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## White Paper

### Next-Generation Wi-Fi Technologies: Paving the Way for 802.11n Adoption

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## Introduction: 802.11n Today and Tomorrow

The arrival of 802.11n is both an evolutionary and revolutionary step forward for businesses looking to substantially upgrade their current wireless networks and take advantage of a new and emerging class of network-based multimedia applications.

The technology, which is most often used with multiple-input multiple-output (MIMO) smart antenna systems, is theoretically capable of over-the-air transmission speeds that are up to four to five times greater than current 802.11 a/b/g systems, according to the Institute of Electrical and Electronics Engineers - Standards Association (IEEE-SA), which in 2003 approved the creation of the IEEE 802.11 Task Group N (charged with guiding the development of the specification).

Early releases of the technology – most recently 802.11n Draft 2.0<sup>1</sup> – have also demonstrated improved reliability, increased throughput, and faster and more accurate deployment across an enterprise environment, better rate vs. range performance, and improved capacity as compared with existing 802.11 technologies.

More important, 802.11n was designed to be *backward compatible* with existing 802.11 a/b/g systems since it incorporates such standard Wi-Fi legacy technologies as Orthogonal Frequency Division Multiplexing (OFDM), forward error correction (FEC) coding and interleaving.

This means that enterprises can incorporate and phase in early Wi-Fi Certified 802.11n Draft 2.0 access points (APs) and wireless technology into their current networks without the risk of impairing the interoperability of current Wi-Fi networks or impairing the security protections associated with 802.11 a/b and g networks..<sup>2</sup>

*"Wi-Fi CERTIFIED 802.11n draft 2.0 Wi-Fi brings the digital home of the future to life today, and revolutionizes the capabilities of enterprise networking. It is the most important advance for Wi-Fi technology since its invention,"*

*- Frank Hanzlik,  
Managing Director,  
Wi-Fi Alliance*

<sup>1</sup> The IEEE sub-committee approved the first 802.11n draft in early 2006.

<sup>2</sup> *Wi-Fi Certified 802.11n Draft 2.0: Taking Wi-Fi to the Next Level*, Wi-Fi Alliance, May 2007

Approximately 78 percent of the Wi-Fi users in the U.S. (mostly consumers) say they are interested in upgrading their systems with newer technology like 802.11n to get improved range and/or throughput, according to research conducted by the W-Fi Alliance, a nonprofit international association formed in 1999 to certify interoperability of wireless local area network (WLAN) products based on IEEE standard and specifications.<sup>3</sup> Nearly 70 percent of those polled said that a faster Wi-Fi connection would also push them to more advanced multimedia and video-rich applications.

More than 195 million 802.11n chipsets are expected to be shipped worldwide next year, which is better than half the total number forecast, according to market researcher In-Stat. 802.11g will continue to dominate the Wi-Fi chipset market through 2008, although 802.11n will take the lead in 2009, says In-Stat.

Factors driving the adoption of 802.11n Wi-Fi include an increased demand for voice over IP (VoIP) technology – especially with the emergence of Wi-Fi and cellular enabled mobile devices; further development of location-aware mobile applications, that can be used remotely or within an office or factory; and the evolution of Wi-Fi radio frequency identification (RFID) technologies, which can be used to tag products and track shipments both inside and outside a warehouse.

Compatibility with existing legacy systems should not be an issue, since groups like the non-profit Wi-Fi Alliance are working to test and certify emerging 802.11n devices. The Wi-Fi Alliance membership presently includes more than 300 member companies from more than 20 countries worldwide.

The Wi-Fi Alliance began testing and certifying 802.11n Draft 2.0 products in June, looking at such things as the technology's compliance with commonly accepted Wi-Fi

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<sup>3</sup> Study conducted by Kelton Research and the Wi-Fi Alliance.

security protocols and backwards compatibility with existing 802.11 a/b/g products. Fully-certified Products based on 802.11n Draft 2.0 are expected to arrive this year.

Despite these efforts and the promise of 802.11n, however, there is a great deal of skepticism among enterprise users who are concerned with such things as the compatibility of early 802.11 Draft-N products, the impact these products and final 802.11n-certified products might have on existing Wi-Fi networks and applications, 802.11n's impact on existing wired networks, network security issues, and compatibility with existing network deployment and management tools.

