MediaTek IoT SmartDevice App Introduction

2017.06.10

Outline

- Overview
- SmartDevice Features
  - User Scenario
  - BTNotify
  - Connection
  - Features (Notification Push/FOTA/FMP/BAS/EPO)
  - About
- Health Features
  - Overview
  - Health Feature

Overview

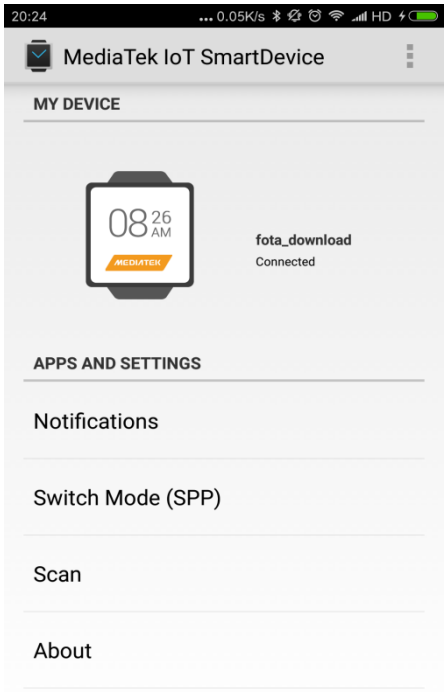
SmartDevice App (1/3)

- ***MediaTek SmartDevice App*** is an Android application used for MediaTek IoT device (based on MT2523/MT2533 chip).

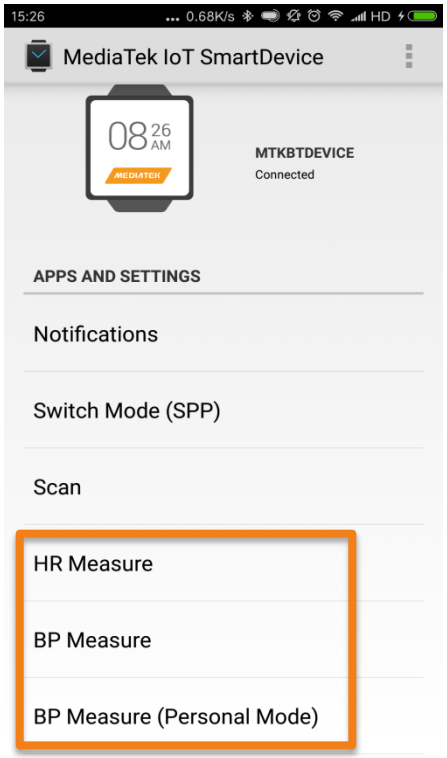
- It doesn't only apply to MediaTek IoT Bluetooth device (MT2523/MT2533), but also for Smart Health Device (MT2523 + MT2511, watch_ref_design project).

SmartDevice App (2/3)

- App GUI



(Connected with IoT Device, disable Health Feature)



(Connected with 2511 health device, enable Health Feature)

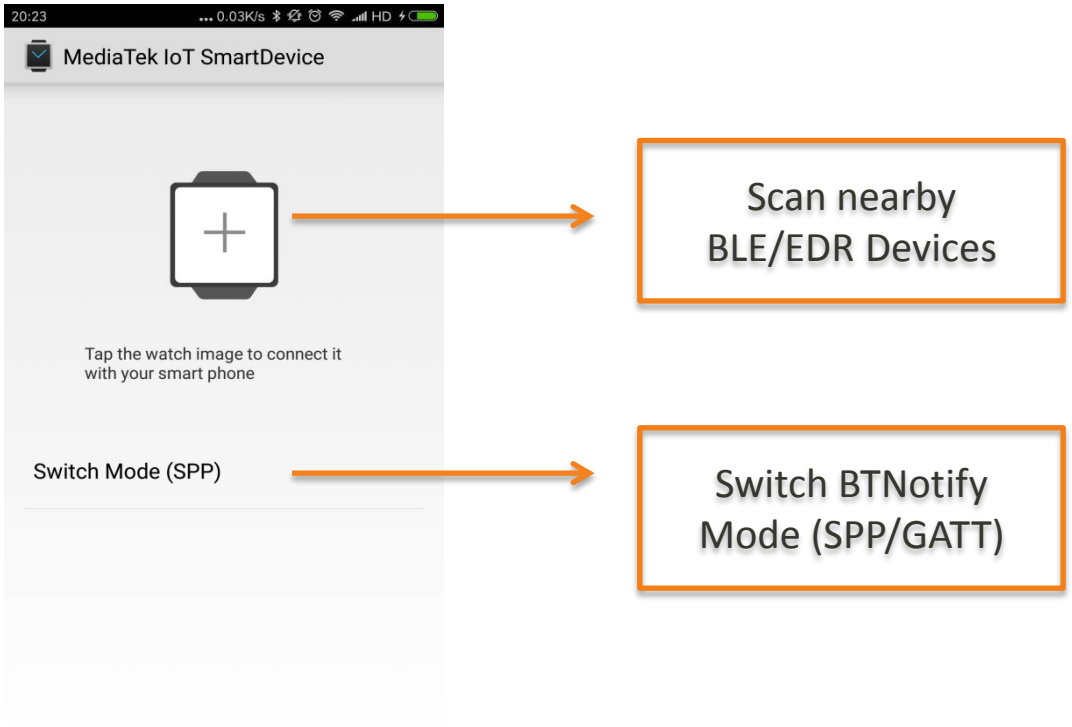
SmartDevice App (3/3)

- The APK includes below features:
  - Scan nearby BT Devices
  - Switch Mode (SPP/GATT)
  - Connection (Based on MTK BTNotify transport protocol)
  - Notification Push
  - FOTA (Firmware Over-The-Air by BTNotify transport)
  - EPO Download (only applies for MTK IoT GNSS Porject)
  - Find Me & BAS (only enable in GATT mode)
  - MT2511 Health Feature (only enable for health device)
    - Heart Rate Measure
    - Blood Pressure Measure
    - Blood Pressure Calibration & Personal Mode
    - Heart Rate Multi-connect & Comparison

