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Intel Special Edition

Next-Gen 802.11ac Wi-Fi

FOR
DUMMIES[®]
A Wiley Brand

Learn to:

- Rev up your Wi-Fi experience
- Stream more videos simultaneously
- Support more devices
- Future-proof your next device investment

David Angell



Welcome to your supercharged Wi-Fi future — now

HD movies and videos, gigabyte photo and music collections, extreme games . . . today's digital content is bigger and better than ever. And now you (and many others!) are interacting with this content simultaneously on an expanding range of Wi-Fi devices, from smartphones, tablets, and laptops to consumer electronics and appliances. The Wi-Fi of yesterday is in gridlock with this overload and today's faster 802.11n is struggling to keep up.

Fasten your seat belts! With 802.11ac, the next generation of Wi-Fi has arrived to supercharge your connected experience with

- **More speed:** Up to six times faster, speedy enough to stream multiple Blu-Ray quality videos, Netflix movies, and YouTube videos simultaneously
- **More capacity:** Up to three times the capacity, so your Wi-Fi can handle more users, more devices, more high-quality video streaming, and bigger downloads
- **More coverage:** Better speeds and reliability at greater distances from your Wi-Fi access point, so you stay connected in more places
- **More battery life:** Transfers data more quickly, so your devices use less power and last longer between charges

This book is your practical "Connectivity Consciousness" guide to help you get 802.11ac smart and enjoy a supercharged connected experience.

Intel 802.11ac products are leading the next generation of supercharged Wi-Fi. Learn more at <http://intel.com/wireless>.

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by David Angell

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Next-Gen 802.11ac Wi-Fi For Dummies®, Intel Special Edition

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Chapter 1

Connecting to Your Digital Life

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In This Chapter

- ▶ Experiencing your congested, connected life now
 - ▶ Moving to the fast lane with 802.11ac Wi-Fi
 - ▶ Counting the ways 802.11ac will change your connected life
-

Today's digital life is all about connections. You connect to the *cloud* (the Internet) for everyday tasks such as working, searching, and shopping. You connect to communicate via email, LinkedIn, Facebook, Skype, and more. You connect to stream movies and videos from Netflix and YouTube and to share photo albums. And this is only the beginning of Wi-Fi connectivity. Now you (and many others!) are doing these activities simultaneously across and between laptops, tablets, smartphones, and a growing number of Wi-Fi enabled consumer electronics and even appliances.

Wi-Fi is essential to the connected life, but all this traffic from all these devices is clogging your connectivity. The Wi-Fi of yesterday is in gridlock and even today's faster 802.11n is struggling to keep up. Fasten your seat belts! With 802.11ac, the next generation of Wi-Fi has arrived, ready to put your connected life back in the fast lane.

About This Book

If you're thinking about buying a Wi-Fi enabled device or upgrading your Wi-Fi network at home, this is the book for you. In today's highly connected life, you can't afford to view Wi-Fi as an afterthought.

Think of this book as a practical "connectivity consciousness" guide designed to help you become Wi-Fi smart so that you can avoid underpowered Wi-Fi products and choose the best wireless experience for your connected life today and tomorrow.

This book includes three icons that highlight special information for easy recall:



This icon flags information that you should remember when making decisions.



You'll find shortcuts and recommendations when text sports this icon.



Watch out! This icon flags information that could cause you some trouble if you don't pay attention.

Your Wi-Fi Powered Life

Wi-Fi is so popular because it uses an unlicensed wireless spectrum (and is therefore free for public use) and is based on standards that ensure interoperability across devices, regardless of the manufacturer.

Through Wi-Fi, people are able to constantly connect at home, at work, and in public places such as airports and cafés. New devices have dropped their cables and added Wi-Fi to connect to the cloud and directly to each other.

No device is an island

The same wireless convenience that you enjoy in your mobile computing devices is driving the explosion of Wi-Fi in consumer electronics and appliances, making them *smart*, or capable of accessing the cloud and other devices. You can now find Wi-Fi in thermostats, cameras, flash drives, TVs, Blu-Ray players, and even refrigerators. In the future, you'll see Wi-Fi in a lot more devices and places.



