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**WLAN Setting**

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# 需求概述/Requirement Overview

## 背景价值/Background Value.

本文档定义了系统 Wi-Fi Setting(WLAN Setting)的功能，Core requirements请参考PIS-331.  
This document specifies the function of Wi-Fi Setting (WLAN Setting). Please refer to PIS-331 for the Core requirements.

## 名词解释/Terminology

AP - Access Point访问接入点

## 功能全景/Functional Panorama

系统需要支持Wi-Fi AP Mode（WLAN AP）和Wi-Fi Client Mode(WLAN Client)，且要能支持这2种模式同时工作。Wi-Fi AP模式下(充当Wi-Fi热点功能)，要能支Wi-Fi Client的接入；在Wi-Fi Client 模式~~（WLAN网络）~~下，要能让系统连接其它Wi-Fi AP, 从而实现和Internet的连接。由于Wi-Fi是WLAN（无线局域网络）的一种无线联网技术~~1个商标~~，以下文档中用WLAN代替Wi-Fi来表示需求。  
 The system shall be able to support Wi-Fi AP Mode (WLAN AP) and Wi-Fi Client Mode (WLAN Client) and be able to support these two modes to work simultaneously. In Wi-Fi AP mode (serving as Wi-Fi hotspot function), the access by Wi-Fi Client shall be supported; In Wi-Fi Client mode (WLAN network), system shall be able to connect with other Wi-Fi AP to realize the connection with the Internet. Since Wi-Fi is a wireless networking technology of WLAN (Wireless Local Area Network), WLAN shall be used in the remaining part of the document instead of Wi-Fi to represent the requirements.

# 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.)

|  |  |  |
| --- | --- | --- |
| Sub feature | Description | Priority |
| WLAN Client开启与关闭/WLAN Client ON/OFF |  | 3 |
| WLAN 热点列表数量/WLAN Hotspot List Number |  | 2 |
| WLAN热点排序规则/WLAN Hotspot Ordering Rules |  | 2 |
| 自动连接热点/Automatic Hotspot Connection |  | 2 |
| 手动连接热点/Manual Hotspot Connection |  | 3 |
| 忘记热点/Forget the Hotspot |  | 1 |
| 断开热点/Disconnect the Hotspot |  | 3 |
| 手动添加WLAN热点/Add a WLAN Hotspot Manually |  | 3 |
| WLAN热点功能开启/WLAN Hotspot Function ON |  | 3 |
| WLAN热点安全类型/WLAN Hotspot Security Type |  | 3 |
| WLAN热点密码设置/WLAN Hotspot Password Settings |  | 3 |
| 隐藏我的设备/Hide My Device |  | 2 |
| 保存WLAN热点设置/Save WLAN Hotspot Settings |  | 2 |
| 远程WLAN热点设置/Remote WLAN Hotspot Settings |  | 1 |
| ~~同步连接的外部热点/External Hotspot for Synchronous Connection~~ |  | ~~1~~ |
| ~~WLAN AP模式的限制/WLAN AP Mode Restrictions~~ |  | ~~1~~ |

# 需求描述/Requirement Description

## WLAN Client

### WLAN Client 开启和关闭/WLAN Client ON/OFF

系统要能支持开启或关闭车机WLAN Client。WLAN Client也称为WLAN 网络，仅支持连接一个外部热点。初始为默认关闭状态，再次启动后将保持上次的历史状态。  
 性能要求：开启、关闭要在1s内完成.  
 The system shall be able to support turning ON/OFF the WLAN Client. WLAN Client is also called WLAN network, it shall only connect one hot spots. Default status is closed and the system will record the history.

Performance requirements: It shall be turned on within 1s.

### WLAN热点列表/WLAN Hotspot List

系统支持最多显示30个搜索到的WLAN AP，按照信号强度由高到低排列，信号强度分为4格，分为1、2、3、4格显示。~~多于30个时，则将剔除信号强度较弱WLAN AP（剔除到只剩30个为止）。信号强度划分请参考PIS-331中的Signal strength value calculation定义。~~

性能要求：如果附近有新热点，5s要能体现在列表中。如果有热点被关闭/消失，需要在1min内刷新列表将其剔除。~~5s要能体现在刷新列表中。~~ The system supports displaying up to 30 searched WLAN AP, which is arranged according to the signal strength from high to low, and the signal strength is divided into 4 grids.

