CC888 EZcarsharing T-Box

Blue Tooth Protocol -V2.1

This Protocol is used for T-Box to communicate between T-Box and App by Blue Tooth, also including some protocol between T-Box and Server that corresponding with Blue Tooth control command.

Suit for：

CC-318 / CC-328 / CC-338 / CC-368 / CC-688 etc.

Version

Version 1.0	**Date 2017-11-20**	**First Released**
Version 1.1	**Date 2018-03-05**	**Add check car status command**
Version 1.2	**Date 2018-05-16**	**Add set password command**
Version 1.3	**Date 2018-06-28**	**Flashing light can control from left to right**
Version 2.0	**Date 2019-01-25**	**Blue Tooth name ID encrypt**
Version 2.1	**Date 2019-08-08**	**Bug fixed & add examples**

Notes:

The following message & command words and symbols all are English upper case letters, blank and other symbols are illegal.

1. T-Box Bluetooth broadcast name format (the format is fixed, the broadcast name of each T-Box is different, and the broadcast name length is fixed to 19)

Example: $EZ_5D4155555555STD

$EZ: Bluetooth broadcast fixed beginning (T-Box Customer Identification ID)

5D4155555555: 12-bit device ID encrypted result

Bluetooth broadcast ID encryption: **Every digital XOR with 5 is the result.**

Example: 081400000000 is T-Box ID, Every digital XOR with 5, the result is : 5D4155555555, So 081400000000 T-Box broadcast name will be :

$EZ_5D4155555555STD

STD: software version identifier.

2. T-Box upload Bluetooth password to server and server reply T-Box :

This part is the command of the T-Box communicate with the server. For the complete data format, please refer to the communication protocol for the T-Box and the server.

2.1 T-Box upload Blue Tooth password to server (0601)

0601 message body:

Start Bytes	Field	Data type	Description
0	Password After Encryption	BYTE[8]	The password in the field is not real blue tooth password, it is the real Bluetooth password (8 digits) XOR 12345678 result.
1			
....			
7			

Example: real password is 87654321, then the password after encryption is 0905050101050509.

The Blue Tooth real password is generated randomly by the T-Box when the T-Box is power on or reset every time, the password need upload to the server and be confirmed by the server, if after the new blue tooth password is generated, the T-Box can not upload

the new blue tooth password to server, or the new blue tooth password is bot confirmed by the server, the T-Box will keep the last old blue tooth password, and the blue tooth password will not change to new password.

Example:

Content with Underline is message body, the below is same.

T-Box Upload: 7E 0601 0008 081400000089 02EF 060300060702070A 7C 7E

06 03 00 06 07 02 07 0A is 07 01 03 02 02 04 00 02 XOR 01 02 03 04 05 06 07 08 result.

Server Reply: 7E 8601 0001 081400000089 5139 00 7B 7E

00 Means password 07 01 03 02 02 04 00 02 confirmed by server.

2.2 The Server Reply the T-Box Upload Blue Tooth Password Command (8601)

8601 message body:

Start Bytes	Field	Data type	Description
0	Result	Byte	00: Server confirm new password Succeed 01:Server confirm new password Failed

After the server confirm the new blue tooth password succeed, the new Blue Tooth password will takes effect. If the new blue tooth password is not confirmed by the server succeed or the server has no response, the T-Box will keep the last old blue tooth password, the new password will be given up.

Every time the T-Box re-power on or reset, the T-Box will generate a new blue tooth password randomly and upload the new blue tooth password to server to confirm.

Example: refer above 0601 command example.

2.3 Server Request T-Box Reset & Upload New Bluetooth Password (8620)

This command is the server request T-Box reset & upload new blue tooth password. After T-Box receive the command, it will reply server with T-Box general reply message 0001, and then generate new blue tooth password and then upload the new blue tooth password to server with command 0601.

Example:

Server download to T-Box:

7E **8620** 0000 081400000089 01F9 CB 7E

T-Box reply server with general 0001 message:

7E **0001** 0005 081400000089 01FB 01F9 8620 00 35 7E

2.4 T-Box Reply Server Reset & Upload New Bluetooth Password (0001)

T-Box will reply server with general reply message 0001, the T-Box reply server general message 0001 please refer to the communication protocol for the T-Box and the server.

Example: refer above 8620 command example.

2.5 Server Download App User Code to T-Box command (8630):

APP User Code : App user code is an identification code of the APP user. It is not the Bluetooth password of the T-Box. It mainly distinguishes which APP user is using Bluetooth to control the vehicle. The super App user code is generally a app user code used by the operation and maintenance APP. The code user authority is greater than that of the ordinary user. If the APP and the device have no special function for the super app user code, and the super app user code may not be set. The control method refers to the following APP control description.

