Mediatek SmartDevice Introduction (MT2523)

2017.01.04

Outline

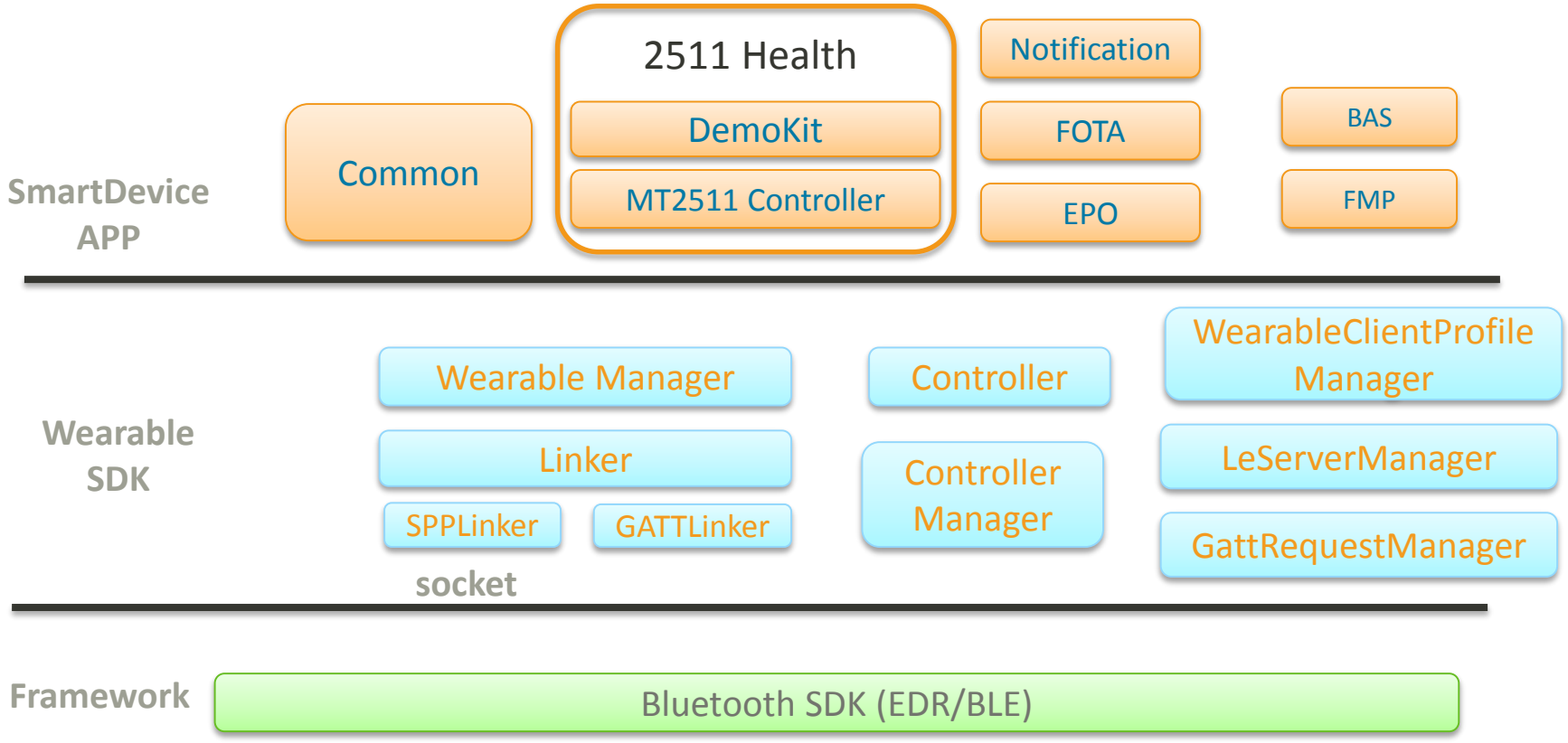
- Overview
- SmartDevice Features

Overview

Introduction

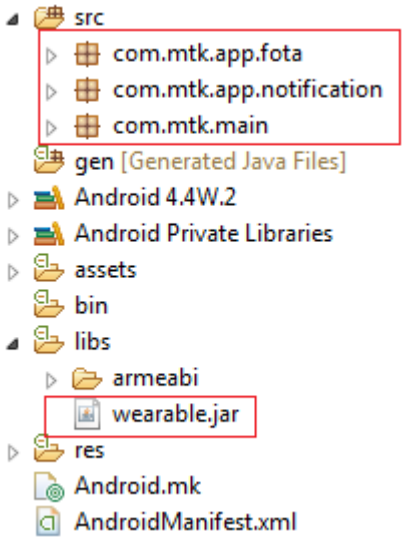
- SmartDevice APP is an application used for MediaTek wearable device.
- It includes below features:
  - Scan/Connect/Switch Mode
  - Notifications Push
  - FOTA
  - FMP/BAS
  - EPO Download
  - MT2511 Health

Architecture

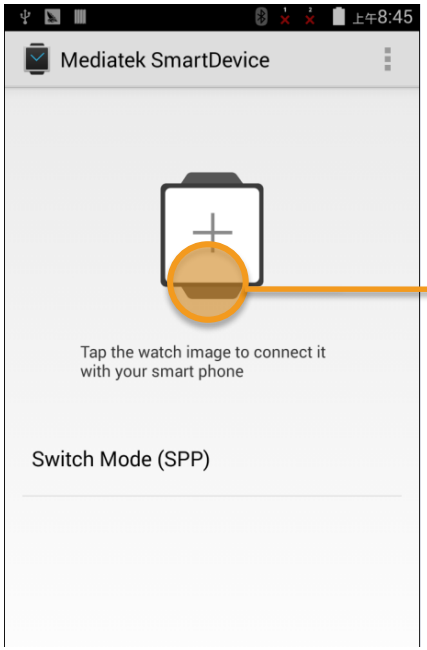


Code Structure

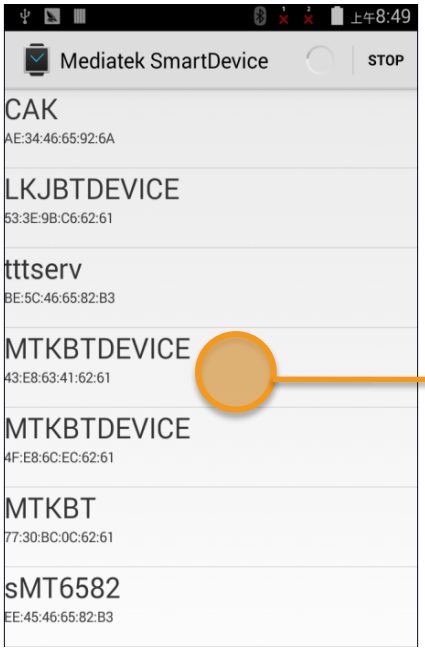
- Libs
  - wearable.jar provides main connect/controller API.
- Main packages
  - com.mtk.main
    - Main UI package
  - com.mtk.app.fota
    - Send firmware data to wearable device to do upgrade.
  - com.mtk.app.notification
    - receive notification and forward to wearable.



