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UNLOCKING THE PRIVATE 5G/LTE OPPORTUNITY

Webinar: Questions and Answers

Unlocking the private 5G/LTE opportunity: Questions and Answers

*This document outlines the questions and answers received from the STL Partners, Dell & Intel webinar, **Unlocking the private 5G/LTE opportunity: drivers, challenges and how to overcome them**, which was hosted on Thursday 12th November 2020.*

 ***You can watch the recording of the session, and also access the slides, using the link* here*.** In this document, we seek to address the questions raised in the webinar that we were unable to address in the time available.*

*The presentation is based on insights and findings from an interview programme and survey with 212 enterprises from 15 developing and developed countries across Europe, Asia Pacific and North and South America within the manufacturing, architecture, engineering, construction, oil and gas, and transport and logistics industries. **You can access the full research report** here**.***

If you have any questions not addressed in the webinar or this Q&A document, or want to hear more about our latest research or from our panellists, please contact:

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In the following pages, we have categorised our questions into three broad categories. Please use the links below to be directed to each section:

- **Enterprise adoption of private cellular networking**

- **The partnership ecosystem**

- **Where do Wi-Fi 6, SD-WAN and open RAN fit in?**

Enterprise adoption of private cellular networking

1. **In the survey, what was the biggest challenge identified for private network adoption?**
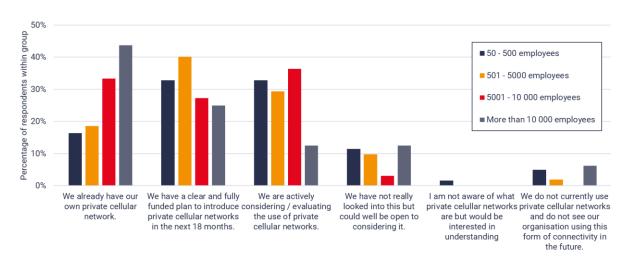
   STL Partners: Cost (of installation and operations collectively) unsurprisingly came up as the biggest challenge in the survey, with approximately a third of respondents citing it as the most pervasive challenge. Interestingly, followed closely behind, almost 25% of survey respondents cited lack of the device and solution ecosystem as their biggest challenge.

   Dell: We agree with the survey findings. In our discussions with customers, telcos and system integrators, we have heard that cost and lack of understanding of the business value are the top challenges for further adoption of private cellular networks.

   Intel: In addition to what was uncovered in the survey, enterprises are also keenly focused on how they're going to manage and operate these networks at scale.

2. **Do you have any estimate for the number of enterprises who may be interested in private LTE solutions say in the next calendar year?**

   STL Partners: We would caution against drawing firm conclusions from our survey, given that we already cited confusion and lack of understanding of what a private network is. However, this suggests that around 30% of respondents (40% for larger firms, 25% for smaller ones) are planning to introduce private cellular networks in the next 18 months (see chart below). However, we have seen significant interest from enterprises who are keen to explore private cellular.

Source: STL Partners survey (Oct 2020), n = 200

   Dell: We don't have that data, however, according to many analysts, the level of expenditure by enterprises in private LTE and 5G over the next years can be measured in billions of dollars at a global level.

   Intel: Agree with Dell. Forecasting volumes in the next calendar year is difficult in a new technology like private networks. Looking at our own funnel of business we see very strong

interest across all the key verticals to deploy in limited live environments to begin answering some of the questions and challenges highlighted in this survey.

3. **It seems today that cellular private networks are reserved for large companies (with large investment capabilities). Do you think at medium term that private networking solutions will be accessible to smaller companies and generate volume?**

   Dell: I think the answer to the question is yes. Smaller companies are more sensitive to cost and do not have the IT/Telecom staff that bigger companies have, so they will require more guidance from their vendors and service providers in order to understand the value that private cellular networks can bring. The solution proposed by Dell, Intel and our partners is flexible enough to support very small deployments and can scale to very large deployments. In addition, we can provide pricing mechanisms (financing, consumption-based, OpEx-based) that will make the solution more affordable to smaller companies.

