Accelerating Digital Transformation in Life Science Manufacturing with Reliable, Secure Private 4G/5G Networks

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In This InfoBrief

This IDC InfoBrief highlights the connectivity and networking challenges facing life science manufacturing and makes the case for the critical role of private 4G/5G networks in improving operational security and resiliency and serving as a platform for innovation.

The InfoBrief leverages insights from IDC's Michael Townsend, Research Director for Life Science Commercial Strategies, and Jason Leigh, Senior Research Manager for 5G and Mobility Solutions, as well as data from the four IDC surveys below.

IDC Survey and Date	Total	Life Science	Process Manufacturing	Combined	Combined U.S. Only
Future Enterprise Connectivity Survey, **August 2024**	n = 715	n = 16	n = 67	n = 83	n = 23
Future Enterprise Resiliency Survey (FERS), **Wave 6, June 2024**	n = 887	n = 23	n = 52	n = 75	n = 25
North American Enterprise 5G, IoT, and Private 4G/5G Networks Survey, **December 2023**	n = 406	n = 22	n = 18	n = 40	n = 33
Digital-Native Business Survey, **2024**	n = 1,271	n = 41	n = 40	n = 81	N/A

Factory-Floor Connectivity Drives Operational Success and Digital Transformation (DX) in Life Science Manufacturing

Digital transformation (DX)
in connectivity and communication
is now a critical success driver in
life science manufacturing.
DX is essential for financial
stability, operational efficiency,
and competitive edge.

Desired outcomes and capabilities:

Process control and IIoT:
Achieving real-time monitoring and data analytics

Security:
Protecting machine parameters and quality records;
securing authorization for process/machine changes

Cold chain monitoring:
Ensuring the safe transport of biologics

Automation:
Utilizing robots and autonomous vehicles

AR/VR training:
Enhancing machine service and training
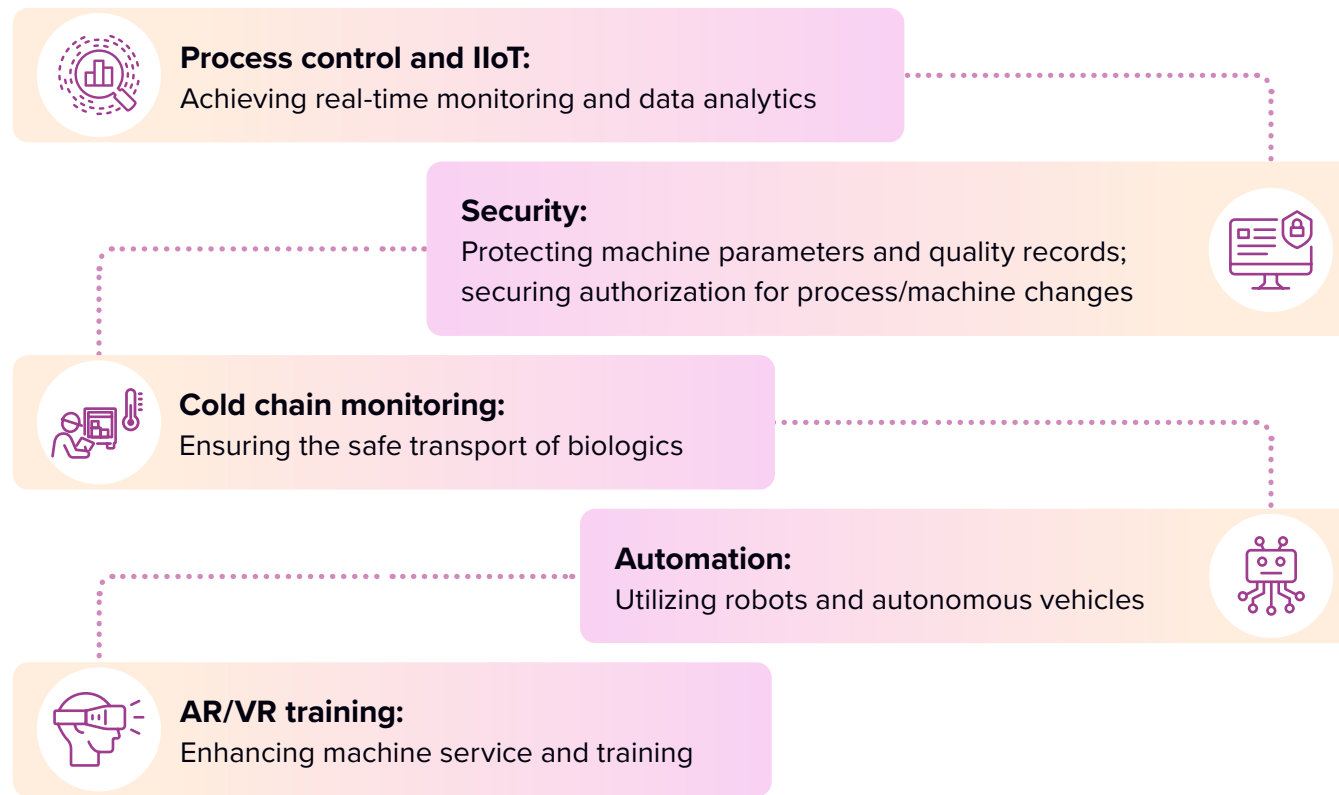
Life Science Manufacturers' DX Journey Has Lagged But Will Accelerate