Network managers are also concerned about how the increased flow of data allowed by 802.11n devices will impact existing controller and access point technology. Products based on the draft version of 802.11n promise to up to five times the throughput and up to twice the range of those based on previous standards, says the Wi-Fi Alliance.

Another concern is the additional power requirements of multiple antennae technology and 802.11n and how this might affect current 802.3 Power over Ethernet (PoE) limitations. The current IEEE 802.3.af standard maintains a maximum power draw of 15.4 watts, although the proposed IEEE 802.3at standard may at least double that amount and provide power management capabilities that are more in tune with the requirements of 802.11n technology.

This white paper will address these issues and explore some of the inherent performance benefits of 802.11n wireless technology as it compares with existing 802.11a/b/g architectures. More important, the paper will also focus on how businesses can now take advantage of products based on early releases of the 802.11 specification (final ratification of the standard by the IEEE committee is not expected until early 2009) without risking legacy compatibility or future wireless expansion plans.

### **Wireless as a Competitive Edge: More Performance Equals More Productivity**

There is no question that businesses will eventually have to upgrade their wireless infrastructures to accommodate the greater bandwidth and throughput capabilities of next-generation networks and remain competitive.

Because of its speed and performance benefits, 802.11n is positioned to play a major role as enterprise users make more use of collaborative and converged applications that mingle voice, data and video along a single wireless stream. The technology will, for example, make it possible for companies to expand the use of real-time video feeds across an enterprise campus, effectively doubling the range and adding the benefit of WPA security.

The speed and reliability of 802.11n also positions it as an even more as a cost-effective alternative to traditional CAT cabling and potentially a competitive option to fiber optics.

The technology will also be pivotal as the number of public wireless hot-spots approaches 180,000 worldwide by the end of 2007<sup>4</sup>, providing even more wireless conduits for mobile workers and field force personnel.

*Nearly 80% of the current users of Wi-Fi technology already show an interest in upgrading their existing networks to 802.11n.*

- Kelton Research

This puts 802.11n in the unique position of providing a substantial upgrade to current wireless networks now, and evolving and offering even more benefits in the future as the specification is refined and finalized. It essentially delivers on the wireless promise without the risk of pain.

In order to fully appreciate the features and benefits of 802.11n and recognize its advantages over existing 802.11 a/b/g technologies, however, it is useful to look at the benefits of wireless in general as a performance and productivity tool in the workplace.

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<sup>4</sup> ABI Research, *Wi-Fi Hotspot Market Data*

Nearly every mobile PC shipped today is equipped with an embedded Wi-Fi capability, says market researcher In-Stat. This equates to roughly 84 million Wi-Fi enabled PCs shipped worldwide in 2006, and an expected 110 million this year. This sets the stage for 802.11 wireless as a standard utility within most businesses.

While many companies deploy restricted internal wireless networks as a convenience for customers and suppliers, most rely on secure 802.11 wireless networks to connect workers within a building or across a campus-wide environment.

These wireless networks provide fast and reliable access to critical business information at the *point-of-need*, whether it is in a conference room, on the manufacturing floor, or in a hospital operating room. In fact, wireless has become a key information systems element in such industry segments as healthcare and education because of its ability to provide quick and secure access to internal data and the Internet from any point within a wireless network (*See Wireless in Action Profiles*).

The basic strategic benefits of wireless within the workplace include:

- Improved worker productivity, since data can be accessed from anywhere within the wireless network;
- Faster access to email and messaging systems, which enhances the decision making process among employees;
- Improved communications and collaboration, through wireless email and collaborative applications;
- Faster response to customer queries and requests, which enhances customer relations and can boost revenue;
- Improved accuracy and a reduction in errors, since data can be input immediately and can be shared among co-workers.

Next-generation wireless networks, like 802.11n, will also play a pivotal role in the evolution and use of technologies such as voice over IP (VOIP), which is being adopted by many companies to supplement or replace existing landline phone systems (*See Related Article*).

