The Adoption of Private Wireless for Enterprise Digitalization
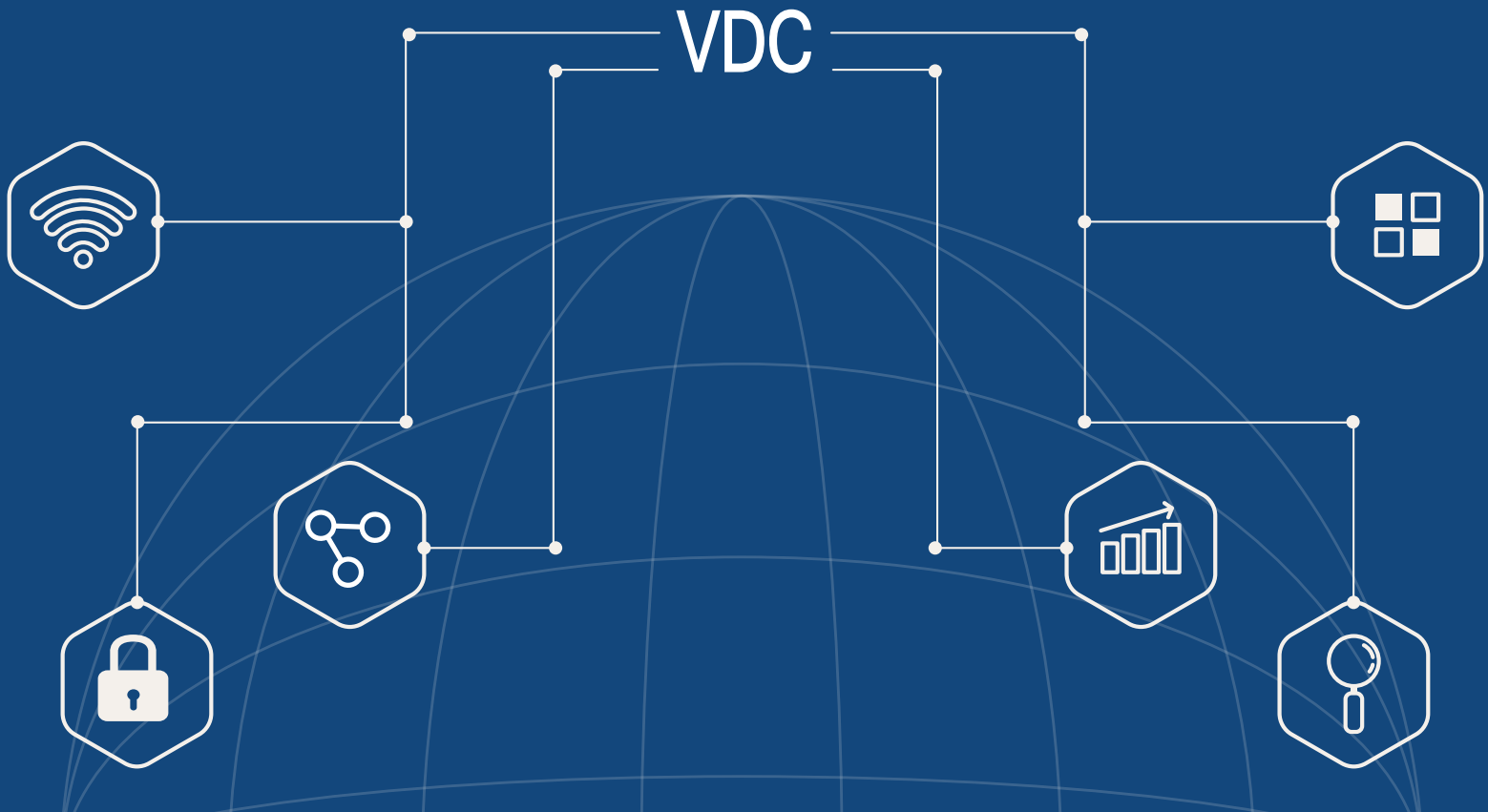
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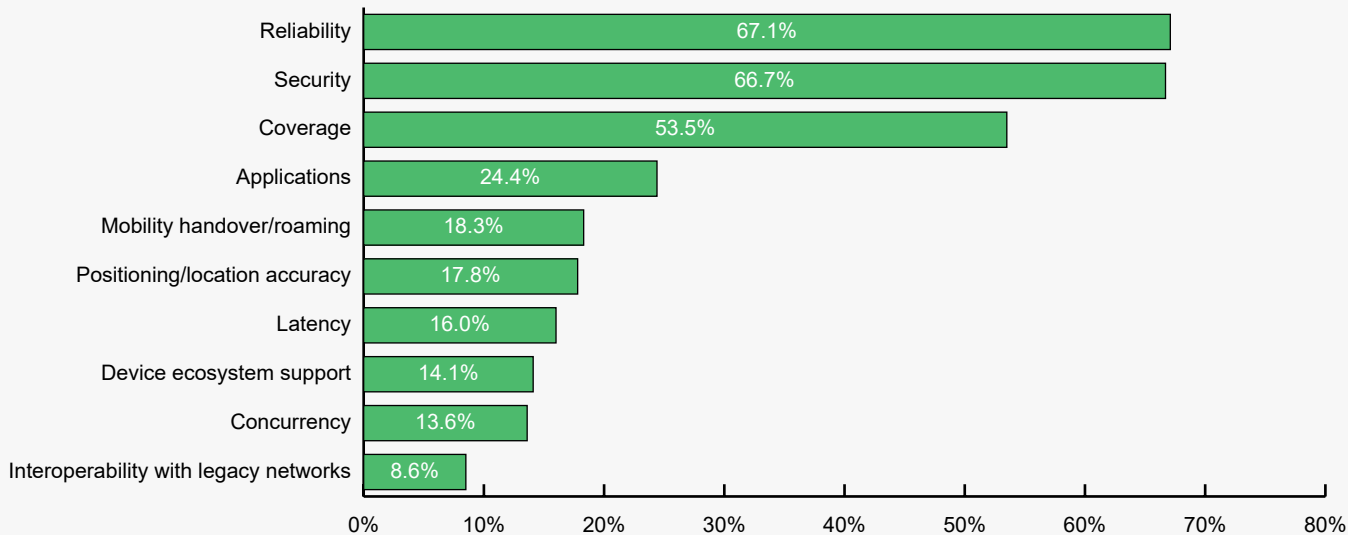# MODERNIZING THE ENTERPRISE THROUGH NETWORK TRANSFORMATION

