

FIJISHI

Dynamic Network Slicing for Industry 4.0 Smart Factories.

India, 04 June 2025/ 11:22 PM IST

Disclaimer: The following is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Fijishi's products remains at the sole discretion of Fijishi.

Use Case: Dynamic Network Slicing for Industry 4.0 Smart Factories

Industry: Manufacturing & Industrial IoT

The Challenge: A large automotive manufacturer was building a new "smart factory" heavily reliant on a dense array of interconnected robots, AGVs, real-time quality control cameras, and IoT sensors. Each application had vastly different connectivity requirements: robots needed ultra-low latency and high reliability, cameras demanded high bandwidth, and sensors required consistent, low-power connectivity. Managing these diverse Quality of Service (QoS) demands on a single, dynamic network was a significant challenge, leading to potential bottlenecks and operational inefficiencies.

The FiRIS Solution: FiRIS was implemented as the intelligent orchestration platform for the factory's private 5G/6G network, integrating with a network of strategically placed Reconfigurable Intelligent Surfaces (RIS) and edge compute nodes.

- **Self-architecting & Intent-driven "Omni-Symphony":**
 - **Service-Centric Intent-Based Control:** Factory operators defined high-level business intents: "Robot control: sub-5ms latency, 99.999% reliability," "Quality control video stream: 1Gbps throughput," "Sensor data: always-on, low power." FiRIS autonomously translated these intents into network configurations.
 - **Decentralized Autonomous Agents:** AI agents distributed across the network and RIS panels made real-time, local decisions to optimize signal paths and resource allocation based on the defined intents.
 - **Federated Multi-Objective Reinforcement Learning:** FiRIS continuously learned from network conditions and application performance, autonomously optimizing resource allocation across different "network slices" to meet all defined QoS objectives simultaneously, even in highly dynamic factory environments.
- **Quantum-cognitive "Synapse":**
 - **Multi-Modal Data Fusion:** Combined data from network performance, robot telemetry, and environmental sensors to gain a holistic view of the factory floor, allowing for highly adaptive network adjustments.

Impact and Benefits:

- **Guaranteed QoS for Critical Applications:** Ensured robots operated with required precision and reliability, preventing production line stoppages.
- **Maximized Network Efficiency:** Optimal resource allocation meant no over-provisioning, reducing infrastructure costs and energy consumption.
- **Rapid Production Line Reconfiguration:** The network could dynamically adapt to changes in factory layout or production demands, significantly reducing downtime for retooling.
- **Enabling True Industry 4.0:** Provided the foundational, intelligent connectivity necessary for advanced automation, real-time analytics, and predictive manufacturing.

- **New Revenue Opportunities for Operators:** Telecom providers can offer "Network-as-a-Service" for private industrial networks, customized to specific manufacturing needs.

Key FiRIS Features Highlighted:

- Self-architecting & Intent-driven "Omni-Symphony" (Service-Centric Intent-Based Control, Decentralized Autonomous Agents, Federated Multi-Objective Reinforcement Learning)
- Quantum-cognitive "Synapse" (Multi-Modal Data Fusion)
- Self-Healing & Elasticity.

This document is provided for information purposes only. This document is not warranted to be error-free, nor subject to any other warranties or conditions, whether expressed orally or implied in law, including implied warranties and conditions of merchantability or fitness for a particular purpose. We specifically disclaim any liability with respect to this document and no contractual obligations are formed either directly or indirectly by this document. This document may not be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without our prior written permission. To know more, please visit www.fijishi.com

©2025 Fijishi, and/or its affiliates. All rights reserved.