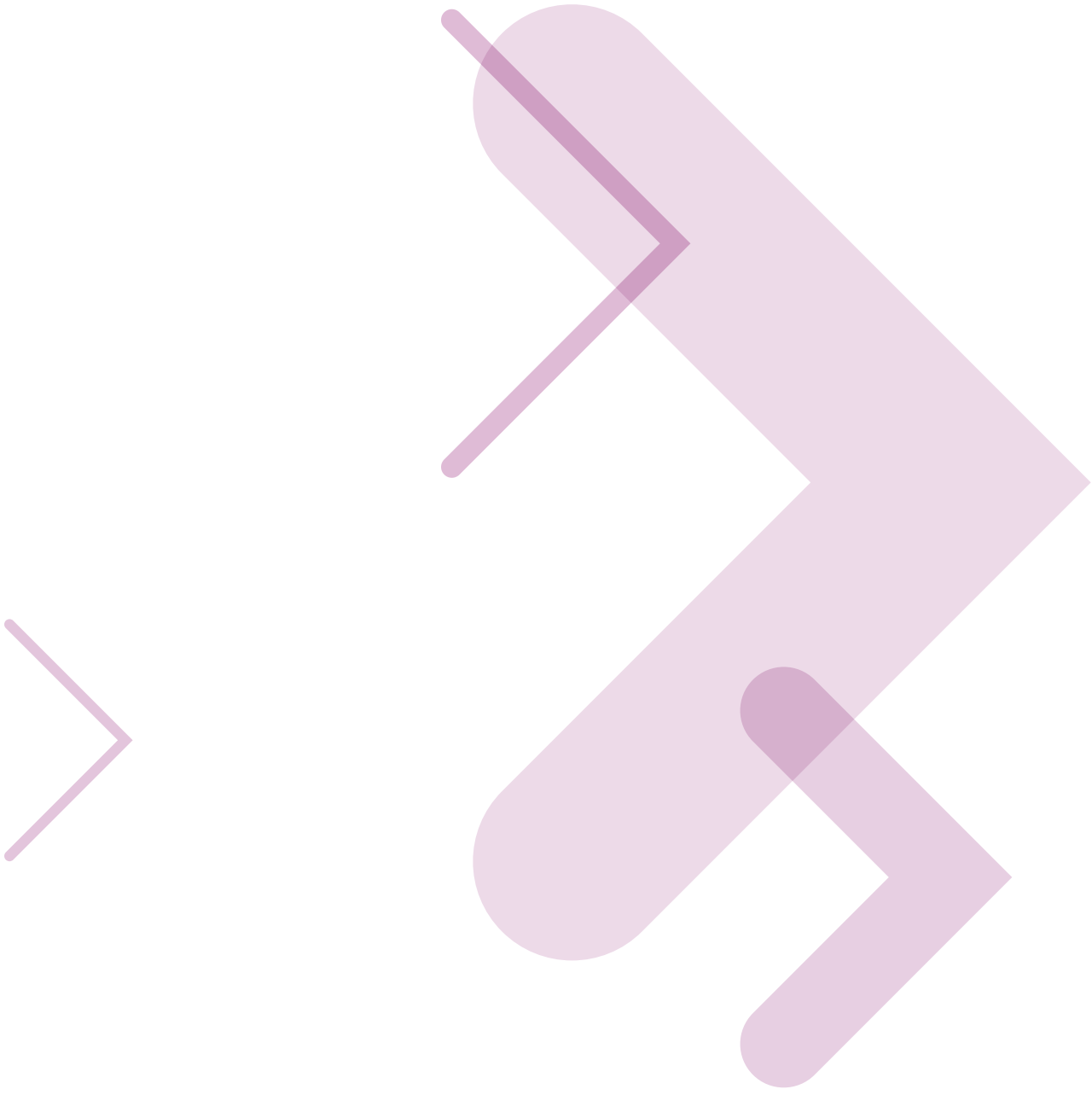
WHITE PAPER

Exploding the Myth that Unlicensed Spectrum Means Unreliable Service

An examination of how a growing number of operators are designing reliability into broadband networks using unlicensed frequencies.



For many wireless broadband network operators, the term "unlicensed reliability" is seen as an oxymoron. For many, the idea of building a high-speed network in the unlicensed band isn't a good one. A great deal has been said about crowded frequencies, self-interference and costly network rips. About how microwaving popcorn can cause interference. About disgruntled and perplexed customers. And ex-customers.

How Years of Evaluation Led Mesa Networks to their Ideal Wireless Broadband System

Mesa Networks, a Wireless Internet Service Provider located in Northern Colorado, at first focused its unlicensed broadband network on the business market. Initial reluctance by a conservative business community, and the interest shown by the SOHO and residential markets, convinced the company to change its focus.

With its new target audiences in mind, Mesa Networks evaluated nearly every available wireless broadband product over more than two years.

