

# A provider's guide to optimizing Wi-Fi in student accommodation

Key steps to delivering superior connectivity and maximizing students' digital experience.



## Fast, reliable internet access has been hailed as our fourth utility, alongside water, gas and electricity.

For students, the ability to readily connect, share, post, stream and learn online has become an indispensable ingredient to their scholastic and social lives – and all the more so in the wake of the coronavirus pandemic, which has accelerated our reliance on digital services.

Deploying a Wi-Fi network within student accommodation – particularly across multi-occupancy, MDU (Multi Dwelling Units) buildings – enables an abundance of devices to be connected and can offer a seamless, uninterrupted user experience as residents move from room to room, around the property.

Furthermore, it radically reduces the need for extensive cabling, which can become a challenging undertaking if the accommodation hasn't been built with Category 6 (CAT6), or higher, cables and connectors.

Not all Wi-Fi services are made equal however and, in some cases, the student user experience can be compromised.

The following guide explores six key considerations for Managed Service Providers (MSPs), that will help ensure students can study, surf, and game unimpeded and benefit from the highest possible connectivity and performance standards.



# 1

## A network designed for demand

**Providing basic Wi-Fi coverage and adequate signal strength is of course vital, but rarely sufficient to meet the connectivity demands of today's expectant student population.**



High network latency will negatively affect student productivity as they wait for internet pages to load, attachments to download or messages to send. It can also cause frustration for those engaged in online social activities, including gaming.

A robust, resilient network calls for a design that meets peak client density and capacity requirements.

This means that at the outset, an accurate understanding of the student demographic and the likely traffic mix is needed – from the number and type of connected devices they're using to their capabilities, the applications they're running and their prospective bandwidth requirements.

A monitoring solution that continually measures and remotely reports on network performance should help provide an accurate picture, allowing the peak 'rush hour' network load to be identified, and enabling optimal coverage and performance configuration – including effective load balancing where applicable – based on real world data insights.

## 2

### Expanding the data highway: a spotlight on ISP bandwidth

**Ensuring adequate bandwidth into the building is an essential cornerstone of resilient, consistent high-speed Wi-Fi for all end-users.**

Student residences will invariably be high client density environments, with bandwidths on a variety of resources shared among multiple users, decreasing the potential throughput or connectivity success each will receive.

The dynamic ecosystem of Wi-Fi networks must support bursts of high-bandwidth traffic as multiple students perform a range of tasks and process large quantities of data. What's more, bandwidth requirements are intensifying year-on-year and networks should be deployed to meet the needs of tomorrow. This, in particular, means matching the capabilities of student hardware using the latest technology, such as Wi-Fi 6, 6E and 7.



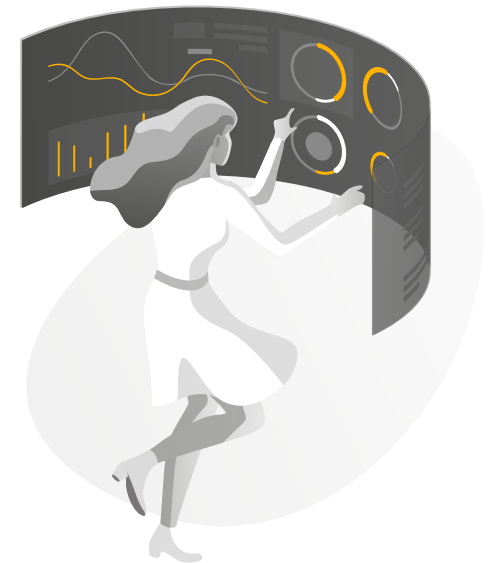
Bandwidth requirements will vary depending upon the size, student density, and variance of work/play patterns within the accommodation. A 1Gbps fibre link, for example, may be adequate for small, lower-density environments with predictable traffic use, but is unlikely to cut it in larger residences with multiple guest users and synchronized use (students studying, viewing, and gaming on similar schedules). In scenarios such as this, 10Gbps may be necessary to avoid traffic congestion and degraded performance.

