

Why Choose LTE? An Explanation Even Your Investors Can Understand

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Baicells Technologies is offering LTE at a value that blows away the entrenched myths that LTE is too expensive for WISPs and other small operators, such as small towns and cities or verticals like oil & gas that might be interested in LTE for private networks. That's well and good, and we are proud of accomplishing this once thought impossible feat, but a fair question remains: Why LTE at all? So we'd like to explain the impact of 2 simple issues you may not fully yet appreciate: NLOS challenges and the benefits of a standard. We think once you do understand, the case for using LTE as your primary wireless access method will be too compelling to ignore.

We hope you do not mind if we explain these things in as layman a way as possible, so you can potentially use these explanations to your investors and customers who might want to understand why you want to upgrade your network to Baicells LTE solutions.

1. NLOS (Non-Line-of-Sight) Challenges

In the license-exempt and lightly-licensed fixed wireless broadband space, operators must live with the modest power limits set by regulators. Whether in the USA, Canada, or anywhere else, regulatory regions require wireless technology in these frequency bands we are permitted to use to operate at greatly reduced power relative to those operators like mobile carriers who hold expensive licensed bands. The reasons for this go back many years, but the crux of the issue is that these bands were never expected to support commercial broadband plays, but rather were expected to be used by all the common indoor and very close range wireless devices that have become pervasive in our lives today, such as Wi-Fi, baby monitors, garage door openers, etc. The exceptions include 3.x GHz bands, but even these are granted very limited output power for fear of interfering with adjacent license band licensees like satcom companies.

Despite this, technologists have been able to make lemonade out of lemons, and now thousands of operators around the world are serving millions of customers around the world – especially in rural areas where choices are few – with community-saving high speed internet. But common technologies like Wi-Fi and its proprietary derivatives can only do so much; Wi-Fi capabilities are modest when it comes to outdoor obstructions like trees. The result is that areas with lovely forests (and even a few trees in a wireless path), while nice to live around have been impossible to service with any kind of broadband speeds today's streaming users demand.

You see (again, this will be remedial for some of you), wireless signals weaken over distance – a process called “attenuation.” This attenuation occurs in a step-like manner, where enough attenuation means the signal drops to progressively lower and lower levels, with each level down reducing the ability of the signal to deliver less and less speed (megabits). These levels are called “modulations.” Top modulations might be able to deliver 80 megabits or more, but by the time distance and trees continue to attenuate the signal, one might be in a modulation that can only deliver 1 or 2 Mbps, and eventually nothing at all. With trees in the way, low power signals are both scattered (reflection) and absorbed by leaves, modulating the signal down to useless levels.

In the wireless business we categorize this sort of radio path obstruction as a foliage-related non-line-of-sight problem (NLOS). Tree-based NLOS is the primary reason keeping most WISPs from being able to connect a majority of the customers in their footprint who want their service; it is a massive business problem, not just a technical one. Those who can beat NLOS -- or at least deal with it much more effectively -- win in the marketplace.

In the wireless world we measure these signal levels in decibels (dB). The way the science works, -3 dB attenuation (loss) means you've lost half your power. Conversely, +3 dB (gain) means your power is double. And it's exponential, so a loss of 6 dB is catastrophic in terms of delivering effective high speed internet. To use an analogy, imagine you are driving down the interstate at 80 mph. If you lost half your power (3dB), you are down to running at 40 mph. Lose another 3 dB (or 6 dB total) and now you are down to 20 mph. So in the wireless world, we might say 80 mph is like 80 dB, but 77 dB is like 40 mph and 74 dB is like 20 mph. That's not going to get you anywhere fast – and your competitor still driving 80 will crush you in the market if your job is to deliver goods down the highway. And guess what? Your job IS to deliver “goods” down the “highway” – broadband down the information superhighway.

This is where LTE comes in. Unlike Wi-Fi, LTE was designed for outdoor wireless, not indoor wireless local networks. As a more advanced technology designed specifically for outdoors, LTE signals are able to hold higher modulation levels in the face of more foliage. LTE also does a better job of collecting all the various reflections off leaves and still making sense of the signal.

LTE does such a better job in fact that it holds about a 7 dB advantage over Wi-Fi on a per modulation basis -- remember that's more than double and double again. With that massive advantage it can easily cope with foliage-based NLOS that will literally render competitive technologies useless, unable to connect. Baicells LTE lets you deliver much higher speeds to your NLOS-impacted customers where your competitors maybe can't service them at all. This means many more potential customers for every tower you install.