8630 message body:

Start Bytes	Field	Data type	Description
0	User Code Length	Byte	Length of the touch pad super password
1	Super User Code	Byte[N]	Super App user code
N+1	Encrypted Blue Tooth Password	Byte[8]	Real blue tooth password XOR 87654321 Result

Example:

Server download to T-Box:

7E 8630 0011 081400000089 014D 08 4142434445464748 060300060702070A 75 7E

T-Box reply server with general 0001 message:

7E **0001** 0005 081400000089 01FC 014D 8630 00 96 7E

2.6 T-Box Reply Server Download Super APP User Code Command (0001)

T-Box will reply server with general reply message 0001, the T-Box reply server general message 0001 please refer to the communication protocol for the T-Box and the server.

Example: refer above 8630 command example.

3. App Download T-Box Message Description by Blue Tooth :

This part is the message that app send message to T-Box to control or check car by blue tooth.

3.1 App Download T-Box Message Data Frame Format

The app download to T-Box message description are as follow:

Marker	Message header	Message body	MD5 Coded value	Check Code	Marker

Marker:

The marker is represented by 0x7e. If the check code, message header, and message body have 0x7e, the escaping process is performed. The escaping rules are defined as follows:

0x7e<->0x7d followed by a 0x02

0x7d<->0x7d followed by a 0x01

The escaping process is as follows:

When sending a message: message encapsulation ------> calculate and fill in the check code ------> escaping;

When receiving a message: escaping restore ------> verify check code ------> parse the message.

Example:

The content of the sent data packet is: 0x30 0x7e 0x08 0x7d 0x55

Then the contents of the encapsulated data packet is: 0x7e 0x30 0x7d 0x02 0x08 0x7d 0x01 0x55 0x7e

Message header content as follow:

Start Byte	Field	Data type	Description
0	Message ID	WORD	The “Message ID” details are as follow.
2	Message body attribute	WORD	The “Message Body Attribute” details are as follow.

4	Device ID	BCD[6]	Up to 12 digits, for example: 081400000089
10	Message serial number	WORD	Cycle accumulation from 0 in the order of transmission

The message body attribute detail is as follows:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Reserved		Fixed with 0000				total length of message body									

The app download T-Box general message body detail is as follows:

Start Byte	Field	Data type	Description
0	User Code Length	BYTE	The length of user ID
1	App User Code	BYTE[N]	User ID is generated by App
N+1	Other parameter	WORD	Different by command,some have not
N+3	Reserved	WORD	For future used. Now fixed 00 00.

App User Code is an app user ID, it maybe same in the single car rent process, or maybe fixed for one car rent company, the app design define the app user code is changeable or not.

MD5 Coded value:

Message Header + Message Body +Blue Tooth Password ⟶ MD5 Coded value

Note: The 16 byte MD5 coded value is not included in the total length of message body in the message body attribute.

Check code:

The check code refers: the first byte of the message header XOR the next byte, and the result XOR the next byte, and so on, the final result of XOR the the last byte of the message body before the check code is the final check code, occupies one byte.

Ezamples:

1) Message ID: 9400
2) Message Body: 08 4142434445464748 02 0000
3) MD5 Coded Value: Message Header + Message Body + Blue Tooth Password

9400 000C 081400000089 0038 08 4142434445464748 02 0000 0000000000000809

Message Header Message Body Blue Tooth Password

Coded 16 Bytes MD5 value: *471C62F613C559C5D678F85787350234*

4) Pack Message: Message +Message Body+Coded MD5 Value

9400 000C 081400000089 0038__ 08 4142434445464748 02 0000 *471C62F613C559C5D678F85787350234*

5) Calculated Check Code：37

6) Pack Full Message: **7E** 9400 000C 081400000089 0038__ 08 4142434445464748 02 0000 *471C62F613C559C5D678F85787350234* 37 **7E**

7) If in the check code, message header, message body, and MD5 in step 6 appear 0x7D or 0x7E, then the escaping process need to be performed, after escaping process the message can be sent.

3.2 App download T-Box CarRented command by Bluetooth (Message ID:9200)

This command is used for app notice the T-Box that the car is rented, The T-Box will reply App by blue tooth with general message ID:9000.

Example: Blue Tooth Password: 00 00 00 00 00 00 08 09, the following example is same.