Where MSPs are taking over the management of underperforming networks, hardware and access point (AP) upgrades should be accompanied by any necessary upgrades to network cabling and ISP speed and capacity.

Miscommunication between marketing and reality can also be a common issue for MSPs, property owners and tenants.

Care should be taken to ensure expectations are aligned between advertised bandwidths from ISPs (Internet Service Providers) and real-world performance. Claims of 'gig service', where ISPs offer up to 1Gbps to properties, will not translate to gigabyte download speeds over Wi-Fi – far from it.

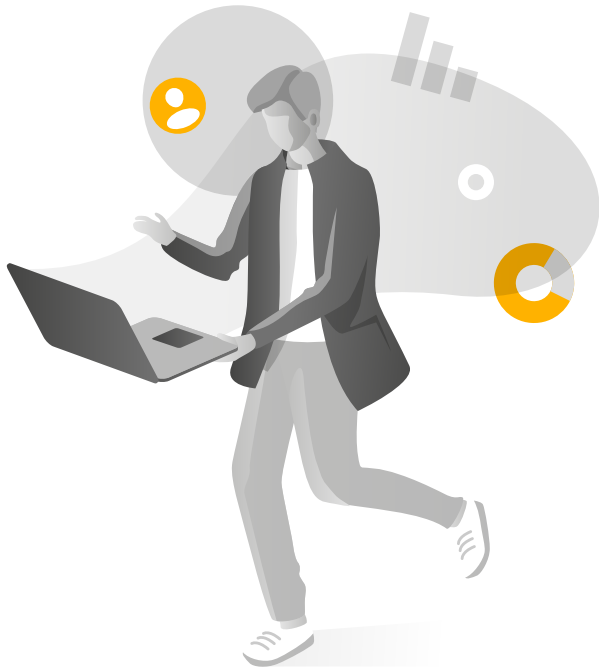
Knowing and communicating your real-world, end-user experience can be easily resolved using a remote internet monitoring and testing solution.



# 3

## The access point route to pervasive connectivity

**Ensuring an adequate number of strategically located access points will help ensure consistently strong and seamless Wi-Fi radio signals, while effectively distributing and scaling up the network load.**



An ideal world scenario might see an AP installed on the wall or ceiling of every room, but as a rule of thumb there should be no more than two rooms and two interior walls between APs.

Site surveys and monitoring data used to determine the optimal AP locations should not only take account of the size, shape and wall structures of the rooms in the accommodation, but also prospective AP density. This will vary according to the number of clients, their capabilities and their bandwidth requirements.

The required aggregate bandwidth for the WLAN can be calculated once typical throughputs per connection and the estimated number of simultaneous connections have been established. Basing these assumptions on recent real-world data from similar environments can provide useful baselines for planning and dimensioning new installations.

It should be remembered that a high client density requirement will not always call for an increase in the number of APs, if the latest Wi-Fi standards, which can deliver significant performance improvements in heavy-use environments, are introduced.

For optimal performance, Wi-Fi signal levels should be above -70dBm, where a typical target would be -65dBm or stronger. Equally, it should be noted that higher signal strengths of up to -30dBm are unlikely to significantly improve end-user performance.

# 4

## Turbo charge performance with the latest Wi-Fi standards

**Students rely on Wi-Fi to perform a range of critical tasks across multiple devices, but architectures built on legacy Wi-Fi 5 (802.11ac) are now being pushed beyond capacity within many residences.**



While Wi-Fi 6 and 6E have significantly alleviated density and congestion challenges, the emergence of Wi-Fi 7 is set to redefine student accommodation connectivity.

Wi-Fi 6 was developed with high-density environments in mind, introducing features such as OFDMA (Orthogonal Frequency Division Multiple Access) and MU-MIMO (Multi-User, Multiple Input, Multiple Output).

