

IP TRANSFER & JOINT VENTURE PROPOSAL

PATENT PENDING (KR) & GLOBAL EXPANSION

Next-Gen Autonomous AI Asset Trading & Decentralized Agentic Commerce Platform

Core Patent Transfer & Joint Venture (JV) Commercialization Proposal Based on
Multi-Agent Privacy Protection (FHE/ZKP) & Decentralized Fraud Prevention (GNN)

Core Patent Executive Summary

- **Invention Title:** Decentralized Consensus-Based Autonomous AI Asset Trading System and Method with Privacy Protection and Fraud Prevention in Multi-Agent Environment
- **IP Status:** Korean Patent Application Filed (PCT International Application in Preparation)
- **Core Convergence Technologies:** FHE (CKKS) + ZKP (zk-SNARKs/STARKs) + Multi-Agent RL (MAPPO/MADDPG) + GNN (RGCN) + Smart Contracts
- **Target Applications:** Autonomous Insurance/ Finance Pricing, Real-World Asset (RWA) Token Trading, Institutional OTC Dark Pools
- **Proposed Partnership Models:** ① Full IP Assignment / Exclusive Licensing ② Joint Venture (JV) R&D & Co-Commercialization
- **Current Stage:** Core System Architecture & Complete Claims Established (Algorithm PoC & Testnet to be Co-Developed)

Tink Innovation

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Official Contact

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1. Executive Summary | Strategic Vision & Value Proposition

"Unlocking the Era of Fully Autonomous Financial Negotiation and Zero-Trust Agentic Commerce"

This proposal is submitted by **Tink Innovation** to offer strategic acquisition (Patent Assignment/Licensing) or Joint Venture (JV) co-development of our core proprietary patent: a decentralized consensus-driven autonomous AI asset trading platform.

100% Zero Data Leakage (FHE + ZKP)	100x+ Hardware Acceleration (FPGA/ASIC)	Real-Time Fraud & Collusion Defense (GNN)	Flexible Cooperation (Sale vs. JV Entity)
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1.1 Structural Limitations of Current Markets vs. The Breakthrough

Conventional algorithmic trading, automated market makers (AMMs), and robo-advisors operate under rigid, pre-defined rules controlled by centralized intermediaries. As autonomous AI agents evolve to negotiate contracts directly on behalf of individuals and institutions ('Agentic Commerce'), three foundational bottlenecks have emerged:

Critical Problem	Current Industry Limitations	Tink Innovation Patent Innovation
1. Privacy & Data Exposure	Negotiating optimal rates requires exposing sensitive personal/corporate financial profiles (income, balance sheet, risk score) to servers and counter-agents.	Fully Homomorphic Encryption (CKKS) + ZKP enable computations over encrypted ciphertexts with zero raw data disclosure.
2. Fraud & Market Manipulation	Autonomous machine-speed environments are vulnerable to wash trading, flash-loan exploits, sybil attacks, and adversarial poisoned offers.	Relational Graph Convolutional Networks (RGCN) detect illicit patterns, backed by on-chain cryptographic slashing.
3. Deadlocks & Settlement Risk	Opposing utility functions cause negotiation deadlocks; lack of escrow leads to counterparty settlement defaults without trusted middlemen.	Dynamic Concession Schedulers prevent deadlocks; Smart Contract Atomic Swaps guarantee deterministic settlement.