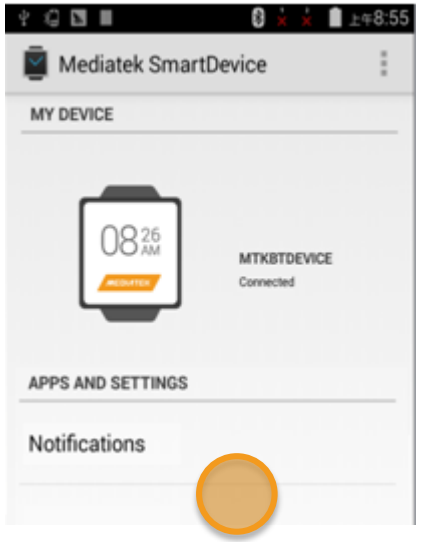
User Scenario



Scan Smart Device

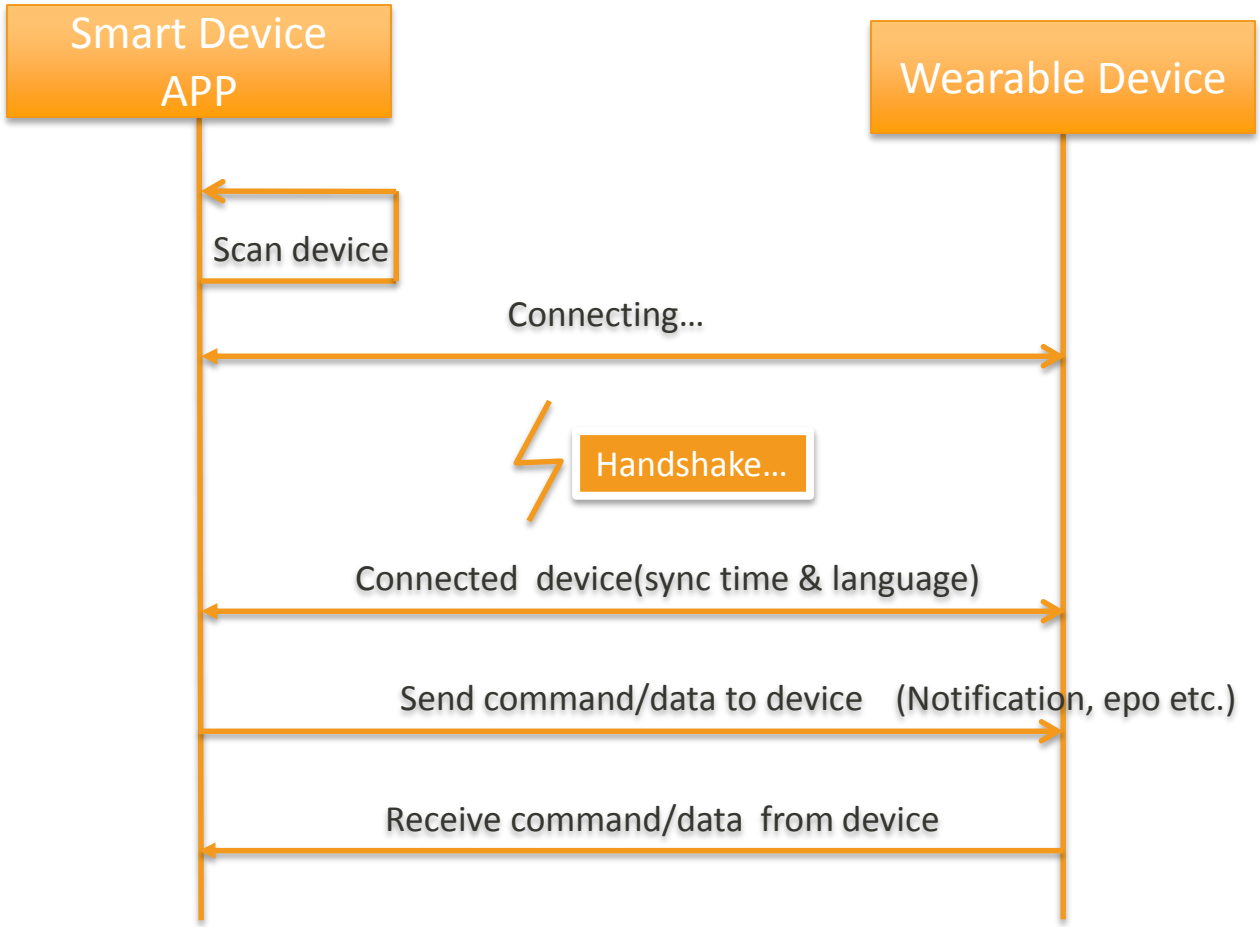


DeviceScanActivity
Each scan only 60 seconds

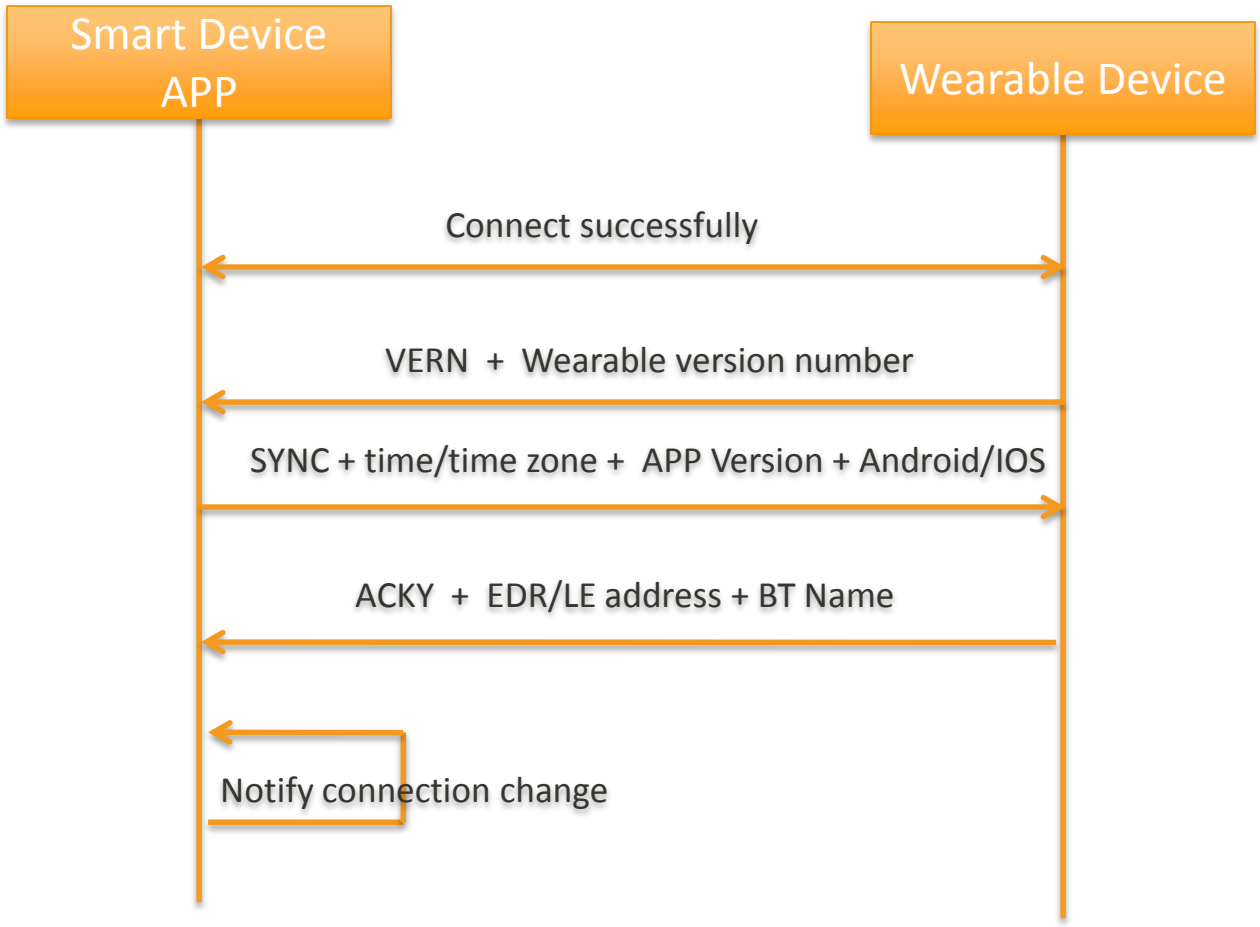


MainActivity
Connect successfully

Communication Flow



HandShake Flow



SmartDevice Features

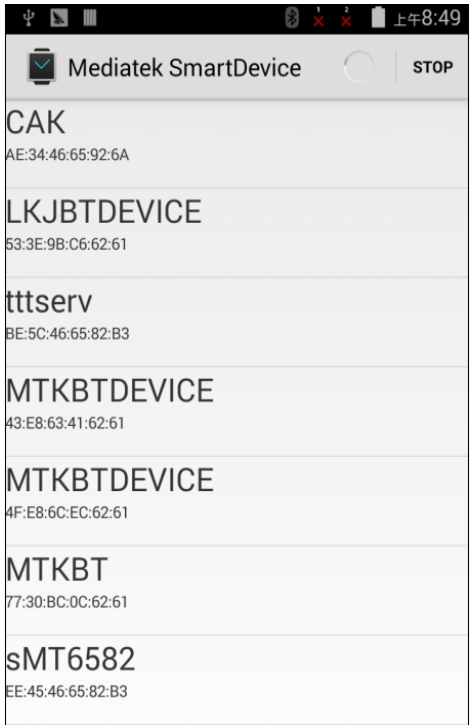
SmartDevice Features Overview

- This part will introduce the main feature in SmartDevice by following order:
  - Scan/Connect/Switch Mode
  - Notifications Push
  - FOTA
  - FMP
  - BAS
  - EPO
  - MT2511 Health

Scan/Connect/Switch Mode (1/5)

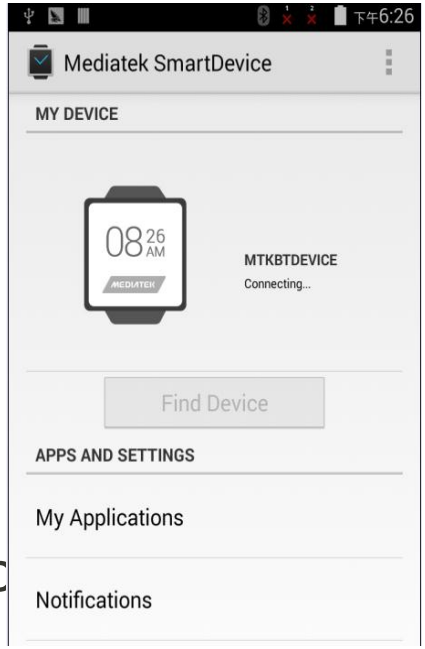
- Scan device feature
  - Auto stop scanning after start 1 minute
  - User could start/stop scan operation
  - Show EDR/DUAL devices in SPP mode

    Show LE/DUAL devices in DOGP mode
  - Clear device list when turn off BT
  - Device scan UI will finish when connect successfully through smart device
  - Show bonded device in SPP mode directly



Scan/Connect/Switch Mode (2/5)

- Connect feature
  - Only APK could connect/disconnect GATT connection in DOGP mode.
  - APK could connect selected device by scan UI
  - APK could disconnect EDR and GATT connection in SPP mode.
  - Smart Device could disconnect EDR connectic , then APK will disconnect GATT in SPP mode.



Scan/Connect/Switch Mode (3/5)

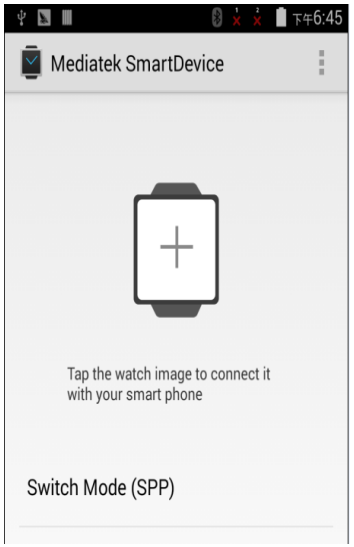
- Auto connect feature
  - SPP auto connect based on A2DP/HFP connection, APK will auto connect SPP when SP(Smart Phone) A2DP/HFP is connecting/connected successfully
