INDIGO

Secrets of a Successful
Fibre Rollout

The combination of a deep talent pool and data-driven technologies make Indigo the partner of choice for designing and building leading-edge fibre-optic networks.

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Optimise the Opportunity

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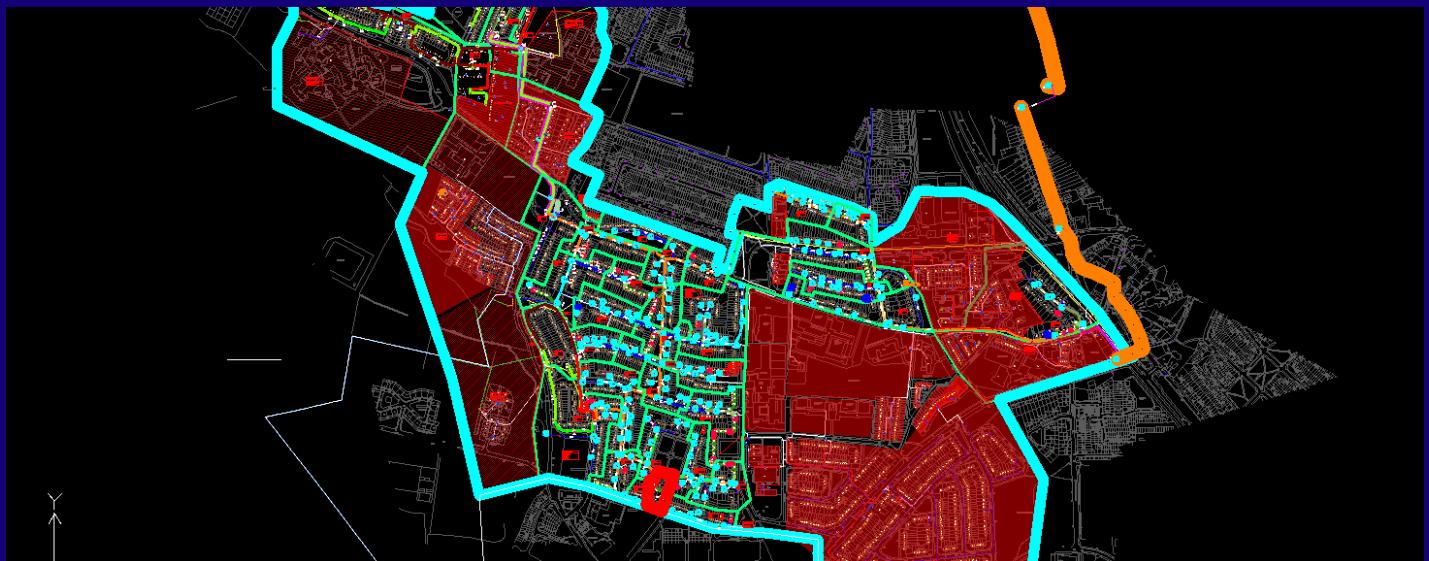
Full-fibre gigabit networks are recognised globally as the solution to increasing bandwidth demands from businesses and consumers. The European Commission is looking to them as the foundation for achieving its 'gigabit society' by 2025, a transition that is already underway in Southeast Asia, the Middle East and North America.

Fibre is the opposite of gold, once it's in the ground its value rises significantly. It is expensive to manufacture but light to transport, and once deployed it is future proof. Unlike legacy copper networks, there is no signal-to-noise degradation or electric power requirement – fibre is passive and provides the optimal use of duct and rack space, enabling gigabit connections that can carry voice, data and video.

Incumbent national operators in many countries have led the move away from copper wire to fibre-optic cable, but the pursuit of market competition by governments has encouraged a new wave of AltNets and CSPs (Communication Service Providers) to enter the market. The most valuable opportunity for fibre is frequently in the rollout of Metropolitan Area Networks (MANs) where **one fibre 'pipe' can be split and distributed in point-to-multipoint deployments covering multiple businesses and hundreds of households.**

In the race to connect users and businesses, CSPs and AltNets need to be circumspect in their choice of network infrastructure partner – a poorly executed design and build could escalate costs and impair the quality of the final service. They also need to make provision for continual improvement, identifying an infrastructure partner that can support the network going forward.