The Wi-Fi Direct standard lets you easily connect devices directly to each other via Wi-Fi. You don't even need a Wi-Fi access point. Learn more at www.wi-fi.org/discover-and-learn/wi-fi-direct.

Wi-Fi traffic congestion

The enormous popularity of Wi-Fi attracts people and their devices like a giant magnet. With the rapid growth of data-heavy uses (such as higher-quality HD or Blu-Ray video streaming), more folks using and staying connected to the cloud, and more and more Wi-Fi enabled devices in use, is it any surprise that Wi-Fi networks are becoming crowded?

Did you know?

- ✓ Wi-Fi traffic will increase 200 percent by 2015.
- ✓ By 2015, 60 percent of Wi-Fi traffic will be video.
- ✓ More Wi-Fi video is consumed in the bedroom than in any other room.
- ✓ Of all Wi-Fi video consumed at home, 10 percent is from the bathroom.

All this congestion is already straining the capabilities of the last Wi-Fi standard, 802.11n, and slowing down your digital life. For example, downloading a 10GB video can take up to 48 minutes using 802.11n but only about 4 minutes using the new 802.11ac standard!

And as the quality of video improves and the number of users grows, the demands for more capacity follow. Streaming a single web video takes up to 8 Mbps capacity, an HDTV-quality video takes up to 25 Mbps, and Blu-Ray videos take up to 40 Mbps. The answer? More bandwidth to keep everything moving, as shown in Figure 1-1. You need more bandwidth today and you'll need even more of it tomorrow.

Revving Up Your Wi-Fi Connectivity

The latest Wi-Fi standard, 802.11ac, is a quantum leap in connectivity capabilities. New wireless technology breakthroughs underlying 802.11ac let it race past 802.11n in four core areas:

- ✓ **Speed:** 802.11ac delivers data more quickly than 802.11n, with speeds up to six times faster. That's speedy enough to transfer an entire HD movie in a few minutes, share photo albums with friends in a matter of seconds, or stream multiple Blu-Ray videos at the same time.
- ✓ **Capacity:** 802.11ac delivers more data simultaneously to more devices than 802.11n. Now your home Wi-Fi can handle the growing number of devices while supporting higher quality video streaming, bigger downloads, and other data-heavy online activities.

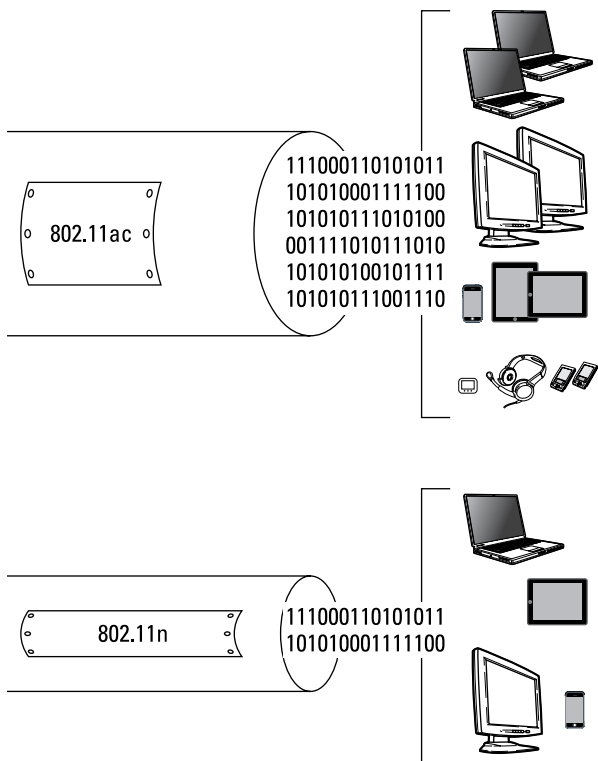


Figure 1-1: Bandwidth is the size of the data pipe.

- ✓ **Coverage:** 802.11ac delivers more speed at further distances than 802.11n for better home coverage.
- ✓ **Battery life:** Because data is transferred more quickly under 802.11ac, your devices can use less power. That savings, in turn, means your devices can go longer without recharging.

