SURVEY REPORT

Great Expectations: Sizing the Opportunity for 5G in Vertical Industries

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Executive Summary

5G will go beyond today's consumer-oriented enhanced Mobile Broadband (eMBB) services to enable use cases for vertical industries that will leverage Massive Machine-type Communication (MMTC) and Ultra-Reliable Low-Latency Communication (URLLC) applications. To understand the size and scope of the opportunity for 5G in industrial applications, Mobile World Live (MWL) conducted an online survey of 345 people from mobile industry and vertical enterprise sectors.

The results confirm the industry's general enthusiasm and high expectations for 5G industrial applications to drive growth and reveal that the services and business models are in an early stage of development. Industrial 5G activity is expected to pick up over the next two years, and the first sectors to benefit will most likely be automotive, manufacturing and media. But concerns remain today about the business case and benefits of 5G as well as the readiness of standards.

Key Findings

- **5G will be the most important radio technology for supporting industrial applications in the next 5 years,** surpassing Wi-Fi which is the current technology leader. Most respondents (76%) say that the 5G MMTC and URLLC are critical or important to their business.

- **Implementations of industrial 5G will increase in next 1-2 years.** Nearly 60% of respondents expect to adopt 5G technology for non-consumer, industrial applications in the next 12 months to two years.

- **High mobile industry expectations for 5G industrial applications, but size of growth opportunity is uncertain.** Nearly 40% say 5G industrial applications will generate 15%-20% of mobile industry revenue in the next five years. Respondents have mixed views on how much 5G will drive their business growth. A quarter of respondents say 5G-based services will drive less than 5% of their growth, while 19% said the services will drive 10% growth and 16% of respondents said the services will drive 15% growth.

- **New service enablement is top benefit.** The most important benefits of MMTC and URLLC are new service enablement, support for new applications, higher performance, and lower latency.

- **Asia leads new 5G service development.** More respondents from Asia (20%) than any other region currently use 5G for non-consumer, industrial applications. And 44% of Asia respondents say they are in the early stages of developing new services, a higher proportion than respondents from Europe and North America.

- **As business models emerge, partnerships will be key.** Business models for implementing 5G industrial applications are expected to be built upon partnerships between mobile operators and industrial enterprises. More than half of respondents (55%) strongly agree that partnerships between industry and mobile operators are necessary for developing 5G technology.

- **Biggest challenges to adoption** are lack of business case, immature standards and unclear benefits of 5G technology.

Introduction

As part of the broad set of specifications for 5G, MMTC and URLLC use cases will take the next generation of cellular connectivity into new territory. Both are included in the 3GPP's latest standards release (Release 16), which is due to be completed in July 2020.

MMTC is designed to connect massive amounts (up to a million per square kilometre) of low-power, low-cost Internet of Things (IoT) devices over wide areas, transmitting at low data rates. 5G MMTC builds upon existing Low Power Wide Area (LPWA) cellular standards NB-IoT and LTE-M to connect more devices and preserve longer device battery life for 10 years. Typical applications for such high-density connectivity include large sensor networks for smart utility metering or logistics, for example.

URLLC is designed to support critical communications and mission-critical applications with a target user plane latency of 1 millisecond, and no higher than 10 milliseconds, as well as high reliability (99.9999% availability) and mobility. The latency, reliability and mobility capabilities enable 5G cellular to support applications such as industrial machine control, vehicle-to-everything (V2X) communications or autonomous driving.

Along with the high data rates achieved in eMBB use cases, the capabilities of MMTC and URLLC open a world of opportunity for 5G in nearly every vertical industry sector from agriculture to factory automation. But at this stage in the market's development, when possibilities seem endless, assessing the size and scope of the opportunity is difficult.

For the wide variety of potential players in this market – including mobile operators, systems integrators, network equipment suppliers and industrial enterprises – there are more questions than answers: how will services be delivered? Who will own the 5G connectivity? And ultimately, who will benefit most?

This MWL survey on behalf of InterDigital offers insight into the current views from mobile and vertical industries on the business case for 5G industrial applications, expectations for business growth, as well as the challenges that need to be overcome.

Survey Methodology

This report is based on responses from an online survey of 345 professionals across mobile communications and vertical industries conducted by Mobile World Live on behalf of InterDigital (Figure 1).