The life science manufacturing industry's approach to DX has been mixed. While some have robustly pursued DX initiatives, many fail to see DX's role in the production process.

Less than one-third of organizations consider themselves **mature, digital-native businesses** (DNBs).

The outlook for life science manufacturers is better,

with **47% considering themselves digital natives.**

Life science manufacturers will accelerate embracing DX,

with **53%** indicating they are at the scale-up phase of their DX journey.

Note: IDC defines a DNB as a company built around modern technologies and data from the start, with value creation based and dependent on digital technologies and significant funding to support high-growth ambitions. n = 1,271 (total), n = 41 (life science); Source: IDC's *Digital-Native Business Survey,* 2024.

Key Use Cases for Realizing DX Gains in Life Science Manufacturing

IDC has identified several use cases that will help life science manufacturing organizations in their journey to become digital native while delivering near-term operational and financial gains.

Prescriptive and augmented maintenance: Robust production equipment monitoring can predict failures and, with AI, suggest maintenance or servicing guidance, reducing time to repair and production downtime.

Autonomous service parts management: Efficient parts management can leverage connectivity for real-time tracking and ordering, saving money and reducing downtime.

Mobile workforce empowerment: Engineers and repair technicians can dynamically access on-demand manuals and schematics in factory areas where legacy connectivity can underperform and ensure maintenance records compliance, reducing repair time and repeat visits and bolstering customer satisfaction.

Intelligent building energy management: Improving production facilities' environmental monitoring can lower costs and enhance employees' quality of work life, bolstering productivity.

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Optimized facility health and safety:
Improved employee safety compliance reduces accident rates and related downtime.

Augmented employee tracking:
By working with intelligent building energy management, tracking can lower HVAC and lighting costs and improve response times in emergencies.

Dynamic space planning:
Leveraging connected sensing, AI, and digital twins can optimize factory design with dynamic parameters and scenario analysis for more efficient and seamless production.

Serialization and track and trace:
Improving project and production tracking helps diagnose product quality issues and satisfies current regulatory requirements.

Cold chain/IoT data records:
Robust connectivity helps life science maintain product safety and efficacy by managing and monitoring the environment for temperature-sensitive biologics and ingredients.

Connectivity and Networking Challenges Create DX Adoption Headwinds for Life Science

Every DX use case has different performance requirements, security concerns, regulatory compliance issues, and complexity levels that can complicate or slow the deployment of tech-enabled use cases in life science organizations.