  - DOGP/SPP auto connect based on the last DOGP/SPP connection address, DOGP/SPP will auto connect after reboot BT or reboot SP/Wearable Device.
  - DOGP/SPP doesn’t auto connect after user disconnect DOGP/SPP connection by click operation.

Scan/Connect/Switch Mode (4/5)

- APK connection in following scenarios:
  - Reboot SP/Smart Device in connected state
  - BT power Off & On in SP/Smart Device
  - SP/Smart Device are out of range, and will auto reconnect when they are in range
  - Initiate EDR connection from Smart Device
  - Initiate APK connection from SP side when no EDR connected

Scan/Connect/Switch Mode (5/5)

- Switch mode feature
  - APK support SPP mode and DOGP mode
  - APK will connect SPP and GATT(PXP/FMP) in SPP mode
  - APK will connect GATT (DOGP/PXP/FMP) in DOGP mode
  - APK can switch mode in disconnected state.
  - APK cannot switch mode to DOGP if SP don’t support LE.
  - APK will keep the last mode when SP reboot or APK reboot.



Notifications Push (1/2)

- SmartDevice will listen new arrived info and push them to wearable, such as:
  - Notification: listen new arrived notification then push it , user can block app' notification in sp or wearable. So when receive new notification of this app, the APK will don't push it to wearable.
  - Message: if receive new SMS, APK will push it to wearable
  - Missed call: if miss a call, APK will push the missed call to wearable
  - Low battery warning: if battery change of SP in low battery status, APK will push it to wearable

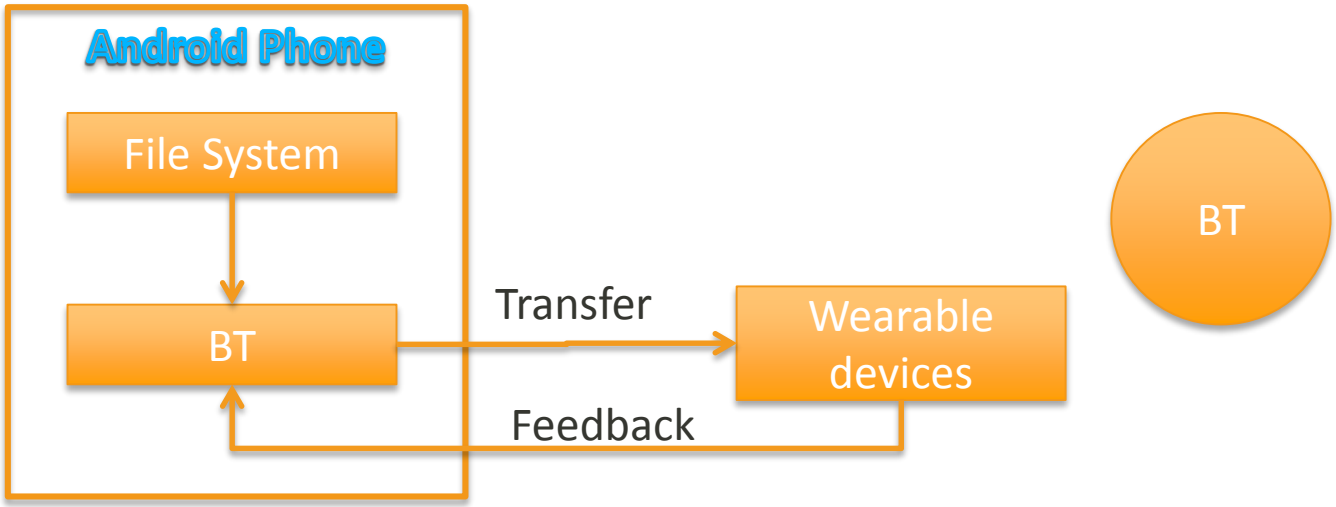
Notifications Push (2/2)