Revenues generated by next-generation voice and intelligent IP multimedia subsystem (IMS) equipment is expected to double through 2009, rising from roughly \$2.5 billion in 2005 to \$5.8 billion, according to Infonetics Research.

Voice over Wi-Fi (VoWiFi) systems can be a cost-effective alternative to conventional telephone networks, since they make use of flexible and globally-available IP networks and therefore eliminate the installation and operational costs associated with wired and cellular telephone systems.

However, VOIP is a time-sensitive application and might create some performance issues when used within the same wireless network designed for data access. The higher speeds and performance benefits offered by emerging 802.11n and current Draft-N systems can easily accommodate voice and data traffic across a wireless network, with little or no impact on capabilities and functions.

The faster speeds and higher reliability offered by 802.11n also becomes a critical requirement as more companies make use of multimedia-rich applications, business-oriented social networking services, and real-time collaborative team networking.

### **MIMO and 802.11n: A Multi-Faceted Partnership**

The higher speed and reliability offered by 802.11n networks are the key reasons why most companies will integrate Draft 2.0 products into their wireless networks today as a first step to eventually transitioning their entire network once the 802.11n specification is

## **Wireless in Action: Healthcare**

### ***Providing Access to Critical Information at the Point of Patient Care***

A number of factors are fueling the adoption of secure and reliable 802.11 wireless technologies in the \$1.5 trillion healthcare industry. One key motivator is increasing demand by doctors, nurses and other healthcare professionals to extend access to patient information services right to the 'point of patient care', which may be bedside or in a hospital operating room.

Doctors and nurses at leading hospitals throughout the U.S. and the world presently use 802.11 wireless networks to do everything from collecting initial information from patients in a hospital waiting room to relying on Wi-Fi enabled voice over IP (VoIP) systems to communicate with other doctors during critical surgical procedures.

A number of hospitals also use wireless networks to not only connect wireless enabled notebook and handheld PCs within a hospital, but to track expensive assets within a healthcare facility such as wireless computers-on-wheels (COWs). At Palmetto Health, a not-for-profit healthcare collaborative in South Carolina, for example, doctors and administrators use a wireless networks at each of the hospital's three locations to support clinical applications and allow healthcare professionals to create and access patient records and files from any one of the 1,300 beds in the hospital collaborative.

The Palmetto Health wireless solution is presently based on Bluesocket® BlueSecure™ 2100 and 5000 Controllers, and includes more than more than 400 wireless access points installed throughout the three hospitals in the Palmetto Health group.

Benefits of wireless networks in hospitals include:

- Improved relationships with patients and other healthcare professionals through immediate access to medical information;
- A reduction in errors because doctors and nurses input critical data on the spot as opposed to entering that data later at hardwired computer station;
- Improved time management and interaction among medical personnel due to seamless mobility across hospital networks and subnets, role-based access control and policy enforcement, real-time monitoring and intrusion detection, and enterprise-level IPsec data encryption and protection;
- Improved bandwidth management, Quality of Service (QoS), and multi-level access control that allow hospitals to securely manage wireless users within a specific RF environment and control access to sensitive and non-sensitive information.
- More reliable control of highly sensitive patient and medical information and compliance with strict HIPAA regulations through the management and control facilities of wireless networks offered by vendors like Bluesocket, Inc.

ratified. However, an important element in these higher-performance networks is MIMO, which is an advanced antenna technology that is well suited for 802.11n, but also works with current 802.11 a/b/g networks.

Basically, MIMO technology employs multiple antennae and radios operating on the same or multiple channels to wirelessly exchange information from Point A to Point B within a network. But, it is important to remember that MIMO is more than just additional antennae. The technology is designed to deliver improved range and throughput, and eliminate many of the signal problems that are common to traditional 802.11 a/b/g systems.

MIMO also uses spatial multiplexing techniques to extend the capabilities of systems beyond the boundaries of frequency and time, to achieve actual transmission speeds of 100M bits/second or more, and theoretical speeds as high as 600M bits/second (bps) when deployed in an 802.11 array, according to independent tests.