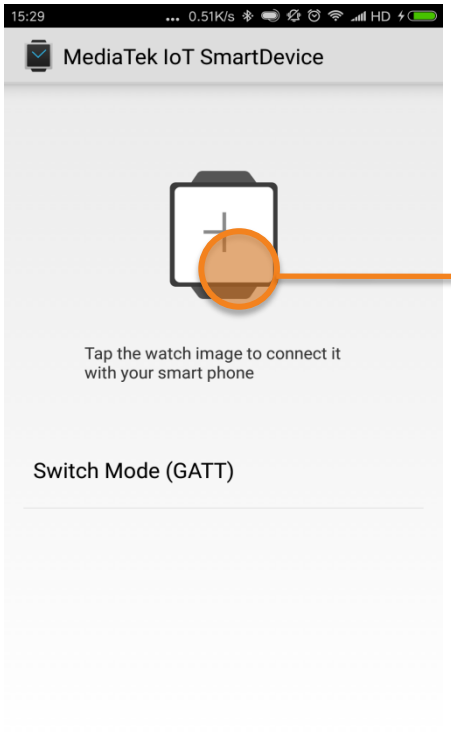
SmartDevice Features

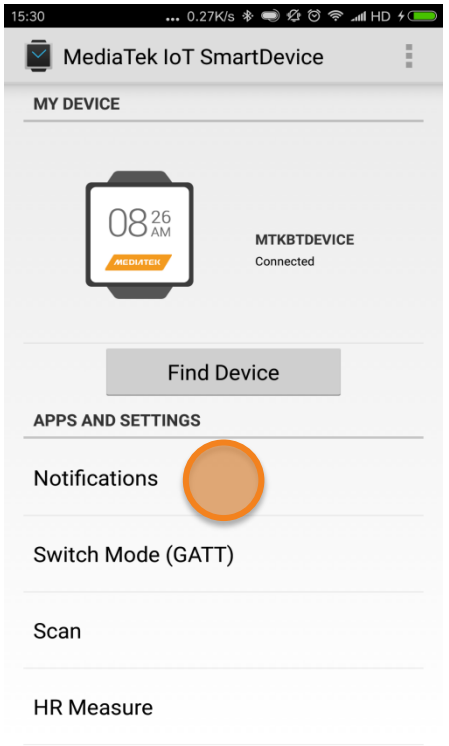
SmartDevice Main UI

- Main Activity



User Scenario





MainActivity
Scan nearby BLE Device

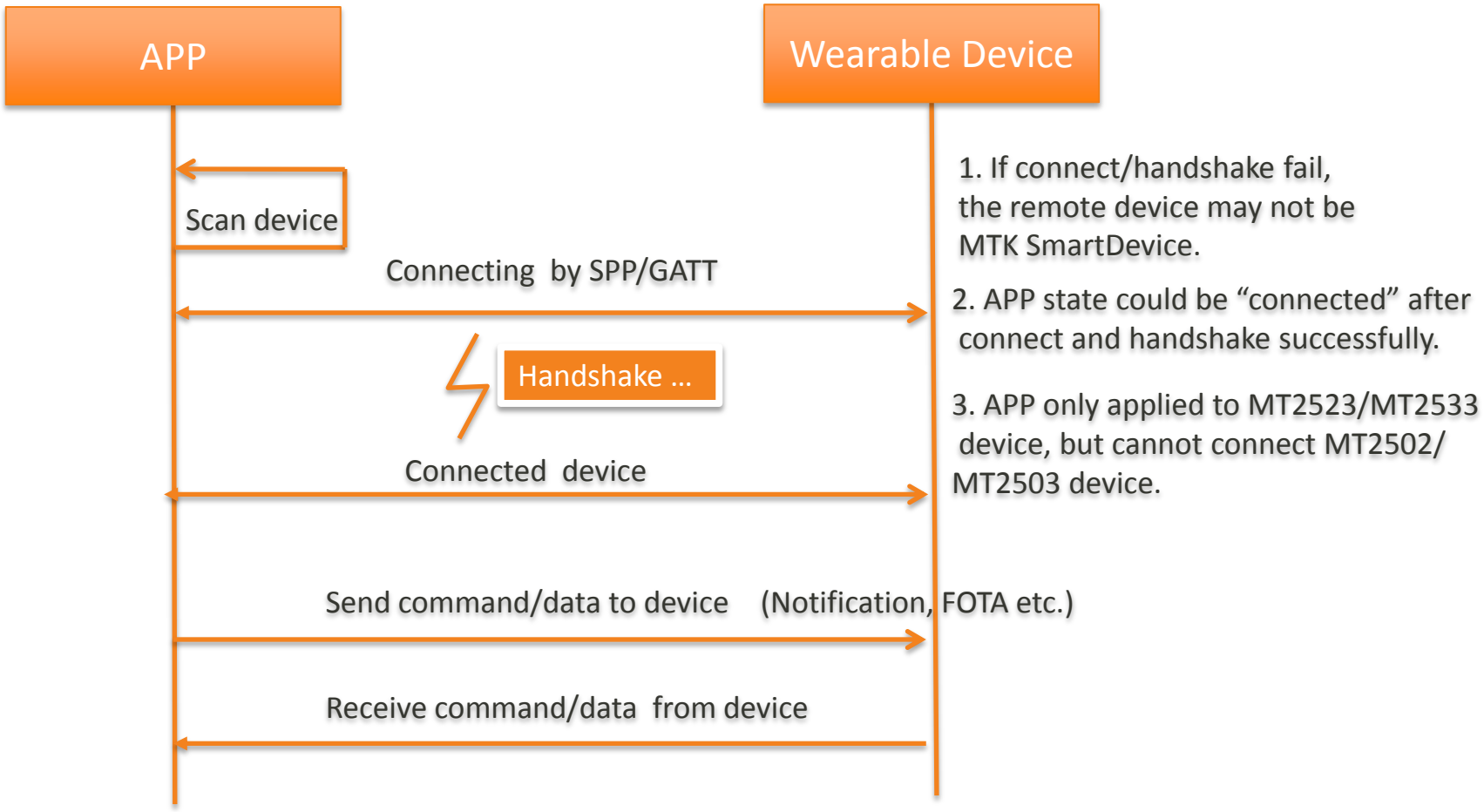
DeviceScanActivity
Each scan only 60 seconds

MainActivity
Connect successfully

BTNotify (1/2)

- BTNotify
  - BTNotify: MTK BT Transport Protocol
  - Handshake: APK must handshake to confirm that the remote device is MTK Smart Device (based on BTNotify) after connect BT device successfully.
  - Two Mode
    - SPP (Based on BT SPP Profile)
    - GATT (i.e. DOGP Mode, Based on MTK defined BLE GATT Profile - DOGP - Data over GATT Profile)

BTNotify (2/2)

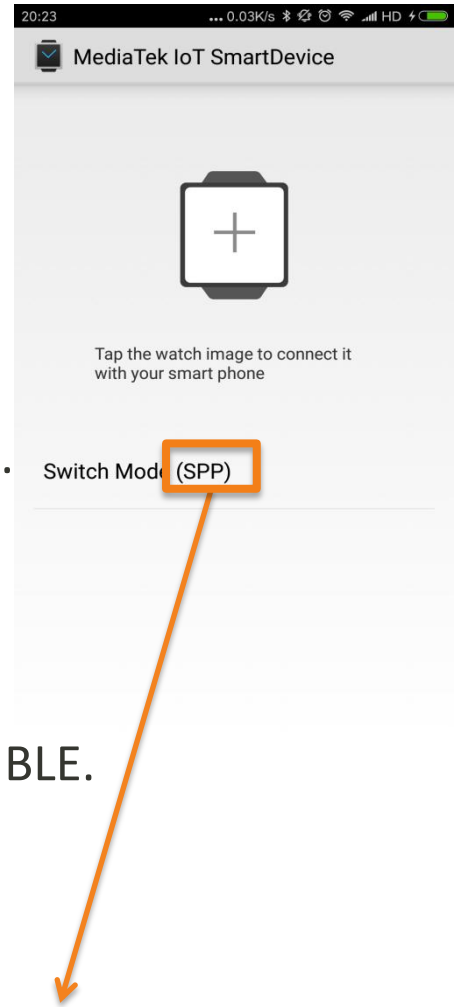

APP
Wearable Device
Scan device
Connecting by SPP/GATT
Handshake …
Connected device
Send command/data to device (Notification, FOTA etc.)
Receive command/data from device
1. If connect/handshake fail, the remote device may not be MTK SmartDevice.
2. APP state could be “connected” after connect and handshake successfully.
3. APP only applied to MT2523/MT2533 device, but cannot connect MT2502/ MT2503 device.

Connection (1/3)

- Switch Mode
  - Support SPP and GATT mode.
  - SPP and GATT cannot coexist.
  - APK will connect only BTNotify SPP profile

  in SPP mode, but will not connect BT A2DP/HFP profiles.
  - APK will connect BLE profiles

  (BTNotify DOGP/FMP/BAS) in GATT mode.
  - APK can switch mode in disconnected state.
  - APK cannot switch to GATT mode if SP don't support BLE.
  - APK will keep the last mode when SP or APK reboot.



Current mode is SPP, APP will switch to GATT mode after click "Switch Mode".

Connection (2/3)

- Scan
  - Show EDR/DUAL devices in SPP mode.
  - Show bonded device in SPP mode directly.
  - Show LE/DUAL devices in GATT mode.

Connection (3/3)

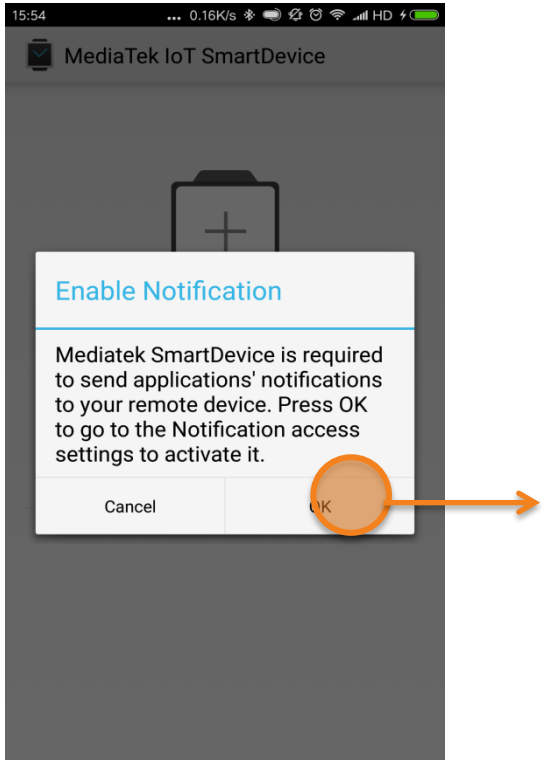
- Auto Reconnect
  - GATT/SPP auto reconnect the last GATT/SPP connection address, GATT/SPP will auto connect after reboot BT, SP, Remote Device.
  - GATT/SPP doesn't auto connect after user disconnect GATT/SPP connection by click operation. (i.e. Code call disconnect API)

