



RANGE EXTENDERS: THE EASY WAY TO GET TOP WI-FI PERFORMANCE AT HOME

LINKSYS RANGE EXTENDERS WITH CROSS-BAND TECHNOLOGY ENSURE STRONG WIRELESS CONNECTIONS, FAST DATA SPEEDS AND EXPAND THE COVERAGE AREA OF HOME WIRELESS ROUTERS

Use a tablet, smartphone, or laptop near a home's Wi-Fi® router and the connection is sure to be strong and transmission speeds fast – crucial when watching a movie or uploading a video. Carry those same devices to an upstairs bedroom, outside to the back yard, downstairs into the garage, or upstairs to a remote attic loft and the connection is certain to get weaker and weaker until there's often no connection at all. Install a gaming console or streaming-media player near a TV situated at the opposite end of the house from the router and data-transmission speeds are likely to be painfully slow or even grind to a halt. Its simple physics – wireless signal strength decreases as the distance between devices and the router increases. Fortunately, this is a problem that's easily solved.

Sometimes, simply moving the router to a different room is enough to help resolve the problem. More often, that's not possible, because the cable that brings Internet service into the home can't be relocated, or because walls or a masonry chimney are in the way, impeding the radio

LINKSYS



signal between the router and Wi-Fi device. Other common devices, including cordless phones, microwave ovens, large mirrors, housing construction materials, alarm systems, lighting control systems, and even baby monitors can interfere with Wi-Fi signals, especially in the 2.4 GHz band.

Getting the router off the floor and atop a tall bookcase might help, but probably not by enough when trying to stream video to a tablet in the back yard. And there's nothing more frustrating than losing a Wi-Fi connection completely in the middle of watching a movie or favorite TV episode. Replacing an existing router with a new one that features the latest Wireless AC technology can help, but this can be time consuming and costly.

If only there was a small, inexpensive, easy-to-install device that could boost that Wi-Fi signal, strengthening it from one end of the house to the other, able to reach outside to that favorite lounge chair under a shady tree, and even down into the garage or up into the attic. The ideal solution would be easy to install, take just a few minutes to set up, and need no change to settings on the router. That device exists: the wireless Range Extender. It's just like having a long Wi-Fi extension cord, but without the cord.

Wi-Fi devices are everywhere

Users are getting younger, too. Much younger. In 2011, 10 percent of children under the age of two had used a wireless device, according to Common Sense Media². In 2013, just two short years later, that number had nearly quadrupled to 38 percent. There's no end in sight.

Whether adult or child, it all means that more people are using more smartphones, tablets, laptops, and streaming media players at the same time – and they're choosing Wi-Fi to connect. Even when a 4G or LTE signal is available for smartphones and tablets, people prefer Wi-Fi. It often provides better speed and reliability, and using Wi-Fi avoids burning through valuable minutes of an expensive monthly mobile data plan³. That's especially important when watching movies and sports highlights, messaging friends, playing online games, or joining a remote videoconference.

Range Extenders to the rescue

Modern routers are already built to handle the increased number of Wi-Fi devices. The real issue is about distance: People like to have their own space instead of all sitting together in the living room. That means retreating to bedrooms, basements, back yards, attics, and maybe even the occasional treehouse – places where a Wi-Fi signal often isn't strong enough to provide acceptable performance. Short of herding everyone back into that living room, the easiest way to boost that Wi-Fi signal is with a Range Extender.

10% to 38%

The number of kids under the age of two using wireless devices nearly quadrupled from 2011 to 2013





And there's more. The newest reason for needing a Range Extender is a whole generation of recently introduced Wi-Fi enabled devices that stay permanently in one spot and can't be moved closer to the router. These include thermostats that can be controlled from a smartphone, refrigerators that send an alert message if their internal temperature gets too warm, ovens that send a text message when the turkey is finished roasting, and even washers and dryers that signal when their loads are done. The number of Wi-Fi enabled televisions per household is expected to double by 2017⁴. Add other Wi-Fi enabled products, including smartphone remote-controlled garage-door openers, home security systems, lawn irrigation systems, and even bathroom scales that communicate with personal-health apps, and the need for a Range Extender becomes even more vital. This isn't the future; it's happening right now. In a 2014 study by the Wi-Fi Alliance[®], more than half the people surveyed said they already have Wi-Fi enabled household items such as appliances, thermostats, or lighting systems, and 73 percent are likely to buy Wi-Fi enabled devices in 2014⁵.