4. **What is the cost barrier to switch over and who owns the capex for installing the 5G Private network for example in a manufacturing factory?**

   Dell: As we said in the answer above, cost can vary depending on size of deployment and use case. There are several operating models: the enterprise may choose to own the assets outright or to consume it as a service, in which case the capex will be a consideration for the telco or managed service provider. As part of the solution we developed (with Intel, radio vendors, system integrators and telcos) we have what we call delta t-shirt sizes, that are basically budgetary costs for different configurations. I would also add that although it's widely perceived that Wi Fi is less expensive, in some scenarios that is not true, and a private cellular network can be more cost-effective than Wi Fi.

   The second point is who owns the CapEx. Again, it depends; some big companies that have a lot of expertise might want to do it themselves (i.e. own and manage the network themselves, and in some countries they can own the spectrum too). What we have seen is that most enterprises don't want to own them - they prefer to work with the telco who is going to provide it as a service. So they won't need to worry about the initial investment and will just pay on a monthly basis. Again, we can help you to quantify that, and convert what would be a CapEx type of deployment into an OpEx-type deployment.

   Intel: Dell's responses are spot on. The only thing we would add is that we don't view the decision as a switch over, but more as an investment in new capability that will work in concert with other access technologies.

5. **What are the main benefits for the oil & gas industries in having a dedicated private LTE network?**

   Intel: The first real value is in the mobile worker (e.g. the engineer, the maintenance worker) and getting them secure access to the sensor / SCADA network. Previously, workers were having to run around looking at gauges and data manually, and they've gained so much efficiency by being able to access and share that data with folks in a way they know is secure, and that they can act

on immediately. Now, because we have this converged environment at the edge, they can maybe begin to do some parsing of that data and provide actionable information to the engineer.

The first use case was really just sensor connectivity and because a lot of the technology in oil and gas is older, they need sensor overlays, and these are very broad environments. With LTE, you can create your overlay sensor network. This may not sound fancy but there are a lot of endpoints, so it solves a real problem and helps you to run the pipe better. Simplistically speaking, private networks creates an economical mechanism to connect the unconnected and transform all facets of how oil and gas operate today.

Dell: Oil and gas firms are interested in private cellular networks to address automation and control, analytics, video surveillance, remote monitoring, connected worker and other emerging use cases such as digital twins and inspection of assets using drones. There are many business benefits, such as increased operational efficiency, higher accuracy and yield, better informed drilling decisions, improved worker security and productivity and new revenue streams, amongst others. It's therefore a very interesting sector for private cellular networks, since they can not only increase efficiency, but also enable new revenue streams, new business models, and better worker safety and efficiency.

6. **Have you come across use case where the customer wants to retrofit existing Wi-Fi infrastructure with 4G/5G cellular network? Is retrofitting Wi-Fi a feasibility?**

    Intel: The answer is yes. We have a commercial deployment with a major sports league where they decided to move their network architecture from Wi-Fi to a CBRS network for critical event workloads. The key drivers for them were around better TCO and a more deterministic network from a performance perspective.

7. **When talking about hybrid networking, are we talking public/private or mobile/fixed?**

    STL Partners: When we say hybrid, we're looking at it in terms of combinations of wireless and fixed connectivity, whether that be a private LTE, private 5G, Wi Fi, industrial ethernet or other LPWAN technologies, etc. What we see happening within the hybrid networking world today is more convergence of these solutions. For example, we spoke to a manufacturing company who were doing studies to look at how they can consolidate some of their connectivity systems. For their particular scenario, they found that the vast majority of their use cases could be served by 5G or industrial ethernet (5G for the use cases requiring mobility and ethernet for the fixed use cases). For them this was about flexibility, particularly with private cellular, where it gives you the flexibility to be able to redesign the layout of your operating site.

