**DYD Franchisee Model & AI/ML-Based SV & SG Optimization**

**1. Overview**

DYD is transitioning to a **franchisee-based model**, where **Service Vans (SVs) and Service Garages (SGs) will be operated by third-party owners**. Revenue will be shared between **DYD & SV Owners and DYD & SG Owners**. Contact details of leads (customers) will **not be shared** with franchisees.

**Key System Updates:**

* **Masked Customer Contact Information**: In **SV App** and **Restricted SG Admin**, customer phone numbers will be **masked**.
* **Separate SV & SG Login for URL-Based Access**: Franchisees will have distinct **login credentials** for secure access to the system.
* **Scalability**: There will now be **more than 4 SVs** and **more than 1 SG** to cover a larger service area.
* **DYD Master Admin Dashboard**:
  + View revenue generated for each SV and SG.
  + Configure settlement cycles (daily, weekly, 3-day, fortnightly, monthly, etc.).
  + Initiate settlements and transfer payments to respective SVs/SGs.

**2. Updated SV & SG Functionalities**

**SV App Functionalities**

1. **Vehicle Checklist:** SVs will continue to maintain vehicle specific checklist on daily basis. There should be provision to track the same in DB and Admin.
2. **Order Management**:
   * Technicians (Name Based specific to SV) can **accept, update, and complete orders**. In franchisee model, there can be need to add/remove/update technicians specific to SV/SG from Admin so that technician specific activities can be tracked.
   * Order details, including **checklists and order timelines**, can be updated.
3. **Payment Tracking**:
   * Technicians can **check and update payment status**.
4. **Order Allocation Mechanism**:
   * Orders are assigned based on **SV/SG proximity, slot availability, and predefined service radius**. Also, there would be provision to allocate orders based on map distance (Actual Travel Route). Both should be configurable considering business need.
   * If a slot is **unavailable**, the nearest SV (within service radius or nearest travel distance) is allocated.
   * **Reallocation in case of order cancellation**:
     + The **nearest available SV (Or Nearest distance)** is reassigned.
     + If no SV is available, the **order is queued for the next free SV**.
5. **Franchisee-Specific Enhancements**:
   * **Masked Contact Details**: Customer numbers are visible in a **partially masked** format.
   * **Restricted SG Admin Panel**: Limited visibility into customer details, allowing order tracking but not direct communication using phone number.
   * **Separate Franchisee Logins** for secure access.

**SG (Service Garage) Functionalities**

* **SG Admin Panel** for tracking garage-based services.
* **Masked customer details** for privacy.
* **Order acceptance and fulfilment** similar to SVs.

**3. Current & Expanding SV/SG Service Areas**

Since the number of **SVs and SGs will increase**, AI-driven models will dynamically adjust their positioning based on demand.

**4. AI/ML/DL-Based Optimization for SV & SG Allocation & Routing**

**A. Dynamic SV & SG Assignment (Including Order Cancellation Handling)**

**Algorithm:** Reinforcement Learning (Deep Q-Learning) / Multi-Armed Bandit (MAB)

* **Why?** These models adapt in real-time to **order requests, availability, and demand patterns**.
* **How?**
  + **Deep Q-Learning:** Allocates SVs and SGs dynamically based on **location, service history, and predicted demand**.
  + **MAB Algorithm:** Balances **exploitation (best-known SV/SG) vs. exploration (alternative SVs/SGs)** to improve efficiency.
  + **Order Cancellation Handling:**
    - If **an order is cancelled**, AI reassigns it to the **nearest available SV/SG**.
    - If no SV/SG is available, the **order is queued for the next free SV/SG**.

**B. Route Optimization**

**Algorithm:** A\* Search / Dijkstra’s Algorithm / Deep Q-Learning for Traffic Prediction

* **Why?** Ensures **shortest travel time(or distance)**, avoiding congestion.
* **How?**
  + *A Algorithm / Dijkstra’s Algorithm:*\* Finds the **shortest path considering real-time traffic**.
  + **Deep Q-Learning:** Uses **historical traffic data** to predict the best routes dynamically.
  + **Impact:** Reduces fuel costs and travel time.

**C. Demand Prediction for SV & SG Positioning**

**Algorithm:** Time-Series Forecasting (LSTM / ARIMA / Prophet)

* **Why?** Helps **pre-position SVs and SGs** in high-demand areas.
* **How?**
  + **LSTM (Long Short-Term Memory)**: Predicts future demand based on past bookings.
  + **ARIMA & Prophet:** Forecast service demand trends.
  + **Impact:** AI suggests **where each SV and SG should be positioned throughout the day**.

**5. DYD Master Admin Dashboard & Revenue Settlement**

**A. Revenue Tracking & Settlement**

1. **View Revenue per SV/SG PLUS Multiple SV/SG for any Franchisee having more than on SV/SG**:
   * Track revenue earned by each **Service Van and Service Garage**.
2. **Configurable Settlement Cycles**:
   * Admin can configure settlement on **daily, weekly, 3-day, fortnightly, or monthly basis**.
3. **Automated Payment Distribution**:
   * Upon **settlement initiation**, the system calculates:
     + **DYD’s share** (to be retained).
     + **Amount to be transferred to each SV/SG**.
   * Transfers money to respective **SV/SG accounts**.
4. **Settlement History & Logs**:
   * Tracks past settlements and payment status.

**B. Secure Franchisee Integration**

* **Masked contacts & restricted SG Admin access**.
* **AI-driven revenue forecasting for fair profit-sharing**.

**6. Implementation Roadmap**

**Phase 1: AI-Based Demand Prediction**

* Analyze **historical booking data**.
* Build **LSTM/ARIMA-based forecasting model**.

**Phase 2: Dynamic SV & SG Allocation Model**

* Train **Deep Q-Learning Model** for **SV/SG assignment**.
* Test **MAB Algorithm** for **order cancellation handling**.

**Phase 3: AI-Powered Route Optimization**

* Implement *A / Dijkstra’s Algorithm*\* for real-time routing.

**Phase 4: DYD Master Admin Dashboard & Settlement System**

* Develop **revenue tracking, configurable settlement, and automated payment system**.
* Deploy **all AI-based models** for **live franchisee optimization**.

**7. Conclusion**

With **AI/ML-driven enhancements**, DYD can:  
✅ Optimize **SV & SG allocation & routing**.  
✅ Improve **franchisee revenue management**.  
✅ Maintain **customer data privacy** while enabling **seamless service execution**.  
✅ Ensure **automated revenue settlement & tracking**.