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**Bluetooth Setting**

**Document Owner**

This specification is owned by:

Zhang Jiajia

Infotainment Group, ESS, PATAC

+86 21 50165016 -(ext)515425

Jiajia2\_Zhang@patac.com.cn

目录

[1 需求概述/Requirement Overview 4](#_Toc53407006)

[1.1 背景价值/Background Information 4](#_Toc53407007)

[1.2 名词解释/Terminology 4](#_Toc53407008)

[1.3 功能全景/Functional Panorama 4](#_Toc53407009)

[2 需求列表/Requirement List 4](#_Toc53407010)

[3 需求描述/Requirement Description 5](#_Toc53407011)

[3.1 安全限制/Bluetooth Security Restrictions 5](#_Toc53407012)

[3.1.1 蓝牙配对限制/Bluetooth Pairing Restrictions 5](#_Toc53407013)

[3.1.2 蓝牙手动连接限制/Bluetooth manual Connection Restrictions 6](#_Toc53407014)

[3.1.3 系统名称修改限制/System Name Modification Restrictions 6](#_Toc53407015)

[3.2 蓝牙设备分类/Bluetooth Device Classification 6](#_Toc53407016)

[3.2.1 蓝牙设备列表/Bluetooth Device List 6](#_Toc53407017)

[3.2.2 设备的优先级/Priority of Devices 7](#_Toc53407018)

[3.2.3 可用设备列表刷新/Available Device List Refresh 7](#_Toc53407019)

[3.2.4 蓝牙的两个模式/Two Modes of Bluetooth 7](#_Toc53407020)

[3.2.5 自定义系统~~的蓝牙~~名称/Customize System Name 8](#_Toc53407021)

[3.3 蓝牙配对/Bluetooth Pairing 8](#_Toc53407022)

[3.3.1 配对方式/ Pairing Method 9](#_Toc53407023)

[3.3.2 配对提示/Pairing Notification 9](#_Toc53407024)

[3.4 蓝牙连接/Bluetooth Connection 9](#_Toc53407025)

[3.4.1 自动连接/Automatic Connection 9](#_Toc53407026)

[3.4.2 手动连接/Manual Connection 10](#_Toc53407027)

[3.4.3 首选连接/First Connection 10](#_Toc53407028)

[3.5 断开连接/Disconnection 10](#_Toc53407029)

[3.5.1 手动断开连接/Manual Disconnection 10](#_Toc53407030)

[3.5.2 信号丢失/Loss of Signal 11](#_Toc53407031)

[3.6 设备移除/Device Removal 11](#_Toc53407032)

[~~3.7 与Carplay的仲裁/Arbitration with CarPlay~~ 11](#_Toc53407033)

[3.8 恢复出厂设置/Restore Factory Settings 11](#_Toc53407034)

[3.9 设备的基本信息显示/Basic Device Information Display 11](#_Toc53407035)

[3.9.1 设备名称信息/Device Name 12](#_Toc53407036)

[3.9.2 电量信息 /Battery Level 12](#_Toc53407037)

[3.9.3 设备信号信息/Device Signal 13](#_Toc53407038)

[4 系统需求/System Requirements 13](#_Toc53407039)

[4.1 账号相关/Account-related 13](#_Toc53407040)

[4.2 应用内设置/In-app Settings 13](#_Toc53407041)

[4.3 外部调用/External Call 13](#_Toc53407042)

[4.4 版本升级/Version Update 13](#_Toc53407043)

[4.5 埋点需求/Event Tracking Requirements 13](#_Toc53407044)

[4.6 相关CAN信号/Related CAN Signals 13](#_Toc53407045)

[4.7 相关标定项/Related Calibration Items 14](#_Toc53407046)

[**Revision Log** 16](#_Toc53407047)

# 需求概述/Requirement Overview

## 背景价值/Background Information

本文档定义了系统的蓝牙设置功能。~~本文档的蓝牙设备不包括BLE设备。~~

This document defines the Bluetooth setting functions of the system.

