ONNEC VIEWPOINT

AI-POWERED PHARMA

Pharma's transformation depends on real-time, secure, auditable data movement – but much of the infrastructure carrying that data was built for a slower, less connected era.

PHARMA'S TRANSFORMATION HAS A HIDDEN PHYSICAL DEPENDENCY

Walk into most pharma boardrooms right now, and the conversation is likely to be about AI. Pharma's AI spend is projected to grow from roughly $4 billion in 2025 to $25.7 billion by 2030, and applications in smart manufacturing, digital twins, predictive maintenance of equipment, and connected lab environments are all moving from pilot to production.

But each of those applications runs on the same invisible layer: a physical network that must move data without loss and in a form that stands up to audit. This includes everything from lab experiments and clinical trials through to manufacturing and quality control systems.

The physical network was often built 10, 15, even 20 years ago, for a world where bandwidth needs were modest and connectivity barely left the office. That world is gone. Modern pharma operations now generate continuous, high-volume data flows across R&D, manufacturing, laboratories, logistics, data centres and a growing web of external partners.

Somewhere along the way, cabling stopped being a background utility. It's now a critical liability that determines resilience, compliance, data integrity and the ability to operate without interruption.

DIGITAL TRANSFORMATION IS PUTTING PRESSURE ON EVERY LAYER OF THE NETWORK

Pharma is an industry becoming more digital, connected and data-driven across R&D, manufacturing and supply chains.

You can see it everywhere you look. In R&D, AI is accelerating molecule discovery and pulling insight out of datasets that would once have taken years to work through, and it now increasingly depends on connecting large streams of biological, clinical and literature data. Digital twins are taking this data dependency even further, running virtual simulations of experiments and processes that only hold value if they're fed by a constant flow of data from the physical systems they mirror.

In manufacturing, smart factories run on real-time monitoring, predictive maintenance, automated quality control and digital batch records. In supply chains, connected systems track products and conditions end-to-end, creating the visibility needed to manage shortages, support drug recalls and keep global logistics networks moving.

None of these are isolated projects. Each one adds more data, more connected systems, and more decisions that depend on information arriving instantly and reliably.

Yet while almost every pharmaceutical company now has a digital transformation strategy, not all have taken the same hard look at whether their physical infrastructure can support it.

Digital transformation only works if data moves continuously and in real time. More connectivity means more demand on the infrastructure carrying it. The physical layer must deliver throughput, low latency, resilience, security and traceability all at once.

A GLOBAL ESTATE MEANS DATA HAS TO MOVE GLOBALLY TOO

Pharma companies are global by default. Offices, R&D labs, manufacturing plants, data centres and distribution hubs are scattered across regions, and increasingly the work doesn't stay "in-house". Contract Research Organisations (CROs), Contract Development and Manufacturing Organisations (CDMOs), specialist laboratories and technology partners are now woven into day-to-day operations, each one adding another stream of data and another point that needs governing.

That changes what 'good infrastructure' means. A CRO running a clinical trial needs to feed results back into the sponsor's systems. A CDMO manufacturing a batch needs to share quality and process data that will end up in a regulatory submission. A specialist lab analysing a sample needs its results to flow back without a gap in the chain of custody. None of that works on a network built for internal office traffic.

Labs on different continents need to collaborate as if they were down the corridor. Manufacturing sites need live access to performance and quality data. Logistics teams need visibility across cold chains that can't afford a blind spot.

The question for infrastructure planning has shifted from 'is there enough cabling for today's systems?' to 'can this network support a distributed, data-driven operating model at all?'

CABLING IS BECOMING THE BOTTLENECK NOBODY BUDGETED FOR

Most existing cabling was designed for office connectivity standard business systems, not for IoT-enabled lab equipment, cloud-connected applications, AI-driven R&D and the kind of IT/OT convergence now common on the factory floor. Industry-wide, smart manufacturing depends on dense sensor networks, automation and cyber-physical systems that simply assume a robust connectivity layer is already there.

In pharma, the pressure shows up in specific ways:

Larger datasets need more throughput, real-time monitoring needs low-latency links that don't flinch, smart manufacturing needs resilient connections between machines, sensors and analytics platforms.

The trouble with this kind of infrastructure is that it's invisible right up until it isn't. When the physical layer can't keep pace, transformation programmes slow down through bottlenecks, unplanned downtime and remediation work that costs more than it would have done upfront.

IN A REGULATED INDUSTRY, CABLING IS A COMPLIANCE ISSUE

Regulation is where pharma differs from most other sectors.