1.2 Strategic Value Proposition for the Acquiring / JV Partner

① Preemptive IP Moat in Agentic AI Finance With Korean patent application filed and PCT international filing underway, the partner secures an exclusive first-mover intellectual property moat across global autonomous fintech, decentralized AI, and tokenized real-world asset (RWA) trading.	② De-Risked Co-Development & Joint Upside By leveraging Tink Innovation's mathematical and architectural foundation alongside the partner's engineering, compute, and commercial distribution channels, both parties can minimize time-to-market and share massive platform transaction revenues.
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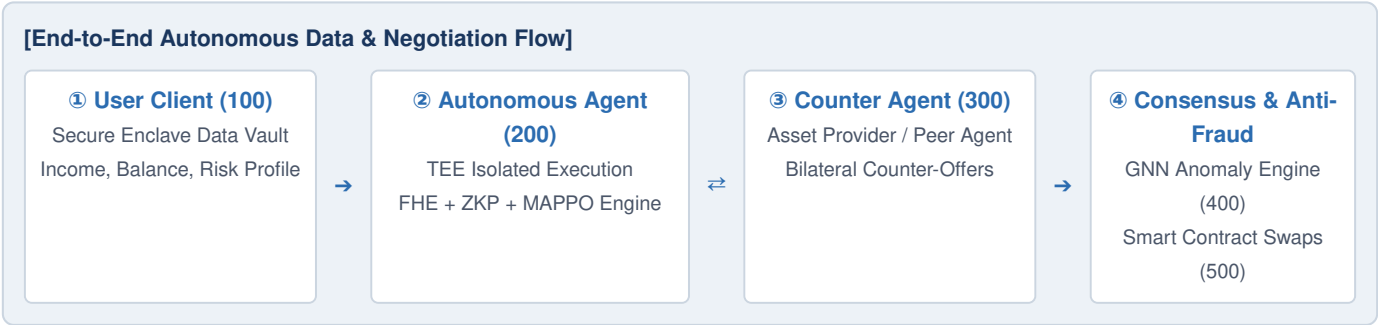
2. Patent Overview & System Architecture | Technical Blueprint

2.1 Basic Bibliographic Information

Title of Invention	Decentralized Consensus-Based Autonomous AI Asset Trading System and Method with Privacy Protection and Fraud Prevention in Multi-Agent Environment		
Patent Holder	Tink Innovation (CEO: Sungchu Kang)	Application Status	KR Application Filed / PCT Prep
Claims Structure	Total 12 Claims (1 Independent, 11 Dependent)	Target Sectors	Agentic AI, Privacy-Preserving FHE/ZKP, RWA, DeFi

2.2 End-to-End System Pipeline & Architecture (Based on Figure 1)

The patented technology establishes a fully integrated, zero-trust decentralized ecosystem comprising the User Client (100), Autonomous Trading Agent (200), Counterparty Agent (300), Distributed Anti-Fraud System (400), and Decentralized Consensus Blockchain Network (500) with Decentralized Oracle Networks (DON).



3. Deep-Dive I: Privacy Protection & Hardware Acceleration | FHE & ZKP

3.1 FHE Profiling & Noise Level Prediction Algorithm (Claims 2, 7 & Fig. 5)

In autonomous commerce, an agent must evaluate user assets (\$A\$), income (\$I\$), consumption habits (\$C\$), and risk preferences (\$R\$) without third-party exposure. Our system applies the **CKKS scheme** to encrypt raw user data into ciphertext $Enc(D_{raw}) = \{Enc(I), Enc(C), Enc(A), Enc(R)\}$.

Proactive Bootstrapping Optimization (Fig. 5)

Repeated homomorphic multiplications accumulate cipher noise. When noise exceeds a critical threshold (L_{th}), decryption fails. The patent's **Noise Tracker Module** calculates the expected depth consumption (ΔL) of the next policy step (M_{next}):

[Dynamic Decision Condition]

$L_{curr} - \Delta L \leq L_{th}$ triggers Proactive Bootstrapping. Otherwise, bootstrapping is **completely bypassed (skipped)**, eliminating massive compute latency.

Heterogeneous Hardware Pipeline (FPGA/ASIC) (Fig. 6)

To enable sub-second real-time counter-offers, the architecture offloads heavy modular reductions to dedicated hardware:

- **Parallel NTT Core Array:** Reduces polynomial multiplication complexity from $O(N^2)$ to $O(N \log N)$.
- **HBM & PCIe Gen5 / CXL MMIO:** Direct memory-mapped I/O eliminates CPU-accelerator transfer bottlenecks.
- **Hardwired Mod Reduction:** Delivers **>100x speedup** over CPU baseline, ensuring millisecond-level responsiveness.

3.2 ZKP Decentralized Ceremony & Hybrid Switching Architecture (Claims 3, 8 & Figs. 7-9)

When counterparty agents mandate proof of criteria (e.g., "Monthly income $\geq$ \$5,000"), the system produces zero-knowledge proofs (π) verifying statement validity without disclosing the underlying witness (w).

