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# Customer Experience Management in 5G

*A Heavy Reading white paper produced in association with*

**accenture**  **VI.AVI**

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## INTRODUCTION

The history of wireless radio communications is marked by generational waves of changing technology, bringing new capabilities and efficiencies to market. Over the next decade, a fifth generation of technology promises to target larger volumes of data transport. It also promises to dramatically expand wireless device use cases into tools that will service society through applications such as smart cities, smart grid, autonomous driving, and massive sensor deployments.

Operators have invested heavily in spectrum and infrastructure to deliver on the service promises of 5G. However, it is their investments in the customer experiences they enable through 5G that will best differentiate their services. Customers want experiences where each interaction is personalized, fast, and user-friendly – and where operators have a unified understanding of their network resources to make real-time adjustments to the customer experiences they want to deliver.

To better understand how operators are approaching 5G and customer experience management, Light Reading and Heavy Reading teamed up with Accenture and VIAVI Solutions to survey wireless service providers on their investment strategies and market expectations. In this report, Heavy Reading presents the results of that survey and examines the experiences operators believe are most worth the investment.

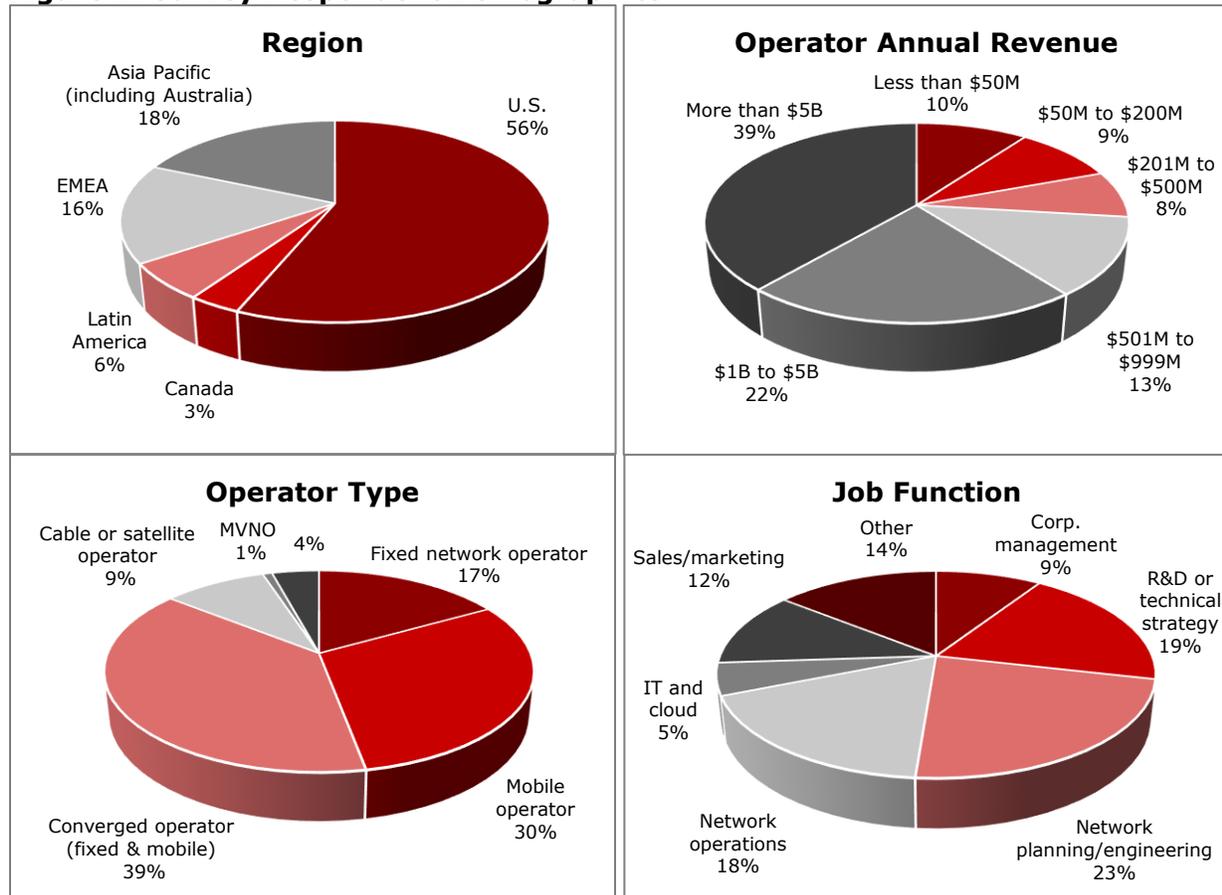
### Key Findings

- More than 94% of respondents will look at 5G for new business-to-business (B2B) growth opportunities, which falls in line with their expectations for network slicing. 44% expect to deploy network slicing within the next 18 months and another 36% expect their companies to deploy slicing sometime in the future.
- Operators are optimistic their target customers will pay more for 5G connectivity. A total of 65% of respondents expect customers will pay more for 5G than they do for 4G connectivity. 25% of them believe it without question, indicating they will “definitely” pay more. Paying more for connectivity also ranked as the leading business model operators expect to pursue in 5G B2B monetization.
- Low latency, higher broadband speeds, and massive connectivity between machines rank as the leading 5G features operators expect will be most valuable to customers. Improvements in efficiency and productivity will be the most recognizable benefit of 5G.
- More than 60% of respondents called out artificial intelligence (AI)-based decision-making and high resolution video as the experiences that will lead 5G’s use cases. At a lower tier, edge compute and immersive experiences through augmented reality/virtual reality (AR/VR) followed as the next leading experiences.
- Customer experience management control systems are how operators tune the experiences they want to deliver, and it is a key component to their ability to compete on factors other than product and price. More than three-quarters of respondents fully expect to make changes to how customer experience management is approached under 5G, leaving less than a quarter saying it will be managed similar to 4G.

## Background to This Study

The online survey was conducted in January 2019 and solicited responses by email invitations to Light Reading’s database of network operators worldwide. After a data cleansing process that removes incomplete, unqualified, or questionable responses, the survey finished with 119 qualified responses.

**Figure 1: Survey Respondent Demographics**



Source: Heavy Reading

The survey group represents a broad mix of geographies. The largest percentage at 59% is based in North America (primarily in the U.S.). The next largest groupings come from Asia Pacific at 18%, Latin America at 6%, and Europe, the Middle East, and Africa (EMEA) at 16%.

A broad mix of company sizes are also represented in the survey group. Nearly 40% (39%) come from Tier 1 operators generating \$5 billion or more in annual revenue. Another 22% come from operators earning between \$1 billion and \$5 billion, while the remaining 41% is from operators producing less than \$1 billion annually.

More than a third (39%) of the respondents work for converged CSPs that operate both fixed and mobile businesses. Mobile-only service providers made up 30% of the base and 17% work for fixed-only providers. The remaining 14% work for other types of CSPs such as mobile virtual network operators (MVNOs) and satellite or cable service providers.

Among the individual respondents, technical roles lead with 42% in engineering, network planning, or R&D positions, followed by network operations at 18%. Sales and marketing roles accounted for 12% of the responding base, and 9% are in corporate management. The remainder are scattered across positions in product management, product marketing, IT, and other roles.