What 802.11ac Means to You

What does 802.11ac mean to you? When your devices are 802.11ac enabled, you can

- ✓ **Protect your investments:** Getting the right Wi-Fi is about future-proofing your device investments. If you purchase a device with underpowered Wi-Fi inside, you're stuck in the slow lane for the life of the device.
- ✓ **Save time:** Think about the amount of time you spend connected to your digital life. Wouldn't you want faster Wi-Fi so you can spend less time waiting?
- ✓ **Stream with ease:** Faster speeds enhance your streaming movie, video, and gaming experiences.
- ✓ **Connect more people:** Additional capacity means enjoying richer content on more devices simultaneously.
- ✓ **Thrive in a crowded Wi-Fi world:** Faster, better Wi-Fi improves your connected life experience even as hotspots get more crowded.

Chapter 2

Getting Wi-Fi Smart

In This Chapter

- ▶ Making sense of Wi-Fi standards
- ▶ Shifting from one speed to multispeed Wi-Fi
- ▶ Understanding why 802.11ac Wi-Fi is better
- ▶ Connecting Wi-Fi devices to access points
- ▶ Using Wi-Fi in the real world

Everything around you is getting Wi-Fi smart. Now it's your turn. A basic understanding of the key technologies that power wireless networks and how next-gen 802.11ac is better will make *you* Wi-Fi smart when shopping for your next connected device.

Wi-Fi Rides on Radio Waves

Wi-Fi uses radio waves to send and receive information. In fact, Wi-Fi connections are a lot like two-way radio communications. A PC or other Wi-Fi device translates data into a radio signal and transmits it using an antenna. A *wireless access point* receives the signal, decodes it, and then sends the info to the Internet. The process also works in reverse.

Deciphering Wi-Fi Standards

Table 2-1 shows the progression of 802.11 Wi-Fi standards. As you can see, each new standard sports a different letter: 802.11a, 802.11b, 802.11n, and so on. (The IEEE has run out of these single-letter designations, hence the new double-letter designation 802.11ac.) There are also designations for related 802.11 technologies, such as 802.11i for Wi-Fi security.

Table 2-1 **Speed and Standards**

<i>Standard</i>	<i>Release Date</i>	<i>Max Speed</i>
802.11b	1999	11 Mbps
802.11a	1999	54 Mbps
802.11g	2002	54 Mbps
802.11n	2007	72–600 Mbps
802.11ac	2013	433 Mbps–1.3 Gbps



These speeds are never achieved in the real world. Real-world data speeds take into account the effects of wireless network overhead and environmental factors. For more on this topic, see “Think throughput,” later in this chapter.

Wi-Fi products support earlier standards for backward compatibility. This multistandard support is typically referenced as 802.11bgn (or 802.11b/g/n), 802.11agn (802.11a/g/n), and so on. These combined designations have deeper meanings than just pure speed, as you discover later in the chapter.

One Speed to Multispeed

Each of the original 802.11 standards (802.11a, b, and g) supported up to one maximum speed. For example, any device with 802.11g Wi-Fi can reach a maximum speed of 54 Mbps.

The arrival of 802.11n presented a range of maximum speeds within a single standard. The wide range of speeds available with 802.11n — 72 Mbps to 600 Mbps — is a result of the standard's support for multiple antennas and data streams (enabled by multiple-input multiple-output, or MIMO, technology). This support increased the range, speed, and reliability of Wi-Fi networks.

Why 802.11ac Wi-Fi Is Better

So why would you want to choose 802.11ac Wi-Fi anyway? In this section, you get your answer and also discover the differences in 802.11ac products.

Better MIMO

Earlier 802.11a/b/g networks relied on a single antenna and a single data stream. With the introduction of the 802.11n specification, Wi-Fi could harness the power of up to three antennas and streams to dramatically improve speed, range, and reliability.

802.11ac builds on these improvements with the capability to transmit to and receive from multiple users at the same time (instead of one at a time) by using multiuser MIMO (MU-MIMO) technology. 802.11ac supports up to three antennas and streams today and will be able to support up to eight antennas in the future.

Fatter streams of joy

The number of antennas in a Wi-Fi product determines the number of streams available. These multiple streams transmit data simultaneously over different paths that are then combined at the receiving Wi-Fi device to increase the receiver signal's capturing capabilities.

