



How to Measure the ROI of Private 5G in Logistics

Build the Business Case,
Not Just the Network



Executive Summary

For logistics organizations, connectivity has become part of the operational infrastructure. Warehouses and distribution centers increasingly depend on mobile devices, automated equipment, robotics, asset tracking, video, and other connected technologies. These systems need reliable connectivity to operate effectively.

Private 5G can provide a strong foundation for these environments, supporting mobility, coverage, device density, and demanding operational applications. However, the technology itself does not make a business case.

Enterprise leaders need to connect the investment to measurable business outcomes. They must understand what problems private 5G could solve, what those problems cost today, and what value better connectivity could create.

The right question is not simply, "How much does private 5G cost?"

Instead, leaders should ask: **What business outcomes could better connectivity enable, and how much are those outcomes worth?**

This shift in perspective helps organizations build a more defensible business case for private 5G. It provides a framework for evaluating operational improvements, financial impact, total cost of ownership, alternative connectivity approaches, and the cost of maintaining the status quo.

A strong business case also distinguishes between measurable returns, potential future capabilities, and longer-term strategic value. By testing assumptions through measured pilots and modeling a range of potential outcomes, organizations can make more informed decisions about where private 5G makes business sense.

This white paper provides a practical framework for evaluating that potential and determining whether the expected return justifies the investment.

Start With the Business Problem, Not the Technology

The first step in building a private 5G business case is identifying the operational problem:

- A logistics organization may struggle with connectivity dead zones across a large facility.
- Mobile devices may lose connections as workers move through the building.
- Automated equipment may experience disruptions.
- High device density may affect network performance.
- Outdoor yards may require connectivity across areas that traditional infrastructure does not easily cover.

Each of these challenges can create operational costs.



Those costs may include lost productivity, equipment downtime, manual intervention, delayed orders, or additional support requirements. In some environments, connectivity limitations may also prevent an organization from deploying new automation or real-time applications.

The business case should start by identifying these constraints and establishing a baseline. For example, an organization might measure:

- Downtime associated with connectivity issues
- Productivity per worker or labor hour
- Order throughput
- Picking and packing rates
- Order cycle time
- Equipment utilization
- Manual intervention rates
- Network-related service calls
- Device failure or reconnection rates
- Costs associated with operational delays

The goal is to understand the current state before introducing a new network. Without that baseline, it becomes difficult to determine whether private 5G actually created measurable value after deployment.

“ Private 5G can be a cost-effective solution when it's designed for the right use case. Success starts with right-sizing the network to solve a specific operational challenge, not overengineering the deployment.

- Jason Wickam | Sparro

Start With the Business Problem, Not the Technology

Once an organization identifies its operational challenges, the next step is connecting connectivity improvements to financial outcomes.

This requires more than listing potential benefits. Each proposed benefit should have a measurable operational metric and a corresponding financial value.

The framework is straightforward:





Consider a warehouse where unreliable connectivity interrupts mobile workflows. If better connectivity reduces those interruptions, employees may spend less time troubleshooting devices or repeating tasks. That could increase productive labor time.

For example, if connectivity-related interruptions cost a facility a measurable number of productive hours each month, the business case can estimate the annual value of recovering that labor time. The model can then compare that financial benefit with the network's upfront and ongoing costs¹. This illustrates an important distinction between the different parts of an ROI model:

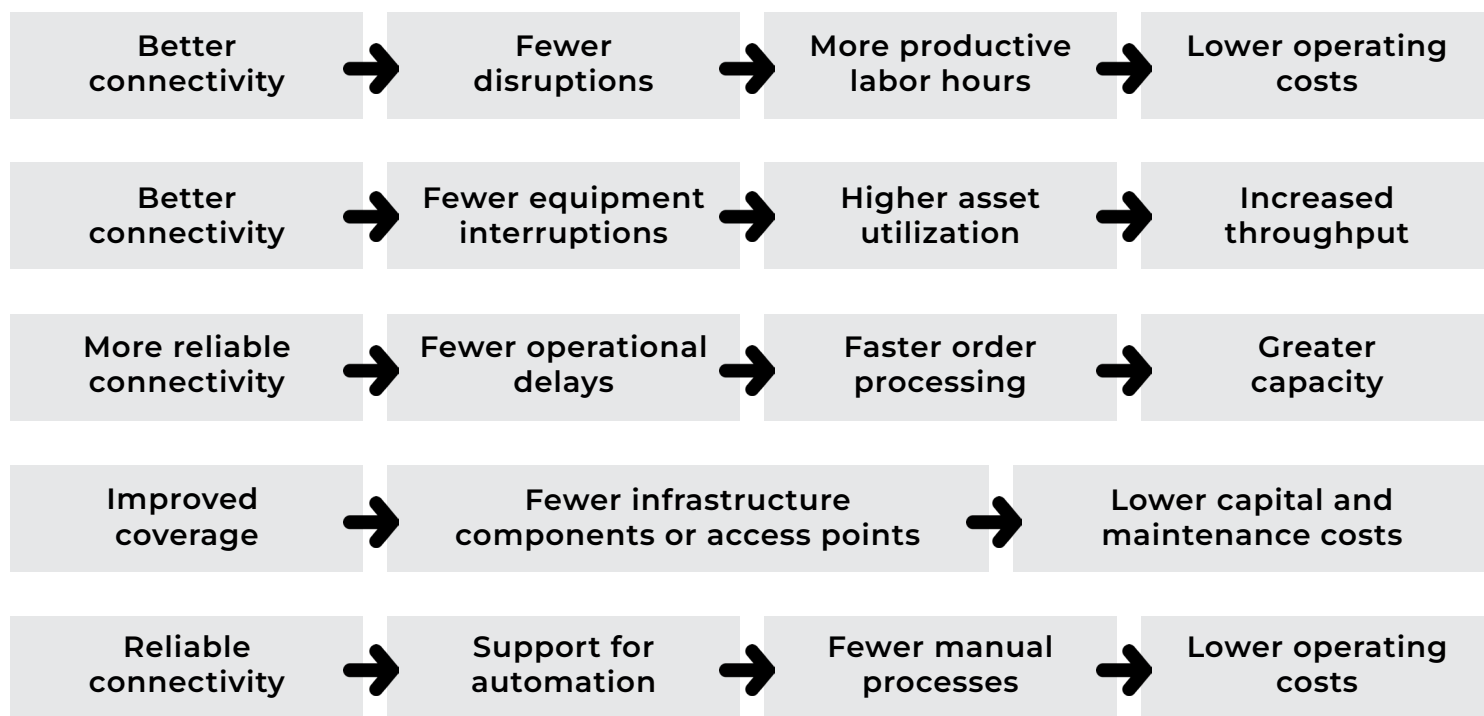
- 1 Operational improvement:**
What changes after deployment?
- 2 Financial impact:**
What does that improvement save or generate?
- 3 Investment cost:**
What does the solution cost to deploy and operate?
- 4 ROI:**
How does the resulting return compare with the investment?
- 5 Payback:**
How long does it take to recover the initial investment?
- 6 NPV:**
What is the investment worth over time after accounting for the time value of money?

Not every organization needs to calculate every metric. However, defining these terms clearly can help finance, operations, and technology leaders evaluate the same business case consistently.

The same approach applies to connected equipment. If more reliable connectivity reduces interruptions for automated guided vehicles or mobile robots, the organization may increase equipment utilization. That could improve throughput without requiring an equivalent increase in equipment or labor.

Other examples include:





The important point is that the network itself is not the financial outcome. The outcome comes from what the network enables.

“ When a private 5G network is designed correctly, the impact is often immediate. Better coverage, more stable connectivity, and stronger application performance quickly translate into improved operational efficiency.

- Jason Wickam | Sparro

Build the ROI Model Around Use Cases

A private 5G business case should not rely on one generic ROI calculation. Instead, organizations should evaluate individual use cases and determine how each could contribute to the overall business case.

Connected Workers

Mobile workers depend on reliable access to applications, scanners, and other devices.

Potential metrics include tasks completed per labor hour, scanning interruptions, device reconnections, and time spent troubleshooting connectivity.

A business case can then estimate the financial value of improving those metrics.



Automated Guided Vehicles and Mobile Robotics

Automation introduces different connectivity requirements.

Organizations may measure vehicle utilization, downtime, throughput, manual intervention, and the number of connected vehicles or robots supported.

If connectivity limits automation performance, improving the network may increase the value of existing equipment.

Real-Time Video and Computer Vision

Video and computer vision can support applications such as inspection, safety, security, and loss prevention.

Potential metrics include inspection time, manual inspection costs, processing accuracy, and the number of processes that can move from manual to automated review.

The financial value will vary significantly by application. That makes it especially important to establish a baseline and measure actual results.

Asset and Inventory Visibility

Connected devices can help organizations improve visibility into inventory and assets.