Benefits of Experience

At Indigo, we provide a full turnkey service, an end-to-end deployment model that has developed over many years and evolved to stay ahead of the technology curve. Right now, that means delivering FTTx (Fibre To The 'Anything') projects – typically cabinet, home or premises – on time and in budget. We are as comfortable with point-to-point as point-to-multipoint, using GPON and XG-PON fibre technology, always aligning to best-practice design and deployment.

The difference with Indigo is our attention to detail. We know from experience that project successes hinges on iterative processes that start with a sound business case, move through survey and design, and culminate in build, delivery and ongoing support. We provide a unique combination of data-driven processes and on-the-ground skills, wrapped in agile and 'right first time' techniques, fixing issues and snags as they happen rather than risk paying a higher price at the end. Our Network Operation Centre (NOC) is available to provide 24x7x365 support and a pathway to continuous improvement for the lifetime of the network.
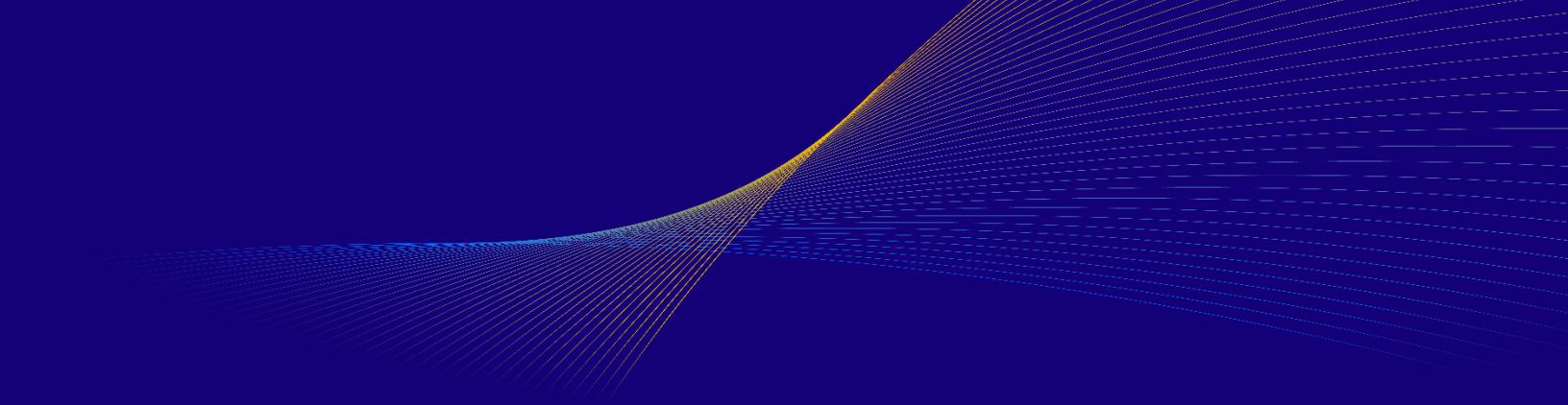
While we have the full capability for end-to-end delivery, we can also step in at any stage of a rollout – survey, design, build. We can also provide network monitoring and maintenance services, delivered as a managed service. Optimised fibre networks are always the outcome, enabled by hard-earned knowledge and practical experience.

02

From Survey to Design

From Survey to Design: Delivering on the Business Case

After a CSP/AltNet has completed a fibre network feasibility study, made the business case and won the tender, it is the responsibility of the survey and design specialist to deliver on the plan and hit on all the technical requirements while staying in budget.

The technical scope will depend on if it's a greenfield, brownfield or overbuild project; architecture and materials will be determined by the target (cabinet, home, premises) and environment (multi-dwelling, open residential, rural). Key project principles must be established at the outset: making sure site activity complies with Health &

Safety regulations; that appropriately qualified personnel are available as needed; that the inventory of tools and equipment is in place.