The respondent group is a cross section of the mobile communications and enterprise sectors. Nearly 20% of respondents were from mobile operators, just over 20% were from network equipment suppliers, 14% were from system integrators and consultants and nearly 15% were from industry verticals (e.g., education, financial services, energy utilities, media, government and transportation and logistics).

The remaining respondent groups included software vendors (13%), device manufacturers (8%), other network products and services (5.5%) and MVNOs (3.7%).

Geographically, the largest group of respondents were from companies with headquarters in Europe (41%), followed by North America (28.6%), Asia (21.3%), Middle East (4%), Africa (3.4%), and South America (1.4%).

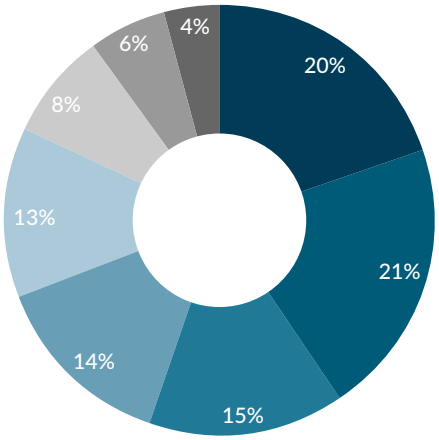


Figure 1.
Profile of Survey Respondents

- Mobile Operators
- Network Equipment Suppliers
- Industry Verticals
- System Integrators / Consultants
- Software Vendors
- Device Manufacturers
- Other Network Products / Services
- MVNOs

Strong Interest in 5G Technology for Industrial Apps

The survey shows that 5G MMTC and URLLC are considered vital technologies for the mobile sector and industry verticals. The majority of respondents (76%) said that both MMTC and URLLC were either critical, high priorities or important, medium priorities for their businesses. Of the operators surveyed, 85% said that MMTC is critical or important to their business and 80% said URLLC is critical or important, which suggests a widely held belief that the technologies will be needed to support future services.

To understand current views on how 5G fits into the mix of radio technologies that can support industrial applications, respondents were asked to rank the most important radio technologies in use today and what the leading technologies will be in five years' time. The results show that the top ranked technology today by a wide margin is Wi-Fi, followed by licensed Internet of Things (IoT) technologies (i.e., LTE-M, NB-IoT) and 4G (Figure 2). In the next five years, respondents ranked 5G by far as the most important radio technology, followed by Wi-Fi and licensed IoT (Figure 3).

Figure 2. Most Important Radio Technologies Today for Industrial Applications [ranked in order of importance]

