

Wi-Fi CERTIFIED™ n: Taking Wi-Fi® to the Next Level



Wi-Fi Alliance
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It's no secret that over the past several years, Wi-Fi has transformed the way people connect – at work and at play. Wi-Fi is easy to use, affordable, and provides a great way to connect to the Internet at home, in the office and on the go. Half of US consumers recently said they would never consider buying a phone, notebook or other digital device that doesn't include Wi-Fi.¹ In fact, in 2010 consumers will purchase over 55 million Wi-Fi connected products.²

Wi-Fi isn't just for connecting a notebook computer to a network anymore. Wi-Fi enabled phones, gaming devices, MP3 players, TVs, and other entertainment products have been entering the market recently, and this trend is growing rapidly. Wi-Fi technology has evolved over the past 10 years to be faster and reach farther than ever before. The newest version of Wi-Fi is 802.11n.

802.11n is a breakthrough technology that enables Wi-Fi networks to do more, faster, and over a larger area. 802.11n Wi-Fi provides the very best connection available for computer networking and home entertainment applications alike – delivering the range, bandwidth, and performance today's multimedia applications and products demand.

The latest industry certification for 802.11n is called **Wi-Fi CERTIFIED n** and is the consumer's indication that a product has passed rigorous testing and can deliver the very best user experience. The certification program tests products based upon the approved 802.11n standard and offers a variety of features based upon the desired application and performance of each product. In fact, as a group, Wi-Fi CERTIFIED n devices can deliver five times or more speed and up to twice the range of older Wi-Fi standards.



Because the industry has been very eager to bring advanced Wi-Fi technology to market, many companies have worked with the Wi-Fi Alliance® for the past two years to test and certify products to a preliminary set of 802.11n standards, called Wi-Fi CERTIFIED 802.11n draft 2.0. There are more than 700 products already on the market certified to these standards – and they will interoperate with the new Wi-Fi CERTIFIED n products in the same frequency band, even if they use different features.

What Can Wi-Fi CERTIFIED n Do For You?

Whether you are traveling by air, checking email down the street at your favorite coffee shop, engaged in an online video game, or simply relaxing in your back yard, Wi-Fi CERTIFIED n can offer you what you need most – the best connection to the people and applications you need right now.

The digital home has become a reality for most of us. We have multiple computers, TVs, video and audio systems, communications devices, gaming devices, digital picture frames and more in every

¹ Wi-Fi Alliance/Wakefield Research, 2009

² Parks Associates, 2009

room of our home. And they talk to each other. In fact, by 2011, over 300 Million households worldwide will have installed home networks.³

You want access to all your information from any of these devices – and you’ll want to move it around quickly and easily. And let’s not forget that there may be many people in your home or on the same network trying to perform all these tasks at the same time. Wi-Fi CERTIFIED n has the increased performance and advanced features to solve all these issues.

Extend Wi-Fi’s Reach Throughout Your Home

Wi-Fi CERTIFIED n wireless routers or access points blanket the whole home in a strong Wi-Fi signal, delivering up to twice the range of previous-generation networks based on 802.11 a/b/g standards. From the attic playroom, to the living room, to the kitchen, to the backyard, an 802.11n Wi-Fi signal can reach all the places a consumer might want to connect. “Dead spots” are dramatically reduced, and even multimedia applications that require a lot of bandwidth can run effortlessly throughout the house.