Today's enterprises are not designed to keep pace with many of the connectivity requirements needed to scale business-critical operations. To tackle these increased demand pressures, businesses are investing in transformative networking and mobile technologies that will enhance operational efficiencies while providing safer and more reliable connectivity. Enterprises are rapidly adopting technology solutions including more mobile computing devices, Autonomous Guided Vehicles (AGVs), IoT devices, and robots, which require highly reliable wireless connectivity. Traditional networks such as Wi-Fi, although essential to network strategy, are struggling to handle increasing device density and serve higher bandwidth and lower latency use cases. As a result, enterprises were dealing with workflow disruptions, spotty coverage indoors and outdoors, unreliable quality of service, increasing security risks to critical enterprise infrastructure, and an inability to serve future applications. According to VDC's 2022 Private 5G & 4G/LTE Networks report, the top 3 networking limitations currently facing enterprise decision-makers' are security, speed/performance, and reliability.

Exhibit 1: What are the top 3 networking limitations for your organization?
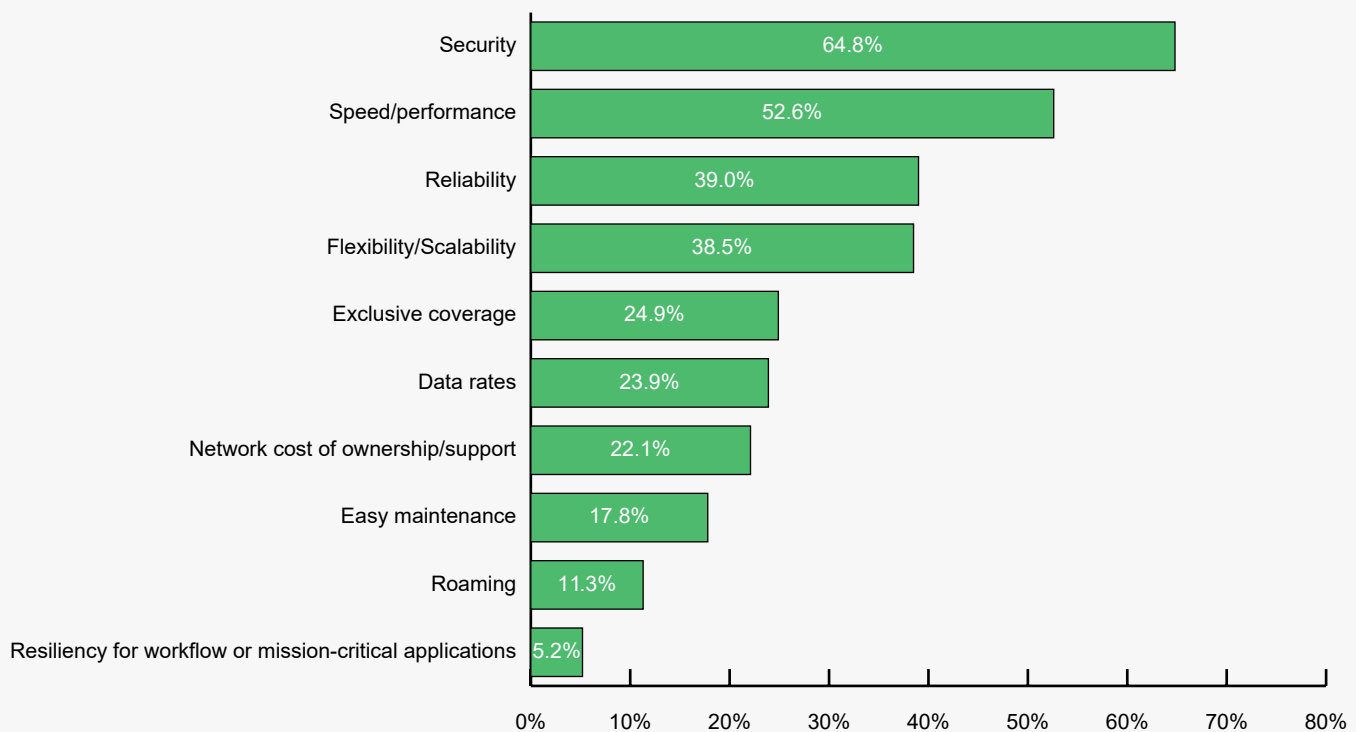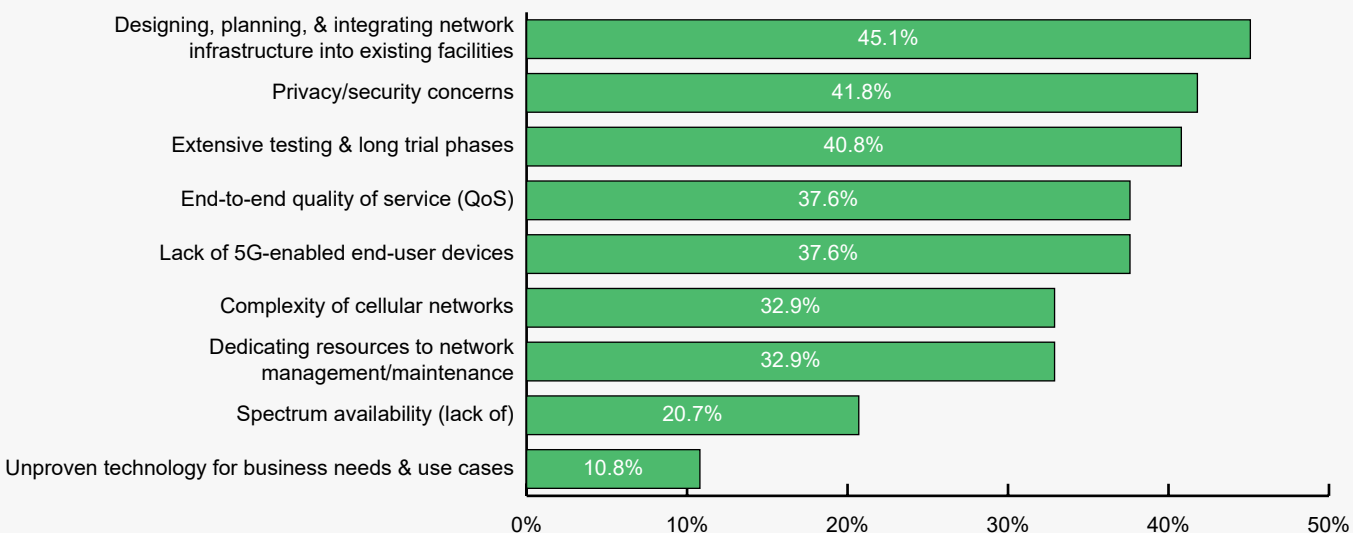