7E 9200 000B 081400000089 0034 08 4142434445464748 0000 7D0224E5443FD7CED3C9FAA4887BE5FEDB 92 7E

3.3 App download T-Box UNLOCK command by Bluetooth (Message ID:9300)

The T-Box will reply App by blue tooth with general message ID:9000.

Example:

7E 9300 000B 081400000089 0036 08 4142434445464748 0000 A3CFD5B6EDF12DC90B95568F4A12E38C BC 7E

3.4 App download T-Box Finding Car command by Bluetooth (Message ID:9400)

9400 Message body is as follow:

Start Byte	Field	Data type	Description
0	App User Code Length	BYTE	The length of app user code
1	App User Code	BYTE[N]	App user code is generated by App
N+1	Finding Car	BYTE	01: Beep siren 2-3 times 02:Flashing light 2-3 times 03:Beep siren & flashing light same time
N+2	Reserved	WORD	For future used. Now fixed 00 00.

The T-Box will reply App by blue tooth with general message ID:9000

Example:

7E 9400 000C 081400000089 0037 08 4142434445464748 01 0000 345E81929FEE49062AF4BE5EB47383F2 F4 7E

3.5 App download T-Box LOCK command by Bluetooth (Message ID:9500)

The T-Box will reply App by blue tooth with general message ID:9000.

Example:

7E 9500 000B 081400000089 0035 08 4142434445464748 0000 7236795342A966042367847B8C0C2AD1 19 7E

3.6 App download T-Box Return Car command by Bluetooth (Message ID:9600)

The T-Box will reply App by blue tooth with general message ID:9000

Example:

7E 9600 000B 081400000089 0039 08 4142434445464748 0000 80A3778F15B58CD5D3C80511B2560EB3 45 7E

3.7 App download T-Box Check Vehicle Status command by Bluetooth (Message ID:9700)

The T-Box will reply App by blue tooth with message ID:9007, the 9007 message is described in the following.

Example:

7E 9700 000B 081400000089 0039 08 4142434445464748 0000 4C384E84EA6813D91395826CAB5272B6 93 7E

3.8 App download T-Box Enable / Disable Engine Power Supply command by Bluetooth (Message ID:9800)

9800 Message body is as follow:

Start Byte	Field	Data type	Description

0	App User Code Length	BYTE	The length of app user code
1	App User Code	BYTE[N]	User Code is generated by App
N+1	Enable / Disable	BYTE	01: Enable engine power supply, engine can be started 00:Disable engine power supply, engine can not be started
N+2	Reserved	WORD	For future used. Now fixed 00 00.

The T-Box will reply App by blue tooth with general message ID:9000

Example:

7E 9800 000C 081400000089 0039 08 4142434445464748 01 0000 261C8D43EA677AEE75D114F864339ADC 8D 7E

3.9 App download T-Box Set Touch Pad Password command by Bluetooth (Message ID:9900)

9900 Message body is as follow:

Start Byte	Field	Data type	Description
0	App User Code Length	BYTE	The length of user ID
1	App User Code	BYTE[N]	User ID is generated by App
N+1	Password Length	BYTE	The length of touch pad password
N+2	Touch Pad Password	BYTE[M]	Real touch pad password
N+M+2	Reserved	WORD	For future used. Now fixed 00 00.

The T-Box will reply App by blue tooth with general message ID:9000

Example:

7E 9900 0014 081400000089 0039 08 4142434445464748 08 0505050506060606 0000 57AF659B19FC7FCA72810B4CF282981B 38 7E

4. T-Box Upload App Message Description by Blue Tooth :

This part is the message that T-Box send message to App to reply the control command or upload status by blue tooth.

4.1 T-Box Upload App Message Data Frame Format

The T-Box upload App message description are as follow:

Marker	Message header	Message body	Check Code	Marker

Marker:

The marker is represented by 0x7e. If the check code, message header, and message body have 0x7e, the escaping process is performed. The escaping rules are defined as follows:

0x7e<->0x7d followed by a 0x02

0x7d<->0x7d followed by a 0x01

The escaping process is as follows:

When sending a message: message encapsulation ------> calculate and fill in the check code ------> escaping;

When receiving a message: escaping restore ------> verify check code ------> parse the message.

Example:

The content of the sent data packet is: 0x30 0x7e 0x08 0x7d 0x55

Then the contents of the encapsulated data packet is: 0x7e 0x30 0x7d 0x02 0x08 0x7d 0x01 0x55 0x7e

Message header content as follow:

Start Byte	Field	Data type	Description
0	Message ID	WORD	The “Message ID” details are as follow.
2	Message body attribute	WORD	The “Message Body Attribute” details are as follow.
4	Device ID	BCD[6]	Up to 12 digits, for example: 081400000089
10	Message serial number	WORD	Cycle accumulation from 0 in the order of transmission

The message body attribute detail is as follows:

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Reserved		Fixed with 0000				total length of message body									

The message body detail please refer the following description.