## 名词解释/Terminology

## 功能全景/Functional Panorama

系统只支持连接一个蓝牙设备，本文档主要定义蓝牙设备（BT phone）配对、连接、断开等功能需求。关于BT phone、Carplay、Carlife的设备连接管理请参考PIS-2098。

系统支持连接设备后使用Phone、Audio功能，蓝牙 Phone功能需要用户在设备端开启通话、电话簿权限；蓝牙Audio功能需要用户开启多媒体权限。设备连接后需显示所支持的功能。

若用户未开启通话权限，需提示用户不支持通话，且不支持键盘拨号。

系统支持通过通过VR打开BT Setting界面。

The system shall support only connecting one Bluetooth device. This document mainly defines the functional requirements like Bluetooth device pairing, connection, disconnection, etc.

The system shall support using Phone and Audio functions after connecting the device. The Bluetooth Phone function shall require the user to enable the phone calls, contacts permission on the device. Bluetooth Audio Function shall require the user to enable Audio Permission. The functions supported by current connected device shall be displayed.

If the permission of BT phone is not enabled, the system shall notice the user that phone call and dial are not supported.

The system shall support to enable BT Setting via VR.

# 需求列表/Requirement List

（细分并描述需求的主要功能模块，列出功能模块的优先级：1，2，3，1最低，3最高）

(Subdivide and describe the main functional modules of the requirements, and list the priority of these functional modules: 1, 2 and 3, 1 represents the lowest and 3 represents the highest.)

|  |  |  |
| --- | --- | --- |
| Subfeature | Description | Priority |
| 蓝牙设备列表/Bluetooth Device List |  | 3 |
| 蓝牙的两个模式/Two Modes of Bluetooth |  | 3 |
| 蓝牙设备的名称/Name of Bluetooth Device |  | 2 |
| 发起配对/Initiate pairing |  | 3 |
| 配对方式/Matching Method |  | 2 |
| 配对结果提示/Pairing Result Prompt |  | 1 |
| 自动连接/Automatic Connection |  | 2 |
| 手动连接/Manual Connection |  | 2 |
| 断开连接/Disconnection |  | 2 |
| 移除已配对设备/Remove Paired Devices |  | 2 |
| 恢复出厂设置/Restore Factory Settings |  | 1 |
| ~~与CarPlay的仲裁/Arbitration with CarPlay~~ |  | ~~3~~ |

# 需求描述/Requirement Description

## 安全限制/Bluetooth Security Restrictions

为保证驾驶安全，设置了与车速和副驾信号相关的安全限制。PIS-2034 、PIS-2036中涉及安全限制操作的处理方式同蓝牙配对的限制。

安全限制中需要的车速信息请参考PIS-2033 5.3.1.8章节。车速限制值为0，当车速超过0则认为车辆处于不安全的范围；副驾检测的信号请参考4.6 章节。

当检测到车速大于0，且副驾信号异常时，提示用户不建议进行蓝牙配对：

* 若用户选择继续执行配对操作，在当前点火周期内将不再做限制；
* 若用户接受了当前的安全限制，则只要当前车辆处于不安全的限制范围，将会一直限制蓝牙配对操作，重复上述提示。具体提示请参考交互设计。

To ensure driving safety, safety limits related to speed and copilot signals are set.

The speed limit shall be obtained via calibration, which shall refer to XXX; Please refer to the appendix for the detection of front passenger and ICEI-XXX for the detection of vehicle speed. Those operations shall supported when speed detection or co-pilot detection is abnormal.

### 蓝牙配对限制/Bluetooth Pairing Restrictions

* 当车速未超过限制值时，支持用户配对设备
* 当车速超过限制值但检测到副驾有人时，支持用户配对设备
* 当车速超过限制值且检测到副驾无人时，提示用户不建议进行蓝牙配对，具体提示操作同上。

~~当车速检测或副驾检测异常时，不支持配对和手动连接新的可用设备。~~

* When the vehicle speed does not exceed the limit, the user shall be supported to pair the device.
* Device pairing shall not be supported when the vehicle speed exceeds the limit and no front passenger is detected.
* Device pairing shall be supported when the vehicle speed exceeds the limit and a front passenger is detected.

