



Gigabit Society.
The Way It Should Be.

ADTRAN

£5BN FOR FULL FIBRE BY 2025

“And we are once again going to believe in ourselves and what we can achieve. And like some slumbering giant, we are going to rise and ping off the guy ropes of self-doubt and negativity with better education, better infrastructure, more police, fantastic full-fibre broadband sprouting in every household,”

*July 22, 2019, Boris Johnson, UK Prime Minister.
"Prime Minister election victory speech"*



THE CHANGING LANDSCAPE OF TELECOM INFRASTRUCTURE

DRIVERS FOR CHANGE



NEEDS OF THE GIG ECONOMY



TELEHEALTH AND TELECARE



INTERNET OF THINGS



VIDEO. STREAMING. CONFRENCING.
GAMING. EVERYTHING.



IN-HOME EXPERIENCE

NEEDS OF THE GIG ECONOMY

The digital revolution has caused an explosion in the number of people working “gigs”! Access to high-speed internet was beginning to empower us to make a living on our own terms.

"Prior to 2020, about 4.7 million workers in Britain found themselves in this category – 1 in 10 workers was a freelancer."

The Guardian, 27 June 2019

Going forward, not only does teleworking look like it will continue to grow, now, the traditional concept of the office, for many, looks like it may die forever. With the right collaborative tools, supported by stable high-capacity broadband, workers can be extremely effective working remotely.





TELEHEALTH AND TELECARE

Nearly 75 percent of people in the UK go online for health information and advice. Additionally, 66 percent of people use a mobile health app to search for information on symptoms or medical conditions or attempt to connect with their physicians to get access to their records and medical tests online.

Adequate infrastructure is the first step needed to close the gap in the digitization of UK healthcare. Inadequate internet speeds, an overall lack of data sharing, and a lack of incentives to invest in digitalization are barriers to transformation. Reliable high-speed broadband must be made available to all patients if they are to make the most of remote-care services.

[1] Deloitte June 2019 report on "Shaping the future of UK healthcare,"

Peter Diamandis, author of *The Future is Faster than you think*, speaks of how the future of health care is about to be turned on its head. With the convergence of sensors (wearables), networks, and Artificial Intelligence (AI), the approach we take with health care will change forever. Rather than being a reactive engagement, the confluence of technology will enable health care to provide early detection of disease sooner. Broadband-enabled health as a service will underpin our desires to extend our longevity.

INTERNET OF THINGS

The Internet of Things (IoT) is made up of devices that connect to the internet and share data with each other. The range of potential devices is enormous, several of which can only be dreamed off in sci-fi movies today. Imagine a Gesture Control Armband that can read the muscle activity in your arms to give you touch-free control of technology. This is just one of many IoT applications that will come to bear in the not so distant future. Such IoT use cases benefit from low latency and highly reliable networks.

Communications networks are the foundation of how our societies function, how our environment is managed, and how our supply chains and production capabilities are automated. While many of the devices realizing this vision will be connected via wireless technology, that wireless network will only be an extension of the same fibre networks running our societies.

Business insider projects over 55 billion IoT devices will be in use by 2025, as compared to 20 billion in 2019.

