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Deploying 5G Private Networks: Timeline, Segments, and Strategies

A Heavy Reading white paper produced for QCT and Intel



AUTHOR: JIM HODGES, RESEARCH DIRECTOR, HEAVY READING

INTRODUCTION

As communications service providers (CSPs) continue to scale their investments in 5G technology, they are also focusing on how to monetize the emerging services and business models for their residential and enterprise customers. One service that is gaining considerable momentum is the ability to use 5G to create high performance programmable private networks.

From an enterprise perspective, 5G private networks are highly desirable because they can be architected to meet the unique technical performance levels that individual enterprises require. There are essentially two deployment options. In the first option, the enterprise builds the private network itself with limited—if any—CSP support. This approach, which is typically chosen only by the largest enterprises, is very complex since it requires the enterprise to manage complex technical and spectrum requirements with preferred vendor partners.

In the second option, the CSP builds and manages the 5G private network for the enterprise client, which greatly simplifies network build, administration, and even security policy enforcement. While this option can be applied to even the largest enterprise customers, it is optimally suited to small and medium business enterprises that have strict performance demands but limited in-house resources to build, manage, and take corrective network action.

To understand the momentum and drivers of this second option, Heavy Reading jointly developed with QCT an online custom survey designed to take the pulse of CSP-built 5G private networks in three regions: North America, Europe, the Middle East, and Africa (EMEA), and Asia Pacific. This white paper presents and analyzes the results of the survey.

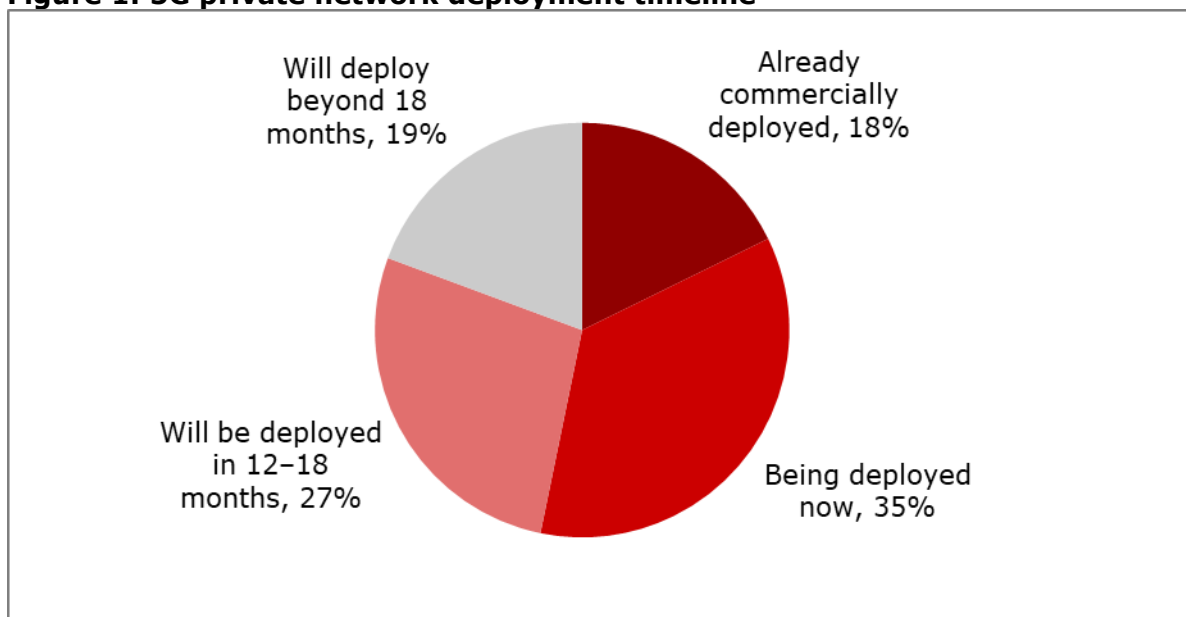
DEPLOYING 5G PRIVATE NETWORKS

The first topic to be addressed in the survey was the timeline for deploying 5G private networks. As shown in **Figure 1** below, the CSPs Heavy Reading surveyed are proposing an aggressive deployment schedule, with 18% claiming to have already deployed some form of 5G private network commercially.

The remainder of respondents are either currently deploying (35%), plan to deploy in 12–18 months (27%), or will deploy sometime after 18 months (19%). It is important to note that only CSPs committed to deploying 5G private networks were invited to take this survey.