### 蓝牙手动连接限制/Bluetooth manual Connection Restrictions

* 当车速未超过限制值时，支持用户手动连接设备
* 当车速超过限制值但检测到副驾有人时，支持用户手动连接设备
* 当车速超过限制值且检测到副驾无人时，支持用户手动连接已配对的设备，~~不支持~~提示用户不建议连接未配对的设备

### 系统名称修改限制/System Name Modification Restrictions

* 当车速未超过限制值时，支持用户修改系统名称
* 当车速超过限制值但检测到副驾有人时，支持用户修改系统名称
* 当车速超过限制值且检测到副驾无人时，提示用户不建议修改系统名称。具体提示操作同上。

## 蓝牙设备分类/Bluetooth Device Classification

### 蓝牙设备列表/Bluetooth Device List

蓝牙设备分为已配对设备和可用设备，设备列表中包括:

1. 已配对设备
2. 已连接设备列表。

该列表用于显示当前已连接设备。若未连接任何设备，无需显示。

1. 未连接设备列表

该列表是指已配对但还未连接到系统的设备。若列表为空，无需显示。

已配对设备列表最多显示10个设备。系统匹配成功第11个设备时，需要删除列表中最后一个设备，并在列表第一行显示该新设备。

1. 可用设备

可用设备指未配对、未连接到系统的设备，列表最多显示10个设备。需要显示设备的名称~~及类型，设备类型如：手机、电脑、BLE设备等。~~

需注意：设备名称中包含特殊字符或表情时，系统需显示对应的特殊字符和表情，该显示需不影响功能。字符定义请参考PIS-2010.

若以上列表为空，都需要区别显示。

Bluetooth devices are divided into paired devices and available devices as below:

1. Paired Devices
   1. List of connected devices

This list is used to display currently connected devices. If no device is connected, no display shall be required.

* 1. List of unconnected devices

This list refers to devices that have been paired but have not been connected to the system yet. This list shall not be displayed if it is empty.

The list of paired devices shall display up to 10 devices. Available Devices

Available devices refer to those that are not paired and connected to the system, and the list shall display up to 10 devices. Display the name and type of device, such as mobile phone, computer, BLE device, etc.

The system need to display the corresponding device name when it contains special characters and emoji, and display shall not be influent function. The HMI shall be displayed distinctively if there is no any device.

### 设备的优先级/Priority of Devices

* 已配对设备的优先级按照连接的时间顺序，最近一次连接的设备具有最高的优先级。
* 可用设备的排序按照设备的蓝牙信号强弱排列。
* The priority of paired devices shall be displayed in chronological order of connection. The most recently connected device shall have the highest priority.
* The priority of available devices is according to the strength of BT signal.

### 可用设备列表刷新/Available Device List Refresh

用户每次进入BT Setting界面，系统将自动刷新一次可用列表，同时支持手动刷新列表。

刷新过程将清除上一次刷新到的列表记录，并实时显示当前扫描到的可用设备。刷新过程持续30s。

The system will automatically refresh the available list every time when user entering the BT setting screen, and it support manually refresh the list.

During the 30 seconds refreshing process, it will clear the records of last list and display the currently scanned available device in real time.