Feature Comparison	MPC-Based Decentralized Ceremony (Fig. 8)	zk-STARKs Transparent Mode (Fig. 9)
Core Objective	Eliminate centralized trust & toxic waste vulnerabilities during Common Reference String (CRS) generation	Provide post-quantum security and zero trusted-setup overhead for high-value contracts
Operational Flow	N randomly selected TEE nodes sequentially update CRS. Immediate zeroization of secrets (s_i). If even 1 node destroys its secret, CRS is unforgeable.	Utilizes Public Random Oracle Model + collision-resistant Poseidon hashes + Fast Reed-Solomon IOPP (FRI) protocol.
Dynamic Switching Target	[zk-SNARKs Mode] Ultra-compact proof size (<수백 bytes) & low gas fee → High-frequency micro-trades & stock orders.	[zk-STARKs Mode] Zero setup risk + quantum resistance → Multi-million dollar RWA, real estate, and long-term insurance policies.

4. Deep-Dive II: Multi-Agent RL & Fraud Prevention | AI & Consensus

4.1 Incomplete Information Game Modeling & Reward Functions (Claim 4 & Fig. 10)

Buyer (200) and Seller (300) agents utilize **MAPPO** (Multi-Agent Proximal Policy Optimization) and **MADDPG** algorithms within an incomplete information setting, discovering optimal contract conditions without knowing counterparty utility weights.

Buyer Agent Reward Function (R_{buy})

$$R_{buy} = \alpha \cdot (P_{max} - P_{agreed}) - \beta \cdot t - \gamma \cdot Risk$$

- P_{max} : Max reservation price; P_{agreed} : Settled price
- t : Elapsed negotiation rounds (time decay penalty)
- $Risk$: Underlying asset volatility/credit risk factor
- α, β, γ : User profile-customized weighting parameters

Seller Agent Reward Function (R_{sell})

$$R_{sell} = \delta \cdot (P_{agreed} - P_{min}) - \epsilon \cdot t$$

- P_{min} : Seller reservation price (floor price)
- δ, ϵ : Margin optimization and turnaround speed weights
- Iterative counter-proposals converge toward theoretical **Nash Equilibrium** with maximized joint utility.

4.2 Edge-Case Control: Deadlock Resolution & Poisoning Defense (Claims 9, 10 & Figs. 11-13)

Dynamic Concession Scheduler (Deadlock Immunity)

When negotiation exceeds threshold round t_{th} , the buyer agent dynamically relaxes reservation price toward oracle market price P_{market} :

$$P_{max}(t) = P_{max}(0) + \gamma_t \cdot (P_{market} - P_{max}(0))$$

(γ_t : Monotonically increasing Sigmoid concession factor)

If counter-agent remains unresponsive at max round t_{max} , session automatically aborts and flags malicious counterparty.

Adversarial Data Poisoning Defense (Minimax)

Hostile agents injecting manipulated high/low bid packets to bias internal policy models are blocked via a 2-stage defense:

- **Gaussian Z-Score Pipeline**: Quarantines anomalous offers deviating from historical mean by >3 standard deviations (σ).
- **Minimax Robust Pre-Training**: Policy network weights optimized under worst-case loss scenarios, preventing panic dumping or overpaying.

4.3 Distributed Anti-Fraud (GNN) & ZK-Rollup Execution (Claims 5, 11, 12 & Figs. 14-19)

[Off-Chain GNN Analytics + On-Chain ZK-Rollup for Gas Efficiency & Real-Time Security]

Network transaction graphs are continuously transformed into relational knowledge graphs. High-complexity RGCN node aggregation is computed on off-chain GPU clusters, generating a succinct zero-knowledge proof (π) certifying the computation's integrity. The smart contract validates π in milliseconds, triggering **Atomic Swaps** for verified trades and **Slashing** staked collateral for fraudulent actors.

5. Market Opportunity & Commercial Impact | Market Sizing & Use Cases

5.1 Target Market TAM / SAM / SOM Projections (2025–2032)

This patented innovation lies at the lucrative intersection of **Autonomous AI Agents (Agentic AI)**, **Privacy-Enhancing Technologies (PETs/FHE)**, and **Tokenized Real-World Assets (RWA/DeFi)**.