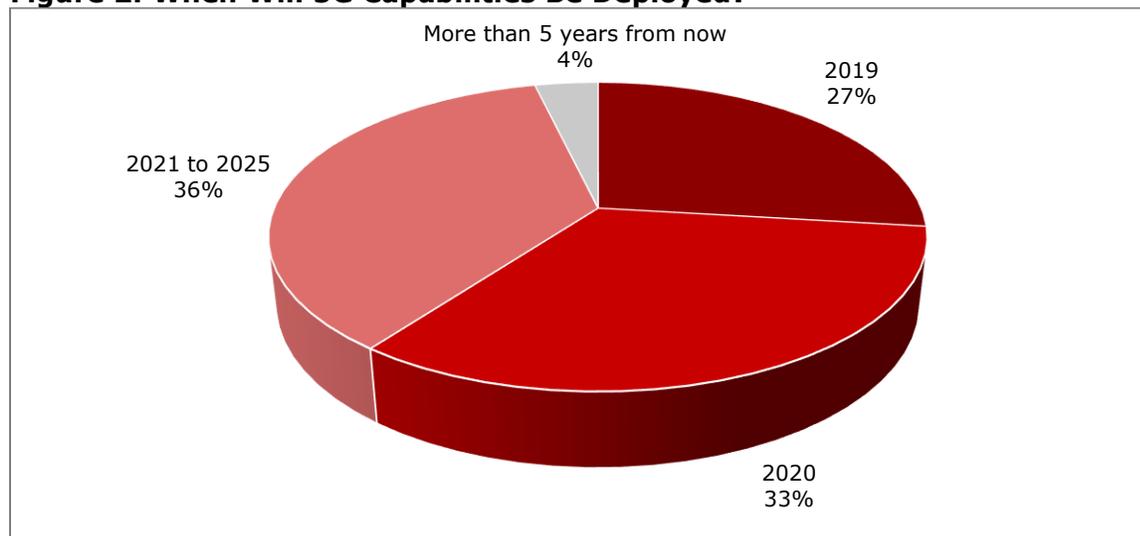
## DEPLOYING 5G

5G is set to have a strong and immediate impact, judging by the speed at which it is captured the imagination of those outside the core mobile sector. It is an industrial development imperative for many governments around the world. While mobile operators are preparing for the generational shift, they are not in a rush to push their Long-Term Evolution (LTE) networks into obsolescence, which raises the question of when and how for 5G. This first section of the survey is focused on the operator timetable, the approaches that will be taken, and the expected challenges to overcome.

### When Will Operators Deploy 5G Capabilities?

5G capabilities are beginning to show up in some regions today, and the related investments and activity will gain momentum in 2019. 60% of the respondents in this survey working for CSPs expect their operators to deploy 5G capabilities over the next 2 years, while 36% expect their timetable to stretch another 2-5 years.

**Figure 2: When Will 5G Capabilities Be Deployed?**



Question: When do you anticipate deploying 5G capabilities? (N=108)

Source: Heavy Reading

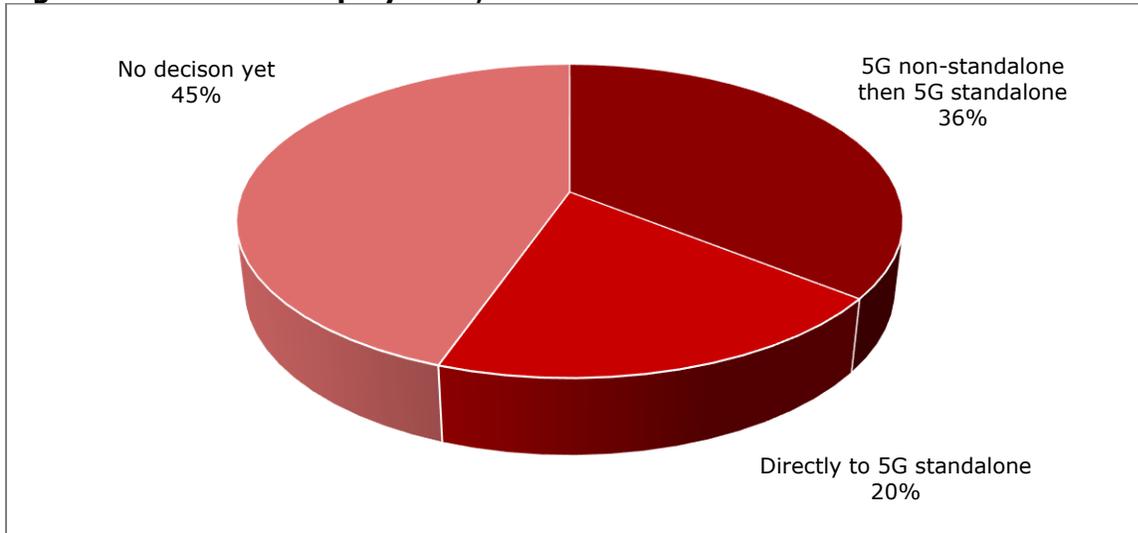
### Standalone or Non-Standalone

Whether operators initially deploy 5G as a NSA or SA network can depend on how quickly their plans were put in place. The initial wave of 5G networks and devices will be classified as NSA, meaning that they will be supported by existing 4G infrastructure. 5G devices will be connected to 5G frequencies for data throughput advances but will continue to use 4G for activities such as connecting to cell towers and servers.

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More than a third of the service provider respondents in this survey are expecting to launch 5G as a NSA network before evolving to SA. These operators can be considered early movers that likely put their plans in place ahead of the 3GPP signing off on the SA standards. However, the approval of the SA standard in June 2018 has created some indecision among nearly half of the responding operators that have not yet committed to a deployment strategy.

**Figure 3: Initial 5G Deployment, Standalone vs. Non-Standalone**



Question: Will you deploy 5G directly on a 5G standalone core network or deploy a 5G non-standalone network first? (N=112)

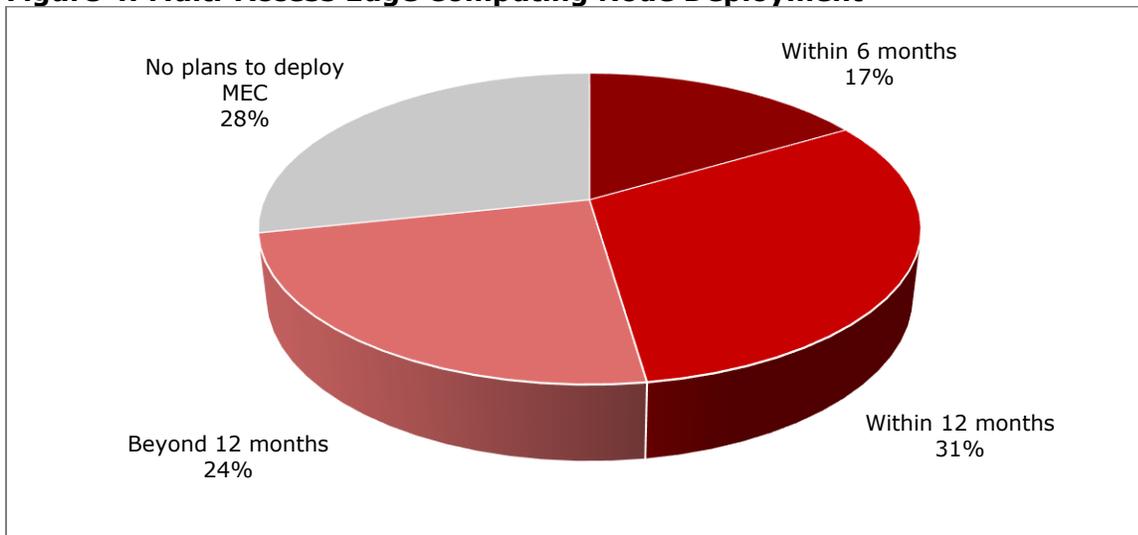
Source: Heavy Reading

### Deploying Multi-Access Edge Computing Nodes

Multi-access edge computing (MEC) nodes, when combined with 5G technology, will be a potent and disruptive force to modern day computing. MEC nodes bring the edge of the network closer to the data center and are a critical technology for the low latency and faster transfer speed promises of 5G. The low latency requirement of as little as 1 ms end-to-end round-trip is what will enable real-time control applications in 5G. Also note that 1 Gbit/s to 10 Gbit/s connections to endpoints in the field represent a throughput threshold that nearly

clears all the historical bottlenecks off the table. Just less than 30% of the survey's respondents have no plans to deploy MEC nodes while almost 48% will deploy during 2019.

