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Public vs. Private Networks

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SUMMARY

Robust communications systems are now in the category of critical infrastructure for utilities. Meeting this imperative comes with unprecedented choices, however. As utilities proceed with grid modernization, the complexity of understanding communications systems requirements can be daunting. Though decisions may seem straightforward, choosing between private LTE (PLTE) or public networks is a complex process.

With PLTE networks, utilities can meet a number of today's system requirements for utility-grade standards of redundancy and resiliency. These networks may be deployed with a clear focus on what is most important. This ability to fine-tune the network, set priorities, and design the network with gateways and backhaul positioned to reduce latency and increase performance metrics all add to the benefits of PLTE.

While every network will be susceptible to outages, private networks operating at utility-grade standards can be hardened with parameters that allow little or no impact if and when a disaster strikes. This ability to recover quickly would simply not be a reality for utilities relying on common carriers for critical communications. Disaster recovery based on redundancy is one of the most critical reasons to deploy PLTE.

When looking at PLTE, utilities should begin thinking of it as the foundation for all communications today and in the future. Each new use case becomes a business case where justifying the communications is now just justifying additional functionality. Utilities are understandably risk-averse when it comes to committing to new pathways, such as private LTE systems designed and operated only for the utility. But with the ability to interconnect with public networks and/or other private networks, investing in a PLTE network is not as risky as it may first appear.

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For many utilities working toward grid modernization, understanding the communications system requirements necessary to achieve their goals can be overwhelming. Many times, the question seems to be a choice between private LTE or public networks. This choice is not a linear decision, and simply deciding between one over the other fails to consider the long-term impacts of that choice. This drives a much bigger question: Do I want to build one foundational network to support the communications need of the evolving power grid, or am I willing to continue to buy specific systems to support new needs as they arise?

The Technology

Before diving into a discussion on the merits of public versus private, let's accept that while either choice brings benefits and negatives, LTE as a technology choice simply makes sense. Getting onto a communications platform that is a worldwide standard will move utilities toward a foundational network that supports any communications use case. LTE (and 5G, for that matter) offers an abundance of options to configure the networks to specific requirements. This also provides a device ecosystem that will continue to grow, thus driving end device costs lower. The days of building disparate networks to support each use case should be behind us. LTE and 5G provide a robust platform capable of supporting current and future use cases in the utility industry.

Public LTE

With public LTE (and this includes FirstNet), what you get is what the carrier is willing to provide at a cost that maintains profitability for the carrier. Common carriers architect and build networks to support consumers, their largest customer base. Their decisions on where to deploy their networks, how much capacity is needed, what spectrum should be used, network reliability and resiliency and many other decisions all are aimed at optimizing their network around customers' needs. They build just enough reliability to satisfy their consumer base. They build coverage where the business case works out and where their customers are most likely to be — urban areas and main thoroughfares.

These networks have become more prolific and reliable over the years, as the consumer demand for data grows. But, at the same time, the public carriers are building as fast as possible to keep up with consumer demand for throughput on the latest spectrum bands, not utility communication needs. That is their focus.

Suppose a utility has requirements for this coverage. In that case, the common carriers may build and offer that service. But let's not make the mistake of believing they are building these networks to utility standards of reliability, redundancy and resiliency. If the need is for

monitoring non-mission-critical applications, there should be no issue with the service provided because this is a lower-cost alternative.

However, carriers may have similar issues with sharing infrastructure, summed up as: No control and dependence on someone else that may not share our priorities.

The recent events of outages — ranging from the Christmas bombing of the AT&T facility in Nashville, to the upgrade failure at T-Mobile on June 15, to the more current internet outage from AWS — all show the significant vulnerabilities of these public networks. Common carriers' networks are subject to large-scale outages as well as many smaller-scale outages. And while the large carriers work to mitigate these outages and secure their networks, they will never be on par with a utility-owned and operated network.

The ability to tune the network to support specific high-availability use cases is another point that must be considered. The public networks are focused on downlink capabilities and maximizing capacity. Utility networks are more uplink-focused and should be custom-built to support their particular use cases — providing the appropriate capacity in the places they need it.

Private LTE (PLTE)

With PLTE networks, the utility can deploy its network with a clear focus on what is most important. As previously mentioned, uplink is most critical for the device networks, and there are specific RAN parameters that can better focus the network on these critical needs. Also, setting the network parameters (like APNs and QCIs) typical for the utility's most critical applications allows the utility to ensure the most critical data reaches its destination. This ability to fine-tune the network, set priorities, and design the network with gateways and backhaul positioned to reduce latency and increase performance metrics adds to the benefits of PLTE.

While every network will be susceptible to outages, these networks can be hardened accordingly if the network is designed to have redundancy for the most critical use cases. Likewise, when a failure occurs, the utility can prioritize the restoration. This is very clear during disaster recovery. While carrier staff is still hunkered down and waiting for access into disaster-stricken areas, the utilities move in with first responders. They are much more prepared to restore the networks, and if constructed to utility hardened standards, they should already be less impacted. Controlling this restoration activity and prioritizing the restoration based on critical assets is of high importance. No carrier would be able to work this type of restoration as efficiently as the utility. This is one of the most critical reasons to deploy PLTE. When disaster strikes and the power is out, returning to normalcy requires restoring power, and restoring power requires communications.

You may say: "I have LMR for my critical communications so how does LTE help me?" When looking at PLTE, you need to change your mindset and start thinking of an "all in" approach. LTE should be viewed as "becoming" your foundation for all communications over time. Only then can you realize the actual benefits of this decision. Also, networks are not built overnight, especially these types of networks. You need to carefully plan the deployment and look at staging the eventual replacement of each of the other disparate networks with PLTE. This may be a 10- or 15-year view but having that runway will provide you the best solution at the right

time. PLTE is foundational, and once that foundation is in place building additional capabilities becomes an easy conversation. Replacing old networks as well as deploying new functionality becomes far easier. Each new use becomes a business case where justifying the communications is now just justifying additional functionality on an existing network. As the network grows, it becomes more and more reliable and continues to provide more required services.

While no one wants to put all their eggs in one basket (or in one network, in this case), LTE provides the opportunity for various levels of redundancy. With the ability to interconnect with public networks and/or other private networks, the PLTE network could have a failover option when a failure occurs, or dual SIM devices for the most critical applications to provide redundancy. This is another advantage of being on a standards-based network. Also, with a single network to manage, more redundancy may be added at minimal costs. This provides control over the level of resiliency required by the network based on the critical services that are carried.

Now the questions become: How do I get there? How can I afford this network? How will I be able to staff up to control the network? These are the most common questions, but the better question is: How can I afford not to move to PLTE?

The risks are far greater when looking at continuing the status quo and not building a PLTE network. The longer you delay a decision to unify network communications around private LTE the more impactful the transition becomes, as the spend on legacy networks exacerbates making the transition. The most significant opportunities exist now. Let’s take advantage of them and keep moving forward.