Technical Design Document (TDD)

1. **Purpose**

- The purpose of this document is to outline the design specifications for new features or systems, ensuring alignment across the development team.

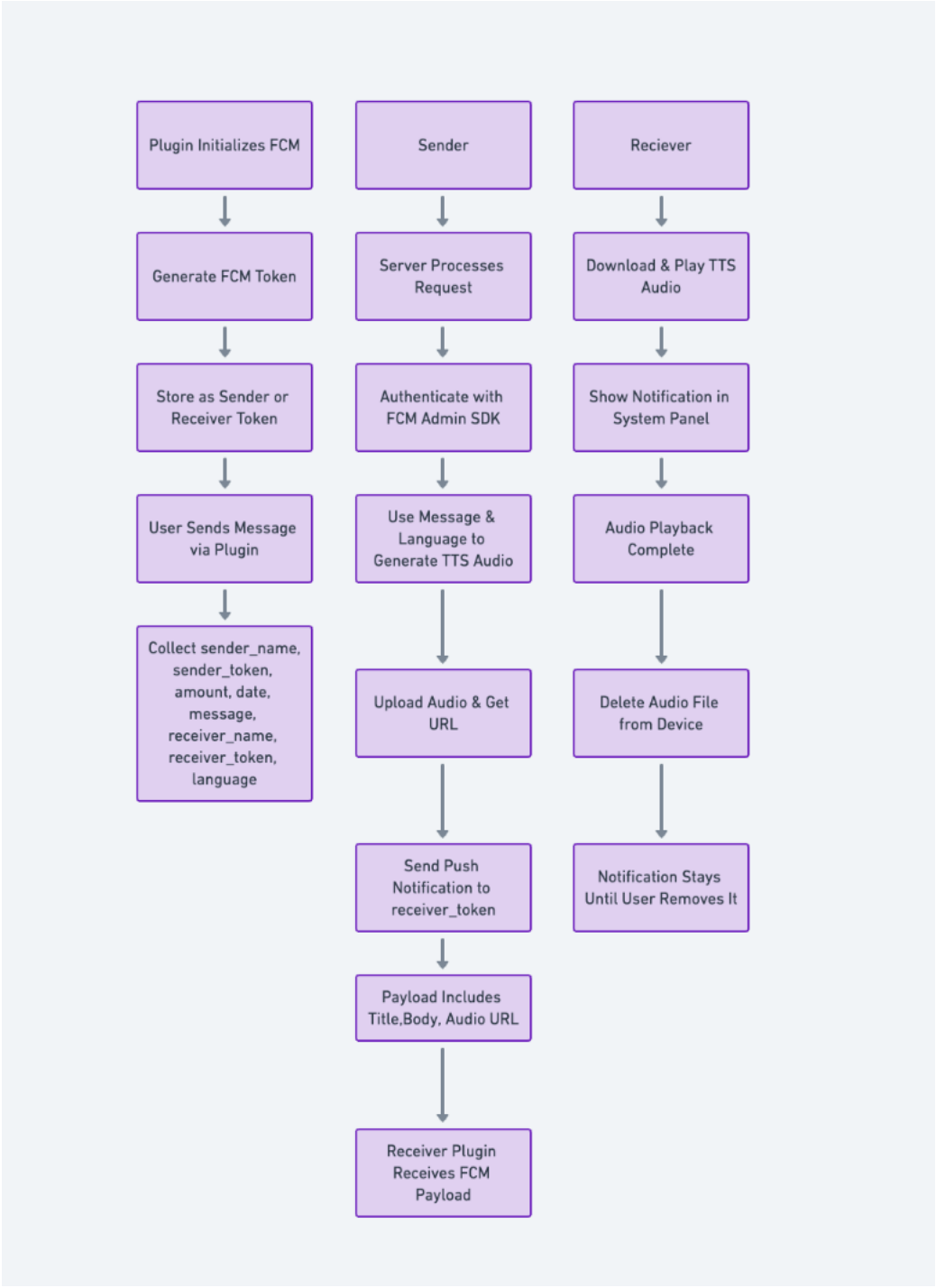
2. Introduction

- Title: **Payment Notifier Plugin**
- Version: **1.0.0**
- Author: **Rohan Batra**
- Date: **25 June 2025**