**Figure 4: Multi-Access Edge Computing Node Deployment**



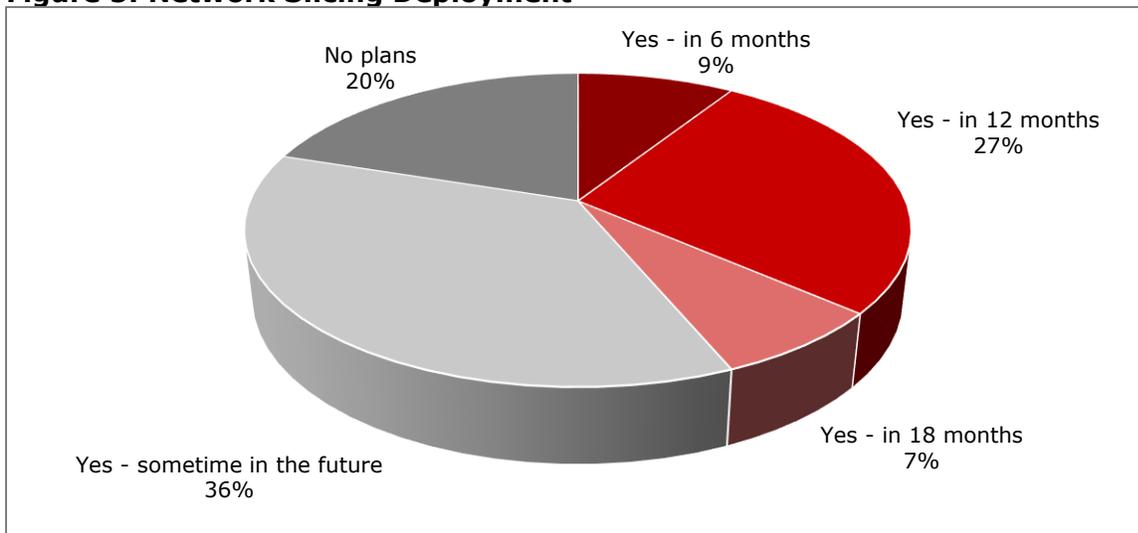
Question: When do you expect to deploy MEC nodes? (N=109)

Source: Heavy Reading

### Planning for Network Slicing

When asked about plans to deploy network slicing, only 20% of respondents indicated their companies have no current plans, while 43% will deploy over the next 18 months. The remainder did not put a timetable for when they will implement network slicing.

**Figure 5: Network Slicing Deployment**



Question: Do you plan to deploy network slicing? (N=110)

Source: Heavy Reading

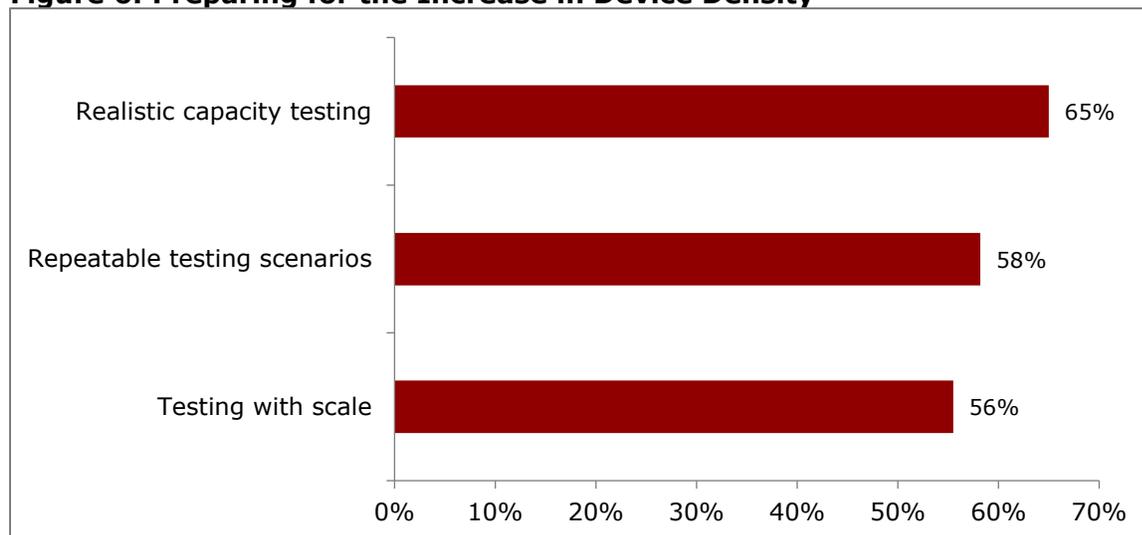
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Telecom networks have a long legacy tail with distributed, proprietary functions running across the networks. Although networks have functioned well with this approach, they have been limited and inflexible. The introduction of network functions virtualization (NFV) and software-defined networking (SDN) is radically changing this architecture and will enable far greater programmability, allowing operators to deploy new applications, reduce component and system complexity, and create slices in the network targeted at specific applications or industries. This will lead to a need for more active and intelligent content distribution and workload management to ensure the resiliency and performance of the network slices, all of which become significantly easier to implement with NFV and SDN.

### Testing for Extreme Device Density

The ambitions and promises of 5G, set out and developed by various mobile industry bodies, are far-reaching and perhaps even a little confused. The blending of aspirations, requirements, and perceptions often leads to definitions that are open to interpretation. However, all do agree that 5G will mean more devices, many more devices, 10x to 100x more devices. Unlike current networks that can become overloaded if there are a large number of devices to be supported, 5G increases the number of devices that can be supported in a given area by a factor of 10x to 100x, creating what is often stated as 1 million devices per square kilometer. The majority of respondents seemingly understand that to best prepare for this new level of density, realistic capacity testing should be at the forefront of their testing scenarios.

**Figure 6: Preparing for the Increase in Device Density**



Question: How will you guarantee the network will cope with the exponential increase of devices? (Select all that apply) (N=119)

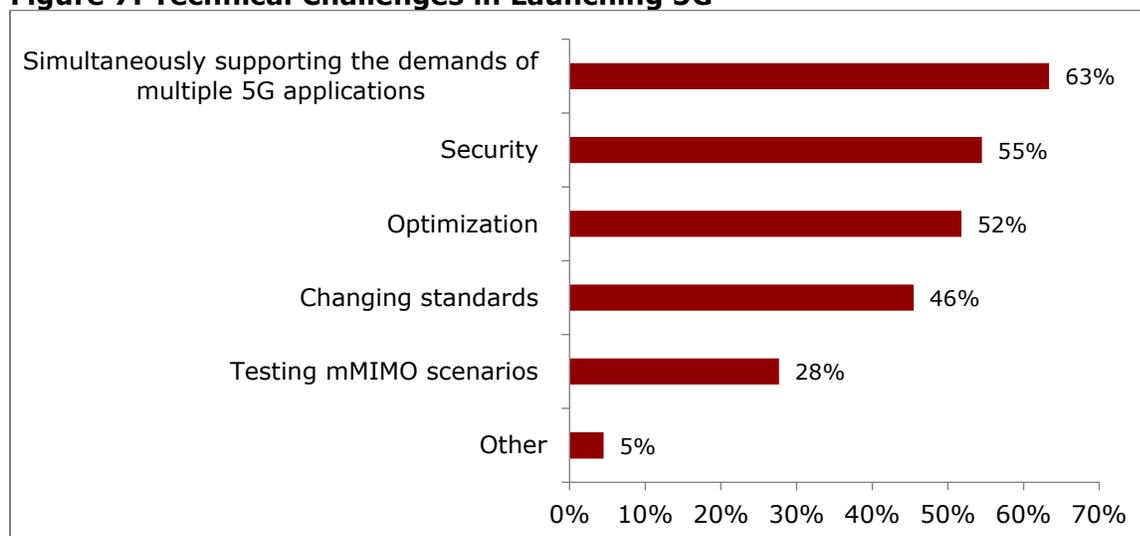
Source: Heavy Reading

### 5G Application Demands Loom as the Leading Technical Challenge

When measuring the technical challenges service providers are most concerned about as they launch 5G, no one challenge stands out. Operators have not yet developed a significant level of comfort with any of the challenges measured in this survey. However, the challenge of supporting multiple 5G applications simultaneously looms heaviest, for clear reasons.