The only logical conclusion from this timeline is that CSPs view the deployment of 5G private networks as a priority.

Figure 1: 5G private network deployment timeline



Question: What is the status of your 5G private network deployment? (n=62)

Source: Heavy Reading

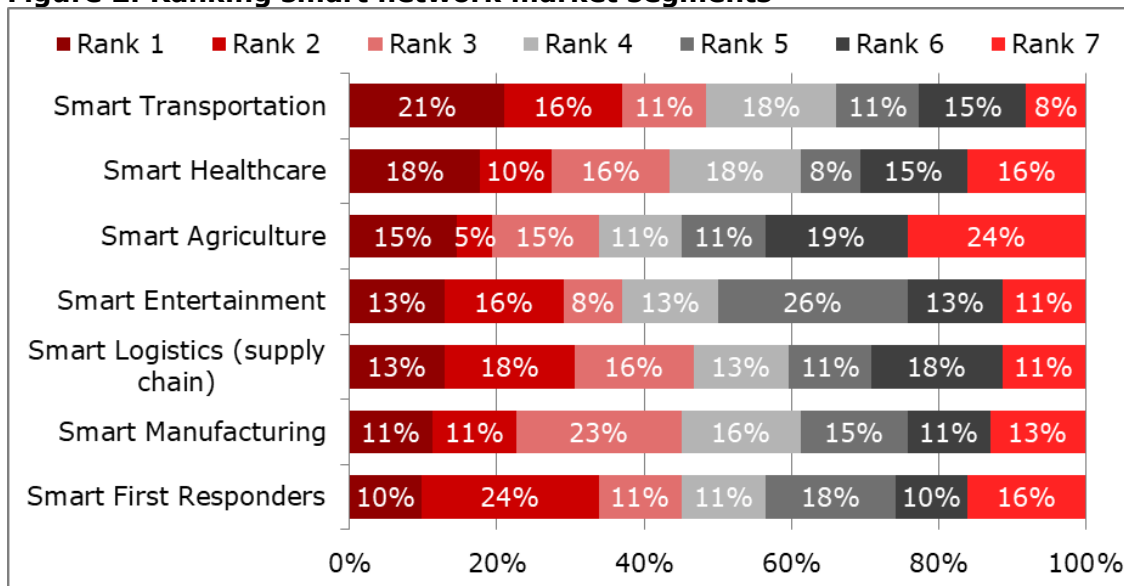
Heavy Reading believes that one of the key factors driving this aggressive deployment schedule is that 5G private networks are extremely well suited foundationally to supporting a broad realm of complex enterprise services.

This is because 5G as a cloud technology can seamlessly offer greater scale both on a network and device level without compromising the ability to support ultra-low latency services that segments such as smart manufacturing demand.

These segments are referred to as smart segments since their evolution path is being reshaped by the need to leverage the additional intelligence inherent with the introduction of automation, robotics, and analytics to make their businesses more efficient. Since 5G is also driving CSP adoption of automation and analytics, the match between CSPs and enterprises on a business level is now more symbiotic than ever.

As **Figure 2** below illustrates, CSPs are engaging enterprise customers in all possible segments, with the smart transportation (21%), smart healthcare (18%), and smart agriculture (15%) segments leading the business opportunity discussion based on “rank 1” levels.

Figure 2: Ranking smart network market segments



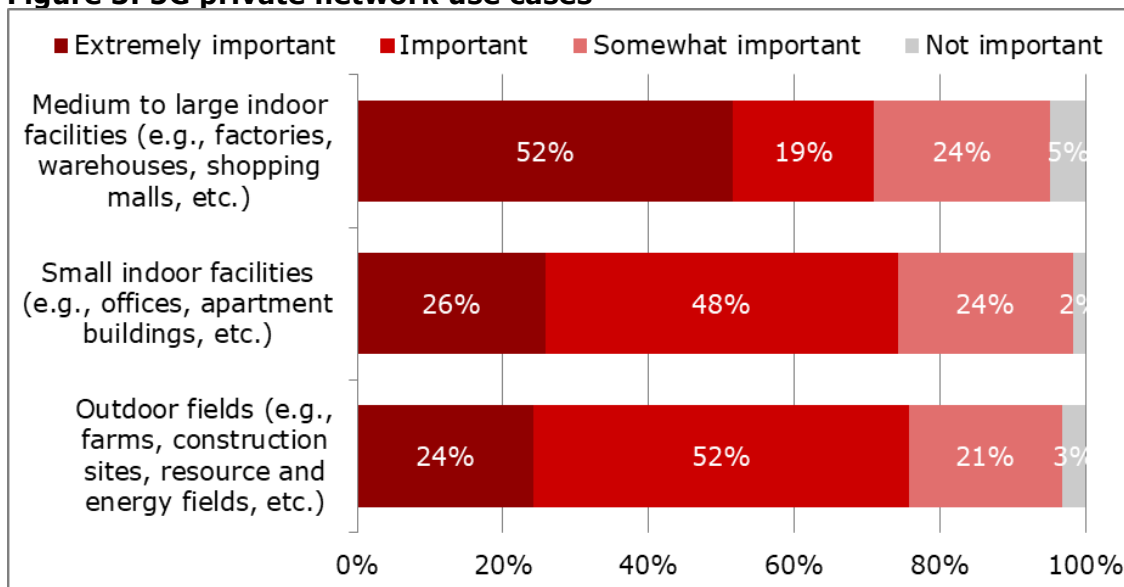
Question: Please rank the following “smart” market segments on a scale of 1 to 7, where 1 is the greatest 5G business opportunity. (n=62)