Just like playing baseball

The job of a Range Extender is simple: to expand the territory a Wi-Fi router can reach by boosting its wireless radio signal. Range Extenders eliminate those annoying dead spots and provide a wider coverage area for Wi-Fi devices.

A great way to visualize the job of a Range Extender is to think of a baseball center fielder who's just caught a long fly ball and wants to throw out a runner trying to score from third base. There's no way the outfielder has enough arm strength to make the throw all the way to home plate. Instead, he throws to second base. After completing the catch, the second baseman extends the center fielder's range by relaying the ball to the catcher. Think of a Wi-Fi Range Extender as doing that second baseman's job.



Fig. 1a. Router, Range Extender, Wi-Fi device all operating on 2.4 GHz frequency band. The data-transmission speed of 300 Mbps has to be shared by the two connections, leaving only half for each.

Fig. 1b. Router, Range Extender, Wi-Fi device all communicating on the 5 GHz frequency band. Like Fig. 1a, the data-transmission speed of 300 Mbps has to be shared, still leaving only 150 Mbps for each connection.

As the baseball example shows, a Range Extender has not one job to do, but two. First, it connects to the Wi-Fi router, just as any other Wi-Fi device does, no different than that second baseman connecting with the catcher. The Range Extender's second job is to serve as a connection point for those tablets and other Wi-Fi devices that are too far away to connect directly to the router – just as that second-baseman connects with the center fielder.

To get the best results from the twin tasks a Range Extender performs, choosing where to locate it is key. The ideal spot isn't at the far reaches of the territory that needs to be covered, but, like that second-baseman, in a convenient midway location – somewhere between the router and that backyard lounge chair. Often, that spot turns out be an electrical outlet in a hallway or perhaps near a kitchen that overlooks the back yard.

Top Speed with Cross-Band Technology

A second baseman communicates with the outfielder and the catcher, but, of course, he can't do both at the same time. That's exactly the way older Range Extenders work. Constructed with only one radio, they can "talk to" the Wi-Fi device or the router, but not both simultaneously. It means that movie-watching or gaming experiences can be slow and sometimes freeze up. Dual-band Range Extenders that contain two radios, are an improvement – they can choose which radio to use, but don't use both at the same time.

Now, imagine a Range Extender with two radios that can communicate with the router and the Wi-Fi device at the same time. That would be the perfect way to get top speed and ensure that videos and song downloads don't freeze up. The extender could start relaying a video, photo, or song to a Wi-Fi tablet in the back yard while still receiving it from the router.

Linksys engineers created the perfect solution. It's called Cross Band technology, and it lets a Linksys Range Extender carry on two conversations at the same time, one on the 2.4 GHz

Number of mobile Wi-Fi products in the average American home by 2017



Fig. 2a. Router and Dual-Band Range Extender with Cross-Band technology communicating at 2.4 GHz; Range Extender and Wi-Fi device communicating at 5 GHz.

Fig. 2b. Router and Dual-Band Range Extender with Cross-Band technology communicating at 5 GHz; Range Extender and Wi-Fi device communicating at 2.4 GHz.

Like Fig. 2a, the Range Extender operates on two different frequencies simultaneously, allowing the router and Wi-Fi device to each operate at 300 Mbps.

radio-frequency band and the other on the 5 GHz band. With Cross-Band technology, the two wireless frequency bands can work together, receiving information on one band and transmitting on the other, all at the same time. No second baseman can do that! The result is fast data-transfer speeds without interruptions and a strong, consistent signal, even when that tablet or smartphone is in the back yard or in a distant bedroom, well beyond the reach of the home's router.

Not all Range Extenders are the same. Only Linksys Dual-Band Range Extenders with Cross-Band technology offer this capability.

Choosing a Range Extender

When purchasing a Range Extender, be sure to select one that operates at the fastest speeds available. Simply look for "Wireless AC" on the box. Linksys Range Extenders include Wireless AC capability and only Linksys offers Cross-Band technology. Linksys Range Extenders work with virtually every router from any manufacturer such as the RE3000W, RE4000W or RE6500.

Wi-Fi Range Extenders come in two styles designed to either plug directly into a wall outlet or sit on a desktop. Each type offers different features.

The newest wireless Wi-Fi Range Extenders are small, unobtrusive products that plug directly into a wall outlet, just like the battery charger that comes with most digital cameras. There are no power cords, no bulky power adapters, and no cables to deal with. And there are no antennas sticking out. Many newer models feature a white outer shell, perfect for blending in with a home's décor. Setup is easy and takes just a few minutes. Simply plug the Range Extender into an electrical outlet midway between the router and the area where the Wi-Fi signal needs boosting. After the ready light comes on, use the browser on a computer, phone, or tablet to finish the setup. Then sit back, relax, and watch that movie, send text messages, play games, or upload and share photos or a video.

