

The Underestimated Twenty Billion Dollar Market Opportunity: CBRS Enabled Private LTE

CBRS Enabled Private LTE Will Revolutionize Wireless Networks

Many, both inside and outside of the telecommunications industry, have become excited in recent years by the progression of technology. This excitement has mainly focused on the possibilities that can be enabled by 5G infrastructure, which has garnered the most buzz and media attention. There is, however, another emerging technology within the space that has comparable implications for enterprises of all types: CBRS enabled Private LTE networks. The potential benefits and market value of Private LTE networks have been consistently underestimated by industry analysts. **Through our bottom-up analysis, Imagine Wireless estimates Private LTE to be a \$20 Billion industry.**

With the U.S. government opening access to the Citizen Band Radio Spectrum (CBRS) band, the landscape of wireless networks is changing. Private LTE networks allow any enterprise to create their own secure and private wireless network to meet their own unique needs, unshackling those organizations from the current status quo regarding network infrastructure. Organizations no longer need to adhere to the same strict rules for wireless networks, or wholly rely on the same institutional service providers. This evolution in capabilities is poised to disrupt the telecom industry, offering a slew of new options for enterprises to consider while simultaneously providing access to a new \$20 Billion dollar market for telecom service providers, network equipment providers, and solution providers.

The Emerging Private LTE Technology

Private LTE is exactly as it sounds: a private wireless network. Enterprises that use this technology to set up private networks gain access to additional capabilities and massive improvements in security. The new ability to create Private LTE networks is due to CBRS – a band of spectrum from 3.5GHz to 3.7GHz that the Federal Communications Commission (FCC) has allowed access to for commercial use. CBRS allows enterprises two types of access – General Authorized Access (GAA) and Priority Access Licenses (PAL). GAA provides free access to the spectrum, similar to the unlicensed spectrum. Access to PAL is available to enterprises who purchase them through government Auction 105 held starting July 23, 2020. PAL users have higher priority access and are protected from GAA users. Each of these PALs grants access to a 10-megahertz channel within the 3550-3650 MHz band. With PAL licensing, an operator can effectively secure up to 40 MHz of CBRS bands in strategic geographical locations. The licenses grant access for ten years and are renewable. While GAA is ideal for indoor deployments, using PAL licenses for outdoor deployments will guarantee spectrum in traffic hotspots and enabling mission-critical/business-critical applications.

The unique technical aspects of Private LTE networks have a variety of business implications. Private LTE networks can utilize an enterprise's existing backhaul, and thus require a less robust and costly wireless infrastructure. This dramatically reduces the cost and technical expertise necessary to run wireless networks – a key attribute that makes Private LTE networks more realistic for enterprises to pursue. Moreover, the CBRS Industry Alliance, OnGo, has established a device certification program that enables a wide diversity of devices – video cameras, IoT sensors/devices, AR/VR goggles, connected machines, and the like.

These product solutions are not currently as mature as Wi-Fi, so the best way to implement Private LTE networks at this time is through following a Private LTE-as-a-Service model. In addition, Private LTE is not a replacement for Wi-Fi, and is most valuable for an enterprise's mission-critical communications, so as it matures, Private LTE will come to co-exist with Wi-Fi. Ultimately, though, Private LTE needs to be as easy to deploy and operate as enterprise Wi-Fi and needs to reach a cost equivalency with Wi-Fi from a coverage and capacity perspective to effectively meet the needs of CIOs and drive market adoption.

Our Bottom-Up Approach

As stated previously, we expect the Private LTE to have a market size of \$20 billion over five years. The main advantage of our analysis is the substantial improvement in accuracy through the use of a bottom-up analysis approach, rather than the more typical top-down analysis approach. In addition, our analysis approached the Private LTE market from a much broader perspective than previous analyses that mainly focused on narrow subsections of the market. Our methodology utilizes the same inputs (coverage area and the number of wireless devices) used to engineer wireless networks. The results of the engineering help us determine the costs and revenues associated with Network-As-A-Service (NaaS), Device-As-A-Service (DaaS), Professional Services and Integration, Security-As-A-Service (SaaS) and, optional backhaul costs. The aggregate cash-flows allow us to define the overall margins to deploy mission-critical/business-critical private wireless networks over CBRS. Our analysis has indicated that NaaS has lower revenues than DaaS; however, NaaS enjoys better margins. This bottom-up approach allows us to gain a much more precise and more detailed understanding of the market than any previous analyses, which have had wildly differing forecasts for the market.