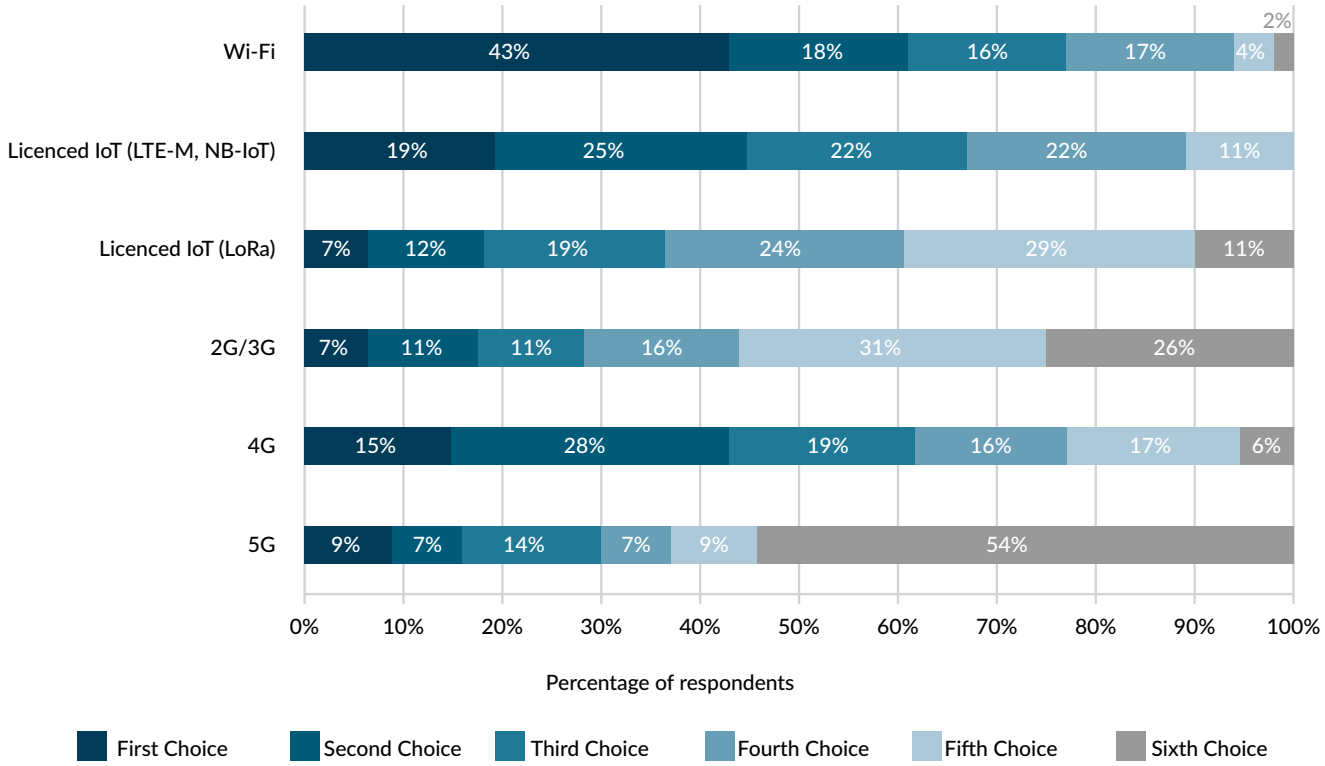
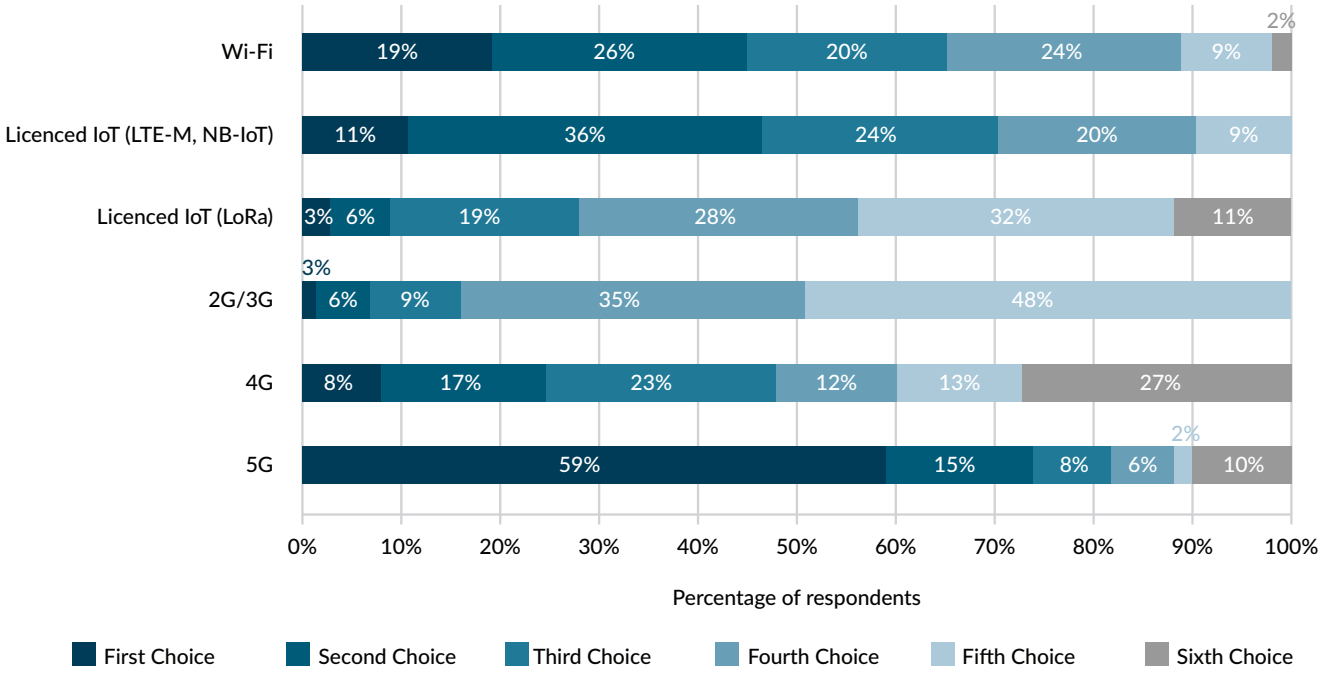