Source: Heavy Reading

In theory, the value propositions associated with automation, robotics, and analytics should have the greatest impact in the largest, most complex enterprise manufacturing or service delivery complexes.

This reality is confirmed in **Figure 3** by the 52% of CSPs that selected medium to large indoor facilities as the “extremely important” use case.

Figure 3: 5G private network use cases



Question: How important are the following use cases to your private 5G network deployment? (n=62)

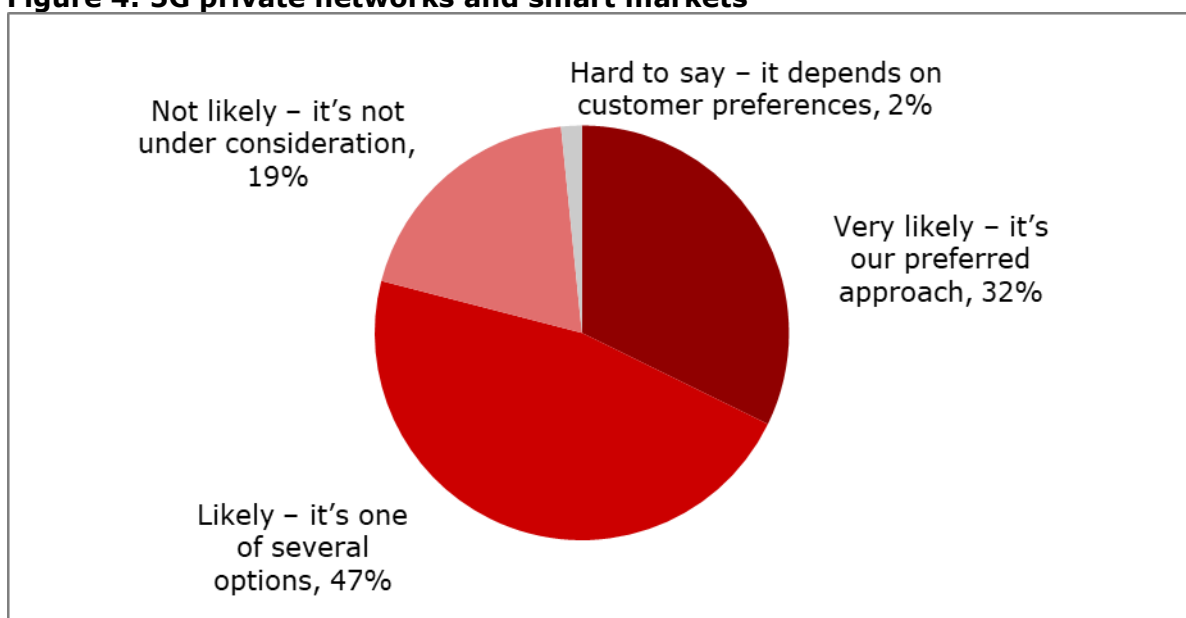
Source: Heavy Reading

5G private networks are gaining momentum as the technology underpinning these smart market segments. However, it is important to note that CSP-managed 5G private networks are not the only technology option available in a world where other wireless technologies such as LTE and Wi-Fi have already been deployed at scale.

Still, as illustrated in **Figure 4**, when Heavy Reading asked CSPs if they planned to use a 5G private network for these smart segment industries, only 19% indicated that it was *not* under consideration.