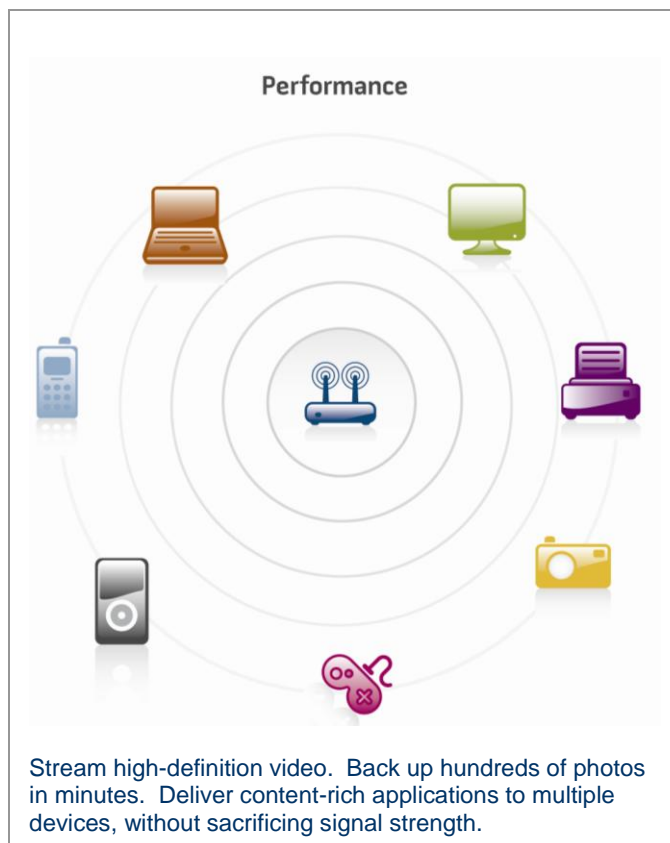
Share a Network Connection Without Sacrificing Signal Strength

Today’s digital home has numerous devices connected to the network – in North America almost 50% of consumers use home networks for more than sharing Internet access.⁴ From the family PC, game console, or Blu-ray DVD player, to the hard drive that stores thousands of songs and pictures, to a digital camera, printer, or HDTV, today’s home Wi-Fi network is subject to demands from numerous devices. Wi-Fi CERTIFIED n products can deliver enough bandwidth to support these demands and more – a “fat pipe” to let everyone connect at the same time and still enjoy things like digital music, streaming video, and online gaming without compromising on the user experience.

Performance and Speed for Next-Gen Applications

The Wi-Fi CERTIFIED n network accommodates content-rich applications. Moving large files around the home network seems effortless. For example, an entire family can enjoy a movie stored on a PC by streaming it to the TV in the living room. Parents can back up a large library of music and photos to an external storage device in minutes instead of hours. Or the kids can defeat the forces of evil in an online game without having to wait for the network to catch up to their acts of heroism and daring.

Wi-Fi CERTIFIED n has the capacity to deliver a wide variety of content-rich applications – and the intelligence to manage prioritization so that a movie doesn’t suffer interference because someone



³ In-Stat, September 2009

⁴ In-Stat September 2009


upstairs is sending a large email attachment. Get Wi-Fi CERTIFIED n for your digital home and beyond. Learn more at www.11nbasics.org.

Where Does Wi-Fi CERTIFIED n Get Its Superpowers?

Wi-Fi CERTIFIED n has several new technological features that enable it to deliver up to five times the speed and twice the range as previous-generation Wi-Fi technologies. Some of them are described here.

Wi-Fi radio signals bounce off of walls and obstructions just like sound waves do. Previous generations of Wi-Fi gear do not use echoes to improve their performance, so they are designed to “tune out” all but the strongest signal they detect. In contrast, Wi-Fi CERTIFIED n devices use the echoes to make the signal stronger and faster. This is why signals get around obstructions and go farther – eliminating dead spots and making it possible to connect even on the back patio.

All Wi-Fi CERTIFIED n networking devices and many client devices like laptops make use of multiple spatial streams to send and receive more than one communication signal simultaneously. This is similar to adding lanes on a highway – it provides additional capacity for data traffic. This “multiple-in, multiple-out,” or MIMO technology, multiplies the performance of the Wi-Fi signal, and is reflected in the two, three, or even four spatial streams found on some Wi-Fi CERTIFIED n networking devices (routers or access points). Look for details on Wi-Fi CERTIFIED n product packaging to determine how many spatial streams are featured in a particular product. You may find a matrix such as the one shown here that describes both the frequency band and the number of transmit and receive streams that have been tested.



