



How to extend the range of your Wireless Network:

Diagnosing a Problem Signal

Note: this article is primarily intended for smaller organizations

Wireless devices such as laptop computers use radio frequency (RF) waves to communicate with one another, and just like the radio waves that you hear on your car radio, the RF waves from a wireless access point (AP) — the device that links up your wired and wireless networks — get weaker and weaker the further away you get from the source. Moreover, metal, concrete, books, and other electronic devices can all interfere with a wireless signal, distorting it and limiting its range.

Before you can treat a temperamental signal, you need to make sure that the signal really is the problem. Here are some diagnostic tools and guidelines to help you get started.

Diagnostic Tools:

Site surveys can help you determine exactly where you have coverage and where you don't. You can get a very rough measure of the strength of your signal by carrying a laptop around your organization and seeing how many "bars" you get. On a Windows XP/Vista/7 machine, you'll see one to five bars in the lower right corner of the desktop; more bars indicate a stronger signal. To get a more precise measurement, you'll have to download special software or buy a device specifically designed to measure the wireless signal. NetStumbler and InSSIDer software are free, but there are numerous other programs that can also help with this process.

Some factors that can cause a weak or distorted wireless signal:

1. Your access point might not be in the best possible location.
2. Your wireless signal isn't as strong as it could be. Is there any way you can strengthen, amplify or extend your signal?
3. Are the materials in your building part of the getting in the way? The signal from most access points will extend for about 300 feet in ideal circumstances. However, certain materials, such as concrete, books, and metal can attenuate or distort a wireless signal, so your range depends on the design and construction of your building. If you have a strong connection on one side of the wall, but no signal or a weak signal on the other side, there's probably something in the wall blocking your signal.
4. Are there other electronic devices interfering with the signal from your access point? Today's wireless equipment usually operates in the 2.4 GHz frequency of the electromagnetic spectrum. Unfortunately, there are several other common devices that use this same frequency. For instance, cordless phones, microwaves and garage door openers operate in the 2.4 GHz frequency. Cordless phones are especially troublesome, since they're so prevalent. Furthermore, your access point might be conflicting with a neighbor's access point. If your wireless signal is inconsistent then interference might be the problem. In other words, the signal gets weaker when the interfering devices are in use, and stronger when they're not.
5. Are you using an old version of wireless? There have been three popular wireless standards: 802.11b, followed by 802.11g, succeeded by 802.11n. The latest standard, 802.11n, has twice the range of 802.11g or 802.11b, and it's quite a bit faster. Now we have 802.11ac, which combines 2.4GHz channels and 5GHz channels for up to 1200Mbps. Channel width is also larger, which adds to interference problems.



Solutions

1. Most access points broadcast to an equal distance in all directions. Putting the access point in a central location might allow the signal to reach more places in your building.
 2. Putting the access point up high on a wall, or on the ceiling, can also increase your range.
 3. Move your access point away from any materials that might be distorting the signal (such as concrete, metal, books, and so on).
 4. Move your access point away from any electronic devices that might be distorting the signal (for example, microwave ovens, cordless phones, and so on).
 5. Change the channel. Wireless devices in the United States operate on one of 11 different channels. When two devices are using the same channel, the interference and signal distortion is greater. Furthermore, several of the channels overlap with one another. So if one device uses channel 3, and another device uses channel 4, the interference will still be strong if the devices are close to one another. The "non-overlapping channels" are 1, 6, and 11. Choose one of these 3 channels to start with, and if your signal is still weak, switch to another. For more information on changing the channel, see the manual that came with your access point. Newer access points sometimes ship with default of "Auto Channel Selection", which will automatically select the best channel to use for your setup.
 6. Buying a stronger antenna for your access point or your wireless adapter could boost the strength of the signal. However, a lot of wireless manufacturers design their equipment so the antennae can't be replaced, so check your manual first.
 7. Buy another access point and configure it as a wireless repeater or hardwire in the area with little or no coverage from your main access point. Assign the same SSID to the second access point as you assigned to the first access point so that laptops can seamlessly transfer their connection from one AP to the other. Repeat until you have the coverage you need. (The SSID is the name that your access point uses to identify itself. When laptop users are looking for a wireless signal to connect to, they'll see your SSID if they're within range of your access point.)
 8. Consider buying a wireless repeater (sometimes know as a range extender or a range expander). This device will receive a wireless signal and then retransmit and amplify that signal (in other words, "repeat" it), which could effectively double the size of your wireless network. However, a repeater will also cause your wireless network to slow down somewhat. There are several brands of repeaters on the market. However, sometimes you can take a regular access point and configure it to act as repeater. Check the manual that came with your access point for more instructions.
 9. Switch to 802.11n or 802.11ac wireless equipment (sometimes known as MIMO equipment). 802.11n equipment looks and acts more or less like older wireless equipment (for example, 802.11g equipment and 802.11b equipment), except that it's faster and it has better coverage. 802.11ac is the same as well, just faster, and larger channel width options and sometimes combine frequencies.
- All of your equipment has to comply with the new standard in order to take advantage of the gains in speed and range. Therefore, you'll have to buy new access points and new wireless adapters in order to see the benefits of the newer 802.11 band.

For more information, visit www.gnswireless.com