Potential metrics include time spent locating assets, inventory accuracy, shrinkage, misplaced inventory, and cycle-count labor.

Better visibility may also support faster workflows and more informed operational decisions.

Yard and Fleet Operations

Logistics operations extend beyond the warehouse walls.

Yards and fleet environments may require connectivity for vehicles, equipment, tracking systems, and mobile workers.

Potential metrics include vehicle turnaround time, dock utilization, dwell time, asset tracking, and dispatch efficiency.

The strongest business cases may combine several use cases.

A single private 5G infrastructure investment could support workers, robots, vehicles, cameras, sensors, and other connected systems. The organization can therefore evaluate the cumulative value of those applications rather than measuring each one in isolation.

That does not guarantee a positive ROI. It does, however, provide a more complete picture of the potential return.



Real-World Examples Show Why the Business Case Must Be Specific

Real-world deployments illustrate why organizations should evaluate private 5G through measurable operational outcomes.

In a case study involving CJ Logistics, Ericsson reported a 20% increase in productivity and approximately 15% CAPEX savings compared with Wi-Fi. The results came from a specific logistics environment and should not be treated as a universal benchmark. They do, however, illustrate how a business case for private 5G can connect network performance with measurable operational and financial outcomes.

Another example comes from Lufthansa Cargo. Ericsson reported a 70% to 80% improvement in process speed after the company replaced Wi-Fi with private 5G at its Los Angeles warehouse. Again, this result reflects a specific deployment and operating environment. It demonstrates the potential value of measuring connectivity in terms of process performance rather than network specifications alone.

These examples should not be treated as assumptions in another organization's financial model. Instead, they provide a useful lesson: **The value of private 5G depends on what the network enables in a specific operating environment.**

The right business case therefore needs to account for the organization's facilities, workflows, applications, workforce, equipment, and strategic priorities.

Calculate the Full Cost of Ownership

A credible ROI model must account for the full cost of deploying and operating the network. The initial infrastructure investment is only one part of that calculation.

Depending on the deployment, the model may need to consider:

- Radio and network infrastructure
- Core network components
- Spectrum or licensing costs, where applicable
- Cabling and power
- Site preparation
- Devices and endpoints
- Network integration
- Application integration
- Cybersecurity
- Network management
- Monitoring and support
- Software licensing
- Training
- Ongoing maintenance
- Future upgrades
- Network expansion

Organizations should also distinguish between capital expenditures and ongoing operating expenses. This distinction can affect how leaders evaluate the investment and compare private 5G with other network architectures.



The goal is to understand the total cost of ownership over the same period used to calculate the expected return. A three- or five-year model, for example, should account for both the initial deployment and the costs of operating, maintaining, and expanding the environment over that period.

Compare Private 5G with the Alternatives

A strong business case should also consider the alternatives. The question is not simply whether private 5G is better than Wi-Fi.

The more useful question is: **Which connectivity architecture can deliver the required business outcomes at an acceptable total cost and risk level?** That comparison should use the same evaluation criteria and time horizon for each option.

For some logistics environments, Wi-Fi may remain the right choice. Organizations may already have a mature infrastructure that meets their current needs.

Public cellular connectivity may make sense for wide-area mobility or operations that extend beyond a single facility.

Private 5G may become more compelling when an environment requires broad coverage, mobility, high device density, predictable performance, or connectivity for mission-critical applications.

Some organizations may need a hybrid architecture that combines multiple connectivity technologies.

The comparison should therefore consider the requirements of the operation, not just the technical specifications of each network.

Leaders should evaluate factors such as:

- Coverage requirements
- Mobility
- Device density
- Performance requirements
- Reliability
- Security
- Application requirements
- Integration requirements
- Scalability
- Total cost of ownership

The best solution may not be the newest technology. It should be the architecture that best supports the organization's operational and financial objectives.



Account for the Value of What the Network Enables

Some of the value created by private 5G may not appear in today's operating metrics.

A more capable network can enable new applications that an organization has not yet deployed.

These could include autonomous mobile robots, computer vision, AI-powered analytics, digital twins, remote operations, real-time asset tracking, and predictive maintenance.

This creates an important distinction in the business case.

- **Direct ROI** comes from measurable improvements to existing operations.
- **Enabled value** comes from new capabilities that become possible because the connectivity infrastructure can support them.
- **Strategic value** may include longer-term benefits such as scalability, operational resilience, or the ability to introduce new applications more quickly.

Organizations should consider all three categories, while clearly separating measured returns from potential future value. They should also not treat speculative benefits as guaranteed returns.