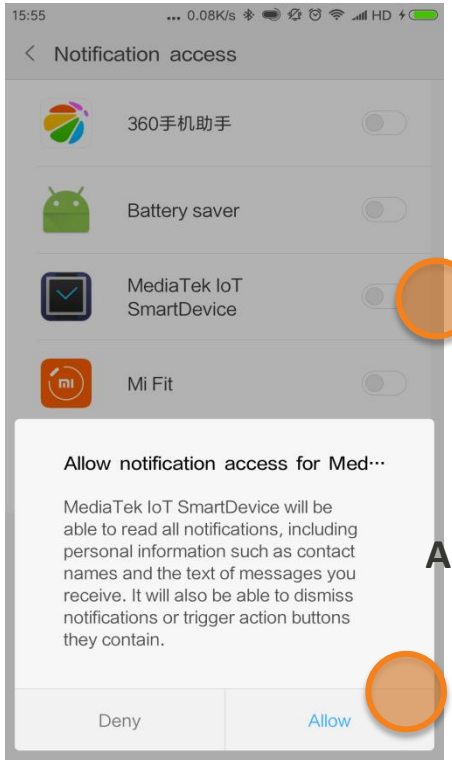
SmartDevice Features

- SmartDevice main features:
  - Notification Push
  - FOTA
  - FMP
  - BAS
  - EPO

Notification Push (1/3)

- Enable:
  - If you don’t activate Notification Push, APK will ask you to activate it in System Setting UI.

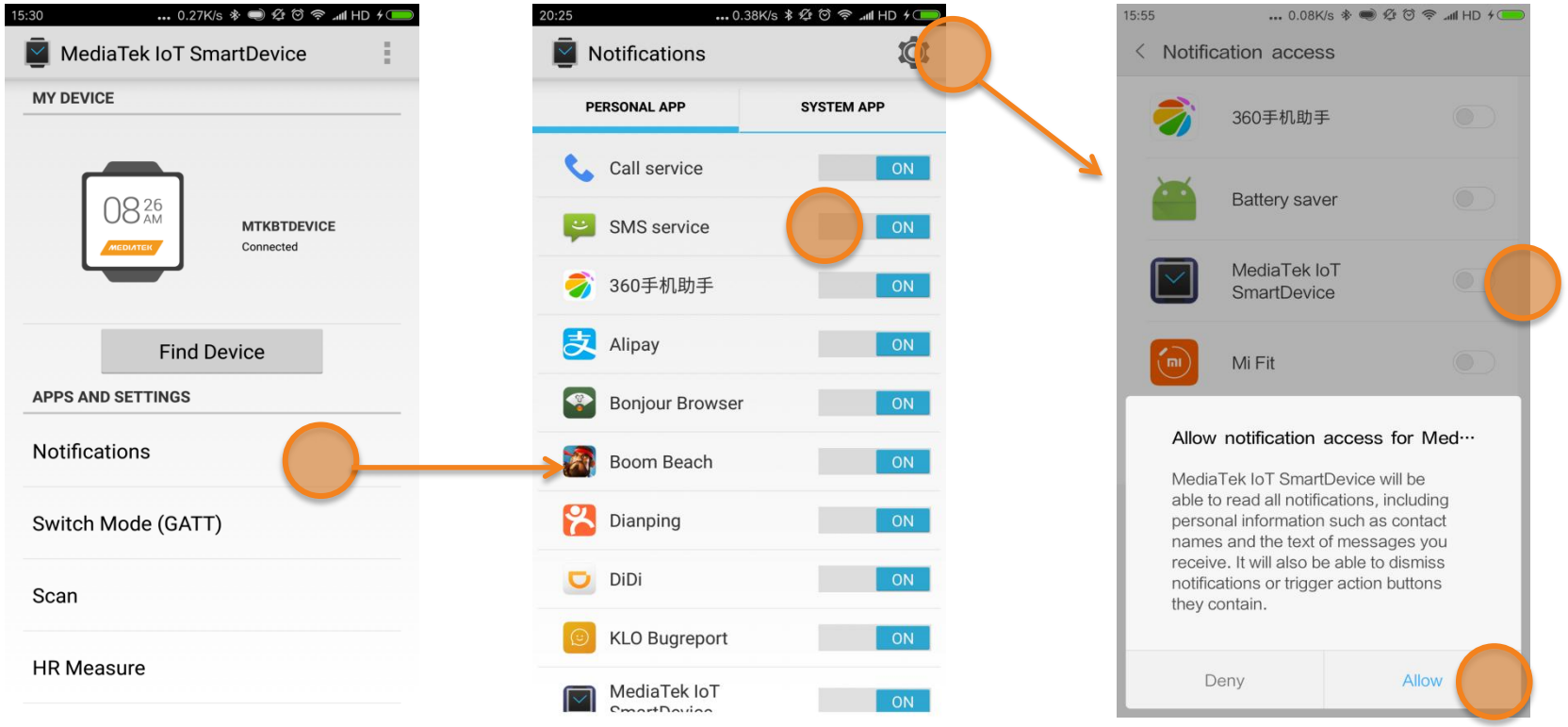




Activate Notification Push

Notification Push (2/3)

- Notification App List:
  - You can disable the APP that if you don't want to sync its notification to device.



Notification Push (3/3)

- SmartDevice will listen new arrived info/notification and push them to remote device, such as:
  - Notification: Normal android application notification.
    User can block some app's notification in APK. So when receive new notification of this app, the APK will don't push it to remote device.
  - Message: If receive new SMS, APK will push it to remote device.
  - Missed call: If miss a call, APK will notify to remote device.
  - Low battery warning: If SP changes to low battery status, APK will notify to remote device.

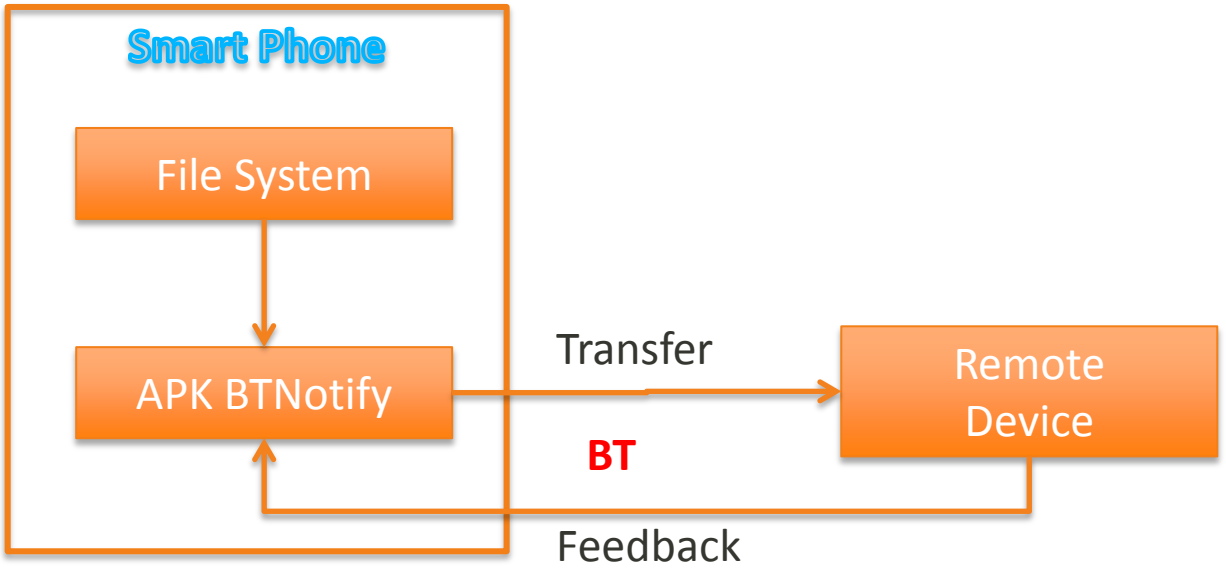
FOTA (1/3)

- FOTA
  - Firmware Over-The-Air , send Firmware data to remote device for Firmware Upgrade.

- Workflow
  - Get current version from remote device via BTNotify.
  - Choose firmware upgrade file from local file system.
  - Transfer firmware data via BTNotify.
  - Remote device starts to upgrade after transfer completely.
  - Feedback the upgrade result to APK after remote device reboot and BTNotify auto reconnect successfully.