### **A Next-Gen 802.11 Technology Primer**

Enterprises looking to adopt next-generation wireless technology into their networks currently have the following choices to consider:

- **802.11n** – An IEEE-ratified standard that will define both client and access point (AP) radio technology, and push Wi-Fi performance up to the 100Mbps throughput level. Although the final standard is far from being completed, we may see speeds well above 100Mbps, depending on what technology and methods are finally adopted.
- **Draft-N** – Since the IEEE doesn't expect ratification of 802.11n until 2008, the Wi-Fi Alliance, an industry group that certifies equipment for interoperability, has put in place a Draft-N certification program that effectively eliminates any questions or concerns about future interoperability and compatibility. Equipment purchased today that adheres to the Draft-N specification will be compatible with the final 802.11n specification, or can be software-upgraded to comply. Draft-N should not be the same as Pre-N (see below).
- **Pre-N** - Many home systems are called Pre-N because their technologies are based on very early 802.11n drafts. However, there is no such thing as conforming to a non-ratified standard and, as such, Pre-N users may run into interoperability concerns and poor performance results when N is ratified.
- **MIMO** – An acronym for Multiple Input Multiple Output. MIMO products use several antennas to send and receive signals simultaneously, while using digital signal processing to sum the signals together. MIMO products operate using standard 802.11a/b/g radios and provide the performance boost that is expected with N products, but with equipment that is being made available in enterprise-class APs today.

Since MIMO uses multiple antennas (typically three), which send and receive signals simultaneously, it provides a better propagation of the signal in difficult radio frequency (RF) environments – which in a typical office building might include metal support columns or shelving, or elevator shafts. These physical obstacles create multi-path interference, resulting in reflections, refractions, echoes, coverage holes or dead spots.

MIMO overcomes these problems by gathering information from all of the signals sent and collected by its multiple antennae and reconstructing this information into a single ‘super signal’ that can easily punch through interference and ‘dead zones’ within a network. 802.11n Draft 2.0 networks also offer built-in Quality of Service (QoS) intelligence that can identify data streams affected by latency delays (most often associated with multimedia-rich data and VoIP applications) and give them priority in the network to improve performance.

MIMO also works with standard 802.11a/b/g clients, so enterprises don’t need to purchase and deploy special WLAN cards. Additionally, it serves as a layer on top of standard 802.11a/b/g radios, so all existing Wi-Fi monitoring and security applications should work with 802.11n.<sup>5</sup> Because of the nature of MIMO and 802.11n technology, however, a new generation of site survey tools will eventually be needed in order to get the full performance benefits promised by a predominantly 802.11n environment.

Just as a chain is as strong as its weakest link, however, MIMO won’t perform any faster than existing 802.11 a/b/g systems – which means theoretical speeds up to 54M bits/second and actual speeds ranging from 20M to 25Mbps. But, MIMO will deliver better throughput across a network, provide a more reliable solution for multi-path problems, and will be easier to deploy since the multiple antenna technology avoid a lot of site survey and ‘hit and miss’ deployment concerns and expenses.

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<sup>5</sup> *Wi-Fi Certified 802.11n Draft 2.0: Taking Wi-Fi to the Next Level*, Wi-Fi Alliance 2007

## Wireless in Action: Education

### *Educators View Wireless Networks as an Integral Learning Asset*

When administrators at Elgin Community College first decided to install a wireless network for students and faculty at this suburban Illinois university, plans were to provide access only to those areas where students and faculty regularly congregated. However, once the system started to take shape and was used, the IT staff quickly expanded the system to cover nearly every inch of the 145-acre campus.

Elgin presently has close to 30 BlueSecure access points (APs) in its network, all of them managed by a single Bluesocket, Inc. controller. Connections between the school's main campus and a downtown location are also managed through a high-speed fiber link, also managed by the BlueSecure Controller. The wireless network complements the university's wired network, and is capable of supporting emerging technologies like voice over IP (VoIP) telephone systems.

Not surprisingly, colleges and universities are major users of wireless networks, which provide flexible Internet access to students and secure connections into sensitive databases and administrative systems. Many schools install a basic Wi-Fi network as a convenience for students and faculty, but quickly migrate wireless nets into classrooms, libraries, and even on-campus sports stadiums.