In contrast, the two largest groups representing 79% of total responses aligned with the “likely to use” option (47%) or “very likely” preferred approach (32%) options. These results confirm that 5G private networks have gained considerable market momentum.

Figure 4: 5G private networks and smart markets



Question: How likely are you to utilize a 5G private network architecture to support “smart” market segment services? (n=62)

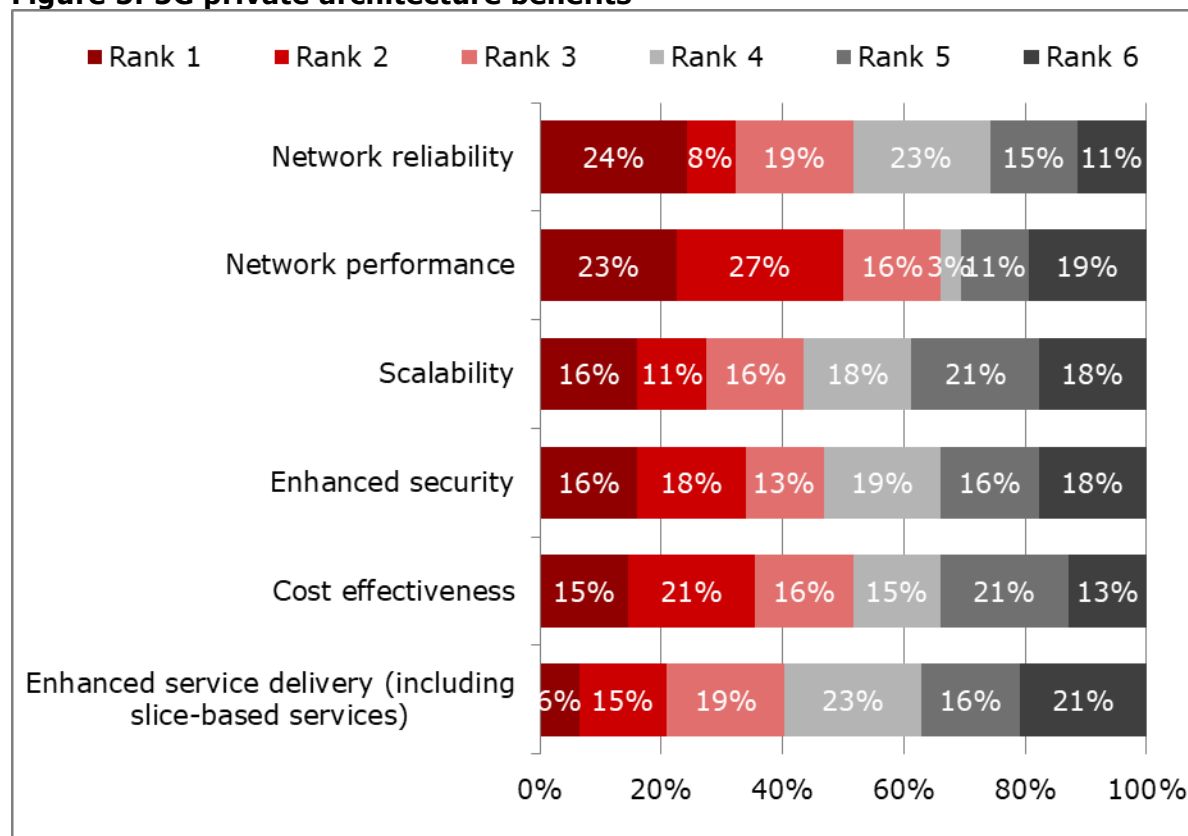
Source: Heavy Reading

Understanding the factors fueling the interest in the deployment of a 5G private network architecture was also within the research scope. As illustrated in **Figure 5** below, there are numerous contributing factors in the mix.

Of these, based on the number of “rank 1” inputs, the top three considerations span network reliability (24%), network performance (23%), and scalability and enhanced security (both 16%).

Heavy Reading interprets this data as verifying that CSPs believe they can sell private networks to their enterprise customers through a focus on their traditional network services strengths—reliability, performance, and security.