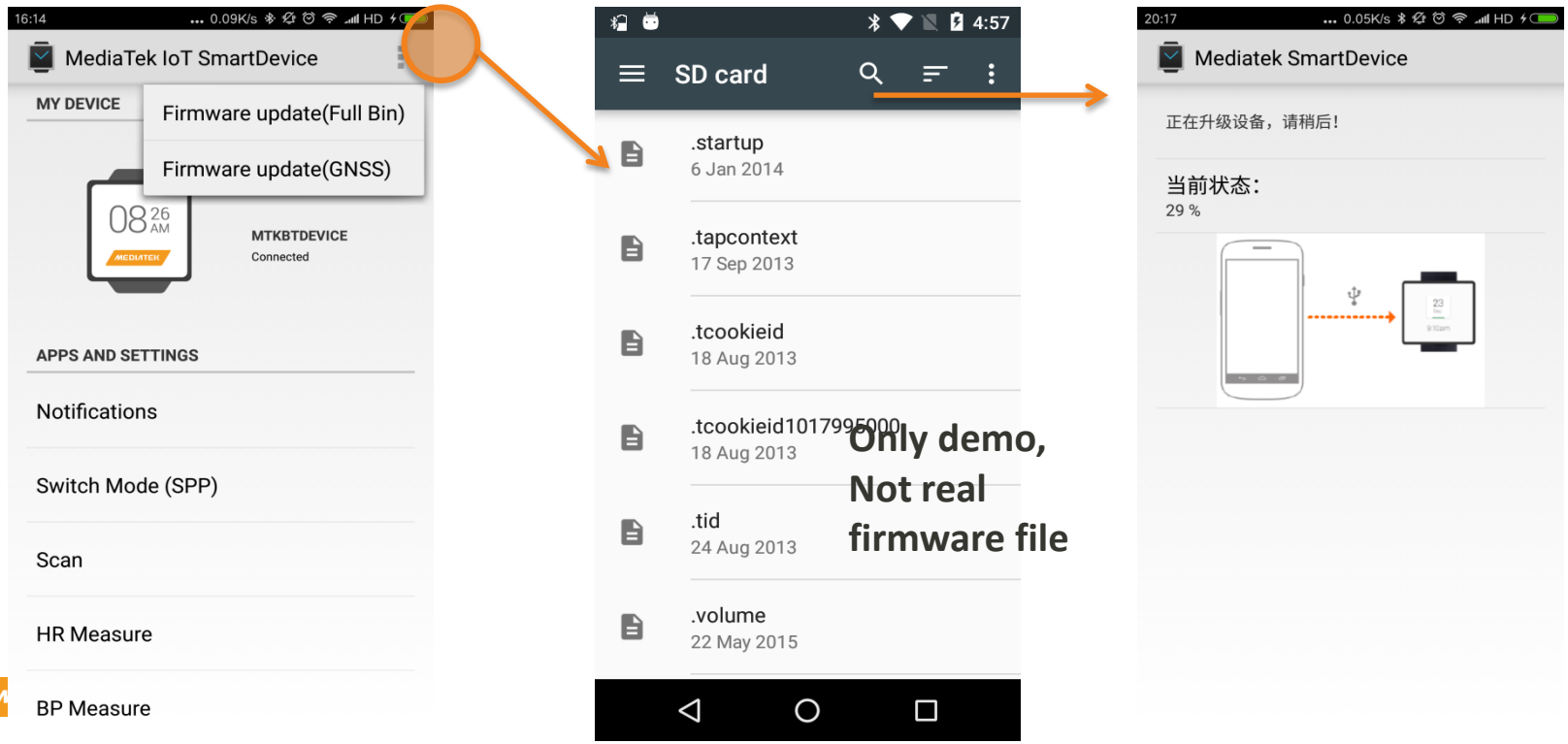
FOTA (2/3)

- FOTA Flow



FOTA (3/3)

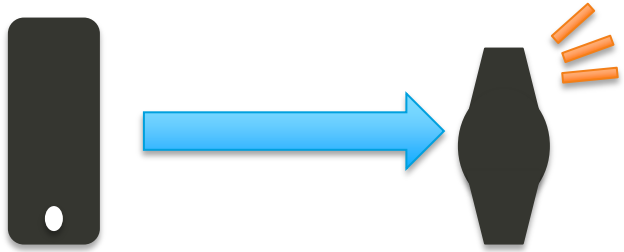
- FOTA UI
  - FOTA menu will be available after connected successfully.
  - FOTA could send full device bin, or GNSS bin(only for GNSS project) to remote device.



FMP (1/3)

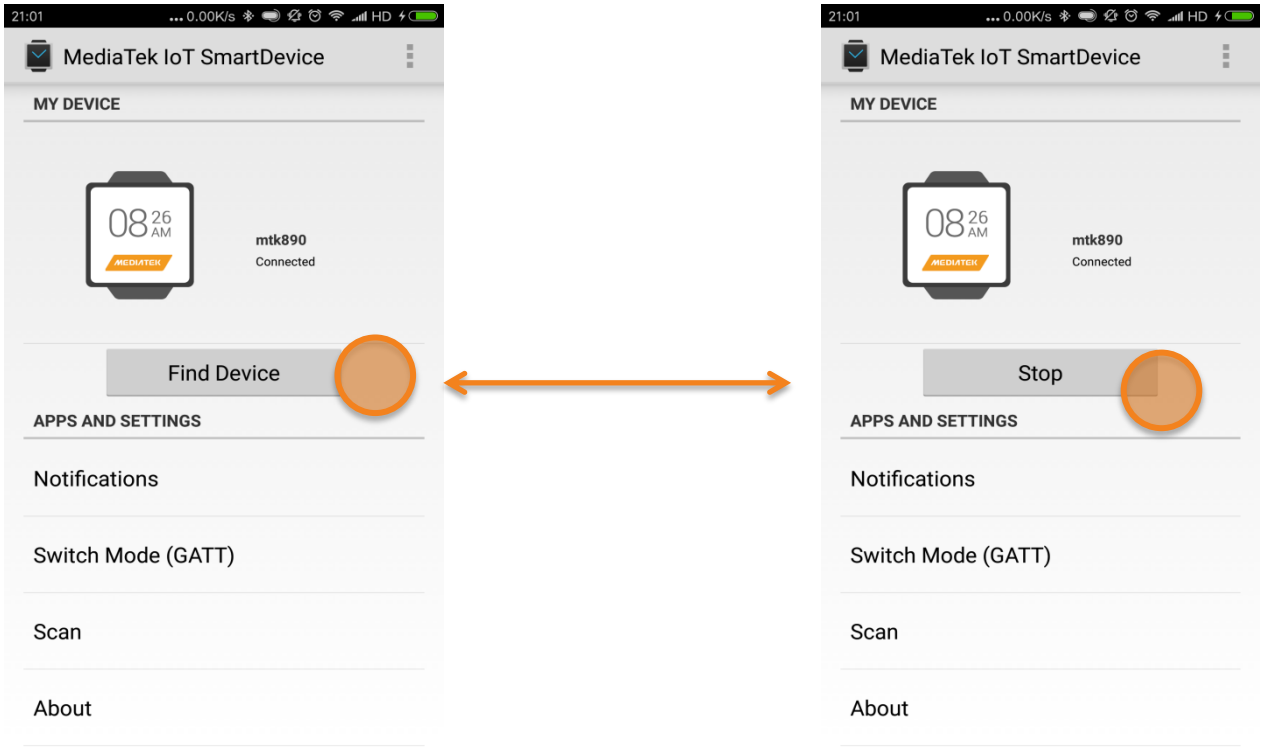
- Find Me Profile (FMP)
  - When a button is pressed on one device to cause an alerting signal on a peer device.
  - Find Phone
    - Press button on watch, the phone will alert out

  - Find watch
    - Press button on Phone, the watch will alert out



FMP (2/3)

- FMP UI

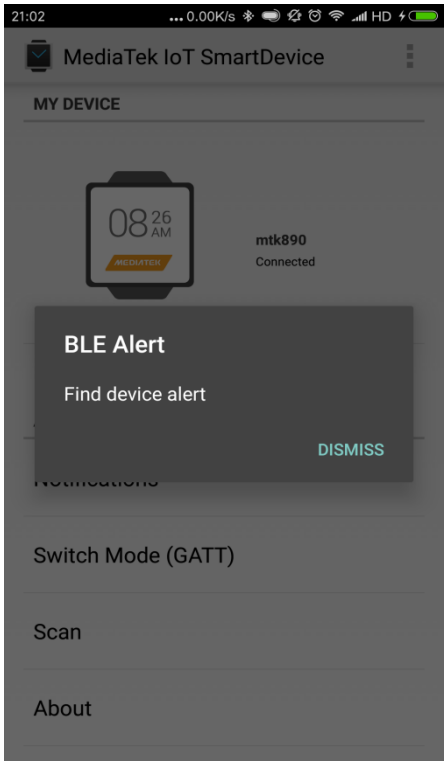


SP APK initiates “Find Me” alert/stop to find device.