Wireless LANs provide a secure and reliable method to offer a wider range of academic and collaborative services to both students and faculty across different campus environments. Naturally, these networks must be secure, especially if linked to an existing wired network. Bluesocket BlueSecure Controllers employ reliable authentication and policy-based user access safeguards, as well as tools that protect a network against viruses and malicious code.

Bluesocket Controllers and edge-to-edge management tools provide administrators with the ability to monitor and control bandwidth use within the network, which is key to minimizing illegal downloads and file sharing among students, and protecting an institution against possible violations. They are also at the center of evolving collaborative education applications that are restructuring the way students and faculty interact with one another and courses are taught.

Some of the universities that presently rely on Bluesocket wireless networks include:

Harvard University  
Florida State University  
Colgate University  
University of Massachusetts - Amherst, MA  
Rutgers University  
Vanderbilt University Law School  
Missouri Southern State University  
University of Missouri – Kansas City  
University of Rhode Island  
Southern Connecticut State University  
University of Michigan  
University of Pittsburgh  
Fordham University (New York, NY)  
London School of Economics  
University of Salzburg (Austria)

## Mapping Out a Strategy for MIMO

When deploying Wi-Fi networks, designers typically look at how much area a given AP will cover at the highest data rate (54Mbps) and the lowest data rate (6Mbps). At the 54Mbps data rate, an 802.11a/b/g MIMO AP increases coverage by 35 percent over a non-MIMO AP. At the 6Mbps data rate, an 802.11a/b/g MIMO AP increases coverage by a dramatic 329 percent over a non-MIMO AP. This means users can have much better

throughput over a greater area and enterprises can deploy fewer APs to cover an equivalent area, reducing equipment costs. While theoretical coverage and utilizing multi-path are great reasons to add MIMO technology to standards-based APs, the advantages can become more pronounced in real-world tests.

*The most important reason for Draft-N adoption...is its compatibility with existing Wi-Fi networks since it offers a clear and measurably improved upgrade path for current Wi-Fi legacy networks*

Bluesocket, Inc. was first company to offer an enterprise-class MIMO access point, the BlueSecure Access Point (BSAP) 1700. The device operates on conventional 802.11 a/b/g networks, offering improved range and throughput while paving the way for 802.11 Draft-N and full 802.11n deployment in the future.

Revenues from shipments of other Draft-N wireless routers and client devices exceeded \$150 million since the products became first available in the second quarter of 2006.<sup>6</sup> This figure is expected to increase substantially as vendors reduce prices for Draft-N products and the Wi-Fi Alliance continues efforts to certify products that are based on 802.11n Draft 2.0.<sup>7</sup>

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<sup>6</sup> Dell'Oro Group, 2007

<sup>7</sup> Wi-Fi Alliance Test Suite, [http://www.wi-fi.org/pressroom\\_overview.php?newsid=545](http://www.wi-fi.org/pressroom_overview.php?newsid=545)

## **802.11n Adoption Strategies: Planning Today for Performance Benefits Tomorrow**

One of the biggest concerns with 802.11n Draft-N products and technologies is compatibility with the final 802.11n specification expected to come in 2009. Not surprisingly, this concern may cause many companies lay initial or pilot purchase decisions for Draft-N products if they believe there is some risk these products will not be totally compatible with the final standard.

Unlike earlier drafts, the 802.11n Draft-2.0 specification has been accepted by the Wi-Fi Alliance and they are in the process of certifying products against the mandatory aspects of the draft. This means that the path from Draft-N to final 802.11n products will be relatively seamless and most likely, accomplished with a field configurable firmware upgrade.

As mentioned earlier, there are some legitimate concerns about the impact 802.11n will have on existing technology and the management of wireless systems in general as it channels up to 10 times the data of conventional technologies networks at higher speeds across a network. The most likely solution is to disperse the centralized ‘intelligence’ and management capabilities of a controller across the entire network to include ‘smart switching’ directly at the APs.

Wireless systems that are best suited to take advantage of the higher-speed and higher-volume capabilities of 802.11n may want to take an edge-based approach to network control and management, delegating control and hand-off responsibilities directly to the APs within the network. Other key capabilities, such as role-based access control and policy management, also take a ‘controller-to-edge approach and in doing so can keep pace with the inherent benefits of 802.11n.