The biggest change in network infrastructure rollout in recent years is the use of data inputs and outputs throughout. New technology has been embraced by Indigo and we use cloud services to transfer data from remote in-the-field devices to desktop applications running in our planning offices. The results have been transformational for HLD (High Level Design) and LLD (Low Level Design) alike.
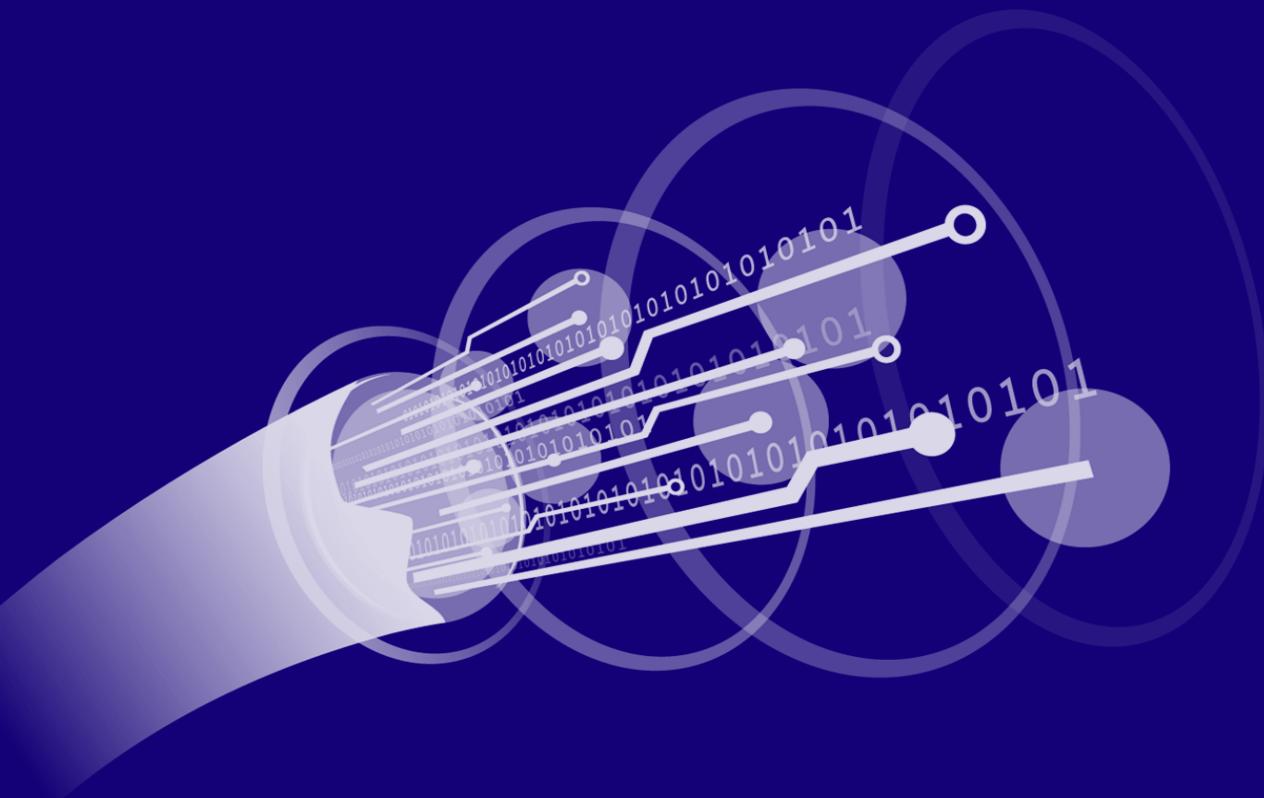
Stage 1: High Level Design

In Indigo's experience, the thoroughness of the on-the-ground survey and data collection phase is integral and critical to project success. Get this piece right and costly snags are avoided that might emerge in the build and delivery phase. The initial outcome is to plan general design workflows, highlighting special considerations, risks and potential hazards.

The (HLD) starts with a review of the available desktop data and information to be able to prepare the high level survey plan. It consists of geographic information of streets, buildings (home counts) and existing infrastructure. It includes an area overview with property mapping, and where to locate the POP sites, feeder and distribution points.

At the HLD stage, risks and hazards are designed out and the preliminary health and safety plan is produced. We flag any potential issues and blockers. We organise and attend any site meetings with key stakeholders.   We consider all client challenges. With our experience and design led approach, we assist with establishing the most suitable build guidelines for successful project execution.

The HLD is available in a range of file formats to ease integration into existing customer tools and systems.