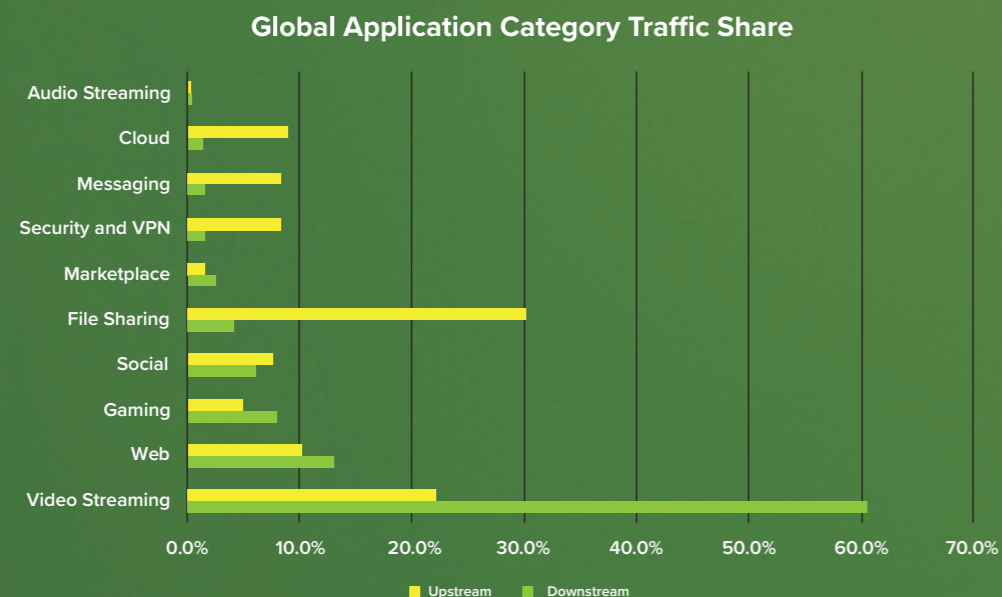


VIDEO. STREAMING. CONFERENCING. GAMING. EVERYTHING.

Netflix and YouTube are household names. The revolution they started in online video streaming has opened the door to a growing number of streaming providers, including Disney+, Hulu, Apple, Universal, HBO Max, Facebook Watch, DC Universe, Discovery, and more. These services are consuming our time and capturing our attention.

Additional cloud applications that are compounding the consumption of bandwidth include cloud recording UHD security cameras, VR streaming, cloud gaming, HD/UHD virtual reality applications, and, most recently, game steaming. Following the lead from Spotify and Netflix, PlayStation Now, GeForce Now, Project xCloud, and the new Google Stadia are just a few

of many cloud gaming subscription-based services. Popular titles like Destiny 2 on Google Stadia commands a sustained bandwidth consumption of 40Mbps downstream at 4K 60FPS video resolution per player in the home. Microsoft X-Cloud and Nvidia GeForce Now claim sustained bandwidth consumption of between 30Mbps and 50Mbps at 1080P 60FPS video resolution. The economics of virtual gaming consoles using lower-cost, cloud-based compute resources, coupled with the sustained income from subscription-based services being delivered on TVs of increasing size and resolution, will ensure that Neilson's Law, which states that a high-end user's connection speed grows by 50% per year.



Sandvine "The Global Internet Phenomena Report" September 2019

Along with a proliferation in the number of streaming service providers and video applications comes the advent of 4K and 8K resolution. As they go mainstream, a single 4K video will grow three-to-five times in size from a Full HD video, requiring about 15-18 Mbps, while a single 8K video will grow another three-to-five times in size from a 4K video.

As a larger proportion of people begin to work remotely, spending more time at home and relying more heavily on video conferencing and virtual meeting applications, the impact on upstream bandwidth is going to be especially critical. Operators will soon

be advertising not only downstream speeds but also upstream speeds, enabling users to interact and communicate with the network just as they would to get information from the network.

At home, people will need more bandwidth as long-form, large-screen, and bandwidth-heavy video conferencing applications require more symmetrical bandwidth to achieve high, quality versus social video on smaller screens. A consumer paying for a video service expects quality. If you fail to deliver on that expectation, the cord will be cut.

