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BLACK & WHITE PAPER

Global Survey Results

How 5G and IoT Will Change the Fortunes of Vertical Businesses

COMMISSIONED BY

pelion

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About this paper

A Black & White paper is a study based on primary research survey data that assesses the market dynamics of a key enterprise technology segment through the lens of the "on the ground" experience and opinions of real practitioners — what they are doing, and why they are doing it.

ABOUT THE AUTHORS

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Introduction

Companies' ability to withstand the operational impacts of COVID-19 has been hugely dependent on their progress along the digital transformation path – how fast they could move to new operating models, preserve and even enhance customer experiences, turn up the dial on efficiencies and generally how they fared against competitors. Even in the first few weeks, it became apparent that businesses built on more flexible digital platforms were coping far better than those clinging to traditional ways of working.

But winning in the new business reality that COVID-19 is creating won't just be about how well companies performed out of the starting gate. A big part of long-term success will be how fast companies can use newer technologies – the Internet of Things (IoT), artificial intelligence (AI) and 5G networks – to reach full digital transformation.

This primary research paper was designed to find out the specifics about how business leaders in key vertical industries intend to deploy and operationalize 5G and an AI-enhanced IoT, what they are looking for from these initiatives, and their expectations about the use cases and outcomes these emergent technology fields will support.

Executive Summary: 451 Take

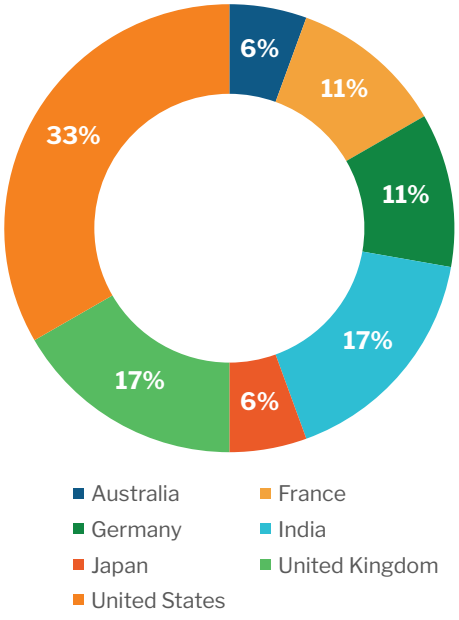
In this Black and White paper, 451 Research sought to bring fresh insights to the commercial evaluation of 5G and IoT as next-generation business enablers. We wanted to hear directly from businesses on which technologies and services will advance 5G success over the new few years and beyond, while also getting a read on the unique challenges that 5G and IoT present.

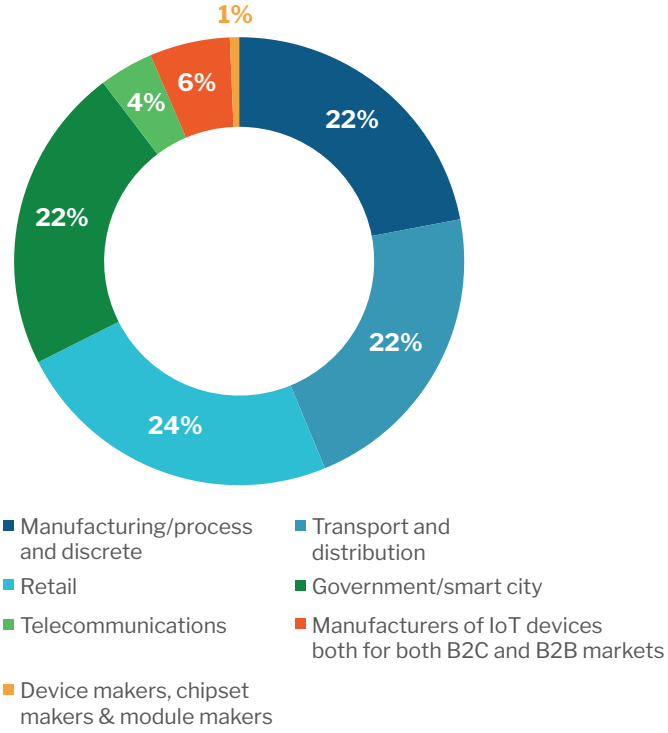
We were especially interested in understanding whether the combination of 5G and IoT might be mutually re-enforcing and, alongside the use of advanced analytics, drive groundbreaking business outcomes. The expectation is that the convergence of these technologies will reshape society, the public realm and businesses everywhere. This report explores the situation today, where things are heading, who and what will get us there, and what will likely stand in the way.

This study has confirmed that most business leaders already have 5G and IoT built into their plans. That is evidenced by the insights from 900 IT decision-making respondents from a mix of company sizes, industries and geographies. See Figure 1 for a geographic and vertical breakdown of respondents.

Figure 1: Survey demographics

Source: 451 Research custom survey (n=900)
Q. In which country are you located?
Q. Which of the following best describes your organization's industry?





Momentum for IoT workloads is reflective of a new phase of maturity in business ecosystems, and the extent to which 5G has already entered the consciousness and planning cycles in enterprise leaders is further along than we anticipated.

Key Research Findings

- Most respondents (54%) in our survey said they are in execution mode of a formal digital transformation strategy.
- Those with digital transformation strategies in place are far more likely to have IoT deployments already (54%) vs. 35% for respondents still in planning mode.
- **Intent to deploy 5G to connect and support 5G endpoints is very high. Overall, survey respondents said they use 5G – either in production, pilot or discovery – to connect an average 26% of their IoT devices today, growing to 66% within the next three years.**
- According to our survey, 93% of respondents expect 5G to have a positive impact on their existing and planned IoT deployments (45% moderately positive and 48% extremely positive).
- Nearly all (98%) survey respondents expect IoT data generation to increase in the next several years; 46% of those say they expect it to increase significantly, which aligns well with 5G capabilities.