2. Standards

The NLOS benefits alone are enough to drive most fixed wireless operators delivering broadband commercially to move to LTE if they deal with foliage-based NLOS, but there is another reason why such users should care a lot about LTE: standards. This is also a reason cities and towns, must care about it.

We are all carrying LTE-enabled devices in our purses and pockets. LTE, in just a few short years, has displaced all other old school mobile technologies. When you see that “4G” icon appear on your smart phone, that's LTE. The mobile operators have invested billions to upgrade their networks to LTE because it gives them much more speed at distances the old 3G methods could deliver.

But that's not the only reason, the global drive for all mobile carriers to use LTE for its technological advantages also means the entire globe is unifying around a single standard, and with such mass comes economies of scale that result in higher profits and lower costs. It results in more vendor choices, preventing companies from the deadly risk of vendor lock where one vendor holds an operator hostage at the mercy of one company's limited R&D and customer service. It results in massive continuing investments by all parties to bring new services and build new devices. It's an explosion in innovation. Just consider the amount of Wi-Fi prompted revolutionary innovations for what and how we can connect things inside just over the space of ½ a generation. We can't imagine living with it, just ask your kids!

LTE is doing the same for outside and we are only at the beginning of the LTE revolution. Those who get on board now with LTE will be able to take advantage of untold new efficiencies, products, and services that emerge. Over \$1 billion is invested annually in LTE R&D, and being standard, every new leap will be backward compatible with the last, just as Wi-Fi has been. Imagine, no more forklift upgrades, or at least you'll now control your pace – no single vendor can put your entire CAPEX investment at risk of obsolescence on a whim or by its failings in the marketplace.

This also translates into a network with higher equity value. Investors understand the value of standards. Potential competitive buy out opportunities become more plausible with your network being more attractive because of an easier integration.

As well, new spectrum being opened by regulators in the U.S. called the Citizens Broadband Radio Service (CBRS) band (3.55 GHz- 3.7 GHz) will enable even the smallest operators to build their own private networks

that can have frequency protection similar to what mobile carriers now enjoy in their licensed spectrum. This includes cities and towns. This is a huge deal because today every city and every town has ever increasing OPEX budgets as they pay the big mobile carriers monthly fees to connect an every-growing list of devices in the communities, from traffic controllers, electronic signs, cameras, plate readers, water plant control valves, and even parking meters. This is part of the “Internet of things” (IoT) phenomenon within a municipal sphere, and while it provides efficiencies and better capabilities, it costs a lot of tax money to pay to connect these things.

The new CBRS band lets cities and towns and oil field operators, etc. the ability to shed these onerous carrier contracts for the first time by allowing them to build their own private, frequency-protected networks. No more carrier contracts. No more ever-expanding monthly fees. Sure, cities could have tried this using Wi-Fi, but that scheme was already tried and failed miserably in the “muni Wi-Fi” boondoggles ten years ago. The band was too shared and too unpredictable. It was also too expensive, requiring base stations every block or so. Now Wi-Fi is back doing what it does best, connecting things in our homes and allowing us to connect best-effort with our smart phones without carrier charges as we drink coffee, shop, etc.

With the CBRS band, no longer will communities that want to connect outdoor devices be at risk of connecting things with cluttered and noisy Wi-Fi spectrum that is being shared by every home and person in town, causing constant interference problems that negatively affects services, and makes it unwise to use for critical operations.

What technology will dominate this space? LTE. LTE will be the pervasive choice in CBRS because of its technical advantages outdoors, its vendor flexibility, its growing set of devices, its backward compatibility, its low cost. Those trying proprietary will find themselves with high cost and limited choices – they would simply be trading one vendor dependency for another.

So friends, Baicells Technologies was created and is staffed by some of the inventors of LTE with a visionary goal of not only making LTE as simple as Wi-Fi, but to democratize the technology in a way that will re-define who can be a carrier. We will bring LTE’s revolutionary NLOS benefits, its economies of scale, and the flexibility of globally-adopted standards to you at price points even the smallest operator – private or public – can afford. Whether your customers are broadband subscribers, taxpayers, or internal customers, the positive results will accrue quickly and progressively, both in customer satisfaction and your bottom lines. Welcome to the Baicells Technologies LTE future; it’s going to be amazing!