Under EU GMP Annex 11, computerised systems used in GMP-regulated activities cover both software and hardware, and the infrastructure underpinning them has to be qualified, documented and auditable, not just validated at the application layer. Risk management, supplier responsibilities, system inventories, data flows, security measures, audit trails and change control all sit on top of a physical network that has to be just as traceable.

The FDA's data integrity guidance makes a similar point from a different angle: data has to be reliable and accurate, and firms are expected to take a risk-based approach to preventing and detecting integrity issues. In a less regulated industry, a poorly labelled patch panel or an undocumented cable run is an inconvenience. In pharma, it's a question an auditor can ask that you might not be able to answer.

As digital batch records, continuous monitoring and cloud-connected systems become standard, that question will be asked more often, not less.

THE COST OF DOING NOTHING IS HIDDEN UNTIL IT ISN'T

Because cabling sits quietly in the background, underinvestment doesn't show up on a balance sheet in any obvious way. It shows up later as slower AI adoption, manufacturing that can't scale the way it should, unreliable IoT connectivity in the lab, audit preparation that takes twice as long as it needs to, and remediation bills that dwarf what proactive investment would have cost.

Cable strain also shows up as lost flexibility, right when sites need to expand or integrate new systems fastest. Live pharma environments make refreshing networks almost impossible because labs, manufacturing lines and supply chains don't get the luxury of pausing while someone redesigns the network underneath them.

The longer modernisation is put off, the more disruptive, costly and operationally risky it becomes, which is the strongest argument for not waiting until something forces the issue.

For CIOs, treating cabling as a strategic, lifecycle-managed asset rather than a late-stage implementation detail starts with a handful of practical steps:

01. AUDIT THE CURRENT ESTATE

Covering each site, lab, data centre and distribution hub, including how each connects to CROs, CDMOs and other external partners, to build an honest picture of what's in place versus what's assumed.

02. MAP INFRASTRUCTURE AGAINST FUTURE WORKLOADS

Including AI, smart manufacturing, IoT, cloud platforms, digital batch records, global labs and partner connectivity, not just today's systems.

03. REVIEW DOCUMENTATION AND AUDITABILITY

Alongside redundancy, segmentation and resilience, so that every cable run, patch panel and connection point can stand up to the kind of question an auditor might ask, not just those a network engineer would check.

04. PLAN UPGRADES AROUND LIVE OPERATIONS

Not the other way around, sequencing work so labs, manufacturing lines and supply chains keep running while the network underneath them is modernised in stages.

05. WORK WITH PARTNERS WHO UNDERSTAND REGULATED ENVIRONMENTS

And can keep changes traceable, documented and audit-ready as they happen, rather than treating compliance as something to reconstruct after the work is done.

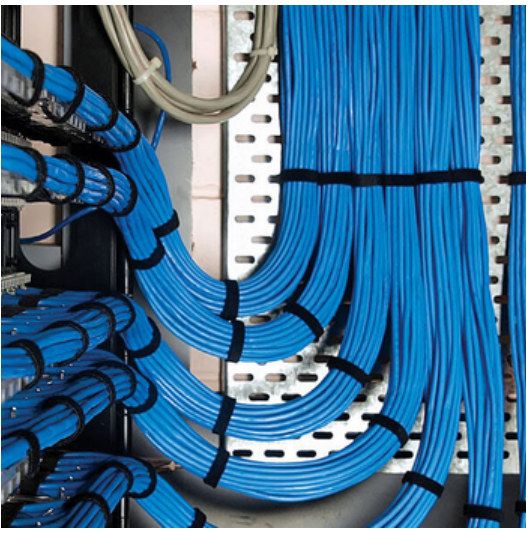
None of this means tearing out the network and starting again. For CIOs, the cabling layer is easy to overlook because it sits beneath the visible transformation agenda. But it's the thing AI pilots, digital twins, CRO and CDMO connections and audits depend on. Getting it right means treating it as something that grows with the business, not something that has to be fought with every time the business changes.

ABOUT ONNEC

Onnec is a leading Infrastructure Solutions and Services company for data centre and enterprise, specialising in structured cabling, managed services, and network solutions. Our team of experienced designers, project managers, and engineers, supported by world-class vendor partnerships, delivers top-tier services and solutions.

Onnec's expertise spans all data centre environments, and can support customers with:

- **Structured cabling design and installation**
- **Installation of cabling, ODFs, PDUs, GPUs and containment solutions**
- **Network hardware installations, changes and support**
- **Connectivity and equipment upgrades and changes**
- **Smart Hands Support and Managed Services**



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