OFDMA reduces latency by allowing multiple clients with varied bandwidth needs to share channels simultaneously, enhancing the experience for gamers and streaming users. Meanwhile, MU-MIMO enables multi-antenna access points to transmit data streams simultaneously, ideal for video conferencing and immersive AR/VR platforms.

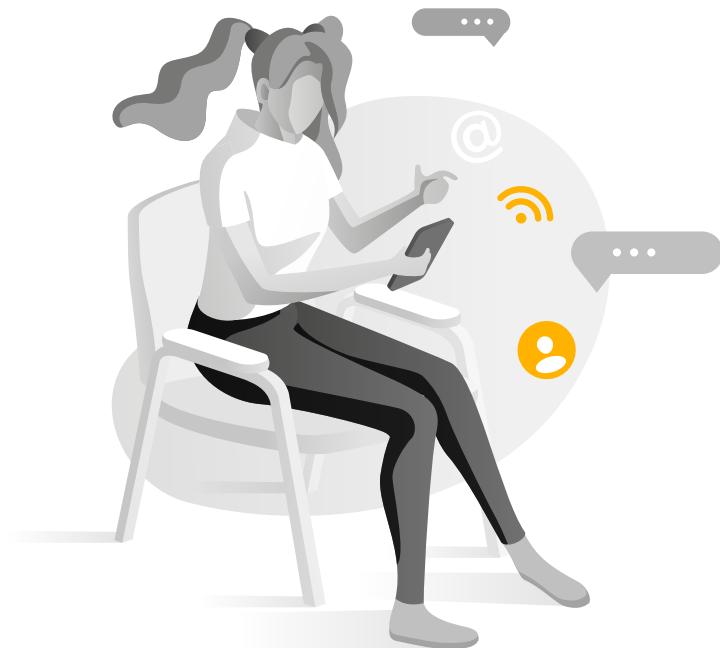
Wi-Fi 6E expanded these capabilities by unlocking the 6 GHz band, reducing congestion in crowded networks.

Wi-Fi 7, the latest advancement, brings transformative features to future-proof connectivity.

Multi-Link Operation (MLO) enables simultaneous connections across multiple bands, delivering ultra-low latency and improved reliability. Wider 320 MHz channels and 4K-QAM modulation dramatically boosts data throughput, making Wi-Fi 7 ideal for dense environments and advanced applications, such as next-gen learning platforms.

Importantly, Wi-Fi 7 routers are backward compatible, allowing for a phased upgrade path while supporting older devices.

Investing in Wi-Fi 7 infrastructure ensures networks are ready for the next generation of devices and applications, while maintaining seamless, high-performance connectivity for students. This means delivering a superior digital experience that meets the growing demands of modern student living and positions your network for the future.



# 5

## Staying connected with robust redundancy

**Uninterrupted internet access can be mission critical for students and so while internet speeds may be front of mind for many users, reliability failings will invariably prove a bigger cause of complaints.**



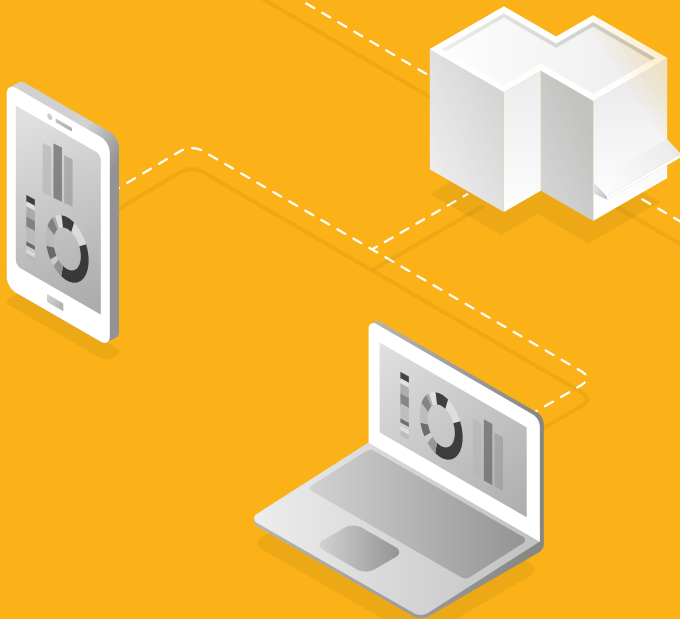
Consideration should consequently be given to using two or more ISPs to help minimize the risk of outages caused by issues such as ISP maintenance, routing problems or power failures.