3. Objectives

- **Objective 1: Enable Real-Time Audio Messaging**
  - Allow users to send and receive real-time, voice-based messages using Firebase Cloud Messaging (FCM) and Text-to-Speech (TTS) technology.
- **Objective 2: Ensure Reliable Cross-Device Communication**
  - Guarantee message delivery between different devices using unique FCM tokens for sender and receiver.
- **Objective 3: Automate Message-to-Audio Conversion**
  - Automatically convert text messages to audio on the server side using TTS services based on the selected language.
- **Objective 4: Manage Audio File Lifecycle Efficiently**
  - Download, play, and delete TTS audio files on the receiver's device to optimize storage and performance.
- **Objective 6: Provide Clear and Accessible Notifications**
  - Display system notifications with message metadata and playback support for accessibility and user awareness
- **Objective 7: Support Multilingual Messaging**
  - Generate TTS audio based on user-specified language settings for broader user inclusivity.

4. Architecture Diagram



6. Design Details

- **FCM Token Manager:**
    - ***Description***: Handles the initialization of Firebase Cloud Messaging (FCM) and generates unique tokens for sender and receiver devices.
    - ***Responsibilities***:
        - Initialize FCM on device startup
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    - ***Dependencies:***
        - Firebase SDK
        - Internet Connectivity
- **Message Composer:**
    - ***Description:*** Gathers user input and compiles all data needed to send a message.
    - ***Responsibilities:***
        - Collect sender name, token, message content, receiver details, date, amount, and language.
        - Structure data in JSON payload
        - Trigger HTTP post request to backend (/send)
    - ***Dependencies:***
        - Input Data
        - Network Access
- **Backend Server Processor:**
    - ***Description:*** Central server that receives the message data and process it using Firebase Admin SDK, language translation and Text To Speech(TTS) generation.
    - ***Responsibilities:***
        - Authenticate with Firebase Admin SDK
        - Parse message content and language text from JSON payload
        - Translate message from English to required language
        - Generate TTS using translated message
        - Save audio file to storage
        - Send a push notification to receiver with the title,body,audio url
    - ***Dependencies:***
        - Firebase Admin SDK
        - Bhashini Text Translation API
        - Bhashini Text To Seech API
        - Network Access

- **Receivers Plugin:**
  - ***Description:*** Listen for upcoming FCM payloads and downloads the audio ,plays it and manages cleanup

  - ***Responsibilities:***
    - Receives push notification from FCM
    - Parse payload
    - Download audio file
    - Play audio and display notification
    - Delete local audio file after playback

  - ***Dependencies:***
    - Firebase Messaging Listener
    - Storage access permissions
    - Audio player Component

7. API Specifications

- **Endpoint: POST /send**
  - ***Purpose:*** Accepts message data from the sender's plugin, processes it (translation+ TTS), and sends a push notification to the receivers via FCM
  - ***Request:***
    - **Method:** POST
    - **Content-Type:** application/json
    - **Body:** fromName, fromToken, message, send_lang, date, toName, toToken, amount
  - **Response:**
    - **Succes:** 200 {error:false,messageid:xxxxx}
    - **Failure:** 500 {error true,messageid:null}
- **Endpoint: GET /audio**
  - ***Purpose:*** Accepts the audio filename from the receiver's plugin and sends the audio file as an attachment
  - ***Request:***
    - **Method:** GET
    - **Content-Type:** text/html
    - **Body:** filename
  - **Response:**
    - **Succes:** 200 <audiofile>.wav
    - **Failure:** 404 Audio file not found

8. Implementation Plan

- Step 1: **Firebase Setup**
  - Register app in Firebase Console.
  - Enable FCM and generate service account credentials.
- Step 2: **Token Generation**
  - Implement FCM token generation.
  - Save sender/receiver tokens securely.
- Step 3: **Message Composer UI**
  - Build sender-side UI for sending message.
  - Validate inputs before sending.
- Step 4: **API Development**
  - Create /send POST, /audio GET endpoint on backend.
  - Parse and validate the inputs.
- Step 5: **Translation and Text To Speech integration**
  - Implement Bhashini Translation API to translate message to target language.
  - Implement Bhashini TTS API for generating audio from translated message.
  - Save audio file and generate url.
- Step 6: **Push Notifications**
  - Sends FCM notification to receiver's token with payload.
- Step 7: **Receiver's Side**
  - Implement payload listener.
  - Download audio from url in payload.
  - Display notification and play audio.
  - Delete downloaded audio after playback.
  - Ensure notification persists until dismissed.