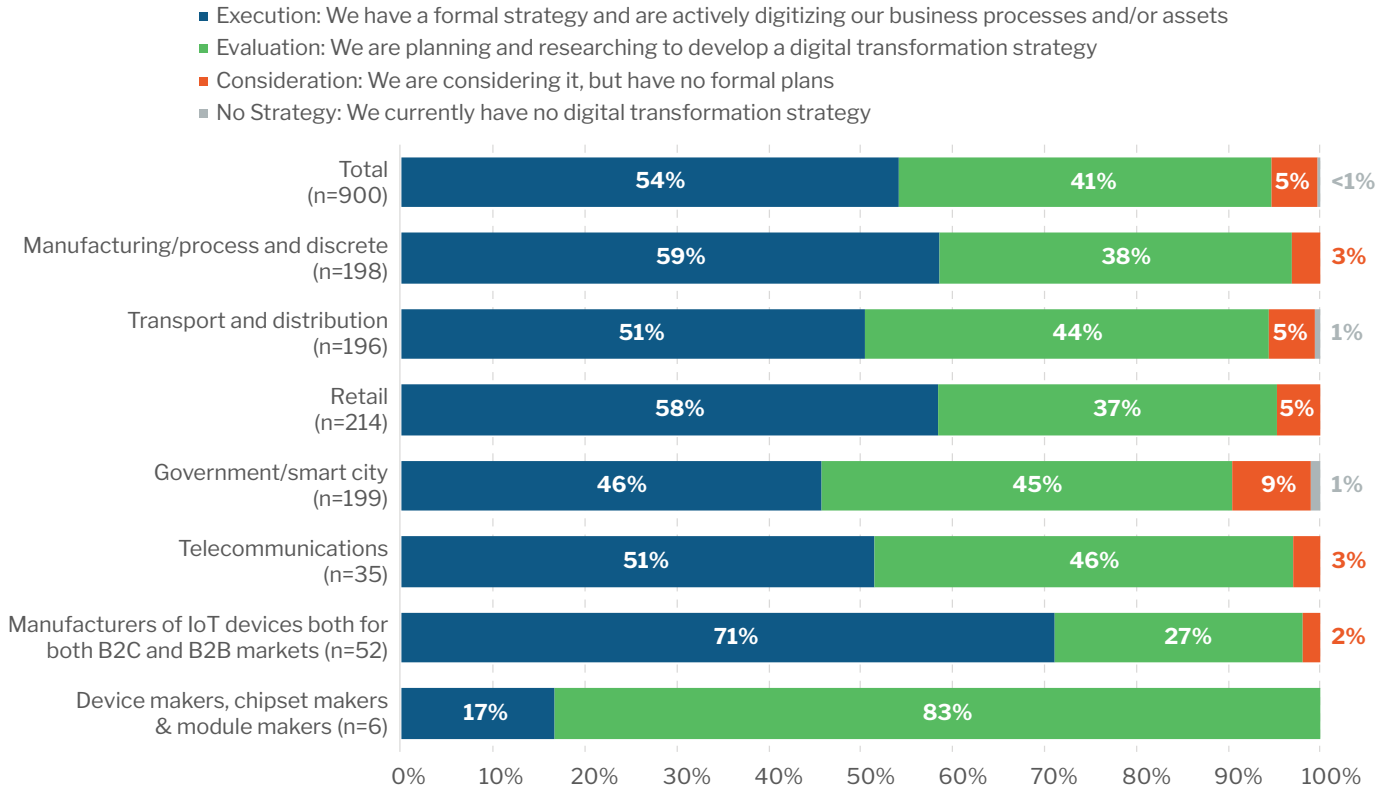
Re-enforcing Market Momentum: Digital Transformation, IoT and 5G

Digital Transformation

Most respondents in our survey (54%) said they have a formal digital transformation strategy in place and are actively digitizing business processes or assets. A lesser number (41%) are involved in a planning and research program to put one in place. A small minority (5%) are considering digital transformation but currently have no action plan. Figure 2 shows a breakdown of the digital transformation plans by vertical.

Figure 2: Digital transformation: all respondents and vertical breakdowns

Source: 451 Research custom survey
Q. How would you best characterize where your organization is in your Digital Transformation efforts?



5G AND INTERNET OF THINGS DEFINED

5G – Fifth-generation wireless (5G) is the latest generation of licensed cellular/wireless technology. 5G network rollouts are underway globally and will accelerate in 2021-2023. 5G systems are engineered to greatly increase the speed and responsiveness of public and private wireless networks. 5G will also enable a sharp increase in the amount of data transmitted over wireless systems due to more available bandwidth and advanced antenna technology. 5G systems will support 'massive machine type communications,' which anticipates the ability to support up to one million concurrent machine connections from a single 5G radio tower.