Performance requirements: If there is any new hotspot nearby, it shall be reflected in the list within 5s. If any hotspot is turned off or disappears, it shall be reflected in the refreshed list within 1min.

### WLAN 热点排序规则/WLAN Hotspot Ordering Rules

WLAN AP列表排序优先级如下：

1. 已连接热点：最先显示当前已连接的WLAN AP
2. 可连接热点：按照信号强度列出当前搜索到的可连接的WLAN AP。在信号强度相同的情况下，优先显示已保存的热点，

需要区别显示已保存的热点、~~无网络的热点、~~安全类型为“无”的热点。

相同强度的WIFI AP，按照每个AP名称的UTF8排序：先比较首字母/首个汉字的UTF8顺序排序，首字母/汉字相同,再比较第二个字母/顺序….

需注意：

1. AP名称中包含特殊字符或表情时，系统需显示对应的字符或表情，且该显示需不影响功能。
2. 需显示AP的频段信息，如：2.4G、5G~~、2.4G/5G~~。

The ordering priority of the WLAN AP list shall be as follows:

1. Connected AP: The connected WLAN AP has the highest priority.
2. Connectable AP: The system shall list connectable AP from current search according the signal strength, and shall display saved AP, AP which is without network or security type of "none" differently.

WIFI AP with the same signal strength shall be sorted according to UTF8 of their AP name: Firstly, sorted by comparing the UTF8 sequence of the first letter/first Chinese character, and then compare the second letter//Chinese character if the first one is the same, etc.

Notice:

1. If the AP name contains special characters or expressions, the system shall display the corresponding characters or expressions without affecting the function.

2. Band information of AP should be displayed, such as 2.4G, 5G...

### 安全限制/Security restriction

安全限制:

* 当车速未超过限定值时，支持手动连接未保存的WLAN热点、手动添加热点；
* 当车速超过限定值且没有检测到有副驾时，不支持手动连接未保存的WLAN热点、手动添加热点；
* 当车速超过限定值且检测到有副驾时，支持手动连接未保存的WLAN热点、手动添加热点。

当用户执行以上不支持的操作时，~~需语音提示用户不可操作的原因。~~提示方式请参考PIS-2035第3.1 章节。

车速、副驾信号请参考PIS-2035。~~附录~~.

Connection security restrictions:

• support manual connection to WLAN hotspots when the speed does not exceed the limit;

• manual connection to WLAN hotspots is not supported when the speed exceeds the limit and the co-pilot is not detected;

• support manual connection to WLAN hotspots when the speed exceeds the limit and the co-pilot is detected.

When the user performs the above unsupported operation, the user shall be prompted by voice to indicate the reason why the operation is not possible.

For speed information, please refer to pis-xxxx, and for co-pilot information, please refer to the appendix. For voice prompt, please refer to pis-2022.

### 自动连接热点/Automatic Hotspot Connection

参考安卓原生的自动连接规则。

~~自动连接规则，可以自动连接的热点范围，仅限于以前成功连接过的WLAN AP。按照列表尝试自动连接可连接列表中已保存过的热点，如果第一个已保存过的热点连接成功后，将不再自动连接其他的热点；若未连接成功，需要根据列表顺序尝试连接第二个、第三个已保存过的热点，若直到最后一个热点都未成功连接，则停止当前的自动连接。系统10s尝试一次自动连接。~~

~~当前连接的热点信号丢失或关闭后导致连接被迫断开，系统需要根据已保存AP列表自动连接其他热点。~~

~~若已保存的WLAN AP修改了名称或修改了密码，系统将不支持自动连接该AP。~~

连接性能：

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

~~Automatic connection rules: The hotspots that can be automatically connected are limited to WLAN AP that have been successfully connected previously Try to automatically connect to the first hot spot according to the list of connectable hot spots.If the connection is not successful, you need to try to connect to the second and third hotspots according to the list order. If the connection is not successful until the last hotspot, the current automatic connection is stopped. The system will try an automatic connection of 10s.~~

~~The system needs to automatically connect to other hot spots based on the saved AP list.~~

~~If a saved WLAN AP changes its name or password, the system will not support automatically connecting to the AP.~~

~~Performance:~~

~~• automatic connection of an AP should be completed within 15s when the system is started up;~~

~~• automatic connection of an AP should be completed within 5s after system startup~~.