### 蓝牙的两个模式/Two Modes of Bluetooth

系统的蓝牙设备要能在Discoverable Mode和Undiscoverable Mode之间切换，在Discoverable Mode下，系统的蓝牙可以被其他设备搜索到，在Undiscoverable Mode下，系统的蓝牙无法被其他设备搜索到。系统设置可被发现(Discoverable Mode)的开关，开关默认为开启状态。

1. 开启Discoverable Mode的操作：
2. 每次进入BT Setting界面时开启该模式
3. 用户手动开启可被发现开关时开启该模式，~~该模式需要100ms刷新一次。~~
4. 未连接任何设备时，用户长按SWC\_VR开启该模式
5. 系统进入Discoverable Mode 时显示倒计时，180s后自动进入Undiscoverable Mode，此时可被发现开关将会关闭。

The Bluetooth device of the system shall be able to switch between Discoverable Mode and Undiscoverable Mode:

1) operation of Discoverable Mode:

a) open this mode every time you enter the BT Setting interface

b) turn on the mode when the user manually turns on the discoverable switch, and the mode needs to be refreshed once at 100ms.

c) ~~when no device is connected, the user will press VR to start the mode~~

2) countdown will be displayed when the system enters Discoverable Mode, and Undiscoverable Mode will be automatically entered after 180s, at which time the Discoverable switch will be turned off.

### 自定义系统~~的蓝牙~~名称/Customize System Name

允许用户修改系统的~~蓝牙设备~~名称，名称支持数字、中文、英文、空格（名称的第一个字符和最后一个字符不能为空格），长度为1~18个字符。修改~~蓝牙~~系统名称后，BT phone、BT audio、WLAN等界面需要同步修改保持一致，当前有设备连接WLAN或BT时，需提示用户将断开~~WLAN~~当前连接的设备。默认的名称通过读取4.7章节标定获取。~~标定文件请参考PISXXXX。~~

自定义名称后100ms生效。

The system shall allow users to customize the name, Names support Numbers, Chinese, English, Spaces (the first and last character of the name cannot be Spaces), and are 1 to 18 characters long. Shall sync to BT phone, BT audio and WLAN screens. The default name shall be obtained by reading the calibration. Please refer to PIS XXXX for the calibration document.

The customized name will become effective after 100ms.

## 蓝牙配对/Bluetooth Pairing

蓝牙的配对可以由车机端或设备端发起，当车机端发起配对时，支持用户选择可用设备列表中的一个蓝牙设备；当车机端发起配对时，系统需要处于Discoverable Mode。

支持配对的方式为Secure Simple Pairing，Secure Simple Pairing会自动生成配对密码，当用户点击同意配对后，完成设备的配对。

配对成功后建立连接；若配对失败，系统需告知用户。

Bluetooth pairing shall be able to be initiated by the system or the device. When the system initiates pairing, the user shall be supported to select a Bluetooth device in the list of available devices. When the system initiates pairing, the system shall be under Discoverable Mode.

The supported paring is Secure Simple Pairing, which shall automatically generate a pairing password. When the user clicks to approve the pairing, the pairing of the devices will be completed.

If pairing fails, the system shall inform the user.

### 配对方式/ Pairing Method

支持配对的方式为Secure Simple Pairing，Secure Simple Pairing会自动生成配对密码，当用户点击同意配对后，完成设备的配对。

The supported paring is Secure Simple Pairing, which shall automatically generate a pairing password. When the user clicks to approve the pairing, the pairing of the devices will be completed.

### 配对提示/Pairing Notification

配对成功后建立连接；若配对失败，系统需告知用户。

If pairing fails, the system shall inform the user.

## 蓝牙连接/Bluetooth Connection

### 自动连接/Automatic Connection

系统支持自动连接已配对设备，已配对设备列表的优先级请参考3.1.2。

自动连接过程参考安卓原生的自动连接规则~~如下：~~

1. ~~系统启动后，根据优先级尝试连接已配对设备列表中的第一个设备，收到设备响应后自动连接；若第一个设备无响应，则系统应根据优先级主动连接列表中的下一个设备，直到列表的最后一个设备仍无连接响应或超出3min，则停止自动连接；~~
2. ~~系统尝试自动连接的过程中，若用户手动连接或配对其他设备，需停止自动连接，执行手动连接、或配对操作；~~
3. ~~已经连接一个设备后，当用户主动断开连接，在当前点火周期内将不再自动连接。~~

连接性能：

* 系统上电开始启动过程中，自动连接一个设备要在15 s内完成；
* 在系统启动完成后，自动连接一个设备要在 5s内完成。

The system shall support automatic connection of paired devices. Please refer to 3.1.2 for the priority of list of paired devices.