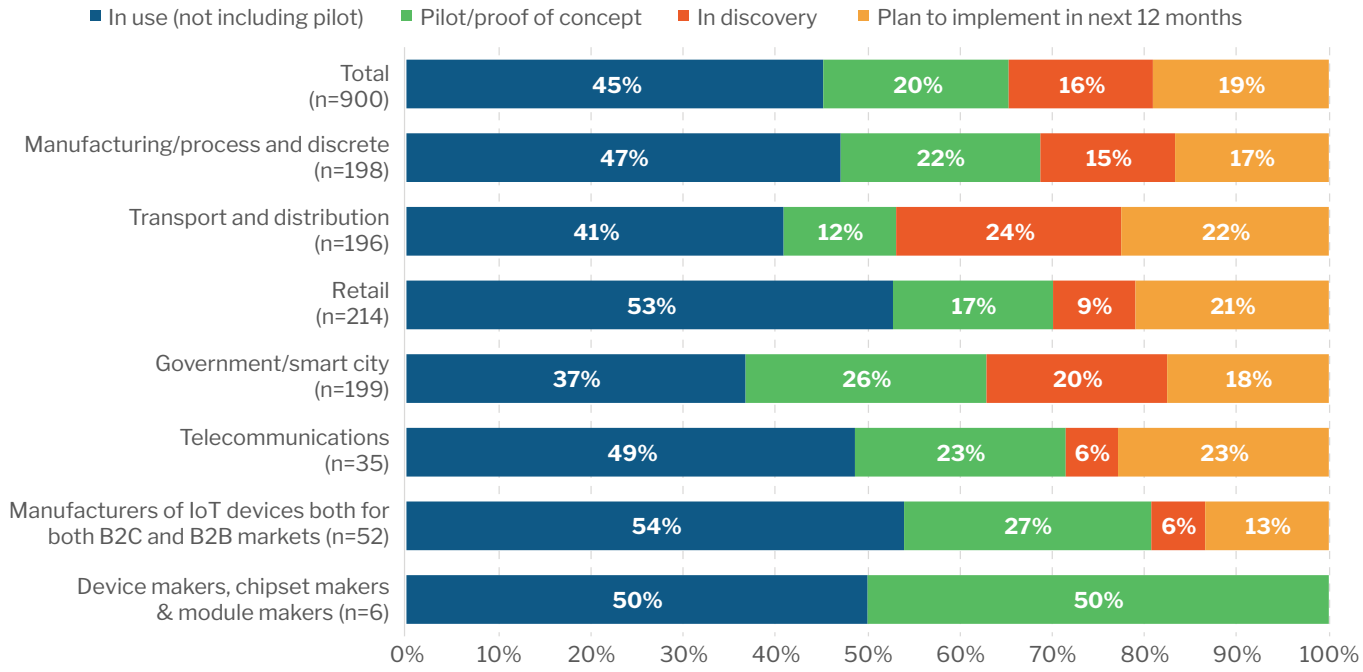
Internet of Things – The Internet of Things is shorthand for a wide range of use cases that combine machine connectivity, sensors, communications networks, analytics and data processing, and applications to digitize the physical world. More specifically, IoT combines physical world assets and data sources with our digital systems to create actionable insights.

The Internet of Things – Vertical Adoption Highlights

Our survey logic was designed to capture insights from technology decision-makers planning to adopt Internet of Things technology within the next 12 months. When asked to characterize the current state of Internet of Things adoption, 'IoT in use' was the most popular in aggregate, accounting for 45% of all respondents. One-fifth (20%) of total respondents indicated they are currently in the pilot/proof-of-concept (POC) phase, while 16% said they are in the discovery phase, and 19% have plans to implement IoT in the next 12 months.

Figure 3: Internet of Things: all respondents and vertical breakdowns

Source: 451 Research custom survey
Q. Which of the following best describes your organization's adoption of Internet of Things (IoT)?



Notable Data Points:

- The most popular currently deployed endpoints for government respondents are cameras and surveillance equipment (60%). In manufacturing, the most connected devices are smartphones (58%), which can often function as IoT gateways to downstream sensors and UI, and leverage onboard sensors for people tracking, environmental monitoring, etc.
- Large companies are more likely to deploy cameras and surveillance systems (64%) than smaller firms (46%).
- Respondents with a digital transformation strategy in place are far more likely to have IoT in use (54%) than respondents still in planning mode (35%).
- A third (33%) of respondents with a digital transformation strategy in place are already using 5G to support IoT initiatives vs. 19% of respondents still in planning mode for digital transformation.
- IoT device OEMs are almost two times as likely to analyze data in a public cloud (60%) vs. telecom operators (31%).
- Well over half (63%) of IoT device OEMs expect significant increases in data generated by their IoT systems per day in two years. Only 34% of transportation respondents indicated the same.

Key Takeaways:

- The presence of a formal digital transformation strategy is a strong leading indicator of existing engagement with both IoT and 5G.
- The consensus view that IoT data generation will either increase (52%) or significantly increase (46%) in two years along with the intention to analyze the majority of data will drive demand for data management solutions on devices, enterprise IT edge and network edge.
- The high incidence of IoT in use by all respondents is a positive sign for IoT maturity overall but does not capture the scale of deployment relative to full potential.