Enterprises are faced with two options as they invest in mobile solutions. The first is to deploy more Wi-Fi access points, which requires significant engineering resources to design complex mesh deployments and install new cabling to connect these access points. This process inevitably leads to a high cost of ownership, with the potential for further problems down the road. The other option is to transform the enterprise network with the deployment of a private wireless network in combination with the existing Wi-Fi network. These networks give enterprises the bandwidth and continued reliability necessary for loaded networks and seamless mobility. The top 3 connectivity features driving the adoption/evaluation of private wireless networks by enterprise decision-makers' are reliability, security, and coverage.

Modernizing the Enterprise
through Network Transformation

Implementing a Strategy
for Network Transformation

Vendor Spotlight: Celona
& Zebra Technologies

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Exhibit 2 - What 3 leading connectivity features are driving the adoption/evaluation of private wireless networks by your organization? Select top 3 most relevant.

Feature	%
Reliability	67.1%
Security	66.7%
Coverage	53.5%
Applications	24.4%
Mobility handover/roaming	18.3%
Positioning/location accuracy	17.8%
Latency	16.0%
Device ecosystem support	14.1%
Concurrency	13.6%
Interoperability with legacy networks	8.6%

However, private wireless networks are a new technology, which means enterprise must vigorously test and prove the networks before they can incorporate into operations. In addition, cellular technology is much more complex compared to Wi-Fi, so solution providers need to educate customers and provide platforms that simplify design and management of the network. End-user devices also must undergo certification and testing to be deployed on the network bands which private networks operate on. The primary challenges facing enterprises that are deploying private wireless networks are designing, planning, and integrating network infrastructure into existing facilities, privacy/security concerns, and extensive testing and long trial phases.

Exhibit 3: What are the primary challenges in deploying a private wireless network to your organization? Select top 3 most relevant

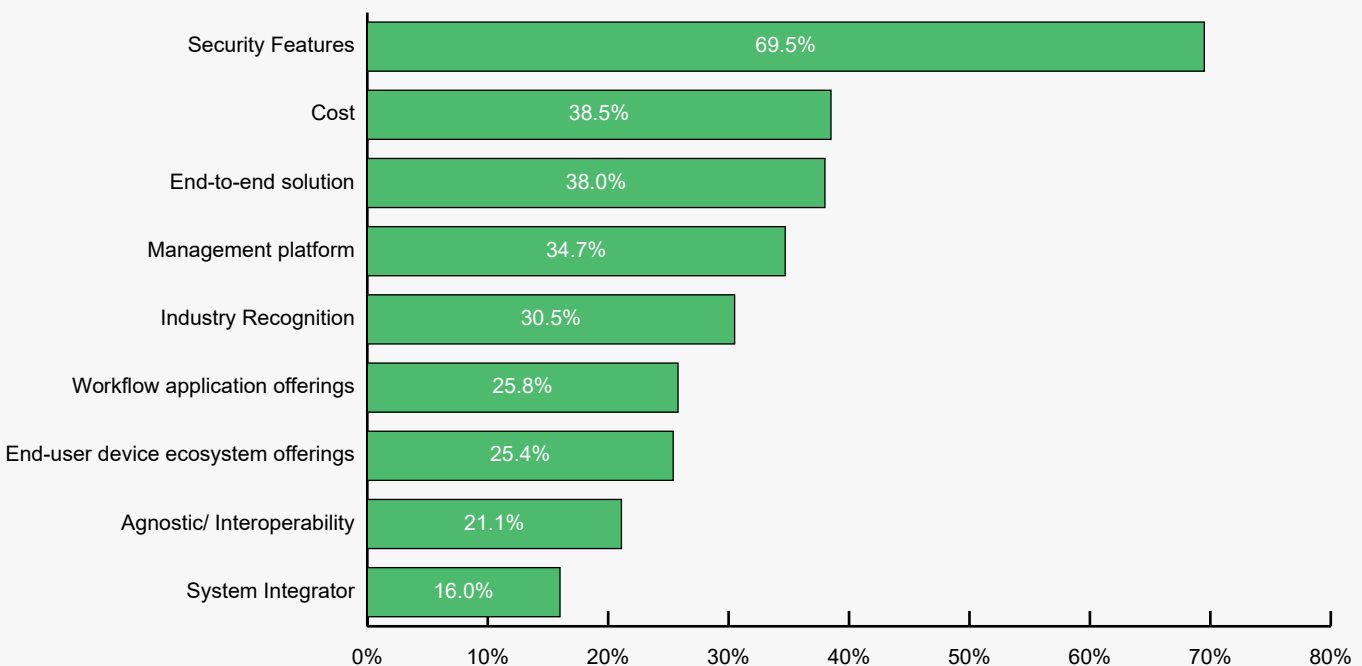| Challenge	%
Designing, planning, & integrating network infrastructure into existing facilities	45.1%
Privacy/security concerns	41.8%
Extensive testing & long trial phases	40.8%
End-to-end quality of service (QoS)	37.6%
Lack of 5G-enabled end-user devices	37.6%
Complexity of cellular networks	32.9%
Dedicating resources to network management/maintenance	32.9%
Spectrum availability (lack of)	20.7%
Unproven technology for business needs & use cases	10.8%