### 手动连接热点/Manual Hotspot Connection

支持用户在WLAN列表中选择一个热点进行连接，已保存的热点无需输入密码；可连接（未保存）的热点需要输入密码后连接。对于连接后无网络信号的热点，需要告知用户。

性能要求：

* 连接已保存的热点需要在1s内完成；
* 连接未保存的热点需要用户输完密码并点击连接后，5秒内完成连接。

连接成功后需在列表置顶且显示已连接状态；如果连接失败，需告知用户。手动连接未保存过的热点时，安全限制参考3.1.4.

Support the user to choose a hot spot in the WLAN list to connect, the saved hot spot does not need to enter a password; Connectable (not saved) hotspots require a password to connect. For the connection after no network signal hotspot, need to inform the user.

Performance requirements:

* The system shall connect the saved hot spot within 1s;
* The connection to the unsaved hot spot needs to be completed within 5 seconds after the user enters the password and clicks the connection.

After successful connection, it should be placed on the top of the list and show the connected status.If the connection fails, inform the user. Manual connect the unsaved hotspot shall follow the security restriction in 3.1.4.

### 自动刷新热点/Auto-refresh Hotspot

当用户进入WLAN界面后，系统需要10秒自动刷新一次WLAN AP列表，退出界面后停止刷新。

The system needs to refresh the WLAN AP list when user enter the WLAN interface automatically in 10 seconds.

### 忘记热点/Forget the Hotspot

支持对已保存热点实施 <忘记>操作，将清除和该热点的所有相关连接记录。忘记当前连接的AP时，需要断开连接。

性能要求：500ms内完成.  
 The system shall support perform the < Forget > operation on saved hotspots shall clear all connection records related to the hotspot. For the current connected AP, to forget this AP the system shall disconnect and remove it, which is not visible to user.

Performance requirements: Completed within 500ms.

### 断开热点/Disconnect the Hotspot

系统支持断开和当前“已连接”热点的连接。当热点信号丢失或关闭导致连接被迫断开，系统需要自动连接其他热点.

性能要求：500ms内完成.  
 The system supports the disconnection from the currently connected hotspot. The system shall automatically connect other hotspots when the current hotspot was forced disconnected by signal loss or shut down.

Performance requirements: Completed within 500m.

### 手动添加WLAN热点/Add WLAN Hotspot Manually

系统要支持手动添加WLAN 热点。 手动添加的WLAN热点数量最多10个。手动添加WLAN要填写网络名（SSID）和密码，输入范围为中英文键盘支持的所有字符，具体字符请参考PIS-2018。

需要支持如下安全类型（Security type）：WPA2 PSK, WPA3 SAE~~, WAPI~~ .

手动添加热点时的安全限制请参考3.1.4.

The system shall support adding a WLAN hotspot manually. The number of WLAN hotspots added manually shall be 10 at most. To manually add WLAN, the user shall enter the network name (SSID) and password, which contains all characters supported by keyboard both Chinese and English, please refer to PIS-2018 for character detail. The security type allowed as below: WPA2 PSK, WPA3 SAE.

Please refer to 3.1.4 for security restriction of add Hotspot manually.

### ~~特定WLAN热点/Specific WLAN Hotspots~~

~~对于有验证需求的特定WLAN（例如商场以及一些餐厅的WLAN），支持对应页面显示。  
For specific WLAN with verification requirements (e.g. WLAN in shopping malls or restaurants), corresponding page display shall be supported.~~

### ~~Wireless CarPlay的连接提示~~

~~若系统WLAN Client模式关闭，再用户连接Wireless CarPlay时，系统需打开Client开关，该过程用户不可见。~~

~~If the system WLAN Client mode is not turned on, when the user connects Wireless CarPlay, the system needs to turn on the Client switch, and the user cannot see the process.~~

## WLAN AP模式/WLAN AP Mode

### WLAN 热点功能开启/WLAN AP Function ON

系统要能支持开启或关闭WLAN 热点。在WLAN热点开启状态下，车辆系统要能显示热点名、热点密码和WLAN Client列表。系统每次启动都默认关闭状态。

开启热点功能后，车机需要同时开启2.4GHz 和5GHz频段的热点。  
 对于已连接到车辆WLAN热点的WLAN Client，如果能获取WLAN Client设备名（Device Name），则必须显示设备名；如果不能则上传已连接WLAN Client设备的MAC地址。如果没有已连接设备需区别显示。设备名支持显示最多32字符。

可连接WLAN Client数量最多8个。系统需在连接第8个Client时，提示用户当前连接数量已达最大，将无法连接更多设备。

性能要求：开启和关闭要在1s内完成  
 The system shall be able to support turning on or off WLAN hotspots (Wi-Fi AP). When WLAN Hotspot is ON, the vehicle system shall be able to display the Hotspot name, Hotspot password and WLAN Client list. Default status is closed.