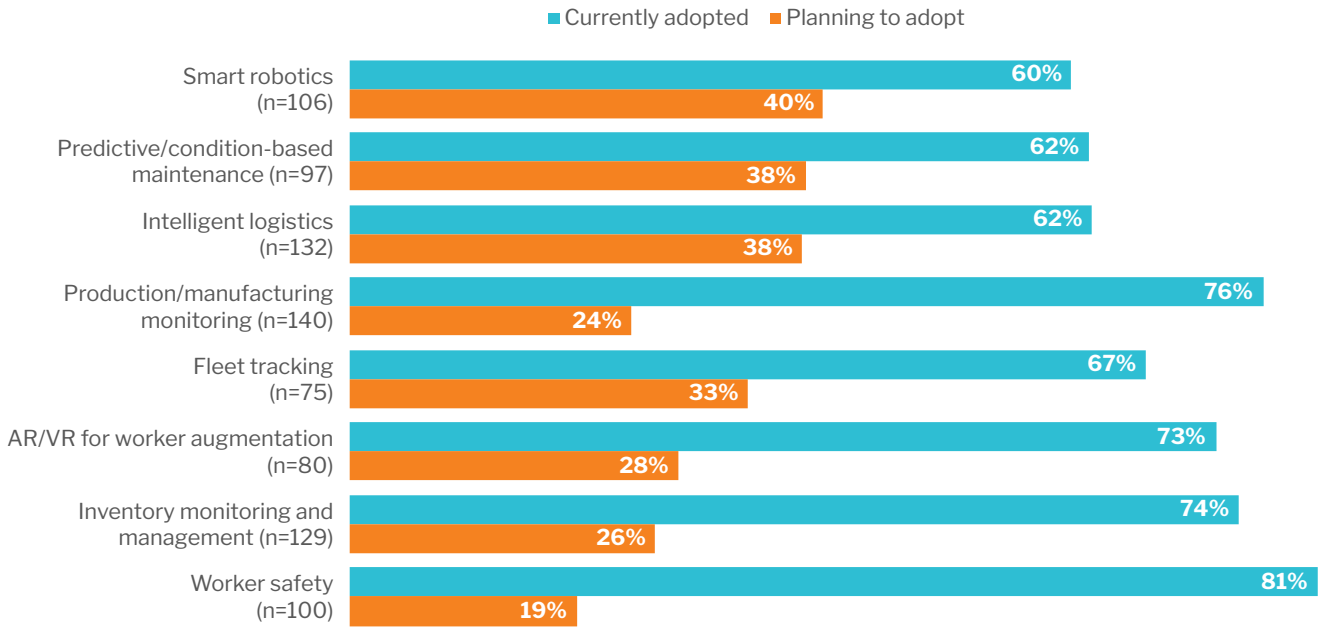
Manufacturing

We double-click here as manufacturing was a machine-to-machine pioneer sector for decades before the concept of a broader IoT was invented. These industrial enterprises create value through their manufacturing systems and processes that have been connected and automated via programmable logic controllers and embedded computing systems since the 1970s. With IoT, they are taking the next step, which calls for a greater convergence of OT/IT groups, processes and systems, and further digital instrumentation through digital twins and digital threads. 5G offers the prospect of a single physical network deployment that can be logically divided and secured to support the entirety of their connectivity and workload needs across humans and machines. Figure 4 shows the results.

Figure 4: Internet of Things: manufacturing use cases, currently adopted and planned

Source: 451 Research custom survey (n=198)

Q. You indicated you work in the manufacturing/process and discrete industry. Which of the following IoT use cases have you implemented or plan to implement in the future?



Transportation

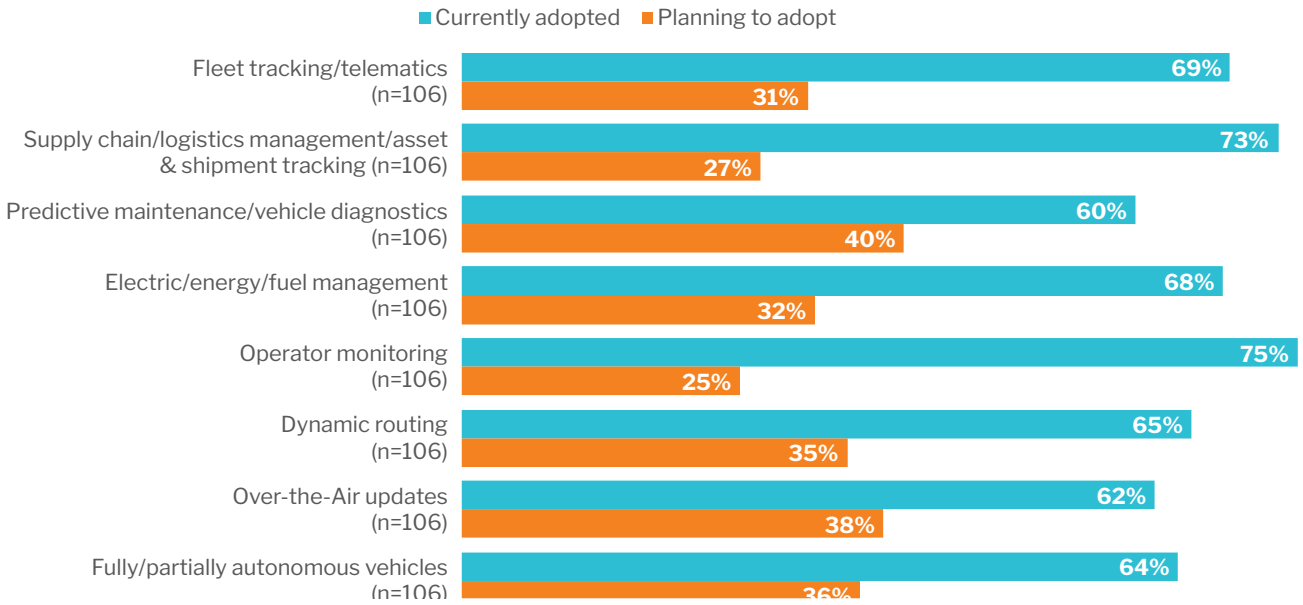
The transportation industry is the bedrock of the global economy because it provides the critical support for the movement of people and products wherever they need to go. The transportation sector encompasses airlines, freight trucking, shipping and logistics, railroads, and maritime shipping. In general, the potential for IoT in transportation is very high because instrumenting and digitizing the physical assets involved in goods movement opens significant opportunities to uncover efficiency and drive automation within and across systems. While we may not be ready for fully autonomous cars yet, commercial use of autonomous trucking for long-haul delivery is already getting underway.

