Test Plan Document for Matter Testing – Firmware, Cloud and Mobile Application

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1. Scope:

- MirAIe BLE and UDP Supported Firmware for RAC Product
- MirAIe ESP32 Hardware supported Firmware for RAC Product
- MirAIe Android and iOS Application with Matter BLE /MirAIe BLE/UDP Supported
- Matter BLE enabled product support in MirAIe and iOS Application
- Cloud Implementation for MirAIe BLE for RAC Product, Matter BLE

2. Objective:

To create **Cloud Environment** and Add Feature in **MirAIe Application** to enhance control using **MirAIe BLE and UDP Firmware**

MirAIe Cloud:

- New category to be introduced - MAC - Matter enabled AC
- New chip Type to be introduced - Possible Values - ESP8266, ESP32, ASR, RTL8710, MTK7625
- Provisioning (/devices) API needs to be enhanced to carry chip Type
- Provisioning API response needs to return VID, PID, Discriminator, Spake2 Verifier, Salt, etc.,
- New / Enhanced FOTA API to return the public key used to sign the image - To write the hash of the public key to the efuse
- Factory download API must take chip Type as argument in addition to category. This is to differentiate between Non-Matter enabled ACs with ESP32 and ESP8266. Front Load WMs with ASR and RTL chipsets.
- New API to give DAC-CSR as input and get DAC
- Explore if this API can add custom OIDs for VID and PID in the subject field of the certificate. The CSR may not carry these.
- Jenkins firmware build pipeline to take appropriate CD, build the firmware, take appropriate signing keys from KMS and sign the image. Also sign it with ESP tool
- New version of line test API to take the QR code base38 encoded value as input and return passcode and discriminator back to firmware
- New API to generate QR code by taking a PSN as input

MirAIe Application Android and iOS:

- As a User, I should be able to onboard any Panasonic device in a simplified way
- As a User, I should be able scan the Panasonic BLE supported devices and pair with the desired device
- As a User, I should be able to connect to the already Paired BLE device during the device onboarding
- As a User, I should be able to see the Onboarding messages or errors clearly while Onboarding via BLE
- As a User, I should be allowed to onboard the device using the conventional way of setting up the Panasonic device by bringing the device to setup mode

- As a User, I should be allowed to select between BLE/WiFi onboarding
- As a User, I should be allowed to scan the QR code, if it is available with the device to proceed with device onboarding/commissioning
- As a User, I should be allowed to onboard any supported matter device from any OEM
- As a User, I should be able to enjoy the complete features of any given Panasonic device, irrespective of it being matter or non-matter enabled
- As a User, I should be able to provide the Manual Pairing code (11 / 22 digits) as an alternative setup to onboard the device, if the device is matter enabled and the Pairing code is available
- As a User, I should be able to control the Panasonic device using MQTT and also be able to connect to the device locally and control it, if the internet is unavailable
- As a User, I should be able to clearly identify the matter enabled Panasonic or Non Panasonic devices that are on boarded on the application
- As a User, I should be able to see all the Non Panasonic devices in a designated area grouped based on device categories
- As a User, I should be able to remove and Matter or Non Matter device from MirAIe application
- As a User, I should be able to reach out to customer care, if any issues are found during Onboarding and Control failures
- As a User, I should be able re-onboard any matter or non-matter device
- As a User, I should be able to control all the non-Panasonic matter devices. All the supported controls should be clearly visible and intuitive
- As a User, I should be able to access all matter or non-matter devices on boarded on to my account from any mobile device login
- As a User, I should be able to see the device status online/Offline clearly (Includes MQTT/UDP control)
- As a User, I should be shown relevant error messages during control failures
- As a User, I should be able to control the device, if it is online

Firmware:

Bluetooth is given highest precedence for onboarding a fresh device. BLE device will be advertising on a fresh device and allow the central devices to scan and connect.