Both 802.11ac and 802.11n support multiple streams. However, each stream supports only 150 Mbps in 802.11n but up to 433 Mbps in 802.11ac — three times the speed per stream.

The number of antennas (and therefore streams) differentiates the performance capabilities in the 802.11n and 802.11ac standards. More antennas and streams mean not only faster speeds but also fewer dead zones, fewer dropped connections, and better coverage.

Translation: You can save time, view smoother videos, and move around more freely with fewer interruptions.

In the vernacular of the new multispeed Wi-Fi standards, the number of send and receive antennas and stream configurations are noted as 1x1 (one antenna supporting one data stream), 2x2 (two antennas supporting two data streams), and 3x3. Table 2-2 compares the performance of antenna and stream configurations in the 802.11n and 802.11ac standards.

Table 2-2 Performance by the Numbers

<i>Configuration</i>	<i>Max Speed for 802.11n</i>	<i>Max Speed for 802.11ac</i>
1x1	150 Mbps	433 Mbps
2x2	300 Mbps	867 Mbps
3x3	450 Mbps	1.3 Gbps

I'm with the 5 GHz band

Wi-Fi works over two spectrum bands: 2.4 GHz and 5 GHz. Older 802.11bgn uses the 2.4 GHz frequency, which is a crowded space and subject to more interference because it's widely used by cordless phones, baby monitors, Bluetooth devices, and even microwave ovens. The 5 GHz frequency, which 802.11a, 802.11n, and 802.11ac use, provides five times the capacity of 2.4 GHz and is considerably less crowded, which means less interference.

Wi-Fi products that support both 2.4 GHz and 5 GHz are *dual band*, which means that they support both frequencies for backward compatibility. 802.11bgn Wi-Fi products are *single band*, which means they support only the 2.4 GHz band.



Choose dual-band Wi-Fi products for complete backward compatibility with the widest range of Wi-Fi standards.

Double wide to quadruple wide

Just as a multilane highway handles more traffic than a single-lane highway, the 5 GHz band handles a lot more traffic than the 2.4 GHz band because it has more lanes, or *channels*.

Combining, or *bonding*, these channels increases their capacity. 802.11n bonded two 20 MHz-wide channels into a single double-wide 40 MHz channel. 802.11ac bonds four 20 MHz channels into a super-wide 80 MHz channel. In the future, 802.11ac products will support an autobahn-wide 160 MHz channel.

It Takes Two to Wi-Fi

At the center of any Wi-Fi network or hotspot is a device called an *access point*, or *AP*. The AP connects Wi-Fi enabled devices (*clients*) to the broadband link that leads to the Internet, as shown in Figure 2-1. At home, your Wi-Fi AP typically connects to a cable modem or a DSL modem.

An AP product includes router functionality to route data between your cable or DSL modem and multiple devices on your Wi-Fi network. The router is what lets you share the broadband link to the Internet.



Most 802.11ac devices available now support dual band and 3x3 (three antennas and three streams). Supporting dual band allows the AP to broadcast both a 2.4GHz and 5GHz Wi-Fi network. Your older Wi-Fi devices can connect to the 2.4GHz network while your 802.11ac devices connect to the 5GHz network for maximum speed and capacity. (See Chapter 3 for more information.)

To connect to the Wi-Fi AP, each device must have a Wi-Fi adapter, which is built into the device by the manufacturer. As a consumer, you will need to find out which Wi-Fi standards the adapter supports. (See Chapter 3 for details.)



To achieve the data speeds of a given 802.11 standard, both the AP and the client's Wi-Fi adapter must support the same maximum configuration. For example, if you have an 802.11ac 3x3 AP and an 802.11ac 2x2 adapter,

the maximum data rate reaches up to 867 Mbps. If the 802.11ac Wi-Fi adapter is 1x1, the maximum speed drops to the capability of the 1x1 adapter, which is 433 Mbps.