Leading solutions providers for private wireless networks are addressing these concerns by offering RF Design and planning tools for enterprises, carrier grade access points, 4G/5G core infrastructure, resource management software, and orchestration platforms for visibility and configuration management of the network. As networking use cases evolve from increased coverage and reliability for mass device adoption to low latency and high bandwidth for automation and real-time tracking/monitoring, private wireless providers are future-proofing solutions with upgradeable pathways to support the evolution from 4G/LTE to 5G. Partnerships between solution providers and user equipment (UE) manufacturers is accelerating the market and enabling faster time-to-deployments for enterprise adopters.

IMPLEMENTING A STRATEGY
FOR NETWORK TRANSFORMATION

Enterprise technology decision-makers that are evaluating private networks for their business need to know where to start and how to effectively deploy these networks, so that the value can be optimized, potential problems mitigated, and the business can evolve into the future. The journey for private wireless starts with a use case or need, which typically highlights the short-comings of existing network infrastructure. Oftentimes this use case is as simple as not maintaining connectivity throughout the entire facility, impacting operational efficiency and user experience for mobile workers that rely on their devices to conduct daily workflows. As organizations deploy more devices, traditional networks can become crowded or 'loaded' and performance will drop as a result. Identifying the use case is the first step for enterprises looking transform their network and will provide an important starting point for conversations with solution providers.

After the key use case is identified, enterprises need to determine the area of network coverage needed. Will the network only be indoors, or will outdoor coverage be necessary as well? Then decision-makers will need to determine the data demands, authentication requirements and specifications of their connectivity needs. Private networks hold a key advantage over public networks in that the enterprise manages and sets network policies and configurations. Also, private cellular allows for higher uplink speeds relative to public cellular, which is more focused on consumer downlink. The types of current and future-desired applications being used on the network are key for setting up configurations and parameters, as well as determining which applications will be run on the private network and which kept on Wi-Fi or traditional networks. Network configuration needs vary by industry but can be tailored to specific organization needs through collaboration with solution and/or managed service providers. Among enterprise decision-makers evaluating/deploying private networks, the top 3 selection criteria for choosing a private wireless solution providers are security features, cost, and an end-to-end solution.

Exhibit 4: When choosing a private wireless solution provider, what are the top 3 selection criteria? Select top 3 most relevant

Criteria	Percentage
Security Features	69.5%
Cost	38.5%
End-to-end solution	38.0%
Management platform	34.7%
Industry Recognition	30.5%
Workflow application offerings	25.8%
End-user device ecosystem offerings	25.4%
Agnostic/ Interoperability	21.1%
System Integrator	16.0%

