EDGE COMPUTING SECURITY PROTOCOL PATENT

United States Patent Application No. 16/789,432

Filing Date: March 15, 2023

Assignee: Summit Digital Solutions, Inc.

ABSTRACT

A system and method for securing edge computing nodes in distributed IoT networks through a multi-layered authentication and encryption protocol. The invention comprises a novel approach to protecting data processing at network edge points using dynamic key generation, behavioral analytics, and artificial intelligence-driven threat detection.

BACKGROUND OF INVENTION

[0001] Edge computing architectures have become increasingly critical in modern enterprise environments, particularly for Internet of Things (IoT) implementations requiring real-time data processing and reduced latency. However, traditional security measures often prove insufficient for protecting distributed edge nodes from sophisticated cyber threats.

[0002] Existing solutions typically rely on static encryption protocols and centralized authentication mechanisms, which can introduce latency and create single points of failure in edge computing environments.

SUMMARY OF INVENTION

[0003] The present invention provides a comprehensive security protocol specifically designed for edge computing environments. The system implements:

a) Dynamic key generation using environmental telemetry data

b) AI-powered behavioral analysis for anomaly detection

c) Distributed ledger verification for node authentication

d) Adaptive encryption strength based on threat levels

e) Self-healing network topology in response to security events

DETAILED DESCRIPTION

Authentication Protocol

[0004] The authentication protocol utilizes a proprietary three-factor verification system:

Hardware-level device fingerprinting

Environmental context validation

Behavioral pattern matching

[0005] Each edge node maintains a unique identity profile comprising:

- Device-specific cryptographic keys

- Historical behavioral patterns

- Network topology position

- Resource utilization patterns

- Communication frequency metrics

Encryption Implementation

[0006] The encryption protocol employs:

- 256-bit AES encryption for data at rest

- Quantum-resistant algorithms for data in transit

- Dynamic key rotation based on network activity

- Segmented encryption zones with unique keys

- Real-time encryption strength adjustment

Threat Detection System

[0007] The threat detection component incorporates:

Machine learning models trained on normal operation patterns

Real-time anomaly detection algorithms

Distributed sensor network monitoring

Predictive threat analysis

Automated response protocols

CLAIMS

A method for securing edge computing nodes comprising:

a) Generating dynamic encryption keys based on environmental data

b) Implementing multi-factor authentication protocols

c) Utilizing artificial intelligence for threat detection

d) Maintaining distributed verification ledgers

e) Executing automated response protocols

The method of claim 1, wherein environmental data includes:

a) Temperature readings

b) Network latency measurements

c) Processing load metrics

d) Power consumption patterns

e) Communication frequency data

A system for implementing the method of claim 1, comprising:

a) Edge computing nodes

b) Security protocol processors

c) Authentication servers

d) Encryption modules

e) Threat detection engines

INVENTORS

- Dr. Robert Martinez, Chief Innovation Officer

- Michael Chang, Chief Technology Officer

- James Henderson, Chief Digital Officer

PATENT REPRESENTATIVES

Wilson & Patterson LLP

1234 Technology Drive, Suite 500

San Francisco, CA 94105

ASSIGNMENT RIGHTS

All rights, title, and interest in this patent application are assigned to Summit Digital Solutions, Inc., a Delaware corporation, including:

Right to prosecute patent application

Right to file continuing applications

Right to collect damages for infringement

Right to license the technology

Right to enforce the patent

EXECUTION

IN WITNESS WHEREOF, this patent application is executed this 15th day of March, 2023.

/s/ Dr. Robert Martinez

_

Dr. Robert Martinez

Chief Innovation Officer

Summit Digital Solutions, Inc.

/s/ Michael Chang

_

Michael Chang

Chief Technology Officer

Summit Digital Solutions, Inc.

State of Delaware

County of New Castle

Subscribed and sworn to before me on March 15, 2023

/s/ Jane Smith

_

Jane Smith

Notary Public

My Commission Expires: December 31, 2025