Stage 2: Low Level Design

More granular local surveys begin to explore and confirm the practicalities of the fibre rollout and inform the bill of materials, a detailed breakdown of what everything will cost. On the ground, iPads, RTK, height rods, range finders, and roll bars will be used to assess the work involved.
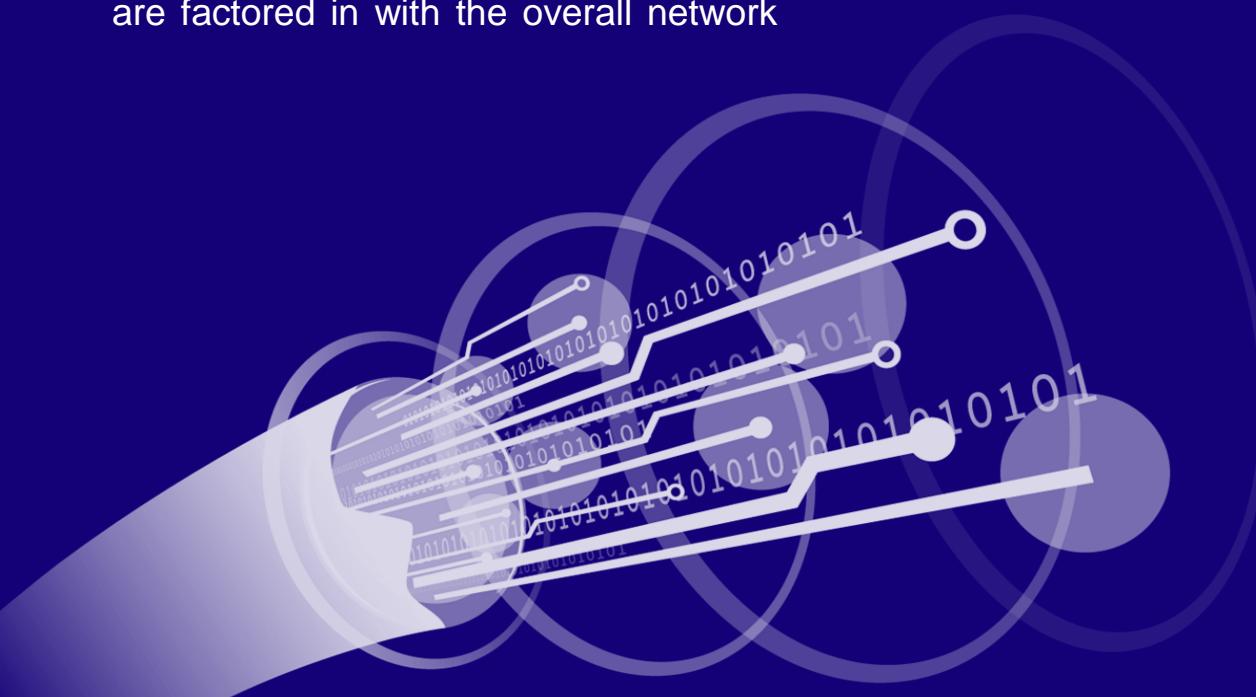
Maps and GIS (Geographic Information Systems), including Ordnance Survey and Google will be used along with existing utility, telco maps and schematics. Wayleave and boundary records are sourced to address any local planning issues.

Localised feeder and distribution routes are factored in with the overall network architecture; site inspections look at overhead/underground options.

Physical considerations include:

➢ Chambers

➢ Splitter cabinets

➢ Poles/ducts/trenches

➢ Drop closures

➢ Rights of ways

➢ Terminals

Indigo expertise in acquisition, wayleave and consenting will influence decisions on overhead/underground installations and hybrid combinations. Informed by performance and planning compliance, we have the skills to identify the best distribution route and most appropriate methods of connectivity for every environment. This reduces build time and costs and is tied in with our SLAs (Service Level Agreements).

Our survey teams comprise multi-discipline skillsets, including engineers, property specialists, planners and builders. Our engineering expertise is augmented with leading-edge technology.

We capture data in the field using handheld devices, drones, 360-degree camera surveys, but rely on experience to identify potential risks. They will range from Gas Detection Units that could leak into a proposed chamber and poles that require trees to be cut around them, to multi-dwelling locations that will need a separate feed and a rethink in how the fibre is spliced.

