

# ActivLine Mobile Application

Project Proposal



By Vinutha Nagraj from Kods Technologies

for easy understanding we are considering "Activline Internet" as name of the project

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# KODS TECHNOLOGIES PVT.LTD.

## Introduction

**Dear Team,**

On behalf of the entire team here at Kods, I want to thank you for the opportunity to earn your business as your provider of Software development services. There are few companies worldwide offering these services that you could have chosen, and yet here we are, with an opportunity to earn your business. I cannot express how much we appreciate being able to put this project proposal in front of you today.

At Kods we believe in standing out. We stand out as a software development company by insisting on pushing the boundaries of website, software & app performance, and by delivering work of the highest quality on time and on budget. Our mission to stand out doesn't stop with our internal goals. After all, our client's satisfaction is what keeps our doors open, and helping you stand out is the best way to make sure you're completely satisfied.

We're committed to helping your brand stand out in a crowded market, against a sea of hungry competitors. I've included a lot of detail in this project agreement, because I want to make it abundantly clear that Kods is one of the best Software Development Company in the business today. You'll find details regarding the functionality of your future project, our development process and complete project details in trailing pages.

— **Vinutha Nagraj**  
Chief Operations Officer

## 1. Executive Summary & Strategic Vision

ActivLine is embarking on a strategic initiative to redefine the fiber internet service experience. In a highly competitive Internet Service Provider (ISP) market, customer retention is driven not merely by connection speed, but by the quality, accessibility, and transparency of service and support. The proposed solution is a holistic Digital Transformation Platform designed to migrate ActivLine from a traditional, manual support model to a modern, automated, self-service ecosystem.

This project involves the engineering of two sophisticated, interconnected software products: a high-performance, cross-platform Mobile Application for end-users and a centralized, data-driven Admin Control Panel for operational staff. By leveraging cutting-edge technologies, we aim to empower customers with total control over their connection lifecycle—from billing and data usage to technical troubleshooting and service requests—while providing the ActivLine team with granular visibility and management capabilities over the entire business operation.

The ultimate goal is to reduce operational costs associated with support calls, improve cash flow through easier payment methods, and increase customer lifetime value through a superior digital experience.

## 2. Technical Architecture & Stack Selection

To deliver a robust, scalable, and future-proof solution, we have selected an industry-standard technology stack that prioritizes performance, maintainability, and rapid deployment.

### A. User Mobile Application: Google Flutter Framework

For the customer-facing mobile interface, we will utilize the **Flutter** framework. This choice allows us to compile native applications for both **Android** and **iOS** from a single, unified codebase.

- **High-Performance Rendering:** Flutter's Skia rendering engine ensures the app runs at a smooth 60 frames per second, providing a premium, responsive feel essential for a modern utility app. This eliminates the "jank" often associated with hybrid apps.
- **Unified UI/UX:** The UI will remain consistent across disparate device sizes, aspect ratios, and operating system versions, reducing long-term maintenance overhead.

- **Native Capabilities:** Flutter provides deep access to native device features such as GPS for location tracking (essential for new installation requests), local storage for caching session data, and biometric authentication sensors.

## B. Admin Panel & Backend Infrastructure: The MERN Stack

The administrative backbone and the API layer will be constructed using the **MERN Stack** (MongoDB, Express.js, React.js, Node.js), a powerful, full-stack JavaScript ecosystem.

- **Frontend (Admin Panel): React.js:** We will build a Single Page Application (SPA) that offers a desktop-class user experience. React's component-based architecture allows for complex, interactive interfaces like real-time dashboards and chat windows to update dynamically without requiring page reloads.
- **Backend API: Node.js & Express.js:** This layer will handle all business logic, authentication, and third-party integrations. Its non-blocking, event-driven architecture is ideal for handling thousands of concurrent connections, real-time chat sockets (via Socket.io), and high-volume data metering streams.
- **Database: MongoDB:** A NoSQL database chosen for its flexibility and scalability. It will efficiently store unstructured and semi-structured data such as varied user profiles, complex ticket logs with chat histories, and diverse transaction records without rigid schema constraints.

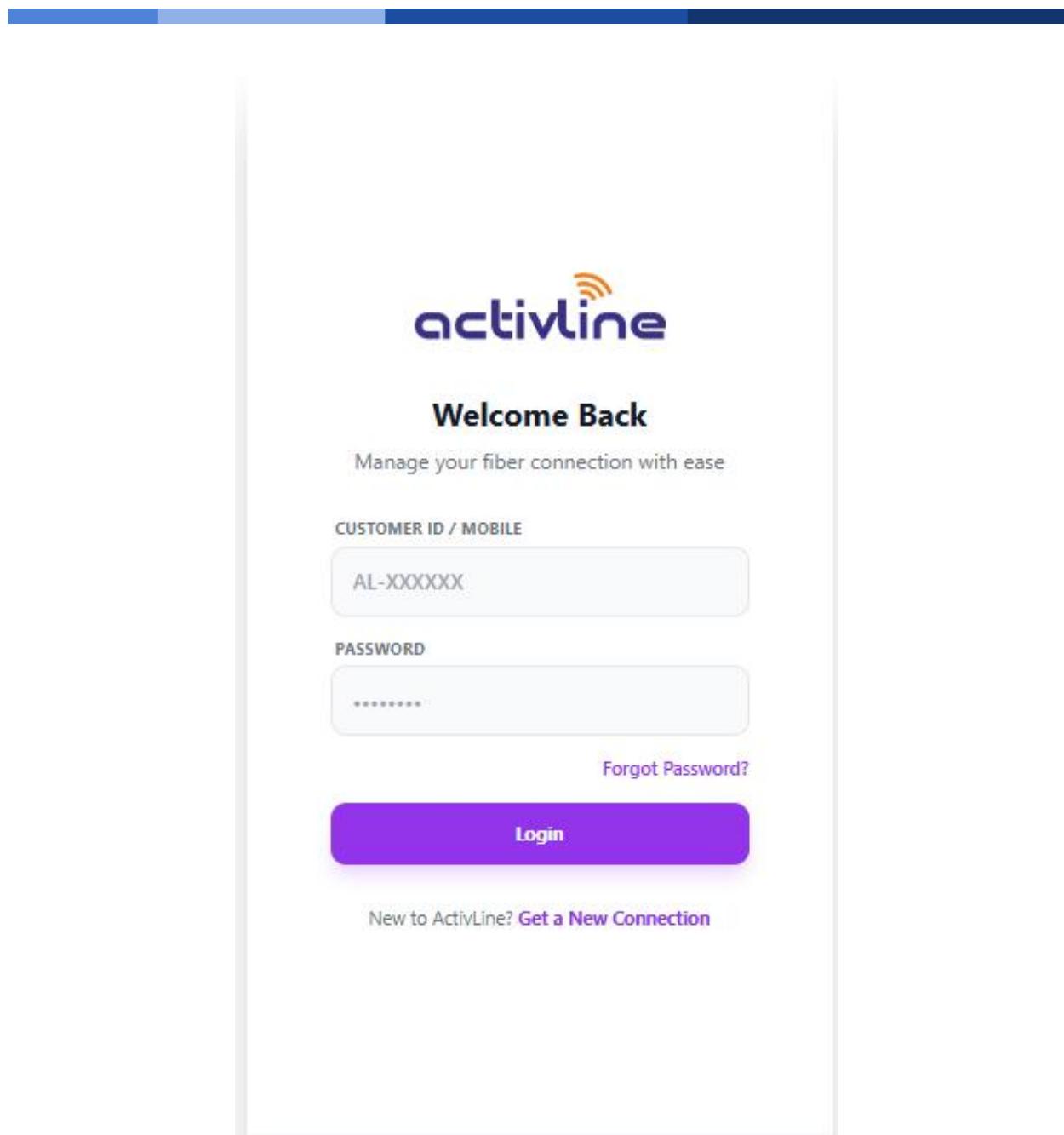
## 3. Module I: The ActivLine User Mobile Application

The user application is the primary touchpoint for the customer. The design philosophy focuses on "Self-Care," enabling users to resolve issues, pay bills, and manage their services instantly.

