

Bluetooth TPMS Communication Protocol

No.	Customer Name	Maker	Create date	Versions	Remark
1		So	2013/11/5	A0	Initial version
2		So	2013/11/15	A1	Adding query of battery voltage, Modifying ID query instruction
3					
4					
5					

Part One Protocol Synopsis

The product divide into three parts: sensor module, Bluetooth receiver module, the mobile phone/OBD or other display device base on iOS / Android operating system with Bluetooth function. For these devices, we uniformly named mobile phone in this text.

Because the mobile phone app is designed by customers themselves, so we only introduce mobile phone functional requirement, and do not describe other details in this text.

Part two Protocol contents

1, Communication mode

TPMS receiver and mobile phone use Bluetooth wireless communication, the mobile phone turn on Bluetooth serial port to receive data from tire.

2, Data uploading time

TPMS receiver upload every tire data to mobile phone every 4s and continuously upload four tire data every time.

3, Tire data frame format from TPMS receiver to mobile phone

Data frame contents			
	Message name	description	
Byte1	synchronous code1	0x55	
Byte2	synchronous code2	0xAA	
Byte3	number of bytes for frame	0x08	
Byte4	Corresponding tyre location of sensor	0x00= left front,0x 01= right front,0x 10= rear left,0x 11= rear right	
Byte5	Pressure value	pressure =P*3.44 unit is KPA, after the DVD receiving the uploading data, multiply by 3.14(decimal system), the calculated value is the practical KPA pressure value;	
Byte6	temperature value	range:-50~ 205℃ calculation: temperature =T-50 ℃ After mobile phone receiving the uploading data, subtracts 50(decimal system),then gets the practical temperature value	
Byte7		air leakage	xxxx 0xxx normal xxxx 1xxx air leakage alarm
		Low battery voltage alarm	Xxx0 xxxx normal Xxx1 xxxx Low

			battery voltage
		Signal abnormal alarm	Xx0x xxxx normal Xx1x xxxx loss of signal alarm
Byte8	Verify byte (CSUM)	Standard block check character	

4, Instruction frames format or command frames format from mobile phone to TPMS receiver

Data frame contents		
	Message name	description
Byte1	synchronous code1	0x55
Byte2	synchronous code2	0xAA
Byte3	number of bytes for frame	0x06
Byte4	function code 1	0x01=learning ID, 0x 02=query ID, 0x 06=quite learning
Byte5	function code 2	When it is in learning, this byte is as a position number of tyre(0x00=left front,0x 01=right front,0x 10=rear left, 0x 11=rear right; it defaults to 0x00 in other conditions.
Byte6	Verify byte (CSUM)	Standard block check character

Remark: The Bluetooth receiver stop to upload data frame from tyre after it receive the command from mobile phone app.

5,Sensor ID learning methods

Sensor ID learning is meaning the mobile phone send instruction to Bluetooth receiver, and the Bluetooth receiver turn into learning method after it receive instruction. The main method is the Bluetooth receiver turn into learning method after it receive instruction to a tyre from mobile phone, in this moment, inflating or deflating the corresponding tyre which installed sensor, making the sensor turn into quickly sending. The Bluetooth receiver thinks it needs to learn sensor ID after it receive continuous same data, and saving this ID in the inside of Bluetooth receiver, meanwhile informing the mobile phone that it completed learning. Please see below in a specific way:

1)Matching to the left front sensor

The mobile phone sends instruction to learn left front sensor ID to Bluetooth receiver, the instruction as follow:

55 AA 06 01 00 F8

The Bluetooth receiver responses an instruction to host immediately after it receive the matching instruction from mobile phone, the instruction as follow:

55 AA 06 10 00 E9

The left front sensor responses success instruction to host after it matches successfully, the instruction as follow:

55 AA 06 18 00 E1

2)Matching to the right front sensor

The mobile phone sends instruction to learn right front sensor ID to Bluetooth receiver, the instruction as follow:

55 AA 06 01 01 F9

The Bluetooth receiver responses an instruction to host immediately after it receive the matching instruction from mobile phone, the instruction as follow:

55 AA 06 10 01 E8

The right front sensor responses success instruction to host after it matches successfully, the instruction as follow:

55 AA 06 18 01 E0

3)Matching to the rear left sensor

The mobile phone sends instruction to learn rear left sensor ID to Bluetooth receiver, the instruction as follow:

55 AA 06 01 10 E8

The Bluetooth receiver responses an instruction to host immediately after it receive the matching instruction from mobile phone, the instruction as follow:

55 AA 06 10 10 F9

The rear left sensor responses success instruction to host after it matches successfully, the instruction as follow:

55 AA 06 18 10 F1

4) Matching to the rear right sensor

The mobile phone sends instruction to learn rear right sensor ID to Bluetooth receiver, the instruction as follow:

55 AA 06 01 11 E9

The Bluetooth receiver responses an instruction to host immediately after it receive the matching instruction from mobile phone, the instruction as follow:

55 AA 06 10 11 F8

The rear right sensor responses success instruction to host after it matches successfully, the instruction as follow:

55 AA 06 18 11 F0

6,Quitting from learning of pairing

The mobile phone send instruction to Bluetooth receiver, the Bluetooth receiver will immediately quit from learning of matching after it receives the instruction from mobile phone:

55 aa 06 06 00 ff

After learning successful, if the Bluetooth receiver does not receive quitting instruction in 4min, it will quite automatically after 4min.

7, Querying the four sensors ID

The mobile phone send below instruction to Bluetooth receiver

```
55 AA 06 07 00 check data
```

The Bluetooth receiver immediately uploads the four sensors ID after receiving the instruction,

```
55 AA 09 01 ID1 ID2 ID3 ID4 check data
```

```
55 AA 09 02 ID1 ID2 ID3 ID4 check data
```

```
55 AA 09 03 ID1 ID2 ID3 ID4 check data
```

```
55 AA 09 04 ID1 ID2 ID3 ID4 check data
```

Tyre location

Sensor ID

8, Tyre exchange

The mobile phone sends below instruction to Bluetooth receiver

```
55 aa 06 03 num check data
```

The receiver responses below instruction after it finish interchange

```
55 aa 06 30 num check data
```

:

Note: check data is checksum, num is subcommand, it is defined as follow:

num=0x00: Left front wheel interchange with right front wheel

num=0x01: Left front wheel interchange with rear left wheel

num=0x02: Left front wheel interchange with rear right wheel

num=0x03: Right front wheel interchange with rear left wheel

num=0x04: Right front wheel interchange with rear right wheel

num=0x05: Rear left wheel interchange with rear right wheel

9, querying the sensors battery voltage

Instructions sent by host					
55	AA	06	02	01	Checksum
synchronous head		Byte length	function code		checksum

The TPMS receiver responses data below immediately after receiving the above instructions, and sending host the battery voltage of sensor in each tyre.

Instructions responded by TPMS receiver battery voltage query									
55	AA	0A	20	01	FL_VOL1	FR_VOL2	RL_VOL3	RR_VOL4	Checksum
synchronous head		Byte length	function code	of	Left front voltage	Right front voltage	Rear left voltage	Rear right voltage	block check

		response					character
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Actual voltage= uploading voltage values \div 10

If suppose FL_VOL1=1EH=30D, then the actual voltage=30 \div 10=3.0V

Part Four Configuration of Mobile Phone

- 1、 data display of tyre inside(display of voltage,temperature)
- 2、 Warning function(low-pressure, high-pressure, high temperature, air leakage, low voltage, no signal)
- 3、 Alert voice switch option
- 4、 self-turn-on option
- 5、 low-pressure, high-pressure, high temperature threshold value set
- 6、 language following system function
- 7、 ID learning
- 8、 tyres exchange
- 9、 Pressure unit, temperature unit option
- 10、 option of screen always light on switch
- 11、 Landscape screen, vertical screen Self-Estimate function
- 12、 Function of Bluetooth devices binding
- 13、 the function for App start automatic search the matched Bluetooth devices after it matched with Bluetooth
- 14、 The function of when it is in every operation status, if the operation

is successful or not.

15、Function of battery voltage query.