Steps

- Mobile Application should be able to scan the peripheral and connect to read the service and characteristics
- Mobile Application should be able to write information on to the characteristics and wait for the Indications
- Post service discovery, the Mobile application should be able to write the Onboarding payload on provided characteristics
- Mobile application should also be able to provide the preferred WiFi credentials for the device registration to succeed which required the WiFi home connection to be up and running.
- Post device registration, the device will fallback to internet and continue to publish information via MQTT
- Any error conditions will continue to work the same way, as it is now

- Note: Onboarding Payload on BLE will as same as WiFi AP, if fresh onboarding. If already commissioned or having fabrics in the BLE advertisements, WIFI Journey can be skipped (payload without WiFi credentials will be sent to device via BLE)

3. Testing Methods:

We are following Agile Methodology during development of Cloud, Firmware, Application.

a. Unit Testing

Unit Testing must need to perform by Software Developer during implementation of Business Logic [Requirement]

b. System and Integration Testing

System and Integration Testing need to perform by Developer after finish development to check code stability

c. Stress and performance Testing

Stress and performance Testing need to perform by Testing Team for make sure Feature must stable and no have adobe effect on other feature of then app

d. User Acceptance Testing

This is final testing to be done by Testing team for checking requirement, user based role testing

e. Regression Testing

This is part of Sanity to make sure after use one feature several times should not have crash, abnormalities in features

4. Hardware Requirement:

Below Hardware would be used to do testing

1. RAC AC with ESP32 Module
2. RAC AC with ESP 8266 Module
3. Laptop for Capture Log
4. Different brand / OS Version Android and iOS Phones
5. Flashing Jig

5. Testing Environment:

We are following Staging [Pre Prod] Test Environment for do Unit and Integration Testing.

Production Test Environment for do Stress, Performance, UAT and Regression Testing.

6. Testing Tools:

1. MQTT.fx for Simulation Control AC Functions
2. Android Studio for Capture Android Application Log
3. Postman for API Simulation
4. Putty for Capture Device Logs
5. Flashing and Provisioning Tool

7. Test Scenarios: Detailed Test Cases will provide in Excel Sheet

1. **Onboarding Matter Panasonic (Add by QR Scan) –MirAIe BLE**

   Pre-Conditions:

   a. A fresh unboxed device will broadcast BLE for 15 minutes
   b. And also will broadcast after each device restart, if the device is not paired with platform/app

   High Level Test Cases:

   - For Onboard Matter Panasonic Device, User need Scan QR code pasted on Device Packaging
   - Successful BLE advertisement, User will move to instructions page for commissioning / onboarding Device
   - User need to input home WiFi Credentials. Successful enter User move to commissioning state.
   - Successful commissioning, User move to Successful page
   - User must able to see commissioned or on boarded AC in MirAIe Application Dashboard

2. **Onboarding Matter Panasonic (Add by Device Type) –MirAIe BLE**

   Pre-Conditions:

   c. A fresh unboxed device will broadcast BLE for 15 minutes
   d. And also will broadcast after each device restart, if the device is not paired with platform/app

   High Level Test Cases:

   - User click on Add by Device Type, User must need to scan QR Code pasted on Device packaging
   - Successful BLE advertisement, User will move to instructions page for commissioning / onboarding Device
   - User need to input home WiFi Credentials. Successful enter User move to commissioning state.
   - Successful commissioning, User move to Successful page
   - User must able to see commissioned or on boarded AC in MirAIe Application Dashboard

3. **Onboarding Non-Matter Panasonic (Add by Device Type) -WiFi**

   Pre-conditions:

   a. Hardware must be ESP8266 /ESP32

   High Level Test Cases:

- User must able to select Panasonic AC from Add by Device list
- Selection must take user to instruction page
- User need to follow instruction to enable onboarding state
- User need to search device
- After search device successfully, user must need to add Home WiFi SSID and Password
- Click on connect user must able to onboard AC successfully

4. **Onboarding Non-Matter Panasonic (Add by QR Code) -WiFi**

   High Level Test Cases:
   - For Onboard Non-Matter Panasonic, User need Scan QR code pasted on Device Packaging
   - Selection must take user to instruction page
   - User need to follow instruction to enable onboarding state
   - User need to search device
   - After search device successfully, user must need to add Home WiFi SSID and Password
   - Click on connect user must able to onboard AC successfully