The automatic connection process is as follows:

1. After startup, the system shall try to connect the first device in the paired devices list according to the priority. If there is no response with the first device, the system shall actively connect the next device in the list according to the priority until the last device, will stop automatic connection if no respond received.
2. The system shall stop automatic connection while the user choose to pair or connect the other device manually, and implement corresponding operation.
3. After a device has been connected, it shall no longer be automatically connected during the current ignition period if the user actively disconnects it.

Connection performance:

* The automatic connection shall be completed within 15s during the startup process of the system.
* The automatic connection shall be completed within 5s when the system finished startup.

### 手动连接/Manual Connection

系统支持用户手动连接列表中的设备，如果该设备在已配对设备列表，选择该设备后系统会自动连接；如果该设备在可用设备列表，需要先配对再连接，请参考3.3章节。

若系统当前已连接一个设备，用户手动连接其他设备时，需要断开当前设备，并告知用户。

性能要求：需要在断开上个设备后的5s内完成连接。

~~支持取消手动连接进程。~~

The system shall support users to manually connect an unconnected device. If the device is a paired device, the system shall connect it automatically. If the device has not been paired, it shall be paired before connecting. Please refer to section 3.3.

If one device is currently connected to the system, the system shall disconnect it and inform the user when the user manually connects another device.

Performance requirements: the connection shall be completed within 5s after the last device is disconnected.

### 首选连接/First Connection

系统支持用户选择一个蓝牙设备作为首选连接，首选连接功能请参考PIS-2098.

## 断开连接/Disconnection

### 手动断开连接/Manual Disconnection

当系统连接一个设备时，用户在车机端或设备端主动断开蓝牙连接，在当前点火周期内将不再自动连接该设备，且不再自动连接其他设备。

断开性能：

* 若在车机端断开连接，设备移除需在500ms内完成移除；
* 若在设备端断开连接，设备移除需要8s内完成移除

When the system is connected to a device, and the user actively disconnects Bluetooth at the on-board mainframe or the device, the device and other devices will not be automatically connected within the current ignition period.

Disconnect performance:

* Disconnect a device shall be completed within 500ms while the disconnection initiated by the system
* Disconnect a device shall be completed within 8s while the disconnection initiated by the device.

### 信号丢失/Loss of Signal

由于蓝牙信号丢失等原因造成的设备断开连接，系统应进入自动连接状态，参考3.4.1节。

If the device is disconnected due to loss of Bluetooth signal and other reasons, the system shall enter the automatic connection state, which shall refer to Section 3.4.1.

## 设备移除/Device Removal

系统需支持用户移除当前连接的设备及已配对列表中的设备，并提示用户将清除该设备的所有连接信息，需要在500ms内从已配对列表中清除。

移除当前连接的设备，需要断开并且移除。

The system shall support the user to remove the currently connected device and the device in the paired list, and prompt the user to clear all connection information of the device. Removal need to be completed within 100ms from paired device list.

The system shall disconnect and remove the currently connected device by removal.

## ~~与Carplay的仲裁/Arbitration with CarPlay~~

~~在连接有线Carplay时，禁用系统蓝牙功能。~~

~~系统蓝牙与无线Carplay互斥。已连接无线Carplay，当用户再连接蓝牙设备时，将会断开当前连接的无线carplay。~~

~~When connecting wire Carplay, the system bluetooth will disable.~~

~~When connecting wireless Carplay, the system bluetooth and Carplay mutually exclusive, Connecting a bluetooth device disconnects the current connected wireless carplay.~~

## 恢复出厂设置/Restore Factory Settings

恢复蓝牙出厂设置，包括但不限于删除已配对和已连接设备的记录，恢复默认名称。恢复蓝牙出厂设置具体规定请参考PIS-2046。

Restore Bluetooth Factory Settings, including but not limited to deleting records of paired and connected devices and restoring default names. Please refer to PIS-2046 for detailed specification on restoring Bluetooth factory settings.