Figure 5: 5G private architecture benefits



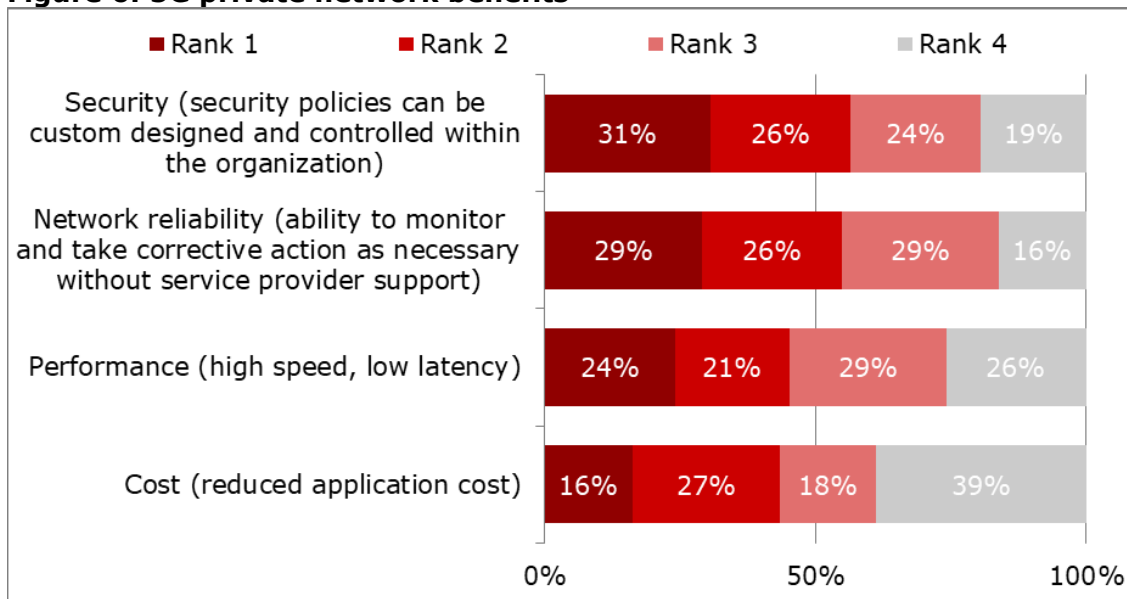
Question: Please rank the following benefits associated with deploying a 5G private architecture on a scale of 1 to 6, where 1 is most important. (n=62)

Source: Heavy Reading

It was expected that reliability would be a key consideration in CSPs’ 5G private architecture plans because it reflects their customer and regulatory obligations to provide customers with highly available services. The next question in the survey investigated the relationship of reliability with the other foundational architecture benefit requirements—security and performance.

As **Figure 6** below captures, based on “rank 1” responses, in a closely packed data range, security attained the highest score (31%), followed by network reliability (29%) and performance (24%). While this confirms that all three remain very important considerations, it does highlight just how important the benefits associated with securing private networks have become.

Figure 6: 5G private network benefits



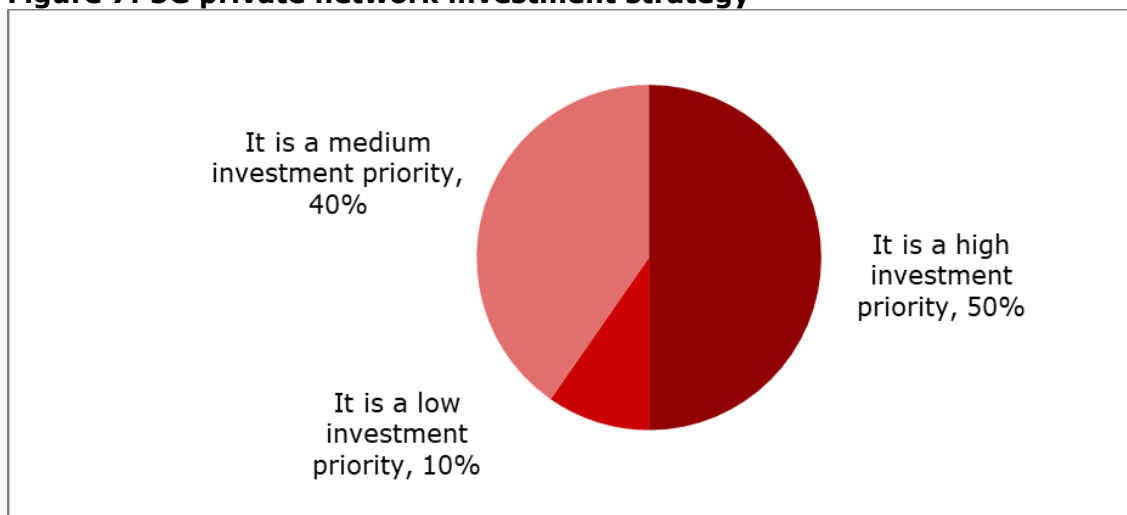
Question: Please rank the following benefits of implementing a private 5G network on a scale of 1 to 4, where 1 is most important and 4 is the least important. (n=62)

Source: Heavy Reading

CSP interest in the 5G private network on a technical level also affects its standing as an investment strategy priority. This impact is definitively documented in **Figure 7** below, which captures that 9 out of 10 CSPs are assessing 5G private network investment as either a “high” (50%) or “medium” (40%) investment priority.