Investment in 5G, as well as 5G's impact, pivots on use cases and applications making use of the underlying connectivity to deliver new levels of performance. 5G will accelerate the switch from non-connected or occasionally connected applications and local services toward always-on, always-sharing cloud applications and services. Speed of response, availability of data, access to analytics, and the ability to aggregate and provide functions and options based on real-time services will all be immeasurably enhanced. From there, add in how network engineers working on 5G are aiming to provide an environment that lays the groundwork for applications not yet envisioned because of today's technical limitations, and it becomes clearer why the application environment tops all challenges.

**Figure 7: Technical Challenges in Launching 5G**



Question: What will be the biggest technical challenges as your company launches 5G? (Select all that apply) (N=119)

Source: Heavy Reading

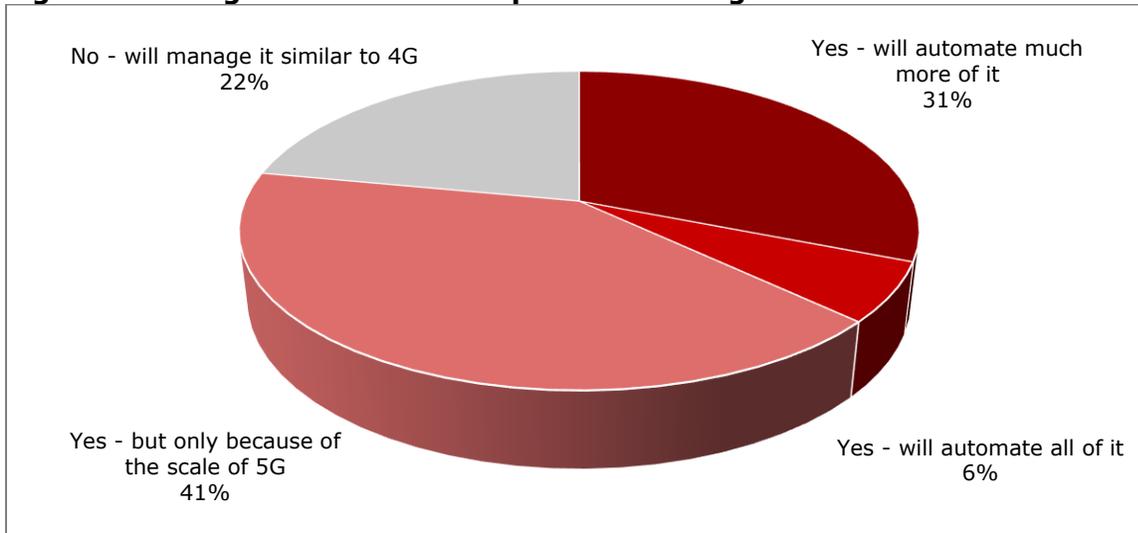
## Customer Experience Management

Most operators recognize it will be too difficult to differentiate on product and price in 5G. They know that making changes to their experience management control systems can lead to the type of compelling experience consumers value. Less than a quarter (22%) of the respondents said customer experience management would remain unchanged in 5G, while the remainder fully expect new systems and approaches to the way they manage the experience they deliver. Nearly a third (31%) said they expect to automate much more of it so that the consumption of network resources can be adjusted in real time to better tune the experience it wants to deliver. Another 41% expect to make changes in customer

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experience management but only because the scale of 5G will require changes to the approach.

**Figure 8: Changes to Customer Experience Management in 5G**



Question: Will customer experience management change in 5G? (N=32)

Source: Heavy Reading

## MONETIZING 5G

This section focuses on the business models operators plan to pursue in monetizing 5G services and what features and benefits they expect will be most recognized and valued by customers.

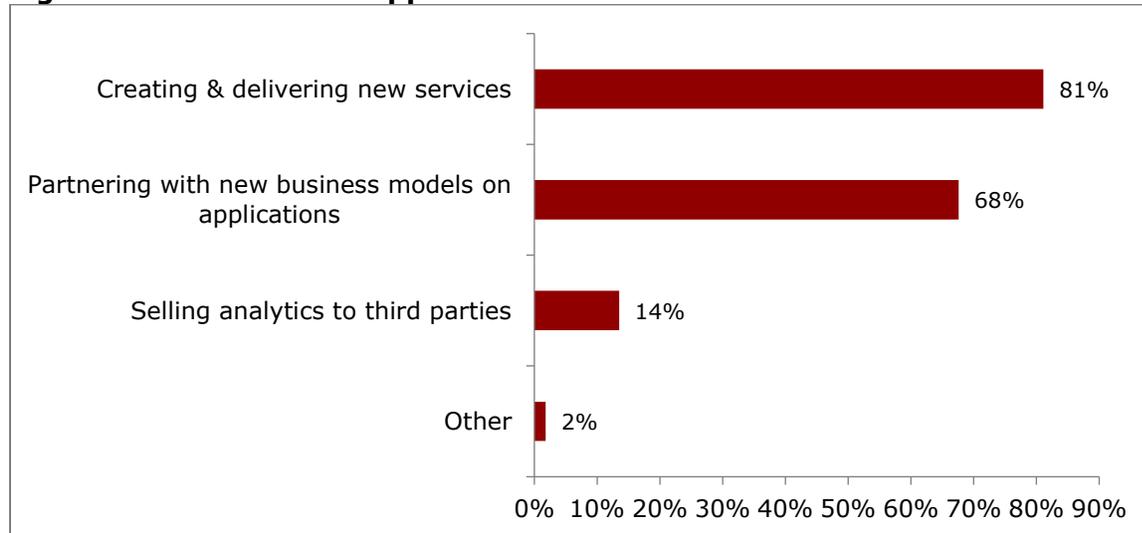
### Newly Created Services Lead New Revenue Interests

New revenue from innovative new services is the target and expectation from most wireless operators investing in 5G. More than 80% of the responding service provider contacts in this survey expect to create brand new revenue streams from services that have not yet been developed. Interestingly, only a small percentage expect to pursue revenue from the analytics that 5G will produce.

Like Internet of Things (IoT), 5G is closely associated with Big Data, with the application of real-time analytics. Billions of permanently connected devices provide a stream of data that can be managed in distributed databases and form the foundation of many innovative new services and applications, as well as revenue from third parties. However, seemingly more appealing are the revenue opportunities from new business models such as the

opportunities for vertical and embedded analytic services that can support decision-making in specialist areas like health management, transport, energy management, etc.