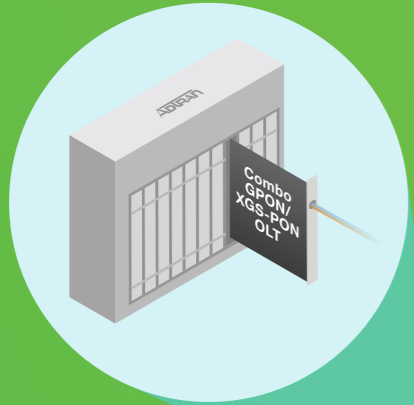
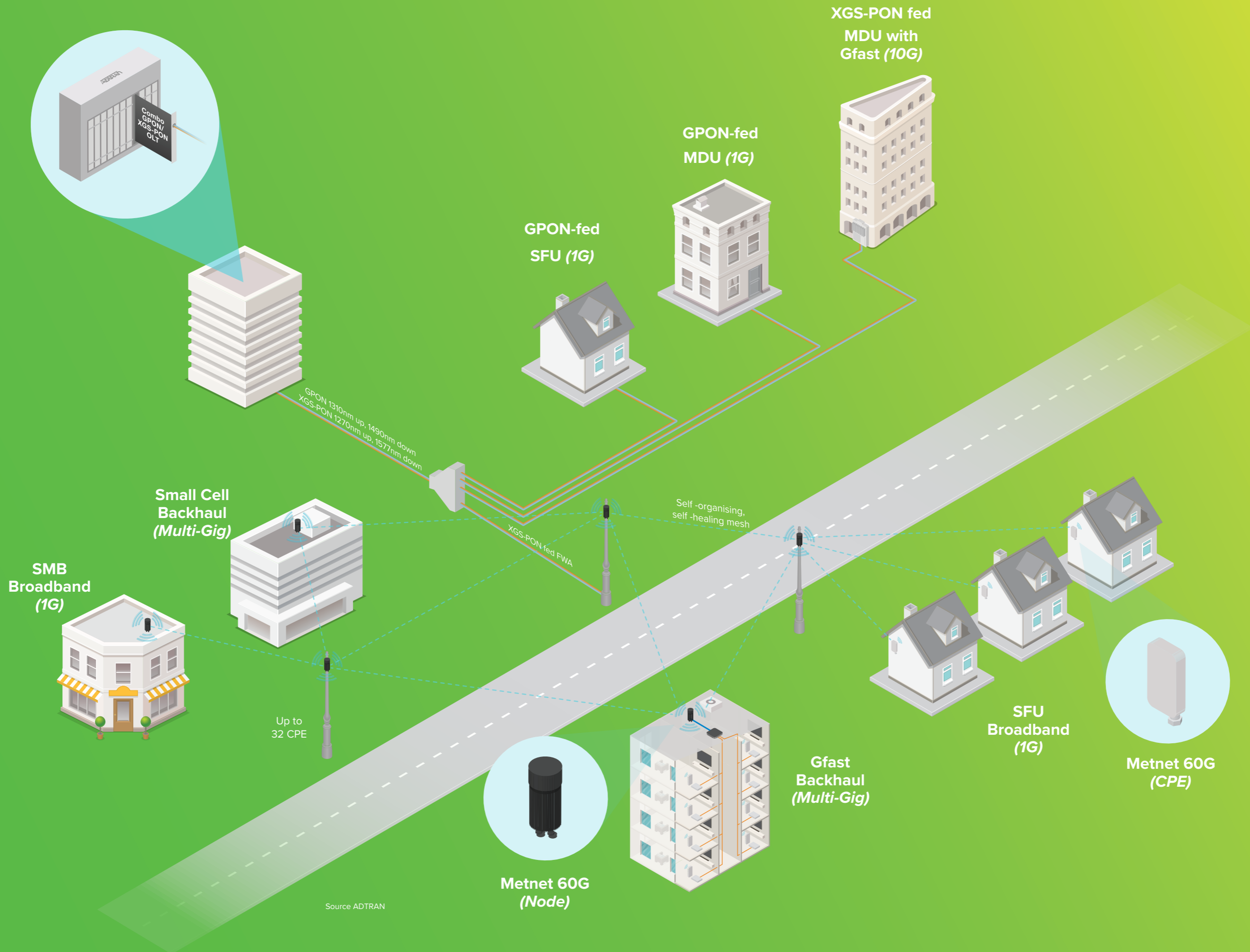
IN-HOME EXPERIENCE



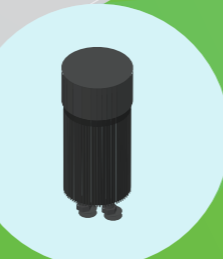
Source ADTRAN

Real Gigabit experience starts with in-home Wi-Fi. To provide a robust personalized experience that delivers the power of a Gigabit access network to the consumer's home, Gigabit Wi-Fi technology (Wi-Fi6) must be extendable to cover the entire home; whether it's Mum's sanctuary, Dad's man cave, the kid's bedrooms, or the family's favorite hangout spots, the Gigabit experience must be available throughout the home. This Gigabit experience, enhanced with real-time insight into devices, application performance, and network status provides operators with a global view of a customer's network, their behavior, and traffic patterns, and hence, enables them to plan network upgrades and automate intervention well before customers experience bottlenecks.





