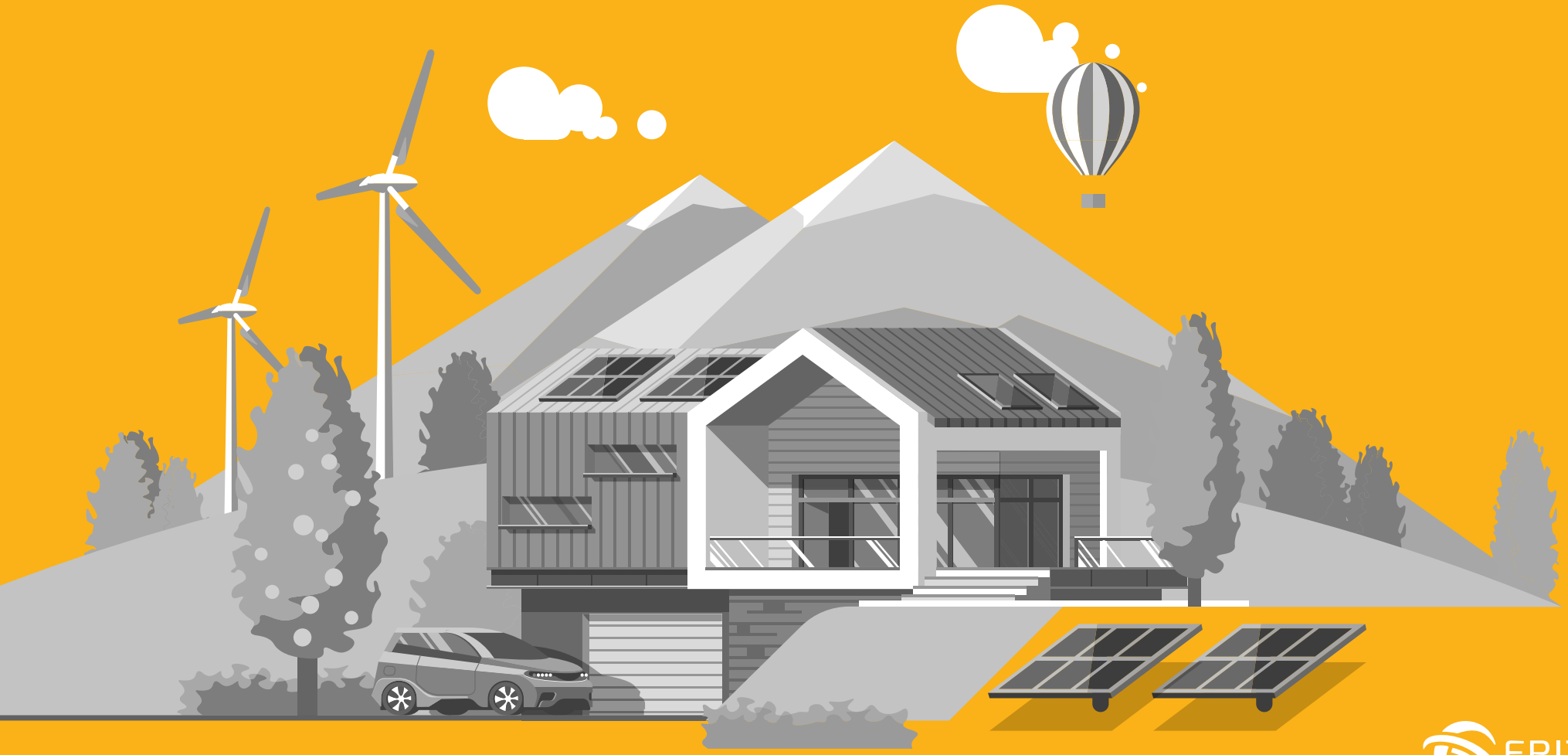
Realizing rural Wi-Fi ambitions

How to ensure optimum Wi-Fi connectivity for your most remote, rural customers



EPITIRO

Although the goal of many rural hospitality businesses is to offer an escape from the hustle, bustle and stresses of modern life, remaining connected can still be a vital prerequisite for holidaymakers, leisure seekers and adventurers.

Whether you're running a campsite, holiday park, open farm or outdoor adventure center, the challenges of providing fast, reliable Wi-Fi services in remote or rural locations, covering large geographical areas, can often lead to guests being left disappointed.

The following guide outlines seven key steps to help service providers overcome the connectivity hurdles and ensure that Wi-Fi standards are not compromised.