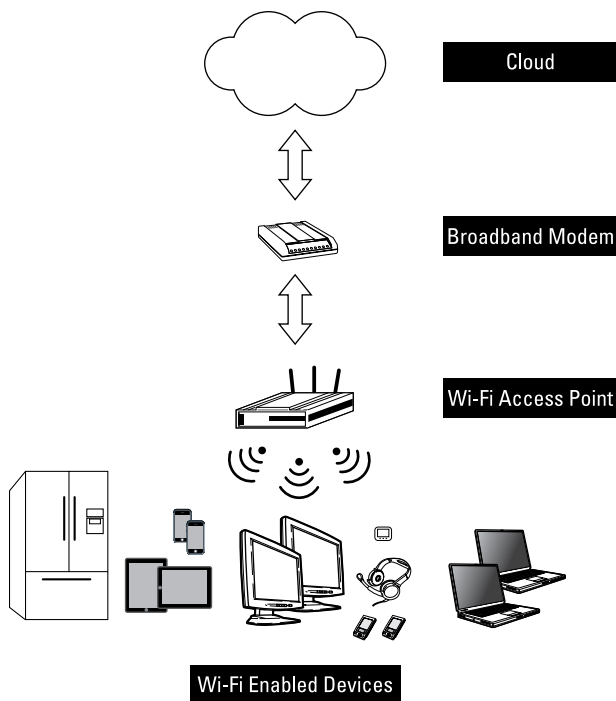


Figure 2-1: Anatomy of a Wi-Fi network.

Using Wi-Fi in the Real World

Wi-Fi products are often touted by their raw maximum speeds. In the real world, however, the difference between the raw maximum speed and what you actually get is staggering.

Because Wi-Fi is wireless, it's affected by the physics of wireless transmissions, network overhead, user congestion, distance, obstacles (such as walls), interference, and more. All these things combine to rob speed. But don't worry — even with all these road bumps, a lot of speed remains available with 802.11ac.

Think throughput

When it comes to estimating what Wi-Fi performance will be in the real world, think throughput. *Throughput*, which is a more accurate measurement of Wi-Fi network speed, takes into account all the bits eaten up by network overhead and environmental factors.

Maintaining the dependable operation and security of a wireless network reduces a product's raw speed by 30 to 50 percent. Environmental factors (such as walls, floors, and other barriers) also affect wireless signals, as do your distance from the access point and the number of clients using the Wi-Fi network. Throughput is not an unchanging and exact number but rather a more realistic gauge of what you can expect for any given Wi-Fi speed claim.



Although the touted data-rate speeds don't happen in the real world, they still serve as a useful benchmark. In general, the higher the data-rate speed, the higher the corresponding throughput.

Sharing, the good and the bad

One of the great things about Wi-Fi is its capability to share Internet connections across devices in a hotspot. However, all these devices compete for access through the same Wi-Fi network, so the more devices that people connect to a Wi-Fi hotspot, the more traffic they create and the slower the speed for everyone.

Talking real speeds

Throughput helps you get a grasp of how the raw speeds touted for a Wi-Fi product translate to the type of performance you may actually get at home with multiple users and devices. Here's the basic formula:

$$\text{Max throughput} = (\text{max data rate} \div 2) \div \text{number of clients}$$

The underlying assumption is that both your Wi-Fi AP and your client are using the same Wi-Fi standard and configuration. For example, the maximum data rate for 802.11ac 2x2 is 867 Mbps.

The “max data rate \div by 2” part of the equation broadly estimates actual throughput by taking into account network overhead and environmental factors. That number is then divided by the number of clients sharing the bandwidth to arrive at the maximum throughput.



The throughput formula doesn't take into account that data rate and throughput decrease as clients move away from the AP.

The following shows how the data rate for an 802.11ac 2x2 device decreases as you add clients:

$(867 \text{ Mbps} \div 2) \div 1 \text{ client} = \sim 433 \text{ Mbps per client}$

$(867 \text{ Mbps} \div 2) \div 2 \text{ clients} = \sim 216 \text{ Mbps per client}$

$(867 \text{ Mbps} \div 2) \div 3 \text{ clients} = \sim 144 \text{ Mbps per client}$

What seemed like way more speed than you would ever need shrinks to speeds that you do need. The higher the maximum data rate, the more throughput.