Based on these metrics, including the small percentage of CSPs (10%) that assessed 5G private network investment as a low priority, it is clear that a majority of CSPs categorize investment in 5G private networks as a strategic imperative.

Figure 7: 5G private network investment strategy



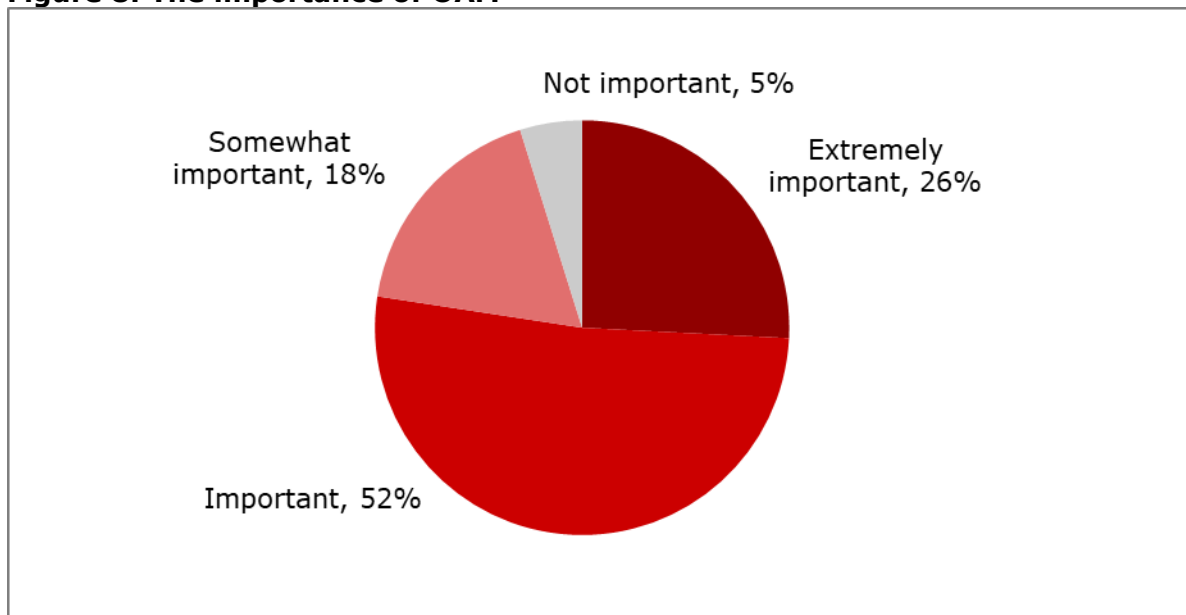
Question: Which best describes your 5G private network investment strategy? (n=62)

Source: Heavy Reading

One of the architecture decisions associated with deploying CSP-managed 5G private networks for enterprise customers is whether to deploy operations administration and maintenance (OAM) processes and functions or to not deploy a complete OAM system to simplify implementation.

While the path taken in large part will be affected by enterprise customer preferences and network complexity, as **Figure 8** below illustrates, 78% of CSPs believe it is either “important” (52%) or “extremely important” (26%). These results confirm that CSPs feel that OAM systems have a significant role to play in 5G private network deployments.

Figure 8: The importance of OAM



Question: How important is it for your 5G private network to support an operations administration and management (OAM) system? (n=62)