By our monetization research and analysis, the PAL tier in the CBRS spectrum is incredibly undervalued in comparison to the total sum of benefits and market value pursued through Private LTE. Due to this, the licenses sold at the government-sponsored Auction 105 can be obtained at an unbelievable bargain. Once the market recognizes the value of these licenses, they will be sold at a very high premium by those who acted on this market opportunity. This goes directly against the FCC's intention to create a more dynamic marketplace for spectrum, and avoid the presence of groups squatting on PAL licenses for resale. This disconnect could make the PAL secondary market even more volatile and challenging to navigate, making it even more critical that those interested in Private LTE bid on these licenses to assure their access to this new technology and market.

The Market Landscape

One of the most critical aspects of the Private LTE market to consider is how it is changing the landscape of the industry. *Figure 1* below shows some of the key players in the industry, including both service providers and potential new entrants.

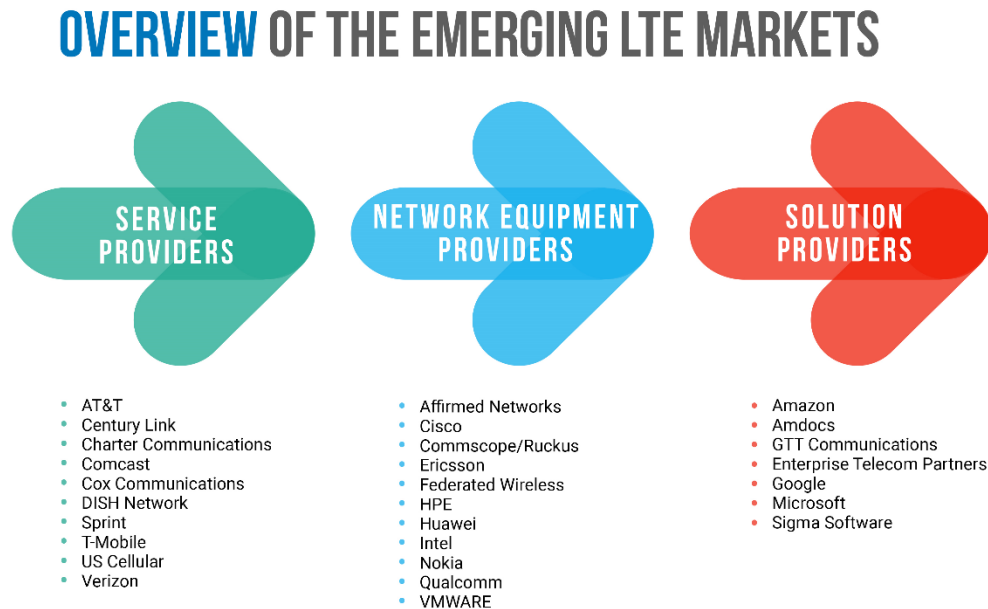


Figure 1

The private wireless network marketplace is expanding. Because of the opening of the CBRS spectrum band, the enterprise wireless market will no longer be dominated by the same handful of telecom service providers. Instead, additional entrants such as Amazon, Google, Federated Wireless, and Ruckus, which have already begun their first forays into Private LTE, will be poised to disrupt this industry, as well as the greater telecom industry at large.

This disruption puts service providers, network equipment providers, and solution providers on notice, due to the likelihood of increased competition, especially from established players from other markets such as Google and nimbler “new” entrants such as Federated Wireless, Syniverse. However, this also leads to opportunities for enterprises, as they will have access to a variety of new vendors and offerings. This will increase their level of choice in which vendors to partner with and will facilitate additional ways for them to leverage Private LTE.

The Benefits of Private LTE

For service providers, the main benefit of entering the Private LTE space is, of course, revenue. The benefits for enterprises for implementing this technology, however, are broader and very impactful to the business. *Figure 2* below shows the most noteworthy use cases for enterprises using Private LTE networks, as well as their portion of the overall Private LTE market.