### 3.1 Authentication & Onboarding Ecosystem

**Login Screen** The entry experience is designed to be frictionless yet secure.

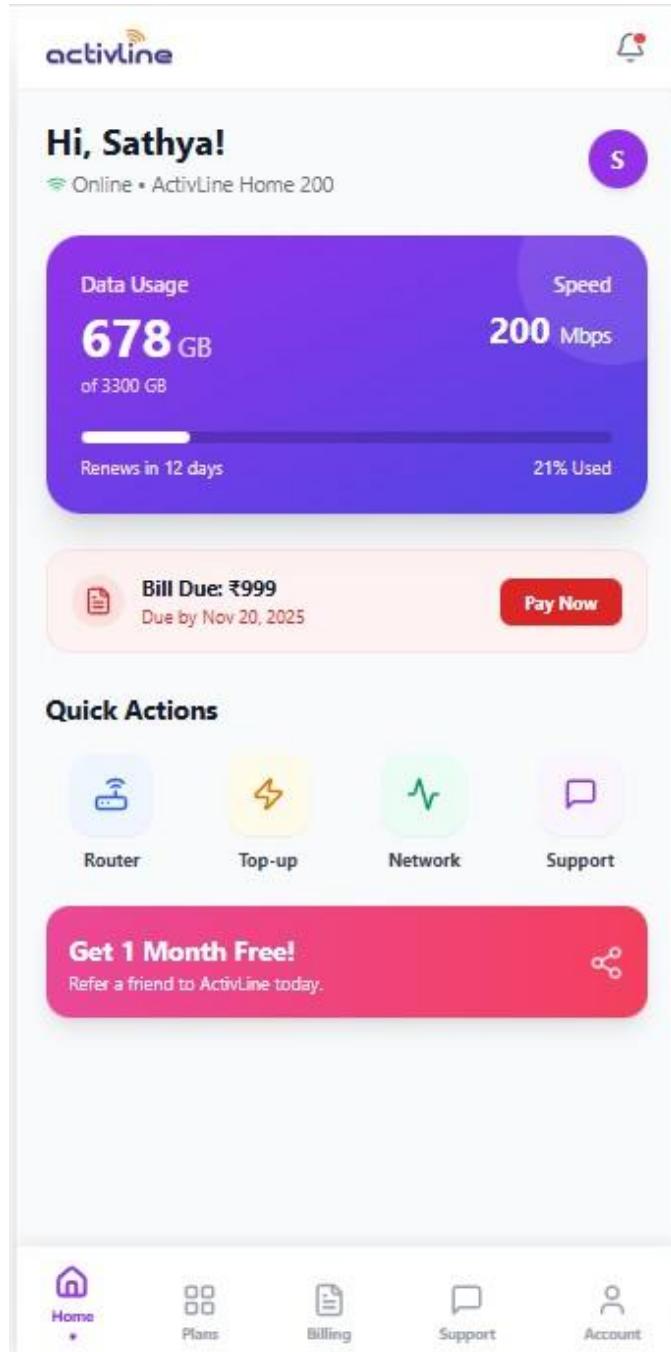
- **User Inputs:** Field for Registered Mobile Number (RMN) or Customer ID, and a Password field with a "Show/Hide" toggle.
- **Biometric Integration:** Once the first login is successful, the app will prompt users to enable FaceID or Fingerprint login for subsequent sessions, removing friction.
- **Validation Logic:** Real-time validation to ensure phone numbers follow the correct format and fields are not empty before submission.
- **Account Recovery:** A secure "Forgot Password" workflow allows users to reset credentials via OTP verification sent to their registered mobile or email, reducing helpdesk calls for password resets.



**New Connection Registration** To drive user acquisition, the app features a public-facing registration module accessible without logging in.

- **Lead Capture Form:** Prospective customers can submit a digital application for a new fiber connection. The form captures essential lead data including Full Name, Mobile Number, Email Address, and Installation Address.
- **Geolocation:** An integrated map feature allows users to pin their exact location, providing the field team with precise coordinates for feasibility checks.
- **Backend Sync:** This data is instantly synchronized with the Admin Panel's lead management system for immediate follow-up by the sales team.

### 3.2 The Dashboard (Command Center)



**Real-Time Data Usage Meter** The hero section of the dashboard features a sophisticated circular visualization of data consumption.

- **Dynamic Visualization:** It displays the data used versus the total quota (e.g., "678 GB of 3300 GB used"). The graphical interface changes color (Green -> Amber ->

Red) based on consumption thresholds (e.g., turning red when 90% of data is exhausted).

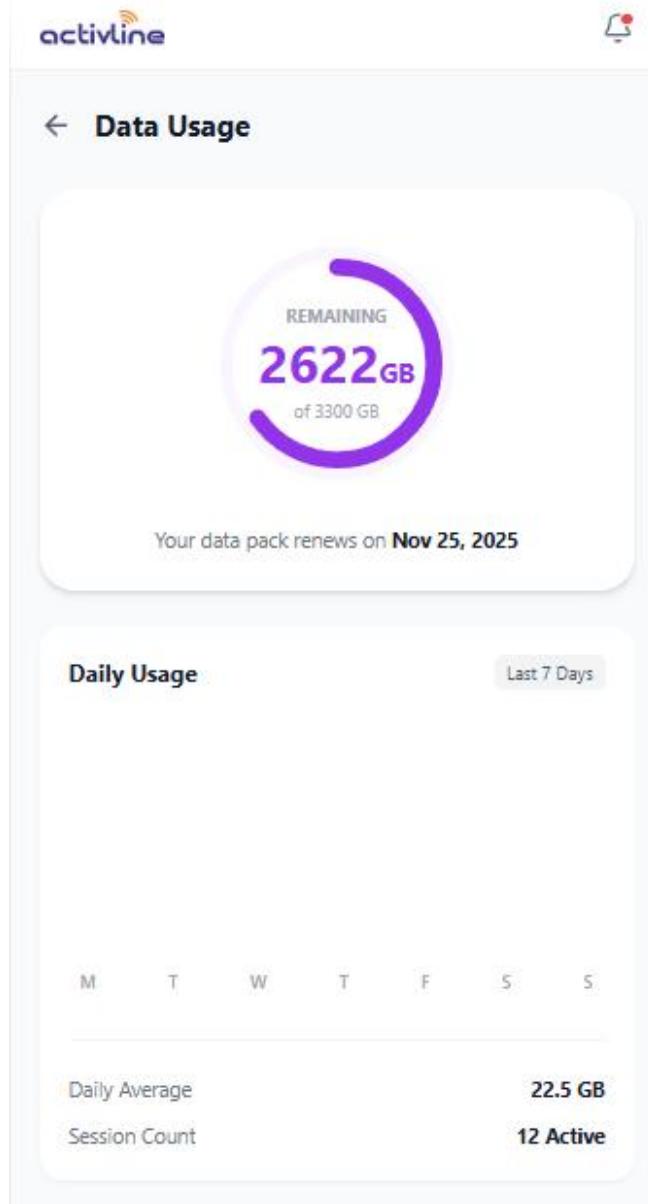
- **Plan Context:** It also clearly displays the plan expiry date and a countdown to renewal ("Renews in 5 days").

**Service Health Monitor** A live status indicator ("Online" or "Offline") gives users immediate confirmation of their connectivity status. This connects to the backend network monitoring APIs to reflect the actual line status, reducing ambiguity during connectivity issues.

**Smart Billing Widget** The dashboard utilizes conditional logic to display a Billing Card only when a payment is due. If a user has an unpaid invoice, a prominent card appears in red, showing the exact outstanding amount and due date, with a "Pay Now" button that shortcuts directly to the payment gateway.

**Quick Actions Grid** Based on user behavior analysis, the most frequently accessed features—Router Management, Top-ups, Network Status, and Support—are elevated to the dashboard in a quick-access grid, minimizing the number of taps required to perform key tasks.

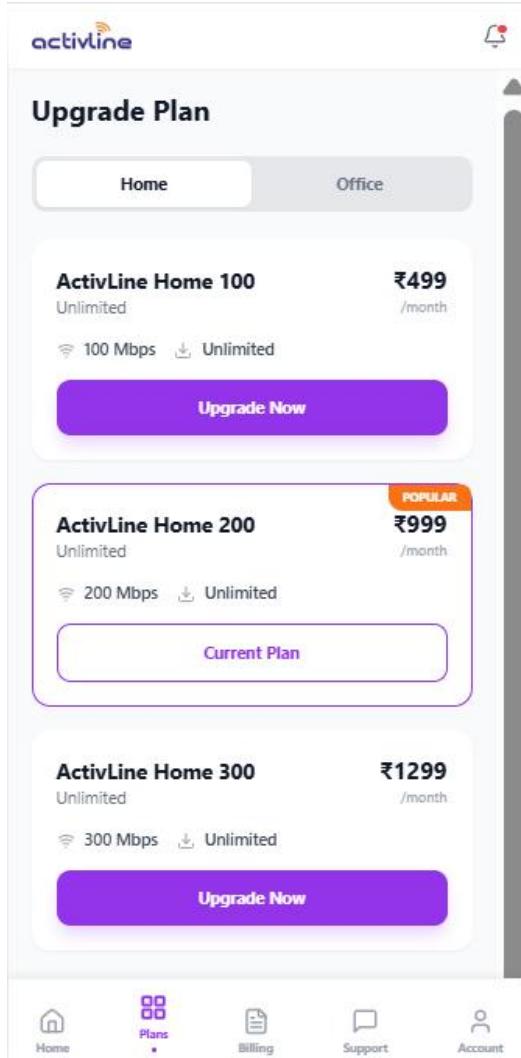
### 3.3 Detailed Usage Analytics



This screen provides deep transparency into internet consumption, addressing common user queries about data exhaustion.

- **Daily Usage Bar Chart:** A visual graph plots data consumption over the last 7 days, allowing users to identify usage patterns and peak activity days.
- **Session Intelligence:** The screen displays the "Daily Average" consumption and the number of active sessions, derived from the radius server logs.
- **Historical Data:** Users can toggle between Weekly and Monthly views to see long-term trends.