1

Are you being served?

Getting internet service to remote, rural locations can be a difficult and often expensive problem for service providers. Broadband signals must go through many junctions, switches and other equipment, costing time and money. Moreover, if you happen to be the only customer, the end-user costs can't be shared.

Broadband services in such areas can also be negatively impacted by outdated, inadequate or limited infrastructure.

In many cases, businesses will be located considerable distances from their local telephone exchanges, resulting is slower speeds, whether connections are standard ADSL (asymmetric digital subscriber line) or FTTC (fiber to the cabinet). This issue will be compounded where older, slower technologies are used in rural exchanges.

All available broadband options should consequently be considered to ensure that, subject to cost, the best possible user experience is achieved.

To summarize, the most common broadband solutions are as follows:

Standard ADSL broadband

Delivered over standard copper phone wires, ADSL has the widest availability, and will usually represent the cheapest option. As expectations and connectivity demands rise however, it will often prove inadequate. Speeds can vary considerably, and in remote areas in particular, they will often be slower than many users have come to expect.

Fiber broadband

On paper, this is the fastest solution with broadband delivered by fiber optic cables. Both 'fiber-to-the-cabinet' and 'fiber-to-the-premises' (FTTP) services should be considered here.

Unlike FTTC, FTTP uses fiber optic cables not only to the cabinet but also from the cabinet to your business. Consequently, it tends to be faster than FTTC, but also more expensive.

Satellite broadband

Satellite broadband connectivity can be a preferred option when standard broadband is inadequate and fiber-optic broadband is too expensive or unavailable.

Supplied via a satellite dish, it is now an option for a majority of rural businesses across Europe and the United States.

Fixed wireless broadband

With this option, the broadband service is delivered into the business wirelessly, from a nearby base station, with providers installing a receiver at your premises.

This can be good choice if a stable, high-speed connection is available for the right price. Again, services can vary wildly and a clear line of sight is required between the receiver and base station.

Bonded broadband

Here, two or more standard ADSL lines are combined to create a single, faster one. If available, it will usually be offered by specialist providers and can be expensive. It is an option worth investigating, but if you're located in a slow broadband area, the speed increase may be negligible.

Cellular & 5G

In some situations, the cellular network can be used to augment, complement or provide back-haul traffic connectivity for Wi-Fi deployments.

Cellular in rural areas suffers from many of the same issues related to infrastructure costs and distance, but depending on your location and available service provider, a hybrid network consisting of Wi-Fi access points using cellular (preferably 5G where it exists) modems to connect to the internet can be a workable option.

2

Upgrade to Wi-Fi 7

Wi-Fi 7 (802.11be) represents the next evolution in wireless networking technology, with significant performance upgrades over Wi-Fi 6 and Wi-Fi 6E.

Offering faster speeds, lower latency and improved reliability, it is especially suited to high-demand and high-density environments, making it ideal for expansive rural settings.

Key features of Wi-Fi 7 include:

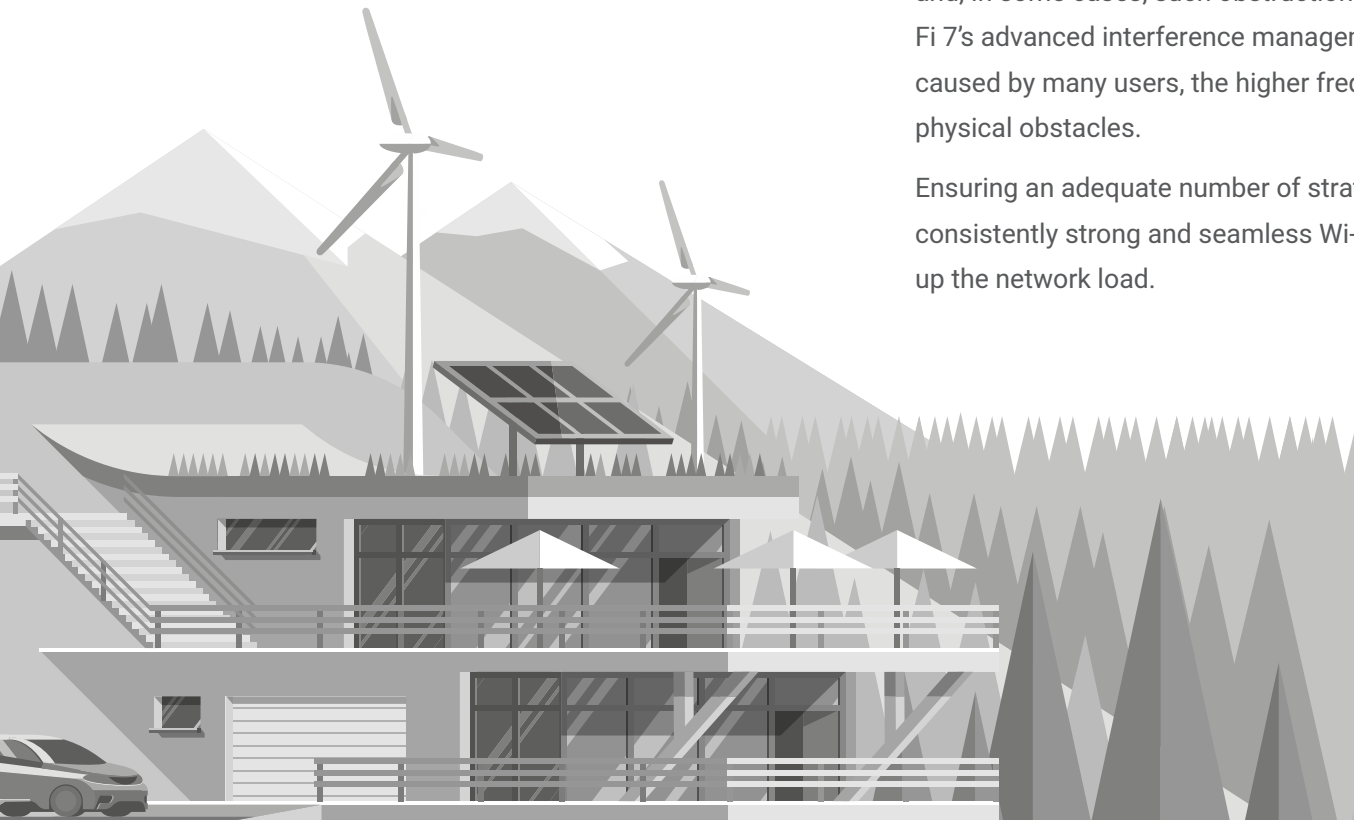
- **Multi-Link Operation (MLO):** Enables devices to connect across multiple frequency bands (2.4 GHz, 5 GHz, and 6 GHz) simultaneously, improving reliability and reducing latency.
- **320 MHz Channel Bandwidth:** Doubles throughput over Wi-Fi 6, allowing more data to flow, particularly important for bandwidth-intensive applications.
- **4K QAM (Quadrature Amplitude Modulation):** Enhances data rates by 20% compared to Wi-Fi 6, ensuring faster, more efficient connections.
- **Enhanced Interference Management:** Offers better performance in crowded environments, reducing network congestion.

Wi-Fi 7 can future-proof rural Wi-Fi deployments, ensuring that networks can handle next-generation applications such as video streaming, augmented reality (AR), virtual reality (VR) and the increasing number of IoT devices.

3

Strategic access point deployment

Site surveys and monitoring data will help determine the optimal access point (AP) locations to ensure proper spacing and adequate signal coverage to meet client density requirements in all areas.



Wi-Fi 7's Multi-Link Operation and wider channel bandwidth make strategic deployment even more critical, with these features helping maximize performance in challenging terrains.

Outdoor access points and wireless bridges should be mounted with a clear line of sight to one another, and at a height that makes their signals accessible to the majority of users. This will depend upon the prevailing landscape and built environment.

When met with trees, hills, power lines and other obstacles, Wi-Fi signals will invariably degrade and, in some cases, such obstructions can even act as a complete signal barrier. Although Wi-Fi 7's advanced interference management features can help mitigate connectivity challenges caused by many users, the higher frequency (6GHz) band is usually the most attenuated by the physical obstacles.

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.

4

Hardware designed for outdoors

Indoor access points (APs) will rarely be suitable for outdoor deployment, where they are likely to be exposed to storms, rain, moisture, dust, and more extreme temperature fluctuations.

Outdoor APs, hosting multiple, high gain, high receive sensitivity antennas, manufactured to withstand harsh environments, should instead be deployed.

For Wi-Fi 7 deployments, ensure APs are designed to handle higher power requirements and include robust ingress protection ratings (IP55–IP68), which will typically range from IP55 to IP68 to certify the level of water and dust protection.