PRIVATE LTE USE CASES: BY MARKET VALUE

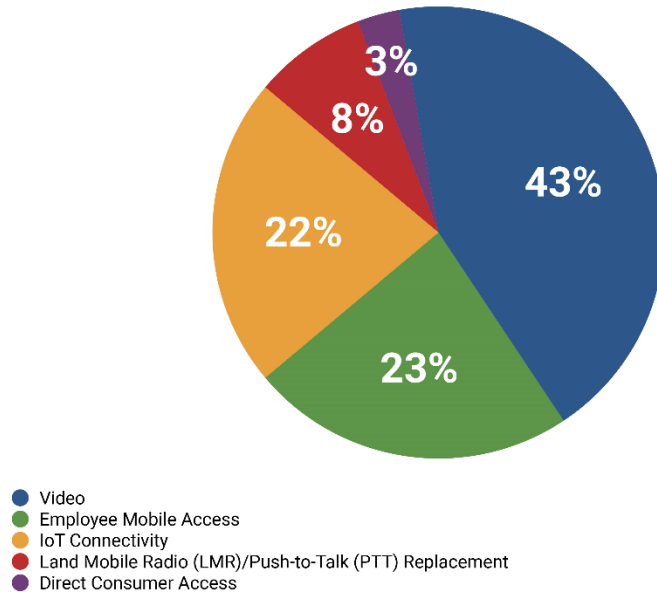


Figure 2

While there are numerous use cases, the principal value adds for enterprises boils down to security and the increased capabilities that security facilitates. Access to a privately-owned LTE network inherently grants increased protection for enterprises because it is private. This, coupled with the additional security services provided by service providers, will lead to improved security for mission-critical/business-critical enterprise applications.

The additional capabilities provided in the use cases above aren't necessarily as simple as they look at face value. For example, video solutions would include more common practices, such as worksite monitoring. However, a Private LTE network would further enable video capability to include activities such as condition monitoring, predictive maintenance, safety and surveillance, facial recognition, asset management, parking enforcement, pedestrian/object detection, and others. All these use cases are undoubtedly valuable, but they also undeniably require the increased security that Private LTE networks provide.

Providers should keep in mind that enterprise customers will want to buy the business result of digital transformations leveraging Private LTE, rather than only NaaS. It is key for solution providers in particular to sell through integrators channels to reach these industry verticals – a new experience for these businesses. Providers will need to have an enterprise priced product to win in these industry verticals, and should avoid focusing on carrier costs or anything that might weaken the enterprise Private LTE business case

Figure 3 below shows the distribution of the Private LTE market by vertical.