Collaboration between the provider ecosystem, enterprises, device OEMs and 3rd party system integrators will lead to successful private wireless deployments. This collaboration ensures that devices will run effectively on the networks, there will be seamless integration/migration with existing systems, and enterprise IT departments can be properly educated on management of the network. Many providers offer tools to help with the evaluation process, such as total cost of ownership (TCO) calculator estimates and RF design tools for building blueprints of the network; however, providers need to work with enterprise customers to know the exact layout of targeted facilities and identify obstacles that could interfere with signals. Some private wireless solution providers offer a 'network-in-a-box' kit, which contains a 4G/LTE or 5G core, access points and management platform for enterprises to quickly set-up and test a private network. Systems integrators exist across verticals that specialize in serving the technological needs of certain industries and can provide tools, support, or management services for enterprises evaluating private networks. Enterprises prefer to deal with a complete solution provider that can satisfy their organization's networking needs and set the business up for operational scale in the future. Through continued ecosystem collaboration, private wireless providers are developing interoperable solutions and working to authenticate more end-user devices for private wireless use. Today, the vendors with more user equipment certified to operate with their networks are seeing increased opportunities for enterprise adoption of their solutions.

VENDOR SPOTLIGHT: CELONA
& ZEBRA TECHNOLOGIES

Across all verticals, businesses want a frictionless experience that works end-to-end from the device to the network. This realization is exactly what drove the partnership between Celona and Zebra Technologies, announced in 2021. Today, there are 6 Zebra devices (TC26*, TC58*, TC78*, ET45*, ET85, L10 Series Tablet) that have undergone Celona's 5G LAN device certification, which takes the guesswork out of device interoperability for customers. Both companies are committed to serving the networking and mobile technology needs of enterprise customers, especially in warehousing and industrial environments. To Celona, an open-device ecosystem is critical to the success of private wireless and Zebra has the largest