8. **How would the TCO be different for countries that do not have CBRS?**

    Dell: Outside of the US, companies can still deploy private networks using licensed or unlicensed spectrum. When using unlicensed spectrum, we don't expect the TCO to be significantly different from CBRS. In the case of licensed spectrum, it is difficult to quantify the difference as spectrum costs can vary hugely depending on the country.

Intel: As Dell noted, there are different schemas adopted by various government agencies across the globe. In many cases, like in Germany, the cost for spectrum is extremely economical putting the TCO on par with GAA spectrum in CBRS.

9. **Is it recommended to have interconnection between the private cellular network and public one?**

   STL Partners: Having this interconnection could be more of an insurance policy or a means of staying connected once you move beyond the operating site. This is essentially a form of roaming, potentially achieved through workarounds (e.g. dual IMSI). A different example we heard in our interviews is in automotive manufacturing where a private cellular network is used in the factory to install firmware onto the vehicle as it moves through the production line. Once the vehicle leaves the factory, it can connect immediately to public cellular as a connected car.

   Intel: The prospects of UE/things being able to seamlessly "roam" between private and public cellular networks is an exciting proposition and promises to deliver even more powerful experiences and capabilities to the end users. There is good work going on in this domain by innovative ecosystem partners. We expect it may take a couple of years for the mechanics and business models to get sorted out before we start seeing this at scale.

10. **How do we deal with the challenge of the lack of devices that have LTE chipsets in them – particularly in oil and gas?**

    Dell: The ecosystem of devices supporting the LTE and 5G in several bands is ever increasing, including bridges to support the connection of legacy wired and wireless devices.

11. **What was the sample size for your survey and did you have broad geographic representation?**

    STL Partners: We surveyed 212 people within the manufacturing, architecture, engineering, construction, oil and gas, and transport and logistics industries. Our survey respondents covered both developed and developing markets, from 15 countries across Europe, Asia Pacific and North and South America. We also supplemented our survey with a series of interviews with enterprises and other players within the wider private cellular ecosystem (e.g. telecoms operators, network equipment providers etc.)

12. **What do you see as the key barriers and challenges to adoption of private cellular?**

    Intel: As we advance from initial field tests and PLCs, we run into issues with operationalising in commercial environments. We need to integrate the network with the diverse management and security systems of our clients' organizational structures, which involves different stovepipes and support teams.

    Dell: Ultimately, there is the lack of understanding of enterprise needs and the business case for private cellular adoption. We need to quantify the commercial value of private cellular for enterprise partners and address the CAPEX cost issue with on-demand, OPEX-based pricing offers.

13. **Beyond the more obvious areas such as ports, mines, big factories, can you give us an example you've seen of not-so-obvious customers for private networks? Why did private cellular make sense for them?**

Dell: The most interesting example would be in the hospitality gaming sector. Casinos are interested in private cellular because of three key benefits. Firstly, the placement of gaming machines can be flexible, rather than constrained by the availability of Ethernet sockets. Secondly, casinos can accommodate more machines and optimise building layout. Finally, they can improve customer experience with new services, such as providing ruggedized waterproof tablets for guests to play games by the swimming pool. These use cases are possible with Wi-Fi, but private 4G/5G will offer better quality of service and security.

14. **What are your views on the suitability for private cellular networks in brownfield versus greenfield environments?**

Intel: Most of our deployments are brownfield in nature. Our work with Dell focuses on simplifying consumption to scale up economically from 'carrier' to 'enterprise'. This directly relates to the brownfield environments, because it deals with existing support systems and on-site technology, e.g. multi-access or hybrid networking.

15. **In the research, security came up as the number one consideration. How does this manifest itself in practice in the field?**

Intel: One of the use cases is sensor connectivity. With LTE, you can create an overlay sensor network in broad environments. It improves efficiency in the field by connecting a mobile worker to the sensor network and giving them secure access to parse data at a converged edge environment and share actionable information in real-time.

The partnership ecosystem

16. **Who do you (and the survey respondents) think should manage private cellular networks? Should they be managed by the vertical or managed on their behalf by the operator? Who do you think is best suited to provide the Private LTE/5G connectivity solution?**

STL Partners: Almost 50% of the survey respondents see telcos as their preferred lead partner, but our results also show interest in other players (e.g. network equipment providers, systems integrators and also the hyperscale cloud providers).