5

The wireless bridge solution to extending networks

Wireless repeaters can offer an attractive, easy-fix solution to extending your Wi-Fi network. Wireless repeaters can offer an attractive, easy-fix solution to extending your Wi-Fi network. They can also have shortcomings however.

Because they bounce back router traffic, they create network congestion. Furthermore, the transmission quality of the wireless signal also diminishes every time it's repeated.

For some, a better option can be to establish a secure wireless link using two wireless bridges. By carrying the signal to a designated location in this way, significant speed loss can be avoided while access points are freed up to exclusively send and receive data to and from client devices.

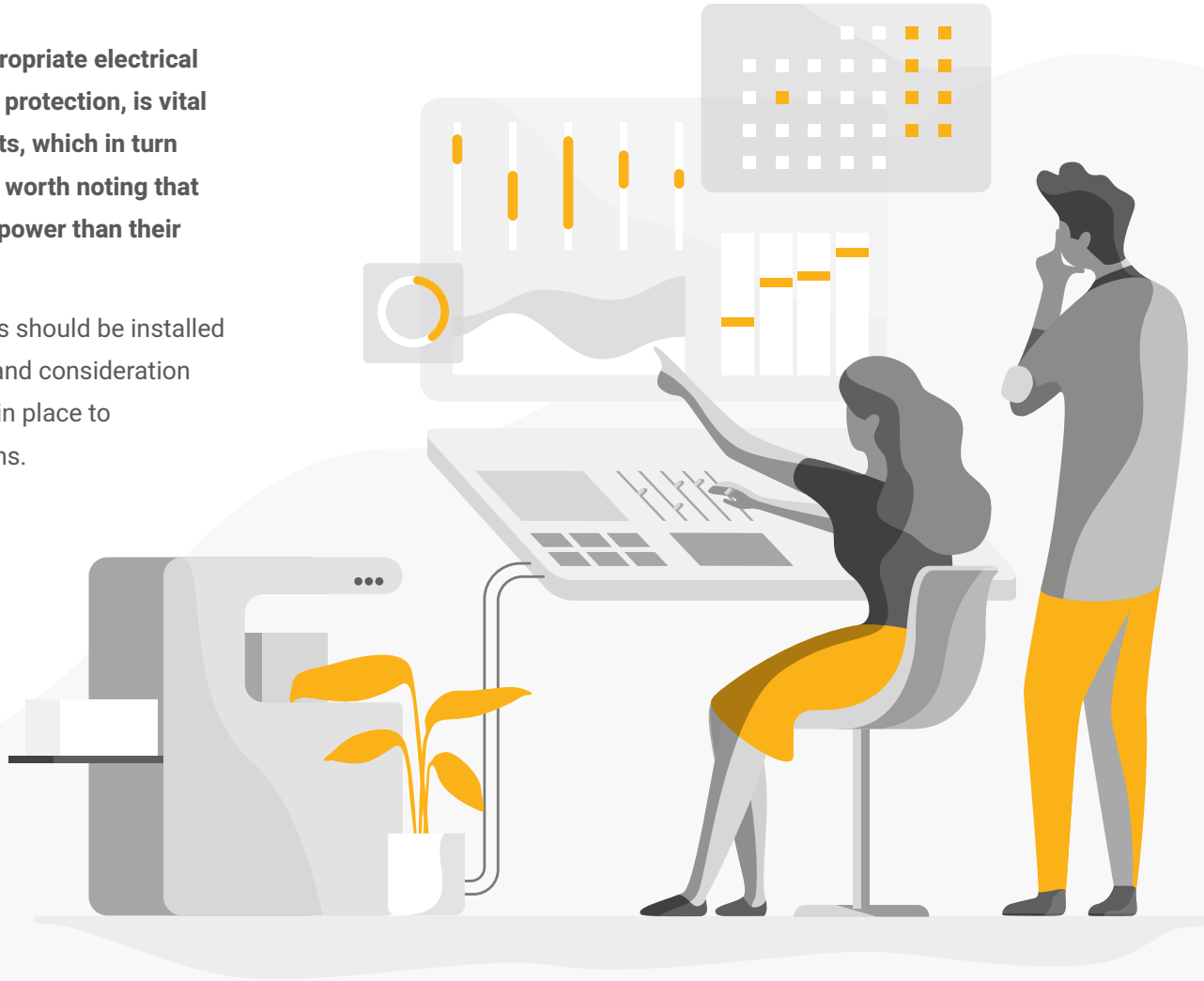
With 320 MHz channel bandwidth, Wi-Fi 7 offers greater efficiency in delivering data across wireless links, minimizing speed loss and ensuring consistent performance for end users.

