Summit Digital Solutions IoT Sensor Integration Architecture v2.1

PROPRIETARY AND CONFIDENTIAL

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1. OVERVIEW AND SCOPE

1. This IoT Sensor Integration Architecture Document ("Architecture") defines the technical and operational framework for Summit Digital Solutions, Inc.'s ("Company") proprietary IoT sensor integration system, including all associated components, protocols, and security measures implemented within the Peak Performance Platform(TM).

2. This Architecture supersedes version 2.0 (dated June 15, 2023) and all prior versions.

2. DEFINITIONS

1. "Edge Devices" means any Company-approved IoT sensors, actuators, or data collection devices deployed at customer premises.

2. "Integration Layer" means the Company's proprietary middleware that facilitates communication between Edge Devices and the Core Platform.

3. "Core Platform" means the Company's Peak Performance Platform(TM) and associated cloud infrastructure.

4. "Protocol Stack" means the complete set of communication protocols utilized for data transmission between system components.

3. SYSTEM ARCHITECTURE

1. Physical Layer Architecture

1.1. Edge Device Infrastructure

- Approved sensor types: Temperature, pressure, vibration, power consumption
- Maximum supported device density: 500 sensors per gateway

- Gateway specifications: ARM64 architecture, minimum 2GB RAM
- Local storage requirements: 32GB minimum, industrial-grade SD

1.2. Network Infrastructure

- Primary connectivity: IEEE 802.15.4e
- Backup connectivity: LTE-M/NB-IoT
- Mesh networking capability: Up to 200 nodes
- Maximum hop count: 8

2. Integration Layer Architecture

2.1. Protocol Support

- MQTT v5.0 with QoS 2
- CoAP for resource-constrained devices
- OPC UA for industrial systems
- Custom SDS Binary Protocol v3.5

2.2. Data Processing

- Edge analytics capability: Up to 10,000 events/second
- Local buffering: 72 hours minimum
- Compression ratio: 10:1 minimum
- Encryption: AES-256-GCM

4. SECURITY FRAMEWORK

1. Device Security

1.1. Authentication

- X.509 certificate-based device authentication
- Hardware security module (HSM) integration
- Rotating encryption keys (24-hour cycle)
- Secure boot verification

1.2. Communication Security

- TLS 1.3 minimum for all connections

- Perfect Forward Secrecy (PFS) enabled
- Certificate pinning required
- Mutual authentication enforced

5. DATA MANAGEMENT

1. Data Collection

1.1. Sampling Requirements

- Minimum sampling rate: 100ms
- Maximum latency: 250ms
- Time synchronization: NTP with GPS backup
- Timestamp precision: Microsecond

1.2. Storage Requirements

- Local cache: 7 days rolling
- Cloud retention: 365 days minimum
- Archival period: 7 years
- Compliance with ISO 27001

6. SCALABILITY AND PERFORMANCE

1. System Capacity

1.1. Platform Limits

- Maximum devices per instance: 1,000,000
- Maximum data throughput: 1TB/day
- Maximum concurrent connections: 100,000
- API request limit: 10,000 requests/second

1.2. Performance Metrics

- System availability: 99.99%
- Data accuracy: 99.999%
- Maximum end-to-end latency: 500ms
- Recovery time objective (RTO): 4 hours

7. COMPLIANCE AND STANDARDS

1. This Architecture adheres to:

- ISO/IEC 29100 Privacy Framework
- NIST Cybersecurity Framework
- IEC 62443 Industrial Network Security
- GDPR Article 25 (Data Protection by Design)

8. INTELLECTUAL PROPERTY

1. All aspects of this Architecture, including but not limited to the Integration Layer, Protocol Stack, and associated software components, are proprietary to Summit Digital Solutions, Inc. and protected under U.S. Patent Nos. 11,234,567 and 11,234,568.

9. DOCUMENT CONTROL

1. This document is maintained by the Office of the Chief Technology Officer.

2. Reviews and updates occur quarterly or as required by technological advances.

APPROVED AND ADOPTED:

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