**Figure 9: New Revenue Opportunities to Pursue**



Question: What new revenue opportunities in 5G will your company primarily pursue? (Select two) (N=119)

Source: Heavy Reading

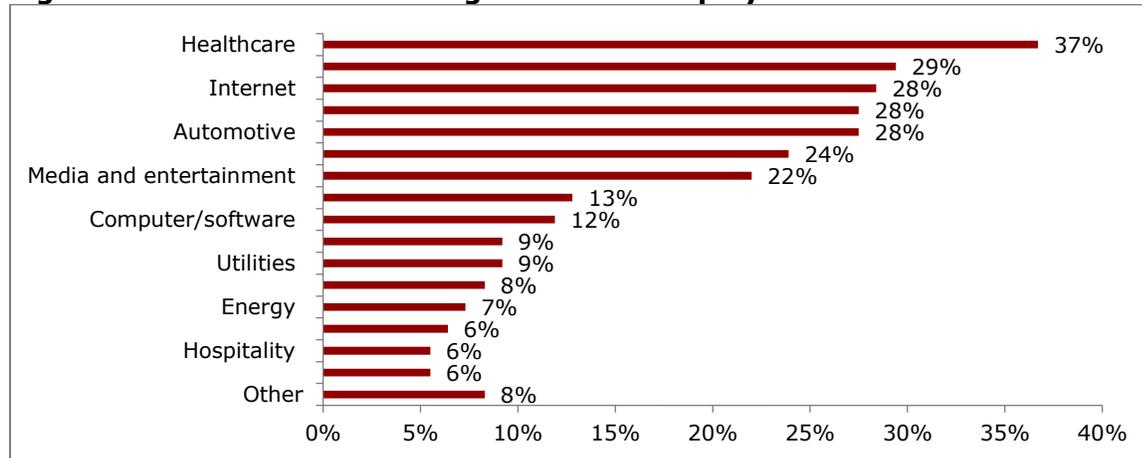
### Leading Industries Targeted

5G requires an investment that will prove to be more significant than what was required in past generations. Operators understand that applications and use cases need to be better identified under 5G to help drive demand. Enterprises may be more focused on IoT than 5G at this time, but they do recognize that 5G will be integral to the industrial internet and will be the trigger to the experiences their applications and services will deliver.

**Figure 10** charts the vertical industries that operators are prioritizing for 5G deployments. There is little surprise that healthcare leads all others by a significant margin. Healthcare systems represent a promising market for 5G. Successful applications will be lucrative as governments face the consequences of aging populations and reducing costs while improving patient care is a fundamental challenge in this industry. The bandwidth and low

latency requirements of tele-medical applications outstrip what is possible under 4G LTE, making healthcare the leading target for operators.

**Figure 10: Industries Most Targeted for 5G Deployments**



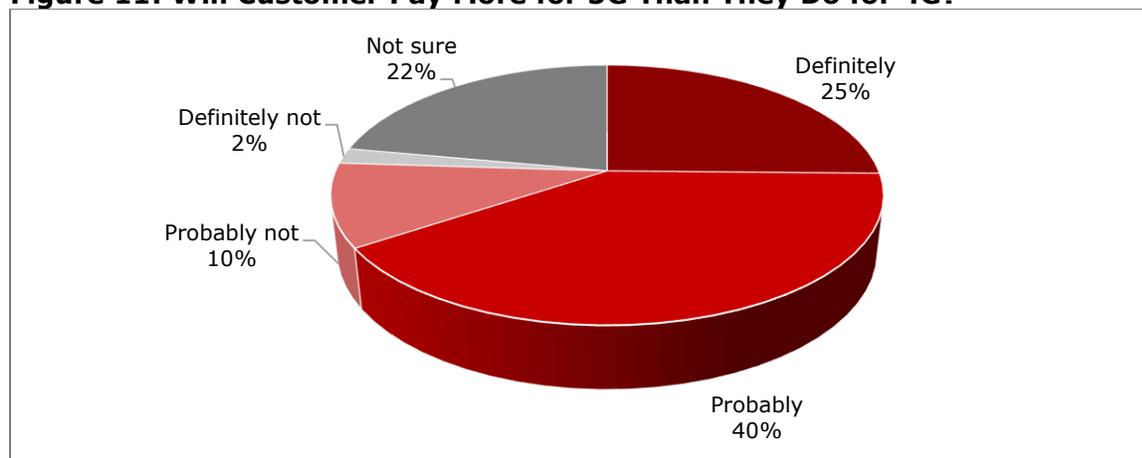
Question: What are the top industries your company is focused on for 5G deployment? (Select three) (N=119)

Source: Heavy Reading

### Business Models for 5G Monetization

Service providers are optimistic that their customers will pay more for 5G connectivity than what they currently pay for 4G infrastructure. A quarter of the respondents fully expect customers to willingly pay higher rates for 5G's enhanced features and another 40% believe their customers will "probably" pay more. These may be high expectations, particularly for a customer base that service providers believe will most value 5G's faster speed over its transformational and mission-critical features. Only 12% of respondents said customers would not be willing to pay more for 5G connectivity.

**Figure 11: Will Customer Pay More for 5G Than They Do for 4G?**



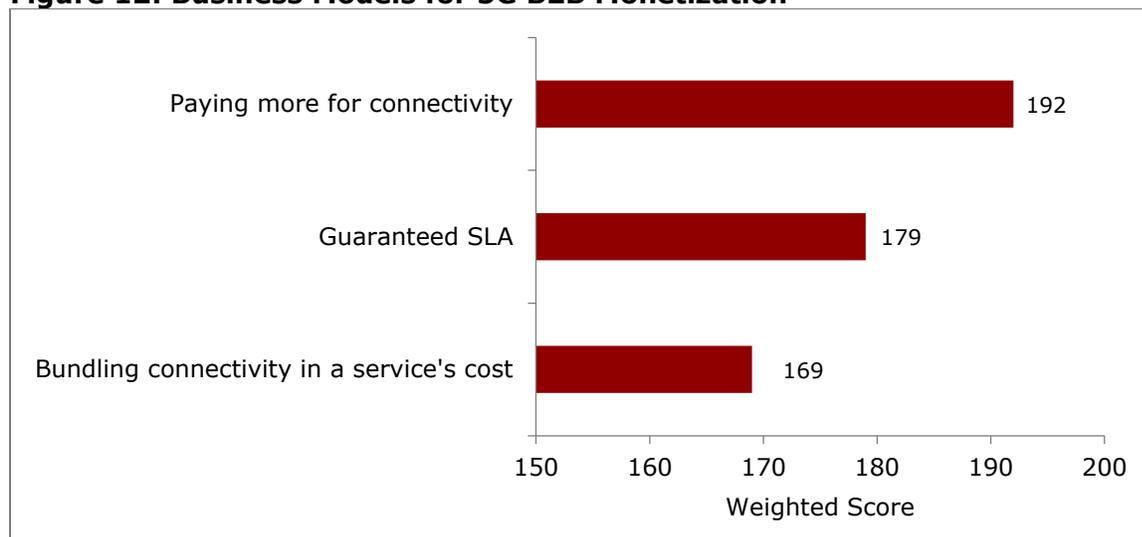
Question: Do you believe your leading target industry will pay more for 5G connectivity than it does for 4G? (N=107)

Source: Heavy Reading

These expectations dovetail with the business models service providers expect to push in monetizing 5G connectivity for B2B services (**Figure 12**). Businesses paying more for connectivity is ranked as the leading model operators expect to pursue, and nearly just as likely is billing for a guaranteed service-level agreement (SLA). Bundling the cost of connectivity with a value-added service was a more distant third model that operators are exploring.