Tested Spatial Streams	Dual-Band Selectable	
	2.4GHz	5GHz
Transmit	3	3
Receive	3	3

www.11nbasics.org

Not all the tasks undertaken on a network are created equal. Watching movies, playing video games or listening to music are especially sensitive to small interruptions or delays. Wi-Fi CERTIFIED n products are designed to help limit delays (called “latency”) in multimedia data streams – which reduces problems like distortion on voice calls and incomplete video graphics in gaming applications. A Wi-Fi CERTIFIED n network has built-in intelligence (called Quality of Service, or QoS) to recognize data streams that are affected by these delays and give them priority on the network to preserve the best multimedia user experience. There is no extra configuration required to enable this feature.

The performance of a product is also determined by the vendor’s choice of optional features. Wi-Fi CERTIFIED n offers a sophisticated set of optional features that may be implemented, giving you a wider range of choices in performance and value, depending upon the function the product is intended to perform. If a Wi-Fi CERTIFIED n product contains these features, you can be assured that they have been tested against the industry standards to ensure that they also meet the highest levels of security, compatibility, and feature operation.

The optional features that provide the broadest benefit across uses are multiple spatial streams, aggregation (for more efficient transmissions), wide channels for higher data rates and an enhanced coding technique called Space Time Block Coding that can improve throughput at range. The Wi-Fi Alliance has created three specialized versions of the Wi-Fi CERTIFIED logo to help consumers identify products with these valuable features.

Wi-Fi vendors will offer a range of products with various features to suit the needs of a particular device, application or market. For more details on these specialized product designations, visit www.11nbasics.org.

Tested. Trusted. Wi-Fi CERTIFIED n.

The companies that make Wi-Fi gear have come together to develop a globally-recognized certification program for Wi-Fi products. The Wi-Fi Alliance began certifying products in March 2000. To date, the Alliance has certified more than 6,000 Wi-Fi-enabled laptops, printers, routers, cameras, phones, and more. Only products which have passed rigorous tests in an independent test laboratory can display the Wi-Fi CERTIFIED logo and name. Consumers should always look for Wi-Fi CERTIFIED when purchasing Wi-Fi enabled products.

Since June 2007, the Wi-Fi Alliance has been testing and certifying 802.11n draft 2.0 products. With the launch of the Wi-Fi CERTIFIED n program, more than 700 products previously certified to the draft standard are now considered to meet the Wi-Fi CERTIFIED n standards as well. The Wi-Fi Alliance will now begin testing and certifying products to higher standards and including testing of the optional feature sets associated with Wi-Fi CERTIFIED n.

Manufacturers may label products as “wireless-n” or “Wi-Fi-n,” but if they are not Wi-Fi CERTIFIED n, they have not been through certification testing, and may not conform to all of the requirements in the standards specification.



Interoperability

Interoperability means that products from different manufacturers work well together, so users don't get locked into a single brand of Wi-Fi products. Any of the more than 300 member companies of the Wi-Fi Alliance can submit products for certification, which means that consumers can choose from plenty of great products, and can mix-and-match Wi-Fi CERTIFIED products with the confidence that they will work together. The buyer simply needs to ensure that they are purchasing products that operate in the same frequency band.

Wi-Fi CERTIFIED n products may be tested and certified for operation in either the 2.4GHz or 5GHz frequency

band, or both. Product labels will identify which frequency is compatible with the product. Consumers should always check to make sure that the product they purchase operates in the frequency band they are using.

Backward Compatibility

Although 802.11n is the very latest in Wi-Fi technology, there's no doubt that consumers will have legacy devices (802.11a, b, g, or draft-n) on their home networks that they will want to connect as well. Wi-Fi CERTIFIED n products work with 802.11a/b/g/draft-n gear too, though users won't get all of the performance benefits of Wi-Fi CERTIFIED n when using it with older Wi-Fi products.