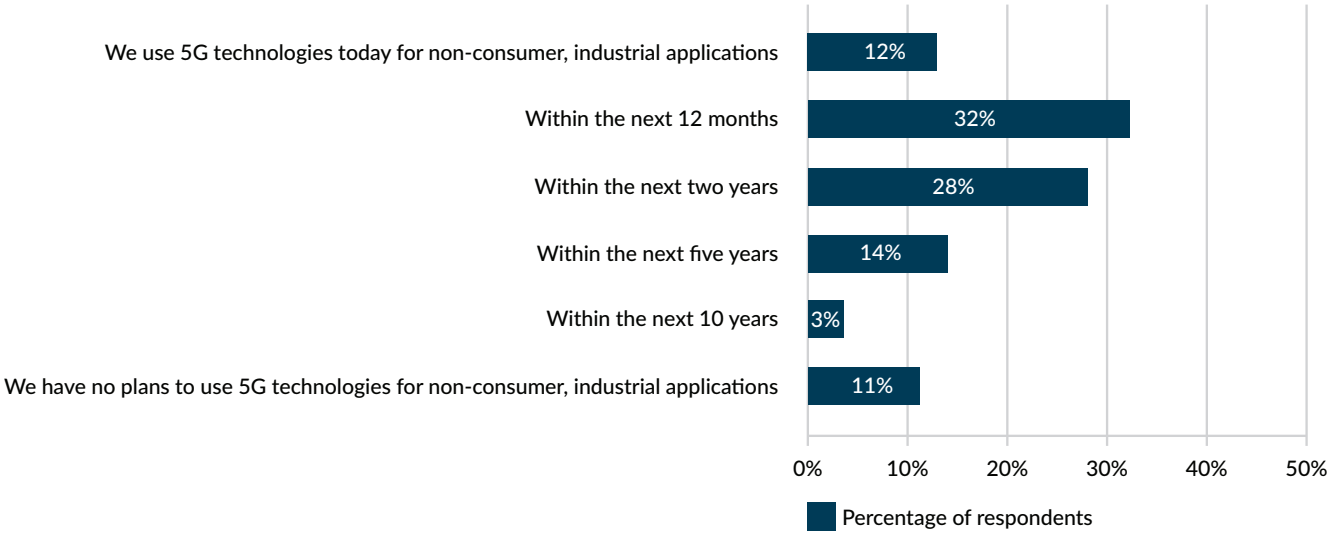
Figure 3. Most Important Radio Technologies in Next Five Years for Industrial Applications [ranked in order of importance]



More than half of respondents said that they are very likely to adopt or apply 5G technologies for non-consumer, industrial applications. When asked about timing, most respondents said they expected to adopt 5G for industrial use cases either in the next 12 months (31.2%) or in the next two years (28.3%), while 14% had longer term expectations with plans to adopt in the next five years.

The survey also revealed that some respondents (12%) are already using 5G technologies for industrial applications. Interestingly, 20% of respondents from the Asia region said they currently use 5G for non-consumer applications, which is a higher proportion than the result from the global set of responses and suggests there are more early adopters in the region and that applications are more developed.

Figure 4. When do you expect to adopt or apply 5G technologies for non-consumer, industrial applications?



New Service Enablement Leads 5G Business Benefits

Respondents were asked to rank the most important benefits of MMTC and URLLC to gain insight into the reasons for pursuing 5G industrial use cases and developing 5G technology. For MMTC, respondents rated the top three benefits as new service enablement, support for new applications and higher performance. Other benefits that were highly rated included lower costs and higher productivity.

The survey revealed differences among geographical regions when it comes to the perceived benefits of MMTC. While new service enablement was ranked as the top benefit across all regions, there were noteworthy divergences in other rankings. Among North American respondents, more respondents rated lower costs as a top benefit than respondents in Europe and Asia, who ranked it as less important, which suggests a regional emphasis on cost reduction in the delivery of future IoT services.

Also, the benefit of higher performance was rated more highly among Asian respondents than those from Europe and North America. Another regional difference was seen in the perceived benefit of higher productivity. More respondents in Asia and Europe ranked higher productivity among the top three benefits than respondents in North America.