Market Sector	2025–2026 Baseline	2030–2032 Projection	CAGR (%)
Autonomous AI Agents (Agentic Commerce)	\$5.2 Billion	\$48.5 Billion	41.2%
Tokenized Real-World Assets (RWA / BCG Study)	\$2.1 Trillion	\$16.0 Trillion	47.8%
Privacy-Preserving Computation (FHE / ZKP)	\$3.8 Billion	\$22.4 Billion	33.5%
Autonomous Algorithmic Trading & Robo-Advisory	\$68.0 Billion	\$295.0 Billion	28.0%

5.2 High-Impact Industry Use Cases

① Personalized Insurance Premium Negotiation Underwriting without data leaks: Individual agents negotiate customized rates across competing insurer agents under FHE, minting NFT policies automatically upon escrow.	② Fractional Real Estate & RWA Trading Connecting government land registries via DON oracles to verify property titles, enabling peer agents to negotiate split-second fractional trades with instant settlement.	③ Institutional OTC Dark Pools Large-block stock and bond trades executed without revealing portfolio orders to the open market, preventing front-running and MEV sandwich attacks.
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5.3 Competitive Matrix

Evaluation Metric	Traditional Robo-Advisors	Standard DeFi / AMM Pools	Tink Innovation Patented System
Execution Mechanism	Centralized server / One-way rule	Passive liquidity pools / Manual swap	Bilateral Multi-Agent Dynamic RL Negotiation
Data Privacy	Plaintext stored on centralized servers	Public wallet balances & history	100% Encrypted Computation (FHE + ZKP)
Fraud & MEV Protection	Post-facto manual audit log	Highly vulnerable to MEV & sandwich attacks	Off-Chain GNN + On-Chain Rollup Slashing
Real-World Asset (RWA)	Limited to legacy financial rails	Single-oracle dependency risk (SPOF)	Chainlink DON Median Consensus Verification

6. Partnership Models & Joint Venture (JV) Framework | Deal Structures

"Tailored Partnership Structures Designed for Maximum Flexibility and Strategic Alignment"

Recognizing that the patent represents foundational core intellectual property with Korean filing complete and international PCT pending, Tink Innovation proposes three flexible deal structures.

6.1 Comparison of Partnership Tracks (Option A vs. Option B vs. Option C)

Dimension	Option A: Full Patent Assignment	Option B: Joint Venture (JV) Entity	Option C: Exclusive Licensing
Structure	Complete sale & transfer of worldwide patent rights	Jointly incorporated commercial JV entity for co-development	Exclusive territorial or domain-specific field-of-use license
Tink Innovation Role	Full IP transfer & technical handover documentation	In-kind IP contribution + Core AI/ Cryptographic R&D leadership	IP licensor providing technical maintenance and updates
Partner Role	Full ownership, in-house commercialization & engineering	Commercial funding + Cloud/GPU compute + Enterprise client access	Integration into existing platform + Royalty disbursement
Financial Model	Upfront lump-sum acquisition fee	Equity shareholding + Platform transaction fee revenue share	Upfront milestone fee + Running gross revenue royalty (%)
Target Partner	Big Tech conglomerates, Tier-1 Investment Banks	Fintech unicorns, Asset management giants, AI firms	Global insurance groups, PropTech & Crypto funds

6.2 Recommended Joint Venture (JV) Governance & Revenue Model (Option B)

JV Equity & Governance Architecture

- **Tink Innovation:** Contributes 100% of global patent rights & architecture blueprints; leads core AI and cryptographic engineering (30%–49% equity).
- **Strategic Partner:** Supplies seed/growth capital, Tier-3 GPU infrastructure, and regulatory financial licensing (51%–70% equity).
- **Board Representation:** Balanced co-CEO or equal board representation ensuring agile strategic execution.

Commercial Revenue Streams

- **Autonomous Transaction Take-Rate:** 0.05% to 0.30% fee on all settled multi-agent asset volumes.
- **B2B Enterprise SaaS & APIs:** Enterprise licensing of FHE privacy profiling and GNN anti-fraud APIs to third-party institutions.
- **RWA Tokenization Protocol Fees:** Onboarding and smart contract audit/settlement fees for institutional real estate token issuers.

7. Research & Development (R&D) Roadmap | 24-Month Plan

[Development Status & Joint Engineering Proposition]

The patent currently provides complete mathematical specifications and formal claim architectures. Empirical benchmarks and software implementations are ready for joint engineering. The following 24-month roadmap outlines the timeline from mathematical simulation to global mainnet deployment.

