Is Your Property Wiring Obsolete? We live in interesting times. We should plan for them.

There are many Student Housing properties that have low voltage wiring infrastructure that is approaching or beyond its useful service life. We discuss why and what to do about it.

By Andrew Marshall, Campus Technologies Inc, July 2024

You probably don't think much about the wire in the walls and under the ground of your student housing community. It just sits there and works, mostly.

This wire though is essential to the smooth running of your wired and wireless Internet service to residents, and like any other physical system it has an operating lifespan. In addition, the technology industry does not stand still and the capabilities of the wire - and the demands on it - change over time.

You probably have two types of low voltage wiring at your property: fiber optic cable that distributes bandwidth around the property, and copper wire that connects the jacks in the wall to the closest fiber handoff. Both fiber and copper have potential challenges.

Fiber Optic cable

Fiber optic cables come in two broad types – Single Mode (SMF) and Multi-Mode (MMF). If your property has Single Mode fiber, breathe a sigh of relief – it's good for the foreseeable future. If you have older Multi Mode[1], you will most likely need to plan to upgrade it to Single Mode to continue to be able to deliver adequate Internet Service levels.

If you do need to upgrade from Multi Mode to Single Mode, bear in mind that the cost can be significant depending on the size and layout of the property and how the Fiber Optic cable was installed initially.

Copper Cable

Your copper cable (sometimes referred to as UTP[2] or Cat5[3], Cat5e, Cat 6 etc.) usually has a planned operating lifespan of 15-20 years, depending on the manufacturer. In practical terms the real-world lifespan depends on how well it was installed, environmental conditions and so on. There's no doubt it can live on past the end of its manufacturers lifespan if treated correctly, but it's also true that it won't live forever and will need replacing at some point. This is a challenge

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[1] Older types of MMF cannot carry more than 1 Gigabit per second over the distances commonly found at Student Housing properties.

[2] Unshielded Twisted Pair
[3] Cat = Category

as there are no precedents for low voltage wire lifespans expiring; if we assume the manufacturer specs are accurate then we're close to the brink on any property built before 2009.

The main types of copper cabling used are listed in the table below. Note that the 'introduced' year precedes the actual common usage date, in some cases by several years. Some merchant builders used previous generation cabling to save costs when wiring, for example.

Wire Type	Introduced	Capacity @ 300 feet
Cat-5	1995	100 Mbit
Cat 5e	2001	1,000 Mbit/1 Gbit
Cat 6	2002	1,000 Mbit/1 Gbit
Cat 6A	2009	10,000 Mbit/10 Gbit

As well as installed lifespan, we need to consider capability.

Most installed Student Housing Internet systems today are designed to deliver 1 Gigabit per second to the individual common room or bedroom jack. You can deliver that on Cat5e, Cat6, or Cat6A (but not Cat5, that has a maximum of 100 Mbit).

Gigabit to the jack is fine until an application or a system comes along that requires more than a Gigabit – for example WiFi 7, which was certified in January 2024 and is expected to be ratified by December 2024 has the ability to consume significantly more than 1 Gigabit per AP[4] – which in turn means that the wiring infrastructure needs to support over 1 Gigabit.

Although there are some fractional solutions – such as 2.5 Gigabit and 5 Gigabit delivered over shorter distances on Cat 6 – it looks like the new 'standard' will be 10 Gigabit over copper, which will require Cat 6A to accommodate the wire distances used in Student Housing wiring design (usually up to 300 feet).

Timing it out

The need to upgrade Multi Mode Fiber to Single Mode needs to be planned for today if you wish to maintain an Internet amenity that will be competitive in the short to medium term. One Gigabit total to an entire student housing building or wiring closet simply isn't enough; the standard is ten Gigabit or greater. Similarly, the need to upgrade pre-Cat5e infrastructure (specifically Cat 5) is a pressing issue as you will not be able to maintain a competitive Internet amenity using wiring rated for only 100 Mbit/sec.

If you have Single Mode Fiber and Cat5e or Cat 6, then there's no immediate need to upgrade today, but it does need to figure in your strategic capital planning. Once WiFi 7 (and beyond) becomes a commonly used standard, then wiring will become an inhibitor to delivering the full capability. [You can, however, deploy and install WiFi 7 in the short-term using your existing infrastructure without upgrading wire, you will however be limited to just under 1 Gigabit per AP].

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[4] wireless Access Point

In this situation, the timing of the need for actual wire replacement will depend on a number of factors: the age and condition of the wire; the need to accommodate over 1 Gigabit to the wall jack or AP, and the continued support of future AP's for 1 Gigabit connections. Predicting the future in technology is a notoriously risky business, but it is reasonable to assume that the earliest this will start to become an issue is 2026 or 2027. As the pace of improvement of WiFi standards is increasing, the demand on the wiring infrastructure will increase commensurately.

Standard	WiFi	Year
802.11b	WiFi 1	1999
802.11a	WiFi 2	1999
802.11g	WiFi 3	2003
802.11n	WiFi 4	2009
802.11ac	WiFi 5	2013
802.11ax	WiFi 6	2019
802.11be	WiFi 7	2024
802.11bn UHR	WiFi 8	2025/6

Stretching it out

There are a few tricks in our toolbox that we can use to extend the service life of what is installed.

Single Mode fiber can be upgraded extensively with just electronics upgrades. There's no technology need that we understand today that would require replacing the Single Mode fiber wiring.

The copper infrastructure suffers from many challenges over time such as having wall jacks painted over, rodents (who love the insulation on this wiring), water ingress, poor quality terminations and so on. It is possible to extend the operating life of the copper wiring system by re-terminating and replacing all jacks, and using a tool called a Certifier to verify the operating status and quality of each wire drop, and repair accordingly. This will keep the wiring operating smoothly and error-free and allow you to get the most out of your wired and wireless infrastructure up to the point it needs to be upgraded.

Reality check

If you have Multi-Mode Fiber, or copper wiring earlier than Cat5e, you should be planning to replace it in the short term. There is really no avoiding this.

If you have Single Mode fiber and Cat6A wiring, you're good to go.

The vast majority of purpose-built Student Housing will have Single Mode fiber and Cat5e or Cat6 wiring. It's critical to determine how long the physical wire will last, and prepare for the capital cost of replacing it when that is needed. That capital cost will be extensive.

Planning to coincide Low Voltage wiring upgrades with other property work can save money – especially if you can coincide these upgrades with overhauling your electrical wiring.

New Construction

New construction being built or planned today should use Single Mode Fiber and Cat6A copper wiring.

Frequently Asked Questions

Why do we need to upgrade our wire? Surely everything is wireless now?

The simple answer to this is that there's a lot of 'wire' in 'wireless'. The wireless AP's that deliver the wireless signal to your residents needs adequate wiring infrastructure to deliver data to the AP. This can't be done wirelessly.

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When will this become a problem for me?

There are many variables that would need to be understood to answer this question. We'd recommend a survey to obtain the information needed to answer that question.

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I'm about to purchase a property – how do I plan for potential Capital Expenses that might arise in the wiring infrastructure?

Once again, we'd recommend a wire infrastructure survey so that you understand your full potential Capital spend going forward.

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A professional survey and assessment will help you in your planning; we're here to provide that if needed. Contact me if we can help.

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Campus Technologies is a national vertically integrated managed network service provider designing, building and operating highly effective wired and wireless networks exclusively in student housing. See more at www.campustechnologies.com