

Wired vs Wireless Networks – Caveats and Suggestions

Over the last decade, wireless internet access has grown to be commonplace just about everywhere. Whether at the coffee shop or in your own backyard, you can always find at least a few Wi-Fi access points. Wi-Fi is a convenient and low cost method to connect to the internet, however it may not be the right technology for every application. When you need high-performance or consistent reliability for functions like children's check-in – hard wired is a better solution. Wired networks typically give you more reliable, faster and more secure connections. Below, learn more about the caveats of wireless, as well as actionable suggestions when you need to work with a wireless network.

Wireless Caveats

Overview

Wireless for home use is usually great. Simple housing construction, low amount of interference and only a few devices on the Wi-Fi network provide good performance even on inexpensive low-quality hardware. Outside the home environment it can be great if it is set up right, is being used with high-quality equipment, your facility's layout happens to be ideal and only a few people are using it. That's unfortunately not what most of us experience though.

Take your typical church setup. Usually the building is large and spread out, only a small number of Wi-Fi access points have been installed and the Wi-Fi equipment is low-cost consumer level gear that is not designed to handle 300 people with Wi-Fi enabled smart phones congesting up the Wi-Fi airwaves (even if those smart phones are not connected to your Wi-Fi network).

When you're evaluating your Wi-Fi setup, keep in mind the number of bars you see on your PC for the wireless connection doesn't indicate quality, it represents signal strength. It's a good measure of how well you can "hear" but not necessarily how well you can "understand". There's much more to a solid wireless network than simply the signal strength. Did you know distance, other wireless devices nearby, obstacles, the quantity of nearby wireless devices, and sharing your Wi-Fi network can very quickly, and very negatively, affect your wireless capabilities?

Distance: The farther away your computers are from the wireless access point, the more difficult it is for your computer to have a good connection to your network. A larger distance means a lower quality signal and reduced available speed. In fact, wireless quality degrades exponentially with distance – meaning when you move from 10 feet to 20 feet away, the quality is not cut in half, it is actually only a quarter as good. This is especially a challenge with check-in stations as you need them in a specific location and that location usually can't be based on the distance from the wireless access point.

Sometimes when the distance between the wireless router/access point and the computer is large, people purchase a wireless repeater or extender. The idea of a wireless repeater or extender is to sit in-between your check-in station and your Wi-Fi access point and rebroadcast the signal and in theory cover the distance between the 2 devices; which it does. While it sounds helpful, in most circumstances it actually is not and can almost guarantee a poor experience with your network. Since it receives the main signal and then re-transmits it,

every transmission is broadcast twice; effectively cutting the wireless bandwidth in half. Add in the typical Wi-Fi interference and your system may not even be able to connect to the internet even though your signal strength shows good signal strength. Due to this we do not recommend using a wireless repeater or extender of any kind.

Other Wireless Devices: Is the wireless set up near a microwave, baby monitor or cordless phone? How about a wireless microphone (or 10)? These devices all share the same frequency as your Wi-Fi network and can significantly impact performance. Think about what it would be like if every radio station shared the same exact channel on your radio. It would be impossible to hear and understand your favorite music because a dozen different songs would all be playing on top of each other. That's what happens with Wi-Fi and these other devices. You wouldn't think that a microwave oven could impact your check-in stations over Wi-Fi, however it shares the same frequency (channel) and the signal it puts out to heat your food is 12,000 times more powerful than your Wi-Fi equipment. Even the small amount of energy that escapes the microwave can easily overpower your Wi-Fi equipment.

Obstacles: Are there concrete walls between the wireless router and check-in station? Metal filing cabinets or multiple floors? Yikes – all these can significantly impact or partially block your wireless signal.

Quantity of wireless devices: Cell phones, even when they aren't in use sitting in people's pockets, are constantly sending out signals and causing wireless interference. Add to that people actually using their cell phone for a conversation or texting, plus smart phones that constantly hunt for open Wi-Fi networks to connect to and all that traffic can cause significant congestion.

Sharing Your Network: Dealing with significant congestion is especially true if you share your wireless network with all your members. We highly recommend locking down your wireless network using a WPA or WPA2 password. This limits the ability for others to access and pass data over your wireless network, which takes up your bandwidth and impacts quality.

Are you streaming your services live over the internet or is someone downloading large files or video content? These can all significantly and negatively impact your network, especially if those computers are connected to your network over Wi-Fi.

Busy Times = High Wi-Fi Demand

When testing your Wi-Fi setup, you may be thinking "my wireless works just great on Tuesday at 2:00pm in my office" - and it probably does. However it won't perform that same way Sunday morning. Now church is full and you've increased the volume of cellular devices a hundred fold, you are heating up bottles for your nursery in the microwave, the band's singers and your senior pastor are all using wireless microphones; plus you now need the wireless to perform over at the check-in station as opposed to your office. All that interference and used bandwidth is a perfect recipe for check-in station disaster. When you share that same wireless bandwidth with everyone else there's not enough to go around causing slowness, intermittent service and sometimes complete internet failure all together.