GPON 1310nm up, 1490nm down
XGS-PON 1270nm up, 1577nm down

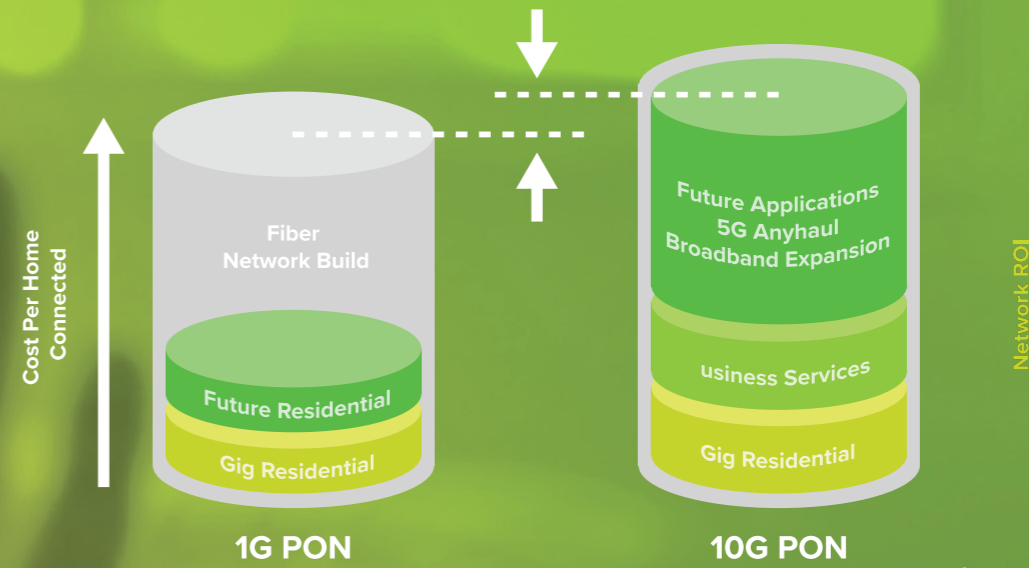


HELLO, FIBER NETWORKS!

How do we bring these applications to life and meet the bandwidth needs of end-users with speed, agility, and reduced capital and operational burden? The first step is bringing fibre as close as possible to the enduser.