A strong financial model clearly separates measured benefits from potential future value. This makes the business case more credible and gives decision-makers a better understanding of the assumptions behind the investment.

Build Conservative, Expected, and Upside Scenarios

No business case should depend on one projected outcome. Instead, enterprise leaders should model a range of scenarios:

- The **conservative case** assumes modest operational improvements and slower adoption.
- The **expected case** uses realistic estimates based on pilot results, internal data, or comparable deployments.
- The **upside case** assumes successful expansion across additional facilities or use cases.

Each scenario can include:

- Initial investment
- Annual operating costs
- Annual financial benefits
- Net cash flow
- Payback period
- Three- or five-year ROI
- Net present value, when appropriate

This approach helps leaders understand how sensitive the business case is to different assumptions. It also enables more useful conversations with finance and executive teams.



The business case should not depend on the best possible outcome. It should remain compelling under a range of credible outcomes.

Use a Pilot to Replace Assumptions with Evidence

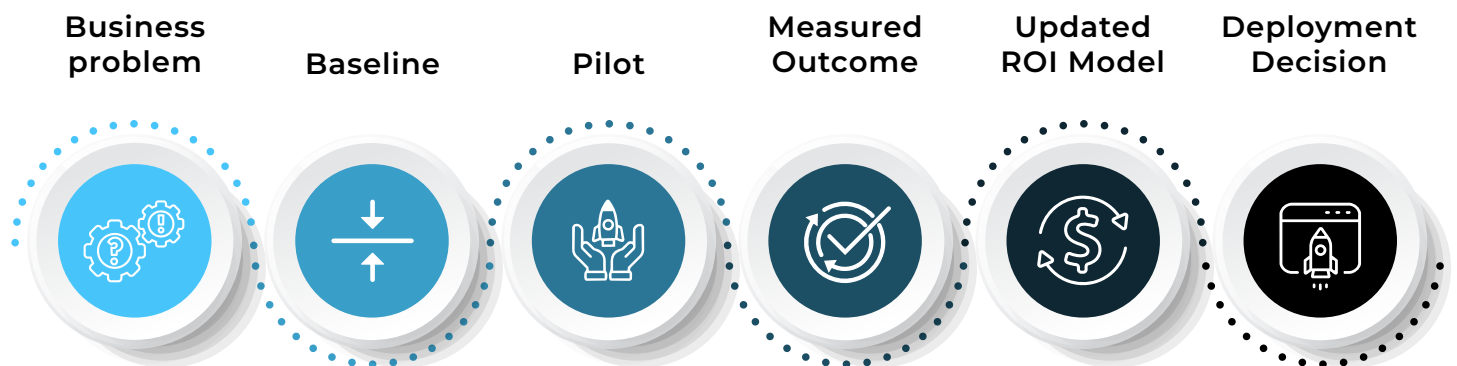
A pilot can help organizations move from theoretical ROI to measured business value. However, the pilot should do more than prove that private 5G works technically. It should test the business case.

Before the pilot begins, the organization should establish:

- A baseline for current performance
- Target KPIs
- A measurement methodology
- Cost assumptions
- Expected operational impacts
- User adoption requirements
- Integration requirements

The pilot can then measure actual results against the assumptions in the original financial model.

This creates a continuous process:



The process can help organizations identify which assumptions hold up in practice and which need adjustment.

It also provides a structured way to determine whether the deployment should remain limited to one site or expand to additional facilities and use cases.

Include the Cost of Doing Nothing

There is one more variable that organizations should include in the business case: the cost of doing nothing.

Leaders often compare the cost of private 5G with the cost of maintaining an existing Wi-Fi or cellular environment. That comparison may miss the operational costs of maintaining the current model.



Those costs could include:

- Lost productivity
- Downtime
- Manual processes
- Labor inefficiency
- Delayed automation
- Poor asset visibility
- Network troubleshooting
- Missed opportunities for new applications

The relevant comparison may not be:

New network versus existing network.

It might be:

Investment in better connectivity versus the cumulative cost of existing operational limitations.

That distinction can change the financial analysis.

If connectivity limitations prevent an organization from meeting productivity targets or deploying planned automation, the cost of maintaining the status quo may increase over time.

A Practical Framework for Building the Business Case

Building a business case for private 5G does not require predicting every future application or operational change. Instead, it requires a disciplined approach to identifying problems, measuring outcomes, and testing assumptions.