5. **Onboarding Matter non-Panasonic (Add by QR Code)- Matter BLE**

   Pre-Conditions:
   a. A fresh unboxed device will broadcast BLE for 15 minutes
   b. And also will broadcast after each device restart, if the device is not paired with platform/app

   High Level Test Cases:
   - For Onboard Matter Non-Panasonic product, User must need to scan QR Code
     If QR Code validation ok then user move to next page which show enable or disable WiFi, Bluetooth and location
   - User need to move next screen for check Set up instructions to commission or onboard device
   - If Device not onboard or available on other platforms, then user move to next page where he can enter WiFi SSID and Password
   - After successful onboarding / commissioning, User must land to Dashboard

6. **Onboarding Matter non-Panasonic (Using Manual Pairing Code)- Matter BLE**

   Pre-Conditions:
   c. A fresh unboxed device will broadcast BLE for 15 minutes
   d. And also will broadcast after each device restart, if the device is not paired with platform/app

   High Level Test Cases:
   - For Onboard Matter Non-Panasonic product, User must need to enter 11 or 22 Digit Manual pairing code. if code validation ok then user move to next page which show enable or disable WiFi, Bluetooth and location
   - User need to move next screen for check Set up instructions to commission or onboard device
   - If Device not onboard or available on other platforms, then user move to next page where he can enter WiFi SSID and Password
   - After successful onboarding / commissioning, User must land to Dashboard

7. **UDP Local Control**
   - To support local control below conditions, need to met

- Mobile app should be connected over WiFi.
- WiFi is not having Internet connectivity.
- User's location coordinates should be in the vicinity of Home Location coordinates (Range we can decide)
- Device IP discovery should be happening only once during app launch and should be re-used for all control/status related query. For any error case App will go in discovery mode first and after that retry the requested operation.
- Cloud will issue symmetric keys using API to app and firmware both for secure communication.
- If Mobile supports dual channel (WiFi and Mobile Data) parallelly, mobile app need to send the status over MQTT to update cloud for any local control changes so that other connected device should be in sync.
- For Device status (/status topic), Mobile app will poll the firmware periodically.
- For Connection status (/connectionStatus topic) App will use status from point-5 to show device connection status(online/offline).

8. Feature to be Tested

- Onboarding of Device [ESP 32] through WiFi AP
- Onboarding for ESP32 Through MirAIe BLE
- Onboarding for ESP32 Through Matter BLE
- Control and Feature Testing for MirAIe BLE enabled product on Remote and Local control
- Control and Feature Testing for Matter BLE enabled product
- Validation of Online and Offline Status for All Products including MirAIe and Matter BLE
- Matter Panasonic device will rely on MirAIe BLE for commissioning and Post registration with cloud will be controlled VIA MQTT or MirAIe Local UDP control
- Non Matter Panasonic devices will use MirAIe BLE channel for commissioning (On BLE advertisements) and can be controlled VIA MQTT or MirAIe Local UDP control (If UDP is supported).
- Matter Non Panasonic devices will use Matter BLE/DNS SD for commissioning and can be controlled via Matter DNS

9. Feature not to be Tested

- Onboarding for ESP 8266 through WiFi AP

10. Resources and Roles & Responsivity

Testing Resources:

Shrikant Nandanwar –IIC – Responsible for Test Plan, Test Cases

Nithesh / Anil – Responsible for Test Cases / Test Execution

11. Schedules

Test Documents	Date
Test Plan	31.08.2023
Test Cases	14.09.2023
Test Execution – Bug Reporting	15.09.2023
Test Closure Report	01.10.2023

12. Dependencies

All Test Executions depend upon below

a. Firmware availability

b. Android and iOS Application

c. Cloud Implementation

d. ESP32 Hardware

e. Matter BLE Enabled Products

13. Risk and Assumptions

- If Firmware and Application not available in given timeline, then Test might get delayed.
- Delayed timeline we need to discuss and mitigate with some other contingency plan like increase work hours or manpower

14. Approvals

Test Approvals:

Internal Approvals for go live on Playstore or AppStore: Manish Misra, Yuki Kasai

Mobile Application Approval: Anurag Shrivastava

Firmware Approval: Murali Maheswara Reddy Thadigotla

QA Approval: Shrikant Nandanwar