

WingFi Protocol White Paper

Decentralized Flight Delay Insurance Protocol

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Executive Summary

WingFi is a decentralized protocol that provides automated, transparent, and instant flight delay insurance powered by smart contracts on the Binance Smart Chain. The protocol eliminates traditional insurance inefficiencies through blockchain technology, oracle-based automation, and community-driven liquidity pools.

1. The Problem

1.1 Traditional Flight Insurance Challenges

High Costs & Poor Coverage

- Traditional flight insurance premiums are expensive due to intermediary overhead
- Claims processing takes weeks or months
- Rejection rates are high due to complex terms and conditions
- Limited transparency in premium allocation and payout calculations

Centralization Risks

- Insurance companies act as gatekeepers
- Customers have no visibility into reserve funds
- Premium pricing lacks transparency
- Claims approval is subjective and often disputed

Market Inefficiency

- \$4.2B+ global flight insurance market dominated by 3-4 large players
- High barrier to entry prevents competition
- Liquidity providers (investors) have no direct access to insurance underwriting
- No programmatic way to hedge against flight delays

1.2 Flight Delay Statistics

- **23%** of all flights experience delays > 15 minutes
- **5.7%** of flights are significantly delayed (>45 minutes)
- **1.8%** of flights are cancelled
- Passengers lose **\$40B+ annually** due to flight disruptions

2. The WingFi Solution

2.1 Decentralized Insurance Protocol

WingFi creates a trustless, automated insurance marketplace where:

1. **Users** purchase flight delay insurance with transparent pricing
2. **Liquidity Providers (LPs)** deposit capital to underwrite policies and earn yield
3. **Oracle Adapters** verify flight status and trigger automatic payouts
4. **Smart Contracts** enforce all rules without intermediaries

2.2 Key Features

Instant Automated Payouts

- Flight status verified by oracle adapters
- 50% coverage for delays, 100% for cancellations
- Payouts execute automatically within minutes of delay confirmation

Transparent Pricing

- All premium calculations on-chain
- Real-time pool utilization visible to all users
- LP earnings calculated transparently based on pool performance

Multiple Pool Types

- **Global Pool:** Diversified exposure across all airlines
- **Airline Pools:** Targeted exposure to specific carriers

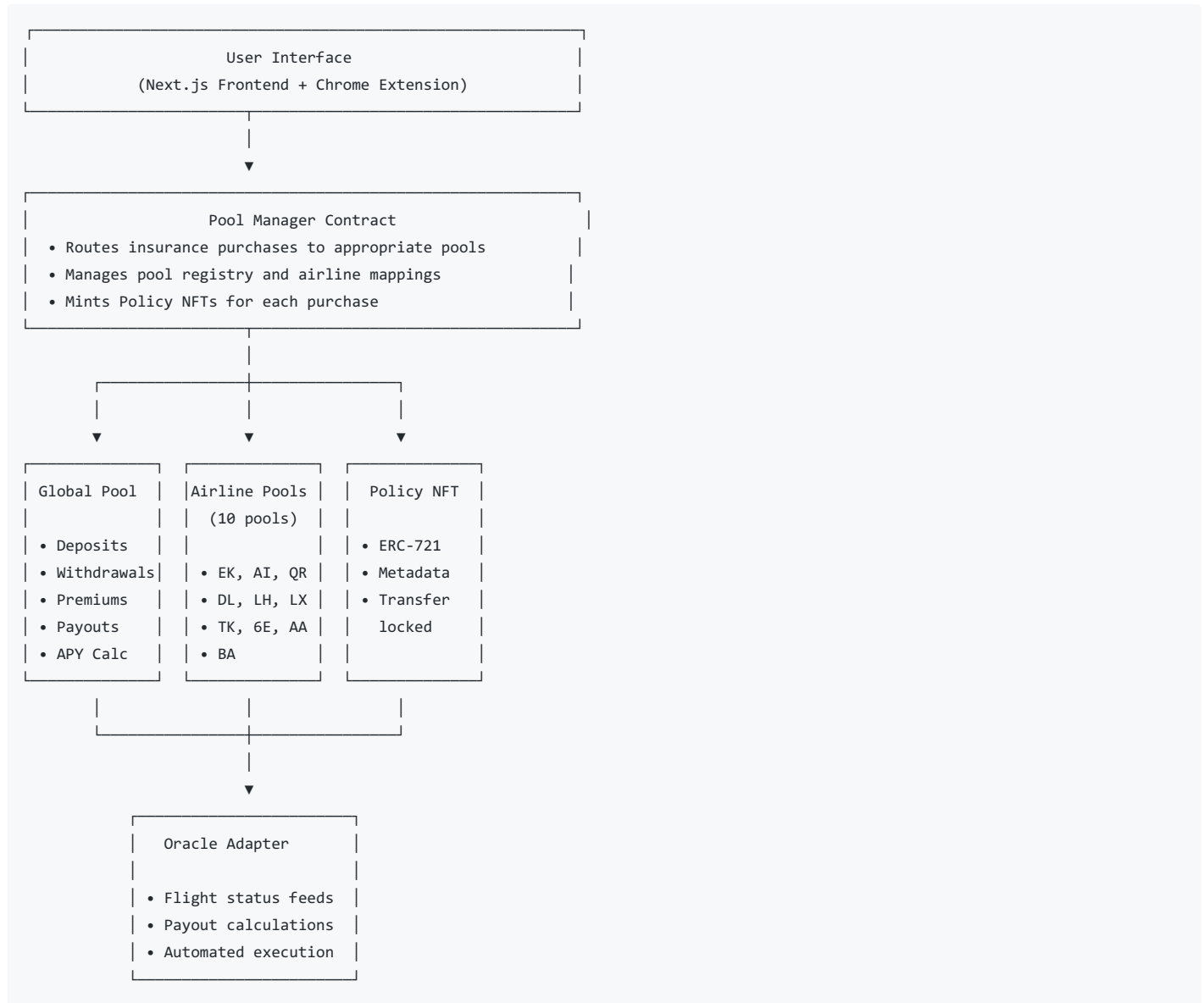
- **Crowd-Fill Pools:** Individual policy funding marketplace