"For the most part, we were underwhelmed by the results," says Todd Bergstrom, President and CEO. "Finally, after a great deal of trial and error, we discovered the Motorola Point-to-Multipoint wireless broadband solution. It's been meeting our reliability and service requirements in unlicensed spectrum for more than five years now…at price points that are winning, and keeping, high-value customers."

On the other hand, there are currently thousands of broadband wireless networks now operating successfully in unlicensed spectrum in more than 120 countries around the world. What about them? What's their secret?

It's not much of a secret really. It's simply operating networks carefully planned and designed to provide optimum reliability in the unlicensed spectrum.

The Case for Unlicensed Frequencies

The fact is, in certain scenarios—such as extending a network over rough terrain or needing to deploy exceptionally cost-effective fixed point-to-point and point-to-multipoint solutions—unlicensed frequency networks have a lot to offer.

Of course, unlicensed spectrum has some challenges in trying to provide the same degree of reliability as licensed spectrum. But that doesn't necessarily mean it's unreliable. It just means you have to be aware of the issues inherent in the unlicensed band. It means you have to choose your equipment very carefully. And it means you have to design reliability into your network from the beginning. When you can do that, you can make a very strong business case for building a carefully designed high-speed wireless network in unlicensed spectrum.

Designing for Robust Reliability

Unlicensed spectrum is free. But just because it doesn't cost anything doesn't mean you don't have the right to expect it to be reliable. How do you design reliability into an unlicensed broadband wireless network? First of all, it takes planning. As in any solution, one size does not fit all. To choose the right unlicensed frequency solution, you have to thoroughly understand your network's specific needs.

You have to understand your customers' needs, too. You have to plan to offer the breakthrough high-speed applications your subscribers and prospects are demanding. Access to virtually anywhere and everywhere. Speed. Music. Video. Interactivity.

You also have to set up a comprehensive network management system. And you have to be careful to choose network equipment that has proven to be reliable in the field, not just in the laboratory. And, of course, you have to plan for success and expansion.

The Outer Limits

We all learned it in Wireless 101. "The farther you go, the weaker the signal." When you're using unlicensed spectrum, the edges of your network are especially vulnerable to interference from other users of the unlicensed band. The question becomes, do you want to try to push service to the absolute outer edges of your system? If you do, you risk the chance that someone will put up a transmitter or other equipment that will quite literally interfere with your ability to serve your customers.

The fact is, reliability is better served by creating a "cushion" that will allow all your customers to enjoy reliable service, no matter where they're located in the network. This cushion is known as fade margin, or allowance for fluctuations in signal strength caused by interference; transmitter or receiver movement; or reflections or scattering due to obstacles in the area. Many broadband wireless systems have a fade margin of 10 db. When you're designing for reliability in unlicensed spectrum, however, it's crucial to select technology that operates reliably with lower fade margins, even as low as 3 db.

Mitigating Against Interference

Some unlicensed network operators have learned a hard truth about how operating in unlicensed spectrum can affect growth. The truth is this: the size of your network matters. The larger your network grows, the more subscribers you gain, the more you're going to experience self-interference. More important, your customers will, too.

As a great many unlicensed operators have discovered, if you want both reliability and scalability in unlicensed frequencies, having GPS synchronization is a must. Because GPS Synchronization is technology that ensures that your network won't interfere with itself.

The sad fact is, some networks have experienced major interference problems as they've grown ultimately resulting in the need to rip out the existing network and replace it with totally new technology.

Technology that is specifically designed to support service and growth in unlicensed spectrum.

How do you solve these scalability and interference issues before they become problems? By making sure you build a network that includes GPS synchronization to reduce self-interference, helping you make more reliable, more efficient, more cost-effective use of unlicensed frequencies. And enabling you to add subscribers and capacity seamlessly, without having to redesign your network every time you change it.

Knowledge is Power

Because unlicensed frequencies are noisier than licensed bands, they can be more susceptible to operational and service issues. The world stands still for no one. Lightning strikes. Leaves grow and block your equipment. Trees fall, temperatures rise, the feed goes down. It all underscores the fact that in designing for reliability, operators of unlicensed wireless broadband networks should have a comprehensive element management system in place.

Nothing causes subscribers to churn faster than operational problems that aren't immediately addressed. With a powerful element/network management system, you'll have real-time visibility of your network's performance. That's crucial knowledge. Because if there's a service interruption or problem, you'll most likely be aware of it before your customers are. That allows you to begin remedying the situation right away. It also allows you to contact customers immediately, reassuring them that you realize they're having issues and that you'll have them resolved quickly. This kind of proactive communication helps customers understand that not only is your network reliable, you're reliable, too.

The Right Hardware

One of the most important factors in designing networks for use in unlicensed frequencies is the inherent reliability of the technology you are deploying in the field. You obviously have many hardware choices. You'll find that some systems will offer more speed; some will offer better reception sensitivity; and some will be cheaper.