6

The right way to plug-in

Ensuring that your Wi-Fi network has the appropriate electrical power supply, including grounding and surge protection, is vital to protect against power outages or brownouts, which in turn will cause inevitable connectivity issues. It is worth noting that Wi-Fi 7 APs can consume significantly more power than their predecessors.

From the outset, weatherproof electrical boxes should be installed where access points are due to be deployed, and consideration should also be given to putting infrastructure in place to accommodate future business expansion plans.



7

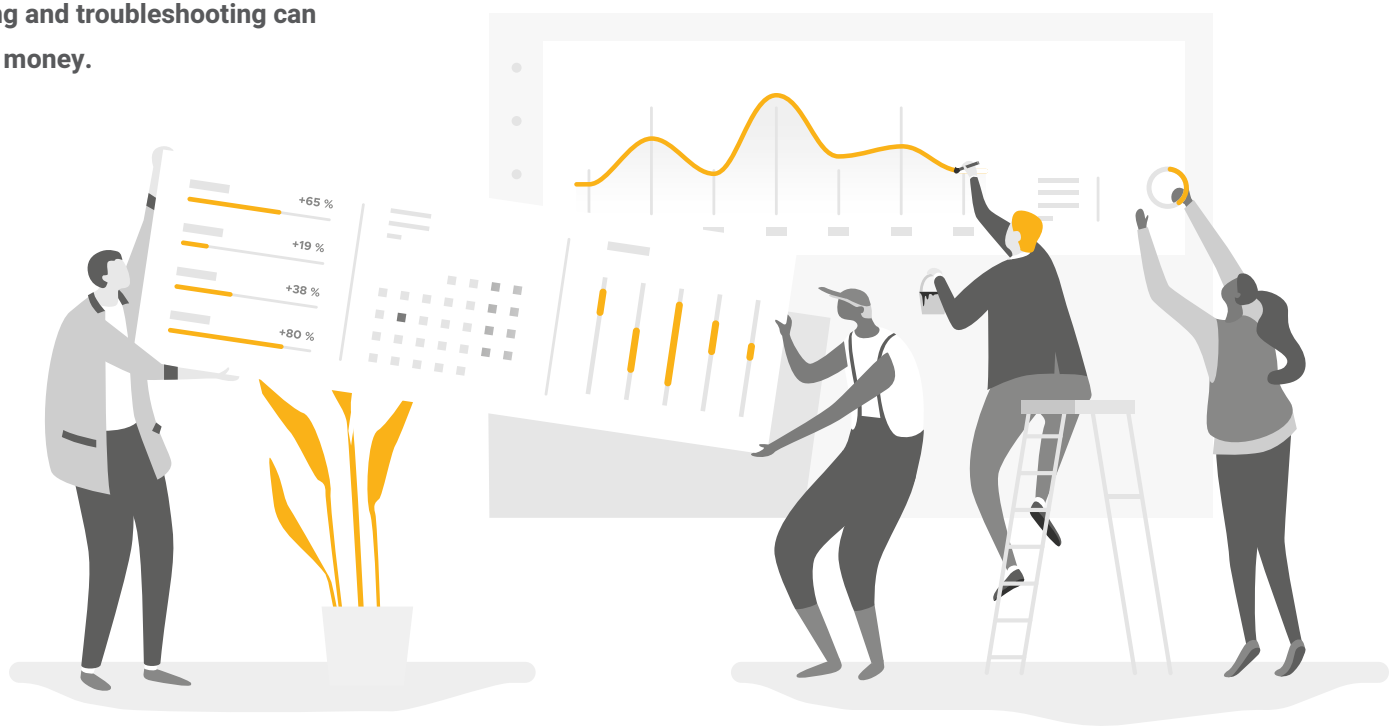
Maintenance, repair and cost of operation

When connectivity and network problems arise in far-flung locations, it can often prove difficult and expensive for skilled technicians or engineers to visit the site.

An internet monitoring solution that gives IT professionals remote access and control over network testing and troubleshooting can help save time and money.

Epitiro, for example, uses plug and play 'virtual agents' to continually measure and report on end-to-end internet services, including speed, service availability, accessibility, reliability, and application performance.

Technicians can set up performance alerts and drill down into detailed data intelligence to establish the cause of problems at the touch of a button, from a single, remote web interface.



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