Community-Driven Liquidity

- Anyone can provide liquidity and earn yield
- Dynamic APY based on premiums collected vs. payouts
- Real-time pool utilization and risk metrics

3. Design Architecture

3.1 Smart Contract System



3.2 Core Smart Contracts

Pool Manager (`PoolManager.sol`)

- Central coordinator for all protocol operations
- Routes insurance purchases to appropriate pools
- Manages airline pool registry
- Integrates with Policy NFT minting

Global Pool (`GlobalPool.sol`)

- Accepts deposits from liquidity providers
- Collects premiums from policy purchases
- Executes payouts for valid claims
- Calculates APY, utilization, and LP tracking
- Inheritable base contract for specialized pools

Airline Pools (`AirlinePool.sol`)

- Inherits from Global Pool

- Specialized liquidity for specific airlines
- 10 pools: Emirates, Air India, Qatar, Delta, Lufthansa, Swiss, Turkish, IndiGo, American, British
- Higher APY potential with concentrated risk

Policy NFT (`PolicyNFT.sol`)

- ERC-721 non-fungible tokens representing insurance policies
- Each NFT contains policy metadata (flight, PNR, coverage, premium, expiry)
- Non-transferable (soul-bound) to prevent secondary market manipulation
- Queryable by owner for portfolio management

Oracle Adapter (`OracleAdapter.sol`)

- Receives flight status updates from authorized oracles
- Calculates payout amounts (50% for delays, 100% for cancellations)
- Triggers automatic payouts to policy holders
- Marks policies as executed in Policy NFT

3.3 Technology Stack

Blockchain Layer

- **Network:** Binance Smart Chain (BSC) Testnet
- **Language:** Solidity 0.8.20
- **Framework:** Foundry (testing & deployment)
- **Token:** Mock USDC (18 decimals for testnet)

Frontend Application

- **Framework:** Next.js 15 (App Router)
- **Web3:** Wagmi v2 + Viem v2
- **UI:** TailwindCSS + shadcn/ui components
- **Charts:** Recharts
- **State:** React Query for contract data caching

Browser Extension

- **Type:** Chrome Extension (Manifest V3)
- **Features:** PNR extraction, MetaMask integration
- **Architecture:** Content scripts + background service worker