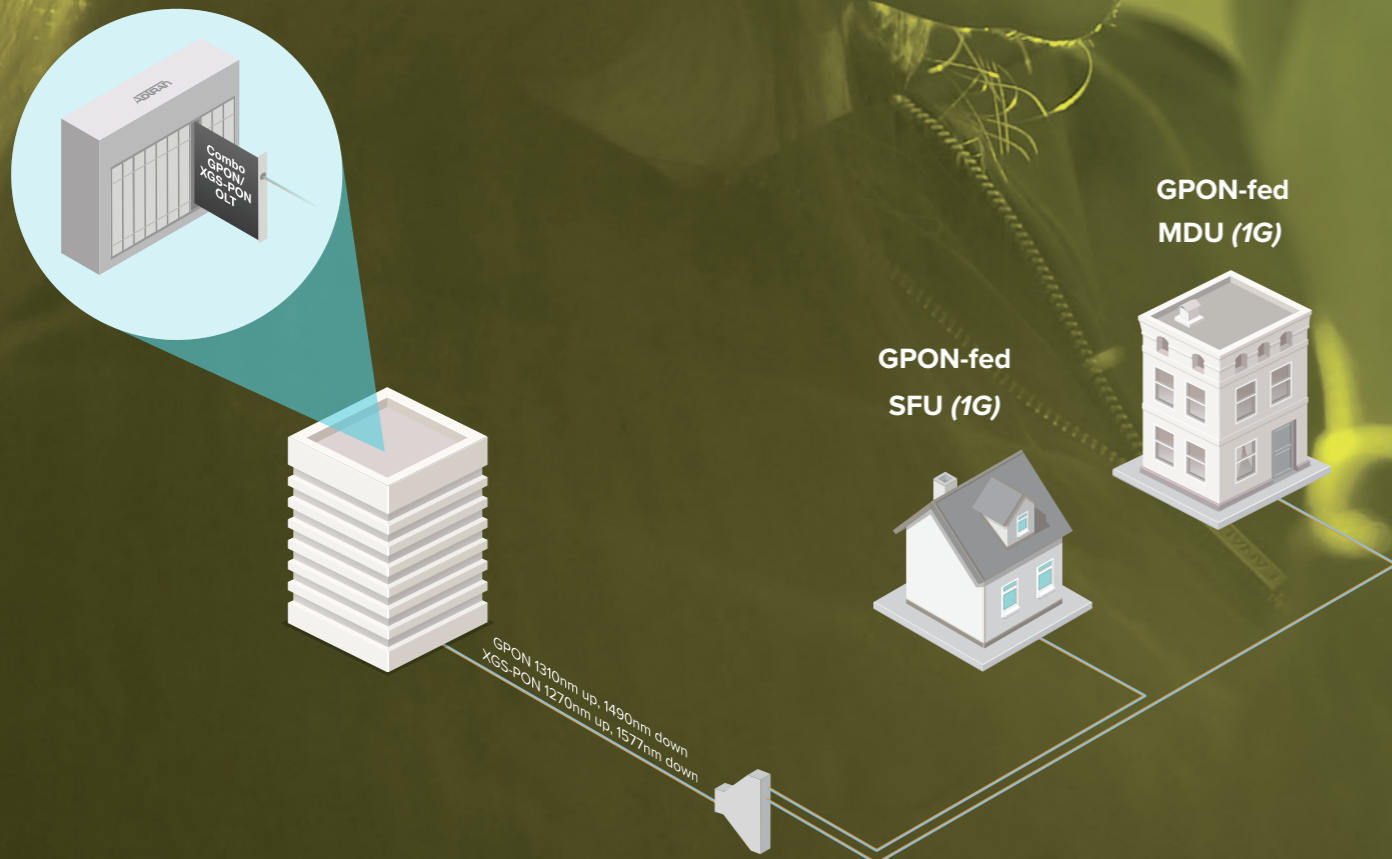
Comparing 1G and 10G PON

Marginal Cost Delta → Material Revenue Add



Source: ADTRAN

However, as mentioned before, not all fibre networks are equal. The technology used to light the fibre has a big impact on the applications the network can support. As we move toward a world that will have 8K video and game streaming within the next couple of years, we must ensure the technologies we are using to light our fibre assets can cope with not only the predicted growth but also unplanned surges in demand. Equally important will be the location of Content Delivery Networks and cloud computing resources, where edge compute location can be the difference between life and death for cloud gamers.



Source: ADTRAN

WE MEAN FULL FIBRE

Full-fibre networks that run fibre to the customer premises, also called Fibre-to-the-Premises (FTTP), provide the most versatile networks. The use of PON technology makes it possible to split a single fibre off a single optical interface to serve many customers at distances up to 20km or more.

With market offerings like Physical Infrastructure Access (PIA) from Openreach, the efficiency with which operators can now deliver Gigabit services over 10Gigabit PON networks has never been greater. Utilizing existing network assets and augmenting them with 10G PON Optical Distribution Networks massively accelerates the timeline from planning to connect the customer. So, if fibre is the answer, what is the question, right? If only it were that simple.