Survey data is meticulously captured in the field on preconfigured forms using handheld devices. We combine the data with public records as we plan where to position cabinets, explore options for repurposing existing infrastructure, and how best to splice the fibre.

Data-Driven Benefits
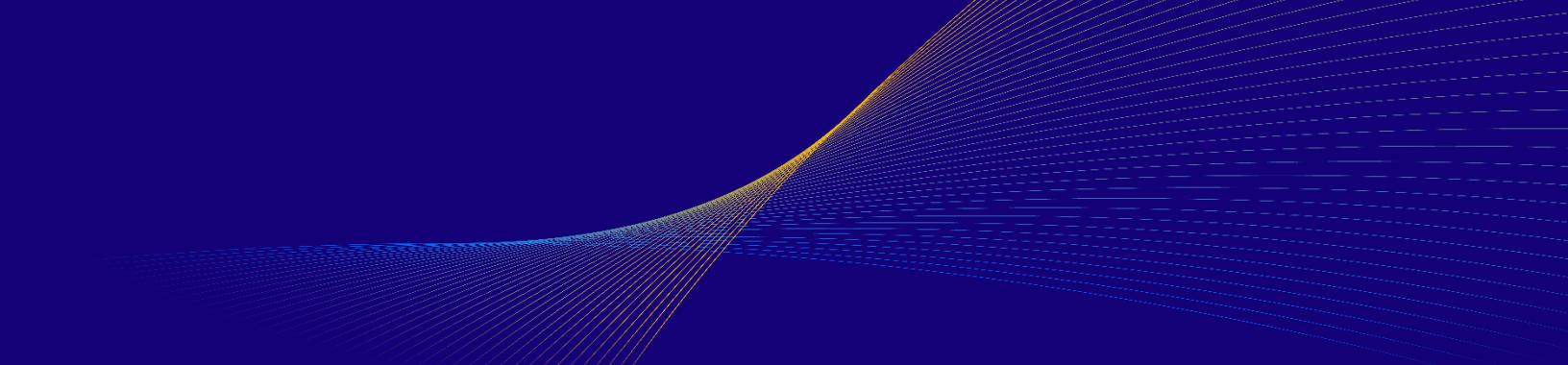
➢ Desktop assessments using field data reduces operational expenditure

➢ Swapping structures out virtually identifies compliance issues earlier

➢ Providing a single data source of site designs enhances asset management

➢ Access to centralised data improves decision-making

➢ Remote access to data speeds up survey and build processes

03

From Design to Build

From Design to Build: Mitigating Risk while Staying in Budget

Indigo's pursuit of 'right first time' design has been integral to success in projects that involve many moving parts. The client is constantly kept in the loop and we make iterative changes on each step towards validation. The endgame is to mitigate risk and hit project milestones that will ensure the timely delivery of a network that is fit for purpose in terms of quality, performance, compliance and cost.

Through a tried-and-tested combination of HLD and LLD, we arrive at an optimum build plan. The caveat is that even the best survey and design work can still run into problems as the rollout from access nodes to premises begins. Duct and cable work account for 60-80 percent of the capital costs of a fibre rollout. Get it wrong and it's easy to go over budget.

We encourage CSPs and AltNets to use Indigo as a one-stop turnkey provider because we keep the channel open between design and build throughout the life of a project. By working from a single data source, we enhance asset management, improve project decision-making and accelerate time to value realisation when the network goes live.

Indigo engineers are on standby and available to go onsite and troubleshoot if any revisions or changes are required during the build. With a foot in both design and build camps, we mitigate the risk of overrun and delays. Issues arise when plans are executed that we can diagnose and resolve faster using 'live' in-the-field applications.

