

A NEW DIGITAL INFRASTRUCTURE FOR LONDON

Transport for London
case study



■ Boldyn Networks is partnering with Transport for London to digitally connect one of the world's oldest underground transport networks and enhance connectivity across London.

The project is establishing a backbone of connectivity across the UK's capital, creating a smarter and safer London for people to live, work and thrive.

The most advanced network of its kind

Boldyn Networks (Boldyn) was awarded a 20-year concession by Transport for London (TfL) in June 2021 to deliver high-speed mobile connectivity on the Underground.

Through the installation of digital infrastructure throughout the city, Boldyn is helping to improve connectivity both above and below ground. Bringing wide reaching socio-economic benefits to local businesses and communities to drive forward London's ambition to become a truly smart city.



£1bn

Over the course of the 20-year contract, Boldyn anticipates investing in excess of £1 billion to support the Connected London vision, aiming to make London the best-connected city in Europe. This will enhance mobile coverage, increase capacity, and improve connectivity across the city's boroughs.

Boldyn's expert team are working with TfL to use the transport system to establish a backbone of connectivity across the capital with a city-wide integrated communications network. The new high-capacity fibre network will accelerate London's transformation into a truly smart city.

The engineering challenge



The London Underground is an iconic network, with some sections more than 160 years old. The Underground consists of 11 lines covering 400 km, serving 272 stations and carrying around 4 million passenger journeys a day. About 45 per cent of the stations have platforms which are underground, meaning phone signals are not available.

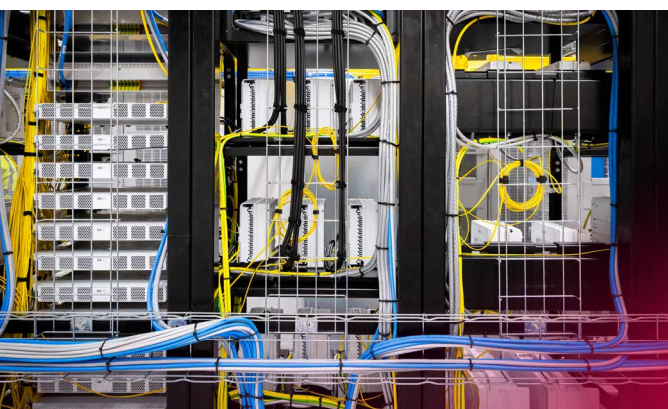
To avoid service disruption, most of the underground engineering work happens during a four-hour window in the early mornings. Our installation partners employ around 200 people, accessing stations and tunnels every night and working in as many as 30 stations at one time.

To fit the work into such a short timeslot, Boldyn is using innovative tools and methods, such as remote equipment monitoring, to enable improved efficiency and deliver the project.

Working in confined, complex spaces such as the London Underground presents challenges. Special care is taken to avoid installing equipment in areas prone to damp or overheating. The solution to all of this is highly detailed planning. From using 3D visualisation to show how installation will work and the best locations for equipment, to carefully installing the right equipment enclosures and durable, dust-proof network components.

This ambitious project also presents numerous engineering challenges due to the historic and spatially constrained environment of the Underground. Maintaining both environmental conditions and aesthetic integrity is essential. The tunnels, many of which date back to the 19th century, are some of the oldest and narrowest in the world. Each Tube station is unique and heritage stations such as Covent Garden, Piccadilly Circus and South Kensington require special care.

One of the key strategies employed in this project is the 'neutral host' model. This shared infrastructure model allows all UK's mobile network operators (MNOs) to use the single set of equipment, removing the need to install their own. This approach reduces overall costs and significantly minimises environmental impact. In addition, TfL benefits from a simplified relationship with a single infrastructure provider.



Upon completion, Boldyn will have built nine edge data centres across the city, housing key MNO equipment and eliminating the need for excessive technology on TfL premises. Mobile signals will be directed from these sites along fibre routes deep underground, avoiding bulky equipment in stations or tunnels.

An advanced backbone of connectivity

The city-wide communications network will bring together a range of capabilities supported by a backbone of new digital connectivity. The new digital fabric for London will offer significant digital services:



High-speed mobile services

High-speed 4G and 5G mobile services provide continuous, uninterrupted cellular coverage in ticket halls, platforms, and tunnels across the Tube network. This system is highly flexible and capable of supporting future upgrades to 6G and 7G.