Consumers should use the Wi-Fi CERTIFIED logo to determine which earlier Wi-Fi standards are supported by a particular product.

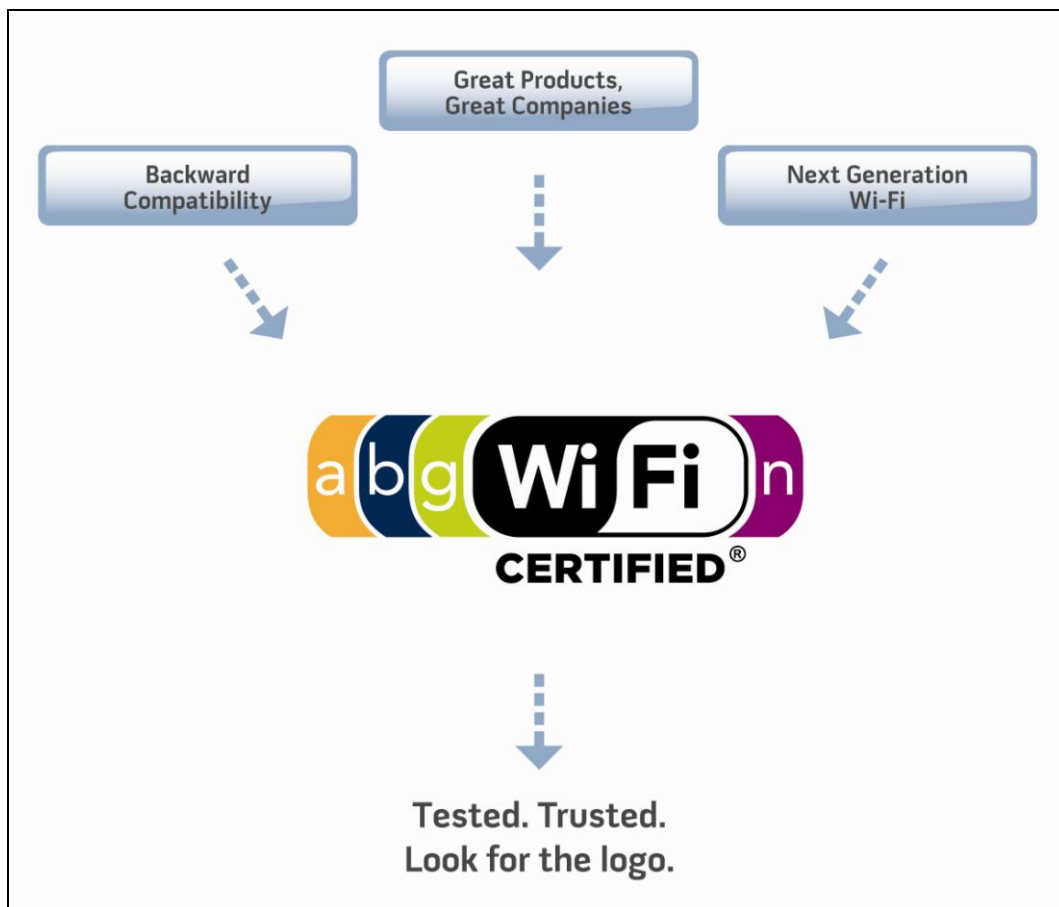
Security

Wi-Fi CERTIFIED n products have the very latest generation of security protections on board. WPA2® (Wi-Fi Protected Access) security is standards-based and government-grade – plenty of protection for a home Wi-Fi network. WPA2 is designed to help ensure that only authorized users can connect to the network, and then encrypts the data that travels over the Wi-Fi network so that privacy is maintained.