Source: Heavy Reading

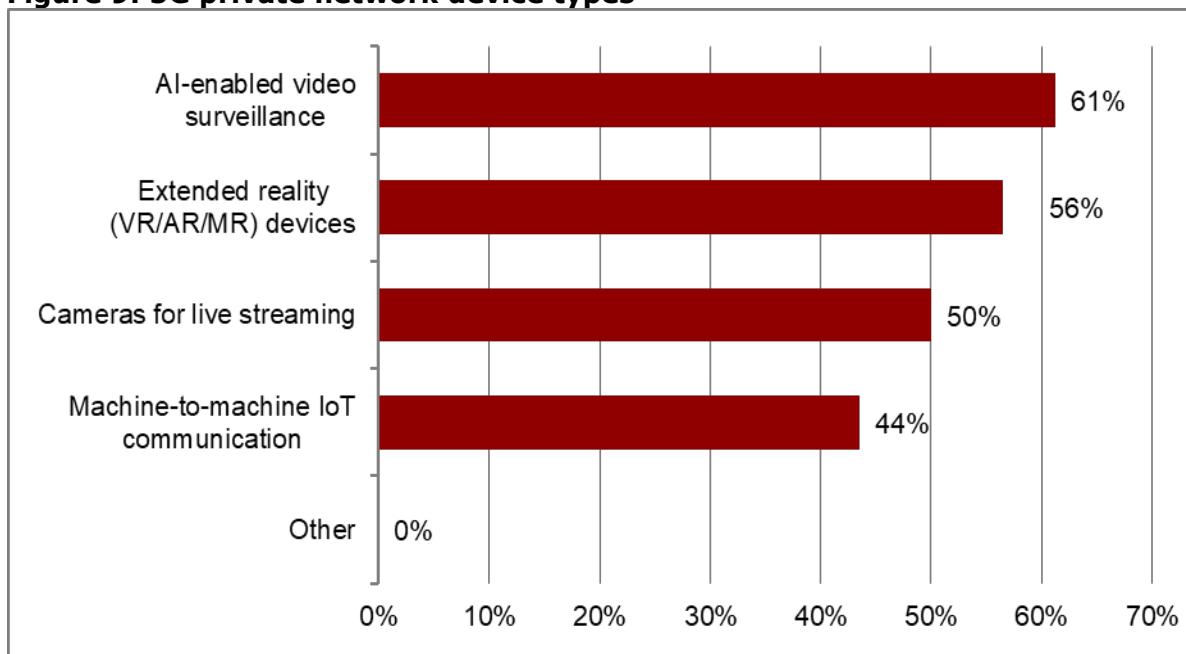
The final two survey questions examined 5G private network device-related considerations. This is an important topic since a broad range of device types will need to be integrated, tested, and scaled depending on the specific demands that each of the smart market segments introduces (see **Figure 2**).

While these devices will possess unique segment-related design requirements, there are several common capabilities, such as the ability to record and stream video, that will be common to many devices in all segments.

Of these, as shown in **Figure 9** below, artificial intelligence (AI)-enabled video surveillance (61%) was the leading capability expected to be heavily utilized in 5G private networks. This focus on surveillance is also consistent with **Figure 6** input ranking custom security policy enforcement as the leading benefit of 5G private networks. In this scenario, video surveillance provides the raw data to drive policy enforcement decisions.

The other three options, including extended reality (virtual, augmented, and mixed reality [VR, AR, and MR]) devices (56%), cameras for live streaming (50%), and machine-to-machine Internet of Things (IoT) communication (44%), also garnered respective scoring metrics. This solidifies the importance of video streaming with or without AI and VR support.

Figure 9: 5G private network device types



Question: Which of the following devices or applications does your organization expect to heavily utilize with its private 5G network? (n=62)