For the moment, Draft-N technology and MIMO remain the only solutions available for enterprises that need to significantly enhance the performance of their WLANs today.

The technology's support for existing 802.11a/b/g clients provides users with more choices, allowing them to protect their current infrastructure and establish a legacy bridge to the future.

Rather than delaying the adoption of 802.11n until the standard is ratified, enterprise users should take a *phased approach* to incorporating Draft-N products into their existing networks to take advantage of the incremental speed and performance improvements of the technology and pave the way for a more extensive deployment in the future.

In order to achieve the maximum benefit now, these phased-in approaches should focus on eliminating existing *trouble spots* within an existing wireless network. For example, the multi-path capabilities of 802.11n Draft 2.0 products can be used to eliminate areas where there is a high concentration of electronics equipment, such as in hospitals. As more 802.11n products are integrated into existing systems, network administrators may find they can cut back on the number of conventional 802.11 a/b/g APs because of the more robust nature of 802.11n.

Benefits of integrating 802.11 Draft-N products and MIMO technology into existing systems – creating a mixed mode environment - include:

- Immediate speed and performance improvements, although limited by the capabilities of existing 802.11 a/b/g equipment;
- Improved reliability and wireless coverage, especially in challenging environments that include physical obstructions;
- Faster and less complicated deployment and positioning of wireless APs throughout an office or building, while still using current wireless test and measurement tools;
- Compatibility with existing Wi-Fi technologies (legacy coverage), while at the same time 'future proofing' networks for eventual upgrades;
- Familiarity with the capabilities of 802.11n, through pilot projects and early testing of the technology's capabilities.

## **VoIP: A Viable and Affordable Alternative to Traditional Telephone Systems**

Improved reliability, better quality of service (QoS), a wider range of Wi-Fi connections both inside and outside the office, and emerging wireless platforms like 802.11n are just a few reasons why businesses worldwide have embraced voice over IP (VoIP) technology as a communications alternative to traditional phone services.

By 2009, there will be more than 55 million subscribers to VoIP services, says market researcher In-Stat, with the highest growth in Asia, South Korea, Hong Kong and Singapore. In Europe, a number of countries, including France and Italy, have also incorporated VoIP services as part of a communications 'triple play', reports In-Stat, further driving the spread of this technology.

Business in the U.S. have also recognized the benefits of IP-based voice communications, with two-thirds of the companies across the nation expected to have some form of wired or wireless VoIP service by 2011.

The emergence of faster and more robust wireless technologies, like 802.11n, is also driving demand for Voice over Wi-Fi (VoWiFi) systems that allow users with wireless-enabled notebook computers and personal digital assistants (PDAs) to engage in voice communications over wireless networks. These exchanges can also include telephones and telephone systems outside the wireless network when used with specialized software or some existing and standard messaging and email programs.

While VoIP technology can be used to replace the conventional telephone systems found in most small-to-medium-sized businesses, the trend right now is to utilize the technology to supplement and extend these systems and achieve some level of cost savings. For example, hospitals are increasingly using VoIP technology to replace expensive mobile phones and pagers, and extend voice communications to the point-of-patient care.

At least one hospital reports saving about 6,000 hours per year through the use of Vocera VoIP badges by its doctor and nursing staff. This equates to a cost savings of about \$105,000 per year. The system operates over a standard WiFi network deployed within the hospital.

While cost savings remains the primary reason why companies and individuals are making the switch to VoIP, there are other benefits to wired and wireless VoIP applications as well. These include:

- The productivity and time-saving benefits of being able to bypass centralized telephone networks and place calls directly to individuals or groups of people either locally or globally;
- The ability to relocate VoIP handsets and systems within a location by connecting it at any point in the data network, or using it within the boundaries of a wireless network;
- A wider variety of VoIP-enabled handsets and dual-mode communications devices, ranging from the pioneering Vocera Communications badges to VoIP-enabled phones that are designed to place and receive VoIP calls without connection to a computer;
- The development of closely-knit voice and data applications that allow users to easily transfer and reroute calls within a company or between branches (intelligent call routing) and handle a variety of messaging formats and technologies.