Other Range Extenders look more like a traditional desktop router with external antennas, a power cord, and a power adapter. Linksys offers a versatile product of this type that can operate in one of four different modes: as a dual-band Range Extender to increase existing wireless coverage; an Access Point to create a new wireless network or upgrade an existing one; a Media Connector to directly connect an HDTV, game console, or Blu-ray[™] player using a cable; or as a Bridge to wirelessly join separate networks together.

LINKSYS





Is there an alternative to a Range Extender?

Most technologies offer several ways to solve a particular challenge, and extending a home's Wi-Fi coverage range is no different. Alternatives exist, but they can be costly, require specialized wiring, and can be finicky to set up.

If a second Wi-Fi router is available (it's usually an old one that's been replaced and is now gathering dust in a closet), it may be possible to set it up as a second Wi-Fi access point. Doing so isn't for the faint of heart. First, it requires running a lengthy, difficult-to-hide cable from the main router to this secondary one. Next, there's the daunting task of accessing the secondary router's password-protected management screens through a Web browser, necessary for adjusting configuration options. These options include turning off the unit's routing capability to make sure it functions only as a Wi-Fi access point, and updating security settings to prevent a conflict with the main router. In contrast, plugging a Linksys Range Extender into an electrical outlet and setting a couple of simple options takes just a few minutes.

739/6 Percentage of people likely to buy a Wi-Fi enabled household device in 2014

	RE3000W	RE4000W	RE6500
FEATURES			
	GOOD	BETTER	BEST
Extended Reach	Up to 5,000 Sq Ft	Up to 7,500 Sq Ft	Up to 10,000 Sq Ft
Wireless Speed	Single Band (2.4 GHz)	Simultaneous Dual Band 2.4 GHz and 5 GHz	Simultaneous Dual Band 2.4 GHz and 5 GHz
Dual Band	N300	N600	AC1200
Cross-Band Technology	-	Yes	Yes
Plug-in or Desktop	Plug-in	Plug-in	Desktop Placement
Wireless Audio	_	_	Yes
Wired Speed	1 Ethernet Port	2 Ethernet Ports	4 Gigabit Ports

Linksys Range Extender Feature Comparison

Conclusion

Experts predict that by 2020 there will be 28 billion connected devices, a phenomenon called the "Internet of Things."⁶ In homes, that means more phones, tablets, laptops, TVs, game consoles, health monitors, kitchen and laundry appliances, lighting, heating and air conditioning, security systems, garage door openers, lawn sprinklers, and more all using Wi-Fi. Many of those can't be moved closer to the router to obtain a strong wireless signal. Wi-Fi Range Extenders solve the problem easily, quickly, and inexpensively.

Linksys Dual-Band Range Extenders with Cross-Band technology provide that strong signal and do so in a way that ensures the best available overall coverage for all your wireless connected devices. Linksys created its dual-band Wi-Fi Range Extenders featuring Cross-Band technology to ensure that people enjoy a strong Wi-Fi signal and a satisfying wireless experience anywhere at home, both inside and out. With more than 100 million wireless routers sold, Linksys is synonymous with going wireless at home.

To learn more about Linksys Range Extenders, visit www.Linksys.com/RangeExtenders

© 2014 Belkin International, Inc. and/or its subsidiaries and affiliates. All rights reserved. Belkin International, the Belkin logo, Linksys, and the Linksys logo are trademarks or registered trademarks of Belkin International, Inc. and/or its subsidiaries and affiliates in the United States and other countries. All other trademarks mentioned in this document are the property of their respective owners.

¹ Strategy Analytics Connected Home Devices service report "Embedded WLAN (Wi-Fi) CE Devices: Global Market Forecast," published February 27, 2014, http://www.strategyanalytics.com/default.aspx?mod=pressreleaseviewer&a0=5483.

² https://www.commonsensemedia.org/zero-to-eight-2013-infographic.

⁴ Strategy Analytics Connected Home Devices report, "Global Connected Devices Forecast 2008-2017," published December 16, 2013, http:// www.strategyanalytics.com/default.aspx?mod=pressreleaseviewer&a0=5452.

⁵ www.wi-fi.org/news-events/newsroom/wi-fi-connectivity-increases-purchase-likelihood-for-smart-home-devices

⁶ http://www.gartner.com/newsroom/id/2684616.