The best choices for unlicensed band operators will be those hardware platforms that are built for superior reliability. Look for equipment and technology that have been tested and proven not just in laboratory settings, but in the noisy real world of unlicensed spectrum. Depending on your location, you'll also want hardware that has been stringently tested for tolerance in terms of temperature, precipitation, lightning strikes and other weather and environmental elements.

Finally, you'll want to choose hardware that provides excellent field failure rates. High quality, high reliability equipment is available that offers extraordinary field failure rates of less than one percent.

Other Equipment Issues

In order to make the most of your wireless broadband opportunities, you'll also want to look for equipment that is fast and simple to deploy. Systems are available that can be deployed in a matter of days, significantly reducing time-to-market and speeding ROI.

You should also look for connectorized equipment that allows you to select individual antennas fine-tuned for site-specific requirements. Other equipment qualities advantageous for use in unlicensed networks include low latency levels and the capability of being upgraded through software downloads. You also want Layer 2 equipment that, unlike Layer 3 devices, does not require configuration to the network, offering fast and simple network integration through IP connectivity.

Safety and Security

In today's ever-changing global environment, your network can never be too safe or too secure. For networks using unlicensed spectrum, safety and security are even more crucial. Look for broadband wireless solutions that provide high levels of security with applications such as over-the-air DES (Data Encryption Standard) encryption, and the advanced protection of AES (Advanced Encryption Standard) capabilities that make code cracking virtually impossible. It is estimated that it would take about 149 trillion years to crack an AES code.

How Community WISP Delivers High-Demand Applications in Unlicensed Spectrum

Community WISP (CWISP) provides municipalities, businesses and institutions in New England with custom wireless broadband networks that deliver reliable, secure high-speed access and service utilizing cost-effective unlicensed spectrum.

"Our customers are demanding the latest breakthrough applications that depend on broadband speed…like WiFi, VoIP, IP-based video surveillance," notes Robert Zakarian, President CWISP. "We ensure reliability by deploying Motorola's Point-to-Multipoint, Point-to-Point and Wireless Broadband Internet access solutions. How reliable are they? Point-to-Multipoint systems are deployed in more than 4000 networks and over 120 countries. That's the best proof of reliability."

Business Only Broadband Offers Reliable, Affordable High-Speed Wireless Solutions in the Unlicensed Band

Chicago's Business Only Broadband (BOB) is a business built on two basic premises: providing a cost-effective last-mile alternative for high-speed wireless service and paying much more than lip service to customer service.

BOB is completely independent of the local phone company making the company's broadband service an excellent choice for a backup Internet connection for business. BOB's customers take advantage of fast installation, bandwidth on demand and 24/7 customer support.

"We've become the largest independent wireless broadband network in Chicagoland," says Rich Kingston, Chief Executive Officer of Business Only Broadband. "We use Motorola's Point-to-Multipoint technology because we find it gives our customers the reliability so crucial to meeting their business goals."

Unlicensed Wisdom

The bottom line is if an operator takes the time to plan and makes the effort to design reliability into the network from the outset, "unlicensed" and "reliability" are not mutually exclusive terms. In any number of scenarios, service providers and enterprise network operators will find that they can, indeed, design for reliability and deploy a successful wireless broadband network in unlicensed spectrum.

To some, this may seem like unconventional wisdom. But to the thousands of operators around the globe who are now running successful, growing networks using unlicensed frequencies, it's not unconventional wisdom. It's unlicensed wisdom.

Wireless Broadband Solutions

Motorola's portfolio of wireless broadband products offers advanced solutions that enable operators to deliver reliable high-speed voice, video and data services in unlicensed spectrum. The Motorola Wireless Broadband portfolio gives network providers a range of flexible, mix-and-match, cost-effective options to fit your network and business model.

Proven in more than 120 countries, Motorola's point-to-multipoint solutions help you build and enhance powerful broadband networks using unlicensed and managed spectrum. Our point-to-point solutions help you bridge and extend high-speed voice and data networks, providing secure, reliable connectivity and services to even the most challenging environments. Motorola's Mesh solutions enable you to provide municipalities and enterprises with cost effective wide area community and campus wide fixed and mobile high-speed wireless broadband coverage for public access, public safety and public works. Complimenting Motorola's outdoor Mesh solution is our comprehensive Wireless LAN solution for WiFi client access virtually anywhere. Part of Motorola's One Point Wireless Suite, the industry leading Motorola AirDefense solution provides robust gap-free protection for Wireless LANs. The other software tools in the One Point Wireless Suite help customers design, deploy and manage their wireless network.

The Motorola Wireless Broadband platform leverages Motorola's more than 75 years of wireless technology knowledge, experience and leadership. Motorola's dedication to creating and maintaining trusted relationships over the long-term also means users are assured of high levels of worldwide service and support as their networks grow over the years.

And if you're an operator with licensed frequency, our wi4 WiMAX solutions deliver standards-based, high-speed voice, data and Internet connectivity in licensed spectrum for both fixed and mobile applications.

MOTOROLA

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