(Only enable in MT2533 Device)

FMP (3/3)

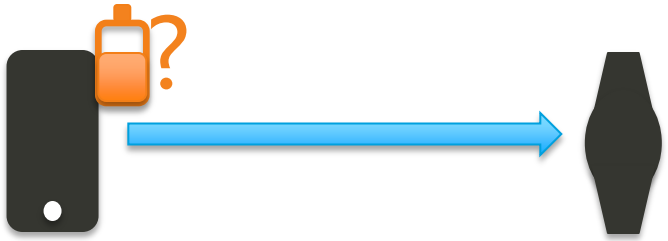
- FMP UI



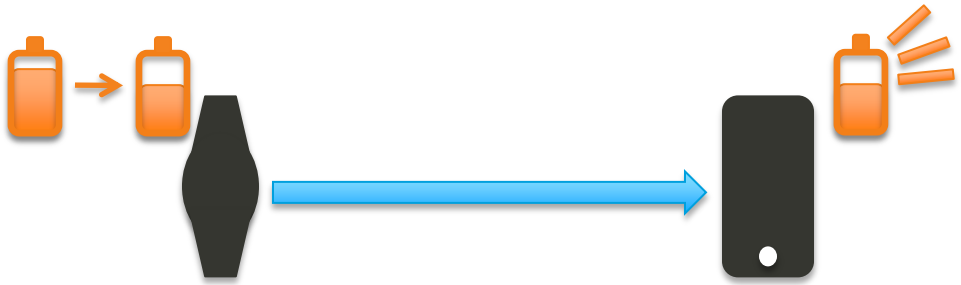
Remote Device initiates “Find Me” alert to find Smart Phone. (Enable in MT2523/MT2533 related project)

BAS (1/2)

- The Battery Service (BAS) exposes the state of a battery within a device
  - SP Read battery level from device when connected.

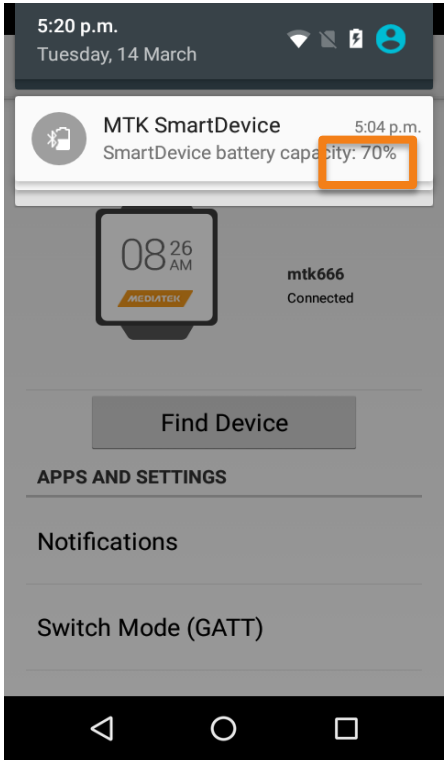


  - When device battery level change, it should notify phone.



BAS (2/2)

- BAS UI
  - SmartDevice APP working as BAS Client.



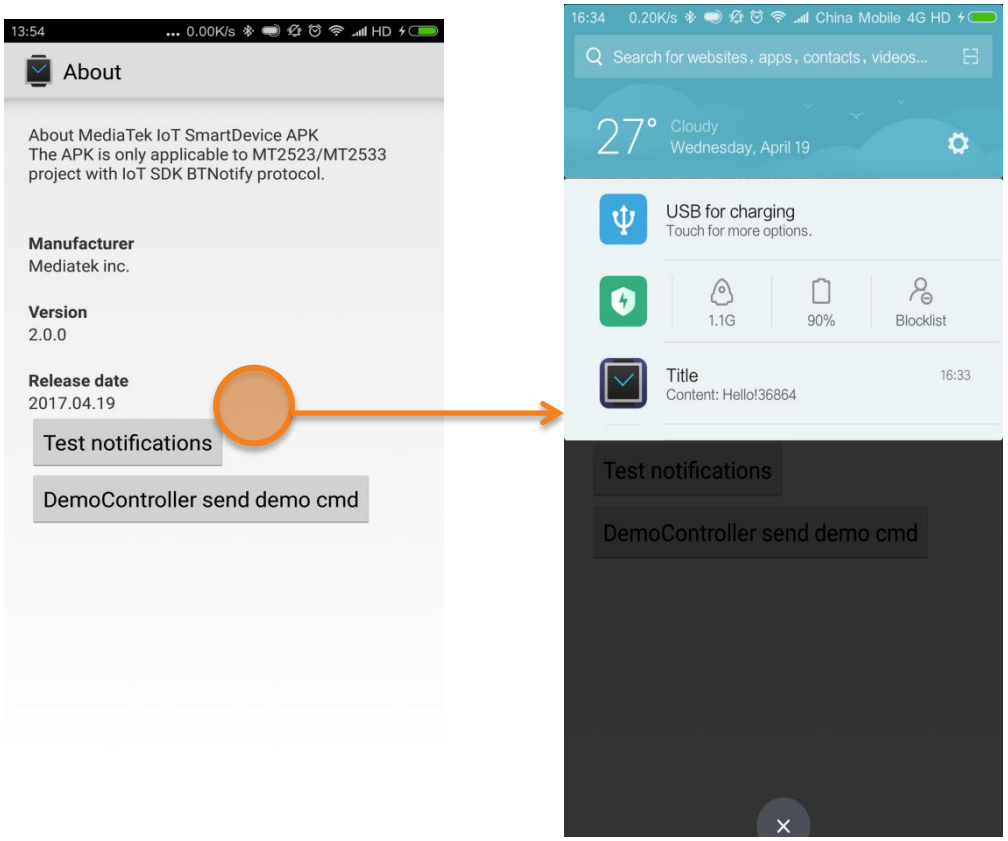
(Only enable in MT2533 Device)

EPO

- EPO
  - EPO: A file be used to assistant location in GNSS.
  - The EPO file will be download from network server and send to device once request and SP has been connected to the internet.
  - Only enable in MT2523 GNSS project.

About (1/2)

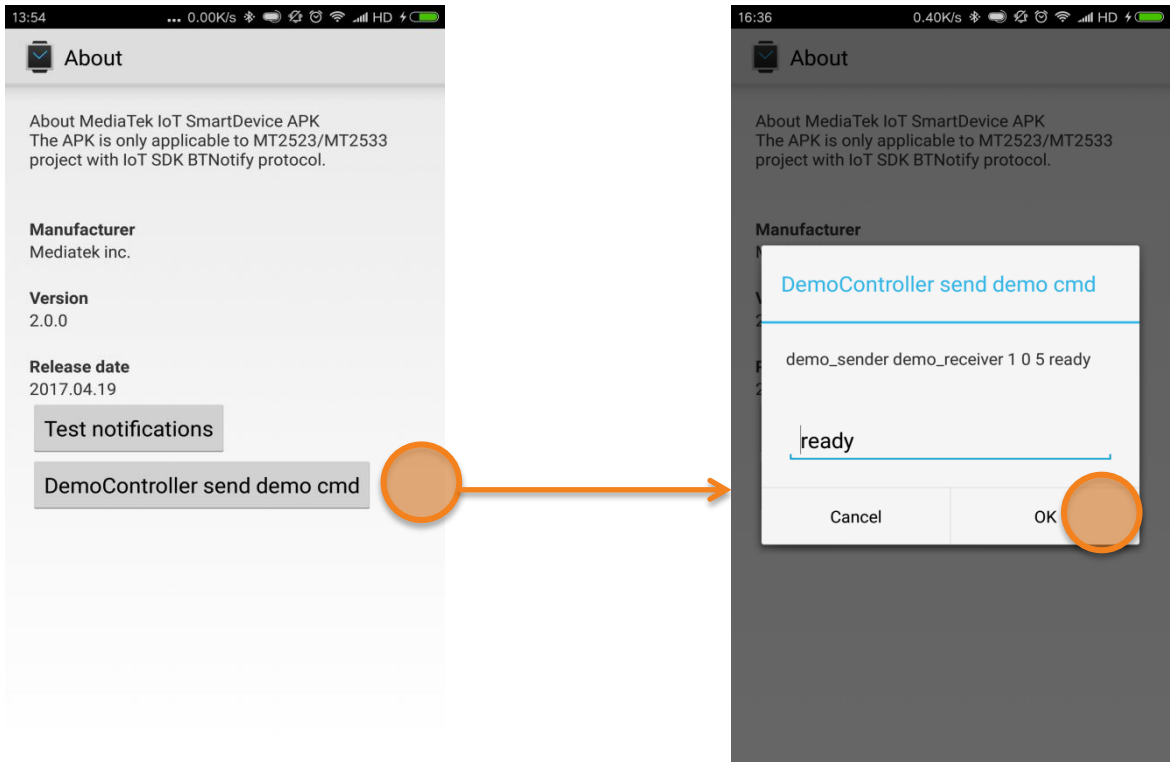
- About GUI



SmartDevice APK send a notification to testing notification push feature.