Oracle Integration

- **API:** FlightAPI.io for live flight data
- **Cache:** File-based caching (24-hour TTL)
- **Update:** 5-minute intervals for real-time flight status

4. Innovation & Competitive Advantages

4.1 Technical Innovations

1. Parametric Insurance Model

- No claims process required
- Objective, verifiable flight status triggers payouts
- Zero human intervention in claims processing

2. Hybrid Pool Architecture

- Global Pool for diversified risk
- Airline-specific pools for targeted exposure
- Dynamic capital allocation between pools

3. LP Tracking System

- On-chain tracking of unique liquidity providers
- Active LP count for accurate APY calculations
- Real-time utilization metrics (basis points)

4. Chrome Extension Integration

- Seamless PNR extraction from booking websites
- One-click insurance purchase flow
- MetaMask bridging for non-Web3 sites

5. Policy NFTs

- Insurance policies as tradeable assets (future)
- Portfolio management through NFT wallets
- Verifiable proof of coverage on-chain

4.2 Economic Model

Revenue Streams

- Premium collection from policy purchases
- Protocol fee (future): 5-10% of premiums

LP Incentives

- APY range: 8-25% based on pool performance
- Calculated as: $(\text{Total Premiums} - \text{Total Payouts}) / \text{TVL} * 100$
- Higher utilization = higher potential returns

Risk Management

- Pool utilization caps at 80% to maintain liquidity
- Diversification across 10+ airline pools
- Historical data analysis for premium pricing

4.3 User Experience Advantages

For Policy Holders

- 70% cheaper than traditional insurance
- Instant purchase (2 clicks)
- Automatic payouts within 5 minutes of delay
- Transparent coverage terms

For Liquidity Providers

- High APY compared to DeFi lending (3-5%)
- Real-time performance tracking
- Withdraw anytime (subject to pool utilization)
- Diversification across multiple risk pools

5. Market Potential

5.1 Total Addressable Market (TAM)

Global Flight Insurance Market

- Current size: **\$4.2 billion** (2024)
- Projected growth: **\$8.5 billion** by 2030
- CAGR: 12.4%

Target Segments

1. **Frequent Flyers:** 100M+ annual business travelers
2. **Budget Travelers:** Price-sensitive customers avoiding traditional insurance
3. **Crypto-Native Users:** 420M+ cryptocurrency holders worldwide
4. **DeFi Investors:** \$50B+ in DeFi protocols seeking yield opportunities

5.2 Competitive Landscape

Traditional Players

- Allianz, AIG, AXA (80% market share)
- High premiums, slow claims
- Limited transparency

Emerging Competitors

- **Etherisc:** Decentralized insurance platform (multi-product)
- **Nexus Mutual:** Mutual insurance model (requires membership)
- **InsurAce:** Multi-chain coverage (focus on DeFi risks)

WingFi Differentiators

- ✈ Specialized in flight insurance only
- 🏊 Multi-pool liquidity architecture
- 🌐 Chrome extension for seamless UX
- ⛽ BSC deployment (lower gas fees)
- 🕒 Real-time flight data integration
- 🔄 A new concept of defi and prediction market

5.3 Go-to-Market Strategy

Phase 1: Testnet Launch (Q4 2024)

- Deploy on BSC Testnet
- Onboard initial LPs with incentives
- Partner with travel communities for beta testing

Phase 2: Mainnet Launch (Q1 2025)

- Deploy on BSC Mainnet
- Launch with 5 major airline pools

- Marketing campaign targeting crypto travelers

Phase 3: Scale & Expand (Q2-Q4 2025)

- Expand to 20+ airline pools
- Integrate with OTA platforms (Booking.com, Expedia)
- Launch mobile app

Phase 4: Ecosystem Growth (2026+)

- Cross-chain expansion (Ethereum, Polygon, Arbitrum)
- Additional insurance products (baggage loss, trip cancellation)
- DAO governance for protocol parameters

5.4 Revenue Projections

Conservative Scenario (Year 1)

- 10,000 policies sold
- Average premium: \$25
- Total premiums: \$250,000
- Claims payout: 30% (\$75,000)
- LP earnings: \$175,000
- Protocol TVL: \$2M

Growth Scenario (Year 3)