Coverage will extend through 400 km of tunnel pairs sections, requiring the installation of 770 km of leaky feeder cable, a 50mm diameter radiating cable mounted at train window level to provide signalling to passing trains. These special cables provide mobile signal coverage underground.



137 stations, platforms,
400 km of tunnel pairs
and 2,000 km of cabling

A total of 8,500 low-power radios and 9,000 high-power radios will be deployed to boost the signal, with additional high-power radios installed mid-tunnel to amplify signals in longer tunnels of around 1,600 meters.

The network is being built using the latest technology, including digital distributed antenna systems (DAS) and the latest generation of fibre switches and IP routers.



The Emergency Services Network

The network will also host the new Emergency Services Network (ESN). The ESN, when fully operational, will give first responders immediate access to life-saving data, images and information in live situations and emergencies on the frontline.



New fibre backbone

Boldyn has already deployed 120 kms of fibre stretching across London. Installing a high-speed fibre network across London's boroughs will create a foundation for smart city and Internet of Things (IoT) applications such as air quality and traffic congestion monitoring. This will also allow for improvements to public safety and the use of new smart solutions to address challenges faced by Londoners.

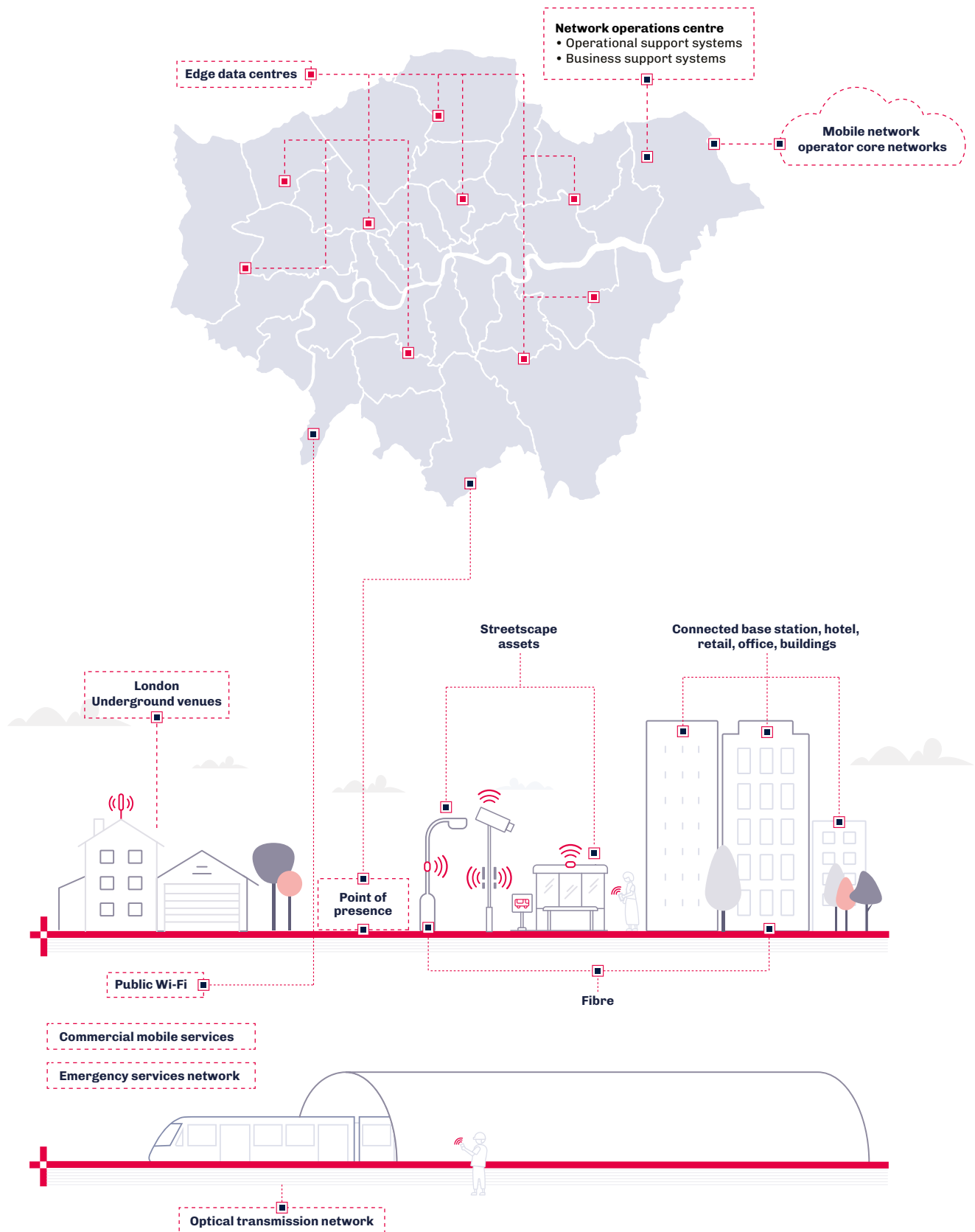
By bringing fibre directly into London's neighbourhoods, the infrastructure will help to bridge the digital divide, giving homes and businesses equal opportunities to access the reliable, high-speed internet that is essential for education, work, healthcare and social connectivity. It will ensure that underserved communities, who often have limited access to fast broadband, benefit from these advances.