Technical Challenges

Optical fibre has technical advantages over traditional communication lines, but it also presents technical challenges for the engineers deploying them. Our multi-vendor field engineers are fully accredited and skilled at working hand-in-hand with project management teams. They ensure every build maintains the integrity of the design. The collective goal is to implement networks as quickly possible, minimising delays while maximising infrastructure resilience.
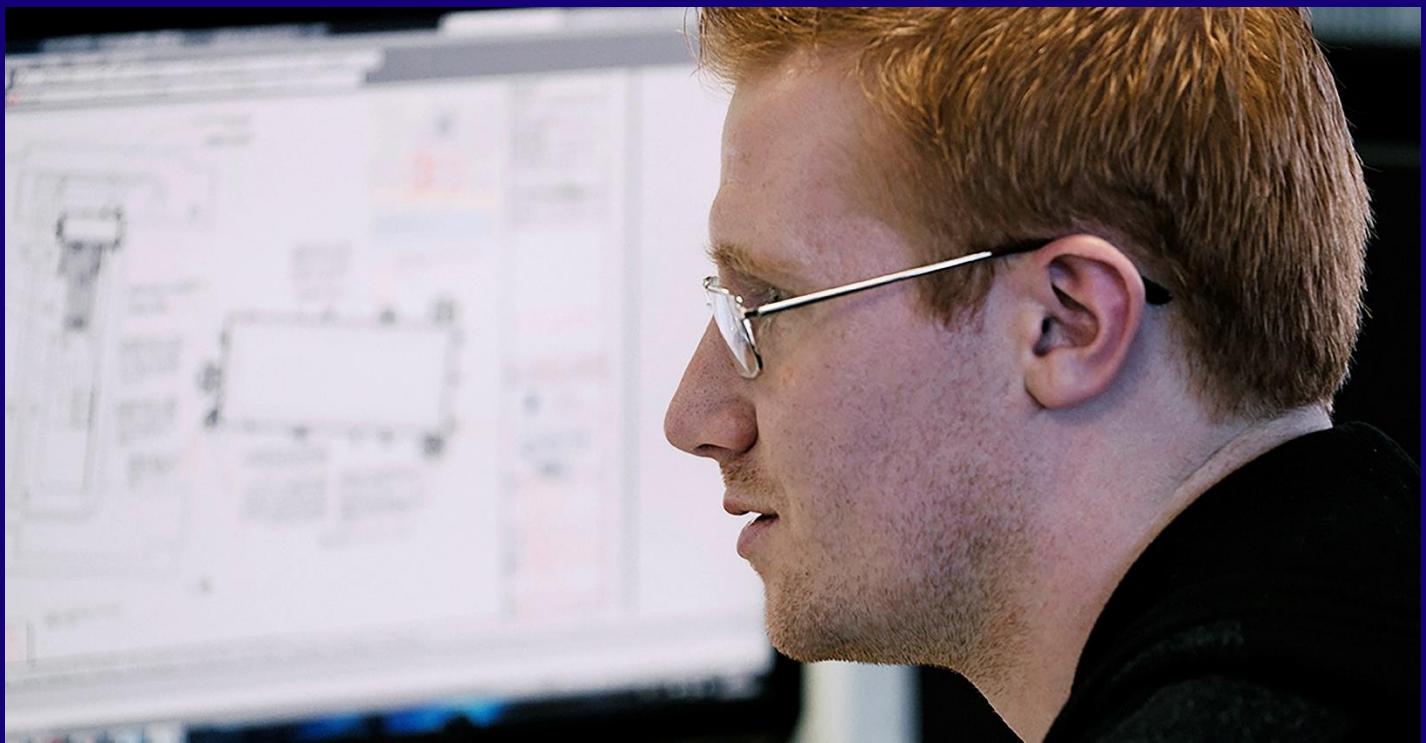
Indigo build teams are expert in the minutiae of fibre installation:

> Aerial/underground; pole/ducts

> Optical distribution racks

> Microduct bundles

> Cabinets/chambers/manholes

> Fibre selection/ splicing/ maintenance

Versatile skills are needed to blow cable into microducts, or fit equipment to high-rise multi-dwelling units. Detailed splicing schedules serve thousands of premises from a single fibre cable. We have skills that span new and legacy networks, enabling our experienced field installation and commissioning teams to build out projects that increasingly rely on hybrid technologies. We also offer network de-installation/de-commissioning solutions to provide fast and efficient migration paths.

Upskilling our people is core to what we do and why CSPs and AltNets trust us. To keep ourselves at the leading edge, we liaise with network infrastructure vendors, take early collection of new hardware for evaluation by our experts. By the time it's commercially available, we're up to speed with the technology. Where necessary we supplement inhouse skills with contracted resources. We have many years of experience in recruiting and managing teams, overseen by highly qualified project managers.

