EDGE-QI Layered Architecture

Layer 8: Input Sources
Camera Feeds, Sensor Networks

| Video Stream | IoT Sensors | External Data |

Layer 7: Data Processing
Real-time Ingestion, Quality Validation

| Data Validator | Preprocessor | Buffer Manager |

Layer 6: ML Intelligence
Computer Vision, Anomaly Detection

| Object Detector | Queue Analyzer | Anomaly Engine |

Layer 5: Core Processing
Task Scheduling, Resource Monitoring

Consensus Protocol

| Scheduler | Energy Monitor | Network Monitor |

Edge Node A
Jetson Nano

Edge Node B
Raspberry Pi

Layer 4: Edge Collaboration
Consensus Protocols, Distributed Decisions

| BFT Consensus | Vote Manager | State Sync |

Layer 3: Bandwidth Optimization
Adaptive Streaming, Data Compression

| Quality Adapter | Compressor | Priority Queue |

Layer 2: Visualization
Real-time Dashboard, Monitoring Interface

| Web Dashboard | Mobile App | Admin Panel |

Layer 1: External Systems
Cloud Services, Alert Systems, Third-party APIs

| REST APIs | MQTT Broker | Alert Manager |

Data Flow

Control Flow

Components:

Functional Modules

— Data Flow
— Control Flow
— Inter-node Communication
▢ Edge Nodes