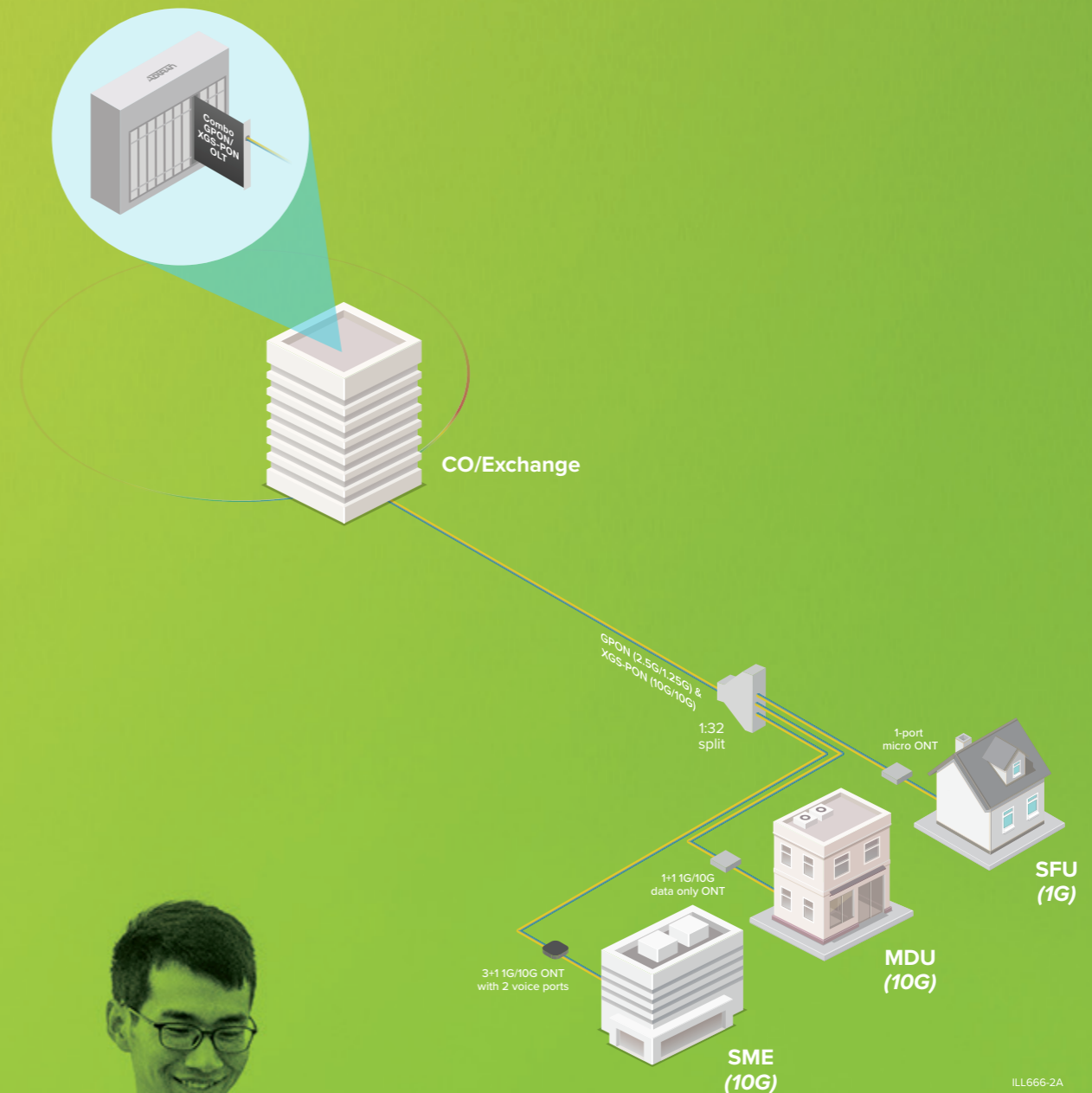
Let's break this down further to understand why technology choice is so important and why XGS-PON strikes the best balance between cost, capacity, and investment protection.

XGS-PON has 10 Gigabits of bandwidth available in every fibre strand connected to an optical interface on the access switch. XGS-PON is symmetric, which means that there are 10 Gbps of