For WLAN Client already connected to WLAN Hotspot of the vehicle, if the Device Name of WLAN Client can be obtained, the device name shall be displayed, otherwise the MAC address of the connected WLAN Client device shall be uploaded. If there is no connected device, the user shall be prompted that there is no connected device. Only support to display at most 32 characters.

The maximum number of WLAN Client that can be connected shall be 8. The system shall prompt the user When the eighth device connected.

Performance requirements: It shall be turned on /off within 1s.

### WLAN热点名设置/WLAN Hotspot Name Setting

系统热点名支持的字符范围如下:

* 数字
* 中文
* 英文
* 空格

~~热点名称长度不超过32字符，热点名称的第一个字符和最后一个字符不能为空格~~。WLAN名称修改~~后，BT setting名称需要保持一致。BT 名称~~请参考PIS-2035. 修改名称时需提示用户将断开当前WLAN连接和BT连接。  
For the system Hotspot names, The range of supported characters shall be as follows:

* Numbers
* Chinese
* English
* Space

### ~~WLAN默认热点名称/WLAN Default Hotspot Name~~

~~系统热点名称的默认名称需要满足3.2.2章节热点名的设置要求，默认名称的设置请参考4.4章节。~~

### WLAN热点安全类型/WLAN Hotspot Security Type

系统的WLAN热点需要支持的安全类型~~包括：~~为WPA2 PSK~~、WPA3 SAE~~ 、~~WAPI~~。

~~根据标定结果~~，

* ~~对于支持WPA3 PSK芯片的默认安全类型设为WPA3 SAE PSK；~~
* ~~若该芯片不支持WPA3 PSK，则默认安全类型为WPA2 PSK。~~

### WLAN热点密码设置/WLAN Hotspot Password Settings

系统热点密码支持的字符范围如下：

* 英文
* 数字

密码长度为8-14个字符。车机的默认热点密码为系统生成的8位随机数字。  
For the system Hotspot password, the range of supported characters shall be as follows:

* English
* Numbers

The password length shall be 8-14 characters. The default hotspot password for on-board mainframe shall be an 8-digit random number generated by the system.

### 隐藏我的设备/Hide My Device

支持隐藏车辆的WLAN热点。  
Hiding the WLAN hotspots of the vehicle shall be supported.

### 保存WLAN热点设置/Save WLAN Hotspot Settings

系统要支持保存WLAN热点设置的功能。用户可以设置WLAN AP的热点密码和热点名称，更改后需要通过保存来生效用户的设置。修改热点安全类型、密码时会断开已建立的WLAN连接。  
 性能要求：1s内完成设置保存

The system shall support the function of saving WLAN Hotspot settings. The users shall be able to set Hotspot password and name of WLAN AP, and the user's settings shall become effective after the change is saved.  
 Performance requirements: Save the settings within 1s.

### ~~断开当前连接的设备~~

~~支持断开WLAN Client列表中的设备。断开后，当前点火周期内将不允许自动连接。~~

### Wireless CarPlay的连接提示

若系统WLAN AP模式关闭，再用户连接Wireless CarPlay时，系统需打开AP热点，该过程用户不可见。

在Wireless CarPlay连接时关闭WLAN AP，需要提示用户CarPlay会因此而断开。

If the system WLAN Client mode is not turned on, when the user connects Wireless CarPlay, the system needs to turn on the Client switch, and the user cannot see the process.

# 系统需求/System Requirements

## 账号相关/Account Related

### ~~同步连接的外部热点~~

~~用户账户将同步和记录连接过的外部热点，记录最大数量为50，根据最近的连接时间进行排序。用户在不同的车辆登陆时，新的车辆可以直接连接账户中已经连接过的外部WLAN热点。~~

### ~~WLAN AP模式的限制/WLAN AP Mode Restrictions~~

~~账户处于非登陆状态不可以使用WLAN热点功能。  
WLAN Hotspot function cannot be used when the account is not logged in.~~

## 外部调用/External Call

### 远程设置车辆WLAN热点/Remote Setting Vehicle WLAN AP

车辆热点需要提供远程设置的能力，系统需提供接口，用于WLAN热点名称/密码读取和设置，接口信息请参考附录。

1. 当系统启动完成后

用户通过远程设置车辆热点的密码和名称时，系统需提示用户热点信息有更新，将断开当前的WLAN连接。

在系统收到远程更改请求后1s内提示用户。

The Vehicle hotspot shall provide the capability of remote setting. In order to realize this function, the system shall provide an interface for reading and setting WLAN Hotspot name/password. Please refer to Appendix for interface.

