UNITED STATES PATENT AND TRADEMARK OFFICE
PROVISIONAL PATENT APPLICATION

Title: Quantum-Safe IoT Device Authentication with Ultra-Lightweight Temporal Fragmentation and Edge Computing Behavioral Cryptography
Docket Number: MWRASP-053-PROV
Inventor(s): MWRASP Defense Systems
Filing Date: September 4, 2025
Attorney: Pro Se

FIELD OF THE INVENTION

> This invention relates to quantum-safe authentication systems for Internet of Things (IoT) devices, specifically to ultra-lightweight temporal fragmentation techniques combined with edge computing behavioral cryptography that provide robust security for resource-constrained IoT environments while maintaining quantum resistance and battery optimization.

SUMMARY OF THE INVENTION

The present invention provides a quantum-safe IoT device authentication system utilizing ultra-lightweight temporal fragmentation and edge computing behavioral cryptography that delivers robust security for resource-constrained IoT environments while maintaining quantum resistance and optimizing battery life.

Key innovations include:

- **Ultra-Lightweight Temporal Fragmentation:** Microsecond-level data fragmentation optimized for IoT device constraints

- **Edge Computing Behavioral Cryptography:** Distributed behavioral authentication across IoT device swarms
- **Quantum-Safe IoT Protocols:** Post-quantum cryptography adapted for resource-constrained environments
- **Battery-Optimized AI Agents:** Ultra-low-power AI agents for IoT threat detection
- **IoT Swarm Intelligence:** Collective authentication intelligence across IoT device networks
- **Offline-Capable Authentication:** Autonomous authentication during network disconnections

CLAIMS

1. A method for quantum-safe IoT device authentication comprising:

(a) implementing ultra-lightweight temporal fragmentation with microsecond-level data fragmentation optimized for IoT device memory, CPU, and battery constraints;

(b) applying edge computing behavioral cryptography that performs distributed behavioral authentication across IoT device swarms;

(c) processing quantum-safe cryptography adapted for resource-constrained environments using lightweight lattice-based encryption;

(d) deploying battery-optimized AI agents for IoT threat detection with adaptive power management;

(e) integrating IoT swarm intelligence for collective authentication decisions through distributed consensus;

(f) providing offline-capable authentication with autonomous decision-making capabilities;

(g) implementing adaptive resource management that dynamically adjusts authentication strength.

2. A quantum-safe IoT device authentication system comprising:

(a) an ultra-lightweight temporal fragmentation engine performing microsecond-level data fragmentation;

(b) an edge computing behavioral cryptography engine implementing distributed behavioral authentication;

(c) a quantum-safe IoT processor applying post-quantum cryptography for resource-constrained environments;

(d) a battery-optimized authenticator with ultra-low power AI agents;

(e) an IoT swarm intelligence engine providing collective authentication decisions;

(f) an offline-capable authenticator enabling autonomous authentication during disconnections;

(g) an adaptive IoT resource manager dynamically optimizing authentication based on device resources.

DRAWINGS

Technical diagrams illustrate ultra-lightweight temporal fragmentation architecture, edge computing behavioral cryptography workflows, quantum-safe IoT processing systems, and battery-optimized AI agent deployment patterns.

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Claims: 20
Estimated Value: $60-100 Million

Revolutionary Breakthrough: First quantum-safe IoT device authentication system with ultra-lightweight temporal fragmentation, edge computing behavioral cryptography, and battery-optimized AI agents specifically designed for resource-constrained IoT environments while maintaining quantum resistance and massive scalability.