Figure 5. Most Important Benefits of MMTC and URLLC

MMTC	URLLC
New Service Enablement	Low Latency
Support for New Applications	Higher Performance
Higher Performance	New Service Enablement

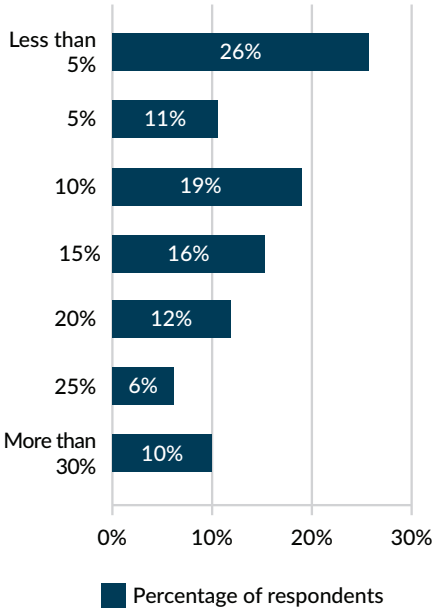
Not surprisingly, respondents said the number one benefit of URLLC by far is low latency, which is followed by higher performance and new service enablement. Other benefits that were also highly rated were lower costs, support for new applications and higher productivity.

There were fewer geographical variations among respondents' views on the benefits of URLLC. Two noteworthy differences were that more respondents in Asia and Europe ranked support for new applications as an important benefit, while the largest proportion of respondents that selected higher productivity were from Asia.

Sizing Up the Industrial 5G Opportunity

There are broad expectations that 5G, as an enabling technology for industrial applications, will contribute to business growth for a wide variety of companies, boost overall mobile industry revenue as well as increase economic activity and GDP for countries across the globe. But just how much growth 5G will deliver is more difficult to pin down.

Figure 6. What percentage of your business growth will be driven by new non-consumer, industrial services based on 5G MMTC or URLLC?

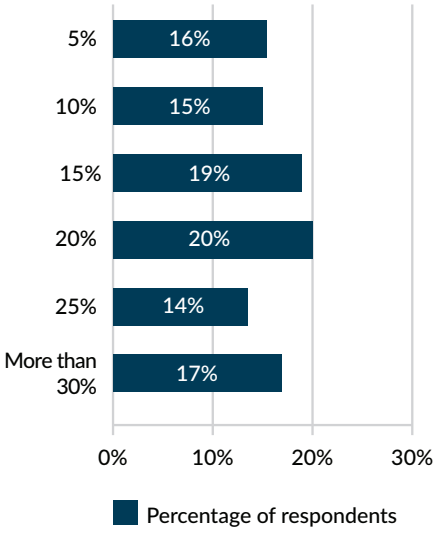


The survey revealed modest expectations for business growth derived from 5G industrial applications. The largest portion of respondents (25.6%) said that new industrial services based on MMTC or URLLC will drive less than 5% growth for their businesses (Figure 6). The next largest portion (19%) said the services will drive 10% growth, and just 10% said new 5G services will drive more than 30% growth.

European respondents were most optimistic about business growth potential as nearly 20% said that 5G industrial services will drive more than 30% growth.

For the mobile industry in general, respondents said that 5G industrial applications will account for a substantial amount of the industry's revenue in future. The largest portion of respondents (39%) are roughly split between industrial 5G apps generating 15% and 20% of total mobile industry revenue in the next five years (Figure 7). The remaining responses are near evenly distributed, with revenue expectations ranging from 5% to more than 30%.

Figure 7. In the next five years, what percentage of mobile industry revenue will be generated by 5G industrial applications?