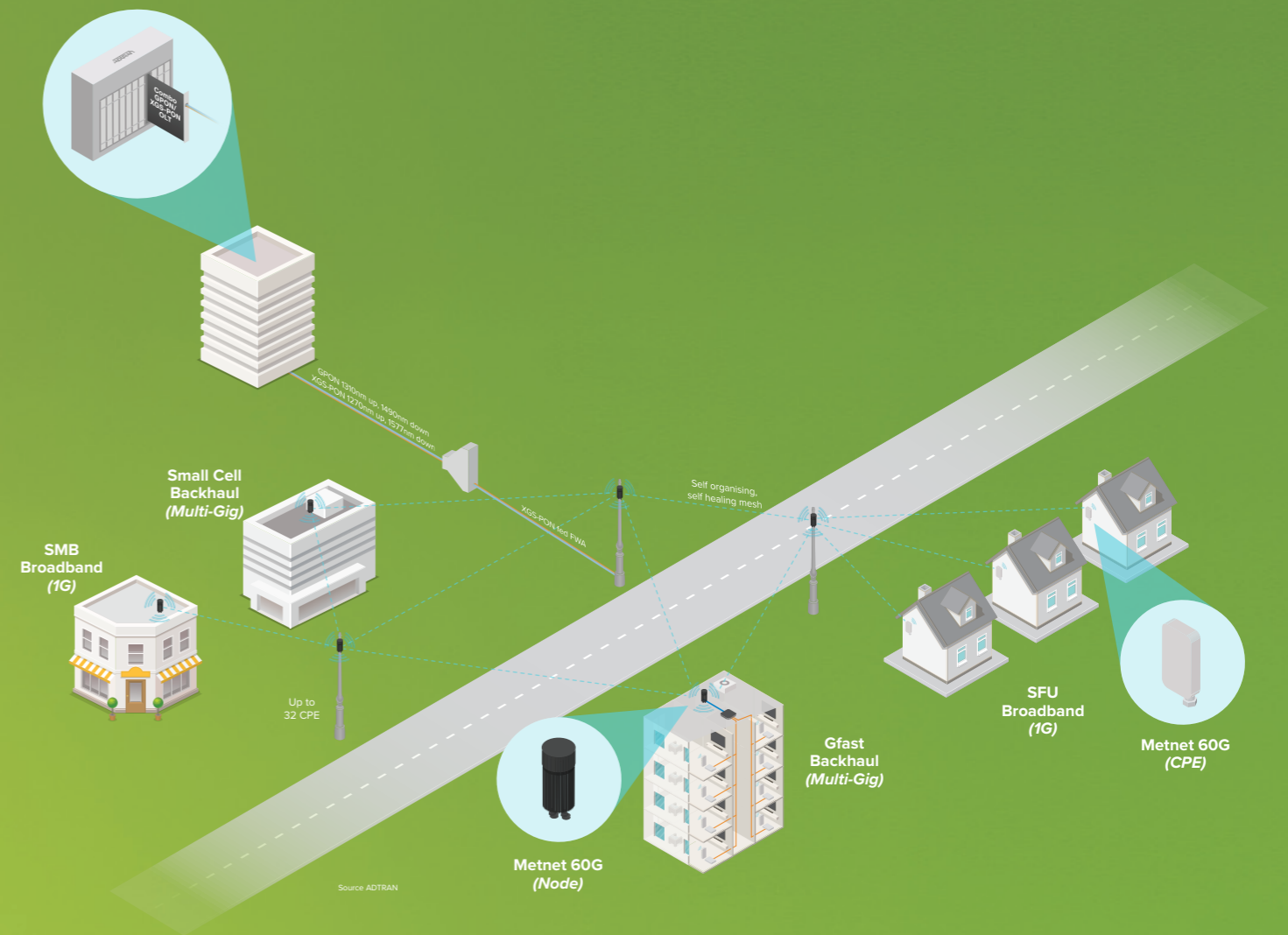
bandwidth available for both upstream and downstream simultaneously. While an XGS-PON-enabled network could be used to deliver 10Gbps services, that would be analogous to existing GPON networks delivering 2.5Gbps services. Just because you can do this, does not mean you should. Where GPON networks have delivered excellent investment returns for services in the 100Mbps to 250Mbps range during the last two decades, XGS-PON will carry the torch forward for the Gigabit society. Services ranging from 250Mbps to multiple gigabits will become the de facto offerings at different points over the next 20 years.

With XGS-PON, over 2,000 customers can be served out of a single rack unit space, increasing the subscriber density of aggregation equipment to an all-time high. The following diagram illustrates the power and potential of XGS-PON over GPON.

Hence, XGS-PON offers the scale, reliability, and flexibility to realize the future of converged residential and business networks supporting tactile internet, critical cloud applications, massive IoT, and 5G.



FIBRE EXTENSIONS, EXTENDING THE EXPERIENCE TO EVERYONE



Going full-fibre all the way to the end customer may not be feasible. Ultimately, delays in securing a full-fibre deployment could mean that some never live long enough to realize the benefits of a Gigabit Society.