Small cells and IoT network

Using TfL's over 80,000 streetscape assets, such as lampposts, CCTV, and bus shelters, a small cell and IoT network is being deployed to help mobile networks cope with the large data demands of customers in dense urban areas. The small, low powered cellular radio units are being installed at street level to enhance mobile coverage and capacity to across London's busiest high streets.

The backbone of London's connectivity





The benefits

Benefits to London

Travellers are already benefiting from uninterrupted high-speed mobile connectivity as they move around the London Underground.

Commuters can catch up on work, access online shopping, stream content and stay active on social media while travelling. Connectivity on the move also allows people to stay in touch with friends and family as well as allow TfL's staff to assist customers with their journeys.

The Connected London¹ project is also an opportunity for city boroughs. Boldyn is deploying a fibre network through TfL's underground tunnels and ducts, bringing fibre directly into London's neighbourhoods to improve digital connectivity and deliver significant social and economic benefits to residents, businesses and visitors. This new digital infrastructure will also significantly improve public safety, delivering vital improvements to the image quality and reliability of CCTV cameras and public buildings.

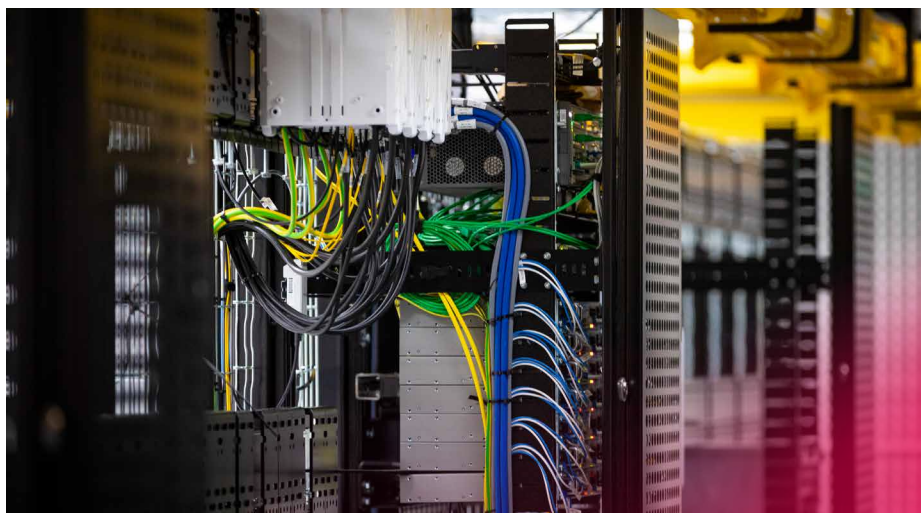
Leveraging TfL assets such as lampposts and bus shelters, Boldyn is helping to revitalise high streets with improved connectivity, supporting local businesses and communities. Improved connectivity not only improves public safety but also supports modern retail trends such as pop-up shops, market fairs, and Just Walk Out technology.