Given the value of tracking assets as they move, transportation has been a longtime adopter of cellular M2M connectivity offered by telecom carriers or specialist telematics service providers. The fleet management solutions industry generates billions of dollars each year by solving problems like 'when will the delivery be made' and 'who is driving which vehicle' with simple connectivity + location solutions, driver apps and management portals. With these systems in place, the possibilities for advanced analytics are endless. Using predictive analytics, fleet managers can more accurately predict vehicle failures – and mitigate one of its most difficult challenges. Figure 5 shows expected IoT use cases.

Figure 5: Internet of Things: transportation use cases, currently adopted and planned

Source: 451 Research custom survey (n=196)

Q. You indicated you work in the transport and distribution industry. Which of the following IoT use cases have you implemented or plan to implement in the future?



Exploding Demand for 5G to Support IoT

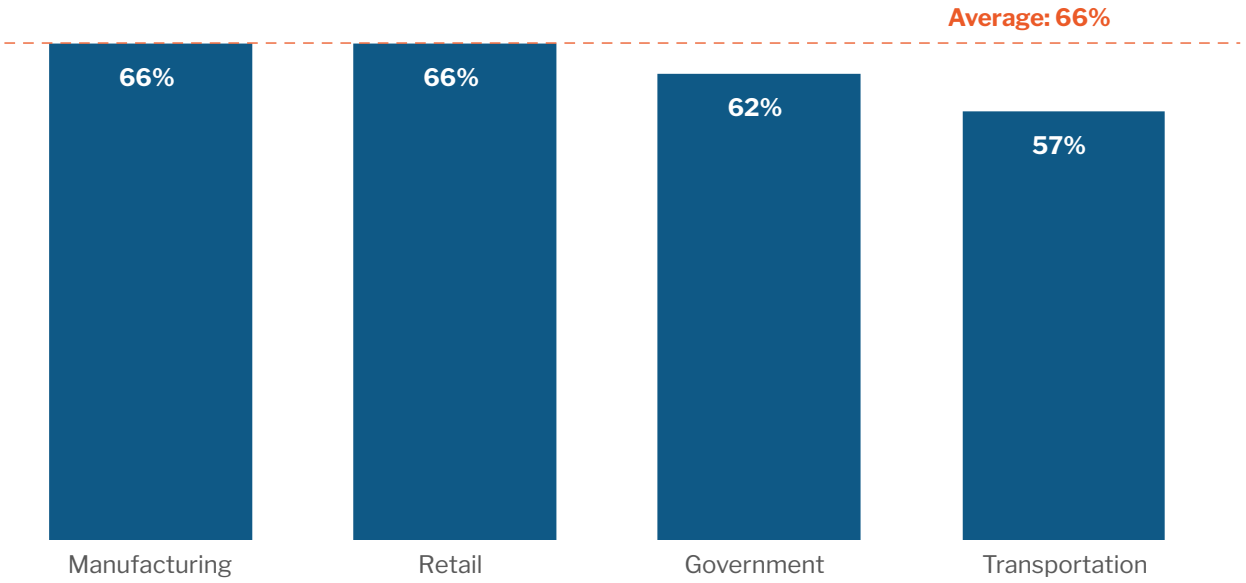
In the previous section, we noted the strong enterprise interest in using 5G networks to support IoT initiatives – in some cases, before it is likely even available commercially to do so at scale. Digging a little deeper into our survey results, we found it's clearly a function of familiarity and intent.

Of our 900 survey respondents, 66% said they had high levels of 'working knowledge' about 5G. That's a notably positive response rate, and one that should be encouraging to 5G network providers, especially at this early stage. Level of 5G familiarity is even higher (71%) among manufacturing respondents, a vertical that many operators see as a prime target for industrial 5G services.

Intent to deploy 5G to connect and support 5G endpoints is also high. Overall, survey respondents said they use 5G – in-production, pilot or discovery – to connect an average 26% of their IoT devices today, growing to 66% within the next three years. Manufacturers and retailers are leading the way in leveraging 5G to connect IoT endpoints (see Figure 6).

Figure 6: Percentage of IoT devices connected by 5G, total and by industry vertical

Source: 451 Research custom survey
Q: What portion of your IoT devices do you expect to be connected via 5G in three years?



How will the enterprises deploy 5G in support of IoT – via public network services or private network deployments? The answer, given the wide variety of IoT endpoints (from vehicles on the move to production line machinery standing in place), is that it depends – on the location of the sensor, use case performance requirements, and concerns about data security and sovereignty. Nevertheless, 76% of survey respondents said they'd consider deploying 5G via a 'private or semi-private' 5G network in the future. This follows current strong enterprise interest in private LTE networks. How will those private 5G networks be run? Survey respondents considering running such a network are split equally on that topic: 35% said they'd run it themselves, 34% said they would use a systems integrator partner, and 31% said they would buy it from a network operator.

Respondents in India (at 93%) and Australia (89%) were most likely to consider running a private 5G network, while respondents from Germany (52%) and France (48%) came in below average (76%) on the question. We believe these responses correlate to the difficulty network operators have in adequately covering the large geographies in India and Australia and a predisposition in favor of private network setups in those countries based on industry mix, regulation and culture.