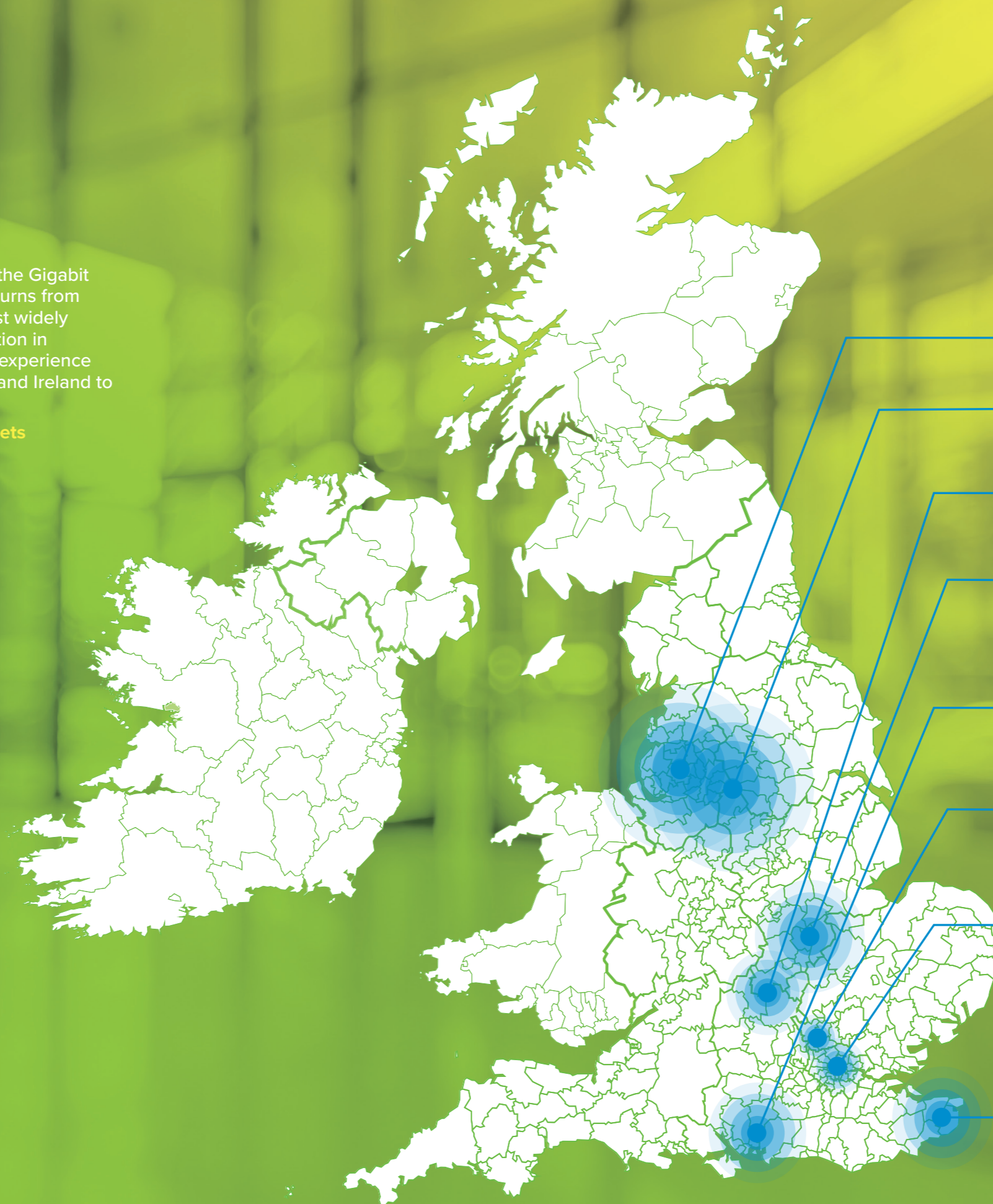
Since there is no need to lay fibre to homes, Gfast offers the shortest time to market and with the lowest upfront investment. Fibre can be run to the basement of a building, or a distribution point outside the building, from which Gigabit broadband services can be provided over existing copper.

Another alternative is to provide Gigabit-ready broadband services over the air. That brings us to a hybrid approach of using fibre with fixed wireless access to deliver fibre-like speeds over a mesh network utilising the 60GHz unlicensed frequency band. The multi-Gigabit wireless extension solution can be utilised for both fixed wireless access and backhaul infrastructure for in-building Gfast access. When these mmWave fibre extensions are connected directly to an XGS-PON-enabled fibre network, they serve as a logical wireless split in the network.

ADTRAN

ADTRAN innovations advance the Gigabit Society goals and maximize returns from fibre investments. With the most widely deployed XGS-PON FTTH solution in Europe, ADTRAN has the right experience and the right people in the UK and Ireland to ensure your success.

Learn more at adtran.com/altnets



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Swish Fibre

Zzoomm

Connect Fibre

toob

Hey! Fibre

Community Fibre

Trooli

Source ADTRAN



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