Chapter 3

Choosing the Right Wi-Fi

In This Chapter

- ▶ Seeing the benefits of 802.11ac versus 802.11n
- ▶ Ensuring backward compatibility
- ▶ Using 802.11ac in the home
- ▶ Finding which Wi-Fi is inside
- ▶ Experiencing the Intel difference

Recognizing how essential Wi-Fi is to the quality of your connected life experience makes choosing the right Wi-Fi product a no-brainer: Go with 802.11ac. In this chapter, you find out how to be a smart buyer of Wi-Fi enabled devices and tips for upgrading your home Wi-Fi network.

Don't Settle for 802.11n

Are you considering the purchase of a new notebook, desktop PC, tablet, or other Wi-Fi enabled device? You shouldn't assume that it has 802.11ac Wi-Fi inside because many devices still include the slower 802.11bgn Wi-Fi adapters.

To make sure you're getting 802.11ac, you need to look under the hood, as described later, in the "Which Wi-Fi Is Inside?" section.



Which Wi-Fi standard is inside will play a big role in the quality of your connectivity experience over the life of the device.

More flavors than Baskin-Robbins

The days of two basic types of PCs are gone. Today, you have a wide range of PC choices beyond just tower desktops and laptops:

- ✓ **All-in-ones** integrate the system's components into the display unit. As a result, these smaller systems are easy to place in the kitchen or family room. All-in-one PCs typically incorporate a touchscreen.
- ✓ **Tablets** are thin, one-piece, mobile, touchscreen-operated computers primarily used for a wide range of cloud-based activities.
- ✓ **Ultrabooks**, the latest generation of slim, lightweight, and powerful notebooks, deliver a balance between portability and performance.
- ✓ **Convertibles** are notebook computers that you can switch to a tablet by moving the display so that it faces up.
- ✓ **2 in 1s**, the newest type of PC, can operate as a traditional notebook or as a free-standing tablet by detaching the display.

Backward to the Future

The Wi-Fi universe includes different Wi-Fi standards. As you cruise from hotspot to hotspot, you never know what to expect in terms of performance emanating from the access point (AP). 802.11ac products are backwardly compatible with 802.11a/b/g/n hotspots. But when an 802.11ac hotspot is available, your 802.11ac Wi-Fi adapter shifts you to the fast lane. And as 802.11ac hotspots multiply, you'll be cruising in the fast lane more often.

Good 802.11ac Starts at Home

A Wi-Fi AP is one of the most important pieces of computer equipment in your home. It connects all your Wi-Fi enabled gadgets to one another and to the cloud.

An 802.11ac AP can easily handle the ever-growing load of Wi-Fi devices as well as data-heavy apps such as video streaming and gaming.



Choose a dual-band 3x3 802.11ac AP. It supports the current top speeds of the 802.11ac standard as well as the 2.4 GHz band for your 802.11b/g/n devices.

The leading Wi-Fi 802.11ac AP vendors include:

- ✓ Asus: www.asus.com
- ✓ Belkin: www.belkin.com
- ✓ Buffalo: www.buffalotech.com
- ✓ D-Link: www.dlink.com
- ✓ Linksys: www.linksys.com

✓ NetGear: www.netgear.com

✓ Trendnet: www.trendnet.com

Which Wi-Fi Is Inside?

If you're test-driving a PC at a retail location, you can see which Wi-Fi adapter is integrated into a PC or tablet by checking out the hardware configuration in Microsoft Windows Device Manager.

Note that in Device Manager, the Wi-Fi adapter will be identified by the product name, which may not indicate the antenna and stream configuration. (For example, the Intel Dual Band Wireless-AC 7260 is a 2x2 802.11ac Wi-Fi product.) You may need to go to the Wi-Fi adapter manufacturer's site to get the specifications.

Microsoft Windows 8/8.1

To check the type of Wi-Fi adapter in a PC running Microsoft 8/8.1, follow these steps:

- 1. Right-click anywhere outside the Start app buttons.**
- 2. Click the All Apps button, select Switch to All Apps, and then select the Control Panel.**
- 3. In the System section, click System and Security.**
- 4. Click Device Manager.**
- 5. Click + Network Adapters to expand the section.**

You see the Wi-Fi adapter product name, such as Intel Dual Band Wireless-AC 7260.

