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THE TECH BUYER'S GURU
TECHNOLOGY REVIEWS, HOW-TO GUIDES, AND PERSONALIZED BUYING ADVICE

AN INTRODUCTION TO WIRELESS NETWORKING (PAGE 2)

An Introduction to Wireless Networking (continued)

Page 1 | Page 2

Rated vs. Real-World Throughput

Now, how about that nagging issue of rated versus actual throughput? So far we've mentioned 11Mbps, 54Mbps, 300Mbps, 433Mbps, 450Mbps, 866Mbps, and 1333Mbps. And of course, we actually left out all sorts of other iterations that have come along, like 22Mbps, 108Mbps, 150Mbps, 600Mbps, and so on. If it were as simple as just comparing these numbers, you wouldn't need a guide to tell you which products to buy! The truth is, though, that the rated speed never, ever corresponds to real-world performance, and furthermore, two products marketed as having the same rated speed can perform entirely differently. That makes shopping for wireless products and anticipating wireless performance a difficult challenge.

As a rule of thumb, assume that the rated speed of a wireless device is between two and four times higher than the actual real-world performance. In fact, the low-priced Buffalo AirStation 802.11n 300Mbps router pictured to the right, which we've actually tested, maxes out at about 35Mbps. Yes, we know that sounds extreme, but it really is that far off from reality. Making matters worse is that manufacturers often advertise a rated speed that combines the total rated throughput on two different bands. An example might be an 802.11n router rated at 750Mbps, where the rating is found by adding a rated 450Mbps throughput on the 5GHz band and a rated 300Mbps throughput on the 2.4GHz band. Unfortunately, this type of rating is not that helpful, because no single device can take advantage of both bands simultaneously (it is somewhat relevant, however, if you're networking multiple devices, with some on the 2.4GHz band, and others on 5GHz). Breaking it down for you, here's the throughput you can expect of the most common networking protocols:

Wireless Networking - Rated vs. Actual Throughput

- ***802.11b, 2.4GHz band:*** 11Mbps rated, 3-5Mbps actual
- ***802.11g, 2.4GHz band:*** 54Mbps rated, 10-15Mbps actual
- ***802.11n, 2.4GHz band:*** 300Mbps rated, 20-40Mbps actual
- ***802.11n, 5GHz band:*** 300Mbps rated, 80-130Mbps actual
- ***802.11ac, 5GHz band:*** 1300Mbps rated, 230-330Mbps actual

As you can see, not only is rated throughput far above the actual throughput, it isn't even remotely comparable between technologies. 300Mbps means something entirely different on the 2.4GHz band than it does on the 5GHz band. Ratings really got out of hand with 802.11n, which was rated 6 times faster than 802.11g, but in reality was more like two times faster. Luckily, later 802.11n devices using the 5GHz band did a lot to correct that issue, boosting speeds by about 300% and getting them somewhat closer to 300mbps. The new 802.11ac standard still significantly overstates throughput, but it's certainly faster than 802.11n of any flavor.

Rather than get upset about all this, we'll help you find the solution that you actually need - it may be that an older 802.11g product, for instance, would be a perfectly usable solution for you. The big question you should be asking at this point is "what do I use my network for and how fast is fast enough?" Good question! In a sense, talking about throughput is a bit like talking about the maximum speed a car can attain - do we really care if a car can go 150 miles per hours? Probably not, but if it couldn't reach 60mph, we'd be concerned. So let's take a look at the speeds that some typical Internet services provide:

Comparing Internet Services - Actual Throughput (Bandwidth)

- ***Basic DSL Internet (1.5Mbps):*** sufficient for web browsing and e-mail, as well as streaming low resolution videos such as standard 240p/360p YouTube
- ***Basic Cable or Midrange DSL Internet (3Mbps):*** sufficient for most YouTube videos and Internet gaming
- ***Premium DSL Internet (7Mbps):*** recommended for smooth streaming of standard-definition Netflix video
- ***Midrange Cable Internet (12Mbps):*** excellent throughput for most typical uses
- ***High-end Cable Internet (25-75Mbps):*** required for streaming Netflix "DVD Quality" 24Mbps (3MB/s) video
- ***Ultra-high-end Fiber Optic Internet (100-300Mbps):*** required for streaming Netflix "Super HD" 56Mbps (7MB/s) video

As you can see, Internet speeds and video streaming requirements vary greatly. Now, if you'll be transferring a lot of files across your "intranet" (local network), you probably already know what type of throughput you'd need. For the typical Interent user, however, the desire for streaming video will likely determine how fast a network needs to be, and for that purpose, the limits of the Internet service provider are likely the most critical factor. That's because the vast majority of Internet subscribers in the U.S. have Internet connection speeds far below the limits of even 802.11n/2.4GHz. In fact, users of DSL would need nothing more than 802.11g to get the most out of their Internet service. That may be why the faster 5GHz technologies haven't caught on. But if you're paying over $50/month for your Internet service to get high-end cable (or fiber) service, you better believe that 5GHz wireless is worthy of your investment!

Recommended Wireless Solutions

So, in the end, there is no one answer to which networking technology is best. Obviously, the newest, fastest technologies almost always cost more. We'd say that for the average home user with a DSL connection, an 802.11n network on the 2.4GHz band is sufficient. For users of cable Internet, 802.11n on the 5GHz band is probably preferable, and for users of fiber or other ultra-high-speed services, only 802.11ac will suffice! For specific recommendations on a whole range of wireless devices by category, check out our Wireless Networking Buyer's Guide!

Back to Page 1

Back to the How-To Guides