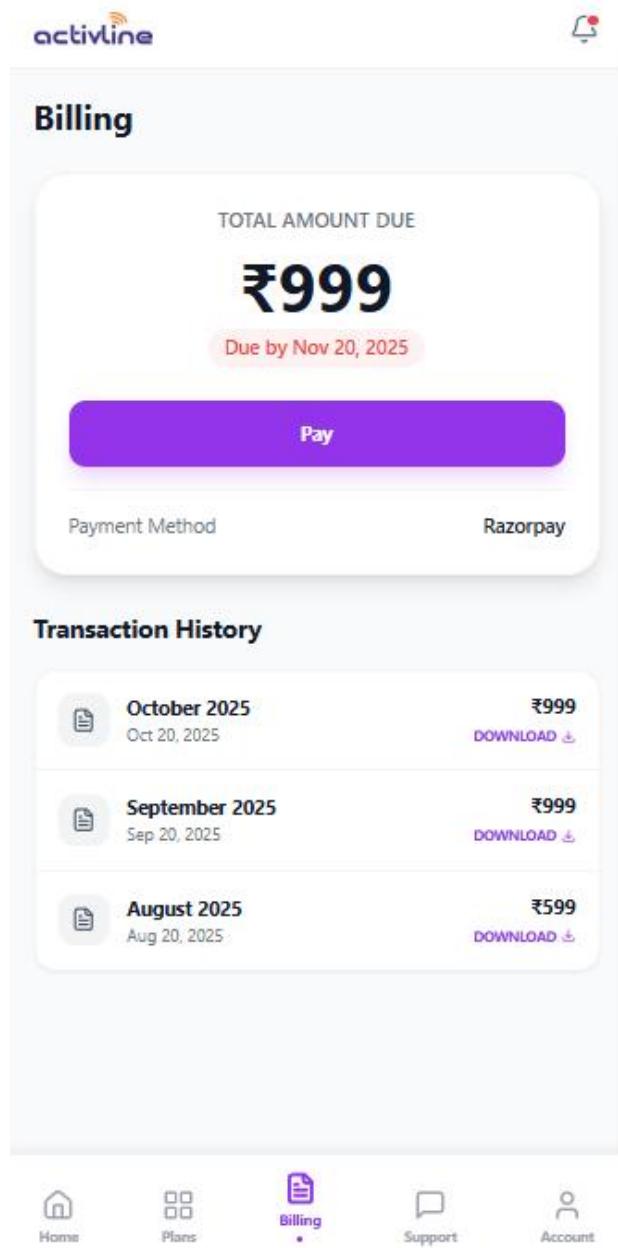
### 3.4 Plan Management & Upgrades



A catalog interface designed to upsell higher-value plans.

- **Segmented View:** Users can toggle between "Home" and "Office" plan categories to filter relevant options.
- **Rich Plan Cards:** Each plan is presented with clear details on Speed (e.g., 200 Mbps), Data Limits (Unlimited/FUP), and Price. High-value plans are tagged with "Popular" or "Best Value" badges to guide decision-making.
- **Comparison Logic:** The user's active plan is visually distinct and labeled "Current Plan," preventing accidental re-purchase.
- **Instant Upgrade Flow:** Users can select a higher-tier plan and upgrade immediately. The system handles the pro-rata calculation and directs the user to the payment gateway to cover the difference for the remaining billing days.

### 3.5 Billing & Payments Hub



A centralized financial ledger for the customer.

- **Amount Due Display:** A clear breakdown of the current payable amount, inclusive of taxes, with a prominent "Due Date" indicator.

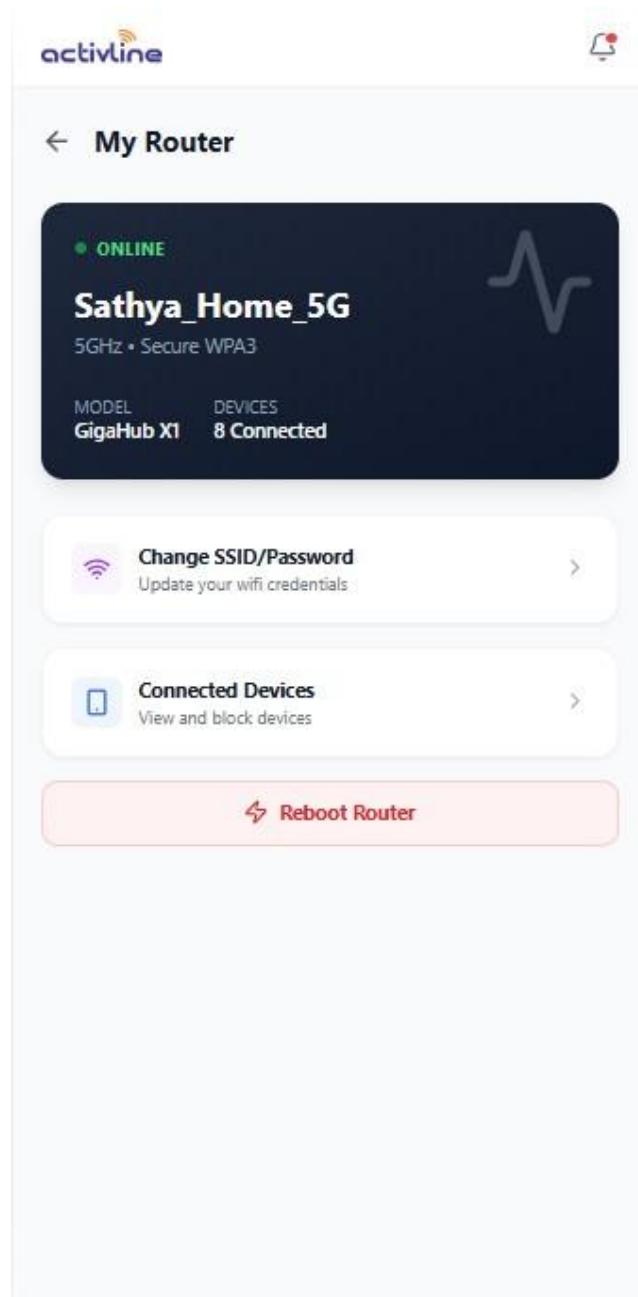
- **Razorpay Integration:** Clicking "Pay" initiates a seamless, embedded checkout experience via Razorpay. Users can complete transactions using UPI, Credit Cards, Debit Cards, or Netbanking without leaving the app environment.
- **Transaction Archives:** A chronological history list of all past invoices. Each record shows the Billing Month, Amount Paid, Transaction ID, and Date.
- **Invoice Download:** Users can generate and download official PDF tax invoices for every past transaction directly to their device storage for tax and reimbursement purposes.

### 3.6 Wallet & Payment Methods

To facilitate recurring revenue, this screen simplifies the payment process.

- **Tokenized Cards:** Users can view a list of their saved payment methods. For security, card details are masked, showing only the card network (Visa/Mastercard) and the last four digits.
- **Payment Method Management:** Users can delete expired cards or add new ones (via a nominal verification charge).
- **Auto-Pay Configuration:** A master toggle allows users to enable automatic monthly debits, ensuring they never face disconnection due to late payments.

### 3.7 Router Management Interface

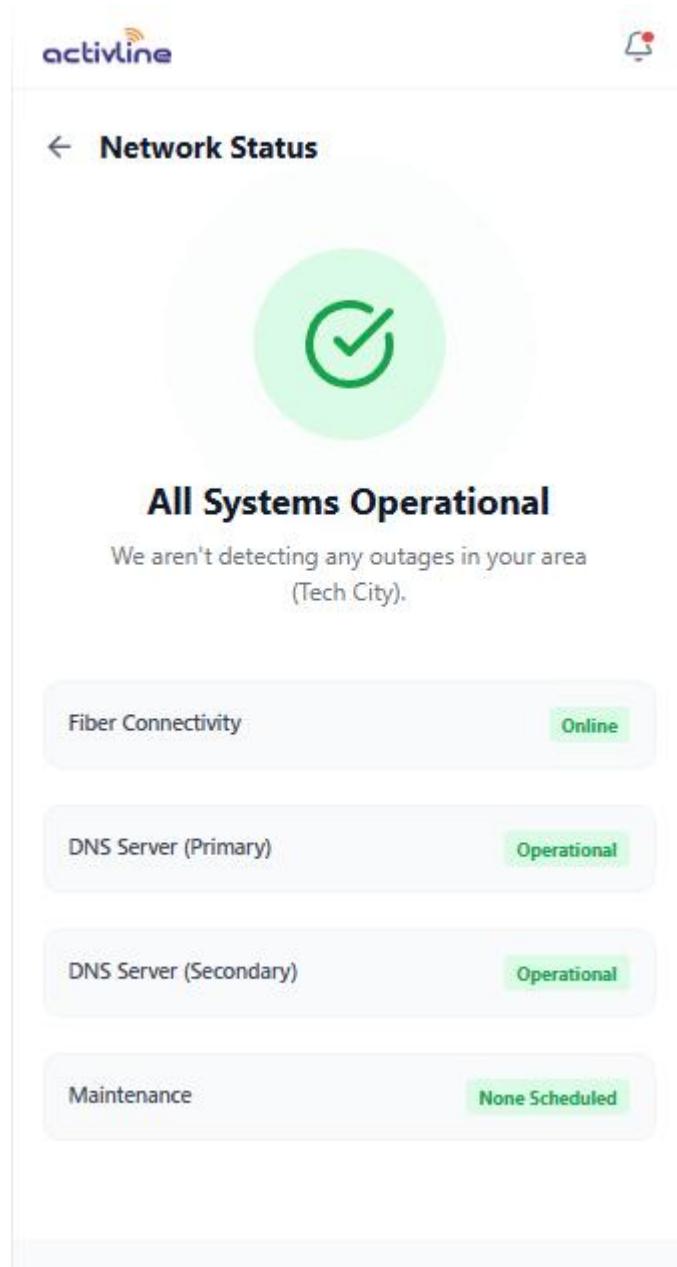


This advanced feature interfaces with compatible CPE (Customer Premise Equipment) via TR-069 or API to give users technical control.

- **Live Status:** Displays real-time router uptime, firmware version, and the specific model of the hardware.