KEY PRIVATE LTE VERTICALS

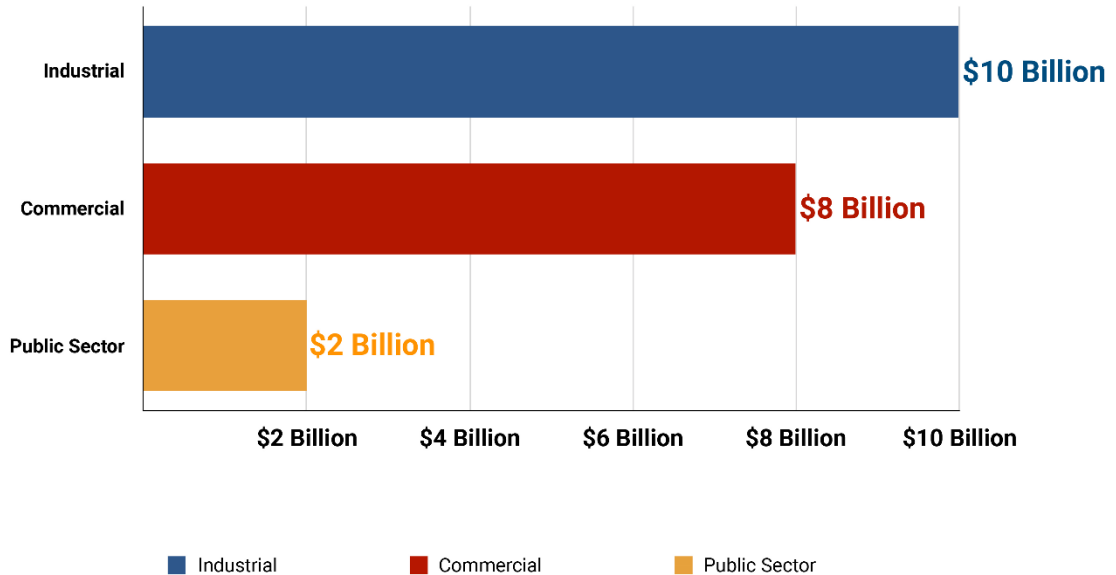


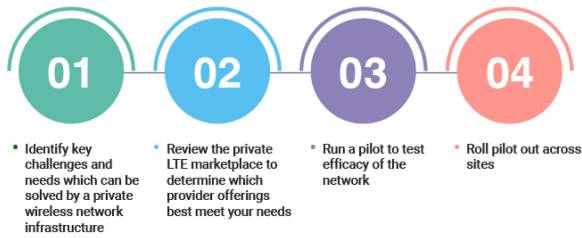
Figure 3

Though the Industrial vertical makes up the largest portion of the market by size, each vertical is relatively sizeable. Since all types of enterprises will be looking to acquire Private LTE technology due to the versatility of the technology’s use cases, all three verticals should be considered as viable market sections for providers to target.

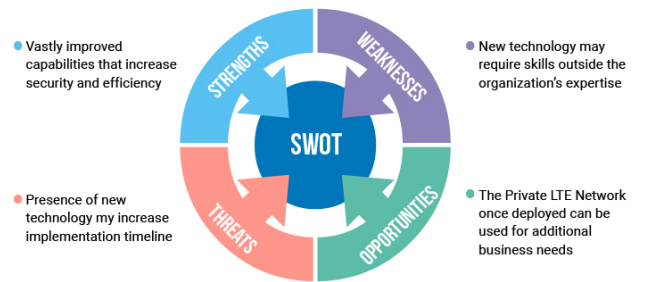
How Can You Pursue Private LTE?

A \$20 billion market size or vastly increased security and capability are sure to garner interest from any business leader. However, each type of stakeholder will have a different list of key steps necessary to be successful in Private LTE. Figure 4 shows the recommended next steps that enterprises, service providers, network equipment providers, and solution providers should pursue, as well as a SWOT analysis for each individual group.