*Note: The following were ranked from highest priority to lowest priority and are presented as a weighted calculation. The score is calculated by assigning a weight to each rating where the highest priority rating holds the highest value, or weight. The weighted scores in the chart are the sum of all the weighted values.*

**Figure 12: Business Models for 5G B2B Monetization**



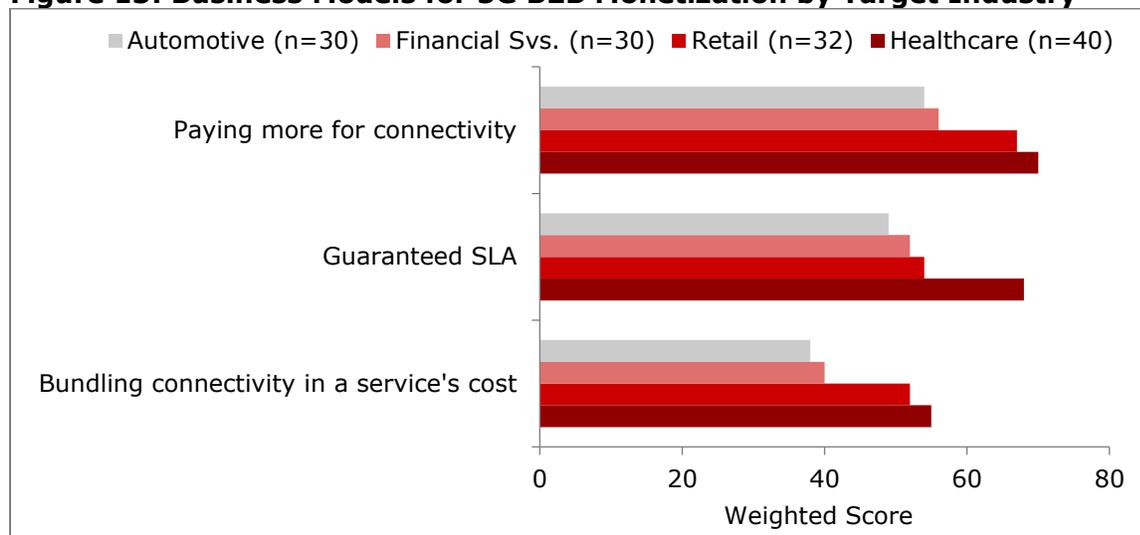
Question: What will be the key business models for 5G B2B monetization in your leading target industry? (Ranked on a 1 to 3 scale where 1 = highest priority and 3 = lowest priority) (Scored as a weighted calculation) (N=119)

Source: Heavy Reading

Different industries can dictate different approaches and business models used by operators. **Figure 13** charts the business model importance by operators that singled out the following industries as their primary target. Paying more for connectivity remains the

leading business model for each. (Because the scores are the sum of weighted ratings, the magnitude of the bars directly relates to the number of respondents by industry.)

**Figure 13: Business Models for 5G B2B Monetization by Target Industry**



Question: What will be the key business models for 5G B2B monetization in your leading target industry? (Ranked on a 1 to 3 scale where 1 = highest priority and 3 = lowest priority) (Scored as a weighted calculation)

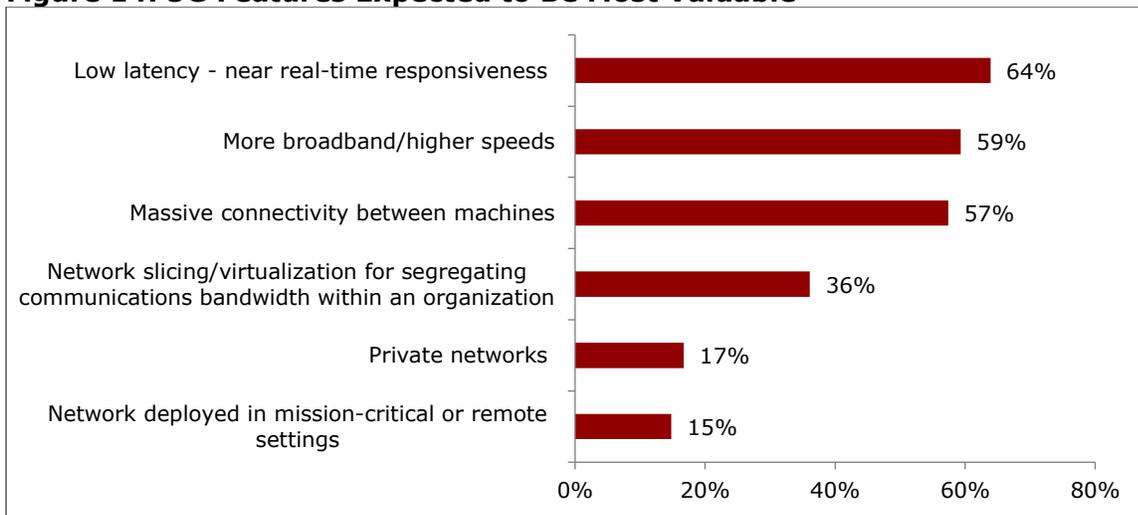
Source: Heavy Reading

### Most Valuable 5G Features

More bandwidth and faster speeds are what service providers expect will be the most valuable features of 5G to their target industry customers. Almost two-thirds indicated 5G's low latency promise would be among the most valuable, if not most recognizable feature, while 59% pointed to 5G's increased bandwidth as its most impactful feature.

5G is the first wireless network generation to address a business problem first, as opposed to previous generations that added to and improved on the wireless capabilities of the generation before it. Thus, it is understandable that operators expect the speeds of 5G to be the most distinguishing feature for their target industry customers. 5G intends to digitize the world and enable an environment where everyone and everything is digitally connected. As solutions and experiences mature, other features such as massive connectivity between machines (57%) and network slicing for segregating communications (36%) will increase in value to the customer.

**Figure 14: 5G Features Expected to Be Most Valuable**



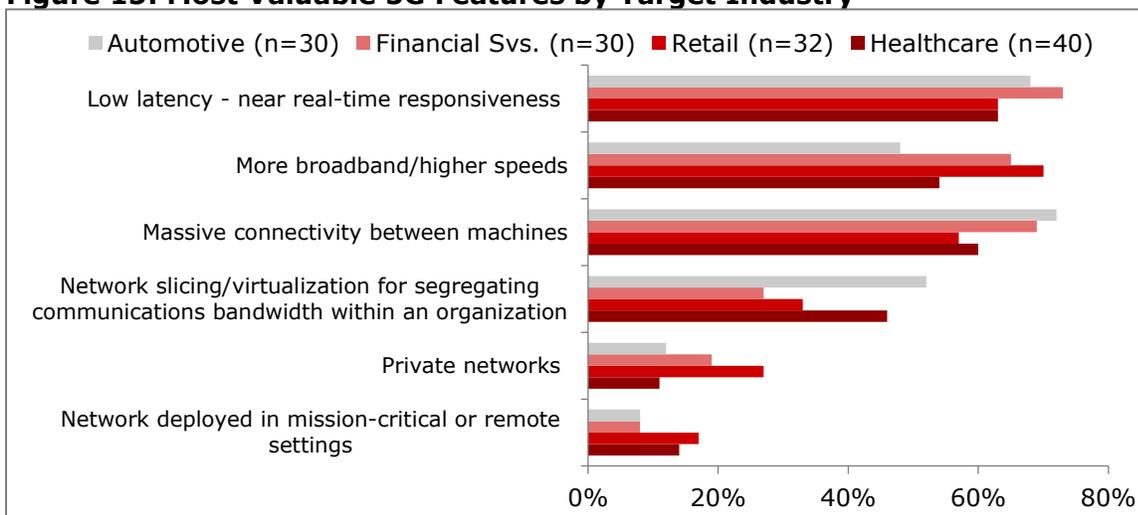
Question: 5G has several features that distinguish it from previous telecommunications generations. Please select the top features most valuable to your leading target industry. (Select three) (N=119)

Source: Heavy Reading

### Most Valuable Features of 5G by Target Industry

A view into the four industries leading as targets for the operators responding to this survey show a level of consistency in the features that will be most valuable. Low latency is the experience each industry is expected to value most, and the high scores for massive connectivity between machines shows operators well understand the IoT priorities of these industries.

