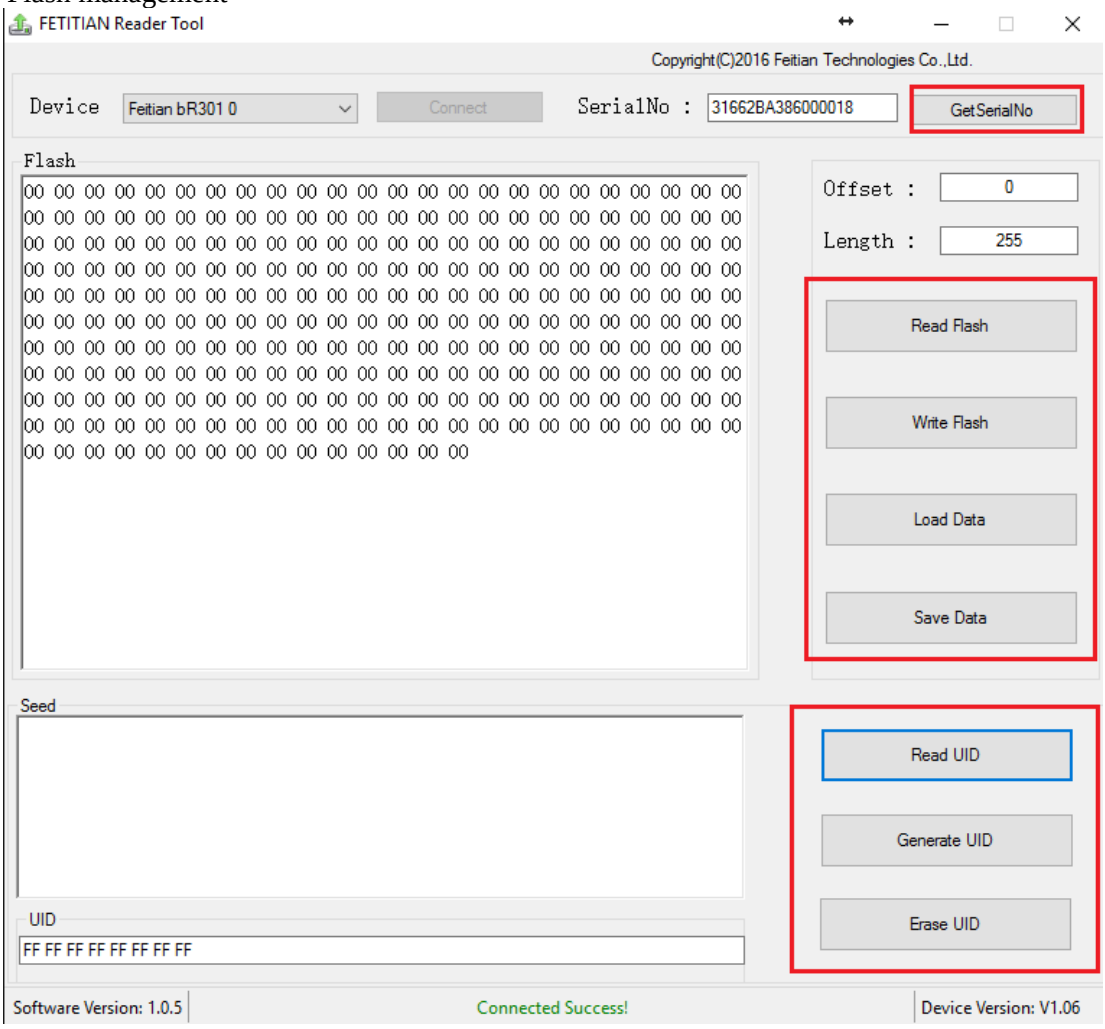
5.2 The operation of UID tool

Step #1: Please keep all the related file in same directory, and using administrator running FeiTianUID.exe, if you are first using this tool, you will need re-plug reader. See below:



Step #2: re-plug reader and using administrator to run the tool again. And start to do operation. The tool provide three function, we will do introduction later.

➔ Read serial number
➔ UID management
➔ Flash management



5.3 Serial number

The serial number is specific unique number for reader, the number includes production date. We provide API for PC and Mobile platform to read it out.

On this part, we only show the tool that Feitian made. After you connected reader to PC, click “Get serialNo” button to get SN.

5.4 UID management

As we motioned before, the UID function using to manager customer brand and encrypted firmware. If you don’t want your reader using by others, you can write your private seed and get UID, bind your UID with your application to make the application only detect this UID after then can using reader, if the UID is not your specific UID, then refuse it.

This tool show user read/write/erase UID, the UID generated by private algorithm through the seed. the default UID is 16xFF, before input your seed, please don't forget it. If you forgot the seed or lost the seed, without exist seed, you cannot change others and erase it.

On other hand, we provide read/write/erase APDU and sample code allow using to do bind in mobile and PC platform. For such document, please contact Feitian and sign NDA to get it.

5.5 BR500 and BR301BLE Bluetooth Driver

This is what we are doing now. the reader is according CCID standard to do develop, means most customer can be using on windows without change their application, but this only limit for USB connection. To provide better experiences, FEITIAN already developed a Bluetooth Driver will allow user do connection reader through Bluetooth, the driver is CCID compatible.

The install manual(BR500_AND_BR301BLE_Driver_Install_Manual) and driver file(BR301BLE_AND_BR500_DRIVER_RELEASE) can find in SDK.

*Please notice, the driver only available for Windows 8/8.1/10, doesn't support Windows 7 and older version.

5.6 Demo Software

Do operation with BR500 and BR301BLE, we provide mobile SDK, for PC platform, customer can call WINSCARD API or PCSC Lite API, they are standard API, you can check MSDN or PCSC LITE official website. FEITIAN also made sample code for reference with different development language. https://github.com/FeitianSmartcardReader/R301/tree/master/Sample%20Code

6.0 FAQ

6.0 FAQ

6.0.1 Development

The SDK based on PCSC API implement, we provide demo source code to reference and guidance customer how to call our APIs. The library based on Bluetooth 4.0 LE to do development.

Notice: For IOS, you will need add your CoreBluetooth.framework in your xcode project
For android, add package -> android.bluetooth

About debug on mobile platform, we provide debug library which can print all transfer APDU between reader and card, so customer can have a review of the operation.

6.0.2 Upload to Appstore

The BR500 not related MFi (made for iPhone/iPad/iPod), so when you upload your application to Appstore, no need PPID anymore.

6.0.3 Driver for Bluetooth connection on Mac OS X

Our Bluetooth CCID driver doesn't MAC OS X now, if customer wants using on Mac OS X, please using micro USB cable.

The current driver only support Windows 8/8/1/10.

6.0.4 Reader low power feature explanation – reader turn off automatically

Some customer found the reader will turn off automatically, this is what we design for. The reader firmware has integrated into low power feature, below is detail:

If with data communication with reader, the reader will turn off after 3mins to save battery, but if you connect reader to a charger adapter, then it will still turn on after 3mins (Don't connect to PC/HOST, because reader firmware will realized you want using reader with USB mode and turn off Bluetooth communication).

6.0.5 How long is the Bluetooth communication distance of Feitan Bluetooth reader

The Bluetooth reader is design based on Bluetooth Smart technology, the communication distance support to 20m, since we consider the security of this device, currently, the distance is 10m.