VoIP-enabled applications and services allow mobile work teams to communicate with one another anywhere and at any time, and reliably and securely exchange voice and data when channeled through controller (like Bluesocket's BlueSecure series) that can support high-throughput applications and provide edge-to-edge control and management.

As products based on the final 802.11n specification become available in Q1 and Q2 2009, most enterprises will begin to rapidly phase-out outdated 2.4GHz 802.11 b and g technologies in favor of 5GHz products, since 802.11n works better in this spectrum where there is less interference as compared with the 2.4GHz range.<sup>8</sup>

Early users of 802.11 Draft-N products and eventually fully-ratified and certified 802.11n technologies will also see a significant positive impact on wired networks, since 802.11n provides gigabit Ethernet speeds – more in tune with wired network capabilities. The speed and performance characteristics of 802.11n also make it a very suitable *convergence partner* for evolving technologies like fixed and mobile WiMAX, which are positioned to be the central architectures in metro-wide wireless deployments and a formidable competitor to high-speed cellular networks.

*As products based on the final 802.11n specification become available in Q1 and Q2 2009, most enterprises will begin to rapidly phase-out outdated 2.4GHz 802.11 b and g technologies.*

- Farpoint Group

### **Conclusion: Taking a Sooner Rather than Later Approach to 802.11n Adoption**

There is no question that businesses will have to eventually upgrade their wireless infrastructures to accommodate the greater bandwidth and throughput capabilities of next-generation and software as a service (SaaS) applications, as well as high-load voice and IP-based solutions. This means that 802.11n is not only a logical evolutionary growth path, but also will ultimately be the primary WLAN infrastructure as enterprises migrate toward converged high-speed wireless networks.

Even though Certified 802.11n Draft 2.0 products will be compatible with the final 802.11n specification, due in about 18 months, most experts advise against taking a ‘forklift’ or wholesale replacement approach to deployment. Rather, companies with existing wireless networks should consider a gradual phase-in of early 802.11n products

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<sup>8</sup> Farpoint Group, [www.farpointgroup.com](http://www.farpointgroup.com)

to immediately improve the speed and performance of these networks and pave the way for a complete transition to 802.11n when products based on the final specification are available

Bluesocket's current and evolving technologies support this gradual approach to 802.11n networking and is working with organizations like the Wi-Fi Alliance to assure that the products available today will work with final 802.11n technologies. The key factor at this point is to support existing legacy wired and wireless systems while taking advantage of the inherent speed and performance benefits of 802.11 Draft-N and MIMO technologies.

The most obvious reason for deploying Draft-N products now are the speed and performance benefits associated with 802.11n, which include theoretical transmission speeds approaching 600Mbps and actual speeds of 300M – 400Mbps in everyday environments (Gigabyte Ethernet performance). Wireless APs and other devices (when paired with multiple-antennae MIMO technology) that are based on 802.11 Draft-N are also less susceptible to interference issues common to most enterprise installations, and are more easily deployed within an existing network (using currently-available testing and measurement tools).

Since 801.22 Draft-N makes use of more wireless spectrum and avoids *channel bonding*, or being restricted to one or more channels, the technology easily outperforms 802.11g and 802.11a networks.

The most important reason for Draft-N adoption today, however, is its compatibility with existing Wi-Fi networks, since it offers a clear and measurably improved upgrade path for current Wi-Fi legacy networks. This compatibility extends to the security of the wireless network, since 802.11 Draft-N is operationally *in sync* with WPA and vendor-specific security tools and techniques.

Bluesocket's BlueSecure Controllers are fully compatible with coming 802.11 Draft-N access point technology, which means companies interested in deploying Draft-N can take advantage of the company's **Secure Mobility**® technology for wireless data and voice applications. Enterprises can deploy reliable, policy-based WLAN security and management tools across their 802.11 a/b/g and wireless networks to maintain control and restrict user access.



For more information please contact Bluesocket at 866-633-3358 or [sales@bluesocket.com](mailto:sales@bluesocket.com).