- Notification Enhance Features
  - Sync notifications operation between sp and wearable
    - Delete notification from device side will also delete it at phone side, vice versa
    - It will not sync notifications when disconnected
  - Support trigger notification's actions from device side
  - Support notification's page
  - Support notification's group
  - Support notification's big text view

FOTA (1/2)

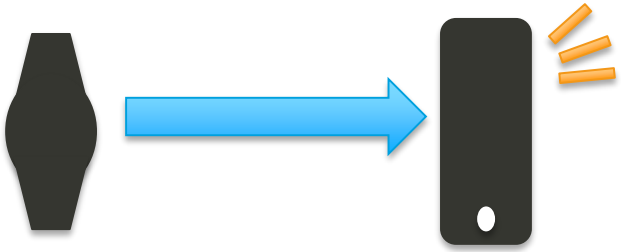
- Introduction
  - Send firmware data to wearable device to do upgrade action
- Steps
  - Get current version from wearable device via BT
  - Choose upgrade file from local file system
  - Transfer upgrade data via BT
  - Wearable device start to upgrade according the data
  - Feedback the result to smart phone

FOTA (2/2)

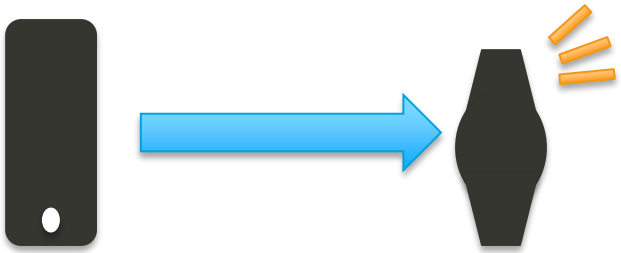

Android Phone
File System
BT
Transfer
Feedback
Wearable devices
BT

FMP (1/2)

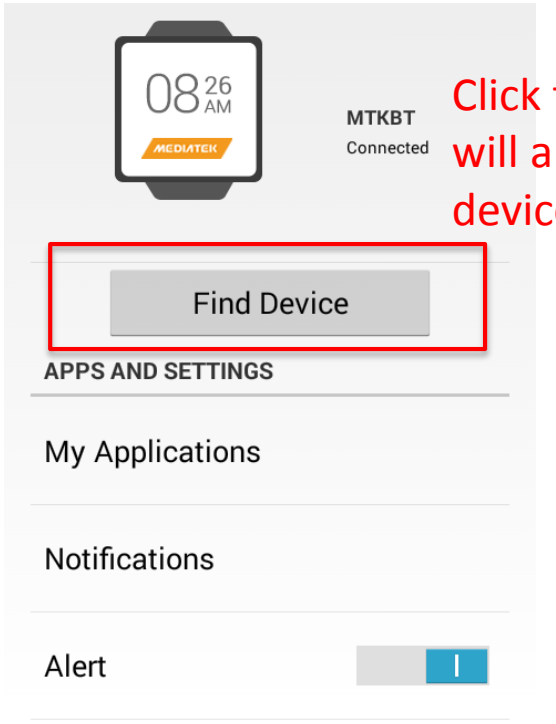
- Find Me profile (FMP) defines the behavior when a button is pressed on one device to cause an alerting signal on a peer device.
  - Find Phone
    - Press button on watch, the phone will alert out



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

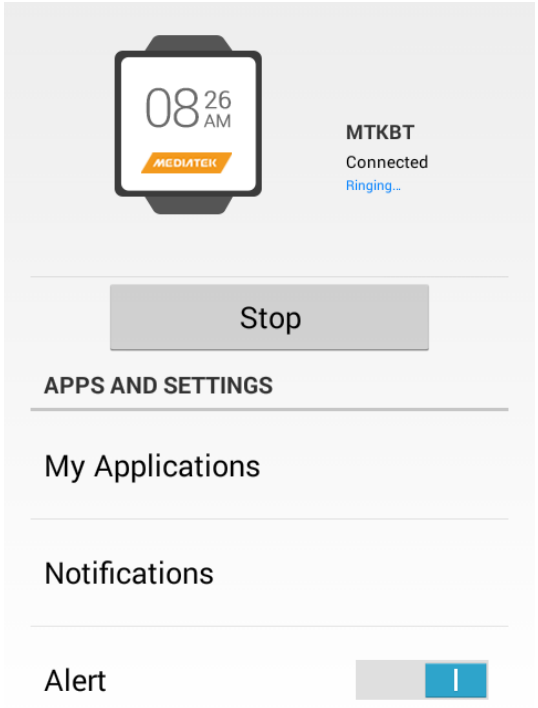


FMP (2/2)



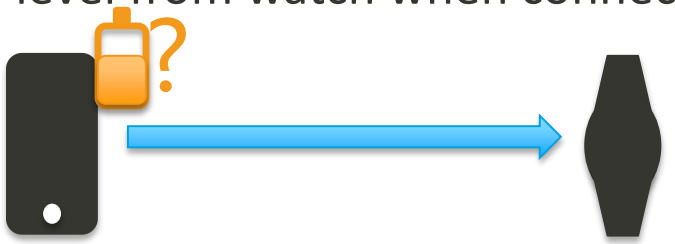
Click this button will alert remote device

UI will change

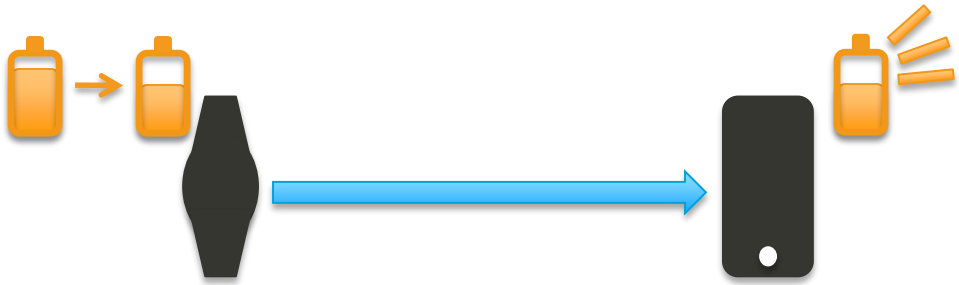


BAS (1/2)

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



  - When watch battery level change, it should notify phone



BAS (2/2)