59% of life science organizations claim that complying with industry standards for secure and private communications hinders use case adoption.

50% say that maintaining high-speed, low-latency data communications in the network to support consistent use case functionality is challenging.

46% state that enhanced security requirements slow use case deployments.

36% struggle to transform their life science networks to be more virtualized, scalable, and agile.

34% cite the complexity of integrating new and emerging technologies into existing network architectures as a deterrent to DX use case adoption.

Life science companies often face headwinds in matching infrastructure investments with cloud connectivity needs and ensuring that both align appropriately with future business goals.
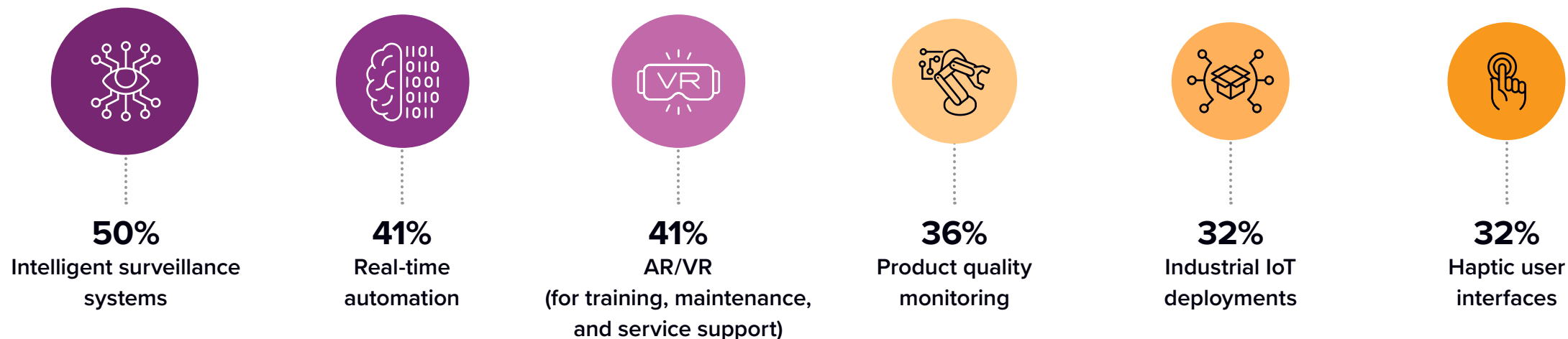
Healthcare and life science companies state that material challenges in aligning network transformation with future business goals and ensuring network infrastructure investments meet cloud connectivity requirements hinder their DX journey.

5G Connectivity, Which Can Leverage Public, Private, or Hybrid Networks, Pairs Well with Key DX Use Cases for Life Science Organizations

Life science organizations recognize that the high-speed, real-time connectivity 5G networks provide is the foundation for the most impactful use cases. Without high-performing connectivity, many use cases' business outcomes would not be possible.

Which of these 5G use cases are most relevant to your organization?

| **50%**
Intelligent surveillance systems | **41%**
Real-time automation | **41%**
AR/VR
(for training, maintenance, and service support) | **36%**
Product quality monitoring | **32%**
Industrial IoT deployments | **32%**
Haptic user interfaces |

n = 406 (total), n = 22 (life science); Source: IDC's *North American 5G, IoT, and Private 4G/5G Networks Survey,* December 2023.

Private 4G/5G Addresses Networking Challenges and Provides an Innovation Platform for Life Science Manufacturing

Private 4G/5G networks address these network challenges and can accelerate the DX journey by providing agile, secure, high-performing network connectivity and a platform for future use case integration.

Zero trust security:
The organization has **absolute control over which devices and use cases connect to the network** and can choose to maintain all proprietary and operational data onsite.

High speed:
Private 5G network deployments have achieved a **data download speed of 10Gbps** when leveraging the mmWave spectrum.