Benefits to mobile and fixed operators

Boldyn is building and operating a neutral host solution that all fixed and mobile operators can share – a far more efficient, cost effective and environmentally friendly approach than each one installing and operating their own network.

Boldyn's infrastructure is future-ready and can incorporate new technologies as and when they become available. Establishing a high-capacity fibre backbone throughout London, bringing fibre-optic cables underneath homes and buildings, will enable fixed providers to provide fibre backhaul throughout the city.

The demand for connectivity is only going to grow and Boldyn is building the network with scalability in mind.



1. [Connected London | London City Hall](#).

Connected London: creating the smart city of the future

Neutral host infrastructure has a huge role to play in supporting ambitions for the capital to be the best connected city in Europe.

London's Tube tunnels will be used to provide full connectivity across the city, bringing fibre directly into its neighbourhoods. This will create new opportunities to bring gigabit speeds to homes and businesses while promoting digital inclusion.

The project will also help unlock new economic and social opportunities for communities across London. The network can connect to small cells and street assets to increase mobile coverage and capacity across the capital's high streets, harnessing the power of 5G and IoT to deliver citywide improvements and future growth.

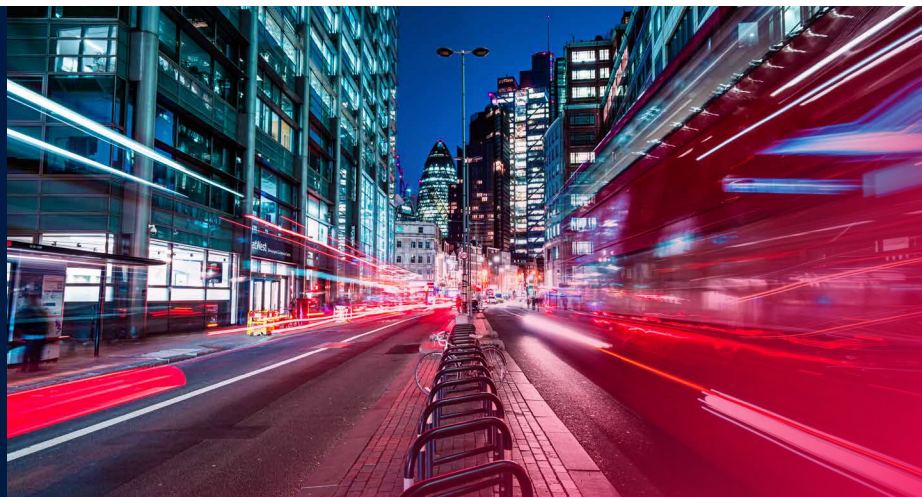
For public transport, insights from IoT sensors and Wi-Fi data provide a real-time overview of current conditions, allowing operators and public bodies to improve services and respond flexibly to customer needs—often even anticipating them. Adding more sensors to tracks, vehicles, and other assets will enhance these capabilities, enabling smart applications like predictive maintenance, and overcrowding management. Further integration of camera data, ticketing systems, and digital signage will offer even more detailed data, enhancing safety, reliability, and the overall user experience.

Boldyn is committed to helping London become a greener, cleaner city. By mounting air quality sensors on existing infrastructure, like lampposts, IoT data can be continuously collected at a hyper-local level.

By leveraging London's

80,000+

street assets—such as CCTV poles, lampposts, and bus stops—Boldyn will drive improvements in areas like traffic congestion, public safety, and city planning, while also helping regenerate the high-streets.