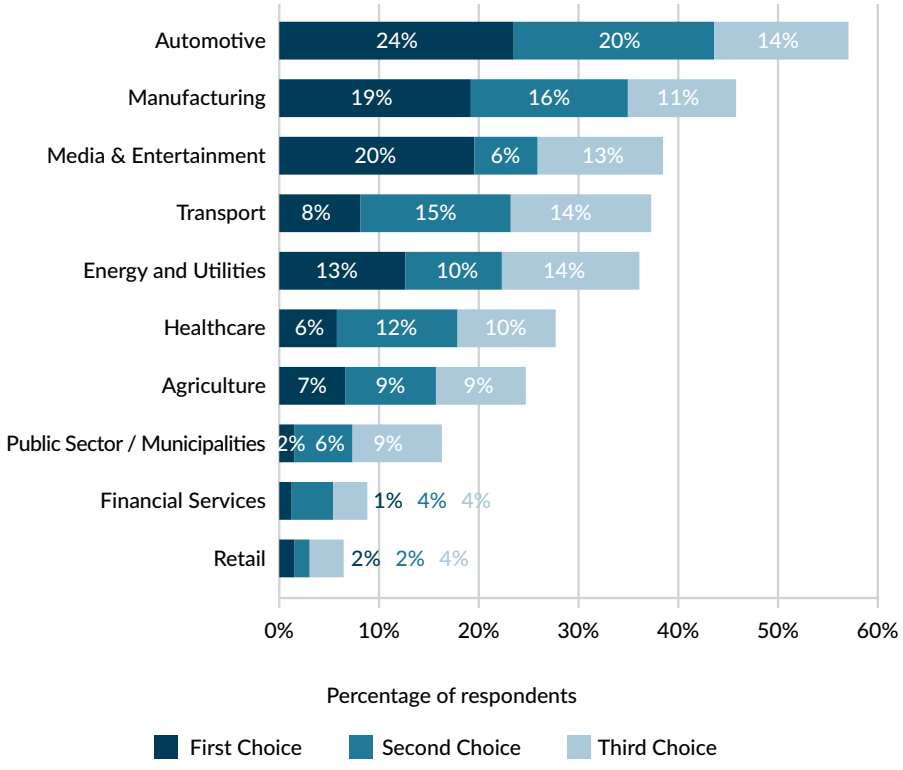
5G technology can be applied to just about any industrial sector, making it difficult for service providers and application developers to prioritize numerous development efforts and customize offerings to suit different business needs. The survey shed some light on which sectors have the biggest opportunities for 5G technology and services.

In the next two years, the industries that will benefit most from 5G are automotive, manufacturing, media and entertainment, transportation and utilities (Figure 8). Most respondents rated these sectors as the first to benefit from 5G because they have the most aggregate demand or because they represent the largest opportunity per deployment in terms of revenue.

Parsing the results from a geographical perspective produced interesting differences among the three main regions. While the automotive sector was ranked highest among all respondents to benefit from 5G in the near term, it was the number one choice for a much higher percentage of respondents from Europe and Asia than from North America.

There were regional differences on views of the manufacturing sector as well. Respondents from Asia and North America were much more enthusiastic about the benefits to this sector than those from Europe. Regarding the media and entertainment sector, a far higher percentage of respondents from Asia said it would benefit most from 5G compared to respondents from Europe and North America.

Figure 8. Which Industries Will Benefit Most from 5G in Next Two Years? [top three choices ranked]



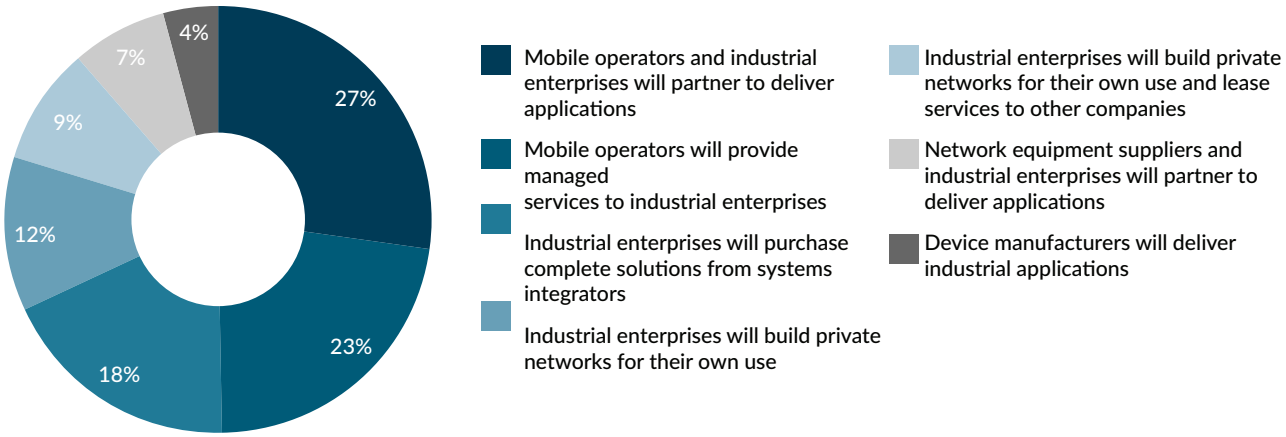
Partnerships are Key to 5G Industrial Business Models

One of the biggest uncertainties surrounding industrial 5G services and applications is the business model. How will services be delivered and who will deliver them? Myriad players are all vying for a role in this potentially lucrative market, including mobile operators, industrial enterprises, systems integrators as well as network equipment suppliers and device manufacturers.