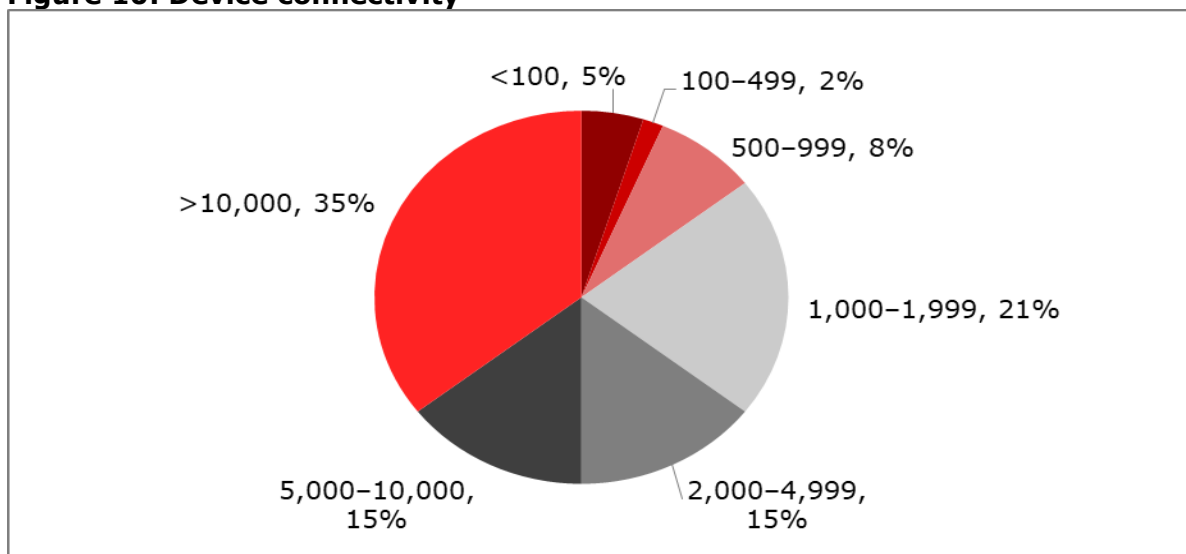
Source: Heavy Reading

In addition to prioritizing device types in their 5G private network deployments, CSPs must also consider and forecast how many of these devices must be supported. The challenge here is that the actual connection numbers will vary by device type, sales cycles, applications supported, and even the size of the enterprise.

This reality is captured in **Figure 10** below. As the figure documents, based on a year one deployment window, a broad range of supported inputs was observed. The largest group, representing a little more than a third of CSPs (35%), estimated that the minimum number of devices they would need to support was greater than 10,000 devices.

In second place and on the lower scale were the 21% of respondents who estimated only 1,000–1,999 devices would need to be supported in the first year. After this, the ranges dropped even further to 15% of CSPs that estimated both 5,000–10,000 and 2,000–4,999.

Figure 10: Device connectivity



Question: What is the minimum number of devices that your organization expects to connect to its private 5G network in the first year of deployment? (n=62)

Source: Heavy Reading

CONCLUSION

The research documented in this white paper confirms that many CSPs are committed to deploying and investing in 5G private networks. The CSPs that Heavy Reading surveyed are proposing an aggressive deployment schedule, with 18% claiming to have already deployed some form of 5G private network commercially. The remainder of respondents are either currently deploying (35%), planning to deploy in 12–18 months (27%), or deploying sometime after 18 months (19%).

While there are several factors why CSPs are deploying these networks, the leading considerations relate to their traditional strengths, including network reliability, network performance, scalability, and enhanced security.

CSPs' commitment to deploying 5G private networks must also be supported by the commitment to fund these buildouts. And the research captures that CSPs have made this connection, as documented by the 9 out of 10 survey respondents who ranked 5G private network investment as either a "high" (50%) or "medium" (40%) investment priority.

Based on these data points and others presented in this white paper, it is apparent that CSPs are "all in" on building 5G private networks for their enterprise customers.

Appendix A: Survey demographics

The 15-question survey launched in 3Q21 collected qualified responses from 62 CSPs. Converged operators with both fixed and mobile networks (27%) and mobile operators (26%) made up the largest distributions. Only those CSPs with 5G private network deployment plans were invited to take the survey. These respondents worked for CSPs in three specific targeted regions: North America, EMEA, and Asia Pacific.

The percentage distribution of respondents was as follows:

- North America: 35%
- EMEA: 32%
- Asia Pacific: 33%

The survey respondents included a mix of senior C-level executives (26%), vice presidents (26%), directors (32%), and managers (16%). Of these, 39% of the respondents were the final decision maker, 47% were part of a team making decisions, and 15% were influencing decisions.

The areas they typically worked in their respective companies included network operations (19%), network planning and engineering (19%), IT, data center, and cloud domain (15%), and security (10%).

They also worked for CSPs of varying sizes. Based on revenue generation metrics, the distribution was as follows:

- \$50m to \$199m: 6%
- \$200m to \$499m: 32%
- \$500m to \$999m: 26%
- \$1bn to \$5bn: 27%
- More than \$5bn: 8%

APPENDIX B: ABOUT QUANTA CLOUD TECHNOLOGY

Quanta Cloud Technology (QCT) is a global data center solutions provider that combines the efficiency of hyperscale hardware with infrastructure software from a diversity of industry leaders to solve next-generation data center design and operational challenges.

QCT serves cloud service providers, telecoms, and enterprises running public, hybrid, and private clouds. QCT offers a wide range of solutions from the hardware and software needed for a 5G Core Network (5GC), to the components needed for 5G Radio Access Networks (5G RAN) and enterprise management systems (OAM).

Product lines include hyper-converged and software-defined data center solutions, as well as servers, storage, switches, and integrated racks with a diverse ecosystem of hardware component and software partners.

For additional information on QCT products and solutions: <https://go.qct.io/telco/>.

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