- SmartDevice APP working as BAS Client

EPO

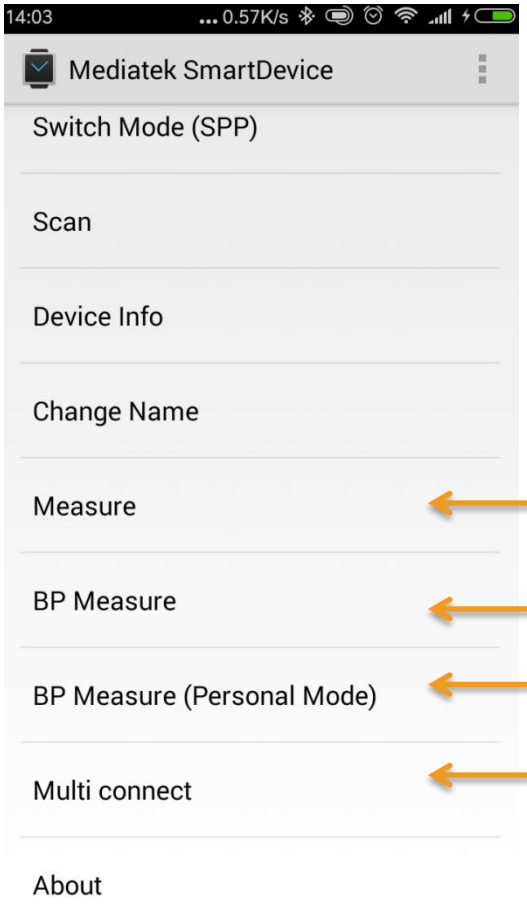
- A file be used to assistant location in GNSS.
- An EPO file will be download and send to device once request and SP has been connected to the internet.

MT2511 Health

- MT2523/2533 can communicate with MT2511 bio-sensor via I2C and SPI
  - MT2511 is a bio-AFE support PPG (photoplethysmography) / ECG (electrocardiography) signal
- SW feature
  - HR (PPG + Motion)
  - Blood Pressure (PPG + ECG)
- APK will provide
  - Add record – add personal data into device
  - HR Measure – measure personal heart rate
  - BP measure
    - General Mode – measure personal blood pressure
    - Personal Mode – measure bp with personal model, which created from calibration process
  - Multiple connect – add reference device for heart rate comparison

MT2511 Health

- MT2511 Health Feature



HR measure

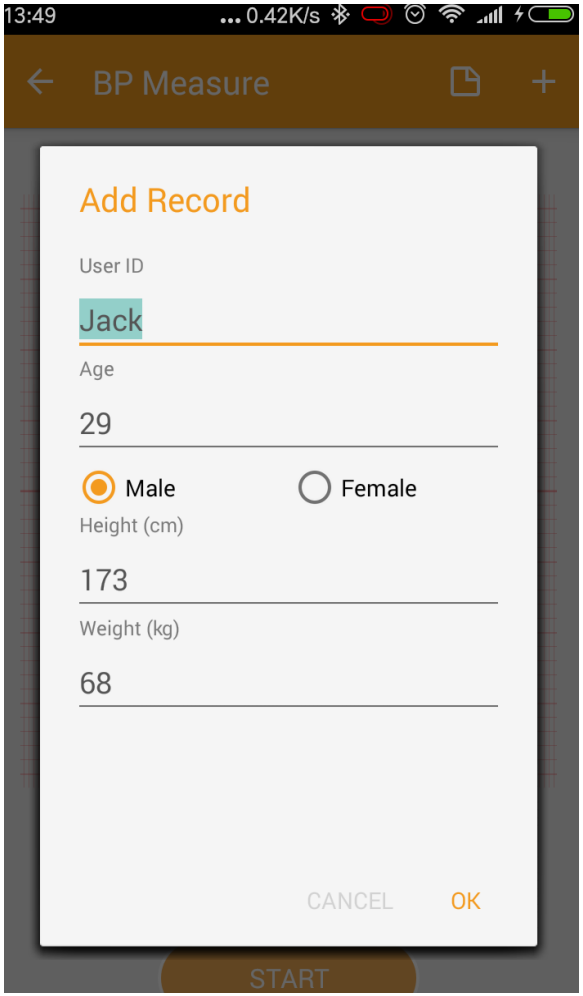
BP General measure

BP Personal measure

HR Multi-connect

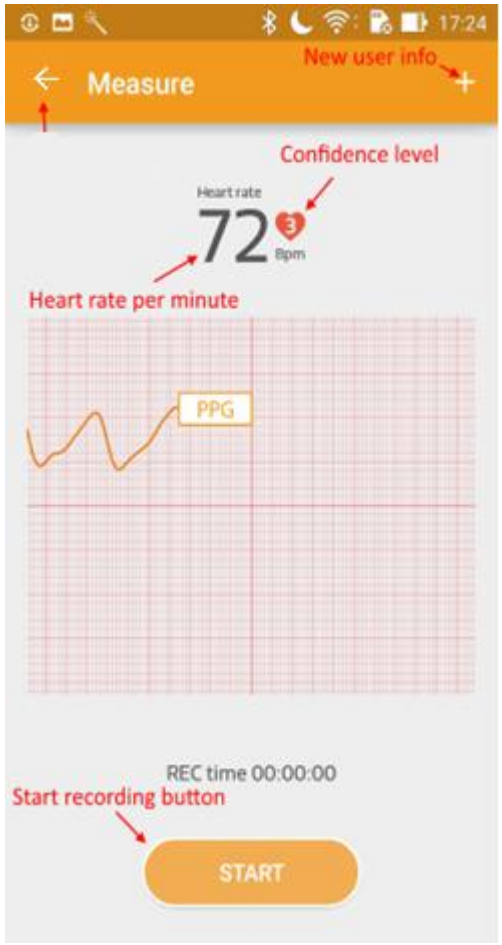
Add Record

- Add record feature
  - Fill in the personal profiles, which will be used when measuring HR/BP.
  - Note: This is mandatory option when measuring BP.



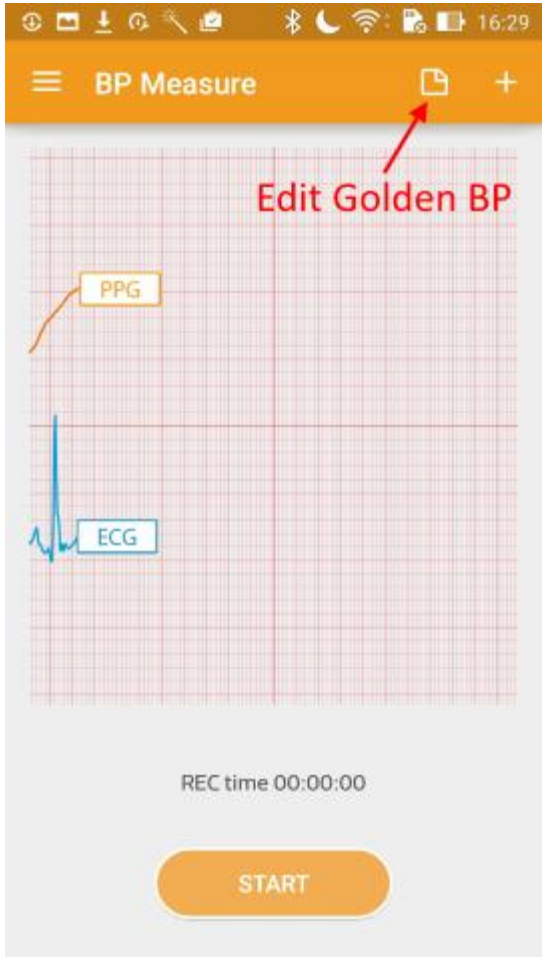
HR Measure

- Present bio-sensor data
  - Turn on heart rate measurement on your device and wait for a few seconds, you will see PPG chart, heart rate per minute and confidence level on the screen.
  - If you would like to edit the user information, click on the “+” sign to the upper right of the screen.
- 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).