Consumers should always turn on the security features in any Wi-Fi product. Products that also feature the Wi-Fi Protected Setup™ certification have the very easiest setup of a protected home network that is supported by multiple vendors – making it possible to configure a security-enabled network at the push of a button or with a short Personal Identification Number (PIN).

Look for the Wi-Fi CERTIFIED Logo

The Wi-Fi CERTIFIED n logo is the consumer’s best assurance of an interoperable, backward-compatible product with security protections in place. Consumers should always look for the logo on product packaging and should always buy Wi-Fi CERTIFIED products to be sure their devices operate together seamlessly, include the latest security features, and are good neighbors to other Wi-Fi equipment.



Wi-Fi CERTIFIED n products may carry a logo that also describes which optional features have been tested in a product. For instance, a product may have “dual-stream n” or “multi-stream n”

which indicates that the optional features required to deliver up to five times the throughput are present. See www.11nbasics.org for more details on how the features in “dual-stream n” and “multi-stream n” products can enhance throughput and range. The difference between these two logos is that “multi-stream n” products must support at least three spatial streams while “dual-stream n” products are only required to support two. You can quickly assess the match of a Wi-Fi CERTIFIED n product to your needs by the specific logo it contains.



dual-stream n



multi-stream n

Typically, the more streams, or highway lanes, a network uses, the more traffic it can handle. For example, if you are streaming video, downloading movies, or running high level gaming graphics, you should look for network products that contain two or more transmit and receive streams. But if you are simply sharing photos, updating email and Facebook pages, or running home finance update applications any Wi-Fi CERTIFIED n product may be more than sufficient to handle your needs.

The number of users on your network will also affect the number of streams you need to handle your network traffic. If multiple users in a household will want to access the network during the same time of the day, you may need more transmit and receive streams to let mom download recipes, the kids access homework assignments, and teenagers download their new favorite videos all at the same time. Your local retailer can assist you with matching your needs to the right network products.

Manufacturers may also identify access points that contain some of the features of Wi-Fi CERTIFIED n, but only have a single stream of communication (not dual-stream or multi-stream) with the corresponding logo. This indicates that the product is Wi-Fi CERTIFIED to previous standards, and also contains some of the features of Wi-Fi CERTIFIED n. These products may be referred to as “wireless-n” or “Wi-Fi n” by the manufacturer, but are classified as Wi-Fi CERTIFIED a or b/g for certification purposes.



with some n features

Learn More about Wi-Fi CERTIFIED n

Wi-Fi CERTIFIED n products will transform the networked home, supporting content-rich applications, reaching farther and going faster, and providing choice across a wide range of manufacturers. Learn more about this exciting technology. Consumers and retailers should visit www.11nbasics.org to view quick video tutorials about Wi-Fi, download a shopping guide, find certified products, and more.



About the Wi-Fi Alliance

The Wi-Fi Alliance is a global non-profit industry association of hundreds of leading companies devoted to the proliferation of Wi-Fi technology across devices and market segments. With technology development, market building, and regulatory programs, the Wi-Fi Alliance has enabled widespread adoption of Wi-Fi worldwide.

The Wi-Fi CERTIFIED™ program was launched in March 2000. It provides a widely-recognized designation of interoperability and quality, and it helps to ensure that Wi-Fi enabled products deliver the best user experience. The Wi-Fi Alliance has completed more than 6,000 product certifications to date, encouraging the expanded use of Wi-Fi products and services in new and established markets.

Wi-Fi®, Wi-Fi Alliance®, WMM®, Wi-Fi Protected Access® (WPA), the Wi-Fi CERTIFIED logo, the Wi-Fi logo, and the Wi-Fi ZONE logo are registered trademarks of the Wi-Fi Alliance; Wi-Fi CERTIFIED™, Wi-Fi Protected Setup™, Wi-Fi Multimedia™, and the Wi-Fi Alliance logo are trademarks of the Wi-Fi Alliance.

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