

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

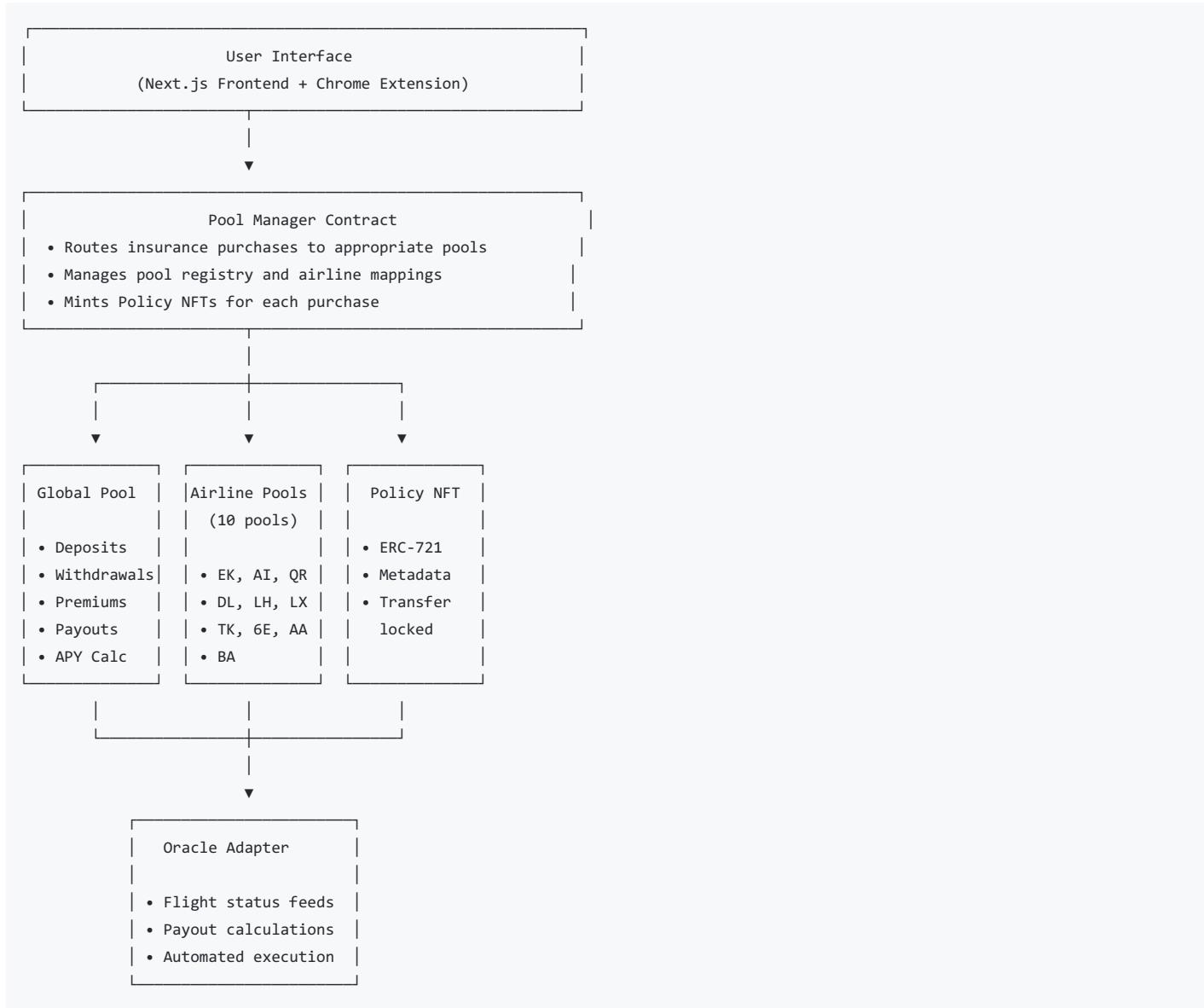
- **Crowd-Fill Pools:** Individual policy funding marketplace

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