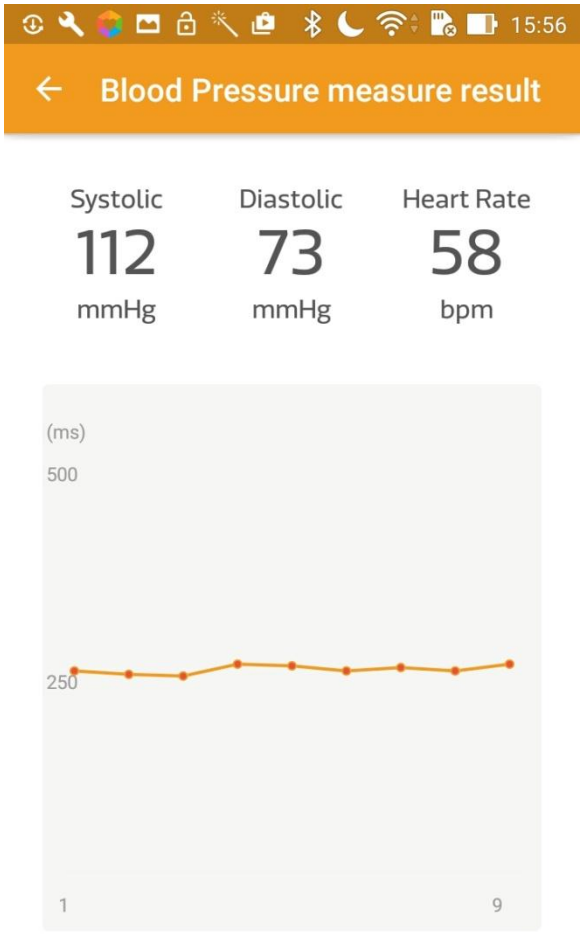
BP Measure – General Mode (1/3)

- 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 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).
  - 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.



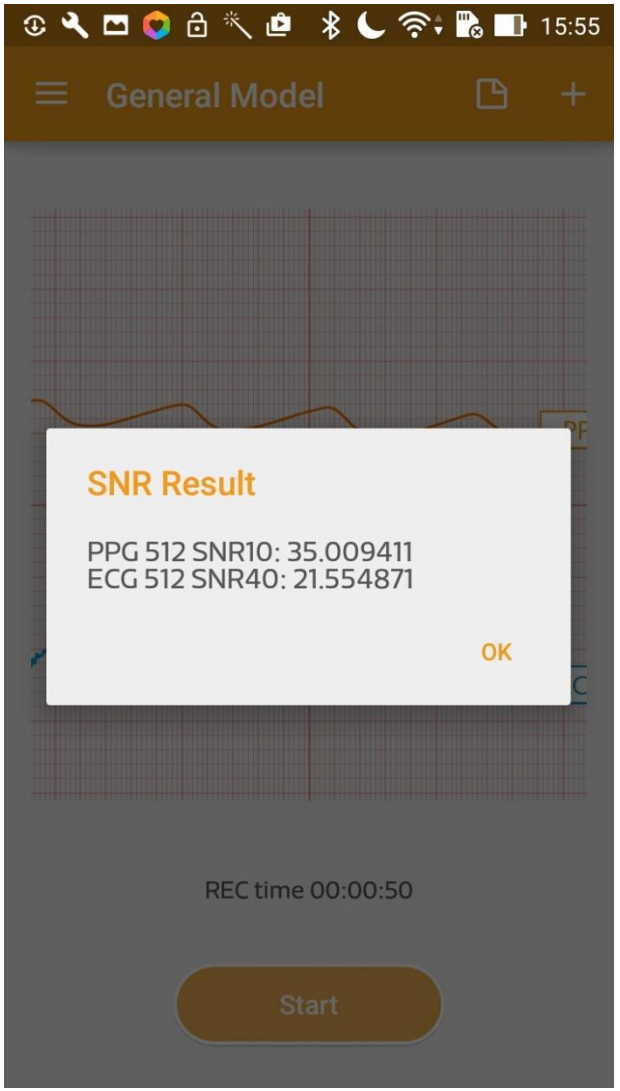
BP Measure – General Mode (2/3)

- Present blood pressure result
  - When the measurement finished, the result page will be shown to you, presenting systolic blood pressure, and diastolic blood pressure.
  - After the measurement the result is shown on the screen. Tap on the ← icon on the top left corner to get back to the measurement screen.



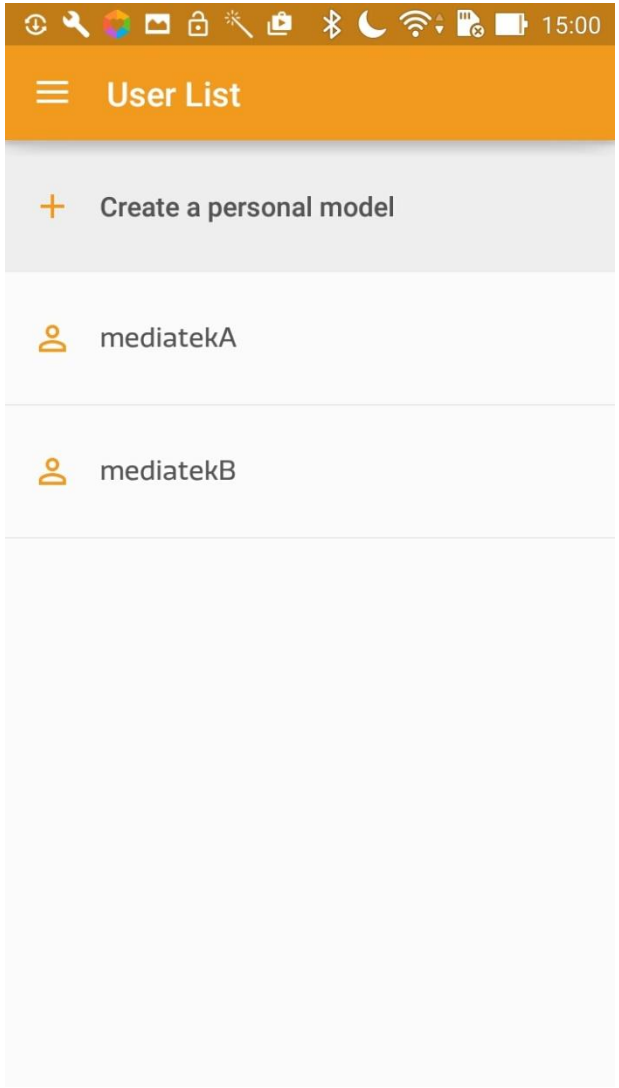
BP Measure – General Mode (3/3)

- If user store raw data, 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.