Low latency:
The deployment of 5G in private networks **can deliver sub-10ms latency rates** and often achieve rates as low as 1ms.
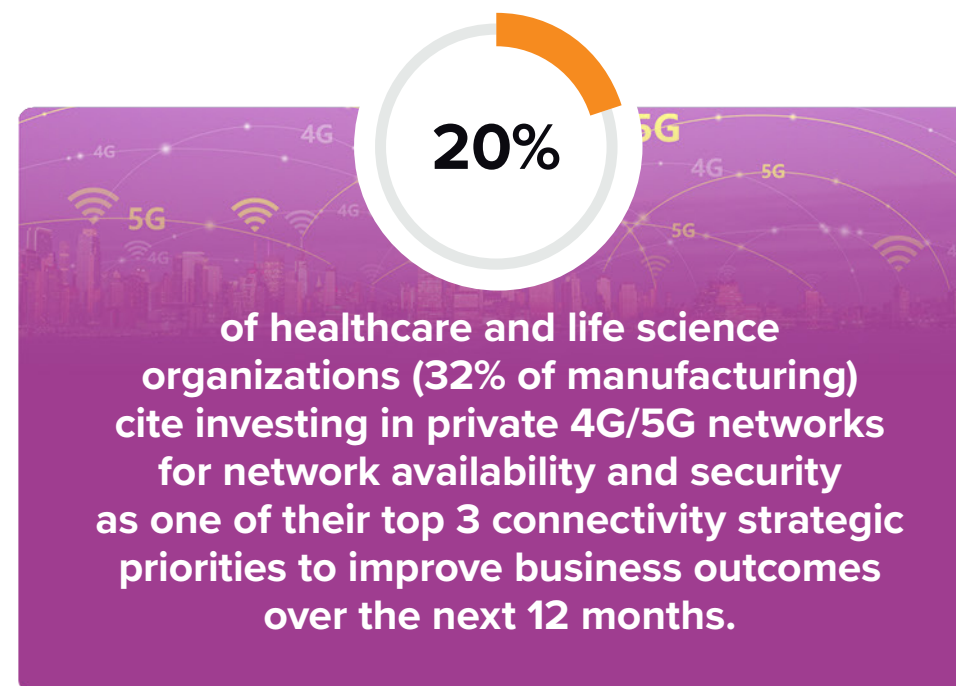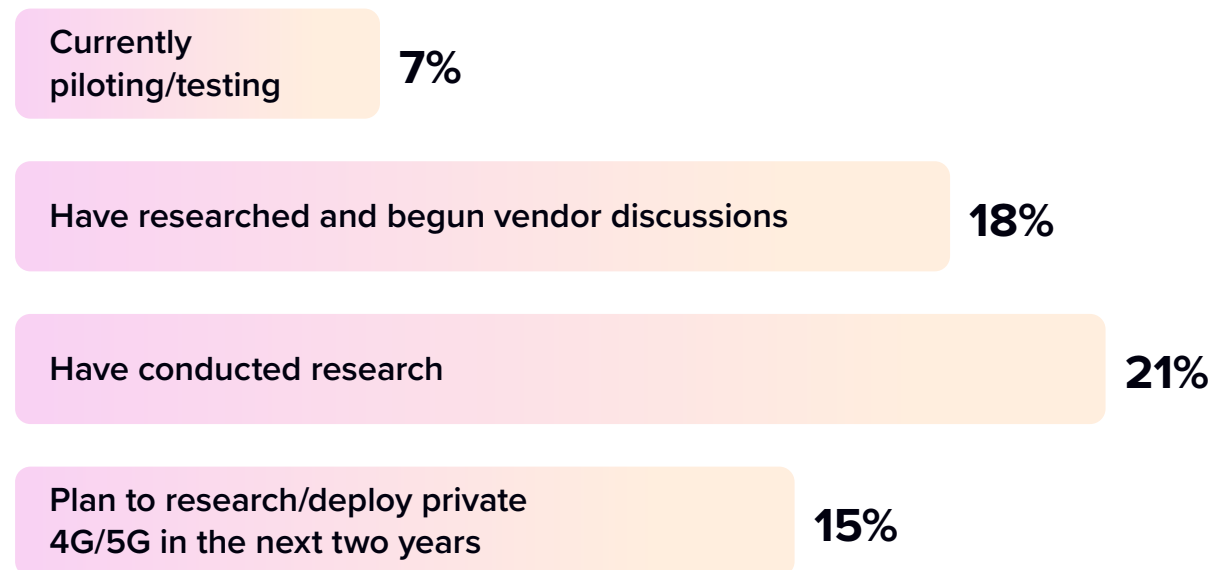
Common network architecture:
Deploying a private 4G/5G network streamlines the integration of new DX use cases by providing a **common network architecture that reduces complexity and enables scalability.**