Why choose to deploy a macro-cellular technology like LTE today or 5G tomorrow on a private network? The largest number of respondents (56%) cited network performance, which is under greater enterprise control in a private environment than via a public service (although network slicing could change that), followed by security/privacy (46%) and efficiency (46%).

Notable Data Points:

- Manufacturers and retailers (each managing 36% of their IoT endpoints via 5G today) checked in as the most aggressive industry sectors currently deploying – or more likely experimenting with – 5G for IoT.
- When it comes to operating a private 5G network, retail (at 35%) is the vertical most likely to turn to a network operator to run it, and government (at 39%) is tops at outsourcing private 5G to a systems integrator partner.
- As for why run a private 5G network at all, 61% of manufacturers cited performance as their top driver, making this a top concern for all respondents (at 55%) and even more important for users in that critical vertical.

Key Takeaways:

- 5G technology looks to be in wide consideration as a critical network technology for connecting IoT endpoints across all our survey respondents, and particularly in key sectors like manufacturing. This is good news for network providers that are banking on enterprise IoT applications to drive significant 5G adoption in the enterprise and help accelerate the building of 5G networks.
- Private 5G, like private LTE before it, is drawing keen interest. The network technology is particularly suited for private deployments, whether fully private – for instance operated by an enterprise itself or an SI partner, with licensed or unlicensed spectrum – or via a segregated slice of a network operator public 5G service. Operators and other network providers that are focused on private LTE would do well to double down on their private 5G efforts.

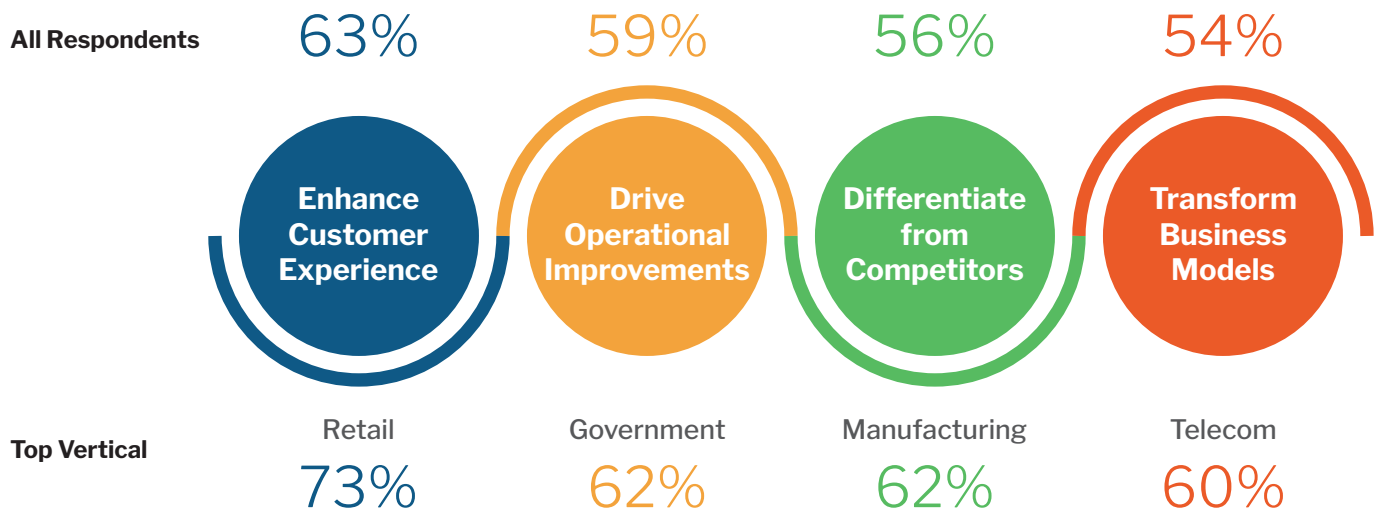
- Understanding the drivers of new technologies is critical if they are to be optimally packaged, priced and delivered. According to our survey, enterprises value performance above all else from their future private 5G connections – they need these networks to guarantee the delivery and security of mission-critical IoT applications and use cases. The fact that cost is not a major concern is also notable: network operators do not have to race to the bottom on 5G/IoT pricing but, rather, can view private 5G as a medium-to-high ARPU (average revenue per user) opportunity, a much-welcome development if it holds true.

The Business Opportunities – and Challenges – of 5G and IoT

We've seen how IoT infrastructure and use case trends have helped to foster enterprise interest in 5G – public *and* private – as a critical connectivity option for IoT. Network operators should be even more encouraged that enterprises view 5G as helping to improve their business and operational outcomes. According to our survey, **93% of respondents expect 5G to have a positive impact on their existing and planned IoT deployments** (45% moderately positive and 48% extremely positive). They expect 5G to deliver significant business paybacks (see Figure 7), led by customer experience and support improvements, as well as operational benefits.