Moreover, in an ideal world, these ISPs will utilize different paths into the building and different internal wiring to avoid them suffering the same fate should cables be severed or damaged.

Setting up load balancing can automatically spread internet traffic across the multiple connections and help maximize bandwidth for users.

Building in 'failover' protection in this way means that when primary connections are down, the secondary ones can take over without a loss of service.

This failover capability can also be supported with IP routing redundancy using a first hop redundancy protocol (FHRP), such as Virtual Router Redundancy Protocol (VRRP).



# 6

## A place for hybrid connectivity

**Wi-Fi offers clear benefits for multi-occupancy residences, offering students the convenience and flexibility to connect, interact and work from anywhere within range of a wireless AP, without the hassle of cable management.**



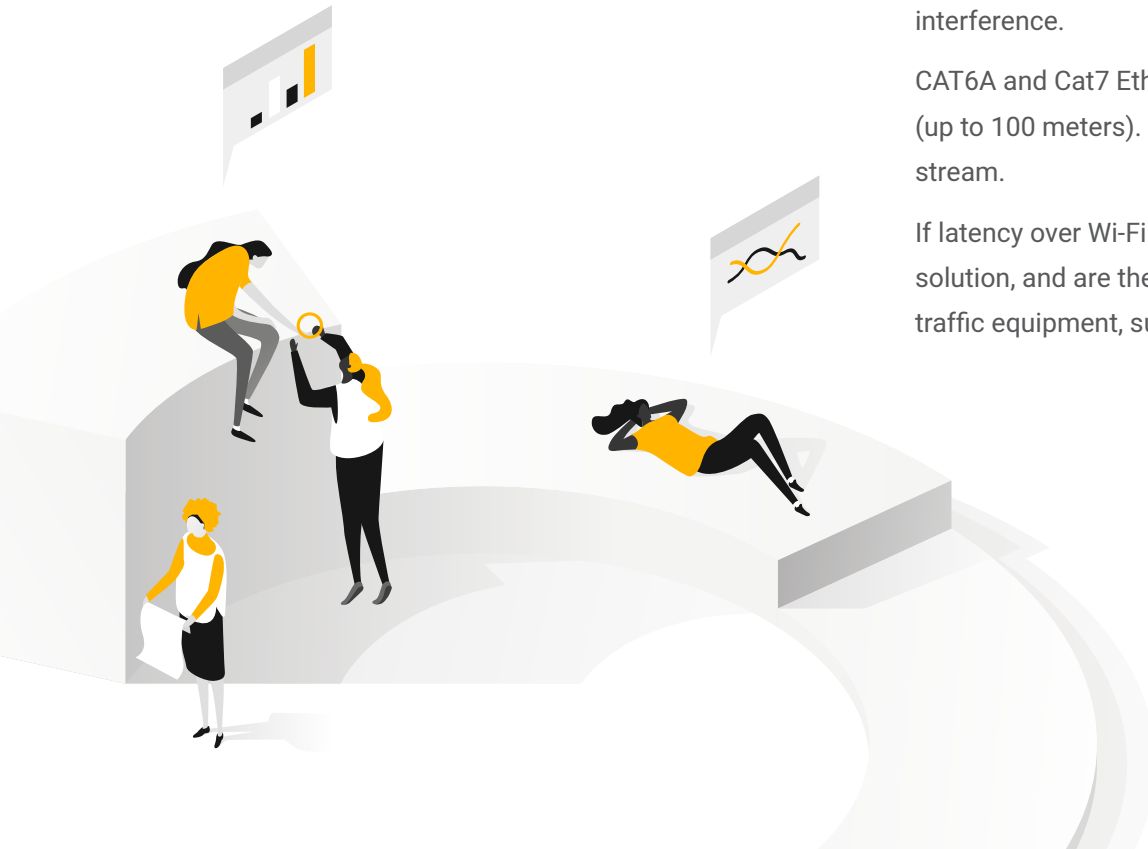
What's more, while most computer devices come with built-in Wi-Fi connectivity, not all – notably smartphones, tablets and the latest thin, light laptops – are spec'd with Ethernet ports and will invariably require USB adaptors.