1. When the system is started and completed

When the user sets the password and name of the hot spot of the vehicle remotely, the system shall prompt the user If there is a device connected to the hot spot of the vehicle, the user shall be prompted to disconnect the current connection.

The user should be prompted for success or failure status.

Completed within 1s.

## 版本升级/Version Upgrade

本文档中定义的功能的升级跟随系统升级。  
The upgrade of functions defined in this document shall follow the upgrade of system.

## 恢复出厂设置/ Factory Reset

系统支持WLAN恢复出厂设置，包括但不限于删除已连接和已保存的记录。恢复出厂设置具体规定请参考PIS-2046。

The system supports WLAN recovery from factory Settings, including but not limited to deleting connected and saved records. Refer to PIS-2046 for specific provisions on restoring factory Settings.

## 相关标定项/Related Calibration Items

通过标定得到系统的热点默认名称。标定请参考PIS2035.

The hotspot default name of the system is obtained through calibration. Refer to PIS1600 for calibration.

# 附录/Appendix

~~副驾信号：Notification Front Passenger Seat Occupancy Status~~

远程设置车辆WLAN 热点接口：eCmd\_TBoxTxHotspotConfigReq , eCmd\_RadioTxHotspotConfigAck

**Revision Log**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Version** | **Date** | **Section** | **Description** | **Author** |
| 0.0.0.4 | 2020-9-9 | 3.1.3 | 根据软件评估意见删除无网络的显示 | Zhang Jiajia |
| 3.1.5 | 根据软件评估意见，删除原有连接规则，按照安卓原生规则开发 |
| 3.1.7 | 更新自动刷新WLAN 热点的场景 |
| 3.2.1 | 补充同时开启双热点的需求 |
| 3.2.3 | 根据软件评估意见删除WAPI类型 |
| 3.2.9 | 补充连接无线Carplay时断开AP |
| 3.2.4 | 根据软件评估意见，删除WPA3类型 |
| 3.2.8 | 根据软件评估意见，删除断开当前连接的设备 |
| 0.0.0.3 | 2019-10-31 | 3.1.2 | 修改列表刷新性能  Change list refresh performance | Zhang Jiajia |
| 3.1.3 | 修改热点排序规则  Change hotspot order regulation |
| 3.1.4 | 新增连接热点的安全限值  Add security restriction for connect hotspot |
| 3.1.7 | 修改手动刷新WLAN 热点为自动刷新  Change auto-refresh WLAN hotspots |
| 3.1.9 | 新增被迫断开连接后需连接其他热点  Add auto-connect other hotspot case |
| 3.1.11 | 删除特定WLAN热点  Delete specific WLAN hotspot |
| 3.1.12 | 新增无线CarPlay连接的提示  Add connection prompt of wireless CarPlay |
| 3.2.2 | 新增热点名支持的范围及长度限制  Add length restriction of WLAN AP name |
| 3.2.4 | 修改WLAN热点安全类型  Change WLAN AP security type |
| 4.1.1 | 删除同步连接的外部热点  Delete Synchronous connection to hot spots |
| 4.1.2 | 删除热点使用限制  Delete the usage restriction of WLAN AP |
| 4.2.1 | 新增热点远程控制提示  Add remote settings of WLAN AP |
| 4.4 | 新增恢复出厂设置  Add factory reset |
| 4.5 | 新增默认名称标定项  Add default name calibration requirement |
| 5 | 新增副驾信号、远程设置热点的接口  Add co-pilot signal and interfaces of remote setting AP |
| 0.0.0.2 | 2019-5-17 | 3.1.6 | 新增手动刷新WLAN 热点  Added refresh WLAN hotspots manually | Zhang Jiajia |
| 3.1.3 | 修改排序规则 Modified the sorting rules |
| 0.0.0.1 | 2018-6-20 | All | Initial release | Chen Deliao |