Figure 7: Enterprises see a range of significant 5G business benefits

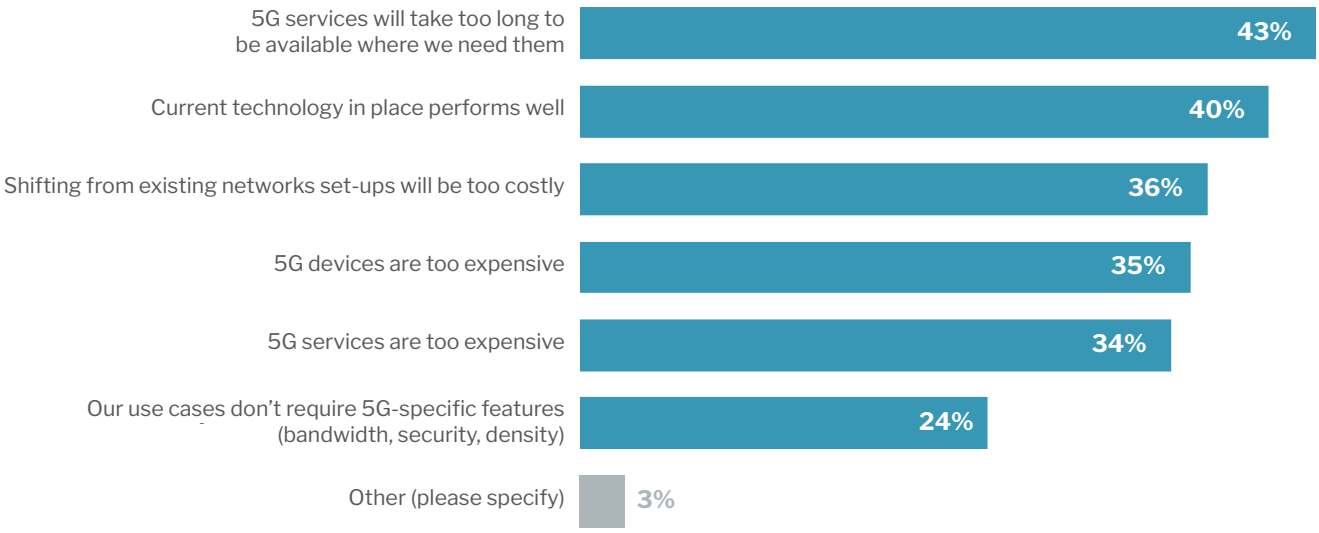
Source: 451 Research custom survey
Q: Which of the following business benefits do you expect to drive 5G investment at your organization?



That's not to say that 5G doesn't raise its share of concerns; any new technology does, but particularly one that so clearly moves the provider – in this case telcos – into new or potentially challenging areas (see Figure 8). Despite the clear interest in 5G outlined earlier, enterprises' number one concern about 5G is whether it will be available when and where they need it. This is no small challenge. The level of investment needed to deliver 5G is significant; if enterprises doubt its availability, those doubts become a self-fulfilling prophecy as operators fail to find the revenue necessary to fund 5G builds. Network operators will need to be transparent with their coverage and capability roadmaps or risk ceding opportunity to alternative deployment models such as private 5G or even Wi-Fi 6.

Figure 8: Availability and cost concerns top enterprise 5G worries

Source: 451 Research custom survey
Q: Which of the following inhibit investment in 5G within your organization?



Notable Data Points:

- When it comes to 5G benefits, 73% of retailers cited its ability to help them transform the customer experience; 66% of manufacturers indicated it would help them become more competitive and differentiated; and 60% of government respondents said it would enable them to deliver services more effectively.
- What might hold 5G back? Transportation respondents were particularly concerned about availability (46%) and the fact that current technologies might work just as well (45%). Retailers, meanwhile, were most likely (39%) to view the transition from current to 5G networks as being too costly.
- Small firms (52%) were more likely to be worried about 5G being available where they needed it, while large enterprises (39%) said that current technology might perform as well as 5G.
- Geographically, 5G network costs were the biggest concern in Japan (52%), while 5G device costs registered as a top concern in India (53%).
- Respondents in Japan (60%) and India (58%) expressed higher-than-average concerns about 5G network availability.

Key Takeaways:

- Without clear business value, 5G in the enterprise will be nothing but a pipe dream. For enterprises already underway with their IoT deployments, the concept of tying business outcome value closely to IT infrastructure plans has become a strong guiding force. So, it's very positive to see real excitement about the ability of 5G networks to help enterprises improve how they serve customers, optimize their operations and help reinvent their business models.
- That said, network operators know the path to 5G is a perilous one. Enterprises understand this as well. They are concerned 5G networks won't be available when and where they need them. A critical 5G network delivery delay could have severe repercussions. If enterprises can't get 5G where they need it, they'll likely quickly turn to other network options (which they aren't convinced would fail to do the job adequately anyway). Cost concerns – both networks and devices – rear their head as usual. In the end, proving business value is critical if 5G network operators hope to use the technology to move from today's commodity machine-to-machine connection business to a mission-critical, use-case-enabling 5G future.