Life Science Manufacturers Are Beginning to Embrace Private 4G/5G Networks

Life science and other process manufacturers recognize the role of private 4G/5G networks in scaling their DX use case adoption and are increasing investments and engaging in pilots to accelerate their DX journey.

Has your organization conducted research on, piloted, or deployed a private 4G or 5G mobile network?

Currently piloting/testing **7%**

Have researched and begun vendor discussions **18%**

Have conducted research **21%**

Plan to research/deploy private 4G/5G in the next two years **15%**

20%

of healthcare and life science organizations (32% of manufacturing) cite investing in private 4G/5G networks for network availability and security as one of their top 3 connectivity strategic priorities to improve business outcomes over the next 12 months.

n = 887 (total), n = 75 (life science and process manufacturing); Source: IDC's *FERS 2024, Wave 6*

Key Guidance for Life Science Organizations Exploring Private 4G/5G Networks for DX

1

Audit the organization's current connectivity landscape.
Most companies have wired, Wi-Fi, and some cellular connectivity but often lack a consolidated view of what is and is not connected and how to manage devices and applications across connectivity modalities.

2

Understand the connectivity performance requirements of current and near-term use cases.
To ensure that private 4G/5G networks and their enabled use cases achieve their intended goals, life science organizations need to benchmark the required speed and latency thresholds and articulate the security, dashboard, and management features necessary for successful private 4G/5G deployment.

3

Establish timelines and KPIs for success.
Robust metrics for monitoring private 4G/5G networks and use case performance are essential not only for determining the ROI but also to help plan, design, and build a private 4G/5G network's phases.

4

Engage trusted partners to inform and guide operational and strategic planning around private 4G/5G networks.
Private 4G/5G networks create unique networking challenges for most life science organizations and require a robust ecosystem of hardware, software, and connectivity vendors for successful deployment. Working with a trusted vendor that understands the technological nuances and the organization's unique needs will reduce/eliminate adoption friction.

89% of North American life science organizations (n = 18; 80% of manufacturing) consider the mobile operator as the key vendor for building and managing a private 4G/5G network.

n = 406 (total), n = 22 (life science); Source: IDC's *North American 5G, IoT, and Private 4G/5G Survey*, December 2023.

About the IDC Analysts

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Michael Townsend is a research manager for IDC Health Insights responsible for Commercial Life Sciences and Life Sciences Commercial Strategies. He provides research-based advisory and consulting services, as well as market analysis on key topics within the commercial life science industry. Michael's research expertise includes sales and marketing, supply chain, manufacturing systems, and emerging technologies and market trends.

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Jason Leigh is a Senior Research Manager for IDC's Mobility team responsible for 5G and mobile operator research. Jason's research focuses on the strategic implications and market opportunities presented by the emerging 5G ecosystem, including commercial availability, installed base forecasts, regional adoption trends, content and services enablement, device impacts, 5G's role in the Internet of Things (IoT), and innovative use cases leveraging 5G. His research also covers the U.S. mobile services market. Jason examines the competitive dynamics between the U.S. mobile operators through financial results analysis, mobile services forecasts, and commentary on the transformation in how mobile services are utilized by consumers and enterprises.

More about Jason Leigh

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