

AUTOMOTIVE PRODUCTION

Real-Time WLAN for RGV-Based Manufacturing Line

Reliable, real-time wireless connectivity for 23 Rail-Guided Vehicles (RGVs) in an automotive production line using a deterministic WLAN system with latency-free roaming.



AW22R - Access Point



CW22R - Client

Project Overview

Industry	Automotive manufacturing
Application	Wireless connectivity for RGVs in a production line
Objective	Transmission of control, sensor, and safety data (PROFIsafe) with guaranteed low latency in large industrial hall
Location	Germany (major automotive OEM)
Integration Partner	Germany (integration partner)

System Architecture

Component	Quantity
Components	23 RGVs (Mobile Units) 12 Access Points 1 central PLC 23 local PLCs
Network	Star topology, Ethernet-based
Communication Protocols	PROFINET, PROFIsafe, ARP, IP

Frequencies	5.2 GHz + 6 GHz (20 MHz each)
Encryption	Device-specific, quantum-secure symmetric key
Max latency	≤ 48 ms (worst case, all 23 RGVs)
Safety response time	200 ms met
Installation	< 2 h provisional without detailed radio planning

Challenges and Results

Key Challenges:

- Reflective metal structures (light tunnel)
- Intermittent shielding (acoustic chamber)
- Frequent roaming under motion

Results:

- Zero packet loss, seamless roaming
- Full PROFINET/PROFIsafe compliance
- Stable operation even under multipath and shielding conditions

Reasons for Choosing deterministic WLAN

- Latency-free roaming
- Predictable real-time performance (also at cell boundaries)
- Quick installation without radio field simulation / extensive planning
- Ethernet-transparent integration
- Significant cost savings (~70 % saved) compared to previous default safety-hardened wireless technology

Project Key Figures

Hall length	350 ft
Total area covered	45,000 sq ft
Access Points	12
Clients	23
Throughput per client	6 Mbit/s / 23 = 260 kbit/s
One-way latency (at >99.9999% reliability)	≤ 2 ms + 2 ms / client * 23 clients = 48 ms
Power	PoE (Access Points) 24 V DC (Clients)

Images



Figure 1: Integration of CW22R Client into RGV

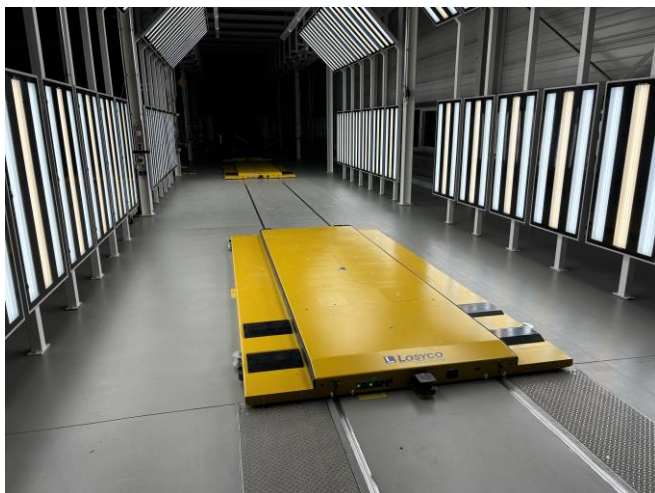


Figure 2: RGV in light tunnel (Access Point visible on the right tunnel side)

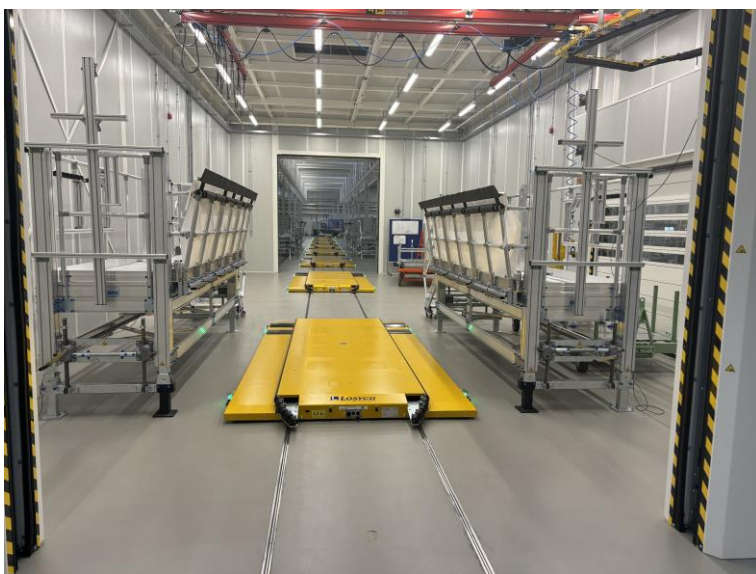


Figure 3: RGVs in one row, partly inside the acoustic chamber (here: with open doors), Access Point mounted inside chamber on back wall



Figure 4: Production Concept (Rendering)

Conclusion

Seamless roaming and deterministic WLAN provided a robust, low-latency, and maintenance-free communication backbone for mobile RGVs in a complex automotive environment. The system met all safety and performance requirements while drastically reducing installation effort and cost. This WLAN has since been designated the standard wireless system for future intralogistics projects at the integrator.

Contact

Aunex Inc.
725 Prudden Street
Lansing, MI 48906
info@aunex.io