1. SYSTEM OVERVIEW (FRONT → BACK)

AgriBridge Connect is a multi-platform digital agriculture ecosystem (Android, iOS, Web) designed with a banking-app level UX: simple, trusted, powerful.

The system must support:

- Online + Offline (Offline-First) operations
- Multiple user roles
- Secure payments
- Automated commissions
- Admin-controlled pricing
- AI-powered tools
- National-scale usage (100,000+ users)

2. USER ROLES & PERMISSIONS

2.1 User Roles

1. Farmer
2. Buyer
3. Input Supplier
4. Advisory Expert
5. Cooperative / Enterprise Admin
6. Field Agent
7. Platform Admin (AgriBridge Team)

3. GLOBAL DESIGN PRINCIPLES

- Banking-style UX (simple dashboards, minimal clicks)
- Works on low bandwidth
- Supports offline capture + later sync
- Clear icons & simple language
- English (initial release)
- Secure by default (OTP, encryption, permissions)

4. AUTHENTICATION & ONBOARDING

USER STORY – REGISTRATION

As a user, I want to register using my phone number or email so that I can securely access the app.

Functional Requirements:

- Phone number + OTP

- Email + password

- User selects role at signup

- Accepts data consent & privacy policy

- Offline signup allowed → sync when online

5. OFFLINE-FIRST ARCHITECTURE (CRITICAL)

Offline Capabilities:

✓ Save drafts offline
✓ Capture photos offline
✓ Cache weather & advisory content
✓ Store farm records offline
✓ GPS mapping offline
✓ Sync automatically when network returns

Sync Rules:

- Conflict resolution → latest timestamp wins

- Admin-critical data always validated server-side

- User notified of sync success/failure

6. FARMER MODULE (CORE USER)

6.1 Farmer Dashboard

As a farmer, I want a clear dashboard so I can see my farm activity at a glance.

Displays:

- Weather alerts

- Market prices

- Wallet balance

- Advisory messages

- Pending transactions

- Offline sync status

6.2 Climate & Weather

As a farmer, I want climate alerts so I can plan planting and harvesting.

Functions:

- Daily forecasts

- Rainfall alerts

- Drought/flood warnings

- Cached forecasts (offline view)

6.3 Produce Marketplace

As a farmer, I want to list my produce so buyers can find and buy it.

Features:

- Add produce (quantity, quality, photos)

- Draft listings offline

- Admin-set price rules

- Auto-commission deduction

- Buyer matching

- Delivery status tracking

6.4 Advisory Services

As a farmer, I want expert advice to improve productivity.

Channels:

- Chat

- Voice notes

- Video calls

- Ticket-based queries

- AI advisory assistant

Offline:

- Capture question/photo offline
- Upload when online

6.5 AI Pest & Disease

As a farmer, I want to identify pests using my phone camera.

Flow:

1. Take photos (offline allowed)
2. Upload
3. AI analysis
4. Recommended treatment
5. Supplier links

6.6 Soil Testing

As a farmer, I want soil analysis to guide planting.

Flow:

- Request for a soil test
- Receive sample instructions
- Lab results uploaded
- Fertility & crop advice shown
- Results stored offline

6.7 Digital Records

As a farmer, I want to track income and expenses.

Records:

- Inputs purchased
- Production sold
- Advisory costs

- Profit/loss summary
- Exportable reports

Offline supported.

7. BUYER MODULE

As a buyer, I want to source produce efficiently.

Functions:

- Browse produce
- Filter by location/quality
- Place orders
- Escrow payments
- Track deliveries
- Rate farmers

8. INPUT SUPPLIER MODULE

As a supplier, I want to sell inputs through the app.

Features:

- Product catalogue
- Inventory management
- Pricing set by Admin
- Order fulfilment
- Commission auto deducted

9. EQUIPMENT HIRE MODULE

As a farmer, I want to hire machinery affordably.

Features:

- Equipment listings
- Availability calendar
- Location-based search
- Booking & payment

- Offline booking request

10. e-WALLET & PAYMENTS

USER STORY

As a user, I want secure payments and transparent balances.

Functions:

- Wallet balance
- Bank & mobile money support
- Escrow payments
- Auto commission
- Offline payment request
- Transaction history

11. COMMUNITY & FORUM

As a farmer, I want to learn from others.

Features:

- Discussion boards
- Expert moderation
- Cached reading offline
- Report abuse
- Admin moderation

12. FIELD AGENT MODULE

As a field agent, I want to support farmers on the ground.

Functions:

- Offline farmer registration
- Data collection
- Upload photos
- Sync later

- Geo-tagging

13. ADMIN PANEL (FULL CONTROL)

Admin Capabilities (ALL CONFIRMED):

✓ User approval & suspension
✓ Role management
✓ Pricing & commission control
✓ Subscription management
✓ Advertisement management
✓ Push notifications (SMS & in-app)
✓ Analytics dashboards
✓ Data exports (PDF / Excel)
✓ Dispute resolution
✓ Content moderation

Admin Web Dashboard only.

14. NOTIFICATIONS SYSTEM

Channels:

- In-app

- Push notifications

- SMS (critical alerts)

Triggers:

- Weather alerts

- Payment updates

- Advisory replies

- System announcement

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15. DATA & PRIVACY

- Users own their data

- Aggregated data anonymized

- Consent required on signup

- POPIA compliant

- Secure encryption

16. SCALABILITY & PERFORMANCE

Designed for:

- **100,000+ users**
- Cloud-native architecture
- Auto-scaling
- Offline tolerance
- Modular services

17. ERROR HANDLING & EDGE CASES

- Network loss
- Payment failures
- Duplicate sync
- Dispute handling
- Device change recovery

18. FINAL NOTE TO DEVELOPERS

This system must be:

- Simple like a banking app
- Powerful like an enterprise platform
- Reliable in rural areas
- Secure by default
- First offline