## 设备的基本信息显示/Basic Device Information Display

系统应有能力显示设备的基本信息。  
The system shall have the ability to display the basic information of the device.

### 设备名称信息/Device Name

系统支持获取设备的名称。  
The system shall support obtaining the device name.

### 电量信息 /Battery Level

#### 电量显示/Battery Level Display

系统应显示连接设备的电量，电量分为5个等级显示。

* 电量>20%时建议显示绿色；
* 电量<=20%且>0时建议显示橙色；

The system shall display the battery level of the connected device, which shall be displayed in 0~5 grids.

* When the level is > 20%, it is recommended to display in Green;
* When the level is <=20% and >=10%, it is recommended to display in Orange;

#### 电量提示阈值/Battery Level Alarm Threshold

当设备电量低于20%时，系统应发出低电量的~~语音~~提示。

When the battery level of the device is less than 10%, the system shall send a voice prompt for low battery level.

#### 电量提示规则/Battery Level Alarm Rules

* 系统连接设备后，若设备当前电量>20%，在单次连接周期内，当设备电量=20%时，系统做出一次提示
* 系统成功连接设备后，若设备当前电量=<20%，立即进行提示。在单次连接周期内只提示一次

性能要求：应在成功连接设备后或当电量<=20%时，做出提示，500ms内完成。  
 If the current battery level of the device is >=20% after the device is connected to the system, the system shall send a battery level alarm when the level becomes <=20% within a single connection period.

If the current battery level of the device is <20% when the device is connected to the system, the system shall send a battery level alarm once connected within a single connection period.

When the device is detected to be under charging status via USB, the alarm shall be canceled. Bluetooth disconnection and reconnection due to internal reasons of the device shall be regarded as within the same connection period.   
 Performance requirements: An alarm shall be given within 500 ms after the device is successfully connected or when the battery level <=20%.

### 设备信号信息/Device Signal

#### 设备信号强度/Device Signal Strength

系统需支持显示设备的信号强度，信号强度分为0~5级。具体以交互为准。  
The system shall support the display of the device signal strength, which shall display in 0~5 levels.

# 系统需求/System Requirements

## 账号相关/Account-related

（N/A）

## 应用内设置/In-app Settings

（N/A）

## 外部调用/External Call

（N/A）

## 版本升级/Version Update

BT Phone功能的升级跟随系统升级。

BT Phone functions shall be update with the system.

## 埋点需求/Event Tracking Requirements

（N/A）

## 相关CAN信号/Related CAN Signals

**CLEA 副驾检测信号：**

|  |  |  |
| --- | --- | --- |
| Clea Family Long Name | CLEA Family short name | CLEA signal Conversion |
| Notification Front Passenger Seat Occupancy Status | NotiFrntPasSeatOccSta | $0=Unknown;  $1=Empty;  $2=Occupied;  $3=Data Not Available |

当 *Notification Front Passenger Seat Occupancy Status* = $2，代表副驾有人。

当 *Notification Front Passenger Seat Occupancy Status =$1*，代表副驾无人。

当 *Notification Front Passenger Seat Occupancy Status* = $0或$3，代表副驾信号异常。

**GB 副驾检测信号：**

|  |  |  |  |
| --- | --- | --- | --- |
| **Long Name** | **Short Name** | GB signal Conversion | CLEA&GB signal conversion mapping |
| Restraint Occupancy Status Protected : Front Passenger Restraint Occupancy Status Authenticated | ROSP\_FrntPsRestOcpStatAuth | $0 = Unknown  $1 = Empty  $2 = Empty or Occupied\_Non-Adult  $3 = Occupied\_Adult | CLEA $0 = GB $0  CLEA $1 = GB $1  CLEA $2 = GB $3  CLEA $3 = GB $2 |