- **Credential Management:** Users can change their Wi-Fi SSID (Name) and Password remotely. This feature significantly reduces technical support call volume related to password resets.
- **Device Monitoring:** A list shows the number of currently connected devices (e.g., "5 Devices Connected").
- **Remote Reboot:** A "Reboot" button sends a command to the router to restart, offering a self-service fix for minor connectivity glitches without waiting for a technician.

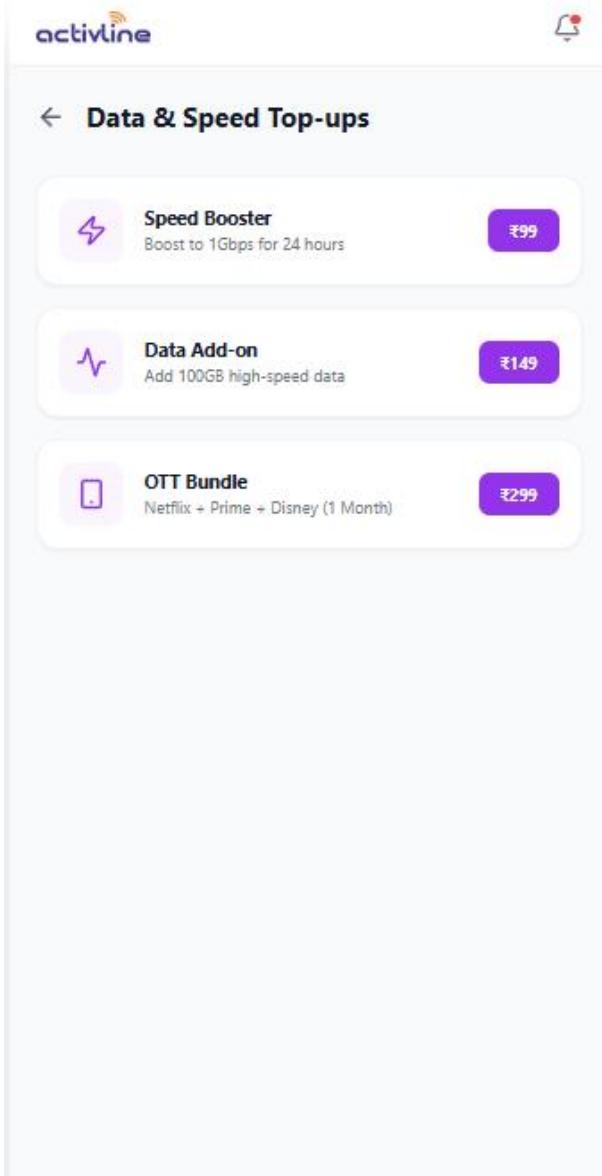
### 3.8 Network Health & Outage Map



A transparency tool to build customer trust during downtime.

- **System Status:** A global indicator shows if the ActivLine network is fully operational or experiencing a partial/major outage.
- **Component Drill-down:** Detailed status checks for critical infrastructure components like Fiber Connectivity, Primary DNS, and Secondary DNS.
- **Maintenance Alerts:** Displays scheduled maintenance windows so users can plan their usage accordingly. If an outage is detected in the user's area, a banner informs them, preventing unnecessary ticket creation.

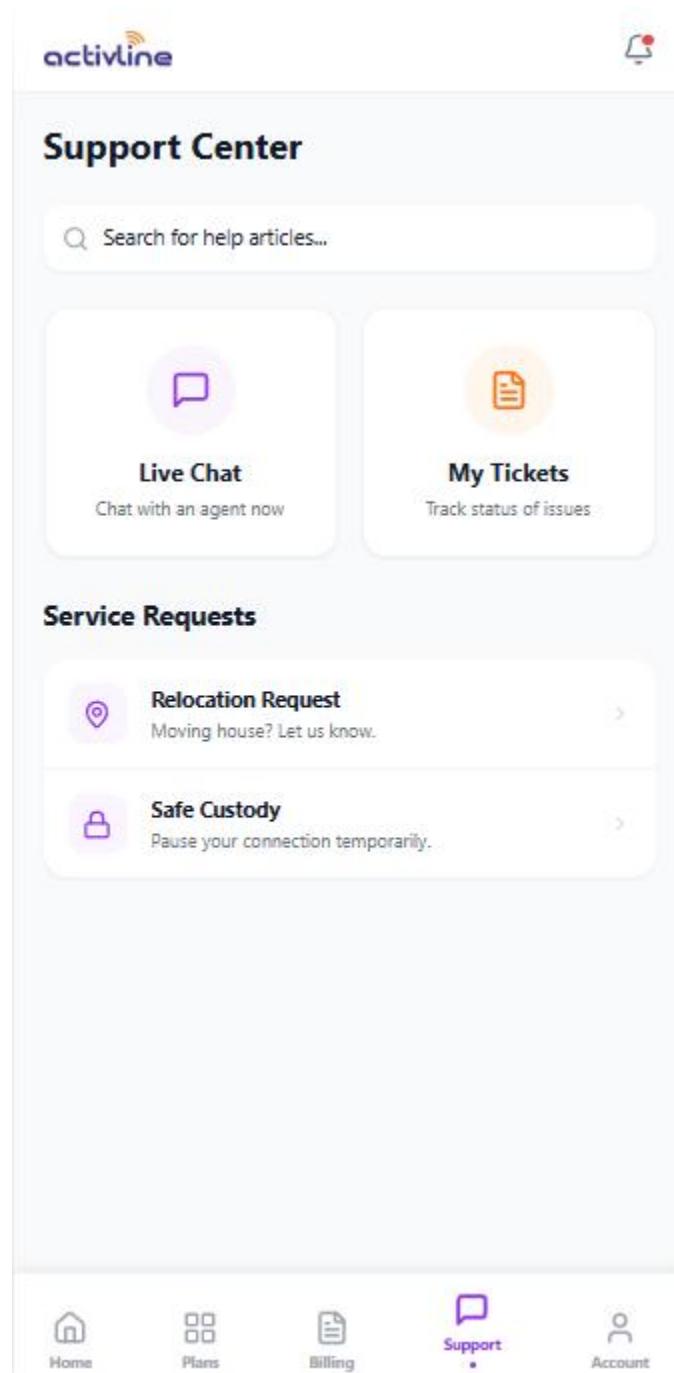
### 3.9 Value-Added Services (Top-ups)



A digital marketplace for micro-transactions and ad-hoc needs.

- **Speed Boosters:** Options for users to purchase temporary speed increases (e.g., "1 Gbps for 24 hours") for specific needs like large downloads or gaming.
- **Data Add-ons:** Packages to top up data if the FUP limit is reached (e.g., "100 GB Extra High Speed").
- **OTT Bundles:** One-tap subscription activation for partner services like Netflix or Disney+, integrated directly into the monthly bill or paid instantly.

### 3.10 Service Requests

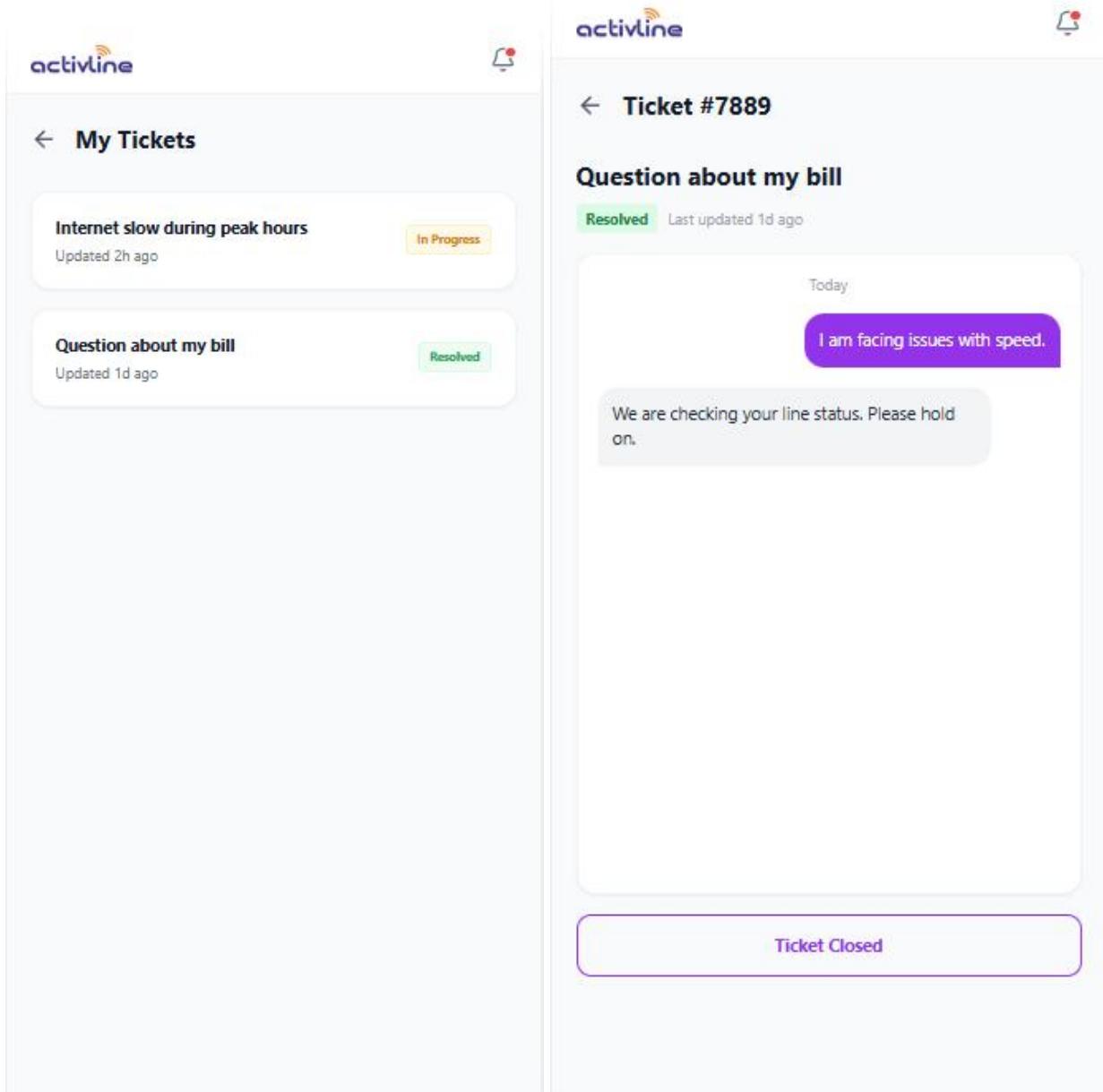


A structured form interface for non-technical administrative requests.