Consistency and Quality

Design revisions and inaccurate planning are the principal cause of poor network builds. Simple processes help eradicate the risks. Consistent symbology in design will eliminate confusion in the build, for example, where lines, points and polygons are used to indicate planned and existing features in outputs. By the rigorous adoption of a universal language, Indigo smooths the transition from design to build with every component clearly marked and understood.
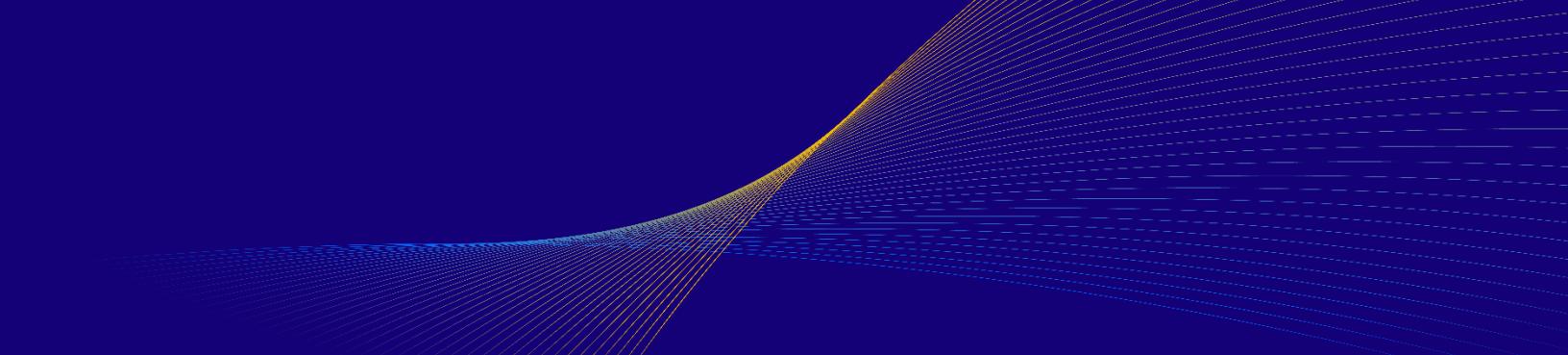
Indigo leverages customised digital tools to reduce operational expenditure, which means quickly solving problems and turning around any re-designs as soon as possible. When build work is informed by data, on-site engineers can look at other options if the first plan is thwarted. Solutions to a chamber that turns out to be congested, for example, could be solved by knowing where a bespoke drop solution could provide an alternative route.

Embedded in the culture of our company is the notion that quality counts above all else. Our employees know that adherence to the highest standard of engineering work and the best possible outcomes is Indigo's number one priority. We would rather get it right and a little late than wrong and on time. In practice, our 'right first time' approach means we deliver on time with infrastructure optimised to meet all the project deliverables.