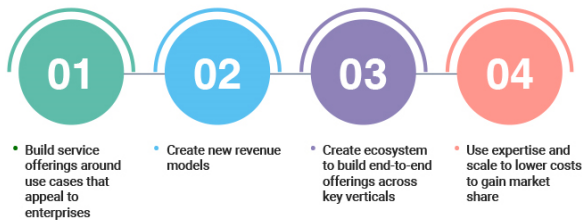
KEY NEXT STEPS: FOR ENTERPRISES



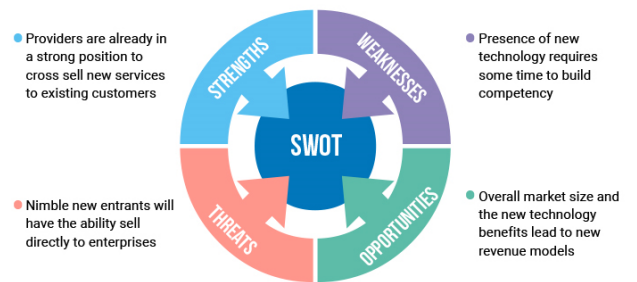
SWOT ANALYSIS: ENTERPRISES



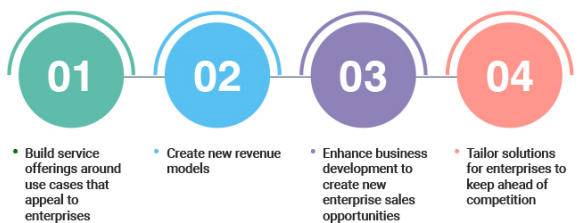
KEY NEXT STEPS: FOR SERVICE PROVIDERS



SWOT ANALYSIS: SERVICE PROVIDERS



KEY NEXT STEPS: FOR NETWORK EQUIPMENT AND SOLUTION PROVIDERS



SWOT ANALYSIS: FOR NETWORK EQUIPMENT AND SOLUTION PROVIDERS

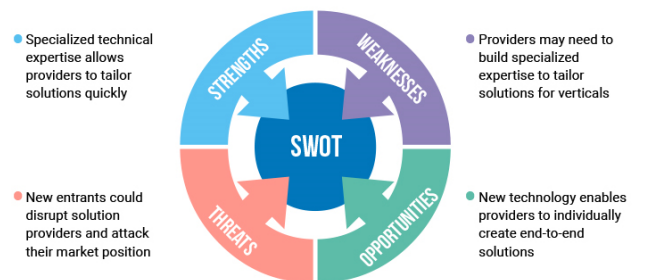


Figure 4

While service providers, network equipment providers, and solution providers will quickly gain the capabilities to support a variety of industries, enterprises must recognize that PLTE over CBRS is not plug-and-play. Large scale Private LTE networks will require significant effort

to set up and manage. Because of this, CIOs will not and should not invest in private wireless networks for the sake of connectivity alone. Enterprises should instead look to form long term relationships with service providers, network equipment providers, and solution providers. This will allow all stakeholders to better work with and learn from each other to be as effective as possible.

Challenges and Recommendations

There are vital challenges each respective group must overcome to be successful:

Enterprises

- Getting used to and learning how to best leverage the new Private LTE-as-a-Service model that is becoming common will take time
- Understanding how to best leverage technology solutions for each use case for individual organizations will be difficult at first because the technology is nascent

Service Providers

- Service providers will find that they have less leverage and market power in a world without restrictive spectrum costs
- The presence of so many new entrants and technology offerings could threaten some of the service providers' existing long-term relationships with enterprises

Network Equipment and Solution Providers

- Providers are not as experienced working directly with enterprise clients and building relationships and will face a learning curve as they enter the market
- Solution providers must learn ways to differentiate themselves to enterprises in a market with a variety of new entrants

Additionally, there are also some key recommendations each group should consider as they move forward with Private LTE:

Enterprises

- Develop an agile approach to pilot new capabilities and expand enterprise-wide
- Collaborate with Private LTE experts to gain the experience and skills to use this technology effectively
- Use a business-case approach to understand costs while identifying revenue opportunities through new digitally enabled products
- Study enterprises who are already beginning to experiment with Private LTE to recognize best practices that can apply to your organization

Service Providers

- Develop sales capabilities to target enterprises with end-to-end offerings that enable business use cases

- Build partnerships with key solution providers to create robust offerings for the essential use cases
- Create new offerings that have the simplicity of enterprise Wi-Fi networks yet deliver the capabilities that Private LTE/Private 5G offer
- Build new revenue models that offer CAPEX/OPEX options
- Explore partnerships with system integrators to better target enterprise customers

Network Equipment and Solution Providers

- Develop partnerships to build end-to-end services that provide outcomes
- Consult with experts to gain more expertise around how to work directly with enterprises within key verticals
- Build capabilities to provide "as-a-service" offerings
- Engage in a consultative approach to selling
- Explore partnerships across the ecosystem, including with service providers, to strengthen offerings for enterprises

By focusing on these recommendations and overcoming these challenges, organizations will be much more equipped to succeed within the Private LTE Market.

Imagine Wireless is Here to Help

A \$20 Billion market opportunity dependent on emerging technology is sure to cause confusion and be full of challenges on the parts of all stakeholders. Thankfully, Imagine Wireless is here to help. We are a select group of hand-picked industry veterans with deep domain expertise, Big 4 consulting experience, and relationships. Our focus is speed to value for our clients. In an age of constantly new emerging technologies, clients need more than traditional deliverables. They want things done fast. We leverage our tools, relationships, and deep industry expertise to drive change not only for our clients but for the overall industry. For all who are interested, please contact us. We look forward to working with groups of all stripes looking to be on the cutting edge.