Microsoft Windows 7

Follow these steps to find the type of Wi-Fi adapter in a PC running Microsoft 7:

1. **Choose Start→Control Panel.**
2. **Click System and Security.**
Note: If the System and Security icon isn't visible, select Category view first.
3. **In the System section, click Device Manager.**
4. **Click + Network Adapters to expand the section.**

You see the Wi-Fi adapter product name, such as Intel Dual Band Wireless-AC 3160.

Shopping online

When you're shopping online, chances are you'll need to delve into the tech specs to get specific information on the Wi-Fi adapter included in the PC. If you don't see a Wi-Fi adapter listed or you see just a generic Wi-Fi reference, contact the PC vendor to see what Wi-Fi product is included.

Experiencing the Intel 802.11ac Wi-Fi Difference

802.11ac Wi-Fi delivers a new level of speed, reliability, and range to power your digital life. Your connected experience can improve when you combine a 4th Generation Intel Core processor with an Intel Dual

Band Wireless-AC Wi-Fi adapter. The adapter supports the following key features:

- ✓ With Intel Wireless Display (Intel WiDi for short), you can stream content from your PC directly to your TV.
- ✓ With Intel WiFi HotSpot Assistant, you get instant Wi-Fi connectivity at a free or paid hotspot without an annoying, time-consuming login process.
- ✓ With Intel Smart Connect Technology, you can stay current with automatic, no-wait updates to your email, social networks, news, and more.

Intel 802.11ac Adapters

The Intel Dual Band Wireless-AC product line includes the following two Wi-Fi adapters:

- ✓ **Intel Dual Band Wireless-AC 3160:** A 1x1 802.11ac Wi-Fi plus Bluetooth adapter that delivers up to 433 Mbps
- ✓ **Intel Dual Band Wireless-AC 7260:** A 2x2 802.11ac Wi-Fi plus Bluetooth adapter that delivers up to 867 Mbps

Visit intel.com/wireless for more information on Intel's Wi-Fi products and technologies.

Intel WiDi

Intel WiDi uses Wi-Fi to seamlessly transfer content on your PC to your TV in full 1080p HD with 5.1 surround sound. All 4th Generation Intel Core processor PCs support Intel WiDi for a serious family room upgrade:

- ✓ Share family photos
- ✓ Play your digital music

- ✓ View Web videos, Internet TV, or streaming movies
- ✓ Enjoy social media from the comfort of your couch

Visit intel.com/go/widi to learn more about Intel WiDi.

Intel WiFi HotSpot Assistant

Intel WiFi HotSpot Assistant simplifies your Wi-Fi hotspot roaming by using your mobile PC with a 4th Generation Intel Core processor and Intel Dual Band Wireless-AC adapter.

A simple one-time terms and conditions (T&C) login on the Easy Wi-Fi Network opens up millions of free and paid hotspots worldwide. As you and your laptop travel from place to place, Intel WiFi HotSpot Assistant autoconnects to an available hotspot, avoiding time-consuming logins. Intel WiFi HotSpot Assistant connects you even if you've never joined the network before.

To get started with Intel WiFi HotSpot Assistant, visit intel.com/hotspotassistant.

Combine Intel WiFi HotSpot Assistant with Intel Smart Connect Technology (see the next section), and Wi-Fi connectivity works even when your laptop sleeps.

Intel Smart Connect Technology

With Intel Smart Connect Technology, you can stay current with automatic no-wait updates to your email, social networks, news, and more. While your laptop is in standby mode, it will periodically wake up to update open applications via a Wi-Fi connection. When you return to your laptop, the latest content is at your fingertips.

Intel Smart Connect Technology also enables your computer to send updates to the cloud if you create something while you're away from a network connection and then connect to a Wi-Fi hotspot — for example, if you write email while traveling by plane. In this way, everyone has your latest thoughts and you have the freshest data ready to go wherever you are.

Combining Intel WiFi HotSpot Assistant with Intel Smart Connect Technology enables automatic Wi-Fi hotspot connectivity with automatic refreshing of your cloud data.

Chapter 4

Top Ten Shopping Tips

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In This Chapter

- ▶ Buy for tomorrow
 - ▶ Think throughput
 - ▶ Upgrade your access point
 - ▶ Look under the hood
 - ▶ Ask for Intel
-

It's time to take your new 802.11ac "Wi-Fi smarts" with you as you shop for your next Wi-Fi enabled product. Use these tips to make sure you make the right choice.