- **Relocation Request:** Users moving homes can submit a request with their new address and preferred shifting date. The app can use GPS to pin the new location.

- **Safe Custody:** Users traveling for extended periods can request to "pause" their connection for a reduced maintenance fee, preventing account termination. This feature includes a date picker for the "Resume Service" date.

### 3.11 Support & Ticketing System

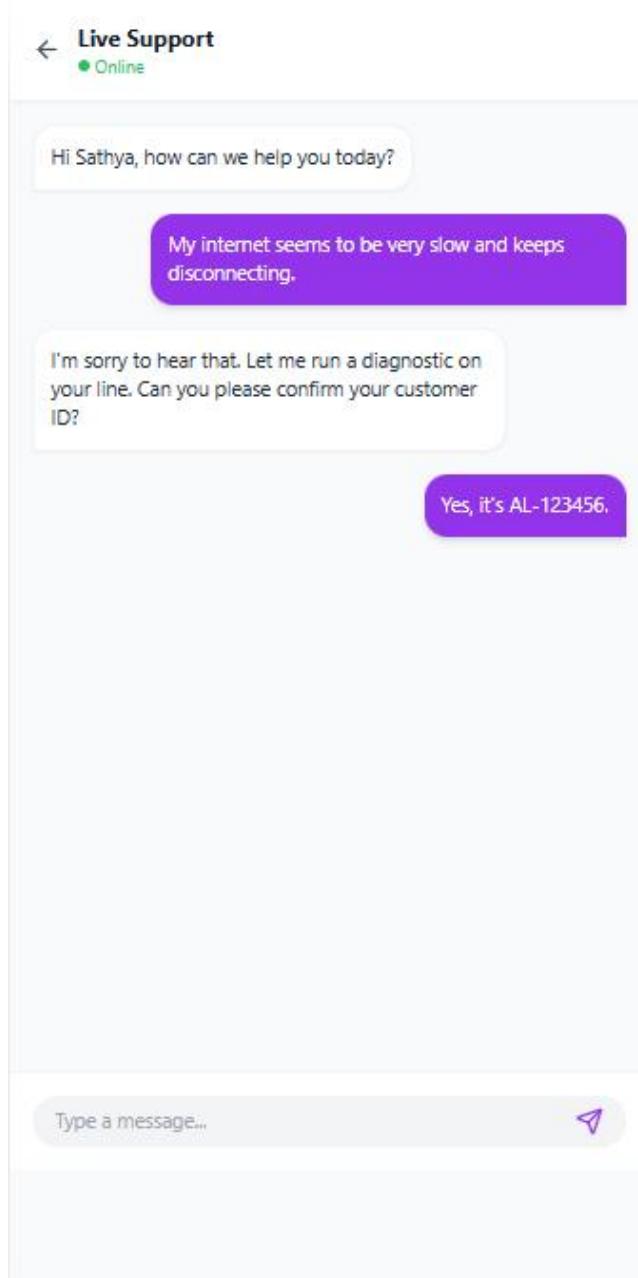


The core customer service module designed to organize support queries.

- **Ticket Dashboard:** A list view of all support tickets raised by the user, categorized by status (Open, In Progress, Resolved).

- **New Ticket Wizard:** A structured flow to create a new ticket. Users select a Category (Billing/Technical), Sub-category, and type a description.
- **Ticket Detail View:** A granular view of a specific ticket, showing the full conversation history between the user and the support team. It supports image attachments (e.g., screenshot of an error message). Users can reply to reopen tickets or provide additional information.

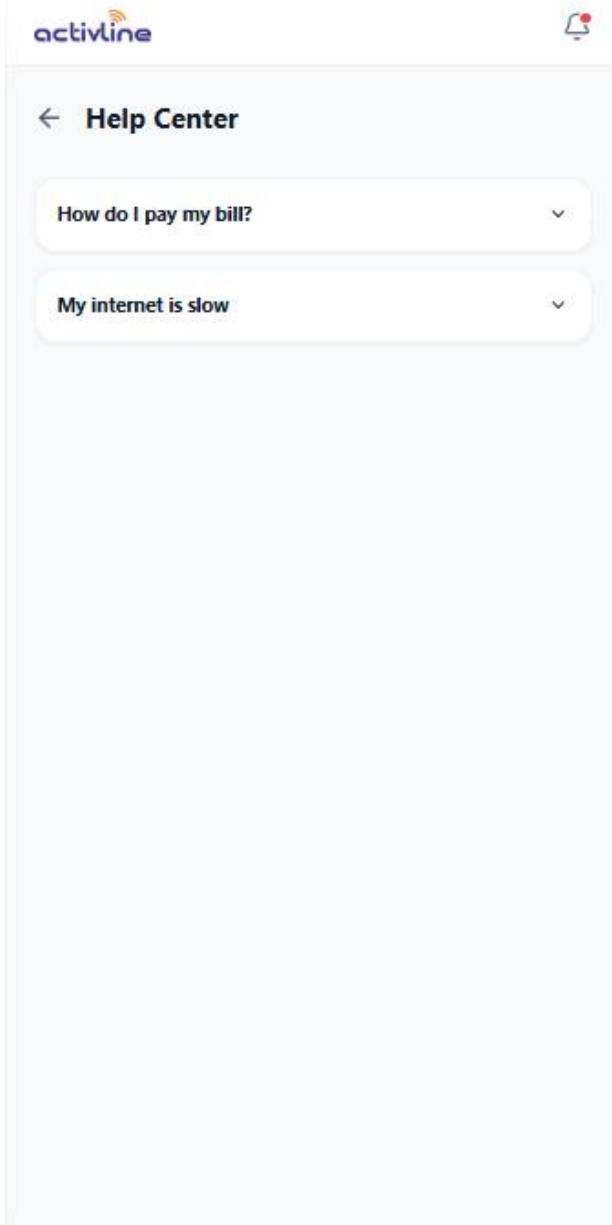
### 3.12 Live Chat Interface



A real-time communication channel.

- **Socket Connection:** Utilizes WebSockets to provide instant messaging capabilities with support agents.
- **Queuing System:** If all agents are busy, the user is shown their position in the queue.
- **Rich Media:** Supports sending images and documents within the chat for faster troubleshooting.

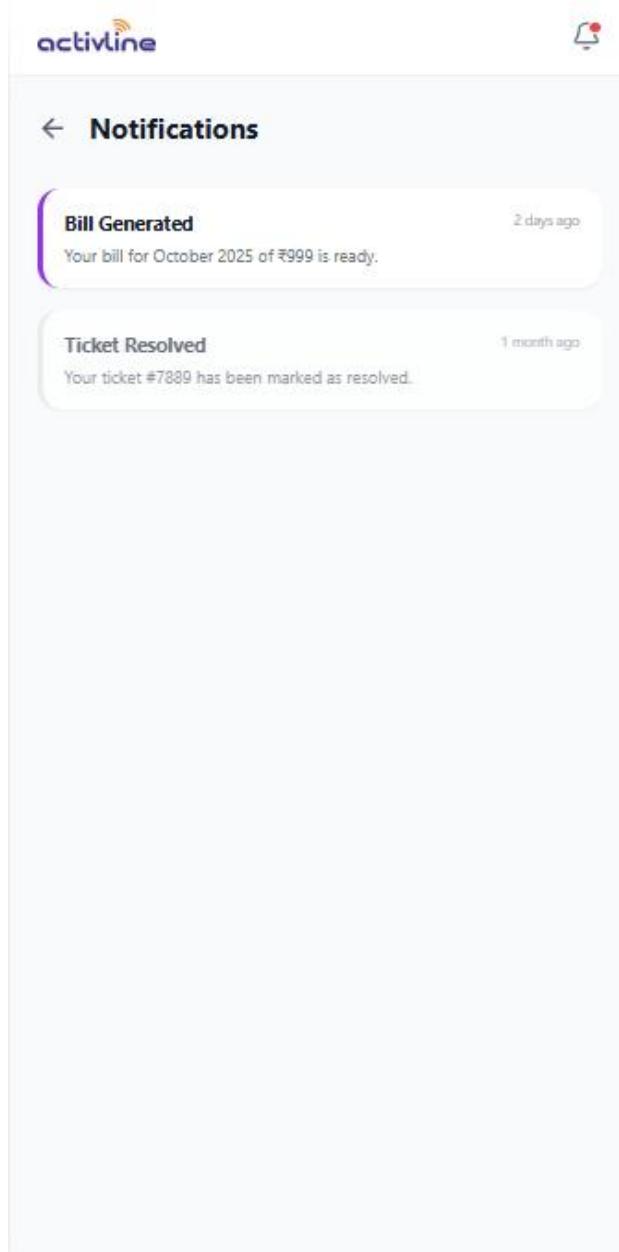
### 3.13 Help Center & FAQ



A self-help knowledge base designed to deflect support tickets.