**Figure 15: Most Valuable 5G Features by Target Industry**



Question: 5G has several features that distinguish it from previous telecommunications generations. Please select the top features most valuable to your leading target industry. (Select three)

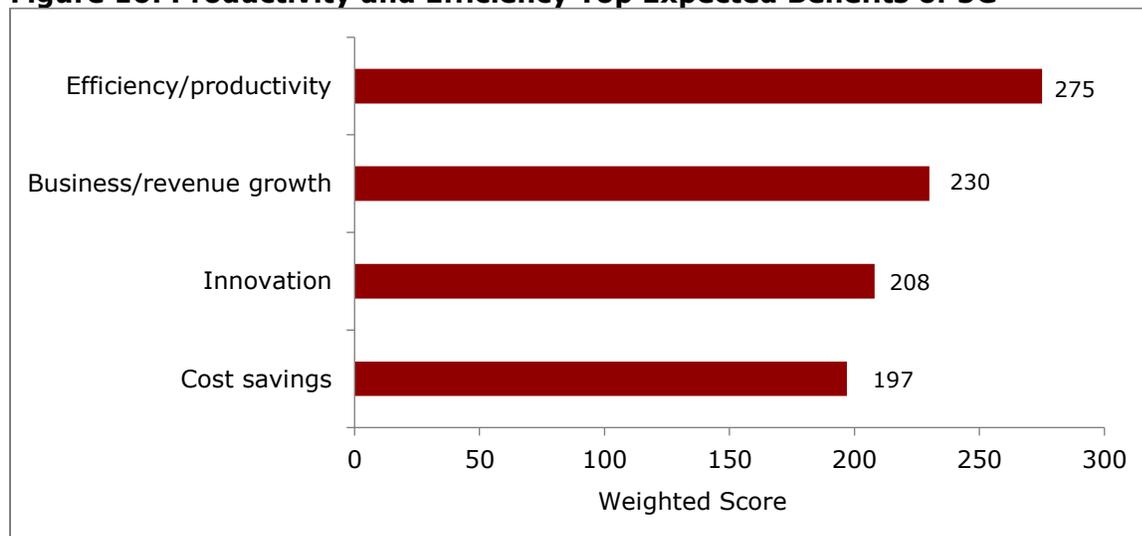
Source: Heavy Reading

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## Benefits of 5G to Customers

Much of the excitement around 5G comes from what it will make possible, from person-to-person high definition video and driverless vehicles to embedded devices reporting health and location. However, it is the overall efficiency in how workers will complete their tasks and the productivity boost from new efficiency levels that will be the most beneficial (and likely, most recognizable) impact of 5G connectivity, according to the service providers surveyed. Business and revenue growth closely follow as another primary benefit operators expect their customers to develop from high bandwidth connectivity, while cost savings is ranked last or as least beneficial.

**Figure 16: Productivity and Efficiency Top Expected Benefits of 5G**



Question: What will be the primary benefit of the features of 5G to your target industry? (Ranked on a 1 to 4 scale where 1 = most beneficial and 4 = least beneficial) (Scored as a weighted calculation) (Select three) (N=119)

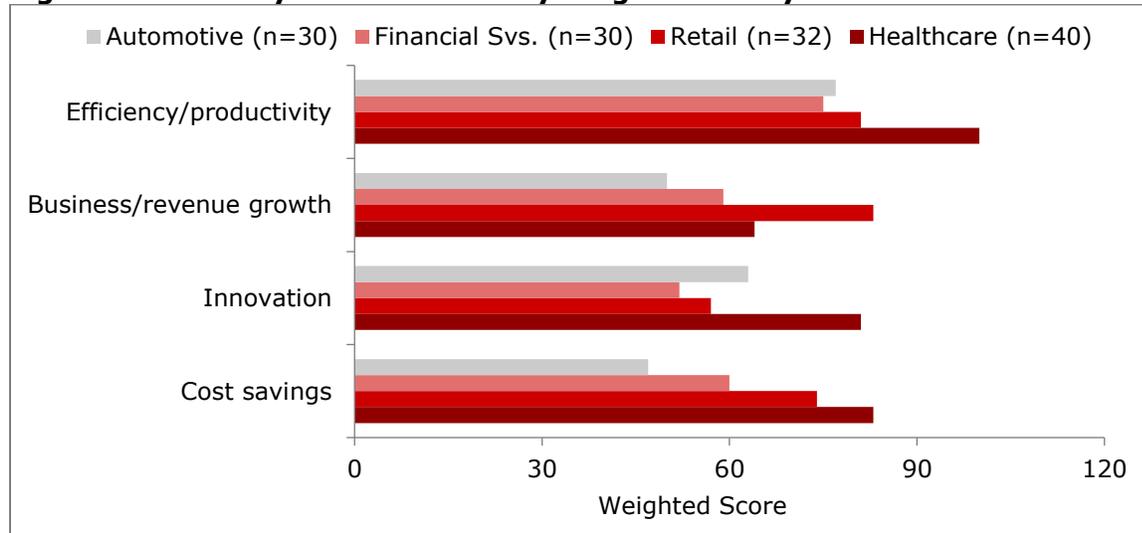
Source: *Heavy Reading*

## Benefits of 5G to Customers by Target Industry

The order of importance only shifts slightly when viewed by specific industry, which suggests that operators believe they have strong handle on what the leading benefits of 5G

will ultimately be. (Again, the scores are the sum of weighted ratings, which means the magnitude of the bars directly relates to the number of respondents by industry.)

**Figure 17: Primary Benefits of 5G by Target Industry**



Question: What will be the primary benefit of the features of 5G to your target industry? (Ranked on a 1 to 4 scale where 1 = most beneficial and 4 = least beneficial) (Scored as a weighted calculation) (Select three)

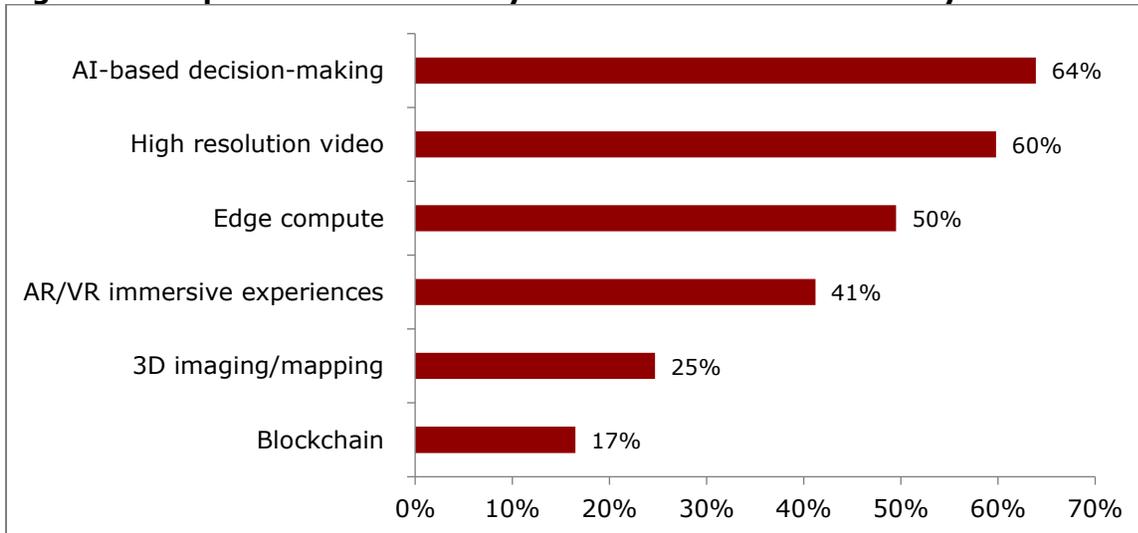
Source: Heavy Reading

### Experiences Molded by 5G

5G is very different from previous generations of wireless connectivity – and the experiences it enables will be, as well. Where previous generations extended mobile voice through to mobile broadband, 5G will support converged communications and computing and will extend across public networks and devices to where information and computing power will be instantaneously available. That level of capability and power will stimulate a surge of new and innovative services and applications, and demand for IT will increase. It is not yet clear if 5G will usher in a transformative wave of IT development in the same way that desktop computing or the internet did. However, previous improvements in the

availability and price of connectivity have led to massive leaps in demand for processing and created a virtuous circle of innovation and value.