While there are many business model permutations, the survey results suggest that most models will be based on partnerships. More than half of respondents (55%) strongly agree that partnerships between industry and mobile operators are necessary for developing and delivering 5G technology for industrial applications and 29% agree that partnerships are necessary.

When it comes to implementing 5G applications, the largest portion of respondents (27.3%) said that mobile operators and industrial enterprises will partner to deliver services; 22.4% said mobile operators will provide managed services to industrial enterprises; 18% said industrial enterprises will purchase complete solutions from systems integrators; and 11% said that industrial enterprises will build private networks for their own use (Figure 9).

Figure 9. How are 5G industrial applications most likely to be implemented?

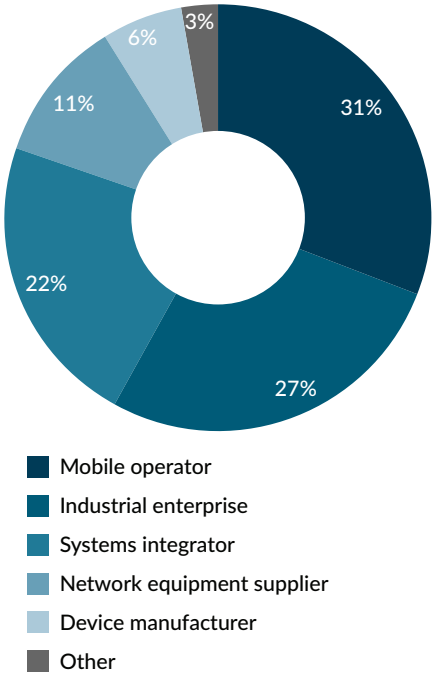


Regional responses to the question of how services are likely to be implemented were mostly in line with the global results. One noteworthy divergence was that more respondents in both Europe and North America (15%) expect enterprises to build private networks for their own use, compared to 6.5% of respondents in Asia.

The survey also sought to reveal what type of companies are likely to emerge as leaders in the 5G industrial market. The results were close as respondents' top choice mobile operators (31%) edged out second choice industrial enterprises (27%), which were followed by systems integrators (22%). The lack of an overwhelming result for a definitive leader here suggests that there are opportunities for many different players at this stage in the market.

Among North American respondents, there was a near three-way tie for the leading company among mobile operators, system integrators and enterprises. In Asia, a slightly higher proportion of respondents (36%) favoured mobile operators while 15% of European respondents said network equipment suppliers would lead in industrial 5G applications.

Figure 10. Which type of company is most likely to lead in delivering 5G-enabled industrial applications?

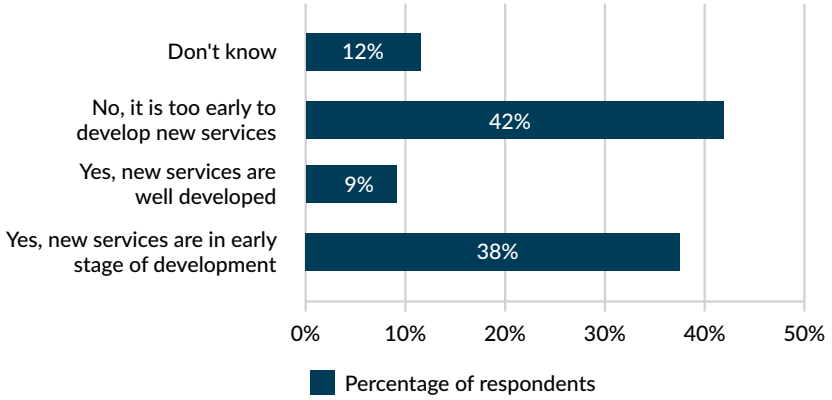


Business Case Uncertainty Persists

While there are high expectations and enthusiasm about the 5G industrial opportunity, the survey also revealed that there are significant challenges to overcome and that the market remains at an early stage of development.