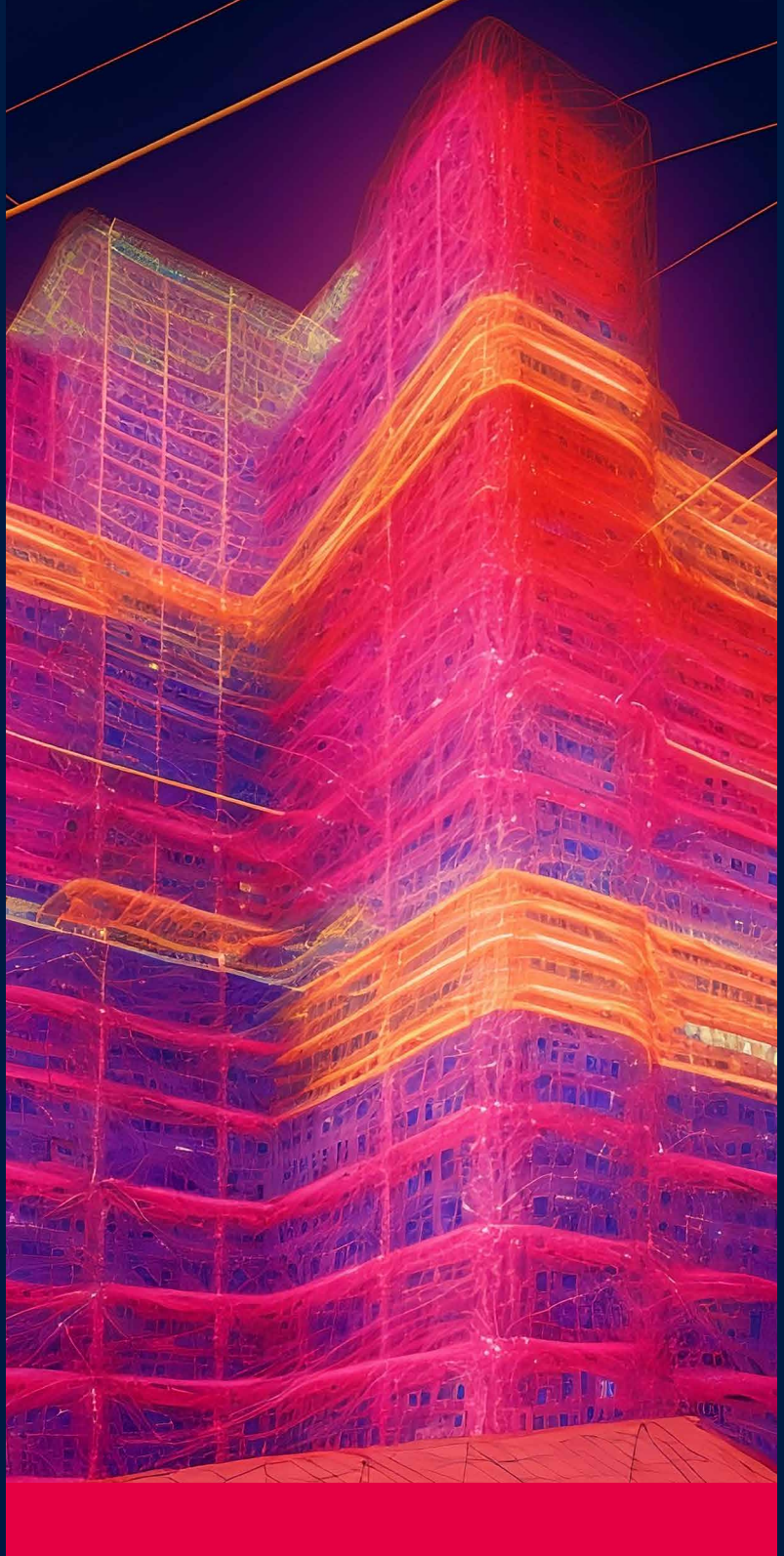


Once an air quality sensor network is in place, authorities will be able to use the data to make informed decisions on how to manage foot traffic, vehicle numbers, and their impact on air quality levels.

Communities of all sizes will benefit from Boldyn's technology, which enhances public services, reduces costs, and improves residents' quality of life.

Creating smart communities is about having the right infrastructure in place to help individuals, businesses, and local areas thrive—ultimately laying the groundwork for London to become a truly smart city.

1. <https://www.london.gov.uk/half-london-homes-now-able-access-full-fibre-broadband-after-mayors-work-boroughs-and-providers>



Boldyn Networks delivers the advanced shared network infrastructure needed for a smart, inclusive, and sustainable future. From interconnected transit to venues, and enterprises to smart cities, we enable new possibilities in the way people live, work and play.

We don't just talk about the future. We exist to help build it. Creating the foundation from which a better collective future can be imagined.

To learn more visit boldyn.com/uk-ie