- 500,000 policies sold
- Average premium: \$20 (economies of scale)
- Total premiums: \$10,000,000
- Claims payout: 35% (\$3,500,000)
- LP earnings: \$6,500,000
- Protocol TVL: \$50M

6. Roadmap

Q4 2024: Foundation

- ☒ Smart contract development
- ☒ Frontend application
- ☒ Chrome extension
- ☒ BSC Testnet deployment

Q1 2025: Mainnet Launch

- ☐ Smart contract audits (CertiK, Hacken)
- ☐ Mainnet deployment
- ☐ Initial liquidity bootstrap
- ☐ Marketing campaign

Q2 2025: Product Expansion

- ☐ Mobile application (iOS, Android)
- ☐ 10 additional airline pools
- ☐ Oracle decentralization (Chainlink integration)
- ☐ Enhanced analytics dashboard

Q3 2025: Partnerships

- ☐ OTA platform integrations
- ☐ Airline partnerships for direct sales
- ☐ Insurance broker partnerships
- ☐ DeFi protocol collaborations

Q4 2025: Governance

- ☐ DAO launch with governance token
- ☐ Protocol parameter voting
- ☐ LP incentive programs
- ☐ Community-driven development

2026+: Multi-Chain & Expansion

- ☐ Ethereum mainnet deployment
 - ☐ Polygon and Arbitrum support
 - ☐ Additional insurance products
 - ☐ Global regulatory compliance
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7. Team & Advisors

Core Team

- Smart contract engineers with 5+ years DeFi experience
- Full-stack developers specialized in Web3 UX
- Insurance industry advisors
- Marketing and growth specialists

Advisors (TBD)

- DeFi protocol founders
 - Traditional insurance executives
 - Aviation industry experts
 - Legal and regulatory consultants
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8. Risk Factors & Mitigation

8.1 Smart Contract Risks

Risk: Bugs or vulnerabilities in contracts **Mitigation:**

- Multiple security audits pre-launch
- Bug bounty program
- Gradual TVL cap increase
- Emergency pause functionality

8.2 Oracle Risks

Risk: Inaccurate or delayed flight status data **Mitigation:**

- Multi-oracle architecture (future)
- Manual override for edge cases
- 24-hour data retention for verification
- Dispute resolution mechanism

8.3 Liquidity Risks

Risk: Insufficient LP capital for large claim events **Mitigation:**

- 80% utilization cap
- Reinsurance pools (future)
- Dynamic premium pricing based on utilization
- Reserve fund from protocol fees

8.4 Regulatory Risks

Risk: Insurance regulation compliance **Mitigation:**

- Parametric model (not traditional insurance)
 - Legal opinion from crypto-friendly jurisdictions
 - KYC/AML for large policies (future)
 - Decentralized governance for adaptability
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9. Tokenomics (Future)

9.1 WING Governance Token

Total Supply: 1,000,000,000 WING

Distribution:

- 40% Community & Ecosystem (LP rewards, user incentives)
- 25% Team & Advisors (4-year vesting)
- 20% Treasury (DAO controlled)
- 10% Early Investors (2-year vesting)
- 5% Liquidity Mining

Utility:

- Governance voting on protocol parameters
 - Staking for premium discounts
 - LP boost multipliers
 - Fee sharing from protocol revenue
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10. Conclusion

WingFi represents the next evolution in travel insurance, leveraging blockchain technology to create a transparent, efficient, and user-centric protocol. By eliminating intermediaries, automating claims processing, and democratizing liquidity provision, WingFi addresses fundamental inefficiencies in the \$4.2B flight insurance market.

The protocol's technical innovation, combined with a proven market need and clear go-to-market strategy, positions WingFi as a leader in decentralized insurance. As the crypto and travel industries continue to converge, WingFi offers a compelling solution for millions of travelers seeking affordable, instant, and trustless flight delay protection.

Join the WingFi revolution and experience the future of travel insurance.

Contact & Resources

Website: wingfi.io (coming soon)

Documentation: docs.wingfi.io

GitHub: github.com/wingfi

Twitter: [@wingfi_protocol](https://twitter.com/wingfi_protocol)

Discord: discord.gg/wingfi

Smart Contracts: BSC Testnet (Chain ID: 97)

Audits: Available upon mainnet launch