About (2/2)

- About GUI



SmartDevice APK send a demo command by using DemoController.

Health Features

Overview (1/3)

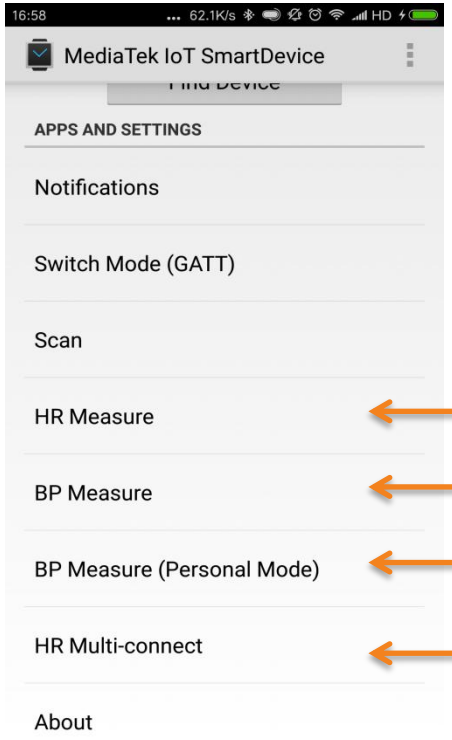
- MT2511
  - Bio-AFE support PPG (photoplethysmography) / ECG (electrocardiography) signal.
  - MT2523/2533 can communicate with MT2511 bio-sensor via I2C and SPI.
- IoT Device SW
  - Use IoT SDK "*project\mt2523_watch\apps\watch_ref_design*"
  - Feature
    - HR (PPG + Motion)
    - Blood Pressure (PPG + ECG)
    - Touchgfx GUI

Overview (2/3)

- APP Health Feature
  - Add record – Transfer personal profile to device
  - HR Measure – measure heart rate
  - BP measure
    - General Mode – Measure personal blood pressure
    - Personal Mode – Measure bp with saved personal model, which created from calibration process.
  - Multiple connect – Add reference device for heart rate comparison

Overview (3/3)

- APP GUI



HR measure

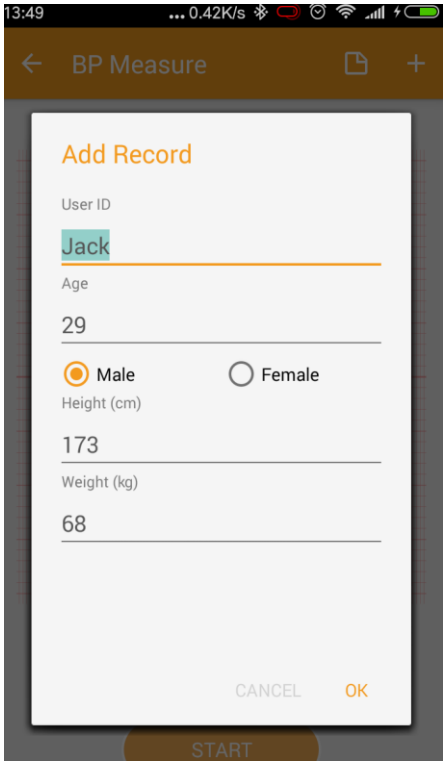
BP General measure

BP Personal measure

HR Multi-connect

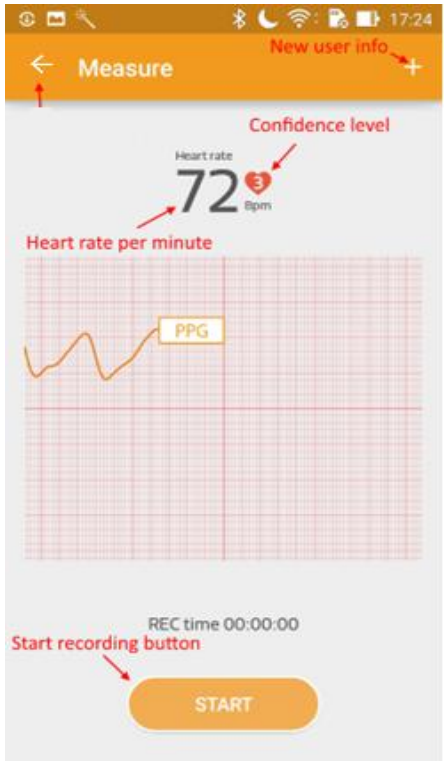
Add Record

- Add Record
  - Fill in the personal profiles and transfer to device, which will be used when measuring HR/BP.
  - Note: This is mandatory option when measuring BP.



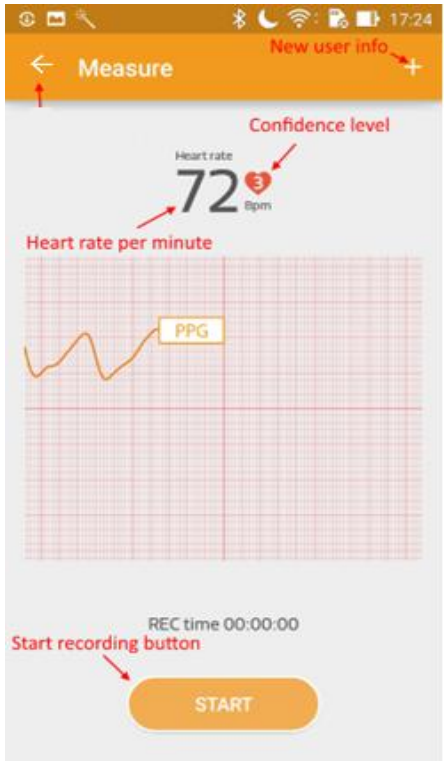
HR Measure (1/2)

- Present bio-sensor data
  - Entry or Turn on heart rate measurement on your device, you will see PPG chart, HR BPM and confidence level on the screen.
  - Confidence level
    - 0 ~ 1: low confidence level
    - 2 ~ 3: high confidence level
  - If you would like to edit the personal profile, click on the “+” (upper right of the screen).



HR Measure (2/2)

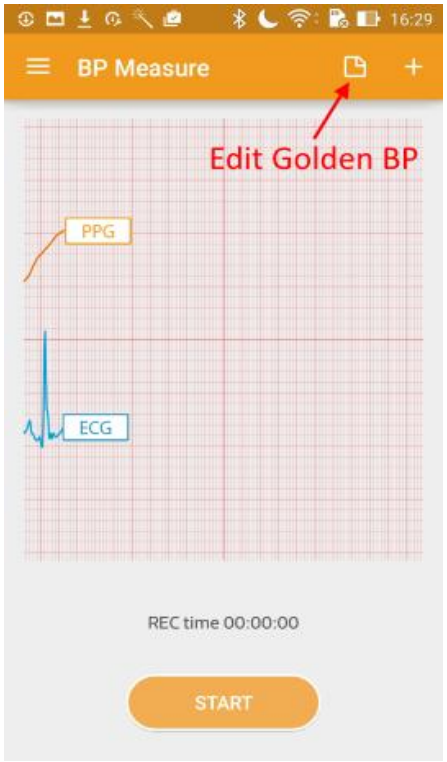
- Store raw data
  - Tap on the “START” button on the bottom of the screen will start a recording session.
  - Tap on the same button (which should be showing “STOP” now) again will stop the recording session and save the result to the local storage on the smart phone. (/sdcard/CatchLog).