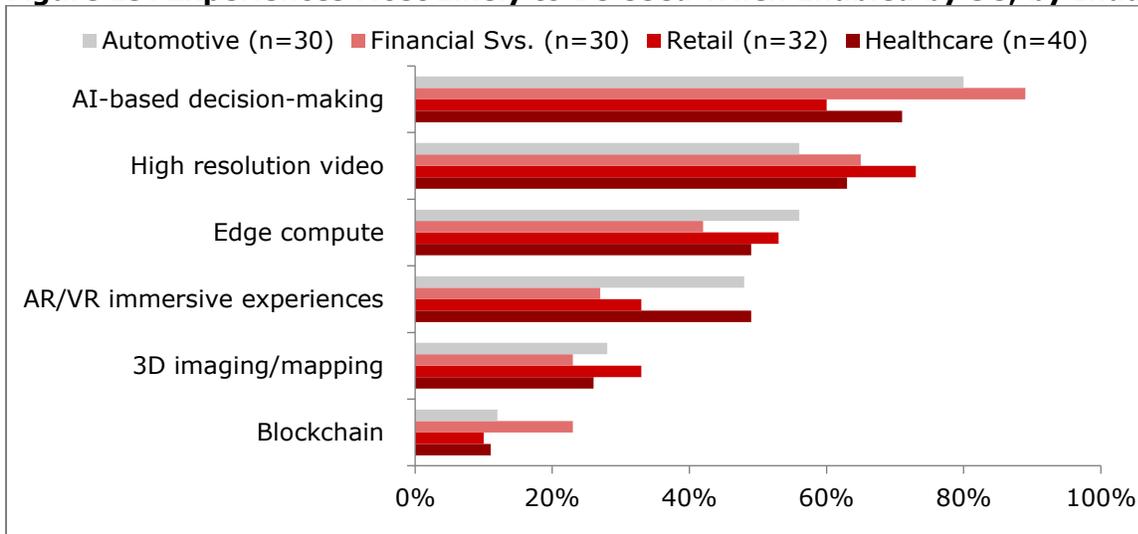
**Figure 18: Experiences Most Likely to Be Used When Enabled by 5G**



Question: What experiences will your target industry use if enabled by 5G? (Select up to three) (N=119)

Source: Heavy Reading

**Figure 19: Experiences Most Likely to Be Used When Enabled by 5G, by Industry**



Question: What experiences will your target industry use if enabled by 5G? (Select up to three)

Source: Heavy Reading

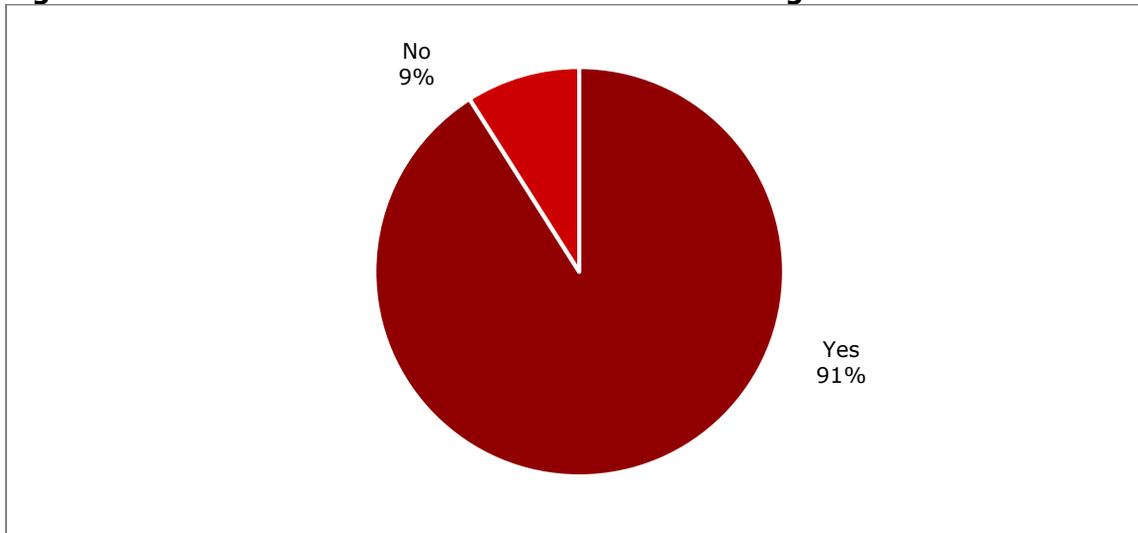
### More Bandwidth and Real-Time Response Speeds Expected to Boost Productivity

One of the final questions in the survey asked if users will be more productive if the mobile experience under 5G is faster with lower latency. No surprise that a resounding 91% said

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yes, but more interesting were the open-text responses on why operators believe an improved mobile experience leads to more productive workers.

**Figure 20: Will Users Be More Productive When Using 5G?**



Question: If mobile connectivity is faster, with lower latency, will users in your target industry be more productive? (N=119)

Source: Heavy Reading

### Most Interesting Responses

Perhaps slightly more interesting is that open-text answers typically generate weak responses in surveys, but in this case, every respondent entered an opinion. Many shared the opinion that faster speeds lead to more efficient experience and faster decision-making, while others detailed more specifics behind the productivity boost. The more interesting responses are listed in the next section.

The following are the more noteworthy open-text responses from CSPs on why they believe users will be more productive with 5G mobile connectivity:

- Near real-time response allows faster actions within internal processes
- The ability to use applications that were not acceptable on the prior technology
- Improved application performance
- Leveraging cloud services more efficiently in an over-the-top (OTT) environment
- Health Insurance Portability and Accountability Act (HIPAA) compliance built into infrastructure means faster and more secure app development
- Improving their business process
- Application innovation
- Better collaboration on the go
- Customers will be able to connect many more devices and sensors to the network
- Service personalization

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- Lower latency for applications means lower investment costs after the initial capital outlay to get on to 5G
  - Automation and remote instrumentation become more feasible
  - Workers can communicate more efficiently with geographically diverse teams
  - Accessing all data on the go, regardless of its volume
  - Customers can manage their things more accurately with the higher data rate speed
  - Better speed results in more effective way of working
  - Richer user interfaces because of higher throughput speeds will lead to more productivity
  - Process data in near real time compared to 4G
  - Speed equals productivity

## CONCLUSION

5G will transform customer experiences on numerous levels. All involved, whether on the consumption or equipment side, application or services side, are preparing for dramatic changes.

The excitement around 5G revolves around three primary advances: its ability to support real-time interactions and low latency, the massive density it will support, and the speed it will achieve. All of these were aptly identified as the most valuable features of 5G in this survey. Together, these capabilities will enable activities across the network that were never feasible before, such as streaming 8K ultra high definition video and autonomous driving. They will also reset users' expectations for what could be possible.

For operators, their experience in running and monetizing a network will also change. Use cases and applications will be what drives traffic and the business models, which is not a familiar position for most operators. Most have not been proactive in exploiting the capabilities of their networks at the application level and have been repeatedly outmaneuvered by OTT companies.

Operators will also need to adapt to a customer base that has grown accustomed to paying just a few cents for a service, which means operators will need to find value in many new ways. They will need visibility of their entire network end-to-end and will require new technologies to deliver the customer experience quality users will demand.

Changes will be so dramatic and far-reaching that no two operators will view the opportunities and threats in the same way. Many will embrace 5G as a revolutionary change in technology and business models. Others that have heavily invested in SDN controllers to give customers some bandwidth control in their 4G networks may view the path to 5G as more evolutionary. These operators may consider 5G a boost to their ability to deliver the right service with the right experience at exactly the right time.