

Wi-Fi Security – Which one, WEP, WPA, or WPA2?

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Well, it finally happened. I tried to add another device to my home Wi-Fi network and I couldn't. I have been in fear of this happening for the last few years. No, it is not the fact that I tried to add one more device and that went over a limit. The limit on the number of devices you can have on a Wi-Fi network is only limited by the local IP addresses you set up, which was much higher than the number of devices I had on the network. I have had my current Router since July 2010. I bought it shortly after the 802.11n standard found its way into reasonably priced routers (around 2009). The "n" version followed the "g" version and increased the bit rate (speed) from about 50mbps to somewhere in the 100 to 300 Mbps area. (The actual speed you get from the router to a device is dependent on many things.) When I set up the Router I had a few older (legacy) devices that I still used. Some of those older devices didn't support the latest Security. So when it came to set up Security for the network, I chose the older Security standard "WEP." Although WEP is not nearly as secure as WPA2, every device supported WEP so there was no problem, until today, when I tried to add a device that did not support WEP. The new device, a security camera, only supports WPA and WPA2. So, now I have to change the Security used by my Router to either WPA or WPA2. This may not sound like much of a problem, but once I change it in the Router, I have to change every device that wants to use my Wi-Fi network. Yes, all the laptops and tablets, all the cell phones, all the Streaming devices, all the Smart TVs, all the smart bulbs and plugs, the wireless printer, any Wi-Fi extender access points, Alexa, Google Home, and all the phones and tablets owned by friends and family that use my Wi-Fi network when visiting.

The first thing I'll have to do is change the security used in the router. For this, I will need the Username and Password for the router. Many router's Username can be left blank and the default password is typically "Admin." (If you have changed either of these on your router, this is a good time to resurrect the correct Username and Password for future use.) Now, using a Browser, I'll go to the IP address of the router. Many routers use <http://192.168.1.0> or <http://192.168.1.1>. Once at the router page, I'll put in the Username and password. Once in the router setup, I'll find Wireless or Wi-Fi Security and look for the Security type. Then I'll choose the desired Security type and put in a passphrase. I'll make a note of the new Wi-Fi Password for the future (a very important step). Now I can go around to all the devices that use the Wi-Fi and make the appropriate changes in their setups. Wish me luck.

So, what really is Wi-Fi security? Well, directly from Wikipedia "Wireless (Wi-Fi) security is the prevention of unauthorized access or damage to computers or data using wireless networks." Basically, Wi-Fi Security protects the data that goes between a

Router and a Device. The device could be a computer, a wireless phone, a smart TV or DVD player, a smart LED bulb, any device that connects to the router, even a smart refrigerator. The most common types of Wi-Fi security are Wired Equivalent Privacy (WEP), and Wi-fi Protected Access (WPA). WEP, which is the older standard (Circa 1999), provides fairly weak security. It is well known that the WEP password can often be cracked within a few minutes with a basic laptop computer and widely available software tools. WEP used a 64-bit (or 128-bit) encryption key. The key was manually inserted into the device and it remained constant. WPA was introduced around 2002 to solve some of the problems with WEP. Even if your router is six years old, it most likely supports WPA. WPA2 is a further improvement over WPA and is the current Security standard. WPA2 employs an encryption algorithm that encrypts the data with a 256-bit key, the longest of all the keys used, and the longer the key the stronger the security. WPA also employs a per-packet key, meaning that it dynamically generates a new key for each packet that is transmitted. In early 2018, WPA3 was announced. WPA3 will have several security improvements over WPA2, but it will take some time for it to show up in routers and devices.

To use WPA or WPA2, you provide the router with a “passphrase” between 8 and 63 characters long –the longer the better. The passphrase can be a collection of alpha and numeric characters, including special symbols like \$, %, and #. (Actually, if you are familiar with the ASCII code, all ASCII printable characters; those decimal values between 32 and 126 can be used. Which, by the way, also includes “space”.) The router will then use the passphrase and the network’s name to generate unique encryption keys to be used on the network. The keys will constantly be changed to avoid being cracked. WPA2, the second version of WPA uses a more advanced encryption algorithm that is more efficient and more resistant to cracking. (All Wi-Fi products have been required to support WPA2 since about 2016. It was intended that WPA2 essentially replace WPA.) Although it is true that “the longer the passphrase, the stronger the protection, it may not be the practical way to go. A passphrase only 9 or 10 characters in length may be adequate for most home use. I can’t prove it, but I have seen some research that showed that it would take a fast PC over 15,000 years to crack a WPA2 passphrase of only 10 characters. (Maybe you could do it in a year with 15,000 computers.) That kind of security would probably be enough for most of us.

So, now that we know what’s behind Wi-Fi security, what shall I do about the original problem of what Security selection to use in place of WEP. Well, I guess the obvious answer is WPA2, as long as all devices support WPA2. Unfortunately, I may not find this out until I attempt to have all devices re-setup with WPA2. I only have a few devices that are older than six years old, so it may just work out. Wish me luck.

Postscript: The upgrade to WPA2 worked out just fine. Unfortunately, about 2 months later I had to replace the router. I had to do the whole upgrade all over again, so now I’m really good at updating all my Wi-Fi devices.