Check code:

The check code refers: the first byte of the message header XOR the next byte, and the result XOR the next byte, and so on, the final result of XOR the the last byte of the message body before the check code is the final check code, occupies one byte.

4.2 T-Box reply App general message by Bluetooth (Message ID:9000)

9000 Message body is as follow:

Start byte	Field	Data type	Description
0	Result Code	WORD	Details are as follow:
2	User Role	BYTE	00:Normal user 55:Super user (maintain etc.)
3	Time	BCD[6]	Format: YY-MM-DD-hh-mm-ss
9	Latitude	DWORD	Unit:10^{-6} Degree, Accuracy is $1x10^{-6}$ Degree.
13	Longitude	DWORD	Unit:10^{-6} Degree, Accuracy is $1x10^{-6}$ Degree.
17	Reserved	WORD	For future used. Now fixed 00 00.

Time and latitude and longitude are required in response to reply Return Car Command. The other command reply, the time and latitude and longitude can be uniformly filled into zero.

Result Code Description:

200: Return car success

500: Send success

501: T-Box check code error

502: Password wrong

503: Control command error

504: Control command sending time out

505: Door is open

506: Engine is running

507: Car Key is not available

508: Car is rent (App user code is not correct)

509: The car has been booked

510: Car maintenance (Normally T-Box or car has problem)

511: Vehicle to be rented

611: Operation fail

After reply app command by blue tooth, the T-Box also send the same data to the server through internet.

Example:

7E 9000 0013 081400000089 0009 0505 00 190802174306 015A3698 06CD99C0 0000 39 7E

4.3 T-Box reply App Check Car Status by Bluetooth (Message ID:9007)

In the car rent process, if the blue tooth connection is well, the T-Box will send this message to app every 10 seconds by blue tooth.

9007 Message body is as follow:

Start byte	Field	Data type	Description
0	Alarm flag	DWORD	Detail please refer the Communication protocol
4	Vehicle Status	DWORD	Detail please refer the Communication protocol
8	Latitude	DWORD	Unit:10^{-6} Degree, Accuracy is $1x10^{-6}$ Degree.
12	Longitude	DWORD	Unit:10^{-6} Degree, Accuracy is $1x10^{-6}$ Degree.
16	altitude	WORD	Height above sea level, Unit is meters (m).
18	Speed	WORD	OBD speed or GPS speed, Unit is **0.1km/hour**
20	Direction	WORD	0 to 359, due north is 0, clockwise
22	Time	BCD[6]	YY-MM-DD-hh-mm-ss
28	Remaining battery & Remaining mileage	BYTE[4]	First Byte[0] is percent of the remaining battery,from 00to 100 The 2~4 Byte are remaining milage, unit is **hundred meters**. For example: Byte[1] = 0x00, Byte[2] = 0x01, Byte[3] = 0x02, means remaining mileage is **0x**000**102** hundred meters = **10.2** km.
32	Total mileage	DWORD	Unit is **hundred meters**
36	Battery Voltage	WORD	Unit is 0.1V
38	Area ID	DWORD	If in the defined area, then report the area ID, if not in defined area, then is 0x00.
42	GPRS signal	BYTE	GPRS signal strength, 1byte
43	Reserved	BYTE[3]	For future used. Now fixed 00 00 00.

Example:

7E 9007 0031 081400000089 000A
0500000000800000001C00015A366006CD9978003D00000000190803104515000000000000000000
00780000000018000000 88 7E

5. Bluetooth send & receive data subpackage

Because the Bluetooth module can only send and receive 20 characters each time, the data sent and received by Bluetooth needs to be processed by packet processing. The examples are as follows:

APP need send the following data:

7ECBDFE568965454ASDFGDF46986GGDSD456BFSDFSDFZBDFGAFAF433D9D8997E

APP need subpackage the data as follow and send:

7ECBDFE568965454ASDF

GDF46986GGDSD456BFSD

FSDFZBDFGAFAF433D9D8

997E

The T-Box receives the data with 7E as the basis for the end of the packet data.

The same reason if T-Box need send the same example data to app, also need subpackage the data as follow and send to app:

7ECBDFE568965454ASDF

GDF46986GGDSD456BFSD

FSDFZBDFGAFAF433D9D8

997E

The APP receive the data with 7E as the basis for the end of the packet data.