As an example of increased Wi-Fi demand consider this: You and a friend are in a large gym, each on one side of the gym shouting to each other across the gym. You can hear and understand each other just fine. Now put all

the members of your organization in the middle of the gym having conversations with each other and you and your friend try to continue your conversation. It's very difficult over all that other noise and commotion. That's what your wireless connection experiences as it tries to "hear" and "talk" over all that additional noise – it has now become very difficult or even impossible to provide consistent, uninterrupted service from the wireless set up to the check-in stations.

That can seriously affect the check-in process and cause frustration, for you and the parents. Often times customers would assume KidCheck is running slowly, when in reality it's their wireless connection. Due to the high variance with wireless connection speeds and strength, the performance and reliability of KidCheck can be negatively affected. "Are you on a wireless network?" is the first question we ask when we receive a concern about KidCheck being slow, going down intermittently or not working consistently. Almost every time the answer is "yes, we're on wireless" and once they've changed to a hard-wired connection they no longer experience these issues.

Suggestions

So what is the right answer? What do you do? We do recommend using a hard wired set-up when you can. Hardwiring a network connection can be much less expensive than you think and provide the check-in experience you want for the parents coming to your organization. We realize it may be difficult sometimes with check-in station placement and the need to run cables to those areas, or trying to work within an established wireless network system. If you need to utilize a wireless network set-up, here are some specific suggestions:

Ensure you are using equipment that uses the latest Wi-Fi technology.

- Make sure your Wi-Fi access point/router uses 802.11n. This is the latest and the best wireless technology and is faster and more resistant to interference than 802.11b or 802.11g. Older computer systems may still be using b or g.
- If your computers are using 802.11b or 802.11g Wi-Fi cards, upgrade them to a good-quality 802.11n Wi-Fi device.

Run your access point/router on 5GHz

- The 5GHz frequency is a different, less congested frequency than the main 2.4GHz. 802.11n uses either 5GHz or 2.4GHz; 802.11b and g only utilize 2.4MHz.
- You will need to be sure your check-in station PCs can accept 5GHz. Or you can use a USB wireless plug in to upgrade to the 5GHz.
- While 5GHz has many benefits, be aware it cuts down the wireless distance capabilities, so it works best as an option when you can have access points and PCs closer together.

There are tradeoffs associated with the various wireless technology and frequency options

	Speed*	Obstacle Penetration	Compatibility	Congestion	Distance
802.11b	11 Mbps	Low	High	High	Low
802.11g	54 Mbps	Low	High	High	Medium
802.11n (2.4GHz)	150 Mbps	Hi	High	High	High
802.11n (5GHz)	300 Mbps	Low	Low	Low	Low

*Mbps = Megabits per second

Set up the check-in station PCs close to the wireless access points

- Take into consideration the distance, obstacle and additional device caveats above to choose the right technology and set-up for your Wi-Fi network.
- Install enough Wi-Fi access points to provide good coverage over the entire area your check-in stations will be located in. Even though this can cause more congestion, it's much better than being too far from access points.

The Apple Airport Extreme wireless router/access point is a great option.

- It has excellent performance and stability, supports a dual-band mode so the network can run at either 2.4Ghz or 5Ghz, is easy to set up and available at a decent price (about \$180 per).

Check your wireless network using www.pingtest.net and www.speedtest.net.

- These will grade the quality and speed of your wireless network. Remember, to get a true answer you need to run these tests at that busy time when everyone is there taxing the network, not that slower "Tuesday at 2:00pm" time.
- If you are consistently experiencing issues, or if the tests come back with a low grade, isolate whether the issue is due to wireless or a problem with your internet connection itself.
- After completing the test on the wireless network, test one PC with a hard wired connection and see if it is better. If so, wireless is likely the issue – if not, you probably have an internet connection concern you should discuss with your Internet Service Provider (ISP). They can monitor your bandwidth use and provide suggestions.
- Keep in mind even if you get a good grade on your Wi-Fi test you may still experience issues. (Was the microwave on during the test? How about the cordless phone?)

Consider Powerline Networking

An alternate option to both wired and wireless to consider is powerline networking, which takes advantage of the network of electrical wires already existing in a building and converts it in a way that allows these wires to convey data. Powerline adapters basically turn a power outlet into a data port. The resulting performance and security are similar to a wired network, without the need to lay Ethernet cable throughout a building. The technology allows the mobility and flexibility of a wireless network, without the possible performance and connection issues sometimes experienced with wireless. Learn more about powerline networking at <http://www.kidcheck.com/best-practice/wireless-network-issues-try-powerline-networking/>.

Conclusion

Be aware that even with these suggestions in place, the stress on your network at heavy traffic times may still negatively affect the check-in process. There's no easy answer as you determine how to work within your organization's existing network set-up. However we hope this article has helped you understand some of the pitfalls of wireless and how it can negatively affect check-in. Plus we hope it has provided some ideas to resolve issues by moving to a wired connection, considering a powerline adapter, or doing some connection testing, and making the necessary wireless set-up adjustments.

KidCheck Recommended System Requirements can be found here <http://kidcheck.com/features-pricing/system-requirements/>

Some ideas for how to be prepared in case the internet goes down can be found here <http://www.kidcheck.com/best-practice/back-plan-suggestions-internet-goes/>

Whitepaper by Cisco for additional information "20 Myths of Wi, Fi Interference"
http://www.cisco.com/c/en/us/products/collateral/wireless/spectrum-expert-wi-fi/prod_white_paper0900aecd807395a9.html