footprint in the rugged Android handheld market, which is the most common end-user device for industrial and warehouse organizations. Celona is also engaged with Zebra resellers to educate on the value of private wireless-enabled devices. Through this partnership, enterprise adopters can deploy Zebra Technologies' industry-leading rugged devices and run them reliably throughout the entire shopfloor and even in outdoor environments on the Celona network.

Although it is proven that expanding traditional networks and deploying more Wi-Fi access points will lead to high TCO for enterprises looking to scale operations, there needs to be proven value for adopting a brand-new technology. According to VDC's 2022 Enterprise Buyer Behavior Guide Survey, two of the leading business obstacles to implementing new technologies in warehouse environments to decision-makers are the cost of technology and cost of deployment. Celona understands this crucial enterprise need and offers its own private wireless TCO calculator[1] to enterprises that are interested in private wireless networks. The company has also conducted studies to highlight the savings and performance of 5G LAN private wireless vs. traditional Wi-Fi networks. In an actual distribution center, Celona found that the number of private wireless access points needed indoors was only 17% of the Wi-Fi access points; outside, the number drops to 6% of Wi-Fi access points.[2]
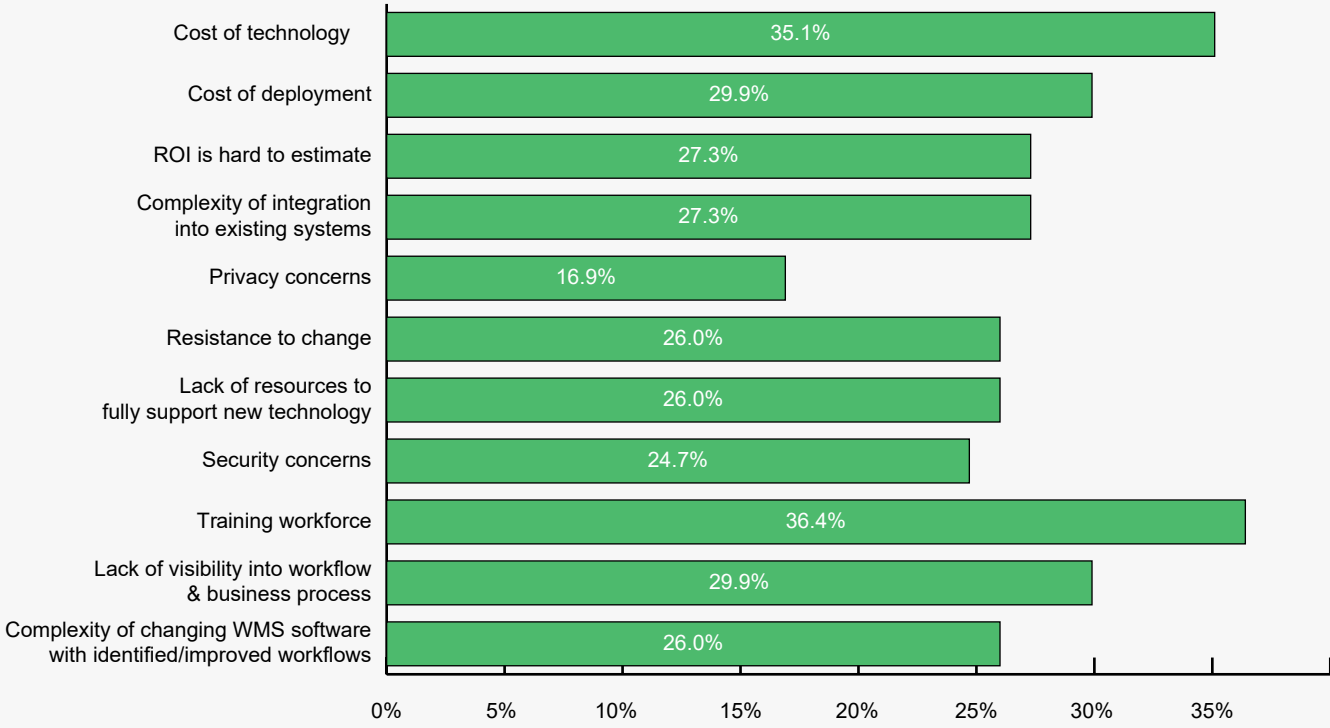
Private wireless equipment costs are 47% of the equivalent Wi-Fi costs and installation costs only 9%. Altogether the TCO of 5G LAN private wireless in the distribution center was 32% of that of an equivalent Wi-Fi network. In terms of performance the latency in a loaded Wi-Fi network is 5x higher than for Celona private wireless, and average data throughput is more than 2x compared to Wi-Fi.[3] Of course, Wi-Fi will remain an important part of enterprise networking, so Celona and Zebra are working together to support seamless transitions between Wi-Fi and private wireless networks; the companies are also working to integrate the Celona Orchestrator platform with Zebra's Enterprise Mobility Management (EMM) to set/manage policies and provision devices en masse on a single platform. This partnership started off on the CBRS band 48 network, but both companies are looking to expand globally as Celona announces support for bands n77, n78 in the UK and Europe.