7.1 Four-Phase R&D Milestone Matrix

Phase	Timeline	Core Development & IP Milestones	Key Deliverables
Phase 1 Math & IP Filing	M1 – M6 (6 Months)	- PCT International Application Filing (US, EU, JP, ASEAN) - CKKS noise depth simulator mathematical formulation - MAPPO/MADDPG reward parameter sensitivity simulation	- International Search Report (ISR) - Mathematical verification whitepaper - Core algorithm technical specification
Phase 2 Algorithm PoC	M7 – M12 (6 Months)	- FHE + zk-SNARKs lightweight pipeline code implementation - Multi-agent incomplete information negotiation sandbox - RGCN graph anomaly detection training on synthetic datasets	- Working software demo & SDK - Benchmark performance report - Fraud detection F1-score validation (>99.2%)
Phase 3 Hardware & Testnet	M13 – M18 (6 Months)	- FPGA-based NTT accelerator pipeline hardware prototype - Blockchain testnet deployment & smart contract Atomic Swaps - Chainlink DON Oracle multi-API integration	- FPGA-accelerated benchmark metrics - Third-party smart contract security audit - Closed alpha/beta testnet environment
Phase 4 Mainnet & Commercial	M19 – M24 (6 Months)	- Production Mainnet launch & institutional onboarding - Commercial deployment with pilot insurance & asset managers - Global RWA exchange oracle gateway activation	- Commercial platform (Web/App/APIs) - Institutional enterprise client contracts - Series A/B funding round or IPO roadmap

7.2 Resource Allocation & Estimated Budget (2-Year JV Estimate: \$2.5M – \$3.5M)

Core Engineering Team Composition

- AI/RL Scientists (3–4 FTE):** MAPPO policy design and adversarial Minimax optimization.
- Cryptographic Engineers (2–3 FTE):** CKKS noise scheduling and zk-STARKs circuit coding.
- Smart Contract Engineers (2 FTE):** ZK-Rollup contracts and Chainlink OCR integration.
- FPGA/Hardware Architect (1–2 FTE):** NTT acceleration and CXL/HBM memory pipeline.

Budget Allocation Breakdown

- R&D Personnel (58%):** Top-tier AI & cryptography research compensation.
- Compute Infrastructure (16%):** Cloud GPU clusters (H100/B200) and FPGA testbeds.
- Global IP & Security Audits (16%):** PCT country entries and top-tier smart contract audits.
- Operations & Regulatory Sandbox (10%):** Legal structuring, financial sandbox filings.

8. Global IP Strategy, Risk Mitigation & Contact | Conclusion

8.1 Global Patent Expansion & Fast-Track Strategy

Tink Innovation plans to file the **PCT application** within the 12-month priority window, leveraging the Patent Prosecution Highway (PPH) to expedite allowance across key commercial jurisdictions: the United States (USPTO), European Union (EPO), Japan (JPO), Singapore, and Hong Kong. Divisional and continuation applications will be filed to build an impenetrable patent fortress.

8.2 Risk Analysis & Proactive Mitigation Matrix

Identified Risk Factor	Potential Operational Impact	Proactive Technical & Strategic Mitigation
1. Technical Latency Overhead	High compute latency during FHE bootstrapping hindering sub-second counter-offers	Implement algorithmic noise tracking (Claim 7) in software first, bypassing 90% of bootstrapping prior to FPGA deployment.
2. Financial Regulatory Hurdles	Regulatory skepticism toward fully autonomous AI financial contracting	Apply for Regulatory Sandbox (Innovative Financial Service) exemptions; provide optional human-in-the-loop confirmation toggles.
3. Off-Chain Oracle Corruption	Manipulated external price feeds poisoning real-world asset (RWA) valuation	Deploy Chainlink DON decentralized median aggregation (Claim 12) with multi-signature verification, eliminating single points of failure.

8.3 Company Information & Official Negotiation Contact

Tink Innovation

- **CEO / Legal Representative:** Sungchu Kang
- **Headquarters Location:** Seoul, Republic of Korea
- **Official Proposal E-mail:** staping@naver.com
- **Proposal Objective:** Strategic Patent Sale / Assignment, Exclusive Licensing, or Joint Venture (JV) R&D Partnership
- **Mutual Non-Disclosure Agreement (NDA):** Available upon request to disclose detailed patent claims, mathematical formulations, and source design files.

[Next Steps & Submission Process]

Interested institutional partners and enterprise buyers are invited to contact us at staping@naver.com. Following the execution of a standard mutual NDA, we will schedule: **1) Technical Claim Analysis Session, 2) Commercial Model (Sale vs. JV) Workshop, and 3) Term Sheet Execution**. We look forward to pioneering the future of autonomous finance together.