Mixed networks, however, combining wired and wireless devices still have a place.

Despite the advent of the new improved 802.11be standard, Ethernet connections will still benefit from faster, more consistent data transfer rates, without the risk of external interference.

CAT6A and Cat7 Ethernet support maximum data rates of 10Gbps over single cable runs (up to 100 meters). By comparison Wi-Fi 7 offers maximum data rate of 2.4Gbps per stream.

If latency over Wi-Fi is proving a problem, Ethernet connections can offer a compelling solution, and are the go-to option for fast, trouble-free data throughput for stationary, high-traffic equipment, such as desktop PCs and media centres.





## Measuring and monitoring Wi-Fi performance through student eyes

The steps outlined in this guide will help ensure that the quality of internet connections – along with students' work and play – is not compromised.



Underpinning these important actions is a clear and obvious need to monitor, measure and benchmark the performance of networks and key network services.

As the quality of student Wi-Fi services can vary dramatically, depending on how busy or congested systems are, it is also vital that end-to-end internet services are measured continuously. Only when KPIs are continuously measured throughout the day and their values aggregated over time, can reliability metrics for any given period be accurately established.

This objective can be cost-effectively achieved by deploying client monitoring devices – remotely controlled, virtual technicians – that can then be connected to a cloud-hosted measurement and scoring solution.

Epitiro is an innovative system that will monitor and report on speed, service availability, accessibility, reliability, and application performance to ensure student Wi-Fi services meet the highest possible performance standards.



## SPOTLIGHT ON **scion**

**As a leading provider of student living facilities that operates to the highest standards, Scion is committed to ensuring fast and reliable internet access for the tens of thousands of students living and learning in their facilities.**

“At Scion, we are constantly striving to improve on the resident experience and internet plays a huge role in that experience. A great internet experience is essential to overall resident satisfaction.”

Scion is a company that is defining the future of student living. The company has been focused on the student residential experience, both on and off campus since 1999. With responsibility for 58,000 beds across 58 markets in 30 states, they understand life on campus and the critical role that fast and reliable internet access has for students. That's why they are using EpiTiro agents to shine a light on Wi-Fi and Ethernet performance, 24/7, 365 days a year.

The agents will continually report back objective performance data to both Scion and their Managed Service Provider (MSP) partners – as viewed from the customer perspective. This helps them to set standards and internet performance goals across their portfolio of high-quality properties.

“At Scion, we are constantly striving to improve on the resident experience and internet plays a huge role in that experience. A great internet experience is essential to overall resident satisfaction.

“With EpiTiro agents constantly monitoring our networks, we are able to measure our residents' and connected clients' internet experience. This information allows us to make better decisions and gain insight into our networks where we previously had none. EpiTiro also allows us to stay on top of performance issues and gives us unequivocal data we can use to uphold our SLAs with our service providers.”

**David Mullenix, VP of Information Technology, Scion**



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