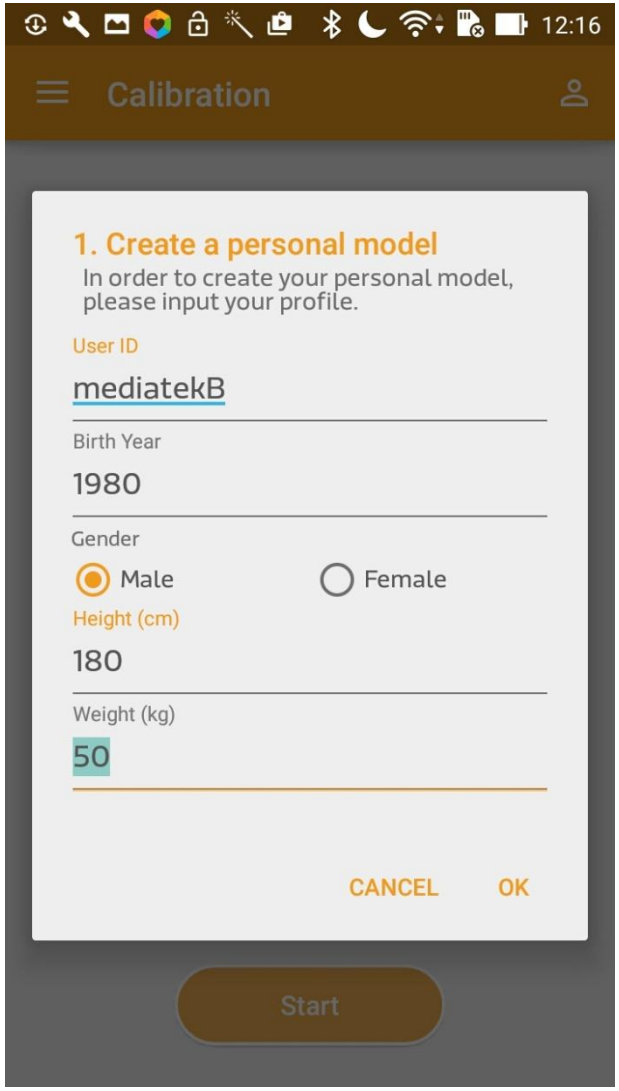
BP Measure – Personal Mode (1/6)

- 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.



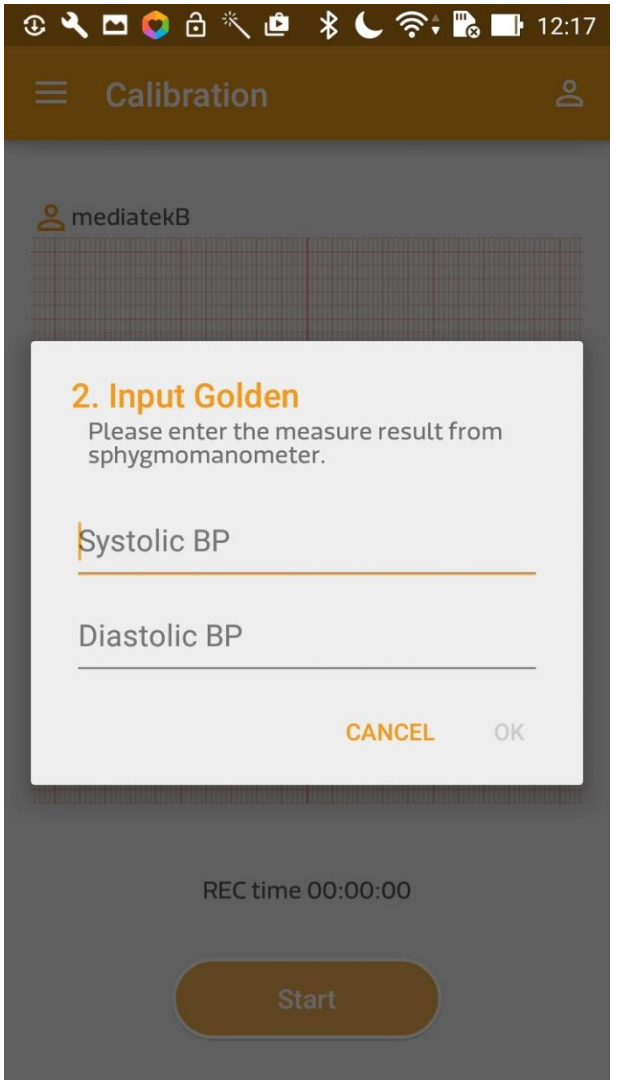
BP Measure – Personal Mode (2/6)

- 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/her 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.



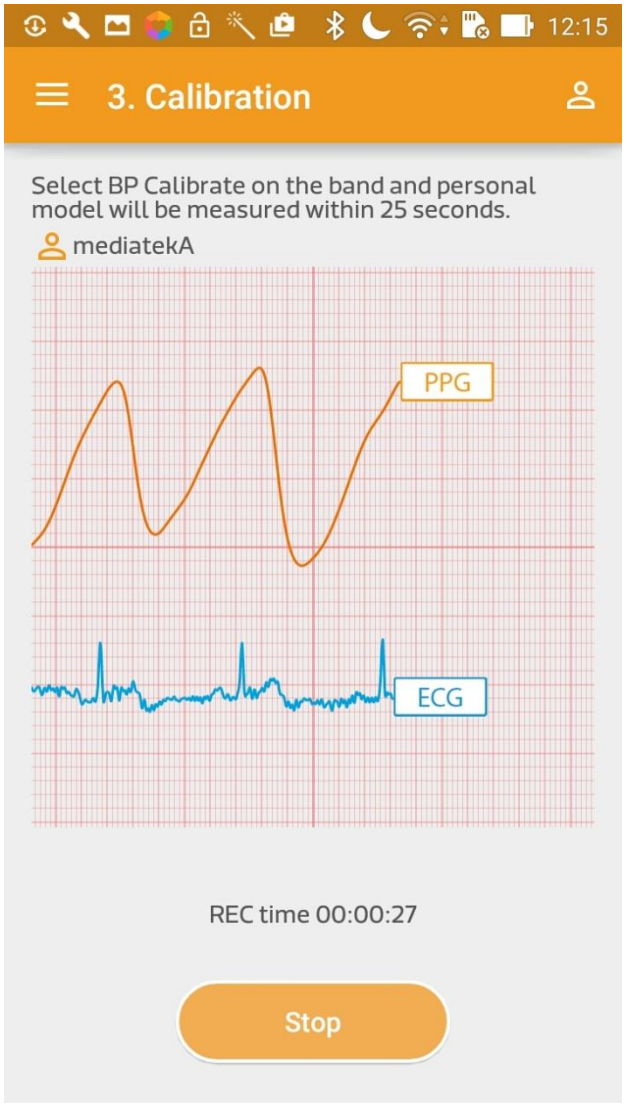
BP Measure – Personal Mode (3/6)

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



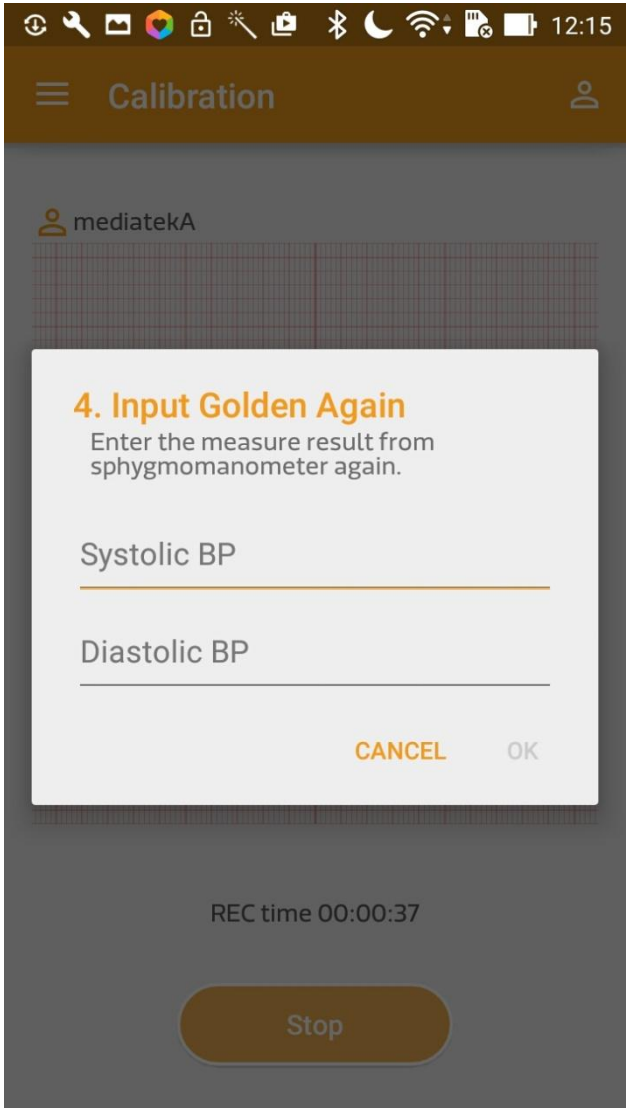
BP Measure – Personal Mode (4/6)