当 *Restraint Occupancy Status Protected : Front Passenger Restraint Occupancy Status Authenticated* = $3，代表副驾有人。

当 *Restraint Occupancy Status Protected : Front Passenger Restraint Occupancy Status Authenticated* = $1，代表副驾无人。

当 *Restraint Occupancy Status Protected : Front Passenger Restraint Occupancy Status Authenticated* = $0或$2，代表副驾信号异常。

## 相关标定项/Related Calibration Items

通过标定得到系统的蓝牙/WIFI默认名称及车辆安全限制信息~~，默认名称需包含车辆VIN后四位。~~标定值如下：~~文件请参考PISXXX~~.

|  |  |  |
| --- | --- | --- |
| CalName | Description | Default Value |
| WiFiClientDeviceName | "Name of the Wi-Fi Module in the Wi-Fi Client Mode (STA mode). The WiFi Client Device Name shall be dependent on the vehicle model and brand. The WiFiClientDeviceName shall be the same as the Bluetooth\_Module\_Device\_Name." |  |

|  |  |
| --- | --- |
| ~~标定项/ Calibration Item~~ | ~~推荐标定值/Recommended Calibration Value~~ |
| ~~系统蓝牙默认名称/ The default BT name of the system~~ | ~~MyBuick+VIN后四位 / MyChevy+VIN后四位~~  ~~MyBuick+last four num of VIN~~ |

**Revision Log**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Version** | **Date** | **Section** | **Description** | **Author** |
| 0.0.0.4 | 2020-6-19 | 3.2.1 | 删除可用设备类型的显示；新增字符参考文档 | Zhang Jiajia |
| 3.9 | 根据UE评估意见，调整原PIS-2036 BT Phone设备的基本信息至本文档 |
| 2020-9-27 | 3.1.3 | 参考北美功能，新增修改系统名称的限制 |
| 3.2.5 | 新增修改名称后断开BT连接的提示 |
| 3.4.3 | 参考北美功能，补充首选连接 |
| 3.7 | 删除与CarPlay的仲裁，统一参考PIS-2098 |
| 4.7 | 补充标定项 |
| 2020-10-26 | 3.4.1 | 根据软件评估意见，采用安卓原生逻辑 |
| 2020-11-10 | 3.1 | 修改蓝牙安全限制的提示，补充参考PIS-2033 |
| 0.0.0.3 | 2019-11-18 | 1.3 | 新增连接设备后的功能全景描述  Add function panorama | Zhang Jiajia |
| 3.1 | 新增蓝牙安全限制  Add the secure restriction |
| 3.2.1 | 新增蓝牙可用设备列表显示  Add the displaying of available device |
| 3.2.2 | 新增设备的优先级  Add the priority of device |
| 3.2.3 | 新增可用列表刷新  Add refresh the available device list |
| 3.2.4 | 新增开启蓝牙可被发现的开关及触发操作  Add the switch of discoverable, add the trigger operation |
| 3.2.5 | 新增自定义系统蓝牙名称  Add customize the system’s BT name |
| 3.3.1 | 新增车机端发起配对  Add the pairing method which is initiated by system |
| 3.4.2 | 新增手动连接的性能要求  Add the performance requirement of manual connect |
| 3.5.1 | 新增手动断开的性能要求  Add the performance requirement of manual disconnect |
| 3.5.2 | 新增信号丢失的情况  Add the situation of signal lost |
| 3.6 | 修改设备移除性能要求  Change the performance requirements of the removal |
| 3.7 | 新增BT与 OnStar的仲裁  Add the arbitration of BT and OnStar |
| 0.0.0.2 | 2019-5-17 | 3.2.4 | Delete legacy pairing | Zhang Jiajia |
| 3.2.2 | 添加蓝牙设备名称的定义规则 |
| 3.6 | 增加“恢复默认名称”的要求 |
| 0.0.0.1 | 2018-7-31 | All | Initial release | Chen Deliao |