- **Searchable Content:** Users can search for keywords to find relevant articles.
- **Categorized FAQs:** Common issues regarding Billing, Technical Support, and Account Management are organized in an accordion-style list for easy browsing.
- **Troubleshooting Guides:** Step-by-step guides (e.g., "How to reset your router") help users solve simple problems themselves.

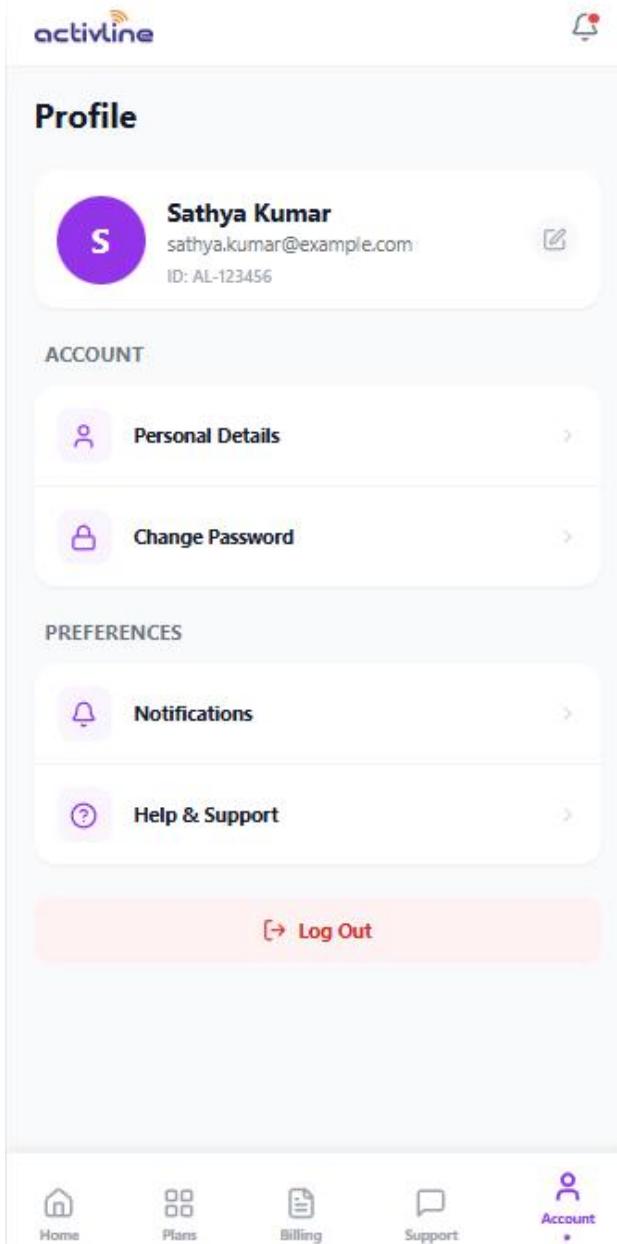
### 3.14 Notifications Center



A persistent inbox for all system alerts.

- **Alert History:** Stores a log of push notifications regarding bill generation, payment confirmations, ticket status changes, and maintenance alerts.
- **Interaction:** Tapping a notification deep-links the user to the relevant screen (e.g., tapping a "Bill Generated" alert takes the user to the Payment screen).
- **Read/Unread Status:** Visual indicators ensure users differentiate between new and archived notifications.

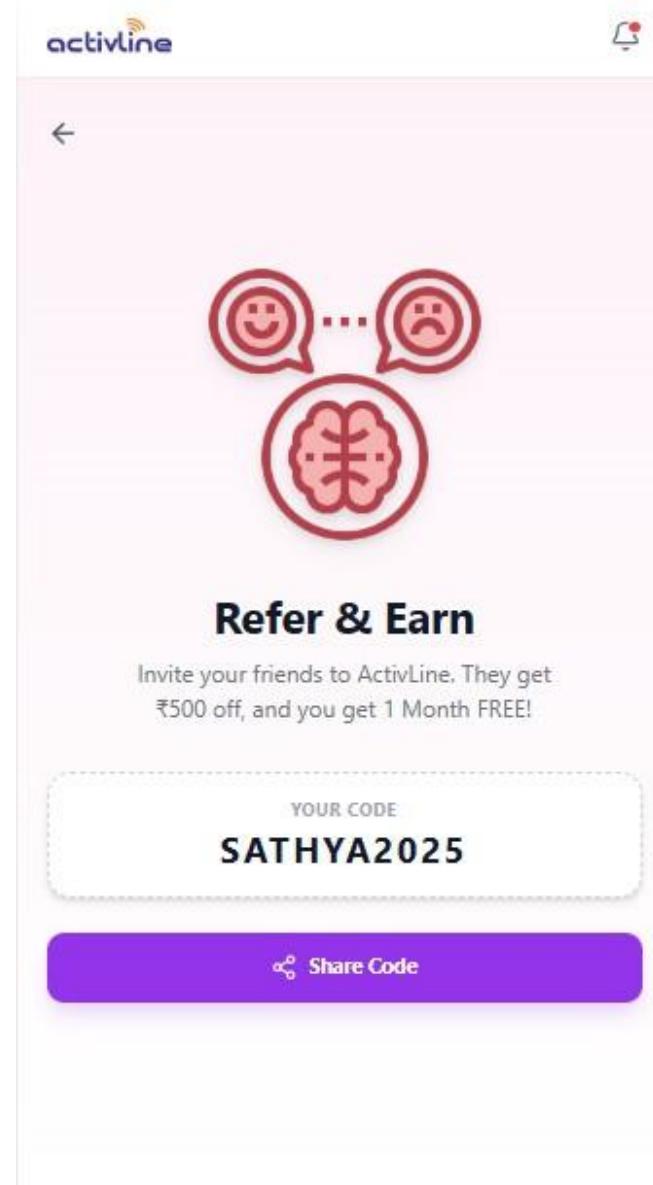
### 3.15 Profile & Settings



The user's personal account control room.

- **Personal Information:** View and edit contact details like Email and Phone Number. Changes require OTP verification for security.
- **Security Settings:** Workflow to change the account password.
- **App Preferences:** Controls for push notification permissions (marketing vs. transactional) and access to legal policies (Terms of Service, Privacy Policy).

### 3.16 Referral Program



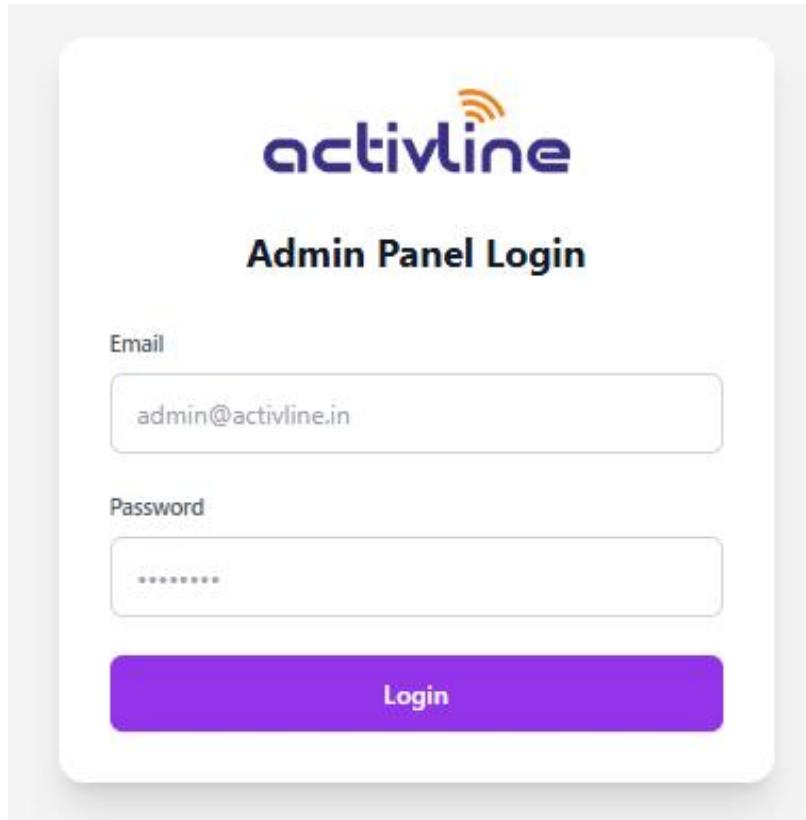
A marketing tool embedded in the app to drive organic growth.

- **Unique Codes:** Generates a unique referral code for every user (e.g., "SATHYA2025").
- **Social Sharing:** Native integration with social apps (WhatsApp, Telegram, etc.) to share the code and download link with pre-filled text.
- **Reward Tracking:** A visual tracker showing how many friends have signed up and the rewards earned (e.g., "Refer and get 1 Month Free").

## 4. Module II: The Admin & Staff Control Panel

The Admin Panel is a comprehensive web-based command center designed for desktop use. It provides the ActivLine management team with 360-degree visibility over operations, finance, and support.

