

A background image showing a row of glass vials on a production line, with a blurred bokeh of lights in the background, suggesting a factory or laboratory setting.

Using SyncMetra for Wireless Pharmaceutical Line Clearance

Learn how SyncMetra supports the acceleration of line clearance applications with AI-driven computer vision powered by deterministic private 5G connectivity.

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Introduction

Canoga Perkins's [SyncMetra 100](#) is an advanced, feature rich, 5G TSN Switch purpose built for public and private 5G and beyond mission critical applications that require deterministic and guaranteed data delivery in a specific time window.

SyncMetra 100 guarantees bounded latency with no data loss. It is well suited for deployment of 5G disaggregated networks in Industry 4.0, gaming, XR, autonomous vehicles, and any applications that require guaranteed data delivery in a specific time window.

Private 5G networks are used across several industries. The SyncMetra 100 product is designed to meet and exceed stringent bandwidth, latency, and scalability performance demands of Private 5G now and in the foreseeable future.

SyncMetra 100 is fully programmable, allowing customers to extend connectivity and network capabilities as specifications continue to evolve. SyncMetra 100 simplifies the end-to-end network architecture significantly reducing operating costs. SyncMetra 100 offers AI Fabric technology to enhance Quality of Service (QoS), especially in high traffic or unpredictable network environments. It also features a Lossless Fabric that guarantees ultra-low latency and minimal jitter, which are critical for TSN applications.

In this paper, we will explore how networks that are powered by SyncMetra can support AI-powered inspection, increase the speed of changeovers and monitor multiple lines efficiently.

Applications

While line clearance is mandated by the FDA for pharmaceutical manufacturing, it is an important function in a wide range of industrial applications where switching a production line from one product to another has the potential for cross-contamination, mislabeling, or equipment damage. Some of the applications where line clearance is important include:

- **Food and beverage manufacturing:** allergen control, packaging integrity and elimination of flavor cross over
- **Cosmetics and personal care:** Contamination prevention, label verification and microbiological safety
- **Consumer packaged goods (CPG) & household chemical:** Chemical separation, component accuracy, brand segregation
- **Electronics assembly:** Part segregation and tooling validation
- **Automotive component manufacturing:** Fastener (screws, clips, rivet) clearance, error proofing



Market Advantage

Pharmaceutical companies go to great lengths to ensure drug safety during manufacturing. One vulnerable part of the process is the production line changeover. The FDA, and other drug regulation agencies worldwide, mandate that before a new drug can be manufactured on a production line, the entire line must be cleared of anything left over from the previous run. This includes the old product, containers, caps and labeling. If any of these items are left in the production line they can impact product efficacy or lead people to take the wrong medicine – with the potential for an adverse health outcome.

Line clearance processes ensure the production line is clean of all objects from the previous production run. Today, many pharmaceutical companies conduct the process manually with inspectors that examine the entire length of the line. This process can take hours or days -- delaying the production switch over.

“Industry experts estimate up to 85% time savings with automated line clearance versus current manual checks.”

Source: PharmTech 2022, “Automating Line Clearance”

The Importance of AI in Line Clearance Applications

State-of-the-art computer vision-based video line clearance has helped to speed up the process. But these systems take extensive and costly network cabling. Now, manufacturers can optimize their process using private 5G which dramatically reduces the cabling costs and meets the low latency needs that the application.

Line clearance systems use AI-driven cameras and computer vision models running on edge servers. The computer vision application must inspect all of the video feeds and stop the line within milliseconds if anomalies are detected.

How SyncMetra Works In Line Clearance Applications

High-resolution industrial cameras are positioned throughout the production line and capture images of critical process areas, including filling stations, packaging equipment, labeling systems, material staging zones, and operator workspaces. The camera traffic is transported over SyncMetra which provides a low-latency, high-reliability private 5G network connection. This provides deterministic connectivity between distributed vision sensors and edge AI compute resources.

The solution is designed to support stringent pharmaceutical manufacturing requirements by providing secure, isolated wireless communications with predictable performance characteristics suitable for time-sensitive quality assurance workflows. Captured images are analyzed by AI-based computer vision models running on an edge server, where current line conditions are compared against approved reference states and electronic batch records.

The system automatically identifies residual product, packaging components, labels, tooling, documentation discrepancies, foreign objects, or any condition that may violate line clearance procedures or Good Manufacturing Practice (GMP) requirements. Inspection results are generated in near real time, allowing operators and quality personnel to rapidly determine whether the production line is compliant and ready for the next manufacturing run.

By combining low-latency private 5G connectivity, SyncMetra TSN-capable transport, and edge AI analytics, the solution minimizes inspection delays, reduces dependence on manual visual verification, and improves consistency and repeatability of line clearance operations. The architecture supports scalable deployment across multiple production lines and manufacturing suites while maintaining centralized visibility, auditability, and operational control. This approach enables pharmaceutical manufacturers to accelerate batch changeovers, reduce production downtime, enhance regulatory compliance, and advance digital manufacturing initiatives aligned with Pharma 4.0 objectives.



SyncMetra by Canoga Perkins

SyncMetra Delivers Bounded Latency

Canoga Perkins' SyncMetra is a software-defined, IT-operated private 5G network transport solution. It is designed to bridge the gap between standard wireless networks and the high-performance requirements of detailed specific and time sensitive applications such as Line Clearance for Pharmaceutical industries.

Why Use SyncMetra for Line Clearance Applications?

Enterprises use SyncMetra to support their Line Clearance applications since it supports the deterministic, low latency connectivity not available with other network technologies. This throughput is essential for highly accurate inspections and faster changeovers.

Some of the advantages the system delivers include:

- **Elimination of Extensive Cabling:** No Ethernet cables required, reducing installation time and cost. Cameras only need local DC power, supplied from the machine or a small distribution hub.
- **Cost Efficiency:** Significant savings on installation expenses and minimized machine modifications.
- **Scalability and Flexibility:** Easy deployment and scalability across production facilities without infrastructure constraints.
- **Enhanced Operational Efficiency:** Real-time, wireless line clearance verification ensures uninterrupted production flow and GMP compliance.

Line clearance is an important product quality process and 5G-based line clearance provides manufacturers with rapid production changeovers that save time and money. Advanced computer vision technology reduces human error and allows organizations to offer continuous quality control and faster verification.

About Canoga Perkins

With over five decades of engineering excellence, Canoga Perkins has consistently led the charge in delivering mission-critical network solutions that empower industries to innovate and thrive. Trusted by leading service providers, industrial enterprises, utilities, military branches, and government agencies, Canoga Perkins combines a rich legacy with a relentless drive for innovation. We lead with AI whenever possible, designing intelligent solutions that are not only reliable and secure but also scalable and adaptable, ensuring our clients are always at the forefront of technological advancement.

Learn more at www.canogaperkins.net.

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