BP Measure – General Mode (1/3)

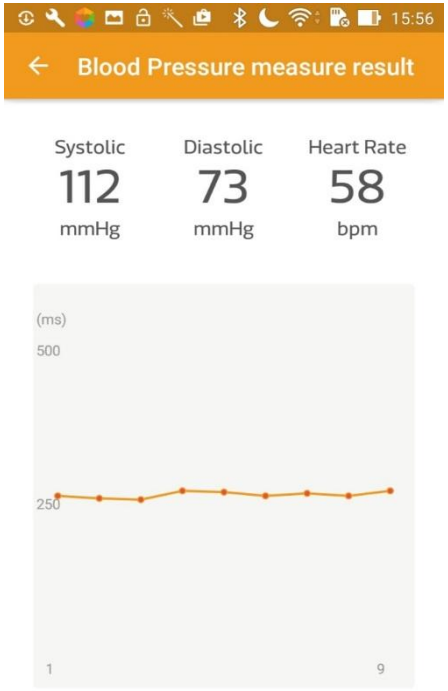
- Present bio-sensor data
  - Turn on blood pressure measurement on your device and wait for a few seconds, you can see both PPG and ECG chart on the measurement area.

- Store raw data
  - Tap “START” button will start a recording session.
  - If you have a golden device, use the second button to the upper right to enter the golden measurement result as a record for debugging usage.



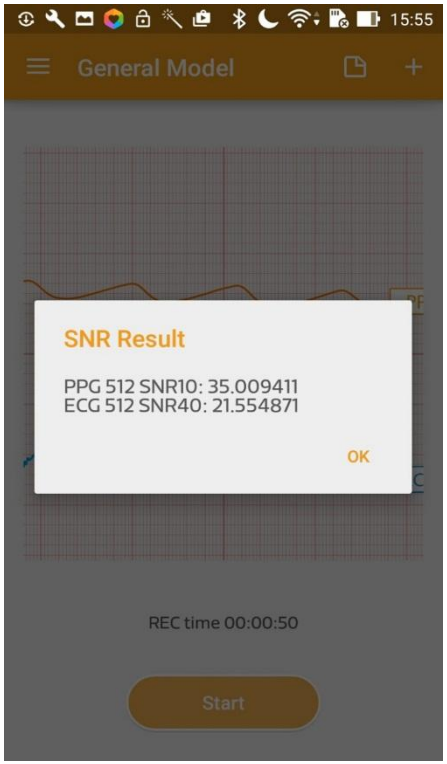
BP Measure – General Mode (2/3)

- Present blood pressure result
  - Show systolic BP, diastolic BP, and HR BPM.
  - Show PWTT chart.



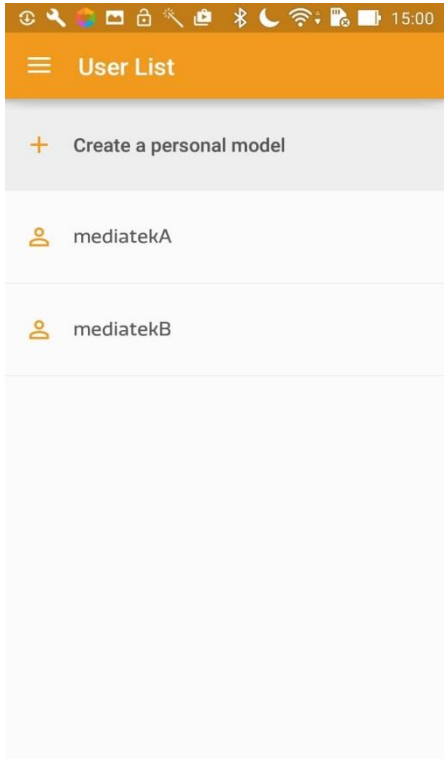
BP Measure – General Mode (3/3)

- SNR
  - If user store raw data (“Start” recording), SNR10 for PPG and SNR40 for ECG would be computed and be shown on screen.
  - User can evaluate the signal quality with the SNR values.



BP Measure – Personal Mode (1/6)

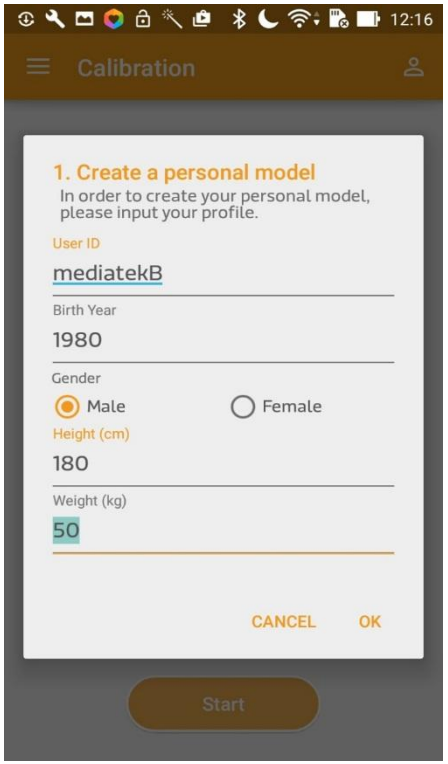
- In personal mode, user can either creates a new personal model or chooses a personal model which had been stored in APK.
- User will execute a calibration process when he/she decided to create a personal model.



BP Measure – Personal Mode (2/6)

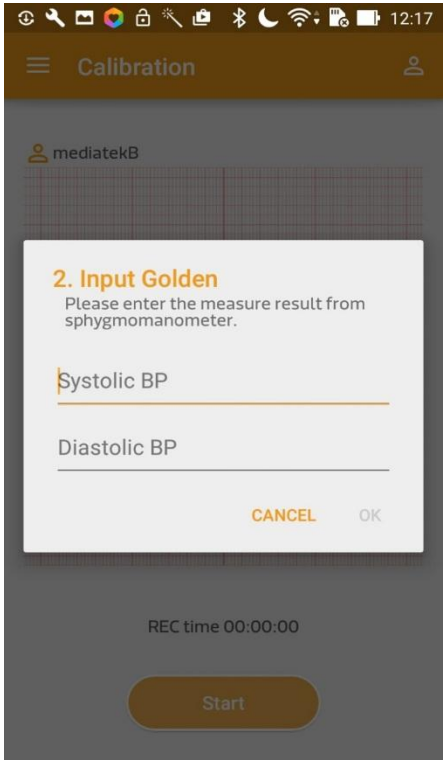
- There are 4 steps in calibration process,
  1. Create a personal model
  2. Input Golden
  3. Calibration
  4. Input Golden again

- User can create his own personal model through these steps.
- The first step is simple, just like general mode, user has to input profiles such as birth year, gender, height, and weight.



BP Measure – Personal Mode (3/6)

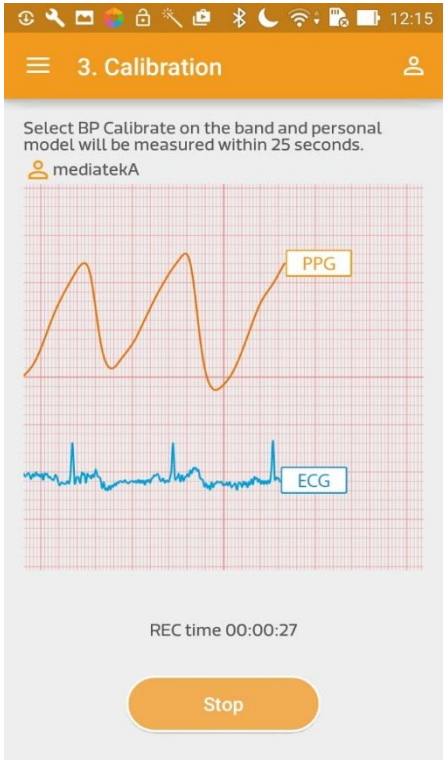
- During calibration process, user need to use a sphygmomanometer as a golden device to measure his/her current blood pressure.
- In the second step, input the measure result from the golden device.