17. **What business capabilities should a telecom operator aim to develop for a successful new line of business in this space?**

STL Partners: Taking a private cellular network to market is not the same as selling a traditional mobile service, it is part of an overall solution and therefore needs to be sold in a more consultative rather than a transactional way. The main challenge here for telcos is the GTM

skillset, the ability to understand the root of customers' needs and issues, and figure out which different connectivity solutions are best suited.

18. **In your opinion, what will be the role of the cloud hyperscalers in private networks? What are your views on the hyperscaler advantages or disadvantages operationalizing private LTE/5G networks?**

STL Partners: The hyperscale cloud providers are increasingly active in this space particularly as an extension of their edge computing strategies. For example, Microsoft's recent acquisitions are a clear statement and is also building a vertical solution (Azure Private Edge Zones) via partners in enabling private networks, which include telecoms operators. AWS is also in the mix with its Outpost solution offering to enable enterprises to run AWS infrastructure on-premises. However, it is still early days and it will be interesting to see how the coopetition dynamics play out between the hyperscale cloud providers and telecoms operators. STL is publishing a new research report on this topic in the coming months.

Intel: Not all hyperscalers are positioned equally so it's difficult to private a simple response. As to the second question, a key capability of the hyperscalers is their vast developer ecosystem. Deploying a platform like Smart Edge, which aims to support multi-cloud services, allows enterprises to take advantage of this vast ecosystem and still give them the control and choice they desire.

19. **Firstly, in private LTE, how are users authenticated? Secondly, who are the current hardware providers?**

STL Partners: SIM or eSIM authentication is used for devices connected to the private network. There are many established device and module vendors (too many to list). The network hardware and function providers include established public network equipment providers (e.g. Nokia, Ericsson, Huawei, Samsung), enterprise infrastructure providers (Dell, Intel, VMWare, Microsoft), alternative hardware and software providers (e.g. JMA, Commscope, Cradlepoint, Athonet)

Intel: There is a lot of literature on the web about how users are authenticated onto a private LTE network. Our solution is 3GPP compliant and we take advantage of these field proven standards. In addition to 3GPP, Smart Edge also employs a zero-trust security model and rules-based access control. Simplistically, what this means is once we add a user into a network that user can only access services that we specify explicitly. To your second question, the Smart Edge platform is designed to run on Intel based servers taking advantage of hardware acceleration as appropriate. We have a great line-up of Dell Technologies servers that are certified to interoperate with our platform. In addition to the Dell servers, we have deployed with many great RAN partners.

20. **What has to happen for adoption of private cellular networking to take off?**

   Intel: For private networking to take off, we must build an ecosystem that helps clients and existing vendors understand and implement the technology. While most deployments today are large enterprises, there are opportunities for private networking solutions to be economical and accessible to smaller sites. We developed technology based on microservices and containerized environments, so it is technically possible to deploy a small number of cores supporting all the same features, and then scale it as the user base grows.

Where do Wi-Fi 6, SD-WAN and open RAN fit in?

21. **How do you see the impact of Wi-Fi 6 on private networks for enterprises?**

   STL Partners: We would argue that it is not a direct competition or either-or situation. Wi-Fi is still the dominant enterprise on-site connectivity technology today but private cellular networks can be complementary to that and other solutions, to support more mission-critical applications for example. It is a question of what the enterprises' current and future needs are. In some cases, an upgrade to Wi-Fi 6 may be sufficient to meet future needs but in other cases, some enterprises may look to deploy a private cellular network even if they have their existing Wi-Fi solution.