# 04
Adding Value at Different Points
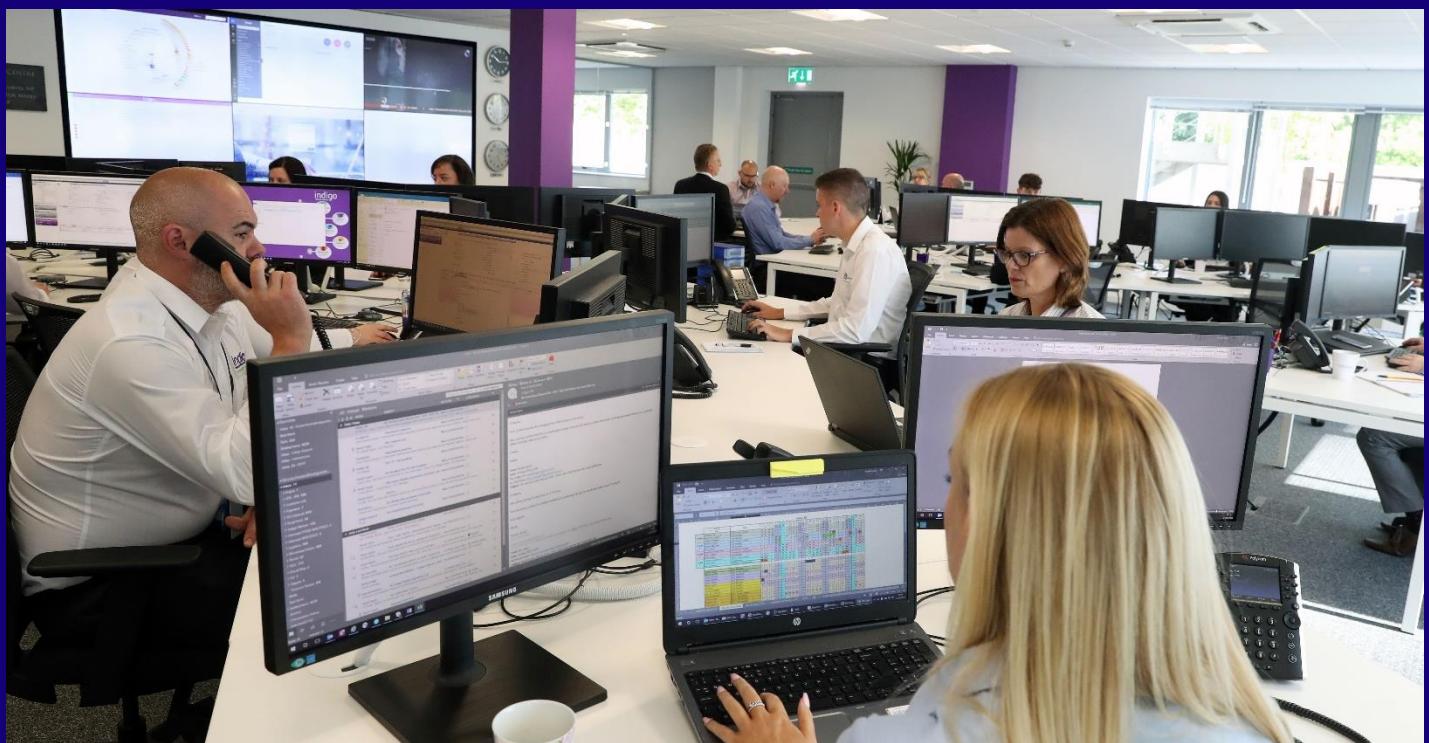
Adding Value at Different Points on the Fibre Journey

Indigo will engage with CSPs and AltNets at any point on their fibre project. We have even provided consulting services at investor stage, before a consortium is formed and a tender bid submitted.

With Indigo selected as a one-stop supplier and single point of contact, CSPs and AltNets are ensuring a seamless transition between design and build phases – a hand-over that becomes more perilous when two or more companies are involved. Company cultures are inevitably different. Processes will not always align, and common methodologies may be harder to find.

While we always make the case for our end-to-end turkey services, where design and build alignment accelerate times to completion, we recognise that some CSPs have existing partnerships or methodologies predicated on using multiple service providers.

The good news is that we can step in at any point and add value. Historically, we started in survey and design and evolved into build and support when clients kept coming back to us to resolve problems with contractors. Today, we might just as easily be contracted to build and asked to work retrospectively on someone else's design because gaps in the plan have emerged.

Managed Service from our NOC

Indigo's end-to-end capability can also be extended to a managed service, providing monitoring, maintenance and upgrades for network operators that ensures continuous improvement. Our purpose-built NOC is the first point of contact when a problem arises, and our proactive approach means engagement starts much earlier.

We use leading-edge tools and processes to identify issues before they disrupt services. As network experts with turnkey knowledge, we have always been strong in diagnostics and fault-finding. Our 24x7x365 operations and multi-vendor engineers can provide on-site support in hours or the next day, depending on the Service Level Agreement (SLA).

Certified to the highest standard ISOs, compliance with local Health & Safety standards is guaranteed. We use best-practice processes and quality management systems to stand over our fault resolution, spares management and other support services.

From design and build to ongoing management and continuous improvement, we like to think the case for Indigo is powerful and compelling.

About Indigo

Over the past twenty years we have grown our competencies to become a one-stop shop for multi-vendor build requirements. Operating in over 90 countries, we work with owners and operators of distributed networks to install, test and optimise fibre optic and wireless infrastructure as well as data centre environments.

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