BP Measure – Personal Mode (4/6)

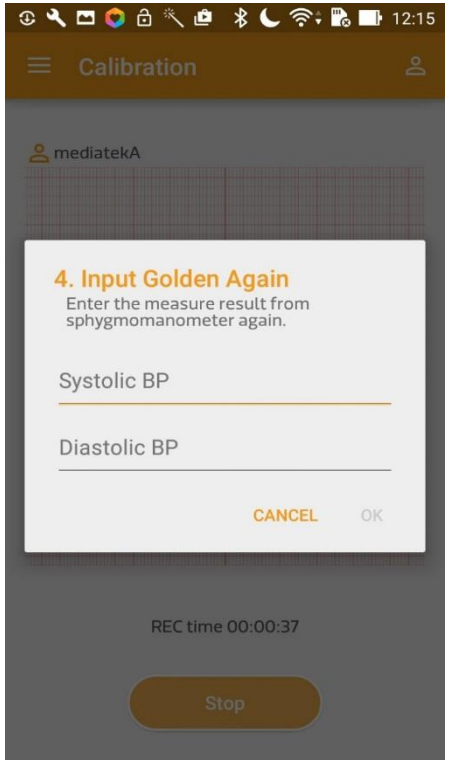
- In third step, user would switch features to select BP measure or calibrate mode.

- When user selects it, the measure of personal model will start and measuring personal model for 25 seconds.
- During the measurement process, EKG and PPG raw data will be transferred to SP through BT and the waveforms will be shown in APK screen.



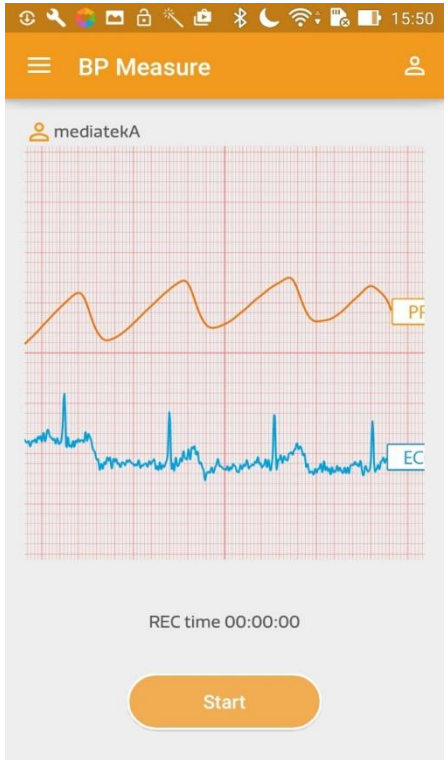
BP Measure – Personal Mode (5/6)

- Finally, after the personal calibration parameter had been measured and transferred to SP, user will be asked to input the measured result from golden device again.
- When user press OK, all the personal model data will be stored in APK.
- The calibration process is completed and user can measure blood pressure with their own model.



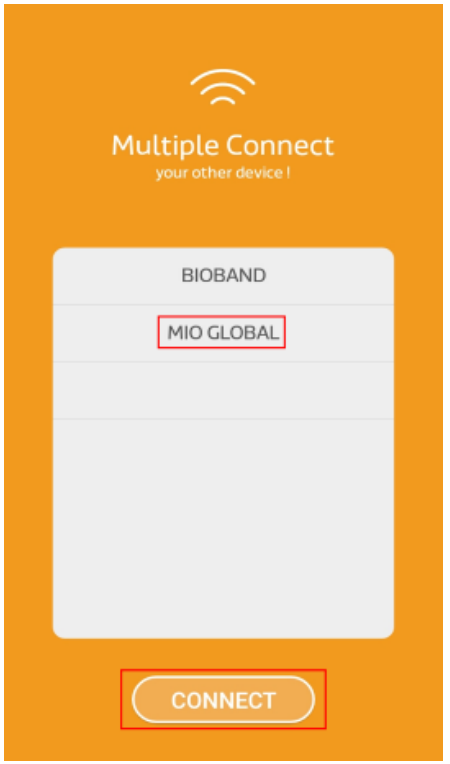
BP Measure – Personal Mode (6/6)

- When user chooses a personal model to measure blood pressure, his personal model would be set to the device.
- User can measure his blood pressure based on the personal model which he had created before through calibration process.
- Just like the process in general mode.



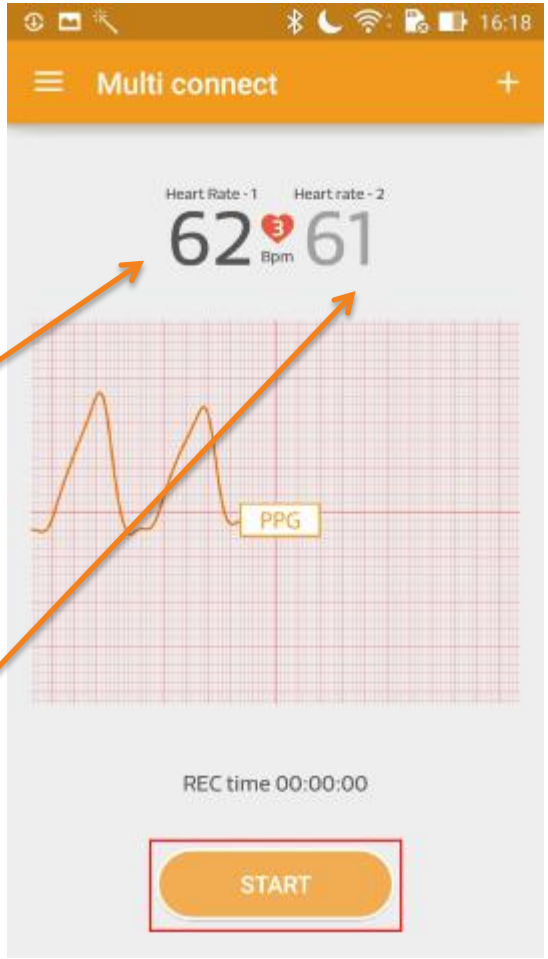
Multiple Connect (1/4)

- Multiple connect feature
  - Select the reference device in the list and tap the “CONNECT” button.
  - Make sure the device is discoverable and support SIG BLE HR Profile.



Multiple Connect (2/4)

- Multiple connect feature
  - Heart rates from both devices will now show in the measure screen.
  - Tap the “START” button to start a recording session.

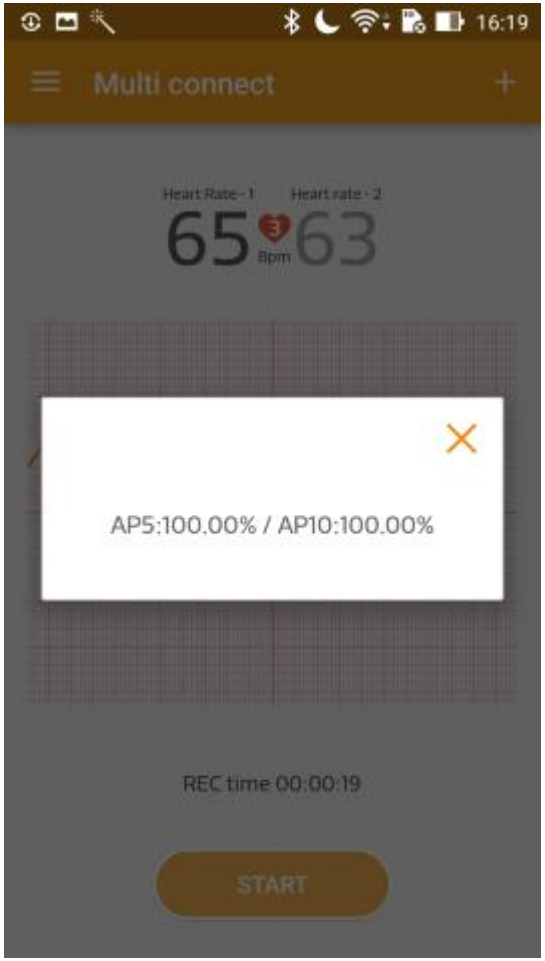


MT2511 Health Device.

Reference HR Device.

Multiple Connect (3/4)

- Multiple connect feature
  - The AP5 and AP10 percentage during the recording period will be calculated and shown on the screen.



Multiple Connect (4/4)

- Multiple connect feature
  - Formula:
    - Diff Count (total number about our hr bpm is difference from golden bpm be measured from reference device)
    - AP5 Count (total number of our hr bpm differ 5~10 from golden bpm)
    - AP10 Count (total number of our hr bpm differ 10 or higher from golden bpm)
    - AP5: 1- (AP5 Count) / (Diff Count)
    - AP10: 1 – ((AP5 Count) / (Diff Count)) * ((AP10 Count) / (Diff Count))

Contact US

(If you have any questions, comments, or suggestions, please contact us by MTK ACS, or send mail to SmartDevice_App@mediatek.com)