   Dell: We believe Wi-Fi 6 and 5G are complementary, but it ultimately depends on the use case and other factors such as network density and coverage area

22. **In the research, we found that there is a sweet spot for private cellular, which has been growing in size, but we foresee that hybrid networking will continue. How do you see this playing out with private cellular versus other alternatives like Wi-Fi? Do you see this as more complementary or competitive?**

   Intel: It is not an either-or decision, and we see both technologies running synergistically with multiaccess or hybrid environments. It depends on cost and use case. Wi-Fi 6 is well-suited for wireless support, but LTE connectivity is much more reliable and stable in a mobile setting, which is required by deterministic environments. LTE is standard 3GPP, so its interoperability brings a lot of benefits.

   Dell: They are very complementary. There are clear use cases where a private cellular network would be suitable to enterprises, but there are many use cases where Wi-Fi would be good enough.

23. **While most companies are looking at choosing between a campus 5G network vs Wi-Fi 6, what most aren't realising is that there is still a long way before end point device with native 5G connectivity will be available. Until then, it may remain a Wi-Fi 6 network with a 5G backhaul. What is your experience with clients?**

STL Partners: We expect to see many more 5G devices in 2021 and will see prices start to come down but some enterprises are already looking at private LTE first as a means of managing that evolution to 5G (as it is still early days with 5G). We think this is a great way of taking a staged approach to meet existing requirements by starting with an initial deployment with 4G to gain better insights, skills and experience for when the evolution to 5G is ready.

Intel: We share your view that it will take a little bit of time for 5G devices to reach critical mass in the market. While we wait for that to happen there are many clients capturing real business value with private LTE networks today and just as many planning 5G trials in the next few months to better assess TCO and fit with other access technologies in their network. In summary, private networks is going to be a healthy mix of LTE and 5G for a few years.

24. **While Wi-Fi is unlicensed and free to use, and with its own security features, why would one want to switch to cellular based solution?**

Dell: As discussed above, we believe that Wi-Fi and 4G/5G are complementary technologies. One of the reasons an enterprise might chose to deploy private cellular networks using licensed or CBRS spectrum is to have better control over the network and over the data and assurance of quality of service.

STL Partners: As mentioned earlier, private cellular solutions can coexist with Wi-Fi (and other solutions). We do believe however there are some cases with certain requirements that warrant the switch to a cellular-based or private cellular solution:

- **Need for outdoor coverage:** Wi-Fi can become problematic from a coverage standpoint where it isn't able to meet reliability or stability requirements in outdoor or even hybrid (indoor-outdoor) sites. One of our interviewees stated that Wi-Fi is too unstable for areas like ports, where it's too unreliable prone to weather conditions.

- **Need for seamless on-site mobility:** This relates to coverage too but more specifically refers to the seamless hand-over between different cells or access points within the operating sites. Private cellular can better support mobility use cases and a single 4G/5G macro cell can also cover a much larger area than for example with Wi-Fi.

- **Risk of network congestion/interference:** In some scenarios, there may be a significant risk of congestion with Wi-Fi due to visitor/casual use that could block more critical applications. One key example is in airports.

25. **What do you see as the relationship between private cellular and open RAN e.g. in relation to different types of cell site (small cell, micro cell, indoor cell, etc.)?**

STL Partners: Tough question... and from a STL research associate! No doubt, open RAN will have an impact on private cellular networks and help drive more choice and innovation. It is not clear where the immediate benefit (and interest) would be for an enterprise to disaggregate the RAN components (RU, DU and CU), although a service provider might want to.

Intel: Private cellular network operators will be able to pick and choose the ideal solution for their deployment circumstances. Open RAN enables this disaggregation and will help foster innovation and right sized solutions in the enterprise.

26. **Do you think 5G will kill SD-WAN? Do enterprises need to keep SD-WAN or get replace by 5G?**

    Intel: That's an interesting question… we don't believe 5G will kill SD-WAN. 5G will probably make SD WAN even better by offering a more robust connection back into the enterprise network vs wired technologies used today. This will give IT decision makers more choice on the transport side of the value chain and as a result drive more innovation in the space. What do you think? Drop me a note!

Get in touch with our panellists to learn more:

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For more information on our research findings, download our report here:

https://stlpartners.com/navigating-the-private-cellular-maze/

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