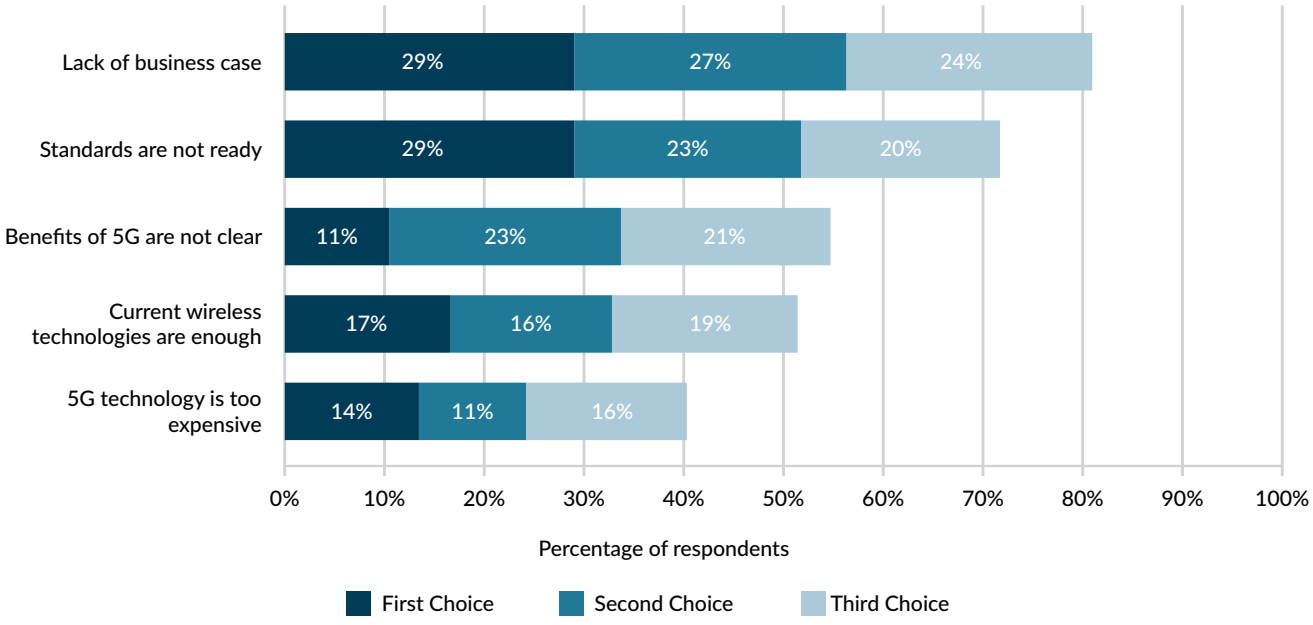
In terms of the industry's progress toward creating new services based on 5G MMTC and URLLC, the largest portion of respondents (42%) say that it is too early to develop new services, while 38% say they are in the early stages of new service development. However, in Asia, the result is flipped – that is, 44% of respondents said services were at an early stage of development and 35% said it is too early. In North America, nearly half of respondent said it was too early to develop services.

Figure 11. Are you currently developing new non-consumer industrial services based on 5G MMTC or URLLC?



Most respondents said that one of the biggest barriers to developing 5G industrial services was lack of business case. This might suggest that such services will take longer than expected to materialize as companies do not yet fully understand the benefits, costs and risks of pursuing industrial 5G applications. But when coupled with the other top challenges – unfinished standards and unclear benefits – the finding rather suggests that the market is still in a very early phase of development.

Figure 12. Biggest Barriers to Adopting 5G Technologies for Industrial Applications [top three choices ranked]



Conclusion

5G-enabled industrial applications and services are broadly expected to boost business growth for the mobile sector as well as for industrial enterprises. To fuel this growth, it is important for mobile operators and industrial enterprises to work together in partnership to understand the use cases and technological requirements that need to be met by 5G. Partnering will also help to address two of the biggest challenges facing the market – that is, the lack of business case and uncertainty about 5G benefits.

While a likely business model for industrial 5G involves mobile operators and industrial enterprises partnering to deliver applications, there are several other options available and all players should be open to exploring new types of relationships among potential customers, suppliers and partners.

It is early days for 5G in vertical industries, but activity will begin to ramp up over the next 12 months as applications and services are developed and standards for MMTC and URLLC use cases are finalized. The sectors to watch are automotive, manufacturing and media and entertainment as these verticals are considered to have the most demand and represent the largest revenue opportunity. The coming months will show how the potential of 5G technology can be turned into business reality for industrial applications.

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