### 4.1 Secure Staff Authentication



A secure gateway for internal teams.

- **Role-Based Access Control (RBAC):** The login system enforces strict permissions. "Super Admins" have full access to financial data and settings, while "Support Staff" have restricted views focused on tickets and user lookups, ensuring data privacy and security.

## 4.2 Master Dashboard

The screenshot displays the Activline Master Dashboard. On the left, a sidebar menu includes: Dashboard (selected), Tickets, Customers, Payments, Plans, Staff, Reports, Logs, and Settings. The main area is titled "Dashboard" and contains four key metrics: "Open Tickets" (1), "In Progress" (1), "Revenue (Month) ₹1498.00", and "Total Customers" (4). Below these are two sections: "Recent Tickets" and "Recent Payments".

SUBJECT	CUSTOMER
#7890 - Internet connection dropping	Sathya Kumar
#7891 - New connection request	Alice Williams
#7889 - Question about my bill	Jane Smith

CUSTOMER	AMOUNT	STATUS
Sathya Kumar	₹999.00	Paid
Jane Smith	₹499.00	Paid
Bob Johnson	₹1499.00	Failed
Alice Williams	₹699.00	Pending
Sathya Kumar	₹999.00	Paid

In the bottom left corner, there is a user profile for "Sathya Admin Admin".

The landing page offering high-level business intelligence.

- Live Operational Metrics:** Real-time counters for Open Tickets, Tickets In-Progress, and Today's Resolved count, helping managers gauge current workload.
- Financial Widget:** A dynamic calculation of the Monthly Recurring Revenue (MRR) based on successful payments over the last 30 days.
- Activity Feeds:** Two side-by-side lists showing the most recent incoming tickets and the latest payment transactions for immediate situational awareness.

### 4.3 Customer Management Module

CUSTOMER ID	NAME	EMAIL	PLAN	STATUS	ACT
AL-123456	Sathya Kumar	sathya.kumar@example.com	ActivLine Home 200	Active	
AL-654321	Jane Smith	jane@example.com	ActivLine Home 100	Active	
AL-789012	Bob Johnson	bob@example.com	ActivLine Pro 500	Suspended	
AL-345678	Alice Williams	alice@example.com	ActivLine Home 300	Active	

S    Sathya Admin  
Admin

A powerful CRM (Customer Relationship Management) interface.

- **Advanced Search:** Admins can search for customers by Name, Customer ID, Email, or Phone Number.
- **Customer List Grid:** A tabular view of all subscribers with sortable columns (Name, Plan, Status, Due Date).
- **Status Indicators:** Color-coded badges indicate if a user is "Active" (Green), "Suspended" (Red), or "New Lead" (Blue).
- **Add Customer Wizard:** A modal form to manually onboard users who sign up offline, capturing all necessary profile and plan details.

## 4.4 Customer 360 Profile

The screenshot shows the ActivLine Customer 360 Profile for a customer named Sathya Kumar. The interface is divided into several sections:

- Left Sidebar:** Includes links for Dashboard, Tickets, Customers, Payments, Plans, Staff, Reports, Logs, and Settings.
- Contact Information:** Displays email (sathya.kumar@example.com), phone number (555-1234), and address (123 Main St, Anytown, USA).
- Current Plan:** Shows the ActivLine Home 200 plan, Device/Modem ID: M-XYZ-789, and a "Change Plan" button.
- Payment History:** A table showing two recent payments:
 

DATE	DESCRIPTION	AMOUNT	STATUS
2025-11-18	ActivLine Home 200 (Renewal)	₹999.00	Paid
2025-10-18	ActivLine Home 200 (Renewal)	₹999.00	Paid
- Support Tickets:** A table showing one support ticket:
 

DATE	SUBJECT	STATUS
3h ago	#7890 - Internet connection dropping	In Progress
- Admin Notes:** A text area for staff notes with a "Save Note" button.

A small sidebar at the bottom left identifies the user as "Sathya Admin Admin".

Clicking on a customer reveals a holistic profile view for deep diagnostics.

- **Identity Card:** Displays contact details and the physical installation address with a Google Maps integration.
- **Subscription Details:** Shows the current plan, plan expiry date, and linked device details (MAC Address).
- **Financial History:** A complete log of every payment made by the customer, including failed attempts.
- **Support History:** A complete archive of every ticket raised by the customer, providing context for support agents.
- **Admin Notes:** A persistent text area for staff to leave internal notes regarding the customer (e.g., "VIP Client," "Dog at premises").

## 4.5 Plan Management CMS

PLAN NAME	TYPE	SPEED	DATA	PRICE (₹)	ACTIONS
ActivLine Home 100	Home	100 Mbps	Unlimited	₹499	
ActivLine Home 200	Home	200 Mbps	Unlimited	₹999	
ActivLine Home 300	Home	300 Mbps	Unlimited	₹699	
ActivLine Pro 500	Office	500 Mbps	Unlimited	₹1499	
ActivLine Pro 1GB	Office	1 Gbps	Unlimited	₹2499	

A Content Management System for service offerings.

- **Plan Inventory:** A list of all active and inactive plans.
- **Plan Editor:** An interface to create new plans or modify existing ones. Admins can set the Plan Name, Speed, FUP Limit, Price, and categorize it as Home or Office.
- **Visibility Toggles:** Admins can hide old plans from new users without affecting existing subscribers. Updates pushed here reflect instantly on the user app.

## 4.6 Payments & Renewals Ledger

PAYMENT ID	CUSTOMER	PLAN	AMOUNT	DATE	TYPE
pay_123	Sathya Kumar (AL-123456)	ActivLine Home 200	₹999.00	2025-11-18	Renewal
pay_124	Jane Smith (AL-654321)	ActivLine Home 100	₹499.00	2025-11-17	New Purchase
pay_125	Bob Johnson (AL-789012)	ActivLine Pro 500	₹1499.00	2025-11-17	Renewal
pay_126	Alice Williams (AL-345678)	ActivLine Home 300	₹699.00	2025-11-18	New Purchase
pay_127	Sathya Kumar (AL-123456)	ActivLine Home 200	₹999.00	2025-10-18	Renewal

A dedicated financial tracking screen.

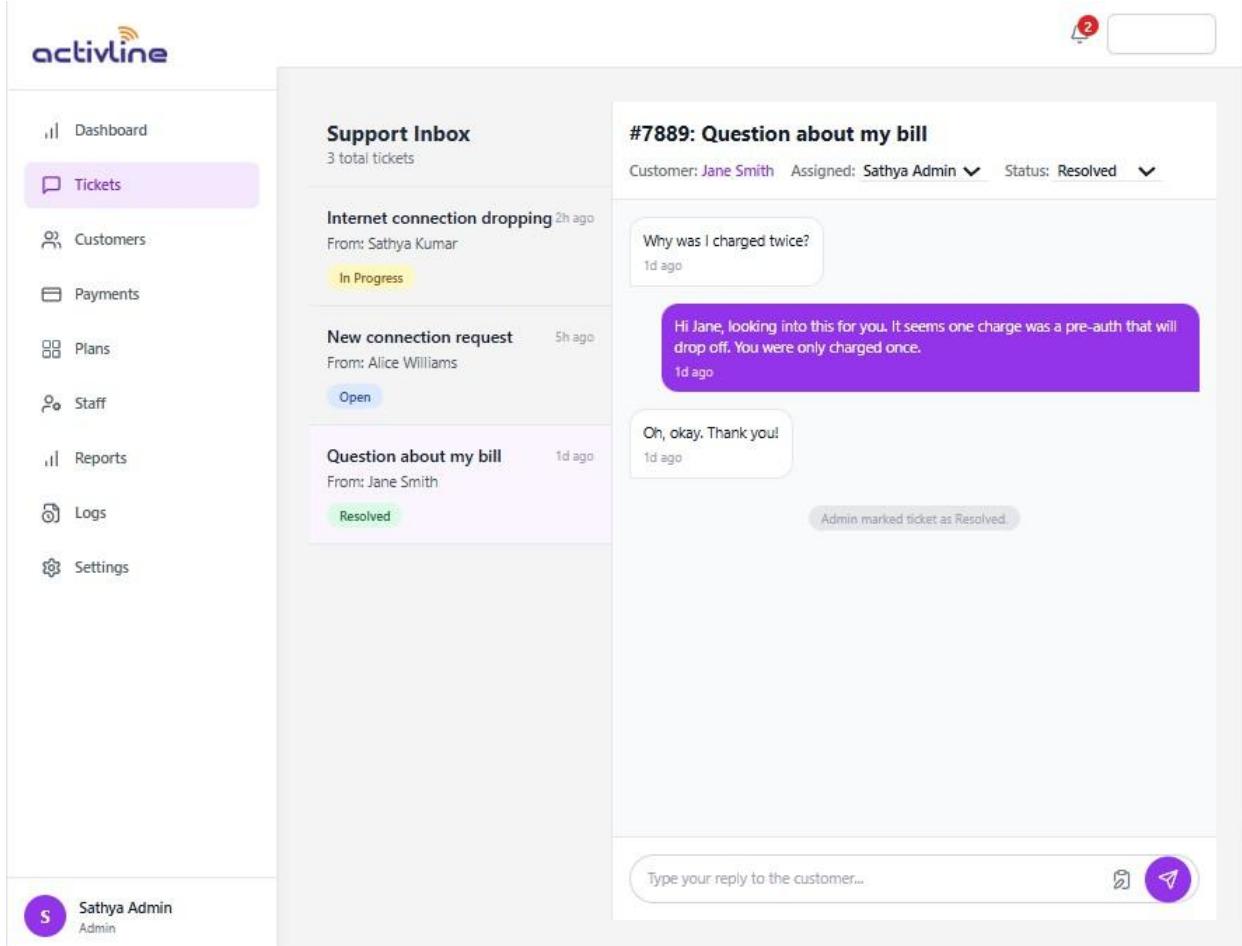
- **Global Transaction Log:** A master list of all payment attempts across the entire user base.
- **Status Filtering:** Tools to filter transactions by status (Paid, Pending, Failed) to identify payment gateway issues or follow up on failed renewals.
- **Transaction Details:** A modal view showing the Razorpay Transaction ID, timestamp, and granular breakdown of the payment.
- **Manual Overrides:** Admins can manually mark a pending transaction as "Paid" (for cash/check collections) or initiate a Refund process directly from the panel which triggers the gateway refund API.