[1]"Private Cellular TCO and ROI Calculator." Celona, https://www.celona.io/tco-calculator
[2]"Solution Brief: Distribution & Logistics." Celona, https://marketing.celona.io/acton/attachment/42957/u-de9a3286-c5f9-4337-aa60-503595a80a56/0/-/-/-/-/Solution%20Brief%3A%20Distribution%20%26%20Logistics
[3]"Case Study: Comparing Wi-Fi and Celona Private Wireless." Celona, https://marketing.celona.io/acton/attachment/42957/u-5a365056-6082-439f-98e5-1fa49baab1c9/0/-/-/-/-/Case%20Study%3A%20Distribution%20%26%20Logistics

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Exhibit 5: What are the greatest business obstacles to implementing new technologies in warehouse environments?

Obstacle	Percentage
Cost of technology	35.1%
Cost of deployment	29.9%
ROI is hard to estimate	27.3%
Complexity of integration into existing systems	27.3%
Privacy concerns	16.9%
Resistance to change	26.0%
Lack of resources to fully support new technology	26.0%
Security concerns	24.7%
Training workforce	36.4%
Lack of visibility into workflow & business process	29.9%
Complexity of changing WMS software with identified/improved workflows	26.0%

ABOUT THE AUTHORS

Rowan is a market research professional within VDC's Enterprise Mobility and AutoID practice. With a passionate interest for the technology industry, Rowan brings skills in economic analysis and industry research to VDC. Rowan holds a B.A. in International Studies with a concentration in Economics from Boston College.

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David has more than twenty years' experience covering enterprise and government mobility solutions, wireless infrastructure and automatic identification and data capture technologies. David's research focuses on the intersection of digital and mobile solutions with today's business and mission critical frontline mobile workforce and how organizations are leveraging mobile solutions to improve workforce productivity and enhance customer engagement. David's consulting and strategic advisory experience is far reawching and includes technology and market opportunity assessments, technology penetration and adoption analysis, product and service development and M&A due diligence support. David has extensive primary market research management and execution experience to support market sizing and forecasting, total cost of ownership (TCO), comparative product performance evaluation, competitive benchmarking and end user requirements analysis. David is a graduate of Boston University (BSB**A)**.

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