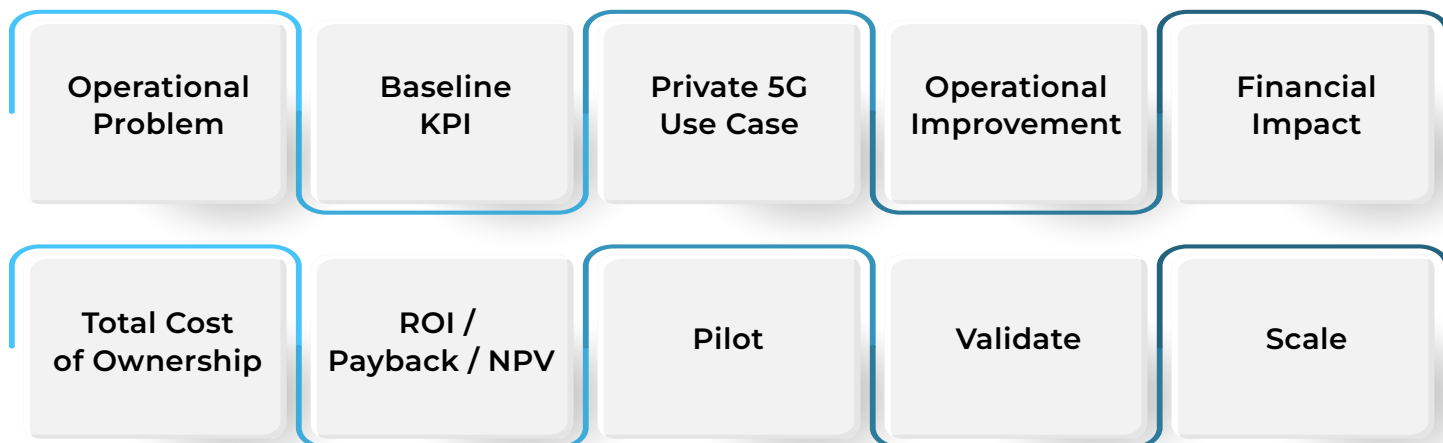
The process can follow seven steps:

- **Identify the operational problem.**
Determine where connectivity limitations affect productivity, reliability, capacity, or growth.
- **Establish a measurable baseline.**
Quantify current performance, the operational impact of the problem, and its financial cost.
- **Prioritize high-value use cases.**
Focus on applications with measurable operational and financial potential.
- **Quantify the potential impact.**
Connect each use case to specific KPIs and financial outcomes.
- **Calculate total cost of ownership.**
Include deployment, integration, operations, support, maintenance, and future expansion.
- **Model multiple scenarios.**
Build conservative, expected, and upside cases based on credible assumptions.
- **Validate through a measured pilot.**
Replace assumptions with real operational data before scaling.



The result should be more than a single ROI percentage. It should be a clear explanation of how the investment supports the business, what assumptions drive the return, and how leaders will measure success.

From Connectivity Investment to Business Value



Connected workers:

Improved device connectivity → fewer disruptions → more productive labor

AGVs/mobile robotics:

Better connectivity → higher utilization → increased throughput

Asset visibility:

Better tracking → less search time → lower labor costs

Build the Business Case Before You Build the Network

Private 5G can provide important capabilities for modern logistics operations. But the strongest business cases start with measurable business outcomes, not network specifications.

Organizations should identify where connectivity creates operational constraints. They should establish a baseline and quantify the cost of those constraints. They should then evaluate how private 5G, Wi-Fi, public cellular, or a hybrid architecture could address those challenges.

The business case should account for direct ROI, enabled capabilities, and strategic value. It should also include the full cost of ownership and the cost of maintaining the status quo.

Most importantly, leaders should test their assumptions.

A measured pilot can help transform a theoretical business case into an evidence-based investment decision. The goal is not to prove that private 5G is the right answer for every logistics operation. Rather, the goal is to determine where it can create measurable value, how much that value is worth, and whether the return justifies the investment.



Ready to Build a More Defensible Connectivity Business Case? Build a Connectivity Strategy Around Business Outcomes

The right private 5G strategy starts with understanding your operational goals, existing infrastructure, and future technology roadmap.

Sparro helps enterprise organizations evaluate connectivity architectures, integrate technologies across complex environments, and build solutions around real business requirements.

Whether private 5G is the right fit or a different connectivity approach makes more sense, the first step is understanding what your network needs to enable.

Talk with Sparro about building a connectivity strategy grounded in measurable business outcomes.



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