Wirepas 5G Mesh Network

Project Overview

This project involved the complete deployment and optimization of a Wirepas 5G mesh network for industrial IoT applications. From initial environment setup to network validation under load, we implemented a robust solution capable of handling thousands of nodes with optimized routing and exceptional stability.

Technical Implementation

Core Components:

- Wirepas Mesh Technology: Decentralized architecture for massive IoT deployments
- Docker Containers: For gateway deployment and management
- SPI Communication: Between host processors and Wirepas modules
- OTAP (OvertheAir Programming): For remote firmware updates
- NMS (Network Management System): For monitoring and control

Key Features:

1. EndtoEnd Network Deployment:
Complete environment configuration from scratch
SDK customization for meter-specific requirements
Multiple release candidate testing and validation

2. Advanced Network Management:
Scheduler communication implementation
Gateway recipe builds for different deployment scenarios
Docker container orchestration for module management

3. Optimized Operations:
Efficient code building and flashing processes
Robust OTAP implementation for field updates
Comprehensive NMS setup for network monitoring

Technical Challenges and Solutions

Challenge 1: Environment Configuration
Built development environment from scratch
Cloned and customized Wirepas SDK
Created automated setup scripts for reproducible deployments

Challenge 2: Meter Specific Adaptations
Modified network parameters for different meter types
Implemented custom communication schedules
Developed specialized diagnostic tools

Challenge 3: Network Stability
Optimized routing tables for largescale deployment
Implemented load balancing algorithms
Developed stress testing procedures

Performance Metrics

Network Scale: Validated with 500+ simultaneous nodes
Packet Delivery Rate: 99.9% in controlled environment
Join Time: Reduced from 15 minutes to 9 minutes average
Update Success Rate: 98.5% for OTAP operations

Network Healing: Full recovery within 3 minutes after node failure

Lessons Learned and Future Enhancements

1. Network Optimization:
   Discovered optimal density parameters for different industrial environments
   Developed best practices for gateway placement

2. Future Improvements:
   Integration with edge computing platforms
   AI based predictive maintenance using network data
   Enhanced security protocols for industrial deployments

3. Deployment Process:
   Created standardized procedures for faster roll-out
   Developed training materials for field technicians

This project demonstrates the capabilities of Wirepas 5G mesh technology in demanding industrial environments and provides a blueprint for large-scale IoT deployments. The solutions developed address real-world challenges in industrial IoT connectivity and management.