Be Connectivity Conscious

Wi-Fi is essential to the quality of your connected life. Choosing the right Wi-Fi product is easy if you always go with 802.11ac. For more on this topic, see Chapter 1.

Buy for Tomorrow

Your 802.11n products might be fine for what you do today. But consider the congestion coming down the pike with the increased use of Internet TV and video

streaming, the rapid rise of multiple-device households, longer connections to the cloud, and the proliferation of Wi-Fi enabled devices of all kinds. 802.11ac offers exponential capacity improvements over 802.11n.

Don't Assume 802.11ac Is Inside

Not all Wi-Fi is the same. When a product touts “the latest Wi-Fi,” don’t assume that 802.11ac is inside — many products still use 802.11n. Ask questions and find out the specific Wi-Fi included in the product.

Do the Math

In the vernacular of the new multispeed Wi-Fi standards, the number of send and receive antenna configurations are noted as 1x1, 2x2, and 3x3. With these antenna configurations, 802.11ac delivers the following maximum data rates:

- ✓ 1x1: 433 Mbps
- ✓ 2x2: 867 Mbps
- ✓ 3x3: 1.3 Gbps

However, the actual Wi-Fi speed shrinks dramatically in the real world. For more on this topic, see Chapter 2.

Think Throughput

Don’t skimp on your 802.11ac choice based on the data rate. Remember that throughput reduces the data rate

speed of any Wi-Fi device by 50 percent. (*Throughput* is a more precise measurement of Wi-Fi network speed that takes into account network overhead and environmental factors.) In addition, the data rate drops with each new connected device. For more on this topic, see Chapter 2.

Go Dual Band

Choose dual-band 802.11ac products for maximum Wi-Fi connectivity flexibility. A dual-band 802.11ac product can connect to older 802.11b/g/n Wi-Fi networks, which use the 2.4 GHz band, and also switch to the much faster 5 GHz band when it is available.

Upgrade Your Access Point

An 802.11ac access point (AP) will be able to handle your ever-growing load of Wi-Fi devices and data-heavy apps such as video streaming and gaming. If you choose a dual-band 3x3 802.11ac AP, you'll have support for the current top speeds of the 802.11ac standard as well as for the 2.4 GHz band used by 802.11b/g/n devices. For more on this topic, see Chapter 3.

Look Under the Hood

If you're test-driving a PC at a retail location, you can see which Wi-Fi adapter is integrated into a laptop, a notebook, an all-in-one, or any PC by checking out the hardware configuration in Microsoft Windows Device Manager. See Chapter 3 for a step-by-step guide.

Ask for Intel

Combine an Intel Dual Band Wireless-AC 802.11ac adapter with a 4th Generation Intel Core processor and you can experience the following:

- ✓ Intel WiDi, for streaming content from your PC to your TV
- ✓ WiFi Hotspot Assistant, to sidestep time-consuming logins
- ✓ Smart Connect Technology, for automatic updates to your email, social networks, and more

Keep This Guide Handy

If you're thinking about buying a Wi-Fi enabled device or upgrading your Wi-Fi network at home, keep this guide handy on your smartphone. Think of this book as your personal, practical guide to making the right Wi-Fi choices for your connected life.

Supercharge your Wi-Fi experience with 802.11ac!

Frustrated with slow Wi-Fi connections and poor streaming video quality? Confused about all the Wi-Fi mumbo-jumbo? This is the book for you. Get smart about the new 802.11ac Wi-Fi standard and start enjoying a faster, richer, and better connected experience.

- **Connect to your Wi-Fi future today** — find out why today's Wi-Fi connections are getting congested and how the new 802.11ac Wi-Fi puts you in the fast lane
- **Get Wi-Fi smart** — understand the basics of Wi-Fi networks so you can make better choices
- **Choose the right Wi-Fi** — peek under the hood to see which Wi-Fi is really inside a PC, laptop, tablet, or other device



Open the book and find:

- Why 802.11ac is the smart Wi-Fi choice
- Advantages of 802.11ac over 802.11n
- Details on your 802.11ac performance choices
- How 802.11ac Wi-Fi transforms your connected experience

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