- In this step, user would switch features on the band and long press mode key to select BP Calibrate feature.
- 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.
- The raw data would be recorded in folder /CatchLog/ if the stat record button had been triggered before user's selecting action on band.



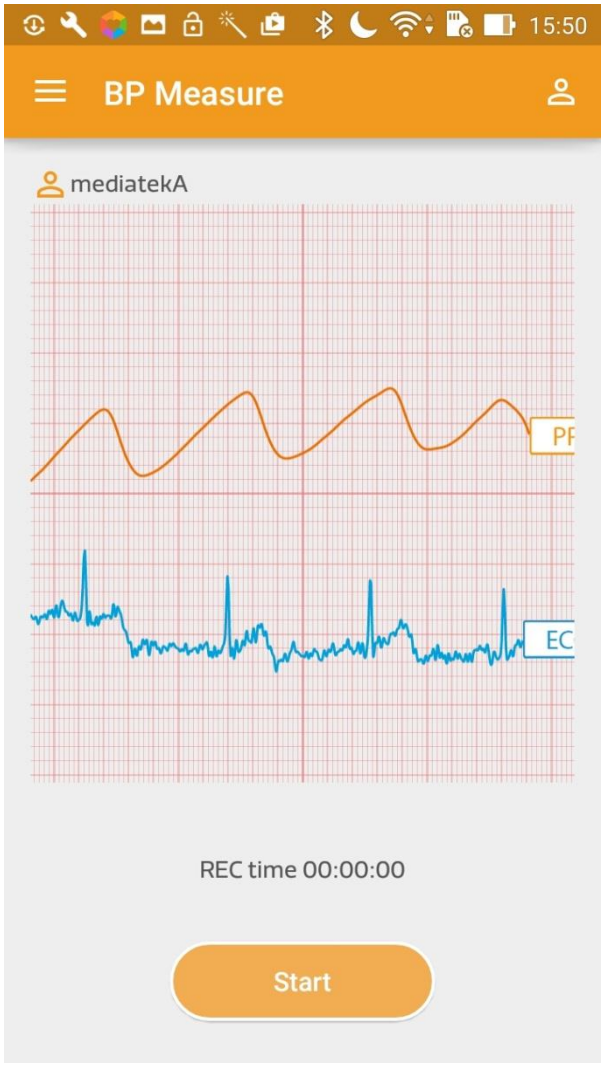
BP Measure – Personal Mode (5/6)

- After the personal model had been measured and transferred to SP, user will be asked to enter 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.



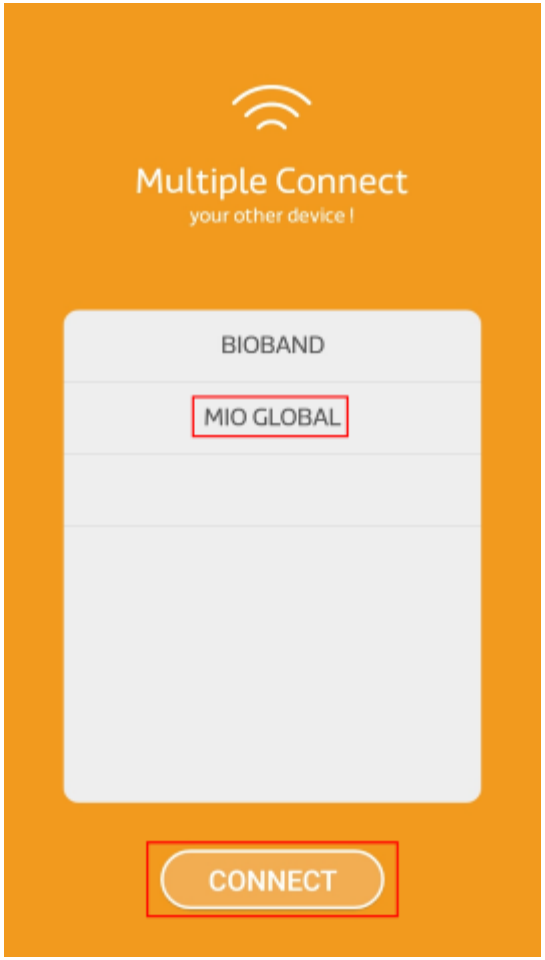
BP Measure – Personal Mode (6/6)

- When user chooses a personal model to measure blood pressure, his/her personal model would be set to the device.
- User can measure his/her blood pressure based on the personal model which he/she had created before through calibration process.
- Just like the process in general mode, If user store raw data, SNR10 for PPG and SNR40 for ECG would be shown.



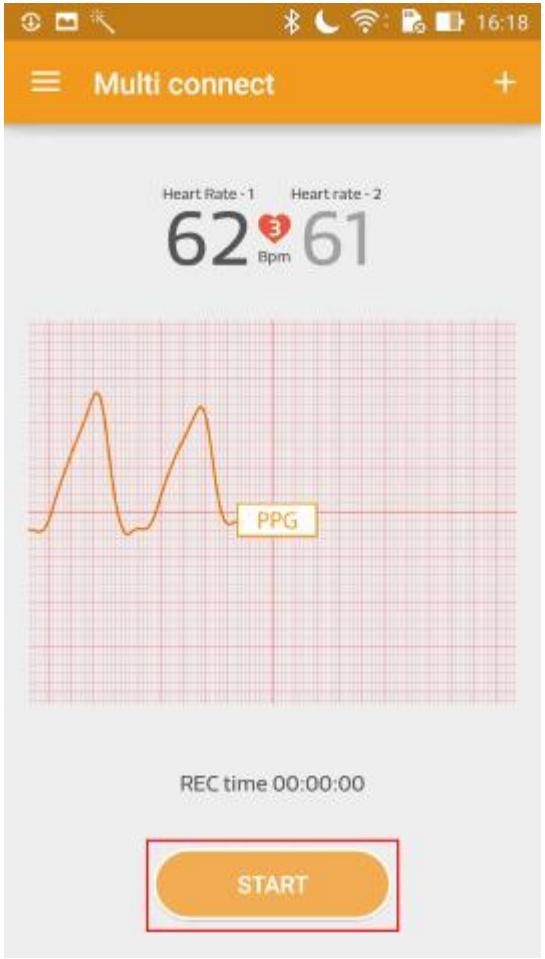
Multiple Connect (1/3)

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



Multiple Connect (2/3)

- Multiple connect feature
  - Heart rates from both devices will now show in the measure screen. Tap the “START” button to start a recording session.
  - Tap the stop button when you’re satisfied with the recording period.



Multiple Connect (3/3)

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