## 4.7 Support Ticket Inbox

The primary workspace for the support team.

- Unified Inbox:** A listing of all tickets sorted by status or urgency. New tickets appear at the top.
- Ticket Detail Workspace:** A split-screen view showing the ticket metadata (Customer Name, Plan) on one side and the chat/activity history on the other.
- Assignment Logic:** Admins can assign specific tickets to individual staff members (e.g., assigning a line fault to a field technician), which triggers a notification to that staff member.
- Status Workflow:** Controls to progress a ticket from Open -> In Progress -> Resolved -> Closed.

## 4.8 Live Chat & Response System



Integrated within the Ticket Workspace.

- **Reply Interface:** A rich text area for admins to send messages back to the user app.
- **Canned Responses:** A quick-insert menu allowing agents to use pre-approved templates for common issues (e.g., "outage acknowledgement," "router reset steps") to ensure consistent and fast communication.

## 4.9 Staff Management

The screenshot shows the activline platform's Staff Management section. The left sidebar has a purple header with the activline logo and a blue footer showing the user's name and role. The main content area has a light gray header with the title "Staff Management" and a purple "Add Staff" button. Below is a table with four columns: NAME, EMAIL, ROLE, and ACTIONS. Two staff entries are listed:

NAME	EMAIL	ROLE	ACTIONS
Sathya Admin	admin@activline.in	Admin	
John Staff	staff@activline.in	Staff	

(Restricted to Super Admins)

- **Employee Directory:** A list of all staff members with access to the panel.
- **Role Provisioning:** Tools to create new staff accounts and assign specific roles (Admin vs. Staff).
- **Access Revocation:** Ability to instantly deactivate a staff account in case of termination or security risks.

## 4.10 Analytics & Reporting Suite

The screenshot displays the Activline Analytics & Reports module. The left sidebar lists various administrative and reporting functions. The main content area is divided into three primary report sections: Financial Report, Customer Report, and Support Report. Each section includes a placeholder for a specific type of chart or visualization.

- Financial Report:** Placeholder for a 'Monthly Recurring Revenue (MRR)' chart.
- Customer Report:** Placeholder for a 'New Signups vs. Churn' bar chart.
- Support Report:** Placeholder for a 'Ticket Volume by Day' line chart.

A data visualization module for strategic planning.

- **Revenue Reports:** Line charts tracking revenue growth over time (Weekly/Monthly/Yearly).
- **Churn Analysis:** Bar charts comparing new customer acquisitions against cancellations/suspensions to monitor business health.
- **Support Performance:** Metrics on ticket volume trends and average resolution time to help optimize staffing schedules.

## 4.11 System Activity Logs

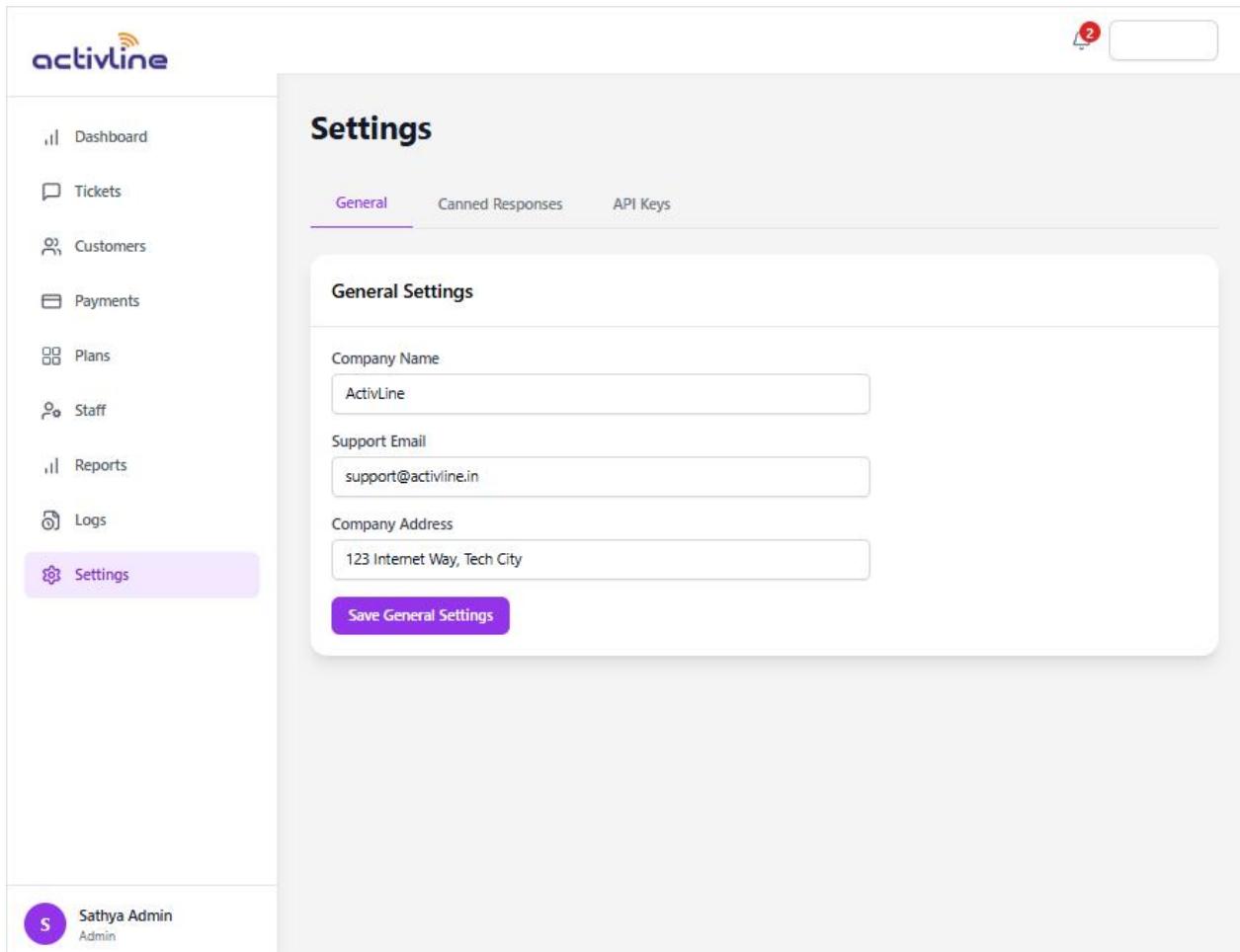
**System Activity Logs**

TIMESTAMP	USER	ACTION
2025-11-18 10:01 AM	Sathya Admin	Logged in
2025-11-18 10:02 AM	Sathya Admin	Viewed customer AL-123456
2025-11-18 10:05 AM	John Staff	Resolved ticket #7889
2025-11-18 10:10 AM	Sathya Admin	Updated plan 'ActivLine Home 100'
2025-11-18 10:15 AM	Sathya Admin	Created new staff member 'dev@activline.in'

A security and auditing layer.

- **Audit Trail:** A chronological, immutable log of every action taken within the panel.
- **Action Details:** Records the Timestamp, the Staff Member responsible, and the specific Action taken (e.g., "John Staff deleted User X," "Sarah Admin changed Plan Y price"). This is critical for accountability and troubleshooting.

## 4.12 Global Settings & Configuration



The central control room for the platform.

- **General Settings:** Configuration for company details (Name, Support Email, Address) displayed on invoices.
- **Canned Response Manager:** An editor to create and manage the library of quick-reply templates used by the support team.
- **Integration Configuration:** A secure interface to update API keys for critical third-party services, specifically the Razorpay Payment Gateway and the Radius/Metering Server used for tracking user data consumption.

## 5. Security & Data Integrity

- **Data Encryption:** All sensitive user data (passwords, personal identifiers) will be hashed and salted before storage using industry-standard algorithms (BCrypt).
- **Secure Communication:** All data transmission between the Mobile App, Admin Panel, and Backend Server will occur over encrypted SSL/TLS (HTTPS) channels.
- **Sanitization:** All user inputs will be sanitized to prevent SQL Injection and Cross-Site Scripting (XSS) attacks.
- **JWT Authentication:** JSON Web Tokens (JWT) will be used for secure, stateless authentication sessions for both users and admins.

## 6. System Performance & Scalability

- **Cloud Infrastructure:** The backend will be deployed on a scalable cloud environment (AWS or Google Cloud), allowing for auto-scaling during traffic spikes.
- **Database Indexing:** MongoDB collections will be optimized with proper indexing to ensure fast query responses even as the customer base grows to hundreds of thousands.
- **CDN Usage:** Static assets (images, logos) will be served via a Content Delivery Network (CDN) to ensure fast load times across different regions.