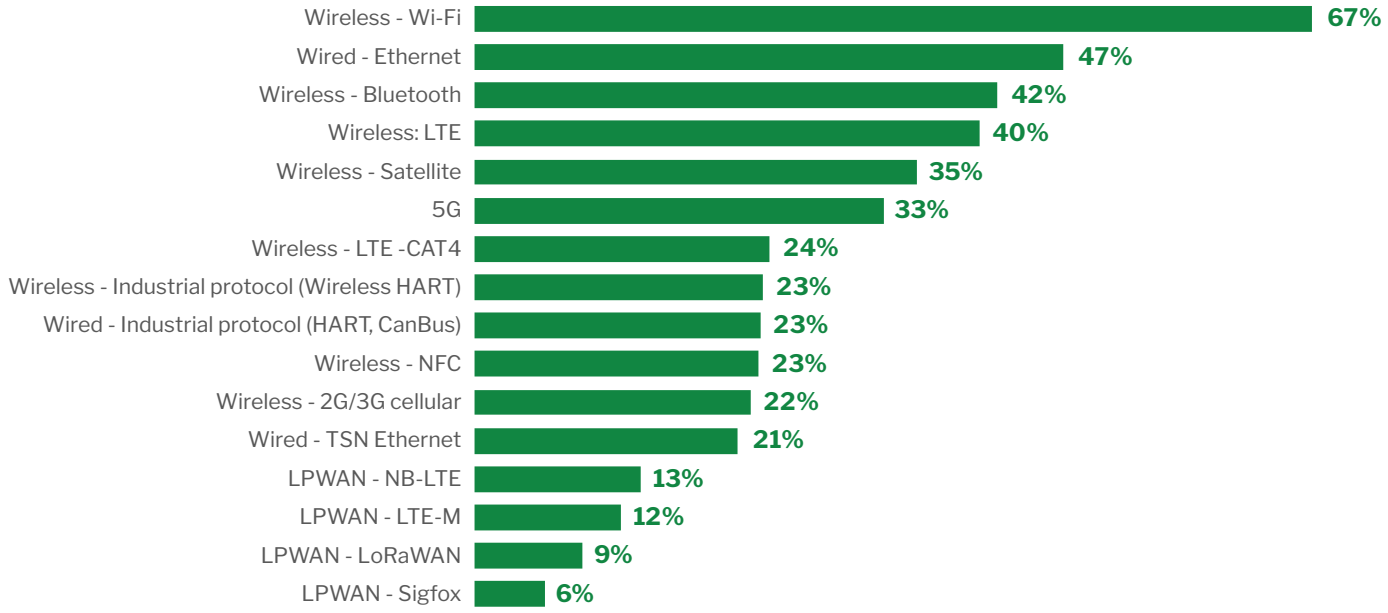
Connectivity Evolution: IoT, 5G and Networks in Transition

IoT data tends to change location – it starts on a sensor in motion or static on a machine but then gets transported to a relatively local server or micro-datacenter or shipped out to a centralized enterprise private or public cloud. Those journeys require strong network connections – the faster, more secure, and more suited to industry protocols and use cases, the better. For enterprises looking to deploy IoT connectivity, the choices are many (as Figure 9 shows) – likely too many, perhaps suggesting a need for consolidation.

Figure 9: IoT connections: many options, but which one is right for the job?

Source: 451 Research and Pelion, 2020

Q: Which of the following connectivity methods are you using/plan to use to support your IoT use cases?



Notable Data Points:

- There are almost as many connectivity options for IoT as there are IoT devices that need to be connected. That said, traditional options, particularly on-premises, still hold – with 67% of respondents opting for Wi-Fi and 47% for wired Ethernet connectivity.
- For on-the-move requirements, the market is evolving rapidly, with 2G/3G networks increasingly replaced by more capable 4G/LTE connectivity, including a range of low-power wide area network (LPWAN) options specifically built for IoT – including LTE-CAT4, LPWAN-NB-LTE and LPWAN-LTE-M.
- Unsurprisingly, manufacturers are most likely to deploy a wired (26%) or wireless (30%) industrial-specific protocol, while also primarily using a wired Ethernet network (51%) for on-premises connectivity. Meanwhile, transportation respondents (46%) led in LTE, and telecom operators (51%) were most likely to use a satellite connection.

- Respondents in Japan (52%) and Germany (52%) were less likely than the average (at 67%) to use Wi-Fi, while India came in well above the pack in LoRaWAN (16%) and Sigfox (14%) adoption.
- Significantly, 5G shows up as an IoT option at least a bit ahead of its actual broad, real-world availability, with 33% of respondents indicating they use 5G for IoT today, most likely in trials and POCs.

Key Takeaways:

- Whether on the go or on-premises, wireless technologies dominate the list of IoT connectivity approaches – with a slew of cellular options in the wide area, and Wi-Fi and Bluetooth showing strength on-site. There are even strong wireless versions of critical industrial protocols. The deployment flexibility and growing capabilities of wireless makes it the connectivity option of choice for IoT.
- Sitting dead center in the responses is 5G; this is notable because in most regions, 5G networks are just now becoming available, and most often not specifically to support IoT applications but for more straightforward fixed and wireless broadband connectivity.

Conclusions

This research study validated our belief that 5G and IoT are already having an impact on companies' operations and will have a far greater impact in future. The vast majority of companies are either in deployment or are about to roll out their plans. Only a tiny majority of organizations still sit on the 5G and IoT fence.

The primary vertical sectors of manufacturing, transportation, retail and government/smart cities are all generally embracing IoT and 5G in a wide variety of use cases. Organizations are bullish about 5G and anticipate adoption as data loads are expected to rise sharply over the next two years.

Expectations are very high, and the onus will fall on network service providers, both public and private, to ensure that the 5G experience aligns with expectations. The opportunities at the intersection of these two technologies are endless and will drive the next decade of digital transformation.

Methodology

Our survey was designed to assess operational impacts of IoT deployments, approaches to security, and expectations on how 5G will impact things like device lifecycles. In addition, we were able to double-click into the workloads driving IoT investment, expected trends around data generation, and specific insights on how telecom operators are intending to monetize 5G and IoT.

To gain these insights and more, we surveyed 900 technology decision-makers in the US, Europe and Asia-Pacific – specifically those with knowledge and visibility into 5G and IoT strategies and the impact those technologies will have on IT. The survey was conducted in December 2019 and January 2020.

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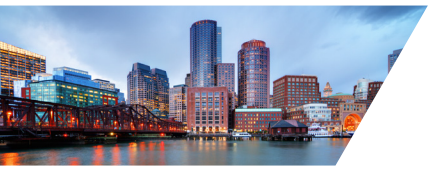

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